STORMWATER SYSTEM & EROSION CONTROL CALCULATIONS

MAYFAIRE FLATS I
(Formerly Westfall Park Apartments Mixed Use)

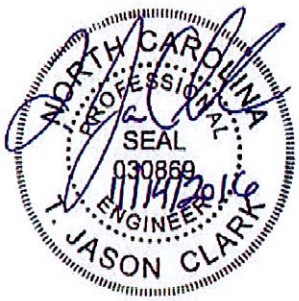
1817 Sir Tyler Drive

Wilmington, North Carolina

For

CCC Westfall Park, LLC
1539 Tippah Park Court
Charlotte, NC 28205

(404) 735-2134



Revised November 2016 (Additional 0.20 Disturbed Area)

Revised October 2015

Revised September 2015

July 2015

Final SW Calcs
12/5/16
SWP2015030R2
Rae

Prepared by:

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902 Market Street
Wilmington, North Carolina 28401

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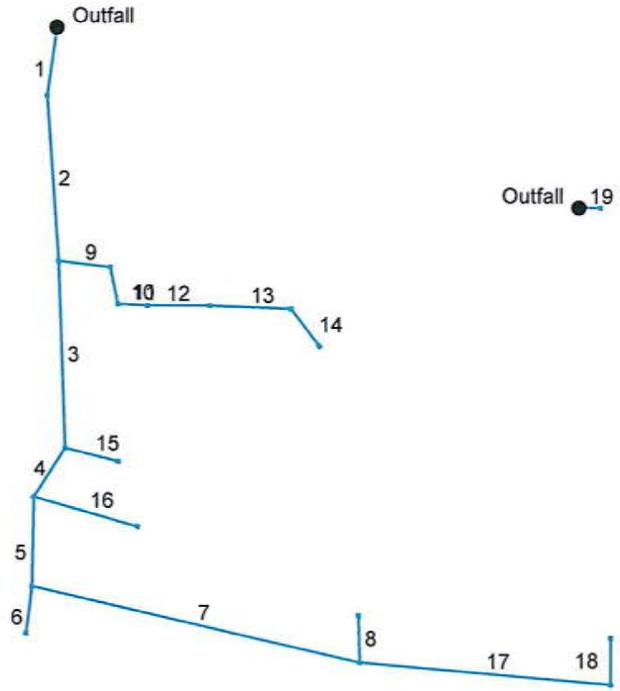
License # C-3641
N&T Project No. 15040

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: Westfall Seg 1.stm	Number of lines: 19	Date: 12/4/15

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	50	0.13	4.94	0.89	0.12	3.86	5.0	12.0	7.4	28.54	58.14	4.04	36	0.76	12.73	13.11	17.00	17.09	15.50	19.70	Exist SD-1
2	1	120	0.17	4.81	0.90	0.15	3.75	5.0	11.5	7.5	28.15	53.42	3.98	36	0.64	13.11	13.88	17.10	17.31	19.70	20.20	SD 1
3	2	136	0.25	3.92	0.91	0.23	3.03	5.0	11.0	7.6	23.12	22.79	4.71	30	0.31	13.88	14.30	17.31	17.74	20.20	20.20	SD 2
4	3	42	0.00	3.61	0.00	0.00	2.76	5.0	10.9	7.7	21.16	25.31	4.31	30	0.38	14.30	14.46	17.80	17.91	20.20	18.00	SD 3
5	4	65	0.77	3.43	0.76	0.59	2.63	5.0	10.7	7.7	20.29	16.83	6.46	24	0.55	14.46	14.82	17.91	18.44	18.00	18.54	Exist SD-2
6	5	34	1.34	1.34	0.77	1.03	1.03	5.0	5.0	9.7	10.00	7.64	5.66	18	0.53	14.82	15.00	18.59	18.90	18.54	18.54	Exist SD 100
7	5	241	0.30	1.32	0.78	0.23	1.01	5.0	9.2	8.1	8.24	15.83	2.62	24	0.49	14.82	16.00	18.98	19.30	18.54	20.11	Exist SD 101
8	7	34	0.05	0.05	0.80	0.04	0.04	5.0	5.0	9.7	0.39	10.50	0.22	18	1.00	16.00	16.34	19.40	19.40	20.11	19.60	Exist SD 102
9	2	37	0.18	0.72	0.80	0.14	0.57	5.0	6.2	9.2	5.20	39.35	1.66	24	3.03	13.88	15.00	17.52	17.54	20.20	19.00	SD 6
10	9	27	0.00	0.54	0.00	0.00	0.42	5.0	6.0	9.3	3.91	26.35	3.30	18	6.30	15.00	16.70	17.54	17.46	19.00	19.00	SD 7
11	10	21	0.05	0.54	0.50	0.03	0.42	5.0	5.8	9.3	3.94	12.55	3.81	18	1.43	16.70	17.00	17.68	17.76	19.00	20.50	SD 8
12	11	45	0.12	0.49	0.82	0.10	0.40	5.0	5.6	9.4	3.74	3.73	3.46	15	0.33	17.00	17.15	18.03	18.18	20.50	21.50	SD 9
13	12	58	0.17	0.37	0.86	0.15	0.30	5.0	5.3	9.6	2.85	1.81	3.63	12	0.26	17.15	17.30	18.18	18.55	21.50	21.50	SD 10
14	13	34	0.20	0.20	0.76	0.15	0.15	5.0	5.0	9.7	1.47	2.73	1.88	12	0.59	17.30	17.50	18.70	18.76	21.50	19.90	SD 11
15	3	39	0.06	0.06	0.75	0.05	0.05	5.0	5.0	9.7	0.44	27.63	0.28	18	6.92	14.30	17.00	18.09	18.09	20.20	20.50	SD 12
16	4	77	0.18	0.18	0.71	0.13	0.13	5.0	5.0	9.7	1.24	4.63	2.42	12	1.69	16.50	17.80	18.16	18.29	18.00	20.80	SD 4
17	7	180	0.81	0.97	0.76	0.62	0.74	5.0	7.7	8.6	6.35	15.08	2.02	24	0.44	16.00	16.80	19.34	19.48	20.11	22.50	Exist SD 103
18	17	34	0.16	0.16	0.76	0.12	0.12	7.1	7.1	8.8	1.08	4.95	0.88	15	0.59	16.80	17.00	19.54	19.54	22.50	22.50	Exist SD 104
19	End	15	0.10	0.10	0.95	0.10	0.10	5.0	5.0	9.7	0.92	5.27	2.27	15	0.67	19.20	19.30	19.80	19.68	21.00	21.50	SD 15

Project File: Westfall Seg 1.stm

Number of lines: 19

Run Date: 12/4/15

NOTES:Intensity = 98.50 / (Inlet time + 12.60) ^ 0.81; 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)	
1	End	50	0.13	4.94	0.89	0.12	3.86	5.0	11.4	8.6	33.06	58.14	4.68	36	0.76	12.73	13.11	17.00	17.12	15.50	19.70	Exist SD-1
2	1	120	0.17	4.81	0.90	0.15	3.75	5.0	11.0	8.7	32.55	53.42	4.60	36	0.64	13.11	13.88	17.13	17.42	19.70	20.20	SD 1
3	2	136	0.25	3.92	0.91	0.23	3.03	5.0	10.6	8.8	26.69	22.79	5.44	30	0.31	13.88	14.30	17.42	18.00	20.20	20.20	SD 2
4	3	42	0.00	3.61	0.00	0.00	2.76	5.0	10.4	8.9	24.40	25.31	4.97	30	0.38	14.30	14.46	18.07	18.22	20.20	18.00	SD 3
5	4	65	0.77	3.43	0.76	0.59	2.63	5.0	10.3	8.9	23.39	16.83	7.45	24	0.55	14.46	14.82	18.22	18.91	18.00	18.54	Exist SD-2
6	5	34	1.34	1.34	0.77	1.03	1.03	5.0	5.0	11.0	11.34	7.64	6.42	18	0.53	14.82	15.00	19.14	19.53	18.54	18.54	Exist SD 100
7	5	241	0.30	1.32	0.78	0.23	1.01	5.0	9.0	9.3	9.44	15.83	3.00	24	0.49	14.82	16.00	19.64	20.06	18.54	20.11	Exist SD 101
8	7	34	0.05	0.05	0.80	0.04	0.04	5.0	5.0	11.0	0.44	10.50	0.25	18	1.00	16.00	16.34	20.20	20.20	20.11	19.60	Exist SD 102
9	2	37	0.18	0.72	0.80	0.14	0.57	5.0	6.0	10.5	5.93	39.35	1.89	24	3.03	13.88	15.00	17.69	17.72	20.20	19.00	SD 6
10	9	27	0.00	0.54	0.00	0.00	0.42	5.0	5.9	10.6	4.46	26.35	3.10	18	6.30	15.00	16.70	17.72	17.67	19.00	19.00	SD 7
11	10	21	0.05	0.54	0.50	0.03	0.42	5.0	5.7	10.6	4.49	12.55	3.94	18	1.43	16.70	17.00	17.78	17.81	19.00	20.50	SD 8
12	11	45	0.12	0.49	0.82	0.10	0.40	5.0	5.5	10.7	4.26	3.73	3.47	15	0.33	17.00	17.15	18.25	18.40	20.50	21.50	SD 9
13	12	58	0.17	0.37	0.86	0.15	0.30	5.0	5.3	10.9	3.24	1.81	4.12	12	0.26	17.15	17.30	18.40	18.88	21.50	21.50	SD 10
14	13	34	0.20	0.20	0.76	0.15	0.15	5.0	5.0	11.0	1.67	2.73	2.13	12	0.59	17.30	17.50	19.07	19.15	21.50	19.90	SD 11
15	3	39	0.06	0.06	0.75	0.05	0.05	5.0	5.0	11.0	0.49	27.63	0.28	18	6.92	14.30	17.00	18.45	18.45	20.20	20.50	SD 12
16	4	77	0.18	0.18	0.71	0.13	0.13	5.0	5.0	11.0	1.40	4.63	1.87	12	1.69	16.50	17.80	18.55	18.66	18.00	20.80	SD 4
17	7	180	0.81	0.97	0.76	0.62	0.74	5.0	7.7	9.8	7.23	15.08	2.30	24	0.44	16.00	16.80	20.11	20.30	20.11	22.50	Exist SD 103
18	17	34	0.16	0.16	0.76	0.12	0.12	7.1	7.1	10.0	1.22	4.95	0.99	15	0.59	16.80	17.00	20.36	20.38	22.50	22.50	Exist SD 104
19	End	15	0.10	0.10	0.95	0.10	0.10	5.0	5.0	11.0	1.04	5.27	2.43	15	0.67	19.20	19.30	19.80	19.70	21.00	21.50	SD 15

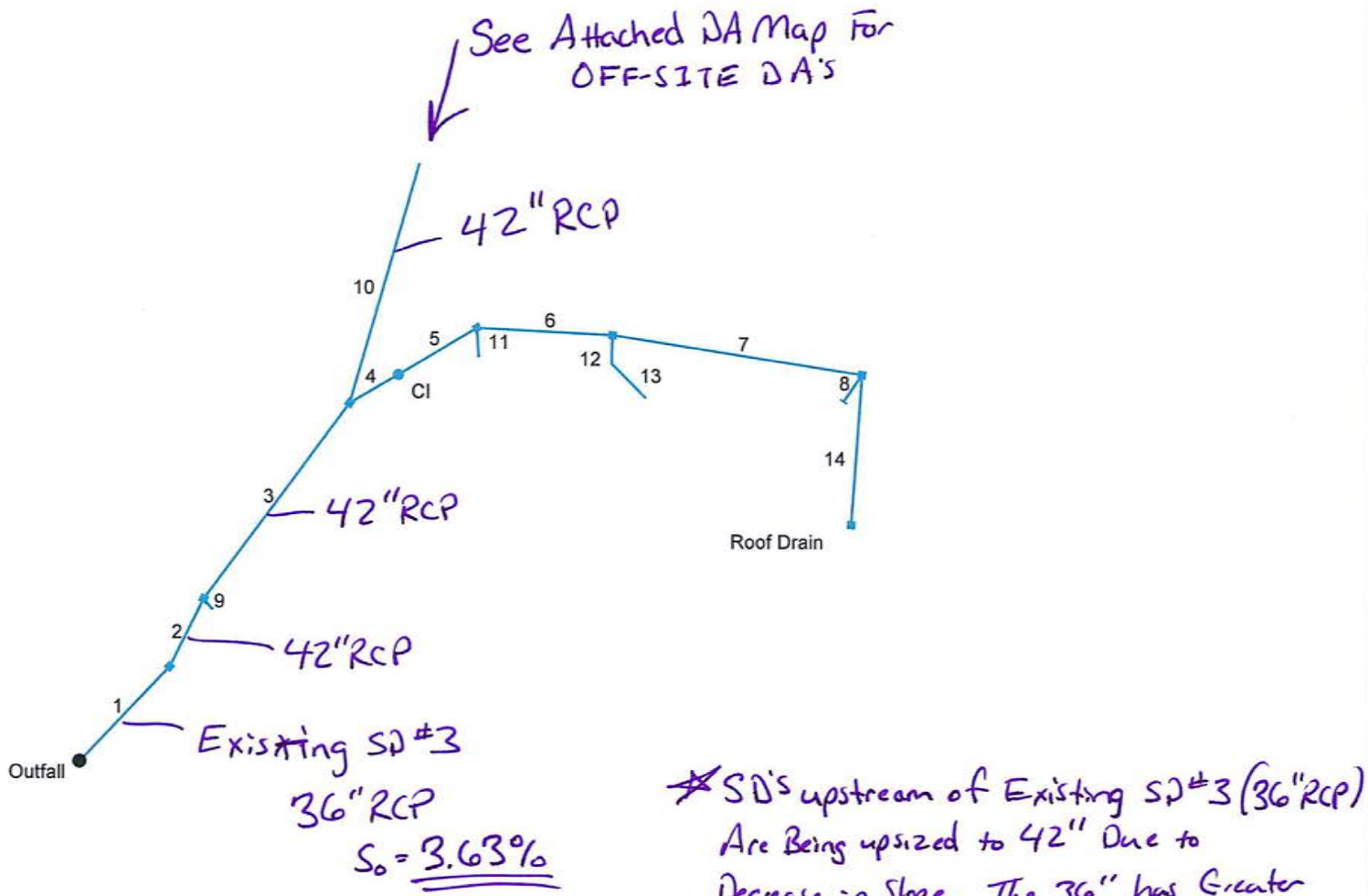
Project File: Westfall Seg 1.stm

Number of lines: 19

Run Date: 12/4/15

NOTES:Intensity = 85.95 / (Inlet time + 11.00) ^ 0.74; Return period =Yrs. 25 ; c = cir e = ellip b = box

Westfall Seg 2



* SD's upstream of Existing SD #3 (36" RCP) Are Being upsized to 42" Due to Decrease in Slope. The 36" has Greater Capacity than the 42" RCP's.

