Appendix B

WinTR-55 CN and Tc Computations

Appendix B-1

WinTR-55 CN and Tc Computations:

Plumtree Branch and Little Plumtree Branch

SCS TR-55 RUNOFF CURVE NUMBER

JOB NAME: Valley Mede Flood Study, Howard County
Existing Land Use, Good Conditions
Drainage Areas #1-10 - Single DA for Calibration

DATE: 04/17/17
JOB NO.: 5635-49

COMPUTED BY: CEL
CHECKED BY: ALH

STUDY POINT: Plumtree Branch at Confluence with Little Plumtree Branch

CONDITION: ULTIMATE / X EXISTING

RUNOFF CURVE NUMBER COMPUTATION

HYDROLOGIC SOIL GROUP	LAND USE	RUNOFF CURVE NO.	Area (ft^2)	AREA (ac)	RCN x A
B	Impervious	98	405	0.009	0.91
D	Impervious	98	1,366,291	31.366	3073.84
A	Open Space (Good)	39	339,062	7.784	303.57
B	Open Space (Good)	61	2,656,716	60.990	3720.38
C	Open Space (Good)	74	2,755,615	63.260	4681.26
D	Open Space (Good)	80	1,627,616	37.365	2989.19
A	Residential - 1/2 Acre	54	3,986,932	91.527	4942.48
B	Residential - 1/2 Acre	70	22,576,404	518.283	36279.80
C	Residential - 1/2 Acre	80	5,947,772	136.542	10923.36
D	Residential - 1/2 Acre	85	2,198,886	50.479	4290.76
A	Residential - 1/8 Acre	77	1,241,568	28.502	2194.69
B	Residential - 1/8 Acre	85	1,396,291	32.054	2724.63
C	Residential - 1/8 Acre	90	674,860	15.493	1394.34
D	Residential - 1/8 Acre	92	1,361,323	31.252	2875.15
A	Row crops - straight row (SR) - (good)	67	436,990	10.032	672.14
B	Row crops - straight row (SR) - (good)	81	847,566	19.457	1576.05
C	Row crops - straight row (SR) - (good)	81	155,427	3.568	289.02
A	Urban district - commercial/business	89	330,387	7.585	675.03
B	Urban district - commercial/business	92	216,585	4.972	457.43
C	Urban district - commercial/business	94	257,737	5.917	556.18
D	Urban district - commercial/business	95	3,510,428	80.588	7655.89
B	Urban district - industrial	88	605,999	13.912	1224.24
C	Urban district - industrial	91	433,235	9.946	905.06
D	Urban district - industrial	93	344,202	7.902	734.87
		TOTAL	**55,268,297**	**1268.786**	**95140.28**
				MI^2	**1.9825**

WEIGHTED RUNOFF CURVE NUMBER = **TOT RCN x AC =** **95140.28** = **74.985**
TOTAL ACRES **1268.79**

SCS TR-55 RUNOFF CURVE NUMBER

JOB NAME: Valley Mede Flood Study, Howard County
Existing Land Use, Fair Conditions
Drainage Areas #1-10 - Single DA for Calibration

DATE: 04/17/17
JOB NO.: 5635-49

COMPUTED BY: CEL
CHECKED BY: ALH

STUDY POINT: Plumtree Branch at Confluence with Little Plumtree Branch

CONDITION: ULTIMATE / X EXISTING

RUNOFF CURVE NUMBER COMPUTATION

HYDROLOGIC SOIL GROUP	LAND USE	RUNOFF CURVE NO.	Area (ft^2)	AREA (ac)	RCN x A
B	Impervious	98	405	0.009	0.91
D	Impervious	98	1,366,291	31.366	3073.84
A	Open Space (Fair)	49	339,062	7.784	381.41
B	Open Space (Fair)	69	2,656,716	60.990	4208.30
C	Open Space (Fair)	79	2,755,615	63.260	4997.56
D	Open Space (Fair)	84	1,627,616	37.365	3138.65
A	Residential - 1/2 Acre	61	3,986,932	91.527	5583.17
B	Residential - 1/2 Acre	76	22,576,404	518.283	39389.50
C	Residential - 1/2 Acre	84	5,947,772	136.542	11469.53
D	Residential - 1/2 Acre	88	2,198,886	50.479	4442.19
A	Residential - 1/8 Acre	81	1,241,568	28.502	2308.70
B	Residential - 1/8 Acre	88	1,396,291	32.054	2820.79
C	Residential - 1/8 Acre	91	674,860	15.493	1409.83
D	Residential - 1/8 Acre	93	1,361,323	31.252	2906.41
A	Row crops - straight row (SR) - (Fair)	67	436,990	10.032	672.14
B	Row crops - straight row (SR) - (Fair)	81	847,566	19.457	1576.05
C	Row crops - straight row (SR) - (Fair)	81	155,427	3.568	289.02
A	Urban district - commercial/business	91	330,387	7.585	690.20
B	Urban district - commercial/business	94	216,585	4.972	467.38
C	Urban district - commercial/business	95	257,737	5.917	562.10
D	Urban district - commercial/business	96	3,510,428	80.588	7736.48
B	Urban district - industrial	90	605,999	13.912	1252.06
C	Urban district - industrial	93	433,235	9.946	924.95
D	Urban district - industrial	94	344,202	7.902	742.77
		TOTAL	**55,268,297**	**1268.786**	**101043.94**
				MI^2	**1.9825**

WEIGHTED RUNOFF CURVE NUMBER = **TOT RCN x AC =** **101043.94** / **TOTAL ACRES** **1268.79** = **79.638**

SCS TR-55 RUNOFF CURVE NUMBER

JOB NAME: Valley Mede Flood Study, Howard County
Ultimate Land Use, Good Conditions
Drainage Areas #1-10 - Single DA for Calibration

