

79.0691	154.459
85.0598	153
88.4071	152.185
93.2699	151
96.1305	150.964
100.713	150.947
101.016	150.941
113.425	150.821
121.918	150.822
130.421	150.823
138.934	150.824
147.456	150.825
148.142	150.848
156.777	150.849
157.383	150.866
166.104	150.867
166.646	150.881
175.435	150.882
175.924	150.893
184.77	150.893
185.454	150.904
186.03	150.91
186.471	150.91
195.39	150.911
195.828	150.911
204.75	150.912
205.185	150.912
214.11	150.912
214.542	150.912
223.469	150.913
223.899	150.913
224.328	150.913
224.757	150.913
226.606	150.875
232.206	150.736
237.619	150.555
266.437	149.593
284.194	149
288.023	148.82
294.955	148.494
315.577	147.526
326.764	147
345.352	146.109
367.261	145
389.122	144.384
438.282	143
441.106	142.989
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442.992	142.982
450.152	142.954
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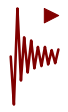
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535.521	142.04
539.492	142.044
544.41	142.042
548.376	142.045
551.45	142.051
554.115	142.053
556.005	142.053
558.664	142.055
563.412	142.057
566.946	142.064
571.737	142.066
575.242	142.073
580.075	142.075
583.551	142.082
586.977	142.088
591.874	142.09
595.541	142.09
600.448	142.093
604.107	142.093
609.025	142.095
612.675	142.095
617.604	142.097
621.244	142.097
622.641	142.096
626.431	142.093
629.889	142.087
634.698	142.083
638.19	142.076
641.731	142.07
646.478	142.066
650.054	142.06
654.753	142.056
659.419	142.052
663.75	142.06
668.432	142.056
672.746	142.063
677.444	142.06
680.743	142.07
685.469	142.067
688.752	142.077
692.299	142.081
695.852	142.075
701.119	142.075
703.992	142.063
708.239	142.071

712.549	142.079
716.654	142.084
721.014	142.092
725.057	142.098
729.467	142.106
730.766	142.109
732.057	142.112
735.706	142.117
737.361	142.116
738.906	142.115
742.564	142.12
743.989	142.118
755.732	142.35
775.632	142.895
775.782	142.895
775.919	142.894
776.153	142.893
778.05	143
783.506	144.753
784.276	145
789.286	146.609
790.503	147
794.831	148.39
796.73	149
800.37	150.169
802.957	151
805.905	151.947
809.183	153
811.435	153.723
815.41	155
816.957	155.497
821.637	157
822.473	157.269
827.863	159
827.984	159.039
828.909	159.336
833.494	160.808
834.09	161
838.998	162.577
840.317	163
844.497	164.343
846.543	165
849.989	166.107
852.77	167
855.476	167.869
858.997	169
860.956	169.629
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866.43	171.387
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875.09	174.169
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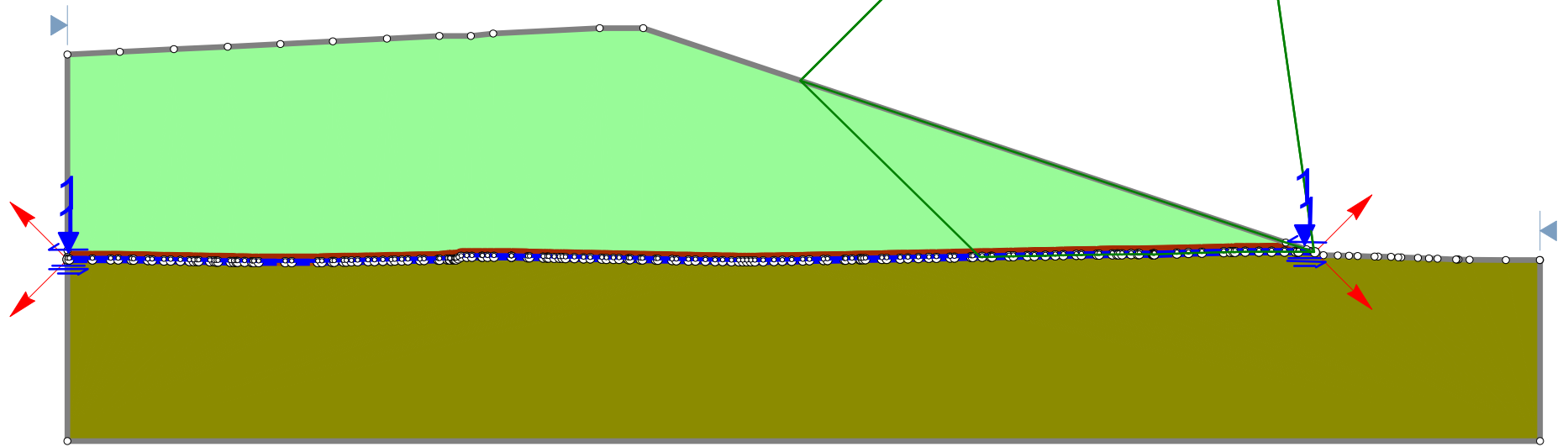
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888.276	178.404
890.13	179
893.723	180.154
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899.164	181.902
902.583	183
906.152	184.146
908.81	185
912.925	186.322
915.037	187
918.41	188.083
921.263	189
923.888	189.843
927.49	191
929.36	191.601
933.717	193
934.825	193.356
939.944	195
940.292	195.112
943.235	196.057
945.863	196.901
946.17	197
951.208	198.618
952.397	199
956.633	200.361
958.624	201
962.07	202.107
964.85	203
967.5	203.851
971.077	205
972.917	205.591
977.304	207
978.32	207.326
983.53	209
983.726	209.063
985.426	209.609
989.318	210.859
989.757	211
994.64	212.568
995.984	213
999.949	214.274
1002.21	215
1005.61	216.122
1007.6	216.78

Material Name	Color	Unit Weight (lbs/ft ³)	Strength Type	Cohesion (psf)	Phi (deg)	Shear Normal Function	Water Surface
C&D		60	Shear Normal function			C&D	None
Critical Geosynthetic Interface		60	Mohr-Coulomb	0	12		Piezometric Line 1
Pea Gravel		132.8	Mohr-Coulomb	107	33.8		Piezometric Line 1
Low Permeability Soil		118.5	Mohr-Coulomb	67	17.4		None
Subgrade		127	Mohr-Coulomb	31	30.6		None
Select Fill		132.8	Mohr-Coulomb	107	33.8		None

0.075



600
500
400
300
200
100
0



Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

Slide Modeler Version:	9.02
Compute Time:	00h:01m:10.685s
Date Created:	7/28/2021, 10:59:59 AM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	GLE/Morgenstern-Price with interslice force function (Half Sine)
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle) [deg]:	135
Left Projection Angle (End Angle) [deg]:	225
Right Projection Angle (Start Angle) [deg]:	45
Right Projection Angle (End Angle) [deg]:	-45
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.075

Materials

C&D

Color	
Strength Type	Shear Normal function
Unit Weight [lbs/ft ³]	60
Water Surface	None
Ru Value	0

Pea Gravel

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	132.8
Cohesion [psf]	107
Friction Angle [deg]	33.8
Water Surface	Piezometric Line 1
Hu Value	1

Low Permeability Soil

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	118.5
Cohesion [psf]	67
Friction Angle [deg]	17.4
Water Surface	None
Ru Value	0

Subgrade

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	127
Cohesion [psf]	31
Friction Angle [deg]	30.6
Water Surface	None
Ru Value	0

Select Fill

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	132.8
Cohesion [psf]	107
Friction Angle [deg]	33.8
Water Surface	None
Ru Value	0

Shear Normal Functions

Name: C&D		
Effective Normal (psf)		Shear (psf)
0		0
2000		1400
10000		6169

Global Minimums

Method: gle/morgenstern-price

FS	1.184480
Axis Location:	883.242, 599.738
Left Slip Surface Endpoint:	557.591, 274.128
Right Slip Surface Endpoint:	948.340, 143.851
Resisting Moment:	1.70564e+08 lb-ft
Driving Moment:	1.43999e+08 lb-ft
Resisting Horizontal Force:	317543 lb
Driving Horizontal Force:	268085 lb
Total Slice Area:	17204.4 ft ²
Surface Horizontal Width:	390.749 ft
Surface Average Height:	44.0292 ft

Global Minimum Coordinates

Method: gle/morgenstern-price

X	Y
557.591	274.128
694.295	139.967
695.918	140
702.465	140.132
703.518	140.154
716.362	140.413
719.644	140.479
730.199	140.692
735.69	140.803
743.977	140.971
751.655	141.126
757.696	141.248
767.54	141.447
771.355	141.524
783.347	141.766
784.957	141.799
794.928	142
798.336	142.012
799.584	142.015
802.272	142.026
809.313	142.051
814.19	142.061
815.343	142.056
825.43	142
826.105	141.999
826.795	142
826.896	142
844.081	142.65
852.85	142.878
863.067	143.224
879.695	143.615
884.698	143.759
887.025	143.821
888.251	143.845
896.082	144
906.423	144.035
915.996	144.06
925.977	144.029
934.42	144
936.1	143.954
936.549	143.941
937.72	143.909
948.34	143.851

Global Minimum Support Data

No Supports Present

Slice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.18448

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	21.6191	9085.92	-44.4622	C&D	2.84217e-14	34.992	152.782	180.967	258.524	0	258.524	408.464	408.464
2	21.6191	27257.8	-44.4622	C&D	0	34.992	441.609	523.077	747.252	0	747.252	1180.65	1180.65
3	21.6191	45429.6	-44.4622	C&D	0	34.992	709.041	839.845	1199.78	0	1199.78	1895.63	1895.63
4	21.6191	63601.5	-44.4622	C&D	0	34.992	961.266	1138.6	1626.57	0	1626.57	2569.96	2569.96
5	21.6191	81773.3	-44.4622	C&D	207.75	30.8002	1203.14	1425.09	2042.09	0	2042.09	3222.85	3222.85
6	21.6191	99945.2	-44.4622	C&D	207.75	30.8002	1417.12	1678.55	2467.27	0	2467.27	3858.04	3858.04
7	4.992	26569.1	-44.4622	Select Fill	107	33.8	1675.65	1984.77	2804.98	0	2804.98	4449.46	4449.46
8	0.998401	5648.14	-44.4622	Pea Gravel	107	33.8	1777.46	2105.37	2985.13	0	2985.13	4729.54	4729.54
9	0.998401	5759.58	-44.4622	Pea Gravel	107	33.8	1796.75	2128.22	3050.45	31.1895	3019.26	4813.79	4782.6
10	1.62366	9429.23	1.15722	Critical Geosynthetic Interface	0	12	1061.82	1257.7	5979.42	62.3895	5917.03	5957.98	5895.59
11	6.54642	37450.2	1.15722	Critical Geosynthetic Interface	0	12	1049.93	1243.62	5913.16	62.3895	5850.77	5891.95	5829.56
12	1.0537	5942.98	1.15722	Critical Geosynthetic Interface	0	12	1038.71	1230.33	5850.66	62.3895	5788.27	5829.67	5767.29
13	12.8437	70546.4	1.15722	Critical Geosynthetic Interface	0	12	1017.57	1205.29	5732.83	62.3895	5670.44	5712.28	5649.89
14	3.28235	17467.4	1.15722	Critical Geosynthetic Interface	0	12	992.402	1175.48	5592.6	62.3895	5530.21	5572.55	5510.16
15	10.5551	54620.5	1.15722	Critical Geosynthetic Interface	0	12	969.962	1148.9	5467.55	62.3895	5405.16	5447.96	5385.57
16	5.49021	27476.4	1.15722	Critical Geosynthetic Interface	0	12	943.232	1117.24	5318.56	62.3895	5256.17	5299.51	5237.12
17	8.28755	40264.7	1.15722	Critical Geosynthetic Interface	0	12	919.509	1089.14	5186.38	62.3895	5123.99	5167.81	5105.42
18	7.67752	36000.6	1.15722	Critical Geosynthetic Interface	0	12	891.26	1055.68	5028.96	62.3895	4966.57	5010.96	4948.57
19	6.041	27447.7	1.15722	Critical Geosynthetic Interface	0	12	866.33	1026.15	4890.03	62.3895	4827.64	4872.53	4810.14
20	9.84447	43070.1	1.15722	Critical Geosynthetic Interface	0	12	836.681	991.032	4724.83	62.3895	4662.44	4707.92	4645.54
21	3.81517	16138.7	1.15722	Critical Geosynthetic Interface	0	12	810.658	960.208	4579.8	62.3895	4517.41	4563.43	4501.04
22	11.9913	48714.3	1.15722	Critical Geosynthetic Interface	0	12	779.797	923.654	4407.84	62.3895	4345.45	4392.09	4329.7
23	1.60986	6307.74	1.15722	Critical Geosynthetic Interface	0	12	752.835	891.718	4257.6	62.3895	4195.21	4242.39	4180
24	9.97162	37845.6	1.15722	Critical Geosynthetic Interface	0	12	729.447	864.015	4127.26	62.3895	4064.87	4112.53	4050.14
25	3.40817	12457.2	0.204137	Critical Geosynthetic Interface	0	12	693.897	821.907	3929.16	62.3895	3866.77	3926.68	3864.29
26	1.24758	4501.38	0.125349	Critical Geosynthetic Interface	0	12	684.282	810.518	3875.58	62.3895	3813.19	3874.08	3811.69
27	2.68835	9592.84	0.238314	Critical Geosynthetic Interface	0	12	677.681	802.7	3838.79	62.3895	3776.4	3835.97	3773.58

28	7.04047	24429.8	0.203264	Critical Geosynthetic Interface	12	658.51	779.992	3731.96	62.3895	3669.57	3729.62	3667.23	
29	4.87714	16336.8	0.113922	Critical Geosynthetic Interface	12	634.592	751.662	3598.68	62.3895	3536.29	3597.42	3535.03	
30	1.15297	3792.35	-0.239823	Critical Geosynthetic Interface	12	620.199	734.613	3518.47	62.3895	3456.08	3521.06	3458.67	
31	10.0876	32064.4	-0.317514	Critical Geosynthetic Interface	12	598.268	708.637	3396.27	62.3895	3333.88	3399.58	3337.19	
32	0.675026	2074.11	-0.0457245	Critical Geosynthetic Interface	12	579.578	686.498	3292.11	62.3895	3229.72	3292.57	3230.18	
33	0.68978	2110.03	0.0374701	Critical Geosynthetic Interface	12	577.466	683.997	3280.35	62.3872	3217.96	3279.97	3217.58	
34	0.100717	307.294	0.0395942	Critical Geosynthetic Interface	12	575.926	682.173	3271.77	62.3895	3209.38	3271.37	3208.98	
35	17.1855	49127.2	2.16691	Critical Geosynthetic Interface	12	550.765	652.37	3131.52	62.3664	3069.16	3110.68	3048.32	
36	8.76831	22558.6	1.48686	Critical Geosynthetic Interface	12	487.956	577.974	2781.54	62.3895	2719.15	2768.87	2706.48	
37	10.2174	24170.7	1.93867	Critical Geosynthetic Interface	12	447.563	530.129	2556.45	62.3895	2494.07	2541.3	2478.92	
38	16.6274	34502.3	1.34699	Critical Geosynthetic Interface	12	385.755	456.919	2212.02	62.3895	2149.64	2202.95	2140.56	
39	5.00303	9218.74	1.6504	Critical Geosynthetic Interface	12	339.636	402.292	1955.03	62.3895	1892.64	1945.24	1882.85	
40	2.32748	4103.65	1.524	Critical Geosynthetic Interface	12	323.262	382.897	1863.78	62.3895	1801.39	1855.18	1792.79	
41	1.22624	2115.26	1.13275	Critical Geosynthetic Interface	12	314.623	372.665	1815.64	62.3895	1753.25	1809.42	1747.03	
42	7.83115	12757.1	1.13404	Critical Geosynthetic Interface	12	295.545	350.067	1709.32	62.3895	1646.93	1703.47	1641.08	
43	10.341	14907.2	0.194502	Critical Geosynthetic Interface	12	256.896	304.288	1493.95	62.3895	1431.56	1493.08	1430.69	
44	9.57219	11875.1	0.149724	Critical Geosynthetic Interface	12	218.079	258.31	1277.65	62.3895	1215.26	1277.08	1214.69	
45	9.98167	10432.9	-0.180702	Critical Geosynthetic Interface	12	180.538	213.844	1068.44	62.3895	1006.05	1069.01	1006.62	
46	8.44311	6590.33	-0.194337	Critical Geosynthetic Interface	12	131.448	155.697	794.888	62.3895	732.499	795.334	732.945	
47	1.67995	944.881	-1.58113	Critical Geosynthetic Interface	12	91.0729	107.874	569.897	62.3895	507.507	572.411	510.021	
48	0.449087	233.174	-1.58092	Critical Geosynthetic Interface	12	83.2724	98.6345	526.428	62.3895	464.038	528.726	466.337	
49	1.1703	569.16	-1.58108	Critical Geosynthetic Interface	12	77.3452	91.6138	493.398	62.3895	431.009	495.533	433.144	
50	10.6204	2456.35	-0.311005	Pea Gravel	107	33.8	193.799	229.551	238.106	55.042	183.064	239.158	184.116

Interslice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.18448

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	557.591	274.128	0	0	0
2	579.21	252.911	2867.92	259.037	5.16108
3	600.83	231.694	11232.2	1998.45	10.0886
4	622.449	210.477	24786.6	6448.49	14.5828
5	644.068	189.26	43313.5	14490.9	18.4981
6	665.687	168.043	66797.3	26643.7	21.7458
7	687.306	146.826	96045	43332.6	24.2835
8	692.298	141.927	103426	47716.8	24.7668
9	693.296	140.947	105002	48648.8	24.8589
10	694.295	139.967	106632	49608.5	24.9493
11	695.918	140	105421	49367.6	25.0932
12	702.465	140.132	100584	48260.7	25.6319
13	703.518	140.154	99811.7	48063.1	25.7126
14	716.362	140.413	90563.3	45264.9	26.5566
15	719.644	140.479	88249.4	44445.8	26.7316
16	730.199	140.692	80955.8	41574.3	27.1825
17	735.69	140.803	77255	39959.3	27.3498
18	743.977	140.971	71796.2	37399	27.5152
19	751.655	141.126	66882.8	34928.8	27.5753
20	757.696	141.248	63118.1	32940.7	27.5596
21	767.54	141.447	57183	29660.1	27.4152
22	771.355	141.524	54951.7	28386.4	27.3195
23	783.347	141.766	48199.2	24425.7	26.8743
24	784.957	141.799	47323.5	23902.5	26.7978
25	794.928	142	42066.4	20731.5	26.2354
26	798.336	142.012	40591.2	19804.7	26.008
27	799.584	142.015	40065.7	19472.4	25.9203
28	802.272	142.026	38922.8	18751.7	25.7232
29	809.313	142.051	36031.7	16920	25.1541
30	814.19	142.061	34131.2	15709.3	24.7148
31	815.343	142.056	33718.5	15441.6	24.6057
32	825.43	142	30286.1	13208	23.5624
33	826.105	141.999	30052.7	13059.2	23.487
34	826.795	142	29811.7	12906.4	23.4093
35	826.896	142	29776.6	12884.1	23.3978
36	844.081	142.65	21972.2	8531.51	21.2205
37	852.85	142.878	18758.1	6803.94	19.9367
38	863.067	143.224	15119.9	4999.59	18.2971
39	879.695	143.615	10437.1	2858.02	15.3141
40	884.698	143.759	9149.77	2339.83	14.3446
41	887.025	143.821	8590.74	2123.29	13.883
42	888.251	143.845	8320.07	2018.55	13.6372
43	896.082	144	6700.49	1427.41	12.026
44	906.423	144.035	5113.05	883	9.79807
45	915.996	144.06	3887	521.982	7.64845
46	925.977	144.029	2903.41	271.168	5.33574
47	934.42	144	2312.09	134.857	3.3381
48	936.1	143.954	2256.59	115.79	2.93738
49	936.549	143.941	2243.25	110.895	2.83011
50	937.72	143.909	2211.48	98.5013	2.55032
51	948.34	143.851	0	0	0

Discharge Sections

Entity Information

Piezoline

X	Y
0	139.001

1.53185	139.006
19.0865	139.06
32.9178	139.02
38.6457	139
48.7796	138.793
50.2602	138.763
61.0905	138.542
64.3705	138.476
73.4615	138.291
78.5505	138.189
85.9551	138.041
92.8528	137.903
95.9447	137.841
98.6483	137.789
99.8304	137.766
108.36	137.6
111.481	137.539
113.16	137.508
114.657	137.481
124.023	137.298
126.413	137.276
128.483	137.258
129.604	137.259
134.88	137.144
140.608	137.001
140.666	137
141.88	136.996
145.396	136.987
165.76	136.931
170.639	136.942
190.43	137
193.662	137.091
201.413	137.308
202.91	137.31
209.905	137.483
212.256	137.486
216.044	137.533
220.799	137.61
228.74	137.769
233.581	137.864
240.055	137.994
246.29	138.116
249.014	138.178
254.334	138.284
259.083	138.368
268.35	138.553
271.397	138.613
282.09	138.827
283.248	138.85
289.114	139
290.561	139
291.004	139
293.847	139

294.079	139
294.897	139
295.735	139
297.392	139.908
299.475	141
303.779	141.026
307.699	141.048
315.325	141.101
315.77	141.098
319.666	141.08
324.496	141.067
337.748	141
337.798	140.999
337.804	140.999
350.01	140.752
351.514	140.722
361.883	140.513
364.794	140.454
366.105	140.426
370.416	140.331
374.199	140.251
376.444	140.207
378.978	140.155
385.656	140.023
392.593	139.886
397.761	139.784
406.485	139.612
410.085	139.541
415.321	139.473
419.58	139.44
426.773	139.263
428.072	139.263
436.007	139.041
437.46	139
447.762	138.797
449.164	138.77
459.994	138.557
463.353	138.491
472.562	138.31
477.849	138.206
485.368	138.058
492.661	137.915
498.42	137.801
505.285	137.698
510.764	137.64
513.847	137.638
516.909	137.636
519.953	137.634
522.978	137.632
529.387	137.687
537.506	137.8
543.814	137.927
550.999	138.073

559.479	138.244
564.556	138.346
575.229	138.562
578.177	138.622
591.066	138.882
591.862	138.898
596.908	139
602.692	139.157
603.345	139.157
604.986	139.174
607.15	139.207
619.626	139.459
623.304	139.533
633.498	139.739
639.412	139.859
647.335	140.019
655.475	140.183
661.139	140.297
671.492	140.507
674.909	140.576
687.464	140.829
688.645	140.853
695.918	141
702.465	141.132
703.518	141.154
716.362	141.413
719.644	141.479
730.199	141.692
735.69	141.803
743.977	141.971
751.655	142.126
757.696	142.248
767.54	142.447
771.355	142.524
783.347	142.766
784.957	142.799
794.928	143
798.336	143.012
799.584	143.015
802.272	143.026
809.313	143.051
814.19	143.061
815.343	143.056
825.43	143
826.105	142.999
826.168	142.999
826.795	143
826.896	143
826.916	143
844.081	143.65
852.85	143.878
863.067	144.224
879.695	144.615

884.698	144.759
887.025	144.821
888.251	144.845
896.082	145
906.423	145.035
915.996	145.06
925.977	145.029
934.42	145
936.1	144.954
936.549	144.941
945.84	144.685

Block Search Polyline

X	Y
0	138.001
1.53185	138.006
19.0865	138.06
32.9178	138.02
38.6457	138
48.7796	137.793
50.2602	137.763
61.0905	137.542
64.3705	137.476
73.4615	137.291
78.5505	137.189
85.9551	137.041
92.8528	136.903
95.9447	136.841
98.6483	136.789
99.8304	136.766
108.36	136.6
111.481	136.539
113.16	136.508
114.657	136.481
124.023	136.298
126.413	136.276
128.483	136.258
129.604	136.259
134.88	136.144
140.608	136.001
140.666	136
141.88	135.996
145.396	135.987
165.76	135.931
170.639	135.942
190.43	136
193.662	136.091
201.413	136.308
202.91	136.31
209.905	136.483
212.256	136.486
216.044	136.533

220.799	136.61
228.74	136.769
233.581	136.864
240.055	136.994
246.29	137.116
249.014	137.178
254.334	137.284
259.083	137.368
268.35	137.553
271.397	137.613
282.09	137.827
283.248	137.85
289.114	138
290.561	138
291.004	138
293.847	138
294.079	138
294.897	138
295.735	138
297.392	138.908
299.475	140
303.779	140.026
307.699	140.048
315.325	140.101
315.77	140.098
319.666	140.08
324.496	140.067
337.748	140
337.798	139.999
337.804	139.999
350.01	139.752
351.514	139.722
361.883	139.513
364.794	139.454
366.105	139.426
370.416	139.331
374.199	139.251
376.444	139.207
378.978	139.155
385.656	139.023
392.593	138.886
397.761	138.784
406.485	138.612
410.085	138.541
415.321	138.473
419.58	138.44
426.773	138.263
428.072	138.263
436.007	138.041
437.46	138
447.762	137.797
449.164	137.77
459.994	137.557

463.353	137.491
472.562	137.31
477.849	137.206
485.368	137.058
492.661	136.915
498.42	136.801
505.285	136.698
510.764	136.64
513.847	136.638
516.909	136.636
519.953	136.634
522.978	136.632
529.387	136.687
537.506	136.8
543.814	136.927
550.999	137.073
559.479	137.244
564.556	137.346
575.229	137.562
578.177	137.622
591.066	137.882
591.862	137.898
596.908	138
602.692	138.157
603.345	138.157
604.986	138.174
607.15	138.207
619.626	138.459
623.304	138.533
633.498	138.739
639.412	138.859
647.335	139.019
655.475	139.183
661.139	139.297
671.492	139.507
674.909	139.576
687.464	139.829
688.645	139.853
695.918	140
702.465	140.132
703.518	140.154
716.362	140.413
719.644	140.479
730.199	140.692
735.69	140.803
743.977	140.971
751.655	141.126
757.696	141.248
767.54	141.447
771.355	141.524
783.347	141.766
784.957	141.799
794.928	142

798.336	142.012
799.584	142.015
802.272	142.026
809.313	142.051
814.19	142.061
815.343	142.056
825.43	142
826.105	141.999
826.168	141.999
826.795	142
826.896	142
826.916	142
844.081	142.65
852.85	142.878
863.067	143.224
879.695	143.615
884.698	143.759
887.025	143.821
888.251	143.845
896.082	144
906.423	144.035
915.996	144.06
925.977	144.029
934.42	144
936.1	143.954
936.549	143.941
949.11	143.595

External Boundary

X	Y
0	294
0	145.001
0	140.001
0	139.001
0	138.001
0	136.001
0	0
1120.27	0
1120.27	137.664
1120.15	137.662
1094.2	137.627
1066.59	137.768
1058.38	138
1056.96	138.055
1056.39	138.077
1042.28	138.625
1035.7	138.881
1027.44	139.202
1014.7	139.696
1012.45	139.784
1006.89	140
997.074	140.271
994.462	140.343
981.639	140.697
974.953	140.881
966.333	141.119
955.65	141.414
949.11	143.595
945.84	144.685
942.57	145.775
926.821	151.026
438	314
405	314
324	310
307	308
283	308
243	306
202	304
162	302
122	300
81	298
40	296

Material Boundary

X	Y
0	136.001
1.53185	136.006
19.0865	136.06
32.9178	136.02
38.6457	136
48.7796	135.793

50.2602	135.763
61.0905	135.542
64.3705	135.476
73.4615	135.291
78.5505	135.189
85.9551	135.041
92.8528	134.903
95.9447	134.841
98.6483	134.789
99.8304	134.766
108.36	134.6
111.481	134.539
113.16	134.508
114.657	134.481
124.023	134.298
126.413	134.276
128.483	134.258
129.604	134.259
134.88	134.144
140.608	134.001
140.666	134
141.88	133.996
145.396	133.987
165.76	133.931
170.639	133.942
190.43	134
193.662	134.091
201.413	134.308
202.91	134.31
209.905	134.483
212.256	134.486
216.044	134.533
220.799	134.61
228.74	134.769
233.581	134.864
240.055	134.994
246.29	135.116
249.014	135.178
254.334	135.284
259.083	135.368
268.35	135.553
271.397	135.613
282.09	135.827
283.248	135.85
289.114	136
290.561	136
291.004	136
293.847	136
294.079	136
294.897	136
295.735	136
297.392	136.908
299.475	138

303.779	138.026
307.699	138.048
315.325	138.101
315.77	138.098
319.666	138.08
324.496	138.067
337.748	138
337.798	137.999
337.804	137.999
350.01	137.752
351.514	137.722
361.883	137.513
364.794	137.454
366.105	137.426
370.416	137.331
374.199	137.251
376.444	137.207
378.978	137.155
385.656	137.023
392.593	136.886
397.761	136.784
406.485	136.612
410.085	136.541
415.321	136.473
419.58	136.44
426.773	136.263
428.072	136.263
436.007	136.041
437.46	136
447.762	135.797
449.164	135.77
459.994	135.557
463.353	135.491
472.562	135.31
477.849	135.206
485.368	135.058
492.661	134.915
498.42	134.801
505.285	134.698
510.764	134.64
513.847	134.638
516.909	134.636
519.953	134.634
522.978	134.632
529.387	134.687
537.506	134.8
543.814	134.927
550.999	135.073
559.479	135.244
564.556	135.346
575.229	135.562
578.177	135.622
591.066	135.882

591.862	135.898
596.908	136
602.692	136.157
603.345	136.157
604.986	136.174
607.15	136.207
619.626	136.459
623.304	136.533
633.498	136.739
639.412	136.859
647.335	137.019
655.475	137.183
661.139	137.297
671.492	137.507
674.909	137.576
687.464	137.829
688.645	137.853
695.918	138
702.465	138.132
703.518	138.154
716.362	138.413
719.644	138.479
730.199	138.692
735.69	138.803
743.977	138.971
751.655	139.126
757.696	139.248
767.54	139.447
771.355	139.524
783.347	139.766
784.957	139.799
794.928	140
798.336	140.012
799.584	140.015
802.272	140.026
809.313	140.051
814.19	140.061
815.343	140.056
825.43	140
826.105	139.999
826.168	139.999
826.795	140
826.896	140
826.916	140
844.081	140.65
852.85	140.878
863.067	141.224
879.695	141.615
884.698	141.759
887.025	141.821
888.251	141.845
896.082	142
906.423	142.035

915.996	142.06
925.977	142.029
934.42	142
936.1	141.954
936.549	141.941
951.154	141.538
955.65	141.414

Material Boundary

X	Y
0	138.001
1.53185	138.006
19.0865	138.06
32.9178	138.02
38.6457	138
48.7796	137.793
50.2602	137.763
61.0905	137.542
64.3705	137.476
73.4615	137.291
78.5505	137.189
85.9551	137.041
92.8528	136.903
95.9447	136.841
98.6483	136.789
99.8304	136.766
108.36	136.6
111.481	136.539
113.16	136.508
114.657	136.481
124.023	136.298
126.413	136.276
128.483	136.258
129.604	136.259
134.88	136.144
140.608	136.001
140.666	136
141.88	135.996
145.396	135.987
165.76	135.931
170.639	135.942
190.43	136
193.662	136.091
201.413	136.308
202.91	136.31
209.905	136.483
212.256	136.486
216.044	136.533
220.799	136.61
228.74	136.769
233.581	136.864
240.055	136.994

246.29	137.116
249.014	137.178
254.334	137.284
259.083	137.368
268.35	137.553
271.397	137.613
282.09	137.827
283.248	137.85
289.114	138
290.561	138
291.004	138
293.847	138
294.079	138
294.897	138
295.735	138
297.392	138.908
299.475	140
303.779	140.026
307.699	140.048
315.325	140.101
315.77	140.098
319.666	140.08
324.496	140.067
337.748	140
337.798	139.999
337.804	139.999
350.01	139.752
351.514	139.722
361.883	139.513
364.794	139.454
366.105	139.426
370.416	139.331
374.199	139.251
376.444	139.207
378.978	139.155
385.656	139.023
392.593	138.886
397.761	138.784
406.485	138.612
410.085	138.541
415.321	138.473
419.58	138.44
426.773	138.263
428.072	138.263
436.007	138.041
437.46	138
447.762	137.797
449.164	137.77
459.994	137.557
463.353	137.491
472.562	137.31
477.849	137.206
485.368	137.058

492.661	136.915
498.42	136.801
505.285	136.698
510.764	136.64
513.847	136.638
516.909	136.636
519.953	136.634
522.978	136.632
529.387	136.687
537.506	136.8
543.814	136.927
550.999	137.073
559.479	137.244
564.556	137.346
575.229	137.562
578.177	137.622
591.066	137.882
591.862	137.898
596.908	138
602.692	138.157
603.345	138.157
604.986	138.174
607.15	138.207
619.626	138.459
623.304	138.533
633.498	138.739
639.412	138.859
647.335	139.019
655.475	139.183
661.139	139.297
671.492	139.507
674.909	139.576
687.464	139.829
688.645	139.853
695.918	140
702.465	140.132
703.518	140.154
716.362	140.413
719.644	140.479
730.199	140.692
735.69	140.803
743.977	140.971
751.655	141.126
757.696	141.248
767.54	141.447
771.355	141.524
783.347	141.766
784.957	141.799
794.928	142
798.336	142.012
799.584	142.015
802.272	142.026
809.313	142.051

814.19	142.061
815.343	142.056
825.43	142
826.105	141.999
826.168	141.999
826.795	142
826.896	142
826.916	142
844.081	142.65
852.85	142.878
863.067	143.224
879.695	143.615
884.698	143.759
887.025	143.821
888.251	143.845
896.082	144
906.423	144.035
915.996	144.06
925.977	144.029
934.42	144
936.1	143.954
936.549	143.941
949.11	143.595

Material Boundary

X	Y
0	140.001
1.53185	140.006
19.0865	140.06
32.9178	140.02
38.6457	140
48.7796	139.793
50.2602	139.763
61.0905	139.542
64.3705	139.476
73.4615	139.291
78.5505	139.189
85.9551	139.041
92.8528	138.903
95.9447	138.841
98.6483	138.789
99.8304	138.766
108.36	138.6
111.481	138.539
113.16	138.508
114.657	138.481
124.023	138.298
126.413	138.276
128.483	138.258
129.604	138.259
134.88	138.144
140.608	138.001

140.666	138
141.88	137.996
145.396	137.987
165.76	137.931
170.639	137.942
190.43	138
193.662	138.091
201.413	138.308
202.91	138.31
209.905	138.483
212.256	138.486
216.044	138.533
220.799	138.61
228.74	138.769
233.581	138.864
240.055	138.994
246.29	139.116
249.014	139.178
254.334	139.284
259.083	139.368
268.35	139.553
271.397	139.613
282.09	139.827
283.248	139.85
289.114	140
290.561	140
291.004	140
293.847	140
294.079	140
294.897	140
295.735	140
297.392	140.908
299.475	142
303.779	142.026
307.699	142.048
315.325	142.101
315.77	142.098
319.666	142.08
324.496	142.067
337.748	142
337.798	141.999
337.804	141.999
350.01	141.752
351.514	141.722
361.883	141.513
364.794	141.454
366.105	141.426
370.416	141.331
374.199	141.251
376.444	141.207
378.978	141.155
385.656	141.023
392.593	140.886

397.761	140.784
406.485	140.612
410.085	140.541
415.321	140.473
419.58	140.44
426.773	140.263
428.072	140.263
436.007	140.041
437.46	140
447.762	139.797
449.164	139.77
459.994	139.557
463.353	139.491
472.562	139.31
477.849	139.206
485.368	139.058
492.661	138.915
498.42	138.801
505.285	138.698
510.764	138.64
513.847	138.638
516.909	138.636
519.953	138.634
522.978	138.632
529.387	138.687
537.506	138.8
543.814	138.927
550.999	139.073
559.479	139.244
564.556	139.346
575.229	139.562
578.177	139.622
591.066	139.882
591.862	139.898
596.908	140
602.692	140.157
603.345	140.157
604.986	140.174
607.15	140.207
619.626	140.459
623.304	140.533
633.498	140.739
639.412	140.859
647.335	141.019
655.475	141.183
661.139	141.297
671.492	141.507
674.909	141.576
687.464	141.829
688.645	141.853
695.918	142
702.465	142.132
703.518	142.154

716.362	142.413
719.644	142.479
730.199	142.692
735.69	142.803
743.977	142.971
751.655	143.126
757.696	143.248
767.54	143.447
771.355	143.524
783.347	143.766
784.957	143.799
794.928	144
798.336	144.012
799.584	144.015
802.272	144.026
809.313	144.051
814.19	144.061
815.343	144.056
825.43	144
826.105	143.999
826.168	143.999
826.795	144
826.896	144
826.916	144
844.081	144.65
852.85	144.878
863.067	145.224
879.695	145.615
884.698	145.759
887.025	145.821
888.251	145.845
896.082	146
906.423	146.035
915.996	146.06
925.977	146.029
934.42	146
936.1	145.954
936.549	145.941
942.57	145.775

Material Boundary

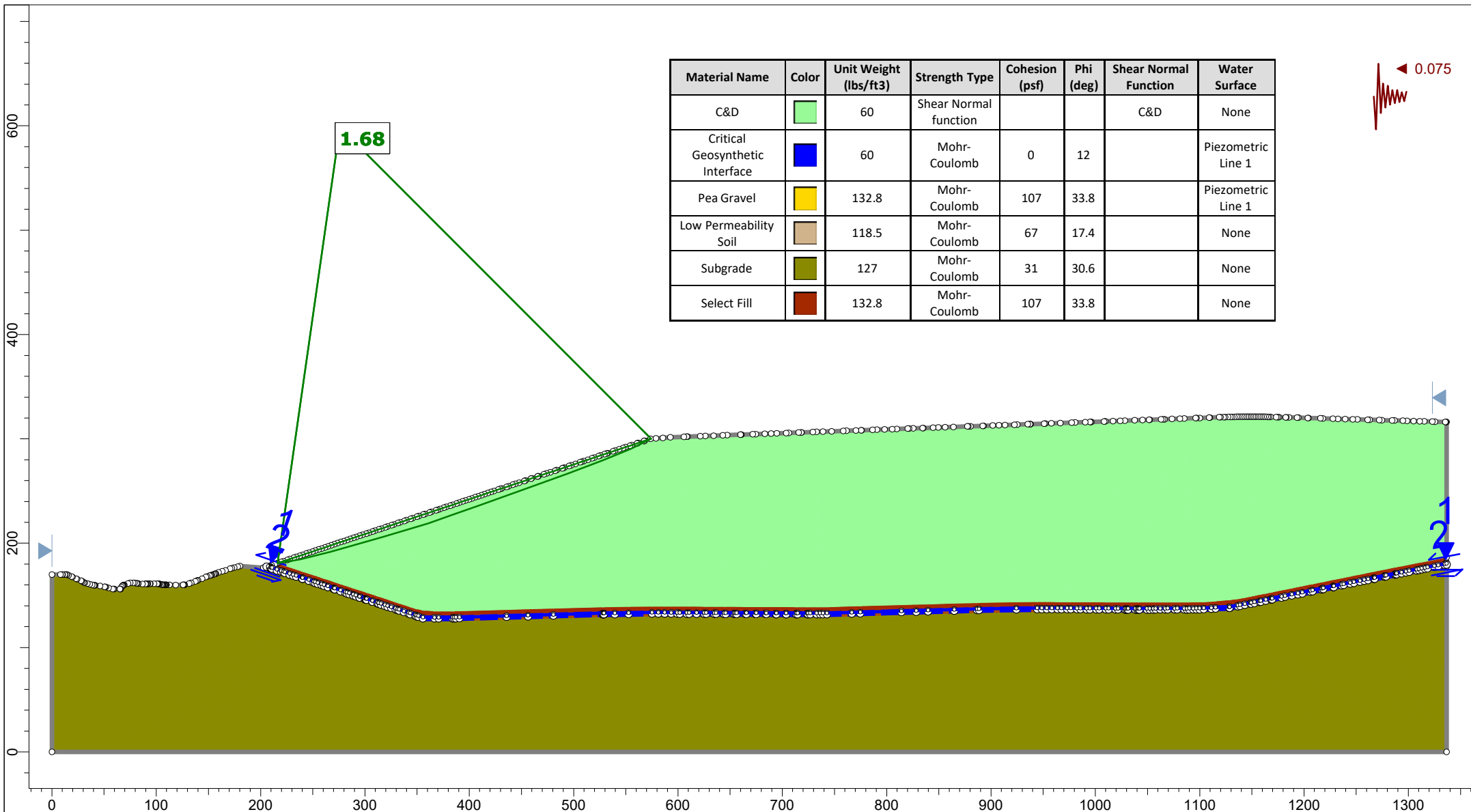
X	Y
0	145.001
1.53185	145.006
19.0865	145.06
32.9178	145.02
38.6457	145
48.7796	144.793
50.2602	144.763
61.0905	144.542
64.3705	144.476
73.4615	144.291

78.5505	144.189
85.9551	144.041
92.8528	143.903
95.9447	143.841
98.6483	143.789
99.8304	143.766
108.36	143.6
111.481	143.539
113.16	143.508
114.657	143.481
124.023	143.298
126.413	143.276
128.483	143.258
129.604	143.259
134.88	143.144
140.608	143.001
140.666	143
141.88	142.996
145.396	142.987
165.76	142.931
170.639	142.942
190.43	143
193.662	143.091
201.413	143.308
202.91	143.31
209.905	143.483
212.256	143.486
216.044	143.533
220.799	143.61
228.74	143.769
233.581	143.864
240.055	143.994
246.29	144.116
249.014	144.178
254.334	144.284
259.083	144.368
268.35	144.553
271.397	144.613
282.09	144.827
283.248	144.85
289.114	145
290.561	145
291.004	145
293.847	145
294.079	145
294.897	145
295.735	145
297.392	145.908
299.475	147
303.779	147.026
307.699	147.048
315.325	147.101
315.77	147.098

319.666	147.08
324.496	147.067
337.748	147
337.798	146.999
337.804	146.999
350.01	146.752
351.514	146.722
361.883	146.513
364.794	146.454
366.105	146.426
370.416	146.331
374.199	146.251
376.444	146.207
378.978	146.155
385.656	146.023
392.593	145.886
397.761	145.784
406.485	145.612
410.085	145.541
415.321	145.473
419.58	145.44
426.773	145.263
428.072	145.263
436.007	145.041
437.46	145
447.762	144.797
449.164	144.77
459.994	144.557
463.353	144.491
472.562	144.31
477.849	144.206
485.368	144.058
492.661	143.915
498.42	143.801
505.285	143.698
510.764	143.64
513.847	143.638
516.909	143.636
519.953	143.634
522.978	143.632
529.387	143.687
537.506	143.8
543.814	143.927
550.999	144.073
559.479	144.244
564.556	144.346
575.229	144.562
578.177	144.622
591.066	144.882
591.862	144.898
596.908	145
602.692	145.157
603.345	145.157

604.986	145.174
607.15	145.207
619.626	145.459
623.304	145.533
633.498	145.739
639.412	145.859
647.335	146.019
655.475	146.183
661.139	146.297
671.492	146.507
674.909	146.576
687.464	146.829
688.645	146.853
695.918	147
702.465	147.132
703.518	147.154
716.362	147.413
719.644	147.479
730.199	147.692
735.69	147.803
743.977	147.971
751.655	148.126
757.696	148.248
767.54	148.447
771.355	148.524
783.347	148.766
784.957	148.799
794.928	149
798.336	149.012
799.584	149.015
802.272	149.026
809.313	149.051
814.19	149.061
815.343	149.056
825.43	149
826.105	148.999
826.168	148.999
826.795	149
826.896	149
826.916	149
844.081	149.65
852.85	149.878
863.067	150.224
879.695	150.615
884.698	150.759
887.025	150.821
888.251	150.845
896.082	151
906.423	151.035
915.996	151.06
925.977	151.029
926.821	151.026

**“FAILURE IN THE WASTE” PSUEDO-STATIC ANALYSIS RESULTS
SLIDE OUTPUT**



 SLIDEINTERPRET 9.020	Project		
	Project: 182-442 S.A. Dunn Permit Renewal/Modification Application		
	Analysis Description: Section A - Waste Failure - Seismic		
	Scenario		
	Section A - Waste Failure - Seismic.slim		
	Drawn By	Checked By	Company
	Created By: ZLM	Checked By: TDM	Civil & Environmental Consultants, Inc.
	Created Date: 1/6/2022 12/10/2015 12:09:38 PM		File Name
	Created Date: 1/6/2022 12/10/2015 12:09:38 PM		Civil & Environmental Consultants, Inc.
			Section A - Waste Failure - Seismic.slim

Slide Analysis Information

151-877 S.A. Dunn C&D Landfill

Project Summary

Slide Modeler Version:	9.02
Compute Time:	00h:02m:33.439s
Author:	DVS
Company:	Civil & Environmental Consultants, Inc.
Date Created:	12/10/2015, 12:09:38 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	GLE/Morgenstern-Price with interslice force function (Half Sine)
Number of slices:	25
Tolerance:	0.005
Maximum number of iterations:	50
Check malpha < 0.2:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Search Method:	Cuckoo Search
Initial # of Surface Vertices:	8
Maximum Iterations:	500
Number of Nests:	50
Minimum Elevation:	Not Defined
Minimum Depth [ft]:	10
Minimum Area:	Not Defined
Minimum Weight:	Not Defined
Convex Surfaces Only:	Enabled

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.075

Materials

C&D

Color	
Strength Type	Shear Normal function
Unit Weight [lbs/ft ³]	60
Water Surface	None
Ru Value	0

Pea Gravel

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	132.8
Cohesion [psf]	107
Friction Angle [deg]	33.8
Water Surface	Piezometric Line 1
Hu Value	1

Low Permeability Soil

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	118.5
Cohesion [psf]	67
Friction Angle [deg]	17.4
Water Surface	None
Ru Value	0

Subgrade

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	127
Cohesion [psf]	31
Friction Angle [deg]	30.6
Water Surface	None
Ru Value	0

Select Fill

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	132.8
Cohesion [psf]	107
Friction Angle [deg]	33.8
Water Surface	None
Ru Value	0

Shear Normal Functions

Name: C&D		
Effective Normal (psf)		Shear (psf)
0		0
2000		1400
10000		6169

Global Minimums

Method: gle/morgenstern-price

FS	1.678120
Axis Location:	275.981, 598.533
Left Slip Surface Endpoint:	216.161, 180.832
Right Slip Surface Endpoint:	574.250, 300.056
Resisting Moment:	3.66852e+07 lb-ft
Driving Moment:	2.18609e+07 lb-ft
Resisting Horizontal Force:	89781.3 lb
Driving Horizontal Force:	53501 lb
Total Slice Area:	2433.94 ft ²
Surface Horizontal Width:	358.089 ft
Surface Average Height:	6.79702 ft

Global Minimum Coordinates**Method: gle/morgenstern-price**

X	Y
216.161	180.832
237.317	184.392
266.872	191.797
317.064	206.024
360.523	218.951
383.022	226.864
408.644	235.902
450.284	250.72
494.396	266.774
528.124	279.577
554.655	290.439
574.25	300.056

Global Minimum Support Data

No Supports Present

Slice Data**Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.67812**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
19	10.5789	555.9359	.55189	C&D9	7.10543e-159	34.9 29	20.60939	34.58489	49.4069	09	49.4069	52.87489	52.87489
29	10.5789	1663.39	.55189	C&D9	09	34.9 29	62.16189	104.3159	149.0219	09	149.0219	159.4819	159.4819
39	14.77749	3639.79	14.0669	C&D9	2.84217e-149	34.9 29	4.40749	158.4279	226.3249	09	226.3249	249.989	249.989
49	14.77749	4723.839	14.0669	C&D9	09	34.9 29	123.1949	206.7359	295.3369	09	295.3369	326.2059	326.2059
59	16.73059	6380.619	15.82539	C&D9	2.84217e-149	34.9 29	144.9329	243.2149	347.449	09	347.449	388.539	388.539
69	16.73059	7218.049	15.82539	C&D9	5.68434e-149	34.9 29	164.3529	275.8039	394.0049	09	394.0049	440.589	440.589
79	16.73059	8055.479	15.82539	C&D9	5.68434e-149	34.9 29	183.739	308.3369	440.489	09	440.489	492.569	492.569
89	14.48649	7563.219	16.56559	C&D9	09	34.9 29	197.4959	331.429	473.4579	09	473.4579	532.2039	532.2039
	14.48649	8014.659	16.56559	C&D9	5.68434e-149	34.9 29	209.2239	351.1029	501.5749	09	501.5749	563.809	563.809
109	14.48649	8466.09	16.56559	C&D9	09	34.9 29	220.8389	370.5939	529.4189	09	529.4189	595.1089	595.1089
119	11.24949	6679.769	19.3789	C&D9	09	34.9 29	215.3239	361.3379	516.1969	09	516.1969	591.939	591.939
129	11.24949	6539.959	19.3789	C&D9	09	34.9 29	210.4319	353.129	504.479	09	504.479	578.4849	578.4849
139	12.8109	7272.489	19.42959	C&D9	5.68434e-149	34.9 29	204.9539	343.9369	491.3379	09	491.3379	563.6319	563.6319
149	12.8109	7081.219	19.42959	C&D9	09	34.9 29	19 .2119	334.39	477.5719	09	477.5719	547.849	547.849
159	13.88039	7438.379	19.58849	C&D9	09	34.9 29	192.3849	322.8449	461.2069	09	461.2069	529.6679	529.6679
169	13.88039	7177.769	19.58849	C&D9	5.68434e-149	34.9 29	185.3939	311.1119	444.4449	09	444.4449	510.4179	510.4179
179	13.88039	6917.139	19.58849	C&D9	09	34.9 29	178.4779	29 .5059	427.8659	09	427.8659	491.3769	491.3769
189	14.70389	69 0.729	19.9 89	C&D9	5.68434e-149	34.9 29	169.2169	283.9649	405.6639	09	405.6639	467.249	467.249
19	14.70389	6593.149	19.9 89	C&D9	09	34.9 29	159.5929	267.8159	382.5929	09	382.5929	440.6759	440.6759
209	14.70389	6195.559	19.9 89	C&D9	2.84217e-149	34.9 29	150.0369	251.779	359.6839	09	359.6839	414.289	414.289
219	16.86449	6482.939	20.7859	C&D9	09	34.9 29	135.7939	227.8779	325.539	09	325.539	377.0849	377.0849
229	16.86449	5692.989	20.7859	C&D9	09	34.9 29	119.5659	200.6459	286.6359	09	286.6359	332.029	332.029
239	13.26559	3765.739	22.26419	C&D9	2.84217e-149	34.9 29	.41189	166.8259	238.3229	09	238.3229	279.0219	279.0219
249	13.26559	2962.239	22.26419	C&D9	2.84217e-149	34.9 29	78.56779	131.8469	188.3519	09	188.3519	220.5179	220.5179
259	19.5949	1965.529	26.1429	C&D9	09	34.9 29	34.3979	57.72389	82.46239	09	82.46239	.3459	.3459

Interslice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.67812

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
19	216.1619	180.8329	09	09	09
29	226.739	182.6129	88.72269	3.469369	2.239329
39	237.3179	184.3929	357.3419	27.82639	4.452669
49	252.0959	188.0949	643.719	84.21939	7.453819
59	266.8729	191.7979	1019.359	185.1129	10.29269
69	283.6039	196.539	1321.889	311.1079	13.24379
79	300.3339	201.2829	1666.259	473.2919	15.8579
89	317.0649	206.0249	2052.319	670.3429	18.08859
	331.559	210.3339	2310.569	826.8449	19.69
109	346.0369	214.6429	2583.979	0.4619	20.97239
119	360.5239	218.9519	2872.089	1156.249	21.92879
129	371.7729	222.9089	2754.889	1137.989	22.44449
139	383.0229	226.8649	2639.459	1107.49	22.76089
149	395.8339	231.3839	2503.669	1056.449	22.87779
159	408.6449	235.9029	2370.749	3.4239	22.73549
169	422.5249	240.8419	2209.59	05.6839	22.2889
179	436.4049	245.7819	2053.49	810.4789	21.53929
189	450.2849	250.729	1902.589	710.9049	20.48839
19	464.9889	256.0729	169.589	586.919	19.05119
209	479.6929	261.4239	1508.139	469.4229	17.28939
219	494.3969	266.7749	1328.359	361.3439	15.21769
229	511.269	273.1769	1052.029	233.0239	12.48949
239	528.1249	279.5779	809.8589	134.5469	.43279
249	541.39	285.0089	554.049	66.46869	6.841129
259	554.6559	290.439	352.9039	25.47379	4.128649
269	574.259	300.0569	09	09	09

Discharge Sections

Entity Information

Piezoline

X	Y
207.158	177.844
209.644	176.98
209.656	176.976
209.673	176.97
209.701	176.961
209.754	176.943
209.889	176.899
211.024	176.525
215.647	175
219.457	173.752
221.753	173
223.198	172.524
227.818	171
231.167	169.903
233.924	169
239.731	167.085
239.989	167
240.158	166.945
246.075	165
250.846	163.432

252.16	163
254.731	162.155
258.246	161
260.564	160.238
264.331	159
269.78	157.209
270.417	157
270.828	156.865
276.502	155
281.239	153.443
282.588	153
284.878	152.247
288.673	151
288.694	150.994
291.145	150.188
294.759	149
294.789	148.99
294.817	148.991
300.025	147.273
300.849	147
300.936	147
301.55	146.798
306.97	145
307.021	145
311.682	143.462
313.072	143
313.082	143
315.185	142.306
319.144	141
321.59	140.197
325.229	139
329.426	137.608
331.256	137
332.629	136.549
337.335	135
341.828	133.529
343.443	133
348.164	131.439
349.492	131
351.137	130.45
355.479	129
366.611	128.944
370.513	128.931
383.965	128.994
385.43	129
387.113	129.048
390.516	129.144
435.781	130.424
456.235	131
480.527	131.667
527.675	132.968
528.433	132.989
528.846	133

528.936	133
528.97	133
529.059	133.001
539.5	133.043
552.72	133.294
575.143	133.619
581.119	133.601
587.25	133.583
593.541	133.565
599.129	133.534
601.589	133.521
608.463	133.488
610.709	133.476
617.792	133.441
625.205	133.405
627.114	133.395
634.744	133.358
636.43	133.349
644.276	133.311
645.74	133.303
653.801	133.264
655.043	133.257
656.126	133.253
664.642	133.216
665.551	133.212
674.288	133.174
675.074	133.171
684.022	133.132
684.619	133.13
693.779	133.09
694.187	133.088
703.562	133.048
703.773	133.047
713.368	133.005
713.392	133.005
714.64	133
723.812	132.994
724.625	132.995
726.778	132.991
732.863	132.987
736.095	132.991
738.943	132.989
742.604	133
766.537	133.668
774.739	133.898
814.017	135
828.404	135.395
839.649	135.705
864.839	136.398
886.554	137
888.573	137.057
924.259	137.663
944.12	137.919

948.68	137.898
953.418	137.877
958.343	137.854
963.659	137.828
967.433	137.811
972.95	137.784
976.521	137.768
982.239	137.739
985.607	137.724
991.527	137.694
994.615	137.677
1000.75	137.646
1003.63	137.631
1009.99	137.599
1012.66	137.584
1019.23	137.551
1021.71	137.539
1028.5	137.505
1029.69	137.499
1030.85	137.495
1031.4	137.492
1038.35	137.463
1040.11	137.456
1041.2	137.452
1042.28	137.45
1049.3	137.42
1052.16	137.449
1055.45	137.483
1057.69	137.531
1062.15	137.526
1066.68	137.507
1069.19	137.568
1075.92	137.51
1078.47	137.582
1085.16	137.513
1087.7	137.49
1090.05	137.577
1093.69	137.552
1096.62	137.674
1099.96	137.645
1103.91	137.833
1111.1	138.173
1115.26	138.472
1128.34	138.992
1128.36	138.993
1128.54	139
1136.54	140.583
1138.64	141
1143.2	141.914
1148.64	143
1149.35	143.143
1152.53	143.786
1157.39	144.767

1158.54	145
1163.34	145.967
1168.47	147
1168.88	147.082
1169.38	147.184
1178.4	149
1181.82	149.688
1188.33	151
1194.13	152.167
1198.27	153
1206.33	154.622
1208.21	155
1216.89	156.747
1218.14	157
1218.36	157.045
1228.05	159
1228.06	159.001
1228.08	159.005
1228.4	159.083
1236.03	160.624
1237.89	161
1244.19	162.271
1247.8	163
1253.54	164.159
1257.71	165
1261.5	165.765
1266.92	166.86
1267.34	166.946
1267.61	167
1277.37	168.971
1277.52	169
1278.54	169.207
1287.42	171
1288.05	171.126
1288.73	171.264
1293.48	172.185
1297.69	173
1300.81	173.606
1308	175
1310.03	175.394
1312.81	175.933
1315.92	176.536
1318.32	177
1324.86	178.267
1328.64	179
1334.83	180.2
1336.61	180.546

External Boundary

	X	Y
0		170
0		0

1336.61	0
1336.61	177.546
1336.61	179.546
1336.61	180.546
1336.61	181.546
1336.61	186.546
1336.61	316.096
1336	316.115
1335.3	316.135
1325.6	316.421
1323.06	316.496
1315.25	316.726
1310.87	316.855
1304.93	317.03
1298.73	317.212
1294.66	317.332
1286.65	317.568
1284.42	317.634
1274.63	317.923
1272	318
1262.91	318.268
1260.99	318.324
1251.2	318.613
1246.79	318.743
1239.42	318.96
1232.47	319.165
1227.56	319.309
1218.04	319.59
1215.62	319.661
1204.11	320
1203.6	320.015
1194.6	320.266
1193.29	320.302
1185.64	320.515
1183.11	320.585
1182.42	320.604
1175.98	320.783
1174.59	320.814
1173.12	320.841
1167.94	320.981
1166.28	321.002
1165.04	321.034
1163.06	321.079
1161.3	321.092
1159.43	321.127
1157.67	321.154
1155.99	321.174
1154.16	321.179
1152.52	321.192
1150.91	321.199
1149.06	321.196
1147.46	321.198
1145.85	321.194

1144.21	321.184
1142.36	321.173
1140.67	321.157
1138.9	321.134
1137.03	321.105
1135.23	321.085
1133.24	321.046
1131.08	320.997
1129.38	320.97
1127.03	320.908
1124.38	320.829
1122.89	320.798
1119.95	320.7
1118.67	320.668
1109.8	320.35
1109.09	320.328
1100.04	320
1096.88	319.885
1096.03	319.854
1085.1	319.456
1081.1	319.31
1073.4	319.03
1066.29	318.771
1064.86	318.717
1062.97	318.643
1052.18	318.254
1051.41	318.223
1045.12	318
1037.57	317.725
1028.17	317.383
1023.72	317.221
1017.01	316.976
1009.52	316.704
1008.28	316.657
996.063	316.213
995.361	316.186
994.822	316.164
990.2	316
980.627	315.651
977.216	315.527
966.37	315.132
957.811	314.821
951.951	314.607
950.897	314.568
937.869	314.094
937.565	314.082
937.331	314.073
935.278	314
925.128	313.63
922.402	313.531
913.375	313.202
907.52	312.989
901.711	312.778

892.78	312.452
891.981	312.423
880.356	312
878.221	311.922
877.459	311.895
863.902	311.401
855.95	311.111
849.484	310.876
844.499	310.694
834.968	310.347
834.362	310.325
825.434	310
821.354	309.851
820.258	309.812
809.633	309.425
805.404	309.271
797.969	309
790.641	308.733
786.363	308.577
775.969	308.199
775.619	308.186
770.512	308
761.583	307.675
758.397	307.559
747.249	307.153
738.908	306.849
732.814	306.627
729.246	306.497
718.278	306.098
718.107	306.092
715.59	306
706.219	305.659
703.734	305.568
694.724	305.24
689.186	305.038
683.216	304.821
674.618	304.508
671.696	304.402
660.668	304
660.102	303.979
659.927	303.973
647.125	303.507
642.972	303.356
634.19	303.036
626.089	302.741
621.298	302.566
609.277	302.129
608.447	302.098
605.746	302
592.729	301.43
585.533	300.889
578.85	300.522
573.694	300

567.931	298.081
567.688	298
567.55	297.954
561.688	296
560.864	295.725
555.688	294
553.874	293.396
549.687	292
547.513	291.275
543.686	290
539.572	288.629
537.686	288
532.56	286.292
531.685	286
529.672	285.329
525.684	284
523.962	283.426
519.684	282
517.638	281.318
513.683	280
509.776	278.698
507.683	278
506.199	277.506
501.681	276
497.772	274.697
495.681	274
491.005	272.442
489.68	272
489.09	271.803
483.679	270
482.242	269.521
477.679	268
474.189	266.837
471.678	266
466.109	264.144
465.678	264
465.484	263.935
459.677	262
459.258	261.86
453.676	260
452.686	259.67
447.676	258
444.164	256.829
441.675	256
437.62	254.648
435.675	254
431.086	252.47
429.675	252
427.788	251.371
423.674	250
420.757	249.028
417.674	248
414.581	246.969

411.673	246
408.486	244.938
405.673	244
402.391	242.906
399.673	242
396.296	240.874
393.672	240
390.201	238.843
387.672	238
384.105	236.811
381.671	236
378.01	234.78
375.671	234
372.05	232.793
369.671	232
368.183	231.504
363.67	230
362.091	229.474
357.67	228
355.998	227.443
351.669	226
349.905	225.412
345.669	224
343.812	223.381
339.669	222
337.719	221.35
333.668	220
331.626	219.319
327.668	218
325.533	217.288
321.667	216
319.439	215.257
315.667	214
313.346	213.226
309.667	212
307.252	211.195
303.666	210
301.159	209.164
297.666	208
295.065	207.133
291.665	206
288.971	205.102
285.665	204
282.877	203.071
279.665	202
276.783	201.04
273.664	200
270.689	199.008
267.664	198
264.594	196.977
261.663	196
258.5	194.946
255.663	194

252.405	192.914
249.662	192
246.31	190.883
243.662	190
240.215	188.851
237.662	188
234.12	186.82
231.661	186
228.017	184.785
225.662	184
221.802	182.716
219.651	182
216.161	180.832
214.953	180.427
213.677	180
210.543	178.955
208.652	178.325
207.677	178
207.158	177.844
205.613	177.382
202.523	176.456
180.07	178
177.959	177.46
174.783	176.639
172.407	176
170.772	175.495
166.382	174
163.292	173.078
159.725	172
157.032	170.826
156.661	170.683
155.94	170.468
154.715	170
153.182	169.408
152.867	169.312
152.014	169.08
151.049	168.783
148.832	168
147.535	167.52
143.965	166
140.022	164.477
138.788	164
137.479	163.509
133.373	162
131.589	161.309
127.185	160
126.959	159.997
126.25	159.995
125.762	159.993
125.68	159.993
118.478	159.969
112.757	159.986
109.707	159.993

109.569	159.993
109.105	159.994
108.997	159.995
108.065	159.997
107.64	159.997
107.166	160
106.378	160.046
106.193	160.053
106.103	160.054
105.8	160.084
105.495	160.108
104.805	160.417
103.221	160.987
102.599	161.033
102.009	161.037
101.614	161.072
101.055	161.048
100.711	161.052
97.7835	161.058
94.3084	161.041
93.8975	161.022
91.9539	161.147
91.63	161.143
91.4102	161.082
90.2817	161.024
89.9486	161.022
89.707	160.951
86.7014	160.813
82.7048	161.264
82.458	161.296
81.3882	161.545
81.1637	161.594
79.2738	162
77.816	162
75.0666	162
72.9864	161.282
69.3934	160
68.7416	159.768
68.2736	159.597
68.1192	159.514
67.9386	159.38
67.3686	159.119
66.5713	158
65.7493	156.136
65.6836	156
65.5752	156
65.3068	156
65.0401	156
59.6261	156
59.182	156
58.1295	156
54.3138	157.2
51.6407	158

50.8258	158.181
50.3907	158.236
45.9965	158.999
41.4109	159.593
40.813	159.676
40.1879	159.755
38.4792	160
36.2697	160.68
34.0018	161.233
31.409	162
30.6648	162.367
29.2396	163.187
28.1824	163.779
27.7683	164
24.1653	165.56
23.3051	166
19.6494	167.648
18.9426	168
15.9722	169.385
14.4129	170
14.1982	170
12.8502	170
12.4376	170
10.2755	170
9.92074	170
8.21815	170

Material Boundary

X	Y
202.523	176.456
209.644	173.98
209.656	173.976
209.673	173.97
209.701	173.961
209.754	173.943
209.889	173.899
211.024	173.525
215.647	172
219.457	170.752
221.753	170
223.198	169.524
227.818	168
231.167	166.903
233.924	166
239.731	164.085
239.989	164
240.158	163.945
246.075	162
250.846	160.432
252.16	160
254.731	159.155
258.246	158

260.564	157.238
264.331	156
269.78	154.209
270.417	154
270.828	153.865
276.502	152
281.239	150.443
282.588	150
284.878	149.247
288.673	148
288.694	147.994
291.145	147.188
294.759	146
294.789	145.99
294.817	145.991
300.025	144.273
300.849	144
300.936	144
301.55	143.798
306.97	142
307.021	142
311.682	140.462
313.072	140
313.082	140
315.185	139.306
319.144	138
321.59	137.197
325.229	136
329.426	134.608
331.256	134
332.629	133.549
337.335	132
341.828	130.529
343.443	130
348.164	128.439
349.492	128
351.137	127.45
355.479	126
366.611	125.944
370.513	125.931
383.965	125.994
385.43	126
387.113	126.048
390.516	126.144
435.781	127.424
456.235	128
480.527	128.667
527.675	129.968
528.433	129.989
528.846	130
528.936	130
528.97	130
529.059	130.001

539.5	130.043
552.72	130.294
575.143	130.619
581.119	130.601
587.25	130.583
593.541	130.565
599.129	130.534
601.589	130.521
608.463	130.488
610.709	130.476
617.792	130.441
625.205	130.405
627.114	130.395
634.744	130.358
636.43	130.349
644.276	130.311
645.74	130.303
653.801	130.264
655.043	130.257
656.126	130.253
664.642	130.216
665.551	130.212
674.288	130.174
675.074	130.171
684.022	130.132
684.619	130.13
693.779	130.09
694.187	130.088
703.562	130.048
703.773	130.047
713.368	130.005
713.392	130.005
714.64	130
723.812	129.994
724.625	129.995
726.778	129.991
732.863	129.987
736.095	129.991
738.943	129.989
742.604	130
766.537	130.668
774.739	130.898
814.017	132
828.404	132.395
839.649	132.705
864.839	133.398
886.554	134
888.573	134.057
924.259	134.663
944.12	134.919
948.68	134.898
953.418	134.877
958.343	134.854

963.659	134.828
967.433	134.811
972.95	134.784
976.521	134.768
982.239	134.739
985.607	134.724
991.527	134.694
994.615	134.677
1000.75	134.646
1003.63	134.631
1009.99	134.599
1012.66	134.584
1019.23	134.551
1021.71	134.539
1028.5	134.505
1029.69	134.499
1030.85	134.495
1031.4	134.492
1038.35	134.463
1040.11	134.456
1041.2	134.452
1042.28	134.45
1049.3	134.42
1052.16	134.449
1055.45	134.483
1057.69	134.531
1062.15	134.526
1066.68	134.507
1069.19	134.568
1075.92	134.51
1078.47	134.582
1085.16	134.513
1087.7	134.49
1090.05	134.577
1093.69	134.552
1096.62	134.674
1099.96	134.645
1103.91	134.833
1111.1	135.173
1115.26	135.472
1128.34	135.992
1128.36	135.993
1128.54	136
1136.54	137.583
1138.64	138
1143.2	138.914
1148.64	140
1149.35	140.143
1152.53	140.786
1157.39	141.767
1158.54	142
1163.34	142.967
1168.47	144

1168.88	144.082
1169.38	144.184
1178.4	146
1181.82	146.688
1188.33	148
1194.13	149.167
1198.27	150
1206.33	151.622
1208.21	152
1216.89	153.747
1218.14	154
1218.36	154.045
1228.05	156
1228.06	156.001
1228.08	156.005
1228.4	156.083
1236.03	157.624
1237.89	158
1244.19	159.271
1247.8	160
1253.54	161.159
1257.71	162
1261.5	162.765
1266.92	163.86
1267.34	163.946
1267.61	164
1277.37	165.971
1277.52	166
1278.54	166.207
1287.42	168
1288.05	168.126
1288.73	168.264
1293.48	169.185
1297.69	170
1300.81	170.606
1308	172
1310.03	172.394
1312.81	172.933
1315.92	173.536
1318.32	174
1324.86	175.267
1328.64	176
1334.83	177.2
1336.61	177.546

Material Boundary

X	Y
205.613	177.382
209.644	175.98
209.656	175.976
209.673	175.97
209.701	175.961

209.754	175.943
209.889	175.899
211.024	175.525
215.647	174
219.457	172.752
221.753	172
223.198	171.524
227.818	170
231.167	168.903
233.924	168
239.731	166.085
239.989	166
240.158	165.945
246.075	164
250.846	162.432
252.16	162
254.731	161.155
258.246	160
260.564	159.238
264.331	158
269.78	156.209
270.417	156
270.828	155.865
276.502	154
281.239	152.443
282.588	152
284.878	151.247
288.673	150
288.694	149.994
291.145	149.188
294.759	148
294.789	147.99
294.817	147.991
300.025	146.273
300.849	146
300.936	146
301.55	145.798
306.97	144
307.021	144
311.682	142.462
313.072	142
313.082	142
315.185	141.306
319.144	140
321.59	139.197
325.229	138
329.426	136.608
331.256	136
332.629	135.549
337.335	134
341.828	132.529
343.443	132
348.164	130.439

349.492	130
351.137	129.45
355.479	128
366.611	127.944
370.513	127.931
383.965	127.994
385.43	128
387.113	128.048
390.516	128.144
435.781	129.424
456.235	130
480.527	130.667
527.675	131.968
528.433	131.989
528.846	132
528.936	132
528.97	132
529.059	132.001
539.5	132.043
552.72	132.294
575.143	132.619
581.119	132.601
587.25	132.583
593.541	132.565
599.129	132.534
601.589	132.521
608.463	132.488
610.709	132.476
617.792	132.441
625.205	132.405
627.114	132.395
634.744	132.358
636.43	132.349
644.276	132.311
645.74	132.303
653.801	132.264
655.043	132.257
656.126	132.253
664.642	132.216
665.551	132.212
674.288	132.174
675.074	132.171
684.022	132.132
684.619	132.13
693.779	132.09
694.187	132.088
703.562	132.048
703.773	132.047
713.368	132.005
713.392	132.005
714.64	132
723.812	131.994
724.625	131.995

726.778	131.991
732.863	131.987
736.095	131.991
738.943	131.989
742.604	132
766.537	132.668
774.739	132.898
814.017	134
828.404	134.395
839.649	134.705
864.839	135.398
886.554	136
888.573	136.057
924.259	136.663
944.12	136.919
948.68	136.898
953.418	136.877
958.343	136.854
963.659	136.828
967.433	136.811
972.95	136.784
976.521	136.768
982.239	136.739
985.607	136.724
991.527	136.694
994.615	136.677
1000.75	136.646
1003.63	136.631
1009.99	136.599
1012.66	136.584
1019.23	136.551
1021.71	136.539
1028.5	136.505
1029.69	136.499
1030.85	136.495
1031.4	136.492
1038.35	136.463
1040.11	136.456
1041.2	136.452
1042.28	136.45
1049.3	136.42
1052.16	136.449
1055.45	136.483
1057.69	136.531
1062.15	136.526
1066.68	136.507
1069.19	136.568
1075.92	136.51
1078.47	136.582
1085.16	136.513
1087.7	136.49
1090.05	136.577
1093.69	136.552

1096.62	136.674
1099.96	136.645
1103.91	136.833
1111.1	137.173
1115.26	137.472
1128.34	137.992
1128.36	137.993
1128.54	138
1136.54	139.583
1138.64	140
1143.2	140.914
1148.64	142
1149.35	142.143
1152.53	142.786
1157.39	143.767
1158.54	144
1163.34	144.967
1168.47	146
1168.88	146.082
1169.38	146.184
1178.4	148
1181.82	148.688
1188.33	150
1194.13	151.167
1198.27	152
1206.33	153.622
1208.21	154
1216.89	155.747
1218.14	156
1218.36	156.045
1228.05	158
1228.06	158.001
1228.08	158.005
1228.4	158.083
1236.03	159.624
1237.89	160
1244.19	161.271
1247.8	162
1253.54	163.159
1257.71	164
1261.5	164.765
1266.92	165.86
1267.34	165.946
1267.61	166
1277.37	167.971
1277.52	168
1278.54	168.207
1287.42	170
1288.05	170.126
1288.73	170.264
1293.48	171.185
1297.69	172
1300.81	172.606

1308	174
1310.03	174.394
1312.81	174.933
1315.92	175.536
1318.32	176
1324.86	177.267
1328.64	178
1334.83	179.2
1336.61	179.546

Material Boundary

X	Y
208.652	178.325
209.644	177.98
209.656	177.976
209.673	177.97
209.701	177.961
209.754	177.943
209.889	177.899
211.024	177.525
215.647	176
219.457	174.752
221.753	174
223.198	173.524
227.818	172
231.167	170.903
233.924	170
239.731	168.085
239.989	168
240.158	167.945
246.075	166
250.846	164.432
252.16	164
254.731	163.155
258.246	162
260.564	161.238
264.331	160
269.78	158.209
270.417	158
270.828	157.865
276.502	156
281.239	154.443
282.588	154
284.878	153.247
288.673	152
288.694	151.994
291.145	151.188
294.759	150
294.789	149.99
294.817	149.991
300.025	148.273
300.849	148

300.936	148
301.55	147.798
306.97	146
307.021	146
311.682	144.462
313.072	144
313.082	144
315.185	143.306
319.144	142
321.59	141.197
325.229	140
329.426	138.608
331.256	138
332.629	137.549
337.335	136
341.828	134.529
343.443	134
348.164	132.439
349.492	132
351.137	131.45
355.479	130
366.611	129.944
370.513	129.931
383.965	129.994
385.43	130
387.113	130.048
390.516	130.144
435.781	131.424
456.235	132
480.527	132.667
527.675	133.968
528.433	133.989
528.846	134
528.936	134
528.97	134
529.059	134.001
539.5	134.043
552.72	134.294
575.143	134.619
581.119	134.601
587.25	134.583
593.541	134.565
599.129	134.534
601.589	134.521
608.463	134.488
610.709	134.476
617.792	134.441
625.205	134.405
627.114	134.395
634.744	134.358
636.43	134.349
644.276	134.311
645.74	134.303

653.801	134.264
655.043	134.257
656.126	134.253
664.642	134.216
665.551	134.212
674.288	134.174
675.074	134.171
684.022	134.132
684.619	134.13
693.779	134.09
694.187	134.088
703.562	134.048
703.773	134.047
713.368	134.005
713.392	134.005
714.64	134
723.812	133.994
724.625	133.995
726.778	133.991
732.863	133.987
736.095	133.991
738.943	133.989
742.604	134
766.537	134.668
774.739	134.898
814.017	136
828.404	136.395
839.649	136.705
864.839	137.398
886.554	138
888.573	138.057
924.259	138.663
944.12	138.919
948.68	138.898
953.418	138.877
958.343	138.854
963.659	138.828
967.433	138.811
972.95	138.784
976.521	138.768
982.239	138.739
985.607	138.724
991.527	138.694
994.615	138.677
1000.75	138.646
1003.63	138.631
1009.99	138.599
1012.66	138.584
1019.23	138.551
1021.71	138.539
1028.5	138.505
1029.69	138.499
1030.85	138.495

1031.4	138.492
1038.35	138.463
1040.11	138.456
1041.2	138.452
1042.28	138.45
1049.3	138.42
1052.16	138.449
1055.45	138.483
1057.69	138.531
1062.15	138.526
1066.68	138.507
1069.19	138.568
1075.92	138.51
1078.47	138.582
1085.16	138.513
1087.7	138.49
1090.05	138.577
1093.69	138.552
1096.62	138.674
1099.96	138.645
1103.91	138.833
1111.1	139.173
1115.26	139.472
1128.34	139.992
1128.36	139.993
1128.54	140
1136.54	141.583
1138.64	142
1143.2	142.914
1148.64	144
1149.35	144.143
1152.53	144.786
1157.39	145.767
1158.54	146
1163.34	146.967
1168.47	148
1168.88	148.082
1169.38	148.184
1178.4	150
1181.82	150.688
1188.33	152
1194.13	153.167
1198.27	154
1206.33	155.622
1208.21	156
1216.89	157.747
1218.14	158
1218.36	158.045
1228.05	160
1228.06	160.001
1228.08	160.005
1228.4	160.083
1236.03	161.624

1237.89	162
1244.19	163.271
1247.8	164
1253.54	165.159
1257.71	166
1261.5	166.765
1266.92	167.86
1267.34	167.946
1267.61	168
1277.37	169.971
1277.52	170
1278.54	170.207
1287.42	172
1288.05	172.126
1288.73	172.264
1293.48	173.185
1297.69	174
1300.81	174.606
1308	176
1310.03	176.394
1312.81	176.933
1315.92	177.536
1318.32	178
1324.86	179.267
1328.64	180
1334.83	181.2
1336.61	181.546

Material Boundary

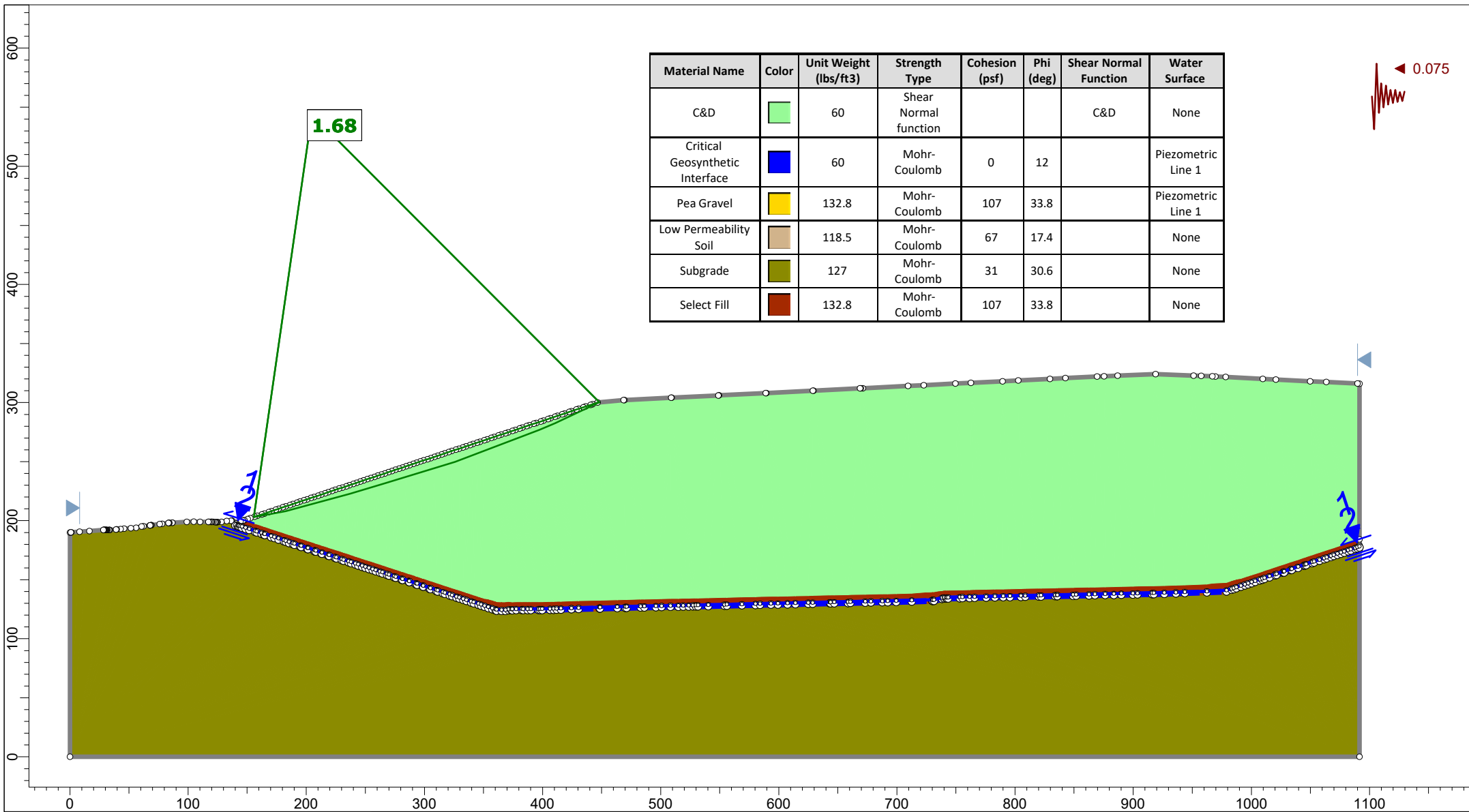
X	Y
216.161	180.832
219.457	179.752
221.753	179
223.198	178.524
227.818	177
231.167	175.903
233.924	175
239.731	173.085
239.989	173
240.158	172.945
246.075	171
250.846	169.432
252.16	169
254.731	168.155
258.246	167
260.564	166.238
264.331	165
269.78	163.209
270.417	163
270.828	162.865
276.502	161
281.239	159.443