Project File: Flats 1 Segment 2 12-15.stm	Number of lines: 14	Date: 12/4/15

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	60	0.00	16.34	0.00	0.00	12.42	5.0	25.7	5.2	64.16	127.1	9.52	36	3.63	12.66	14.84	17.00	17.41	15.00	18.50	Exist SD #3
2	1	35	0.00	16.34	0.00	0.00	12.42	5.0	25.6	5.2	64.28	72.15	6.85	42	0.51	14.84	15.02	18.17	18.27	18.50	19.50	SD 15
3	2	113	0.00	15.76	0.00	0.00	11.97	5.0	25.3	5.2	62.33	72.08	6.79	42	0.51	15.02	15.60	18.36	18.66	19.50	20.60	SD 16
4	3	26	0.17	1.00	0.72	0.12	0.75	5.0	10.8	7.7	5.76	27.34	1.83	24	1.46	15.60	15.98	19.37	19.38	20.60	20.50	SD 19
5	4	42	0.05	0.83	0.89	0.04	0.63	5.0	10.4	7.8	4.88	18.13	1.55	24	0.64	15.93	16.20	19.40	19.42	20.50	21.00	SD 20
6	5	62	0.00	0.73	0.00	0.00	0.56	5.0	10.1	7.9	4.39	8.43	2.48	18	0.65	16.20	16.60	19.42	19.53	21.00	21.20	SD 21
7	6	115	0.08	0.17	0.88	0.07	0.12	5.0	7.2	8.8	1.08	7.59	0.61	18	0.52	16.60	17.20	19.62	19.63	21.20	21.30	SD 22
8	7	15	0.04	0.04	0.53	0.02	0.02	5.0	5.0	9.7	0.21	9.13	0.17	15	2.00	17.20	17.50	19.63	19.63	21.30	20.50	SD 23
9	2	6	0.58	0.58	0.78	0.45	0.45	15.0	15.0	6.7	3.05	30.91	1.72	18	8.67	15.08	15.60	18.96	18.97	19.50	18.50	SD 18
10	3	115	14.76	14.76	0.76	11.22	11.22	25.0	25.0	5.2	58.82	59.34	6.38	42	0.35	15.60	16.00	18.84	19.16	20.60	19.00	SD 17
11	5	13	0.05	0.05	0.53	0.03	0.03	5.0	5.0	9.7	0.26	16.02	0.21	15	6.15	16.20	17.00	19.45	19.45	21.00	20.50	SD 24
12	6	13	0.16	0.56	0.76	0.12	0.43	5.0	5.1	9.6	4.17	8.01	3.40	15	1.54	16.60	16.80	19.53	19.58	21.20	20.50	SD 25
13	12	22	0.40	0.40	0.78	0.31	0.31	5.0	5.0	9.7	3.02	6.16	2.46	15	0.91	16.80	17.00	19.67	19.71	20.50	21.00	SD 26
14	7	70	0.05	0.05	0.61	0.03	0.03	5.0	5.0	9.7	0.30	2.19	0.54	10	1.00	17.20	17.90	19.63	19.64	21.30	21.50	RD 10inch

Westfall Seg 2

Number of lines: 14

Run Date: 12/4/15

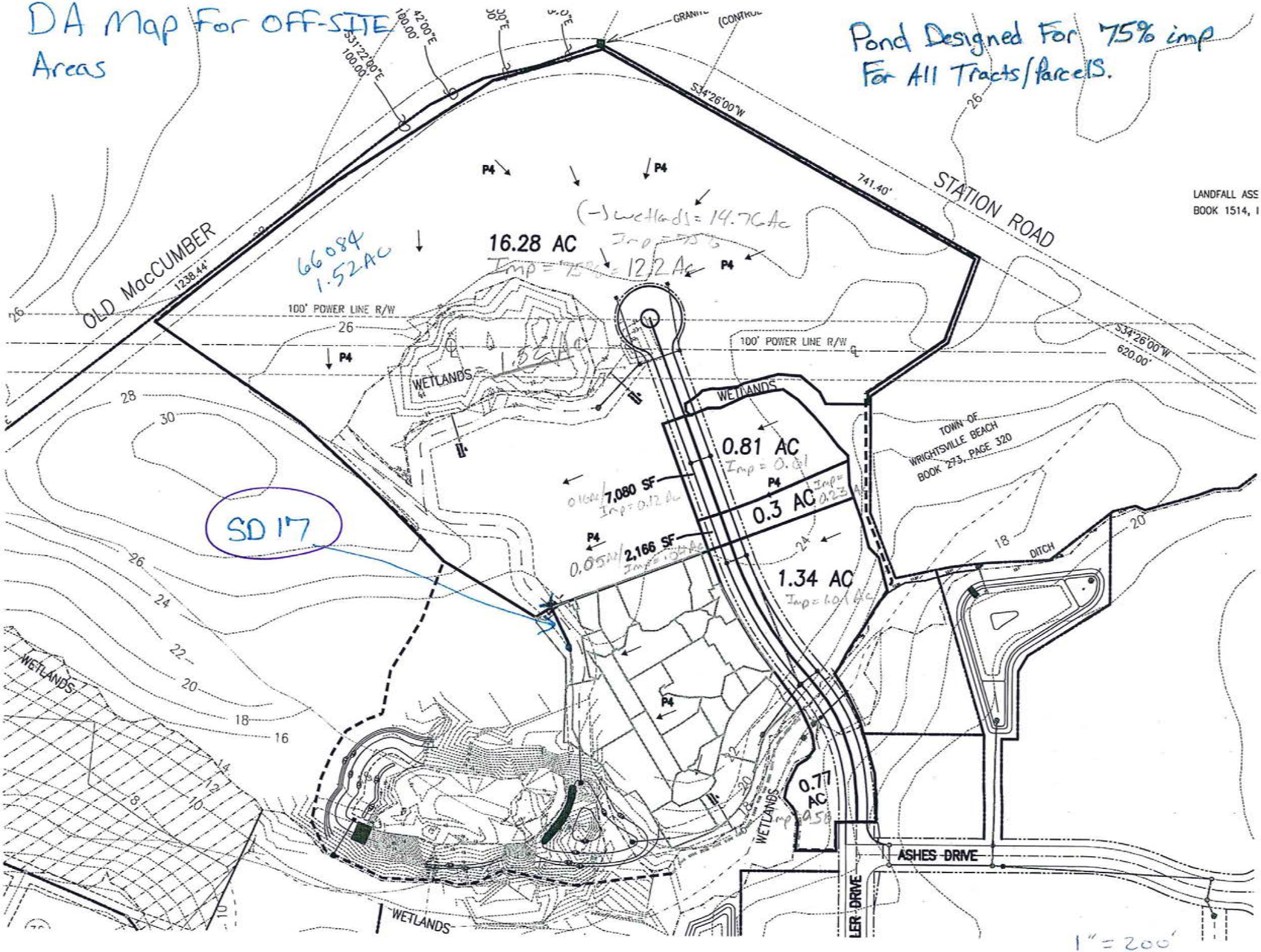
NOTES:Intensity = 98.50 / (Inlet time + 12.60) ^ 0.81; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Tabulation

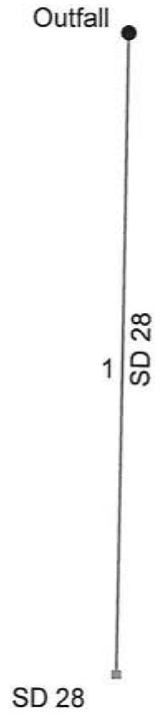
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	60	0.00	16.34	0.00	0.00	12.42	5.0	25.6	5.9	73.89	127.1	10.73	36	3.63	12.66	14.84	17.00	17.55	15.00	18.50	Exist SD #3
2	1	35	0.00	16.34	0.00	0.00	12.42	5.0	25.5	6.0	74.01	72.15	7.69	42	0.51	14.84	15.02	18.50	18.69	18.50	19.50	SD 15
3	2	113	0.00	15.76	0.00	0.00	11.97	5.0	25.3	6.0	71.68	72.08	7.45	42	0.51	15.02	15.60	18.75	19.32	19.50	20.60	SD 16
4	3	26	0.17	1.00	0.72	0.12	0.75	5.0	10.1	8.9	6.70	27.34	2.13	24	1.46	15.60	15.98	20.11	20.14	20.60	20.50	SD 19
5	4	42	0.05	0.83	0.89	0.04	0.63	5.0	9.8	9.1	5.67	18.13	1.81	24	0.64	15.93	16.20	20.16	20.18	20.50	21.00	SD 20
6	5	62	0.00	0.73	0.00	0.00	0.56	5.0	9.5	9.2	5.09	8.43	2.88	18	0.65	16.20	16.60	20.18	20.33	21.00	21.20	SD 21
7	6	115	0.08	0.17	0.88	0.07	0.12	5.0	6.9	10.1	1.24	7.59	0.70	18	0.52	16.60	17.20	20.45	20.46	21.20	21.30	SD 22
8	7	15	0.04	0.04	0.53	0.02	0.02	5.0	5.0	11.0	0.23	9.13	0.19	15	2.00	17.20	17.50	20.47	20.47	21.30	20.50	SD 23
9	2	6	0.58	0.58	0.78	0.45	0.45	15.0	15.0	7.7	3.47	30.91	1.96	18	8.67	15.08	15.60	19.55	19.56	19.50	18.50	SD 18
10	3	115	14.76	14.76	0.76	11.22	11.22	25.0	25.0	6.0	67.57	59.34	7.02	42	0.35	15.60	16.00	19.42	19.94	20.60	19.00	SD 17
11	5	13	0.05	0.05	0.53	0.03	0.03	5.0	5.0	11.0	0.29	16.02	0.24	15	6.15	16.20	17.00	20.23	20.23	21.00	20.50	SD 24
12	6	13	0.16	0.56	0.76	0.12	0.43	5.0	5.1	10.9	4.74	8.01	3.86	15	1.54	16.60	16.80	20.33	20.40	21.20	20.50	SD 25
13	12	22	0.40	0.40	0.78	0.31	0.31	5.0	5.0	11.0	3.43	6.16	2.80	15	0.91	16.80	17.00	20.51	20.57	20.50	21.00	SD 26
14	7	70	0.05	0.05	0.61	0.03	0.03	5.0	5.0	11.0	0.34	2.19	0.61	10	1.00	17.20	17.90	20.47	20.48	21.30	21.50	RD 10inch

Westfall Seg 2 | Number of lines: 14 | Run Date: 12/4/15

NOTES:Intensity = 85.95 / (Inlet time + 11.00) ^ 0.74; Return period =Yrs. 25 ; c = cir e = ellip b = box


DA Map For OFF-SITE
Areas
Pond Designed For 75% imp
For All Tracts/Parcels.
S31°22'00"E
100.00'
S42°00'E
100.00'
S34°26'00"W
741.40'
STATION ROAD
OLD MacCUMBER
1238.44'
(-) wetland = 14.76 Ac
16.28 AC
Imp = 75%
12.2 Ac
66084
1.52 AC
100' POWER LINE R/W
WETLANDS
1.52 AC
0.81 AC
Imp = 0.81
7,080 SF
Imp = 0.12 Ac
0.3 AC
Imp = 0.23 Ac
2,166 SF
Imp = 0.05 Ac
1.34 AC
Imp = 1.01 Ac
0.77 AC
Imp = 0.58
TOWN OF
WRIGHTSVILLE BEACH
BOOK 273, PAGE 320
DITCH
ASHES DRIVE
LER DRIVE
SD 17
P4
S34°26'00"W
620.00'
LANDFALL ASS
BOOK 1514, I
1" = 200'

Westfall Seg 3



Project File: Flats 1 Seg 3 12-15.stm	Number of lines: 1	Date: 12/4/15

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	68	0.09	0.09	0.95	0.09	0.09	5.0	5.0	9.7	0.83	6.07	2.85	15	0.88	17.90	18.50	18.26	18.86	19.00	22.00	SD 28

Westfall Seg 3

Number of lines: 1

Run Date: 12/4/15

NOTES:Intensity = 98.50 / (Inlet time + 12.60) ^ 0.81; 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)	
1	End	68	0.09	0.09	0.95	0.09	0.09	5.0	5.0	11.0	0.94	6.07	3.09	15	0.88	17.90	18.50	18.26	18.88	19.00	22.00	SD 28

Westfall Seg 3 | Number of lines: 1 | Run Date: 12/4/15

NOTES:Intensity = 85.95 / (Inlet time + 11.00) ^ 0.74; Return period =Yrs. 25 ; c = cir e = ellip b = box

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Dec 4 2015

SD 27 and 27A 25-Year

Invert Elev Dn (ft)	= 19.50
Pipe Length (ft)	= 24.00
Slope (%)	= 0.42
Invert Elev Up (ft)	= 19.60
Rise (in)	= 12.0
Shape	= Circular
Span (in)	= 12.0
No. Barrels	= 1
n-Value	= 0.012
Culvert Type	= Circular Concrete
Culvert Entrance	= Square edge w/headwall (C)
Coeff. K,M,c,Y,k	= 0.0098, 2, 0.0398, 0.67, 0.5

Embankment

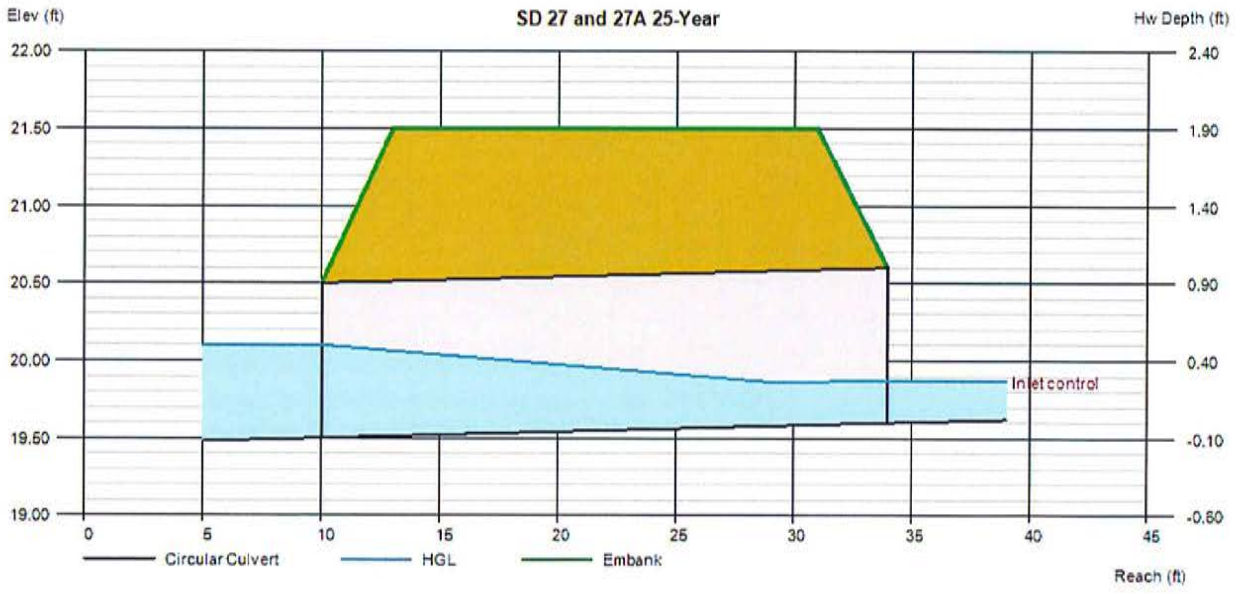
Top Elevation (ft)	= 21.50
Top Width (ft)	= 18.00
Crest Width (ft)	= 80.00

Calculations

Qmin (cfs)	= 0.24
Qmax (cfs)	= 0.72
Tailwater Elev (ft)	= (dc+D)/2

Highlighted

Qtotal (cfs)	= 0.24
Qpipe (cfs)	= 0.24
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 0.49
Veloc Up (ft/s)	= 2.13
HGL Dn (ft)	= 20.10
HGL Up (ft)	= 19.80
Hw Elev (ft)	= 19.87
Hw/D (ft)	= 0.27
Flow Regime	= Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Dec 4 2015

SD 27 and 27A 10-Year

Invert Elev Dn (ft)	= 19.50
Pipe Length (ft)	= 24.00
Slope (%)	= 0.42
Invert Elev Up (ft)	= 19.60
Rise (in)	= 12.0
Shape	= Circular
Span (in)	= 12.0
No. Barrels	= 1
n-Value	= 0.012
Culvert Type	= Circular Concrete
Culvert Entrance	= Square edge w/headwall (C)
Coeff. K,M,c,Y,k	= 0.0098, 2, 0.0398, 0.67, 0.5