DATE: 04/17/17
JOB NO.: 5635-49

COMPUTED BY: CEL
CHECKED BY: ALH

STUDY POINT: Plumtree Branch at Confluence with Little Plumtree Branch

CONDITION: X ULTIMATE
EXISTING

RUNOFF CURVE NUMBER COMPUTATION

HYDROLOGIC SOIL GROUP	LAND USE	RUNOFF CURVE NO.	Area (ft^2)	AREA (ac)	RCN x A
B	Impervious	98	405	0.009	0.91
D	Impervious	98	1,366,930	31.380	3075.28
B	Open Space (Good)	61	41,329	0.949	57.88
A	Residential - 1/2 Acre	54	4,762,986	109.343	5904.53
B	Residential - 1/2 Acre	70	23,253,226	533.821	37367.44
C	Residential - 1/2 Acre	80	7,751,868	177.958	14236.67
D	Residential - 1/2 Acre	85	3,598,125	82.602	7021.13
A	Residential - 1/8 Acre	77	1,241,568	28.502	2194.69
B	Residential - 1/8 Acre	85	4,185,775	96.092	8167.83
C	Residential - 1/8 Acre	90	1,652,435	37.935	3414.12
D	Residential - 1/8 Acre	92	1,589,705	36.495	3357.50
A	Urban district - commercial/business	89	330,387	7.585	675.03
B	Urban district - commercial/business	92	216,585	4.972	457.43
C	Urban district - commercial/business	94	257,737	5.917	556.18
D	Urban district - commercial/business	95	3,509,789	80.574	7654.50
B	Urban district - industrial	88	602,645	13.835	1217.46
C	Urban district - industrial	91	562,603	12.916	1175.32
D	Urban district - industrial	93	344,202	7.902	734.87
		TOTAL	**55,268,300**	**1268.786**	**97268.79**
				MI^2	**1.9825**

WEIGHTED RUNOFF CURVE NUMBER = **TOT RCN x AC =** **97268.79** = **76.663**
TOTAL ACRES **1268.79**

SCS TR-55 RUNOFF CURVE NUMBER

JOB NAME: Valley Mede Flood Study, Howard County
Ultimate Land Use, Fair Conditions
Drainage Areas #1-10 - Single DA for Calibration

DATE: 08/15/17
JOB NO.: 5635-49

COMPUTED BY: CEL
CHECKED BY: ALH

STUDY POINT: Plumtree Branch at Confluence with Little Plumtree Branch

CONDITION: X ULTIMATE
EXISTING

RUNOFF CURVE NUMBER COMPUTATION

HYDROLOGIC SOIL GROUP	LAND USE	RUNOFF CURVE NO.	Area (ft^2)	AREA (ac)	RCN x A
B	Impervious	98	405	0.009	0.91
D	Impervious	98	1,366,930	31.380	3075.28
B	Open Space (Fair)	69	41,329	0.949	65.47
A	Residential - 1/2 Acre	61	4,762,986	109.343	6669.93
B	Residential - 1/2 Acre	76	23,253,226	533.821	40570.37
C	Residential - 1/2 Acre	84	7,751,868	177.958	14948.51
D	Residential - 1/2 Acre	88	3,598,125	82.602	7268.94
A	Residential - 1/8 Acre	81	1,241,568	28.502	2308.70
B	Residential - 1/8 Acre	88	4,185,775	96.092	8456.11
C	Residential - 1/8 Acre	91	1,652,435	37.935	3452.06
D	Residential - 1/8 Acre	93	1,589,705	36.495	3394.00
A	Urban district - commercial/business	91	330,387	7.585	690.20
B	Urban district - commercial/business	94	216,585	4.972	467.38
C	Urban district - commercial/business	95	257,737	5.917	562.10
D	Urban district - commercial/business	96	3,509,789	80.574	7735.07
B	Urban district - industrial	90	602,645	13.835	1245.13
C	Urban district - industrial	93	562,603	12.916	1201.15
D	Urban district - industrial	94	344,202	7.902	742.77
		TOTAL	**55,268,300**	**1268.786**	**102854.07**
				MI^2	**1.9825**

WEIGHTED RUNOFF CURVE NUMBER = **TOT RCN x AC =** **102854.07** = **81.065**
TOTAL ACRES **1268.79**

SCS TR-55 RUNOFF CURVE NUMBER

JOB NAME: Valley Mede Flood Study, Howard County
Ultimate Land Use, Fair Conditions
Drainage Area #1

DATE: 04/17/17
JOB NO.: 5635-49

COMPUTED BY: CEL
CHECKED BY: ALH

STUDY POINT: A: Plumtree Branch 750ft Downstream of Little Plumtree

CONDITION: X ULTIMATE
EXISTING

RUNOFF CURVE NUMBER COMPUTATION

HYDROLOGIC SOIL GROUP	LAND USE	RUNOFF CURVE NO.	Area (ft^2)	AREA (ac)	RCN x A
A	Residential - 1/2 Acre	61	273,654	6.282	383.22
B	Residential - 1/2 Acre	76	45,612	1.047	79.58
C	Residential - 1/2 Acre	84	210,559	4.834	406.04
D	Residential - 1/2 Acre	88	2,790	0.064	5.64
A	Residential - 1/8 Acre	81	15,746	0.361	29.28
B	Residential - 1/2 Acre	88	8,167	0.187	16.50
		TOTAL	**556,528**	**12.776**	**920.25**
				MI^2	**0.0200**

WEIGHTED RUNOFF CURVE NUMBER = **TOT RCN x AC =** **920.25** = **72.029**
TOTAL ACRES **12.78**

SCS TR-55 RUNOFF CURVE NUMBER

JOB NAME: Valley Mede Flood Study, Howard County
Ultimate Land Use, Fair Conditions
Drainage Area #2

DATE: 08/15/17
JOB NO.: 5635-49

COMPUTED BY: HBH
CHECKED BY:

STUDY POINT: B: Plumtree Branch at Confluence with Little Plumtree Branch

CONDITION: X ULTIMATE
EXISTING

RUNOFF CURVE NUMBER COMPUTATION

HYDROLOGIC SOIL GROUP	LAND USE	RUNOFF CURVE NO.	Area (ft^2)	AREA (ac)	RCN x A
D	Impervious	98	175,832	4.037	395.58
A	Residential - 1/2 Acre	61	2,653,726	60.921	3716.19
B	Residential - 1/2 Acre	76	25,938	0.595	45.25
C	Residential - 1/2 Acre	84	678,968	15.587	1309.30
D	Residential - 1/2 Acre	88	36,710	0.843	74.16
A	Residential - 1/8 Acre	81	1,215,169	27.896	2259.61
B	Residential - 1/8 Acre	88	235,467	5.406	475.69
C	Residential - 1/8 Acre	91	658,324	15.113	1375.29
D	Residential - 1/8 Acre	93	124,165	2.850	265.09
A	Urban district - commercial/business	91	267,489	6.141	558.80
B	Urban district - commercial/business	94	63,111	1.449	136.19
C	Urban district - commercial/business	95	199,710	4.585	435.55
D	Urban district - commercial/business	96	262,311	6.022	578.10
		TOTAL	**6,596,920**	**151.444**	**11624.81**
				MI^2	**0.2366**

