Site Stormwater H&H

Normal Depth Swale Calculations

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Jun 3 2019

INLET SWALE TO SE BASIN FOR FV

Trapezoidal

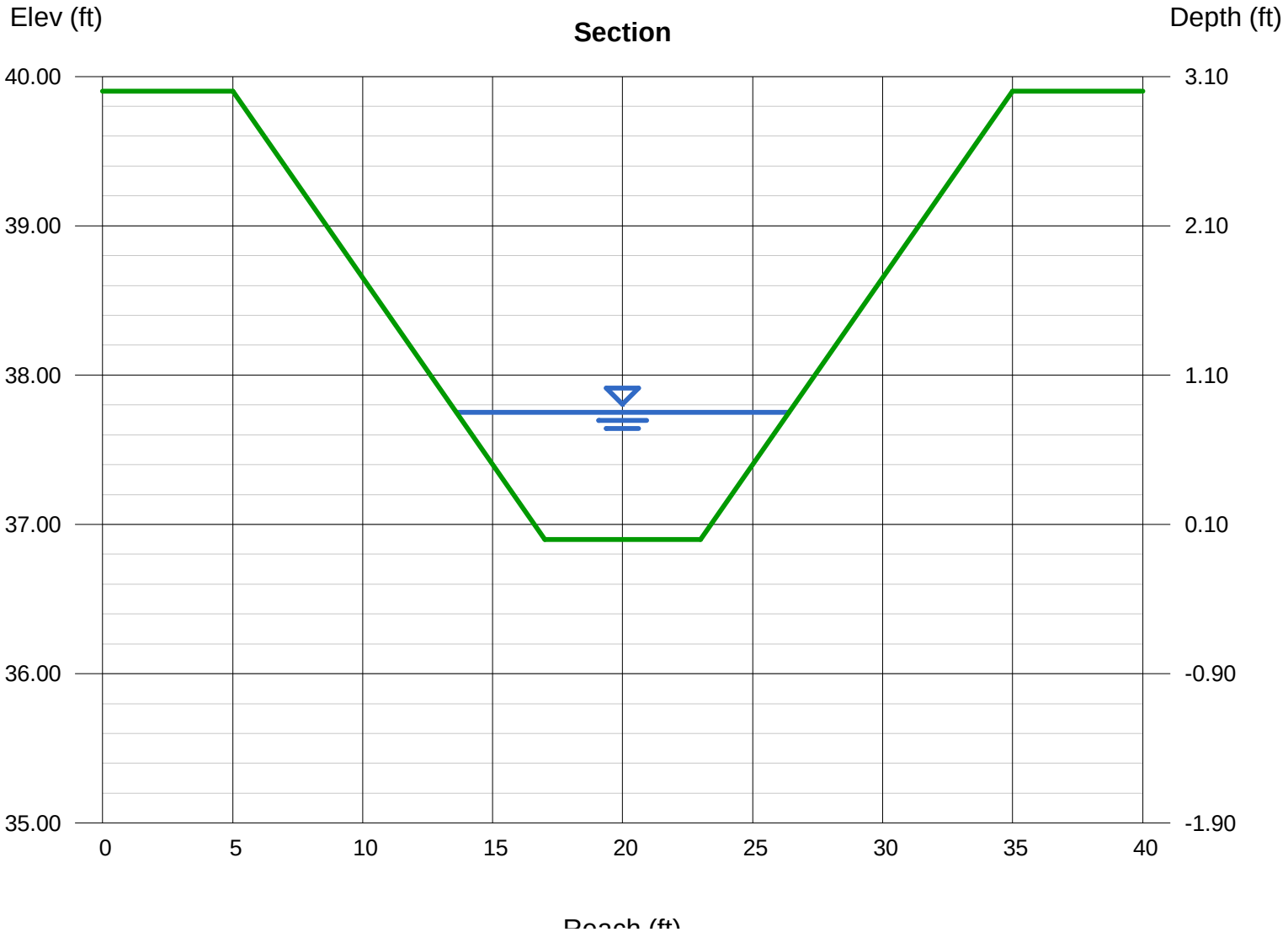
Bottom Width (ft)	= 6.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 36.90
Slope (%)	= 0.53
N-Value	= 0.040

Calculations

Compute by:	Known Q
Known Q (cfs)	= 15.60

Highlighted

Depth (ft)	= 0.85
Q (cfs)	= 15.60
Area (sqft)	= 7.99
Velocity (ft/s)	= 1.95
Wetted Perim (ft)	= 13.01
Crit Depth, Yc (ft)	= 0.53
Top Width (ft)	= 12.80
EGL (ft)	= 0.91



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Jun 3 2019

INLET SWALE TO SW BASIN FOR FV

Trapezoidal

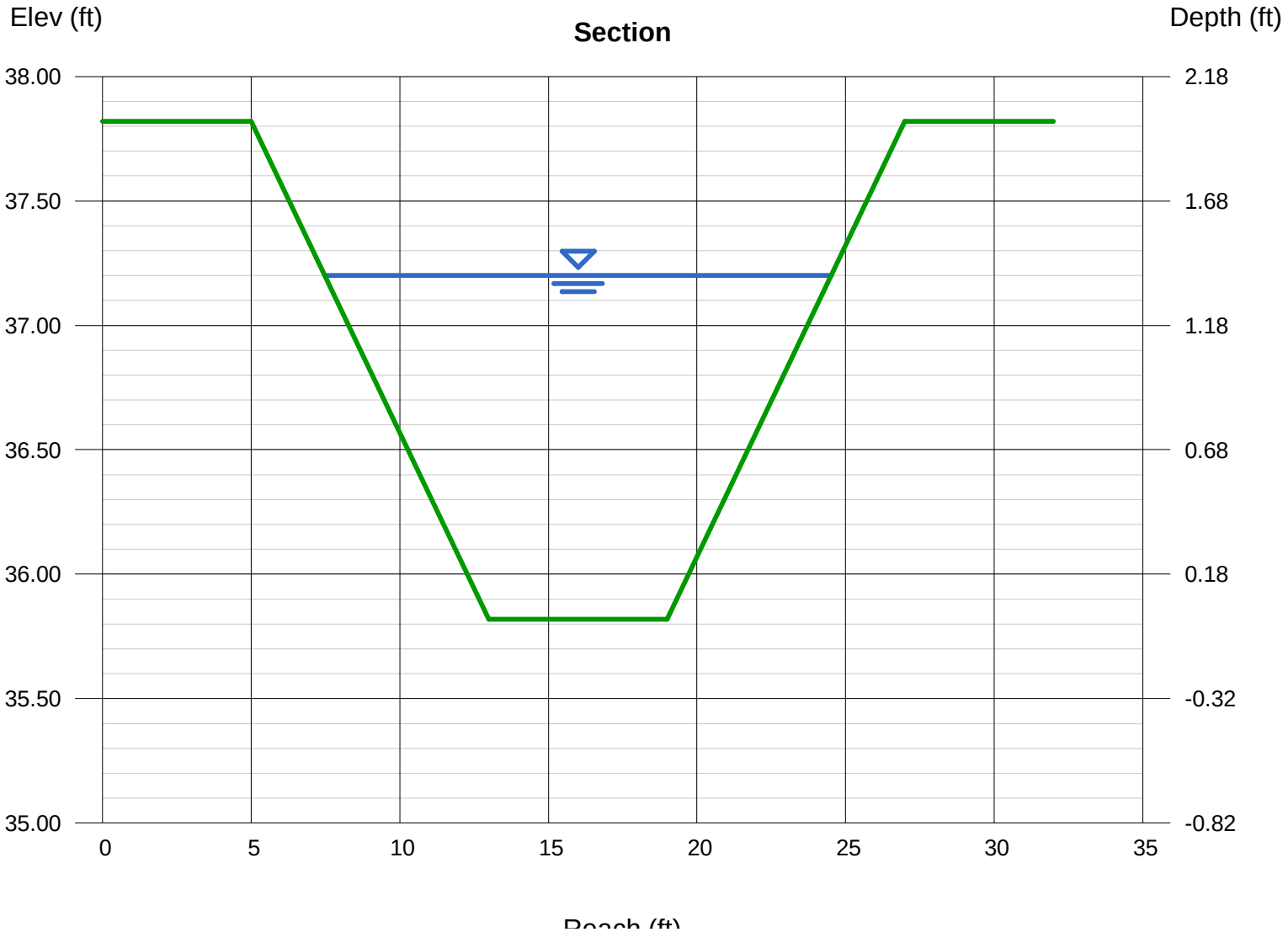
Bottom Width (ft)	= 6.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 35.82
Slope (%)	= 0.50
N-Value	= 0.040

Calculations

Compute by:	Known Q
Known Q (cfs)	= 39.23

Highlighted

Depth (ft)	= 1.38
Q (cfs)	= 39.23
Area (sqft)	= 15.90
Velocity (ft/s)	= 2.47
Wetted Perim (ft)	= 17.38
Crit Depth, Yc (ft)	= 0.90
Top Width (ft)	= 17.04
EGL (ft)	= 1.47



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Jun 3 2019

OUTFALL SWALE AT END OF SYSTEM FOR FV

Trapezoidal

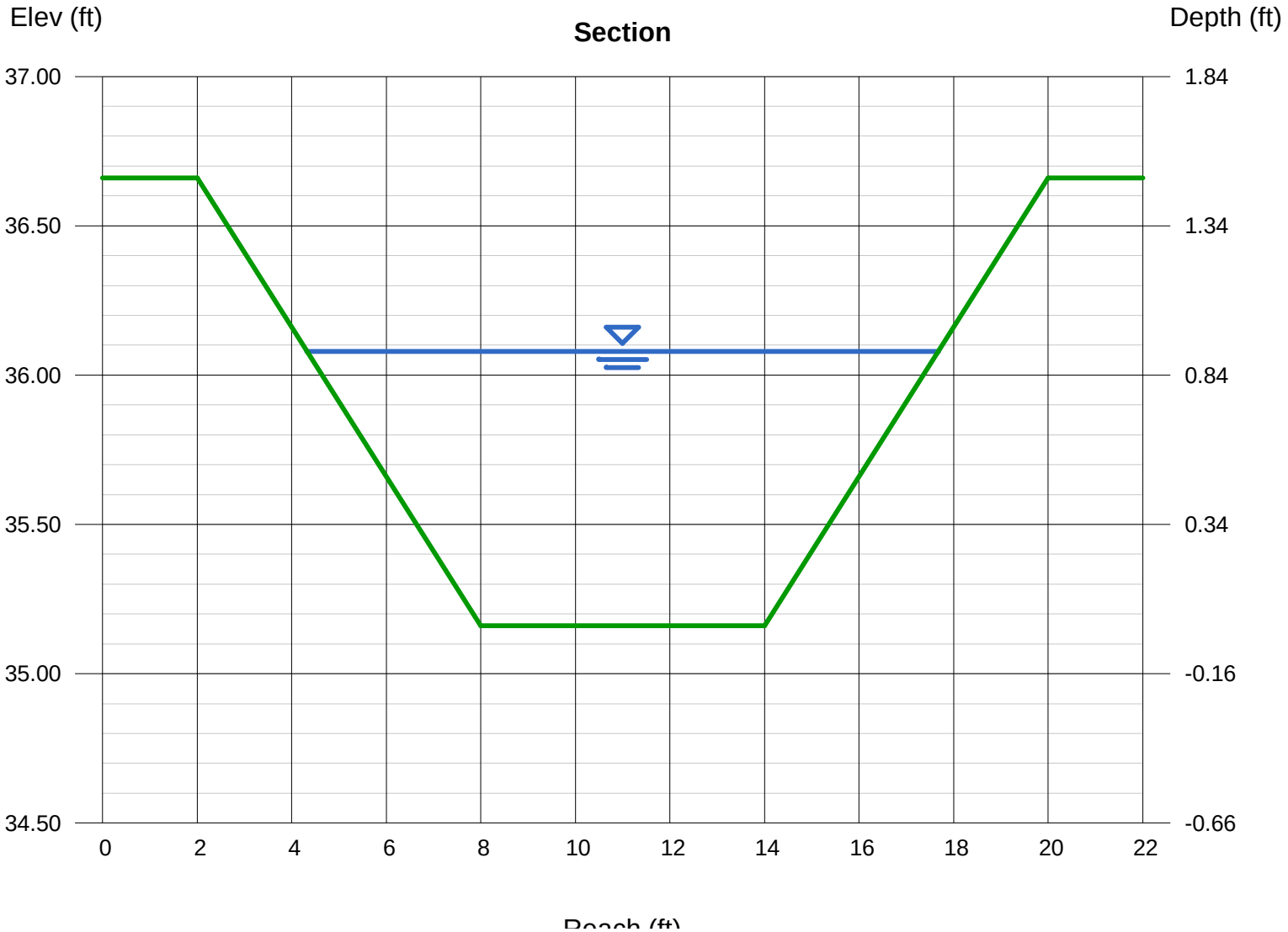
Bottom Width (ft)	= 6.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 35.16
Slope (%)	= 0.50
N-Value	= 0.040

Calculations

Compute by:	Known Q
Known Q (cfs)	= 17.50

Highlighted

Depth (ft)	= 0.92
Q (cfs)	= 17.50
Area (sqft)	= 8.91
Velocity (ft/s)	= 1.97
Wetted Perim (ft)	= 13.59
Crit Depth, Yc (ft)	= 0.57
Top Width (ft)	= 13.36
EGL (ft)	= 0.98



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Jun 3 2019

ROADSIDE SWALE, CATCHMENT 4A FOR FV

Trapezoidal

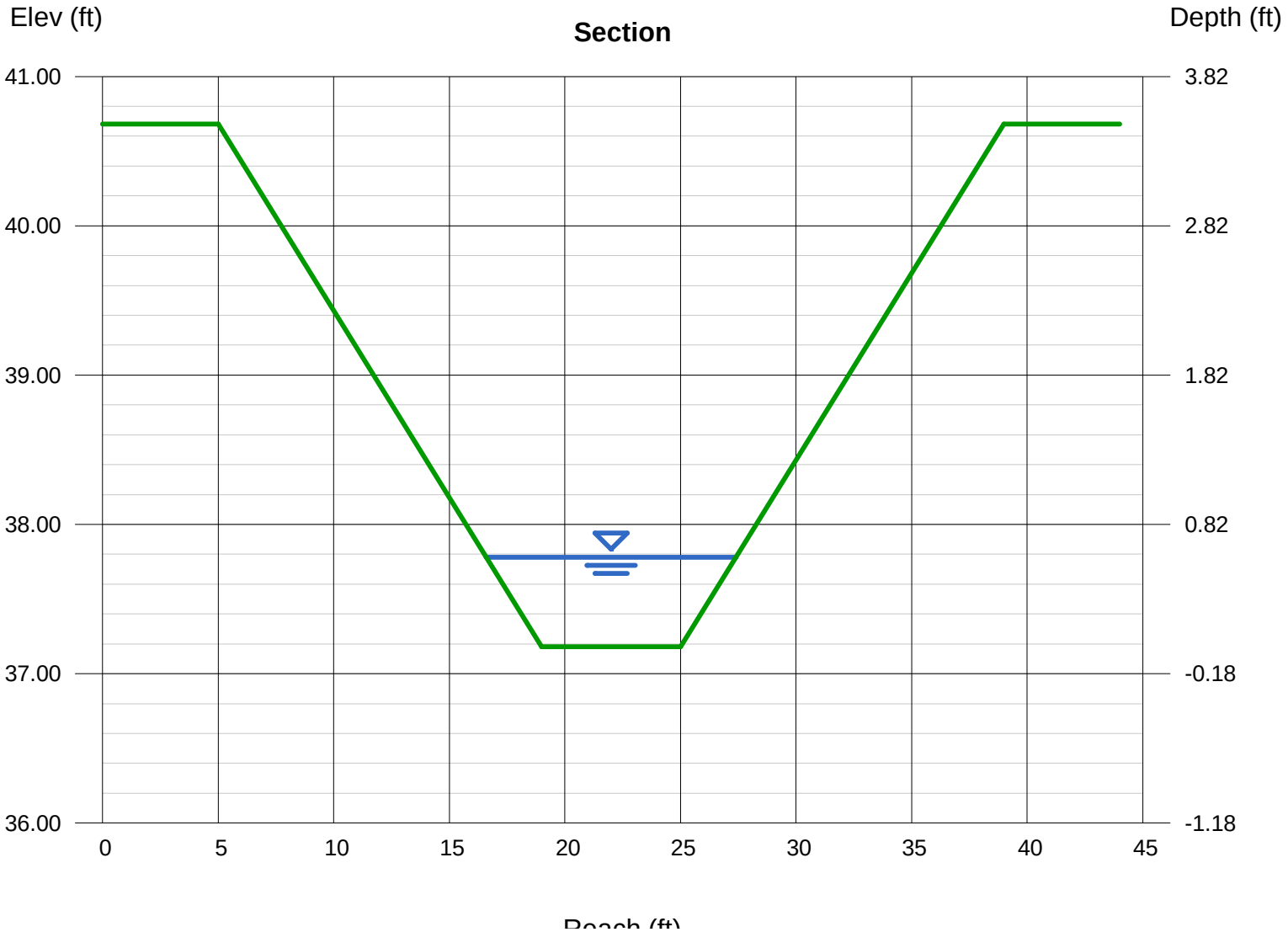
Bottom Width (ft)	= 6.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 3.50
Invert Elev (ft)	= 37.18
Slope (%)	= 0.42
N-Value	= 0.040

Calculations

Compute by:	Known Q
Known Q (cfs)	= 7.20

Highlighted

Depth (ft)	= 0.60
Q (cfs)	= 7.200
Area (sqft)	= 5.04
Velocity (ft/s)	= 1.43
Wetted Perim (ft)	= 10.95
Crit Depth, Yc (ft)	= 0.33
Top Width (ft)	= 10.80
EGL (ft)	= 0.63



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Jun 3 2019

ROADSIDE SWALE, CATCHMENT 4B FOR FV

Trapezoidal

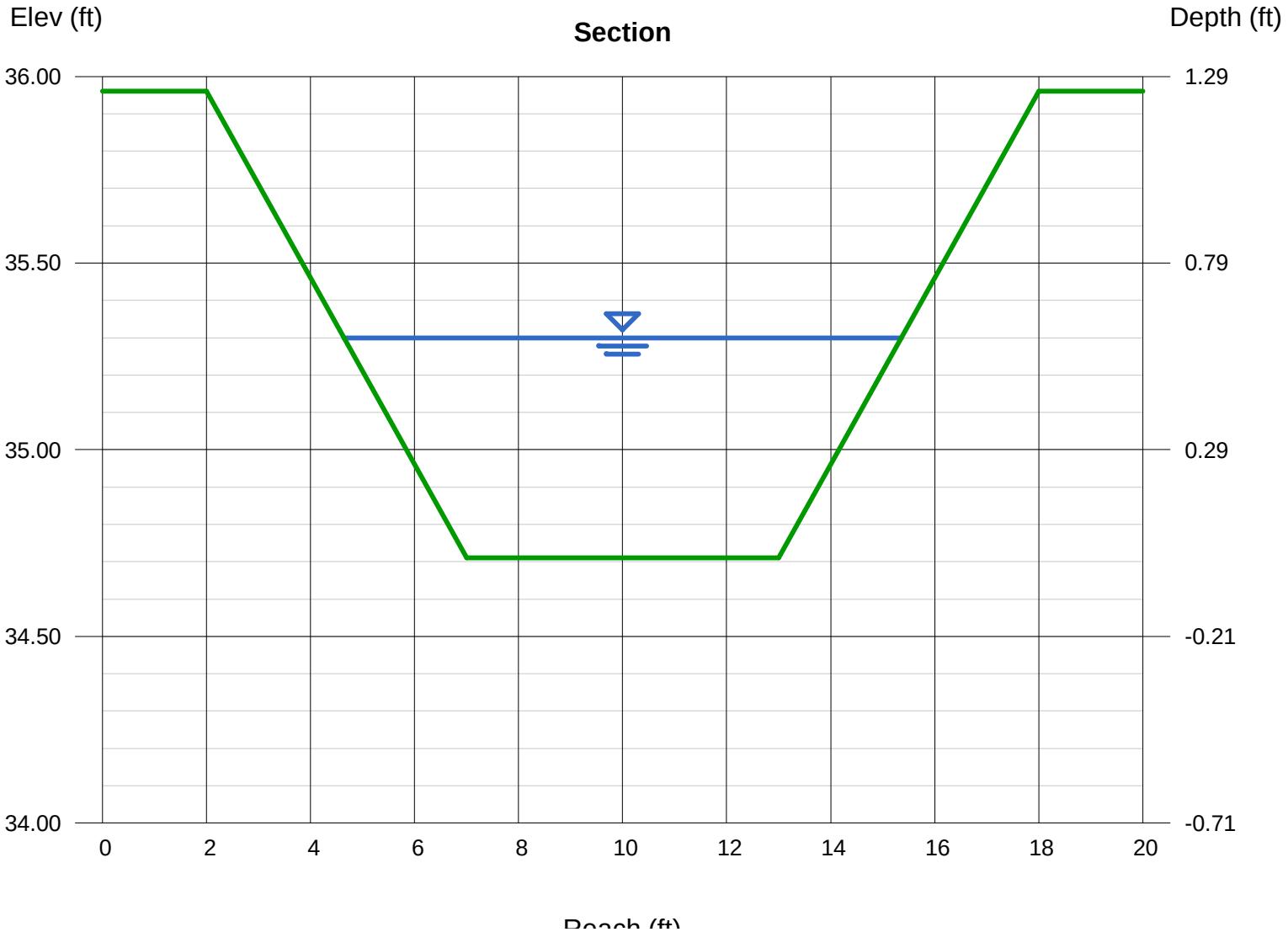
Bottom Width (ft)	= 6.00
Side Slopes (z:1)	= 4.00, 4.00
Total Depth (ft)	= 1.25
Invert Elev (ft)	= 34.71
Slope (%)	= 0.42
N-Value	= 0.040

Calculations

Compute by:	Known Q
Known Q (cfs)	= 7.01

Highlighted

Depth (ft)	= 0.59
Q (cfs)	= 7.010
Area (sqft)	= 4.93
Velocity (ft/s)	= 1.42
Wetted Perim (ft)	= 10.87
Crit Depth, Yc (ft)	= 0.33
Top Width (ft)	= 10.72
EGL (ft)	= 0.62



Appendix C: Forebay Sizing Calculations

Forebay Sizing Calculations

NW INFILTRATION BASIN FOREBAY SIZING

RPV RUNOFF ENTERING FOREBAY = 4.844 AC*4,3560*0.35”/12 = 5702 CU-FT (DIRECT RUNOFF, NOT TREATED BY AN UPSTREAM BMP FROM SUMMARY FOR POND NW BMP FORBAY IN HYDROCAD)

10% RPV = 570.2 CU-FT

STORAGE PROVIDED IN FOREBAY AT ELEVATION OF WEIR (39.10’) = 3,000 CU-FT

SW INFILTRATION BASIN FOREBAY SIZING

RPV RUNOFF ENTERING FOREBAY = 11.526 AC*4,3560*0.57”/12 = 23848 CU-FT (DIRECT RUNOFF, NOT TREATED BY AN UPSTREAM BMP FROM SUMMARY FOR POND NW BMP FORBAY IN HYDROCAD)

10% RPV = 2384.8 CU-FT

STORAGE PROVIDED IN FOREBAY AT ELEVATION OF WEIR (37.30’) = 8,500 CU-FT

Appendix D: Soil Reports

RAUCH inc.
Engineering | Survey | Architecture | Environmental

June 6, 2019

REPORT ON INFILTROMETER TESTING AT 24778 DUPONT BOULEVARD, GEORGETOWN, DE 19947

SUSSEX PARCEL ID: 133-6.00-123.00

The scope of work for this project included a soil profile to the depth of groundwater, and infiltrometer testing to allow engineering design for SWM to proceed.

Nine (9) infiltration tests to varying depths based on proposed stormwater features were constructed. Groundwater levels indicated that approximately six to seven (6-7) feet of unsaturated material exists on the site.

The infiltrometers were 4" in diameter, constructed of sch. 10 pvc and driven into the bottom of the auger depth 3". 24" or the max amount of water allowable was initially added to each infiltrometer. After each one (1) hour period the depth of water remaining was measured and then returned to the 24" depth for a minimum of three hours. A pre-wetting period of either one hour, or a 12" water level drop was used to simulate the saturated conditions of a stormwater facility.

Deep auger borings within the test areas were used to obtain the soil profile. Infiltrometers were then constructed nearby the profile hole to run the infiltration tests. This soil data is shown in the attachments. NRCS has the soil in the area identified as Downer loamy sand. The profiles show a well-drained soil, and extensive depth of structure. No confining layers were observed during the borings.

A summary table of the results has been provided below.

MD office | 106 N. Harrison St – Easton, MD 21601
VA office | 8229 Boone Blvd, Suite 625 – Vienna, VA 22182
email: design@raucheng.com | web: www.raucheng.com
phone: 410.770.9081 | fax: 410.770.3667

RAUCH inc

Summary Table:

Test #	Longitude	Latitude	Test Depth Inches	Elevation Feet	Design Infiltration Rate
1	75°21'29.19"W	38°38'30.74"N	16”	40.00	0.532 in/hr
2	75°21'26.23"W	38°38'26.70"N	37.5”	36.90	14.408 in/hr
3	75°21'27.03"W	38°38'26.11"N	31”	36.90	2.246 in/hr
4	75°21'32.15"W	38°38'26.59"N	39”	35.80	10.8 in/hr
5	75°21'29.59"W	38°38'25.87"N	42”	39.44	15 in/hr
6	75°21'33.94"W	38°38'27.92"N	38”	35.80	15 in/hr
7	75°21'36.90"W	38°38'32.49"N	59”	37.10	2.8 in/hr
8	75°21'33.74"W	38°38'32.06"N	36	39.00	1.464 in/hr

Submitted by :

Kyle A. Kowalczyk

Kyle Kowalczyk, Environmental Scientist.

MD office | 106 N. Harrison St – Easton, MD 21601
VA office | 8229 Boone Blvd, Suite 625 – Vienna, VA 22182
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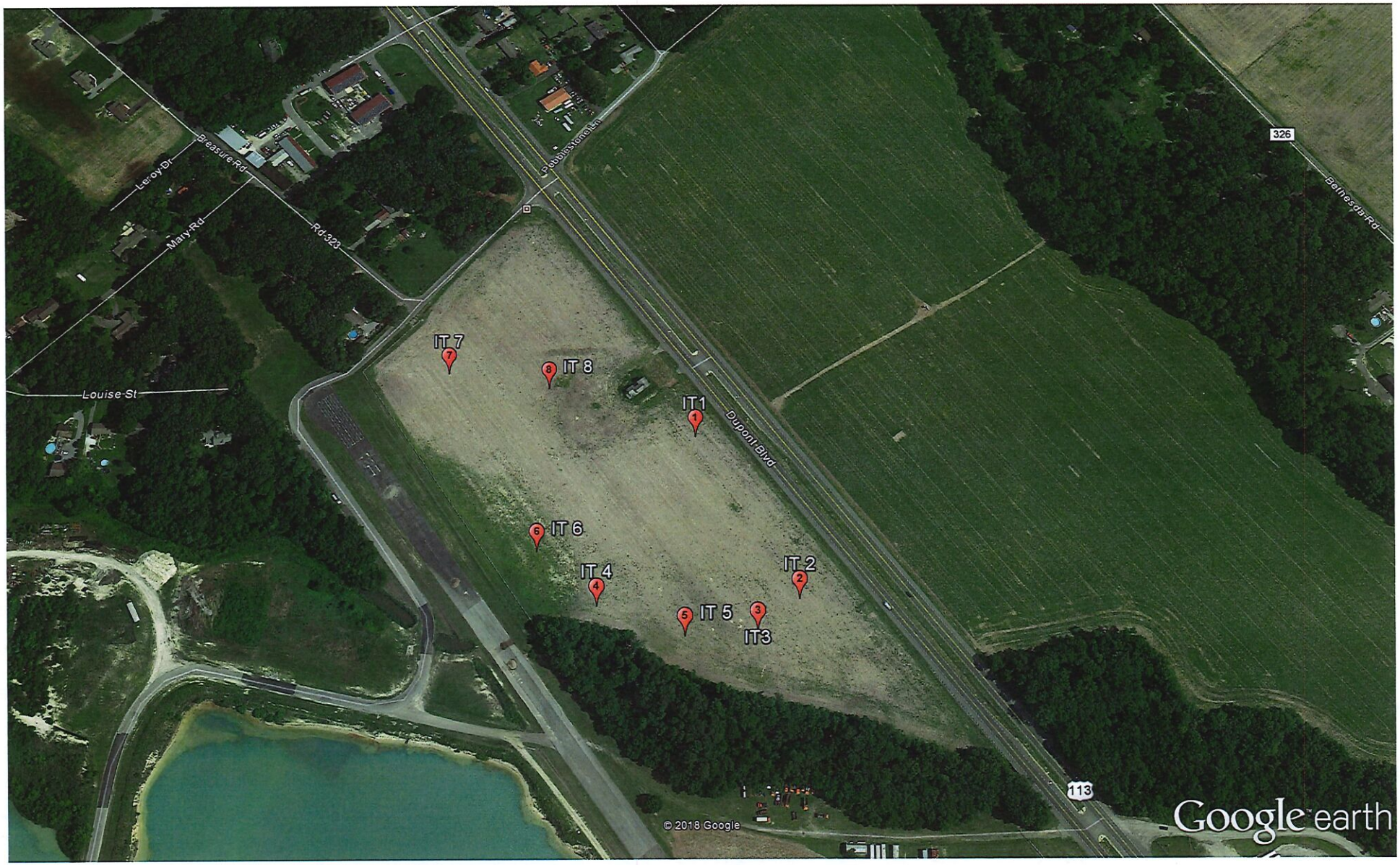
APPENDIX 1:
TEST LOCATION SITE PLAN

MD office | 106 N. Harrison St – Easton, MD 21601
VA office | 8229 Boone Blvd, Suite 625 – Vienna, VA 22182
email: design@raucheng.com | web: www.raucheng.com
phone: 410.770.9081 | fax: 410.770.3667



Google Earth Pro

feet 1000

meters 500

APPENDIX 2:
SOIL BORING LOGS

MD office | 106 N. Harrison St – Easton, MD 21601
VA office | 8229 Boone Blvd, Suite 625 – Vienna, VA 22182
email: design@raucheng.com | web: www.raucheng.com
phone: 410.770.9081 | fax: 410.770.3667

Name of Tester: Kyle Kowalczyk
Test Method: Single Ring
Temperature: 65°
Precipitation: 0"
Boring Diameter: 4.25"
Casing Diameter: 4"
Depth of Penetration: 3"

Profile #	Date
1	2.5.19

Depth (in)		Thickness	Matrix	Mottles		Description	Texture	Structure	Remarks
0	12	12	10yr 4/2				sl	2msbk	
12	18	6	2.5y 6/4				sl	2msbk	
18	26	8	2.5y 6/3				ls	1msbk	
26	30	4	2.5y 6/3				ls	2csbk	gravel
30	38	8	2.5y 6/3	5yr 5/8	10yr 6/1	f2d,m2d	sl	2csbk	gravel
38	42	4	2.5y 6/3	10yr 6/1		m2d	ls	1msbk	
42	50	8	2.5y 7/3	2.5y 7/1		m2p	ls	1msbk	
50	60	10	5y 7/2	7.5yr 6/8		m2d	sl	2msbk	
60	64	4	10yr 7/6	2.5y 7/2		m2d	sl	2msbk	
64	68	4	10yr 7/6	2.5y 7/2		m2d	sl	2msbk	tacky
68	80	12	2.5y 7/4	5y 7/1	7.5yr 6/8	m2d,c2d	sl	2msbk	tacky
80	88	8	2.5y 7/1	2.5y 7/4		m2p	sl	2msbk	tacky, wet
88	92	4	2.5y 7/4	5y 7/1	7.5yr 6/8	m2d,m2d	sl	2msbk	tacky, wet

Landscape Feature:	% Slope
Summit	
Shoulder	
Sideslope	0-2%
Footslope	
Toeslope	
Depression	

Hillside Element:	
Divergent	
Convergent	
Level	*

Name of Tester: Kyle Kowalczyk
Test Method: Single Ring
Temperature: 51°
Precipitation: 0.2"
Boring Diameter: 4.25"
Casing Diameter: 4"
Depth of Penetration: 3"

Profile #	Date
2	2.7.19

Depth (in)		Thickness	Matrix	Mottles		Description	Texture	Structure	Remarks
0	12	12	10yr 4/2				sl	2msbk	
12	20	8	2.5y 6/4	2.5y 7/2		m2p	sl	2msbk	
20	38	18	2.5y 6/4	2.5y 7/2	10yr 5/8	m2p,f1d	sl	2msbk	
38	56	18	2.5y 7/4	2.5y 7/2		m2p	ls	2msbk	gravel, wet
56	74	18	2.5y 6/4	2.5y 7/1	7.5yr 6/8	m2p,m2d	hsl	1msbk	
74	78	4	2.5y 7/4	5y 8/1	7.5yr 7/8	m2d,f1d	sl	2csbk	H2O at 74"

Landscape Feature:	% Slope
Summit	
Shoulder	
Sideslope	0-2%
Footslope	
Toeslope	
Depression	

Hillside Element:	
Divergent	
Convergent	
Level	*

Name of Tester: Kyle Kowalczyk
Test Method: Single Ring
Temperature: 65°
Precipitation: 0"
Boring Diameter: 4.25"
Casing Diameter: 4"
Depth of Penetration: 3"

Profile #	Date
3	2.5.19

Depth (in)		Thickness	Matrix	Mottles		Description	Texture	Structure	Remarks
0	14	14	10yr 4/2				sl	1msbk	
14	28	14	2.5y 6/4	2.5y 7/2		m2p	sl	2msbk	
28	44	16	2.5y 6/4	2.5y 7/2	7.5yr 5/8	m2p, f1d	sl	2csbk	
44	48	4	2.5y 7/4				sl	1msbk	wet
48	52	4	2.5y 7/4	2.5y 7/2	7.5yr 5/8	m2p, m2d	sl	3msbk	wet
52	57	5	2.5y 7/4	5y 7/1	7.5yr 5/8	m3d, m2d	sl	3msbk	wet, heavy
57	64	7	5yr 5/8	10yr 6/6	5y 7/1	m2d,m2d	sl	3msbk	wet, heavy
64	82	18	5y 7/1	5yr 6/8	2.5y 6/4	c2d, c2d	sl	3msbk	H2O at 82"

Landscape Feature:	% Slope
Summit	
Shoulder	
Sideslope	0-2%
Footslope	
Toeslope	
Depression	

Hillside Element:	
Divergent	
Convergent	
Level	*

Name of Tester: Kyle Kowalczyk
Test Method: Single Ring
Temperature: 51°
Precipitation: 0.2"
Boring Diameter: 4.25"
Casing Diameter: 4"
Depth of Penetration: 3"

Profile #	Date
4	2.7.19

Depth (in)		Thickness	Matrix	Mottles		Description	Texture	Structure	Remarks
0	10	10	10yr 5/2				sl	1msbk	
10	18	8	2.5y 6/4				sl	1msbk	
18	28	10	2.5y 6/2				sl	1msbk	gravel
28	40	12	2.5y 6/2				sl	1csbk	gravel
40	47	7	2.5y 6/2	7.5yr 6/8		c1d	sl	1csbk	
47	66	19	2.5y 6/2	7.5yr 6/8	5y 8/1	m2d,c2d	sl/ls	1fsbk	
66	83	17	2.5y 6/2	7.5yr 6/8	5y 8/1	f1d,m2d,f1d	sl	2csbk	
83	87	4	9.5 N	7.5yr 6/8	5G 3/1	f1d	sl	2csbk	H2O at 83"

Landscape Feature:	% Slope
Summit	
Shoulder	
Sideslope	0-2%
Footslope	
Toeslope	
Depression	

Hillside Element:	
Divergent	
Convergent	
Level	*

Name of Tester: Kyle Kowalczyk
Test Method: Single Ring
Temperature: 51°
Precipitation: 0.2"
Boring Diameter: 4.25"
Casing Diameter: 4"
Depth of Penetration: 3"

Profile #	Date
5	2.7.19

Depth (in)		Thickness	Matrix	Mottles		Description	Texture	Structure	Remarks
0	12	12	10yr 4/2				sl	1msbk	
12	18	6	2.5y 6/4				sl	2msbk	
18	26	8	2.5y 6/4	7.5yr 5/8		f1d	sl	2msbk	gravel
26	34	8	2.5y 6/2				sl	2csbk	gravel
34	44	10	2.5y 6/2				sl/ls	2csbk	gravel
44	60	16	2.5y 6/2	7.5yr 6/8	5y 8/1	f1d,f1d	sl	2csbk	gravel, wet at 58"
60	79	19	5y 8/1	7.5yr 6/8		c2d	sl	2msbk	H2O at 79"

Landscape Feature:	% Slope
Summit	
Shoulder	
Sideslope	0-2%
Footslope	
Toeslope	
Depression	

Hillside Element:	
Divergent	
Convergent	
Level	*

Name of Tester: Kyle Kowalczyk
Test Method: Single Ring
Temperature: 51°
Precipitation: 0.2"
Boring Diameter: 4.25"
Casing Diameter: 4"
Depth of Penetration: 3"

Profile #	Date
6	2.7.19

Depth (in)		Thickness	Matrix	Mottles		Description	Texture	Structure	Remarks
0	12	12	10yr 4/3				sl	massive	
12	24	12	2.5y 6/4				sl	1msbk	
24	34	10	2.5y 7/3				sl/ls	1csbk	gravel
34	58	24	2.5y 7/3	5y 8/1	7.5yr 7/8	m3d,m2d	sl	2msbk	
58	79	21	9/N	7.5yr 7/6		f1d	sl	3msbk	H2O at 79"

Landscape Feature:	% Slope
Summit	
Shoulder	
Sideslope	
Footslope	
Toeslope	0-2%
Depression	

Hillside Element:	
Divergent	
Convergent	
Level	*

Name of Tester: Kyle Kowalczyk
Test Method: Single Ring
Temperature: 51°
Precipitation: 0.2"
Boring Diameter: 4.25"
Casing Diameter: 4"
Depth of Penetration: 3"

Profile #	Date
7	2.7.19

Depth (in)		Thickness	Matrix	Mottles		Description	Texture	Structure	Remarks
0	11	11	10yr 4/2				sl	2msbk	
11	30	19	2.5y 6/3				sl	2msbk	heavy
30	40	10	2.5y 6/3	7.5yr 6/8	10yr 7/1	f1d,c1d	sl	3msbk	gravel, heavy
40	56	16	2.5y 7/2	2.5y 6/3	7.5yr 6/8	m3p,m3d	sl	2csbk	
56	64	8	5y 7/1	7.5yr 6/8		c1d	sl	2csbk	
64	74	10	5y 7/1	5G 3/1	7.5yr 6/8	f1d,f1d	sl	1csbk	H2O at 74"

Landscape Feature:	% Slope
Summit	
Shoulder	
Sideslope	
Footslope	
Toeslope	0-2%
Depression	

Hillside Element:	
Divergent	
Convergent	
Level	*

Name of Tester: Kyle Kowalczyk
Test Method: Single Ring
Temperature: 51°
Precipitation: 0.2"
Boring Diameter: 4.25"
Casing Diameter: 4"
Depth of Penetration: 3"

Profile #	Date
8	2.7.19

Depth (in)		Thickness	Matrix	Mottles		Description	Texture	Structure	Remarks
0	12	12	10yr 5/2				sl	1msbk	
12	20	8	10yr 6/3				sl	1msbk	
20	32	12	10yr 6/3	7.5yr 5/8		f1d	sl	2msbk	gravel
32	36	4	2.5y 6/2	7.5yr 5/8		m2d	sl	3msbk	heavy
36	41	5	2.5y 6/2	7.5yr 5/8		m2d	scl	3msbk	
41	47	6	2.5y 6/4	7.5yr 6/8	2.5y 7/1	c1d,m2p	scl	3msbk	
47	56	9	2.5y 6/4	7.5yr 6/8	2.5y 7/1	c2d,m2p	sl	2msbk	heavy
56	69	13	2.5y 6/4				ls	2fsbk	
69	84	15	5y 8/1	5G 3/1	7.5yr 7/6	f1d,f1d	sl	2msbk	H2O at 84"

Landscape Feature:	% Slope
Summit	
Shoulder	
Sideslope	
Footslope	0-2%
Toeslope	
Depression	

Hillside Element:	
Divergent	
Convergent	
Level	*

Name of Tester: Kyle Kowalczyk
Test Method: Single Ring
Temperature: 32°
Precipitation: 0"
Boring Diameter: 4.25"
Casing Diameter: 4"
Depth of Penetration: 3"

Profile #	Date
9	3.6.19

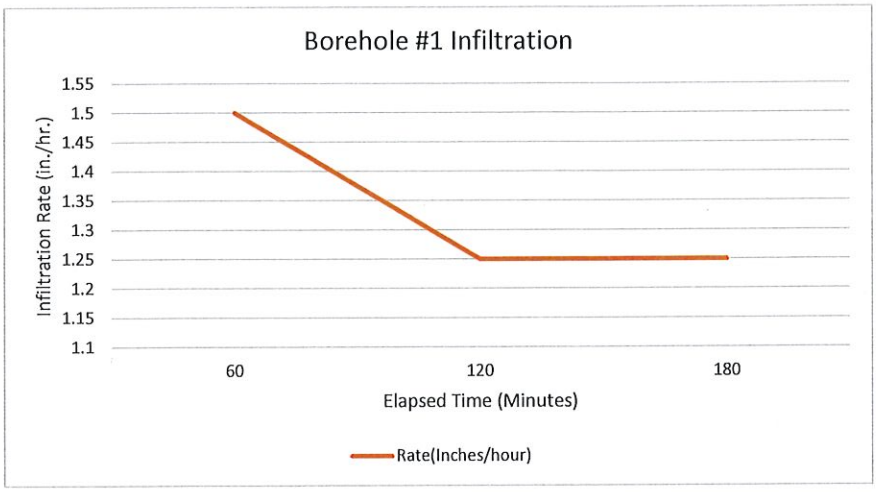
Depth (in)		Thickness	Matrix	Mottles		Description	Texture	Structure	Remarks
0	9	9	10yr 4/2				sl	1msbk	
9	21	12	10yr 5/4				sl	1msbk	
21	29	8	10yr 5/6	7.5yr 5/8	10yr 6/1	f1d,c1p	sl	2msbk	
29	46	17	2.5y 6/4	7.5yr 5/8	10yr 7/1	f1d,f1d	ls	2msbk	gravel at 40"
46	58	12	10yr 7/1	7.5yr 5/8		c2d	ls	1msbk	
58	78	20	5y 8/1	10yr 8/4		c1d	s	1msbk	
78	88	10	9/N	7.5yr 7/8	10yr 8/4	f2d,c2d	s	1msbk	H2O at 88"

Landscape Feature:	% Slope
Summit	
Shoulder	
Sideslope	0-2%
Footslope	
Toeslope	
Depression	

Hillside Element:	
Divergent	
Convergent	
Level	*

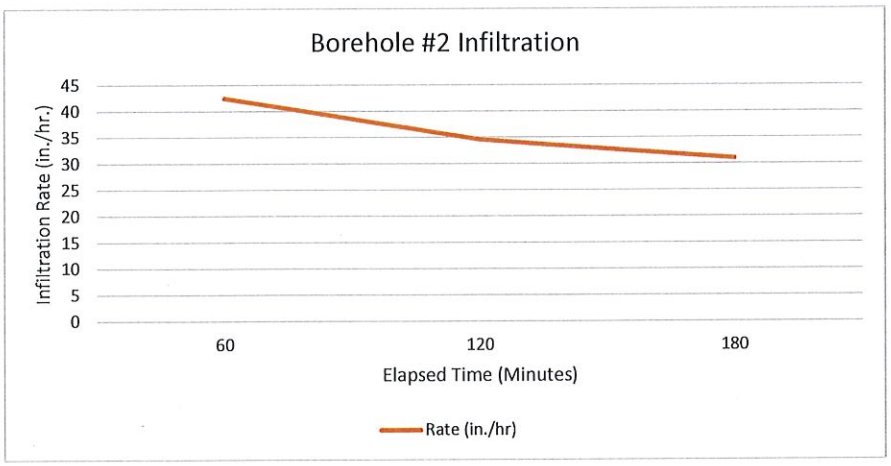
APPENDIX 3:
INFILTRATION RATES AND GRAPHS

MD office | 106 N. Harrison St – Easton, MD 21601
VA office | 8229 Boone Blvd, Suite 625 – Vienna, VA 22182
email: design@raucheng.com | web: www.raucheng.com
phone: 410.770.9081 | fax: 410.770.3667



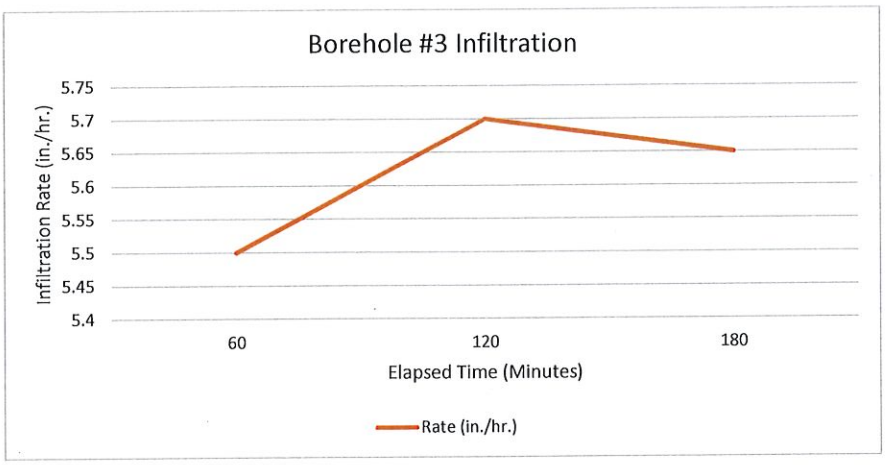
INFILTRATION TEST				
16" DEEP INFILTROMETER				
Start Tme	End Time	Duration	Infiltration	Rate (inch/hour)
6:12	7:12	1:00	1.5	1.5
6:12	*6:27*	*0:15*	*0.375*	
6:27	*6:42*	*0:15*	*0.375*	
6:42	*6:57*	*0:15*	*0.375*	
6:57	*7:12*	*0:15*	*0.375*	
7:13	8:13	1:00	1.25	1.25
7:13	*7:28*	*0:15*	*0.3125*	
7:28	*7:43*	*0:15*	*0.3125*	
7:43	*7:58*	*0:15*	*0.3125*	
7:58	*8:13*	*0:15*	*0.3125*	
8:13	9:13	1:00	1.25	1.25
8:13	*8:28*	*0:15*	*0.3125*	
8:28	*8:43*	*0:15*	*0.3125*	
8:43	*8:58*	*0:15*	*0.3125*	
8:58	*9:13*	*0:15*	*0.3125*	
Average				**1.33**

