Appendix C
Preliminary Hydrology Report

Michael Baker
INTERNATIONAL

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UNIVERSITY MEDICAL OFFICE PARK
PRELIMINARY HYDROLOGY REPORT
Palm Desert, California

December 7, 2022

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1 Introduction

Michael Baker International has been retained to prepare engineering design for a new commercial development known as University Medical Office Park in the City of Palm Desert, APNs 694-580-026 and -027. The proposed development includes two medical office buildings, a courtyard, and a surrounding parking lot with respective landscape, and requires a drainage report to show how storm water runoff from the 100-year storm event shall be handled on-site for proper storm water handling and safety to the public.

The project site is located in Palm Desert, California in the County of Riverside. The site lies between Gerald Ford Drive and College Drive, west of Technology Drive. Figure 1 shows the general vicinity of the project location.

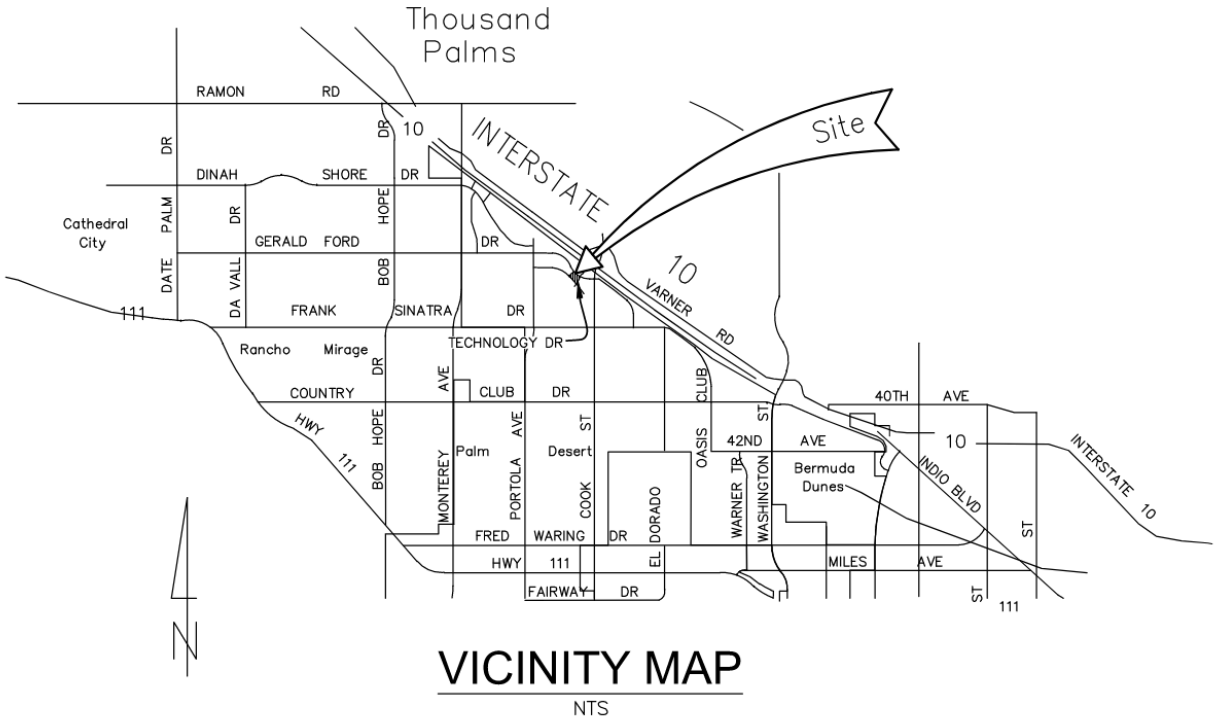


Figure 1: Vicinity Map

The objectives of this study include the following:

1. Develop a hydrology map which identifies drainage boundaries and subareas within the project site. Subarea boundaries are based on the proposed development drainage patterns, desired concentration points, and the existing topography.

2. Prepare an analysis of the proposed development hydrology based on the Riverside County Flood Control and Water Conservation District (RCFC&WCD) rational method for the 100-year storm events (Rational Method calculations to be provided in Final).

3. Perform catch basin sizing calculations to determine the sizes of inlets needed to provide required flood protection within the site (catch basin sizing provided in Final).

4. Determine proposed storm drain facility design with hydraulic calculations based on the proposed site plan and delineated drainage areas (hydraulics provided in Final).

5. Utilize the short cut synthetic hydrograph to perform retention basin sizing, basins shall be sized to contain the runoff resulting from the 100-year, 24-hour storm event and to evacuate the storm event within 48 hours.

The included calculations are prepared in accordance with the criteria and procedures described in the RCFC&WCD Hydrology Manual (April 1978). To comply with the Colorado River Basin Regional Water Quality Control Board for discretionary new developments and redevelopment projects a separate submittal will be made for the project-specific WQMP.

2 Hydrology

2.1 Project Condition Descriptions

Existing Condition

The approximately 10.5-acre site is on vacant land with poor land cover. The neighboring properties consist of undeveloped land and commercial developments. There are two existing retention basins on-site that collect runoff from the three adjacent streets in accordance with the City of Palm Desert North Sphere Drainage Master Plan (October 2007). In 2004, RBF Consulting prepared a Hydrology Study for University Park Internal Streets, which included a hydrologic analysis of College Drive, University Park Drive, Pacific Avenue, and Technology Drive. The study shows that the basins on the project site collect the runoff from about 10.9 acres. According to the report, the basin in the southern corner of the project site collects 4.46 acres of College Drive and the basin in the eastern corner collects 6.40 acres of Gerald Ford Drive and portions of College Drive and Technology Drive. The basin in the eastern corner also collects the on-site runoff. The Hydrology Study prepared by RBF Consulting is included in Appendix C of this report.

The site is generally flat, and slopes toward the east, in which site runoff sheet flows to the eastern retention basin. The site currently lies within a FEMA mapped flood plain Zone X, an

area determined to be outside the 0.2% annual chance floodplain and of minimal flood hazard; the FIRMette is provided in Appendix F.

Proposed Condition

The hydrology delineation is based on proposed site grading and aerial topography flown and compiled for the project; the proposed project area is approximately 10.5 acres. The proposed drainage pattern is similar to the existing in that majority of the site runoff flows easterly to the on-site retention areas. Site runoff sheet flows through the proposed parking lot and is intercepted by catch basins. Runoff from the buildings, the proposed courtyard area, and the respective landscape will use roof runoff controls and area drains to convey runoff to the retention areas; these systems will be defined and sized in Final.

Two underground chamber systems are proposed to replace the existing aboveground retention basin in the eastern corner. Basin B will be located under a portion of the eastern parking area and will collect on-site runoff and Basin C will be located under the north-eastern landscape area and collect offsite runoff. These two systems will prevent the commingling of stormwater from the public streets and private development, allowing effective stormwater quality monitoring. The Basin A, the southern retention basin, will remain aboveground and will be expanded to properly store the increase in runoff due to development, in addition to the existing capture of offsite runoff from the adjacent streets. New storm drain connections are proposed for the existing offsite catch basins to align with the proposed configurations of the retention areas. Drywells are included in this design to properly evacuate the runoff of the 100-year, 24-hour storm event. One drywell will be included in each basin. The drywell locations and specifications will be detailed in the final grading and utility plans.

The collection locations and basin sizes are carefully planned to proportionately collect and convey runoff for retention and eventual drawdown of the storm water volume generated from the site. The proposed on-site water quality basins are designed to retain 100% of the 100-year, 24-hour storm and infiltrate within 48 hours. Geotechnical tests will provide confirmation of timely infiltration in Final. Overflow is planned to ultimately flow east along Gerald Ford Drive and is based on underground storage top of stone, catch basin flow line, and building pad elevations; a detailed discussion of overflow for all three basins will be provided in final. Exhibit 1, the Proposed Condition Hydrology Map, clearly details the various subareas and collection systems to be employed.

2.2 Description of Analysis

The 10.5-acre project site consists of three sub-watershed areas; the runoff from the parking areas northeast and northwest will be conveyed to Basin B and the remainder of the site, including the proposed buildings, will be conveyed to the aboveground system, Basin A. A small portion of the parking lot, some of the proposed landscaped areas and two driveways along the perimeter of the site will flow towards the adjacent streets, Gerald Ford Drive and Technology

Drive, and will use the offsite catch basins to enter Basin C. Site runoff for these sub-watersheds will be determined based on rational method hydrology analysis in Final.

2.3 Rational Method

Hydrology calculations for the project conditions to determine 100-year discharges for the project drainage area will be performed per the RCFC&WCD Hydrology Manual guidelines. The guidelines suggest that watershed budgets for drainage areas encompassing less than one square mile be calculated using the rational method (RM). Detailed RM calculations for the 100-year storm event will be included in Appendix A.

The RM is an empirical computation procedure for developing a peak runoff rate for small watersheds for storms of a specified recurrence interval. The RM equation is based on the assumption that the peak flow is directly proportional to the drainage area, rainfall intensity, and a loss coefficient, which considers the effects of land use and soil type. The design discharges were computed generated a hydrologic "link-node" model that divides the area into sub-area, each tributary to a concentration point or hydrologic "node" point determined by the existing terrain or proposed site layout. A thorough technical description of the RM is provided in the RCFC&WCD Hydrology Manual.

The Antecedent Moisture Condition (AMC) can be defined as the relative wetness of a watershed just prior to a flood producing storm event and is expressed as the amount of rainfall occurring in a specific period of time prior to a major storm. The generalized definitions of AMC levels are:

AMC I: Lowest runoff potential. The watershed soils are dry enough to allow satisfactory grading or cultivation to take place.

AMC II: Moderate runoff potential, an intermediate condition.

AMC III: Highest runoff potential. The watershed is practically saturated from antecedent rains.

AMC II is applied for the 100-year storm event as outlined in the RCFC&WCD Hydrology Manual.

RCFC&WCD Hydrology Manual reference plates are included in Appendix G; deviations from the RCFC&WCD Hydrology Manual include the precipitation and soil data used. Precipitation data used in this study is taken from the NOAA Atlas 14 website at the project location and is included in Appendix F. See the next section for more information on soil data deviation.

2.3.1 Soil Conditions

The RCFC&WCD uses the SCS soils classification system, which categorizes soils into four hydrologic groups A, B, C and D with D being the least pervious, thus providing the highest runoff potential. Soil data from the USDA's Natural Resources Conservation Service Web Soil Survey is included in Appendix E, the project site drainage area consists of hydrologic soil type A.

2.3.2 Land Use

The developed site will consist of commercial land use. The commercial land use actual impervious cover range of 80 to 90 percent is provided on Plate E-6.3 of the RCFC&WCD Hydrology Manual. The proposed on-site impervious area is approximately 7.10 acres, resulting in about 68% of impervious cover and 32% pervious cover. Upon incorporating offsite flows using a 90% impervious value, the tributary area of Basin A is 80.5% impervious and 75.1% impervious for Basin C. Basin B does not collect any offsite runoff and its tributary area is 83.7% impervious. The difference of the pre and post land use development condition results in impacts to the existing drainage systems, in which approximately 33% of the total area attributed to the retention systems will be converted to impervious cover from the pervious, undeveloped condition.

2.4 Catch Basins

Each on-site catch basin will be sized appropriately to collect its tributary flows, inlet sizing calculations will be performed in Final.

3 Hydraulics

Hydraulic calculations for the proposed pipe systems will be performed and provided in Final using the Los Angeles County Flood Control District Water Surface Pressure Gradient (WSPGW – CivilDesign) design software. WSPGW computes and plots uniform and non-uniform steady flow water surface profiles and pressure gradients in open channels or closed conduits with irregular or regular sections. The computation procedure is based on solving Bernoulli's equation for the total energy between two sections in a reach.

3.1 Proposed Improvements

The proposed facilities constitute of multiple storm drain lines that convey runoff. The three off-site catch basins will require new storm drain connections to the on-site retention systems due to the replacement of the northern basin with underground chambers and the expansion

of the southern, aboveground basin. A complete layout of the proposed improvements can be seen on Exhibit 1, the Proposed Condition Hydrology Map.

3.2 Flood Attention

There are no anticipated negative downstream or upstream impacts from this development, therefore, no on-site flood attention is needed for this project.

4 Water Quality Treatment Measures

4.1 Water Quality Basins

Low Impact Development (LID) is implemented for this project site and is in accordance with the Riverside County Design Handbook for Low Impact Development Best Management Practices. The project is required to retain 100% of the 100-year, 24-hour storm event on-site per the City of Palm Desert retention requirements. A spreadsheet based on the short cut synthetic hydrograph method approach as prescribed by the RCFC&WCD Hydrology Manual has been utilized to perform the calculations and is found in Appendix C, a summary is provided below.

4.1.1 Proposed Condition Flood Routing

Basin storage capacity is modeled based on the "truncated pyramid" formula, a more conservative estimate than "average end areas" sometimes used. Percolation is taken incrementally, and the proposed drywells are incorporated in the analysis. Rainfall input data for the 100-year, 24-hour storm is input per said Hydrology Manual using the aforementioned NOAA Atlas 14 point precipitation frequency estimates. Basin inflow is modeled in 15-minute intervals for the 24-hour storm, based on the design storm unit hydrographs presented in the RCFC&WCD Hydrology Manual.

Basin ID:	A
Depth:	5 feet + 1 foot of freeboard
Area at Top of Basin:	12,240.3 SF
Max Storage:	41,162.14 CF
Total Flow Volume:	54,681.65 CF
100-Year, 24-Hour Water Surface Elevation:	171.9 ft
Basin ID:	B
Depth:	6.00 feet

Area at Top of Basin:	6000.15 SF
Max Storage:	20,327.43 CF
Total Flow Volume:	30,597.87 CF

Basin ID:	C
Depth:	8.50 feet
Area at Top of Basin:	6552 SF
Max Storage:	33,202 CF
Total Flow Volume:	45,245.25 CF

The maximum side slope of the aboveground basin is 3:1 in order to accommodate the site plan due to the large volume of offsite run-on. The aboveground basin meets the requirement for 1 foot minimum of freeboard. No percolation tests have been performed yet for this project, results of geotechnical analysis will be included in Appendix D.

The basin depth shown on the unit hydrograph calculations for the underground basins are not representative of the actual depth since pore space has to be incorporated into the design. The depth is adjusted so that the unit hydrographs use the actual storage provided by the systems, and still account for appropriate infiltration based on the area.

4.1.2 Drawdown Time Determination

Drawdown time is the amount of time the design volume takes to pass through the effective storage area of the retention basin. Per the City of Palm Desert requirement, the drawdown time must not exceed 48 hours in order to implement proper vector control and prevent other nuisance issues. The drawdown times for the proposed basins are analyzed using an infiltration rate of 2 in/hr due to the use of drywells that allow for even greater infiltration.

A factor of safety of 3 will be applied to the determined infiltration rate. The anticipated design infiltrate rate of 2 in/hr is applied to the total dead storage volume and results in a drawdown time of approximately 33, 12, and 22 hours for Basins A, B, and C, respectively, which all fall within the 48-hour maximum; the drawdown time calculations are included in Appendix C.

5 Conclusion

The methodologies used in this study are in compliance with the City of Palm Desert and RCFC&WCD criteria. The proposed retention basin systems will retain 100% of the 100-year, 24-hour storm event. Based on the provided design calculations, the proposed drainage system will capture sufficient on-site and offsite runoff to prevent significant flooding during the 100-year storm event. There are no anticipated negative upstream or downstream impacts.

6 References

1. Riverside County Flood Control and Water Conservation District Hydrology Manual, RCFC&WCD April 1978.
2. Design Handbook for Low Impact Development Best Management Practices, RCFC&WCD September 2011.
3. Riverside County Whitewater River Region Stormwater Quality Best Management Practice Design Handbook for Low Impact Development, RCFC&WCD June 2014.
4. Hydrology Study University Park Internal Streets, RBF Consulting November 2004.
5. City of Palm Desert North Sphere Drainage Master Plan, VA Consulting, Inc. October 2007.

In the City of Palm Desert, County of Riverside, State of California

UNIVERSITY MEDICAL OFFICE PARK

PRELIMINARY HYDROLOGY MAP

PROPOSED CONDITION

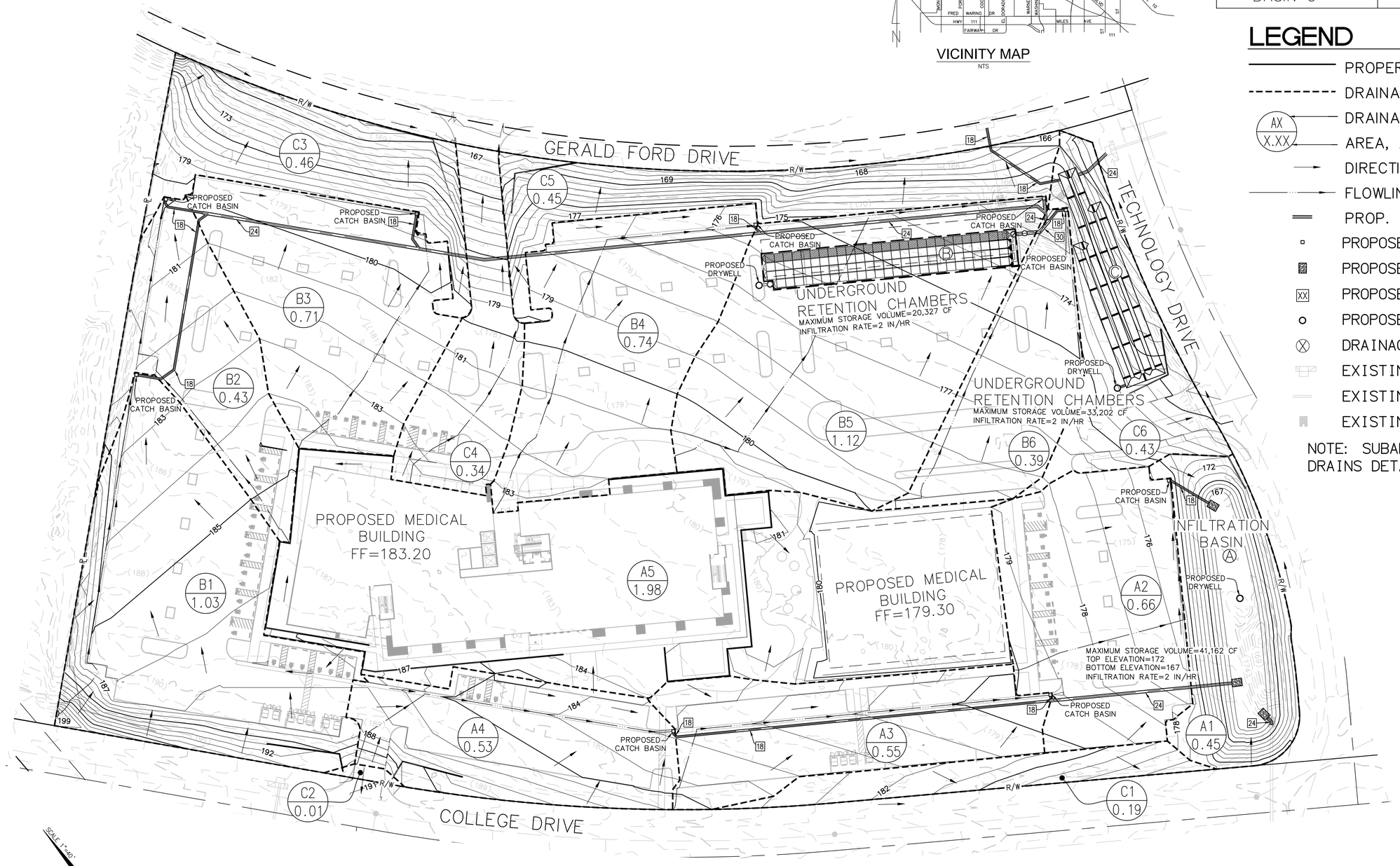
VICINITY MAP
NTS

LAND USE OF DRAINAGE SUBAREAS		
DRAINAGE BASIN	% PERVIOUS	% IMPERVIOUS
BASIN A	19.54	80.46
BASIN B	16.30	83.70
BASIN C	24.86	75.14

LEGEND

- PROPERTY LINE
- DRAINAGE AREA BOUNDARY
- AX / X.XX — DRAINAGE MANAGEMENT SUBAREA, AREA, AC
- DIRECTION OF FLOW
- FLOWLINE
- PROP. STORM DRAIN LINE
- PROPOSED CATCH BASIN
- PROPOSED ENERGY DISSAPATOR
- XX — PROPOSED STORM DRAIN SIZE - IN.
- PROPOSED DRYWELL
- DRAINAGE BASIN
- EXISTING PUBLIC CATCH BASIN IN STREET
- EXISTING STORM DRAIN
- EXISTING STORM DRAIN OUTLET

NOTE: SUBAREA A5 WILL HAVE ROOF AND AREA DRAINS DETAILED IN FINAL ENGINEERING.



SCALE 1"=40'

40 20 0 40 80 120
SCALE: 1"=40'

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CITY OF PALM DESERT
UNIVERSITY MEDICAL OFFICE PARK
PRELIMINARY HYDROLOGY MAP

SHEET 1
OF SHEETS 1
CITY FILE NUMBER

REVISED: 12/07/2022

H:\PDATA\190641\CADD\STORMWATER\HYDRO\190641 HYDROLOGY MAP.DWG GRACIANO, CARMEN 12/7/2022 4:05 PM

APPENDIX A

RATIONAL METHOD CALCULATIONS - 100-YEAR STORM EVENT
(TO BE INCLUDED IN FINAL)

APPENDIX B

STORM DRAIN SIZING
(TO BE INCLUDED IN FINAL)

APPENDIX C

RETENTION BASIN SIZING

APPENDIX C.1

SHORT CUT SYNTHETIC HYDROGRAPH CALCULATIONS

HYDROLOGY CALCULATIONS - UNIVERSITY PARK
Using the RCFC&WCD Short Cut Unit Hydrograph Method

Area Designations	**Proposed Conditions*-Basin A (College & Tech)**				*receiving runoff from south half of College Dr. from northwestern University Park/College intersection to southwestern University Park/College intersection AND 4.17 acres of on-site development.
Drainage Area (ac.)	**8.6300**				
Unit time (minutes)	**5**	**5**	**5**	**15**	
100 Year Storm Duration (hrs)	1	3	6	24	
Total Precipitation (Plates D-4.4,E-5.2, 5.4, 5.6)(in.)	**1.53**	**2.21**	**2.89**	**4.49**	Or data from NOAA interactive website
Soils Group	A				
AMC index II Runoff Number (plate E-6.1)	32				
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	0.74	(AMC II)			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)		**80.46**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.20	(used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	90				
Retention Basin Percolation Rate (in/hr)	**2**	(also used for drywell percolation rate)			

Percolation is taken incrementally.
Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used
(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)
Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))
The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell can be zeroed out by entering .001 for values

Drywell design factors **Upper sec. (ft.)=** **5** **Lower sec. (ft.)=** **15** **Ring diam. (ft.) =** **4** **Drywell lower max. (cf)=** **298.45** **Upper max.(cf)=** **62.83**
Gravel bed width around drwyell= **1** **Drywell total(cf)=** **361.28**

Ret. Basin design (area, depth) **Top =** **12240.3** s.f. **Bot. =** **4795.5** **s.f.** **Max. Depth (d)=** **5** **Max. storage=** **41162.14** (d/3)*(bottom+top+(bottom*top)^0.50)
Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol*3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**
Outside input from: **N/A**

1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr	Loss Rate Max.	Min.	Value	Effective Rain (in/hr	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft	Overflow Vol. (cf)	Overflow Rate (cfs)	
0:05	3.7	0.6793	0.2041		N/A	0.4752	4.1350	1240.50	0.00	30.89	0.43	361.28	20.00	878.79	4795.50	66.60	812.19	0.10	0.00	0.00	
0:10	4.8	0.8813	0.2041		N/A	0.6771	5.8924	1767.73	0.00	286.14	3.97	361.28	20.00	1763.76	4942.40	68.64	2507.30	0.30	0.00	0.00	
0:15	5.1	0.9364	0.2041		N/A	0.7322	6.3717	1911.52	0.00	286.14	3.97	361.28	20.00	1907.55	5248.98	72.90	4341.95	0.53	0.00	0.00	
0:20	4.9	0.8996	0.2041		N/A	0.6955	6.0522	1815.66	0.00	286.14	3.97	361.28	20.00	1811.69	5580.81	77.51	6076.13	0.74	0.00	0.00	
0:25	6.6	1.2118	0.2041		N/A	1.0076	8.7683	2630.48	0.00	286.14	3.97	361.28	20.00	2626.50	5894.46	81.87	8620.77	1.05	0.00	0.00	
0:30	7.3	1.3403	0.2041		N/A	1.1361	9.8866	2965.99	0.00	286.14	3.97	361.28	20.00	2962.01	6354.70	88.26	11494.52	1.40	0.00	0.00	
0:35	8.4	1.5422	0.2041		N/A	1.3381	11.6441	3493.22	0.00	286.14	3.97	361.28	20.00	3489.25	6874.46	95.48	14888.29	1.81	0.00	0.00	
0:40	9	1.6524	0.2041		N/A	1.4483	12.6027	3780.80	0.00	286.14	3.97	361.28	20.00	3776.83	7488.27	104.00	18561.11	2.25	0.00	0.00	
0:45	12.3	2.2583	0.2041		N/A	2.0541	17.8750	5362.50	0.00	286.14	3.97	361.28	20.00	5358.52	8152.56	113.23	23806.40	2.89	0.00	0.00	
0:50	17.6	3.2314	0.2041		N/A	**3.0272**	**26.3426**	**7902.79**	0.00	286.14	3.97	361.28	20.00	7898.82	9101.25	126.41	31578.82	3.84	0.00	0.00	**PEAK**
0:55	16.1	2.9560	0.2041		N/A	2.7518	23.9461	7183.84	0.00	286.14	3.97	361.28	20.00	7179.87	10507.01	145.93	38612.75	4.69	0.00	0.00	
1:00	4.2	0.7711	0.2041		N/A	0.5670	4.9338	1480.15	0.00	286.14	3.97	361.28	20.00	1476.18	11779.20	163.60	39925.33	4.85	0.00	0.00	
	0	0.0000	0.2041		0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	357.31	19.68	0.00	12016.60	166.90	39758.43	4.83	0.00	0.00	
	0	0.0000	0.2041		0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	353.33	19.37	0.00	11986.42	166.48	39591.96	4.81	0.00	0.00	
1:15	0	0.0000	0.2041		0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	349.36	19.05	0.00	11956.31	166.06	39425.90	4.79	0.00	0.00	
						Total volume (cf)		**41535.20**								**Total Overflow (cf)**			**0.00**		

3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr	Loss Rate Max.	Value Min.		Effective Rain (in/hr	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft	Overflow Vol. (cf)	Overflow Rate (cfs)	
0:05	1.3	0.34	0.20	N/A		0.1406	1.2237	367.11	0.00	30.89	0.43	361.28	20.00	5.40	4795.50	5.40	0.00	0.00	0.00	0.00	
0:10	1.3	0.34	0.20	N/A		0.1406	1.2237	367.11	0.00	286.14	3.97	361.28	20.00	363.13	4795.50	66.60	296.53	0.04	0.00	0.00	
0:15	1.1	0.29	0.20	N/A		0.0876	0.7621	228.64	0.00	286.14	3.97	361.28	20.00	224.67	4849.13	67.35	453.85	0.06	0.00	0.00	
0:20	1.5	0.40	0.20	N/A		0.1937	1.6852	505.57	0.00	286.14	3.97	361.28	20.00	501.60	4877.59	67.74	887.71	0.11	0.00	0.00	
0:25	1.5	0.40	0.20	N/A		0.1937	1.6852	505.57	0.00	286.14	3.97	361.28	20.00	501.60	4956.06	68.83	1320.47	0.16	0.00	0.00	
0:30	1.8	0.48	0.20	N/A		0.2732	2.3776	713.27	0.00	286.14	3.97	361.28	20.00	709.30	5034.33	69.92	1959.85	0.24	0.00	0.00	
0:35	1.5	0.40	0.20	N/A		0.1937	1.6852	505.57	0.00	286.14	3.97	361.28	20.00	501.60	5149.97	71.53	2389.92	0.29	0.00	0.00	
0:40	1.8	0.48	0.20	N/A		0.2732	2.3776	713.27	0.00	286.14	3.97	361.28	20.00	709.30	5227.75	72.61	3026.61	0.37	0.00	0.00	
0:45	1.8	0.48	0.20	N/A		0.2732	2.3776	713.27	0.00	286.14	3.97	361.28	20.00	709.30	5342.91	74.21	3661.70	0.44	0.00	0.00	
0:50	1.5	0.40	0.20	N/A		0.1937	1.6852	505.57	0.00	286.14	3.97	361.28	20.00	501.60	5457.77	75.80	4087.49	0.50	0.00	0.00	
0:55	1.6	0.42	0.20	N/A		0.2202	1.9160	574.81	0.00	286.14	3.97	361.28	20.00	570.83	5534.79	76.87	4581.45	0.56	0.00	0.00	
1:00	1.8	0.48	0.20	N/A		0.2732	2.3776	713.27	0.00	286.14	3.97	361.28	20.00	709.30	5624.13	78.11	5212.64	0.63	0.00	0.00	
1:05	2.2	0.58	0.20	N/A		0.3793	3.3007	990.20	0.00	286.14	3.97	361.28	20.00	986.23	5738.28	79.70	6119.16	0.74	0.00	0.00	
1:10	2.2	0.58	0.20	N/A		0.3793	3.3007	990.20	0.00	286.14	3.97	361.28	20.00	986.23	5902.24	81.98	7023.41	0.85	0.00	0.00	
1:15	2.2	0.58	0.20	N/A		0.3793	3.3007	990.20	0.00	286.14	3.97	361.28	20.00	986.23	6065.79	84.25	7925.39	0.96	0.00	0.00	
1:20	2	0.53	0.20	N/A		0.3263	2.8391	851.74	0.00	286.14	3.97	361.28	20.00	847.76	6228.93	86.51	8686.64	1.06	0.00	0.00	
1:25	2.6	0.69	0.20	N/A		0.4854	4.2238	1267.13	0.00	286.14	3.97	361.28	20.00	1263.16	6366.61	88.43	9861.37	1.20	0.00	0.00	
1:30	2.7	0.72	0.20	N/A		0.5119	4.4545	1336.36	0.00	286.14	3.97	361.28	20.00	1332.39	6579.08	91.38	11102.39	1.35	0.00	0.00	
1:35	2.4	0.64	0.20	N/A		0.4323	3.7622	1128.67	0.00	286.14	3.97	361.28	20.00	1124.69	6803.54	94.49	12132.58	1.47	0.00	0.00	
1:40	2.7	0.72	0.20	N/A		0.5119	4.4545	1336.36	0.00	286.14	3.97	361.28	20.00	1332.39	6989.86	97.08	13367.89	1.62	0.00	0.00	
1:45	3.3	0.88	0.20	N/A		0.6710	5.8392	1751.76	0.00	286.14	3.97	361.28	20.00	1747.78	7213.29	100.18	15015.49	1.82	0.00	0.00	
1:50	3.1	0.82	0.20	N/A		0.6180	5.3776	1613.29	0.00	286.14	3.97	361.28	20.00	1609.32	7511.28	104.32	16520.48	2.01	0.00	0.00	
1:55	2.9	0.77	0.20	N/A		0.5649	4.9161	1474.83	0.00	286.14	3.97	361.28	20.00	1470.85	7783.48	108.10	17883.23	2.17	0.00	0.00	
2:00	3	0.80	0.20	N/A		0.5915	5.1469	1544.06	0.00	286.14	3.97	361.28	20.00	1540.09	8029.95	111.53	19311.79	2.35	0.00	0.00	
2:05	3.1	0.82	0.20	N/A		0.6180	5.3776	1613.29	0.00	286.14	3.97	361.28	20.00	1609.32	8288.33	115.12	20805.99	2.53	0.00	0.00	
2:10	4.2	1.11	0.20	N/A		0.9097	7.9162	2374.85	0.00	286.14	3.97	361.28	20.00	2370.88	8558.58	118.87	23058.00	2.80	0.00	0.00	
2:15	5	1.33	0.20	N/A		1.1219	9.7624	2928.71	0.00	286.14	3.97	361.28	20.00	2924.73	8965.89	124.53	25858.21	3.14	0.00	0.00	
2:20	3.5	0.93	0.20	N/A		0.7241	6.3007	1890.22	0.00	286.14	3.97	361.28	20.00	1886.25	9472.35	131.56	27612.90	3.35	0.00	0.00	
2:25	6.8	1.80	0.20	N/A		1.5992	13.9163	4174.89	0.00	286.14	3.97	361.28	20.00	4170.92	9789.71	135.97	31647.85	3.84	0.00	0.00	
2:30	7.3	1.94	0.20	N/A		1.7318	15.0702	4521.06	0.00	286.14	3.97	361.28	20.00	4517.08	10519.49	146.10	36018.82	4.38	0.00	0.00	
2:35	8.2	2.17	0.20	N/A		**1.9705**	**17.1472**	**5144.15**	0.00	286.14	3.97	361.28	20.00	5140.17	11310.05	157.08	41001.91	4.98	0.00	0.00	
2:40	5.9	1.56	0.20	N/A		1.3605	11.8393	3551.80	0.00	286.14	3.97	361.28	20.00	3547.83	12211.32	169.60	41162.14	5.00	3218.00	10.73	**PEAK**
2:45	2	0.53	0.20	N/A		0.3263	2.8391	851.74	0.00	286.14	3.97	361.28	20.00	847.76	12240.30	170.00	41162.14	5.00	677.76	2.26	
2:50	1.8	0.48	0.20	N/A		0.2732	2.3776	713.27	0.00	286.14	3.97	361.28	20.00	709.30	12240.30	170.00	41162.14	5.00	539.29	1.80	
2:55	1.8	0.48	0.20	N/A		0.2732	2.3776	713.27	0.00	286.14	3.97	361.28	20.00	709.30	12240.30	170.00	41162.14	5.00	539.29	1.80	
3:00	0.6	0.16	0.20	0.14		0.0159	0.1385	41.54	0.00	286.14	3.97	361.28	20.00	37.57	12240.30	170.00	41029.70	4.98	0.00	0.00	
	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	357.31	19.68	0.00	12216.35	169.67	40860.03	4.96	0.00	0.00	
	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	353.33	19.37	0.00	12185.66	169.25	40690.79	4.94	0.00	0.00	
3:15	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	349.36	19.05	0.00	12155.05	168.82	40521.97	4.92	0.00	0.00	
	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	345.38	18.73	0.00	12124.51	168.40	40353.57	4.90	0.00	0.00	
	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	341.41	18.42	0.00	12094.06	167.97	40185.60	4.88	0.00	0.00	
3:30	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	337.44	18.10	0.00	12063.68	167.55	40018.05	4.86	0.00	0.00	
	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	333.46	17.79	0.00	12033.37	167.13	39850.92	4.84	0.00	0.00	
	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	329.49	17.47	0.00	12003.14	166.71	39684.21	4.82	0.00	0.00	
						Total volume (cf)		**50206.63**								**Total Overflow (cf)**			**4974.34**		

