DELAWARE WATERSHED JOINT DISTRICT NO. 10
Rehabilitation Grade Stabilization Dam Site A-99
Water Structure No. DJA-174

Jackson County, Kansas

APPROVED
This 19th day of January, 2022
Earl D. Lewis, Jr., P.E.
Chief Engineer
Division of Water Resources
Kansas Department of Agriculture

EARL D. LEWIS, JR., P.E.
CHIEF ENGINEER

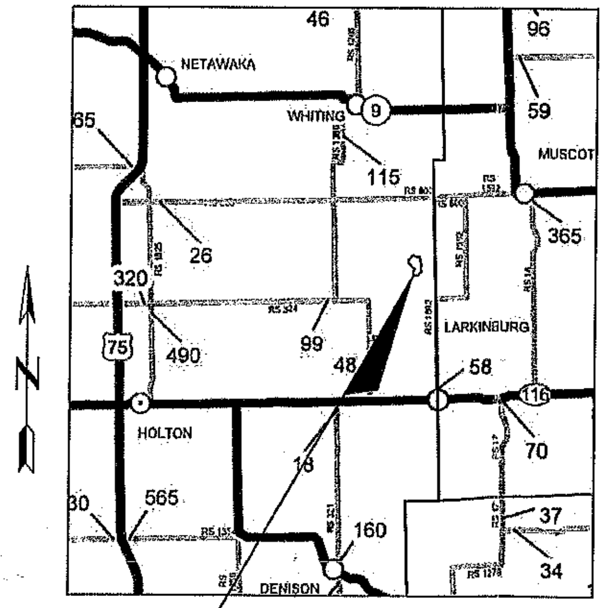
Location:
THE S 1/2 OF SECTION
13-T6S-R16E
IN JACKSON COUNTY, KS
39°31'17.03"N, 95°34'34.93"W

TABLE OF APPROXIMATE QUANTITIES

Item	Unit	Quantity
Mobilization	Each	1
Clearing and Grubbing	Acres	1
New Fence / Gate	L.Ft./Each	1700/2
Seeding & Mulching	Acres	1.5
Permanent Reference Marker and Witness Post	Each	2
Rock Barrier	Each	2
Excavation:		
Stilling Basin	Cu. Yds.	300
Pipe Trench: Principal Spwy., and Drain Pipe	Cu. Yds.	5200
Earthfill:		
Embankment - Class A Hand Compaction: Principal Spwy., and Drain Pipe	Cu. Yds.	60
Embankment & Auxiliary Spwy. Class A fill.	Cu. Yds.	5400
Excavation, Salvage, and Spreading Topsoil	Cu. Yds.	120
Principal Spillway Works:		
PVC Pipe 12" dia. DR25 AWWA C-900	L.Ft.	155
Outlet Housing - CM Pipe 15" Dia., 16 ga.	L.Ft.	20
Beaver Retardent Structure	Each	1
Dewatering of Water Body	Each	1
C.M. Pipe Support 8' long with 7.1° saddle angle	Each	2
Reinforced Concrete for Pipe Support Class 4000	Cu. Yds.	0.5
Riprap Rock Around Inlet of Principal Spillway	Cu. Yds.	25
Stilling Basin and Rock Barriers Riprap	Cu. Yds.	120
Non-woven Geotextile 8 oz./yd Under Riprap	Sq. Yd.	205
Drawdown / Drainage Diaphragm		
Drawdown Pipe - PVC Pipe 6" dia. DR25	L.Ft.	209.2
Drawdown Riser - 12" CMP	L.Ft.	6
Drawdown Valve	Each	1
Drainage Diaphragm Pipe - PVC Pipe 4" dia. DR25	L.Ft.	65
Drainfill for Drainage Diaphragm	Cu. Yds.	6.2
Non-woven Geotextile Filter Fabric 8oz./yd.	SqYd	22
4" PVC DR25 ASTM D2241 90° Elbow Connector	Each	1
No. 30 Slotted PVC Pipe 4" dia. DR25 ASTM D2241	L.Ft.	6
Manufactured End Cap - 4" dia. DR25 ASTM D2241	Each	1
4" Filter Fabric Sleeve	L.Ft.	6
Outlet Housing - 6" dia., Helical CM Pipe 16 ga.	L.Ft.	16
Animal Guard for 6" CMP	Each	1
Outlet Housing - 8" dia., Helical CM Pipe 16 ga.	L.Ft.	16
Animal Guard for 8" CMP	Each	1
Stormwater Pollution Prevention:		
Hay Bale Sediment Barriers	L.Ft.	130
Silt Fencing	L.Ft.	70

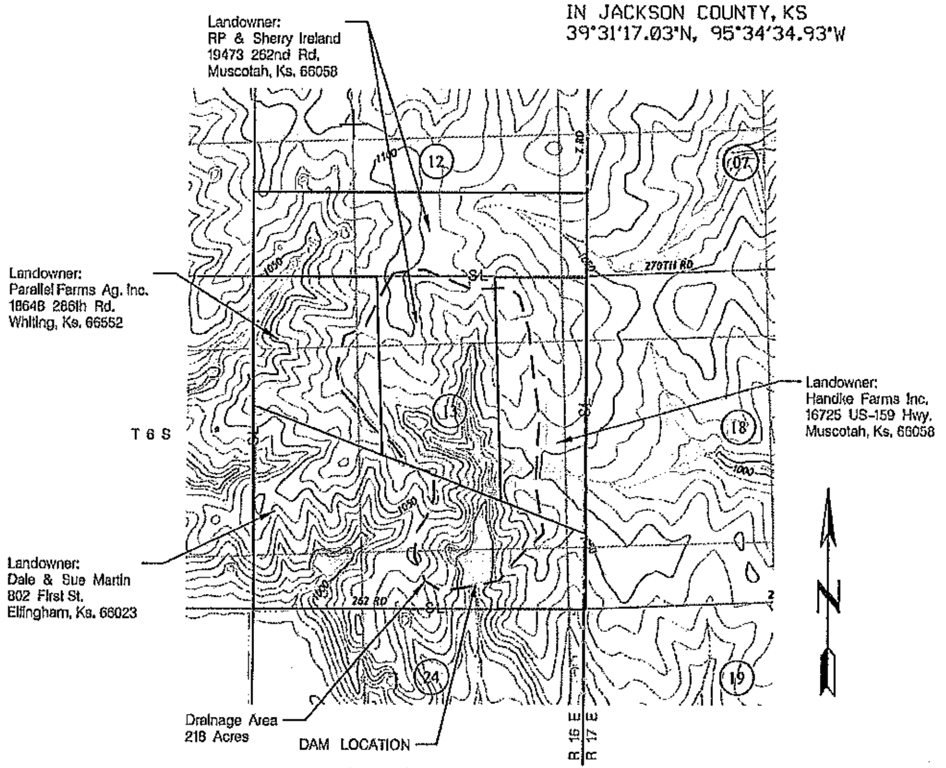
INDEX to SHEETS

LOCATION MAP



PROJECT LOCATION

Drawing Not to Scale



DRAINAGE AREA MAP

Drawing Not to Scale

NOTE: SEE SHEET 5 FOR CONSTRUCTION INGRESS/EGRESS ROUTE.

Note: CONSTRUCTION INSPECTION
Before the start fo construction, the chief engineer shall be provided in writing with the name, address and telephone number of the engineer responsible for the inspection.

During Construction, a licensed engineer will remain on site for inspection whenever any of the following conditions are met:
backfill in the cutoff trench, conduits and their appurtenances being placed, backfill around the conduit, drain materials being installed, and any other stage of construction required by a permit.

CONSTRUCTION NOTIFICATION
Notify the Division of Water Resources 48 hours prior to construction starting. The contact is Ambrose Ketter, Dam Safety Team Leader, (785) 564-6653 or Ambrose.Ketter@ks.gov.

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(1-800-344-7233)

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KANSAS

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Find out where the underground utility lines might be buried before you dig.

Anyone digging in Kansas must call before digging. The person who is doing the work is responsible for calling KOC. If the owner contracts with a professional excavator to do the excavation then the professional excavator is responsible for calling KOC.

You (the digger) will need to provide information about the work site when you call. This is a FREE service.