282.588	159
284.878	158.247
288.673	157
288.694	156.994
291.145	156.188
294.759	155
294.789	154.99
294.817	154.991
300.025	153.273
300.849	153
300.936	153
301.55	152.798
306.97	151
307.021	151
311.682	149.462
313.072	149
313.082	149
315.185	148.306
319.144	147
321.59	146.197
325.229	145
329.426	143.608
331.256	143
332.629	142.549
337.335	141
341.828	139.529
343.443	139
348.164	137.439
349.492	137
351.137	136.45
355.479	135
366.611	134.944
370.513	134.931
383.965	134.994
385.43	135
387.113	135.048
390.516	135.144
435.781	136.424
456.235	137
480.527	137.667
527.675	138.968
528.433	138.989
528.846	139
528.936	139
528.97	139
529.059	139.001
539.5	139.043
552.72	139.294
575.143	139.619
581.119	139.601
587.25	139.583
593.541	139.565
599.129	139.534

601.589	139.521
608.463	139.488
610.709	139.476
617.792	139.441
625.205	139.405
627.114	139.395
634.744	139.358
636.43	139.349
644.276	139.311
645.74	139.303
653.801	139.264
655.043	139.257
656.126	139.253
664.642	139.216
665.551	139.212
674.288	139.174
675.074	139.171
684.022	139.132
684.619	139.13
693.779	139.09
694.187	139.088
703.562	139.048
703.773	139.047
713.368	139.005
713.392	139.005
714.64	139
723.812	138.994
724.625	138.995
726.778	138.991
732.863	138.987
736.095	138.991
738.943	138.989
742.604	139
766.537	139.668
774.739	139.898
814.017	141
828.404	141.395
839.649	141.705
864.839	142.398
886.554	143
888.573	143.057
924.259	143.663
944.12	143.919
948.68	143.898
953.418	143.877
958.343	143.854
963.659	143.828
967.433	143.811
972.95	143.784
976.521	143.768
982.239	143.739
985.607	143.724
991.527	143.694

994.615	143.677
1000.75	143.646
1003.63	143.631
1009.99	143.599
1012.66	143.584
1019.23	143.551
1021.71	143.539
1028.5	143.505
1029.69	143.499
1030.85	143.495
1031.4	143.492
1038.35	143.463
1040.11	143.456
1041.2	143.452
1042.28	143.45
1049.3	143.42
1052.16	143.449
1055.45	143.483
1057.69	143.531
1062.15	143.526
1066.68	143.507
1069.19	143.568
1075.92	143.51
1078.47	143.582
1085.16	143.513
1087.7	143.49
1090.05	143.577
1093.69	143.552
1096.62	143.674
1099.96	143.645
1103.91	143.833
1111.1	144.173
1115.26	144.472
1128.34	144.992
1128.36	144.993
1128.54	145
1136.54	146.583
1138.64	147
1143.2	147.914
1148.64	149
1149.35	149.143
1152.53	149.786
1157.39	150.767
1158.54	151
1163.34	151.967
1168.47	153
1168.88	153.082
1169.38	153.184
1178.4	155
1181.82	155.688
1188.33	157
1194.13	158.167
1198.27	159

1206.33	160.622
1208.21	161
1216.89	162.747
1218.14	163
1218.36	163.045
1228.05	165
1228.06	165.001
1228.08	165.005
1228.4	165.083
1236.03	166.624
1237.89	167
1244.19	168.271
1247.8	169
1253.54	170.159
1257.71	171
1261.5	171.765
1266.92	172.86
1267.34	172.946
1267.61	173
1277.37	174.971
1277.52	175
1278.54	175.207
1287.42	177
1288.05	177.126
1288.73	177.264
1293.48	178.185
1297.69	179
1300.81	179.606
1308	181
1310.03	181.394
1312.81	181.933
1315.92	182.536
1318.32	183
1324.86	184.267
1328.64	185
1334.83	186.2
1336.61	186.546



SLIDEINTERPRET 9.020

Project			
Project: 182-442 S.A. Dunn Permit Renewal 182-442 S.A. Dunn Footprint Modification			
Group		Scenario	
Analysis Description: Section B - Waste Failure - Seismic.slim		Section B - Waste Failure - Seismic.slim	
Drawn By: ZLM		Company: Civil & Environmental Consultants, Inc.	
Checked By: TDM		Civil & Environmental Consultants, Inc.	
Created Date: 1/6/2022 9/26/2018, 11:46:34 AM		File Name: Section B - Waste Failure - Seismic.slim	

Slide Analysis Information

182-442 S.A. Dunn Footprint Modification

Project Summary

Slide Modeler Version:	9.02
Compute Time:	00h:01m:53.374s
Author:	DVS
Company:	Civil & Environmental Consultants, Inc.
Date Created:	9/26/2018, 11:46:34 AM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	GLE/Morgenstern-Price with interslice force function (Half Sine)
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft ³]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Search Method:	Cuckoo Search
Initial # of Surface Vertices:	8
Maximum Iterations:	500
Number of Nests:	50
Minimum Elevation:	Not Defined
Minimum Depth [ft]:	10
Minimum Area:	Not Defined
Minimum Weight:	Not Defined
Convex Surfaces Only:	Enabled

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.075

Materials

C&D

Color	
Strength Type	Shear Normal function
Unit Weight [lbs/ft3]	60
Water Surface	None
Ru Value	0

Pea Gravel

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	132.8
Cohesion [psf]	107
Friction Angle [deg]	33.8
Water Surface	Piezometric Line 1
Hu Value	1

Low Permeability Soil

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	118.5
Cohesion [psf]	67
Friction Angle [deg]	17.4
Water Surface	None
Ru Value	0

Subgrade

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	127
Cohesion [psf]	31
Friction Angle [deg]	30.6
Water Surface	None
Ru Value	0

Select Fill

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	132.8
Cohesion [psf]	107
Friction Angle [deg]	33.8
Water Surface	None
Ru Value	0

Shear Normal Functions

Name: C&D		
Effective Normal (psf)		Shear (psf)
0		0
2000		1400
10000		6169

Global Minimums

Method: gle/morgenstern-price

FS	1.682130
Axis Location:	204.692, 543.991
Left Slip Surface Endpoint:	155.587, 203.011
Right Slip Surface Endpoint:	448.013, 300.119
Resisting Moment:	2.40024e+07 lb-ft
Driving Moment:	1.4269e+07 lb-ft
Resisting Horizontal Force:	71585.6 lb
Driving Horizontal Force:	42556.4 lb
Total Slice Area:	1939.64 ft ²
Surface Horizontal Width:	292.426 ft
Surface Average Height:	6.63291 ft

Global Minimum Coordinates**Method: gle/morgenstern-price**

X	Y
155.587	203.011
182.574	207.875
237.041	222.665
266.641	231.689
325.864	249.747
397.468	276.876
410.571	282.373
448.013	300.119

Global Minimum Support Data

No Supports Present

Slice Data**Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.68213**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
14	5.397374	133.714	10.21574	C&D4	04	34.9924	9.622564	16.1864	23.1234	04	23.1234	24.85754	24.85754
24	5.397374	01.1434	10.21574	C&D4	04	34.9924	29.00334	8.7874	69.69634	04	69.69634	74.9234	74.9234
34	5.397374	668.5724	10.21574	C&D4	04	34.9924	8.58564	81.72734	116.7534	04	116.7534	125.5094	125.5094
	5.397374	936.0014	10.21574	C&D4	04	34.9924	68.36454	114.9984	164.2834	04	164.2834	176.6034	176.6034
54	5.397374	1203.434	10.21574	C&D4	2.84217e-14	34.9924	88.33384	148.5894	212.2714	04	212.2714	228.194	228.194
64	6.051894	1567.04	15.19274	C&D4	04	34.9924	98.35684	165.4 94	236.3554	04	236.3554	263.0654	263.0654
74	6.051894	1702.524	15.19274	C&D4	04	34.9924	107.064	180.0894	257.274	04	257.274	286.3434	286.3434
84	6.051894	1838.014	15.19274	C&D4	04	34.9924	115.7834	194.7624	278.2324	04	278.2324	309.6734	309.6734
94	6.051894	1973.494	15.19274	C&D4	2.84217e-14	34.9924	124.5214	209.464	299.2284	04	299.2284	333.0434	333.0434

104	6.051894	2108.984	15.19274	C&D4	2.84217e-14	34.9924	133.2694	224.1754	320.254	04	320.254	356.4	356.4
114	6.051894	224.464	15.19274	C&D4	04	34.9924	142.0224	238.8994	341.2854	04	341.2854	379.8524	379.8524
124	6.051894	2379.954	15.19274	C&D4	04	34.9924	150.774	253.6224	362.3184	04	362.3184	03.2624	03.2624
134	6.051894	2515.434	15.19274	C&D4	04	34.9924	159.5214	268.3354	383.3374	04	383.3374	26.6564	26.6564
14	6.051894	2650.924	15.19274	C&D4	04	34.9924	168.2564	283.0284	04.3274	04	04.3274	50.0184	50.0184
154	5.920024	2689.24	16.95364	C&D4	04	34.9924	170.6994	287.1384	10.1974	04	10.1974	62.234	62.234
164	5.920024	2748.884	16.95364	C&D4	5.68434e-14	34.9924	174.4	293.4374	19.1954	04	19.1954	72.3734	72.3734
174	5.920024	2808.534	16.95364	C&D4	04	34.9924	178.1684	299.7024	28.1464	04	28.1464	82.464	82.464
184	5.920024	2868.184	16.95364	C&D4	04	34.9924	181.8724	305.9324	37.0464	04	37.0464	92.4894	92.4894
194	5.920024	2927.824	16.95364	C&D4	04	34.9924	185.5534	312.1254	5.8924	04	5.8924	502.4584	502.4584
204	5.922264	2988.534	16.9574	C&D4	04	34.9924	189.1984	318.2554	54.6514	04	54.6514	512.34	512.34
214	5.922264	3048.074	16.9574	C&D4	04	34.9924	192.8234	324.354	63.3634	04	63.3634	522.1584	522.1584
224	5.922264	3107.614	16.9574	C&D4	5.68434e-14	34.9924	196.4254	330.4124	72.0164	04	72.0164	531.914	531.914
234	5.922264	3167.154	16.9574	C&D4	5.68434e-14	34.9924	200.0014	336.4274	80.6114	04	80.6114	541.594	541.594
24	5.922264	3226.694	16.9574	C&D4	04	34.9924	203.5514	342.4	89.1424	04	89.1424	551.2084	551.2084
254	5.922264	3286.224	16.9574	C&D4	5.68434e-14	34.9924	207.0764	348.3284	97.6114	04	97.6114	560.7534	560.7534
264	5.922264	3345.764	16.9574	C&D4	5.68434e-14	34.9924	210.5754	354.214	506.024	04	506.024	570.2284	570.2284
274	5.922264	3405.34	16.9574	C&D4	5.68434e-14	34.9924	214.0484	360.0564	514.3654	04	514.3654	579.6324	579.6324
284	5.922264	3464.84	16.9574	C&D4	04	34.9924	217.494	365.854	522.6494	04	522.6494	588.9674	588.9674
294	5.922264	3524.384	16.9574	C&D4	5.68434e-14	34.9924	220.9174	371.6114	530.8734	04	530.8734	598.2354	598.2354
304	5.5084	3263.974	20.75054	C&D4	04	34.9924	208.1194	350.0834	500.1194	04	500.1194	578.974	578.974
314	5.5084	3180.854	20.75054	C&D4	04	34.9924	202.6914	340.9534	87.0754	04	87.0754	563.874	563.874
324	5.5084	3097.724	20.75054	C&D4	04	34.9924	197.2994	331.8824	74.1184	04	74.1184	548.8694	548.8694
334	5.5084	3014.64	20.75054	C&D4	5.68434e-14	34.9924	191.9394	322.8674	61.2384	04	61.2384	533.964	533.964
34	5.5084	2931.484	20.75054	C&D4	5.68434e-14	34.9924	186.614	313.9034	8.434	04	8.434	519.1364	519.1364
354	5.5084	2848.364	20.75054	C&D4	5.68434e-14	34.9924	181.314	304.9874	35.6964	04	35.6964	504.3894	504.3894
364	5.5084	2765.234	20.75054	C&D4	5.68434e-14	34.9924	176.0354	296.114	23.024	04	23.024	89.7154	89.7154
374	5.5084	2682.114	20.75054	C&D4	5.68434e-14	34.9924	170.7834	287.284	10.4	04	10.4	75.1064	75.1064
384	5.5084	2598.994	20.75054	C&D4	04	34.9924	165.5514	278.4794	397.8284	04	397.8284	60.5524	60.5524
394	5.5084	2515.864	20.75054	C&D4	04	34.9924	160.3384	269.7094	385.2974	04	385.2974	6.0454	6.0454
04	5.5084	2432.74	20.75054	C&D4	5.68434e-14	34.9924	155.1384	260.9624	372.8034	04	372.8034	31.5814	31.5814
14	5.5084	2349.624	20.75054	C&D4	04	34.9924	149.954	252.2364	360.3374	04	360.3374	17.1494	17.1494
24	5.5084	2266.54	20.75054	C&D4	2.84217e-14	34.9924	14.7724	243.5254	347.894	04	347.894	02.74	02.74
34	6.55134	2535.254	22.75884	C&D4	2.84217e-14	34.9924	133.3764	224.3554	320.5074	04	320.5074	376.464	376.464
	6.55134	23134	22.75884	C&D4	04	34.9924	122.024	205.254	293.2214	04	293.2214	34.414	34.414
54	6.2404	1932.954	25.35934	C&D4	2.84217e-14	34.9924	104.614	175.9674	251.3814	04	251.3814	300.9624	300.9624
64	6.2404	1604.074	25.35934	C&D4	04	34.9924	87.23234	146.7364	209.6224	04	209.6224	250.9674	250.9674
74	6.2404	1275.184	25.35934	C&D4	2.84217e-14	34.9924	69.6954	117.2364	167.484	04	167.484	200.5134	200.5134
84	6.2404	946.2974	25.35934	C&D4	04	34.9924	51.9874	87.4954	124.9284	04	124.9284	149.5684	149.5684
94	6.2404	617.4124	25.35934	C&D4	7.10543e-154	34.9924	34.09964	57.35994	81.94264	04	81.94264	98.10464	98.10464
504	6.2404	275.0814	25.35934	C&D4	04	34.9924	15.27724	25.69824	36.71174	04	36.71174	3.95254	3.95254

Interslice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.68213

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
14	155.5874	203.0114	04	04	04
24	160.9854	203.984	19.54894	0.4773914	1.398914
34	166.3824	204.9574	78.61274	3.833054	2.791454
	171.7794	205.9294	177.814	12.96824	.171364
54	177.1774	206.9024	317.7474	30.77774	5.53254
64	182.574	207.8754	99.0084	60.1134	6.869084
74	188.6264	209.5184	589.8054	86.37494	8.33154
84	194.6784	211.1614	688.8754	118.354	9.748684
94	200.734	212.8054	796.2594	156.424	11.11394
104	206.7824	214.4 84	911.9894	200.8654	12.4214
114	212.834	216.0924	1036.094	251.8984	13.66484
124	218.8864	217.7354	1168.564	309.6374	14.84084
134	224.9374	219.3794	1309.414	374.14	15.94 74
14	230.9894	221.0224	1458.634	5.2054	16.97334
154	237.0414	222.6654	1616.194	522.7594	17.92394
164	242.9614	224.474	1687.334	573.6314	18.77624
174	248.8814	226.2754	1759.984	624.9714	19.554
184	254.8014	228.084	1834.124	676.4254	20.24
194	260.7214	229.884	1909.694	727.6164	20.85754
204	266.6414	231.6894	1986.694	778.1464	21.38934
214	272.564	233.4954	2064.874	827.5354	21.8394
224	278.4864	235.3014	214 .384	875.4114	22.2074
234	284.4084	237.1064	2225.174	921.3354	22.49214
24	290.334	238.9124	2307.224	964.8574	22.69424
254	296.2534	240.7184	2390.484	1005.524	22.81334
264	302.1754	242.524	2474.94	1042.884	22.84974
274	308.0974	24 .334	2560.454	1076.474	22.8034
284	314.0194	246.1354	2647.084	1105.84	22.67314
294	319.9424	247.9414	2734.754	1130.574	22.46064
304	325.864	249.7474	2823.434	1150.214	22.1654
314	331.3724	251.834	2684.24	1074.484	21.81614
324	336.884	253.9214	2548.454	998.5154	21.39594
334	342.3884	256.0084	2416.24	922.8814	20.90464
34	347.8964	258.094	2287.464	848.1054	20.34294
354	353.404	260.1814	2162.264	774.674	19.71114
364	358.9124	262.2684	2040.64	703.0384	19.01014
374	364.424	264.3554	1922.54	633.6054	18.24084
384	369.9284	266.4 24	1807.974	566.7414	17.40454
394	375.4364	268.5294	1697.024	502.7694	16.50284
04	380.94	270.6154	1589.664	1.9674	15.53734
14	386.4524	272.7024	1485.94	384.574	14.51054
24	391.964	274.7894	1385.74	330.7674	13.42494
34	397.4684	276.8764	1289.194	280.7074	12.28384
	04.0194	279.624	1094.184	209.8964	10.85914
54	10.5714	282.3734	916.2574	151.154	9.367664
64	16.8114	285.3314	682.234	94.57324	7.892214
74	23.0514	288.2884	87.6714	54.4 994	6.370864
84	29.2924	291.2464	332.7034	28.00754	.811914
94	35.5324	294.204	217.4754	12.25084	3.224184
504	1.7734	297.1624	142.1414	.012574	1.6174
514	8.0134	300.1194	04	04	04

Discharge Sections

Entity Information

Piezoline

X	Y
140.028	196.713

141.766	196.149
142.289	195.994
143.045	195.769
144.237	195.414
145.518	195
148.459	194.052
151.716	193
156.612	191.418
157.903	191
161.952	189.689
164.08	189
164.758	188.78
170.247	187
172.895	186.14
176.403	185
181.024	183.497
182.529	183
185.376	182.065
188.619	181
189.923	180.575
194.757	179
195.648	178.71
200.895	177
201.373	176.844
207.034	175
207.098	174.979
207.993	174.687
212.823	173.114
213.172	173
218.549	171.248
219.311	171
224.274	169.383
225.449	169
230	167.518
231.588	167
235.725	165.651
237.722	165
241.444	163.784
243.846	163
247.162	161.917
249.97	161
252.88	160.05
256.093	159
258.598	158.182
262.216	157
264.316	156.314
268.34	155
270.035	154.446
274.463	153
275.754	152.578
280.585	151
281.473	150.71
286.71	149

287.186	148.844
292.824	147
292.886	146.98
293.74	146.7
298.583	145.115
298.935	145
304.279	143.251
305.047	143
309.976	141.387
311.159	141
315.674	139.523
317.272	139
321.371	137.659
323.386	137
327.069	135.795
329.5	135
332.77	133.931
335.619	133
339.508	131.716
341.678	131
345.692	129.704
347.866	129
350.959	127.992
354.006	127
357.278	125.924
360.089	125
361.133	124.745
365.215	124.477
368.707	124.493
371.484	125
373.654	125.03
374.386	125.08
377.631	125.239
382.427	125.316
383.677	125.244
387.287	125.197
390.059	125.187
396.735	125.233
398.019	125.268
399.749	125.314
406.24	125.429
409.208	125.512
411.915	125.585
415.53	125.683
424.48	125.93
430.485	126.131
448.199	126.599
448.732	126.618
463.334	127
470.097	127.145
471.17	127.168
483.106	127.425
486.086	127.487

495.863	127.696
500.697	127.797
508.409	127.961
515.014	128.097
518.981	128.181
523.614	128.281
527.447	128.363
529.69	128.406
531.66	128.441
540.373	128.637
554.05	128.953
556.089	129
568.694	129.288
580.167	129.531
584.066	129.617
593.259	129.813
599.175	129.945
607.386	130.128
614.024	130.271
624.97	130.517
628.615	130.596
643.158	130.917
643.782	130.931
646.896	131
658.497	131.248
660.64	131.294
673.082	131.561
677.922	131.665
687.656	131.874
692.236	131.971
699.35	132.123
712.535	132.48
729.855	132.992
730.239	132.992
731.42	133
738.245	134.694
739.951	135
740.007	135.001
741.701	135.015
742.332	135.017
743.317	135.019
753.154	135.287
755.462	135.336
761.566	135.471
765.71	135.559
775.589	135.763
783.012	135.917
790.009	136.066
795.683	136.184
804.848	136.379
808.664	136.459
820.13	136.704
821.971	136.743

833.961	137
835.574	137.035
835.855	137.041
849.047	137.327
851.677	137.384
862.588	137.62
867.593	137.729
876.198	137.915
883.605	138.076
889.878	138.211
899.713	138.425
903.628	138.509
915.919	138.776
917.449	138.809
926.274	139
936.214	139.29
943.717	139.589
962.389	140.22
979.061	141
983.234	142.38
985.11	143
987.287	143.719
991.16	145
994.524	146.112
997.209	147
1000.33	148.033
1003.26	149
1007.19	150.301
1009.31	151
1011.14	151.607
1015.36	153
1020.26	154.621
1021.41	155
1027.04	156.861
1027.46	157
1027.82	157.12
1033.5	159
1034.29	159.258
1039.55	161
1044.85	162.749
1045.6	163
1046.49	163.294
1051.65	165
1053.18	165.503
1057.7	167
1061.67	168.313
1063.75	169
1067.3	170.173
1069.8	171
1072.91	172.028
1075.85	173
1078.52	173.882
1081.9	175

1084.13	175.737
1087.95	177
1089.74	177.591
1091.61	178.21

External Boundary

X	Y
0	189.907
0	0
1091.61	0
1091.61	175.21
1091.61	177.21
1091.61	178.21
1091.61	179.21
1091.61	184.21
1091.61	315.915
1089.91	316
1063.4	317.322
1049.79	318
1020.8	319.445
1009.68	320
978.207	321.569
969.56	322
967.034	322.1
957.494	322.477
951.058	322.728
918.857	324
886.821	322.699
875.264	322.234
869.428	322
842.625	320.66
829.419	320
802.655	318.662
789.411	318
762.684	316.664
749.402	316
722.713	314.666
709.393	314
671.066	312.084
669.384	312
668.793	311.97
629.376	310
628.822	309.972
589.367	308
588.85	307.974
549.358	306
548.879	305.976
509.349	304
508.907	303.978
469.34	302
468.527	301.928
446.661	300

442.399	298.58
440.658	298
436.441	296.595
434.656	296
430.483	294.609
428.654	294
424.525	292.624
422.652	292
418.566	290.639
416.65	290
412.608	288.653
410.647	288
406.65	286.668
404.645	286
400.692	284.683
398.643	284
394.734	282.697
392.641	282
388.775	280.712
386.639	280
382.817	278.727
380.636	278
376.859	276.741
374.634	276
370.9	274.756
368.632	274
364.942	272.77
362.63	272
358.984	270.785
356.628	270
353.025	268.8
350.625	268
347.067	266.814
344.623	266
341.108	264.829
338.621	264
335.15	262.843
332.619	262
329.191	260.858
326.617	260
323.233	258.872
320.614	258
317.274	256.887
314.612	256
311.316	254.902
308.61	254
305.357	252.916
302.608	252
299.398	250.931
296.606	250
293.44	248.945
290.603	248
287.481	246.96

284.601	246
281.522	244.974
278.599	244
275.563	242.989
272.597	242
269.605	241.003
266.595	240
263.646	239.017
260.592	238
257.687	237.032
254.59	236
251.728	235.046
248.588	234
245.769	233.061
242.586	232
239.81	231.075
236.583	230
233.851	229.09
230.581	228
227.892	227.104
224.579	226
221.933	225.118
218.577	224
215.974	223.133
212.575	222
210.015	221.147
206.572	220
204.056	219.162
200.57	218
198.097	217.176
194.568	216
192.138	215.19
188.566	214
186.179	213.205
182.564	212
180.22	211.219
176.561	210
174.261	209.233
170.559	208
168.301	207.248
164.557	206
162.342	205.262
158.555	204
156.383	203.276
152.553	202
150.424	201.291
147.568	200.339
146.55	200
144.336	199.263
140.538	198
140.028	197.831
137.04	199.831
136.822	199.82

136.281	199.806
132.588	199.709
128.132	198.907
124.832	198.717
124.43	198.72
123.832	198.73
123.354	198.751
122.743	198.757
121.425	198.812
120.213	198.857
119.938	198.854
119.584	198.87
118.385	198.849
117.235	198.834
117.034	198.833
110.132	198.987
104.818	199.102
98.8143	198.859
86.6552	198.181
86.5428	198.179
84.1379	198
83.868	197.986
83.5647	197.967
83.3869	197.961
78.0277	197.266
75.9286	197.019
68.8572	196.138
68.697	196.118
67.841	196.002
67.8254	196.002
67.6997	196
62.2082	195.148
60.6701	194.935
55.9212	194
51.5095	193.601
45.8245	193.113
42.7715	192.86
39.5414	192.548
39.0396	192.503
33.5804	192
33.3498	191.999
33.0358	191.998
31.7133	191.995
31.057	191.995
30.8982	191.995
30.4475	191.994
29.8506	191.994
29.6366	191.993
29.391	191.993
29.3226	191.993
28.622	191.994
28.542	191.993
28.3605	191.993

28.2555	191.993
16.346	191.138
8.05554	190.53
0.998983	190.005
0.686216	190

Material Boundary

X	Y
140.028	197.831
140.028	197.713
140.028	196.713
140.028	195.713
140.028	193.713
141.766	193.149
142.289	192.994
143.045	192.769
144.237	192.414
145.518	192
148.459	191.052
151.716	190
156.612	188.418
157.903	188
161.952	186.689
164.08	186
164.758	185.78
170.247	184
172.895	183.14
176.403	182
181.024	180.497
182.529	180
185.376	179.065
188.619	178
189.923	177.575
194.757	176
195.648	175.71
200.895	174
201.373	173.844
207.034	172
207.098	171.979
207.993	171.687
212.823	170.114
213.172	170
218.549	168.248
219.311	168
224.274	166.383
225.449	166
230	164.518
231.588	164
235.725	162.651
237.722	162
241.444	160.784
243.846	160

247.162	158.917
249.97	158
252.88	157.05
256.093	156
258.598	155.182
262.216	154
264.316	153.314
268.34	152
270.035	151.446
274.463	150
275.754	149.578
280.585	148
281.473	147.71
286.71	146
287.186	145.844
292.824	144
292.886	143.98
293.74	143.7
298.583	142.115
298.935	142
304.279	140.251
305.047	140
309.976	138.387
311.159	138
315.674	136.523
317.272	136
321.371	134.659
323.386	134
327.069	132.795
329.5	132
332.77	130.931
335.619	130
339.508	128.716
341.678	128
345.692	126.704
347.866	126
350.959	124.992
354.006	124
357.278	122.924
360.089	122
361.133	121.745
365.215	121.477
368.707	121.493
371.484	122
373.654	122.03
374.386	122.08
377.631	122.239
382.427	122.316
383.677	122.244
387.287	122.197
390.059	122.187
396.735	122.233
398.019	122.268

399.749	122.314
406.24	122.429
409.208	122.512
411.915	122.585
415.53	122.683
424.48	122.93
430.485	123.131
448.199	123.599
448.732	123.618
463.334	124
470.097	124.145
471.17	124.168
483.106	124.425
486.086	124.487
495.863	124.696
500.697	124.797
508.409	124.961
515.014	125.097
518.981	125.181
523.614	125.281
527.447	125.363
529.69	125.406
531.66	125.441
540.373	125.637
554.05	125.953
556.089	126
568.694	126.288
580.167	126.531
584.066	126.617
593.259	126.813
599.175	126.945
607.386	127.128
614.024	127.271
624.97	127.517
628.615	127.596
643.158	127.917
643.782	127.931
646.896	128
658.497	128.248
660.64	128.294
673.082	128.561
677.922	128.665
687.656	128.874
692.236	128.971
699.35	129.123
712.535	129.48
729.855	129.992
730.239	129.992
731.42	130
738.245	131.694
739.951	132
740.007	132.001
741.701	132.015

742.332	132.017
743.317	132.019
753.154	132.287
755.462	132.336
761.566	132.471
765.71	132.559
775.589	132.763
783.012	132.917
790.009	133.066
795.683	133.184
804.848	133.379
808.664	133.459
820.13	133.704
821.971	133.743
833.961	134
835.574	134.035
835.855	134.041
849.047	134.327
851.677	134.384
862.588	134.62
867.593	134.729
876.198	134.915
883.605	135.076
889.878	135.211
899.713	135.425
903.628	135.509
915.919	135.776
917.449	135.809
926.274	136
936.214	136.29
943.717	136.589
962.389	137.22
979.061	138
983.234	139.38
985.11	140
987.287	140.719
991.16	142
994.524	143.112
997.209	144
1000.33	145.033
1003.26	146
1007.19	147.301
1009.31	148
1011.14	148.607
1015.36	150
1020.26	151.621
1021.41	152
1027.04	153.861
1027.46	154
1027.82	154.12
1033.5	156
1034.29	156.258
1039.55	158

1044.85	159.749
1045.6	160
1046.49	160.294
1051.65	162
1053.18	162.503
1057.7	164
1061.67	165.313
1063.75	166
1067.3	167.173
1069.8	168
1072.91	169.028
1075.85	170
1078.52	170.882
1081.9	172
1084.13	172.737
1087.95	174
1089.74	174.591
1091.61	175.21

Material Boundary

X	Y
140.028	195.713
141.766	195.149
142.289	194.994
143.045	194.769
144.237	194.414
145.518	194
148.459	193.052
151.716	192
156.612	190.418
157.903	190
161.952	188.689
164.08	188
164.758	187.78
170.247	186
172.895	185.14
176.403	184
181.024	182.497
182.529	182
185.376	181.065
188.619	180
189.923	179.575
194.757	178
195.648	177.71
200.895	176
201.373	175.844
207.034	174
207.098	173.979
207.993	173.687
212.823	172.114
213.172	172
218.549	170.248

219.311	170
224.274	168.383
225.449	168
230	166.518
231.588	166
235.725	164.651
237.722	164
241.444	162.784
243.846	162
247.162	160.917
249.97	160
252.88	159.05
256.093	158
258.598	157.182
262.216	156
264.316	155.314
268.34	154
270.035	153.446
274.463	152
275.754	151.578
280.585	150
281.473	149.71
286.71	148
287.186	147.844
292.824	146
292.886	145.98
293.74	145.7
298.583	144.115
298.935	144
304.279	142.251
305.047	142
309.976	140.387
311.159	140
315.674	138.523
317.272	138
321.371	136.659
323.386	136
327.069	134.795
329.5	134
332.77	132.931
335.619	132
339.508	130.716
341.678	130
345.692	128.704
347.866	128
350.959	126.992
354.006	126
357.278	124.924
360.089	124
361.133	123.745
365.215	123.477
368.707	123.493
371.484	124

373.654	124.03
374.386	124.08
377.631	124.239
382.427	124.316
383.677	124.244
387.287	124.197
390.059	124.187
396.735	124.233
398.019	124.268
399.749	124.314
406.24	124.429
409.208	124.512
411.915	124.585
415.53	124.683
424.48	124.93
430.485	125.131
448.199	125.599
448.732	125.618
463.334	126
470.097	126.145
471.17	126.168
483.106	126.425
486.086	126.487
495.863	126.696
500.697	126.797
508.409	126.961
515.014	127.097
518.981	127.181
523.614	127.281
527.447	127.363
529.69	127.406
531.66	127.441
540.373	127.637
554.05	127.953
556.089	128
568.694	128.288
580.167	128.531
584.066	128.617
593.259	128.813
599.175	128.945
607.386	129.128
614.024	129.271
624.97	129.517
628.615	129.596
643.158	129.917
643.782	129.931
646.896	130
658.497	130.248
660.64	130.294
673.082	130.561
677.922	130.665
687.656	130.874
692.236	130.971

699.35	131.123
712.535	131.48
729.855	131.992
730.239	131.992
731.42	132
738.245	133.694
739.951	134
740.007	134.001
741.701	134.015
742.332	134.017
743.317	134.019
753.154	134.287
755.462	134.336
761.566	134.471
765.71	134.559
775.589	134.763
783.012	134.917
790.009	135.066
795.683	135.184
804.848	135.379
808.664	135.459
820.13	135.704
821.971	135.743
833.961	136
835.574	136.035
835.855	136.041
849.047	136.327
851.677	136.384
862.588	136.62
867.593	136.729
876.198	136.915
883.605	137.076
889.878	137.211
899.713	137.425
903.628	137.509
915.919	137.776
917.449	137.809
926.274	138
936.214	138.29
943.717	138.589
962.389	139.22
979.061	140
983.234	141.38
985.11	142
987.287	142.719
991.16	144
994.524	145.112
997.209	146
1000.33	147.033
1003.26	148
1007.19	149.301
1009.31	150
1011.14	150.607

1015.36	152
1020.26	153.621
1021.41	154
1027.04	155.861
1027.46	156
1027.82	156.12
1033.5	158
1034.29	158.258
1039.55	160
1044.85	161.749
1045.6	162
1046.49	162.294
1051.65	164
1053.18	164.503
1057.7	166
1061.67	167.313
1063.75	168
1067.3	169.173
1069.8	170
1072.91	171.028
1075.85	172
1078.52	172.882
1081.9	174
1084.13	174.737
1087.95	176
1089.74	176.591
1091.61	177.21

Material Boundary

X	Y
140.028	197.713
141.766	197.149
142.289	196.994
143.045	196.769
144.237	196.414
145.518	196
148.459	195.052
151.716	194
156.612	192.418
157.903	192
161.952	190.689
164.08	190
164.758	189.78
170.247	188
172.895	187.14
176.403	186
181.024	184.497
182.529	184
185.376	183.065
188.619	182
189.923	181.575
194.757	180

195.648	179.71
200.895	178
201.373	177.844
207.034	176
207.098	175.979
207.993	175.687
212.823	174.114
213.172	174
218.549	172.248
219.311	172
224.274	170.383
225.449	170
230	168.518
231.588	168
235.725	166.651
237.722	166
241.444	164.784
243.846	164
247.162	162.917
249.97	162
252.88	161.05
256.093	160
258.598	159.182
262.216	158
264.316	157.314
268.34	156
270.035	155.446
274.463	154
275.754	153.578
280.585	152
281.473	151.71
286.71	150
287.186	149.844
292.824	148
292.886	147.98
293.74	147.7
298.583	146.115
298.935	146
304.279	144.251
305.047	144
309.976	142.387
311.159	142
315.674	140.523
317.272	140
321.371	138.659
323.386	138
327.069	136.795
329.5	136
332.77	134.931
335.619	134
339.508	132.716
341.678	132
345.692	130.704

347.866	130
350.959	128.992
354.006	128
357.278	126.924
360.089	126
361.133	125.745
365.215	125.477
368.707	125.493
371.484	126
373.654	126.03
374.386	126.08
377.631	126.239
382.427	126.316
383.677	126.244
387.287	126.197
390.059	126.187
396.735	126.233
398.019	126.268
399.749	126.314
406.24	126.429
409.208	126.512
411.915	126.585
415.53	126.683
424.48	126.93
430.485	127.131
448.199	127.599
448.732	127.618
463.334	128
470.097	128.145
471.17	128.168
483.106	128.425
486.086	128.487
495.863	128.696
500.697	128.797
508.409	128.961
515.014	129.097
518.981	129.181
523.614	129.281
527.447	129.363
529.69	129.406
531.66	129.441
540.373	129.637
554.05	129.953
556.089	130
568.694	130.288
580.167	130.531
584.066	130.617
593.259	130.813
599.175	130.945
607.386	131.128
614.024	131.271
624.97	131.517
628.615	131.596

643.158	131.917
643.782	131.931
646.896	132
658.497	132.248
660.64	132.294
673.082	132.561
677.922	132.665
687.656	132.874
692.236	132.971
699.35	133.123
712.535	133.48
729.855	133.992
730.239	133.992
731.42	134
738.245	135.694
739.951	136
740.007	136.001
741.701	136.015
742.332	136.017
743.317	136.019
753.154	136.287
755.462	136.336
761.566	136.471
765.71	136.559
775.589	136.763
783.012	136.917
790.009	137.066
795.683	137.184
804.848	137.379
808.664	137.459
820.13	137.704
821.971	137.743
833.961	138
835.574	138.035
835.855	138.041
849.047	138.327
851.677	138.384
862.588	138.62
867.593	138.729
876.198	138.915
883.605	139.076
889.878	139.211
899.713	139.425
903.628	139.509
915.919	139.776
917.449	139.809
926.274	140
936.214	140.29
943.717	140.589
962.389	141.22
979.061	142
983.234	143.38
985.11	144

987.287	144.719
991.16	146
994.524	147.112
997.209	148
1000.33	149.033
1003.26	150
1007.19	151.301
1009.31	152
1011.14	152.607
1015.36	154
1020.26	155.621
1021.41	156
1027.04	157.861
1027.46	158
1027.82	158.12
1033.5	160
1034.29	160.258
1039.55	162
1044.85	163.749
1045.6	164
1046.49	164.294
1051.65	166
1053.18	166.503
1057.7	168
1061.67	169.313
1063.75	170
1067.3	171.173
1069.8	172
1072.91	173.028
1075.85	174
1078.52	174.882
1081.9	176
1084.13	176.737
1087.95	178
1089.74	178.591
1091.61	179.21

Material Boundary

X	Y
147.568	200.339
148.459	200.052
151.716	199
156.612	197.418
157.903	197
161.952	195.689
164.08	195
164.758	194.78
170.247	193
172.895	192.14
176.403	191
181.024	189.497
182.529	189

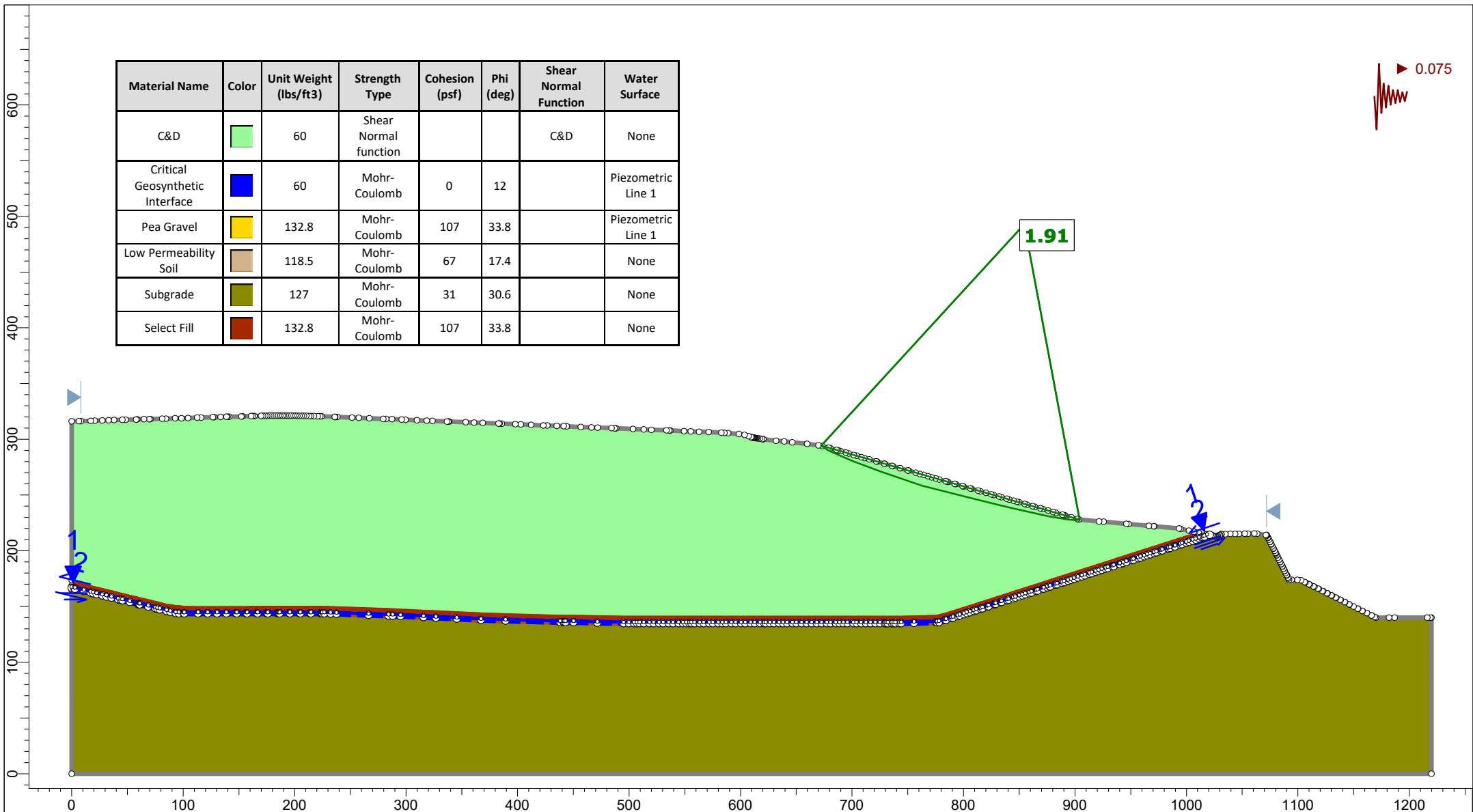
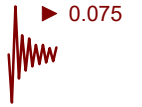
185.376	188.065
188.619	187
189.923	186.575
194.757	185
195.648	184.71
200.895	183
201.373	182.844
207.034	181
207.098	180.979
207.993	180.687
212.823	179.114
213.172	179
218.549	177.248
219.311	177
224.274	175.383
225.449	175
230	173.518
231.588	173
235.725	171.651
237.722	171
241.444	169.784
243.846	169
247.162	167.917
249.97	167
252.88	166.05
256.093	165
258.598	164.182
262.216	163
264.316	162.314
268.34	161
270.035	160.446
274.463	159
275.754	158.578
280.585	157
281.473	156.71
286.71	155
287.186	154.844
292.824	153
292.886	152.98
293.74	152.7
298.583	151.115
298.935	151
304.279	149.251
305.047	149
309.976	147.387
311.159	147
315.674	145.523
317.272	145
321.371	143.659
323.386	143
327.069	141.795
329.5	141
332.77	139.931

335.619	139
339.508	137.716
341.678	137
345.692	135.704
347.866	135
350.959	133.992
354.006	133
357.278	131.924
360.089	131
361.133	130.745
365.215	130.477
368.707	130.493
371.484	131
373.654	131.03
374.386	131.08
377.631	131.239
382.427	131.316
383.677	131.244
387.287	131.197
390.059	131.187
396.735	131.233
398.019	131.268
399.749	131.314
406.24	131.429
409.208	131.512
411.915	131.585
415.53	131.683
424.48	131.93
430.485	132.131
448.199	132.599
448.732	132.618
463.334	133
470.097	133.145
471.17	133.168
483.106	133.425
486.086	133.487
495.863	133.696
500.697	133.797
508.409	133.961
515.014	134.097
518.981	134.181
523.614	134.281
527.447	134.363
529.69	134.406
531.66	134.441
540.373	134.637
554.05	134.953
556.089	135
568.694	135.288
580.167	135.531
584.066	135.617
593.259	135.813
599.175	135.945

607.386	136.128
614.024	136.271
624.97	136.517
628.615	136.596
643.158	136.917
643.782	136.931
646.896	137
658.497	137.248
660.64	137.294
673.082	137.561
677.922	137.665
687.656	137.874
692.236	137.971
699.35	138.123
712.535	138.48
729.855	138.992
730.239	138.992
731.42	139
738.245	140.694
739.951	141
740.007	141.001
741.701	141.015
742.332	141.017
743.317	141.019
753.154	141.287
755.462	141.336
761.566	141.471
765.71	141.559
775.589	141.763
783.012	141.917
790.009	142.066
795.683	142.184
804.848	142.379
808.664	142.459
820.13	142.704
821.971	142.743
833.961	143
835.574	143.035
835.855	143.041
849.047	143.327
851.677	143.384
862.588	143.62
867.593	143.729
876.198	143.915
883.605	144.076
889.878	144.211
899.713	144.425
903.628	144.509
915.919	144.776
917.449	144.809
926.274	145
936.214	145.29
943.717	145.589

962.389	146.22
979.061	147
983.234	148.38
985.11	149
987.287	149.719
991.16	151
994.524	152.112
997.209	153
1000.33	154.033
1003.26	155
1007.19	156.301
1009.31	157
1011.14	157.607
1015.36	159
1020.26	160.621
1021.41	161
1027.04	162.861
1027.46	163
1027.82	163.12
1033.5	165
1034.29	165.258
1039.55	167
1044.85	168.749
1045.6	169
1046.49	169.294
1051.65	171
1053.18	171.503
1057.7	173
1061.67	174.313
1063.75	175
1067.3	176.173
1069.8	177
1072.91	178.028
1075.85	179
1078.52	179.882
1081.9	181
1084.13	181.737
1087.95	183
1089.74	183.591
1091.61	184.21

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Shear Normal Function	Water Surface
C&D		60	Shear Normal function			C&D	None
Critical Geosynthetic Interface		60	Mohr-Coulomb	0	12		Piezometric Line 1
Pea Gravel		132.8	Mohr-Coulomb	107	33.8		Piezometric Line 1
Low Permeability Soil		118.5	Mohr-Coulomb	67	17.4		None
Subgrade		127	Mohr-Coulomb	31	30.6		None
Select Fill		132.8	Mohr-Coulomb	107	33.8		None



Project		151-18776-A Application	
Project: 182-442 S.A. Dunn Permit Renewal/Modification		C&D Landfill	
Group	Analysis Description	Scenario	Section C - Waste Failure - Seismic.slim
Drawn By	Created By: ZLM	Checked By: TDM	Company: Civil & Environmental Consultants, Inc.
Date	Created Date: 1/6/2022 12/10/2015 12:09:38 PM	File Name	Civil & Environmental Consultants, Inc. Section C - Waste Failure - Seismic.slim

Slide Analysis Information

151-877 S.A. Dunn C&D Landfill

Project Summary

Slide Modeler Version:	9.02
Compute Time:	00h:02m:27.155s
Author:	DVS
Company:	Civil & Environmental Consultants, Inc.
Date Created:	12/10/2015, 12:09:38 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	GLE/Morgenstern-Price with interslice force function (Half Sine)
Number of slices:	25
Tolerance:	0.005
Maximum number of iterations:	50
Check malpha < 0.2:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Search Method:	Cuckoo Search
Initial # of Surface Vertices:	8
Maximum Iterations:	500
Number of Nests:	50
Minimum Elevation:	Not Defined
Minimum Depth [ft]:	10
Minimum Area:	Not Defined
Minimum Weight:	Not Defined
Convex Surfaces Only:	Enabled

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.075

Materials

C&D

Color	
Strength Type	Shear Normal function
Unit Weight [lbs/ft ³]	60
Water Surface	None
Ru Value	0

Pea Gravel

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	132.8
Cohesion [psf]	107
Friction Angle [deg]	33.8
Water Surface	Piezometric Line 1
Hu Value	1

Low Permeability Soil

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	118.5
Cohesion [psf]	67
Friction Angle [deg]	17.4
Water Surface	None
Ru Value	0

Subgrade

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	127
Cohesion [psf]	31
Friction Angle [deg]	30.6
Water Surface	None
Ru Value	0

Select Fill

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	132.8
Cohesion [psf]	107
Friction Angle [deg]	33.8
Water Surface	None
Ru Value	0

Shear Normal Functions

Name: C&D		
Effective Normal (psf)		Shear (psf)
0		0
2000		1400
10000		6169

Global Minimums

Method: gle/morgenstern-price

FS	1.912030
Axis Location:	854.443, 492.913
Left Slip Surface Endpoint:	672.287, 294.179
Right Slip Surface Endpoint:	904.137, 227.947
Resisting Moment:	1.57582e+07 lb-ft
Driving Moment:	8.24159e+06 lb-ft
Resisting Horizontal Force:	60259.1 lb
Driving Horizontal Force:	31515.8 lb
Total Slice Area:	1583.57 ft ²
Surface Horizontal Width:	231.85 ft
Surface Average Height:	6.83014 ft

Global Minimum Coordinates**Method: gle/morgenstern-price**

X	Y
672.287	294.179
679.917	289.387
700.071	280.591
725.788	271.046
762.541	258.498
791.182	251.192
816.898	244.729
842.56	238.49
874.888	231.28
893.118	228.063
901.107	227.498
904.137	227.947

Global Minimum Support Data

No Supports Present

Slice Data**Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.91203**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1-	7.62961-	671.122-	32.1319-	C&D-	0-	34.992-	25.8742-	49.4722-	70.6745-	0-	70.6745-	86.9254-	86.9254-
2-	10.0774-	2139.56-	23.5757-	C&D-	0-	34.992-	65.841-	125.89-	179.842-	0-	179.842-	208.574-	208.574-
3-	10.0774-	3052.62-	23.5757-	C&D-	2.84217e-14-	34.992-	92.9583-	177.739-	253.912-	0-	253.912-	294.478-	294.478-
4-	12.8581-	4897.61-	20.3648-	C&D-	0-	34.992-	119.34-	228.181-	325.973-	0-	325.973-	370.272-	370.272-
5-	12.8581-	5737.83-	20.3648-	C&D-	0-	34.992-	139.01-	265.792-	379.703-	0-	379.703-	431.303-	431.303-
6-	9.18824-	4539.31-	18.8504-	C&D-	5.68434e-14-	34.992-	156.027-	298.328-	426.183-	0-	426.183-	479.452-	479.452-
7-	9.18824-	4817.43-	18.8504-	C&D-	0-	34.992-	165.461-	316.367-	451.952-	0-	451.952-	508.442-	508.442-
8-	9.18824-	5095.68-	18.8504-	C&D-	0-	34.992-	175.021-	334.646-	478.066-	0-	478.066-	537.82-	537.82-
9-	9.18824-	5373.9-	18.8504-	C&D-	0-	34.992-	184.73-	353.209-	504.585-	0-	504.585-	567.653-	567.653-
10-	9.5473-	5642.46-	14.3103-	C&D-	0-	34.992-	198.553-	379.639-	542.341-	0-	542.341-	592.989-	592.989-
11-	9.5473-	5470.18-	14.3103-	C&D-	0-	34.992-	193.197-	369.399-	527.713-	0-	527.713-	576.995-	576.995-
12-	9.5473-	5297.49-	14.3103-	C&D-	0-	34.992-	187.73-	358.945-	512.778-	0-	512.778-	560.666-	560.666-
13-	8.57188-	4600.73-	14.1063-	C&D-	0-	34.992-	182.614-	349.163-	498.804-	0-	498.804-	544.695-	544.695-
14-	8.57188-	4444.76-	14.1063-	C&D-	5.68434e-14-	34.992-	176.83-	338.105-	483.007-	0-	483.007-	527.445-	527.445-
15-	8.57188-	4288.73-	14.1063-	C&D-	0-	34.992-	170.947-	326.856-	466.938-	0-	466.938-	509.897-	509.897-
16-	8.55392-	4106.09-	13.6652-	C&D-	0-	34.992-	165.176-	315.822-	451.174-	0-	451.174-	491.333-	491.333-
17-	8.55392-	3915.26-	13.6652-	C&D-	5.68434e-14-	34.992-	157.613-	301.36-	430.515-	0-	430.515-	468.835-	468.835-
18-	8.55392-	3724.05-	13.6652-	C&D-	0-	34.992-	149.946-	286.702-	409.574-	0-	409.574-	446.03-	446.03-
19-	10.776-	4349.38-	12.5723-	C&D-	5.68434e-14-	34.992-	140.648-	268.923-	384.176-	0-	384.176-	415.543-	415.543-
20-	10.776-	3906.01-	12.5723-	C&D-	2.84217e-14-	34.992-	125.989-	240.894-	344.134-	0-	344.134-	372.232-	372.232-
21-	10.776-	3462.61-	12.5723-	C&D-	2.84217e-14-	34.992-	111.31-	212.828-	304.04-	0-	304.04-	328.865-	328.865-
22-	9.11521-	2466.71-	10.0079-	C&D-	0-	34.992-	95.4279-	182.461-	260.659-	0-	260.659-	277.499-	277.499-
23-	9.11521-	1913.84-	10.0079-	C&D-	2.84217e-14-	34.992-	73.5098-	140.553-	200.79-	0-	200.79-	213.762-	213.762-
24-	7.98904-	999.213-	4.04946-	C&D-	1.42109e-14-	34.992-	45.2982-	86.6116-	123.731-	0-	123.731-	126.938-	126.938-
25-	3.02976-	101.544-	8.44047-	C&D-	0-	34.992-	13.0716-	24.9933-	35.7046-	0-	35.7046-	33.7649-	33.7649-

Interslice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.91203

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1-	672.287-	294.179-	0-	0-	0-
2-	679.917-	289.387-	191.583-	7.90838-	2.36378-
3-	689.994-	284.989-	479.384-	45.5676-	5.42991-
4-	700.071-	280.591-	888.108-	130.605-	8.36594-
5-	712.93-	275.819-	1276.7-	267.234-	11.8223-
6-	725.788-	271.046-	1731.81-	459.337-	14.8548-
7-	734.976-	267.909-	1975.47-	593.361-	16.7184-
8-	744.164-	264.772-	2234.15-	739.151-	18.3064-
9-	753.352-	261.635-	2507.76-	893.263-	19.6059-
10-	762.541-	258.498-	2796.21-	1051.5-	20.6085-
11-	772.088-	256.062-	2644.47-	1032.64-	21.3302-
12-	781.635-	253.627-	2495.3-	994.161-	21.723-
13-	791.182-	251.192-	2349.02-	938.849-	21.7854-
14-	799.754-	249.038-	2203.12-	870.493-	21.5599-
15-	808.326-	246.883-	2061.07-	793.998-	21.0685-
16-	816.898-	244.729-	1923.14-	711.872-	20.3126-
17-	825.452-	242.65-	1756.42-	615.005-	19.2975-
18-	834.006-	240.57-	1597.13-	519.758-	18.0266-
19-	842.56-	238.49-	1445.53-	428.385-	16.5073-
20-	853.336-	236.087-	1179.29-	299.669-	14.2576-
21-	864.112-	233.684-	941.552-	194.392-	11.6653-
22-	874.888-	231.28-	732.386-	113.091-	8.77797-
23-	884.003-	229.672-	466.775-	50.3084-	6.15152-
24-	893.118-	228.063-	263.198-	15.6605-	3.40513-
25-	901.107-	227.498-	46.2083-	0.758594-	0.940531-
26-	904.137-	227.947-	0-	0-	0-

Discharge Sections

Entity Information

Piezoline

X	Y
0	167.667
2.61045	167.033
2.74827	167
2.93545	166.955
10.984	165
16.9104	163.561
19.2198	163
22.3549	162.239
27.4555	161
31.2131	160.088
35.6913	159
41.768	157.524
43.927	157
45.5183	156.614
52.1628	155
59.8261	153.139
59.8924	153.123
60.4145	153
60.8582	152.895
60.9162	152.881

68.6396	151
75.206	149.4
76.8497	149
79.0691	148.459
85.0598	147
88.4071	146.185
93.2699	145
96.1305	144.964
100.713	144.947
101.016	144.941
113.425	144.821
121.918	144.822
130.421	144.823
138.934	144.824
147.456	144.825
148.142	144.848
156.777	144.849
157.383	144.866
166.104	144.867
166.646	144.881
175.435	144.882
175.924	144.893
184.77	144.893
185.454	144.904
186.03	144.91
186.471	144.91
195.39	144.911
195.828	144.911
204.75	144.912
205.185	144.912
214.11	144.912
214.542	144.912
223.469	144.913
223.899	144.913
224.328	144.913
224.757	144.913
226.606	144.875
232.206	144.736
237.619	144.555
266.437	143.593
284.194	143
288.023	142.82
294.955	142.494
315.577	141.526
326.764	141
345.352	140.109
367.261	139
389.122	138.384
438.282	137
441.106	136.989
441.813	136.988
442.992	136.982
450.152	136.954

471.589	136.475
495.112	136.041
499.816	136.042
504.522	136.042
507.015	136.043
509.52	136.047
513.255	136.047
518.191	136.045
521.934	136.044
526.857	136.043
530.609	136.042
535.521	136.04
539.492	136.044
544.41	136.042
548.376	136.045
551.45	136.051
554.115	136.053
556.005	136.053
558.664	136.055
563.412	136.057
566.946	136.064
571.737	136.066
575.242	136.073
580.075	136.075
583.551	136.082
586.977	136.088
591.874	136.09
595.541	136.09
600.448	136.093
604.107	136.093
609.025	136.095
612.675	136.095
617.604	136.097
621.244	136.097
622.641	136.096
626.431	136.093
629.889	136.087
634.698	136.083
638.19	136.076
641.731	136.07
646.478	136.066
650.054	136.06
654.753	136.056
659.419	136.052
663.75	136.06
668.432	136.056
672.746	136.063
677.444	136.06
680.743	136.07
685.469	136.067
688.752	136.077
692.299	136.081
695.852	136.075

701.119	136.075
703.992	136.063
708.239	136.071
712.549	136.079
716.654	136.084
721.014	136.092
725.057	136.098
729.467	136.106
730.766	136.109
732.057	136.112
735.706	136.117
737.361	136.116
738.906	136.115
742.564	136.12
743.989	136.118
755.732	136.35
775.632	136.895
775.782	136.895
775.919	136.894
776.153	136.893
778.05	137
783.506	138.753
784.276	139
789.286	140.609
790.503	141
794.831	142.39
796.73	143
800.37	144.169
802.957	145
805.905	145.947
809.183	147
811.435	147.723
815.41	149
816.957	149.497
821.637	151
822.473	151.269
827.863	153
827.984	153.039
828.909	153.336
833.494	154.808
834.09	155
838.998	156.577
840.317	157
844.497	158.343
846.543	159
849.989	160.107
852.77	161
855.476	161.869
858.997	163
860.956	163.629
865.223	165
866.43	165.387
871.45	167

871.897	167.144
875.09	168.169
877.36	168.898
877.677	169
882.821	170.652
883.903	171
888.276	172.404
890.13	173
893.723	174.154
896.357	175
899.164	175.902
902.583	177
906.152	178.146
908.81	179
912.925	180.322
915.037	181
918.41	182.083
921.263	183
923.888	183.843
927.49	185
929.36	185.601
933.717	187
934.825	187.356
939.944	189
940.292	189.112
943.235	190.057
945.863	190.901
946.17	191
951.208	192.618
952.397	193
956.633	194.361
958.624	195
962.07	196.107
964.85	197
967.5	197.851
971.077	199
972.917	199.591
977.304	201
978.32	201.326
983.53	203
983.726	203.063
985.426	203.609
989.318	204.859
989.757	205
994.64	206.568
995.984	207
999.949	208.274
1002.21	209
1005.61	210.122
1008.27	211
1011.51	212.172
1013.9	213
1014.76	213.314

1016.17	213.831
1018.57	214.636

External Boundary

X	Y
0	316.109
0	173.667
0	168.667
0	167.667
0	166.667
0	164.667
0	0
1219.81	0
1219.81	140
1218.71	140
1216.08	140
1186.91	140
1181.65	140
1169.98	140
1168.96	140.51
1165.98	142
1165.94	142.022
1161.98	144
1161.87	144.052
1157.97	146
1157.81	146.083
1153.97	148
1153.74	148.113
1149.97	150
1146.3	151.832
1145.96	152
1142.35	153.804
1141.96	154
1138.41	155.775
1137.96	156
1134.46	157.746
1133.96	158
1130.52	159.716
1129.95	160
1126.58	161.687
1125.95	162
1122.63	163.658
1121.95	164
1118.69	165.628
1117.94	166
1114.74	167.599
1113.94	168
1110.8	169.569
1109.94	170
1106.86	171.539
1105.93	172
1102.91	173.513

1099.52	173.859
1094.52	173.86
1092.03	174
1091.53	174.999
1091.03	176
1090.13	177.801
1090.03	178
1089.94	178.171
1089.03	180
1088.12	181.822
1088.03	182
1087.11	183.832
1087.03	184
1086.11	185.84
1086.03	186
1085.11	187.848
1085.03	188
1084.1	189.856
1084.03	190
1083.1	191.864
1083.03	192
1082.1	193.874
1082.03	194
1081.09	195.885
1081.03	196
1080.32	197.424
1080.04	198
1079.89	198.297
1079.04	200
1078.08	201.905
1078.04	202
1077.98	202.109
1077.04	204
1076.2	205.676
1076.04	206
1075.05	207.97
1075.04	208
1075.02	208.038
1074.04	210
1073.25	211.588
1073.04	212
1072.31	213.453
1072.04	214
1071.94	214.206
1071.32	214.159
1063.42	215.257
1060.85	215.402
1055.24	215.305
1052.25	215.254
1047.24	215.167
1043.65	215.105
1039.23	215.029
1035.05	214.956

1031.23	214.89
1031.21	214.89
1031.2	214.89
1030.1	214.34
1029.41	214
1028.1	213.348
1027.2	212.901
1026.1	212.904
1025.2	212.906
1024.29	213.363
1024.06	213.481
1023.02	214
1021.42	214.349
1021.42	214.349
1020.86	214.406
1018.57	214.636
1018.35	214.657
1016.17	214.831
1016.17	214.831
1014.12	215.298
1011.03	216
1007.6	216.78
1006.66	216.994
1002.24	218
994.715	219.711
993.444	220
971.061	221.961
970.626	222
966.337	222.38
948.029	224
946.173	224.161
925.668	226
921.667	226.352
903.558	228
902.15	228.407
896.627	230
890.917	231.686
889.857	232
888.805	232.302
882.886	234
880.441	234.701
875.91	236
870.915	237.432
868.933	238
863.881	239.448
861.956	240
856.849	241.464
854.979	242
849.816	243.48
848.002	244
844.816	244.913
841.024	246
838.911	246.606

834.049	248
831.937	248.605
827.072	250
824.844	250.639
820.092	252
815.118	253.427
813.119	254
807.03	255.746
806.142	256
799.957	257.773
799.166	258
792.927	259.789
792.189	260
785.902	261.802
785.213	262
784	262.348
778.236	264
774.987	264.932
771.259	266
767.956	266.946
764.278	268
760.966	268.949
757.298	270
750.551	271.933
750.317	272
750.187	272.037
743.335	274
743.061	274.079
736.354	276
736.025	276.094
729.373	278
728.994	278.109
722.393	280
721.65	280.213
715.413	282
711.155	283.22
708.431	284
704.082	285.246
701.451	286
697.045	287.263
694.47	288
689.688	289.37
687.491	290
686.287	290.345
680.51	292
679.092	292.406
673.53	294
669.841	294.53
659.621	296
646.437	297.28
639.023	298
631.875	298.773
620.523	300

619.315	300.188
617.055	300.54
615.53	300.777
614.431	300.948
613.602	301.077
612.954	301.178
612.434	301.259
612.007	301.326
611.651	301.381
611.349	301.428
610.968	301.547
610.518	301.688
609.978	301.857
609.52	302
607.088	302.81
603.517	304
598.461	304.667
588.88	305.484
585.658	305.81
582.821	306
571.381	306.465
562.784	306.814
555.284	307.119
549.352	307.36
536.852	307.868
535.963	307.904
533.597	308
520.061	308.55
513.256	308.826
503.601	309.219
488.514	309.832
487.129	309.888
484.372	310
471.823	310.51
466.201	310.738
456.663	311.126
444.195	311.632
441.407	311.746
435.148	312
426.585	312.348
423.112	312.489
412.237	312.931
403.018	313.305
398.046	313.507
385.924	314
383.861	314.084
382.932	314.122
368.722	314.699
360.927	315.016
353.446	315.32
338.63	315.922
338.031	315.946
336.699	316

323.645	316.53
318.615	316.735
309.688	317.097
299.451	317.513
296.058	317.651
287.475	318
282.072	318.219
279.631	318.319
266.885	318.837
257.515	319.217
251.553	319.46
238.25	320
236.354	320.077
236.173	320.083
235.965	320.089
224.14	320.551
222.969	320.58
220.62	320.668
217.402	320.78
214.627	320.868
213.003	320.9
210.498	320.971
208.258	321.027
206.459	321.054
204.401	321.099
202.505	321.134
200.731	321.162
198.84	321.182
197.16	321.202
195.55	321.217
193.625	321.229
192.069	321.238
190.542	321.241
189.025	321.24
187.104	321.244
185.592	321.237
184.055	321.226
182.47	321.208
180.586	321.204
178.955	321.18
177.231	321.148
175.401	321.135
173.584	321.095
171.608	321.044
169.885	321.023
163.988	320.857
162.472	320.831
161.042	320.799
153.258	320.573
152.168	320.544
141.311	320.227
139.934	320.187
138.971	320.159

133.511	320
127.85	319.835
126.697	319.801
116.045	319.491
112.503	319.388
104.328	319.15
98.4359	318.978
92.6962	318.811
84.4928	318.572
81.1502	318.474
70.6725	318.169
69.6887	318.14
64.8782	318
58.8789	317.825
57.7947	317.794
48.471	317.522
45.4995	317.435
38.0244	317.217
33.1503	317.075
27.539	316.912
20.747	316.714
17.0146	316.605
8.28898	316.351
6.451	316.297

Material Boundary

X	Y
0	164.667
2.61045	164.033
2.74827	164
2.93545	163.955
10.984	162
16.9104	160.561
19.2198	160
22.3549	159.239
27.4555	158
31.2131	157.088
35.6913	156
41.768	154.524
43.927	154
45.5183	153.614
52.1628	152
59.8261	150.139
59.8924	150.123
60.4145	150
60.8582	149.895
60.9162	149.881
68.6396	148
75.206	146.4
76.8497	146
79.0691	145.459
85.0598	144

88.4071	143.185
93.2699	142
96.1305	141.964
100.713	141.947
101.016	141.941
113.425	141.821
121.918	141.822
130.421	141.823
138.934	141.824
147.456	141.825
148.142	141.848
156.777	141.849
157.383	141.866
166.104	141.867
166.646	141.881
175.435	141.882
175.924	141.893
184.77	141.893
185.454	141.904
186.03	141.91
186.471	141.91
195.39	141.911
195.828	141.911
204.75	141.912
205.185	141.912
214.11	141.912
214.542	141.912
223.469	141.913
223.899	141.913
224.328	141.913
224.757	141.913
226.606	141.875
232.206	141.736
237.619	141.555
266.437	140.593
284.194	140
288.023	139.82
294.955	139.494
315.577	138.526
326.764	138
345.352	137.109
367.261	136
389.122	135.384
438.282	134
441.106	133.989
441.813	133.988
442.992	133.982
450.152	133.954
471.589	133.475
495.112	133.041
499.816	133.042
504.522	133.042
507.015	133.043

509.52	133.047
513.255	133.047
518.191	133.045
521.934	133.044
526.857	133.043
530.609	133.042
535.521	133.04
539.492	133.044
544.41	133.042
548.376	133.045
551.45	133.051
554.115	133.053
556.005	133.053
558.664	133.055
563.412	133.057
566.946	133.064
571.737	133.066
575.242	133.073
580.075	133.075
583.551	133.082
586.977	133.088
591.874	133.09
595.541	133.09
600.448	133.093
604.107	133.093
609.025	133.095
612.675	133.095
617.604	133.097
621.244	133.097
622.641	133.096
626.431	133.093
629.889	133.087
634.698	133.083
638.19	133.076
641.731	133.07
646.478	133.066
650.054	133.06
654.753	133.056
659.419	133.052
663.75	133.06
668.432	133.056
672.746	133.063
677.444	133.06
680.743	133.07
685.469	133.067
688.752	133.077
692.299	133.081
695.852	133.075
701.119	133.075
703.992	133.063
708.239	133.071
712.549	133.079
716.654	133.084

721.014	133.092
725.057	133.098
729.467	133.106
730.766	133.109
732.057	133.112
735.706	133.117
737.361	133.116
738.906	133.115
742.564	133.12
743.989	133.118
755.732	133.35
775.632	133.895
775.782	133.895
775.919	133.894
776.153	133.893
778.05	134
783.506	135.753
784.276	136
789.286	137.609
790.503	138
794.831	139.39
796.73	140
800.37	141.169
802.957	142
805.905	142.947
809.183	144
811.435	144.723
815.41	146
816.957	146.497
821.637	148
822.473	148.269
827.863	150
827.984	150.039
828.909	150.336
833.494	151.808
834.09	152
838.998	153.577
840.317	154
844.497	155.343
846.543	156
849.989	157.107
852.77	158
855.476	158.869
858.997	160
860.956	160.629
865.223	162
866.43	162.387
871.45	164
871.897	164.144
875.09	165.169
877.36	165.898
877.677	166
882.821	167.652

883.903	168
888.276	169.404
890.13	170
893.723	171.154
896.357	172
899.164	172.902
902.583	174
906.152	175.146
908.81	176
912.925	177.322
915.037	178
918.41	179.083
921.263	180
923.888	180.843
927.49	182
929.36	182.601
933.717	184
934.825	184.356
939.944	186
940.292	186.112
943.235	187.057
945.863	187.901
946.17	188
951.208	189.618
952.397	190
956.633	191.361
958.624	192
962.07	193.107
964.85	194
967.5	194.851
971.077	196
972.917	196.591
977.304	198
978.32	198.326
983.53	200
983.726	200.063
985.426	200.609
989.318	201.859
989.757	202
994.64	203.568
995.984	204
999.949	205.274
1002.21	206
1005.61	207.122
1008.27	208
1011.51	209.172
1013.9	210
1014.76	210.314
1016.17	210.831
1024.06	213.481

Material Boundary

X	Y
0	166.667
2.61045	166.033
2.74827	166
2.93545	165.955
10.984	164
16.9104	162.561
19.2198	162
22.3549	161.239
27.4555	160
31.2131	159.088
35.6913	158
41.768	156.524
43.927	156
45.5183	155.614
52.1628	154
59.8261	152.139
59.8924	152.123
60.4145	152
60.8582	151.895
60.9162	151.881
68.6396	150
75.206	148.4
76.8497	148
79.0691	147.459
85.0598	146
88.4071	145.185
93.2699	144
96.1305	143.964
100.713	143.947
101.016	143.941
113.425	143.821
121.918	143.822
130.421	143.823
138.934	143.824
147.456	143.825
148.142	143.848
156.777	143.849
157.383	143.866
166.104	143.867
166.646	143.881
175.435	143.882
175.924	143.893
184.77	143.893
185.454	143.904
186.03	143.91
186.471	143.91
195.39	143.911
195.828	143.911
204.75	143.912
205.185	143.912
214.11	143.912
214.542	143.912

223.469	143.913
223.899	143.913
224.328	143.913
224.757	143.913
226.606	143.875
232.206	143.736
237.619	143.555
266.437	142.593
284.194	142
288.023	141.82
294.955	141.494
315.577	140.526
326.764	140
345.352	139.109
367.261	138
389.122	137.384
438.282	136
441.106	135.989
441.813	135.988
442.992	135.982
450.152	135.954
471.589	135.475
495.112	135.041
499.816	135.042
504.522	135.042
507.015	135.043
509.52	135.047
513.255	135.047
518.191	135.045
521.934	135.044
526.857	135.043
530.609	135.042
535.521	135.04
539.492	135.044
544.41	135.042
548.376	135.045
551.45	135.051
554.115	135.053
556.005	135.053
558.664	135.055
563.412	135.057
566.946	135.064
571.737	135.066
575.242	135.073
580.075	135.075
583.551	135.082
586.977	135.088
591.874	135.09
595.541	135.09
600.448	135.093
604.107	135.093
609.025	135.095
612.675	135.095

617.604	135.097
621.244	135.097
622.641	135.096
626.431	135.093
629.889	135.087
634.698	135.083
638.19	135.076
641.731	135.07
646.478	135.066
650.054	135.06
654.753	135.056
659.419	135.052
663.75	135.06
668.432	135.056
672.746	135.063
677.444	135.06
680.743	135.07
685.469	135.067
688.752	135.077
692.299	135.081
695.852	135.075
701.119	135.075
703.992	135.063
708.239	135.071
712.549	135.079
716.654	135.084
721.014	135.092
725.057	135.098
729.467	135.106
730.766	135.109
732.057	135.112
735.706	135.117
737.361	135.116
738.906	135.115
742.564	135.12
743.989	135.118
755.732	135.35
775.632	135.895
775.782	135.895
775.919	135.894
776.153	135.893
778.05	136
783.506	137.753
784.276	138
789.286	139.609
790.503	140
794.831	141.39
796.73	142
800.37	143.169
802.957	144
805.905	144.947
809.183	146
811.435	146.723

815.41	148
816.957	148.497
821.637	150
822.473	150.269
827.863	152
827.984	152.039
828.909	152.336
833.494	153.808
834.09	154
838.998	155.577
840.317	156
844.497	157.343
846.543	158
849.989	159.107
852.77	160
855.476	160.869
858.997	162
860.956	162.629
865.223	164
866.43	164.387
871.45	166
871.897	166.144
875.09	167.169
877.36	167.898
877.677	168
882.821	169.652
883.903	170
888.276	171.404
890.13	172
893.723	173.154
896.357	174
899.164	174.902
902.583	176
906.152	177.146
908.81	178
912.925	179.322
915.037	180
918.41	181.083
921.263	182
923.888	182.843
927.49	184
929.36	184.601
933.717	186
934.825	186.356
939.944	188
940.292	188.112
943.235	189.057
945.863	189.901
946.17	190
951.208	191.618
952.397	192
956.633	193.361
958.624	194

962.07	195.107
964.85	196
967.5	196.851
971.077	198
972.917	198.591
977.304	200
978.32	200.326
983.53	202
983.726	202.063
985.426	202.609
989.318	203.859
989.757	204
994.64	205.568
995.984	206
999.949	207.274
1002.21	208
1005.61	209.122
1008.27	210
1011.51	211.172
1013.9	212
1014.76	212.314
1016.17	212.831
1020.86	214.406

Material Boundary

X	
0	168.667
2.61045	168.033
2.74827	168
2.93545	167.955
10.984	166
16.9104	164.561
19.2198	164
22.3549	163.239
27.4555	162
31.2131	161.088
35.6913	160
41.768	158.524
43.927	158
45.5183	157.614
52.1628	156
59.8261	154.139
59.8924	154.123
60.4145	154
60.8582	153.895
60.9162	153.881
68.6396	152
75.206	150.4
76.8497	150
79.0691	149.459
85.0598	148
88.4071	147.185

93.2699	146
96.1305	145.964
100.713	145.947
101.016	145.941
113.425	145.821
121.918	145.822
130.421	145.823
138.934	145.824
147.456	145.825
148.142	145.848
156.777	145.849
157.383	145.866
166.104	145.867
166.646	145.881
175.435	145.882
175.924	145.893
184.77	145.893
185.454	145.904
186.03	145.91
186.471	145.91
195.39	145.911
195.828	145.911
204.75	145.912
205.185	145.912
214.11	145.912
214.542	145.912
223.469	145.913
223.899	145.913
224.328	145.913
224.757	145.913
226.606	145.875
232.206	145.736
237.619	145.555
266.437	144.593
284.194	144
288.023	143.82
294.955	143.494
315.577	142.526
326.764	142
345.352	141.109
367.261	140
389.122	139.384
438.282	138
441.106	137.989
441.813	137.988
442.992	137.982
450.152	137.954
471.589	137.475
495.112	137.041
499.816	137.042
504.522	137.042
507.015	137.043
509.52	137.047

513.255	137.047
518.191	137.045
521.934	137.044
526.857	137.043
530.609	137.042
535.521	137.04
539.492	137.044
544.41	137.042
548.376	137.045
551.45	137.051
554.115	137.053
556.005	137.053
558.664	137.055
563.412	137.057
566.946	137.064
571.737	137.066
575.242	137.073
580.075	137.075
583.551	137.082
586.977	137.088
591.874	137.09
595.541	137.09
600.448	137.093
604.107	137.093
609.025	137.095
612.675	137.095
617.604	137.097
621.244	137.097
622.641	137.096
626.431	137.093
629.889	137.087
634.698	137.083
638.19	137.076
641.731	137.07
646.478	137.066
650.054	137.06
654.753	137.056
659.419	137.052
663.75	137.06
668.432	137.056
672.746	137.063
677.444	137.06
680.743	137.07
685.469	137.067
688.752	137.077
692.299	137.081
695.852	137.075
701.119	137.075
703.992	137.063
708.239	137.071
712.549	137.079
716.654	137.084
721.014	137.092

725.057	137.098
729.467	137.106
730.766	137.109
732.057	137.112
735.706	137.117
737.361	137.116
738.906	137.115
742.564	137.12
743.989	137.118
755.732	137.35
775.632	137.895
775.782	137.895
775.919	137.894
776.153	137.893
778.05	138
783.506	139.753
784.276	140
789.286	141.609
790.503	142
794.831	143.39
796.73	144
800.37	145.169
802.957	146
805.905	146.947
809.183	148
811.435	148.723
815.41	150
816.957	150.497
821.637	152
822.473	152.269
827.863	154
827.984	154.039
828.909	154.336
833.494	155.808
834.09	156
838.998	157.577
840.317	158
844.497	159.343
846.543	160
849.989	161.107
852.77	162
855.476	162.869
858.997	164
860.956	164.629
865.223	166
866.43	166.387
871.45	168
871.897	168.144
875.09	169.169
877.36	169.898
877.677	170
882.821	171.652
883.903	172

