STORMWATER MANAGEMENT REPORT

Founders Plaza Parking Lot Improvements

323 & 321 Pitkin Street East Hartford, Connecticut 06108

PREPARED FOR

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PREPARED BY



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Stormwater Report Narrative

Project Description

The proposed project includes the reconfiguration of and addition to the existing parking lots serving the 111 Founders Plaza office building.

Site Description

The Project Site (the site) is comprised of two (2) parcels consisting of 323 Pitkin Street (\pm 3.45-acres, Map Lot 4-38) and 321 Pitkin Street (\pm 5.73-acres, Map Lot 4-38C) in East Hartford, Connecticut. The site is the location of an active office building and parking garage, with associated parking lots. The site has interconnection with the adjacent hotel located directly to the northwest of the site, with the adjacent office building located directly to the south of the site, and with the adjacent office buildings located directly to the east of the site. The Site is bounded by Pitkin Street to the north, East River Drive to the west, an office building to the south, and office buildings to the east.

Per the National Resources Conservation Service (NRCS), surface soils on the Site include Udorthents Urban Land Complex and Urban Land soils (Hydraulic Soil Group B and D, moderate and very slow infiltration rate potential respectively), see Appendix A for more information.

The site is not located within a FEMA 100-yr flood zone, per FEMA map no. 09003C0368G, effective September 16, 2011 (included in Appendix A). It is located within a Zone X, described as "0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depths less than one foot or with drainage areas of less than one square mile". The site is protected from flood risk by levees constructed adjacent to the Connecticut River.

A geotechnical engineering evaluation of the adjacent property was performed by JGI Eastern, dated September 30, 2005. It is noted within the geotech report that bedrock was not encountered and that groundwater was encountered at depths between 10.5 and 15 feet below grade.



Existing Drainage Conditions

The existing site is developed with an office building, a parking garage, and associated parking lots. Untreated stormwater runoff from the site is generally captured by on-site catch basins and discharged to the south to Hartland Street. Based upon a review of available drainage mapping and topography within the town right-of-ways, it is anticipated that the entire proposed development area to the east of the parking garage drains to the Meadow Hill pumping station. The western portion of the area to the west of the parking garage drains to East River Drive, where it is captured by catch basins and conveyed north to the Pitkin Street pumping station. Figure 2 illustrates the existing drainage areas selected for the site. The following describes the four (4) drainage areas and their respective characteristics:

Area 1A – Untreated stormwater from this portion of the site, to the east of the parking garage, flows overland in an easterly direction where it is captured by an existing catch basin (Design Point 1). From this point, stormwater is discharged east and then south to the storm main in Hartland Street.

Area 2A – Untreated stormwater from this portion of the site, generally the northeast portions of the site, flows overland where it is captured by existing catch basins and discharged towards a common existing manhole (Design Point 2). From this point, stormwater is discharged south to the storm main in Hartland Street.

Area 3A – Untreated stormwater from this portion of the site flows overland to an existing catch basin (Design Point 3). From this point, stormwater is discharged west and then south to the storm main in Hartland Street.

Area 4A – Untreated stormwater from this portion of the site flows overland to East River Drive, where it is captured by an existing catch basin (Design Point 4). From this point, stormwater is discharged west and then north up East River Drive.

Table 1 below provides a summary of the existing conditions hydrologic data.

Drainage Area	Discharge Location	Area (sq ft)	Curve Number	Time of Concentration (min)
Area 1A (DP-1)	Onsite Catch	41,610	94	5.0
	Basin			
Area 2A (DP-2)	Onsite Manhole	123,645	90	5.0
Area 3A (DP-3)	Onsite Catch	21,351	96	5.0
	Basin			
Area 4A (DP-4)	East River Drive Catch Basin	33,023	91	5.0

Table 1Existing Conditions Hydrologic Data



Proposed Drainage Conditions

The redevelopment project includes the reconfiguration of portions of the existing parking lots and addition of new pavement areas. The sum of the proposed improvements will increase onsite imperviousness by approximately 26,400 square feet.

Under proposed conditions, existing drainage patterns will largely be unchanged, with the minor exception that a portion of the northeast grassed areas which drain overland to Pitkin Street today will be captured, treated, and discharged to the south to Hartland Street. The proposed stormwater management systems, which are comprised of four (4) separate subsurface infiltration chamber areas, have been sized, located, and designed to both provide water quality treatment of the tributary watershed areas, and to mitigate peak flows from the proposed development to preconstruction conditions.

The proposed use of open-bottom plastic chambers as infiltration galleries promotes retention and infiltration of the first inch of rainfall over all new impervious surfaces, which is in line with State water quality standards and the Town's Stormwater Management Plan regarding the disconnection of impervious areas. As a side benefit of the project, approximately 21,300 square feet of currently-untreated existing pavement on the site are proposed to be connected to a stormwater management area and have the first inch of tributary rainfall retained and infiltrated.

Peak rates of runoff to East River Drive, Hartland Street, and Pitkin Street will be reduced by the proposed development. Rates to Pitkin Street will be reduced by virtue of the removal of tributary watershed and rates to East River Drive and Hartland Street will be reduced by the inclusion of subsurface stormwater management areas (see Table 2).

Figure 3 illustrates the proposed "post construction" drainage conditions for the project. Under proposed conditions, the site is divided into eight (8) drainage areas that discharge stormwater to the four (4) original design points (See Figure 3):

Area 1B – This area consists of the area to the east of the parking garage. It is proposed to install a new catch basin which will capture the runoff from this new pavement and discharge it to a subsurface infiltration system, prior to discharging to the existing catch basin (Design Point 1).

Area 1C – This area will continue to drain overland to the existing catch basin (Design Point 1).



Area 2B – This area consists of portion of existing pavement and a portion of new pavement, the runoff from which will be captured by an existing catch basin and discharged to a subsurface infiltration system. The outlet from this system will ultimately drain to the existing manhole (Design Point 2).

Area 2C – This area is primarily new pavement, the runoff from which will be captured by two new catch basins and discharged to a subsurface infiltration system. The outlet from this system will ultimately drain to the existing manhole (Design Point 2).

Area 2D – This area will continue to drain overland ultimately to the existing manhole (Design Point 2).

Area 3A – This area will continue to drain overland to the existing onsite catch basin (Design Point 3).

Area 4B – This area consists of the new parking stalls to the west of the parking garage and a portion of the existing garage ramp, the runoff from which will be captured by a new catch basin and discharged to a subsurface infiltration system. The outlet from this system will ultimately drain to the East River Drive catch basin (Design Point 4).

Area 4C – This area will continue to drain overland to the East River Drive catch basin (Design Point 4).

Table 2 below provides a summary of the proposed conditions hydrologic data.

Table 2Proposed Conditions Hydrologic Data

				Time of
		Area	Curve	Concentration
Drainage Area	Discharge Location	(sq ft)	Number	(min)
Area 1B (DP-1)	Infiltration 1B	8,063	94	5.0
Area 1C (DP-1)	Onsite Catch Basin	33,547	97	5.0
Area 2B (DP-2)	Infiltration 2B	25,908	94	5.0
Area 2C (DP-2)	Infiltration 2C	10,949	95	5.0
Area 2D (DP-2)	Onsite Manhole	93,858	94	5.0
Area 3A (DP-3)	Onsite Catch Basin	21,351	96	5.0
Area 4B (DP-4)	Infiltration 4B	3,093	98	5.0
Area 4C (DP-4)	East River Drive Catch Basin	29,933	91	5.0



Hydrologic Analysis

The rainfall-runoff response of the site under existing and proposed conditions was evaluated for storm events with recurrence intervals of 2, 5, 10, 25 and 100-years. Rainfall volumes used for this analysis were based on the NOAA National Weather Service Type III, 24-hour storm event; they were 3.07, 4.06, 4.88, 6.01, and 7.75-inches, respectively. Runoff coefficients for the existing and proposed conditions, as previously shown in Tables 1 and 2 respectively, were determined using NRCS Technical Release 55 (TR-55) methodology as provided in HydroCAD. The HydroCAD model is based on the NRCS Technical Release 20 (TR-20) Model for Project Formulation Hydrology (see Appendix B for calculations).

Drainage areas used in the analyses were described in previous sections and shown on Figures 2 and 3. The HydroCAD model is based on the NRCS Technical Release 20 (TR-20) Model for Project Formulation Hydrology. Detailed printouts of the HydroCAD analyses are included in Appendix D. Table 3 presents a summary of the existing and proposed conditions peak discharge rates.



Table 3 Peak Discharge Rates (cfs*)

Design Point	2-year	5-year	10-year	25-year	100-year
Design Point 1: Onsite Catch Basin					
Existing	2.69	3.69	4.51	5.64	7.36
Proposed	2.34	3.63	4.50	5.60	7.29
Design Point 2: Onsite Manhole					
Existing	6.98	10.00	12.49	15.90	21.12
Proposed	6.34	9.43	12.20	15.81	20.85
Design Point 3: Onsite Catch Basin					
Existing	1.45	1.96	2.37	2.95	3.82
Proposed	1.42	1.93	2.35	2.93	3.81
Design Point 4: East River Drive Catch Basin					
Existing	1.93	2.74	3.40	4.31	5.70
Proposed	1.93	2.74	3.40	4.31	5.69

* Expressed in cubic feet per second

The results of the analysis indicate that there is no increase in peak flow runoff for all storm events between the pre- and post-development conditions at the Design Points.

Hydraulic Analysis

The only pipes proposed to accommodate the project are short runs of 18" HDPE pipes connecting the catch basins to the new subsurface galleries, and 12" RCP pipes outleting the subsurface systems to existing onsite structures. As such, the 12" RCP outlet pipes were analyzed using StormCAD, a HEC-22 based program, to safely convey the estimated 100-year flows exiting the subsurface systems. Pipe sizing calculations are included in Appendix D of this report.



Figure 1: Site Locus Map

Way 17, 2018 **FIGURE 1**



0 335 670 1340 Feet

Site Location Map

Founders Plaza Parking Lot Improvements 323 & 321 Pitkin Street East Hartford, Connecticut



Figure 2: Existing Drainage Areas









Existing Drainage Conditions

Figure 2

05/15/2018 Parking Lot Improvements Founders Plaza, Pitkin Street, East Hartford



Figure 3: Proposed Drainage Areas







Proposed Drainage Conditions

Figure 3

Parking Lot Improvements 05/15/2018 Founders Plaza, Pitkin Street, East Hartford



Appendix A Additional Mapping



NRCS Web Soil Survey Mapping



USDA Natural Resources Conservation Service



Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
306	Udorthents-Urban land complex	В	38.7	27.3%
307	Urban land	D	69.1	48.7%
308	Udorthents, smoothed	С	0.3	0.2%
309	Udorthents, flood control	С	10.0	7.0%
W	Water		23.7	16.7%
Totals for Area of Intere	st	141.7	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





FEMA Mapping

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National Flood Hazard Layer FIRMette



Legend





Appendix B: Long Term Operations and Maintenance Measures

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Project Information

Site

Project Name:	Founders Plaza Parking Lot Improvements
Address or Locus:	111 Founders Plaza (323 & 321 Pitkin Street)
City, State & Zip:	East Hartford, Connecticut

Developer

Client Name:	Merchant 99-111 Founders LLC
Client Address:	111 Founders Plaza, Suite 101
Client City, State & Zip:	East Hartford, Connecticut 06108

Site Supervisor

Site Manager Name:	TBD
Site Manager Address:	
Site Manager City, State & Zip:	
Site Manager Telephone No.:	
Site Manager Cell Phone:	
Site Manager E-Mail:	



Long Term Stormwater Maintenance Measures

- Street Sweeping (Standard Pavement): Sweep or vacuum roads and parking areas 2x per year, preferably in late spring and late fall.
- Catch Basins with Deep Sumps and Oil/debris Traps: Inspect twice per year. Remove sediment once per year or whenever greater than 6 inches of sediment has accumulated.
- Trash/Litter: Routinely pick up and remove litter from entire property as required. Routinely inspect all dumpster and compactor locations for spills. Remove all trash litter from the enclosure and dispose of properly.
- Vegetated Areas: Inspect bi-annually. Replant bare areas upon identification. Routinely mow lawn and remove clippings, minimum once every 2 wks.
- Underground Infiltration Chambers: Inspect the system quarterly for the first year. Clean as needed via jet/vac in the first year. Subsequent to the first year, inspect the system two (2) times per year, preferably in the spring after snowmelt and before winter conditions. Clean the system once per year via jet/vac, preferably after snowmelt in the spring. Repair any damages immediately upon identification.



Long Term Best Management Practices Checklist

> The Long-Term BMP Maintenance/Evaluation Checklist is attached.

Parking Lot Improvements – 111 Founders Plaza, East Hartford, CT Best Management Practices – Maintenance/ Evaluation Checklist

Long Term Practices

Best Management	Inspection Frequency	Date	Inspector	Minimum Maintonanco and	Cleaning/Repair Needed	Date of	Performed
Practice		inspecieu		Key Items to Check		Cleaning/Repair	Бу
Street Sweeping	2x per yr, preferably in late spring and late fall						
Catch Basins	Inspect/ Clean bi-annually						
Vegetated Areas	Inspect bi-annually Replant bare areas upon identification						
Trash/ Litter	Routinely pick up and remove litter from entire property as required. Routinely inspect all dumpster and compactor locations for spills. Remove all trash litter from the enclosure and dispose of properly.						
Underground Infiltration Chambers	Inspect the system quarterly for the first year. Clean as needed in the first year. Subsequent to the first year, inspect the system two (2) times per year, preferably in the spring after snowmelt and before winter conditions. Clean the system once per year via jet/vac.						

Stormwater Control Manager _____



Appendix C: Erosion and Sedimentation Control Measures



Erosion and Sedimentation Control Measures

The following erosion and sedimentation controls are for use during the earthwork and construction phases of the project. The following controls are provided as recommendations for the site contractor and do not constitute or replace the final Stormwater Pollution Prevention Plan that must be fully implemented by the Contractor and owner in Compliance with EPA NPDES regulations.