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[Chapter 66.—PUBLIC UTILITIES
Article 18.—UTILITY DAMAGE PREVENTION]

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1421 E. 104th Street, Ste. 100 KCMO 64131
o: 816-333-4477 f: 816-333-5806

JOEL S. BUFFINGTON
PE25822
12-24-21

Mark	Description	Date

CFS ENGINEERS, P.A.
1421 E 104TH STREET
KANSAS CITY, MO

DELAWARE WATERSHED JOINT DISTRICT
NO. 10: GRADE STABILIZATION
DETENTION DAM SITE A99
JACKSON COUNTY, KANSAS

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Ckd by: ---
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TITLE SHEET

Sheet reference number:
1

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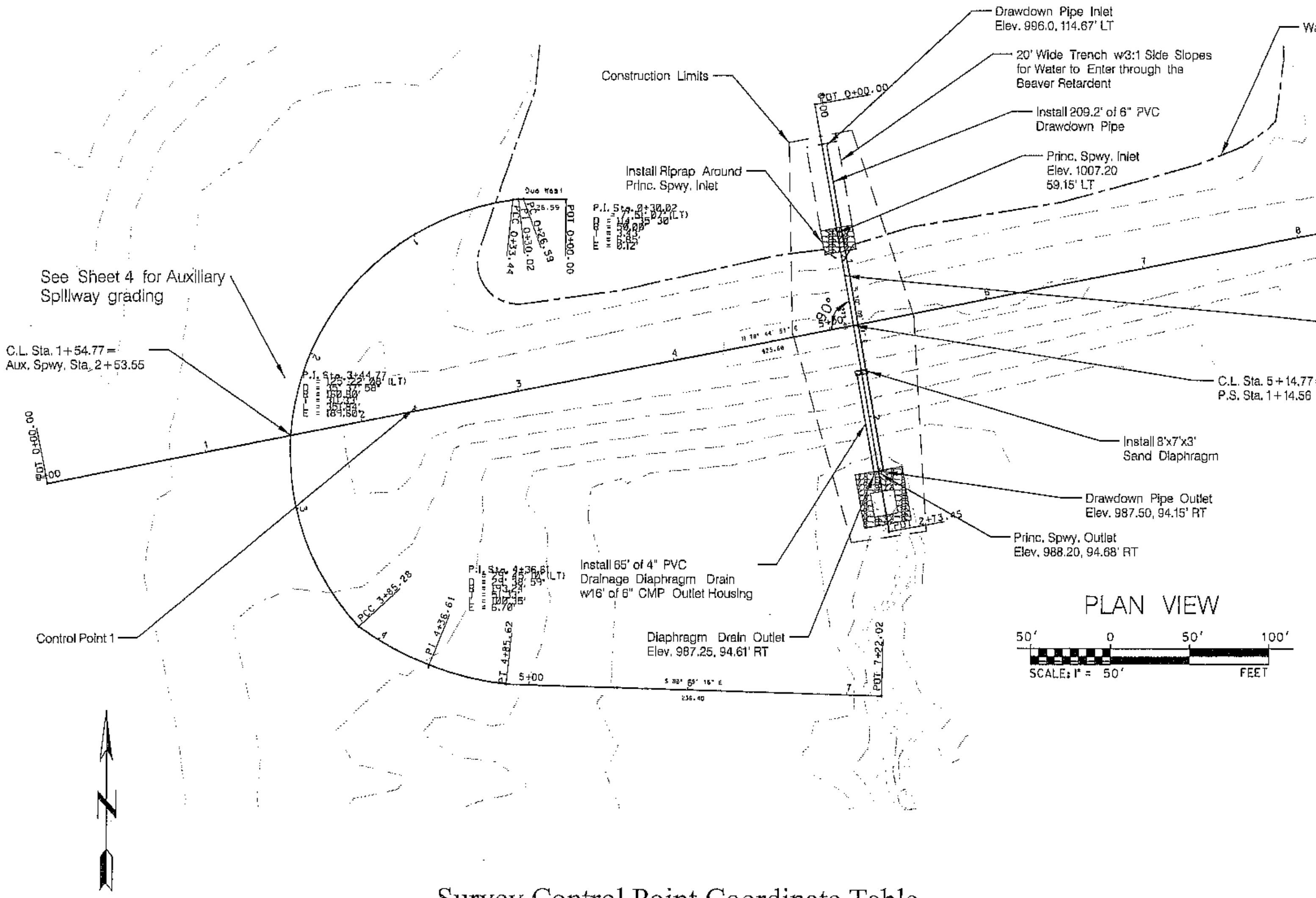
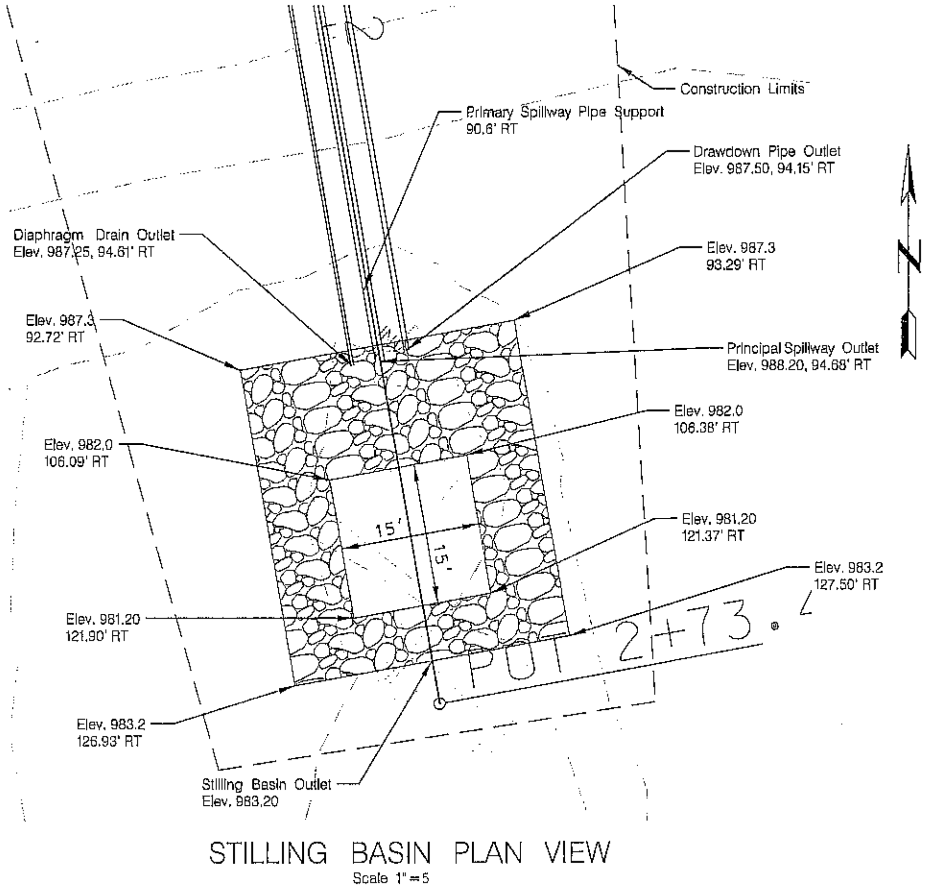


PLAN VIEW



STILLING BASIN PLAN VIEW

Scale 1"=5

Survey Control Point Coordinate Table

Location	Northing	Easting	Elevation	Description
C.L. Dam POT Sta. 00+35.90	659200.57	10548512.42	1016.83	Begin Dam Alignment
C.L. Dam PI Sta. 1+54.77	659223.86	10548629.00	1014.05	C.L. Dam = C.L. Aux. Spwy.
CP 1 Sta. 2+34.43	659241.09	10548706.80	1018.14	Control Point 1
C.L. Dam PI Sta. 5+14.77	659294.11	10548982.08	1020.01	C.L. Dam = C.L. Primay Spwy.
CP 2 Sta. 0+51.36	659362.04	10549311.59	1017.8	Control Point 2
C.L. Dam POT Sta. 8+87.79	659366.90	10549347.93	1019.69	End Dam Alignment
P.S. Dam POT 0+00.00	659433.45	10548957.11		Begin Primary Spwy. Alignment
P.S. Dam POT 2+73.45	659164.20	10549005.35	982	End Primary Spwy. Alignment

RESERVOIR CAPACITY TABLE

	Elev.	Acres	Incr. Storage (ac.ft.)	Total Storage (ac.ft.)
	985	0.0	0.0	0.0
	989	0.16	0.21	0.21
	993	0.65	0.15	1.72
	997	1.53	4.24	5.96
	1001	3.54	9.86	15.82
	1005	5.12	17.22	33.04
P.S.	1007.2	8.06	14.38	47.42
	1011	9.78	33.85	81.27
A.S.	1014.4	12.09	37.10	118.37
	1014.8	12.44	4.90	123.28
	1016	13.41	15.50	138.78
T.O.D.	1018	15.36	28.74	167.52

DISCHARGE TABLE

Item	Elev.	Acres	Pipe (cfs)	Aux. Spwy (cfs)	Total (cfs)
	985	0.0	0	0	0
	989	0.16	0	0	0
	993	0.65	0	0	0
	997	1.53	0	0	0
	1001	3.54	0	0	0
	1005	5.12	0	0	0
P.S.	1007.2	8.06	0	0	0
	1011	9.78	6.87	0	6.87
A.S.	1014.4	12.09	9.79	0	9.79
	1014.8	12.44	10.08	58.96	69.04
	1016	13.41	10.89	471.75	482.64
T.O.D.	1018	15.36	12.14	1592.18	1604.31

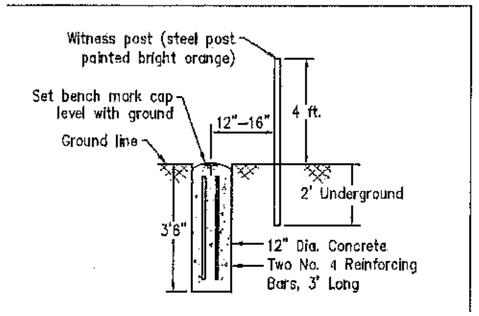
Note:
The height of each lift in the embankment shall be no more than 9 inches.

