

WATER PERMIT NO. 1959-1

Name of Applicant: **John Latham**

Address: **Box 18, Camp Crook SD 57724**

Phone: **605 430-8157**

Amount of Water Claimed: **56 acre-feet**

Total Acres: **NA**

Source of Water Supply: **runoff**

Water to be used for: **water distribution system**

County: **Harding**

Type of Waste Disposal System:

Location: **25 miles southeast of Camp Crook**

PRIORITY

Date Received: **4-11-16**

Application/License Fee: **\$ 700**

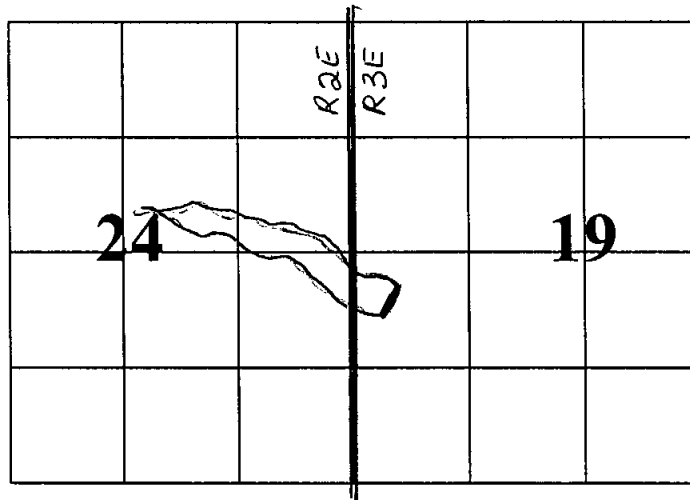
Corrected Application Received:

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

Remarks:

Diversion Point: **NW 1/4 SW 1/4 Sec 19-T15N-
R3E**

Water Impounded: **NW 1/4 SW 1/4 Sec 19-T15N-
R3E and NE 1/4 SE 1/4, S 1/2 NE 1/4 Sec 24-
T15N-R2E**



Depth of Well: **NA**

Well Driller:

Remarks:

Type of Map: **aerial**

Prepared by:

Reviewed and the Number Assigned on: **4-12-16**

By: **Karen Schlaak**

Notice of Hearing - date to intervene: _____

Mail to: DENR - Water Rights 523 E Capitol Ave Pierre, SD 57501-3182 ph. (605) 773-3352	No. <u>1959-1</u> (office use only) Hydrologic Unit <u>10130304</u>
	Basin <u>Mereau River</u> <u>605-375-</u>
	Newspaper <u>Nation Center News Buffalo</u> <u>3228</u>
	<u>Black Hills Pioneer - Spearfish</u> <u>605-642-2761</u>

RECEIVED

APR 11 2016

WATER RIGHTS
PROGRAM

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

Check use(s) of water:

☐ Municipal	☒ Water Distribution System	☐ Recreational	☐ Institutional
☐ Rural Water System	☐ Commercial	☐ Fish & Wildlife	☐ Geothermal
☐ Domestic (over 18 gpm)	☐ Industrial	☐ Other	

Type of Application:
(check one)

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

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

- Name to Appear on Water Permit John Latham
Mailing Address Box 18 (Address) Camp Creek (City) SD (State) 57724 (Zip Code)
Phone _____ Mobile 6054308157 Email jlangus@outlook.com
- Amount of water claimed _____ *CFS or 7 **GPM and 56 ***AF or _____ Gallons
Flow rate and volume are both required. (*Cubic Feet per Second) (**Gallons per Minute) (***Acre Feet - storage capacity of dam/dugout or annual use)
- Source of water supply Pond Water impounded: NW 1/4 SW 1/4 Sec 19 T15N R3E & NE 1/4 SE 1/4 S 1/2 NE 1/4 Sec 24 T15N R2E
- Location of point of diversion Inlet in dam NW 1/4 S 19 T 15N R 3E County Harding
(example - 3 wells in SW 1/4 NE 1/4 section 12-T104N-R53W)
If not a public water supply (e.g. municipal), will water be used outside of the area described above? ☒ Yes ☐ No
If "Yes," where will water be used? S 25 T 15N R 2E & S 18, 19 T 15N R 3E
(example - NW 1/4 section 12-T104N-R53W)
- County or counties where water will be used Harding
- Annual period during which water is to be used Yearlong
- 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)

Use inlet in Dam to gravity flow water to a cistern. Pump water from cistern through Livestock Water Pipeline to Watering Facilities on the ranch.

I, John Latham, the applicant, certify under
Name of Person Title (if applicable)

penalty of perjury that I have read this application, examined the attached map, and that the matters stated are true. I further certify, if acting on behalf of an entity or individual other than myself, that I am authorized to submit this application.

**SOUTH DAKOTA
WATER PERMIT NO. 1959-1**

Date of first receipt of application April 11, 2016.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 1959-1 to John Latham, Box 18, Camp Crook SD 57724 authorizing the construction of the dam and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 1959-1 authorizes impoundment of 56 acre-feet of water from runoff by repairing an existing dam located in the NW 1/4 SW 1/4 Section 19-T15N-R3E with water impounded in the NW 1/4 SW 1/4 Section 19-T15N-R3E and the NE 1/4 SE 1/4, S 1/2 NE 1/4 Section 24-T15N-R2E. The water will supply a livestock water distribution system located in Section 25-T15N-R2E and Sections 18 and 19 of T15N-R3E.
2. The water appropriated shall be used for the purpose of supplying a livestock water distribution system 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. 1959-1 is May 31, 2016.
5. The date from which applicant may claim right is April 11, 2016.
6. One-fifth of the construction is to be completed on or before December 1, 2018.
7. All construction is to be completed on or before May 31, 2021.
8. Water is to be put to beneficial use on or before May 31, 2025.
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. 1959-1 authorizes an impoundment with a storage capacity of 56.0 acre feet of water and sufficient water annually to maintain the water level to the outlet elevation.
2. Low flows as needed for downstream domestic use, including livestock water and prior water rights must be by-passed.

WATER MANAGEMENT BOARD

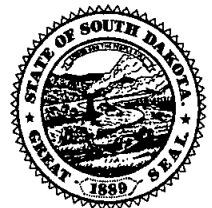
By: *Jeanne Goodman*
Jeanne Goodman, Chief Engineer

Water Rights Program

Department of Environment and Natural Resources

JUN 27 2016

date



Supplemental Information

(type or print)

1. Well Information

(check one or both as applicable) ☐ Drilling new well(s) ☐ Using existing well(s)

a) If new wells, how many ____ Have test holes been drilled ☐ Yes ☐ No Drilled by ____
(if yes, please provide copies of logs)

b) If existing wells, how many ____ Provide copy of log(s), if available. Drilled by ____

For either Existing or Proposed Wells:

c) Well Depth (required) ____ Depth to Top of Water Bearing Material ____ Depth to Water from Surface ____

d) Distance to nearest domestic well on applicant's property ____ 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:

NRCS
414 E Stumer Rd. Suite 700
Rapid City, SD 57701

b) Freeboard 3

c) Crest Width 12

Crest Length 1,085

d) Height 20.7

e) Primary Outlet Capacity 24.7cfs

If pipe, diameter 18"

f) Secondary Spillway Capacity 288.3cfs

Spillway Width 100'

g) X & Y Slope (e.g. 3 to 1 is a typical slope)

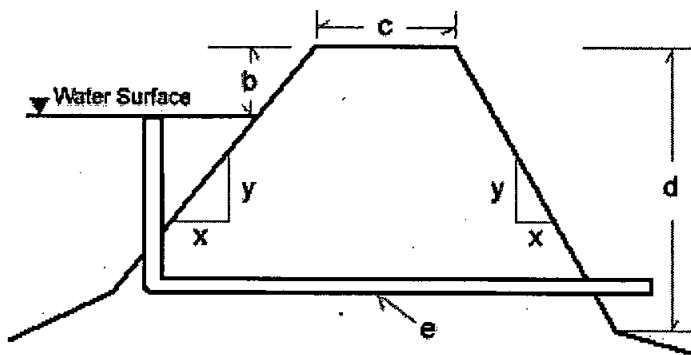
Upstream 3:1

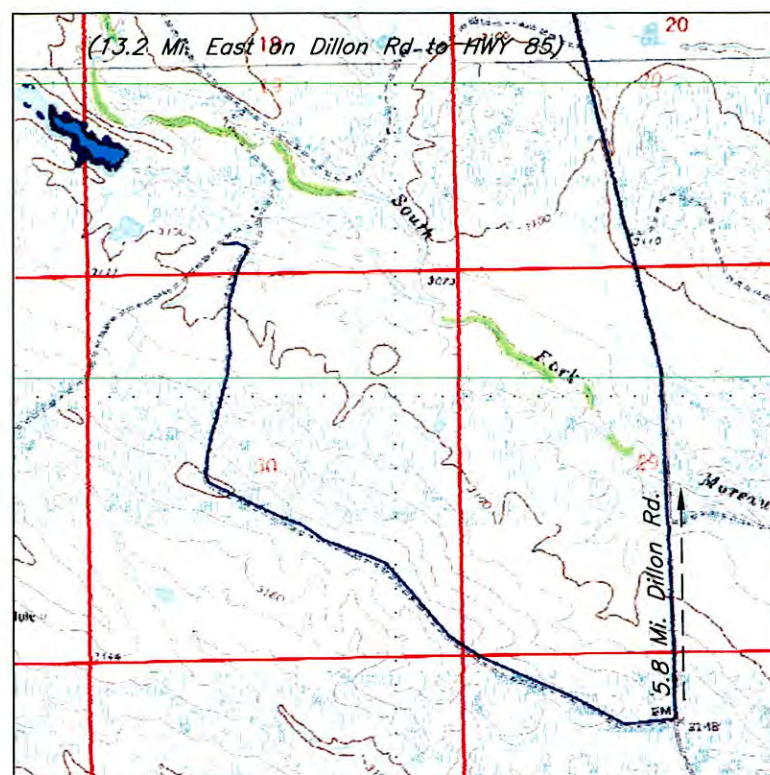
Downstream 3:1

h) Surface Area of Impoundment 11.2ac

i) Storage 56.0 Acre Feet

j) Drainage Area Above Dam 1,100.8 Acres





SW1/4, Sec 19, T15N, R 3E
Harding County, South Dakota

LOCATION MAP

GENERAL NOTES

1. If cultural resources are discovered during construction, discontinue construction and notify the local Natural Resources Conservation Service office.
2. The landowner is responsible for complying with all federal, state, and local laws.

CONSTRUCTION NOTES

1. Clear and grub the entire area within the work limits.
2. All fill material must not contain frozen material, sod, roots, or other perishable material, or rock larger than eight inches in diameter as described in SD Construction Specification SD-7S.
3. Any shale, gravel, or sand that is exposed during borrow operations shall be immediately backfilled with 2 feet of clay material.
4. Six inches topsoil will be incorporated into the earthfill to meet the neat lines shown on the typical section.
5. All areas top-dressed with topsoil and disturbed during construction will be seeded according to SD Construction Specification SD-28.

6. _____

NO EXCAVATOR MAY BEGIN ANY EXCAVATION WITHOUT FIRST NOTIFYING THE ONE-CALL NOTIFICATION CENTER OF THE PROPOSED EXCAVATION AT 1-800-781-7474.

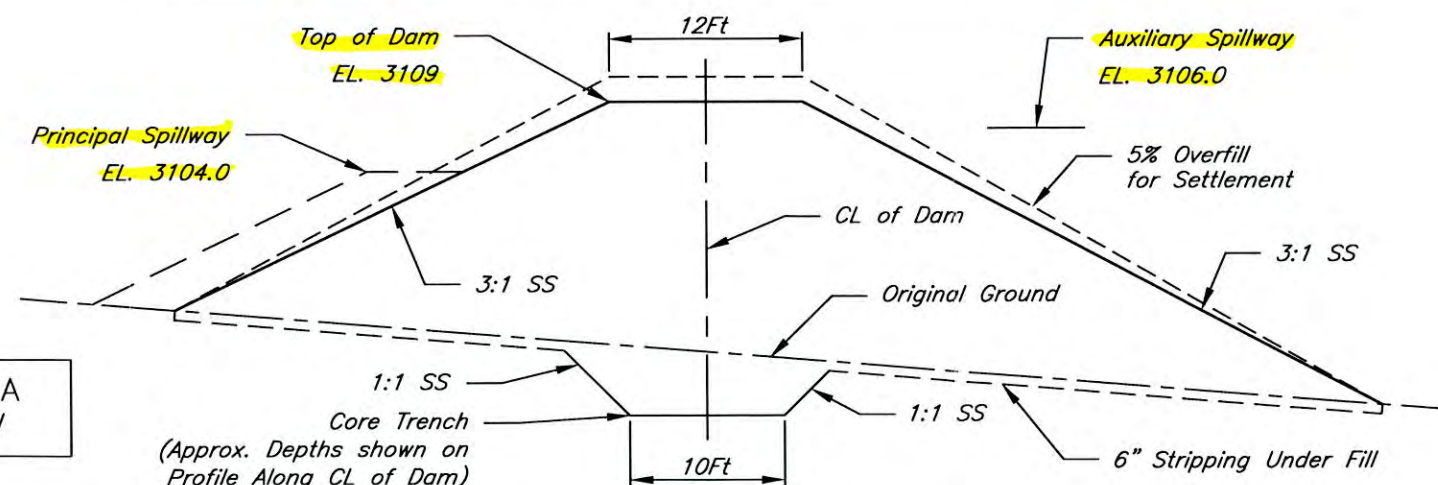
NRCS HAZARD CLASS A
NRCS JOB CLASS _IV

SD CONSTRUCTION AND MATERIAL SPECIFICATIONS

SD-4 Stripping
SD-5 Excavation
SD-7S Earthfill - Class S
SD-10 Salvaging And Spreading Topsoil
SD-28 Seeding
SD-14 WOOD AND STEEL STRUCTURES
SD-20A PLASTIC PIPELINE
SD-55 PLASTIC PIPE MATERIAL SPECIFICATION
SD-_____
SD-_____
For A Full Text Version See
http://www.sd.usda.gov/technical/SD_Engineering.html

TABLE OF QUANTITIES

ITEM	UNIT	QUANTITY	AS-BUILT
Earthfill Class S - Embankment	Cu. Yd.	12,656	
Earthfill Class S - Core Trench	Cu. Yd.	329	
Earthfill Class S - Stripping	Cu. Yd.	1,235	
Total Earthfill	Cu. Yd.	14,220	
Auxiliary Spillway cut	Cu. Yd.	298	
Topsoil Auxiliary Spillway	Cu. Yd.	117	
Seeding (Earthfill and Auxiliary Spillway)	Acre	1.7	
Principal Spillway Pipe			
18" Dia. SDR 26 Pipe	Lin. Ft.	75	
48" Dia. 4' Tall Riser and Base	Each	1	
with Trash Rack and Baffle	Each	1	
	Each		
Rubber Diaphragm	Each	3	
Timber Pipe Support	Each	1	



TYPICAL CROSS SECTION OF DAM

INDEX OF DRAWINGS

1. Cover Sheet (Sheet 4of12)
2. Plan View and Design Data (Sheet 5of12)
3. Profile of Dam and Auxiliary Spillway and Maximum Cross-Section of Dam.(Sheet 6of12)
4. Cross-Section of Auxiliary Spillway Profile of Principal Spillway.(Sheet 7of12)
5. Concrete Riser Detail.(Sheet 8of12)
6. Trash Rack and Baffle Detail.(Sheet 9of12)
7. Diaphragm Detail.(Sheet 10of12)
8. Timber Pipe Support Detail.(Sheet 11of12)
9. Supply pipe inlet Drawing.(Sheet 12of12)

STATEMENT OF COMPLIANCE

Construction (was) (was not) completed in accordance with approved construction plans and specifications.

JAA Date

POND WITH PRINCIPAL SPILLWAY PIPE
JOB PLAN 1.0P REV. 1/2012



Latham
378 POND
COVER SHEET



File No.
pipe.dwg

Drawing No.