Embankment

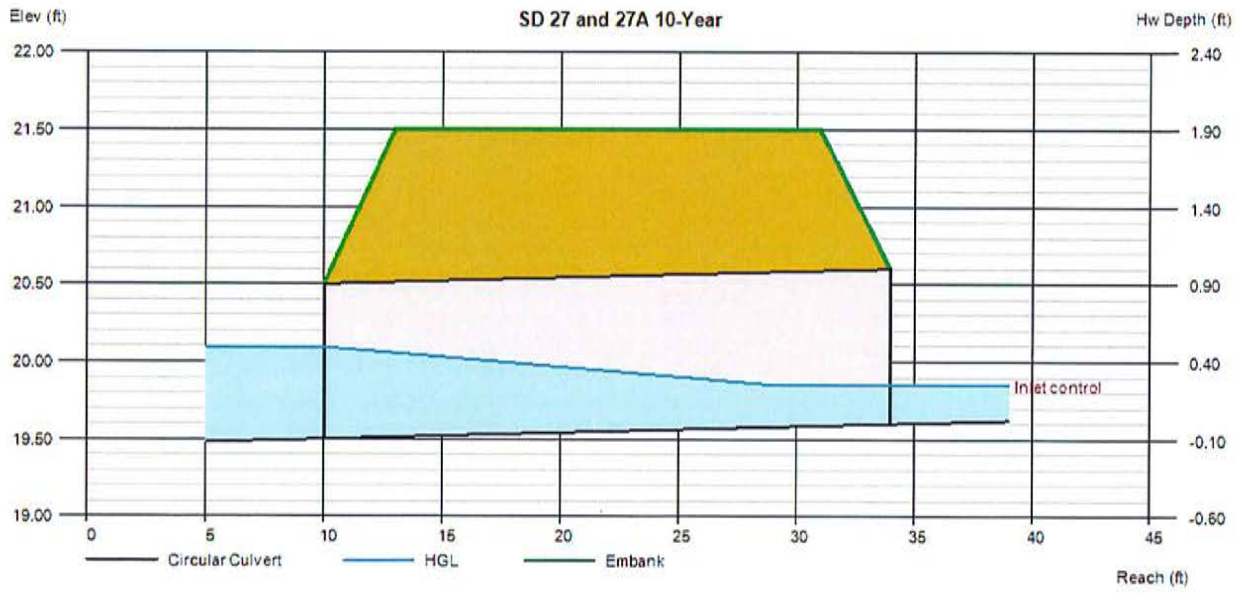
Top Elevation (ft)	= 21.50
Top Width (ft)	= 18.00
Crest Width (ft)	= 80.00

Calculations

Qmin (cfs)	= 0.21
Qmax (cfs)	= 0.64
Tailwater Elev (ft)	= (dc+D)/2

Highlighted

Qtotal (cfs)	= 0.21
Qpipe (cfs)	= 0.21
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 0.43
Veloc Up (ft/s)	= 2.05
HGL Dn (ft)	= 20.09
HGL Up (ft)	= 19.79
Hw Elev (ft)	= 19.85
Hw/D (ft)	= 0.25
Flow Regime	= Inlet Control



Swale Calculations
10-year and 25-year

Westfall Swale Calculations

Swale ID	DA		Imp.		RATIONAL		I10	I25	Q10	Q25
	(SF)	(AC)	(SF)	(AC)	"C"	Tc	(in/hr)	(in/hr)	(CFS)	(CFS)
3	2126	0.049	907	0.021	0.58	5	9.7	11	0.27	0.31
4	7625	0.175	6134	0.141	0.82	5	9.7	11	1.40	1.58
5	10167	0.233	8315	0.191	0.83	5	9.7	11	1.88	2.14
6	2368	0.054	1071	0.025	0.59	5	9.7	11	0.31	0.36
7	4520	0.104	3700	0.085	0.83	5	9.7	11	0.84	0.95
8	2488	0.057	1796	0.041	0.77	5	9.7	11	0.43	0.48
9	2488	0.057	1796	0.041	0.77	5	9.7	11	0.43	0.48
9A	1244	0.029	898	0.021	0.77	5	9.7	11	0.21	0.24
9B	1244	0.029	898	0.021	0.77	5	9.7	11	0.21	0.24

SD Energy Dissipater Calculations

SIZED For 15" SD

$Q_{10} = 0.83$ cfs $\vec{V} = 2.85$ fps (SD #28) (Zone 1 CLASS A)

$Q_{10} = 0.92$ cfs $\vec{V} = 2.27$ fps (SD #15)

PREVENT SCOUR

$4(1.25') = 5'$

$W = 3(1.25') = 3.75$

* USE AT ALL 12" & 15" FES's $5'_W \times 5'_L \times 12"$ CLASS B *

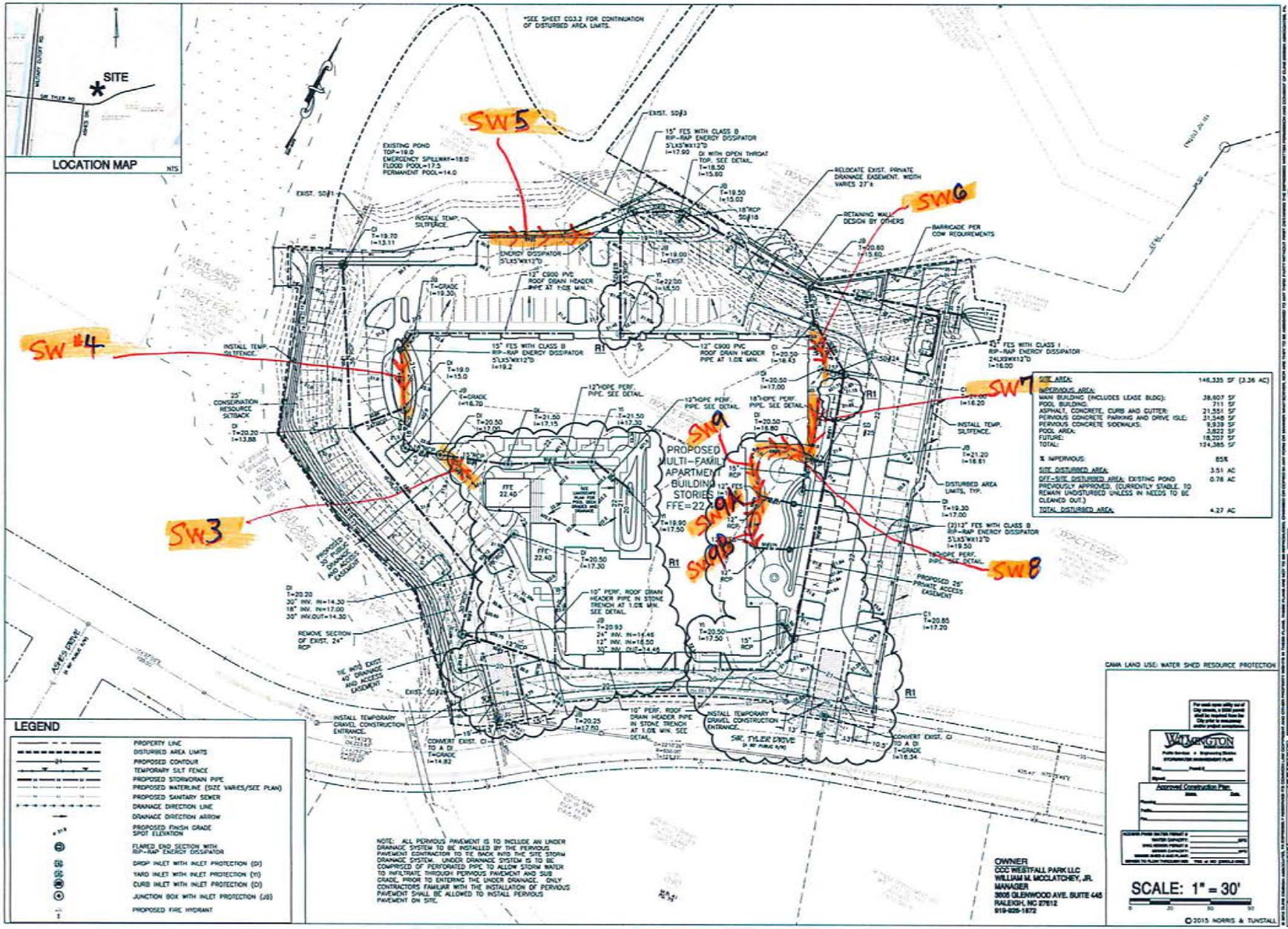
$Q_{10} = 75.53$ cfs $\vec{V} = 7.85$ fps (FES INTO SD #17) (ZONE 2 CLASS B)

Prevent Scour

$8(3') = 24"$

$W = 3(3') = 9'$

* USE @ 36" FES $9 \times 24 \times 12"$ CLASS 1 *



CLINE DESIGN

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ClineDesign1@msn.com
Anne Cline Tingler

NORRIS & TUNSTALL CONSULTING ENGINEERS, P.C.
302 MARKET STREET
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FAX (910) 343-9604
LICENCE #C-3641

Mayfaire Flats I
1817 Sir Tyler Drive
Wilmington, North Carolina

PERMIT PLANS

PRELIMINARY NOT FOR CONSTRUCTION

PROJECT: 215007
DATE: 04.8.2015

REVISIONS:	DATE
PER COW COMMENTS 6.16.15	
PERMIT SET 8/10/15	
TRC SIGNATURES 8/14/15	
R1: 11/10/15-REVISED GRADING, SIDEWALK, ADDED ROOF DRAIN.	

DRAWN BY:
CHECKED BY:

CG3.0
NT #10240
GRADING, STORM DRAINAGE, AND EROSION CONTROL PLAN

SW9 was split into
SW9 - SW9A - SW9B (All minor Swales)

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jul 9 2015

Swale 3 10-yr

Triangular

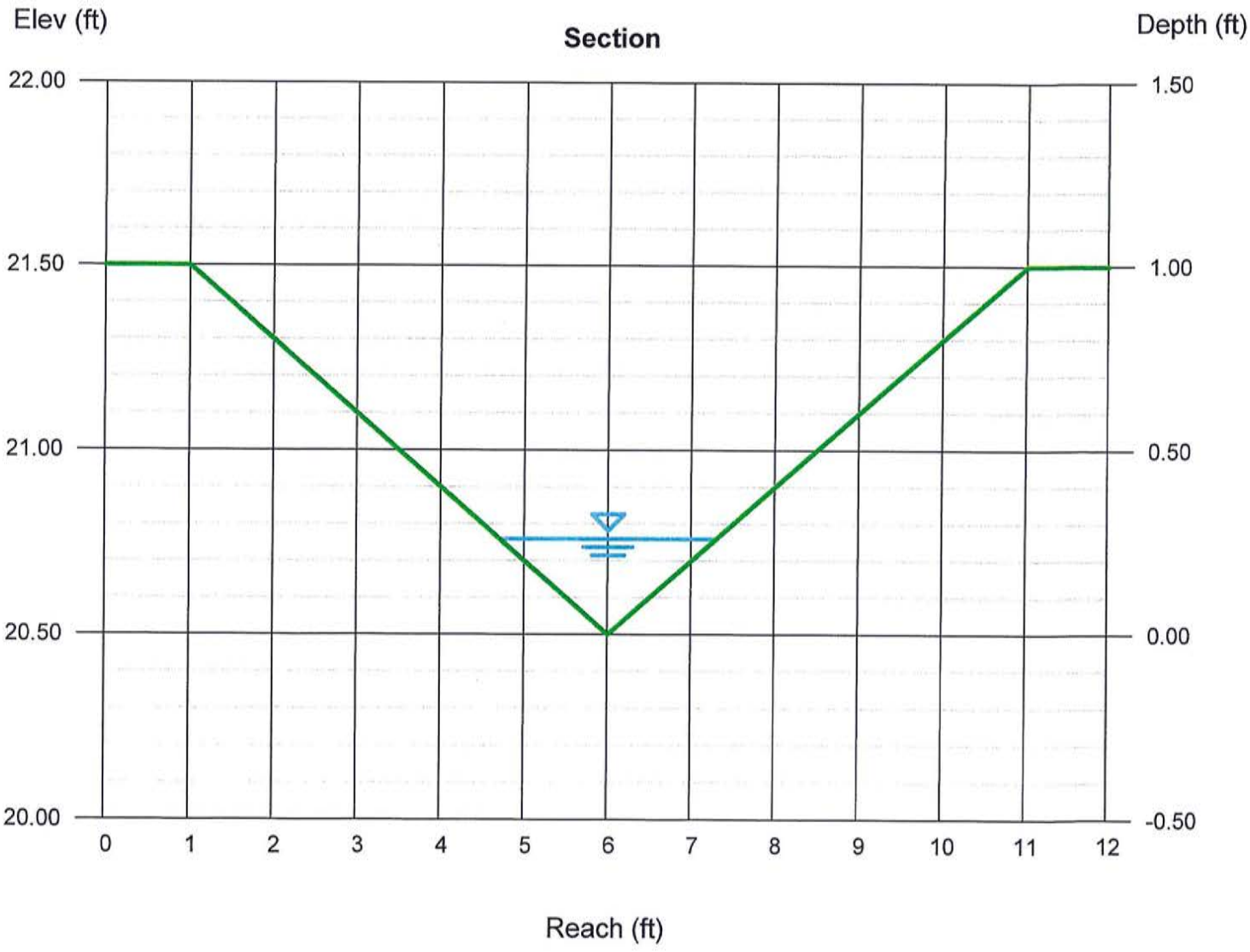
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 20.50
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.27

Highlighted

Depth (ft)	= 0.26
Q (cfs)	= 0.270
Area (sqft)	= 0.34
Velocity (ft/s)	= 0.80
Wetted Perim (ft)	= 2.65
Crit Depth, Yc (ft)	= 0.18
Top Width (ft)	= 2.60
EGL (ft)	= 0.27



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jul 9 2015

Swale 3 25-yr

Triangular

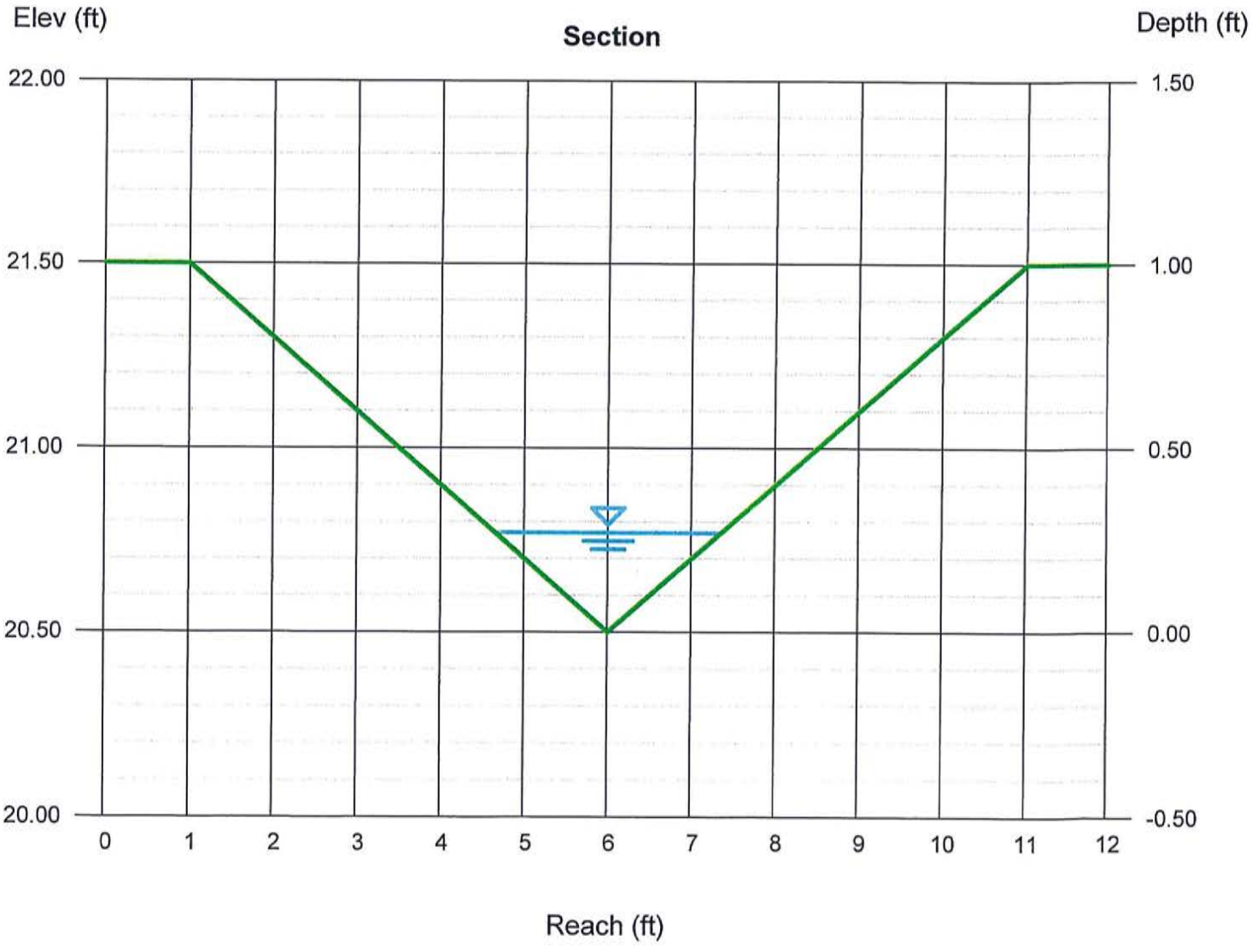
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 20.50
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.31