*USING A FACTOR OF SAFETY OF 2.5, THE DESIGN INFILTRATION RATE SHALL BE NO GREATER THAN 0.532 IN/HR



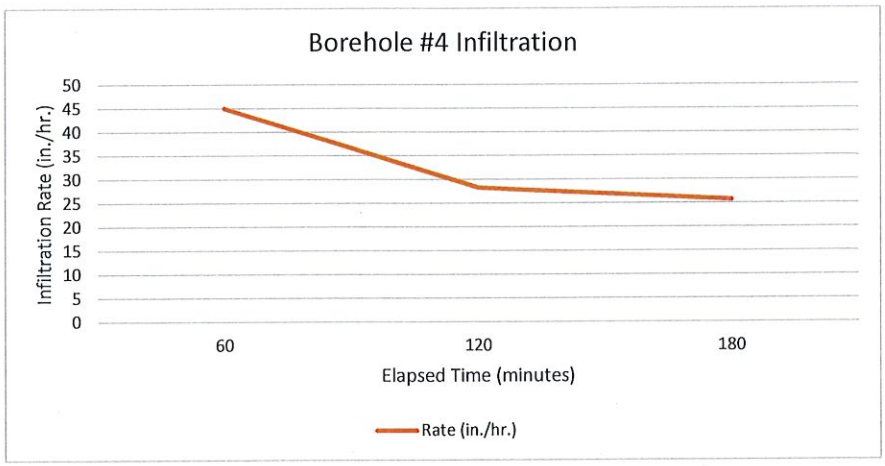
INFILTRATION TEST				
37.5" DEEP INFILTROMETER				
Start Time	End Time	Duration	Infiltration	Rate (inch/hour)
12:25	1:18	53	37.5	42.452
12:25	*12:40*	*0:15*	*10.613*	
12:40	*12:55*	*0:15*	*10.613*	
12:55	*1:10*	*0:15*	*10.613*	
1:10	*1:18*	*0:08*	*5.66*	
1:19	2:24	1:05	37.5	34.6
1:19	*1:34*	*0:15*	*8.654*	
1:34	*1:49*	*0:15*	*8.654*	
1:49	*2:04*	*0:15*	*8.654*	
2:04	*2:19*	*0:15*	*8.654*	
2:19	*2:24*	*0:05*	*2.885*	
2:26	3:26	1:00	31	31
2:26	*2:41*	*0:15*	*7.75*	
2:41	*2:56*	*0:15*	*7.75*	
2:56	*3:11*	*0:15*	*7.75*	
3:11	*3:26*	*0:15*	*7.75*	
Average				**36.02**

*USING A FACTOR OF SAFETY OF 2.5, THE DESIGN INFILTRATION RATE SHALL BE NO GREATER THAN 14.408 IN/HR



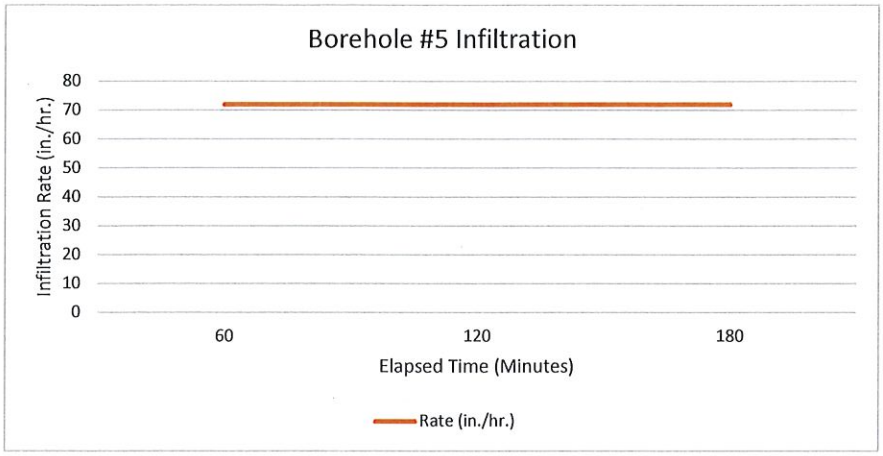
INFILTRATION TEST				
31" DEEP INFILTROMETER				
Start Time	End Time	Duration	Infiltration	Rate (inch/hour)
1:17	2:17	1:00	5.5"	5.5
1:17	*1:32*	*0:15*	*1.375*	
1:32	*1:47*	*0:15*	*1.375*	
1:47	*2:02*	*0:15*	*1.375*	
2:02	*2:17*	*0:15*	*1.375*	
2:22	3:22	1:00	5.70"	5.7
2:22	*2:37*	*0:15*	*1.425*	
2:37	*2:52*	*0:15*	*1.425*	
2:52	*3:07*	*0:15*	*1.425*	
3:07	*3:22*	*0:15*	*1.425*	
3:23	4:23	1:00	5.65"	5.65
3:23	*3:38*	*0:15*	*1.4125*	
3:38	*3:53*	*0:15*	*1.4125*	
3:53	*4:08*	*0:15*	*1.4125*	
4:08	*4:23*	*0:15*	*1.4125*	
Average				**5.616**

*USING A FACTOR OF SAFETY OF 2.5, THE DESIGN INFILTRATION RATE SHALL BE NO GREATER THAN 2.246 IN/HR



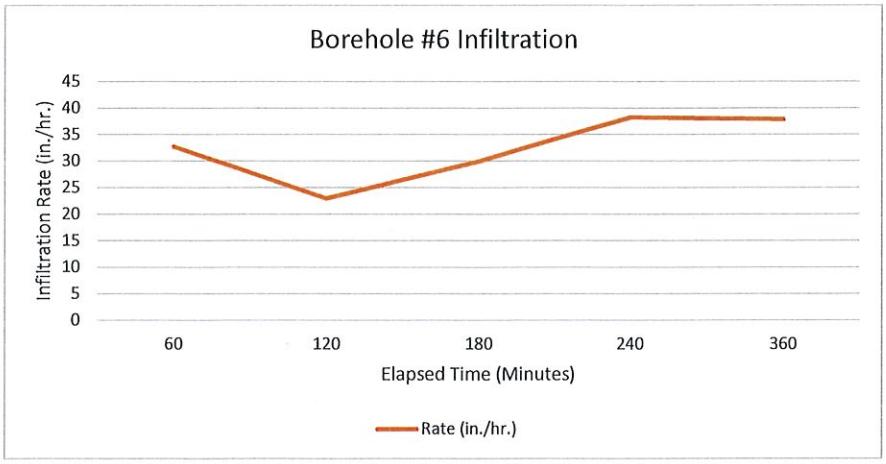
INFILTRATION TEST				
39" DEEP INFILTROMETER				
Time Start	Time End	Duration	Infiltration	Rate (inches/hour)
11:33	11:49	0:16	12"	45
11:33	*11:48*	*0:15*	*11.25*	
11:48	*11:49*	*0:01*	*0.75*	
11:50	12:16	0:26	12.25"	28.27
11:50	*12:05*	*0:15*	*7.067*	
12:05	*12:16*	*0:11*	*5.183*	
12:17	12:45	0:28	12"	25.71
12:17	*12:32*	*0:15*	*6.429*	
12:32	*12:45*	*0:13*	*5.571*	
AVERAGE				**27"**

*USING A FACTOR OF SAFETY OF 2.5, THE DESIGN INFILTRATION RATE SHALL BE NO GREATER THAN 10.8 IN/HR



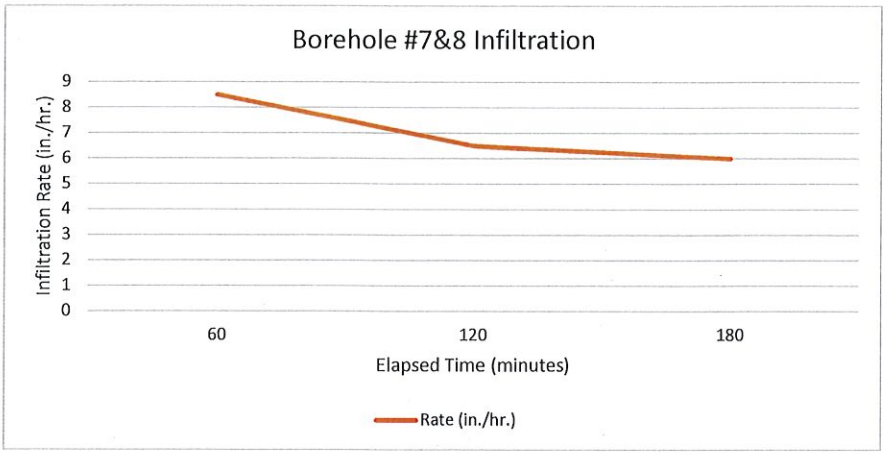
INFILTRATION TEST				
42" DEEP INFILTROMETER				
Time Start	Time End	Duration	Iniltration	Rate (/hr)
11:38	11:53	0:15	>18"	>72"
11:53	12:08	0:15	>18"	>72"
12:09	12:22	0:13	>18"	>72"
Average				**75.67**

*USING A FACTOR OF SAFETY, THE DEIGN INFILTRATION RATE SHALL BE NO GREATER THAN 15 IN/HR



INFILTRATION TEST				
38" DEEP INFILTROMETER				
Start Time	End Time	Duration	Infiltration (inches)	Rate (inch/hour)
11:42	12:04	0:22	12	32.72
11:42	*11:57*	*0:15*	*8.182*	
11:57	*12:04*	*0:07*	*3.818*	
12:04	12:38	0:34	13	22.94
12:04	*12:19*	*0:15*	*5.735*	
12:19	*12:34*	*0:15*	*5.735*	
12:34	*12:38*	*0:04*	*1.529*	
12:39	1:05	0:26	13	30
12:39	*12:54*	*0:15*	*7.5*	
12:54	*1:05*	*0:11*	*5.5*	
1:09	1:29	0:20	12.75	38.25
1:09	*1:24*	*0:15*	*9.563*	
1:24	*1:29*	*0:05*	*3.188*	
1:33	1:52	0:19	12	37.89
1:33	*1:48*	*0:15*	*9.474*	
1:48	*1:52*	*0:04*	*2.526*	
Average				**32.56**

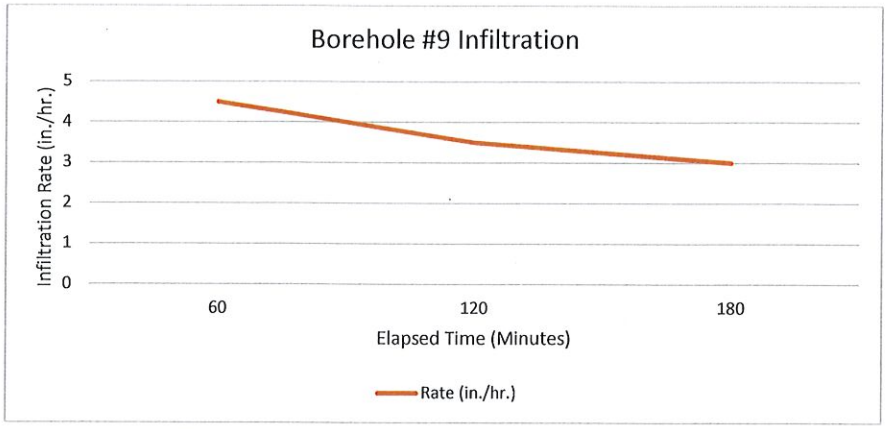
*USING A FACTOR OF SAFETY OF 2.5, THE DESIGN INFILTRATION RATE SHALL BE NO GREATER THAN 15 IN/HR



INFILTRATION TEST				
59" DEEP INFILTROMETER				
Start Time	End Time	Duration	Infiltration (inches)	Rate (/hour)
8:25	9:25	1:00	8.5	8.5
8:25	*8:40*	*0:15*	*2.125*	
8:40	*8:55*	*0:15*	*2.125*	
8:55	*9:10*	*0:15*	*2.125*	
9:10	*9:25*	*0:15*	*2.125*	
9:27	10:27	1:00	6.5	6.5
9:27	*9:42*	*0:15*	*1.625*	
9:42	*9:57*	*0:15*	*1.625*	
9:57	*10:12*	*0:15*	*1.625*	
10:12	*10:27*	*0:15*	*1.625*	
10:28	11:28	1:00	6	6
10:28	*10:43*	*0:15*	*1.5*	
10:43	*10:58*	*0:15*	*1.5*	
10:58	*11:13*	*0:15*	*1.5*	
11:13	*11:28*	*0:15*	*1.5*	
Average				**7**

Please Note* Infiltration test performed approximately equidistant between profiles 7 and 8.

*USING A FACTOR OF SAFETY OF 2.5, THE DESIGN INFILTRATION RATE SHALL BE NO GREATER THAN 2.8 IN/HR



INFILTRATION TEST				
36" DEEP INFILTROMETER				
Start Time	End Time	Duration	Infiltration (inches)	Rate (/hour)
11:42	12:42	1:00	4.5	4.5
11:42	*11:57*	*0:15*	*1.125*	
11:57	*12:12*	*0:15*	*1.125*	
12:12	*12:27*	*0:15*	*1.125*	
12:27	*12:42*	*0:15*	*1.125*	
12:42	1:42	1:00	3.5	3.5
12:42	*12:57*	*0:15*	*0.875*	
12:57	*1:12*	*0:15*	*0.875*	
1:12	*1:27*	*0:15*	*0.875*	
1:27	*1:42*	*0:15*	*0.875*	
1:42	2:42	1:00	3	3
1:42	*1:57*	*0:15*	*0.75*	
1:57	*2:12*	*0:15*	*0.75*	
2:12	*2:27*	*0:15*	*0.75*	
2:27	*2:42*	*0:15*	*0.75*	
Average				**3.66**

*USING A FACTOR OF SAFETY OF 2.5, THE DESIGN INFILTRATION RATE SHALL BE NO GREATER THAN 1.464 IN/HR

APPENDIX 12

PRELIMINARY STORMWATER MANAGEMENT PLANS

PRELIMINARY SEDIMENT AND STORMWATER MANAGEMENT PLAN

CLEANBAY SUSSEX I (HOWARD)

RENEWABLE ELECTRICITY AND NUTRIENT RECOVERY
6 MW POWER GENERATION FACILITY

DAGSBORO HUNDRED 24778 DU PONT BLVD.
TAX PARCEL NUMBER 113-6-123.00
SUSSEX COUNTY, DELAWARE

PARCEL DATA:
TAX MAP #: 133-6.00-123.00
PLUS #: 2017-08-04
CONDITIONAL USE #: 2589
DNR SEDIMENT AND STORMWATER PROGRAM #:
ADDRESS: 24778 DU PONT BLVD, GEORGETOWN, DE.
LATITUDE/LONGITUDE: 38.64204° N 75.35889° W
EXISTING SITE AREA: 19.244 ACRES
PROPOSED SITE AREA: 19.244 ACRES
EXISTING WETLAND AREA: 2.61 ACRES
PROPOSED CONDITION: INDUSTRIAL
PROPOSED DISCHARGE LOCATION: HORSE POND SWAMP DITCH
WATERSHED: COW BRIDGE BRANCH, INDIAN RIVER
PROPOSED TOTAL LIMIT OF DISTURBANCE PER DISCHARGE
LOCATION: 20.07 ACRES

OWNER DATA:
CLEANBAY BIOFUELS LLC.
726 SECOND STREET. UNIT 3B
ANNAPOLIS, MD. 21403
410 514 6488

DESIGNER DATA:
RAUCH INC
106 N HARRISON STREET
EASTON, MD. 21601
410 770 9081

LAND DEVELOPER DATA:
TBC.

REVIEW AGENCY DATA:
SUSSEX CONSERVATION DISTRICT
23818 SHORTLY ROAD
GEORGETOWN DE 19947
302 856 7219

1. THE DNREC SEDIMENT AND STORMWATER MANAGEMENT PROGRAM MUST BE NOTIFIED IN WRITING FIVE (5) DAYS PRIOR TO COMMENCING WITH CONSTRUCTION. FAILURE TO DO SO CONSTITUTES A VIOLATION OF THE APPROVED SEDIMENT AND STORMWATER MANAGEMENT PLAN.
2. REVIEW AND OR APPROVAL OF THE SEDIMENT AND STORMWATER MANAGEMENT PLAN SHALL NOT RELIEVE THE CONTRACTOR FROM HIS OR HER RESPONSIBILITIES FOR COMPLIANCE WITH THE REQUIREMENTS OF THE SEDIMENT AND STORMW ATER REGULATIONS, NOR SHALL IT RELIEVE THE CONTRACTOR FROM ERRORS OR OMISSIONS IN THE APPROVED PLAN.
3. IF THE APPROVED PLAN NEEDS TO BE MODIFIED, ADDITIONAL SEDIMENT AND STORMWATER CONTROL MEASURES MAY BE REQUIRED AS DEEMED NECESSARY BY DNREC.
4. FOLLOWING SOIL DISTURBANCE OR REDISTURBANCE, PERMANENT OR TEMPORARY STABILIZATION SHALL BE COMPLETED FOR ALL PERIMETER SEDIMENT CONTROLS, SOIL STOCKPILES, AND ALL OTHER DISTURBED OR GRADED AREAS ON THE PROJECT SITE WITHIN 14 CALENDAR DAYS UNLESS MORE RESTRICTIVE FEDERAL REQUIREMENTS APPLY.
5. ALL EROSION AND SEDIMENT CONTROL PRACTICES SHALL COMPLY WITH THE DELAWARE EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION.
6. AT ANY TIME A DEWATERING OPERATION IS USED, IT SHALL BE PREVIOUSLY APPROVED BY THE AGENCY CONSTRUCTION SITE REVIEWER FOR A NON-EROSIVE POINT OF DISCHARGE, AND A DEWATERING PERMIT SHALL BE APPROVED BY THE DNREC WELL PERMITTING BRANCH.
7. APPROVED PLANS REMAIN VALID FOR 3 YEARS FROM THE DATE OF APPROVAL.
8. POST CONSTRUCTION VERIFICATION DRAWINGS ARE TO BE SUBMITTED TO THE DISTRICT WITHIN 60-DAYS OF STORMWATER MANAGEMENT FACILITY COMPLETION.
9. APPROVAL OF A SEDIMENT AND STORMWATER PLAN DOES NOT GRANT OR IMPLY A RIGHT TO DISCHARGE STORMWATER RUNOFF. THE OWNER/DEVEWPER IS RESPONSIBLE FOR ACQUIRING ANY AND ALL AGREEMENTS, EASEMENTS, ETC., NECESSARY TO COMPLY WITH STATE DRAINAGE AND OTHER APPLICABLE LAWS.
10. THE NOTICE OF INTENT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY UNDER A NPDES GENERAL PERMIT FOR THIS PROJECT IS# __ . AT ANY TIME THE OWNERSHIP FOR THIS PROJECT CHANGES, A TRANSFER OF AUTHORIZATION OR A CO-PERMITTEE APPLICATION MUST BE SUBMITTED TO DNREC. THE PERMITTEE OF RECORD SHALL NOT BE RELIEVED OF THEIR RESPONSIBILITIES UNTIL A NOTICE OF TERMINATION HAS BEEN PROCESSED BY DNREC.
11. THE OWNER SHALL BE FAMILIAR WITH AND COMPLY WITH ALL ASPECTS OF THE NPDES CONSTRUCTION GENERAL PERMIT ASSOCIATED WITH THE PROJECT, INCLUDING, BUT NOT LIMITED TO, PERFORMING WEEKLY SITE INSPECTIONS DURING CONSTRUCTION AND AFTER RAIN EVENTS, AND MAINTAINING WRITTEN LOGS OF THESE INSPECTIONS.
12. THE CONTRACTOR SHALL AT ALL TIMES PROTECT AGAINST SEDIMENT OF DEBRIS LADEN RUNOFF OR WIND FROM LEAVING THE SIDE. PERIMETER CONTROLS SHALL BE CHECKED DAILY AND ADJUSTED AND/OR REPAIRED TO FULLY CONTAIN AND CONTROL SEDIMENT FROM LEAVING THE SITE. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT HAS REACHED HALF OF THE EFFECTIVE CAPACITY OF THE CONTROL. IN ADDITION, THE CONTRACTOR MAY NEED TO ADJUST OR ALTER MEASURES IN TIMES OF ADVERSE WEATHER CONDITIONS, OR AS DIRECTED BY THE AGENCY SITE REVIEWER.
13. BEFORE ANY EARTHWORK OR EXCAVATION TAKES PLACE, THE CONTRACTOR SHALL CALL MISS UTILITY AT 811 OR 1.800.282.8555 AT LEAST 48 HOURS PRIOR TO CONSTRUCTION, TO HAVE ALL EXISTING UTILITIES MARKED ONSITE.
14. BEST AVAILABLE TECHNOLOGY (BAT) SHALL BE EMPLOYED TO MANAGE TURBID DISCHARGES IN ACCORDANCE WITH REQUIREMENTS OF 7. DEL C. CH 60, REGULATIONS GOVERNING THE CONTROL OF WATER POLLUTION, SECTION 9.1.02, KNOWN AS SPECIAL CONDITIONS FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES AND DEPARTMENT POLICIES, PROCEDURES, AND GUIDANCE.
15. DOCUMENTATION OF SOIL TESTING AND MATERIALS USED FOR TEMPORARY OR PERMANENT STABILIZATION INCLUDING BUT NOT LIMITED TO SOIL TEST RESULTS, SEED TAGS, SOIL AMENDMENT TAGS, ETC, SHALL BE PROVIDED TO THE DEPARTMENT OR DELEGATED AGENCY TO VERIFY THAT THE PERMANENT OR TEMPORARY STABILIZATION HAS BEEN COMPLETED IN ACCORDANCE WITH THE APPROVED PLAN AND THE STANDARDS AND SPECIFICATIONS OF THE DELAWARE EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION.
16. THE DEPARTMENT OF THE DELEGATED AGENCY SHALL HAVE THE DISCRETION TO REQUIRE ADDITIONAL SOIL TESTING AND REAPPLICATION OF PERMANENT OR TEMPORARY STABILIZATION IN ACCORDANCE WITH THE SPECIFICATION PROVIDED WITHIN THE DELAWARE EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION.

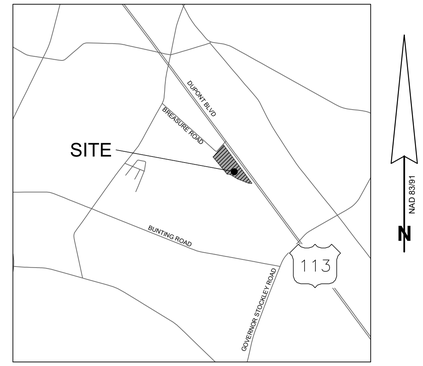
SHEET LIST TABLE

SHEET NUMBER	TITLE
CB006-C-SW000	STORMWATER COVER SHEET
CB006-C-SW001	SWM KEY
CB006-C-SW010	PRE DEVELOPMENT SUBAREA LOD AREA DATA
CB006-C-SW011	PRE CONSTRUCTION SWM PLAN
CB006-C-SW012	CONSTRUCTION SWM PLAN
CB006-C-SW013	BMP CONTRIBUTING AREA PLAN
CB006-C-SW020	CONSTRUCTION SITE DETAILS AND NOTES 1
CB006-C-SW021	CONSTRUCTION SITE DETAILS AND NOTES 2
CB006-C-SW022	CONSTRUCTION SITE DETAILS AND NOTES 3
CB006-C-SW023	CONSTRUCTION SITE DETAILS AND NOTES 4
CB006-C-SW024	CONSTRUCTION SITE DETAILS AND NOTES 5
CB006-C-SW025	CONSTRUCTION SITE DETAILS AND NOTES 6
CB006-C-SW026	CONSTRUCTION SITE SITE DETAILS AND NOTES 7
CB006-C-SW030	POST CONSTRUCTION SITE SWM PLAN 1
CB006-C-SW031	POST CONSTRUCTION SITE SWM PLAN 2
CB006-C-SW032	POST CONSTRUCTION SITE SWM PLAN 3
CB006-C-SW033	POST CONSTRUCTION SITE SWM PLAN 4
CB006-C-SW034	POST CONSTRUCTION SITE SWM PLAN 5
CB006-C-SW040	PIPE SCHEDULE AND DETAILS
CB006-C-SW041	POST CONSTRUCTION SITE DETAILS 1
CB006-C-SW042	POST CONSTRUCTION SITE DETAILS 2
CB006-C-SW043	POST CONSTRUCTION SITE DETAILS 3

NOTES

1. PROPERTY IS LOCATED AT DISTRICT 133, TAX MAP 6.00, PARCEL 123.00
2. DEED REFERENCE: BOOK 7542 PAGE 0
3. PARCEL LOCATED OUTSIDE MUNICIPALITY BOUNDARIES OF THE TOWN OF GEORGETOWN
4. ZONING IS RESIDENTIAL/AGRICULTURAL
5. CURRENT LAND USE IS AGRICULTURAL
6. PROPOSED CONDITIONAL LAND USE -- GENERAL INDUSTRIAL (I -1)
7. PARCEL IS LOCATED IN FLOOD ZONE X (AREA OF MINIMAL FLOOD HAZARD) FIRM PANEL 10005C0325K EFFECTIVE MARCH 16, 2015

MISS UTILITY OF DELMARVA
CALL BEFORE YOU DIG



LOCATION MAP
SCALE: 1" = ½ MILES

OWNER'S CERTIFICATION:

"I, THE UNDERSIGNED, CERTIFY THAT ALL LAND CLEARING, CONSTRUCTION AND DEVELOPMENT SHALL BE DONE PURSUANT TO THE APPROVED PLAN AND THAT RESPONSIBLE PERSONNEL (I.E., BLUE CARD HOLDER) INVOLVED IN THE LAND DISTURBANCE WILL HAVE A CERTIFICATION OF TRAINING PRIOR TO INITIATION OF THE PROJECT, AT A DNREC SPONSORED OR APPROVED TRAINING COURSE FOR THE CONTROL OF EROSION AND SEDIMENT DURING CONSTRUCTION. IN ADDITION, I GRANT THE DNREC SEDIMENT AND STORMW ATER PROGRAM AND/OR THE RELEVANT DELEGATED AGENCY THE RIGHT TO CONDUCT ON-SITE REVIEWS, AND I UNDERSTAND MY RESPONSIBILILLES UNDER THE NPDES CONSTRUCTION GENERAL PERMIT, AS REFERENCED ON THIS COVERSHEET."

TOM SPANGLER — DATE:
CLEANBAY BIOFUELS LLC.
726 SECOND STREET. UNIT 3B
ANNAPOLIS, MD. 21403
410 514 6488

WETLAND CERTIFICATION:

THIS PROPERTY, TAX MAP 113-6.00, HAS BEEN EXAMINED BY RAUCH INC. FOR THE PRESENCE OF WATERS OF THE UNITED STATES, INCLUDING WETLANDS (SECTION 404 AND SECTION 10), STATE SUBAQUEOUS LANDS AND STATE REGULATED WETLANDS AS ESTABLISHED BY THE REVIEWING AGENCIES IN THE FORM OF MANUALS, POLICIES AND PROCEDURES IN PLACE AT THE TIME THAT THE INVESTIGATION WAS CONDUCTED. THE WETLAND INFORMATION CONTAINED IN THIS PLAN SET IS IN ACCORDANCE WITH THIS CRITERIA PER STATE JD #XXXX AND/ OR ARMY CORPS JD #XXXX [AS APPLICABLE].

KYLE KOWALCYZK — DATE:
RAUCH INC
106 N HARRISON STREET
EASTON, MD. 21601
410 770 9081

SITE DESIGNER'S CERTIFICATION:

I HEREBY CERTIFY THAT THIS PLAN HAS BEEN PREPARED UNDER MY SUPERVISION AND TO THE BEST OF MY KNOWLEDGE COMPLIES WITH THE APPLICABLE STATE AND LOCAL REGULATIONS AND ORDINANCES.

ROBERT D RAUCH — DATE:
RAUCH INC
106 N HARRISON STREET
EASTON, MD. 21601
410 770 9081

STORMWATER COVER SHEET

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL NUMBER 113-6.00-123.00

SUSSEX COUNTY, DELAWARE

PREPARED FOR CLEANBAY BIOFUELS LLC.

RAUCH INC
engineering design & development services
office: 410.770.9081 | fax: 410.770.3667
email: design@rauchinc.com | web: www.rauchinc.com
Maryland Office: 106 N. Harrison St. Easton, MD 21601
Virginia Office: 8229 Boone Blvd. Suite 625 - Vienna, VA 22182

Professional Certification
I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Delaware.
License No. 8359
Expiration Date: June 30, 2020

ROBERT D. RAUCH — No. 8359 — PROFESSIONAL ENGINEER — DELAWARE — 10-Jun-19

REVISIONS

REV. #	DATE	DESCRIPTION
A	6/2/19	Revised per county comments 23 April 2019

DATE: 4/MAR/19
SCALE: N/A
DRAWN BY: WJR
DESIGNED BY: WJR
APPROVED BY: X
SHEET NO.: CB006-C-SW000

FOR REVIEW

Z:\CLEANBAY BIOFUELS\CLEANBAY - SUSSEX I (HOWARD)\DESIGN\00-DRAWINGS\00-GENERAL SITE\02-CIVIL\02 - PRODUCTION DRAWINGS\DWG\CB006-C-SW STORMWATER\CB006-C-SW000 COVERSHEET.DWG

LINETYPES

	PROPOSED	EXISTING
TOPOGRAPHY		
MAJOR CONTOURS		
MINOR CONTOURS		
TOP OF SLOPE BREAKLINE		
BOTTOM OF SLOPE BREAKLINE		
TOPOGRAPHY BREAKLINE		
CATCHMENT AREA		
Tc FLOW PATH		
PARCEL BOUNDARY		
PARCEL SETBACK/EASEMENT		
FENCELINE WOOD		
FENCELINE STEEL		X
TREELINE/VEGETATION		
ROADWAY CENTERLINE		
RIGHT OF WAY		ROW
UTILITIES		
OVERHEAD ELECTRIC	OE	OE
UNDERGROUND ELECTRIC	UE	UE
TELEPHONE LINE	T	T
GAS PIPE LINE	G	G
CABLE TV	CTV	CTV
WATER PIPE	W	W
STORMWATER PIPE		
UNDERDRAIN		
SANITARY SEWER	SS	SS
FORCE MAIN SEWER	FM	FM
ENVIRONMENTAL		
WETLAND LINE		
FLOOD PLANE 100/500 YR		
MEAN HIGH WATER		MHW
MEAN LOW WATER		MLW
CRITICAL AREA BOUNDARY		
BUFFER 25'/100'		
SOILS BOUNDARY		
EROSION AND SEDIMENT CONTROL		
SILT FENCE	SF	
SUPER SILT FENCE	SSF	
LIMITS OF DISTURBANCE	LOD	
STOCK PILE AREA	SP	
COMPOST FILLED LOGS	CFL	
SENSITIVE AREA PROTECTION	SAP	

SYMBOLS

	PROPOSED	EXISTING
FLARED END SECTION		
YARD INLET	YI	YI
CURB INLET	CI	CI
CUSTOM INLET	CuI	CuI
NYLOPLAST INLET	N	N
STORM DRAIN MANHOLE	D	D
SANITARY SEWER MANHOLE	S	S
CLEANOUT	C	C
GATE VALVE	GV	GV
SIGN		
WATER METER	WM	WM
FIRE HYDRANT		
WELL	W	W
BOLLARD		
ELECTRIC TRANSFORMER	ELEC	ELEC
TELEPHONE PEDESTAL	T	T
UTILITY POLE		
GUY WIRE		
CONIFEROUS TREE		
DECIDUOUS TREE		
SPOT ELEVATION	X39.01	X 39.00
LAND SLOPE	−0.41%	−0.41%
BENCHMARK	ELEV: 123	
BOREHOLE/MONITORING WELL		

HATCHES

- ASPHALT
- GRAVEL
- CONCRETE
- RIPRAP/ROCK
- ESD/LID/BMP BED BOTTOM
- PRETREATMENT FILTER STRIP
- ROOFTOP/NON-ROOFTOP DISCONNECT
- BRICK PAVING
- EXISTING,TO BE DEMOLISHED
- STEEP SLOPES
- IMPERVIOUS AREA
- WOODED/FOREST AREA
- STORMWATER ACCES LANE

ABBREVIATIONS

ADA	AMERICANS WITH DISABILITIES ACT
AGIP	AT GRADE INLET PROTECTION
@	AT
BC	BACK OF CURB
BM	BENCHMARK
BRL	BUILDING RESTRICTION LINE
CES	CONCRETE END SECTION
C/O	CLEAN OUT
CHRD	CHORD
CI	CURB INLET
CIP	CURB INLET PROTECTION
CL	CENERLINE
CMP	CORRUGATED METAL PIPE
CuI	CUSTOM INLET
CY	CUBIC YARD
DEL DOT	DELAWARE DEPARTMENT OF TRANSPORTATION
DI	DUCTILE IRON
E	EAST
EL/ELEV	ELEVATION
EP	EDGE OF PAVE
ESC	EROSION AND SEDIMENT CONTROL
EX	EXISTING
FES	FLARED END SECTION
FFE	FINISHED FLOOR ELEVATION
FH	FIRE HYDRANT
FL	FLOW LINE
FT	FOOT
GFA	GROSS FLOOR AREA
GPD	GALLONS PER DAY
GV	GATE VALVE
HDPE	HIGH DENSITY POLYETHYLENE
I	INLET
INV	INVERT
KV	KILOVOLTS
L	ARC LENGTH
LF	LINEAR FEET
LOD	LIMITS OF DISTURBED AREA
LT	LEFT
MAX	MAXIMUM
MBR	MICRO-BIORETENTION
MD	MARYLAND
MEP	MECHANICAL, ELECTRICAL, AND PLUMBING
MH	MANHOLE
MHW	MEAN HIGH WATER
MIN	MINIMUM
MLW	MEAN LOW WATER
MSHA	MARYLAND STATE HIGHWAY ADMINISTRATION
MUTCD	MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES
N	NORTH
NO	NUMBER
PC	POINT OF CURVATURE
PE	POLYETHYLENE
PERF	PERFORATED
PR	PROPOSED
PT	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
Q	DISCHARGE
R	RADIUS
RCP	REINFORCED CONCRETE PIPE
RCN	RUNOFF CURVE NUMBER
ROW	RIGHT-OF-WAY
RT	RIGHT
S	SOUTH
SCE	STABILIZED CONSTRUCTION ENTRANCE
SD	STORM DRAIN
SDMH	STORM DRAIN MANHOLE
Sf	FRICTION SLOPE
SF	SILT FENCE
SHA	STATE HIGHWAY ADMINISTRATION
SIP	STANDARD INLET PROTECTION
SQ	SQUARE
SS	SANITARY SEWER
SSF	SUPER SILT FENCE
SSMH	SANITARY SEWER MANHOLE
STA	STATION
STD	STANDARD
SWM	STORM WATER MANAGEMENT
TAN	TANGENT
TB	THRUST BLOCK
TBR	TO BE REMOVED
TC	TOP OF CURB
Tc	TIME OF CONCENTRATION
TP	TAX PARCEL
TYP	TYPICAL
UE	UNDERGROUND ELECTRIC
UL	UNDERGROUND LIGHT CABLE
UT	UNDERGROUND TELEPHONE
V	VELOCITY
W	WEST
W/	WITH

SWM KEY

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL NUMBER 113-6.00-123.00

SUSSEX COUNTY, DELAWARE

PREPARED FOR CLEANBAY BIOFUELS LLC.

RAUCH inc.
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ROBERT D. RAUCH LICENSE No. 8359 DELAWARE PROFESSIONAL ENGINEER

10-Jun-19

Professional Certification
I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Delaware.
License No. 8359
Expiration Date: June 30, 2020

REVISIONS

REV. #	DATE	DESCRIPTION
A	5/31/19	Revised per county comments 23 April 2019

DATE:	4/MAR/2019
SCALE:	N/A
DRAWN BY:	WJR
DESIGNED BY:	WJR
APPROVED BY:	X
SHEET NO.:	CB006-C-SW001

FOR REVIEW

TIME OF CONCENTRATION FOR EXISITNG CATCHMENTS									
	SEGMENT	FLOW TYPE	LENGTH (FT)	SLOPE	2-YR 24-HR RAINFALL (INCH)	SURFACE TYPE	MANNING'S NO	TIME (HOURS)	TOTAL TIME FOR CATCHMENT (HOURS)
EX-1	1	SCS SHEET FLOW	100.1	1.00%	3.4	-	0.17	0.232	-
	2	SCS SHALLOW CONCENTRATED FLOW	529.7	0.53%	-	UNPAVED	-	0.125	-
	3	SCS SHALLOW CONCENTRATED FLOW	766.7	0.61%		GRASSED WATERWAY	-	0.182	0.539
EX-2	1	SCS SHEET FLOW	100.1	0.98%	3.4	-	0.17	0.234	-
	2	SCS SHALLOW CONCENTRATED FLOW	609.2	0.51%	-	UNPAVED	-	0.147	-
	3	SCS SHALLOW CONCENTRATED FLOW	392.5	1.09%	-	UNPAVED	-	0.065	0.446
EX-3	1	SCS SHEET FLOW	100	0.71%	3.4	-	0.17	0.265	-
	2	SCS SHALLOW CONCENTRATED FLOW	1116.7	0.49%	-	UNPAVED	-	0.274	0.539
EX-4	1	SCS SHEET FLOW	38.5	1.92%	3.4	-	0.170	0.083	-
	2	SCS SHALLOW CONCENTRATED FLOW	254.7	0.57%	-	UNPAVED	-	0.058	-
	3	SCS SHALLOW CONCENTRATED FLOW	846.3	0.22%	-	GRASSED WATERWAY	-	0.333	-
	4	SCS SHALLOW CONCENTRATED FLOW	909.4	0.56%	-	GRASSED WATERWAY	-	0.224	0.698

Pre Development										
	Row Crops HSG A	Row Crops HSG D	Wooded Area HSG D	Impervious Area HSG A	Impervious Area HSG D	Pervious Area HSG A	Pervious Area HSG D	Total Area	TC (hours)	RC
EX-1	2.179	0.000	0.000	0.169	0.000	1.125	0.102	3.575	0.54	60
EX-2	5.885	0.069	0.000	0.000	0.000	0.072	0.004	6.030	0.45	67
EX-3	8.313	1.041	0.133	0.039	0.000	0.000	0.000	9.526	0.54	70
EX-4	1.998	0.059	0.000	0.964	0.050	0.108	0.000	3.179	0.70	76
								22.31		

SOILS DATA					
SYMBOL	SOIL SERIES	SLOPE	HYDRIC	HIGHLY ERODIBLE	HYDRO. CLASS.
DnA	Downer loamy sand	0-2%	NO	NO	A
LO	Longmarsh and Indiantown soils	0-2%	YES	NO	B/D

0 60 120 Feet

PRE DEVELOPMENT SUBAREA LOD DATA

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL 113-6.00-123.00

SUSSEX COUNTY, DELAWARE

PREPARED FOR CLEANBAY BIOFUELS LLC.

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Professional Certification
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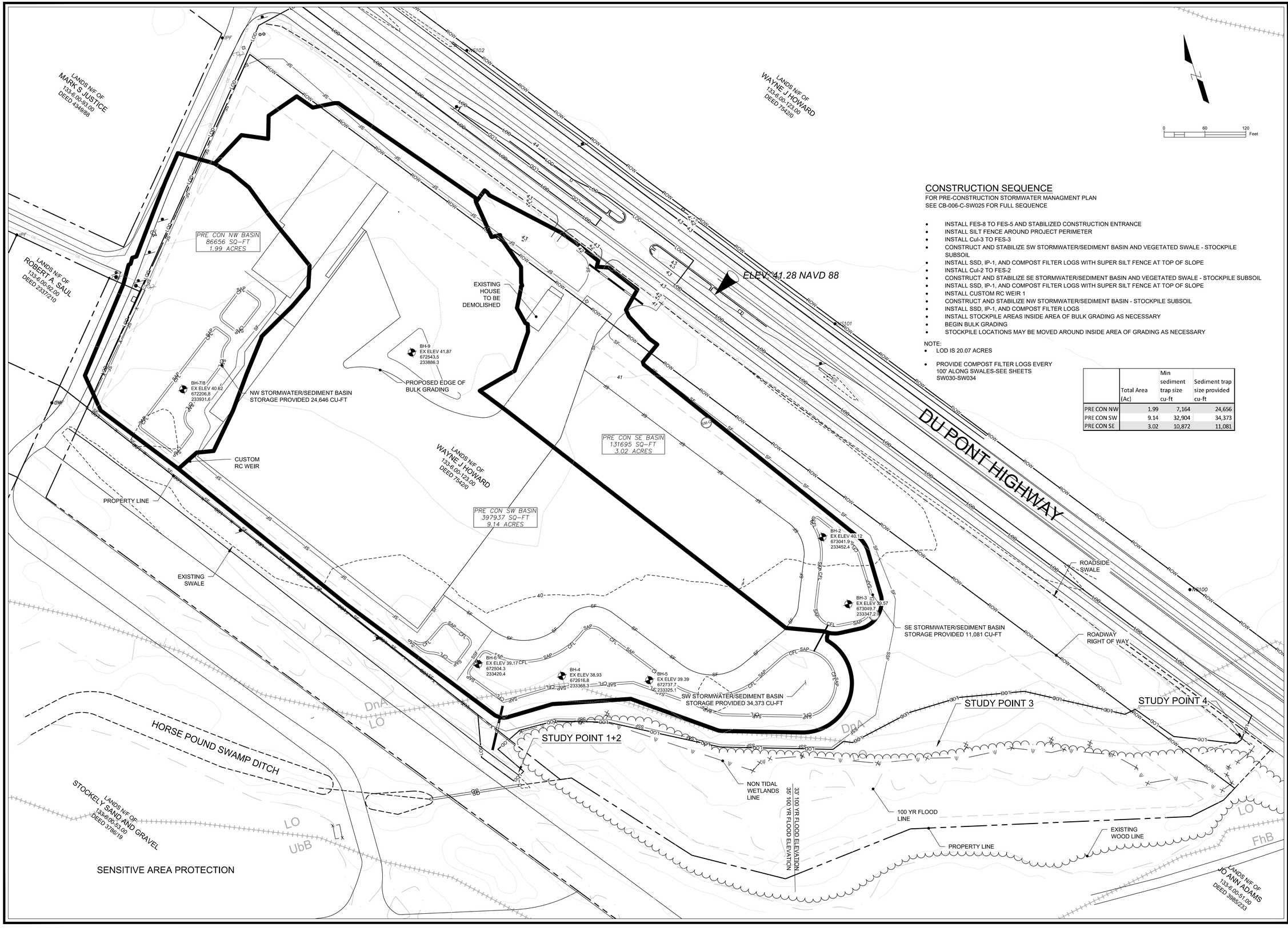
License No. 8359
Expiration Date: June 30, 2020

REVISIONS

REV. #	DATE	DESCRIPTION
1	6/3/19	Revised per county comments 23 April 2014

DATE:	15/FEB/2019
SCALE:	AS SHOWN
DRAWN BY:	WJR
DESIGNED BY:	WJR
APPROVED BY:	X
SHEET NO.:	CB006-C-SW010

FOR REVIEW



CONSTRUCTION SEQUENCE

FOR PRE-CONSTRUCTION STORMWATER MANAGMENT PLAN
SEE CB-006-C-SW025 FOR FULL SEQUENCE

- INSTALL FES-8 TO FES-5 AND STABILIZED CONSTRUCTION ENTRANCE
- INSTALL SILT FENCE AROUND PROJECT PERIMETER
- INSTALL Cul-3 TO FES-3
- CONSTRUCT AND STABILIZE SW STORMWATER/SEDIMENT BASIN AND VEGETATED SWALE - STOCKPILE SUBSOIL
- INSTALL SSD, IP-1, AND COMPOST FILTER LOGS WITH SUPER SILT FENCE AT TOP OF SLOPE
- INSTALL Cul-2 TO FES-2
- CONSTRUCT AND STABILIZE SE STORMWATER/SEDIMENT BASIN AND VEGETATED SWALE - STOCKPILE SUBSOIL
- INSTALL SSD, IP-1, AND COMPOST FILTER LOGS WITH SUPER SILT FENCE AT TOP OF SLOPE
- INSTALL CUSTOM RC WEIR 1
- CONSTRUCT AND STABILIZE NW STORMWATER/SEDIMENT BASIN - STOCKPILE SUBSOIL
- INSTALL SSD, IP-1, AND COMPOST FILTER LOGS
- INSTALL STOCKPILE AREAS INSIDE AREA OF BULK GRADING AS NECESSARY
- BEGIN BULK GRADING
- STOCKPILE LOCATIONS MAY BE MOVED AROUND INSIDE AREA OF GRADING AS NECESSARY

NOTE:
- LOD IS 20.07 ACRES
- PROVIDE COMPOST FILTER LOGS EVERY 100' ALONG SWALES-SEE SHEETS SW030-SW034

	Total Area (Ac)	Min sediment trap size cu-ft	Sediment trap size provided cu-ft
PRE CON NW	1.99	7,164	24,656
PRE CON SW	9.14	32,904	34,373
PRE CON SE	3.02	10,872	11,081

PRE-CONSTRUCTION SWM PLAN

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL 113-6.00-123.00

SUSSEX COUNTY, DELAWARE

PREPARED FOR CLEANBAY BIOFUELS LLC.