Straw Bale Barriers

Straw bale barriers will be placed to trap sediment transported by runoff before it reaches the drainage system or leaves the construction site. Bales will be set at least four inches into the existing ground to minimize undercutting by runoff.

Silt Fencing

In areas where high runoff velocities or high sediment loads are expected, straw bale barriers will be backed up with silt fencing. This semi-permeable barrier made of a synthetic porous fabric will provide additional protection. The silt fences and straw bale barrier will be replaced as determined by periodic field inspections.

Catch Basin Protection

Newly constructed and existing catch basins will be protected with straw bale barriers (where appropriate) or silt sacks throughout construction.

Vegetative Slope Stabilization

Stabilization of open soil surfaces will be implemented within 14 days after grading or construction activities have temporarily or permanently ceased, unless there is sufficient snow cover to prohibit implementation. Vegetative slope stabilization will be used to minimize erosion on slopes of 3:1 or flatter. Annual grasses, such as annual rye, will be used to ensure rapid germination and production of root mass. Permanent stabilization will be completed with the planting of perennial grasses or legumes. Establishment of temporary and permanent vegetative cover may be established by hydro-seeding or sodding. A suitable topsoil, good seedbed preparation, and adequate lime, fertilizer and water will be provided for effective establishment of these vegetative stabilization methods. Mulch will also be used after permanent seeding to



protect soil from the impact of falling rain and to increase the capacity of the soil to absorb water.

Maintenance

- The contractor or subcontractor will be responsible for implementing each control shown on the Sedimentation and Erosion Control Plan. In accordance with EPA regulations, the contractor must sign a copy of a certification to verify that a plan has been prepared and that permit regulations are understood.
- The on-site contractor will inspect all sediment and erosion control structures periodically and after each rainfall event. Records of the inspections will be prepared and maintained on-site by the contractor.
- Silt shall be removed from behind barriers if greater than 6-inches deep or as needed.
- > Damaged or deteriorated items will be repaired immediately after identification.
- The underside of straw bales should be kept in close contact with the earth and reset as necessary.
- Sediment that is collected in structures shall be disposed of properly and covered if stored on-site.
- Erosion control structures shall remain in place until all disturbed earth has been securely stabilized. After removal of structures, disturbed areas shall be regraded and stabilized as necessary.

The sedimentation and erosion control plan is included in project plan set; a reduced version and Erosion Control Maintenance checklist is included here for quick reference.



Construction Best Management Practices - Maintenance/Evaluation Checklist

Parking Lot Improvements – 111 Founders Plaza, East Hartford, CT Best Management Practices – Maintenance/ Evaluation Checklist

Construction Practices

Best	Inspection	Date		Minimum Maintenance	Cleaning/Repair Needed	Date of	Performed
Management	Frequency	Inspected	Inspector	and Key Items to Check	l	Cleaning/Repair	by
Practice							
Straw Bales/Silt	Once per week or						
Fencing	after a 1" or greater						
Catch Basin	Once per week or						
Protection	after a 1" or greater						
Vagatated Slapa	Once per week or						
Stabilization	after a 1" or greater						
Glabilization	storm event						

Stormwater Control Manager _____



Appendix D Hydrologic Computations

- > Water Quality Design Calculations
- ► Rainfall Data
- > HydroCAD Analysis: Existing Conditions
- > HydroCAD Analysis: Proposed Conditions
- > StormCAD Table (Hydraulic Spreadsheet)



Design Calculations

Water Quality Volume

Water Quality Volume Calculations

Project:	Founders Plaza	By: SJK	Date: <u>5/15/18</u>
Location:	111 Founders Plaza, East Hartford, CT	Checked: PV	Date: 5/15/18

Basin Name	Infiltration 1B	Infiltration 2B	Infiltration 2C	Infiltration 4B	
Rainfall, P	1.0 in.	1.0 in.	1.0 in.	1.0 in.	а
Area, A	0.19 ac	0.59 ac	0.25 ac	0.07 ac	b
Impervious Cover Area	0.15 ac	0.51 ac	0.23 ac	0.07 ac	с
% Impervious, I	79 %	87 %	90 %	100 %	
Volumetric Runoff Coeff., R	0.758	0.829	0.856	0.950	d
Required Water	0.012 ac-ft	0.041 ac-ft	0.018 ac-ft	0.006 ac-ft	е
WQV	509 cf	1,790 cf	781 cf	245 cf	
Provided Water Quality Volume, WQV	0.015 ac-ft	0.055 ac-ft	0.018 ac-ft	0.006 ac-ft	f
	669 cf	2,397 cf	791 cf	246 cf	1

* The proposed stormwater management system will retain and treat the first inch of rainfall over 1.10 acres of impervious area. The project only proposes to add 0.61 acres of impervious area.

^a First one inch of rainfall; 2004 Connecticut Stormwater Quality Manual

b Area tributary to the stormwater management basin

 $^{\rm c}$ Impervious cover area tributary to the stormwater management basin

^d R=0.05+0.009*I; Section 7.4.1 from 2004 Connecticut Stormwater Quality Manual

^e WQV=P*R*A/12; Section 7.4.1 from 2004 Connecticut Stormwater Quality Manual

 $^{\mathsf{f}}$ Volumetric storage below the low-flow orifice; from Proposed HydroCAD output



Rainfall Data
Precipitation Frequency Data Server



NOAA Atlas 14, Volume 10, Version 2 Location name: East Hartford, Connecticut, USA* Latitude: 41.7639°, Longitude: -72.6588° Elevation: 19.6 ft** * source: ESRI Maps ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-I	PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration				Average i	recurrence	interval (y	ears)				
Duration	1	2	5	10	25	50	100	200	500	1000	
5-min	0.333 (0.263-0.420)	0.404 (0.320-0.511)	0.521 (0.410-0.661)	0.618 (0.484-0.789)	0.752 (0.568-1.01)	0.855 (0.632-1.17)	0.958 (0.686-1.37)	1.09 (0.735-1.59)	1.26 (0.815-1.91)	1.39 (0.876-2.15)	
10-min	0.472 (0.373-0.595)	0.573 (0.453-0.723)	0.739 (0.582-0.936)	0.876 (0.686-1.12)	1.07 (0.805-1.43)	1.21 (0.895-1.66)	1.36 (0.972-1.93)	1.54 (1.04-2.25)	1.78 (1.16-2.70)	1.96 (1.24-3.04)	
15-min	0.555 (0.439-0.700)	0.674 (0.533-0.851)	0.869 (0.684-1.10)	1.03 (0.807-1.32)	1.25 (0.947-1.68)	1.43 (1.05-1.95)	1.60 (1.14-2.28)	1.81 (1.23-2.65)	2.09 (1.36-3.18)	2.31 (1.46-3.58)	
30-min	0.744 (0.588-0.938)	0.906 (0.715-1.14)	1.17 (0.921-1.48)	1.39 (1.09-1.77)	1.69 (1.28-2.26)	1.92 (1.42-2.64)	2.16 (1.54-3.07)	2.45 (1.65-3.58)	2.83 (1.84-4.29)	3.12 (1.97-4.84)	
60-min	0.933 (0.738-1.18)	1.14 (0.898-1.44)	1.47 (1.16-1.86)	1.75 (1.37-2.23)	2.13 (1.61-2.85)	2.42 (1.79-3.32)	2.72 (1.95-3.87)	3.08 (2.08-4.50)	3.56 (2.31-5.41)	3.93 (2.49-6.10)	
2-hr	1.21 (0.967-1.52)	1.47 (1.17-1.85)	1.89 (1.50-2.38)	2.24 (1.77-2.84)	2.73 (2.07-3.63)	3.10 (2.31-4.23)	3.47 (2.51-4.94)	3.97 (2.70-5.78)	4.64 (3.02-7.01)	5.15 (3.27-7.94)	
3-hr	1.40 (1.12-1.75)	1.70 (1.35-2.12)	2.18 (1.73-2.74)	2.58 (2.04-3.26)	3.13 (2.40-4.17)	3.56 (2.67-4.85)	3.99 (2.90-5.68)	4.59 (3.12-6.65)	5.39 (3.52-8.11)	6.00 (3.82-9.21)	
6-hr	1.75 (1.41-2.17)	2.12 (1.71-2.64)	2.74 (2.19-3.41)	3.25 (2.58-4.07)	3.95 (3.04-5.23)	4.49 (3.39-6.10)	5.03 (3.69-7.15)	5.83 (3.98-8.40)	6.89 (4.51-10.3)	7.70 (4.91-11.7)	
12-hr	2.12 (1.71-2.61)	2.59 (2.10-3.20)	3.38 (2.72-4.18)	4.03 (3.22-5.02)	4.92 (3.81-6.48)	5.61 (4.25-7.58)	6.30 (4.64-8.91)	7.34 (5.03-10.5)	8.72 (5.72-13.0)	9.76 (6.25-14.8)	
24-hr	2.46 (2.01-3.02)	3.07 (2.50-3.76)	4.06 (3.29-4.99)	4.88 (3.93-6.04)	6.01 (4.69-7.88)	6.88 (5.26-9.28)	7.75 (5.78-11.0)	9.16 (6.29-13.0)	11.0 (7.25-16.3)	12.4 (7.97-18.7)	
2-day	2.79 (2.29-3.39)	3.54 (2.90-4.31)	4.76 (3.88-5.81)	5.77 (4.68-7.10)	7.16 (5.63-9.38)	8.24 (6.36-11.1)	9.31 (7.03-13.2)	11.2 (7.72-15.9)	13.7 (9.05-20.2)	15.6 (10.1-23.4)	
3-day	3.04 (2.50-3.68)	3.86 (3.17-4.68)	5.20 (4.26-6.33)	6.32 (5.14-7.73)	7.85 (6.20-10.2)	9.03 (7.00-12.1)	10.2 (7.75-14.5)	12.4 (8.53-17.4)	15.2 (10.0-22.2)	17.3 (11.2-25.9)	
4-day	3.25 (2.68-3.92)	4.12 (3.40-4.98)	5.55 (4.56-6.73)	6.73 (5.49-8.22)	8.36 (6.62-10.9)	9.62 (7.47-12.9)	10.9 (8.26-15.4)	13.2 (9.09-18.5)	16.2 (10.7-23.6)	18.5 (11.9-27.5)	
7-day	3.82 (3.17-4.59)	4.79 (3.97-5.76)	6.38 (5.26-7.70)	7.69 (6.31-9.34)	9.50 (7.55-12.3)	10.9 (8.49-14.5)	12.3 (9.35-17.3)	14.7 (10.2-20.6)	18.0 (11.9-26.1)	20.4 (13.2-30.3)	
10-day	4.41 (3.67-5.28)	5.43 (4.52-6.51)	7.10 (5.88-8.54)	8.48 (6.97-10.3)	10.4 (8.26-13.3)	11.9 (9.24-15.7)	13.3 (10.1-18.5)	15.8 (11.0-22.0)	19.1 (12.7-27.6)	21.5 (14.0-31.8)	
20-day	6.35 (5.33-7.55)	7.43 (6.22-8.84)	9.18 (7.65-11.0)	10.6 (8.81-12.8)	12.6 (10.1-16.0)	14.2 (11.1-18.4)	15.7 (11.9-21.4)	18.0 (12.6-24.9)	21.0 (14.1-30.2)	23.3 (15.2-34.2)	
30-day	8.03 (6.76-9.51)	9.13 (7.67-10.8)	10.9 (9.15-13.0)	12.4 (10.3-14.9)	14.5 (11.6-18.2)	16.1 (12.5-20.6)	17.6 (13.2-23.6)	19.7 (13.9-27.1)	22.4 (15.1-32.0)	24.5 (16.0-35.8)	
45-day	10.1 (8.57-12.0)	11.3 (9.52-13.3)	13.2 (11.0-15.6)	14.7 (12.3-17.5)	16.8 (13.5-20.9)	18.5 (14.4-23.5)	20.1 (15.0-26.5)	21.9 (15.5-29.9)	24.2 (16.3-34.4)	26.0 (17.0-37.9)	
60-day	11.9 (10.1-14.0)	13.1 (11.1-15.4)	15.0 (12.7-17.8)	16.7 (13.9-19.8)	18.9 (15.1-23.3)	20.6 (16.0-26.0)	22.3 (16.6-29.0)	23.8 (16.9-32.4)	25.9 (17.5-36.7)	27.5 (18.0-39.8)	

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









NOAA Atlas 14, Volume 10, Version 2

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Maps & aerials

Small scale terrain

Precipitation Frequency Data Server



Large scale terrain





Large scale aerial

Precipitation Frequency Data Server



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US Department of Commerce National Oceanic and Atmospheric Administration National Weather Service National Water Center 1325 East West Highway Silver Spring, MD 20910 Questions?: HDSC.Questions@noaa.gov

Disclaimer



HydroCAD Analysis: Existing Conditions



Area Listing (all nodes)

Area	CN	Description
(sq-ft)		(subcatchment-numbers)
14,380	61	>75% Grass cover, Good, HSG B (2A)
47,709	80	>75% Grass cover, Good, HSG D (1A, 2A, 3A, 4A)
85,338	98	Paved parking, HSG D (2A)
72,202	98	Unconnected pavement, HSG D (1A, 3A, 4A)
219,629	92	TOTAL AREA



2-Year Storm Event – Existing

42200_EX HydroCAD	Type III 24-h
Prepared by VHB	
HydroCAD® 10.00-19 s/n 01038 © 2016 HydroCAD Software Solutions L	LC

Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points Runoff by SCS TR-20 method, UH=SCS, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: 1A	Runoff Area=41,610 sf 80.19% Impervious Runoff Depth=2.42" Tc=5.0 min CN=94 Runoff=2.69 cfs 8,384 cf
Subcatchment2A: 2A	Runoff Area=123,645 sf 69.02% Impervious Runoff Depth=2.05" Tc=5.0 min CN=90 Runoff=6.98 cfs 21,107 cf
Subcatchment3A: 3A	Runoff Area=21,351 sf 86.13% Impervious Runoff Depth=2.62" Tc=5.0 min CN=96 Runoff=1.45 cfs 4,663 cf
Subcatchment4A: 4A	Runoff Area=33,023 sf 61.91% Impervious Runoff Depth=2.14" Tc=5.0 min CN=91 Runoff=1.93 cfs 5,880 cf
Link DP-1: DP-1	Inflow=2.69 cfs 8,384 cf Primary=2.69 cfs 8,384 cf
Link DP-2: DP-2	Inflow=6.98 cfs 21,107 cf Primary=6.98 cfs 21,107 cf
Link DP-3: DP-3	Inflow=1.45 cfs 4,663 cf Primary=1.45 cfs 4,663 cf
Link DP-4: DP-4	Inflow=1.93 cfs 5,880 cf Primary=1.93 cfs 5,880 cf

