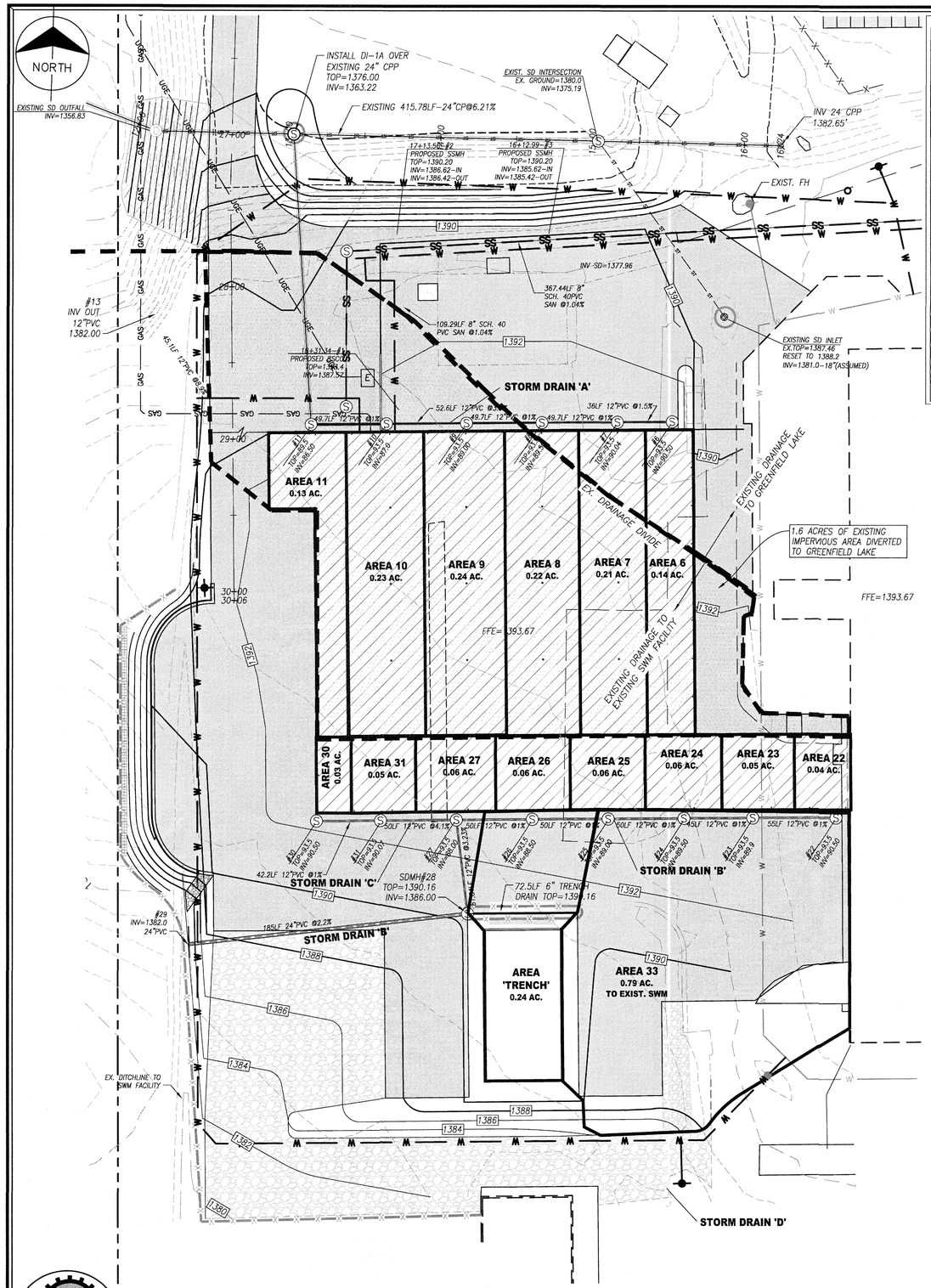


PF tabular

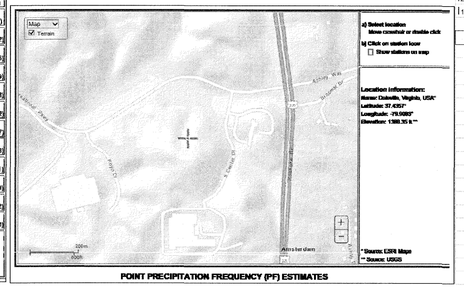
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)										
	1	2	5	10	25	50	100	200	500	1000
5-min	3.78 (3.41-4.19)	4.61 (4.08-4.99)	5.42 (4.89-6.01)	6.07 (5.46-6.72)	6.88 (6.14-7.52)	7.44 (6.60-8.27)	8.00 (7.03-8.90)	8.52 (7.42-9.52)	9.16 (7.86-10.3)	9.64 (8.18-10.9)
10-min	3.00 (2.72-3.34)	3.61 (3.28-4.00)	4.34 (3.97-4.82)	4.86 (4.36-5.38)	5.48 (4.89-6.07)	5.93 (5.26-6.58)	6.36 (5.59-7.07)	6.78 (5.88-7.54)	7.34 (6.22-8.18)	7.68 (6.44-8.81)
15-min	2.60 (2.36-2.78)	3.02 (2.73-3.35)	3.66 (3.20-4.05)	4.10 (3.68-4.54)	4.63 (4.13-5.13)	5.00 (4.44-5.58)	5.36 (4.71-5.98)	5.68 (4.95-6.34)	6.07 (5.22-6.84)	6.35 (5.36-7.20)
30-min	1.71 (1.55-1.90)	2.00 (1.80-2.21)	2.60 (2.34-2.89)	2.97 (2.65-3.29)	3.43 (3.05-3.80)	3.77 (3.34-4.18)	4.19 (3.61-4.68)	4.42 (3.85-4.94)	4.83 (4.15-5.44)	5.14 (4.36-5.83)
60-min	1.07 (0.952-1.19)	1.31 (1.18-1.45)	1.67 (1.50-1.85)	1.93 (1.74-2.14)	2.28 (2.04-2.53)	2.55 (2.27-2.83)	2.83 (2.48-3.14)	3.10 (2.70-3.48)	3.47 (2.98-3.90)	3.78 (3.19-4.26)
2-hr	0.630 (0.575-0.696)	0.772 (0.702-0.854)	0.988 (0.899-1.09)	1.15 (1.04-1.27)	1.37 (1.23-1.51)	1.54 (1.38-1.70)	1.72 (1.52-1.91)	1.90 (1.65-2.12)	2.15 (1.85-2.41)	2.34 (1.99-2.65)
3-hr	0.495 (0.413-0.592)	0.566 (0.507-0.675)	0.708 (0.644-0.792)	0.825 (0.747-0.912)	0.992 (0.884-1.09)	1.11 (0.983-1.23)	1.24 (1.10-1.37)	1.37 (1.20-1.53)	1.56 (1.34-1.75)	1.70 (1.45-1.93)
6-hr	0.288 (0.261-0.319)	0.348 (0.319-0.387)	0.438 (0.399-0.487)	0.510 (0.462-0.567)	0.612 (0.546-0.680)	0.686 (0.616-0.775)	0.765 (0.680-0.874)	0.829 (0.732-0.984)	1.01 (0.860-1.19)	1.13 (0.928-1.28)
12-hr	0.175 (0.160-0.193)	0.213 (0.194-0.236)	0.268 (0.243-0.299)	0.313 (0.283-0.350)	0.380 (0.339-0.424)	0.436 (0.384-0.487)	0.493 (0.432-0.555)	0.565 (0.492-0.637)	0.655 (0.552-0.757)	0.751 (0.629-0.882)
24-hr	0.111 (0.102-0.122)	0.135 (0.124-0.148)	0.171 (0.157-0.187)	0.201 (0.184-0.220)	0.245 (0.222-0.268)	0.282 (0.254-0.308)	0.322 (0.288-0.352)	0.367 (0.324-0.400)	0.432 (0.376-0.472)	0.487 (0.416-0.535)