Highlighted

Depth (ft)	= 0.27
Q (cfs)	= 0.310
Area (sqft)	= 0.36
Velocity (ft/s)	= 0.85
Wetted Perim (ft)	= 2.75
Crit Depth, Yc (ft)	= 0.19
Top Width (ft)	= 2.70
EGL (ft)	= 0.28



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jul 9 2015

Swale 4 10-yr

Triangular

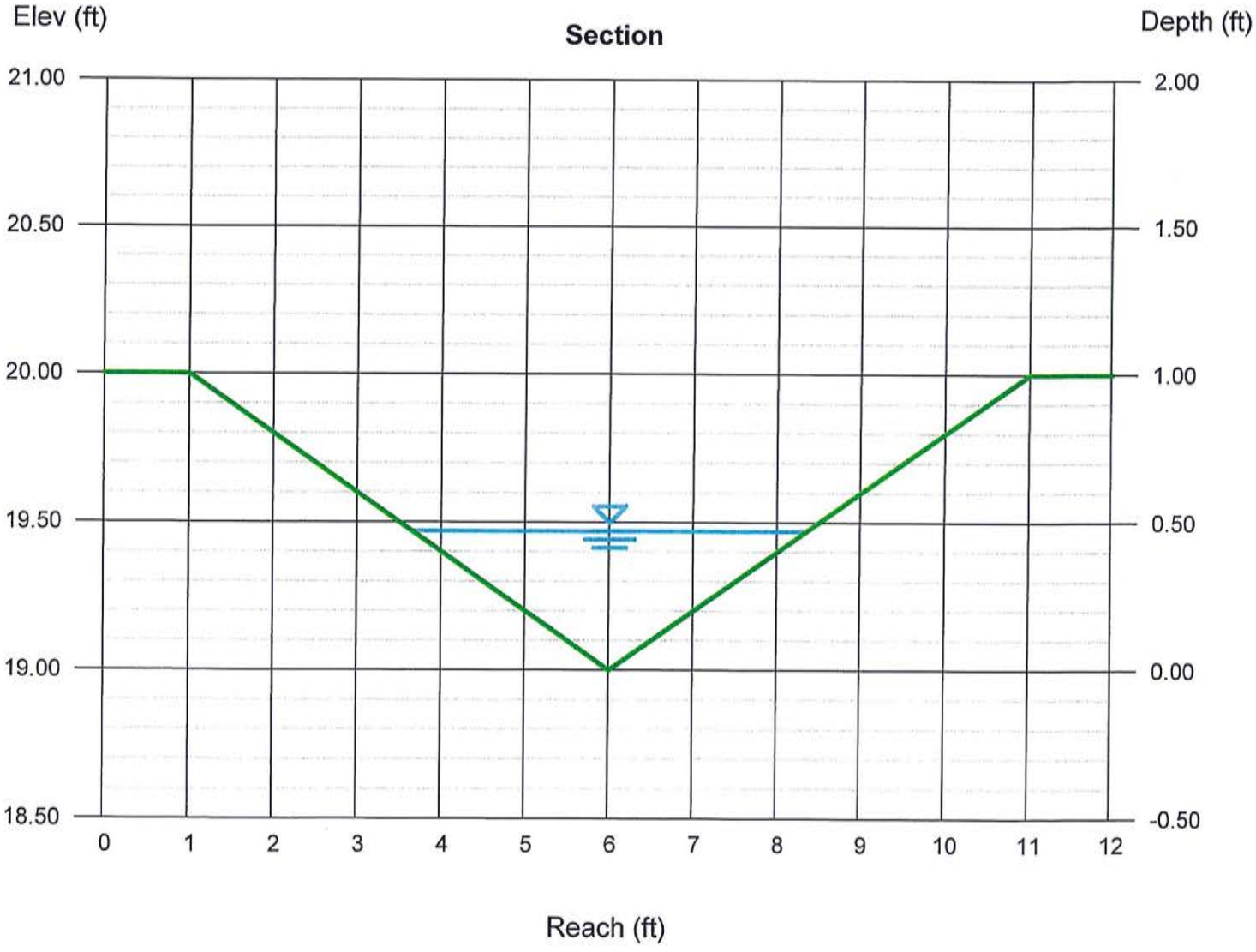
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 19.00
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.40

Highlighted

Depth (ft)	= 0.47
Q (cfs)	= 1.400
Area (sqft)	= 1.10
Velocity (ft/s)	= 1.27
Wetted Perim (ft)	= 4.79
Crit Depth, Yc (ft)	= 0.35
Top Width (ft)	= 4.70
EGL (ft)	= 0.49



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jul 9 2015

Swale 4 25-yr

Triangular

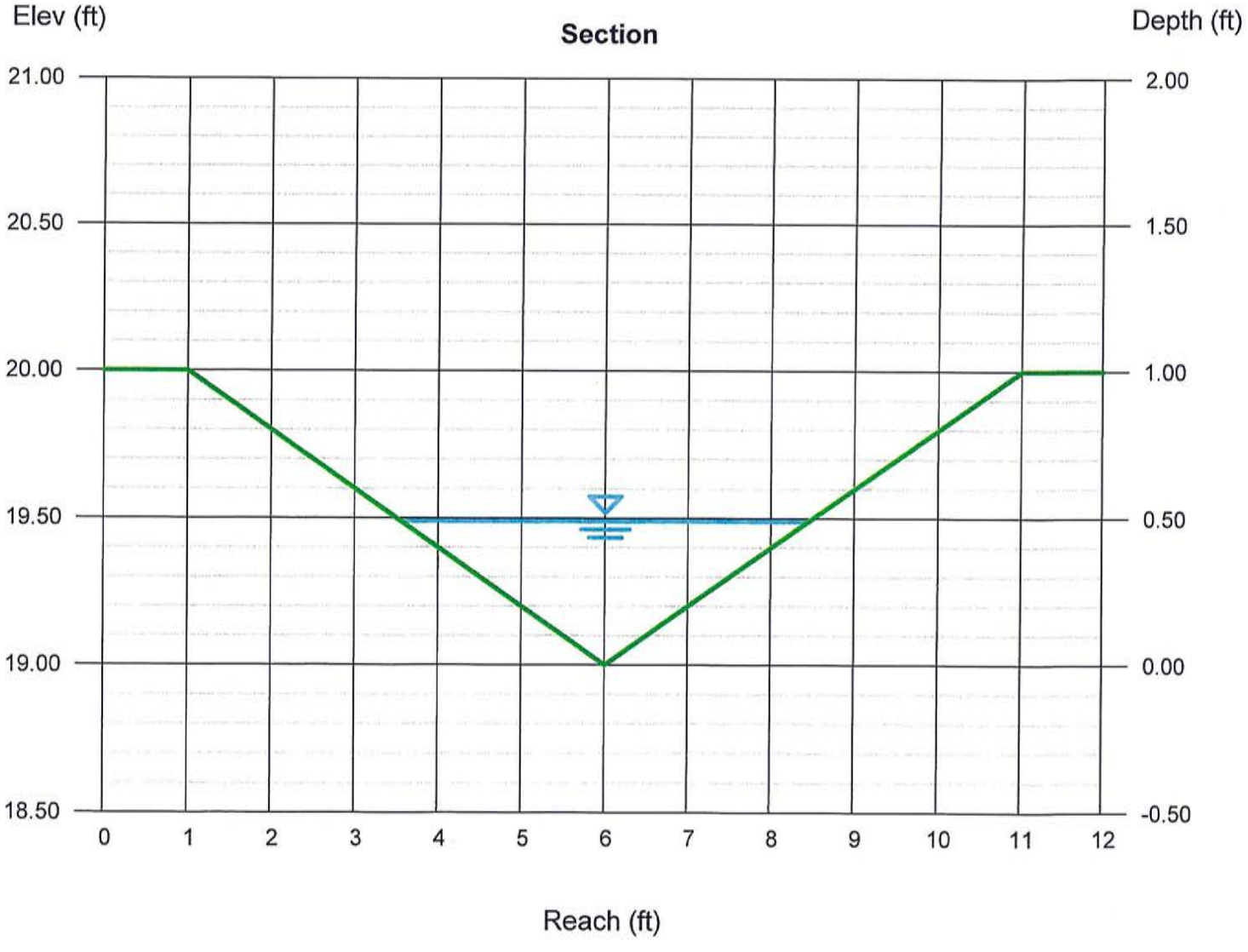
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 19.00
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.58

Highlighted

Depth (ft)	= 0.49
Q (cfs)	= 1.580
Area (sqft)	= 1.20
Velocity (ft/s)	= 1.32
Wetted Perim (ft)	= 5.00
Crit Depth, Yc (ft)	= 0.37
Top Width (ft)	= 4.90
EGL (ft)	= 0.52



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jul 9 2015

Swale 5 10-yr

Triangular

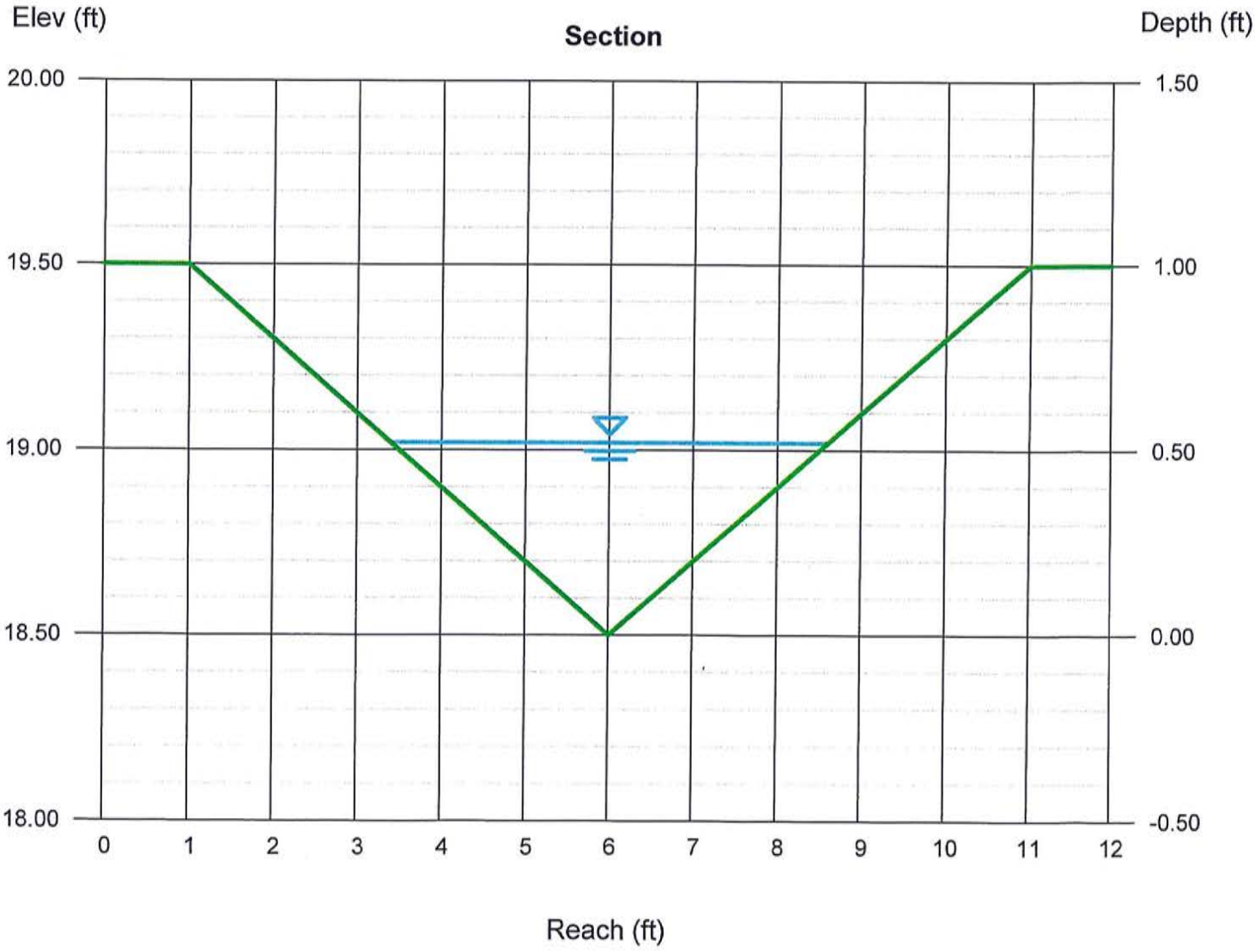
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 18.50
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.88

Highlighted

Depth (ft)	= 0.52
Q (cfs)	= 1.880
Area (sqft)	= 1.35
Velocity (ft/s)	= 1.39
Wetted Perim (ft)	= 5.30
Crit Depth, Yc (ft)	= 0.39
Top Width (ft)	= 5.20
EGL (ft)	= 0.55



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jul 9 2015

Swale 5 25-yr

Triangular

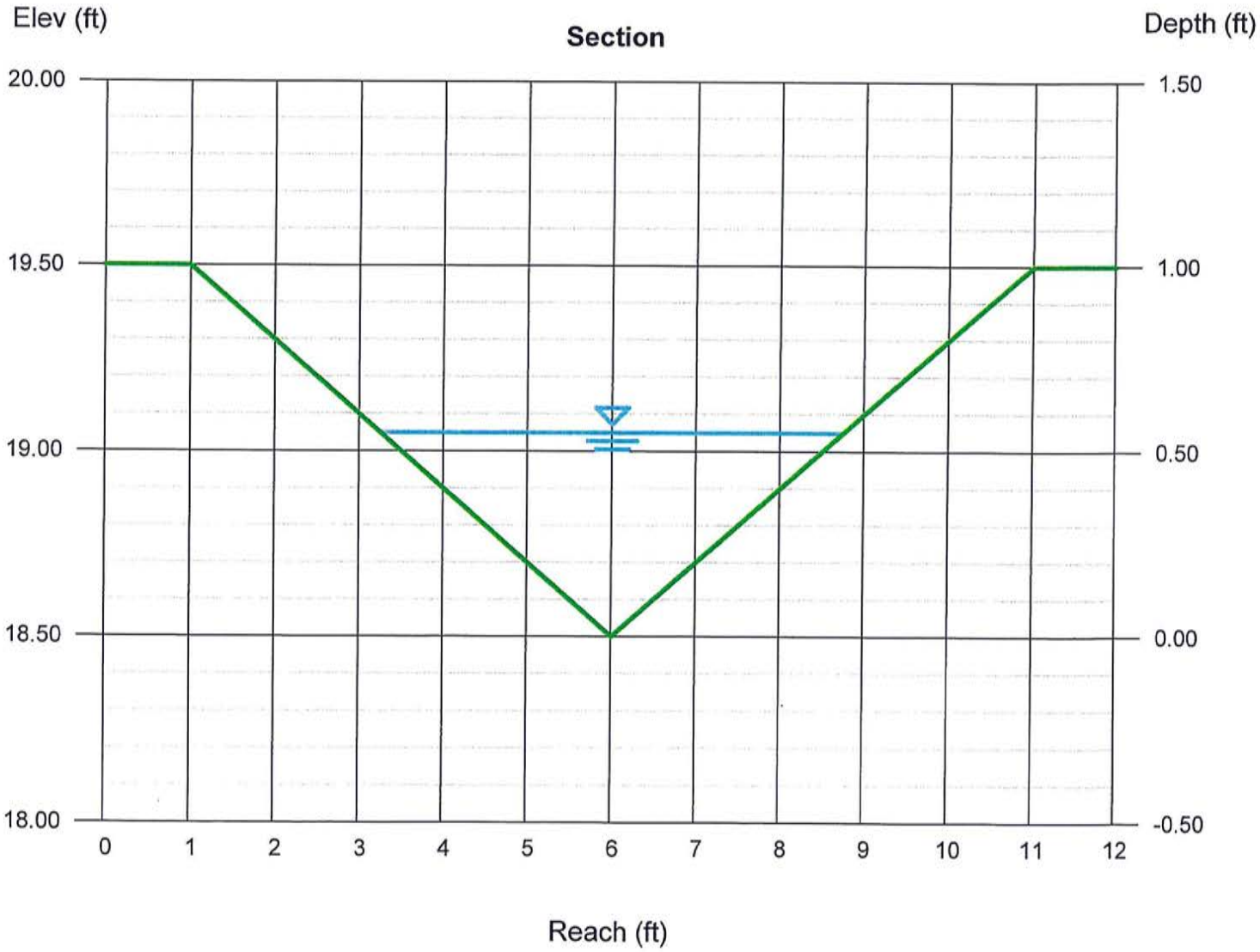
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 18.50
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.14