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ROBERT D. RAUCH II No. 8359 DELAWARE PROFESSIONAL ENGINEER 10-Jun-19

Professional Certification
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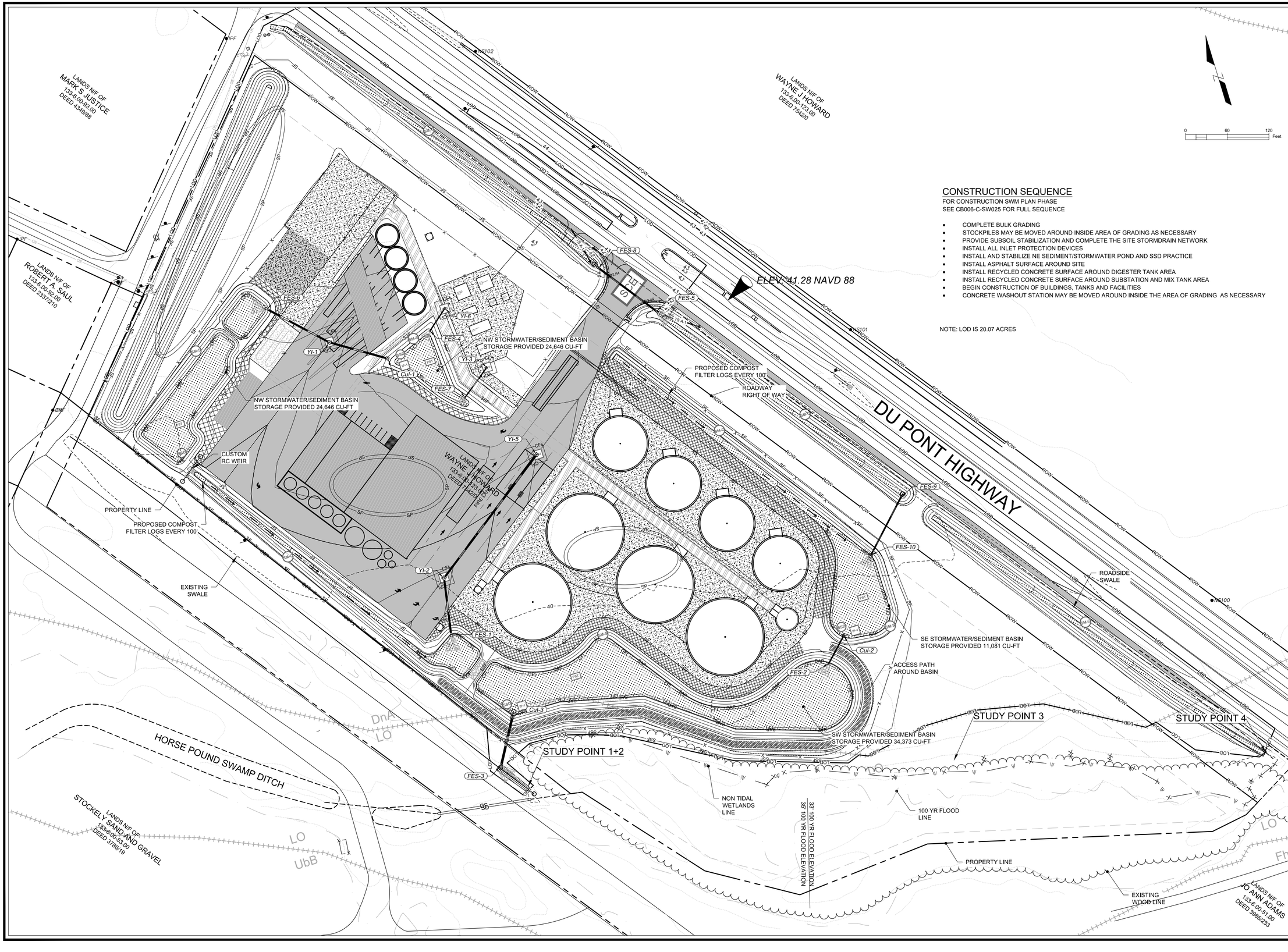
License No. 8359
Expiration Date: June 30, 2020

REVISIONS

REV. #	DATE	DESCRIPTION
A	6/2019	Revised per county comments 23 April 2019

DATE: 15/FEB/2019
SCALE: AS SHOWN
DRAWN BY: WJR
DESIGNED BY: WJR
APPROVED BY: X
SHEET NO.: CB006-C-SW011

FOR REVIEW



CONSTRUCTION SEQUENCE

FOR CONSTRUCTION SWM PLAN PHASE
SEE CB006-C-SW025 FOR FULL SEQUENCE

- COMPLETE BULK GRADING
- STOCKPILES MAY BE MOVED AROUND INSIDE AREA OF GRADING AS NECESSARY
- PROVIDE SUBSOIL STABILIZATION AND COMPLETE THE SITE STORMDRAIN NETWORK
- INSTALL ALL INLET PROTECTION DEVICES
- INSTALL AND STABILIZE NE SEDIMENT/STORMWATER POND AND SSD PRACTICE
- INSTALL ASPHALT SURFACE AROUND SITE
- INSTALL RECYCLED CONCRETE SURFACE AROUND DIGESTER TANK AREA
- INSTALL RECYCLED CONCRETE SURFACE AROUND SUBSTATION AND MIX TANK AREA
- BEGIN CONSTRUCTION OF BUILDINGS, TANKS AND FACILITIES
- CONCRETE WASHOUT STATION MAY BE MOVED AROUND INSIDE THE AREA OF GRADING AS NECESSARY

NOTE: LOD IS 20.07 ACRES

CONSTRUCTION SWM PLAN

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL 113-6.00-123.00

SUSSEX COUNTY, DELAWARE

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ROBERT D. RAUCH II — No. 8359 — DELAWARE — PROFESSIONAL ENGINEER

10-Jun-19

REVISIONS

REV. #	DATE	DESCRIPTION
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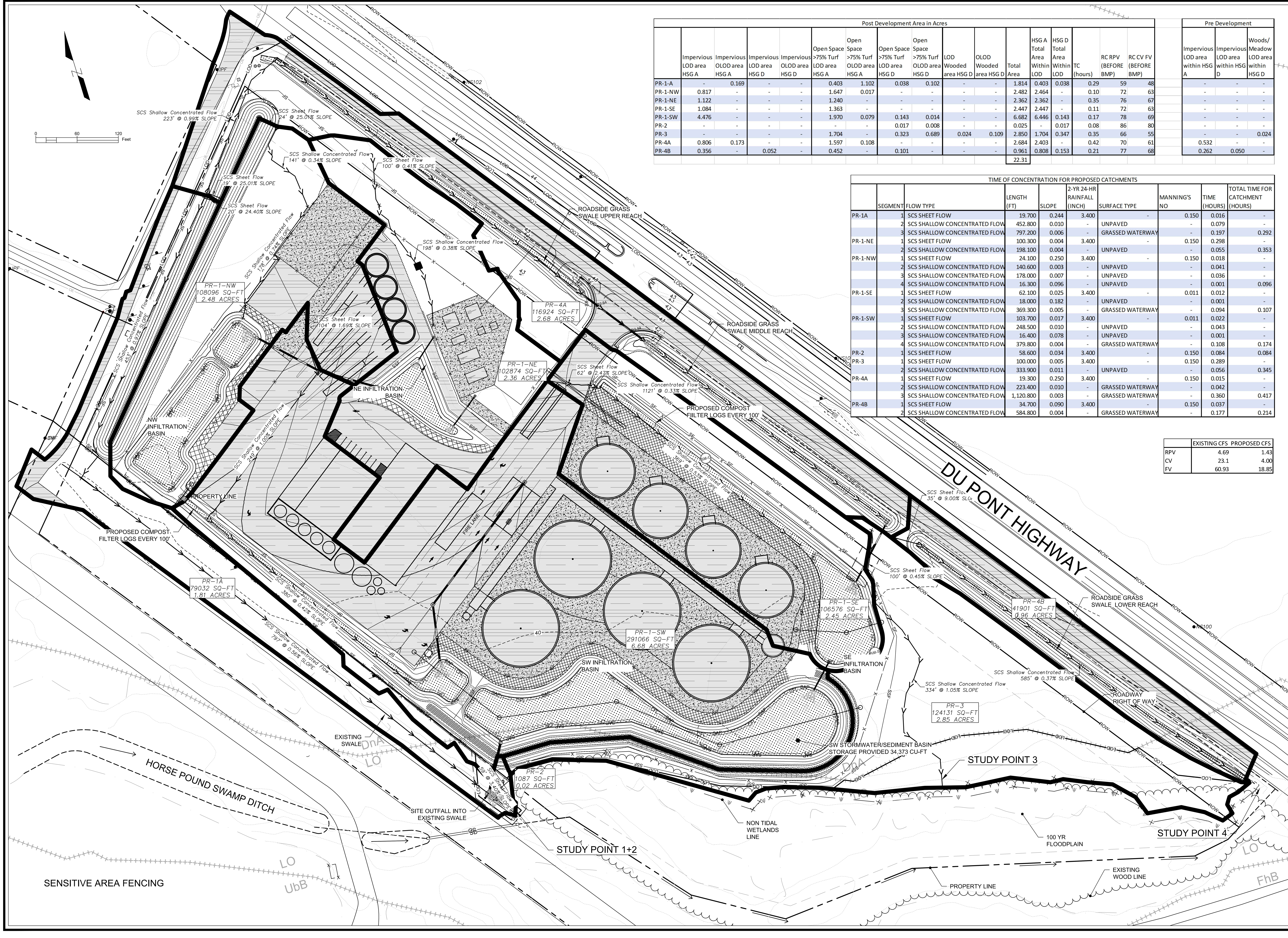
FOR REVIEW



Post Development Area in Acres															
	Impervious LOD area HSG A	Impervious OLOD area HSG A	Impervious LOD area HSG D	Impervious OLOD area HSG D	Open Space >75% Turf LOD area HSG A	Open Space >75% Turf OLOD area HSG A	Open Space >75% Turf LOD area HSG D	Open Space >75% Turf OLOD area HSG D	LOD Wooded area HSG D	OLOD Wooded area HSG D	Total Area	HSG A Total Area Within LOD	HSG D Total Area Within LOD	TC (hours)	RC RPV (BEFORE BMP)	RC CV FV (BEFORE BMP)
PR-1-A	-	0.169	-	-	0.403	1.102	0.038	0.102	-	-	1.814	0.403	0.038	0.29	59	48
PR-1-NW	0.817	-	-	-	1.647	0.017	-	-	-	-	2.482	2.464	-	0.10	72	63
PR-1-NE	1.122	-	-	-	1.240	-	-	-	-	-	2.362	2.362	-	0.35	76	67
PR-1-SE	1.084	-	-	-	1.363	-	-	-	-	-	2.447	2.447	-	0.11	72	63
PR-1-SW	4.476	-	-	-	1.970	0.079	0.143	0.014	-	-	6.682	6.446	0.143	0.17	78	69
PR-2	-	-	-	-	-	-	0.017	0.008	-	-	0.025	-	0.017	0.08	86	80
PR-3	-	-	-	-	1.704	-	0.323	0.689	0.024	0.109	2.850	1.704	0.347	0.35	66	55
PR-4A	0.806	0.173	-	-	1.597	0.108	-	-	-	-	2.684	2.403	-	0.42	70	61
PR-4B	0.356	-	0.052	-	0.452	-	0.101	-	-	-	0.961	0.808	0.153	0.21	77	68
											22.31					

Pre Development		
Impervious LOD area within HSG A	Impervious LOD area within HSG D	Woods/ Meadow LOD area within HSG D
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	0.024
0.532	-	-
0.262	0.050	-

TIME OF CONCENTRATION FOR PROPOSED CATCHMENTS									
	SEGMENT	FLOW TYPE	LENGTH (FT)	SLOPE	2-YR 24-HR RAINFALL (INCH)	SURFACE TYPE	MANNING'S NO	TIME (HOURS)	TOTAL TIME FOR CATCHMENT (HOURS)
PR-1A	1	SCS SHEET FLOW	19.700	0.244	3.400	-	0.150	0.016	-
	2	SCS SHALLOW CONCENTRATED FLOW	452.800	0.010	-	UNPAVED	-	0.079	-
	3	SCS SHALLOW CONCENTRATED FLOW	797.200	0.006	-	GRASSED WATERWAY	-	0.197	0.292
PR-1-NE	1	SCS SHEET FLOW	100.300	0.004	3.400	-	0.150	0.298	-
	2	SCS SHALLOW CONCENTRATED FLOW	198.100	0.004	-	UNPAVED	-	0.055	0.353
PR-1-NW	1	SCS SHEET FLOW	24.100	0.250	3.400	-	0.150	0.018	-
	2	SCS SHALLOW CONCENTRATED FLOW	140.600	0.003	-	UNPAVED	-	0.041	-
	3	SCS SHALLOW CONCENTRATED FLOW	178.000	0.007	-	UNPAVED	-	0.036	-
	4	SCS SHALLOW CONCENTRATED FLOW	16.300	0.096	-	UNPAVED	-	0.001	0.096
PR-1-SE	1	SCS SHEET FLOW	62.100	0.025	3.400	-	0.011	0.012	-
	2	SCS SHALLOW CONCENTRATED FLOW	18.000	0.182	-	UNPAVED	-	0.001	-
	3	SCS SHALLOW CONCENTRATED FLOW	369.300	0.005	-	GRASSED WATERWAY	-	0.094	0.107
PR-1-SW	1	SCS SHEET FLOW	103.700	0.017	3.400	-	0.011	0.022	-
	2	SCS SHALLOW CONCENTRATED FLOW	248.500	0.010	-	UNPAVED	-	0.043	-
	3	SCS SHALLOW CONCENTRATED FLOW	16.400	0.078	-	UNPAVED	-	0.001	-
	4	SCS SHALLOW CONCENTRATED FLOW	379.800	0.004	-	GRASSED WATERWAY	-	0.108	0.174
PR-2	1	SCS SHEET FLOW	58.600	0.034	3.400	-	0.150	0.084	0.084
PR-3	1	SCS SHEET FLOW	100.000	0.005	3.400	-	0.150	0.289	-
	2	SCS SHALLOW CONCENTRATED FLOW	333.900	0.011	-	UNPAVED	-	0.056	0.345
PR-4A	1	SCS SHEET FLOW	19.300	0.250	3.400	-	0.150	0.015	-
	2	SCS SHALLOW CONCENTRATED FLOW	223.400	0.010	-	GRASSED WATERWAY	-	0.042	-
	3	SCS SHALLOW CONCENTRATED FLOW	1,120.800	0.003	-	GRASSED WATERWAY	-	0.360	0.417
PR-4B	1	SCS SHEET FLOW	34.700	0.090	3.400	-	0.150	0.037	-
	2	SCS SHALLOW CONCENTRATED FLOW	584.800	0.004	-	GRASSED WATERWAY	-	0.177	0.214

	EXISTING CFS	PROPOSED CFS
RPV	4.69	1.43
CV	23.1	4.00
FV	60.93	18.85

BMP CONTRIBUTING AREA PLAN

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL 113-6.00-123.00
SUSSEX COUNTY, DELAWARE
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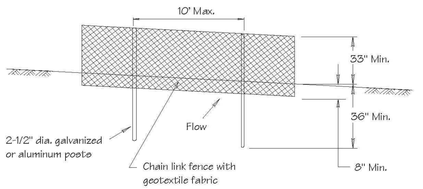
A	6/3/19	Revised per county comments 23 April 2019

DATE: 15/FEB/2019
SCALE: AS SHOWN
DRAWN BY: WJR
DESIGNED BY: WJR
APPROVED BY: X
SHEET NO.: CB006-C-SW013

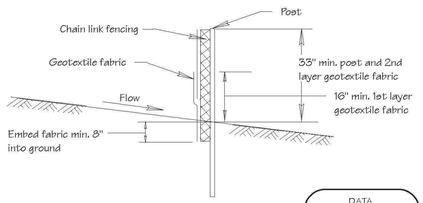
FOR REVIEW

Standard Detail & Specifications

Super Silt Fence



Perspective



Section

DATA
Max. controlled slope

Source:	Symbol:	Detail No.
Adapted from MD Stds. & Specs. for ESC	SSF	DE-ESC-3.1.2.3 Sheet 1 of 2 Effective FEB 2019

Standard Detail & Specifications

Super Silt Fence

Construction Notes:

1. The poles do not need to be set in concrete.
2. Chain link fence shall be fastened securely to the fence posts with wire ties or staples.
3. Geotextile fabric shall be fastened securely to the chain link fence with ties spaced every 24" at the top and mid section.
4. Geotextile fabric shall be embedded a minimum of 8" into the ground.
5. When two sections of geotextile fabric adjoin each other, they shall be overlapped by 6" and folded.
6. Maintenance shall be performed as needed and silt buildups removed when "bulges" develop in the silt fence.

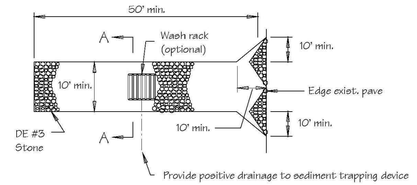
Materials:

1. Fencing: Fencing shall be 42 inches in height and constructed in accordance with the latest Delaware Department of Transportation (Del-DOT) Specifications for Chain Link Fencing (Section 727). The Del-DOT specification for a 6 foot fence shall be used, substituting 42 inch fabric and 6 foot length posts.
2. Geosynthetic Fabric: Type GD-I

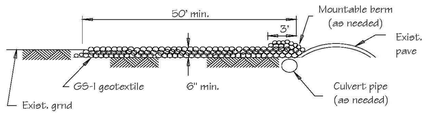
Source:	Symbol:	Detail No.
Adapted from MD Stds. & Specs. for ESC	SSF	DE-ESC-3.1.2.3 Sheet 2 of 2 Effective FEB 2019

Standard Detail & Specifications

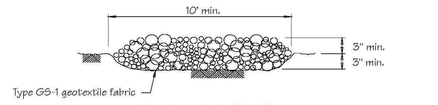
Stabilized Construct. Entrance



Plan



Profile

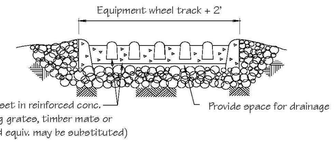


Section A-A (Std.)

Source:	Symbol:	Detail No.
Adapted from VA ESC Handbook	SCE	DE-ESC-3.4.7 Sheet 1 of 2 Effective FEB 2019

Standard Detail & Specifications

Stabilized Construct. Entrance



Section A-A (Opt.)

Construction Notes:

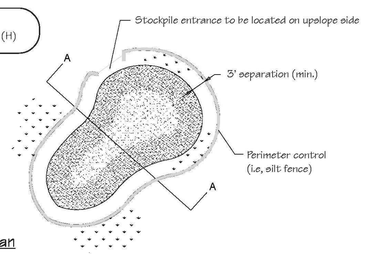
1. Stone size - Use DE #3 stone.
2. Length - As required, but not less than 50 feet (except on a single residence lot where a 30 foot minimum length would apply).
3. Thickness - Not less than size (6) inches.
4. Width - Ten (10) foot minimum, but not less than the full width at points where ingress or egress occurs.
5. Geotextile - Type GS-I; placed over the entire area prior to placing of stone.
6. Surface Water - All surface water flowing or diverted toward construction entrances shall be piped across the entrance. If piping is impractical, a mountable berm with 5:1 slopes will be permitted.
7. Maintenance - The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public rights-of-way must be removed immediately.
8. Washing - Vehicle wheels shall be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with stone and which drains into an approved sediment trapping device.
9. Inspection - Periodic inspection and needed maintenance shall be provided after each rain.

Source:	Symbol:	Detail No.
Adapted from VA ESC Handbook	SCE	DE-ESC-3.4.7 Sheet 2 of 2 Effective FEB 2019

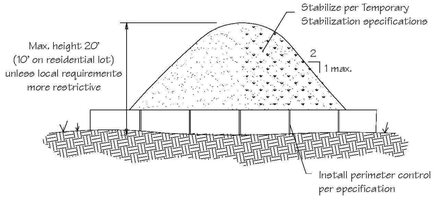
Standard Detail & Specifications

Soil Stockpile

DATA
Max. height (H)



Plan



Section A-A

Source:	Symbol:	Detail No.
Adapted from Colorado Urban Storm Drainage Criteria Manual, Vol 3	SP	DE-ESC-3.7.3 Sheet 1 of 2 Effective FEB 2019

Standard Detail & Specifications

Soil Stockpile

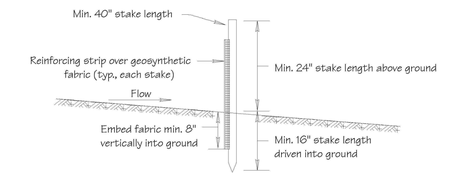
Construction Notes:

1. Locate stockpiles so that they are 50 feet from any storm drain inlet, open channel, wetland or waterbody. Redirect any concentrated flow around the stockpile using an approved erosion and sediment control measure.
2. Secure the perimeter of the stockpile with an approved erosion and sediment control perimeter device.
3. If stockpile is to remain inactive for more than 14 calendar days, the stockpile must be vegetated. Follow the temporary vegetation specifications. The vegetation chosen shall last the duration of the stockpile; the stockpile shall be restabilized if the temporary vegetation dies or erosion results.

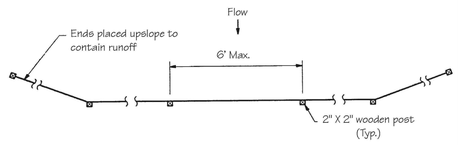
Source:	Symbol:	Detail No.
Adapted from Colorado Urban Storm Drainage Criteria Manual, Vol 3	SP	DE-ESC-3.7.3 Sheet 2 of 2 Effective FEB 2019

Standard Detail & Specifications

Silt Fence



Section



Plan

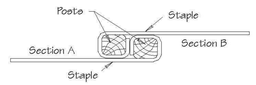
DATA
Max. controlled slope

Source:	Symbol:	Detail No.
Adapted form MD Stds. & Specs. for ESC	SF	DE-ESC-3.1.2.1 Sheet 1 of 2 Effective FEB 2019

Standard Detail & Specifications

Silt Fence

Construction Detail



Top

Method for joining continuous sections

Construction Notes:

1. Geosynthetic fabric to be fastened securely to fence posts with wire ties or staples.
2. When two sections of filter cloth adjoin each other they shall be overlapped by six inches and folded.
3. Maintenance shall be performed as needed and material removed when "bulges" develop in the silt fence.

Materials:

1. Stakes: Steel (either T or U) or 2" x 2" hardwood
2. Geosynthetic Fabric: Type GD-I
3. Reinforcing strip: Wooden lath or plastic strip

Source:	Symbol:	Detail No.
Adapted from MD Stds. & Specs. for ESC	SF	DE-ESC-3.1.2.1 Sheet 2 of 2 Effective FEB 2019

CONSTRUCTION SITE DETAILS AND NOTES 1

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL NUMBER 113-6.00-123.00

SUSSEX COUNTY, DELAWARE

PREPARED FOR CLEANBAY BIOFUELS LLC.

RAUCH INC.
engineering design & development services
office: 410.770.9281 | fax: 410.770.3667
email: design@raucheng.com | web: www.raucheng.com
Maryland Office: 8 Market Place, Baltimore, MD 21202
Virginia Office: 8229 Boone Blvd, Suite 625 - Vienna, VA 22182

Professional Certification
I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Delaware.
License No. 8359
Expiration Date: June 30, 2020

REVISIONS

REV. #	DATE	DESCRIPTION
A	6/3/19	Revised per county comments 23 April 2019

DATE: 26/FEB/19
SCALE: AS SHOWN
DRAWN BY: WJR
DESIGNED BY: WJR
APPROVED BY: X
SHEET NO.: CB006-C-SW020

FOR REVIEW

Standard Detail & Specifications
Pipe Outlet Sediment Trap

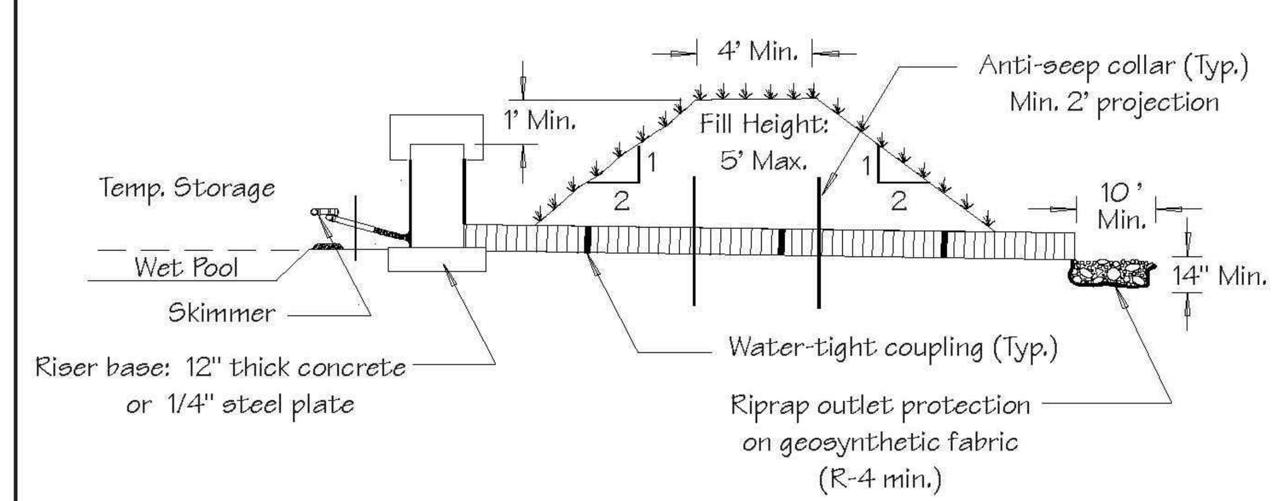
Construction Notes

1. The area under embankment shall be cleared, grubbed and stripped of any vegetation and root mat. The pool area shall be cleared.
2. The fill material for the embankment shall be free of roots or other woody vegetation as well as oversized stones, rocks, organic material, or other objectionable material. The embankment shall be compacted by traversing with equipment while it is being constructed.
3. All fill slopes shall be 2:1 or flatter; cut slopes 1:1 or flatter.
4. All pipe connections shall be watertight.
5. Fill material around the pipe spillway shall be hand compacted in four (4) inch layers. A minimum of two (2) feet of hand-compacted backfill shall be placed over the pipe spillway before crossing it with construction equipment.
6. The riser shall be anchored with either a concrete base or steel plate base to prevent flotation. Concrete bases shall be 12 inches thick with the riser embedded nine (9) inches. Steel plate bases will be 1/4 inch minimum thickness attached to the riser by a continuous weld around the bottom to form a watertight connection. The plate shall have 2.5 feet of stone, gravel or tamped earth placed on it.
7. Volume of temporary storage shall be 3,600 cubic feet per acre of drainage area. Wet pool storage should be provided whenever practicable, but shall not be used to fulfill the temporary storage volume requirement.
8. Sediment shall be removed and trap restored to its original dimensions when the sediment has accumulated to 1/2 the design depth of the trap. Removed sediment shall be deposited in a suitable area and in such a manner that it will not erode.
9. The structure shall be inspected after each rain and repairs made as needed.
10. **A skimmer dewatering device shall be considered an integral part of the trap. Any additional dewatering operations for the wet pool shall be conducted in accordance with any and all regulatory requirements.**
11. Construction operations shall be carried out in such a manner that erosion and water pollution are minimized. Disturbed areas shall be stabilized in accordance with the Standards and Specifications for Vegetative Stabilization contained in this Handbook.
12. The structure shall be removed and area stabilized when the drainage area has been properly stabilized.

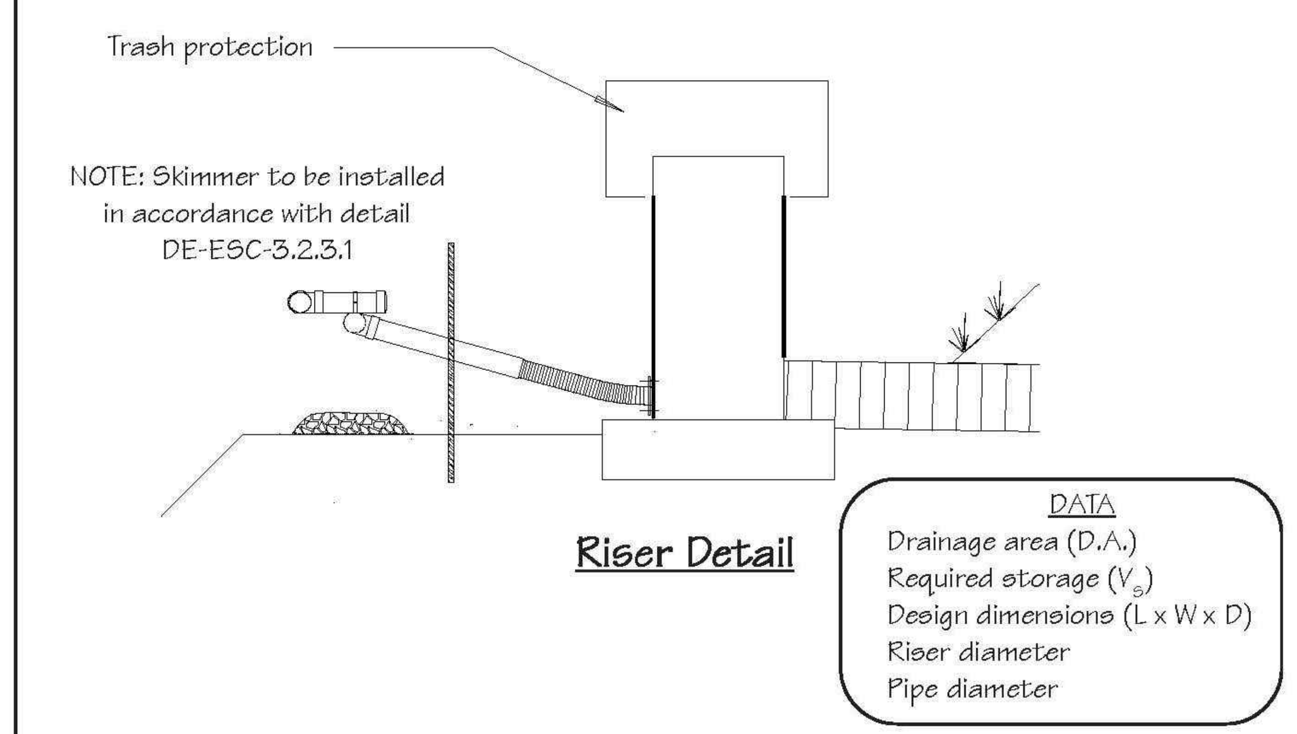
MAXIMUM DRAINAGE AREA: 5 ACRES

Source:	Symbol:	Detail No.
DE ESC Handbook	PST	DE-ESC-3.1.3.1 Sheet 2 of 2 Effective FEB 2019

Standard Detail & Specifications
Pipe Outlet Sediment Trap



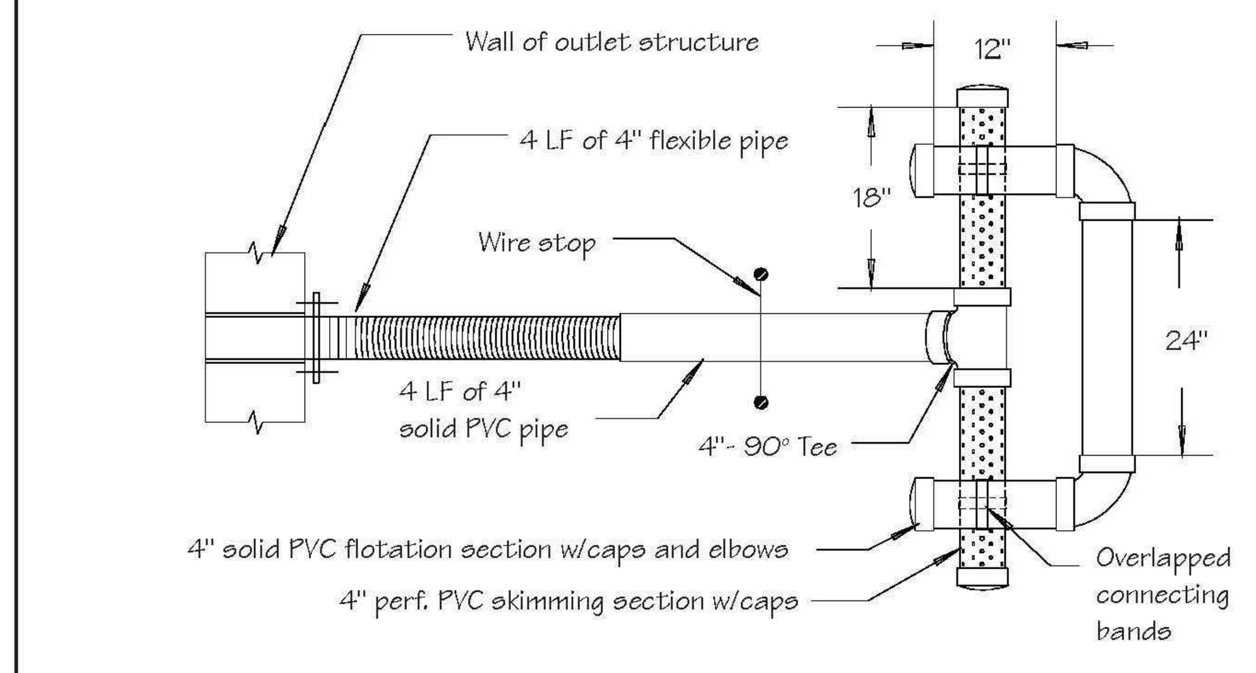
Profile thru Pipe Outlet



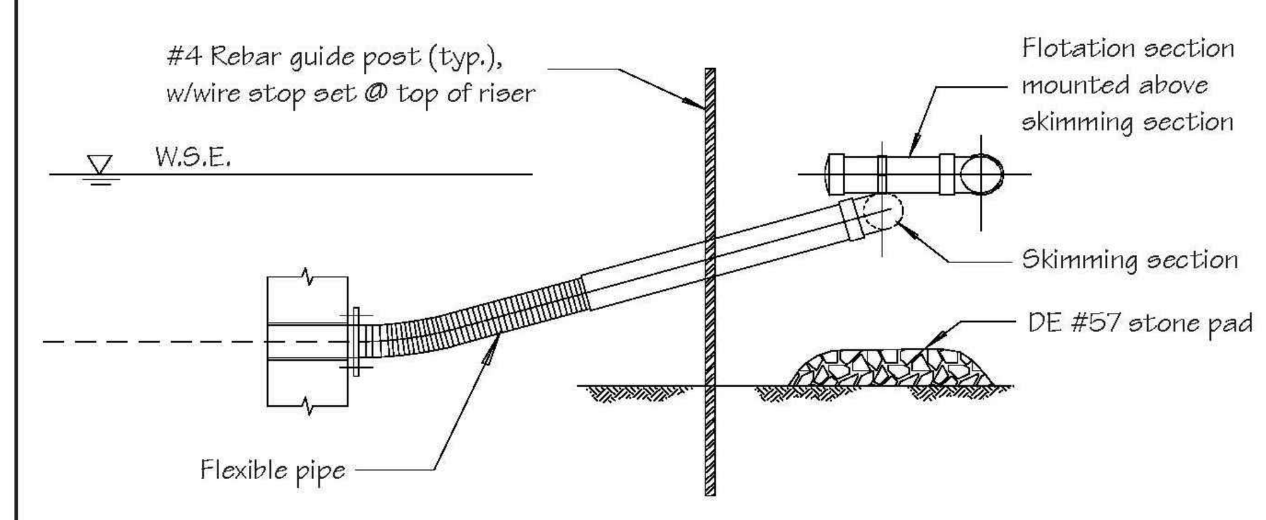
Riser Detail

Source:	Symbol:	Detail No.
DE ESC Handbook	PST	DE-ESC-3.1.3.1 Sheet 1 of 2 Effective FEB 2019

Standard Detail & Specifications
Skimmer Dewatering Device



Plan



Profile thru ℄ of Pipe

Source:	Symbol:	Detail No.
Adapted from drawing by Vandemark & Lynch, Inc.	SDD	DE-ESC-3.2.3.1 Sheet 1 of 2 Effective FEB 2019

Standard Detail & Specifications
Skimmer Dewatering Device

Construction Notes:

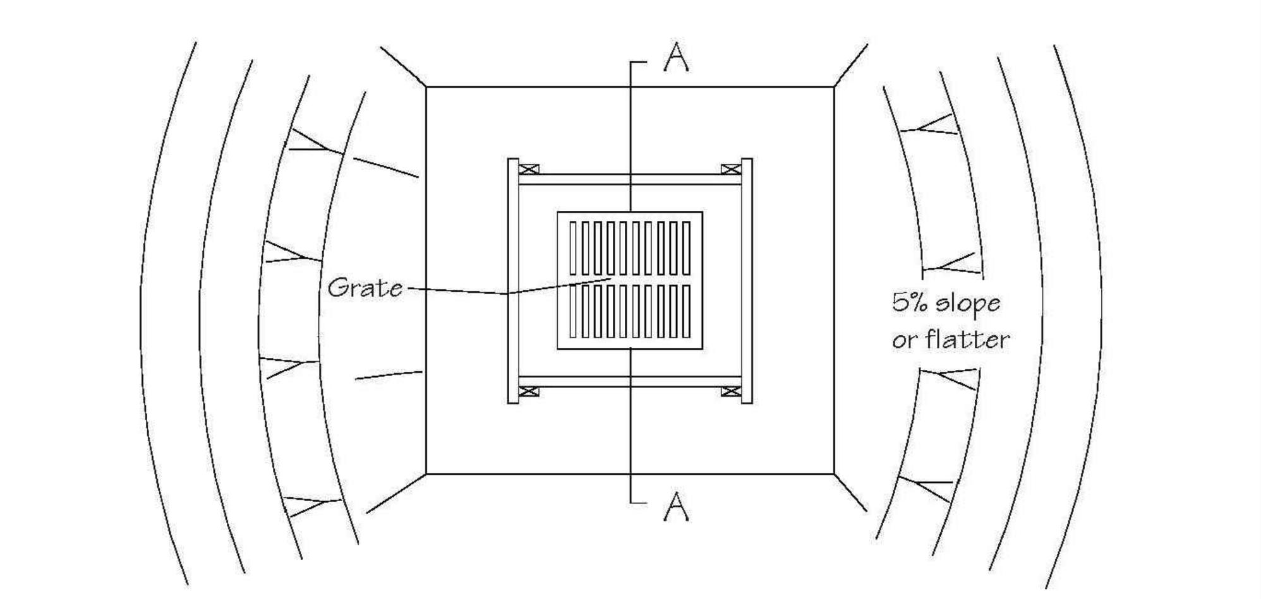
1. Pipe flotation section shall be solvent welded to ensure an airtight assembly. Contractor to conduct a test to check for leaks prior to installation.
2. Skimmer section shall have (12) rows of 1/2" dia. holes, 1-1/4" on center. If additional filtration is necessary, the filtering media shall consist of a Type GD-II geotextile fabric wrapped around the perforated portion of the skimmer and attached with plastic snap ties, bands, etc.
3. Flexible pipe shall be inserted into solid pipe and fastened with (2) #8 wood screws.
4. At a minimum, the structure shall be inspected after each rain and repairs made as needed. If vandalism is a problem, more frequent inspection may be necessary.
5. Construction operations shall be carried out in such a manner that erosion and water pollution are minimized.
6. The structure shall only be removed when the contributing drainage area has been properly stabilized.

Materials:

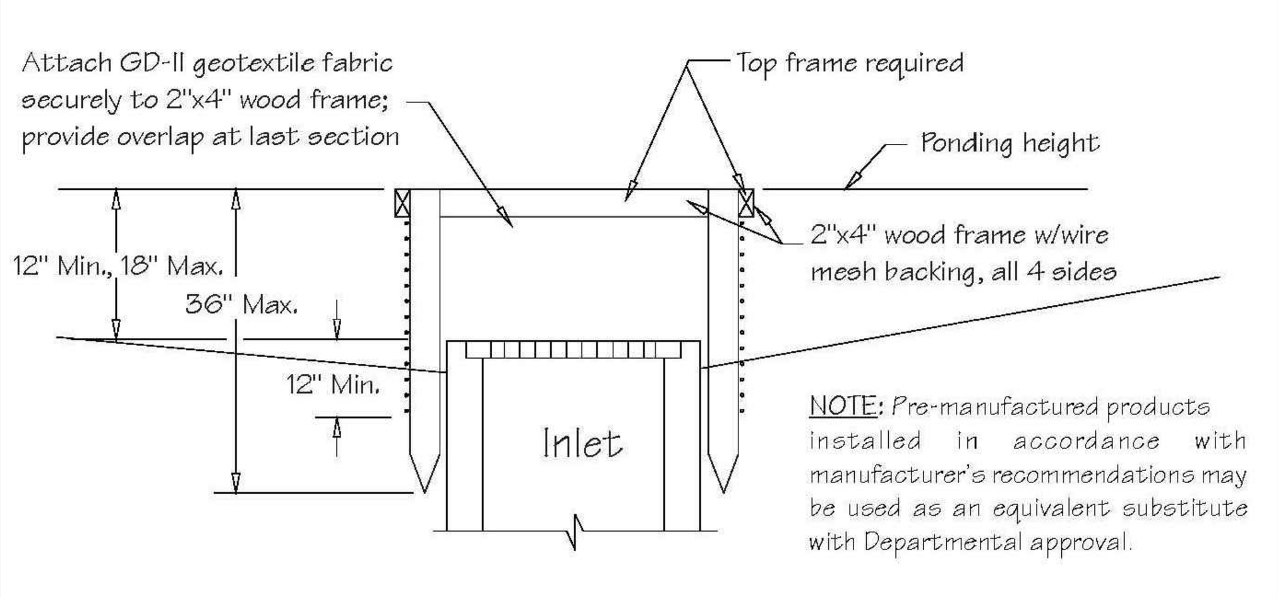
1. Solid pipe - 4" Sched. 40 PVC
2. Perforated pipe - 4" Sched. 40 PVC
3. 90° Tee (1 ea.) - 4" Sched. 40 PVC
4. 90° Elbow (2 ea.) - 4" Sched. 40 PVC
5. Cap (4 ea.) - 4" Sched. 40 PVC, solid
6. Flexible pipe - 4" corrugated plastic tubing (non-perforated)

Source:	Symbol:	Detail No.
Delaware ESC Handbook	SDD	DE-ESC-3.2.3.1 Sheet 2 of 2 Effective FEB 2019

Standard Detail & Specifications
Inlet Protection - Type 1



Plan



Section A-A

Source:	Symbol:	Detail No.
Adapted from Erosion Draw Manual J. McCullah & Assoc.	IP-1	DE-ESC-3.1.5.1 Sheet 2 of 2 Effective FEB 2019

Standard Detail & Specifications
Inlet Protection - Type 1

Construction Notes:

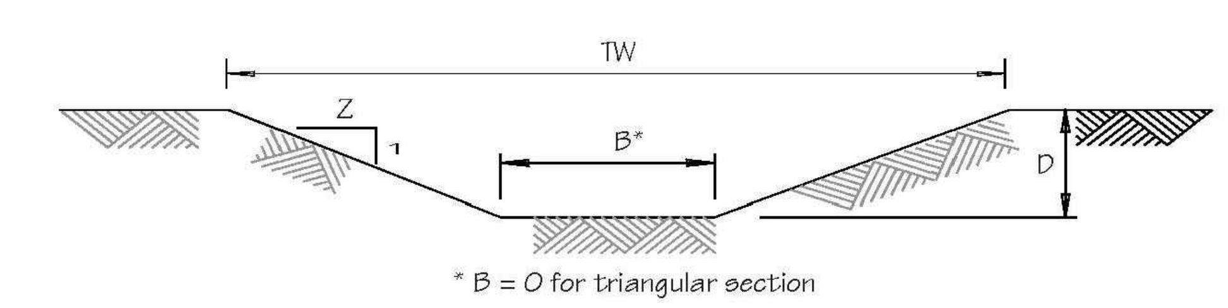
1. Excavate completely around inlet to a depth of 18" below grate elevation.
2. Drive 2" x 4" post 1' into ground at four corners of inlet. Place nail strips between posts on ends of inlet. Assemble top portion of 2" x 4" frame using overlap joint shown. Top of frame (weir) must be 6" below edge of roadway adjacent to inlet.
3. Stretch wire mesh tightly around frame and fasten securely. Ends must meet at post.
4. Stretch geotextile fabric tightly over wire mesh, the cloth must extend from top of frame to 18" below inlet grate elevation. Fasten securely to frame. Ends must meet at post, be overlapped and folded, then fastened down.
5. Backfill around inlet in compacted 6" layers until at least 12" of geotextile fabric is buried.
6. If the inlet is not in a low point, construct a compacted earth dike in the ditchline below it. The top of this dike is to be at least 6" higher than the top of frame (weir).
7. This structure must be inspected frequently and the filter fabric replaced when clogged.

Materials:

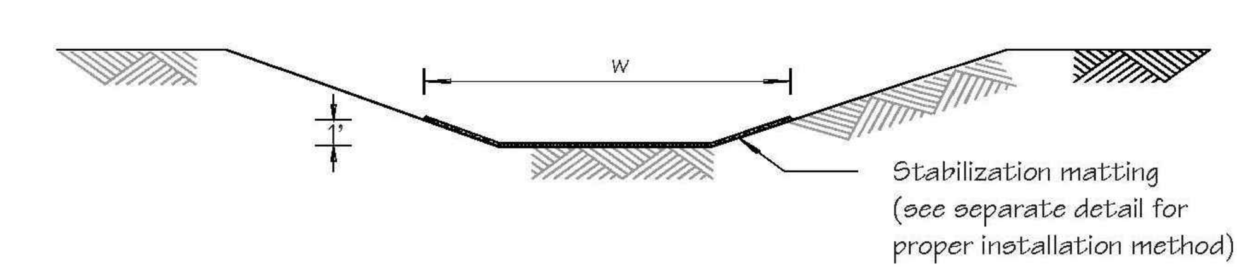
1. Wooden frame is to be constructed of 2" x 4" construction grade lumber.
2. Wire mesh must be of sufficient strength to support filter fabric with water fully impounded against it.
3. Geotextile fabric: Type GD-II

Source:	Symbol:	Detail No.
Adapted. from Erosion Draw Manual J. McCullah & Assoc.	IP-1	DE-ESC-3.1.5.1 Sheet 1 of 2 Effective FEB 2019

Standard Detail & Specifications
Veg. Channel - Triang./Trap.



Typical Section (Design)



Typical Section (Stabilization)

DATA
Design discharge (Q_2)
Design topwidth (TW)
Design depth (D)
Design bottom width (B)
Design sideslope (Z)
Design channel slope (s)
Width of stabilization mat (w)
Type of stabilization matting

Source:	Symbol:	Detail No.
Delaware ESC Handbook	VC-T	DE-ESC-3.3.3.2 Sheet 1 of 2 Effective FEB 2019

Standard Detail & Specifications
Veg. Channel - Triang./Trap.

Construction Notes:

1. All trees, brush, stumps, obstructions, and other objectionable material shall be removed and disposed of so as not to interfere with the proper functioning of the waterway.
2. The channel shall be excavated or shaped to line, grade, and cross section as required to meet the criteria specified herein, and be free of bank projections or other irregularities which will impede normal flow.
3. Fills shall be compacted as needed to prevent unequal settlement that would cause damage in the waterway.
4. All earth removed and not needed in construction shall be spread or disposed of so that it will not interfere with the functioning of the waterway.
5. Stabilization shall be done in accordance with the appropriate Standard and Specifications for Vegetative Stabilization and Stabilization Mat.
   a. It is recommended that, when conditions permit, temporary diversions or other means should be used to prevent water from entering the waterway during the establishment of the vegetation.
   b. Should groundwater or base flow conditions preclude the establishment of adequate vegetative stabilization throughout the entire design section, provisions shall be made through use of a lining material, stone center drain and/or subsurface drain. Such practices shall be designed and constructed in accordance with the appropriate Standard(s) and Specifications and Standard Detail(s).

Source:	Symbol:	Detail No.
Delaware ESC Handbook	VC-T	DE-ESC-3.3.3.2 Sheet 2 of 2 Effective FEB 2019

CONSTRUCTION SITE DETAILS AND NOTES 2

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL NUMBER 113-6.00-123.00

SUSSEX COUNTY, DELAWARE

PREPARED FOR CLEANBAY BIOFUELS LLC.

RAUCH inc.
engineering design & development services
office: 410.770.9081 | fax: 410.770.3667
email: design@raucheng.com | web: www.raucheng.com
Maryland Office: 106 N. Harrison St - Easton, MD 21601
Virginia Office: 8229 Boone Blvd, Suite 625 - Vienna, VA 22182

ROBERT D. RAUCH LICENSE No. 8359 DELAWARE PROFESSIONAL ENGINEER
10-Jun-19

Professional Certification
I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Delaware.
License No. 8359
Expiration Date: June 30, 2020

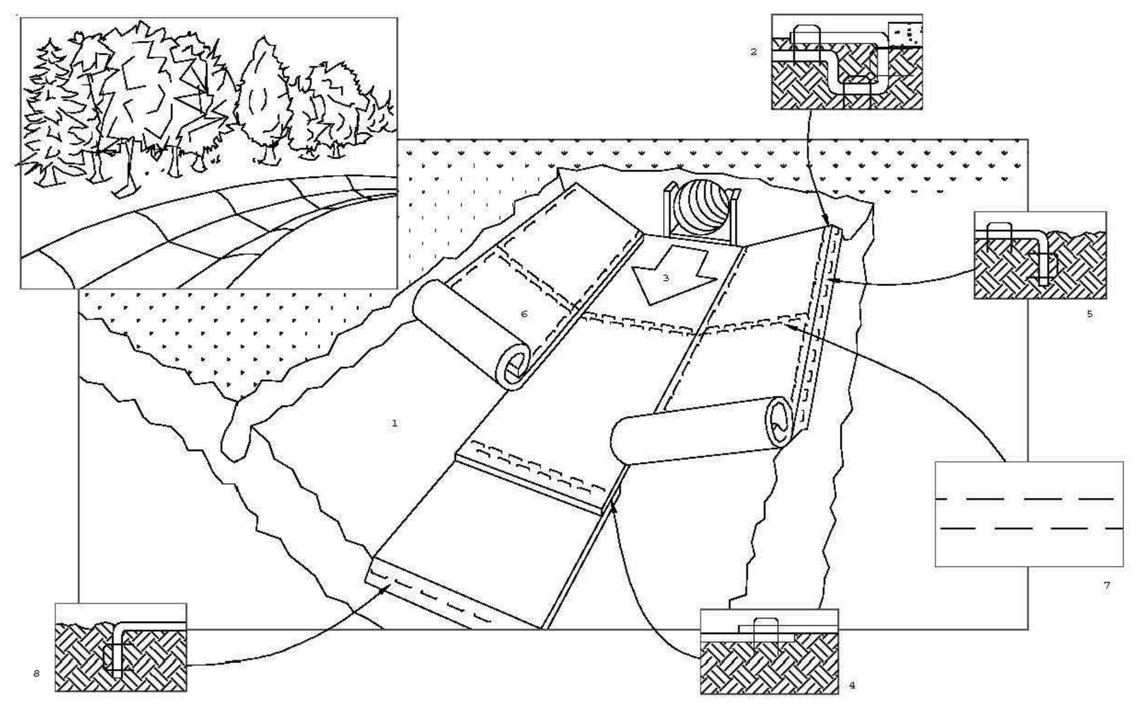
REVISIONS

REV. #	DATE	DESCRIPTION
A	6/3/19	Revised per county comments 23 April 2019

DATE:	26/FEB/19
SCALE:	AS SHOWN
DRAWN BY:	WJR
DESIGNED BY:	WJR
APPROVED BY:	X
SHEET NO.:	CB006-C-SW021

FOR REVIEW

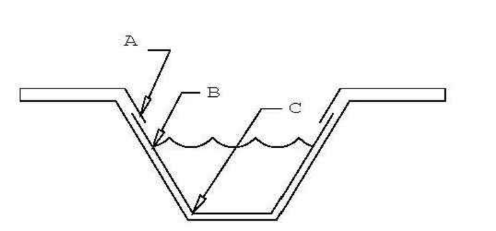
Standard Detail & Specifications
Stabilization Matting - Channel



Perspective

CRITICAL POINTS

A. Overlaps and seams
B. Projected waterline
C. Channel bottom/side slope vertices



Note: Horizontal staple spacing should be altered if necessary to allow staples to secure the critical points along the channel surface.