888.276	173.404
890.13	174
893.723	175.154
896.357	176
899.164	176.902
902.583	178
906.152	179.146
908.81	180
912.925	181.322
915.037	182
918.41	183.083
921.263	184
923.888	184.843
927.49	186
929.36	186.601
933.717	188
934.825	188.356
939.944	190
940.292	190.112
943.235	191.057
945.863	191.901
946.17	192
951.208	193.618
952.397	194
956.633	195.361
958.624	196
962.07	197.107
964.85	198
967.5	198.851
971.077	200
972.917	200.591
977.304	202
978.32	202.326
983.53	204
983.726	204.063
985.426	204.609
989.318	205.859
989.757	206
994.64	207.568
995.984	208
999.949	209.274
1002.21	210
1005.61	211.122
1008.27	212
1011.51	213.172
1013.9	214
1014.76	214.314
1016.17	214.831
1016.17	214.831

Material Boundary

X	Y
---	---

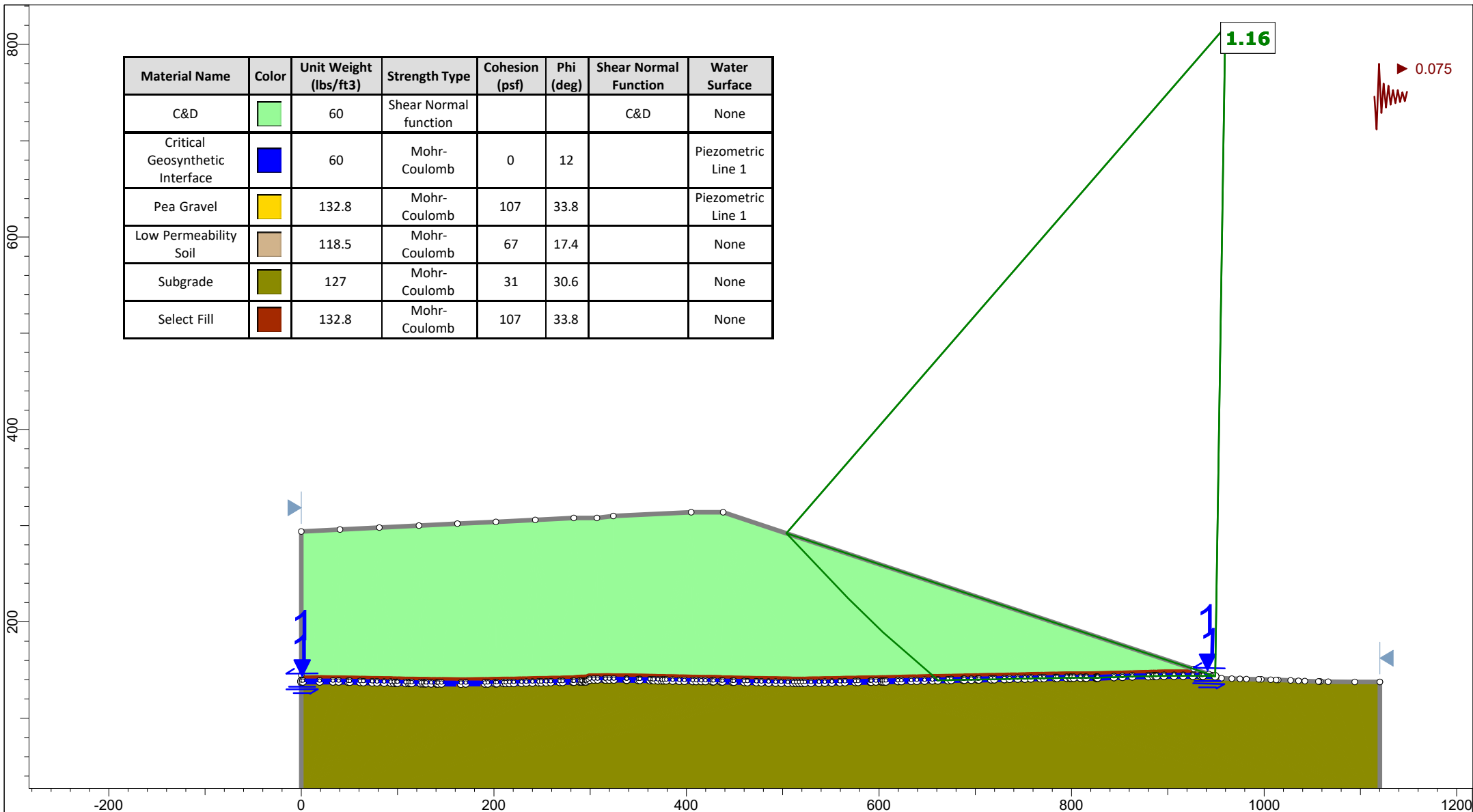
0	173.667
2.61045	173.033
2.74827	173
2.93545	172.955
10.984	171
16.9104	169.561
19.2198	169
22.3549	168.239
27.4555	167
31.2131	166.088
35.6913	165
41.768	163.524
43.927	163
45.5183	162.614
52.1628	161
59.8261	159.139
59.8924	159.123
60.4145	159
60.8582	158.895
60.9162	158.881
68.6396	157
75.206	155.4
76.8497	155
79.0691	154.459
85.0598	153
88.4071	152.185
93.2699	151
96.1305	150.964
100.713	150.947
101.016	150.941
113.425	150.821
121.918	150.822
130.421	150.823
138.934	150.824
147.456	150.825
148.142	150.848
156.777	150.849
157.383	150.866
166.104	150.867
166.646	150.881
175.435	150.882
175.924	150.893
184.77	150.893
185.454	150.904
186.03	150.91
186.471	150.91
195.39	150.911
195.828	150.911
204.75	150.912
205.185	150.912
214.11	150.912
214.542	150.912
223.469	150.913

223.899	150.913
224.328	150.913
224.757	150.913
226.606	150.875
232.206	150.736
237.619	150.555
266.437	149.593
284.194	149
288.023	148.82
294.955	148.494
315.577	147.526
326.764	147
345.352	146.109
367.261	145
389.122	144.384
438.282	143
441.106	142.989
441.813	142.988
442.992	142.982
450.152	142.954
471.589	142.475
495.112	142.041
499.816	142.042
504.522	142.042
507.015	142.043
509.52	142.047
513.255	142.047
518.191	142.045
521.934	142.044
526.857	142.043
530.609	142.042
535.521	142.04
539.492	142.044
544.41	142.042
548.376	142.045
551.45	142.051
554.115	142.053
556.005	142.053
558.664	142.055
563.412	142.057
566.946	142.064
571.737	142.066
575.242	142.073
580.075	142.075
583.551	142.082
586.977	142.088
591.874	142.09
595.541	142.09
600.448	142.093
604.107	142.093
609.025	142.095
612.675	142.095
617.604	142.097

621.244	142.097
622.641	142.096
626.431	142.093
629.889	142.087
634.698	142.083
638.19	142.076
641.731	142.07
646.478	142.066
650.054	142.06
654.753	142.056
659.419	142.052
663.75	142.06
668.432	142.056
672.746	142.063
677.444	142.06
680.743	142.07
685.469	142.067
688.752	142.077
692.299	142.081
695.852	142.075
701.119	142.075
703.992	142.063
708.239	142.071
712.549	142.079
716.654	142.084
721.014	142.092
725.057	142.098
729.467	142.106
730.766	142.109
732.057	142.112
735.706	142.117
737.361	142.116
738.906	142.115
742.564	142.12
743.989	142.118
755.732	142.35
775.632	142.895
775.782	142.895
775.919	142.894
776.153	142.893
778.05	143
783.506	144.753
784.276	145
789.286	146.609
790.503	147
794.831	148.39
796.73	149
800.37	150.169
802.957	151
805.905	151.947
809.183	153
811.435	153.723
815.41	155

816.957	155.497
821.637	157
822.473	157.269
827.863	159
827.984	159.039
828.909	159.336
833.494	160.808
834.09	161
838.998	162.577
840.317	163
844.497	164.343
846.543	165
849.989	166.107
852.77	167
855.476	167.869
858.997	169
860.956	169.629
865.223	171
866.43	171.387
871.45	173
871.897	173.144
875.09	174.169
877.36	174.898
877.677	175
882.821	176.652
883.903	177
888.276	178.404
890.13	179
893.723	180.154
896.357	181
899.164	181.902
902.583	183
906.152	184.146
908.81	185
912.925	186.322
915.037	187
918.41	188.083
921.263	189
923.888	189.843
927.49	191
929.36	191.601
933.717	193
934.825	193.356
939.944	195
940.292	195.112
943.235	196.057
945.863	196.901
946.17	197
951.208	198.618
952.397	199
956.633	200.361
958.624	201
962.07	202.107

964.85	203
967.5	203.851
971.077	205
972.917	205.591
977.304	207
978.32	207.326
983.53	209
983.726	209.063
985.426	209.609
989.318	210.859
989.757	211
994.64	212.568
995.984	213
999.949	214.274
1002.21	215
1005.61	216.122
1007.6	216.78



Project: 182-442 S.A. Dunn Permit Renewal SMDM Alternative A Slope Stability Program			
Analysis Description: Section D - Waste Failure - Seismic Fail		Scenario: Section D - Waste Failure - Seismic.slim	
Drawn By: ZLM		Company: Civil & Environmental Consultants, Inc.	
Created Date: 1/6/2022 7/28/2021 10:59:59 AM		File Name: Section D - Waste Failure - Seismic.slim	
Checked By: TDM		Checked Date: 1/9/2022	

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

Slide Modeler Version:	9.02
Compute Time:	00h:03m:01.566s
Date Created:	7/28/2021, 10:59:59 AM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Slices Type:	Vertical
Analysis Methods Used	
	GLE/Morgenstern-Price with interslice force function (Half Sine)
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Search Method:	Cuckoo Search
Initial # of Surface Vertices:	8
Maximum Iterations:	500
Number of Nests:	50
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined
Convex Surfaces Only:	Enabled

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Seismic Load Coefficient (Horizontal):	0.075

Materials

C&D

Color	
Strength Type	Shear Normal function
Unit Weight [lbs/ft ³]	60
Water Surface	None
Ru Value	0

Pea Gravel

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	132.8
Cohesion [psf]	107
Friction Angle [deg]	33.8
Water Surface	Piezometric Line 1
Hu Value	1

Low Permeability Soil

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	118.5
Cohesion [psf]	67
Friction Angle [deg]	17.4
Water Surface	None
Ru Value	0

Subgrade

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	127
Cohesion [psf]	31
Friction Angle [deg]	30.6
Water Surface	None
Ru Value	0

Select Fill

Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft ³]	132.8
Cohesion [psf]	107
Friction Angle [deg]	33.8
Water Surface	None
Ru Value	0

Shear Normal Functions

Name: C&D		
Effective Normal (psf)		Shear (psf)
0		0
2000		1400
10000		6169

Global Minimums

Method: gle/morgenstern-price

FS	1.164880
Axis Location:	959.724, 818.096
Left Slip Surface Endpoint:	503.645, 292.114
Right Slip Surface Endpoint:	949.110, 143.595
Resisting Moment:	3.37195e+08 lb-ft
Driving Moment:	2.89469e+08 lb-ft
Resisting Horizontal Force:	418898 lb
Driving Horizontal Force:	359607 lb
Total Slice Area:	22674.3 ft ²
Surface Horizontal Width:	445.465 ft
Surface Average Height:	50.9004 ft

Global Minimum Coordinates

Method: gle/morgenstern-price

X	Y
503.645	292.114
568.085	224.46
604.182	189.274
661.559	139.306
671.492	139.507
674.909	139.576
687.464	139.829
688.645	139.853
695.918	140
702.465	140.132
703.518	140.154
716.362	140.413
719.644	140.479
730.199	140.692
735.69	140.803
743.977	140.971
751.655	141.126
757.696	141.248
767.54	141.447
771.355	141.524
783.347	141.766
784.957	141.799
794.928	142
798.336	142.012
799.584	142.015
802.272	142.026
809.313	142.051
814.19	142.061
815.343	142.056
825.43	142
826.105	141.999
826.795	142
826.896	142
844.081	142.65
852.85	142.878
863.067	143.224
879.695	143.615
884.698	143.759
887.025	143.821
888.251	143.845
896.082	144
906.423	144.035
915.996	144.06
925.977	144.029
934.42	144
936.1	143.954
936.549	143.941
949.11	143.595

Global Minimum Support Data

No Supports Present

Slice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.16488

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [deg]	Base Material	Base Cohesion [psf]	Base Friction Angle [deg]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	64.4393	89254.7	-46.3942	C&D	0	34.992	471.692	549.464	784.949	0	784.949	1280.17	1280.17
2	36.097	125065	-44.2671	C&D	0	34.992	1152.69	1342.74	1918.2	0	1918.2	3041.77	3041.77
3	49.5216	245514	-41.0518	C&D	207.75	30.8002	1629.94	1898.69	2836.56	0	2836.56	4256.04	4256.04
4	5.6112	33828.1	-41.0518	Select Fill	107	33.8	2043.28	2380.18	3395.63	0	3395.63	5175.08	5175.08
5	1.12224	7132.56	-41.0518	Pea Gravel	107	33.8	2151.9	2506.71	3584.65	0	3584.65	5458.69	5458.69
6	1.12224	7254.88	-41.0518	Pea Gravel	107	33.8	2172.75	2530.99	3652.1	31.1895	3620.91	5544.29	5513.1
7	9.93357	63711.5	1.15722	Critical Geosynthetic Interface	0	12	1201.81	1399.96	6648.69	62.3895	6586.3	6624.41	6562.03
8	3.41639	21428.1	1.15722	Critical Geosynthetic Interface	0	12	1181.55	1376.36	6537.65	62.3895	6475.26	6513.78	6451.39
9	12.5555	76622.9	1.15722	Critical Geosynthetic Interface	0	12	1156.46	1347.14	6400.17	62.3895	6337.78	6376.81	6314.42
10	1.18099	7035.16	1.15722	Critical Geosynthetic Interface	0	12	1134.39	1321.43	6279.23	62.3895	6216.84	6256.32	6193.93
11	7.27292	42672.5	1.15722	Critical Geosynthetic Interface	0	12	1120.44	1305.18	6202.76	62.3895	6140.37	6180.13	6117.74
12	6.54642	37450.2	1.15722	Critical Geosynthetic Interface	0	12	1097.19	1278.1	6075.37	62.3895	6012.98	6053.2	5990.81
13	1.0537	5942.98	1.15722	Critical Geosynthetic Interface	0	12	1084.17	1262.93	6004.02	62.3895	5941.63	5982.12	5919.73
14	12.8437	70546.4	1.15722	Critical Geosynthetic Interface	0	12	1059.78	1234.52	5870.33	62.3895	5807.94	5848.92	5786.53
15	3.28235	17467.4	1.15722	Critical Geosynthetic Interface	0	12	1030.91	1200.89	5712.12	62.3895	5649.73	5691.3	5628.91
16	10.5551	54620.5	1.15722	Critical Geosynthetic Interface	0	12	1005.4	1171.17	5572.33	62.3895	5509.94	5552.02	5489.63
17	5.49021	27476.4	1.15722	Critical Geosynthetic Interface	0	12	975.234	1136.03	5407.01	62.3895	5344.62	5387.31	5324.92
18	8.28755	40264.7	1.15722	Critical Geosynthetic Interface	0	12	948.716	1105.14	5261.66	62.3895	5199.27	5242.5	5180.11
19	7.67752	36000.6	1.15722	Critical Geosynthetic Interface	0	12	917.391	1068.65	5089.98	62.3895	5027.59	5071.45	5009.06
20	6.041	27447.7	1.15722	Critical Geosynthetic Interface	0	12	889.971	1036.71	4939.75	62.3895	4877.36	4921.77	4859.38
21	9.84447	43070.1	1.15722	Critical Geosynthetic Interface	0	12	857.663	999.075	4762.67	62.3895	4700.28	4745.34	4682.95
22	3.81517	16138.7	1.15722	Critical Geosynthetic Interface	0	12	829.502	966.27	4608.34	62.3895	4545.95	4591.59	4529.2
23	11.9913	48714.3	1.15722	Critical Geosynthetic Interface	0	12	796.404	927.715	4426.94	62.3895	4364.56	4410.86	4348.47

24	1.60986	6307.74	1.15722	Critical Geosynthetic Interface	12	767.655	894.226	4269.39	62.3895	4207	4253.88	4191.49
25	9.97162	37845.6	1.15722	Critical Geosynthetic Interface	12	742.901	865.391	4133.74	62.3895	4071.35	4118.73	4056.34
26	3.40817	12457.2	0.204137	Critical Geosynthetic Interface	12	706.152	822.582	3932.32	62.3895	3869.93	3929.81	3867.42
27	1.24758	4501.38	0.125349	Critical Geosynthetic Interface	12	696.111	810.886	3877.31	62.3895	3814.92	3875.78	3813.39
28	2.68835	9592.84	0.238314	Critical Geosynthetic Interface	12	689.116	802.738	3838.98	62.3895	3776.59	3836.11	3773.72
29	7.04047	24429.8	0.203264	Critical Geosynthetic Interface	12	669.101	779.422	3729.29	62.3895	3666.9	3726.91	3664.52
30	4.87714	16336.8	0.113922	Critical Geosynthetic Interface	12	644.241	750.464	3593.04	62.3895	3530.65	3591.76	3529.37
31	1.15297	3792.35	-0.239823	Critical Geosynthetic Interface	12	629.499	733.291	3512.25	62.3895	3449.86	3514.88	3452.49
32	10.0876	32064.4	-0.317514	Critical Geosynthetic Interface	12	606.82	706.873	3387.97	62.3895	3325.58	3391.33	3328.94
33	0.675026	2074.11	-0.0457245	Critical Geosynthetic Interface	12	587.349	684.191	3281.25	62.3895	3218.86	3281.72	3219.33
34	0.68978	2110.03	0.0374701	Critical Geosynthetic Interface	12	585.129	681.605	3269.08	62.3872	3206.7	3268.7	3206.31
35	0.100717	307.294	0.0395942	Critical Geosynthetic Interface	12	583.54	679.754	3260.38	62.3895	3197.99	3259.98	3197.59
36	17.1855	49127.2	2.16691	Critical Geosynthetic Interface	12	556.723	648.515	3113.39	62.3664	3051.03	3092.33	3029.96
37	8.76831	22558.6	1.48686	Critical Geosynthetic Interface	12	492.92	574.193	2763.75	62.3895	2701.36	2750.96	2688.57
38	10.2174	24170.7	1.93867	Critical Geosynthetic Interface	12	451.739	526.222	2538.07	62.3895	2475.68	2522.77	2460.38
39	16.6274	34502.3	1.34699	Critical Geosynthetic Interface	12	389.309	453.498	2195.93	62.3895	2133.54	2186.78	2124.39
40	5.00303	9218.74	1.6504	Critical Geosynthetic Interface	12	342.624	399.116	1940.08	62.3895	1877.69	1930.21	1867.82
41	2.32748	4103.65	1.524	Critical Geosynthetic Interface	12	326.109	379.878	1849.58	62.3895	1787.19	1840.9	1778.51
42	1.22624	2115.26	1.13275	Critical Geosynthetic Interface	12	317.444	369.784	1802.09	62.3895	1739.7	1795.81	1733.43
43	7.83115	12757.1	1.13404	Critical Geosynthetic Interface	12	298.172	347.335	1696.47	62.3895	1634.08	1690.57	1628.18
44	10.341	14907.2	0.194502	Critical Geosynthetic Interface	12	259.213	301.952	1482.97	62.3895	1420.58	1482.09	1419.7
45	9.57219	11875.1	0.149724	Critical Geosynthetic Interface	12	219.954	256.22	1267.81	62.3895	1205.43	1267.24	1204.85
46	9.98167	10432.9	-0.180702	Critical Geosynthetic Interface	12	181.976	211.98	1059.68	62.3895	997.287	1060.25	997.861
47	8.44311	6590.33	-0.194337	Critical Geosynthetic Interface	12	132.198	153.995	786.881	62.3895	724.491	787.329	724.939
48	1.67995	944.881	-1.58113	Critical Geosynthetic Interface	12	91.2145	106.254	562.276	62.3895	499.886	564.794	502.404

49	0.449087	233.174	-1.58092	Critical Geosynthetic Interface	12	83.2891	97.0218	518.842	62.3895	456.453	521.141	458.751
50	12.5608	3203.62	-1.58108	Critical Geosynthetic Interface	12	35.0664	40.8482	254.565	62.3895	192.176	255.533	193.143

Interslice Data

Global Minimum Query (gle/morgenstern-price) - Safety Factor: 1.16488

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [deg]
1	503.645	292.114	0	0	0
2	568.085	224.46	29399.1	6740.04	12.9125
3	604.182	189.274	64656.6	21986.1	18.7803
4	653.703	146.147	124673	56746.3	24.4732
5	659.314	141.261	132337	61528.1	24.9354
6	660.437	140.283	133960	62532.9	25.0233
7	661.559	139.306	135634	63564.2	25.1099
8	671.492	139.507	127139	61488	25.8097
9	674.909	139.576	124257	60667.2	26.0235
10	687.464	139.829	113859	57239.5	26.6897
11	688.645	139.853	112897	56887	26.7428
12	695.918	140	107036	54616.5	27.0335
13	702.465	140.132	101857	52442.1	27.2421
14	703.518	140.154	101033	52081.9	27.2708
15	716.362	140.413	91187	47505.4	27.518
16	719.644	140.479	88734.1	46290.8	27.5501
17	730.199	140.692	81028.8	42303.4	27.5681
18	735.69	140.803	77134.9	40198.3	27.5259
19	743.977	140.971	71410.2	37008.4	27.3955
20	751.655	141.126	66276.5	34065.6	27.2028
21	757.696	141.248	62355.2	31775	27.0025
22	767.54	141.447	56193.8	28120.3	26.5841
23	771.355	141.524	53883.9	26737.9	26.3912
24	783.347	141.766	46913.9	22550.6	25.6727
25	784.957	141.799	46012.1	22009	25.5632
26	794.928	142	40608.8	18778.2	24.8166
27	798.336	142.012	39088.3	17841.8	24.5343
28	799.584	142.015	38546.8	17507.8	24.4274
29	802.272	142.026	37370.5	16787.8	24.1909
30	809.313	142.051	34398.1	14978.7	23.5308
31	814.19	142.061	32446	13798.6	23.039
32	815.343	142.056	32021.4	13538.7	22.9187
33	825.43	142	28493.4	11395.6	21.7984
34	826.105	141.999	28254.2	11254.6	21.7191
35	826.795	142	28007.3	11110.1	21.6375
36	826.896	142	27971.3	11089.1	21.6256
37	844.081	142.65	20062.4	7070.6	19.414
38	852.85	142.878	16802.5	5510.19	18.1563
39	863.067	143.224	13121.3	3907.81	16.5847
40	879.695	143.615	8376.25	2057.07	13.7978
41	884.698	143.759	7073.57	1621.06	12.9077
42	887.025	143.821	6507.69	1441.05	12.486
43	888.251	143.845	6233.32	1354.74	12.2619
44	896.082	144	4591.74	876.073	10.8018
45	906.423	144.035	2976.81	460.993	8.80298
46	915.996	144.06	1729.97	209.09	6.89153
47	925.977	144.029	729.101	61.8473	4.84861
48	934.42	144	129.578	6.99842	3.0915
49	936.1	143.954	73.2586	3.50553	2.7396
50	936.549	143.941	59.7678	2.76151	2.64541
51	949.11	143.595	0	0	0

Discharge Sections

Entity Information

Piezoline

X	Y
0	139.001
1.53185	139.006
19.0865	139.06
32.9178	139.02
38.6457	139
48.7796	138.793
50.2602	138.763
61.0905	138.542
64.3705	138.476
73.4615	138.291
78.5505	138.189
85.9551	138.041
92.8528	137.903
95.9447	137.841
98.6483	137.789
99.8304	137.766
108.36	137.6
111.481	137.539
113.16	137.508
114.657	137.481
124.023	137.298
126.413	137.276
128.483	137.258
129.604	137.259
134.88	137.144
140.608	137.001
140.666	137
141.88	136.996
145.396	136.987
165.76	136.931
170.639	136.942
190.43	137
193.662	137.091
201.413	137.308
202.91	137.31
209.905	137.483
212.256	137.486
216.044	137.533
220.799	137.61
228.74	137.769
233.581	137.864
240.055	137.994
246.29	138.116

249.014	138.178
254.334	138.284
259.083	138.368
268.35	138.553
271.397	138.613
282.09	138.827
283.248	138.85
289.114	139
290.561	139
291.004	139
293.847	139
294.079	139
294.897	139
295.735	139
297.392	139.908
299.475	141
303.779	141.026
307.699	141.048
315.325	141.101
315.77	141.098
319.666	141.08
324.496	141.067
337.748	141
337.798	140.999
337.804	140.999
350.01	140.752
351.514	140.722
361.883	140.513
364.794	140.454
366.105	140.426
370.416	140.331
374.199	140.251
376.444	140.207
378.978	140.155
385.656	140.023
392.593	139.886
397.761	139.784
406.485	139.612
410.085	139.541
415.321	139.473
419.58	139.44
426.773	139.263
428.072	139.263
436.007	139.041
437.46	139
447.762	138.797
449.164	138.77
459.994	138.557
463.353	138.491
472.562	138.31
477.849	138.206
485.368	138.058
492.661	137.915

498.42	137.801
505.285	137.698
510.764	137.64
513.847	137.638
516.909	137.636
519.953	137.634
522.978	137.632
529.387	137.687
537.506	137.8
543.814	137.927
550.999	138.073
559.479	138.244
564.556	138.346
575.229	138.562
578.177	138.622
591.066	138.882
591.862	138.898
596.908	139
602.692	139.157
603.345	139.157
604.986	139.174
607.15	139.207
619.626	139.459
623.304	139.533
633.498	139.739
639.412	139.859
647.335	140.019
655.475	140.183
661.139	140.297
671.492	140.507
674.909	140.576
687.464	140.829
688.645	140.853
695.918	141
702.465	141.132
703.518	141.154
716.362	141.413
719.644	141.479
730.199	141.692
735.69	141.803
743.977	141.971
751.655	142.126
757.696	142.248
767.54	142.447
771.355	142.524
783.347	142.766
784.957	142.799
794.928	143
798.336	143.012
799.584	143.015
802.272	143.026
809.313	143.051
814.19	143.061

815.343	143.056
825.43	143
826.105	142.999
826.168	142.999
826.795	143
826.896	143
826.916	143
844.081	143.65
852.85	143.878
863.067	144.224
879.695	144.615
884.698	144.759
887.025	144.821
888.251	144.845
896.082	145
906.423	145.035
915.996	145.06
925.977	145.029
934.42	145
936.1	144.954
936.549	144.941
945.84	144.685

External Boundary

X	Y
0	294
0	145.001
0	140.001
0	139.001
0	138.001
0	136.001
0	0
1120.27	0
1120.27	137.664
1120.15	137.662
1094.2	137.627
1066.59	137.768
1058.38	138
1056.96	138.055
1056.39	138.077
1042.28	138.625
1035.7	138.881
1027.44	139.202
1014.7	139.696
1012.45	139.784
1006.89	140
997.074	140.271
994.462	140.343
981.639	140.697
974.953	140.881
966.333	141.119
955.65	141.414
949.11	143.595
945.84	144.685
942.57	145.775
926.821	151.026
438	314
405	314
324	310
307	308
283	308
243	306
202	304
162	302
122	300
81	298
40	296

Material Boundary

X	Y
0	136.001
1.53185	136.006
19.0865	136.06
32.9178	136.02
38.6457	136
48.7796	135.793

50.2602	135.763
61.0905	135.542
64.3705	135.476
73.4615	135.291
78.5505	135.189
85.9551	135.041
92.8528	134.903
95.9447	134.841
98.6483	134.789
99.8304	134.766
108.36	134.6
111.481	134.539
113.16	134.508
114.657	134.481
124.023	134.298
126.413	134.276
128.483	134.258
129.604	134.259
134.88	134.144
140.608	134.001
140.666	134
141.88	133.996
145.396	133.987
165.76	133.931
170.639	133.942
190.43	134
193.662	134.091
201.413	134.308
202.91	134.31
209.905	134.483
212.256	134.486
216.044	134.533
220.799	134.61
228.74	134.769
233.581	134.864
240.055	134.994
246.29	135.116
249.014	135.178
254.334	135.284
259.083	135.368
268.35	135.553
271.397	135.613
282.09	135.827
283.248	135.85
289.114	136
290.561	136
291.004	136
293.847	136
294.079	136
294.897	136
295.735	136
297.392	136.908
299.475	138

303.779	138.026
307.699	138.048
315.325	138.101
315.77	138.098
319.666	138.08
324.496	138.067
337.748	138
337.798	137.999
337.804	137.999
350.01	137.752
351.514	137.722
361.883	137.513
364.794	137.454
366.105	137.426
370.416	137.331
374.199	137.251
376.444	137.207
378.978	137.155
385.656	137.023
392.593	136.886
397.761	136.784
406.485	136.612
410.085	136.541
415.321	136.473
419.58	136.44
426.773	136.263
428.072	136.263
436.007	136.041
437.46	136
447.762	135.797
449.164	135.77
459.994	135.557
463.353	135.491
472.562	135.31
477.849	135.206
485.368	135.058
492.661	134.915
498.42	134.801
505.285	134.698
510.764	134.64
513.847	134.638
516.909	134.636
519.953	134.634
522.978	134.632
529.387	134.687
537.506	134.8
543.814	134.927
550.999	135.073
559.479	135.244
564.556	135.346
575.229	135.562
578.177	135.622
591.066	135.882

591.862	135.898
596.908	136
602.692	136.157
603.345	136.157
604.986	136.174
607.15	136.207
619.626	136.459
623.304	136.533
633.498	136.739
639.412	136.859
647.335	137.019
655.475	137.183
661.139	137.297
671.492	137.507
674.909	137.576
687.464	137.829
688.645	137.853
695.918	138
702.465	138.132
703.518	138.154
716.362	138.413
719.644	138.479
730.199	138.692
735.69	138.803
743.977	138.971
751.655	139.126
757.696	139.248
767.54	139.447
771.355	139.524
783.347	139.766
784.957	139.799
794.928	140
798.336	140.012
799.584	140.015
802.272	140.026
809.313	140.051
814.19	140.061
815.343	140.056
825.43	140
826.105	139.999
826.168	139.999
826.795	140
826.896	140
826.916	140
844.081	140.65
852.85	140.878
863.067	141.224
879.695	141.615
884.698	141.759
887.025	141.821
888.251	141.845
896.082	142
906.423	142.035

915.996	142.06
925.977	142.029
934.42	142
936.1	141.954
936.549	141.941
951.154	141.538
955.65	141.414

Material Boundary

X	Y
0	138.001
1.53185	138.006
19.0865	138.06
32.9178	138.02
38.6457	138
48.7796	137.793
50.2602	137.763
61.0905	137.542
64.3705	137.476
73.4615	137.291
78.5505	137.189
85.9551	137.041
92.8528	136.903
95.9447	136.841
98.6483	136.789
99.8304	136.766
108.36	136.6
111.481	136.539
113.16	136.508
114.657	136.481
124.023	136.298
126.413	136.276
128.483	136.258
129.604	136.259
134.88	136.144
140.608	136.001
140.666	136
141.88	135.996
145.396	135.987
165.76	135.931
170.639	135.942
190.43	136
193.662	136.091
201.413	136.308
202.91	136.31
209.905	136.483
212.256	136.486
216.044	136.533
220.799	136.61
228.74	136.769
233.581	136.864
240.055	136.994

246.29	137.116
249.014	137.178
254.334	137.284
259.083	137.368
268.35	137.553
271.397	137.613
282.09	137.827
283.248	137.85
289.114	138
290.561	138
291.004	138
293.847	138
294.079	138
294.897	138
295.735	138
297.392	138.908
299.475	140
303.779	140.026
307.699	140.048
315.325	140.101
315.77	140.098
319.666	140.08
324.496	140.067
337.748	140
337.798	139.999
337.804	139.999
350.01	139.752
351.514	139.722
361.883	139.513
364.794	139.454
366.105	139.426
370.416	139.331
374.199	139.251
376.444	139.207
378.978	139.155
385.656	139.023
392.593	138.886
397.761	138.784
406.485	138.612
410.085	138.541
415.321	138.473
419.58	138.44
426.773	138.263
428.072	138.263
436.007	138.041
437.46	138
447.762	137.797
449.164	137.77
459.994	137.557
463.353	137.491
472.562	137.31
477.849	137.206
485.368	137.058

492.661	136.915
498.42	136.801
505.285	136.698
510.764	136.64
513.847	136.638
516.909	136.636
519.953	136.634
522.978	136.632
529.387	136.687
537.506	136.8
543.814	136.927
550.999	137.073
559.479	137.244
564.556	137.346
575.229	137.562
578.177	137.622
591.066	137.882
591.862	137.898
596.908	138
602.692	138.157
603.345	138.157
604.986	138.174
607.15	138.207
619.626	138.459
623.304	138.533
633.498	138.739
639.412	138.859
647.335	139.019
655.475	139.183
661.139	139.297
671.492	139.507
674.909	139.576
687.464	139.829
688.645	139.853
695.918	140
702.465	140.132
703.518	140.154
716.362	140.413
719.644	140.479
730.199	140.692
735.69	140.803
743.977	140.971
751.655	141.126
757.696	141.248
767.54	141.447
771.355	141.524
783.347	141.766
784.957	141.799
794.928	142
798.336	142.012
799.584	142.015
802.272	142.026
809.313	142.051

814.19	142.061
815.343	142.056
825.43	142
826.105	141.999
826.168	141.999
826.795	142
826.896	142
826.916	142
844.081	142.65
852.85	142.878
863.067	143.224
879.695	143.615
884.698	143.759
887.025	143.821
888.251	143.845
896.082	144
906.423	144.035
915.996	144.06
925.977	144.029
934.42	144
936.1	143.954
936.549	143.941
949.11	143.595

Material Boundary

X	Y
0	140.001
1.53185	140.006
19.0865	140.06
32.9178	140.02
38.6457	140
48.7796	139.793
50.2602	139.763
61.0905	139.542
64.3705	139.476
73.4615	139.291
78.5505	139.189
85.9551	139.041
92.8528	138.903
95.9447	138.841
98.6483	138.789
99.8304	138.766
108.36	138.6
111.481	138.539
113.16	138.508
114.657	138.481
124.023	138.298
126.413	138.276
128.483	138.258
129.604	138.259
134.88	138.144
140.608	138.001

140.666	138
141.88	137.996
145.396	137.987
165.76	137.931
170.639	137.942
190.43	138
193.662	138.091
201.413	138.308
202.91	138.31
209.905	138.483
212.256	138.486
216.044	138.533
220.799	138.61
228.74	138.769
233.581	138.864
240.055	138.994
246.29	139.116
249.014	139.178
254.334	139.284
259.083	139.368
268.35	139.553
271.397	139.613
282.09	139.827
283.248	139.85
289.114	140
290.561	140
291.004	140
293.847	140
294.079	140
294.897	140
295.735	140
297.392	140.908
299.475	142
303.779	142.026
307.699	142.048
315.325	142.101
315.77	142.098
319.666	142.08
324.496	142.067
337.748	142
337.798	141.999
337.804	141.999
350.01	141.752
351.514	141.722
361.883	141.513
364.794	141.454
366.105	141.426
370.416	141.331
374.199	141.251
376.444	141.207
378.978	141.155
385.656	141.023
392.593	140.886

397.761	140.784
406.485	140.612
410.085	140.541
415.321	140.473
419.58	140.44
426.773	140.263
428.072	140.263
436.007	140.041
437.46	140
447.762	139.797
449.164	139.77
459.994	139.557
463.353	139.491
472.562	139.31
477.849	139.206
485.368	139.058
492.661	138.915
498.42	138.801
505.285	138.698
510.764	138.64
513.847	138.638
516.909	138.636
519.953	138.634
522.978	138.632
529.387	138.687
537.506	138.8
543.814	138.927
550.999	139.073
559.479	139.244
564.556	139.346
575.229	139.562
578.177	139.622
591.066	139.882
591.862	139.898
596.908	140
602.692	140.157
603.345	140.157
604.986	140.174
607.15	140.207
619.626	140.459
623.304	140.533
633.498	140.739
639.412	140.859
647.335	141.019
655.475	141.183
661.139	141.297
671.492	141.507
674.909	141.576
687.464	141.829
688.645	141.853
695.918	142
702.465	142.132
703.518	142.154

716.362	142.413
719.644	142.479
730.199	142.692
735.69	142.803
743.977	142.971
751.655	143.126
757.696	143.248
767.54	143.447
771.355	143.524
783.347	143.766
784.957	143.799
794.928	144
798.336	144.012
799.584	144.015
802.272	144.026
809.313	144.051
814.19	144.061
815.343	144.056
825.43	144
826.105	143.999
826.168	143.999
826.795	144
826.896	144
826.916	144
844.081	144.65
852.85	144.878
863.067	145.224
879.695	145.615
884.698	145.759
887.025	145.821
888.251	145.845
896.082	146
906.423	146.035
915.996	146.06
925.977	146.029
934.42	146
936.1	145.954
936.549	145.941
942.57	145.775

Material Boundary

X	Y
0	145.001
1.53185	145.006
19.0865	145.06
32.9178	145.02
38.6457	145
48.7796	144.793
50.2602	144.763
61.0905	144.542
64.3705	144.476
73.4615	144.291

78.5505	144.189
85.9551	144.041
92.8528	143.903
95.9447	143.841
98.6483	143.789
99.8304	143.766
108.36	143.6
111.481	143.539
113.16	143.508
114.657	143.481
124.023	143.298
126.413	143.276
128.483	143.258
129.604	143.259
134.88	143.144
140.608	143.001
140.666	143
141.88	142.996
145.396	142.987
165.76	142.931
170.639	142.942
190.43	143
193.662	143.091
201.413	143.308
202.91	143.31
209.905	143.483
212.256	143.486
216.044	143.533
220.799	143.61
228.74	143.769
233.581	143.864
240.055	143.994
246.29	144.116
249.014	144.178
254.334	144.284
259.083	144.368
268.35	144.553
271.397	144.613
282.09	144.827
283.248	144.85
289.114	145
290.561	145
291.004	145
293.847	145
294.079	145
294.897	145
295.735	145
297.392	145.908
299.475	147
303.779	147.026
307.699	147.048
315.325	147.101
315.77	147.098

319.666	147.08
324.496	147.067
337.748	147
337.798	146.999
337.804	146.999
350.01	146.752
351.514	146.722
361.883	146.513
364.794	146.454
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370.416	146.331
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378.978	146.155
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392.593	145.886
397.761	145.784
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426.773	145.263
428.072	145.263
436.007	145.041
437.46	145
447.762	144.797
449.164	144.77
459.994	144.557
463.353	144.491
472.562	144.31
477.849	144.206
485.368	144.058
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575.229	144.562
578.177	144.622
591.066	144.882
591.862	144.898
596.908	145
602.692	145.157
603.345	145.157

604.986	145.174
607.15	145.207
619.626	145.459
623.304	145.533
633.498	145.739
639.412	145.859
647.335	146.019
655.475	146.183
661.139	146.297
671.492	146.507
674.909	146.576
687.464	146.829
688.645	146.853
695.918	147
702.465	147.132
703.518	147.154
716.362	147.413
719.644	147.479
730.199	147.692
735.69	147.803
743.977	147.971
751.655	148.126
757.696	148.248
767.54	148.447
771.355	148.524
783.347	148.766
784.957	148.799
794.928	149
798.336	149.012
799.584	149.015
802.272	149.026
809.313	149.051
814.19	149.061
815.343	149.056
825.43	149
826.105	148.999
826.168	148.999
826.795	149
826.896	149
826.916	149
844.081	149.65
852.85	149.878
863.067	150.224
879.695	150.615
884.698	150.759
887.025	150.821
888.251	150.845
896.082	151
906.423	151.035
915.996	151.06
925.977	151.029
926.821	151.026

APPENDIX C2

PROJECT DESIGN CALCULATIONS

APPENDIX C2.1 – LEACHATE

- . Leachate Generation Estimate**
 - . Help Model Output**
-

LEACHATE GENERATION ESTIMATE

Civil & Environmental Engineering, Landscape Architecture and Land Surveying, PLLC

Project Name:	<u>North Berm Permit Modification</u>	Date:	<u>1/7/2022</u>
Project Location:	<u>Dunn C&D Facility</u>	Calculated By:	<u>CSD</u>
Project Number:	<u>182-442</u>	Checked By:	<u>AJK</u>

Maximum Expected Leachate Generation

Average Waste Depth	Area (acre)	Annual Totals (ft ³ /acre/year)	Annual Totals (gal/acre/year)	Daily Values (gal/acre/day)	Avg. Daily Value (gal/day)
Open (10ft)	5.0	61,374	459,078	1,257	6,285
50 ft	15.4	36,878	275,847	755	11,627
100 ft	8.1	18,625	139,315	381	3,086
150 ft	18.5	12,586	94,143	238	4,403
Cap*	15.2	n/a	n/a	20	304
				TOTAL:	25,705
				Rate (GPM):	18

Notes:

*Final cap assumed to produce 20 gal/acre/day of leachate based on previous data.

Daily rates from HELP model (refer to collection estimates table)

Areas associated with each waste depth are delineated on attached figure.

Civil & Environmental Engineering, Landscape Architecture and Land Surveying, PLLC

Project Name: North Berm Permit Modification **Date:** 1/4/2022
Project Location: Dunn C&D Facility **Calculated By:** EMW
Project Number: 182-442 **Checked By:** AJK

HELP Model Leachate Collection Estimates

Month	10 feet waste (gal/ac/day)	50 feet waste (gal/ac/day)	100 feet waste (gal/ac/day)	150 feet waste (gal/ac/day)
January	1,014	311	51	36
February	1,251	689	208	111
March	1,044	824	421	268
April	1,121	512	358	46
May	3,121	241	159	106
June	2,287	870	122	58
July	1,603	1,245	507	247
August	1,151	1,248	706	473
September	810	1,085	688	501
October	715	974	626	482
November	474	620	430	331
December	494	445	290	195
Average:	1,257	755	381	238

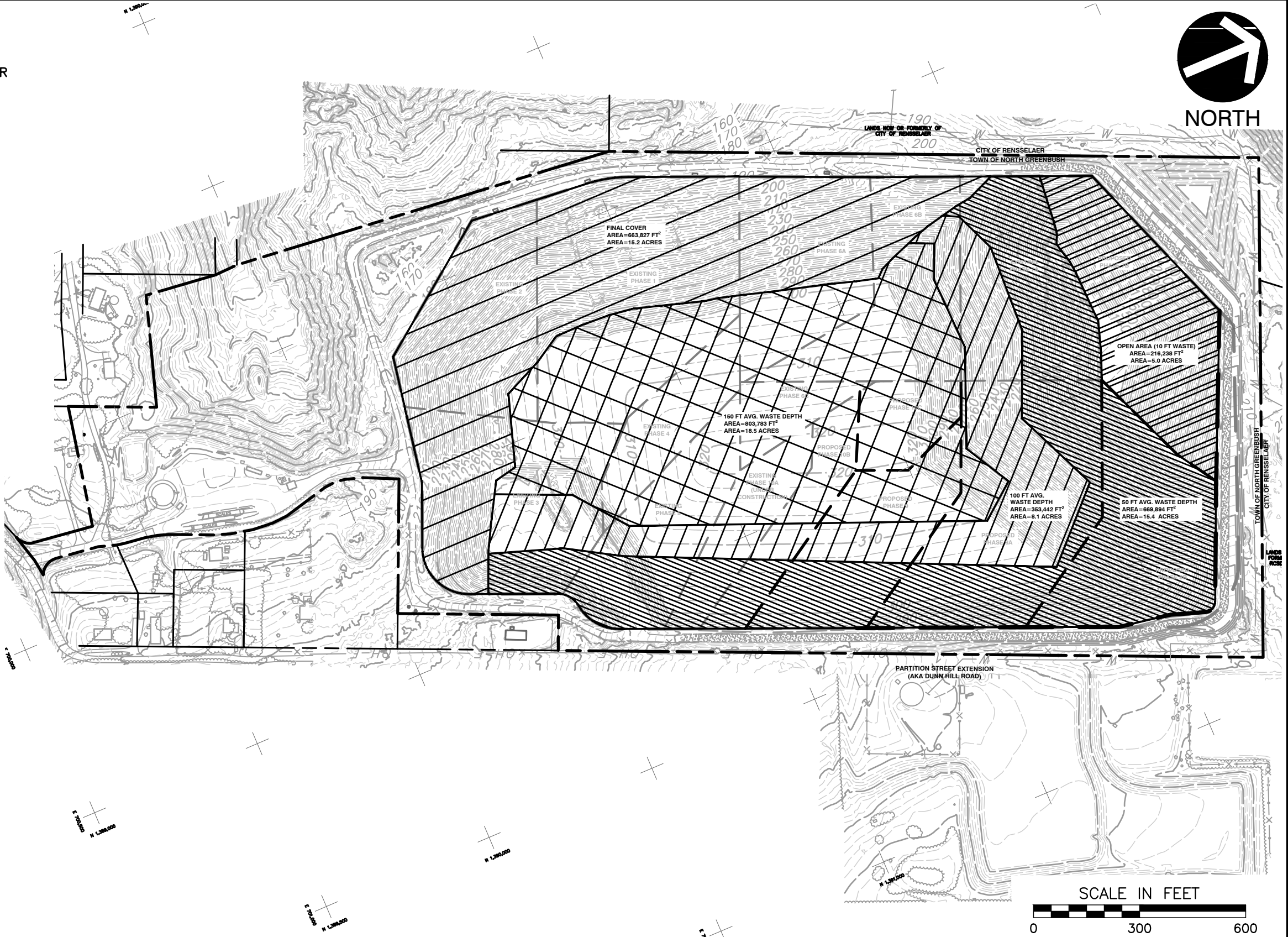
P:\2018\182-442\ -CADD\Draw\SW16-Other Figures\182442-SW16-HELP Phasing Areas_7B.dwg[LAYOUT] LS:(1/10/2022 - ewilson) - LP: 1/12/2022 10:37 AM

LEGEND:

- EXISTING 10-FOOT CONTOUR
- EXISTING 2-FOOT CONTOUR
- EXISTING FENCE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING TREE LINE
- EXISTING WATER LINE
- EXISTING PROPERTY LINE
- EXISTING TOWN LINE

REFERENCE NOTES:

- UNLESS NOTED OTHERWISE, EXISTING TOPOGRAPHY WAS COMPILED BY SOUTHERN RESOURCES MAPPING CORPORATION USING PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPHY DATED MARCH 16, 2021, AND SUPPLEMENTED WITH TOPOGRAPHY FROM OCTOBER 7, 2020 AND NOVEMBER 4, 2020. SURVEY CONTROL DATA WAS PROVIDED BY WASTE CONNECTIONS, INC.
- PROPERTY LINE INFORMATION WAS TAKEN FROM A PLAN TITLED "ATLA/ASCM LAND TITLE BOUNDARY SURVEY, LANDS OF KELLY AND DUNN TO BE CONVEYED TO S.A. DUNN & COMPANY, LLC," PREPARED AND SEALED BY WILLIAM N. CURRAN, AND UPDATED AS NECESSARY BASED ON AVAILABLE TITLE INFORMATION.



**Civil & Environmental Engineering,
Landscape Architecture and
Land Surveying PLLC**
31 BELLOWS ROAD - RAYNHAM, MA 02767
774-501-2176 · 866-312-2024

MSE BERM MODIFICATION
DUNN MINE AND C&D FACILITY
S.A. DUNN & COMPANY, LLC
RENSSELAER, NEW YORK

HELP MODEL PHASING AREAS

DRAWN BY:	CSD	CHECKED BY:	EMW	APPROVED BY:	AJK	FIGURE NO.:
DATE:	JANUARY 2022	DWG SCALE:	1"=300'	PROJECT NO:	182-442	


```

*****
*****
**
**
**          HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE          **
**          HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)              **
**          DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**          USAE WATERWAYS EXPERIMENT STATION                      **
**          FOR USEPA RISK REDUCTION ENGINEERING LABORATORY        **
**                                                                    **
*****
*****

```

```

PRECIPITATION DATA FILE:  C:\DUNNPRES.D4
TEMPERATURE DATA FILE:   C:\DUNNTEMP.D7
SOLAR RADIATION DATA FILE: C:\DUNNSOL.D13
EVAPOTRANSPIRATION DATA: C:\DUNNEVAP.D11
SOIL AND DESIGN DATA FILE: C:\DUNN10FT.D10
OUTPUT DATA FILE:        C:\DUNN10FT.OUT

```

TIME: 8:40 DATE: 1/ 8/2019

```

*****
TITLE:  DUNN OPEN (10FT WASTE)
*****

```

NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

```

          TYPE 1 - VERTICAL PERCOLATION LAYER
          MATERIAL TEXTURE NUMBER 0
THICKNESS          = 120.00 INCHES
POROSITY           = 0.6710 VOL/VOL
FIELD CAPACITY     = 0.2920 VOL/VOL
WILTING POINT     = 0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3632 VOL/VOL
EFFECTIVE SAT. HYD. COND. = 0.999999975000E-04 CM/SEC

```

LAYER 2

TYPE 2 - LATERAL DRAINAGE LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4170	VOL/VOL
FIELD CAPACITY	=	0.0450	VOL/VOL
WILTING POINT	=	0.0180	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0496	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	1.000000000000	CM/SEC
SLOPE	=	2.80	PERCENT
DRAINAGE LENGTH	=	200.0	FEET

LAYER 3

TYPE 4 - FLEXIBLE MEMBRANE LINER

MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	3.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	3.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 4

TYPE 3 - BARRIER SOIL LINER

MATERIAL TEXTURE NUMBER 16

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4270	VOL/VOL
FIELD CAPACITY	=	0.4180	VOL/VOL
WILTING POINT	=	0.3670	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4270	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000E-06	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	74.00	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	8.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	4.008	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.368	INCHES

LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.616	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	55.023	INCHES
TOTAL INITIAL WATER	=	55.023	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
ALBANY NEW YORK

STATION LATITUDE	=	42.45	DEGREES
MAXIMUM LEAF AREA INDEX	=	4.50	
START OF GROWING SEASON (JULIAN DATE)	=	123	
END OF GROWING SEASON (JULIAN DATE)	=	282	
EVAPORATIVE ZONE DEPTH	=	8.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.90	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	68.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	66.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	74.00	%

NOTE: PRECIPITATION DATA FOR ALBANY NEW YORK
WAS ENTERED FROM THE DEFAULT DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ALBANY NEW YORK

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
-----	-----	-----	-----	-----	-----
21.10	23.40	33.80	46.60	57.50	66.70
71.40	69.20	61.20	50.50	39.30	26.50

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ALBANY NEW YORK
AND STATION LATITUDE = 42.45 DEGREES

MONTHLY TOTALS (IN INCHES) FOR YEAR 1974

JAN/JUL FEB/AUG MAR/SEP APR/OCT MAY/NOV JUN/DEC

	-----	-----	-----	-----	-----	-----
PRECIPITATION	2.04	2.12	3.10	2.80	3.47	3.31
	4.84	3.53	5.37	1.49	3.83	2.57
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.388	0.504	0.413	2.927	4.072	3.491
	2.994	4.226	3.090	1.392	1.227	0.309
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.1284	0.8823	0.9305	0.5344	2.8447	2.2750
	1.6606	1.1959	0.9115	0.6936	0.2492	0.4800
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.005	0.040	0.038	0.022	0.116	0.096
	0.068	0.049	0.038	0.028	0.010	0.020
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.006	0.012	0.013	0.016	0.033	0.008
	0.007	0.006	0.009	0.009	0.007	0.008

ANNUAL TOTALS FOR YEAR 1974

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	38.47	139646.125	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	25.032	90865.602	65.07
DRAINAGE COLLECTED FROM LAYER 2	12.7860	46413.094	33.24
PERC./LEAKAGE THROUGH LAYER 4	0.000062	0.225	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0441		
CHANGE IN WATER STORAGE	0.652	2367.149	1.70
SOIL WATER AT START OF YEAR	55.023	199733.750	
SOIL WATER AT END OF YEAR	55.675	202100.891	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE 0.0000 0.045 0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 1975

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	2.75	3.58	2.72	2.18	2.96	3.80
	6.96	5.98	4.57	5.88	2.89	2.78
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.638	0.508	0.291	2.309	2.258	4.397
	5.642	4.764	3.066	1.310	0.921	0.491
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.3332	1.2062	1.2453	1.6300	3.7880	2.3523
	1.6607	1.1134	0.3974	0.8482	0.7508	1.4761
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.014	0.054	0.051	0.069	0.154	0.099
	0.068	0.045	0.017	0.035	0.032	0.060
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.016	0.005	0.012	0.078	0.026	0.010
	0.007	0.017	0.006	0.016	0.034	0.017

ANNUAL TOTALS FOR YEAR 1975

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	47.05	170791.516	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	26.595	96541.062	56.53

DRAINAGE COLLECTED FROM LAYER 2	16.8017	60990.016	35.71
PERC./LEAKAGE THROUGH LAYER 4	0.000079	0.286	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0580		
CHANGE IN WATER STORAGE	3.653	13260.115	7.76
SOIL WATER AT START OF YEAR	55.675	202100.891	
SOIL WATER AT END OF YEAR	57.422	208441.156	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.906	6919.856	4.05
ANNUAL WATER BUDGET BALANCE	0.0000	0.030	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 1976

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	3.78 2.60	2.60 5.04	3.57 2.61	3.63 5.65	4.89 1.41	5.37 1.39
RUNOFF	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
EVAPOTRANSPIRATION	0.541 4.409	0.615 4.601	0.688 2.766	3.006 1.565	5.514 0.844	3.509 0.467
LATERAL DRAINAGE COLLECTED FROM LAYER 2	2.2361 1.8520	1.7768 1.4960	1.4317 1.1049	0.8824 0.9782	4.5263 0.5535	2.4207 0.1390
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.091 0.075	0.077 0.061	0.058 0.046	0.037 0.040	0.184 0.023	0.102 0.006
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.005 0.010	0.006 0.004	0.008 0.003	0.025 0.008	0.027 0.008	0.017 0.006

ANNUAL TOTALS FOR YEAR 1976

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	42.54	154420.234	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	28.524	103541.469	67.05
DRAINAGE COLLECTED FROM LAYER 2	19.3977	70413.539	45.60
PERC./LEAKAGE THROUGH LAYER 4	0.000090	0.327	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0667		
CHANGE IN WATER STORAGE	-5.382	-19535.172	-12.65
SOIL WATER AT START OF YEAR	57.422	208441.156	
SOIL WATER AT END OF YEAR	53.023	192473.828	
SNOW WATER AT START OF YEAR	1.906	6919.856	4.48
SNOW WATER AT END OF YEAR	0.923	3352.010	2.17
ANNUAL WATER BUDGET BALANCE	0.0000	0.068	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 1977

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	1.51 2.31	2.63 3.66	5.90 6.66	3.41 4.00	2.29 4.85	2.87 4.21
RUNOFF	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
EVAPOTRANSPIRATION	0.497 2.319	0.599 3.547	0.622 2.849	1.964 1.627	3.652 1.207	2.861 0.434
LATERAL DRAINAGE COLLECTED	0.9429	0.9993	0.9439	0.6256	2.3813	2.8381

FROM LAYER 2	2.0494	1.4163	1.0637	0.7276	0.3366	0.3473
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.038	0.045	0.038	0.026	0.097	0.119
TOP OF LAYER 3	0.083	0.058	0.045	0.030	0.014	0.014
STD. DEVIATION OF DAILY	0.013	0.003	0.008	0.015	0.068	0.015
HEAD ON TOP OF LAYER 3	0.010	0.005	0.006	0.012	0.008	0.012

ANNUAL TOTALS FOR YEAR 1977

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	44.30	160809.016	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	22.178	80507.086	50.06
DRAINAGE COLLECTED FROM LAYER 2	14.6719	53259.059	33.12
PERC./LEAKAGE THROUGH LAYER 4	0.000070	0.255	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0506		
CHANGE IN WATER STORAGE	7.450	27042.574	16.82
SOIL WATER AT START OF YEAR	53.023	192473.828	
SOIL WATER AT END OF YEAR	58.832	213560.437	
SNOW WATER AT START OF YEAR	0.923	3352.010	2.08
SNOW WATER AT END OF YEAR	2.564	9307.977	5.79
ANNUAL WATER BUDGET BALANCE	0.0000	0.036	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 1978

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	6.44 4.04	0.88 3.06	1.99 1.87	1.68 2.95	1.96 0.91	4.60 3.08
RUNOFF	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
EVAPOTRANSPIRATION	0.423 2.619	0.589 4.111	0.390 1.814	2.431 1.345	2.346 1.019	4.842 0.620
LATERAL DRAINAGE COLLECTED FROM LAYER 2	2.1498 1.9277	1.5844 1.3499	1.4084 0.9993	2.5019 0.8313	4.2789 0.7259	2.7459 0.3773
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.087 0.078	0.071 0.055	0.057 0.042	0.105 0.034	0.174 0.031	0.115 0.015
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.016 0.009	0.019 0.005	0.042 0.003	0.060 0.002	0.015 0.003	0.013 0.007

ANNUAL TOTALS FOR YEAR 1978

	INCHES	CU. FEET	PERCENT
PRECIPITATION	33.46	121459.836	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	22.550	81857.352	67.39
DRAINAGE COLLECTED FROM LAYER 2	20.8806	75796.461	62.40
PERC./LEAKAGE THROUGH LAYER 4	0.000096	0.350	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0721		
CHANGE IN WATER STORAGE	-9.971	-36194.371	-29.80
SOIL WATER AT START OF YEAR	58.832	213560.437	
SOIL WATER AT END OF YEAR	49.816	180831.312	

SNOW WATER AT START OF YEAR	2.564	9307.977	7.66
SNOW WATER AT END OF YEAR	1.610	5842.733	4.81
ANNUAL WATER BUDGET BALANCE	0.0000	0.051	0.00

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1974 THROUGH 1978

JAN/JUL FEB/AUG MAR/SEP APR/OCT MAY/NOV JUN/DEC

TOTALS	3.30	2.36	3.46	2.74	3.11	3.99
	4.15	4.25	4.22	3.99	2.78	2.81

TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000

TOTALS	0.497	0.563	0.481	2.527	3.569	3.820
	3.596	4.250	2.717	1.448	1.044	0.464

TOTALS	1.1581	1.2898	1.1920	1.2349	3.5638	2.5264
	1.8301	1.3143	0.8954	0.8158	0.5232	0.5639

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

 AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 3

AVERAGES	0.0471	0.0575	0.0485	0.0519	0.1450	0.1062
	0.0744	0.0535	0.0376	0.0332	0.0220	0.0229
STD. DEVIATIONS	0.0403	0.0163	0.0099	0.0348	0.0375	0.0105
	0.0069	0.0064	0.0121	0.0046	0.0095	0.0213

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1974 THROUGH 1978

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	41.16 (5.315)	149425.3	100.00
RUNOFF	0.000 (0.0000)	0.00	0.000
EVAPOTRANSPIRATION	24.976 (2.6891)	90662.52	60.674
LATERAL DRAINAGE COLLECTED FROM LAYER 2	16.90756 (3.31595)	61374.437	41.07365
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.00008 (0.00001)	0.289	0.00019
AVERAGE HEAD ON TOP OF LAYER 3	0.058 (0.011)		
CHANGE IN WATER STORAGE	-0.720 (6.9832)	-2611.94	-1.748

PEAK DAILY VALUES FOR YEARS 1974 THROUGH 1978

	(INCHES)	(CU. FT.)
PRECIPITATION	2.45	8893.500
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 2	0.22271	808.45447
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000001	0.00332
AVERAGE HEAD ON TOP OF LAYER 3	0.281	
MAXIMUM HEAD ON TOP OF LAYER 3	0.544	
LOCATION OF MAXIMUM HEAD IN LAYER 2 (DISTANCE FROM DRAIN)	6.2 FEET	
SNOW WATER	6.73	24443.5762
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.6710
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.0770

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

FINAL WATER STORAGE AT END OF YEAR 1978

LAYER	(INCHES)	(VOL/VOL)
1	38.2342	0.3186
2	1.3336	0.0556
3	0.0000	0.0000
4	10.2480	0.4270
SNOW WATER	1.610	

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**
**          HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE          **
**          HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)              **
**          DEVELOPED BY ENVIRONMENTAL LABORATORY                    **
**          USAE WATERWAYS EXPERIMENT STATION                       **
**          FOR USEPA RISK REDUCTION ENGINEERING LABORATORY         **
**                                                                    **
*****
*****

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PRECIPITATION DATA FILE:  C:\DUNNPRES.D4
TEMPERATURE DATA FILE:   C:\DUNNTEMP.D7
SOLAR RADIATION DATA FILE: C:\DUNNSOL.D13
EVAPOTRANSPIRATION DATA: C:\DUNNEVAP.D11
SOIL AND DESIGN DATA FILE: C:\DUNN50FT.D10
OUTPUT DATA FILE:        C:\DUNN50FT.OUT

```

TIME: 8:46 DATE: 1/ 8/2019

```

*****
TITLE:  DUNN 50FT WASTE
*****

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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

```

          TYPE 1 - VERTICAL PERCOLATION LAYER
          MATERIAL TEXTURE NUMBER 0
THICKNESS           = 600.00  INCHES
POROSITY             = 0.6710 VOL/VOL
FIELD CAPACITY       = 0.2920 VOL/VOL
WILTING POINT       = 0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3118 VOL/VOL
EFFECTIVE SAT. HYD. COND. = 0.999999975000E-04 CM/SEC

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LAYER 2

TYPE 2 - LATERAL DRAINAGE LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4170	VOL/VOL
FIELD CAPACITY	=	0.0450	VOL/VOL
WILTING POINT	=	0.0180	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0464	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	1.000000000000	CM/SEC
SLOPE	=	2.80	PERCENT
DRAINAGE LENGTH	=	200.0	FEET

LAYER 3

TYPE 4 - FLEXIBLE MEMBRANE LINER

MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	3.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	3.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 4

TYPE 3 - BARRIER SOIL LINER

MATERIAL TEXTURE NUMBER 16

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4270	VOL/VOL
FIELD CAPACITY	=	0.4180	VOL/VOL
WILTING POINT	=	0.3670	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4270	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000E-06	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	74.00	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	8.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	4.008	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.368	INCHES

LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.616	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	198.415	INCHES
TOTAL INITIAL WATER	=	198.415	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
ALBANY NEW YORK

STATION LATITUDE	=	42.45	DEGREES
MAXIMUM LEAF AREA INDEX	=	4.50	
START OF GROWING SEASON (JULIAN DATE)	=	123	
END OF GROWING SEASON (JULIAN DATE)	=	282	
EVAPORATIVE ZONE DEPTH	=	8.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.90	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	68.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	66.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	74.00	%

NOTE: PRECIPITATION DATA FOR ALBANY NEW YORK
WAS ENTERED FROM THE DEFAULT DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ALBANY NEW YORK

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
-----	-----	-----	-----	-----	-----
21.10	23.40	33.80	46.60	57.50	66.70
71.40	69.20	61.20	50.50	39.30	26.50

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ALBANY NEW YORK
AND STATION LATITUDE = 42.45 DEGREES

MONTHLY TOTALS (IN INCHES) FOR YEAR 1974

JAN/JUL FEB/AUG MAR/SEP APR/OCT MAY/NOV JUN/DEC

	-----	-----	-----	-----	-----	-----
PRECIPITATION	2.04	2.12	3.10	2.80	3.47	3.31
	4.84	3.53	5.37	1.49	3.83	2.57
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.388	0.504	0.413	2.927	4.072	3.491
	2.994	4.226	3.090	1.392	1.227	0.309
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0452	0.0609	0.0589	0.0893	0.0369	0.0315
	0.4351	0.6492	0.6386	0.5401	0.2332	0.2528
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.002	0.003	0.002	0.004	0.001	0.001
	0.018	0.026	0.027	0.022	0.010	0.010
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.001	0.002	0.002	0.002	0.001	0.001
	0.009	0.003	0.008	0.007	0.006	0.005

ANNUAL TOTALS FOR YEAR 1974

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	38.47	139646.125	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	25.032	90865.602	65.07
DRAINAGE COLLECTED FROM LAYER 2	3.0716	11150.082	7.98
PERC./LEAKAGE THROUGH LAYER 4	0.000018	0.067	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0105		
CHANGE IN WATER STORAGE	10.366	37630.289	26.95
SOIL WATER AT START OF YEAR	198.415	720246.875	
SOIL WATER AT END OF YEAR	208.782	757877.125	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE 0.0000 0.078 0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 1975

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	2.75	3.58	2.72	2.18	2.96	3.80
	6.96	5.98	4.57	5.88	2.89	2.78
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.638	0.508	0.291	2.309	2.258	4.397
	5.642	4.764	3.066	1.310	0.921	0.491
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0762	0.0229	0.6767	0.4481	0.1151	0.4677
	1.0548	0.9590	0.2879	0.6186	0.3625	0.2805
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.003	0.001	0.028	0.019	0.005	0.020
	0.043	0.039	0.012	0.025	0.015	0.011
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.002	0.001	0.011	0.004	0.004	0.017
	0.001	0.014	0.005	0.014	0.007	0.005

ANNUAL TOTALS FOR YEAR 1975

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	47.05	170791.516	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	26.595	96541.062	56.53

DRAINAGE COLLECTED FROM LAYER 2	5.3700	19493.129	11.41
PERC./LEAKAGE THROUGH LAYER 4	0.000029	0.106	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0184		
CHANGE IN WATER STORAGE	15.085	54757.191	32.06
SOIL WATER AT START OF YEAR	208.782	757877.125	
SOIL WATER AT END OF YEAR	221.960	805714.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.906	6919.856	4.05
ANNUAL WATER BUDGET BALANCE	0.0000	0.017	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 1976

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	3.78 2.60	2.60 5.04	3.57 2.61	3.63 5.65	4.89 1.41	5.37 1.39
RUNOFF	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
EVAPOTRANSPIRATION	0.541 4.409	0.615 4.601	0.688 2.766	3.006 1.565	5.514 0.844	3.509 0.467
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0505 1.4026	0.9843 1.5846	1.3399 1.4938	0.9097 1.5146	0.2199 0.7553	1.1670 0.1874
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.002 0.057	0.043 0.064	0.054 0.063	0.038 0.062	0.009 0.032	0.049 0.008
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.002 0.006	0.014 0.004	0.009 0.001	0.014 0.010	0.010 0.015	0.009 0.007

ANNUAL TOTALS FOR YEAR 1976

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	42.54	154420.234	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	28.524	103541.469	67.05
DRAINAGE COLLECTED FROM LAYER 2	11.6097	42143.066	27.29
PERC./LEAKAGE THROUGH LAYER 4	0.000057	0.207	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0401		
CHANGE IN WATER STORAGE	2.406	8735.470	5.66
SOIL WATER AT START OF YEAR	221.960	805714.500	
SOIL WATER AT END OF YEAR	225.349	818017.812	
SNOW WATER AT START OF YEAR	1.906	6919.856	4.48
SNOW WATER AT END OF YEAR	0.923	3352.010	2.17
ANNUAL WATER BUDGET BALANCE	0.0000	0.018	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 1977

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	1.51 2.31	2.63 3.66	5.90 6.66	3.41 4.00	2.29 4.85	2.87 4.21
RUNOFF	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
EVAPOTRANSPIRATION	0.497 2.319	0.599 3.547	0.622 2.849	1.964 1.627	3.652 1.207	2.861 0.434
LATERAL DRAINAGE COLLECTED	1.1691	1.3269	1.4602	0.7153	0.3435	0.9506

FROM LAYER 2	1.8333	1.7365	1.6063	0.9945	0.4139	0.3384
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.048	0.060	0.059	0.030	0.014	0.040
	0.075	0.071	0.068	0.040	0.017	0.014
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.012	0.001	0.012	0.014	0.009	0.026
	0.001	0.001	0.008	0.020	0.008	0.005

ANNUAL TOTALS FOR YEAR 1977

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	44.30	160809.016	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	22.178	80507.086	50.06
DRAINAGE COLLECTED FROM LAYER 2	12.8886	46785.512	29.09
PERC./LEAKAGE THROUGH LAYER 4	0.000063	0.228	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0446		
CHANGE IN WATER STORAGE	9.233	33516.129	20.84
SOIL WATER AT START OF YEAR	225.349	818017.812	
SOIL WATER AT END OF YEAR	232.942	845578.000	
SNOW WATER AT START OF YEAR	0.923	3352.010	2.08
SNOW WATER AT END OF YEAR	2.564	9307.977	5.79
ANNUAL WATER BUDGET BALANCE	0.0000	0.056	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 1978

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	6.44 4.04	0.88 3.06	1.99 1.87	1.68 2.95	1.96 0.91	4.60 3.08
RUNOFF	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
EVAPOTRANSPIRATION	0.423 2.619	0.589 4.111	0.390 1.814	2.431 1.345	2.346 1.019	4.842 0.620
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.4331 2.3832	1.1560 2.1934	1.1701 1.9658	0.6655 1.8902	0.6631 1.6601	2.1918 1.4842
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.018 0.097	0.052 0.089	0.048 0.083	0.028 0.077	0.027 0.070	0.092 0.060
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.015 0.002	0.016 0.002	0.019 0.002	0.012 0.002	0.028 0.007	0.007 0.009

ANNUAL TOTALS FOR YEAR 1978

	INCHES	CU. FEET	PERCENT
PRECIPITATION	33.46	121459.836	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	22.550	81857.352	67.39
DRAINAGE COLLECTED FROM LAYER 2	17.8565	64819.250	53.37
PERC./LEAKAGE THROUGH LAYER 4	0.000084	0.306	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0617		
CHANGE IN WATER STORAGE	-6.947	-25217.105	-20.76
SOIL WATER AT START OF YEAR	232.942	845578.000	
SOIL WATER AT END OF YEAR	226.949	823826.125	

 AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 3

AVERAGES	0.0144	0.0317	0.0383	0.0238	0.0112	0.0404
	0.0578	0.0579	0.0504	0.0452	0.0288	0.0207
STD. DEVIATIONS	0.0197	0.0279	0.0234	0.0131	0.0100	0.0343
	0.0302	0.0252	0.0296	0.0236	0.0243	0.0223

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1974 THROUGH 1978

	INCHES		CU. FEET	PERCENT
	-----		-----	-----
PRECIPITATION	41.16 (5.315)		149425.3	100.00
RUNOFF	0.000 (0.0000)		0.00	0.000
EVAPOTRANSPIRATION	24.976 (2.6891)		90662.52	60.674
LATERAL DRAINAGE COLLECTED FROM LAYER 2	10.15929 (5.95760)		36878.211	24.68003
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.00005 (0.00003)		0.183	0.00012
AVERAGE HEAD ON TOP OF LAYER 3	0.035 (0.021)			
CHANGE IN WATER STORAGE	6.029 (8.5525)		21884.39	14.646

PEAK DAILY VALUES FOR YEARS 1974 THROUGH 1978

	(INCHES)	(CU. FT.)
PRECIPITATION	2.45	8893.500
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 2	0.08012	290.82498
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000000	0.00132
AVERAGE HEAD ON TOP OF LAYER 3	0.101	
MAXIMUM HEAD ON TOP OF LAYER 3	0.199	
LOCATION OF MAXIMUM HEAD IN LAYER 2 (DISTANCE FROM DRAIN)	2.8 FEET	
SNOW WATER	6.73	24443.5762
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.6710
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.0770

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

FINAL WATER STORAGE AT END OF YEAR 1978

LAYER	(INCHES)	(VOL/VOL)
-----	-----	-----
1	215.2881	0.3588
2	1.4132	0.0589
3	0.0000	0.0000
4	10.2480	0.4270
SNOW WATER	1.610	

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HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
HELP MODEL VERSION 3.07 (1 NOVEMBER 1997)
DEVELOPED BY ENVIRONMENTAL LABORATORY
USAE WATERWAYS EXPERIMENT STATION
FOR USEPA RISK REDUCTION ENGINEERING LABORATORY
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PRECIPITATION DATA FILE: C:\DUNNPRES.D4
TEMPERATURE DATA FILE: C:\DUNNTEMP.D7
SOLAR RADIATION DATA FILE: C:\DUNNSOL.D13
EVAPOTRANSPIRATION DATA: C:\DUNNEVAP.D11
SOIL AND DESIGN DATA FILE: C:\DUNN100F.D10
OUTPUT DATA FILE: C:\DUNN100F.OUT

```

TIME: 8:52 DATE: 1/ 8/2019

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*****
TITLE: DUNN 100FT WASTE
*****

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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

```

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 0
THICKNESS = 1200.00 INCHES
POROSITY = 0.6710 VOL/VOL
FIELD CAPACITY = 0.2920 VOL/VOL
WILTING POINT = 0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.3021 VOL/VOL
EFFECTIVE SAT. HYD. COND. = 0.999999975000E-04 CM/SEC

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LAYER 2

TYPE 2 - LATERAL DRAINAGE LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4170	VOL/VOL
FIELD CAPACITY	=	0.0450	VOL/VOL
WILTING POINT	=	0.0180	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0460	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	1.000000000000	CM/SEC
SLOPE	=	2.80	PERCENT
DRAINAGE LENGTH	=	200.0	FEET

LAYER 3

TYPE 4 - FLEXIBLE MEMBRANE LINER

MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	3.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	3.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 4

TYPE 3 - BARRIER SOIL LINER

MATERIAL TEXTURE NUMBER 16

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4270	VOL/VOL
FIELD CAPACITY	=	0.4180	VOL/VOL
WILTING POINT	=	0.3670	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4270	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000E-06	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	74.00	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	8.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	4.008	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.368	INCHES

LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.616	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	373.847	INCHES
TOTAL INITIAL WATER	=	373.847	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA -----

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
ALBANY NEW YORK

STATION LATITUDE	=	42.45	DEGREES
MAXIMUM LEAF AREA INDEX	=	4.50	
START OF GROWING SEASON (JULIAN DATE)	=	123	
END OF GROWING SEASON (JULIAN DATE)	=	282	
EVAPORATIVE ZONE DEPTH	=	8.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.90	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	68.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	66.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	74.00	%

NOTE: PRECIPITATION DATA FOR ALBANY NEW YORK
WAS ENTERED FROM THE DEFAULT DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ALBANY NEW YORK

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
-----	-----	-----	-----	-----	-----
21.10	23.40	33.80	46.60	57.50	66.70
71.40	69.20	61.20	50.50	39.30	26.50

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ALBANY NEW YORK
AND STATION LATITUDE = 42.45 DEGREES

MONTHLY TOTALS (IN INCHES) FOR YEAR 1974 -----

JAN/JUL FEB/AUG MAR/SEP APR/OCT MAY/NOV JUN/DEC

	-----	-----	-----	-----	-----	-----
PRECIPITATION	2.04	2.12	3.10	2.80	3.47	3.31
	4.84	3.53	5.37	1.49	3.83	2.57
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.388	0.504	0.413	2.927	4.072	3.491
	2.994	4.226	3.090	1.392	1.227	0.309
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0341	0.0469	0.0375	0.0550	0.0039	0.0352
	0.1511	0.4178	0.4491	0.4129	0.1419	0.1652
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.001	0.002	0.002	0.002	0.000	0.001
	0.006	0.017	0.019	0.017	0.006	0.007
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.001	0.001	0.001	0.001	0.000	0.002
	0.006	0.003	0.007	0.004	0.005	0.004

ANNUAL TOTALS FOR YEAR 1974

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	38.47	139646.125	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	25.032	90865.602	65.07
DRAINAGE COLLECTED FROM LAYER 2	1.9506	7080.858	5.07
PERC./LEAKAGE THROUGH LAYER 4	0.000013	0.046	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0067		
CHANGE IN WATER STORAGE	11.487	41699.469	29.86
SOIL WATER AT START OF YEAR	373.847	1357063.870	
SOIL WATER AT END OF YEAR	385.334	1398763.370	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE 0.0000 0.140 0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 1975

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	2.75	3.58	2.72	2.18	2.96	3.80
	6.96	5.98	4.57	5.88	2.89	2.78
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.638	0.508	0.291	2.309	2.258	4.397
	5.642	4.764	3.066	1.310	0.921	0.491
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0365	0.0435	0.2836	0.3349	0.0694	0.0449
	0.4063	0.6212	0.3002	0.2126	0.1384	0.0844
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.001	0.002	0.012	0.014	0.003	0.002
	0.017	0.025	0.013	0.009	0.006	0.003
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.001	0.002	0.011	0.005	0.002	0.002
	0.007	0.009	0.004	0.006	0.004	0.001

ANNUAL TOTALS FOR YEAR 1975

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	47.05	170791.516	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	26.595	96541.062	56.53

DRAINAGE COLLECTED FROM LAYER 2	2.5760	9350.970	5.48
PERC./LEAKAGE THROUGH LAYER 4	0.000016	0.058	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0088		
CHANGE IN WATER STORAGE	17.879	64899.488	38.00
SOIL WATER AT START OF YEAR	385.334	1398763.370	
SOIL WATER AT END OF YEAR	401.307	1456743.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.906	6919.856	4.05
ANNUAL WATER BUDGET BALANCE	0.0000	-0.074	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 1976

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	3.78 2.60	2.60 5.04	3.57 2.61	3.63 5.65	4.89 1.41	5.37 1.39
RUNOFF	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
EVAPOTRANSPIRATION	0.541 4.409	0.615 4.601	0.688 2.766	3.006 1.565	5.514 0.844	3.509 0.467
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0369 0.2491	0.0619 0.6332	0.6711 0.7916	0.6301 0.9061	0.2842 0.5715	0.1737 0.2261
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.002 0.010	0.003 0.026	0.027 0.033	0.026 0.037	0.012 0.024	0.007 0.009
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.001 0.008	0.005 0.008	0.007 0.001	0.008 0.008	0.005 0.008	0.004 0.005

ANNUAL TOTALS FOR YEAR 1976

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	42.54	154420.234	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	28.524	103541.469	67.05
DRAINAGE COLLECTED FROM LAYER 2	5.2356	19005.242	12.31
PERC./LEAKAGE THROUGH LAYER 4	0.000029	0.105	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0180		
CHANGE IN WATER STORAGE	8.781	31873.285	20.64
SOIL WATER AT START OF YEAR	401.307	1456743.000	
SOIL WATER AT END OF YEAR	411.070	1492184.120	
SNOW WATER AT START OF YEAR	1.906	6919.856	4.48
SNOW WATER AT END OF YEAR	0.923	3352.010	2.17
ANNUAL WATER BUDGET BALANCE	0.0000	0.129	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 1977

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	1.51 2.31	2.63 3.66	5.90 6.66	3.41 4.00	2.29 4.85	2.87 4.21
RUNOFF	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
EVAPOTRANSPIRATION	0.497 2.319	0.599 3.547	0.622 2.849	1.964 1.627	3.652 1.207	2.861 0.434
LATERAL DRAINAGE COLLECTED	0.0801	0.7105	0.9242	0.5783	0.3301	0.0459

FROM LAYER 2	0.7441	1.0190	0.9986	0.7689	0.3270	0.1836
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.003	0.032	0.038	0.024	0.013	0.002
TOP OF LAYER 3	0.030	0.041	0.042	0.031	0.014	0.007
STD. DEVIATION OF DAILY	0.006	0.003	0.008	0.010	0.005	0.002
HEAD ON TOP OF LAYER 3	0.014	0.001	0.007	0.013	0.006	0.005

ANNUAL TOTALS FOR YEAR 1977

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	44.30	160809.016	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	22.178	80507.086	50.06
DRAINAGE COLLECTED FROM LAYER 2	6.7104	24358.580	15.15
PERC./LEAKAGE THROUGH LAYER 4	0.000036	0.129	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0232		
CHANGE IN WATER STORAGE	15.411	55943.242	34.79
SOIL WATER AT START OF YEAR	411.070	1492184.120	
SOIL WATER AT END OF YEAR	424.841	1542171.370	
SNOW WATER AT START OF YEAR	0.923	3352.010	2.08
SNOW WATER AT END OF YEAR	2.564	9307.977	5.79
ANNUAL WATER BUDGET BALANCE	0.0000	-0.027	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 1978

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	6.44 4.04	0.88 3.06	1.99 1.87	1.68 2.95	1.96 0.91	4.60 3.08
RUNOFF	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
EVAPOTRANSPIRATION	0.423 2.619	0.589 4.111	0.390 1.814	2.431 1.345	2.346 1.019	4.842 0.620
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.1008 1.3408	0.2076 1.3384	0.4885 1.2633	0.3816 1.2736	0.2214 1.1950	0.3738 0.9974
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.004 0.055	0.009 0.054	0.020 0.053	0.016 0.052	0.009 0.050	0.016 0.041
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.003 0.001	0.007 0.000	0.008 0.000	0.005 0.000	0.005 0.005	0.019 0.010

ANNUAL TOTALS FOR YEAR 1978

	INCHES	CU. FEET	PERCENT
PRECIPITATION	33.46	121459.836	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	22.550	81857.352	67.39
DRAINAGE COLLECTED FROM LAYER 2	9.1821	33331.102	27.44
PERC./LEAKAGE THROUGH LAYER 4	0.000046	0.169	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0316		
CHANGE IN WATER STORAGE	1.728	6271.106	5.16
SOIL WATER AT START OF YEAR	424.841	1542171.370	
SOIL WATER AT END OF YEAR	427.523	1551907.750	

SNOW WATER AT START OF YEAR	2.564	9307.977	7.66
SNOW WATER AT END OF YEAR	1.610	5842.733	4.81
ANNUAL WATER BUDGET BALANCE	0.0000	0.114	0.00

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1974 THROUGH 1978

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION						

TOTALS	3.30	2.36	3.46	2.74	3.11	3.99
	4.15	4.25	4.22	3.99	2.78	2.81
STD. DEVIATIONS	1.95	0.98	1.48	0.82	1.15	1.00
	1.88	1.21	1.97	1.85	1.64	1.01
RUNOFF						

TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						

TOTALS	0.497	0.563	0.481	2.527	3.569	3.820
	3.596	4.250	2.717	1.448	1.044	0.464
STD. DEVIATIONS	0.099	0.053	0.167	0.437	1.347	0.791
	1.396	0.475	0.523	0.140	0.170	0.112
LATERAL DRAINAGE COLLECTED FROM LAYER 2						

TOTALS	0.0577	0.2141	0.4810	0.3960	0.1818	0.1347
	0.5783	0.8059	0.7606	0.7148	0.4747	0.3313
STD. DEVIATIONS	0.0308	0.2858	0.3421	0.2282	0.1399	0.1454
	0.4820	0.3686	0.3935	0.4169	0.4399	0.3759
PERCOLATION/LEAKAGE THROUGH LAYER 4						

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

 AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 3

AVERAGES	0.0023	0.0096	0.0196	0.0166	0.0074	0.0057
	0.0235	0.0328	0.0320	0.0291	0.0200	0.0135
STD. DEVIATIONS	0.0013	0.0129	0.0139	0.0096	0.0057	0.0061
	0.0196	0.0150	0.0165	0.0170	0.0185	0.0153

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1974 THROUGH 1978

	INCHES		CU. FEET	PERCENT
	-----		-----	-----
PRECIPITATION	41.16 (5.315)		149425.3	100.00
RUNOFF	0.000 (0.0000)		0.00	0.000
EVAPOTRANSPIRATION	24.976 (2.6891)		90662.52	60.674
LATERAL DRAINAGE COLLECTED FROM LAYER 2	5.13095 (2.98159)		18625.348	12.46465
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.00003 (0.00001)		0.101	0.00007
AVERAGE HEAD ON TOP OF LAYER 3	0.018 (0.010)			
CHANGE IN WATER STORAGE	11.057 (6.2829)		40137.32	26.861

PEAK DAILY VALUES FOR YEARS 1974 THROUGH 1978

	(INCHES)	(CU. FT.)
PRECIPITATION	2.45	8893.500
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 2	0.05588	202.83315
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000000	0.00095
AVERAGE HEAD ON TOP OF LAYER 3	0.070	
MAXIMUM HEAD ON TOP OF LAYER 3	0.139	
LOCATION OF MAXIMUM HEAD IN LAYER 2 (DISTANCE FROM DRAIN)	2.3 FEET	
SNOW WATER	6.73	24443.5762
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.6710
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.0770

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

FINAL WATER STORAGE AT END OF YEAR 1978

LAYER	(INCHES)	(VOL/VOL)
1	415.8846	0.3466
2	1.3902	0.0579
3	0.0000	0.0000
4	10.2480	0.4270
SNOW WATER	1.610	

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**
**          HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE          **
**          HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)              **
**          DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**          USAE WATERWAYS EXPERIMENT STATION                      **
**          FOR USEPA RISK REDUCTION ENGINEERING LABORATORY         **
**                                                                    **
*****
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PRECIPITATION DATA FILE:  C:\DUNNPRES.D4
TEMPERATURE DATA FILE:   C:\DUNNTEMP.D7
SOLAR RADIATION DATA FILE: C:\DUNNSOL.D13
EVAPOTRANSPIRATION DATA: C:\DUNNEVAP.D11
SOIL AND DESIGN DATA FILE: C:\DUNN150F.D10
OUTPUT DATA FILE:        C:\DUNN150F.OUT

