STORMWATER SYSTEM & EROSION CONTROL CALCULATIONS

DUNGANNON VILLAGE

110 Dungannon Boulevard

Wilmington, North Carolina

For

Autumn Hall DVC, LLC
1202 Eastwood Road
Wilmington, NC 28403

(910) 313-0795

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ENGINEERING

NORTH CAROLINA PROFESSIONAL SEAL 030869 ENGINEER T. JASON CLARK

2/28/2017

Final SW Calcs
2/28/2017
SWP 201601 5R1
Rac

Revised February 2017 (Sign Shed & Patio Revisions)

December 2014

Prepared by:

NORRIS & TUNSTALL CONSULTING ENGINEERS, P.C.

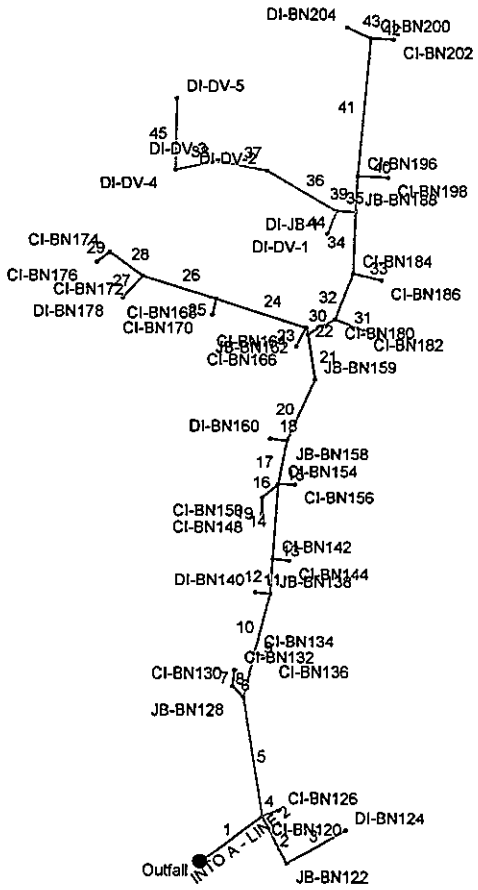
902 Market Street
Wilmington, North Carolina 28401

(910) 343-9653
(910) 343-9604 (Fax)

License # C-3641

N&T Project No. 14069

05150-1 POND B LINE NW



Project File: 14069 - 05150 PONDB NW-B 033108 DEC 2016.stm	Number of lines: 45	Date: 2/1/17