WEIGHTED RUNOFF CURVE NUMBER = **TOT RCN x AC =** **11624.81** = **76.760**
TOTAL ACRES **151.44**

SCS TR-55 RUNOFF CURVE NUMBER

JOB NAME: Valley Mede Flood Study, Howard County
Ultimate Land Use, Fair Conditions
Drainage Area #3

DATE: 08/15/17
JOB NO.: 5635-49

COMPUTED BY: HBH
CHECKED BY:

STUDY POINT: C: Plumtree Branch at US 40

CONDITION: X ULTIMATE
EXISTING

RUNOFF CURVE NUMBER COMPUTATION

HYDROLOGIC SOIL GROUP	LAND USE	RUNOFF CURVE NO.	Area (ft^2)	AREA (ac)	RCN x A
D	Impervious - rds paved open ditch (incl ROW)	98	34,963	0.803	78.66
A	Residential - 1/2 Acre	61	972,014	22.314	1361.18
B	Residential - 1/2 Acre	76	3,402,224	78.104	5935.93
C	Residential - 1/2 Acre	84	532,268	12.219	1026.41
D	Residential - 1/2 Acre	88	557,958	12.809	1127.19
B	Urban district - commercial/business	94	39,809	0.914	85.91
D	Urban district - commercial/business	96	91,280	2.096	201.17
		TOTAL	**5,630,516**	**129.259**	**9816.44**
				MI^2	**0.2020**

WEIGHTED RUNOFF CURVE NUMBER = **TOT RCN x AC =** **9816.44** = **75.944**
TOTAL ACRES **129.26**

SCS TR-55 RUNOFF CURVE NUMBER

JOB NAME: Valley Mede Flood Study, Howard County
Ultimate Land Use, Fair Conditions
Drainage Area #4

DATE: 08/15/17
JOB NO.: 5635-49

COMPUTED BY: CEL
CHECKED BY: ALH

STUDY POINT: D: Plumtree Branch upstream of Hearthstone Rd

CONDITION: X ULTIMATE
EXISTING

RUNOFF CURVE NUMBER COMPUTATION

HYDROLOGIC SOIL GROUP	LAND USE	RUNOFF CURVE NO.	Area (ft^2)	AREA (ac)	RCN x A
A	Residential - 1/2 Acre	61	792881	18.202	1110.32
B	Residential - 1/2 Acre	76	2869921	65.884	5007.21
C	Residential - 1/2 Acre	84	1148269	26.361	2214.29
D	Residential - 1/2 Acre	88	393920	9.043	795.80
		TOTAL	**5,204,991**	**119.490**	**9127.62**
				MI^2	**0.1867**

WEIGHTED RUNOFF CURVE NUMBER = **TOT RCN x AC =** **9127.62** = **76.388**
TOTAL ACRES **119.49**

SCS TR-55 RUNOFF CURVE NUMBER

JOB NAME: Valley Mede Flood Study, Howard County
Ultimate Land Use, Fair Conditions
Drainage Area #5

DATE: 08/15/17
JOB NO.: 5635-49

COMPUTED BY: CEL
CHECKED BY: ALH

STUDY POINT: E: Little Plumtree Branch at Michael's Way

CONDITION: X ULTIMATE
EXISTING

RUNOFF CURVE NUMBER COMPUTATION

HYDROLOGIC SOIL GROUP	LAND USE	RUNOFF CURVE NO.	Area (ft^2)	AREA (ac)	RCN x A
B	Impervious	98	405	0.009	0.91
D	Impervious	98	788,820	18.109	1774.66
B	Residential - 1/2 Acre	76	5,163,807	118.545	9009.40
C	Residential - 1/2 Acre	84	1,244,916	28.579	2400.66
D	Residential - 1/2 Acre	88	106,892	2.454	215.94
B	Residential - 1/8 Acre	88	2,789,484	64.038	5635.32
C	Residential - 1/8 Acre	91	977,575	22.442	2042.23
D	Residential - 1/8 Acre	93	228,382	5.243	487.59
		TOTAL	**11,300,281**	**259.419**	**21566.72**
				MI^2	**0.4053**

WEIGHTED RUNOFF CURVE NUMBER = **TOT RCN x AC =** **21566.72** = **83.135**
TOTAL ACRES **259.42**

SCS TR-55 RUNOFF CURVE NUMBER

JOB NAME: Valley Mede Flood Study, Howard County
Ultimate Land Use, Fair Conditions
Drainage Area #6

DATE: 08/15/17
JOB NO.: 5635-49

COMPUTED BY: CEL
CHECKED BY: ALH

STUDY POINT: F: Storage at Country Lane Ponds

CONDITION: X ULTIMATE
EXISTING

RUNOFF CURVE NUMBER COMPUTATION

HYDROLOGIC SOIL GROUP	LAND USE	RUNOFF CURVE NO.	Area (ft^2)	AREA (ac)	RCN x A
B	Residential - 1/2 Acre	76	1,856,756	42.625	3239.52
C	Residential - 1/2 Acre	84	40,775	0.936	78.63
		TOTAL	**1,897,531**	**43.561**	**3318.15**
				MI^2	**0.0681**

WEIGHTED RUNOFF CURVE NUMBER = **TOT RCN x AC =** **3318.15** = **76.172**
TOTAL ACRES **43.56**

SCS TR-55 RUNOFF CURVE NUMBER

JOB NAME: Valley Mede Flood Study, Howard County
Ultimate Land Use, Fair Conditions
Drainage Area #7