```

TIME: 8:55 DATE: 1/ 8/2019

```

*****
TITLE:  DUNN 150FT WASTE
*****

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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

```

          TYPE 1 - VERTICAL PERCOLATION LAYER
          MATERIAL TEXTURE NUMBER 0
THICKNESS          = 1800.00  INCHES
POROSITY           = 0.6710 VOL/VOL
FIELD CAPACITY     = 0.2920 VOL/VOL
WILTING POINT      = 0.0770 VOL/VOL
INITIAL SOIL WATER CONTENT = 0.2988 VOL/VOL
EFFECTIVE SAT. HYD. COND. = 0.999999975000E-04 CM/SEC

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LAYER 2

TYPE 2 - LATERAL DRAINAGE LAYER

MATERIAL TEXTURE NUMBER 0

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4170	VOL/VOL
FIELD CAPACITY	=	0.0450	VOL/VOL
WILTING POINT	=	0.0180	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0459	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	1.00000000000	CM/SEC
SLOPE	=	2.80	PERCENT
DRAINAGE LENGTH	=	200.0	FEET

LAYER 3

TYPE 4 - FLEXIBLE MEMBRANE LINER

MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12	CM/SEC
FML PINHOLE DENSITY	=	3.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	3.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	3 - GOOD	

LAYER 4

TYPE 3 - BARRIER SOIL LINER

MATERIAL TEXTURE NUMBER 16

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4270	VOL/VOL
FIELD CAPACITY	=	0.4180	VOL/VOL
WILTING POINT	=	0.3670	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4270	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000E-06	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	74.00	
FRACTION OF AREA ALLOWING RUNOFF	=	0.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	8.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	4.008	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	5.368	INCHES

LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.616	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	549.114	INCHES
TOTAL INITIAL WATER	=	549.114	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA -----

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
ALBANY NEW YORK

STATION LATITUDE	=	42.45	DEGREES
MAXIMUM LEAF AREA INDEX	=	4.50	
START OF GROWING SEASON (JULIAN DATE)	=	123	
END OF GROWING SEASON (JULIAN DATE)	=	282	
EVAPORATIVE ZONE DEPTH	=	8.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.90	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	68.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	66.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	74.00	%

NOTE: PRECIPITATION DATA FOR ALBANY NEW YORK
WAS ENTERED FROM THE DEFAULT DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ALBANY NEW YORK

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
-----	-----	-----	-----	-----	-----
21.10	23.40	33.80	46.60	57.50	66.70
71.40	69.20	61.20	50.50	39.30	26.50

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ALBANY NEW YORK
AND STATION LATITUDE = 42.45 DEGREES

MONTHLY TOTALS (IN INCHES) FOR YEAR 1974 -----

JAN/JUL FEB/AUG MAR/SEP APR/OCT MAY/NOV JUN/DEC

	-----	-----	-----	-----	-----	-----
PRECIPITATION	2.04	2.12	3.10	2.80	3.47	3.31
	4.84	3.53	5.37	1.49	3.83	2.57
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.388	0.504	0.413	2.927	4.072	3.491
	2.994	4.226	3.090	1.392	1.227	0.309
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0307	0.0450	0.0344	0.0485	0.0017	0.0197
	0.1198	0.3589	0.3897	0.3914	0.0970	0.1419
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.001	0.002	0.001	0.002	0.000	0.001
	0.005	0.015	0.016	0.016	0.004	0.006
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.001	0.001	0.001	0.001	0.000	0.001
	0.005	0.003	0.006	0.004	0.003	0.003

ANNUAL TOTALS FOR YEAR 1974

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	38.47	139646.125	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	25.032	90865.602	65.07
DRAINAGE COLLECTED FROM LAYER 2	1.6787	6093.555	4.36
PERC./LEAKAGE THROUGH LAYER 4	0.000011	0.041	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0058		
CHANGE IN WATER STORAGE	11.759	42686.840	30.57
SOIL WATER AT START OF YEAR	549.114	1993284.750	
SOIL WATER AT END OF YEAR	560.874	2035971.620	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00

ANNUAL WATER BUDGET BALANCE	0.0000	0.076	0.00
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MONTHLY TOTALS (IN INCHES) FOR YEAR 1975

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	2.75	3.58	2.72	2.18	2.96	3.80
	6.96	5.98	4.57	5.88	2.89	2.78
RUNOFF	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.638	0.508	0.291	2.309	2.258	4.397
	5.642	4.764	3.066	1.310	0.921	0.491
LATERAL DRAINAGE COLLECTED	0.0326	0.0251	0.2227	0.2883	0.0420	0.0497
FROM LAYER 2	0.2392	0.5095	0.2517	0.1451	0.0860	0.0541
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.001	0.001	0.009	0.012	0.002	0.002
TOP OF LAYER 3	0.010	0.021	0.011	0.006	0.004	0.002
STD. DEVIATION OF DAILY	0.001	0.001	0.009	0.005	0.002	0.002
HEAD ON TOP OF LAYER 3	0.006	0.007	0.006	0.005	0.002	0.001

ANNUAL TOTALS FOR YEAR 1975

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	47.05	170791.516	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	26.595	96541.062	56.53

DRAINAGE COLLECTED FROM LAYER 2	1.9461	7064.447	4.14
PERC./LEAKAGE THROUGH LAYER 4	0.000013	0.046	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0067		
CHANGE IN WATER STORAGE	18.509	67185.961	39.34
SOIL WATER AT START OF YEAR	560.874	2035971.620	
SOIL WATER AT END OF YEAR	577.476	2096237.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	1.906	6919.856	4.05
ANNUAL WATER BUDGET BALANCE	0.0000	-0.014	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 1976

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	3.78 2.60	2.60 5.04	3.57 2.61	3.63 5.65	4.89 1.41	5.37 1.39
RUNOFF	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
EVAPOTRANSPIRATION	0.541 4.409	0.615 4.601	0.688 2.766	3.006 1.565	5.514 0.844	3.509 0.467
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0199 0.1129	0.0280 0.2220	0.4025 0.5320	0.5209 0.6788	0.2291 0.4873	0.1495 0.1610
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.001 0.005	0.001 0.009	0.016 0.022	0.022 0.028	0.009 0.020	0.006 0.007
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.001 0.003	0.002 0.008	0.008 0.002	0.006 0.007	0.006 0.006	0.004 0.005

ANNUAL TOTALS FOR YEAR 1976

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	42.54	154420.234	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	28.524	103541.469	67.05
DRAINAGE COLLECTED FROM LAYER 2	3.5439	12864.395	8.33
PERC./LEAKAGE THROUGH LAYER 4	0.000021	0.075	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0122		
CHANGE IN WATER STORAGE	10.472	38014.309	24.62
SOIL WATER AT START OF YEAR	577.476	2096237.750	
SOIL WATER AT END OF YEAR	588.931	2137819.750	
SNOW WATER AT START OF YEAR	1.906	6919.856	4.48
SNOW WATER AT END OF YEAR	0.923	3352.010	2.17
ANNUAL WATER BUDGET BALANCE	0.0000	-0.017	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 1977

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
	-----	-----	-----	-----	-----	-----
PRECIPITATION	1.51 2.31	2.63 3.66	5.90 6.66	3.41 4.00	2.29 4.85	2.87 4.21
RUNOFF	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
EVAPOTRANSPIRATION	0.497 2.319	0.599 3.547	0.622 2.849	1.964 1.627	3.652 1.207	2.861 0.434
LATERAL DRAINAGE COLLECTED	0.0548	0.3408	0.6767	0.4985	0.2476	0.0808

FROM LAYER 2	0.2377	0.7010	0.7196	0.6419	0.2731	0.1233
PERCOLATION/LEAKAGE THROUGH	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
LAYER 4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.002	0.015	0.028	0.021	0.010	0.003
TOP OF LAYER 3	0.010	0.029	0.030	0.026	0.011	0.005
STD. DEVIATION OF DAILY	0.002	0.008	0.007	0.008	0.006	0.001
HEAD ON TOP OF LAYER 3	0.011	0.001	0.006	0.009	0.006	0.003

ANNUAL TOTALS FOR YEAR 1977

	INCHES	CU. FEET	PERCENT
	-----	-----	-----
PRECIPITATION	44.30	160809.016	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	22.178	80507.086	50.06
DRAINAGE COLLECTED FROM LAYER 2	4.5959	16683.193	10.37
PERC./LEAKAGE THROUGH LAYER 4	0.000026	0.094	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0159		
CHANGE IN WATER STORAGE	17.526	63618.551	39.56
SOIL WATER AT START OF YEAR	588.931	2137819.750	
SOIL WATER AT END OF YEAR	604.816	2195482.500	
SNOW WATER AT START OF YEAR	0.923	3352.010	2.08
SNOW WATER AT END OF YEAR	2.564	9307.977	5.79
ANNUAL WATER BUDGET BALANCE	0.0000	0.085	0.00

MONTHLY TOTALS (IN INCHES) FOR YEAR 1978

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	6.44 4.04	0.88 3.06	1.99 1.87	1.68 2.95	1.96 0.91	4.60 3.08
RUNOFF	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000
EVAPOTRANSPIRATION	0.423 2.619	0.589 4.111	0.390 1.814	2.431 1.345	2.346 1.019	4.842 0.620
LATERAL DRAINAGE COLLECTED FROM LAYER 2	0.0677 0.7019	0.1355 0.9089	0.1936 0.8740	0.1695 0.8925	0.0867 0.8837	0.0229 0.6340
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000	0.0000 0.0000

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON TOP OF LAYER 3	0.003 0.029	0.006 0.037	0.008 0.037	0.007 0.036	0.004 0.037	0.001 0.026
STD. DEVIATION OF DAILY HEAD ON TOP OF LAYER 3	0.003 0.011	0.005 0.000	0.005 0.000	0.005 0.000	0.002 0.004	0.001 0.010

ANNUAL TOTALS FOR YEAR 1978

	INCHES	CU. FEET	PERCENT
PRECIPITATION	33.46	121459.836	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	22.550	81857.352	67.39
DRAINAGE COLLECTED FROM LAYER 2	5.5709	20222.211	16.65
PERC./LEAKAGE THROUGH LAYER 4	0.000030	0.109	0.00
AVG. HEAD ON TOP OF LAYER 3	0.0192		
CHANGE IN WATER STORAGE	5.339	19380.004	15.96
SOIL WATER AT START OF YEAR	604.816	2195482.500	
SOIL WATER AT END OF YEAR	611.110	2218327.750	

 AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 3

AVERAGES	0.0017	0.0052	0.0124	0.0128	0.0049	0.0027
	0.0115	0.0220	0.0233	0.0224	0.0154	0.0091
STD. DEVIATIONS	0.0008	0.0060	0.0100	0.0086	0.0045	0.0022
	0.0099	0.0111	0.0105	0.0117	0.0140	0.0095

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1974 THROUGH 1978

	INCHES		CU. FEET	PERCENT
	-----		-----	-----
PRECIPITATION	41.16 (5.315)		149425.3	100.00
RUNOFF	0.000 (0.0000)		0.00	0.000
EVAPOTRANSPIRATION	24.976 (2.6891)		90662.52	60.674
LATERAL DRAINAGE COLLECTED FROM LAYER 2	3.46710 (1.67465)		12585.562	8.42264
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.00002 (0.00001)		0.073	0.00005
AVERAGE HEAD ON TOP OF LAYER 3	0.012 (0.006)			
CHANGE IN WATER STORAGE	12.721 (5.4097)		46177.13	30.903

PEAK DAILY VALUES FOR YEARS 1974 THROUGH 1978

	(INCHES)	(CU. FT.)
PRECIPITATION	2.45	8893.500
RUNOFF	0.000	0.0000
DRAINAGE COLLECTED FROM LAYER 2	0.04128	149.83722
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.000000	0.00073
AVERAGE HEAD ON TOP OF LAYER 3	0.052	
MAXIMUM HEAD ON TOP OF LAYER 3	0.103	
LOCATION OF MAXIMUM HEAD IN LAYER 2 (DISTANCE FROM DRAIN)	1.7 FEET	
SNOW WATER	6.73	24443.5762
MAXIMUM VEG. SOIL WATER (VOL/VOL)		0.6710
MINIMUM VEG. SOIL WATER (VOL/VOL)		0.0770

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

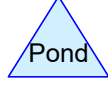
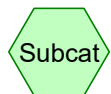
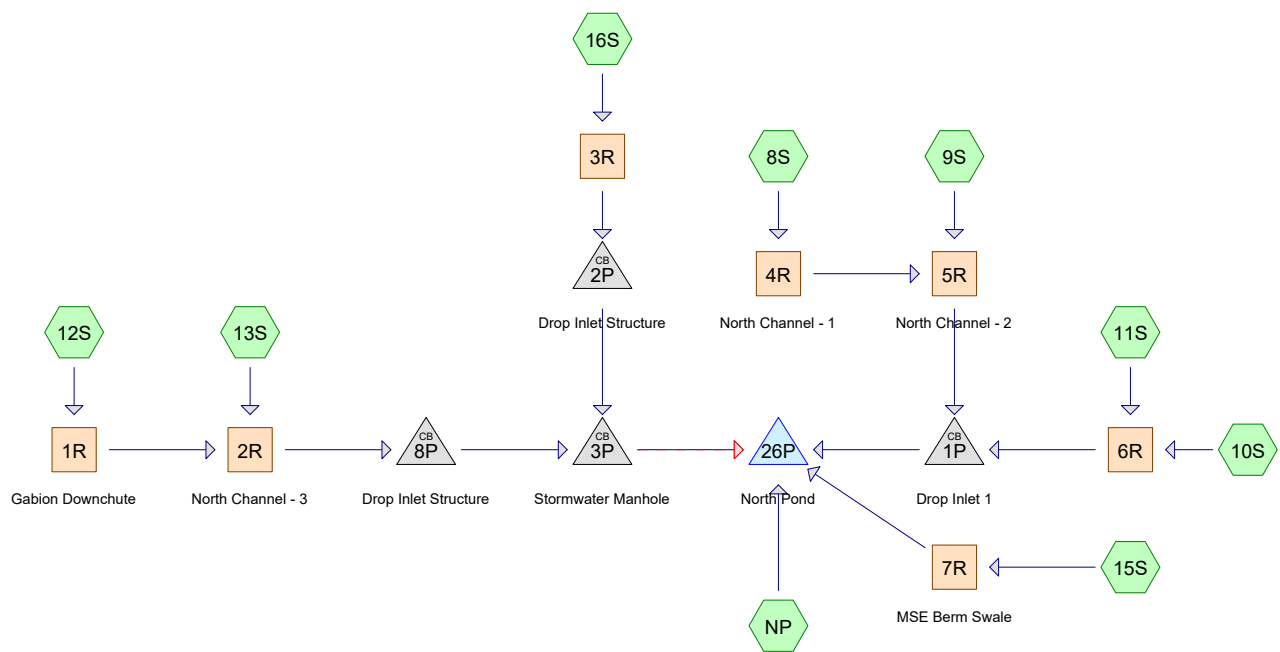
FINAL WATER STORAGE AT END OF YEAR 1978

LAYER	(INCHES)	(VOL/VOL)
1	599.4922	0.3331
2	1.3694	0.0571
3	0.0000	0.0000
4	10.2480	0.4270
SNOW WATER	1.610	

APPENDIX C2.2 – STORMWATER

- . North Pond Hydrocad Analyses**
 - . Downchute and Downchute Energy Dissipator Design**
 - . Final Cover Diversion Berm and Perimeter Swale Design**
 - . Drainage Area Maps**
-

NORTH POND HYDROCAD ANALYSIS



Post-Development_North Pond

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Page 2

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year, 24-Hour Storm	Type II 24-hr		Default	24.00	1	2.80	2
2	10-Year, 24-Hour Storm	Type II 24-hr		Default	24.00	1	4.25	2
3	25-Year, 24-Hour Storm	Type II 24-hr		Default	24.00	1	4.90	2
4	100-Year, 24-Hour Storm	Type II 24-hr		Default	24.00	1	5.90	2

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Page 3

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
11.736	80	(12S)
1.730	98	Basin (NP)
0.576	80	CAP (11S)
27.987	80	Cap (8S, 9S, 10S, 13S, 16S)
0.947	85	Gravel Road (13S, 16S, NP)
1.279	85	Gravel roads, HSG B (8S, 9S, 11S)
0.660	67	Vegetation (Hyd. Group B) (15S)
44.915	81	TOTAL AREA

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Page 4

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
1.279	HSG B	8S, 9S, 11S
0.000	HSG C	
0.000	HSG D	
43.636	Other	8S, 9S, 10S, 11S, 12S, 13S, 15S, 16S, NP
44.915		TOTAL AREA

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Page 5

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	11.736	11.736		12S
0.000	0.000	0.000	0.000	1.730	1.730	Basin	NP
0.000	0.000	0.000	0.000	0.576	0.576	CAP	11S
0.000	0.000	0.000	0.000	27.987	27.987	Cap	8S, 9S, 10S, 13S, 16S
0.000	0.000	0.000	0.000	0.947	0.947	Gravel Road	13S, 16S, NP
0.000	1.279	0.000	0.000	0.000	1.279	Gravel roads	8S, 9S, 11S
0.000	0.000	0.000	0.000	0.660	0.660	Vegetation (Hyd. Group B)	15S
0.000	1.279	0.000	0.000	43.636	44.915	TOTAL AREA	

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Page 6

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	1P	200.60	200.00	65.0	0.0092	0.013	0.0	36.0	0.0
2	2P	187.00	185.20	36.0	0.0500	0.011	0.0	36.0	0.0
3	3P	179.30	177.00	46.0	0.0500	0.011	0.0	36.0	0.0
4	8P	187.00	183.00	80.0	0.0500	0.011	0.0	36.0	0.0

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Page 7

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment8S:	Runoff Area=11.897 ac 0.00% Impervious Runoff Depth>1.10" Flow Length=633' Tc=11.4 min CN=80 Runoff=18.83 cfs 1.089 af
Subcatchment9S:	Runoff Area=5.653 ac 0.00% Impervious Runoff Depth>1.10" Flow Length=717' Tc=10.7 min CN=80 Runoff=9.15 cfs 0.518 af
Subcatchment10S:	Runoff Area=9.230 ac 0.00% Impervious Runoff Depth>1.10" Flow Length=1,350' Tc=15.0 min CN=80 Runoff=12.85 cfs 0.844 af
Subcatchment11S:	Runoff Area=0.758 ac 0.00% Impervious Runoff Depth>1.16" Flow Length=291' Slope=0.0800 '/' Tc=9.3 min CN=81 Runoff=1.37 cfs 0.073 af
Subcatchment12S:	Runoff Area=11.736 ac 0.00% Impervious Runoff Depth>1.10" Flow Length=944' Slope=0.0500 '/' Tc=13.5 min CN=80 Runoff=17.26 cfs 1.074 af
Subcatchment13S:	Runoff Area=1.365 ac 0.00% Impervious Runoff Depth>1.16" Flow Length=510' Tc=6.0 min CN=81 Runoff=2.76 cfs 0.132 af
Subcatchment15S:	Runoff Area=0.660 ac 0.00% Impervious Runoff Depth>0.49" Flow Length=854' Tc=7.7 min CN=67 Runoff=0.45 cfs 0.027 af
Subcatchment16S:	Runoff Area=1.546 ac 0.00% Impervious Runoff Depth>1.16" Flow Length=122' Slope=0.0800 '/' Tc=6.2 min CN=81 Runoff=3.11 cfs 0.149 af
SubcatchmentNP:	Runoff Area=2.070 ac 83.57% Impervious Runoff Depth>2.35" Tc=6.0 min CN=96 Runoff=7.63 cfs 0.406 af
Reach 1R: Gabion Downchute	Avg. Flow Depth=0.42' Max Vel=13.56 fps Inflow=17.26 cfs 1.074 af n=0.030 L=260.0' S=0.3308 '/' Capacity=105.82 cfs Outflow=17.06 cfs 1.073 af
Reach 2R: North Channel - 3	Avg. Flow Depth=0.90' Max Vel=5.35 fps Inflow=18.56 cfs 1.205 af n=0.028 L=457.0' S=0.0219 '/' Capacity=100.17 cfs Outflow=17.96 cfs 1.202 af
Reach 3R:	Avg. Flow Depth=0.25' Max Vel=4.95 fps Inflow=3.11 cfs 0.149 af n=0.028 L=348.0' S=0.0747 '/' Capacity=185.10 cfs Outflow=2.93 cfs 0.149 af
Reach 4R: North Channel - 1	Avg. Flow Depth=1.03' Max Vel=3.91 fps Inflow=18.83 cfs 1.089 af n=0.028 L=1,200.0' S=0.0100 '/' Capacity=67.72 cfs Outflow=15.97 cfs 1.081 af
Reach 5R: North Channel - 2	Avg. Flow Depth=0.70' Max Vel=8.56 fps Inflow=20.36 cfs 1.598 af n=0.028 L=850.0' S=0.0729 '/' Capacity=182.89 cfs Outflow=20.00 cfs 1.594 af
Reach 6R:	Avg. Flow Depth=0.93' Max Vel=3.85 fps Inflow=13.98 cfs 0.917 af n=0.028 L=185.0' S=0.0108 '/' Capacity=70.41 cfs Outflow=13.68 cfs 0.916 af
Reach 7R: MSE Berm Swale	Avg. Flow Depth=0.14' Max Vel=1.67 fps Inflow=0.45 cfs 0.027 af n=0.028 L=850.0' S=0.0188 '/' Capacity=14.63 cfs Outflow=0.29 cfs 0.026 af

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Page 8

Pond 1P: Drop Inlet 1

Peak Elev=203.22' Inflow=32.08 cfs 2.510 af
36.0" Round Culvert n=0.013 L=65.0' S=0.0092 '/' Outflow=32.08 cfs 2.510 af

Pond 2P: Drop Inlet Structure

Peak Elev=187.63' Inflow=2.93 cfs 0.149 af
36.0" Round Culvert n=0.011 L=36.0' S=0.0500 '/' Outflow=2.93 cfs 0.149 af

Pond 3P: Stormwater Manhole

Peak Elev=181.08' Inflow=19.84 cfs 1.352 af
Primary=19.84 cfs 1.352 af Secondary=0.00 cfs 0.000 af Outflow=19.84 cfs 1.352 af

Pond 8P: Drop Inlet Structure

Peak Elev=188.68' Inflow=17.96 cfs 1.202 af
36.0" Round Culvert n=0.011 L=80.0' S=0.0500 '/' Outflow=17.96 cfs 1.202 af

Pond 26P: North Pond

Peak Elev=151.81' Storage=133,473 cf Inflow=53.37 cfs 4.294 af
Discarded=1.38 cfs 1.312 af Primary=0.00 cfs 0.000 af Outflow=1.38 cfs 1.312 af

Total Runoff Area = 44.915 ac Runoff Volume = 4.312 af Average Runoff Depth = 1.15"
96.15% Pervious = 43.185 ac 3.85% Impervious = 1.730 ac

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Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 9

Summary for Subcatchment 8S:

Runoff = 18.83 cfs @ 12.04 hrs, Volume= 1.089 af, Depth> 1.10"

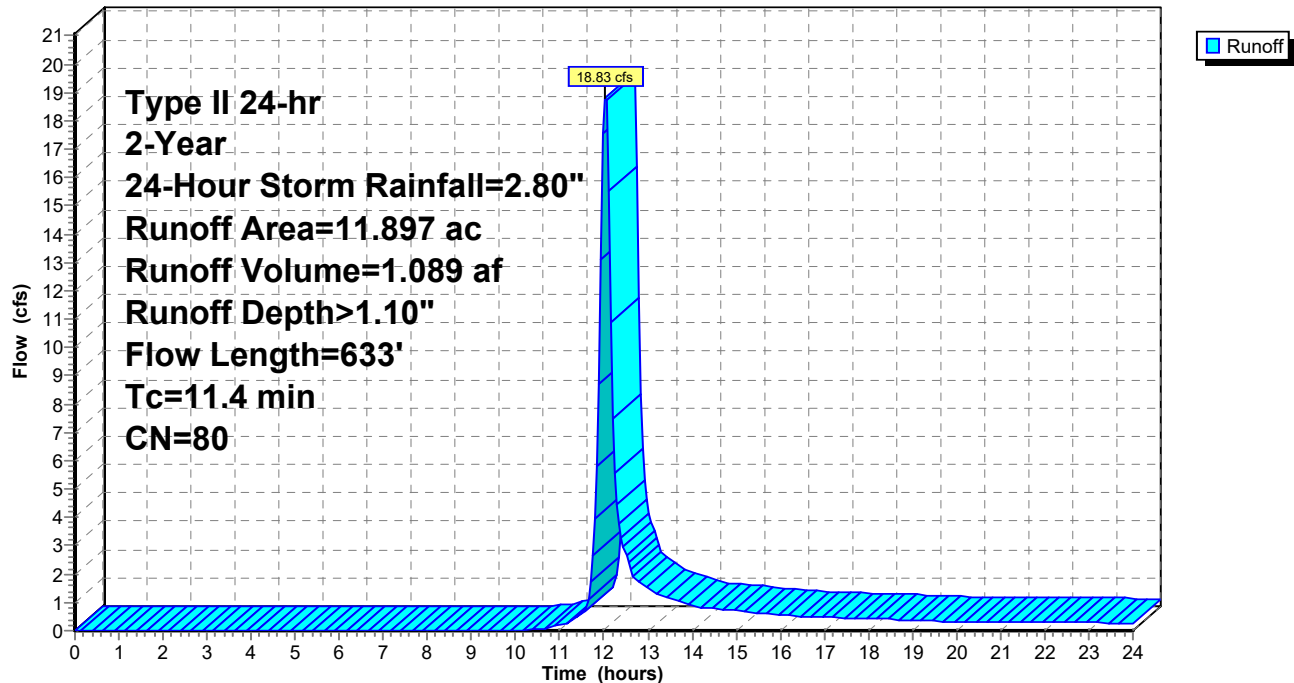
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

Area (ac)	CN	Description
* 11.340	80	Cap
0.557	85	Gravel roads, HSG B
11.897	80	Weighted Average
11.897		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Section 1 Grass: Short n= 0.150 P2= 2.80"
3.7	351	0.0500	1.57		Shallow Concentrated Flow, Section 2 Short Grass Pasture Kv= 7.0 fps
0.4	182	0.0250	7.37	41.47	Trap/Vee/Rect Channel Flow, Diversion Berm 1 Bot.W=0.00' D=1.50' Z= 3.0 & 2.0 ' Top.W=7.50' n= 0.025
11.4	633	Total			

Subcatchment 8S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 10

Summary for Subcatchment 9S:

[47] Hint: Peak is 292% of capacity of segment #3

Runoff = 9.15 cfs @ 12.03 hrs, Volume= 0.518 af, Depth> 1.10"

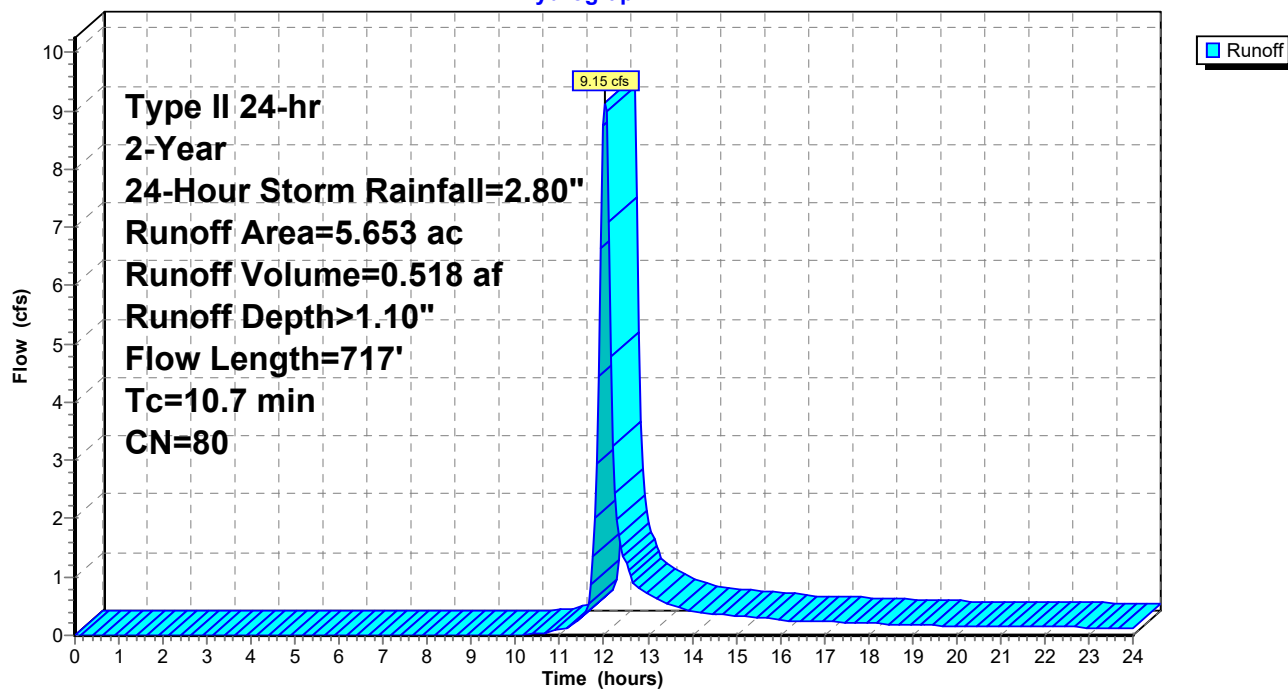
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

Area (ac)	CN	Description
* 5.113	80	Cap
0.540	85	Gravel roads, HSG B
5.653	80	Weighted Average
5.653		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Section 1 Grass: Short n= 0.150 P2= 2.80"
2.0	191	0.0500	1.57		Shallow Concentrated Flow, Section 2 Short Grass Pasture Kv= 7.0 fps
1.4	406	0.0500	5.01	3.13	Trap/Vee/Rect Channel Flow, Diversion Berm 1 Bot.W=0.00' D=0.50' Z= 3.0 & 2.0 ' / ' Top.W=2.50' n= 0.025
0.0	20	0.3333	17.70	79.67	Trap/Vee/Rect Channel Flow, Let-Down Channel 1 Bot.W=3.00' D=1.50' n= 0.040
10.7	717	Total			

Subcatchment 9S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 12

Summary for Subcatchment 10S:

[47] Hint: Peak is 716% of capacity of segment #4

Runoff = 12.85 cfs @ 12.08 hrs, Volume= 0.844 af, Depth> 1.10"

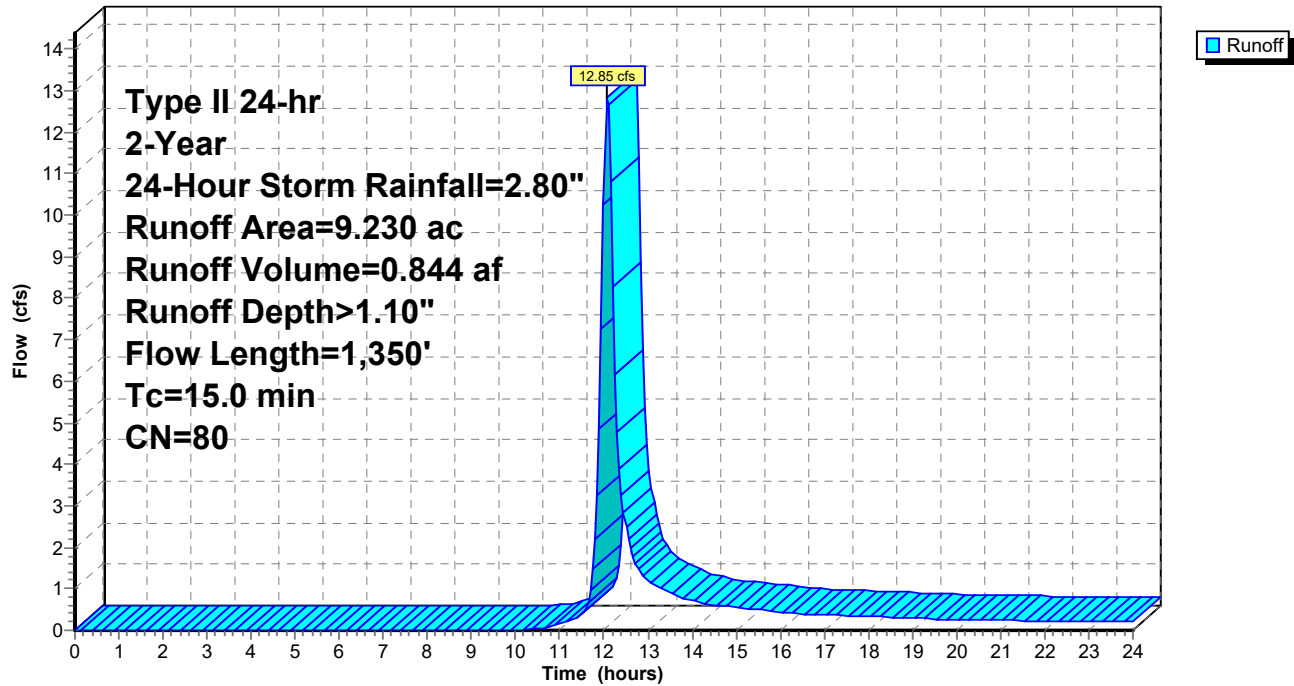
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

Area (ac)	CN	Description
* 9.230	80	Cap
9.230		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Grass: Short n= 0.150 P2= 2.80"
5.2	488	0.0500	1.57		Shallow Concentrated Flow, Section 1 Short Grass Pasture Kv= 7.0 fps
0.3	70	0.3300	4.02		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	280	0.0400	2.87	1.80	Trap/Vee/Rect Channel Flow, Diversion Berm 1 Bot.W=0.00' D=0.50' Z= 3.0 & 2.0 '/' Top.W=2.50' n= 0.039
0.2	222	0.3333	17.70	79.67	Trap/Vee/Rect Channel Flow, Gabion Downchute Bot.W=3.00' D=1.50' n= 0.040
0.4	190	0.0210	7.63	91.59	Trap/Vee/Rect Channel Flow, North Channel Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.030
15.0	1,350	Total			

Subcatchment 10S:

Hydrograph



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Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 14

Summary for Subcatchment 11S:

Runoff = 1.37 cfs @ 12.01 hrs, Volume= 0.073 af, Depth> 1.16"

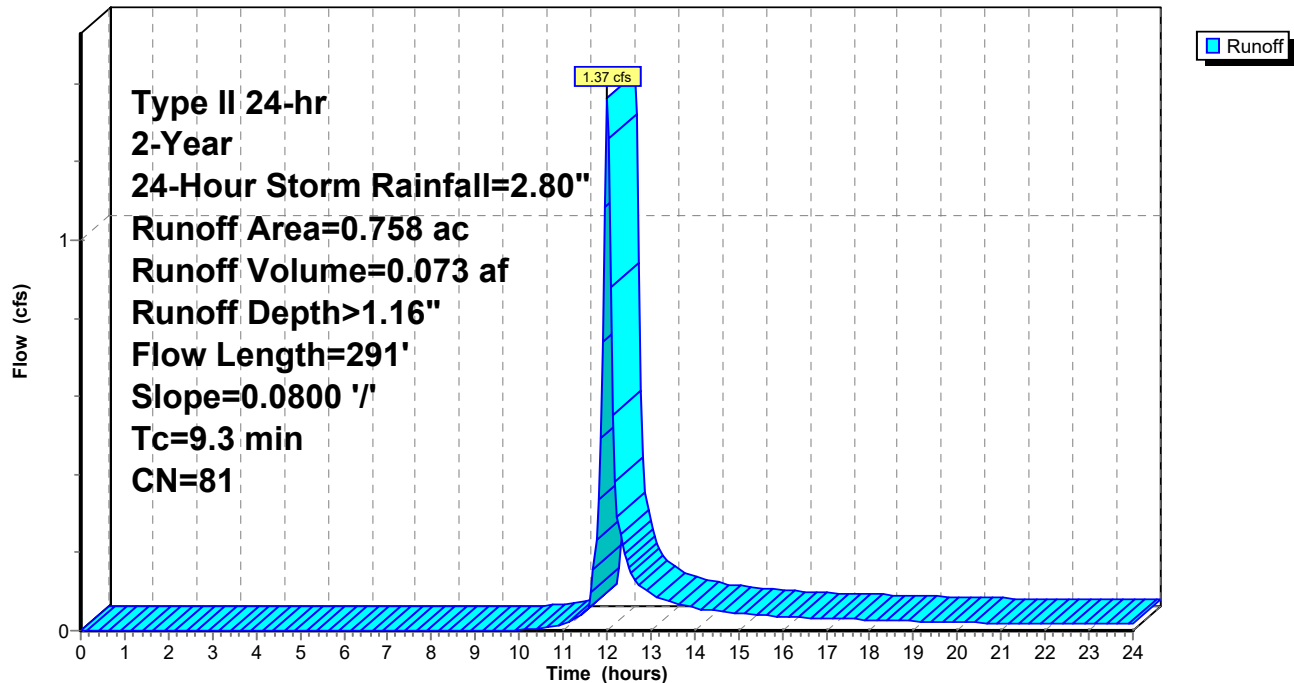
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

Area (ac)	CN	Description
* 0.576	80	CAP
0.182	85	Gravel roads, HSG B
0.758	81	Weighted Average
0.758		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0800	0.19		Sheet Flow, MSE Exterior Slope Grass: Dense n= 0.240 P2= 2.80"
0.2	20	0.0800	1.98		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	171	0.0800	9.56	14.34	Trap/Vee/Rect Channel Flow, Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.022 Earth, clean & straight
9.3	291	Total			

Subcatchment 11S:

Hydrograph



Post-Development_North Pond

Summary for Subcatchment 12S:

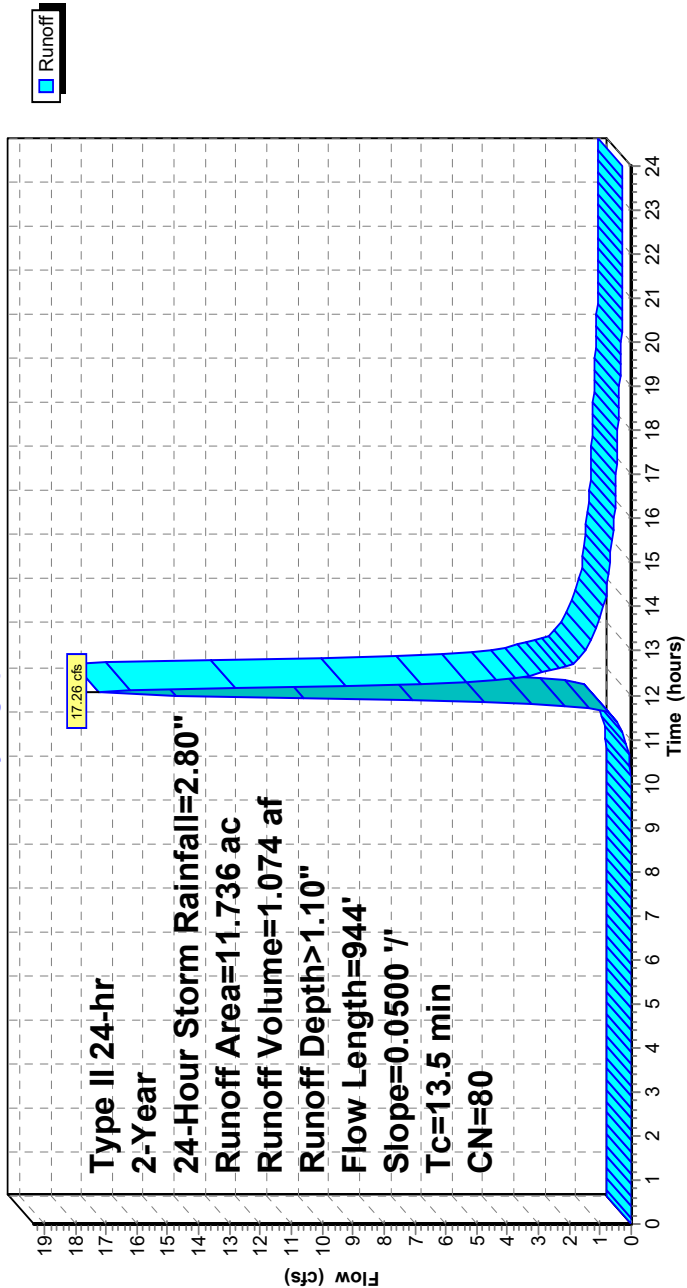
Runoff = 17.26 cfs @ 12.06 hrs, Volume= 1.074 af, Depth> 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

Area (ac)		CN	Description		
*	11.736	80			
11.736		100.00% Pervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Plateau Grass: Short n= 0.150 P2= 2.80"
3.8	359	0.0500	1.57		Shallow Concentrated Flow, Plateau Short Grass Pasture Kv= 7.0 fps
2.4	485	0.0500	3.35		Shallow Concentrated Flow, Sideslope Berm Grassed Waterway Kv= 15.0 fps

Subcatchment 12S:

Hydrograph



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Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 16

Summary for Subcatchment 13S:

Runoff = 2.76 cfs @ 11.98 hrs, Volume= 0.132 af, Depth> 1.16"

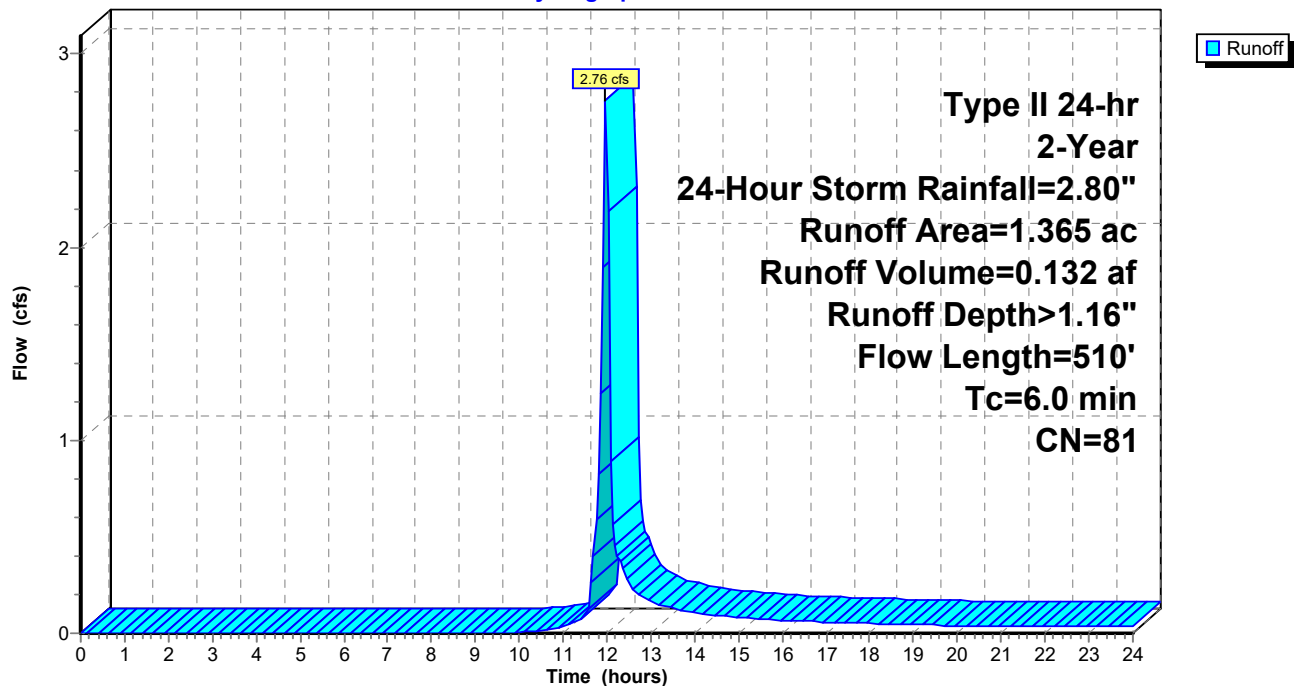
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

Area (ac)	CN	Description
* 1.080	80	Cap
* 0.285	85	Gravel Road
1.365	81	Weighted Average
1.365		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.3300	0.43		Sheet Flow, Section 1
					Grass: Short n= 0.150 P2= 2.80"
3.0	460	0.0300	2.60		Shallow Concentrated Flow, Perimeter Swale
					Grassed Waterway Kv= 15.0 fps
5.0	510	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 13S:

Hydrograph



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Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 17

Summary for Subcatchment 15S:

Runoff = 0.45 cfs @ 12.01 hrs, Volume= 0.027 af, Depth> 0.49"

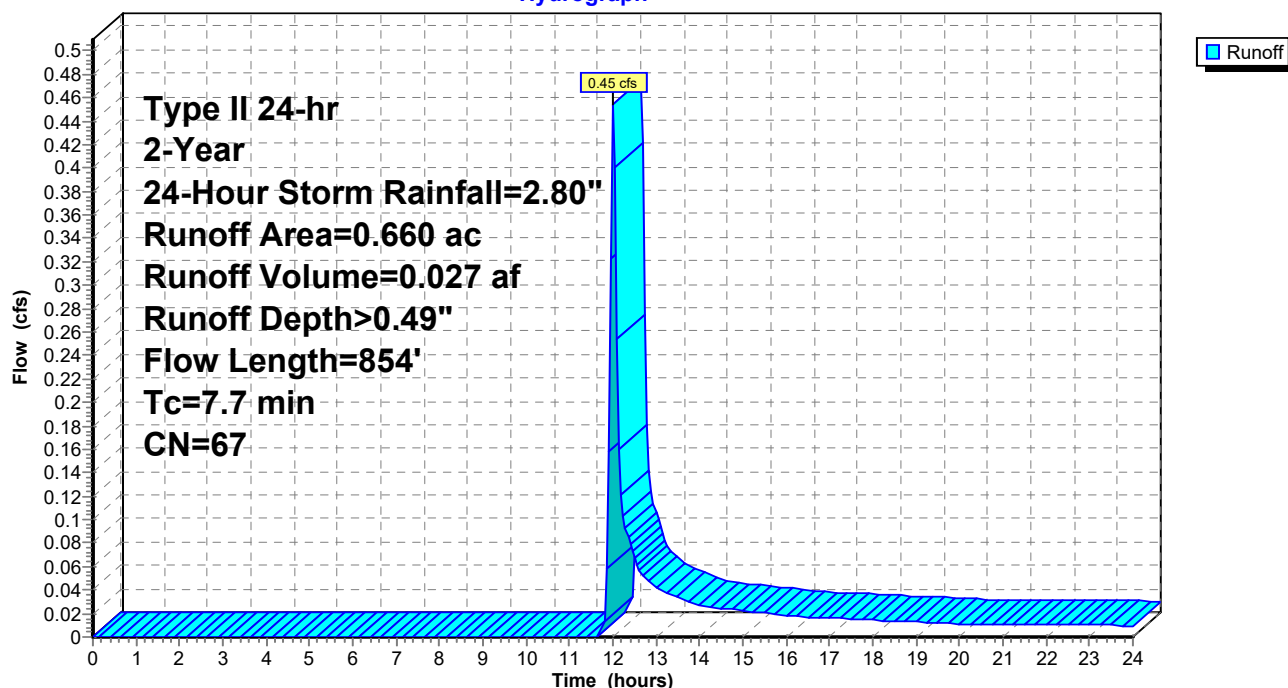
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

Area (ac)	CN	Description
* 0.660	67	Vegetation (Hyd. Group B)
0.660		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	29	0.0330	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 2.80"
4.5	825	0.0100	3.09	3.09	Trap/Vee/Rect Channel Flow, Bot.W=1.00' D=0.50' Z= 2.0 '/' Top.W=3.00' n= 0.022 Earth, clean & straight
7.7	854	Total			

Subcatchment 15S:

Hydrograph



Post-Development_North Pond

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Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 18

Summary for Subcatchment 16S:

Runoff = 3.11 cfs @ 11.98 hrs, Volume= 0.149 af, Depth> 1.16"

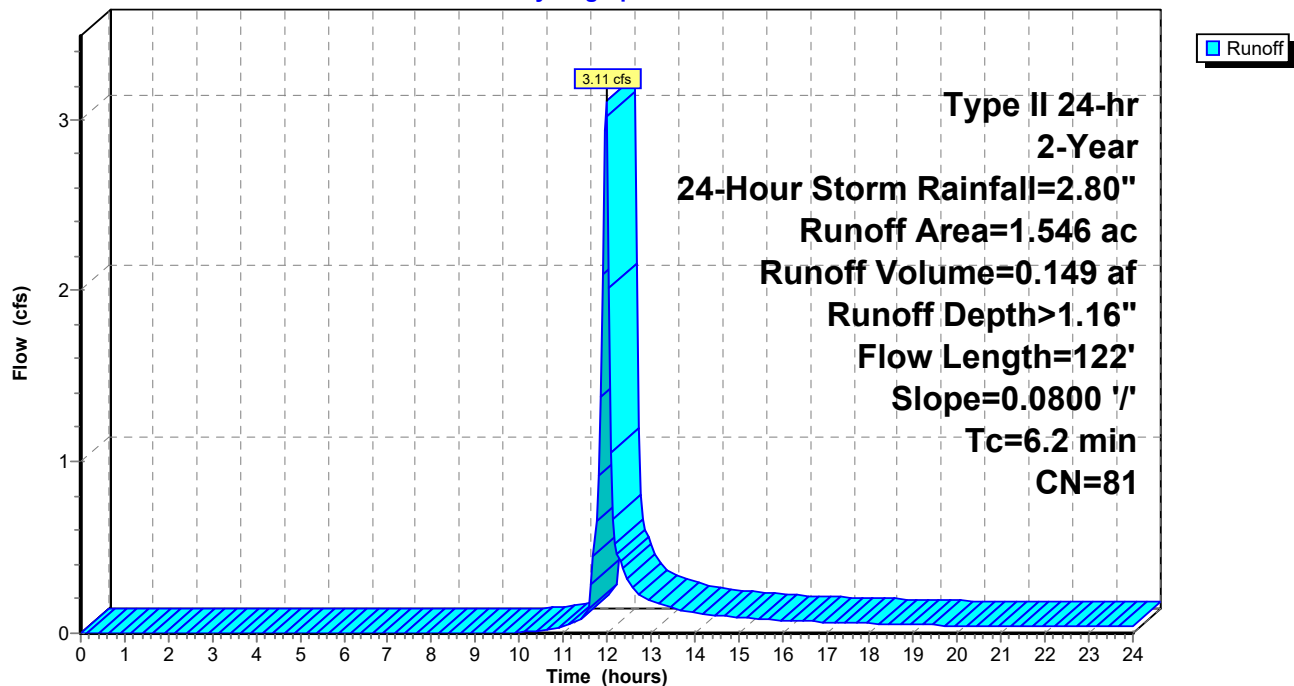
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

Area (ac)	CN	Description
* 1.224	80	Cap
* 0.322	85	Gravel Road
1.546	81	Weighted Average
1.546		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	100	0.0800	0.28		Sheet Flow, Grass: Short n= 0.150 P2= 2.80"
0.2	22	0.0800	1.98		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.2	122	Total			

Subcatchment 16S:

Hydrograph



Post-Development_North Pond

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Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 19

Summary for Subcatchment NP:

Runoff = 7.63 cfs @ 11.96 hrs, Volume= 0.406 af, Depth> 2.35"

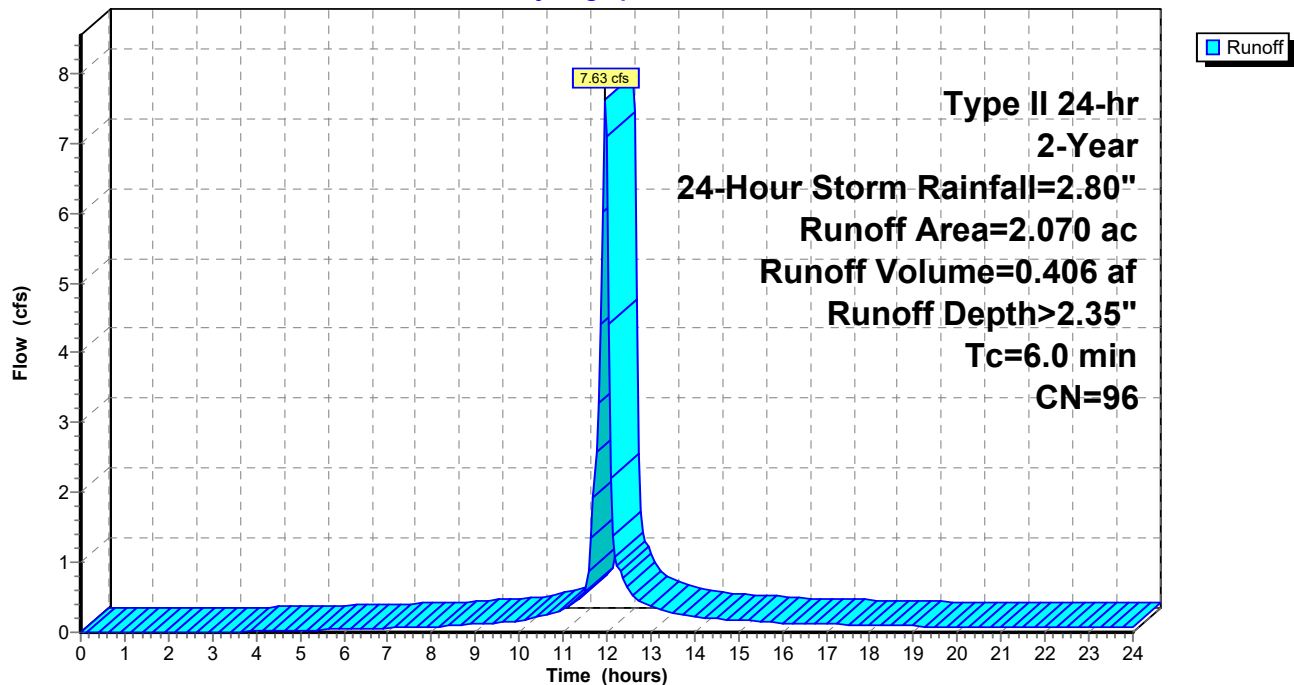
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

Area (ac)	CN	Description
* 1.730	98	Basin
* 0.340	85	Gravel Road
2.070	96	Weighted Average
0.340		16.43% Pervious Area
1.730		83.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0					Direct Entry,
1.0	0				Total, Increased to minimum Tc = 6.0 min

Subcatchment NP:

Hydrograph



Summary for Reach 1R: Gabion Downchute

Mannings from Figure 5B.11 Determining "n" for Riprap Lined Channel Using Depth of Flow

Inflow Area = 11.736 ac, 0.00% Impervious, Inflow Depth > 1.10" for 2-Year, 24-Hour Storm event
 Inflow = 17.26 cfs @ 12.06 hrs, Volume= 1.074 af
 Outflow = 17.06 cfs @ 12.07 hrs, Volume= 1.073 af, Atten= 1%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 13.56 fps, Min. Travel Time= 0.3 min

Avg. Velocity = 3.83 fps, Avg. Travel Time= 1.1 min

Peak Storage= 330 cf @ 12.06 hrs

Average Depth at Peak Storage= 0.42' , Surface Width= 3.00'

Bank-Full Depth= 1.50' Flow Area= 4.5 sf, Capacity= 105.82 cfs

3.00' x 1.50' deep channel, n= 0.030

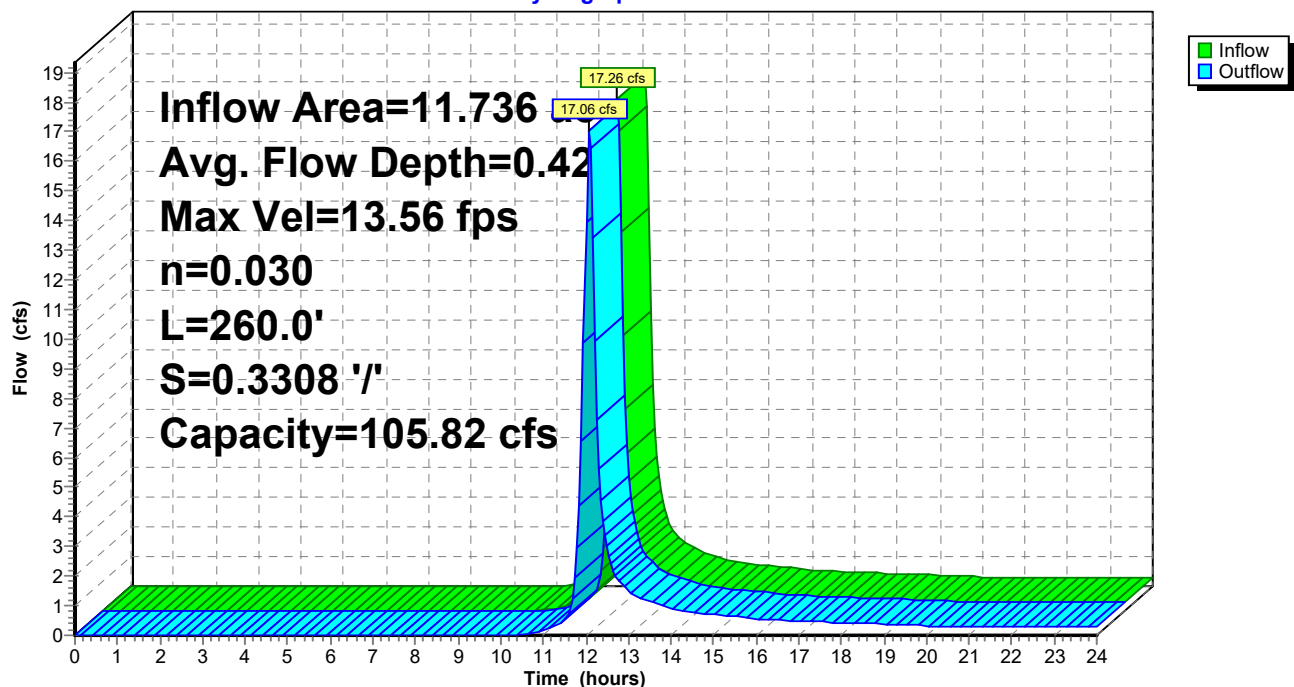
Length= 260.0' Slope= 0.3308 '/'

Inlet Invert= 290.00', Outlet Invert= 204.00'



Reach 1R: Gabion Downchute

Hydrograph



Post-Development_North Pond

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Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 21

Summary for Reach 2R: North Channel - 3

[62] Hint: Exceeded Reach 1R OUTLET depth by 0.48' @ 12.10 hrs

Inflow Area = 13.101 ac, 0.00% Impervious, Inflow Depth > 1.10" fo2-Year, 24-Hour Storm event
Inflow = 18.56 cfs @ 12.06 hrs, Volume= 1.205 af
Outflow = 17.96 cfs @ 12.10 hrs, Volume= 1.202 af, Atten= 3%, Lag= 2.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 5.35 fps, Min. Travel Time= 1.4 min

Avg. Velocity = 1.89 fps, Avg. Travel Time= 4.0 min

Peak Storage= 1,559 cf @ 12.07 hrs

Average Depth at Peak Storage= 0.90' , Surface Width= 5.60'

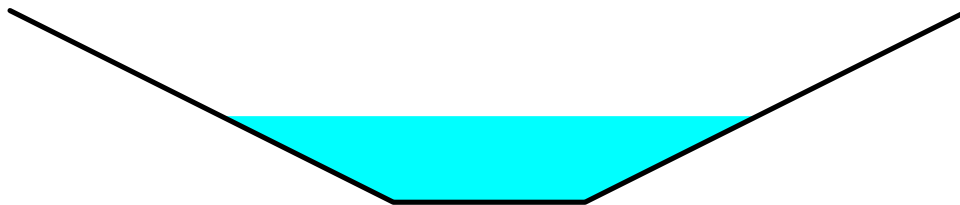
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 100.17 cfs

2.00' x 2.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 '/' Top Width= 10.00'

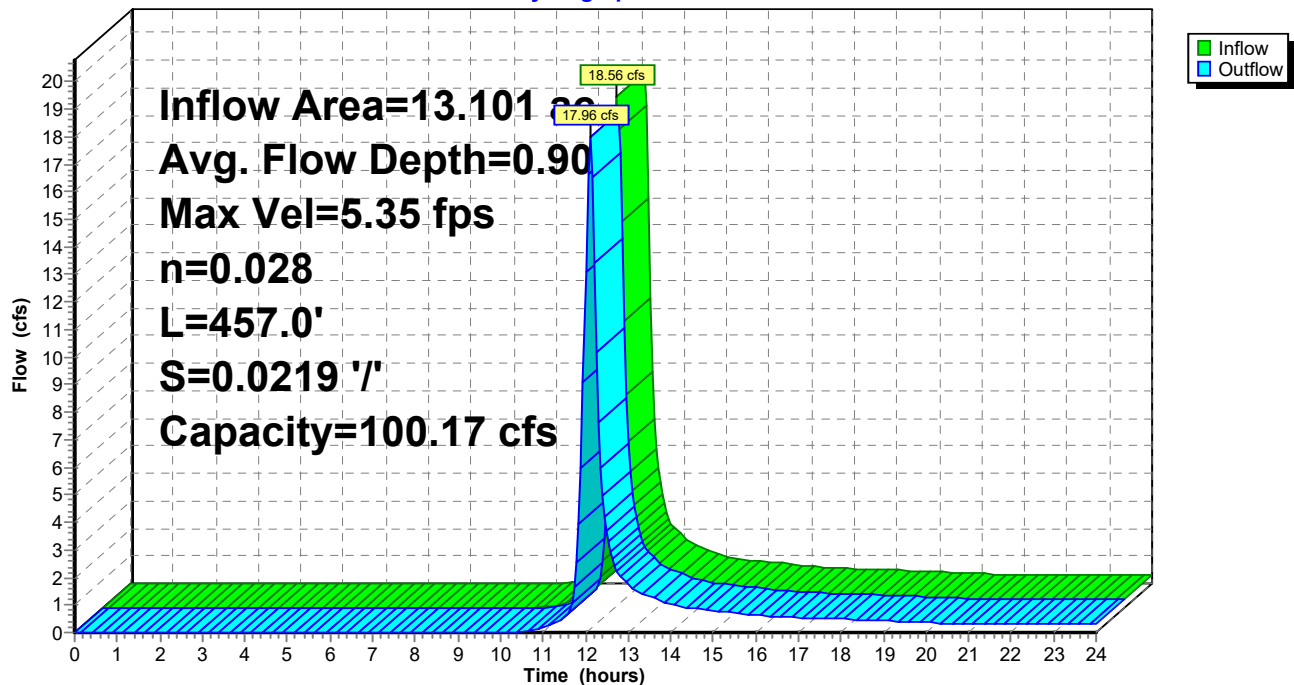
Length= 457.0' Slope= 0.0219 '/'

Inlet Invert= 204.00', Outlet Invert= 194.00'



Reach 2R: North Channel - 3

Hydrograph



Post-Development_North Pond

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Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 22

Summary for Reach 3R:

Inflow Area = 1.546 ac, 0.00% Impervious, Inflow Depth > 1.16" for 2-Year, 24-Hour Storm event
Inflow = 3.11 cfs @ 11.98 hrs, Volume= 0.149 af
Outflow = 2.93 cfs @ 12.01 hrs, Volume= 0.149 af, Atten= 6%, Lag= 1.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 4.95 fps, Min. Travel Time= 1.2 min

Avg. Velocity = 1.38 fps, Avg. Travel Time= 4.2 min

Peak Storage= 216 cf @ 11.99 hrs

Average Depth at Peak Storage= 0.25', Surface Width= 2.99'

Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 185.10 cfs

2.00' x 2.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 '/' Top Width= 10.00'

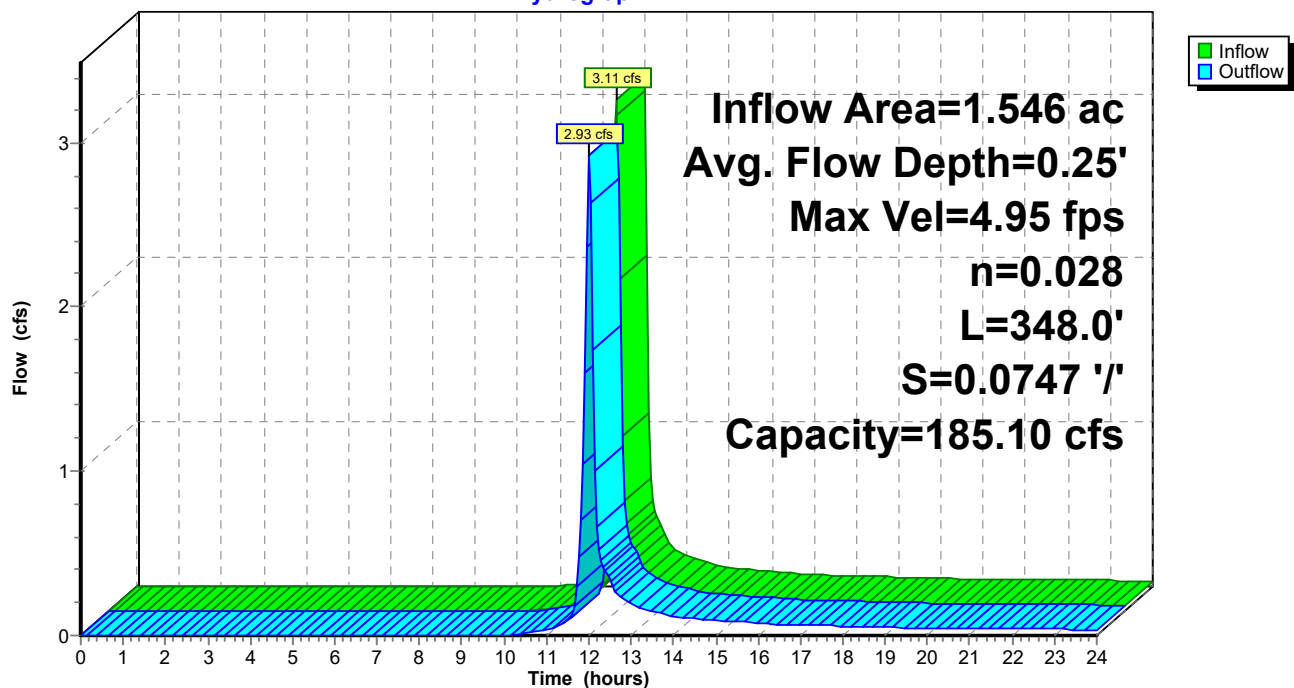
Length= 348.0' Slope= 0.0747 '/'

Inlet Invert= 220.00', Outlet Invert= 194.00'



Reach 3R:

Hydrograph



Post-Development_North Pond

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Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 23

Summary for Reach 4R: North Channel - 1

Inflow Area = 11.897 ac, 0.00% Impervious, Inflow Depth > 1.10" fo2-Year, 24-Hour Storm event
Inflow = 18.83 cfs @ 12.04 hrs, Volume= 1.089 af
Outflow = 15.97 cfs @ 12.18 hrs, Volume= 1.081 af, Atten= 15%, Lag= 8.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 3.91 fps, Min. Travel Time= 5.1 min

Avg. Velocity = 1.42 fps, Avg. Travel Time= 14.1 min

Peak Storage= 5,009 cf @ 12.09 hrs

Average Depth at Peak Storage= 1.03' , Surface Width= 6.12'

Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 67.72 cfs

2.00' x 2.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 ' / ' Top Width= 10.00'

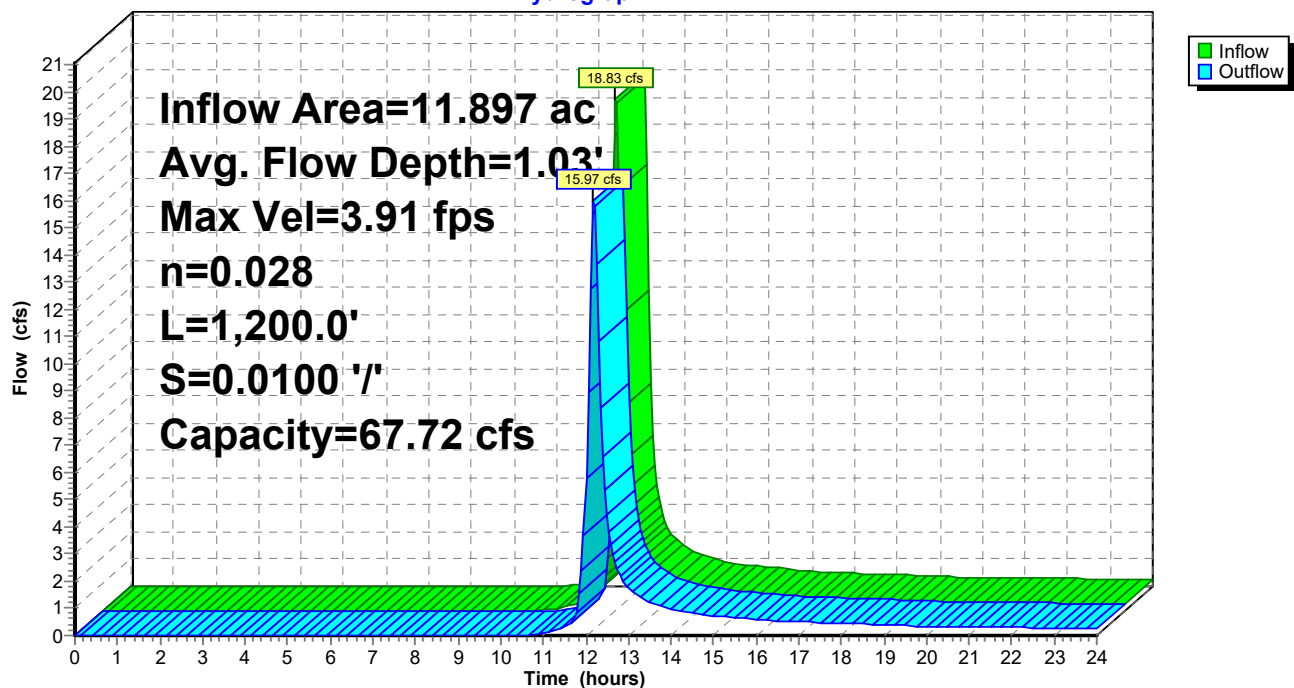
Length= 1,200.0' Slope= 0.0100 ' / '

Inlet Invert= 290.00', Outlet Invert= 278.00'



Reach 4R: North Channel - 1

Hydrograph



Post-Development_North Pond

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Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 24

Summary for Reach 5R: North Channel - 2

[61] Hint: Exceeded Reach 4R outlet invert by 0.70' @ 12.15 hrs

Inflow Area = 17.550 ac, 0.00% Impervious, Inflow Depth > 1.09" fo2-Year, 24-Hour Storm event
Inflow = 20.36 cfs @ 12.14 hrs, Volume= 1.598 af
Outflow = 20.00 cfs @ 12.19 hrs, Volume= 1.594 af, Atten= 2%, Lag= 2.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 8.56 fps, Min. Travel Time= 1.7 min

Avg. Velocity = 3.14 fps, Avg. Travel Time= 4.5 min

Peak Storage= 2,005 cf @ 12.16 hrs

Average Depth at Peak Storage= 0.70' , Surface Width= 4.78'

Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 182.89 cfs

2.00' x 2.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 '/' Top Width= 10.00'

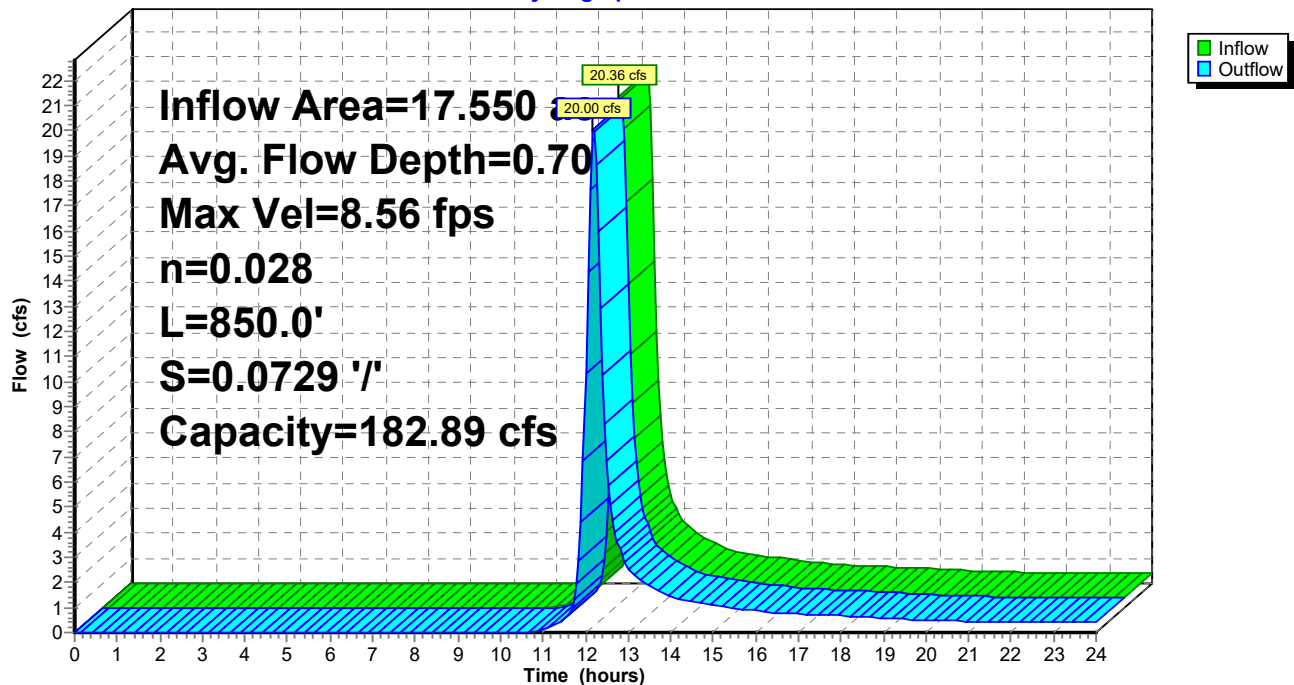
Length= 850.0' Slope= 0.0729 '/'

Inlet Invert= 278.00', Outlet Invert= 216.00'



