

# DRAINAGE ANALYSIS

FOR  
Site Plan – Senior Village  
**Panther Way and West Central Street**

LOCATED IN  
FRANKLIN, MASSACHUSETTS

PREPARED FOR  
Camford Property Group, LLC  
37 East Central Street  
Franklin, MA 02038

PREPARED BY  
UNITED CONSULTANTS, INC.  
850 FRANKLIN STREET, SUITE 11D  
WRENTHAM, MA. 02093

DATE: December 13, 2024  
Revised June 20, 2025  
Revised August 8, 2025



*Carlos A. Quintal*  
8/20/25

## **Table of Contents**

Appendix A	-	Narrative Description
Appendix B	-	Pre-development vs Post-development Rate and Volume of Runoff
Appendix C	-	Pre-development Drainage Analysis
Appendix D	-	Post-development Drainage Analysis
Appendix E	-	TSS Removal Worksheet, De minimus Calculations and Manufacturers TSS Removal Worksheets
Appendix F	-	Permeability Calculations Soil Logs, SCS Soil Map and Information
Appendix G	-	Checklist for Designers
Appendix H	-	Checklist for Storm-Water Report and Stormwater Facilities Plan
Appendix I	-	Operation and Maintenance Plan - Sample Maintenance Log
Appendix J	-	Draft Illicit Discharge Statement
Appendix K	-	Riprap sizing calculations
Appendix L	-	Watershed Plans

## **APPENDIX A**

## I. DESCRIPTION

This report is offered in support of the stormwater management system designed for the "Site Plan – Panther Way – Senior Village in Franklin, Massachusetts. This project included the construction of 44 residential units as well as a mixed use building including commercial uses and apartments. The site was partially developed with a building which included parking areas and utilities and a stormwater system. The stormwater analysis at the time of the original project permitting process includes rainfall values from TP-40. We have now revised the rainfall values and have included the NOAA-Atlas -14 .

The primary goals of the stormwater system are to collect the stormwater runoff generated from the proposed driveways, parking areas, and buildings. The stormwater will be directed to one of four infiltration ponds. Infiltration Pond 1 is an underground infiltration area located to the front of the existing building. Pond 2 is an open pond which was constructed as part of the original development project. This pond will now receive flow as well as overflow from the proposed development. Pond 2 and Pond 3 receive flow from the proposed project driveway drainage system and after treatment provide for storage and infiltration. Pond 5 receives flow from the lots located to the north of the main driveway. An overflow is included from Ponds 3 and 5 which directs the stormwater overflow to Pond 2. Both the pre-development and post-development conditions flowing offsite are summarized in Appendix B.

## II. Purpose

The purpose of this report is to examine the hydrological and hydraulic aspects of the proposed Panther Way – Senior Village" Site Plan. This report was developed for review by the Town of Franklin Planning Board and Conservation Commission to obtain the necessary permits to allow the project to proceed.

This report considers the overall hydrological impact of proposed additional development upon the local watersheds with specific emphasis directed toward the adjacent and immediate downstream areas. The hydrology and criteria are consistent with the Town of Franklin Planning Board, Franklin Conservation Commission and Mass DEP Storm Water Management Policies.

## III. Pre-Development Conditions

The site consists of three parcels of land containing 800,948+/- square feet of land, when combined, and is located off of Panther Way and West Central Street in Franklin. A portion of the site is currently developed with an existing building and paved parking areas, lawn and landscaping. The upland soils for the site were taken from the soil survey of Norfolk and Suffolk counties. Additionally, soil test was conducted to determine the Hydrologic soil group of the western portion of the site. This testing was used to determine the HSG was a B soil which has been used in the evaluation. Refer to the site plan for the location and soil types. Soil testing was conducted on the site to determine soil types and permeability rates. See the soil logs and permeability test results located in Appendix F. Permeability test was completed on site and the infiltration rate used for the design are based on the Rawls rate for sand. Utilizing a Hydrocad computer model the pre-development and post development conditions were calculated. This included an analysis of the watershed utilizing a Hydrologic soil group A or B. A comparison of the pre-development vs. post development rate and volume of runoff can be found in Appendix B.

## IV. Post Development Conditions

The proposed development will consist of the construction of a mixed-use building and residential housing units. The proposed buildings will be accessed by private driveways and parking areas. The driveways will be captured in deep sump hooded catch basing and will be piped to water quality units and then directed to the three underground infiltration pond or the open pond. The proposed infiltration

system will promote groundwater re-charge as required by the Town of Franklin Stormwater Regulations. Municipal utility connections are also included in the project. The proposal is to service the buildings with town water and sewer. The project design includes the construction of one main site driveway and a connection driveway to the exiting commercial site. TSS removal will be accomplished by a treatment train. The site will be treated by deep sump hooded catch basins, water quality units and four infiltration ponds. Utilizing the same computer model as the existing conditions we have modeled the changes in surfaces and ground cover and have calculated the post development conditions. All calculations for the above have been included in this report. Pre-development calculations are in Appendix C. Post-development calculations are in Appendix D.

## V. Conclusion

Stormwater from the existing and proposed parking areas and driveways will be captured by the catch basins and water quality units for TSS removal which will then be directed to the three underground infiltration ponds and one open pond. The existing and proposed roofs will be captured and directed to an underground infiltration pond. The comparison in Appendix B summarizes the rate and volumes of runoff leaving the site in both the pre-development and post-development conditions.

## VI. Stormwater Management Standards

Refer to Checklist for Stormwater Report in Appendix H

### **Town of Franklin Stormwater Management Bylaw – Chapter 153 – Bylaw Amendment 21-867**

Impervious Coverage Entire Site site =

1" x 276,371 sq. ft. impervious = 23,031 cubic feet (Required)

Storage in Pond 1 – Pond 5 below the outlet invert = 34,843 cubic feet (Provided)

**This narrative is for the Panther Way Site Plan – Senior Housing Development located on Panther Way and West Central Street.**

### **LID Measures**

- No disturbance is proposed to any Wetland Resource Area.
- Existing Vegetation Removal within the buffer zone is minimal.
- 

### **Standard 1: No New Untreated Discharges**

No new untreated discharges are proposed.

A stormwater system has been provided or is proposed which will provide the required TSS removal which includes the installation of deep sump hooded catch basins, water quality units and five infiltration basins.

### **Standard 2: Peak Rate Attenuation**

The drainage system has been designed to match or reduce the rate of storm-water runoff from the site when comparing the pre-development conditions to the post development conditions. See Appendix B of this report for a summary of the design storms.

### Standard 3: Recharge

- Soil testing has been completed. See Appendix F or this report for permeability test results and sheet 4 for soil testing information. Additional soil testing can be found on the plan sheets.

- Drawdown within 72 hours

Pond 1

Storage Volume below outlet = 4,375 cubic feet

Time =  $(4,375) / (14.76''/\text{hr} \times 1'/12'' \times 5,214 \text{ sf.}) = 0.68 \text{ hours} < 72 \text{ hours}$

Pond 2

Storage Volume below outlet = 12,620 cubic feet

Time =  $(12,620) / (23.85''/\text{hr} \times 1'/12'' \times 10,086 \text{ sf.}) = 0.63 \text{ hours} < 72 \text{ hours}$

Pond 3

Storage Volume below outlet = 9,626 cubic feet

Time =  $(9,636) / (13.60''/\text{hr} \times 1'/12'' \times 4,009 \text{ sf.}) = 1.66 \text{ hours} < 72 \text{ hours}$

Pond 5

Storage Volume below outlet = 8,222 cubic feet

Time =  $(8,222) / (14.90''/\text{hr} \times 1'/12'' \times 3,432 \text{ sf.}) = 1.93 \text{ hours} < 72 \text{ hours}$

See Stage Area-Storage tables this appendix.

### Standard 4: Water Quality

- The owner will be responsible for compliance with standard four requirements.
- Refer to the Operation and Maintenance Plan and the Storm-water Facilities Plan for the Inspection and Maintenance Schedule and the Operation and Maintenance Schedule.
- See Appendix B for the Manufactures TSS removal rate. The site is not located within a zone II. The Infiltration Ponds have been designed with an infiltration rate of 8.27 inches per hour. This led to the Water Quality unit being modeled with a 1" WQV.
- The proposed project will include a Water Quality Unit which will provide TSS removal. The summary of the Manufacturers' Predicted Net Annual results as well as the TSS Removal Worksheet are included.

Water Quality Volumes for Ponds 1, 2, 3 and 5

Pond 1

$48,773 \times 1/12 = 4,064 \text{ cubic feet (Required)}$

Storage Volume below outlet = 4,375 cubic feet provided

Pond 2

$150,722 \times 1/12 = 12,560 \text{ cubic feet (Required)}$

Storage Volume below outlet = 12,620 cubic feet provided

Pond 3

$53,525 \times 1/12 = 4,460 \text{ cubic feet (Required)}$

Storage Volume below outlet = 9,626 cubic feet provided

Pond 5

$18,940 \times 1/12 = 1,578 \text{ cubic feet (Required)}$

Storage Volume below outlet = 8,222 cubic feet provided

**Standard 5: Land uses with higher potential pollutant loads**

None proposed for Lot 2.

**Standard 6: Critical Areas**

N/A

**Standard 7: Re-developments and Other Projects**

N/A

**Standard 8: Construction Period Pollution Prevention and Erosion Sedimentation Control**

- Refer to Site Plans for the Inspection and Maintenance Schedule and the Operation and Maintenance Schedule.
- The project will be covered by an NPDES Construction General Permit.

**Standard 9: Operation and Maintenance Plan**

- Refer to Site Plans for the Inspection and Maintenance Schedule and the Operation and Maintenance Schedule.
- The owner will be responsible for the storm-water management system, implementation of the operation and maintenance, the maintenance costs, and completion of the maintenance logs.

**Standard 10: Prohibition of Illicit Discharges**

- Owner to be responsible for compliance with avoiding illicit discharges.
- The site will be connected to the town sewer system.

## Stage-Area-Storage for Pond 1P: POND 1 (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
244.79	5,214	2,512	245.31	5,214	4,413
244.80	5,214	2,546	245.32	5,214	4,451
244.81	5,214	2,581	245.33	5,214	4,489
244.82	5,214	2,615	245.34	5,214	4,527
244.83	5,214	2,650	245.35	5,214	4,565
244.84	5,214	2,685	245.36	5,214	4,603
244.85	5,214	2,720	245.37	5,214	4,641
244.86	5,214	2,755	245.38	5,214	4,679
244.87	5,214	2,790	245.39	5,214	4,717
244.88	5,214	2,825	245.40	5,214	4,755
244.89	5,214	2,860	245.41	5,214	4,793
244.90	5,214	2,896	245.42	5,214	4,831
244.91	5,214	2,931	245.43	5,214	4,869
244.92	5,214	2,967	245.44	5,214	4,907
244.93	5,214	3,003	245.45	5,214	4,945
244.94	5,214	3,039	245.46	5,214	4,983
244.95	5,214	3,075	245.47	5,214	5,021
244.96	5,214	3,111	245.48	5,214	5,059
244.97	5,214	3,147	245.49	5,214	5,097
244.98	5,214	3,183	245.50	5,214	5,135
244.99	5,214	3,219	245.51	5,214	5,173
245.00	5,214	3,258	245.52	5,214	5,211
245.01	5,214	3,292	245.53	5,214	5,248
245.02	5,214	3,329	245.54	5,214	5,286
245.03	5,214	3,365	245.55	5,214	5,324
245.04	5,214	3,402	245.56	5,214	5,362
245.05	5,214	3,439	245.57	5,214	5,400
245.06	5,214	3,476	245.58	5,214	5,438
245.07	5,214	3,513	245.59	5,214	5,476
245.08	5,214	3,550	245.60	5,214	5,513
245.09	5,214	3,587	245.61	5,214	5,551
245.10	5,214	3,624	245.62	5,214	5,589
245.11	5,214	3,661	245.63	5,214	5,626
245.12	5,214	3,698	245.64	5,214	5,664
245.13	5,214	3,735	245.65	5,214	5,702
245.14	5,214	3,773	245.66	5,214	5,739
245.15	5,214	3,810	245.67	5,214	5,777
245.16	5,214	3,847	245.68	5,214	5,814
245.17	5,214	3,885	245.69	5,214	5,851
245.18	5,214	3,922	245.70	5,214	5,889
245.19	5,214	3,960	245.71	5,214	5,926
245.20	5,214	3,997	245.72	5,214	5,963
245.21	5,214	4,035	245.73	5,214	6,001
245.22	5,214	4,073	245.74	5,214	6,038
245.23	5,214	4,110	245.75	5,214	6,075
245.24	5,214	4,148	245.76	5,214	6,112
245.25	5,214	4,186	245.77	5,214	6,149
245.26	5,214	4,224	245.78	5,214	6,186
245.27	5,214	4,261	245.79	5,214	6,222
245.28	5,214	4,299	245.80	5,214	6,259
245.29	5,214	4,337	245.81	5,214	6,296
245.30	5,214	4,375	245.82	5,214	6,333

Stage-Area-Storage for Pond 2P: POND 2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
249.00	10,086	0	250.04	11,332	11,137
249.02	10,110	202	250.06	11,356	11,364
249.04	10,134	404	250.08	11,381	11,591
249.06	10,158	607	250.10	11,405	11,819
249.08	10,182	811	250.12	11,430	12,047
249.10	10,206	1,015	250.14	11,454	12,276
249.12	10,230	1,219	250.16	11,479	12,505
249.14	10,254	1,424	250.18	11,503	12,735
249.16	10,278	1,629	250.20	11,528	12,966
249.18	10,301	1,835	250.22	11,552	13,196
249.20	10,325	2,041	250.24	11,577	13,428
249.22	10,349	2,248	250.26	11,601	13,659
249.24	10,373	2,455	250.28	11,626	13,892
249.26	10,397	2,663	250.30	11,650	14,125
249.28	10,421	2,871	250.32	11,675	14,358
249.30	10,445	3,080	250.34	11,699	14,591
249.32	10,469	3,289	250.36	11,724	14,826
249.34	10,493	3,498	250.38	11,748	15,060
249.36	10,517	3,709	250.40	11,773	15,296
249.38	10,541	3,919	250.42	11,797	15,531
249.40	10,565	4,130	250.44	11,822	15,768
249.42	10,589	4,342	250.46	11,846	16,004
249.44	10,613	4,554	250.48	11,871	16,241
249.46	10,637	4,766	250.50	11,895	16,479
249.48	10,661	4,979	250.52	11,920	16,717
249.50	10,685	5,193	250.54	11,944	16,956
249.52	10,708	5,407	250.56	11,969	17,195
249.54	10,732	5,621	250.58	11,993	17,435
249.56	10,756	5,836	250.60	12,018	17,675
249.58	10,780	6,051	250.62	12,042	17,915
249.60	10,804	6,267	250.64	12,067	18,156
249.62	10,828	6,483	250.66	12,091	18,398
249.64	10,852	6,700	250.68	12,116	18,640
249.66	10,876	6,917	250.70	12,140	18,883
249.68	10,900	7,135	250.72	12,165	19,126
249.70	10,924	7,353	250.74	12,189	19,369
249.72	10,948	7,572	250.76	12,214	19,613
249.74	10,972	7,791	250.78	12,238	19,858
249.76	10,996	8,011	250.80	12,263	20,103
249.78	11,020	8,231	250.82	12,287	20,348
249.80	11,044	8,452	250.84	12,312	20,594
249.82	11,068	8,673	250.86	12,336	20,841
249.84	11,091	8,895	250.88	12,361	21,088
249.86	11,115	9,117	250.90	12,385	21,335
249.88	11,139	9,339	250.92	12,410	21,583
249.90	11,163	9,562	250.94	12,434	21,832
249.92	11,187	9,786	250.96	12,459	22,080
249.94	11,211	10,010	250.98	12,483	22,330
249.96	11,235	10,234	251.00	12,508	22,580
249.98	11,259	10,459	251.02	12,532	22,830
250.00	11,283	10,685	251.04	12,556	23,081
250.02	11,307	10,910	251.06	12,581	23,332

250.17  
12,121

## Stage-Area-Storage for Pond 3P: POND 3 (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
277.72	4,009	7,340	278.24	4,009	8,877
277.73	4,009	7,370	278.25	4,009	8,907
277.74	4,009	7,400	278.26	4,009	8,936
277.75	4,009	7,429	278.27	4,009	8,965
277.76	4,009	7,459	278.28	4,009	8,994
277.77	4,009	7,489	278.29	4,009	9,023
277.78	4,009	7,519	278.30	4,009	9,052
277.79	4,009	7,549	278.31	4,009	9,081
277.80	4,009	7,579	278.32	4,009	9,110
277.81	4,009	7,608	278.33	4,009	9,139
277.82	4,009	7,638	278.34	4,009	9,167
277.83	4,009	7,668	278.35	4,009	9,196
277.84	4,009	7,698	278.36	4,009	9,225
277.85	4,009	7,727	278.37	4,009	9,254
277.86	4,009	7,757	278.38	4,009	9,283
277.87	4,009	7,787	278.39	4,009	9,312
277.88	4,009	7,817	278.40	4,009	9,340
277.89	4,009	7,846	278.41	4,009	9,369
277.90	4,009	7,876	278.42	4,009	9,398
277.91	4,009	7,906	278.43	4,009	9,426
277.92	4,009	7,935	278.44	4,009	9,455
277.93	4,009	7,965	278.45	4,009	9,483
277.94	4,009	7,995	278.46	4,009	9,512
277.95	4,009	8,024	278.47	4,009	9,540
277.96	4,009	8,054	278.48	4,009	9,569
277.97	4,009	8,084	278.49	4,009	9,597
277.98	4,009	8,113	278.50	4,009	9,626
277.99	4,009	8,143	278.51	4,009	9,654
278.00	4,009	8,172	278.52	4,009	9,682
278.01	4,009	8,202	278.53	4,009	9,711
278.02	4,009	8,232	278.54	4,009	9,739
278.03	4,009	8,261	278.55	4,009	9,767
278.04	4,009	8,291	278.56	4,009	9,795
278.05	4,009	8,320	278.57	4,009	9,823
278.06	4,009	8,350	278.58	4,009	9,852
278.07	4,009	8,379	278.59	4,009	9,880
278.08	4,009	8,409	278.60	4,009	9,908
278.09	4,009	8,438	278.61	4,009	9,936
278.10	4,009	8,467	278.62	4,009	9,964
278.11	4,009	8,497	278.63	4,009	9,992
278.12	4,009	8,526	278.64	4,009	10,019
278.13	4,009	8,556	278.65	4,009	10,047
278.14	4,009	8,585	278.66	4,009	10,075
278.15	4,009	8,614	278.67	4,009	10,103
278.16	4,009	8,644	278.68	4,009	10,130
278.17	4,009	8,673	278.69	4,009	10,158
278.18	4,009	8,702	278.70	4,009	10,186
278.19	4,009	8,731	278.71	4,009	10,213
278.20	4,009	8,761	278.72	4,009	10,241
278.21	4,009	8,790	278.73	4,009	10,268
278.22	4,009	8,819	278.74	4,009	10,296
278.23	4,009	8,848	278.75	4,009	10,323

## Stage-Area-Storage for Pond 5P: POND 5 (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
268.82	3,432	6,271	269.34	3,432	7,583
268.83	3,432	6,297	269.35	3,432	7,608
268.84	3,432	6,322	269.36	3,432	7,633
268.85	3,432	6,347	269.37	3,432	7,658
268.86	3,432	6,373	269.38	3,432	7,683
268.87	3,432	6,398	269.39	3,432	7,707
268.88	3,432	6,424	269.40	3,432	7,732
268.89	3,432	6,449	269.41	3,432	7,757
268.90	3,432	6,475	269.42	3,432	7,782
268.91	3,432	6,500	269.43	3,432	7,806
268.92	3,432	6,525	269.44	3,432	7,831
268.93	3,432	6,551	269.45	3,432	7,856
268.94	3,432	6,576	269.46	3,432	7,880
268.95	3,432	6,602	269.47	3,432	7,905
268.96	3,432	6,627	269.48	3,432	7,929
268.97	3,432	6,652	269.49	3,432	7,954
268.98	3,432	6,678	269.50	3,432	7,979
268.99	3,432	6,703	269.51	3,432	8,003
269.00	3,432	6,729	269.52	3,432	8,027
269.01	3,432	6,754	269.53	3,432	8,052
269.02	3,432	6,779	269.54	3,432	8,076
269.03	3,432	6,805	269.55	3,432	8,101
269.04	3,432	6,830	269.56	3,432	8,125
269.05	3,432	6,855	269.57	3,432	8,149
269.06	3,432	6,881	269.58	3,432	8,174
269.07	3,432	6,906	269.59	3,432	8,198
269.08	3,432	6,931	269.60	3,432	8,222
269.09	3,432	6,956	269.61	3,432	8,246
269.10	3,432	6,982	269.62	3,432	8,271
269.11	3,432	7,007	269.63	3,432	8,295
269.12	3,432	7,032	269.64	3,432	8,319
269.13	3,432	7,057	269.65	3,432	8,343
269.14	3,432	7,083	269.66	3,432	8,367
269.15	3,432	7,108	269.67	3,432	8,391
269.16	3,432	7,133	269.68	3,432	8,415
269.17	3,432	7,158	269.69	3,432	8,439
269.18	3,432	7,183	269.70	3,432	8,463
269.19	3,432	7,208	269.71	3,432	8,487
269.20	3,432	7,233	269.72	3,432	8,511
269.21	3,432	7,259	269.73	3,432	8,535
269.22	3,432	7,284	269.74	3,432	8,558
269.23	3,432	7,309	269.75	3,432	8,582
269.24	3,432	7,334	269.76	3,432	8,606
269.25	3,432	7,359	269.77	3,432	8,629
269.26	3,432	7,384	269.78	3,432	8,653
269.27	3,432	7,409	269.79	3,432	8,677
269.28	3,432	7,434	269.80	3,432	8,700
269.29	3,432	7,459	269.81	3,432	8,724
269.30	3,432	7,484	269.82	3,432	8,747
269.31	3,432	7,509	269.83	3,432	8,771
269.32	3,432	7,534	269.84	3,432	8,794
269.33	3,432	7,559	269.85	3,432	8,818

## **APPENDIX B**

## Pre-Development vs. Post Development Rate and Volume of Runoff

This analysis was prepared to show the summary of the pre-development and post development rate and volume of runoff as required by the Town of Franklin Storm-water Requirements.

The pre-development watershed area 1 is located to the middle portion of the site with a discharge to Panther Way. Post-development Link 1L was provided to combine the outlet control structure from Pond 2 and the piped outlet from Pond 1 with the undeveloped area which discharge to Panther Way. A comparison of the rate and volume for pre-development area 1S and post-development Link 1L is provided below:

2-year storm event (CFS)			2 year storm event (A.F.)		
Pre		Post	Pre		Post
1S	vs	1L	1S	vs	1L
0.13		0.01	0.083		0.003

10 year storm event (CFS)			10 year storm event (A.F.)		
Pre		Post	Pre		Post
1S	vs	1L	1S	vs	1L
2.76		0.17	0.585		0.031

100 year storm event (CFS)			100 year storm event (A.F.)		
Pre		Post	Pre		Post
1S	vs	1L	1S	vs	1L
14.24		11.07	2.006		0.728

The pre-development watershed area 2S is located to the north portion of the site with a discharge to the Highwood Condominiums. Post-development Sub-catchment 52S was included to show the reduced discharge to the Highwood Condominiums. A comparison of the rate and volume for pre-development area 2S and post-development 52S is provided below:

2-year storm event (CFS)			2 year storm event (A.F.)		
Pre		Post	Pre		Post
2S	vs	52S	2S	vs	52S
0.00		0.00	0.000		0.000

10 year storm event (CFS)			10 year storm event (A.F.)		
Pre		Post	Pre		Post
2S	vs	52S	2S	vs	52S
0.01		0.01	0.006		0.003

100 year storm event (CFS)			100 year storm event (A.F.)		
Pre		Post	Pre		Post
2S	vs	52S	2S	vs	52S
0.38		0.15	0.081		0.015

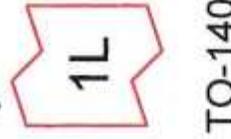
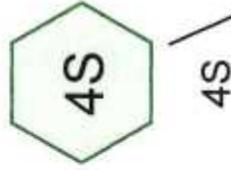
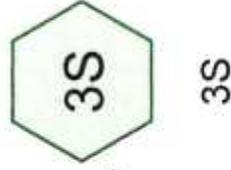
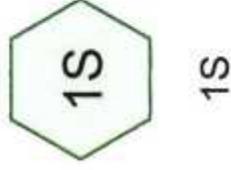
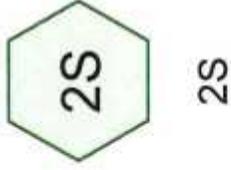
The pre-development watershed areas 3S and 4S are directed to West Central Street and have been combined into Line 1L (To 140) Post-development watershed 52S and 54S are directed to West Central Street and have been combined into Link 54L. A comparison of the rate and volume for pre-development area 1S and post-development Link 1L is provided below:

2-year storm event (CFS)			2 year storm event (A.F.)		
Pre		Post	Pre		Post
1L	vs	54L	1L	vs	54L
0.45		0.38	0.086		0.072
10 year storm event (CFS)			10 year storm event (A.F.)		
Pre		Post	Pre		Post
1L	vs	54L	1L	vs	54L
3.20		2.65	0.316		0.267
100 year storm event (CFS)			100 year storm event (A.F.)		
Pre		Post	Pre		Post
1L	vs	54L	1L	vs	54L
10.13		8.55	0.872		0.744

\*No changes or a reduction in both the rate of runoff and volume of runoff for the 2 year, 10 year and 100 year storm events have been realized.

Pre-development areas 3S and 4S were included as the discharge from these areas was directed away from the development. Based on post-development conditions these areas are now included in the developments stormwater system and have been included in the post-development areas.

## **APPENDIX C**



**Drainage Diagram for UC1378-PRE-NOV-2024**

Prepared by {enter your company name here} 8/20/2025  
HydroCAD® 8.00 s/n 001535 © 2006 HydroCAD Software Solutions LLC

**Area Listing (all nodes)**

<u>Area (acres)</u>	<u>CN</u>	<u>Description (subcats)</u>
7.486	30	Woods, Good, HSG A (1S,2S,3S)
9.991	55	Woods, Good, HSG B (1S,2S,3S,4S)
0.740	76	Gravel roads, HSG A (1S)
<hr/>		
18.217		

## **2 YR PRE-DEVELOPMENT**

**Subcatchment 1S: 1S**

Runoff = 0.13 cfs @ 15.06 hrs, Volume= 0.083 af, Depth= 0.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
32,213	76	Gravel roads, HSG A
231,397	30	Woods, Good, HSG A
278,160	55	Woods, Good, HSG B
541,770	46	Weighted Average
541,770		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0630	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.25"
2.6	197	0.0660	1.28		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	68	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.5	107	0.0560	1.18		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.7	55	0.0730	1.35		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.8	63	0.0630	1.25		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.0	200	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.8	96	0.1670	2.04		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
4.0	180	0.0220	0.74		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.6	204	0.0680	1.30		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	68	0.0290	0.85		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.9	112	0.1700	2.06		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.1	140	0.0180	2.16		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
28.3	1,540	Total			

**Subcatchment 2S: 2S**

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
64,758	30	Woods, Good, HSG A
4,438	55	Woods, Good, HSG B
69,196	32	Weighted Average
69,196		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.1180	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.25"
0.3	38	0.1580	1.99		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.3	34	0.1180	1.72		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.4	31	0.0850	1.27		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.0	92	0.0230	0.76		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	47	0.0350	0.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.1	12	0.1670	2.04		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
9.9	304	Total			

**Subcatchment 3S: 3S**

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
29,937	30	Woods, Good, HSG A
2,732	55	Woods, Good, HSG B
32,669	32	Weighted Average
32,669		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC

**Subcatchment 4S: 4S**

Runoff = 0.45 cfs @ 12.36 hrs, Volume= 0.086 af, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
149,899	55	Woods, Good, HSG B
149,899		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1140	0.14		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.25"
1.7	168	0.1150	1.70		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.6	145	0.0970	1.56		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
9.4	363	Total			

**Link 1L: TO-140**

Inflow Area = 4.191 ac, Inflow Depth = 0.25" for 2YR-NOAA event  
 Inflow = 0.45 cfs @ 12.36 hrs, Volume= 0.086 af  
 Primary = 0.45 cfs @ 12.36 hrs, Volume= 0.086 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

## **10 YR PRE-DEVELOPMENT**

**Subcatchment 1S: 1S**

Runoff = 2.76 cfs @ 12.58 hrs, Volume= 0.585 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
32,213	76	Gravel roads, HSG A
231,397	30	Woods, Good, HSG A
278,160	55	Woods, Good, HSG B
541,770	46	Weighted Average
541,770		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0630	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.25"
2.6	197	0.0660	1.28		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	68	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.5	107	0.0560	1.18		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.7	55	0.0730	1.35		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.8	63	0.0630	1.25		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.0	200	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.8	96	0.1670	2.04		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
4.0	180	0.0220	0.74		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.6	204	0.0680	1.30		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	68	0.0290	0.85		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.9	112	0.1700	2.06		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.1	140	0.0180	2.16		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
28.3	1,540	Total			

**Subcatchment 2S: 2S**

Runoff = 0.01 cfs @ 16.95 hrs, Volume= 0.006 af, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
84,758	30	Woods, Good, HSG A
4,438	55	Woods, Good, HSG B
69,196	32	Weighted Average
69,196		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.1180	0.14		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.25"
0.3	38	0.1580	1.99		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.3	34	0.1180	1.72		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.4	31	0.0650	1.27		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.0	92	0.0230	0.76		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.8	47	0.0350	0.94		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.1	12	0.1670	2.04		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
9.9	304	Total			

**Subcatchment 3S: 3S**

Runoff = 0.00 cfs @ 16.94 hrs, Volume= 0.003 af, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
29,937	30	Woods, Good, HSG A
2,732	55	Woods, Good, HSG B
32,669	32	Weighted Average
32,669		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>

**Subcatchment 4S: 4S**

Runoff = 3.20 cfs @ 12.15 hrs, Volume= 0.313 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
149,899	55	Woods, Good, HSG B
149,899		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1140	0.14		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.25"
1.7	168	0.1150	1.70		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.6	145	0.0970	1.56		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
9.4	363	Total			

**Link 1L: TO-140**

Inflow Area = 4.191 ac, Inflow Depth = 0.90" for 10YR-NOAA event  
 Inflow = 3.20 cfs @ 12.15 hrs, Volume= 0.316 af  
 Primary = 3.20 cfs @ 12.15 hrs, Volume= 0.316 af, Atten= 0%, Lag= 0.0 min

Primary outflow = inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

## **100 YR PRE-DEVELOPMENT**

**Subcatchment 1S: 1S**

Runoff = 14.24 cfs @ 12.45 hrs, Volume= 2.006 af, Depth= 1.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
32,213	76	Gravel roads, HSG A
231,397	30	Woods, Good, HSG A
278,160	55	Woods, Good, HSG B
541,770	46	Weighted Average
541,770		Pervious Area

To (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.7	50	0.0630	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.25"
2.6	197	0.0660	1.28		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	68	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.5	107	0.0560	1.18		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.7	55	0.0730	1.35		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.8	63	0.0630	1.25		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
3.0	200	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.8	96	0.1670	2.04		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
4.0	180	0.0220	0.74		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.6	204	0.0660	1.30		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.3	68	0.0290	0.85		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.9	112	0.1700	2.06		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.1	140	0.0180	2.16		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
28.3	1,540	Total			

**Subcatchment 2S: 2S**

Runoff = 0.38 cfs @ 12.40 hrs, Volume= 0.081 af, Depth= 0.61"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
 Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
64,758	30	Woods, Good, HSG A
4,438	55	Woods, Good, HSG B
69,196	32	Weighted Average
69,196		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.1180	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.25"
0.3	38	0.1580	1.99		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.3	34	0.1180	1.72		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.4	31	0.0650	1.27		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
2.0	92	0.0230	0.76		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	47	0.0350	0.94		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.1	12	0.1670	2.04		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
9.9	304	Total			

**Subcatchment 3S: 3S**

Runoff = 0.18 cfs @ 12.34 hrs, Volume= 0.038 af, Depth= 0.61"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
29,937	30	Woods, Good, HSG A
2,732	55	Woods, Good, HSG B
32,669	32	Weighted Average
32,669		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC

**Subcatchment 4S: 4S**

Runoff = 10.03 cfs @ 12.14 hrs, Volume= 0.834 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
149,899	55	Woods, Good, HSG B
149,899		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1140	0.14		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.25"
1.7	168	0.1150	1.70		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
1.6	145	0.0970	1.56		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
9.4	363	Total			

**Link 1L: TO-140**

Inflow Area = 4.191 ac, Inflow Depth = 2.50" for 100YR-noaa event  
 Inflow = 10.13 cfs @ 12.14 hrs, Volume= 0.872 af  
 Primary = 10.13 cfs @ 12.14 hrs, Volume= 0.872 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs

## **APPENDIX D**

**Area Listing (all nodes)**

<u>Area (acres)</u>	<u>CN</u>	<u>Description (subcats)</u>
0.668	30	Woods, Good, HSG A (18S,52S,53S)
3.512	39	>75% Grass cover, Good, HSG A (2S,5S,6S,7S,8S,9S,10S,11S,12S,13S,14S,15S,17S,18S)
3.494	55	Woods, Good, HSG B (12S,51S,52S,53S,54S)
3.868	61	>75% Grass cover, Good, HSG B (10S,12S,34S,35S,36S,37S,38S,39S,40S,41S,42S,43S,44S)
6.345	98	Paved parking & roofs (1S,2S,4S,5S,6S,7S,8S,9S,10S,11S,12S,13S,14S,17S,18S,20S,21S,22S)
0.330	98	Pond (17S)
<hr/>		
18.217		

## **2 YR POST-DEVELOPMENT**

**Subcatchment 1S: CB1**

Runoff = 0.70 cfs @ 12.09 hrs, Volume= 0.057 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
9,594	98	Paved parking & roofs
9,594		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	62	0.0100	4.91	3.86	<b>Circular Channel (pipe), CB1-DMH1</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.8					<b>Direct Entry,</b>
6.0	62	Total			

**Subcatchment 2S: CB2**

Runoff = 1.06 cfs @ 12.09 hrs, Volume= 0.087 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
14,408	98	Paved parking & roofs
122	39	>75% Grass cover, Good, HSG A
14,530	98	Weighted Average
122		Pervious Area
14,408		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0	10	0.0100	4.91	3.86	<b>Circular Channel (pipe), CB2-DMH2</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0					<b>Direct Entry, MIN. TC</b>
6.0	10	Total			

