Summary of Revised Materials

Brickhaven No. 2 Mine Tract A - Mine Permit Transfer/Modification Application

Addendum 1 - March 13, 2015

Section / Item	Action Needed	Comments
Binder		
Cover	replace	added revision date
Spine	replace	added revision date
Calculation B Stormwater		
Sediment Basin #5 Sediment Basin #7	Replace select sections	Revisions to Sediment Basins 5 and 7 for 25-year 24-hour storm
Drawings		
02C-01 02C-06 02C-07 02C-12 02C-13 02C-14	replace select drawings	Revisions to Erosion & Sediment Control Plan for 25-year 24-hour storm

Mine Permit Transfer/Modification

Brickhaven No.2 Mine Tract “A”

Charah, Inc.

Moncure, North Carolina

November 2014
Revised December 2014
Revised March 2015

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Brickhaven No 2. Mine	Computed: PAW	Date: 3/5/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #5	Sheet: 1	Of: 4

Objective This basin is only active during Phase 1. Will only have skimmer.
Design the sediment basin to contain the 25-year storm.

References

1. NC Erosion and Sediment Control Planning and Design Manual.
2. "Elements of Urban Stormwater Design" by H. Rooney Malcom, P.E.
3. NOAA Atlas 14, Volume 2, Version 3
4. VA Erosion and Sediment Control Handbook

Given

Phase	1	1		
Storm Event (yrs) =	10	25		
Total Drainage Area A (ac) =	24.3	24.3		
Disturbed Area (ac) =	24.3	24.3		
Curve Number CN =	94	94	Hydrographs	
Rainfall Depth P (in) =	5.17	6.14	(24-hr rainfall)	Ref 3
Peak Flow Q_p (cfs) =	144.76	173.86	Hydrographs	

Design Criteria

Required sediment storage	1,800	cf / acre of drainage
Required sediment storage	43,740	cf (based on largest Phase)
Required Surface Area	435	sf/cfs of the 10-yr storm peak flow (based on the largest Phase in cfs)
Required Surface Area (SF)	75,629	of the 10-yr storm peak flow (based on the largest Phase)

Determine Shape of Basin:

Measure the area of the Basin using AutoCADD.
Calculate Volume of the Basin using Truncated Pyramid Method.
Shape factor used in hydrographs basin depth may be gretaer than indicated below

Elevation (ft)	Depth (ft)	Area (sf)	Volume (cf)	Cumulative Vol (cf)	Cumulative Vol (cy)
229	0	400	-	-	-
230	1	56,327	20,491	20,491	759
231	2	61,173	58,733	79,225	2,934
232	3	66,075	63,608	142,833	5,290
233	4	71,034	68,540	211,372	7,829
234	5	79,286	75,122	286,495	10,611
235	6	88,989	84,091	370,585	13,725
236	7	104,062	96,427	467,013	17,297

Design Sediment Depth (ft) = 3
Sediment Storage (cf) = 142,833 *Required Sediment Storage Achieved*

Design Surface Area Depth (ft) = 5
Surface Area (sf) = 79,286 *Required Surface Area Achieved*

Project:	Charah Brickhaven No 2. Mine	Computed: PAW	Date: 3/5/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #5	Sheet: 2	Of: 4

Select Skimmer

A. R. Jarrett Method

$D = [Q / (2{,}310 * (H^{0.5})]^{0.5}$

D =Diameter of Orifice (inches)

Q = Dewater Rate (cf/day)

H = Head on orifice, varies based on skimmer size (ft)

Skimmer Size (Inches)	Head (ft)
1.5	0.125
2	0.167
2.5	0.167
3	0.250
4	0.333
5	0.333
6	0.417
8	0.500

Volume to Dewater (cf) =	142,833		
Number of Skimmers	2		
Days to Drain =	5	*assumed*	
Q (cf/day) =	14,283		0.17 cfs
Selected Skimmer Size (inches) =	4		
Head on Skimmer (feet) =	0.333		
Diameter of Orifice (inches) =	3.3		

Route the flow through the Basin

Riser is not perforated, but skimmer is attached.

$S = (1000/CN) - 10$

Runoff Depth Q* (inches) $= (P-0.2S)^2/(P+0.8S)$ Ref 2, III-4

T_P (min) $= 60.5(Q^*)A/Q_P/1.39$

Phase	1	1
Storm Event (yrs) =	10	25
S =	0.64	0.64
Runoff Depth Q* (inches) =	4.48	5.44
Time to Peak T_p (min) =	32.70	33.07

Determine Pond Storage Elevation (Z_{Water}):

Pick one point near max expected water surface and the other at the mid depth.

Z_1 (ft) =	3	S_1 (cf)=	142,833
Z_2 (ft) =	6	S_2 (cf) =	370,585
b = $\ln(S_2/S_1)/\ln(Z_2/Z_1)$ =	1.4		Ref 2, III-8
$K_S = S_2/Z_2^b$ =	31,518		

Project:	Charah Brickhaven No 2. Mine	Computed: PAW	Date: 3/5/15
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Task:	Sediment Basin #5	Sheet: 3	Of: 4

Determine Settling Velocity

Conversion Factor = 3.281 ft/sec per m/sec

Gravitational Acceleration, g (m/s^2) = 9.81

Specific Gravity of soil (s_s) = 2.6

Kinematic Viscosity of water (υ) = 1.14E-06 n^2 / sec @ 20° C Ref 2, IV-11

Diameter of the Design Particle d_{15} = 40.00E-06 m

Design Particle Settling Velocity = $(g / 18) * [(s_s - 1) / \upsilon] d^2$ = 4.02E-03 ft/sec

Route the Storm through the Basin using the Hydrograph Model

Set Height of Emergency Spillway at (ft) = 7.00

Set Top of Dam at (ft) = 7.50

See Hydrograph

Emergency Spillway

Q_E (cfs) = 25-Yr Storm

Q_E (cfs) = 0.0 Emergency spillway not used for the 25-year storm

Cross Section = Trapezoid

Channel Side Slope (z) = 5 (enter X for X:1)

n = 0.03 Grass Lined

Vp (ft/sec) = 5.0 Permissible Velocity for lining Ref 2, II-7

Allowable Shear Stress (psf) = 2.0 Allowable Shear Stress for lining

Bottom Width, b (ft) = 10

Calculate Required Depth of Spillway:

Normal-Depth Procedure

$AR^{2/3}=Qn/1.49s^{0.5}$ Q=VA

$Z_{req}=Qn/1.49s^{0.5}$ Area (A)= bd+z(d^2)

$Z_{av}=AR^{2/3}$ R=Area/(b+2d((z^2)+1)^.5)

Avg Shear Stress(T) = K_b*d*s*unit weight of water

Channel Slope ft/ft	Depth, d (ft)	A (sf)	Z_{req}	R	Z_{avail}	V (ft/sec)	T (psf)
0.01	0.00	0.00	0.00	0.00	0.00	0.0	0.0
0.02	0.00	0.00	0.00	0.00	0.00	0.0	0.0

Though the emergency spillway is not used for the 25-year storm, construct it to be :

10 ft, Bottom Width (measured at top of lining)

0.5 ft, depth (measured at top of lining)

1% slope

Anti-Seep Collar:

Anti-Seep Collar Size = 2 * Barrel Dia

Anti-Seep Collar Size (ft) = 2

Use Anti-Seep Collar Size (ft) = 2 x 2

HDR Computation

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Project:	Charah Brickhaven No 2. Mine	Computed: PAW	Date: 3/5/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #5	Sheet: 4	Of: 4

Minimum Concrete Base for Riser:

Diameter of Riser (in) =	18	From Hydrograph
Avg Density of Concrete (lbs/cf) =	87.6	
Density of Water (lbs/cf) =	62.4	
Riser Displacement (cf) =	11.84	Pi * $(D_R/24)^2$ * Total Ht of Riser
Convert cf to cy =	27^{-1}	
Min Concrete Needed (cy) =	0.31	
Width & Length (ft) =	2.5	
Thickness (ft) =	1.3	

Anti-Vortex Device:

Diameter of Riser (in) =	18	From Hydrograph
Cylinder Diameter (in) =	27	Ref 4, III-104, Table 3.14-D
Cylinder Thickness (gage) =	16	
Cylinder Height (in) =	8	

Determine Tailwater conditions to size outlet apron

Use Normal Depth Procedure (Manning's Eqn.) Ref 2, II-7

$A*R^{2/3} = Q*n/1.49\ s^{0.5}$ Area (A)= bd+z(d^2) $Z_{av} = A*R^{2/3}$

$Z_{req} = Q*n/1.49s^{0.5}$ R=Area/(b+2d((z^2)+1)^.5)

n =	0.069	6-inch diameter Rip Rap, Lined Channel
Vp (ft/sec) =	9	Permissible Velocity for lining
Side Slope (z) =	5	enter X for X:1
s (ft/ft) =	0.02	Outlet Slope (estimated)
Bottom Width (ft) =	6	6 * Barrel Diameter
Q_B (cfs) =	6.0	Peak Flow out of the barrel 25-yr Hydrograph

Q (cfs)	Z_{req}	Flow Depth d (ft)	A (sf)	R (ft)	Z_{av}	V (ft/sec)
6.0	1.98	0.47	3.9	0.36	1.98	1.5

Flow Depth = Tailwater, d (ft) = 0.47 0.5* Barrel Diameter (ft) = 0.50 Ref 1, 8.06.3

Minimum Tailwater Conditions: d<0.5*Diameter of Outlet Pipe

Maximum Tailwater Conditions: d>0.5*Diameter of Outlet Pipe

Since the Tailwater is less than half of the diameter of the outlet, use Minimum Tailwater conditions.

Barrel Diameter (ft)	Entrance (ft)	Length (ft)	Outlet Width (ft)	Median Rip Rap Size d_{50}	Selected Rip Rap Size (in)
1	3	9	10	0.2	Class A

Conclusion

This temporary basin can contain the 25-yr storm.

HDR Computation

Job No. 0453925-237673-018

Project:	Charah Brickhaven No 2. Mine	Computed: PAW	Date: 3/5/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Riser Pipe Perforations/Skimmer Flow	Sheet 1	Of 2

Diameter of Riser (in) =	18	
Circumference of Riser (in) =	56.5	
eight of Riser from bottom of barrel (in) =	80	From Hydrograph
Vertical spacing between holes (in) =	0	center to center
Water Stage increment (ft)	0.05	

Orifice Equation

$Q = C_d * A * (2 * g * h)^{0.5}$ Ref 1, p III-11

Q = cfs, discharge

C_d = 0.6 coefficient of discharge

A = sf, cross sectional area

g = 32.2 ft/sec^2, gravity

h = ft, driving head measured from the center of the pipe

	Perforations					Skimmer	
Row	1	2	3	4	5	2	# of skimmers
Holes per row	0	0	0	0	0		
Hole Diameter (in)	0.75	0.75	0.75	0.75	0.75		
Spacing edge to edge (in)							
Inlet Area (sf)	0.000	0.000	0.000	0.000	0.000		
Hole Stage (in)	0.50	0.50	0.50	0.50	0.50		
Hole Stage (ft)	0.04	0.04	0.04	0.04	0.04		

Water Stage (ft)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Total Flow (cfs)
0.00	0.00	0.00	0.00			0.00	0.00
0.04	0.00	0.00	0.00			0.00	0.00
0.09	0.00	0.00	0.00			0.00	0.00
0.14	0.00	0.00	0.00			0.00	0.00
0.19	0.00	0.00	0.00			0.00	0.00
0.24	0.00	0.00	0.00			0.00	0.00
0.29	0.00	0.00	0.00			0.00	0.00
0.34	0.00	0.00	0.00			0.33	0.33
0.39	0.00	0.00	0.00			0.33	0.33
0.44	0.00	0.00	0.00			0.33	0.33
0.49	0.00	0.00	0.00			0.33	0.33
0.54	0.00	0.00	0.00			0.33	0.33
0.59	0.00	0.00	0.00			0.33	0.33
0.64	0.00	0.00	0.00			0.33	0.33
0.69	0.00	0.00	0.00			0.33	0.33
0.74	0.00	0.00	0.00			0.33	0.33
0.79	0.00	0.00	0.00			0.33	0.33
0.84	0.00	0.00	0.00			0.33	0.33
0.89	0.00	0.00	0.00			0.33	0.33
0.94	0.00	0.00	0.00			0.33	0.33
0.99	0.00	0.00	0.00			0.33	0.33
1.04	0.00	0.00	0.00			0.33	0.33
1.09	0.00	0.00	0.00			0.33	0.33
1.14	0.00	0.00	0.00			0.33	0.33
1.19	0.00	0.00	0.00			0.33	0.33
1.24	0.00	0.00	0.00			0.33	0.33
1.29	0.00	0.00	0.00			0.33	0.33
1.34	0.00	0.00	0.00			0.33	0.33
1.39	0.00	0.00	0.00			0.33	0.33
1.44	0.00	0.00	0.00			0.33	0.33
1.49	0.00	0.00	0.00			0.33	0.33
1.54	0.00	0.00	0.00			0.33	0.33
1.59	0.00	0.00	0.00			0.33	0.33

1.64	0.00	0.00	0.00	0.33	0.33
1.69	0.00	0.00	0.00	0.33	0.33
1.74	0.00	0.00	0.00	0.33	0.33
1.79	0.00	0.00	0.00	0.33	0.33
1.84	0.00	0.00	0.00	0.33	0.33
1.89	0.00	0.00	0.00	0.33	0.33
1.94	0.00	0.00	0.00	0.33	0.33
1.99	0.00	0.00	0.00	0.33	0.33
2.04	0.00	0.00	0.00	0.33	0.33
2.09	0.00	0.00	0.00	0.33	0.33
2.14	0.00	0.00	0.00	0.33	0.33
2.19	0.00	0.00	0.00	0.33	0.33
2.24	0.00	0.00	0.00	0.33	0.33
2.29	0.00	0.00	0.00	0.33	0.33
2.34	0.00	0.00	0.00	0.33	0.33
2.39	0.00	0.00	0.00	0.33	0.33
2.44	0.00	0.00	0.00	0.33	0.33
2.49	0.00	0.00	0.00	0.33	0.33
2.54	0.00	0.00	0.00	0.33	0.33
2.59	0.00	0.00	0.00	0.33	0.33
2.64	0.00	0.00	0.00	0.33	0.33
2.69	0.00	0.00	0.00	0.33	0.33
2.74	0.00	0.00	0.00	0.33	0.33
2.79	0.00	0.00	0.00	0.33	0.33
2.84	0.00	0.00	0.00	0.33	0.33
2.89	0.00	0.00	0.00	0.33	0.33
2.94	0.00	0.00	0.00	0.33	0.33
2.99	0.00	0.00	0.00	0.33	0.33
3.04	0.00	0.00	0.00	0.33	0.33
3.09	0.00	0.00	0.00	0.33	0.33
3.14	0.00	0.00	0.00	0.33	0.33
3.19	0.00	0.00	0.00	0.33	0.33
3.24	0.00	0.00	0.00	0.33	0.33
3.29	0.00	0.00	0.00	0.33	0.33
3.34	0.00	0.00	0.00	0.33	0.33
3.39	0.00	0.00	0.00	0.33	0.33
3.44	0.00	0.00	0.00	0.33	0.33
3.49	0.00	0.00	0.00	0.33	0.33
3.54	0.00	0.00	0.00	0.33	0.33
3.59	0.00	0.00	0.00	0.33	0.33
3.64	0.00	0.00	0.00	0.33	0.33
3.69	0.00	0.00	0.00	0.33	0.33
3.74	0.00	0.00	0.00	0.33	0.33
3.79	0.00	0.00	0.00	0.33	0.33
3.84	0.00	0.00	0.00	0.33	0.33
3.89	0.00	0.00	0.00	0.33	0.33
3.94	0.00	0.00	0.00	0.33	0.33
3.99	0.00	0.00	0.00	0.33	0.33

Computed By: PAW Date: 3/5/15

Checked By: MDP Date: 3/615

Sheet: _1___of _2_

Sediment Basin # 5 Brickhaven

Phase 1

10 - year Storm Event

Qp =	144.76	cfs
Tp =	32.70	minutes
dT = Max of	2	minutes
or	1.0%	of increment to peak

b = 1.4

K_s = 31,518

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	12	(in)	
Height of Riser above barrel =	5.7	(ft)	
Height of Riser from bottom of barrel=	6.7	(ft) elevation	235.70
Emergency Spillway =	7.0	(ft) elevation	236.00
Total Height of Dam =	7.5	(ft) elevation	236.50
Length of Emergency Spillway =	10	(ft)	
Diameter of Riser =	18	(in)	
Permanent Pond Stage =	0	(ft) elevation	229.0

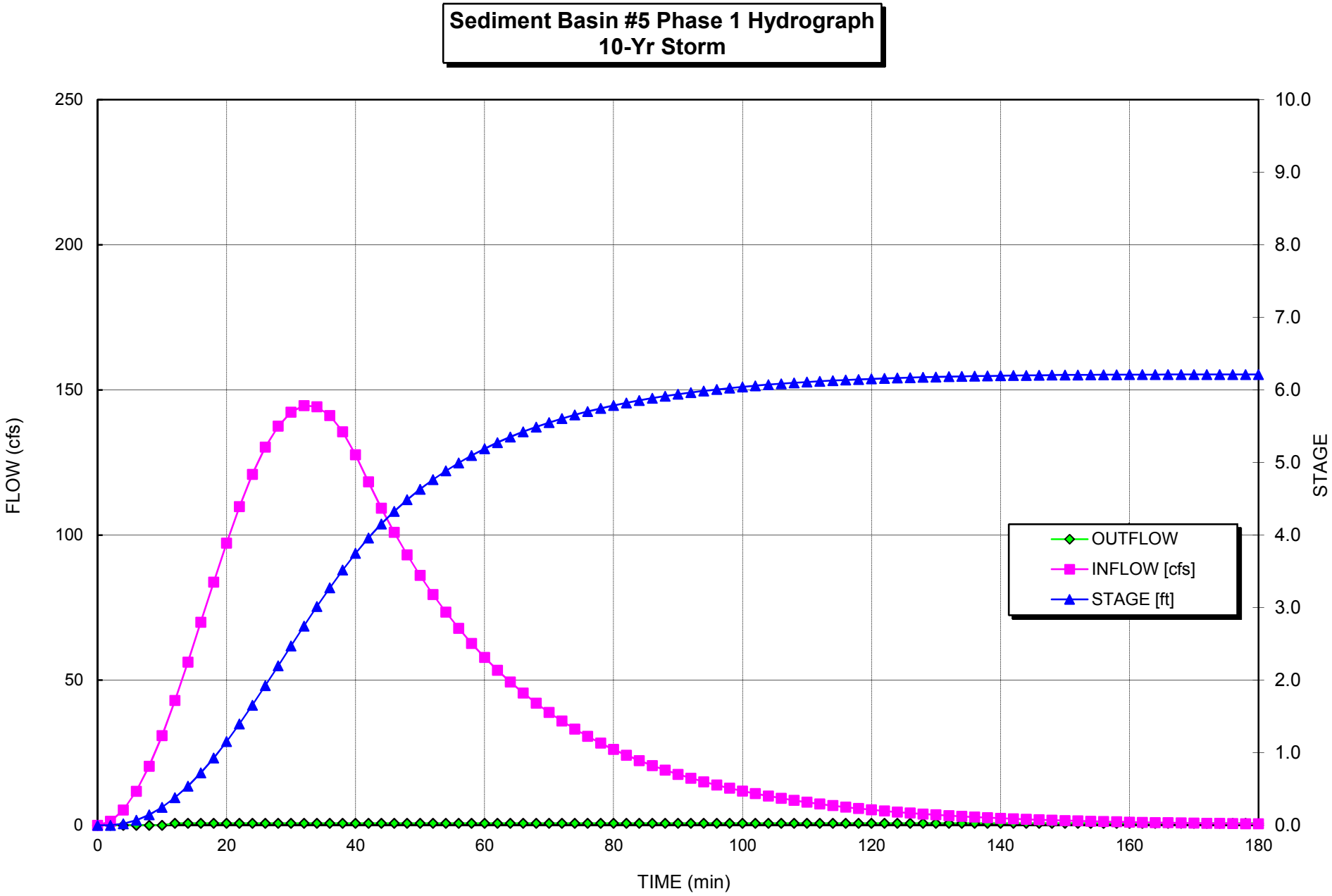
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
6.2	ft Maximum Stage	235.21	msl elevation
0.7	cfs Peak outflow		
0.7	cfs Peak Riser/Barrel outflow		
0.0	cfs Peak Weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer/ Perf Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.3	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	5.3	160	0.0	0.00	0.00	0.00	0.00	0.00	22.54	10,246	N/A
6	11.7	793	0.1	0.00	0.00	0.00	0.00	0.00	34.91	15,866	N/A
8	20.3	2,197	0.1	0.00	0.00	0.00	0.00	0.00	46.09	20,952	N/A
10	30.9	4,638	0.2	0.00	0.00	0.00	0.00	0.00	56.53	25,694	N/A
12	43.0	8,347	0.4	0.33	0.33	0.00	0.33	0.66	66.36	30,165	100%
14	56.2	13,428	0.5	0.33	0.33	0.00	0.33	0.66	75.56	34,345	100%
16	69.9	20,089	0.7	0.33	0.33	0.00	0.33	0.66	84.34	38,337	100%
18	83.8	28,403	0.9	0.33	0.33	0.00	0.33	0.66	92.70	42,138	100%
20	97.2	38,380	1.2	0.33	0.33	0.00	0.33	0.66	100.64	45,747	100%
22	109.8	49,969	1.4	0.33	0.33	0.00	0.33	0.66	108.16	49,164	100%
24	120.9	63,061	1.7	0.33	0.33	0.00	0.33	0.66	115.25	52,388	100%
26	130.3	77,491	1.9	0.33	0.33	0.00	0.33	0.66	121.92	55,420	100%
28	137.5	93,044	2.2	0.33	0.33	0.00	0.33	0.66	128.17	58,257	100%
30	142.3	109,465	2.5	0.33	0.33	0.00	0.33	0.66	133.98	60,900	100%
32	144.6	126,466	2.7	0.33	0.33	0.00	0.33	0.66	139.37	63,348	100%
34	144.2	143,738	3.0	0.33	0.33	0.00	0.33	0.66	144.32	65,601	100%
36	141.2	160,963	3.3	0.33	0.33	0.00	0.33	0.66	148.85	67,659	100%
38	135.6	177,822	3.5	0.33	0.33	0.00	0.33	0.66	152.95	69,524	100%
40	127.7	194,013	3.7	0.33	0.33	0.00	0.33	0.66	156.64	71,198	100%
42	118.3	209,255	4.0	0.33	0.33	0.00	0.33	0.66	159.90	72,683	100%
44	109.3	223,373	4.2	0.33	0.33	0.00	0.33	0.66	162.78	73,990	100%
46	100.9	236,406	4.3	0.33	0.33	0.00	0.33	0.66	165.32	75,144	100%
48	93.2	248,436	4.5	0.33	0.33	0.00	0.33	0.66	167.57	76,170	100%
50	86.1	259,541	4.6	0.33	0.33	0.00	0.33	0.66	169.59	77,084	100%
52	79.5	269,791	4.8	0.33	0.33	0.00	0.33	0.66	171.39	77,904	100%
54	73.4	279,252	4.9	0.33	0.33	0.00	0.33	0.66	173.01	78,640	100%
56	67.8	287,983	5.0	0.33	0.33	0.00	0.33	0.66	174.47	79,304	100%
58	62.6	296,042	5.1	0.33	0.33	0.00	0.33	0.66	175.79	79,903	100%
60	57.8	303,478	5.2	0.33	0.33	0.00	0.33	0.66	176.98	80,446	100%
62	53.4	310,340	5.3	0.33	0.33	0.00	0.33	0.66	178.07	80,939	100%
64	49.3	316,671	5.4	0.33	0.33	0.00	0.33	0.66	179.05	81,386	100%
66	45.6	322,512	5.4	0.33	0.33	0.00	0.33	0.66	179.95	81,793	100%
68	42.1	327,901	5.5	0.33	0.33	0.00	0.33	0.66	180.76	82,164	100%
70	38.9	332,872	5.5	0.33	0.33	0.00	0.33	0.66	181.51	82,502	100%
72	35.9	337,457	5.6	0.33	0.33	0.00	0.33	0.66	182.18	82,811	100%
74	33.2	341,685	5.7	0.33	0.33	0.00	0.33	0.66	182.80	83,093	100%
76	30.6	345,584	5.7	0.33	0.33	0.00	0.33	0.66	183.37	83,351	100%
78	28.3	349,179	5.7	0.33	0.33	0.00	0.33	0.66	183.89	83,587	100%
80	26.1	352,494	5.8	0.33	0.33	0.00	0.33	0.66	184.37	83,803	100%
82	24.1	355,549	5.8	0.33	0.33	0.00	0.33	0.66	184.80	84,000	100%