EMBANKMENT REQUIREMENTS

Embankment Zone	Source and Type of Material				Placement and Moisture Density Requirements				
	Source	Description and Grading	Depth of Lift		Maximum Size Rock Fragment		Compaction Class	Reference Test	Required Compaction	Allowable Moisture Range from Optimum (%)
Zone I	Borrow and Required Excavation	Plastic soil w/ 0-35% durable Rock>#4	9" 1	6"	A (Spec. 23)	Method A ASTM D-698	95%	2% below to 3% Above Optimum
Zone II		Soil w/ 0-35% durable Rock>#4	9" 1* 12" 2 24" 3	6" 1* 8" 2 16" 3				
		Soil w/ 35-65% durable Rock>#4	9" 1 12" 2 24" 3	6" 1 8" 2 16" 3		Method A or Method C ASTM D-696	95%	As necessary to obtain compaction
Zone IV		Random	9"	(Spec. 23)	C	ASTM D-696	(Spec. 23)	(Spec. 23)

100% Standard Proctor Dry Density = 100.0 pcf at 22.5%
Allowable Moisture Range for Compaction = 20.5 to 25.5 %
Minimum Acceptable Density in Zones 1 and 2 is 95.0 pcf

* 1 Sheepsfoot Tamping Roller 2 Pneumatic Roller 3 Vibrating Roller



PERMANENT REFERENCE MARKER AND WITNESS POST

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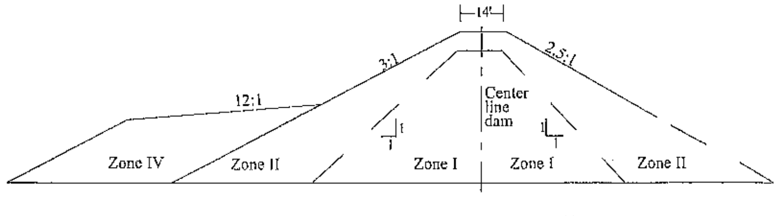

Earthfill Placement Details

(Drawing not to scale)

APPROVED
Earl D. Lewis, Jr., P.E.
JAN 12 2022
Chief Engineer, Division of Water Resources
Kansas Department of Agriculture

CFS ENGINEERS
cfse.com
1421 E. 104th Street, Ste. 100 KCMO 64131
o 816-333-4477 f 816-333-6688

PE25822
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1421E 104TH STREET
KANSAS CITY, MO

DELAWARE WATERSHED JOINT DISTRICT
NO. 10; GRADE STABILIZATION
DETENTION DAM SITE A99
JACKSON COUNTY, KANSAS

PLAN VIEW AND
SURVEY CONTROL

Sheet reference number:
2

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PRINCIPAL SPILLWAY
TABLE OF PIPE GRADES

LOCATION	GRADE (FT/FT)	ELEV.
59.15' LT	.1235	1007.20
94.68' RT		988.20

DRAWDOWN
TABLE OF PIPE GRADES

LOCATION	GRADE (FT/FT)	ELEV.
114.67' LT	.012	996.0
30.01' RT	.1054	994.52
94.15' RT		987.54

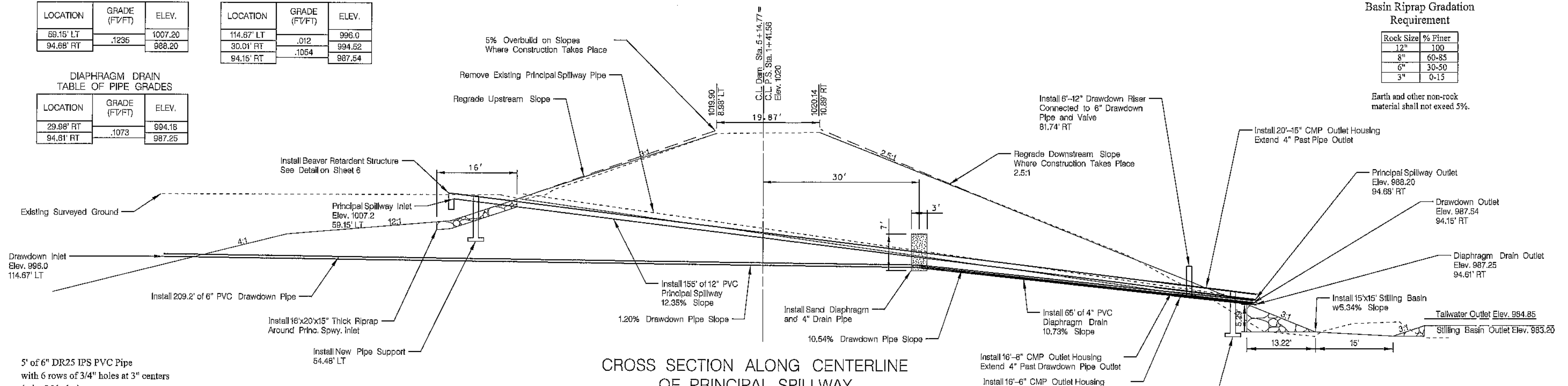
DIAPHRAGM DRAIN
TABLE OF PIPE GRADES

LOCATION	GRADE (FT/FT)	ELEV.
29.98' RT	.1073	994.18
94.61' RT		987.25

Principal Spillway and Stilling
Basin Riprap Gradation
Requirement

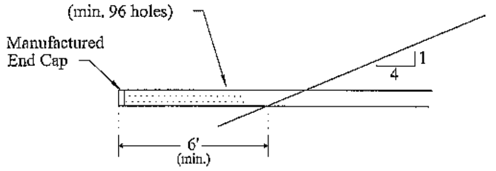
Rock Size	% Finer
12"	100
8"	60-85
6"	30-50
3"	0-15

Earth and other non-rock material shall not exeed 5%.

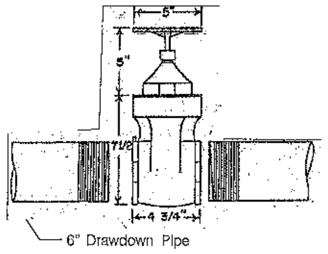


CROSS SECTION ALONG CENTERLINE OF PRINCIPAL SPILLWAY

Scale : 1" = 10'



Details of Drawdown Inlet
(Drawing not to scale)



Details of Drawdown Valve
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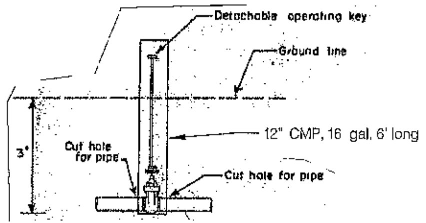
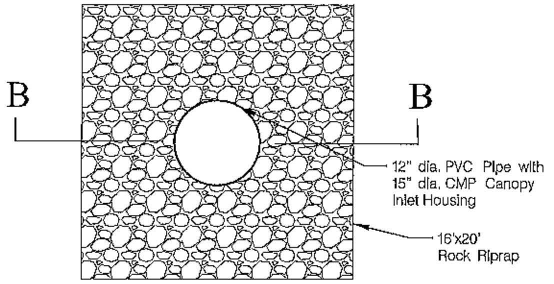
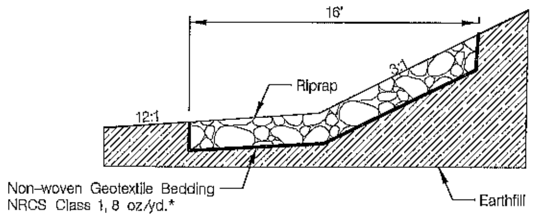


Details of Drawdown Riser
(Drawing not to scale)

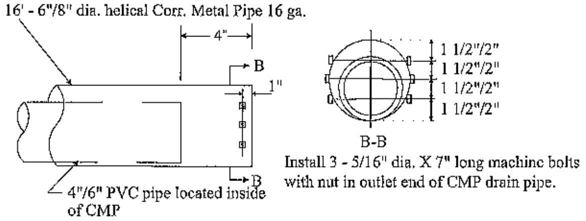


Plan View of P.S. Inlet
(Drawing not to scale)



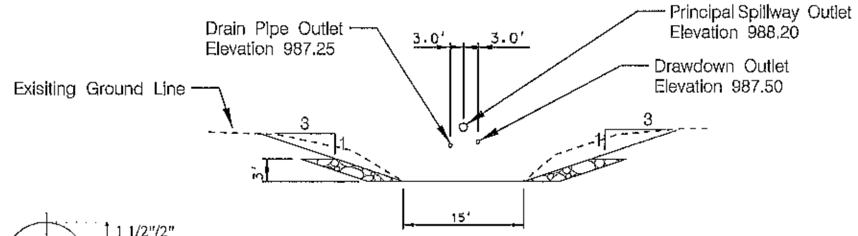
Riprap and Geotextile Placement
(Drawing not to scale)

Note:
Riprap shall be placed over a nonwoven geotextile needle punched 8 oz./yd.² or a 9 inch bedding of well-graded gravel with median rock size of 1 inch. The gravel shall contain approximately 20 percent fines (finer than 200 sieve) by weight.