3/22/16 1:33 PM
Sheet 4 of 12

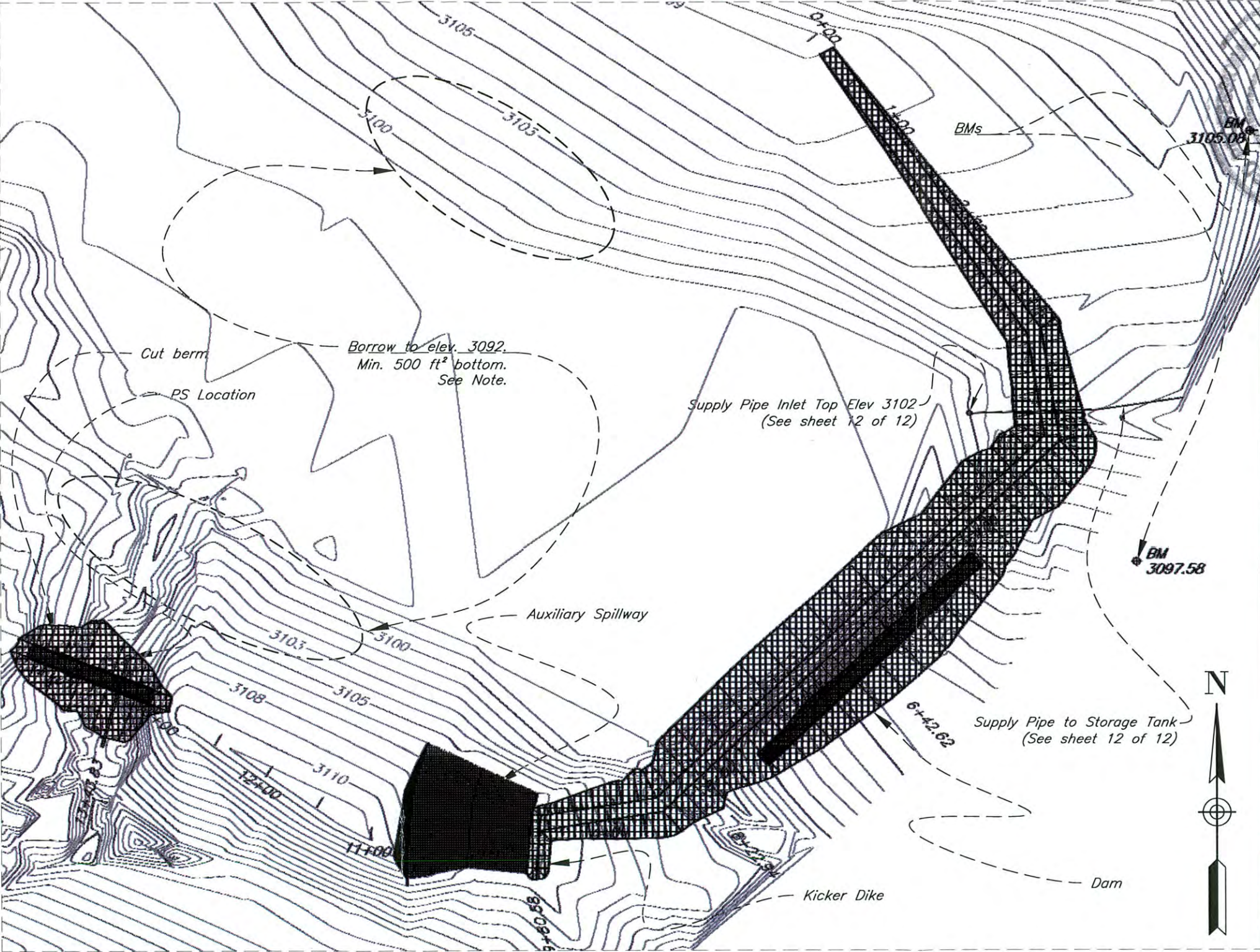
HYDRAULIC DATA		
Drainage Area	1100.8	Acres
Annual Runoff Yield (50% Chance)	24.8	Ac. Ft
Time of Concentration	2.67	Hours
Runoff Curve Number	79	
Principal Spillway, 2Year - 24 Hour Rainfall	1.9	Inches
Auxiliary Spillway, 25Year - 24 Hour Rainfall	3.3	Inches
Peak Runoff 2Year - 24 Hour Rainfall	146	CFS
Principal Spillway Discharge	21.7	CFS
Peak Runoff 25Year - 24 Hour Rainfall	481	CFS
Auxiliary Spillway Discharge	288.3	CFS
Auxiliary Spillway Flow Depth	1.230	Feet

STRUCTURE DATA		
Length of Top of Dam	1,085	Feet
Water Depth to Crest of Principal Spillway	12	Feet
Height of Downstream Toe to Top of Dam	20.5	Feet
Effective Height	11.3	Feet
Product of Storage X Effective Height	975.7	

POOL DATA			
	ELEV.	AREA	STORAGE
Crest of Principal Spillway	3104	11.2Ac.	56 Ac.-Ft
Crest of Auxiliary Spillway	3106.0	21.9Ac.	88.7 Ac.-Ft
Top of Dam	3109	34.5 Ac..	173.8 Ac.-Ft

SEDIMENT YIELD					
Erodibility Area	Gross Rate (A.F./Ac./Yr.)	Drainage Area (Acres)	Delivery Rate (%)	Design Period (Years)	Required Sediment Volume (Ac.-Ft.)
Q	00016	1100.8	20	20	7.050

BENCHMARK POINTS TABLE					
NO.	ID	ELEVATION	NORTHING	EASTING	BENCHMARK DESCRIPTION
1	BM	3105.08	16440703.555'	1946800.2190'	Bm at fence corner by gate
2	BM	3097.58	16440342.867'	1946704.6940'	BM in fenceline East of existing fill



- Note:
- Borrow to elevation 3092.
 - minimum bottom area should be 500 square feet.
 - If Shale is encountered DO NOT USE AS FILL MATERIAL FOR STRUCTURES (See Soil Scientist Report).

Date	3/8/16
Designed	PJF 0374
Drawn	PJF ROY E
Checked	JE BOSCHKE
Approved	4/14/16

LATHAM
378 POND
PLAN VIEW AND DESIGN DATA
SW1/4, Sec. 19, T15N, R 3E
Harding County, South Dakota

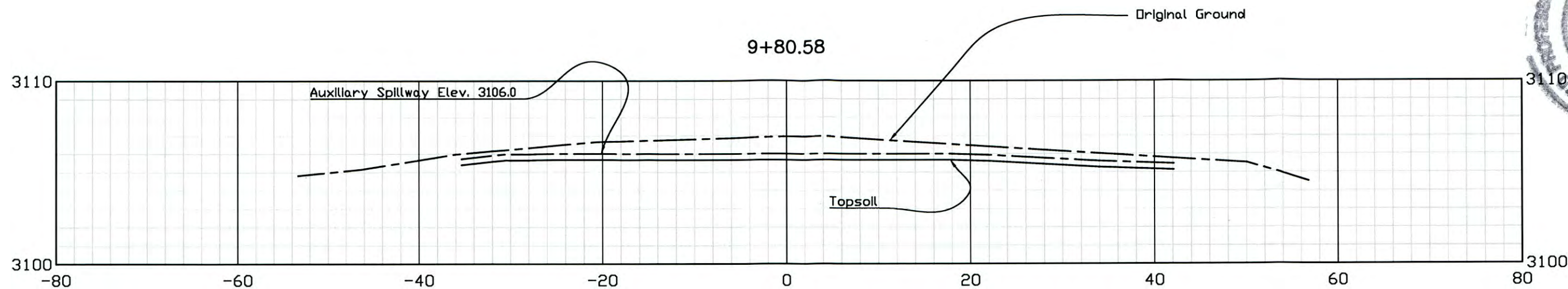


Natural Resources Conservation Service
United States Department of Agriculture

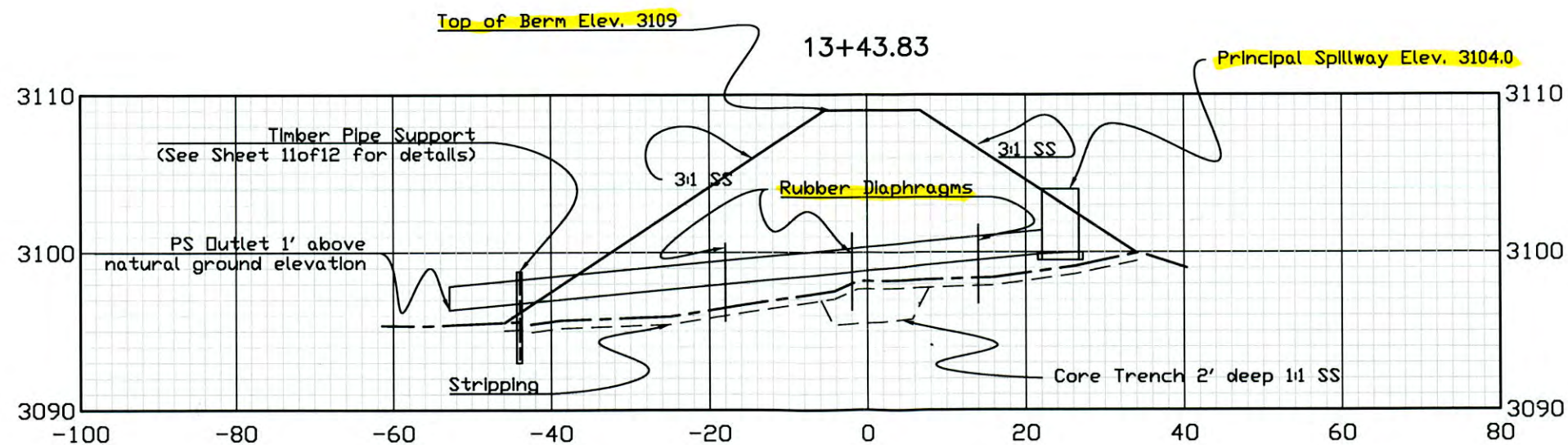
File No.
pipe.dwg

Drawing No.
-

3/22/16 1:33 PM
Sheet 5 of 12



Auxiliary Spillway profile



Principal Spillway Profile

Professional Engineer
REG. NO. 6314
DESIGNED BY P/J ROYE
DRAWN BY P/J BOSCHKE
CHECKED BY P/J BOSCHKE
DATE 3/3/16
3/3/16
4/14/16
4/14/16

Latham
Pond

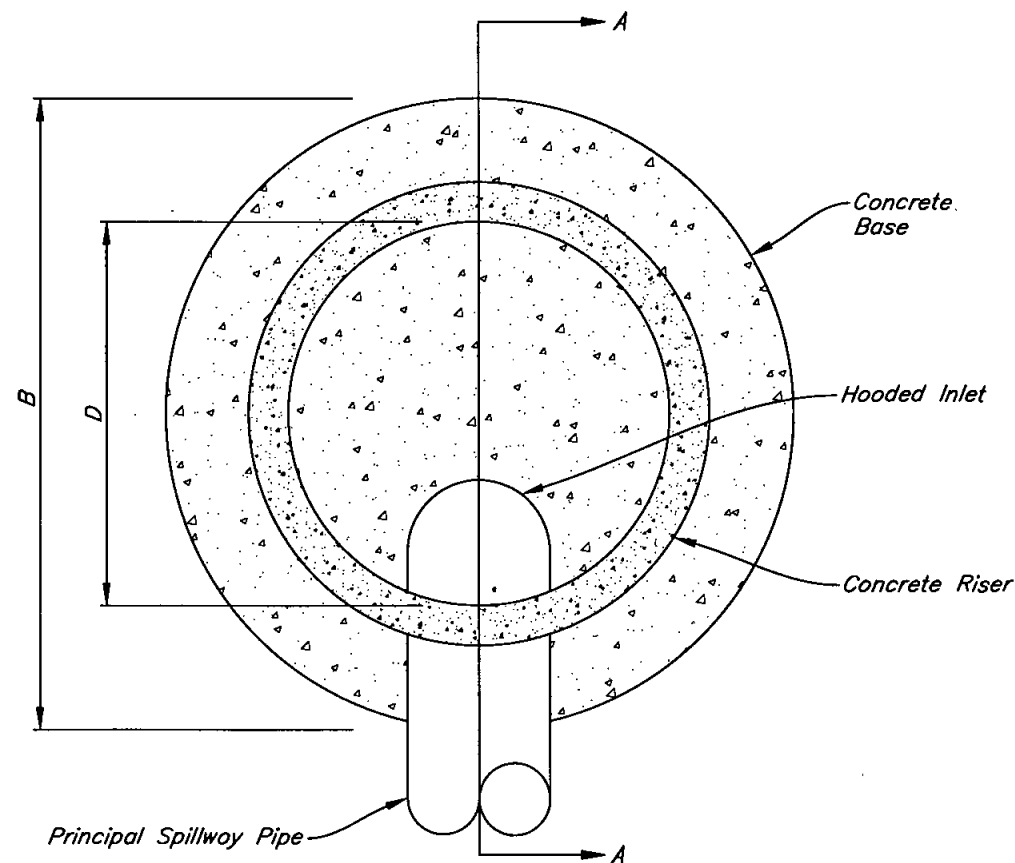
-----, Latham

United States
Department of
Agriculture
USDA
Natural Resources
Conservation Service

File No.
Latham_Pond.dwg

Drawing No.

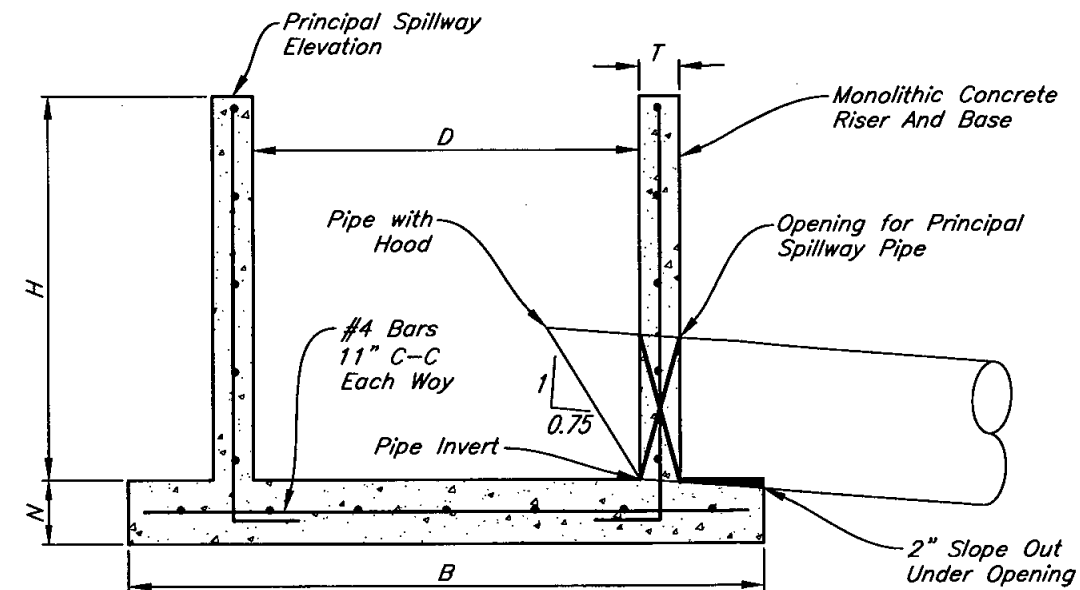
3/22/16 1:41 PM
Sheet 7 of 12



PLAN VIEW PRECAST RISER AND BASE

CONSTRUCTION NOTES

1. The riser and base is precast reinforced concrete and is manufactured according to ASTM C478 Standard Specification For Precast Reinforced Concrete Monhole Sections.
2. Provide a watertight joint between the precast concrete riser and the principal spillway pipe borrel.
3. Contact NRCS prior to installation for other options for the construction of the riser if a precast monolithic riser and base is not used.

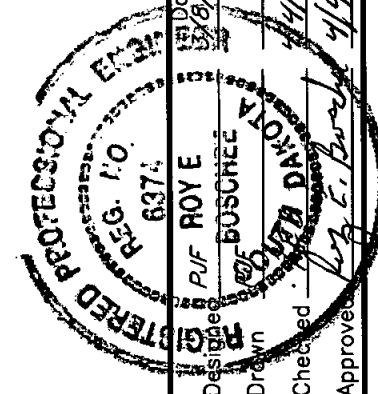


SECTION VIEW A-A

GUIDE TABLE FOR PRECAST RISER AND BASE DIMENSIONS

(D) RISER DIAMETER	(H) RISER HEIGHT	(T) WALL THICKNESS	(B) BASE DIAMETER	(N) BASE THICKNESS	ESTIMATED WEIGHT	DIA. PIPE BARREL
30"	4'	3.5"	51"	6"	2,600 LBS	10" to 18"
30"	4.5'	3.5"	51"	6"	2,790 LBS	10" to 18"
30"	5'	3.5"	51"	6"	2,980 LBS	10" to 18"
36"	4'	4"	64"	6"	3,770 LBS	10" to 24"
36"	4.5'	4"	64"	6"	4,030 LBS	10" to 24"
36"	5'	4"	64"	6"	4,290 LBS	10" to 24"
36"	5.5'	4"	64"	6"	4,550 LBS	10" to 24"
36"	6'	4"	64"	6"	4,815 LBS	10" to 24"
48"	4'	5"	79"	8"	6,870 LBS	10" to 30"
48"	4.5'	5"	79"	8"	7,300 LBS	10" to 36"
48"	5'	5"	79"	8"	7,740 LBS	10" to 36"
48"	5.5'	5"	79"	8"	8,170 LBS	10" to 36"
48"	6'	5"	79"	8"	8,600 LBS	10" to 36"