6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr	Loss Rate Value Max.	Min.	Effective Rain (in/hr	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft	Overflow Vol. (cf)	Overflow Rate (cfs)
0:05	0.5	0.17	0.20	0.16	0.0173	0.1509	45.27	0.00	30.89	0.43	44.84	2.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:10	0.6	0.21	0.20	0.19	0.0208	0.1811	54.32	0.00	69.24	0.96	98.20	4.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:15	0.6	0.21	0.20	0.19	0.0208	0.1811	54.32	0.00	114.88	1.60	150.92	7.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:20	0.6	0.21	0.20	0.19	0.0208	0.1811	54.32	0.00	159.97	2.22	203.02	10.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:25	0.6	0.21	0.20	0.19	0.0208	0.1811	54.32	0.00	204.53	2.84	254.50	12.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:30	0.7	0.24	0.20	N/A	0.0386	0.3361	100.83	0.00	248.56	3.45	361.28	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:35	0.7	0.24	0.20	N/A	0.0386	0.3361	100.83	0.00	286.14	3.97	361.28	20.00	96.86	4795.50	66.60	30.25	0.00	0.00	0.00
0:40	0.7	0.24	0.20	N/A	0.0386	0.3361	100.83	0.00	286.14	3.97	361.28	20.00	96.86	4800.97	66.68	60.43	0.01	0.00	0.00
0:45	0.7	0.24	0.20	N/A	0.0386	0.3361	100.83	0.00	286.14	3.97	361.28	20.00	96.86	4806.43	66.76	90.53	0.01	0.00	0.00
0:50	0.7	0.24	0.20	N/A	0.0386	0.3361	100.83	0.00	286.14	3.97	361.28	20.00	96.86	4811.87	66.83	120.55	0.01	0.00	0.00
0:55	0.7	0.24	0.20	N/A	0.0386	0.3361	100.83	0.00	286.14	3.97	361.28	20.00	96.86	4817.30	66.91	150.50	0.02	0.00	0.00
1:00	0.8	0.28	0.20	N/A	0.0733	0.6379	191.36	0.00	286.14	3.97	361.28	20.00	187.39	4822.72	66.98	270.91	0.03	0.00	0.00
1:05	0.8	0.28	0.20	N/A	0.0733	0.6379	191.36	0.00	286.14	3.97	361.28	20.00	187.39	4844.50	67.28	391.01	0.05	0.00	0.00
1:10	0.8	0.28	0.20	N/A	0.0733	0.6379	191.36	0.00	286.14	3.97	361.28	20.00	187.39	4866.22	67.59	510.82	0.06	0.00	0.00
1:15	0.8	0.28	0.20	N/A	0.0733	0.6379	191.36	0.00	286.14	3.97	361.28	20.00	187.39	4887.89	67.89	630.32	0.08	0.00	0.00
1:20	0.8	0.28	0.20	N/A	0.0733	0.6379	191.36	0.00	286.14	3.97	361.28	20.00	187.39	4909.50	68.19	749.52	0.09	0.00	0.00
1:25	0.8	0.28	0.20	N/A	0.0733	0.6379	191.36	0.00	286.14	3.97	361.28	20.00	187.39	4931.06	68.49	868.43	0.11	0.00	0.00
1:30	0.8	0.28	0.20	N/A	0.0733	0.6379	191.36	0.00	286.14	3.97	361.28	20.00	187.39	4952.57	68.79	987.03	0.12	0.00	0.00
1:35	0.8	0.28	0.20	N/A	0.0733	0.6379	191.36	0.00	286.14	3.97	361.28	20.00	187.39	4974.02	69.08	1105.34	0.13	0.00	0.00
1:40	0.8	0.28	0.20	N/A	0.0733	0.6379	191.36	0.00	286.14	3.97	361.28	20.00	187.39	4995.42	69.38	1223.35	0.15	0.00	0.00
1:45	0.8	0.28	0.20	N/A	0.0733	0.6379	191.36	0.00	286.14	3.97	361.28	20.00	187.39	5016.76	69.68	1341.06	0.16	0.00	0.00
1:50	0.8	0.28	0.20	N/A	0.0733	0.6379	191.36	0.00	286.14	3.97	361.28	20.00	187.39	5038.05	69.97	1458.48	0.18	0.00	0.00
1:55	0.8	0.28	0.20	N/A	0.0733	0.6379	191.36	0.00	286.14	3.97	361.28	20.00	187.39	5059.29	70.27	1575.60	0.19	0.00	0.00
2:00	0.9	0.31	0.20	N/A	0.1080	0.9397	281.90	0.00	286.14	3.97	361.28	20.00	277.93	5080.47	70.56	1782.96	0.22	0.00	0.00
2:05	0.8	0.28	0.20	N/A	0.0733	0.6379	191.36	0.00	286.14	3.97	361.28	20.00	187.39	5117.98	71.08	1899.27	0.23	0.00	0.00
2:10	0.9	0.31	0.20	N/A	0.1080	0.9397	281.90	0.00	286.14	3.97	361.28	20.00	277.93	5139.01	71.38	2105.82	0.26	0.00	0.00
2:15	0.9	0.31	0.20	N/A	0.1080	0.9397	281.90	0.00	286.14	3.97	361.28	20.00	277.93	5176.37	71.89	2311.85	0.28	0.00	0.00
2:20	0.9	0.31	0.20	N/A	0.1080	0.9397	281.90	0.00	286.14	3.97	361.28	20.00	277.93	5213.63	72.41	2517.36	0.31	0.00	0.00
2:25	0.9	0.31	0.20	N/A	0.1080	0.9397	281.90	0.00	286.14	3.97	361.28	20.00	277.93	5250.80	72.93	2722.36	0.33	0.00	0.00
2:30	0.9	0.31	0.20	N/A	0.1080	0.9397	281.90	0.00	286.14	3.97	361.28	20.00	277.93	5287.88	73.44	2926.84	0.36	0.00	0.00
2:35	0.9	0.31	0.20	N/A	0.1080	0.9397	281.90	0.00	286.14	3.97	361.28	20.00	277.93	5324.86	73.96	3130.81	0.38	0.00	0.00
2:40	0.9	0.31	0.20	N/A	0.1080	0.9397	281.90	0.00	286.14	3.97	361.28	20.00	277.93	5361.76	74.47	3334.27	0.41	0.00	0.00
2:45	1	0.35	0.20	N/A	0.1427	1.2414	372.43	0.00	286.14	3.97	361.28	20.00	368.46	5398.55	74.98	3627.75	0.44	0.00	0.00
2:50	1	0.35	0.20	N/A	0.1427	1.2414	372.43	0.00	286.14	3.97	361.28	20.00	368.46	5451.63	75.72	3920.49	0.48	0.00	0.00
2:55	1	0.35	0.20	N/A	0.1427	1.2414	372.43	0.00	286.14	3.97	361.28	20.00	368.46	5504.58	76.45	4212.50	0.51	0.00	0.00
3:00	1	0.35	0.20	N/A	0.1427	1.2414	372.43	0.00	286.14	3.97	361.28	20.00	368.46	5557.39	77.19	4503.77	0.55	0.00	0.00
3:05	1	0.35	0.20	N/A	0.1427	1.2414	372.43	0.00	286.14	3.97	361.28	20.00	368.46	5610.08	77.92	4794.31	0.58	0.00	0.00
3:10	1.1	0.38	0.20	N/A	0.1773	1.5432	462.97	0.00	286.14	3.97	361.28	20.00	458.99	5662.62	78.65	5174.66	0.63	0.00	0.00
3:15	1.1	0.38	0.20	N/A	0.1773	1.5432	462.97	0.00	286.14	3.97	361.28	20.00	458.99	5731.42	79.60	5554.05	0.67	0.00	0.00
3:20	1.1	0.38	0.20	N/A	0.1773	1.5432	462.97	0.00	286.14	3.97	361.28	20.00	458.99	5800.04	80.56	5932.49	0.72	0.00	0.00
3:25	1.2	0.42	0.20	N/A	0.2120	1.8450	553.50	0.00	286.14	3.97	361.28	20.00	549.53	5868.48	81.51	6400.51	0.78	0.00	0.00
3:30	1.3	0.45	0.20	N/A	0.2467	2.1468	644.04	0.00	286.14	3.97	361.28	20.00	640.06	5953.13	82.68	6957.90	0.85	0.00	0.00
3:35	1.4	0.49	0.20	N/A	0.2814	2.4486	734.57	0.00	286.14	3.97	361.28	20.00	730.60	6053.94	84.08	7604.41	0.92	0.00	0.00
3:40	1.4	0.49	0.20	N/A	0.2814	2.4486	734.57	0.00	286.14	3.97	361.28	20.00	730.60	6170.87	85.71	8249.30	1.00	0.00	0.00
3:45	1.5	0.52	0.20	N/A	0.3161	2.7504	825.11	0.00	286.14	3.97	361.28	20.00	821.13	6287.51	87.33	8983.11	1.09	0.00	0.00
3:50	1.5	0.52	0.20	N/A	0.3161	2.7504	825.11	0.00	286.14	3.97	361.28	20.00	821.13	6420.23	89.17	9715.08	1.18	0.00	0.00
3:55	1.6	0.55	0.20	N/A	0.3507	3.0521	915.64	0.00	286.14	3.97	361.28	20.00	911.67	6552.62	91.01	10535.73	1.28	0.00	0.00
4:00	1.6	0.55	0.20	N/A	0.3507	3.0521	915.64	0.00	286.14	3.97	361.28	20.00	911.67	6701.05	93.07	11354.33	1.38	0.00	0.00
4:05	1.7	0.59	0.20	N/A	0.3854	3.3539	1006.18	0.00	286.14	3.97	361.28	20.00	1002.20	6849.10	95.13	12261.41	1.49	0.00	0.00
4:10	1.8	0.62	0.20	N/A	0.4201	3.6557	1096.71	0.00	286.14	3.97	361.28	20.00	1092.74	7013.16	97.41	13256.74	1.61	0.00	0.00

4:15	1.9	0.66	0.20	N/A		0.4548	3.9575	1187.25	0.00	286.14	3.97	361.28	20.00	1183.27	7193.18	99.91	14340.11	1.74	0.00	0.00	
4:20	2	0.69	0.20	N/A		0.4895	4.2593	1277.78	0.00	286.14	3.97	361.28	20.00	1273.81	7389.13	102.63	15511.29	1.88	0.00	0.00	
4:25	2.1	0.73	0.20	N/A		0.5241	4.5611	1368.32	0.00	286.14	3.97	361.28	20.00	1364.34	7600.95	105.57	16770.06	2.04	0.00	0.00	
4:30	2.1	0.73	0.20	N/A		0.5241	4.5611	1368.32	0.00	286.14	3.97	361.28	20.00	1364.34	7828.62	108.73	18025.67	2.19	0.00	0.00	
4:35	2.2	0.76	0.20	N/A		0.5588	4.8628	1458.85	0.00	286.14	3.97	361.28	20.00	1454.88	8055.72	111.88	19368.67	2.35	0.00	0.00	
4:40	2.3	0.80	0.20	N/A		0.5935	5.1646	1549.39	0.00	286.14	3.97	361.28	20.00	1545.41	8298.62	115.26	20798.82	2.53	0.00	0.00	
4:45	2.4	0.83	0.20	N/A		0.6282	5.4664	1639.92	0.00	286.14	3.97	361.28	20.00	1635.95	8557.28	118.85	22315.91	2.71	0.00	0.00	
4:50	2.4	0.83	0.20	N/A		0.6282	5.4664	1639.92	0.00	286.14	3.97	361.28	20.00	1635.95	8831.67	122.66	23829.20	2.89	0.00	0.00	
4:55	2.5	0.87	0.20	N/A		0.6629	5.7682	1730.46	0.00	286.14	3.97	361.28	20.00	1726.48	9105.37	126.46	25429.22	3.09	0.00	0.00	
5:00	2.6	0.90	0.20	N/A		0.6975	6.0700	1820.99	0.00	286.14	3.97	361.28	20.00	1817.02	9394.76	130.48	27115.75	3.29	0.00	0.00	
5:05	3.1	1.08	0.20	N/A		0.8709	7.5789	2273.66	0.00	286.14	3.97	361.28	20.00	2269.69	9699.80	134.72	29250.72	3.55	0.00	0.00	
5:10	3.6	1.25	0.20	N/A		1.0443	9.0878	2726.34	0.00	286.14	3.97	361.28	20.00	2722.36	10085.94	140.08	31833.00	3.87	0.00	0.00	
5:15	3.9	1.35	0.20	N/A		1.1484	9.9931	2997.94	0.00	286.14	3.97	361.28	20.00	2993.97	10552.98	146.57	34680.40	4.21	0.00	0.00	
5:20	4.2	1.46	0.20	N/A		1.2524	10.8985	3269.55	0.00	286.14	3.97	361.28	20.00	3265.57	11067.98	153.72	37792.25	4.59	0.00	0.00	
5:25	4.7	1.63	0.20	N/A		1.4258	12.4074	3722.22	0.00	286.14	3.97	361.28	20.00	3718.25	11630.80	161.54	41162.14	5.00	186.81	0.62	
5:30	5.6	1.94	0.20	N/A		**1.7379**	**15.1234**	**4537.03**	0.00	286.14	3.97	361.28	20.00	4533.06	12240.30	170.00	41162.14	5.00	4363.05	14.54	**PEAK**
5:35	1.9	0.66	0.20	N/A		0.4548	3.9575	1187.25	0.00	286.14	3.97	361.28	20.00	1183.27	12240.30	170.00	41162.14	5.00	1013.27	3.38	
5:40	0.9	0.31	0.20	N/A		0.1080	0.9397	281.90	0.00	286.14	3.97	361.28	20.00	277.93	12240.30	170.00	41162.14	5.00	107.92	0.36	
5:45	0.6	0.21	0.20	0.19		0.0208	0.1811	54.32	0.00	286.14	3.97	361.28	20.00	50.35	12240.30	170.00	41042.48	4.99	0.00	0.00	
5:50	0.5	0.17	0.20	0.16		0.0173	0.1509	45.27	0.00	286.14	3.97	361.28	20.00	41.29	12218.66	169.70	40914.07	4.97	0.00	0.00	
5:55	0.3	0.10	0.20	0.09		0.0104	0.0905	27.16	0.00	286.14	3.97	361.28	20.00	23.19	12195.43	169.38	40767.88	4.95	0.00	0.00	
6:00	0.2	0.07	0.20	0.06		0.0069	0.0604	18.11	0.00	286.14	3.97	361.28	20.00	14.13	12168.99	169.01	40613.00	4.93	0.00	0.00	
	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	357.31	19.68	0.00	12140.98	168.62	40444.37	4.91	0.00	0.00	
	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	353.33	19.37	0.00	12110.48	168.20	40276.17	4.89	0.00	0.00	
6:15	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	349.36	19.05	0.00	12080.06	167.78	40108.39	4.87	0.00	0.00	
	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	345.38	18.73	0.00	12049.71	167.36	39941.04	4.85	0.00	0.00	
	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	341.41	18.42	0.00	12019.44	166.94	39774.10	4.83	0.00	0.00	
6:30	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	337.44	18.10	0.00	11989.25	166.52	39607.58	4.81	0.00	0.00	
	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	333.46	17.79	0.00	11959.13	166.10	39441.48	4.79	0.00	0.00	
	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	329.49	17.47	0.00	11929.09	165.68	39275.80	4.77	0.00	0.00	
6:45	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	325.51	17.15	0.00	11899.13	165.27	39110.54	4.75	0.00	0.00	
	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	321.54	16.84	0.00	11869.24	164.85	38945.69	4.73	0.00	0.00	
	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	317.56	16.52	0.00	11839.42	164.44	38781.25	4.71	0.00	0.00	
7:00	0	0.00	0.20	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	313.59	16.20	0.00	11809.68	164.02	38617.23	4.69	0.00	0.00	
					Total volume (cf)			**53294.54**								**Total Overflow (cf)**			**5671.05**		

24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr	Loss Rate Value Max.	Min.	Effective Rain (in/hr	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft	Overflow Vol. (cf)	Overflow Rate (cfs)
0:15	0.2	0.04	0.36	0.03	0.0036	0.0313	28.13	0.00	30.89	1.29	26.84	1.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:30	0.3	0.05	0.35	0.05	0.0054	0.0469	42.20	0.00	53.85	2.24	66.80	3.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:45	0.3	0.05	0.35	0.05	0.0054	0.0469	42.20	0.00	88.02	3.67	105.33	5.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1:00	0.4	0.07	0.35	0.06	0.0072	0.0625	56.26	0.00	120.97	5.04	156.55	7.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1:15	0.3	0.05	0.34	0.05	0.0054	0.0469	42.20	0.00	164.78	6.87	191.88	9.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1:30	0.3	0.05	0.34	0.05	0.0054	0.0469	42.20	0.00	195.00	8.13	225.95	11.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1:45	0.3	0.05	0.33	0.05	0.0054	0.0469	42.20	0.00	224.14	9.34	258.81	13.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2:00	0.4	0.07	0.33	0.06	0.0072	0.0625	56.26	0.00	252.24	10.51	319.17	16.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2:15	0.4	0.07	0.33	0.06	0.0072	0.0625	56.26	0.00	286.14	11.92	361.28	20.00	2.23	4795.50	2.23	0.00	0.00	0.00	0.00
2:30	0.4	0.07	0.32	0.06	0.0072	0.0625	56.26	0.00	286.14	11.92	361.28	20.00	44.34	4795.50	44.34	0.00	0.00	0.00	0.00
2:45	0.5	0.09	0.32	0.08	0.0090	0.0781	70.33	0.00	286.14	11.92	361.28	20.00	58.41	4795.50	58.41	0.00	0.00	0.00	0.00
3:00	0.5	0.09	0.31	0.08	0.0090	0.0781	70.33	0.00	286.14	11.92	361.28	20.00	58.41	4795.50	58.41	0.00	0.00	0.00	0.00
3:15	0.5	0.09	0.31	0.08	0.0090	0.0781	70.33	0.00	286.14	11.92	361.28	20.00	58.41	4795.50	58.41	0.00	0.00	0.00	0.00
3:30	0.5	0.09	0.31	0.08	0.0090	0.0781	70.33	0.00	286.14	11.92	361.28	20.00	58.41	4795.50	58.41	0.00	0.00	0.00	0.00
3:45	0.5	0.09	0.30	0.08	0.0090	0.0781	70.33	0.00	286.14	11.92	361.28	20.00	58.41	4795.50	58.41	0.00	0.00	0.00	0.00
4:00	0.6	0.11	0.30	0.10	0.0108	0.0938	84.39	0.00	286.14	11.92	361.28	20.00	72.47	4795.50	72.47	0.00	0.00	0.00	0.00
4:15	0.6	0.11	0.29	0.10	0.0108	0.0938	84.39	0.00	286.14	11.92	361.28	20.00	72.47	4795.50	72.47	0.00	0.00	0.00	0.00
4:30	0.7	0.13	0.29	0.11	0.0126	0.1094	98.46	0.00	286.14	11.92	361.28	20.00	86.54	4795.50	86.54	0.00	0.00	0.00	0.00
4:45	0.7	0.13	0.29	0.11	0.0126	0.1094	98.46	0.00	286.14	11.92	361.28	20.00	86.54	4795.50	86.54	0.00	0.00	0.00	0.00
5:00	0.8	0.14	0.28	0.13	0.0144	0.1250	112.53	0.00	286.14	11.92	361.28	20.00	100.60	4795.50	100.60	0.00	0.00	0.00	0.00
5:15	0.6	0.11	0.28	0.10	0.0108	0.0938	84.39	0.00	286.14	11.92	361.28	20.00	72.47	4795.50	72.47	0.00	0.00	0.00	0.00
5:30	0.7	0.13	0.28	0.11	0.0126	0.1094	98.46	0.00	286.14	11.92	361.28	20.00	86.54	4795.50	86.54	0.00	0.00	0.00	0.00
5:45	0.8	0.14	0.27	0.13	0.0144	0.1250	112.53	0.00	286.14	11.92	361.28	20.00	100.60	4795.50	100.60	0.00	0.00	0.00	0.00
6:00	0.8	0.14	0.27	0.13	0.0144	0.1250	112.53	0.00	286.14	11.92	361.28	20.00	100.60	4795.50	100.60	0.00	0.00	0.00	0.00
6:15	0.9	0.16	0.27	0.15	0.0162	0.1407	126.59	0.00	286.14	11.92	361.28	20.00	114.67	4795.50	114.67	0.00	0.00	0.00	0.00
6:30	0.9	0.16	0.26	0.15	0.0162	0.1407	126.59	0.00	286.14	11.92	361.28	20.00	114.67	4795.50	114.67	0.00	0.00	0.00	0.00
6:45	1	0.18	0.26	0.16	0.0180	0.1563	140.66	0.00	286.14	11.92	361.28	20.00	128.74	4795.50	128.74	0.00	0.00	0.00	0.00
7:00	1	0.18	0.25	0.16	0.0180	0.1563	140.66	0.00	286.14	11.92	361.28	20.00	128.74	4795.50	128.74	0.00	0.00	0.00	0.00
7:15	1	0.18	0.25	0.16	0.0180	0.1563	140.66	0.00	286.14	11.92	361.28	20.00	128.74	4795.50	128.74	0.00	0.00	0.00	0.00
7:30	1.1	0.20	0.25	0.18	0.0198	0.1719	154.72	0.00	286.14	11.92	361.28	20.00	142.80	4795.50	142.80	0.00	0.00	0.00	0.00
7:45	1.2	0.22	0.24	0.19	0.0216	0.1875	168.79	0.00	286.14	11.92	361.28	20.00	156.87	4795.50	156.87	0.00	0.00	0.00	0.00
8:00	1.3	0.23	0.24	0.21	0.0233	0.2032	182.86	0.00	286.14	11.92	361.28	20.00	170.93	4795.50	170.93	0.00	0.00	0.00	0.00
8:15	1.5	0.27	0.24	N/A	0.0317	0.2761	248.46	0.00	286.14	11.92	361.28	20.00	236.54	4795.50	199.81	36.73	0.00	0.00	0.00
8:30	1.5	0.27	0.23	N/A	0.0350	0.3050	274.48	0.00	286.14	11.92	361.28	20.00	262.55	4802.14	200.09	99.19	0.01	0.00	0.00
8:45	1.6	0.29	0.23	N/A	0.0563	0.4899	440.92	0.00	286.14	11.92	361.28	20.00	429.00	4813.44	200.56	327.63	0.04	0.00	0.00
9:00	1.7	0.31	0.23	N/A	0.0775	0.6746	607.13	0.00	286.14	11.92	361.28	20.00	595.21	4854.76	202.28	720.55	0.09	0.00	0.00
9:15	1.9	0.34	0.22	N/A	0.1167	1.0153	913.77	0.00	286.14	11.92	361.28	20.00	901.84	4925.82	205.24	1417.16	0.17	0.00	0.00
9:30	2	0.36	0.22	N/A	0.1378	1.1995	1079.51	0.00	286.14	11.92	361.28	20.00	1067.59	5051.81	210.49	2274.25	0.28	0.00	0.00
9:45	2.1	0.38	0.22	N/A	0.1590	1.3834	1245.02	0.00	286.14	11.92	361.28	20.00	1233.10	5206.83	216.95	3290.40	0.40	0.00	0.00
10:00	2.2	0.40	0.22	N/A	0.1801	1.5670	1410.29	0.00	286.14	11.92	361.28	20.00	1398.36	5390.62	224.61	4464.15	0.54	0.00	0.00
10:15	1.5	0.27	0.21	N/A	0.0575	0.5001	450.05	0.00	286.14	11.92	361.28	20.00	438.13	5602.91	233.45	4668.82	0.57	0.00	0.00
10:30	1.5	0.27	0.21	N/A	0.0605	0.5269	474.18	0.00	286.14	11.92	361.28	20.00	462.26	5639.93	235.00	4896.08	0.59	0.00	0.00
10:45	2	0.36	0.21	N/A	0.1534	1.3348	1201.35	0.00	286.14	11.92	361.28	20.00	1189.43	5681.03	236.71	5848.80	0.71	0.00	0.00
11:00	2	0.36	0.20	N/A	0.1564	1.3611	1224.99	0.00	286.14	11.92	361.28	20.00	1213.06	5853.34	243.89	6817.98	0.83	0.00	0.00
11:15	1.9	0.34	0.20	N/A	0.1414	1.2308	1107.72	0.00	286.14	11.92	361.28	20.00	1095.79	6028.63	251.19	7662.58	0.93	0.00	0.00
11:30	1.9	0.34	0.20	N/A	0.1444	1.2565	1130.85	0.00	286.14	11.92	361.28	20.00	1118.93	6181.39	257.56	8523.95	1.04	0.00	0.00
11:45	1.7	0.31	0.19	N/A	0.1114	0.9694	872.42	0.00	286.14	11.92	361.28	20.00	860.50	6337.19	264.05	9120.40	1.11	0.00	0.00
12:00	1.8	0.32	0.19	N/A	0.1322	1.1508	1035.71	0.00	286.14	11.92	361.28	20.00	1023.78	6445.06	268.54	9875.64	1.20	0.00	0.00
12:15	2.5	0.45	0.19	N/A	0.2608	2.2696	2042.68	0.00	286.14	11.92	361.28	20.00	2030.76	6581.66	274.24	11632.16	1.41	0.00	0.00
12:30	2.6	0.47	0.19	N/A	0.2816	2.4505	2205.45	0.00	286.14	11.92	361.28	20.00	2193.53	6899.35	287.47	13538.22	1.64	0.00	0.00

12:45	2.8	0.50	0.18	N/A		0.3203	2.7873	2508.61	0.00	286.14	11.92	361.28	20.00	2496.69	7244.09	301.84	15733.07	1.91	0.00	0.00	
13:00	2.9	0.52	0.18	N/A		0.3410	2.9676	2670.85	0.00	286.14	11.92	361.28	20.00	2658.93	7641.06	318.38	18073.62	2.20	0.00	0.00	
13:15	3.4	0.61	0.18	N/A		0.4336	3.7727	3395.45	0.00	286.14	11.92	361.28	20.00	3383.53	8064.39	336.02	21121.14	2.57	0.00	0.00	
13:30	3.4	0.61	0.17	N/A		**0.4362**	**3.7961**	**3416.50**	0.00	286.14	11.92	361.28	20.00	3404.57	8615.58	358.98	24166.73	2.94	0.00	0.00	
13:45	2.3	0.41	0.17	N/A		0.2413	2.1000	1890.03	0.00	286.14	11.92	361.28	20.00	1878.11	9166.42	381.93	25662.90	3.12	0.00	0.00	
14:00	2.3	0.41	0.17	N/A		0.2439	2.1228	1910.52	0.00	286.14	11.92	361.28	20.00	1898.60	9437.03	393.21	27168.29	3.30	0.00	0.00	
14:15	2.7	0.48	0.17	N/A		0.3184	2.7704	2493.37	0.00	286.14	11.92	361.28	20.00	2481.44	9709.30	404.55	29245.18	3.55	0.00	0.00	
14:30	2.6	0.47	0.16	N/A		0.3030	2.6363	2372.64	0.00	286.14	11.92	361.28	20.00	2360.72	10084.94	420.21	31185.69	3.79	0.00	0.00	
14:45	2.6	0.47	0.16	N/A		0.3055	2.6581	2392.28	0.00	286.14	11.92	361.28	20.00	2380.36	10435.91	434.83	33131.22	4.02	0.00	0.00	
15:00	2.5	0.45	0.16	N/A		0.2900	2.5233	2270.98	0.00	286.14	11.92	361.28	20.00	2259.05	10787.79	449.49	34940.79	4.24	0.00	0.00	
15:15	2.4	0.43	0.16	N/A		0.2744	2.3882	2149.38	0.00	286.14	11.92	361.28	20.00	2137.46	11115.07	463.13	36615.11	4.45	0.00	0.00	
15:30	2.3	0.41	0.15	N/A		0.2589	2.2528	2027.48	0.00	286.14	11.92	361.28	20.00	2015.56	11417.90	475.75	38154.93	4.63	0.00	0.00	
15:45	1.9	0.34	0.15	N/A		0.1894	1.6481	1483.31	0.00	286.14	11.92	361.28	20.00	1471.39	11696.40	487.35	39138.97	4.75	0.00	0.00	
16:00	1.9	0.34	0.15	N/A		0.1917	1.6683	1501.47	0.00	286.14	11.92	361.28	20.00	1489.55	11874.38	494.77	40133.75	4.88	0.00	0.00	**PEAK**
16:15	0.4	0.07	0.15	0.06		0.0072	0.0625	56.26	0.00	286.14	11.92	361.28	20.00	44.34	12054.30	502.26	39675.83	4.82	0.00	0.00	
16:30	0.4	0.07	0.15	0.06		0.0072	0.0625	56.26	0.00	286.14	11.92	361.28	20.00	44.34	11971.48	498.81	39221.36	4.76	0.00	0.00	
16:45	0.3	0.05	0.14	0.05		0.0054	0.0469	42.20	0.00	286.14	11.92	361.28	20.00	30.27	11889.28	495.39	38756.25	4.71	0.00	0.00	
17:00	0.3	0.05	0.14	0.05		0.0054	0.0469	42.20	0.00	286.14	11.92	361.28	20.00	30.27	11805.16	491.88	38294.64	4.65	0.00	0.00	
17:15	0.5	0.09	0.14	0.08		0.0090	0.0781	70.33	0.00	286.14	11.92	361.28	20.00	58.41	11721.67	488.40	37864.64	4.60	0.00	0.00	
17:30	0.5	0.09	0.14	0.08		0.0090	0.0781	70.33	0.00	286.14	11.92	361.28	20.00	58.41	11643.90	485.16	37437.89	4.55	0.00	0.00	
17:45	0.5	0.09	0.13	0.08		0.0090	0.0781	70.33	0.00	286.14	11.92	361.28	20.00	58.41	11566.71	481.95	37014.35	4.50	0.00	0.00	
18:00	0.4	0.07	0.13	0.06		0.0072	0.0625	56.26	0.00	286.14	11.92	361.28	20.00	44.34	11490.11	478.75	36579.93	4.44	0.00	0.00	
18:15	0.4	0.07	0.13	0.06		0.0072	0.0625	56.26	0.00	286.14	11.92	361.28	20.00	44.34	11411.54	475.48	36148.79	4.39	0.00	0.00	
18:30	0.4	0.07	0.13	0.06		0.0072	0.0625	56.26	0.00	286.14	11.92	361.28	20.00	44.34	11333.56	472.23	35720.90	4.34	0.00	0.00	
18:45	0.3	0.05	0.13	0.05		0.0054	0.0469	42.20	0.00	286.14	11.92	361.28	20.00	30.27	11256.17	469.01	35282.17	4.29	0.00	0.00	
19:00	0.2	0.04	0.12	0.03		0.0036	0.0313	28.13	0.00	286.14	11.92	361.28	20.00	16.21	11176.82	465.70	34832.68	4.23	0.00	0.00	
19:15	0.3	0.05	0.12	0.05		0.0054	0.0469	42.20	0.00	286.14	11.92	361.28	20.00	30.27	11095.52	462.31	34400.64	4.18	0.00	0.00	
19:30	0.4	0.07	0.12	0.06		0.0072	0.0625	56.26	0.00	286.14	11.92	361.28	20.00	44.34	11017.38	459.06	33985.92	4.13	0.00	0.00	
19:45	0.3	0.05	0.12	0.05		0.0054	0.0469	42.20	0.00	286.14	11.92	361.28	20.00	30.27	10942.37	455.93	33560.26	4.08	0.00	0.00	
20:00	0.2	0.04	0.12	0.03		0.0036	0.0313	28.13	0.00	286.14	11.92	361.28	20.00	16.21	10865.38	452.72	33123.75	4.02	0.00	0.00	
20:15	0.3	0.05	0.12	0.05		0.0054	0.0469	42.20	0.00	286.14	11.92	361.28	20.00	30.27	10786.43	449.43	32704.59	3.97	0.00	0.00	
20:30	0.3	0.05	0.12	0.05		0.0054	0.0469	42.20	0.00	286.14	11.92	361.28	20.00	30.27	10710.62	446.28	32288.59	3.92	0.00	0.00	
20:45	0.3	0.05	0.11	0.05		0.0054	0.0469	42.20	0.00	286.14	11.92	361.28	20.00	30.27	10635.38	443.14	31875.72	3.87	0.00	0.00	
21:00	0.2	0.04	0.11	0.03		0.0036	0.0313	28.13	0.00	286.14	11.92	361.28	20.00	16.21	10560.71	440.03	31451.90	3.82	0.00	0.00	
21:15	0.3	0.05	0.11	0.05		0.0054	0.0469	42.20	0.00	286.14	11.92	361.28	20.00	30.27	10484.05	436.84	31045.34	3.77	0.00	0.00	
21:30	0.2	0.04	0.11	0.03		0.0036	0.0313	28.13	0.00	286.14	11.92	361.28	20.00	16.21	10410.52	433.77	30627.78	3.72	0.00	0.00	
21:45	0.3	0.05	0.11	0.05		0.0054	0.0469	42.20	0.00	286.14	11.92	361.28	20.00	30.27	10335.00	430.62	30227.43	3.67	0.00	0.00	
22:00	0.2	0.04	0.11	0.03		0.0036	0.0313	28.13	0.00	286.14	11.92	361.28	20.00	16.21	10262.59	427.61	29816.03	3.62	0.00	0.00	
22:15	0.3	0.05	0.11	0.05		0.0054	0.0469	42.20	0.00	286.14	11.92	361.28	20.00	30.27	10188.18	424.51	29421.79	3.57	0.00	0.00	
22:30	0.2	0.04	0.11	0.03		0.0036	0.0313	28.13	0.00	286.14	11.92	361.28	20.00	16.21	10116.88	421.54	29016.47	3.52	0.00	0.00	
22:45	0.2	0.04	0.10	0.03		0.0036	0.0313	28.13	0.00	286.14	11.92	361.28	20.00	16.21	10043.57	418.48	28614.19	3.48	0.00	0.00	
23:00	0.2	0.04	0.10	0.03		0.0036	0.0313	28.13	0.00	286.14	11.92	361.28	20.00	16.21	9970.81	415.45	28214.95	3.43	0.00	0.00	
23:15	0.2	0.04	0.10	0.03		0.0036	0.0313	28.13	0.00	286.14	11.92	361.28	20.00	16.21	9898.60	412.44	27818.72	3.38	0.00	0.00	
23:30	0.2	0.04	0.10	0.03		0.0036	0.0313	28.13	0.00	286.14	11.92	361.28	20.00	16.21	9826.94	409.46	27425.47	3.33	0.00	0.00	
23:45	0.2	0.04	0.10	0.03		0.0036	0.0313	28.13	0.00	286.14	11.92	361.28	20.00	16.21	9755.81	406.49	27035.19	3.28	0.00	0.00	
24:00	0.2	0.04	0.10	0.03		0.0036	0.0313	28.13	0.00	286.14	11.92	361.28	20.00	16.21	9685.23	403.55	26647.85	3.24	0.00	0.00	
	0	0.00	0.10	0.00		0.0000	0.0000	0.00	0.00	286.14	11.92	349.36	19.05	0.00	9615.17	400.63	26247.21	3.19	0.00	0.00	
						Total volume (cf)		**54681.65**									**Total Overflow (cf)**		**0.00**		

HYDROLOGY CALCULATIONS - UNIVERSITY PARK

Using the RCFC&WCD Short Cut Unit Hydrograph Method

Area Designations	**Proposed Conditions*- Basin B - UG Retention of On-Site**				*receiving runoff from on-site ONLY
Drainage Area (ac.)	**4.4200**				
Unit time (minutes)	**5**	**5**	**5**	**15**	
100 Year Storm Duration (hrs)	1	3	6	24	
Total Precipitation (Plates D-4.4,E-5.2, 5.4, 5.6)(in.)	**1.53**	**2.21**	**2.89**	**4.49**	Or data from NOAA interactive website
Soils Group	A				
AMC index II Runoff Number (plate E-6.1)	32				
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	0.74	(AMC II)			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)		**83.7**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.18	(used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	90				
Retention Basin Percolation Rate (in/hr)	**2**	(also used for drywell percolation rate)			

Percolation is taken incrementally.

Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used

(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)

Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))

The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell is zeroed out by entering .001 for values

Drywell design factors **Upper sec. (ft.)=** **5** **Lower sec. (ft.)=** **15** **Ring diam. (ft.) =** **4** **Drywell lower max. (cf)=** **298.45** **Upper max.(cf)=** **62.83**

Gravel bed width around drwyell= **1** **Drywell total(cf)=** **361.28**

Ret. Basin design (area, depth) **Top =** **6000.15** s.f. **Bot. =** **6000.15** **s.f.** **Max. Depth (d)=** **3.388** **Max. storage=** **20328.51** (d/3)*(bottom+top+(bottom*top)^0.50)

Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol*3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**

Outside input from: **N/A**

1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Max.	Value Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft	Overflow Vol. (cf)	Overflow Rate (cfs)	
0:05	3.7	0.6793	0.1826	N/A	0.4968	2.2140	664.20	0.00	30.89	0.43	361.28	20.00	302.49	6000.15	83.34	219.15	0.04	0.00	0.00	
0:10	4.8	0.8813	0.1826	N/A	0.6987	3.1141	934.23	0.00	286.14	3.97	361.28	20.00	930.25	6000.15	83.34	1066.07	0.18	0.00	0.00	
0:15	5.1	0.9364	0.1826	N/A	0.7538	3.3596	1007.87	0.00	286.14	3.97	361.28	20.00	1003.90	6000.15	83.34	1986.63	0.33	0.00	0.00	
0:20	4.9	0.8996	0.1826	N/A	0.7171	3.1959	958.77	0.00	286.14	3.97	361.28	20.00	954.80	6000.15	83.34	2858.09	0.48	0.00	0.00	
0:25	6.6	1.2118	0.1826	N/A	1.0292	4.5870	1376.09	0.00	286.14	3.97	361.28	20.00	1372.12	6000.15	83.34	4146.88	0.69	0.00	0.00	
0:30	7.3	1.3403	0.1826	N/A	1.1577	5.1598	1547.93	0.00	286.14	3.97	361.28	20.00	1543.96	6000.15	83.34	5607.50	0.93	0.00	0.00	
0:35	8.4	1.5422	0.1826	N/A	1.3597	6.0599	1817.96	0.00	286.14	3.97	361.28	20.00	1813.99	6000.15	83.34	7338.15	1.22	0.00	0.00	
0:40	9	1.6524	0.1826	N/A	1.4698	6.5508	1965.25	0.00	286.14	3.97	361.28	20.00	1961.28	6000.15	83.34	9216.10	1.54	0.00	0.00	
0:45	12.3	2.2583	0.1826	N/A	2.0757	9.2511	2775.34	0.00	286.14	3.97	361.28	20.00	2771.37	6000.15	83.34	11904.13	1.98	0.00	0.00	
0:50	17.6	3.2314	0.1826	N/A	**3.0488**	**13.5880**	**4076.40**	0.00	286.14	3.97	361.28	20.00	4072.43	6000.15	83.34	15893.22	2.65	0.00	0.00	**PEAK**
0:55	16.1	2.9560	0.1826	N/A	2.7734	12.3606	3708.18	0.00	286.14	3.97	361.28	20.00	3704.20	6000.15	83.34	19514.09	3.25	0.00	0.00	
1:00	4.2	0.7711	0.1826	N/A	0.5886	2.6231	786.94	0.00	286.14	3.97	361.28	20.00	782.96	6000.15	83.34	20213.72	3.37	0.00	0.00	
	0	0.0000	0.1826	0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	357.31	19.68	0.00	6000.15	83.34	20130.38	3.35	0.00	0.00	
	0	0.0000	0.1826	0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	353.33	19.37	0.00	6000.15	83.34	20047.05	3.34	0.00	0.00	
1:15	0	0.0000	0.1826	0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	349.36	19.05	0.00	6000.15	83.34	19963.71	3.33	0.00	0.00	
					Total volume (cf)		**21619.17**								**Total Overflow (cf)**			**0.00**		

3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Max.	Value Min.		Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft	Overflow Vol. (cf)	Overflow Rate (cfs)	
0:05	1.3	0.34	0.18	N/A		0.1622	0.7229	216.87	0.00	30.89	0.43	216.44	10.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0:10	1.3	0.34	0.18	N/A		0.1622	0.7229	216.87	0.00	216.01	3.00	361.28	20.00	69.03	6000.15	69.03	0.00	0.00	0.00	0.00	
0:15	1.1	0.29	0.18	N/A		0.1092	0.4865	145.96	0.00	286.14	3.97	361.28	20.00	141.98	6000.15	83.34	58.65	0.01	0.00	0.00	
0:20	1.5	0.40	0.18	N/A		0.2152	0.9593	287.79	0.00	286.14	3.97	361.28	20.00	283.82	6000.15	83.34	259.13	0.04	0.00	0.00	
0:25	1.5	0.40	0.18	N/A		0.2152	0.9593	287.79	0.00	286.14	3.97	361.28	20.00	283.82	6000.15	83.34	459.60	0.08	0.00	0.00	
0:30	1.8	0.48	0.18	N/A		0.2948	1.3139	394.17	0.00	286.14	3.97	361.28	20.00	390.19	6000.15	83.34	766.46	0.13	0.00	0.00	
0:35	1.5	0.40	0.18	N/A		0.2152	0.9593	287.79	0.00	286.14	3.97	361.28	20.00	283.82	6000.15	83.34	966.94	0.16	0.00	0.00	
0:40	1.8	0.48	0.18	N/A		0.2948	1.3139	394.17	0.00	286.14	3.97	361.28	20.00	390.19	6000.15	83.34	1273.80	0.21	0.00	0.00	
0:45	1.8	0.48	0.18	N/A		0.2948	1.3139	394.17	0.00	286.14	3.97	361.28	20.00	390.19	6000.15	83.34	1580.65	0.26	0.00	0.00	
0:50	1.5	0.40	0.18	N/A		0.2152	0.9593	287.79	0.00	286.14	3.97	361.28	20.00	283.82	6000.15	83.34	1781.13	0.30	0.00	0.00	
0:55	1.6	0.42	0.18	N/A		0.2418	1.0775	323.25	0.00	286.14	3.97	361.28	20.00	319.27	6000.15	83.34	2017.07	0.34	0.00	0.00	
1:00	1.8	0.48	0.18	N/A		0.2948	1.3139	394.17	0.00	286.14	3.97	361.28	20.00	390.19	6000.15	83.34	2323.92	0.39	0.00	0.00	
1:05	2.2	0.58	0.18	N/A		0.4009	1.7867	536.00	0.00	286.14	3.97	361.28	20.00	532.03	6000.15	83.34	2772.61	0.46	0.00	0.00	
1:10	2.2	0.58	0.18	N/A		0.4009	1.7867	536.00	0.00	286.14	3.97	361.28	20.00	532.03	6000.15	83.34	3221.30	0.54	0.00	0.00	
1:15	2.2	0.58	0.18	N/A		0.4009	1.7867	536.00	0.00	286.14	3.97	361.28	20.00	532.03	6000.15	83.34	3669.99	0.61	0.00	0.00	
1:20	2	0.53	0.18	N/A		0.3478	1.5503	465.08	0.00	286.14	3.97	361.28	20.00	461.11	6000.15	83.34	4047.77	0.67	0.00	0.00	
1:25	2.6	0.69	0.18	N/A		0.5070	2.2594	677.83	0.00	286.14	3.97	361.28	20.00	673.86	6000.15	83.34	4638.29	0.77	0.00	0.00	
1:30	2.7	0.72	0.18	N/A		0.5335	2.3776	713.29	0.00	286.14	3.97	361.28	20.00	709.32	6000.15	83.34	5264.27	0.88	0.00	0.00	
1:35	2.4	0.64	0.18	N/A		0.4539	2.0231	606.92	0.00	286.14	3.97	361.28	20.00	602.94	6000.15	83.34	5783.88	0.96	0.00	0.00	
1:40	2.7	0.72	0.18	N/A		0.5335	2.3776	713.29	0.00	286.14	3.97	361.28	20.00	709.32	6000.15	83.34	6409.86	1.07	0.00	0.00	
1:45	3.3	0.88	0.18	N/A		0.6926	3.0868	926.04	0.00	286.14	3.97	361.28	20.00	922.07	6000.15	83.34	7248.59	1.21	0.00	0.00	
1:50	3.1	0.82	0.18	N/A		0.6396	2.8504	855.13	0.00	286.14	3.97	361.28	20.00	851.15	6000.15	83.34	8016.41	1.34	0.00	0.00	
1:55	2.9	0.77	0.18	N/A		0.5865	2.6140	784.21	0.00	286.14	3.97	361.28	20.00	780.24	6000.15	83.34	8713.31	1.45	0.00	0.00	
2:00	3	0.80	0.18	N/A		0.6130	2.7322	819.67	0.00	286.14	3.97	361.28	20.00	815.69	6000.15	83.34	9445.67	1.57	0.00	0.00	
2:05	3.1	0.82	0.18	N/A		0.6396	2.8504	855.13	0.00	286.14	3.97	361.28	20.00	851.15	6000.15	83.34	10213.49	1.70	0.00	0.00	
2:10	4.2	1.11	0.18	N/A		0.9313	4.1506	1245.17	0.00	286.14	3.97	361.28	20.00	1241.20	6000.15	83.34	11371.35	1.90	0.00	0.00	
2:15	5	1.33	0.18	N/A		1.1434	5.0961	1528.84	0.00	286.14	3.97	361.28	20.00	1524.86	6000.15	83.34	12812.88	2.14	0.00	0.00	
2:20	3.5	0.93	0.18	N/A		0.7456	3.3232	996.96	0.00	286.14	3.97	361.28	20.00	992.99	6000.15	83.34	13722.53	2.29	0.00	0.00	
2:25	6.8	1.80	0.18	N/A		1.6208	7.2236	2167.09	0.00	286.14	3.97	361.28	20.00	2163.12	6000.15	83.34	15802.31	2.63	0.00	0.00	
2:30	7.3	1.94	0.18	N/A		1.7534	7.8146	2344.39	0.00	286.14	3.97	361.28	20.00	2340.41	6000.15	83.34	18059.39	3.01	0.00	0.00	
2:35	8.2	2.17	0.18	N/A		**1.9921**	**8.8784**	**2663.51**	0.00	286.14	3.97	361.28	20.00	2659.54	6000.15	83.34	20328.51	3.39	307.08	1.02	
2:40	5.9	1.56	0.18	N/A		1.3821	6.1599	1847.97	0.00	286.14	3.97	361.28	20.00	1843.99	6000.15	83.34	20328.51	3.39	1760.66	5.87	**PEAK**
2:45	2	0.53	0.18	N/A		0.3478	1.5503	465.08	0.00	286.14	3.97	361.28	20.00	461.11	6000.15	83.34	20328.51	3.39	377.77	1.26	
2:50	1.8	0.48	0.18	N/A		0.2948	1.3139	394.17	0.00	286.14	3.97	361.28	20.00	390.19	6000.15	83.34	20328.51	3.39	306.86	1.02	
2:55	1.8	0.48	0.18	N/A		0.2948	1.3139	394.17	0.00	286.14	3.97	361.28	20.00	390.19	6000.15	83.34	20328.51	3.39	306.86	1.02	
3:00	0.6	0.16	0.18	0.14		0.0159	0.0709	21.28	0.00	286.14	3.97	361.28	20.00	17.30	6000.15	83.34	20262.47	3.38	0.00	0.00	
	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	357.31	19.68	0.00	6000.15	83.34	20179.14	3.36	0.00	0.00	
	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	353.33	19.37	0.00	6000.15	83.34	20095.80	3.35	0.00	0.00	
3:15	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	349.36	19.05	0.00	6000.15	83.34	20012.47	3.34	0.00	0.00	
	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	345.38	18.73	0.00	6000.15	83.34	19929.13	3.32	0.00	0.00	
	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	341.41	18.42	0.00	6000.15	83.34	19845.80	3.31	0.00	0.00	
3:30	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	337.44	18.10	0.00	6000.15	83.34	19762.46	3.29	0.00	0.00	
	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	333.46	17.79	0.00	6000.15	83.34	19679.13	3.28	0.00	0.00	
	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	329.49	17.47	0.00	6000.15	83.34	19595.79	3.27	0.00	0.00	
					Total volume (cf)			**26723.97**											**3059.22**		
																Total Overflow (cf)					

6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft	Overflow Vol. (cf)	Overflow Rate (cfs)
0:05	0.5	0.17	0.18	0.16	0.0173	0.0773	23.18	0.00	30.89	0.43	22.76	1.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:10	0.6	0.21	0.18	N/A	0.0255	0.1137	34.12	0.00	50.35	0.70	56.18	2.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:15	0.6	0.21	0.18	N/A	0.0255	0.1137	34.12	0.00	78.94	1.10	89.21	4.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:20	0.6	0.21	0.18	N/A	0.0255	0.1137	34.12	0.00	107.19	1.49	121.84	6.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:25	0.6	0.21	0.18	N/A	0.0255	0.1137	34.12	0.00	135.10	1.88	154.09	7.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:30	0.7	0.24	0.18	N/A	0.0602	0.2683	80.49	0.00	162.68	2.26	232.32	11.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:35	0.7	0.24	0.18	N/A	0.0602	0.2683	80.49	0.00	229.59	3.19	333.99	17.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:40	0.7	0.24	0.18	N/A	0.0602	0.2683	80.49	0.00	286.14	3.97	361.28	20.00	49.23	6000.15	49.23	0.00	0.00	0.00	0.00
0:45	0.7	0.24	0.18	N/A	0.0602	0.2683	80.49	0.00	286.14	3.97	361.28	20.00	76.52	6000.15	76.52	0.00	0.00	0.00	0.00
0:50	0.7	0.24	0.18	N/A	0.0602	0.2683	80.49	0.00	286.14	3.97	361.28	20.00	76.52	6000.15	76.52	0.00	0.00	0.00	0.00
0:55	0.7	0.24	0.18	N/A	0.0602	0.2683	80.49	0.00	286.14	3.97	361.28	20.00	76.52	6000.15	76.52	0.00	0.00	0.00	0.00
1:00	0.8	0.28	0.18	N/A	0.0949	0.4229	126.86	0.00	286.14	3.97	361.28	20.00	122.89	6000.15	83.34	39.55	0.01	0.00	0.00
1:05	0.8	0.28	0.18	N/A	0.0949	0.4229	126.86	0.00	286.14	3.97	361.28	20.00	122.89	6000.15	83.34	79.10	0.01	0.00	0.00
1:10	0.8	0.28	0.18	N/A	0.0949	0.4229	126.86	0.00	286.14	3.97	361.28	20.00	122.89	6000.15	83.34	118.66	0.02	0.00	0.00
1:15	0.8	0.28	0.18	N/A	0.0949	0.4229	126.86	0.00	286.14	3.97	361.28	20.00	122.89	6000.15	83.34	158.21	0.03	0.00	0.00
1:20	0.8	0.28	0.18	N/A	0.0949	0.4229	126.86	0.00	286.14	3.97	361.28	20.00	122.89	6000.15	83.34	197.76	0.03	0.00	0.00
1:25	0.8	0.28	0.18	N/A	0.0949	0.4229	126.86	0.00	286.14	3.97	361.28	20.00	122.89	6000.15	83.34	237.31	0.04	0.00	0.00
1:30	0.8	0.28	0.18	N/A	0.0949	0.4229	126.86	0.00	286.14	3.97	361.28	20.00	122.89	6000.15	83.34	276.87	0.05	0.00	0.00
1:35	0.8	0.28	0.18	N/A	0.0949	0.4229	126.86	0.00	286.14	3.97	361.28	20.00	122.89	6000.15	83.34	316.42	0.05	0.00	0.00
1:40	0.8	0.28	0.18	N/A	0.0949	0.4229	126.86	0.00	286.14	3.97	361.28	20.00	122.89	6000.15	83.34	355.97	0.06	0.00	0.00
1:45	0.8	0.28	0.18	N/A	0.0949	0.4229	126.86	0.00	286.14	3.97	361.28	20.00	122.89	6000.15	83.34	395.52	0.07	0.00	0.00
1:50	0.8	0.28	0.18	N/A	0.0949	0.4229	126.86	0.00	286.14	3.97	361.28	20.00	122.89	6000.15	83.34	435.08	0.07	0.00	0.00
1:55	0.8	0.28	0.18	N/A	0.0949	0.4229	126.86	0.00	286.14	3.97	361.28	20.00	122.89	6000.15	83.34	474.63	0.08	0.00	0.00
2:00	0.9	0.31	0.18	N/A	0.1296	0.5774	173.23	0.00	286.14	3.97	361.28	20.00	169.26	6000.15	83.34	560.55	0.09	0.00	0.00
2:05	0.8	0.28	0.18	N/A	0.0949	0.4229	126.86	0.00	286.14	3.97	361.28	20.00	122.89	6000.15	83.34	600.10	0.10	0.00	0.00
2:10	0.9	0.31	0.18	N/A	0.1296	0.5774	173.23	0.00	286.14	3.97	361.28	20.00	169.26	6000.15	83.34	686.02	0.11	0.00	0.00
2:15	0.9	0.31	0.18	N/A	0.1296	0.5774	173.23	0.00	286.14	3.97	361.28	20.00	169.26	6000.15	83.34	771.94	0.13	0.00	0.00
2:20	0.9	0.31	0.18	N/A	0.1296	0.5774	173.23	0.00	286.14	3.97	361.28	20.00	169.26	6000.15	83.34	857.87	0.14	0.00	0.00
2:25	0.9	0.31	0.18	N/A	0.1296	0.5774	173.23	0.00	286.14	3.97	361.28	20.00	169.26	6000.15	83.34	943.79	0.16	0.00	0.00
2:30	0.9	0.31	0.18	N/A	0.1296	0.5774	173.23	0.00	286.14	3.97	361.28	20.00	169.26	6000.15	83.34	1029.71	0.17	0.00	0.00
2:35	0.9	0.31	0.18	N/A	0.1296	0.5774	173.23	0.00	286.14	3.97	361.28	20.00	169.26	6000.15	83.34	1115.63	0.19	0.00	0.00
2:40	0.9	0.31	0.18	N/A	0.1296	0.5774	173.23	0.00	286.14	3.97	361.28	20.00	169.26	6000.15	83.34	1201.55	0.20	0.00	0.00
2:45	1	0.35	0.18	N/A	0.1642	0.7320	219.60	0.00	286.14	3.97	361.28	20.00	215.63	6000.15	83.34	1333.84	0.22	0.00	0.00
2:50	1	0.35	0.18	N/A	0.1642	0.7320	219.60	0.00	286.14	3.97	361.28	20.00	215.63	6000.15	83.34	1466.13	0.24	0.00	0.00
2:55	1	0.35	0.18	N/A	0.1642	0.7320	219.60	0.00	286.14	3.97	361.28	20.00	215.63	6000.15	83.34	1598.42	0.27	0.00	0.00
3:00	1	0.35	0.18	N/A	0.1642	0.7320	219.60	0.00	286.14	3.97	361.28	20.00	215.63	6000.15	83.34	1730.71	0.29	0.00	0.00
3:05	1	0.35	0.18	N/A	0.1642	0.7320	219.60	0.00	286.14	3.97	361.28	20.00	215.63	6000.15	83.34	1863.00	0.31	0.00	0.00
3:10	1.1	0.38	0.18	N/A	0.1989	0.8866	265.97	0.00	286.14	3.97	361.28	20.00	261.99	6000.15	83.34	2041.66	0.34	0.00	0.00
3:15	1.1	0.38	0.18	N/A	0.1989	0.8866	265.97	0.00	286.14	3.97	361.28	20.00	261.99	6000.15	83.34	2220.32	0.37	0.00	0.00
3:20	1.1	0.38	0.18	N/A	0.1989	0.8866	265.97	0.00	286.14	3.97	361.28	20.00	261.99	6000.15	83.34	2398.98	0.40	0.00	0.00
3:25	1.2	0.42	0.18	N/A	0.2336	1.0411	312.34	0.00	286.14	3.97	361.28	20.00	308.36	6000.15	83.34	2624.01	0.44	0.00	0.00
3:30	1.3	0.45	0.18	N/A	0.2683	1.1957	358.71	0.00	286.14	3.97	361.28	20.00	354.73	6000.15	83.34	2895.40	0.48	0.00	0.00
3:35	1.4	0.49	0.18	N/A	0.3030	1.3503	405.08	0.00	286.14	3.97	361.28	20.00	401.10	6000.15	83.34	3213.17	0.54	0.00	0.00
3:40	1.4	0.49	0.18	N/A	0.3030	1.3503	405.08	0.00	286.14	3.97	361.28	20.00	401.10	6000.15	83.34	3530.93	0.59	0.00	0.00
3:45	1.5	0.52	0.18	N/A	0.3376	1.5048	451.44	0.00	286.14	3.97	361.28	20.00	447.47	6000.15	83.34	3895.07	0.65	0.00	0.00
3:50	1.5	0.52	0.18	N/A	0.3376	1.5048	451.44	0.00	286.14	3.97	361.28	20.00	447.47	6000.15	83.34	4259.20	0.71	0.00	0.00
3:55	1.6	0.55	0.18	N/A	0.3723	1.6594	497.81	0.00	286.14	3.97	361.28	20.00	493.84	6000.15	83.34	4669.71	0.78	0.00	0.00
4:00	1.6	0.55	0.18	N/A	0.3723	1.6594	497.81	0.00	286.14	3.97	361.28	20.00	493.84	6000.15	83.34	5080.21	0.85	0.00	0.00
4:05	1.7	0.59	0.18	N/A	0.4070	1.8139	544.18	0.00	286.14	3.97	361.28	20.00	540.21	6000.15	83.34	5537.08	0.92	0.00	0.00
4:10	1.8	0.62	0.18	N/A	0.4417	1.9685	590.55	0.00	286.14	3.97	361.28	20.00	586.58	6000.15	83.34	6040.32	1.01	0.00	0.00
4:15	1.9	0.66	0.18	N/A	0.4764	2.1231	636.92	0.00	286.14	3.97	361.28	20.00	632.95	6000.15	83.34	6589.93	1.10	0.00	0.00

4:20	2	0.69	0.18	N/A		0.5110	2.2776	683.29	0.00	286.14	3.97	361.28	20.00	679.31	6000.15	83.34	7185.91	1.20	0.00	0.00	
4:25	2.1	0.73	0.18	N/A		0.5457	2.4322	729.66	0.00	286.14	3.97	361.28	20.00	725.68	6000.15	83.34	7828.26	1.30	0.00	0.00	
4:30	2.1	0.73	0.18	N/A		0.5457	2.4322	729.66	0.00	286.14	3.97	361.28	20.00	725.68	6000.15	83.34	8470.61	1.41	0.00	0.00	
4:35	2.2	0.76	0.18	N/A		0.5804	2.5868	776.03	0.00	286.14	3.97	361.28	20.00	772.05	6000.15	83.34	9159.33	1.53	0.00	0.00	
4:40	2.3	0.80	0.18	N/A		0.6151	2.7413	822.40	0.00	286.14	3.97	361.28	20.00	818.42	6000.15	83.34	9894.41	1.65	0.00	0.00	
4:45	2.4	0.83	0.18	N/A		0.6498	2.8959	868.76	0.00	286.14	3.97	361.28	20.00	864.79	6000.15	83.34	10675.87	1.78	0.00	0.00	
4:50	2.4	0.83	0.18	N/A		0.6498	2.8959	868.76	0.00	286.14	3.97	361.28	20.00	864.79	6000.15	83.34	11457.32	1.91	0.00	0.00	
4:55	2.5	0.87	0.18	N/A		0.6844	3.0504	915.13	0.00	286.14	3.97	361.28	20.00	911.16	6000.15	83.34	12285.15	2.05	0.00	0.00	
5:00	2.6	0.90	0.18	N/A		0.7191	3.2050	961.50	0.00	286.14	3.97	361.28	20.00	957.53	6000.15	83.34	13159.34	2.19	0.00	0.00	
5:05	3.1	1.08	0.18	N/A		0.8925	3.9778	1193.35	0.00	286.14	3.97	361.28	20.00	1189.37	6000.15	83.34	14265.37	2.38	0.00	0.00	
5:10	3.6	1.25	0.18	N/A		1.0659	4.7506	1425.19	0.00	286.14	3.97	361.28	20.00	1421.22	6000.15	83.34	15603.26	2.60	0.00	0.00	
5:15	3.9	1.35	0.18	N/A		1.1700	5.2143	1564.30	0.00	286.14	3.97	361.28	20.00	1560.32	6000.15	83.34	17080.24	2.85	0.00	0.00	
5:20	4.2	1.46	0.18	N/A		1.2740	5.6780	1703.40	0.00	286.14	3.97	361.28	20.00	1699.43	6000.15	83.34	18696.34	3.12	0.00	0.00	
5:25	4.7	1.63	0.18	N/A		1.4474	6.4508	1935.25	0.00	286.14	3.97	361.28	20.00	1931.27	6000.15	83.34	20328.51	3.39	215.77	0.72	
5:30	5.6	1.94	0.18	N/A		**1.7595**	**7.8419**	**2352.57**	0.00	286.14	3.97	361.28	20.00	2348.59	6000.15	83.34	20328.51	3.39	2265.26	7.55	**PEAK**
5:35	1.9	0.66	0.18	N/A		0.4764	2.1231	636.92	0.00	286.14	3.97	361.28	20.00	632.95	6000.15	83.34	20328.51	3.39	549.61	1.83	
5:40	0.9	0.31	0.18	N/A		0.1296	0.5774	173.23	0.00	286.14	3.97	361.28	20.00	169.26	6000.15	83.34	20328.51	3.39	85.92	0.29	
5:45	0.6	0.21	0.18	N/A		0.0255	0.1137	34.12	0.00	286.14	3.97	361.28	20.00	30.15	6000.15	83.34	20275.32	3.38	0.00	0.00	
5:50	0.5	0.17	0.18	0.16		0.0173	0.0773	23.18	0.00	286.14	3.97	361.28	20.00	19.21	6000.15	83.34	20211.20	3.37	0.00	0.00	
5:55	0.3	0.10	0.18	0.09		0.0104	0.0464	13.91	0.00	286.14	3.97	361.28	20.00	9.94	6000.15	83.34	20137.80	3.36	0.00	0.00	
6:00	0.2	0.07	0.18	0.06		0.0069	0.0309	9.27	0.00	286.14	3.97	361.28	20.00	5.30	6000.15	83.34	20059.76	3.34	0.00	0.00	
	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	357.31	19.68	0.00	6000.15	83.34	19976.43	3.33	0.00	0.00	
	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	353.33	19.37	0.00	6000.15	83.34	19893.09	3.32	0.00	0.00	
6:15	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	349.36	19.05	0.00	6000.15	83.34	19809.76	3.30	0.00	0.00	
	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	345.38	18.73	0.00	6000.15	83.34	19726.42	3.29	0.00	0.00	
	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	341.41	18.42	0.00	6000.15	83.34	19643.09	3.27	0.00	0.00	
6:30	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	337.44	18.10	0.00	6000.15	83.34	19559.75	3.26	0.00	0.00	
	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	333.46	17.79	0.00	6000.15	83.34	19476.41	3.25	0.00	0.00	
	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	329.49	17.47	0.00	6000.15	83.34	19393.08	3.23	0.00	0.00	
6:45	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	325.51	17.15	0.00	6000.15	83.34	19309.74	3.22	0.00	0.00	
	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	321.54	16.84	0.00	6000.15	83.34	19226.41	3.20	0.00	0.00	
	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	317.56	16.52	0.00	6000.15	83.34	19143.07	3.19	0.00	0.00	
7:00	0	0.00	0.18	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	313.59	16.20	0.00	6000.15	83.34	19059.74	3.18	0.00	0.00	
					Total volume (cf)			**29144.85**								**Total Overflow (cf)**			**3116.56**		

