3/25/2024

RATIONAL METHOD PIPE DESIGN WORKSHEET

LOCATION	PIPE SEGMENT From	To	INCREMENTAL AREA DESIGNATION	A (Acres)	Total A	C	C*A	Sum (C*A)	FLOW TIME (min.) To Inlet	In Chan.	Tot.	100-Yr I (in/hr)	100-Yr Q (cfs)	DESIGN CONDITIONS Pipe Diam (in.)	Length (ft)	Slope (%)	Q-full (cfs)	V-Full (fps)	Design (100-Yr) Depth Peak (in.)	V-Peak (fps)	Inverts Up	Down	Remarks
SITE TO ST1																							
	TD1	DMH1		0.130		0.62	0.08		5		5	6.0	0.48	8	5	0.020	1.86	5.32	2.1	1.39	330	329.90	TD1-DMH1
	DMH1	ST-1		0.130		0.62	0.08		5		5	6.0	0.48	8	10	0.020	1.86	5.32	2.1	1.39	329.80	329.60	DMH1-ST1
	ST-1	HW1			0.130			0.16	7		7	6.0	0.97	12	12	0.020	5.47	6.97	2.1	1.23	329.60	329.40	ST1-HW1
SITE TO BASIN 3																							
	CB-5	DMH-5		0.480		0.62	0.30		10		10	6.0	1.79	12	16	0.016	4.89	6.23	4.4	2.27	340	339.75	CB5-DMH5
	CB-6	DMH-5		0.050		0.9	0.05		5		5	6.0	0.32	12	12	0.020	8.06	4.57	12.8	3.25	340	399.75	CB6-DMH5
	DI-1	DMH-5		0.320		0.42	0.20	0.20	10		15	6.0	1.20	12	37	0.020	5.47	6.97	2.6	1.53	340	399.75	DI1-DMH5
	DMH5	DMH4		0.860		0.65	0.56		10		15	6.0	3.35	12	72	0.023	5.87	7.47	6.9	4.27	339.65	338.00	DMH5-DMH4
	DMH4	DMH-3		0.860		0.65	0.56		10		15	6.0	3.35	12	50	0.038	7.54	9.61	5.3	4.27	337.90	336.00	DMH4-DMH3
	DMH-3	DMH-2		0.860		0.65	0.56	0.56	10		15	6.0	3.36	12	78	0.050	8.65	11.02	4.7	4.28	335.90	332.00	DMH3-DMH2
	DI2	CB3		0.34		0.62		0.21	10		15	6.0	1.26	12	31	0.020	5.47	6.97	2.6	1.53	334.50	333.00	DI2-CB3
	CB3	DMH-2		0.34		0.62		0.21	10		10	6	1.26	12	16	0.016	4.89	6.23	4.4	2.27	333.00	332.5	CB3-DMH2
	CB4	DMH-2		0.040		0.90	0.04		5		5	6.0	0.22	12	12	0.020	8.06	4.57	12.8	3.25	333.00	332.50	CB4-DMH2
	DMH2	FES3A		1.580		0.62	0.98		15		15	6.0	5.88	15	18	0.020	9.92	8.09	8.9	4.79	332.00	331.50	DMH2-FES3A
POND-3		BASIN	Q Values For Pond Outlet Based on TR-20 25-Year Storm									Q_{25}	2.46	12	18	0.010	4.71	3.84	7.8	2.01	332.20	332.00	12"HPDE -Settling Pond
POND-3		BASIN	Q Values For Pond Outlet Based on TR-20 100-Year Storm									Q100	4.92	12	18	0.010	4.71	3.84	7.8	2.01	322.20	332.00	12" HDPE -Settling Pond

Notes:

1) Runoff Coefficient C-Values used; Impervious(Pavement) C=0.90 Grass/OpenSpace C=0.20, Residential Suburban C=.25~.40, Mannings "n" HDPE n=0.012, RCP n=0.013
2) Rainfall Intensity I (in/hr) values taken from Figure 10-4 Intensity-Duration-Frequency Curve for Boston, Massachusetts, Mass Highway Design Manual.
3) Five (5) minute minimum flow time used for minimum time of concentration (Tc) to CB inlet to system
4) Massachusetts Cascade Grate Inlet Capacity = 1.26 cfs @ 100% efficiency, Standard Grate = 0.95 cfs PL
5) Blue Highlight denotes calculated peak flow (cfs) to CB Inlet