84	22.3	358,364	5.9	0.33	0.33	0.00	0.33	0.66	185.20	84,181	100%
86	20.6	360,958	5.9	0.33	0.33	0.00	0.33	0.66	185.56	84,347	100%
88	19.0	363,348	5.9	0.33	0.33	0.00	0.33	0.66	185.90	84,499	100%
90	17.6	365,549	5.9	0.33	0.33	0.00	0.33	0.66	186.20	84,639	100%
92	16.2	367,576	6.0	0.33	0.33	0.00	0.33	0.66	186.49	84,766	100%
94	15.0	369,441	6.0	0.33	0.33	0.00	0.33	0.66	186.74	84,884	100%
96	13.8	371,159	6.0	0.33	0.33	0.00	0.33	0.66	186.98	84,991	100%
98	12.8	372,738	6.0	0.33	0.33	0.00	0.33	0.66	187.20	85,090	100%
100	11.8	374,191	6.0	0.33	0.33	0.00	0.33	0.66	187.40	85,180	100%
102	10.9	375,527	6.1	0.33	0.33	0.00	0.33	0.66	187.58	85,263	100%
104	10.1	376,755	6.1	0.33	0.33	0.00	0.33	0.66	187.75	85,339	100%
106	9.3	377,883	6.1	0.33	0.33	0.00	0.33	0.66	187.90	85,409	100%
108	8.6	378,919	6.1	0.33	0.33	0.00	0.33	0.66	188.04	85,473	100%
110	7.9	379,869	6.1	0.33	0.33	0.00	0.33	0.66	188.17	85,531	100%
112	7.3	380,741	6.1	0.33	0.33	0.00	0.33	0.66	188.29	85,585	100%
114	6.8	381,540	6.1	0.33	0.33	0.00	0.33	0.66	188.39	85,634	100%
116	6.2	382,271	6.1	0.33	0.33	0.00	0.33	0.66	188.49	85,678	100%
118	5.8	382,941	6.1	0.33	0.33	0.00	0.33	0.66	188.58	85,719	100%
120	5.3	383,554	6.2	0.33	0.33	0.00	0.33	0.66	188.67	85,757	100%
122	4.9	384,114	6.2	0.33	0.33	0.00	0.33	0.66	188.74	85,791	100%
124	4.5	384,624	6.2	0.33	0.33	0.00	0.33	0.66	188.81	85,822	100%
126	4.2	385,090	6.2	0.33	0.33	0.00	0.33	0.66	188.87	85,850	100%
128	3.9	385,514	6.2	0.33	0.33	0.00	0.33	0.66	188.93	85,876	100%
130	3.6	385,900	6.2	0.33	0.33	0.00	0.33	0.66	188.98	85,900	100%
132	3.3	386,250	6.2	0.33	0.33	0.00	0.33	0.66	189.03	85,921	100%
134	3.1	386,567	6.2	0.33	0.33	0.00	0.33	0.66	189.07	85,940	100%
136	2.8	386,854	6.2	0.33	0.33	0.00	0.33	0.66	189.11	85,958	100%
138	2.6	387,113	6.2	0.33	0.33	0.00	0.33	0.66	189.14	85,973	100%
140	2.4	387,346	6.2	0.33	0.33	0.00	0.33	0.66	189.17	85,987	100%
142	2.2	387,555	6.2	0.33	0.33	0.00	0.33	0.66	189.20	86,000	100%
144	2.1	387,743	6.2	0.33	0.33	0.00	0.33	0.66	189.23	86,011	100%
146	1.9	387,909	6.2	0.33	0.33	0.00	0.33	0.66	189.25	86,022	100%
148	1.7	388,057	6.2	0.33	0.33	0.00	0.33	0.66	189.27	86,031	100%
150	1.6	388,188	6.2	0.33	0.33	0.00	0.33	0.66	189.28	86,038	100%
152	1.5	388,302	6.2	0.33	0.33	0.00	0.33	0.66	189.30	86,045	100%
154	1.4	388,402	6.2	0.33	0.33	0.00	0.33	0.66	189.31	86,051	100%
156	1.3	388,488	6.2	0.33	0.33	0.00	0.33	0.66	189.32	86,057	100%
158	1.2	388,562	6.2	0.33	0.33	0.00	0.33	0.66	189.33	86,061	100%
160	1.1	388,623	6.2	0.33	0.33	0.00	0.33	0.66	189.34	86,065	100%
162	1.0	388,674	6.2	0.33	0.33	0.00	0.33	0.66	189.35	86,068	100%
164	0.9	388,715	6.2	0.33	0.33	0.00	0.33	0.66	189.35	86,070	100%
166	0.9	388,747	6.2	0.33	0.33	0.00	0.33	0.66	189.36	86,072	100%
168	0.8	388,770	6.2	0.33	0.33	0.00	0.33	0.66	189.36	86,074	100%
170	0.7	388,786	6.2	0.33	0.33	0.00	0.33	0.66	189.36	86,075	100%
172	0.7	388,794	6.2	0.33	0.33	0.00	0.33	0.66	189.37	86,075	100%
174	0.6	388,796	6.2	0.33	0.33	0.00	0.33	0.66	189.37	86,075	100%
176	0.6	388,791	6.2	0.33	0.33	0.00	0.33	0.66	189.36	86,075	100%
178	0.5	388,781	6.2	0.33	0.33	0.00	0.33	0.66	189.36	86,074	100%
180	0.5	388,765	6.2	0.33	0.33	0.00	0.33	0.66	189.36	86,073	100%
182	0.5	388,744	6.2	0.33	0.33	0.00	0.33	0.66	189.36	86,072	100%
184	0.4	388,719	6.2	0.33	0.33	0.00	0.33	0.66	189.36	86,071	100%
186	0.4	388,690	6.2	0.33	0.33	0.00	0.33	0.66	189.35	86,069	100%
188	0.4	388,657	6.2	0.33	0.33	0.00	0.33	0.66	189.35	86,067	100%
190	0.3	388,621	6.2	0.33	0.33	0.00	0.33	0.66	189.34	86,065	100%
192	0.3	388,581	6.2	0.33	0.33	0.00	0.33	0.66	189.34	86,062	100%
194	0.3	388,538	6.2	0.33	0.33	0.00	0.33	0.66	189.33	86,060	100%
196	0.3	388,492	6.2	0.33	0.33	0.00	0.33	0.66	189.33	86,057	100%
198	0.2	388,444	6.2	0.33	0.33	0.00	0.33	0.66	189.32	86,054	100%
200	0.2	388,394	6.2	0.33	0.33	0.00	0.33	0.66	189.31	86,051	100%
202	0.2	388,341	6.2	0.33	0.33	0.00	0.33	0.66	189.30	86,048	100%
204	0.2	388,286	6.2	0.33	0.33	0.00	0.33	0.66	189.30	86,044	100%
206	0.2	388,229	6.2	0.33	0.33	0.00	0.33	0.66	189.29	86,041	100%


Sediment Basin #5 Phase 1 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE
TIME (min)
0
50
100
150
200
250
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180
OUTFLOW
INFLOW [cfs]
STAGE [ft]

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Computed By: PAW Date: 3/5/15

Checked By: MDP Date: 3/615

Sheet: _1___of _2_

Qp = 173.86 cfs

Tp = 33.07 minutes

dT = Max of 2 minutes

or 1.0% of increment to peak

Sediment Basin # 5 Brickhaven

Phase 1

25 - year Storm Event

b = 1.4

K_s = 31,518

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	12	(in)	
Height of Riser above barrel =	5.7	(ft)	
Height of Riser from bottom of barrel=	6.7	(ft) elevation	235.70
Emergency Spillway =	7.0	(ft) elevation	236.00
Total Height of Dam =	7.5	(ft) elevation	236.50
Length of Emergency Spillway =	10	(ft)	
Diameter of Riser =	18	(in)	
Permanent Pond Stage =	0	(ft) elevation	229.0

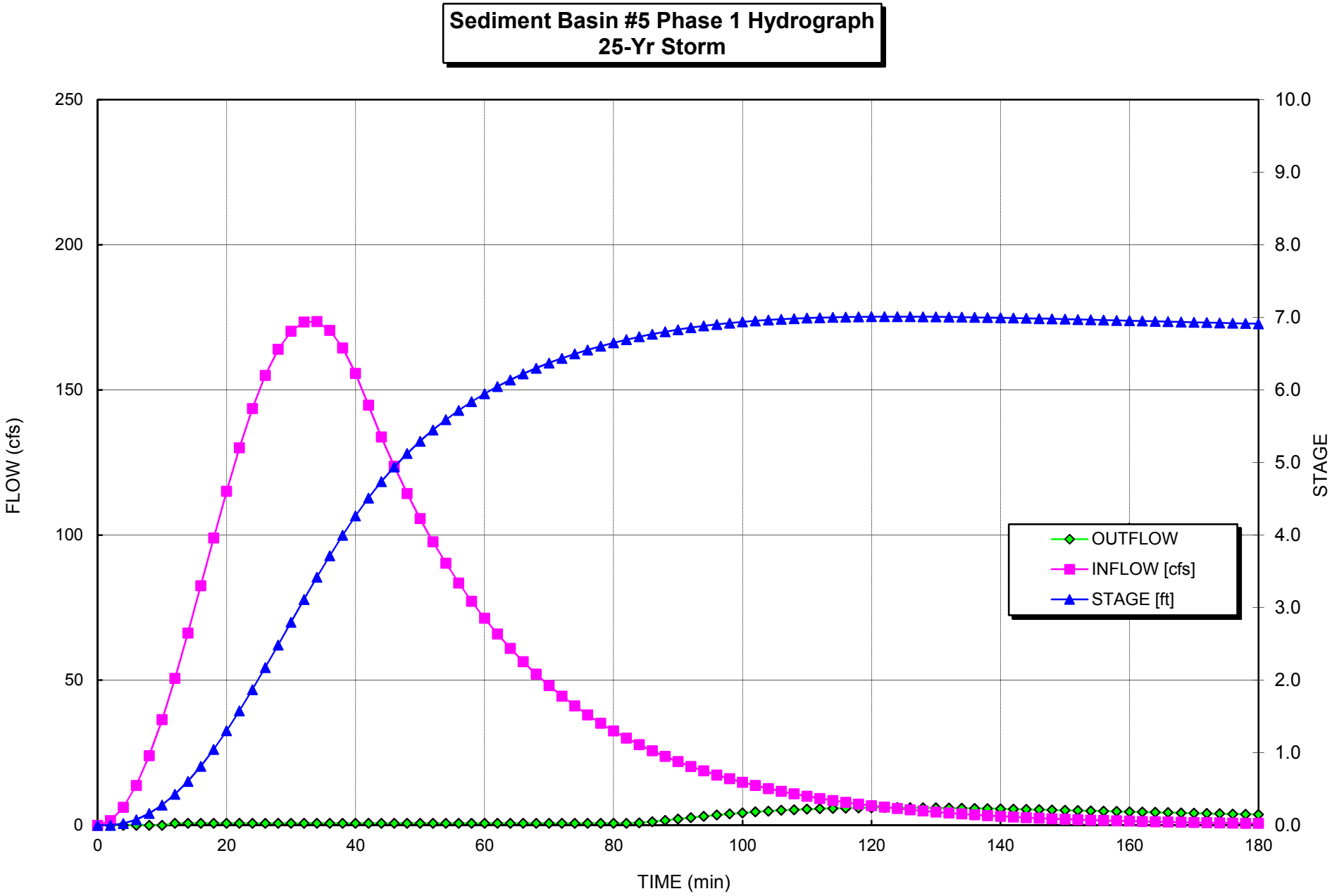
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
7.0	ft Maximum Stage	236.01	msl elevation
6.1	cfs Peak outflow		
6.0	cfs Peak Riser/Barrel outflow		
0.0	cfs Peak Weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer/ Perf Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.6	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	6.2	188	0.0	0.00	0.00	0.00	0.00	0.00	23.55	10,707	N/A
6	13.7	932	0.1	0.00	0.00	0.00	0.00	0.00	36.48	16,581	N/A
8	23.9	2,582	0.2	0.00	0.00	0.00	0.00	0.00	48.17	21,897	N/A
10	36.4	5,453	0.3	0.00	0.00	0.00	0.00	0.00	59.08	26,855	N/A
12	50.6	9,818	0.4	0.33	0.33	0.00	0.33	0.66	69.37	31,531	100%
14	66.2	15,815	0.6	0.33	0.33	0.00	0.33	0.66	79.01	35,913	100%
16	82.5	23,681	0.8	0.33	0.33	0.00	0.33	0.66	88.22	40,098	100%
18	99.0	33,506	1.0	0.33	0.33	0.00	0.33	0.66	96.98	44,082	100%
20	115.1	45,308	1.3	0.33	0.33	0.00	0.33	0.66	105.31	47,867	100%
22	130.1	59,035	1.6	0.33	0.33	0.00	0.33	0.66	113.20	51,453	100%
24	143.6	74,566	1.9	0.33	0.33	0.00	0.33	0.66	120.65	54,840	100%
26	155.0	91,714	2.2	0.33	0.33	0.00	0.33	0.66	127.66	58,028	100%
28	164.0	110,234	2.5	0.33	0.33	0.00	0.33	0.66	134.24	61,016	100%
30	170.2	129,833	2.8	0.33	0.33	0.00	0.33	0.66	140.37	63,804	100%
32	173.4	150,178	3.1	0.33	0.33	0.00	0.33	0.66	146.06	66,390	100%
34	173.5	170,908	3.4	0.33	0.33	0.00	0.33	0.66	151.31	68,776	100%
36	170.5	191,651	3.7	0.33	0.33	0.00	0.33	0.66	156.11	70,960	100%
38	164.5	212,032	4.0	0.33	0.33	0.00	0.33	0.66	160.48	72,945	100%
40	155.7	231,690	4.3	0.33	0.33	0.00	0.33	0.66	164.41	74,732	100%
42	144.7	250,290	4.5	0.33	0.33	0.00	0.33	0.66	167.91	76,324	100%
44	133.8	267,578	4.7	0.33	0.33	0.00	0.33	0.66	171.00	77,729	100%
46	123.7	283,552	4.9	0.33	0.33	0.00	0.33	0.66	173.73	78,969	100%
48	114.3	298,313	5.1	0.33	0.33	0.00	0.33	0.66	176.15	80,070	100%
50	105.7	311,951	5.3	0.33	0.33	0.00	0.33	0.66	178.32	81,053	100%
52	97.7	324,552	5.4	0.33	0.33	0.00	0.33	0.66	180.26	81,934	100%
54	90.3	336,194	5.6	0.33	0.33	0.00	0.33	0.66	182.00	82,726	100%
56	83.5	346,949	5.7	0.33	0.33	0.00	0.33	0.66	183.57	83,441	100%
58	77.2	356,886	5.8	0.33	0.33	0.00	0.33	0.66	184.99	84,086	100%
60	71.3	366,065	5.9	0.33	0.33	0.00	0.33	0.66	186.28	84,671	100%
62	65.9	374,543	6.0	0.33	0.33	0.00	0.33	0.66	187.44	85,202	100%
64	60.9	382,375	6.1	0.33	0.33	0.00	0.33	0.66	188.51	85,685	100%
66	56.3	389,609	6.2	0.33	0.33	0.00	0.33	0.66	189.47	86,124	100%
68	52.1	396,289	6.3	0.33	0.33	0.00	0.33	0.66	190.35	86,525	100%
70	48.1	402,458	6.4	0.33	0.33	0.00	0.33	0.66	191.16	86,891	100%
72	44.5	408,155	6.4	0.33	0.33	0.00	0.33	0.66	191.89	87,225	100%
74	41.1	413,415	6.5	0.33	0.33	0.00	0.33	0.66	192.57	87,530	100%
76	38.0	418,271	6.6	0.33	0.33	0.00	0.33	0.66	193.18	87,809	100%
78	35.1	422,754	6.6	0.33	0.33	0.00	0.33	0.66	193.74	88,065	100%
80	32.5	426,892	6.6	0.33	0.33	0.00	0.33	0.66	194.26	88,300	100%
82	30.0	430,711	6.7	0.33	0.33	0.00	0.33	0.66	194.73	88,515	100%

84	27.8	434,235	6.7	0.33	0.42	0.00	9.43	0.85	195.17	88,712	100%
86	25.7	437,465	6.8	0.33	0.61	0.00	9.45	1.23	195.56	88,892	100%
88	23.7	440,396	6.8	0.33	0.84	0.00	9.48	1.68	195.92	89,054	100%
90	21.9	443,042	6.8	0.33	1.07	0.00	9.50	2.15	196.24	89,199	100%
92	20.3	445,415	6.9	0.33	1.31	0.00	9.52	2.62	196.53	89,330	100%
94	18.7	447,532	6.9	0.33	1.54	0.00	9.54	3.08	196.78	89,445	100%
96	17.3	449,411	6.9	0.33	1.75	0.00	9.55	3.51	197.00	89,548	100%
98	16.0	451,068	6.9	0.33	1.95	0.00	9.57	3.91	197.20	89,638	100%
100	14.8	452,521	6.9	0.33	2.13	0.00	9.58	4.27	197.38	89,716	100%
102	13.7	453,784	7.0	0.33	2.30	0.00	9.59	4.59	197.53	89,785	100%
104	12.6	454,875	7.0	0.33	2.44	0.00	9.60	4.88	197.66	89,844	100%
106	11.7	455,807	7.0	0.33	2.57	0.00	9.61	5.13	197.77	89,894	100%
108	10.8	456,594	7.0	0.33	2.67	0.00	9.61	5.35	197.86	89,936	100%
110	10.0	457,248	7.0	0.33	2.76	0.00	9.62	5.53	197.94	89,971	100%
112	9.2	457,784	7.0	0.33	2.84	0.00	9.62	5.68	198.00	90,000	100%
114	8.5	458,210	7.0	0.33	2.90	0.00	9.63	5.80	198.05	90,023	100%
116	7.9	458,538	7.0	0.33	2.95	0.01	9.63	5.90	198.09	90,041	100%
118	7.3	458,776	7.0	0.33	2.98	0.02	9.63	5.98	198.12	90,053	100%
120	6.7	458,934	7.0	0.33	3.00	0.03	9.63	6.03	198.14	90,062	100%
122	6.2	459,019	7.0	0.33	3.02	0.03	9.63	6.06	198.15	90,066	100%
124	5.8	459,039	7.0	0.33	3.02	0.03	9.63	6.07	198.15	90,067	100%
126	5.3	459,002	7.0	0.33	3.01	0.03	9.63	6.06	198.14	90,065	100%
128	4.9	458,914	7.0	0.33	3.00	0.03	9.63	6.03	198.13	90,061	100%
130	4.5	458,782	7.0	0.33	2.98	0.02	9.63	5.98	198.12	90,054	100%
132	4.2	458,610	7.0	0.33	2.96	0.01	9.63	5.93	198.10	90,044	100%
134	3.9	458,403	7.0	0.33	2.93	0.01	9.63	5.86	198.07	90,033	100%
136	3.6	458,167	7.0	0.33	2.89	0.00	9.63	5.79	198.05	90,021	100%
138	3.3	457,903	7.0	0.33	2.86	0.00	9.62	5.71	198.01	90,006	100%
140	3.1	457,616	7.0	0.33	2.82	0.00	9.62	5.63	197.98	89,991	100%
142	2.8	457,309	7.0	0.33	2.77	0.00	9.62	5.55	197.94	89,975	100%
144	2.6	456,984	7.0	0.33	2.73	0.00	9.62	5.45	197.91	89,957	100%
146	2.4	456,645	7.0	0.33	2.68	0.00	9.61	5.36	197.87	89,939	100%
148	2.2	456,292	7.0	0.33	2.63	0.00	9.61	5.26	197.82	89,920	100%
150	2.1	455,930	7.0	0.33	2.58	0.00	9.61	5.16	197.78	89,900	100%
152	1.9	455,559	7.0	0.33	2.53	0.00	9.61	5.06	197.74	89,880	100%
154	1.8	455,181	7.0	0.33	2.48	0.00	9.60	4.96	197.69	89,860	100%
156	1.6	454,798	7.0	0.33	2.43	0.00	9.60	4.86	197.65	89,839	100%
158	1.5	454,411	7.0	0.33	2.38	0.00	9.60	4.76	197.60	89,819	100%
160	1.4	454,022	7.0	0.33	2.33	0.00	9.59	4.65	197.55	89,798	100%
162	1.3	453,631	7.0	0.33	2.28	0.00	9.59	4.55	197.51	89,776	100%
164	1.2	453,240	6.9	0.33	2.23	0.00	9.59	4.45	197.46	89,755	100%
166	1.1	452,849	6.9	0.33	2.18	0.00	9.58	4.35	197.42	89,734	100%
168	1.0	452,460	6.9	0.33	2.13	0.00	9.58	4.25	197.37	89,713	100%
170	0.9	452,072	6.9	0.33	2.08	0.00	9.58	4.15	197.32	89,692	100%
172	0.9	451,687	6.9	0.33	2.03	0.00	9.57	4.06	197.28	89,671	100%
174	0.8	451,305	6.9	0.33	1.98	0.00	9.57	3.96	197.23	89,651	100%
176	0.7	450,926	6.9	0.33	1.94	0.00	9.57	3.87	197.19	89,630	100%
178	0.7	450,551	6.9	0.33	1.89	0.00	9.56	3.78	197.14	89,610	100%
180	0.6	450,180	6.9	0.33	1.85	0.00	9.56	3.69	197.10	89,590	100%
182	0.6	449,814	6.9	0.33	1.80	0.00	9.56	3.60	197.05	89,570	100%
184	0.5	449,452	6.9	0.33	1.76	0.00	9.55	3.52	197.01	89,550	100%
186	0.5	449,095	6.9	0.33	1.72	0.00	9.55	3.43	196.97	89,531	100%
188	0.5	448,744	6.9	0.33	1.68	0.00	9.55	3.35	196.93	89,511	100%
190	0.4	448,397	6.9	0.33	1.64	0.00	9.55	3.27	196.88	89,493	100%
192	0.4	448,056	6.9	0.33	1.60	0.00	9.54	3.20	196.84	89,474	100%
194	0.4	447,720	6.9	0.33	1.56	0.00	9.54	3.12	196.80	89,456	100%
196	0.3	447,390	6.9	0.33	1.52	0.00	9.54	3.05	196.76	89,438	100%
198	0.3	447,065	6.9	0.33	1.49	0.00	9.53	2.97	196.72	89,420	100%
200	0.3	446,746	6.9	0.33	1.45	0.00	9.53	2.90	196.69	89,402	100%
202	0.3	446,432	6.9	0.33	1.42	0.00	9.53	2.84	196.65	89,385	100%
204	0.2	446,124	6.9	0.33	1.39	0.00	9.53	2.77	196.61	89,368	100%
206	0.2	445,821	6.9	0.33	1.35	0.00	9.52	2.71	196.57	89,352	100%


Sediment Basin #5 Phase 1 Hydrograph
25-Yr Storm
FLOW (cfs)
STAGE
TIME (min)
0
50
100
150
200
250
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180
OUTFLOW
INFLOW [cfs]
STAGE [ft]

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HDR Computation

Job No. 0453925-237673-018

Project:	Charah Brickhaven No 2. Mine	Computed: PAW	Date: 3/5/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #7	Sheet: 1	Of: 5

Objective Design the sediment basin to contain the 25-year storm and pass the 100-year storm without over topping the berm.

References

1. NC Erosion and Sediment Control Planning and Design Manual.
2. "Elements of Urban Stormwater Design" by H. Rooney Malcom, P.E.
3. NOAA Atlas 14, Volume 2, Version 3
4. VA Erosion and Sediment Control Handbook

Given

Phase	1	2	2	2		
Storm Event (yrs) =	10	10	25	100		
Total Drainage Area A (ac) =	93.1	91.8	91.8	91.8		
Disturbed Area (ac) =	93.1	44.9	44.9	44.9		
Curve Number CN =	89	89	89	89	Hydrographs	
Rainfall Depth P (in) =	5.17	5.17	6.14	7.71	(24-hr rainfall)	Ref 3
Peak Flow Q_p (cfs) =	554.63	321.57	394.45	511.71	Hydrographs	

Route the flow through the Basin

$$S = (1000/CN) - 10$$

$$\text{Runoff Depth } Q^* \text{ (inches)} = (P-0.2S)^2/(P+0.8S)$$ Ref 2, III-4

$$T_P \text{ (min)} = 60.5(Q^*)A/Q_P/1.39$$

Phase	1	2	2	2
Storm Event (yrs) =	10	10	25	100
S =	1.24	1.24	1.24	1.24
Runoff Depth Q* (inches) =	3.93	3.93	4.87	6.40
Time to Peak T_p (min) =	28.75	48.89	49.34	49.99

Determine Shape of Basin: Phase 1

Measure the area of the Basin using AutoCADD.
Calculate Volume of the Basin using Truncated Pyramid Method.
Shape factor used in hydrographs basin depth may be greater than indicated below

Elevation (ft)	Depth (ft)	Area (sf)	Volume (cf)	Cumulative Vol (cf)	Cumulative Vol (cy)
209	0	3,471	-	-	-
210	1	245,958	92,882	92,882	3,440
211	2	252,432	249,188	342,070	12,669
212	3	258,948	255,683	597,754	22,139
213	4	265,536	262,235	859,989	31,851
214	5	272,143	268,833	1,128,821	41,808
215	6	278,816	275,473	1,404,294	52,011
216	7	285,514	282,158	1,686,453	62,461

Project:	Charah Brickhaven No 2. Mine	Computed: PAW	Date: 3/5/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #7	Sheet: 2	Of: 5

Determine Shape of Basin: Phase 2

Elevation (ft)	Depth (ft)	Area (sf)	Volume (cf)	Cumulative Vol (cf)	Cumulative Vol (cy)
208	0	0	-	-	-
209	1	3,471	1,157	1,157	43
210	2	144,467	56,777	57,934	2,146
211	3	151,459	147,949	205,883	7,625
212	4	183,573	167,259	373,142	13,820
213	5	190,399	186,976	560,118	20,745
214	6	199,014	194,691	754,808	27,956
215	7	205,919	202,457	957,265	35,454
216	8	214,264	210,078	1,167,343	43,235

Design Criteria

Required sediment storage	1,800	cf / acre of drainage
Required Surface Area	435	sf/cfs (10-yr storm peak)

	Phase 1	Phase 2	
Required sediment storage (cf)	167,580	165,240	
Required Surface Area (SF)	241,264	139,883	
Design Sediment Depth (ft) =	3	3	
Design Surface Area Depth (ft) =	3	3	
Sediment Storage (cf) =	597,754	205,883	*Required Sediment Storage Achieved*
Surface Area (sf) =	258,948	151,459	*Required Surface Area Achieved*

Determine Pond Storage Elevation (Z_{Water}):

Pick one point near max expected water surface and the other at the mid depth.