24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft	Overflow Vol. (cf)	Overflow Rate (cfs)
0:15	0.2	0.04	0.32	0.03	0.0036	0.0160	14.41	0.00	30.89	1.29	13.12	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:30	0.3	0.05	0.32	0.05	0.0054	0.0240	21.61	0.00	42.11	1.75	32.98	1.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:45	0.3	0.05	0.31	0.05	0.0054	0.0240	21.61	0.00	59.10	2.46	52.13	2.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1:00	0.4	0.07	0.31	0.06	0.0072	0.0320	28.82	0.00	75.47	3.14	77.80	3.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1:15	0.3	0.05	0.31	0.05	0.0054	0.0240	21.61	0.00	97.43	4.06	95.35	4.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1:30	0.3	0.05	0.30	0.05	0.0054	0.0240	21.61	0.00	112.44	4.69	112.28	5.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1:45	0.3	0.05	0.30	0.05	0.0054	0.0240	21.61	0.00	126.92	5.29	128.60	6.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2:00	0.4	0.07	0.29	0.06	0.0072	0.0320	28.82	0.00	140.88	5.87	151.55	7.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2:15	0.4	0.07	0.29	0.06	0.0072	0.0320	28.82	0.00	160.51	6.69	173.68	8.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2:30	0.4	0.07	0.29	0.06	0.0072	0.0320	28.82	0.00	179.43	7.48	195.02	9.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2:45	0.5	0.09	0.28	0.08	0.0090	0.0400	36.02	0.00	197.68	8.24	222.80	11.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:00	0.5	0.09	0.28	0.08	0.0090	0.0400	36.02	0.00	221.44	9.23	249.59	12.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:15	0.5	0.09	0.28	0.08	0.0090	0.0400	36.02	0.00	244.36	10.18	275.43	13.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:30	0.5	0.09	0.27	0.08	0.0090	0.0400	36.02	0.00	266.46	11.10	308.83	15.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3:45	0.5	0.09	0.27	0.08	0.0090	0.0400	36.02	0.00	286.14	11.92	332.93	17.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4:00	0.6	0.11	0.27	0.10	0.0108	0.0480	43.22	0.00	286.14	11.92	361.28	20.00	2.95	6000.15	2.95	0.00	0.00	0.00	0.00
4:15	0.6	0.11	0.26	0.10	0.0108	0.0480	43.22	0.00	286.14	11.92	361.28	20.00	31.30	6000.15	31.30	0.00	0.00	0.00	0.00
4:30	0.7	0.13	0.26	0.11	0.0126	0.0560	50.43	0.00	286.14	11.92	361.28	20.00	38.51	6000.15	38.51	0.00	0.00	0.00	0.00
4:45	0.7	0.13	0.26	0.11	0.0126	0.0560	50.43	0.00	286.14	11.92	361.28	20.00	38.51	6000.15	38.51	0.00	0.00	0.00	0.00
5:00	0.8	0.14	0.25	0.13	0.0144	0.0640	57.63	0.00	286.14	11.92	361.28	20.00	45.71	6000.15	45.71	0.00	0.00	0.00	0.00
5:15	0.6	0.11	0.25	0.10	0.0108	0.0480	43.22	0.00	286.14	11.92	361.28	20.00	31.30	6000.15	31.30	0.00	0.00	0.00	0.00
5:30	0.7	0.13	0.25	0.11	0.0126	0.0560	50.43	0.00	286.14	11.92	361.28	20.00	38.51	6000.15	38.51	0.00	0.00	0.00	0.00
5:45	0.8	0.14	0.24	0.13	0.0144	0.0640	57.63	0.00	286.14	11.92	361.28	20.00	45.71	6000.15	45.71	0.00	0.00	0.00	0.00
6:00	0.8	0.14	0.24	0.13	0.0144	0.0640	57.63	0.00	286.14	11.92	361.28	20.00	45.71	6000.15	45.71	0.00	0.00	0.00	0.00
6:15	0.9	0.16	0.24	0.15	0.0162	0.0720	64.84	0.00	286.14	11.92	361.28	20.00	52.91	6000.15	52.91	0.00	0.00	0.00	0.00
6:30	0.9	0.16	0.23	0.15	0.0162	0.0720	64.84	0.00	286.14	11.92	361.28	20.00	52.91	6000.15	52.91	0.00	0.00	0.00	0.00
6:45	1	0.18	0.23	0.16	0.0180	0.0800	72.04	0.00	286.14	11.92	361.28	20.00	60.12	6000.15	60.12	0.00	0.00	0.00	0.00
7:00	1	0.18	0.23	0.16	0.0180	0.0800	72.04	0.00	286.14	11.92	361.28	20.00	60.12	6000.15	60.12	0.00	0.00	0.00	0.00
7:15	1	0.18	0.22	0.16	0.0180	0.0800	72.04	0.00	286.14	11.92	361.28	20.00	60.12	6000.15	60.12	0.00	0.00	0.00	0.00
7:30	1.1	0.20	0.22	0.18	0.0198	0.0880	79.24	0.00	286.14	11.92	361.28	20.00	67.32	6000.15	67.32	0.00	0.00	0.00	0.00
7:45	1.2	0.22	0.22	0.19	0.0216	0.0961	86.45	0.00	286.14	11.92	361.28	20.00	74.53	6000.15	74.53	0.00	0.00	0.00	0.00
8:00	1.3	0.23	0.22	0.21	0.0233	0.1041	93.65	0.00	286.14	11.92	361.28	20.00	81.73	6000.15	81.73	0.00	0.00	0.00	0.00
8:15	1.5	0.27	0.21	N/A	0.0568	0.2534	228.03	0.00	286.14	11.92	361.28	20.00	216.11	6000.15	216.11	0.00	0.00	0.00	0.00
8:30	1.5	0.27	0.21	N/A	0.0598	0.2666	239.94	0.00	286.14	11.92	361.28	20.00	228.02	6000.15	228.02	0.00	0.00	0.00	0.00
8:45	1.6	0.29	0.21	N/A	0.0807	0.3598	323.79	0.00	286.14	11.92	361.28	20.00	311.87	6000.15	250.01	61.87	0.01	0.00	0.00
9:00	1.7	0.31	0.20	N/A	0.1016	0.4528	407.54	0.00	286.14	11.92	361.28	20.00	395.62	6000.15	250.01	207.48	0.03	0.00	0.00
9:15	1.9	0.34	0.20	N/A	0.1404	0.6258	563.22	0.00	286.14	11.92	361.28	20.00	551.29	6000.15	250.01	508.76	0.08	0.00	0.00
9:30	2	0.36	0.20	N/A	0.1612	0.7186	646.75	0.00	286.14	11.92	361.28	20.00	634.82	6000.15	250.01	893.58	0.15	0.00	0.00
9:45	2.1	0.38	0.20	N/A	0.1820	0.8113	730.17	0.00	286.14	11.92	361.28	20.00	718.25	6000.15	250.01	1361.82	0.23	0.00	0.00
10:00	2.2	0.40	0.19	N/A	0.2028	0.9039	813.48	0.00	286.14	11.92	361.28	20.00	801.56	6000.15	250.01	1913.38	0.32	0.00	0.00
10:15	1.5	0.27	0.19	N/A	0.0799	0.3560	320.36	0.00	286.14	11.92	361.28	20.00	308.44	6000.15	250.01	1971.81	0.33	0.00	0.00
10:30	1.5	0.27	0.19	N/A	0.0826	0.3682	331.41	0.00	286.14	11.92	361.28	20.00	319.49	6000.15	250.01	2041.29	0.34	0.00	0.00
10:45	2	0.36	0.18	N/A	0.1752	0.7806	702.55	0.00	286.14	11.92	361.28	20.00	690.63	6000.15	250.01	2481.92	0.41	0.00	0.00
11:00	2	0.36	0.18	N/A	0.1778	0.7926	713.38	0.00	286.14	11.92	361.28	20.00	701.46	6000.15	250.01	2933.37	0.49	0.00	0.00
11:15	1.9	0.34	0.18	N/A	0.1626	0.7245	652.05	0.00	286.14	11.92	361.28	20.00	640.13	6000.15	250.01	3323.49	0.55	0.00	0.00
11:30	1.9	0.34	0.18	N/A	0.1652	0.7363	662.65	0.00	286.14	11.92	361.28	20.00	650.73	6000.15	250.01	3724.21	0.62	0.00	0.00
11:45	1.7	0.31	0.17	N/A	0.1319	0.5878	529.05	0.00	286.14	11.92	361.28	20.00	517.13	6000.15	250.01	3991.33	0.67	0.00	0.00
12:00	1.8	0.32	0.17	N/A	0.1524	0.6794	611.45	0.00	286.14	11.92	361.28	20.00	599.53	6000.15	250.01	4340.86	0.72	0.00	0.00
12:15	2.5	0.45	0.17	N/A	0.2807	1.2511	1125.98	0.00	286.14	11.92	361.28	20.00	1114.06	6000.15	250.01	5204.91	0.87	0.00	0.00
12:30	2.6	0.47	0.17	N/A	0.3012	1.3424	1208.15	0.00	286.14	11.92	361.28	20.00	1196.23	6000.15	250.01	6151.13	1.03	0.00	0.00
12:45	2.8	0.50	0.16	N/A	0.3396	1.5136	1362.24	0.00	286.14	11.92	361.28	20.00	1350.31	6000.15	250.01	7251.44	1.21	0.00	0.00

13:00	2.9	0.52	0.16	N/A		0.3600	1.6046	1444.16	0.00	286.14	11.92	361.28	20.00	1432.24	6000.15	250.01	8433.67	1.41	0.00	0.00	
13:15	3.4	0.61	0.16	N/A		0.4523	2.0157	1814.13	0.00	286.14	11.92	361.28	20.00	1802.20	6000.15	250.01	9985.87	1.66	0.00	0.00	
13:30	3.4	0.61	0.16	N/A		**0.4547**	**2.0264**	**1823.76**	0.00	286.14	11.92	361.28	20.00	1811.84	6000.15	250.01	11547.70	1.92	0.00	0.00	
13:45	2.3	0.41	0.15	N/A		0.2595	1.1565	1040.83	0.00	286.14	11.92	361.28	20.00	1028.91	6000.15	250.01	12326.61	2.05	0.00	0.00	
14:00	2.3	0.41	0.15	N/A		0.2618	1.1669	1050.22	0.00	286.14	11.92	361.28	20.00	1038.30	6000.15	250.01	13114.90	2.19	0.00	0.00	
14:15	2.7	0.48	0.15	N/A		0.3360	1.4974	1347.64	0.00	286.14	11.92	361.28	20.00	1335.72	6000.15	250.01	14200.61	2.37	0.00	0.00	
14:30	2.6	0.47	0.15	N/A		0.3203	1.4275	1284.73	0.00	286.14	11.92	361.28	20.00	1272.80	6000.15	250.01	15223.40	2.54	0.00	0.00	
14:45	2.6	0.47	0.14	N/A		0.3225	1.4375	1293.72	0.00	286.14	11.92	361.28	20.00	1281.80	6000.15	250.01	16255.20	2.71	0.00	0.00	
15:00	2.5	0.45	0.14	N/A		0.3068	1.3673	1230.55	0.00	286.14	11.92	361.28	20.00	1218.62	6000.15	250.01	17223.82	2.87	0.00	0.00	
15:15	2.4	0.43	0.14	N/A		0.2910	1.2969	1167.24	0.00	286.14	11.92	361.28	20.00	1155.31	6000.15	250.01	18129.13	3.02	0.00	0.00	
15:30	2.3	0.41	0.14	N/A		0.2752	1.2264	1103.79	0.00	286.14	11.92	361.28	20.00	1091.87	6000.15	250.01	18970.99	3.16	0.00	0.00	
15:45	1.9	0.34	0.14	N/A		0.2054	0.9157	824.09	0.00	286.14	11.92	361.28	20.00	812.16	6000.15	250.01	19533.14	3.26	0.00	0.00	
16:00	1.9	0.34	0.13	N/A		0.2075	0.9249	832.40	0.00	286.14	11.92	361.28	20.00	820.48	6000.15	250.01	20103.62	3.35	0.00	0.00	**PEAK**
16:15	0.4	0.07	0.13	0.06		0.0072	0.0320	28.82	0.00	286.14	11.92	361.28	20.00	16.89	6000.15	250.01	19870.50	3.31	0.00	0.00	
16:30	0.4	0.07	0.13	0.06		0.0072	0.0320	28.82	0.00	286.14	11.92	361.28	20.00	16.89	6000.15	250.01	19637.39	3.27	0.00	0.00	
16:45	0.3	0.05	0.13	0.05		0.0054	0.0240	21.61	0.00	286.14	11.92	361.28	20.00	9.69	6000.15	250.01	19397.07	3.23	0.00	0.00	
17:00	0.3	0.05	0.13	0.05		0.0054	0.0240	21.61	0.00	286.14	11.92	361.28	20.00	9.69	6000.15	250.01	19156.76	3.19	0.00	0.00	
17:15	0.5	0.09	0.12	0.08		0.0090	0.0400	36.02	0.00	286.14	11.92	361.28	20.00	24.10	6000.15	250.01	18930.85	3.16	0.00	0.00	
17:30	0.5	0.09	0.12	0.08		0.0090	0.0400	36.02	0.00	286.14	11.92	361.28	20.00	24.10	6000.15	250.01	18704.94	3.12	0.00	0.00	
17:45	0.5	0.09	0.12	0.08		0.0090	0.0400	36.02	0.00	286.14	11.92	361.28	20.00	24.10	6000.15	250.01	18479.03	3.08	0.00	0.00	
18:00	0.4	0.07	0.12	0.06		0.0072	0.0320	28.82	0.00	286.14	11.92	361.28	20.00	16.89	6000.15	250.01	18245.92	3.04	0.00	0.00	
18:15	0.4	0.07	0.12	0.06		0.0072	0.0320	28.82	0.00	286.14	11.92	361.28	20.00	16.89	6000.15	250.01	18012.80	3.00	0.00	0.00	
18:30	0.4	0.07	0.12	0.06		0.0072	0.0320	28.82	0.00	286.14	11.92	361.28	20.00	16.89	6000.15	250.01	17779.69	2.96	0.00	0.00	
18:45	0.3	0.05	0.11	0.05		0.0054	0.0240	21.61	0.00	286.14	11.92	361.28	20.00	9.69	6000.15	250.01	17539.37	2.92	0.00	0.00	
19:00	0.2	0.04	0.11	0.03		0.0036	0.0160	14.41	0.00	286.14	11.92	361.28	20.00	2.49	6000.15	250.01	17291.85	2.88	0.00	0.00	
19:15	0.3	0.05	0.11	0.05		0.0054	0.0240	21.61	0.00	286.14	11.92	361.28	20.00	9.69	6000.15	250.01	17051.54	2.84	0.00	0.00	
19:30	0.4	0.07	0.11	0.06		0.0072	0.0320	28.82	0.00	286.14	11.92	361.28	20.00	16.89	6000.15	250.01	16818.42	2.80	0.00	0.00	
19:45	0.3	0.05	0.11	0.05		0.0054	0.0240	21.61	0.00	286.14	11.92	361.28	20.00	9.69	6000.15	250.01	16578.11	2.76	0.00	0.00	
20:00	0.2	0.04	0.11	0.03		0.0036	0.0160	14.41	0.00	286.14	11.92	361.28	20.00	2.49	6000.15	250.01	16330.59	2.72	0.00	0.00	
20:15	0.3	0.05	0.10	0.05		0.0054	0.0240	21.61	0.00	286.14	11.92	361.28	20.00	9.69	6000.15	250.01	16090.27	2.68	0.00	0.00	
20:30	0.3	0.05	0.10	0.05		0.0054	0.0240	21.61	0.00	286.14	11.92	361.28	20.00	9.69	6000.15	250.01	15849.95	2.64	0.00	0.00	
20:45	0.3	0.05	0.10	0.05		0.0054	0.0240	21.61	0.00	286.14	11.92	361.28	20.00	9.69	6000.15	250.01	15609.64	2.60	0.00	0.00	
21:00	0.2	0.04	0.10	0.03		0.0036	0.0160	14.41	0.00	286.14	11.92	361.28	20.00	2.49	6000.15	250.01	15362.12	2.56	0.00	0.00	
21:15	0.3	0.05	0.10	0.05		0.0054	0.0240	21.61	0.00	286.14	11.92	361.28	20.00	9.69	6000.15	250.01	15121.80	2.52	0.00	0.00	
21:30	0.2	0.04	0.10	0.03		0.0036	0.0160	14.41	0.00	286.14	11.92	361.28	20.00	2.49	6000.15	250.01	14874.28	2.48	0.00	0.00	
21:45	0.3	0.05	0.10	0.05		0.0054	0.0240	21.61	0.00	286.14	11.92	361.28	20.00	9.69	6000.15	250.01	14633.96	2.44	0.00	0.00	
22:00	0.2	0.04	0.10	0.03		0.0036	0.0160	14.41	0.00	286.14	11.92	361.28	20.00	2.49	6000.15	250.01	14386.44	2.40	0.00	0.00	
22:15	0.3	0.05	0.10	0.05		0.0054	0.0240	21.61	0.00	286.14	11.92	361.28	20.00	9.69	6000.15	250.01	14146.12	2.36	0.00	0.00	
22:30	0.2	0.04	0.09	0.03		0.0036	0.0160	14.41	0.00	286.14	11.92	361.28	20.00	2.49	6000.15	250.01	13898.60	2.32	0.00	0.00	
22:45	0.2	0.04	0.09	0.03		0.0036	0.0160	14.41	0.00	286.14	11.92	361.28	20.00	2.49	6000.15	250.01	13651.08	2.28	0.00	0.00	
23:00	0.2	0.04	0.09	0.03		0.0036	0.0160	14.41	0.00	286.14	11.92	361.28	20.00	2.49	6000.15	250.01	13403.56	2.23	0.00	0.00	
23:15	0.2	0.04	0.09	0.03		0.0036	0.0160	14.41	0.00	286.14	11.92	361.28	20.00	2.49	6000.15	250.01	13156.04	2.19	0.00	0.00	
23:30	0.2	0.04	0.09	0.03		0.0036	0.0160	14.41	0.00	286.14	11.92	361.28	20.00	2.49	6000.15	250.01	12908.52	2.15	0.00	0.00	
23:45	0.2	0.04	0.09	0.03		0.0036	0.0160	14.41	0.00	286.14	11.92	361.28	20.00	2.49	6000.15	250.01	12661.00	2.11	0.00	0.00	
24:00	0.2	0.04	0.09	0.03		0.0036	0.0160	14.41	0.00	286.14	11.92	361.28	20.00	2.49	6000.15	250.01	12413.48	2.07	0.00	0.00	
	0	0.00	0.09	0.00		0.0000	0.0000	0.00	0.00	286.14	11.92	349.36	19.05	0.00	6000.15	250.01	12163.47	2.03	0.00	0.00	
					Total volume (cf)			**30597.87**									**Total Overflow (cf)**		**0.00**		

HYDROLOGY CALCULATIONS - UNIVERSITY PARK

Using the RCFC&WCD Short Cut Unit Hydrograph Method

Area Designations — **Proposed Conditions*- Basin C - UG Retention (Gerald Ford & Tech)**

*receiving runoff from north half of College Dr. from northwestern University Park/College intersection to College/Technology intersection, west half of Technology Dr., and south half of Gerald Ford Dr. from Pacific Ave/Gerald Ford intersection to Gerald Ford/Technology intersection and 1.88 acres of on-site development.

Drainage Area (ac.)	**8.2800**				
Unit time (minutes)	**5**	**5**	**5**	**15**	
100 Year Storm Duration (hrs)	1	3	6	24	
Total Precipitation (Plates D-4.4,E-5.2, 5.4, 5.6)(in.)	**1.53**	**2.21**	**2.89**	**4.49**	Or data from NOAA interactive website
Soils Group	A				
AMC index II Runoff Number (plate E-6.1)	32				
Plate E-6.2 Pervious Area Loss Rate (Fp)(in/hr)	0.74	(AMC II)			
Percentage of Impervious Cover (Ai)(%) (plate E-6.3)		**75.2**			
Weighted Average Loss Rate (F=Fp(1-.9Ai))(in./hr.)	0.24	(used for 1, 3, and 6 hour storm, the 24 hour storm uses variable maximum loss rate per plate E-1.1 (3 of 6))			
Low Loss Rate Percent (%)	90				
Retention Basin Percolation Rate (in/hr)	**2**	(also used for drywell percolation rate)			

Percolation is taken incrementally.

Basin volume is calculated using the "truncated pyramid" formula, a more conservative estimate than "averaged end areas" sometimes used

(Drywell can be "zeroed out" by reducing numbers to less than .001, but should not entered as zeros or program chokes.)

Drywell storage includes 40% of the 1' wide rock bed surrounding the drywell: formula (upper)*PI()*(diam/2)^2+(lower)*PI()*((diam/2)^2+0.4*((diam/2+(grav+0.4166))^2-(diam/2+0.4166)^2))

The drywell wall thickness is assumed at 5" (0.4166) and the gravel bed width is variable "grav"

Drywell is zeroed out by entering .001 for values

Drywell design factors **Upper sec. (ft.)=** **5** **Lower sec. (ft.)=** **15** **Ring diam. (ft.) =** **4** **Drywell lower max. (cf)=** **298.45** **Upper max.(cf)=** **62.83**

Gravel bed width around drwyell= **1** **Drywell total(cf)=** **361.28**

Ret. Basin design (area, depth) **Top =** **6552** s.f. **Bot. =** **6552** **s.f.** **Max. Depth (d)=** **5.067** **Max. storage=** **33198.98** (d/3)*(bottom+top+(bottom*top)^0.50)

Formulas **vol=(h/3)*(bottom+top+(bottom*top)^0.50)** **area=bottom+(h/d)*(top-bottom)** **h=(vol*3)/(bottom+top+(bottom*top)^0.5)** **(values must be non-zero or error occurs)**

Outside input from: **N/A**

1 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Max.	Value Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft	Overflow Vol. (cf)	Overflow Rate (cfs)	
0:05	3.7	0.6793	0.2392	N/A	0.4402	3.6748	1102.45	0.00	30.89	0.43	361.28	20.00	740.74	6552.00	91.00	649.74	0.10	0.00	0.00	
0:10	4.8	0.8813	0.2392	N/A	0.6421	5.3610	1608.30	0.00	286.14	3.97	361.28	20.00	1604.32	6552.00	91.00	2163.06	0.33	0.00	0.00	
0:15	5.1	0.9364	0.2392	N/A	0.6972	5.8209	1746.26	0.00	286.14	3.97	361.28	20.00	1742.28	6552.00	91.00	3814.35	0.58	0.00	0.00	
0:20	4.9	0.8996	0.2392	N/A	0.6605	5.5143	1654.28	0.00	286.14	3.97	361.28	20.00	1650.31	6552.00	91.00	5373.66	0.82	0.00	0.00	
0:25	6.6	1.2118	0.2392	N/A	0.9726	8.1202	2436.05	0.00	286.14	3.97	361.28	20.00	2432.08	6552.00	91.00	7714.73	1.18	0.00	0.00	
0:30	7.3	1.3403	0.2392	N/A	1.1011	9.1932	2757.96	0.00	286.14	3.97	361.28	20.00	2753.98	6552.00	91.00	10377.71	1.58	0.00	0.00	
0:35	8.4	1.5422	0.2392	N/A	1.3031	10.8793	3263.80	0.00	286.14	3.97	361.28	20.00	3259.83	6552.00	91.00	13546.54	2.07	0.00	0.00	
0:40	9	1.6524	0.2392	N/A	1.4132	11.7991	3539.72	0.00	286.14	3.97	361.28	20.00	3535.75	6552.00	91.00	16991.29	2.59	0.00	0.00	
0:45	12.3	2.2583	0.2392	N/A	2.0191	16.8576	5057.27	0.00	286.14	3.97	361.28	20.00	5053.30	6552.00	91.00	21953.59	3.35	0.00	0.00	
0:50	17.6	3.2314	0.2392	N/A	**2.9922**	**24.9818**	**7494.54**	0.00	286.14	3.97	361.28	20.00	7490.57	6552.00	91.00	29353.16	4.48	0.00	0.00	**PEAK**
0:55	16.1	2.9560	0.2392	N/A	2.7168	22.6825	6804.75	0.00	286.14	3.97	361.28	20.00	6800.77	6552.00	91.00	33198.98	5.07	2863.95	9.55	
1:00	4.2	0.7711	0.2392	N/A	0.5320	4.4413	1332.38	0.00	286.14	3.97	361.28	20.00	1328.41	6552.00	91.00	33198.98	5.07	1237.41	4.12	
	0	0.0000	0.2392	0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	357.31	19.68	0.00	6552.00	91.00	33107.98	5.05	0.00	0.00	
	0	0.0000	0.2392	0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	353.33	19.37	0.00	6552.00	91.00	33016.98	5.04	0.00	0.00	
1:15	0	0.0000	0.2392	0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	349.36	19.05	0.00	6552.00	91.00	32925.98	5.03	0.00	0.00	
					Total volume (cf)		**38797.76**								**Total Overflow (cf)**			**4101.35**		

3 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Max.	Value Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft	Overflow Vol. (cf)	Overflow Rate (cfs)	
0:05	1.3	0.34	0.24	N/A	0.1056	0.8816	264.48	0.00	30.89	0.43	264.05	13.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
0:10	1.3	0.34	0.24	N/A	0.1056	0.8816	264.48	0.00	256.72	3.57	361.28	20.00	163.68	6552.00	91.00	72.68	0.01	0.00	0.00	
0:15	1.1	0.29	0.24	N/A	0.0526	0.4388	131.63	0.00	286.14	3.97	361.28	20.00	127.65	6552.00	91.00	109.33	0.02	0.00	0.00	
0:20	1.5	0.40	0.24	N/A	0.1586	1.3244	397.33	0.00	286.14	3.97	361.28	20.00	393.35	6552.00	91.00	411.68	0.06	0.00	0.00	
0:25	1.5	0.40	0.24	N/A	0.1586	1.3244	397.33	0.00	286.14	3.97	361.28	20.00	393.35	6552.00	91.00	714.03	0.11	0.00	0.00	
0:30	1.8	0.48	0.24	N/A	0.2382	1.9887	596.60	0.00	286.14	3.97	361.28	20.00	592.63	6552.00	91.00	1215.66	0.19	0.00	0.00	
0:35	1.5	0.40	0.24	N/A	0.1586	1.3244	397.33	0.00	286.14	3.97	361.28	20.00	393.35	6552.00	91.00	1518.01	0.23	0.00	0.00	
0:40	1.8	0.48	0.24	N/A	0.2382	1.9887	596.60	0.00	286.14	3.97	361.28	20.00	592.63	6552.00	91.00	2019.63	0.31	0.00	0.00	
0:45	1.8	0.48	0.24	N/A	0.2382	1.9887	596.60	0.00	286.14	3.97	361.28	20.00	592.63	6552.00	91.00	2521.26	0.38	0.00	0.00	
0:50	1.5	0.40	0.24	N/A	0.1586	1.3244	397.33	0.00	286.14	3.97	361.28	20.00	393.35	6552.00	91.00	2823.61	0.43	0.00	0.00	
0:55	1.6	0.42	0.24	N/A	0.1852	1.5458	463.75	0.00	286.14	3.97	361.28	20.00	459.78	6552.00	91.00	3192.39	0.49	0.00	0.00	
1:00	1.8	0.48	0.24	N/A	0.2382	1.9887	596.60	0.00	286.14	3.97	361.28	20.00	592.63	6552.00	91.00	3694.01	0.56	0.00	0.00	
1:05	2.2	0.58	0.24	N/A	0.3443	2.8743	862.30	0.00	286.14	3.97	361.28	20.00	858.32	6552.00	91.00	4461.34	0.68	0.00	0.00	
1:10	2.2	0.58	0.24	N/A	0.3443	2.8743	862.30	0.00	286.14	3.97	361.28	20.00	858.32	6552.00	91.00	5228.66	0.80	0.00	0.00	
1:15	2.2	0.58	0.24	N/A	0.3443	2.8743	862.30	0.00	286.14	3.97	361.28	20.00	858.32	6552.00	91.00	5995.98	0.92	0.00	0.00	
1:20	2	0.53	0.24	N/A	0.2912	2.4315	729.45	0.00	286.14	3.97	361.28	20.00	725.47	6552.00	91.00	6630.46	1.01	0.00	0.00	
1:25	2.6	0.69	0.24	N/A	0.4504	3.7600	1128.00	0.00	286.14	3.97	361.28	20.00	1124.02	6552.00	91.00	7663.48	1.17	0.00	0.00	
1:30	2.7	0.72	0.24	N/A	0.4769	3.9814	1194.42	0.00	286.14	3.97	361.28	20.00	1190.45	6552.00	91.00	8762.93	1.34	0.00	0.00	
1:35	2.4	0.64	0.24	N/A	0.3973	3.3172	995.15	0.00	286.14	3.97	361.28	20.00	991.17	6552.00	91.00	9663.10	1.47	0.00	0.00	
1:40	2.7	0.72	0.24	N/A	0.4769	3.9814	1194.42	0.00	286.14	3.97	361.28	20.00	1190.45	6552.00	91.00	10762.55	1.64	0.00	0.00	
1:45	3.3	0.88	0.24	N/A	0.6360	5.3099	1592.97	0.00	286.14	3.97	361.28	20.00	1588.99	6552.00	91.00	12260.54	1.87	0.00	0.00	
1:50	3.1	0.82	0.24	N/A	0.5830	4.8671	1460.12	0.00	286.14	3.97	361.28	20.00	1456.15	6552.00	91.00	13625.69	2.08	0.00	0.00	
1:55	2.9	0.77	0.24	N/A	0.5299	4.4242	1327.27	0.00	286.14	3.97	361.28	20.00	1323.30	6552.00	91.00	14857.99	2.27	0.00	0.00	
2:00	3	0.80	0.24	N/A	0.5564	4.6457	1393.70	0.00	286.14	3.97	361.28	20.00	1389.72	6552.00	91.00	16156.71	2.47	0.00	0.00	
2:05	3.1	0.82	0.24	N/A	0.5830	4.8671	1460.12	0.00	286.14	3.97	361.28	20.00	1456.15	6552.00	91.00	17521.85	2.67	0.00	0.00	
2:10	4.2	1.11	0.24	N/A	0.8747	7.3026	2190.79	0.00	286.14	3.97	361.28	20.00	2186.82	6552.00	91.00	19617.67	2.99	0.00	0.00	
2:15	5	1.33	0.24	N/A	1.0868	9.0740	2722.19	0.00	286.14	3.97	361.28	20.00	2718.21	6552.00	91.00	22244.88	3.40	0.00	0.00	
2:20	3.5	0.93	0.24	N/A	0.6890	5.7527	1725.82	0.00	286.14	3.97	361.28	20.00	1721.84	6552.00	91.00	23875.73	3.64	0.00	0.00	
2:25	6.8	1.80	0.24	N/A	1.5642	13.0594	3917.83	0.00	286.14	3.97	361.28	20.00	3913.86	6552.00	91.00	27698.58	4.23	0.00	0.00	
2:30	7.3	1.94	0.24	N/A	1.6968	14.1665	4249.95	0.00	286.14	3.97	361.28	20.00	4245.98	6552.00	91.00	31853.57	4.86	0.00	0.00	
2:35	8.2	2.17	0.24	N/A	**1.9355**	**16.1593**	**4847.78**	0.00	286.14	3.97	361.28	20.00	4843.80	6552.00	91.00	33198.98	5.07	3407.38	11.36	
2:40	5.9	1.56	0.24	N/A	1.3255	11.0667	3320.01	0.00	286.14	3.97	361.28	20.00	3316.04	6552.00	91.00	33198.98	5.07	3225.04	10.75	**PEAK**
2:45	2	0.53	0.24	N/A	0.2912	2.4315	729.45	0.00	286.14	3.97	361.28	20.00	725.47	6552.00	91.00	33198.98	5.07	634.47	2.11	
2:50	1.8	0.48	0.24	N/A	0.2382	1.9887	596.60	0.00	286.14	3.97	361.28	20.00	592.63	6552.00	91.00	33198.98	5.07	501.63	1.67	
2:55	1.8	0.48	0.24	N/A	0.2382	1.9887	596.60	0.00	286.14	3.97	361.28	20.00	592.63	6552.00	91.00	33198.98	5.07	501.63	1.67	
3:00	0.6	0.16	0.24	0.14	0.0159	0.1328	39.85	0.00	286.14	3.97	361.28	20.00	35.88	6552.00	91.00	33143.86	5.06	0.00	0.00	
	0	0.00	0.24	0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	357.31	19.68	0.00	6552.00	91.00	33052.86	5.04	0.00	0.00	
	0	0.00	0.24	0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	353.33	19.37	0.00	6552.00	91.00	32961.86	5.03	0.00	0.00	
3:15	0	0.00	0.24	0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	349.36	19.05	0.00	6552.00	91.00	32870.86	5.02	0.00	0.00	
	0	0.00	0.24	0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	345.38	18.73	0.00	6552.00	91.00	32779.86	5.00	0.00	0.00	
	0	0.00	0.24	0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	341.41	18.42	0.00	6552.00	91.00	32688.86	4.99	0.00	0.00	
3:30	0	0.00	0.24	0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	337.44	18.10	0.00	6552.00	91.00	32597.86	4.98	0.00	0.00	
	0	0.00	0.24	0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	333.46	17.79	0.00	6552.00	91.00	32506.86	4.96	0.00	0.00	
	0	0.00	0.24	0.00	0.0000	0.0000	0.00	0.00	286.14	3.97	329.49	17.47	0.00	6552.00	91.00	32415.86	4.95	0.00	0.00	
					Total volume (cf)		**45099.41**								**Total Overflow (cf)**			**8270.14**		