Use manufacturer's recommendations for stapling patterns for channel installations.

Source:	Symbol:	Detail No.
Adapted from North American Green, Inc.	SM-C	DE-ESC-3.4.6.2 Sheet 1 of 3 Effective FEB 2019

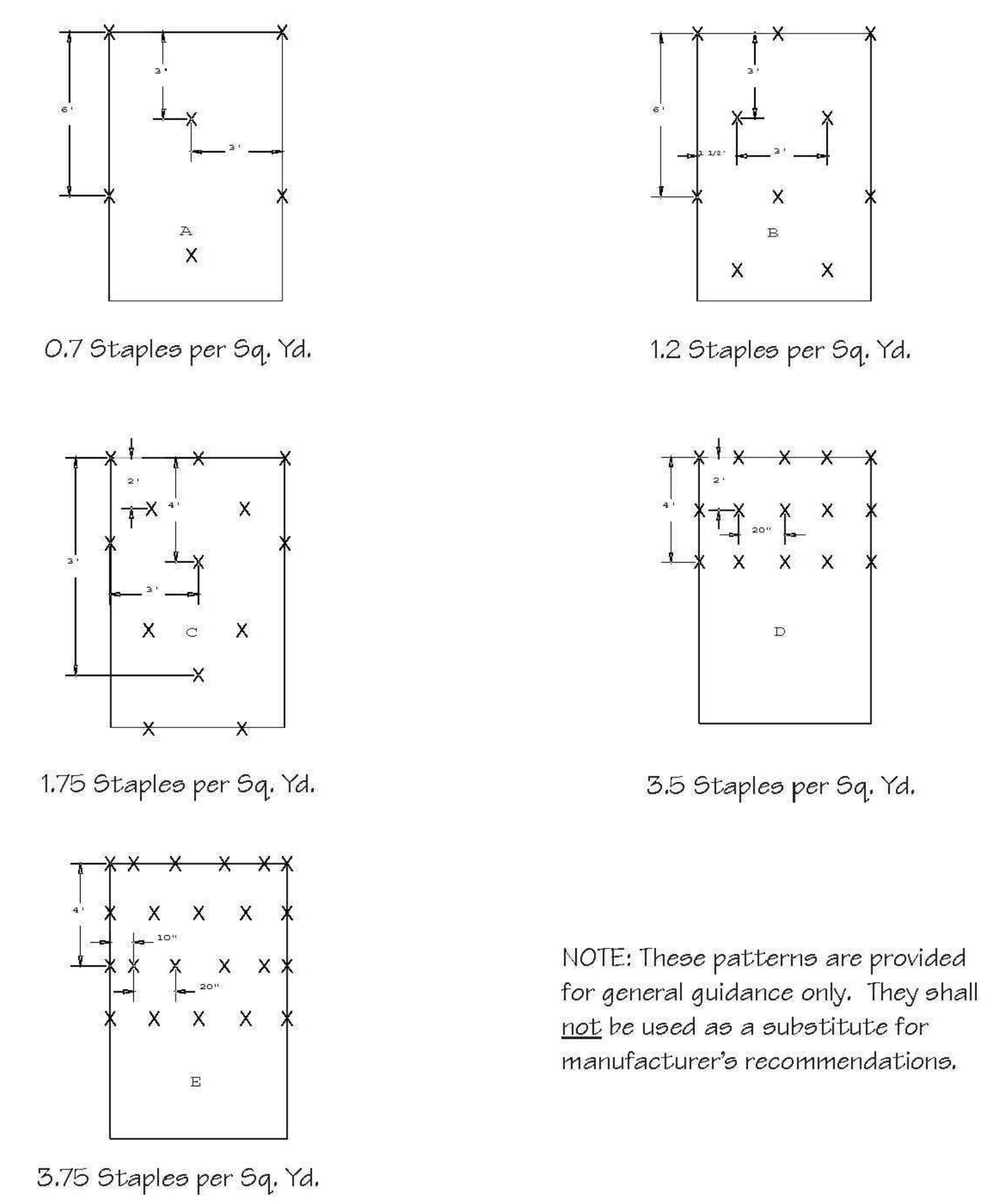
Standard Detail & Specifications
Stabilization Matting - Channel

Construction Notes:

1. Prepare soil before installing matting, including application of lime, fertilizer, and seed.
2. Begin at the top of the channel by anchoring the mat in a 6" deep X 6" wide trench. Backfill and compact the trench after stapling.
3. Roll center mat in direction of water flow on bottom of channel.
4. Place mats end over end (shingle style) with a 6" overlap, use a double row of staggered staples 4" apart to secure mats.
5. Full Length edge of mats at top of side slopes must be anchored in 6" deep X 6" wide trench; backfill and compact the trench after stapling.
6. Mats on side slopes must be overlapped 4" over the center mat and stapled.
7. In high flow channel applications, a staple check slot is recommended at 30 to 40 foot intervals. Use a row of staples 4" apart over entire width of the channel. Place a second row 4" below the first row in a staggered pattern.
8. The terminal end of the mats must be anchored in a 6" X 6" wide trench. Backfill and compact the trench after stapling.

Source:	Symbol:	Detail No.
Adapted from North American Green, Inc.	SM-C	DE-ESC-3.4.6.2 Sheet 2 of 3 Effective FEB 2019

Standard Detail & Specifications
Stabilization Matting - Channel



Stapling Patterns

Source:	Symbol:	Detail No.
Adapted from North American Green, Inc.	SM-C	DE-ESC-3.4.6.2 Sheet 3 of 3 Effective FEB 2019

Standard Detail & Specifications
Mulching

1. Materials and Amounts

a. *Straw* - Straw shall be unrotted small grain straw applied at the rate of 1-1/2 to 2 tons per acre, or 70 to 90 pounds (two bales) per 1,000 square feet. Mulch materials shall be relatively free of weeds and shall be free of noxious weeds such as; thistles, Johnsongrass, and quackgrass. Spread mulch uniformly by hand or mechanically. For uniform distribution of hand spread mulch, divide area into approximately 1,000 square feet sections and place 70-90 pounds (two bales) of mulch in each section.

b. *Wood chips* - Apply at the rate of approximately 6 tons per acre or 275 pounds per 1,000 square feet when available and when feasible. These are particularly well suited for utility and road rights-of-way. If wood chips are used, increase the application rate of nitrogen fertilizer by 20 pounds of N per acre (200 pounds of 10-10-10 or 66 pounds of 30-0-0 per acre).

c. *Hydraulically applied mulch* -The following conditions apply to hydraulically applied mulch:

i. Definitions:

a. Wood fiber mulch shall consist of specially prepared wood that has been processed to a uniform state, is packaged for sale as a hydraulic mulch for use with hydraulic seeding equipment, and consists of a minimum of 70% virgin or recycled wood fiber combined with 30% paper fiber and additives.

b. Blended fiber mulch shall consist of any hydraulic mulch that contains greater than 30% paper fiber. The paper component must consist of specially prepared paper that has been processed to a uniform fibrous state and is packaged for sale as a hydraulic mulch for use with hydraulic seeding equipment.

c. A bonded fiber matrix (BFM) consists of long strand, specially prepared wood fibers that have been processed to a uniform state held together by a water resistant bonding agent. BFMs shall contain no paper (cellulose) mulch but may contain small percentages of synthetic fibers to enhance performance.

d. Refer to **Figure 3.4.5a** for conditions and limitations of use for each of the above categories of hydraulic mulch.

ii. All components of the hydraulically applied mulches shall be pre-packaged by the manufacturer to assure material performance. Field mixing of the mulch components is acceptable, but must be done per manufacturers recommendations to ensure the proper results.

iii. Hydraulic mulches shall be applied with a viable seed and at manufacturer's recommended rates. Increased rates may be necessary based on site conditions.

iv. Hydraulically applied mulches and additives shall be mixed according to manufacturers recommendations.

iv. Materials within this category shall only be used when hydraulically applied mulch has been specified for use on the approved Sediment and Stormwater Plan, or supplemental approval from the plan approval agency has been obtained in writing for a specific area.

Source:	Symbol:	Detail No.
Delaware ESC Handbook & Filtrexx™ International		DE-ESC-3.4.5 Sheet 1 of 3 Effective FEB 2019

Standard Detail & Specifications
Mulching

v. Application:

a. Apply product to geotechnically stable slopes that have been designed and constructed to divert runoff away from the face of the slope.

b. Do not apply to saturated soils, or if precipitation is anticipated within 24-48 hours.

c. During the spring (March 1 to May 31) and fall (September 1 to November 30) seasons, hydraulic mulches may be applied in a one-step process where all components are mixed together in single-tank loads. It is recommended that the product be applied from opposing directions to achieve optimum soil coverage.

d. During the summer (June 1 to August 31) and winter (December 1 to February 28) seasons, the following two-step process is required:

Step One– Mix and apply seed and soil amendments with a small amount of mulch for visual metering.

Step Two – Mix and apply mulch at manufacturers recommended rates over freshly seeded surfaces. Apply from opposing directions to achieve optimum soil coverage.

e. Minimum curing temperature is 40° F (4° C). The best results and more rapid curing are achieved at temperatures exceeding 60° F (15° C). Curing times may be accelerated in high temperature, low humidity conditions on dry soils.

vi. Recommended application rates are for informational purposes only. Conformance with this standard and specification shall be performance-based and requires **100% soil coverage**. Any areas with bare soil showing shall be top dressed until full coverage is achieved.

d. *Compost blanket (CB)* - Loosely applied with a pneumatic blower so that a 1" compost blanket uniformly covers the **soil with 100% coverage**. This application can be used with seed to promote germination by applying the approved seed mix directly into the loosely blown compost. The compost blanket performs best on slopes less than 2:1 and requires no mulch anchoring.

2. Anchoring mulch - Mulch must be anchored immediately to minimize loss by wind or water. This may be done by one of the following methods, depending upon size of area, erosion hazard, and cost.

a. *Crimping* - A crimper is a tractor drawn implement designed to punch and anchor mulch into the top two (2) inches of soil. This practice affords maximum erosion control but is limited to flatter slopes where equipment can operate safely. On sloping land, crimping should be done on the contour whenever possible.

b. *Tracking* - Tracking is the process of cutting mulch (usually straw) into the soil using a bulldozer or other equipment that runs on cleated tracks. Tracking is used primarily on slopes 3:1 or steeper and should be done up and down the slope with cleat marks running across the slope.

c. *Liquid mulch binders* - Applications of liquid mulch binders should be heavier at edges, in valleys, and at crests of banks and other areas where the mulch will be moved by wind or water. All other areas should have a uniform application of binder. The use of synthetic binders is the preferred method of mulch binding and should be applied at the rates recommended by the manufacturer.

d. *Paper fiber* - The fiber binder shall be applied at a net dry weight of 750 lbs/ac. The wood cellulose fiber shall be mixed with water, and the mixture shall contain a maximum of 50 lbs. of wood cellulose fiber per 100 gallons.

e. *Nettings* - Synthetic or organic nettings may be used to secure straw mulch. Install and secure according to the manufacturers recommendations.

Source:	Symbol:	Detail No.
Delaware ESC Handbook & Filtrexx™ International		DE-ESC-3.4.5 Sheet 2 of 3 Effective FEB 2019

Standard Detail & Specifications
Mulching

MULCHING MATERIAL SELECTION GUIDE

Percent Slope	Type of Mulch / App. Rate*	Dec. 1 to Feb. 28(29)	March 1 to May 31	June 1 to Aug. 31	Sept. 1 to Nov. 30
Less than 2%	Blended Fiber @ 2000 lbs/ac. minimum	xxxxxxxxxxxxxxxx	OK (≤1 ac.)	xxxxxxxxxxxxxxxx	OK (≤1 ac.)
	Wood Fiber @ 2000 lbs/ac. min.	xxxxxxxxxxxxxxxx	OK	xxxxxxxxxxxxxxxx	OK
	BFM @ 3000 lbs/ac. min.	OK	OK	OK	OK
	Straw @ 2 Tons/ac. Min.	OK	OK	OK	OK
	Stabilization Matting**	OK	OK	OK	OK
	1" Compost Blanket (CB)	OK	OK	OK	OK
2% to 5.9%	Wood Fiber @ 2000 lbs/ac. min.	xxxxxxxxxxxxxxxx	OK	xxxxxxxxxxxxxxxx	OK
	BFM @ 3000-3500 lbs/ac. min	OK	OK	OK	OK
	Straw @ 2 Tons/ac. min.	OK	OK	OK	OK
	Stabilization Matting**	OK	OK	OK	OK
	1" Compost Blanket (CB)	OK	OK	OK	OK
6% to 10.9%	Wood Fiber @ 2000-2500 lbs/ac. min.	xxxxxxxxxxxxxxxx	OK	xxxxxxxxxxxxxxxx	OK
	BFM @ 3500-4000 lbs/ac. min.	OK	OK	OK	OK
	Straw @ 2 Tons/ac. min.	OK	OK	OK	OK
	Stabilization Matting**	OK	OK	OK	OK
	1" Compost Blanket (CB)	OK	OK	OK	OK
11% to 24.9%	Wood Fiber @ 2500-3000 lbs/ac. min.	xxxxxxxxxxxxxxxx	OK	xxxxxxxxxxxxxxxx	OK
	BFM @ 3500-4000 lbs/ac. min.	OK	OK	OK	OK
	Straw @ 2 Tons/ac. min.	OK	OK	OK	OK
	Stabilization Matting**	OK	OK	OK	OK
	1" Compost Blanket (CB)	OK	OK	OK	OK
25% to 33%	Wood Fiber @ 2500-3000 lbs/ac. min.	xxxxxxxxxxxxxxxx	OK	xxxxxxxxxxxxxxxx	OK
	BFM @ 4000 lbs/ac. min.	xxxxxxxxxxxxxxxx	OK	xxxxxxxxxxxxxxxx	OK
	Straw @ 2 Tons/ac. min.	OK	OK	OK	OK
	Stabilization Matting**	OK	OK	OK	OK
	1" Compost Blanket (CB)	OK	OK	OK	OK
33% and up	BFM @ 4000-4500 lbs/ac. min.	xxxxxxxxxxxxxxxx	OK	xxxxxxxxxxxxxxxx	OK
	Straw @ 2 Tons/ac. min.***	OK	OK	OK	OK
	Stabilization Matting**	OK	OK	OK	OK
	1" Compost Blanket (CB)	2:1 Max.	2:1 Max.	2:1 Max.	2:1 Max.

* Note: Manufacturers Recommended Rates for informational purposes only. Performance standard requires 100% soil coverage.
** Note: Stabilization Matting must be applied in accordance with Section 3.4.6 of the Delaware ESC Handbook.
***Note: Straw applied on slopes greater than 33% must be netted (this does not apply to topsoil stockpiles).
OK = Acceptable to use during this time period.
xxx = Not acceptable to use during this time period.
All application rates are minimums

Source:	Symbol:	Detail No.
Delaware ESC Handbook & Filtrexx™ International		DE-ESC-3.4.5 Sheet 3 of 3 Effective FEB 2019

Standard Detail & Specifications
Topsoiling

Construction Notes:

1. Site Preparation (Where Topsoil is to be added)

Note: When topsoiling, maintain needed erosion and sediment control practices such as diversions, grade stabilization structures, berms, dikes, waterways and sediment basins.

a. Grading - Grades on the areas to be topsoiled which have been previously established shall be maintained.

b. Liming - Where the topsoil is either highly acid or composed of heavy clays, ground limestone shall be spread at the rate of 4-8 tons/acre (200-400 pounds per 1,000 square feet). Lime shall be distributed uniformly over designated areas and worked into the soil in conjunction with tillage operations as described in the following procedures.

c. Tilling - After the areas to be topsoiled have been brought to grade, and immediately prior to dumping and spreading the topsoil, the subgrade shall be loosened by discing or by scarifying to a depth of a least 3 inches to permit bonding of the topsoil to the subsoil. Pack by passing a bulldozer up and down over the entire surface area of the slope to create horizontal erosion check slots to prevent topsoil from sliding down the slope.

2. Topsoil Material and Application

Note: Topsoil salvaged from the existing site may often be used but it should meet the same standards as set forth in these specifications. The depth of topsoil to be salvaged shall be no more than the depth described as a representative profile for that particular soil type as described in the soil survey published by USDA-SCS in cooperation with Delaware Agricultural Experimental Station.

Source:	Symbol:	Detail No.
USDA - NRCS		DE-ESC-3.4.1 Sheet 1 of 2 Effective FEB 2019

Standard Detail & Specifications
Topsoiling

Construction Notes (cont.)

a. Materials - Topsoil shall be a loam, sandy loam, clay loam, silt loam, sandy clay loam, loamy sand or other soil as approved by an agronomist or soil scientist. It shall not have a mixture of contrasting textured subsoil and contain no more than 5 percent by volume of cinders, stones, slag, coarse fragment, gravel, sticks, roots, trash or other extraneous materials larger than 1-1/2 inches in diameter. Topsoil must be free of plants or plant parts of bermudagrass, quackgrass, Johnsongrass, nutsedge, poison ivy, thistles, or others as specified. All topsoil shall be tested by a reputable laboratory for organic matter content, pH and soluble salts. A pH of 6.0 to 7.5 and an organic content of not less than 1.5 percent by weight is required. If pH value is less than 6.0 lime shall be applied and incorporated with the topsoil to adjust the pH to 6.5 or higher. Topsoil containing soluble salts greater than 500 parts per million shall not be used.

Note: No sod or seed shall be placed on soil which has been treated with soil sterilants or chemicals used for weed control until sufficient time has elapsed to permit dissipation of toxic materials.

b. Grading - The topsoil shall be uniformly distributed and compacted to a minimum of four (4) inches. Spreading shall be performed in such a manner that sodding or seeding can proceed with a minimum of additional soil preparation and tillage. Any irregularities in the surface resulting from topsoiling or other operations shall be corrected in order to prevent the formation of depressions or water pockets. Topsoil shall not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or in a condition that may otherwise be detrimental to proper grading and seedbed preparation.

Note: Topsoil substitutes or amendments as approved by a qualified agronomist or soil scientist, may be used in lieu of natural topsoil. Compost material used to improve the percentage of organic matter shall be provided by a certified supplier.

Compost amendments that are intended to meet specific post-construction stormwater management goals shall further meet the requirements of **Appendix 3.06.2 Post Construction Stormwater Management BMP Standards and Specifications, Section 14.0 Soil Amendments.**

Source:	Symbol:	Detail No.
USDA - NRCS		DE-ESC-3.4.1 Sheet 2 of 2 Effective FEB 2019

CONSTRUCTION SITE DETAILS AND NOTES 3

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL NUMBER 113-6.00-123.00

SUSSEX COUNTY, DELAWARE

PREPARED FOR CLEANBAY BIOFUELS LLC.

RAUCH inc.
engineering design & development services
office: 410.770.9081 | fax: 410.770.3667
email: design@raucheng.com | web: www.raucheng.com
Maryland Office: 106 N. Harrison St - Easton, MD 21601
Virginia Office: 8229 Boone Blvd, Suite 625 - Vienna, VA 22182

ROBERT D. RAUCH LICENSE No. 8359 DELAWARE PROFESSIONAL ENGINEER
10-Jun-19

Professional Certification
I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Delaware.
License No. 8359
Expiration Date: June 30, 2020

REVISIONS

REV. #	DATE	DESCRIPTION
A	6/3/19	Revised per county comments 23 April 2019

DATE:	26/FEB/19
SCALE:	AS SHOWN
DRAWN BY:	WJR
DESIGNED BY:	WJR
APPROVED BY:	X
SHEET NO.:	CB006-C-SW022

FOR REVIEW

Standard Detail & Specifications
Vegetative Stabilization

TEMPORARY SEEDING BY RATES, DEPTHS AND DATES											
Mix #	Species[6]	Seeding Rate		Optimum Seeding Dates [1] O = Optimum Planting Period; A = Acceptable Planting Period							Planting Depth[3]
				Coastal Plain			Piedmont			All	
	Certified Seed	lb/Ac[5]	lb/1000 sq.ft.	2/1-4/30	[2] 5/1-8/14	8/15-10/31	3/1-4/30	[2] 5/1-7/31	8/1-10/31	10/31-2/1	
1	Barley	125	4	O	A	O	O	A	O		1-2 inches 2-3" sandy soils
2	Oats	125	4	O	A	A	O	A	A		1-2 inches 2-3" sandy soils
3	Rye	125	4	O	A	O	O	A	O	A	1-2 inches 2-3" sandy soils
4	Perennial Ryegrass	125	4	O	A	O	O	A	O		0.5 inches 1-2" sandy soils
5	Annual Ryegrass	125	4	O	A	O	O	A	O	A	0.5 inches 1-2" sandy soils
6	Winter Wheat	125	4	O	A	O	O	A	O	A	1-2 inches 2-3" sandy soils
7	Foxtail Millet	30 PLS	0.7		O			O			0.5 inches 1-2" sandy soils
8	Pearl Millet	20 PLS	0.5		O			O			0.5 inches 1-2" sandy soils

1. Winter seeding requires 3 tons per acre of straw mulch for proper stabilization.
2. May be planted throughout summer if soil moisture is adequate or seeded area can be irrigated.
3. Applicable on slopes 3:1 or less.
4. Fifty pounds per acre of Annual Lespedeza may be added to 1/2 the seeding rate of any of the above species.
5. Use varieties currently recommended for Delaware. Contact a County Extension Office for information.
6. Warm season grasses such as Millet or Weeping Lovegrass may be used between 5/1 and 9/1 if desired. Seed at 3-5 lbs. per acre. Good on low fertility and acid areas. Seed after frost through summer at a depth of 0.5".

NOTE: Alternative seed mixes may be used with prior approval from the Department or Delegated Agency.

Source: Delaware ESC Handbook | Symbol: | Detail No. DE-ESC-3.4.3 Sheet 1 of 4 Effective FEB 2019

Standard Detail & Specifications
Vegetative Stabilization

PERMANENT SEEDING AND SEEDING DATES											
Seeding Mixtures		Seeding Rate[1]		Optimum Seeding Dates [2] O = Optimum Planting Period A = Acceptable Planting Period							Remarks
Mix No.	Certified Seed[3]			Coastal Plain			Piedmont			All[4]	
	Well Drained Soils	lb/Ac	lb/1000 sq.ft.	2/1-4/30	5/1-8/14	8/15-10/31	3/1-4/30	5/1-7/31	8/1-10/31	10/31-2/1	
1	Tall Fescue Weeping Lovegrass	140 10	3.2 0.23	A	O	A	A	O	A	Add 100 lbs./ac Winter Rye	Good erosion control mix Tolerant of low fertility soils Lovegrass very difficult to mow; Germinates only in hot weather
2	Deertongue Sheep Fescue Common Lespedeza[5] Inoculated	30 30 15	0.69 0.69 0.35	A	O	A	A	O	A	Add 100 lbs./ac Winter Rye	Good erosion control mix Tolerant of low fertility soils Good wildlife cover and food
3	Tall Fescue (Turf-type) **or** Strong Creeping Red Fescue **or** Perennial Ryegrass **plus** Flatpea[5]	50 50 50 15	1.15 1.15 1.15 0.34	O	A	O	O	A	O	Add 100 lbs./ac. Winter Rye	Good erosion control mix Tall Fescue for droughty conditions. Creeping Red Fescue for heavy shade. Flatpea to suppress woody vegetation.
4	Strong Creeping Red Fescue Kentucky Bluegrass Perennial Ryegrass **or** Redtop **plus** White Clover[5]	100 70 15 5 3	2.3 1.61 0.35 0.11 0.07	O	A	O	O	A	O	Add 100 lbs./ac. Winter Rye	Suitable waterway mix. Canada Bluegrass more drought tolerant. Use Redtop for increased drought tolerance.
5	Switchgrass[6,7] **or** Coastal Panicgrass Big Bluestem Little Bluestem Indian Grass	10 10 5 5 5	0.23 0.23 0.11 0.11 0.1		O			O			Native warm-season mixture. Tolerant of low fertility soils. Drought tolerant. Poor shade tolerance. N fertilizer discouraged - weeds
6	Tall Fescue (turf-type) (Blend of 3 cultivars)	150	3.5	O	A	O	O	A	O		Managed filter strip for nutrient uptake.
7	Tall Fescue Ky. Bluegrass (Blend) Perennial Ryegrass	150 20 20	3.5 0.46 0.46	O	A	O	O	A	O		Three cultivars of Kentucky Bluegrass. Traffic tolerant.
8	Big Bluestem[7] Indian Grass[7] Little Bluestem[7] Creeping Red Fescue **plus one of:** Partridge Pea Bush Clover Wild Indigo Showy Tick-Trefoil	10 10 8 30 5 3 3 2	0.23 0.23 0.18 0.69 0.11 0.07 0.07 0.05	O	A		O	A			All species are native. Indian Grass and Bluestem have fluffy seeds. Plant with a specialized native seed drill. Creeping Red Fescue will provide erosion protection while the warm season grasses get established.

NOTE: Alternative seed mixes may be used with prior approval from the Department or Delegated Agency.

Source: Delaware ESC Handbook | Symbol: | Detail No. DE-ESC-3.4.3 Sheet 2 of 4 Effective FEB 2019

Standard Detail & Specifications
Vegetative Stabilization

PERMANENT SEEDING AND SEEDING DATES (cont.)											
Seeding Mixtures		Seeding Rate[1]		Optimum Seeding Dates [2] O = Optimum Planting Period A = Acceptable Planting Period							Remarks
Mix No.	Certified Seed[3]			Coastal Plain			Piedmont			All[4]	
	Poorly Drained Soils	lb/Ac	lb/1000 sq.ft.	2/1-4/30	5/1-8/14	8/15-10/31	3/1-4/30	5/1-7/31	8/1-10/31	10/31-2/1	
9	Redtop Creeping Bentgrass Sheep Fescue Rough Bluegrass	75 35 30 45	1.72 0.8 0.69 1	O	A	O	O	A	O	Add 100 lbs./ac. Winter Rye	Quick stabilization of disturbed sites and waterways
10	Reed Canarygrass[6]	10	0.23	A		O	A		O		Good erosion control, wildlife cover and wetland revegetation.
	Residential Lawns										
11	Tall Fescue Perennial Ryegrass Kentucky Bluegrass Blend	100 25 30	2.3 0.57 0.69	O	A	O	O	A	O		High value, high maintenance, light traffic, irrigation necessary. Well drained soils, full sun.
12	Tall Fescue Perennial Ryegrass Sheep Fescue	100 25 25	2.3 0.57 0.57	O	A	O	O	A	O		Moderate value, low maintenance, traffic tolerant
13	Creeping Red Fescue Chewings Fescue Rough Bluegrass Kentucky Bluegrass	50 50 20 20	1.15 1.15 0.4 0.4	O	A	O	O	A	O		Shade tolerant, moderate traffic tolerance, moderate maintenance.
14	Creeping Red Fescue Rough Bluegrass **or** Chewings Fescue	50 90	1.15 2.1	O	A	O	O	A	O		Shade tolerant, moisture tolerant.
15	K-31 Tall Fescue	150	3.5	O	A	O	O	A	O		Monoculture, but performs well alone in lawns. Discouraged.

1. When hydroseeding is the chosen method of application, the total rate of seed should be increased by 25%.
2. Winter seeding requires 3 tons per acre of straw mulch. Planting dates listed above are average for Delaware. These dates may require adjustment to reflect local conditions.
3. All seed shall meet the minimum purity and minimum germination percentages recommended by the Delaware Department of Agriculture. The maximum % of weed seeds shall be in accordance with Section 1, Chapter 24, Title 3 of the Delaware Code.
4. Cool season species may be planted throughout summer if soil moisture is adequate or seeded area can be irrigated.
5. All leguminous seed must be inoculated.
6. Warm season grass mix and Reed Canary Grass cannot be mowed more than 4 times per year.
7. Warm season grasses require a soil temperature of at least 50 degrees in order to germinate, and will remain dormant until then.

NOTE: Alternative seed mixes may be used with prior approval from the Department or Delegated Agency.

Source: Delaware ESC Handbook | Symbol: | Detail No. DE-ESC-3.4.3 Sheet 3 of 4 Effective FEB 2019

Standard Detail & Specifications
Vegetative Stabilization

Construction Notes:

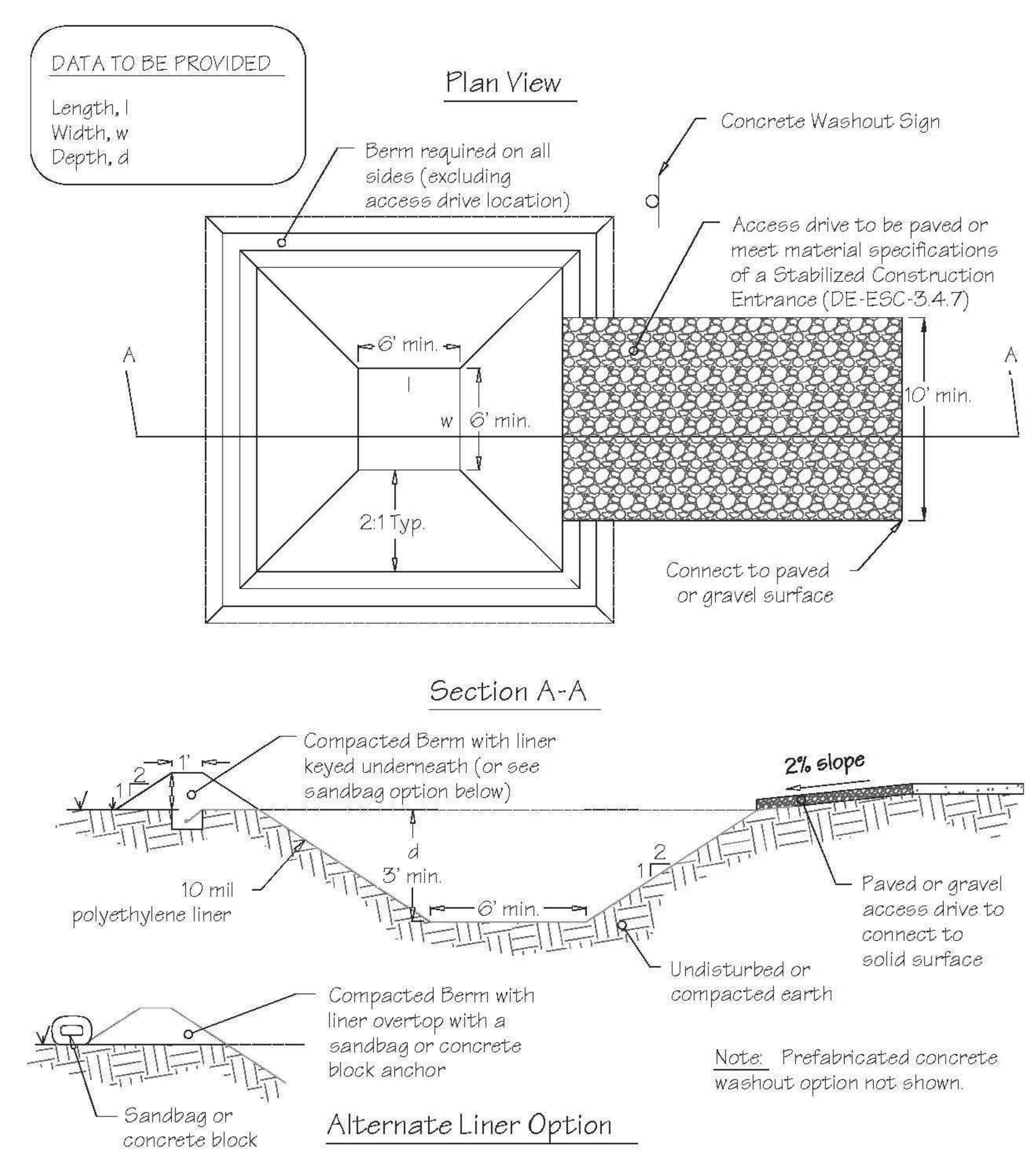
1. Site Preparation
   a. Prior to seeding, install needed erosion and sediment control practices such as diversions, grade stabilization structures, berms, dikes, grassed waterways, and sediment basins.
   b. Final grading and shaping is not necessary for temporary seedings.
2. Seedbed Preparation

   It is important to prepare a good seedbed to insure the success of establishing vegetation. The seedbed should be well prepared, loose, uniform, and free of large clods, rocks, and other objectionable material. The soil surface should not be compacted or crusted.
3. Soil Amendments
   a. Lime - Apply liming materials based on the recommendations of a **soil test** in accordance with the approved nutrient management plan. If a nutrient management plan is not required, apply dolomitic limestone at the rate of 1 to 2 tons per acre. Apply limestone uniformly and incorporate into the top 4 to 6 inches of soil.
   b. Fertilizer - Apply fertilizer based on the recommendations of a **soil test** in accordance with the approved nutrient management plan. If a nutrient management plan is not required, apply a formulation of 10-10-10 at the rate of 600 pounds per acre. Apply fertilizer uniformly and incorporate into the top 4 to 6 inches of soils.
4. Seeding
   a. For **temporary stabilization**, select a mixture from **Sheet 1**. For a **permanent stabilization**, select a mixture from **Sheet 2** or **Sheet 3** depending on the conditions. Alternative seed mixes may be used with prior approval from the Department or Delegated Agency.
   b. Apply seed uniformly with a broadcast seeder, drill, cultipacker seeder or hydroseeder. All seed will be applied at the recommended rate and planting depth.
   c. Seed that has been broadcast should be covered by raking or dragging and then lightly tamped into place using a roller or cultipacker. If hydroseeding is used and the seed and fertilizer is mixed, they will be mixed on site and the seeding shall be done immediately and without interruption.
5. Mulching

   All mulching shall be done in accordance with detail **DE-ESC-3.4.5**.

Source: Delaware ESC Handbook | Symbol: | Detail No. DE-ESC-3.4.3 Sheet 4 of 4 Effective FEB 2019

Standard Detail & Specifications
Concrete Washout



Source: Adapted from Colorado Urban Storm Drainage Criteria Manual, Vol 3 | Symbol: CW | Detail No. DE-ESC-3.6.2 Sheet 1 of 2 Effective FEB 2019

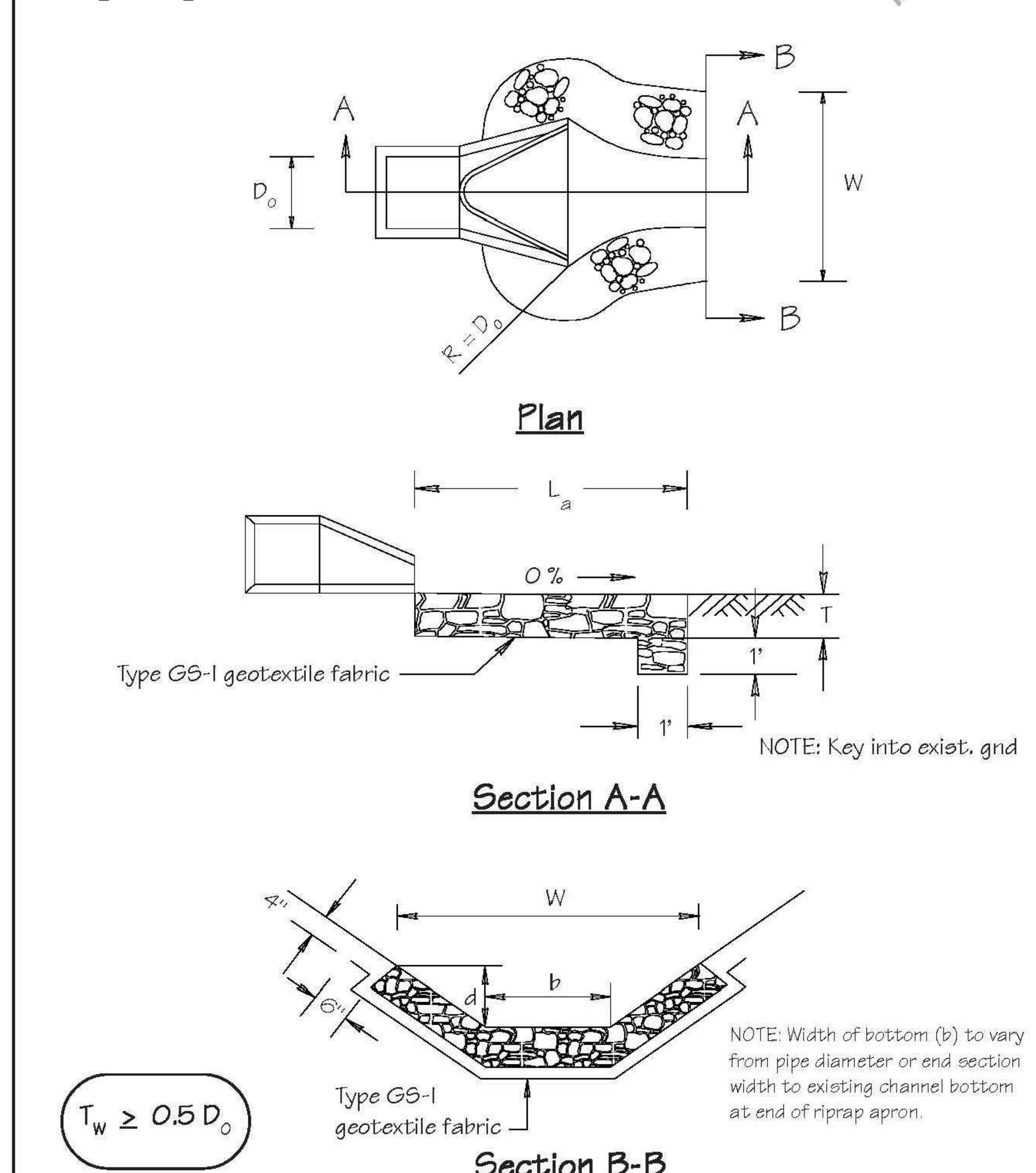
Standard Detail & Specifications
Concrete Washout

Construction Notes:

1. Locate washout area a minimum of 50 feet from open channels, stormdrain inlets, wetlands or waterbodies.
2. Locate washout area so that it is accessible to concrete equipment (service with a minimum 10 foot wide gravel accessway), but so it is not in a highly active construction area causing accidental damage.
3. Minimum dimensions for prefabricated units are 4 feet by 4 feet by 1 foot deep with a minimum 4mil polyethylene plastic liner. Minimum dimensions for constructed concrete washout areas are 6 feet by 6 feet by 3 feet deep, with a minimum 10mil polyethylene liner, 2:1 side slopes, and a 1 foot high by 1 foot wide compacted fill berm.
4. The liner must be free of tears or holes and placed over smooth surfaces to prevent puncturing. For excavated washouts, anchor the liner underneath the berm or overtop with sandbags or concrete blocks to hold in place.
5. Provide a sign designating the washout area, and for large construction sites, provide signs throughout directing traffic to its location.
6. Allow washed out concrete mixture to harden through evaporation of the wastewater. Once the facility has reached 75 percent of its capacity, remove the hardened concrete by reusing the broken aggregate onsite, recycling, or disposing of offsite. The hardened material can be buried on site with minimum of 1 foot of clean, compacted fill.
7. Apply a new liner before reusing the station for additional washouts after maintenance has occurred.

Source: Adapted from Colorado Urban Storm Drainage Criteria Manual, Vol 3 | Symbol: CW | Detail No. DE-ESC-3.6.2 Sheet 2 of 2 Effective FEB 2019

Standard Detail & Specifications
Riprap Outlet Protection - 2



Source: Adapted from MD E&S Manual | Symbol: ROP-2 | Detail No. DE-ESC-3.3.10.2 Sheet 1 of 2 Effective FEB 2019

Standard Detail & Specifications
Riprap Outlet Protection - 2

DATA

Pipe diameter (D_o)
Apron length (L_a)
Apron width (W)
Bottom width (b)
Riprap depth (d)
Riprap size (R No.)
Riprap thickness (T)

Construction Notes:

1. The subgrade for the riprap shall be prepared to the required lines and grades as shown on the plan. Any fill required in the subgrade shall be compacted to a density of approximately that of the surrounding undisturbed material.
2. The riprap shall conform to the grading limits as shown on the plan.
3. Filter cloth shall be protected from punching, cutting or tearing. Any damage other than an occasional small hole shall be repaired by placing another piece of cloth over the damaged area. All connecting joints should overlap a minimum of 1 ft. If the damage is extensive, replace the entire filter cloth.
4. Stone for the riprap or gabion outlets may be placed by equipment. Riprap shall be placed in a manner to prevent damage to the filter cloth. Hand placement will be required to the extent necessary to prevent damage to the conduits, structures, etc.

Source: Adapted from MD E&S Manual | Symbol: ROP-2 | Detail No. DE-ESC-3.3.10.2 Sheet 2 of 2 Effective FEB 2019

CONSTRUCTION SITE DETAILS AND NOTES 4

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL NUMBER 113-6.00-123.00
SUSSEX COUNTY, DELAWARE
PREPARED FOR CLEANBAY BIOFUELS LLC.

RAUCH inc.
engineering design & development services
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ROBERT D. RAUCH LICENSE No. 8359 PROFESSIONAL ENGINEER DELAWARE
10-Jun-19

Professional Certification
I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Delaware.
License No. 8359
Expiration Date: June 30, 2020

REVISIONS

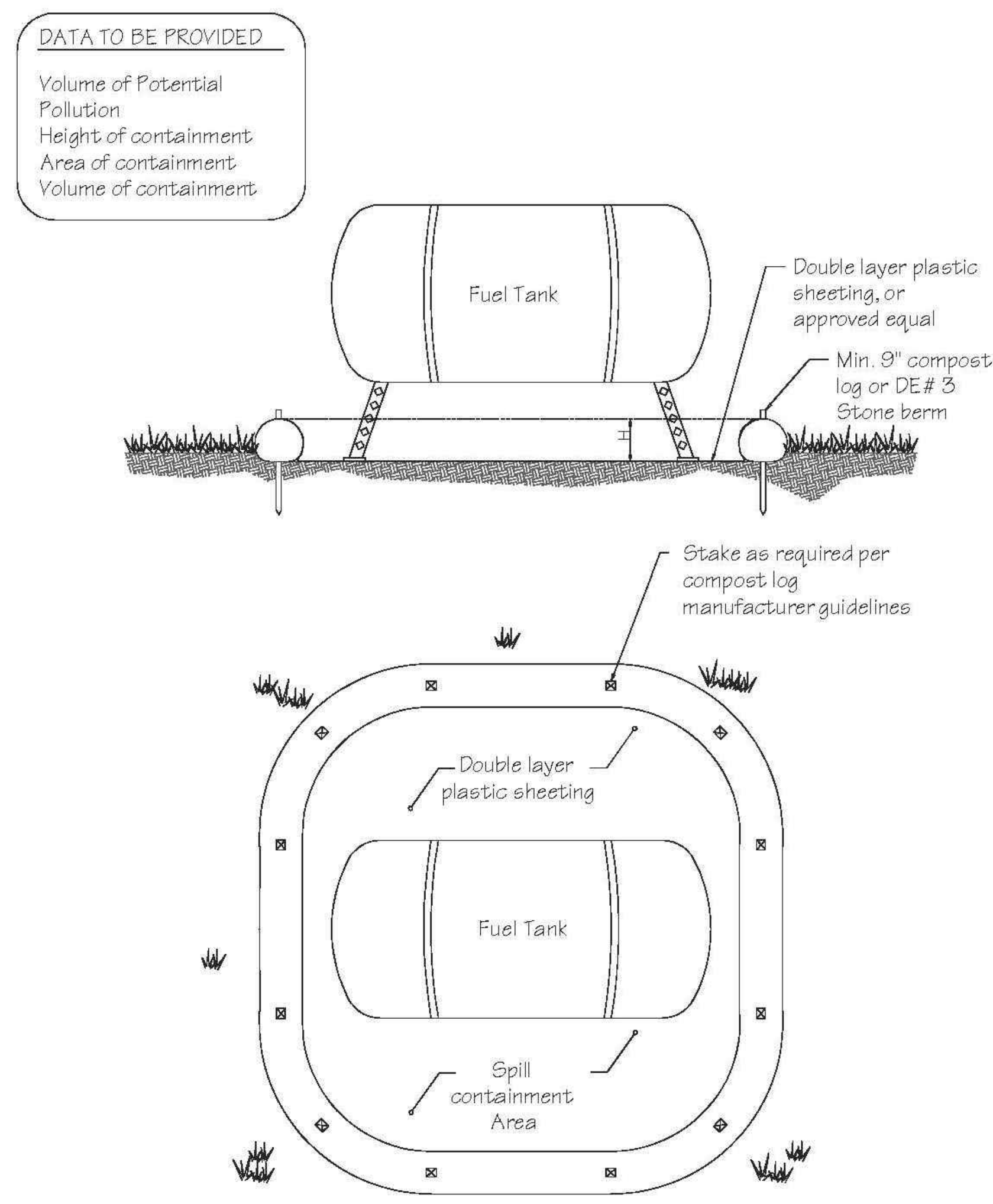
REV. #	DATE	DESCRIPTION
A	6/3/19	Revised per county comments 23 April 2019

DATE: 26/FEB/19
SCALE: AS SHOWN
DRAWN BY: WJR
DESIGNED BY: WJR
APPROVED BY: X
SHEET NO.: CB006-C-SW023

FOR REVIEW

Standard Detail & Specifications

Construction Site Waste Mgt & Spill Control



Source:	Symbol:	Detail No.
Delaware ESC Handbook		DE-ESC-3.6.1 Sheet 1 of 5 Effective FEB 2019

Standard Detail & Specifications

Construction Site Waste Mgt & Spill Control

Pollution Prevention – Spill Prevention

1. Fueling should only take place in signed designated areas, away from downstream drainage facilities and watercourses.
2. Fueling must be with nozzles equipped with automatic shut-off to control drips. Do not top off.
3. Protect the areas where equipment or vehicles are being repaired, maintained, fueled or parked from storm water run-on and runoff.
4. Use barriers such as berms to prevent storm water run-on and runoff, and to contain spills.
5. Place a "Fueling Area" sign next to each fueling area.
6. Store hazardous materials such as fuel, solvents, oil and chemicals in secondary containment.
7. Inspect vehicles and equipment for leaks on each day of use. Repair fluid and oil leaks immediately.
8. Absorbent spill clean-up materials and spill kits must be available in fueling areas and on fuel trucks.
9. If fueling is to take place at night, make sure the fueling area is sufficiently illuminated.
10. Properly dispose of used oil, fluids, lubricants and spill clean-up materials.