Install 3 - 5/16" dia. X 7" long machine bolts with nut in outlet end of CMP drain pipe.

ANIMAL GUARD FOR DRAIN AND DRAWDOWN
(Drawing not to scale)



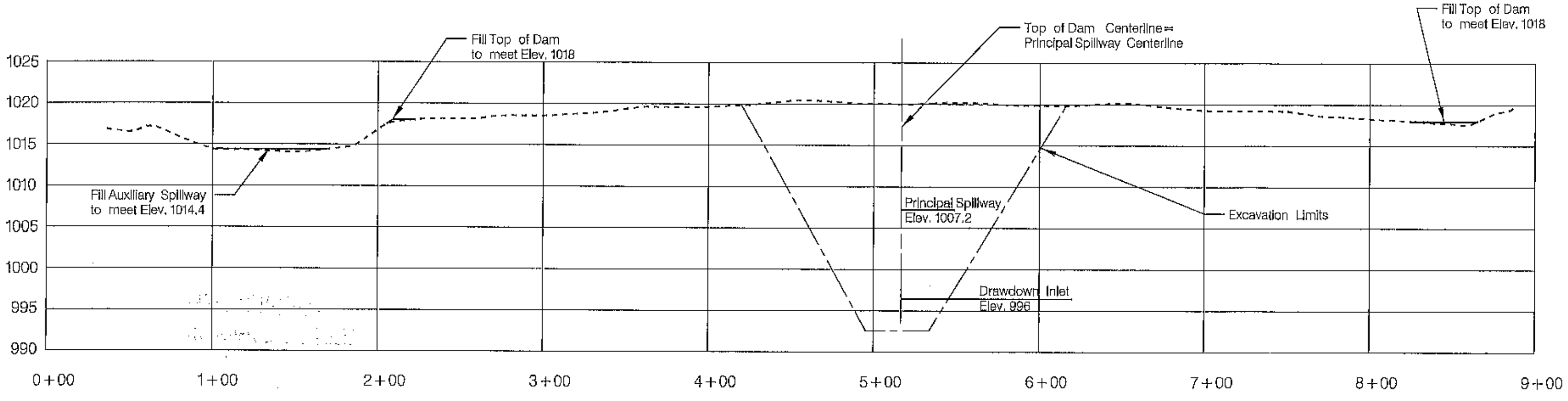
CROSS SECTION STILLING BASIN
(Drawing not to scale)

APPROVED
Earl D. Lewis, Jr., P.E.
JAN 12 2022
Chief Engineer, Division of Water Resources
Kansas Department of Agriculture

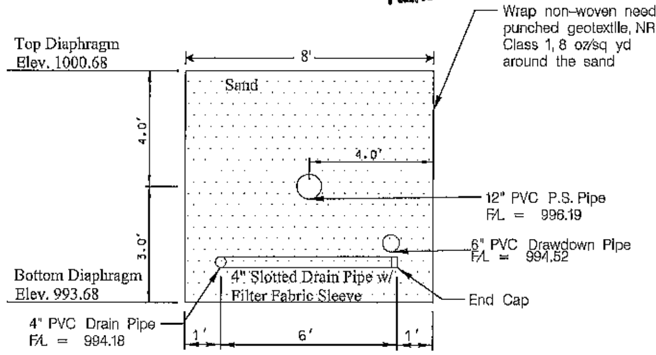
SAND DRAINFILL REQUIREMENT

SIEVE No.	% PASSING
3/8"	100
4	95-100
8	80-100
16	50-85
30	25-60
50	5-30
100*	0-10
200*	0-5

* All material finer than #100 sieve must be non-plastic, washed, clean sand.



PROFILE ALONG TOP OF DAM



CROSS SECTION OF SAND DIAPHRAGM
(Drawing not to scale)

Note:
·Three or more rows of 0.030 inch wide slots uniformly spaced at 2 slots per inch. Minimum of 4 square inches open area per foot of length.

·Compact sand in 6" lifts with vibrator.

·Drainage Diaphragm is 8'x7x3'
Sand Volume = 6.2 yds.

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o: 816-333-4477 f: 816-333-5888

EL S. BUFFINGTON
PE25822
12-24-21
KANSAS
PROFESSIONAL ENGINEER

Mark	Description	Date

CFS ENGINEERS, P.A.
1421E 104TH STREET
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NO. 10; GRADE STABILIZATION
DETENTION DAM SITE A99
JACKSON COUNTY, KANSAS

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CROSS SECTION AND PROFILE VIEWS

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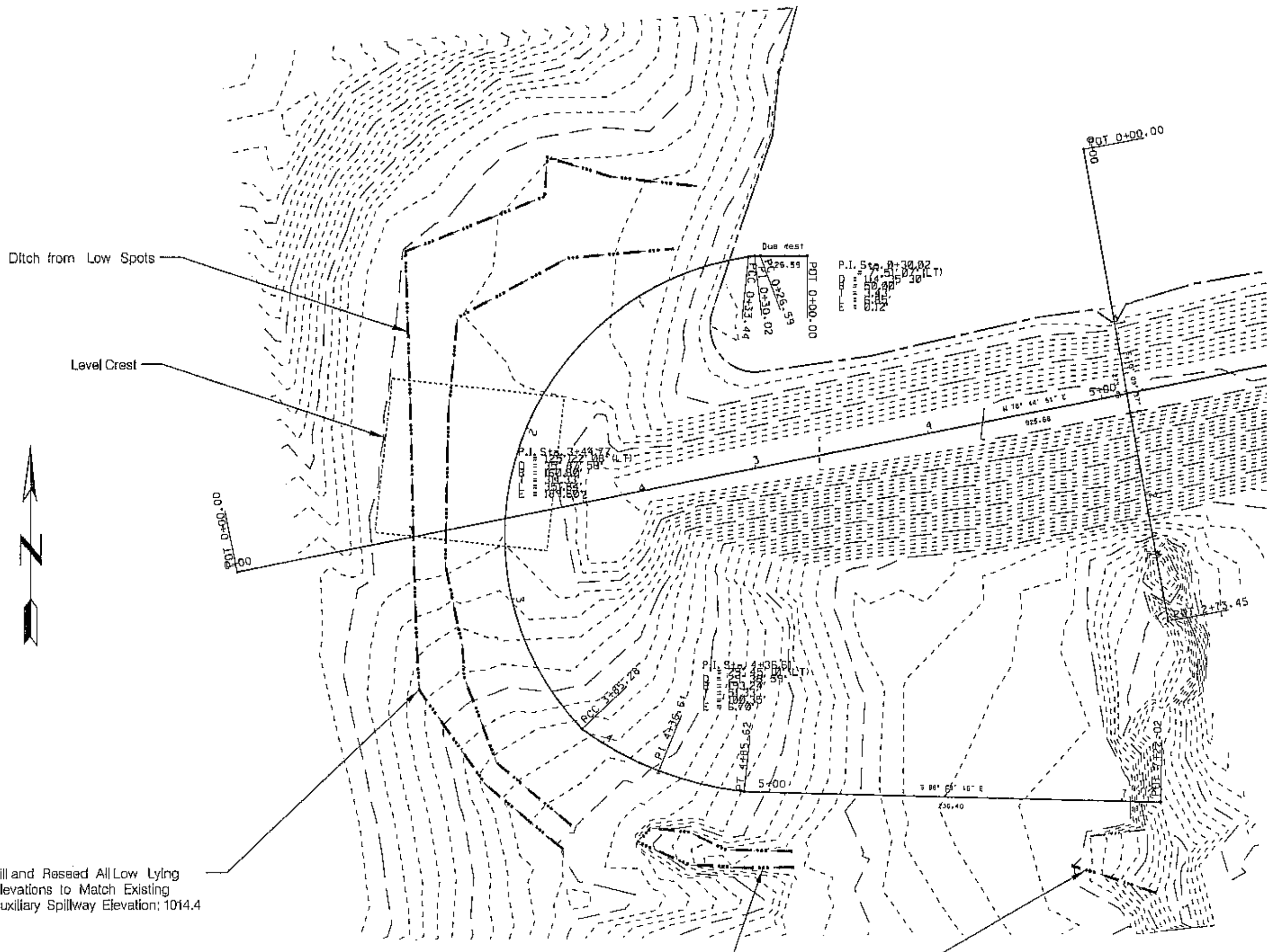
PLAN VIEW OF AUXILIARY SPILLWAY
Scale 1" = 50'