6 Hour Storm in 5 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft	Overflow Vol. (cf)	Overflow Rate (cfs)
0:05	0.5	0.17	0.24	0.16	0.0173	0.1448	43.43	0.00	30.89	0.43	43.00	2.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:10	0.6	0.21	0.24	0.19	0.0208	0.1737	52.12	0.00	67.67	0.94	94.18	4.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:15	0.6	0.21	0.24	0.19	0.0208	0.1737	52.12	0.00	111.44	1.55	144.75	7.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:20	0.6	0.21	0.24	0.19	0.0208	0.1737	52.12	0.00	154.69	2.15	194.72	9.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:25	0.6	0.21	0.24	0.19	0.0208	0.1737	52.12	0.00	197.43	2.74	244.10	12.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:30	0.7	0.24	0.24	0.22	0.0243	0.2027	60.80	0.00	239.66	3.33	321.60	16.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:35	0.7	0.24	0.24	0.22	0.0243	0.2027	60.80	0.00	286.14	3.97	361.28	20.00	17.14	6552.00	17.14	0.00	0.00	0.00	0.00
0:40	0.7	0.24	0.24	0.22	0.0243	0.2027	60.80	0.00	286.14	3.97	361.28	20.00	56.83	6552.00	56.83	0.00	0.00	0.00	0.00
0:45	0.7	0.24	0.24	0.22	0.0243	0.2027	60.80	0.00	286.14	3.97	361.28	20.00	56.83	6552.00	56.83	0.00	0.00	0.00	0.00
0:50	0.7	0.24	0.24	0.22	0.0243	0.2027	60.80	0.00	286.14	3.97	361.28	20.00	56.83	6552.00	56.83	0.00	0.00	0.00	0.00
0:55	0.7	0.24	0.24	0.22	0.0243	0.2027	60.80	0.00	286.14	3.97	361.28	20.00	56.83	6552.00	56.83	0.00	0.00	0.00	0.00
1:00	0.8	0.28	0.24	N/A	0.0383	0.3195	95.86	0.00	286.14	3.97	361.28	20.00	91.89	6552.00	91.00	0.89	0.00	0.00	0.00
1:05	0.8	0.28	0.24	N/A	0.0383	0.3195	95.86	0.00	286.14	3.97	361.28	20.00	91.89	6552.00	91.00	1.77	0.00	0.00	0.00
1:10	0.8	0.28	0.24	N/A	0.0383	0.3195	95.86	0.00	286.14	3.97	361.28	20.00	91.89	6552.00	91.00	2.66	0.00	0.00	0.00
1:15	0.8	0.28	0.24	N/A	0.0383	0.3195	95.86	0.00	286.14	3.97	361.28	20.00	91.89	6552.00	91.00	3.54	0.00	0.00	0.00
1:20	0.8	0.28	0.24	N/A	0.0383	0.3195	95.86	0.00	286.14	3.97	361.28	20.00	91.89	6552.00	91.00	4.43	0.00	0.00	0.00
1:25	0.8	0.28	0.24	N/A	0.0383	0.3195	95.86	0.00	286.14	3.97	361.28	20.00	91.89	6552.00	91.00	5.31	0.00	0.00	0.00
1:30	0.8	0.28	0.24	N/A	0.0383	0.3195	95.86	0.00	286.14	3.97	361.28	20.00	91.89	6552.00	91.00	6.20	0.00	0.00	0.00
1:35	0.8	0.28	0.24	N/A	0.0383	0.3195	95.86	0.00	286.14	3.97	361.28	20.00	91.89	6552.00	91.00	7.09	0.00	0.00	0.00
1:40	0.8	0.28	0.24	N/A	0.0383	0.3195	95.86	0.00	286.14	3.97	361.28	20.00	91.89	6552.00	91.00	7.97	0.00	0.00	0.00
1:45	0.8	0.28	0.24	N/A	0.0383	0.3195	95.86	0.00	286.14	3.97	361.28	20.00	91.89	6552.00	91.00	8.86	0.00	0.00	0.00
1:50	0.8	0.28	0.24	N/A	0.0383	0.3195	95.86	0.00	286.14	3.97	361.28	20.00	91.89	6552.00	91.00	9.74	0.00	0.00	0.00
1:55	0.8	0.28	0.24	N/A	0.0383	0.3195	95.86	0.00	286.14	3.97	361.28	20.00	91.89	6552.00	91.00	10.63	0.00	0.00	0.00
2:00	0.9	0.31	0.24	N/A	0.0730	0.6091	182.72	0.00	286.14	3.97	361.28	20.00	178.75	6552.00	91.00	98.38	0.02	0.00	0.00
2:05	0.8	0.28	0.24	N/A	0.0383	0.3195	95.86	0.00	286.14	3.97	361.28	20.00	91.89	6552.00	91.00	99.26	0.02	0.00	0.00
2:10	0.9	0.31	0.24	N/A	0.0730	0.6091	182.72	0.00	286.14	3.97	361.28	20.00	178.75	6552.00	91.00	187.01	0.03	0.00	0.00
2:15	0.9	0.31	0.24	N/A	0.0730	0.6091	182.72	0.00	286.14	3.97	361.28	20.00	178.75	6552.00	91.00	274.76	0.04	0.00	0.00
2:20	0.9	0.31	0.24	N/A	0.0730	0.6091	182.72	0.00	286.14	3.97	361.28	20.00	178.75	6552.00	91.00	362.51	0.06	0.00	0.00
2:25	0.9	0.31	0.24	N/A	0.0730	0.6091	182.72	0.00	286.14	3.97	361.28	20.00	178.75	6552.00	91.00	450.26	0.07	0.00	0.00
2:30	0.9	0.31	0.24	N/A	0.0730	0.6091	182.72	0.00	286.14	3.97	361.28	20.00	178.75	6552.00	91.00	538.01	0.08	0.00	0.00
2:35	0.9	0.31	0.24	N/A	0.0730	0.6091	182.72	0.00	286.14	3.97	361.28	20.00	178.75	6552.00	91.00	625.75	0.10	0.00	0.00
2:40	0.9	0.31	0.24	N/A	0.0730	0.6091	182.72	0.00	286.14	3.97	361.28	20.00	178.75	6552.00	91.00	713.50	0.11	0.00	0.00
2:45	1	0.35	0.24	N/A	0.1076	0.8986	269.59	0.00	286.14	3.97	361.28	20.00	265.61	6552.00	91.00	888.11	0.14	0.00	0.00
2:50	1	0.35	0.24	N/A	0.1076	0.8986	269.59	0.00	286.14	3.97	361.28	20.00	265.61	6552.00	91.00	1062.73	0.16	0.00	0.00
2:55	1	0.35	0.24	N/A	0.1076	0.8986	269.59	0.00	286.14	3.97	361.28	20.00	265.61	6552.00	91.00	1237.34	0.19	0.00	0.00
3:00	1	0.35	0.24	N/A	0.1076	0.8986	269.59	0.00	286.14	3.97	361.28	20.00	265.61	6552.00	91.00	1411.95	0.22	0.00	0.00
3:05	1	0.35	0.24	N/A	0.1076	0.8986	269.59	0.00	286.14	3.97	361.28	20.00	265.61	6552.00	91.00	1586.56	0.24	0.00	0.00
3:10	1.1	0.38	0.24	N/A	0.1423	1.1882	356.45	0.00	286.14	3.97	361.28	20.00	352.47	6552.00	91.00	1848.04	0.28	0.00	0.00
3:15	1.1	0.38	0.24	N/A	0.1423	1.1882	356.45	0.00	286.14	3.97	361.28	20.00	352.47	6552.00	91.00	2109.51	0.32	0.00	0.00
3:20	1.1	0.38	0.24	N/A	0.1423	1.1882	356.45	0.00	286.14	3.97	361.28	20.00	352.47	6552.00	91.00	2370.99	0.36	0.00	0.00
3:25	1.2	0.42	0.24	N/A	0.1770	1.4777	443.31	0.00	286.14	3.97	361.28	20.00	439.34	6552.00	91.00	2719.32	0.42	0.00	0.00
3:30	1.3	0.45	0.24	N/A	0.2117	1.7672	530.17	0.00	286.14	3.97	361.28	20.00	526.20	6552.00	91.00	3154.52	0.48	0.00	0.00
3:35	1.4	0.49	0.24	N/A	0.2464	2.0568	617.04	0.00	286.14	3.97	361.28	20.00	613.06	6552.00	91.00	3676.59	0.56	0.00	0.00
3:40	1.4	0.49	0.24	N/A	0.2464	2.0568	617.04	0.00	286.14	3.97	361.28	20.00	613.06	6552.00	91.00	4198.65	0.64	0.00	0.00
3:45	1.5	0.52	0.24	N/A	0.2810	2.3463	703.90	0.00	286.14	3.97	361.28	20.00	699.93	6552.00	91.00	4807.58	0.73	0.00	0.00
3:50	1.5	0.52	0.24	N/A	0.2810	2.3463	703.90	0.00	286.14	3.97	361.28	20.00	699.93	6552.00	91.00	5416.50	0.83	0.00	0.00
3:55	1.6	0.55	0.24	N/A	0.3157	2.6359	790.76	0.00	286.14	3.97	361.28	20.00	786.79	6552.00	91.00	6112.29	0.93	0.00	0.00
4:00	1.6	0.55	0.24	N/A	0.3157	2.6359	790.76	0.00	286.14	3.97	361.28	20.00	786.79	6552.00	91.00	6808.08	1.04	0.00	0.00
4:05	1.7	0.59	0.24	N/A	0.3504	2.9254	877.63	0.00	286.14	3.97	361.28	20.00	873.65	6552.00	91.00	7590.74	1.16	0.00	0.00
4:10	1.8	0.62	0.24	N/A	0.3851	3.2150	964.49	0.00	286.14	3.97	361.28	20.00	960.52	6552.00	91.00	8460.25	1.29	0.00	0.00
4:15	1.9	0.66	0.24	N/A	0.4198	3.5045	1051.35	0.00	286.14	3.97	361.28	20.00	1047.38	6552.00	91.00	9416.63	1.44	0.00	0.00

4:20	2	0.69	0.24	N/A		0.4544	3.7941	1138.22	0.00	286.14	3.97	361.28	20.00	1134.24	6552.00	91.00	10459.87	1.60	0.00	0.00	
4:25	2.1	0.73	0.24	N/A		0.4891	4.0836	1225.08	0.00	286.14	3.97	361.28	20.00	1221.10	6552.00	91.00	11589.98	1.77	0.00	0.00	
4:30	2.1	0.73	0.24	N/A		0.4891	4.0836	1225.08	0.00	286.14	3.97	361.28	20.00	1221.10	6552.00	91.00	12720.08	1.94	0.00	0.00	
4:35	2.2	0.76	0.24	N/A		0.5238	4.3731	1311.94	0.00	286.14	3.97	361.28	20.00	1307.97	6552.00	91.00	13937.05	2.13	0.00	0.00	
4:40	2.3	0.80	0.24	N/A		0.5585	4.6627	1398.80	0.00	286.14	3.97	361.28	20.00	1394.83	6552.00	91.00	15240.88	2.33	0.00	0.00	
4:45	2.4	0.83	0.24	N/A		0.5932	4.9522	1485.67	0.00	286.14	3.97	361.28	20.00	1481.69	6552.00	91.00	16631.57	2.54	0.00	0.00	
4:50	2.4	0.83	0.24	N/A		0.5932	4.9522	1485.67	0.00	286.14	3.97	361.28	20.00	1481.69	6552.00	91.00	18022.27	2.75	0.00	0.00	
4:55	2.5	0.87	0.24	N/A		0.6278	5.2418	1572.53	0.00	286.14	3.97	361.28	20.00	1568.56	6552.00	91.00	19499.82	2.98	0.00	0.00	
5:00	2.6	0.90	0.24	N/A		0.6625	5.5313	1659.39	0.00	286.14	3.97	361.28	20.00	1655.42	6552.00	91.00	21064.24	3.21	0.00	0.00	
5:05	3.1	1.08	0.24	N/A		0.8359	6.9790	2093.71	0.00	286.14	3.97	361.28	20.00	2089.73	6552.00	91.00	23062.98	3.52	0.00	0.00	
5:10	3.6	1.25	0.24	N/A		1.0093	8.4267	2528.02	0.00	286.14	3.97	361.28	20.00	2524.05	6552.00	91.00	25496.03	3.89	0.00	0.00	
5:15	3.9	1.35	0.24	N/A		1.1134	9.2954	2788.61	0.00	286.14	3.97	361.28	20.00	2784.64	6552.00	91.00	28189.67	4.30	0.00	0.00	
5:20	4.2	1.46	0.24	N/A		1.2174	10.1640	3049.20	0.00	286.14	3.97	361.28	20.00	3045.23	6552.00	91.00	31143.89	4.75	0.00	0.00	
5:25	4.7	1.63	0.24	N/A		1.3908	11.6117	3483.52	0.00	286.14	3.97	361.28	20.00	3479.54	6552.00	91.00	33198.98	5.07	1333.45	4.44	
5:30	5.6	1.94	0.24	N/A		**1.7029**	**14.2176**	**4265.28**	0.00	286.14	3.97	361.28	20.00	4261.31	6552.00	91.00	33198.98	5.07	4170.31	13.90	**PEAK**
5:35	1.9	0.66	0.24	N/A		0.4198	3.5045	1051.35	0.00	286.14	3.97	361.28	20.00	1047.38	6552.00	91.00	33198.98	5.07	956.38	3.19	
5:40	0.9	0.31	0.24	N/A		0.0730	0.6091	182.72	0.00	286.14	3.97	361.28	20.00	178.75	6552.00	91.00	33198.98	5.07	87.75	0.29	
5:45	0.6	0.21	0.24	0.19		0.0208	0.1737	52.12	0.00	286.14	3.97	361.28	20.00	48.14	6552.00	91.00	33156.13	5.06	0.00	0.00	
5:50	0.5	0.17	0.24	0.16		0.0173	0.1448	43.43	0.00	286.14	3.97	361.28	20.00	39.46	6552.00	91.00	33104.58	5.05	0.00	0.00	
5:55	0.3	0.10	0.24	0.09		0.0104	0.0869	26.06	0.00	286.14	3.97	361.28	20.00	22.08	6552.00	91.00	33035.67	5.04	0.00	0.00	
6:00	0.2	0.07	0.24	0.06		0.0069	0.0579	17.37	0.00	286.14	3.97	361.28	20.00	13.40	6552.00	91.00	32958.07	5.03	0.00	0.00	
	0	0.00	0.24	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	357.31	19.68	0.00	6552.00	91.00	32867.07	5.02	0.00	0.00	
	0	0.00	0.24	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	353.33	19.37	0.00	6552.00	91.00	32776.07	5.00	0.00	0.00	
6:15	0	0.00	0.24	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	349.36	19.05	0.00	6552.00	91.00	32685.07	4.99	0.00	0.00	
	0	0.00	0.24	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	345.38	18.73	0.00	6552.00	91.00	32594.07	4.97	0.00	0.00	
	0	0.00	0.24	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	341.41	18.42	0.00	6552.00	91.00	32503.07	4.96	0.00	0.00	
6:30	0	0.00	0.24	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	337.44	18.10	0.00	6552.00	91.00	32412.07	4.95	0.00	0.00	
	0	0.00	0.24	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	333.46	17.79	0.00	6552.00	91.00	32321.07	4.93	0.00	0.00	
	0	0.00	0.24	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	329.49	17.47	0.00	6552.00	91.00	32230.07	4.92	0.00	0.00	
6:45	0	0.00	0.24	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	325.51	17.15	0.00	6552.00	91.00	32139.07	4.91	0.00	0.00	
	0	0.00	0.24	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	321.54	16.84	0.00	6552.00	91.00	32048.07	4.89	0.00	0.00	
	0	0.00	0.24	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	317.56	16.52	0.00	6552.00	91.00	31957.07	4.88	0.00	0.00	
7:00	0	0.00	0.24	0.00		0.0000	0.0000	0.00	0.00	286.14	3.97	313.59	16.20	0.00	6552.00	91.00	31866.07	4.86	0.00	0.00	
					Total volume (cf)			**45916.11**								**Total Overflow (cf)**			**6547.89**		

24 Hour Storm in 15 minute increments

Time	Pattern %	Storm Rain (in/hr)	Loss Rate Value Max.	Min.	Effective Rain (in/hr)	Flow Rate (cfs)	Flow Vol. (cf)	Outside Input (cf)	Drywell Retention Area (sf)	Drywell Period Perc. (cf)	Drywell Storage Vol. (cf)	Drywell Storage Depth (ft)	Overflow To Basin (cf)	Retention Area (sf)	Basin Period Perc. (cf)	Basin Storage Vol. (cf)	Basin Storage Depth (ft	Overflow Vol. (cf)	Overflow Rate (cfs)
0:15	0.2	0.04	0.42	0.03	0.0036	0.0300	26.99	0.00	30.89	1.29	25.70	1.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:30	0.3	0.05	0.42	0.05	0.0054	0.0450	40.49	0.00	52.88	2.20	63.99	3.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0:45	0.3	0.05	0.41	0.05	0.0054	0.0450	40.49	0.00	85.62	3.57	100.90	5.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1:00	0.4	0.07	0.41	0.06	0.0072	0.0600	53.98	0.00	117.19	4.88	150.00	7.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1:15	0.3	0.05	0.40	0.05	0.0054	0.0450	40.49	0.00	159.18	6.63	183.86	9.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1:30	0.3	0.05	0.40	0.05	0.0054	0.0450	40.49	0.00	188.14	7.84	216.50	10.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1:45	0.3	0.05	0.39	0.05	0.0054	0.0450	40.49	0.00	216.06	9.00	247.99	12.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2:00	0.4	0.07	0.39	0.06	0.0072	0.0600	53.98	0.00	242.99	10.12	291.84	14.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2:15	0.4	0.07	0.38	0.06	0.0072	0.0600	53.98	0.00	280.49	11.69	336.57	18.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2:30	0.4	0.07	0.38	0.06	0.0072	0.0600	53.98	0.00	286.14	11.92	361.28	20.00	17.35	6552.00	17.35	0.00	0.00	0.00	0.00
2:45	0.5	0.09	0.37	0.08	0.0090	0.0750	67.48	0.00	286.14	11.92	361.28	20.00	55.55	6552.00	55.55	0.00	0.00	0.00	0.00
3:00	0.5	0.09	0.37	0.08	0.0090	0.0750	67.48	0.00	286.14	11.92	361.28	20.00	55.55	6552.00	55.55	0.00	0.00	0.00	0.00
3:15	0.5	0.09	0.36	0.08	0.0090	0.0750	67.48	0.00	286.14	11.92	361.28	20.00	55.55	6552.00	55.55	0.00	0.00	0.00	0.00
3:30	0.5	0.09	0.36	0.08	0.0090	0.0750	67.48	0.00	286.14	11.92	361.28	20.00	55.55	6552.00	55.55	0.00	0.00	0.00	0.00
3:45	0.5	0.09	0.35	0.08	0.0090	0.0750	67.48	0.00	286.14	11.92	361.28	20.00	55.55	6552.00	55.55	0.00	0.00	0.00	0.00
4:00	0.6	0.11	0.35	0.10	0.0108	0.0900	80.97	0.00	286.14	11.92	361.28	20.00	69.05	6552.00	69.05	0.00	0.00	0.00	0.00
4:15	0.6	0.11	0.35	0.10	0.0108	0.0900	80.97	0.00	286.14	11.92	361.28	20.00	69.05	6552.00	69.05	0.00	0.00	0.00	0.00
4:30	0.7	0.13	0.34	0.11	0.0126	0.1050	94.47	0.00	286.14	11.92	361.28	20.00	82.54	6552.00	82.54	0.00	0.00	0.00	0.00
4:45	0.7	0.13	0.34	0.11	0.0126	0.1050	94.47	0.00	286.14	11.92	361.28	20.00	82.54	6552.00	82.54	0.00	0.00	0.00	0.00
5:00	0.8	0.14	0.33	0.13	0.0144	0.1200	107.96	0.00	286.14	11.92	361.28	20.00	96.04	6552.00	96.04	0.00	0.00	0.00	0.00
5:15	0.6	0.11	0.33	0.10	0.0108	0.0900	80.97	0.00	286.14	11.92	361.28	20.00	69.05	6552.00	69.05	0.00	0.00	0.00	0.00
5:30	0.7	0.13	0.32	0.11	0.0126	0.1050	94.47	0.00	286.14	11.92	361.28	20.00	82.54	6552.00	82.54	0.00	0.00	0.00	0.00
5:45	0.8	0.14	0.32	0.13	0.0144	0.1200	107.96	0.00	286.14	11.92	361.28	20.00	96.04	6552.00	96.04	0.00	0.00	0.00	0.00
6:00	0.8	0.14	0.31	0.13	0.0144	0.1200	107.96	0.00	286.14	11.92	361.28	20.00	96.04	6552.00	96.04	0.00	0.00	0.00	0.00
6:15	0.9	0.16	0.31	0.15	0.0162	0.1350	121.46	0.00	286.14	11.92	361.28	20.00	109.54	6552.00	109.54	0.00	0.00	0.00	0.00
6:30	0.9	0.16	0.31	0.15	0.0162	0.1350	121.46	0.00	286.14	11.92	361.28	20.00	109.54	6552.00	109.54	0.00	0.00	0.00	0.00
6:45	1	0.18	0.30	0.16	0.0180	0.1499	134.95	0.00	286.14	11.92	361.28	20.00	123.03	6552.00	123.03	0.00	0.00	0.00	0.00
7:00	1	0.18	0.30	0.16	0.0180	0.1499	134.95	0.00	286.14	11.92	361.28	20.00	123.03	6552.00	123.03	0.00	0.00	0.00	0.00
7:15	1	0.18	0.29	0.16	0.0180	0.1499	134.95	0.00	286.14	11.92	361.28	20.00	123.03	6552.00	123.03	0.00	0.00	0.00	0.00
7:30	1.1	0.20	0.29	0.18	0.0198	0.1649	148.45	0.00	286.14	11.92	361.28	20.00	136.53	6552.00	136.53	0.00	0.00	0.00	0.00
7:45	1.2	0.22	0.29	0.19	0.0216	0.1799	161.94	0.00	286.14	11.92	361.28	20.00	150.02	6552.00	150.02	0.00	0.00	0.00	0.00
8:00	1.3	0.23	0.28	0.21	0.0233	0.1949	175.44	0.00	286.14	11.92	361.28	20.00	163.52	6552.00	163.52	0.00	0.00	0.00	0.00
8:15	1.5	0.27	0.28	0.24	0.0269	0.2249	202.43	0.00	286.14	11.92	361.28	20.00	190.51	6552.00	190.51	0.00	0.00	0.00	0.00
8:30	1.5	0.27	0.27	0.24	0.0269	0.2249	202.43	0.00	286.14	11.92	361.28	20.00	190.51	6552.00	190.51	0.00	0.00	0.00	0.00
8:45	1.6	0.29	0.27	0.26	0.0287	0.2399	215.93	0.00	286.14	11.92	361.28	20.00	204.00	6552.00	204.00	0.00	0.00	0.00	0.00
9:00	1.7	0.31	0.27	N/A	0.0384	0.3209	288.77	0.00	286.14	11.92	361.28	20.00	276.84	6552.00	273.00	3.84	0.00	0.00	0.00
9:15	1.9	0.34	0.26	N/A	0.0781	0.6524	587.14	0.00	286.14	11.92	361.28	20.00	575.21	6552.00	273.00	306.06	0.05	0.00	0.00
9:30	2	0.36	0.26	N/A	0.0999	0.8337	750.29	0.00	286.14	11.92	361.28	20.00	738.36	6552.00	273.00	771.42	0.12	0.00	0.00
9:45	2.1	0.38	0.26	N/A	0.1215	1.0146	913.17	0.00	286.14	11.92	361.28	20.00	901.25	6552.00	273.00	1399.67	0.21	0.00	0.00
10:00	2.2	0.40	0.25	N/A	0.1432	1.1953	1075.79	0.00	286.14	11.92	361.28	20.00	1063.87	6552.00	273.00	2190.54	0.33	0.00	0.00
10:15	1.5	0.27	0.25	0.24	0.0269	0.2249	202.43	0.00	286.14	11.92	361.28	20.00	190.51	6552.00	273.00	2108.05	0.32	0.00	0.00
10:30	1.5	0.27	0.24	0.24	0.0269	0.2249	202.43	0.00	286.14	11.92	361.28	20.00	190.51	6552.00	273.00	2025.55	0.31	0.00	0.00
10:45	2	0.36	0.24	N/A	0.1181	0.9858	887.25	0.00	286.14	11.92	361.28	20.00	875.32	6552.00	273.00	2627.88	0.40	0.00	0.00
11:00	2	0.36	0.24	N/A	0.1216	1.0154	913.82	0.00	286.14	11.92	361.28	20.00	901.89	6552.00	273.00	3256.77	0.50	0.00	0.00
11:15	1.9	0.34	0.23	N/A	0.1072	0.8946	805.15	0.00	286.14	11.92	361.28	20.00	793.23	6552.00	273.00	3777.00	0.58	0.00	0.00
11:30	1.9	0.34	0.23	N/A	0.1106	0.9235	831.16	0.00	286.14	11.92	361.28	20.00	819.24	6552.00	273.00	4323.24	0.66	0.00	0.00
11:45	1.7	0.31	0.23	N/A	0.0781	0.6522	586.98	0.00	286.14	11.92	361.28	20.00	575.05	6552.00	273.00	4625.29	0.71	0.00	0.00
12:00	1.8	0.32	0.22	N/A	0.0995	0.8304	747.37	0.00	286.14	11.92	361.28	20.00	735.44	6552.00	273.00	5087.73	0.78	0.00	0.00
12:15	2.5	0.45	0.22	N/A	0.2285	1.9080	1717.18	0.00	286.14	11.92	361.28	20.00	1705.26	6552.00	273.00	6520.00	1.00	0.00	0.00
12:30	2.6	0.47	0.22	N/A	0.2498	2.0855	1876.99	0.00	286.14	11.92	361.28	20.00	1865.07	6552.00	273.00	8112.06	1.24	0.00	0.00
12:45	2.8	0.50	0.21	N/A	0.2890	2.4127	2171.46	0.00	286.14	11.92	361.28	20.00	2159.53	6552.00	273.00	9998.60	1.53	0.00	0.00

13:00	2.9	0.52	0.21	N/A		0.3102	2.5896	2330.67	0.00	286.14	11.92	361.28	20.00	2318.75	6552.00	273.00	12044.35	1.84	0.00	0.00	
13:15	3.4	0.61	0.21	N/A		0.4032	3.3660	3029.39	0.00	286.14	11.92	361.28	20.00	3017.47	6552.00	273.00	14788.82	2.26	0.00	0.00	
13:30	3.4	0.61	0.20	N/A		**0.4063**	**3.3923**	**3053.05**	0.00	286.14	11.92	361.28	20.00	3041.13	6552.00	273.00	17556.94	2.68	0.00	0.00	
13:45	2.3	0.41	0.20	N/A		0.2119	1.7688	1591.91	0.00	286.14	11.92	361.28	20.00	1579.99	6552.00	273.00	18863.93	2.88	0.00	0.00	
14:00	2.3	0.41	0.20	N/A		0.2149	1.7944	1614.94	0.00	286.14	11.92	361.28	20.00	1603.02	6552.00	273.00	20193.95	3.08	0.00	0.00	
14:15	2.7	0.48	0.20	N/A		0.2898	2.4194	2177.48	0.00	286.14	11.92	361.28	20.00	2165.56	6552.00	273.00	22086.51	3.37	0.00	0.00	
14:30	2.6	0.47	0.19	N/A		0.2748	2.2944	2064.93	0.00	286.14	11.92	361.28	20.00	2053.00	6552.00	273.00	23866.51	3.64	0.00	0.00	
14:45	2.6	0.47	0.19	N/A		0.2777	2.3189	2087.01	0.00	286.14	11.92	361.28	20.00	2075.09	6552.00	273.00	25668.60	3.92	0.00	0.00	
15:00	2.5	0.45	0.19	N/A		0.2627	2.1931	1973.81	0.00	286.14	11.92	361.28	20.00	1961.89	6552.00	273.00	27357.49	4.18	0.00	0.00	
15:15	2.4	0.43	0.18	N/A		0.2476	2.0670	1860.28	0.00	286.14	11.92	361.28	20.00	1848.36	6552.00	273.00	28932.84	4.42	0.00	0.00	
15:30	2.3	0.41	0.18	N/A		0.2324	1.9405	1746.42	0.00	286.14	11.92	361.28	20.00	1734.50	6552.00	273.00	30394.34	4.64	0.00	0.00	
15:45	1.9	0.34	0.18	N/A		0.1633	1.3637	1227.36	0.00	286.14	11.92	361.28	20.00	1215.44	6552.00	273.00	31336.78	4.78	0.00	0.00	
16:00	1.9	0.34	0.18	N/A		0.1661	1.3864	1247.77	0.00	286.14	11.92	361.28	20.00	1235.84	6552.00	273.00	32299.62	4.93	0.00	0.00	**PEAK**
16:15	0.4	0.07	0.17	0.06		0.0072	0.0600	53.98	0.00	286.14	11.92	361.28	20.00	42.06	6552.00	273.00	32068.68	4.89	0.00	0.00	
16:30	0.4	0.07	0.17	0.06		0.0072	0.0600	53.98	0.00	286.14	11.92	361.28	20.00	42.06	6552.00	273.00	31837.74	4.86	0.00	0.00	
16:45	0.3	0.05	0.17	0.05		0.0054	0.0450	40.49	0.00	286.14	11.92	361.28	20.00	28.56	6552.00	273.00	31593.30	4.82	0.00	0.00	
17:00	0.3	0.05	0.16	0.05		0.0054	0.0450	40.49	0.00	286.14	11.92	361.28	20.00	28.56	6552.00	273.00	31348.86	4.78	0.00	0.00	
17:15	0.5	0.09	0.16	0.08		0.0090	0.0750	67.48	0.00	286.14	11.92	361.28	20.00	55.55	6552.00	273.00	31131.42	4.75	0.00	0.00	
17:30	0.5	0.09	0.16	0.08		0.0090	0.0750	67.48	0.00	286.14	11.92	361.28	20.00	55.55	6552.00	273.00	30913.97	4.72	0.00	0.00	
17:45	0.5	0.09	0.16	0.08		0.0090	0.0750	67.48	0.00	286.14	11.92	361.28	20.00	55.55	6552.00	273.00	30696.53	4.69	0.00	0.00	
18:00	0.4	0.07	0.16	0.06		0.0072	0.0600	53.98	0.00	286.14	11.92	361.28	20.00	42.06	6552.00	273.00	30465.59	4.65	0.00	0.00	
18:15	0.4	0.07	0.15	0.06		0.0072	0.0600	53.98	0.00	286.14	11.92	361.28	20.00	42.06	6552.00	273.00	30234.64	4.61	0.00	0.00	
18:30	0.4	0.07	0.15	0.06		0.0072	0.0600	53.98	0.00	286.14	11.92	361.28	20.00	42.06	6552.00	273.00	30003.70	4.58	0.00	0.00	
18:45	0.3	0.05	0.15	0.05		0.0054	0.0450	40.49	0.00	286.14	11.92	361.28	20.00	28.56	6552.00	273.00	29759.27	4.54	0.00	0.00	
19:00	0.2	0.04	0.15	0.03		0.0036	0.0300	26.99	0.00	286.14	11.92	361.28	20.00	15.07	6552.00	273.00	29501.33	4.50	0.00	0.00	
19:15	0.3	0.05	0.14	0.05		0.0054	0.0450	40.49	0.00	286.14	11.92	361.28	20.00	28.56	6552.00	273.00	29256.90	4.47	0.00	0.00	
19:30	0.4	0.07	0.14	0.06		0.0072	0.0600	53.98	0.00	286.14	11.92	361.28	20.00	42.06	6552.00	273.00	29025.96	4.43	0.00	0.00	
19:45	0.3	0.05	0.14	0.05		0.0054	0.0450	40.49	0.00	286.14	11.92	361.28	20.00	28.56	6552.00	273.00	28781.52	4.39	0.00	0.00	
20:00	0.2	0.04	0.14	0.03		0.0036	0.0300	26.99	0.00	286.14	11.92	361.28	20.00	15.07	6552.00	273.00	28523.59	4.35	0.00	0.00	
20:15	0.3	0.05	0.14	0.05		0.0054	0.0450	40.49	0.00	286.14	11.92	361.28	20.00	28.56	6552.00	273.00	28279.15	4.32	0.00	0.00	
20:30	0.3	0.05	0.14	0.05		0.0054	0.0450	40.49	0.00	286.14	11.92	361.28	20.00	28.56	6552.00	273.00	28034.71	4.28	0.00	0.00	
20:45	0.3	0.05	0.13	0.05		0.0054	0.0450	40.49	0.00	286.14	11.92	361.28	20.00	28.56	6552.00	273.00	27790.28	4.24	0.00	0.00	
21:00	0.2	0.04	0.13	0.03		0.0036	0.0300	26.99	0.00	286.14	11.92	361.28	20.00	15.07	6552.00	273.00	27532.35	4.20	0.00	0.00	
21:15	0.3	0.05	0.13	0.05		0.0054	0.0450	40.49	0.00	286.14	11.92	361.28	20.00	28.56	6552.00	273.00	27287.91	4.16	0.00	0.00	
21:30	0.2	0.04	0.13	0.03		0.0036	0.0300	26.99	0.00	286.14	11.92	361.28	20.00	15.07	6552.00	273.00	27029.98	4.13	0.00	0.00	
21:45	0.3	0.05	0.13	0.05		0.0054	0.0450	40.49	0.00	286.14	11.92	361.28	20.00	28.56	6552.00	273.00	26785.54	4.09	0.00	0.00	
22:00	0.2	0.04	0.13	0.03		0.0036	0.0300	26.99	0.00	286.14	11.92	361.28	20.00	15.07	6552.00	273.00	26527.61	4.05	0.00	0.00	
22:15	0.3	0.05	0.12	0.05		0.0054	0.0450	40.49	0.00	286.14	11.92	361.28	20.00	28.56	6552.00	273.00	26283.17	4.01	0.00	0.00	
22:30	0.2	0.04	0.12	0.03		0.0036	0.0300	26.99	0.00	286.14	11.92	361.28	20.00	15.07	6552.00	273.00	26025.24	3.97	0.00	0.00	
22:45	0.2	0.04	0.12	0.03		0.0036	0.0300	26.99	0.00	286.14	11.92	361.28	20.00	15.07	6552.00	273.00	25767.31	3.93	0.00	0.00	
23:00	0.2	0.04	0.12	0.03		0.0036	0.0300	26.99	0.00	286.14	11.92	361.28	20.00	15.07	6552.00	273.00	25509.38	3.89	0.00	0.00	
23:15	0.2	0.04	0.12	0.03		0.0036	0.0300	26.99	0.00	286.14	11.92	361.28	20.00	15.07	6552.00	273.00	25251.44	3.85	0.00	0.00	
23:30	0.2	0.04	0.12	0.03		0.0036	0.0300	26.99	0.00	286.14	11.92	361.28	20.00	15.07	6552.00	273.00	24993.51	3.81	0.00	0.00	
23:45	0.2	0.04	0.12	0.03		0.0036	0.0300	26.99	0.00	286.14	11.92	361.28	20.00	15.07	6552.00	273.00	24735.58	3.78	0.00	0.00	
24:00	0.2	0.04	0.12	0.03		0.0036	0.0300	26.99	0.00	286.14	11.92	361.28	20.00	15.07	6552.00	273.00	24477.65	3.74	0.00	0.00	
	0	0.00	0.12	0.00		0.0000	0.0000	0.00	0.00	286.14	11.92	349.36	19.05	0.00	6552.00	273.00	24204.65	3.69	0.00	0.00	
					Total volume (cf)			**45245.25**								**Total Overflow (cf)**			**0.00**		

APPENDIX C.2

DRAWDOWN TIME CALCULATION

UNIVERSITY PARK
DRAW-DOWN TIME CHECK

DRAW-DOWN TIME

BASIN	Total Dead Storage Volume	Infiltration Rate	Infilitration Safety Factor	Design Infiltration Rate (P_{design})	Design Infiltration Rate Used	Total Area	Total Infiltration	Draw-Down Time
-	(ft^3)	(in/hr)	-	(in/hr)	(in/hr)	(sf)	(cfs)	(hrs)
A	26,247	6.00	3	2.00	2.00	4,795	0.222	**32.84**
B	12,163	6.00	3	2.00	2.00	6,000	0.278	**12.16**
C	24,205	6.00	3	2.00	2.00	6,552	0.303	**22.17**
					DRAW DOWN CHECK	**GOOD**		

Michael Baker
INTERNATIONAL

We Make a Difference

APPENDIX C.3

EXCERPT FROM NORTH SPHERE DRAINAGE MASTER PLAN, OCTOBER 2007

10. CAPITAL IMPROVEMENT PROGRAM FUNDING OPTIONS

The City currently receives funding for capital improvements including some storm drainage facilities within the North Sphere Study Area through three financing district programs in place at this writing and existing City drainage fees.

The existing assessment and community facilities districts are authorized to fund drainage facilities but do not include any of the the proposed capital improvements. Assessment districts and community facilities districts are typically used to finance the type of facilities included in the North Sphere Drainage Master Plan. However, the developing properties in the Study Area have already obligated their properties for the payment of assessments and special taxes to fund capital improvements. Unless the owners of the developed properties authorize additional assessments or the qualified electors authorize additional special taxes, there is not capacity to fund the proposed capital improvements using an assessment district or community facilities district.

See Figure 4, Drainage Fee Zone Map and Figure 5, Existing Assessment and Community Facility District Map. These are:

- Benefit Assessment District No. 1
- Community Facilities District No. 2005-1, and
- Section 29 Assessment District No. 2004-02
- Existing City Drainage Fees

An evaluation of the North Sphere's existing drainage assessments and fees is presented in the following:

10.1 Evaluation of Existing City Drainage Assessment Programs

- Benefit Assessment District No. 1

The City Benefit Assessment District No. 1 ("Benefit Assessment District") was established pursuant to the Benefit Assessment Act of 1982 and in compliance with procedural requirements of Article X2ID of the State Constitution.