2-day	0.069 (0.061-0.071)	0.079 (0.073-0.087)	0.101 (0.092-0.109)	0.119 (0.106-0.128)	0.142 (0.125-0.154)	0.162 (0.141-0.176)	0.184 (0.156-0.200)	0.209 (0.176-0.227)	0.242 (0.213-0.265)	0.271 (0.236-0.299)
3-day	0.047 (0.043-0.051)	0.056 (0.050-0.061)	0.071 (0.065-0.077)	0.083 (0.076-0.090)	0.100 (0.091-0.109)	0.114 (0.104-0.124)	0.129 (0.117-0.141)	0.146 (0.130-0.159)	0.169 (0.149-0.185)	0.190 (0.165-0.206)
4-day	0.037 (0.034-0.040)	0.045 (0.041-0.049)	0.056 (0.052-0.061)	0.066 (0.060-0.071)	0.079 (0.072-0.086)	0.090 (0.082-0.098)	0.102 (0.092-0.111)	0.114 (0.102-0.124)	0.133 (0.117-0.145)	0.148 (0.129-0.162)
7-day	0.024 (0.022-0.026)	0.029 (0.027-0.032)	0.036 (0.034-0.039)	0.042 (0.039-0.046)	0.050 (0.046-0.054)	0.057 (0.052-0.061)	0.063 (0.058-0.069)	0.071 (0.064-0.077)	0.081 (0.072-0.088)	0.089 (0.079-0.097)
10-day	0.019 (0.018-0.021)	0.023 (0.022-0.025)	0.029 (0.027-0.031)	0.033 (0.031-0.035)	0.038 (0.035-0.041)	0.043 (0.039-0.046)	0.047 (0.043-0.050)	0.053 (0.047-0.056)	0.058 (0.052-0.063)	0.063 (0.057-0.068)
20-day	0.013 (0.012-0.014)	0.015 (0.015-0.016)	0.019 (0.017-0.020)	0.021 (0.020-0.022)	0.024 (0.023-0.026)	0.027 (0.025-0.028)	0.029 (0.027-0.031)	0.032 (0.028-0.034)	0.035 (0.032-0.038)	0.038 (0.035-0.041)
30-day	0.011 (0.010-0.011)	0.013 (0.012-0.013)	0.015 (0.014-0.016)	0.017 (0.016-0.017)	0.019 (0.018-0.020)	0.022 (0.019-0.022)	0.022 (0.021-0.023)	0.024 (0.022-0.025)	0.026 (0.024-0.027)	0.027 (0.025-0.029)
45-day	0.009 (0.009-0.009)	0.011 (0.010-0.011)	0.012 (0.012-0.013)	0.014 (0.013-0.014)	0.015 (0.014-0.016)	0.016 (0.015-0.017)	0.017 (0.016-0.018)	0.019 (0.017-0.020)	0.020 (0.019-0.021)	0.021 (0.019-0.022)
60-day	0.008 (0.008-0.008)	0.009 (0.009-0.010)	0.011 (0.010-0.011)	0.012 (0.011-0.012)	0.013 (0.012-0.014)	0.014 (0.013-0.015)	0.015 (0.014-0.015)	0.015 (0.015-0.016)	0.016 (0.015-0.017)	0.017 (0.016-0.018)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.