DATE: 08/15/17
JOB NO.: 5635-49

COMPUTED BY: CEL
CHECKED BY: ALH

STUDY POINT: G: Little Plumtree Branch at confluence with Plumtree Branch

CONDITION: X ULTIMATE
EXISTING

RUNOFF CURVE NUMBER COMPUTATION

HYDROLOGIC SOIL GROUP	LAND USE	RUNOFF CURVE NO.	Area (ft^2)	AREA (ac)	RCN x A
D	Impervious - rds paved open ditch (incl ROW)	98	161,092	3.698	362.42
A	Residential - 1/2 Acre	61	70,710	1.623	99.02
B	Residential - 1/2 Acre	76	577,454	13.257	1007.50
C	Residential - 1/2 Acre	84	3,403,201	78.127	6562.65
D	Residential - 1/2 Acre	88	514,179	11.804	1038.75
A	Residential - 1/8 Acre or less	81	10,653	0.245	19.81
B	Residential - 1/8 Acre or less	88	1,152,657	26.461	2328.60
C	Residential - 1/8 Acre or less	91	16,536	0.380	34.54
D	Residential - 1/8 Acre or less	93	1,237,158	28.401	2641.32
A	Urban district - commercial/business	91	62,899	1.444	131.40
B	Urban district - commercial/business	94	19,641	0.451	42.38
C	Urban district - commercial/business	95	36,208	0.831	78.97
D	Urban district - commercial/business	96	1,346,251	30.906	2966.94
C	Urban district - industrial	93	547,522	12.569	1168.95
		TOTAL	**9,156,161**	**210.197**	**18483.24**
				MI^2	**0.3284**

WEIGHTED RUNOFF CURVE NUMBER = **TOT RCN x AC =** **18483.24** = **87.933**
TOTAL ACRES **210.20**

SCS TR-55 RUNOFF CURVE NUMBER

JOB NAME: Valley Mede Flood Study, Howard County
Ultimate Land Use, Fair Conditions
Drainage Area #8

DATE: 08/15/17
JOB NO.: 5635-49

COMPUTED BY: CEL
CHECKED BY: ALH

STUDY POINT: H: Little Plumtree Branch downstream of US 40

CONDITION: X ULTIMATE
EXISTING

RUNOFF CURVE NUMBER COMPUTATION

HYDROLOGIC SOIL GROUP	LAND USE	RUNOFF CURVE NO.	Area (ft^2)	AREA (ac)	RCN x A
D	Impervious - rds paved open ditch (incl ROW)	98	206,222	4.734	463.95
B	Residential - 1/2 Acre	76	75,735	1.739	132.14
C	Residential - 1/2 Acre	84	179,636	4.124	346.41
D	Residential - 1/2 Acre	88	28,778	0.661	58.14
B	Urban district - commercail/business	94	91,217	2.094	196.84
C	Urban district - commercail/business	95	21,819	0.501	47.59
D	Urban district - commercail/business	96	1,313,957	30.164	2895.77
C	Urban district - industrial	93	15,081	0.346	32.20
		TOTAL	**1,932,445**	**44.363**	**4173.03**
				MI^2	**0.0693**

WEIGHTED RUNOFF CURVE NUMBER = **TOT RCN x AC =** **4173.03** = **94.066**
TOTAL ACRES **44.36**

SCS TR-55 RUNOFF CURVE NUMBER

JOB NAME: Valley Mede Flood Study, Howard County
Ultimate Land Use, Fair Conditions
Drainage Area #9

DATE: 08/15/17
JOB NO.: 5635-49

COMPUTED BY: CEL
CHECKED BY: ALH

STUDY POINT: I: Little Plumtree Branch upstream of US 40

CONDITION: X ULTIMATE
EXISTING

RUNOFF CURVE NUMBER COMPUTATION

HYDROLOGIC SOIL GROUP	LAND USE	RUNOFF CURVE NO.	Area (ft^2)	AREA (ac)	RCN x A
B	Residential - 1/2 Acre	76	1,189,709	27.312	2075.71
D	Residential - 1/2 Acre	88	267,440	6.140	540.28
B	Urban district - commercial/business	94	2,807	0.064	6.06
D	Urban district - commercial/business	96	495,992	11.386	1093.10
B	Urban district - industrial	90	169,573	3.893	350.36
D	Urban district - industrial	94	344,202	7.902	742.77
		TOTAL	**2,469,723**	**56.697**	**4808.27**
				MI^2	**0.0886**

WEIGHTED RUNOFF CURVE NUMBER = **TOT RCN x AC =** **4808.27** = **84.806**
TOTAL ACRES **56.70**

SCS TR-55 RUNOFF CURVE NUMBER

JOB NAME: Valley Mede Flood Study, Howard County
Ultimate Land Use, Fair Conditions
Drainage Area #10

DATE: 08/15/17
JOB NO.: 5635-49

COMPUTED BY: CEL
CHECKED BY: ALH

STUDY POINT: J: Little Plumtree Branch at N. Chatham

CONDITION: X ULTIMATE
EXISTING

RUNOFF CURVE NUMBER COMPUTATION

HYDROLOGIC SOIL GROUP	LAND USE	RUNOFF CURVE NO.	Area (ft^2)	AREA (ac)	RCN x A
B	Open Space (Fair)	69	41,329	0.949	65.47
B	Residential - 1/2 Acre	76	8,046,031	184.711	14038.07
C	Residential - 1/2 Acre	84	313,035	7.186	603.65
D	Residential - 1/2 Acre	88	1,689,457	38.785	3413.04
B	Urban district - industrial	90	433,072	9.942	894.78
		TOTAL	**10,522,924**	**241.573**	**19015.01**
				MI^2	**0.3775**

WEIGHTED RUNOFF CURVE NUMBER = **TOT RCN x AC =** **19015.01** = **78.713**
TOTAL ACRES **241.57**

TR-55 TIME OF CONCENTRATION WORKSHEET

DRAINAGE AREA: Valley Mede Floodplain Analysis
Existing/Proposed Tc BY: EZS/CEL
Drainage Areas #1-10 - Single Drainage for Total Watershed

OVERLAND FLOW

Flow Segment Name	AB	
Surface Description	Grass (Dense)	
Roughness Coefficient	0.24	
Land Slope (ft/ft)	0.020	
Flow Length (ft) [100' max]	100.00	
Two-Year Rainfall (in.)	3.19	
Flow Time (hr.)	0.2382	0.238

SHALLOW CONCENTRATED FLOW

Flow Segment Name	BC			
Flow Length (ft)	490			
Paved or Unpaved	Unpaved			
Land Slope (ft/ft)	0.024			
Flow Velocity (ft/sec.)	2.5246			
Flow Time (hr.)	0.0539			0.054