PRECAST CONCRETE RISER AND BASE
WITH HOODED INLET
REV. 1/2012



LATHAM
378 POND
PRECAST CONCRETE RISER AND BASE WITH HOODED INLET

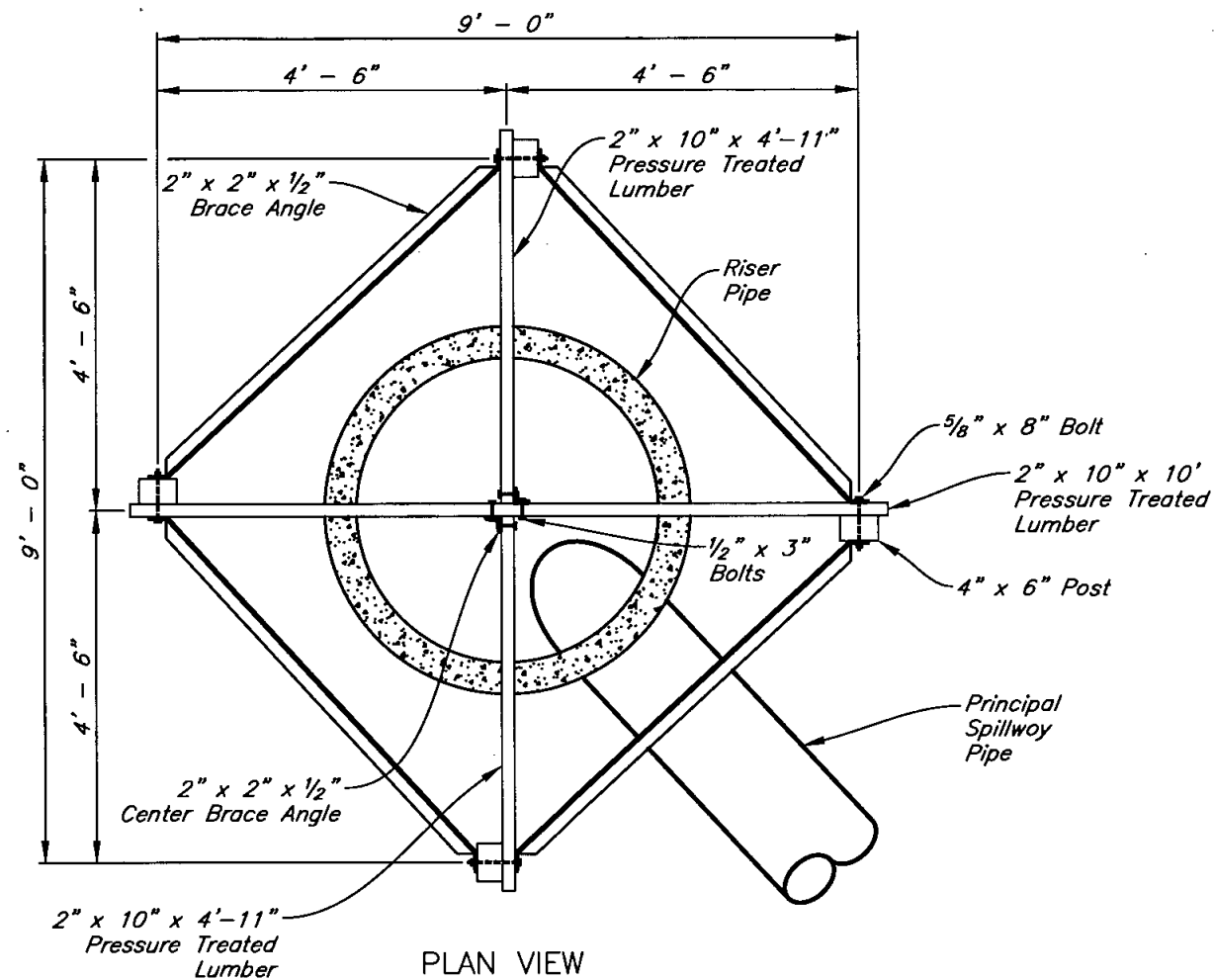


File No.
pipe.dwg

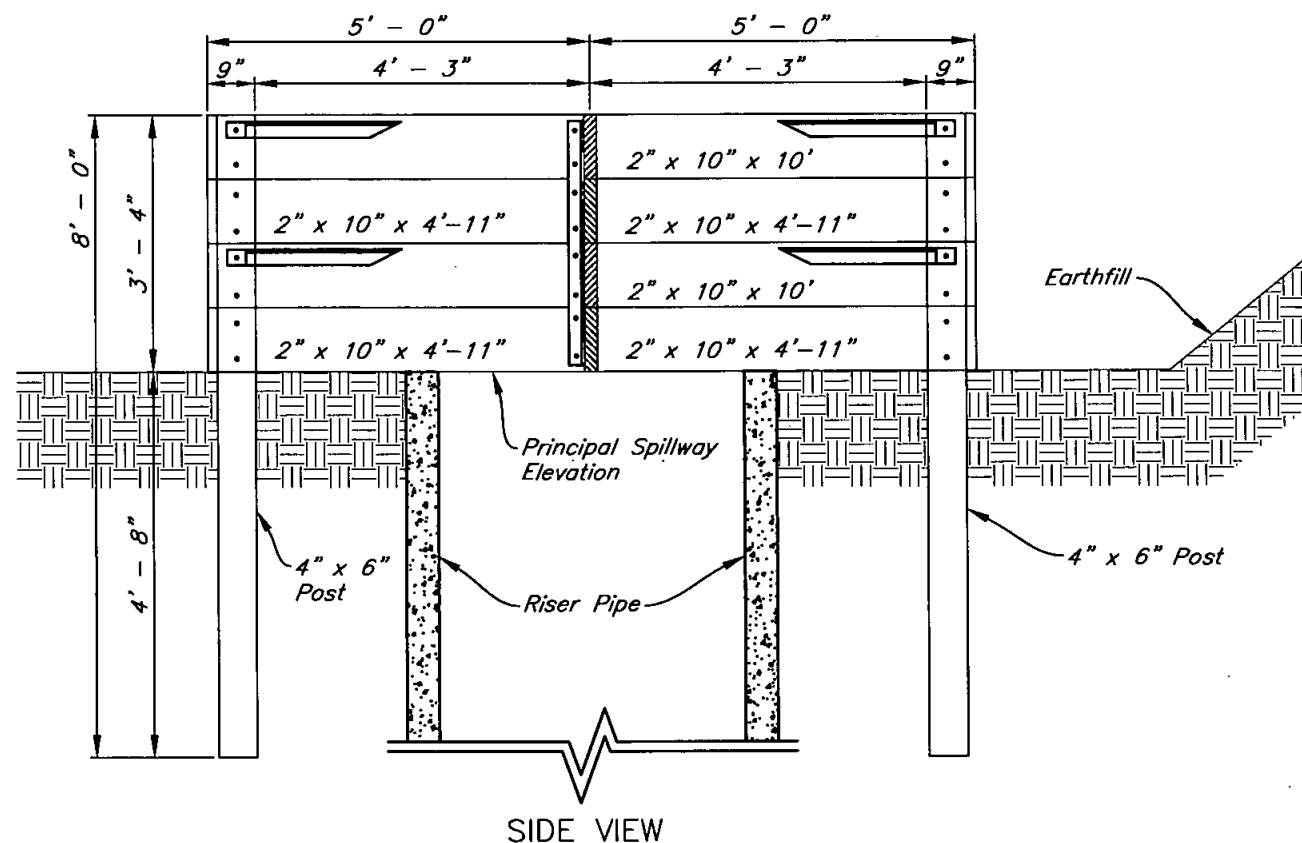
Drawing No.
—

3/16/16 2:19 PM
Sheet 8 of 12

SW1/4, Sec 19, T15N, R 3E
Harding County, South Dakota



PLAN VIEW

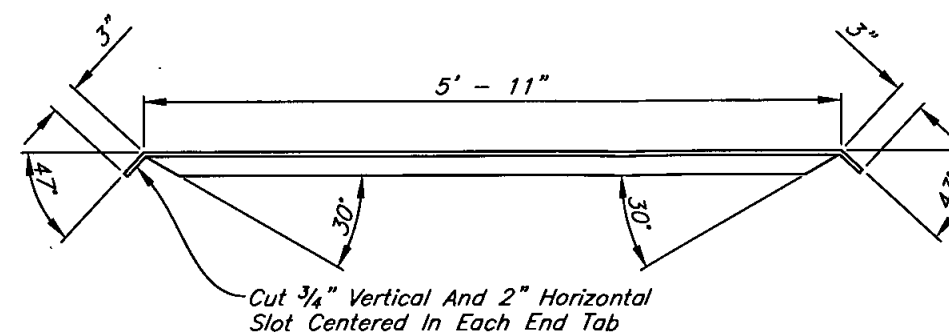


SIDE VIEW

TABLE OF QUANTITIES			
ITEM	LENGTH OR SIZE	UNIT	QUANTITY
4" X 6" Pressure Treated Post	8 Ft	Each	4
2" X 10" Pressure Treated Lumber	10 Ft	Each	4
2" X 10" Pressure Treated Lumber	4' - 11"	Each	8
2" X 2" X 1/4" Steel Angle	6' - 5"	Each	8
2" X 2" X 1/4" Steel Angle	3' - 2"	Each	2
Steel Bolt (with nut and 2 washers)	5/8" X 8"	Sets	32
Steel Bolt (with nut and 2 washers)	1/2" X 3"	Sets	32

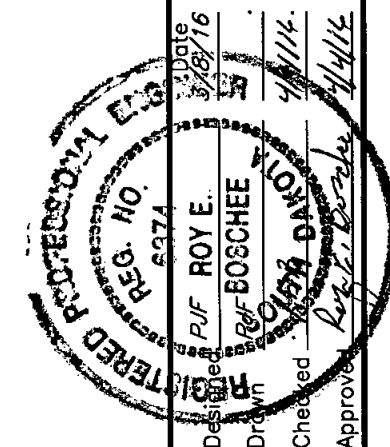
CONSTRUCTION NOTES

1. Bolt 4" x 6" posts and 2" x 10" lumber together using two 5/8" x 8" bolts. Do not place bolts closer than 1 1/2" from edge of board.
2. For center brace angles drill eight, 9/16" holes, 5/8" from outer edge of each leg of each angle and centered 5 1/4" apart along the leg.
3. Attach brace angles to top bolt on top of 2" x 10" board and to top bolt on next to bottom board.
4. All nuts, bolts, and washers shall be galvanized.



PLAN VIEW OF BRACE ANGLE

TRASH RACK AND BAFFLE FOR RISER DIA. 36" TO 60"
JOB PLAN NO. 6.4 REV. 1/2012



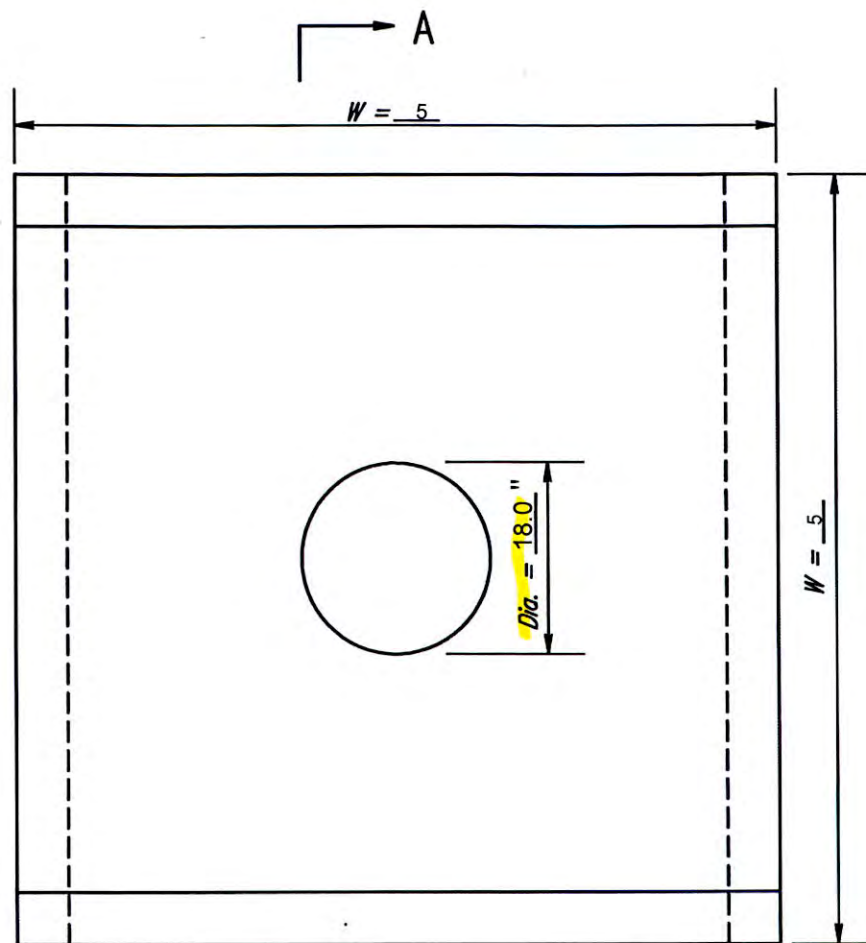
LATHAM
378 POND
TRASH RACK AND BAFFLE FOR RISER DIA. 36" TO 60"
SW1/4, Sec. 19, T15N, R 3E
Harding County, South Dakota



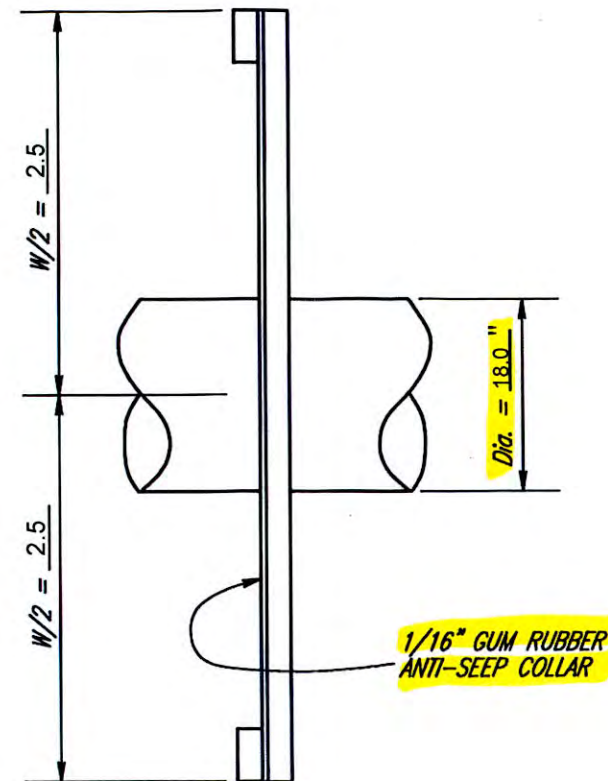
File No.
pipe.dwg

Drawing No.
-

3/16/16 2:19 PM
Sheet 9 of 12



ELEVATION



SECTION A - A

TABLE OF QUANTITIES

PIPE DIA. INCHES	" W " FEET	MAXIMUM COLLAR SPACING	NUMER OF COLLARS EA.
10	4	22	
12	4	21	
15	4	19	
18	5	24	3

NOTE:

1. Cut a ROUND hole (SMOOTH NON-JAGGED) 3.3% smaller than pipe size in center of Collar, Cut is very important to maintain watertightness around pipe. (DO NOT CUT X or SPLIT WILL CAUSE RUBBER TO RIP, MUST BE A ROUND HOLE)
2. Insert Collar over pipe from UPSTREAM to DOWNSTREAM direction.
3. Collars are supplied by Agri Drain, 1462 340 St. Adair IA 50002 (1-800-232-4742).

Number of Collars Required:

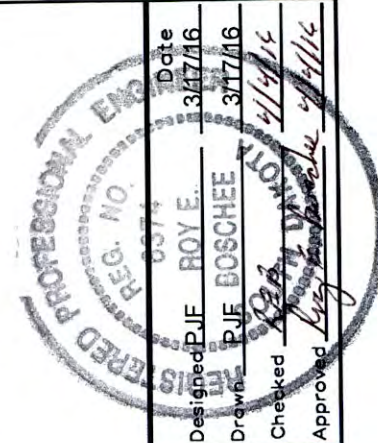
L1 = Distance from Riser or Inlet to Centerline of Dam

L2 = Distance from Centerline of Dam to downstream intersection of backslope and Pipe outlet as measured along the pipe.

$$\frac{0.15 (L1 + L2)}{\text{Height of Collar minus diameter of Pipe}} = \frac{0.15 (22.0 + 42.0)}{3.5} = 2.7$$

Use 3 Diaphragms, place 16' apart. See Sheet 7 of 12 for detail.

RUBBER DIAPHRAGM
ANTI-SEEP COLLAR

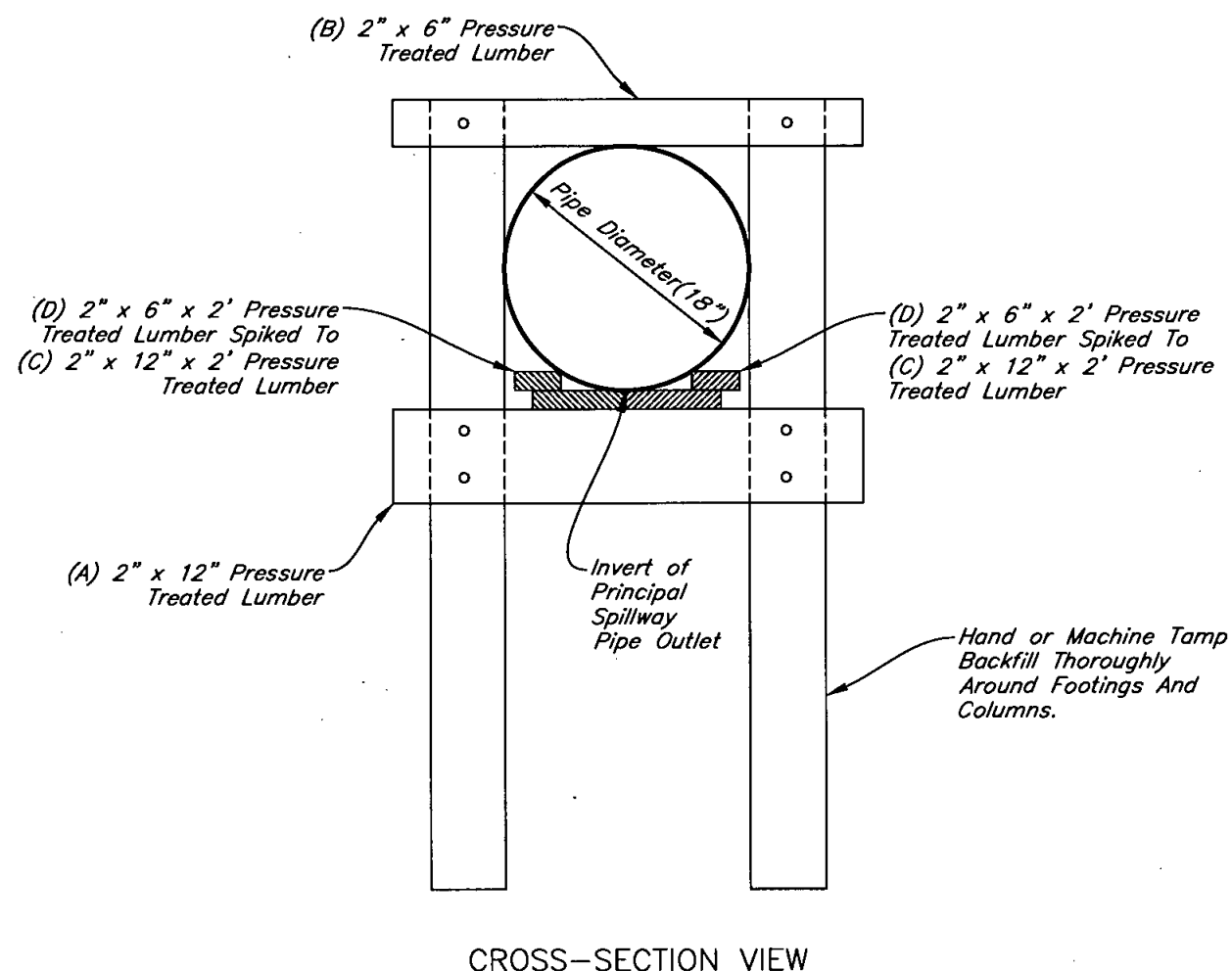


PRODUCER Latham
SW1/4 SECT. 19 T. 15N R. 3E
Harding COUNTY
Harding CONSERVATION DISTRICT