$C_{impervious}$ =	0.90	
$C_{pervious}$ =	0.33	
I_2 =	4.51	
I_{10} =	6.07	(Worse case Tc = 5 min. Botetourt County)

Str. - Area	$A_{impervious}$	$A_{pervious}$	A_{total}	$C_{weighted}$	Q_2	Q_{10}
6	0.14	0.00	0.14	0.90	0.6	0.8
7	0.21	0.00	0.21	0.90	0.9	1.1
8	0.22	0.00	0.22	0.90	0.9	1.2
9	0.24	0.00	0.24	0.90	1.0	1.3
10	0.23	0.00	0.23	0.90	0.9	1.3
11	0.13	0.00	0.13	0.90	0.5	0.7
22	0.04	0.00	0.04	0.90	0.2	0.2
23	0.05	0.00	0.05	0.90	0.2	0.3
24	0.06	0.00	0.06	0.90	0.2	0.3
25	0.06	0.00	0.06	0.90	0.2	0.3
26	0.06	0.00	0.06	0.90	0.2	0.3
27	0.06	0.00	0.06	0.90	0.2	0.3
30	0.03	0.00	0.03	0.90	0.1	0.2
31	0.05	0.00	0.05	0.90	0.2	0.3
33	0.76	0.03	0.79	0.88	3.1	4.2
Trench	0.24	0.00	0.24	0.90	1.0	1.3

Inlet Report

Page 1

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet Ht (in)	Curb Inlet L (ft)	Grate Inlet Area (sqft)	Grate Inlet L (ft)	Grate Inlet W (ft)	Gutter So (ft/ft)	Gutter W (ft)	Gutter Sw (ft/ft)	Gutter Sx (ft/ft)	Gutter n	Gutter Depth (ft)	Gutter Spread (ft)	Inlet Depth (ft)	Inlet Spread (ft)	Inlet Depr (in)	Byp Line No
1	12	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
2	11	0.50*	0.00	0.00	0.50	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
3	10	0.80*	0.00	0.00	0.80	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	9	0.80*	0.00	0.00	0.80	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	8	0.70*	0.00	0.00	0.70	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
6	7	0.70*	0.00	0.00	0.70	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
7	6	0.50*	0.00	0.00	0.50	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	28	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
9	27	0.90*	0.00	0.00	0.90	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
10	26	0.80*	0.00	0.00	0.80	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
11	25	0.80*	0.00	0.00	0.80	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
12	24	0.70*	0.00	0.00	0.70	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
13	23	0.30*	0.00	0.00	0.30	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
14	22	0.20*	0.00	0.00	0.20	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
15	31	0.70*	0.00	0.00	0.70	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
16	30	0.40*	0.00	0.00	0.40	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
17	33	4.20*	0.00	0.00	4.20	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