Z_1 (ft) =	5	S_1 (cf)=	1,128,821	560,118
Z_2 (ft) =	7	S_2 (cf) =	1,686,453	957,265
b =	$\ln(S_2/S_1)/\ln(Z_2/Z_1)$ =		1.2	1.6
K_S =	$S_2/Z_2^{\,b}$ =		165,450	43,148

Ref 2, III-8

Project:	Charah Brickhaven No 2. Mine	Computed: PAW	Date: 3/5/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #7	Sheet: 3	Of: 5

Select Skimmer

$D = [Q / (2{,}310 * (H^{0.5})]^{0.5}$ A. R. Jarrett Method

D =Diameter of Orifice (inches)

Q = Dewater Rate (cf/day)

H = Head on orifice, varies based on skimmer size (ft)

Skimmer Size (Inches)	Head (ft)
1.5	0.125
2	0.167
2.5	0.167
3	0.250
4	0.333
5	0.333
6	0.417
8	0.500

Volume to Dewater (cf) =	597,754	205,883	
Number of Skimmers	2	2	
Days to Drain =	3	3	*assumed*
Q each (cf/day) =	99,626	34,314	
cfs	1.15	0.40	
Selected Skimmer Size (inches) =	8	8	
Head on Skimmer (feet) =	0.5	0.5	
Diameter of Orifice (inches) =	7.8	4.6	

Riser is not perforated, but skimmer is attached.
use larger orifice for all phases

Determine Settling Velocity

Conversion Factor =	3.281	ft/sec per m/sec	
Gravitational Acceleration, g (m/s^2) =	9.81		
Specific Gravity of soil (s_s)=	2.6		
Kinematic Viscosity of water (v) =	1.14E-06	n^2 / sec @ 20^o C	Ref 2, IV-11
Diameter of the Design Particle d_{15} =	40.00E-06	m	

Design Particle Settling Velocity = $(g / 18) * [(s_s - 1) / \upsilon] d^2 =$ 4.02E-03 ft/sec

Route the Storm through the Basin using the Hydrograph Model

Set Height of Emergency Spillway at (ft) = 8.50

Set Top of Dam at (ft) = 9.00

See Hydrograph

Project:	Charah Brickhaven No 2. Mine	Computed: PAW	Date: 3/5/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #7	Sheet: 4	Of: 5

Emergency Spillway

Q_E (cfs) = 100-Yr Storm
Q_E (cfs) = 47.4
Cross Section = Trapezoid
Channel Side Slope (z) = 5 (enter X for X:1)
n = 0.03 Grass Lined
Vp (ft/sec) = 5.0 Permissible Velocity for lining Ref 2, II-7
Allowable Shear Stress (psf) = 2.0 Allowable Shear Stress for lining
Bottom Width, b (ft) = 50

Calculate Required Depth of Spillway:
Normal-Depth Procedure

$AR^{2/3}=Qn/1.49s^{0.5}$ Q=VA
$Z_{req}=Qn/1.49s^{0.5}$ Area (A)= bd+z(d^2)
$Z_{av}=AR^{2/3}$ R=Area/(b+2d((z^2)+1)^.5)
Avg Shear Stress(T) = K_b*d*s*unit weight of water

Channel Slope ft/ft	Depth, d (ft)	A (sf)	Z_{req}	R	Z_{avail}	V (ft/sec)	T (psf)
0.01	0.37	19.05	9.54	0.35	9.54	2.5	0.2
0.02	0.30	15.40	6.75	0.29	6.75	3.1	0.4

Construct the channel to be : 50 ft, Bottom Width (measured at top of lining)
0.5 ft, depth (measured at top of lining)
1% slope

Anti-Seep Collar:

Anti-Seep Collar Size = 2 * Barrel Dia
Anti-Seep Collar Size (ft) = 6
Use Anti-Seep Collar Size (ft) = 6 x 6

Minimum Concrete Base for Riser:

Diameter of Riser (in) = 72 From Hydrograph
Avg Density of Concrete (lbs/cf) = 87.6
Density of Water (lbs/cf) = 62.4
Riser Displacement (cf) = 231.85 Pi * $(D_R/24)^2$ * Total Ht of Riser
Convert cf to cy = 27^{-1}
Min Concrete Needed (cy) = 6.12
Width & Length (ft) = 7
Thickness (ft) = 3.4

Anti-Vortex Device:

Diameter of Riser (in) = 72 From Hydrograph
Cylinder Diameter (in) = 84 Ref 4, III-104, Table 3.14-D
Cylinder Thickness (gage) = 16
Cylinder Height (in) = 13

Project:	Charah Brickhaven No 2. Mine	Computed: PAW	Date: 3/5/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Sediment Basin #7	Sheet: 5	Of: 5

Determine Tailwater conditions to size outlet apron

Use Normal Depth Procedure (Manning's Eqn.) Ref 2, II-7

$A*R^{2/3} = Q*n/1.49\ s^{0.5}$ Area (A)= bd+z(d^2) $Z_{av} = A*R^{2/3}$

$Z_{req} = Q*n/1.49s^{0.5}$ R=Area/(b+2d((z^2)+1)^.5)

n =	0.069	6-inch diameter Rip Rap, Lined Channel
Vp (ft/sec) =	9	Permissible Velocity for lining
Side Slope (z) =	5	enter X for X:1
s (ft/ft) =	0.02	Outlet Slope (estimated)
Bottom Width (ft) =	18	6 * Barrel Diameter
Q_B (cfs) =	15.4	Peak Flow out of the barrel 25-yr Hydrograph

Q (cfs)	Z_{req}	Flow Depth d (ft)	A (sf)	R (ft)	Z_{av}	V (ft/sec)
15.4	5.03	0.45	9.2	0.41	5.03	1.7

Flow Depth = Tailwater, d (ft) = 0.45 0.5* Barrel Diameter (ft) = 1.50 Ref 1, 8.06.3

Minimum Tailwater Conditions: d<0.5*Diameter of Outlet Pipe

Maximum Tailwater Conditions: d>0.5*Diameter of Outlet Pipe

Since the Tailwater is less than half of the diameter of the outlet, use Minimum Tailwater conditions.

Barrel Diameter (ft)	Entrance (ft)	Length (ft)	Outlet Width (ft)	Median Rip Rap Size d_{50}	Selected Rip Rap Size (in)
3	9	16	19	0.5	Class B

Conclusion

The basin can contain the 25-yr storm and pass the 100-yr storm without overtopping the berm.

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HDR Computation

Job No. 0453925-237673-018

Project:	Charah Brickhaven No 2. Mine	Computed: PAW	Date: 3/5/15
Subject:	Permit Application	Checked: MDP	Date: 3/6/15
Task:	Riser Pipe Perforations/Skimmer Flow	Sheet 1	Of 2

Diameter of Riser (in) =	72	
Circumference of Riser (in) =	226.2	
eight of Riser from bottom of barrel (in) =	98	From Hydrograph
Vertical spacing between holes (in) =	0	center to center
Water Stage increment (ft)	0.05	

Orifice Equation

$Q = C_d * A * (2 * g * h)^{0.5}$ Ref 1, p III-11

Q = cfs, discharge

C_d = 0.6 coefficient of discharge

A = sf, cross sectional area

g = 32.2 ft/sec^2, gravity

h = ft, driving head measured from the center of the pipe

	Perforations					Skimmer	
Row	1	2	3	4	5	2	# of skimmers
Holes per row	0	0	0	0	0		
Hole Diameter (in)	0.75	0.75	0.75	0.75	0.75		
Spacing edge to edge (in)							
Inlet Area (sf)	0.000	0.000	0.000	0.000	0.000		
Hole Stage (in)	0.50	0.50	0.50	0.50	0.50		
Hole Stage (ft)	0.04	0.04	0.04	0.04	0.04		

Water Stage (ft)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Flow (cfs)	Total Flow (cfs)
0.00	0.00	0.00	0.00			0.00	0.00
0.04	0.00	0.00	0.00			0.00	0.00
0.09	0.00	0.00	0.00			0.00	0.00
0.14	0.00	0.00	0.00			0.00	0.00
0.19	0.00	0.00	0.00			0.00	0.00
0.24	0.00	0.00	0.00			0.00	0.00
0.29	0.00	0.00	0.00			0.00	0.00
0.34	0.00	0.00	0.00			0.00	0.00
0.39	0.00	0.00	0.00			0.00	0.00
0.44	0.00	0.00	0.00			0.00	0.00
0.49	0.00	0.00	0.00			0.00	0.00
0.54	0.00	0.00	0.00			2.31	2.31
0.59	0.00	0.00	0.00			2.31	2.31
0.64	0.00	0.00	0.00			2.31	2.31
0.69	0.00	0.00	0.00			2.31	2.31
0.74	0.00	0.00	0.00			2.31	2.31
0.79	0.00	0.00	0.00			2.31	2.31
0.84	0.00	0.00	0.00			2.31	2.31
0.89	0.00	0.00	0.00			2.31	2.31
0.94	0.00	0.00	0.00			2.31	2.31
0.99	0.00	0.00	0.00			2.31	2.31
1.04	0.00	0.00	0.00			2.31	2.31
1.09	0.00	0.00	0.00			2.31	2.31
1.14	0.00	0.00	0.00			2.31	2.31
1.19	0.00	0.00	0.00			2.31	2.31
1.24	0.00	0.00	0.00			2.31	2.31
1.29	0.00	0.00	0.00			2.31	2.31
1.34	0.00	0.00	0.00			2.31	2.31
1.39	0.00	0.00	0.00			2.31	2.31
1.44	0.00	0.00	0.00			2.31	2.31
1.49	0.00	0.00	0.00			2.31	2.31
1.54	0.00	0.00	0.00			2.31	2.31
1.59	0.00	0.00	0.00			2.31	2.31

1.64	0.00	0.00	0.00	2.31	2.31
1.69	0.00	0.00	0.00	2.31	2.31
1.74	0.00	0.00	0.00	2.31	2.31
1.79	0.00	0.00	0.00	2.31	2.31
1.84	0.00	0.00	0.00	2.31	2.31
1.89	0.00	0.00	0.00	2.31	2.31
1.94	0.00	0.00	0.00	2.31	2.31
1.99	0.00	0.00	0.00	2.31	2.31
2.04	0.00	0.00	0.00	2.31	2.31
2.09	0.00	0.00	0.00	2.31	2.31
2.14	0.00	0.00	0.00	2.31	2.31
2.19	0.00	0.00	0.00	2.31	2.31
2.24	0.00	0.00	0.00	2.31	2.31
2.29	0.00	0.00	0.00	2.31	2.31
2.34	0.00	0.00	0.00	2.31	2.31
2.39	0.00	0.00	0.00	2.31	2.31
2.44	0.00	0.00	0.00	2.31	2.31
2.49	0.00	0.00	0.00	2.31	2.31
2.54	0.00	0.00	0.00	2.31	2.31
2.59	0.00	0.00	0.00	2.31	2.31
2.64	0.00	0.00	0.00	2.31	2.31
2.69	0.00	0.00	0.00	2.31	2.31
2.74	0.00	0.00	0.00	2.31	2.31
2.79	0.00	0.00	0.00	2.31	2.31
2.84	0.00	0.00	0.00	2.31	2.31
2.89	0.00	0.00	0.00	2.31	2.31
2.94	0.00	0.00	0.00	2.31	2.31
2.99	0.00	0.00	0.00	2.31	2.31
3.04	0.00	0.00	0.00	2.31	2.31
3.09	0.00	0.00	0.00	2.31	2.31
3.14	0.00	0.00	0.00	2.31	2.31
3.19	0.00	0.00	0.00	2.31	2.31
3.24	0.00	0.00	0.00	2.31	2.31
3.29	0.00	0.00	0.00	2.31	2.31
3.34	0.00	0.00	0.00	2.31	2.31
3.39	0.00	0.00	0.00	2.31	2.31
3.44	0.00	0.00	0.00	2.31	2.31
3.49	0.00	0.00	0.00	2.31	2.31
3.54	0.00	0.00	0.00	2.31	2.31
3.59	0.00	0.00	0.00	2.31	2.31
3.64	0.00	0.00	0.00	2.31	2.31
3.69	0.00	0.00	0.00	2.31	2.31
3.74	0.00	0.00	0.00	2.31	2.31
3.79	0.00	0.00	0.00	2.31	2.31
3.84	0.00	0.00	0.00	2.31	2.31
3.89	0.00	0.00	0.00	2.31	2.31
3.94	0.00	0.00	0.00	2.31	2.31
3.99	0.00	0.00	0.00	2.31	2.31

Computed By: PAW Date: 3/5/15

Checked By: MDP Date: 3/6/15

Sheet: __1__of _2_

Sediment Basin # 7 Brickhaven

Phase 1

10 - year Storm Event

Qp =	554.63	cfs
Tp =	28.75	minutes
dT = Max of	2	minutes
or	1.0%	of increment to peak

b = 1.2

K_s = 165,450

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	36	(in)	
Height of Riser above barrel =	5.2	(ft)	
Height of Riser from bottom of barrel=	8.2	(ft) elevation	217.20
Emergency Spillway =	8.5	(ft) elevation	217.50
Total Height of Dam =	9.0	(ft) elevation	218.00
Length of Emergency Spillway =	50	(ft)	
Diameter of Riser =	72	(in)	
Permanent Pond Stage =	0	(ft) elevation	209.0

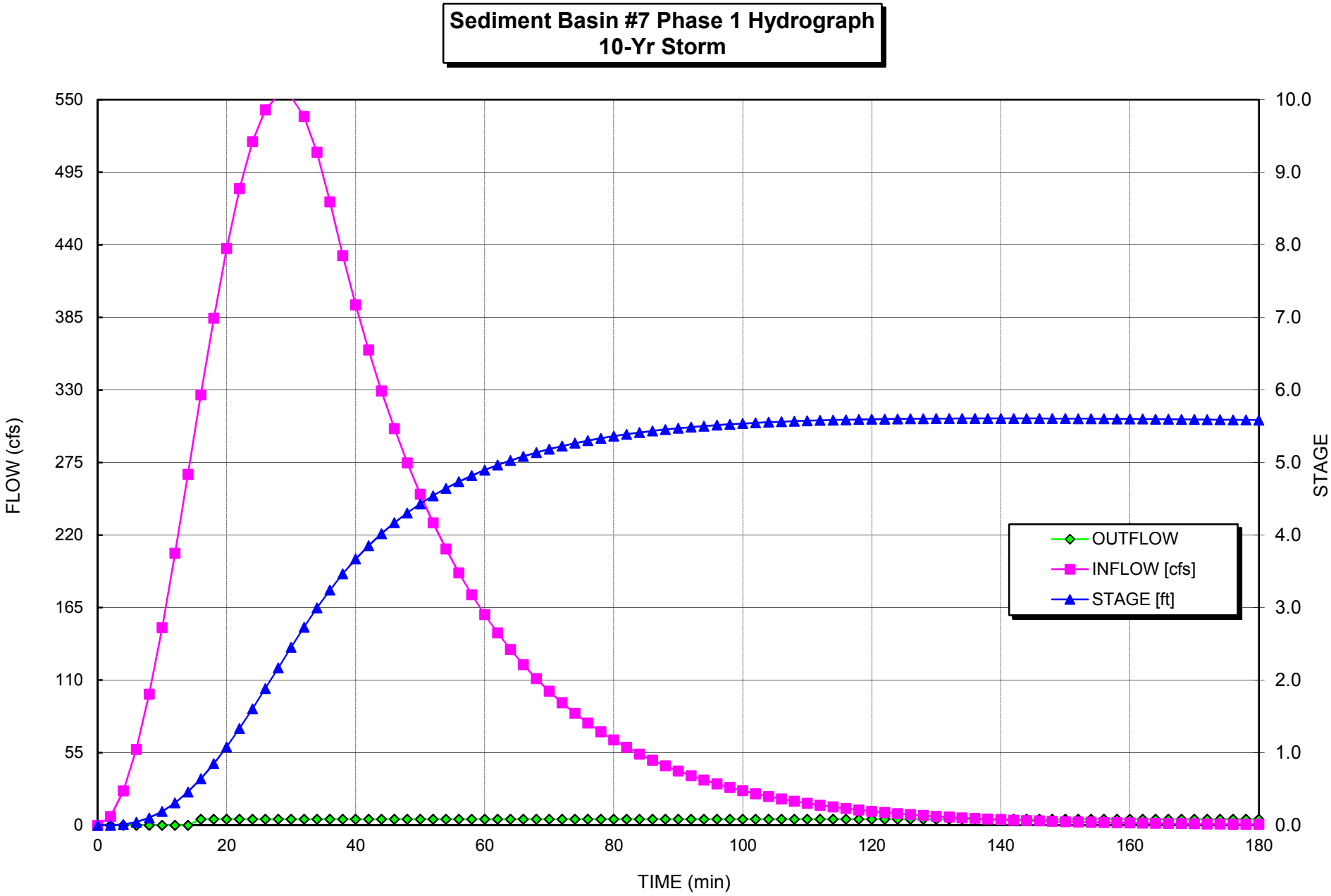
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
5.6	ft Maximum Stage	214.61	msl elevation
4.6	cfs Peak outflow		
4.6	cfs Peak Riser/Barrel outflow		
0.0	cfs Peak Weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer/ Perf Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	6.6	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	26.1	792	0.0	0.00	0.00	0.00	0.00	0.00	182.91	83,139	N/A
6	57.5	3,920	0.0	0.00	0.00	0.00	0.00	0.00	236.97	107,713	N/A
8	99.4	10,821	0.1	0.00	0.00	0.00	0.00	0.00	279.29	126,952	N/A
10	149.7	22,748	0.2	0.00	0.00	0.00	0.00	0.00	314.99	143,176	N/A
12	206.2	40,717	0.3	0.00	0.00	0.00	0.00	0.00	346.11	157,324	N/A
14	266.0	65,457	0.5	0.00	0.00	0.00	0.00	0.00	373.76	169,890	N/A
16	326.3	97,374	0.6	2.31	2.31	0.00	2.31	4.61	398.58	181,170	100%
18	384.3	135,978	0.8	2.31	2.31	0.00	2.31	4.61	420.71	191,233	100%
20	437.3	181,545	1.1	2.31	2.31	0.00	2.31	4.61	440.86	200,391	100%
22	482.6	233,463	1.3	2.31	2.31	0.00	2.31	4.61	459.18	208,718	100%
24	518.1	290,818	1.6	2.31	2.31	0.00	2.31	4.61	475.80	216,273	100%
26	542.2	352,439	1.9	2.31	2.31	0.00	2.31	4.61	490.83	223,106	100%
28	553.7	416,951	2.2	2.31	2.31	0.00	2.31	4.61	504.37	229,260	100%
30	552.0	482,842	2.5	2.31	2.31	0.00	2.31	4.61	516.49	234,770	100%
32	537.3	548,533	2.7	2.31	2.31	0.00	2.31	4.61	527.27	239,667	100%
34	510.2	612,457	3.0	2.31	2.31	0.00	2.31	4.61	536.76	243,982	100%
36	472.6	673,129	3.2	2.31	2.31	0.00	2.31	4.61	545.03	247,741	100%
38	431.7	729,289	3.5	2.31	2.31	0.00	2.31	4.61	552.15	250,975	100%
40	394.4	780,545	3.7	2.31	2.31	0.00	2.31	4.61	558.25	253,750	100%
42	360.3	827,322	3.9	2.31	2.31	0.00	2.31	4.61	563.53	256,152	100%
44	329.2	870,005	4.0	2.31	2.31	0.00	2.31	4.61	568.14	258,246	100%
46	300.7	908,950	4.2	2.31	2.31	0.00	2.31	4.61	572.18	260,083	100%
48	274.7	944,480	4.3	2.31	2.31	0.00	2.31	4.61	575.74	261,702	100%
50	250.9	976,889	4.4	2.31	2.31	0.00	2.31	4.61	578.90	263,135	100%
52	229.2	1,006,449	4.5	2.31	2.31	0.00	2.31	4.61	581.70	264,408	100%
54	209.4	1,033,404	4.6	2.31	2.31	0.00	2.31	4.61	584.19	265,542	100%
56	191.3	1,057,981	4.7	2.31	2.31	0.00	2.31	4.61	586.42	266,554	100%
58	174.8	1,080,384	4.8	2.31	2.31	0.00	2.31	4.61	588.41	267,459	100%
60	159.7	1,100,803	4.9	2.31	2.31	0.00	2.31	4.61	590.20	268,271	100%
62	145.8	1,119,408	5.0	2.31	2.31	0.00	2.31	4.61	591.80	269,000	100%
64	133.2	1,136,357	5.0	2.31	2.31	0.00	2.31	4.61	593.24	269,655	100%
66	121.7	1,151,792	5.1	2.31	2.31	0.00	2.31	4.61	594.54	270,245	100%
68	111.2	1,165,844	5.1	2.31	2.31	0.00	2.31	4.61	595.71	270,776	100%
70	101.6	1,178,634	5.2	2.31	2.31	0.00	2.31	4.61	596.76	271,254	100%
72	92.8	1,190,270	5.2	2.31	2.31	0.00	2.31	4.61	597.71	271,686	100%
74	84.8	1,200,852	5.3	2.31	2.31	0.00	2.31	4.61	598.57	272,075	100%
76	77.4	1,210,470	5.3	2.31	2.31	0.00	2.31	4.61	599.34	272,427	100%
78	70.7	1,219,210	5.3	2.31	2.31	0.00	2.31	4.61	600.04	272,744	100%
80	64.6	1,227,146	5.4	2.31	2.31	0.00	2.31	4.61	600.67	273,031	100%
82	59.0	1,234,347	5.4	2.31	2.31	0.00	2.31	4.61	601.24	273,290	100%