Storm Sewers v10.40

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	126	0.45	15.16	0.39	0.18	11.35	5.0	12.5	5.9	67.45	239.1	6.81	48	2.77	14.60	18.10	19.63	20.58	24.20	26.30	INTO A - LINE 2
2	1	87	0.00	0.98	0.00	0.00	0.69	5.0	6.2	7.0	4.79	15.34	1.53	24	0.46	18.10	18.50	21.60	21.64	26.30	25.75	
3	2	110	0.98	0.98	0.70	0.69	0.69	5.0	5.0	7.2	4.96	34.10	2.96	24	2.27	18.50	21.00	21.67	21.78	25.75	25.00	
4	1	28	0.53	0.53	0.81	0.43	0.43	5.0	5.0	7.2	3.10	3.86	2.53	15	0.36	18.10	18.20	21.54	21.60	26.30	26.30	
5	1	198	0.00	13.20	0.00	0.00	10.06	5.0	11.7	6.0	60.80	129.1	6.81	48	0.81	18.10	19.70	21.27	22.05	26.30	27.70	
6	5	26	0.13	0.90	0.85	0.11	0.73	5.0	5.1	7.2	5.29	11.29	2.99	18	1.16	19.70	20.00	22.89	22.95	27.70	26.70	
7	6	26	0.77	0.77	0.81	0.62	0.62	5.0	5.0	7.2	4.51	3.98	3.67	15	0.38	20.00	20.10	23.04	23.16	26.70	26.70	
8	5	75	0.21	12.30	0.82	0.17	9.33	5.0	11.5	6.1	56.75	128.5	6.67	48	0.80	19.70	20.30	22.71	22.56	27.70	27.57	
9	8	26	0.21	0.21	0.82	0.17	0.17	5.0	5.0	7.2	1.24	4.00	1.01	15	0.38	20.30	20.40	23.48	23.49	27.57	27.57	
10	8	101	0.00	11.88	0.00	0.00	8.98	5.0	11.1	6.1	55.18	119.7	6.66	48	0.69	20.30	21.00	23.19	23.23	27.57	28.60	
11	10	24	1.23	1.23	0.81	1.00	1.00	5.0	5.0	7.2	7.20	13.66	6.67	18	1.69	25.10	25.50	25.87	26.54	28.60	28.50	
12	10	57	0.04	10.65	0.85	0.03	7.99	5.0	10.8	6.2	49.36	84.76	6.71	48	0.35	21.00	21.20	23.32	23.42	28.60	29.10	
13	12	27	0.07	0.07	0.85	0.06	0.06	5.0	5.0	7.2	0.43	3.93	0.35	15	0.37	21.20	21.30	24.60	24.60	29.10	29.10	
14	12	124	0.11	10.54	0.85	0.09	7.89	5.0	10.3	6.3	49.44	81.58	5.69	48	0.32	21.20	21.60	23.95	24.09	29.10	30.40	
15	14	27	0.11	0.11	0.85	0.09	0.09	5.0	5.0	7.2	0.68	21.14	1.63	15	10.72	23.60	26.50	25.21	26.82	30.40	30.35	
16	14	34	1.37	1.59	0.81	1.11	1.30	5.0	5.6	7.1	9.21	17.26	4.50	24	0.58	23.60	23.80	25.08	24.88	30.40	29.50	
17	14	73	0.00	8.73	0.00	0.00	6.41	5.0	10.0	6.3	40.44	129.2	9.55	42	1.65	24.30	25.50	25.65	27.48	30.40	31.00	
18	17	27	0.49	0.49	0.68	0.33	0.33	5.0	5.0	7.2	2.41	19.73	2.96	15	9.34	25.50	28.00	28.23	28.62	31.00	31.25	
19	16	27	0.22	0.22	0.85	0.19	0.19	5.0	5.0	7.2	1.35	9.06	0.80	18	0.74	23.80	24.00	25.30	25.30	29.50	29.50	
20	17	110	0.00	8.24	0.00	0.00	6.08	5.0	9.5	6.4	38.79	90.94	6.16	42	0.82	25.50	26.40	28.03	28.33	31.00	31.90	