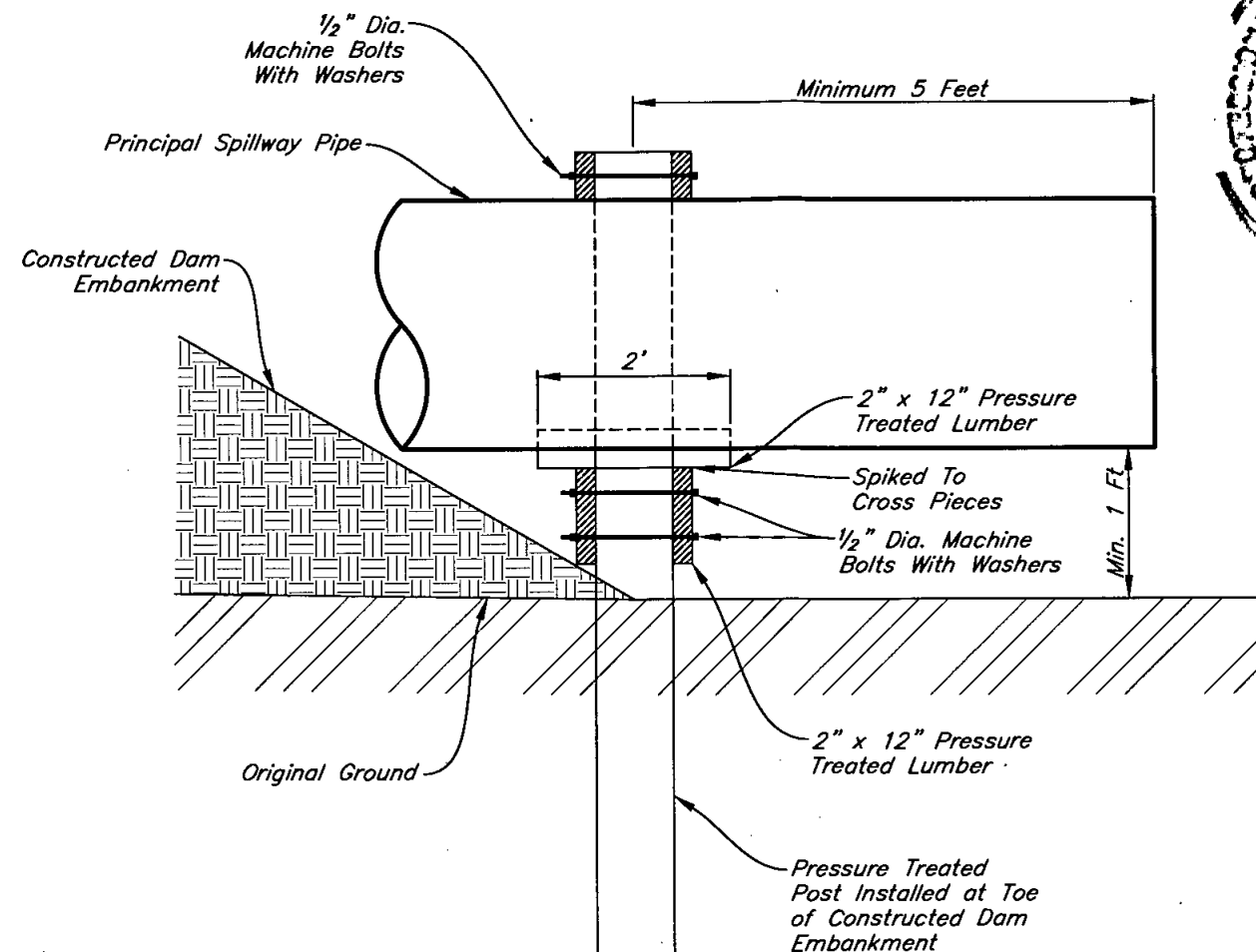
USDA - NRCS
FIELD SUPPORT OFFICE
1530 SAMCO ROAD, SUITE 4
RAPID CITY, SD 57702



File Name:
RUBBER DIAPHRAGM
Drawing No.
Job Plan 3.8RC
(11/2011)
Sheet 10 of 12



CROSS-SECTION VIEW



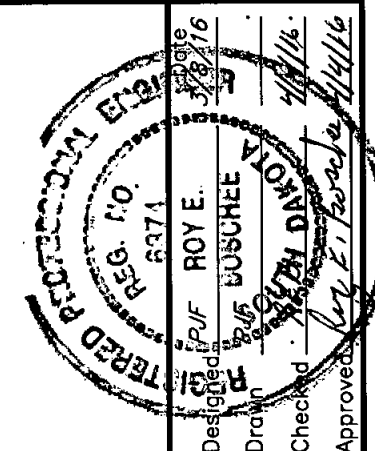
PROFILE VIEW

LENGTHS REQUIRED FOR DIFFERENT PIPE DIAMETERS						
ITEM	MATERIAL SIZES BASED ON PIPE DIAMETER				UNIT	QUANTITY
	12" TO 18"	21" TO 24"	30" TO 36"	42" TO 48"		
8" Dia. Pressure Treated Post	8 Ft	—	—	—	Each	2
10" Dia. Pressure Treated Post	—	10 Ft	10 Ft	12 Ft		
(A) 2" X 12" Pressure Treated Lumber	4 Ft	4 Ft	5 Ft	6 Ft	Each	2
(B) 2" X 6" Pressure Treated Lumber	4 Ft	4 Ft	5 Ft	6 Ft	Each	2
(C) 2" X 12" Pressure Treated Lumber	2 Ft	2 Ft	2 Ft	2 Ft	Each	2
(D) 2" X 6" Pressure Treated Lumber	2 Ft	2 Ft	2 Ft	2 Ft	Each	2
1/2" Dia. Machine Bolts With Nuts	12 In.	14 In.	14 In.	14 In.	Each	6
1/2" Dia. Washers					Each	12
Spike Nails					Each	20

CONSTRUCTION NOTES

1. All nuts, bolts, and washers shall be galvanized.
2. If PVC pipe is used, protect the portions of pipe that will be permanently exposed to ultraviolet light from sunlight by priming the pipe with PVC solvent and painting with two coats high quality exterior latex paint.
3. Hand or machine tamp backfill thoroughly around footings and columns.

TIMBER PIPE SUPPORT
JOB PLAN NO. 4.0 REV. 1/2012



LATHAM
378 POND
TIMBER PIPE SUPPORT



File No.
pipe.dwg

Drawing No.

3/16/16 2:30 PM
Sheet 11 of 12

SW1/4, Sec 19, T15N, R 3E Harding County, South Dakota

PIPE INLET PLAN VIEW

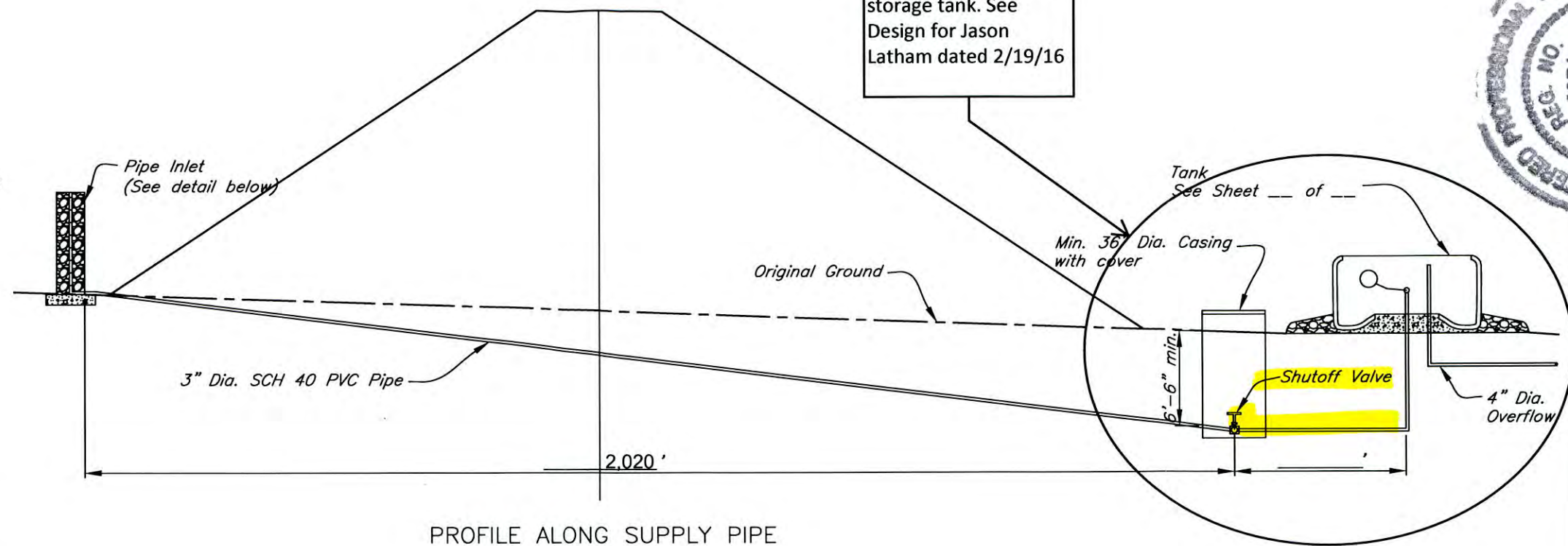
FILTER GRADATION

US Standard Sieve Size	Percent Passing or Percent Finer Than
1½"	100
1"	95-100
½"	25-60
#4	0-10
#8	0-5

SD DOT Coarse Aggregate for use in Portland Cement Concrete Size #1 meets requirements.

PIPE INLET SECTION VIEW

NOT TO SCALE



BILL OF MATERIALS			
	Item	No.	Unit
1	Concrete (Class 3000)	0.8	Cu. Yd.
2	Reinforcing Steel (No. 4 Bars -40 Lin.ft)	26.7	LB.
3	Gravel for Inlet Riser	0.9	Cu. Yd.
4	24" Dia. PVC DR51	6	Ft.
5	3" Dia. SCH 40 slotted PVC pipe; 0.032 inch slot width w/ end cap and elbow	5.5	Ft.
6	3" Dia. SCH 40 PVC pipe		Ft.
7	Shutoff Valve and Appurtenances	1	Each
8	Manhole with cover	1	Each

SD CONSTRUCTION AND MATERIAL SPECIFICATIONS

SD-12B Concrete for Minor Structures
SD-13 Steel Reinforcement
SD-16 Wood Fabrication
SD-20A Plastic Pipeline Stock Water
SD-55 Plastic Pipe

SD-_____

SD-_____

For A Full Text Version See

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/sd/technical/engineering/>

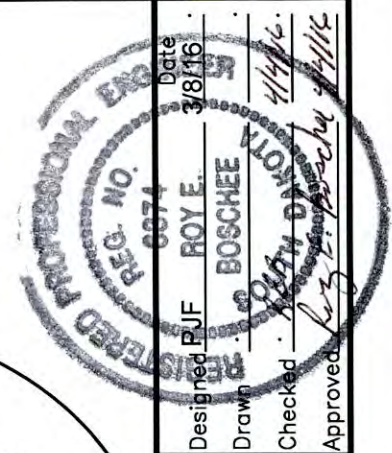
CONSTRUCTION NOTES

1. A minimum bury depth of 6.5' feet of pipeline cover shall be maintained throughout the downstream side of the pipeline to prevent freezing.
2. Pipeline installation location will be as shown on the construction plans (Plan View).
3. Install top of riser a minimum of 4 feet below permanent pool elevation.
4. Provide protection around the inlet from livestock or fence the pool area off.
5. Mechanically tamp the pipeline trench backfill.
6. Use compacted clay or bentonite as low permeability backfill for the trench that passes underneath the embankment.
7. Maximum earthfill allowed above the pipe is 30 feet.

GENERAL NOTES

1. If cultural resources are discovered during construction, discontinue construction and notify the local Natural Resources Conservation Service office.
2. The landowner is responsible for complying with all federal, state, and local laws.

NO EXCAVATOR MAY BEGIN ANY EXCAVATION WITHOUT FIRST NOTIFYING THE ONE-CALL NOTIFICATION CENTER OF THE PROPOSED EXCAVATION AT 1-800-781-7474.



NAME: Latham
516 PIPELINE
STOCK WATER SYSTEM FOR EARTH DAMS

Case	Year	County
T15N	1935	Harding
P3F	1935	Harding

SW1/4	Sec 19	T 15N	R 3E	Hardina
-------	--------	-------	------	---------

United States Department of Agriculture



NRC
Nuclear Regulatory Commission

File No.
JP22.2.dwg

Drawing No.

Sheet 12 of 12

JOB PLAN 22.2 02/2016

REVISIONS		
DATE	APPROVED	TITLE
10/10/16	Jay B. Cobb	SIC - SD

Legend

 Latham_Watershed

 Sections

Latham_Contours_1ft

 Intermediate

 Index Contour

Latham_Watershed_All_Pools

ELEV_FEET

 3094 - 3096

 3097 - 3099

 3100 - 3102

 3103 - 3105

 3106 - 3109

ELEV_FEET	POOL_ACRES	ACRE FOOT
3109	34.5	173.8
3108	30.4	141.4
3107	26.5	113
3106	21.9	88.7
3105	16.2	69.6
3104	11.2	56
3103	8.1	46.5
3102	6.8	39.2
3101	6	32.7
3100	5.5	27
3099	5.1	21.7
3098	4.8	16.8
3097	4.5	12.2
3096	4.2	7.9
3095	3.9	3.9
3094	3.4	0.2

Subbasin 1
Acres: 1100.8
Avg Slope: 3
Length: 14,469 ft
RCN: 79

Latham

Stage Storage

SEC 24 & 19-T 15N-R 2&3E
HARDING COUNTY, SOUTH DAKOTA



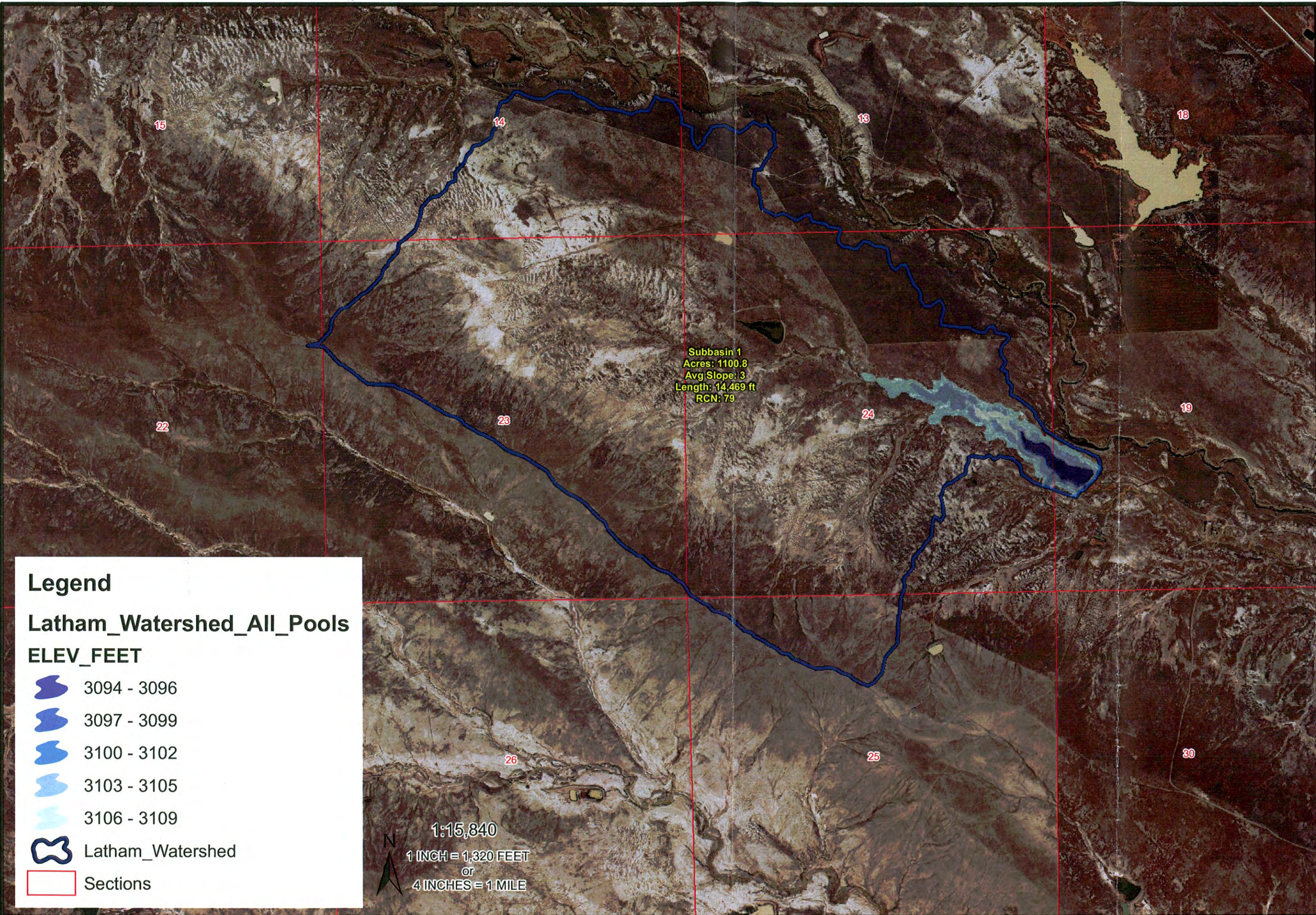
Natural Resources Conservation Service
United States Department of Agriculture

Sheet 3 of 12

Designed PJF Date 3/1/16
Drawn PJF Date 3/1/16
Checked AF BOSCHEE Date 3/1/16
Approved MUTH Date 3/1/16

1:3,796

1 INCH = 330 FEET
OR
16 INCHES = 1 MILE



Legend

Latham_Watershed_All_Pools

ELEV_FEET

- 3094 - 3096
- 3097 - 3099
- 3100 - 3102
- 3103 - 3105
- 3106 - 3109

Latham_Watershed

Sections

Subbasin 1
Acres: 1100.8
Avg Slope: 3
Length: 14,469 ft
RCN: 79

1:15,840

1 INCH = 1,320 FEET
or
4 INCHES = 1 MILE

Latham Watershed

SEC 13,14,22-24,25 & 19-T 15N-R 2&3E
HARDING COUNTY, SOUTH DAKOTA



Designed: PJF Date: 3/1/16
Drawn: PJF6374 Date: 3/1/16
Checked: ROY E. ROACHEE Date: 3/1/16
Approved: [Signature] Date: 3/1/16



U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CONSTRUCTION PLANS AND SPECIFICATIONS

Pond (378)

for

Latham

Section: 19

County: Harding

Township: 5N

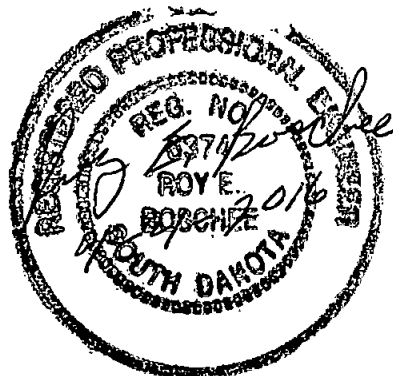
Range: 3E

Prepared By:

Rapid City Field Support Office

Designed By: Paul Fulton

Harding Conservation District, South Dakota



DOCUMENTATION FOR HAZARD CLASSIFICATION

Producer: **John Latham** Name of Site: **Latham Dam**
County: **Harding**
Field #: Watershed: **South Fork Moreau**
Location
1/4 Section: **SW** Section: **19** Township: **15N** Range: **3E**
Latitude: Longitude:

Dam in Series: **No**
Explain: **Small dam upstream has limited storage and the volume of water in the event of a breach would be stored in Latham Dam.**

Dam and Reservoir Data

Assumed Job Class
Assumed Hazard Class
Centerline Elevation Channel Bottom*
Centerline Elevation Flood Plain*
Centerline Elevation Top of Dam*
Centerline Elevation Auxiliary Spillway Crest*
*Elevation is based on Mean Sea Level Datum

III
A
3088.3
3090
3109
3106.3

Max. Depth of Water within Reservoir

17 Ft.

Storage

Storage Below Principal Spillway
Storage between Principal Spillway and Auxiliary Spillway
Storage between Auxiliary Spillway and Top of Dam
Other
Total Storage to Top of Dam

56 Ac.-Ft.
32.7 Ac.-Ft.
85.1 Ac.-Ft.
 Ac.-Ft.
173.8 Ac.-Ft.

Downstream Conditions

- Valley Conditions Downstream of Structure
Approximate Slope of Channel
- Stream Channel Size

Parallel
1%
Depth **3** Ft.
Bottom Width **10** Ft.
Top Width **22** Ft.