CHANNEL FLOW

Flow Segment Name	CD	DE	EF	FG	GH	HI	
Flow Depth (ft)	2	2.5	1.75	3	3.5	3	
Bottom Width (ft)	3	3	4	5	6	8	
Side Slope (Z1)	3	5	10	4	3	5	
Side Slope (Z2)	3	5	10	4	3	5	
Manning's Coefficient	0.035	0.035	0.035	0.035	0.035	0.035	
Flow Length (ft)	1524	2164	3471	1753	3852	586	
Channel Slope (ft/ft)	0.032	0.013	0.005	0.007	0.004	0.003	
Flow Velocity (ft/sec.)	8.3582	5.9279	2.9763	5.0334	4.2791	3.6546	
Flow Time (hr.)	0.0506	0.1014	0.3240	0.0967	0.2500	0.0445	0.867

PIPE FLOW (Assuming full flow)

Flow Segment Name						
Pipe Diameter (ft)						
Manning's Coefficient						
Pipe Slope (ft/ft)						
Pipe Length (ft)						
Flow Velocity (ft/sec.)						
Flow Time (hr.)						0.000

TIME OF CONCENTRATION (hr.)/(min) 1.159 69.57

TR-55 TIME OF CONCENTRATION WORKSHEET

DRAINAGE AREA: Valley Mede Floodplain Analysis
Existing/Proposed Tc BY: CEL
Drainage Area #1- Plumtree Branch 750lf Downstream of Little Plumtree Confluence

OVERLAND FLOW

Flow Segment Name	A1B1	
Surface Description	Grass (Dense)	
Roughness Coefficient	0.24	
Land Slope (ft/ft)	0.030	
Flow Length (ft) [100' max]	100.00	
Two-Year Rainfall (in.)	3.19	
Flow Time (hr.)	0.2025	0.203

SHALLOW CONCENTRATED FLOW

Flow Segment Name	B1C1			
Flow Length (ft)	237			
Paved or Unpaved	Unpaved			
Land Slope (ft/ft)	0.160			
Flow Velocity (ft/sec.)	6.4553			
Flow Time (hr.)	0.0102			0.010

CHANNEL FLOW

Flow Segment Name	C1D1	E1F1	F1I				
Flow Depth (ft)	0.25	1	3				
Bottom Width (ft)	1.5	3	8				
Side Slope (Z1)	1	5	5				
Side Slope (Z2)	10	5	5				
Manning's Coefficient	0.016	0.035	0.035				
Flow Length (ft)	262	131	579				
Channel Slope (ft/ft)	0.027	0.084	0.003				
Flow Velocity (ft/sec.)	4.5608	8.8192	3.6754				
Flow Time (hr.)	0.0160	0.0041	0.0438				0.064

PIPE FLOW (Assuming full flow)

Flow Segment Name	D1E1					
Pipe Diameter (ft)	1.50					
Manning's Coefficient	0.013					
Pipe Slope (ft/ft)	0.112					
Pipe Length (ft)	44.71					
Flow Velocity (ft/sec.)	19.878					
Flow Time (hr.)	0.0006					0.001

TIME OF CONCENTRATION (hr.)/(min) 0.277 16.63

TR-55 TIME OF CONCENTRATION WORKSHEET

DRAINAGE AREA: Valley Mede Floodplain Analysis
Existing/Proposed Tc BY: CEL
Drainage Area #2- Plumtree Branch at Confluence with Little Plumtree

OVERLAND FLOW

Flow Segment Name	A2B2	
Surface Description	Grass (Dense)	
Roughness Coefficient	0.24	
Land Slope (ft/ft)	0.080	
Flow Length (ft) [100' max]	100.00	
Two-Year Rainfall (in.)	3.19	
Flow Time (hr.)	0.1368	0.137

SHALLOW CONCENTRATED FLOW

Flow Segment Name	B2C2			
Flow Length (ft)	177			
Paved or Unpaved	Unpaved			
Land Slope (ft/ft)	0.062			
Flow Velocity (ft/sec.)	4.0266			
Flow Time (hr.)	0.0122			0.012

CHANNEL FLOW

Flow Segment Name	C2D2	E2F2	F2H			
Flow Depth (ft)	0.5	1	3.5			
Bottom Width (ft)	1	2	6			
Side Slope (Z1)	2	3	3			
Side Slope (Z2)	2	3	3			
Manning's Coefficient	0.035	0.035	0.035			
Flow Length (ft)	542	454	3391			
Channel Slope (ft/ft)	0.033	0.026	0.004			
Flow Velocity (ft/sec.)	3.5375	4.9118	4.2454			
Flow Time (hr.)	0.0425	0.0257	0.2219			0.290

PIPE FLOW (Assuming full flow)

Flow Segment Name	D2E2					
Pipe Diameter (ft)	2.00					
Manning's Coefficient	0.024					
Pipe Slope (ft/ft)	0.046					
Pipe Length (ft)	131					
Flow Velocity (ft/sec.)	8.355					
Flow Time (hr.)	0.0043					0.004

TIME OF CONCENTRATION (hr.)/(min)	0.443	26.61

TR-55 TIME OF CONCENTRATION WORKSHEET

DRAINAGE AREA: Valley Mede Floodplain Analysis
Existing/Proposed Tc BY: CEL
Drainage Area #3 - Plumtree Branch at US 40

OVERLAND FLOW

Flow Segment Name	A3B3	
Surface Description	Grass (Dense)	
Roughness Coefficient	0.24	
Land Slope (ft/ft)	0.030	
Flow Length (ft) [100' max]	100.00	
Two-Year Rainfall (in.)	3.19	
Flow Time (hr.)	0.2025	0.203

SHALLOW CONCENTRATED FLOW

Flow Segment Name	B3C3			
Flow Length (ft)	913			
Paved or Unpaved	Unpaved			
Land Slope (ft/ft)	0.034			
Flow Velocity (ft/sec.)	2.9735			
Flow Time (hr.)	0.0853			0.085

CHANNEL FLOW

Flow Segment Name	D3G				
Flow Depth (ft)	2.5				
Bottom Width (ft)	3				
Side Slope (Z1)	5				
Side Slope (Z2)	5				
Manning's Coefficient	0.035				
Flow Length (ft)	457				
Channel Slope (ft/ft)	0.002				
Flow Velocity (ft/sec.)	2.4379				
Flow Time (hr.)	0.0521				0.052