Highlighted

Depth (ft)	= 0.55
Q (cfs)	= 2.140
Area (sqft)	= 1.51
Velocity (ft/s)	= 1.41
Wetted Perim (ft)	= 5.61
Crit Depth, Yc (ft)	= 0.41
Top Width (ft)	= 5.50
EGL (ft)	= 0.58



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jul 9 2015

Swale 6 10-yr

Triangular

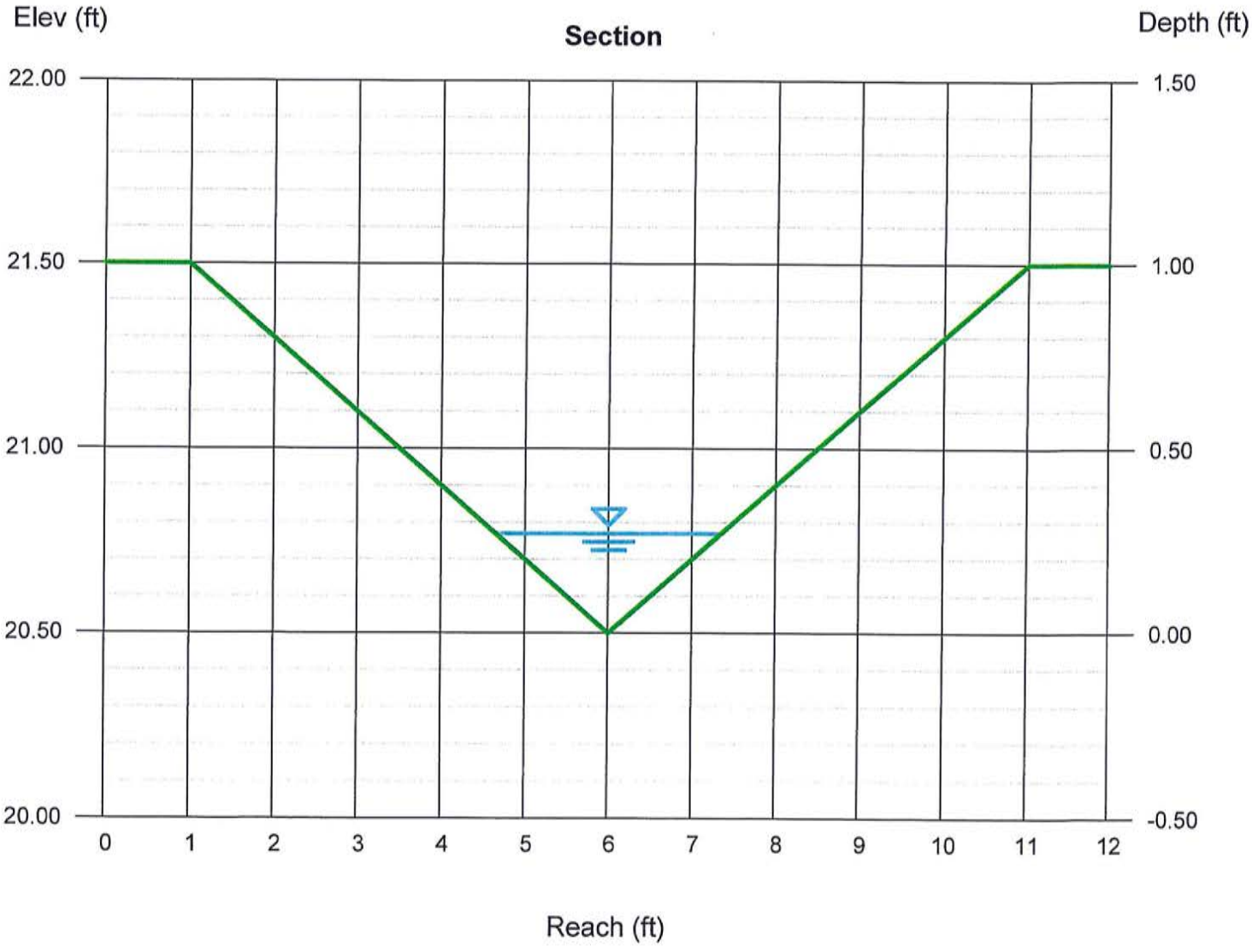
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 20.50
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.31

Highlighted

Depth (ft)	= 0.27
Q (cfs)	= 0.310
Area (sqft)	= 0.36
Velocity (ft/s)	= 0.85
Wetted Perim (ft)	= 2.75
Crit Depth, Yc (ft)	= 0.19
Top Width (ft)	= 2.70
EGL (ft)	= 0.28



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jul 9 2015

Swale 6 25-yr

Triangular

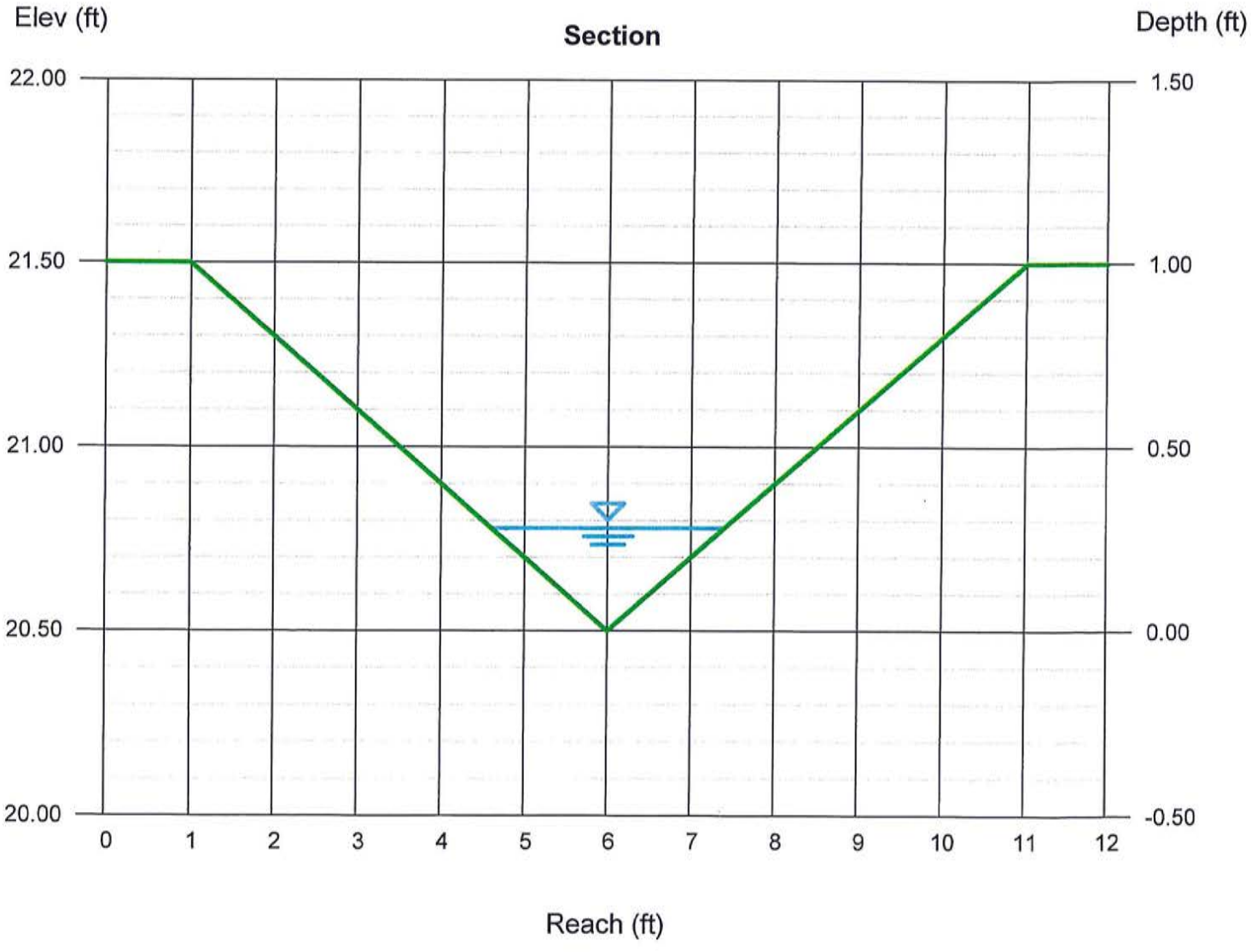
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 20.50
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.36

Highlighted

Depth (ft)	= 0.28
Q (cfs)	= 0.360
Area (sqft)	= 0.39
Velocity (ft/s)	= 0.92
Wetted Perim (ft)	= 2.86
Crit Depth, Yc (ft)	= 0.21
Top Width (ft)	= 2.80
EGL (ft)	= 0.29



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jul 9 2015

Swale 7 10-yr

Triangular

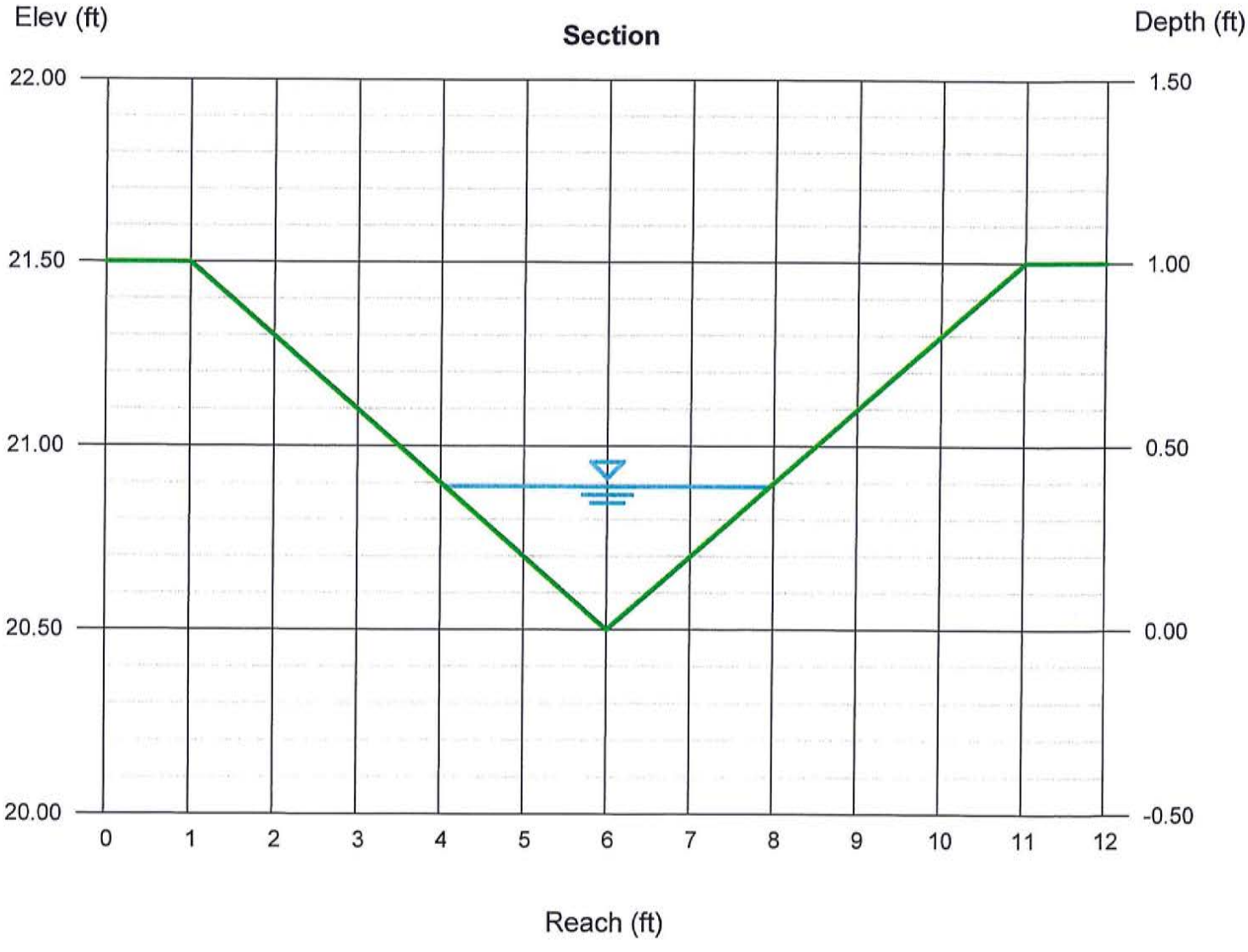
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 20.50
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.84

Highlighted

Depth (ft)	= 0.39
Q (cfs)	= 0.840
Area (sqft)	= 0.76
Velocity (ft/s)	= 1.10
Wetted Perim (ft)	= 3.98
Crit Depth, Yc (ft)	= 0.29
Top Width (ft)	= 3.90
EGL (ft)	= 0.41



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jul 9 2015

Swale 7 25-yr

Triangular

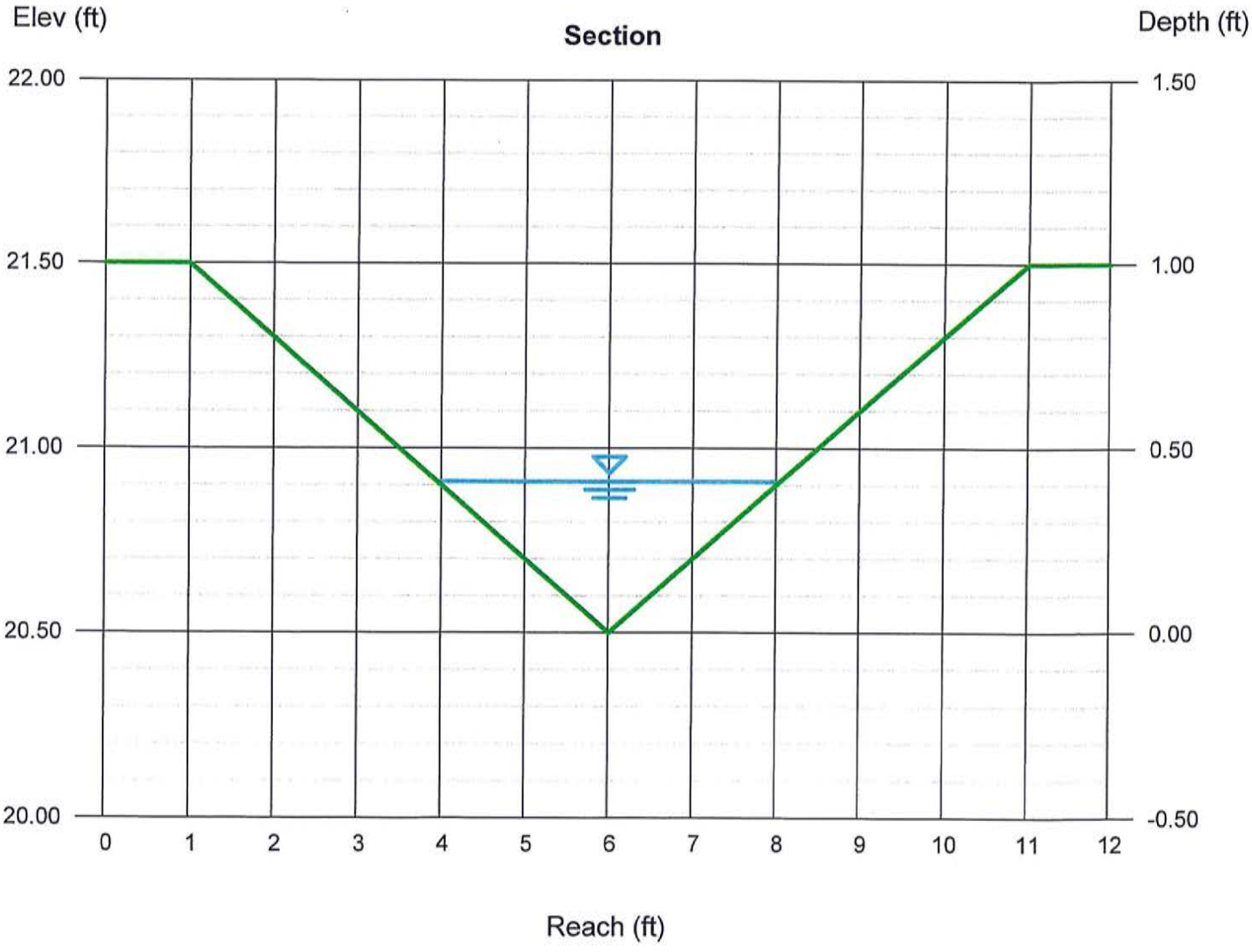
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 20.50
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.95