Total Runoff Area = 219,629 sf Runoff Volume = 40,034 cf Average Runoff Depth = 2.19" 28.27% Pervious = 62,089 sf 71.73% Impervious = 157,540 sf

Summary for Subcatchment 1A: 1A

Runoff = 2.69 cfs @ 12.07 hrs, Volume= 8,384 cf, Depth= 2.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs Type III 24-hr 2-year Rainfall=3.07"

33,367 98 Unconnected pavement, HSG D 8,243 80 >75% Grass cover, Good, HSG D 41,610 94 Weighted Average	
8,243 80 >75% Grass cover, Good, HSG D	
41 610 94 Weighted Average	
8,243 19.81% Pervious Area	
33,367 80.19% Impervious Area	
33,367 100.00% Unconnected	
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Subcatchment 1A: 1A	
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Summary for Subcatchment 2A: 2A

Runoff = 6.98 cfs @ 12.07 hrs, Volume= 21,107 cf, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs Type III 24-hr 2-year Rainfall=3.07"

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Summary for Subcatchment 3A: 3A

Runoff = 1.45 cfs @ 12.07 hrs, Volume= 4,663 cf, Depth= 2.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs Type III 24-hr 2-year Rainfall=3.07"



Summary for Subcatchment 4A: 4A

Runoff = 1.93 cfs @ 12.07 hrs, Volume= 5,880 cf, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs Type III 24-hr 2-year Rainfall=3.07"

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Inflow A	Area =	41,610 sf,	80.19% Impervious,	Inflow Depth = 2.42"	for 2-year event
Inflow	=	2.69 cfs @	12.07 hrs, Volume=	8,384 cf	
Primary	, =	2.69 cfs @	12.07 hrs, Volume=	8,384 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-1: DP-1

Summary for Link DP-2: DP-2

Inflow A	rea =	123,645 sf, 69.02% Impervious,	Inflow Depth = 2.05"	for 2-year event
Inflow	=	6.98 cfs @ 12.07 hrs, Volume=	21,107 cf	
Primary	=	6.98 cfs @ 12.07 hrs, Volume=	21,107 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-2: DP-2

Summary for Link DP-3: DP-3

Inflow A	Area =	21,351 sf, 86.13% Impervious,	Inflow Depth = 2.62"	for 2-year event
Inflow	=	1.45 cfs @ 12.07 hrs, Volume=	4,663 cf	
Primary	/ =	1.45 cfs @ 12.07 hrs, Volume=	4,663 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-3: DP-3

Summary for Link DP-4: DP-4

Inflow A	rea =	33,023 sf, 61.91% Impervious,	Inflow Depth = 2.14"	for 2-year event
Inflow	=	1.93 cfs @ 12.07 hrs, Volume=	5,880 cf	
Primary	=	1.93 cfs @ 12.07 hrs, Volume=	5,880 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-4: DP-4



5-Year Storm Event – Existing

42200_EX HydroCAD	Type III 24-hr	5-year Raii	nfall=4.06"
Prepared by VHB		Printed	5/23/2018
HydroCAD® 10.00-19 s/n 01038 © 2016 HydroCAD Software Solutions	LLC		Page 12
			-

Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points Runoff by SCS TR-20 method, UH=SCS, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: 1A	Runoff Area=41,610 sf 80.19% Impervious Runoff Depth=3.38" Tc=5.0 min CN=94 Runoff=3.69 cfs 11,731 cf
Subcatchment2A: 2A	Runoff Area=123,645 sf 69.02% Impervious Runoff Depth=2.98" Tc=5.0 min CN=90 Runoff=10.00 cfs 30,665 cf
Subcatchment3A: 3A	Runoff Area=21,351 sf 86.13% Impervious Runoff Depth=3.60" Tc=5.0 min CN=96 Runoff=1.96 cfs 6,404 cf
Subcatchment4A: 4A	Runoff Area=33,023 sf 61.91% Impervious Runoff Depth=3.07" Tc=5.0 min CN=91 Runoff=2.74 cfs 8,462 cf
Link DP-1: DP-1	Inflow=3.69 cfs 11,731 cf Primary=3.69 cfs 11,731 cf
Link DP-2: DP-2	Inflow=10.00 cfs 30,665 cf Primary=10.00 cfs 30,665 cf
Link DP-3: DP-3	Inflow=1.96 cfs 6,404 cf Primary=1.96 cfs 6,404 cf
Link DP-4: DP-4	Inflow=2.74 cfs 8,462 cf Primary=2.74 cfs 8,462 cf

Total Runoff Area = 219,629 sf Runoff Volume = 57,263 cf Average Runoff Depth = 3.13" 28.27% Pervious = 62,089 sf 71.73% Impervious = 157,540 sf

Summary for Subcatchment 1A: 1A

Runoff = 3.69 cfs @ 12.07 hrs, Volume= 11,731 cf, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs Type III 24-hr 5-year Rainfall=4.06"

33,367 98 Unconnected pavement, HSG D 8,243 80 >75% Grass cover, Good, HSG D 41,610 94 Weighted Average 8,243 19.81% Pervious Area 33,367 80.19% Impervious Area 33,367 100.00% Unconnected Tc Length Slope Velocity Capacity Description (ft/ft) (ft/ft) (ft/scc) (cfs) 5.0 Direct Entry, Subcatchment 1A: 1A Hydrograph Type III 24-hr S-year Rainfall=4.06" Runoff Area=41,610 sf Runoff Volume=11,731 cf Runoff Volume=11,731 cf Output 0 0 Tc=5.0 min CN=94 Output Output Output Velocity Direct Entry, Colspan="2">Colspan="2">Output Output		Area (sf)	CN	De	escri	ption	1 I												
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Summary for Subcatchment 2A: 2A

Runoff 10.00 cfs @ 12.07 hrs, Volume= 30,665 cf, Depth= 2.98" =

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs Type III 24-hr 5-year Rainfall=4.06"

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		23,92	7	8	0	>75	5%	Gras	ss c	ove	r, Go	ood,	HS	G E)										
		14,38	0	6	1	>75	5%	Gras	ss c	ove	r, Go	ood,	HS	G E	3										
	1	23,64	5	9	90 Weighted Average																				
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Summary for Subcatchment 3A: 3A

Runoff = 1.96 cfs @ 12.07 hrs, Volume= 6,404 cf, Depth= 3.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs Type III 24-hr 5-year Rainfall=4.06"

18,390 98 Unconnected pavement, HSG D 2,961 80 >75% Grass cover, Good, HSG D 21,351 96 Weighted Average 2,961 13.87% Pervious Area 18,390 86.13% Impervious Area 18,390 100.00% Unconnected Tc Length Slope Velocity Capacity Description (ft/ft) (ft/ft) (ft/ft) (ft/ft) (ft/ft) Subcatchment 3A: 3A Hydrograph Type III 24-hr 5-0 Direct Entry, Runoff Type III 24-hr S-year Rainfall=4.06" Runoff Area=21,351 sf Runoff Area=21,351 sf Runoff Volume=6,404 cf Runoff Depth=3.60" Tc=5.0 min CN=96 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	Area (sf)	CN E	Description						
2.961 80 >75% Grass cover, Good, HSG D 21,351 96 Weighted Average 2.961 13.87% Pervious Area 18,390 100.00% Unconnected Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 3A: 3A Hydrograph Type III 24-hr 5-year Rainfall=4.06" Runoff Area=21,351 sf Runoff Volume=6,404 cf Runoff Depth=3.60" Tc=5.0 min CN=96 0 1 2 3 4 5 6 7 8 9 10 11 12 13.14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 Tmme (howe)	18,390	98 L	Inconnecte	ed paveme	nt, HSG	D			
21,351 96 Weighted Average 2,961 13,87% Pervious Area 18,390 100.00% Unconnected Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 3A: 3A Hydrograph 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2,961	80 >	75% Gras	s cover, Go	ood, HSC	G D			
2,961 13.87% Pervious Area 18,390 86.13% Impervious Area 18,390 100.00% Unconnected Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) Direct Entry, Subcatchment 3A: 3A Hydrograph Type III 24-hr 5-year Rainfall=4.06" Runoff Area=21,351 sf Runoff Volume=6,404 cf Runoff Depth=3.60" Tc=5.0 min CN=96 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 28 27 28 29 30	 21,351 96 Weighted Average								
18,390 86.13% Impervious Area 18,390 100.00% Unconnected Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 3A: 3A Hydrograph Type III 24-hr 5-year Rainfall=4.06" Runoff Area=21,351 sf Runoff Volume=6,404 cf Runoff Depth=3.60" Tc=5.0 min CN=96	2,961	1	13.87% Pervious Area						
18,390 100.00% Unconnected Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 3A: 3A Hydrograph Type III 24-hr 5-year Rainfall=4.06" Runoff Area=21,351 sf Runoff Volume=6,404 cf Runoff Depth=3.60" Tc=5.0 min CN=96	18,390	8	6.13% Imp	pervious Ar	ea				
Tc Length (ft/ft) Slope Velocity (ft/ft) Capacity Description (cfs) 5.0 Direct Entry, Subcatchment 3A: 3A Hydrograph Type III 24-hr S-year Rainfall=4.06" Runoff Type III 24-hr S-year Rainfall=4.06" Runoff Area=21,351 sf Runoff Volume=6,404 cf Runoff Depth=3.60" Tc=5.0 min CN=96 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 32 42 5 26 27 28 29 30	18,390	1	00.00% U	nconnected	ł				
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Summary for Subcatchment 4A: 4A

Runoff 2.74 cfs @ 12.07 hrs, Volume= 8,462 cf, Depth= 3.07" =

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs Type III 24-hr 5-year Rainfall=4.06"

	Area	(sf)	CN	1 [Des	crip	tion													
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	33,0)23	9	1 \	Nei	ghte	ed A	vera	ige											
	12,5	578		38.09% Pervious Area																
	20,4	45		6	61.9	91%	Im	pervi	ous	Area	l									
	20,4	45		1	100	.009	% U	ncon	nect	ted										
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									٦	Гime (hours)									

Summary for Link DP-1: DP-1

Inflow A	Area	=	41,610 sf	, 80.19% Impervio	us, Inflo	w Depth =	3.38"	for 5-y	ear event
Inflow	=	=	3.69 cfs @	12.07 hrs, Volum	e=	11,731 c	f		
Primary	/ =	=	3.69 cfs @	12.07 hrs, Volum	e=	11,731 c	f, Atten	n= 0%, L	_ag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-1: DP-1

Summary for Link DP-2: DP-2

Inflow A	vrea =	123,645 sf, 69.02% Impervious	, Inflow Depth = 2.98" for 5-year event	
Inflow	=	10.00 cfs @ 12.07 hrs, Volume=	30,665 cf	
Primary		10.00 cfs @ 12.07 hrs, Volume=	30,665 cf, Atten= 0%, Lag= 0.0 mi	n

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-2: DP-2

Summary for Link DP-3: DP-3

Inflow A	rea =	21,351 sf, 86.13% Impervious,	Inflow Depth = 3.60"	for 5-year event
Inflow	=	1.96 cfs @ 12.07 hrs, Volume=	6,404 cf	
Primary	=	1.96 cfs @ 12.07 hrs, Volume=	6,404 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-3: DP-3

Summary for Link DP-4: DP-4

Inflow A	rea =	33,023 sf, 61.91% Impervious,	Inflow Depth = 3.07"	for 5-year event
Inflow	=	2.74 cfs @ 12.07 hrs, Volume=	8,462 cf	
Primary	=	2.74 cfs @ 12.07 hrs, Volume=	8,462 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-4: DP-4



10-Year Storm Event – Existing
42200_EX HydroCAD	Type III 24-hr	10-year Raii	nfall=4.88"
Prepared by VHB		Printed	5/23/2018
HydroCAD® 10.00-19 s/n 01038 © 2016 HydroCAD Software Solutions	s LLC		Page 21
	3 220		<u>r age z r</u>

Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points Runoff by SCS TR-20 method, UH=SCS, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: 1A	Runoff Area=41,610 sf 80.19% Impervious Runoff Depth=4.19" Tc=5.0 min CN=94 Runoff=4.51 cfs 14,528 cf
Subcatchment2A: 2A	Runoff Area=123,645 sf 69.02% Impervious Runoff Depth=3.76" Tc=5.0 min CN=90 Runoff=12.49 cfs 38,749 cf
Subcatchment3A: 3A	Runoff Area=21,351 sf 86.13% Impervious Runoff Depth=4.41" Tc=5.0 min CN=96 Runoff=2.37 cfs 7,852 cf
Subcatchment4A: 4A	Runoff Area=33,023 sf 61.91% Impervious Runoff Depth=3.87" Tc=5.0 min CN=91 Runoff=3.40 cfs 10,638 cf
Link DP-1: DP-1	Inflow=4.51 cfs 14,528 cf Primary=4.51 cfs 14,528 cf
Link DP-2: DP-2	Inflow=12.49 cfs 38,749 cf Primary=12.49 cfs 38,749 cf
Link DP-3: DP-3	Inflow=2.37 cfs 7,852 cf Primary=2.37 cfs 7,852 cf
Link DP-4: DP-4	Inflow=3.40 cfs 10,638 cf Primary=3.40 cfs 10,638 cf

Total Runoff Area = 219,629 sf Runoff Volume = 71,767 cf Average Runoff Depth = 3.92" 28.27% Pervious = 62,089 sf 71.73% Impervious = 157,540 sf

Summary for Subcatchment 1A: 1A

Runoff = 4.51 cfs @ 12.07 hrs, Volume= 14,528 cf, Depth= 4.19"