**Subcatchment 4S: CB4**

Runoff = 0.55 cfs @ 12.09 hrs, Volume= 0.045 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
7,554	98	Paved parking & roofs
7,554		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0	13	0.0100	4.91	3.86	Circular Channel (pipe), CB4-DMH4 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0					Direct Entry, MIN.TC
6.0	13	Total			

**Subcatchment 5S: CB5**

Runoff = 0.50 cfs @ 12.09 hrs, Volume= 0.038 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
7,852	98	Paved parking & roofs
2,558	39	>75% Grass cover, Good, HSG A
10,410	84	Weighted Average
2,558		Pervious Area
7,852		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	41	0.0030	2.69	2.11	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.7					Direct Entry, MIN. TC
6.0	41	Total			

**Subcatchment 6S: CB6**

Runoff = 0.29 cfs @ 12.09 hrs, Volume= 0.021 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
4,648	98	Paved parking & roofs
1,389	39	>75% Grass cover, Good, HSG A
6,037	84	Weighted Average
1,389		Pervious Area
4,648		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	38	0.0050	3.47	2.73	<b>Circular Channel (pipe), CB6-DMH5</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.8					<b>Direct Entry,</b>
6.0	38	Total			

**Subcatchment 7S: CB7**

Runoff = 0.11 cfs @ 12.09 hrs, Volume= 0.008 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
1,784	98	Paved parking & roofs
584	39	>75% Grass cover, Good, HSG A
2,368	83	Weighted Average
584		Pervious Area
1,784		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	48	0.0200	6.95	5.46	<b>Circular Channel (pipe), CB7-DMH5</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.9					<b>Direct Entry, MIN, TC</b>
6.0	48	Total			

**Subcatchment 8S: CB8**

Runoff = 0.11 cfs @ 12.11 hrs, Volume= 0.009 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
2,933	98	Paved parking & roofs
3,025	39	>75% Grass cover, Good, HSG A
5,958	68	Weighted Average
3,025		Pervious Area
2,933		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	100	0.0200	6.95	5.46	<b>Circular Channel (pipe), CB8-DMH4</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.8					<b>Direct Entry, MIN. TC</b>
6.0	100	Total			

**Subcatchment 9S: CB9**

Runoff = 0.04 cfs @ 12.15 hrs, Volume= 0.005 af, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
2,195	98	Paved parking & roofs
4,619	39	>75% Grass cover, Good, HSG A
6,814	58	Weighted Average
4,619		Pervious Area
2,195		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	25	0.0100	0.10		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.8	19	0.3330	0.38		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.0	11	0.0454	4.33		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.4	114	0.0600	4.97		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	22	0.0050	3.47	2.73	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.5					<b>Direct Entry, MIN. TC.</b>
6.0	191	Total			

**Subcatchment 10S: CB10**

Runoff = 0.43 cfs @ 12.15 hrs, Volume= 0.042 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
11,195	98	Paved parking & roofs
13,303	39	>75% Grass cover, Good, HSG A
7,605	61	>75% Grass cover, Good, HSG B
32,103	65	Weighted Average

20,908 Pervious Area  
11,195 Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	28	0.0210	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
2.6	22	0.0260	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
1.7	100	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	7	0.0500	1.57		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	5	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	19	0.3300	4.02		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	10	0.0500	4.54		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	31	0.0300	8.51	6.69	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.4					Direct Entry, MIN TC
8.4	222	Total			

**Subcatchment 11S: CB11**

Runoff = 0.07 cfs @ 12.11 hrs, Volume= 0.006 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
2,003	98	Paved parking & roofs
2,251	39	>75% Grass cover, Good, HSG A
4,254	67	Weighted Average
2,251		Pervious Area
2,003		Impervious Area

**UC1378-POST-2025-REV1**

Type III 24-hr 2YR-NOAA Rainfall=3.36"

Prepared by {enter your company name here}

Page 7

HydroCAD® 8.00 s/n 001535 © 2006 HydroCAD Software Solutions LLC

8/20/2025

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	22	0.0100	0.10		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.8	12	0.1670	0.26		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.3	6	0.3330	0.30		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.1	17	0.0740	1.90		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.0	8	0.0600	4.97		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	40	0.0300	8.51	6.69	<b>Circular Channel (pipe), CB11-DMH7</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.9					<b>Direct Entry, MIN. TC</b>
6.0	105	Total			

**Subcatchment 12S: CB12**

Runoff = 0.35 cfs @ 12.12 hrs, Volume= 0.036 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
8,359	98	Paved parking & roofs
11,088	39	>75% Grass cover, Good, HSG A
11,592	61	>75% Grass cover, Good, HSG B
2,937	55	Woods, Good, HSG B
33,976	62	Weighted Average
25,617		Pervious Area
8,359		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	41	0.1950	0.16		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.25"
0.0	8	0.3300	4.02		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	5	0.0100	2.03		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	14	0.1250	2.47		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	62	0.3300	4.02		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	102	0.0490	4.49		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.9					Direct Entry, MIN TC
0.5	93	0.0210	2.94		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	47	0.0400	9.83	7.72	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.5	372	Total			

**Subcatchment 13S: CB13**

Runoff = 0.26 cfs @ 12.10 hrs, Volume= 0.020 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
5,493	98	Paved parking & roofs
4,121	39	>75% Grass cover, Good, HSG A
9,614	73	Weighted Average
4,121		Pervious Area
5,493		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	11	0.1820	0.27		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
1.2	29	0.3330	0.41		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.4	75	0.0210	2.94		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.0	9	0.0200	6.95	5.46	Circular Channel (pipe), CB13-DMH10 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
3.7					Direct Entry, MIN. TC
6.0	124	Total			

**Subcatchment 14S: CB14**

Runoff = 0.50 cfs @ 12.11 hrs, Volume= 0.040 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
11,118	98	Paved parking & roofs
7,973	39	>75% Grass cover, Good, HSG A
19,091	73	Weighted Average
7,973		Pervious Area
11,118		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	37	0.0100	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.7	92	0.0110	2.13		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.2	35	0.0150	2.49		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.2	43	0.0230	3.08		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	100	0.0100	4.91	3.86	Circular Channel (pipe), CB14-DMH10 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
7.2	307	Total			

**Subcatchment 15S: RETAINING WALL DRAIN**

Runoff = 0.00 cfs @ 23.84 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
3,920	39	>75% Grass cover, Good, HSG A
3,920		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	105	0.0200	6.95	5.46	Circular Channel (pipe), RETWALL-DMH1 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.7					Direct Entry, MIN. TC
6.0	105	Total			

**Subcatchment 17S: 17S**

Runoff = 0.53 cfs @ 12.15 hrs, Volume= 0.052 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
3,022	98	Paved parking & roofs
14,391	98	Pond
22,278	39	>75% Grass cover, Good, HSG A
39,691	65	Weighted Average
22,278		Pervious Area
17,413		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0390	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.2	17	0.0390	1.38		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	16	0.1250	2.47		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	12	0.3300	4.02		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	11	0.1540	2.75		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.9	59	0.0230	1.06		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	6	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	21	0.3300	4.02		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	15	0.1321	2.54		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.8	178	0.0560	1.66		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.9	65	0.0310	1.23		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
8.5	450	Total			

**Subcatchment 18S: 18S**

Runoff = 0.01 cfs @ 15.33 hrs, Volume= 0.003 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
4,411	98	Paved parking & roofs
22,080	39	>75% Grass cover, Good, HSG A
8,779	30	Woods, Good, HSG A
35,270	44	Weighted Average
30,859		Pervious Area
4,411		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.25"
0.5	36	0.0560	1.18		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.2	37	0.2700	2.60		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.1	14	0.1430	1.89		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.2	19	0.0820	1.43		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
8.9	156	Total			

**Subcatchment 20S: ROOF1**

Runoff = 0.37 cfs @ 12.09 hrs, Volume= 0.030 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
5,064	98	Paved parking & roofs
5,064		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	70	0.0100	4.91	3.86	<b>Circular Channel (pipe), CLEANOUT-DMH6</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.8					<b>Direct Entry, MIN. TC.</b>
6.0	70	Total			

**Subcatchment 21S: ROOF1**

Runoff = 0.37 cfs @ 12.09 hrs, Volume= 0.030 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
5.048	98	Paved parking & roofs
5.048		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	58	0.0400	9.83	7.72	<b>Circular Channel (pipe), CLEANOUT-DMH8</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.9					<b>Direct Entry, MIN. TC.</b>
6.0	58	Total			

**Subcatchment 22S: ROOF-REAR**

Runoff = 0.74 cfs @ 12.09 hrs, Volume= 0.060 af, Depth= 3.13'

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
10.112	98	Paved parking & roofs
10.112		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	160	0.0200	6.95	5.46	<b>Circular Channel (pipe), CLEANOUT-DMH9</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.6					<b>Direct Entry, MIN. TC.</b>
6.0	160	Total			

**Subcatchment 30S: CB30**

Runoff = 0.03 cfs @ 12.36 hrs, Volume= 0.006 af, Depth= 0.24'

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
3,270	98	Paved parking & roofs
10,380	39	>75% Grass cover, Good, HSG A
13,650	53	Weighted Average
10,380		Pervious Area
3,270		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.2	38	0.0050	3.47	2.73	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	38	Total			

**Subcatchment 31S: CB31**

Runoff = 0.36 cfs @ 12.10 hrs, Volume= 0.027 af, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
6,355	98	Paved parking & roofs
2,758	39	>75% Grass cover, Good, HSG A
9,113	80	Weighted Average
2,758		Pervious Area
6,355		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.0	8	0.0075	4.26	3.34	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	8	Total			

**Subcatchment 32S: CB32**

Runoff = 0.38 cfs @ 12.10 hrs, Volume= 0.028 af, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
7,349	98	Paved parking & roofs
4,297	39	>75% Grass cover, Good, HSG A
11,646	76	Weighted Average
4,297		Pervious Area
7,349		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.2	32	0.0050	3.47	2.73	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	32	Total			

**Subcatchment 33S: CB33**

Runoff = 0.10 cfs @ 12.12 hrs, Volume= 0.010 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
3,439	98	Paved parking & roofs
5,144	39	>75% Grass cover, Good, HSG A
8,583	63	Weighted Average
5,144		Pervious Area
3,439		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.2	42	0.0050	3.47	2.73	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	42	Total			

**Subcatchment 34S: CB34**

Runoff = 0.52 cfs @ 12.10 hrs, Volume= 0.039 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
10,509	98	Paved parking & roofs
6,920	39	>75% Grass cover, Good, HSG A
1,505	61	>75% Grass cover, Good, HSG B
18,934	73	Weighted Average
8,425		Pervious Area
10,509		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	50	0.0350	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.1	7	0.0350	1.31		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	63	0.0635	5.12		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.6	209	0.0800	5.74		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.6					Direct Entry, MIN TC
0.0	16	0.0200	6.95	5.46	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	345	Total			

**Subcatchment 35S: CB35**

Runoff = 0.32 cfs @ 12.09 hrs, Volume= 0.024 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
5.089	98	Paved parking & roofs
1.446	39	>75% Grass cover, Good, HSG A
1.165	61	>75% Grass cover, Good, HSG B
7.700	81	Weighted Average
2.611		Pervious Area
5.089		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC
0.0	2	0.0400	9.83	7.72	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	2	Total			

**Subcatchment 36S: CB36**

Runoff = 0.67 cfs @ 12.09 hrs, Volume= 0.049 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
8.647	98	Paved parking & roofs
3.366	61	>75% Grass cover, Good, HSG B
12.013	88	Weighted Average

3,366 Pervious Area  
8,647 Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	43	0.0470	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.2	17	0.0410	1.42		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	32	0.0410	4.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	26	0.0770	5.63		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	87	0.0400	4.06		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.7					Direct Entry, MIN TC
0.0	19	0.0210	7.12	5.59	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	224	Total			

**Subcatchment 37S: CB37**

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 0.017 af, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
2,907	98	Paved parking & roofs
590	61	>75% Grass cover, Good, HSG B
3,497	92	Weighted Average
590		Pervious Area
2,907		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC
0.0	8	0.0500	10.99	8.63	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	8	Total			

**Subcatchment 38S: CB38**

Runoff = 0.52 cfs @ 12.09 hrs, Volume= 0.039 af, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
6,806	98	Paved parking & roofs
1,621	61	>75% Grass cover, Good, HSG B
8,427	91	Weighted Average
1,621		Pervious Area
6,806		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC
0.0	19	0.0330	8.93	7.01	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	19	Total			

**Subcatchment 39S: CB39**

Runoff = 0.50 cfs @ 12.09 hrs, Volume= 0.036 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
6,620	98	Paved parking & roofs
3,815	61	>75% Grass cover, Good, HSG B
10,435	84	Weighted Average
3,815		Pervious Area
6,620		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC
0.0	8	0.0400	9.83	7.72	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	8	Total			

**Subcatchment 40S: CB40**

Runoff = 0.55 cfs @ 12.09 hrs, Volume= 0.040 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
7,083	98	Paved parking & roofs
3,954	61	>75% Grass cover, Good, HSG B
11,037	85	Weighted Average
3,954		Pervious Area
7,083		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.0	19	0.0410	9.95	7.82	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	19	Total			

**Subcatchment 41S: CB41**

Runoff = 1.57 cfs @ 12.11 hrs, Volume= 0.120 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
21,462	98	Paved parking & roofs
21,670	61	>75% Grass cover, Good, HSG B
43,132	79	Weighted Average
21,670		Pervious Area
21,462		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	7	0.0450	0.14		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.1	5	0.0450	1.05		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.25"
2.0	21	0.0450	0.17		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
2.1	17	0.0260	0.13		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.9	59	0.0260	1.13		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.8	56	0.0280	1.17		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.2	27	0.0190	2.80		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.6	147	0.0410	4.11		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.0	9	0.0400	9.83	7.72	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
7.5	348	Total			

**Subcatchment 42S: CB42**

Runoff = 0.73 cfs @ 12.09 hrs, Volume= 0.054 af, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
9,346	98	Paved parking & roofs
2,328	61	>75% Grass cover, Good, HSG B
11,674	91	Weighted Average
2,328		Pervious Area
9,346		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC
0.0	14	0.0200	6.95	5.46	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	14	Total			

**Subcatchment 43S: CB43**

Runoff = 0.73 cfs @ 12.09 hrs, Volume= 0.053 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
9,303	98	Paved parking & roofs
6,582	61	>75% Grass cover, Good, HSG B
15,885	83	Weighted Average
6,582		Pervious Area
9,303		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC
0.0	12	0.0300	8.51	6.69	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	12	Total			

**Subcatchment 44S: CB44**

Runoff = 1.10 cfs @ 12.13 hrs. Volume= 0.095 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
11,746	98	Paved parking & roofs
45,362	61	>75% Grass cover, Good, HSG B
57,108	69	Weighted Average
45,362		Pervious Area
11,746		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0380	0.19		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.1	8	0.0380	1.36		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.6	50	0.0400	1.40		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	24	0.3300	4.02		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.5	64	0.0940	2.15		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	31	0.3200	3.96		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
1.5	91	0.0220	1.04		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.4	46	0.0860	2.05		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	13	0.3300	4.02		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.0	18	0.0200	6.95	5.46	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim=3.1' r= 0.25' n= 0.012
7.7	395	Total			

**Subcatchment 46S: CB46**

Runoff = 0.44 cfs @ 12.09 hrs. Volume= 0.033 af, Depth= 2.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
6,048	98	Paved parking & roofs
605	39	>75% Grass cover, Good, HSG A
6,653	93	Weighted Average
605		Pervious Area
6,048		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.0	9	0.0300	8.51	6.69	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	9	Total			

**Subcatchment 50S: ROOF**

Runoff = 1.07 cfs @ 12.09 hrs, Volume= 0.088 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
14,656	98	Paved parking & roofs
14,656		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.2	88	0.0300	8.51	6.69	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	88	Total			

**Subcatchment 51S: CB51**

Runoff = 0.29 cfs @ 12.48 hrs, Volume= 0.057 af, Depth= 0.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
12,143	39	>75% Grass cover, Good, HSG A
54,072	61	>75% Grass cover, Good, HSG B
22,931	55	Woods, Good, HSG B
89,146	56	Weighted Average
89,146		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	50	0.0480	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.25"
0.6	48	0.0830	1.44		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.1	9	0.2220	2.36		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.1	40	0.5000	4.95		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.6	133	0.0150	0.86		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	11	0.1820	2.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	43	0.0470	1.52		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	6	0.3330	4.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	33	0.0610	1.73		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	18	0.1110	2.33		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	20	0.1000	2.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	47	0.0430	1.45		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	42	0.0480	1.53		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.0	68	0.0290	1.19		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.3	144	0.0690	1.84		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.1	115	0.0175	0.93		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	14	0.2800	3.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	5	0.0200	8.34	6.55	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
18.7	846	Total			

**Subcatchment 52S: 52S**

Runoff = 0.00 cfs @ 22.45 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
3,594	30	Woods, Good, HSG A
2,275	55	Woods, Good, HSG B
5,869	40	Weighted Average
5,869		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC

**Subcatchment 53S: 53S**

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
2,249	55	Woods, Good, HSG B
16,708	30	Woods, Good, HSG A
10,000	39	>75% Grass cover, Good, HSG A
28,957	35	Weighted Average
28,957		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC

**Subcatchment 54S: 54S**

Runoff = 0.38 cfs @ 12.36 hrs, Volume= 0.072 af, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
121,822	55	Woods, Good, HSG B
3,269	61	>75% Grass cover, Good, HSG B
125,091	55	Weighted Average
125,091		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1140	0.14		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.25"
1.7	168	0.1150	1.70		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.6	58	0.0970	1.56		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.2	7	0.0100	0.70		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.9	80	0.0970	1.56		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
9.5	363	Total			

**Subcatchment 55S: HOUSE-ROOFS**

Runoff = 1.38 cfs @ 12.09 hrs, Volume= 0.113 af, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2YR-NOAA Rainfall=3.36"

Area (sf)	CN	Description
18,940	98	Paved parking & roofs
18,940		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.2	78	0.0200	8.34	6.55	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
6.2	78	Total			

**Reach 1R: DMH1-DMH2**

Inflow Area = 0.310 ac, Inflow Depth = 2.22" for 2YR-NOAA event

Inflow = 0.70 cfs @ 12.09 hrs, Volume= 0.057 af

Outflow = 0.70 cfs @ 12.09 hrs, Volume= 0.057 af, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Max. Velocity= 3.97 fps, Min. Travel Time= 0.2 min

Avg. Velocity = 1.31 fps, Avg. Travel Time= 0.7 min

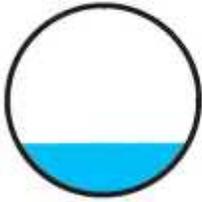
Peak Storage= 9 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.28'

Bank-Full Depth= 1.00', Capacity at Bank-Full= 4.21 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished

Length= 53.0' Slope= 0.0119 1'

Inlet Invert= 246.00', Outlet Invert= 245.37'



**Reach 2R: DMH2-POND1**

Inflow Area = 0.644 ac, Inflow Depth = 2.69" for 2YR-NOAA event  
 Inflow = 1.76 cfs @ 12.09 hrs, Volume= 0.144 af  
 Outflow = 1.76 cfs @ 12.09 hrs, Volume= 0.144 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 4.79 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 1.62 fps, Avg. Travel Time= 0.1 min

Peak Storage= 3 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.47'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.86 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 7.0' Slope= 0.0100 '/'  
 Inlet Invert= 245.37', Outlet Invert= 245.30'



**Reach 3R: DMH3-POND1**

Inflow Area = 0.503 ac, Inflow Depth = 1.99" for 2YR-NOAA event  
 Inflow = 1.06 cfs @ 12.09 hrs, Volume= 0.083 af  
 Outflow = 1.06 cfs @ 12.09 hrs, Volume= 0.083 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 4.19 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 1.35 fps, Avg. Travel Time= 0.1 min

Peak Storage= 2 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.36'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.86 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 8.0' Slope= 0.0100 '/'  
 Inlet Invert= 245.38', Outlet Invert= 245.30'



### Reach 4R: DMH4-DMH3

Inflow Area = 0.503 ac, Inflow Depth = 1.99" for 2YR-NOAA event  
 Inflow = 1.06 cfs @ 12.09 hrs, Volume= 0.083 af  
 Outflow = 1.06 cfs @ 12.09 hrs, Volume= 0.083 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 3.95 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 1.27 fps, Avg. Travel Time= 0.0 min

Peak Storage= 1 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.37'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.56 cfs

12.0" Diameter Pipe, n= 0.013 Concrete pipe, bends & connections  
 Length= 2.0' Slope= 0.0100 '/  
 Inlet Invert= 245.40', Outlet Invert= 245.38'



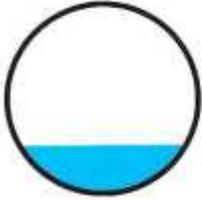
### Reach 5R: DMH5-DMH4

Inflow Area = 0.193 ac, Inflow Depth = 1.80" for 2YR-NOAA event  
 Inflow = 0.40 cfs @ 12.09 hrs, Volume= 0.029 af  
 Outflow = 0.40 cfs @ 12.10 hrs, Volume= 0.029 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 2.52 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 0.89 fps, Avg. Travel Time= 0.5 min

Peak Storage= 4 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.26'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.78 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 25.0' Slope= 0.0052 '/  
 Inlet Invert= 245.63', Outlet Invert= 245.50'



**Reach 6R: DMH6-HEADWALL**

Inflow Area = 2.778 ac, Inflow Depth = 1.03" for 2YR-NOAA event  
 Inflow = 2.63 cfs @ 12.12 hrs, Volume= 0.239 af  
 Outflow = 2.56 cfs @ 12.14 hrs, Volume= 0.239 af, Atten= 2%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 4.11 fps, Min. Travel Time= 0.5 min  
 Avg. Velocity = 1.37 fps, Avg. Travel Time= 1.6 min

Peak Storage= 85 cf @ 12.13 hrs, Average Depth at Peak Storage= 0.58'  
 Bank-Full Depth= 1.50', Capacity at Bank-Full= 8.19 cfs

18.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 135.0' Slope= 0.0052 '/  
 Inlet Invert= 252.20', Outlet Invert= 251.50'



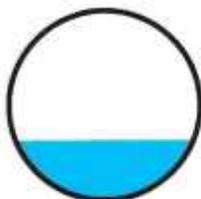
**Reach 7R: DMH7-DMH6**

Inflow Area = 2.622 ac, Inflow Depth = 1.07" for 2YR-NOAA event  
 Inflow = 2.61 cfs @ 12.12 hrs, Volume= 0.234 af  
 Outflow = 2.59 cfs @ 12.12 hrs, Volume= 0.234 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 7.74 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 2.57 fps, Avg. Travel Time= 0.6 min

Peak Storage= 29 cf @ 12.12 hrs, Average Depth at Peak Storage= 0.40'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 11.93 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 86.0' Slope= 0.0291 '/  
 Inlet Invert= 254.95', Outlet Invert= 252.45'



**Reach 8R: DMH8-DMH7**

Inflow Area = 1.787 ac, Inflow Depth = 1.25" for 2YR-NOAA event  
 Inflow = 2.15 cfs @ 12.11 hrs, Volume= 0.186 af  
 Outflow = 2.13 cfs @ 12.11 hrs, Volume= 0.186 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 7.75 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 2.58 fps, Avg. Travel Time= 0.6 min

Peak Storage= 27 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.38'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.90 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 97.0' Slope= 0.0320 '/'  
 Inlet Invert= 258.30', Outlet Invert= 255.20'



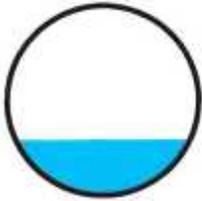
**Reach 9R: DMH9-DMH8**

Inflow Area = 0.891 ac, Inflow Depth = 1.62" for 2YR-NOAA event  
 Inflow = 1.46 cfs @ 12.10 hrs, Volume= 0.120 af  
 Outflow = 1.44 cfs @ 12.11 hrs, Volume= 0.120 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 7.48 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 2.42 fps, Avg. Travel Time= 0.7 min

Peak Storage= 19 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.30'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.62 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 98.0' Slope= 0.0390 '/'  
 Inlet Invert= 262.22', Outlet Invert= 258.40'



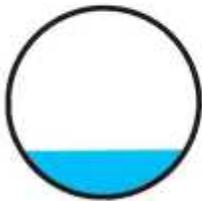
**Reach 10R: DMH10-DMH9**

Inflow Area = 0.659 ac, Inflow Depth = 1.09" for 2YR-NOAA event  
 Inflow = 0.76 cfs @ 12.11 hrs, Volume= 0.060 af  
 Outflow = 0.74 cfs @ 12.12 hrs, Volume= 0.060 af, Atten= 2%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 4.97 fps, Min. Travel Time= 0.4 min  
 Avg. Velocity = 1.95 fps, Avg. Travel Time= 1.1 min

Peak Storage= 19 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.25'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 5.61 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 127.0' Slope= 0.0211 '/'  
 Inlet Invert= 265.90', Outlet Invert= 263.22'



**Reach 11R: DMH11-HEADWALL**

Inflow Area = 0.116 ac, Inflow Depth = 3.13" for 2YR-NOAA event  
 Inflow = 0.37 cfs @ 12.09 hrs, Volume= 0.030 af  
 Outflow = 0.35 cfs @ 12.12 hrs, Volume= 0.030 af, Atten= 5%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 2.42 fps, Min. Travel Time= 1.2 min  
 Avg. Velocity = 0.79 fps, Avg. Travel Time= 3.7 min

Peak Storage= 26 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.25'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.73 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 174.0' Slope= 0.0050 '/'  
 Inlet Invert= 251.62', Outlet Invert= 250.75'



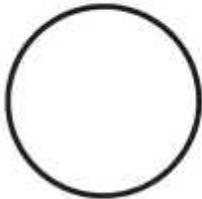
**Reach 20R: DM20-EXIST.DMH**

Inflow Area = 1.386 ac, Inflow Depth = 0.00" for 2YR-NOAA event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.22 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 36.0' Slope= 0.0350 '/'  
 Inlet Invert= 241.77', Outlet Invert= 240.51'



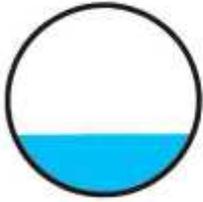
**Reach 22R: DMH22-HEADWALL**

Inflow Area = 3.976 ac, Inflow Depth = 0.61" for 2YR-NOAA event  
 Inflow = 2.40 cfs @ 12.13 hrs, Volume= 0.202 af  
 Outflow = 2.39 cfs @ 12.14 hrs, Volume= 0.202 af, Atten= 1%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 7.01 fps, Min. Travel Time= 0.3 min  
 Avg. Velocity = 2.39 fps, Avg. Travel Time= 0.8 min

Peak Storage= 38 cf @ 12.14 hrs, Average Depth at Peak Storage= 0.40'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 10.68 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 110.0' Slope= 0.0233 '/'  
 Inlet Invert= 254.50', Outlet Invert= 251.94'

**Reach 30R: DMH30-HW30**

Inflow Area = 0.987 ac, Inflow Depth = 0.86" for 2YR-NOAA event  
 Inflow = 0.84 cfs @ 12.10 hrs, Volume= 0.071 af  
 Outflow = 0.84 cfs @ 12.10 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 3.93 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 1.53 fps, Avg. Travel Time= 0.1 min

Peak Storage= 3 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.32'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.86 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 12.0' Slope= 0.0100 '/'  
 Inlet Invert= 251.10', Outlet Invert= 250.98'

**Reach 31R: DMH31-DMH30**

Inflow Area = 0.778 ac, Inflow Depth = 0.68" for 2YR-NOAA event  
 Inflow = 0.48 cfs @ 12.11 hrs, Volume= 0.044 af  
 Outflow = 0.48 cfs @ 12.11 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 2.62 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 1.08 fps, Avg. Travel Time= 0.2 min

Peak Storage= 2 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.28'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.73 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 10.0' Slope= 0.0050 '/'  
 Inlet Invert= 251.25', Outlet Invert= 251.20'



### Reach 32R: DMH32-HW32

Inflow Area = 3.245 ac, Inflow Depth = 0.35" for 2YR-NOAA event  
 Inflow = 1.26 cfs @ 12.10 hrs, Volume= 0.096 af  
 Outflow = 1.25 cfs @ 12.10 hrs, Volume= 0.096 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 6.53 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 2.12 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.29'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.69 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 7.0' Slope= 0.0300 '/  
 Inlet Invert= 252.65', Outlet Invert= 252.44'



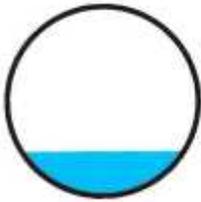
### Reach 33R: DMH33-DMH32

Inflow Area = 3.093 ac, Inflow Depth = 0.24" for 2YR-NOAA event  
 Inflow = 0.83 cfs @ 12.11 hrs, Volume= 0.063 af  
 Outflow = 0.82 cfs @ 12.11 hrs, Volume= 0.063 af, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 5.79 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 2.12 fps, Avg. Travel Time= 0.4 min

Peak Storage= 7 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.24'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.69 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 47.0' Slope= 0.0300 '/  
 Inlet Invert= 254.16', Outlet Invert= 252.75'

**Reach 34R: DMH34-DMH33**

Inflow Area = 3.093 ac, Inflow Depth = 0.24" for 2YR-NOAA event  
 Inflow = 0.84 cfs @ 12.10 hrs, Volume= 0.063 af  
 Outflow = 0.83 cfs @ 12.11 hrs, Volume= 0.063 af, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 6.97 fps, Min. Travel Time= 0.3 min  
 Avg. Velocity = 2.54 fps, Avg. Travel Time= 0.8 min

Peak Storage= 14 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.21'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 8.63 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 120.0' Slope= 0.0500 '/  
 Inlet Invert= 260.26', Outlet Invert= 254.26'

**Reach 36R: DMH36-MANIFOLD**

Inflow Area = 2.033 ac, Inflow Depth = 1.78" for 2YR-NOAA event  
 Inflow = 3.88 cfs @ 12.11 hrs, Volume= 0.301 af  
 Outflow = 3.87 cfs @ 12.11 hrs, Volume= 0.301 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 10.00 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 3.27 fps, Avg. Travel Time= 0.2 min

Peak Storage= 16 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.41'  
 Bank-Full Depth= 1.50', Capacity at Bank-Full= 24.14 cfs

18.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
 Length= 40.0' Slope= 0.0313 '/  
 Inlet Invert= 280.00', Outlet Invert= 278.75'

**Reach 37R: DMH37-DMH36**

Inflow Area = 2.033 ac, Inflow Depth = 1.78" for 2YR-NOAA event  
 Inflow = 3.91 cfs @ 12.11 hrs, Volume= 0.301 af  
 Outflow = 3.88 cfs @ 12.11 hrs, Volume= 0.301 af, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 8.79 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 2.88 fps, Avg. Travel Time= 0.5 min

Peak Storage= 37 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.49'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 12.12 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 84.0' Slope= 0.0300 '/'  
 Inlet Invert= 282.77', Outlet Invert= 280.25'

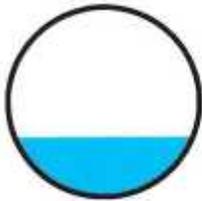
**Reach 38R: DMH38-DHH37**

Inflow Area = 1.677 ac, Inflow Depth = 1.69" for 2YR-NOAA event  
 Inflow = 3.08 cfs @ 12.11 hrs, Volume= 0.235 af  
 Outflow = 3.04 cfs @ 12.11 hrs, Volume= 0.235 af, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 9.13 fps, Min. Travel Time= 0.3 min  
 Avg. Velocity = 2.99 fps, Avg. Travel Time= 0.8 min

Peak Storage= 49 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.40'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 14.00 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 146.0' Slope= 0.0400 '/'  
 Inlet Invert= 288.71', Outlet Invert= 282.87'



**Reach 39R: DMH39-DHH38**

Inflow Area = 1.244 ac, Inflow Depth = 1.55" for 2YR-NOAA event  
 Inflow = 2.08 cfs @ 12.11 hrs, Volume= 0.160 af  
 Outflow = 2.08 cfs @ 12.12 hrs, Volume= 0.160 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 8.32 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 2.96 fps, Avg. Travel Time= 0.2 min

Peak Storage= 9 cf @ 12.12 hrs, Average Depth at Peak Storage= 0.35'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 35.0' Slope= 0.0400 '/  
 Inlet Invert= 292.40', Outlet Invert= 291.00'



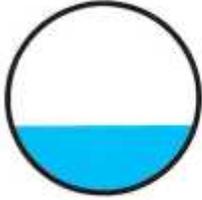
**Reach 40R: DMH40-DHH39**

Inflow Area = 1.244 ac, Inflow Depth = 1.55" for 2YR-NOAA event  
 Inflow = 2.11 cfs @ 12.11 hrs, Volume= 0.160 af  
 Outflow = 2.08 cfs @ 12.11 hrs, Volume= 0.160 af, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 8.36 fps, Min. Travel Time= 0.3 min  
 Avg. Velocity = 2.96 fps, Avg. Travel Time= 0.7 min

Peak Storage= 32 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.36'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 126.0' Slope= 0.0400 '/  
 Inlet Invert= 299.44', Outlet Invert= 294.40'



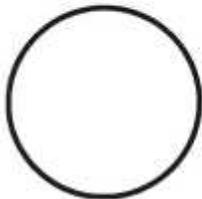
### Reach 41R: DMH41-DMH34

Inflow Area = 2.481 ac, Inflow Depth = 0.00" for 2YR-NOAA event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 34.0' Slope= 0.0400 '/  
 Inlet Invert= 264.62', Outlet Invert= 263.26'



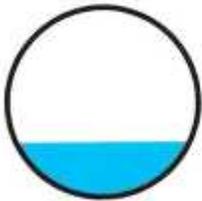
### Reach 42R: DMH42-DMH43

Inflow Area = 1.676 ac, Inflow Depth = 1.06" for 2YR-NOAA event  
 Inflow = 1.82 cfs @ 12.11 hrs, Volume= 0.148 af  
 Outflow = 1.81 cfs @ 12.11 hrs, Volume= 0.148 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 6.13 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 2.27 fps, Avg. Travel Time= 0.2 min

Peak Storage= 7 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.36'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 9.90 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 22.0' Slope= 0.0200 '/  
 Inlet Invert= 271.39', Outlet Invert= 270.95'



**Reach 43R: DMH43-DMH44**

Inflow Area = 1.944 ac, Inflow Depth = 1.25" for 2YR-NOAA event  
 Inflow = 2.52 cfs @ 12.11 hrs, Volume= 0.202 af  
 Outflow = 2.50 cfs @ 12.11 hrs, Volume= 0.202 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 7.29 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 2.46 fps, Avg. Travel Time= 0.6 min