Highlighted

Depth (ft)	= 0.41
Q (cfs)	= 0.950
Area (sqft)	= 0.84
Velocity (ft/s)	= 1.13
Wetted Perim (ft)	= 4.18
Crit Depth, Yc (ft)	= 0.30
Top Width (ft)	= 4.10
EGL (ft)	= 0.43



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jul 9 2015

Swale 8 10-yr

Triangular

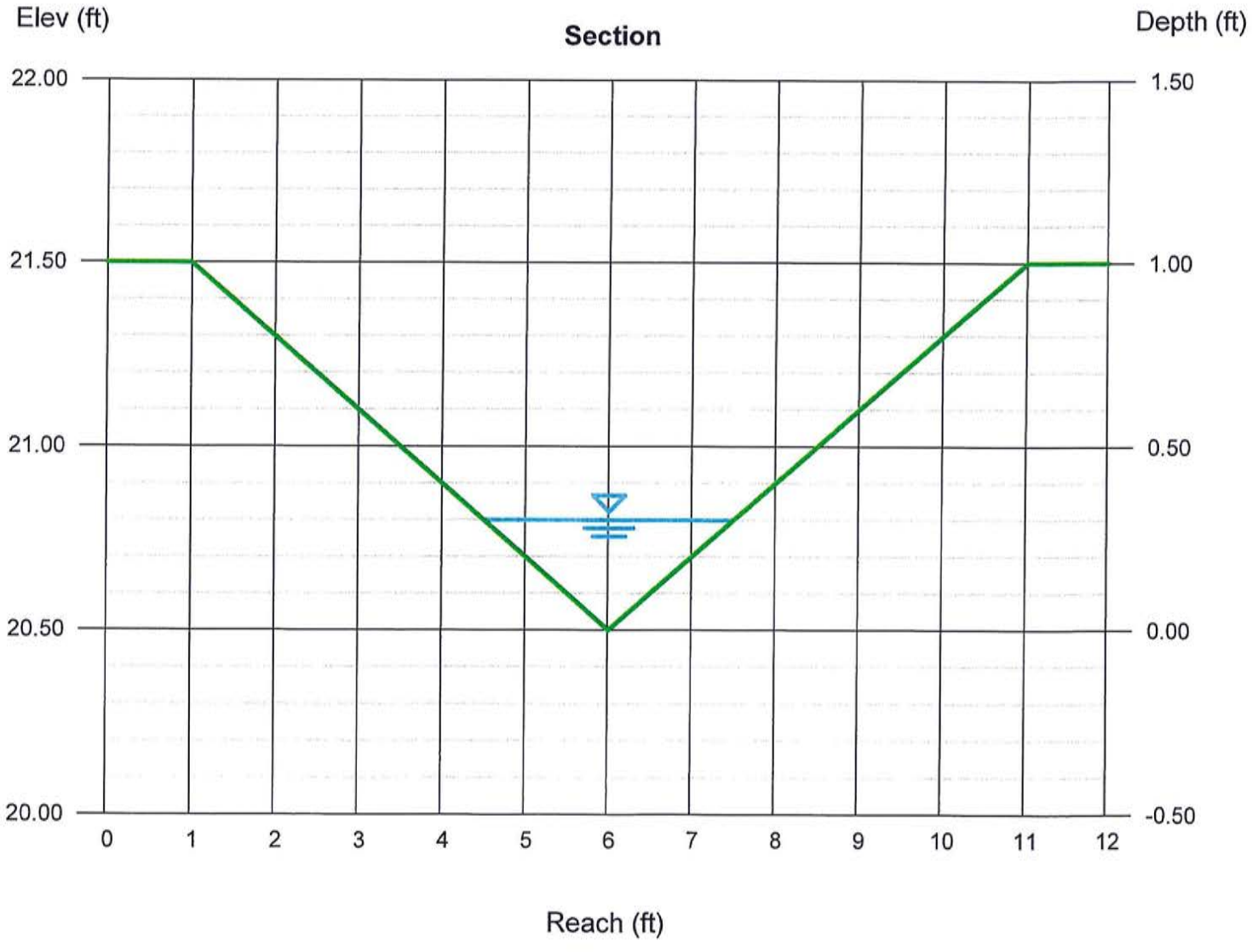
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 20.50
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.43

Highlighted

Depth (ft)	= 0.30
Q (cfs)	= 0.430
Area (sqft)	= 0.45
Velocity (ft/s)	= 0.96
Wetted Perim (ft)	= 3.06
Crit Depth, Yc (ft)	= 0.22
Top Width (ft)	= 3.00
EGL (ft)	= 0.31



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Thursday, Jul 9 2015

Swale 8 25-yr

Triangular

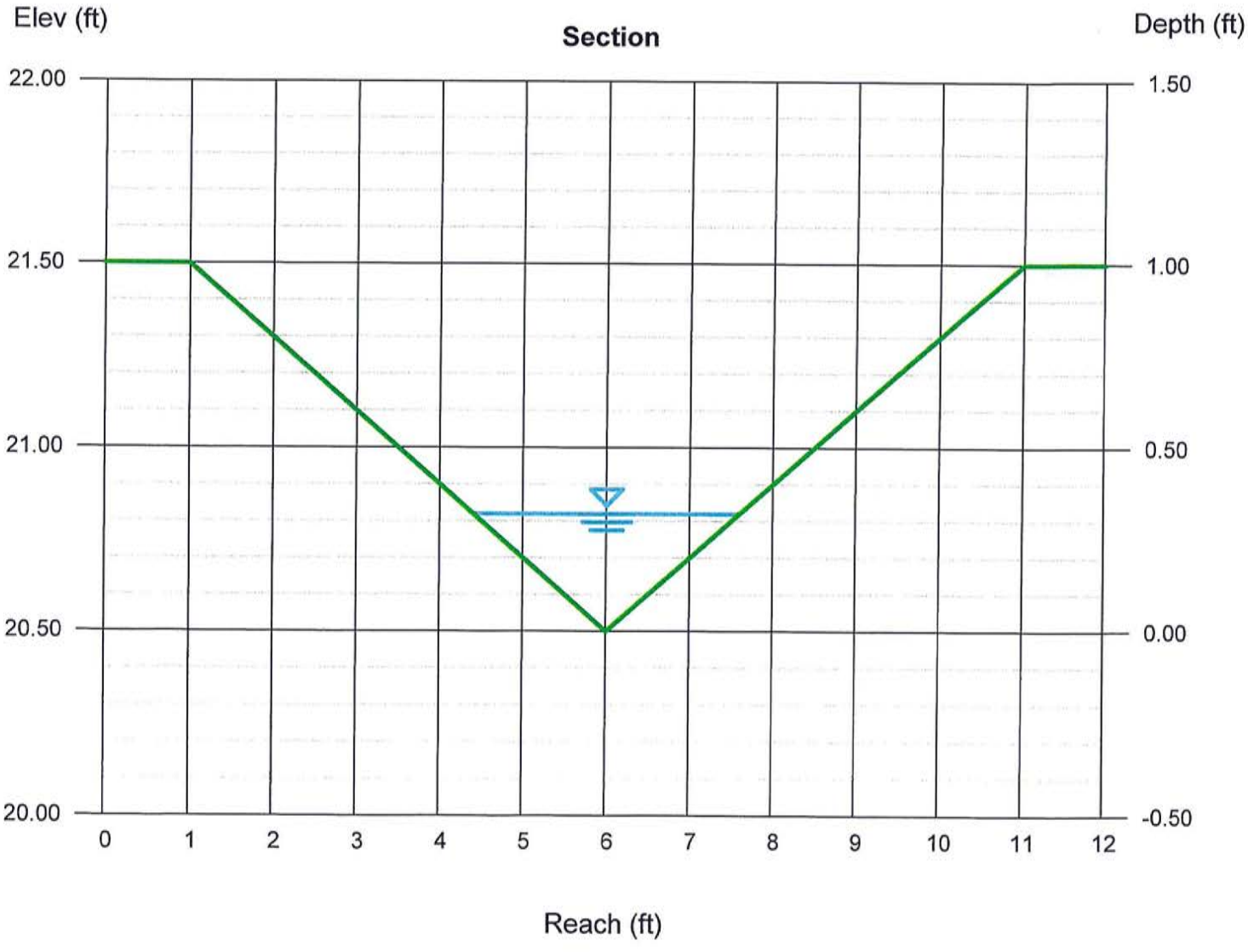
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 20.50
Slope (%)	= 0.50
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.48

Highlighted

Depth (ft)	= 0.32
Q (cfs)	= 0.480
Area (sqft)	= 0.51
Velocity (ft/s)	= 0.94
Wetted Perim (ft)	= 3.26
Crit Depth, Yc (ft)	= 0.23
Top Width (ft)	= 3.20
EGL (ft)	= 0.33



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Dec 4 2015

Swale 9 10-yr

Triangular

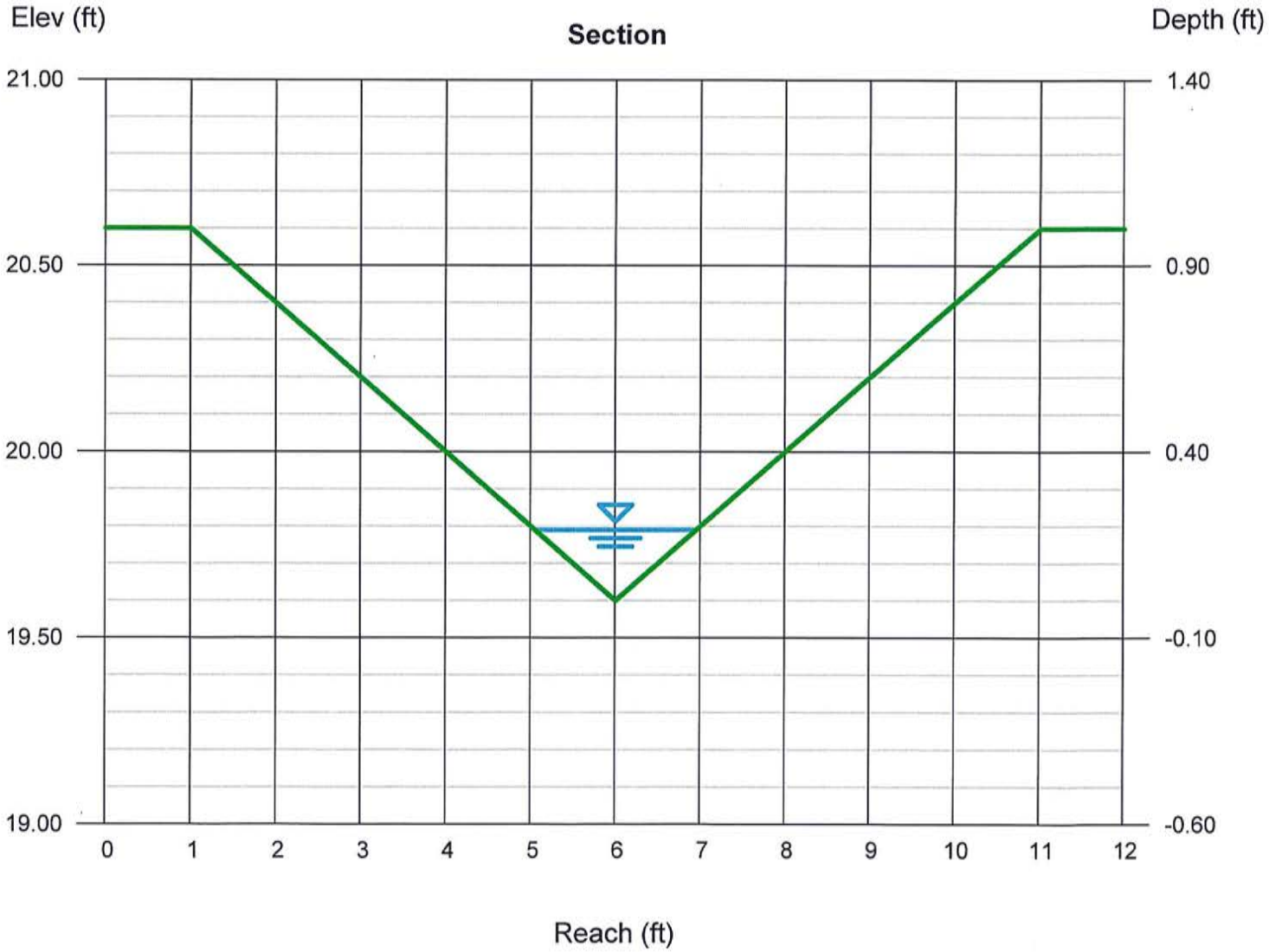
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 19.60
Slope (%)	= 6.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.43

Highlighted

Depth (ft)	= 0.19
Q (cfs)	= 0.430
Area (sqft)	= 0.18
Velocity (ft/s)	= 2.38 ✓ ok
Wetted Perim (ft)	= 1.94
Crit Depth, Yc (ft)	= 0.22
Top Width (ft)	= 1.90
EGL (ft)	= 0.28



