

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	N-9	Curb- Horiz	1350.10	Cir	4.00	4.00	36	Cir	1340.80	30	Cir	1341.40
2	O-10	Curb- Horiz	1351.40	Rect	4.00	4.00	30	Cir	1342.45	24	Cir	1342.95
3	O-9	Manhole	1359.80	Cir	4.00	4.00	24	Cir	1353.02	24	Cir	1353.22
4	O-7	Manhole	1362.35	Cir	4.00	4.00	24	Cir	1353.72	24	Cir	1354.62
5	O-8	Curb- Horiz	1361.66	Rect	4.00	4.00	18	Cir	1354.76	18	Cir	1354.96
6	O-8	Curb- Horiz	1361.66	Rect	4.00	4.00	18	Cir	1355.09			
7	O-5	Manhole	1362.54	Cir	4.00	4.00	24	Cir	1355.46	24	Cir	1355.66
8	O-3	Curb- Horiz	1361.02	Rect	4.00	4.00	24	Cir	1356.38	24	Cir	1356.58
9	O-1	Curb- Horiz	1361.00	Rect	4.00	4.00	24	Cir	1357.00	18	Cir	1357.50
10	O-2	Curb- Horiz	1361.04	Rect	4.00	4.00	18	Cir	1357.63			
11	O-4	Curb- Horiz	1361.04	Rect	4.00	4.00	18	Cir	1357.63			
12	O-15	Curb- Horiz	1349.80	Rect	4.00	4.00	18	Cir	1342.80			
13	O-13	Curb- Horiz	1361.80	Cir	4.00	4.00	24	Cir	1343.32	24	Cir	1343.52
14	O-12	Grate	1347.00	Rect	4.00	4.00	24	Cir	1343.80	24	Cir	1344.00
15	O-14	Grate	1347.00	Rect	4.00	4.00	24	Cir	1344.05			

Project File: 111617 Broad-Charter.slm Number of Structures: 15 Run Date: 11/22/2017

Storm Sewers v12.00

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junction (ft)	One Line No.	Junction Type
1		28.27	36	Cir	110.230	1340.01	1340.90	0.807	1341.78	1342.82	n/a	1342.62	End	Curb- Horiz
2		23.84	30	Cir	170.000	1341.40	1342.45	0.618	1343.01	1344.12	n/a	1344.12	1	Curb- Horiz
3		10.73	24	Cir	276.000	1342.95	1353.02	3.649	1344.12	1354.19	0.41	1354.19	2	Manhole
4		10.77	24	Cir	25.900	1353.22	1353.72	2.000	1354.19	1354.90	0.49	1354.90	3	Manhole
5		2.11	18	Cir	7.500	1354.42	1354.78	4.533	1354.50	1355.31	0.10	1355.31	4	Curb- Horiz
6		2.14	18	Cir	26.000	1354.96	1355.00	0.500	1355.81	1356.04	n/a	1355.84	5	Curb- Horiz
7		9.27	24	Cir	208.000	1353.02	1355.46	0.737	1354.80	1355.55	n/a	1355.55	4	Manhole
8		9.48	24	Cir	144.000	1355.66	1356.38	0.500	1356.77	1357.49	0.85	1356.14	7	Curb- Horiz
9		8.32	24	Cir	42.000	1355.55	1357.00	1.000	1355.14	1355.03	n/a	1355.03	8	Curb- Horiz
10		2.69	18	Cir	26.000	1357.50	1357.63	0.500	1358.15	1358.28	0.24	1358.52	9	Curb- Horiz
11		2.53	18	Cir	25.000	1357.63	1357.63	0.500	1358.10	1358.23	0.23	1358.23	9	Curb- Horiz
12		1.80	18	Cir	40.000	1342.40	1342.60	0.500	1342.98	1343.11	0.19	1343.11	1	Curb- Horiz
13		14.66	24	Cir	37.000	1342.95	1343.32	1.000	1344.12	1344.70	0.31	1344.70	2	Curb- Horiz
14		13.57	24	Cir	26.000	1343.52	1343.80	1.000	1344.70	1345.13	0.88	1345.13	13	Grate
15		6.79	24	Cir	5.000	1344.00	1344.05	1.001	1345.13	1344.97	n/a	1344.97	14	Grate

Project File: 111617 Broad-Charter.slm Number of lines: 15 Run Date: 11/22/2017

NOTES: Return period = 10 Yrs. ; J - Line contains hyd. jump.