	Area (sf)	CN	Descr	ription								
	33.367	98	Uncor	necte	ed paveme	ent. HS	GD					
	8,243	80	>75%	Gras	s cover, G	ood, H	SG D					
	41,610	94	Weigh	nted A	verage							
	8,243		19.81	% Pei	rvious Are	а						
	33,367		80.19	% Imp	pervious A	rea						
	33,367		100.0	0% U	nconnecte	d						
Т	c Length	Slop	e Vel	ocity	Capacity	Desc	ription	า				
(min) (feet)	(ft/f	t) (ft/	/sec)	(cfs)							
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Summary for Subcatchment 2A: 2A

Runoff = 12.49 cfs @ 12.07 hrs, Volume= 38,749 cf, Depth= 3.76"

 Area (sf)	CN	Description					
85,338	98	Paved park	ing, HSG D)			
23,927	80	>75% Ġras	75% Grass cover, Good, HSG D				
 14,380	61	>75% Gras	75% Grass cover, Good, HSG B				
 123,645	90	Weighted A	verage				
38,307		30.98% Pe	30.98% Pervious Area				
85,338		69.02% Imp	pervious Ar	ea			
Tc Length	Slop	e Velocity	Capacity	Description			
 (min) (feet)	(ft/1	t) (ft/sec)	(cfs)				
5.0				Direct Entry,			

Subcatchment 2A: 2A



Summary for Subcatchment 3A: 3A

Runoff = 2.37 cfs @ 12.07 hrs, Volume= 7,852 cf, Depth= 4.41"

	Area (sf)	CN	D	escri	iptio	n												
	18.3	90	98	U	ncor	nec	ted pa	avem	ent, I	ISG	D								
	2,9	61	80	>	75%	Gra	ss co	ver, G	Good,	HS	G D								
	21,3	51	96	W	/eigh	ted	Avera	age											
	2,9	61		1:	3.879	% P	erviou	is Are	a										
	18,3	90		86	3.139	% In	npervi	ious A	Area										
	18,3	90		1()0.00)% l	Jncor	nnecte	ed										
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,	Tc Ler	ngth	Slo	ppe	Vel	ocity	/ Ca	pacity	y De	escri	ptior	า							
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Summary for Subcatchment 4A: 4A

Runoff = 3.40 cfs @ 12.07 hrs, Volume= 10,638 cf, Depth= 3.87"

20,445 12,578 33,023 91 Weighted Average 12,578 38,09% Pervious Area 20,445 61,91% Impervious Area 20,445 100,00% Unconnected Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 4A: 4A Hydrograph 10-year Rainfall=4.88" Runoff Area=33,023 sf Runoff Volume=10,638 cf Runoff Volume=10,638 cf Runoff Depth=3.87" Tc=5.0 min CN=91 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 Tmme (house)		A	rea (sf)	CN	Desc	ription								
12,578 80 >75% Grass cover, Good, HSG D 33,023 91 Weighted Average 12,578 38.09% Pervious Area 20,445 61.91% Impervious Area 20,445 100.00% Unconnected Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 4A: 4A Hydrograph 10-year Rainfall=4.88" Runoff Area=33,023 sf Runoff Area=33,023 sf Runoff Depth=3.87" Tc=5.0 min CN=91 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 25 27 28 29 30 Time (hows)		20.445 98 Unconnected pavement, HSG D												
33,023 91 Weighted Average 12,578 38.09% Pervious Area 20,445 61.91% Impervious Area 20,445 100.00% Unconnected Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 4A: 4A Hydrograph Type III 24-hr 10-year Rainfall=4.88" Runoff Area=33,023 sf Runoff Area=33,023 sf Runoff Depth=3.87" Tc=5.0 min CN=91 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 Time (hours)			12,578	80	>75%	6 Gras	s cover, G	ood, HS	G D					
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(%) (%) (%) (%) (%) (%) (%) (%)							Hydro	ograph						
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		Ċ) 1 2	3 4 5	6 7 8	3 <u>9</u> 10	11 12 13 1 Tin	4 15 16 ne (hours)	17 18 19	20 21 2	22 23 24	25 26 27	28 29 30	

Summary for Link DP-1: DP-1

Inflow A	Area =	41,610 sf, 80.19% Impervious,	Inflow Depth = 4.19"	for 10-year event
Inflow	=	4.51 cfs @ 12.07 hrs, Volume=	14,528 cf	
Primary	/ =	4.51 cfs @ 12.07 hrs, Volume=	14,528 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-1: DP-1

Summary for Link DP-2: DP-2

Inflow A	Area =	123,645 sf, 69.02% Impervious,	Inflow Depth = 3.76"	for 10-year event
Inflow	=	12.49 cfs @ 12.07 hrs, Volume=	38,749 cf	
Primary	/ =	12.49 cfs @ 12.07 hrs, Volume=	38,749 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-2: DP-2

Summary for Link DP-3: DP-3

Inflow A	Area =	21,351 sf, 86.13% Impervious,	Inflow Depth = 4.41 "	for 10-year event
Inflow	=	2.37 cfs @ 12.07 hrs, Volume=	7,852 cf	
Primary	/ =	2.37 cfs @ 12.07 hrs, Volume=	7,852 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-3: DP-3

Summary for Link DP-4: DP-4

Inflow Ar	ea =	33,023 sf, 61.91% Impervious,	Inflow Depth = 3.87"	for 10-year event
Inflow	=	3.40 cfs @ 12.07 hrs, Volume=	10,638 cf	
Primary	=	3.40 cfs @ 12.07 hrs, Volume=	10,638 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-4: DP-4



25-Year Storm Event- Existing

42200_EX HydroCAD	Type III 24-hr	25-year Raiı	nfall=6.01"
Prepared by VHB		Printed	5/23/2018
HydroCAD® 10.00-19 s/n 01038 © 2016 HydroCAD Software Solution	s LLC		Page 30

Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points Runoff by SCS TR-20 method, UH=SCS, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: 1A	Runoff Area=41,610 sf 80.19% Impervious Runoff Depth=5.31" Tc=5.0 min CN=94 Runoff=5.64 cfs 18,400 cf
Subcatchment2A: 2A	Runoff Area=123,645 sf 69.02% Impervious Runoff Depth=4.86" Tc=5.0 min CN=90 Runoff=15.90 cfs 50,031 cf
Subcatchment3A: 3A	Runoff Area=21,351 sf 86.13% Impervious Runoff Depth=5.54" Tc=5.0 min CN=96 Runoff=2.95 cfs 9,852 cf
Subcatchment4A: 4A	Runoff Area=33,023 sf 61.91% Impervious Runoff Depth=4.97" Tc=5.0 min CN=91 Runoff=4.31 cfs 13,669 cf
Link DP-1: DP-1	Inflow=5.64 cfs 18,400 cf Primary=5.64 cfs 18,400 cf
Link DP-2: DP-2	Inflow=15.90 cfs 50,031 cf Primary=15.90 cfs 50,031 cf
Link DP-3: DP-3	Inflow=2.95 cfs 9,852 cf Primary=2.95 cfs 9,852 cf
Link DP-4: DP-4	Inflow=4.31 cfs 13,669 cf Primary=4.31 cfs 13,669 cf

Total Runoff Area = 219,629 sf Runoff Volume = 91,953 cf Average Runoff Depth = 5.02" 28.27% Pervious = 62,089 sf 71.73% Impervious = 157,540 sf

Summary for Subcatchment 1A: 1A

Runoff = 5.64 cfs @ 12.07 hrs, Volume= 18,400 cf, Depth= 5.31"

	Area (st	f) (CN	Des	scrip	tion												
	33,36	7	98	Und	conn	ecte	d pa	avem	ent, I	HSC	ЭD							
	8,24	3	80	>75	5% G	Grass	s cov	ver, C	Good	, HS	SG D)						
	41,61	0	94	We	ighte	ed A	vera	ige										
	8,24	3		19.	81%	Per	viou	s Are	a									
	33,36	7		80.	19%	Imp	ervi	ous A	rea									
	33,36	7		100	0.00%	% Ur	ncon	necte	ed									
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Summary for Subcatchment 2A: 2A

Runoff = 15.90 cfs @ 12.07 hrs, Volume= 50,031 cf, Depth= 4.86"

A	Area (sf)	CN	Description	Ì							
	85,338	98	Paved park	king, HSG D)						
	23,927	80	>75% Ġras	s cover, Go	ood, HS	SG D					
	14,380	61	>75% Gras	s cover, Go	ood, HS	SG B					
	123,645	90	Weighted A	Verage							
	38,307		30.98% Pe	rvious Area	a						
	85,338		69.02% Im	pervious Ar	ea						
Тс	Longth	Slone	Velocity	Capacity	Desci	rintion					
(min)	(feet)	(ft/ft)		Capacity (cfs)	Desci	ιριοπ					
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				Time	e (hours)						

Summary for Subcatchment 3A: 3A

Runoff = 2.95 cfs @ 12.07 hrs, Volume= 9,852 cf, Depth= 5.54"

	Area	a (sf	F)	C١	1	Des	scrip	otior	ו																	
	18	3.39	0	98	3	Und	coni	nect	ed r	bave	eme	nt. I	HSC	G D												
	2	2,96	1	80) :	>75	5% (Gras	ss c	over	, Go	boc	, HS	SG	D											
	21	.35	1	96	3	We	ight	ed A	Aver	age	. <u>.</u>															
	2	2,96	1			13.8	87%	b Pe	ervio	us A	Area	a														
	18	3,39	0		ł	86.	13%	5 Im	perv	/iou	s Ar	ea														
	18	3,39	0			100	.00	% U	İnco	nne	cted	b														
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											Tim	e (h	ours)													

Summary for Subcatchment 4A: 4A

Runoff = 4.31 cfs @ 12.07 hrs, Volume= 13,669 cf, Depth= 4.97"

	Area (sf) CN	Descriptior	า					
	20,44	5 98	Unconnect	ed paveme	nt, HSG D)			
	12,578	8 80	>75% Gras	ss cover, Go	ood, HSG	D			
	33,023	3 91	Weighted A	Average					
	12,578	8	38.09% Pe	rvious Area	1				
	20,44	5	61.91% lm	pervious Ar	ea				
	20,44	5	100.00% U	Inconnected	b				
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				Subca	tchmen	t 4A: 4A			
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				4.31 cfs		, , , , , , , , , , , , , , , ,	Type	III 24-hr	
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						25-yea	ar Rainfa	all=6.01"	
						Runof	f Area=:	33,023 sf	
	3				R	unoff V	olume=1	13.669 cf	
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				Tim	e (hours)				

Summary for Link DP-1: DP-1

Inflow A	rea =	41,610 sf, 80.19% Impervious,	Inflow Depth = 5.31"	for 25-year event
Inflow	=	5.64 cfs @ 12.07 hrs, Volume=	18,400 cf	
Primary	=	5.64 cfs @ 12.07 hrs, Volume=	18,400 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-1: DP-1

Summary for Link DP-2: DP-2

Inflow A	\rea =	123,645 sf,	, 69.02% Impervious,	Inflow Depth = 4.86"	for 25-year event
Inflow	=	15.90 cfs @	12.07 hrs, Volume=	50,031 cf	
Primary	/ =	15.90 cfs @	12.07 hrs, Volume=	50,031 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-2: DP-2

Summary for Link DP-3: DP-3

Inflow A	vrea =	21,351 sf, 86.13% Impervious	, Inflow Depth = 5.54"	for 25-year event
Inflow	=	2.95 cfs @ 12.07 hrs, Volume=	9,852 cf	
Primary	=	2.95 cfs @ 12.07 hrs, Volume=	9,852 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-3: DP-3

Summary for Link DP-4: DP-4

Inflow A	Area =	33,023 sf, 61.91% Impervious,	Inflow Depth = 4.97"	for 25-year event
Inflow	=	4.31 cfs @ 12.07 hrs, Volume=	13,669 cf	
Primary	/ =	4.31 cfs @ 12.07 hrs, Volume=	13,669 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-4: DP-4



100-Year Storm Event – Existing

42200_	EX HydroCAD	
Prepare	ed by VHB	

 Type III 24-hr
 100-year Rainfall=7.75"

 Printed
 5/23/2018

 ns LLC
 Page 39

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Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points Runoff by SCS TR-20 method, UH=SCS, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: 1A	Runoff Area=41,610 sf 80.19% Impervious Runoff Depth=7.03" Tc=5.0 min CN=94 Runoff=7.36 cfs 24,388 cf
Subcatchment2A: 2A	Runoff Area=123,645 sf 69.02% Impervious Runoff Depth=6.56" Tc=5.0 min CN=90 Runoff=21.12 cfs 67,588 cf
Subcatchment3A: 3A	Runoff Area=21,351 sf 86.13% Impervious Runoff Depth=7.27" Tc=5.0 min CN=96 Runoff=3.82 cfs 12,938 cf
Subcatchment4A: 4A	Runoff Area=33,023 sf 61.91% Impervious Runoff Depth=6.68" Tc=5.0 min CN=91 Runoff=5.70 cfs 18,376 cf
Link DP-1: DP-1	Inflow=7.36 cfs 24,388 cf Primary=7.36 cfs 24,388 cf
Link DP-2: DP-2	Inflow=21.12 cfs 67,588 cf Primary=21.12 cfs 67,588 cf
Link DP-3: DP-3	Inflow=3.82 cfs 12,938 cf Primary=3.82 cfs 12,938 cf
Link DP-4: DP-4	Inflow=5.70 cfs 18,376 cf Primary=5.70 cfs 18,376 cf

Total Runoff Area = 219,629 sf Runoff Volume = 123,291 cf Average Runoff Depth = 6.74" 28.27% Pervious = 62,089 sf 71.73% Impervious = 157,540 sf