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Dec 4 2015

Swale 9 25-yr

Triangular

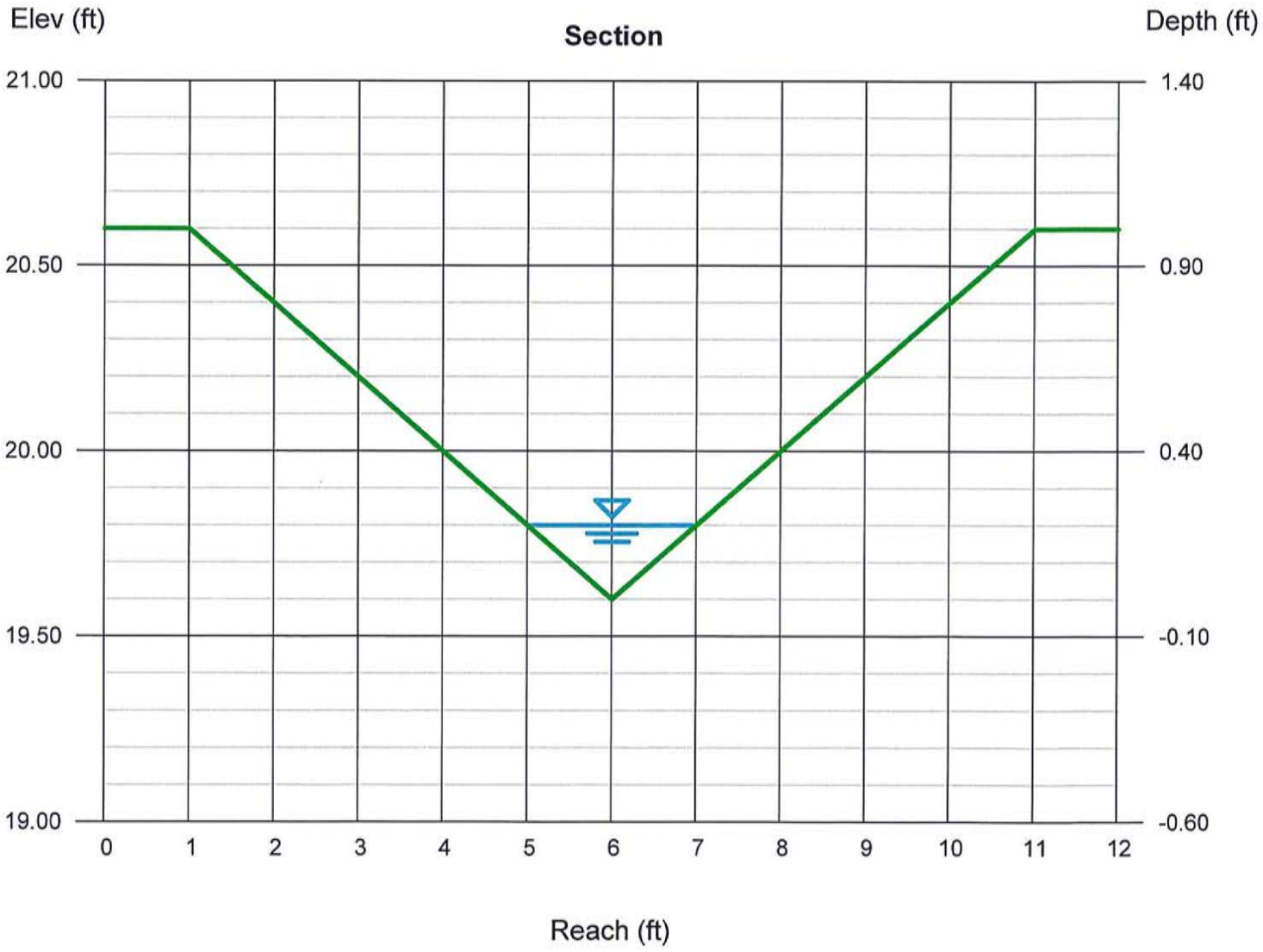
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 19.60
Slope (%)	= 6.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.48

Highlighted

Depth (ft)	= 0.20
Q (cfs)	= 0.480
Area (sqft)	= 0.20
Velocity (ft/s)	= 2.40 OK
Wetted Perim (ft)	= 2.04
Crit Depth, Yc (ft)	= 0.23
Top Width (ft)	= 2.00
EGL (ft)	= 0.29



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Dec 4 2015

Swale 9A 10-yr

Triangular

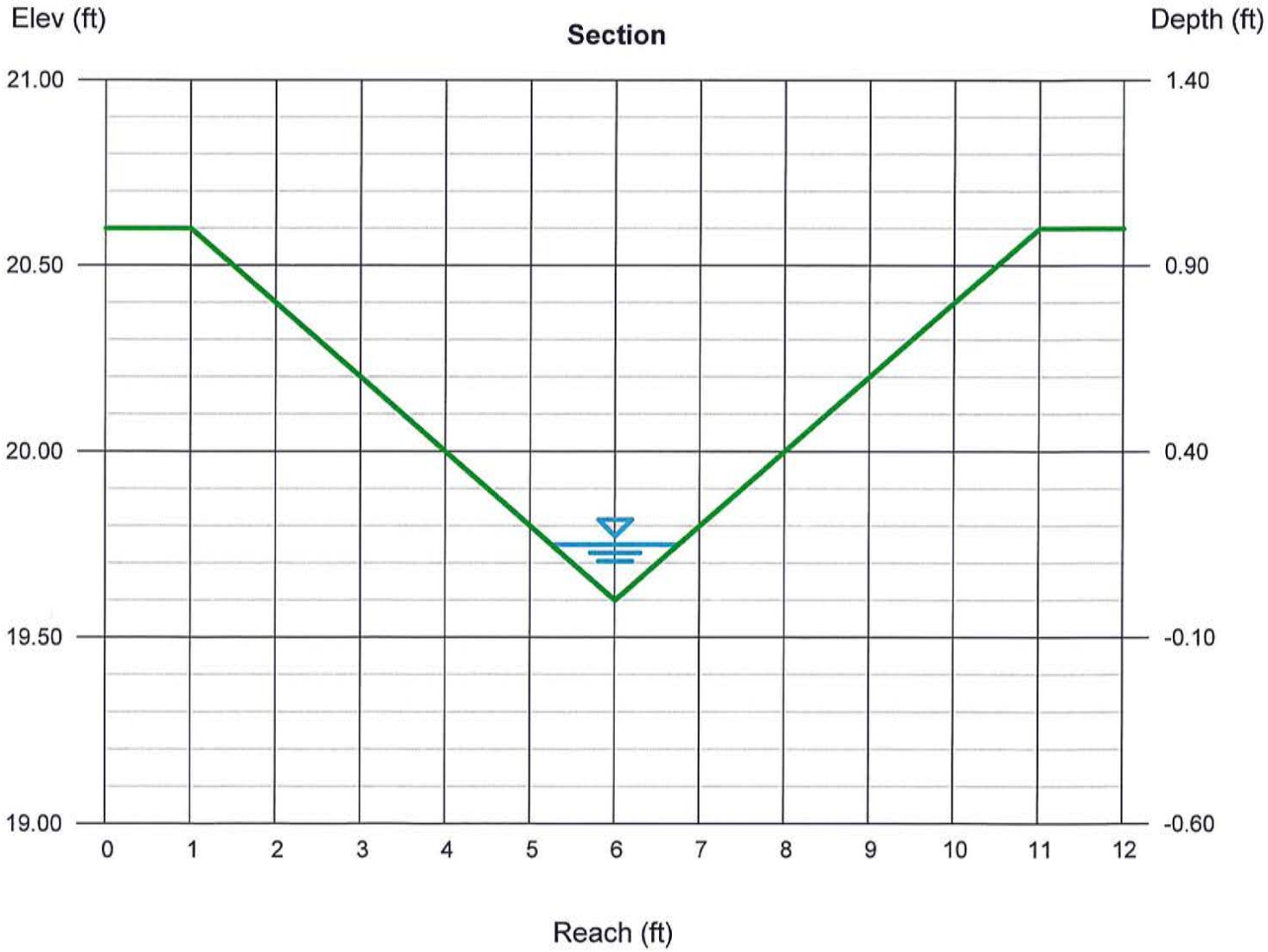
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 19.60
Slope (%)	= 5.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.21

Highlighted

Depth (ft)	= 0.15
Q (cfs)	= 0.210
Area (sqft)	= 0.11
Velocity (ft/s)	= 1.87
Wetted Perim (ft)	= 1.53
Crit Depth, Yc (ft)	= 0.17
Top Width (ft)	= 1.50
EGL (ft)	= 0.20



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Dec 4 2015

Swale 9A 25-yr

Triangular

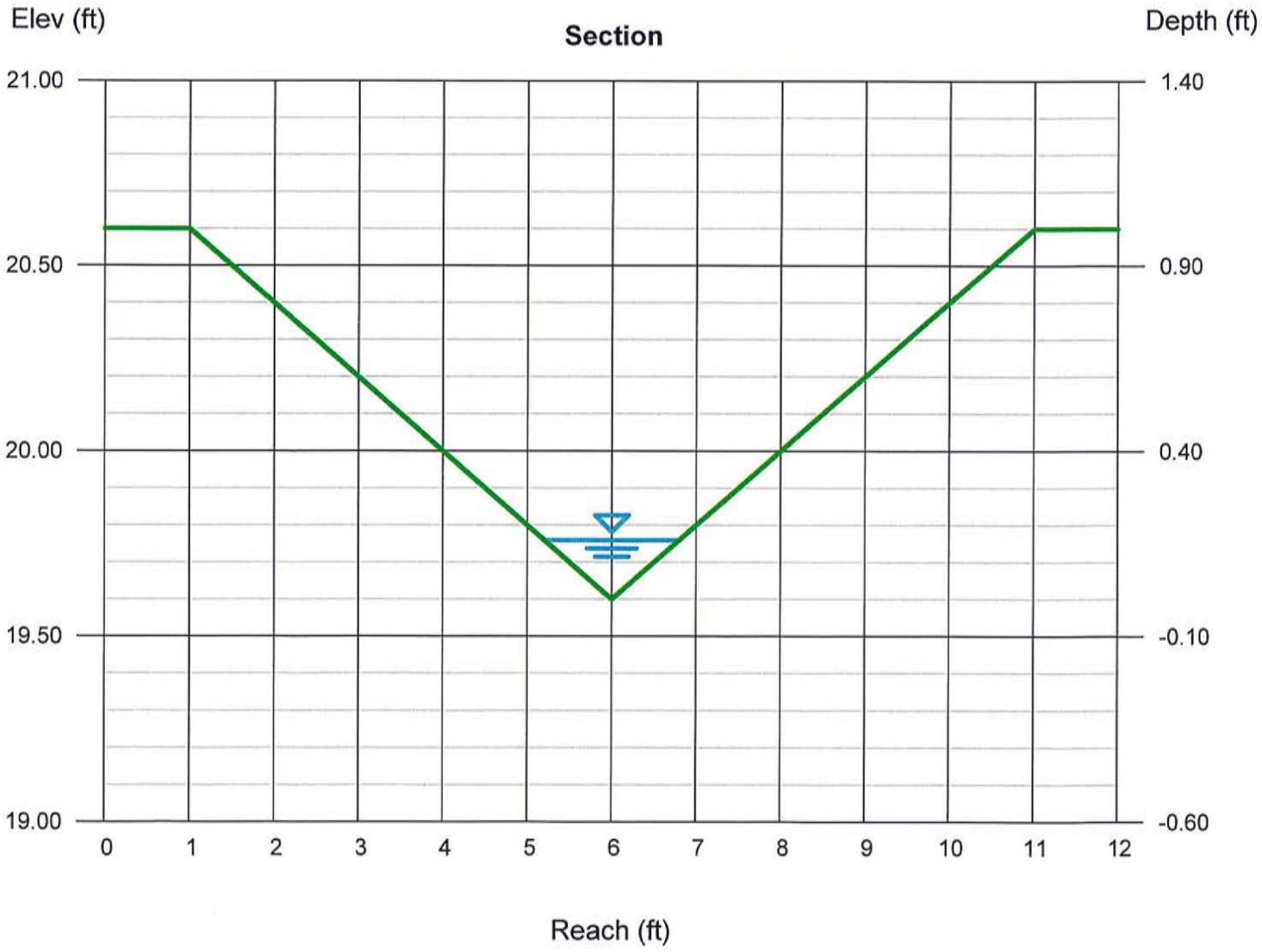
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 19.60
Slope (%)	= 5.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.24

Highlighted

Depth (ft)	= 0.16
Q (cfs)	= 0.240
Area (sqft)	= 0.13
Velocity (ft/s)	= 1.88
Wetted Perim (ft)	= 1.63
Crit Depth, Yc (ft)	= 0.18
Top Width (ft)	= 1.60
EGL (ft)	= 0.21



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Dec 4 2015

Swale 9B 10-yr

Triangular

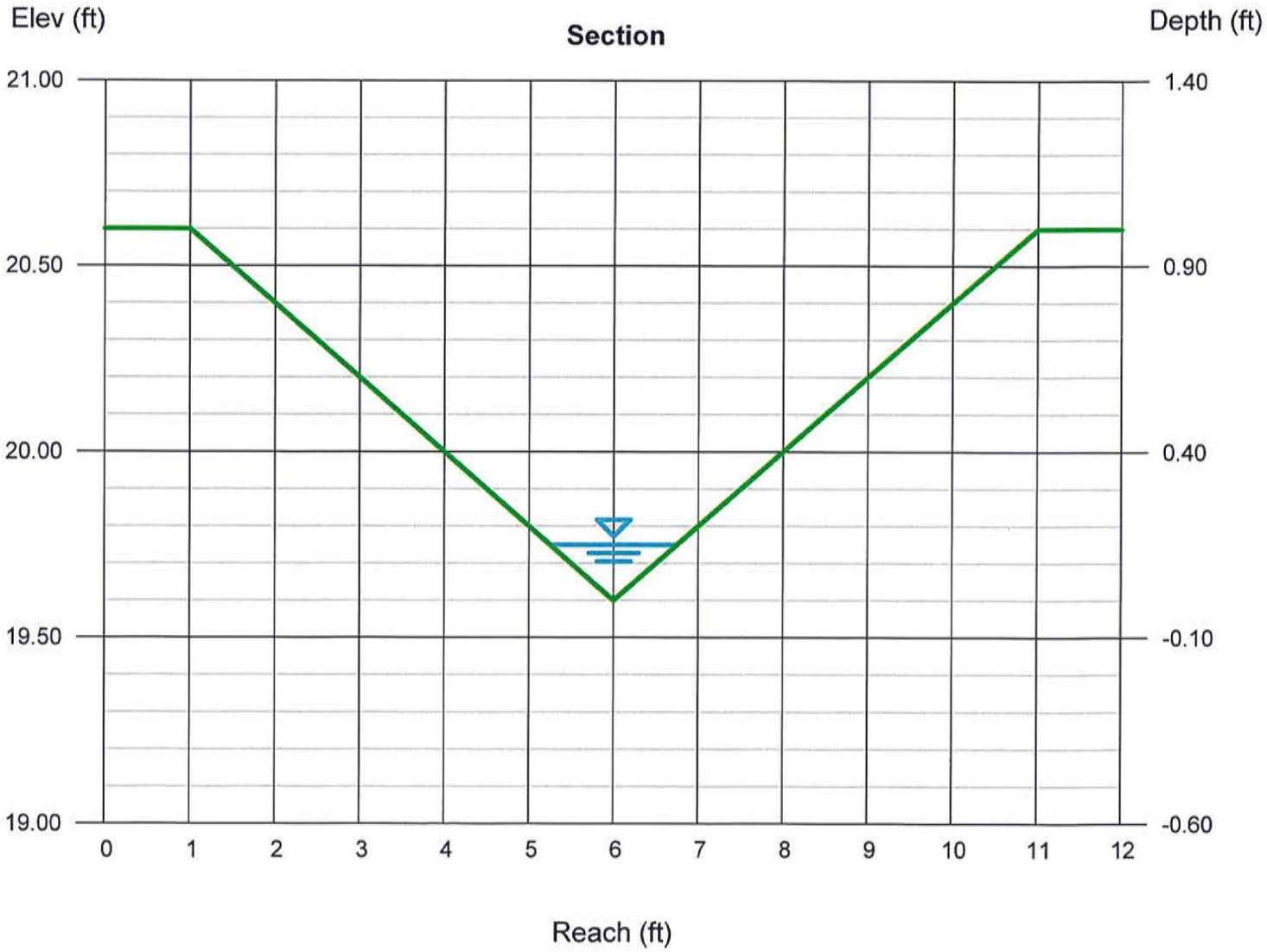
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 19.60
Slope (%)	= 5.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.21

Highlighted

Depth (ft)	= 0.15
Q (cfs)	= 0.210
Area (sqft)	= 0.11
Velocity (ft/s)	= 1.87
Wetted Perim (ft)	= 1.53
Crit Depth, Yc (ft)	= 0.17
Top Width (ft)	= 1.50
EGL (ft)	= 0.20