21	20	75	0.00	8.24	0.00	0.00	6.08	5.0	9.2	6.4	39.10	51.91	5.48	42	0.27	26.40	26.60	28.86	29.00	31.90	31.50	
22	21	10	0.34	3.24	0.82	0.28	2.40	5.0	6.6	6.9	16.54	40.29	3.37	30	0.97	26.60	26.70	29.76	29.78	31.50	31.20	
23	22	34	0.38	0.38	0.82	0.31	0.31	5.0	5.0	7.2	2.25	2.94	1.99	15	0.21	28.88	28.95	29.98	30.02	31.20	31.20	
24	22	152	0.20	2.52	0.82	0.16	1.81	5.0	6.0	7.0	12.69	20.08	5.06	24	0.79	28.00	29.20	29.88	30.48	31.20	33.20	
25	24	26	0.38	0.38	0.82	0.31	0.31	5.0	5.0	7.2	2.25	14.56	1.33	18	1.92	29.20	29.70	31.00	31.01	33.20	33.20	
26	24	124	0.04	1.94	0.85	0.03	1.33	5.0	5.7	7.1	9.42	8.78	7.68	15	1.85	29.20	31.50	30.48	33.13	33.20	34.95	
27	26	48	0.68	0.68	0.69	0.47	0.47	5.0	5.0	7.2	3.39	6.57	2.76	15	1.04	31.50	32.00	34.48	34.61	34.95	35.50	
28	26	66	0.84	1.22	0.81	0.68	0.83	5.0	5.5	7.1	5.90	8.72	4.81	15	1.82	31.50	32.70	34.24	34.79	34.95	36.20	
29	28	26	0.38	0.38	0.39	0.15	0.15	5.0	5.0	7.2	1.07	6.94	0.87	15	1.15	32.70	33.00	35.43	35.43	36.20	36.20	
30	21	50	0.12	5.00	0.85	0.10	3.68	5.0	9.0	6.5	23.82	36.51	3.37	36	0.30	26.60	26.75	29.76	29.82	31.50	31.00	
31	30	51	0.22	0.22	0.85	0.19	0.19	5.0	5.0	7.2	1.35	9.07	1.10	15	1.97	26.75	27.75	30.11	30.13	31.00	31.00	
32	30	81	0.93	4.66	0.82	0.76	3.39	5.0	8.7	6.5	22.12	62.84	5.59	30	2.35	26.75	28.65	29.95	30.25	31.00	33.15	
33	32	47	0.20	0.20	0.85	0.17	0.17	5.0	5.0	7.2	1.23	9.88	1.01	15	2.34	28.65	29.75	30.93	30.94	33.15	33.15	
34	32	101	0.00	3.53	0.00	0.00	2.46	5.0	8.2	6.6	16.25	30.57	4.81	30	0.56	28.65	29.21	30.77	30.57	33.15	35.80	
35	34	30	0.31	1.93	0.84	0.26	1.48	5.0	7.9	6.7	9.86	23.60	2.71	30	0.33	29.21	29.31	30.99	31.00	35.80	35.00	
36	35	130	0.46	1.47	0.83	0.38	1.11	5.0	7.0	6.8	7.57	16.24	3.76	24	0.52	29.31	29.98	31.09	30.96	35.00	34.00	
37	36	82	0.15	1.01	0.68	0.10	0.73	5.0	6.5	6.9	5.03	7.52	3.70	18	0.51	29.98	30.40	31.21	31.37	34.00	34.00	
38	37	70	0.45	0.86	0.79	0.36	0.63	5.0	6.2	7.0	4.37	4.88	3.85	15	0.57	30.40	30.80	31.58	31.83	34.00	34.50	
39	34	59	0.09	1.60	0.85	0.08	0.98	5.0	6.8	6.9	6.70	22.08	4.57	18	4.42	29.21	31.81	30.90	32.81	35.80	35.77	
40	39	49	0.09	0.09	0.85	0.08	0.08	5.0	5.0	7.2	0.55	8.36	0.70	15	1.68	31.81	32.63	33.23	33.23	35.77	36.00	
41	39	226	0.28	1.42	0.85	0.24	0.82	5.0	5.6	7.1	5.85	5.81	3.69	18	0.31	31.81	32.50	33.08	33.75	35.77	36.00	