Peak Storage= 30 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.41'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 11.06 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 86.0' Slope= 0.0250 '/  
 Inlet Invert= 270.85', Outlet Invert= 268.70'



**Reach 44R: DMH44-DMH45**

Inflow Area = 1.944 ac, Inflow Depth = 1.25" for 2YR-NOAA event  
 Inflow = 2.50 cfs @ 12.11 hrs, Volume= 0.202 af  
 Outflow = 2.48 cfs @ 12.12 hrs, Volume= 0.202 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 7.26 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 2.45 fps, Avg. Travel Time= 0.5 min

Peak Storage= 24 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.40'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 11.05 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 71.0' Slope= 0.0249 '/  
 Inlet Invert= 266.70', Outlet Invert= 264.93'



**Reach 45R: DMH45-DMH22**

Inflow Area = 3.976 ac, Inflow Depth = 0.61" for 2YR-NOAA event  
 Inflow = 2.48 cfs @ 12.12 hrs, Volume= 0.202 af  
 Outflow = 2.40 cfs @ 12.13 hrs, Volume= 0.202 af, Atten= 3%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 7.53 fps, Min. Travel Time= 0.5 min  
 Avg. Velocity = 2.56 fps, Avg. Travel Time= 1.4 min

Peak Storage= 69 cf @ 12.12 hrs, Average Depth at Peak Storage= 0.39'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 11.75 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 211.0' Slope= 0.0282 '/'  
 Inlet Invert= 260.61', Outlet Invert= 254.66'



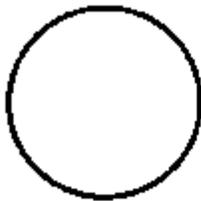
**Reach 46R: DMH 46-DMH45**

Inflow Area = 2.033 ac, Inflow Depth = 0.00" for 2YR-NOAA event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 8.02 cfs

12.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
 Length= 25.0' Slope= 0.0300 '/'  
 Inlet Invert= 272.25', Outlet Invert= 271.50'



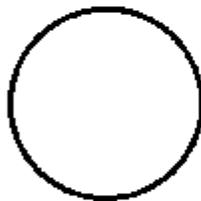
**Reach 55R: OCS-DMH**

Inflow Area = 12.351 ac, Inflow Depth = 0.00" for 2YR-NOAA event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 11.41 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 27.0' Slope= 0.0874 1'  
 Inlet Invert= 245.25', Outlet Invert= 242.89'



**Pond 1P: POND 1**

Inflow Area = 1.386 ac, Inflow Depth = 2.29" for 2YR-NOAA event  
 Inflow = 3.32 cfs @ 12.09 hrs, Volume= 0.264 af  
 Outflow = 1.78 cfs @ 12.00 hrs, Volume= 0.264 af, Atten= 46%, Lag= 0.0 min  
 Discarded = 1.78 cfs @ 12.00 hrs, Volume= 0.264 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Peak Elev= 244.12' @ 12.23 hrs Surf.Area= 5,214 sf Storage= 779 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 1.8 min ( 779.7 - 777.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	243.75'	3,772 cf	39.50'W x 132.00'L x 2.67'H Prismatoid 13,921 cf Overall - 4,492 cf Embedded = 9,429 cf x 40.0% Voids
#2	244.42'	4,492 cf	24.0"D x 130.00'L Horizontal Cylinder x 11 Inside #1
		8,264 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	14.760 in/hr Exfiltration over Surface area
#2	Primary	245.30'	12.0" Vert. Orifice/Grate X 3.00 C= 0.600

Discarded OutFlow Max=1.78 cfs @ 12.00 hrs HW=243.78' (Free Discharge)  
 ↳1=Exfiltration (Exfiltration Controls 1.78 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=243.75' (Free Discharge)  
 ↳2=Orifice/Grate ( Controls 0.00 cfs)

**Pond 2P: POND 2**

Inflow Area = 12.351 ac, Inflow Depth = 0.76" for 2YR-NOAA event  
 Inflow = 8.78 cfs @ 12.12 hrs, Volume= 0.778 af  
 Outflow = 5.69 cfs @ 12.27 hrs, Volume= 0.778 af, Atten= 35%. Lag= 8.5 min  
 Discarded = 5.69 cfs @ 12.27 hrs, Volume= 0.778 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Peak Elev= 249.18' @ 12.27 hrs Surf.Area= 10,299 sf Storage= 1,816 cf

Plug-Flow detention time= 1.9 min calculated for 0.777 af (100% of inflow)  
 Center-of-Mass det. time= 1.9 min ( 835.8 - 833.8 )

Volume	Invert	Avail.Storage	Storage Description
#1	249.00'	50,131 cf	Custom Stage Data {Prismatic} Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
249.00	10,086	0	0
250.00	11,283	10,685	10,685
252.00	13,732	25,015	35,700
253.00	15,130	14,431	50,131

Device	Routing	Invert	Outlet Devices
#1	Discarded	248.90'	23.850 in/hr Exfiltration over Surface area above invert Excluded Surface area = 0 sf
#2	Primary	250.66'	12.0" Vert. Orifice/Grate C= 0.600
#3	Primary	250.17'	4.0" Vert. Orifice/Grate X 5.00 C= 0.600
#4	Primary	251.88'	2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600
#5	Secondary	252.00'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=5.68 cfs @ 12.27 hrs HW=249.18' (Free Discharge)

↳1=Exfiltration (Exfiltration Controls 5.68 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=249.00' (Free Discharge)

↳2=Orifice/Grate ( Controls 0.00 cfs)

↳3=Orifice/Grate ( Controls 0.00 cfs)

↳4=Orifice/Grate ( Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=249.00' (Free Discharge)

↳5=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Pond 3P: POND 3**

Inflow Area = 2.033 ac, Inflow Depth = 1.78" for 2YR-NOAA event  
 Inflow = 3.87 cfs @ 12.11 hrs, Volume= 0.301 af  
 Outflow = 1.26 cfs @ 11.95 hrs, Volume= 0.301 af, Atten= 67%, Lag= 0.0 min  
 Discarded = 1.26 cfs @ 11.95 hrs, Volume= 0.301 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Peak Elev= 275.91' @ 12.47 hrs Surf.Area= 4,009 sf Storage= 2,263 cf

Plug-Flow detention time= 9.2 min calculated for 0.301 af (100% of inflow)  
 Center-of-Mass det. time= 9.2 min ( 837.3 - 828.1 )

Volume	Invert	Avail. Storage	Storage Description
#1	274.80'	5,122 cf	59.83'W x 67.00'L x 5.00'H Prismatoid 20,043 cf Overall - 7,238 cf Embedded = 12,805 cf x 40.0% Voids
#2	275.60'	7,238 cf	48.0'D x 64.00'L Horizontal Cylinder x 9 Inside #1
		12,360 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	274.50'	13.600 in/hr Exfiltration over Surface area above invert Excluded Surface area = 0 sf
#2	Primary	278.50'	12.0" Vert. Orifice/Grate X 6.00 C= 0.600

Discarded OutFlow Max=1.26 cfs @ 11.95 hrs HW=274.67' (Free Discharge)

↳1=Exfiltration (Exfiltration Controls 1.26 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=274.60' (Free Discharge)

↳2=Orifice/Grate ( Controls 0.00 cfs)

**Pond 5P: POND 5**

Inflow Area = 2.481 ac, Inflow Depth = 0.82" for 2YR-NOAA event  
 Inflow = 1.39 cfs @ 12.09 hrs, Volume= 0.170 af  
 Outflow = 1.18 cfs @ 12.10 hrs, Volume= 0.170 af, Atten= 15%, Lag= 0.5 min  
 Discarded = 1.18 cfs @ 12.10 hrs, Volume= 0.170 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Peak Elev= 267.78' @ 12.14 hrs Surf.Area= 3,432 sf Storage= 112 cf

Plug-Flow detention time= 1.0 min calculated for 0.170 af (100% of inflow)  
 Center-of-Mass det. time= 1.0 min ( 821.3 - 820.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	267.70'	4,400 cf	<b>36.90'W x 93.00'L x 5.00'H Prismatoid</b> 17,159 cf Overall - 6,158 cf Embedded = 11,001 cf x 40.0% Voids
#2	268.70'	6,158 cf	<b>48.0'D x 70.00'L Horizontal Cylinder x 7 Inside #1</b>
		10,558 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	267.60'	<b>14.900 In/hr Exfiltration over Surface area above Invert</b> Excluded Surface area = 0 sf
#2	Primary	271.60'	<b>12.0" Vert. Orifice/Grate X 3.00 C= 0.600</b>

**Discarded OutFlow** Max=1.18 cfs @ 12.10 hrs HW=267.77' (Free Discharge)  
 ←1=Exfiltration (Exfiltration Controls 1.18 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=267.70' (Free Discharge)  
 ←2=Orifice/Grate ( Controls 0.00 cfs)

### Link 1L: COMBINE HYDROGRAPHS

Inflow Area = 14.546 ac, Inflow Depth = 0.00" for 2YR-NOAA event  
 Inflow = 0.01 cfs @ 15.33 hrs, Volume= 0.003 af  
 Primary = 0.01 cfs @ 15.33 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

### Link 54L: TO-140

Inflow Area = 3.536 ac, Inflow Depth = 0.24" for 2YR-NOAA event  
 Inflow = 0.38 cfs @ 12.36 hrs, Volume= 0.072 af  
 Primary = 0.38 cfs @ 12.36 hrs, Volume= 0.072 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

## **10 YR POST-DEVELOPMENT**

**Subcatchment 1S: CB1**

Runoff = 1.10 cfs @ 12.09 hrs, Volume= 0.091 af, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
9,594	98	Paved parking & roofs
9,594		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	62	0.0100	4.91	3.86	<b>Circular Channel (pipe), CB1-DMH1</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.8					<b>Direct Entry,</b>
6.0	62	Total			

**Subcatchment 2S: CB2**

Runoff = 1.66 cfs @ 12.09 hrs, Volume= 0.139 af, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
14,408	98	Paved parking & roofs
122	39	>75% Grass cover, Good, HSG A
14,530	98	Weighted Average
122		Pervious Area
14,408		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0	10	0.0100	4.91	3.86	<b>Circular Channel (pipe), CB2-DMH2</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0					<b>Direct Entry, MIN. TC</b>
6.0	10	Total			

**Subcatchment 4S: CB4**

Runoff = 0.87 cfs @ 12.09 hrs, Volume= 0.072 af, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
7,554	98	Paved parking & roofs
7,554		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0	13	0.0100	4.91	3.86	<b>Circular Channel (pipe), CB4-DMH4</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0					<b>Direct Entry, MIN.TC</b>
6.0	13	Total			

**Subcatchment 5S: CB5**

Runoff = 0.94 cfs @ 12.09 hrs, Volume= 0.069 af, Depth= 3.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
7,852	98	Paved parking & roofs
2,558	39	>75% Grass cover, Good, HSG A
10,410	84	Weighted Average
2,558		Pervious Area
7,852		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	41	0.0030	2.69	2.11	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.7					<b>Direct Entry, MIN. TC</b>
6.0	41	Total			

**Subcatchment 6S: CB6**

Runoff = 0.55 cfs @ 12.09 hrs, Volume= 0.040 af, Depth= 3.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
4,648	98	Paved parking & roofs
1,389	39	>75% Grass cover, Good, HSG A
6,037	84	Weighted Average
1,389		Pervious Area
4,648		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	38	0.0050	3.47	2.73	<b>Circular Channel (pipe), CB6-DMH5</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.8					<b>Direct Entry,</b>
6.0	38	Total			

**Subcatchment 7S: CB7**

Runoff = 0.21 cfs @ 12.09 hrs, Volume= 0.015 af, Depth= 3.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
1,784	98	Paved parking & roofs
584	39	>75% Grass cover, Good, HSG A
2,368	83	Weighted Average
584		Pervious Area
1,784		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	48	0.0200	6.95	5.46	<b>Circular Channel (pipe), CB7-DMH5</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.9					<b>Direct Entry, MIN. TC</b>
6.0	48	Total			

**Subcatchment 8S: CB8**

Runoff = 0.31 cfs @ 12.10 hrs, Volume= 0.023 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
2,933	98	Paved parking & roofs
3,025	39	>75% Grass cover, Good, HSG A
5,958	68	Weighted Average
3,025		Pervious Area
2,933		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	100	0.0200	6.95	5.46	<b>Circular Channel (pipe), CB8-DMH4</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished <b>Direct Entry, MIN. TC</b>
5.8					
6.0	100	Total			

**Subcatchment 9S: CB9**

Runoff = 0.21 cfs @ 12.11 hrs, Volume= 0.017 af, Depth= 1.29'

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
2,195	98	Paved parking & roofs
4,619	39	>75% Grass cover, Good, HSG A
6,814	58	Weighted Average
4,619		Pervious Area
2,195		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	25	0.0100	0.10		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.8	19	0.3330	0.38		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.0	11	0.0454	4.33		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.4	114	0.0600	4.97		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	22	0.0050	3.47	2.73	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished <b>Direct Entry, MIN. TC.</b>
0.5					
6.0	191	Total			

**Subcatchment 10S: CB10**

Runoff = 1.34 cfs @ 12.13 hrs, Volume= 0.111 af, Depth= 1.80'

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
11,195	98	Paved parking & roofs
13,303	39	>75% Grass cover, Good, HSG A
7,605	61	>75% Grass cover, Good, HSG B
32,103	65	Weighted Average

20,908 Pervious Area  
 11,195 Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	28	0.0210	0.14		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
2.6	22	0.0260	0.14		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
1.7	100	0.0200	0.99		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	7	0.0500	1.57		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.0	5	0.0100	2.03		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	19	0.3300	4.02		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.0	10	0.0500	4.54		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	31	0.0300	8.51	6.69	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.4					<b>Direct Entry, MIN TC</b>
8.4	222	Total			

**Subcatchment 11S: CB11**

Runoff = 0.21 cfs @ 12.10 hrs, Volume= 0.016 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
2,003	98	Paved parking & roofs
2,251	39	>75% Grass cover, Good, HSG A
4,254	67	Weighted Average
2,251		Pervious Area
2,003		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	22	0.0100	0.10		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.8	12	0.1670	0.26		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.3	6	0.3330	0.30		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.1	17	0.0740	1.90		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	8	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	40	0.0300	8.51	6.69	Circular Channel (pipe), CB11-DMH7 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.9					Direct Entry, MIN. TC
6.0	105	Total			

**Subcatchment 12S: CB12**

Runoff = 1.30 cfs @ 12.11 hrs, Volume= 0.102 af, Depth= 1.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
8,359	98	Paved parking & roofs
11,088	39	>75% Grass cover, Good, HSG A
11,592	61	>75% Grass cover, Good, HSG B
2,937	55	Woods, Good, HSG B
33,976	62	Weighted Average
25,617		Pervious Area
8,359		Impervious Area

**UC1378-POST-2025-REV1**

Type III 24-hr 10YR-NOAA Rainfall=5.22"

Prepared by {enter your company name here}

Page 49

HydroCAD® 8.00 s/n 001535 © 2006 HydroCAD Software Solutions LLC

8/20/2025

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	41	0.1950	0.16		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.25"
0.0	8	0.3300	4.02		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.0	5	0.0100	2.03		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	14	0.1250	2.47		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.3	62	0.3300	4.02		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.4	102	0.0490	4.49		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.9					<b>Direct Entry, MIN TC</b>
0.5	93	0.0210	2.94		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	47	0.0400	9.83	7.72	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.5	372	Total			

**Subcatchment 13S: CB13**

Runoff = 0.62 cfs @ 12.09 hrs, Volume= 0.045 af, Depth= 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
5,493	98	Paved parking & roofs
4,121	39	>75% Grass cover, Good, HSG A
9,614	73	Weighted Average
4,121		Pervious Area
5,493		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	11	0.1820	0.27		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
1.2	29	0.3330	0.41		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.4	75	0.0210	2.94		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.0	9	0.0200	6.95	5.46	<b>Circular Channel (pipe), CB13-DMH10</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
3.7					<b>Direct Entry, MIN. TC</b>
6.0	124	Total			

**Subcatchment 14S: CB14**

Runoff = 1.19 cfs @ 12.11 hrs, Volume= 0.090 af, Depth= 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
11,118	98	Paved parking & roofs
7,973	39	>75% Grass cover, Good, HSG A
19,091	73	Weighted Average
7,973		Pervious Area
11,118		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	37	0.0100	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.7	92	0.0110	2.13		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.2	35	0.0150	2.49		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.2	43	0.0230	3.08		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.3	100	0.0100	4.91	3.86	Circular Channel (pipe), CB14-DMH10 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
7.2	307	Total			

**Subcatchment 15S: RETAINING WALL DRAIN**

Runoff = 0.01 cfs @ 12.44 hrs, Volume= 0.002 af, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
3,920	39	>75% Grass cover, Good, HSG A
3,920		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	105	0.0200	6.95	5.46	Circular Channel (pipe), RETWALL-DMH1 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.7					Direct Entry, MIN. TC
6.0	105	Total			

**Subcatchment 17S: 17S**

Runoff = 1.65 cfs @ 12.13 hrs, Volume= 0.137 af, Depth= 1.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
3,022	98	Paved parking & roofs
14,391	98	Pond
22,278	39	>75% Grass cover, Good, HSG A
39,691	65	Weighted Average
22,278		Pervious Area
17,413		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0390	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.2	17	0.0390	1.38		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	16	0.1250	2.47		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	12	0.3300	4.02		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	11	0.1540	2.75		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.9	59	0.0230	1.06		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	6	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	21	0.3300	4.02		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	15	0.1321	2.54		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.8	178	0.0560	1.66		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.9	65	0.0310	1.23		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
8.5	450	Total			

**Subcatchment 18S: 18S**

Runoff = 0.17 cfs @ 12.35 hrs, Volume= 0.031 af, Depth= 0.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
4,411	98	Paved parking & roofs
22,080	39	>75% Grass cover, Good, HSG A
8,779	30	Woods, Good, HSG A
35,270	44	Weighted Average
30,859		Pervious Area
4,411		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.11		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.25"
0.5	36	0.0580	1.18		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.2	37	0.2700	2.60		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.1	14	0.1430	1.89		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.2	19	0.0820	1.43		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
8.9	156	Total			

**Subcatchment 20S: ROOF1**

Runoff = 0.58 cfs @ 12.09 hrs, Volume= 0.048 af, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
5,064	98	Paved parking & roofs
5,064		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	70	0.0100	4.91	3.86	<b>Circular Channel (pipe), CLEANOUT-DMH6</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.8					<b>Direct Entry, MIN. TC.</b>
6.0	70	Total			

**Subcatchment 21S: ROOF1**

Runoff = 0.58 cfs @ 12.09 hrs, Volume= 0.048 af, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
5,048	98	Paved parking & roofs
5,048		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	58	0.0400	9.83	7.72	<b>Circular Channel (pipe), CLEANOUT-DMH8</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.9					<b>Direct Entry, MIN. TC.</b>
6.0	58	Total			

**Subcatchment 22S: ROOF-REAR**

Runoff = 1.16 cfs @ 12.09 hrs, Volume= 0.096 af, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
10,112	98	Paved parking & roofs
10,112		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	160	0.0200	6.95	5.46	<b>Circular Channel (pipe), CLEANOUT-DMH9</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.6					<b>Direct Entry, MIN. TC.</b>
6.0	160	Total			

**Subcatchment 30S: CB30**

Runoff = 0.27 cfs @ 12.12 hrs, Volume= 0.025 af, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
3,270	98	Paved parking & roofs
10,380	39	>75% Grass cover, Good, HSG A
13,650	53	Weighted Average
10,380		Pervious Area
3,270		impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.2	38	0.0050	3.47	2.73	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	38	Total			

**Subcatchment 31S: CB31**

Runoff = 0.74 cfs @ 12.09 hrs, Volume= 0.054 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
6,355	98	Paved parking & roofs
2,758	39	>75% Grass cover, Good, HSG A
9,113	80	Weighted Average
2,758		Pervious Area
6,355		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.0	8	0.0075	4.26	3.34	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	8	Total			

**Subcatchment 32S: CB32**

Runoff = 0.83 cfs @ 12.10 hrs, Volume= 0.061 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
7,349	98	Paved parking & roofs
4,297	39	>75% Grass cover, Good, HSG A
11,646	76	Weighted Average
4,297		Pervious Area
7,349		Impervious Area

To (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.2	32	0.0050	3.47	2.73	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	32	Total			

**Subcatchment 33S: CB33**

Runoff = 0.35 cfs @ 12.10 hrs, Volume= 0.027 af, Depth= 1.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
3,439	98	Paved parking & roofs
5,144	39	>75% Grass cover, Good, HSG A
8,583	63	Weighted Average
5,144		Pervious Area
3,439		Impervious Area

To (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.2	42	0.0050	3.47	2.73	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	42	Total			

**Subcatchment 34S: CB34**

Runoff = 1.22 cfs @ 12.09 hrs, Volume= 0.089 af, Depth= 2.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
10,509	98	Paved parking & roofs
6,920	39	>75% Grass cover, Good, HSG A
1,505	61	>75% Grass cover, Good, HSG B
18,934	73	Weighted Average
8,425		Pervious Area
10,509		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	50	0.0350	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.1	7	0.0350	1.31		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	63	0.0635	5.12		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.6	209	0.0800	5.74		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.6					Direct Entry, MIN TC
0.0	16	0.0200	6.95	5.46	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	345	Total			

**Subcatchment 35S: CB35**

Runoff = 0.64 cfs @ 12.09 hrs, Volume= 0.047 af, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
5,089	98	Paved parking & roofs
1,446	39	>75% Grass cover, Good, HSG A
1,165	61	>75% Grass cover, Good, HSG B
7,700	81	Weighted Average
2,611		Pervious Area
5,089		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC
0.0	2	0.0400	9.83	7.72	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	2	Total			

**Subcatchment 36S: CB36**

Runoff = 1.19 cfs @ 12.09 hrs, Volume= 0.089 af, Depth= 3.88"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
8,647	98	Paved parking & roofs
3,366	61	>75% Grass cover, Good, HSG B
12,013	88	Weighted Average

3,366 Pervious Area  
8,647 Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	43	0.0470	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.2	17	0.0410	1.42		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	32	0.0410	4.11		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	26	0.0770	5.63		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	87	0.0400	4.06		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.7					Direct Entry, MIN TC
0.0	19	0.0210	7.12	5.59	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	224	Total			

**Subcatchment 37S: CB37**

Runoff = 0.37 cfs @ 12.09 hrs, Volume= 0.029 af, Depth= 4.30"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
2,907	98	Paved parking & roofs
590	81	>75% Grass cover, Good, HSG B
3,497	92	Weighted Average
590		Pervious Area
2,907		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC
0.0	8	0.0500	10.99	8.63	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	8	Total			

**Subcatchment 38S: CB38**

Runoff = 0.89 cfs @ 12.09 hrs, Volume= 0.068 af, Depth= 4.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
6,806	98	Paved parking & roofs
1,621	61	>75% Grass cover, Good, HSG B
8,427	91	Weighted Average
1,621		Pervious Area
6,806		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.0	19	0.0330	8.93	7.01	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	19	Total			

**Subcatchment 39S: CB39**

Runoff = 0.95 cfs @ 12.09 hrs, Volume= 0.089 af, Depth= 3.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
6,620	98	Paved parking & roofs
3,815	61	>75% Grass cover, Good, HSG B
10,435	84	Weighted Average
3,815		Pervious Area
6,620		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.0	8	0.0400	9.83	7.72	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	8	Total			

**Subcatchment 40S: CB40**

Runoff = 1.03 cfs @ 12.09 hrs, Volume= 0.075 af, Depth= 3.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
7,083	98	Paved parking & roofs
3,954	61	>75% Grass cover, Good, HSG B
11,037	85	Weighted Average
3,954		Pervious Area
7,083		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.0	19	0.0410	9.95	7.82	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	19	Total			

**Subcatchment 41S: CB41**

Runoff = 3.26 cfs @ 12.11 hrs, Volume= 0.247 af, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
21,462	98	Paved parking & roofs
21,670	61	>75% Grass cover, Good, HSG B
43,132	79	Weighted Average
21,870		Pervious Area
21,462		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	7	0.0450	0.14		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.1	5	0.0450	1.05		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.25"
2.0	21	0.0450	0.17		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
2.1	17	0.0260	0.13		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.9	59	0.0260	1.13		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.8	56	0.0280	1.17		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.2	27	0.0190	2.80		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.6	147	0.0410	4.11		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.0	9	0.0400	9.83	7.72	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
7.5	348	Total			

**Subcatchment 42S: CB42**

Runoff = 1.23 cfs @ 12.09 hrs, Volume= 0.094 af, Depth= 4.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
9,346	98	Paved parking & roofs
2,328	61	>75% Grass cover, Good, HSG B
11,674	91	Weighted Average
2,328		Pervious Area
9,346		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC
0.0	14	0.0200	6.95	5.46	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	14	Total			

**Subcatchment 43S: CB43**

Runoff = 1.40 cfs @ 12.09 hrs, Volume= 0.103 af, Depth= 3.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
9,303	98	Paved parking & roofs
6,582	61	>75% Grass cover, Good, HSG B
15,885	83	Weighted Average
6,582		Pervious Area
9,303		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC
0.0	12	0.0300	8.51	6.69	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	12	Total			

**Subcatchment 44S: CB44**

Runoff = 2.97 cfs @ 12.12 hrs, Volume= 0.231 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
11,746	98	Paved parking & roofs
45,362	61	>75% Grass cover, Good, HSG B
57,108	69	Weighted Average
45,362		Pervious Area
11,746		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0380	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.1	8	0.0380	1.36		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.6	50	0.0400	1.40		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	24	0.3300	4.02		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	64	0.0940	2.15		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	31	0.3200	3.96		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.5	91	0.0220	1.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	46	0.0860	2.05		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	13	0.3300	4.02		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	18	0.0200	6.95	5.46	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
7.7	395	Total			

**Subcatchment 46S: CB46**

Runoff = 0.72 cfs @ 12.09 hrs, Volume= 0.056 af, Depth= 4.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
6,048	98	Paved parking & roofs
605	39	>75% Grass cover, Good, HSG A
6,653	93	Weighted Average
605		Pervious Area
6,048		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.0	9	0.0300	8.51	6.69	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	9	Total			

**Subcatchment 50S: ROOF**

Runoff = 1.67 cfs @ 12.09 hrs, Volume= 0.140 af, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
14,656	98	Paved parking & roofs
14,656		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.2	88	0.0300	8.51	6.69	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	88	Total			

**Subcatchment 51S: CB51**

Runoff = 1.61 cfs @ 12.31 hrs, Volume= 0.197 af, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
12,143	39	>75% Grass cover, Good, HSG A
54,072	61	>75% Grass cover, Good, HSG B
22,931	55	Woods, Good, HSG B
89,146	56	Weighted Average
89,146		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	50	0.0480	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.25"
0.6	48	0.0830	1.44		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.1	9	0.2220	2.36		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.1	40	0.5000	4.95		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.6	133	0.0150	0.86		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	11	0.1820	2.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	43	0.0470	1.52		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	6	0.3330	4.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	33	0.0810	1.73		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	18	0.1110	2.33		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	20	0.1000	2.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	47	0.0430	1.45		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	42	0.0480	1.53		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.0	68	0.0290	1.19		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.3	144	0.0690	1.84		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.1	115	0.0175	0.93		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	14	0.2800	3.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	5	0.0200	8.34	6.55	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
18.7	846	Total			

**Subcatchment 52S: 52S**

Runoff = 0.01 cfs @ 12.41 hrs, Volume= 0.003 af, Depth= 0.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
3,594	30	Woods, Good, HSG A
2,275	55	Woods, Good, HSG B
5,869	40	Weighted Average
5,869		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC

**Subcatchment 53S: 53S**

Runoff = 0.01 cfs @ 14.85 hrs, Volume= 0.006 af, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
2,249	55	Woods, Good, HSG B
16,708	30	Woods, Good, HSG A
10,000	39	>75% Grass cover, Good, HSG A
28,957	35	Weighted Average
28,957		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC

**Subcatchment 54S: 54S**

Runoff = 2.65 cfs @ 12.16 hrs, Volume= 0.261 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
121,822	55	Woods, Good, HSG B
3,269	61	>75% Grass cover, Good, HSG B
125,091	55	Weighted Average
125,091		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1140	0.14		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.25"
1.7	168	0.1150	1.70		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.6	58	0.0970	1.56		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.2	7	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.9	80	0.0970	1.56		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
9.5	363	Total			

**Subcatchment 55S: HOUSE-ROOFS**

Runoff = 2.16 cfs @ 12.09 hrs, Volume= 0.181 af, Depth= 4.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10YR-NOAA Rainfall=5.22"

Area (sf)	CN	Description
18,940	98	Paved parking & roofs
18,940		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC
0.2	78	0.0200	8.34	6.55	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
6.2	78	Total			

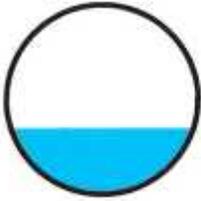
**Reach 1R: DMH1-DMH2**

Inflow Area = 0.310 ac, Inflow Depth = 3.61" for 10YR-NOAA event  
Inflow = 1.10 cfs @ 12.09 hrs, Volume= 0.093 af  
Outflow = 1.09 cfs @ 12.09 hrs, Volume= 0.093 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Max. Velocity= 4.50 fps, Min. Travel Time= 0.2 min  
Avg. Velocity = 1.52 fps, Avg. Travel Time= 0.6 min

Peak Storage= 13 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.35'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 4.21 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 53.0' Slope= 0.0119 '/'  
Inlet Invert= 246.00', Outlet Invert= 245.37'



**Reach 2R: DMH2-POND1**

Inflow Area = 0.644 ac, Inflow Depth = 4.32" for 10YR-NOAA event  
 Inflow = 2.76 cfs @ 12.09 hrs, Volume= 0.232 af  
 Outflow = 2.75 cfs @ 12.09 hrs, Volume= 0.232 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 5.33 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 1.87 fps, Avg. Travel Time= 0.1 min

Peak Storage= 4 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.62'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.86 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 7.0' Slope= 0.0100 '/  
 Inlet Invert= 245.37', Outlet Invert= 245.30'



**Reach 3R: DMH3-POND1**

Inflow Area = 0.503 ac, Inflow Depth = 3.59" for 10YR-NOAA event  
 Inflow = 1.93 cfs @ 12.09 hrs, Volume= 0.151 af  
 Outflow = 1.93 cfs @ 12.09 hrs, Volume= 0.151 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 4.91 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 1.59 fps, Avg. Travel Time= 0.1 min

Peak Storage= 3 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.50'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.86 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 8.0' Slope= 0.0100 '/  
 Inlet Invert= 245.38', Outlet Invert= 245.30'



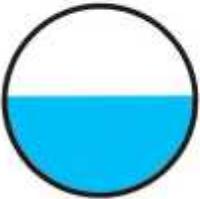
**Reach 4R: DMH4-DMH3**

Inflow Area = 0.503 ac, Inflow Depth = 3.59" for 10YR-NOAA event  
 Inflow = 1.93 cfs @ 12.09 hrs, Volume= 0.151 af  
 Outflow = 1.93 cfs @ 12.09 hrs, Volume= 0.151 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 4.62 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 1.50 fps, Avg. Travel Time= 0.0 min

Peak Storage= 1 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.52'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.56 cfs

12.0" Diameter Pipe, n= 0.013 Concrete pipe, bends & connections  
 Length= 2.0' Slope= 0.0100 '/  
 Inlet Invert= 245.40', Outlet Invert= 245.38'



**Reach 5R: DMH5-DMH4**

Inflow Area = 0.193 ac, Inflow Depth = 3.44" for 10YR-NOAA event  
 Inflow = 0.76 cfs @ 12.09 hrs, Volume= 0.055 af  
 Outflow = 0.75 cfs @ 12.09 hrs, Volume= 0.055 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 3.01 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 1.03 fps, Avg. Travel Time= 0.4 min

Peak Storage= 6 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.36'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.78 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 25.0' Slope= 0.0052 '/  
 Inlet Invert= 245.63', Outlet Invert= 245.50'



**Reach 6R: DMH6-HEADWALL**

Inflow Area = 2.778 ac, Inflow Depth = 2.27" for 10YR-NOAA event  
 Inflow = 6.41 cfs @ 12.12 hrs, Volume= 0.525 af  
 Outflow = 6.23 cfs @ 12.13 hrs, Volume= 0.525 af, Atten= 3%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 5.10 fps, Min. Travel Time= 0.4 min  
 Avg. Velocity = 1.67 fps, Avg. Travel Time= 1.3 min

Peak Storage= 168 cf @ 12.12 hrs, Average Depth at Peak Storage= 0.99'  
 Bank-Full Depth= 1.50', Capacity at Bank-Full= 8.19 cfs

18.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 135.0' Slope= 0.0052 '/  
 Inlet Invert= 252.20', Outlet Invert= 251.50'



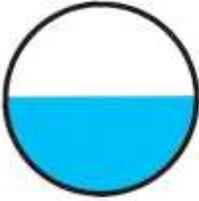
**Reach 7R: DMH7-DMH6**

Inflow Area = 2.622 ac, Inflow Depth = 2.33" for 10YR-NOAA event  
 Inflow = 6.26 cfs @ 12.11 hrs, Volume= 0.508 af  
 Outflow = 6.21 cfs @ 12.12 hrs, Volume= 0.508 af, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 9.81 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 3.13 fps, Avg. Travel Time= 0.5 min

Peak Storage= 55 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.64'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 11.93 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 86.0' Slope= 0.0291 '/  
 Inlet Invert= 254.95', Outlet Invert= 252.45'



**Reach 8R: DMH8-DMH7**

Inflow Area = 1.787 ac, Inflow Depth = 2.56" for 10YR-NOAA event  
 Inflow = 4.75 cfs @ 12.10 hrs, Volume= 0.382 af  
 Outflow = 4.71 cfs @ 12.11 hrs, Volume= 0.382 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 9.47 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 3.10 fps, Avg. Travel Time= 0.5 min

Peak Storage= 49 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.61'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.90 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 97.0' Slope= 0.0320 '/'  
 Inlet Invert= 258.30', Outlet Invert= 255.20'



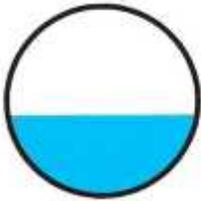
**Reach 9R: DMH9-DMH8**

Inflow Area = 0.891 ac, Inflow Depth = 3.11" for 10YR-NOAA event  
 Inflow = 2.91 cfs @ 12.10 hrs, Volume= 0.231 af  
 Outflow = 2.88 cfs @ 12.11 hrs, Volume= 0.231 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 9.05 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 2.88 fps, Avg. Travel Time= 0.6 min