3/25/2024

RATIONAL METHOD PIPE DESIGN WORKSHEET

LOCATION	PIPE SEGMENT From	To	INCREMENTAL AREA DESIGNATION	A (Acres)	Total A	C	C*A	Sum (C*A)	FLOW TIME (min.) To Inlet	In Chan.	Tot.	100-Yr I (in/hr)	100-Yr Q (cfs)	DESIGN CONDITIONS Pipe Diam (in.)	Length (ft)	Slope (%)	Q-full (cfs)	V-Full (fps)	Design (100-Yr) Depth Peak (in.)	V-Peak (fps)	Inverts Up	Down	Remarks
SITE TO BASIN1																							
	CB7	DMH6		1.400		0.60	0.84		5		5	6.0	5.04	15	12	0.016	8.87	7.23	8.5	4.11	332.25	332.00	CB7-DMH6
	CB8	DMH6		0.060		0.90	0.05		5		5	6.0	0.32	12	12	0.020	5.47	6.97	0.7	0.41	332.25	332.00	CB8-DMH6
	DMH6	DMH7			1.460			0.89	7		7	6.0	5.36	12	58	0.015	4.74	6.04	13.6	6.83	331.90	331.00	DMH6-DMH7
	DMH7	DMH8		1.020		0.66	0.67		10		10	6.0	4.04	12	80	0.030	6.70	8.53	7.2	5.15	334.65	328.5	DMH7-DMH8
	CB16	DMH8		0.380		0.8	0.30		5		5	6.0	1.82	12	12	0.010	8.06	4.57	12.8	3.25	329	328.5	CB16-DMH8
	DMH8	DMH9		1.400		0.7	0.98		10		10	6.0	5.88	15	112	0.011	7.36	6.00	12.0	4.79	328.4	327.4	DMH8-DMH9
	DMH15	WALL	Outlet Based on TR-20 100-Year Storm										0.32	12	15	0.020	5.47	6.97	0.7	0.41	326.50	326.00	DMH15-WALL
	DMH9	WALL		0.860		0.65	0.56		10		15	6.0	3.35	15	12	0.011	7.36	6.00	6.8	2.73	328.40	327.40	DMH9-HW3
POND-1		BASIN	Q Values For Pond Outlet Based on TR-20 25-Year Storm									Q_{25}	0.45	15	30	0.038	9.92	8.09	0.7	0.37	322.75	322.00	15"HPDE -Settling Pond
POND-1		BASIN	Q Values For Pond Outlet Based on TR-20 100-Year Storm									Q100	5.62	15	30	0.038	9.92	8.09	8.5	4.58	322.75	322.00	15" HDPE -Settling Pond

Notes:
1) Runoff Coefficient C-Values used; Impervious(Pavement) C=0.90 Grass/OpenSpace C=0.20, Residential Suburban C=.25~.40, Mannings "n" HDPE n=0.012, RCP n=0.013
2) Rainfall Intensity I (in/hr) values taken from Figure 10-4 Intensity-Duration-Frequency Curve for Boston, Massachusetts, Mass Highway Design Manual.
3) Five (5) minute minimum flow time used for minimum time of concentration (Tc) to CB inlet to system
4) Massachusetts Cascade Grate Inlet Capacity = 1.26 cfs @ 100% efficiency, Standard Grate = 0.95 cfs as PL
5) Blue Highlight denotes calculated peak flow (cfs) to CB Inlet

3/25/2024

RATIONAL METHOD PIPE DESIGN WORKSHEET

LOCATION	PIPE SEGMENT From	To	INCREMENTAL AREA DESIGNATION	A (Acres)	Total A	C	C*A	Sum (C*A)	FLOW TIME (min.) To Inlet	In Chan.	Tot.	100-Yr I (in/hr)	100-Yr Q (cfs)	DESIGN CONDITIONS Pipe Diam (in.)	Length (ft)	Slope (%)	Q-full (cfs)	V-Full (fps)	Design (100-Yr) Depth Peak (in.)	V-Peak (fps)	Inverts Up	Down	Remarks
SITE TO BASIN2																							
	CB-12	DMH11		0.490		0.42	0.21		10		10	6.0	1.23	15	12	0.040	14.03	11.44	1.3	1.01	331.5	330.75	CB12-DMH11
	CB-13	DMH11		0.100		0.90	0.09		5		5	6.0	0.54	12	12	0.040	7.74	9.86	0.8	0.69	331.50	330.75	CB13-DMH11
	DMH11	DMH12			0.590			0.30	7		7	6.0	1.77	12	61	0.020	5.47	6.97	3.9	2.26	330.65	329.65	DMH11-DMH12
	DMH12	DMH13		0.590		0.66	0.39		10		10	6.0	2.34	12	106	0.050	8.65	11.02	3.2	2.98	329.55	328.35	DMH12-DMH13
	CB14	DMH16		0.088		0.9	0.08		5		5	6.0	0.48	12	34	0.020	8.06	4.57	12.8	3.25	330	329	CB14-DMH16
	CB15	DMH16		0.280		0.42	0.20	0.20	10		15	6.0	1.20	12	20	0.030	6.70	8.53	2.1	1.53	329.75	329	CB15-DMH16
	DMH16	DMH13		0.360		0.42	0.28		10		10	6.0	1.23	12	20	0.300	6.70	8.53	2.1	1.53	328.9	327.5000	DMH16-DMH13
	DMH13	HW2		0.960		0.45	0.43		10		15	6.0	2.59	12	72	0.023	5.87	7.47	5.3	3.30	327.25	327.00	DMH13-HW2
POND-2		BASIN	Q Values For Pond Outlet Based on TR-20 25-Year Storm									Q_{25}	0.46	15	20	0.038	13.58	11.07	1.4	1.01	322.00	321.50	15"HPDE -Settling Pond
POND-2		BASIN	Q Values For Pond Outlet Based on TR-20 100-Year Storm									Q100	4.56	15	20	0.038	13.58	11.07	5.0	3.72	322.00	321.50	15" HDPE -Settling Pond

Notes:

1) Runoff Coefficient C-Values used; Impervious(Pavement) C=0.90 Grass/OpenSpace C=0.20, Residential Suburban C=.25~.40, Manninga "n" HDPE n=0.012, RCP n=0.013
2) Rainfall Intensity I (in/hr) values taken from Figure 10-4 Intensity-Duration-Frequency Curve for Boston, Massachusetts, Mass Highway Design Manual.
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