05150-1 POND B LINE NW

Number of lines: 45

Run Date: 2/1/17

NOTES:Intensity = 121.80 / (Inlet time + 23.50) ^ 0.84; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
42	41	37	0.61	0.61	0.62	0.38	0.38	5.0	5.0	7.2	2.73	5.32	2.23	15	0.68	32.50	32.75	34.08	34.15	36.00	36.00	
43	41	42	0.53	0.53	0.39	0.21	0.21	5.0	5.0	7.2	1.49	4.98	1.22	15	0.60	32.50	32.75	34.13	34.16	36.00	36.00	
44	35	40	0.15	0.15	0.74	0.11	0.11	5.0	5.0	7.2	0.80	4.45	0.65	15	0.48	29.31	29.50	31.18	31.18	35.00	34.00	
45	38	117	0.41	0.41	0.66	0.27	0.27	5.0	5.0	7.2	1.96	4.62	2.03	15	0.51	30.80	31.40	32.06	32.17	34.50	35.20	

05150-1 POND B LINE NW

Number of lines: 45

Run Date: 2/1/17

NOTES:Intensity = 121.80 / (Inlet time + 23.50) ^ 0.84; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
35	34	30	0.31	1.93	0.84	0.26	1.48	5.0	7.6	7.6	11.27	23.60	2.84	30	0.33	29.21	29.31	31.14	31.15	35.80	35.00	
36	35	130	0.46	1.47	0.83	0.38	1.11	5.0	6.8	7.8	8.62	16.24	3.98	24	0.52	29.31	29.98	31.23	31.03	35.00	34.00	
37	36	82	0.15	1.01	0.68	0.10	0.73	5.0	6.4	7.9	5.72	7.52	3.87	18	0.51	29.98	30.40	31.28	31.47	34.00	34.00	
38	37	70	0.45	0.86	0.79	0.36	0.63	5.0	6.1	7.9	4.95	4.88	4.07	15	0.57	30.40	30.80	31.64	32.00	34.00	34.50	
39	34	59	0.09	1.60	0.85	0.08	0.98	5.0	6.6	7.8	7.62	22.08	4.98	18	4.42	29.21	31.81	30.99	32.88	35.80	35.77	
40	39	49	0.09	0.09	0.85	0.08	0.08	5.0	5.0	8.1	0.62	8.36	0.68	15	1.68	31.81	32.63	33.36	33.36	35.77	36.00	
41	39	226	0.28	1.42	0.85	0.24	0.82	5.0	5.5	8.0	6.61	5.81	3.74	18	0.31	31.81	32.50	33.31	34.20	35.77	36.00	
42	41	37	0.61	0.61	0.62	0.38	0.38	5.0	5.0	8.1	3.08	5.32	2.51	15	0.68	32.50	32.75	34.52	34.60	36.00	36.00	
43	41	42	0.53	0.53	0.39	0.21	0.21	5.0	5.0	8.1	1.68	4.98	1.37	15	0.60	32.50	32.75	34.59	34.62	36.00	36.00	
44	35	40	0.15	0.15	0.74	0.11	0.11	5.0	5.0	8.1	0.90	4.45	0.74	15	0.48	29.31	29.50	31.34	31.35	35.00	34.00	
45	38	117	0.41	0.41	0.66	0.27	0.27	5.0	5.0	8.1	2.20	4.62	1.89	15	0.51	30.80	31.40	32.34	32.46	34.50	35.20	

05150-1 POND B LINE NW

Number of lines: 11

Run Date: 2/1/17

NOTES:Intensity = 155.43 / (Inlet time + 26.20) ^ 0.86; Return period =Yrs. 25 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
35	34	30	0.31	1.93	0.84	0.26	1.48	5.0	7.4	8.3	12.36	23.60	2.52	30	0.33	29.21	29.31	32.03	32.05	35.80	35.00	
36	35	130	0.46	1.47	0.83	0.38	1.11	5.0	6.6	8.5	9.43	16.24	3.00	24	0.52	29.31	29.98	32.10	32.33	35.00	34.00	
37	36	82	0.15	1.01	0.68	0.10	0.73	5.0	6.3	8.6	6.25	7.52	3.54	18	0.51	29.98	30.40	32.40	32.69	34.00	34.00	
38	37	70	0.45	0.86	0.79	0.36	0.63	5.0	6.0	8.6	5.41	4.88	4.41	15	0.57	30.40	30.80	32.79	33.28	34.00	34.50	
39	34	59	0.09	1.60	0.85	0.08	0.98	5.0	6.5	8.5	8.33	22.08	5.31	18	4.42	29.21	31.81	31.86	32.93	35.80	35.77	
40	39	49	0.09	0.09	0.85	0.08	0.08	5.0	5.0	8.9	0.68	8.36	0.67	15	1.68	31.81	32.63	33.45	33.45	35.77	36.00	
41	39	226	0.28	1.42	0.85	0.24	0.82	5.0	5.5	8.8	7.21	5.81	4.08	18	0.31	31.81	32.50	33.31	34.37	35.77	36.00	
42	41	37	0.61	0.61	0.62	0.38	0.38	5.0	5.0	8.9	3.35	5.32	2.73	15	0.68	32.50	32.75	34.75	34.85	36.00	36.00	
43	41	42	0.53	0.53	0.39	0.21	0.21	5.0	5.0	8.9	1.83	4.98	1.49	15	0.60	32.50	32.75	34.83	34.86	36.00	36.00	
44	35	40	0.15	0.15	0.74	0.11	0.11	5.0	5.0	8.9	0.98	4.45	0.80	15	0.48	29.31	29.50	32.19	32.20	35.00	34.00	
45	38	117	0.41	0.41	0.66	0.27	0.27	5.0	5.0	8.9	2.40	4.62	1.96	15	0.51	30.80	31.40	33.67	33.83	34.50	35.20	

05150-1 POND B LINE NW

Number of lines: 11

Run Date: 2/1/17

NOTES:Intensity = 171.29 / (Inlet time + 27.30) ^ 0.85; Return period =Yrs. 50 ; c = cir e = ellip b = box