84	53.9	1,240,879	5.4	2.31	2.31	0.00	2.31	4.61	601.75	273,523	100%
86	49.3	1,246,797	5.4	2.31	2.31	0.00	2.31	4.61	602.21	273,734	100%
88	45.0	1,252,156	5.5	2.31	2.31	0.00	2.31	4.61	602.63	273,924	100%
90	41.1	1,257,004	5.5	2.31	2.31	0.00	2.31	4.61	603.01	274,095	100%
92	37.6	1,261,384	5.5	2.31	2.31	0.00	2.31	4.61	603.35	274,250	100%
94	34.3	1,265,338	5.5	2.31	2.31	0.00	2.31	4.61	603.66	274,389	100%
96	31.3	1,268,903	5.5	2.31	2.31	0.00	2.31	4.61	603.93	274,514	100%
98	28.6	1,272,111	5.5	2.31	2.31	0.00	2.31	4.61	604.18	274,626	100%
100	26.2	1,274,994	5.5	2.31	2.31	0.00	2.31	4.61	604.40	274,727	100%
102	23.9	1,277,579	5.5	2.31	2.31	0.00	2.31	4.61	604.60	274,817	100%
104	21.8	1,279,894	5.6	2.31	2.31	0.00	2.31	4.61	604.77	274,897	100%
106	19.9	1,281,960	5.6	2.31	2.31	0.00	2.31	4.61	604.93	274,969	100%
108	18.2	1,283,800	5.6	2.31	2.31	0.00	2.31	4.61	605.07	275,033	100%
110	16.6	1,285,433	5.6	2.31	2.31	0.00	2.31	4.61	605.20	275,089	100%
112	15.2	1,286,876	5.6	2.31	2.31	0.00	2.31	4.61	605.31	275,139	100%
114	13.9	1,288,148	5.6	2.31	2.31	0.00	2.31	4.61	605.40	275,183	100%
116	12.7	1,289,261	5.6	2.31	2.31	0.00	2.31	4.61	605.49	275,222	100%
118	11.6	1,290,230	5.6	2.31	2.31	0.00	2.31	4.61	605.56	275,255	100%
120	10.6	1,291,068	5.6	2.31	2.31	0.00	2.31	4.61	605.63	275,284	100%
122	9.7	1,291,785	5.6	2.31	2.31	0.00	2.31	4.61	605.68	275,309	100%
124	8.8	1,292,392	5.6	2.31	2.31	0.00	2.31	4.61	605.73	275,330	100%
126	8.1	1,292,899	5.6	2.31	2.31	0.00	2.31	4.61	605.76	275,347	100%
128	7.4	1,293,315	5.6	2.31	2.31	0.00	2.31	4.61	605.80	275,362	100%
130	6.7	1,293,646	5.6	2.31	2.31	0.00	2.31	4.61	605.82	275,373	100%
132	6.2	1,293,901	5.6	2.31	2.31	0.00	2.31	4.61	605.84	275,382	100%
134	5.6	1,294,086	5.6	2.31	2.31	0.00	2.31	4.61	605.85	275,388	100%
136	5.1	1,294,207	5.6	2.31	2.31	0.00	2.31	4.61	605.86	275,393	100%
138	4.7	1,294,270	5.6	2.31	2.31	0.00	2.31	4.61	605.87	275,395	100%
140	4.3	1,294,280	5.6	2.31	2.31	0.00	2.31	4.61	605.87	275,395	100%
142	3.9	1,294,241	5.6	2.31	2.31	0.00	2.31	4.61	605.87	275,394	100%
144	3.6	1,294,157	5.6	2.31	2.31	0.00	2.31	4.61	605.86	275,391	100%
146	3.3	1,294,033	5.6	2.31	2.31	0.00	2.31	4.61	605.85	275,387	100%
148	3.0	1,293,872	5.6	2.31	2.31	0.00	2.31	4.61	605.84	275,381	100%
150	2.7	1,293,677	5.6	2.31	2.31	0.00	2.31	4.61	605.82	275,374	100%
152	2.5	1,293,450	5.6	2.31	2.31	0.00	2.31	4.61	605.81	275,366	100%
154	2.3	1,293,196	5.6	2.31	2.31	0.00	2.31	4.61	605.79	275,358	100%
156	2.1	1,292,915	5.6	2.31	2.31	0.00	2.31	4.61	605.77	275,348	100%
158	1.9	1,292,611	5.6	2.31	2.31	0.00	2.31	4.61	605.74	275,338	100%
160	1.7	1,292,286	5.6	2.31	2.31	0.00	2.31	4.61	605.72	275,326	100%
162	1.6	1,291,941	5.6	2.31	2.31	0.00	2.31	4.61	605.69	275,314	100%
164	1.4	1,291,577	5.6	2.31	2.31	0.00	2.31	4.61	605.66	275,302	100%
166	1.3	1,291,198	5.6	2.31	2.31	0.00	2.31	4.61	605.64	275,289	100%
168	1.2	1,290,803	5.6	2.31	2.31	0.00	2.31	4.61	605.61	275,275	100%
170	1.1	1,290,394	5.6	2.31	2.31	0.00	2.31	4.61	605.57	275,261	100%
172	1.0	1,289,973	5.6	2.31	2.31	0.00	2.31	4.61	605.54	275,246	100%
174	0.9	1,289,541	5.6	2.31	2.31	0.00	2.31	4.61	605.51	275,232	100%
176	0.8	1,289,098	5.6	2.31	2.31	0.00	2.31	4.61	605.48	275,216	100%
178	0.8	1,288,646	5.6	2.31	2.31	0.00	2.31	4.61	605.44	275,201	100%
180	0.7	1,288,184	5.6	2.31	2.31	0.00	2.31	4.61	605.41	275,185	100%
182	0.6	1,287,715	5.6	2.31	2.31	0.00	2.31	4.61	605.37	275,168	100%
184	0.6	1,287,239	5.6	2.31	2.31	0.00	2.31	4.61	605.33	275,152	100%
186	0.5	1,286,756	5.6	2.31	2.31	0.00	2.31	4.61	605.30	275,135	100%
188	0.5	1,286,266	5.6	2.31	2.31	0.00	2.31	4.61	605.26	275,118	100%
190	0.4	1,285,772	5.6	2.31	2.31	0.00	2.31	4.61	605.22	275,101	100%
192	0.4	1,285,272	5.6	2.31	2.31	0.00	2.31	4.61	605.18	275,084	100%
194	0.4	1,284,767	5.6	2.31	2.31	0.00	2.31	4.61	605.15	275,066	100%
196	0.3	1,284,259	5.6	2.31	2.31	0.00	2.31	4.61	605.11	275,049	100%
198	0.3	1,283,746	5.6	2.31	2.31	0.00	2.31	4.61	605.07	275,031	100%
200	0.3	1,283,230	5.6	2.31	2.31	0.00	2.31	4.61	605.03	275,013	100%
202	0.3	1,282,710	5.6	2.31	2.31	0.00	2.31	4.61	604.99	274,995	100%
204	0.2	1,282,188	5.6	2.31	2.31	0.00	2.31	4.61	604.95	274,977	100%
206	0.2	1,281,663	5.6	2.31	2.31	0.00	2.31	4.61	604.91	274,959	100%


Sediment Basin #7 Phase 1 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE
TIME (min)
550
495
440
385
330
275
220
165
110
55
0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
20
40
60
80
100
120
140
160
180
OUTFLOW
INFLOW [cfs]
STAGE [ft]

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Computed By: PAW Date: 3/5/15

Checked By: MDP Date: 3/6/15

Sheet: _1___of __2___

Qp = 321.57 cfs

Tp = 48.89 minutes

dT = Max of **2** minutes

or **1.0%** of increment to peak

Sediment Basin # 7 Brickhaven

Phase 2

10 - year Storm Event

b = 1.6

Ks = 43,148

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	36	(in)	
Height of Riser above barrel =	5.2	(ft)	
Height of Riser from bottom of barrel=	9.2	(ft) elevation	217.20
Emergency Spillway =	9.5	(ft) elevation	217.50
Total Height of Dam =	10	(ft) elevation	218.00
Length of Emergency Spillway =	50	(ft)	
Diameter of Riser =	72	(in)	
Permanent Pond Stage =	0	(ft) elevation	208.0

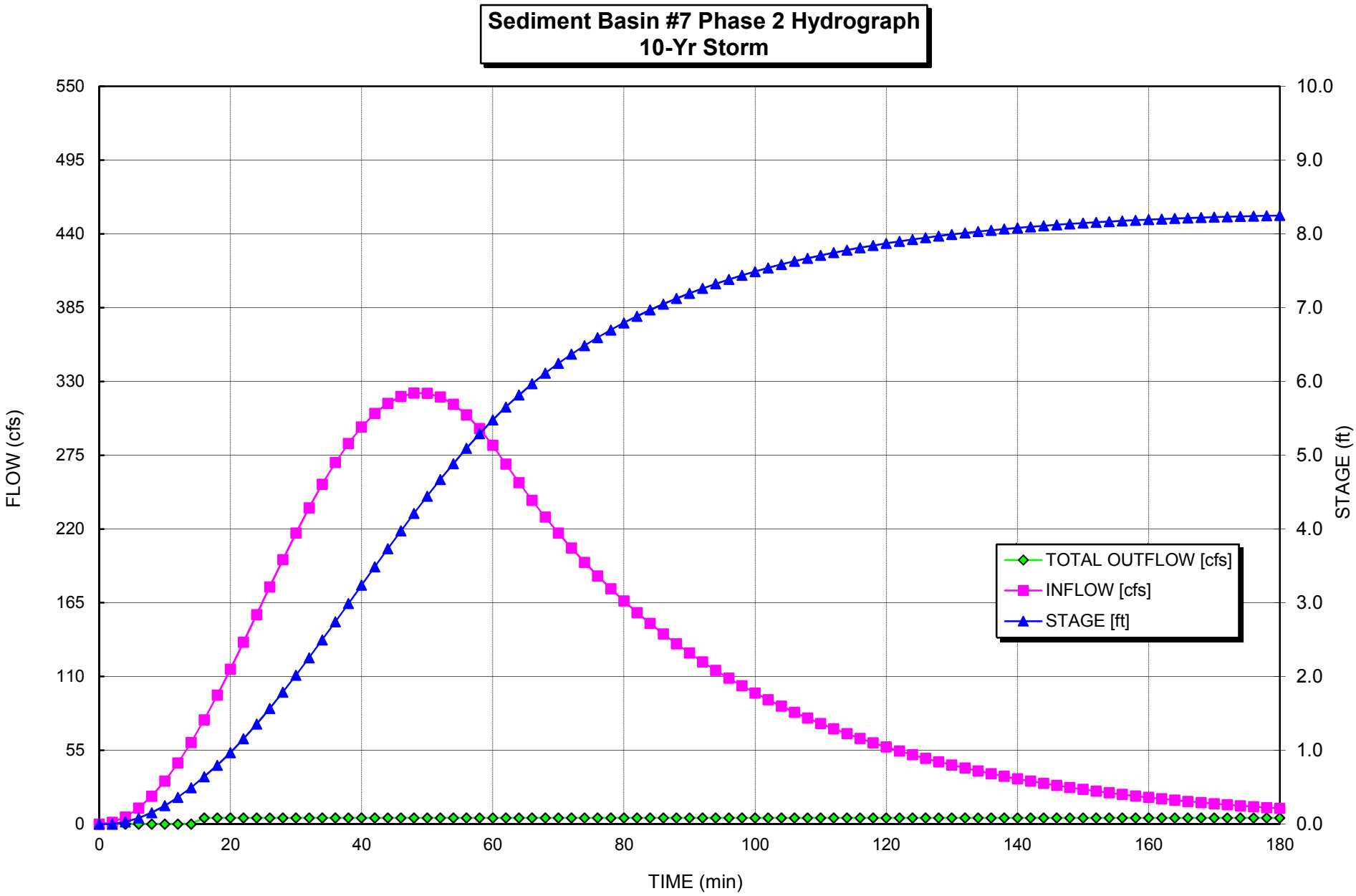
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
8.3	ft Maximum Stage	216.27	msl elevation
4.6	cfs Peak outflow		
4.6	cfs Peak Riser/Barrel outflow		
0.0	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer/ Perf Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.3	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	5.3	159	0.0	0.00	0.00	0.00	0.00	0.00	18.79	8,541	N/A
6	11.8	793	0.1	0.00	0.00	0.00	0.00	0.00	34.16	15,528	N/A
8	20.8	2,209	0.2	0.00	0.00	0.00	0.00	0.00	50.02	22,737	N/A
10	32.1	4,703	0.2	0.00	0.00	0.00	0.00	0.00	66.26	30,120	N/A
12	45.5	8,551	0.4	0.00	0.00	0.00	0.00	0.00	82.78	37,627	N/A
14	60.8	14,008	0.5	0.00	0.00	0.00	0.00	0.00	99.47	45,214	N/A
16	77.7	21,302	0.6	2.31	2.31	0.00	2.31	4.61	116.27	52,849	100%
18	96.1	30,078	0.8	2.31	2.31	0.00	2.31	4.61	132.20	60,089	100%
20	115.5	41,054	1.0	2.31	2.31	0.00	2.31	4.61	148.42	67,465	100%
22	135.6	54,357	1.2	2.31	2.31	0.00	2.31	4.61	164.77	74,894	100%
24	156.2	70,077	1.4	2.31	2.31	0.00	2.31	4.61	181.11	82,320	100%
26	176.8	88,265	1.6	2.31	2.31	0.00	2.31	4.61	197.35	89,702	100%
28	197.2	108,929	1.8	2.31	2.31	0.00	2.31	4.61	213.42	97,007	100%
30	217.0	132,038	2.0	2.31	2.31	0.00	2.31	4.61	229.26	104,208	100%
32	235.8	157,518	2.3	2.31	2.31	0.00	2.31	4.61	244.82	111,281	100%
34	253.4	185,261	2.5	2.31	2.31	0.00	2.31	4.61	260.05	118,207	100%
36	269.5	215,116	2.7	2.31	2.31	0.00	2.31	4.61	274.93	124,966	100%
38	283.8	246,901	3.0	2.31	2.31	0.00	2.31	4.61	289.39	131,543	100%
40	296.0	280,400	3.2	2.31	2.31	0.00	2.31	4.61	303.43	137,921	100%
42	306.1	315,370	3.5	2.31	2.31	0.00	2.31	4.61	316.99	144,088	100%
44	313.7	351,544	3.7	2.31	2.31	0.00	2.31	4.61	330.07	150,031	100%
46	318.8	388,633	4.0	2.31	2.31	0.00	2.31	4.61	342.62	155,737	100%
48	321.3	426,336	4.2	2.31	2.31	0.00	2.31	4.61	354.63	161,197	100%
50	321.2	464,339	4.4	2.31	2.31	0.00	2.31	4.61	366.09	166,402	100%
52	318.4	502,325	4.7	2.31	2.31	0.00	2.31	4.61	376.96	171,344	100%
54	313.0	539,976	4.9	2.31	2.31	0.00	2.31	4.61	387.23	176,016	100%
56	305.1	576,982	5.1	2.31	2.31	0.00	2.31	4.61	396.91	180,412	100%
58	294.8	613,039	5.3	2.31	2.31	0.00	2.31	4.61	405.96	184,528	100%
60	282.3	647,863	5.5	2.31	2.31	0.00	2.31	4.61	414.40	188,362	100%
62	268.4	681,189	5.7	2.31	2.31	0.00	2.31	4.61	422.21	191,912	100%
64	254.5	712,846	5.8	2.31	2.31	0.00	2.31	4.61	429.40	195,184	100%
66	241.3	742,835	6.0	2.31	2.31	0.00	2.31	4.61	436.04	198,200	100%
68	228.8	771,243	6.1	2.31	2.31	0.00	2.31	4.61	442.17	200,988	100%
70	217.0	798,150	6.2	2.31	2.31	0.00	2.31	4.61	447.85	203,570	100%
72	205.8	823,636	6.4	2.31	2.31	0.00	2.31	4.61	453.12	205,965	100%
74	195.1	847,773	6.5	2.31	2.31	0.00	2.31	4.61	458.02	208,191	100%
76	185.0	870,631	6.6	2.31	2.31	0.00	2.31	4.61	462.58	210,263	100%
78	175.4	892,277	6.7	2.31	2.31	0.00	2.31	4.61	466.83	212,194	100%
80	166.3	912,773	6.8	2.31	2.31	0.00	2.31	4.61	470.79	213,995	100%
82	157.7	932,179	6.9	2.31	2.31	0.00	2.31	4.61	474.49	215,677	100%
84	149.5	950,551	7.0	2.31	2.31	0.00	2.31	4.61	477.95	217,249	100%

86	141.8	967,943	7.0	2.31	2.31	0.00	2.31	4.61	481.18	218,720	100%
88	134.5	984,406	7.1	2.31	2.31	0.00	2.31	4.61	484.21	220,097	100%
90	127.5	999,987	7.2	2.31	2.31	0.00	2.31	4.61	487.05	221,387	100%
92	120.9	1,014,733	7.3	2.31	2.31	0.00	2.31	4.61	489.71	222,597	100%
94	114.6	1,028,687	7.3	2.31	2.31	0.00	2.31	4.61	492.21	223,731	100%
96	108.7	1,041,889	7.4	2.31	2.31	0.00	2.31	4.61	494.55	224,796	100%
98	103.1	1,054,379	7.4	2.31	2.31	0.00	2.31	4.61	496.75	225,795	100%
100	97.7	1,066,193	7.5	2.31	2.31	0.00	2.31	4.61	498.81	226,733	100%
102	92.7	1,077,367	7.5	2.31	2.31	0.00	2.31	4.61	500.75	227,614	100%
104	87.9	1,087,933	7.6	2.31	2.31	0.00	2.31	4.61	502.57	228,443	100%
106	83.3	1,097,924	7.6	2.31	2.31	0.00	2.31	4.61	504.29	229,221	100%
108	79.0	1,107,368	7.7	2.31	2.31	0.00	2.31	4.61	505.90	229,953	100%
110	74.9	1,116,295	7.7	2.31	2.31	0.00	2.31	4.61	507.41	230,641	100%
112	71.0	1,124,731	7.7	2.31	2.31	0.00	2.31	4.61	508.83	231,288	100%
114	67.4	1,132,701	7.8	2.31	2.31	0.00	2.31	4.61	510.17	231,897	100%
116	63.9	1,140,230	7.8	2.31	2.31	0.00	2.31	4.61	511.43	232,470	100%
118	60.6	1,147,340	7.8	2.31	2.31	0.00	2.31	4.61	512.62	233,008	100%
120	57.4	1,154,053	7.9	2.31	2.31	0.00	2.31	4.61	513.73	233,515	100%
122	54.4	1,160,390	7.9	2.31	2.31	0.00	2.31	4.61	514.78	233,991	100%
124	51.6	1,166,370	7.9	2.31	2.31	0.00	2.31	4.61	515.77	234,439	100%
126	49.0	1,172,012	7.9	2.31	2.31	0.00	2.31	4.61	516.69	234,860	100%
128	46.4	1,177,333	8.0	2.31	2.31	0.00	2.31	4.61	517.56	235,257	100%
130	44.0	1,182,350	8.0	2.31	2.31	0.00	2.31	4.61	518.38	235,629	100%
132	41.7	1,187,078	8.0	2.31	2.31	0.00	2.31	4.61	519.15	235,980	100%
134	39.6	1,191,533	8.0	2.31	2.31	0.00	2.31	4.61	519.88	236,309	100%
136	37.5	1,195,728	8.0	2.31	2.31	0.00	2.31	4.61	520.56	236,618	100%
138	35.6	1,199,677	8.1	2.31	2.31	0.00	2.31	4.61	521.20	236,909	100%
140	33.7	1,203,394	8.1	2.31	2.31	0.00	2.31	4.61	521.80	237,181	100%
142	32.0	1,206,889	8.1	2.31	2.31	0.00	2.31	4.61	522.36	237,438	100%
144	30.3	1,210,174	8.1	2.31	2.31	0.00	2.31	4.61	522.89	237,678	100%
146	28.8	1,213,261	8.1	2.31	2.31	0.00	2.31	4.61	523.39	237,903	100%
148	27.3	1,216,159	8.1	2.31	2.31	0.00	2.31	4.61	523.85	238,115	100%
150	25.9	1,218,878	8.1	2.31	2.31	0.00	2.31	4.61	524.29	238,313	100%
152	24.5	1,221,428	8.2	2.31	2.31	0.00	2.31	4.61	524.70	238,498	100%
154	23.3	1,223,817	8.2	2.31	2.31	0.00	2.31	4.61	525.08	238,672	100%
156	22.0	1,226,054	8.2	2.31	2.31	0.00	2.31	4.61	525.43	238,834	100%
158	20.9	1,228,146	8.2	2.31	2.31	0.00	2.31	4.61	525.77	238,986	100%
160	19.8	1,230,101	8.2	2.31	2.31	0.00	2.31	4.61	526.08	239,127	100%
162	18.8	1,231,926	8.2	2.31	2.31	0.00	2.31	4.61	526.37	239,259	100%
164	17.8	1,233,628	8.2	2.31	2.31	0.00	2.31	4.61	526.64	239,382	100%
166	16.9	1,235,214	8.2	2.31	2.31	0.00	2.31	4.61	526.89	239,496	100%
168	16.0	1,236,688	8.2	2.31	2.31	0.00	2.31	4.61	527.13	239,603	100%
170	15.2	1,238,058	8.2	2.31	2.31	0.00	2.31	4.61	527.34	239,702	100%
172	14.4	1,239,328	8.2	2.31	2.31	0.00	2.31	4.61	527.54	239,793	100%
174	13.7	1,240,503	8.2	2.31	2.31	0.00	2.31	4.61	527.73	239,878	100%
176	13.0	1,241,589	8.2	2.31	2.31	0.00	2.31	4.61	527.90	239,956	100%
178	12.3	1,242,590	8.2	2.31	2.31	0.00	2.31	4.61	528.06	240,028	100%
180	11.6	1,243,510	8.2	2.31	2.31	0.00	2.31	4.61	528.21	240,094	100%
182	11.0	1,244,355	8.3	2.31	2.31	0.00	2.31	4.61	528.34	240,155	100%
184	10.5	1,245,126	8.3	2.31	2.31	0.00	2.31	4.61	528.46	240,210	100%
186	9.9	1,245,830	8.3	2.31	2.31	0.00	2.31	4.61	528.57	240,260	100%
188	9.4	1,246,468	8.3	2.31	2.31	0.00	2.31	4.61	528.67	240,306	100%
190	8.9	1,247,044	8.3	2.31	2.31	0.00	2.31	4.61	528.76	240,348	100%
192	8.5	1,247,562	8.3	2.31	2.31	0.00	2.31	4.61	528.85	240,385	100%
194	8.0	1,248,024	8.3	2.31	2.31	0.00	2.31	4.61	528.92	240,418	100%
196	7.6	1,248,434	8.3	2.31	2.31	0.00	2.31	4.61	528.98	240,447	100%
198	7.2	1,248,794	8.3	2.31	2.31	0.00	2.31	4.61	529.04	240,473	100%
200	6.8	1,249,106	8.3	2.31	2.31	0.00	2.31	4.61	529.09	240,495	100%
202	6.5	1,249,374	8.3	2.31	2.31	0.00	2.31	4.61	529.13	240,515	100%
204	6.2	1,249,599	8.3	2.31	2.31	0.00	2.31	4.61	529.17	240,531	100%


Sediment Basin #7 Phase 2 Hydrograph
10-Yr Storm
FLOW (cfs)
STAGE (ft)
TIME (min)
550
495
440
385
330
275
220
165
110
55
0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
20
40
60
80
100
120
140
160
180
TOTAL OUTFLOW [cfs]
INFLOW [cfs]
STAGE [ft]

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Qp = 394.45 cfs

Tp = 49.34 minutes

dT = Max of **2** minutes

or **1.0%** of increment to peak

Sediment Basin # 7 Brickhaven

Phase 2

25 - year Storm Event

b = 1.6

Ks = 43,148

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	36	(in)	
Height of Riser above barrel =	5.2	(ft)	
Height of Riser from bottom of barrel=	9.2	(ft) elevation	217.20
Emergency Spillway =	9.5	(ft) elevation	217.50
Total Height of Dam =	10.0	(ft) elevation	218.00
Length of Emergency Spillway =	50	(ft)	
Diameter of Riser =	72	(in)	
Permanent Pond Stage =	0	(ft) elevation	208.0

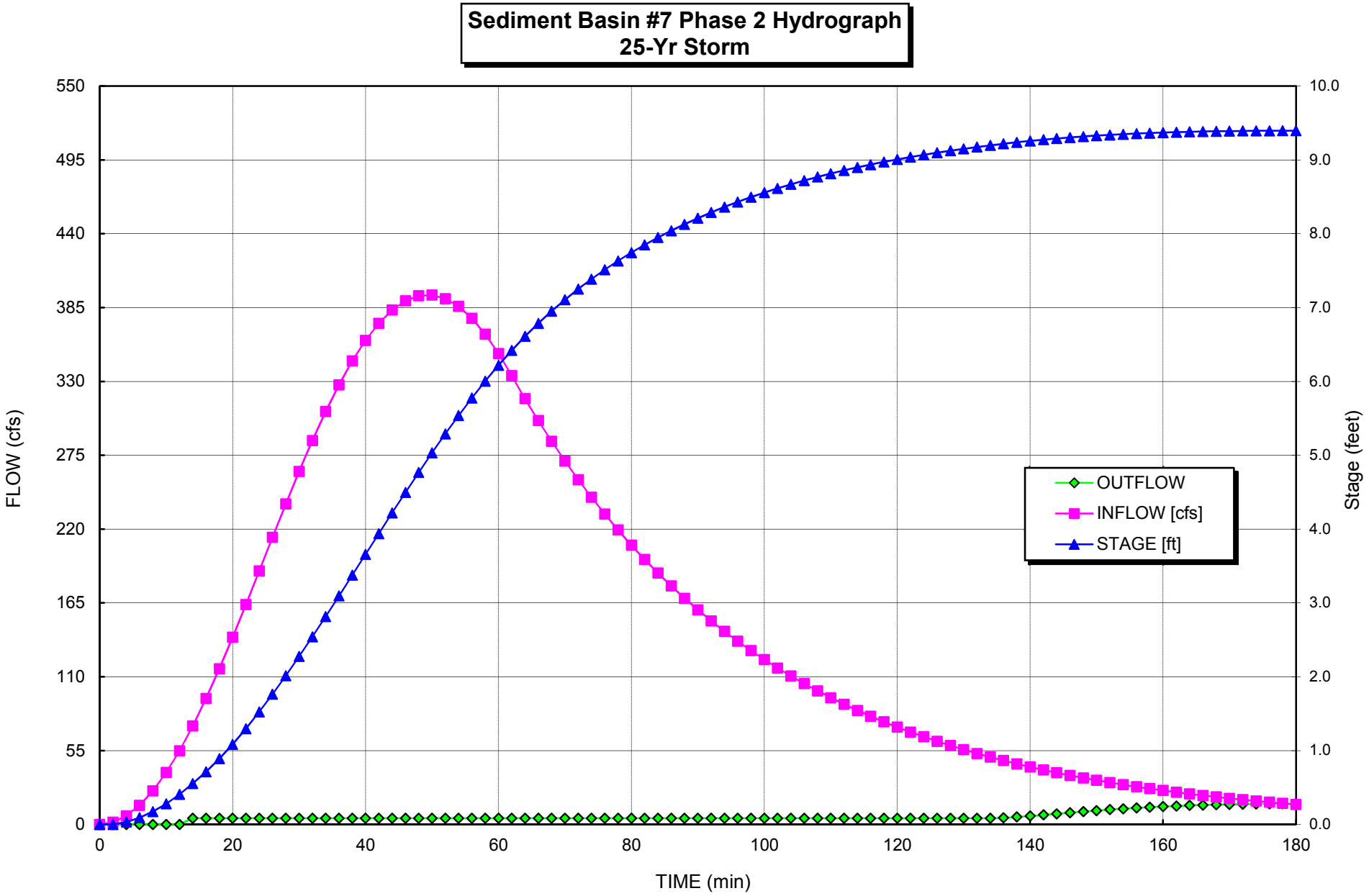
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
100%	Minimum Settling Efficiency		
9.4	ft Maximum Stage	217.4	msl elevation
15.4	cfs Peak outflow		
15.4	cfs Peak Riser/Barrel outflow		
0.0	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer/ Perf Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	1.6	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	6.4	192	0.0	0.00	0.00	0.00	0.00	0.00	20.14	9,153	N/A
6	14.2	955	0.1	0.00	0.00	0.00	0.00	0.00	36.61	16,641	N/A
8	25.0	2,661	0.2	0.00	0.00	0.00	0.00	0.00	53.61	24,368	N/A
10	38.6	5,665	0.3	0.00	0.00	0.00	0.00	0.00	71.02	32,282	N/A
12	54.8	10,302	0.4	0.00	0.00	0.00	0.00	0.00	88.72	40,329	N/A
14	73.3	16,881	0.6	2.31	2.31	0.00	2.31	4.61	106.62	48,465	100%
16	93.8	25,123	0.7	2.31	2.31	0.00	2.31	4.61	123.63	56,195	100%
18	115.9	35,824	0.9	2.31	2.31	0.00	2.31	4.61	141.08	64,129	100%
20	139.4	49,184	1.1	2.31	2.31	0.00	2.31	4.61	158.75	72,158	100%
22	163.8	65,362	1.3	2.31	2.31	0.00	2.31	4.61	176.47	80,214	100%
24	188.8	84,470	1.5	2.31	2.31	0.00	2.31	4.61	194.14	88,247	100%
26	213.9	106,572	1.8	2.31	2.31	0.00	2.31	4.61	211.69	96,221	100%
28	238.7	131,685	2.0	2.31	2.31	0.00	2.31	4.61	229.03	104,104	100%
30	262.9	159,777	2.3	2.31	2.31	0.00	2.31	4.61	246.12	111,872	100%
32	285.9	190,767	2.5	2.31	2.31	0.00	2.31	4.61	262.91	119,502	100%
34	307.6	224,528	2.8	2.31	2.31	0.00	2.31	4.61	279.34	126,974	100%
36	327.5	260,886	3.1	2.31	2.31	0.00	2.31	4.61	295.39	134,268	100%
38	345.2	299,628	3.4	2.31	2.31	0.00	2.31	4.61	311.01	141,368	100%
40	360.6	340,501	3.7	2.31	2.31	0.00	2.31	4.61	326.17	148,259	100%
42	373.3	383,216	3.9	2.31	2.31	0.00	2.31	4.61	340.84	154,926	100%
44	383.1	427,458	4.2	2.31	2.31	0.00	2.31	4.61	354.98	161,355	100%
46	390.0	472,882	4.5	2.31	2.31	0.00	2.31	4.61	368.58	167,535	100%
48	393.7	519,129	4.8	2.31	2.31	0.00	2.31	4.61	381.60	173,455	100%
50	394.3	565,823	5.0	2.31	2.31	0.00	2.31	4.61	394.03	179,105	100%
52	391.6	612,582	5.3	2.31	2.31	0.00	2.31	4.61	405.85	184,477	100%
54	385.8	659,025	5.5	2.31	2.31	0.00	2.31	4.61	417.04	189,564	100%
56	377.0	704,773	5.8	2.31	2.31	0.00	2.31	4.61	427.59	194,358	100%
58	365.2	749,459	6.0	2.31	2.31	0.00	2.31	4.61	437.48	198,856	100%
60	350.8	792,734	6.2	2.31	2.31	0.00	2.31	4.61	446.72	203,055	100%
62	334.2	834,272	6.4	2.31	2.31	0.00	2.31	4.61	455.29	206,951	100%
64	317.1	873,828	6.6	2.31	2.31	0.00	2.31	4.61	463.21	210,550	100%
66	300.8	911,326	6.8	2.31	2.31	0.00	2.31	4.61	470.51	213,868	100%
68	285.4	946,871	7.0	2.31	2.31	0.00	2.31	4.61	477.26	216,936	100%
70	270.7	980,562	7.1	2.31	2.31	0.00	2.31	4.61	483.51	219,777	100%
72	256.8	1,012,496	7.3	2.31	2.31	0.00	2.31	4.61	489.31	222,414	100%
74	243.6	1,042,763	7.4	2.31	2.31	0.00	2.31	4.61	494.70	224,866	100%
76	231.1	1,071,447	7.5	2.31	2.31	0.00	2.31	4.61	499.73	227,148	100%
78	219.3	1,098,631	7.6	2.31	2.31	0.00	2.31	4.61	504.41	229,276	100%
80	208.0	1,124,391	7.7	2.31	2.31	0.00	2.31	4.61	508.78	231,262	100%
82	197.3	1,148,801	7.8	2.31	2.31	0.00	2.31	4.61	512.86	233,118	100%
84	187.2	1,171,929	7.9	2.31	2.31	0.00	2.31	4.61	516.68	234,854	100%