PIPE FLOW (Assuming full flow)

Flow Segment Name	C3D3				
Pipe Diameter (ft)	4.00				
Manning's Coefficient	0.024				
Pipe Slope (ft/ft)	0.016				
Pipe Length (ft)	2440				
Flow Velocity (ft/sec.)	7.728				
Flow Time (hr.)	0.0877				0.088

TIME OF CONCENTRATION (hr.)/(min) 0.428 25.65

TR-55 TIME OF CONCENTRATION WORKSHEET

DRAINAGE AREA: Valley Mede Floodplain Analysis
Existing/Proposed Tc BY: CEL
Drainage Area #4 - Plumtree Branch Upstream of Hearthstone Rd

OVERLAND FLOW

Flow Segment Name	A4B4	
Surface Description	Grass (Dense)	
Roughness Coefficient	0.24	
Land Slope (ft/ft)	0.020	
Flow Length (ft) [100' max]	100.00	
Two-Year Rainfall (in.)	3.19	
Flow Time (hr.)	0.2382	0.238

SHALLOW CONCENTRATED FLOW

Flow Segment Name	B4C4			
Flow Length (ft)	735			
Paved or Unpaved	Unpaved			
Land Slope (ft/ft)	0.031			
Flow Velocity (ft/sec.)	2.8537			
Flow Time (hr.)	0.0716			0.072

CHANNEL FLOW

Flow Segment Name	D4E4				
Flow Depth (ft)	1.75				
Bottom Width (ft)	4				
Side Slope (Z1)	10				
Side Slope (Z2)	10				
Manning's Coefficient	0.035				
Flow Length (ft)	2240				
Channel Slope (ft/ft)	0.007				
Flow Velocity (ft/sec.)	3.3825				
Flow Time (hr.)	0.1839				0.184

PIPE FLOW (Assuming full flow)

Flow Segment Name	C4D4				
Pipe Diameter (ft)	3.00				
Manning's Coefficient	0.024				
Pipe Slope (ft/ft)	0.025				
Pipe Length (ft)	1060				
Flow Velocity (ft/sec.)	8.004				
Flow Time (hr.)	0.0368				0.037

TIME OF CONCENTRATION (hr.)/(min) 0.530 31.83

TR-55 TIME OF CONCENTRATION WORKSHEET

DRAINAGE AREA: Valley Mede Floodplain Analysis
Existing/Proposed Tc BY: CEL
Drainage Area #5 - Plumtree Branch at Michaels Way

OVERLAND FLOW

Flow Segment Name	A5B5	
Surface Description	Grass (Dense)	
Roughness Coefficient	0.24	
Land Slope (ft/ft)	0.020	
Flow Length (ft) [100' max]	100.00	
Two-Year Rainfall (in.)	3.19	
Flow Time (hr.)	0.2382	0.238

SHALLOW CONCENTRATED FLOW

Flow Segment Name	B5C5			
Flow Length (ft)	490			
Paved or Unpaved	Unpaved			
Land Slope (ft/ft)	0.024			
Flow Velocity (ft/sec.)	2.5246			
Flow Time (hr.)	0.0539			0.054

CHANNEL FLOW

Flow Segment Name	C5D5	D5E5				
Flow Depth (ft)	2	2.5				
Bottom Width (ft)	3	3				
Side Slope (Z1)	3	5				
Side Slope (Z2)	3	5				
Manning's Coefficient	0.035	0.035				
Flow Length (ft)	1524	2164				
Channel Slope (ft/ft)	0.032	0.013				
Flow Velocity (ft/sec.)	8.3582	5.9279				
Flow Time (hr.)	0.0506	0.1014				0.152

PIPE FLOW (Assuming full flow)

Flow Segment Name						
Pipe Diameter (ft)						
Manning's Coefficient						
Pipe Slope (ft/ft)						
Pipe Length (ft)						
Flow Velocity (ft/sec.)						
Flow Time (hr.)						0.000

TIME OF CONCENTRATION (hr.)/(min) 0.444 26.65

TR-55 TIME OF CONCENTRATION WORKSHEET

DRAINAGE AREA: Valley Mede Floodplain Analysis
Existing/Proposed Tc BY: CEL
Drainage Area #6 - Ponds near Country Lane

OVERLAND FLOW

Flow Segment Name	A6B6	
Surface Description	Grass (Dense)	
Roughness Coefficient	0.24	
Land Slope (ft/ft)	0.030	
Flow Length (ft) [100' max]	100.00	
Two-Year Rainfall (in.)	3.19	
Flow Time (hr.)	0.2025	0.203

SHALLOW CONCENTRATED FLOW

Flow Segment Name	B6C6			
Flow Length (ft)	100			
Paved or Unpaved	Unpaved			
Land Slope (ft/ft)	0.050			
Flow Velocity (ft/sec.)	3.6072			
Flow Time (hr.)	0.0077			0.008

CHANNEL FLOW

Flow Segment Name	C6D6	E6F6				
Flow Depth (ft)	0.25					
Bottom Width (ft)	1					
Side Slope (Z1)	10					
Side Slope (Z2)	1					
Manning's Coefficient	0.016					
Flow Length (ft)	143					
Channel Slope (ft/ft)	0.007					
Flow Velocity (ft/sec.)	2.2303					
Flow Time (hr.)	0.0178	0.0000				0.018

PIPE FLOW (Assuming full flow)

Flow Segment Name	D6E6					
Pipe Diameter (ft)	2.00					
Manning's Coefficient	0.024					
Pipe Slope (ft/ft)	0.033					
Pipe Length (ft)	1900					
Flow Velocity (ft/sec.)	7.045					
Flow Time (hr.)	0.0749					0.075

TIME OF CONCENTRATION (hr.)/(min) 0.303 18.18

TR-55 TIME OF CONCENTRATION WORKSHEET

DRAINAGE AREA: Valley Mede Floodplain Analysis
Existing/Proposed Tc BY: CEL
Drainage Area #7 - Little Plumtree Branch at Plumtree Confluence

OVERLAND FLOW

Flow Segment Name	a7b7	
Surface Description	Grass (Dense)	
Roughness Coefficient	0.24	
Land Slope (ft/ft)	0.070	
Flow Length (ft) [100' max]	100.00	
Two-Year Rainfall (in.)	3.19	
Flow Time (hr.)	0.1443	0.144