CLEAN UP SPILLS

1. If it is safe to do so, immediately contain and clean up any chemical and/or hazardous material spills.
2. Properly dispose of used oil, fluids, lubricants and spill clean-up materials.
3. Do not bury spills or wash them down with water.

LEAKS AND DRIPS

1. Use drip pans or absorbent pads at all times. Place under and around leaky equipment.
2. Do not allow oil, grease, fuel or chemicals to drip onto the ground.
3. Have spill kits and clean up material on-site.
4. Repair leaky equipment promptly or remove problem vehicles and equipment from the site. Clean up contaminated soil immediately.
5. Store contaminated waste in sealed containers constructed of suitable material. Label these containers properly.
6. Clean up all spills and leaks. Promptly dispose of waste and spent clean up materials.

Source:	Symbol:	Detail No.
Delaware ESC Handbook		DE-ESC-3.6.1 Sheet 2 of 5 Effective FEB 2019

Standard Detail & Specifications

Construction Site Waste Mgt & Spill Control

Notes:

The Construction Site Pollution Prevention Plan should include the following elements:

1. **Material Inventory**

   Document the storage and use of the following materials:

   a. Concrete
   b. Detergents
   c. Paints (enamel and latex)
   d. Cleaning solvents
   e. Pesticides
   f. Wood scraps
   g. Fertilizers
   h. Petroleum based products

2. **Good housekeeping practices**

   a. Store only enough product required to do the job.
   b. All materials shall be stored in a neat, orderly manner in their original labeled containers and covered.
   c. Substances shall not be mixed.
   d. When possible, all of a product shall be used up prior to disposal of the container.
   e. Manufacturers' instructions for disposal shall be strictly adhered to.
   f. The site foreman shall designate someone to inspect all BMPs daily.

3. **Waste management practices**

   a. All waste materials shall be collected and stored in securely lidded dumpsters in a location that does not drain to a waterbody.
   b. Waste materials shall be salvaged and/or recycled whenever possible.
   c. The dumpsters shall be emptied a minimum of twice per week, or more if necessary. The licensed trash hauler is responsible for cleaning out dumpsters.

Source:	Symbol:	Detail No.
Adapted from USEPA Pub. 840-B-92-002		DE-ESC-3.6.1 Sheet 3 of 5 Effective FEB 2019

Standard Detail & Specifications

Construction Site Waste Mgt & Spill Control

Notes (cont.)

   d. Trash shall be disposed of in accordance with all applicable Delaware laws.
   e. Trash cans shall be placed at all lunch spots and littering is strictly prohibited. Recycle bins shall be placed near the construction trailer.
   f. If fertilizer bags can not be stored in a weather-proof location, they shall be kept on a pallet and covered with plastic sheeting which is overlapped and anchored.

4. **Equipment maintenance practices**

   a. If possible, equipment should be taken to off-site commercial facilities for washing and maintenance.
   b. If performed on-site, vehicles shall be washed with high-pressure water spray without detergents in an area contained by an impervious berm.
   c. Drip pans shall be used for all equipment maintenance.
   d. Equipment shall be inspected for leaks on a daily basis.
   e. Washout from concrete trucks shall be disposed of in a temporary pit for hardening and proper disposal.
   f. Fuel nozzles shall be equipped with automatic shut-off valves.
   g. All used products such as oil, antifreeze, solvents and tires shall be disposed of in accordance with manufacturers' recommendations and local, state and federal laws and regulations.

5. **Spill prevention practices**

   a. Potential spill areas shall be identified and contained in covered areas with no connection to the storm drain system.
   b. Warning signs shall be posted in hazardous material storage areas.
   c. Preventive maintenance shall be performed on all tanks, valves, pumps, pipes and other equipment as necessary.
   d. Low or non-toxic substances shall be prioritized for use.

Source:	Symbol:	Detail No.
Adapted from USEPA Pub. 840-B-92-002		DE-ESC-3.6.1 Sheet 4 of 5 Effective FEB 2019

NOTE: ALL ESC MAT SHALL BE BIODEGRADABLE

Standard Detail & Specifications

Construction Site Waste Mgt & Spill Control

Notes (cont.)

   e. Contact information for reporting spills through the DNREC 24-Hour Toll Free Number shall be prominently posted.

6. **Education**

   a. Best management practices for construction site pollution control shall be a part of regular progress meetings.
   b. Information regarding waste management, equipment maintenance and spill prevention shall be prominently posted in the construction trailer.

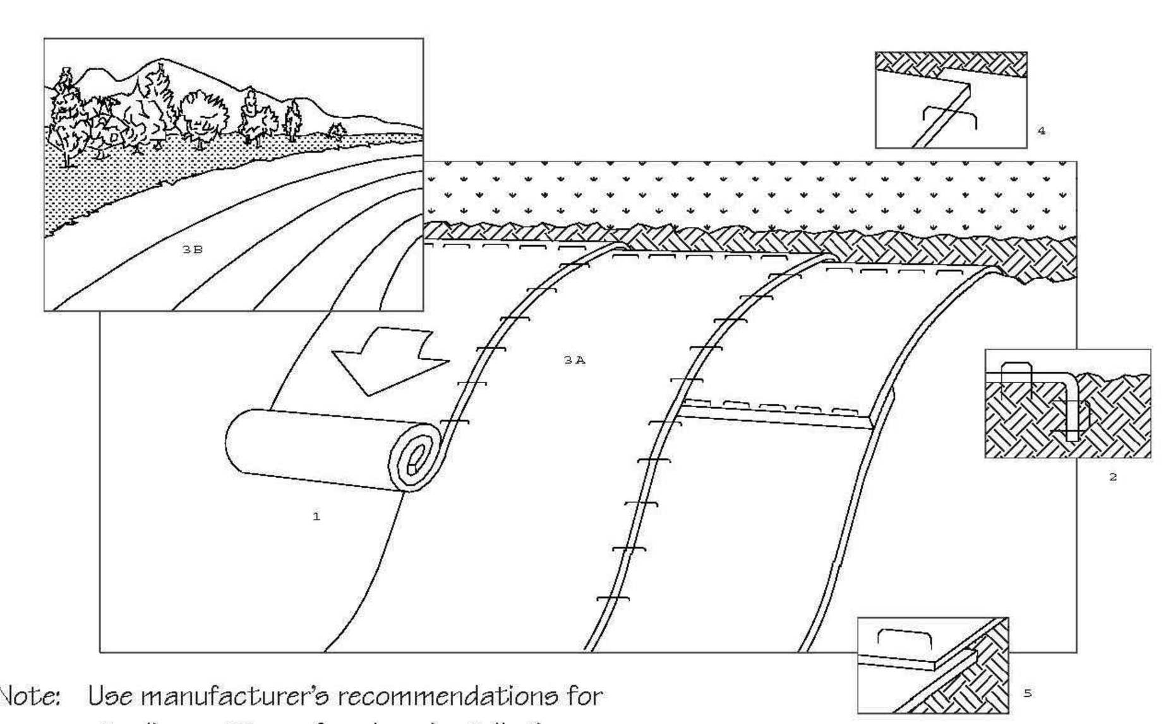
CONTACT INFORMATION

DNREC 24-Hour Toll Free Number	**800-662-8802**
DNREC Solid & Hazardous Waste Management Section	**302-739-9403**

Source:	Symbol:	Detail No.
Adapted from USEPA Pub. 840-B-92-002		DE-ESC-3.6.1 Sheet 5 of 5 Effective FEB 2019

Standard Detail & Specifications

Stabilization Matting - Slope



Note: Use manufacturer's recommendations for stapling patterns for slope installations.

Perspective

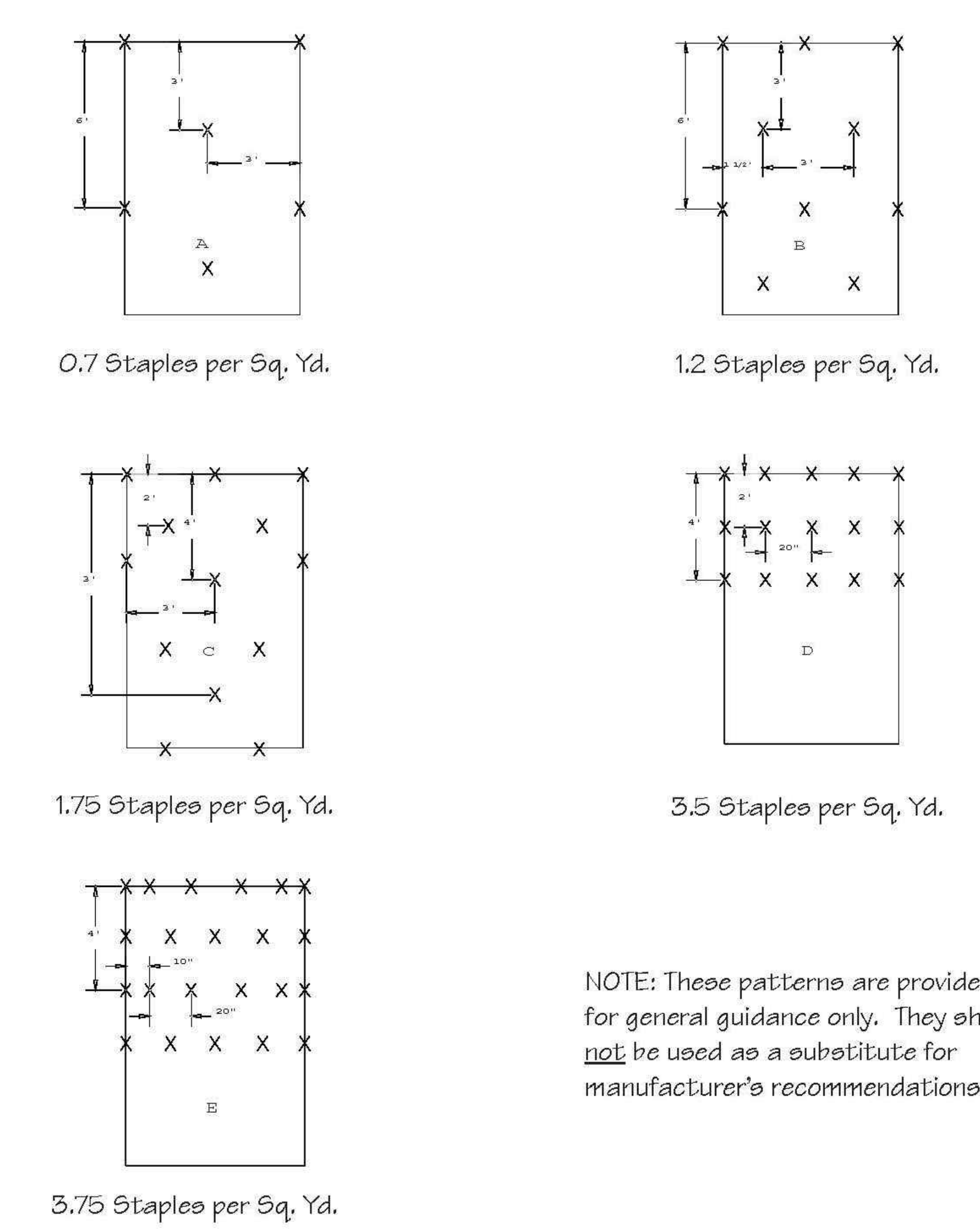
Construction Notes:

1. Prepare soil before installing matting, including application of lime, fertilizer, and seed.
2. Begin at the top of the slope by anchoring the mat in a 6" deep X 6" wide trench. Backfill and compact trench after stapling.
3. Roll the mats (A) down or (B) horizontally across the slope.
4. The edges of parallel mats must be stapled with approx. 2" overlap.
5. When mats must be spliced down the slope, place mats end over end (shingle style) with approx. 4" overlap. Staple through overlapped area, approx. 12" apart.

Source:	Symbol:	Detail No.
Adapted from North American Green, Inc.	SM-S	DE-ESC-3.4.6.1 Sheet 1 of 2 Effective FEB 2019

Standard Detail & Specifications

Stabilization Matting - Slope



NOTE: These patterns are provided for general guidance only. They shall not be used as a substitute for manufacturer's recommendations.

Stapling Patterns

Source:	Symbol:	Detail No.
Adapted from North American Green, Inc.	SM-S	DE-ESC-3.4.6.1 Sheet 2 of 2 Effective FEB 2019

CONSTRUCTION SITE DETAILS AND NOTES 5

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL NUMBER 113-6.00-123.00

SUSSEX COUNTY, DELAWARE

PREPARED FOR CLEANBAY BIOFUELS LLC.

RAUCH inc.
engineering design & development services
office: 410.770.9081 | fax: 410.770.3667
email: design@raucheng.com | web: www.raucheng.com
Maryland Office: 106 N. Harrison St - Easton, MD 21601
Virginia Office: 8229 Boone Blvd, Suite 625 - Vienna, VA 22182

ROBERT D. RAUCH LICENSE No. 8359 DELAWARE REGISTERED PROFESSIONAL ENGINEER

10-Jun-19

Professional Certification
I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Delaware.
License No. 8359
Expiration Date: June 30, 2020

REVISIONS

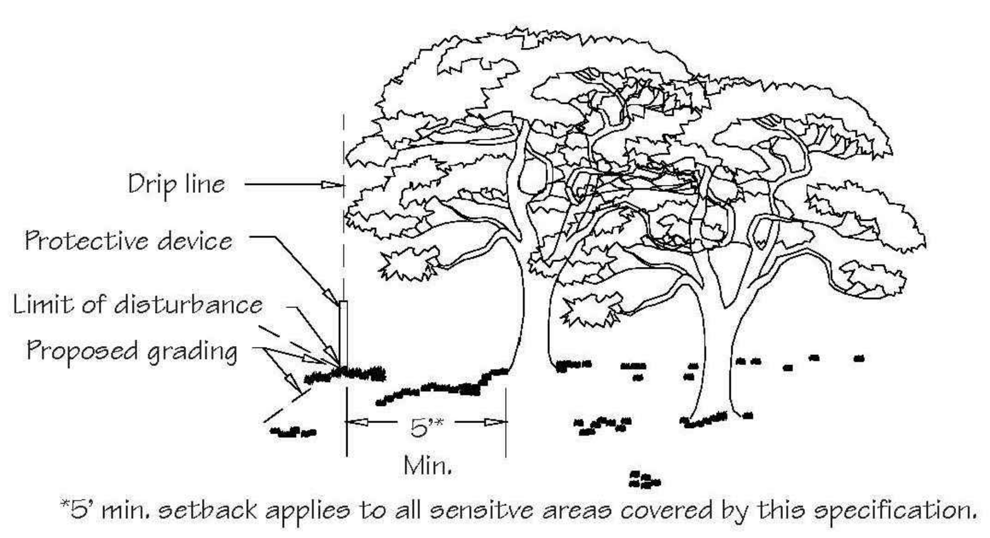
REV. #	DATE	DESCRIPTION
A	6/3/19	Revised per county comments 23 April 2019

DATE:	26/FEB/19
SCALE:	AS SHOWN
DRAWN BY:	WJR
DESIGNED BY:	WJR
APPROVED BY:	X
SHEET NO.:	CB006-C-SW024

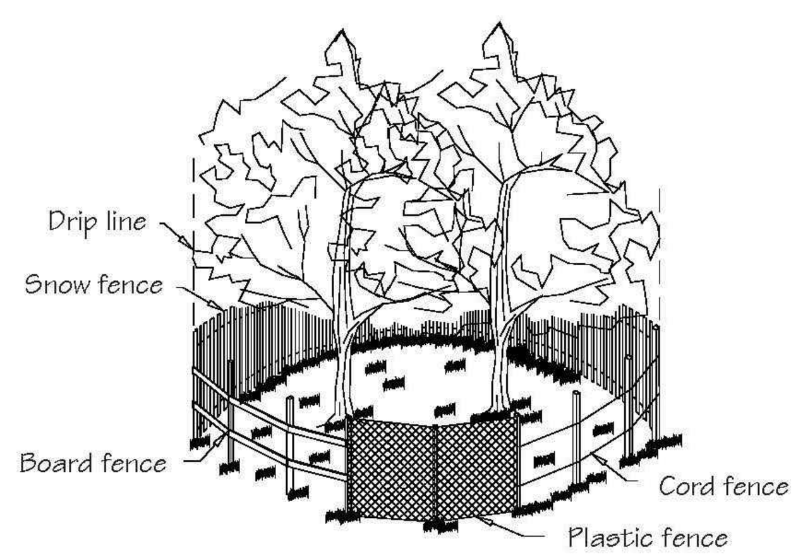
FOR REVIEW

Standard Detail & Specifications
Sensitive Area Protection

DELAWARE EROSION & SEDIMENT CONTROL HANDBOOK



Location of Sensitive Area Protection



Methods of Sensitive Area Protection

Source:	Symbol:	Detail No.
Adapted from VA ESC Handbook	SAP	DE-ESC-3.7.2 Sheet 1 of 3 Effective FEB 2019

Standard Detail & Specifications
Sensitive Area Protection

DELAWARE EROSION & SEDIMENT CONTROL HANDBOOK

Construction Notes:

Fencing shall be installed at the extents of all sensitive areas. For trees, the fencing shall be installed outside the dripline (mature canopy) and at no time within 5 feet of the trunk. Personnel must be instructed to honor protective devices. The devices described are suggested only, and are not intended to exclude the use of other devices which will protect the trees to be retained. If silt fence is to be used for demarcation purposes, appropriate signage shall be provided a minimum of every 20 feet denoting the area as a sensitive area protection zone.

Materials:

1. Snow Fence - Standard 40-inch high snow fence shall be placed at the limits of clearing or construction on standard steel posts set 6 feet apart.
2. Board Fence - Board fencing consisting of 4-inch square posts set securely in the ground and protruding at least 4 feet above the ground shall be placed at the limits of clearing with a minimum of two horizontal boards between posts. For tree proteciton, if it is not practical to erect a fence at the drip line, construct a triangular fence nearer the trunk. The limits of clearing will still be located at the drip line, since the root zone within the drip line will still require protection.
3. Plastic Fencing - 40-inch high "international orange" plastic (polyethylene) web fencing secured to conventional metal "T" or "U" posts driven to a minimum depth of 18 inches on 6-foot minimum centers shall be installed at the limits of clearing. The fence should have the following minimum physical qualities:
   a. Tensile yield: Average 2,000 lbs. per 4-foot width (ASTM D638)
   b. Ultimate tensile yield: Average 2,900 lbs. per 4-foot width (ASTM D638)
   c. Elongation at break (%): Greater than 1000% (ASTM D638)
   d. Chemical resistance: Inert to most chemicals and acids

Source:	Symbol:	Detail No.
Adapted from VA ESC Handbook	SAP	DE-ESC-3.7.2 Sheet 2 of 3 Effective FEB 2019

Standard Detail & Specifications
Sensitive Area Protection

DELAWARE EROSION & SEDIMENT CONTROL HANDBOOK

4. Cord Fence - Posts with a minimum size of 2 inches square or 2 inches in diameter set securely in the ground and protruding at least 4 feet above the ground shall be placed at the limits of clearing with two rows of cord 1/4-inch or thicker at least 2 feet apart running between posts with strips of colored surveyor's flagging tied securely to the string at intervals no greater than 3 feet.
5. Earth Berms - Temporary earth berms shall be constructed according to specifications for a Temporary Earth Dike with the base of the berm on the sensitive area side located along the limits of clearing. Earth berms may not be used for this purpose if their presence will conflict with drainage patterns.
6. Trunk Armoring (Tree Protection Only) - As a last resort, a tree trunk can be armored with burlap wrapping and 2-inch studs wired vertically no more than 2 inches apart to a height of 5 feet encircling the trunk. If this alternative is used, the root zone within the drip line will still require protection. Nothing should ever be nailed to a tree.

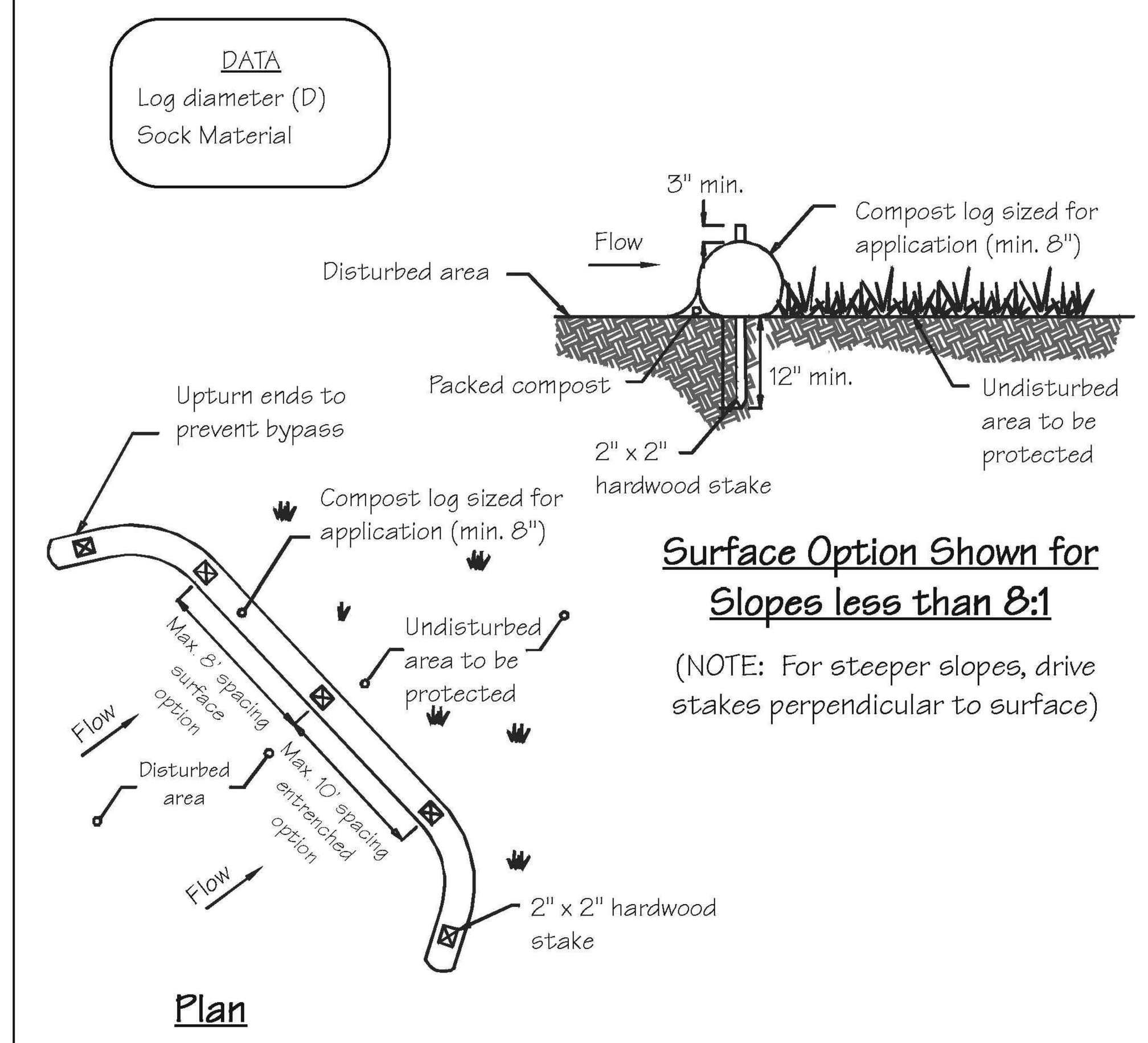
Maintenance:

Fencing and armoring devices shall be in place before any excavation or grading is begun, shall be kept in good repair for the duration of construction activities, and shall be the last items removed during the final cleanup after the completion of the project.

Source:	Symbol:	Detail No.
Adapted from VA ESC Handbook	SAP	DE-ESC-3.7.2 Sheet 3 of 3 Effective FEB 2019

Standard Detail & Specifications
Compost Filter Log

DELAWARE EROSION & SEDIMENT CONTROL HANDBOOK



NOTE: Manufacturer's recommendations supersede any installation details shown for this practice

Source:	Symbol:	Detail No.
Adapted from MD Stds & Specs for ESC & Filtrexx[TM] International	CFL	DE-ESC-3.1.7 Sheet 1 of 2 Effective FEB 2019

Standard Detail & Specifications
Compost Filter Log

DELAWARE EROSION & SEDIMENT CONTROL HANDBOOK

Construction Notes:

1. Prior to installation, clear bedding area of obstructions including rocks or debris larger than 1 inch and fill in any sharp depression areas.
2. If socks are prepared on-site, fill the sock fabric using a pneumatic blower so that the logs are rigid and do not deform. Terminate at the desired length.
3. For trenched applications, excavate 2 to 4 inches below grade along the width and length of the compost filter log.
4. Install the compost filter logs perpendicular to the flow direction and parallel to the slope with the beginning and end of the installation pointing up the slope a minimum of 1 foot elevation difference. On sites where this is not possible, upturn at a minimum length of 10' at a 30 degree angle to prevent runoff bypass.
5. For untrenched applications, blow or hand pack soil, mulch, or compost on the upslope side of the log, filling the bottom void area.
6. Stake the filled log every 10 feet maximum through the center of the sock for trenched applications, or every 8 feet for untrenched. The stake shall be a 2" by 2" hardwood. It should extend 12" below grade and protrude at least 3" above the top of the sock. If located on a slope greater than 8:1, the stake shall be angled downslope at a 45 degree angle to prevent the force of the water from dislodging to log.
7. When the length of the compost filter log needed exceeds the available compost filter sock length, the next sock shall be overlapped a minimum of 12" before being filled, and a stake placed through both socks at the overlap.
8. Remove accumulated sediment when it has reached half of the effective height of the log.
9. Inspect weekly and after rain event. If sock is degrading or the sock is failing, vegetate to secure the compost, replace the log, or reinforce with an additional log. If the log has been crushed due to construction equipment, it can be "fluffed" back to its effective height. If the effective height can no longer be restored, the log shall be replaced or reinforced with an additional compost filter log.

Source:	Symbol:	Detail No.
Adapted from MD Stds & Specs for ESC & Filtrexx[TM] International	CFL	DE-ESC-3.1.7 Sheet 2 of 2 Effective FEB 2019

CONSTRUCTION SITE DETAILS AND NOTES 5

OF THE LANDS OF
CLEANBAY SUSSEX 1
PARCEL NUMBER 113-6.00-123.00
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ROBERT D. RAUCH LICENSE No. 8359 DELAWARE PROFESSIONAL ENGINEER
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I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Delaware.
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REVISIONS

REV. #	DATE	DESCRIPTION
A	6/3/19	Revised per county comments 23 April 2019

DATE: 26/FEB/19
SCALE: AS SHOWN
DRAWN BY: WJR
DESIGNED BY: WJR
APPROVED BY: X
SHEET NO.: CB006-C-SW025

FOR REVIEW

CONSTRUCTION SEQUENCE

1. NOTIFY THE SUSSEX CONSERVATION DISTRICT IN WRITING AT LEAST FIVE (5) DAYS PRIOR TO THE START OF CONSTRUCTION. FAILURE TO DO SO CONSTITUENTS A VIOLATION OF THE APPROVED SEDIMENT AND STORMWATER MANAGEMENT PLAN.

2. PRIOR TO ANY CLEARING, INSTALLATION OF SEDIMENT CONTROL MEASURES, OR GRADING, SCHEDULE AND CONDUCT A PRE-CONSTRUCTION MEETING WITH THE AGENCY CONSTRUCTION SITE REVIEWER. THE LANDOWNER/DEVELOPER REPRESENTATIVE, SITE CONTRACTOR, AND CERTIFIED CONSTRUCTION REVIEWER ARE REQUIRED TO BE IN ATTENDANCE AT THE PRE-CONSTRUCTION MEETING; THE SITE DESIGNER IS RECOMMENDED TO ATTEND.

PERIMETER CONTROLS

3. INSTALL THE ENTRANCEWAY CULVERTS AND STABILIZED CONSTRUCTION ENTRANCE(S) AS INDICATED ON THE PLAN, FOLLOWED BY THE PERIMETER CONTROLS (I.E., BERMS, SILT FENCE, COMPOST LOGS) AND INLET PROTECTION ON ANY EXISTING INLETS. MARK THE LIMITS OF SENSITIVE AREAS, SUCH AS PRESERVED TREES, INFILTRATION AREAS, AND OTHER SECTIONS THAT ARE NOT TO BE DISTURBED WITH A PHYSICAL BARRIER. ONLY CLEAR WOODS THAT ARE NEEDED TO INSTALL THE PERIMETER CONTROLS (AS NEEDED).

4. SCHEDULE A PERIMETER CONTROL REVIEW WITH THE AGENCY CONSTRUCTION SITE REVIEWER.

5. THE CONTRACTOR SHOULD AT ALL TIMES PROTECT AGAINST SEDIMENT OR DEBRIS LADEN RUNOFF OR WIND FROM LEAVING THE SITE. ALL PERIMETER CONTROLS ARE TO BE REVIEWED BY THE AGENCY CONSTRUCTION SITE REVIEWER AND APPROVED PRIOR TO PROCEEDING WITH FURTHER SITE DISTURBANCE OR CONSTRUCTION.

6. CHECK PERIMETER CONTROLS DAILY AND ADJUST AND/OR REPAIR TO FULLY CONTAIN AND CONTROL SEDIMENT FROM LEAVING THE SITE. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT HAS REACHED HALF OF THE EFFECTIVE CAPACITY OF THE CONTROL. ADJUST OR ALTER MEASURES IN TIMES OF ADVERSE WEATHER CONDITIONS, AS NEEDED OR AS DIRECTED BY THE AGENCY CONSTRUCTION SITE REVIEWER.

PRE-CONSTRUCTION SITE STORMWATER MANAGEMENT PLAN

7. SEE THE DETAILED CONSTRUCTION SEQUENCE ON THE PRE-CONSTRUCTION SITE STORMWATER MANAGMENT PLAN FOR SEQUENCING.

8. CLEAR AND GRUB THE SEDIMENT TRAP AND BASIN AREA(S).

9. NOTIFY THE PERSON RESPONSIBLE FOR STORMWATER SYSTEM CONSTRUCTION REVIEW AT LEAST THREE (3) DAYS PRIOR TO THE START OF THE STORMWATER SYSTEM CONSTRUCTION; STORMWATER FACILITIES MUST BE REVIEWED THROUGHOUT THEIR CONSTRUCTION.

10. CONSTRUCT THE SEDIMENT TRAP AND/OR BASIN(S), STARTING WITH THE OUTLET DEVICE AND DISCHARGE PIPE, AND STABILIZE IMMEDIATELY WITH SEED AND MULCH. FOR BASIN CONSTRUCTION, SEE THE SPECIFIC CONSTRUCTION SEQUENCE FOR THE FACILITY.

11. STOCKPILE TOPSOIL AND EXCAVATED SUBSOILS. STOCKPILES SHOULD BE SURROUNDED WITH A PERIMETER CONTROL, LOCATED ON LAND WITH SLIGHT TO NO SLOPE, AND STABILIZED ONCE INACTIVE.

12. CONSTRUCT TEMPORARY EARTH DIKES, BERMS, AND/OR SWALES NEEDED FOR SEDIMENT AND EROSION CONTROL AS INDICATED ON THE PLAN AND STABILIZE IMMEDIATELY AS PER THE VEGETATION SPECIFICATIONS. ALL CONVEYANCE AREAS, AND SLOPES, REQUIRE SEEDING AND MATTING AT A MINIMUM.

13. PERFORM ANY DEMOLITION WORK, AND CLEAR, GRUB, AND ROUGH GRADE THE SITE'S ROADWAYS. STOCKPILE APPROPRIATELY.

14. CONSTRUCT ROADSIDE DITCHES AND TEMPORARILY STABILIZE. STONE CHECK DAMS SHALL BE INSTALLED AT THIS TIME IF APPLICABLE.

15. CLEAR AND GRUB REMAINING AREAS WITHIN THE LIMITS OF DISTURBANCE FOR THE PHASE OF CONSTRUCTION.STOCKPILE APPROPRIATELY.

CONSTRUCTION SITE STORMWATER MANAGEMENT PLAN

16. SEE THE DETAILED CONSTRUCTION SEQUENCE ON THE CONSTRUCTION SITE STORMWATER MANAGMENT PLAN FOR SEQUENCING.

17. CONSTRUCT THE STORMWATER CONVEYANCE SYSTEM, STARTING AT THE LOWEST ELEVATION WITHIN THE NETWORK ANDWORKING UPWARDS. INSTALL NECESSARY INLET PROTECTION AS SHOWN ON PLAN. INSTALL ANY REMAINING STORMWATER MANAGEMENT FACILITIES, FOLLOWING ITS RESPECTIVE SEQUENCE OF CONSTRUCTION.[ADDITIONAL SEQUENCE OF CONSTRUCTION TO BE PROVIDED FOR ALL STORMWATER FACILITIES.]

18. INSTALL REMAINING ROADWAY UTILITIES. [AS APPLICABLE]

19. INSTALL THE CURB AND GUTTER [AS APPLICABLE], FOLLOWED BY THE SUB-BASE AND BASE COURSE SECTIONS OF THE ROADWAYS TO DESIGN GRADES. INSTALL ANY SIDEWALKS.

20. ROUGH GRADE LOT OR BUILDING AREAS AND INDIVIDUAL UTILITY CONNECTIONS. TEMPORARY STABILIZATION IS TO BE APPLIED IN ACCORDANCE WITH THE STABILIZATION NOTES AND DETAILS.

21. COMMENCE BUILDING CONSTRUCTION. [AS APPLICABLE]

22. FINAL GRADE SWALES OR DITCHES, AND APPLY PERMANENT STABILIZATION AS SOON AS FINAL GRADE IS ACHIEVED.

23. FINAL GRADE LOT OR BUILDING AREAS AND APPLY PERMANENT STABILIZATION

24. FLUSH OUT THE STORMWATER PIPES FOR ANY ACCUMULATED SEDIMENT, AND REMOVE SEDIMENT FROM WITHIN ANY FOREBAYS, WITH INSPECTION BY THE CERTIFIED CONSTRUCTION REVIEWER AND/OR THE AGENCY CONSTRUCTION SITE REVIEWER. UPON APPROVAL OF THE AGENCY CONSTRUCTION SITE REVIEWER, CONVERT THE SEDIMENT BASIN TO FINAL POND DESIGN AS SPECIFIED ON THE POND CONVERSION NOTES, AND/OR FILL IN ANY SEDIMENT TRAPS. PROVIDE PERMANENT STABILIZATION AS PER THE VEGETATION SPECIFICATIONS.

POST CONSTRUCTION SITE STORMWATER MANAGEMENT PLAN

25. SEE THE DETAILED CONSTRUCTION SEQUENCE ON THE POST CONSTRUCTION SITE STORMWATER MANAGMENT PLAN FOR SEQUENCING.

26. WHEN ALL UPSTREAM CONTRIBUTING AREAS HAVE BEEN STABILIZED, COMMENCE CONSTRUCTION OF ANY ADDITIONAL STORMWATER MANAGEMENT FACILITIES. CARE SHOULD BE TAKEN TO PROHIBIT COMPACTION OF THE UNDERLYING SOILS DURING CONSTRUCTION. PROVIDE PERMANENT STABILIZATION. [AS APPLICABLE]

27. INSTALL TOPCOAT TO THE ROADWAYS.

28. THE EROSION AND SEDIMENT CONTROL DEVICES SHOULD BE REMOVED ONLY AFTER WORK IN AN AREA HAS BEEN COMPLETED AND STABILIZED, WITH WRITTEN APPROVAL FROM THE AGENCY CONSTRUCTION SITE REVIEWER. [REQUIRED SEQUENCE ITEM] COORDINATE THE INSPECTION, AND AFTER THE WRITTEN APPROVAL, REMOVE THE REMAINING CONSTRUCTION SITE CONTROLS.

29. IF ANY INDIVIDUAL LOTS ARE SOLD AND DEVELOPED, PROVIDE ON-SITE EROSION AND SEDIMENT CONTROLS FOR THAT LOT (PERIMETER CONTROLS AND A STABILIZED CONSTRUCTION ENTRANCE, AT A MINIMUM). [AS APPLICABLE]

30. PRIOR TO COMMENCING A NEW PHASE OF CONSTRUCTION, RECEIVE WRITTEN APPROVAL FROM THE AGENCY CONSTRUCTION SITE REVIEWER THAT THE PREVIOUS PHASE HAS BEEN SUFFICIENTLY STABILIZED. [REQUIRED SEQUENCE ITEM, AS APPLICABLE]

31. TERMINATE COVERAGE OF THE CONSTRUCTION GENERAL PERMIT, WHICH REQUIRES SUBMISSION AND ACCEPTANCE OF THE POST CONSTRUCTION VERIFICATION DOCUMENTS, INCLUDING FINAL STABILIZATION THROUGHOUT THE SITE, ALL ELEMENTS OF THE SEDIMENT AND STORMWATER MANAGEMENT PLAN IMPLEMENTED, ACCEPTANCE OF THE FINAL OPERATION AND MAINTENANCE PLAN, AND SUBMITTAL OF THE NOTICE OF TERMINATION. [REQUIRED SEQUENCE ITEM]

Summary Table for Sub-Areas Draining to a Common Point of Interest (POI)[1]

POI: ____________________

Ref. #	Sub-Area ID[2]	Contributing Area (ac)	RPv Runoff Reduction Shortfall(+) or Credit(-) (cu.ft.)[3]	Adjusted RPv CN after all reductions[4]	Cv RCN for H&H Modeling[4]	Fv RCN for H&H Modeling[4]	TN Pollutant Load (lb/yr)	TP Pollutant Load (lb/yr)	TSS Pollutant Load (lb/yr)
1	PR-1-A	1.81	0	47.79	47.79	47.79	2.48	0.33	99.05
2	PR-1-SW	16.65	-4511	54.01	62.78	65.22	34.95	4.72	1397.97
3	PR-2	0.02	0	80.00	80.00	80.00	0.17	0.02	6.64
4	PR-3	2.85	45	55.33	55.33	55.33	6.51	0.88	260.50
5	PR-4B	0.96	1112	68.35	68.35	68.35	4.59	0.62	183.80
Totals to Common POI		**22.29 ac**	**-3354 cu.ft.**	**54.31**	**60.87**	**62.69**	**48.70 lb/yr**	**6.57 lb/yr**	**1947.96 lb/yr**
RPv Runoff Reduction Goal Met?			**YES**						
If Not, Total Offset Volume Required			**N/A**						

Notes:

1. As long as the site lies within the same watershed, all sub-areas within the site can be tallied to reflect global site conditions; or, the summary table can be used to show conditions to a specific POI.
2. Only the most downstream sub-area information should be entered for a series of sub-areas that drain directly into each other, as the upstream areas will already be accounted for in the DURMM computations.
3. A RPv runoff reduction shortfall should be entered as a positive number, as it is the runoff volume still needed to be reduced. A RPv credit should be entered as a negative number, as it indicates the additional volume that was reduced past the requirement.
4. To portray an accurate total weighted CN value for the RPv, Cv and Fv events, an entry must be made for every defined sub-area. If a sub-area's contributing drainage acreage is entered, but not its corresponding CN value, then the total weighted CN will be skewed.

NOTE: TO SEE SUB AREAS AND POI REFER TO SHEET CB006-C-SW013

CONSTRUCTION SITE NOTES

1. THE RESPONSIBILITY TO OPERATE AND MAINTAIN EACH POST CONSTRUCTION STORMWATER MANAGEMENT FACILITY SHALL BE ON THE CONTRACTOR DOING CONSTRUCTION AND THE OWNER POST CONSTRUCTION.

2. THE DNREC SEDIMENT AND STORMWATER PROGRAM AND/OR THE SUSSEX COUNTY SOIL CONSERVATION DISTRICT RESERVES THE RIGHT TO ENTER PRIVATE PROPERTY FOR PURPOSES OF PERIODIC SITE REVIEWS.

3. THE DNREC SEDIMENT AND STORMWATER PROGRAM [OR THE SUSSEX COUNTY SOIL CONSERVATION DISTRICT] SHOULD BE NOTIFIED WITH 30 BUSINESS DAYS IF THE PROPERTY OWNERSHIP IS TRANSFERRED TO A NEW PERSON OR ENTITY.

4. THE DNREC SEDIMENT AND STORMWATER PROGRAM AND/OR THE SUSSEX COUNTY SOIL CONSERVATION DISTRICT MAY SEEK ENFORCEMENT ACTION AGAINST ANY OWNER DEEMED NEGLIGENT IN FULFILLING THE OPERATIO AND MAINTENANCE REQUIREMENTS OF THE DELAWARE SEDIMENT AND STORMWATER REGULATIONS.

5. THE DNREC SEDIMENT AND STORMWATER PROGRAM [OR, THE SUSSEX COUNTY SOIL CONSERVATION DISTRICT] SHOULD BE CONTACTED IF A CONCERN ARISES REGARDING A STORMWATER MANAGEMENT FACILITY, BEFORE ANY NON-ROUTINE MAINTENANCE, OR IF MODIFICATIONS TO THE FACILITY ARE DESIRED.

6. ANY DESIGN MODIFICATIONS MADE TO THE STORMWATER SYSTEM SHALL REQUIRE THE CREATION OF A NEW POST CONSTRUCTION STORMWATER MANAGEMENT PLAN AND/OR OPERATIONS AND MAINTENANCE PLAN, WITH APPROVAL OF THE PLAN(S) BY THE DNREC SEDIMENT AND STORMWATER PROGRAM [OR THE SUSSEX COUNTY SOIL CONSERVATION DISTRICT].

7. FOR ALL STORMWATER EASEMENT AREAS (I.E., ACCESS, MAINTENANCE, OR OFFSITE) AND THE MINIMUM 10-FOOT WIDE ACCESSWAYS TO ALL STORMWATER FACILITIES AND THEIR STRUCTURAL COMPONENTS, REGULAR MOWING SHOULD BE PERFORMED TO KEEP THE GRASS 6 INCHES OR LESS; NO TREES OR SHRUBS SHOULD BE PLANTED, AND ANY FOUND GROWING SHOULD BE REMOVED; AND NO PERMANENT STRUCTURES, SUCH AS FENCES OR SHEDS, SHOULD BE LOCATED WITHIN THE EASEMENT OR ACCESSWAY.

8. TREES SHOULD NOT BE PLANTED, AND SHOULD BE REMOVED IF FOUND GROWING, ON AND WITHIN 15 FEET OF ALL POND EMBANKMENTS, ON POND SLOPES OR SAFETY BENCHES, AND WITHIN 10 FEET OF STRUCTURAL COMPONENTS, SUCH AS PIPE INLETS.

9. WHEN THE FACILITY IS EXCAVATED TO REMOVE ACCUMULATED SEDIMENT, THE DISPOSAL AREA SHALL BE PERMANENTLY STABILIZED SO THAT IT DOES NOT RECREATE AN EROSION PROBLEM. ANY MATERIAL TAKEN OFFSITE SHALL STILL BE USED OR DISPOSED OF IN AN APPROVED DNREC MANNER.

10. BEFORE ANY EARTHWORK OR EXCAVATION TAKES PLACE, THE CONTRACTOR SHOULD CALL MISS UTILITY AT 811 OR 1-800-282-8555 AT LEAST 48 HOURS PRIOR TO CONSTRUCTION, TO HAVE ALL EXISTING UTILITIES MARKED ONSITE.

11. ANY FACILITY SPECIFIC ROUTINE OR NON-ROUTINE MAINTENANCE, AND/OR OPERATIONAL REQUIREMENTS NOT LISTED IN THE ABOVE-MENTIONED STANDARD REQUIREMENTS FOR THE TYPE OF FACILITY. MAY INCLUDE, BUT IS NOT LIMITED TO ANY MOWING, SEDIMENT REMOVAL, PIPE INSPECTIONS, WATERING, RESEEDING/PLANTING, TRASH REMOVAL, ETC

VOLUME OF CUT : 20,178 CU-YD
VOLUME OF FILL : 23,540 CU-YD

CONSTRUCTION SITE DETAILS AND NOTES 6

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL NUMBER 113-6.00-123.00

SUSSEX COUNTY, DELAWARE

PREPARED FOR CLEANBAY BIOFUELS LLC.

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11-Jun-19

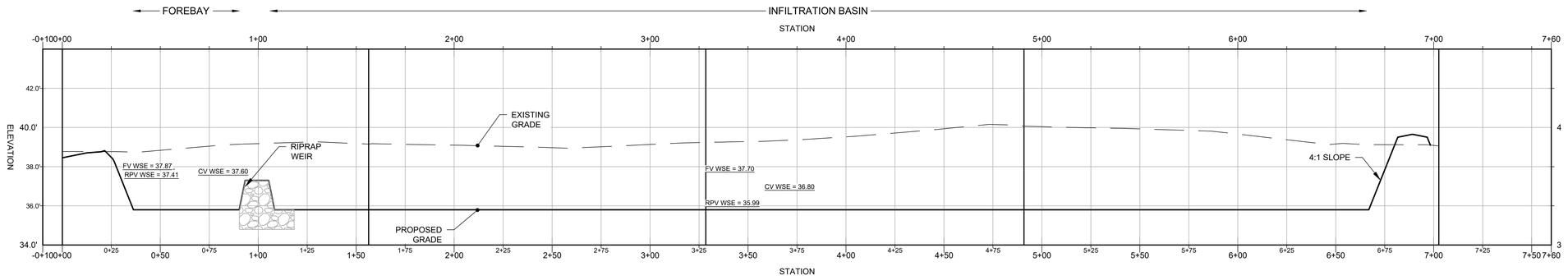
Professional Certification
I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Delaware.
License No. 8359
Expiration Date: June 30, 2020

REVISIONS

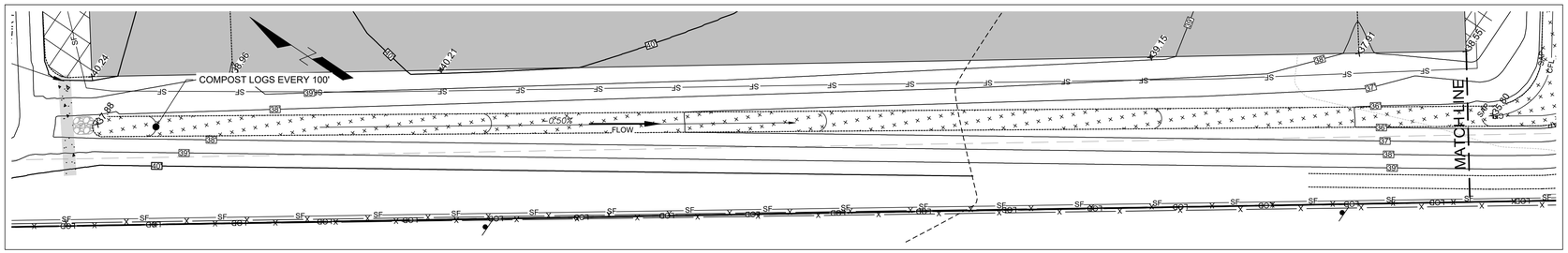
REV. #	DATE	DESCRIPTION
A	6/3/19	Revised per county comments 23 April 2019

DATE:	26/FEB/19
SCALE:	AS SHOWN
DRAWN BY:	WJR
DESIGNED BY:	WJR
APPROVED BY:	X
SHEET NO.:	CB006-C-SW026

FOR REVIEW

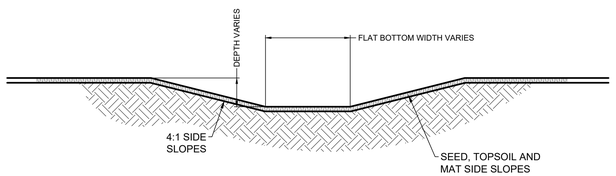


10V:1H EXAGGERATED PROFILE: E
SCALE AS SHOWN



SW INFILTRATION BASIN INLET SWALE PLAN

SCALE 1"=20'



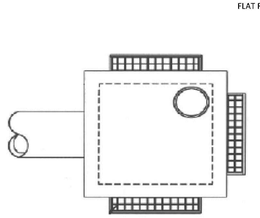
STANDARD SWALE DETAIL

NTS

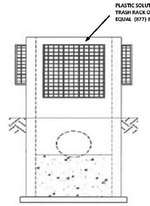
StormRax™

FLAT RACK SIDE WEIR

PLASTIC SOLUTIONS, INC. TRASH RACK OR APPROVED EQUAL (877) 877-5727



PLAN VIEW



SIDE VIEW

AVAILABLE OPTIONS
REMOVABLE ACCESS PANEL
ANTI VORTEX PLATE

WEIR DIMENSIONS
WEIR OPENING WIDTH (in) "A"
WEIR OPENING LENGTH (in) "B"

Plastic Solutions, Inc.
P.O. BOX 4386, WINCHESTER, VA. 22604
238 McGHEE RD. WINCHESTER, VA. 22603
PH.: (877) 877-5727
FAX: (540) 722-2219
WEBSITE: WWW.PLASTIC-SOLUTION.COM

CUSTOMER:
PROJECT:
DATE:
DRAWN BY:
APP'D BY:
DETAIL:
DWG. NO.:

SEQUENCE OF CONSTRUCTION FOR INFILTRATION BASINS PONDS

SEE CB06-C-SW025 FOR FULL SEQUENCE

PRE-CONSTRUCTION PHASE

CLEARLY MARK OUT EXTENTS OF BASINS, VEGETATED SWALES AND OUTFALL STRUCTURES.