86	177.6	1,193,841	8.0	2.31	2.31	0.00	2.31	4.61	520.25	236,479	100%
88	168.5	1,214,601	8.1	2.31	2.31	0.00	2.31	4.61	523.60	238,001	100%
90	159.8	1,234,266	8.2	2.31	2.31	0.00	2.31	4.61	526.74	239,428	100%
92	151.6	1,252,894	8.3	2.31	2.31	0.00	2.31	4.61	529.69	240,767	100%
94	143.9	1,270,537	8.4	2.31	2.31	0.00	2.31	4.61	532.45	242,023	100%
96	136.5	1,287,246	8.4	2.31	2.31	0.00	2.31	4.61	535.05	243,203	100%
98	129.5	1,303,069	8.5	2.31	2.31	0.00	2.31	4.61	537.48	244,311	100%
100	122.8	1,318,051	8.6	2.31	2.31	0.00	2.31	4.61	539.78	245,353	100%
102	116.5	1,332,236	8.6	2.31	2.31	0.00	2.31	4.61	541.93	246,332	100%
104	110.5	1,345,665	8.7	2.31	2.31	0.00	2.31	4.61	543.96	247,253	100%
106	104.9	1,358,376	8.7	2.31	2.31	0.00	2.31	4.61	545.86	248,120	100%
108	99.5	1,370,406	8.8	2.31	2.31	0.00	2.31	4.61	547.66	248,936	100%
110	94.4	1,381,790	8.8	2.31	2.31	0.00	2.31	4.61	549.35	249,703	100%
112	89.5	1,392,561	8.9	2.31	2.31	0.00	2.31	4.61	550.94	250,426	100%
114	84.9	1,402,751	8.9	2.31	2.31	0.00	2.31	4.61	552.43	251,106	100%
116	80.6	1,412,390	8.9	2.31	2.31	0.00	2.31	4.61	553.84	251,747	100%
118	76.4	1,421,505	9.0	2.31	2.31	0.00	2.31	4.61	555.17	252,351	100%
120	72.5	1,430,124	9.0	2.31	2.31	0.00	2.31	4.61	556.42	252,919	100%
122	68.8	1,438,273	9.0	2.31	2.31	0.00	2.31	4.61	557.60	253,454	100%
124	65.3	1,445,974	9.1	2.31	2.31	0.00	2.31	4.61	558.71	253,959	100%
126	61.9	1,453,252	9.1	2.31	2.31	0.00	2.31	4.61	559.75	254,434	100%
128	58.7	1,460,128	9.1	2.31	2.31	0.00	2.31	4.61	560.74	254,881	100%
130	55.7	1,466,623	9.2	2.31	2.31	0.00	2.31	4.61	561.66	255,302	100%
132	52.9	1,472,756	9.2	2.31	2.31	0.00	2.31	4.61	562.54	255,699	100%
134	50.1	1,478,546	9.2	2.31	2.31	0.00	2.31	4.61	563.36	256,073	100%
136	47.6	1,484,010	9.2	2.31	2.46	0.00	94.40	4.91	564.13	256,424	100%
138	45.1	1,489,129	9.2	2.31	2.77	0.00	94.53	5.53	564.86	256,753	100%
140	42.8	1,493,880	9.3	2.31	3.14	0.00	94.64	6.28	565.53	257,058	100%
142	40.6	1,498,264	9.3	2.31	3.55	0.00	94.74	7.09	566.14	257,338	100%
144	38.5	1,502,287	9.3	2.31	3.96	0.00	94.84	7.92	566.71	257,595	100%
146	36.6	1,505,960	9.3	2.31	4.37	0.00	94.92	8.75	567.23	257,830	100%
148	34.7	1,509,296	9.3	2.31	4.77	0.00	95.00	9.55	567.69	258,042	100%
150	32.9	1,512,312	9.3	2.31	5.16	0.00	95.07	10.31	568.11	258,234	100%
152	31.2	1,515,022	9.3	2.31	5.51	0.00	95.14	11.03	568.49	258,406	100%
154	29.6	1,517,444	9.3	2.31	5.84	0.00	95.19	11.69	568.83	258,560	100%
156	28.1	1,519,595	9.4	2.31	6.15	0.00	95.25	12.29	569.13	258,696	100%
158	26.6	1,521,490	9.4	2.31	6.42	0.00	95.29	12.84	569.40	258,816	100%
160	25.3	1,523,147	9.4	2.31	6.66	0.00	95.33	13.33	569.63	258,921	100%
162	24.0	1,524,581	9.4	2.31	6.88	0.00	95.36	13.76	569.83	259,012	100%
164	22.7	1,525,808	9.4	2.31	7.06	0.00	95.39	14.13	570.00	259,089	100%
166	21.6	1,526,842	9.4	2.31	7.22	0.00	95.41	14.45	570.14	259,154	100%
168	20.5	1,527,698	9.4	2.31	7.36	0.00	95.43	14.71	570.26	259,209	100%
170	19.4	1,528,390	9.4	2.31	7.46	0.00	95.45	14.93	570.35	259,252	100%
172	18.4	1,528,929	9.4	2.31	7.55	0.00	95.46	15.10	570.43	259,286	100%
174	17.5	1,529,328	9.4	2.31	7.61	0.00	95.47	15.23	570.49	259,311	100%
176	16.6	1,529,599	9.4	2.31	7.66	0.00	95.48	15.31	570.52	259,328	100%
178	15.7	1,529,752	9.4	2.31	7.68	0.00	95.48	15.36	570.54	259,338	100%
180	14.9	1,529,797	9.4	2.31	7.69	0.00	95.48	15.37	570.55	259,341	100%
182	14.2	1,529,743	9.4	2.31	7.68	0.00	95.48	15.36	570.54	259,338	100%
184	13.4	1,529,599	9.4	2.31	7.66	0.00	95.48	15.31	570.52	259,328	100%
186	12.7	1,529,373	9.4	2.31	7.62	0.00	95.47	15.24	570.49	259,314	100%
188	12.1	1,529,074	9.4	2.31	7.57	0.00	95.47	15.14	570.45	259,295	100%
190	11.5	1,528,707	9.4	2.31	7.51	0.00	95.46	15.03	570.40	259,272	100%
192	10.9	1,528,280	9.4	2.31	7.45	0.00	95.45	14.89	570.34	259,245	100%
194	10.3	1,527,798	9.4	2.31	7.37	0.00	95.44	14.74	570.27	259,215	100%
196	9.8	1,527,267	9.4	2.31	7.29	0.00	95.42	14.58	570.20	259,181	100%
198	9.3	1,526,693	9.4	2.31	7.20	0.00	95.41	14.40	570.12	259,145	100%
200	8.8	1,526,079	9.4	2.31	7.11	0.00	95.40	14.21	570.03	259,106	100%
202	8.4	1,525,431	9.4	2.31	7.01	0.00	95.38	14.01	569.94	259,065	100%
204	7.9	1,524,752	9.4	2.31	6.90	0.00	95.37	13.81	569.85	259,022	100%
206	7.5	1,524,047	9.4	2.31	6.80	0.00	95.35	13.60	569.75	258,978	100%


Sediment Basin #7 Phase 2 Hydrograph
25-Yr Storm
FLOW (cfs)
Stage (feet)
TIME (min)
550
495
440
385
330
275
220
165
110
55
0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
20
40
60
80
100
120
140
160
180
OUTFLOW
INFLOW [cfs]
STAGE [ft]

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Sediment Basin # 7 Brickhaven

Phase 2

100 - year Storm Event

Qp =	511.7	cfs
Tp =	50.0	minutes
dT = Max of	2	minutes
or	1.0%	of increment to peak

b = 1.6

Ks = 43,148

Number of Riser/Barrel Assemblies	2		
Diameter of Barrel =	36	(in)	
Height of Riser above barrel =	5.2	(ft)	
Height of Riser from bottom of barrel=	9.2	(ft) elevation	217.20
Emergency Spillway =	9.5	(ft) elevation	217.50
Total Height of Dam =	10.0	(ft) elevation	218.00
Length of Emergency Spillway =	50	(ft)	
Diameter of Riser =	72	(in)	
Permanent Pond Stage =	0	(ft) elevation	208.0

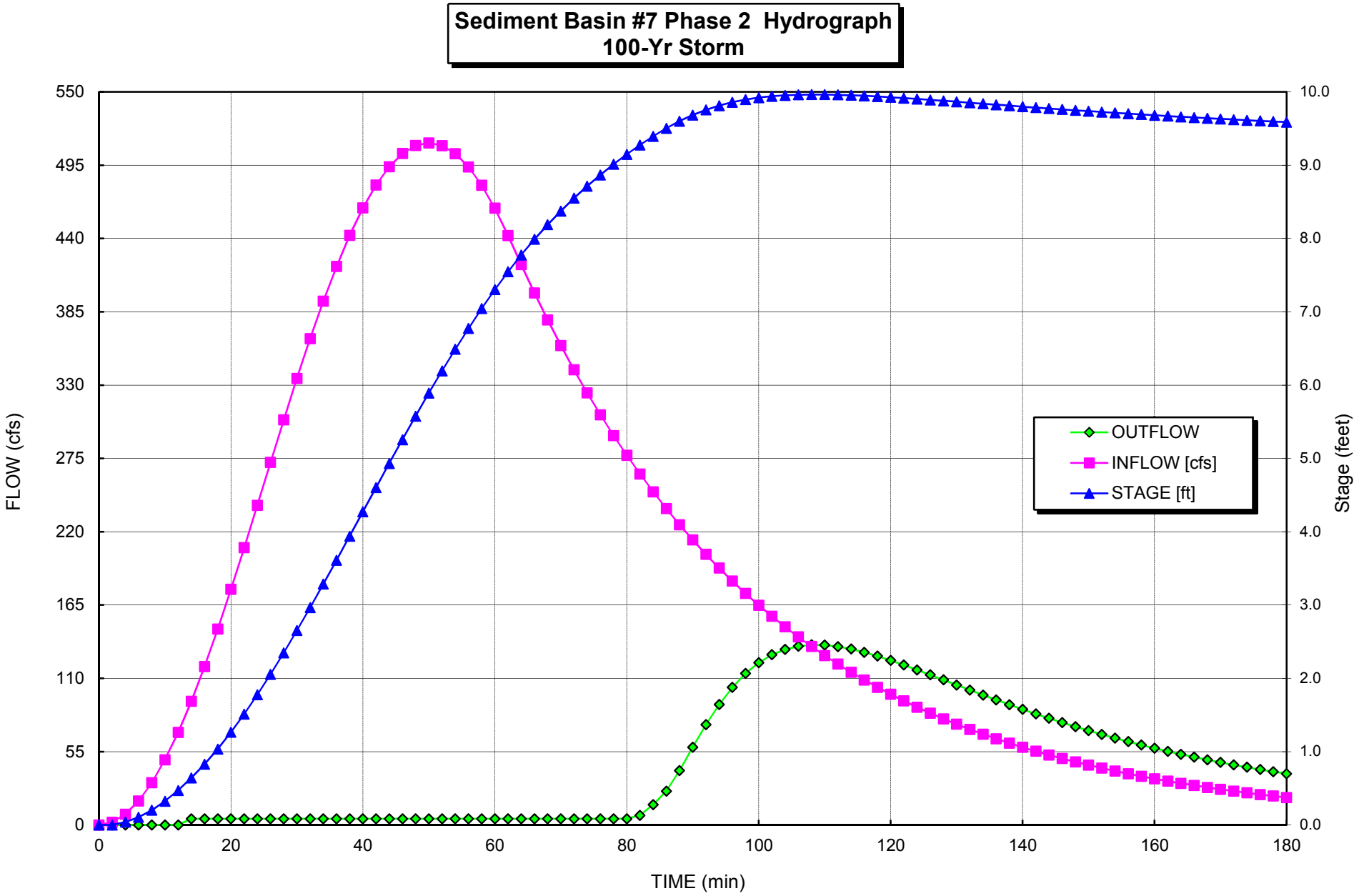
4.0E-03	Settling Velocity of design particle (fps)		
2	Effective number of cells (2 is construction site #)		
96%	Minimum Settling Efficiency		
10.0	ft Maximum Stage	218.0	msl elevation
135.1	cfs Peak outflow		
87.7	cfs Peak Riser/Barrel outflow		
47.4	cfs peak weir flow		

Notes:

1. Length of emergency spillway is the bottom width of the emergency spillway.
2. Settling efficiency neglects permanent pond volume

TIME (min)	INFLOW [cfs]	STORAGE [cu ft]	STAGE [ft]	Skimmer/ Perf Flow [cfs]	RISER CAPACITY [cfs]	WEIR FLOW [cfs]	BARREL CAPACITY [cfs]	TOTAL OUTFLOW [cfs]	Bound Discharge [cfs]	Estimated Surface Area (sf)	Settling Efficiency [%]
0	0.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
2	2.0	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	-	N/A
4	8.0	242	0.0	0.00	0.00	0.00	0.00	0.00	21.97	9,987	N/A
6	18.0	1,207	0.1	0.00	0.00	0.00	0.00	0.00	39.95	18,157	N/A
8	31.7	3,364	0.2	0.00	0.00	0.00	0.00	0.00	58.50	26,589	N/A
10	48.9	7,162	0.3	0.00	0.00	0.00	0.00	0.00	77.50	35,226	N/A
12	69.4	13,028	0.5	0.00	0.00	0.00	0.00	0.00	96.82	44,011	N/A
14	92.8	21,352	0.6	2.31	2.31	0.00	2.31	4.61	116.37	52,894	100%
16	118.8	31,933	0.8	2.31	2.31	0.00	2.31	4.61	135.17	61,443	100%
18	147.0	45,635	1.0	2.31	2.31	0.00	2.31	4.61	154.38	70,174	100%
20	176.8	62,716	1.3	2.31	2.31	0.00	2.31	4.61	173.78	78,989	100%
22	208.0	83,383	1.5	2.31	2.31	0.00	2.31	4.61	193.21	87,823	100%
24	239.8	107,785	1.8	2.31	2.31	0.00	2.31	4.61	212.58	96,627	100%
26	272.0	136,013	2.1	2.31	2.31	0.00	2.31	4.61	231.80	105,365	100%
28	303.9	168,097	2.3	2.31	2.31	0.00	2.31	4.61	250.81	114,006	100%
30	335.0	204,007	2.7	2.31	2.31	0.00	2.31	4.61	269.55	122,524	100%
32	364.9	243,652	3.0	2.31	2.31	0.00	2.31	4.61	287.97	130,896	100%
34	393.0	286,882	3.3	2.31	2.31	0.00	2.31	4.61	306.02	139,100	100%
36	419.0	333,490	3.6	2.31	2.31	0.00	2.31	4.61	323.65	147,116	100%
38	442.4	383,218	3.9	2.31	2.31	0.00	2.31	4.61	340.84	154,926	100%
40	462.9	435,756	4.3	2.31	2.31	0.00	2.31	4.61	357.53	162,514	100%
42	480.1	490,750	4.6	2.31	2.31	0.00	2.31	4.61	373.70	169,864	100%
44	493.8	547,810	4.9	2.31	2.31	0.00	2.31	4.61	389.32	176,962	100%
46	503.7	606,510	5.3	2.31	2.31	0.00	2.31	4.61	404.35	183,795	100%
48	509.7	666,401	5.6	2.31	2.31	0.00	2.31	4.61	418.77	190,350	100%
50	511.7	727,012	5.9	2.31	2.31	0.00	2.31	4.61	432.56	196,618	100%
52	509.7	787,864	6.2	2.31	2.31	0.00	2.31	4.61	445.70	202,589	100%
54	503.6	848,472	6.5	2.31	2.31	0.00	2.31	4.61	458.16	208,255	100%
56	493.7	908,355	6.8	2.31	2.31	0.00	2.31	4.61	469.94	213,609	100%
58	480.0	967,045	7.0	2.31	2.31	0.00	2.31	4.61	481.02	218,645	100%
60	462.8	1,024,091	7.3	2.31	2.31	0.00	2.31	4.61	491.39	223,359	100%
62	442.3	1,079,069	7.5	2.31	2.31	0.00	2.31	4.61	501.05	227,748	100%
64	420.5	1,131,587	7.8	2.31	2.31	0.00	2.31	4.61	509.99	231,812	100%
66	399.2	1,181,491	8.0	2.31	2.31	0.00	2.31	4.61	518.24	235,566	100%
68	378.9	1,228,838	8.2	2.31	2.31	0.00	2.31	4.61	525.88	239,036	100%
70	359.7	1,273,757	8.4	2.31	2.31	0.00	2.31	4.61	532.95	242,251	100%
72	341.5	1,316,371	8.5	2.31	2.31	0.00	2.31	4.61	539.52	245,236	100%
74	324.2	1,356,798	8.7	2.31	2.31	0.00	2.31	4.61	545.63	248,013	100%
76	307.8	1,395,149	8.9	2.31	2.31	0.00	2.31	4.61	551.32	250,599	100%
78	292.2	1,431,527	9.0	2.31	2.31	0.00	2.31	4.61	556.62	253,011	100%
80	277.4	1,466,034	9.1	2.31	2.31	0.00	2.31	4.61	561.58	255,264	100%
82	263.3	1,498,764	9.3	2.31	3.60	0.00	94.75	7.19	566.21	257,370	100%
84	250.0	1,529,498	9.4	2.31	7.64	0.00	95.48	15.28	570.51	259,322	100%

86	237.3	1,557,660	9.5	2.31	12.66	0.02	96.13	25.35	574.40	261,089	100%
88	225.3	1,583,094	9.6	2.31	18.03	4.73	96.71	40.79	577.87	262,668	99%
90	213.9	1,605,231	9.7	2.31	23.24	11.82	97.21	58.31	580.86	264,029	99%
92	203.0	1,623,897	9.8	2.31	27.98	19.25	97.63	75.21	583.37	265,167	98%
94	192.7	1,639,233	9.8	2.31	32.10	26.16	97.97	90.35	585.41	266,096	98%
96	183.0	1,651,518	9.9	2.31	35.53	32.16	98.24	103.21	587.04	266,837	97%
98	173.7	1,661,088	9.9	2.31	38.27	37.10	98.45	113.65	588.30	267,411	97%
100	164.9	1,668,292	9.9	2.31	40.39	40.97	98.61	121.74	589.25	267,842	97%
102	156.5	1,673,469	9.9	2.31	41.93	43.82	98.72	127.68	589.93	268,151	96%
104	148.6	1,676,932	10.0	2.31	42.97	45.76	98.80	131.70	590.39	268,358	96%
106	141.1	1,678,959	10.0	2.31	43.58	46.91	98.84	134.08	590.65	268,478	96%
108	133.9	1,679,798	10.0	2.31	43.84	47.39	98.86	135.06	590.76	268,528	96%
110	127.1	1,679,661	10.0	2.31	43.79	47.31	98.86	134.90	590.74	268,520	96%
112	120.7	1,678,728	10.0	2.31	43.51	46.78	98.84	133.80	590.62	268,465	96%
114	114.6	1,677,154	10.0	2.31	43.03	45.89	98.80	131.96	590.42	268,371	96%
116	108.8	1,675,068	9.9	2.31	42.41	44.72	98.76	129.53	590.14	268,247	96%
118	103.3	1,672,576	9.9	2.31	41.66	43.33	98.70	126.65	589.82	268,098	96%
120	98.0	1,669,769	9.9	2.31	40.82	41.78	98.64	123.43	589.45	267,931	97%
122	93.1	1,666,720	9.9	2.31	39.92	40.12	98.58	119.96	589.05	267,748	97%
124	88.3	1,663,491	9.9	2.31	38.97	38.38	98.50	116.33	588.62	267,555	97%
126	83.9	1,660,132	9.9	2.31	38.00	36.60	98.43	112.59	588.18	267,354	97%
128	79.6	1,656,684	9.9	2.31	37.00	34.80	98.36	108.80	587.72	267,147	97%
130	75.6	1,653,181	9.9	2.31	36.00	33.00	98.28	105.00	587.26	266,937	97%
132	71.7	1,649,650	9.9	2.31	35.00	31.22	98.20	101.22	586.79	266,724	97%
134	68.1	1,646,114	9.8	2.31	34.00	29.47	98.12	97.48	586.33	266,512	98%
136	64.7	1,642,590	9.8	2.31	33.02	27.76	98.04	93.80	585.86	266,299	98%
138	61.4	1,639,092	9.8	2.31	32.06	26.09	97.97	90.21	585.39	266,088	98%
140	58.3	1,635,633	9.8	2.31	31.11	24.47	97.89	86.70	584.93	265,879	98%
142	55.3	1,632,221	9.8	2.31	30.19	22.91	97.81	83.30	584.48	265,672	98%
144	52.5	1,628,864	9.8	2.31	29.29	21.41	97.74	80.00	584.03	265,469	98%
146	49.9	1,625,566	9.8	2.31	28.42	19.96	97.67	76.81	583.59	265,268	98%
148	47.3	1,622,331	9.7	2.31	27.57	18.58	97.59	73.73	583.16	265,072	99%
150	44.9	1,619,163	9.7	2.31	26.75	17.26	97.52	70.76	582.73	264,879	99%
152	42.7	1,616,063	9.7	2.31	25.96	15.99	97.45	67.90	582.32	264,690	99%
154	40.5	1,613,033	9.7	2.31	25.19	14.78	97.39	65.16	581.91	264,505	99%
156	38.4	1,610,073	9.7	2.31	24.44	13.64	97.32	62.52	581.51	264,325	99%
158	36.5	1,607,183	9.7	2.31	23.72	12.54	97.26	59.99	581.13	264,148	99%
160	34.6	1,604,363	9.7	2.31	23.03	11.51	97.19	57.57	580.75	263,975	99%
162	32.9	1,601,612	9.7	2.31	22.36	10.53	97.13	55.24	580.38	263,807	99%
164	31.2	1,598,929	9.7	2.31	21.71	9.60	97.07	53.02	580.01	263,642	99%
166	29.6	1,596,313	9.7	2.31	21.09	8.72	97.01	50.89	579.66	263,482	99%
168	28.1	1,593,762	9.6	2.31	20.48	7.89	96.95	48.85	579.31	263,325	99%
170	26.7	1,591,276	9.6	2.31	19.90	7.10	96.90	46.91	578.98	263,172	99%
172	25.4	1,588,852	9.6	2.31	19.34	6.37	96.84	45.05	578.65	263,023	99%
174	24.1	1,586,489	9.6	2.31	18.80	5.68	96.79	43.27	578.33	262,877	99%
176	22.9	1,584,185	9.6	2.31	18.28	5.03	96.74	41.58	578.02	262,735	99%
178	21.7	1,581,937	9.6	2.31	17.77	4.42	96.68	39.96	577.71	262,596	100%
180	20.6	1,579,745	9.6	2.31	17.28	3.85	96.63	38.42	577.41	262,461	100%
182	19.5	1,577,606	9.6	2.31	16.81	3.32	96.59	36.95	577.12	262,328	100%
184	18.6	1,575,518	9.6	2.31	16.36	2.83	96.54	35.55	576.84	262,199	100%
186	17.6	1,573,479	9.6	2.31	15.92	2.38	96.49	34.22	576.56	262,073	100%
188	16.7	1,571,487	9.6	2.31	15.49	1.96	96.45	32.95	576.29	261,949	100%
190	15.9	1,569,540	9.5	2.31	15.08	1.58	96.40	31.75	576.02	261,828	100%
192	15.1	1,567,636	9.5	2.31	14.68	1.24	96.36	30.60	575.76	261,710	100%
194	14.3	1,565,772	9.5	2.31	14.30	0.93	96.32	29.52	575.51	261,594	100%
196	13.6	1,563,946	9.5	2.31	13.92	0.66	96.27	28.50	575.26	261,481	100%
198	12.9	1,562,156	9.5	2.31	13.56	0.42	96.23	27.54	575.01	261,369	100%
200	12.2	1,560,399	9.5	2.31	13.21	0.23	96.19	26.64	574.77	261,260	100%
202	11.6	1,558,671	9.5	2.31	12.86	0.08	96.15	25.81	574.53	261,152	100%
204	11.0	1,556,969	9.5	2.31	12.53	0.00	96.11	25.06	574.30	261,046	100%