Peak Storage= 31 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.43'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.62 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 98.0' Slope= 0.0390 '/'  
 Inlet Invert= 262.22', Outlet Invert= 258.40'



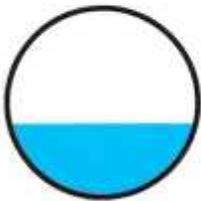
**Reach 10R: DMH10-DMH9**

Inflow Area = 0.659 ac, Inflow Depth = 2.45" for 10YR-NOAA event  
 Inflow = 1.80 cfs @ 12.10 hrs, Volume= 0.135 af  
 Outflow = 1.77 cfs @ 12.11 hrs, Volume= 0.135 af, Atten= 2%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 6.35 fps, Min. Travel Time= 0.3 min  
 Avg. Velocity = 2.35 fps, Avg. Travel Time= 0.9 min

Peak Storage= 36 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.39'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 5.61 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 127.0' Slope= 0.0211 '/'  
 Inlet Invert= 265.90', Outlet Invert= 263.22'



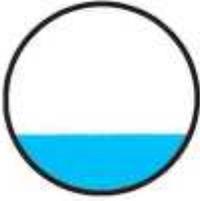
**Reach 11R: DMH11-HEADWALL**

Inflow Area = 0.116 ac, Inflow Depth = 4.98" for 10YR-NOAA event  
 Inflow = 0.58 cfs @ 12.09 hrs, Volume= 0.048 af  
 Outflow = 0.55 cfs @ 12.12 hrs, Volume= 0.048 af, Atten= 5%, Lag= 1.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 2.76 fps, Min. Travel Time= 1.1 min  
 Avg. Velocity = 0.91 fps, Avg. Travel Time= 3.2 min

Peak Storage= 36 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.31'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.73 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 174.0' Slope= 0.0050 '/'  
 Inlet Invert= 251.62', Outlet Invert= 250.75'



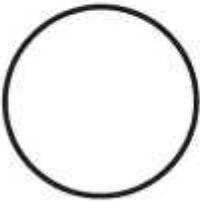
**Reach 20R: DM20-EXIST.DMH**

Inflow Area = 1.386 ac, Inflow Depth = 0.00" for 10YR-NOAA event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.22 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 36.0' Slope= 0.0350 '/'  
 Inlet Invert= 241.77', Outlet Invert= 240.51'



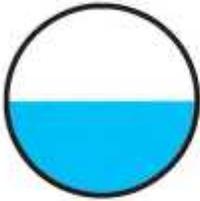
**Reach 22R: DMH22-HEADWALL**

Inflow Area = 3.976 ac, Inflow Depth = 1.29" for 10YR-NOAA event  
 Inflow = 5.35 cfs @ 12.12 hrs, Volume= 0.428 af  
 Outflow = 5.27 cfs @ 12.13 hrs, Volume= 0.428 af, Atten= 1%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 8.65 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 2.84 fps, Avg. Travel Time= 0.6 min

Peak Storage= 67 cf @ 12.13 hrs, Average Depth at Peak Storage= 0.62'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 10.68 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 110.0' Slope= 0.0233 '/'  
 Inlet Invert= 254.50', Outlet Invert= 251.94'



**Reach 30R: DMH30-HW30**

Inflow Area = 0.987 ac, Inflow Depth = 2.03" for 10YR-NOAA event  
 Inflow = 2.18 cfs @ 12.10 hrs, Volume= 0.167 af  
 Outflow = 2.18 cfs @ 12.10 hrs, Volume= 0.167 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 5.06 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 1.84 fps, Avg. Travel Time= 0.1 min

Peak Storage= 5 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.54'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.86 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 12.0' Slope= 0.0100 '/'  
 Inlet Invert= 251.10', Outlet Invert= 250.98'



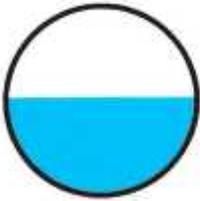
**Reach 31R: DMH31-DMH30**

Inflow Area = 0.778 ac, Inflow Depth = 1.74" for 10YR-NOAA event  
 Inflow = 1.45 cfs @ 12.10 hrs, Volume= 0.113 af  
 Outflow = 1.44 cfs @ 12.10 hrs, Volume= 0.113 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 3.53 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 1.33 fps, Avg. Travel Time= 0.1 min

Peak Storage= 4 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.52'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.73 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 10.0' Slope= 0.0050 '/'  
 Inlet Invert= 251.25', Outlet Invert= 251.20'

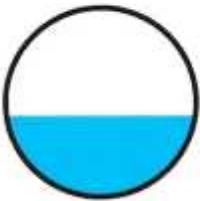
**Reach 32R: DMH32-HW32**

Inflow Area = 3.245 ac, Inflow Depth = 0.71" for 10YR-NOAA event  
 Inflow = 2.56 cfs @ 12.10 hrs, Volume= 0.192 af  
 Outflow = 2.56 cfs @ 12.10 hrs, Volume= 0.192 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 7.94 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 2.51 fps, Avg. Travel Time= 0.0 min

Peak Storage= 2 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.43'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.69 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 7.0' Slope= 0.0300 '/'  
 Inlet Invert= 252.65', Outlet Invert= 252.44'

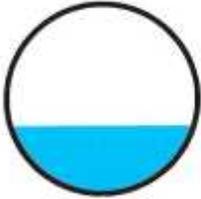
**Reach 33R: DMH33-DMH32**

Inflow Area = 3.093 ac, Inflow Depth = 0.53" for 10YR-NOAA event  
 Inflow = 1.85 cfs @ 12.10 hrs, Volume= 0.136 af  
 Outflow = 1.84 cfs @ 12.10 hrs, Volume= 0.136 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 7.28 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 2.51 fps, Avg. Travel Time= 0.3 min

Peak Storage= 12 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.36'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.69 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 47.0' Slope= 0.0300 '/'  
 Inlet Invert= 254.16', Outlet Invert= 252.75'



### Reach 34R: DMH34-DMH33

Inflow Area = 3.093 ac, Inflow Depth = 0.53" for 10YR-NOAA event  
 Inflow = 1.87 cfs @ 12.09 hrs, Volume= 0.136 af  
 Outflow = 1.85 cfs @ 12.10 hrs, Volume= 0.136 af, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 8.77 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 3.01 fps, Avg. Travel Time= 0.7 min

Peak Storage= 26 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.32'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 8.63 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 120.0' Slope= 0.0500 '/'  
 Inlet Invert= 260.26', Outlet Invert= 254.26'



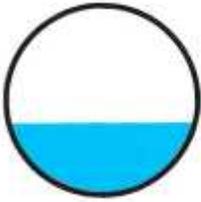
### Reach 36R: DMH36-MANIFOLD

Inflow Area = 2.033 ac, Inflow Depth = 3.41" for 10YR-NOAA event  
 Inflow = 7.44 cfs @ 12.11 hrs, Volume= 0.577 af  
 Outflow = 7.42 cfs @ 12.11 hrs, Volume= 0.577 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 12.01 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 3.84 fps, Avg. Travel Time= 0.2 min

Peak Storage= 25 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.57'  
 Bank-Full Depth= 1.50', Capacity at Bank-Full= 24.14 cfs

18.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
 Length= 40.0' Slope= 0.0313 '/'  
 Inlet Invert= 280.00', Outlet Invert= 278.75'



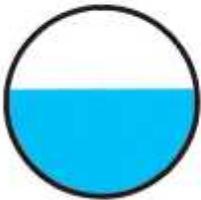
**Reach 37R: DMH37-DMH36**

Inflow Area = 2.033 ac, Inflow Depth = 3.41" for 10YR-NOAA event  
 Inflow = 7.49 cfs @ 12.11 hrs, Volume= 0.577 af  
 Outflow = 7.44 cfs @ 12.11 hrs, Volume= 0.577 af, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 10.39 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 3.39 fps, Avg. Travel Time= 0.4 min

Peak Storage= 61 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.71'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 12.12 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 84.0' Slope= 0.0300 '/'  
 Inlet Invert= 282.77', Outlet Invert= 280.25'



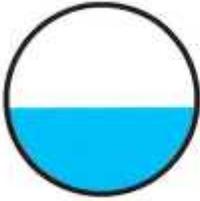
**Reach 38R: DMH38-DHH37**

Inflow Area = 1.677 ac, Inflow Depth = 3.29" for 10YR-NOAA event  
 Inflow = 6.01 cfs @ 12.10 hrs, Volume= 0.459 af  
 Outflow = 5.95 cfs @ 12.11 hrs, Volume= 0.459 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 10.96 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 3.52 fps, Avg. Travel Time= 0.7 min

Peak Storage= 80 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.57'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 14.00 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 146.0' Slope= 0.0400 '/'  
 Inlet Invert= 288.71', Outlet Invert= 282.87'



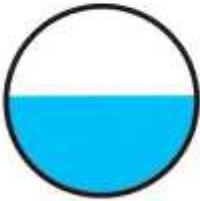
**Reach 39R: DMH39-DHH38**

Inflow Area = 1.244 ac, Inflow Depth = 3.11" for 10YR-NOAA event  
 Inflow = 4.22 cfs @ 12.11 hrs, Volume= 0.322 af  
 Outflow = 4.21 cfs @ 12.11 hrs, Volume= 0.322 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 10.03 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 3.46 fps, Avg. Travel Time= 0.2 min

Peak Storage= 15 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.53'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 35.0' Slope= 0.0400 '/'  
 Inlet Invert= 292.40', Outlet Invert= 291.00'



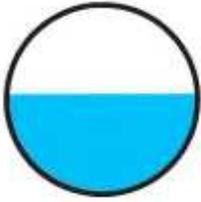
**Reach 40R: DMH40-DHH39**

Inflow Area = 1.244 ac, Inflow Depth = 3.11" for 10YR-NOAA event  
 Inflow = 4.27 cfs @ 12.10 hrs, Volume= 0.322 af  
 Outflow = 4.22 cfs @ 12.11 hrs, Volume= 0.322 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 10.07 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 3.46 fps, Avg. Travel Time= 0.6 min

Peak Storage= 53 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.53'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 126.0' Slope= 0.0400 '/'  
 Inlet Invert= 299.44', Outlet Invert= 294.40'

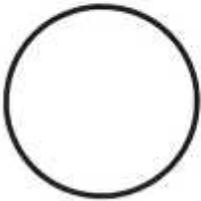
**Reach 41R: DMH41-DMH34**

Inflow Area = 2.481 ac, Inflow Depth = 0.00" for 10YR-NOAA event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 34.0' Slope= 0.0400 '/'  
 Inlet Invert= 264.62', Outlet Invert= 263.26'

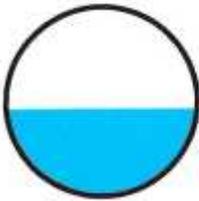
**Reach 42R: DMH42-DMH43**

Inflow Area = 1.676 ac, Inflow Depth = 2.39" for 10YR-NOAA event  
 Inflow = 4.34 cfs @ 12.11 hrs, Volume= 0.334 af  
 Outflow = 4.33 cfs @ 12.11 hrs, Volume= 0.334 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 7.79 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 2.70 fps, Avg. Travel Time= 0.1 min

Peak Storage= 12 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.58'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 9.90 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 22.0' Slope= 0.0200 '/'  
 Inlet Invert= 271.39', Outlet Invert= 270.95'



**Reach 43R: DMH43-DMH44**

Inflow Area = 1.944 ac, Inflow Depth = 2.64" for 10YR-NOAA event  
 Inflow = 5.54 cfs @ 12.10 hrs, Volume= 0.428 af  
 Outflow = 5.50 cfs @ 12.11 hrs, Volume= 0.428 af, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 9.01 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 2.93 fps, Avg. Travel Time= 0.5 min

Peak Storage= 53 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.63'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 11.06 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 86.0' Slope= 0.0250 '/'  
 Inlet Invert= 270.85', Outlet Invert= 268.70'



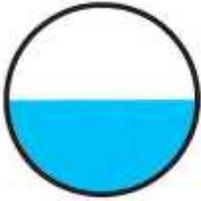
**Reach 44R: DMH44-DMH45**

Inflow Area = 1.944 ac, Inflow Depth = 2.64" for 10YR-NOAA event  
 Inflow = 5.50 cfs @ 12.11 hrs, Volume= 0.428 af  
 Outflow = 5.46 cfs @ 12.11 hrs, Volume= 0.428 af, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 8.98 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 2.92 fps, Avg. Travel Time= 0.4 min

Peak Storage= 43 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.62'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 11.05 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 71.0' Slope= 0.0249 '/'  
 Inlet Invert= 266.70', Outlet Invert= 264.93'



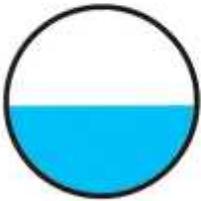
**Reach 45R: DMH45-DMH22**

Inflow Area = 3.976 ac, Inflow Depth = 1.29" for 10YR-NOAA event  
 Inflow = 5.46 cfs @ 12.11 hrs, Volume= 0.428 af  
 Outflow = 5.35 cfs @ 12.12 hrs, Volume= 0.428 af, Atten= 2%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 9.36 fps, Min. Travel Time= 0.4 min  
 Avg. Velocity = 3.04 fps, Avg. Travel Time= 1.2 min

Peak Storage= 122 cf @ 12.12 hrs, Average Depth at Peak Storage= 0.60'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 11.75 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 211.0' Slope= 0.0282 '/  
 Inlet Invert= 260.61', Outlet Invert= 254.66'



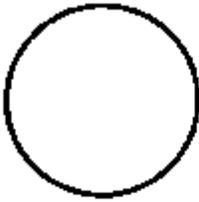
**Reach 46R: DMH 46-DMH45**

Inflow Area = 2.033 ac, Inflow Depth = 0.00" for 10YR-NOAA event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs, Average Depth at Peak Storage= 0.00'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 8.02 cfs

12.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
 Length= 25.0' Slope= 0.0300 '/  
 Inlet Invert= 272.25', Outlet Invert= 271.50'



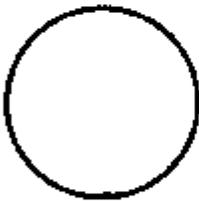
**Reach 55R: OCS-DMH**

Inflow Area = 12.351 ac, Inflow Depth = 0.00" for 10YR-NOAA event  
 Inflow = 0.01 cfs @ 12.49 hrs, Volume= 0.000 af  
 Outflow = 0.01 cfs @ 12.50 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 2.37 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 1.81 fps, Avg. Travel Time= 0.2 min

Peak Storage= 0 cf @ 12.49 hrs, Average Depth at Peak Storage= 0.02'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 11.41 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 27.0' Slope= 0.0874 %  
 Inlet Invert= 245.25', Outlet Invert= 242.89'



**Pond 1P: POND 1**

Inflow Area = 1.386 ac, Inflow Depth = 3.91" for 10YR-NOAA event  
 Inflow = 5.62 cfs @ 12.09 hrs, Volume= 0.452 af  
 Outflow = 1.78 cfs @ 11.85 hrs, Volume= 0.452 af, Atten= 68%, Lag= 0.0 min  
 Discarded = 1.78 cfs @ 11.85 hrs, Volume= 0.452 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Peak Elev= 244.92' @ 12.40 hrs Surf.Area= 5,214 sf Storage= 2,984 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 7.3 min ( 778.3 - 770.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	243.75'	3,772 cf	<b>39.50'W x 132.00'L x 2.67'H Prismaoid</b> 13,921 cf Overall - 4,492 cf Embedded = 9,429 cf x 40.0% Voids
#2	244.42'	4,492 cf	<b>24.0'D x 130.00'L Horizontal Cylinder x 11 Inside #1</b>
		8,264 cf	<b>Total Available Storage</b>

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>14.760 in/hr Exfiltration over Surface area</b>
#2	Primary	245.30'	<b>12.0" Vert. Orifice/Grate X 3.00 C= 0.600</b>

Discarded OutFlow Max=1.78 cfs @ 11.85 hrs HW=243.78' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 1.78 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=243.75' (Free Discharge)

↑2=Orifice/Grate ( Controls 0.00 cfs)

**Pond 2P: POND 2**

Inflow Area = 12.351 ac, Inflow Depth = 1.59" for 10YR-NOAA event  
 Inflow = 19.91 cfs @ 12.12 hrs, Volume= 1.636 af  
 Outflow = 6.38 cfs @ 12.49 hrs, Volume= 1.636 af, Atten= 68%, Lag= 22.3 min  
 Discarded = 6.36 cfs @ 12.49 hrs, Volume= 1.636 af  
 Primary = 0.01 cfs @ 12.49 hrs, Volume= 0.000 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Peak Elev= 250.20' @ 12.49 hrs Surf.Area= 11,527 sf Storage= 12,959 cf

Plug-Flow detention time= 10.9 min calculated for 1.635 af (100% of inflow)

Center-of-Mass det. time= 10.9 min ( 832.7 - 821.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	249.00'	50,131 cf	<b>Custom Stage Data (Prismatic) Listed below (Recalc)</b>

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
249.00	10,086	0	0
250.00	11,283	10,685	10,685
252.00	13,732	25,015	35,700
253.00	15,130	14,431	50,131

Device	Routing	Invert	Outlet Devices
#1	Discarded	248.90'	<b>23.850 in/hr Exfiltration over Surface area above Invert</b> Excluded Surface area = 0 sf
#2	Primary	250.66'	<b>12.0" Vert. Orifice/Grate C= 0.600</b>
#3	Primary	250.17'	<b>4.0" Vert. Orifice/Grate X 5.00 C= 0.600</b>
#4	Primary	251.88'	<b>2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600</b>
#5	Secondary	252.00'	<b>10.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

**Discarded OutFlow** Max=6.36 cfs @ 12.49 hrs HW=250.20' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 6.36 cfs)

**Primary OutFlow** Max=0.01 cfs @ 12.49 hrs HW=250.20' (Free Discharge)

↑2=Orifice/Grate ( Controls 0.00 cfs)

↑3=Orifice/Grate (Orifice Controls 0.01 cfs @ 0.57 fps)

↑4=Orifice/Grate ( Controls 0.00 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=249.00' (Free Discharge)

↑5=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Pond 3P: POND 3**

Inflow Area = 2.033 ac, Inflow Depth = 3.41" for 10YR-NOAA event  
 Inflow = 7.42 cfs @ 12.11 hrs, Volume= 0.577 af  
 Outflow = 1.26 cfs @ 11.75 hrs, Volume= 0.577 af, Atten= 83%, Lag= 0.0 min  
 Discarded = 1.26 cfs @ 11.75 hrs, Volume= 0.577 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Peak Elev= 277.70' @ 12.62 hrs Surf.Area= 4,009 sf Storage= 7,267 cf

Plug-Flow detention time= 36.6 min calculated for 0.577 af (100% of inflow)  
 Center-of-Mass det. time= 36.6 min ( 847.0 - 810.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	274.60'	5,122 cf	<b>59.83"W x 67.00"L x 5.00"H Prismaoid</b> 20,043 cf Overall - 7,238 cf Embedded = 12,805 cf x 40.0% Voids
#2	275.60'	7,238 cf	<b>48.0"D x 64.00'L Horizontal Cylinder x 9 Inside #1</b>
		12,360 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	274.50'	<b>13.600 in/hr Exfiltration over Surface area above invert</b> Excluded Surface area = 0 sf
#2	Primary	278.50'	<b>12.0" Vert. Orifice/Grate X 6.00 C= 0.600</b>

**Discarded OutFlow** Max=1.26 cfs @ 11.75 hrs HW=274.67' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 1.26 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=274.60' (Free Discharge)

↑2=Orifice/Grate ( Controls 0.00 cfs)

**Pond 5P: POND 5**

Inflow Area = 2.481 ac, Inflow Depth = 1.63" for 10YR-NOAA event  
 Inflow = 2.86 cfs @ 12.12 hrs, Volume= 0.378 af  
 Outflow = 1.18 cfs @ 12.00 hrs, Volume= 0.378 af, Atten= 59%, Lag= 0.0 min  
 Discarded = 1.18 cfs @ 12.00 hrs, Volume= 0.378 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Peak Elev= 269.24' @ 12.65 hrs Surf.Area= 3,432 sf Storage= 2,401 cf

Plug-Flow detention time= 9.9 min calculated for 0.378 af (100% of inflow)  
 Center-of-Mass det. time= 9.9 min ( 835.4 - 825.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	267.70'	4,400 cf	<b>36.90'W x 93.00'L x 5.00'H Prismaoid</b> 17,159 cf Overall - 6,158 cf Embedded = 11,001 cf x 40.0% Voids
#2	268.70'	6,158 cf	<b>48.0"D x 70.00'L Horizontal Cylinder</b> x 7 Inside #1
		10,558 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	267.60'	<b>14.900 in/hr Exfiltration over Surface area above invert</b> Excluded Surface area = 0 sf
#2	Primary	271.60'	<b>12.0" Vert. Orifice/Grate X 3.00</b> C= 0.600

**Discarded OutFlow** Max=1.18 cfs @ 12.00 hrs HW=267.78' (Free Discharge)  
 ↳1=Exfiltration (Exfiltration Controls 1.18 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=267.70' (Free Discharge)  
 ↳2=Orifice/Grate ( Controls 0.00 cfs)

**Link 1L: COMBINE HYDROGRAPHS**

Inflow Area = 14.546 ac, Inflow Depth = 0.03" for 10YR-NOAA event  
 Inflow = 0.17 cfs @ 12.35 hrs, Volume= 0.031 af  
 Primary = 0.17 cfs @ 12.35 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

**Link 54L: TO-140**

Inflow Area = 3.536 ac, Inflow Depth = 0.91" for 10YR-NOAA event  
 Inflow = 2.65 cfs @ 12.16 hrs, Volume= 0.267 af  
 Primary = 2.65 cfs @ 12.16 hrs, Volume= 0.267 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

## **100 YR POST-DEVELOPMENT**

**Subcatchment 1S: CB1**

Runoff = 1.73 cfs @ 12.09 hrs, Volume= 0.146 af, Depth= 7.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
9,594	98	Paved parking & roofs
9,594		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	62	0.0100	4.91	3.86	<b>Circular Channel (pipe), CB1-DMH1</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.8					<b>Direct Entry,</b>
6.0	62	Total			

**Subcatchment 2S: CB2**

Runoff = 2.62 cfs @ 12.09 hrs, Volume= 0.221 af, Depth= 7.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
14,408	98	Paved parking & roofs
122	39	>75% Grass cover, Good, HSG A
14,530	98	Weighted Average
122		Pervious Area
14,408		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0	10	0.0100	4.91	3.86	<b>Circular Channel (pipe), CB2-DMH2</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0					<b>Direct Entry, MIN. TC</b>
6.0	10	Total			

**Subcatchment 4S: CB4**

Runoff = 1.36 cfs @ 12.09 hrs, Volume= 0.115 af, Depth= 7.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
7,554	98	Paved parking & roofs
7,554		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0	13	0.0100	4.91	3.86	<b>Circular Channel (pipe), CB4-DMH4</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0					<b>Direct Entry, MIN.TC</b>
6.0	13	Total			

**Subcatchment 5S: CB5**

Runoff = 1.66 cfs @ 12.09 hrs, Volume= 0.125 af, Depth= 6.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
7,852	98	Paved parking & roofs
2,558	39	>75% Grass cover, Good, HSG A
10,410	84	Weighted Average
2,558		Pervious Area
7,852		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	41	0.0030	2.69	2.11	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.7					<b>Direct Entry, MIN. TC</b>
6.0	41	Total			

**Subcatchment 6S: CB6**

Runoff = 0.96 cfs @ 12.09 hrs, Volume= 0.072 af, Depth= 6.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
4,648	98	Paved parking & roofs
1,389	39	>75% Grass cover, Good, HSG A
6,037	84	Weighted Average
1,389		Pervious Area
4,648		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	38	0.0050	3.47	2.73	<b>Circular Channel (pipe), CB6-DMH5</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.8					<b>Direct Entry,</b>
6.0	38	Total			

**Subcatchment 7S: CB7**

Runoff = 0.37 cfs @ 12.09 hrs, Volume= 0.028 af, Depth= 6.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
1,784	98	Paved parking & roofs
584	39	>75% Grass cover, Good, HSG A
2,368	83	Weighted Average
584		Pervious Area
1,784		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	48	0.0200	6.95	5.46	<b>Circular Channel (pipe), CB7-DMH5</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.9					<b>Direct Entry, MIN. TC</b>
6.0	48	Total			

**Subcatchment 8S: CB8**

Runoff = 0.69 cfs @ 12.09 hrs, Volume= 0.050 af, Depth= 4.39"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
2,933	98	Paved parking & roofs
3,025	39	>75% Grass cover, Good, HSG A
5,958	68	Weighted Average
3,025		Pervious Area
2,933		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	100	0.0200	6.95	5.46	<b>Circular Channel (pipe), CB8-DMH4</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.8					<b>Direct Entry, MIN. TC</b>
6.0	100	Total			

**Subcatchment 9S: CB9**

Runoff = 0.57 cfs @ 12.10 hrs, Volume= 0.042 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
2,195	98	Paved parking & roofs
4,619	39	>75% Grass cover, Good, HSG A
6,814	58	Weighted Average
4,619		Pervious Area
2,195		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	25	0.0100	0.10		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.8	19	0.3330	0.38		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.0	11	0.0454	4.33		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.4	114	0.0600	4.97		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	22	0.0050	3.47	2.73	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.5					<b>Direct Entry, MIN. TC.</b>
6.0	191	Total			

**Subcatchment 10S: CB10**

Runoff = 3.16 cfs @ 12.12 hrs, Volume= 0.248 af, Depth= 4.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
11,195	98	Paved parking & roofs
13,303	39	>75% Grass cover, Good, HSG A
7,605	61	>75% Grass cover, Good, HSG B
32,103	65	Weighted Average

20,908 Pervious Area  
11,195 Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	28	0.0210	0.14		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
2.6	22	0.0260	0.14		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
1.7	100	0.0200	0.99		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	7	0.0500	1.57		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.0	5	0.0100	2.03		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	19	0.3300	4.02		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.0	10	0.0500	4.54		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	31	0.0300	8.51	6.69	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.4					<b>Direct Entry, MIN TC</b>
8.4	222	Total			

**Subcatchment 11S: CB11**

Runoff = 0.48 cfs @ 12.09 hrs, Volume= 0.035 af, Depth= 4.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
2,003	98	Paved parking & roofs
2,251	39	>75% Grass cover, Good, HSG A
4,254	67	Weighted Average
2,251		Pervious Area
2,003		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	22	0.0100	0.10		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.8	12	0.1670	0.26		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.3	6	0.3330	0.30		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.1	17	0.0740	1.90		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	8	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	40	0.0300	8.51	6.69	Circular Channel (pipe), CB11-DMH7 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.9					Direct Entry, MIN. TC
6.0	105	Total			

**Subcatchment 12S: CB12**

Runoff = 3.25 cfs @ 12.10 hrs, Volume= 0.240 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
8,359	98	Paved parking & roofs
11,088	39	>75% Grass cover, Good, HSG A
11,592	61	>75% Grass cover, Good, HSG B
2,937	55	Woods, Good, HSG B
33,976	62	Weighted Average
25,617		Pervious Area
8,359		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	41	0.1950	0.16		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.25"
0.0	8	0.3300	4.02		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.0	5	0.0100	2.03		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	14	0.1250	2.47		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.3	62	0.3300	4.02		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.4	102	0.0490	4.49		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.9					<b>Direct Entry, MIN TC</b>
0.5	93	0.0210	2.94		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	47	0.0400	9.83	7.72	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.5	372	Total			

**Subcatchment 13S: CB13**

Runoff = 1.26 cfs @ 12.09 hrs, Volume= 0.091 af, Depth= 4.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
5,493	98	Paved parking & roofs
4,121	39	>75% Grass cover, Good, HSG A
9,614	73	Weighted Average
4,121		Pervious Area
5,493		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	11	0.1820	0.27		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
1.2	29	0.3330	0.41		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.4	75	0.0210	2.94		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.0	9	0.0200	6.95	5.48	<b>Circular Channel (pipe), CB13-DMH10</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
3.7					<b>Direct Entry, MIN. TC</b>
6.0	124	Total			

**Subcatchment 14S: CB14**

Runoff = 2.41 cfs @ 12.11 hrs, Volume= 0.182 af, Depth= 4.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
11,118	98	Paved parking & roofs
7,973	39	>75% Grass cover, Good, HSG A
19,091	73	Weighted Average
7,973		Pervious Area
11,118		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	37	0.0100	0.11		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.7	92	0.0110	2.13		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.2	35	0.0150	2.49		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.2	43	0.0230	3.08		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.3	100	0.0100	4.91	3.86	<b>Circular Channel (pipe), CB14-DMH10</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
7.2	307	Total			

**Subcatchment 15S: RETAINING WALL DRAIN**

Runoff = 0.09 cfs @ 12.12 hrs, Volume= 0.009 af, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
3,920	39	>75% Grass cover, Good, HSG A
3,920		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	105	0.0200	6.95	5.46	<b>Circular Channel (pipe), RETWALL-DMH1</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
5.7					<b>Direct Entry, MIN. TC</b>
6.0	105	Total			

**Subcatchment 17S: 17S**

Runoff = 3.89 cfs @ 12.12 hrs, Volume= 0.307 af, Depth= 4.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
3,022	98	Paved parking & roofs
14,391	98	Pond
22,278	39	>75% Grass cover, Good, HSG A
39,691	65	Weighted Average
22,278		Pervious Area
17,413		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0390	0.19		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.2	17	0.0390	1.38		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	16	0.1250	2.47		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.0	12	0.3300	4.02		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	11	0.1540	2.75		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.9	59	0.0230	1.06		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.0	6	0.0200	2.87		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	21	0.3300	4.02		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	15	0.1321	2.54		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
1.8	178	0.0560	1.66		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.9	65	0.0310	1.23		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
8.5	450	Total			

**Subcatchment 18S: 18S**

Runoff = 1.21 cfs @ 12.15 hrs, Volume= 0.117 af, Depth= 1.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
4,411	98	Paved parking & roofs
22,080	39	>75% Grass cover, Good, HSG A
8,779	30	Woods, Good, HSG A
35,270	44	Weighted Average
30,859		Pervious Area
4,411		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.11		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.25"
0.5	36	0.0560	1.18		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.2	37	0.2700	2.60		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.1	14	0.1430	1.89		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.2	19	0.0820	1.43		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
8.9	156	Total			

**Subcatchment 20S: ROOF1**

Runoff = 0.91 cfs @ 12.09 hrs, Volume= 0.077 af, Depth= 7.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
5,064	98	Paved parking & roofs
5,064		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	70	0.0100	4.91	3.86	Circular Channel (pipe), CLEANOUT-DMH6 Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished Direct Entry, MIN. TC.
5.8					
6.0	70	Total			

**Subcatchment 21S: ROOF1**

Runoff = 0.91 cfs @ 12.09 hrs, Volume= 0.077 af, Depth= 7.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
5,048	98	Paved parking & roofs
5,048		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.1	58	0.0400	9.83	7.72	<b>Circular Channel (pipe), CLEANOUT-DMH8</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished <b>Direct Entry, MIN. TC.</b>
5.9					
6.0	58	Total			

**Subcatchment 22S: ROOF-REAR**

Runoff = 1.82 cfs @ 12.09 hrs, Volume= 0.154 af, Depth= 7.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
10,112	98	Paved parking & roofs
10,112		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	160	0.0200	6.95	5.46	<b>Circular Channel (pipe), CLEANOUT-DMH9</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished <b>Direct Entry, MIN. TC.</b>
5.6					
6.0	160	Total			

**Subcatchment 30S: CB30**

Runoff = 0.92 cfs @ 12.10 hrs, Volume= 0.070 af, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
3,270	98	Paved parking & roofs
10,380	39	>75% Grass cover, Good, HSG A
13,650	53	Weighted Average
10,380		Pervious Area
3,270		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.2	38	0.0050	3.47	2.73	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	38	<b>Total</b>			

**Subcatchment 31S: CB31**

Runoff = 1.37 cfs @ 12.09 hrs, Volume= 0.101 af, Depth= 5.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
6,355	98	Paved parking & roofs
2,758	39	>75% Grass cover, Good, HSG A
9,113	80	Weighted Average
2,758		Pervious Area
6,355		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.0	8	0.0075	4.26	3.34	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	8	<b>Total</b>			

**Subcatchment 32S: CB32**

Runoff = 1.61 cfs @ 12.09 hrs, Volume= 0.119 af, Depth= 5.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
7,349	98	Paved parking & roofs
4,297	39	>75% Grass cover, Good, HSG A
11,646	76	Weighted Average
4,297		Pervious Area
7,349		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.2	32	0.0050	3.47	2.73	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	32	Total			

**Subcatchment 33S: CB33**

Runoff = 0.85 cfs @ 12.10 hrs, Volume= 0.063 af, Depth= 3.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
3,439	98	Paved parking & roofs
5,144	39	>75% Grass cover, Good, HSG A
8,583	63	Weighted Average
5,144		Pervious Area
3,439		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.2	42	0.0050	3.47	2.73	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	42	Total			

**Subcatchment 34S: CB34**

Runoff = 2.48 cfs @ 12.09 hrs, Volume= 0.180 af, Depth= 4.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
10,509	98	Paved parking & roofs
6,920	39	>75% Grass cover, Good, HSG A
1,505	61	>75% Grass cover, Good, HSG B
18,934	73	Weighted Average
8,425		Pervious Area
10,509		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.5	50	0.0350	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.1	7	0.0350	1.31		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	63	0.0635	5.12		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.6	209	0.0800	5.74		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.6					Direct Entry, MIN TC
0.0	16	0.0200	6.95	5.46	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	345	Total			

**Subcatchment 35S: CB35**

Runoff = 1.17 cfs @ 12.09 hrs, Volume= 0.087 af, Depth= 5.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
5,089	98	Paved parking & roofs
1,446	39	>75% Grass cover, Good, HSG A
1,165	61	>75% Grass cover, Good, HSG B
7,700	81	Weighted Average
2,611		Pervious Area
5,089		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC
0.0	2	0.0400	9.83	7.72	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	2	Total			

**Subcatchment 36S: CB36**

Runoff = 2.02 cfs @ 12.09 hrs, Volume= 0.155 af, Depth= 6.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
8,647	98	Paved parking & roofs
3,366	61	>75% Grass cover, Good, HSG B
12,013	88	Weighted Average

3.386 Pervious Area  
8.647 Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	43	0.0470	0.20		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.2	17	0.0410	1.42		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	32	0.0410	4.11		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.1	26	0.0770	5.63		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.4	87	0.0400	4.06		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
1.7					<b>Direct Entry, MIN TC</b>
0.0	19	0.0210	7.12	5.59	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	224	Total			