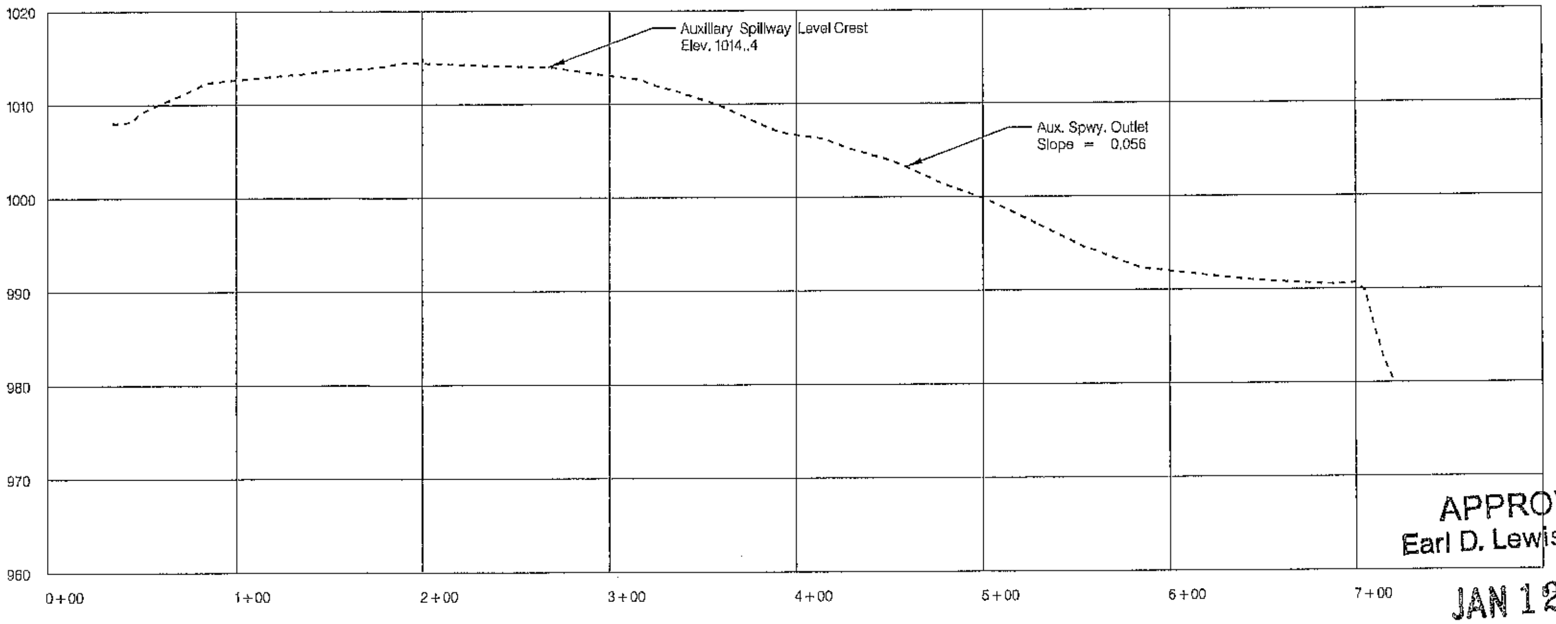
Surveyed Ditch from Low Spots

Level Crest

Fill and Reseed All Low Lying Elevations to Match Existing Auxiliary Spillway Elevation: 1014.4

Fill and Reseed All Low Lying Elevations Causing Ditch to Match Surrounding Grade

NOTE:
The Auxiliary Spillway survey shows ditches along the outside of the spillway. In order to prevent further erosion, the ditches will be filled, compacted, and reseeded to match existing elevation grades and to minimally meet the 1014.4 Auxilary Spillway elevation.



PROFILE OF AUXILIARY SPILLWAY

APPROVED
Earl D. Lewis, Jr., P.E.
JAN 12 2022
Chief Engineer, Division of Water Resources
Kansas Department of Agriculture

CFS
cfse.com
ENGINEERS
1421 E. 104th Street, Ste. 100 KCMO 64131
o: 816-333-4477 f: 816-333-6688

JOEL S. BUFFINGTON
PE25822
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AUXILIARY SPILLWAY DETAILS

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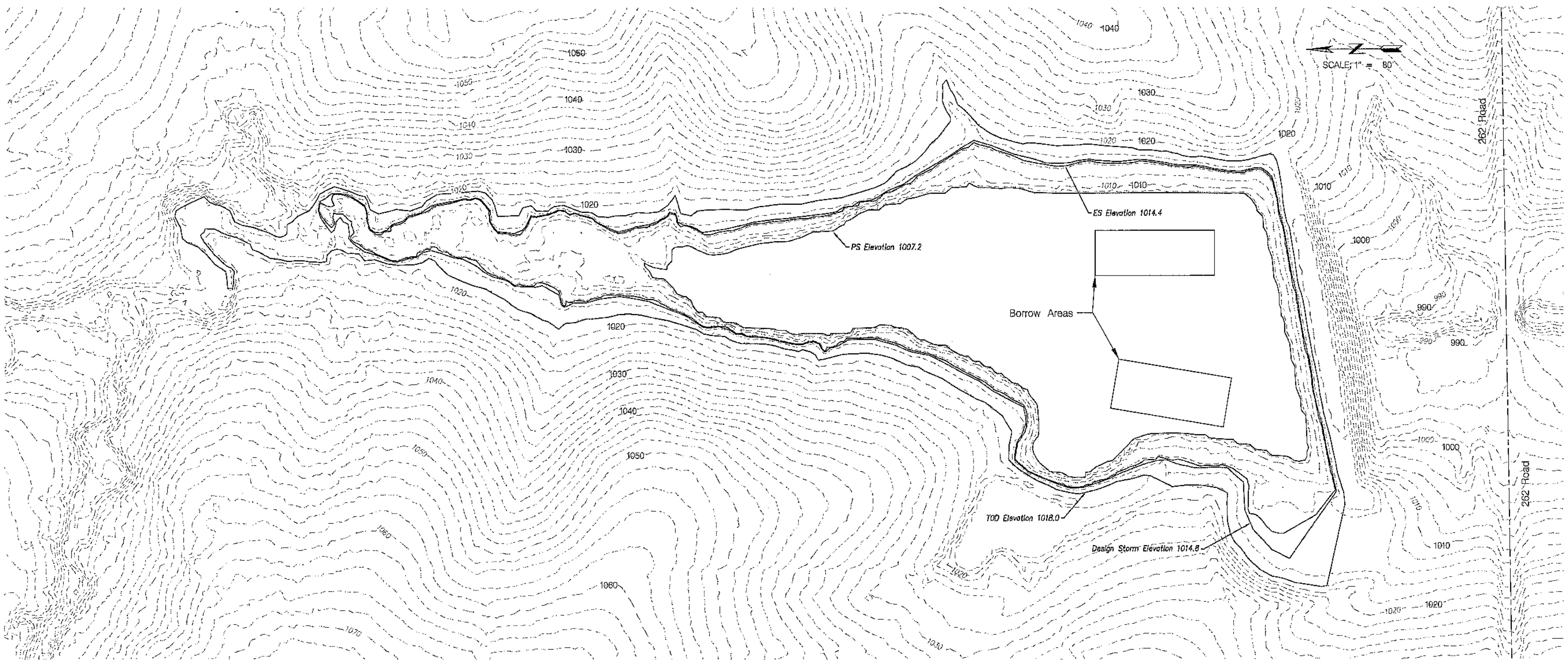


TOPOGRAPHIC MAP

Hydrology Summary for Dam Design

Soil Group Letter	Land Use Name	Condition Practice Name	Complex No.		Area Acres	Complex Number Times Area	
			AMC II	AMC III		AMC II	AMC III
B	Pasture	Fair	69	84	69	4761	5796
D	Cultivated	Terraced	81	92	27	2187	2484
D	Pasture	Poor to Fair	86	94	66	5676	6204
D	Cropland	Residue	88	95	56	4928	5320
				Totals	218	17552	19804