Reach 5R: North Channel - 2

Hydrograph



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Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 25

Summary for Reach 6R:

Inflow Area = 9.988 ac, 0.00% Impervious, Inflow Depth > 1.10" for 2-Year, 24-Hour Storm event
Inflow = 13.98 cfs @ 12.07 hrs, Volume= 0.917 af
Outflow = 13.68 cfs @ 12.10 hrs, Volume= 0.916 af, Atten= 2%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 3.85 fps, Min. Travel Time= 0.8 min

Avg. Velocity = 1.36 fps, Avg. Travel Time= 2.3 min

Peak Storage= 667 cf @ 12.08 hrs

Average Depth at Peak Storage= 0.93' , Surface Width= 5.73'

Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 70.41 cfs

2.00' x 2.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 ' / ' Top Width= 10.00'

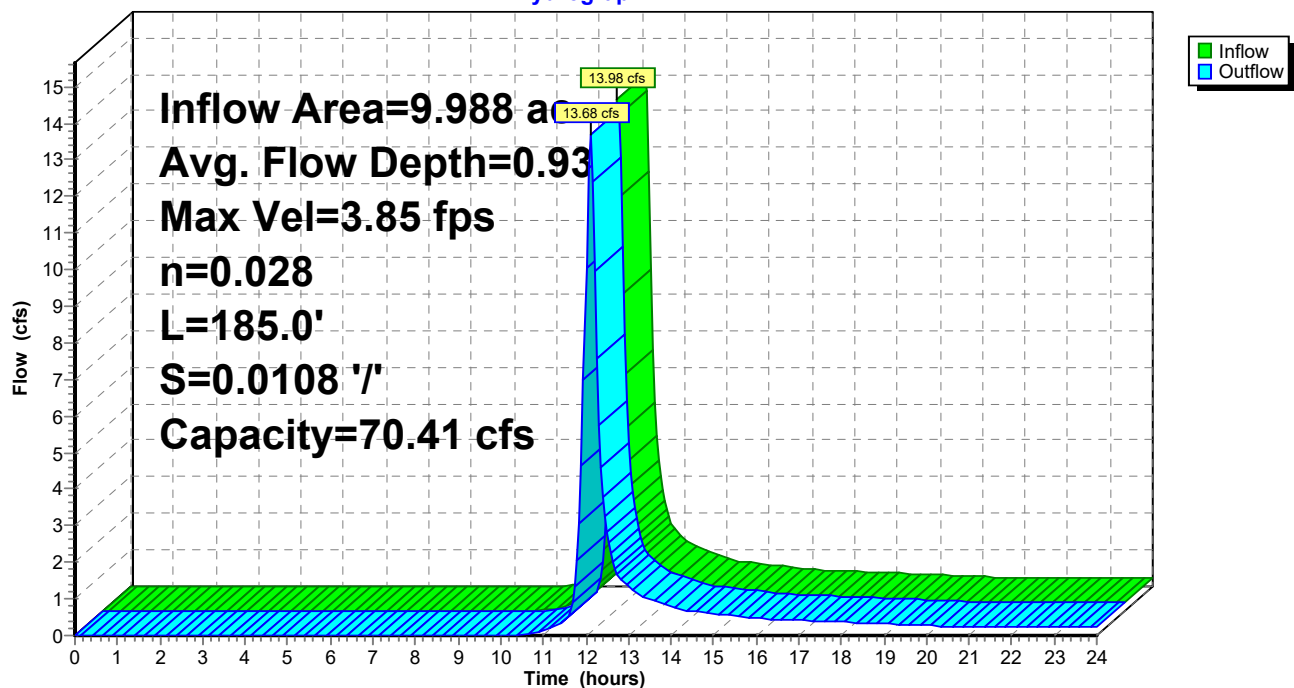
Length= 185.0' Slope= 0.0108 ' / '

Inlet Invert= 218.00', Outlet Invert= 216.00'



Reach 6R:

Hydrograph



Post-Development_North Pond

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Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 26

Summary for Reach 7R: MSE Berm Swale

Inflow Area = 0.660 ac, 0.00% Impervious, Inflow Depth > 0.49" for 2-Year, 24-Hour Storm event
Inflow = 0.45 cfs @ 12.01 hrs, Volume= 0.027 af
Outflow = 0.29 cfs @ 12.24 hrs, Volume= 0.026 af, Atten= 36%, Lag= 13.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 1.67 fps, Min. Travel Time= 8.5 min

Avg. Velocity = 0.65 fps, Avg. Travel Time= 21.7 min

Peak Storage= 151 cf @ 12.09 hrs

Average Depth at Peak Storage= 0.14' , Surface Width= 1.55'

Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 14.63 cfs

1.00' x 1.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 ' / ' Top Width= 5.00'

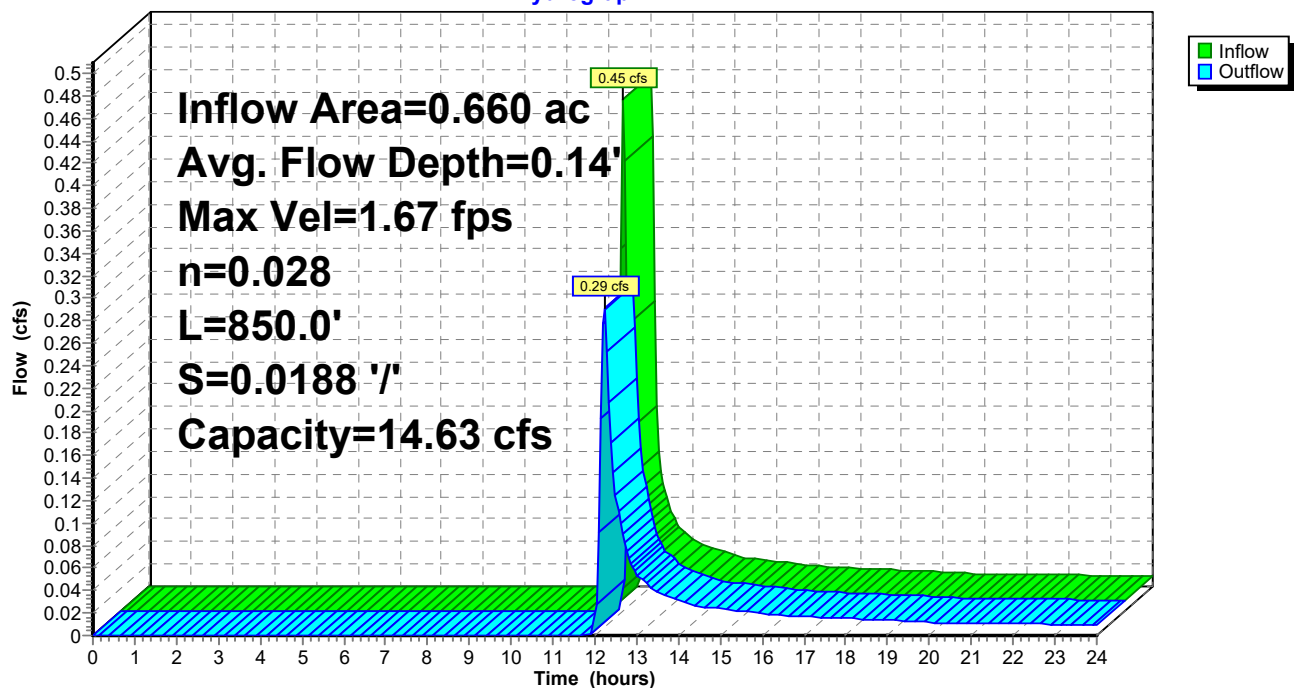
Length= 850.0' Slope= 0.0188 ' / '

Inlet Invert= 216.00', Outlet Invert= 200.00'



Reach 7R: MSE Berm Swale

Hydrograph



Post-Development_North Pond

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Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 27

Summary for Pond 1P: Drop Inlet 1

Inflow Area = 27.538 ac, 0.00% Impervious, Inflow Depth > 1.09" for 2-Year, 24-Hour Storm event
Inflow = 32.08 cfs @ 12.14 hrs, Volume= 2.510 af
Outflow = 32.08 cfs @ 12.14 hrs, Volume= 2.510 af, Atten= 0%, Lag= 0.0 min
Primary = 32.08 cfs @ 12.14 hrs, Volume= 2.510 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 203.22' @ 12.14 hrs

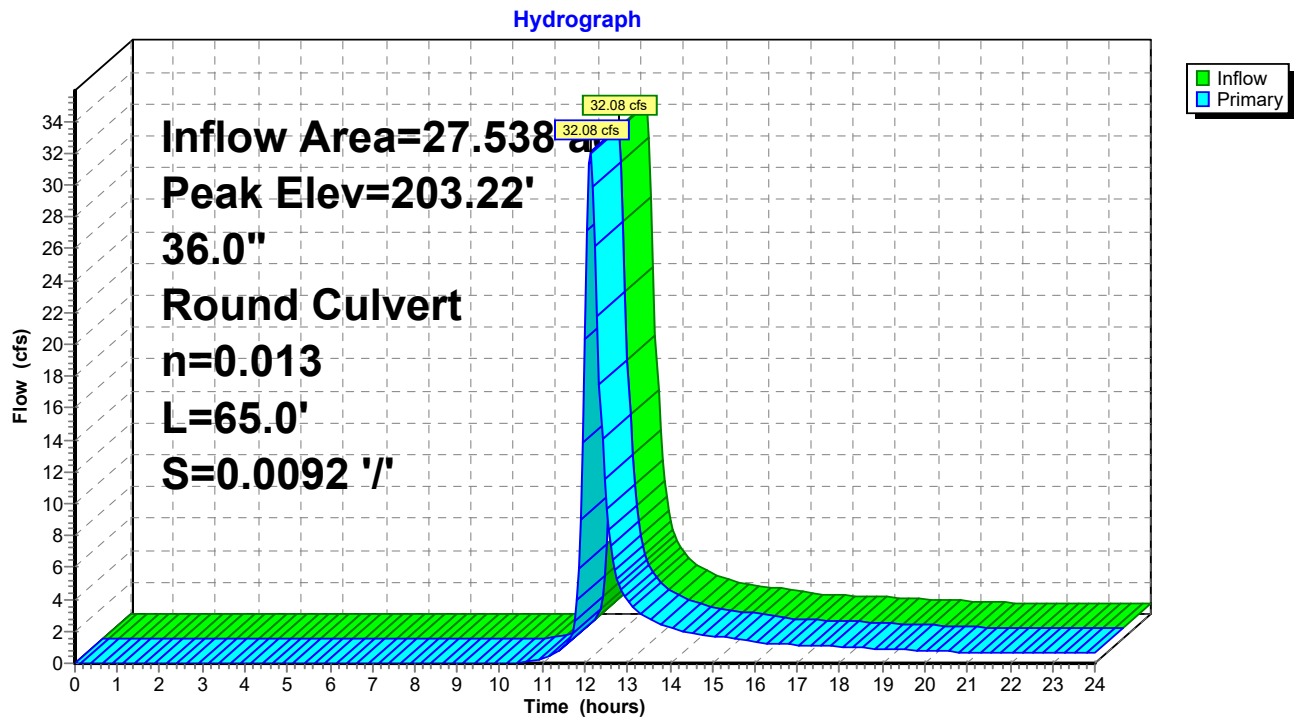
Flood Elev= 220.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	200.60'	36.0" Round Culvert L= 65.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 200.60' / 200.00' S= 0.0092 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=31.81 cfs @ 12.14 hrs HW=203.20' (Free Discharge)

1=Culvert (Barrel Controls 31.81 cfs @ 6.53 fps)

Pond 1P: Drop Inlet 1



Summary for Pond 2P: Drop Inlet Structure

Inflow Area = 1.546 ac, 0.00% Impervious, Inflow Depth > 1.16" fo2-Year, 24-Hour Storm event
 Inflow = 2.93 cfs @ 12.01 hrs, Volume= 0.149 af
 Outflow = 2.93 cfs @ 12.01 hrs, Volume= 0.149 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.93 cfs @ 12.01 hrs, Volume= 0.149 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 187.63' @ 12.01 hrs

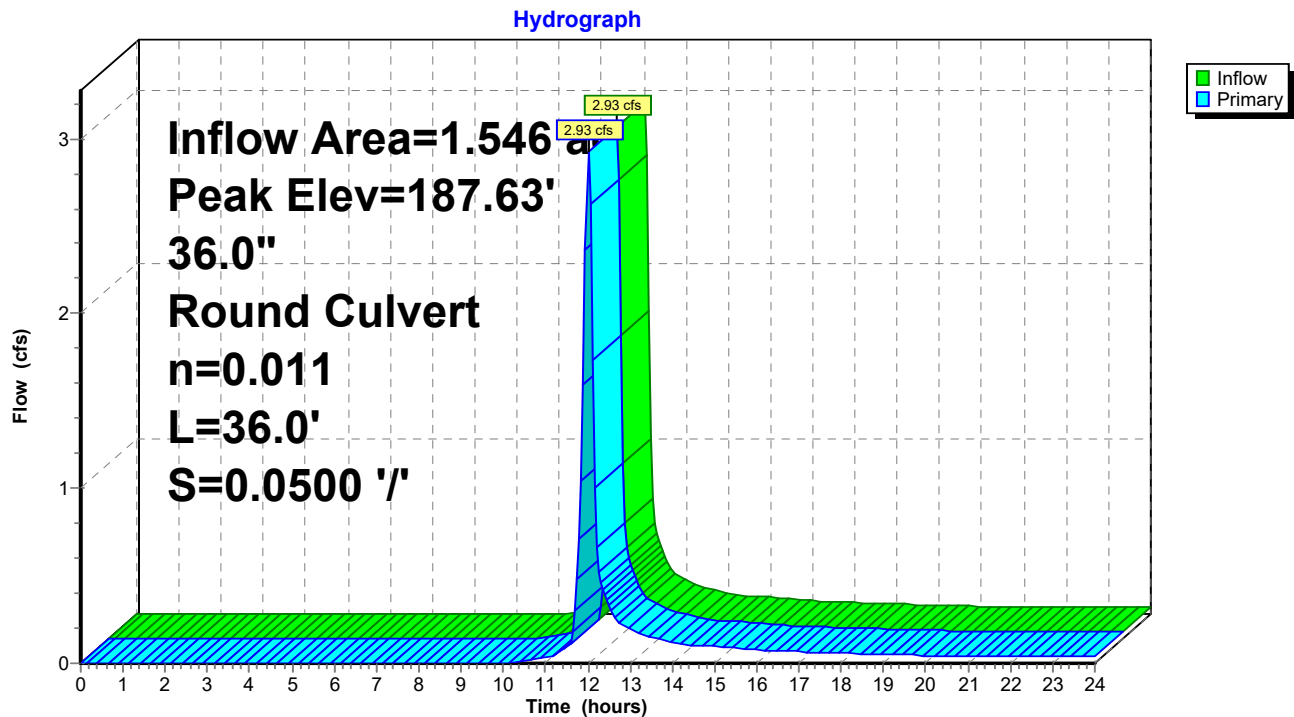
Flood Elev= 196.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	187.00'	36.0" Round 36" HDPE Pipe L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 187.00' / 185.20' S= 0.0500 '/ Cc= 0.900 n= 0.011, Flow Area= 7.07 sf

Primary OutFlow Max=2.87 cfs @ 12.01 hrs HW=187.62' (Free Discharge)

1=36" HDPE Pipe (Inlet Controls 2.87 cfs @ 2.69 fps)

Pond 2P: Drop Inlet Structure



Post-Development_North Pond

Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 29

Summary for Pond 3P: Stormwater Manhole

Inflow Area = 14.647 ac, 0.00% Impervious, Inflow Depth > 1.11" fo2-Year, 24-Hour Storm event
 Inflow = 19.84 cfs @ 12.08 hrs, Volume= 1.352 af
 Outflow = 19.84 cfs @ 12.08 hrs, Volume= 1.352 af, Atten= 0%, Lag= 0.0 min
 Primary = 19.84 cfs @ 12.08 hrs, Volume= 1.352 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 181.08' @ 12.08 hrs

Flood Elev= 188.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	179.30'	36.0" Round 36" HDPE Pipe L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 179.30' / 177.00' S= 0.0500 '/' Cc= 0.900 n= 0.011, Flow Area= 7.07 sf
#2	Secondary	196.00'	6.0' long x 1.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

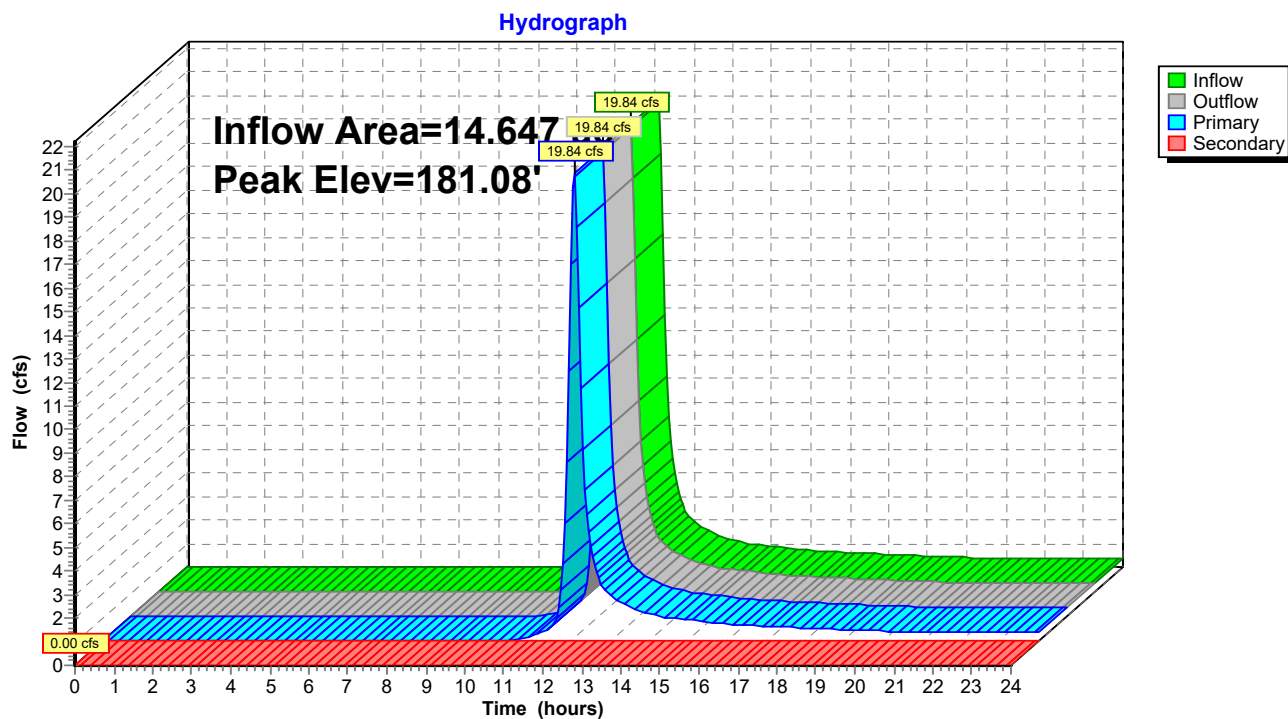
Primary OutFlow Max=19.54 cfs @ 12.08 hrs HW=181.06' (Free Discharge)

↑1=36" HDPE Pipe (Inlet Controls 19.54 cfs @ 4.52 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=179.30' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 3P: Stormwater Manhole



Summary for Pond 8P: Drop Inlet Structure

Inflow Area = 13.101 ac, 0.00% Impervious, Inflow Depth > 1.10" fo2-Year, 24-Hour Storm event
 Inflow = 17.96 cfs @ 12.10 hrs, Volume= 1.202 af
 Outflow = 17.96 cfs @ 12.10 hrs, Volume= 1.202 af, Atten= 0%, Lag= 0.0 min
 Primary = 17.96 cfs @ 12.10 hrs, Volume= 1.202 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 188.68' @ 12.10 hrs

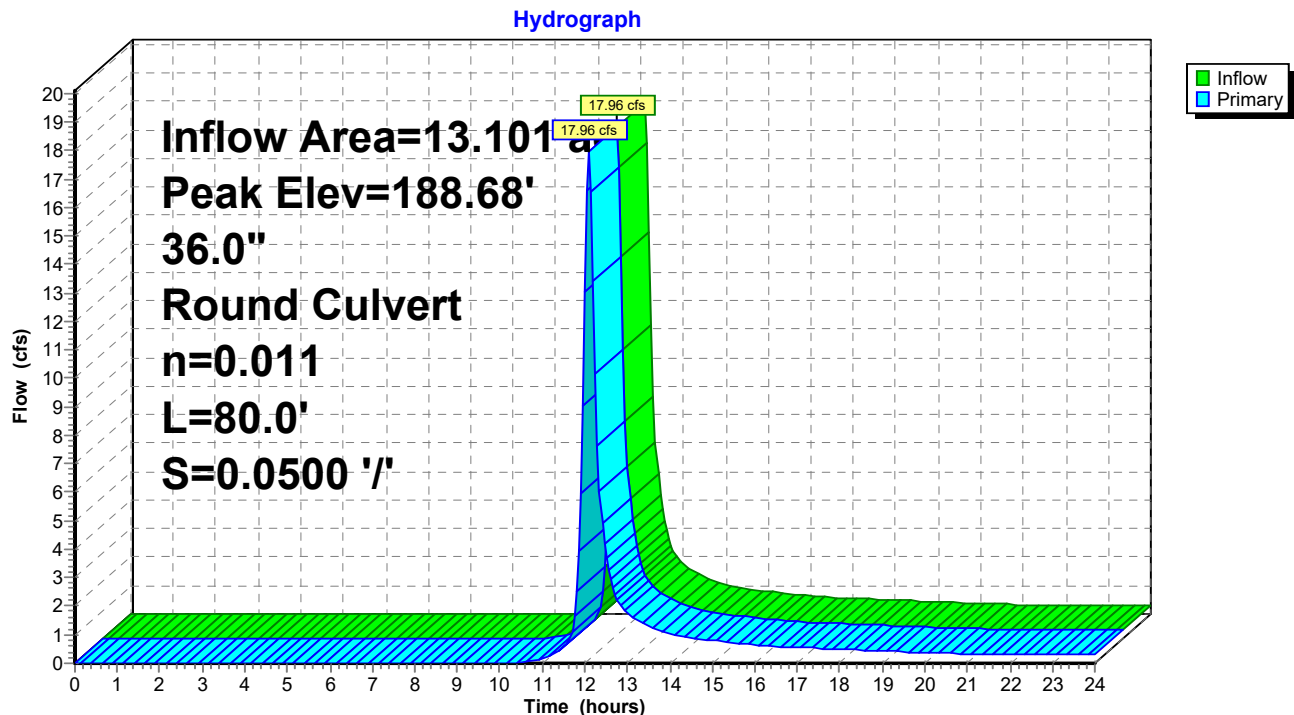
Flood Elev= 196.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	187.00'	36.0" Round Culvert L= 80.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 187.00' / 183.00' S= 0.0500 '/' Cc= 0.900 n= 0.011, Flow Area= 7.07 sf

Primary OutFlow Max=17.94 cfs @ 12.10 hrs HW=188.68' (Free Discharge)

↑1=Culvert (Inlet Controls 17.94 cfs @ 4.41 fps)

Pond 8P: Drop Inlet Structure



Post-Development_North Pond

Type II 24-hr 2-Year, 24-Hour Storm Rainfall=2.80"

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Page 32

Summary for Pond 26P: North Pond

Inflow Area = 44.915 ac, 3.85% Impervious, Inflow Depth > 1.15" for 2-Year, 24-Hour Storm event
 Inflow = 53.37 cfs @ 12.10 hrs, Volume= 4.294 af
 Outflow = 1.38 cfs @ 19.45 hrs, Volume= 1.312 af, Atten= 97%, Lag= 441.2 min
 Discarded = 1.38 cfs @ 19.45 hrs, Volume= 1.312 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 151.81' @ 19.45 hrs Surf.Area= 17,623 sf Storage= 133,473 cf

Plug-Flow detention time= 379.8 min calculated for 1.309 af (30% of inflow)
 Center-of-Mass det. time= 241.1 min (1,089.6 - 848.5)

Volume	Invert	Avail.Storage	Storage Description
#1	140.00'	731,085 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.00	5,675	0	0
150.00	15,091	103,830	103,830
160.00	29,062	220,765	324,595
170.00	52,236	406,490	731,085

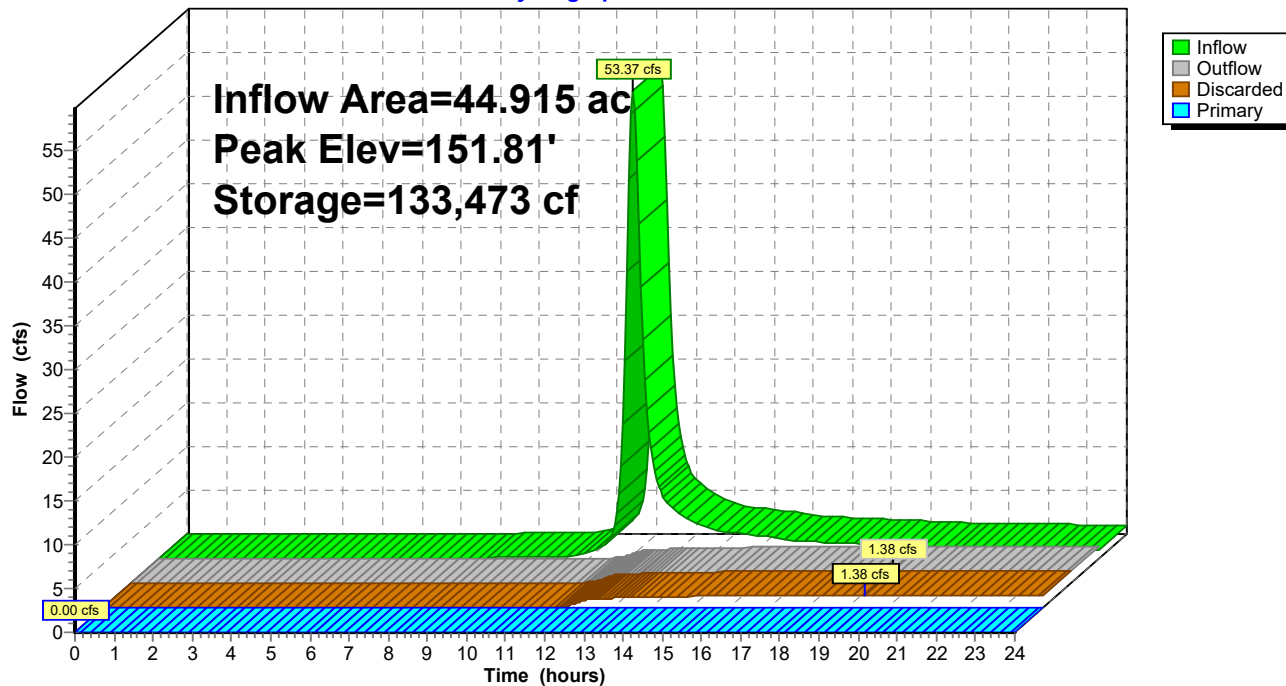
Device	Routing	Invert	Outlet Devices
#1	Discarded	140.00'	5.000 in/hr Exfiltration over Horizontal area above 140.00' Excluded Horizontal area = 5,675 sf
#2	Primary	167.00'	17.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=1.38 cfs @ 19.45 hrs HW=151.81' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 1.38 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=140.00' (Free Discharge)
 ↑ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 26P: North Pond

Hydrograph



Post-Development_North Pond*Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"*

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Page 34

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment8S:	Runoff Area=11.897 ac 0.00% Impervious Runoff Depth>2.24" Flow Length=633' Tc=11.4 min CN=80 Runoff=38.71 cfs 2.225 af
Subcatchment9S:	Runoff Area=5.653 ac 0.00% Impervious Runoff Depth>2.24" Flow Length=717' Tc=10.7 min CN=80 Runoff=18.75 cfs 1.057 af
Subcatchment10S:	Runoff Area=9.230 ac 0.00% Impervious Runoff Depth>2.24" Flow Length=1,350' Tc=15.0 min CN=80 Runoff=26.67 cfs 1.724 af
Subcatchment11S:	Runoff Area=0.758 ac 0.00% Impervious Runoff Depth>2.33" Flow Length=291' Slope=0.0800 '/' Tc=9.3 min CN=81 Runoff=2.75 cfs 0.147 af
Subcatchment12S:	Runoff Area=11.736 ac 0.00% Impervious Runoff Depth>2.24" Flow Length=944' Slope=0.0500 '/' Tc=13.5 min CN=80 Runoff=35.68 cfs 2.193 af
Subcatchment13S:	Runoff Area=1.365 ac 0.00% Impervious Runoff Depth>2.33" Flow Length=510' Tc=6.0 min CN=81 Runoff=5.46 cfs 0.265 af
Subcatchment15S:	Runoff Area=0.660 ac 0.00% Impervious Runoff Depth>1.30" Flow Length=854' Tc=7.7 min CN=67 Runoff=1.39 cfs 0.071 af
Subcatchment16S:	Runoff Area=1.546 ac 0.00% Impervious Runoff Depth>2.33" Flow Length=122' Slope=0.0800 '/' Tc=6.2 min CN=81 Runoff=6.13 cfs 0.300 af
SubcatchmentNP:	Runoff Area=2.070 ac 83.57% Impervious Runoff Depth>3.78" Tc=6.0 min CN=96 Runoff=11.92 cfs 0.653 af
Reach 1R: Gabion Downchute	Avg. Flow Depth=0.69' Max Vel=17.25 fps Inflow=35.68 cfs 2.193 af n=0.030 L=260.0' S=0.3308 '/' Capacity=105.82 cfs Outflow=35.37 cfs 2.192 af
Reach 2R: North Channel - 3	Avg. Flow Depth=1.28' Max Vel=6.51 fps Inflow=38.51 cfs 2.458 af n=0.028 L=457.0' S=0.0219 '/' Capacity=100.17 cfs Outflow=37.39 cfs 2.454 af
Reach 3R:	Avg. Flow Depth=0.37' Max Vel=6.11 fps Inflow=6.13 cfs 0.300 af n=0.028 L=348.0' S=0.0747 '/' Capacity=185.10 cfs Outflow=5.92 cfs 0.300 af
Reach 4R: North Channel - 1	Avg. Flow Depth=1.48' Max Vel=4.75 fps Inflow=38.71 cfs 2.225 af n=0.028 L=1,200.0' S=0.0100 '/' Capacity=67.72 cfs Outflow=34.23 cfs 2.212 af
Reach 5R: North Channel - 2	Avg. Flow Depth=1.04' Max Vel=10.61 fps Inflow=45.57 cfs 3.270 af n=0.028 L=850.0' S=0.0729 '/' Capacity=182.89 cfs Outflow=44.72 cfs 3.264 af
Reach 6R:	Avg. Flow Depth=1.33' Max Vel=4.65 fps Inflow=28.94 cfs 1.871 af n=0.028 L=185.0' S=0.0108 '/' Capacity=70.41 cfs Outflow=28.39 cfs 1.870 af
Reach 7R: MSE Berm Swale	Avg. Flow Depth=0.29' Max Vel=2.47 fps Inflow=1.39 cfs 0.071 af n=0.028 L=850.0' S=0.0188 '/' Capacity=14.63 cfs Outflow=1.11 cfs 0.071 af

Post-Development_North Pond*Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"*

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Page 35

Pond 1P: Drop Inlet 1

Peak Elev=206.51' Inflow=71.53 cfs 5.134 af
36.0" Round Culvert n=0.013 L=65.0' S=0.0092 '/' Outflow=71.53 cfs 5.134 af

Pond 2P: Drop Inlet Structure

Peak Elev=187.91' Inflow=5.92 cfs 0.300 af
36.0" Round Culvert n=0.011 L=36.0' S=0.0500 '/' Outflow=5.92 cfs 0.300 af

Pond 3P: Stormwater Manhole

Peak Elev=182.28' Inflow=41.52 cfs 2.753 af
Primary=41.52 cfs 2.753 af Secondary=0.00 cfs 0.000 af Outflow=41.52 cfs 2.753 af

Pond 8P: Drop Inlet Structure

Peak Elev=189.69' Inflow=37.39 cfs 2.454 af
36.0" Round Culvert n=0.011 L=80.0' S=0.0500 '/' Outflow=37.39 cfs 2.454 af

Pond 26P: North Pond

Peak Elev=158.34' Storage=278,297 cf Inflow=116.01 cfs 8.611 af
Discarded=2.44 cfs 2.378 af Primary=0.00 cfs 0.000 af Outflow=2.44 cfs 2.378 af

Total Runoff Area = 44.915 ac Runoff Volume = 8.637 af Average Runoff Depth = 2.31"
96.15% Pervious = 43.185 ac 3.85% Impervious = 1.730 ac

Post-Development_North Pond

Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

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Page 36

Summary for Subcatchment 8S:

Runoff = 38.71 cfs @ 12.03 hrs, Volume= 2.225 af, Depth> 2.24"

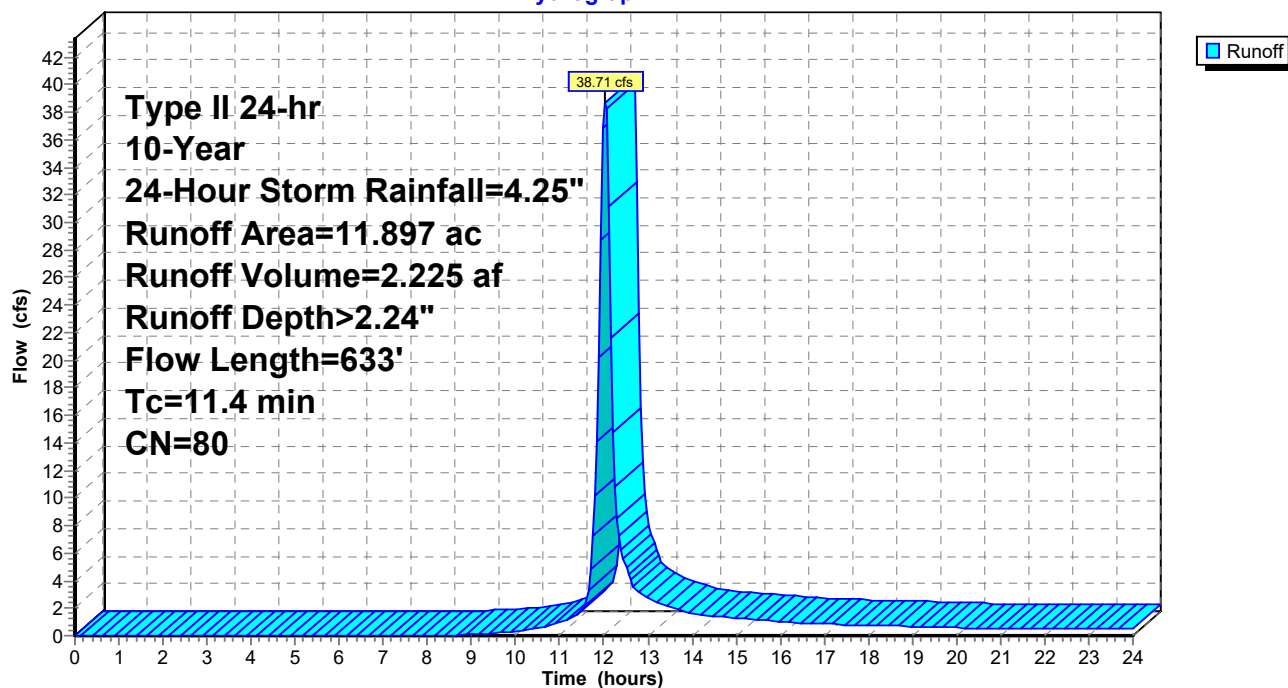
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

Area (ac)	CN	Description
* 11.340	80	Cap
0.557	85	Gravel roads, HSG B
11.897	80	Weighted Average
11.897		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Section 1 Grass: Short n= 0.150 P2= 2.80"
3.7	351	0.0500	1.57		Shallow Concentrated Flow, Section 2 Short Grass Pasture Kv= 7.0 fps
0.4	182	0.0250	7.37	41.47	Trap/Vee/Rect Channel Flow, Diversion Berm 1 Bot.W=0.00' D=1.50' Z= 3.0 & 2.0 '/' Top.W=7.50' n= 0.025
11.4	633	Total			

Subcatchment 8S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

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Page 37

Summary for Subcatchment 9S:

[47] Hint: Peak is 599% of capacity of segment #3

Runoff = 18.75 cfs @ 12.02 hrs, Volume= 1.057 af, Depth> 2.24"

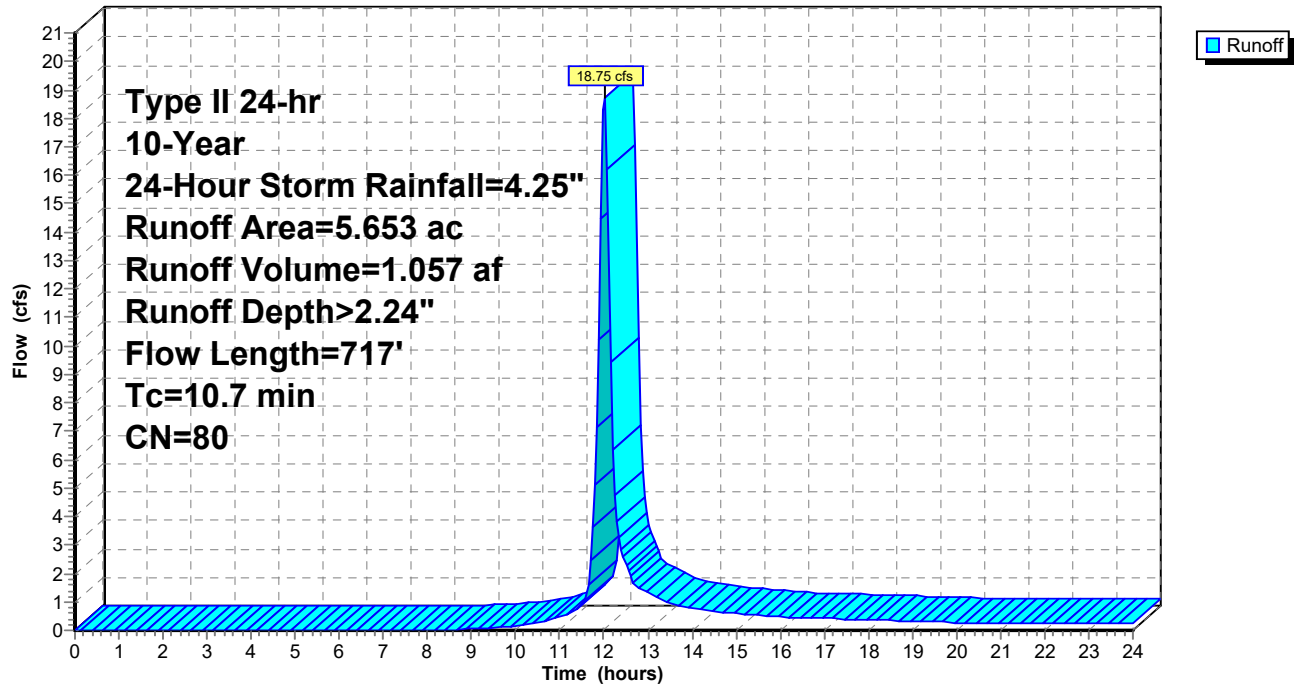
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

Area (ac)	CN	Description
* 5.113	80	Cap
0.540	85	Gravel roads, HSG B
5.653	80	Weighted Average
5.653		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Section 1 Grass: Short n= 0.150 P2= 2.80"
2.0	191	0.0500	1.57		Shallow Concentrated Flow, Section 2 Short Grass Pasture Kv= 7.0 fps
1.4	406	0.0500	5.01	3.13	Trap/Vee/Rect Channel Flow, Diversion Berm 1 Bot.W=0.00' D=0.50' Z= 3.0 & 2.0 '/' Top.W=2.50' n= 0.025
0.0	20	0.3333	17.70	79.67	Trap/Vee/Rect Channel Flow, Let-Down Channel 1 Bot.W=3.00' D=1.50' n= 0.040
10.7	717	Total			

Subcatchment 9S:

Hydrograph



Summary for Subcatchment 10S:

[47] Hint: Peak is 1485% of capacity of segment #4

Runoff = 26.67 cfs @ 12.07 hrs, Volume= 1.724 af, Depth> 2.24"

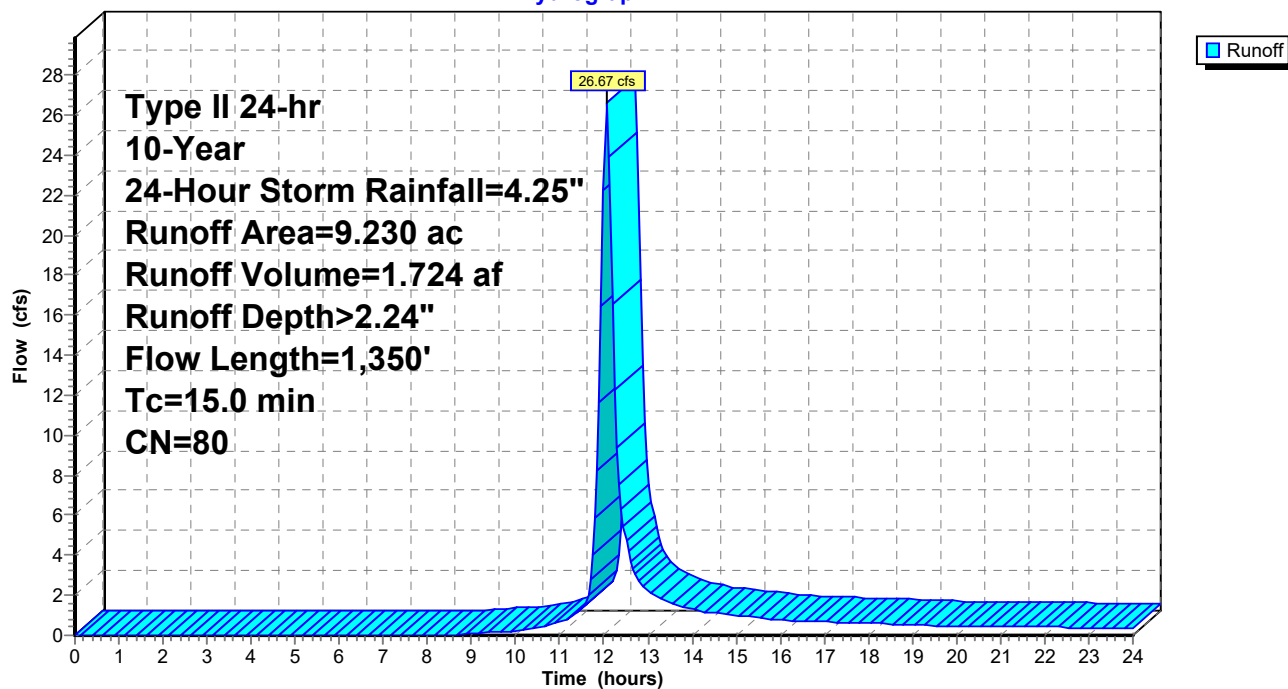
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

Area (ac)	CN	Description
* 9.230	80	Cap
9.230		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Grass: Short n= 0.150 P2= 2.80"
5.2	488	0.0500	1.57		Shallow Concentrated Flow, Section 1 Short Grass Pasture Kv= 7.0 fps
0.3	70	0.3300	4.02		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	280	0.0400	2.87	1.80	Trap/Vee/Rect Channel Flow, Diversion Berm 1 Bot.W=0.00' D=0.50' Z= 3.0 & 2.0 '/' Top.W=2.50' n= 0.039
0.2	222	0.3333	17.70	79.67	Trap/Vee/Rect Channel Flow, Gabion Downchute Bot.W=3.00' D=1.50' n= 0.040
0.4	190	0.0210	7.63	91.59	Trap/Vee/Rect Channel Flow, North Channel Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.030
15.0	1,350	Total			

Subcatchment 10S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

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Page 41

Summary for Subcatchment 11S:

Runoff = 2.75 cfs @ 12.01 hrs, Volume= 0.147 af, Depth> 2.33"

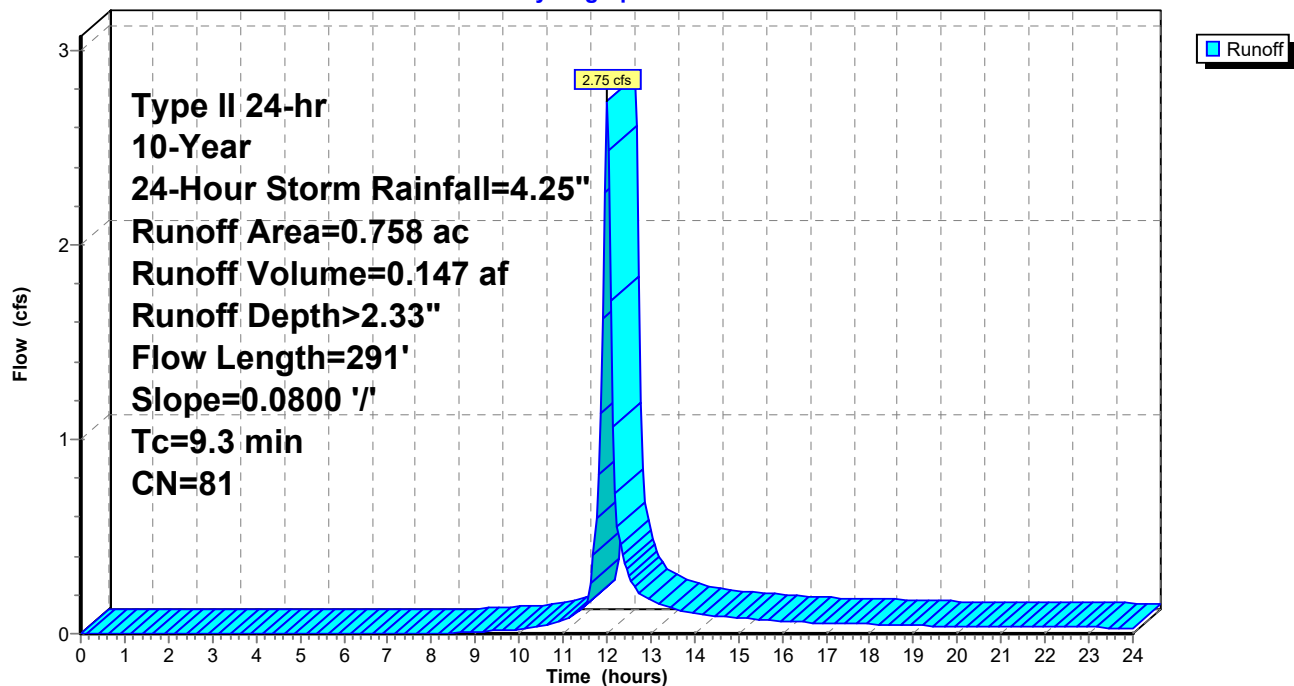
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

Area (ac)	CN	Description
* 0.576	80	CAP
0.182	85	Gravel roads, HSG B
0.758	81	Weighted Average
0.758		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0800	0.19		Sheet Flow, MSE Exterior Slope Grass: Dense n= 0.240 P2= 2.80"
0.2	20	0.0800	1.98		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	171	0.0800	9.56	14.34	Trap/Vee/Rect Channel Flow, Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.022 Earth, clean & straight
9.3	291	Total			

Subcatchment 11S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

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Page 42

Summary for Subcatchment 12S:

Runoff = 35.68 cfs @ 12.06 hrs, Volume= 2.193 af, Depth> 2.24"

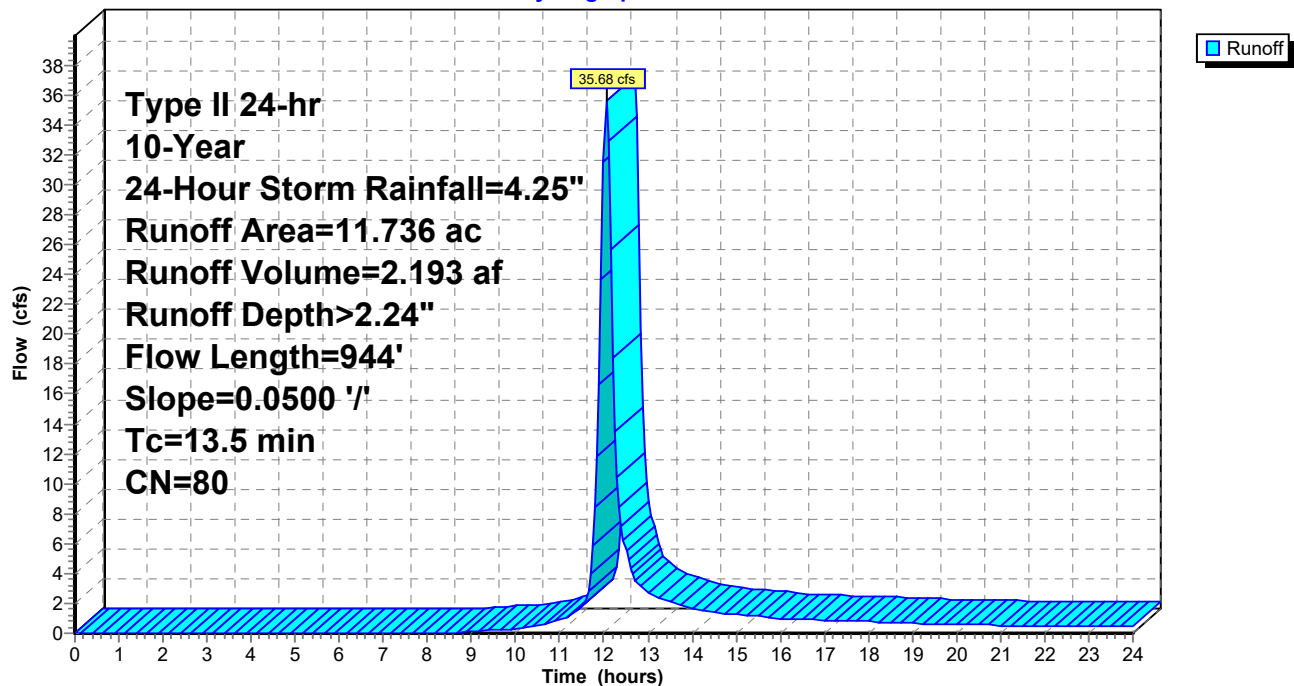
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

Area (ac)	CN	Description
* 11.736	80	
11.736		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Plateau Grass: Short n= 0.150 P2= 2.80"
3.8	359	0.0500	1.57		Shallow Concentrated Flow, Plateau Short Grass Pasture Kv= 7.0 fps
2.4	485	0.0500	3.35		Shallow Concentrated Flow, Sideslope Berm Grassed Waterway Kv= 15.0 fps
13.5	944	Total			

Subcatchment 12S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

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Page 43

Summary for Subcatchment 13S:

Runoff = 5.46 cfs @ 11.97 hrs, Volume= 0.265 af, Depth> 2.33"

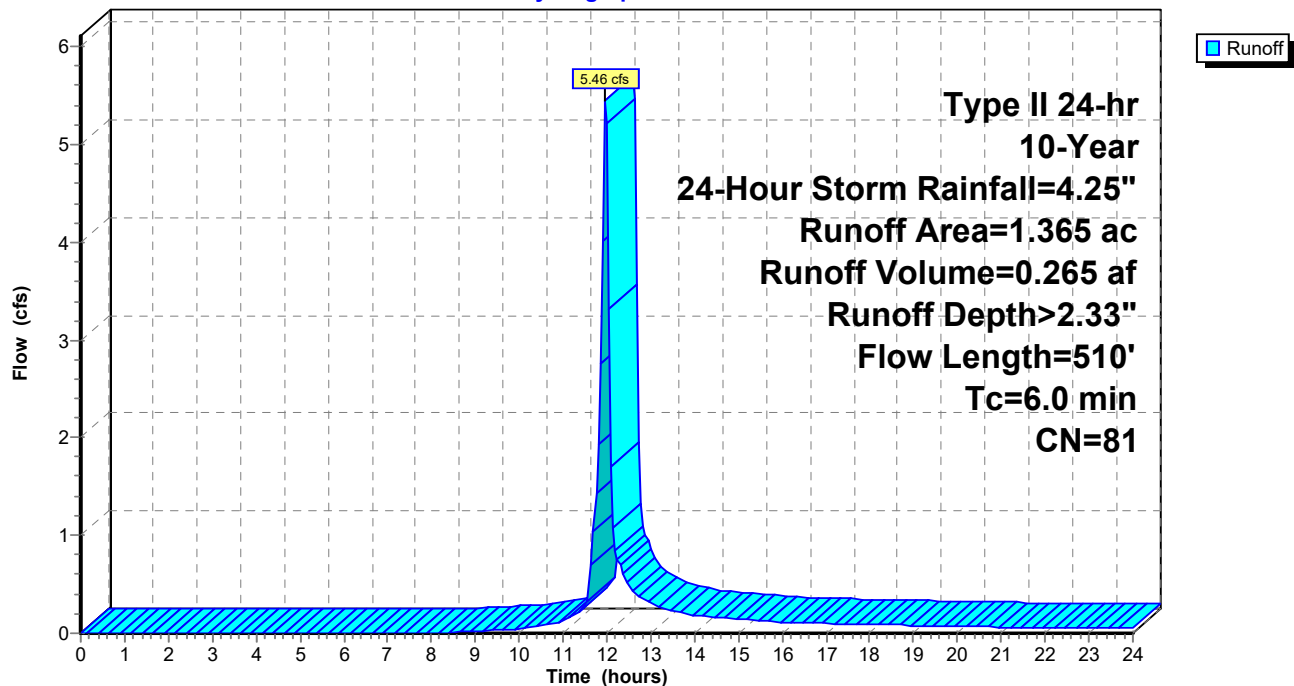
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

Area (ac)	CN	Description
* 1.080	80	Cap
* 0.285	85	Gravel Road
1.365	81	Weighted Average
1.365		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.3300	0.43		Sheet Flow, Section 1
					Grass: Short n= 0.150 P2= 2.80"
3.0	460	0.0300	2.60		Shallow Concentrated Flow, Perimeter Swale
					Grassed Waterway Kv= 15.0 fps
5.0	510	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 13S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

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Page 44

Summary for Subcatchment 15S:

Runoff = 1.39 cfs @ 12.00 hrs, Volume= 0.071 af, Depth> 1.30"

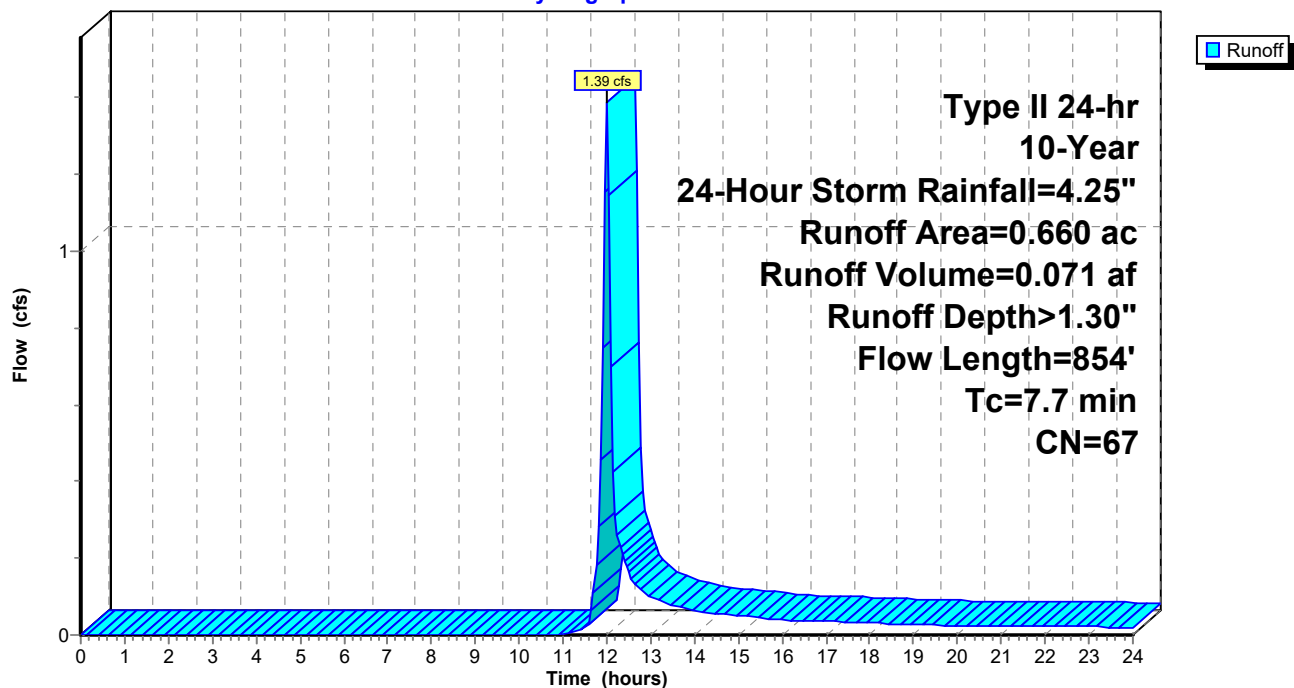
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

Area (ac)	CN	Description
* 0.660	67	Vegetation (Hyd. Group B)
0.660		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	29	0.0330	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 2.80"
4.5	825	0.0100	3.09	3.09	Trap/Vee/Rect Channel Flow, Bot.W=1.00' D=0.50' Z= 2.0 '/' Top.W=3.00' n= 0.022 Earth, clean & straight
7.7	854	Total			

Subcatchment 15S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

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Page 45

Summary for Subcatchment 16S:

Runoff = 6.13 cfs @ 11.97 hrs, Volume= 0.300 af, Depth> 2.33"

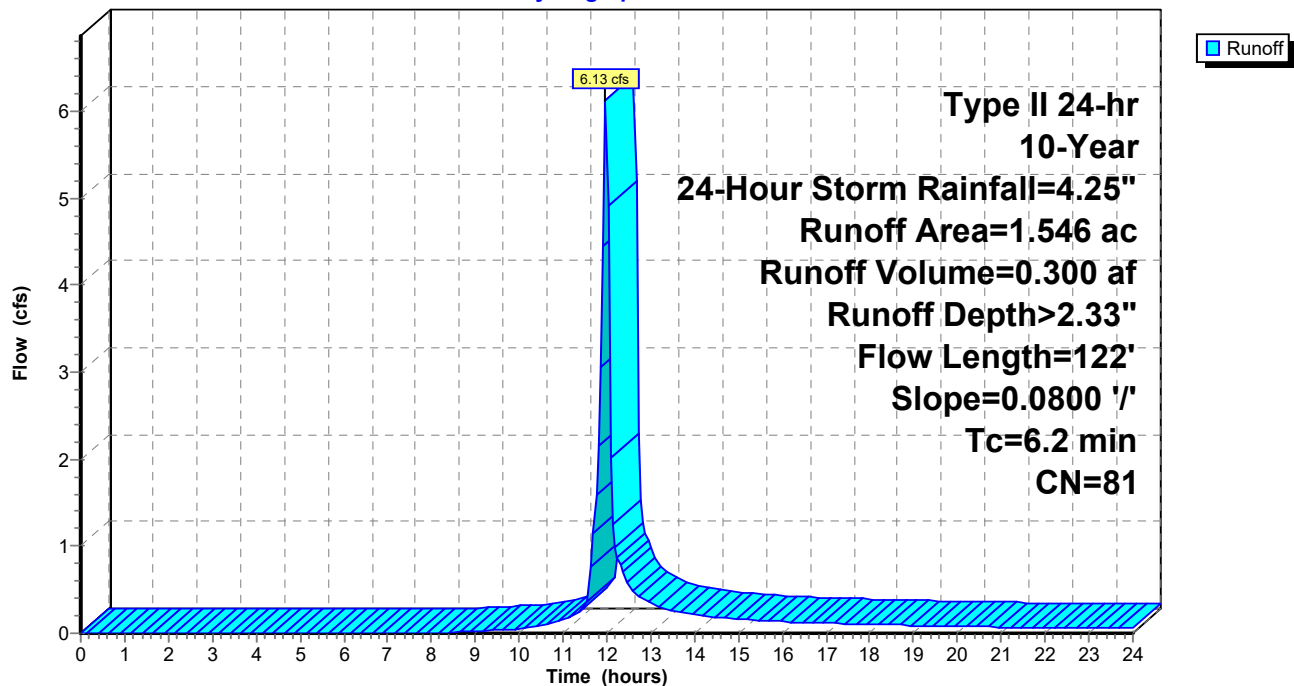
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

Area (ac)	CN	Description
* 1.224	80	Cap
* 0.322	85	Gravel Road
1.546	81	Weighted Average
1.546		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	100	0.0800	0.28		Sheet Flow, Grass: Short n= 0.150 P2= 2.80"
0.2	22	0.0800	1.98		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.2	122	Total			

Subcatchment 16S:

Hydrograph



Post-Development_North Pond

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Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

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Page 46

Summary for Subcatchment NP:

Runoff = 11.92 cfs @ 11.96 hrs, Volume= 0.653 af, Depth> 3.78"

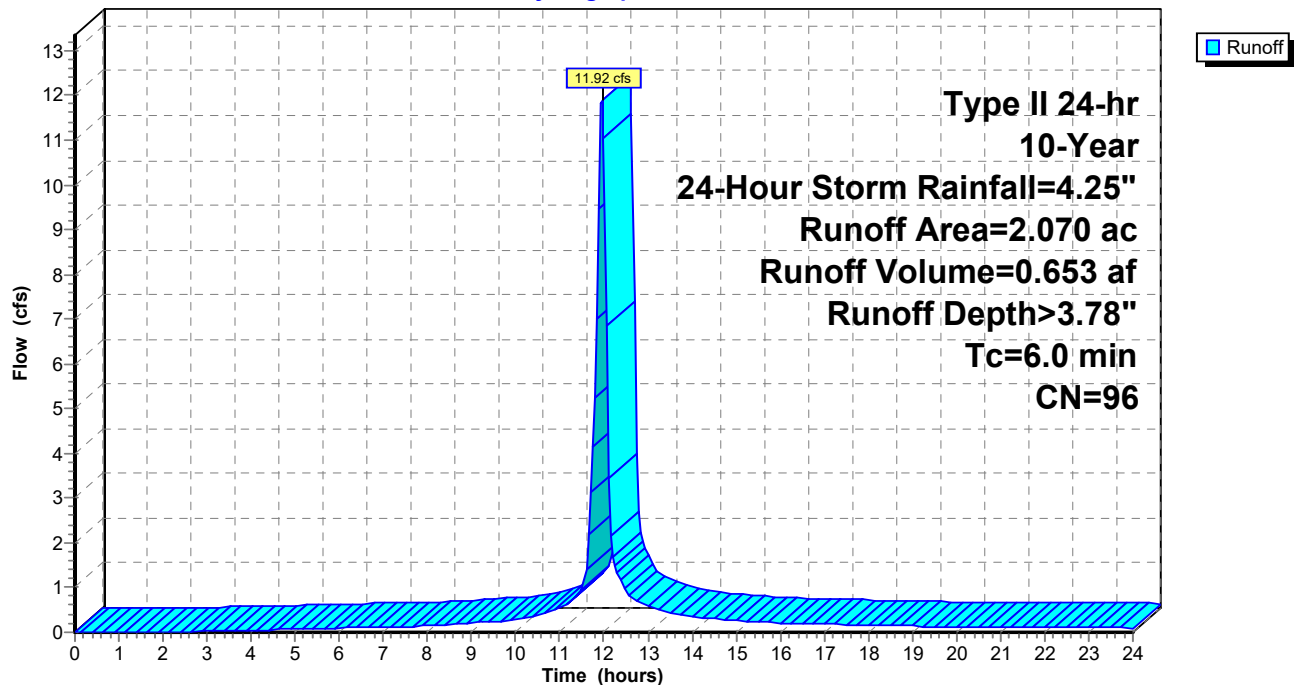
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

Area (ac)	CN	Description
* 1.730	98	Basin
* 0.340	85	Gravel Road
2.070	96	Weighted Average
0.340		16.43% Pervious Area
1.730		83.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0					Direct Entry,
1.0	0				Total, Increased to minimum Tc = 6.0 min

Subcatchment NP:

Hydrograph



Summary for Reach 1R: Gabion Downchute

Mannings from Figure 5B.11 Determining "n" for Riprap Lined Channel Using Depth of Flow

Inflow Area = 11.736 ac, 0.00% Impervious, Inflow Depth > 2.24" for 10-Year, 24-Hour Storm event
 Inflow = 35.68 cfs @ 12.06 hrs, Volume= 2.193 af
 Outflow = 35.37 cfs @ 12.06 hrs, Volume= 2.192 af, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 17.25 fps, Min. Travel Time= 0.3 min

Avg. Velocity = 4.63 fps, Avg. Travel Time= 0.9 min

Peak Storage= 537 cf @ 12.06 hrs

Average Depth at Peak Storage= 0.69' , Surface Width= 3.00'

Bank-Full Depth= 1.50' Flow Area= 4.5 sf, Capacity= 105.82 cfs

3.00' x 1.50' deep channel, n= 0.030

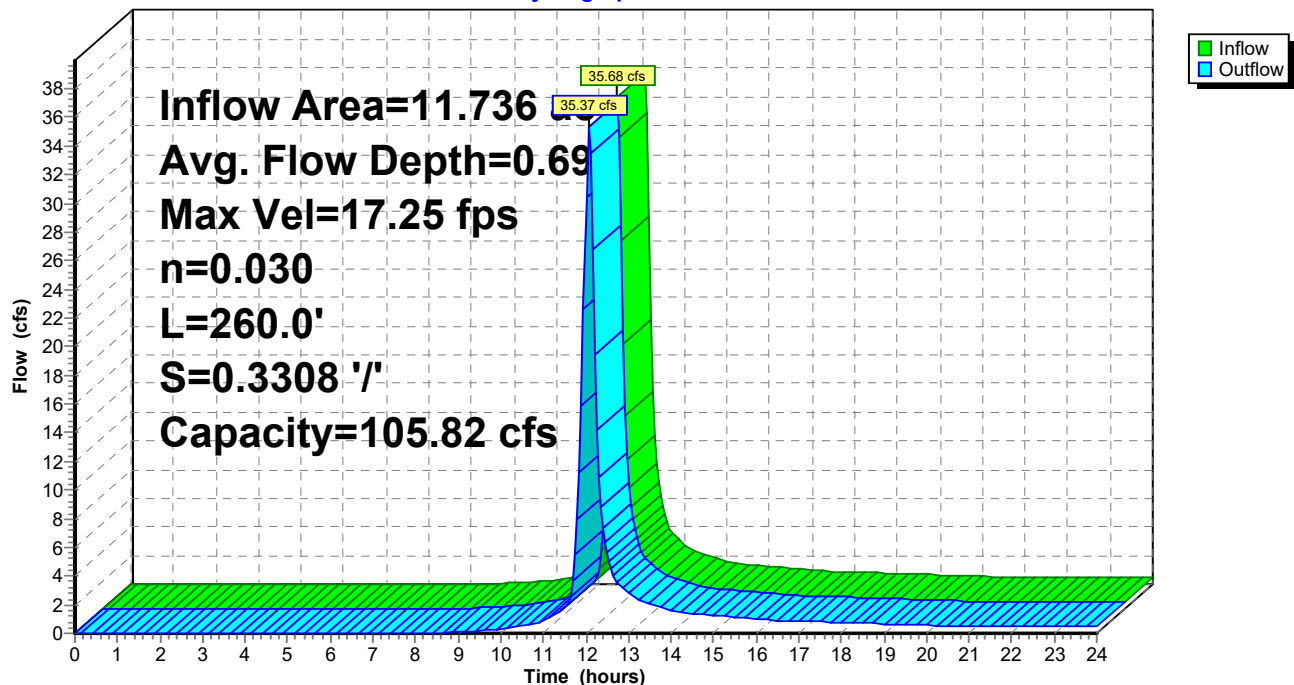
Length= 260.0' Slope= 0.3308 '/'

Inlet Invert= 290.00', Outlet Invert= 204.00'



Reach 1R: Gabion Downchute

Hydrograph



Summary for Reach 2R: North Channel - 3

[62] Hint: Exceeded Reach 1R OUTLET depth by 0.60' @ 12.10 hrs

Inflow Area =	13.101 ac	0.00% Impervious, Inflow Depth > 2.25"	for 0-Year, 24-Hour Storm event
Inflow	=	38.51 cfs @ 12.05 hrs, Volume = 2.458 af	
Outflow	=	37.39 cfs @ 12.08 hrs, Volume = 2.454 af, Atten= 3%, Lag= 2.1 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.51 fps, Min. Travel Time= 1.2 min
Avg. Velocity= 2.21 fps, Avg. Travel Time= 3.4 min

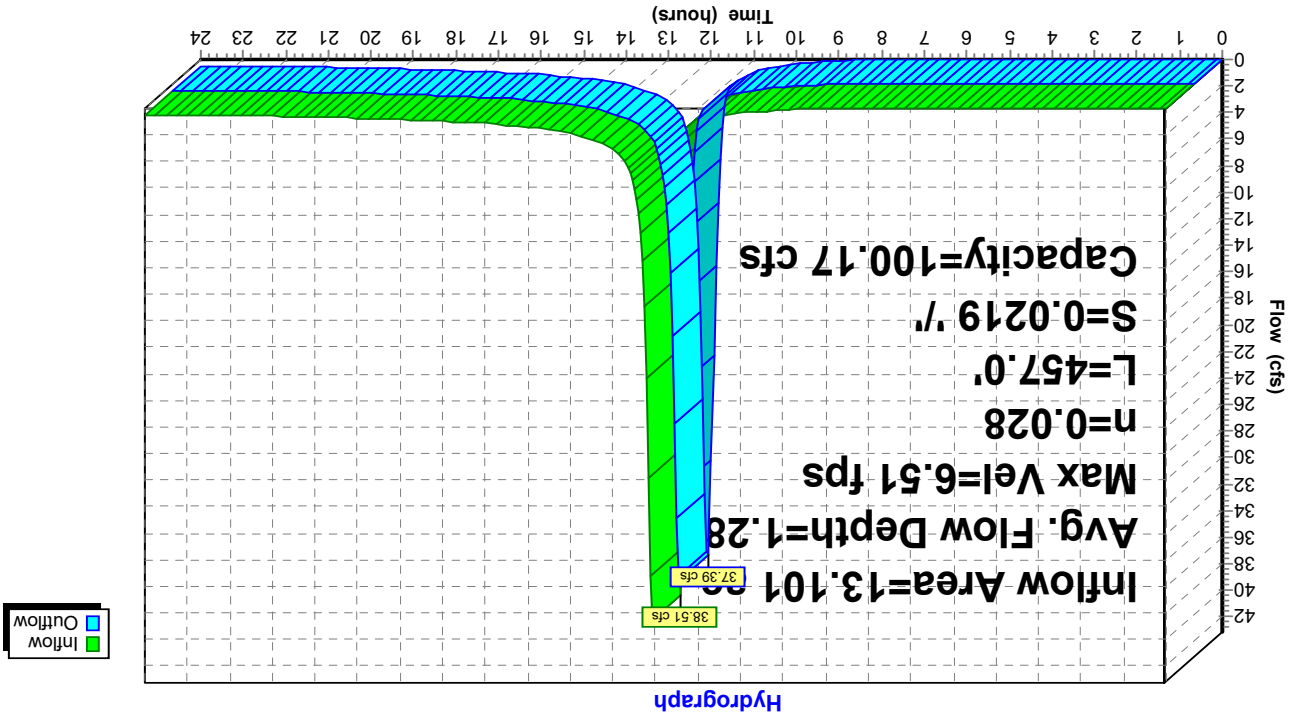
Peak Storage= 2,679 cf @ 12.06 hrs

Average Depth at Peak Storage= 1.28', Surface Width= 7.13'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 100.17 cfs

2.00' x 2.00' deep channel, n= 0.028
Side Slope Z-value= 2.0' Top Width= 10.00'
Length= 457.0' Slope= 0.0219'/'
Inlet Invert= 204.00', Outlet Invert= 194.00'



Reach 2R: North Channel - 3



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Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

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Page 49

Summary for Reach 3R:

Inflow Area = 1.546 ac, 0.00% Impervious, Inflow Depth > 2.33" for 10-Year, 24-Hour Storm event
Inflow = 6.13 cfs @ 11.97 hrs, Volume= 0.300 af
Outflow = 5.92 cfs @ 12.00 hrs, Volume= 0.300 af, Atten= 3%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 6.11 fps, Min. Travel Time= 0.9 min

Avg. Velocity = 1.64 fps, Avg. Travel Time= 3.5 min

Peak Storage= 349 cf @ 11.99 hrs

Average Depth at Peak Storage= 0.37' , Surface Width= 3.47'

Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 185.10 cfs

2.00' x 2.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 ' / ' Top Width= 10.00'

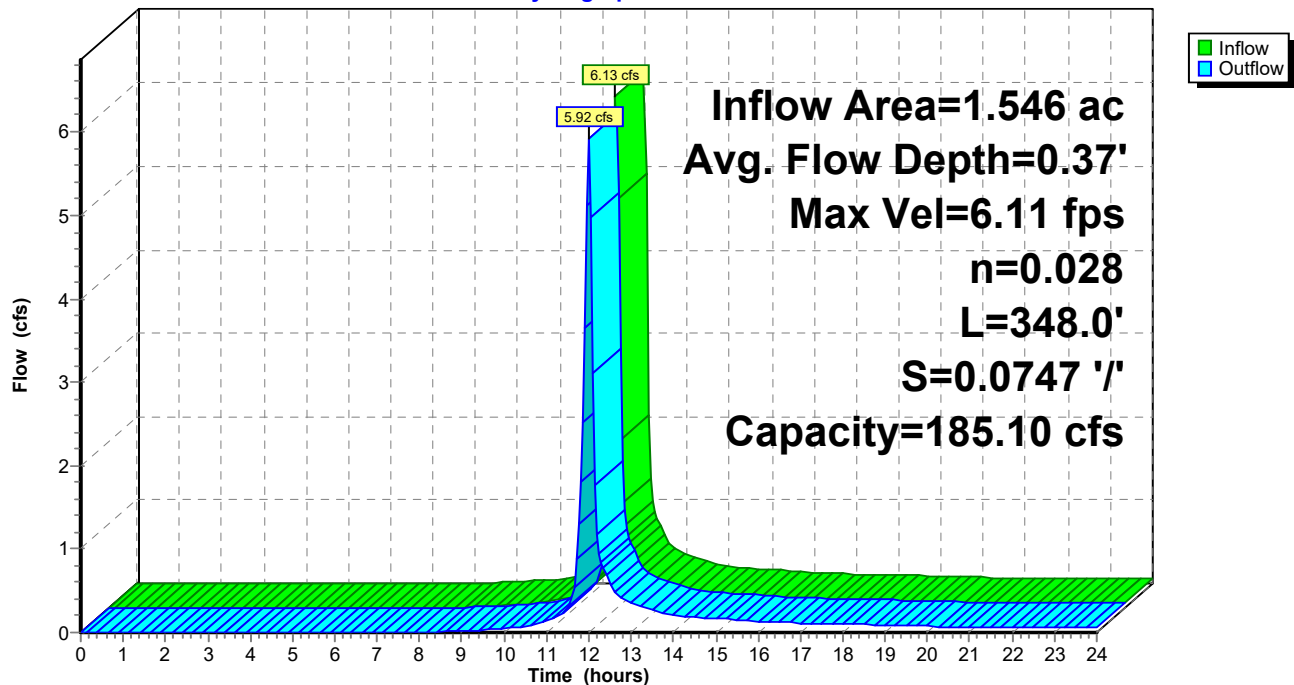
Length= 348.0' Slope= 0.0747 ' / '

Inlet Invert= 220.00', Outlet Invert= 194.00'



Reach 3R:

Hydrograph



Summary for Reach 4R: North Channel - 1

Inflow Area = 11.897 ac, 0.00% Impervious, Inflow Depth > 2.24" for 10-Year, 24-Hour Storm event
 Inflow = 38.71 cfs @ 12.03 hrs, Volume= 2.225 af
 Outflow = 34.23 cfs @ 12.15 hrs, Volume= 2.212 af, Atten= 12%, Lag= 7.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Max. Velocity= 4.75 fps, Min. Travel Time= 4.2 min
 Avg. Velocity = 1.66 fps, Avg. Travel Time= 12.1 min

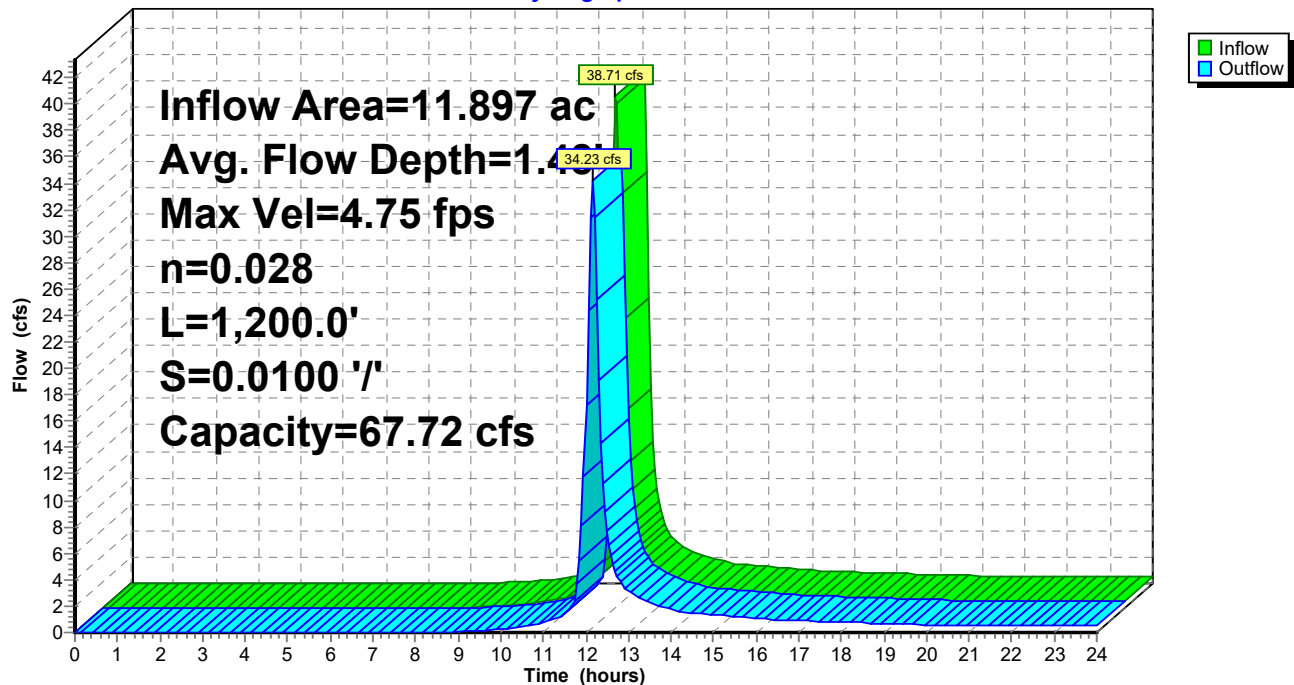
Peak Storage= 8,793 cf @ 12.08 hrs
 Average Depth at Peak Storage= 1.48' , Surface Width= 7.91'
 Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 67.72 cfs