INSTALL OUTLET STRUCTURE AND PIPE STARTING AT THE DOWNSTREAM MOST POINT AND WORKING UPSTREAM

EXCAVATE BASINS TO FINAL GRADE AND AMEND SOIL WITH BACKFILL WITH 4" TOPSOIL SALVAGED FROM ON SITE AND 2" WOOD CHIPS AND THOROUGHLY MIX INTO THE TOP 18" OF THE BED. USE LOW GROUND PRESSURE EQUIPMENT WHERE TRAVERSING THE INFILTRATION BED AND KEEP MOVEMENT ACROSS THE BED TO A MINIMUM.

PLACE FILL/TOPOSIL WON FROM THE BASIN AT DESIGNATED STOCKPILE AREAS AND IMMEDIATELY STABILIZE ALL EXPOSED SOIL

PERMANENTLY STABILIZE THE INFILTRATION BASIN BED WITH THE SEED MIXES SPECIFIED IN THE BASIN SEEDING SCHEDULE, AND TEMPORARY SEED MIXTURE AS SPECIFIED IN DE-ESC-3.4.3

INSTALL COMPOST FILTER LOGS, PERMANENTLY STABILIZE SIDE SLOPES WITH TOPSOIL, SEED AND EROSION CONTROL MATTING, INSTALL SUPER SILT FENCE ALONG TOP OF SLOPES. INSTALL ALL ADDITIONAL ASSOCIATED SEDIMENT CONTROL DEVICES

TEST THE INFILTRATION BED TO ENSURE THAT THE SOIL INFILTRATION RATE IS WITHIN THE SPECIFIED RANGE ACCORDING TO TABLE 1.2 IN THE DELAWARE POST CONSTRUCTION STORMWATER BMP STANDARDS AND SPECS.

CONSTRUCTION PHASE

MAINTAIN ALL SEDIMENT CONTROL DEVICES. IMMEDIATELY REMOVE ANY SEDIMENT THAT BUILDS UP IN FOREBAYS OR INSIDE THE INFILTRATION BASIN.

POST CONSTRUCTION PHASE

AFTER THE ASSOCIATED DRAINAGE AREA HAS BEEN COMPLETELY STABILIZED, INFILTRATION BASINS SHALL BE COMPLETED.

CONSTRUCT ANY FOREBAYS OR WEIRS, AT THIS TIME ALL EFFORTS SHALL BE UNDERTAKEN TO MINIMIZE COMPACTION TO THE INFILTRATION BED. RE-TEST INFILTRATION RATES TO ENSURE THAT THE SOIL INFILTRATION RATE IS WITHIN THE SPECIFIED RANGE ACCORDING TO TABLE 1.2 IN THE DELAWARE POST CONSTRUCTION STORMWATER BMP STANDARDS AND SPECS AND SHOWS NO SIGN OF CLOGGING FROM SEDIMENT THAT HAS WASHED INTO THE BASIN DURING THE CONSTRUCTION PHASE OF THE PROJECT. USE LOW GROUND PRESSURE EQUIPMENT AND MINIMIZE COMPACTION TO THE INFILTRATION BASIN FLOOR.

THE INFILTRATION BED SHALL BE TESTED BY A QUALIFIED PROFESSIONAL AS PER APPENDIX 1 IN THE DELAWARE POST CONSTRUCTION STORMWATER BMP STANDARDS AND SPECIFICATIONS.

BASIN SEEDING SCHEDULE

SEED BASES OF INFILTRATION BASIN WITH

- 50% ERNMX-180-2 SOUTH EASTERN RAIN GARDEN MIX @ 0.5lb/1000 SQ-FT
- 50% ERNMX-183 NATIVE DETENTION AREA MIX @ 0.5lb/1000 SQ-FT

ALL OTHER AREAS SHALL BE STABILIZED WITH TOPSOIL AND PERMANENT SEEDING AS PER ESC STANDARDS

TURF FILTER STRIP
PRE-TREATMENT

INFILTATION BED AREA TO BE SEEDED WITH ERNST SEED MIXES AND TEMPORARY STABILIZATION MIX

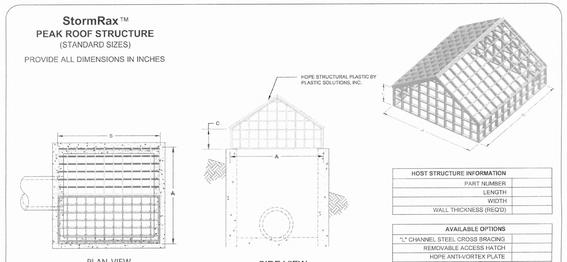
SEEDING RATES

BASIN	AREA SQ-FT	TOTAL WT OF SEED LB
NE	3789	8
NW	11523	22
SE	13356	26
SW	34977	68
TOTAL		124

PERMANENTLY STABILIZE ALL BARE EARTH WITH TOPSOIL AND PERMANENT SEEDING

StormRax™
PEAK ROOF STRUCTURE
(STANDARD SIZES)

PROVIDE ALL DIMENSIONS IN INCHES



HOST STRUCTURE INFORMATION
PART NUMBER
LENGTH
WIDTH
WALL THICKNESS (REQ'D)

AVAILABLE OPTIONS
"L" CHANNEL STEEL CROSS BRACING
REMOVABLE ACCESS HATCH
HOPE ANTI-VORTEX PLATE

NOTES: 1. GABLE END SHOULD BE SHORTER END WHEN MEASURING.
2. MEASUREMENT CHANGES WILL OCCUR WHEN ACCESS DOOR IS NEEDED AND LADDER PLACEMENT IS DETERMINED.

DIMENSION CODES (A, B, C)

WIDTH A	29 1/8	36 13/16	45 13/16	54 11/16	66 7/16	72 9/16	81 5/16	90 9/16	99 1/2	108 3/8
CODE	03	04	05	06	07	08	09	10	11	12
LENGTH B	32 7/8	38 1/4	43 5/8	49	54 3/8	59 3/4	65 1/8	70 1/2	76 1/2	81 7/8
CODE	06	07	08	09	10	11	12	13	14	15
HEIGHT C	11 5/16	16 7/8								
CODE	02	03								
	2 Grids High	3 Grids High								

Peak Roof — Width A — Length B — Height C

Plastic Solutions, Inc.
PO Box 4386, Winchester, VA 22604
238 McGhee Rd, Winchester, VA 22603
(877) 877-5727 phone
(540) 722-2219 fax
http://www.plastic-solution.com

CUSTOMER:
PROJECT:
DATE:
DRAWN BY:
APP'D BY:
DETAIL:

POST CONSTRUCTION SITE SWM PLAN 1

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL NUMBER 113-6.00-123.00
SUSSEX COUNTY, DELAWARE

PREPARED FOR CLEANBAY BIOFUELS LLC.

RAUCH INC.
engineering design & development services
office: 410.770.9081 | fax: 410.770.3667
email: design@raucheng.com | web: www.raucheng.com
Maryland Office: 8 Market Place, Baltimore, MD 21202
Virginia Office: 8229 Boone Blvd, Suite 625 | Vienna, VA 22182

Professional Certification
I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Delaware.
License No. 8359
Expiration Date: June 30, 2020

REVISIONS

REV. #	DATE	DESCRIPTION
A	6/3/19	Revised per county comments 23 April 2019

DATE: 2/6/19
SCALE: AS SHOWN
DRAWN BY: WJR
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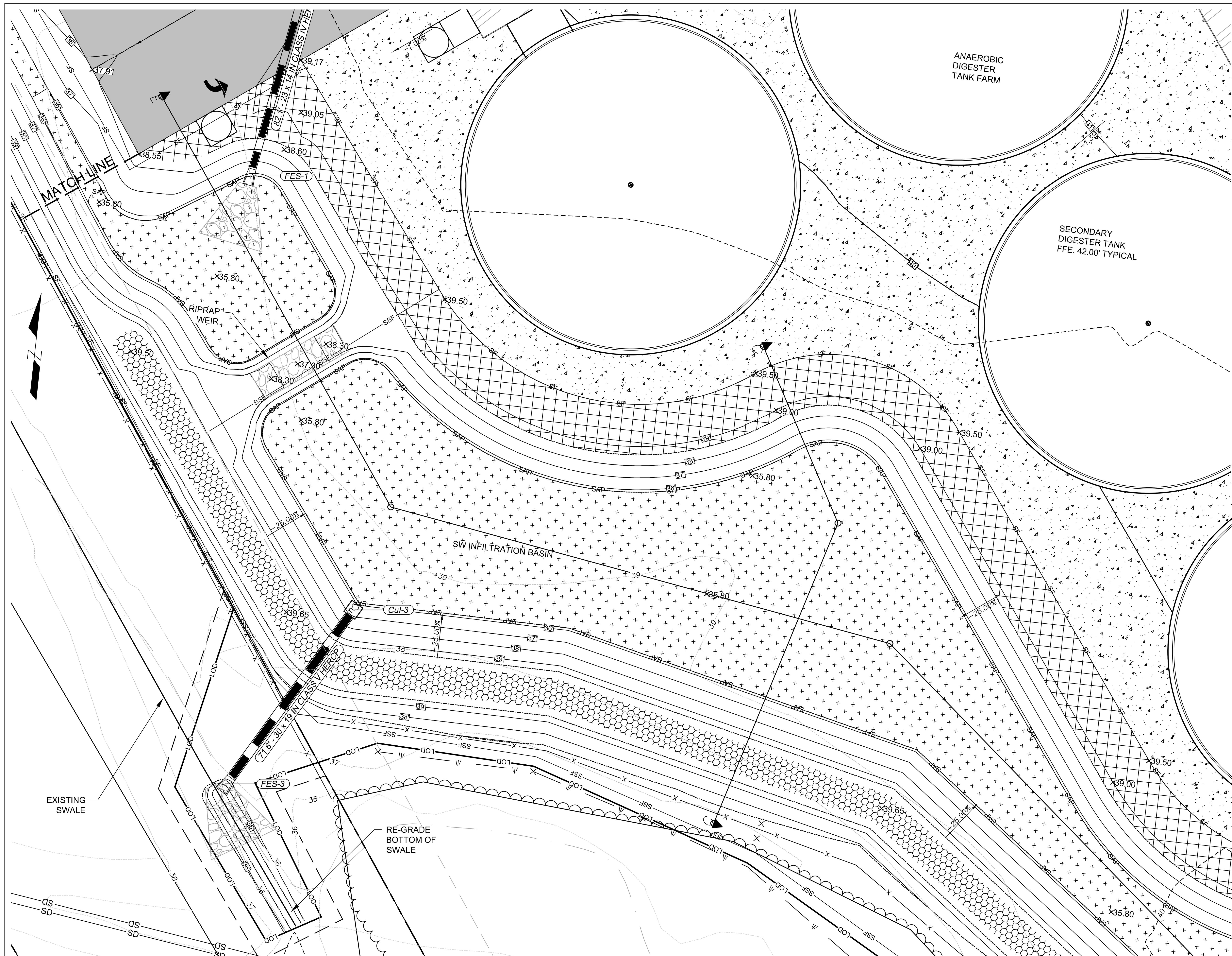
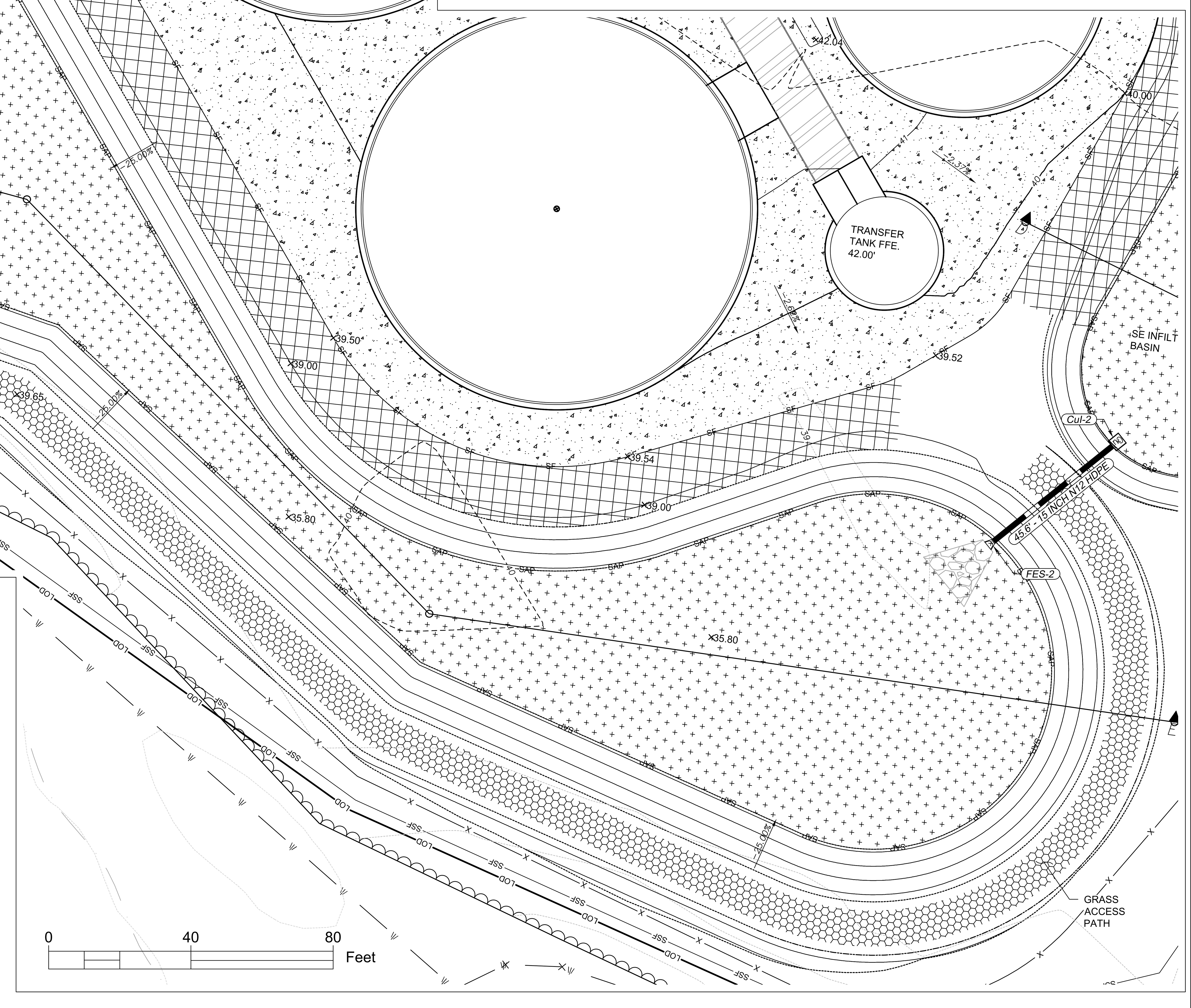
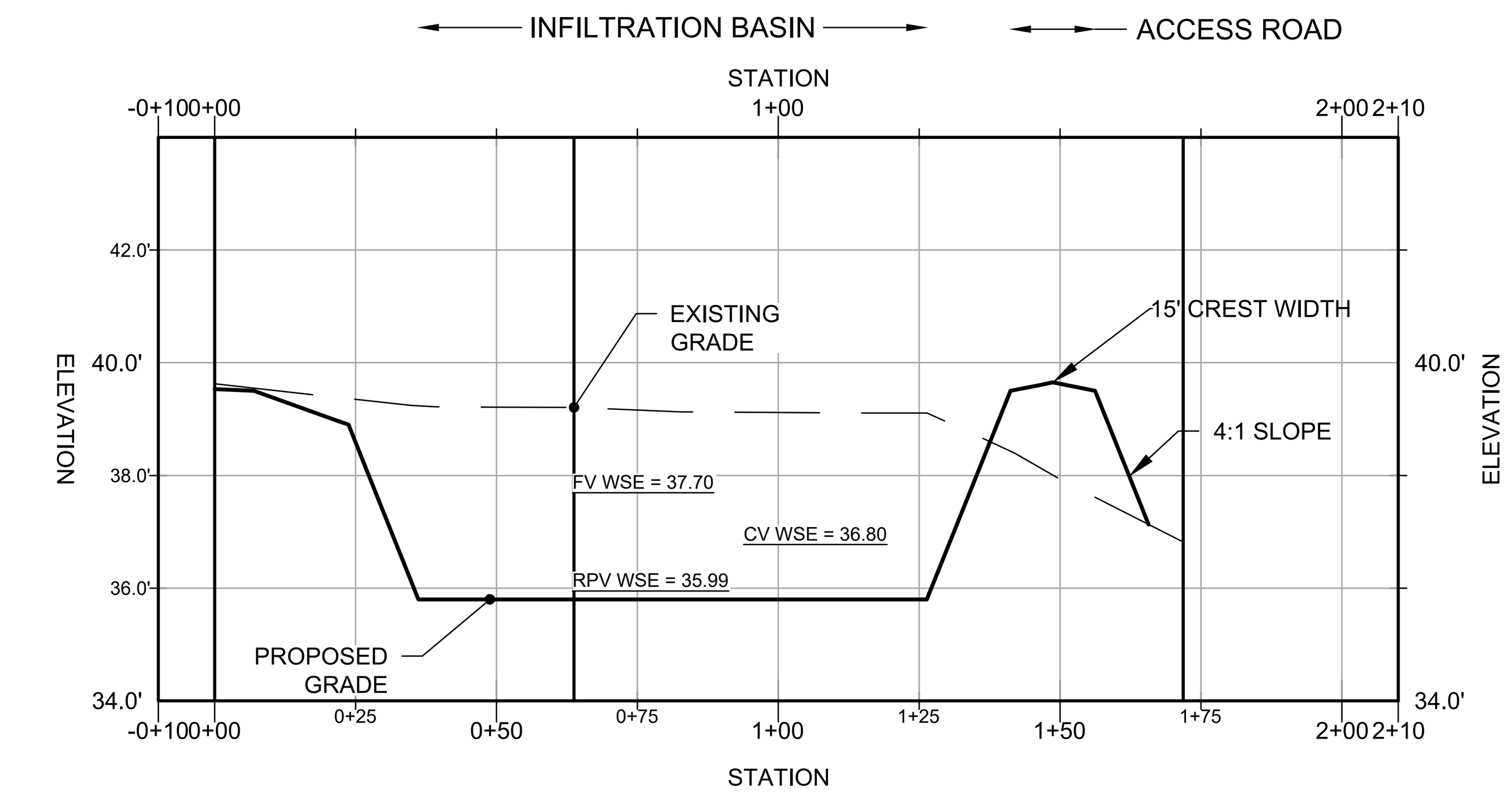
APPROVED BY: X
SHEET NO.: CB006-C-SW030

FOR REVIEW

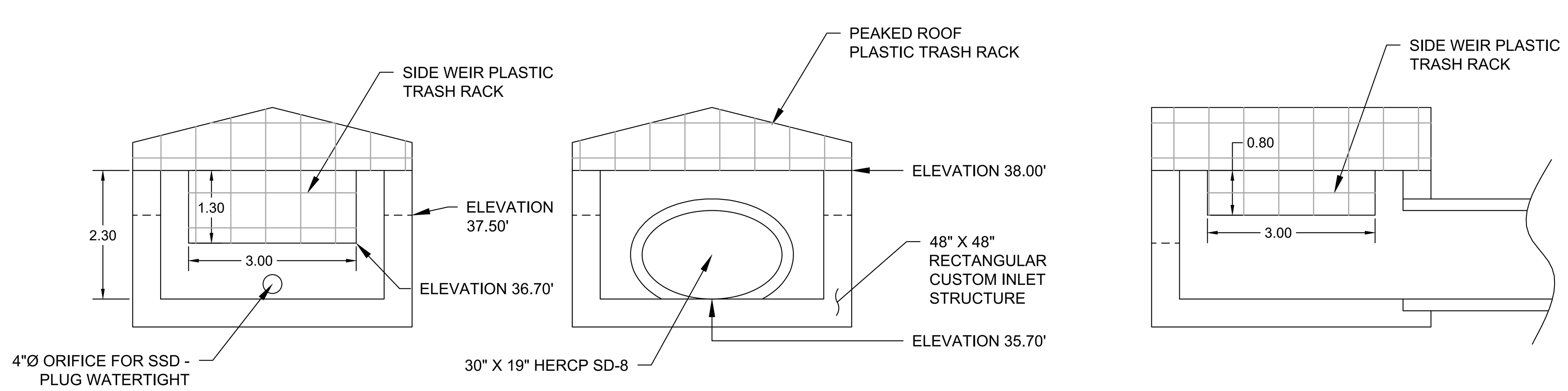



SW INFILTRATION BASIN PLAN

SCALE 1"=20'



10V:1H EXAGGERATED PROFILE: E
SCALE AS SHOWN



SW INFILTRATION BASIN Cul-3 DETAIL

SCALE 1"=20'

POST CONSTRUCTION SITE SWM PLAN 2

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL NUMBER 113-6.00-123.00

SUSSEX COUNTY, DELAWARE

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ROBERT D. RAUCH
LICENSE
No. 8359
DELAWARE
PROFESSIONAL ENGINEER
10-Jun-19

Professional Certification
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SHEET NO.:	CB006-C-SW031

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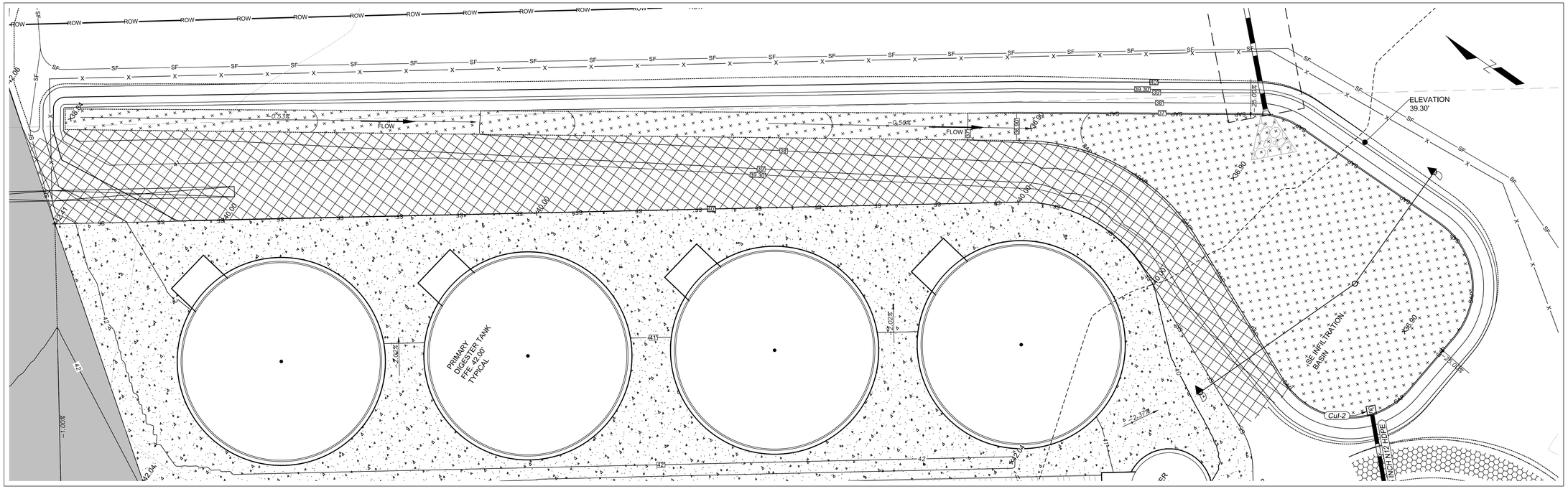
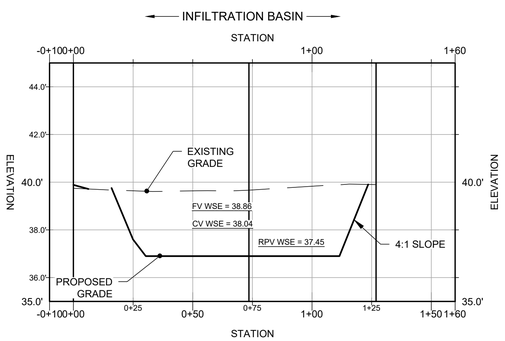


SE INFILTRATION BASIN PLAN
SCALE 1"=20'



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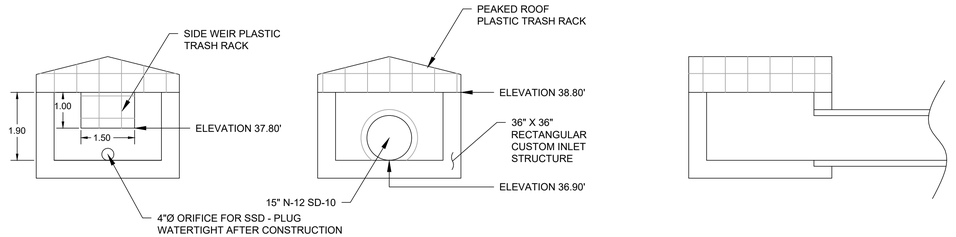
SCALE AS SHOWN



SE INFILTRATION BASIN Cul-2 DETAIL
SCALE 1"=20'

POST CONSTRUCTION SWM PLAN 3

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL NUMBER 113-6.00-123.00

SUSSEX COUNTY, DELAWARE

PREPARED FOR CLEANBAY BIOFUELS LLC.

RAUCH INC
engineering design & development services
office: 410.770.9281 | fax: 410.770.3867
email: design@raucheng.com | web: www.raucheng.com
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Virginia Office: 8229 Boone Blvd, Suite 625 - Vienna, VA 22182

Professional Certification
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License No. 8359
Expiration Date: June 30, 2020

ROBERT D. RAUCH II — No. 8359 — PROFESSIONAL ENGINEER — DELAWARE
10-Jun-19

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A	6/3/19	Revised per county comments 23 April 2019

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APPROVED BY: X
SHEET NO.: CB006-C-SW032

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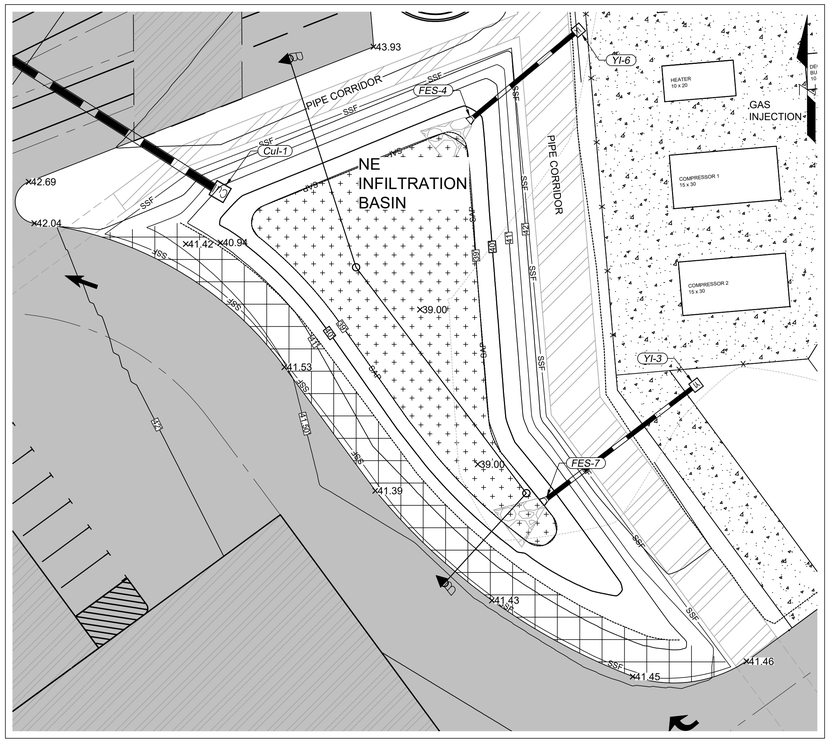
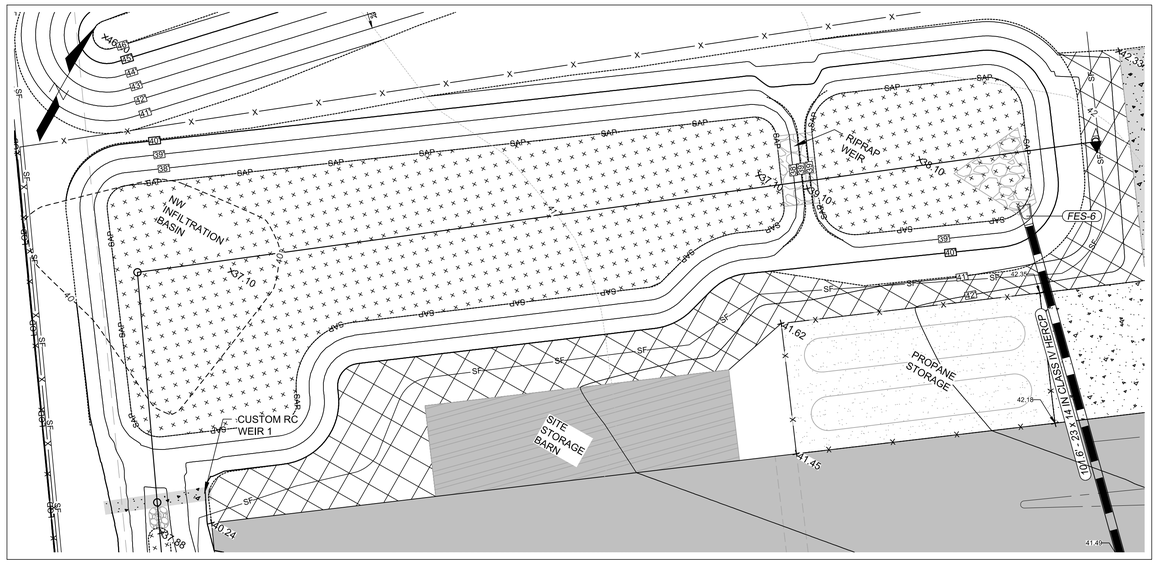
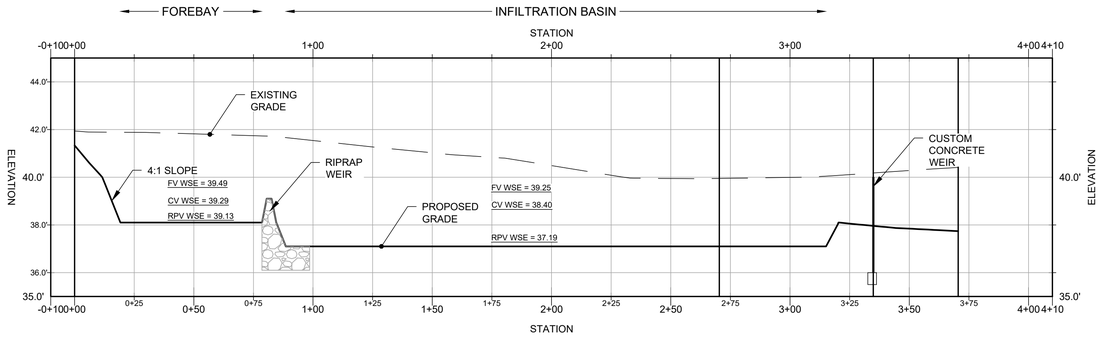


NE INFILTRATION BASIN PLAN
SCALE 1"=20'



NW INFILTRATION BASIN PLAN
SCALE 1"=20'



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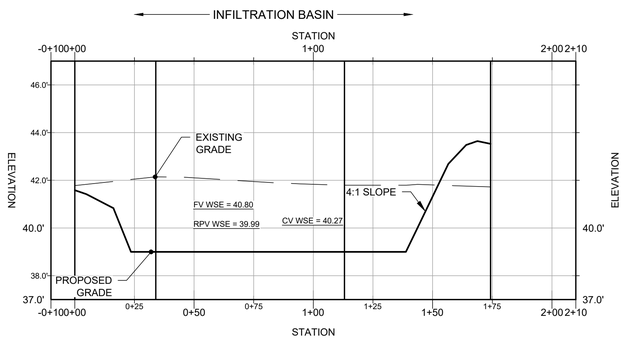

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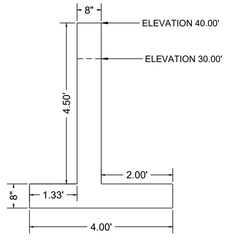
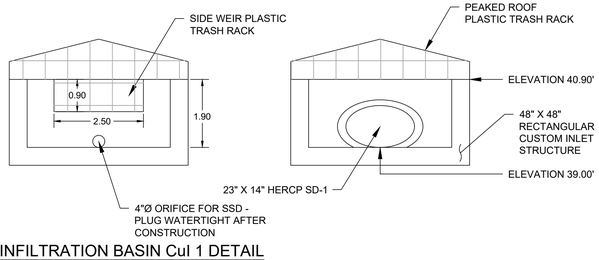
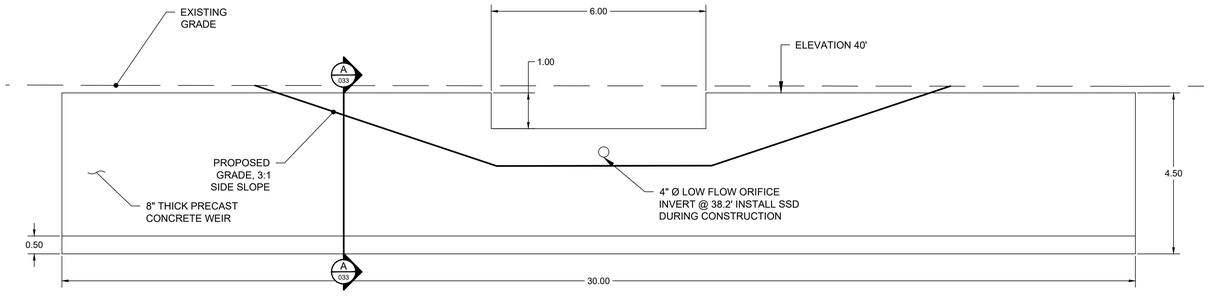


NW INFILTRATION BASIN RC WEIR
SECTION A-A
SCALE 1"=20'



NE INFILTRATION BASIN Cul 1 DETAIL
SCALE 1"=20'



NW INFILTRATION BASIN RC WEIR DETAIL
SCALE 1"=20'

POST-CONSTRUCTION SITE SWM PLAN 4

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL NUMBER 113-6.00-123.00

SUSSEX COUNTY, DELAWARE

PREPARED FOR CLEANBAY BIOFUELS LLC.

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Professional Certification
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License No. 8359
Expiration Date: June 30, 2020

CHRISTOPHER D. RAUCH — No. 8359 — PROFESSIONAL ENGINEER — DELAWARE — 10-Jun-19

REVISIONS

REV: #	DATE	DESCRIPTION
A	6/3/19	Revised per county comments 23 April 2019

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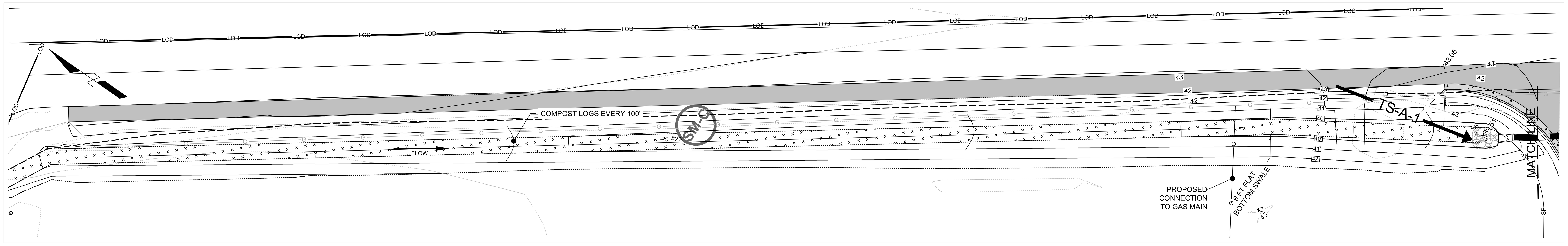
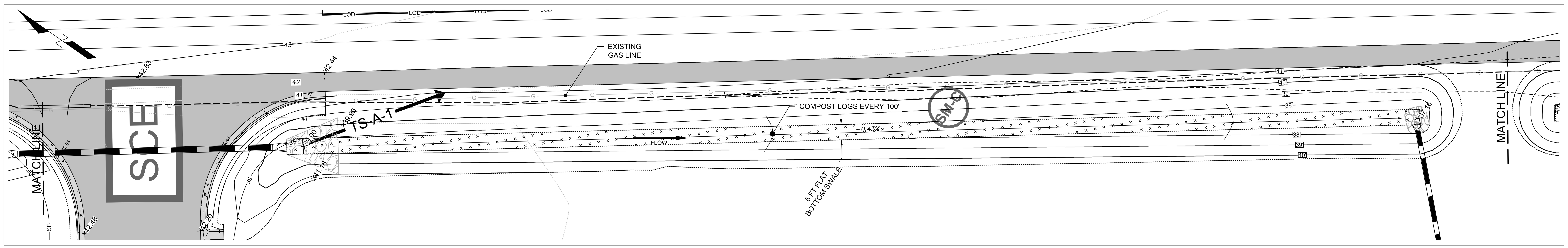
SHEET NO.: CB006-C-SW033

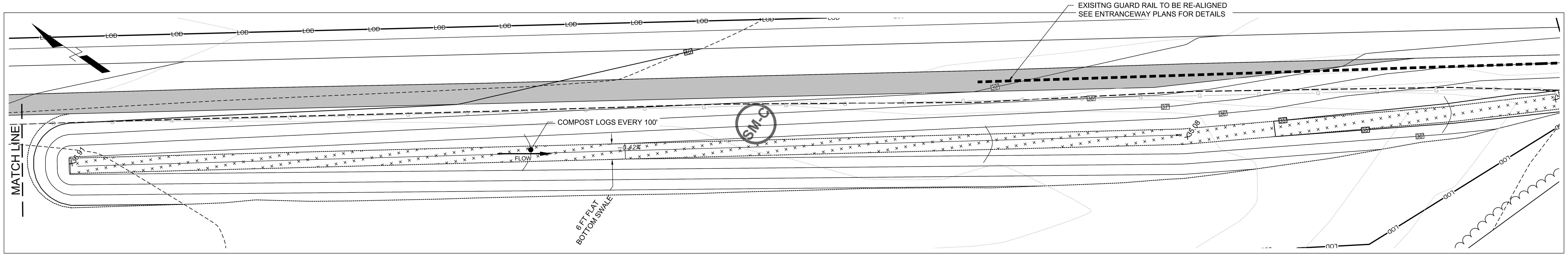
FOR REVIEW



ROADSIDE SWALE - UPPER REACH
SCALE 1"=20'



ROADSIDE SWALE - MIDDLE REACH
SCALE 1"=20'



ROADSIDE SWALE - BOTTOM REACH
SCALE 1"=20'

NOTE: GAS UTILITIES ARE
PRESENT ON SITE. CHECK
WITH MISS UTILITY
BEFORE EXCAVATION

POST-CONSTRUCTION SITE SWM PLAN 5

OF THE LANDS OF
CLEANBAY SUSSEX 1
PARCEL NUMBER 113-6.00-123.00
SUSSEX COUNTY, DELAWARE
PREPARED FOR CLEANBAY BIOFUELS LLC.