Summary for Subcatchment 1A: 1A

Runoff 7.36 cfs @ 12.07 hrs, Volume= 24,388 cf, Depth= 7.03" =

	Area (sf)	CN Description	
	33,367	98 Unconnected pavement, HSG D	
	8,243	80 >75% Grass cover, Good, HSG D	
	41,610	94 Weighted Average	
	8,243	19.81% Pervious Area	
	33,367	80.19% Impervious Area	
	33,367	100.00% Unconnected	
	To Length	Slope Velocity Capacity Description	
(m	in) (feet)	(ft/ft) (ft/sec) (cfs)	
5	5.0	Direct Entry,	
		Subcatchment 1A: 1A	
		Hydrograph	
			Runoff
		I I I I I I I I I I I I I I I I I I I	
	7-4	Type III 24-hr	
		100-vear Rainfall=7 75"	
	5	Runoff Volume=24,388 cf	
cfs)		Runoff Depth=7.03"	
ت م	4-	$T_c=5.0$ min	
FIC			
	3	CN=94	
	2		
	0 1 2 3	3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	
		Time (hours)	

Summary for Subcatchment 2A: 2A

Runoff = 21.12 cfs @ 12.07 hrs, Volume= 67,588 cf, Depth= 6.56"

/ "Uda (Ul)	CN	Description			
85,338	98	Paved park	ing, HSG D)	
23,927	80	>75% Ġras	s cover, Go	ood, HSG D	
14,380	61	>75% Gras	s cover, Go	ood, HSG B	
123,645	90	Weighted A	verage		
38,307		30.98% Pei	rvious Area	3	
85,338		69.02% Imp	pervious Ar	rea	
Tc Length	Slope	e Velocity	Capacity	Description	
(min) (feet)	(ft/ft)	(ft/sec)	(cts)		
5.0				Direct Entry,	
			Subca	atchment 2A: 2A	
			Subca _{Hydro}	atchment 2A: 2A	
23			Subca Hydro	atchment 2A: 2A	ff
23			Subca Hydro	atchment 2A: 2A ograph	ff
23 23 22 22 21 21 20 20 20 20 20 20 20 20 20 20			Subca Hydro	atchment 2A: 2A	ff
			Subca Hydro	atchment 2A: 2A ograph Type III 24-hr 100-year Rainfall=7.75"	ff
			Subca	atchment 2A: 2A ograph Type III 24-hr 100-year Rainfall=7.75" Runoff Area=123,645 sf	ff



Summary for Subcatchment 3A: 3A

Page 42

Runoff 3.82 cfs @ 12.07 hrs, Volume= 12,938 cf, Depth= 7.27" =

	Ar	ea (sf)	C	CN	D	esc	ript	ion																		
	18.390 98 Unconnected pavement, HSG D																										
	2,961 80 >75% Grass cover, Good, HSG D																										
	21.351 96 Weighted Average																										
	_	2.9	61	13.87% Pervious Area																							
	18 390 86 13% Impervious Area																										
	18.390 100.00% Unconnected																										
		-,-																									
-	Тс	Len	ngth		Slo	pe	Ve	loc	ity	Са	ipac	ity	De	esci	ript	ion											
(mi	in)	(fe	eet)		(ft/	ft)	(ft	t/se	ec)		(c	fs)			-												
5	5.0												Di	rec	tΕ	ntr	у,										
	Subcatchment 3A: 3A																										
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													•														

Summary for Subcatchment 4A: 4A

Runoff = 5.70 cfs @ 12.07 hrs, Volume= 18,376 cf, Depth= 6.68"

	Ar	ea (s	sf)	С	Ν	D	esc	crip	otior	า																			
	20,445 98 Unconnected pavement, HSG D																												
	12,578 80 >75% Grass cover, Good, HSG D																												
	(33,02	23	91 Weighted Average																									
		12,57	78		38.09% Pervious Area																								
	20,445 61.91% Impervious Area																												
	2	20,44	15			1(00.	009	%ι	İnc	onr	nect	ted																
	Тс	Len	gth	S	Slop	ре	Ve	elo	city	C	Cap	acit	ty	De	sc	ript	ion												
(m	in)	(fe	et)		(ft/	ft)	(1	ft/s	ec)			(cfs	5)																
:	5.0													Di	rec	t E	Intr	у,											
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Summary for Link DP-1: DP-1

Inflow A	rea =	41,610 sf, 80.19% Impervious,	Inflow Depth = 7.03"	for 100-year event
Inflow	=	7.36 cfs @ 12.07 hrs, Volume=	24,388 cf	
Primary	=	7.36 cfs @ 12.07 hrs, Volume=	24,388 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-1: DP-1

Summary for Link DP-2: DP-2

Inflow /	Area	=	123,645 sf,	, 69.02% Impervious	Inflow Depth = 6.56"	for 100-year event
Inflow		=	21.12 cfs @	12.07 hrs, Volume=	67,588 cf	
Primar	у	=	21.12 cfs @	12.07 hrs, Volume=	67,588 cf, Atte	en= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

Hydrograph Inflow Primary 21.12 cfs 23 Inflow Area=123,645 sf 21.12 cfs 22 21-20-19-18-17 16 15 14 13 12 11 Flow (cfs) 10 9-8-7-6-5-4 3 2 1 0-Ó 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 Time (hours)

Link DP-2: DP-2

Summary for Link DP-3: DP-3

Inflow A	Area =	21,351 sf,	86.13% Impervious,	Inflow Depth = 7.27 "	for 100-year event
Inflow	=	3.82 cfs @ 1	12.07 hrs, Volume=	12,938 cf	
Primary	/ =	3.82 cfs @ 1	12.07 hrs, Volume=	12,938 cf, Atte	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-3: DP-3

Summary for Link DP-4: DP-4

Inflow A	\rea =	33,023 sf, 61.91% Impervious,	Inflow Depth = 6.68"	for 100-year event
Inflow	=	5.70 cfs @ 12.07 hrs, Volume=	18,376 cf	
Primary	· =	5.70 cfs @ 12.07 hrs, Volume=	18,376 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs



Link DP-4: DP-4



HydroCAD Analysis: Proposed Conditions


Area Listing (all nodes)

Area	CN	Description
(sq-ft)		(subcatchment-numbers)
3,149	61	>75% Grass cover, Good, HSG B (2B, 2C, 2D)
39,410	80	>75% Grass cover, Good, HSG D (1B, 1C, 2B, 2C, 2D, 3A, 4C)
184,143	98	Paved parking, HSG D (1B, 1C, 2B, 2C, 2D, 3A, 4B, 4C)
226,702	94	TOTAL AREA



2-Year Storm Event – Proposed

Type III 24-hr 2-year Rainfall=3.07" Printed 5/23/2018

HydroCAD® 10.00-19 s/n 01038 © 2016 HydroCAD Software Solutions LLC

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points Runoff by SCS TR-20 method, UH=SCS, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1B: 1B	Runoff Area=8,063 sf 78.66% Impervious Runoff Depth=2.42" Tc=5.0 min CN=94 Runoff=0.52 cfs 1,625 cf
Subcatchment1C: 1C	Runoff Area=33,547 sf 91.76% Impervious Runoff Depth=2.73" Tc=5.0 min CN=97 Runoff=2.34 cfs 7,626 cf
Subcatchment2B: 2B	Runoff Area=25,908 sf 87.45% Impervious Runoff Depth=2.42" Tc=5.0 min CN=94 Runoff=1.68 cfs 5,220 cf
Subcatchment2C: 2C	Runoff Area=10,949 sf 89.54% Impervious Runoff Depth=2.52" Tc=5.0 min CN=95 Runoff=0.73 cfs 2,297 cf
Subcatchment2D: 2D	Runoff Area=93,858 sf 79.22% Impervious Runoff Depth=2.42" Tc=5.0 min CN=94 Runoff=6.08 cfs 18,911 cf
Subcatchment3A: 3A	Runoff Area=21,351 sf 86.08% Impervious Runoff Depth=2.52" Tc=5.0 min CN=95 Runoff=1.42 cfs 4,480 cf
Subcatchment4B: 4B	Runoff Area=3,093 sf 100.00% Impervious Runoff Depth=2.84" Tc=5.0 min CN=98 Runoff=0.22 cfs 731 cf
Subcatchment4C: 4C	Runoff Area=29,933 sf 62.58% Impervious Runoff Depth=2.14" Tc=5.0 min CN=91 Runoff=1.76 cfs 5,329 cf
Pond INF 1B: INF 1B	Peak Elev=17.63' Storage=785 cf Inflow=0.52 cfs 1,625 cf Outflow=0.22 cfs 955 cf
Pond INF 2B: INF 2B	Peak Elev=16.26' Storage=3,048 cf Inflow=1.68 cfs 5,220 cf Outflow=0.28 cfs 2,815 cf
Pond INF 2C: INF 2C	Peak Elev=15.95' Storage=983 cf Inflow=0.73 cfs 2,297 cf Outflow=0.50 cfs 1,506 cf
Pond INF 4B: INF 4B	Peak Elev=20.21' Storage=299 cf Inflow=0.22 cfs 731 cf Outflow=0.19 cfs 486 cf
Link DP-1: DP-1	Inflow=2.34 cfs 8,581 cf Primary=2.34 cfs 8,581 cf
Link DP-2: DP-2	Inflow=6.34 cfs 23,232 cf Primary=6.34 cfs 23,232 cf
Link DP-3: DP-3	Inflow=1.42 cfs 4,480 cf Primary=1.42 cfs 4,480 cf
Link DP-4: DP-4	Inflow=1.93 cfs 5,815 cf Primary=1.93 cfs 5,815 cf

Total Runoff Area = 226,702 sf Runoff Volume = 46,219 cf Average Runoff Depth = 2.45" 18.77% Pervious = 42,559 sf 81.23% Impervious = 184,143 sf

Summary for Subcatchment 1B: 1B

Runoff = 0.52 cfs @ 12.07 hrs, Volume= 1,625 cf, Depth= 2.42"

A	rea (sf)	CN D	escription						
-	6 342 98 Paved parking HSG D								
	1,721	80 >	75% Gras	s cover, Go	bod, HSG D				
	8,063	94 W	/eighted A	verage					
	1,721	2	1.34% Per	rvious Area	1				
	6,342	78	8.66% Imp	pervious Ar	ea				
_									
Tc	Length	Slope	Velocity	Capacity	Description				
(min)	(teet)	(ft/ft)	(ft/sec)	(cts)					
5.0					Direct Entry,				
	Subcatchment 1B: 1B								
				Hydro	ograph				
0.55-						Runoff			
0.5-					Type III 24-hr				
0.45					2-vear Rainfall=3.07"				
0.45					$+++++$ \mathbf{P}_{1} \mathbf{p}_{2} \mathbf{h}_{1} \mathbf{h}_{2} \mathbf				
0.4-									
0.35					Runoff Volume=1,625 cf				
sj 0.3-					Runoff Depth=2.42"				
<u>о</u> ш 0.25-					Tc=5.0 min				
0.2					CN=94				
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	0 1 2 3 4	5678	9 10 11 12 13	14 15 16 17 18 ⁻ Tim	19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 ne (hours)				

Summary for Subcatchment 1C: 1C

Runoff = 2.34 cfs @ 12.07 hrs, Volume= 7,626 cf, Depth= 2.73"

A	rea (sf)	CN D	Description					
30.784 98 Paved parking, HSG D								
	2,763 80 >75% Grass cover, Good, HSG D							
	33,547	97 V	Veighted A	verage				
	2,763	8	.24% Perv	vious Area				
	30,784	9	1.76% Imp	pervious Ar	rea			
Tc	Length	Slope	Velocity	Capacity	Description			
(min)	(feet)	(ft/ft)	(ft/sec)	(cts)				
5.0					Direct Entry,			
				Subca	atchmont 1C: 1C			
				Subca				
				Hydro	ograph			
1		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 2.34 cfs	I I		Runoff		
					Type III 24-hr			
				++-+-	2-vear Rainfall=3.07"			
2-					$D_{1} = D_{2} = D_{1} = D_{2$			
-					RUNOIT Area=33,547 St			
-					Runoff Volume=7,626 cf			
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	Time (hours)							

Summary for Subcatchment 2B: 2B

Runoff = 1.68 cfs @ 12.07 hrs, Volume= 5,220 cf, Depth= 2.42"

Area (sf)	CN E	Description						
22,657 98 Paved parking, HSG D								
1,214	80 >	•75% Ġras	s cover, Go	bod, HSG D				
2,037	61 >	•75% Gras	s cover, Go	pod, HSG B				
25,908	94 V	Veighted A	verage					
3,251	1	2.55% Pe	rvious Area					
22,657	8	37.45% Imp	pervious Ar	ea				
To Length	Slone	Velocity	Canacity	Description				
(min) (feet)	(ft/ft)	(ft/sec)	(cfs)	Description				
5.0	(1211)	()	()	Direct Entry,				
			Subaa	tohmont 2P, 2P				
Subcatchment 2B: 2B								
	1 1 1 1		Hydro	9graph				
(§)		1 1 1 1 1 1		Type III 24-hr 2-year Rainfall=3.07" Runoff Area=25,908 sf Runoff Volume=5,220 cf Runoff Depth=2.42"	Runoff			
5 1 1 1 1 1 1 1 1				Runoπ Deptn=2.42 Tc=5.0 min CN=94				
0 1 2 3 4	5 6 7 8	9 10 11 12 13 ⁻	14 15 16 17 18 1 Tim	րապիապիազիալիալիալիակակակակակակակակակակակակակակակ				

Summary for Subcatchment 2C: 2C

Runoff = 0.73 cfs @ 12.07 hrs, Volume= 2,297 cf, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Type III 24-hr 2-year Rainfall=3.07"

	Ar	ea (sf)	CN [Description	l			
		9,804	4 98 Paved parking, HSG D					
		343	80 >	>75% Ġras	s cover, Go	ood, HSG D		
		802	61 >	>75% Gras	s cover, Go	ood, HSG B		
		10,949	95 \	Neighted A	verage			
		1,145		10.46% Pe	rvious Area	3		
		9,804	8	39.54% Imp	pervious Ar	rea		
	Tc	l enath	Slope	Velocity	Canacity	Description		
(m	nin)	(feet)	(ft/ft)	(ft/sec)	(cfs)	Decemption		
	5.0		, , , , , , , , , , , , , , , , , , ,			Direct Entry,		
					Subca	atchment 2C: 2C		
						ograpn		
	0.8						Runoff	
	0.75			0.73 cfs				
	0.7					I ype III 24-hr		
	0.65	/	 - -+-	+		2-year Rainfall=3.07"		
	0.6					Runoff Area=10 949 sf		
	0.55	с і і і /і- т - ·						
	0.5							
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0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 Time (hours)