The Benefit Assessment District was formed for the purpose of authorizing the levy of annual assessments commencing with FY 2007/08 on parcels of land within the subdivisions known as Parcel Map No. 24255 (Monterey 170) / Assessment District 2004-02 (Section 29). The Benefit Assessment District encompasses approximately 528 acres generally located north of Gerald Ford

Drive, southwest of I-10, west of Portola Avenue and east of Monterey Avenue.

The amounts collected from the annual levy of assessments are to be used to fund the costs and expenses to operate, maintain and service drainage basin improvements, facilities and expansions associated with properties in the Benefit Assessment District.

Authorized services are generally described as drainage basin maintenance that may include but is not limited to inspection, repair, removal and replacement, and servicing of drainage basins, inlets, catch basins, manholes, outlets, drywells, pumps, filters and storm drain pipes installed in connection with the development of benefiting properties as well as any off-site improvements and facilities directly associated with the infrastructure that is deemed necessary to service or protect the properties; and includes all appurtenant, equipment, materials and service contracts related to the operation, maintenance and servicing of the improvement and facilities.

Drainage basin maintenance may include, but is not limited to grading of access perimeter roads, repair of erosion of slopes to access roads, debris clearance, anchormat repairs, dust control through the application of soil stabilization agents, weed abatement, mosquito and vector control, storm drain inlets and outlets, pumps filters and pipes.

The maintenance program may include but is not limited to inspection and documentation of the system, cleaning, servicing or repair of the facilities and equipment, and partial removal, replacement or rehabilitation of equipment and facilities.

It is anticipated that a portion of the services might not be performed on an annual basis but as a result of an extraordinary event. Moneys collected each year for these extraordinary services will be accumulated in a special fund designated as the "Reserve Fund" and are to be spent as needed.

Each parcel's proportional special benefit is determined based on the parcel's gross acreage as compared to the acreage of other parcels in the Benefit Assessment District.

Exempt parcels that were determined to receive no special benefit from the authorized operations, maintenance and services are not assessed. Exempt parcels include:

- Lots or parcels identified as public streets and other roadways;

- Dedicated public easements including open space areas, utility rights-of-way, greenbelts, parkways, parks, or other publicly owned properties that are part of the improvements or may provide other benefits to private properties in the Benefit Assessment District;

- Private properties that cannot be developed independently from a adjacent property, such as common areas, sliver parcels or bifurcated lots or properties with very restrictive development use; and

- Parcels owned by the school district, CVWD and private developers that will not be assessed as part of the Benefit Assessment District because the runoff generated by these properties will be captured and retained through the construction and grading of the sites.

Government owned properties or public properties are not necessarily exempt properties and shall be subject to special benefit assessments unless it qualifies for an exemption status.

The maximum assessment rate is equal to the initial maximum assessment rate established as $379.75 per gross acre for FY 2007/08 adjusted annually by the greater of three percent or the annual percentage change in the Consumer Price Index of All Urban Consumers for the Los Angeles-Orange-Riverside Area.

Table 10-1
Benefit Assessment District No. 1 Budget for FY 2007/08

Direct Costs	
Labor and Maintenance	$ 80,000
Materials	85,000
Utilities	1,500
Administration	
City Administrative Overhead	$ 11,200
Professional Fees for Administration	5,000
County Administrative Fees	1,000
Reserve Fund (10% of Direct Costs)	$ 16,000
Balance to Levy	$200,000
Parcels Levied	273
Total Gross Acres	528
FY 2007-08 Maximum Assessment Rate per Gross Acre	$ 379.73

Based on a typical density of five dwelling units per acre, the maximum assessment of FY 2007/08 is about $76 per residence.

MuniFinancial has prepared the budget and proposed assessment levy for the Benefit Assessment District for FY 2007/08. The amount to be levied is 50% of the maximum assessment for a total of $100,000 or $157.87 per gross acre.

Recommendation: The City should condition all new development in the North Sphere to annex into the Benefit Assessment District or form a similar district.

- Community Facilities District No. 2005-1

City Community Facilities District No. 2005-1 (University Park) (the "Community Facilities District") was formed pursuant to the Mello-Roos Community Facilities District Act of 1982 to authorize the levy of a special tax and the issuance of bonds to fund the acquisition and construction of facilities. The principal amount of bonds authorized to be issued is $70,000,000.

The boundaries of the Community Facilities District are composed on one contiguous area, which is generally north of Frank Sinatra Drive, south of Gerald Ford Drive, west of Cook Street and east of Portola Avenue. The Community Facilities District is divided into five zones; Zones A through D are being developed as commercial and mixed use properties and Zone E is being developed as residential property.

The facilities that the Community Facilities District is authorized to finance include a pedestrian bridge, traffic signals, landscaping, street improvements, well site improvements and land acquisition, water improvements, storm drain improvements, utility improvements, public art improvements and park site land acquisition, together with appurtenances and appurtenant work.

The storm drain improvements include:

- Pacific Avenue: Catch basins and interim-condition retention basins on the east and west sides of Pacific Avenue, adjacent to Gerald Ford Drive;

- College Drive: Catch basins and interim-condition retention basins on the southwest corner of College Drive and University Park Drive west intersection, catch basins on the east and west sides of the intersection

with Technology Drive and a permanent retention basin along Technology Drive, and a catch basin and interim-condition retention basin on the east side of College Drive south of the east intersection with University Park Drive;

- University Park Drive: Catch basins on the east and west sides of University Park Drive at the west intersection with College Drive and an interim-condition retention basin in the southwestern corner of the intersection, catch basins on the north and south sides of University Park Drive and an interim-condition retention basin in the northwestern quadrant of the east intersection of College Drive and University Park Drive, and as indicated above a catch basin and interim-condition retention basin on the south side of University Park Drive, west of Cook Street;

- Technology Drive: Catch basins on the east and west sides of Technology Drive and an interim-condition retention basin west of Technology Drive and south of Gerald Ford Drive;

- Gerald Ford Drive: Catch basins and interim-condition retention basin between Pacific Avenue and Technology Drive on the south side of Gerald Ford Drive, as indicated above, catch basin and interim-condition retention basin on the south side of Gerald Ford Drive west of Pacific Avenue, and as indicated above, catch basin and interim-condition retention basin west of Technology Drive;

- Cook Street: As indicated above, catch basin and interim-condition retention south of University Park Drive, west of side of cook Street; and in-tract storm drains.

The following Table 10-2 summarizes the estimated costs of the facilities presented in the Community Facilities District Report dated December 8, 2005. Although the list of authorized facilities includes an extensive list of basin and storm drain improvements, the cost estimate only includes $237,000 for drainage fees. The required retention basins and storm drain improvements will be constructed as properties are being developed. All of the properties in the Community Facilities District are conditioned to provide retention basins and storm drain improvements which will retain storm water on the properties.

Table 10-2
City of Palm Desert
Community Facilities District No. 2005-1 (University Park)
Estimated Costs

Facilities	**Estimated Costs**
Street Improvements and Grading	$ 9,667,740
Sewer Improvements	598,937
Water Improvements	3,730,529
Traffic Signals	977,805
Park Site Acquisition and Improvements	7,416,000
Utilities	1,191,010
Cook Street Pedestrian Bridge	1,504,315
Landscaping Cost	11,534,118
Fringed Toed Lizard Fee	142,200
Public Works – Drainage Fee	**237,000**
Public Works – Signal Fee	3,149,523
Coachella Valley Water District	8,197,668
TUMF Fee	837,135
Art in Public Places Fee	526,500
In-tract Sewer and Water Facilities	5,265,000
In-tract Streets	2,740,500
Commercial Sewer & Water Improvements	1,356,520
Parks	1,800,000
Total Public Fees and Improvements	$ 57,775,627
Incidental Costs, Capitalized Interest and Reserve Fund	12,224,373
Authorized Principal Amount of Bonds	$ 70,000,000

The rate and method of apportionment of the special tax, which establishes the special tax to be levied on properties in the Community Facilities District provides that the maximum annual special tax for the commercial and mixed use properties in Zones A through D is: $21,000 per acre for Zone A, $27,000 per acre for Zone B, $27,000 per acre for Zone C and $23,000 per acre for Zone D.

The assigned special tax for developed residential property in Zone E is determined based on the land use class and the residential floor area as summarized in the following Table 10-3.

Table 10-3
City of Palm Desert
Community Facilities District No. 2005-1
(University Park)
Assigned Special Tax for Developed Property
With Zone E

Land Use Class	Residential Floor Area	Assigned Special Tax
Single Family Property	Greater than 2,300 sq. ft.	$1.44 per square foot
Single Family Property	2,300 sq. ft. to 1,725 sq. ft.	$1.67 per square foot
Single Family Property	Less than 1,725 sq. ft.	$1.38 per square foot
Multifamily Property	Not Applicable	$1.50 per square foot
Non Residential Property	Not Applicable	$28,000 per acre

In 2006, the Community Facilities District issued $50,000,000 of its Special Tax Bonds, Series 2006A. The Community Facilities District also has issued $17,915,000 in May 2006 of its Special Tax Bonds, Series 2007. The Community Facilities District is authorized to issue additional parity bonds in a principal amount of up to $2,085,000. Net bond proceeds from the 2006 bonds and the 2007 bonds are to be used to fund the acquisition and construction of the authorized public improvements.

- Section 29 Assessment District No. 2004-02

City Section 29 Assessment District No. 2004-02 (the "Assessment District") was established pursuant to the Municipal Improvement Act of 1913 to authorize the acquisition and construction of public improvements. The improvements consist of streets, sewers, storm drains, water lines, drainage basins, relocation of utilities and acquisition of necessary rights-of-way or property.

The Engineer's Report states that storm drainage improvements are required so that increased runoff from the developed properties does not negatively affect downstream properties. The drainage system will generally be constructed in existing or proposed streets. The storm drains will outlet into an existing drainage basin at the northeasterly portion of the Assessment District. The basin will retain the storm flows so that storm water on the properties does not negatively affect downstream properties.

At the time the Assessment District was formed, the existing drainage basin was privately owned. The City acquired the existing basin, deepened the basin to increase storm runoff capacity and stabilized the sidewalls from erosion. The acquisition and improvement of the basin and the construction of storm

drains was required so that the properties in the Assessment District could develop.

The source of funds to finance the acquisition and construction of the authorized improvements include a City contribution, funds collected from payment of a portion of the amounts assessed and bonds secured with the unpaid assessments. Bonds in the amount of the unpaid assessments are authorized to be issued pursuant to the Improvement Bond Act of 1915.

The Engineer's Report for the Assessment District states that the storm drains are required to protect both the properties to be developed as well as downstream properties, and that the residential units or other developments in the Assessment District could not be constructed on the properties without the storm drains and basin. The estimated costs were assessed to the benefiting properties based on the number of residential units or equivalent residential units to be developed on each property.

Some properties in the Assessment District were not assessed for storm drain improvements because on-site retention basins that will contain all incremental runoff on the properties had been constructed or are required to be constructed as a condition of development of the properties.

The following Table 10-4 summarizes the estimated costs for the Assessment District. The estimated construction cost for storm drain improvements and acquisition and improvement of the basin is $6,262,770 or about 26.7% of the total estimated construction cost excluding incidental costs. The incidental costs are the costs associated with issuance of the bonds.

Table 10-4
City of Palm Desert
Section 29 Assessment District No. 2004-02
Estimated Costs

Construction Costs	
Street Improvements	$ 9,220,690
Sewer Improvements	1,628,384
Storm Drain Improvements and Basin Land Cost	**6,262,770**
Water Improvements	1,937,397
Impact Fees	1,718,309
Contingency	2,731,826
Total	$ 23,499,375
Engineering, Construction Administration, Right of way Incidentals	8,767,246
Costs of Issuance	557,000
Capitalized Interest, Reserve Fund and Discount	6,468,321
Total Project Costs, Capitalized Interest, Reserve Fund and Discount	$ 39,291,943
Less General Benefit	(123,821)
Less City Contribution	(713,246)
Total Assessment Amount	$ 38,454,875

In April 2007, the City issued $29,430,000 of Limited Obligation Improvement Bonds, Series 2007 secured by unpaid assessments levied on parcels in the Assessment District. The net bond proceeds plus cash payments of assessments and other funds will be used to acquire and construct public improvements, including storm drain improvements.

Storm drain improvements to be funded with proceeds of the bonds are described as:

- Storm drains are required so that increased runoff from the developed properties does not negatively affect downstream properties. The storm drains will generally be constructed in the existing or proposed streets. The storm drains will outlet into an existing drainage basin at the northeasterly portion of the Assessment District. This basin will retain the storm flows so that it does not negatively affect downstream properties.

- The drainage basin is privately held and will need to be acquired to allow certain of the properties to develop. The basin will also need to be deepened to increase storm runoff capacity and the sidewalls will need to be stabilized from erosion. The City has entered into the purchase agreement providing for the acquisition of the drainage basin and has formed a maintenance district, Benefit Assessment District No. 1, to provide for the maintenance of the basin.

The City has or will contract for construction of a portion of the improvements. Construction of some of the improvements is being performed by property owners and is underway. The City plans to acquire the eligible improvements which the property owners are constructed under the terms of certain acquisition agreements between the City and the property owners. In addition, the City has entered into a purchase and sale agreement and escrow instructions to acquire the existing retention basin.

The property owners are proceeding to develop the property in the Assessment District in accordance with the approved planned uses for mixed-use development including commercial, multifamily residential and single family residential. Construction of a Lowe's Home Improvement Center is complete. Construction of an apartment complex and single family residential units is underway.

One parcel consisting of 19.16 acres has been sold to the Palm Springs Unified School District which plans to develop a school on the site.

10.2 Evaluation of Existing City Drainage Fees

The above analysis was developed from reports and bond official statements for the Benefit Assessment District, Assessment District and Community Facilities District.

The three districts have been formed to fund maintenance of storm drains and retention basins, and acquisition and construction of drainage improvements and other public improvements to facilitate development of most of the property in the North Sphere.

Drainage fees are an eligible cost to be funded in the Assessment District and Community Facilities District. The list of eligible facilities to be funded is greater than the available bond proceeds so it is possible that the drainage fees were not funded. If the drainage fees have not been funded in the Assessment District or Community Facilities District, then the property owner should be

required to pay the fees prior to recording the final tract map or parcel map. If the property owner constructed master plan drainage facilities which were identified in the study used to calculate the drainage fee, then the property owner may request a fee credit. VA does not have enough information to know if drainage fees have been paid, funded in the Assessment District or Community Facilities District or remain to be paid, or if any of the property owners are eligible for a drainage fee credit.

Development of the property is proceeding within the Assessment District and Community Facilities District. Some tract/parcel maps have been recorded and other properties have approved tentative tract/parcel maps. It is our understanding that: (i) golf course properties have been conditioned to retain storm water onsite based on a 100 year storm event; (ii) other residential and commercial properties are required to retain onsite the differential runoff based on a 25 year storm event; and (iii) no conditions have been imposed on developing properties to participate in funding offsite drainage facilities.

10.3 Evaluation of Funding Options

- Current Offsite Drainage Fees

  The City has established an off-site drainage fee of $4,000 per acre for land in areas of the City designated as Zone 1, $1,500 in areas designated as Zone 2 and $1,000 in areas designated as Zone 3.

  Zone 2 and 3 are in the NSDMP area. Zone 2 is the portion of the North Sphere located south of the Palm Springs Ridge Line. Zone 3 is the portion of the North Sphere located north of the Palm Springs Ridge Line and south of I-10.

  The off-site drainage fees are collected prior to approval of the final map in the case of land being subdivided, or prior to issuance of a building permit in the case of construction on or improvement of subdivided land.

  The total area in the North Sphere is approximately 5,000 acres. Excluding streets, the total area of undeveloped land within the North Sphere in Zone 2 is 75 acres and 987.1 acres in Zone 3. The estimated off-site drainage fees to be collected from undeveloped land are $112,500 in Zone 2 and $987,100 in Zone 3.

- Allocation of Capital Costs for Recommended Improvements

The capital cost for recommended improvements in Zone 2 is $17,817,022. The total area of developed and undeveloped land excluding streets is 1,647.3 acres. If the capital costs are allocated based on the area of land in the zone, then the drainage fee will be $10,815.89 per acre. The allocated cost of the recommended improvements for Zone 2 is $17,005,291 for developed properties and $811,192 for undeveloped properties.
The capital cost for recommended improvements in Zone 3 is $36,709,291. The total area of developed and undeveloped land excluding streets in Zone 3 is 2,947.4 acres. If the capital costs are allocated based on the area of land in the zone, then the drainage fee will be $12,454.80 per acre. The allocated cost of the recommended improvements for Zone 3 is $24,415,153 for developed properties and $12,294,138 for undeveloped properties.

Table 10-5 on the following page, summarizes the Allocation of Capital Improvements Costs. Table 10-6 summaries existing Off-Site Drainage Fee and new Off-Site Drainage Fees needed to provide the proposed capital improvement costs.

- Current City and Regional Drainage Conditions on Development

The existing City ordinance requires new development to retain the differential runoff from pre-development to post-development based on a 25-year storm event.

The CVWD requires that new developments retain all runoff on-site based on the 100-year storm event as a condition for irrigation of golf courses and landscaping. The majority of developments in the North Sphere are golf course oriented developments. New developments in the North Sphere are being designed to retain all runoff on-site based on a 100-year storm event.

The recommended storm drains and retention basins have been designed to accommodate flows from streets and existing developments that were designed to retain differential flows from a 25-year storm event but do not have facilities to accommodate runoff from a 100-year storm event.

Most of the properties which are developing in the North Sphere have been included in Assessment Districts and Community Facilities Districts which are authorized to levy special assessment and special taxes to pay debt service on bonds issued to fund public improvements including storm drains and retention basins.

- Drainage Improvement Funding Options

The allocation of recommended drainage improvement costs to developing properties in the study area either through drainage fees or as a condition of development does not seem to be appropriate because the properties that

Table 10-5
North Sphere Drainage Area Development Summary

	Zone 3 Area North of Palm Springs Ridge Line			Zone 2 Area South of Palm Springs Ridge Line			Totals	
	Developed Areas(ac)	Undeveloped Areas(ac)	Total Area(ac)	Developed Areas(ac)	Undeveloped Areas(ac)	Total Area(ac)	Total Area(ac)	Percent of Total
100-Year Retained	1,592.7	987.1	2,579.8	1,451.7	58.1	1,509.8	4,089.6	81.76%
Incremental Retention	312.7		312.7	120.6	16.9	137.5	450.2	9%
No Retention	54.9		54.9				54.9	1.1%
Total Excluding Streets	1,960.3	987.1	2,947.4	1,572.3	75.0	1,647.3	4,594.7	91.86%
Streets	390.5		390.5	16.9		16.9	407.4	8.14%
Total	2,350.8	987.1	3,337.9	1,589.2	75.0	1,664.2	5,002.1	100%
Percent of Total	47%	19.73%	66.73%	31.77%	1.5%	33.27%	100%	

(1) Includes 596.6 acres of land proposed to be developed with 100-Year Full Retention and 390.5 acres of land currently undergoing development assumed to be developed for 100-Year Full Retention

Table 10-6
Allocation of Capital Improvement Costs

	Zone 3 Area North of Palm Springs Ridge Line			Zone 2 Area South of Palm Springs Ridge Line			Totals
	Developed Areas	Undeveloped Areas	Total	Developed Areas	Undeveloped Areas	Total	Totals
Private Property (acres)	1960.3 ac	987.1 ac	2947.4 ac	1572.3 ac	75 ac	1647.3 ac	4594.7 ac
Streets (acres)	390.5 ac	–	390.5 ac	16.9 ac	–	16.9 ac	407.4 ac
Current Off-Site Drainage Fees per acre	N/A	$1,000		N/A	$1,500		
Projected Off-Site Drainage Fees	N/A	$987,100	$987,100	N/A	$112,500	$112,500	$1,099,600
Allocation of Costs for Recommended Improvements	$24,415,153	$12,294,138	$36,709,291	$17,005,830	$811,192	$18,140,904	$54,850,195
Allocation of Costs per acre for Recommended Improvements	$12,454.80	$12,454.80	–	$10,815.89	$10,815.89	–	

are developing have or will meet the requirement to retain water on site and will also be incurring substantial annual costs for assessments and special taxes to fund the acquisition, construction and maintenance costs of the basins and storm drain improvement required to retain storm runoff on the properties within the special districts which do not include the proposed Master Plan drainage improvements.

Redevelopment Agency funds utilized for a pay-as-you-go CIP or to cover bonded indebtedness payments, through the potential issuance of general obligation bonds or revenue bonds should the City be able to set up a drainage utility could potentially be a source of funding for the CIP projects identified in the drainage study. Additionally federal grants and/or State loans through the Infrastructure Bank could also be an appropriate source of funds to finance the recommended drainage system improvements as well. These optional sources are discussed below:

(1) Redevelopment Agency (RDA) Funding

Use of RDA funds for a pay-as-you-go program to fund sequential improvements under the proposed CIP could be considered subject to the adequacy and availability of tax incremental revenues allocated to the RDA to fund drainage improvements.

(2) General Obligation (GO) Bonds

Consideration could be given to issuance of Drainage System general obligation bonds to finance the NSDMP program over a 20 to 30 year period. A potential source for bond payments could be RDA funds. The amount of the bond issue would be dependent upon the capital expenditures anticipated in the bond issue and the availability of RDA funds. Two-thirds voter approval would be required for authorization of GO Bonds.

(3) Establishment of a Drainage System Utility

Consideration could be given to establishing a North Sphere Area Drainage System Utility including existing developed properties. This would require compliance with the provisions of Proposition 218, requiring a 2/3 voter approval of registered voters to authorize special tax the utility. A majority vote of property owners is required to authorize the levy of a special assessment or of a property related drainage fee.

Once a Drainage System Utility is established, funding for improvements could potentially be developed, through a pay-as-you-go or the issuance of a Revenue Bond issue utilizing enterprise funds from designated drainage utility fund sources.

(4) Grant & Loan Programs

- Federal Earmarks

The City may wish to consider developing a long-range program to obtain federal funding "Earmarks" to provide supplemental funding for its NSDMP CIP. The potential exists to obtain these federal funding "earmarks" through programs such as the following:

- Environmental Protection Agency's State & Tribal Assistance Grant Program (STAG)
- ACOE Section 219 Environmental Infrastructure Program
- ACOE Section 205 Small Flood Control Program
- ACOE Section 206 Aquatic Restoration Program
- Housing & Urban Development (HUD) Economic Development Initiative Program

In recent years several Southern California cities have been successful in obtaining federal assistance through the EPA, STAG and ACOE programs with grants ranging from $100,000 to as much as $2,000,000 per year. These grants are not competitive but rather require working with the City's local congressional representative and the State's Senate delegation to have the City's specific programs or projects written into federal law.

As an example, the following are typical steps entailed in developing and implementing a federal grant program:

Initial Steps

- Establish the Program Team
- Determine Program Project Requirements
- Form an Effective Grant Team (Political -Technical-Administrative)
- Establish a Clear Multi-Year Program Focus

Develop the Grant Program

- Prepare Program Project Descriptions
- Determine "Talking Points"
- Select a Potential Funding Program

Initial Legislative Briefings

- Retain a Legislative Advocacy Firm – DC
- Develop a Legislative Strategy
- Conduct Briefings with Legislators, Staff - Local Office
- Develop a Legislative Package
- Prepare a Program "White Paper"
- Draft Legislative Language for Authorization or Appropriation
- Set-up a "Briefing Binder"

Conduct DC Briefings

- Establish Briefing Team
- Schedule DC Briefing Trip
- Coordinate & Follow-up with Advocacy Firm During Legislative Process

Program Implementation

- Establish Strong Federal Agency Liaison
- Prepare a Work Plan Request for Funds
- Scoping Process
- Environmental Documentation - National Environmental Policy Act (NEPA)
- Planning, Design or Construction Process
- Continued PR and Follow-up for Future Funding – Ongoing

- State Programs

  - State of California Infrastructure Bank Loan Program

This State Infrastructure Bank Loan Program has funds available through an application process, which is open on a continuous basis. These are low interest loans (≈1/2 going bond rates) aimed at addressing infrastructure programs which are difficult to fund from other sources, such as drainage improvements. Agency responsibilities under this program are:

- Prioritization of Projects
- Determination of Project Applicability
- Prepare Application Package
- Submit Application Package
- Dedicate a Funding Source for Repayment
- Provide for Compliance with the California Environmental Quality Act (CEQA)

10.4 Drainage System Funding Plan Recommendations

An analysis was conducted in regard to setting up a Drainage System Financial Implementation Plan (FIP). Recommended Key Program Objectives (KPO) are set forth below for the City's consideration in developing and implementing a FIP to provide adequate funding resources for its NSDMP CIP. The following is a brief synopsis of the key program objectives:

- KPO 1– Finalization of 20-Year Drainage CIP

  It is recommended that a working Drainage Program Committee (DPC) be formed and that the City and the consultant conduct a DPC workshop session to finalize the content and sequencing of the proposed 20-Year CIP for drainage projects in the North Sphere area. Participants in this session should include Public Works management and engineering staff as well as City administration and finance department representatives.

- KPO No. 2 – Funding Option Determination

  Based upon the determinations made in the KPO process, it is recommended that the DPC work with the consultant to focus upon a preferred funding alternative for the North Sphere drainage program. A detailed review of existing entitlements within the study area would be needed to ascertain if certain of the projects in the proposed Drainage CIP are conditioned for construction by the developers.

  A review of the availability of RDA funds would also be needed to determine the viability of funding either direct funding of drainage projects or allocations for bond payments to either general obligation bonds or revenue bonds should a drainage utility be viable and approved by the voters under Proposition 218 requirements.

  If it is determined to be viable and receives approval by the voters Drainage Utility revenue bond issues of varying amounts could be issued based upon the projected revenues available to fund a series of bonds to

cover the CIP costs over the planning period. Bond proceeds would be utilized exclusively for drainage system capital improvement projects as identified in the CIP.

An evaluation of the viability of considering the formation of a City Drainage Utility should also be made through the DPC process.

- KPO No 3 – Establishment of a Federal Grant Program

Since 1995, several cities in Southern California have been the recipients of appropriated federal funds for their infrastructure programs. Funds are being utilized through the United States Environmental Protection Agency's (EPA), STAG Program as well as through the ACOE Section 219, Environmental Infrastructure Program, under the Water Resources Development Act (WRDA), to fund various drainage infrastructure improvements such as drainage conveyance facilities, retention basins, artificial wetlands, NPDES compliance, and water quality programs. Funds are available for planning, design and construction activities.

EPA funds under the STAG program are allocated to provide 55% in federal funding for projects, requiring a 45% local sponsor match. These funds are disbursed on reimbursement basis following expenditures by the local sponsor. Projects funded under the ACOE Section 219 program are funded at 75% federal and 25 % local for planning and design and 50% federal and 50% local for construction projects.

Other funding sources through the ACOE Continuing Authorities programs such as their Section 205, Small Flood Control Program for drainage system upgrades for flood protection as well as Section 206 Aquatic Restoration Program for development of artificial wetlands and water quality protection projects are also viable alternatives to consider.

Appropriations under both EPA and ACOE programs would require specific federal "earmarks " to the City through authorizing legislation, enacted through the City's congressional delegation for both the House and Senate. Grant proposals are usually prepared in the late fall of each year for introduction in Congress in January or February of the following year. City may wish to take advantage of these types of federal programs, but should understand that they often involve a long term approach in working with the congressional delegation and may require the utilization of federal lobbyists as well.

- KPO No. 4 – State & Regional Grant & Loan Program Development

  The City should continue to evaluate the potential of obtaining State and regional grants and loans through such options as the Department of Water Resources (DWR) Integrated Regional Water Management Program (IRWMP) focused on the distribution of Proposition 50, 84 and 1E funds.

  Use of the State Infrastructure Bank Loan program should also be considered to potentially take advantage of low interest loans, which could augment RDA funding and provide match dollars for potential federal grants.

  Other regional programs, or cooperative projects with the CVWD when they become available for consideration and eligibility should also be considered.

Michael Baker
INTERNATIONAL

We Make a Difference

APPENDIX C.4

UNIVERSITY PARK HYDROLOGY STUDY, NOVEMBER 2004

HYDROLOGY STUDY

UNIVERSITY PARK INTERNAL STREETS

COLLEGE DRIVE,
UNIVERSITY PARK DRIVE,
PACIFIC AVENUE &
TECHNOLOGY DRIVE

PREPARED FOR:
Cornerstone Developers, Inc.
5005 Calle San Raphael
Palm Springs, CA 92262

PREPARED BY:
RBF Consulting
74-410 Highway 111
Palm Desert, CA 92260
(760) 346-7481

CONTACT PERSON:
Brad Donais

JN: 20-100551
November 2004

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BACKGROUND AND PURPOSE

Parcel Map 31730 is located directly east of California State University Palm Desert Campus. Bounded by Cook Street on the east, Gerald Ford Drive on the north, Frank Sinatra Drive on the south and Portola Avenue to the west, within the City of Palm Desert, California. The project site, approximately 295.6 acres, is currently vacant land. It is proposed that the proposed developed site will be subdivided into 17 parcels for residential housing, commercial, hotel, restaurant and office land uses. The major internal streets providing access to these 17 parcels are as follows: College Drive (7267 lineal feet), Pacific Avenue (3147 lineal feet), Technology Drive (1374 lineal feet) and University Park Drive (664 lineal feet). The proposed project will contain all of its drainage onsite including the internal streets. The drainage as a result of widening along the external streets (Gerald Ford Drive, Portola Avenue, Frank Sinatra Drive and Cook Street) may either be diverted to onsite drainage or directed to the existing storm drain system at the intersection of Cook and Gerald Ford.

The purpose of this report is to provide final hydrology and hydraulic analysis for the internal streets using the approved Tentative Parcel Map 31370. The report shall utilize the Riverside County Flood Control and Water Conservation District Rational Method and Synthetic Unit Hydrograph (Short-cut Method).

ONSITE DRAINAGE

Run-off generated from the construction of the major internal streets will be directed to temporary and permanent on-site retention basins. The temporary retention basins will be incorporated into the site development plans for parcels 2, 4 and 14.

The effective rainfall computation has been presented for the 100 year storm event 3, 6 and 24-hour storm. The worst case will be used to evaluate the volume required for runoff storage.

Water will be contained within the streets using 8” curb and gutter, directed to catch basins. The catch basins will transport drainage from the streets into the retention basins.

OFFSITE DRAINAGE

As part of the overall improvements for the University Park Project the major roads on the north and east sides of this project, Gerald Ford Drive, and Cook Street, will be constructed at the same time (please see the attached exhibit). The runoff from the major roads will be routed to either low points and into retention basins that will contain the 100-year storm or to the existing storm drain catch basin located at the intersection of Cook and Gerald Ford.

SECONDARY OVERFLOW

The secondary overflow of storms exceeding the subsurface storage capacities will flood onsite streets. The streets will route flood waters to the northeastern portion of this project near the

intersection of Cook Street and Gerald Ford Drive. When the curbs exceed their capacity the water will flow towards Gerald Ford and Cook Street.

CATCH BASIN SUMMARY

Per the City of Palm Desert the catch basins and storm drain pipe system will be designed for 100-year storm event. Eight-inch curb will be used throughout the project to keep the flood waters within the top of curb for the 10-year storm event. The catch basins will be constructed using the RCFC&WCD catch basin standards.

Drainage Area	Street	CB Station	CB Opening (Ft)	Type	Flow Interception (cfs)	Flow-by (cfs)
A	College Drive	40+30.00 RT	7	Sump	16.53	0
AA	University Park Drive	10+74.50 RT	7	Sump	11.48	0
B	Pacific Avenue	22+70.00 LT	7	Sump	8.85	0
C	Pacific Avenue	22+77.00 RT	7	Sump	5.95	0
D	College Drive	40+30.00 LT	7	Sump	4.63	0
DD	Technology Drive	15+63.50 LT	7	Sump	5.25	0
E	University Park Drive	10+65.00 LT	7	Sump	4.53	0
EE	College Drive	48+26.50 RT	7	Sump	7.25	0
F	University Park Drive	35+89.50 LT	7	Sump	3.66	0
FF	College Drive	49+80.00 RT	7	Sump	11.33	0
G	Technology Drive	13+00.00 RT	7	Flow-by	6.20	2.01
H	University Park Drive	36+06.00 RT	7	Sump	11.66	0
I	College Drive	63+50.00 LT	7	Sump	5.53	0

UNIT HYDROGRAPH
RETENTION VOUME

RETENTION VOLUME

Using the Riverside County Flood Control and Water Conservation Districts guidelines, "The 3 and 6-hour duration storms are considered representative of local thunderstorms which usually occur in the summer months, while the 24-hour storm is considered representative of the general storms which usually occur in the winter." The following calculations will use the worst case from the 3,6 and 24-hour duration storms.

Comparing the effective rain for the three storm durations revealed that the 6-hour duration controlled. The full site was broken down into multiple drainage areas. The following table shows each drainage area, the volume required for the 6-hour storm and the required basin volume with percolation.

Drainage Area	Drainage Area Size (Acre)	6-Hour Volume (Cu Ft)	Perc. Rate (in/hr)	Req'd Basin Volume (Cu Ft)
Temporary Basin A – NW Quadrant Pacific & Gerald Ford				
B	***2.60***	***18,154***	***6***	***5,866***
Temporary Basin B – NE Quadrant Pacific & Gerald Ford				
C	***1.35***	***9,426***	***6***	***3,351***
Temporary Basin C – NW Quadrant College & University Park				
I	1.57	-	6	-
H	3.41	-	6	-
F	0.92	-	6	-
Total	***5.90***	***41,196***	***6***	***12,384***
Permanent Basin A – NW Quadrant College & Technology				
FF	2.84	-	6	-
EE	1.62	-	6	-
Total	***4.46***	***31,141***	***6***	***9,466***
Permanent Basin B – NW Quadrant Technology & Gerald Ford				
DD	1.24	-	6	-
Gerald Ford	5.16	-	6	-
Parcel 8	6.99	-	6	-
Total	***13.39***	***93,493***	***6***	***26,890***
Permanent Basin C – NW Quadrant University Park & College (1)				
A	4.81	-	6	-
AA	3.22	-	6	-
D	1.18	-	6	-
E	1.26	-	6	-
Total	***10.47***	***73,105***	***6***	***(1)***
Underground Retention – Mid Point Technology (2)				
G	***1.44***	***10,055***	***6***	***980 (2)***

Notes:

(1) Permanent Basin designed for residential runoff of Parcel 9, low density housing. The retention basin was sized for the residential both the residential and street drainage areas. See hydrology Study for Tentative Tract Map No. 32655 for additional hydrology information on this basin.