2.00' x 2.00' deep channel, n= 0.028
 Side Slope Z-value= 2.0 ' / ' Top Width= 10.00'
 Length= 1,200.0' Slope= 0.0100 ' / '
 Inlet Invert= 290.00', Outlet Invert= 278.00'



Reach 4R: North Channel - 1

Hydrograph



Summary for Reach 5R: North Channel - 2

[61] Hint: Exceeded Reach 4R outlet invert by 1.04' @ 12.10 hrs

Inflow Area = 17.550 ac, 0.00% Impervious, Inflow Depth > 2.24" for 10-Year, 24-Hour Storm event
 Inflow = 45.57 cfs @ 12.11 hrs, Volume= 3.270 af
 Outflow = 44.72 cfs @ 12.15 hrs, Volume= 3.264 af, Atten= 2%, Lag= 2.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 10.61 fps, Min. Travel Time= 1.3 min

Avg. Velocity = 3.68 fps, Avg. Travel Time= 3.8 min

Peak Storage= 3,623 cf @ 12.12 hrs

Average Depth at Peak Storage= 1.04' , Surface Width= 6.17'

Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 182.89 cfs

2.00' x 2.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 ' / ' Top Width= 10.00'

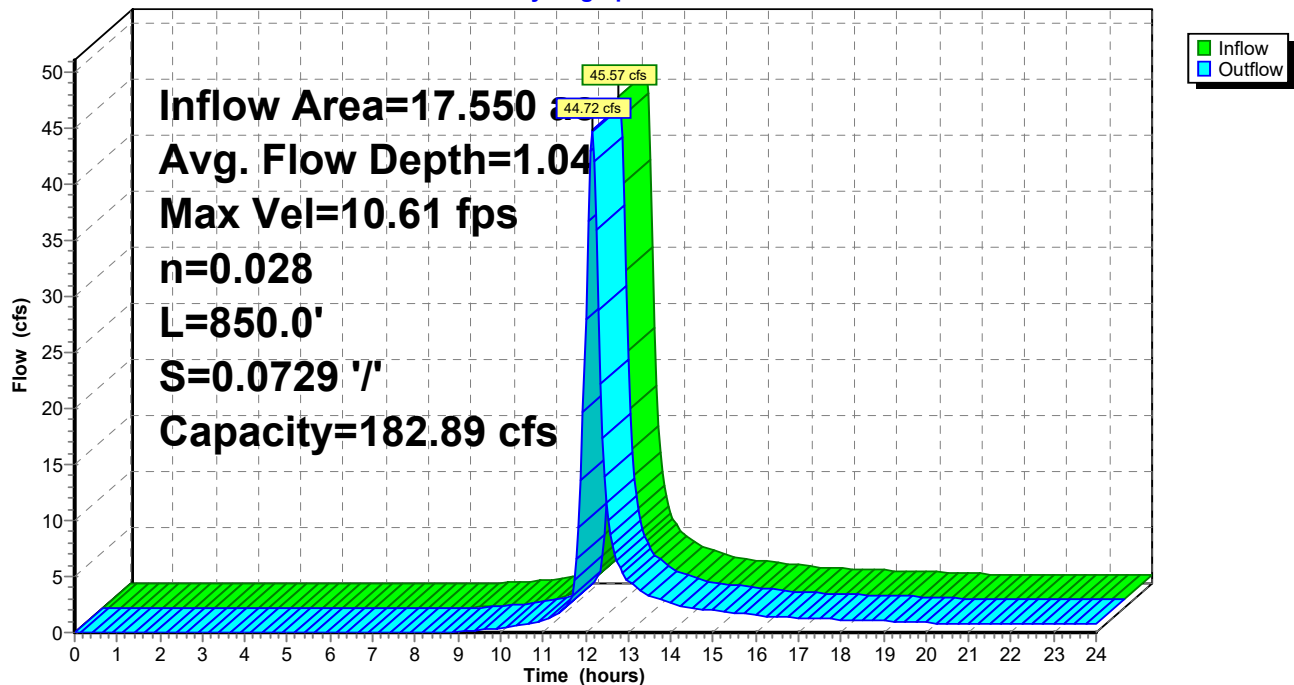
Length= 850.0' Slope= 0.0729 ' / '

Inlet Invert= 278.00', Outlet Invert= 216.00'



Reach 5R: North Channel - 2

Hydrograph



Post-Development_North Pond

Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

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Page 52

Summary for Reach 6R:

Inflow Area = 9.988 ac, 0.00% Impervious, Inflow Depth > 2.25" for 10-Year, 24-Hour Storm event
Inflow = 28.94 cfs @ 12.06 hrs, Volume= 1.871 af
Outflow = 28.39 cfs @ 12.09 hrs, Volume= 1.870 af, Atten= 2%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 4.65 fps, Min. Travel Time= 0.7 min

Avg. Velocity = 1.60 fps, Avg. Travel Time= 1.9 min

Peak Storage= 1,143 cf @ 12.07 hrs

Average Depth at Peak Storage= 1.33', Surface Width= 7.31'

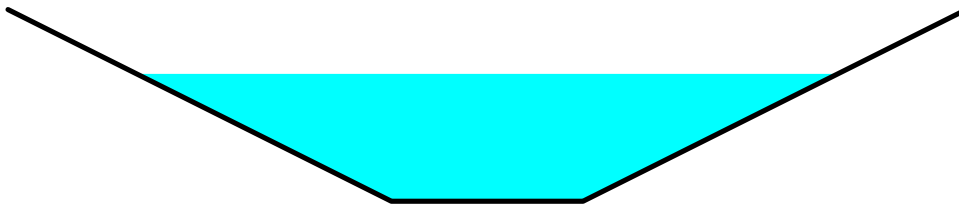
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 70.41 cfs

2.00' x 2.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 '/' Top Width= 10.00'

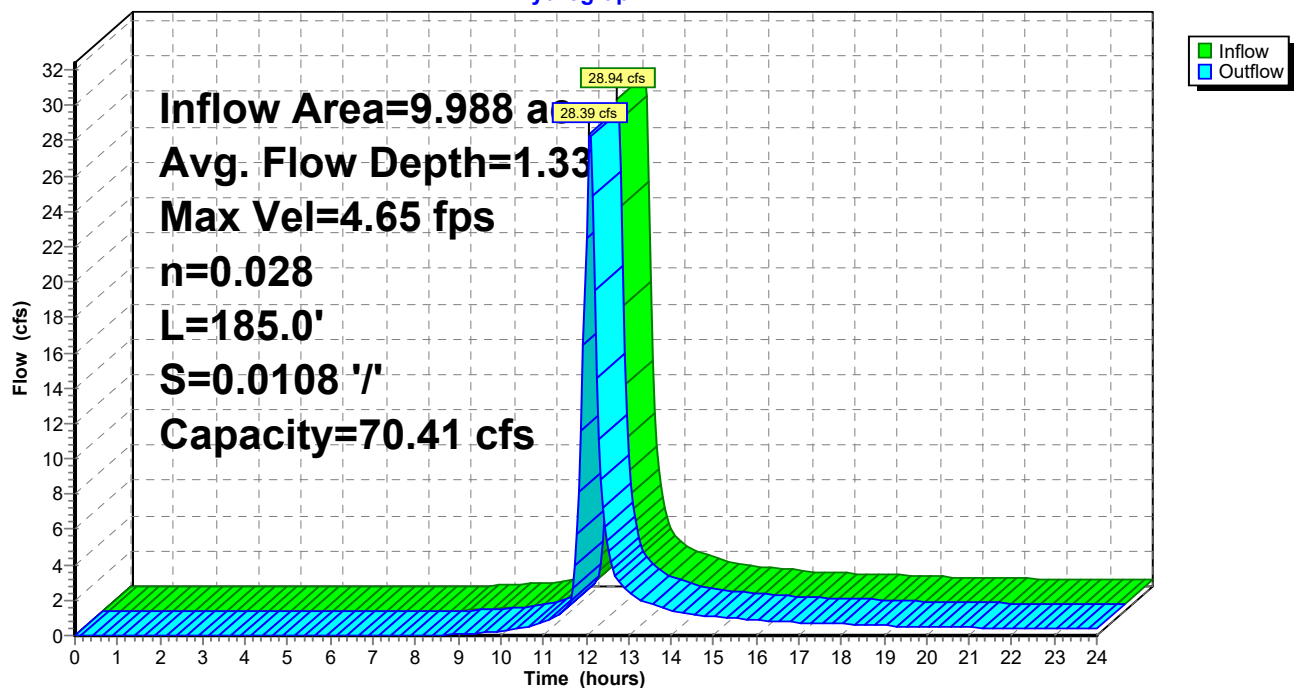
Length= 185.0' Slope= 0.0108 '/'

Inlet Invert= 218.00', Outlet Invert= 216.00'



Reach 6R:

Hydrograph



Summary for Reach 7R: MSE Berm Swale

Inflow Area = 0.660 ac, 0.00% Impervious, Inflow Depth > 1.30" for 10-Year, 24-Hour Storm event
 Inflow = 1.39 cfs @ 12.00 hrs, Volume= 0.071 af
 Outflow = 1.11 cfs @ 12.15 hrs, Volume= 0.071 af, Atten= 20%, Lag= 9.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Max. Velocity= 2.47 fps, Min. Travel Time= 5.7 min
 Avg. Velocity = 0.86 fps, Avg. Travel Time= 16.4 min

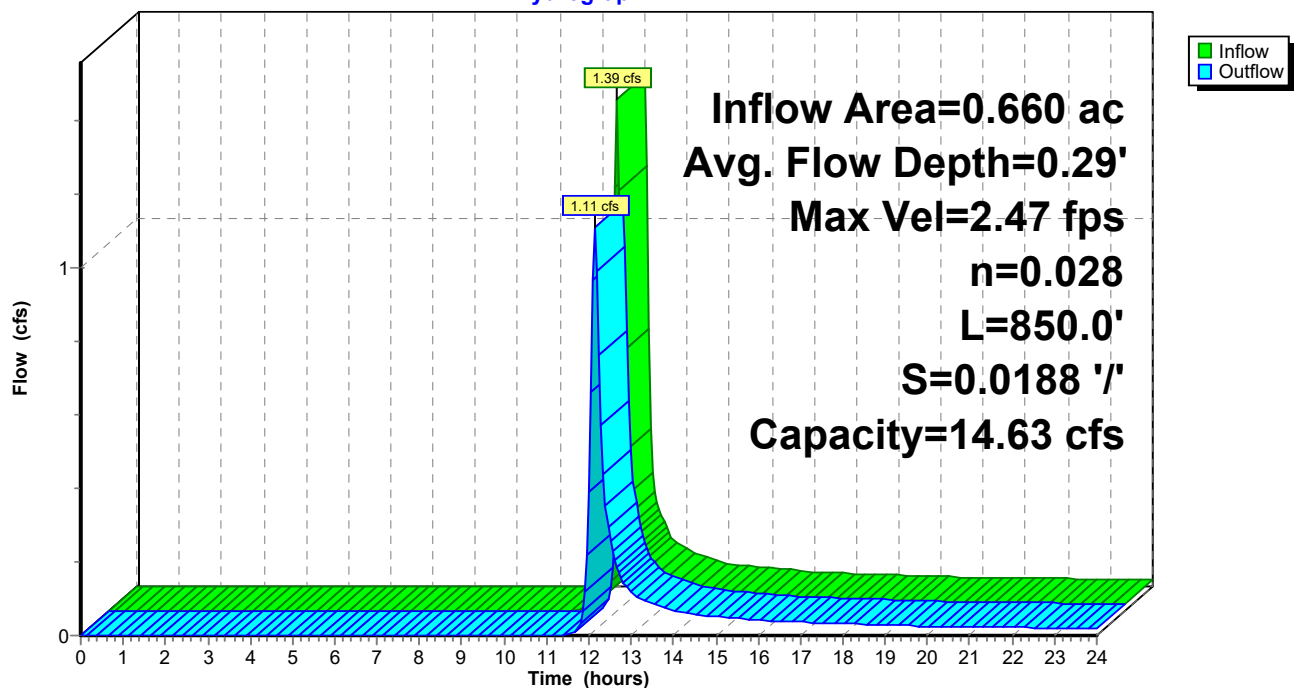
Peak Storage= 385 cf @ 12.06 hrs
 Average Depth at Peak Storage= 0.29' , Surface Width= 2.15'
 Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 14.63 cfs

1.00' x 1.00' deep channel, n= 0.028
 Side Slope Z-value= 2.0 ' / ' Top Width= 5.00'
 Length= 850.0' Slope= 0.0188 ' / '
 Inlet Invert= 216.00', Outlet Invert= 200.00'



Reach 7R: MSE Berm Swale

Hydrograph



Summary for Pond 1P: Drop Inlet 1

Inflow Area = 27.538 ac, 0.00% Impervious, Inflow Depth > 2.24" for 10-Year, 24-Hour Storm event
 Inflow = 71.53 cfs @ 12.12 hrs, Volume= 5.134 af
 Outflow = 71.53 cfs @ 12.12 hrs, Volume= 5.134 af, Atten= 0%, Lag= 0.0 min
 Primary = 71.53 cfs @ 12.12 hrs, Volume= 5.134 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 206.51' @ 12.12 hrs

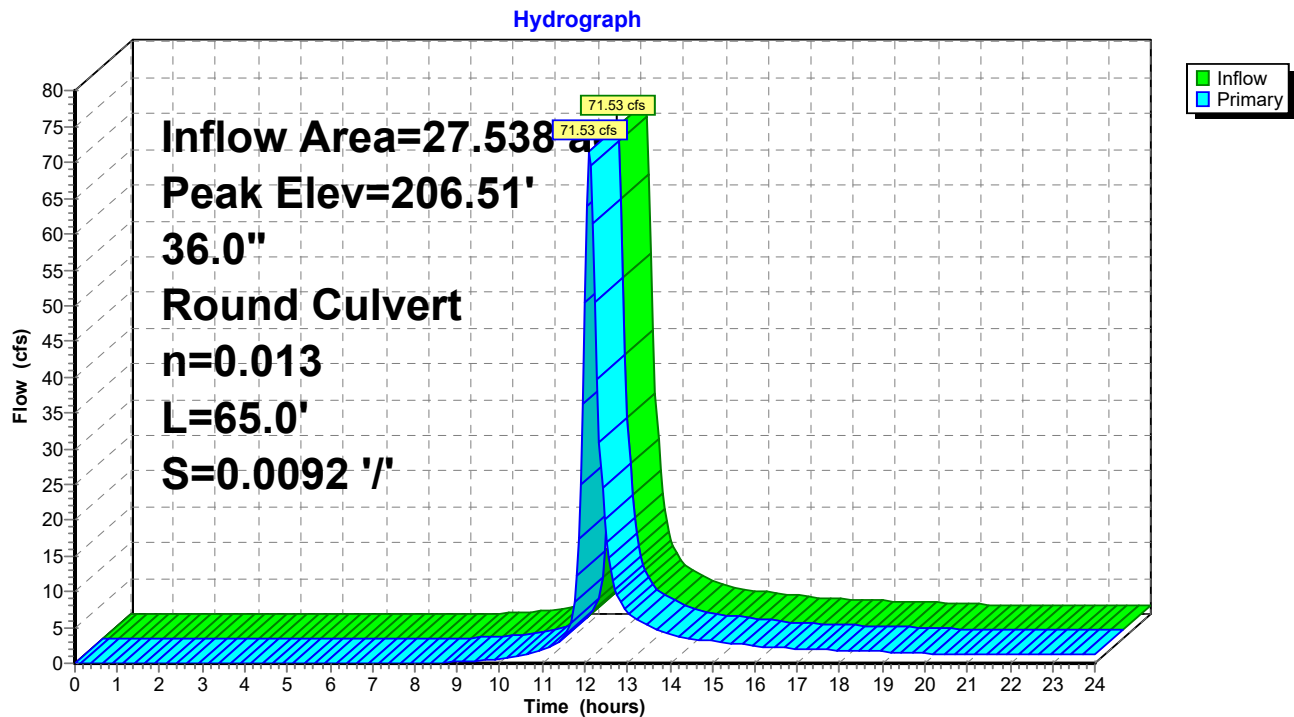
Flood Elev= 220.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	200.60'	36.0" Round Culvert L= 65.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 200.60' / 200.00' S= 0.0092 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=70.60 cfs @ 12.12 hrs HW=206.40' (Free Discharge)

↑ **1=Culvert** (Inlet Controls 70.60 cfs @ 9.99 fps)

Pond 1P: Drop Inlet 1



Summary for Pond 2P: Drop Inlet Structure

Inflow Area = 1.546 ac, 0.00% Impervious, Inflow Depth > 2.33" for 10-Year, 24-Hour Storm event
 Inflow = 5.92 cfs @ 12.00 hrs, Volume= 0.300 af
 Outflow = 5.92 cfs @ 12.00 hrs, Volume= 0.300 af, Atten= 0%, Lag= 0.0 min
 Primary = 5.92 cfs @ 12.00 hrs, Volume= 0.300 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 187.91' @ 12.00 hrs

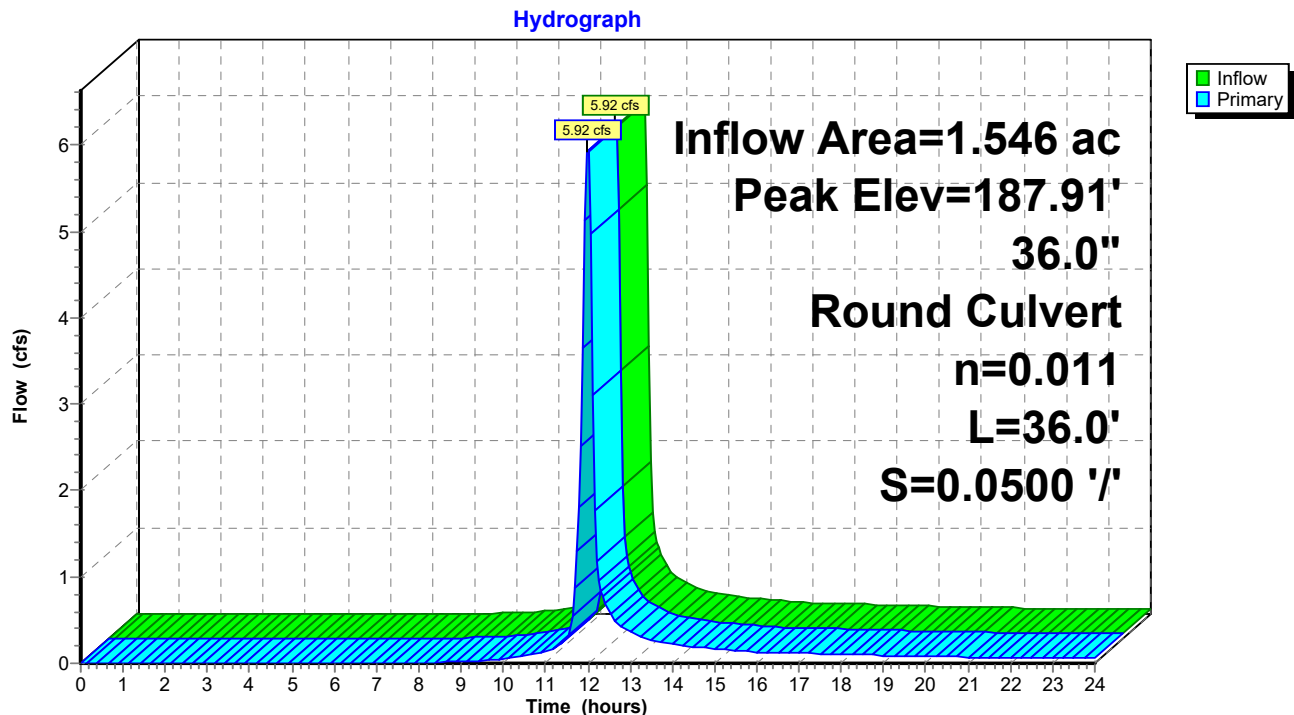
Flood Elev= 196.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	187.00'	36.0" Round 36" HDPE Pipe L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 187.00' / 185.20' S= 0.0500 '/ Cc= 0.900 n= 0.011, Flow Area= 7.07 sf

Primary OutFlow Max=5.88 cfs @ 12.00 hrs HW=187.91' (Free Discharge)

1=36" HDPE Pipe (Inlet Controls 5.88 cfs @ 3.25 fps)

Pond 2P: Drop Inlet Structure



Summary for Pond 3P: Stormwater Manhole

Inflow Area = 14.647 ac, 0.00% Impervious, Inflow Depth > 2.26" for 10-Year, 24-Hour Storm event
 Inflow = 41.52 cfs @ 12.07 hrs, Volume= 2.753 af
 Outflow = 41.52 cfs @ 12.07 hrs, Volume= 2.753 af, Atten= 0%, Lag= 0.0 min
 Primary = 41.52 cfs @ 12.07 hrs, Volume= 2.753 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 182.28' @ 12.07 hrs

Flood Elev= 188.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	179.30'	36.0" Round 36" HDPE Pipe L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 179.30' / 177.00' S= 0.0500 '/' Cc= 0.900 n= 0.011, Flow Area= 7.07 sf
#2	Secondary	196.00'	6.0' long x 1.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

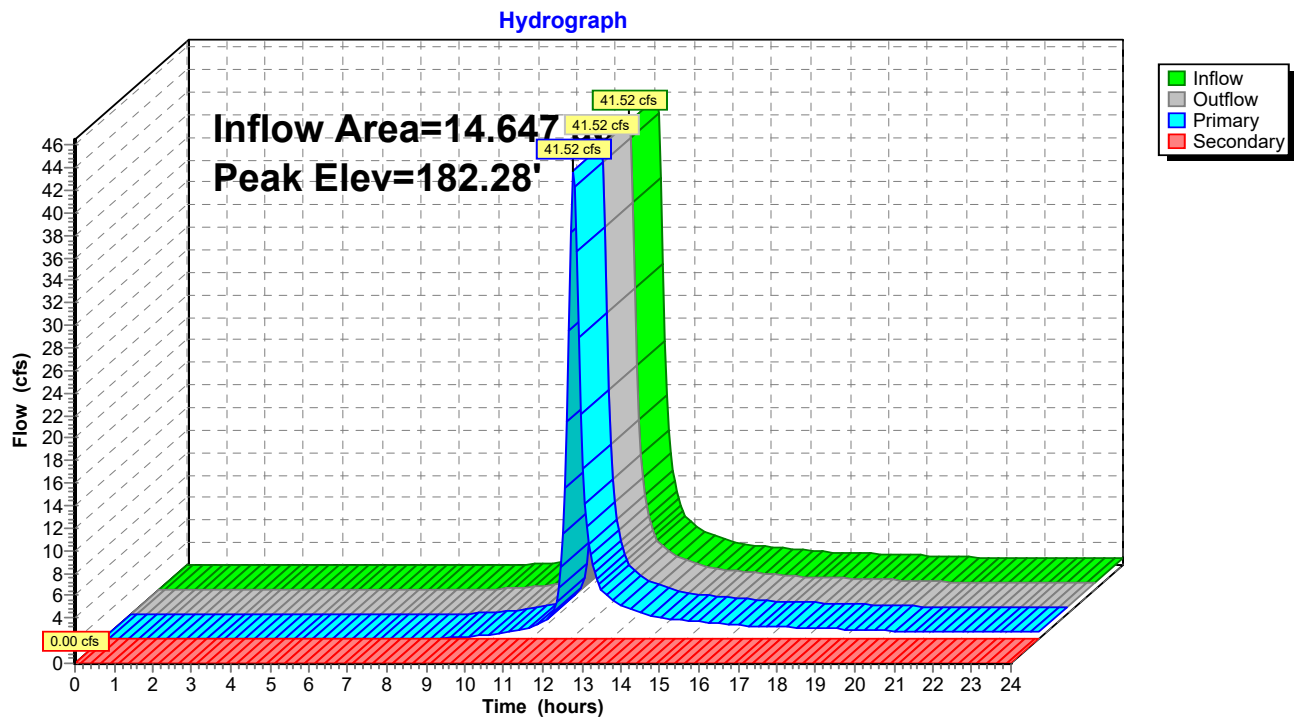
Primary OutFlow Max=40.95 cfs @ 12.07 hrs HW=182.23' (Free Discharge)

↑1=36" HDPE Pipe (Inlet Controls 40.95 cfs @ 5.83 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=179.30' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 3P: Stormwater Manhole



Summary for Pond 8P: Drop Inlet Structure

Inflow Area = 13.101 ac, 0.00% Impervious, Inflow Depth > 2.25" for 10-Year, 24-Hour Storm event
 Inflow = 37.39 cfs @ 12.08 hrs, Volume= 2.454 af
 Outflow = 37.39 cfs @ 12.08 hrs, Volume= 2.454 af, Atten= 0%, Lag= 0.0 min
 Primary = 37.39 cfs @ 12.08 hrs, Volume= 2.454 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 189.69' @ 12.08 hrs

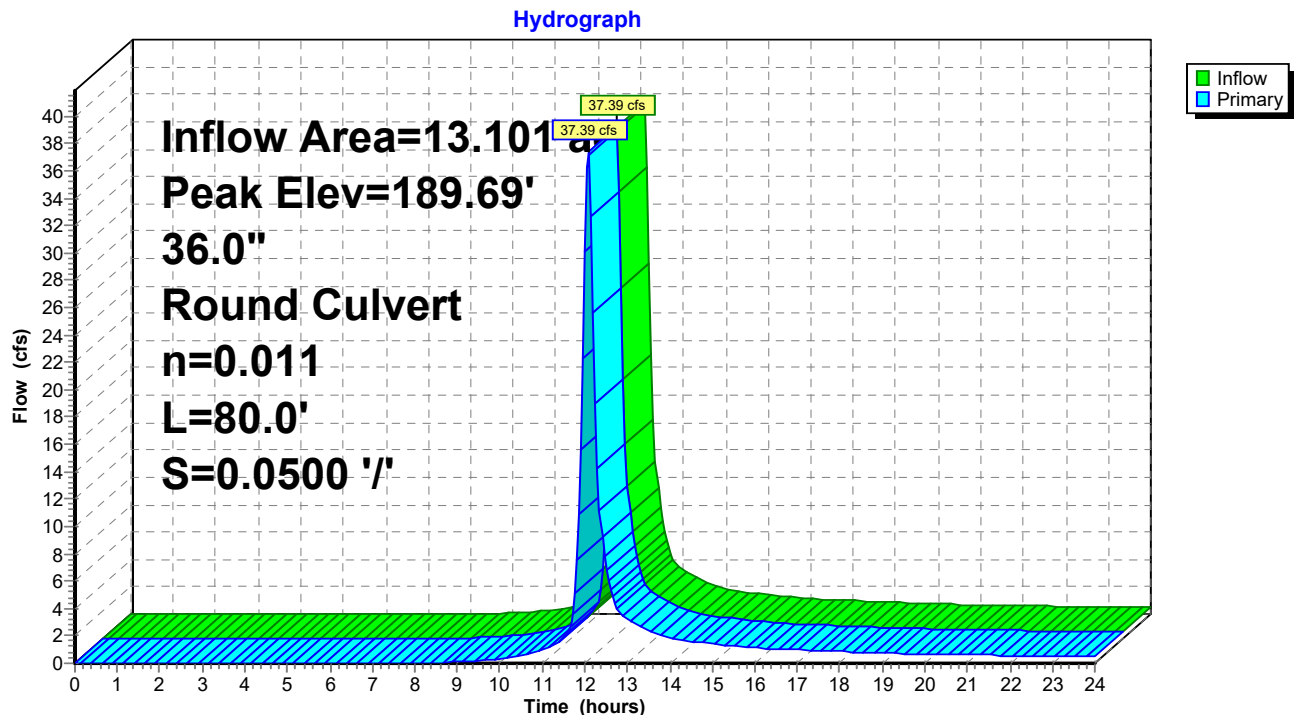
Flood Elev= 196.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	187.00'	36.0" Round Culvert L= 80.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 187.00' / 183.00' S= 0.0500 '/ Cc= 0.900 n= 0.011, Flow Area= 7.07 sf

Primary OutFlow Max=36.81 cfs @ 12.08 hrs HW=189.66' (Free Discharge)

↑ **1=Culvert** (Inlet Controls 36.81 cfs @ 5.55 fps)

Pond 8P: Drop Inlet Structure



Post-Development_North Pond

Type II 24-hr 10-Year, 24-Hour Storm Rainfall=4.25"

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Page 59

Summary for Pond 26P: North Pond

Inflow Area = 44.915 ac, 3.85% Impervious, Inflow Depth > 2.30" for 10-Year, 24-Hour Storm event
 Inflow = 116.01 cfs @ 12.09 hrs, Volume= 8.611 af
 Outflow = 2.44 cfs @ 19.41 hrs, Volume= 2.378 af, Atten= 98%, Lag= 439.1 min
 Discarded = 2.44 cfs @ 19.41 hrs, Volume= 2.378 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 158.34' @ 19.41 hrs Surf.Area= 26,744 sf Storage= 278,297 cf

Plug-Flow detention time= 386.5 min calculated for 2.378 af (28% of inflow)
 Center-of-Mass det. time= 251.6 min (1,081.1 - 829.5)

Volume	Invert	Avail.Storage	Storage Description
#1	140.00'	731,085 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.00	5,675	0	0
150.00	15,091	103,830	103,830
160.00	29,062	220,765	324,595
170.00	52,236	406,490	731,085

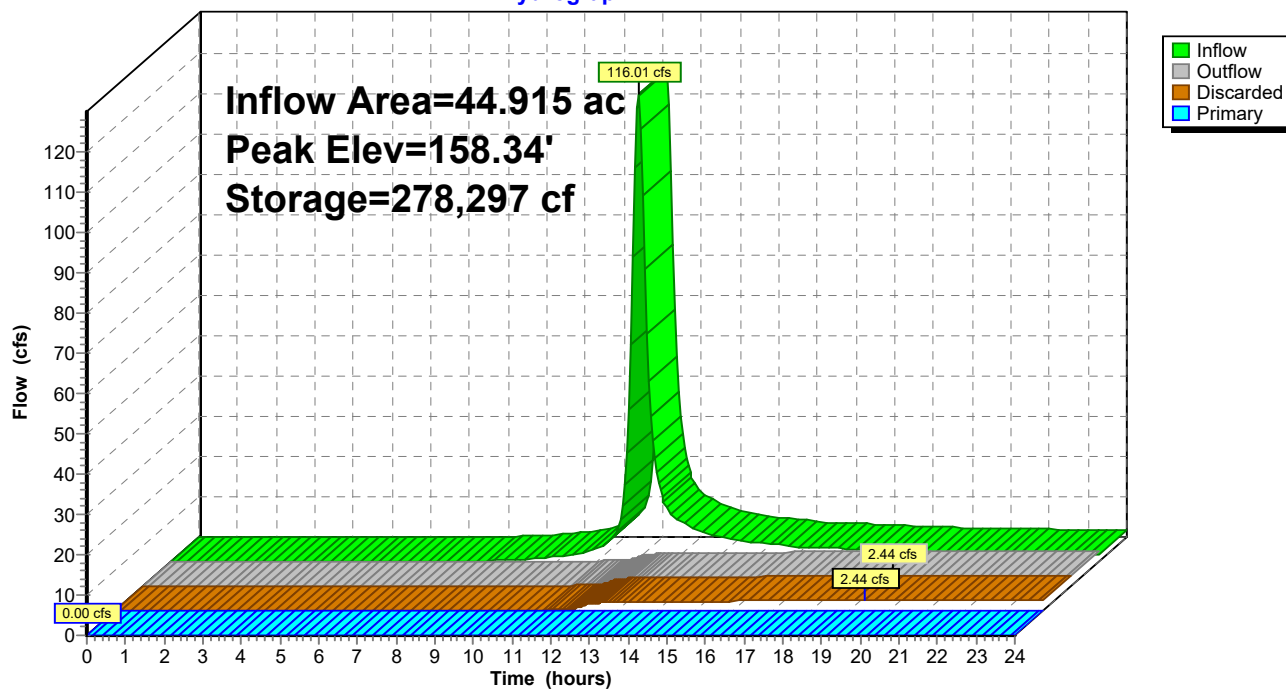
Device	Routing	Invert	Outlet Devices
#1	Discarded	140.00'	5.000 in/hr Exfiltration over Horizontal area above 140.00' Excluded Horizontal area = 5,675 sf
#2	Primary	167.00'	17.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=2.44 cfs @ 19.41 hrs HW=158.34' (Free Discharge)
 ↑1=**Exfiltration** (Exfiltration Controls 2.44 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=140.00' (Free Discharge)
 ↑2=**Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 26P: North Pond

Hydrograph



Post-Development_North Pond*Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"*

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Page 61

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment8S:	Runoff Area=11.897 ac 0.00% Impervious Runoff Depth>2.80" Flow Length=633' Tc=11.4 min CN=80 Runoff=48.10 cfs 2.775 af
Subcatchment9S:	Runoff Area=5.653 ac 0.00% Impervious Runoff Depth>2.80" Flow Length=717' Tc=10.7 min CN=80 Runoff=23.31 cfs 1.319 af
Subcatchment10S:	Runoff Area=9.230 ac 0.00% Impervious Runoff Depth>2.80" Flow Length=1,350' Tc=15.0 min CN=80 Runoff=33.21 cfs 2.151 af
Subcatchment11S:	Runoff Area=0.758 ac 0.00% Impervious Runoff Depth>2.89" Flow Length=291' Slope=0.0800 '/' Tc=9.3 min CN=81 Runoff=3.39 cfs 0.183 af
Subcatchment12S:	Runoff Area=11.736 ac 0.00% Impervious Runoff Depth>2.80" Flow Length=944' Slope=0.0500 '/' Tc=13.5 min CN=80 Runoff=44.40 cfs 2.736 af
Subcatchment13S:	Runoff Area=1.365 ac 0.00% Impervious Runoff Depth>2.89" Flow Length=510' Tc=6.0 min CN=81 Runoff=6.73 cfs 0.329 af
Subcatchment15S:	Runoff Area=0.660 ac 0.00% Impervious Runoff Depth>1.73" Flow Length=854' Tc=7.7 min CN=67 Runoff=1.88 cfs 0.095 af
Subcatchment16S:	Runoff Area=1.546 ac 0.00% Impervious Runoff Depth>2.89" Flow Length=122' Slope=0.0800 '/' Tc=6.2 min CN=81 Runoff=7.56 cfs 0.373 af
SubcatchmentNP:	Runoff Area=2.070 ac 83.57% Impervious Runoff Depth>4.43" Tc=6.0 min CN=96 Runoff=13.82 cfs 0.764 af
Reach 1R: Gabion Downchute	Avg. Flow Depth=0.80' Max Vel=18.46 fps Inflow=44.40 cfs 2.736 af n=0.030 L=260.0' S=0.3308 '/' Capacity=105.82 cfs Outflow=44.05 cfs 2.735 af
Reach 2R: North Channel - 3	Avg. Flow Depth=1.42' Max Vel=6.90 fps Inflow=47.96 cfs 3.064 af n=0.028 L=457.0' S=0.0219 '/' Capacity=100.17 cfs Outflow=46.62 cfs 3.059 af
Reach 3R:	Avg. Flow Depth=0.41' Max Vel=6.50 fps Inflow=7.56 cfs 0.373 af n=0.028 L=348.0' S=0.0747 '/' Capacity=185.10 cfs Outflow=7.33 cfs 0.372 af
Reach 4R: North Channel - 1	Avg. Flow Depth=1.64' Max Vel=5.03 fps Inflow=48.10 cfs 2.775 af n=0.028 L=1,200.0' S=0.0100 '/' Capacity=67.72 cfs Outflow=43.01 cfs 2.761 af
Reach 5R: North Channel - 2	Avg. Flow Depth=1.17' Max Vel=11.32 fps Inflow=57.95 cfs 4.079 af n=0.028 L=850.0' S=0.0729 '/' Capacity=182.89 cfs Outflow=56.79 cfs 4.073 af
Reach 6R:	Avg. Flow Depth=1.47' Max Vel=4.92 fps Inflow=36.02 cfs 2.333 af n=0.028 L=185.0' S=0.0108 '/' Capacity=70.41 cfs Outflow=35.36 cfs 2.331 af
Reach 7R: MSE Berm Swale	Avg. Flow Depth=0.34' Max Vel=2.71 fps Inflow=1.88 cfs 0.095 af n=0.028 L=850.0' S=0.0188 '/' Capacity=14.63 cfs Outflow=1.52 cfs 0.094 af

Post-Development_North Pond*Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"*

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Page 62

Pond 1P: Drop Inlet 1

Peak Elev=209.18' Inflow=90.56 cfs 6.404 af
36.0" Round Culvert n=0.013 L=65.0' S=0.0092 '/' Outflow=90.56 cfs 6.404 af

Pond 2P: Drop Inlet Structure

Peak Elev=188.02' Inflow=7.33 cfs 0.372 af
36.0" Round Culvert n=0.011 L=36.0' S=0.0500 '/' Outflow=7.33 cfs 0.372 af

Pond 3P: Stormwater Manhole

Peak Elev=183.12' Inflow=51.81 cfs 3.432 af
Primary=51.81 cfs 3.432 af Secondary=0.00 cfs 0.000 af Outflow=51.81 cfs 3.432 af

Pond 8P: Drop Inlet Structure

Peak Elev=190.37' Inflow=46.62 cfs 3.059 af
36.0" Round Culvert n=0.011 L=80.0' S=0.0500 '/' Outflow=46.62 cfs 3.059 af

Pond 26P: North Pond

Peak Elev=160.84' Storage=349,888 cf Inflow=146.18 cfs 10.694 af
Discarded=2.93 cfs 2.854 af Primary=0.00 cfs 0.000 af Outflow=2.93 cfs 2.854 af

Total Runoff Area = 44.915 ac Runoff Volume = 10.723 af Average Runoff Depth = 2.87"
96.15% Pervious = 43.185 ac 3.85% Impervious = 1.730 ac

Post-Development_North Pond

Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 63

Summary for Subcatchment 8S:

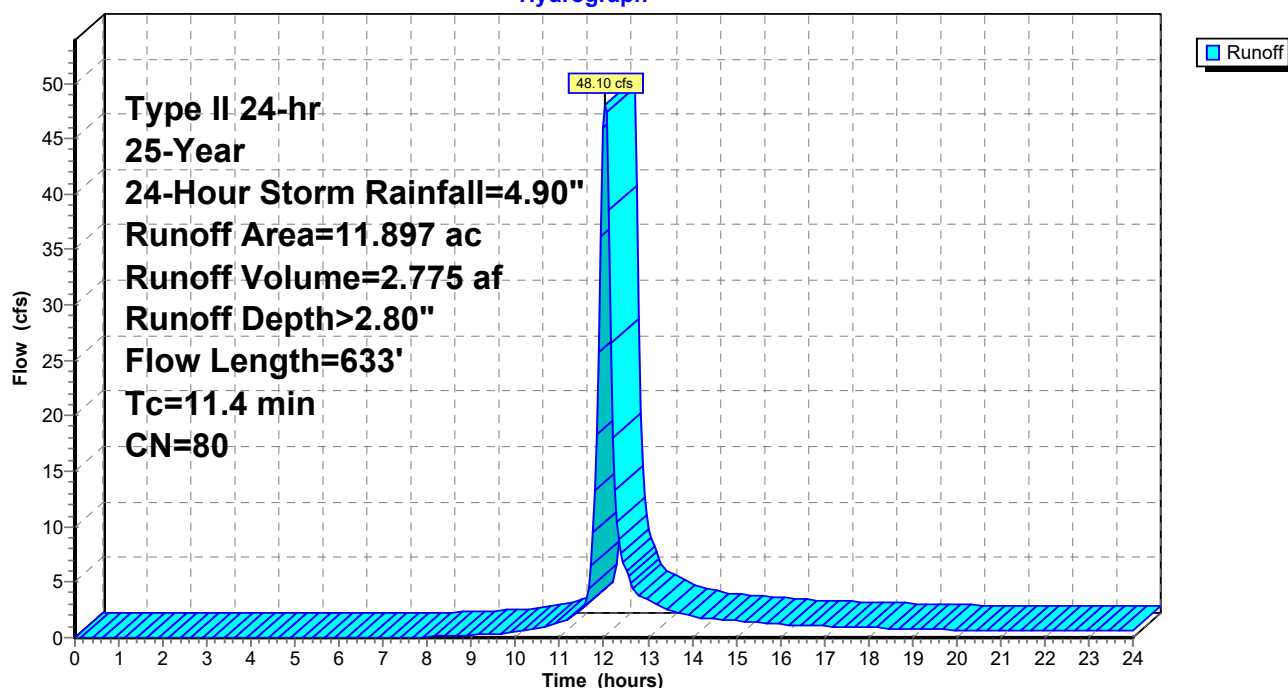
[47] Hint: Peak is 116% of capacity of segment #3

Runoff = 48.10 cfs @ 12.03 hrs, Volume= 2.775 af, Depth> 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

Area (ac)	CN	Description
* 11.340	80	Cap
0.557	85	Gravel roads, HSG B
11.897	80	Weighted Average
11.897		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Section 1 Grass: Short n= 0.150 P2= 2.80"
3.7	351	0.0500	1.57		Shallow Concentrated Flow, Section 2 Short Grass Pasture Kv= 7.0 fps
0.4	182	0.0250	7.37	41.47	Trap/Vee/Rect Channel Flow, Diversion Berm 1 Bot.W=0.00' D=1.50' Z= 3.0 & 2.0 ' Top.W=7.50' n= 0.025
11.4	633	Total			

Subcatchment 8S:**Hydrograph**

Post-Development_North Pond

Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 64

Summary for Subcatchment 9S:

[47] Hint: Peak is 744% of capacity of segment #3

Runoff = 23.31 cfs @ 12.02 hrs, Volume= 1.319 af, Depth> 2.80"

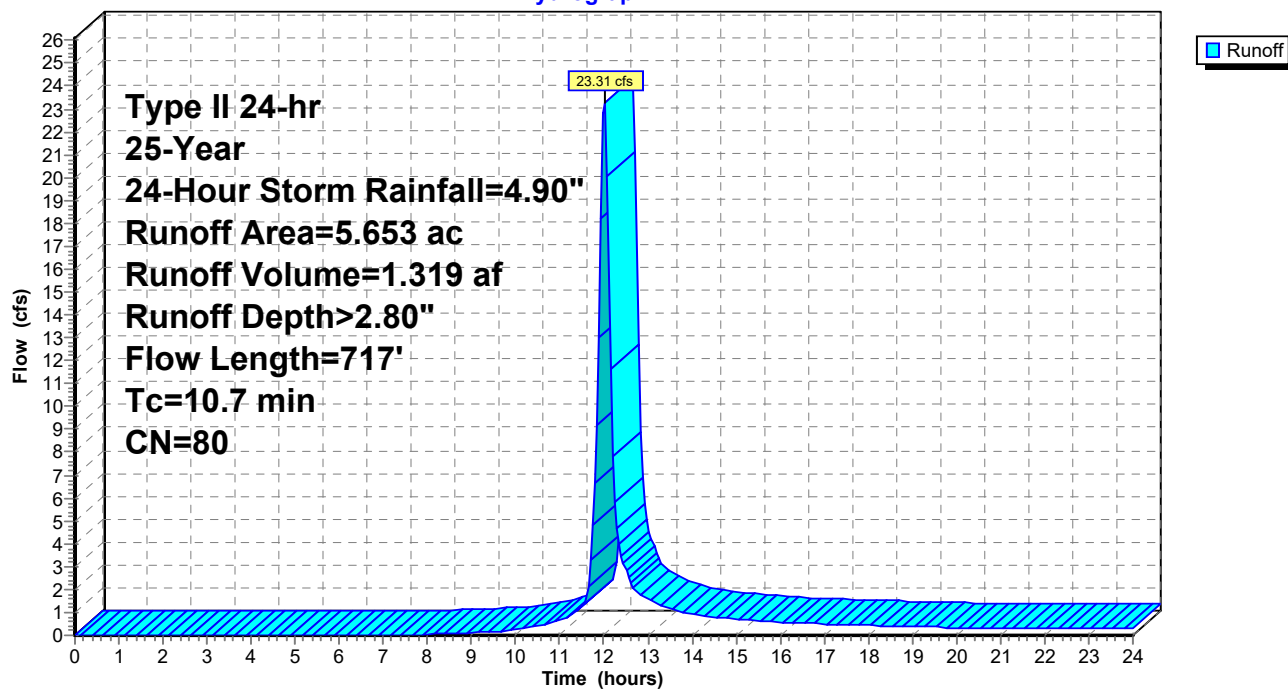
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

Area (ac)	CN	Description
* 5.113	80	Cap
0.540	85	Gravel roads, HSG B
5.653	80	Weighted Average
5.653		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Section 1 Grass: Short n= 0.150 P2= 2.80"
2.0	191	0.0500	1.57		Shallow Concentrated Flow, Section 2 Short Grass Pasture Kv= 7.0 fps
1.4	406	0.0500	5.01	3.13	Trap/Vee/Rect Channel Flow, Diversion Berm 1 Bot.W=0.00' D=0.50' Z= 3.0 & 2.0 '/' Top.W=2.50' n= 0.025
0.0	20	0.3333	17.70	79.67	Trap/Vee/Rect Channel Flow, Let-Down Channel 1 Bot.W=3.00' D=1.50' n= 0.040
10.7	717	Total			

Subcatchment 9S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 66

Summary for Subcatchment 10S:

[47] Hint: Peak is 1849% of capacity of segment #4

Runoff = 33.21 cfs @ 12.07 hrs, Volume= 2.151 af, Depth> 2.80"

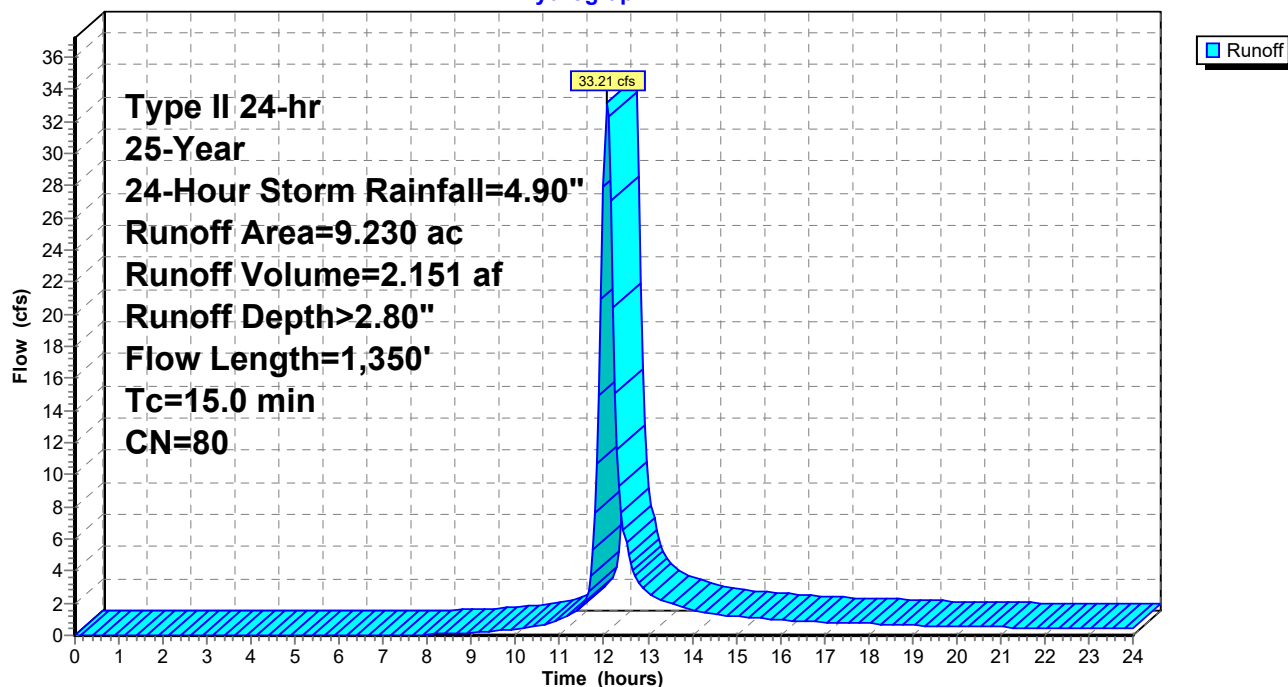
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

Area (ac)	CN	Description
* 9.230	80	Cap
9.230		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Grass: Short n= 0.150 P2= 2.80"
5.2	488	0.0500	1.57		Shallow Concentrated Flow, Section 1 Short Grass Pasture Kv= 7.0 fps
0.3	70	0.3300	4.02		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	280	0.0400	2.87	1.80	Trap/Vee/Rect Channel Flow, Diversion Berm 1 Bot.W=0.00' D=0.50' Z= 3.0 & 2.0 '/' Top.W=2.50' n= 0.039
0.2	222	0.3333	17.70	79.67	Trap/Vee/Rect Channel Flow, Gabion Downchute Bot.W=3.00' D=1.50' n= 0.040
0.4	190	0.0210	7.63	91.59	Trap/Vee/Rect Channel Flow, North Channel Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.030
15.0	1,350	Total			

Subcatchment 10S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 68

Summary for Subcatchment 11S:

Runoff = 3.39 cfs @ 12.01 hrs, Volume= 0.183 af, Depth> 2.89"

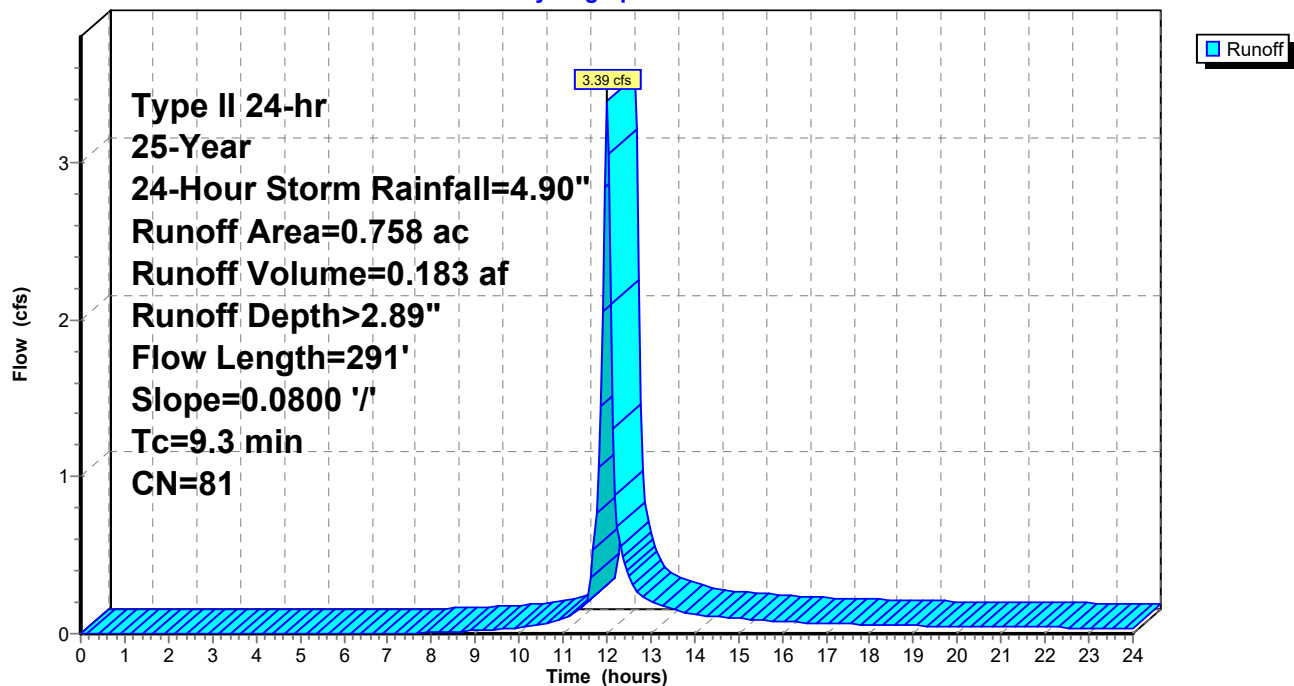
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

Area (ac)	CN	Description
* 0.576	80	CAP
0.182	85	Gravel roads, HSG B
0.758	81	Weighted Average
0.758		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0800	0.19		Sheet Flow, MSE Exterior Slope Grass: Dense n= 0.240 P2= 2.80"
0.2	20	0.0800	1.98		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	171	0.0800	9.56	14.34	Trap/Vee/Rect Channel Flow, Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.022 Earth, clean & straight
9.3	291	Total			

Subcatchment 11S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 69

Summary for Subcatchment 12S:

Runoff = 44.40 cfs @ 12.05 hrs, Volume= 2.736 af, Depth> 2.80"

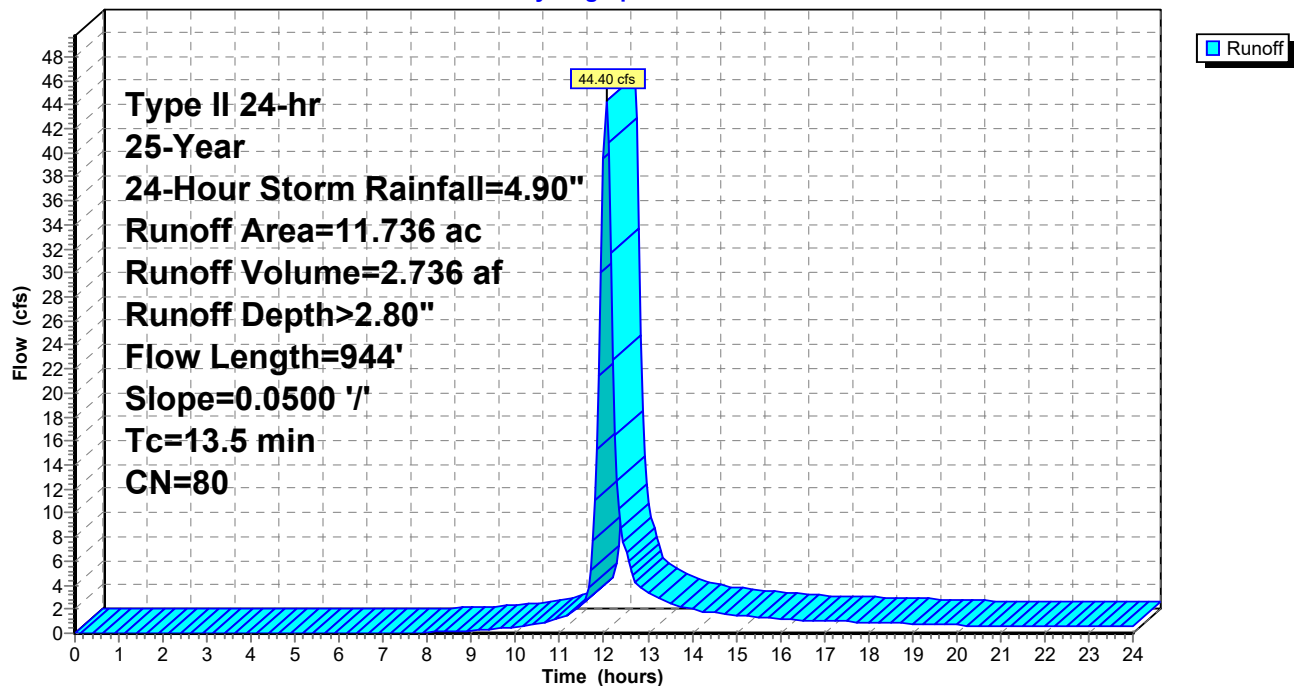
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

Area (ac)	CN	Description
* 11.736	80	
11.736		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Plateau Grass: Short n= 0.150 P2= 2.80"
3.8	359	0.0500	1.57		Shallow Concentrated Flow, Plateau Short Grass Pasture Kv= 7.0 fps
2.4	485	0.0500	3.35		Shallow Concentrated Flow, Sideslope Berm Grassed Waterway Kv= 15.0 fps
13.5	944	Total			

Subcatchment 12S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 70

Summary for Subcatchment 13S:

Runoff = 6.73 cfs @ 11.97 hrs, Volume= 0.329 af, Depth> 2.89"

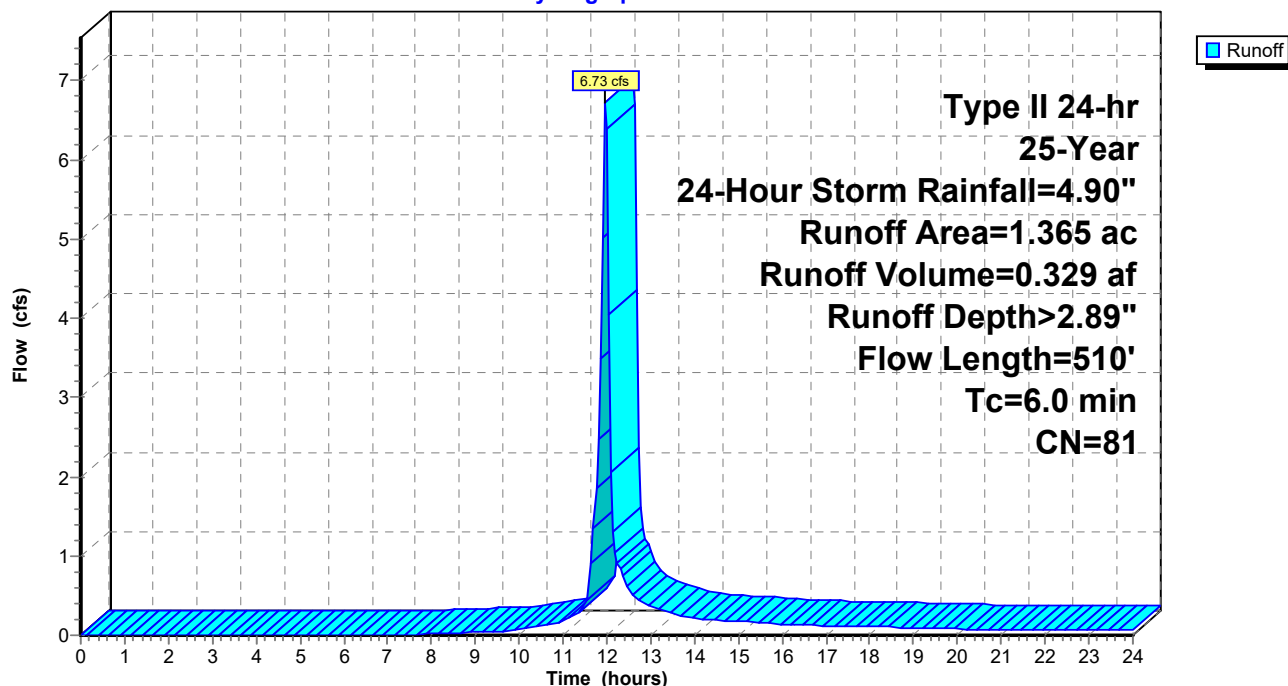
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

Area (ac)	CN	Description
* 1.080	80	Cap
* 0.285	85	Gravel Road
1.365	81	Weighted Average
1.365		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.3300	0.43		Sheet Flow, Section 1
					Grass: Short n= 0.150 P2= 2.80"
3.0	460	0.0300	2.60		Shallow Concentrated Flow, Perimeter Swale
					Grassed Waterway Kv= 15.0 fps
5.0	510	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 13S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 71

Summary for Subcatchment 15S:

Runoff = 1.88 cfs @ 12.00 hrs, Volume= 0.095 af, Depth> 1.73"

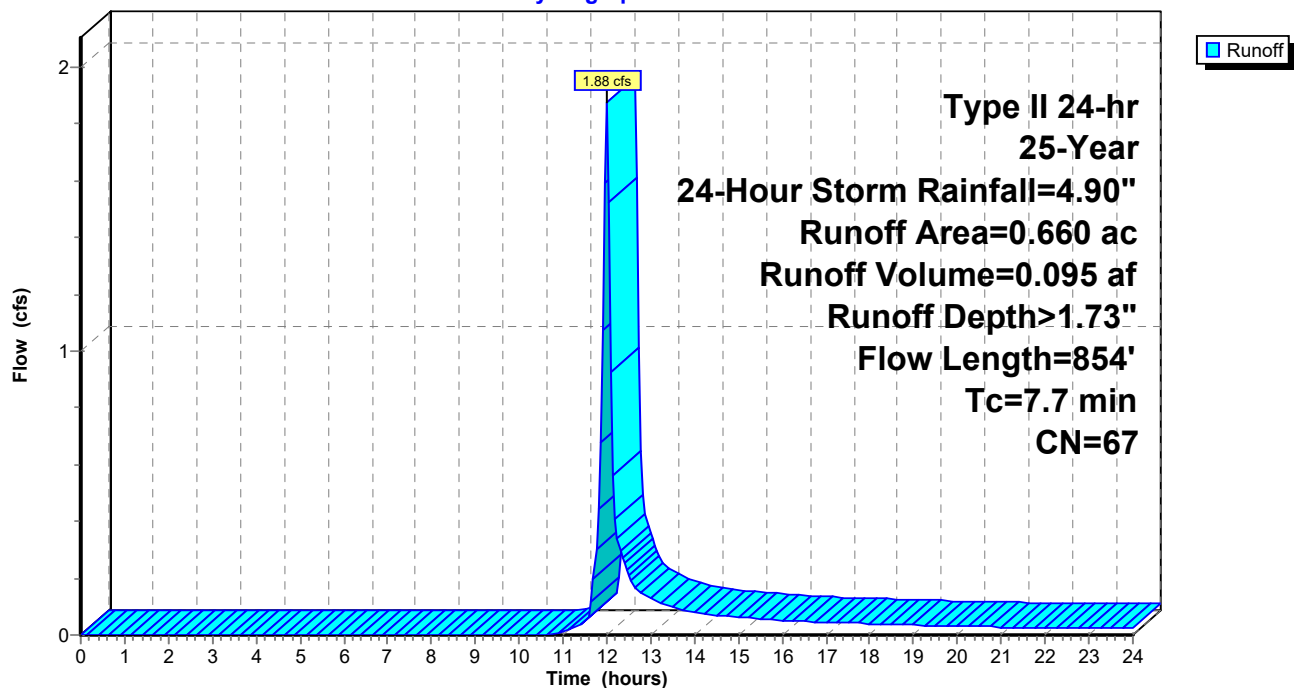
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

Area (ac)	CN	Description
* 0.660	67	Vegetation (Hyd. Group B)
0.660		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	29	0.0330	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 2.80"
4.5	825	0.0100	3.09	3.09	Trap/Vee/Rect Channel Flow, Bot.W=1.00' D=0.50' Z= 2.0 '/' Top.W=3.00' n= 0.022 Earth, clean & straight
7.7	854	Total			

Subcatchment 15S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 72

Summary for Subcatchment 16S:

Runoff = 7.56 cfs @ 11.97 hrs, Volume= 0.373 af, Depth> 2.89"

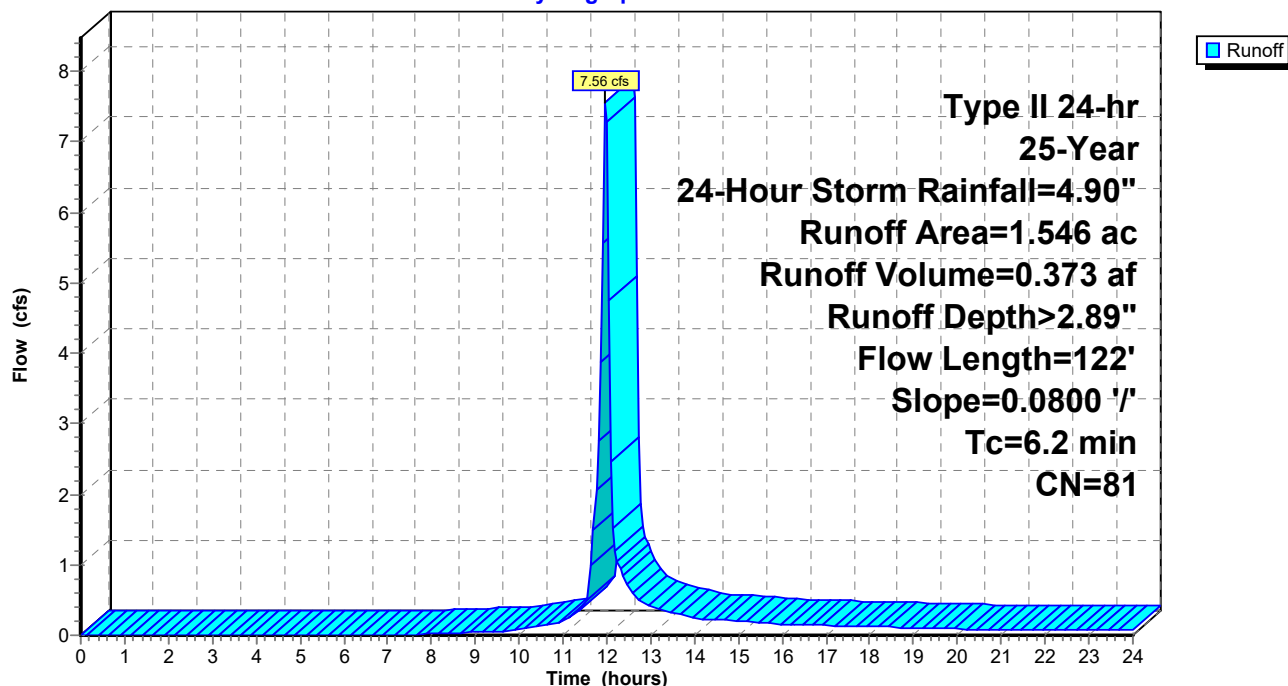
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

Area (ac)	CN	Description
* 1.224	80	Cap
* 0.322	85	Gravel Road
1.546	81	Weighted Average
1.546		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	100	0.0800	0.28		Sheet Flow, Grass: Short n= 0.150 P2= 2.80"
0.2	22	0.0800	1.98		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.2	122	Total			

Subcatchment 16S:

Hydrograph



Post-Development_North Pond

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Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 73

Summary for Subcatchment NP:

Runoff = 13.82 cfs @ 11.96 hrs, Volume= 0.764 af, Depth> 4.43"

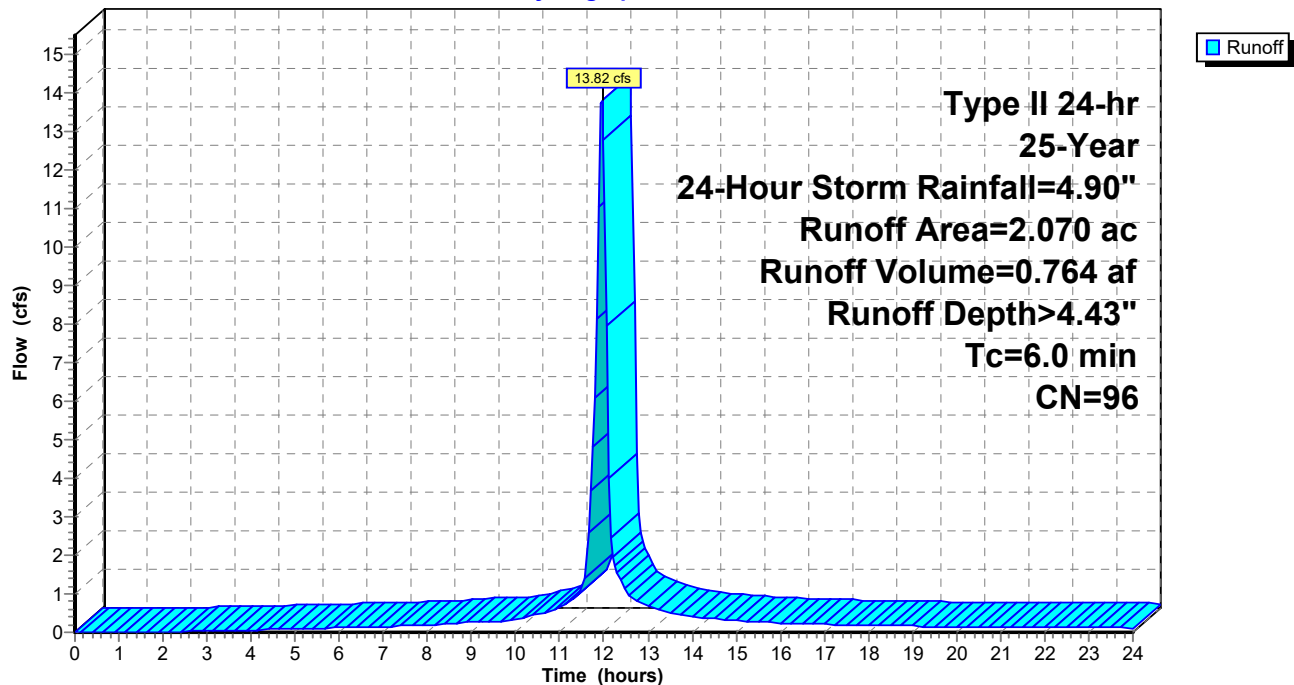
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

Area (ac)	CN	Description
* 1.730	98	Basin
* 0.340	85	Gravel Road
2.070	96	Weighted Average
0.340		16.43% Pervious Area
1.730		83.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0					Direct Entry,
1.0	0				Total, Increased to minimum Tc = 6.0 min

Subcatchment NP:

Hydrograph



Summary for Reach 1R: Gabion Downchute

Mannings from Figure 5B.11 Determining "n" for Riprap Lined Channel Using Depth of Flow

Inflow Area = 11.736 ac, 0.00% Impervious, Inflow Depth > 2.80" for 25-Year, 24-Hour Storm event
 Inflow = 44.40 cfs @ 12.05 hrs, Volume= 2.736 af
 Outflow = 44.05 cfs @ 12.06 hrs, Volume= 2.735 af, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 18.46 fps, Min. Travel Time= 0.2 min

Avg. Velocity = 4.91 fps, Avg. Travel Time= 0.9 min

Peak Storage= 625 cf @ 12.06 hrs

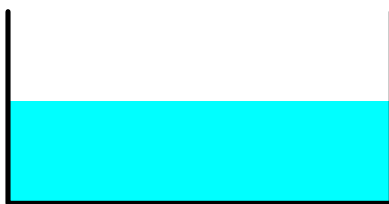
Average Depth at Peak Storage= 0.80' , Surface Width= 3.00'

Bank-Full Depth= 1.50' Flow Area= 4.5 sf, Capacity= 105.82 cfs

3.00' x 1.50' deep channel, n= 0.030

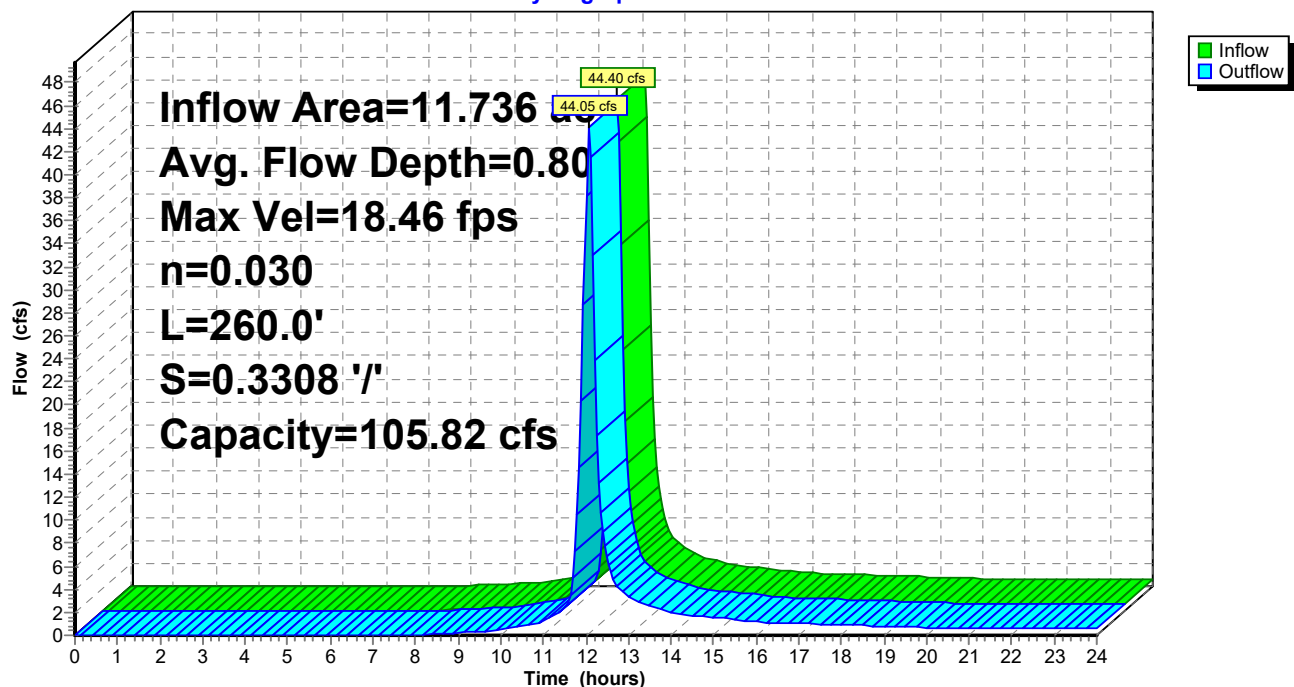
Length= 260.0' Slope= 0.3308 '/'

Inlet Invert= 290.00', Outlet Invert= 204.00'



Reach 1R: Gabion Downchute

Hydrograph



Summary for Reach 2R: North Channel - 3

[62] Hint: Exceeded Reach 1R OUTLET depth by 0.63' @ 12.10 hrs

Inflow Area = 13.101 ac, 0.00% Impervious, Inflow Depth > 2.81" for 25-Year, 24-Hour Storm event
Inflow = 47.96 cfs @ 12.05 hrs, Volume = 3.064 af
Outflow = 46.62 cfs @ 12.08 hrs, Volume = 3.059 af, Atten = 3%, Lag = 2.0 min

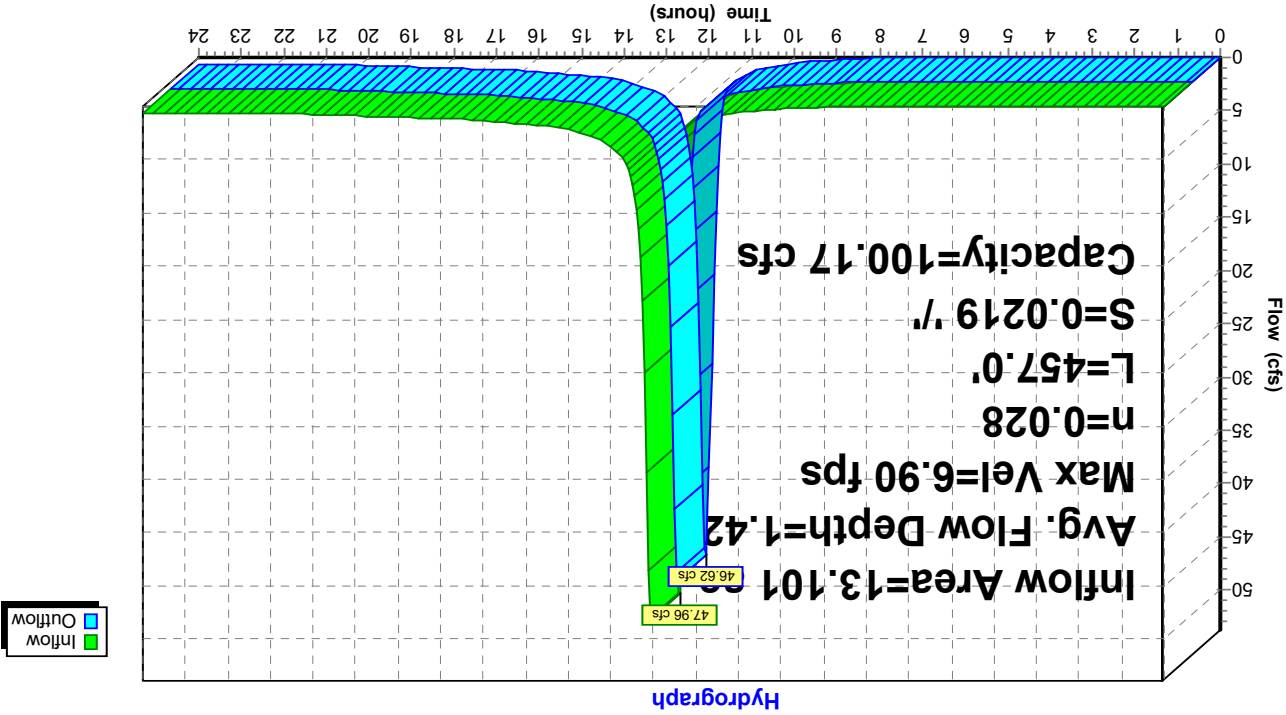
Routing by Stor-Ind+Trans method, Time Span = 0.00-24.00 hrs, dt = 0.05 hrs
Max. Velocity = 6.90 fps, Min. Travel Time = 1.1 min
Avg. Velocity = 2.32 fps, Avg. Travel Time = 3.3 min

Peak Storage = 3,154 cf @ 12.06 hrs
Average Depth at Peak Storage = 1.42', Surface Width = 7.70'
Bank-Full Depth = 2.00', Flow Area = 12.0 sf, Capacity = 100.17 cfs

2.00' x 2.00' deep channel, n = 0.028
Side Slope Z-value = 2.0', Top Width = 10.00'
Length = 457.0', Slope = 0.0219 %
Inlet Invert = 204.00', Outlet Invert = 194.00'



Reach 2R: North Channel - 3



Post-Development_North Pond

Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 76

Summary for Reach 3R:

Inflow Area = 1.546 ac, 0.00% Impervious, Inflow Depth > 2.89" fo25-Year, 24-Hour Storm event
Inflow = 7.56 cfs @ 11.97 hrs, Volume= 0.373 af
Outflow = 7.33 cfs @ 12.00 hrs, Volume= 0.372 af, Atten= 3%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 6.50 fps, Min. Travel Time= 0.9 min

Avg. Velocity = 1.73 fps, Avg. Travel Time= 3.3 min

Peak Storage= 404 cf @ 11.98 hrs

Average Depth at Peak Storage= 0.41' , Surface Width= 3.65'

Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 185.10 cfs

2.00' x 2.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 '/' Top Width= 10.00'