SHALLOW CONCENTRATED FLOW

Flow Segment Name	b7c7			
Flow Length (ft)	222			
Paved or Unpaved	Unpaved			
Land Slope (ft/ft)	0.018			
Flow Velocity (ft/sec.)	2.1635			
Flow Time (hr.)	0.0286			0.029

CHANNEL FLOW

Flow Segment Name	e7f7	f7H				
Flow Depth (ft)	1	3.25				
Bottom Width (ft)	3	5				
Side Slope (Z1)	2	5				
Side Slope (Z2)	2	5				
Manning's Coefficient	0.016	0.035				
Flow Length (ft)	338	3122				
Channel Slope (ft/ft)	0.012	0.110				
Flow Velocity (ft/sec.)	7.7299	20.9063				
Flow Time (hr.)	0.0121	0.0415				0.054

PIPE FLOW (Assuming full flow)

Flow Segment Name	c7d7	d7e7				
Pipe Diameter (ft)	3.00	5.00				
Manning's Coefficient	0.013	0.013				
Pipe Slope (ft/ft)	0.009	0.046				
Pipe Length (ft)	1490	520				
Flow Velocity (ft/sec.)	9.146	28.499				
Flow Time (hr.)	0.0453	0.005				0.050

TIME OF CONCENTRATION (hr.)/(min) 0.277 16.61

TR-55 TIME OF CONCENTRATION WORKSHEET

DRAINAGE AREA: Valley Mede Floodplain Analysis
Existing/Proposed Tc BY: CEL
Drainage Area #8 - Little Plumtree Branch at Downstream US 40 Culvert

OVERLAND FLOW

Flow Segment Name	A8B8	
Surface Description	Grass (Dense)	
Roughness Coefficient	0.24	
Land Slope (ft/ft)	0.024	
Flow Length (ft) [100' max]	21.09	
Two-Year Rainfall (in.)	3.19	
Flow Time (hr.)	0.0641	0.064

SHALLOW CONCENTRATED FLOW

Flow Segment Name	B8C8			
Flow Length (ft)	232			
Paved or Unpaved	paved			
Land Slope (ft/ft)	0.006			
Flow Velocity (ft/sec.)	1.6360			
Flow Time (hr.)	0.0393			0.039

CHANNEL FLOW

Flow Segment Name							
Flow Depth (ft)							
Bottom Width (ft)							
Side Slope (Z1)							
Side Slope (Z2)							
Manning's Coefficient							
Flow Length (ft)							
Channel Slope (ft/ft)							
Flow Velocity (ft/sec.)							
Flow Time (hr.)							0.000

PIPE FLOW (Assuming full flow)

Flow Segment Name	C8D8	D8m				
Pipe Diameter (ft)	2.00	5.00				
Manning's Coefficient	0.013	0.024				
Pipe Slope (ft/ft)	0.013	0.017				
Pipe Length (ft)	689	825				
Flow Velocity (ft/sec.)	8.227	9.359				
Flow Time (hr.)	0.0233	0.024				0.048

TIME OF CONCENTRATION (hr.)/(min) 0.151 9.07

TR-55 TIME OF CONCENTRATION WORKSHEET

DRAINAGE AREA: Valley Mede Floodplain Analysis
Existing/Proposed Tc BY: CEL
Drainage Area #9- Little Plumtree Branch at Upstream US 40 Culvert

OVERLAND FLOW

Flow Segment Name	A9B9	
Surface Description	Grass (Dense)	
Roughness Coefficient	0.24	
Land Slope (ft/ft)	0.020	
Flow Length (ft) [100' max]	100.00	
Two-Year Rainfall (in.)	3.19	
Flow Time (hr.)	0.2382	0.238

SHALLOW CONCENTRATED FLOW

Flow Segment Name	B9C9			
Flow Length (ft)	546			
Paved or Unpaved	Unpaved			
Land Slope (ft/ft)	0.026			
Flow Velocity (ft/sec.)	2.5827			
Flow Time (hr.)	0.0588			0.059

CHANNEL FLOW

Flow Segment Name	C9D9	D9E9	E9F9				
Flow Depth (ft)	0.25	3	3.5				
Bottom Width (ft)	1	2	4				
Side Slope (Z1)	10	3	3				
Side Slope (Z2)	1	3	3				
Manning's Coefficient	0.016	0.035	0.035				
Flow Length (ft)	252	551	2279				
Channel Slope (ft/ft)	0.036	0.022	0.007				
Flow Velocity (ft/sec.)	5.0298	8.4788	5.5367				
Flow Time (hr.)	0.0139	0.0180	0.1143				0.146

PIPE FLOW (Assuming full flow)

Flow Segment Name						
Pipe Diameter (ft)						
Manning's Coefficient						
Pipe Slope (ft/ft)						
Pipe Length (ft)						
Flow Velocity (ft/sec.)						
Flow Time (hr.)						0.000

TIME OF CONCENTRATION (hr.)/(min) 0.443 26.60

TR-55 TIME OF CONCENTRATION WORKSHEET

DRAINAGE AREA: Valley Mede Floodplain Analysis
Existing/Proposed Tc BY: CEL
Drainage Area #10 - Little Plumtree Branch at Upstream N Chatham Culvert

OVERLAND FLOW

Flow Segment Name	A10B10	
Surface Description	Grass (Dense)	
Roughness Coefficient	0.24	
Land Slope (ft/ft)	0.010	
Flow Length (ft) [100' max]	100.00	
Two-Year Rainfall (in.)	3.19	
Flow Time (hr.)	0.3143	0.314

SHALLOW CONCENTRATED FLOW

Flow Segment Name	B10C10			
Flow Length (ft)	450			
Paved or Unpaved	Unpaved			
Land Slope (ft/ft)	0.016			
Flow Velocity (ft/sec.)	2.0114			
Flow Time (hr.)	0.0622			0.062

CHANNEL FLOW

Flow Segment Name	C10D10	E10F10	F10G10	G10H10			
Flow Depth (ft)	0.25	3	2.25	3			
Bottom Width (ft)	1	2	3	8			
Side Slope (Z1)	10	3	10	3			
Side Slope (Z2)	1	3	10	3			
Manning's Coefficient	0.016	0.035	0.035	0.013			
Flow Length (ft)	559	1573	2428	1319			
Channel Slope (ft/ft)	0.014	0.025	0.010	0.005			
Flow Velocity (ft/sec.)	3.1875	9.1576	4.7399	11.7877			
Flow Time (hr.)	0.0487	0.0477	0.1423	0.0311			0.270