**Subcatchment 37S: CB37**

Runoff = 0.61 cfs @ 12.09 hrs, Volume= 0.048 af, Depth= 7.22"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
2,907	98	Paved parking & roofs
590	61	>75% Grass cover, Good, HSG B
3,497	92	Weighted Average
590		Pervious Area
2,907		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.0	8	0.0500	10.99	8.63	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	8	Total			

**Subcatchment 38S: CB38**

Runoff = 1.46 cfs @ 12.09 hrs, Volume= 0.114 af, Depth= 7.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
6,806	98	Paved parking & roofs
1,621	61	>75% Grass cover, Good, HSG B
8,427	91	Weighted Average
1,621		Pervious Area
6,806		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.0	19	0.0330	8.93	7.01	<b>Circular Channel (pipe),</b> Diam= 12.0' Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe. finished
6.0	19	<b>Total</b>			

**Subcatchment 39S: CB39**

Runoff = 1.67 cfs @ 12.09 hrs, Volume= 0.125 af, Depth= 6.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
6,620	98	Paved parking & roofs
3,815	61	>75% Grass cover, Good, HSG B
10,435	84	Weighted Average
3,815		Pervious Area
6,620		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.0	8	0.0400	9.83	7.72	<b>Circular Channel (pipe),</b> Diam= 12.0' Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe. finished
6.0	8	<b>Total</b>			

**Subcatchment 40S: CB40**

Runoff = 1.79 cfs @ 12.09 hrs, Volume= 0.135 af, Depth= 6.39"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
7,083	98	Paved parking & roofs
3,954	61	>75% Grass cover, Good, HSG B
11,037	85	Weighted Average
3,954		Pervious Area
7,083		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.0	19	0.0410	9.95	7.82	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	19	Total			

**Subcatchment 41S: CB41**

Runoff = 6.10 cfs @ 12.11 hrs, Volume= 0.468 af, Depth= 5.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
21,462	98	Paved parking & roofs
21,670	61	>75% Grass cover, Good, HSG B
43,132	79	Weighted Average
21,670		Pervious Area
21,462		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	7	0.0450	0.14		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.1	5	0.0450	1.05		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.25"
2.0	21	0.0450	0.17		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
2.1	17	0.0260	0.13		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.25"
0.9	59	0.0260	1.13		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.8	56	0.0280	1.17		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.2	27	0.0190	2.80		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.6	147	0.0410	4.11		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.0	9	0.0400	9.83	7.72	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
7.5	348	Total			

**Subcatchment 42S: CB42**

Runoff = 2.02 cfs @ 12.09 hrs, Volume= 0.159 af, Depth= 7.10'

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
9,346	98	Paved parking & roofs
2,328	61	>75% Grass cover, Good, HSG B
11,674	91	Weighted Average
2,328		Pervious Area
9,346		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC
0.0	14	0.0200	6.95	5.46	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	14	Total			

**Subcatchment 43S: CB43**

Runoff = 2.50 cfs @ 12.09 hrs, Volume= 0.187 af, Depth= 6.15'

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
9,303	98	Paved parking & roofs
6,582	61	>75% Grass cover, Good, HSG B
15,885	83	Weighted Average
6,582		Pervious Area
9,303		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC
0.0	12	0.0300	8.51	6.69	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	12	Total			

**Subcatchment 44S: CB44**

Runoff = 6.45 cfs @ 12.11 hrs, Volume= 0.492 af, Depth= 4.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
11,746	98	Paved parking & roofs
45,362	61	>75% Grass cover, Good, HSG B
57,108	69	Weighted Average
45,362		Pervious Area
11,746		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0380	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.25"
0.1	8	0.0380	1.36		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.6	50	0.0400	1.40		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	24	0.3300	4.02		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	64	0.0940	2.15		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	31	0.3200	3.96		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.5	91	0.0220	1.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	46	0.0860	2.05		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	13	0.3300	4.02		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	18	0.0200	6.95	5.46	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
7.7	395	Total			

**Subcatchment 46S: CB46**

Runoff = 1.17 cfs @ 12.09 hrs, Volume= 0.093 af, Depth= 7.34"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
6,048	98	Paved parking & roofs
605	39	>75% Grass cover, Good, HSG A
6,653	93	Weighted Average
605		Pervious Area
6,048		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.0	9	0.0300	8.51	6.69	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.0	9	<b>Total</b>			

**Subcatchment 50S: ROOF**

Runoff = 2.63 cfs @ 12.09 hrs, Volume= 0.223 af, Depth= 7.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
14,656	98	Paved parking & roofs
14,656		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.2	88	0.0300	8.51	6.69	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
6.2	88	<b>Total</b>			

**Subcatchment 51S: CB51**

Runoff = 4.83 cfs @ 12.27 hrs, Volume= 0.515 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
12,143	39	>75% Grass cover, Good, HSG A
54,072	61	>75% Grass cover, Good, HSG B
22,931	55	Woods, Good, HSG B
89,146	56	Weighted Average
89,146		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.6	50	0.0480	0.10		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.25"
0.6	48	0.0830	1.44		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.1	9	0.2220	2.36		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.1	40	0.5000	4.95		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.6	133	0.0150	0.86		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	11	0.1820	2.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	43	0.0470	1.52		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	6	0.3330	4.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	33	0.0610	1.73		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	18	0.1110	2.33		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.2	20	0.1000	2.21		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	47	0.0430	1.45		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	42	0.0480	1.53		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.0	68	0.0290	1.19		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.3	144	0.0690	1.84		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.1	115	0.0175	0.93		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	14	0.2800	3.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.0	5	0.0200	8.34	6.55	Circular Channel (pipe), Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
18.7	846	Total			

**Subcatchment 52S: 52S**

Runoff = 0.15 cfs @ 12.12 hrs, Volume= 0.015 af, Depth= 1.33'

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
3,594	30	Woods, Good, HSG A
2,275	55	Woods, Good, HSG B
5,869	40	Weighted Average
5,869		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC

**Subcatchment 53S: 53S**

Runoff = 0.31 cfs @ 12.17 hrs, Volume= 0.048 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
2,249	55	Woods, Good, HSG B
16,708	30	Woods, Good, HSG A
10,000	39	>75% Grass cover, Good, HSG A
28,957	35	Weighted Average
28,957		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, MIN TC

**Subcatchment 54S: 54S**

Runoff = 8.24 cfs @ 12.15 hrs, Volume= 0.696 af, Depth= 2.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
121,822	55	Woods, Good, HSG B
3,269	61	>75% Grass cover, Good, HSG B
125,091	55	Weighted Average
125,091		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.1140	0.14		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 3.25"
1.7	168	0.1150	1.70		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.6	58	0.0970	1.56		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.2	7	0.0100	0.70		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.9	80	0.0970	1.56		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
9.5	363	Total			

**Subcatchment 55S: HOUSE-ROOFS**

Runoff = 3.40 cfs @ 12.09 hrs, Volume= 0.288 af, Depth= 7.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Type III 24-hr 100YR-noaa Rainfall=8.18"

Area (sf)	CN	Description
18,940	98	Paved parking & roofs
18,940		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					<b>Direct Entry, MIN TC</b>
0.2	78	0.0200	8.34	6.55	<b>Circular Channel (pipe),</b> Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
6.2	78	Total			

**Reach 1R: DMH1-DMH2**

Inflow Area = 0.310 ac, Inflow Depth = 5.99" for 100YR-noaa event  
Inflow = 1.81 cfs @ 12.09 hrs, Volume= 0.155 af  
Outflow = 1.80 cfs @ 12.09 hrs, Volume= 0.155 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
Max. Velocity= 5.15 fps, Min. Travel Time= 0.2 min  
Avg. Velocity = 1.77 fps, Avg. Travel Time= 0.5 min

Peak Storage= 19 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.46'  
Bank-Full Depth= 1.00', Capacity at Bank-Full= 4.21 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
Length= 53.0' Slope= 0.0119 1/2'  
Inlet Invert= 246.00', Outlet Invert= 245.37'



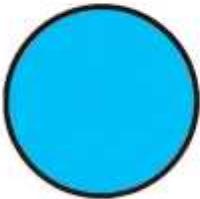
**Reach 2R: DMH2-POND1**

Inflow Area = 0.644 ac, Inflow Depth = 7.00" for 100YR-noaa event  
 Inflow = 4.41 cfs @ 12.09 hrs, Volume= 0.376 af  
 Outflow = 4.03 cfs @ 12.15 hrs, Volume= 0.376 af, Atten= 9%, Lag= 3.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 5.58 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 2.16 fps, Avg. Travel Time= 0.1 min

Peak Storage= 5 cf @ 12.10 hrs, Average Depth at Peak Storage= 1.00'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.86 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 7.0' Slope= 0.0100 '/  
 Inlet Invert= 245.37', Outlet Invert= 245.30'



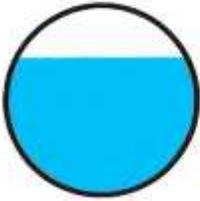
**Reach 3R: DMH3-POND1**

Inflow Area = 0.503 ac, Inflow Depth = 6.32" for 100YR-noaa event  
 Inflow = 3.38 cfs @ 12.09 hrs, Volume= 0.265 af  
 Outflow = 3.38 cfs @ 12.09 hrs, Volume= 0.265 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 5.54 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 1.88 fps, Avg. Travel Time= 0.1 min

Peak Storage= 5 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.72'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.86 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 8.0' Slope= 0.0100 '/  
 Inlet Invert= 245.38', Outlet Invert= 245.30'



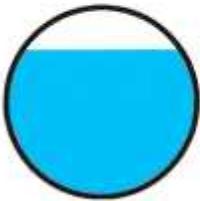
### Reach 4R: DMH4-DMH3

Inflow Area = 0.503 ac, Inflow Depth = 6.32" for 100YR-noaa event  
 Inflow = 3.38 cfs @ 12.09 hrs, Volume= 0.265 af  
 Outflow = 3.38 cfs @ 12.09 hrs, Volume= 0.265 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 5.16 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 1.77 fps, Avg. Travel Time= 0.0 min

Peak Storage= 1 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.78'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.56 cfs

12.0" Diameter Pipe, n= 0.013 Concrete pipe, bends & connections  
 Length= 2.0' Slope= 0.0100 '/'  
 Inlet Invert= 245.40', Outlet Invert= 245.38'



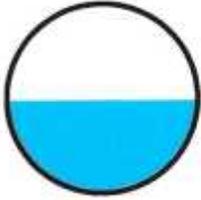
### Reach 5R: DMH5-DMH4

Inflow Area = 0.193 ac, Inflow Depth = 6.23" for 100YR-noaa event  
 Inflow = 1.34 cfs @ 12.09 hrs, Volume= 0.100 af  
 Outflow = 1.33 cfs @ 12.09 hrs, Volume= 0.100 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 3.50 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 1.19 fps, Avg. Travel Time= 0.4 min

Peak Storage= 10 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.49'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.78 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 25.0' Slope= 0.0052 '/'  
 Inlet Invert= 245.63', Outlet Invert= 245.50'



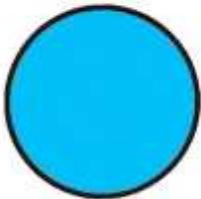
### Reach 6R: DMH6-HEADWALL

Inflow Area = 2.778 ac, Inflow Depth = 4.62" for 100YR-noaa event  
 Inflow = 11.08 cfs @ 12.12 hrs, Volume= 1.069 af  
 Outflow = 8.19 cfs @ 12.10 hrs, Volume= 1.069 af, Atten= 26%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 5.28 fps, Min. Travel Time= 0.4 min  
 Avg. Velocity = 2.01 fps, Avg. Travel Time= 1.1 min

Peak Storage= 239 cf @ 12.05 hrs, Average Depth at Peak Storage= 1.50'  
 Bank-Full Depth= 1.50', Capacity at Bank-Full= 8.19 cfs

18.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 135.0' Slope= 0.0052 '/  
 Inlet Invert= 252.20', Outlet Invert= 251.50'



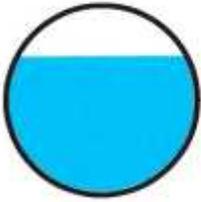
### Reach 7R: DMH7-DMH6

Inflow Area = 2.622 ac, Inflow Depth = 4.70" for 100YR-noaa event  
 Inflow = 10.53 cfs @ 12.12 hrs, Volume= 1.026 af  
 Outflow = 10.53 cfs @ 12.12 hrs, Volume= 1.026 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 10.97 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 3.79 fps, Avg. Travel Time= 0.4 min

Peak Storage= 83 cf @ 12.12 hrs, Average Depth at Peak Storage= 0.91'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 11.93 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 86.0' Slope= 0.0291 '/  
 Inlet Invert= 254.95', Outlet Invert= 252.45'

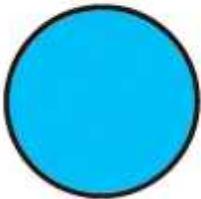
**Reach 8R: DMH8-DMH7**

Inflow Area = 1.787 ac, Inflow Depth = 4.99" for 100YR-noaa event  
 Inflow = 9.51 cfs @ 12.10 hrs, Volume= 0.743 af  
 Outflow = 7.62 cfs @ 12.28 hrs, Volume= 0.743 af, Atten= 20%, Lag= 10.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 9.81 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 3.71 fps, Avg. Travel Time= 0.4 min

Peak Storage= 76 cf @ 12.05 hrs, Average Depth at Peak Storage= 1.00'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.90 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 97.0' Slope= 0.0320 '/'  
 Inlet Invert= 258.30', Outlet Invert= 255.20'

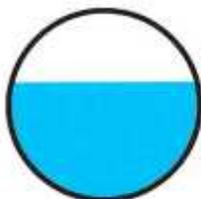
**Reach 9R: DMH9-DMH8**

Inflow Area = 0.891 ac, Inflow Depth = 5.74" for 100YR-noaa event  
 Inflow = 5.41 cfs @ 12.10 hrs, Volume= 0.427 af  
 Outflow = 5.37 cfs @ 12.10 hrs, Volume= 0.427 af, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 10.53 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 3.43 fps, Avg. Travel Time= 0.5 min

Peak Storage= 50 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.62'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.62 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 98.0' Slope= 0.0390 '/'  
 Inlet Invert= 262.22', Outlet Invert= 258.40'



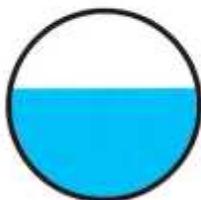
### Reach 10R: DMH10-DMH9

Inflow Area = 0.659 ac, Inflow Depth = 4.97" for 100YR-noaa event  
 Inflow = 3.66 cfs @ 12.10 hrs, Volume= 0.273 af  
 Outflow = 3.62 cfs @ 12.11 hrs, Volume= 0.273 af, Atten= 1%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 7.61 fps, Min. Travel Time= 0.3 min  
 Avg. Velocity = 2.76 fps, Avg. Travel Time= 0.8 min

Peak Storage= 61 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.59'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 5.61 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 127.0' Slope= 0.0211 '/  
 Inlet Invert= 265.90', Outlet Invert= 263.22'



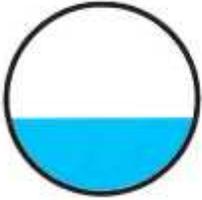
### Reach 11R: DMH11-HEADWALL

Inflow Area = 0.116 ac, Inflow Depth = 7.94" for 100YR-noaa event  
 Inflow = 0.91 cfs @ 12.09 hrs, Volume= 0.077 af  
 Outflow = 0.88 cfs @ 12.11 hrs, Volume= 0.077 af, Atten= 4%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 3.12 fps, Min. Travel Time= 0.9 min  
 Avg. Velocity = 1.05 fps, Avg. Travel Time= 2.8 min

Peak Storage= 51 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.40'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.73 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 174.0' Slope= 0.0050 '/  
 Inlet Invert= 251.62', Outlet Invert= 250.75'



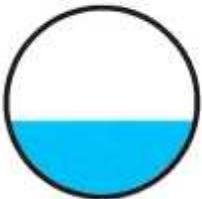
**Reach 20R: DM20-EXIST.DMH**

Inflow Area = 1.386 ac, Inflow Depth = 0.60" for 100YR-noaa event  
 Inflow = 2.44 cfs @ 12.28 hrs, Volume= 0.069 af  
 Outflow = 2.44 cfs @ 12.29 hrs, Volume= 0.069 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 8.29 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 5.60 fps, Avg. Travel Time= 0.1 min

Peak Storage= 11 cf @ 12.28 hrs, Average Depth at Peak Storage= 0.40'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.22 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 36.0' Slope= 0.0350 '/'  
 Inlet Invert= 241.77', Outlet Invert= 240.51'



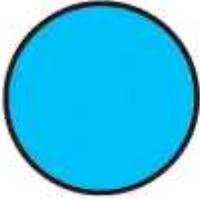
**Reach 22R: DMH22-HEADWALL**

Inflow Area = 3.976 ac, Inflow Depth = 3.02" for 100YR-noaa event  
 Inflow = 12.36 cfs @ 12.26 hrs, Volume= 1.002 af  
 Outflow = 10.68 cfs @ 12.33 hrs, Volume= 1.002 af, Atten= 14%, Lag= 3.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 9.92 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 3.41 fps, Avg. Travel Time= 0.5 min

Peak Storage= 135 cf @ 12.25 hrs, Average Depth at Peak Storage= 1.25'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 10.68 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 110.0' Slope= 0.0233 '/'  
 Inlet Invert= 254.50', Outlet Invert= 251.94'



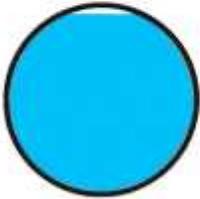
### Reach 30R: DMH30-HW30

Inflow Area = 0.987 ac, Inflow Depth = 4.28" for 100YR-noaa event  
 Inflow = 4.31 cfs @ 12.07 hrs, Volume= 0.352 af  
 Outflow = 4.29 cfs @ 12.07 hrs, Volume= 0.352 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 5.60 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 2.17 fps, Avg. Travel Time= 0.1 min

Peak Storage= 9 cf @ 12.07 hrs, Average Depth at Peak Storage= 0.95'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 3.86 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 12.0' Slope= 0.0100 1/  
 Inlet Invert= 251.10', Outlet Invert= 250.98'



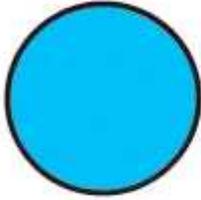
### Reach 31R: DMH31-DMH30

Inflow Area = 0.778 ac, Inflow Depth = 3.88" for 100YR-noaa event  
 Inflow = 3.38 cfs @ 12.10 hrs, Volume= 0.251 af  
 Outflow = 2.99 cfs @ 12.07 hrs, Volume= 0.251 af, Atten= 12%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 3.89 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 1.57 fps, Avg. Travel Time= 0.1 min

Peak Storage= 8 cf @ 12.13 hrs, Average Depth at Peak Storage= 1.00'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 2.73 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 10.0' Slope= 0.0050 1/  
 Inlet Invert= 251.25', Outlet Invert= 251.20'

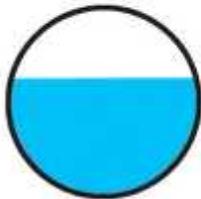
**Reach 32R: DMH32-HW32**

Inflow Area = 3.245 ac, Inflow Depth = 1.55" for 100YR-noaa event  
 Inflow = 4.78 cfs @ 12.10 hrs, Volume= 0.419 af  
 Outflow = 4.77 cfs @ 12.10 hrs, Volume= 0.419 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 9.25 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 3.04 fps, Avg. Travel Time= 0.0 min

Peak Storage= 4 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.63'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.69 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 7.0' Slope= 0.0300 '/  
 Inlet Invert= 252.65', Outlet Invert= 252.44'

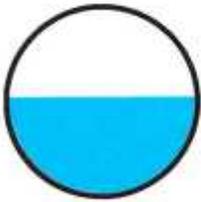
**Reach 33R: DMH33-DMH32**

Inflow Area = 3.093 ac, Inflow Depth = 1.26" for 100YR-noaa event  
 Inflow = 3.63 cfs @ 12.10 hrs, Volume= 0.326 af  
 Outflow = 3.61 cfs @ 12.10 hrs, Volume= 0.326 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 8.69 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 3.00 fps, Avg. Travel Time= 0.3 min

Peak Storage= 20 cf @ 12.10 hrs, Average Depth at Peak Storage= 0.53'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 6.69 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 47.0' Slope= 0.0300 '/  
 Inlet Invert= 254.16', Outlet Invert= 252.75'

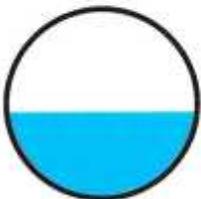
**Reach 34R: DMH34-DMH33**

Inflow Area = 3.093 ac, Inflow Depth = 1.26" for 100YR-noaa event  
 Inflow = 3.65 cfs @ 12.09 hrs, Volume= 0.326 af  
 Outflow = 3.63 cfs @ 12.10 hrs, Volume= 0.326 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 10.53 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 3.60 fps, Avg. Travel Time= 0.6 min

Peak Storage= 42 cf @ 12.09 hrs, Average Depth at Peak Storage= 0.45'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 8.63 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 120.0' Slope= 0.0500 '/  
 Inlet Invert= 260.26', Outlet Invert= 254.26'

**Reach 36R: DMH36-MANIFOLD**

Inflow Area = 2.033 ac, Inflow Depth = 6.18" for 100YR-noaa event  
 Inflow = 13.19 cfs @ 12.14 hrs, Volume= 1.046 af  
 Outflow = 13.12 cfs @ 12.14 hrs, Volume= 1.046 af, Atten= 1%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 13.90 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 4.50 fps, Avg. Travel Time= 0.1 min

Peak Storage= 38 cf @ 12.13 hrs, Average Depth at Peak Storage= 0.79'  
 Bank-Full Depth= 1.50', Capacity at Bank-Full= 24.14 cfs

18.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
 Length= 40.0' Slope= 0.0313 '/  
 Inlet Invert= 280.00', Outlet Invert= 278.75'



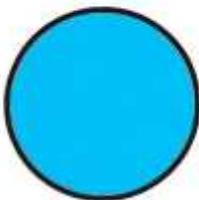
### Reach 37R: DMH37-DMH36

Inflow Area = 2.033 ac, Inflow Depth = 6.18" for 100YR-noaa event  
 Inflow = 13.30 cfs @ 12.10 hrs, Volume= 1.046 af  
 Outflow = 13.19 cfs @ 12.14 hrs, Volume= 1.046 af, Atten= 1%, Lag= 1.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 11.21 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 3.98 fps, Avg. Travel Time= 0.4 min

Peak Storage= 105 cf @ 12.12 hrs, Average Depth at Peak Storage= 1.25'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 12.12 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 84.0' Slope= 0.0300 '/'  
 Inlet Invert= 282.77', Outlet Invert= 280.25'



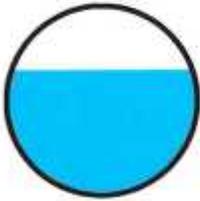
### Reach 38R: DMH38-DHH37

Inflow Area = 1.677 ac, Inflow Depth = 6.03" for 100YR-noaa event  
 Inflow = 10.82 cfs @ 12.10 hrs, Volume= 0.843 af  
 Outflow = 10.72 cfs @ 12.11 hrs, Volume= 0.843 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 12.59 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 4.15 fps, Avg. Travel Time= 0.6 min

Peak Storage= 125 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.83'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 14.00 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 146.0' Slope= 0.0400 '/'  
 Inlet Invert= 288.71', Outlet Invert= 282.87'



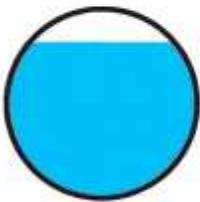
**Reach 39R: DMH39-DHH38**

Inflow Area = 1.244 ac, Inflow Depth = 5.82" for 100YR-noaa event  
 Inflow = 7.78 cfs @ 12.11 hrs, Volume= 0.603 af  
 Outflow = 7.75 cfs @ 12.11 hrs, Volume= 0.603 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 11.20 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 4.02 fps, Avg. Travel Time= 0.1 min

Peak Storage= 24 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.82'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 35.0' Slope= 0.0400 '/'  
 Inlet Invert= 292.40', Outlet Invert= 291.00'



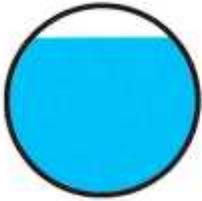
**Reach 40R: DMH40-DHH39**

Inflow Area = 1.244 ac, Inflow Depth = 5.82" for 100YR-noaa event  
 Inflow = 7.86 cfs @ 12.10 hrs, Volume= 0.603 af  
 Outflow = 7.78 cfs @ 12.11 hrs, Volume= 0.603 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 11.20 fps, Min. Travel Time= 0.2 min  
 Avg. Velocity = 4.02 fps, Avg. Travel Time= 0.5 min

Peak Storage= 88 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.83'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 126.0' Slope= 0.0400 '/'  
 Inlet Invert= 299.44', Outlet Invert= 294.40'



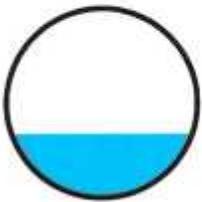
**Reach 41R: DMH41-DMH34**

Inflow Area = 2.481 ac, Inflow Depth = 0.28" for 100YR-noaa event  
 Inflow = 1.93 cfs @ 12.61 hrs, Volume= 0.059 af  
 Outflow = 1.91 cfs @ 12.61 hrs, Volume= 0.059 af, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 8.14 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 5.26 fps, Avg. Travel Time= 0.1 min

Peak Storage= 8 cf @ 12.61 hrs, Average Depth at Peak Storage= 0.34'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 34.0' Slope= 0.0400 '/'  
 Inlet Invert= 264.62', Outlet Invert= 263.26'



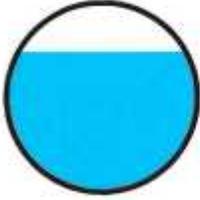
**Reach 42R: DMH42-DMH43**

Inflow Area = 1.676 ac, Inflow Depth = 4.86" for 100YR-noaa event  
 Inflow = 8.89 cfs @ 12.11 hrs, Volume= 0.679 af  
 Outflow = 8.87 cfs @ 12.11 hrs, Volume= 0.679 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 9.12 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 3.17 fps, Avg. Travel Time= 0.1 min

Peak Storage= 21 cf @ 12.11 hrs, Average Depth at Peak Storage= 0.93'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 9.90 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 22.0' Slope= 0.0200 '/'  
 Inlet Invert= 271.39', Outlet Invert= 270.95'



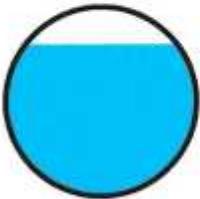
### Reach 43R: DMH43-DMH44

Inflow Area = 1.944 ac, Inflow Depth = 5.17" for 100YR-noaa event  
 Inflow = 10.86 cfs @ 12.10 hrs, Volume= 0.837 af  
 Outflow = 10.78 cfs @ 12.11 hrs, Volume= 0.837 af, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 10.28 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 3.49 fps, Avg. Travel Time= 0.4 min

Peak Storage= 91 cf @ 12.10 hrs, Average Depth at Peak Storage= 1.00'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 11.06 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 86.0' Slope= 0.0250 '/'  
 Inlet Invert= 270.85', Outlet Invert= 268.70'



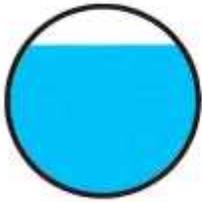
### Reach 44R: DMH44-DMH45

Inflow Area = 1.944 ac, Inflow Depth = 5.17" for 100YR-noaa event  
 Inflow = 10.78 cfs @ 12.11 hrs, Volume= 0.837 af  
 Outflow = 10.72 cfs @ 12.11 hrs, Volume= 0.837 af, Atten= 1%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 10.26 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 3.48 fps, Avg. Travel Time= 0.3 min

Peak Storage= 75 cf @ 12.11 hrs, Average Depth at Peak Storage= 1.00'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 11.05 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 71.0' Slope= 0.0249 '/'  
 Inlet Invert= 266.70', Outlet Invert= 264.93'

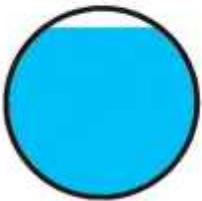
**Reach 45R: DMH45-DMH22**

Inflow Area = 3.976 ac, Inflow Depth = 3.02" for 100YR-noaa event  
 Inflow = 12.63 cfs @ 12.25 hrs, Volume= 1.002 af  
 Outflow = 12.36 cfs @ 12.26 hrs, Volume= 1.002 af, Atten= 2%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 10.91 fps, Min. Travel Time= 0.3 min  
 Avg. Velocity = 3.66 fps, Avg. Travel Time= 1.0 min

Peak Storage= 246 cf @ 12.26 hrs, Average Depth at Peak Storage= 1.13'  
 Bank-Full Depth= 1.25', Capacity at Bank-Full= 11.75 cfs

15.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 211.0' Slope= 0.0282 '  
 Inlet Invert= 260.61', Outlet Invert= 254.66'

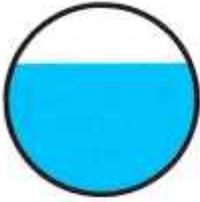
**Reach 46R: DMH 46-DMH45**

Inflow Area = 2.033 ac, Inflow Depth = 0.97" for 100YR-noaa event  
 Inflow = 6.59 cfs @ 12.27 hrs, Volume= 0.165 af  
 Outflow = 6.60 cfs @ 12.27 hrs, Volume= 0.165 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 11.35 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 6.51 fps, Avg. Travel Time= 0.1 min

Peak Storage= 15 cf @ 12.27 hrs, Average Depth at Peak Storage= 0.69'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 8.02 cfs

12.0" Diameter Pipe, n= 0.010 PVC, smooth interior  
 Length= 25.0' Slope= 0.0300 '  
 Inlet Invert= 272.25', Outlet Invert= 271.50'



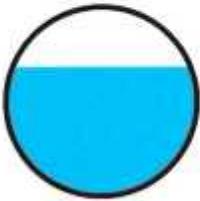
**Reach 55R: OCS-DMH**

Inflow Area = 12.351 ac, Inflow Depth = 0.53" for 100YR-noaa event  
 Inflow = 9.26 cfs @ 12.51 hrs, Volume= 0.542 af  
 Outflow = 9.25 cfs @ 12.51 hrs, Volume= 0.542 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 16.17 fps, Min. Travel Time= 0.0 min  
 Avg. Velocity = 11.31 fps, Avg. Travel Time= 0.0 min

Peak Storage= 15 cf @ 12.51 hrs, Average Depth at Peak Storage= 0.68'  
 Bank-Full Depth= 1.00', Capacity at Bank-Full= 11.41 cfs

12.0" Diameter Pipe, n= 0.012 Concrete pipe, finished  
 Length= 27.0' Slope= 0.0874 '/'  
 Inlet Invert= 245.25', Outlet Invert= 242.89'



**Pond 1P: POND 1**

Inflow Area = 1.386 ac, Inflow Depth = 6.63" for 100YR-noaa event  
 Inflow = 8.90 cfs @ 12.09 hrs, Volume= 0.766 af  
 Outflow = 4.22 cfs @ 12.28 hrs, Volume= 0.766 af, Atten= 53%, Lag= 11.6 min  
 Discarded = 1.78 cfs @ 11.70 hrs, Volume= 0.696 af  
 Primary = 2.44 cfs @ 12.28 hrs, Volume= 0.069 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Peak Elev= 245.76' @ 12.28 hrs Surf.Area= 5,214 sf Storage= 6,110 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 13.2 min ( 777.3 - 764.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	243.75'	3,772 cf	<b>39.50'W x 132.00'L x 2.67'H Prismaoid</b> 13,921 cf Overall - 4,492 cf Embedded = 9,429 cf x 40.0% Voids
#2	244.42'	4,492 cf	<b>24.0"D x 130.00'L Horizontal Cylinder</b> x 11 Inside #1
		8,264 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	<b>14.760 In/hr Exfiltration over Surface area</b>
#2	Primary	245.30'	<b>12.0" Vert. Orifice/Grate X 3.00 C= 0.600</b>

**Discarded OutFlow** Max=1.78 cfs @ 11.70 hrs HW=243.78' (Free Discharge)

↑#1=Exfiltration (Exfiltration Controls 1.78 cfs)

**Primary OutFlow** Max=2.41 cfs @ 12.28 hrs HW=245.76' (Free Discharge)

↑#2=Orifice/Grate (Orifice Controls 2.41 cfs @ 2.30 fps)

**Pond 2P: POND 2**

Inflow Area = 12.351 ac, Inflow Depth = 3.35" for 100YR-noaa event  
 Inflow = 34.61 cfs @ 12.11 hrs, Volume= 3.449 af  
 Outflow = 17.73 cfs @ 12.51 hrs, Volume= 3.449 af, Atten= 49%, Lag= 24.0 min  
 Discarded = 7.66 cfs @ 12.51 hrs, Volume= 2.898 af  
 Primary = 9.26 cfs @ 12.51 hrs, Volume= 0.542 af  
 Secondary = 0.80 cfs @ 12.51 hrs, Volume= 0.008 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Peak Elev= 252.10' @ 12.51 hrs Surf.Area= 13,878 sf Storage= 37,148 cf

Plug-Flow detention time= 22.2 min calculated for 3.449 af (100% of inflow)

Center-of-Mass det. time= 22.2 min ( 827.5 - 805.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	249.00'	50,131 cf	<b>Custom Stage Data (Prismatic) Listed below (Recalc)</b>

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
249.00	10,086	0	0
250.00	11,283	10,685	10,685
252.00	13,732	25,015	35,700
253.00	15,130	14,431	50,131

Device	Routing	Invert	Outlet Devices
#1	Discarded	248.90'	<b>23.850 in/hr Exfiltration over Surface area above invert</b> Excluded Surface area = 0 sf
#2	Primary	250.66'	<b>12.0" Vert. Orifice/Grate C= 0.600</b>
#3	Primary	250.17'	<b>4.0" Vert. Orifice/Grate X 5.00 C= 0.600</b>
#4	Primary	251.88'	<b>2.00' x 2.00' Horiz. Orifice/Grate Limited to weir flow C= 0.600</b>
#5	Secondary	252.00'	<b>10.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=7.66 cfs @ 12.51 hrs HW=252.10' (Free Discharge)

↳1=Exfiltration (Exfiltration Controls 7.66 cfs)

Primary OutFlow Max=9.16 cfs @ 12.51 hrs HW=252.10' (Free Discharge)

↳2=Orifice/Grate (Orifice Controls 3.87 cfs @ 4.57 fps)

↳3=Orifice/Grate (Orifice Controls 2.79 cfs @ 6.39 fps)

↳4=Orifice/Grate (Weir Controls 2.71 cfs @ 1.54 fps)