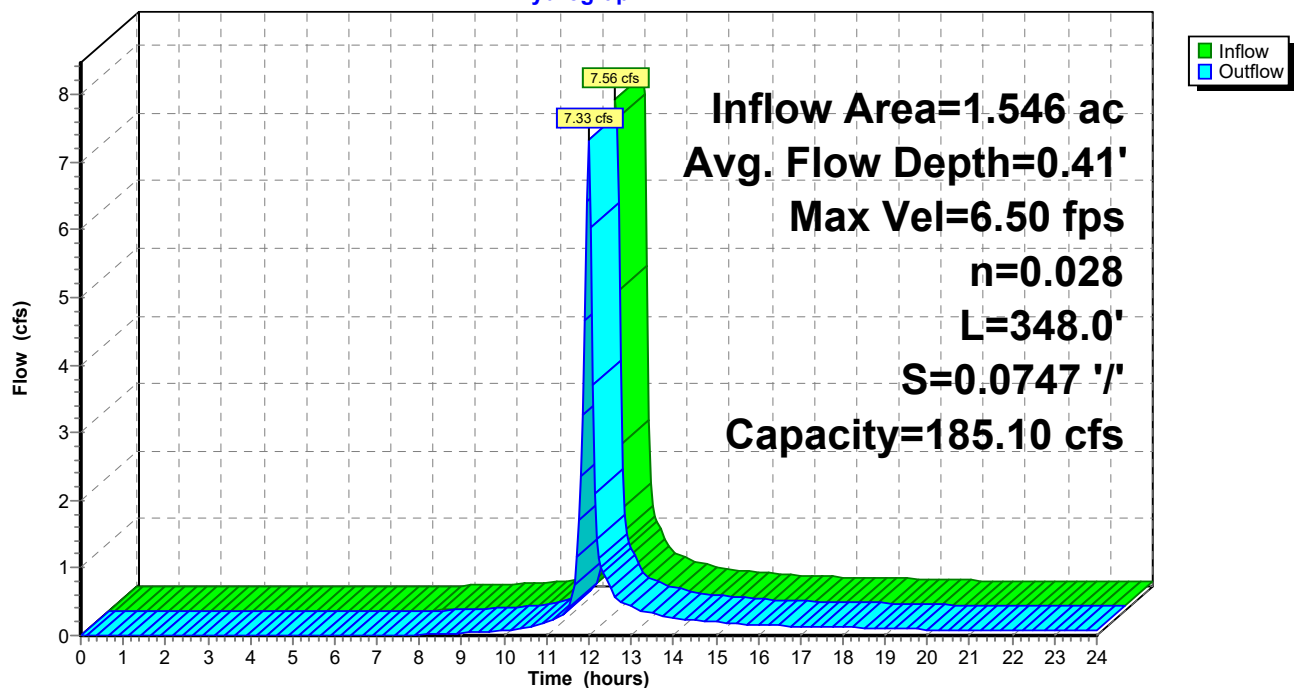
Length= 348.0' Slope= 0.0747 '/'

Inlet Invert= 220.00', Outlet Invert= 194.00'



Reach 3R:

Hydrograph



Post-Development_North Pond

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Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 77

Summary for Reach 4R: North Channel - 1

Inflow Area = 11.897 ac, 0.00% Impervious, Inflow Depth > 2.80" fo25-Year, 24-Hour Storm event
Inflow = 48.10 cfs @ 12.03 hrs, Volume= 2.775 af
Outflow = 43.01 cfs @ 12.14 hrs, Volume= 2.761 af, Atten= 11%, Lag= 6.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 5.03 fps, Min. Travel Time= 4.0 min

Avg. Velocity = 1.74 fps, Avg. Travel Time= 11.5 min

Peak Storage= 10,408 cf @ 12.08 hrs

Average Depth at Peak Storage= 1.64' , Surface Width= 8.57'

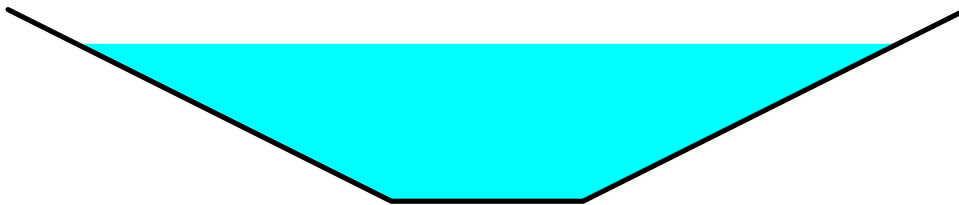
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 67.72 cfs

2.00' x 2.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 ' / ' Top Width= 10.00'

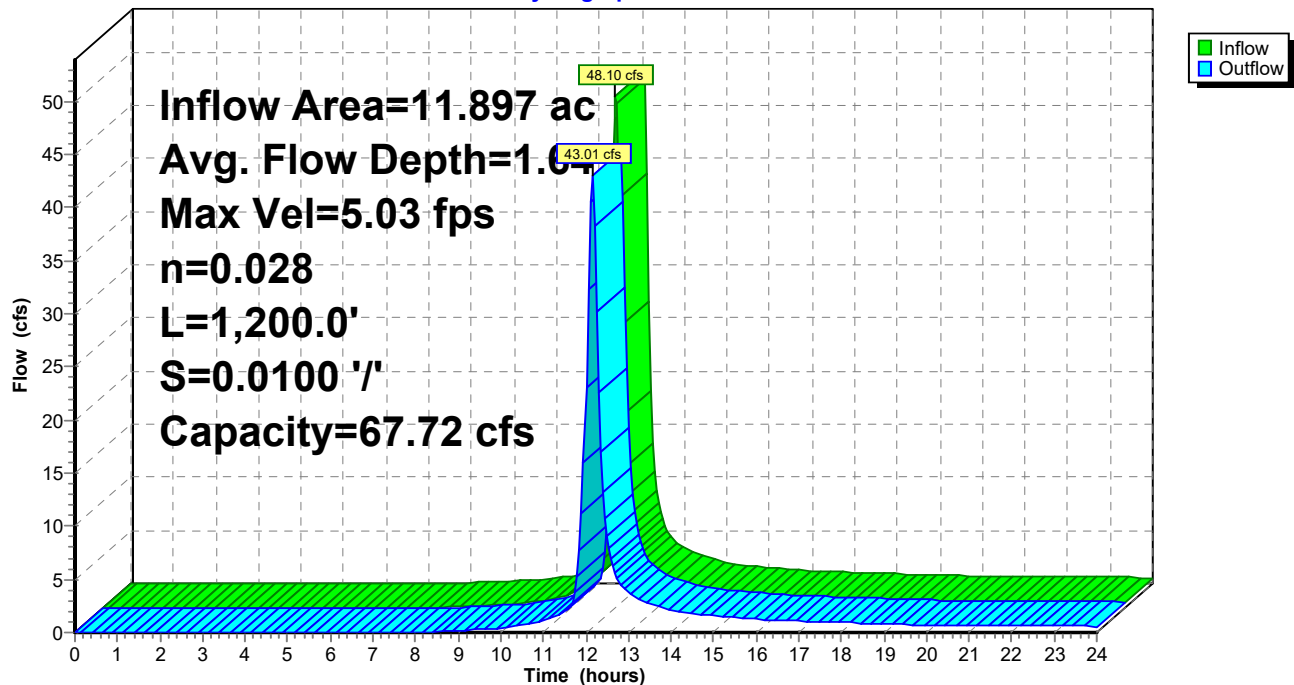
Length= 1,200.0' Slope= 0.0100 ' / '

Inlet Invert= 290.00', Outlet Invert= 278.00'



Reach 4R: North Channel - 1

Hydrograph



Summary for Reach 5R: North Channel - 2

[61] Hint: Exceeded Reach 4R outlet invert by 1.17' @ 12.10 hrs

Inflow Area = 17.550 ac, 0.00% Impervious, Inflow Depth > 2.79" for 25-Year, 24-Hour Storm event
Inflow = 57.95 cfs @ 12.10 hrs, Volume = 4.079 af
Outflow = 56.79 cfs @ 12.14 hrs, Volume = 4.073 af, Atten = 2%, Lag = 2.3 min

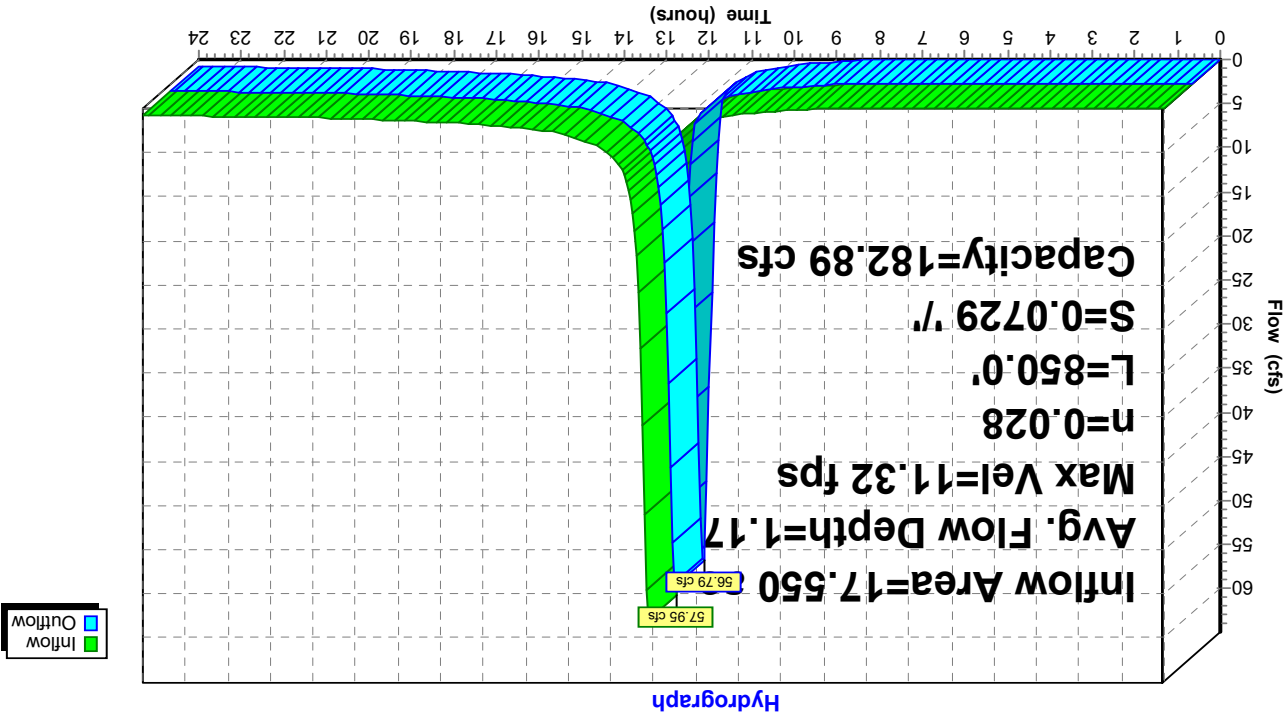
Routing by Stor-Ind+Trans method, Time Span = 0.00-24.00 hrs, dt = 0.05 hrs
Max. Velocity = 11.32 fps, Min. Travel Time = 1.3 min
Avg. Velocity = 3.87 fps, Avg. Travel Time = 3.7 min

Peak Storage = 4,326 cf @ 12.11 hrs
Average Depth at Peak Storage = 1.17', Surface Width = 6.69'
Bank-Full Depth = 2.00' Flow Area = 12.0 sf, Capacity = 182.89 cfs

2.00' x 2.00' deep channel, n = 0.028
Side Slope Z-value = 2.0' Top Width = 10.00'
Length = 850.0' Slope = 0.0729'/'
Inlet Invert = 278.00', Outlet Invert = 216.00'



Reach 5R: North Channel - 2



Post-Development_North Pond

Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 79

Summary for Reach 6R:

Inflow Area = 9.988 ac, 0.00% Impervious, Inflow Depth > 2.80" fo25-Year, 24-Hour Storm event
Inflow = 36.02 cfs @ 12.06 hrs, Volume= 2.333 af
Outflow = 35.36 cfs @ 12.08 hrs, Volume= 2.331 af, Atten= 2%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 4.92 fps, Min. Travel Time= 0.6 min

Avg. Velocity = 1.68 fps, Avg. Travel Time= 1.8 min

Peak Storage= 1,345 cf @ 12.07 hrs

Average Depth at Peak Storage= 1.47' , Surface Width= 7.88'

Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 70.41 cfs

2.00' x 2.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 '/' Top Width= 10.00'

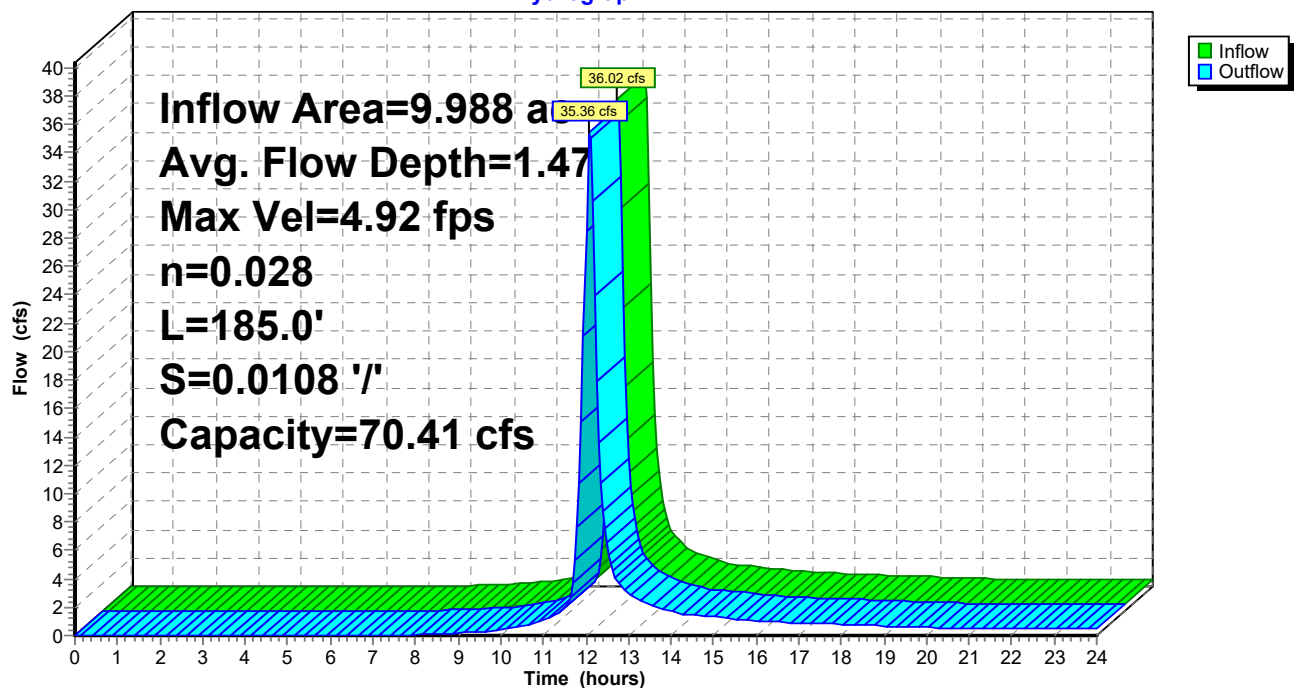
Length= 185.0' Slope= 0.0108 '/'

Inlet Invert= 218.00', Outlet Invert= 216.00'



Reach 6R:

Hydrograph



Summary for Reach 7R: MSE Berm Swale

Inflow Area = 0.660 ac, 0.00% Impervious, Inflow Depth > 1.73" for 25-Year, 24-Hour Storm event
 Inflow = 1.88 cfs @ 12.00 hrs, Volume= 0.095 af
 Outflow = 1.52 cfs @ 12.14 hrs, Volume= 0.094 af, Atten= 19%, Lag= 8.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Max. Velocity= 2.71 fps, Min. Travel Time= 5.2 min
 Avg. Velocity = 0.93 fps, Avg. Travel Time= 15.3 min

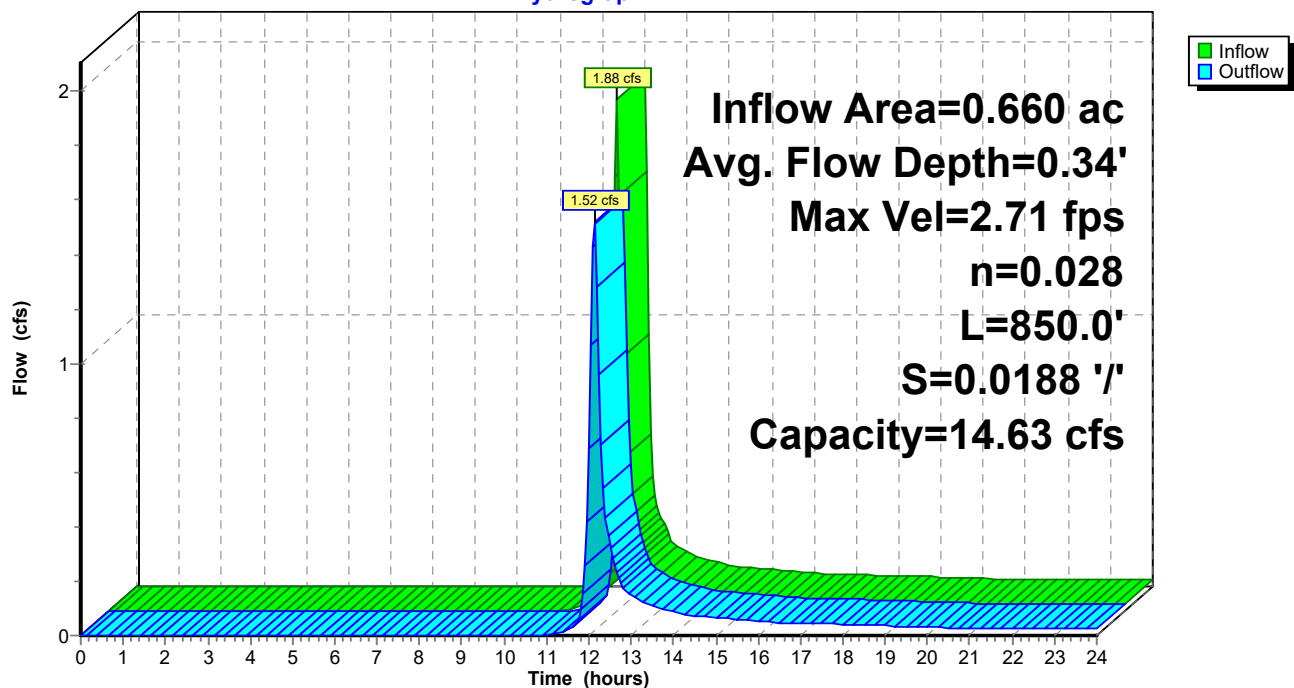
Peak Storage= 489 cf @ 12.05 hrs
 Average Depth at Peak Storage= 0.34', Surface Width= 2.37'
 Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 14.63 cfs

1.00' x 1.00' deep channel, n= 0.028
 Side Slope Z-value= 2.0 '/' Top Width= 5.00'
 Length= 850.0' Slope= 0.0188 '/'
 Inlet Invert= 216.00', Outlet Invert= 200.00'



Reach 7R: MSE Berm Swale

Hydrograph



Summary for Pond 1P: Drop Inlet 1

Inflow Area = 27.538 ac, 0.00% Impervious, Inflow Depth > 2.79" fo25-Year, 24-Hour Storm event
 Inflow = 90.56 cfs @ 12.11 hrs, Volume= 6.404 af
 Outflow = 90.56 cfs @ 12.11 hrs, Volume= 6.404 af, Atten= 0%, Lag= 0.0 min
 Primary = 90.56 cfs @ 12.11 hrs, Volume= 6.404 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 209.18' @ 12.11 hrs

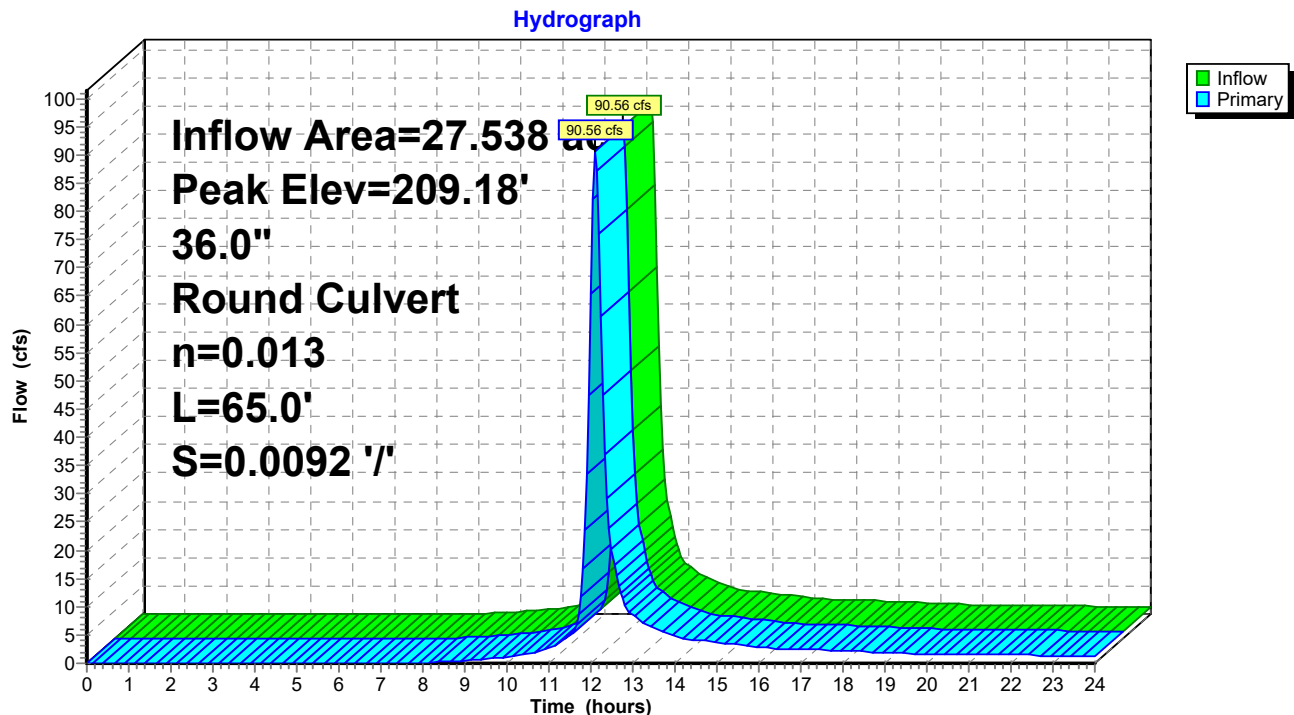
Flood Elev= 220.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	200.60'	36.0" Round Culvert L= 65.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 200.60' / 200.00' S= 0.0092 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=89.60 cfs @ 12.11 hrs HW=209.03' (Free Discharge)

↑1=Culvert (Inlet Controls 89.60 cfs @ 12.68 fps)

Pond 1P: Drop Inlet 1



Summary for Pond 2P: Drop Inlet Structure

Inflow Area = 1.546 ac, 0.00% Impervious, Inflow Depth > 2.89" fo25-Year, 24-Hour Storm event
 Inflow = 7.33 cfs @ 12.00 hrs, Volume= 0.372 af
 Outflow = 7.33 cfs @ 12.00 hrs, Volume= 0.372 af, Atten= 0%, Lag= 0.0 min
 Primary = 7.33 cfs @ 12.00 hrs, Volume= 0.372 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 188.02' @ 12.00 hrs

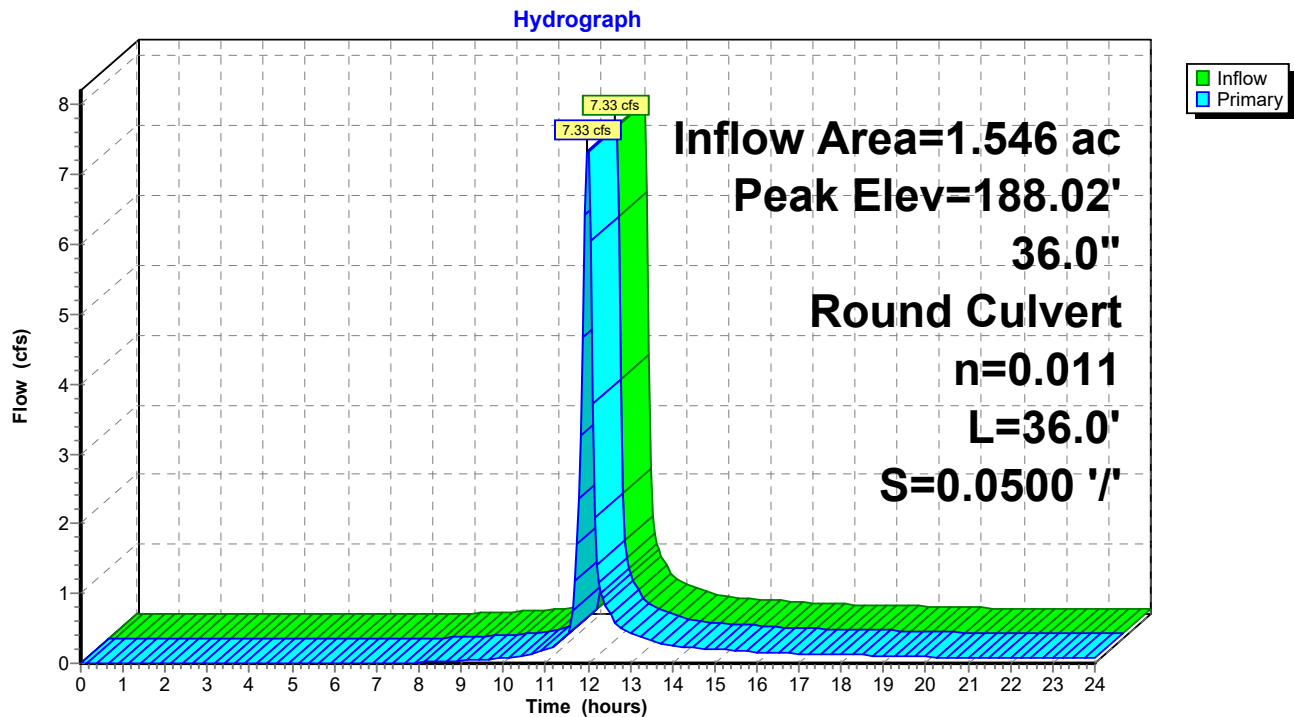
Flood Elev= 196.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	187.00'	36.0" Round 36" HDPE Pipe L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 187.00' / 185.20' S= 0.0500 '/ Cc= 0.900 n= 0.011, Flow Area= 7.07 sf

Primary OutFlow Max=7.23 cfs @ 12.00 hrs HW=188.02' (Free Discharge)

1=36" HDPE Pipe (Inlet Controls 7.23 cfs @ 3.43 fps)

Pond 2P: Drop Inlet Structure



Summary for Pond 3P: Stormwater Manhole

[79] Warning: Submerged Pond 8P Primary device # 1 OUTLET by 0.09'

Inflow Area = 14.647 ac, 0.00% Impervious, Inflow Depth > 2.81" fo25-Year, 24-Hour Storm event
 Inflow = 51.81 cfs @ 12.06 hrs, Volume= 3.432 af
 Outflow = 51.81 cfs @ 12.06 hrs, Volume= 3.432 af, Atten= 0%, Lag= 0.0 min
 Primary = 51.81 cfs @ 12.06 hrs, Volume= 3.432 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 183.12' @ 12.06 hrs

Flood Elev= 188.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	179.30'	36.0" Round 36" HDPE Pipe L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 179.30' / 177.00' S= 0.0500 ' / Cc= 0.900 n= 0.011, Flow Area= 7.07 sf
#2	Secondary	196.00'	6.0' long x 1.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

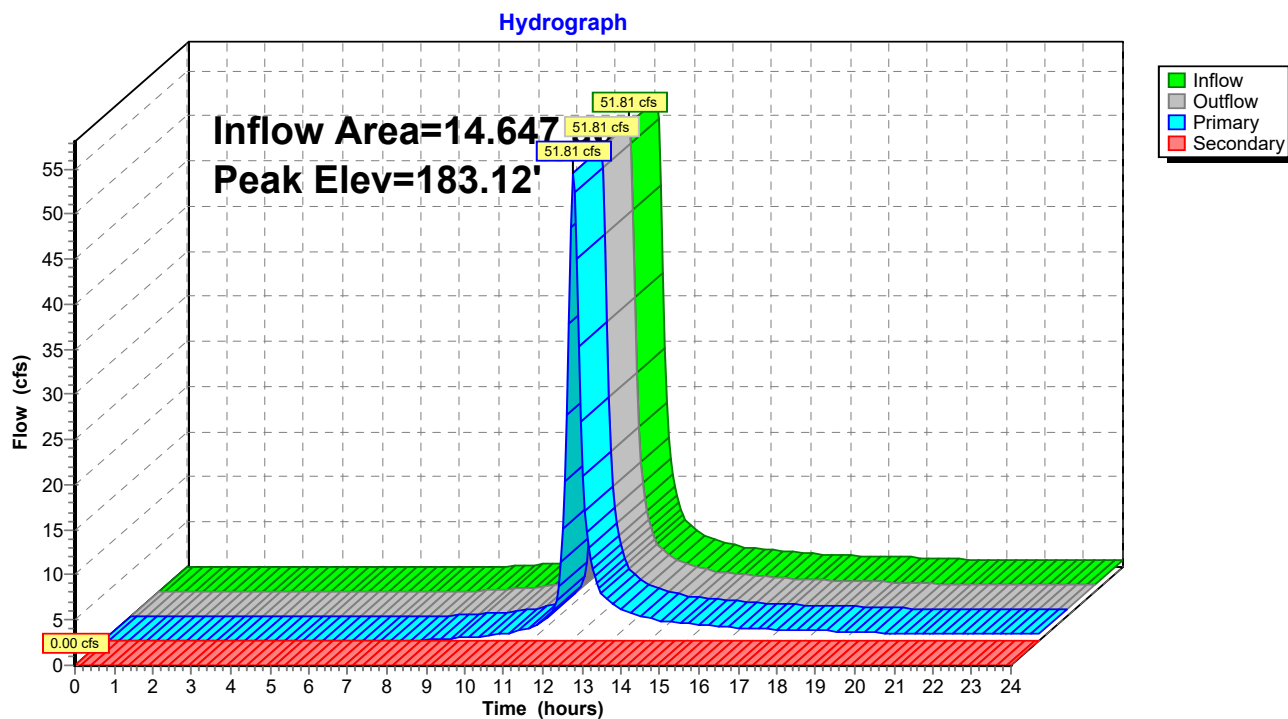
Primary OutFlow Max=51.09 cfs @ 12.06 hrs HW=183.05' (Free Discharge)

↑1=36" HDPE Pipe (Inlet Controls 51.09 cfs @ 7.23 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=179.30' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 3P: Stormwater Manhole



Summary for Pond 8P: Drop Inlet Structure

Inflow Area = 13.101 ac, 0.00% Impervious, Inflow Depth > 2.80" fo25-Year, 24-Hour Storm event
 Inflow = 46.62 cfs @ 12.08 hrs, Volume= 3.059 af
 Outflow = 46.62 cfs @ 12.08 hrs, Volume= 3.059 af, Atten= 0%, Lag= 0.0 min
 Primary = 46.62 cfs @ 12.08 hrs, Volume= 3.059 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 190.37' @ 12.08 hrs

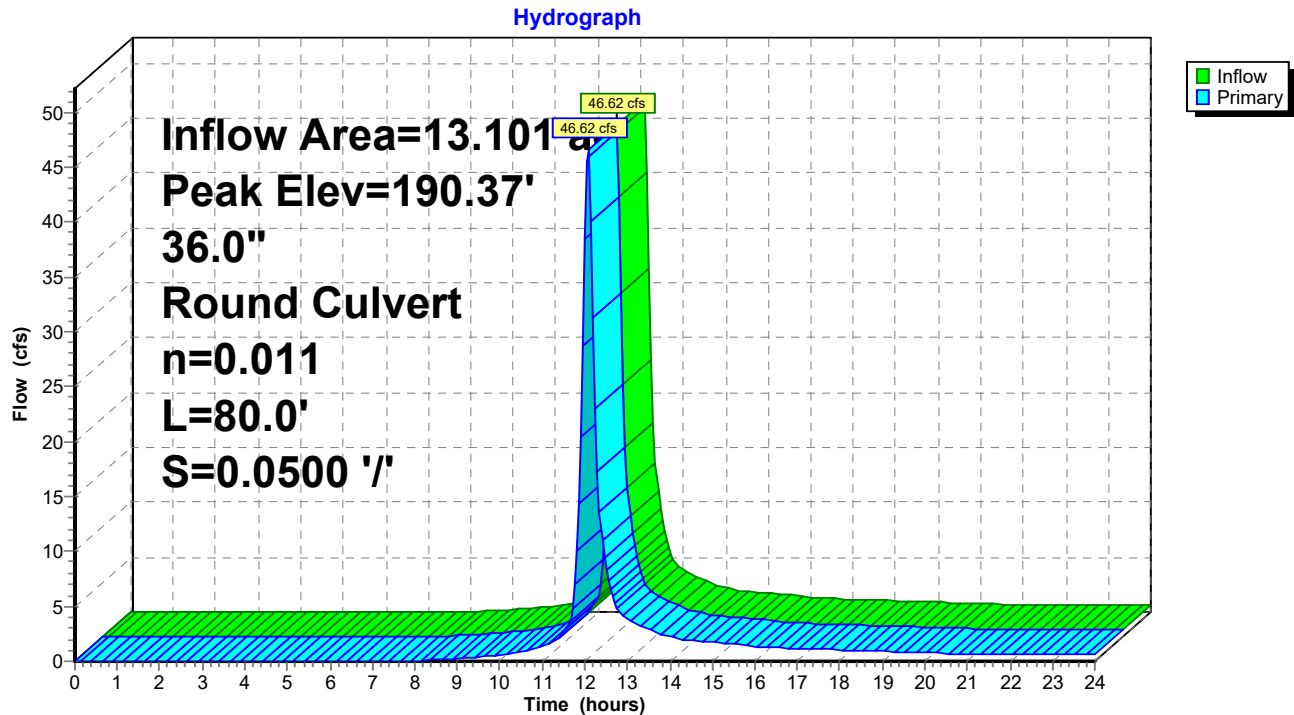
Flood Elev= 196.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	187.00'	36.0" Round Culvert L= 80.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 187.00' / 183.00' S= 0.0500 '/' Cc= 0.900 n= 0.011, Flow Area= 7.07 sf

Primary OutFlow Max=45.83 cfs @ 12.08 hrs HW=190.31' (Free Discharge)

↑1=Culvert (Inlet Controls 45.83 cfs @ 6.48 fps)

Pond 8P: Drop Inlet Structure



Post-Development_North Pond

Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 86

Summary for Pond 26P: North Pond

Inflow Area = 44.915 ac, 3.85% Impervious, Inflow Depth > 2.86" fo25-Year, 24-Hour Storm event
 Inflow = 146.18 cfs @ 12.08 hrs, Volume= 10.694 af
 Outflow = 2.93 cfs @ 19.35 hrs, Volume= 2.854 af, Atten= 98%, Lag= 436.2 min
 Discarded = 2.93 cfs @ 19.35 hrs, Volume= 2.854 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 160.84' @ 19.35 hrs Surf.Area= 31,013 sf Storage= 349,888 cf

Plug-Flow detention time= 392.1 min calculated for 2.854 af (27% of inflow)
 Center-of-Mass det. time= 256.1 min (1,079.7 - 823.5)

Volume	Invert	Avail.Storage	Storage Description
#1	140.00'	731,085 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.00	5,675	0	0
150.00	15,091	103,830	103,830
160.00	29,062	220,765	324,595
170.00	52,236	406,490	731,085

Device	Routing	Invert	Outlet Devices
#1	Discarded	140.00'	5.000 in/hr Exfiltration over Horizontal area above 140.00' Excluded Horizontal area = 5,675 sf
#2	Primary	167.00'	17.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=2.93 cfs @ 19.35 hrs HW=160.84' (Free Discharge)
 ↑1=**Exfiltration** (Exfiltration Controls 2.93 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=140.00' (Free Discharge)
 ↑2=**Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Post-Development_North Pond

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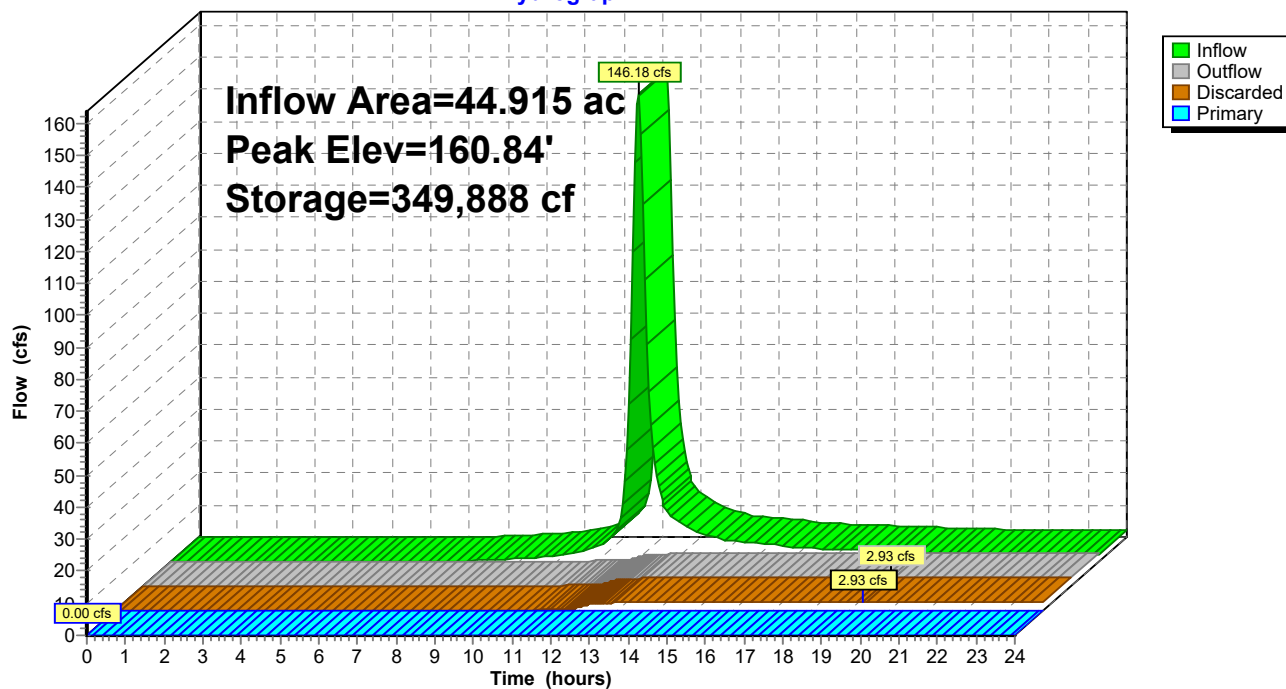
Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 87

Pond 26P: North Pond

Hydrograph



Post-Development_North Pond*Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"*

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Page 88

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment8S:	Runoff Area=11.897 ac 0.00% Impervious Runoff Depth>3.68" Flow Length=633' Tc=11.4 min CN=80 Runoff=62.82 cfs 3.651 af
Subcatchment9S:	Runoff Area=5.653 ac 0.00% Impervious Runoff Depth>3.68" Flow Length=717' Tc=10.7 min CN=80 Runoff=30.45 cfs 1.735 af
Subcatchment10S:	Runoff Area=9.230 ac 0.00% Impervious Runoff Depth>3.68" Flow Length=1,350' Tc=15.0 min CN=80 Runoff=43.48 cfs 2.830 af
Subcatchment11S:	Runoff Area=0.758 ac 0.00% Impervious Runoff Depth>3.79" Flow Length=291' Slope=0.0800 '/' Tc=9.3 min CN=81 Runoff=4.40 cfs 0.239 af
Subcatchment12S:	Runoff Area=11.736 ac 0.00% Impervious Runoff Depth>3.68" Flow Length=944' Slope=0.0500 '/' Tc=13.5 min CN=80 Runoff=58.07 cfs 3.599 af
Subcatchment13S:	Runoff Area=1.365 ac 0.00% Impervious Runoff Depth>3.79" Flow Length=510' Tc=6.0 min CN=81 Runoff=8.72 cfs 0.431 af
Subcatchment15S:	Runoff Area=0.660 ac 0.00% Impervious Runoff Depth>2.45" Flow Length=854' Tc=7.7 min CN=67 Runoff=2.68 cfs 0.135 af
Subcatchment16S:	Runoff Area=1.546 ac 0.00% Impervious Runoff Depth>3.79" Flow Length=122' Slope=0.0800 '/' Tc=6.2 min CN=81 Runoff=9.80 cfs 0.488 af
SubcatchmentNP:	Runoff Area=2.070 ac 83.57% Impervious Runoff Depth>5.42" Tc=6.0 min CN=96 Runoff=16.74 cfs 0.936 af
Reach 1R: Gabion Downchute	Avg. Flow Depth=0.97' Max Vel=19.99 fps Inflow=58.07 cfs 3.599 af n=0.030 L=260.0' S=0.3308 '/' Capacity=105.82 cfs Outflow=57.66 cfs 3.598 af
Reach 2R: North Channel - 3	Avg. Flow Depth=1.61' Max Vel=7.40 fps Inflow=62.79 cfs 4.029 af n=0.028 L=457.0' S=0.0219 '/' Capacity=100.17 cfs Outflow=61.17 cfs 4.024 af
Reach 3R:	Avg. Flow Depth=0.47' Max Vel=7.01 fps Inflow=9.80 cfs 0.488 af n=0.028 L=348.0' S=0.0747 '/' Capacity=185.10 cfs Outflow=9.53 cfs 0.487 af
Reach 4R: North Channel - 1	Avg. Flow Depth=1.87' Max Vel=5.40 fps Inflow=62.82 cfs 3.651 af n=0.028 L=1,200.0' S=0.0100 '/' Capacity=67.72 cfs Outflow=56.93 cfs 3.635 af
Reach 5R: North Channel - 2	Avg. Flow Depth=1.35' Max Vel=12.23 fps Inflow=77.68 cfs 5.369 af n=0.028 L=850.0' S=0.0729 '/' Capacity=182.89 cfs Outflow=76.04 cfs 5.362 af
Reach 6R:	Avg. Flow Depth=1.67' Max Vel=5.28 fps Inflow=47.14 cfs 3.069 af n=0.028 L=185.0' S=0.0108 '/' Capacity=70.41 cfs Outflow=46.31 cfs 3.067 af
Reach 7R: MSE Berm Swale	Avg. Flow Depth=0.42' Max Vel=3.01 fps Inflow=2.68 cfs 0.135 af n=0.028 L=850.0' S=0.0188 '/' Capacity=14.63 cfs Outflow=2.21 cfs 0.134 af

Post-Development_North Pond*Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"*

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Page 89

Pond 1P: Drop Inlet 1

Peak Elev=214.69' Inflow=120.76 cfs 8.429 af
36.0" Round Culvert n=0.013 L=65.0' S=0.0092 '/' Outflow=120.76 cfs 8.429 af

Pond 2P: Drop Inlet Structure

Peak Elev=188.18' Inflow=9.53 cfs 0.487 af
36.0" Round Culvert n=0.011 L=36.0' S=0.0500 '/' Outflow=9.53 cfs 0.487 af

Pond 3P: Stormwater Manhole

Peak Elev=184.79' Inflow=67.98 cfs 4.512 af
Primary=67.98 cfs 4.512 af Secondary=0.00 cfs 0.000 af Outflow=67.98 cfs 4.512 af

Pond 8P: Drop Inlet Structure

Peak Elev=191.72' Inflow=61.17 cfs 4.024 af
36.0" Round Culvert n=0.011 L=80.0' S=0.0500 '/' Outflow=61.17 cfs 4.024 af

Pond 26P: North Pond

Peak Elev=164.04' Storage=460,796 cf Inflow=193.95 cfs 14.009 af
Discarded=3.79 cfs 3.723 af Primary=0.00 cfs 0.000 af Outflow=3.79 cfs 3.723 af

Total Runoff Area = 44.915 ac Runoff Volume = 14.043 af Average Runoff Depth = 3.75"
96.15% Pervious = 43.185 ac 3.85% Impervious = 1.730 ac

Post-Development_North Pond

Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

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Page 90

Summary for Subcatchment 8S:

[47] Hint: Peak is 152% of capacity of segment #3

Runoff = 62.82 cfs @ 12.03 hrs, Volume= 3.651 af, Depth> 3.68"

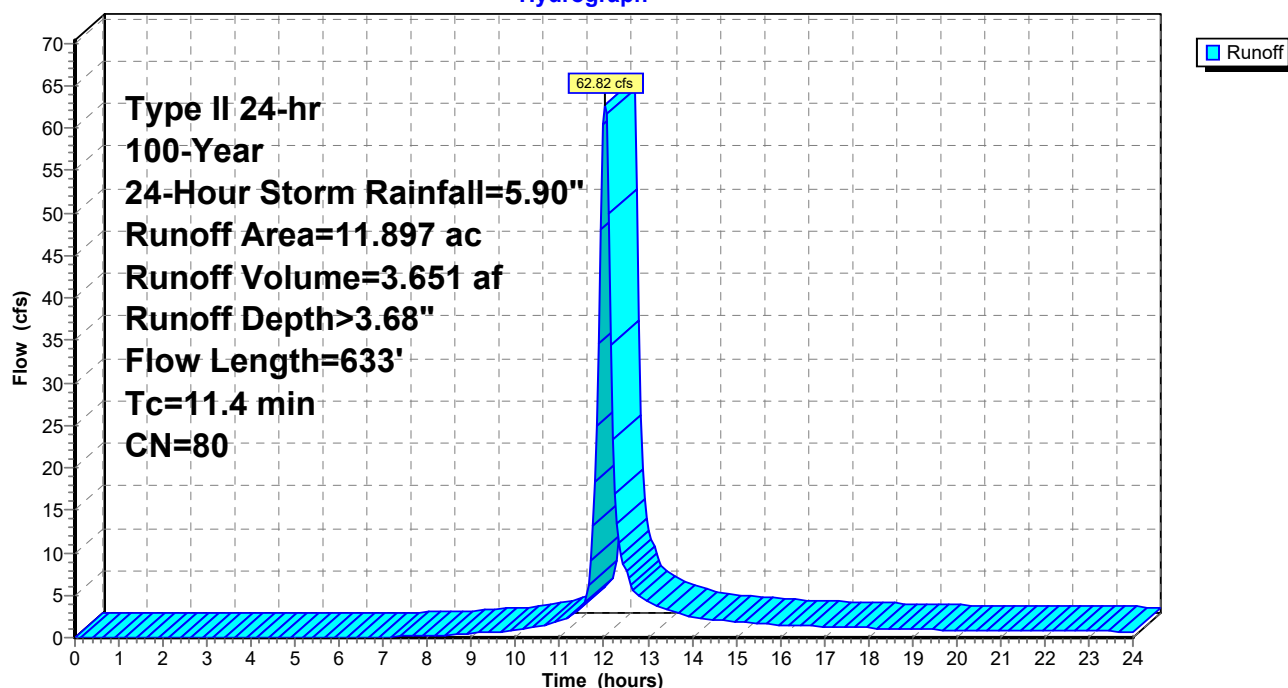
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

Area (ac)	CN	Description
* 11.340	80	Cap
0.557	85	Gravel roads, HSG B
11.897	80	Weighted Average
11.897		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Section 1 Grass: Short n= 0.150 P2= 2.80"
3.7	351	0.0500	1.57		Shallow Concentrated Flow, Section 2 Short Grass Pasture Kv= 7.0 fps
0.4	182	0.0250	7.37	41.47	Trap/Vee/Rect Channel Flow, Diversion Berm 1 Bot.W=0.00' D=1.50' Z= 3.0 & 2.0 ' Top.W=7.50' n= 0.025
11.4	633	Total			

Subcatchment 8S:

Hydrograph



Summary for Subcatchment 9S:

[47] Hint: Peak is 972% of capacity of segment #3

Runoff = 30.45 cfs @ 12.02 hrs, Volume= 1.735 af, Depth> 3.68"

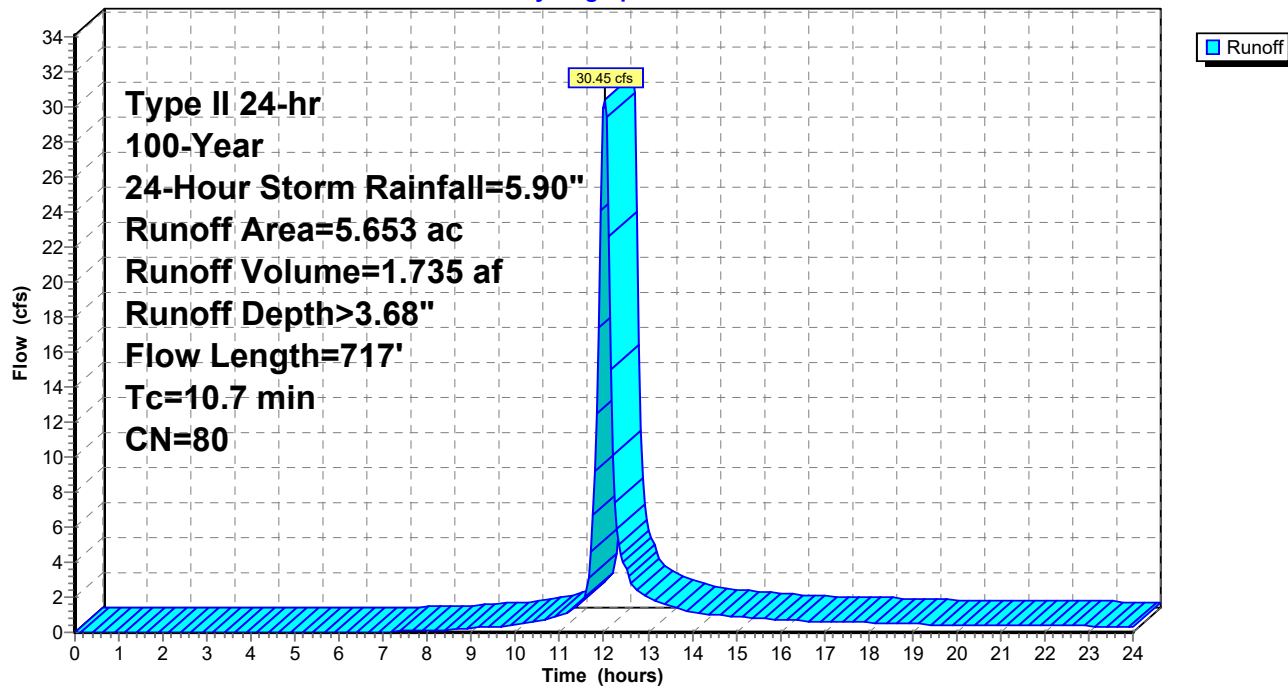
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

Area (ac)	CN	Description
* 5.113	80	Cap
0.540	85	Gravel roads, HSG B
5.653	80	Weighted Average
5.653		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Section 1 Grass: Short n= 0.150 P2= 2.80"
2.0	191	0.0500	1.57		Shallow Concentrated Flow, Section 2 Short Grass Pasture Kv= 7.0 fps
1.4	406	0.0500	5.01	3.13	Trap/Vee/Rect Channel Flow, Diversion Berm 1 Bot.W=0.00' D=0.50' Z= 3.0 & 2.0 '/' Top.W=2.50' n= 0.025
0.0	20	0.3333	17.70	79.67	Trap/Vee/Rect Channel Flow, Let-Down Channel 1 Bot.W=3.00' D=1.50' n= 0.040
10.7	717	Total			

Subcatchment 9S:

Hydrograph



Summary for Subcatchment 10S:

[47] Hint: Peak is 2421% of capacity of segment #4

Runoff = 43.48 cfs @ 12.07 hrs, Volume= 2.830 af, Depth> 3.68"

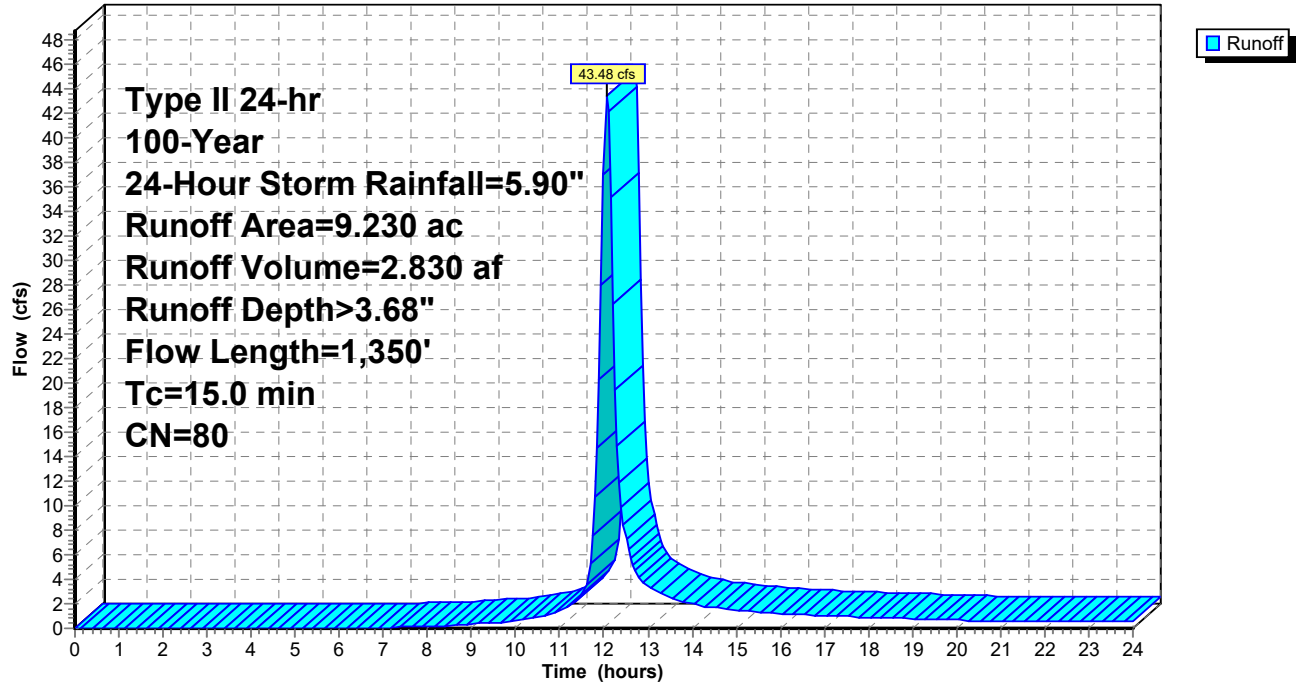
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

Area (ac)	CN	Description
* 9.230	80	Cap
9.230		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Grass: Short n= 0.150 P2= 2.80"
5.2	488	0.0500	1.57		Shallow Concentrated Flow, Section 1 Short Grass Pasture Kv= 7.0 fps
0.3	70	0.3300	4.02		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	280	0.0400	2.87	1.80	Trap/Vee/Rect Channel Flow, Diversion Berm 1 Bot.W=0.00' D=0.50' Z= 3.0 & 2.0 '/' Top.W=2.50' n= 0.039
0.2	222	0.3333	17.70	79.67	Trap/Vee/Rect Channel Flow, Gabion Downchute Bot.W=3.00' D=1.50' n= 0.040
0.4	190	0.0210	7.63	91.59	Trap/Vee/Rect Channel Flow, North Channel Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.030
15.0	1,350	Total			

Subcatchment 10S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

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Page 95

Summary for Subcatchment 11S:

Runoff = 4.40 cfs @ 12.00 hrs, Volume= 0.239 af, Depth> 3.79"

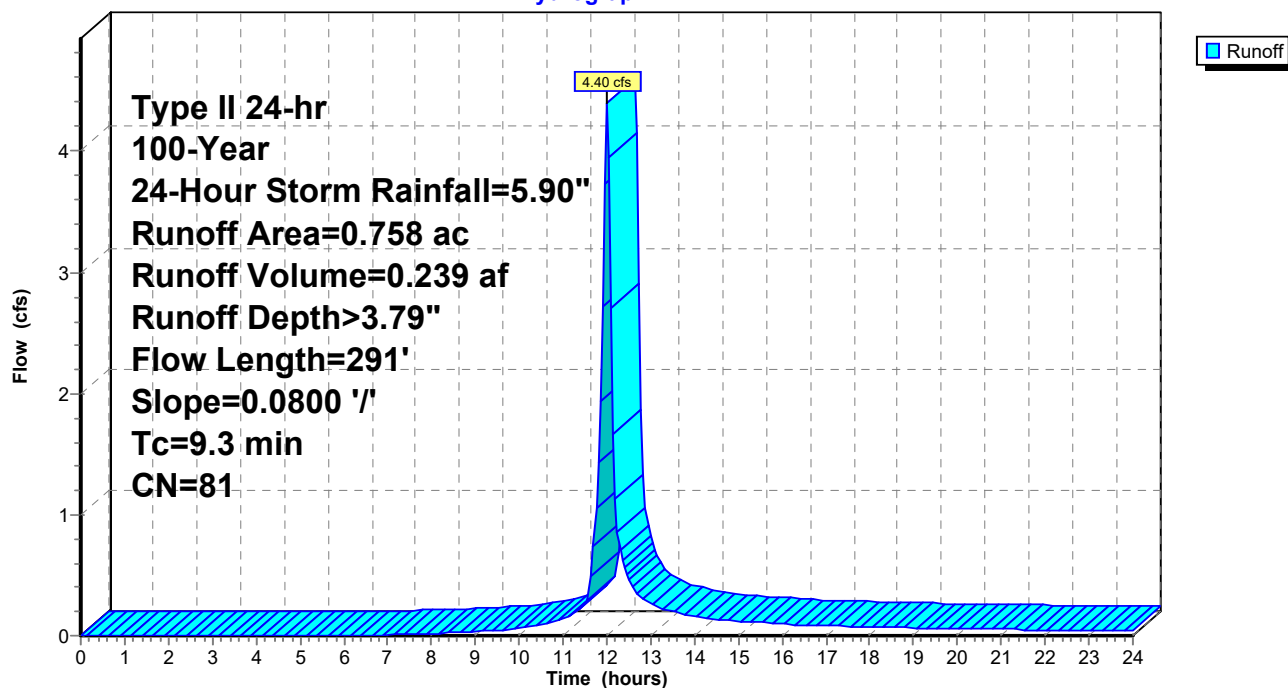
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

Area (ac)	CN	Description
* 0.576	80	CAP
0.182	85	Gravel roads, HSG B
0.758	81	Weighted Average
0.758		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8	100	0.0800	0.19		Sheet Flow, MSE Exterior Slope Grass: Dense n= 0.240 P2= 2.80"
0.2	20	0.0800	1.98		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	171	0.0800	9.56	14.34	Trap/Vee/Rect Channel Flow, Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.022 Earth, clean & straight
9.3	291	Total			

Subcatchment 11S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

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Page 96

Summary for Subcatchment 12S:

Runoff = 58.07 cfs @ 12.05 hrs, Volume= 3.599 af, Depth> 3.68"

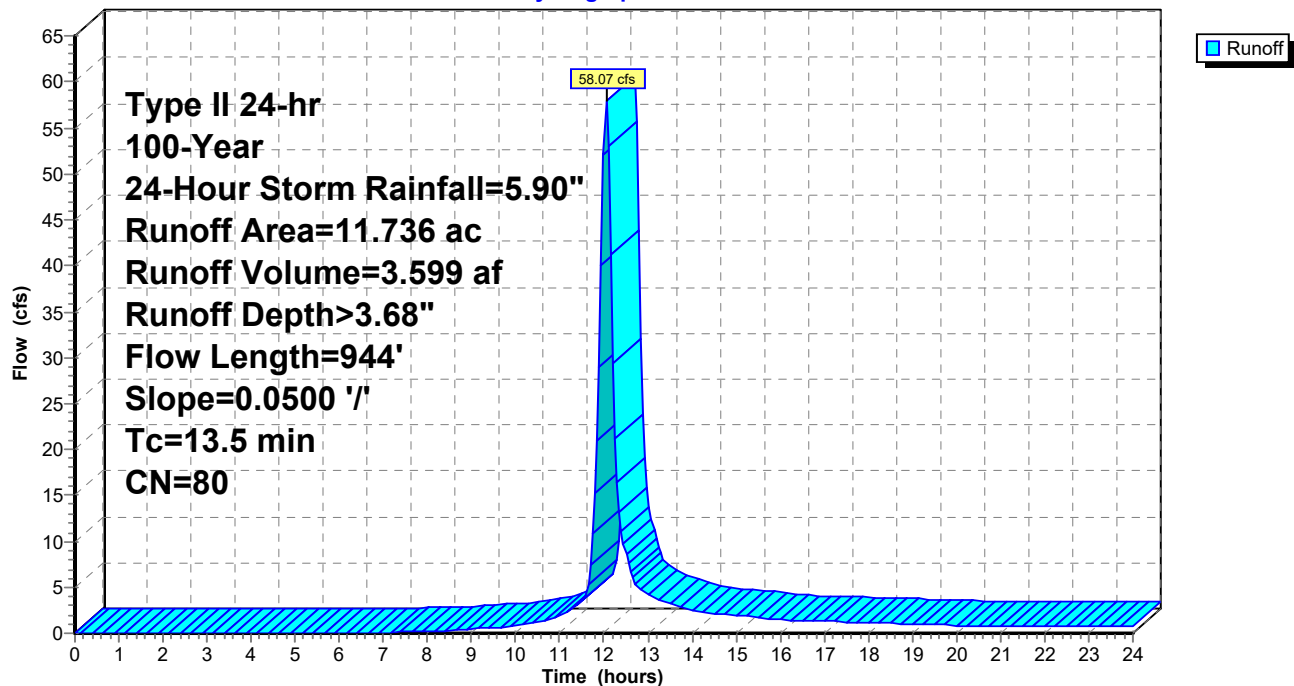
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

Area (ac)	CN	Description
* 11.736	80	
11.736		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Plateau Grass: Short n= 0.150 P2= 2.80"
3.8	359	0.0500	1.57		Shallow Concentrated Flow, Plateau Short Grass Pasture Kv= 7.0 fps
2.4	485	0.0500	3.35		Shallow Concentrated Flow, Sideslope Berm Grassed Waterway Kv= 15.0 fps
13.5	944	Total			

Subcatchment 12S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

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Page 97

Summary for Subcatchment 13S:

Runoff = 8.72 cfs @ 11.97 hrs, Volume= 0.431 af, Depth> 3.79"

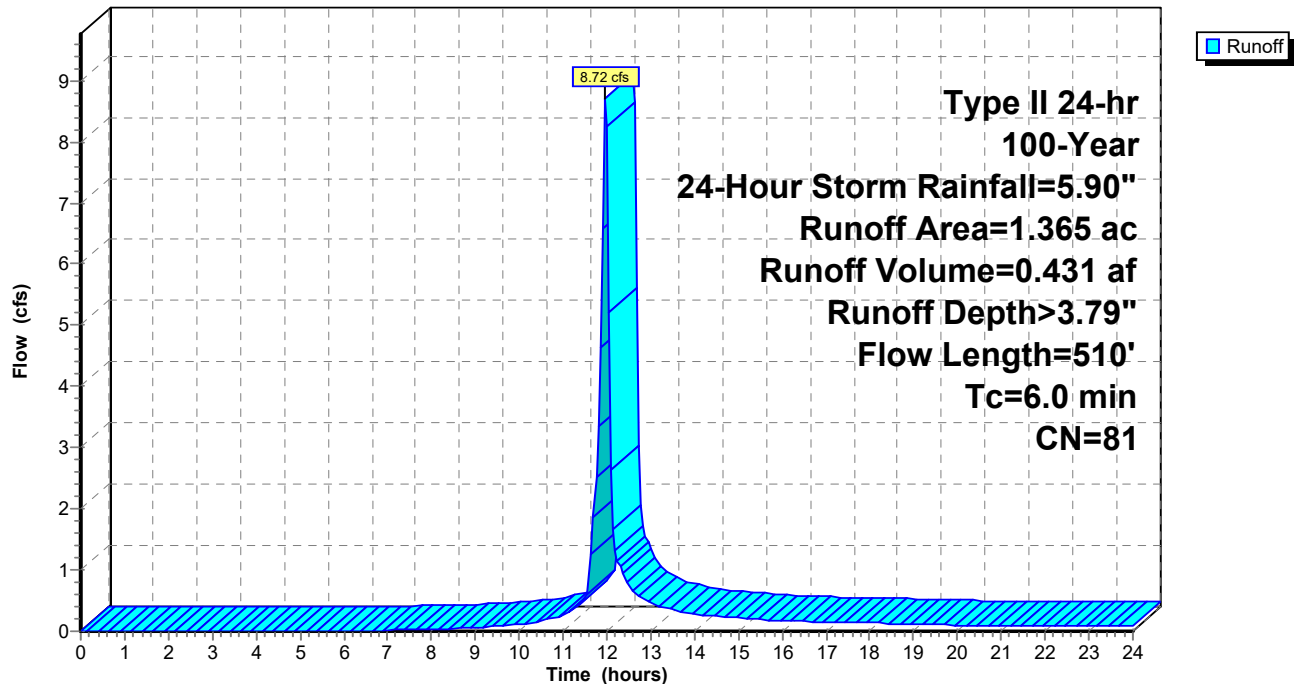
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

Area (ac)	CN	Description
* 1.080	80	Cap
* 0.285	85	Gravel Road
1.365	81	Weighted Average
1.365		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	50	0.3300	0.43		Sheet Flow, Section 1
					Grass: Short n= 0.150 P2= 2.80"
3.0	460	0.0300	2.60		Shallow Concentrated Flow, Perimeter Swale
					Grassed Waterway Kv= 15.0 fps
5.0	510	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 13S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

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Page 98

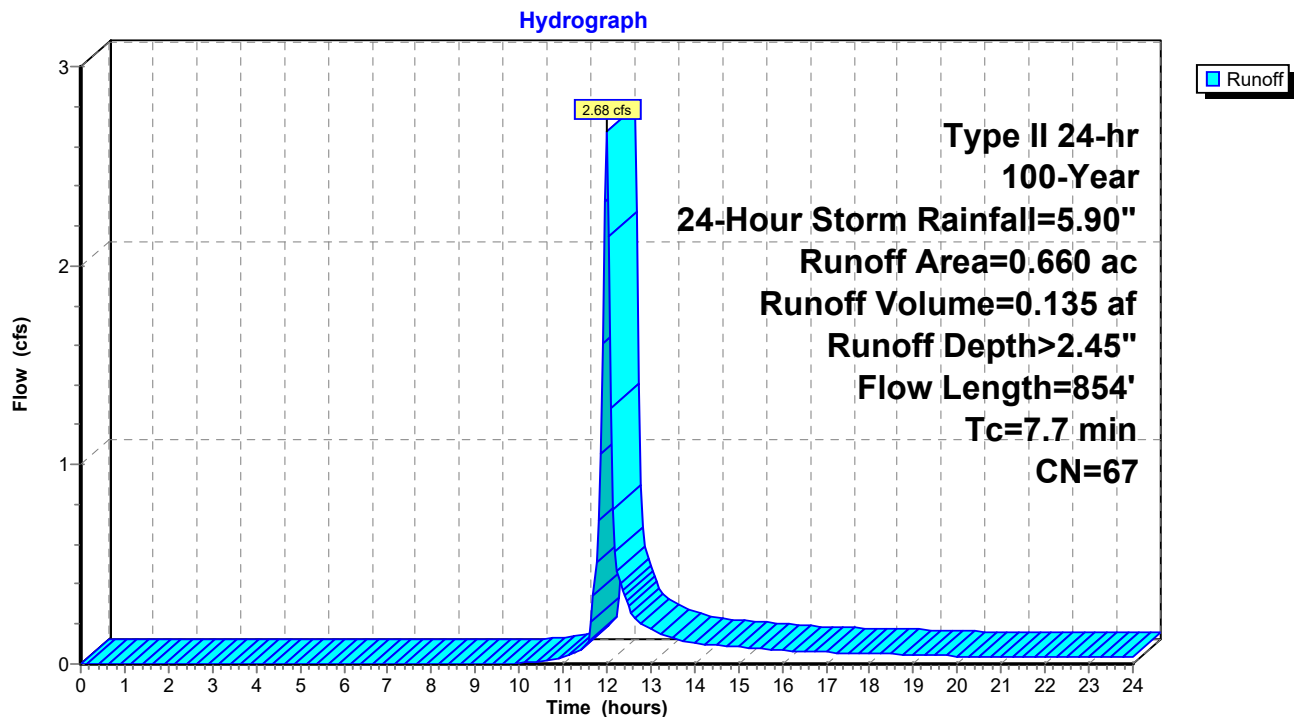
Summary for Subcatchment 15S:

Runoff = 2.68 cfs @ 11.99 hrs, Volume= 0.135 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

Area (ac)	CN	Description
* 0.660	67	Vegetation (Hyd. Group B)
0.660		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.2	29	0.0330	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 2.80"
4.5	825	0.0100	3.09	3.09	Trap/Vee/Rect Channel Flow, Bot.W=1.00' D=0.50' Z= 2.0 '/' Top.W=3.00' n= 0.022 Earth, clean & straight
7.7	854	Total			

Subcatchment 15S:

Post-Development_North Pond

Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

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Page 99

Summary for Subcatchment 16S:

Runoff = 9.80 cfs @ 11.97 hrs, Volume= 0.488 af, Depth> 3.79"

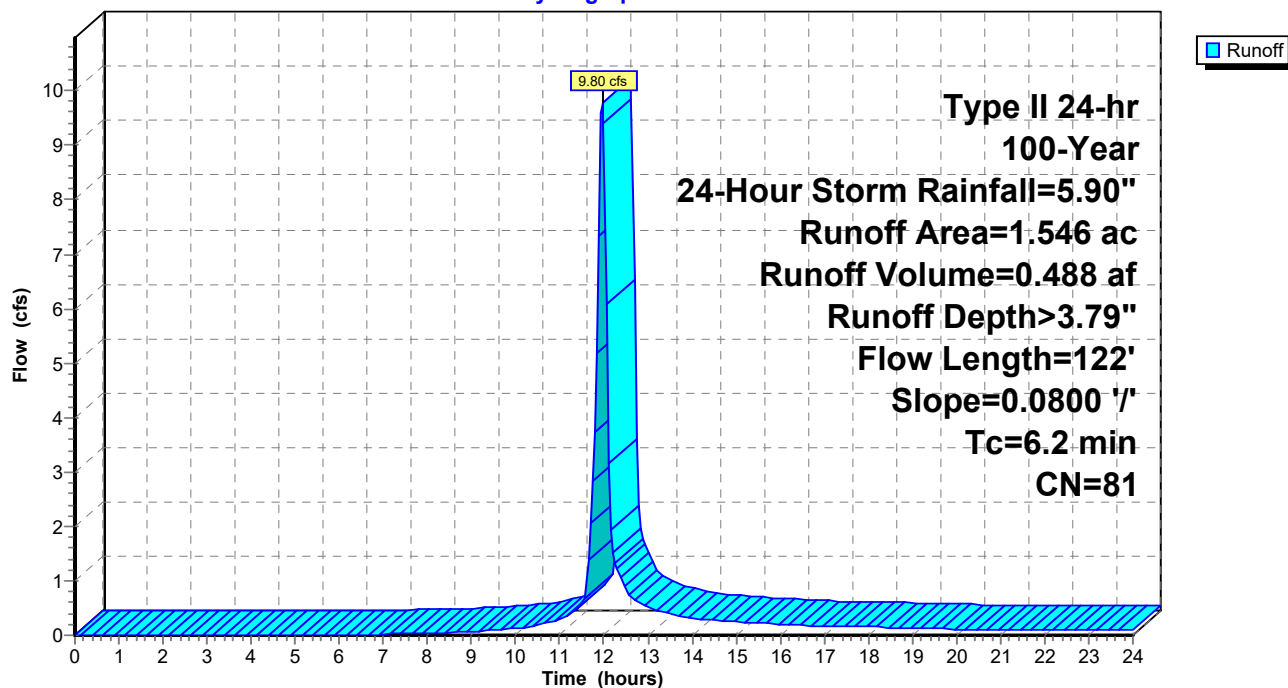
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

Area (ac)	CN	Description
* 1.224	80	Cap
* 0.322	85	Gravel Road
1.546	81	Weighted Average
1.546		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	100	0.0800	0.28		Sheet Flow, Grass: Short n= 0.150 P2= 2.80"
0.2	22	0.0800	1.98		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.2	122	Total			

Subcatchment 16S:

Hydrograph



Post-Development_North Pond

Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

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Page 100

Summary for Subcatchment NP:

Runoff = 16.74 cfs @ 11.96 hrs, Volume= 0.936 af, Depth> 5.42"

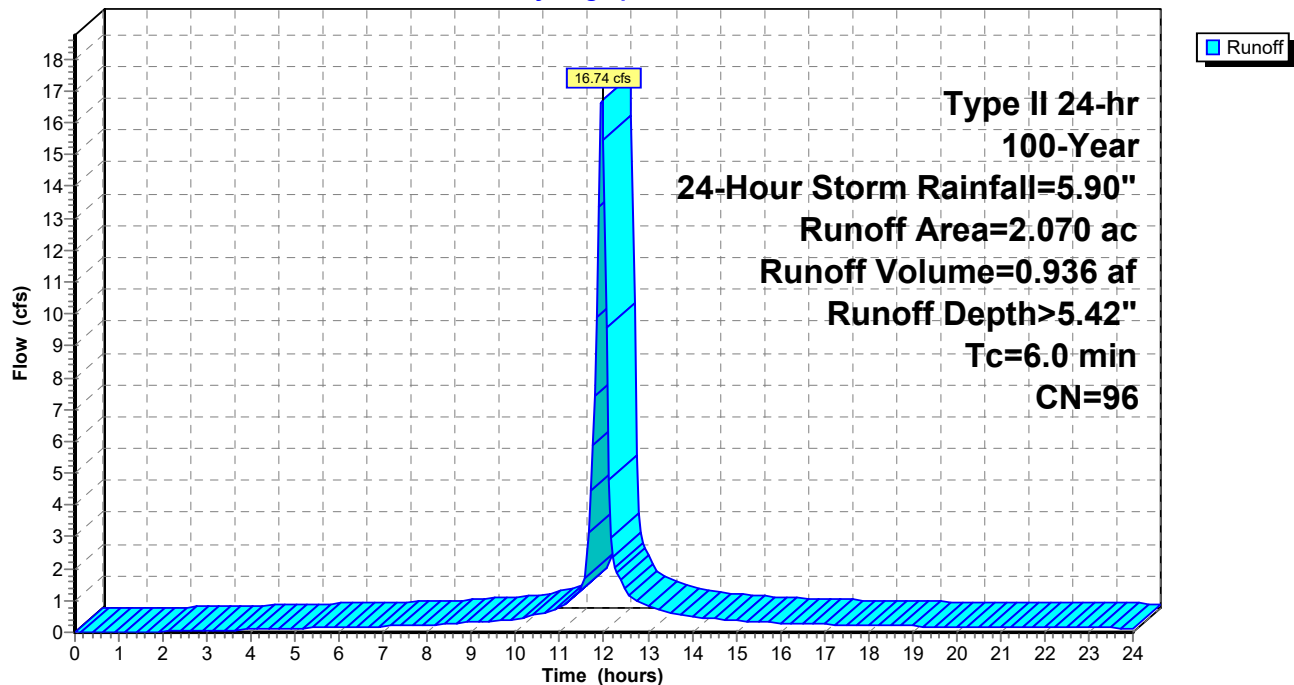
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

Area (ac)	CN	Description
* 1.730	98	Basin
* 0.340	85	Gravel Road
2.070	96	Weighted Average
0.340		16.43% Pervious Area
1.730		83.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.0					Direct Entry,
1.0	0				Total, Increased to minimum Tc = 6.0 min

Subcatchment NP:

Hydrograph



Summary for Reach 1R: Gabion Downchute

Mannings from Figure 5B.11 Determining "n" for Riprap Lined Channel Using Depth of Flow

Inflow Area = 11.736 ac, 0.00% Impervious, Inflow Depth > 3.68" for 100-Year, 24-Hour Storm event
 Inflow = 58.07 cfs @ 12.05 hrs, Volume= 3.599 af
 Outflow = 57.66 cfs @ 12.06 hrs, Volume= 3.598 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 19.99 fps, Min. Travel Time= 0.2 min

Avg. Velocity = 5.29 fps, Avg. Travel Time= 0.8 min

Peak Storage= 755 cf @ 12.05 hrs

Average Depth at Peak Storage= 0.97' , Surface Width= 3.00'

Bank-Full Depth= 1.50' Flow Area= 4.5 sf, Capacity= 105.82 cfs

3.00' x 1.50' deep channel, n= 0.030

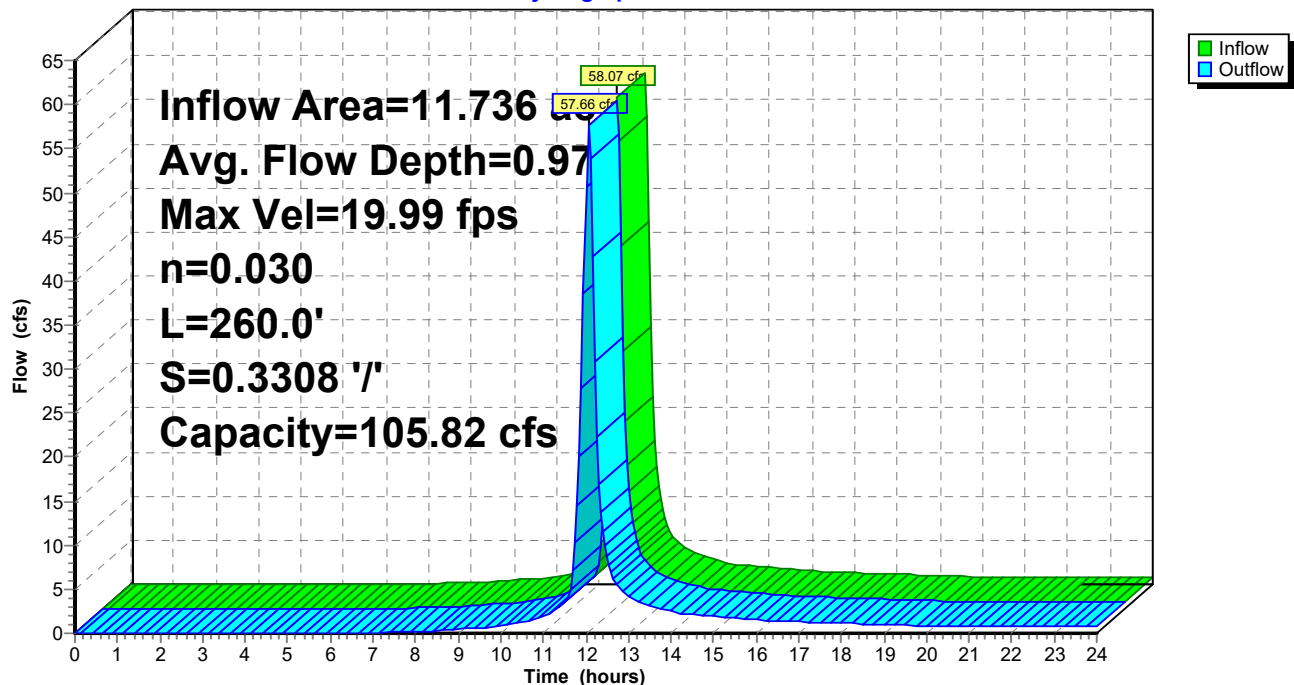
Length= 260.0' Slope= 0.3308 '/'

Inlet Invert= 290.00', Outlet Invert= 204.00'



Reach 1R: Gabion Downchute

Hydrograph



Summary for Reach 2R: North Channel - 3

[62] Hint: Exceeded Reach 1R OUTLET depth by 0.66' @ 12.15 hrs

Inflow Area = 13.101 ac, 0.00% Impervious, Inflow Depth > 3.69" for 100-Year, 24-Hour Storm event
 Inflow = 62.79 cfs @ 12.04 hrs, Volume= 4.029 af
 Outflow = 61.17 cfs @ 12.07 hrs, Volume= 4.024 af, Atten= 3%, Lag= 1.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 7.40 fps, Min. Travel Time= 1.0 min

Avg. Velocity = 2.48 fps, Avg. Travel Time= 3.1 min

Peak Storage= 3,857 cf @ 12.06 hrs

Average Depth at Peak Storage= 1.61' , Surface Width= 8.46'

Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 100.17 cfs

2.00' x 2.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 ' / ' Top Width= 10.00'

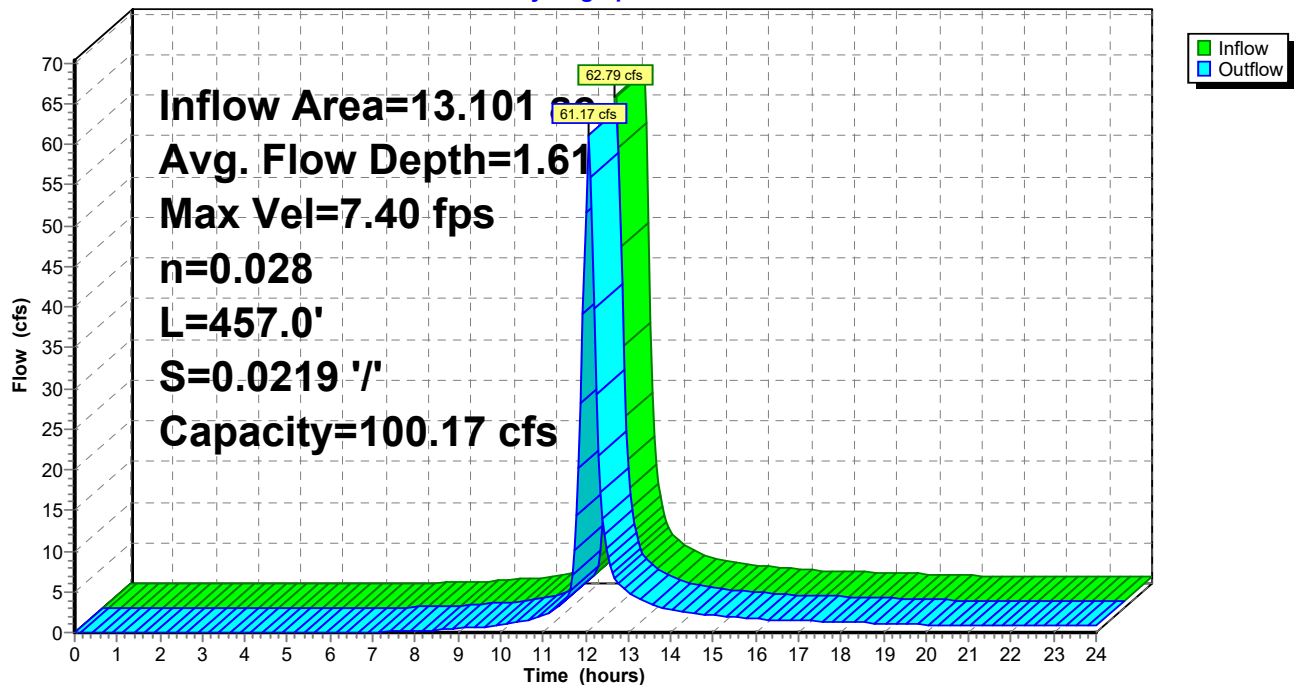
Length= 457.0' Slope= 0.0219 ' / '

Inlet Invert= 204.00', Outlet Invert= 194.00'



Reach 2R: North Channel - 3

Hydrograph



Post-Development_North Pond

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Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

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Page 103

Summary for Reach 3R:

Inflow Area = 1.546 ac, 0.00% Impervious, Inflow Depth > 3.79" for 100-Year, 24-Hour Storm event
Inflow = 9.80 cfs @ 11.97 hrs, Volume= 0.488 af
Outflow = 9.53 cfs @ 11.99 hrs, Volume= 0.487 af, Atten= 3%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 7.01 fps, Min. Travel Time= 0.8 min

Avg. Velocity = 1.85 fps, Avg. Travel Time= 3.1 min

Peak Storage= 485 cf @ 11.98 hrs

Average Depth at Peak Storage= 0.47' , Surface Width= 3.89'

Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 185.10 cfs

2.00' x 2.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 '/' Top Width= 10.00'

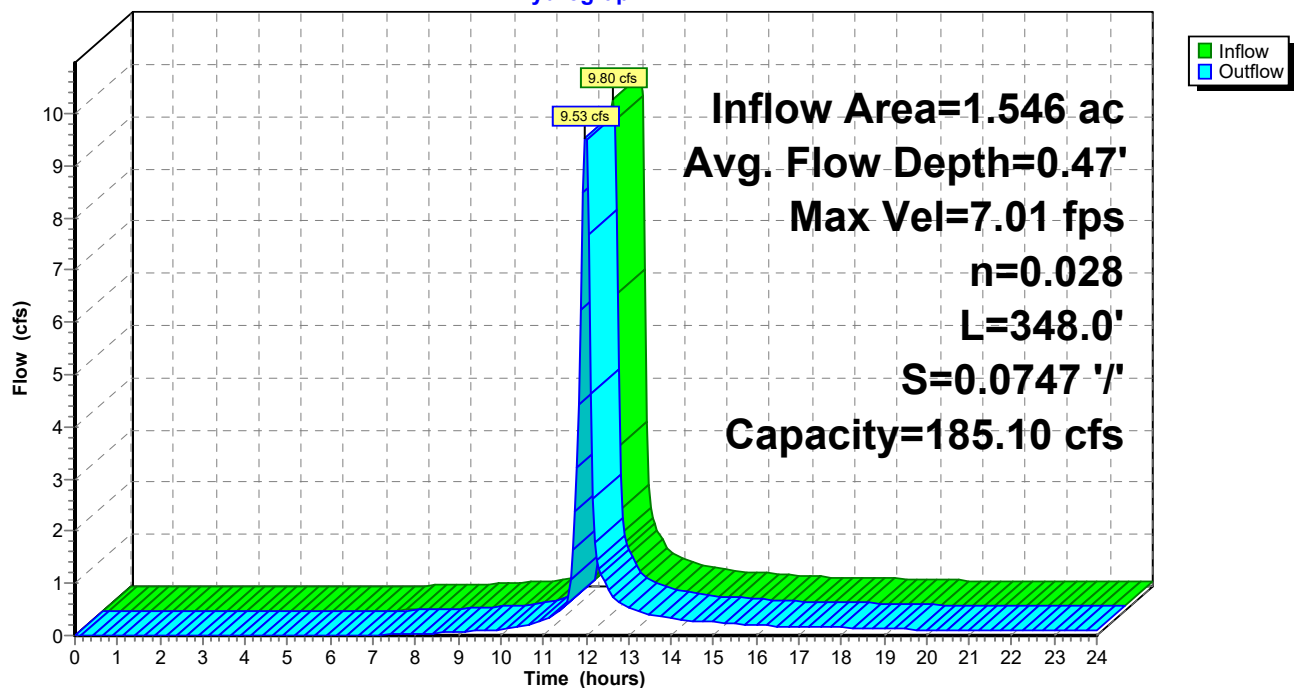
Length= 348.0' Slope= 0.0747 '/'

Inlet Invert= 220.00', Outlet Invert= 194.00'



Reach 3R:

Hydrograph



Post-Development_North Pond

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Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

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Page 104

Summary for Reach 4R: North Channel - 1

Inflow Area = 11.897 ac, 0.00% Impervious, Inflow Depth > 3.68" for 100-Year, 24-Hour Storm event
Inflow = 62.82 cfs @ 12.03 hrs, Volume= 3.651 af
Outflow = 56.93 cfs @ 12.13 hrs, Volume= 3.635 af, Atten= 9%, Lag= 6.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 5.40 fps, Min. Travel Time= 3.7 min

Avg. Velocity = 1.85 fps, Avg. Travel Time= 10.8 min

Peak Storage= 12,821 cf @ 12.07 hrs

Average Depth at Peak Storage= 1.87' , Surface Width= 9.46'

Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 67.72 cfs

2.00' x 2.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 ' / ' Top Width= 10.00'

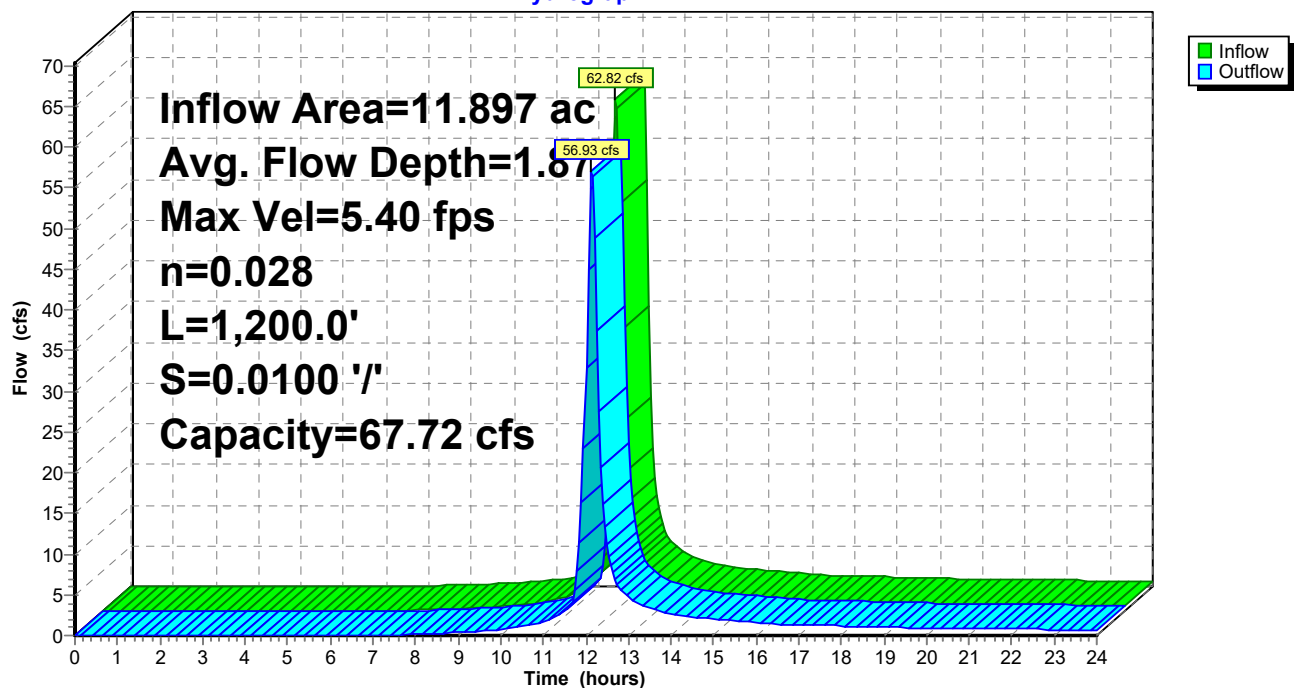
Length= 1,200.0' Slope= 0.0100 ' / '

Inlet Invert= 290.00', Outlet Invert= 278.00'



Reach 4R: North Channel - 1

Hydrograph



Summary for Reach 5R: North Channel - 2

[61] Hint: Exceeded Reach 4R outlet invert by 1.35' @ 12.10 hrs

Inflow Area = 17.550 ac, 0.00% Impervious, Inflow Depth > 3.67" for 100-Year, 24-Hour Storm event
 Inflow = 77.68 cfs @ 12.09 hrs, Volume= 5.369 af
 Outflow = 76.04 cfs @ 12.13 hrs, Volume= 5.362 af, Atten= 2%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 12.23 fps, Min. Travel Time= 1.2 min

Avg. Velocity = 4.13 fps, Avg. Travel Time= 3.4 min

Peak Storage= 5,375 cf @ 12.11 hrs

Average Depth at Peak Storage= 1.35' , Surface Width= 7.39'

Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 182.89 cfs

2.00' x 2.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 '/' Top Width= 10.00'

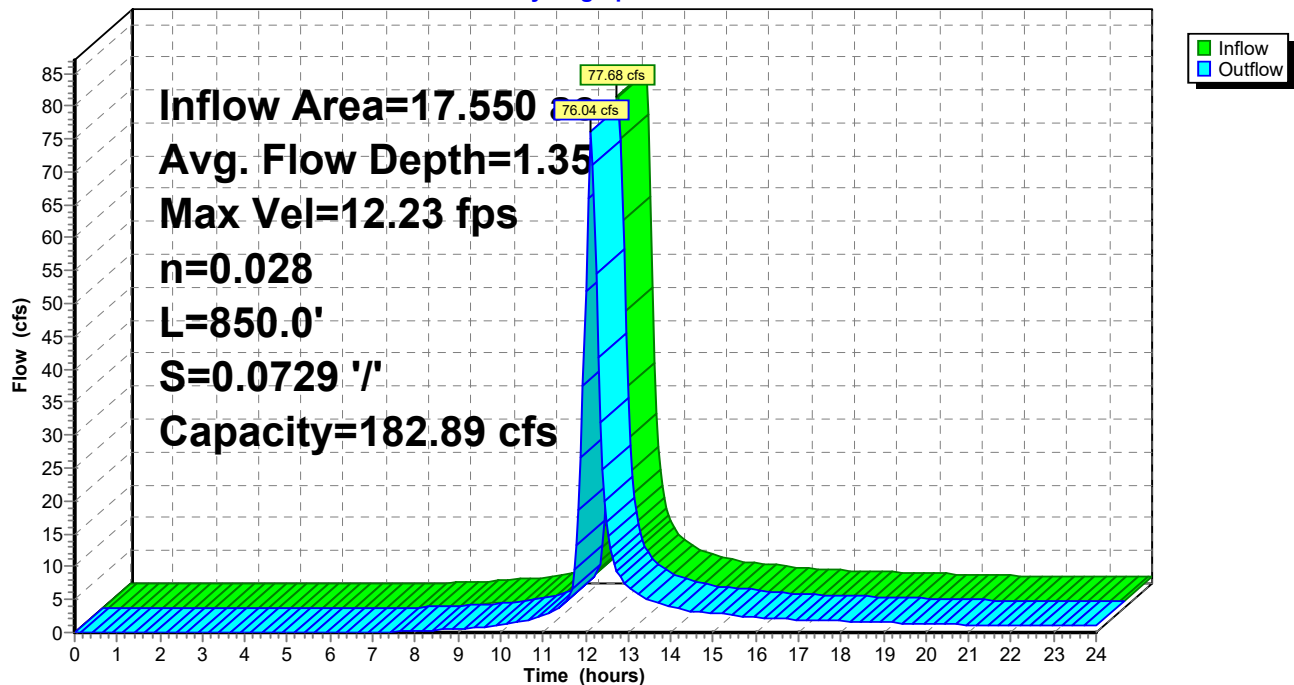
Length= 850.0' Slope= 0.0729 '/'

Inlet Invert= 278.00', Outlet Invert= 216.00'



Reach 5R: North Channel - 2

Hydrograph



Post-Development_North Pond

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Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

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Page 106

Summary for Reach 6R:

Inflow Area = 9.988 ac, 0.00% Impervious, Inflow Depth > 3.69" for 100-Year, 24-Hour Storm event
Inflow = 47.14 cfs @ 12.06 hrs, Volume= 3.069 af
Outflow = 46.31 cfs @ 12.08 hrs, Volume= 3.067 af, Atten= 2%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 5.28 fps, Min. Travel Time= 0.6 min

Avg. Velocity = 1.79 fps, Avg. Travel Time= 1.7 min

Peak Storage= 1,643 cf @ 12.07 hrs

Average Depth at Peak Storage= 1.67' , Surface Width= 8.66'

Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 70.41 cfs

2.00' x 2.00' deep channel, n= 0.028

Side Slope Z-value= 2.0 '/' Top Width= 10.00'

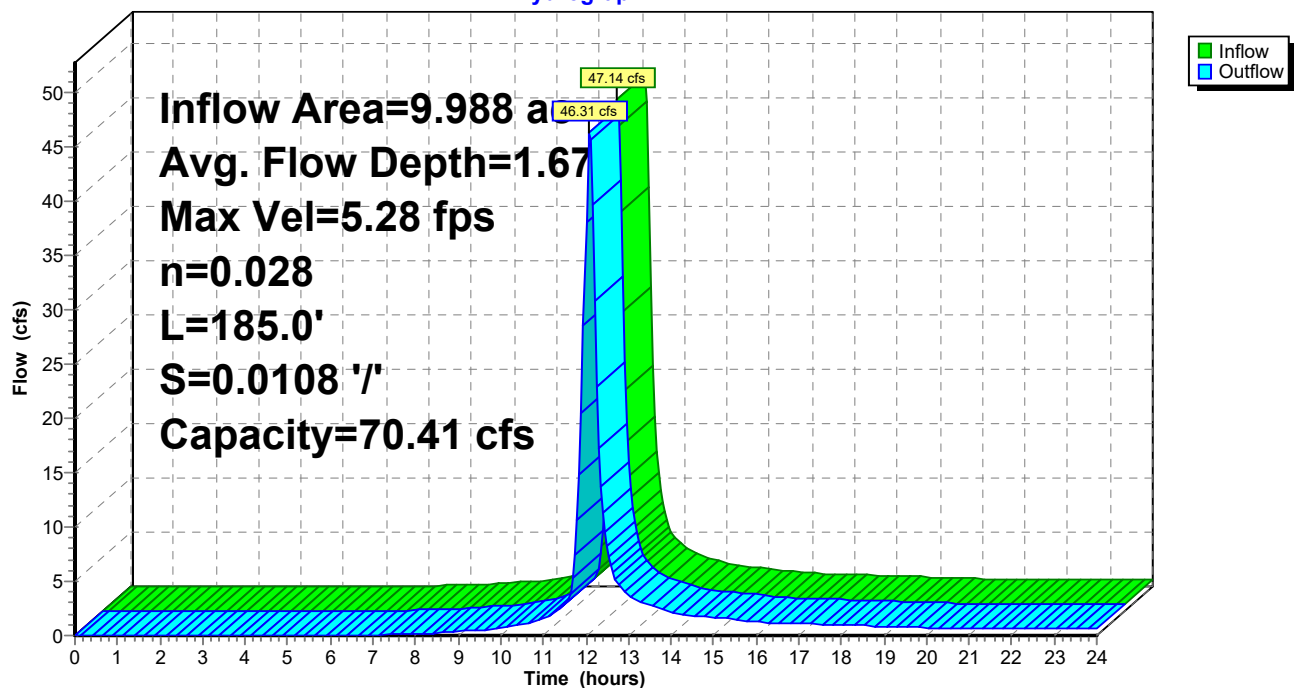
Length= 185.0' Slope= 0.0108 '/'

Inlet Invert= 218.00', Outlet Invert= 216.00'



Reach 6R:

Hydrograph



Summary for Reach 7R: MSE Berm Swale

Inflow Area = 0.660 ac, 0.00% Impervious, Inflow Depth > 2.45" for 100-Year, 24-Hour Storm event
 Inflow = 2.68 cfs @ 11.99 hrs, Volume= 0.135 af
 Outflow = 2.21 cfs @ 12.12 hrs, Volume= 0.134 af, Atten= 17%, Lag= 7.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Max. Velocity= 3.01 fps, Min. Travel Time= 4.7 min
 Avg. Velocity = 1.00 fps, Avg. Travel Time= 14.1 min

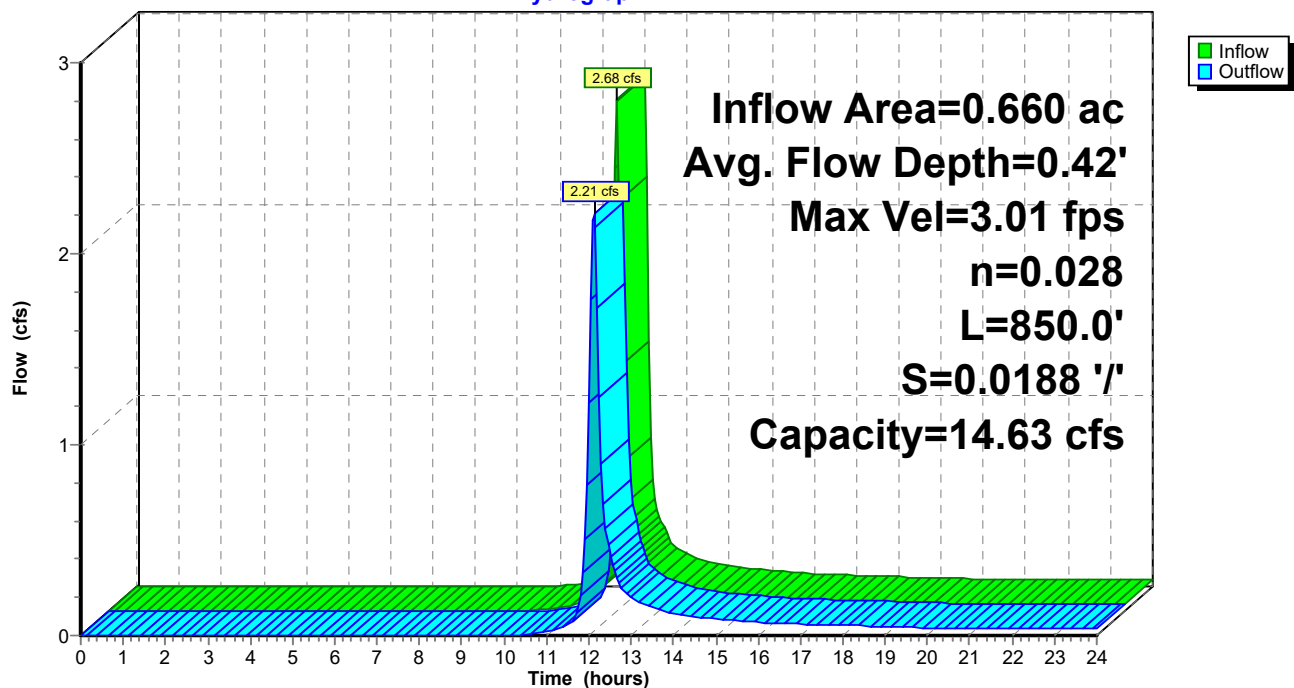
Peak Storage= 646 cf @ 12.04 hrs
 Average Depth at Peak Storage= 0.42', Surface Width= 2.66'
 Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 14.63 cfs

1.00' x 1.00' deep channel, n= 0.028
 Side Slope Z-value= 2.0 '/' Top Width= 5.00'
 Length= 850.0' Slope= 0.0188 '/'
 Inlet Invert= 216.00', Outlet Invert= 200.00'



Reach 7R: MSE Berm Swale

Hydrograph



Summary for Pond 1P: Drop Inlet 1

Inflow Area = 27.538 ac, 0.00% Impervious, Inflow Depth > 3.67" for 100-Year, 24-Hour Storm event
 Inflow = 120.76 cfs @ 12.11 hrs, Volume= 8.429 af
 Outflow = 120.76 cfs @ 12.11 hrs, Volume= 8.429 af, Atten= 0%, Lag= 0.0 min
 Primary = 120.76 cfs @ 12.11 hrs, Volume= 8.429 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 214.69' @ 12.11 hrs

Flood Elev= 220.00'

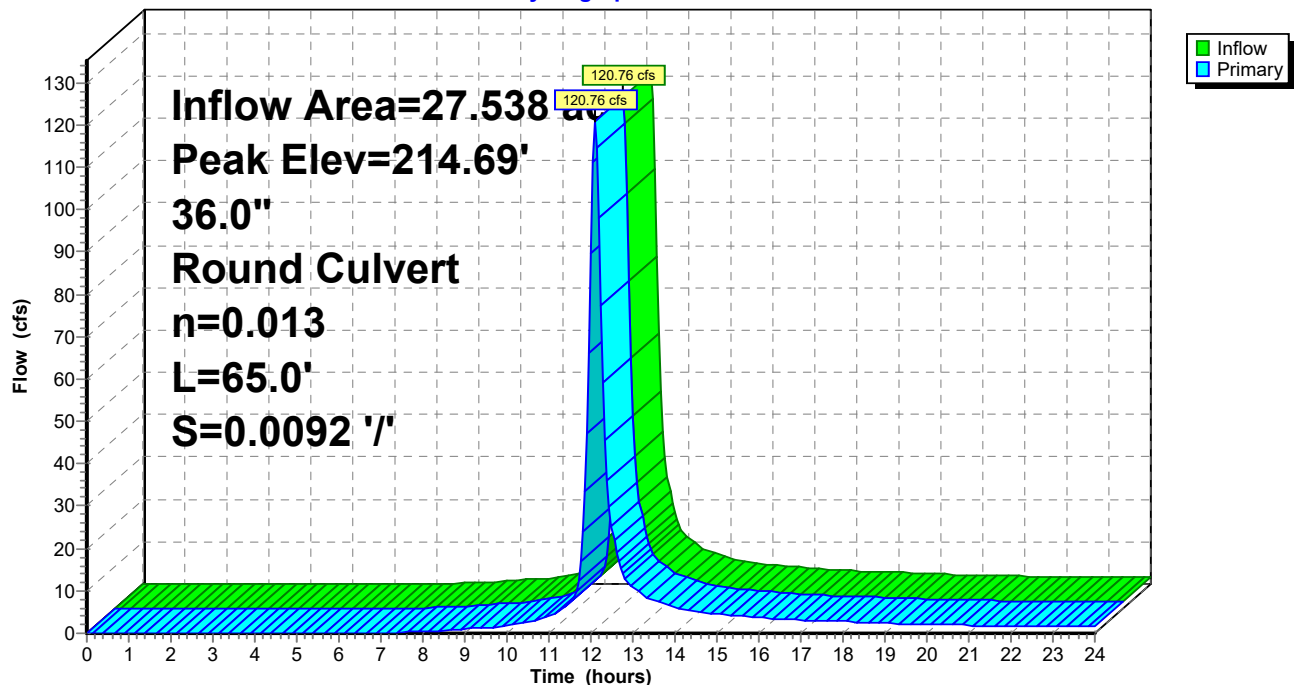
Device	Routing	Invert	Outlet Devices
#1	Primary	200.60'	36.0" Round Culvert L= 65.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 200.60' / 200.00' S= 0.0092 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=120.01 cfs @ 12.11 hrs HW=214.53' (Free Discharge)

↑ **1=Culvert** (Inlet Controls 120.01 cfs @ 16.98 fps)

Pond 1P: Drop Inlet 1

Hydrograph



Summary for Pond 2P: Drop Inlet Structure

Inflow Area = 1.546 ac, 0.00% Impervious, Inflow Depth > 3.78" for 100-Year, 24-Hour Storm event
 Inflow = 9.53 cfs @ 11.99 hrs, Volume= 0.487 af
 Outflow = 9.53 cfs @ 11.99 hrs, Volume= 0.487 af, Atten= 0%, Lag= 0.0 min
 Primary = 9.53 cfs @ 11.99 hrs, Volume= 0.487 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 188.18' @ 11.99 hrs

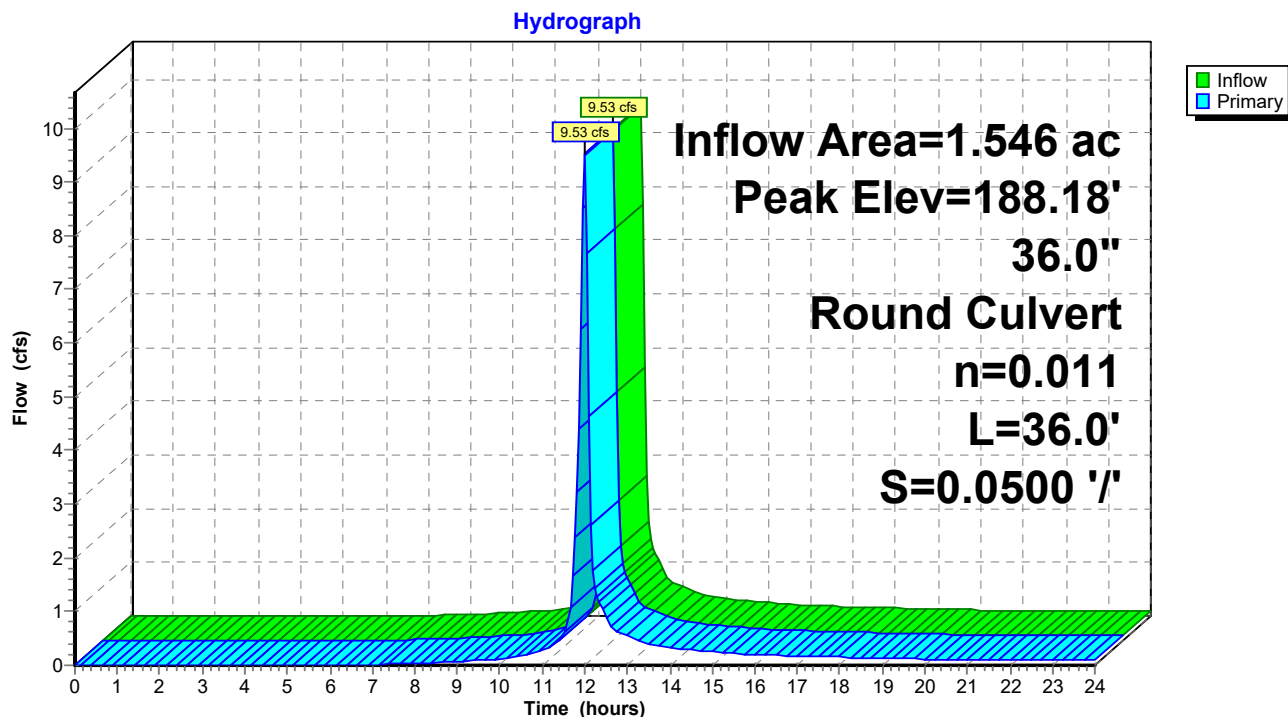
Flood Elev= 196.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	187.00'	36.0" Round 36" HDPE Pipe L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 187.00' / 185.20' S= 0.0500 '/ Cc= 0.900 n= 0.011, Flow Area= 7.07 sf

Primary OutFlow Max=9.35 cfs @ 11.99 hrs HW=188.17' (Free Discharge)

1=36" HDPE Pipe (Inlet Controls 9.35 cfs @ 3.68 fps)

Pond 2P: Drop Inlet Structure



Summary for Pond 3P: Stormwater Manhole

[79] Warning: Submerged Pond 8P Primary device # 1 OUTLET by 1.77'

Inflow Area = 14.647 ac, 0.00% Impervious, Inflow Depth > 3.70" for 100-Year, 24-Hour Storm event
 Inflow = 67.98 cfs @ 12.06 hrs, Volume= 4.512 af
 Outflow = 67.98 cfs @ 12.06 hrs, Volume= 4.512 af, Atten= 0%, Lag= 0.0 min
 Primary = 67.98 cfs @ 12.06 hrs, Volume= 4.512 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 184.79' @ 12.06 hrs

Flood Elev= 188.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	179.30'	36.0" Round 36" HDPE Pipe L= 46.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 179.30' / 177.00' S= 0.0500 '/' Cc= 0.900 n= 0.011, Flow Area= 7.07 sf
#2	Secondary	196.00'	6.0' long x 1.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

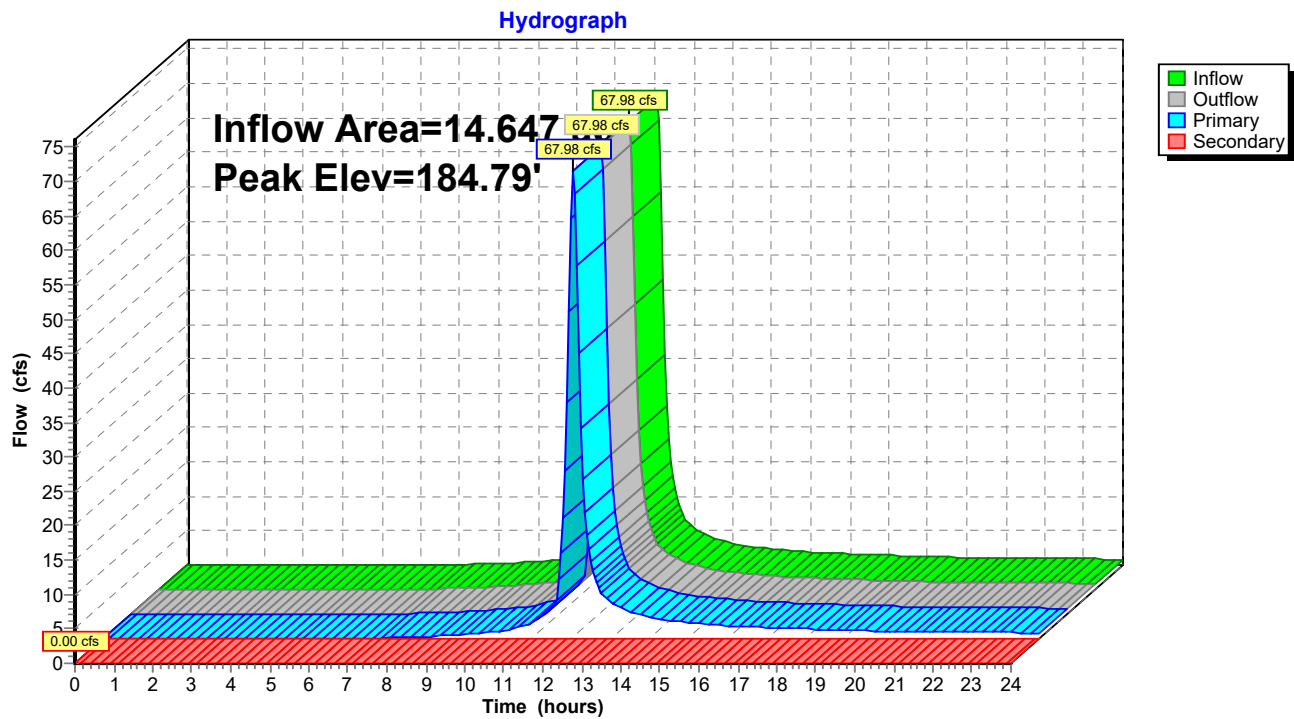
Primary OutFlow Max=67.27 cfs @ 12.06 hrs HW=184.71' (Free Discharge)

↑1=36" HDPE Pipe (Inlet Controls 67.27 cfs @ 9.52 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=179.30' (Free Discharge)

↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 3P: Stormwater Manhole



Summary for Pond 8P: Drop Inlet Structure

Inflow Area = 13.101 ac, 0.00% Impervious, Inflow Depth > 3.69" for 100-Year, 24-Hour Storm event
 Inflow = 61.17 cfs @ 12.07 hrs, Volume= 4.024 af
 Outflow = 61.17 cfs @ 12.07 hrs, Volume= 4.024 af, Atten= 0%, Lag= 0.0 min
 Primary = 61.17 cfs @ 12.07 hrs, Volume= 4.024 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Peak Elev= 191.72' @ 12.07 hrs

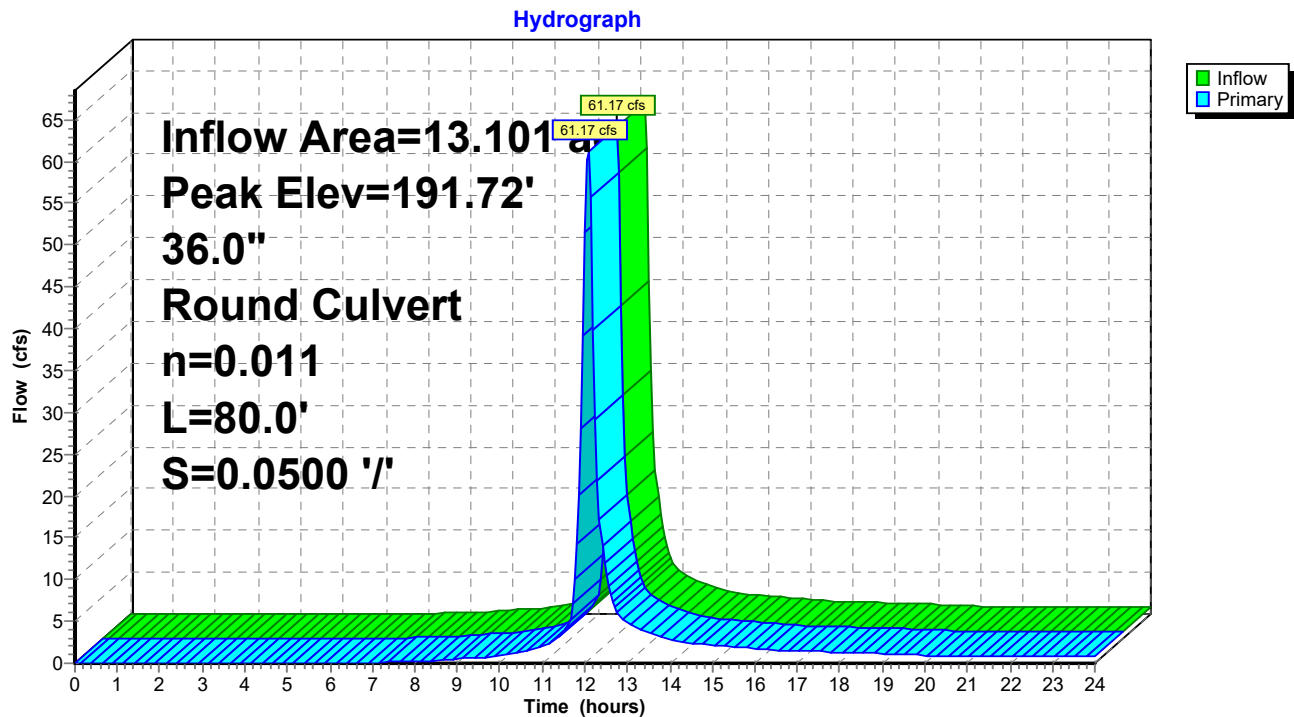
Flood Elev= 196.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	187.00'	36.0" Round Culvert L= 80.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 187.00' / 183.00' S= 0.0500 '/ Cc= 0.900 n= 0.011, Flow Area= 7.07 sf

Primary OutFlow Max=60.08 cfs @ 12.07 hrs HW=191.62' (Free Discharge)

↑ **1=Culvert** (Inlet Controls 60.08 cfs @ 8.50 fps)

Pond 8P: Drop Inlet Structure



Post-Development_North Pond

Type II 24-hr 100-Year, 24-Hour Storm Rainfall=5.90"

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Page 113

Summary for Pond 26P: North Pond

Inflow Area = 44.915 ac, 3.85% Impervious, Inflow Depth > 3.74" for 100-Year, 24-Hour Storm event
 Inflow = 193.95 cfs @ 12.08 hrs, Volume= 14.009 af
 Outflow = 3.79 cfs @ 19.13 hrs, Volume= 3.723 af, Atten= 98%, Lag= 423.2 min
 Discarded = 3.79 cfs @ 19.13 hrs, Volume= 3.723 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Peak Elev= 164.04' @ 19.13 hrs Surf.Area= 38,417 sf Storage= 460,796 cf

Plug-Flow detention time= 397.9 min calculated for 3.723 af (27% of inflow)
 Center-of-Mass det. time= 260.3 min (1,076.4 - 816.1)

Volume	Invert	Avail.Storage	Storage Description
#1	140.00'	731,085 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.00	5,675	0	0
150.00	15,091	103,830	103,830
160.00	29,062	220,765	324,595
170.00	52,236	406,490	731,085

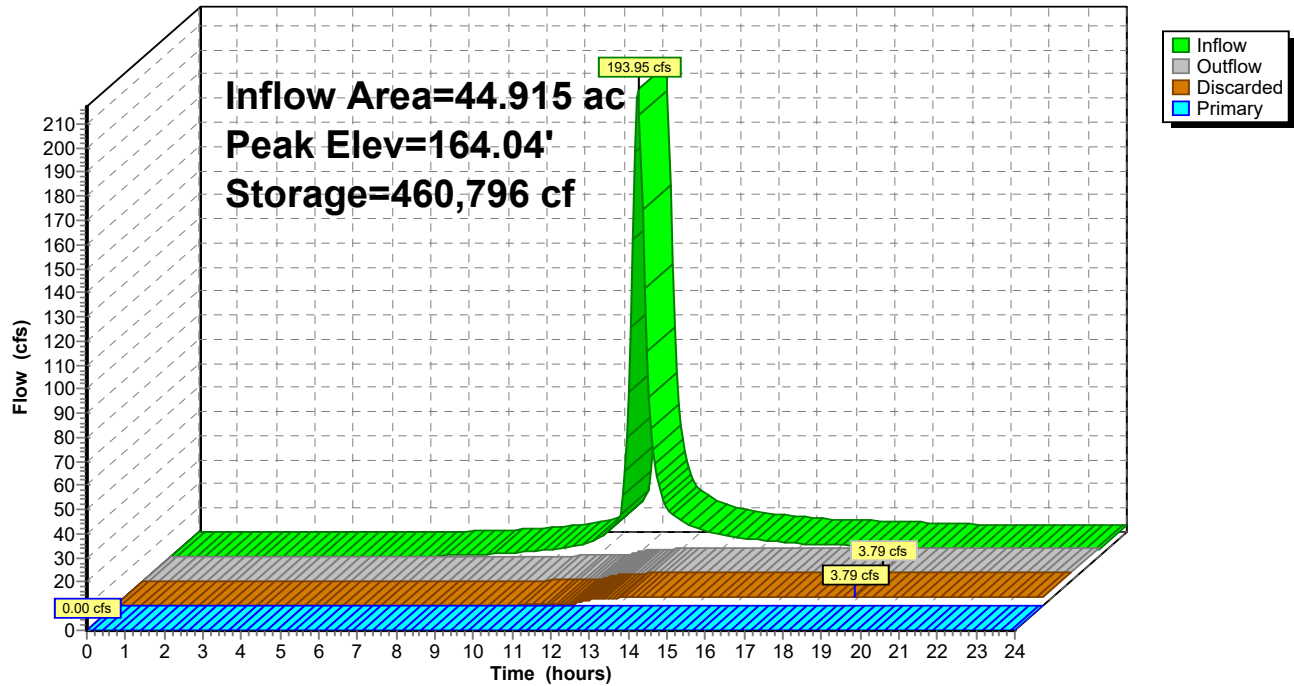
Device	Routing	Invert	Outlet Devices
#1	Discarded	140.00'	5.000 in/hr Exfiltration over Horizontal area above 140.00' Excluded Horizontal area = 5,675 sf
#2	Primary	167.00'	17.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=3.79 cfs @ 19.13 hrs HW=164.04' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 3.79 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=140.00' (Free Discharge)
 ↑ **2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 26P: North Pond

Hydrograph



DOWNCHUTE
AND
DOWNCHUTE ENERGY DISSIPATOR DESIGN

Civil & Environmental Engineering, Landscape Architecture and Land Surveying, PLLC

Project: North Berm Modification
Prepared by: KFH
Checked by:

Date: 5/11/2021
Job #: 182-442
Sheet 1 of 1

Downchute Design - Gabion Baskets

Reference Material: Standards and Specifications for Lined Waterway or Outlet, *New York Standards and Specifications For Erosion and Sediment Control*, November 2016.

Objective: Determine appropriate cross-section and gabion basket size for downchutes along landfill using methodology presented in reference manual.

HydroCAD Analysis:

The downchutes will be designed with the same cross-section and gabion basket sizes. Therefore, the design input will utilize the largest drainage area to represent the maximum flow rate to any downchute. *The representative drainage area is subcatchment "12S" (refer to node "1R" in HydroCAD report titled "Energy Dissipator Model"). The curve number for stabilized final cover is 80. The downchute was designed for a 25-Year, 24-Hour storm event.*

25-Year, 24-Hour Storm: 4.9 in

Channel Parameters

Depth	1.5 ft
Bottom Width	3 ft
Side Slopes	0 H:0V
Channel Slope	0.33 ft/ft
Manning's, n	0.03

Table 2. Stone Sizes and Allowable Velocities for Gabions (courtesy of and adapted from Maccaferri Gabions)

Type	Thickness (ft)	Filling Stone Range	D50	Critical* Velocity	Limit** Velocity
Mattress	0.5	3 - 4"	3.4"	11.5	13.8
	0.5	3 - 6"	4.3"	13.8	14.8
	0.75	3 - 4"	3.4"	14.8	16
	0.75	3 - 6"	4.7"	14.8	20
	1	3 - 5"	4"	13.6	18
	1	4 - 6"	5"	16.4	21
Basket	1.5	4 - 8"	6"	19	24.9
	1.5	5 - 10"	7.5"	21	26.2

Reference: Freeman, Gary E., Fischenich, J.Craig, *Gabions for Streambank Erosion Control*, May 2000.

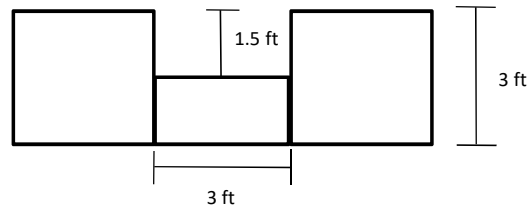
Maximum Velocity = 18.47 fps

Choose Gabion Basket

Gabion Basket Parameters*

	Outside Baskets	Inside Basket
Thickness	3 ft	1.5 ft
Length	6 ft	6 ft
Width	3 ft	3 ft
D ₅₀	7.5 in	
Critical Velocity	21 fps	

*Reference: Gabion - Galvanized, *Product Standard Specifications*, Maccaferri, May 2005.



Maximum Velocity < Critical Velocity
18.47 < 21 GOOD

Civil & Environmental Engineering, Landscape Architecture and Land Surveying, PLLC

Project: North Berm Modification
Prepared by: KFH
Checked by:

Date: 5/11/2021
Job #: 182-442
Sheet 1 of 2

Downchute Energy Dissipator

Reference Material: Design of Roadside Channels with Flexible Linings, September 2005 (U.S. Department of Transportation Federal Highway Administration).

Objective:

Determine the minimum bottom width of gabion-lined downchutes so that rip-rap will be able to withstand shear stresses of incoming flow using methodology presented in reference manual.

HydroCAD Analysis:

The energy dissipators will have specific cross-section and rip-rap size based on inflow. Therefore, the design input will utilize the individual drainage areas to represent the maximum flow rate to that downchute. The representative drainage area is shown as *subcatchment "12S"* (refer to node "3R" in HydroCAD report titled "Energy Dissipator Model"). The curve number for stabilized final cover is 80. The energy dissipator was designed for a 25-Year, 24-Hour storm event.

25-Year, 24-Hour Storm: 4.9 in

Inflow, Q =	44.40 cfs
Bottom Width, B =	7 ft
Side slope, Z =	2 H:1V
Channel Slope, S =	0.3333 ft/ft
Channel Depth =	1.5 ft
D ₅₀ =	1 ft
Manning's n (assumed) =	0.04

$$\tau_{dp} = \gamma d S$$

τ_d = maximum shear stress
 γ = specific weight of water
d = depth of flow

γ =	62.4 pcf
d =	0.47 ft
S =	0.33 ft/ft
τ_d =	9.78 psf

Civil & Environmental Engineering, Landscape Architecture and Land Surveying, PLLC

Project: North Berm Modification
Prepared by: KFH
Checked by:

Date: 5/11/2021
Job #: 182-442
Sheet 2 of 2

$$\tau_p \geq S_p \tau_{dp}$$

$$\tau = \gamma_p \gamma_p D_{50p}$$

$$Re = \frac{V_p D_{50p}}{\nu}$$

$$V = \sqrt{\frac{\tau_p}{\gamma_p}}$$

Table 6.1. Selection of Shields' Parameter and Safety Factor

Reynolds number	F*	SF
$\leq 4 \times 10^4$	0.047	1.0
$4 \times 10^4 < Re < 2 \times 10^5$	Linear interpolation	Linear interpolation
$\geq 2 \times 10^5$	0.15	1.5

τ_p = permissible shear stress

SF = Safety Factor

F = Shield's Parameter

γ_s = specific weight of stone, 165 pcf

Re = Reynold's Number

V = Shear Velocity

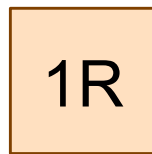
ν = kinematic viscosity, 1.217×10^{-5} ft²/s

V =	2.25
Re =	184545.71
F =	0.140 (Linear Interpolation)
SF =	1.40 (Linear Interpolation)

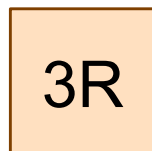
$$\tau_p = 14.37 \geq 13.7 \text{ GOOD}$$

CONCLUSION:

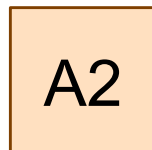
Transitioning from the gabion-lined downchute to a rip-rap lined channel with bottom width of 7 ft maintains a sufficient flow depth and velocity to utilize rip-rap of $D_{50} = 1$ ft in the energy dissipator.



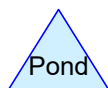
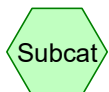
Gabion Downchute



Rip-Rap Inlet Transition



Rip-Rap Energy
Dissipator - Outlet



Routing Diagram for Energy Dissipator Model

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Energy Dissipator Model

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Page 2

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	25-Year, 24-Hour Storm	Type II 24-hr		Default	24.00	1	4.90	2

Energy Dissipator Model

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Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 3

Summary for Subcatchment 12S:

Runoff = 44.40 cfs @ 12.05 hrs, Volume= 2.736 af, Depth> 2.80"

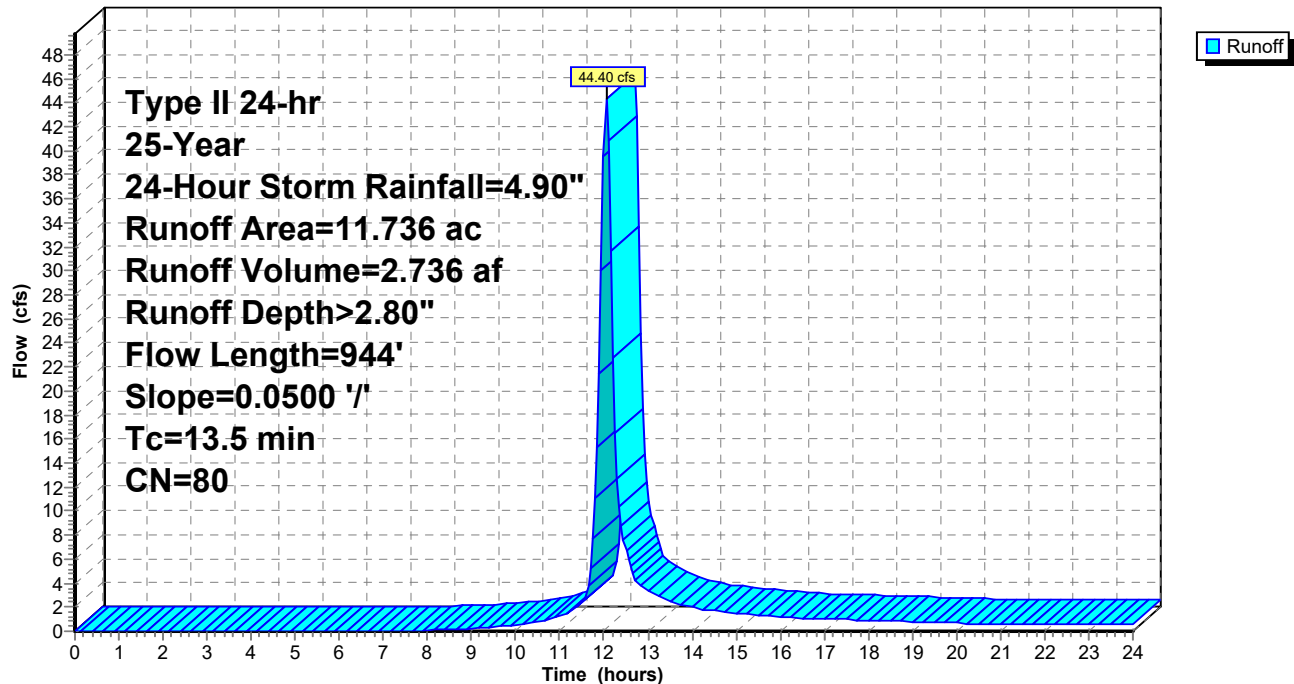
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

Area (ac)	CN	Description
* 11.736	80	
11.736		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Plateau Grass: Short n= 0.150 P2= 2.80"
3.8	359	0.0500	1.57		Shallow Concentrated Flow, Plateau Short Grass Pasture Kv= 7.0 fps
2.4	485	0.0500	3.35		Shallow Concentrated Flow, Sideslope Berm Grassed Waterway Kv= 15.0 fps
13.5	944	Total			

Subcatchment 12S:

Hydrograph



Energy Dissipator Model

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Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 4

Summary for Reach 1R: Gabion Downchute

Mannings from Figure 5B.11 Determining "n" for Riprap Lined Channel Using Depth of Flow

Inflow Area = 11.736 ac, 0.00% Impervious, Inflow Depth > 2.80" for 25-Year, 24-Hour Storm event
Inflow = 44.40 cfs @ 12.05 hrs, Volume= 2.736 af
Outflow = 44.09 cfs @ 12.06 hrs, Volume= 2.735 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 18.47 fps, Min. Travel Time= 0.2 min

Avg. Velocity = 4.91 fps, Avg. Travel Time= 0.8 min

Peak Storage= 550 cf @ 12.06 hrs

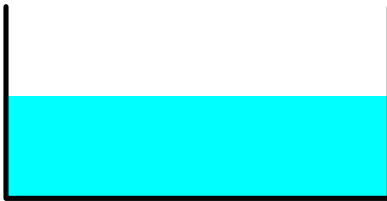
Average Depth at Peak Storage= 0.80' , Surface Width= 3.00'

Bank-Full Depth= 1.50' Flow Area= 4.5 sf, Capacity= 105.86 cfs

3.00' x 1.50' deep channel, n= 0.030

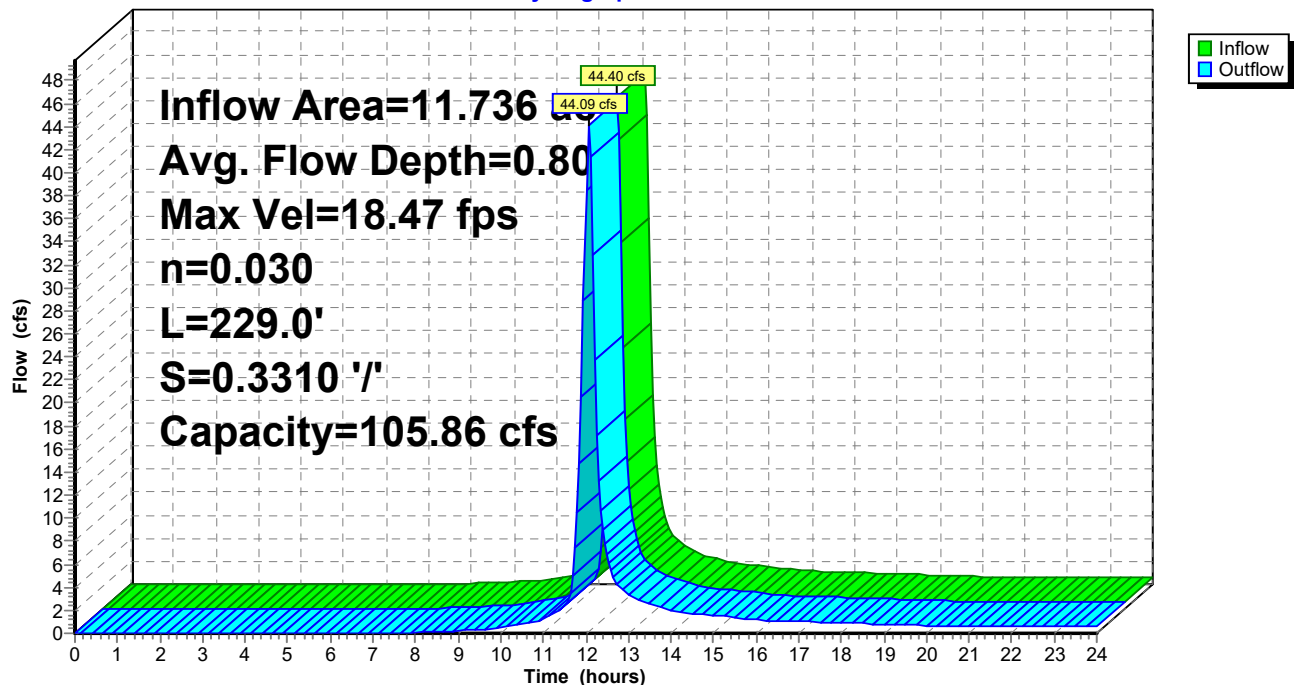
Length= 229.0' Slope= 0.3310 '/'

Inlet Invert= 290.00', Outlet Invert= 214.20'



Reach 1R: Gabion Downchute

Hydrograph



Energy Dissipator Model

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Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 5

Summary for Reach 3R: Rip-Rap Inlet Transition

[61] Hint: Exceeded Reach 1R outlet invert by 0.47' @ 12.05 hrs

Inflow Area = 11.736 ac, 0.00% Impervious, Inflow Depth > 2.80" 25-Year, 24-Hour Storm event
Inflow = 44.09 cfs @ 12.06 hrs, Volume= 2.735 af
Outflow = 44.07 cfs @ 12.06 hrs, Volume= 2.735 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 11.72 fps, Min. Travel Time= 0.0 min

Avg. Velocity= 2.98 fps, Avg. Travel Time= 0.0 min

Peak Storage= 30 cf @ 12.06 hrs

Average Depth at Peak Storage= 0.47' , Surface Width= 8.89'

Bank-Full Depth= 1.50' Flow Area= 15.0 sf, Capacity= 337.34 cfs

7.00' x 1.50' deep channel, n= 0.040 Riprap, 12-inch

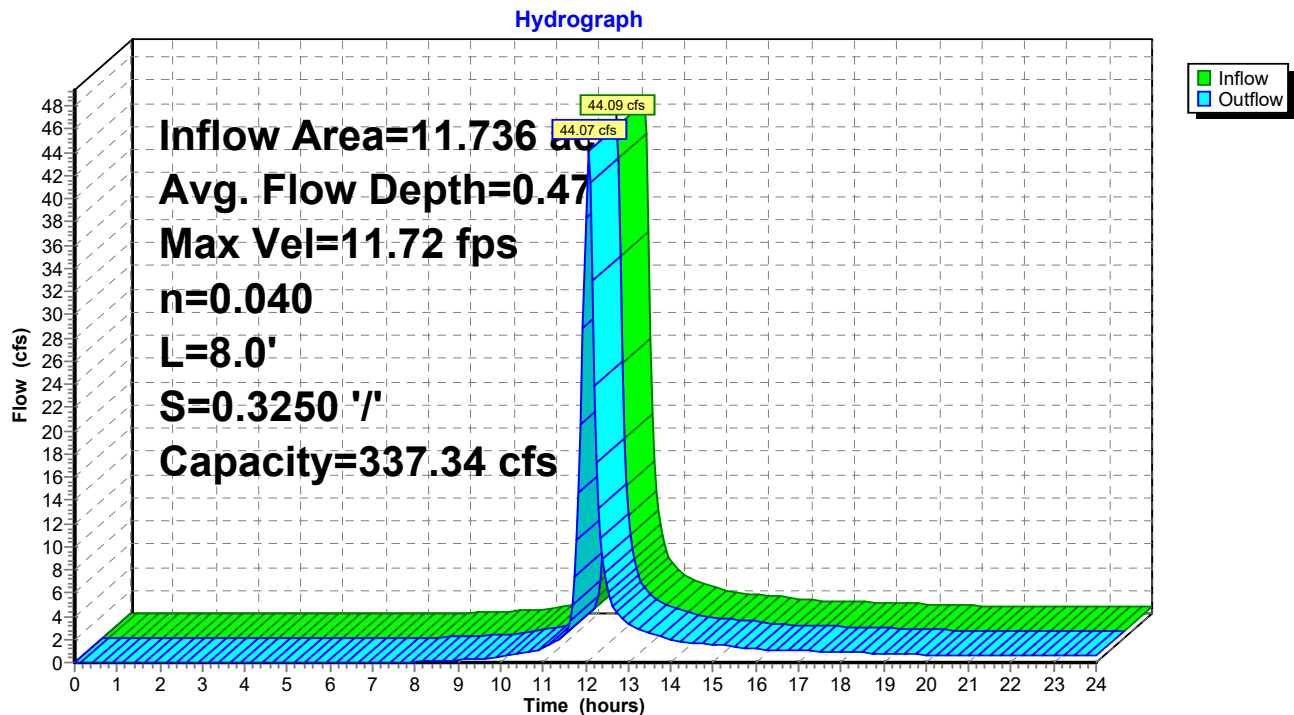
Side Slope Z-value= 2.0 '/' Top Width= 13.00'

Length= 8.0' Slope= 0.3250 '/'

Inlet Invert= 214.20', Outlet Invert= 211.60'



Reach 3R: Rip-Rap Inlet Transition



Energy Dissipator Model

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Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 6

Summary for Reach A2: Rip-Rap Energy Dissipator - Outlet

[61] Hint: Exceeded Reach 3R outlet invert by 0.25' @ 12.05 hrs

Inflow Area = 11.736 ac, 0.00% Impervious, Inflow Depth > 2.80" 25-Year, 24-Hour Storm event
Inflow = 44.07 cfs @ 12.06 hrs, Volume= 2.735 af
Outflow = 43.97 cfs @ 12.06 hrs, Volume= 2.734 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 5.65 fps, Min. Travel Time= 0.1 min

Avg. Velocity= 1.39 fps, Avg. Travel Time= 0.3 min

Peak Storage= 179 cf @ 12.06 hrs

Average Depth at Peak Storage= 0.26' , Surface Width= 31.02'

Bank-Full Depth= 1.50' Flow Area= 49.5 sf, Capacity= 860.16 cfs

30.00' x 1.50' deep channel, n= 0.060

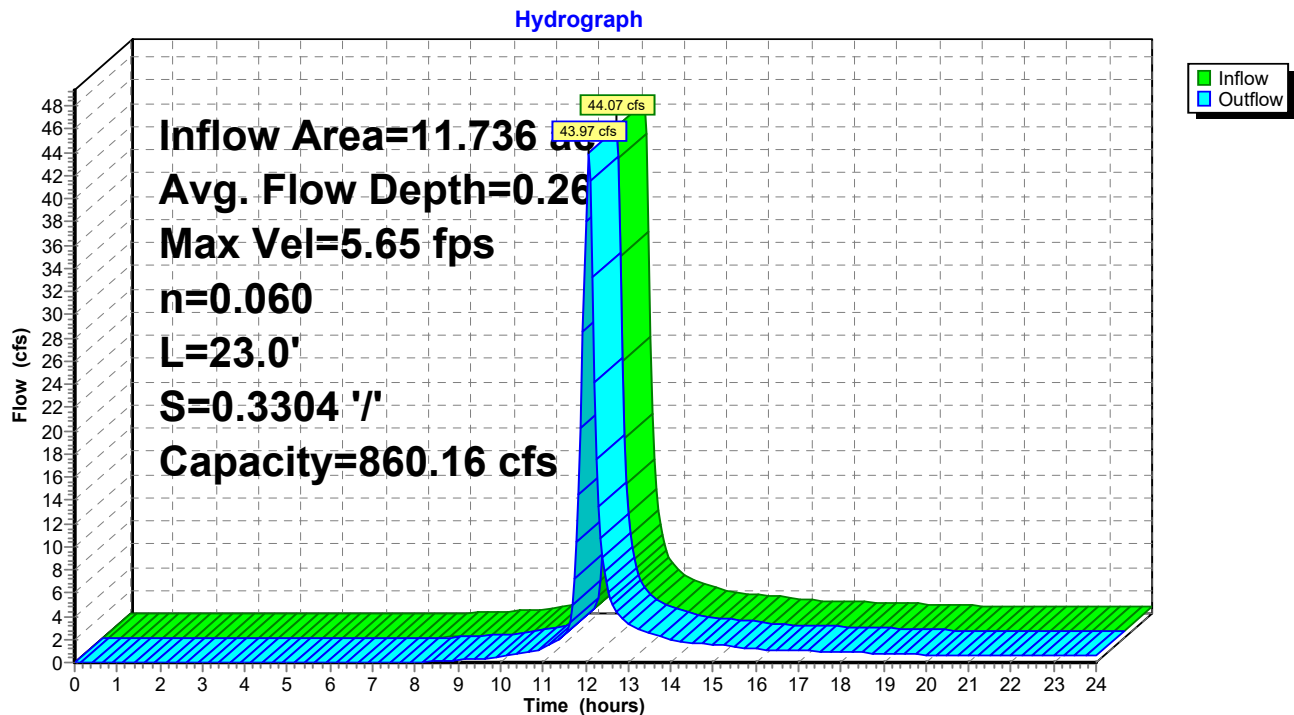
Side Slope Z-value= 2.0 '/' Top Width= 36.00'

Length= 23.0' Slope= 0.3304 '/'

Inlet Invert= 211.60', Outlet Invert= 204.00'



Reach A2: Rip-Rap Energy Dissipator - Outlet



FINAL COVER DIVERSION BERM
AND
PERIMETER SWALE DESIGN

Civil & Environmental Engineering, Landscape Architecture and Land Surveying, PLLC

Project: North Berm Modification
Prepared by: KFH
Checked by:

Date: 5/11/2021
Job #: 182-442
Sheet 1 of 1

Perimeter Swale Design - Erosion Mat

Reference Material: Standards and Specifications for Lined Waterway or Outlet, *New York Standards and Specifications For Erosion and Sediment Control*, November 2016.

Objective: Determine appropriate erosion mat for perimeter swales using methodology presented in reference manual.

HydroCAD Analysis:

The same erosion mat will be utilized for the entire length of the perimeter swale. Therefore, the swale with the largest peak flow will be utilized to select the appropriate erosion mat (refer to node "5R" in the HydroCAD report titled "Post Development_North Pond" provided in this appendix). The erosion mat was selected to provide adequate resistance to erosion during the peak flow from a 25-Year, 24-Hour storm event.

25-Year, 24-Hour Storm: 4.9 in

Channel Parameters

Depth	2 ft
Bottom Width	2 ft
Side Slopes	2 H:1V
Channel Slope	0.073 ft/ft

Selected Erosion Mat: North American Green P550

Manning's Roughness Coefficient*

*Since Manning's n varies with depth in a grass lined channel, an iterative process is used to determine the hydraulic characteristics of the proposed channel. The value of Manning's n is linearly interpolated from the values indicated on P550 Turf Reinforcement Mat, Material and Performance Specification Sheet, North American Green, March 2009.

Assume Depth of Flow =	1 ft
Manning's n =	0.031
HydroCAD Depth of Flow =	1.25 ft

CONTINUE

Depth of Flow =	1.25 ft
Manning's n =	0.027
HydroCAD Depth of Flow =	1.17 ft

CONTINUE

Depth of Flow =	1.17 ft
Manning's n =	0.028
HydroCAD Depth of Flow =	1.19 ft

STOP

Maximum Velocity = 11.41 fps

Maximum Permissible Shear Stress		
	Short Duration	Long Duration
Phase 1 Unvegetated	4.0 lbs/ft ² (191 Pa)	3.25 lbs/ft ² (156 Pa)
Phase 2 Partially Veg.	12.0 lbs/ft ² (576 Pa)	12.0 lbs/ft ² (576 Pa)
Phase 3 Fully Veg.	14.0 lbs/ft ² (672 Pa)	12.0 lbs/ft ² (576 Pa)
Velocity Unveg	12.5 ft/s (3.8 m/s)	
Velocity Veg.	25 ft/s (7.6 m/s)	

*Reference: P550 Turf Reinforcement Mat, *Material and Performance Specification Sheet*, North American Green, March 2009.

Maximum Velocity < **Critical Velocity**
11.41 < 12.5 GOOD

Civil & Environmental Engineering, Landscape Architecture and Land Surveying, PLLC

Project: North Berm Modification
Prepared by: KFH
Checked by:

Date: 5/11/2021
Job #: 182-442
Sheet 1 of 1

Diversion Berm Design - Erosion Mat

Reference Material: Standards and Specifications for Lined Waterway or Outlet, *New York Standards and Specifications For Erosion and Sediment Control*, November 2016.

Objective: Determine appropriate erosion mat for perimeter swales using methodology presented in reference manual.

HydroCAD Analysis:

The final cover diversion berms will be designed with the same cross-section and erosion matting. Therefore, the design input will utilize the largest drainage area to represent the maximum flow rate to any diversion berm. The representative drainage area is shown as subcatchment "28S" (refer to HydroCAD report titled "Diversion Berm Model"). The curve number for stabilized final cover is 80. The swale was designed for a 25-Year, 24-Hour storm event.

25-Year, 24-Hour Storm: 4.9 in

Channel Parameters

Depth	1.5 ft
Bottom Width	0 ft
Side Slopes	2 H:1V
	3 H:1V
Channel Slope	0.04 ft/ft

Selected Erosion Mat: North American Green P300

Manning's Roughness Coefficient*

*Manning's n varies with depth of flow in a grass lined channel. For the purposes of this calculation, the value of Manning's n has been estimated using an assumed flow depth and linear interpolation of the values indicated on P300 Turf Reinforcement Mat, Material and Performance Specification Sheet, North American Green, March 2009.

Assumed Depth of Flow =	1 ft
Manning's n =	0.029

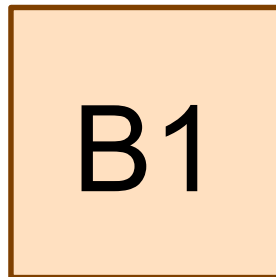
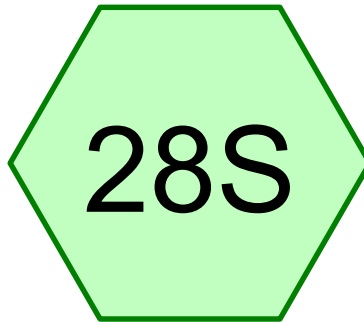
Depth of Flow from HydroCAD =	1.01 ft
Maximum Velocity =	5.83 fps

Maximum Permissible Shear Stress		
	Short Duration	Long Duration
Phase 1 Unvegetated	3.0 lbs/ft ² (144 Pa)	2.0 lbs/ft ² (196 Pa)
Phase 2 Partially Veg.	8.0 lbs/ft ² (383 Pa)	8.0 lbs/ft ² (383 Pa)
Phase 3 Fully Veg.	8.0 lbs/ft ² (383 Pa)	8.0 lbs/ft ² (383 Pa)
Velocity Unveg	9.0 ft/s (2.7 m/s)	
Velocity Veg.	16 ft/s (4.9 m/s)	

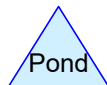
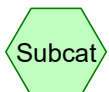
*Reference: P300 Turf Reinforcement Mat, *Material and Performance Specification Sheet*, North American Green, March 2009.

Maximum Velocity	<	Critical Velocity
5.83	<	9

GOOD



Sideslope Swale



Routing Diagram for Diversion Berm Model

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Diversion Berm Model

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Page 2

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	25-Year, 24-Hour Storm	Type II 24-hr		Default	24.00	1	4.90	2

Diversion Berm Model

Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 3

Summary for Subcatchment 28S:

[47] Hint: Peak is 868% of capacity of segment #4

Runoff = 15.58 cfs @ 12.07 hrs, Volume= 1.009 af, Depth> 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

Area (ac)	CN	Description
* 4.330	80	Cap
4.330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	100	0.0500	0.23		Sheet Flow, Grass: Short n= 0.150 P2= 2.80"
5.2	488	0.0500	1.57		Shallow Concentrated Flow, Section 1 Short Grass Pasture Kv= 7.0 fps
0.3	70	0.3300	4.02		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	280	0.0400	2.87	1.80	Trap/Vee/Rect Channel Flow, Diversion Berm 1 Bot.W=0.00' D=0.50' Z= 3.0 & 2.0 ' Top.W=2.50' n= 0.039
0.2	222	0.3333	17.70	79.67	Trap/Vee/Rect Channel Flow, Gabion Downchute Bot.W=3.00' D=1.50' n= 0.040
0.4	190	0.0210	7.63	91.59	Trap/Vee/Rect Channel Flow, North Channel Bot.W=2.00' D=2.00' Z= 2.0 ' Top.W=10.00' n= 0.030
15.0	1,350	Total			

Diversion Berm Model

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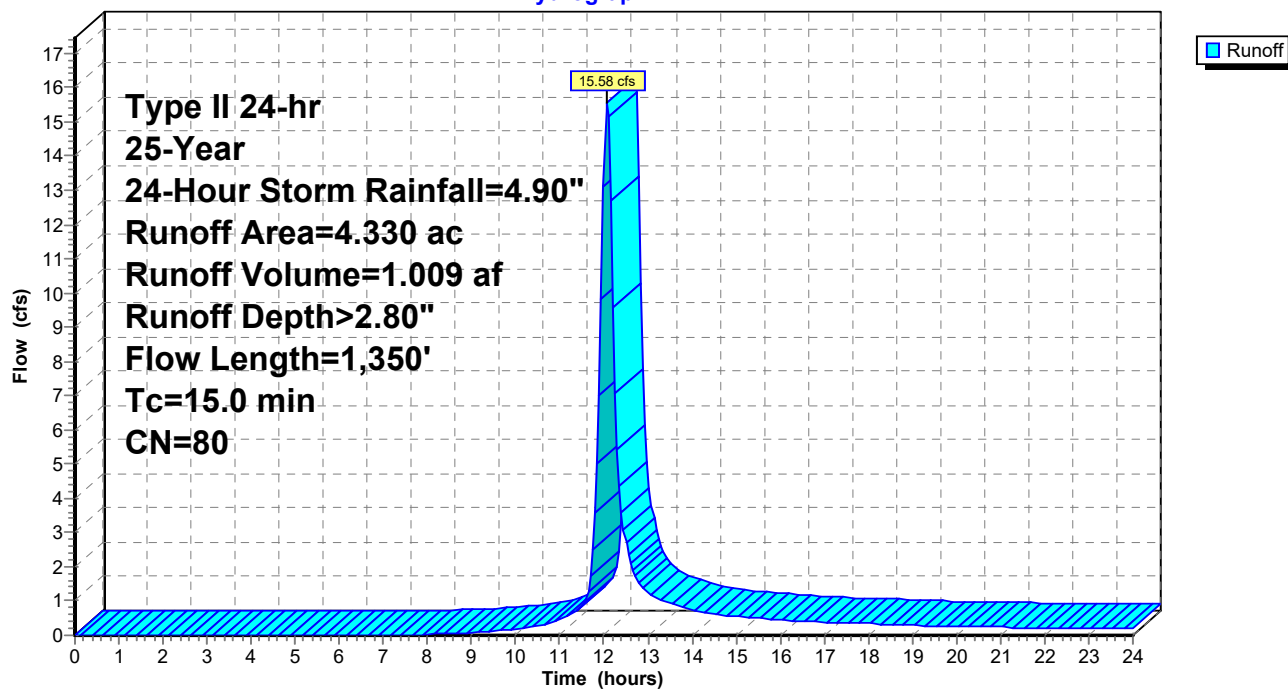
Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 4

Subcatchment 28S:

Hydrograph



Diversion Berm Model

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Type II 24-hr 25-Year, 24-Hour Storm Rainfall=4.90"

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Page 5

Summary for Reach B1: Sideslope Swale

Inflow Area = 4.330 ac, 0.00% Impervious, Inflow Depth > 2.80" for 25-Year, 24-Hour Storm event
Inflow = 15.58 cfs @ 12.07 hrs, Volume= 1.009 af
Outflow = 15.45 cfs @ 12.08 hrs, Volume= 1.009 af, Atten= 1%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Max. Velocity= 6.13 fps, Min. Travel Time= 0.3 min

Avg. Velocity = 2.41 fps, Avg. Travel Time= 0.7 min

Peak Storage= 253 cf @ 12.07 hrs

Average Depth at Peak Storage= 1.01', Surface Width= 5.03'

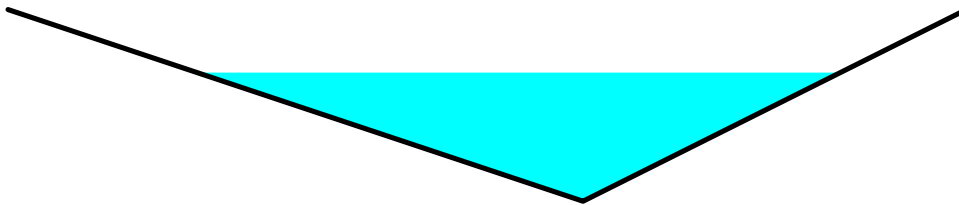
Bank-Full Depth= 1.50' Flow Area= 5.6 sf, Capacity= 45.22 cfs

0.00' x 1.50' deep channel, n= 0.029

Side Slope Z-value= 3.0 2.0 '/' Top Width= 7.50'

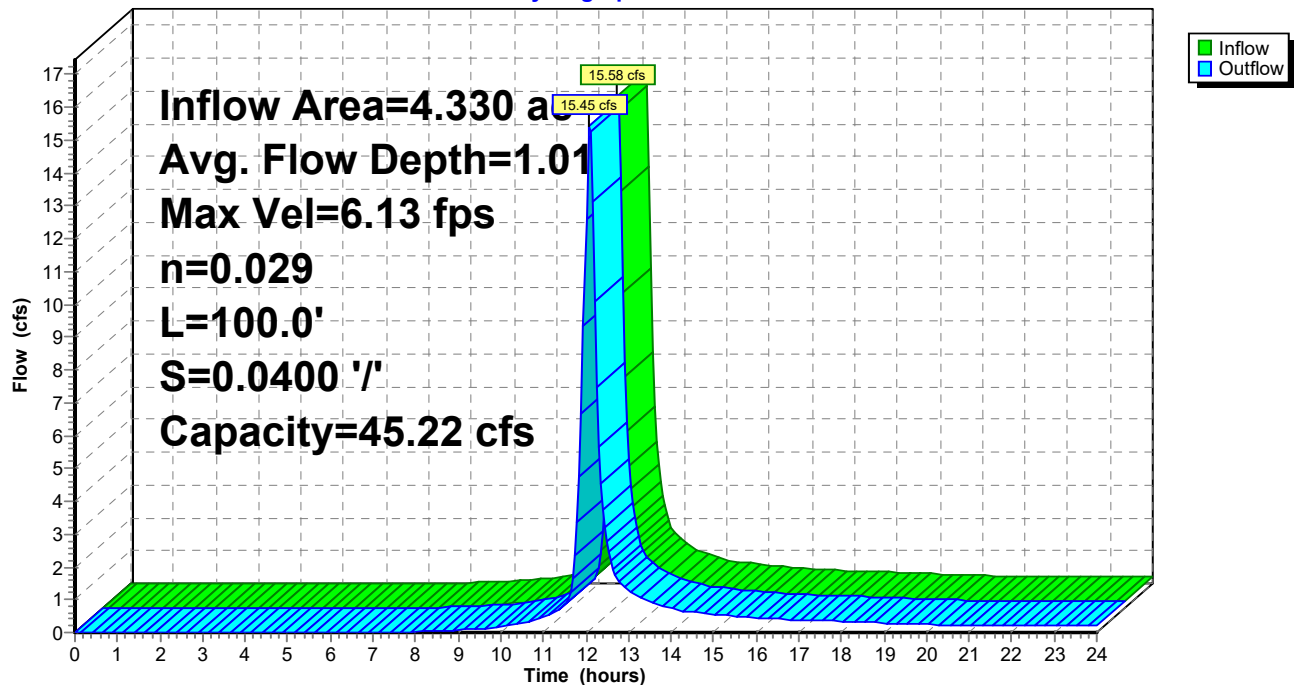
Length= 100.0' Slope= 0.0400 '/'

Inlet Invert= 290.00', Outlet Invert= 286.00'



Reach B1: Sideslope Swale

Hydrograph



DRAINAGE AREA MAPS