- Valley Characteristics

Width **300** Ft.
Roughness Coefficient **0.045**
Slope **1%**

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				
Paved Township or Paved County Road D-27			☐	☒
Other Describe: timber bridge with low girders			☒	☐
			☐	☒
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 multi rural users			☐	☒
			☐	☒
Describe Old Homestead 1.700 down stream Harding Rd 1.7 mi down stream				

Location:

Is Dam located within five miles of urban development?

No

Describe Potential Development:

Located 26.7 Mi SW of Buffalo SD No potential development

Rational For Determining Hazard Class:

Site is located 22 miles from nearest town. Development in this area is unlikely. Paved county road is lightly traveled and would be breached by less than two feet in the event of a failure.

Method Used for Evaluation of Impact Area

Visual Assessment

Further Evaluation Needed

No

Attached: Breach Routings ☐

Maps ☒

Other supporting documents:

Actual Hazard Class*

A

Final Job Class

IV

Hazard Analysis by:

[Signature]

Date:

4/14/18

Approved by

[Signature]

Date:

4/14/18

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

Client: Latham
 County: HARDING MSE2
 Practice: Pond (378)
 Calculated By: PJF
 Checked By: KEB

State: SD

Date: 3/1/2016

Date: 3/29/16

Drainage Area: 1100.8 Acres (user entered value)
 Curve Number: 79 (user entered value)
 Watershed Length: 14469 Feet
 Watershed Slope: 3 Percent
 Time of Concentration: 2.67 Hours (calculated value)
 Rainfall Type: MSE2

Storm Number	1	2	3	4	5	6	7
Frequency (yrs)	1	2	5	10	25	50	100
24-Hr rainfall (in)	1.60	1.90	2.30	2.70	3.30	3.70	4.20
Ia/P Ratio	00.33	00.28	00.23	00.20	00.16	00.14	00.13
Used	00.33	00.28	00.23	00.20	00.16	00.14	00.13
Runoff (in)	.31	.47	.71	.97	1.41	1.72	2.13
(ac-ft)	28.44	43.11	65.13	88.98	129.34	157.78	195.39
Unit Peak Discharge (cfs/acre/in)	00.272	00.286	00.297	00.303	00.309	00.313	00.316
Peak Discharge (cfs)	92	146	231	325	481	593	739

Site Identification	atham_48inch_Drop
Watershed Runoff Curve Number	79.
Total Watershed Drainage Area (Sq.Miles)	1.72
Watershed Time of Concentration (Hours)	2.67
SDH Rainfall Total (Inches)	N/A
SDH Rainfall Duration (Hours)	N/A
FBH or Storm Rainfall Total (Inches)	3.30
FBH or Storm Rainfall Duration (Hours)	24.0
SDH Inflow Peak (CFS)	N/A
FBH or Storm Inflow Peak (CFS)	476.4
Initial Reservoir Elevation (Feet)	3104.00
Maximum WS SDH (Feet)	N/A
Maximum WS FBH or Storm (Feet)	3106.90
Storage at Max. WS FBH or Storm (Acre-Ft)	111.0
Top Dam (Feet)	3107.90
Storage, Top Dam (Acre-Ft)	139.0
Emb. Yardage (CY)	N/A
PSH Drawdown (Days)	3.86
378 Drawdown (Days)	3.74
PS Crest (Feet)	3104.00
PS Number of Conduits	1
PS Conduit Diameter (Inches)	18.0
PS Conduit Height (Feet)	N/A
PS Conduit Width (Feet)	N/A
PS Conduit Area (Sq. Feet)	1.77
Storage, PS Crest (Acre-Ft)	56.
PS Discharge at AS Crest (CFS)	23.0
PS Discharge for SDH (CFS)	N/A
PS Discharge FBH or Storm (CFS)	24.7
AS Crest (Feet)	3105.68
Storage, AS Crest (Acre-Ft)	82.6
AS Width (Feet)	100.
AS Exit Slope (%)	0.33
AS Ret. Curve Index	3.50
AS Veg. Cover Factor	0.80
AS Maintenance Code	1
AS Max. Head SDH (Feet)	N/A
AS Peak Discharge SDH/Storm (CFS)	278.8
AS Exit Velocity SDH or Storm (Ft/S)	2.58
AS Stress SDH or Storm (Lb./Sq.Ft.)	0.009
Hp FBH or Storm (Feet)	1.22
AS Peak Discharge FBH/Storm (CFS)	279.
AS Integ. Dist. FBH or Storm (Feet)	N/A
Oe/B FBH or Storm (Acre-Ft/Ft)	0.8
Uncontrolled Drainage Area (Sq.Miles)	1.72
Number of Errors	0
Number of Warnings	0

 SITES XEQ 03/21/2016 WATER RESOURCE SITE ANALYSIS COMPUTER PROGRAM
 VER 2005.1.6 (USER MANUAL - DATED DECEMBER 2005)
 TIME 12:27:59

***** 80-80 LIST OF INPUT Data *****

SITES	01/01/2005	Latham	1.72	H5
SAVMOV	0 101			
SAVMOV	101 1			1
STRUCTURE				

3094	0.2
3095	3.9
3096	7.9
3097	12.2
3098	16.8
3099	21.7
3100	27
3101	32.7
3102	39.2
3103	46.5
3104	56
3105	69.6
3106	88.7
3107	113
3108	141.4
3109	173.8

ENDTABLE

WSDATA	5A1	AC 79	1100.8	2.67
--------	-----	-------	--------	------

RAINTABLE MSEII

24	0.000000	0.000170	0.000359	0.000565	0.000790
	0.001030	0.001290	0.001570	0.001870	0.002180
	0.002510	0.002860	0.003230	0.003620	0.004020
	0.004440	0.004880	0.005340	0.005810	0.006310
	0.006820	0.007350	0.007890	0.008460	0.009040
	0.009640	0.010260	0.010900	0.011550	0.012230
	0.012920	0.013630	0.014350	0.015100	0.015860
	0.016640	0.017440	0.018250	0.019090	0.019940
	0.020810	0.021700	0.022600	0.023530	0.024470
	0.025430	0.026410	0.027400	0.028420	0.029450
	0.030500	0.031560	0.032650	0.033750	0.034870
	0.036010	0.037170	0.038350	0.039540	0.040750
	0.041980	0.043220	0.044490	0.045770	0.047070
	0.048390	0.049730	0.051080	0.052450	0.053840
	0.055250	0.056680	0.058120	0.059580	0.061060
	0.062560	0.064080	0.065610	0.067160	0.068730
	0.070320	0.071930	0.073550	0.075190	0.076850
	0.078530	0.080220	0.081940	0.083670	0.085420
	0.087180	0.090120	0.093100	0.096120	0.099190
	0.102290	0.105450	0.108640	0.111880	0.115160
	0.118490	0.121850	0.125270	0.128720	0.132220
	0.135760	0.141150	0.147320	0.154280	0.162030
	0.170560	0.179880	0.189980	0.200870	0.212540
	0.225000	0.243980	0.269120	0.304660	0.356220
	0.456270	0.643780	0.695340	0.730880	0.756020
	0.775000	0.787460	0.799130	0.810020	0.820120
	0.829440	0.837970	0.845720	0.852680	0.858850
	0.864240	0.867780	0.871280	0.874730	0.878150
	0.881510	0.884840	0.888120	0.891360	0.894550

0.897710	0.900810	0.903880	0.906900	0.909880
0.912820	0.914580	0.916330	0.918060	0.919780
0.921470	0.923150	0.924810	0.926450	0.928070
0.929680	0.931270	0.932840	0.934390	0.935920
0.937440	0.938940	0.940420	0.941880	0.943320
0.944750	0.946160	0.947550	0.948920	0.950270
0.951610	0.952930	0.954230	0.955510	0.956780
0.958020	0.959250	0.960460	0.961650	0.962830
0.963990	0.965130	0.966250	0.967350	0.968440
0.969500	0.970550	0.971580	0.972600	0.973590
0.974570	0.975530	0.976470	0.977400	0.978300
0.979190	0.980060	0.980910	0.981750	0.982560
0.983360	0.984140	0.984900	0.985650	0.986370
0.987080	0.987770	0.988450	0.989100	0.989740
0.990360	0.990960	0.991540	0.992110	0.992650
0.993180	0.993690	0.994190	0.994660	0.995120
0.995560	0.995980	0.996380	0.996770	0.997140
0.997490	0.997820	0.998130	0.998430	0.998710
0.998970	0.999210	0.999435	0.999641	0.999830
1.000000				

ENDTABLE

PDIRECT		1.9			3.30		
POOLDATA	ELEV	3104	3104	3104	3095	3095.0	SC
PSINLET		1.27	12.6				
PSDATA	1	75	18		.009	3098	
ASDATA	41	50		3		.0033	2
ASINSURF	41		3.5	3.5			
ASINLET	41	0.0	0.0	50	0.0		3
		100	3				

ENDTABLE

ASEXSURF	41		3.5				
			.8	0			
			1				
			2	0			
			.02				

ENDTABLE

ASEXIT	41	N				50	
BTMWIDTH	FEET	100					
GRAPHICS	I						
GO,DESIGN	HLIO	MSEII	24	MSEII378	24		
SAVMOV	2	101	1				

ENDJOB

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

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

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

1SITES

XEQ 03/21/2016	Latham	WSID=
VER 2005.1.6		SUBW= A
TIME 12:27:59	SITE = S 1	PASS= 1
		PART= 1

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

STORM DISTRIBUTION-PSH
 PRINCIPAL SPILLWAY DURATION = 24.00 HOURS

STORM DISTRIBUTION AUX. -

PRECIP. - P-PS, 1-DAY	P-PS, 10-DAY	P-SD	P-FB	
1.90	0.00	0.00	3.30	
WSDATA - CN	DA-SM	TC/L	-/H	QRF
79.00	1.72	2.67	0.00	0.00
SITEDATA- PERM POOL	CREST PS	FP SED	VALLEY FL	378?
3104.00	3104.00	3104.00	3095.00	YES
BASEFLOW	INITIAL EL	EXTRA VOL	SITE TYPE	
0.00	0.00	0.00	DESIGN	
PSDATA - NO. COND	COND L	DIA/W	-/H	
1.00	75.00	18.00	0.00	
PS N	KE	WEIR L	TW EL	
0.009	1.27	12.60	3098.00	
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	0.00	50	
AUX.Data - INLET Ci	SIDE SLOPE	EXIT Ci	EXIT SLOPE	ACTUAL AUX?
3.500	3.00	3.500	0.003	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 03/21/2016 Latham WSID=
 VER 2005.1.6 SUBW= A
 TIME 12:27:59 SITE = S 1 PASS= 1 PART= 2

MESSAGE ---- Climatic Index changed from 0.0 to 1.0 for this run.

HYD	PI	1.72								
	0	0.1690								
		0.00	0.11	1.78	6.70	14.99	S	1		1
		26.83	43.06	63.72	85.89	106.13			PI D	2
		122.52	134.20	141.79	144.77	143.82			PI D	3
		139.97	133.10	123.12	111.91	101.62			PI D	4
									PI D	5
									PI D	6

9.89	9.51	9.15	8.80	8.47	PO D 30
8.14	7.83	7.54	7.32	7.10	PO D 31
6.89	6.69	6.49	6.30	6.11	PO D 32
5.93	5.76	5.59	5.42	5.26	PO D 33
5.11	4.95	4.81	4.67	4.53	PO D 34
4.39	4.26	4.14	4.02	3.90	PO D 35
3.78	3.67	3.56	3.46	3.35	PO D 36
3.25	3.16	3.07	2.97	2.89	PO D 37
2.80	2.72	2.66	2.61	2.57	PO D 38
2.53	2.49	2.45	2.41	2.37	PO D 39
2.33	2.29	2.25	2.22	2.18	PO D 40
2.15	2.11	2.08	2.04	2.01	PO D 41
1.98	1.94	1.91	1.88	1.85	PO D 42
1.82	1.79	1.76	1.73	1.70	PO D 43
1.68	1.65	1.62	1.60	1.57	PO D 44
1.54	1.52	1.49	1.47	1.45	PO D 45
1.42	1.40	1.38	1.35	1.33	PO D 46
1.31	1.29	1.27	1.25	1.23	PO D 47
1.21	1.19	1.17	1.15	1.13	PO D 48
1.11	1.09	1.08	1.06	1.04	PO D 49
1.02	1.01	0.99	0.98	0.96	PO D 50
0.94	0.93	0.91	0.90	0.88	PO D 51
0.87	0.86	0.84	0.83	0.81	PO D 52
0.80	0.79	0.78	0.76	0.75	PO D 53
0.74	0.73	0.71	0.70	0.69	PO D 54
0.68	0.67	0.66	0.65	0.64	PO D 55
0.63	0.62	0.61	0.60	0.59	PO D 56
0.58	0.57	0.56	0.55	0.54	PO D 57
0.53	0.52	0.51	0.51	0.50	PO D 58

ENDTABLE

P 1, T 1 59

1SITES -----
 XEQ 03/21/2016 Latham WSID=
 VER 2005.1.6 SUBW= A
 TIME 12:27:59 SITE = S 1 PASS= 1 PART= 4

PERM POOL	3104.00 FT	56.0 ACFT	0.00 AC	26.1 CFS
CREST PS	3104.00 FT	56.0 ACFT	0.00 AC	26.1 CFS
SED ACCUM	3104.00 FT	56.0 ACFT	0.00 AC	26.1 CFS
START ELEV	3104.00 FT	56.0 ACFT	0.00 AC	0.0 CFS
NRCS-PSH	D= 24.00 HR	P= 1.90 IN	Q= 0.47 IN	DA= 1.72 SM
	TC= 2.67 HR	CN= 79.00	VOL= 42.7 ACFT	

PEAK = 144.8 CFS, AT 13.9 HRS.

ROUTED RESULT - HYD TYPE	EMAX	VOL-MAX	AMAX	QMAX
NRCS-PSH	3105.68 FT	82.6 ACFT	0.00 AC	23.0 CFS

PS STORAGE 26.6 ACFT, BETWEEN AUX. CREST AND SED. ACCUM ELEVATIONS.

DRAWDOWN (DDT) TEST 3104.00 FT 56.0 ACFT 0.00 CFS
 CONTROL IS 0.000 DETENTION STORAGE

DRAWDOWN TIME = 3.86 DAYS, TO 0.0 CFS (LIMIT = 10.00 DAYS)

RATING TABLE DEVELOPED, SITE = S 1:
BY PROGRAM FOR PS AND AUX. SPILLWAYS
AUX. RATING USED WSPVRT METHOD.