Secondary OutFlow Max=0.75 cfs @ 12.51 hrs HW=252.10' (Free Discharge)

↳5=Broad-Crested Rectangular Weir (Weir Controls 0.75 cfs @ 0.74 fps)

**Pond 3P: POND 3**

Inflow Area = 2.033 ac, Inflow Depth = 6.18" for 100YR-noaa event  
 Inflow = 13.12 cfs @ 12.14 hrs, Volume= 1.046 af  
 Outflow = 7.86 cfs @ 12.27 hrs, Volume= 1.046 af, Atten= 40%, Lag= 7.8 min  
 Discarded = 1.26 cfs @ 11.50 hrs, Volume= 0.881 af  
 Primary = 6.59 cfs @ 12.27 hrs, Volume= 0.165 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Peak Elev= 279.05' @ 12.27 hrs Surf.Area= 4,009 sf Storage= 11,108 cf

Plug-Flow detention time= 47.8 min calculated for 1.046 af (100% of inflow)  
 Center-of-Mass det. time= 47.8 min ( 842.2 - 794.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	274.60'	5,122 cf	59.83'W x 67.00'L x 5.00'H Prismatic 20,043 cf Overall - 7,238 cf Embedded = 12,805 cf x 40.0% Voids
#2	275.60'	7,238 cf	48.0'D x 64.00'L Horizontal Cylinder x 9 Inside #1
		12,360 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	274.50'	13.600 In/hr Exfiltration over Surface area above invert Excluded Surface area = 0 sf
#2	Primary	278.50'	12.0" Vert. Orifice/Grate X 6.00 C= 0.600

Discarded OutFlow Max=1.26 cfs @ 11.50 hrs HW=274.65' (Free Discharge)

↳1=Exfiltration (Exfiltration Controls 1.26 cfs)

Primary OutFlow Max=6.19 cfs @ 12.27 hrs HW=279.03' (Free Discharge)

↳2=Orifice/Grate (Orifice Controls 6.19 cfs @ 2.47 fps)

**Pond 5P: POND 5**

Inflow Area = 2.481 ac, Inflow Depth = 3.88" for 100YR-noaa event  
 Inflow = 6.42 cfs @ 12.23 hrs, Volume= 0.803 af  
 Outflow = 3.11 cfs @ 12.61 hrs, Volume= 0.803 af, Atten= 52%, Lag= 22.9 min  
 Discarded = 1.18 cfs @ 11.75 hrs, Volume= 0.744 af  
 Primary = 1.93 cfs @ 12.61 hrs, Volume= 0.059 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs  
 Peak Elev= 272.00' @ 12.61 hrs Surf.Area= 3,432 sf Storage= 9,171 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 49.2 min ( 870.3 - 821.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	267.70'	4,400 cf	<b>36.90'W x 93.00'L x 5.00'H Prismaoid</b> 17,159 cf Overall - 6,158 cf Embedded = 11,001 cf x 40.0% Voids
#2	268.70'	6,158 cf	<b>48.0"D x 70.00'L Horizontal Cylinder x 7 Inside #1</b>
		10,558 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	267.60'	<b>14.900 in/hr Exfiltration over Surface area above invert</b> Excluded Surface area = 0 sf
#2	Primary	271.60'	<b>12.0" Vert. Orifice/Grate X 3.00 C= 0.600</b>

**Discarded OutFlow** Max=1.18 cfs @ 11.75 hrs HW=267.76' (Free Discharge)  
 ↳1=Exfiltration (Exfiltration Controls 1.18 cfs)

**Primary OutFlow** Max=1.90 cfs @ 12.61 hrs HW=272.00' (Free Discharge)  
 ↳2=Orifice/Grate (Orifice Controls 1.90 cfs @ 2.15 fps)

**Link 1L: COMBINE HYDROGRAPHS**

Inflow Area = 14.546 ac, Inflow Depth = 0.60" for 100YR-noaa event  
 Inflow = 11.07 cfs @ 12.49 hrs, Volume= 0.728 af  
 Primary = 11.07 cfs @ 12.49 hrs, Volume= 0.728 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

**Link 54L: TO-140**

Inflow Area = 3.536 ac, Inflow Depth = 2.52" for 100YR-noaa event  
 Inflow = 8.55 cfs @ 12.15 hrs, Volume= 0.744 af  
 Primary = 8.55 cfs @ 12.15 hrs, Volume= 0.744 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

## **APPENDIX E**

**INSTRUCTIONS:**

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Fulington Basin - 1

A	B	C	D	E
BMP <sup>1</sup>	TSS Removal Rate <sup>1</sup>	Starting TSS Load*	Amount Removed (B*C)	Remaining Load (C-D)
Proprietary Treatment	0.45	1.00	0.45	0.55

**TSS Removal Calculation Worksheet**

Separate Form Needs to be Completed for Each Outlet or BMP Train

**Total TSS Removal =**

45%

Project: VC1378  
 Prepared By: KRG  
 Date: 8/8/25

\*Equals remaining load from previous BMP (E) which enters the BMP

**INSTRUCTIONS:**

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location:

B BMP <sup>1</sup>	C TSS Removal Rate <sup>1</sup>	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Infiltration Basin	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

**Total TSS Removal =**

*Separate Form Needs to be Completed for Each Outlet or BMP Train*

Project:   
 Prepared By:   
 Date:

\*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet  
 must be used if Proprietary BMP Proposed  
 1. From MassDEP Stormwater Handbook Vol. 1

**INSTRUCTIONS:**

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin - 2

A	B	C	D	E
BMP <sup>1</sup>	TSS Removal Rate <sup>1</sup>	Starting TSS Load*	Amount Removed (B*C)	Remaining Load (C-D)
Proprietary Trenton, NJ	0.45	1.00	0.45	0.55

**TSS Removal Calculation Worksheet**

Separate Form Needs to be Completed for Each Outlet or BMP Train

**Total TSS Removal =**

45%

Project: VC1378  
 Prepared By: KKG  
 Date: 8/8/25

\*Equals remaining load from previous BMP (E) which enters the BMP

**INSTRUCTIONS:**

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location:

B	C	D	E	F
BMP <sup>1</sup>	TSS Removal Rate <sup>1</sup>	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Infiltration Basin	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Separate Form Needs to be Completed for Each Outlet or BMP Train

**Total TSS Removal =**

Project:   
 Prepared By:   
 Date:

\*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed  
 1. From MassDEP Stormwater Handbook Vol. 1

**INSTRUCTIONS:**

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin - 3

A	B	C	D	E
BMP <sup>1</sup>	TSS Removal Rate <sup>1</sup>	Starting TSS Load*	Amount Removed (B*C)	Remaining Load (C-D)
<u>Proprietary Treatment Unit</u>	<u>0.45</u>	<u>1.00</u>	<u>0.45</u>	<u>0.55</u>

Separate Form Needs to be Completed for Each Outlet or BMP Train

**Total TSS Removal =** 45%

Project: VC1378  
 Prepared By: KRG  
 Date: 8/8/25

\*Equals remaining load from previous BMP (E) which enters the BMP

**INSTRUCTIONS:**

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location:

BMP <sup>1</sup>	C TSS Removal Rate <sup>1</sup>	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Infiltration Basin	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Separate Form Needs to  
be Completed for Each  
Outlet or BMP Train

**Total TSS Removal =**

Project:   
 Prepared By:   
 Date:

\*Equals remaining load from previous BMP (E) which enters the BMP

**TSS Removal  
Calculation Worksheet**

**INSTRUCTIONS:**

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location:

B BMP <sup>1</sup>	C TSS Removal Rate <sup>1</sup>	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Infiltration Basin	0.80	0.75	0.60	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15
	0.00	0.15	0.00	0.15

Separate Form Needs to  
be Completed for Each  
Outlet or BMP Train

**Total TSS Removal =**

**85%**

Project:   
 Prepared By:   
 Date:

\*Equals remaining load from previous BMP (E)  
which enters the BMP

Non-automated TSS Calculation Sheet  
 must be used if Proprietary BMP Proposed  
 1. From MassDEP Stormwater Handbook Vol. 1

## De Minimus Storm-water Discharge Calculation

### Impervious Areas

To Pond 1 - 48,773 sq. ft.

To Pond 2 - 150,722 sq. ft.

To Pond 3 - 53,525 sq. ft.

To Pond 5 - 18,940 sq. ft.

De minimus area to Panther Way - 4,411 sq. ft.

### TSS Removal

To Ponds 1, 2 and 3 - 97%

To Pond 5 - 85%

Pond 1 -  $48,778 \times .85 = 41,461$

Pond 2 -  $150,722 \times .85 = 128,114$

Pond 3 -  $53,525 \times .85 = 45,496$

Pond 5 -  $18,940 \times .85 = 16,099$

De minimus -  $4,411 \times 0 = 0$

$$41,161 + 128,114 + 45,496 + 16,099 + 0 = 230,870$$

$$48,778 + 150,722 + 53,525 + 18,940 + 4,411 = 276,376$$

230,870

$230,870 / 276,376 = 83.5\%$  which is greater than 80%

**Estimated Net Annual Solids Load Reduction  
Based on the Rational Rainfall Method**



**Senior Village / Panther Way  
Franklin, MA  
DMH 32**

**CASCADE  
separator™**

<b>AREA</b>	1.21	acres	<b>CASCADE MODEL</b>	CS-4
<b>WEIGHTED C</b>	0.95		<b>RAINFALL STATION</b>	68
<b>TC</b>	5.00	minutes		

Rainfall Intensity <sup>2</sup> (In/hr)	Percent Rainfall Volume <sup>1</sup>	Hydraulic Loading Rate (gpm/ft <sup>2</sup> )	Removal Efficiency (%)	Incremental Removal (%)
0.02	9.3%	0.82	100.0	9.3
0.04	9.5%	1.64	100.0	9.5
0.06	8.7%	2.46	100.0	8.7
0.08	10.1%	3.28	100.0	10.1
0.10	7.2%	4.11	100.0	7.2
0.12	6.0%	4.93	100.0	6.0
0.14	6.3%	5.75	100.0	6.3
0.16	5.6%	6.57	100.0	5.6
0.18	4.7%	7.39	100.0	4.7
0.20	3.6%	8.21	100.0	3.6
0.25	8.2%	10.26	100.0	8.2
0.50	14.9%	20.53	92.6	13.8
0.75	3.2%	30.79	83.0	2.7
1.00	1.2%	41.06	73.3	0.9
1.50	0.7%	61.58	54.0	0.4
2.00	0.8%	76.08	37.4	0.3
				97.2
				Removal Efficiency Adjustment <sup>2</sup> = 6.5%
				Predicted % Annual Rainfall Treated = 93.5%
				<b>Predicted Net Annual Load Removal Efficiency = 90.7%</b>

1 - Based on 10 years of rainfall data from NCDC station 736, Blue Hill, Norfolk County, MA

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

**Estimated Net Annual Solids Load Reduction  
Based on the Rational Rainfall Method**



**Senior Village / Panther Way  
Franklin, MA  
DMH 36**



AREA	1.49	acres	CASCADE MODEL	CS-4
WEIGHTED C	0.95			
TC	5.00	minutes	RAINFALL STATION	68

Rainfall Intensity <sup>1</sup> (in/hr)	Percent Rainfall Volume <sup>1</sup>	Hydraulic Loading Rate (gpm/ft <sup>2</sup> )	Removal Efficiency (%)	Incremental Removal (%)
0.02	9.3%	1.01	100.0	9.3
0.04	9.5%	2.02	100.0	9.5
0.06	8.7%	3.03	100.0	8.7
0.08	10.1%	4.04	100.0	10.1
0.10	7.2%	5.06	100.0	7.2
0.12	6.0%	6.07	100.0	6.0
0.14	6.3%	7.08	100.0	6.3
0.16	5.6%	8.09	100.0	5.6
0.18	4.7%	9.10	100.0	4.7
0.20	3.6%	10.11	100.0	3.6
0.25	8.2%	12.64	100.0	8.2
0.50	14.9%	25.28	88.1	13.1
0.75	3.2%	37.92	76.3	2.5
1.00	1.2%	50.56	64.4	0.8
1.50	0.7%	75.84	40.6	0.3
2.00	0.8%	76.08	30.4	0.2
				96.1
				Removal Efficiency Adjustment <sup>2</sup> = 6.5%
				Predicted % Annual Rainfall Treated = 93.4%
				<b>Predicted Net Annual Load Removal Efficiency = 89.6%</b>

1 - Based on 10 years of rainfall data from NCDIC station 736, Blue Hill, Norfolk County, MA

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

## **APPENDIX F**

# Guelph Permeameter Calculations

Report  Print

### Head #1

Remember Type Tests "1" for Combined and "2" for Inner Boundary

Enter the test water head height (cm)  $H_0 = 100$   
 Enter the measured inner head height (cm)  $H_1 = 80$   
 Enter the measured outer head height (cm)  $H_2 = 120$

Enter the Guelph Radius (cm)  $R = 10$

Enter the soil moisture saturation capacity (value out of the below equation)  $S = 0.5$

1. Combined Boundary (see equation)  $Q_1 = 0.0016$
2. See table for boundary conditions (see table)  $Q_2 = 0.0022$
3. See table for boundary conditions (see table)  $Q_3 = 0.0018$
4. See table for boundary conditions (see table)  $Q_4 = 0.0015$
5. See table for boundary conditions (see table)  $Q_5 = 0.0012$
6. See table for boundary conditions (see table)  $Q_6 = 0.0010$
7. See table for boundary conditions (see table)  $Q_7 = 0.0008$
8. See table for boundary conditions (see table)  $Q_8 = 0.0006$
9. See table for boundary conditions (see table)  $Q_9 = 0.0004$
10. See table for boundary conditions (see table)  $Q_{10} = 0.0002$

Remember Type Tests "1" for Combined and "2" for Inner Boundary

Enter the test water head height (cm)  $H_0 = 100$   
 Enter the measured inner head height (cm)  $H_1 = 80$   
 Enter the measured outer head height (cm)  $H_2 = 120$

Enter the Guelph Radius (cm)  $R = 10$

Enter the soil moisture saturation capacity (value out of the below equation)  $S = 0.5$

1. Combined Boundary (see equation)  $Q_1 = 0.0016$
2. See table for boundary conditions (see table)  $Q_2 = 0.0022$
3. See table for boundary conditions (see table)  $Q_3 = 0.0018$
4. See table for boundary conditions (see table)  $Q_4 = 0.0015$
5. See table for boundary conditions (see table)  $Q_5 = 0.0012$
6. See table for boundary conditions (see table)  $Q_6 = 0.0010$
7. See table for boundary conditions (see table)  $Q_7 = 0.0008$
8. See table for boundary conditions (see table)  $Q_8 = 0.0006$
9. See table for boundary conditions (see table)  $Q_9 = 0.0004$
10. See table for boundary conditions (see table)  $Q_{10} = 0.0002$

### Head #2

Remember Type Tests "1" for Combined and "2" for Inner Boundary

Enter the test water head height (cm)  $H_0 = 100$   
 Enter the measured inner head height (cm)  $H_1 = 80$   
 Enter the measured outer head height (cm)  $H_2 = 120$

Enter the Guelph Radius (cm)  $R = 10$

Enter the soil moisture saturation capacity (value out of the below equation)  $S = 0.5$

1. Combined Boundary (see equation)  $Q_1 = 0.0016$
2. See table for boundary conditions (see table)  $Q_2 = 0.0022$
3. See table for boundary conditions (see table)  $Q_3 = 0.0018$
4. See table for boundary conditions (see table)  $Q_4 = 0.0015$
5. See table for boundary conditions (see table)  $Q_5 = 0.0012$
6. See table for boundary conditions (see table)  $Q_6 = 0.0010$
7. See table for boundary conditions (see table)  $Q_7 = 0.0008$
8. See table for boundary conditions (see table)  $Q_8 = 0.0006$
9. See table for boundary conditions (see table)  $Q_9 = 0.0004$
10. See table for boundary conditions (see table)  $Q_{10} = 0.0002$

Average

$Q = 0.0016$

$Q_1 = 0.0016$

$Q_2 = 0.0022$

$Q_3 = 0.0018$

$Q_4 = 0.0015$

$Q_5 = 0.0012$

$Q_6 = 0.0010$

$Q_7 = 0.0008$

$Q_8 = 0.0006$

$Q_9 = 0.0004$

$Q_{10} = 0.0002$

Calculate permeability (cm/s) for the test and average (cm/s). Enter the head of water in the test (cm)  $H_0 = 100$ , the measured inner head (cm)  $H_1 = 80$ , the measured outer head (cm)  $H_2 = 120$ , the Guelph radius (cm)  $R = 10$ , the soil moisture saturation capacity (value out of the below equation)  $S = 0.5$ , and the soil moisture saturation capacity (value out of the below equation)  $S = 0.5$ .

Boundary Condition	Permeability (cm/s)
Combined Boundary	$Q_1 = 0.0016$
Inner Boundary	$Q_2 = 0.0022$
Outer Boundary	$Q_3 = 0.0018$
Inner Boundary	$Q_4 = 0.0015$
Outer Boundary	$Q_5 = 0.0012$
Inner Boundary	$Q_6 = 0.0010$
Outer Boundary	$Q_7 = 0.0008$
Inner Boundary	$Q_8 = 0.0006$
Outer Boundary	$Q_9 = 0.0004$
Inner Boundary	$Q_{10} = 0.0002$

Calculate permeability (cm/s) for the test and average (cm/s). Enter the head of water in the test (cm)  $H_0 = 100$ , the measured inner head (cm)  $H_1 = 80$ , the measured outer head (cm)  $H_2 = 120$ , the Guelph radius (cm)  $R = 10$ , the soil moisture saturation capacity (value out of the below equation)  $S = 0.5$ , and the soil moisture saturation capacity (value out of the below equation)  $S = 0.5$ .

Boundary Condition	Permeability (cm/s)
Combined Boundary	$Q_1 = 0.0016$
Inner Boundary	$Q_2 = 0.0022$
Outer Boundary	$Q_3 = 0.0018$
Inner Boundary	$Q_4 = 0.0015$
Outer Boundary	$Q_5 = 0.0012$
Inner Boundary	$Q_6 = 0.0010$
Outer Boundary	$Q_7 = 0.0008$
Inner Boundary	$Q_8 = 0.0006$
Outer Boundary	$Q_9 = 0.0004$
Inner Boundary	$Q_{10} = 0.0002$



GP FIELD DATA SHEET

SECTION 1: SITE INFORMATION

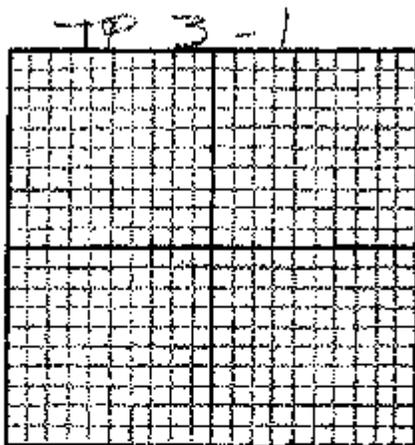
Date 8-25-25 Investigator C. QUINLAN

Site Location PAULINE WAY

Dominant Soil Type(s) SAND & GRAVEL

Site Map:

Soil Profile Description (horizon depth, texture, structure, color, etc.):



Depth

Description

A	12"	SANDY LOAM
B	53 40"	SANDY LOAM 10 YR 4/4
C	15 12"	LOAMY SANDS & GRAVEL 2.5 Y 6/3
	15" 15"	L. SAND & GRAVEL 12" ROCK - COMPACT

Presence of special soil conditions (mottling, water table depth, hardpan, induration, compacted layers, etc.):

NO ROOTS

NO WATER

NO REFUSAL

Comments and Notes (topography, slope, vegetation, etc.):







GP FIELD DATA SHEET

SECTION 1: SITE INFORMATION

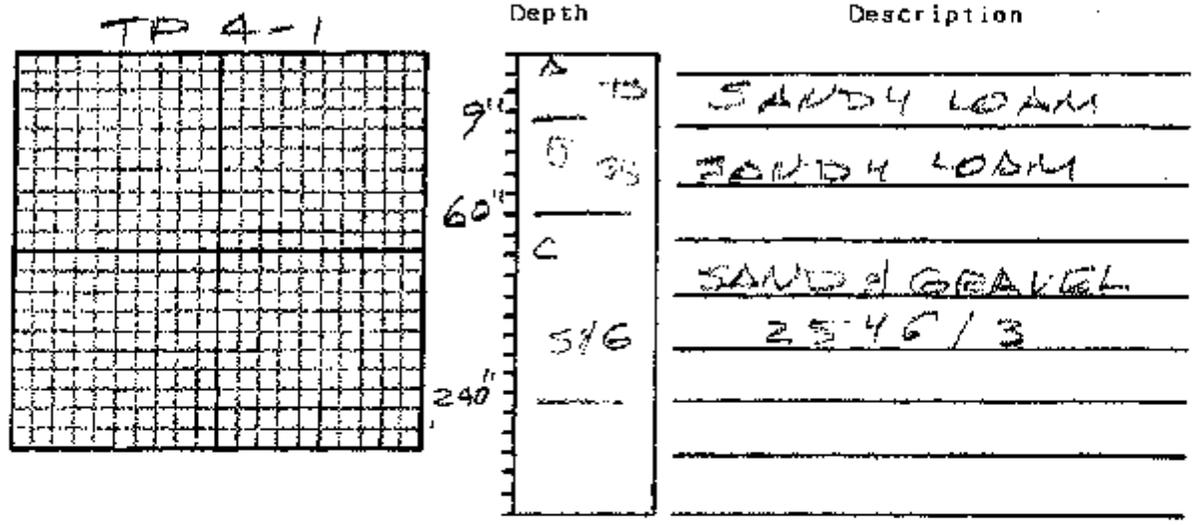
Date 2/24/25 Investigator C RWINTEL

Site Location PANTHER WAY

Dominant Soil Type(s) SAND & GRAVEL

Site Map:

Soil Profile Description (horizon depth, texture, structure, color, etc.):



Presence of special soil conditions (mottling, water table depth, hardpan, induration, compacted layers, etc.):

no water  
no mottles  
no refusals

Comments and Notes (topography, slope, vegetation, etc.):



# SOLOSTAR Guelph Permeameter Calculations

Head  
 Pressure

## Head E

Record the head  $h$  for discharge and for the first reservoir. Enter the discharge head height  $h_1$  in cm. Enter the discharge head height  $h_2$  in cm.

- Enter the soil sample description category number out of the below numbers:
1. Coarse sand (fine-grained), 40% or more sand, 5% or less silt, and 5% or less clay.
  2. Sand, mostly from the lower 1/3 of the sample, with 10% or less silt and 5% or less clay.
  3. Well-sorted sand with 10% or less silt and 5% or less clay, and with 10% or less fines (silt and clay) in the upper 1/3 of the sample.
  4. Fine sand, mostly from the lower 1/3 of the sample, with 10% or less silt and 5% or less clay.

Enter the soil sample description category number out of the below numbers:

Steady State Rate of Water Level Change (Type is variable)

$$Q_1 = \frac{Q}{Q_1 + Q_2}$$

$$Q_2 = \frac{Q}{Q_1 + Q_2}$$

$$Q_3 = \frac{Q}{Q_1 + Q_2}$$

$$Q_4 = \frac{Q}{Q_1 + Q_2}$$

$$Q_5 = \frac{Q}{Q_1 + Q_2}$$

$$Q_6 = \frac{Q}{Q_1 + Q_2}$$

## Head D

Record the head  $h$  for discharge and for the first reservoir. Enter the discharge head height  $h_1$  in cm. Enter the discharge head height  $h_2$  in cm.

- Enter the soil sample description category number out of the below numbers:
1. Coarse sand (fine-grained), 40% or more sand, 5% or less silt, and 5% or less clay.
  2. Sand, mostly from the lower 1/3 of the sample, with 10% or less silt and 5% or less clay.
  3. Well-sorted sand with 10% or less silt and 5% or less clay, and with 10% or less fines (silt and clay) in the upper 1/3 of the sample.
  4. Fine sand, mostly from the lower 1/3 of the sample, with 10% or less silt and 5% or less clay.

Enter the soil sample description category number out of the below numbers:

Steady State Rate of Water Level Change (Type is variable)

$$Q_1 = \frac{Q}{Q_1 + Q_2}$$

$$Q_2 = \frac{Q}{Q_1 + Q_2}$$

$$Q_3 = \frac{Q}{Q_1 + Q_2}$$

$$Q_4 = \frac{Q}{Q_1 + Q_2}$$

$$Q_5 = \frac{Q}{Q_1 + Q_2}$$

$$Q_6 = \frac{Q}{Q_1 + Q_2}$$

## Tree Head Method

Record the head  $h$  for discharge and for the first reservoir. Enter the discharge head height  $h_1$  in cm. Enter the discharge head height  $h_2$  in cm.

- Enter the soil sample description category number out of the below numbers:
1. Coarse sand (fine-grained), 40% or more sand, 5% or less silt, and 5% or less clay.
  2. Sand, mostly from the lower 1/3 of the sample, with 10% or less silt and 5% or less clay.
  3. Well-sorted sand with 10% or less silt and 5% or less clay, and with 10% or less fines (silt and clay) in the upper 1/3 of the sample.
  4. Fine sand, mostly from the lower 1/3 of the sample, with 10% or less silt and 5% or less clay.

Enter the soil sample description category number out of the below numbers:

Steady State Rate of Water Level Change (Type is variable)

$$Q_1 = \frac{Q}{Q_1 + Q_2}$$

$$Q_2 = \frac{Q}{Q_1 + Q_2}$$

$$Q_3 = \frac{Q}{Q_1 + Q_2}$$

$$Q_4 = \frac{Q}{Q_1 + Q_2}$$

$$Q_5 = \frac{Q}{Q_1 + Q_2}$$

$$Q_6 = \frac{Q}{Q_1 + Q_2}$$



Average

$$Q_1 = \frac{Q}{Q_1 + Q_2}$$

$$Q_2 = \frac{Q}{Q_1 + Q_2}$$

$$Q_3 = \frac{Q}{Q_1 + Q_2}$$

$$Q_4 = \frac{Q}{Q_1 + Q_2}$$

$$Q_5 = \frac{Q}{Q_1 + Q_2}$$

$$Q_6 = \frac{Q}{Q_1 + Q_2}$$

Calculate the head  $h$  for discharge and for the first reservoir. Enter the discharge head height  $h_1$  in cm. Enter the discharge head height  $h_2$  in cm.

Soil Sample Description	Soil Sample Description	Soil Sample Description
Coarse sand (fine-grained), 40% or more sand, 5% or less silt, and 5% or less clay.	Sand, mostly from the lower 1/3 of the sample, with 10% or less silt and 5% or less clay.	Well-sorted sand with 10% or less silt and 5% or less clay, and with 10% or less fines (silt and clay) in the upper 1/3 of the sample.
Fine sand, mostly from the lower 1/3 of the sample, with 10% or less silt and 5% or less clay.	Coarse sand (fine-grained), 40% or more sand, 5% or less silt, and 5% or less clay.	Sand, mostly from the lower 1/3 of the sample, with 10% or less silt and 5% or less clay.
Well-sorted sand with 10% or less silt and 5% or less clay, and with 10% or less fines (silt and clay) in the upper 1/3 of the sample.	Fine sand, mostly from the lower 1/3 of the sample, with 10% or less silt and 5% or less clay.	Coarse sand (fine-grained), 40% or more sand, 5% or less silt, and 5% or less clay.

Calculate the head  $h$  for discharge and for the first reservoir. Enter the discharge head height  $h_1$  in cm. Enter the discharge head height  $h_2$  in cm.

Soil Sample Description	Soil Sample Description	Soil Sample Description
Coarse sand (fine-grained), 40% or more sand, 5% or less silt, and 5% or less clay.	Sand, mostly from the lower 1/3 of the sample, with 10% or less silt and 5% or less clay.	Well-sorted sand with 10% or less silt and 5% or less clay, and with 10% or less fines (silt and clay) in the upper 1/3 of the sample.
Fine sand, mostly from the lower 1/3 of the sample, with 10% or less silt and 5% or less clay.	Coarse sand (fine-grained), 40% or more sand, 5% or less silt, and 5% or less clay.	Sand, mostly from the lower 1/3 of the sample, with 10% or less silt and 5% or less clay.
Well-sorted sand with 10% or less silt and 5% or less clay, and with 10% or less fines (silt and clay) in the upper 1/3 of the sample.	Fine sand, mostly from the lower 1/3 of the sample, with 10% or less silt and 5% or less clay.	Coarse sand (fine-grained), 40% or more sand, 5% or less silt, and 5% or less clay.

111



GP FIELD DATA SHEET

SECTION 1: SITE INFORMATION

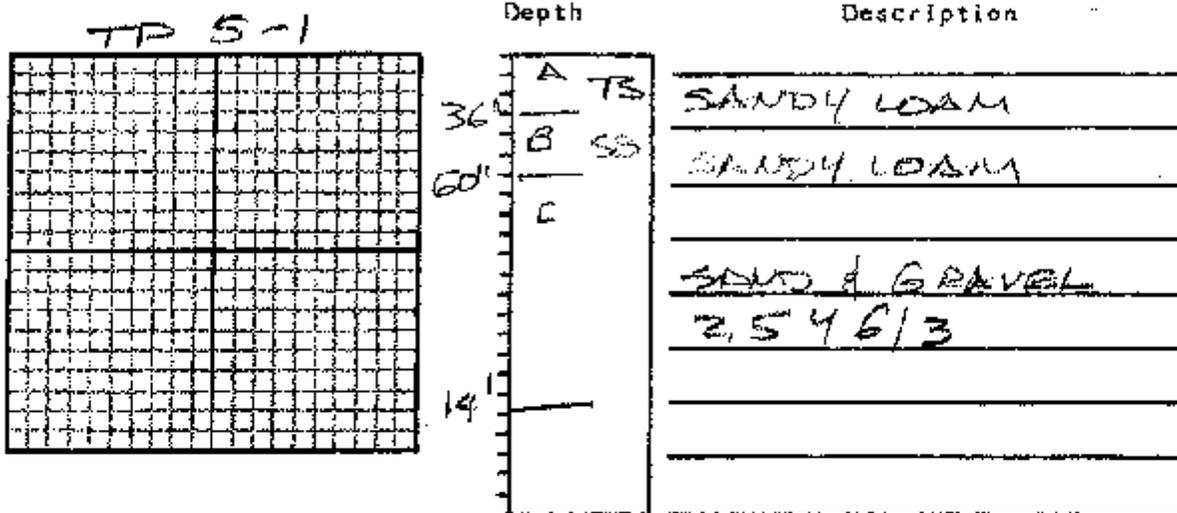
Date 2-25-25 Investigator C QUINTAL

Site Location PANTHER WAY

Dominant Soil Type(s) SAND & GRAVEL

Site Map:

Soil Profile Description (horizon depth, texture, structure, color, etc.):



Presence of special soil conditions (mottling, water table depth, hardpan, induration, compacted layers, etc.):

no water

no mottles

Comments and Notes (topography, slope, vegetation, etc.):







GP FIELD DATA SHEET

SECTION 1: SITE INFORMATION

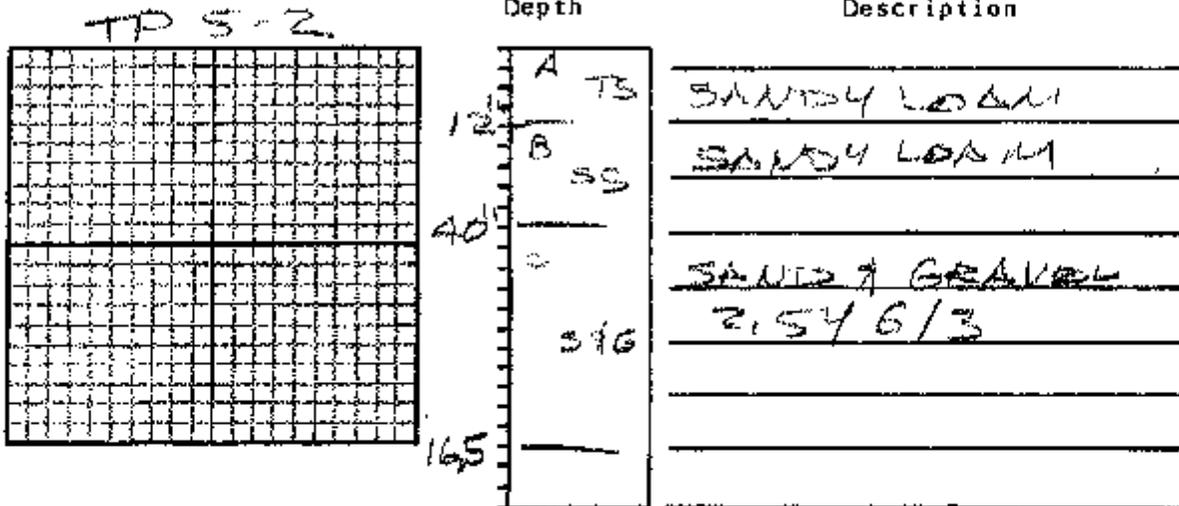
Date 2-25-25 Investigator C. DWINTAL

Site Location PANTHER WAY

Dominant Soil Type(s) SAND & GRAVEL

Site Map:

Soil Profile Description (horizon depth, texture, structure, color, etc.):



Presence of special soil conditions (mottling, water table depth, hardpan, induration, compacted layers, etc.):

water @ 16.5'

no caprock

Comments and Notes (topography, slope, vegetation, etc.):



# SOILMOISTURE Guelph Permeameter Calculations

Input  
Result

Support: [sl@soilmoisture.com](mailto:sl@soilmoisture.com)

## Head #1

Reservoir Type (enter "1" for Combined and "2" for lower reservoir):

Enter water head height ("H" in cm):

Enter the Barotube Radius ("r" in cm):

Enter the soil texture-structure category (enter one of the below numbers):

1. Compacted, Structureless, Clayey or silty materials such as landfill caps and liners, bentonite or mouse sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured, may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category must frequently apply for agricultural soils.
4. Coarse and granular sands, may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

Steady State Rate of Water Level Change ("R" in cm/min):

$h^2 = 0.38 \text{ cm}^2$

$C = 0.82016$

$Q = 12.4033$

$K_p = 3.736\text{-}52 \text{ cm/day}$   
 3.736-52 cm/day  
 3.736-51 inch/day  
 1.476-52 inch/day

$\phi_w = 1.666\text{-}51 \text{ in}^2/\text{min}^2$

## Head #2

Reservoir Type (enter "1" for Combined and "2" for lower reservoir):

Enter water head height ("H" in cm):

Enter the Barotube Radius ("r" in cm):

Enter the soil texture-structure category (enter one of the below numbers):

1. Compacted, Structureless, Clayey or silty materials such as landfill caps and liners, bentonite or mouse sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category must frequently apply for agricultural soils.
4. Coarse and granular sands, may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

Steady State Rate of Water Level Change ("R" in cm/min):

$h^2 = 0.33 \text{ cm}^2$

$C = 1.8764$

$Q = 18.5847$

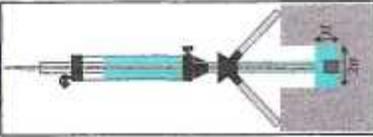
$K_p = 3.656\text{-}52 \text{ cm/day}$   
 3.656-52 cm/day  
 3.656-51 inch/day  
 1.432-52 inch/day

$\phi_w = 1.346\text{-}52 \text{ in}^2/\text{min}^2$

## Average

$K_p = 3.376\text{-}52 \text{ cm/day}$   
 3.376-52 cm/day  
 3.376-51 inch/day  
 1.332-52 inch/day

$\phi_w = 1.382\text{-}52 \text{ in}^2/\text{min}^2$



## Two Head Method

Reservoir Type (enter "1" for Combined and "2" for lower reservoir):

Enter the first water head height ("H1" in cm):

Enter the second water head height ("H2" in cm):

Enter the Barotube Radius ("r" in cm):

Enter the soil texture-structure category (enter one of the below numbers):

1. Compacted, Structureless, Clayey or silty materials such as landfill caps and liners, bentonite or mouse sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. This category must frequently apply for agricultural soils.
4. Coarse and granular sands, may also include some highly structured soils with large and/or numerous cracks, macropores, etc.