Sediment Basin #7 Phase 2 Hydrograph
100-Yr Storm
FLOW (cfs)
Stage (feet)
TIME (min)
OUTFLOW
INFLOW [cfs]
STAGE [ft]
0
55
110
165
220
275
330
385
440
495
550
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
0
20
40
60
80
100
120
140
160
180

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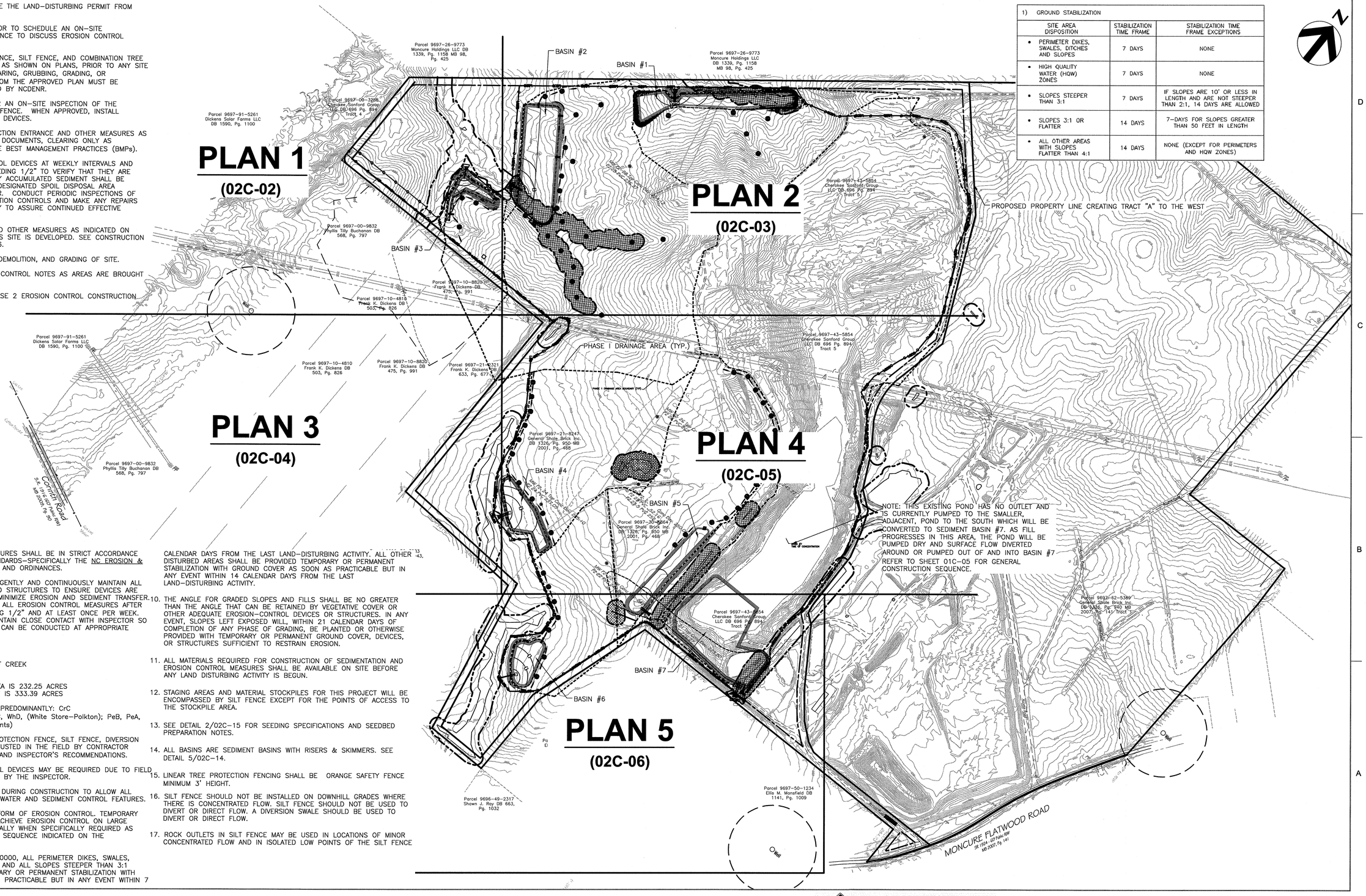
CONSTRUCTION SEQUENCE: PHASE 1

1. OBTAIN AND MAINTAIN ON SITE THE LAND-DISTURBING PERMIT FROM NCDENR.
2. CONTACT THE STATE INSPECTOR TO SCHEDULE AN ON-SITE PRE-CONSTRUCTION CONFERENCE TO DISCUSS EROSION CONTROL MEASURES.
3. INSTALL TREE PROTECTION FENCE, SILT FENCE, AND COMBINATION TREE PROTECTION AND SILT FENCE AS SHOWN ON PLANS, PRIOR TO ANY SITE DISTURBANCE ACTIVITIES (CLEARING, GRUBBING, GRADING, OR EXCAVATION). DEVIATIONS FROM THE APPROVED PLAN MUST BE SUBMITTED TO AND APPROVED BY NCDENR.
4. CONTACT THE INSPECTOR FOR AN ON-SITE INSPECTION OF THE INSTALLED TREE PROTECTION FENCE. WHEN APPROVED, INSTALL REMAINING EROSION CONTROL DEVICES.
5. INSTALL STABILIZED CONSTRUCTION ENTRANCE AND OTHER MEASURES AS INDICATED ON CONSTRUCTION DOCUMENTS, CLEARING ONLY AS NECESSARY TO INSTALL THESE BEST MANAGEMENT PRACTICES (BMPs).
6. INSPECT ALL EROSION CONTROL DEVICES AT WEEKLY INTERVALS AND AFTER EVERY RAINFALL EXCEEDING 1/2" TO VERIFY THAT THEY ARE FUNCTIONING PROPERLY. ANY ACCUMULATED SEDIMENT SHALL BE REMOVED AND PLACED IN A DESIGNATED SPOIL DISPOSAL AREA APPROVED BY THE INSPECTOR. CONDUCT PERIODIC INSPECTIONS OF ALL EROSION AND SEDIMENTATION CONTROLS AND MAKE ANY REPAIRS OR MODIFICATIONS NECESSARY TO ASSURE CONTINUED EFFECTIVE OPERATION OF EACH DEVICE.
7. INSTALL SEDIMENT BASINS AND OTHER MEASURES AS INDICATED ON CONSTRUCTION DOCUMENTS AS SITE IS DEVELOPED. SEE CONSTRUCTION SEQUENCE ON SHEET 02C-06.
8. BEGIN CLEARING, GRUBBING, DEMOLITION, AND GRADING OF SITE.
9. STABILIZE SITE PER EROSION CONTROL NOTES AS AREAS ARE BROUGHT TO ROUGH GRADES.
10. SEE SHEET 02C-07 FOR PHASE 2 EROSION CONTROL CONSTRUCTION SEQUENCE.

1) GROUND STABILIZATION		
SITE AREA DISPOSITION	STABILIZATION TIME FRAME	STABILIZATION TIME FRAME EXCEPTIONS
• PERIMETER DIKES, SWALES, DITCHES AND SLOPES	7 DAYS	NONE
• HIGH QUALITY WATER (HQW) ZONES	7 DAYS	NONE
• SLOPES STEEPER THAN 3:1	7 DAYS	IF SLOPES ARE 10' OR LESS IN LENGTH AND ARE NOT STEEPER THAN 2:1, 14 DAYS ARE ALLOWED
• SLOPES 3:1 OR FLATTER	14 DAYS	7-DAYS FOR SLOPES GREATER THAN 50 FEET IN LENGTH
• ALL OTHER AREAS WITH SLOPES FLATTER THAN 4:1	14 DAYS	NONE (EXCEPT FOR PERIMETERS AND HQW ZONES)



EROSION CONTROL NOTES

1. ALL EROSION CONTROL MEASURES SHALL BE IN STRICT ACCORDANCE WITH LOCAL AND STATE STANDARDS-SPECIFICALLY THE NC EROSION & SEDIMENT CONTROL MANUAL, AND ORDINANCES.
2. THE CONTRACTOR SHALL DILIGENTLY AND CONTINUOUSLY MAINTAIN ALL EROSION CONTROL BMPs AND STRUCTURES TO ENSURE DEVICES ARE FUNCTIONING PROPERLY TO MINIMIZE EROSION AND SEDIMENT TRANSFER. CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES AFTER EVERY RAIN EVENT EXCEEDING 1/2" AND AT LEAST ONCE PER WEEK. THE CONTRACTOR SHALL MAINTAIN CLOSE CONTACT WITH INSPECTOR SO THAT PERIODIC INSPECTIONS CAN BE CONDUCTED AT APPROPRIATE STAGES OF CONSTRUCTION.
3. SITE DATA:
   RIVER BASIN: CAPE FEAR
   VIA TRIBUTARIES TO GULF CREEK
   LATITUDE: 5.6027
   LONGITUDE: 79.0172
   THE TOTAL DENUDED AREA IS 232.25 ACRES
   THE TOTAL SITE ACREAGE IS 333.39 ACRES
4. THE SOIL CLASSIFICATION IS PREDOMINANTLY: CrC (Carbonton-Brickhaven); WhC, WhD, (White Store-Polkton); PeB, PeA, PfF (Peawick); UdC (Udorthents)
5. FINAL LOCATION OF TREE PROTECTION FENCE, SILT FENCE, DIVERSION DITCHES, ETC. SHALL BE ADJUSTED IN THE FIELD BY CONTRACTOR BASED ON SITE CONDITIONS AND INSPECTOR'S RECOMMENDATIONS.
6. ADDITIONAL EROSION CONTROL DEVICES MAY BE REQUIRED DUE TO FIELD CONDITIONS OR AS DIRECTED BY THE INSPECTOR.
7. THE SITE SHALL BE GRADED DURING CONSTRUCTION TO ALLOW ALL RUNOFF TO DRAIN TO STORMWATER AND SEDIMENT CONTROL FEATURES.
8. STABILIZATION IS THE BEST FORM OF EROSION CONTROL. TEMPORARY SEEDING IS NECESSARY TO ACHIEVE EROSION CONTROL ON LARGE DENUDED AREAS AND ESPECIALLY WHEN SPECIFICALLY REQUIRED AS PART OF THE CONSTRUCTION SEQUENCE INDICATED ON THE CONSTRUCTION DOCUMENTS.
9. PER GENERAL PERMIT NCG010000, ALL PERIMETER DIKES, SWALES, DITCHES, PERIMETER SLOPES AND ALL SLOPES STEEPER THAN 3:1 SHALL BE PROVIDED TEMPORARY OR PERMANENT STABILIZATION WITH GROUND COVER AS SOON AS PRACTICABLE BUT IN ANY EVENT WITHIN 7 CALENDAR DAYS FROM THE LAST LAND-DISTURBING ACTIVITY. ALL OTHER DISTURBED AREAS SHALL BE PROVIDED TEMPORARY OR PERMANENT STABILIZATION WITH GROUND COVER AS SOON AS PRACTICABLE BUT IN ANY EVENT WITHIN 14 CALENDAR DAYS FROM THE LAST LAND-DISTURBING ACTIVITY.
10. THE ANGLE FOR GRADED SLOPES AND FILLS SHALL BE NO GREATER THAN THE ANGLE THAT CAN BE RETAINED BY VEGETATIVE COVER OR OTHER ADEQUATE EROSION-CONTROL DEVICES OR STRUCTURES. IN ANY EVENT, SLOPES LEFT EXPOSED WILL, WITHIN 21 CALENDAR DAYS OF COMPLETION OF ANY PHASE OF GRADING, BE PLANTED OR OTHERWISE PROVIDED WITH TEMPORARY OR PERMANENT GROUND COVER, DEVICES, OR STRUCTURES SUFFICIENT TO RESTRAIN EROSION.
11. ALL MATERIALS REQUIRED FOR CONSTRUCTION OF SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE AVAILABLE ON SITE BEFORE ANY LAND DISTURBING ACTIVITY IS BEGUN.
12. STAGING AREAS AND MATERIAL STOCKPILES FOR THIS PROJECT WILL BE ENCOMPASSED BY SILT FENCE EXCEPT FOR THE POINTS OF ACCESS TO THE STOCKPILE AREA.
13. SEE DETAIL 2/02C-15 FOR SEEDING SPECIFICATIONS AND SEEDBED PREPARATION NOTES.
14. ALL BASINS ARE SEDIMENT BASINS WITH RISERS & SKIMMERS. SEE DETAIL 5/02C-14.
15. LINEAR TREE PROTECTION FENCING SHALL BE ORANGE SAFETY FENCE MINIMUM 3' HEIGHT.
16. SILT FENCE SHOULD NOT BE INSTALLED ON DOWNHILL GRADES WHERE THERE IS CONCENTRATED FLOW. SILT FENCE SHOULD NOT BE USED TO DIVERT OR DIRECT FLOW. A DIVERSION SWALE SHOULD BE USED TO DIVERT OR DIRECT FLOW.
17. ROCK OUTLETS IN SILT FENCE MAY BE USED IN LOCATIONS OF MINOR CONCENTRATED FLOW AND IN ISOLATED LOW POINTS OF THE SILT FENCE

HDR Engineering Inc.
of the Carolinas

440 S. Church St. Suite 1000
Charlotte, NC 28202-2075
704.338.6700
N.C.B.E.L.S. License Number F-0116

ISSUE	DATE	DESCRIPTION
C	03/2015	RESIZED BASIN #7
B	12/31/14	REVISED PER NCDENR COMMENTS
A	11/2014	ISSUED FOR APPROVAL

PROJECT MANAGER	M.D. PLUMMER, P.E.
DESIGNED BY	R. BAYSDEN, P.E.
DRAWN BY	R. BAYSDEN, P.E.
CHECKED BY	J. READLING, P.E.
PROJECT NUMBER	453925-237673-018

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025495 MICHAEL D. PLUMMER

Charah®

BRICKHAVEN No. 2 MINE TRACT "A" MINE
STRUCTURAL FILL
MONCURE, NC

EROSION AND SEDIMENTATION CONTROL PLAN - PHASE 1 OVERALL

0 1" 2"

FILENAME 02C-01.dwg
SCALE 1"=300'

SHEET 02C-01

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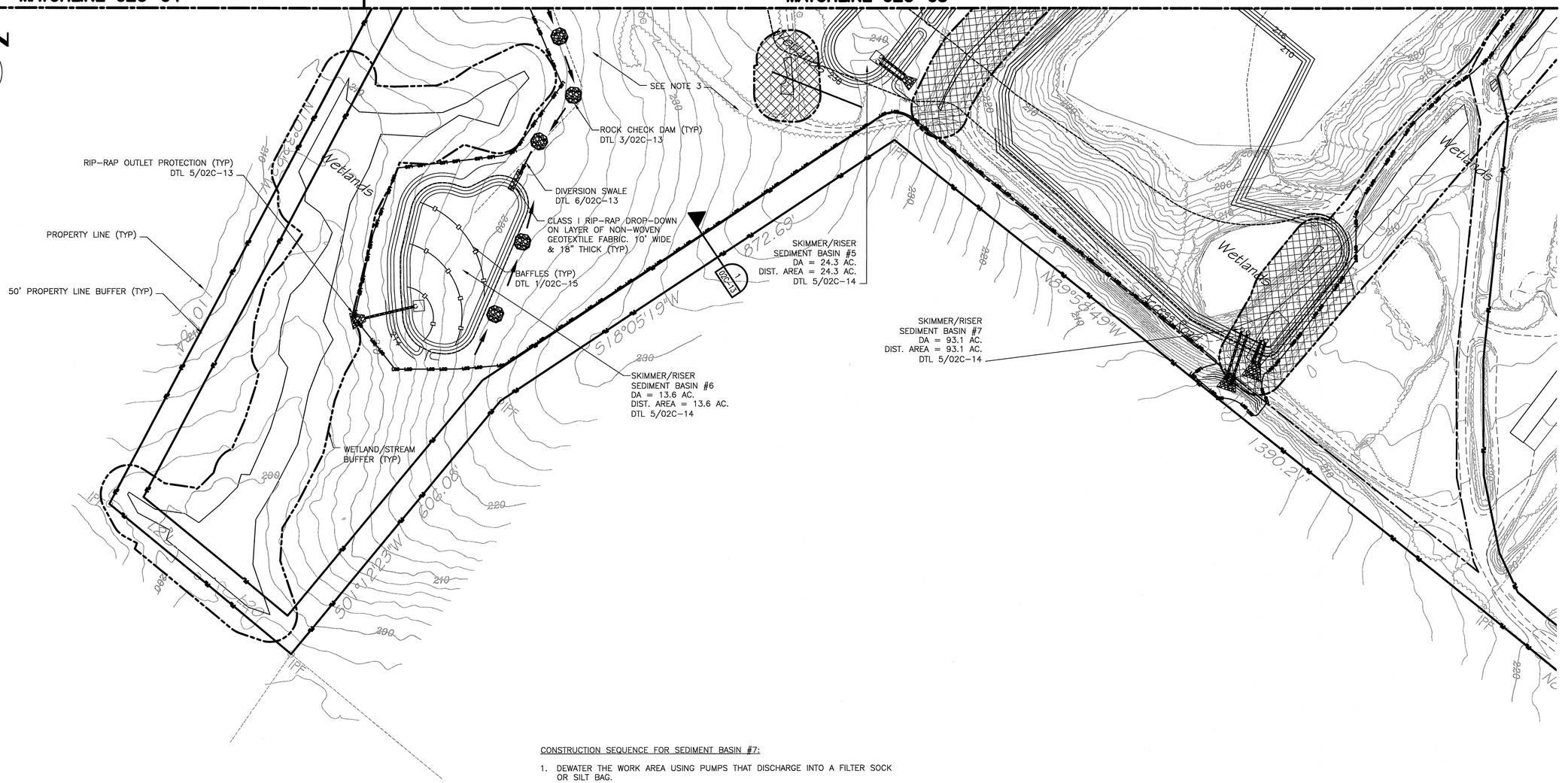

CONSTRUCTION SEQUENCE FOR SEDIMENT BASIN #7:

1. DEWATER THE WORK AREA USING PUMPS THAT DISCHARGE INTO A FILTER SOCK OR SILT BAG.
2. INSTALL RISER, BARREL, SKIMMER, AND APRON OUTLET.
3. DEWATER SETTLING POND USING EITHER OF THESE METHODS.
   - A. PROVIDE FLOCCULANT PER MANUFACTURERS RECOMMENDATIONS. PUMP WATER DIRECTLY TO THE APRON OUTLETS OF SB #7.
4. AFTER THE SETTLING POND IS DRY OR CONDITIONS ARE SUITABLE, REMOVE UNSUITABLE SOILS AND STOCKPILE THEM WITHIN THE LIMITS OF DISTURBANCE AND OUTSIDE THE PROPOSED GRADING OF SB #7.
5. EXCAVATE THE SOUTHERN PORTION OF SB #7. EXCAVATED MATERIAL CAN BE USED AS BACKFILL FOR THE SETTLING POND.

GENERAL NOTES:

1. SEE SHEET 02C-01 FOR EROSION CONTROL NOTES AND PHASE I CONSTRUCTION SEQUENCE.
2. SEE SHEETS 02C-07 – 02C-13 FOR PHASE 2 EROSION CONTROL.
3. ALL AREAS WITHIN LIMITS OF DISTURBANCE TO BE CLEARED.