Summary for Subcatchment 2D: 2D

Runoff = 6.08 cfs @ 12.07 hrs, Volume= 18,911 cf, Depth= 2.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Type III 24-hr 2-year Rainfall=3.07"

	Are	ea (sf)	CN	Description					
	7	4,350	98	Paved parking, HSG D					
	1	9,198	80	>75% Gras	s cover, Go	ood, HSG D			
		310	61	>75% Gras	s cover, Go	ood, HSG B			
	ę	93,858	94	Weighted A	verage				
	1	9,508		20.78% Pe	rvious Area	l			
	1	4,350		79.22% Im	pervious Ar	ea			
-	Тс	l enath	Slope	Velocity	Capacity	Description			
(mi	in)	(feet)	(ft/ft)	(ft/sec)	(cfs)	Becchption			
5	5.0					Direct Entry,			
					Subaa	tobmont 2D	- 20		
					Subca	itchment 2D	. 20		
					Hydro	ograph		1	
	ſ							Runoff	
	6						Type III 24-hr		
	-					2	2-vear Rainfall=3.07"		
	5-					Ri	inoff Area=93.858 sf		
	-						ff Volumo - 19 011 of		
_	4) - VOIUIIIE — 0,9- 1-CI-	1	
(cfs)							Runoff Depth=2.42"		
Ň		$\begin{pmatrix} -1 & -1 & -1 & -1 & -1 & -1 & -1 & -1 $	$-\frac{1}{1}$ $-\frac{1}{1}$ $-\frac{1}{1}$ $-\frac{1}{1}$ $-\frac{1}{1}$		$\frac{1}{1} - \frac{1}{1} - \frac{1}{1} - \frac{1}{1} - \frac{1}{1} - \frac{1}{1} - \frac{1}{1}$	$\begin{bmatrix} 1 & -1 & -1 & -1 & -1 & -1 & -1 & -1 &$	Tc=5.0 min	-	
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0 **1** 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 **Time (hours)**

Summary for Subcatchment 3A: 3A

Runoff = 1.42 cfs @ 12.07 hrs, Volume= 4,480 cf, Depth= 2.52"

A	Area (sf)	CN D	Description				
	18.380	98 F	aved park	ina. HSG D)		
	2,971 80 >75% Grass cover, Good, HSG D						
	21.351	95 V	Veiahted A	verage	,		
	2,971	1	3.92% Per	vious Area	l		
	18,380	8	6.08% Imp	pervious Ar	ea		
Тс	Length	Slope	Velocity	Capacity	Description		
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)			
5.0					Direct Entry,		
				Cubaa	tahmant 24, 24		
				Subca	itchment 3A: 3A		
				Hydro	ograph		
						Runoff	
			1.42 cfs				
					Type III 24-hr		
					2 voor Poinfoll+2 07"		
					Runoff Area=21,351 sf		
1-					Runoff Volume=4 480 cf		
s)							
(ct					Runoff Deptn=2.52"		
No					Tc=5.0 min		
				I I I I I I I I I I			
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0-		5679		/////////////////////////////////////			
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Summary for Subcatchment 4B: 4B

Runoff = 0.22 cfs @ 12.07 hrs, Volume= 731 cf, Depth= 2.84"



Summary for Subcatchment 4C: 4C

Runoff = 1.76 cfs @ 12.07 hrs, Volume= 5,329 cf, Depth= 2.14"



Summary for Pond INF 1B: INF 1B

Inflow Area	a =	8,063 sf,	78.66% Impervious,	Inflow Depth = 2.42'	' for 2-year event
Inflow	=	0.52 cfs @	12.07 hrs, Volume=	1,625 cf	
Outflow	=	0.22 cfs @	12.25 hrs, Volume=	955 cf, Atte	en= 58%, Lag= 10.8 min
Primary	=	0.22 cfs @	12.25 hrs, Volume=	955 cf	-

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 17.63' @ 12.25 hrs Surf.Area= 745 sf Storage= 785 cf

Plug-Flow detention time= 216.0 min calculated for 955 cf (59% of inflow) Center-of-Mass det. time= 112.0 min (899.6 - 787.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	15.90'	587 cf	11.00'W x 67.70'L x 3.50'H Field A
			2,606 cf Overall - 827 cf Embedded = 1,779 cf x 33.0% Voids
#2A	16.40'	827 cf	ADS_StormTech SC-740 +Cap x 18 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			2 Rows of 9 Chambers
		1,414 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	17.40'	12.0" Vert. Orifice/Grate	C= 0.600

Primary OutFlow Max=0.22 cfs @ 12.25 hrs HW=17.63' (Free Discharge) —1=Orifice/Grate (Orifice Controls 0.22 cfs @ 1.63 fps)

Pond INF 1B: INF 1B - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

9 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 65.70' Row Length +12.0" End Stone x 2 = 67.70' Base Length 2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

18 Chambers x 45.9 cf = 826.9 cf Chamber Storage

2,606.3 cf Field - 826.9 cf Chambers = 1,779.4 cf Stone x 33.0% Voids = 587.2 cf Stone Storage

Chamber Storage + Stone Storage = 1,414.1 cf = 0.032 afOverall Storage Efficiency = 54.3%Overall System Size = $67.70' \times 11.00' \times 3.50'$

18 Chambers 96.5 cy Field 65.9 cy Stone



Pond INF 1B: INF 1B



Summary for Pond INF 2B: INF 2B

Inflow Area	a =	25,908 sf,	87.45% Impervious,	Inflow Depth = 2.42"	for 2-year event
Inflow	=	1.68 cfs @	12.07 hrs, Volume=	5,220 cf	
Outflow	=	0.28 cfs @	12.53 hrs, Volume=	2,815 cf, Atte	en= 83%, Lag= 27.4 min
Primary	=	0.28 cfs @	12.53 hrs, Volume=	2,815 cf	

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 16.26' @ 12.53 hrs Surf.Area= 3,327 sf Storage= 3,048 cf

Plug-Flow detention time= 289.6 min calculated for 2,814 cf (54% of inflow) Center-of-Mass det. time= 180.5 min (968.1 - 787.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	14.80'	2,479 cf	25.25'W x 131.78'L x 3.50'H Field A
			11,646 cf Overall - 4,135 cf Embedded = 7,511 cf x 33.0% Voids
#2A	15.30'	4,135 cf	ADS_StormTech SC-740 +Cap x 90 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			5 Rows of 18 Chambers
		6,613 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	16.00'	12.0" Vert. Orifice/Grate	C= 0.600

Primary OutFlow Max=0.28 cfs @ 12.53 hrs HW=16.26' (Free Discharge) —1=Orifice/Grate (Orifice Controls 0.28 cfs @ 1.73 fps)

Pond INF 2B: INF 2B - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length) Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length 5 Rows x 51.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

90 Chambers x 45.9 cf = 4,134.6 cf Chamber Storage

11,645.8 cf Field - 4,134.6 cf Chambers = 7,511.2 cf Stone x 33.0% Voids = 2,478.7 cf Stone Storage

Chamber Storage + Stone Storage = 6,613.3 cf = 0.152 af Overall Storage Efficiency = 56.8% Overall System Size = 131.78' x 25.25' x 3.50'

90 Chambers 431.3 cy Field 278.2 cy Stone





Pond INF 2B: INF 2B

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Summary for Pond INF 2C: INF 2C

Inflow Area	a =	10,949 sf,	89.54% Impervious,	Inflow Depth = 2.	.52" for 2-year event
Inflow	=	0.73 cfs @	12.07 hrs, Volume=	2,297 cf	
Outflow	=	0.50 cfs @	12.15 hrs, Volume=	1,506 cf,	Atten= 31%, Lag= 4.5 min
Primary	=	0.50 cfs @	12.15 hrs, Volume=	1,506 cf	-

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 15.95' @ 12.15 hrs Surf.Area= 810 sf Storage= 983 cf

Plug-Flow detention time= 192.4 min calculated for 1,506 cf (66% of inflow) Center-of-Mass det. time= 95.1 min (876.4 - 781.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	14.00'	633 cf	25.25'W x 32.10'L x 3.50'H Field A 2,837 cf Overall - 919 cf Embedded = 1,918 cf x 33.0% Voids
#2A	14.50'	919 cf	ADS_StormTech SC-740 +Cap x 20 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 5 Rows of 4 Chambers
		1,552 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	15.60'	12.0" Vert. Orifice/Grate	C= 0.600

Primary OutFlow Max=0.50 cfs @ 12.15 hrs HW=15.95' (Free Discharge) 1=Orifice/Grate (Orifice Controls 0.50 cfs @ 2.02 fps)

Pond INF 2C: INF 2C - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length 5 Rows x 51.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

20 Chambers x 45.9 cf = 918.8 cf Chamber Storage

2,836.5 cf Field - 918.8 cf Chambers = 1,917.7 cf Stone x 33.0% Voids = 632.9 cf Stone Storage

Chamber Storage + Stone Storage = 1,551.7 cf = 0.036 afOverall Storage Efficiency = 54.7%Overall System Size = $32.10' \times 25.25' \times 3.50'$

20 Chambers 105.1 cy Field 71.0 cy Stone





Pond INF 2C: INF 2C



Summary for Pond INF 4B: INF 4B

Inflow Area	a =	3,093 sf,	100.00% Im	pervious,	Inflow Depth =	2.84"	for 2-y	ear event
Inflow	=	0.22 cfs @	12.07 hrs, \	Volume=	731 c	f		
Outflow	=	0.19 cfs @	12.11 hrs, \	Volume=	486 c	f, Atten	i= 12%,	Lag= 2.5 min
Primary	=	0.19 cfs @	12.11 hrs, \	Volume=	486 c	f		

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 20.21' @ 12.11 hrs Surf.Area= 379 sf Storage= 299 cf

Plug-Flow detention time= 198.9 min calculated for 486 cf (66% of inflow) Center-of-Mass det. time= 100.3 min (856.7 - 756.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	18.80'	316 cf	6.25'W x 60.58'L x 3.50'H Field A
			1,325 cf Overall - 368 cf Embedded = 958 cf x 33.0% Voids
#2A	19.30'	368 cf	ADS_StormTech SC-740 +Cap x 8 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		684 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	20.00'	12.0" Vert. Orifice/Grate C= 0.600
Primary 1=Or	OutFlow Max= ifice/Grate (Orif	0.19 cfs @ ice Contro	0 12.11 hrs HW=20.21' (Free Discharge) bls 0.19 cfs @ 1.57 fps)

Pond INF 4B: INF 4B - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

8 Chambers x 45.9 cf = 367.5 cf Chamber Storage

1,325.1 cf Field - 367.5 cf Chambers = 957.6 cf Stone x 33.0% Voids = 316.0 cf Stone Storage

Chamber Storage + Stone Storage = 683.5 cf = 0.016 af Overall Storage Efficiency = 51.6% Overall System Size = 60.58' x 6.25' x 3.50'

8 Chambers 49.1 cy Field 35.5 cy Stone





Pond INF 4B: INF 4B



Summary for Link DP-1: DP-1

Inflow /	Area =	=	41,610 sf,	, 89.22% Ir	npervious,	Inflow Depth =	2.47"	for 2-	year event	
Inflow	=		2.34 cfs @	12.07 hrs,	Volume=	8,581 cf				
Primar	y =		2.34 cfs @	12.07 hrs,	Volume=	8,581 cf	, Atten	= 0%,	Lag= 0.0 n	nin

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-1: DP-1

Summary for Link DP-2: DP-2

Inflow A	rea =	130,715 sf, 81.71% Impervious,	Inflow Depth = 2.13"	for 2-year event
Inflow	=	6.34 cfs @ 12.08 hrs, Volume=	23,232 cf	
Primary	=	6.34 cfs @ 12.08 hrs, Volume=	23,232 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-2: DP-2

Summary for Link DP-3: DP-3

Inflow A	Area	=	21,351 sf,	86.08% Imperviou	s, Inflow Depth = 2	2.52" for 2·	-year event
Inflow	=	=	1.42 cfs @	12.07 hrs, Volume	= 4,480 cf		
Primary	y =	=	1.42 cfs @	12.07 hrs, Volume	= 4,480 cf,	Atten= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-3: DP-3

Summary for Link DP-4: DP-4

Inflow A	Area	=	33,026 sf	66.09% Imper	vious, l	Inflow Depth =	2.11"	for 2-	year event
Inflow		=	1.93 cfs @	12.08 hrs, Volu	ume=	5,815 cf			
Primar	у	=	1.93 cfs @	12.08 hrs, Volu	ume=	5,815 cf	, Atten	= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-4: DP-4