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Dec 4 2015

Swale 9B 25-yr

Triangular

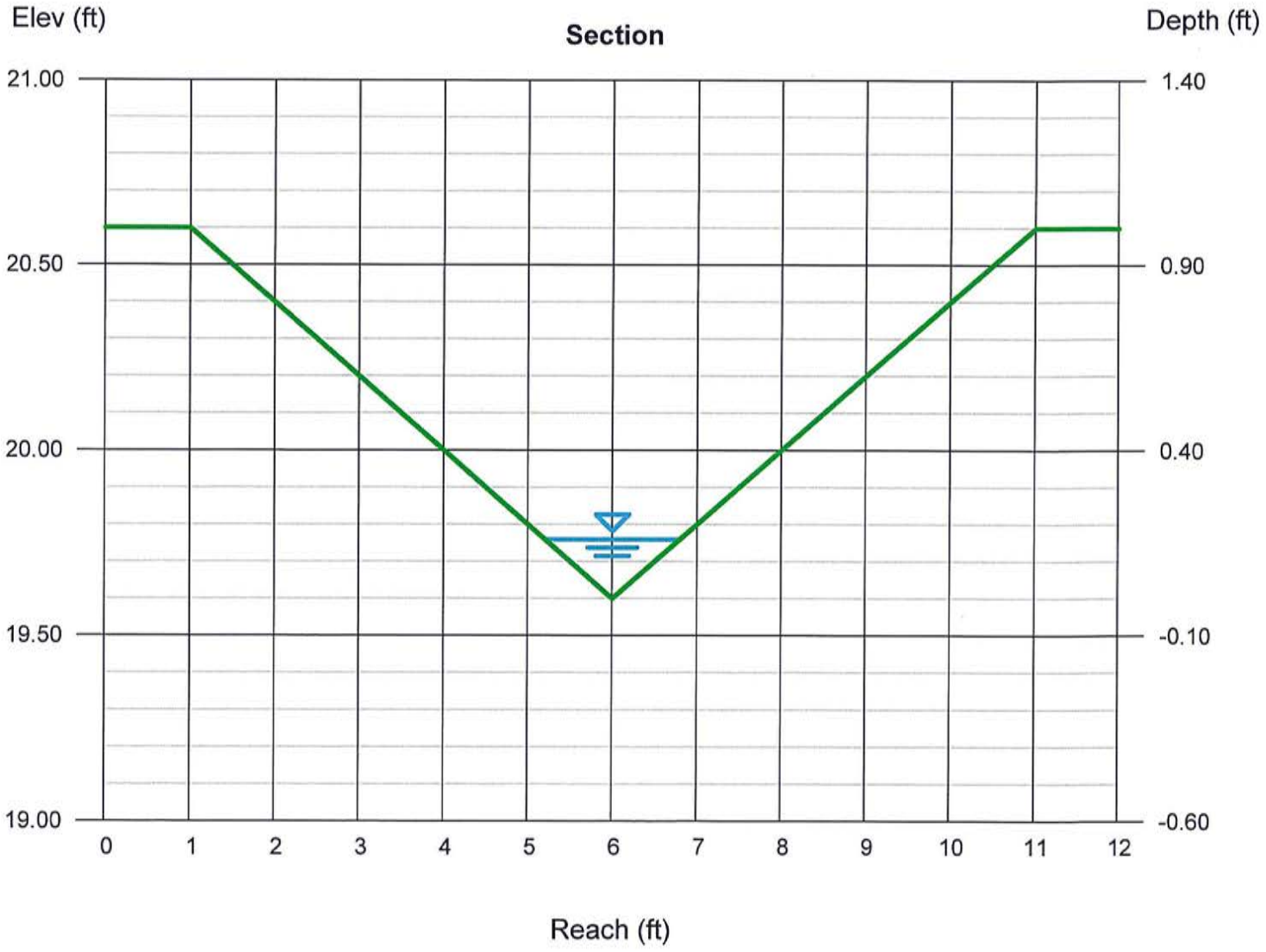
Side Slopes (z:1)	= 5.00, 5.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 19.60
Slope (%)	= 5.00
N-Value	= 0.030

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.24

Highlighted

Depth (ft)	= 0.16
Q (cfs)	= 0.240
Area (sqft)	= 0.13
Velocity (ft/s)	= 1.88
Wetted Perim (ft)	= 1.63
Crit Depth, Yc (ft)	= 0.18
Top Width (ft)	= 1.60
EGL (ft)	= 0.21



Date	Design	NORRIS & TUNSTALL CONSULTING ENGINEERS P.C.	Wilmington, NC Brunswick County, NC	Sheet 1 Of 3
10/22/16	JK			
Check	Job	For		Job No.
	WESTFALL MF	EC CALCS		15040

- NOTE → TOTAL WESTFALL MF DISTURBED AREA = 4.47 Ac
  ↑ Increased from 4.27 Ac
- INCREASE IS DUE TO LANDSCAPING PLAN REQUIRING DISTURBANCE OUTSIDE PREVIOUS LIMITS. ALSO, A TRASH COMPACTOR IS NOW LOCATED AT THE NE CORNER.
- PREVIOUS Approval/Submittal Included Letter From OFFSITE PROPERTY OWNER ALLOWING OFFSITE WORK.

* EXISTING POND 4 Will Function As Sediment Basin.

→ Required Storage Volume = 4.47 Ac x 1,800 cf/Ac = 8,046 cf

NORMAL POOL POND 4 @ 14'
TEMP POOL @ 15.35'
Volume Between NP & TP = 69,580 cf (FW 990306) [Main Pond + Forebay] ✓ CK

Size Skimmer For 68,580 cf

→ Required Surface Area => SEE PAGE 2 (Sized for Pond 4 DA)

Date	Design	Norris & Tunstall Consulting Engineers, P.C.	Wilmington, NC Brunswick County, NC	Sheet 2 Of 3
10/16	JJC			
Check	Job		For	Job No.
	WestFall MF (Revision)		EC Calcs	15040

Required Surface Area For Sediment Basin: $435_{SF}/Q_{10}$

Assume Total Pond 4 DA = 25.15 Ac. (Minus Pond & Wetlands) = 22.8 Ac

Assume Total Imp (Permitted) = 16.3 Ac. (Currently Not All Built)

Large DA → t_c USE FAA Method

Flow Length = 1,900 ft
S_o = 0.5%
Rational 'C' = 0.69
} t_c = 41 Min ⇒ Use 30 min

Wilmington i_{10} = 4.74 in/hr ⇒ t_c = 30 min

$$RQ = SA_s = 22.8\,Ac\left(\frac{6.5\,Ac \times .2 + 16.3 \times .95}{22.8\,Ac.}\right) \times 4.74\,in/hr = 79.6\,cfs$$

$$79.6\,cfs \Rightarrow 80\,cfs \times \frac{435\,sf}{cfs} = 34{,}609\,sf$$

Pond SA @ PP = 36,000 sf ✓ OK

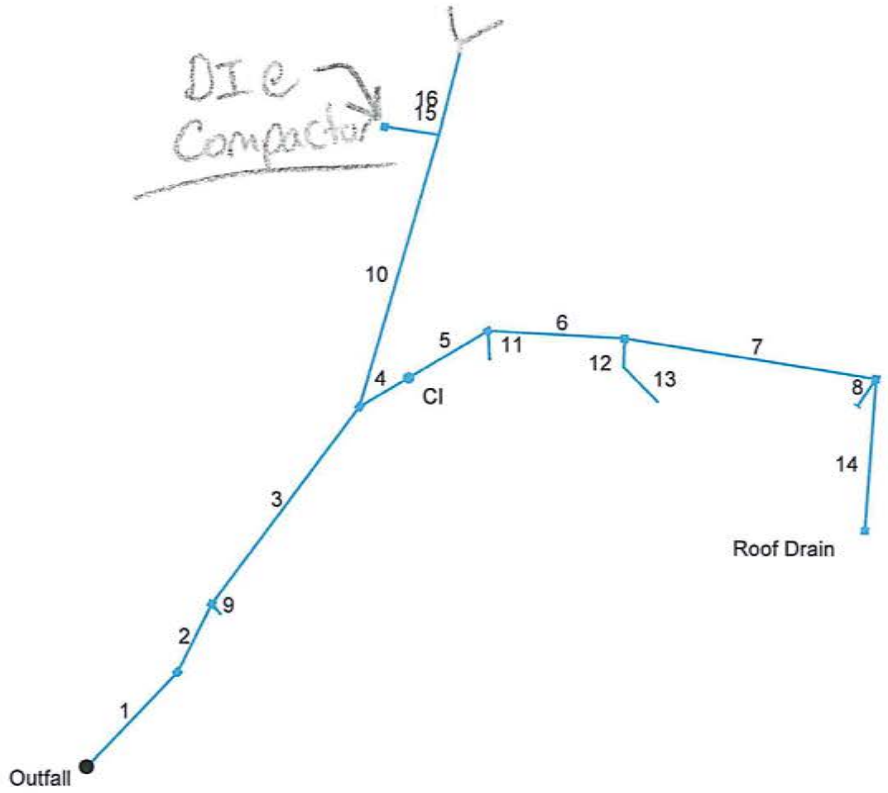
Temp Pool Volume As Required.

Calculate Skimmer Size				
Basin Volume in Cubic Feet	68,580	Cu.Ft	**Skimmer Size**	**5.0** Inch
Days to Drain*	3	Days	Orifice Radius	**2.1** Inch[es]
			Orifice Diameter	**4.2** Inch[es]

*In NC assume 3 days to drain

Estimate Volume of Basin	Length	Width			
Top of water surface in feet			Feet	VOLUME	0 Cu. Ft.
Bottom dimensions in feet			Feet		
Depth in feet			Feet		

Westfall Seg 2



Project File: Add Compactor 10-2016.stm	Number of lines: 16	Date: 10/31/16

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	60	0.00	16.54	0.00	0.00	12.61	5.0	25.9	4.5	57.27	127.1	8.77	36	3.63	12.66	14.84	15.50	17.29	15.00	18.50	Exist SD #3
2	1	35	0.00	16.54	0.00	0.00	12.61	5.0	25.8	4.5	57.37	72.15	7.35	42	0.51	14.84	15.02	17.91	17.39	18.50	19.50	SD 15
3	2	113	0.00	15.96	0.00	0.00	12.16	5.0	25.5	4.6	55.62	72.08	7.33	42	0.51	15.02	15.60	17.93	17.93	19.50	20.60	SD 16
4	3	26	0.17	1.00	0.72	0.12	0.75	5.0	12.8	5.9	4.42	24.30	1.41	24	1.15	15.60	15.90	18.94	18.95	20.60	20.50	SD 19
5	4	42	0.05	0.83	0.89	0.04	0.63	5.0	12.2	6.0	3.74	16.37	1.19	24	0.52	15.90	16.12	18.96	18.97	20.50	21.00	SD 20
6	5	62	0.00	0.73	0.00	0.00	0.56	5.0	11.8	6.0	3.36	9.34	1.90	18	0.79	16.12	16.61	18.97	19.03	21.00	21.20	SD 21
7	6	115	0.08	0.17	0.88	0.07	0.12	5.0	7.9	6.7	0.81	7.52	0.46	18	0.51	16.61	17.20	19.08	19.09	21.20	21.30	SD 22
8	7	15	0.04	0.04	0.53	0.02	0.02	5.0	5.0	7.2	0.15	9.13	0.12	15	2.00	17.20	17.50	19.09	19.09	21.30	20.50	SD 23
9	2	6	0.58	0.58	0.78	0.45	0.45	15.0	15.0	5.6	2.54	30.91	1.44	18	8.67	15.08	15.60	18.42	18.43	19.50	18.50	SD 18
10	3	130	0.00	14.96	0.00	0.00	11.41	0.0	25.1	4.6	52.56	55.81	6.23	42	0.31	15.60	16.00	18.51	18.84	20.60	19.00	SD 17
11	5	13	0.05	0.05	0.53	0.03	0.03	5.0	5.0	7.2	0.19	16.02	0.16	15	6.15	16.20	17.00	18.99	18.99	21.00	20.50	SD 24
12	6	13	0.16	0.56	0.76	0.12	0.43	5.0	5.2	7.2	3.12	8.01	2.54	15	1.54	16.60	16.80	19.03	19.06	21.20	20.50	SD 25
13	12	22	0.40	0.40	0.78	0.31	0.31	5.0	5.0	7.2	2.26	6.16	1.84	15	0.91	16.80	17.00	19.11	19.14	20.50	21.00	SD 26
14	7	70	0.05	0.05	0.61	0.03	0.03	5.0	5.0	7.2	0.22	2.19	0.40	10	1.00	17.20	17.90	19.09	19.10	21.30	21.50	RD 10inch
15	10	25	0.20	0.20	0.95	0.19	0.19	5.0	5.0	7.2	1.37	20.42	2.22	15	10.00	16.50	19.00	19.43	19.46	19.00	22.00	DI-C
16	10	38	14.76	14.76	0.76	11.22	11.22	25.0	25.0	4.6	51.79	0.00	5.38	42	-0.79	16.30	16.00	19.80	19.90	19.00	23.00	42

Westfall Seg 2

Number of lines: 16

Run Date: 10/31/16

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)	
1	End	60	0.00	16.54	0.00	0.00	12.61	5.0	25.8	5.3	66.29	127.1	9.78	36	3.63	12.66	14.84	16.00	17.44	15.00	18.50	Exist SD #3
2	1	35	0.00	16.54	0.00	0.00	12.61	5.0	25.7	5.3	66.38	72.15	6.98	42	0.51	14.84	15.02	18.25	18.37	18.50	19.50	SD 15
3	2	113	0.00	15.96	0.00	0.00	12.16	5.0	25.4	5.3	64.30	72.08	6.86	42	0.51	15.02	15.60	18.44	18.79	19.50	20.60	SD 16
4	3	26	0.17	1.00	0.72	0.12	0.75	5.0	11.9	6.9	5.15	24.30	1.64	24	1.15	15.60	15.90	19.51	19.52	20.60	20.50	SD 19
5	4	42	0.05	0.83	0.89	0.04	0.63	5.0	11.4	6.9	4.35	16.37	1.38	24	0.52	15.90	16.12	19.53	19.55	20.50	21.00	SD 20
6	5	62	0.00	0.73	0.00	0.00	0.56	5.0	11.0	7.0	3.89	9.34	2.20	18	0.79	16.12	16.61	19.55	19.63	21.00	21.20	SD 21
7	6	115	0.08	0.17	0.88	0.07	0.12	5.0	7.6	7.6	0.93	7.52	0.53	18	0.51	16.61	17.20	19.70	19.71	21.20	21.30	SD 22
8	7	15	0.04	0.04	0.53	0.02	0.02	5.0	5.0	8.1	0.17	9.13	0.14	15	2.00	17.20	17.50	19.72	19.72	21.30	20.50	SD 23
9	2	6	0.58	0.58	0.78	0.45	0.45	15.0	15.0	6.4	2.90	30.91	1.64	18	8.67	15.08	15.60	19.09	19.10	19.50	18.50	SD 18
10	3	130	0.00	14.96	0.00	0.00	11.41	0.0	25.1	5.3	60.69	55.81	6.31	42	0.31	15.60	16.00	19.10	19.57	20.60	19.00	SD 17
11	5	13	0.05	0.05	0.53	0.03	0.03	5.0	5.0	8.1	0.22	16.02	0.18	15	6.15	16.20	17.00	19.58	19.58	21.00	20.50	SD 24
12	6	13	0.16	0.56	0.76	0.12	0.43	5.0	5.2	8.1	3.52	8.01	2.86	15	1.54	16.60	16.80	19.63	19.67	21.20	20.50	SD 25
13	12	22	0.40	0.40	0.78	0.31	0.31	5.0	5.0	8.1	2.54	6.16	2.07	15	0.91	16.80	17.00	19.73	19.77	20.50	21.00	SD 26
14	7	70	0.05	0.05	0.61	0.03	0.03	5.0	5.0	8.1	0.25	2.19	0.46	10	1.00	17.20	17.90	19.71	19.72	21.30	21.50	RD 10inch
15	10	25	0.20	0.20	0.95	0.19	0.19	5.0	5.0	8.1	1.55	20.42	1.28	15	10.00	16.50	19.00	20.17	20.18	19.00	22.00	DI-C
16	10	38	14.76	14.76	0.76	11.22	11.22	25.0	25.0	5.3	59.78	0.00	6.21	42	-0.79	16.30	16.00	19.80	19.93	19.00	23.00	42

Westfall Seg 2

Number of lines: 16

Run Date: 10/31/16

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