Storm Sewers v12.00

Inlet Report

Line No	Inlet ID	Q = CIA	Q carry	Q capt	Q Byp	Junc Type	Curb Inlet		Grate Inlet			Gutter						Inlet				Byp Line No
		(cfs)	(cfs)	(cfs)	(cfs)		HT (ft)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (ft)	
1	N-9	3.50*	0.00	3.50	0.00	Curb	6.0	12.40	0.00	0.00	0.00	Sag	2.00	0.083	0.021	0.013	0.33	10.01	0.50	10.01	2.0	Off
2	O-10	1.47	0.00	1.47	0.00	Curb	4.0	4.00	0.00	0.00	0.00	Sag	2.00	0.083	0.020	0.013	0.25	8.04	0.25	8.04	0.0	4
3	O-9	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
4	O-7	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
5	O-6	0.00	0.00	0.00	0.00	Curb	4.0	6.00	0.00	0.00	0.00	Sag	2.00	0.083	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off
6	O-8	2.14	0.00	2.14	0.00	Curb	4.0	6.00	0.00	0.00	0.00	Sag	2.00	0.083	0.020	0.013	0.34	10.84	3.50	10.84	2.0	Off
7	O-5	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
8	O-3	1.79	0.00	1.79	0.00	Curb	4.0	6.00	0.00	0.00	0.00	Sag	2.00	0.083	0.020	0.013	0.31	9.37	0.48	9.37	2.0	Off
9	O-1	3.43	4.48	7.90	0.00	Curb	4.0	6.00	0.00	0.00	0.00	Sag	2.00	0.083	0.020	0.013	0.83	25.20	0.80	25.20	2.0	Off
10	O-2	2.89	0.00	0.25	2.84	Curb	4.0	6.00	0.00	0.00	0.00	14.000	2.00	0.083	0.020	0.013	0.09	1.05	0.08	1.01	0.0	9
11	O-4	2.53	0.00	0.70	1.84	Curb	4.0	6.00	0.00	0.00	0.00	1.140	2.00	0.083	0.020	0.013	0.13	1.80	0.38	1.42	2.0	9
12	O-15	1.80	0.00	1.80	0.00	Curb	5.5	4.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.28	10.98	0.45	10.98	2.0	1
13	O-13	1.80	0.00	1.80	0.00	Curb	4.0	4.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.28	11.12	0.28	11.12	0.0	2
14	O-12	6.79	0.00	6.79	0.00	Grate	0.0	0.00	16.00	4.00	4.00	Sag	4.00	0.050	0.020	0.013	0.43	15.44	0.43	15.44	0.0	13
15	O-14	6.79	0.00	6.79	0.00	Grate	0.0	0.00	16.00	4.00	4.00	Sag	4.00	0.050	0.020	0.013	0.43	15.44	0.43	15.44	0.0	14

Project File: 111617 Broad-Charter.slm

Number of lines: 15

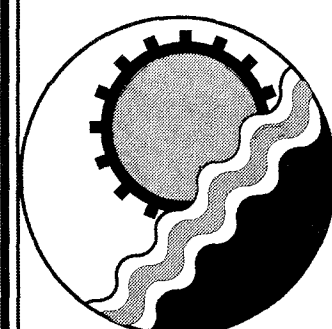
Run Date: 11/22/2017

NOTES: Inlet N-Values = 0.013; Intensity = 59.78 / (inlet time + 12.30) ^ 0.80; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