5-Year Storm Event – Proposed

Type III 24-hr 5-year Rainfall=4.06" Printed 5/23/2018

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Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points Runoff by SCS TR-20 method, UH=SCS, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1B: 1B	Runoff Area=8,063 sf 78.66% Impervious Runoff Depth=3.38" Tc=5.0 min CN=94 Runoff=0.72 cfs 2,273 cf
Subcatchment1C: 1C	Runoff Area=33,547 sf 91.76% Impervious Runoff Depth=3.71" Tc=5.0 min CN=97 Runoff=3.13 cfs 10,375 cf
Subcatchment2B: 2B	Runoff Area=25,908 sf 87.45% Impervious Runoff Depth=3.38" Tc=5.0 min CN=94 Runoff=2.30 cfs 7,304 cf
Subcatchment2C: 2C	Runoff Area=10,949 sf 89.54% Impervious Runoff Depth=3.49" Tc=5.0 min CN=95 Runoff=0.99 cfs 3,185 cf
Subcatchment2D: 2D	Runoff Area=93,858 sf 79.22% Impervious Runoff Depth=3.38" Tc=5.0 min CN=94 Runoff=8.35 cfs 26,462 cf
Subcatchment3A: 3A	Runoff Area=21,351 sf 86.08% Impervious Runoff Depth=3.49" Tc=5.0 min CN=95 Runoff=1.93 cfs 6,210 cf
Subcatchment4B: 4B	Runoff Area=3,093 sf 100.00% Impervious Runoff Depth=3.82" Tc=5.0 min CN=98 Runoff=0.29 cfs 986 cf
Subcatchment4C: 4C	Runoff Area=29,933 sf 62.58% Impervious Runoff Depth=3.07" Tc=5.0 min CN=91 Runoff=2.49 cfs 7,670 cf
Pond INF 1B: INF 1B	Peak Elev=17.79' Storage=864 cf Inflow=0.72 cfs 2,273 cf Outflow=0.60 cfs 1,604 cf
Pond INF 2B: INF 2B	Peak Elev=16.48' Storage=3,582 cf Inflow=2.30 cfs 7,304 cf Outflow=0.88 cfs 4,898 cf
Pond INF 2C: INF 2C	Peak Elev=16.08' Storage=1,049 cf Inflow=0.99 cfs 3,185 cf Outflow=0.88 cfs 2,393 cf
Pond INF 4B: INF 4B	Peak Elev=20.25' Storage=309 cf Inflow=0.29 cfs 986 cf Outflow=0.27 cfs 740 cf
Link DP-1: DP-1	Inflow=3.63 cfs 11,979 cf Primary=3.63 cfs 11,979 cf
Link DP-2: DP-2	Inflow=9.43 cfs 33,753 cf Primary=9.43 cfs 33,753 cf
Link DP-3: DP-3	Inflow=1.93 cfs 6,210 cf Primary=1.93 cfs 6,210 cf
Link DP-4: DP-4	Inflow=2.74 cfs 8,410 cf Primary=2.74 cfs 8,410 cf

Total Runoff Area = 226,702 sf Runoff Volume = 64,464 cf Average Runoff Depth = 3.41" 18.77% Pervious = 42,559 sf 81.23% Impervious = 184,143 sf
Runoff 0.72 cfs @ 12.07 hrs, Volume= 2,273 cf, Depth= 3.38" =

A	rea (sf)	CN E	Description			
	6,342	98 F	aved park	ing, HSG D)	
	1,721 80 >75% Grass cover, Good, HSG D					
	8,063	94 V	Veighted A	verage		
	1,721	2	21.34% Per	vious Area	3	
	6,342	7	'8.66% Imp	pervious Ar	rea	
Tc	Length	Slope	Velocity	Capacity	Description	
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)		
5.0					Direct Entry,	
				Subca	atchment 1B: 1B	
				Hydro	ograph	
0.8					······································	
0.0		!!!!-				
0.75					Type III 24-hr	
0.65		- + - -				
0.05					5-year-Raintail=4.06	
0.55		- + - -	·		Runoff Area=8,063 sf	
0.5		¹ ¹ ¹ ¹ - 1 1 1 1			Runoff Volume=2 273 cf	
9 0.45		- + - -				
រ ប្រ ប.4		!!				
6 <u>0.35</u>			· · · · ·		Tc=5.0 min	
0.3					CN=94	
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0.2						
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0.05				Imm		
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Summary for Subcatchment 1C: 1C

Runoff = 3.13 cfs @ 12.07 hrs, Volume= 10,375 cf, Depth= 3.71"

A	rea (sf)	CN D	escription						
30,784 98 Paved parking, HSG D									
	2,763 80 >75% Grass cover, Good, HSG D								
	33,547	97 V	97 Weighted Average						
	2,763	8	.24% Perv	ious Area					
	30,784	9	1.76% Imp	pervious Ar	ea				
Тс	Length	Slope	Slope Velocity Capacity Description						
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
5.0					Direct Entry	y ,			
				Subca	tchment 1	C: 1C			
				Hydro	ograph				
(
-								Runoff	
			¦- + - + - ∕ −	$\frac{1}{1} = \frac{1}{1} = \frac{1}{1} = \frac{1}{1} = \frac{1}{1} = \frac{1}{1} = \frac{1}{1}$	$\begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 &$		oe III 24-hr		
3-						E voor Doir			
-						5-year Rair	11aii–4.06		
]					F	Runoff Area	=33,547 sf		
-					Run	off Volume	=10,375 cf		
[s] 2-∛						Runoff De	epth=3.71"		
Ň						· · · · · · · · · · · · ·	c=5.0 min		
Ē.									
-							CN=97		
1-									
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0-		56780	10 11 12 13 1	14 15 16 17 18 1	9 20 21 22 23 24 25	26 27 28 29 30 31 32 3	3 34 35 36 37 38 39 40		
0	. 2 0 4	5 6 7 6 8		Tim	e (hours)				

Summary for Subcatchment 2B: 2B

Runoff 2.30 cfs @ 12.07 hrs, Volume= 7,304 cf, Depth= 3.38" =

Area (sf)	CN Description	l						
22,657	98 Paved park	king, HSG D)					
1,214	80 >75% Ġras	80 >75% Grass cover, Good, HSG D						
2,037	61 >75% Gras	s cover, Go	bod, HSG B					
25,908	94 Weighted A	Average						
3,251	12.55% Pe	rvious Area	l					
22,657	87.45% lm	pervious Ar	ea					
To Length	Slone Velocity	Capacity	Description					
(min) (feet)	(ft/ft) (ft/sec)	(cfs)	Description					
5.0		(010)	Direct Entry,					
			•					
		Subca	tchment 2B: 2B					
		Hydro	ograph					
				Pupoff				
	1 1 1 1 1 1 2.30 cfs							
			Type III 24-hr					
			5-year Painfall=/ 06"					
2-2								
			Runoff Area=25,908 sf					
			Runoff Volume=7.304 cf					
(sj			Dunoff Donth-2 20"					
			Runon Deptn=3.38					
H			Tc=5.0 min					
1			CN=94					
			1 1 <td></td>					
		Umm						
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0 1 2 3 4	5 6 7 8 9 10 11 12 13	14 15 16 17 18 1 Tim	9 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 e (hours)					

Summary for Subcatchment 2C: 2C

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Runoff 0.99 cfs @ 12.07 hrs, Volume= 3,185 cf, Depth= 3.49" =

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Type III 24-hr 5-year Rainfall=4.06"

Area (sf)	CN Description	า					
9,804	98 Paved par	98 Paved parking, HSG D					
343	80 >75% Gra	ss cover, Go	bod, HSG D				
802	61 >75% Gras	ss cover, Go	bod, HSG B				
10,949	95 Weighted	Average					
1,145	10.46% Pe	ervious Area	1				
9,804	89.54% Im	pervious Ar	ea				
To Length	Slone Velocity	Canacity	Description				
(min) (feet)	(ft/ft) (ft/sec)	(cfs)	Description				
5.0	(111) (111)	()	Direct Entry,				
		Subca	tchment 2C: 2C				
		Hydro	paraph				
				Runoff			
1-1	0.99 cfs		Type III 24 br				
			5-year Rainfall=4.06"				
			Runoff Area=10,949 sf				
			Pupoff Volumo=3 185 cf				
∂							
Č (Č			Runoff Depth=3.49"				
			Tc=5.0 min				
			CIN-30				
			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				
		<u>+++1111</u>					
0 1 2 3 4	5 6 7 8 9 10 11 12 13	14 15 16 17 18 1	9 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40				

Time (hours)

Summary for Subcatchment 2D: 2D

Page 35

Runoff 8.35 cfs @ 12.07 hrs, Volume= 26,462 cf, Depth= 3.38" =

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Type III 24-hr 5-year Rainfall=4.06"

Area (sf) CN Description							
74,350 98 Paved parking, HSG D	Paved parking, HSG D						
19,198 80 >75% Grass cover, Good, HSG D	-75% Grass cover, Good, HSG D						
310 61 >75% Grass cover, Good, HSG B							
93,858 94 Weighted Average	Weighted Average						
19,508 20.78% Pervious Area							
74,350 79.22% Impervious Area							
Tc Length Slope Velocity Capacity Description							
(min) (feet) (ft/ft) (ft/sec) (cfs)							
5.0 Direct Entry,							
Subcatchment 2D: 2D							
Hydrograph							
	1						
9	Runoff						
	-						
[] {	-						
'↓ Runoff Area=93,858 sf							
⁶ Runoff Volume=26.462 cf	-						
$\hat{\mathbf{e}}$	-						
$ = \frac{1}{2} \int \frac$	-						
CN=94							
3							
	-						

0-0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 Time (hours)

Summary for Subcatchment 3A: 3A

Runoff = 1.93 cfs @ 12.07 hrs, Volume= 6,210 cf, Depth= 3.49"

Ar	ea (sf)	CN D	escription					
18,380 98 Paved parking, HSG D								
	2,971	80 >	75% Ġras	s cover, Go	bod, HSG D			
	21,351 95 Weighted Average							
	2,971	1	3.92% Per	vious Area	1			
	18,380	8	6.08% Imp	pervious Ar	ea			
_		~		•				
l C	Length	Slope	Slope Velocity Capacity Description					
<u>(min)</u>	(leet)	(11/11)	(II/sec)	(CIS)	Disc of Factors			
5.0					Direct Entry,			
				Subca	ntchment 3A: 3A			
				Hydro	ograph			
ſ						Runoff		
2			1.93 cfs					
					I ype III 24-nr			
					5-vear Rainfall=4.06"			
-								
					Nulloii Alea-21,331 Si			
					Runoff Volume=6,210 cf			
(cfs)					Runoff Depth=3.49"			
					Tc=5.0 min			
_					CN=95			
-								
-								
0-								
0	1 2 3 4	5 6 7 8 9	9 10 11 12 13 1	4 15 16 17 18 1 Time	9 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 e (hours)			

Summary for Subcatchment 4B: 4B

Runoff = 0.29 cfs @ 12.07 hrs, Volume= 986 cf, Depth= 3.82"



Summary for Subcatchment 4C: 4C

Runoff 2.49 cfs @ 12.07 hrs, Volume= 7,670 cf, Depth= 3.07" =

Area (sf)	CN Description		
18,733	98 Paved parking, HS	G D	
11,200	80 >75% Grass cover	, Good, HSG D	
29,933	91 Weighted Average		
11,200	37.42% Pervious A	rea	
18,733	62.58% Impervious	Area	
Tc Length	Slope Velocity Capac	ity Description	
(min) (feet	(ft/ft) (ft/sec) (c	fs)	
5.0		Direct Entry,	
	Qk	actabusent (C) (C	
	Suc	icatchment 4C: 4C	
	Hy	/drograph	
			Runoff
- I I I	1		
		Type III 24-hr	
		5 year Painfall-4 06"	
■	┝╺┝╶┤╸┽╺┝╶┤╸┽╸┼╺ <mark>┥</mark> ╸┽╺┝╶┤╸┽		
2-		Runoff Area=29,933 sf	
		Runoff Volume=7 670 cf	
6			
(ct		Runoff Depth=3.07"	
No		Tc=5.0 min	
	┟╶╎╴┤╴┼╶┟╶╎╴┽╶┼╶╴		
1-1		CN-31	
- 1 1 1			
-			
0 1 2 3	<mark>իներարարարություն է հայտարարարարություն։</mark> 1 5 6 7 8 9 10 11 12 13 14 15 16 17	ninninninninninninninninninninninninnin	
		Time (hours)	

Summary for Pond INF 1B: INF 1B

Inflow Area	ı =	8,063 sf,	78.66% Impervious,	Inflow Depth =	3.38"	for 5-year event
Inflow	=	0.72 cfs @	12.07 hrs, Volume=	2,273 cf	-	
Outflow	=	0.60 cfs @	12.12 hrs, Volume=	1,604 cf	, Atten	= 16%, Lag= 2.9 min
Primary	=	0.60 cfs @	12.12 hrs, Volume=	1,604 cf		-

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 17.79' @ 12.12 hrs Surf.Area= 745 sf Storage= 864 cf

Plug-Flow detention time= 174.8 min calculated for 1,604 cf (71% of inflow) Center-of-Mass det. time= 83.6 min (862.3 - 778.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	15.90'	587 cf	11.00'W x 67.70'L x 3.50'H Field A 2 606 cf Overall - 827 cf Embedded = 1 779 cf. x 33.0% Voids
#2A	16.40'	827 cf	ADS_StormTech SC-740 +Cap x 18 Inside #1 Effective Size= 44.6"W x 30.0 "H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0 "H x 7.56'L with 0.44' Overlap 2 Pows of 9 Chambers
		1,414 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	17.40'	12.0" Vert. Orifice/Grate	C= 0.600

Primary OutFlow Max=0.60 cfs @ 12.12 hrs HW=17.79' (Free Discharge) —1=Orifice/Grate (Orifice Controls 0.60 cfs @ 2.12 fps)

Pond INF 1B: INF 1B - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

9 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 65.70' Row Length +12.0" End Stone x 2 = 67.70' Base Length 2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

18 Chambers x 45.9 cf = 826.9 cf Chamber Storage

2,606.3 cf Field - 826.9 cf Chambers = 1,779.4 cf Stone x 33.0% Voids = 587.2 cf Stone Storage

Chamber Storage + Stone Storage = 1,414.1 cf = 0.032 afOverall Storage Efficiency = 54.3%Overall System Size = $67.70' \times 11.00' \times 3.50'$

18 Chambers 96.5 cy Field 65.9 cy Stone



Pond INF 1B: INF 1B



Summary for Pond INF 2B: INF 2B

Inflow Area	a =	25,908 sf,	87.45% Impervious,	Inflow Depth = 3.3	8" for 5-year event
Inflow	=	2.30 cfs @	12.07 hrs, Volume=	7,304 cf	
Outflow	=	0.88 cfs @	12.29 hrs, Volume=	4,898 cf, A	tten= 62%, Lag= 13.0 min
Primary	=	0.88 cfs @	12.29 hrs, Volume=	4,898 cf	-

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 16.48' @ 12.29 hrs Surf.Area= 3,327 sf Storage= 3,582 cf