LEGEND

—LOD—	LIMITS OF DISTURBANCE
—o—o—o—	SILT FENCE. SEE DTL 1/02C-13
—XX—	TREE PROTECTION
—[]—[]—	BAFFLES. SEE DTL 1/02C-15
→	DIVERSION SWALE. SEE DTL 6/02C-13
●	ROCK CHECK DAM. SEE DTL 3/02C-13
▨	CLASS I RIP-RAP DROP-DOWN
▨	WETLAND/STREAM BUFFER AREAS TO BE REMOVED

HDR Engineering Inc.
of the Carolinas

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Charlotte, NC 28202-2075
704.338.6700

N.C.B.E.L.S. License Number F-0116

ISSUE	DATE	DESCRIPTION
C	03/2015	REVISED BASIN #7
B	12/31/14	REVISED PER NCDENR COMMENTS
A	11/2014	ISSUED FOR APPROVAL

PROJECT MANAGER	M.D. PLUMMER, P.E.
DESIGNED BY	R. BAYSDEN, P.E.
DRAWN BY	R. BAYSDEN, P.E.
CHECKED BY	J. READLING, P.E.
PROJECT NUMBER	453925-237673-018

025495
MICHAEL D. PLUMMER
3/6/15

Charah®

BRICKHAVEN No. 2 MINE TRACT "A" MINE
STRUCTURAL FILL
MONCURE, NC

EROSION AND SEDIMENTATION CONTROL PLAN - PHASE 1
PLAN 5

0 1" 2"

FILENAME 02C-06.dwg
SCALE 1"=100'

SHEET
02C-06

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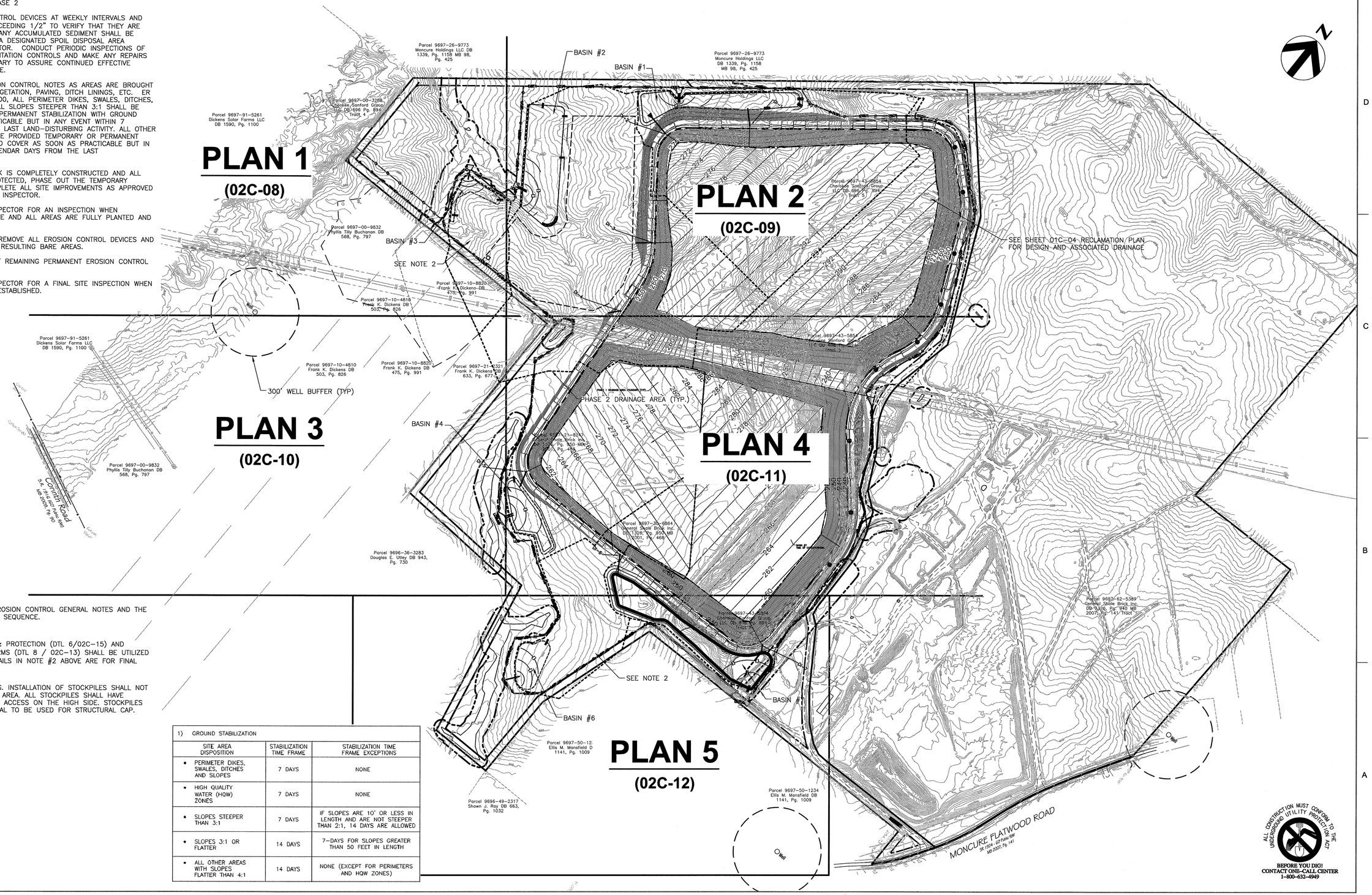
CONSTRUCTION SEQUENCE: PHASE 2

1. INSPECT ALL EROSION CONTROL DEVICES AT WEEKLY INTERVALS AND AFTER EVERY RAINFALL EXCEEDING 1/2" TO VERIFY THAT THEY ARE FUNCTIONING PROPERLY. ANY ACCUMULATED SEDIMENT SHALL BE REMOVED AND PLACED IN A DESIGNATED SPOIL DISPOSAL AREA APPROVED BY THE INSPECTOR. CONDUCT PERIODIC INSPECTIONS OF ALL EROSION AND SEDIMENTATION CONTROLS AND MAKE ANY REPAIRS OR MODIFICATIONS NECESSARY TO ASSURE CONTINUED EFFECTIVE OPERATION OF EACH DEVICE.
2. STABILIZE SITE PER EROSION CONTROL NOTES AS AREAS ARE BROUGHT TO ROUGH GRADE WITH VEGETATION, PAVING, DITCH LININGS, ETC. ER GENERAL PERMIT NCG010000, ALL PERIMETER DIKES, SWALES, DITCHES, PERIMETER SLOPES AND ALL SLOPES STEEPER THAN 3:1 SHALL BE PROVIDED TEMPORARY OR PERMANENT STABILIZATION WITH GROUND COVER AS SOON AS PRACTICABLE BUT IN ANY EVENT WITHIN 7 CALENDAR DAYS FROM THE LAST LAND-DISTURBING ACTIVITY. ALL OTHER DISTURBED AREAS SHALL BE PROVIDED TEMPORARY OR PERMANENT STABILIZATION WITH GROUND COVER AS SOON AS PRACTICABLE BUT IN ANY EVENT WITHIN 14 CALENDAR DAYS FROM THE LAST LAND-DISTURBING ACTIVITY.
3. ONCE THE STORM NETWORK IS COMPLETELY CONSTRUCTED AND ALL INLETS ARE PROPERLY PROTECTED, PHASE OUT THE TEMPORARY SEDIMENT BASINS TO COMPLETE ALL SITE IMPROVEMENTS AS APPROVED BY THE EROSION CONTROL INSPECTOR.
4. CONTACT THE NCDENR INSPECTOR FOR AN INSPECTION WHEN CONSTRUCTION IS COMPLETE AND ALL AREAS ARE FULLY PLANTED AND STABILIZED.
5. WHEN SITE IS APPROVED, REMOVE ALL EROSION CONTROL DEVICES AND STABILIZE THESE AND ANY RESULTING BARE AREAS.
6. COMPLETE INSTALLATION OF REMAINING PERMANENT EROSION CONTROL DEVICES.
7. CONTACT THE NCDENR INSPECTOR FOR A FINAL SITE INSPECTION WHEN VEGETATION HAS BECOME ESTABLISHED.



GENERAL NOTES

1) SEE SHEET 02C-01 FOR EROSION CONTROL GENERAL NOTES AND THE PHASE 1 EROSION CONTROL SEQUENCE.

2) NOTE THAT SLOPE DRAINS & PROTECTION (DTL 6/02C-15) AND TEMPORARY DIVERSION BERMS (DTL 8 / 02C-13) SHALL BE UTILIZED AS FILL PROGRESSES. DETAILS IN NOTE #2 ABOVE ARE FOR FINAL APPLICATION.

3) PROPOSED STOCKPILE AREAS. INSTALLATION OF STOCKPILES SHALL NOT IMPEDE DESIGNED DRAINAGE AREA. ALL STOCKPILES SHALL HAVE PERIMETER SILT FENCE WITH ACCESS ON THE HIGH SIDE. STOCKPILES ARE FOR EXCAVATED MATERIAL TO BE USED FOR STRUCTURAL CAP.

1) GROUND STABILIZATION		
SITE AREA DISPOSITION	STABILIZATION TIME FRAME	STABILIZATION TIME FRAME EXCEPTIONS
• PERIMETER DIKES, SWALES, DITCHES AND SLOPES	7 DAYS	NONE
• HIGH QUALITY WATER (HQW) ZONES	7 DAYS	NONE
• SLOPES STEEPER THAN 3:1	7 DAYS	IF SLOPES ARE 10' OR LESS IN LENGTH AND ARE NOT STEEPER THAN 2:1, 14 DAYS ARE ALLOWED
• SLOPES 3:1 OR FLATTER	14 DAYS	7-DAYS FOR SLOPES GREATER THAN 50 FEET IN LENGTH
• ALL OTHER AREAS WITH SLOPES FLATTER THAN 4:1	14 DAYS	NONE (EXCEPT FOR PERIMETERS AND HQW ZONES)

ALL CONSTRUCTION MUST CONFORM TO THE UNDERGROUND UTILITY PROTECTION ACT
BEFORE YOU DIG! CONTACT ONE-CALL CENTER 1-800-632-4949

HDR Engineering Inc. of the Carolinas
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704.338.6700
N.C.B.E.L.S. License Number F-0116

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PROJECT MANAGER	M.D. PLUMMER, P.E.
DESIGNED BY	R. BAYSDEN, P.E.
DRAWN BY	R. BAYSDEN, P.E.
CHECKED BY	J. READLING, P.E.
PROJECT NUMBER	453925-237673-018

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 026495 3/6/15 MICHAEL D. PLUMMER

Charah®

BRICKHAVEN No. 2 MINE TRACT "A" MINE
STRUCTURAL FILL
MONCURE, NC

EROSION AND SEDIMENTATION CONTROL PLAN - PHASE 2 OVERALL

0 1" 2"

FILENAME 02C-07.dwg
SCALE 1"=300'

SHEET 02C-07

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MATCHLINE 02C-10

MATCHLINE 02C-11

ALL CONSTRUCTION MUST CONFORM TO THE UNDERGROUND UTILITY PROTECTION ACT.
BEFORE YOU DIG!
CONTACT ONE-CALL CENTER
1-800-632-4949

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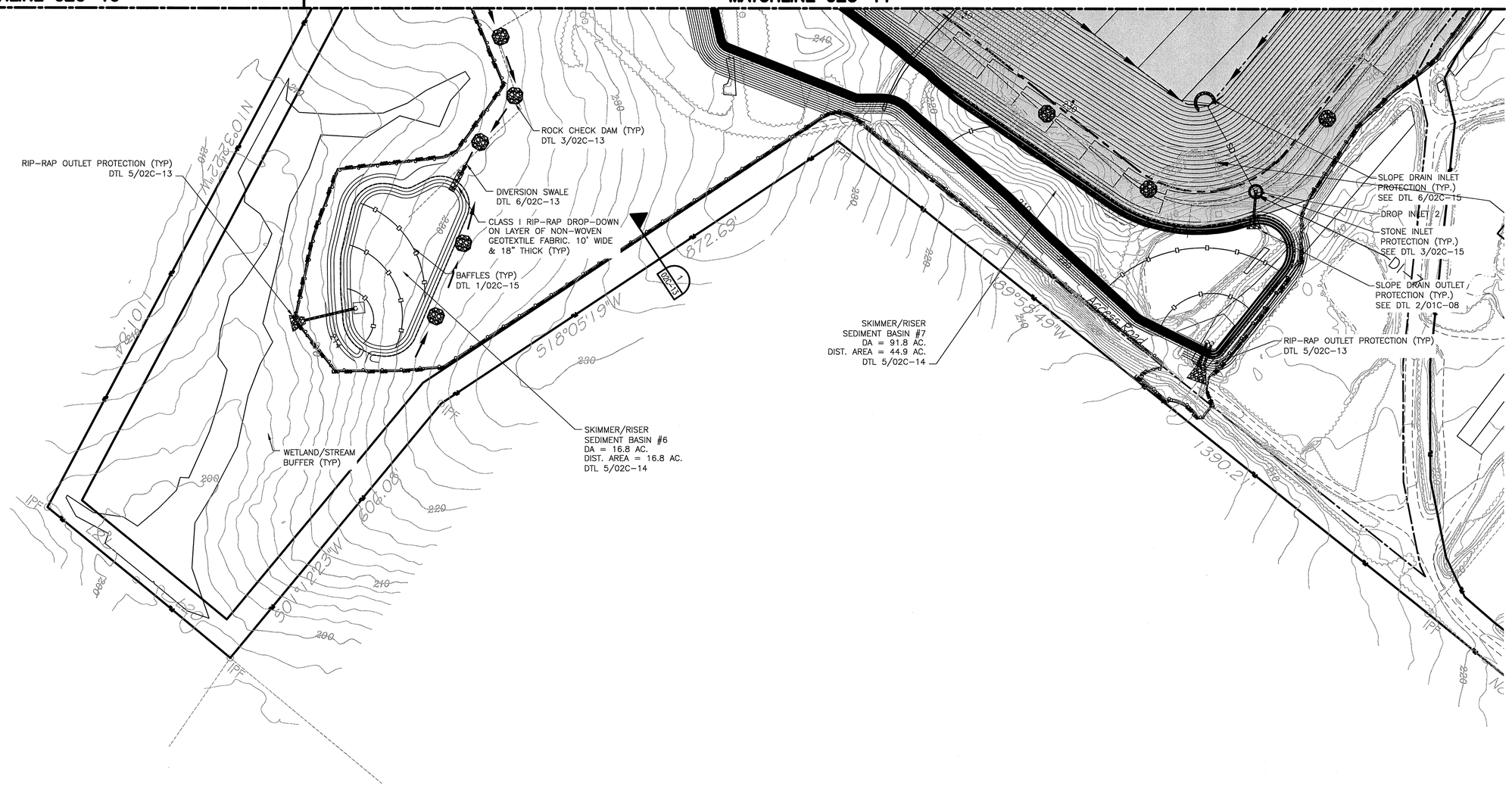

GENERAL NOTES:

1. SEE SHEET 02C-07 FOR EROSION CONTROL NOTES AND PHASE 2 CONSTRUCTION SEQUENCE.
2. SEE SHEETS 02C-02 – 02C-06 FOR PHASE 1 EROSION CONTROL.
3. SHADED AREA INDICATES STRUCTURAL FILL AREA REQUIRED TO BE VEGETATE/STABILIZED PRIOR TO ACTIVE DISTUBRANCE/GRADING NORTH OF BISECTING POWER LINES. SEE PHASE 2 CONSTRUCTION SEQUENCE.
4. REFER TO SHEET 01C-07 FOR SLOPE DRAIN OUTLET PROTECTION.

LEGEND

- LIMITS OF DISTURBANCE
- SILT FENCE. SEE DTL 1/02C-13
- TREE PROTECTION
- BAFFLES. SEE DTL 1/02C-15
- DIVERSION SWALE. SEE DTL 6/02C-13
- ROCK CHECK DAM. SEE DTL 3/02C-13
- CLASS I RIP-RAP DROP-DOWN
- SEE NOTE 4

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025495 3/6/15 MICHAEL D PLUMMER

Charah®

BRICKHAVEN No. 2 MINE TRACT "A" MINE
STRUCTURAL FILL
MONCURE, NC

EROSION AND SEDIMENTATION CONTROL PLAN - PHASE 2 PLAN 5

0 1" 2"

FILENAME 02C-12.dwg
SCALE 1"=100'

SHEET 02C-12

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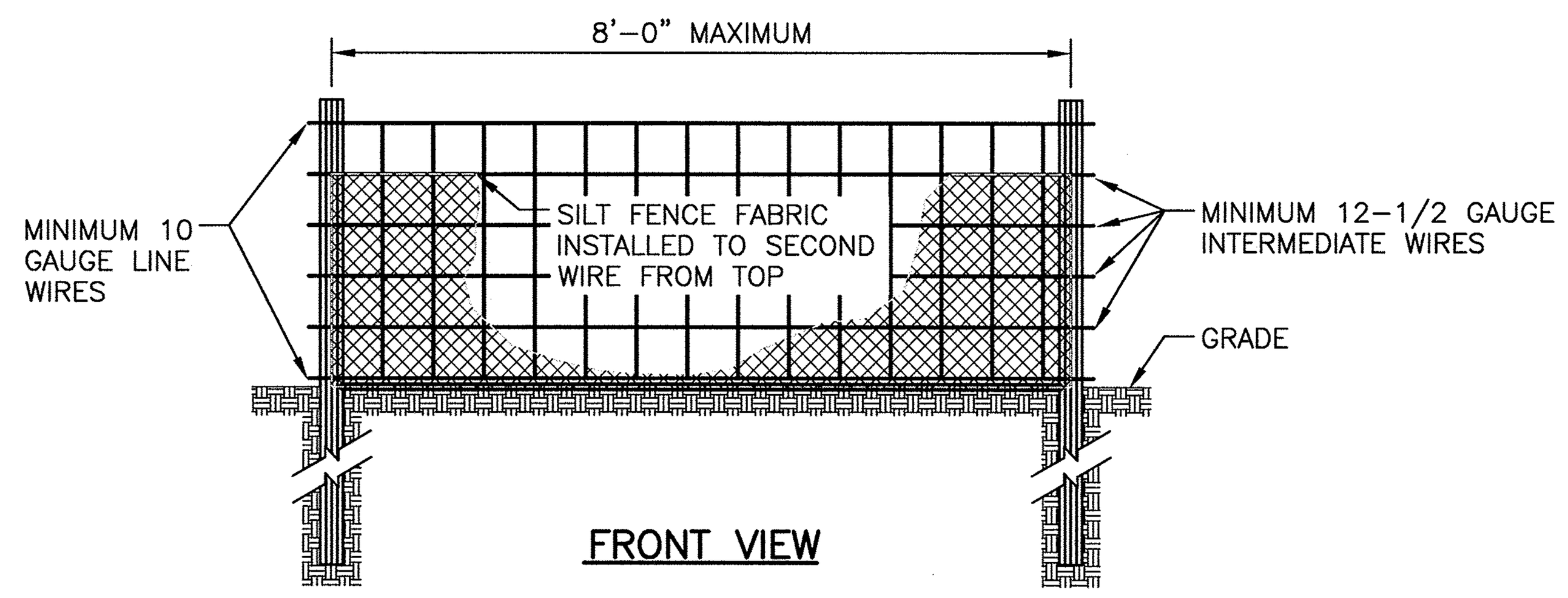
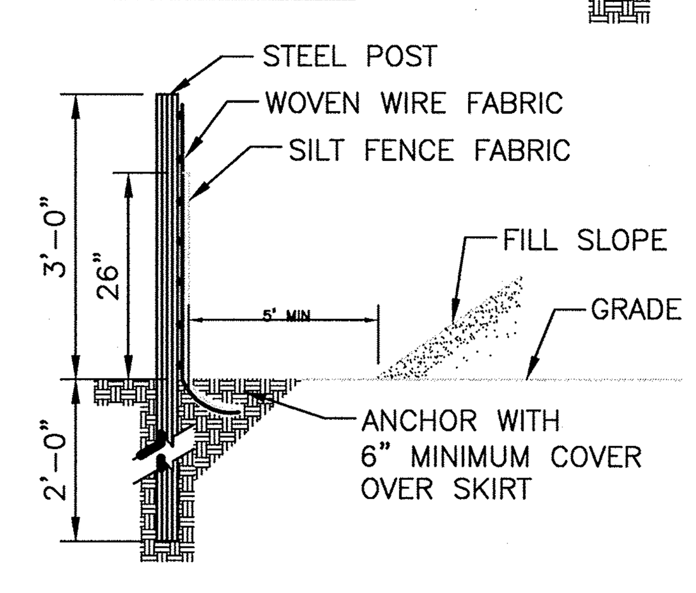


FRONT VIEW



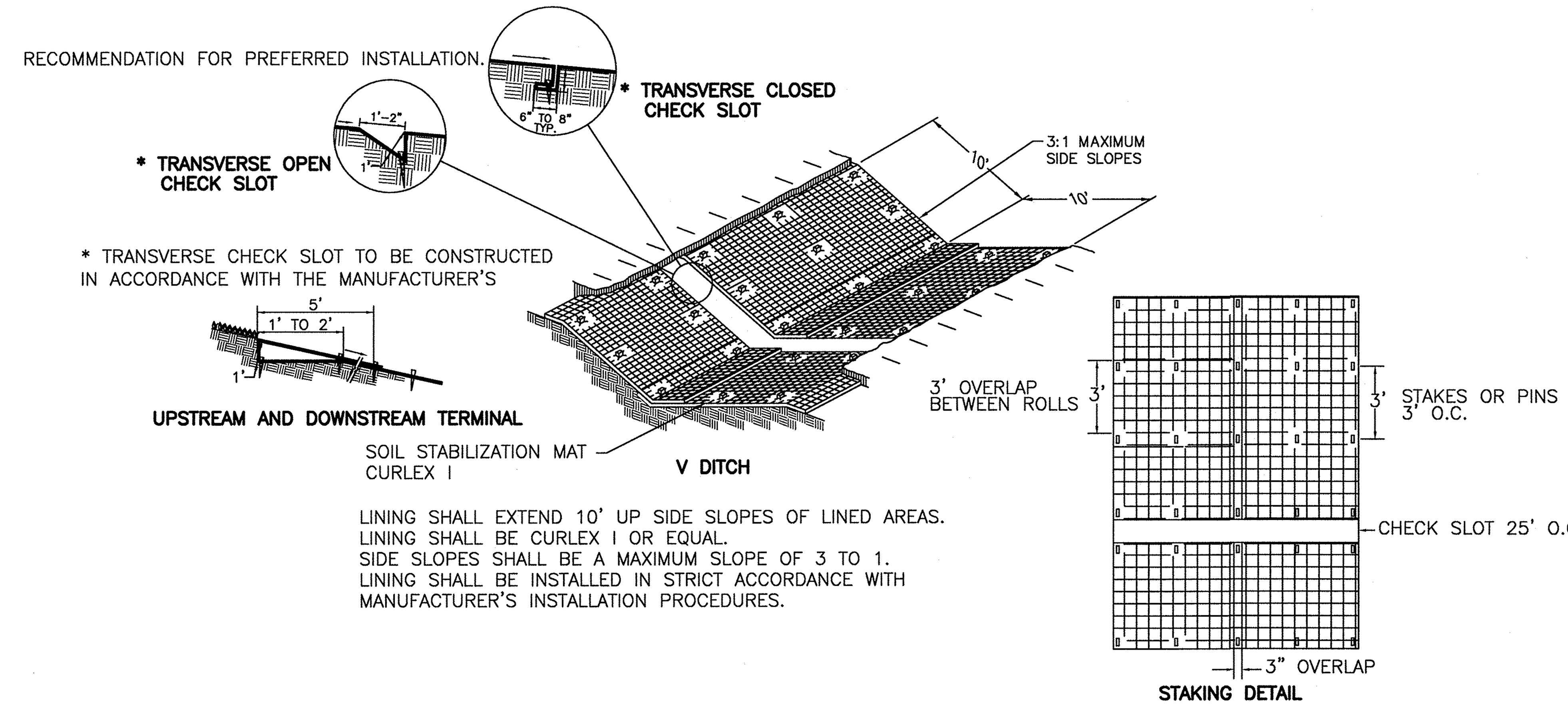
SIDE VIEW

NOTE:

1. USE SILT FENCE ONLY WHEN DRAINAGE AREA DOES NOT EXCEED 1/4 ACRE AND NEVER IN AREAS OF CONCENTRATED FLOW.
2. SILT FENCE IS TO BE SECURELY FASTENED TO EACH STEEL SUPPORT POST OR TO WOVEN WIRE WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POST.
3. INSPECT FREQUENTLY AND REPAIR OR REPLACE PROMPTLY AS NEEDED.
4. REMOVE SEDIMENT DEPOSITED AS NEEDED TO PROVIDE STORAGE VOLUME FOR THE NEXT RAIN AND TO REMOVE PRESSURE ON THE SILT FENCE. UNIFORMLY DISTRIBUTE ON THE SOURCE AREA PRIOR TO TOPSOILING.

TEMPORARY SILT FENCE DETAIL (1/–)

NO TO SCALE



LINING SHALL EXTEND 10' UP SIDE SLOPES OF LINED AREAS.
LINING SHALL BE CURLEX I OR EQUAL.
SIDE SLOPES SHALL BE A MAXIMUM SLOPE OF 3 TO 1.
LINING SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTALLATION PROCEDURES.

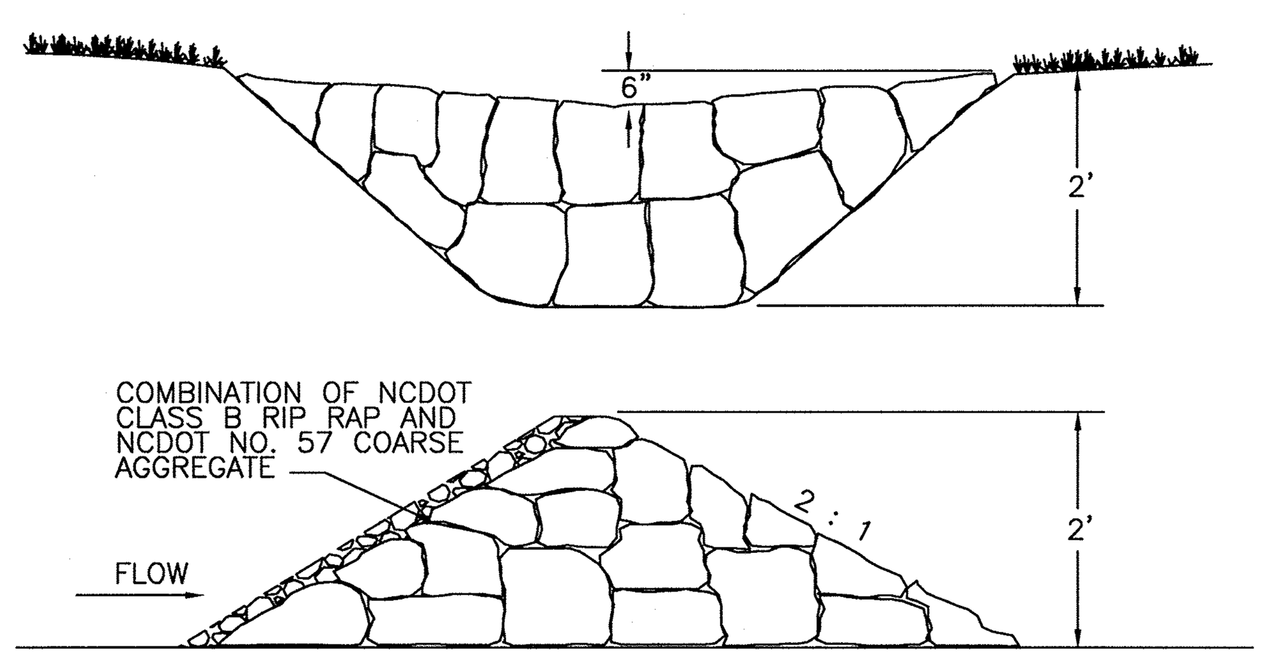
NOTE: STAKES SHALL BE WOOD OR METAL AS RECOMMENDED BY MANUFACTURER AND SHALL BE AT LEAST 12" IN LENGTH.

SLOPE INSTALLATION—EROSION CONTROL BLANKET NOTES:

1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING APPLICATION OF FERTILIZER AND SEED.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN A 6" DEEP x 6" WIDE TRENCH WITH APPROXIMATELY 12" OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
3. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" APART ACROSS THE WIDTH OF THE BLANKET.
3. ROLL THE BLANKETS DOWN OR HORIZONTALLY ACROSS THE SLOPE. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED BY PLACING STAPLES/STAKES IN APPROXIMATE LOCATIONS, SEE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2"–5" OVERLAP DEPENDING ON BLANKET TYPE. TO ENSURE PROPER SEAM ALIGNMENT, PLACE THE EDGE OF THE OVERLAPPING BLANKET EVEN WITH THE COLORED SEAM STITCH ON THE PREVIOUSLY INSTALLED BLANKET.
5. CONSECUTIVE BLANKETS SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART ACROSS ENTIRE BLANKET WIDTH.

