



HMS * Summary of Results

Project : Morningside

Run Name : PR-10

Start of Run : 08Jun09 1200

Basin Model : PR

End of Run : 09Jun09 1200

Met. Model : 10-yr

Execution Time : 09Sep09 1409

Control Specs : Control 1

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
Sub-1	35.181	09 Jun 09 0126	9.5943	0.081
CVT_96	35.181	09 Jun 09 0126	9.5943	0.081
Sub-2	5.9998	09 Jun 09 0011	0.56163	0.005
J-1	35.889	09 Jun 09 0126	10.156	0.086
weir	35.889	09 Jun 09 0126	10.156	0.086
Sub-5	2.0779	09 Jun 09 0011	0.19761	0.002
DR_15105	2.0779	09 Jun 09 0011	0.19761	0.002
Primary	1.6300	08 Jun 09 1200	3.2331	
DR_15303	1.6300	08 Jun 09 1200	3.2331	0.000
Sub-4	1.1051	09 Jun 09 0008	0.094398	0.001
J-2	2.7351	09 Jun 09 0008	3.3275	0.001
DR_15304	2.7351	09 Jun 09 0008	3.3275	0.000
J-3	2.7351	09 Jun 09 0008	3.3275	0.000
DR_1730	2.7351	09 Jun 09 0008	3.3275	0.000
J-4	2.7351	09 Jun 09 0008	3.3275	0.000
DR_1731	2.7351	09 Jun 09 0008	3.3275	0.000
Sub-7	8.5545	09 Jun 09 0019	0.99188	0.008
J-5	12.568	09 Jun 09 0017	4.5170	0.010
DR_1737	12.568	09 Jun 09 0017	4.5170	0.000
Sub-8	15.421	09 Jun 09 0011	1.4348	0.011
Sub-9	12.458	09 Jun 09 0011	1.1570	0.008
POND	36.947	09 Jun 09 0016	7.0569	0.019
DR_1744	36.947	09 Jun 09 0016	7.0569	0.000
Secondaryv (Ghost)	34.258	09 Jun 09 0126	9.3727	0.081
Diversiion-1	34.258	09 Jun 09 0126	9.3727	0.081
Sub-3	9.2752	09 Jun 09 0011	0.87367	0.008
D-1	35.394	09 Jun 09 0126	10.246	0.089
Diversiion-2-4	35.394	09 Jun 09 0126	10.246	0.089
Sub-6	2.9766	09 Jun 09 0011	0.27928	0.002
D-2	35.753	09 Jun 09 0125	10.526	0.091
Diversiion-5	35.753	09 Jun 09 0125	10.526	0.091
Sub-10	6.2033	09 Jun 09 0011	0.57889	0.005
J-6	60.515	09 Jun 09 0015	18.161	0.005
no_name	60.515	09 Jun 09 0015	18.161	0.000
OUTFALL	60.515	09 Jun 09 0015	18.161	0.000

HMS * Summary of Results for POND

Project : Morningside Run Name : PR-10

Start of Run : 08Jun09 1200 Basin Model : PR
End of Run : 09Jun09 1200 Met. Model : 10-yr
Execution Time : 09Sep09 1409 Control Specs : Control 1

Computed Results

Peak Inflow : 39.640 (cfs) Date/Time of Peak Inflow : 09 Jun 09 0012
Peak Outflow : 36.947 (cfs) Date/Time of Peak Outflow : 09 Jun 09 0016
Total Inflow : (in) Peak Storage : 0.95092(ac-ft)
Total Outflow : (in) Peak Elevation : 10.817(ft)

Pipe I.D.	Downstream Pipe I.D.	Design Notes	Pipe Length (ft)	Approx. Slope (ft/ft) (min=0.005)	10-Yr Storm Peak Rate of Runoff (cfs)	Pipe Diam/ Culv Height (in)	n (exist 0.015 new 0.013)	Manning's Pipe Velocity (fps)	Manning's Pipe Capacity (cfs)	Sufficient Capacity (Manning's)	Orifice's Pipe Velocity (fps)	Orifice's Pipe Capacity (cfs)	Sufficient Capacity (Orifice)	Watershed Areas contributing to the flow in the pipe	DS Cover	US Cover	DS Invert	US Invert	DS Ground Elev	US Ground Elev
		Notation	L	S		D	n	V _m	Q _m		V _o	Q _o					ID	IU		
		Equation Used		(1)				(2)/(6)**	(3)**		(4)*	(5)*								

CVT_96	DR_15303/D-1	4' W x 2' H	40	0.0025	35.2	24	0.013	5.7	44.2	yes				1	2.40	1.38	10.20	10.30	14.60	13.68
DR_15303	DR_15304	Plate with 6" dia orifice to control inflow	104	0.0010	1.6	24	0.015	1.9	6.1	yes				1->2	2.37	2.50	10.00	10.10	14.37	14.60
DR_15304	DR_1730		185	0.0003	2.7	24	0.015	1.0	3.2	yes				1->2, 4	2.05	2.37	9.95	10.00	14.00	14.37
DR_1730	DR_1731		235	0.0004	2.7	24	0.015	1.3	4.0	yes				1->2, 4	1.40	2.05	9.85	9.95	13.25	14.00
DR_1731	DR_1737		228	0.0027	2.7	24	0.015	3.3	10.2	yes				1->2, 4	1.77	1.40	9.23	9.85	13.00	13.25
DR_15105	DR_1737		226	0.0065	2.1	12	0.015	3.2	2.5	yes				5	2.67	3.33	9.33	10.79	13.00	15.12
DR_1737	POND		336	0.0001	12.6	24	0.015	0.6	1.9	no	6.6	20.7	yes	1->2, 4->5, 7	0.00	1.77	9.20	9.23	11.20	13.00
DR_1744	no_name (outfall)	Elliptical (36"x60")	129	0.0111	36.9	36	0.015	9.9	116.6	yes				1->2, 4->5, 7->9	3.14	4.10	7.66	9.09	13.80	16.19