Steady State Rate of Water Level Change ("R1" in cm/min):

Steady State Rate of Water Level Change ("R2" in cm/min):

$Q_1 = 0.76048$

$Q_2 = 1.10948$

$C_1 = 0.80316$

$C_2 = 1.25754$

$Q_3 = 0.08498$

$Q_4 = 0.08207$

$Q_5 = 0.01869$

$Q_6 = 0.02411$

$K_p = 1.877\text{-}52 \text{ cm/day}$   
 1.877-52 cm/day  
 1.877-51 inch/day  
 0.739-52 inch/day

$\phi_w = 1.346\text{-}52 \text{ in}^2/\text{min}^2$

Calculations include combined head (cases 1-3). Where the soil is not fully saturated, the soil moisture head must be used. The soil moisture head must be used for cases 1-3. The soil moisture head must be used for cases 1-3. The soil moisture head must be used for cases 1-3.

Soil Texture-Structure Category	$h^2$ (cm <sup>2</sup> )	Shape Factor
Compacted, Structureless, clayey or silty materials such as landfill caps and liners, bentonite or mouse sediments, etc.	0.01	$C_1 = \left( \frac{W_{1/2}}{W_{1/4}} \right) \frac{R_{1/2}}{R_{1/4}}$ $C_2 = \left( \frac{W_{1/2}}{W_{1/4}} \right) \frac{R_{1/2}}{R_{1/4}}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left( \frac{W_{1/2}}{W_{1/4}} \right) \frac{R_{1/2}}{R_{1/4}}$ $C_2 = \left( \frac{W_{1/2}}{W_{1/4}} \right) \frac{R_{1/2}}{R_{1/4}}$
Most structured soils from silts into through loams; also includes unstructured medium and fine sands. The category must frequently apply for agricultural soils.	0.12	$C_1 = \left( \frac{W_{1/2}}{W_{1/4}} \right) \frac{R_{1/2}}{R_{1/4}}$ $C_2 = \left( \frac{W_{1/2}}{W_{1/4}} \right) \frac{R_{1/2}}{R_{1/4}}$
Coarse and granular sands; may also include some highly structured soils with large and/or numerous cracks, macropores, etc.	0.36	$C_1 = \left( \frac{W_{1/2}}{W_{1/4}} \right) \frac{R_{1/2}}{R_{1/4}}$ $C_2 = \left( \frac{W_{1/2}}{W_{1/4}} \right) \frac{R_{1/2}}{R_{1/4}}$

Calculations include combined head (cases 1-3). Where the soil is not fully saturated, the soil moisture head must be used. The soil moisture head must be used for cases 1-3. The soil moisture head must be used for cases 1-3.

Soil Texture-Structure Category	$h^2$ (cm <sup>2</sup> )	Shape Factor
Over Head, Combined Reservoir	$Q_1 = R_1 \times 35.22$	$K_p = \frac{C_1 \times Q_1}{2\pi H_1 (H_1 - H_2) + \pi^2 (H_1^2 - H_2^2)}$
Over Head, Lower Reservoir	$Q_1 = R_1 \times 2.18$	$\phi_w = \frac{C_1 \times Q_1}{2\pi H_1 (H_1 - H_2) + \pi^2 (H_1^2 - H_2^2)}$
Two Head, Combined Reservoir	$Q_1 = R_1 \times 35.22$ $Q_2 = R_2 \times 35.22$	$K_p = \frac{C_1 \times Q_1 + C_2 \times Q_2}{2\pi H_1 (H_1 - H_2) + \pi^2 (H_1^2 - H_2^2)}$
Two Head, Lower Reservoir	$Q_1 = R_1 \times 2.18$ $Q_2 = R_2 \times 2.18$	$\phi_w = \frac{C_1 \times Q_1 + C_2 \times Q_2}{2\pi H_1 (H_1 - H_2) + \pi^2 (H_1^2 - H_2^2)}$

✳

### Guelph Permeameter Data Sheet

Investigator: CAROLINA GONZALEZ Date: 3/19/19

Location: PAWELIUKS 11A4 Test Id: 2

Depth of hole: 4.9" Radius: 3 cm (standard calcs assume 3 cm radius)

Reservoirs used during test (check one): Combined:  Inner only:

Reservoir constant used: 35.27

Water level in well = 5 cm				
Time <i>t</i> (min)	$\Delta t$ (min)	Water level in reservoir <i>h</i> (cm)	$\Delta h$ (cm)	Rate of change $\Delta h / \Delta t$
0		20		
0:15	0.25	25	5	20.0
0:28	0.22	30		22.7
0:44	0.22	35		18.75
0:58	0.23	40		21.43
1:12	0.23	45		21.42
1:27	0.25	50		20.0
1:41	0.22	55		21.42
1:56	0.25	60		20.0
2:09	0.22	65		23.04
2:23	0.23	70		21.42
2:38	0.25	75		20.0

Steady rate for 3 consecutive readings ( $R_1$ ): 21.13

Water level in well = 10 cm				
Time <i>t</i> (min)	$\Delta t$ (min)	Water level in reservoir <i>h</i> (cm)	$\Delta h$ (cm)	Rate of change $\Delta h / \Delta t$
0:12		30		
0:31	0.30	40	5	16.67
0:40	0.15	45	5	33.33
0:58	0.15	50	5	33.33
1:19	0.15	55	5	33.33
1:08	0.15	60	5	33.33
1:23	0.15	65	5	33.33
1:27	0.15	70	5	33.33
1:36	0.15	75	5	33.33

Steady rate for 3 consecutive readings ( $R_2$ ): 33.33

Comments:

$R_{avg} = 0.795 \text{ m/min} = 47.7 \text{ in/hr}$

# SOIL MOISTURE Guelph Permeameter Calculations

Input Result

Support: ag@ub.ca

## Head #1

Reservoir Type (enter "1" for Combined and "2" for Inert reservoir):

Enter the first water head height ("H1" in cm):

Enter the second water head height ("H2" in cm):

Enter the Borehole Radius ("r" in cm):

Enter the soil texture-structure category (enter one of the below numbers):

1. Combined, Structureless, clayey or silty materials such as landfill caps and loess, lacustrine or marine sediments, etc.
2. Soil which are both fine textured (clayey or silty) and unstratified, may also include some fine sands.
3. Most stratified fine-grained soils through loams, also includes unstratified medium and fine sands. This category may be generally applicable for agricultural soils.
4. Coarse and gravelly sands, may also include some highly stratified soils with large and/or numerous cracks, macropores, etc.

Steady State Rate of Water Level Change ("R" in cm/min):

Flow Type:

$r^2 = 9.35 \text{ cm}^2$   
 $C = 0.80316$   
 $Q = 22.0419$   
 $K_{1T} = 0.032-02 \text{ cm/sec}$   
 $K_{2T} = 0.032-04 \text{ cm/sec}$   
 $K_{3T} = 0.032-03 \text{ cm/sec}$   
 $K_{4T} = 0.032-01 \text{ cm/sec}$

## Head #2

Reservoir Type (enter "1" for Combined and "2" for Inert reservoir):

Enter water head height ("H1" in cm):

Enter the Borehole Radius ("r" in cm):

Enter the soil texture-structure category (enter one of the below numbers):

1. Combined, Structureless, clayey or silty materials such as landfill caps and loess, lacustrine or marine sediments, etc.
2. Soil which are both fine textured (clayey or silty) and unstratified, may also include some fine sands.
3. Most stratified fine-grained soils through loams, also includes unstratified medium and fine sands. This category may be generally applicable for agricultural soils.
4. Coarse and gravelly sands, may also include some highly stratified soils with large and/or numerous cracks, macropores, etc.

Steady State Rate of Water Level Change ("R" in cm/min):

Flow Type:

$r^2 = 9.35 \text{ cm}^2$   
 $C = 1.20194$   
 $Q = 38.22$   
 $K_{1T} = 0.032-02 \text{ cm/sec}$   
 $K_{2T} = 0.032-04 \text{ cm/sec}$   
 $K_{3T} = 0.032-03 \text{ cm/sec}$   
 $K_{4T} = 0.032-01 \text{ cm/sec}$

## Two Head Method

Reservoir Type (enter "1" for Combined and "2" for Inert reservoir):

Enter the first water head height ("H1" in cm):

Enter the second water head height ("H2" in cm):

Enter the Borehole Radius ("r" in cm):

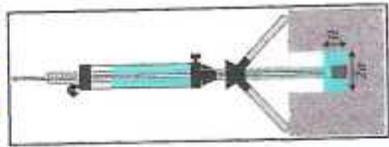
Enter the soil texture-structure category (enter one of the below numbers):

1. Combined, Structureless, clayey or silty materials such as landfill caps and loess, lacustrine or marine sediments, etc.
2. Soil which are both fine textured (clayey or silty) and unstratified, may also include some fine sands.
3. Most stratified fine-grained soils through loams, also includes unstratified medium and fine sands. This category may be generally applicable for agricultural soils.
4. Coarse and gravelly sands, may also include some highly stratified soils with large and/or numerous cracks, macropores, etc.

Steady State Rate of Water Level Change ("R1" in cm/min):

Steady State Rate of Water Level Change ("R2" in cm/min):

$r^2 = 9.35 \text{ cm}^2$   
 $Q_1 = 2.16$   
 $Q_2 = 0.80316$   
 $C_1 = 1.20194$   
 $C_2 = 0.20496$   
 $C_3 = 0.00397$   
 $C_4 = 0.00500$   
 $C_5 = 0.02443$   
 $K_{1T} = 1.182-03 \text{ cm/sec}$   
 $K_{2T} = 1.182-01 \text{ cm/sec}$   
 $K_{3T} = 4.442-01 \text{ cm/sec}$   
 $K_{4T} = 7.418-04 \text{ cm/sec}$   
 $K_{5T} = 3.318-03 \text{ cm/sec}$



Calculation formulas related to head losses (Q, Water H1, H2, H3, H4, H5, H6, H7, H8, H9, H10, H11, H12, H13, H14, H15, H16, H17, H18, H19, H20, H21, H22, H23, H24, H25, H26, H27, H28, H29, H30, H31, H32, H33, H34, H35, H36, H37, H38, H39, H40, H41, H42, H43, H44, H45, H46, H47, H48, H49, H50, H51, H52, H53, H54, H55, H56, H57, H58, H59, H60, H61, H62, H63, H64, H65, H66, H67, H68, H69, H70, H71, H72, H73, H74, H75, H76, H77, H78, H79, H80, H81, H82, H83, H84, H85, H86, H87, H88, H89, H90, H91, H92, H93, H94, H95, H96, H97, H98, H99, H100, H101, H102, H103, H104, H105, H106, H107, H108, H109, H110, H111, H112, H113, H114, H115, H116, H117, H118, H119, H120, H121, H122, H123, H124, H125, H126, H127, H128, H129, H130, H131, H132, H133, H134, H135, H136, H137, H138, H139, H140, H141, H142, H143, H144, H145, H146, H147, H148, H149, H150, H151, H152, H153, H154, H155, H156, H157, H158, H159, H160, H161, H162, H163, H164, H165, H166, H167, H168, H169, H170, H171, H172, H173, H174, H175, H176, H177, H178, H179, H180, H181, H182, H183, H184, H185, H186, H187, H188, H189, H190, H191, H192, H193, H194, H195, H196, H197, H198, H199, H200, H201, H202, H203, H204, H205, H206, H207, H208, H209, H210, H211, H212, H213, H214, H215, H216, H217, H218, H219, H220, H221, H222, H223, H224, H225, H226, H227, H228, H229, H230, H231, H232, H233, H234, H235, H236, H237, H238, H239, H240, H241, H242, H243, H244, H245, H246, H247, H248, H249, H250, H251, H252, H253, H254, H255, H256, H257, H258, H259, H260, H261, H262, H263, H264, H265, H266, H267, H268, H269, H270, H271, H272, H273, H274, H275, H276, H277, H278, H279, H280, H281, H282, H283, H284, H285, H286, H287, H288, H289, H290, H291, H292, H293, H294, H295, H296, H297, H298, H299, H300, H301, H302, H303, H304, H305, H306, H307, H308, H309, H310, H311, H312, H313, H314, H315, H316, H317, H318, H319, H320, H321, H322, H323, H324, H325, H326, H327, H328, H329, H330, H331, H332, H333, H334, H335, H336, H337, H338, H339, H340, H341, H342, H343, H344, H345, H346, H347, H348, H349, H350, H351, H352, H353, H354, H355, H356, H357, H358, H359, H360, H361, H362, H363, H364, H365, H366, H367, H368, H369, H370, H371, H372, H373, H374, H375, H376, H377, H378, H379, H380, H381, H382, H383, H384, H385, H386, H387, H388, H389, H390, H391, H392, H393, H394, H395, H396, H397, H398, H399, H400, H401, H402, H403, H404, H405, H406, H407, H408, H409, H410, H411, H412, H413, H414, H415, H416, H417, H418, H419, H420, H421, H422, H423, H424, H425, H426, H427, H428, H429, H430, H431, H432, H433, H434, H435, H436, H437, H438, H439, H440, H441, H442, H443, H444, H445, H446, H447, H448, H449, H450, H451, H452, H453, H454, H455, H456, H457, H458, H459, H460, H461, H462, H463, H464, H465, H466, H467, H468, H469, H470, H471, H472, H473, H474, H475, H476, H477, H478, H479, H480, H481, H482, H483, H484, H485, H486, H487, H488, H489, H490, H491, H492, H493, H494, H495, H496, H497, H498, H499, H500, H501, H502, H503, H504, H505, H506, H507, H508, H509, H510, H511, H512, H513, H514, H515, H516, H517, H518, H519, H520, H521, H522, H523, H524, H525, H526, H527, H528, H529, H530, H531, H532, H533, H534, H535, H536, H537, H538, H539, H540, H541, H542, H543, H544, H545, H546, H547, H548, H549, H550, H551, H552, H553, H554, H555, H556, H557, H558, H559, H560, H561, H562, H563, H564, H565, H566, H567, H568, H569, H570, H571, H572, H573, H574, H575, H576, H577, H578, H579, H580, H581, H582, H583, H584, H585, H586, H587, H588, H589, H590, H591, H592, H593, H594, H595, H596, H597, H598, H599, H600, H601, H602, H603, H604, H605, H606, H607, H608, H609, H610, H611, H612, H613, H614, H615, H616, H617, H618, H619, H620, H621, H622, H623, H624, H625, H626, H627, H628, H629, H630, H631, H632, H633, H634, H635, H636, H637, H638, H639, H640, H641, H642, H643, H644, H645, H646, H647, H648, H649, H650, H651, H652, H653, H654, H655, H656, H657, H658, H659, H660, H661, H662, H663, H664, H665, H666, H667, H668, H669, H670, H671, H672, H673, H674, H675, H676, H677, H678, H679, H680, H681, H682, H683, H684, H685, H686, H687, H688, H689, H690, H691, H692, H693, H694, H695, H696, H697, H698, H699, H700, H701, H702, H703, H704, H705, H706, H707, H708, H709, H710, H711, H712, H713, H714, H715, H716, H717, H718, H719, H720, H721, H722, H723, H724, H725, H726, H727, H728, H729, H730, H731, H732, H733, H734, H735, H736, H737, H738, H739, H740, H741, H742, H743, H744, H745, H746, H747, H748, H749, H750, H751, H752, H753, H754, H755, H756, H757, H758, H759, H760, H761, H762, H763, H764, H765, H766, H767, H768, H769, H770, H771, H772, H773, H774, H775, H776, H777, H778, H779, H780, H781, H782, H783, H784, H785, H786, H787, H788, H789, H790, H791, H792, H793, H794, H795, H796, H797, H798, H799, H800, H801, H802, H803, H804, H805, H806, H807, H808, H809, H810, H811, H812, H813, H814, H815, H816, H817, H818, H819, H820, H821, H822, H823, H824, H825, H826, H827, H828, H829, H830, H831, H832, H833, H834, H835, H836, H837, H838, H839, H840, H841, H842, H843, H844, H845, H846, H847, H848, H849, H850, H851, H852, H853, H854, H855, H856, H857, H858, H859, H860, H861, H862, H863, H864, H865, H866, H867, H868, H869, H870, H871, H872, H873, H874, H875, H876, H877, H878, H879, H880, H881, H882, H883, H884, H885, H886, H887, H888, H889, H890, H891, H892, H893, H894, H895, H896, H897, H898, H899, H900, H901, H902, H903, H904, H905, H906, H907, H908, H909, H910, H911, H912, H913, H914, H915, H916, H917, H918, H919, H920, H921, H922, H923, H924, H925, H926, H927, H928, H929, H930, H931, H932, H933, H934, H935, H936, H937, H938, H939, H940, H941, H942, H943, H944, H945, H946, H947, H948, H949, H950, H951, H952, H953, H954, H955, H956, H957, H958, H959, H960, H961, H962, H963, H964, H965, H966, H967, H968, H969, H970, H971, H972, H973, H974, H975, H976, H977, H978, H979, H980, H981, H982, H983, H984, H985, H986, H987, H988, H989, H990, H991, H992, H993, H994, H995, H996, H997, H998, H999, H1000, H1001, H1002, H1003, H1004, H1005, H1006, H1007, H1008, H1009, H1010, H1011, H1012, H1013, H1014, H1015, H1016, H1017, H1018, H1019, H1020, H1021, H1022, H1023, H1024, H1025, H1026, H1027, H1028, H1029, H1030, H1031, H1032, H1033, H1034, H1035, H1036, H1037, H1038, H1039, H1040, H1041, H1042, H1043, H1044, H1045, H1046, H1047, H1048, H1049, H1050, H1051, H1052, H1053, H1054, H1055, H1056, H1057, H1058, H1059, H1060, H1061, H1062, H1063, H1064, H1065, H1066, H1067, H1068, H1069, H1070, H1071, H1072, H1073, H1074, H1075, H1076, H1077, H1078, H1079, H1080, H1081, H1082, H1083, H1084, H1085, H1086, H1087, H1088, H1089, H1090, H1091, H1092, H1093, H1094, H1095, H1096, H1097, H1098, H1099, H1100, H1101, H1102, H1103, H1104, H1105, H1106, H1107, H1108, H1109, H1110, H1111, H1112, H1113, H1114, H1115, H1116, H1117, H1118, H1119, H1120, H1121, H1122, H1123, H1124, H1125, H1126, H1127, H1128, H1129, H1130, H1131, H1132, H1133, H1134, H1135, H1136, H1137, H1138, H1139, H1140, H1141, H1142, H1143, H1144, H1145, H1146, H1147, H1148, H1149, H1150, H1151, H1152, H1153, H1154, H1155, H1156, H1157, H1158, H1159, H1160, H1161, H1162, H1163, H1164, H1165, H1166, H1167, H1168, H1169, H1170, H1171, H1172, H1173, H1174, H1175, H1176, H1177, H1178, H1179, H1180, H1181, H1182, H1183, H1184, H1185, H1186, H1187, H1188, H1189, H1190, H1191, H1192, H1193, H1194, H1195, H1196, H1197, H1198, H1199, H1200, H1201, H1202, H1203, H1204, H1205, H1206, H1207, H1208, H1209, H1210, H1211, H1212, H1213, H1214, H1215, H1216, H1217, H1218, H1219, H1220, H1221, H1222, H1223, H1224, H1225, H1226, H1227, H1228, H1229, H1230, H1231, H1232, H1233, H1234, H1235, H1236, H1237, H1238, H1239, H1240, H1241, H1242, H1243, H1244, H1245, H1246, H1247, H1248, H1249, H1250, H1251, H1252, H1253, H1254, H1255, H1256, H1257, H1258, H1259, H1260, H1261, H1262, H1263, H1264, H1265, H1266, H1267, H1268, H1269, H1270, H1271, H1272, H1273, H1274, H1275, H1276, H1277, H1278, H1279, H1280, H1281, H1282, H1283, H1284, H1285, H1286, H1287, H1288, H1289, H1290, H1291, H1292, H1293, H1294, H1295, H1296, H1297, H1298, H1299, H1300, H1301, H1302, H1303, H1304, H1305, H1306, H1307, H1308, H1309, H1310, H1311, H1312, H1313, H1314, H1315, H1316, H1317, H1318, H1319, H1320, H1321, H1322, H1323, H1324, H1325, H1326, H1327, H1328, H1329, H1330, H1331, H1332, H1333, H1334, H1335, H1336, H1337, H1338, H1339, H1340, H1341, H1342, H1343, H1344, H1345, H1346, H1347, H1348, H1349, H1350, H1351, H1352, H1353, H1354, H1355, H1356, H1357, H1358, H1359, H1360, H1361, H1362, H1363, H1364, H1365, H1366, H1367, H1368, H1369, H1370, H1371, H1372, H1373, H1374, H1375, H1376, H1377, H1378, H1379, H1380, H1381, H1382, H1383, H1384, H1385, H1386, H1387, H1388, H1389, H1390, H1391, H1392, H1393, H1394, H1395, H1396, H1397, H1398, H1399, H1400, H1401, H1402, H1403, H1404, H1405, H1406, H1407, H1408, H1409, H1410, H1411, H1412, H1413, H1414, H1415, H1416, H1417, H1418, H1419, H1420, H1421, H1422, H1423, H1424, H1425, H1426, H1427, H1428, H1429, H1430, H1431, H1432, H1433, H1434, H1435, H1436, H1437, H1438, H1439, H1440, H1441, H1442, H1443, H1444, H1445, H1446, H1447, H1448, H1449, H1450, H1451, H1452, H1453, H1454, H1455, H1456, H1457, H1458, H1459, H1460, H1461, H1462, H1463, H1464, H1465, H1466, H1467, H1468, H1469, H1470, H1471, H1472, H1473, H1474, H1475, H1476, H1477, H1478, H1479, H1480, H1481, H1482, H1483, H1484, H1485, H1486, H1487, H1488, H1489, H1490, H1491, H1492, H1493, H1494, H1495, H1496, H1497, H1498, H1499, H1500, H1501, H1502, H1503, H1504, H1505, H1506, H1507, H1508, H1509, H1510, H1511, H1512, H1513, H1514, H1515, H1516, H1517, H1518, H1519, H1520, H1521, H1522, H1523, H1524, H1525, H1526, H1527, H1528, H1529, H1530, H1531, H1532, H1533, H1534, H1535, H1536, H1537, H1538, H1539, H1540, H1541, H1542, H1543, H1544, H1545, H1546, H1547, H1548, H1549, H1550, H1551, H1552, H1553, H1554, H1555, H1556, H1557, H1558, H1559, H1560, H1561, H1562, H1563, H1564, H1565, H1566, H1567, H1568, H1569, H1570, H1571, H1572, H1573, H1574, H1575, H1576, H1577, H1578, H1579, H1580, H1581, H1582, H1583, H1584, H1585, H1586, H1587, H1588, H1589, H1590, H1591, H1592, H1593, H1594, H1595, H1596, H1597, H1598, H1599, H1600, H1601, H1602, H1603, H1604, H1605, H1606, H1607, H1608, H1609, H1610, H1611, H1612, H1613, H1614, H1615, H1616, H1617, H1618, H1619, H1620, H1621, H1622, H1623, H1624, H1625, H1626, H1627, H1628, H1629, H1630, H1631, H1632, H1633, H1634, H1635, H1636, H1637, H1638, H1639, H1640, H1641, H1642, H1643, H1644, H1645, H1646, H1647, H1648, H1649, H1650, H1651, H1652, H1653, H1654, H1655, H1656, H1657, H1658, H1659, H1660, H1661, H1662, H1663, H1664, H1665, H1666, H1667, H1668, H1669, H1670, H1671, H1672, H1673, H1674, H1675, H1676, H1677, H1678, H1679, H1680, H1681, H1682, H1683, H1684, H1685, H1686, H1687, H1688, H1689, H1690, H1691, H1692, H1693, H1694, H1695, H1696, H1697, H1698, H1699, H1700, H1701, H1702, H1703, H1704, H1705, H1706, H1707, H1708, H1709, H1710, H1711, H1712, H1713, H1714, H1715, H1716, H1717, H1718, H1719, H1720, H1721, H1722, H1723, H1724, H1725, H1726, H1727, H1728, H1729, H1730, H1731, H1732, H1733, H1734, H1735, H1736, H1737, H1738, H1739, H1740, H1741, H1742, H1743, H1744, H1745, H1746, H1747, H1748, H1749, H1750, H1751, H1752, H1753, H1754, H1755, H1756, H1757, H1758, H1759, H1760, H1761, H1762, H1763, H1764, H1765, H1766, H1767, H1768, H1769, H1770, H1771, H1772, H1773, H1774, H1775, H1776, H1777, H1778, H1779, H1780, H1781, H1782, H1783, H1784, H1785, H1786, H1787, H1788, H1789, H1790, H1791, H1792, H1793, H1794, H1795, H1796, H1797, H1798, H1799, H1800, H1801, H1802, H1803, H1804, H1805, H1806, H1807, H1808, H1809, H1810, H1811, H1812, H1813, H1814, H1815, H1816, H1817, H1818, H1819, H1820, H1821, H1822, H1823, H1824, H1825, H1826, H1827, H1828, H1829, H1830, H1831, H1832, H1833, H1834, H1835, H1836, H1837, H1838, H1839, H1840, H1841, H1842, H1843, H1844, H1845, H1846, H1847, H1848, H1849, H1850, H1851, H1852, H1853, H1854, H1855, H1856, H1857, H1858, H1859, H1860, H1861, H1862, H1863, H1864, H1865, H1866, H1867, H1868, H1869, H1870, H1871, H1872, H1873, H1874, H1875, H1876, H1877, H1878, H1879, H1880, H1881



GP FIELD DATA SHEET

SECTION 1: SITE INFORMATION

Date 4/17/19 Investigator CARLOS A. SOLORZANO

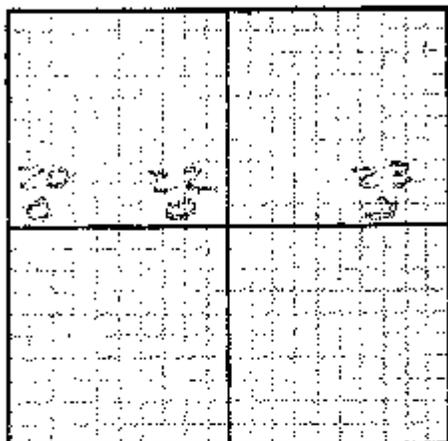
Site Location PALMER WAY

Dominant Soil Type(s) SANDY & GRAVELLY

Site Map:

Soil Profile Description (horizon depth, texture, structure, color, etc.):

PJ-20



Depth	Description
0" - 10"	A - 7.5% 3/2 Loamy Sand
10" - 18"	B - 10.4% 3/2 Loamy Sand
18" - 23"	C1 - 3.5% 4/3 S & G
23" - 28"	C2 - 2.5% 6/3
28" - 38"	Med. Sand
38" - 48"	
48" - 58"	
58" - 68"	

Presence of special soil conditions (mottling, water table depth, hardpan, induration, compacted layers, etc.):

---



---



---



---

Comments and Notes (topography, slope, vegetation, etc.):

---



---



---





# SCIENCE MOISTURE Guelph Permeameter Calculations

Input  
Result

Support: @guelphcare.com

## Head #1

Reverser Type (enter "1" for Combined and "2" for Inert reservoir): **1**  
 Enter the first water head height ("H1" in cm): **10**  
 Enter the second water head height ("H2" in cm): **10**

Enter the soil texture-structure category (enter one of the below numbers): **4**

1. Combined, Structureless, clay or silty materials (such as loess) and clays, lacustrine or marine sediments, etc.
2. Soils which are both fine-textured (clays or silts) and unstratified; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstratified medium and low sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravelly sands; may also include some highly structured soils with large angular numerous cracks, macropores, etc.

Steady State Rate of Water Level Change ("R" in cm/hr): **0.0000**

$r^* = 0.30 \text{ cm}^2/\text{hr}$   
 $C = 0.02715$   
 $Q = 7.12058$

$K_{11} = 3.18E-02 \text{ cm/sec}$   
 $K_{12} = 0.00000 \text{ cm/sec}$   
 $K_{13} = 3.9E-01 \text{ cm/sec}$   
 $K_{14} = 0.17E-03 \text{ cm/sec}$   
 $Q_{11} = 8.6E-02 \text{ cm}^2/\text{sec}$

## Head #2

Reverser Type (enter "1" for Combined and "2" for Inert reservoir): **1**  
 Enter the first water head height ("H1" in cm): **10**  
 Enter the second water head height ("H2" in cm): **10**

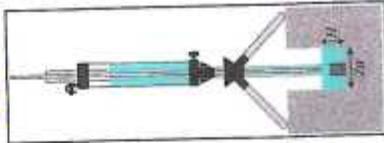
Enter the soil texture-structure category (enter one of the below numbers): **4**

1. Combined, Structureless, clay or silty materials (such as loess) and clays, lacustrine or marine sediments, etc.
2. Soils which are both fine-textured (clays or silts) and unstratified; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstratified medium and low sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravelly sands; may also include some highly structured soils with large angular numerous cracks, macropores, etc.

Steady State Rate of Water Level Change ("R" in cm/hr): **0.0000**

$r^* = 0.30 \text{ cm}^2/\text{hr}$   
 $C = 1.28714$   
 $Q = 11.7528$

$K_{11} = 1.51E-02 \text{ cm/sec}$   
 $K_{12} = 0.00000 \text{ cm/sec}$   
 $K_{13} = 1.1E-04 \text{ cm/sec}$   
 $K_{14} = 1.27E-01 \text{ cm/sec}$   
 $K_{15} = 7.1E-03 \text{ cm/sec}$   
 $Q_{11} = 8.6E-02 \text{ cm}^2/\text{sec}$



## Average

$K_{11} = 2.01E-02 \text{ cm/sec}$   
 $K_{12} = 1.8E-04 \text{ cm/sec}$   
 $K_{13} = 4.0E-01 \text{ cm/sec}$   
 $K_{14} = 1.20E-03 \text{ cm/sec}$   
 $Q_{11} = 1.7E-02 \text{ cm}^2/\text{sec}$

## Two Head Method

Reverser Type (enter "1" for Combined and "2" for Inert reservoir): **1**  
 Enter the first water head height ("H1" in cm): **10**  
 Enter the second water head height ("H2" in cm): **10**

Enter the soil texture-structure category (enter one of the below numbers): **4**

1. Combined, Structureless, clay or silty materials (such as loess) and clays, lacustrine or marine sediments, etc.
2. Soils which are both fine-textured (clays or silts) and unstratified; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstratified medium and low sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravelly sands; may also include some highly structured soils with large angular numerous cracks, macropores, etc.

Steady State Rate of Water Level Change ("R" in cm/hr): **0.0000**

Steady State Rate of Water Level Change ("R" in cm/hr): **0.0000**

$Q_{11} = 0.40284$

$Q_{12} = 0.72314$

$Q_{13} = 0.80315$

$Q_{14} = 1.28714$

$Q_{15} = 0.04149$

$Q_{16} = 0.00997$

$Q_{17} = 0.05169$

$Q_{18} = 0.00415$

$K_{11} = 1.61E-04 \text{ cm/sec}$   
 $K_{12} = 2.01E-02 \text{ cm/sec}$   
 $K_{13} = 1.51E-02 \text{ cm/sec}$   
 $K_{14} = 1.20E-03 \text{ cm/sec}$

Calculations involved in determining the two-head method, where  $R$  is steady-state rate of rise of water in the reservoir,  $K_{11}$  to  $K_{18}$  are the hydraulic conductivity (cm/sec),  $Q_{11}$  to  $Q_{18}$  are the hydraulic conductivity (cm/sec) multiplied by the length parameter class. Table 2 is the Brooks and Dean,  $K_{11}$  to  $K_{18}$  for the two-head method. See Table 2 for the Brooks and Dean,  $Q_{11}$  to  $Q_{18}$  for the two-head method. See Table 2 for the Brooks and Dean,  $Q_{11}$  to  $Q_{18}$  for the two-head method. See Table 2 for the Brooks and Dean,  $Q_{11}$  to  $Q_{18}$  for the two-head method.