TYPICAL SECTION FOR SOIL STABILZATION MAT LINED AREAS (TYP.) (2/–)

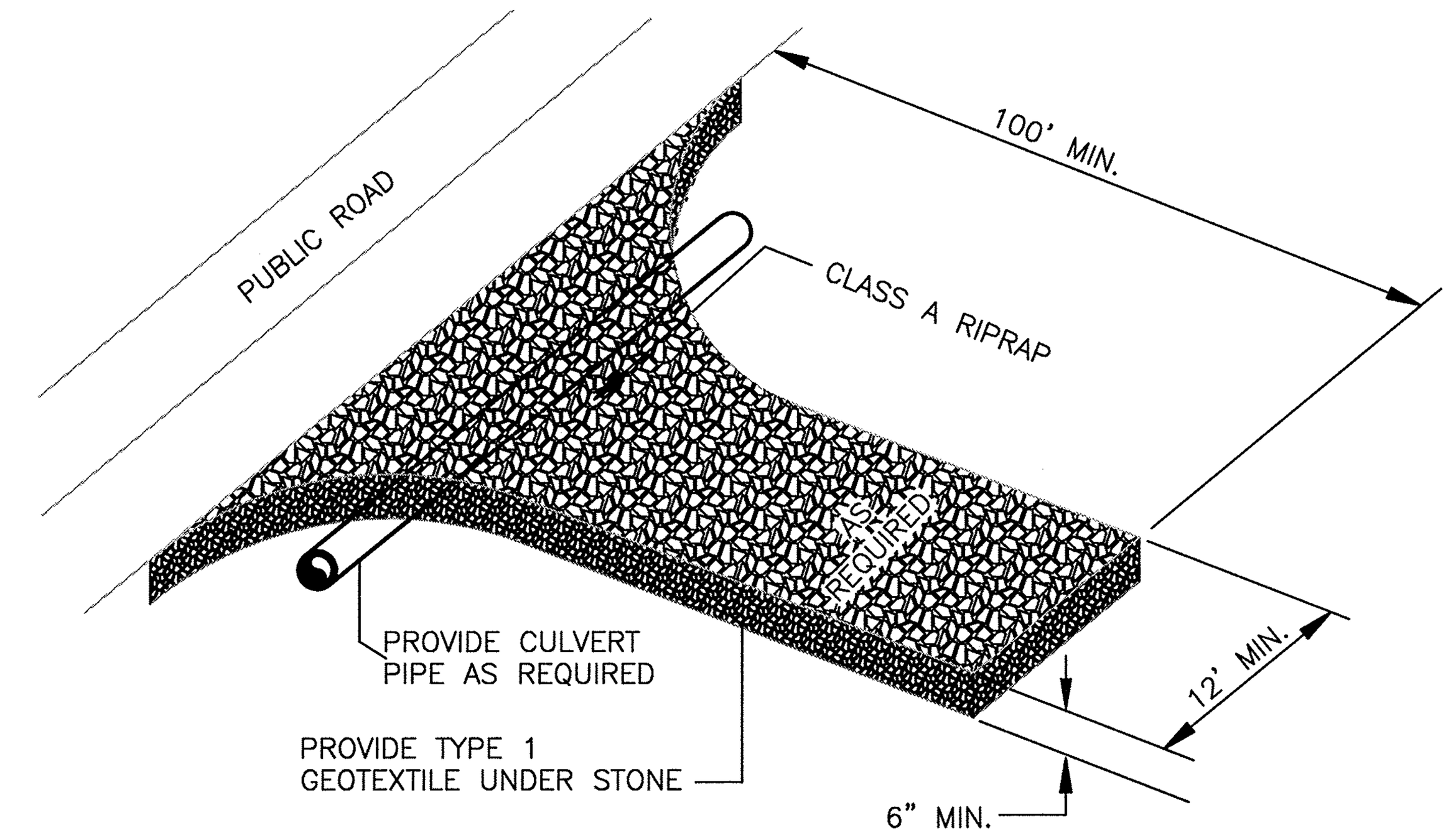
NTS



NOTE:
PLACE EVERY 100' ALONG FLOW PATH.

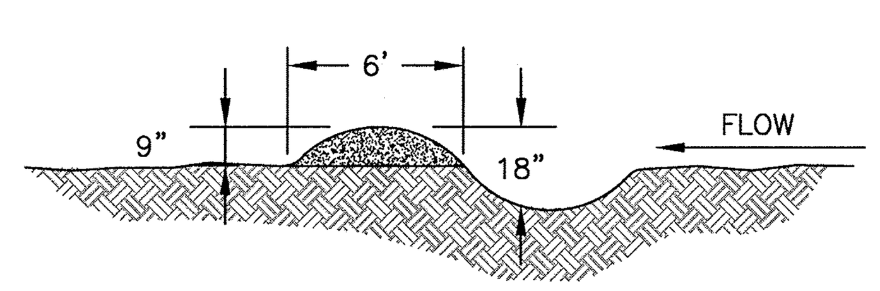
ROCK CHECK DAM (3/–)

NTS



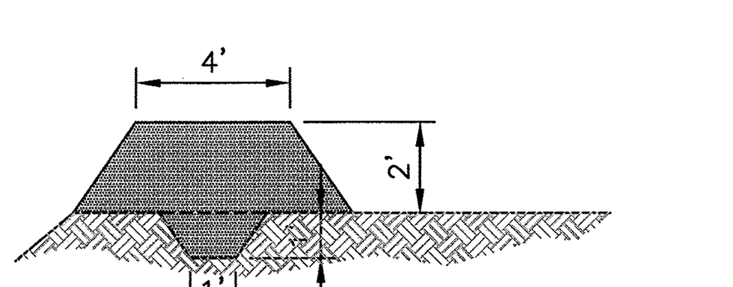
TEMPORARY GRAVEL CONSTRUCTION ENTRANCE DETAIL (4/–)

NOT TO SCALE NCDENR 6.06



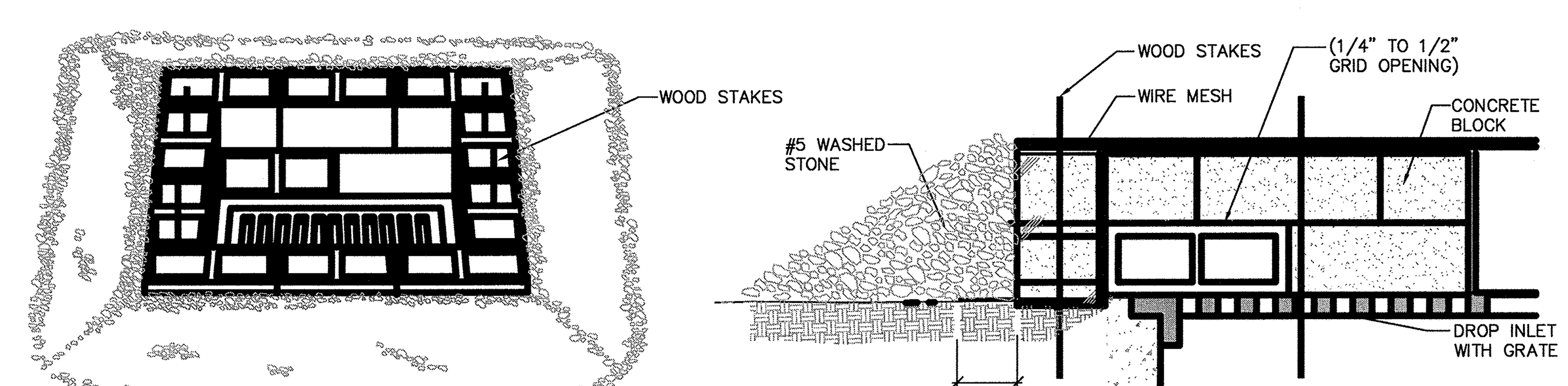
DIVERSION SWALE (6/–)

N.T.S.



DIVERSION DIKE (8/–)

N.T.S.



SPECIFIC APPLICATION: THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE HEAVY FLOWS ARE EXPECTED AND WHERE OVERFLOW CAPACITY IS NECESSARY TO PREVENT EXCESSIVE PONDING AROUND THE STRUCTURE

BLOCK AND GRAVEL STONE INLET SEDIMENT FILTER (7/–)

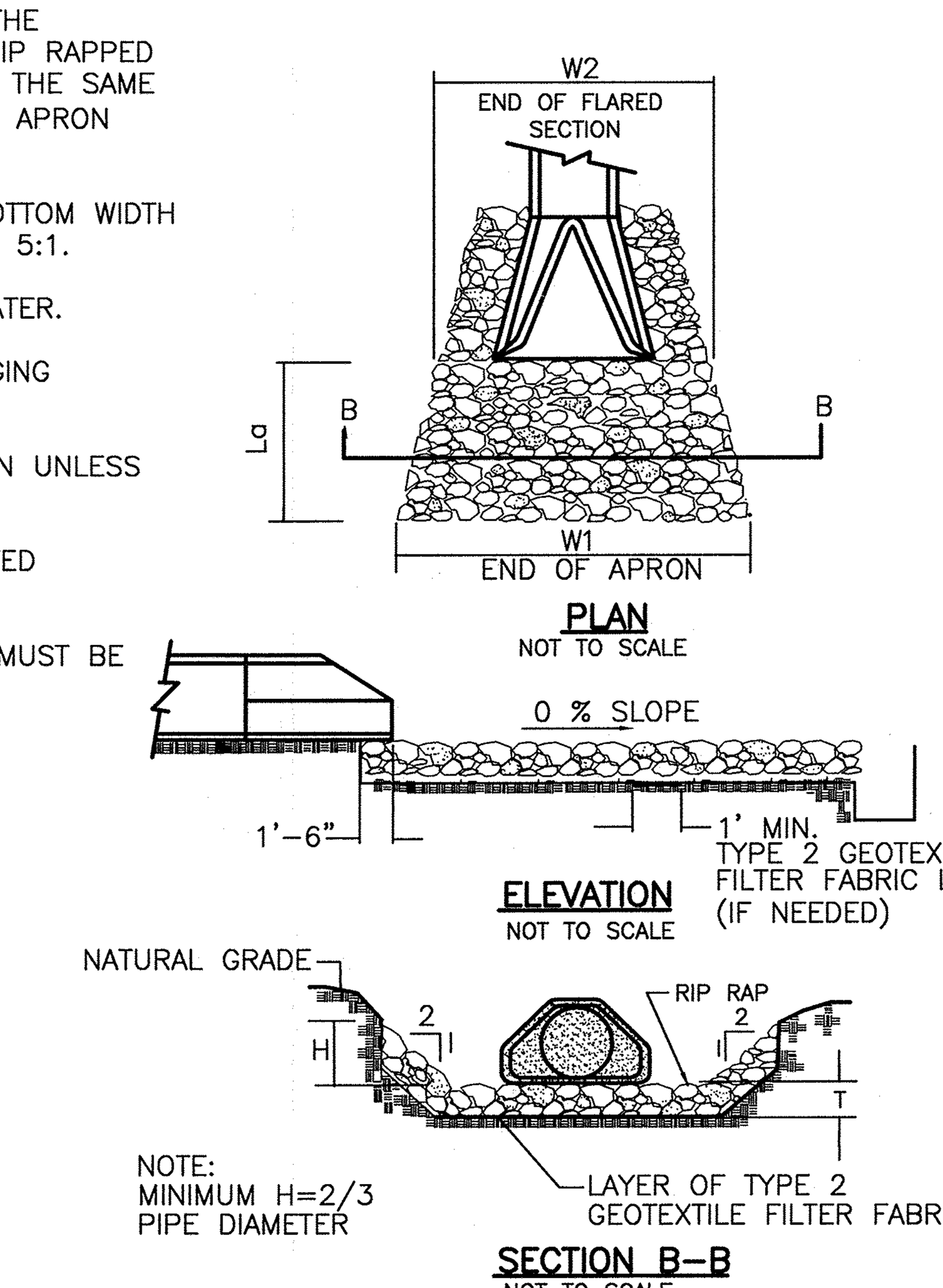
NOT TO SCALE

NOTES:

1. CLASS OR MEDIAN SIZE OF RIP RAP AND LENGTH, WIDTH AND DEPTH OF APRON TO BE SHOWN ON PLANS.
2. RIP RAP SHOULD EXTEND UP BOTH SIDES OF THE APRON AND AROUNG THE END OF THE PIPE OR CULBVERT AT THE DISCHARGE OUTLET AT A MAXIMUM SLOPE OF 2:1 AND A HEIGHT NOT LESS THAN TWO THIRDS THE PIPE DIAMETER OR CULVERT HEIGHT.
3. THERE SHALL BE NO OVERFLOW FROM THE END OF THE APRON TO THE SURFACE OF THE RECEIVING CHANNEL. THE AREA TO BE PAVED OR RIP RAPPED SHALL BE UNDERCUT SO THAT THE INVERT OF THE APRON SHALL BE THE SAME GRADE (FLUSH) WITH THE SURFACE OF THE RECEIVING CHANNEL. THE APRON SHALL HAVE A CUTOFF OR TOE WALL AT THE DOWNSTREAM END.
4. THE WIDTH OF THE END OF THE APRON SHALL BE EQUAL TO THE BOTTOM WIDTH OF THE RECEIVING CHANNEL. MAXIMUM TAPER TO RECEIVING CHANNEL 5:1.
5. ALL SUBGRADE FOR STRUCTURE TO BE COMPACTED TO 95% OR GREATER.
6. THE PLACING OF FILL, EITHER LOOSE OR COMPACTED IN THE RECEVIGING CHANNEL SHALL NOT BE ALLOWED.
7. NO BENDS OR CURVES IN THE HORIZONTAL ALIGNMENT OF THE APRON UNLESS OTHERWISE SHOWN.
8. TYPE 2 GEOTEXTILE FILTER FABRIC SHALL BE INSTALLED ON COMPACTED SUBGRADE PRIOR TO PLACEMENT OF RIP RAP.
9. ANY DISTURBED AREA FROM END OF APRON TO RECEIVING CHANNEL MUST BE STABILIZED.

LOCATION	W1	W2	La	CLASS	T
SB1*	19'	9'	16'	B	18"
SB2*	17'	7.5'	14'	B	18"
SB3	19'	9'	16'	B	18"
SB4*	43'	9'	40'	2	24"
SB5*	10'	3'	9'	B	18"
SB6	15'	9'	12'	B	18"
SB7*	19'	9'	16'	B	18"

1. SB = SEDIMENT BASIN
2. CLASS = NCDOT CLASS RIP RAP
3. * = FOR EACH BARREL. SEE SEDIMENT BASIN SCHEDULE ON 02C–14
4. CLASS A RIP RAP MIDRANGE = 4"
5. CLASS B RIP RAP MIDRANGE = 8"
6. CLASS 1 RIP RAP MIDRANGE = 10"
7. CLASS 2 RIP RAP MIDRANGE = 14"



NOTE:
MINIMUM H=2/3 PIPE DIAMETER

RIPRAP APRON AT PIPE OUTFALLS (5/–)

NTS

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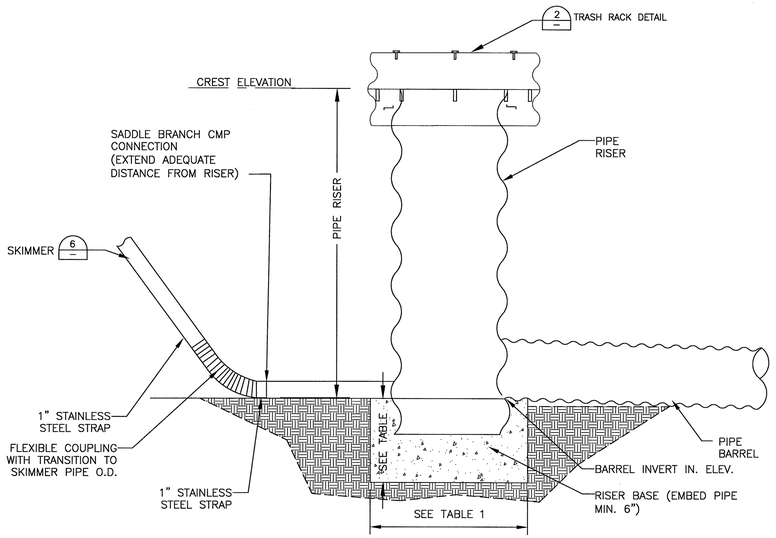
NORTH CAROLINA PROFESSIONAL SEAL 025495 ENGINEER MICHAEL D. PLUMMER

Charah®

BRICKHAVEN No. 2 MINE TRACT "A" MINE
STRUCTURAL FILL
MONCURE, NC

EROSION AND SEDIMENTATION CONTROL DETAILS (1 OF 3)

FILENAME 02C–13.dwg
SCALE AS SHOWN
SHEET 02C-13



OUTLET STRUCTURE ENLARGEMENT
1
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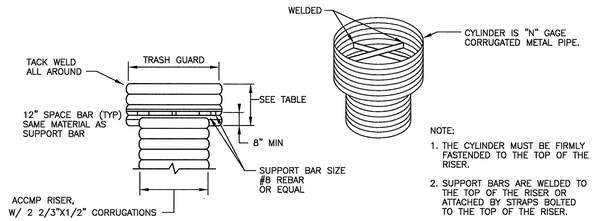

ISOMETRIC DETAIL

TRASH RACK DETAIL
2
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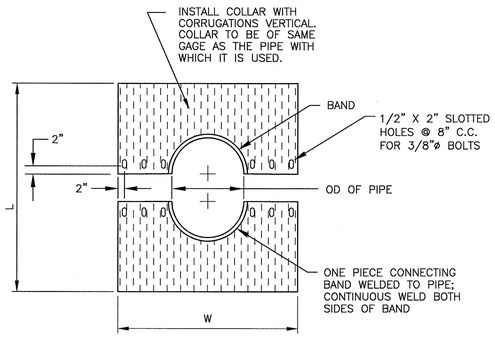

ANTI-SEEP COLLAR DETAIL
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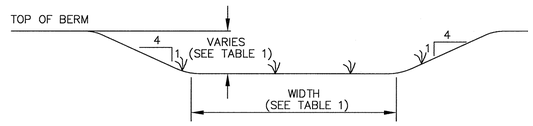
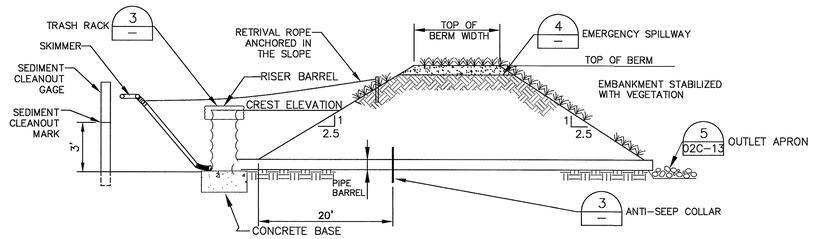


NOTES:
1. EMERGENCY SPILLWAY IS GRASS LINED.

EMERGENCY SPILLWAY TYPICAL
4
N.T.S.

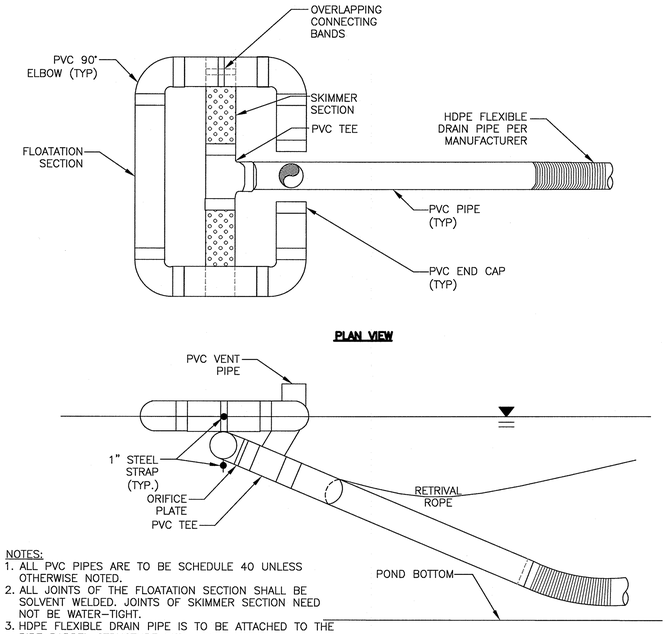


CONSTRUCTION, MAINTENANCE AND INSPECTION NOTES

1. INSPECT SEDIMENT BASINS AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (1/2 INCH OR GREATER) RAINFALL EVENT AND REPAIR IMMEDIATELY.
2. REMOVE SEDIMENT AND RESTORE THE BASIN TO ITS ORIGINAL DIMENSIONS WHEN IT ACCUMULATES TO ONE-HALF THE DESIGN DEPTH. PLACED REMOVED SEDIMENT IN AN AREA WITH SEDIMENT CONTROLS.
3. CHECK EMBANKMENT, SPILLWAYS, AND OUTLET FOR EROSION DAMAGE, AND INSPECT THE EMBANKMENT FOR PIPING AND SETTLEMENT. MAKE ALL NECESSARY REPAIRS IMMEDIATELY. REMOVE ALL TRASH AND OTHER DEBRIS FROM THE RISER AND POOL AREA.
4. ALL CMP SHALL BE FULLY ASPHALT COATED, 16 GA. OR HEAVIER.
5. POND DIMENSIONS SHOWN ARE FOR THE CONTROLLING PHASE.
6. SEDIMENT BASINS 1, 2, 4 AND 7 HAVE MULTIPLE OUTLET STRUCTURES (RISER, BARREL, SKIMMER).
7. BASIN #7 UTILIZES THE EXISTING SETTLING POND. BECAUSE OF ITS LARGE DRAINAGE AREA 1/2 OF ITS DRAINAGE AREA MUST BE STABILIZED IN PHASE II TO CONSTRUCT A BASIN.
8. MSL = MEAN SEA LEVEL

Sediment Basin #	Useful Life (Phase)	Bottom Elevation (MSL)	Top of Berm Elevation (MSL)	Top of Berm Width (FT)	Emergency Spillway Elevation (MSL)	Emergency Spillway Width (FT)	Number of Riser/Barrel/ Skimmer Assemblies	Riser Diameter (IN)	Riser Crest Elevation (MSL)	Trash Guard Diameter (IN)	Trash Guard Thickness (Gage)	Trash Guard Height (IN)	Concrete Ballast Dimensions (FT)	Barrel Diameter (IN)	Barrel Invert In (MSL)	Barrel Invert Out (MSL)	Antiseep Collar Size (FT)	Skimmer Size (IN)	Skimmer Orifice (IN)
1	1 & 2	213.0	221.0	6	220.5	20	2	72	220.1	102	14	36	7x7x3	36	213.0	211.8	6x6	8	5
2	1 & 2	193.0	201.0	6	200.0	20	2	72	199.4	102	14	36	7x7x3	30	193.0	190.4	5x5	4	5
3	1 & 2	190.0	197.0	6	196.2	10	1	54	195.9	78	16	25	6x6x2	36	190.0	189.4	6x6	3	2.8
4	1 & 2	219.0	226.0	12	224.5	10	2	54	222.6	78	16	25	6x6x2	36	219.0	218.4	6x6	4	3.2
5	1	229.0	236.5	9	236.0	10	2	18	235.7	27	16	8	2.5X2.5X1.5	12	229.0	228.3	2x2	4	3.3
6	1 & 2	211.0	218.5	9	218.0	10	1	54	217.5	78	16	25	6x6x2	36	211.0	209.8	6x6	5	3.9
7	1 & 2	208.0	218.0	6	217.5	30	2	72	217.2	102	14	36	7x7x4	36	208.0	207.6	6x6	8	7.6

SEDIMENT BASIN SCHEDULE DETAIL
5
N.T.S.



NOTES:
1. ALL PVC PIPES ARE TO BE SCHEDULE 40 UNLESS OTHERWISE NOTED.
2. ALL JOINTS OF THE FLOATATION SECTION SHALL BE SOLVENT WELDED. JOINTS OF SKIMMER SECTION NEED NOT BE WATER-TIGHT.
3. HDPE FLEXIBLE DRAIN PIPE IS TO BE ATTACHED TO THE PIPE BARREL STRUCTURE WITH WATER-TIGHT CONNECTIONS.
4. SEE SCHEDULE FOR ORIFICE SIZE.
5. FAIRCLOTH TYPE OR EQUIVALENT SKIMMER TO BE USED.

FAIRCLOTH SKIMMER DETAIL
6
N.T.S.

HDR Engineering Inc.
of the Carolinas

440 S. Church St. Suite 1000
Charlotte, NC 28202-2075
704.338.6700
N.C.B.E.L.S. License Number F-0116

ISSUE	DATE	DESCRIPTION
B	12/31/14	REVISED PER NCDENR COMMENTS
A	11/2014	ISSUED FOR APPROVAL

PROJECT MANAGER	M.D. PLUMMER, P.E.
DESIGNED BY	R. BAYSDEN, P.E.
DRAWN BY	R. BAYSDEN, P.E.
CHECKED BY	J. READLING, P.E.
PROJECT NUMBER	453925-237673-018

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 025495 3/6/15 MICHAEL D. PLUMMER

Charah®

BRICKHAVEN No. 2 MINE TRACT "A" MINE
STRUCTURAL FILL
MONCURE, NC

EROSION AND SEDIMENTATION CONTROL DETAILS (2 OF 3)

0 1" 2"

FILENAME 02C-14.dwg
SCALE AS SHOWN

SHEET 02C-14

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