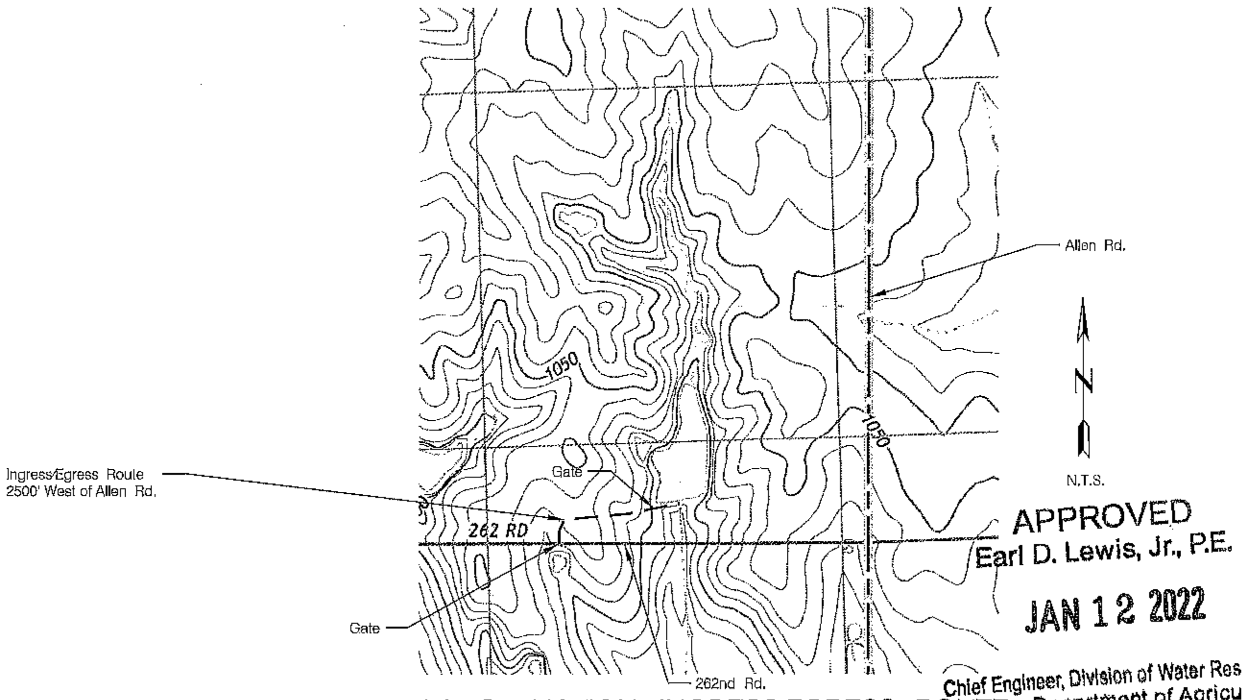
HYDROLOGY

GENERAL INFORMATION
Average Watershed Slope =1.9%; Drainage Area = 218 acres
Weighted Soil Cover Complex No. AMCII = 80; AMCIII = 91
Drainage Length = 6,200 ft.; Drop = 120 ft.;
Inflow Hydrographs = NRCS 6hr. duration, type II rainstorm

STRUCTURE CLASSIFICATION:
Effective: Ht. = 33.5 ft., Storage = 118.37 ac.ft.
Structure Size 3, Class A
Aux. Spwy. 100 YR, 6 hr. P = 5.7 in.
Requirements: Minimum Width = 40', Freeboard = 3'

DETENTION:
Principal Spillway at Elev. 1007.2 ft.; AMC II = 80
12" Diam. PVC Principal Spillway; Canopy Inlet w/Beaver Retardent
4% 6 hr. P = 4.5 in.; Max. Routed El. 1011.8
Max. Storage = 89.9 ac. ft.

DESIGN STORM
Zone 1; AMC III = 91 Aux. Spwy. 1% 6 hr. P = 5.7 in.
Aux. Spwy. Len. 70 ft.; Level Crest 180 ft.
Aux. Spwy. Crest Elev. 1014.4
Floodrouting NRCS 6 hr. Type II Storm
12" Diam. Max. Routed Elev.: 1014.8
Maximum Routed Discharge = 74.6 cfs
TOD Set at = 1018



CONSTRUCTION INGRESS/EGRESS ROUTE

APPROVED
Earl D. Lewis, Jr., P.E.
JAN 12 2022
Chief Engineer, Division of Water Resources
Kansas Department of Agriculture

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CFS ENGINEERS
cfse.com
1421 E. 104th Street, Ste. 100 KCMO 64131
o: 816-333-4477 f: 816-333-5688

JOEL S. BUFFINGTON
PE25822
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Submitted by: ---
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CONTOUR MAP AND
HYDROLOGY

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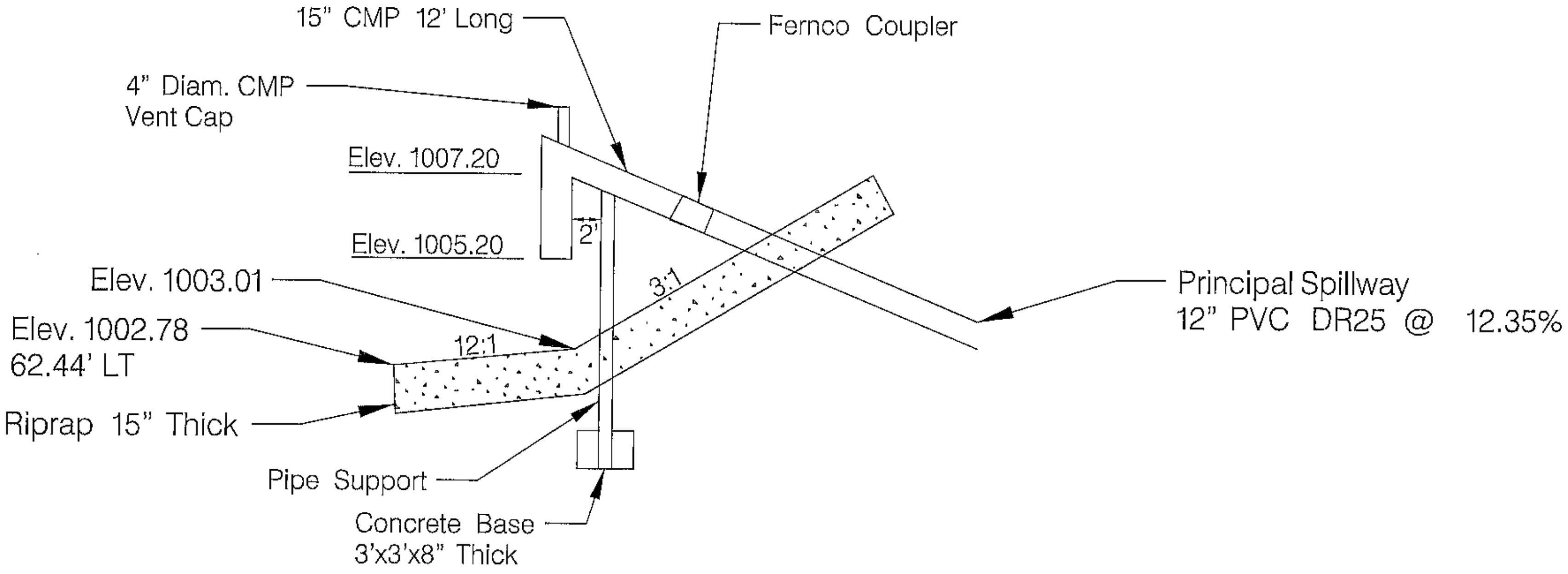
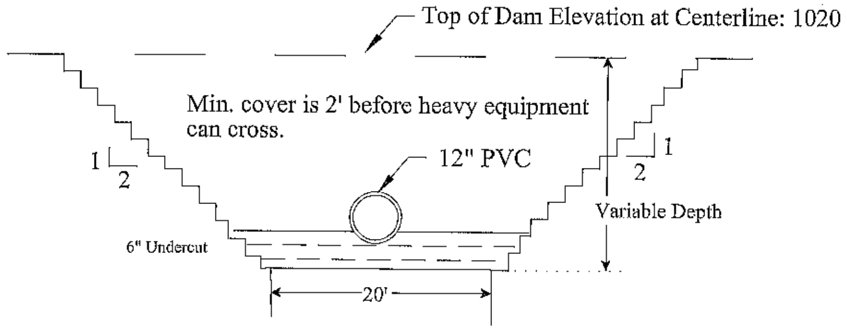
BEAVER RETARDENT AND DRAWDOWN INLET DETAILS

(Drawing not to scale)

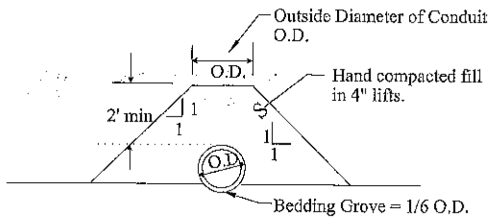


PRINCIPAL SPILLWAY PIPE AND STILLING BASIN DETAILS



Principal Spillway Pipe Trench and Backfill

(Drawing not to scale)



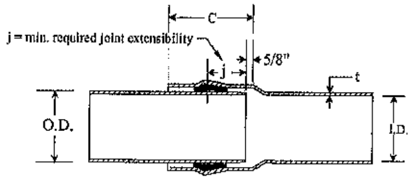
Pipe Bedding / Backfill

(Drawing not to scale)

Note:
Hand compacted earthfill around all conduits and structures shall consist of the higher plasticity soils available at the site. The soil shall be at proper moisture content and well pulverized. The largest soil particle shall be 3-inch diameter and the largest rock fragment shall be 2-inch diameter. The fill shall be placed in lifts not to exceed 4 inches thick before compaction.

SPECIFICATIONS FOR PVC PIPE

1. SDR pressure rated PVC pipe shall conform to ASTM Standard D-2241 or AWWA C-905 or C-900. Schedule 40 and 80 PVC shall conform to ASTM Standard D-1785.
2. Pipe material designation shall be PVC 1120 or PVC 1220.
3. The longest section of pipe in the installation shall not exceed 20 ft.
4. PVC pipe shall be joined by gasketed couplings capable of resisting 160 psi.
5. PVC welding solvent must be engineered and formulated for the intended use to produce a weld of maximum strength.
6. Wrap exterior of exposed pipe with black plastic tape unless pipe is specifically formulated to resist ultra-violet degradation.
7. The pipe shall be firmly and uniformly bedded so the lower one-sixth of the circumference will bear against original earth or compacted fill.