PIPE FLOW (Assuming full flow)

Flow Segment Name	D10E10					
Pipe Diameter (ft)	1.75					
Manning's Coefficient	0.024					
Pipe Slope (ft/ft)	0.019					
Pipe Length (ft)	369.14					
Flow Velocity (ft/sec.)	4.914					
Flow Time (hr.)	0.0209					0.021

TIME OF CONCENTRATION (hr.)/(min)	0.667	40.03

Appendix B-2

WinTR-55 CN and Tc Computations:

Existing Ponds D and H

SCS TR-55 RUNOFF CURVE NUMBER

JOB NAME: Valley Mede Flood Study, Howard County
Ultimate Land Use, Fair Conditions
Pond D

DATE: 04/17/17
JOB NO.: 5635-49

COMPUTED BY: CEL
CHECKED BY: ALH

STUDY POINT: Pond D

CONDITION: X ULTIMATE
EXISTING

RUNOFF CURVE NUMBER COMPUTATION

HYDROLOGIC SOIL GROUP	LAND USE	RUNOFF CURVE NO.	Area (ft^2)	AREA (ac)	RCN x A
B	Open Space (Fair)	69	99,527	2.285	157.65
B	Residential - 1/2 Acre	76	1,003,578	23.039	1750.96
		TOTAL	**1,103,105**	**25.324**	**1908.62**
				MI^2	**0.0396**

WEIGHTED RUNOFF CURVE NUMBER = **TOT RCN x AC =** **1908.62** = **75.368**
TOTAL ACRES **25.32**

SCS TR-55 RUNOFF CURVE NUMBER

JOB NAME: Valley Mede Flood Study, Howard County
Ultimate Land Use, Fair Conditions
Pond H

DATE: 04/17/17
JOB NO.: 5635-49

COMPUTED BY: CEL
CHECKED BY: ALH

STUDY POINT: Pond H

CONDITION: X ULTIMATE
EXISTING

RUNOFF CURVE NUMBER COMPUTATION

HYDROLOGIC SOIL GROUP	LAND USE	RUNOFF CURVE NO.	Area (ft^2)	AREA (ac)	RCN x A
B	Open Space (Fair)	69	32,310	0.742	51.18
D	Open Space (Fair)	84	17,572	0.403	33.89
B	Residential - 1/2 Acre	76	1,000,261	22.963	1745.18
D	Residential - 1/2 Acre	88	45,611	1.047	92.14
		TOTAL	**1,095,754**	**25.155**	**1922.38**
				MI^2	**0.0393**

WEIGHTED RUNOFF CURVE NUMBER = **TOT RCN x AC =** **1922.38** = **76.421**
TOTAL ACRES **25.16**

TR-55 TIME OF CONCENTRATION WORKSHEET

DRAINAGE AREA: Valley Mede Floodplain Analysis
Existing/Proposed Tc BY: CEL
Pond D

OVERLAND FLOW

Flow Segment Name	aabb	
Surface Description	Grass (Dense)	
Roughness Coefficient	0.24	
Land Slope (ft/ft)	0.020	
Flow Length (ft) [100' max]	100.00	
Two-Year Rainfall (in.)	3.19	
Flow Time (hr.)	0.2382	0.238

SHALLOW CONCENTRATED FLOW

Flow Segment Name	bbcc			
Flow Length (ft)	129			
Paved or Unpaved	Unpaved			
Land Slope (ft/ft)	0.050			
Flow Velocity (ft/sec.)	3.6256			
Flow Time (hr.)	0.0099			0.010

CHANNEL FLOW

Flow Segment Name	ccdd					
Flow Depth (ft)	0.5					
Bottom Width (ft)	1					
Side Slope (Z1)	10					
Side Slope (Z2)	1					
Manning's Coefficient	0.016					
Flow Length (ft)	156					
Channel Slope (ft/ft)	0.019					
Flow Velocity (ft/sec.)	5.4949					
Flow Time (hr.)	0.0079					0.008

PIPE FLOW (Assuming full flow)

Flow Segment Name	ddee					
Pipe Diameter (ft)	2.50					
Manning's Coefficient	0.013					
Pipe Slope (ft/ft)	0.028					
Pipe Length (ft)	1938					
Flow Velocity (ft/sec.)	14.075					
Flow Time (hr.)	0.0383					0.038

TIME OF CONCENTRATION (hr.)/(min)	0.294	17.65

TR-55 TIME OF CONCENTRATION WORKSHEET

DRAINAGE AREA: Valley Mede Floodplain Analysis
Existing/Proposed Tc
Pond H

BY: CEL

OVERLAND FLOW

Flow Segment Name	llmm	
Surface Description	Grass (Dense)	
Roughness Coefficient	0.24	
Land Slope (ft/ft)	0.070	
Flow Length (ft) [100' max]	100.00	
Two-Year Rainfall (in.)	3.19	
Flow Time (hr.)	0.1443	0.144

SHALLOW CONCENTRATED FLOW

Flow Segment Name	mmnn			
Flow Length (ft)	508			
Paved or Unpaved	Unpaved			
Land Slope (ft/ft)	0.024			
Flow Velocity (ft/sec.)	2.4789			
Flow Time (hr.)	0.0570			0.057

CHANNEL FLOW

Flow Segment Name	oopp					
Flow Depth (ft)	0.5					
Bottom Width (ft)	2					
Side Slope (Z1)	2					
Side Slope (Z2)	2					
Manning's Coefficient	0.035					
Flow Length (ft)	300					
Channel Slope (ft/ft)	0.020					
Flow Velocity (ft/sec.)	3.0066					
Flow Time (hr.)	0.0277					0.028

PIPE FLOW (Assuming full flow)

Flow Segment Name	nnoo	ppqq				
Pipe Diameter (ft)	2.00	2.00				
Manning's Coefficient	0.013	0.013				
Pipe Slope (ft/ft)	0.024	0.032				
Pipe Length (ft)	246	878				
Flow Velocity (ft/sec.)	11.255	12.858				
Flow Time (hr.)	0.0061	0.019				0.025

TIME OF CONCENTRATION (hr.)/(min)	0.254	15.24