RATING TABLE NUMBER 1

	ELEV. FEET	Q-TOTAL CFS	Q-PS CFS	Q-AUX. CFS	VOLUME AC-FT	AREA ACRE
1	3104.00	0.00	0.00	0.00	56.00	0.00
2	3104.17	2.68	2.68	0.00	58.28	0.00
3	3104.33	7.57	7.57	0.00	60.56	0.00
4	3104.50	13.91	13.91	0.00	62.83	0.00
FULL CONDUIT FLOW, ELEV = 3104.67 FT						
5	3104.67	21.42	21.42	0.00	65.11	0.00
6	3105.21	22.25	22.25	0.00	73.62	0.00
7	3105.75	23.07	23.07	0.00	83.96	0.00
8	3106.29	23.87	23.87	0.00	95.83	0.00
9	3106.83	24.63	24.63	0.00	108.98	0.00
10	3107.38	25.38	25.38	0.00	123.67	0.00
11	3107.92	26.10	26.10	0.00	139.04	0.00
12	3108.46	26.80	26.80	0.00	156.25	0.00
13	3109.00	27.49	27.49	0.00	173.78	0.00

HYD	FI							
		1.72						1
	0	0.1690						2
		0.00	0.01	0.09	0.32	0.89	FI D	3
		2.24	5.59	16.41	39.40	73.96	FI D	4
		120.75	181.30	253.23	325.02	386.32	FI D	5
		432.31	461.33	476.45	475.99	463.80	FI D	6
		442.80	412.73	374.49	335.19	300.65	FI D	7
		270.54	243.94	220.78	200.23	181.27	FI D	8
		164.14	149.13	135.73	123.69	112.86	FI D	9
		103.24	94.53	86.90	80.22	74.38	FI D	10
		69.34	65.00	61.16	57.78	54.76	FI D	11
		52.11	49.72	47.53	45.62	43.91	FI D	12
		42.30	40.77	39.28	37.85	36.44	FI D	13
		35.08	33.76	32.63	31.63	30.68	FI D	14
		29.76	28.86	27.98	27.12	26.26	FI D	15
		25.42	24.58	23.74	22.90	22.06	FI D	16
		21.23	20.39	19.56	18.72	17.89	FI D	17
		17.06	16.23	15.39	14.55	13.70	FI D	18
		12.83	11.93	11.00	10.05	9.07	FI D	19
		8.10	7.15	6.26	5.42	4.66	FI D	20
		3.98	3.38	2.85	2.41	2.04	FI D	21
		1.73	1.46	1.24	1.05	0.88	FI D	22
		0.75	0.63	0.53	0.45	0.37	FI D	23
		0.31	0.26	0.22	0.18	0.15	FI D	24
		0.13	0.10	0.09	0.07	0.06	FI D	25
		0.05	0.04	0.03	0.02	0.02	FI D	26
		0.01	0.01	0.01	0.00	0.00	FI D	27
		0.00	0.00	0.00	0.00	0.00	FI D	28
ENDTABLE							P 1,T 1	29

1SITES -----
 XEQ 03/21/2016 Latham WSID=
 VER 2005.1.6 SUBW= A
 TIME 12:27:59 SITE = S 1 PASS= 1 PART= 5

1SITES -----
 XEQ 03/21/2016 Latham WSID=
 VER 2005.1.6 SUBW= A
 TIME 12:27:59 SITE = S 1 PASS= 1 PART= 6

AUX. CREST 3105.68 FT 82.6 ACFT 0.00 AC 23.0 CFS
 PS STORAGE 26.6 ACFT, BETWEEN AUX. CREST AND SED. ACCUM ELEVATIONS.
 START ELEV 3104.00 FT 56.0 ACFT 0.00 AC 0.0 CFS
 EFFECTIVE HEIGHT(H)= 10.7 FEET, PRODUCT= 883. (H * STORAGE AT CREST AUX.).
 INPUT DESIGN CLASS = A1 = LT 3000. PRODUCT.
 NRCS-FBH D= 24.00 HR P= 3.30 IN Q= 1.41 IN DA= 1.72 SM
 TC= 2.67 HR CN= 79.00 VOL= 129.6 ACFT
 PEAK = 476.4 CFS, AT 13.8 HRS.

 RATING TABLE DEVELOPED, SITE = S 1:
 BY PROGRAM FOR PS AND AUX. SPILLWAYS
 AUX. RATING USED WSPVRT METHOD.

RATING TABLE NUMBER 2

	ELEV. FEET	Q-TOTAL CFS	Q-PS CFS	Q-AUX. CFS	VOLUME AC-FT	AREA ACRE
1	3104.00	0.00	0.00	0.00	56.00	0.00
2	3104.17	2.68	2.68	0.00	58.28	0.00
3	3104.33	7.57	7.57	0.00	60.56	0.00
4	3104.50	13.91	13.91	0.00	62.83	0.00
FULL CONDUIT FLOW, ELEV = 3104.67 FT						
5	3104.67	21.42	21.42	0.00	65.11	0.00
6	3104.80	21.60	21.60	0.00	66.82	0.00
7	3104.92	21.81	21.81	0.00	68.54	0.00
8	3105.05	22.00	22.00	0.00	70.53	0.00
9	3105.18	22.20	22.20	0.00	72.95	0.00
10	3105.30	22.39	22.39	0.00	75.36	0.00
11	3105.43	22.59	22.59	0.00	77.78	0.00
12	3105.55	22.78	22.78	0.00	80.19	0.00
13	3105.68	22.97	22.97	0.00	82.61	0.00
14	3105.85	30.19	23.22	6.97	85.80	0.00
15	3106.01	37.40	23.46	13.94	89.04	0.00
16	3106.31	75.98	23.89	52.08	96.29	0.00
17	3106.68	196.73	24.41	172.31	105.16	0.00
18	3107.34	546.94	25.33	521.61	122.69	0.00
19	3108.17	1105.50	26.43	1079.07	146.92	0.00
20	3109.00	1794.11	27.49	1766.62	173.80	0.00

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.	0.	0.0	3.5	**	**	**	CREST
2	0.	50.	0.3	3.5	0.80	1	2.0	EXIT !

* Upper case indicates a reach of constructed spillway channel.

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

! Reach 2 used in computing exit channel velocities.

HYD	FO	1.72							1
	0	0.1690						S 1	2
		0.04	0.04	0.04	0.04	0.05	FO D		3
		0.08	0.14	0.32	0.76	1.67	FO D		4
		3.69	8.18	16.56	21.67	22.13	FO D		5
		22.56	24.72	39.76	71.01	133.20	FO D		6
		188.78	244.06	280.69	298.86	303.53	FO D		7
		299.13	288.87	275.03	259.22	242.45	FO D		8
		225.37	208.53	193.62	182.52	171.36	FO D		9
		160.37	149.69	139.45	129.75	120.64	FO D		10
		112.17	104.36	97.19	90.64	84.67	FO D		11
		79.25	75.30	73.39	71.47	69.55	FO D		12
		67.66	65.79	63.94	62.13	60.34	FO D		13
		58.58	56.85	55.15	53.51	51.91	FO D		14
		50.35	48.85	47.38	45.96	44.58	FO D		15
		43.24	41.93	40.66	39.42	38.21	FO D		16
		37.24	36.73	36.22	35.70	35.17	FO D		17
		34.62	34.07	33.52	32.95	32.37	FO D		18
		31.79	31.19	30.59	29.97	29.34	FO D		19
		28.69	28.03	27.37	26.70	26.03	FO D		20
		25.35	24.68	24.00	23.34	22.96	FO D		21
		22.94	22.91	22.89	22.86	22.84	FO D		22
		22.82	22.79	22.77	22.74	22.72	FO D		23
		22.69	22.67	22.64	22.62	22.59	FO D		24
		22.57	22.54	22.52	22.49	22.47	FO D		25
		22.44	22.42	22.39	22.37	22.34	FO D		26
		22.32	22.29	22.27	22.24	22.22	FO D		27
		22.19	22.17	22.14	22.12	22.09	FO D		28
		22.07	22.04	22.02	21.99	21.96	FO D		29
		21.93	21.90	21.87	21.84	21.81	FO D		30
		21.77	21.74	21.70	21.67	21.63	FO D		31
		21.60	21.56	21.53	21.50	21.46	FO D		32
		21.43	20.87	19.93	19.03	18.18	FO D		33
		17.36	16.58	15.83	15.12	14.44	FO D		34
		13.81	13.28	12.77	12.29	11.82	FO D		35
		11.37	10.93	10.52	10.12	9.73	FO D		36
		9.36	9.00	8.66	8.33	8.01	FO D		37
		7.71	7.45	7.23	7.01	6.81	FO D		38
		6.61	6.41	6.22	6.04	5.86	FO D		39
		5.69	5.52	5.35	5.20	5.04	FO D		40
		4.89	4.75	4.61	4.47	4.34	FO D		41
		4.21	4.09	3.97	3.85	3.73	FO D		42

3.62	3.52	3.41	3.31	3.21	FO D 43
3.12	3.03	2.94	2.85	2.77	FO D 44
2.68	2.64	2.59	2.55	2.51	FO D 45
2.47	2.43	2.39	2.35	2.31	FO D 46
2.28	2.24	2.20	2.17	2.13	FO D 47
2.10	2.06	2.03	2.00	1.96	FO D 48
1.93	1.90	1.87	1.84	1.81	FO D 49
1.78	1.75	1.72	1.69	1.67	FO D 50
1.64	1.61	1.59	1.56	1.53	FO D 51
1.51	1.48	1.46	1.44	1.41	FO D 52
1.39	1.37	1.35	1.32	1.30	FO D 53
1.28	1.26	1.24	1.22	1.20	FO D 54
1.18	1.16	1.14	1.12	1.10	FO D 55
1.09	1.07	1.05	1.03	1.02	FO D 56
1.00	0.98	0.97	0.95	0.94	FO D 57
0.92	0.91	0.89	0.88	0.86	FO D 58
0.85	0.84	0.82	0.81	0.80	FO D 59
0.78	0.77	0.76	0.75	0.73	FO D 60
0.72	0.71	0.70	0.69	0.68	FO D 61
0.66	0.65	0.64	0.63	0.62	FO D 62
0.61	0.60	0.59	0.58	0.57	FO D 63
0.56	0.55	0.55	0.54	0.53	FO D 64
0.52	0.51	0.50	0.49	0.00	FO D 65

ENDTABLE

P 1,T 2 66

1SITES -----

XEQ 03/21/2016

Latham

WSID=

VER 2005.1.6

SUBW= A

TIME 12:27:59

SITE = S 1

PASS= 1

PART= 7

DRAWDOWN USING FREEBOARD STORM FOLLOWS, STARTING AT ELEVATION 3105.68 FT.

DRAWDOWN (DDT) TEST 3104.00 FT 56.0 ACFT 0.00 CFS

CONTROL IS 0.000 DETENTION STORAGE

DRAWDOWN TIME = 3.74 DAYS, TO 0.0 CFS (LIMIT = 10.00 DAYS)

HYD	FO	1.72						1
	0	0.1690					S 1	2
		0.04	0.04	0.04	0.04	0.05	FO D	3
		0.08	0.14	0.32	0.76	1.67	FO D	4
		3.69	8.18	16.56	21.67	22.13	FO D	5
		22.56	24.72	39.76	71.01	133.20	FO D	6
		188.78	244.06	280.69	298.86	303.53	FO D	7
		299.13	288.87	275.03	259.22	242.45	FO D	8
		225.37	208.53	193.62	182.52	171.36	FO D	9
		160.37	149.69	139.45	129.75	120.64	FO D	10
		112.17	104.36	97.19	90.64	84.67	FO D	11
		79.25	75.30	73.39	71.47	69.55	FO D	12
		67.66	65.79	63.94	62.13	60.34	FO D	13
		58.58	56.85	55.15	53.51	51.91	FO D	14
		50.35	48.85	47.38	45.96	44.58	FO D	15
		43.24	41.93	40.66	39.42	38.21	FO D	16
		37.24	36.73	36.22	35.70	35.17	FO D	17
		34.62	34.07	33.52	32.95	32.37	FO D	18
		31.79	31.19	30.59	29.97	29.34	FO D	19
		28.69	28.03	27.37	26.70	26.03	FO D	20

25.35	24.68	24.00	23.34	22.96	FO D 21
22.94	22.91	22.89	22.86	22.84	FO D 22
22.82	22.79	22.77	22.74	22.72	FO D 23
22.69	22.67	22.64	22.62	22.59	FO D 24
22.57	22.54	22.52	22.49	22.47	FO D 25
22.44	22.42	22.39	22.37	22.34	FO D 26
22.32	22.29	22.27	22.24	22.22	FO D 27
22.19	22.17	22.14	22.12	22.09	FO D 28
22.07	22.04	22.02	21.99	21.96	FO D 29
21.93	21.90	21.87	21.84	21.81	FO D 30
21.77	21.74	21.70	21.67	21.63	FO D 31
21.60	21.56	21.53	21.50	21.46	FO D 32
21.43	20.87	19.93	19.03	18.18	FO D 33
17.36	16.58	15.83	15.12	14.44	FO D 34
13.81	13.28	12.77	12.29	11.82	FO D 35
11.37	10.93	10.52	10.12	9.73	FO D 36
9.36	9.00	8.66	8.33	8.01	FO D 37
7.71	7.45	7.23	7.01	6.81	FO D 38
6.61	6.41	6.22	6.04	5.86	FO D 39
5.69	5.52	5.35	5.20	5.04	FO D 40
4.89	4.75	4.61	4.47	4.34	FO D 41
4.21	4.09	3.97	3.85	3.73	FO D 42
3.62	3.52	3.41	3.31	3.21	FO D 43
3.12	3.03	2.94	2.85	2.77	FO D 44
2.68	2.64	2.59	2.55	2.51	FO D 45
2.47	2.43	2.39	2.35	2.31	FO D 46
2.28	2.24	2.20	2.17	2.13	FO D 47
2.10	2.06	2.03	2.00	1.96	FO D 48
1.93	1.90	1.87	1.84	1.81	FO D 49
1.78	1.75	1.72	1.69	1.67	FO D 50
1.64	1.61	1.59	1.56	1.53	FO D 51
1.51	1.48	1.46	1.44	1.41	FO D 52
1.39	1.37	1.35	1.32	1.30	FO D 53
1.28	1.26	1.24	1.22	1.20	FO D 54
1.18	1.16	1.14	1.12	1.10	FO D 55
1.09	1.07	1.05	1.03	1.02	FO D 56
1.00	0.98	0.97	0.95	0.94	FO D 57
0.92	0.91	0.89	0.88	0.86	FO D 58
0.85	0.84	0.82	0.81	0.80	FO D 59
0.78	0.77	0.76	0.75	0.73	FO D 60
0.72	0.71	0.70	0.69	0.68	FO D 61
0.66	0.65	0.64	0.63	0.62	FO D 62
0.61	0.60	0.59	0.58	0.57	FO D 63
0.56	0.55	0.55	0.54	0.53	FO D 64
0.52	0.51	0.50	0.49	0.00	FO D 65

ENDTABLE

P 1,T 2 66

1SITES -----
 XEQ 03/21/2016 Latham WSID=
 VER 2005.1.6 SUBW= A
 TIME 12:27:59 SITE = S 1 PASS= 1 PART= 8

ROUTED	BTM WIDTH	MAX ELEV	VOL-MAX	AREA-MAX	AUX.-HP	VOL-AUX.
RESULTS	FT	FT	ACFT	AC	FT	ACFT
NRCS-FBH	100.0	3106.90	110.5	0.0	1.22	27.9

^^^^ NOTE -- ACTUAL Hp OF 1.22 RAISED TO MEET MIN. 378 CRITERIA.

PEAK - CFS Q-PS Q-AUX. Q-TOT.
DISCHARGE = 24.7 278.8 303.5

	CRITICAL DEPTH	CRITICAL VELOCITY	CRITICAL SLOPE-Sc	25% OF Q Sc
AUXILIARY	FT	FT/SEC	FT/FT	FT/FT
SPILLWAY ---	0.62	4.42	0.019	0.059

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

Aux. Spillway Discharge = 279. cfs; Bottom Width = 100. ft

REACH NO.	FROM STA	TO STA	SLOPE %	MANNING'S n	VELOCITY ft/s	TOTAL STRESS lb/ft^2	EFFECTIVE STRESS lb/ft^2
2	0.	50.	0.33	0.033	2.58	0.22	0.009

AUXILIARY SPILLWAY DURATION FLOW = 13.4 HOURS
ATTACK, OE/B = 0.8 ACFT/FT

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

EXIT CHANNEL FLOW SUBCRITICAL: MAX VELOCITY= 2.6 FT/SEC
EXIT SLOPE = 0.003 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 = 3107.68.

ROUTED RESULTS	BTM WIDTH FT	MAX ELEV FT	VOL-MAX ACFT	AREA-MAX AC	AUX.HP FT	VOL-AUX. ACFT
MINIMUM AUX.	100.0	3107.68	132.7	0.0	2.00	50.0

PEAK - CFS Q-PS Q-AUX. Q-TOT.
DISCHARGES = 25.8 750.9 776.6

	CRITICAL DEPTH	CRITICAL VELOCITY	CRITICAL SLOPE-Sc	25% OF Q Sc
AUXILIARY	FT	FT/SEC	FT/FT	FT/FT
SPILLWAY ---	1.19	6.09	0.011	0.025

>>>>> NHCP378 RUN - MINIMUM DEPTH, DESIGN FLOW TO TOP OF DAM; 1.00 FT REQUIRED
FOR THIS PASS. NEW TOP OF DAM ELEVATION = 3107.90.