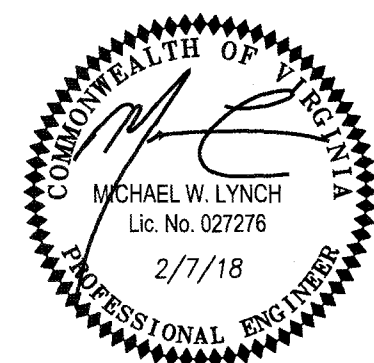
Storm Sewers v12.00

Hydraulic Grade Line Computations

Line	Size	Q (ft³)	Downstream								Len (ft)	Upstream								Check		JL coeff	Minor loss (ft)	
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sq ft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sq ft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Energy loss (ft)			
1	36	28.27	1340.01	1341.78	1.77	4.19	6.51	0.71	1342.49	0.000	110.250	1340.90	1342.62	1.72**	4.19	6.75	0.71	1343.33	0.000	0.000	n/a	1.50	1.06	
2	30	23.94	1341.40	1343.01	1.61*	3.33	7.19	0.74	1343.75	0.000	170.000	1342.45	1344.12	1.66**	3.47	8.90	0.74	1344.85	0.000	0.000	n/a	1.50	n/a	
3	24	10.73	1342.95	1344.12	1.16	1.90	5.85	0.49	1344.60	0.000	270.000	1353.02	1354.19	1.17**	1.92	5.90	0.49	1354.68	0.000	0.000	n/a	0.85	0.41	
4	24	10.77	1353.22	1354.19	0.97	1.52	7.10	0.49	1354.68	0.000	26.000	1353.72	1354.90	1.18**	1.92	6.51	0.49	1355.36	0.000	0.000	n/a	1.00	0.49	
5	18	2.11	1354.42	1354.90	0.48	0.48	4.40	0.20	1355.10	0.000	7.500	1354.76	1355.31	0.55**	0.58	3.62	0.20	1355.51	0.000	0.000	n/a	0.50	0.10	
6	18	2.14	1354.98	1355.51	0.55*	0.59	3.63	0.20	1355.72	0.000	26.000	1355.00	1355.64	0.55**	0.59	3.63	0.20	1355.85	0.000	0.000	n/a	1.00	n/a	
7	24	9.27	1353.92	1354.80	0.88	1.52	8.09	0.44	1355.34	0.000	208.000	1355.46	1356.55	1.09**	1.74	5.32	0.44	1356.99	0.000	0.000	n/a	0.15	n/a	
8	24	9.48	1355.66	1356.77	1.11*	1.79	5.31	0.44	1357.21	0.500	144.000	1356.38	1357.49	1.11**	1.76	5.30	0.44	1357.93	0.498	0.498	0.719	1.50	0.65	
9	24	8.32	1355.59	1356.14	1.56	1.62	3.16	0.41	1356.55	0.000	42.000	1357.00	1358.03	1.03**	1.62	5.12	0.41	1358.44	0.000	0.000	n/a	2.25	0.92	
10	18	2.69	1357.60	1358.15	0.55*	0.73	3.94	0.24	1358.38	0.500	26.000	1357.63	1358.28	0.65**	0.73	3.94	0.24	1358.52	0.502	0.501	0.730	1.00	0.24	
11	18	2.53	1357.50	1358.10	0.60*	0.66	3.86	0.23	1358.32	0.000	25.000	1357.63	1358.23	0.60**	0.66	3.62	0.23	1358.48	0.000	0.000	n/a	1.00	0.23	
12	18	1.80	1342.40	1342.60	0.50*	0.52	3.48	0.19	1343.09	0.000	40.000	1342.60	1343.11	0.50**	0.52	3.48	0.19	1343.29	0.000	0.000	n/a	1.00	0.19	
13	24	14.66	1342.95	1344.12	1.17*	1.91	7.66	0.63	1344.75	0.000	37.000	1343.32	1344.70	1.38**	2.31	6.35	0.63	1345.33	0.000	0.000	n/a	0.50	0.31	
14	24	13.57	1343.52	1344.70	1.18	1.93	7.05	0.58	1345.29	0.000	26.000	1343.80	1345.13	1.33**	2.21	6.14	0.59	1345.71	0.000	0.000	n/a	1.50	0.66	
15	24	6.79	1344.00	1345.13	1.13	1.42	3.73	0.36	1345.46	0.000	5.000	1344.05	1344.97	0.92**	1.42	4.79	0.36	1345.33	0.000	0.000	n/a	1.00	n/a	
Project File: 111617 Broad-Charter.slm													Number of lines: 15						Run Date: 11/22/2017					
Notes: * Normal depth assumed; ** Critical depth; J-Line contains hyd. jump ; a = air o = ellip b = box																								



ENGINEERING CONCEPTS, INC.

94 GREENFIELD STREET
DALEVILLE, VIRGINIA 24083
540.473.1253

Drawn	ECI	STORM DRAIN CALCULATIONS BROAD ST. &
-------	-----	---