One Head, Combined Reservoir	One Head, Inert Reservoir	Two Head, Combined Reservoir	Two Head, Inert Reservoir
$H_1 = H_2 = 10.22$	$H_1 = H_2 = 2.16$	$H_1 = H_2 = 15.22$	$H_1 = H_2 = 2.16$
$Q_1 = Q_2 = 0.00$	$Q_1 = Q_2 = 0.00$	$Q_1 = Q_2 = 0.00$	$Q_1 = Q_2 = 0.00$
$Q_3 = 2.01E-02$	$Q_3 = 2.01E-02$	$Q_3 = 2.01E-02$	$Q_3 = 2.01E-02$
$Q_4 = 1.20E-03$	$Q_4 = 1.20E-03$	$Q_4 = 1.20E-03$	$Q_4 = 1.20E-03$
$Q_5 = 1.27E-01$	$Q_5 = 1.27E-01$	$Q_5 = 1.27E-01$	$Q_5 = 1.27E-01$
$Q_6 = 7.1E-03$	$Q_6 = 7.1E-03$	$Q_6 = 7.1E-03$	$Q_6 = 7.1E-03$
$Q_7 = 1.51E-02$	$Q_7 = 1.51E-02$	$Q_7 = 1.51E-02$	$Q_7 = 1.51E-02$
$Q_8 = 0.00000$	$Q_8 = 0.00000$	$Q_8 = 0.00000$	$Q_8 = 0.00000$
$Q_9 = 0.00000$	$Q_9 = 0.00000$	$Q_9 = 0.00000$	$Q_9 = 0.00000$
$Q_{10} = 0.00000$	$Q_{10} = 0.00000$	$Q_{10} = 0.00000$	$Q_{10} = 0.00000$
$Q_{11} = 8.6E-02$	$Q_{11} = 8.6E-02$	$Q_{11} = 8.6E-02$	$Q_{11} = 8.6E-02$
$Q_{12} = 0.00000$	$Q_{12} = 0.00000$	$Q_{12} = 0.00000$	$Q_{12} = 0.00000$
$Q_{13} = 1.1E-04$	$Q_{13} = 1.1E-04$	$Q_{13} = 1.1E-04$	$Q_{13} = 1.1E-04$
$Q_{14} = 1.27E-01$	$Q_{14} = 1.27E-01$	$Q_{14} = 1.27E-01$	$Q_{14} = 1.27E-01$
$Q_{15} = 7.1E-03$	$Q_{15} = 7.1E-03$	$Q_{15} = 7.1E-03$	$Q_{15} = 7.1E-03$
$Q_{16} = 1.51E-02$	$Q_{16} = 1.51E-02$	$Q_{16} = 1.51E-02$	$Q_{16} = 1.51E-02$
$Q_{17} = 0.00000$	$Q_{17} = 0.00000$	$Q_{17} = 0.00000$	$Q_{17} = 0.00000$
$Q_{18} = 0.00000$	$Q_{18} = 0.00000$	$Q_{18} = 0.00000$	$Q_{18} = 0.00000$

## Head #1

Reverser Type (enter "1" for Combined and "2" for Inert reservoir): **1**  
 Enter the first water head height ("H1" in cm): **10**  
 Enter the second water head height ("H2" in cm): **10**

Enter the soil texture-structure category (enter one of the below numbers): **4**

1. Combined, Structureless, clay or silty materials (such as loess) and clays, lacustrine or marine sediments, etc.
2. Soils which are both fine-textured (clays or silts) and unstratified; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstratified medium and low sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravelly sands; may also include some highly structured soils with large angular numerous cracks, macropores, etc.

Steady State Rate of Water Level Change ("R" in cm/hr): **0.0000**

$r^* = 0.30 \text{ cm}^2/\text{hr}$   
 $C = 0.02715$   
 $Q = 7.12058$

$K_{11} = 3.18E-02 \text{ cm/sec}$   
 $K_{12} = 0.00000 \text{ cm/sec}$   
 $K_{13} = 3.9E-01 \text{ cm/sec}$   
 $K_{14} = 0.17E-03 \text{ cm/sec}$   
 $Q_{11} = 8.6E-02 \text{ cm}^2/\text{sec}$

## Head #2

Reverser Type (enter "1" for Combined and "2" for Inert reservoir): **1**  
 Enter the first water head height ("H1" in cm): **10**  
 Enter the second water head height ("H2" in cm): **10**

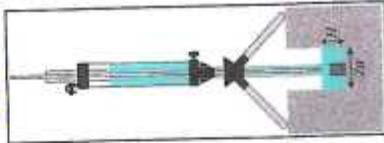
Enter the soil texture-structure category (enter one of the below numbers): **4**

1. Combined, Structureless, clay or silty materials (such as loess) and clays, lacustrine or marine sediments, etc.
2. Soils which are both fine-textured (clays or silts) and unstratified; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstratified medium and low sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravelly sands; may also include some highly structured soils with large angular numerous cracks, macropores, etc.

Steady State Rate of Water Level Change ("R" in cm/hr): **0.0000**

$r^* = 0.30 \text{ cm}^2/\text{hr}$   
 $C = 1.28714$   
 $Q = 11.7528$

$K_{11} = 1.51E-02 \text{ cm/sec}$   
 $K_{12} = 0.00000 \text{ cm/sec}$   
 $K_{13} = 1.1E-04 \text{ cm/sec}$   
 $K_{14} = 1.27E-01 \text{ cm/sec}$   
 $K_{15} = 7.1E-03 \text{ cm/sec}$   
 $Q_{11} = 8.6E-02 \text{ cm}^2/\text{sec}$



## Average

$K_{11} = 2.01E-02 \text{ cm/sec}$   
 $K_{12} = 1.8E-04 \text{ cm/sec}$   
 $K_{13} = 4.0E-01 \text{ cm/sec}$   
 $K_{14} = 1.20E-03 \text{ cm/sec}$   
 $Q_{11} = 1.7E-02 \text{ cm}^2/\text{sec}$

## Two Head Method

Reverser Type (enter "1" for Combined and "2" for Inert reservoir): **1**  
 Enter the first water head height ("H1" in cm): **10**  
 Enter the second water head height ("H2" in cm): **10**

Enter the soil texture-structure category (enter one of the below numbers): **4**

1. Combined, Structureless, clay or silty materials (such as loess) and clays, lacustrine or marine sediments, etc.
2. Soils which are both fine-textured (clays or silts) and unstratified; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstratified medium and low sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravelly sands; may also include some highly structured soils with large angular numerous cracks, macropores, etc.

Steady State Rate of Water Level Change ("R" in cm/hr): **0.0000**

Steady State Rate of Water Level Change ("R" in cm/hr): **0.0000**

$Q_{11} = 0.40284$

$Q_{12} = 0.72314$

$Q_{13} = 0.80315$

$Q_{14} = 1.28714$

$Q_{15} = 0.04149$

$Q_{16} = 0.00997$

$Q_{17} = 0.05169$

$Q_{18} = 0.00415$

$K_{11} = 1.61E-04 \text{ cm/sec}$   
 $K_{12} = 2.01E-02 \text{ cm/sec}$   
 $K_{13} = 1.51E-02 \text{ cm/sec}$   
 $K_{14} = 1.20E-03 \text{ cm/sec}$

Calculations involved in determining the two-head method, where  $R$  is steady-state rate of rise of water in the reservoir,  $K_{11}$  to  $K_{18}$  are the hydraulic conductivity (cm/sec),  $Q_{11}$  to  $Q_{18}$  are the hydraulic conductivity (cm/sec) multiplied by the length parameter class. Table 2 is the Brooks and Dean,  $K_{11}$  to  $K_{18}$  for the two-head method. See Table 2 for the Brooks and Dean,  $Q_{11}$  to  $Q_{18}$  for the two-head method. See Table 2 for the Brooks and Dean,  $Q_{11}$  to  $Q_{18}$  for the two-head method.

Self Transmittance Category	$r^*$ (cm <sup>2</sup> /hr)	Storage Factor
Compacted, homogeneous, clay or silty materials with or without coarse and fine sand, lacustrine or marine sediment, etc.	0.01	$C_1 = \left( \frac{H_1/H_2}{1.102 + 0.110(H_1/H_2)} \right) \frac{1.015}{0.01}$ $C_2 = \left( \frac{H_1/H_2}{1.102 + 0.110(H_1/H_2)} \right) \frac{0.015}{0.01}$
Sets which are both fine-textured (clays or silts) and unstratified; may also include some fine sands.	0.01	$C_1 = \left( \frac{H_1/H_2}{1.992 + 0.091(H_1/H_2)} \right) \frac{0.015}{0.01}$ $C_2 = \left( \frac{H_1/H_2}{1.992 + 0.091(H_1/H_2)} \right) \frac{0.015}{0.01}$
Most structured soils from clays through loams; also includes unstratified medium and low sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left( \frac{H_1/H_2}{1.503 + 0.091(H_1/H_2)} \right) \frac{0.125}{0.12}$ $C_2 = \left( \frac{H_1/H_2}{1.503 + 0.091(H_1/H_2)} \right) \frac{0.125}{0.12}$
Coarse and gravelly sands; may also include some highly structured soils with large angular numerous cracks, macropores, etc.	0.16	$C_1 = \left( \frac{H_1/H_2}{1.072 + 0.091(H_1/H_2)} \right) \frac{0.165}{0.16}$ $C_2 = \left( \frac{H_1/H_2}{1.072 + 0.091(H_1/H_2)} \right) \frac{0.165}{0.16}$



GP FIELD DATA SHEET

SECTION 1: SITE INFORMATION

Date 4/19/19 Investigator CARLOS A. QUINTANA

Site Location PANTHER WAY

Dominant Soil Type(s) SAND

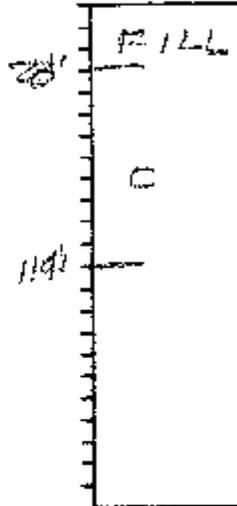
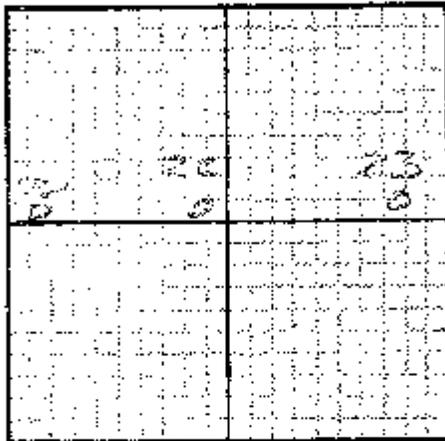
Site Map:

Soil Profile Description (horizon depth, texture, structure, color, etc.):

PT - 23

Depth

Description



Depth	Description
0 - 20"	FILL
20 - 114"	SAND
114 - 128"	
128 - 142"	
142 - 156"	
156 - 170"	
170 - 184"	
184 - 198"	
198 - 212"	
212 - 226"	
226 - 240"	

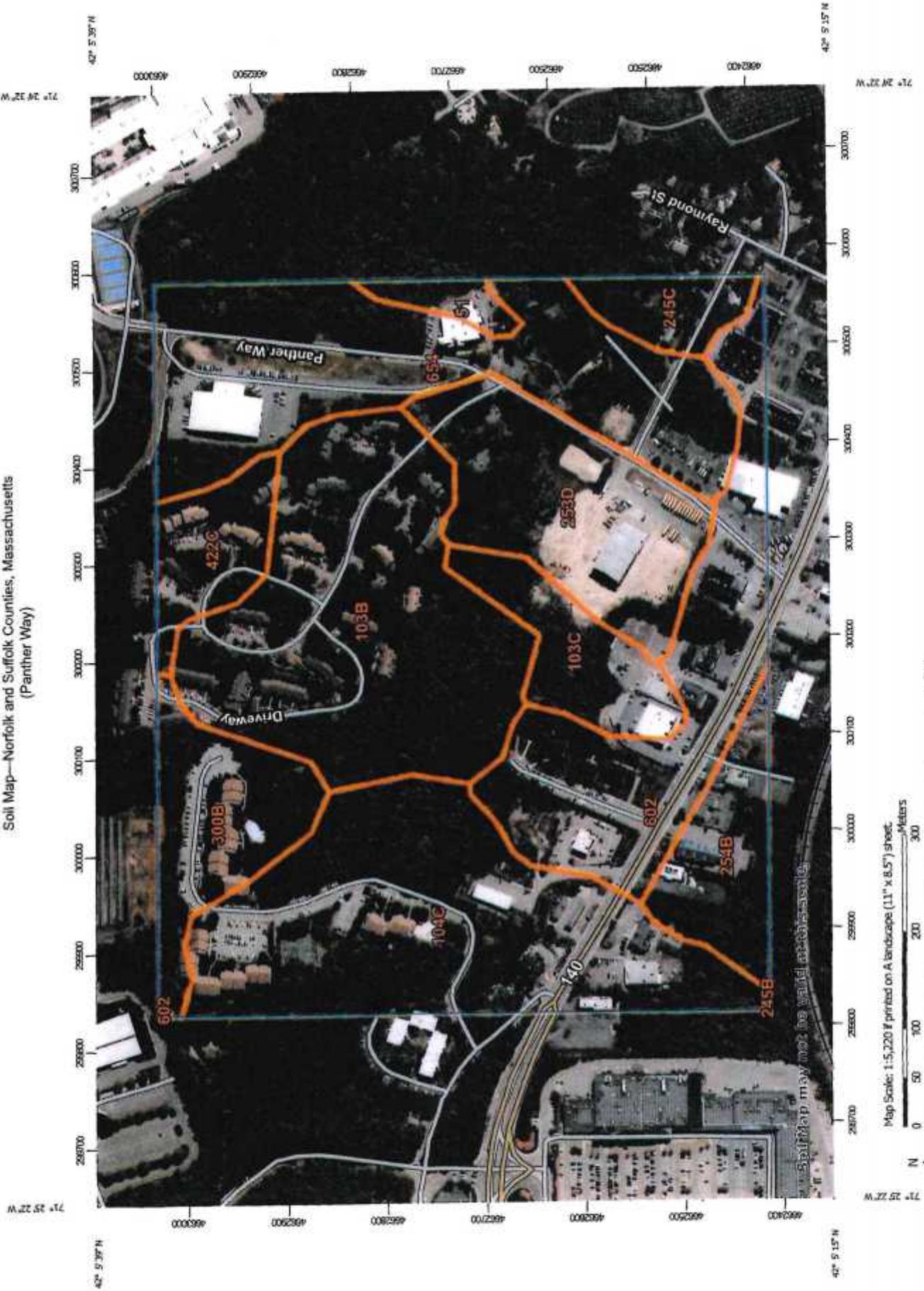
Presence of special soil conditions (mottling, water table depth, hardpan, induration, compacted layers, etc.):

water @ 9 ft

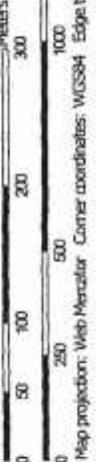
Comments and Notes (topography, slope, vegetation, etc.):



Soil Map—Norfolk and Suffolk Counties, Massachusetts  
(Panther Way)



Map Scale: 1:5,220 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tic: UTM Zone 19N WGS84

## MAP LEGEND

- Area of Interest (AOI)
- Area of Interest (AOI)
- Soils**
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points
- Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spot Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features
- Water Features**
- Streams and Canals
- Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads
- Background**
- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL:  
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts  
Survey Area Data: Version 20, Aug 27, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
51	Swansea muck, 0 to 1 percent slopes	1.3	1.1%
103B	Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes	22.4	19.4%
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	5.0	4.3%
104C	Hollis-Rock outcrop Charlton complex, 0 to 15 percent slopes	22.3	19.4%
245B	Hinckley loamy sand, 3 to 8 percent slopes	0.0	0.0%
245C	Hinckley loamy sand, 8 to 15 percent slopes	2.6	2.3%
253D	Hinckley loamy sand, 15 to 35 percent slopes	11.5	10.0%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	5.4	4.7%
300B	Montauk fine sandy loam, 3 to 8 percent slopes	7.0	6.1%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	4.0	3.5%
602	Urban land, 0 to 15 percent slopes	14.3	12.4%
654	Udultents, loamy	19.5	16.9%
<b>Totals for Area of Interest</b>		<b>115.4</b>	<b>100.0%</b>

## **APPENDIX G**

## **CHECKLIST FOR DESIGNERS**

---

# Site Planning

## GOALS and NEEDS Addressed:

1. Create a visually appealing community
2. Stabilize and increase property values
3. Encourage low impact development
4. Preserve the Town's historic and cultural heritage
5. Protect Franklin's natural environment, including habitat, water resources, and ecosystem services

### FRANKLIN POLICY:

Subdivision plans and site plans for all forms of development shall adhere to the principles of environmental and aesthetic compatibility and energy-efficient design.

BEST DEVELOPMENT PRACTICES	Incorporated into Project?
The site plan should be designed to address the following to the maximum extent practicable	
Unique natural features have been preserved <i>(the development program should either avoid altering or showcase significant natural features)</i>	✓
Native vegetation planted in disturbed areas as needed to enhance or restore habitat	✓
Historic and cultural resources have been preserved <i>(the development program should either avoid altering or showcase significant historic and cultural features)</i>	✓
Clearing, grading, and building placement consider view sheds	✓
Cut and fill have been minimized	✓
Buildings blend into the natural topography	✓
Buildings are oriented to the sun and wind for maximum energy efficiency <i>Vegetated protection from northwest (winter) winds is provided Deciduous species planted or retained close to the East, South and West building edges</i>	✓
Conforms to §185-31 of the Town of Franklin Zoning Code and/or Chapter 300 of the Town of Franklin Subdivision Regulations	✓ (P)

40 (P) See plan sheets 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

## Stormwater Management

Checklist for Designers

### GOALS and NEEDS addressed:

1. Protect local and regional wetlands and water bodies;
2. Maximize groundwater recharge to retain a viable local groundwater supply; and
3. Minimize pollutants in stormwater runoff.

**FRANKLIN POLICY:** In addition to MassDEP's Stormwater Management Standards, all new development projects in Franklin must meet the following performance measures. All redevelopment projects shall meet the standards and if they fail to meet the standards, shall retrofit or expand existing stormwater management systems to improve existing conditions.

1. Post-development peak discharge rates and volumes from the site shall not exceed pre-development peak discharge rates and volumes from the site.
2. All drainage facilities proposed shall utilize best management practices as outlined in the Massachusetts Stormwater Management Standards.
3. All sites will have an Operation and Maintenance plan to insure future compliance.

Additionally, new development projects must:

1. Retain the volume of runoff equivalent to, or greater than, one (1.0) inch multiplied by the total post-construction impervious surface area on the site AND/OR
2. Remove 90% of the average annual load of Total Suspended Solids (TSS) generated from the total post-construction impervious area on the site AND 60% of the average annual load of Total Phosphorus (TP) generated from the total post-construction impervious surface area on the site.

And redevelopment projects must:

1. Retain the volume of runoff equivalent to, or greater than, 0.80 inch multiplied by the total post-construction impervious surface area on the site AND/OR
2. Remove 80% of the average annual post-construction load of Total Suspended Solids (TSS) generated from the total post-construction impervious area on the site AND 50% of the average annual load of Total Phosphorus (TP) generated from the total post-construction impervious surface area on the site.

**BEST DEVELOPMENT PRACTICES**

Incorporated into Project?

The site plan should be designed to address the following to the maximum extent practicable

<b>Vegetated swales</b> (recommended to convey runoff from roadways & parking lots)	No
<b>Vegetated filter strips</b> (recommended to filter and infiltrate runoff from roadways, parking lots, and driveways; use along roadsides and parking lots)	No
<b>Constructed wetlands</b> (preferred method for stormwater retention & pollutant removal)	No
<b>Bioretention cells</b> (rain gardens) (recommended on residential lots and parking lot islands)	No
<b>Pervious paving surfaces</b> (recommended in overflow parking and low-traffic areas)	No
<b>Sediment Forebays</b> (use in combination with other BDP)	No
<b>Roof gardens</b> (encouraged on flat or gently sloped commercial and industrial rooftops)	No
<b>Retention/Detention basins</b> (may be used in series with other practices to provide pre-treatment)	✓
<b>Recharge Systems</b> (suitable for all areas of development)	✓
<b>Drain pipe/catch basin systems</b> (as required to collect runoff when other systems are not practical)	✓
<b>If utilizing drain pipe and/or catch basin systems, have you documented that other systems are infeasible?</b>	✓



# Landscape Design

Checklist for Designers

## GOALS and NEEDS addressed:

1. Stabilize water use at a sustainable level;
2. Create landscapes that minimize habitat destruction and maximize habitat value;
3. Encourage the development of landscapes that provide environmental quality and visual relief through the planting of native or naturalized species

<p><b>FRANKLIN POLICIES:</b></p> <p>a) Site plans and landscape plans for all proposed projects shall take appropriate steps, as outlined in the Guidebook, to minimize water use for irrigation and to allow for natural recharge of groundwater. Landscape plans shall follow the guidelines in the Guidebook for selecting species that are most appropriate to the site conditions.</p> <p>b) Native and habitat-creating species shall be used in all landscape plans to the maximum extent possible while still meeting the site's landscaping needs. Invasive species may not be planted in Franklin under any condition. Refer to the Massachusetts Prohibited Plant list for more information.</p> <p>c) Actively promote the Town of Franklin's Water Conservation Measures.</p>
--

BEST DEVELOPMENT PRACTICES	Incorporated into Project?
The site plan must address all of the following principles:	
Retain and Recharge water on site ( <i>install bio-retention cells, vegetated filter strips and minimize lawn areas where feasible</i> )	✓
Preserve natural vegetation to the maximum extent practicable	✓
Irrigation system is water efficient ( <i>if an in-ground irrigation system is proposed, it is a water efficient system with timers and automatic sensors to prevent overwatering</i> )	Not Proposed
Preserve soil permeability ( <i>minimize disturbing existing landscapes. Prepare new planting beds in accordance to the Planting Bed Guidelines on p. 13, and install 1-2" of shredded pine bark mulch on new planting areas</i> )	✓
Minimize the use of turf grass ( <i>when applicable, reduce the size of the lawn area; instead, plant a bio-retention cell, use alternative, drought tolerant groundcover</i> )	✓
Specify variety of native and naturalized species ( <i>species from the plant list have been incorporated into the landscape design, and no invasive species are used. Refer to the Plant Species Section and the Massachusetts Prohibited Plant List</i> )	✓
Species are appropriate to the soil, site, and microclimate conditions ( <i>select appropriate species from the plant list in this guidebook</i> )	✓

## **APPENDIX H**



# Checklist for Stormwater Report

## A. Introduction

**Important:** When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the [Massachusetts Stormwater Handbook](#). The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.<sup>1</sup> This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8<sup>2</sup>
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

<sup>1</sup> The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

<sup>2</sup> For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



# Checklist for Stormwater Report

## B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

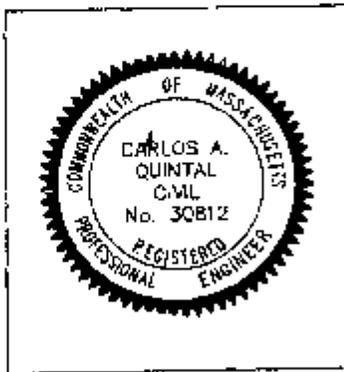
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

### Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



*Carlos A. Quintal*  
Signature and Date

## Checklist

**Project Type:** Is the application for new development, redevelopment, or a mix of new and redevelopment?

- New development  
 Redevelopment  
 Mix of New Development and Redevelopment



# Checklist for Stormwater Report

---

## Checklist (continued)

**LID Measures:** Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- No disturbance to any Wetland Resource Areas
- Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- Reduced Impervious Area (Redevelopment Only)
- Minimizing disturbance to existing trees and shrubs
- LID Site Design Credit Requested:
  - Credit 1
  - Credit 2
  - Credit 3
- Use of "country drainage" versus curb and gutter conveyance and pipe
- Bioretention Cells (includes Rain Gardens)
- Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- Treebox Filter
- Water Quality Swale
- Grass Channel
- Green Roof
- Other (describe): \_\_\_\_\_

### Standard 1: No New Untreated Discharges

- No new untreated discharges
- Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included



# Checklist for Stormwater Report

## Checklist (continued)

### Standard 2: Peak Rate Attenuation

- Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

### Standard 3: Recharge

- Soil Analysis provided.
- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.
  - Static
  - Simple Dynamic
  - Dynamic Field<sup>1</sup>
- Runoff from all impervious areas at the site discharging to the infiltration BMP.
- Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the Infiltration BMPs is sufficient to generate the required recharge volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
  - Site is comprised solely of C and D soils and/or bedrock at the land surface
  - M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
  - Solid Waste Landfill pursuant to 310 CMR 19.000
  - Project is otherwise subject to Stormwater Management Standards *only* to the maximum extent practicable.
- Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

<sup>1</sup> 80% TSS removal is required prior to discharge to Infiltration BMP if Dynamic Field method is used.



# Checklist for Stormwater Report

## Checklist (continued)

### Standard 3: Recharge (continued)

- The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

### Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
  - Provisions for storing materials and waste products inside or under cover;
  - Vehicle washing controls;
  - Requirements for routine inspections and maintenance of stormwater BMPs;
  - Spill prevention and response plans;
  - Provisions for maintenance of lawns, gardens, and other landscaped areas;
  - Requirements for storage and use of fertilizers, herbicides, and pesticides;
  - Pet waste management provisions;
  - Provisions for operation and management of septic systems;
  - Provisions for solid waste management;
  - Snow disposal and plowing plans relative to Wetland Resource Areas;
  - Winter Road Salt and/or Sand Use and Storage restrictions;
  - Street sweeping schedules;
  - Provisions for prevention of illicit discharges to the stormwater management system;
  - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
  - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
  - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
  - Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
    - is within the Zone II or Interim Wellhead Protection Area
    - is near or to other critical areas
    - is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
    - involves runoff from land uses with higher potential pollutant loads.
  - The Required Water Quality Volume is reduced through use of the LID site Design Credits.
  - Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



# Checklist for Stormwater Report

## Checklist (continued)

### Standard 4: Water Quality (continued)

- The BMP is sized (and calculations provided) based on:
  - The ½" or 1" Water Quality Volume or
  - The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the proprietary BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

### Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted *prior* to the discharge of stormwater to the post-construction stormwater BMPs.
- The NPDES Multi-Sector General Permit does *not* cover the land use.
- LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- All exposure has been eliminated.
- All exposure has *not* been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

### Standard 6: Critical Areas

- The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- Critical areas and BMPs are identified in the Stormwater Report.



# Checklist for Stormwater Report

## Checklist (continued)

### Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
- Limited Project
    - Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
    - Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
    - Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
  - Bike Path and/or Foot Path
  - Redevelopment Project
  - Redevelopment portion of mix of new and redevelopment.
- Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

### Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
  - Construction Period Operation and Maintenance Plan;
  - Names of Persons or Entity Responsible for Plan Compliance;
  - Construction Period Pollution Prevention Measures;
  - Erosion and Sedimentation Control Plan Drawings;
  - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
  - Vegetation Planning;
  - Site Development Plan;
  - Construction Sequencing Plan;
  - Sequencing of Erosion and Sedimentation Controls;
  - Operation and Maintenance of Erosion and Sedimentation Controls;
  - Inspection Schedule;
  - Maintenance Schedule;
  - Inspection and Maintenance Log Form.
- A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



# Checklist for Stormwater Report

## Checklist (continued)

### Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- The project is **not** covered by a NPDES Construction General Permit.
- The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted **BEFORE** land disturbance begins.

### Standard 9: Operation and Maintenance Plan

- The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
  - Name of the stormwater management system owners;
  - Party responsible for operation and maintenance;
  - Schedule for implementation of routine and non-routine maintenance tasks;
  - Plan showing the location of all stormwater BMPs maintenance access areas;
  - Description and delineation of public safety features;
  - Estimated operation and maintenance budget; and
  - Operation and Maintenance Log Form.
- The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
  - A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
  - A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

### Standard 10: Prohibition of Illicit Discharges

- The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- An Illicit Discharge Compliance Statement is attached;
- NO Illicit Discharge Compliance Statement is attached but will be submitted **prior** to the discharge of any stormwater to post-construction BMPs.

## **APPENDIX I**

# **Operation and Maintenance Plan**

FOR  
Site Plan – Senior Village  
**Panther Way and West Central Street**

LOCATED IN  
FRANKLIN, MASSACHUSETTS

PREPARED FOR  
Camford Property Group, LLC  
37 East Central Street  
Franklin, MA 02038

PREPARED BY  
UNITED CONSULTANTS, INC.  
850 FRANKLIN STREET, SUITE 11D  
WRENTHAM, MA. 02093

DATE: December 13, 2024  
Revised June 20, 2025

## **Operation and Maintenance Plan**

### **Good House Keeping Measures**

1. The parking area and driveways will receive the minimum amount of sand and salt. Snow for (Lot 2) will be stored on the sides of the driveways.
2. The site landscaping will consist of mulch with trees, shrubs, turf lawn and existing wooded areas. These areas will be assessed by the owner's landscape professional to determine the minimum amounts of fertilizers, herbicides and pesticides necessary and shall only apply the minimums necessary.
3. The site will be stabilized with landscaped areas with mulch and turf lawn. This will improve the existing site coverage.

### **Long Term Pollution Prevention Plan**

The owner shall employ good housekeeping measures, which include removing trash and debris from the site, keeping trash in receptacles and complying with the long-term operation and maintenance plan. The owner does not plan to store materials or waste products on the site. The owner will not allow vehicles to be washed outside of the building. The owner will have routine inspections and maintenance completed for the Storm-water BMP's. See the Operation and Maintenance Plan Stormwater Facilities Plan for details and schedule. No hazardous materials for businesses are anticipated. If hazardous materials are proposed in the future they will be stored within the building. The owner will employ a landscape professional to determine and apply the minimum amounts of fertilizers, herbicides and pesticides. No storage of landscape materials on site is proposed. The site is serviced by Town water and sewer. A dumpster is proposed to provide refuse storage and will be emptied and disposed of offsite. The owner will designate an emergency contact person prior to commencing construction. Snow will be placed in the snow storage areas provided on the site plan. If necessary, excess parking spaces could be used to store snow. The owner will apply the minimum amount of sand and salt necessary. The parking area will be swept four per year with one sweeping immediately following the last winter sanding. Sand piles will not be stored on site.

## **Operation and Maintenance Plan**

An operation and maintenance schedule for the construction period and the post-development period has been provided on the Operation and Maintenance Plan Stormwater Facilities Plan. During the construction period and after completion the Owner, Panther Way 2019, LLC shall be responsible for the operation and maintenance of the site and the drainage system. Upon completion of the construction work the property owner shall be responsible for the maintenance of the drainage facilities. The yearly estimated operation and maintenance budget is \$8,000.

The owner will provide documentation which will be submitted to the Franklin DPW confirming when maintenance has been satisfactorily completed.

The owner of the stormwater management system will notify the Director of changes in ownership or assignment of financial responsibility.

The owner, Panther Way 2019, LLC is the responsible party.

---

Name	Title
------	-------

# Yearly Inspection and Maintenance Log

## Page 1

100 and 110 East Central Street  
Franklin, Massachusetts

### Parking Lot Sweeping and Curb Inspection -- Four Times Per Year

Date: _____	Performed By: _____

Notes:

### Water Quality Units - 4 Times per year

Date: _____	Performed By: _____

### Cleaning Performed -- 4 Times per year

Date: _____	Performed By: _____

Notes:

### Catch Basins - 4 Times per year

Date: _____	Performed By: _____

### Cleaning Performed -- When Sediment Depth reaches 18"

Date: _____	Performed By: _____

Notes:

Open Infiltration Pond – 4 times per year

Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_

Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_

Inspect and clean pretreatment BMP's every six months and after every major storm event (2 year return frequency).

Items to be inspect:

- Signs of differential settling
- Cracking
- Erosion
- Leakage in the embankments
- Tree growth on the embankments
- Condition of Riprap
- Sediment accumulation and
- The health of the turf

If any of the above items are found to be in need of maintenance the corrective measures shall be completed immediately.

Underground Infiltration Pond -- 4 times per year

Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_

Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_

Cleaning Performed:

Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_

Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_

**Notes:**

Inspect and clean pretreatment BMP's every six months and after every major storm event (2 year return frequency). Check the inlet and outlet pipes to determine if they are clogged. Remove accumulated sediment, trash, debris, leaves, lawn clippings from mowing.

Inspect the infiltration area after the first several rainfall events, after all major storms, and on regularly scheduled dates every six months.

Inspect the infiltration area 24 hours to several days after a rain event, to look for ponded water at the surface of the trench. If water is present in may be that the infiltration area is clogged. If so then rehabilitation of the bottom of the trench shall be completed including removing all accumulated sediment, scarifying and till the bottom area, remove and replace the stone media.

Landscape Area Inspection - 4 times per year

Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_

Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_

**Work Performed Repairs completed:**

Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_

Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_

Headwall and Riprap - 4 times per year

Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_

Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_

**Work Performed Repairs completed:**

Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_  
Date: \_\_\_\_\_

Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_  
Performed By: \_\_\_\_\_

## **APPENDIX J**

## In Compliance with DEP Storm-water Management Standard 10

### Panther Way – Senior Village Site

No Illicit discharges to the storm-water management system, including wastewater discharges and discharges of storm-water contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease are proposed and shall not be allowed.

The site map located in Appendix J shall be part of this Illicit Discharge Compliance Statement.

The owner, Panther Way 2019, LLC is the responsible party.

---

Name	Title
------	-------

## **APPENDIX K**

Last updated: July 29, 2024

# Rip Rap Calculator



I want to find the...

...

- average rock diameter ( $D_{50}$ )
- rip rap volume
- both  $D_{50}$  and rip rap volume

## ^ Rip rap specifications

Water velocity (v) <sup>1</sup>

...

5.57

ft/s  $\nabla$

Isbash constant (c)

...

Highly turbulent (0.86)

Low turbulence (1.2)

Gravitational acceleration (g)

...

32.17

ft/s<sup>2</sup>  $\nabla$

Specific gravity (s) <sup>1</sup>

...

2.75

Average rock diameter ( $D_{50}$ )

...

4.471

in  $\nabla$



Share result

Reload calculator

Clear all changes

Did we solve your problem today?

Yes

No

Last updated: July 29, 2024

# Rip Rap Calculator

Omni Calculator

I want to find the...

- average rock diameter ( $D_{50}$ )
- rip rap volume
- both  $D_{50}$  and rip rap volume

## Rip rap specifications

Water velocity ( $V$ ) i ...

8.74 ft/s v

Isbash constant ( $C$ ) ...

- Highly turbulent (0.86)
- Low turbulence (1.2)

Gravitational acceleration ( $g$ ) ...

32.17 ft/s<sup>2</sup> v

Specific gravity ( $S$ ) i ...

2.75

Average rock diameter ( $D_{50}$ ) ...

11.007 in v



Share result

Reload calculator

Clear all changes

Did we solve your problem today?

Yes

No

Last updated: July 29, 2024

# Rip Rap Calculator

I want to find the...

- average rock diameter ( $D_{50}$ )
- rip rap volume
- both  $D_{50}$  and rip rap volume

## ^ Rip rap specifications

Water velocity ( $V$ ) ⓘ ...

9.51 ft/s

Isbash constant ( $C$ ) ...

- Highly turbulent (0.86)
- Low turbulence (1.2)

Gravitational acceleration ( $g$ ) ...

32.17 ft/s<sup>2</sup>

Specific gravity ( $s$ ) ⓘ ...

2.75

Average rock diameter ( $D_{50}$ ) ...

13.032 in



Share result

Reload calculator

Clear all changes

Did we solve your problem today?

Yes

No

*Handwritten notes in red ink:*  
 $13.032 \text{ in} \approx 1.086 \text{ ft}$   
 $1.086 \text{ ft} \times 1.35 \approx 1.466 \text{ m}$

## APPENDIX L