(2) Either this drainage will enter the proposed underground retention chambers or a temporary above ground basin will be constructed in the interim. This drainage will ultimately be retained on the Evan's commercial site.

Michael Baker
INTERNATIONAL

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APPENDIX C.5

UNDERGROUND RETENTION CHAMBERS SPECIFICATIONS

User Inputs

Chamber Model:	MC-3500
Outlet Control Structure:	Yes
Project Name:	190641 University Park (on-site)
Engineer:	Carmen Graciano
Project Location:	California
Measurement Type:	Imperial
Required Storage Volume:	19904.52 cubic ft.
Stone Porosity:	40%
Stone Foundation Depth:	9 in.
Stone Above Chambers:	12 in.
Average Cover Over Chambers:	18 in.
Design Constraint Dimensions:	(100 ft. x 250 ft.)

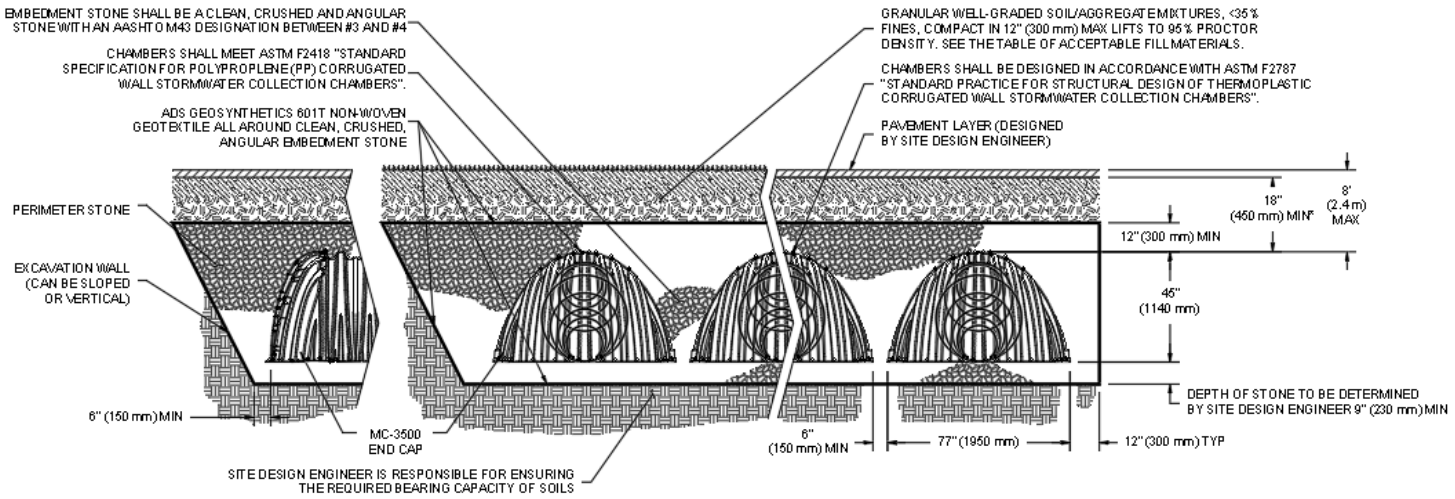
Results

System Volume and Bed Size

Installed Storage Volume:	20327.43 cubic ft.
Storage Volume Per Chamber:	109.90 cubic ft.
Number Of Chambers Required:	107
Number Of End Caps Required:	8
Chamber Rows:	4
Maximum Length:	203.38 ft.
Maximum Width:	29.77 ft.
Approx. Bed Size Required:	6000.15 square ft.

System Components

Amount Of Stone Required:	783 cubic yards
Volume Of Excavation (Not Including Fill):	1223 cubic yards
Total Non-woven Geotextile Required:	1942 square yards
Woven Geotextile Required (excluding Isolator Row):	51 square yards
Woven Geotextile Required (Isolator Row):	231 square yards
Total Woven Geotextile Required:	281 square yards
Impervious Liner Required:	0 square yards



PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	

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190641 UNIVERSITY PARK (ON-SITE)

PALM DESERT, CA

MC-3500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-3500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-3500 CHAMBER SYSTEM

1. STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
10. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
11. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

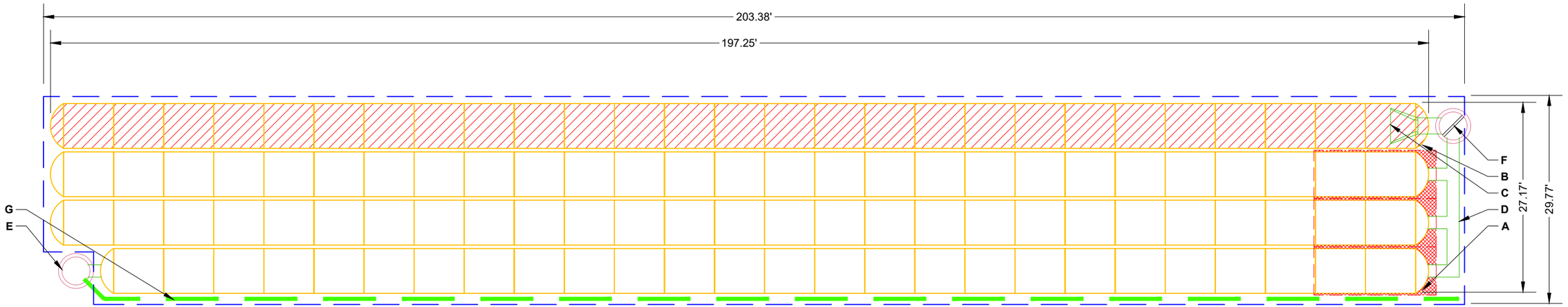
USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT		CONCEPTUAL ELEVATIONS	
107	STORMTECH MC-3500 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	12.50
8	STORMTECH MC-3500 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	6.50
12	STONE ABOVE (in)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	6.00
9	STONE BELOW (in)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	6.00
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	6.00
20331	INSTALLED SYSTEM VOLUME (CF) (PERIMETER STONE INCLUDED) (COVER STONE INCLUDED) (BASE STONE INCLUDED)	TOP OF STONE:	5.50
		TOP OF MC-3500 CHAMBER:	4.50
		24" ISOLATOR ROW PLUS INVERT:	0.92
		18" x 18" BOTTOM MANIFOLD INVERT:	0.90
6000	SYSTEM AREA (SF)	18" BOTTOM CONNECTION INVERT:	0.90
466.3	SYSTEM PERIMETER (ft)	BOTTOM OF MC-3500 CHAMBER:	0.75
		UNDERDRAIN INVERT:	0.00
		BOTTOM OF STONE:	0.00

*INVERT ABOVE BASE OF CHAMBER

PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*	MAX FLOW
PREFABRICATED END CAP	A	18" BOTTOM CORED END CAP, PART#: MC3500IEPP18BC / TYP OF ALL 18" BOTTOM CONNECTIONS	1.77"	
PREFABRICATED END CAP	B	24" BOTTOM CORED END CAP, PART#: MC3500IEPP24BC / TYP OF ALL 24" BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	2.06"	
FLAMP	C	INSTALL FLAMP ON 24" ACCESS PIPE / PART#: MC350024RAMP		
MANIFOLD	D	18" x 18" BOTTOM MANIFOLD, ADS N-12	1.77"	
CONCRETE STRUCTURE	E	OCS (DESIGN BY ENGINEER / PROVIDED BY OTHERS)		4.0 CFS OUT
CONCRETE STRUCTURE W/WEIR	F	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		16.5 CFS IN
UNDERDRAIN	G	6" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN		



ISOLATOR ROW PLUS
(SEE DETAIL)

PLACE MINIMUM 17.50' OF ADSPLUS175 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS

BED LIMITS

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

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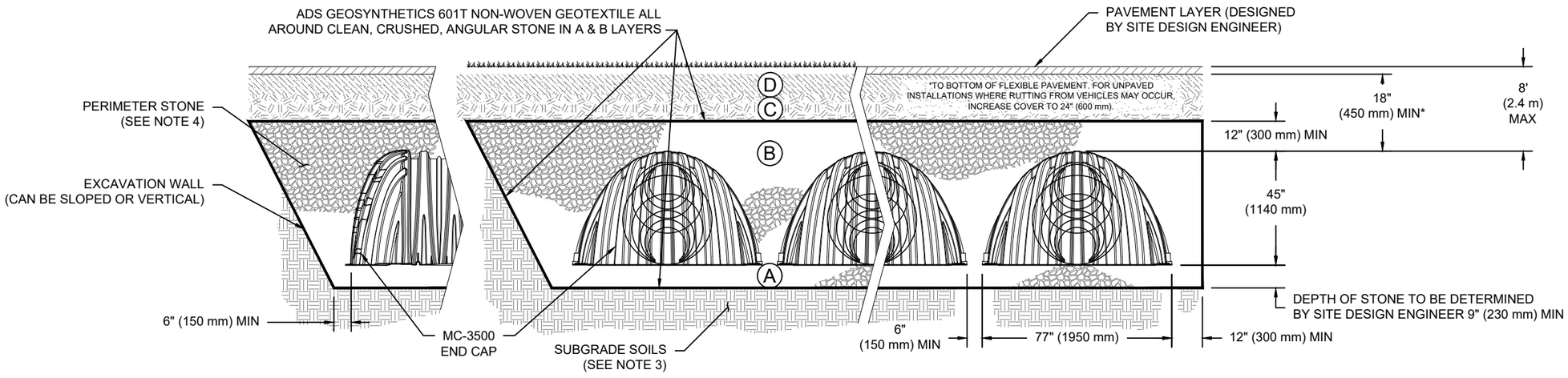
ADS

0 15 30

ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
2. MC-3500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

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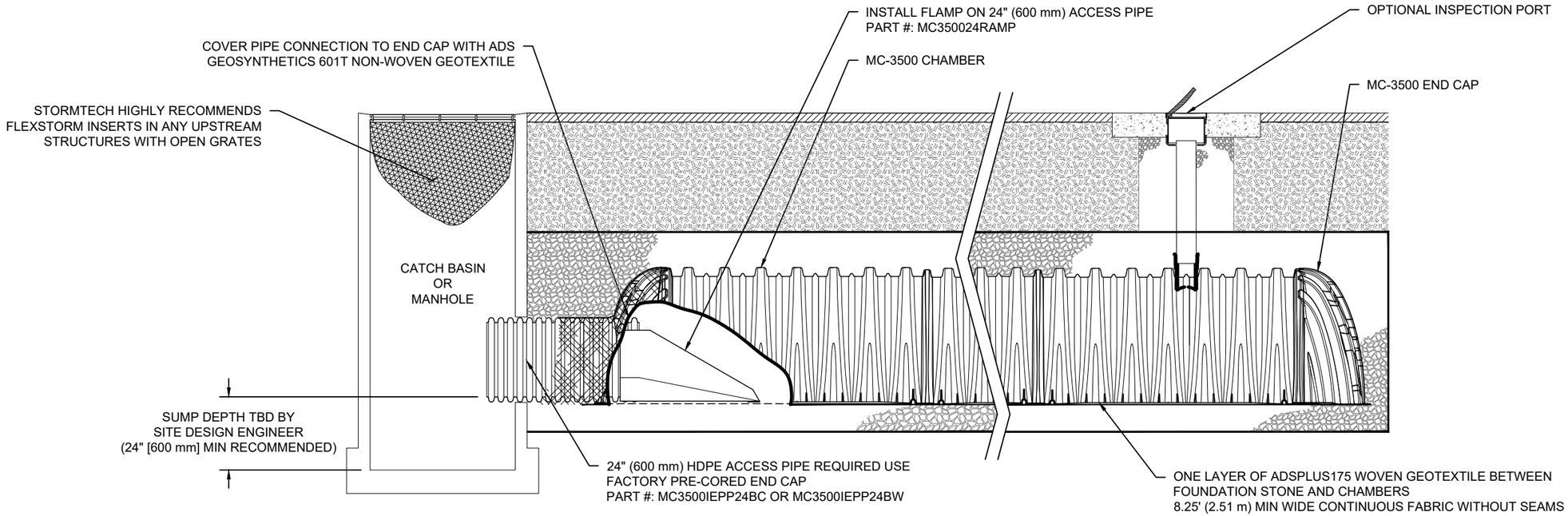

MC-3500 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

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UNDERDRAIN DETAIL

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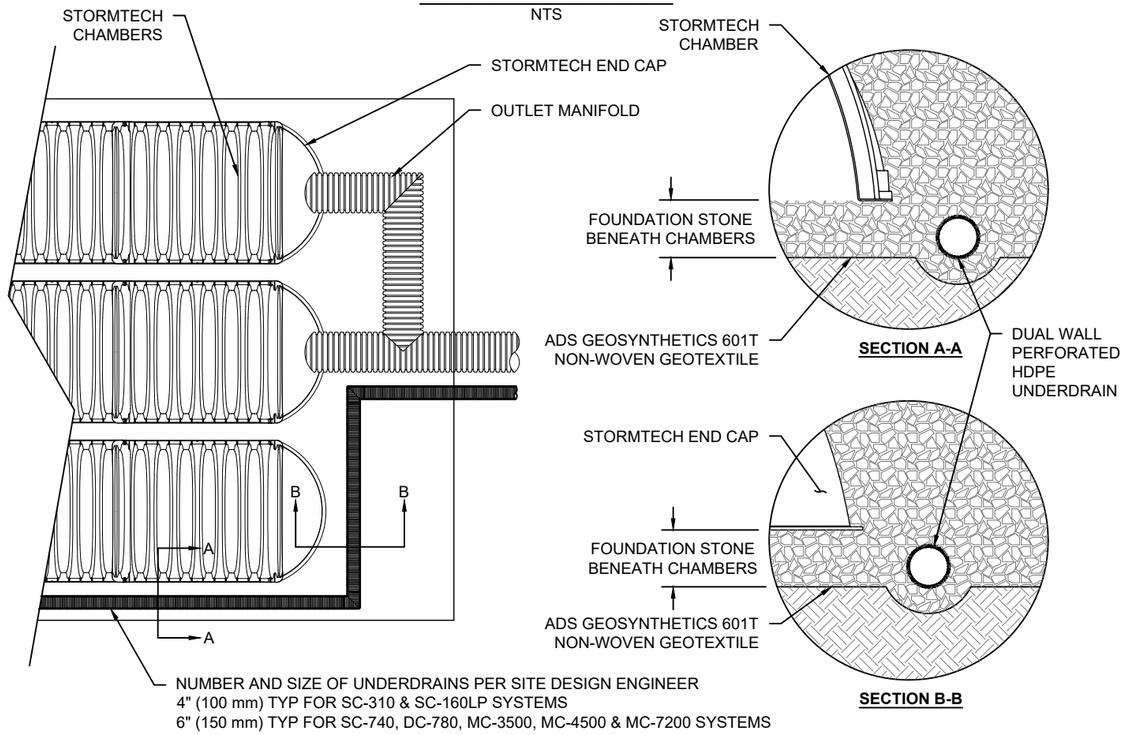
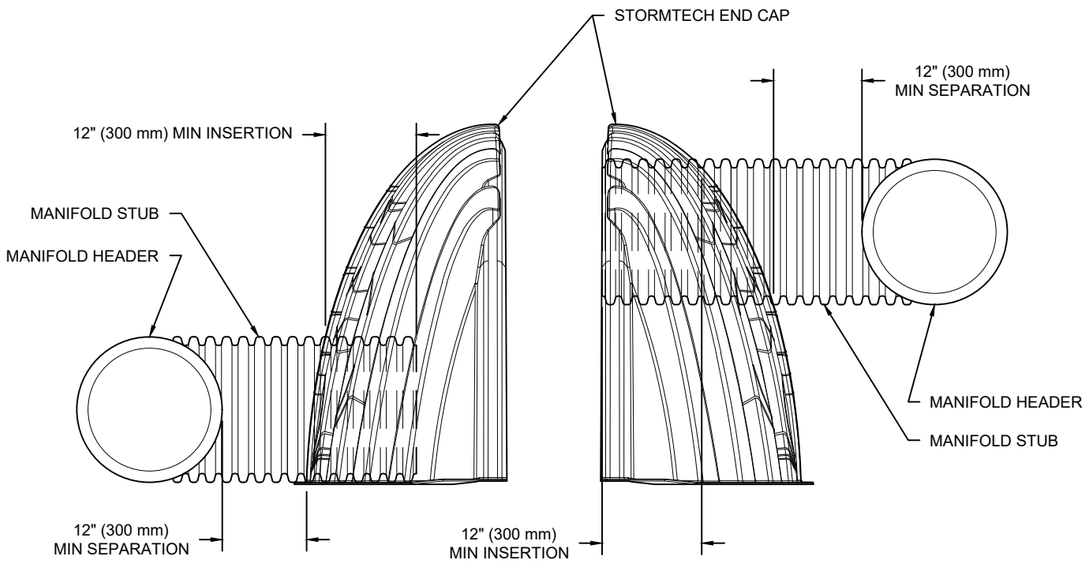


MC-SERIES END CAP INSERTION DETAIL

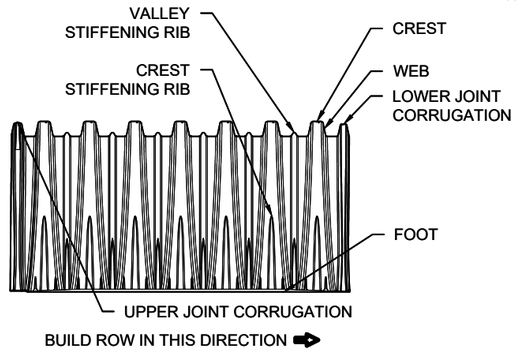
NTS

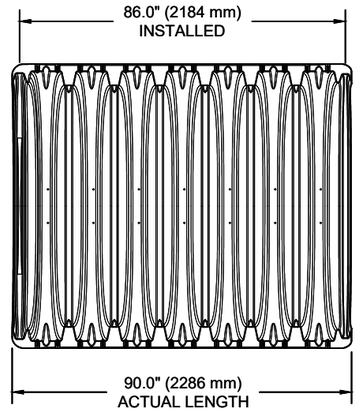


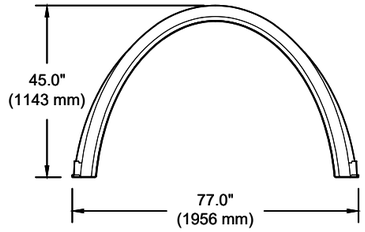
NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

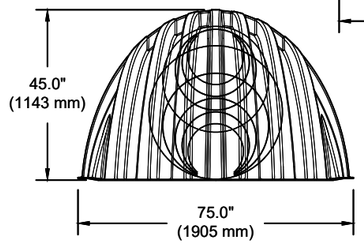
MC-3500 TECHNICAL SPECIFICATION

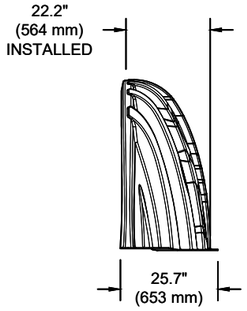
NTS











NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 86.0"	(1956 mm X 1143 mm X 2184 mm)
CHAMBER STORAGE	109.9 CUBIC FEET	(3.11 m³)
MINIMUM INSTALLED STORAGE*	175.0 CUBIC FEET	(4.96 m³)
WEIGHT	134 lbs.	(60.8 kg)

NOMINAL END CAP SPECIFICATIONS

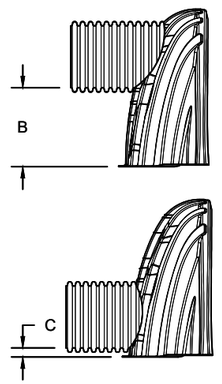
SIZE (W X H X INSTALLED LENGTH)	75.0" X 45.0" X 22.2"	(1905 mm X 1143 mm X 564 mm)
END CAP STORAGE	14.9 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	45.1 CUBIC FEET	(1.28 m³)
WEIGHT	49 lbs.	(22.2 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION, 6" SPACING BETWEEN CHAMBERS, 6" (152 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A WELDED CROWN PLATE END WITH "C"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC3500IEPP06T	6" (150 mm)	33.21" (844 mm)	---
MC3500IEPP06B		---	0.66" (17 mm)
MC3500IEPP08T	8" (200 mm)	31.16" (791 mm)	---
MC3500IEPP08B		---	0.81" (21 mm)
MC3500IEPP10T	10" (250 mm)	29.04" (738 mm)	---
MC3500IEPP10B		---	0.93" (24 mm)
MC3500IEPP12T	12" (300 mm)	26.36" (670 mm)	---
MC3500IEPP12B		---	1.35" (34 mm)
MC3500IEPP15T	15" (375 mm)	23.39" (594 mm)	---
MC3500IEPP15B		---	1.50" (38 mm)
MC3500IEPP18TC	18" (450 mm)	20.03" (509 mm)	---
MC3500IEPP18TW			
MC3500IEPP18BC		---	1.77" (45 mm)
MC3500IEPP18BW			
MC3500IEPP24TC	24" (600 mm)	14.48" (368 mm)	---
MC3500IEPP24TW			
MC3500IEPP24BC		---	2.06" (52 mm)
MC3500IEPP24BW			
MC3500IEPP30BC	30" (750 mm)	---	2.75" (70 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PRECORED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-3500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

190641 UNIVERSITY PARK (ON-SITE)
PALM DESERT, CA

DATE: | DRAWN: CG | CHECKED: N/A
PROJECT #:

DATE	DRW	CHK	DESCRIPTION

StormTech® Chamber System
888-892-2694 | WWW.STORMTECH.COM
4640 TRUEMAN BLVD
HILLIARD, OH 43026
1-800-733-7473
ADS

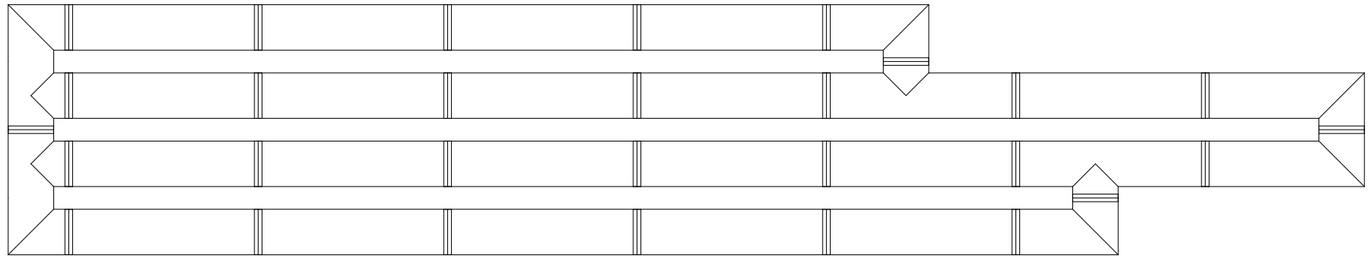
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 644 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = N/A
- PIPE STORAGE VOLUME = 18,209 CF
- BACKFILL STORAGE VOLUME = 14,993 CF
- TOTAL STORAGE PROVIDED = 33,202 CF

PIPE DETAILS
- DIAMETER = 72"
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = PERFORATED
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 18"
- ABOVE PIPE = 18"
- WIDTH AT SIDES = 18"
- BELOW PIPE = 12"



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY

SCALE: 1" = 20'

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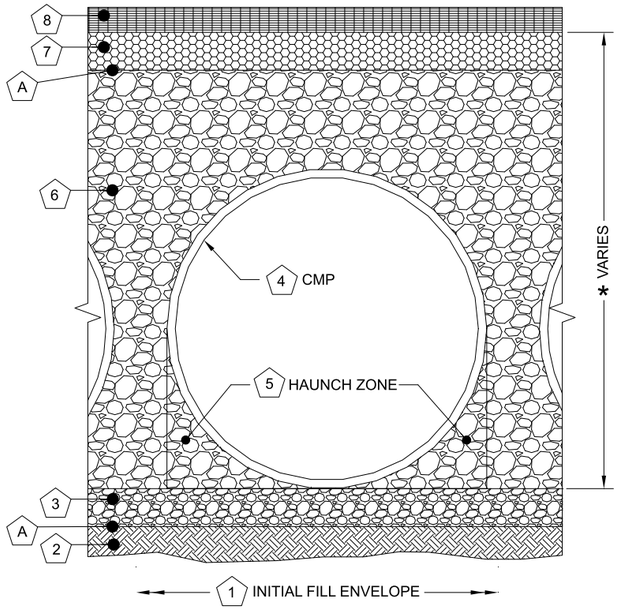
DATE	REVISION DESCRIPTION	BY

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH® CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO24135 University Park
Offsite Flow UG System
Palm Desert, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
15926	24135	11/23/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		



	Infiltration Systems - CMP Infiltration & CMP Perforated Drainage Pipe			
	Material Location	Description	Material Designation	Designation
8	Rigid or Flexible Pavement (if applicable)			
7	Road Base (if applicable			
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types. Wrap the trench only.
6	Backfill	Infiltration pipe systems have a pipe perforation sized of 3/8" diameter. An open graded, free draining stone, with a particle size of ½" – 2 ½" diameter is recommended.	AASHTO M 145-A-1 or AASHTO M 43 - 3, 4	Material shall be worked into the pipe haunches by means of shovel-slicing, rodding, air-tamper, vibratory rod, or other effective methods. Compaction of all placed fill material is necessary and shall be considered adequate when no further yielding of the material is observed under the compactor, or under foot, and the Project Engineer or his representative is satisfied with the level of compaction"
3	Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	For soil aggregates larger than 3/8" a dedicated bedding layer is not required for CMP. Pipe may be placed on the trench bottom comprised of native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Soil aggregates less than 3/8" and unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation.
A	Geotextile Layer	None	None	Contech does not recommend geotextiles be placed under the invert of Infiltration systems due to the propensity for geotextiles to clog over time.
*	Note: The listed AASHTO designations are for gradation only. The stone must also be angular and clean.			

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT.

FOUNDATION/BEDDING PREPARATION

2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMLY COMPACTED WITHOUT SOFT SPOTS.

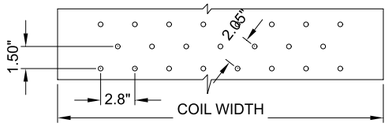
BACKFILL

MATERIAL SHALL BE PLACED IN 8"-10" MAXIMUM LIFTS. INADEQUATE COMPACTION CAN LEAD TO EXCESSIVE DEFLECTIONS WITHIN THE SYSTEM AND SETTLEMENT OF THE SOILS OVER THE SYSTEM. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO-LIFT DIFFERENTIAL BETWEEN THE SIDES OF ANY PIPE IN THE SYSTEM AT ALL TIMES DURING THE BACKFILL PROCESS. BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON ANY PIPES IN THE SYSTEM.

EQUIPMENT USED TO PLACE AND COMPACT THE BACKFILL SHALL BE OF A SIZE AND TYPE SO AS NOT TO DISTORT, DAMAGE, OR DISPLACE THE PIPE. ATTENTION MUST BE GIVEN TO PROVIDING ADEQUATE MINIMUM COVER FOR SUCH EQUIPMENT. MAINTAIN BALANCED LOADING ON ALL PIPES IN THE SYSTEM DURING ALL SUCH OPERATIONS.

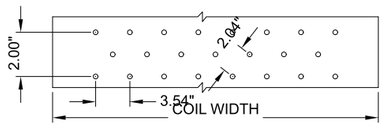
OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. REFER TO TYPICAL BACKFILL DETAIL FOR MATERIAL REQUIRED.

2 2/3" x 1/2" CORRUGATION - STEEL AND ALUMINUM CMP EDGE SPACING EQUAL ON BOTH SIDES



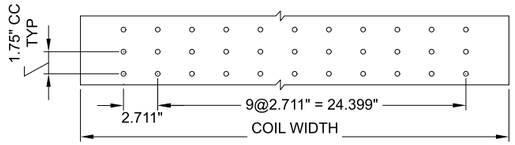
OPEN AREA = 3.76 SQ IN/SQ FT

3" x 1" CORRUGATION - STEEL AND ALUMINUM CMP (COIL PROVIDED FROM CONTECH LANTANA, FL PLANT)



OPEN AREA = 4.16 SQ IN/SQ FT

5" x 1" CORRUGATION - STEEL ONLY
EDGE SPACING EQUAL ON BOTH SIDES



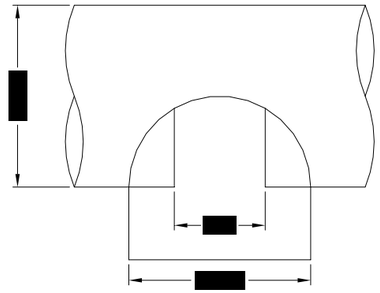
OPEN AREA = 3.33 SQ IN/SQ FT

NOTES:

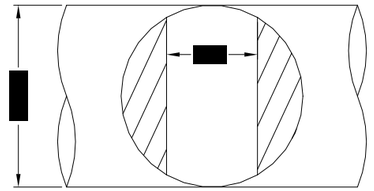
1. PERFORATIONS MEET AASHTO AND ASTM SPECIFICATIONS.
2. PERFORATION OPEN AREA PER SQUARE FOOT OF PIPE IS BASED ON THE NOMINAL DIAMETER AND LENGTH OF PIPE.
3. ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
4. ALL HOLES ⌀3/8".

TYPICAL PERFORATION DETAIL

SCALE: N.T.S.



PLAN

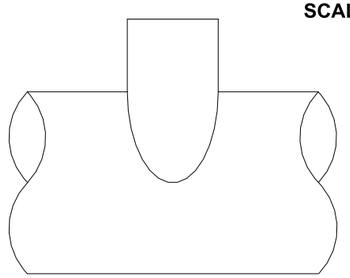


FRONT

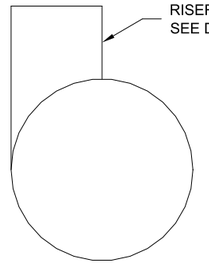
NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.

TYPICAL MANWAY DETAIL

SCALE: N.T.S.



ELEVATION

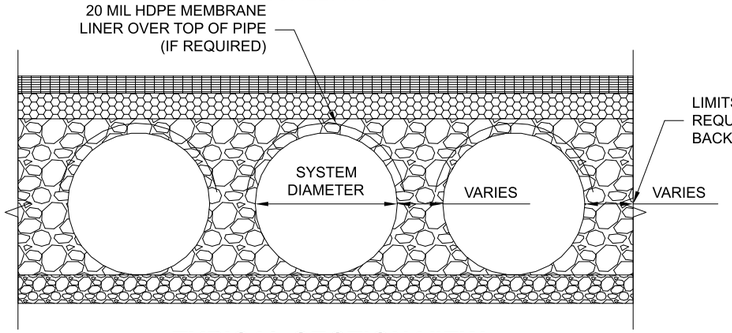


END

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.