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Wednesday, Nov 5 2014

Swale 1 Q-10

Triangular

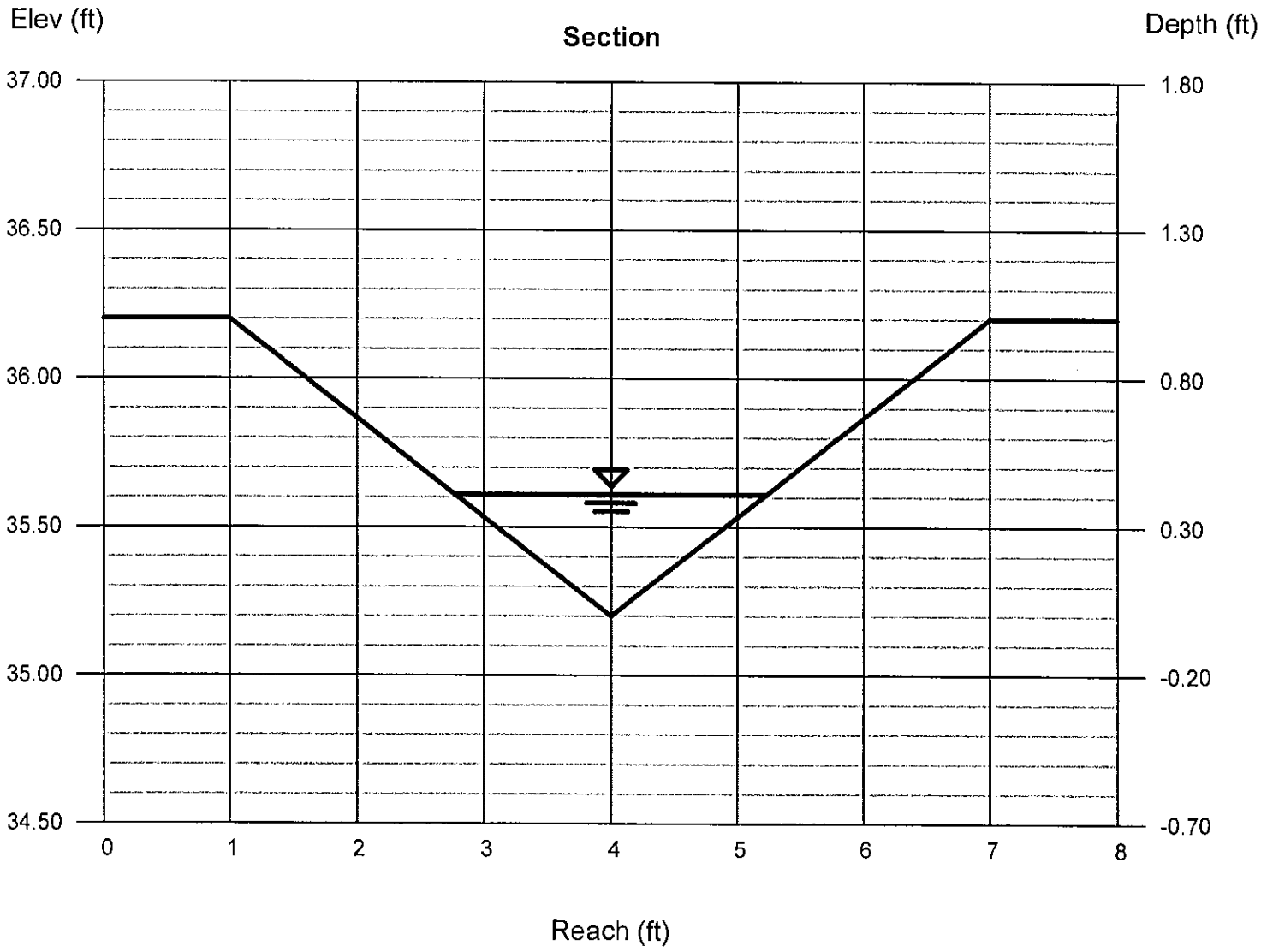
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 35.20
Slope (%)	= 0.60
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.56

Highlighted

Depth (ft)	= 0.41
Q (cfs)	= 0.555
Area (sqft)	= 0.50
Velocity (ft/s)	= 1.10
Wetted Perim (ft)	= 2.59
Crit Depth, Yc (ft)	= 0.30
Top Width (ft)	= 2.46
EGL (ft)	= 0.43