Gasketted PVC Pipe Joint Detail

Table of Pipe Joint Dimensions

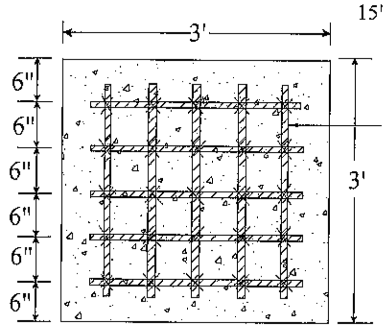
Nom. Dia.	DR	I.D.	O.D.	t	C	j	C req.
4	25	4.154	4.50	0.173	4.72	2.06	3.50
6	25	6.31	6.90	0.276	5.25	6.25	3.9
12	25	12.08	13.20	0.528	8.25	9.25	14.4

* All dimensions in inches. DR = dimension ratio.

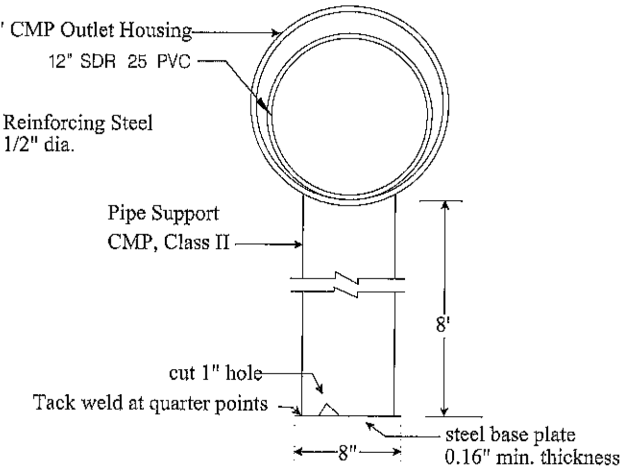
* The maximum pipe section length is 20'

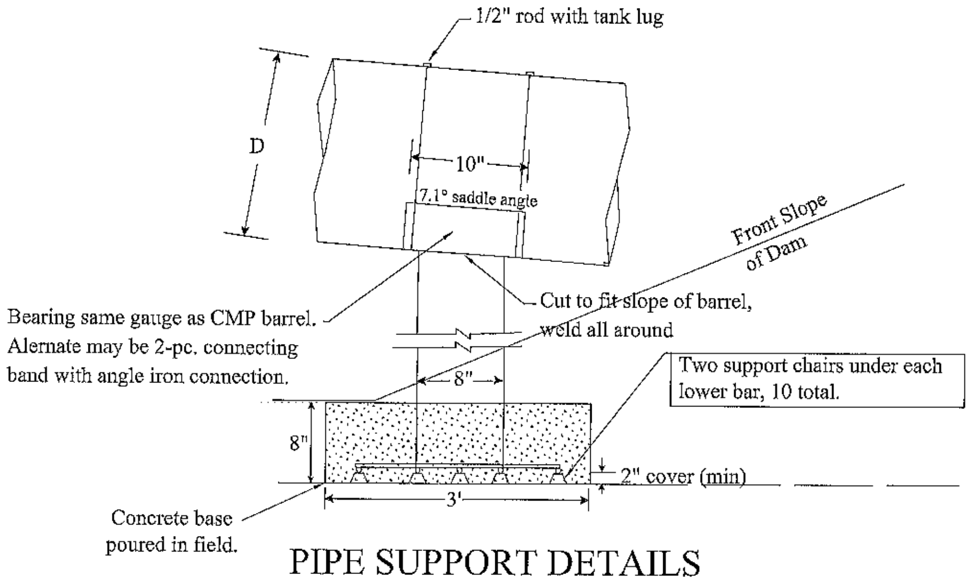
* C req. = required joint depth

(Drawing not to scale)



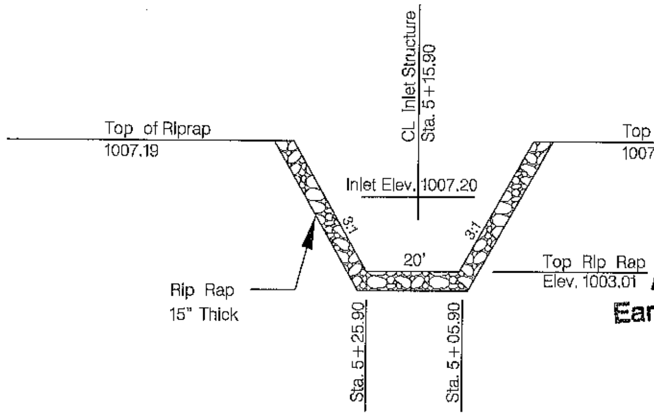
Placement of Reinforcing Steel for Base of Pipe Support





PIPE SUPPORT DETAILS
INLET AND OUTLET END OF PIPE

(Drawing not to scale)



APPROVED
Earl D. Lewis, Jr., P.E.
JAN 12 2022
Chief Engineer, Division of Water Resources
Kansas Department of Agriculture

CROSS SECTION OF INLET TRENCH

(Drawing not to scale)

CFS ENGINEERS
cfse.com
1421 E. 104th Street, Ste. 100 KCMO 64131
o: 816-333-4477 f: 816-333-6688

PE25822
12-24-21
KANSAS
PROFESSIONAL ENGINEER

Mark	Description	Date

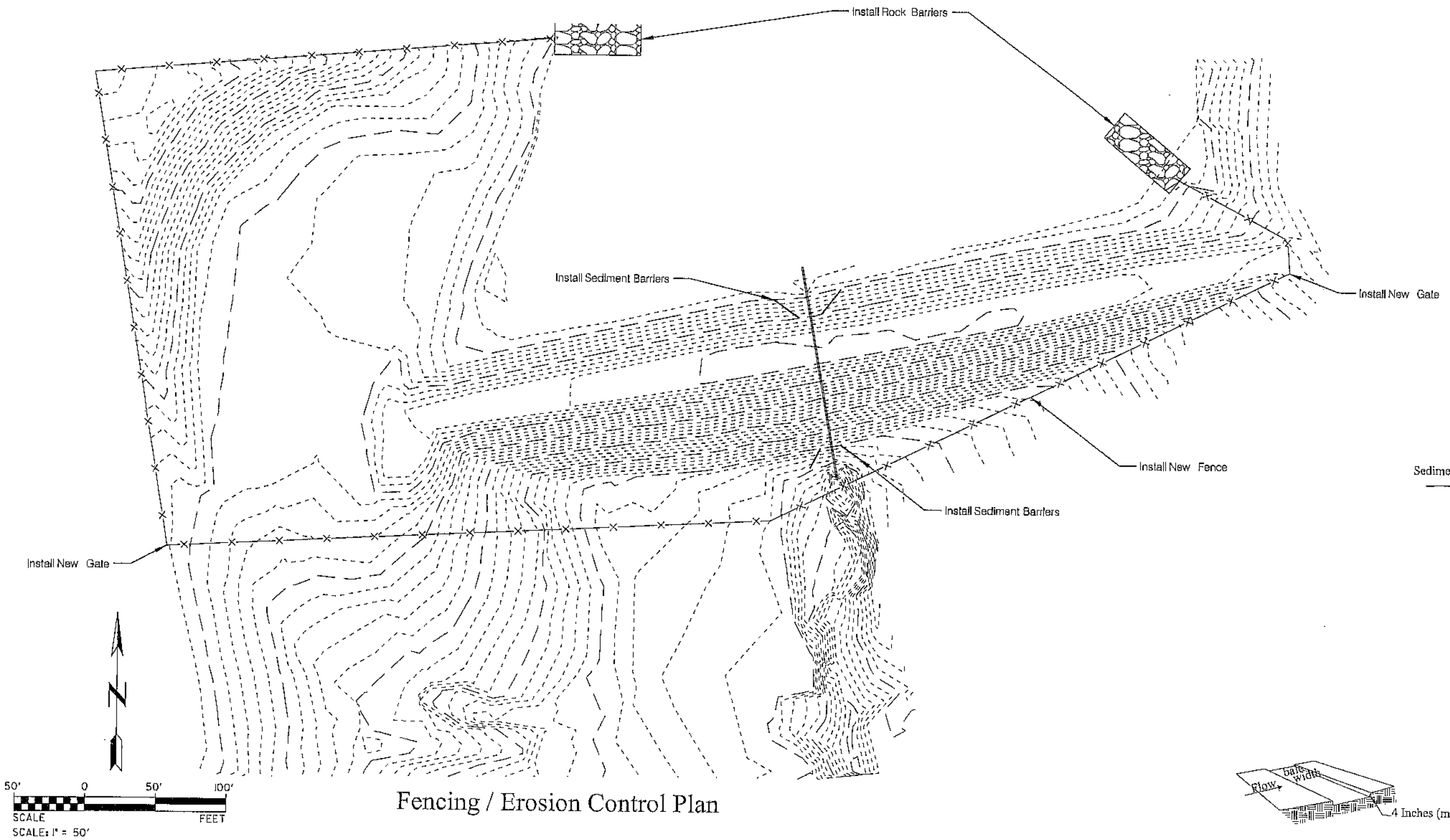
CFS ENGINEERS, P.A.
1421E 104TH STREET
KANSAS CITY, MO