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10-Jun-19

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SCALE: AS SHOWN
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DESIGNED BY: WJR
APPROVED BY: X
SHEET NO.: CB006-C-SW034

FOR REVIEW

PIPE SCHEDULE
SITE DRAINAGE

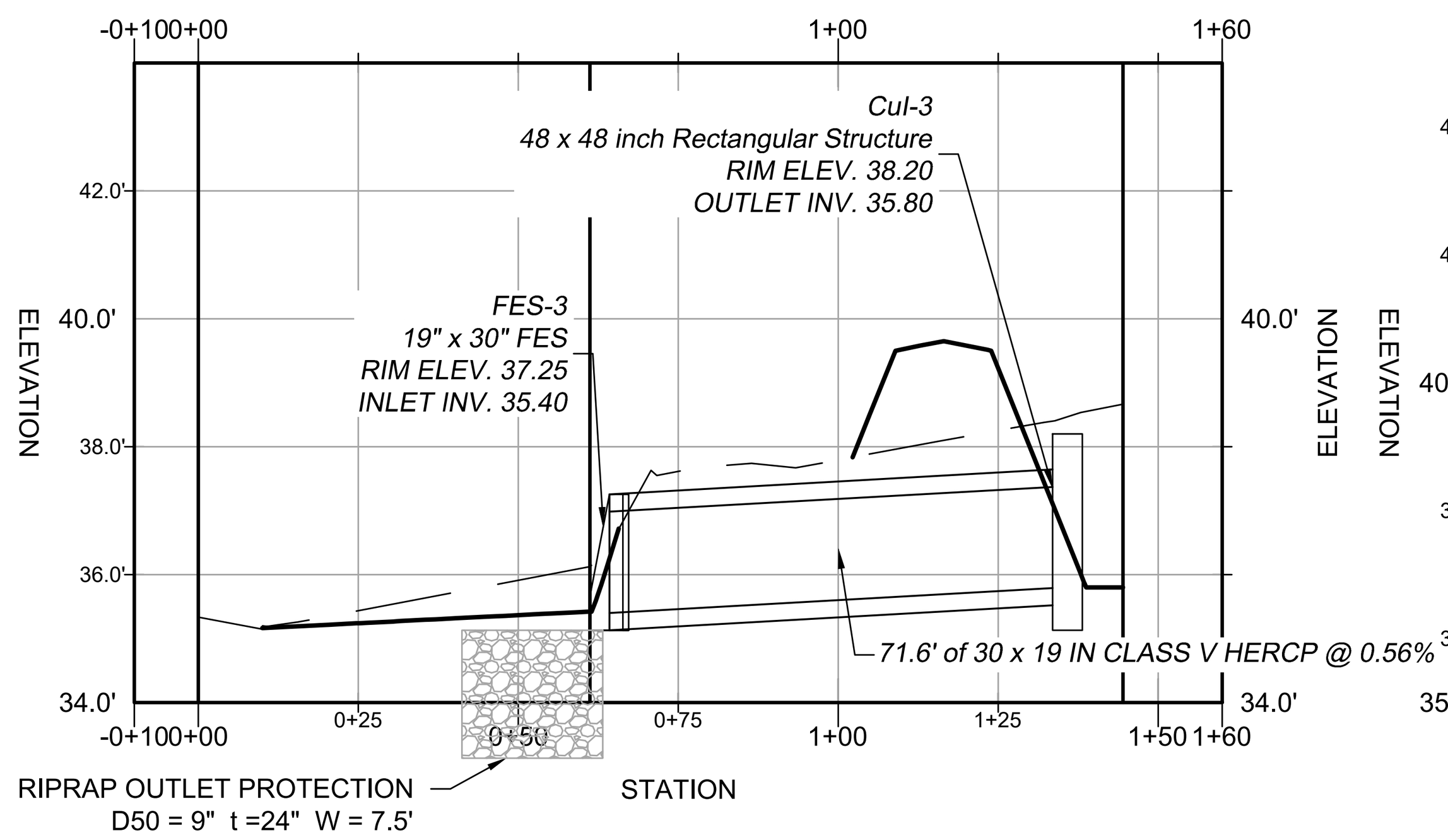
PIPE NAME	SIZE AND MATERIAL	LENGTH	SLOPE	UPSTREAM STRUCTURE AND INVERT	DOWNSTREAM STRUCTURE AND INVERT
SD-2	23 x 14 IN CLASS IV HERCP	101.58'	0.45%	YI-1 INV. 38.56'	FES-6 INV. 38.10'
SD-4	23 x 14 IN CLASS IV HERCP	222.38'	0.82%	YI-5 INV. 37.97'	YI-2 INV. 36.15'
SD-5	23 x 14 IN CLASS IV HERCP	82.13'	0.43%	YI-2 INV. 36.15'	FES-1 INV. 35.80'
SD-8	30 x 19 IN CLASS V HERCP	71.60'	0.56%	Cul-3 INV. 35.80'	FES-3 INV. 35.40'
SD-9	12 INCH N12 HDPE	38.85'	0.42%	YI-6 INV. 40.16'	FES-4 INV. 40.00'
SD-3	12 INCH N12 HDPE	53.08'	0.47%	YI-3 INV. 39.75'	FES-7 INV. 39.50'
SD-10	15 INCH N12 HDPE	45.62'	2.41%	Cul-2 INV. 36.90'	FES-2 INV. 35.80'
SD-1	23 x 14 IN CLASS IV HERCP	86.77'	0.51%	Cul-1 INV. 39.00'	YI-1 INV. 38.56'

STRUCTURE SCHEDULE
SITE DRAINAGE

STRUCTURE NAME	STRUCTURE TYPE AND SIZE	CONNECTED PIPES	RIM ELEVATION
Cul-1	48 x 48 inch Rectangular Structure	SD-1 INV OUT = 39.000	40.90
Cul-2	36 x 36 inch Rectangular Structure	SD-10 INV OUT = 36.900	38.75
Cul-3	48 x 48 inch Rectangular Structure	SD-8 INV OUT = 35.800	38.20
FES-1	14" x 23" FES	SD-5 INV IN = 35.800	37.20
FES-2	15" HDPE FES	SD-10 INV IN = 35.800	37.15
FES-3	19" x 30" FES	SD-8 INV IN = 35.400	37.25
FES-4	12" HDPE FES	SD-9 INV IN = 40.000	41.11
FES-6	14" x 23" FES	SD-2 INV IN = 38.100	39.50
FES-7	12" HDPE FES	SD-3 INV IN = 39.500	40.61
YI-1	48 x 48 DEL DOT DRAINAGE INLET	SD-1 INV IN = 38.561 SD-2 INV OUT = 38.561	41.49
YI-2	48 x 48 DEL DOT DRAINAGE INLET	SD-4 INV IN = 36.150 SD-5 INV OUT = 36.150	38.78
YI-3	24 x 24 DEL DOT DRAINAGE INLET	SD-3 INV OUT = 39.750	41.61
YI-5	48 x 48 DEL DOT DRAINAGE INLET	SD-4 INV OUT = 37.967	41.00
YI-6	24 x 24 DEL DOT DRAINAGE INLET	SD-9 INV OUT = 40.163	42.02

NOTE: FOR CUSTOM OUTLET STRUCTURES AND WEIRS SEE STORMWATER DRAWINGS

FOR STORMWATER PRACTICE SECTIONS SEE STORMWATER DRAWINGS



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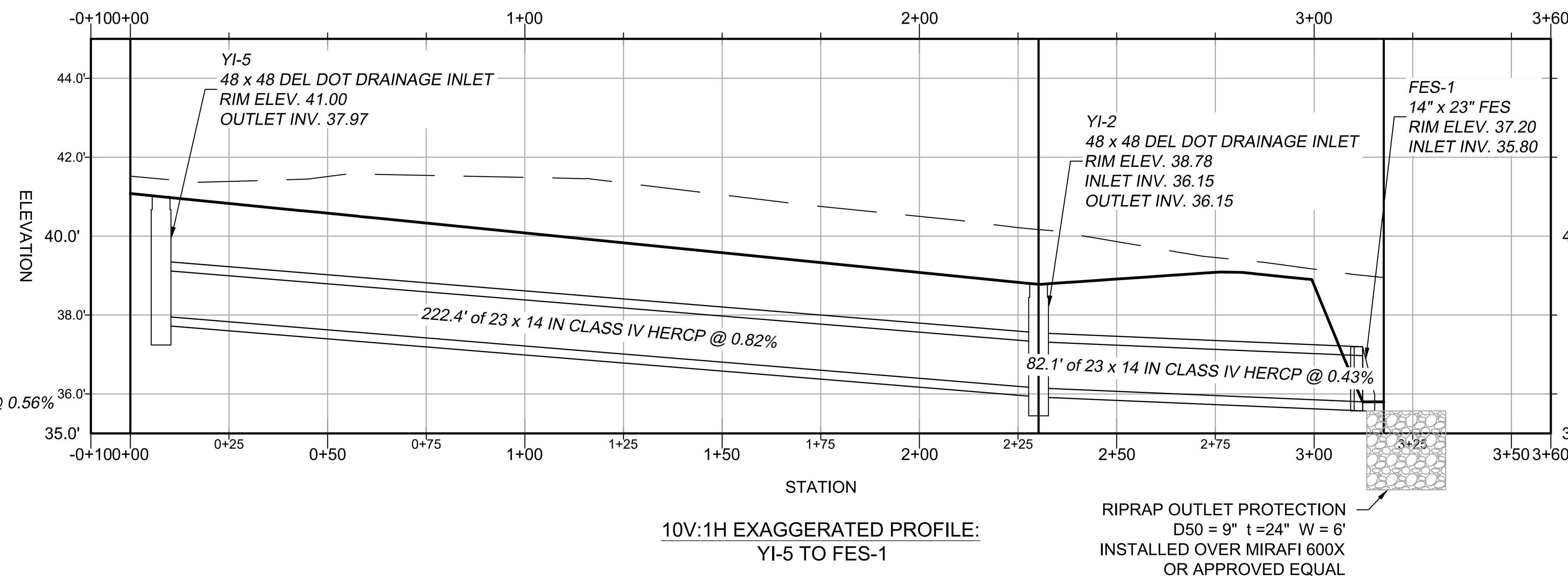
Cul-3 TO FES-3



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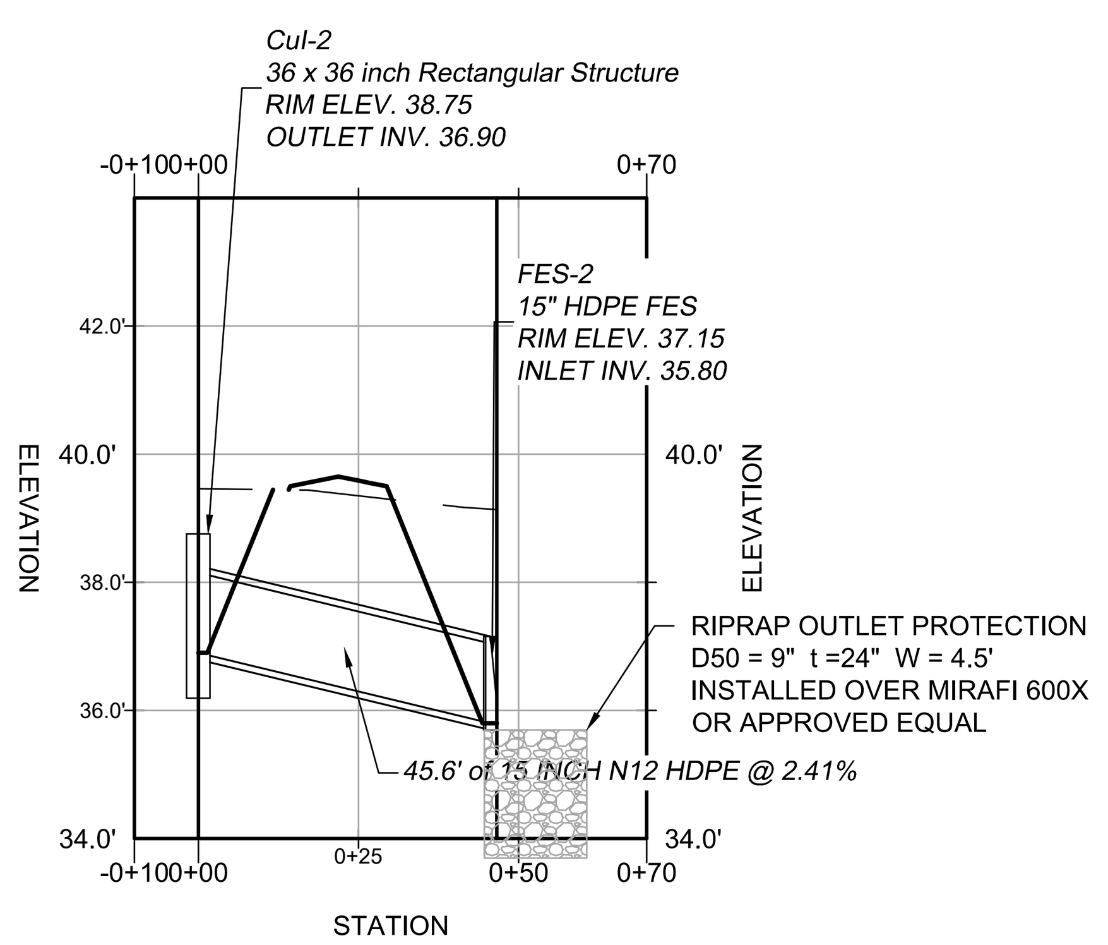
YI-5 TO FES-1



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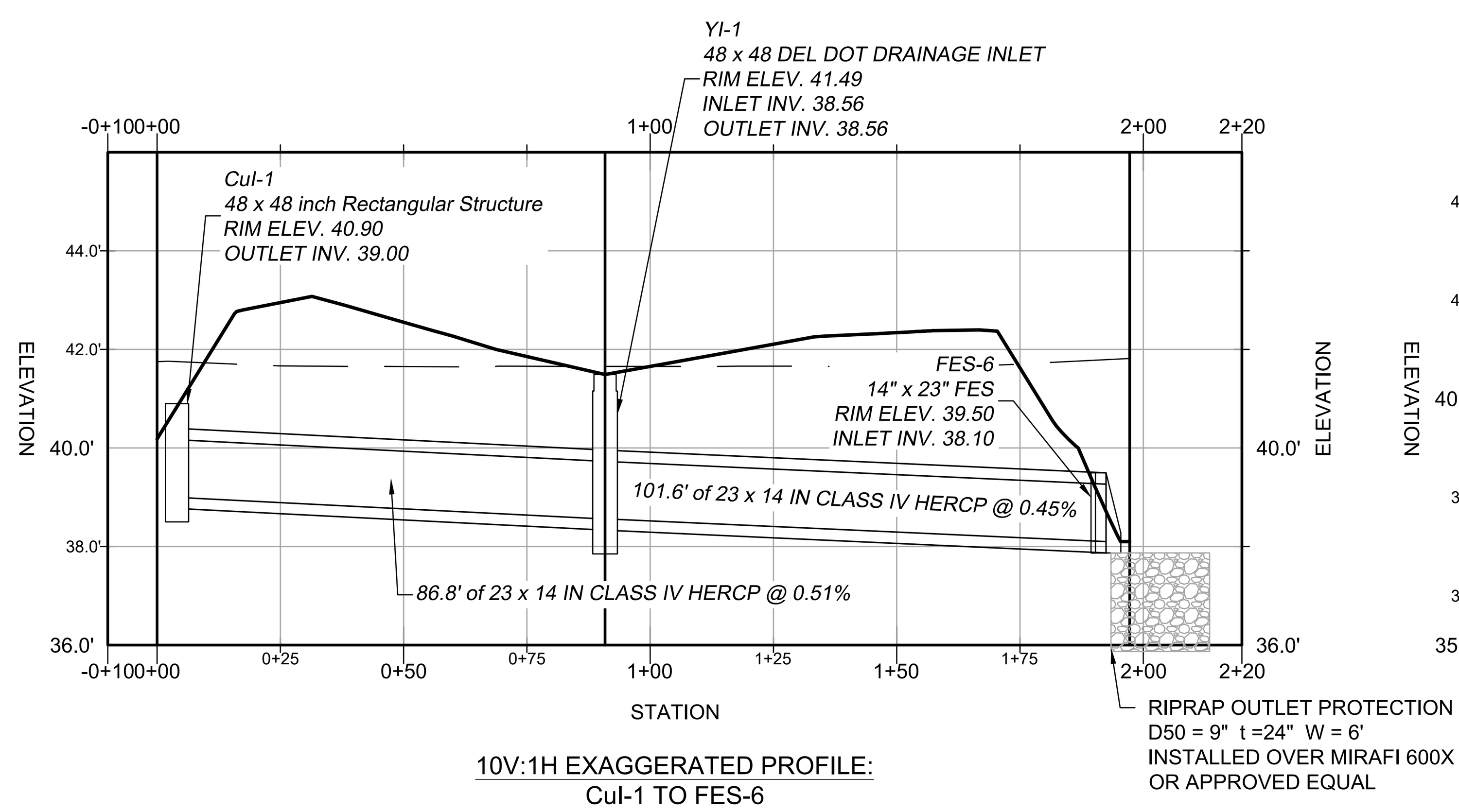
Cul-2 TO FES-2



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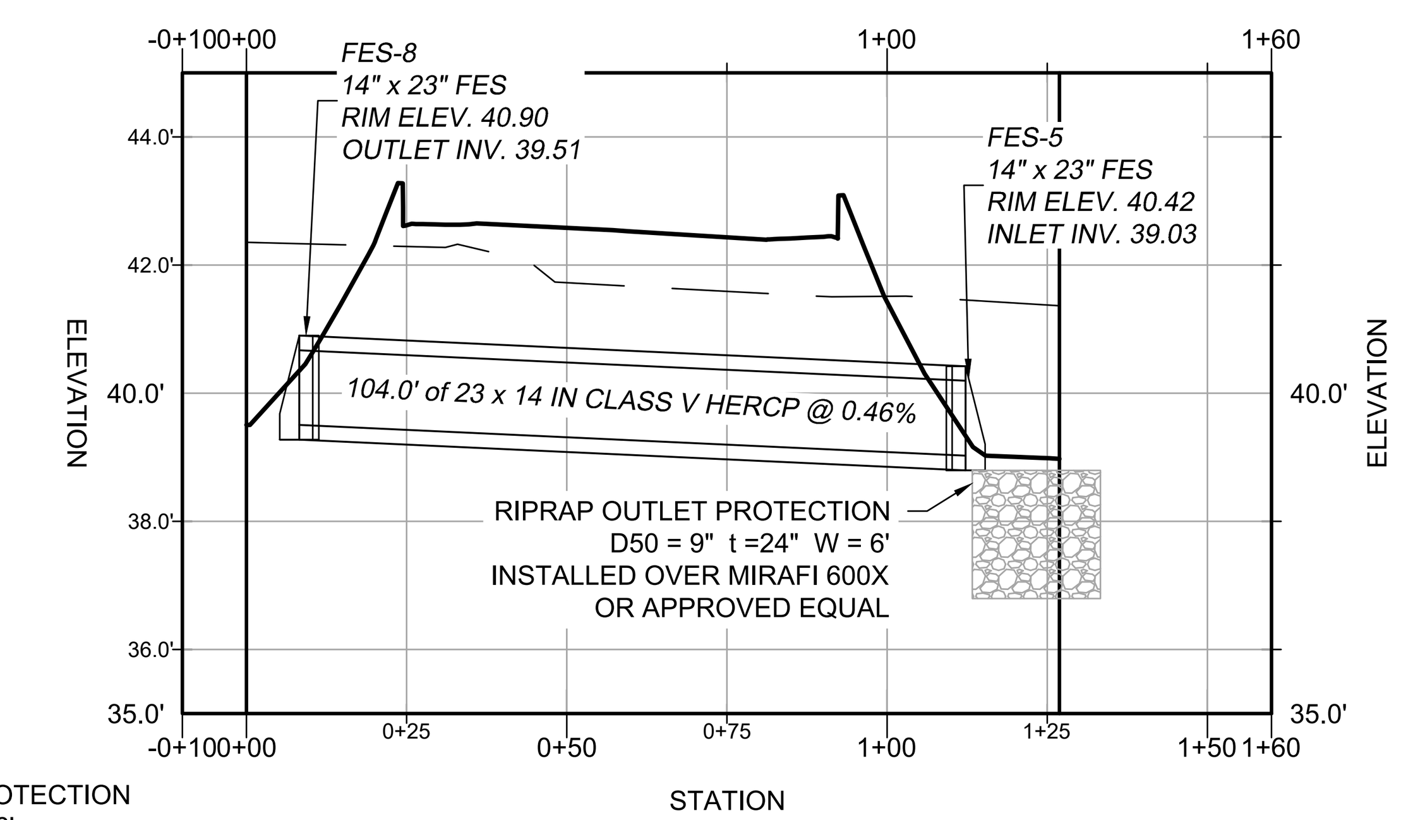
Cul-1 TO FES-6



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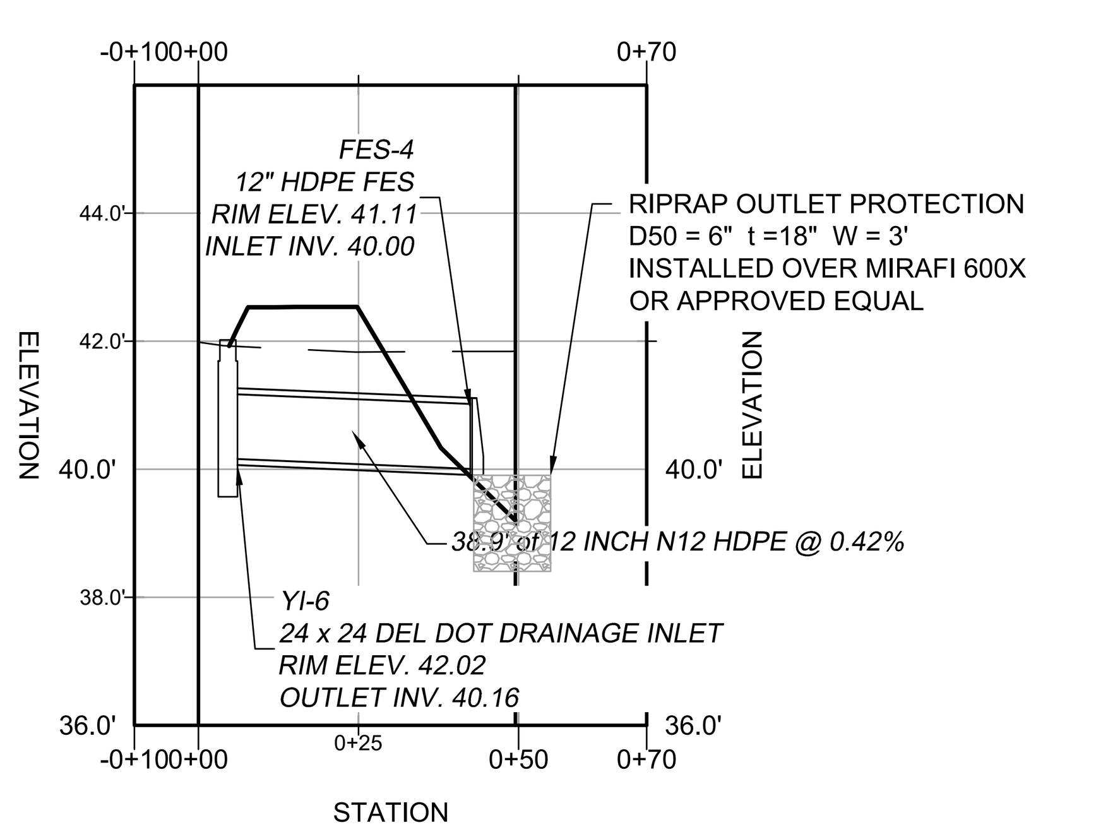
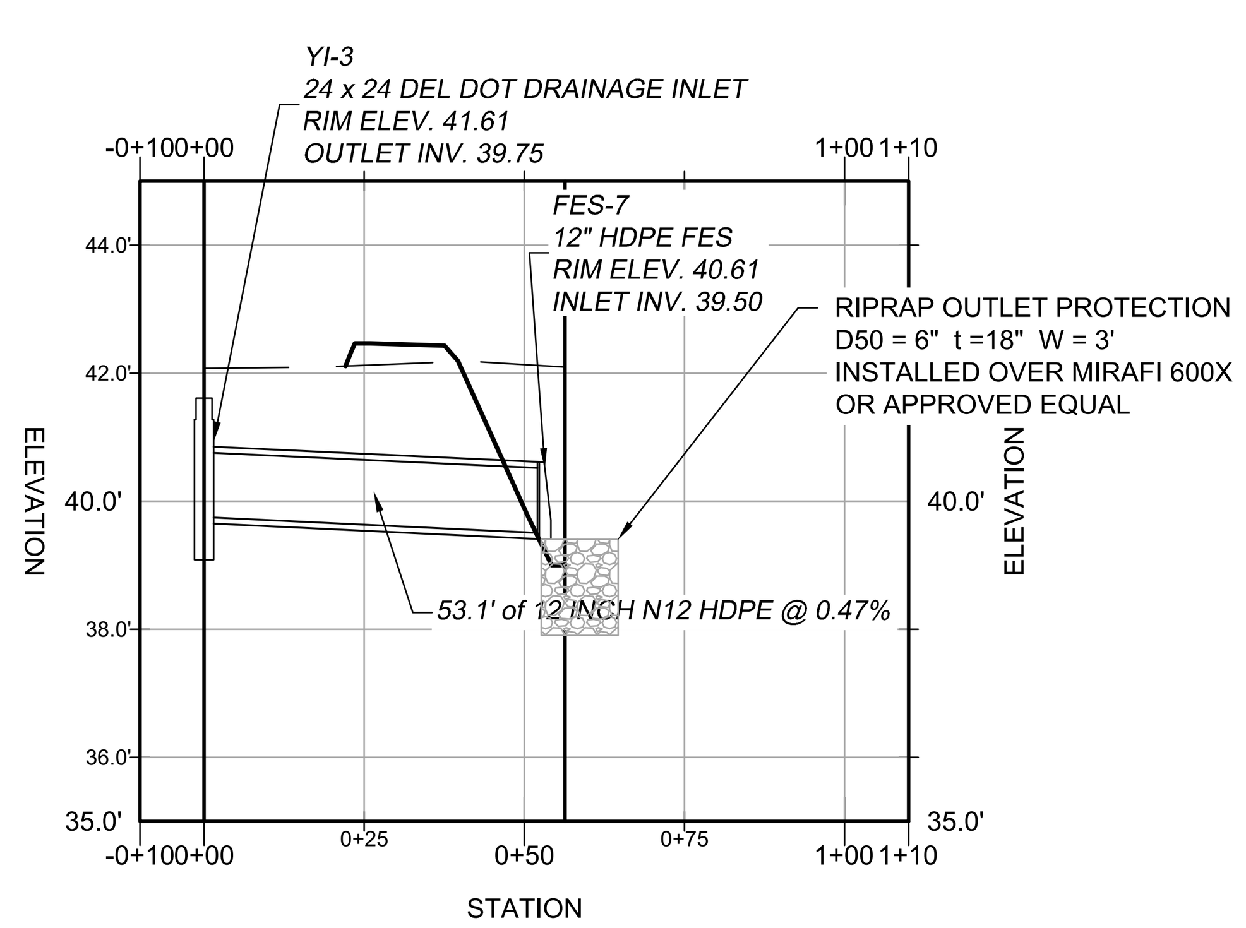
FES-8 TO FES-5



10V:1H EXAGGERATED PROFILE:
YI-6 TO FES 4



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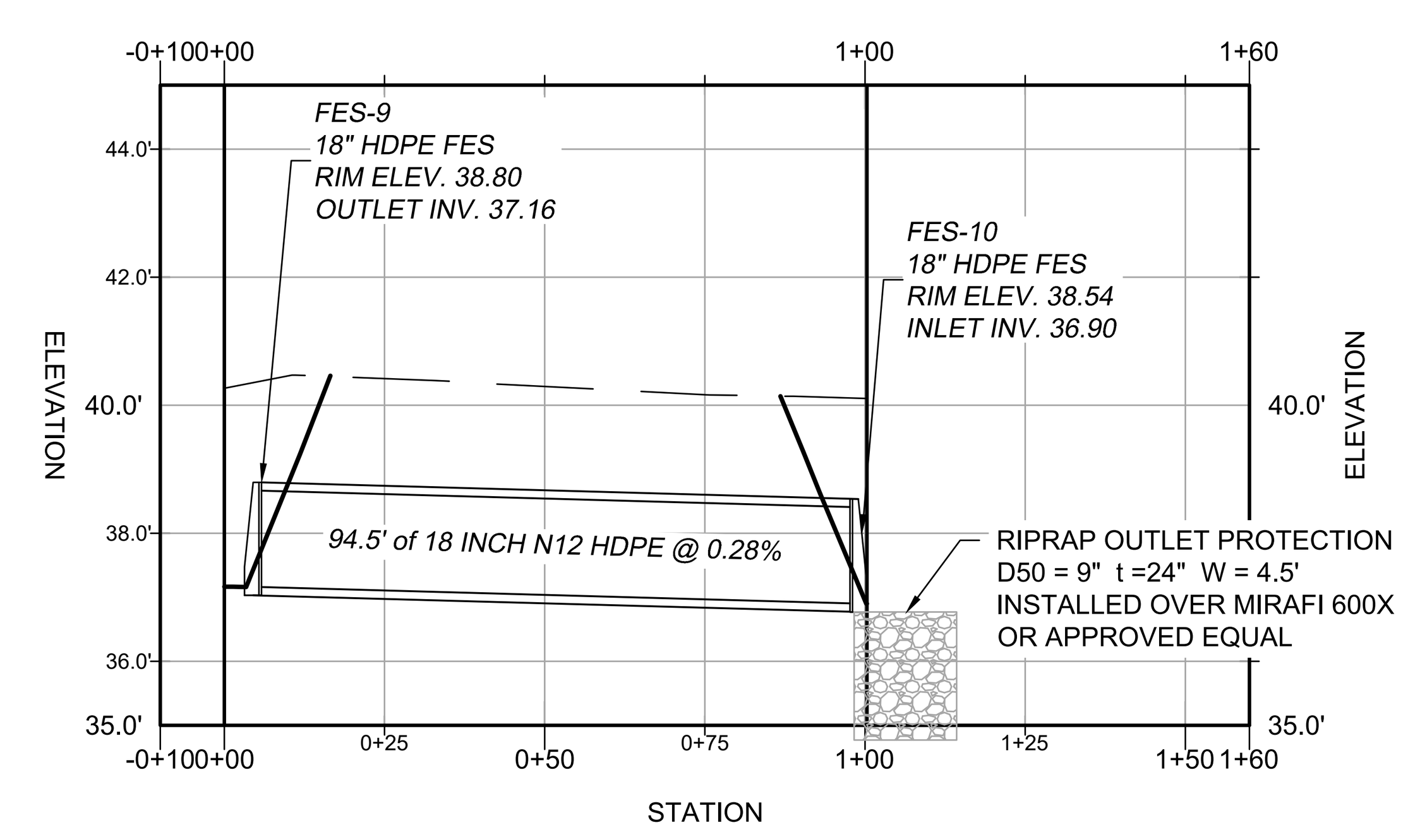
YI-3 TO FES-7



10V:1H EXAGGERATED PROFILE:
FES-9 TO FES-10

STORM DRAIN TABLES AND DETAILS

OF THE LANDS OF
CLEANBAY SUSSEX 1
PARCEL NUMBER 113-6.00-123.00
SUSSEX COUNTY, DELAWARE
PREPARED FOR CLEANBAY BIOFUELS LLC.

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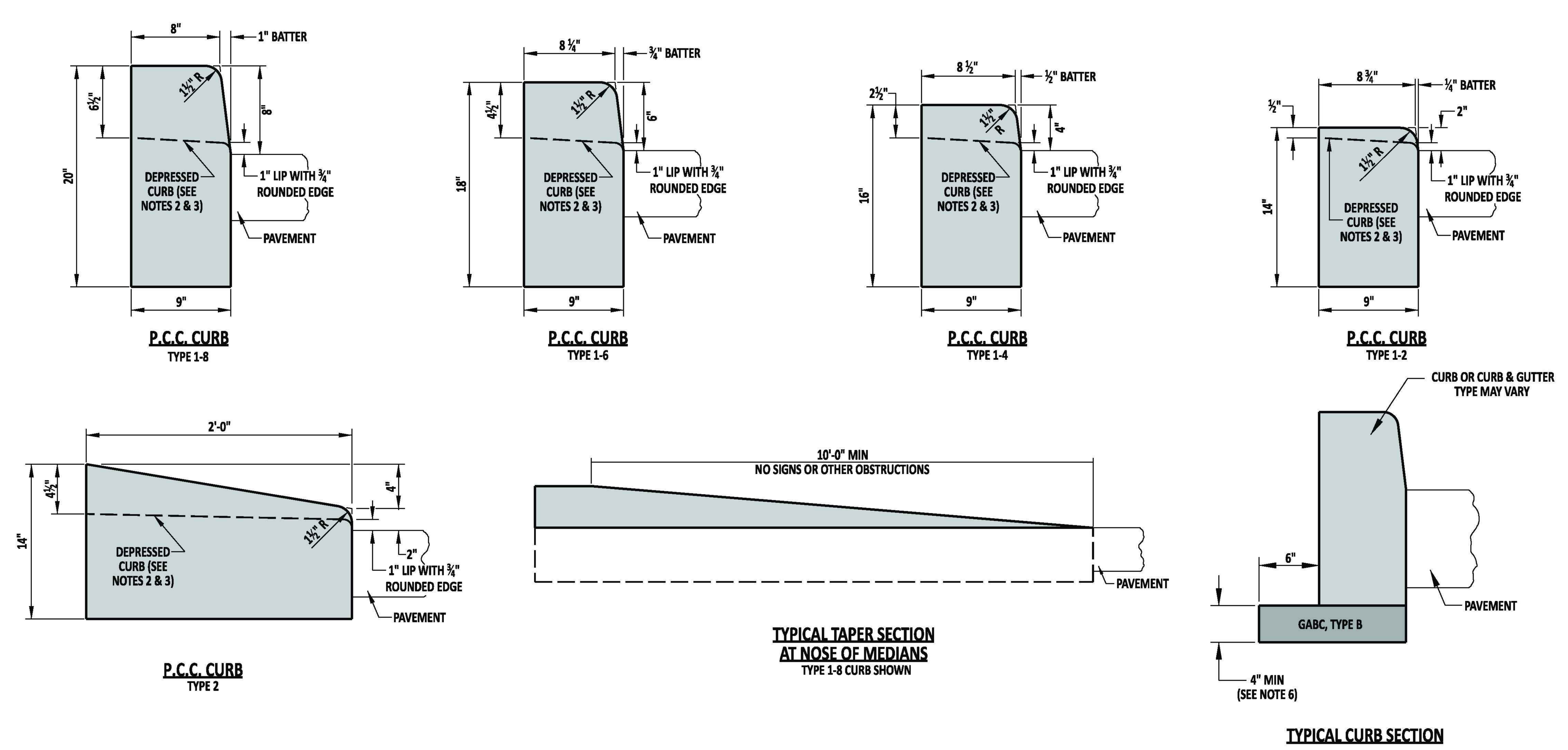
REVISIONS

REV. #	DATE	DESCRIPTION
A	6/3/19	Revised per county comments 23 April 2019

DATE:	6/5/19
SCALE:	AS SHOWN
DRAWN BY:	WJR
DESIGNED BY:	WJR
APPROVED BY:	X
SHEET NO.:	CB006-C-SW040

FOR REVIEW

SCALE : NTS

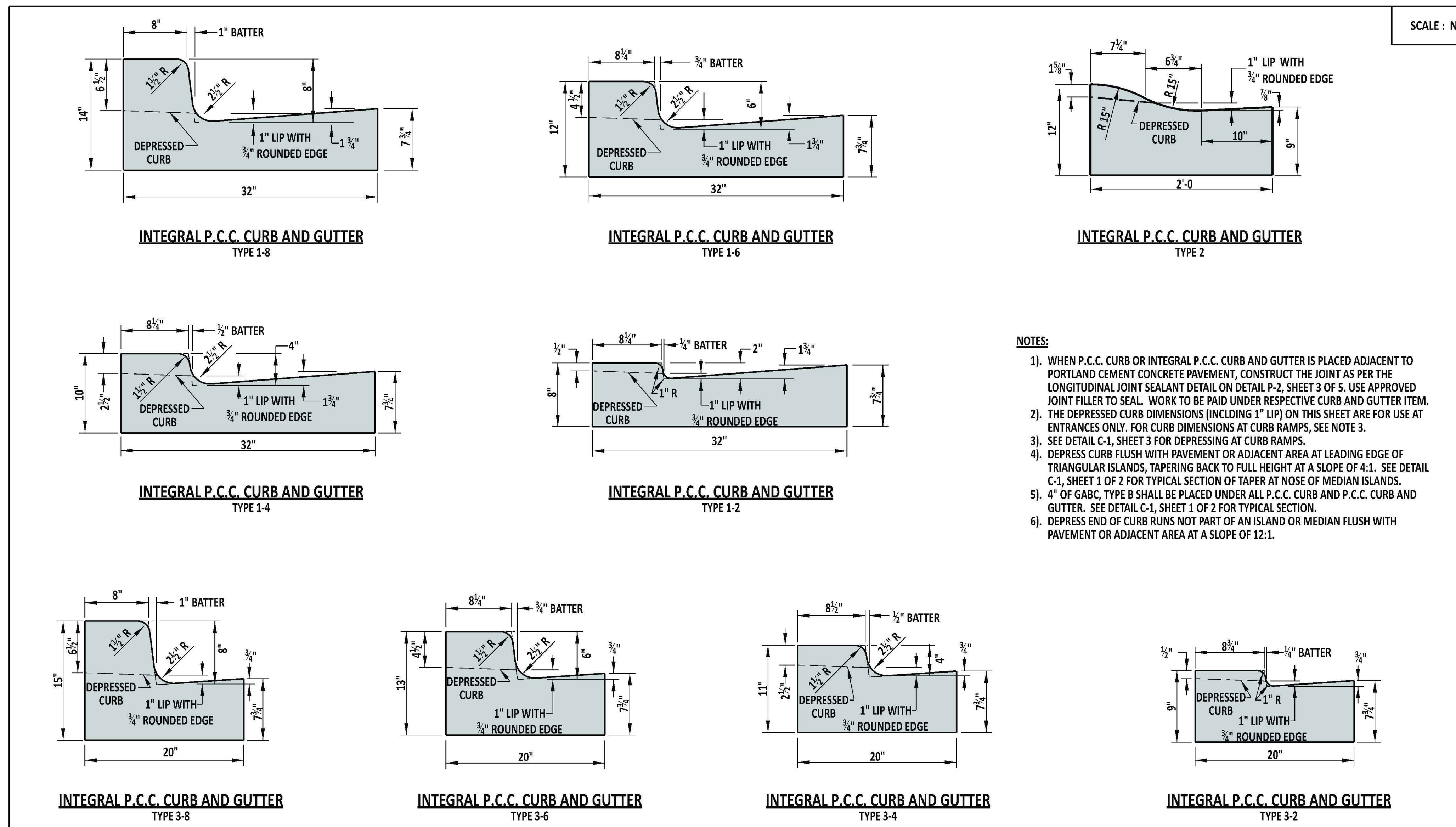


NOTES:
1). WHEN P.C.C. CURB OR INTEGRAL P.C.C. CURB AND GUTTER IS PLACED ADJACENT TO PORTLAND CEMENT CONCRETE PAVEMENT, CONSTRUCT THE JOINT AS PER THE LONGITUDINAL JOINT SEALANT DETAIL ON DETAIL P-2, SHEET 3. USE APPROVED JOINT FILLER TO SEAL. WORK TO BE PAID UNDER RESPECTIVE CURB AND GUTTER ITEM.
2). THE DEPRESSED CURB DIMENSIONS (INCLUDING 1" LIP) ON THIS SHEET ARE FOR USE AT ENTRANCES ONLY. FOR CURB DEPRESSIONS AT CURB RAMPS, SEE NOTE 3.
3). AT CURB RAMPS, DEPRESS CURB FLUSH WITH THE PAVEMENT (WITH NO LIP). SLOPE THE TOP OF THE CURB 8.3% OR FLATTER IN THE DIRECTION OF PEDESTRIAN TRAVEL.
4). DEPRESS CURB FLUSH WITH PAVEMENT OR ADJACENT AREA AT ALL CORNERS OF TRIANGULAR ISLANDS, TAPERING BACK TO FULL HEIGHT AT A RATE OF 4:1.
5). TAPER END OF CURB RUNS NOT PART OF AN ISLAND OR MEDIAN FLUSH WITH PAVEMENT OR ADJACENT AREA AT A RATE OF 12:1.
6). FOR SUBDIVISION APPLICATIONS, A MINIMUM OF 6" OF GABC IS REQUIRED.

DELAWARE DEPARTMENT OF TRANSPORTATION	P.C.C. CURB		APPROVED	SIGNATURE ON FILE (CHIEF ENGINEER)	5/31/2017 (DATE)
	STANDARD NO. C-1 (2017)	SHT. 1 OF 3	RECOMMENDED	SIGNATURE ON FILE (DESIGN ENGINEER)	5/18/2017 (DATE)

5/10/2017

SCALE : NTS



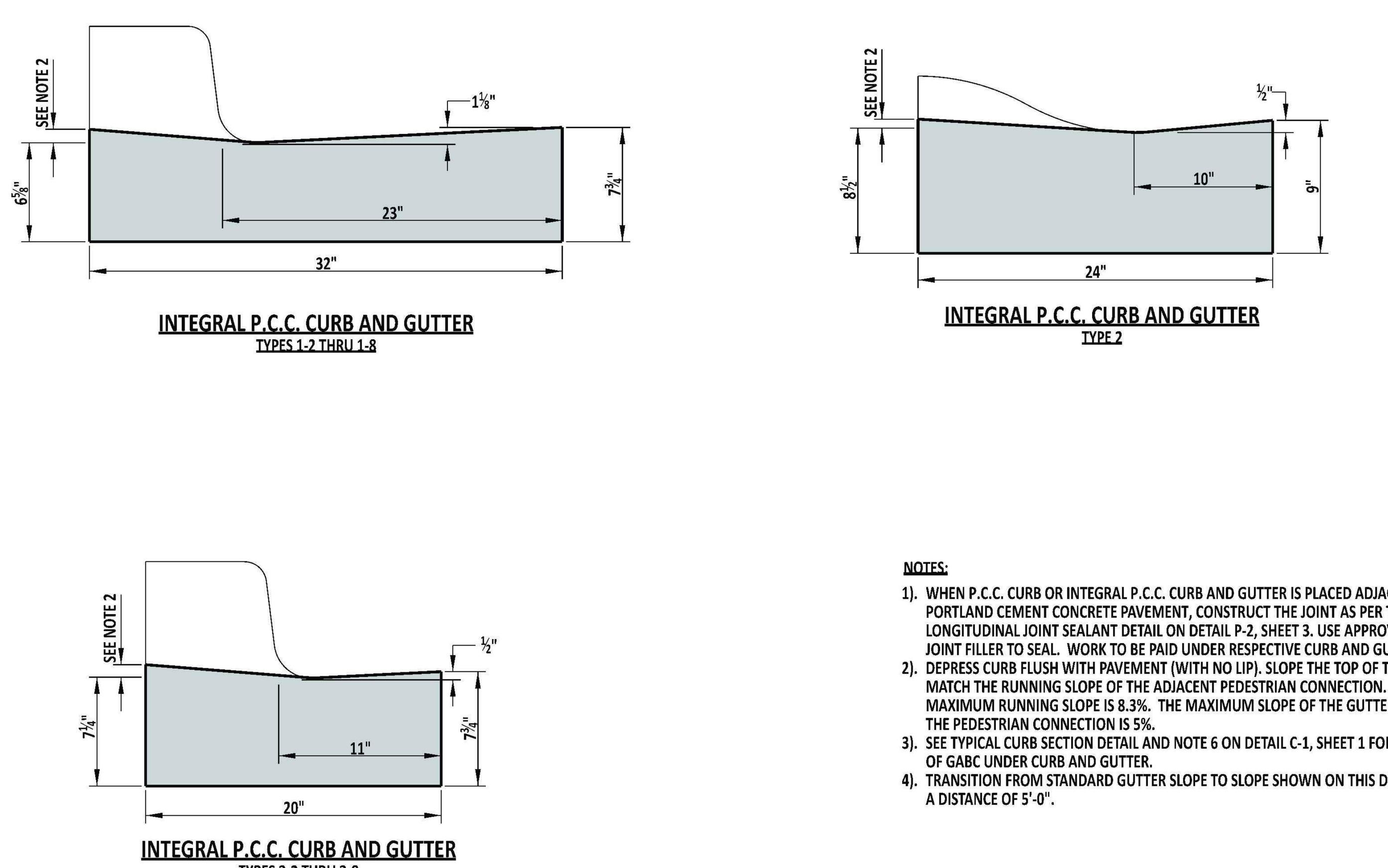
NOTES:
1). WHEN P.C.C. CURB OR INTEGRAL P.C.C. CURB AND GUTTER IS PLACED ADJACENT TO PORTLAND CEMENT CONCRETE PAVEMENT, CONSTRUCT THE JOINT AS PER THE LONGITUDINAL JOINT SEALANT DETAIL ON DETAIL P-2, SHEET 3 OF 5. USE APPROVED JOINT FILLER TO SEAL. WORK TO BE PAID UNDER RESPECTIVE CURB AND GUTTER ITEM.
2). THE DEPRESSED CURB DIMENSIONS (INCLDING 1" LIP) ON THIS SHEET ARE FOR USE AT ENTRANCES ONLY. FOR CURB DIMENSIONS AT CURB RAMPS, SEE NOTE 3.
3). SEE DETAIL C-1, SHEET 3 FOR DEPRESSING AT CURB RAMPS.
4). DEPRESS CURB FLUSH WITH PAVEMENT OR ADJACENT AREA AT LEADING EDGE OF TRIANGULAR ISLANDS, TAPERING BACK TO FULL HEIGHT AT A SLOPE OF 4:1. SEE DETAIL C-1, SHEET 1 OF 2 FOR TYPICAL SECTION OF TAPER AT NOSE OF MEDIAN ISLANDS.
5). 4" OF GABC, TYPE B SHALL BE PLACED UNDER ALL P.C.C. CURB AND P.C.C. CURB AND GUTTER. SEE DETAIL C-1, SHEET 1 OF 2 FOR TYPICAL SECTION.
6). DEPRESS END OF CURB RUNS NOT PART OF AN ISLAND OR MEDIAN FLUSH WITH PAVEMENT OR ADJACENT AREA AT A SLOPE OF 12:1.

DELAWARE DEPARTMENT OF TRANSPORTATION	INTEGRAL P.C.C. CURB & GUTTER		APPROVED	SIGNATURE ON FILE (CHIEF ENGINEER)	2/27/2019 (DATE)
	STANDARD NO. C-1 (2017)	SHT. 2 OF 3	RECOMMENDED	SIGNATURE ON FILE (DESIGN ENGINEER)	2/25/2019 (DATE)

10/15/2018

THIS DETAIL IS TO BE USED ONLY FOR THE SECTIONS OF CURB & GUTTER THAT ARE DIRECTLY IN FRONT OF THE PEDESTRIAN CONNECTIONS. REFER TO DETAIL C-1, SHEET 2 FOR TYPICAL CURB DIMENSIONS AND FOR DEPRESSING CURB AT ENTRANCES

SCALE : NTS

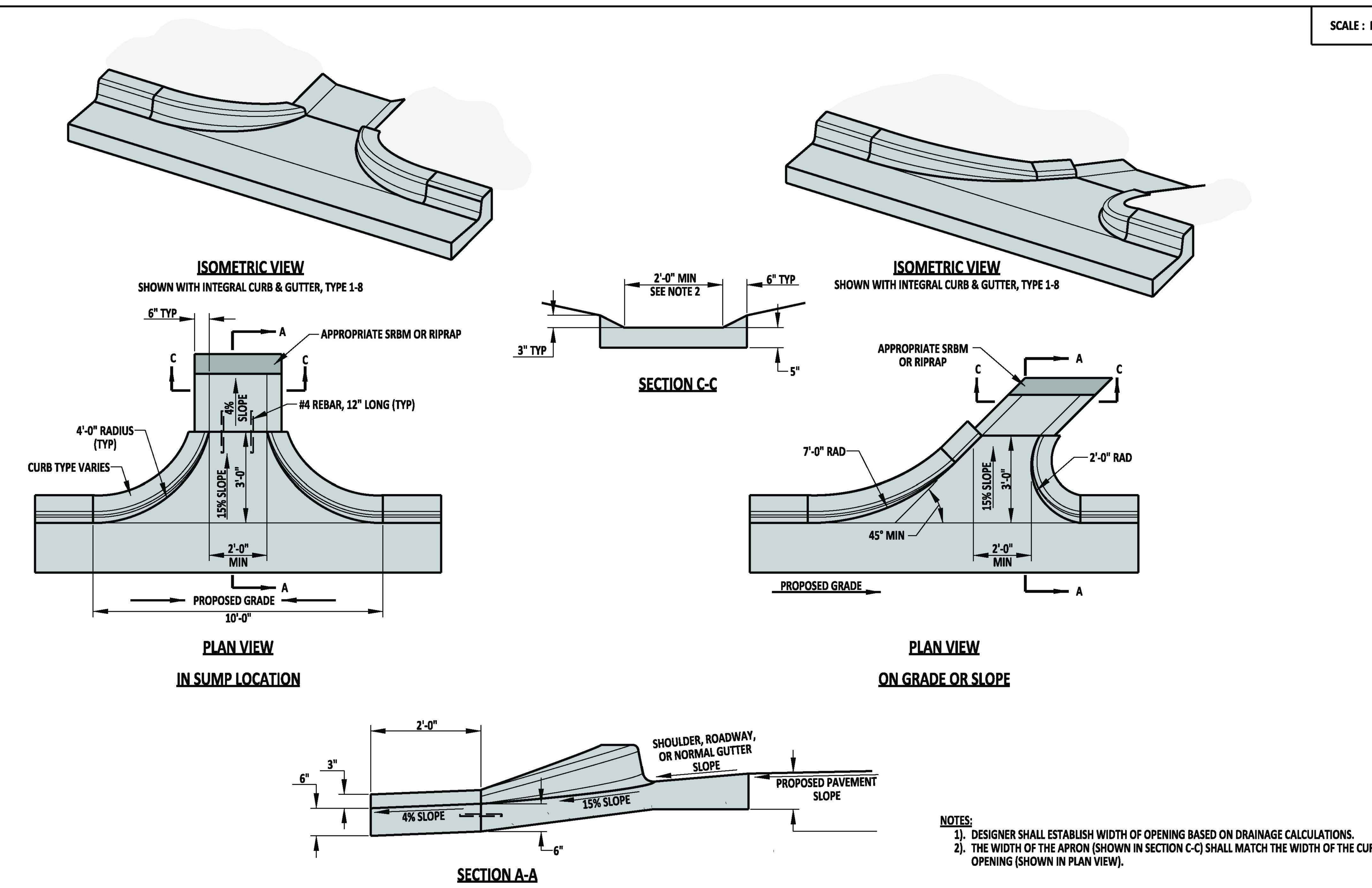


NOTES:
1). WHEN P.C.C. CURB OR INTEGRAL P.C.C. CURB AND GUTTER IS PLACED ADJACENT TO PORTLAND CEMENT CONCRETE PAVEMENT, CONSTRUCT THE JOINT AS PER THE LONGITUDINAL JOINT SEALANT DETAIL ON DETAIL P-2, SHEET 3. USE APPROVED JOINT FILLER TO SEAL. WORK TO BE PAID UNDER RESPECTIVE CURB AND GUTTER ITEM.
2). DEPRESS CURB FLUSH WITH PAVEMENT (WITH NO LIP). SLOPE THE TOP OF THE CURB TO MATCH THE RUNNING SLOPE OF THE ADJACENT PEDESTRIAN CONNECTION. THE MAXIMUM RUNNING SLOPE IS 8.3%. THE MAXIMUM SLOPE OF THE GUTTER PAN AT THE PEDESTRIAN CONNECTION IS 5%.
3). SEE TYPICAL CURB SECTION DETAIL AND NOTE 6 ON DETAIL C-1, SHEET 1 FOR PLACEMENT OF GABC UNDER CURB AND GUTTER.
4). TRANSITION FROM STANDARD GUTTER SLOPE TO SLOPE SHOWN ON THIS DETAIL OVER A DISTANCE OF 5'-0".

DELAWARE DEPARTMENT OF TRANSPORTATION	INTEGRAL P.C.C. CURB & GUTTER (FOR USE AT PEDESTRIAN CONNECTIONS ONLY)		APPROVED	SIGNATURE ON FILE (CHIEF ENGINEER)	1/04/2019 (DATE)
	STANDARD NO. C-1 (2018)	SHT. 3 OF 3	RECOMMENDED	SIGNATURE ON FILE (DESIGN ENGINEER)	12/20/2018 (DATE)

1/7/2019

SCALE : NTS



NOTES:
1). DESIGNER SHALL ESTABLISH WIDTH OF OPENING BASED ON DRAINAGE CALCULATIONS.
2). THE WIDTH OF THE APRON (SHOWN IN SECTION C-C) SHALL MATCH THE WIDTH OF THE CURB OPENING (SHOWN IN PLAN VIEW).