Diversion-1	Diversion-2	4' W x 2' H	29	0.0017	34.3	24	0.013	4.7	36.8	yes				1->2	1.85	2.50	10.05	10.10	13.90	14.60
Diversion-2	Diversion-3	4' W x 2' H	331	0.0017	35.4	24	0.013	4.6	36.0	yes				1->3	8.90	1.85	9.50	10.05	20.40	13.90
Diversion-3	Diversion-4	4' W x 2' H	89	0.0017	35.4	24	0.013	4.7	36.4	yes				1->3	11.65	8.90	9.35	9.50	23.00	20.40
Diversion-4	Diversion-5	4' W x 2' H	308	0.0017	35.4	24	0.013	4.6	36.0	yes				1->3	5.12	11.65	8.84	9.35	15.96	23.00
Diversion-5	no_name (outfall)	4' W x 2' H	308	0.0017	35.8	24	0.013	4.6	36.0	yes				1->3, 6	3.47	5.12	8.33	8.84	13.80	15.96

no_name	CHANNEL	OUTFALL - modeled as cleaned	155	0.0098	60.5	48	0.015	9.8	123.3	yes				1->10	0.00	2.14	6.14	7.66	10.14	13.80
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Orifice Sizing		
Q _{demand} (cfs)	35.89	from HMS
Orifice Dia (ft)	0.5	input
Q _{total} (cfs)	35.89	$= (1.486/n) * (W_{cul} * y) * ((W_{cul} * y) / (W_{cul} + 2 * y))^{2/3} * S_{cul}^{1/2} + 0.82 * \pi * (D_{orif}/2)^2 * (64.4 * (y - D_{orif}/2))^{1/2}$
Depth in MH [y] (ft)	1.85	= change depth so Total Q = Q demand
Q _{orifice} (cfs)	1.63	$= 0.82 * \pi * (D_{orif}/2)^2 * (64.4 * (y - D_{orif}/2))^{1/2}$
Q _{diversion} (cfs)	34.26	$= (1.486/n) * (W_{cul} * y) * ((W_{cul} * y) / (W_{cul} + 2 * y))^{2/3} * S_{cul}^{1/2}$

Equations Used:

- (1) $S = (IU-ID)/L$
- (2) $V_m = (1.486/n) * ((D/48)^{(2/3)}) * (S^{0.5})$
- (3) $Q_m = V_m * A$
- (4) $V_o = Q_o / A$
- (5) $Q_o = C_d * A * ((2 * g * h)^{0.5})$
- (6) $V_m [culv] = (1.486/n) * ((A/P_w)^{(2/3)}) * (S^{0.5})$

*When $V_m > 10$ fps then Q_o will be checked for capacity under orifice equation.

**When $V_m < 10$ fps then only Q_m and V_m should be used.

Diversion Culvert takes portion of runoff from Areas 1 & 2, and all runoff from Areas 3 & 6

User Input =	
HMS Results =	
Calculated =	
New/Replace =	

Hydraulic Gradeline Calculations

Morningside Drive - Greenwich, CT

Proposed - 10-Year Storm

Water Surface Elevation	10-Yr Storm Peak Rate of Runoff (cfs)	Surface Elev. @ Inlet	Surface Elev. @ Outlet	Pipe Segment	Pipe Length (ft)	Pipe Diam (in)	Area (sf)	HGL Slope	Freeboard (ft)
12.27	35.2	13.68	14.60	CVT_96	40	24	3.14	0.00158	1.4
12.21	*From Diversion-1								

12.32	1.6	14.60	14.37	DR_15303	104	24	3.14	0.00007	2.3
12.31	2.7	14.37	14.00	DR_15304	185	24	3.14	0.00019	2.1
12.28	2.7	14.00	13.25	DR_1730	235	24	3.14	0.00019	1.7
12.23	2.7	13.25	13.00	DR_1731	228	24	3.14	0.00019	1.0
13.21	2.1	15.12	13.00	DR_15105	226	12	0.79	0.00450	1.9
12.19	12.6	13.00	11.20	DR_1737	336	24	3.14	0.00409	0.8
10.82	*Starting Water Surface Elevation - From Pond (Developed in HEC-HMS)								

12.21	34.3	14.60	13.90	Diversion-1	29	-	7.80	0.00149	2.4
12.17	35.4	13.90	20.40	Diversion-2	331	-	7.80	0.00159	1.7
11.64	35.4	20.40	23.00	Diversion-3	89	-	7.80	0.00159	8.8
11.50	35.4	23.00	15.96	Diversion-4	308	-	7.80	0.00159	11.5
11.01	35.8	15.96	13.80	Diversion-5	308	-	7.80	0.00163	5.0
10.50	*From no_name (outfall)								

10.65	36.9	16.19	13.80	DR_1744	129	36	11.78	0.00111	5.5
10.50	60.5	13.80	10.14	no_name	155	48	12.57	0.00235	3.3
10.14	*Starting Water Surface Elevation - Assume D/S crown of no_name (outfall)								

$$\text{HGL SLOPE} = ((Q*n)/(1.486*A*R_h^{2/3}))^2$$