TYPICAL RISER DETAIL

SCALE: N.T.S.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

DATE	REVISION DESCRIPTION	BY

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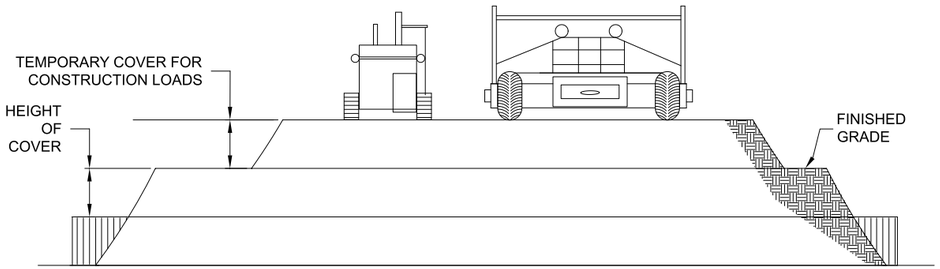

CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

APPLICABLE POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745

APPLICABLE
HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.
REQUIREMENTS
INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

NOTE:
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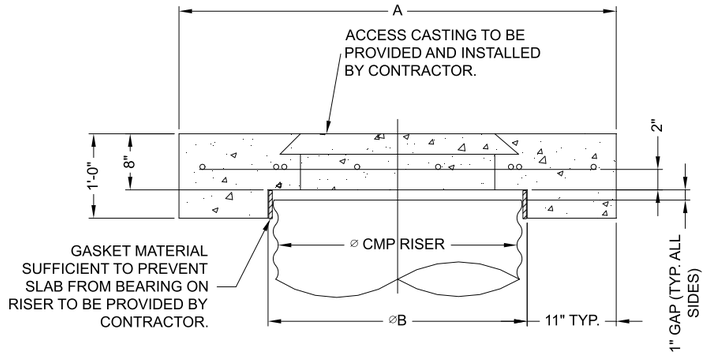
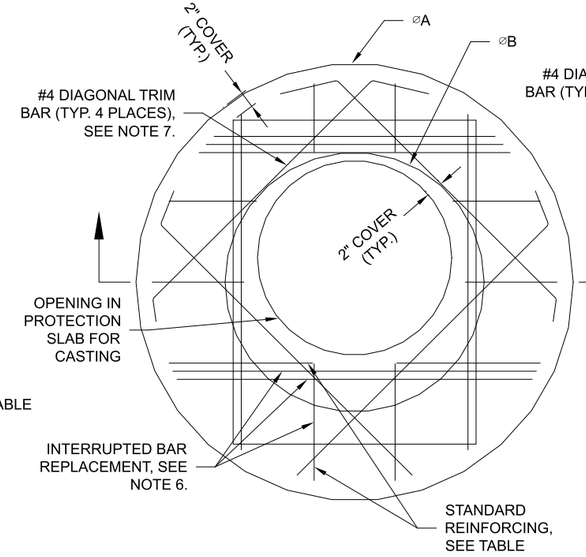


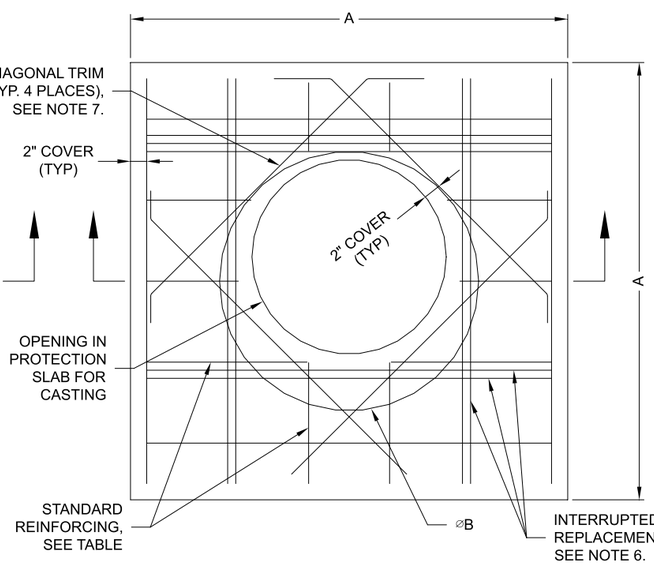
SECTION VIEW

REINFORCING TABLE				
⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

DATE	REVISION DESCRIPTION	BY

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO24135 University Park
Offsite Flow UG System
Palm Desert, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
15926	24135	11/23/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

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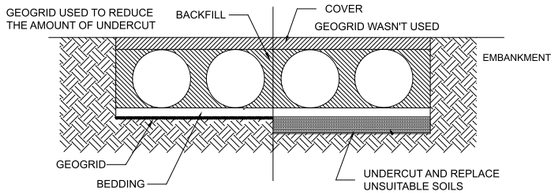
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

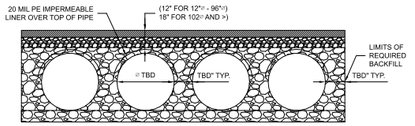


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

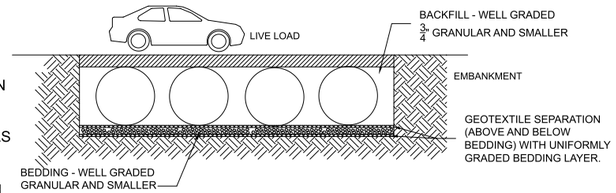
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

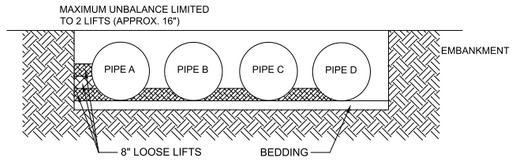
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



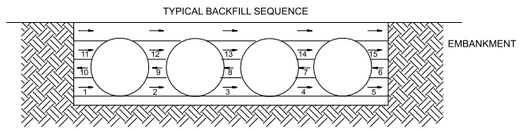
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

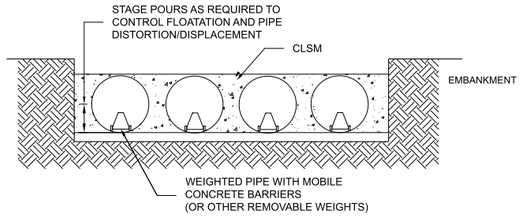


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

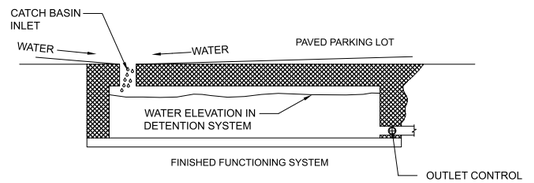


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

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DATE	REVISION DESCRIPTION	BY

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH CMP DETENTION SYSTEMS

CONTECH **DYODS** DRAWING

DYO24135 University Park Offsite Flow UG System Palm Desert, CA DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
15926	24135	11/23/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

APPENDIX D

SOILS DATA

Michael Baker
INTERNATIONAL

We Make a Difference

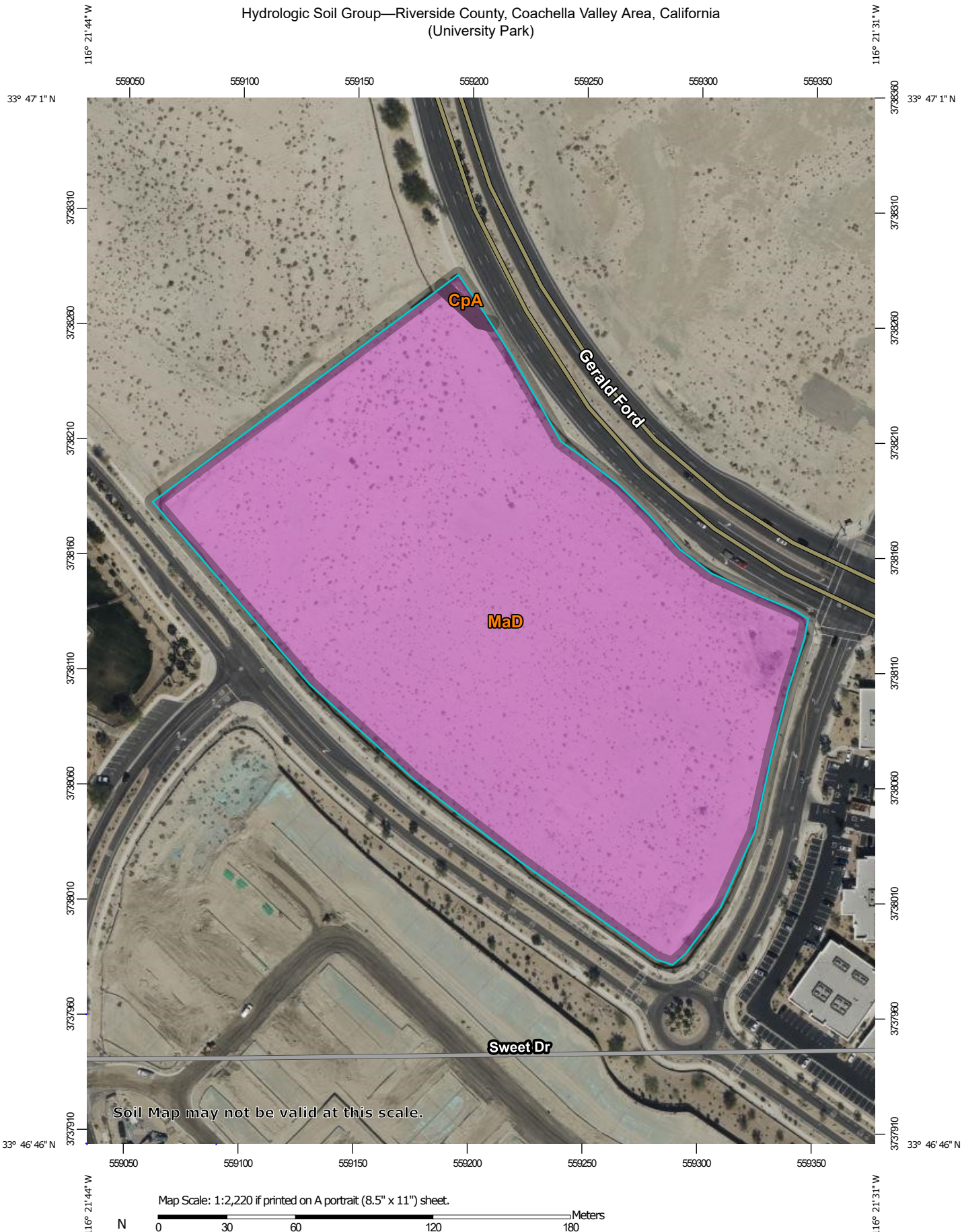
APPENDIX D.1

RESULTS OF ON-SITE PERCOLATION TESTING
(TO BE PROVIDED IN FINAL)

APPENDIX D.2

USDA NRCS CUSTOM SOIL RESOURCE REPORT – UNIVERSITY PARK

Hydrologic Soil Group—Riverside County, Coachella Valley Area, California
(University Park)



Map Scale: 1:2,220 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 30 60 120 180

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

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 1:24,000.

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: Riverside County, Coachella Valley Area, California
Survey Area Data: Version 14, Sep 1, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 15, 2022—May 28, 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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CpA	Coachella fine sand, 0 to 2 percent slopes	A	0.0	0.3%
MaD	Myoma fine sand, 5 to 15 percent slopes	A	10.3	99.7%
Totals for Area of Interest			**10.4**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX E

FLOOD DATA

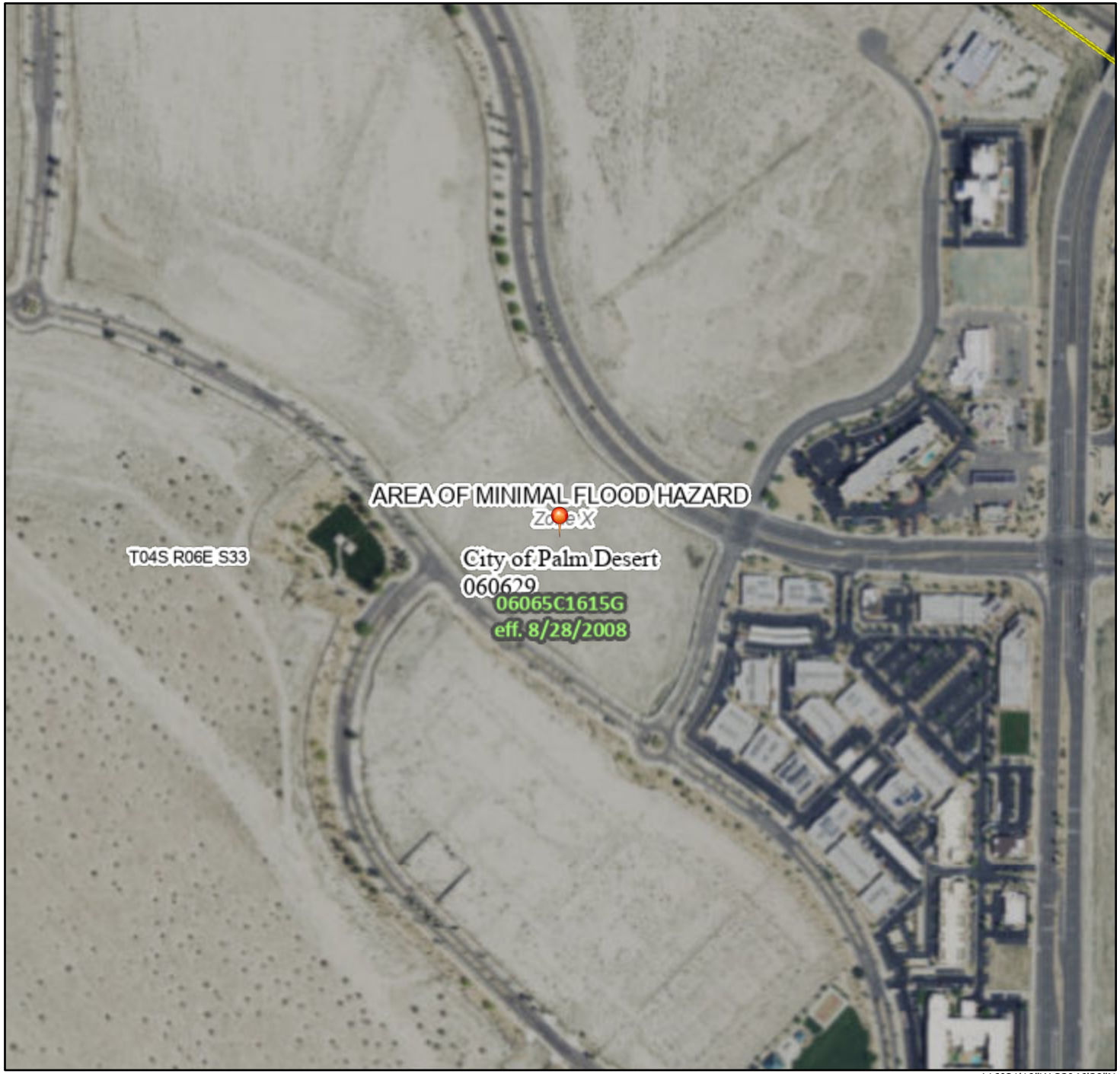
APPENDIX E.1

FEMA FIRMETTE

National Flood Hazard Layer FIRMette

FEMA

116°21'56"W 33°47'9"N



116°21'19"W 33°46'39"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/17/2022 at 2:31 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX E.2

NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES

NOAA Atlas 14, Volume 6, Version 2
Location name: Palm Desert, California, USA*
Latitude: 33.7817°, Longitude: -116.3604°
Elevation: 197.08 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.060** (0.050-0.073)	**0.092** (0.077-0.112)	**0.141** (0.117-0.172)	**0.187** (0.154-0.230)	**0.260** (0.207-0.330)	**0.324** (0.253-0.421)	**0.399** (0.303-0.531)	**0.487** (0.359-0.666)	**0.627** (0.443-0.895)	**0.758** (0.518-1.12)
10-min	**0.086** (0.072-0.104)	**0.132** (0.110-0.161)	**0.203** (0.168-0.247)	**0.268** (0.221-0.329)	**0.372** (0.296-0.472)	**0.465** (0.362-0.603)	**0.572** (0.435-0.761)	**0.698** (0.515-0.955)	**0.898** (0.636-1.28)	**1.09** (0.742-1.61)
15-min	**0.104** (0.087-0.126)	**0.160** (0.133-0.194)	**0.245** (0.204-0.298)	**0.324** (0.267-0.398)	**0.450** (0.358-0.571)	**0.562** (0.438-0.729)	**0.692** (0.525-0.920)	**0.844** (0.623-1.16)	**1.09** (0.769-1.55)	**1.31** (0.897-1.94)
30-min	**0.159** (0.133-0.193)	**0.244** (0.203-0.296)	**0.374** (0.311-0.455)	**0.495** (0.408-0.608)	**0.687** (0.546-0.872)	**0.858** (0.668-1.11)	**1.06** (0.802-1.40)	**1.29** (0.950-1.76)	**1.66** (1.17-2.37)	**2.00** (1.37-2.96)
60-min	**0.230** (0.192-0.279)	**0.354** (0.294-0.429)	**0.542** (0.450-0.659)	**0.717** (0.590-0.880)	**0.994** (0.791-1.26)	**1.24** (0.967-1.61)	**1.53** (1.16-2.03)	**1.86** (1.38-2.55)	**2.40** (1.70-3.43)	**2.90** (1.98-4.29)
2-hr	**0.327** (0.272-0.396)	**0.488** (0.406-0.592)	**0.728** (0.604-0.886)	**0.948** (0.780-1.16)	**1.29** (1.02-1.63)	**1.58** (1.23-2.05)	**1.92** (1.46-2.55)	**2.30** (1.70-3.15)	**2.89** (2.04-4.12)	**3.41** (2.33-5.05)
3-hr	**0.392** (0.327-0.476)	**0.581** (0.484-0.705)	**0.860** (0.714-1.05)	**1.11** (0.916-1.37)	**1.50** (1.19-1.90)	**1.83** (1.43-2.38)	**2.21** (1.68-2.94)	**2.63** (1.94-3.60)	**3.28** (2.32-4.68)	**3.85** (2.63-5.69)
6-hr	**0.529** (0.441-0.641)	**0.781** (0.650-0.947)	**1.15** (0.954-1.40)	**1.48** (1.22-1.82)	**1.98** (1.58-2.52)	**2.41** (1.88-3.13)	**2.89** (2.19-3.84)	**3.42** (2.53-4.68)	**4.23** (2.99-6.04)	**4.92** (3.36-7.28)
12-hr	**0.628** (0.524-0.761)	**0.946** (0.788-1.15)	**1.41** (1.17-1.72)	**1.83** (1.50-2.24)	**2.46** (1.96-3.12)	**3.00** (2.33-3.89)	**3.59** (2.73-4.78)	**4.27** (3.15-5.84)	**5.28** (3.74-7.54)	**6.15** (4.20-9.09)
24-hr	**0.739** (0.654-0.852)	**1.14** (1.01-1.32)	**1.73** (1.53-2.00)	**2.26** (1.97-2.63)	**3.05** (2.59-3.68)	**3.73** (3.10-4.58)	**4.49** (3.64-5.64)	**5.34** (4.21-6.90)	**6.62** (5.02-8.90)	**7.72** (5.66-10.7)
2-day	**0.818** (0.724-0.943)	**1.29** (1.14-1.48)	**1.96** (1.73-2.27)	**2.56** (2.24-2.99)	**3.46** (2.93-4.16)	**4.22** (3.50-5.18)	**5.05** (4.10-6.36)	**5.99** (4.72-7.74)	**7.38** (5.60-9.93)	**8.57** (6.28-11.9)
3-day	**0.859** (0.760-0.990)	**1.36** (1.20-1.57)	**2.08** (1.84-2.41)	**2.72** (2.38-3.17)	**3.67** (3.11-4.42)	**4.47** (3.71-5.49)	**5.35** (4.34-6.73)	**6.32** (4.99-8.17)	**7.78** (5.90-10.5)	**9.01** (6.61-12.5)
4-day	**0.891** (0.789-1.03)	**1.41** (1.25-1.63)	**2.17** (1.92-2.51)	**2.84** (2.49-3.31)	**3.83** (3.25-4.62)	**4.67** (3.87-5.73)	**5.58** (4.53-7.02)	**6.60** (5.21-8.53)	**8.10** (6.14-10.9)	**9.38** (6.88-13.0)
7-day	**0.936** (0.828-1.08)	**1.50** (1.33-1.73)	**2.32** (2.05-2.69)	**3.05** (2.67-3.56)	**4.12** (3.49-4.96)	**5.01** (4.16-6.16)	**5.99** (4.86-7.53)	**7.07** (5.58-9.13)	**8.65** (6.56-11.6)	**9.99** (7.33-13.9)
10-day	**0.968** (0.857-1.12)	**1.57** (1.39-1.81)	**2.44** (2.15-2.82)	**3.20** (2.80-3.73)	**4.34** (3.67-5.22)	**5.28** (4.39-6.49)	**6.31** (5.12-7.94)	**7.45** (5.88-9.62)	**9.12** (6.91-12.3)	**10.5** (7.71-14.6)
20-day	**1.02** (0.906-1.18)	**1.69** (1.49-1.95)	**2.65** (2.34-3.07)	**3.51** (3.07-4.10)	**4.79** (4.06-5.77)	**5.86** (4.87-7.21)	**7.03** (5.70-8.84)	**8.31** (6.56-10.7)	**10.2** (7.71-13.7)	**11.7** (8.59-16.3)
30-day	**1.11** (0.982-1.28)	**1.84** (1.63-2.13)	**2.93** (2.58-3.39)	**3.90** (3.41-4.55)	**5.36** (4.54-6.46)	**6.58** (5.46-8.09)	**7.90** (6.41-9.94)	**9.35** (7.38-12.1)	**11.5** (8.69-15.4)	**13.2** (9.68-18.4)
45-day	**1.18** (1.05-1.36)	**1.99** (1.76-2.29)	**3.19** (2.81-3.69)	**4.28** (3.74-4.99)	**5.93** (5.03-7.15)	**7.33** (6.09-9.01)	**8.84** (7.17-11.1)	**10.5** (8.28-13.6)	**12.9** (9.77-17.3)	**14.8** (10.9-20.7)
60-day	**1.25** (1.11-1.45)	**2.13** (1.88-2.45)	**3.45** (3.04-3.99)	**4.65** (4.07-5.43)	**6.48** (5.49-7.81)	**8.04** (6.68-9.88)	**9.74** (7.90-12.3)	**11.6** (9.14-15.0)	**14.2** (10.8-19.2)	**16.4** (12.1-22.9)

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

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

Please refer to NOAA Atlas 14 document for more information.

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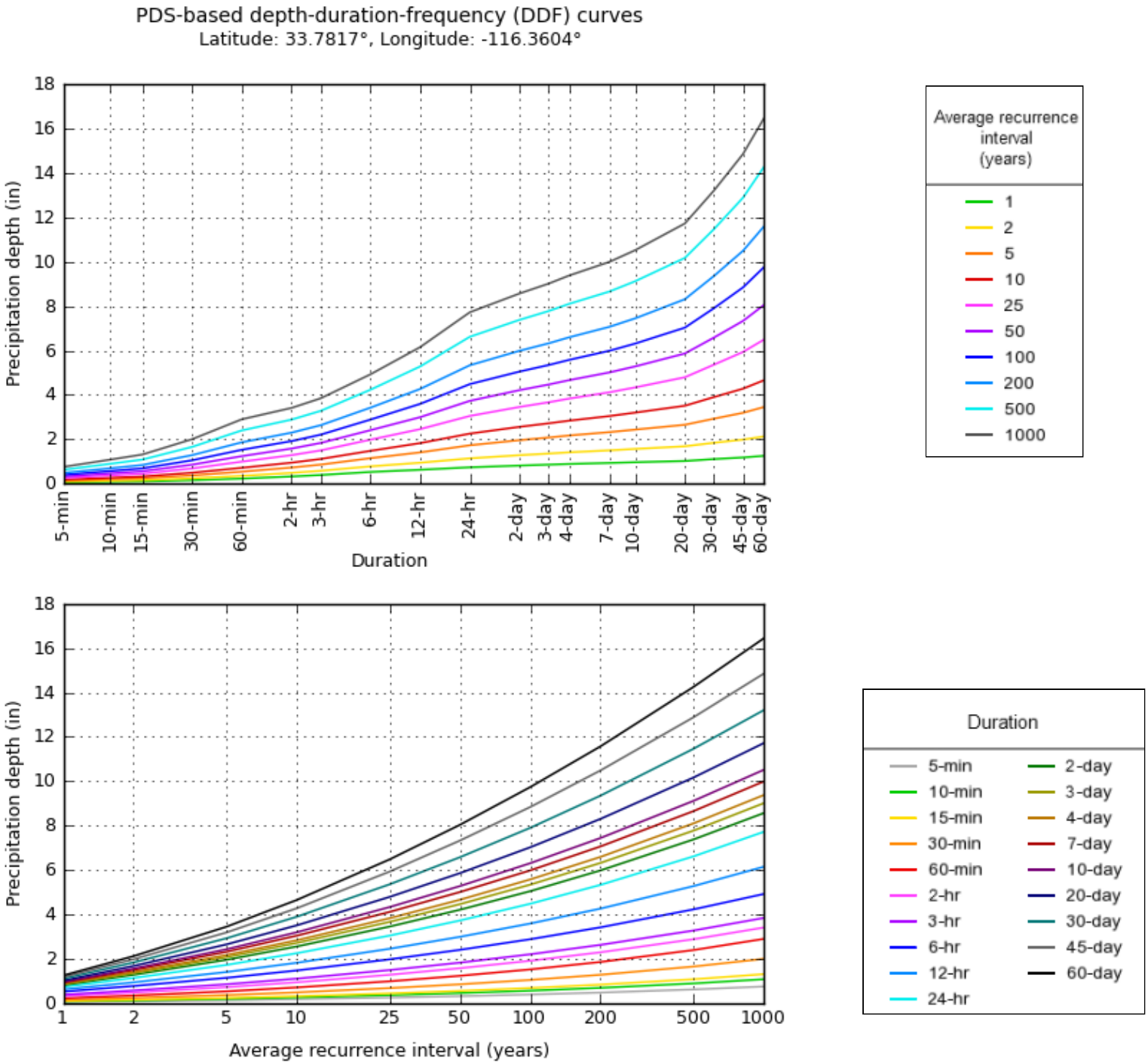
PF graphical



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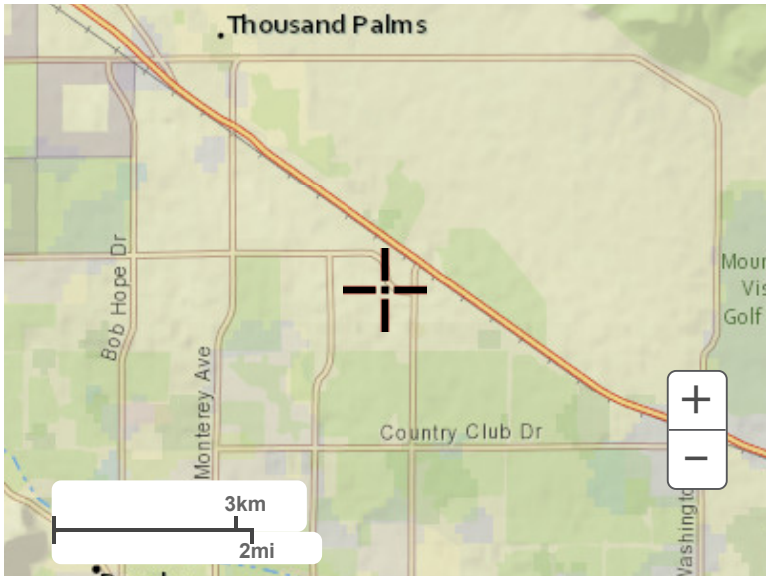
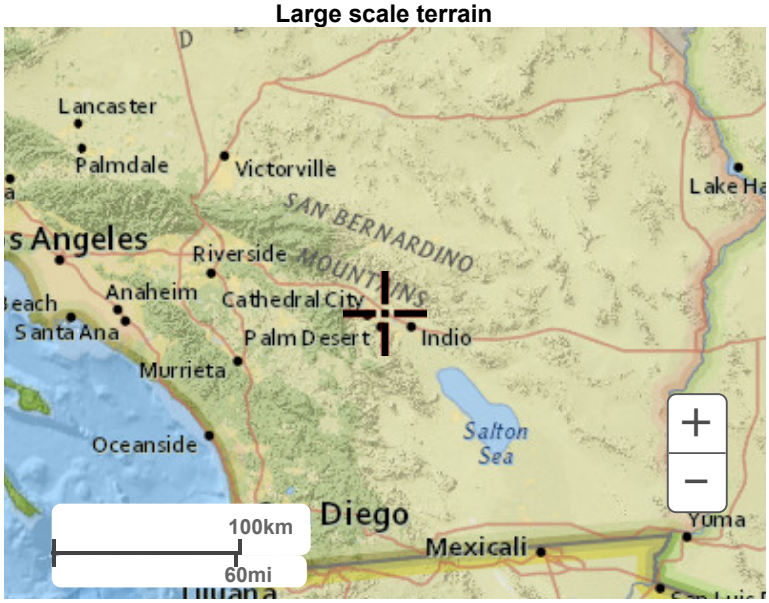
Maps & aerials

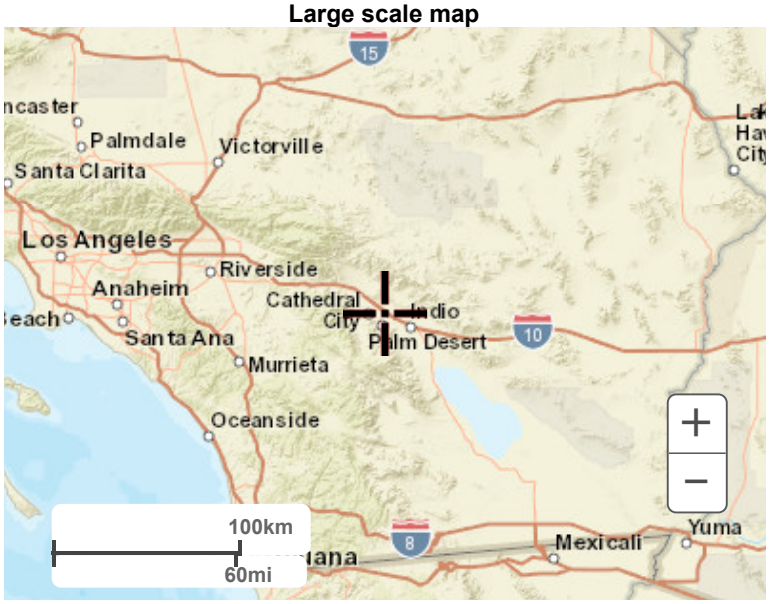
Small scale terrain



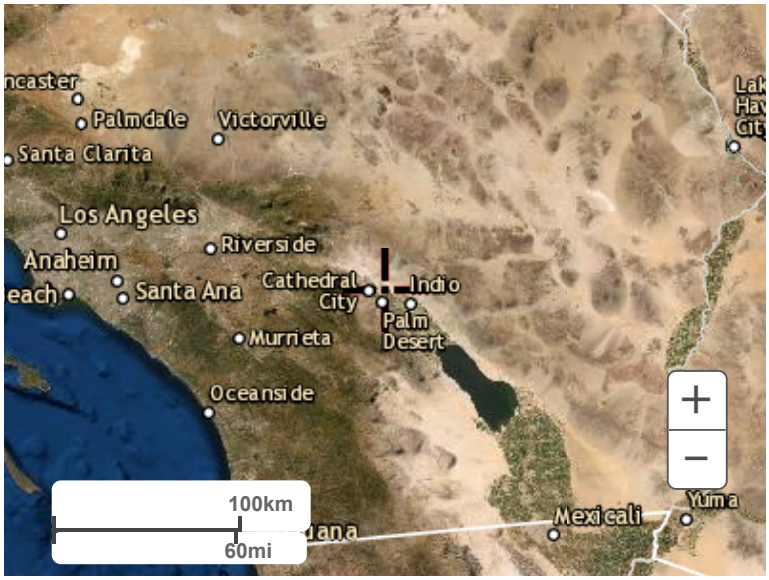
Large scale terrain



Large scale map



Large scale aerial



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APPENDIX F

RCFC&WCD HYDROLOGY MANUAL PLATES E-6.1-6.3

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

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RUNOFF INDEX NUMBERS FOR PERVIOUS AREAS

PLATE E-6.1 (1 of 2)

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
AGRICULTURAL COVERS (cont.) -					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Deciduous (Apples, apricots, pears, walnuts, etc.)		See Note 4			
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small Grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87
Vineyard		See Note 4			

Notes:

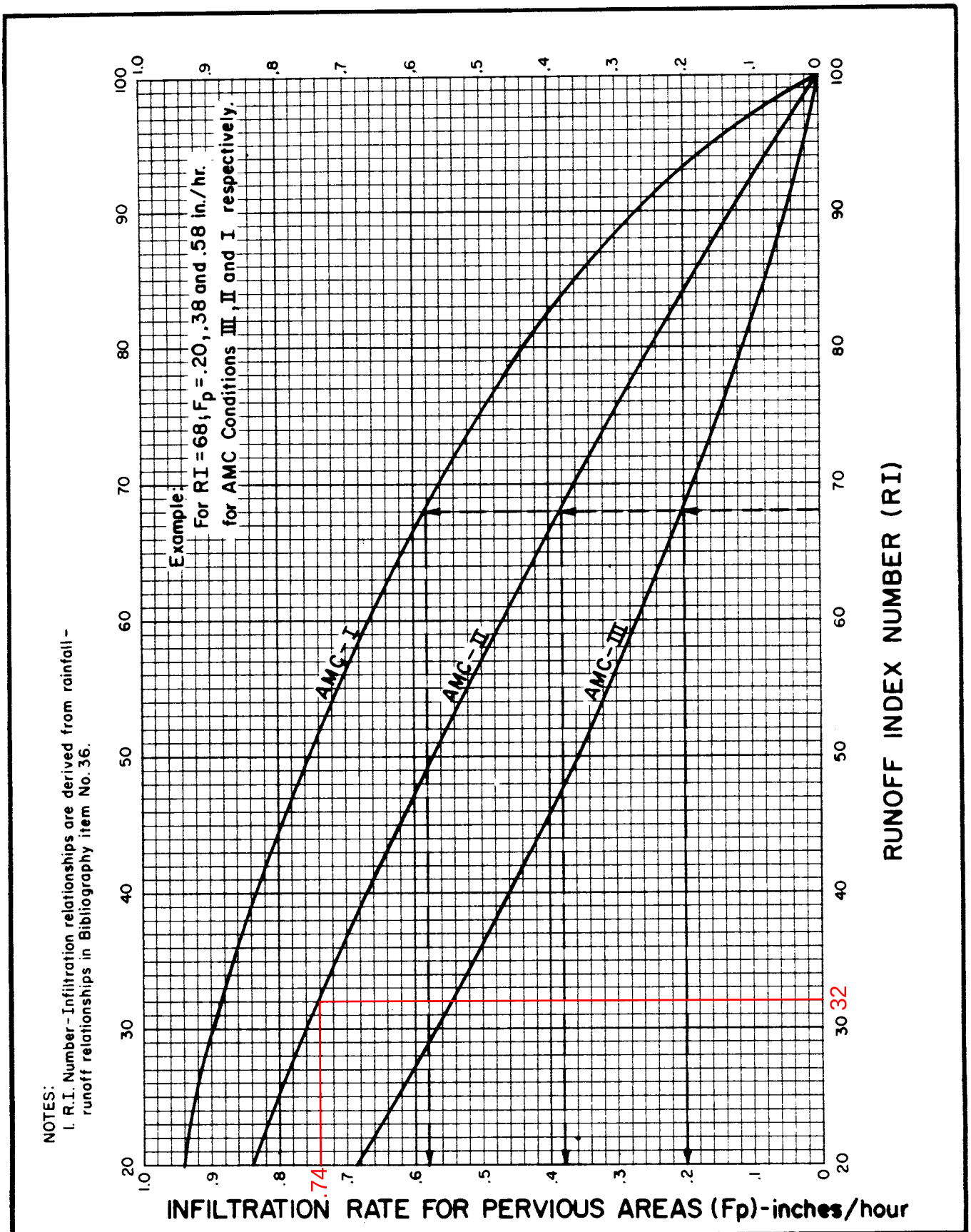
1. All runoff index (RI) numbers are for Antecedent Moisture Condition (AMC) II.

2. Quality of cover definitions:
   Poor-Heavily grazed or regularly burned areas. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.
   Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.
   Good-Heavy or dense cover with more than 75 percent of the ground surface protected.

3. See Plate C-2 for a detailed description of cover types.

4. Use runoff index numbers based on ground cover type. See discussion under "Cover Type Descriptions" on Plate C-2.

5. Reference Bibliography item 17.



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HYDROLOGY MANUAL

INFILTRATION RATE FOR PERVIOUS AREAS VERSUS RUNOFF INDEX NUMBERS

PLATE E-6.2