ROUTED RESULTS	BTM WIDTH FT	MAX ELEV FT	VOL-MAX ACFT	AREA-MAX AC	AUX.HP FT	VOL-AUX. ACFT
MINIMUM AUX.	100.0	3107.90	138.9	0.0	2.22	56.3

PEAK - CFS Q-PS Q-AUX. Q-TOT.
DISCHARGES = 26.1 895.6 921.7

	CRITICAL	CRITICAL	CRITICAL	25% OF Q
--	----------	----------	----------	----------

AUXILIARY SPILLWAY ---	DEPTH FT 1.34	VELOCITY FT/SEC 6.44	SLOPE-Sc FT/FT 0.010	Sc FT/FT 0.022
---------------------------	---------------------	----------------------------	----------------------------	----------------------

Inflow Hyd 1 PSH-Peak = 22.97 CFS at 6.42 hrs., Location Point

Inflow Hyd 1 FBH-Peak = 303.53 CFS at 4.06 hrs., Location Point

HYDOUT 1

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

Latham

0 SUBWATERSHED(S) ANALYZED.

1 STRUCTURE(S) ANALYZED.

2 HYDROGRAPHS ROUTED AT LOWEST SITE.

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

SITES.....COMPUTATIONS COMPLETE

>>>	SITE ID	SUBWS ID	SUBWS DA (SQ MI)	CURVE NO.	TC (HRS)	TOTAL DA (SQ MI)	TYPE DESIGN	STRUC CLASS	<<<
	S 1	A	1.72	79.	2.67	1.72	378NR	A1	

PASS NO.	DIA./ WIDTH (IN/FT)	AUX.CREST ELEV (FT)	BTM. WIDTH (FT)	MAX. HP (FT)	MAX. ELEV (FT)	EMB. VOL. (CY)	INTEGR.* DIST. (FT)	EXIT* VEL. (FT/SEC)	TYPE HYD
1	18.0	3105.7	100.0	2.2	3107.9	0.	0.	2.6	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 2005.1.6 ,01/01/2005
FILES

INPUT = C:\SITESdata\base\Latham_48inch_Drop.D2C

OUTPUT = C:\SITESdata\base\Latham_48inch_Drop.OUT
DATED 03/21/2016 12:27:59

FILE GEN. = C:\SITESdata\base\Latham_48inch_Drop.DEC DATED 03/21/2016 12:27:59

GRAPHICS FILES GENERATED

OPTION "L" = C:\SITESdata\base\Latham_48inch_Drop.DRG DATED 03/21/2016 12:27:59

OPTION "P" = C:\SITESdata\base\Latham_48inch_Drop.DHY DATED 03/21/2016 12:27:59

OPTION "E" = C:\SITESdata\base\Latham_48inch_Drop.DEM DATED 03/21/2016 12:27:59

Latham Dam Repair – Harding County

On November 9, 2015, Gerald Miller and I performed soil investigations for a suitable borrow site to fix a headcut leading into the Latham dam on John Latham's ranch (SE ¼ Sec.24, T. 15 N. R. 2 E.) in Harding County. The area around the dam was mapped Swanboy-Slickspots, 0 to 2 percent slopes (SyA) and Lismas-Hisle complex, 6 to 25 percent slopes (LhD). Soil investigations confirmed the soils mapped in the area and care needs to be taken when choosing borrow areas. There are many areas of claypan (dispersive clay) soils and are signified by the lack of vegetation growing in those areas. This is unsuitable material for fill due to the high likelihood of piping.

There should be enough areas of Swanboy soil to get the amount of fill material required. Swanboy soil areas are signified by relatively good stands of western wheatgrass but fill should only be taken to a depth of about 5 feet. If shale is encountered above this depth, the material should be discarded because this material would be unsuited for fill – difficult to pack and potential for piping. Care should be taken to moisten this material thoroughly before placing and packing in the headcut. This soil has a high expansive clay (smectic) content and will be prone to cracking when it dries.

Submitted by,

Kent Cooley
Area Resource Soil Scientist

Cut/Fill Summary

Name	Cut Factor	Fill Factor	2d Area	Cut	Fill	Net
Grade Stabilization cy	1.000	1.000	58488.51 Sq. Ft.	0.00 Cu. Yd.	10970.29 Cu. Yd.	10970.29 Cu. Yd. <Fill>
GS Core cy	1.000	1.000	3849.33 Sq. Ft.	0.00 Cu. Yd.	236.99 Cu. Yd.	236.99 Cu. Yd. <Fill>
Cut Berm cy	1.000	1.000	8232.22 Sq. Ft.	0.00 Cu. Yd.	1685.35 Cu. Yd.	1685.35 Cu. Yd. <Fill>
Cut Stripping (1)	1.000	1.000	8232.11 Sq. Ft.	0.00 Cu. Yd.	152.45 Cu. Yd.	152.45 Cu. Yd. <Fill>
GS Stripping (1)	1.000	1.000	58458.83 Sq. Ft.	0.00 Cu. Yd.	1082.57 Cu. Yd.	1082.57 Cu. Yd. <Fill>
Cut Core cy	1.000	1.000	1521.61 Sq. Ft.	0.00 Cu. Yd.	92.26 Cu. Yd.	92.26 Cu. Yd. <Fill>
Aux Spill cy	1.000	1.000	9594.50 Sq. Ft.	297.99 Cu. Yd.	3.29 Cu. Yd.	294.70 Cu. Yd. <Cut>
Topsoil cy	1.000	1.000	9594.50 Sq. Ft.	0.00 Cu. Yd.	117.27 Cu. Yd.	117.27 Cu. Yd. <Fill>
Totals			157971.59 Sq. Ft.	297.99 Cu. Yd.	14340.46 Cu. Yd.	14042.47 Cu. Yd. <Fill>

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 and the foundation shall be free of standing water 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 materials shall have a moisture content that when kneaded in the hand will form a firm 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 and mixed 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

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 incorporated in required earthfill areas as specified, or 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-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 periods:

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

Late Spring 5/15 to 6/15 – Warm-season species only with a companion crop.

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

Dormant 11/1 to Spring Thaw - Cool season species with mulch.

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. The cover crop shall be clipped or chemically killed and perennial species shall be planted during the next available establishment period. 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 the species to be planted.

3. Fertilizer

Fertilizer is ☐ Required ☒ Not Required

If fertilizer is used it shall be supplied and applied as follows: Apply fertilizer based on the recommendations from a soil test or apply 30 to 40 pounds of actual N and 40 to 60 pounds of P_2O_5 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. Do not use manure on areas that will drain directly into a water body or stream. 5 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. 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 3 inches. The seedbed should be firm enough so that the boot heel of an average adult penetrates the soil to a depth of approximately 1/2 inch. The contractor shall suspend operations when the soil is too wet.

5. 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 1/4 to 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-eight or serpentine pattern, etc.).

6. 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 nine months of its latest germination test.

	Grass	Seeding Rate (PLS lbs./Acre)	
		Drilled	Broadcast
☐	Smooth Brome grass ¹	12	16
☐	Western Wheatgrass	8	10
☒	Intermediate Wheatgrass	8	10
☐	Slender Wheatgrass	5	6
☐	Western Wheatgrass	15	20
☐	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.

7. Cover Crops

If permanent seeding is not completed during the early or late spring period, a cover crop meeting the following rates and dates will be planted immediately after construction. Cover crops are required for all practices constructed after the early or late 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.

Cover Crop	Seeding rate (lbs./acre)	Spring Dates	Fall Dates
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.

8. Companion Crops

Companion Crops are ☐ Required ☒ Not Required to be seeded during the permanent seeding period. Companion crops are only to be used for warm-season species seeded in the late spring period (5/15 to 6/15). The companion crops shall be seeded as follows:

Companion Crop	Seeding rate (lbs./acre)
None	

Companion crops shall be seeded at the same time as the permanent seeding. The companion crop should be clipped and removed or mowed before it becomes competitive with the perennial species or sets seed.

9. **Mulching**
Mulching is ☐ Required ☒ Not Required

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 seedbed during the early spring period where the design velocity is greater than 2.5 fps. 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.

CONSTRUCTION SPECIFICATION

SD-14 WOOD AND STEEL STRUCTURES

1. Scope

The work shall consist of furnishing and constructing wood and/or steel structures.

2. Materials

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

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

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

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

Structural poles, posts, and lumber. All wood material shall be sound, new 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 poles, posts, and all nominal lumber sizes 2X10 or larger shall be pressure treated by one of the following preservatives:

Creosote

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.

Hardware. Bolts, rods, nuts, washers, and other hardware shall be an appropriate grade of steel and shall be galvanized except as shown otherwise on the drawings.

Structural Steel. Except as shown on the drawings, steel shall be malleable, weldable, carbon steel.

Galvanizing of Steel. Except as otherwise specified, items shown on the drawings to be galvanized, shall be galvanized according to ASTM A123, except bolts, screws, and other fasteners 0.5 inch or less in diameter may be coated with electro-deposited zinc or cadmium coating following ASTM B766 or B633.

Zinc Painting of Steel - For items specified to be painted with zinc paint, the surfaces shall be cleaned and painted as follows.

Cleaning - Surfaces to be painted must be clean and dry. Remove oil and grease using a solvent. Clean surfaces to be painted using sand blasting, power disk sanding, or wire brushing.

Paint - Apply 2 coats of zinc-rich cold galvanized compound using brush, or aerosol application (example: Rust-Oleum Professional Galvanizing Compound) or zinc dust - zinc oxide primer ASTM D79, D520, or D4146.

3. Installation

Structures shall be installed accurately to the dimensions shown on the drawings.

Nails and spikes shall be driven in wood 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.

Steel welds shall be heavy duty with obvious strength equal to the strength of the structural steel.

4. Measurement and Payment

Material quantities will not be measured. Payment for each structure, complete in place, will be made at the contract lump sum price for that structure. Such payment will be considered full compensation for all labor, transportation, equipment, materials, and all other items necessary and incidental to completion of the work.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary.

CONSTRUCTION SPECIFICATION
SD-20A PLASTIC PIPELINE
(STOCK WATER AND/OR DOMESTIC)

1. Scope

The work consists of furnishing and installing Poly-vinyl Chloride (PVC), Polyethylene (PE), High Density Polyethylene (HDPE), and Acrylonitrile-Butadiene-Styrene (ABS) plastic pipe complete with fittings and appurtenances, as shown on the drawings.

2. Materials

Plastic pipe and fittings shall conform to Material Specification SD-55.

3. Handling and Storage

Pipe shall be delivered to the site and handled by means that provide adequate support to the pipe. Plastic pipe shall be protected from bending, impact, abrasion, and cutting damage. Manufacturer's recommendations must be followed. Special care shall be taken to avoid impact damage below 40°F temperature. Pipe that is not ultraviolet resistant must not be exposed to sunlight for more than 15 days.

4. Joints and Connections

All joints and connections shall be made to carry design flows without significant pressure loss and to withstand the maximum design working pressure without leakage. Manufacturer's recommendations must be followed.

Dissimilar metals must not be in contact with each other. Steel or other metals subject to corrosion must be protected from corrosion using high quality materials.

5. Trench Construction

Except as shown on the drawings, pipe trenches shall be not wider than 30 inches.

Where trench bottoms contain rocks or other material that may contact and damage the pipe, the trench bottom shall be excavated at least four inches below pipe grade and backfilled with bedding material consisting of sand or fine-grained soil.

Pipelines may be installed by "plow-in" where soils are suitable and rocks will not damage the pipe system.

6. Thrust Blocks

Except as otherwise specified, for pipelines greater than 1 1/2 inch diameter, thrust control shall be provided at all elbows greater than 45°, all tee connections, and at any location of potential thrust damage.

Thrust blocks must be formed against solid, compact earth. Except as otherwise shown on the drawings, thrust blocks shall consist of filling the space between the pipe and trench wall with concrete to the top of the pipe and for a distance of one foot along the pipe in each direction from center of the thrust.

7. Placement

Pipe that is not connected with flexible "slip-joint" connections must be installed in a "snake-like" position. The pipe shall be allowed to come to within a few degrees of subsoil temperature before backfilling or being connected to other facilities.

For pipe over four inches diameter, small holes shall be excavated in bedding material under pipe bells, fittings, and appurtenances as needed to assure the pipeline is uniformly supported on bedding at line and grade throughout its entire length. Blocking or mounding beneath the pipeline to bring it to design grade is not permitted. Care shall be taken to prevent distortion or damage and to exclude foreign material from entering the pipeline.

8. Testing

The pipeline shall be completely tested for 2 hours at design pressure (but not less than 10 feet of head) for pressure, leakage, and proper functioning. Lines must be slowly filled (to avoid damage) and flushed clean.

Conditions requiring repair and retest include excessive water hammer, continuing unsteady delivery of water, damage to the pipe, detrimental discharge from control valves, visible leaks, and/or loss of more than one-half gallon of water per hour per inch diameter per mile of pipe.

9. 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. Except where the pipe trench is precision excavated with pipe fitting bottom and with trench width not more than 110 percent of the pipe diameter, earth fill shall be worked and compacted under the haunches of the pipe to provide continuous support in layers not more than 6 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 within two feet of the pipe 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.

10. Potable Water Pipelines

All equipment and pipelines used for water for human consumption shall meet all requirements (including shock chlorinating) of the South Dakota Department of Health. Manufacturer's recommendations must be followed.

11. Certification and Guarantee

The installing contractor shall certify that his or her installation complies with this specification. The contractor shall furnish the installation owner a one-year written guarantee protecting the installation from defective materials and construction. Material manufacturers and pipe markings must also be supplied to the owner in writing.

PLASTIC PIPE (SD-55)

MATERIAL SPECIFICATION

1. Scope

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

2. Material

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

Poly vinyl chloride (PVC) Pipe

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

Polyethylene (PE) pipe

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

High density polyethylene (HDPE) pipe

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

Acrylonitrile-butadiene-styrene (ABS) pipe

Plastic pipe, schedules 40 and 80	ASTM D1527
Plastic pipe, SDR-PR	ASTM D2282
Schedule 40 plastic drain, waste, and vent pipe	ASTM D2661
Composite sewer pipe	ASTM D2680
Sewer pipe and fittings	ASTM 2751

3. Perforations

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

- a. Perforations may be circular or slots, but must be free of materials that reduce effective openings.
- b. Circular perforations shall be 3/16 to 5/16 inch diameter holes arranged in rows parallel to the axis of the pipe. Center-to-center perforation spacing along rows shall not exceed 2.5 inches. Perforations may appear at the ends of short and random lengths. Rows shall be arranged in equal groups at equal distance from pipe bottom vertical centerline. Lowermost rows shall be separated by 60 to 125 degrees. Uppermost rows shall be separated by an arc of 166 degrees or less. Other rows shall be uniformly spaced.

- c. Slot perforations shall be located within two rows, with one row in each of the lower quadrants of the pipe. Slots shall be no wider than 1/8 inch and spaced no more than 1.5 inches apart.
- d. Row numbers and minimum openings must be as follows.

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

4. Potable use pipeline

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

Water Permit Application No 1958-1
John Latham

Top of Dam Elev - 3109
2nd Spillway Elev - 3106
P. Spillway Elev - 3104
DIS Emb. Toe Elev - 3088.3

Cat. 3 - Low Hazard Dam

Ht. = 20.7 ft.

Normal Storage Capacity - 56 Ac-Ft.
Int. Storage Capacity - 88.7
Max Storage Capacity - 173.8

Int Capacity x Eff Ht. = $88.7 \times 11.3 = 1002 < 3000 \therefore 25 \text{ year}$
Minimum Spillway Design

From USGS NRI 98-4055 "Tech. Rep. Est. Peak Flows ... in SD"
DA = 1102 Ac = 1.72 mi²

$$Q_{25} = 207 CA^{.573}$$

$$= 207(1.72)^{.573}$$

$$= \underline{283 \text{ cfs}}$$

$$Q_{100} = 379 CA^{.566}$$

$$= 379(1.72)^{.566}$$

$$= \underline{515 \text{ cfs}}$$

Secondary Spillway Capacity

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

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

$$= \underline{1350 \text{ cfs}} \quad H = 3$$

NRCS Annual Yield

$$CN = 79 \quad ISD = 1 \quad DA = 1102 \text{ Ac}$$

Section 74:02:08:09

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

$$80\% \text{ chance} = 0.1$$

$$0.1 \times 1102^{1/2} = \underline{9 \text{ Ac-Ft}}$$

$$50\% \text{ chance} = 0.27$$

$$0.27 \times 1102^{1/2} = \underline{24.8 \text{ Ac-Ft}}$$

$$10\% \text{ chance} = 1.0$$

$$1.0 \times 1102^{1/2} = \underline{92 \text{ Ac-Ft}}$$

RECEIPT

WATER RIGHTS PROGRAM

South Dakota Department of Environment and Natural Resources

Date

4-11, 20 16

John Latham, 12269 Latham Rd, Camp Crook SD 57724

RECEIVED OF

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

Fee for Application for Permit No. _____ to Appropriate Water, to construct and to put water to beneficial use	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. _____	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. 07812

By Shanne Goodman
Chief Engineer /KS



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

May 9, 2016

John Latham
Box 18
Camp Crook, SD 57724

Dear Mr. Latham:

We have reviewed the plans and specifications for your dam project located in the NW ¼ SW ¼ of Section 19-T15N-3E, in Harding County. The plans and specifications for the reconstruction of the dam are approved. Approval of the plans and specifications does not authorize reconstruction of the dam. The reconstruction of the dam may not begin until Water Permit No. 1959-1 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 Latham Dam will be classified as a small size Category 3, Low Hazard dam with a dam height of 20.7 feet and a normal storage capacity of 56 acre-feet and a maximum storage capacity of 173.8 acre-feet.

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

Sincerely,

Timothy G. Schaal, P.E.
Engineer IV
for Jeanne Goodman, Chief Engineer
Water Rights Program
(605) 773-3352

c: Roy Boschec, P.E., NRCS, 414 E Stumer Rd, Rapid City SD 57701



**DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 1959-1, John Latham**

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. 1959-1, John Latham, Box 18, Camp Crook, SD 57724.

The Chief Engineer is recommending APPROVAL of Application No. 1959-1 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. 1959-1 authorizes an impoundment with a storage capacity of 56.0 acre feet of water and sufficient water annually to maintain the water level to the outlet elevation.
2. Low flows as needed for downstream domestic use, including livestock water and prior water rights must be by-passed.

See report on application for additional information.

Jeanne Goodman, Chief Engineer
May 9, 2016

REPORT ON
WATER PERMIT APPLICATION No. 1959-1
John Latham
May 9, 2016

Water Permit Application No. 1959-1 has been filed by John Latham to impound 56 acre-feet of water from runoff by reconstructing a dam located in the NW $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 19-T15N-R3E, in Harding County. The application also requests impoundment of sufficient water to maintain water at the outlet elevation. The water will supply a water distribution system for 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, reconstruction of the dam cannot begin until Water Permit Application No. 1959-1 is approved.

The dam will be 20.7 feet high with a normal storage capacity of 56 acre-feet with a reservoir level at the primary spillway elevation, and a maximum storage capacity of 173.8 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.

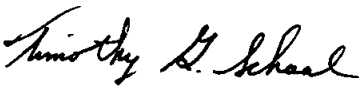
The dam has a drainage area of 1102 acres or 1.72 square miles. The dam will have a 48 inch diameter precast concrete riser and an 18 inch diameter PVC barrel with 5.0 foot of freeboard as the primary spillway; and a 100 foot wide earthcut secondary spillway with 3.0 feet of available freeboard. A 25-year frequency event produces a peak runoff of approximately 283 cfs, and a 100-year frequency event produces a peak runoff of approximately 515 cfs. The earthcut secondary spillway will have a capacity of approximately 1350 cfs.