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Nov 7 2014

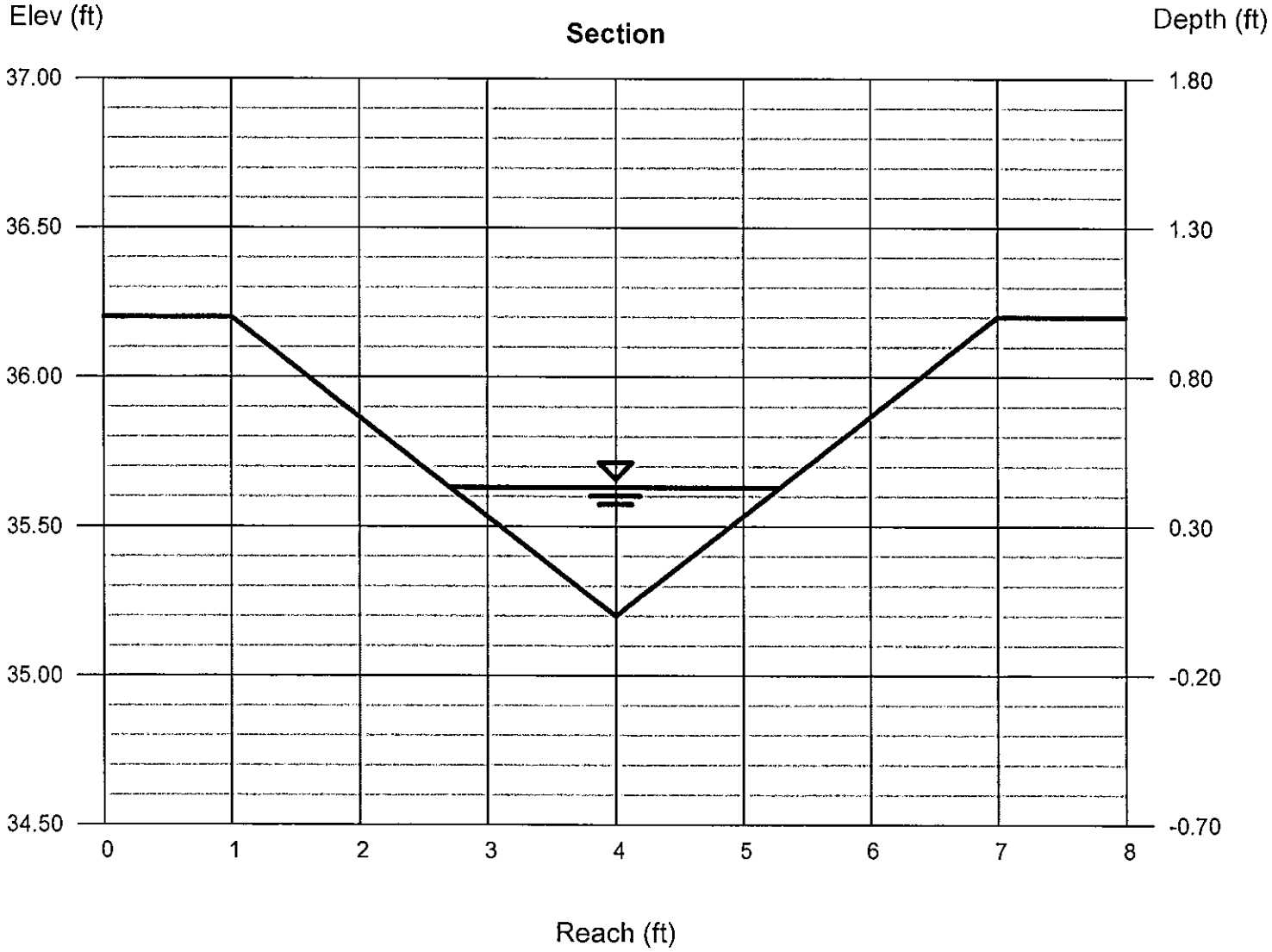
Swale 1 Q-25

Triangular

Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 35.20
Slope (%)	= 0.60
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.62

Highlighted

Depth (ft)	= 0.43
Q (cfs)	= 0.620
Area (sqft)	= 0.55
Velocity (ft/s)	= 1.12
Wetted Perim (ft)	= 2.72
Crit Depth, Yc (ft)	= 0.31
Top Width (ft)	= 2.58
EGL (ft)	= 0.45