Storm Sewer Tabulation

Page 1

Station Line	Station To Line	Len (ft)	Drng Area Incr (ac)	Drng Area Total (ac)	Rnoff coeff (C)	Area x C Incr	Area x C Total	Tc Inlet (min)	Tc Syst (min)	Rain (I) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe Size (in)	Pipe Slope (%)	Invert Elev Dn (ft)	Invert Elev Up (ft)	HGL Elev Dn (ft)	HGL Elev Up (ft)	Grnd / Rim Elev Dn (ft)	Grnd / Rim Elev Up (ft)	Line ID
1	End	89.837	0.00	0.00	0.00	0.00	0.00	0.0	2.5	0.0	4.00	14.76	4.63	15	4.45	1382.00	1386.00	1382.85	1386.81	1383.67	1390.00	12-Outfall
2	1	49.745	0.00	0.00	0.00	0.00	0.00	0.0	2.3	0.0	4.00	7.01	4.76	15	1.01	1386.00	1386.50	1386.81	1387.31	1390.00	1389.50	11-12
3	2	49.745	0.00	0.00	0.00	0.00	0.00	0.0	2.1	0.0	3.50	3.87	5.17	12	1.01	1386.50	1387.00	1387.31	1387.80	1389.50	1393.50	10-11
4	3	52.652	0.00	0.00	0.00	0.00	0.00	0.0	1.8	0.0	2.70	7.52	4.29	12	3.80	1387.00	1388.00	1387.80	1388.70	1393.50	1393.50	9-10
5	4	49.745	0.00	0.00	0.00	0.00	0.00	0.0	1.5	0.0	1.90	3.87	3.59	12	1.01	1389.00	1389.50	1389.70	1390.09	1393.50	1393.50	8-9
6	5	49.745	0.00	0.00	0.00	0.00	0.00	0.0	0.9	0.0	1.20	4.02	2.95	12	1.09	1389.50	1390.04	1390.09	1390.50	1393.50	1393.50	7-8
7	6	36.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.50	4.36	2.01	12	1.28	1390.04	1390.50	1390.50	1390.79	1393.50	1393.20	6-7
8	End	185.043	0.00	0.00	0.00	0.00	0.00	0.0	6.1	0.0	4.80	10.29	5.60	15	2.16	1382.00	1386.00	1382.77	1386.89	1384.75	1390.16	28-Outfall
9	8	81.837	0.00	0.00	0.00	0.00	0.00	0.0	5.9	0.0	4.80	12.58	5.15	15	3.23	1386.00	1388.00	1386.89	1388.89	1390.16	1393.50	27-28
10	9	50.000	0.00	0.00	0.00	0.00	0.00	0.0	5.6	0.0	2.80	3.86	4.22	12	1.00	1388.00	1388.50	1388.89	1389.22	1393.50	1393.50	26-27
11	10	50.000	0.00	0.00	0.00	0.00	0.00	0.0	5.3	0.0	2.00	3.86	3.68	12	1.00	1388.50	1389.00	1389.22	1389.60	1393.50	1393.50	25-26
12	11	50.000	0.00	0.00	0.00	0.00	0.00	0.0	4.8	0.0	1.20	3.86	2.91	12	1.00	1389.00	1389.50	1389.60	1389.96	1393.50	1393.50	24-25
13	12	45.308	0.00	0.00	0.00	0.00	0.00	0.0	3.8	0.0	0.50	3.63	2.01	12	0.88	1389.50	1389.90	1389.96	1390.19	1393.50	1393.50	23-24
14	13	54.692	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.20	4.04	1.54	12	1.10	1389.90	1390.50	1390.19	1390.68	1393.50	1393.50	22-23
15	9	50.000	0.00	0.00	0.00	0.00	0.00	0.0	1.4	0.0	1.10	7.85	2.39	12	4.14	1388.00	1390.07	1388.89	1390.51	1393.50	1393.50	31-27
16	15	42.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.40	3.90	1.82	12	1.02	1390.07	1390.50	1390.51	1390.76	1393.50	1393.50	30-31
17	End	209.196	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	4.20	24.66	4.76	15	12.43	1355.00	1381.00	1355.86	1381.63	1356.67	1385.77	33-32

COMMONWEALTH OF VIRGINIA
ROBERT H. WAMPLER, JR.
Lic. No. 34713
2/16/18
PROFESSIONAL ENGINEER

ENGINEERING CONCEPTS, INC.
94 GREEENFIELD STREET
DALEVILLE, VIRGINIA 24083
540.473.1253

Altec

Drawn MSMJ	BUILDING SITE DRAINAGE MAP ACCESS DRIVE & BUILDING EXPANSION	SCALE: 1"=40'	
Designed ECI		DATE: OCT. 4, 2017	
Checked ECI	ALTEC INDUSTRIES AT GREENFIELD BOTETOURT COUNTY VIRGINIA	PROJECT: 17058	
Approved RHW		C11	