The annual yield for this drainage area with an 80 percent chance of occurrence, or 8 out of 10 years, is expected to be 9 acre-feet. The annual yield with a 50 percent chance of occurrence, or 1 out of 2 years, is expected to be 25 acre-feet; and the annual yield with a 10 percent chance of occurrence, or 1 out of 10 years, is expected to be 92 acre-feet.

The Latham Dam will be located in the SW $\frac{1}{4}$ of Section 19-T15N-R3E on an unnamed tributary to the South Fork Moreau River, about 1.0 miles upstream of the confluence of the unnamed tributary and South Fork Moreau River. There are no existing Water Rights/Permits filed on the unnamed tributary between Latham Dam and the South Fork Moreau River.

Conclusions:

1. Water Permit Application No. 1959-1 should be approved since unappropriated water is available and approval should not have any adverse effect on existing Water Permits/Rights.
2. If approved, the low flow bypass requirement for downstream domestic use should be a qualification on Water Permit Application No. 1959-1.


Timothy G. Schaal, P.E.
Engineer IV

RECEIVED

MAY 23 2016

WATER RIGHTS
PROGRAM

NOTICE OF APPLICA-
TION NO. 1959-1
to Appropriate Water

Affidavit of Publication

STATE OF SOUTH DAKOTA:

COUNTY OF HARDING:

Letitia Lister of said County and State being first duly sworn, on her oath says: That the NATION'S CENTER NEWS is a legal weekly newspaper of general circulation, printed and published in the City of Buffalo, in said County and State by Letitia Lister, and has been such a newspaper during the times hereinafter mentioned; and that said newspaper has a bonafide circulation of at least 200 copies weekly, and has been published within said County in the English language for at least one year prior to the first publication of the notice herein mentioned, and is printed in whole or in part in an office maintained at the place of publication; and that I, Letitia Lister, the undersigned, am the Publisher of said newspaper and have personal knowledge of all the facts stated in this affidavit; and that the advertisement headed:

Notice of Application
No. 1959-1

a printed copy of which is hereto attached, was printed and published in said newspaper for 1 successive and consecutive weeks, the first publication being made on the 19th day of May, 2016 and the last publication on the _____ day of _____, that the full amount of fees charged for publishing same, to-wit: The sum of \$ 26.80, insures solely to the benefit of the publisher of the NATION CENTER NEWS, that no agreement or understanding for a division thereof has been made with any person and that no part thereof has been agreed to be paid to any other person whomsoever.

[Signature]
Subscribed and sworn to before me this 19th day of May, 2016

[Signature]
Notary Public, Lawrence County, South Dakota
My commission expires: 10-24-2016

Notice is given that John Latham, Box 18, Camp Crook SD 57724 has filed an application for a water permit to impound 56 acre-feet of water from runoff by repairing an existing dam located in the NW 1/4 SW 1/4 Section 19-T15N-R3E with water impounded in the NW 1/4 SW 1/4 Section 19-T15N-R3E and the NE 1/4 SE 1/4, S 1/2 NE 1/4 Section 24-T15N-R2E. This application requests impoundment of sufficient water to maintain water to the outlet elevation.

The water will supply a livestock water distribution system to be located in the Section 25-T15N-R2E and Sections 18 and 19; in T15N-R3E.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 1959-1 with qualifications 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. The Chief Engineer's recommendation with qualifications, the application, and staff report are available at <http://denr.sd.gov/public> or contact Eric Gronlund for this information, or other information, at the Water Rights Program address provided below.

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 May 31, 2016.

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.

If the applicant does not contest the recommendation of the Chief Engineer and no petition to oppose the application is received, the Chief Engineer shall act on the application pursuant to the recommendation with no hearing held before the Water Management Board. 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.

Steven M. Pirner,
Secretary,
Department of
Environment and
Natural Resources.

Published once at the
total approximate cost of
\$27.26.

#215
May 19

RECEIVED

MAY 23 2016

WATER RIGHTS
PROGRAM

Affidavit of Publication

STATE OF SOUTH DAKOTA:

COUNTY OF LAWRENCE:

Letitia Lister of said County and State being first duly sworn, on her oath says: That the BLACK HILLS PIONEER is a legal daily newspaper of general circulation, printed and published in the City of Spearfish, in said County and State by Letitia Lister, and has been such a newspaper during the times hereinafter mentioned; and that said newspaper has a bonafide circulation of at least 200 copies weekly, and has been published within said County in the English language for at least one year prior to the first publication of the notice herein mentioned, and is printed in whole or in part in an office maintained at the place of publication; and that I, Letitia Lister, the undersigned, am the Publisher of said newspaper and have personal knowledge of all the facts stated in this affidavit; and that the advertisement headed:

Notice Of Application
No. 1959-1

a printed copy of which is hereto attached, was printed and published in said newspaper for 1 successive and consecutive weeks, the first publication being made on the 19th day of May 2016, and the last publication on the _____ day of _____, that the full amount of fees charged for publishing same, to-wit: The sum of \$ 26.80, insures solely to the benefit of the publisher of the BLACK HILLS PIONEER, that no agreement or understanding for a division thereof has been made with any person and that no part thereof has been agreed to be paid to any other person whomsoever.

[Signature]
Subscribed and sworn to before me this 20th day of May, 2016

[Signature]
Notary Public, Lawrence County, South Dakota
My commission expires: 10-24-2016

NOTICE OF APPLICATION NO. 1959-1 to Appropriate Water

Notice is given that John Latham, Box 18, Camp Crook SD 57724 has filed an application for a water permit to impound 56 acre-feet of water from runoff by repairing an existing dam located in the NW 1/4 SW 1/4 Section 19-T15N-R3E with water impounded in the NW 1/4 SW 1/4 Section 19-T15N-R3E and the NE 1/4 SE 1/4, S 1/2 NE 1/4 Section 24-T15N-R2E. This application requests impoundment of sufficient water to maintain water to the outlet elevation.

The water will supply a livestock water distribution system to be located in the Section 25-T15N-R2E and Sections 18 and 19; in T15N-R3E.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 1959-1 with qualifications 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. The Chief Engineer's recommendation with qualifications, the application, and staff report are available at <http://denr.sd.gov/public> or contact Eric Gronlund for this information, or other information, at the Water Rights Program address provided below.

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 May 31, 2016.

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.

If the applicant does not contest the recommendation of the Chief Engineer and no petition to oppose the application is received, the Chief Engineer shall act on the application pursuant to the recommendation with no hearing held before the Water Management Board. 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.

Steven M. Pirmer,
Secretary,
Department of
Environment and
Natural Resources.

Published once at the
total approximate cost of
\$27.26.

#345
May 19

Schlaak, Karen

From: Schlaak, Karen
Sent: Tuesday, May 10, 2016 8:50 AM
To: Legals (legals@bhpioneer.com)
Subject: 1959-1, John Latham
Attachments: 1959-1publicnov2015.short1.docx; FORM8.FRM.doc

Attached is a notice to be published on May 19, 2016 in both the Black Hills Pioneer and the Nation's Center News.

John Latham, Box 18, Camp Crook SD 57724 (605 430-8157) has been notified to contact you to authorize publication and arrange for payment.

Please send the affidavit or return the attached Proof of Publication form ASAP.

Let me know if you have questions. Please acknowledge receipt of this email.

Karen Schlaak

Water Rights Program
523 E Capitol Ave
Pierre SD 57501
Phone: 605 773-3352



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

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

May 9, 2016

John Latham
Box 18
Camp Crook SD 57724

Dear Mr. Latham:

Water Permit Application No. 1959-1 for 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 Nation's Center News printed at Buffalo SD (Ph # 605-375-3228) and the Black Hills Pioneer printed at Spearfish SD (Ph # 605-642-2761). You will need to contact the newspaper(s) 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(s) to authorize publication of your Notice and to arrange for payment. Early contact with the paper(s) can eliminate delays. Upon receiving authorization from you, the publisher has been instructed to publish your notice. The newspaper has also been instructed to send us the Proof of Publication. We must receive Proof of Publication before action can be taken on the application.

Sincerely,

Eric Gronlund
Natural Resources Engineer
(605) 773-3352

enclosures

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

Instruction to Newspaper - Publish the Notice on May 19, 2016. The applicant is responsible for payment.

NOTICE OF APPLICATION NO. 1959-1 to Appropriate Water

Notice is given that John Latham, Box 18, Camp Crook SD 57724 has filed an application for a water permit to impound 56 acre-feet of water from runoff by repairing an existing dam located in the NW 1/4 SW 1/4 Section 19-T15N-R3E with water impounded in the NW 1/4 SW 1/4 Section 19-T15N-R3E and the NE 1/4 SE 1/4, S 1/2 NE 1/4 Section 24-T15N-R2E. This application requests impoundment of sufficient water to maintain water to the outlet elevation.

The water will supply a livestock water distribution system to be located in the Section 25-T15N-R2E and Sections 18 and 19; in T15N-R3E.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 1959-1 with qualifications 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. The Chief Engineer's recommendation with qualifications, the application, and staff report are available at <http://denr.sd.gov/public> or contact Eric Gronlund for this information, or other information, at the Water Rights Program address provided below.

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 May 31, 2016.

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.

If the applicant does not contest the recommendation of the Chief Engineer and no petition to oppose the application is received, the Chief Engineer shall act on the application pursuant to the recommendation with no hearing held before the Water Management Board. 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.

Steven M. Pirner, Secretary, Department of Environment and Natural Resources. Published once at the total approximate cost of_____.



DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

JUN 27 2016

John Latham
PO Box 18
Camp Crook SD 57724

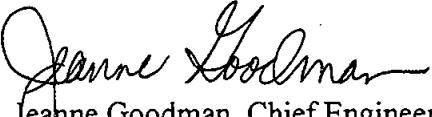
Dear Mr. Latham:

Enclosed is Water Permit No. 1959-1 authorizing construction of the 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,


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

enclosures

Report of Examination of Works and/or Application of Water to Beneficial Use For Permit No. 1959-1

I have this day September 6, 2018 made a thorough examination of the water use system constructed by John Latham, Box 18, Camp Crook, SD 57724 of Permit No. 1959-1, bearing the priority of 4/11/2016 authorizing the diversion and storage of 56 acre-feet of runoff water from a dry draw tributary to the South Fork of the Moreau River for livestock water purposes in Harding County.

Inspection contact & relationship to permit holder, if applicable:

John Latham, owner
605-430-8157 (cell)

A. Dam Information:

- 1) Height to crest 20.5 feet from downstream toe
- 2) Height to primary spillway 15.5 feet from downstream toe
- 3) Height to secondary spillway 17.5 feet from downstream toe
- 4) Crest width 12 feet
- 5) Crest length 1,085 feet
- 6) Primary Spillway width 18 inches
- 7) Secondary Spillway width 100 feet
- 8) Approx. storage to primary spillway 56 ac-ft
- 9) Approx. storage to crest 174 ac-ft

Date constructed: Fall 2017

B. Works used to put water to beneficial use:

This is an earth fill embankment utilizing an 18" PVC primary spillway and a 100' wide vegetated earth emergency spillway. The reservoir pool is fenced. Water is put to beneficial use for livestock using a pipeline distribution system to provide water for stock tanks located on the ranch.

C. Compliance with Permit Requirements:

- 1) Permit qualifications being abided by: Yes

Low flows as needed for downstream domestic use including livestock and prior water rights must be by-passed. A permanent by-pass structure was not installed. Any by-pass of flows if needed will use temporary means.

Irrigation Questionnaires checked to determine if permit owner started irrigation by the end of construction period. N/A

List any extended period of nonuse: none

- 2) Exceptions to compliance are: none

D. Condition and Location:

1. The system is in good condition with the point of diversion located as follows:
480' E and 1,616' N of the SW corner Section 19 T15N R3E (45.246482, -103.811535)

The works are capable of diverting to the place of use and storing 56.0 acre-feet of water which is to be used for **livestock use**. Water has been put to beneficial use to the maximum extent and the license should be issued for 56.0 acre-feet storage.

2. All structures, wells and lands on map Yes

E. Comments or other permit(s) associated with the project: none



Steven Quissell
Water Rights Inspector
DENR, Water Rights Program

Date report completed: 9/11/2018



Crest of dam



Primary Spillway inlet and pool

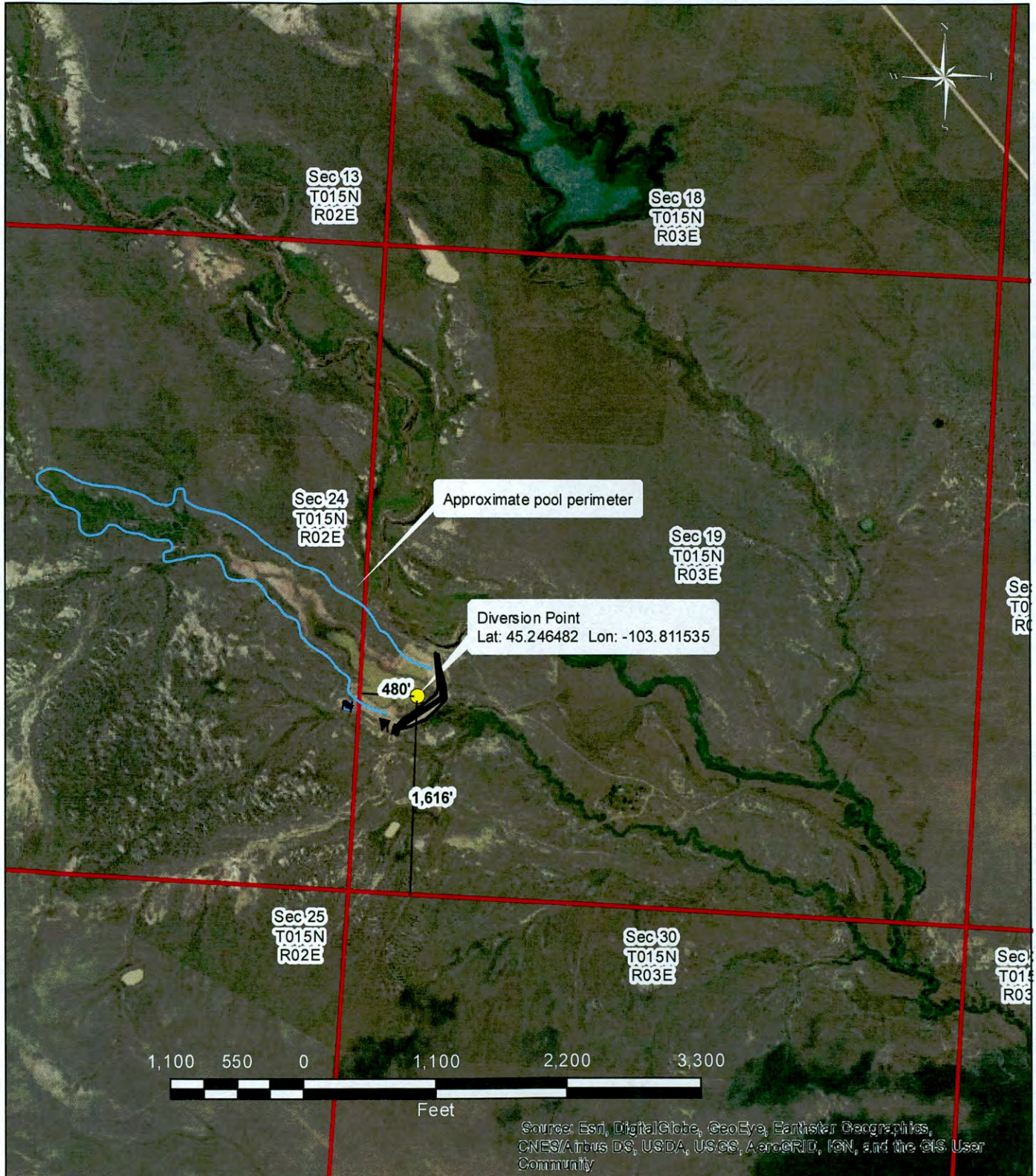


18" PVC spillway outlet

Water Right # 1959-1

John Latham

9/6/2018



Steven Quissell

Steven Quissell
Water Rights Inspector
DENR Water Rights Program





DEPARTMENT of ENVIRONMENT
and NATURAL RESOURCES

JOE FOSS BUILDING
523 EAST CAPITOL
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

SEP 26 2018

1959-1

John Latham
Box 18
Camp Crook SD 57724

Dear Mr. Latham:

Enclosed is Water License No. 1959-1. 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. 1959-1

(1) John Latham, Box 18, Camp Crook SD 57724 made Application No. 1959-1, April 11, 2016 for a water permit to impound 56 acre feet of water from runoff, Harding County, South Dakota for domestic livestock watering purposes. Permit No. 1959-1, with a priority date of April 11, 2016 was approved May 31, 2016 and issued to the applicant for diversion of water with construction of the described water supply system to be completed on or before May 31, 2021 and for the application to beneficial use of water on or before May 31, 2025.

(2) It is certified that the permit holder has complied with the provisions of South Dakota State Law relating to completion of the water supply system and is entitled to impound 56 acre feet of water for beneficial use.

The storage dam is located (spillway):

- 480'E and 1,616'N of the SW corner of Section 19, T15N, R3E (NW ¼ SW ¼)
(Latitude 45.246482, Longitude -103.811535).

Water is impounded in the NW ¼ SW ¼ Section 19, T15N, R3E and the E ½ Section 24, T15N, R2E.

(3) The permit holder has complied with the provisions of South Dakota State Law relating to the application of water to beneficial use for livestock using a pipeline distribution system to provide water for stock tanks located on the ranch.

(4) Pursuant to South Dakota Water Law 46-5-30.1 John Latham, Box 18, Camp Crook SD 57724 the holder and/or owner of Water Right No. 1959-1 is issued a license to appropriate water, the right to impound 56 acre feet of water from dry draw runoff (tributary to the South Fork of the Moreau River) with a priority date of April 11, 2016 from the location specified in (2) of this license for domestic livestock watering purposes.

This license is subject to South Dakota Water Law, any limitations or conditions listed in Water Right No. 1959-1 and subject to the following qualifications:

- Water Right No. 1959-1 authorizes an impoundment with a storage capacity of 56 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

SEP 26 2018

date