DELAWARE WATERSHED JOINT DISTRICT
NO. 10: GRADE STABILIZATION
DETENTION DAM SITE A99
JACKSON COUNTY, KANSAS

Designed by: ---
Date: 00-00-00
Dwn by: ---
Ckd by: ---
Reviewed by: ---
Submitted by: ---
Plot scale: 1:2
File name: 201089-ST-SH-PipeDetails.dgn
Plot date: 12/23/2021 10:08:25 AM

PIPE DETAILS

Sheet reference number:
6

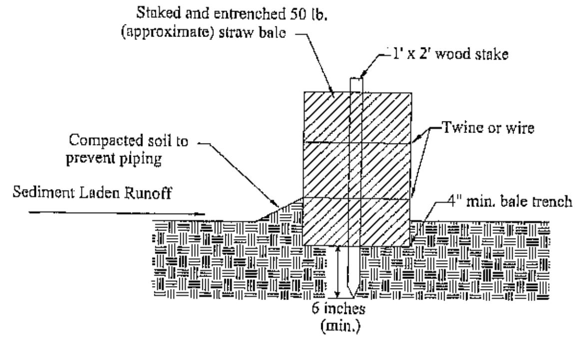


Fencing / Erosion Control Plan

NOTES:
1. STILLING BASIN SHALL BE RELOCATED/EXCAVATED AT THE BEGINNING OF EARTH DISTURBING ACTIVITIES TO ACT AS A SEDIMENT TRAP.
2. PLACE BALE SEDIMENT BARRIER OR SILT FENCE ON NORTH AND SOUTH SIDE OF STILLING BASIN AS SHOWN.
3. TEMPORARY EROSION CONTROL SHALL BE REMOVED FROM THE STILLING BASIN AFTER THERE IS AN ESTABLISHMENT OF GRASS COVER.
4. SILT FENCE SHALL BE USED AND PLACED AT FRONT TOE OF FILL OF THE EMBANKMENT WITH CONSTRUCTION OF NEW SLOPE.
5. SEDIMENT BARRIERS SHALL BE USED AND PLACED ON THE BACK TOE OF FILL OF THE EMBANKMENT WITH CONSTRUCTION OF NEW SLOPE.
6. TOPSOILING: ALL DISTURBED AREA NOT COVERED BY WATER SHALL HAVE A MINIMUM OF 6 INCHES OF TOPSOIL.
7. ALL AREA DISTURBED BY CONSTRUCTION SHALL BE SEEDED AND MULCHED. THE AREA SHALL BE MONITORED MONTHLY UNTIL AT LEAST 70 PERCENT OF THE VEGETATION IS ESTABLISHED.
8. SEDIMENT BARRIER IS NEEDED.

Typical Bale Sediment Barrier

(Drawing not to scale)



Installation of Bale Sediment Barrier

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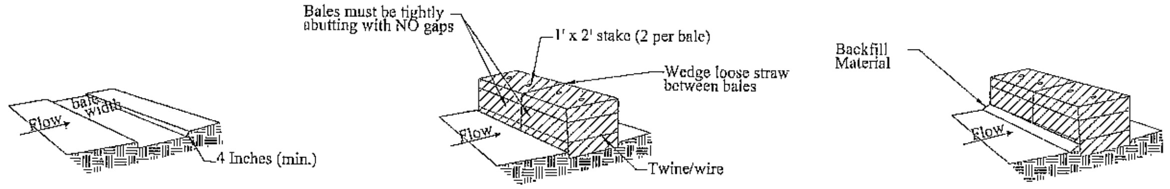
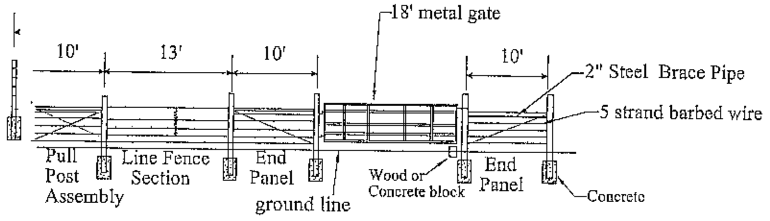


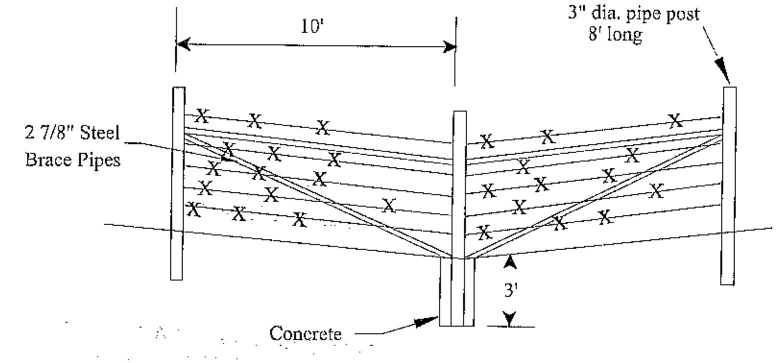
1. Excavate the Trench

2. Place and Stake Straw Bales

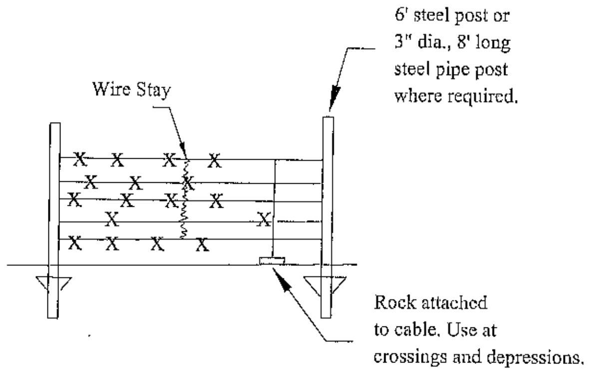
3. Backfill and compact excavated soil



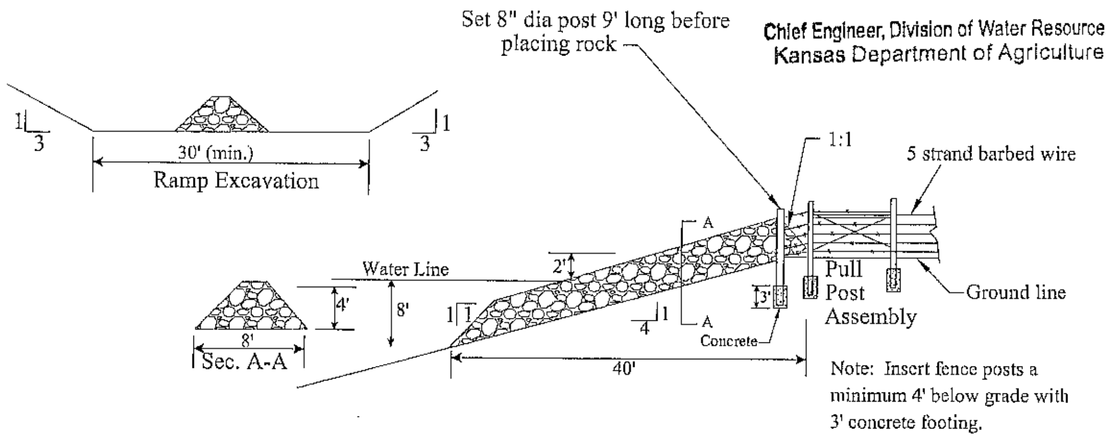
Section / Gate Detail



Corner Assembly



Line Fence Section



Note: Insert fence posts a minimum 4' below grade with 3' concrete footing.

Rock Fence Barrier Details

APPROVED
Earl D. Lewis, Jr., P.E.
JAN 12 2022
Chief Engineer, Division of Water Resources
Kansas Department of Agriculture

CFS ENGINEERS
1421 E. 104th Street, Ste. 100 KCMO 64131
o: 816-333-4477 f: 816-333-6888
CFS
cfse.com

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NO. 10; GRADE STABILIZATION
DETENTION DAM SITE A99
JACKSON COUNTY, KANSAS

Designed by: ---		Date: 00-00-00
Dwn by: ---	Ckd by: ---	Reviewed by: ---
Submitted by: ---		Plot scale: 1:600

File name: 201089-ST-SH-ErosionControl_Fencing.dgn
Plot date: 12/23/2021 10:08:29 AM

EROSION CONTROL AND FENCING

Sheet reference number: 7

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