DELAWARE DEPARTMENT OF TRANSPORTATION	CURB OPENING DETAILS		APPROVED	SIGNATURE ON FILE (CHIEF ENGINEER)	01/07/2013 (DATE)
	STANDARD NO. C-4 (2012)	SHT. 1 OF 1	RECOMMENDED	SIGNATURE ON FILE (DESIGN ENGINEER)	12/20/2012 (DATE)

12/4/2012

CONSTRUCTION SITE DETAILS AND NOTES 1

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL NUMBER 113-6.00-123.00
SUSSEX COUNTY, DELAWARE
PREPARED FOR CLEANBAY BIOFUELS LLC.

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email: design@rauchinc.com | web: www.rauchinc.com
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Virginia Office: 8229 Boone Blvd. Suite 625 · Vienna, VA 22182

Professional Certification
I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Delaware.
License No. 8359
Expiration Date: June 30, 2020

ROBERT J. RAUCH LICENSE No. 8359 DELAWARE REGISTERED PROFESSIONAL ENGINEER
10-Jun-19

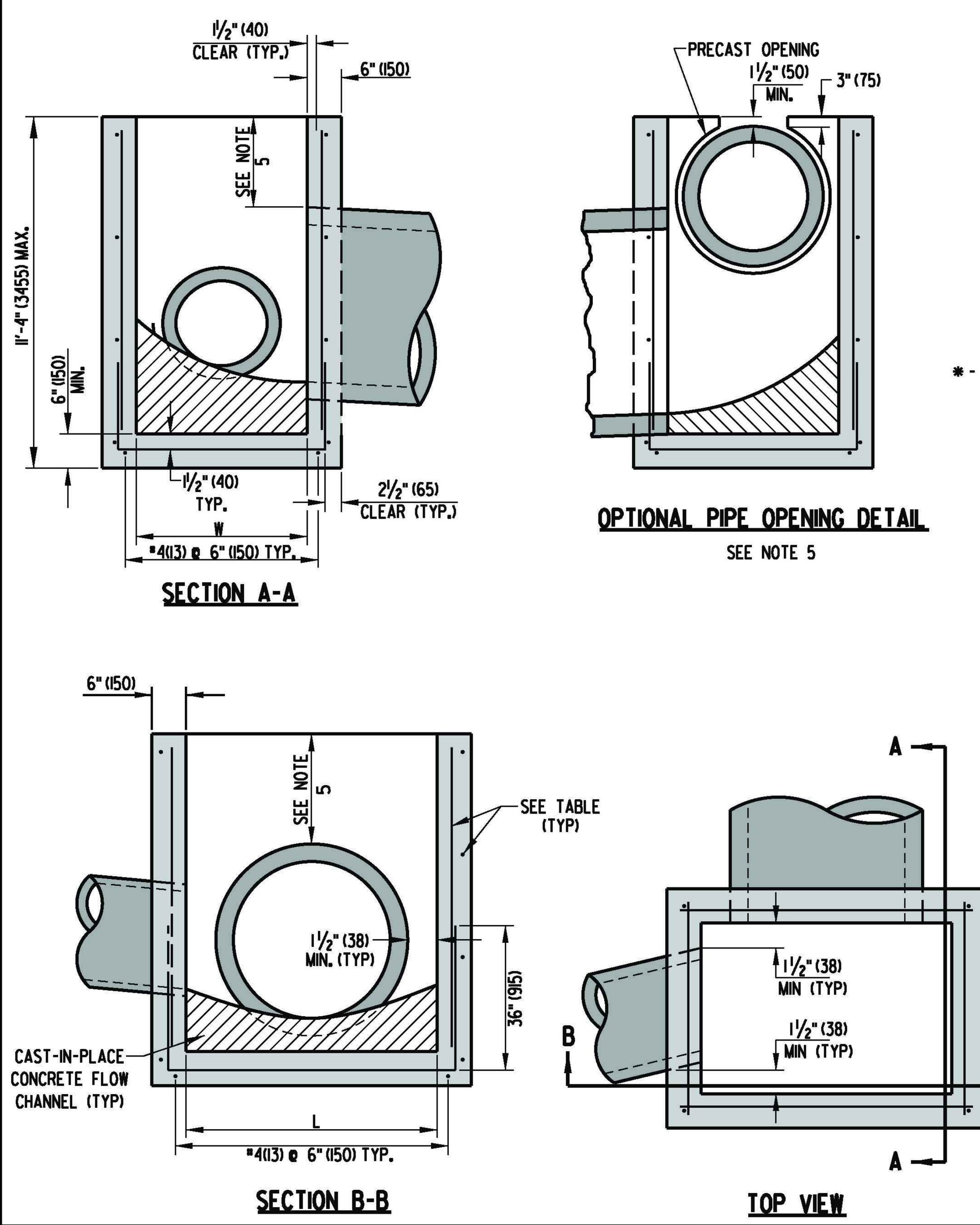
REVISIONS

REV. #	DATE	DESCRIPTION
A	6/3/19	Revised per county comments 23 April 2019

DATE:	6/5/19
SCALE:	AS SHOWN
DRAWN BY:	WJS
DESIGNED BY:	WJR
APPROVED BY:	X
SHEET NO.:	CB006-C-SW041

FOR REVIEW

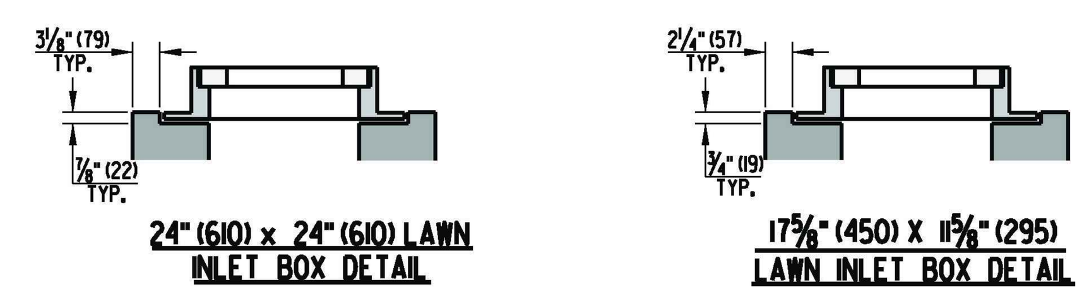
SCALE : N.T.S.



INLET BOX SCHEDULE			
L	W	FABRICATION TOLERANCE	
17⅝" (450)	11⅝" (295)	+1" (25)	*
24" (610)	24" (610)	+1" (25)	*
34" (865)	18" (455)	-1" (25)	
34" (865)	24" (610)	-1" (25)	
48" (1220)	30" (760)	+6" (150)	
48" (1220)	48" (1220)	+6" (150)	
66" (1675)	30" (760)	+6" (150)	
66" (1675)	48" (1220)	+6" (150)	
66" (1675)	66" (1675)	+6" (150)	
72" (1830)	24" (610)	-1" (25)	
72" (1830)	48" (1220)	-1" (25)	
72" (1830)	72" (1830)	-1" (25)	

* - THESE BOXES ARE TO BE USED FOR LAWN INLETS AND ARE NOT INTENDED TO BE USED IN THE TRAVELWAY. THE MAX DEPTH FOR THESE BOXES IS 4' (1220). SEE NOTE 8 FOR REINFORCEMENT.

WALL REINFORCEMENT SCHEDULE		
INTERIOR WALL DIMENSION	AREA OF HORIZONTAL REINFORCEMENT PER FOOT (mm^2)	AREA OF VERTICAL REINFORCEMENT PER FOOT (mm^2)
	IN^2 (mm^2)	IN^2 (mm^2)
LESS THAN 4' (1220)	0.132 (85)	0.132 (85)
4' (1220) TO 4.5' (1370)	0.163 (105)	0.132 (85)
4.5' (1370) TO 5' (1525)	0.198 (128)	0.132 (85)
5' (1525) TO 5.5' (1675)	0.239 (154)	0.132 (85)
5.5' (1675) TO 6' (1830)	0.284 (183)	0.132 (85)

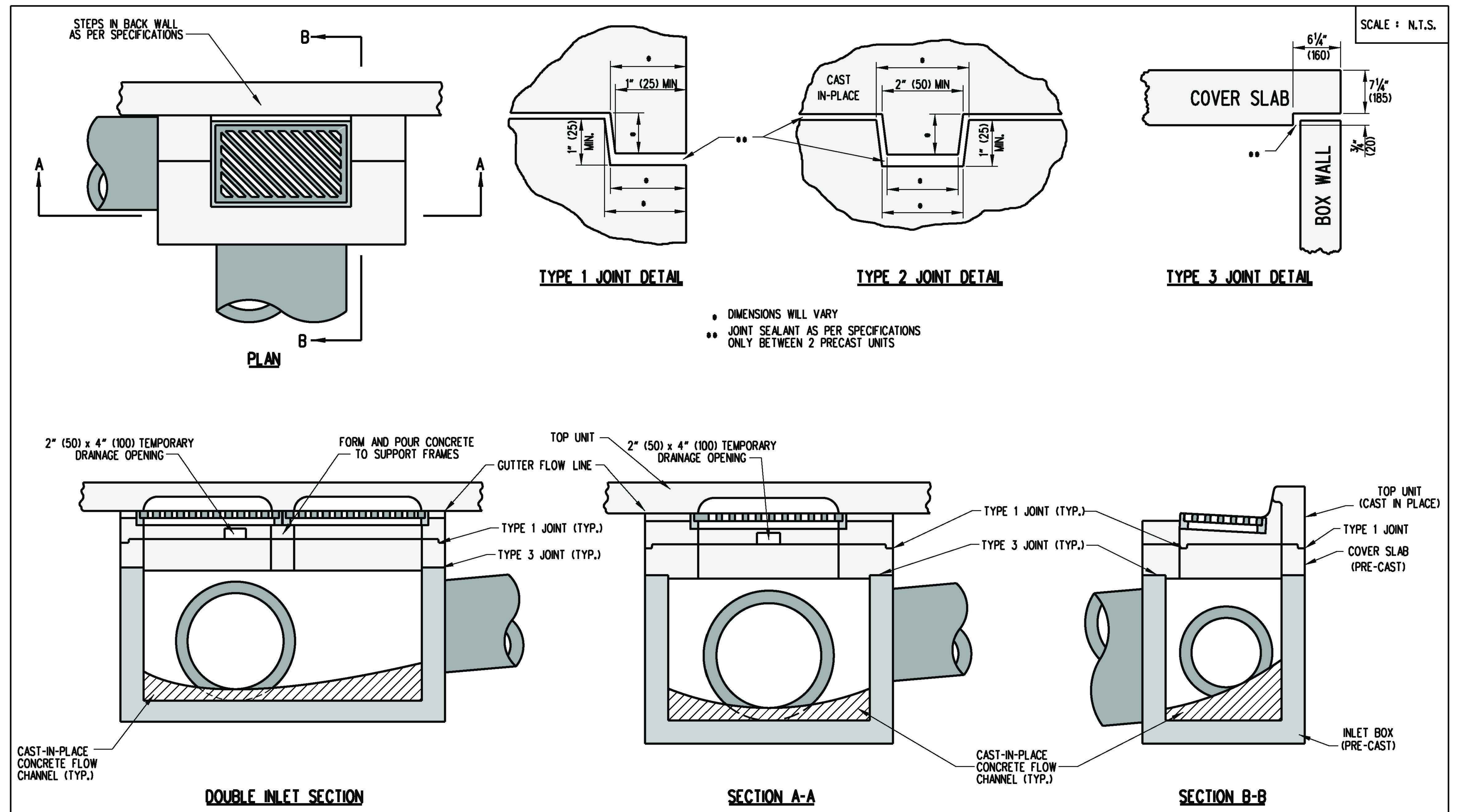


NOTES:
1). INLET BOXES SHALL BE PRECAST OR CAST-IN-PLACE.
2). PIPES SHALL NOT BE INSTALLED THROUGH ANY CORNER OF THE INLET BOX.
3). RISER SECTIONS MAY BE USED FOR DEEP INLET BOXES.
4). PIPES MAY BE INSTALLED NEAR OR THROUGH JOINTS FOR RISER SECTIONS.
5). WHEN THE COVER ABOVE THE PIPE IS LESS THAN 4" (100) TO THE COVER SLAB OR TOP UNIT OPENING, THE PORTION OF BOX WALL ABOVE THE PIPE MAY BE REMOVED AS SHOWN IN THE OPTIONAL PIPE OPENING DETAIL. THE AREA ABOVE THE PIPE SHALL THEN BE FORMED AND FILLED WITH HIGH-STRENGTH, NON-SHRINK GROUT MIXED WITH COARSE AGGREGATE IN A 1:1 RATIO BY WEIGHT.
6). CONCRETE FLOW CHANNEL SHALL BE WARPED FOR POSITIVE DRAINAGE.
7). WHEN INLET BOX IS PRECAST, PIPE OPENING SHALL BE BETWEEN 3" (75) AND 4" (100) LARGER THAN OUTSIDE DIAMETER OF PIPE AND SHALL NOT ENCROACH ON ADJACENT WALL.
8). REINFORCEMENT FOR LAWN INLET BOXES SHALL BE 4" (102) X 4" (102), W4 X W4 (W26 X W26) WELDED WIRE.

DELAWARE DEPARTMENT OF TRANSPORTATION	INLET BOX DETAILS		APPROVED	SIGNATURE ON FILE (CHIEF ENGINEER)	01/19/2010 (DATE)
	STANDARD NO. D-4 (2009)	SHT. 1 OF 1	RECOMMENDED	SIGNATURE ON FILE (DESIGN ENGINEER)	01/14/2010 (DATE)

08/19/2009

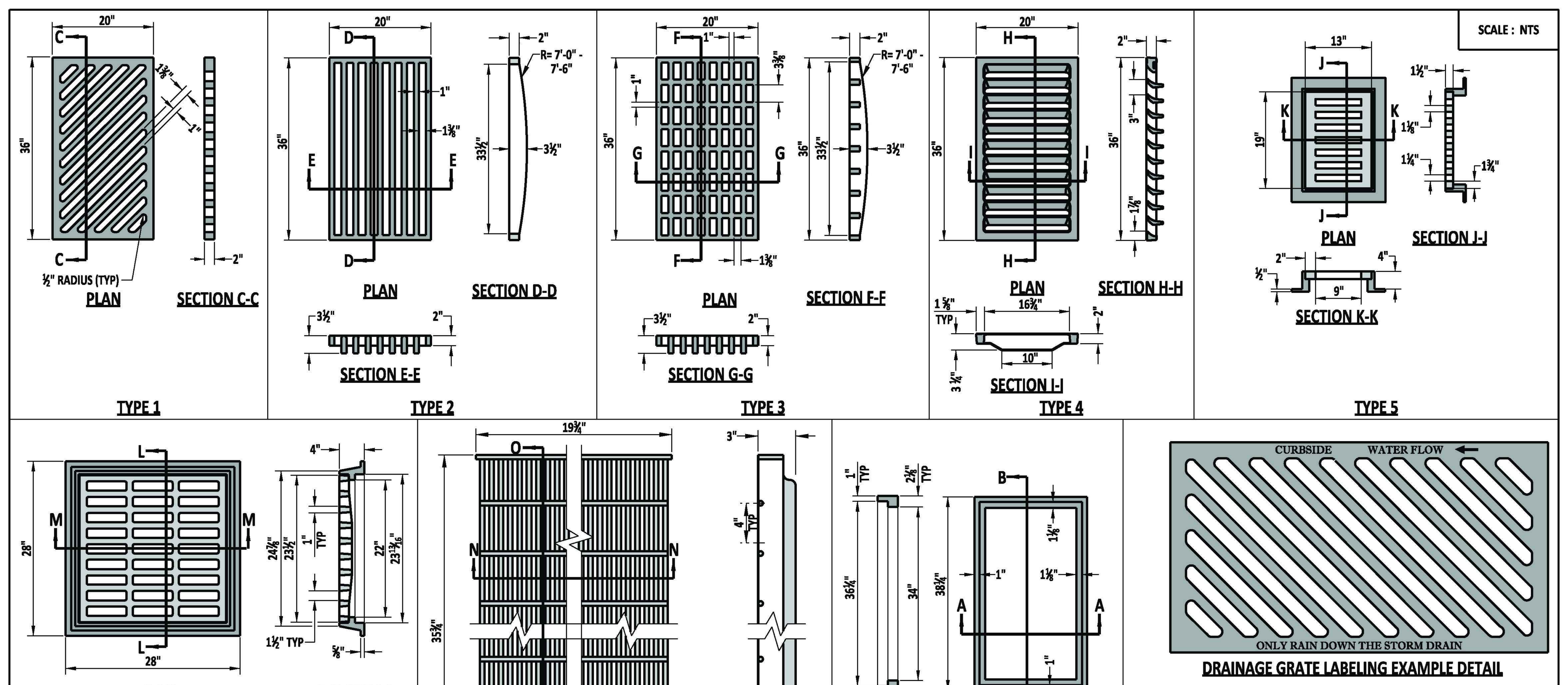
SCALE : N.T.S.



DELAWARE DEPARTMENT OF TRANSPORTATION	DRAINAGE INLET ASSEMBLY		APPROVED	SIGNATURE ON FILE (CHIEF ENGINEER)	12/28/2010 (DATE)
	STANDARD NO. D-5 (2010)	SHT. 1 OF 9	RECOMMENDED	SIGNATURE ON FILE (DESIGN ENGINEER)	12/27/2010 (DATE)

10/26/2010

SCALE : NTS

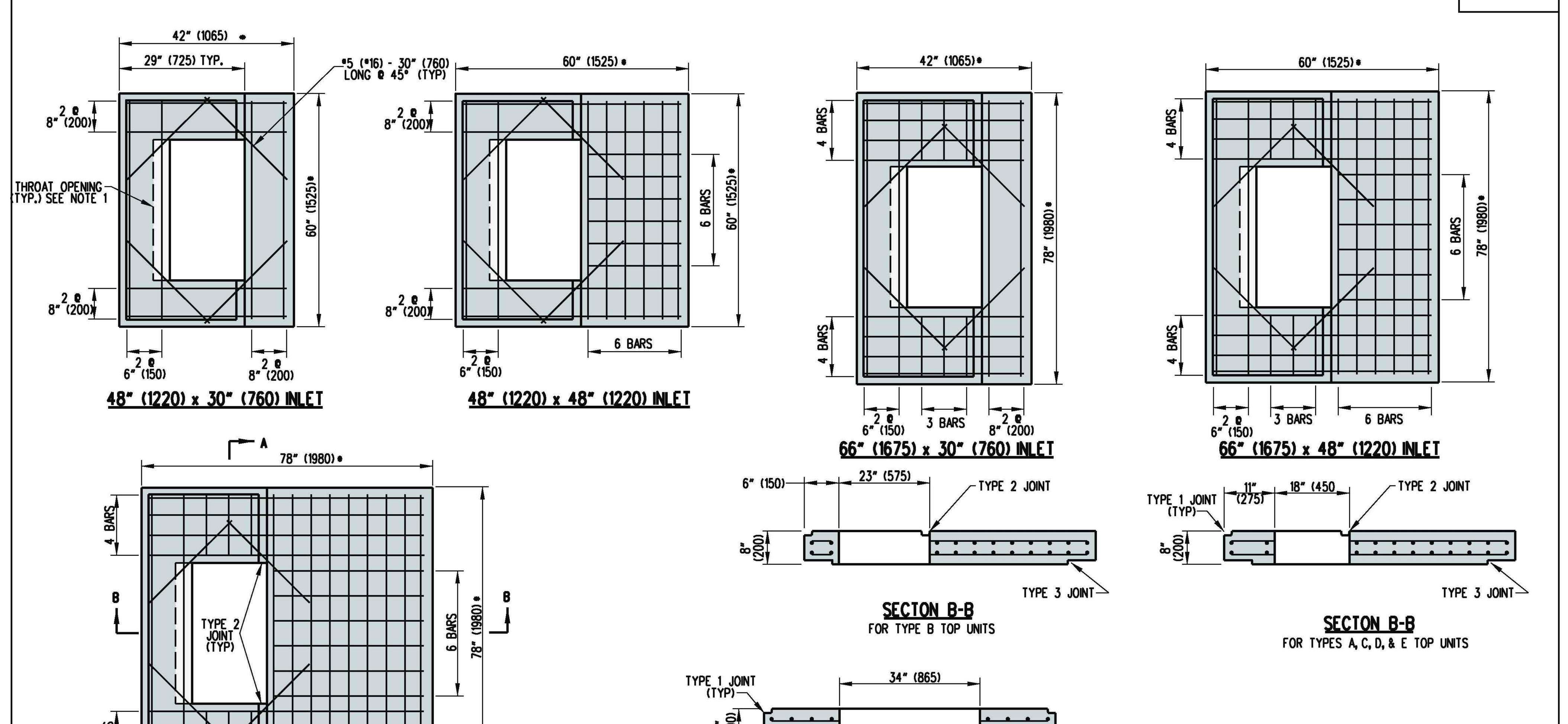


NOTES:
1). ONLY INSTALL THE TYPE 2 DRAINAGE INLET GRATE WHERE BICYCLE TRAFFIC IS NOT EXPECTED TO BE PRESENT.
2). LABEL THE TOP OF ALL DRAINAGE INLET GRATES, EXCEPT TYPE 7, WITH "ONLY RAIN DOWN THE STORM DRAIN". ALSO, LABEL DRAINAGE INLET GRATES TYPE 1 AND TYPE 4 WITH "WATER FLOW" AND AN ARROW INDICATING FLOW DIRECTION AS SHOWN IN THE EXAMPLE DETAIL.
3). LABEL THE TOP AND BOTTOM OF THE TYPE 1 DRAINAGE INLET GRATE WITH "CURBSIDE" AS SHOWN ON THE EXAMPLE DETAIL.
4). ONLY USE THE TYPES 5 & 6 DRAINAGE INLET FRAME AND GRATE COMBINATIONS ON LAWN INLET DRAINAGE BOXES. SEE SCHEDULE ON DETAIL D-4, SHEET 1 FOR WHICH BOX SIZES ARE CONSIDERED LAWN INLET DRAINAGE BOXES.
5). THE TYPE 6 DRAINAGE INLET FRAME AND GRATE COMBINATION SHOWN IS THE NEENAH FOUNDRY FRAME AND GRATE COMBINATION MODEL NF-1878-A5G, AN ACCEPTABLE ALTERNATIVE IS THE EAST JORDAN IRON WORKS FRAME AND GRATE COMBINATION MODEL V-5622.

DELAWARE DEPARTMENT OF TRANSPORTATION	DRAINAGE INLET FRAME AND GRATES		APPROVED	SIGNATURE ON FILE (CHIEF ENGINEER)	12/30/2014 (DATE)
	STANDARD NO. D-5 (2014)	SHT. 2 OF 9	RECOMMENDED	SIGNATURE ON FILE (DESIGN ENGINEER)	12/11/2014 (DATE)

12/4/2014

SCALE : N.T.S.



NOTES :
1). RELOCATE ENCROACHING REINFORCING BARS WHEN USING TYPE B UNIT.
2). COVER SLABS SHALL BE PRECAST AND MUST BE SIZED TO FIT INLET BOX DIMENSIONS.
3). ALL BARS ARE TO BE #5 (#16) SPACED @ 6" (150) UNLESS NOTED OTHERWISE. TOP REINFORCEMENT SHALL BE 0.11 IN^2 (70 mm^2) HORIZONTAL REINFORCEMENT PER FOOT IN BOTH DIRECTIONS.
4). MINIMUM BAR COVER = 1½" (38).

* - DIMENSIONS TO MATCH OUTSIDE TO OUTSIDE DIMENSIONS OF BOX.

DELAWARE DEPARTMENT OF TRANSPORTATION	DRAINAGE INLET COVER SLAB DETAILS		APPROVED	SIGNATURE ON FILE (CHIEF ENGINEER)	12/28/2010 (DATE)
	STANDARD NO. D-5 (2010)	SHT. 4 OF 9	RECOMMENDED	SIGNATURE ON FILE (DESIGN ENGINEER)	12/27/2010 (DATE)

12/31/2010

CONSTRUCTION SITE DETAILS AND NOTES 2

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL NUMBER 113-6.00-123.00

SUSSEX COUNTY, DELAWARE

PREPARED FOR CLEANBAY BIOFUELS LLC.

RAUCH inc.
engineering design & development services
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email: design@raucheng.com | web: www.raucheng.com
Maryland Office: 106 N. Harrison St - Easton, MD 21601
Virginia Office: 8229 Boone Blvd, Suite 625 - Vienna, VA 22182

ROBERT D. RAUCH LICENSE No. 8359 DELAWARE PROFESSIONAL ENGINEER

10-Jun-19

Professional Certification
I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Delaware.
License No. 8359
Expiration Date: June 30, 2020

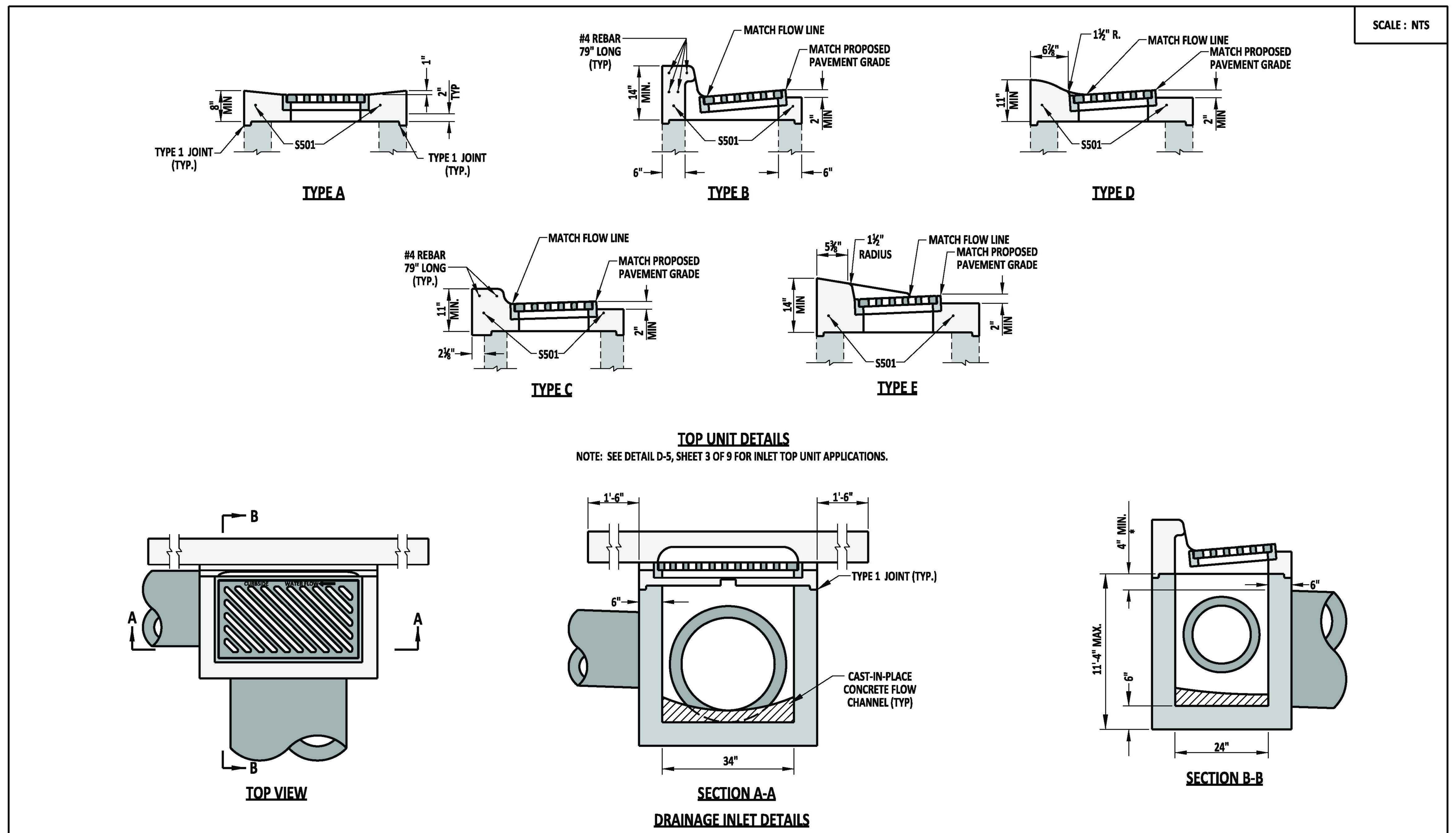
REVISIONS

REV. #	DATE	DESCRIPTION
A	6/3/19	Revised per county comments 23 April 2019

DATE:	6/5/19
SCALE:	AS SHOWN
DRAWN BY:	WJS
DESIGNED BY:	WJR
APPROVED BY:	X
SHEET NO.:	CB006-C-SW042

FOR REVIEW

SCALE : NTS



DRAINAGE INLET DETAILS

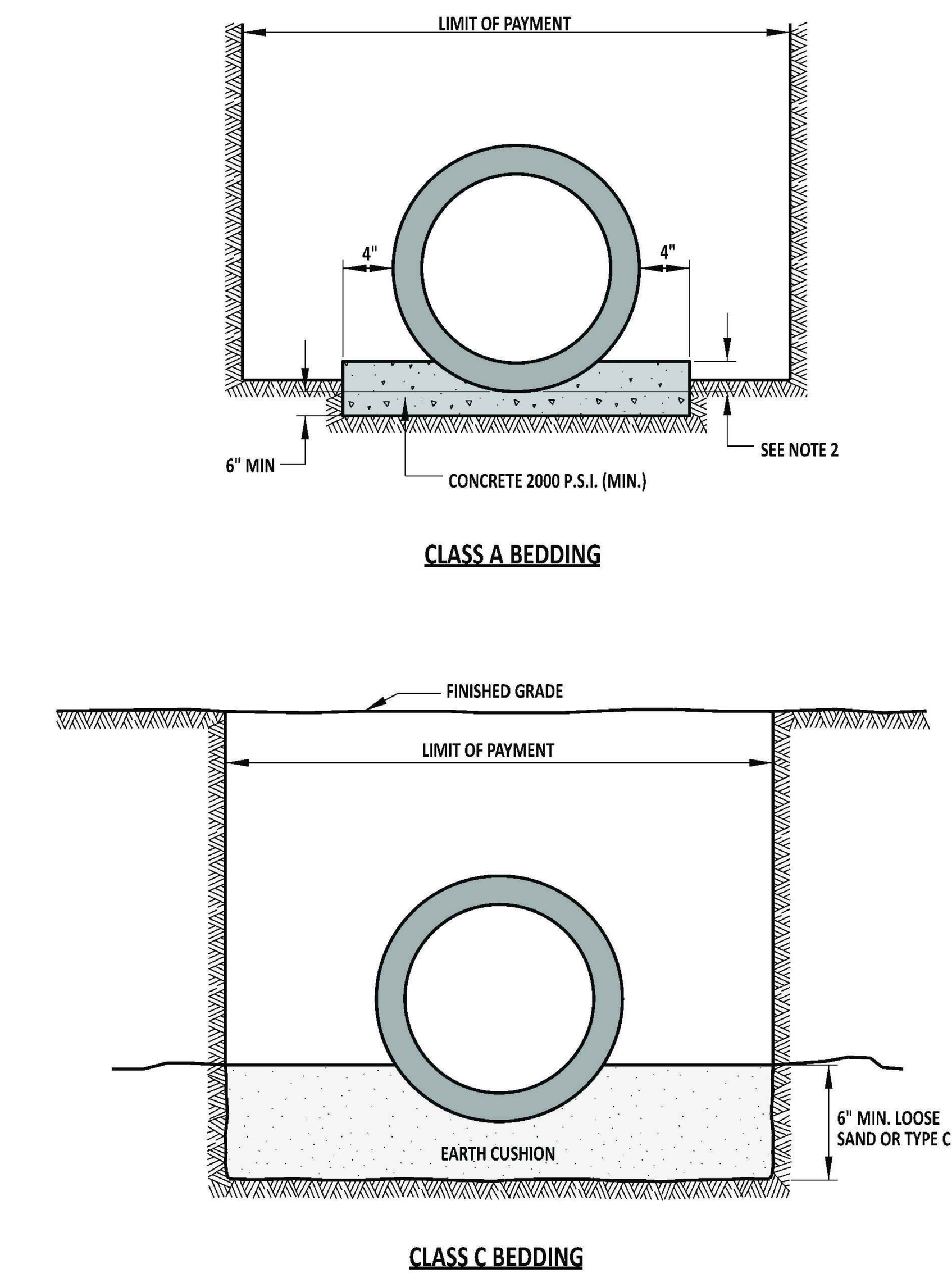
NOTE: REFER TO PREVIOUS SHEETS FOR REINFORCING REQUIREMENTS

* - SEE OPTIONAL PIPE OPENING DETAIL ON STANDARD NO. D-4, SHEET 1 OF 1

DELAWARE DEPARTMENT OF TRANSPORTATION	34" x 24" DRAINAGE INLET DETAILS	APPROVED	SIGNATURE ON FILE (CHIEF ENGINEER) 01/07/2013 (DATE)
	STANDARD NO. D-5 (2012) SHT. 6 OF 9	RECOMMENDED	SIGNATURE ON FILE (DESIGN ENGINEER) 12/20/2012 (DATE)

12/4/2012

SCALE : NTS



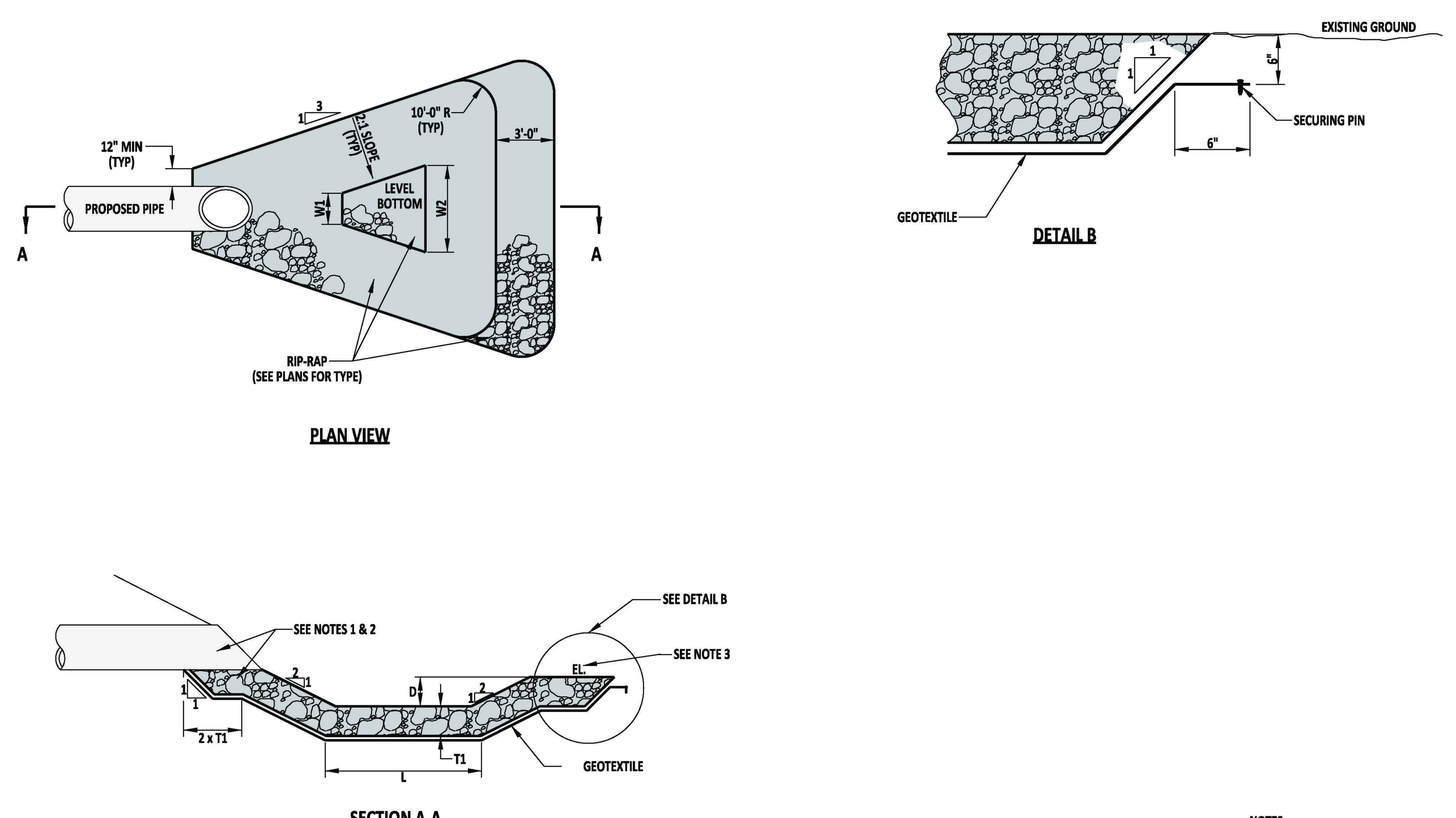
NOTE:

1). USE CLASS C BEDDING UNLESS OTHERWISE INDICATED.
2). FOR CLASS A BEDDING, IMBED PIPE IN CONCRETE 6" FOR PIPES SMALLER THAN 24" I.D., 10" FOR PIPES 24" TO 60", AND FOR PIPES LARGER THAN 60" SEE PROJECT DETAILS.

DELAWARE DEPARTMENT OF TRANSPORTATION	PIPE BEDDING	APPROVED	SIGNATURE ON FILE (CHIEF ENGINEER) 1/04/2019 (DATE)
	STANDARD NO. D-8 (2018) SHT. 1 OF 1	RECOMMENDED	SIGNATURE ON FILE (DESIGN ENGINEER) 12/20/2018 (DATE)

1/7/2019

SCALE : NTS



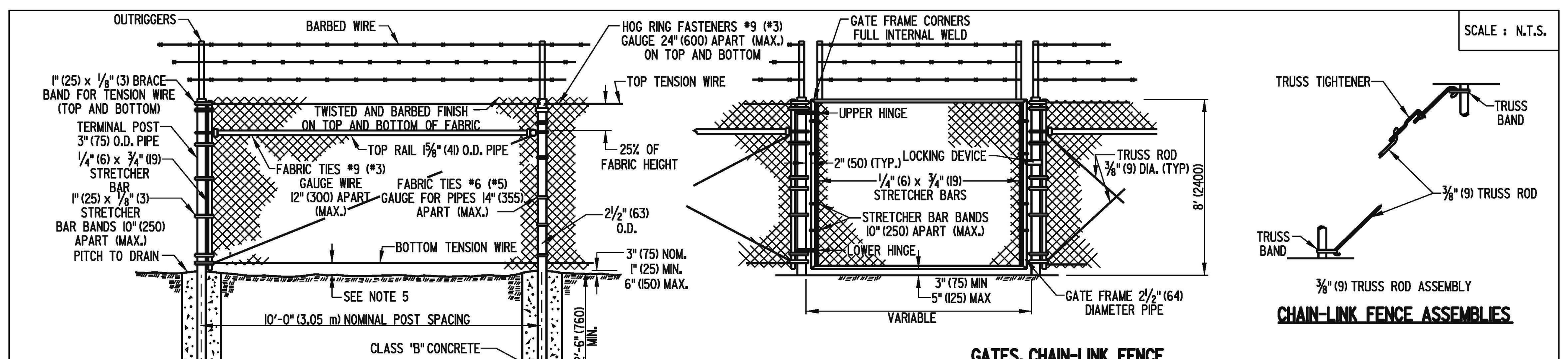
NOTES:

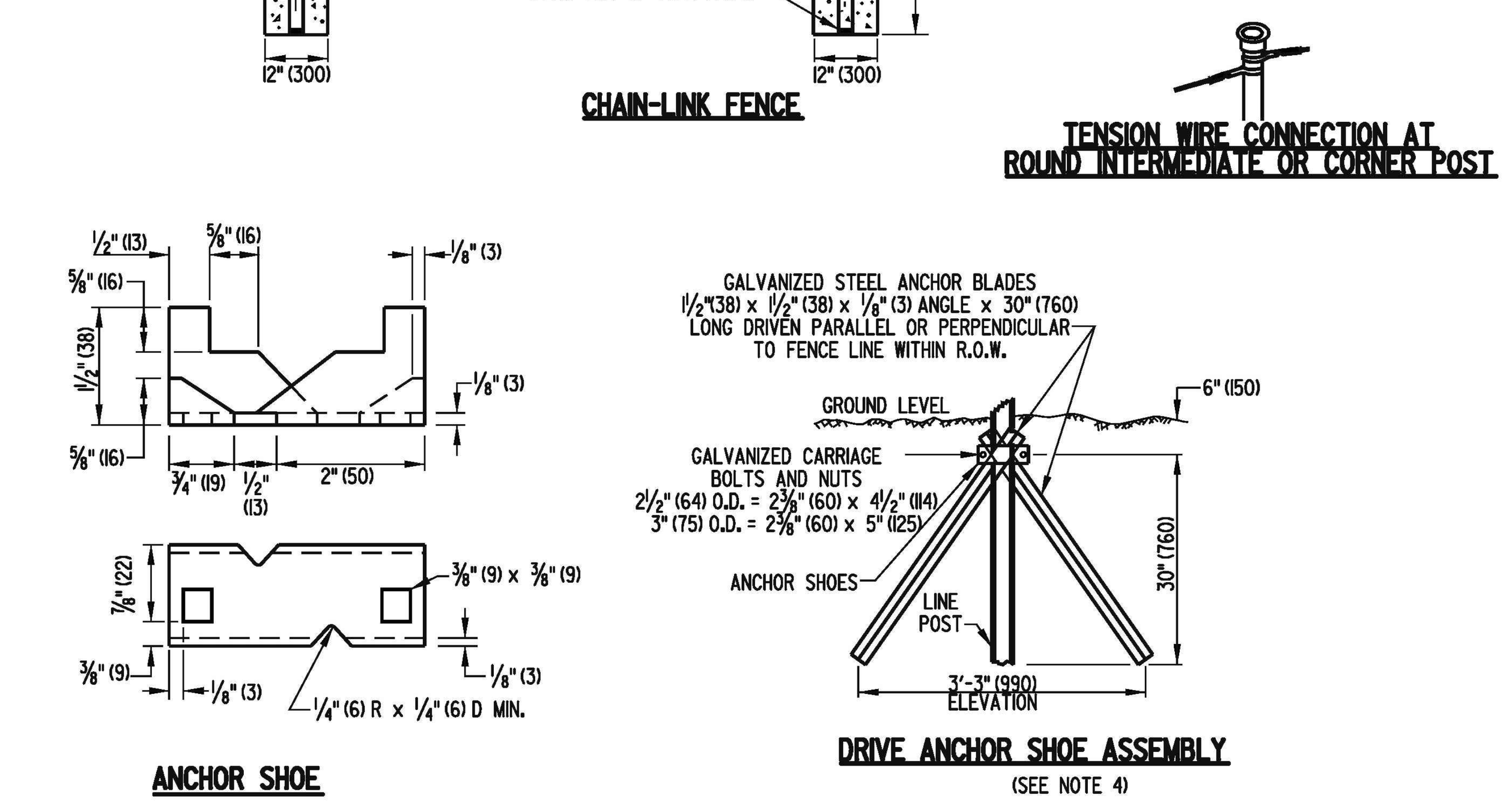
1). PLACE RIPRAP PRIOR TO PLACING PIPE.
2). PLACE DELAWARE NO. 3 STONE UNDER PIPE.
3). CONSTRUCT DISSIPATOR SUCH THAT THE ELEVATION (EL.) IS LOWER THAN PIPE INVERT.
4). REFER TO THE PIPE ENERGY DISSIPATOR SCHEDULE ON THE PLANS FOR THE VALUE OF DIMENSION VARIABLES.

DELAWARE DEPARTMENT OF TRANSPORTATION	RIPRAP ENERGY DISSIPATOR	APPROVED	SIGNATURE ON FILE (CHIEF ENGINEER) 12/30/2014 (DATE)
	STANDARD NO. E-20 (2014) SHT. 1 OF 1	RECOMMENDED	SIGNATURE ON FILE (DESIGN ENGINEER) 12/11/2014 (DATE)

10/24/2014

SCALE : N.T.S.





GENERAL NOTES

1). POSTS	TERMINAL, CORNER AND GATE POSTS	LINE POSTS	TOP OR BRACE RAIL
	3" (75) O.D. PIPE	2½" (64) O.D. PIPE	1⅝" (41) O.D. PIPE
AASHTO TYPE	I OR II	I OR II	I OR II
AASHTO GRADE	I OR 2	I OR 2	I OR 2
MINIMUM LENGTH OF POST:	10'-8" (3250)	10'-8" (3250)	N/A
ACTUAL OUTSIDE DIAMETER	2⅞" (73)	2⅜" (60)	1.660" (42)
WALL THICKNESS	GRADE 1 = .203" (5.2) GRADE 2 = .160" (4)	GRADE 1 = .154" (3.9) GRADE 2 = .120" (3)	GRADE 1 = .140" (3.5) GRADE 2 = .111" (2.8)

2). THE DEPTH OF CONCRETE FOOTERS IN SOLID ROCK MAY BE REDUCED TO 12" (300) BELOW THE TOP OF ROCK AND THE DIAMETER OF THE HOLE IN ROCK MAY BE REDUCED TO 6" (150).
3). BRACE BANDS AND STRETCHER BAR BANDS SHALL BE FURNISHED WITH 5⁄16" (8) DIA. CARRIAGE BOLTS AND ELASTIC STOP NUTS.
4). DRIVE ANCHOR SHOE ASSEMBLY ONLY TO BE USED IN WET AREAS AND WITH PRIOR APPROVAL OF THE ENGINEER.
5). THE BOTTOM OF THE FENCE SHALL BE 2" (50) MAX ABOVE HARD GROUND OR PAVEMENT. WHERE THERE IS SOFT GROUND, THE BOTTOM OF THE FENCE SHALL EXTEND INTO THE GROUND IN ORDER TO BE FIRM DUE TO SHIFTING SOIL OR SAND.
6). NUTS AND BOLTS SHALL BE TACK WELDED OR BURRED TO PREVENT REMOVAL.
7). IF THERE ARE ANY OPENINGS IN THE FENCE LARGER THAN 96 SQ. IN. (620 sq. cm) DUE TO UTILITIES OR GRADED TERRAIN, THE OPENINGS SHALL BE SECURED WITH A METAL GRILL THAT IS LOCKED OR PERMANENTLY WELDED.
8). VEGETATION AND PERMANENT STRUCTURES (SUCH AS BUILDINGS, LIGHT POLES, AND UTILITY POLES) SHALL BE AT LEAST 14' (4.2 m) FROM THE FENCE. ANY EXCEPTIONS SHALL REQUIRE THE CONSTRUCTION OF TOP GUARDS.

DELAWARE DEPARTMENT OF TRANSPORTATION	CHAIN LINK FENCE DETAILS	APPROVED	[signature] (CHIEF ENGINEER) 10/10/06 (DATE)
	STANDARD NO. M-7 (2006) SHT. 1 OF 1	RECOMMENDED	[signature] (DESIGN ENGINEER) 10/9/06 (DATE)

06/27/2006

CONSTRUCTION SITE DETAILS AND NOTES 3

OF THE LANDS OF

CLEANBAY SUSSEX 1

PARCEL NUMBER 113-6.00-123.00

SUSSEX COUNTY, DELAWARE

PREPARED FOR CLEANBAY BIOFUELS LLC.

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ROBERT D. RAUCH LICENSE No. 8359 DELAWARE PROFESSIONAL ENGINEER

10-Jun-19

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License No. 8359
Expiration Date: June 30, 2020

REVISIONS

REV. #	DATE	DESCRIPTION
A	6/3/19	Revised per county comments 23 April 2019

DATE:	6/5/19
SCALE:	AS SHOWN
DRAWN BY:	WJS
DESIGNED BY:	WJR
APPROVED BY:	X
SHEET NO.:	CB006-C-SW043

FOR REVIEW