Plug-Flow detention time= 224.9 min calculated for 4,898 cf (67% of inflow) Center-of-Mass det. time= 129.2 min (907.9 - 778.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	14.80'	2,479 cf	25.25'W x 131.78'L x 3.50'H Field A
			11,646 cf Overall - 4,135 cf Embedded = 7,511 cf x 33.0% Voids
#2A	15.30'	4,135 cf	ADS_StormTech SC-740 +Cap x 90 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			5 Rows of 18 Chambers
		6,613 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	16.00'	12.0" Vert. Orifice/Grate	C= 0.600

Primary OutFlow Max=0.88 cfs @ 12.29 hrs HW=16.48' (Free Discharge) —1=Orifice/Grate (Orifice Controls 0.88 cfs @ 2.36 fps)

Pond INF 2B: INF 2B - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length) Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length 5 Rows x 51.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

90 Chambers x 45.9 cf = 4,134.6 cf Chamber Storage

11,645.8 cf Field - 4,134.6 cf Chambers = 7,511.2 cf Stone x 33.0% Voids = 2,478.7 cf Stone Storage

Chamber Storage + Stone Storage = 6,613.3 cf = 0.152 af Overall Storage Efficiency = 56.8% Overall System Size = 131.78' x 25.25' x 3.50'

90 Chambers 431.3 cy Field 278.2 cy Stone





Pond INF 2B: INF 2B

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Summary for Pond INF 2C: INF 2C

Inflow Area	a =	10,949 sf,	89.54% Impervious,	Inflow Depth = 3.49	9" for 5-year event
Inflow	=	0.99 cfs @	12.07 hrs, Volume=	3,185 cf	
Outflow	=	0.88 cfs @	12.11 hrs, Volume=	2,393 cf, At	tten= 11%, Lag= 2.3 min
Primary	=	0.88 cfs @	12.11 hrs, Volume=	2,393 cf	-

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 16.08' @ 12.11 hrs Surf.Area= 810 sf Storage= 1,049 cf

Plug-Flow detention time= 160.4 min calculated for 2,393 cf (75% of inflow) Center-of-Mass det. time= 76.3 min (849.3 - 773.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	14.00'	633 cf	25.25'W x 32.10'L x 3.50'H Field A
			2,837 cf Overall - 919 cf Embedded = 1,918 cf x 33.0% Voids
#2A	14.50'	919 cf	ADS_StormTech SC-740 +Cap x 20 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			5 Rows of 4 Chambers
		1,552 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	15.60'	12.0" Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=0.88 cfs @ 12.11 hrs HW=16.08' (Free Discharge) —1=Orifice/Grate (Orifice Controls 0.88 cfs @ 2.36 fps)

Pond INF 2C: INF 2C - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length 5 Rows x 51.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

20 Chambers x 45.9 cf = 918.8 cf Chamber Storage

2,836.5 cf Field - 918.8 cf Chambers = 1,917.7 cf Stone x 33.0% Voids = 632.9 cf Stone Storage

Chamber Storage + Stone Storage = 1,551.7 cf = 0.036 afOverall Storage Efficiency = 54.7%Overall System Size = $32.10' \times 25.25' \times 3.50'$

20 Chambers 105.1 cy Field 71.0 cy Stone





Pond INF 2C: INF 2C

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Summary for Pond INF 4B: INF 4B

Inflow Area	a =	3,093 sf,	100.00% Impervious,	Inflow Depth = 3.82	2" for 5-year event
Inflow	=	0.29 cfs @	12.07 hrs, Volume=	986 cf	
Outflow	=	0.27 cfs @	12.10 hrs, Volume=	740 cf, At	ten= 8%, Lag= 1.9 min
Primary	=	0.27 cfs @	12.10 hrs, Volume=	740 cf	-

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 20.25' @ 12.10 hrs Surf.Area= 379 sf Storage= 309 cf

Plug-Flow detention time= 171.7 min calculated for 740 cf (75% of inflow) Center-of-Mass det. time= 85.3 min (836.1 - 750.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	18.80'	316 cf	6.25'W x 60.58'L x 3.50'H Field A
			1,325 cf Overall - 368 cf Embedded = 958 cf x 33.0% Voids
#2A	19.30'	368 cf	ADS_StormTech SC-740 +Cap x 8 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		684 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	20.00'	12.0" Vert. Orifice/Grate C= 0.600
Primary	outFlow M	ax=0.27 cfs @ Orifice Contro) 12.10 hrs HW=20.25' (Free Discharge) bls 0.27 cfs @ 1.71 fps)

Pond INF 4B: INF 4B - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

8 Chambers x 45.9 cf = 367.5 cf Chamber Storage

1,325.1 cf Field - 367.5 cf Chambers = 957.6 cf Stone x 33.0% Voids = 316.0 cf Stone Storage

Chamber Storage + Stone Storage = 683.5 cf = 0.016 afOverall Storage Efficiency = 51.6%Overall System Size = $60.58' \times 6.25' \times 3.50'$

8 Chambers 49.1 cy Field 35.5 cy Stone





Type III 24-hr 5-year Rainfall=4.06" Printed 5/23/2018 LC Page 50

Pond INF 4B: INF 4B



Summary for Link DP-1: DP-1

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Inflow A	Area =	41,610 sf, 89.22% Impervious,	Inflow Depth = 3.45"	for 5-year event
Inflow	=	3.63 cfs @ 12.08 hrs, Volume=	11,979 cf	
Primary	y =	3.63 cfs @ 12.08 hrs, Volume=	11,979 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-1: DP-1

Summary for Link DP-2: DP-2

Inflow Ar	ea =	130,715 sf, 81.71% Impervious,	Inflow Depth = 3.10"	for 5-year event
Inflow	=	9.43 cfs @ 12.08 hrs, Volume=	33,753 cf	
Primary	=	9.43 cfs @ 12.08 hrs, Volume=	33,753 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-2: DP-2

Summary for Link DP-3: DP-3

Inflow A	Area =	21,351 sf, 86.08% Impervious,	Inflow Depth = 3.49"	for 5-year event
Inflow	=	1.93 cfs @ 12.07 hrs, Volume=	6,210 cf	
Primary	y =	1.93 cfs @ 12.07 hrs, Volume=	6,210 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-3: DP-3

Summary for Link DP-4: DP-4

Page 54

Inflow A	rea =	33,026 sf, 66.09% Impervious,	Inflow Depth = 3.06"	for 5-year event
Inflow	=	2.74 cfs @ 12.07 hrs, Volume=	8,410 cf	
Primary	=	2.74 cfs @ 12.07 hrs, Volume=	8,410 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-4: DP-4



10-Year Storm Event- Proposed

Type III 24-hr 10-year Rainfall=4.88" Printed 5/23/2018

HydroCAD® 10.00-19 s/n 01038 © 2016 HydroCAD Software Solutions LLC

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points Runoff by SCS TR-20 method, UH=SCS, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1B: 1B	Runoff Area=8,063 sf 78.66% Impervious Runoff Depth=4.19" Tc=5.0 min CN=94 Runoff=0.88 cfs 2,815 cf
Subcatchment1C: 1C	Runoff Area=33,547 sf 91.76% Impervious Runoff Depth=4.53" Tc=5.0 min CN=97 Runoff=3.78 cfs 12,657 cf
Subcatchment2B: 2B	Runoff Area=25,908 sf 87.45% Impervious Runoff Depth=4.19" Tc=5.0 min CN=94 Runoff=2.82 cfs 9,045 cf
Subcatchment2C: 2C	Runoff Area=10,949 sf 89.54% Impervious Runoff Depth=4.30" Tc=5.0 min CN=95 Runoff=1.21 cfs 3,924 cf
Subcatchment2D: 2D	Runoff Area=93,858 sf 79.22% Impervious Runoff Depth=4.19" Tc=5.0 min CN=94 Runoff=10.21 cfs 32,769 cf
Subcatchment3A: 3A	Runoff Area=21,351 sf 86.08% Impervious Runoff Depth=4.30" Tc=5.0 min CN=95 Runoff=2.35 cfs 7,652 cf
Subcatchment4B: 4B	Runoff Area=3,093 sf 100.00% Impervious Runoff Depth=4.64" Tc=5.0 min CN=98 Runoff=0.35 cfs 1,197 cf
Subcatchment4C: 4C	Runoff Area=29,933 sf 62.58% Impervious Runoff Depth=3.87" Tc=5.0 min CN=91 Runoff=3.09 cfs 9,643 cf
Pond INF 1B: INF 1B	Peak Elev=17.85' Storage=893 cf Inflow=0.88 cfs 2,815 cf Outflow=0.79 cfs 2,146 cf
Pond INF 2B: INF 2B	Peak Elev=16.65' Storage=3,987 cf Inflow=2.82 cfs 9,045 cf Outflow=1.49 cfs 6,639 cf
Pond INF 2C: INF 2C	Peak Elev=16.14' Storage=1,080 cf Inflow=1.21 cfs 3,924 cf Outflow=1.09 cfs 3,133 cf
Pond INF 4B: INF 4B	Peak Elev=20.28' Storage=316 cf Inflow=0.35 cfs 1,197 cf Outflow=0.33 cfs 951 cf
Link DP-1: DP-1	Inflow=4.50 cfs 14,803 cf Primary=4.50 cfs 14,803 cf
Link DP-2: DP-2	Inflow=12.20 cfs 42,541 cf Primary=12.20 cfs 42,541 cf
Link DP-3: DP-3	Inflow=2.35 cfs 7,652 cf Primary=2.35 cfs 7,652 cf
Link DP-4: DP-4	Inflow=3.40 cfs 10,594 cf Primary=3.40 cfs 10,594 cf

Total Runoff Area = 226,702 sf Runoff Volume = 79,702 cf Average Runoff Depth = 4.22" 18.77% Pervious = 42,559 sf 81.23% Impervious = 184,143 sf

Summary for Subcatchment 1B: 1B

Runoff 0.88 cfs @ 12.07 hrs, Volume= 2,815 cf, Depth= 4.19" =

A	rea (sf)	CN D	Description						
	6.342	98 F	aved park	ina. HSG D)				
	1,721	80 >	·75% Ġras	s cover, Go	ood, HSG	C			
	8,063	94 V	Veighted A	verage					
	1,721	2	1.34% Pe	rvious Area	ı				
	6,342	7	8.66% Imp	pervious Ar	ea				
	,								
Tc	Length	Slope	Velocity	Capacity	Descripti	on			
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
5.0					Direct E	ntry,			
				• •					
				Subca	itchment	1B: 1B			
				Hydro	ograph				
		11 - + -1-							Dunoff
0.95		- + - -	-+-+				- + - + -		
0.9		- + - -			+-	- -+- -+	Type	11 24-hr	
0.85		- + - -		$- \vdash - \mid - \mid - \mid - \mid - \mid - \mid - \mid - \mid - \mid $				└┽┚ ┼⋐╤┸╷╴╹┽┚┚ ┝╴ ╸ ╵╴╵╶╵╶╵╶╵╶╵	
0.0		- + - -				10-year	Rainfa	l=4.88"	
0.7		- + - - - + - -			++- ++-	Runof	F Area=8	3.063 sf	
0.65		- + - -		+ - +					
0.6	╉	- + - -			F		Jume-4	2,0_I J_CI	
5 0.55		ii - i- i-				Runo	ff Deptl	า=4.19"	
0.45		- + - - - + - -					Tc =	5.0 min	
L 0.4							-++		
0.35								CN=94	
0.3									
0.25								- + - - + - -	
0.2		iii- I I I I I						i - i - i - i - i - i - i - i	
0.10									
0.05				Amm					
0			ntantantanta	ntuntuntuntu	rinninninninnin				
	0 1 2 3 4	5678	9 10 11 12 13	14 15 16 17 18 ⁻ Tim	19 20 21 22 23 2 1e (hours)	24 25 26 27 28 29	30 31 32 33 34 3	35 36 37 38 39 40	

Summary for Subcatchment 1C: 1C

Runoff = 3.78 cfs @ 12.07 hrs, Volume= 12,657 cf, Depth= 4.53"

A	Area (sf)	CN D	escription)			
-	30.784	98 P	aved park	ina. HSG D)	
	2,763	80 >	75% Ġras	s cover, Go	ood, HSG D	
	33,547	97 V	Veighted A	verage		
	2,763	8	.24% Perv	vious Area		
	30,784	9	1.76% Imp	pervious Ar	rea	
_						
TC	Length	Slope	Velocity	Capacity	Description	
(min)	(feet)	(ft/ft)	(ft/sec)	(CIS)	-	
5.0					Direct Entry,	
				Subca	atchment 1C: 1C	
				Hydro	ograph	
4-			378 cfs			
					Type III 24-hr	
					10 year Dainfall-4 99"	
	+ - +			· · · · · · · · · · · · · · · · · · ·		
3-					Runoff Area=33,547 sf	
					Runoff Volume=12.657 cf	
6						
(cti					Runoπ Deptn=4.53	
<u>8</u> 2-					Tc=5.0 min	
ш.					CN=97	
1-						
					1 1 <td></td>	
0-	0 1 2 3 4	5678	9 10 11 12 13 ⁻	14 15 16 17 18 1		
				Tim	ne (hours)	

Summary for Subcatchment 2B: 2B

Runoff = 2.82 cfs @ 12.07 hrs, Volume= 9,045 cf, Depth= 4.19"

Area (sf) CN Description									
22,657 98 Paved parking, HSG D									
1,214 80 >75% Grass cover, Good, HSG D									
2,037	2,037 61 >75% Grass cover, Good, HSG B								
25,908	94	Weighted Average							
3,251		12.55% Pervious Area							
22,657 87.45% Impervious Area									
Tc Length Slope Velocity Capacity Description									
(min) (feet)	(ft/	ft) (ft/sec) (cfs)							
5.0		Direct Entry,							
Subcatchment 2B: 2B									
Hydrograph									



Summary for Subcatchment 2C: 2C

Runoff = 1.21 cfs @ 12.07 hrs, Volume= 3,924 cf, Depth= 4.30"

9,804 98 Paved parking, HSG D 343 80 >75% Grass cover, Good, HSG D 802 61 >75% Grass cover, Good, HSG B 10,949 95 Weighted Average 1,145 10.46% Pervious Area 9,804 89.54% Impervious Area Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 2C: 2C Hydrograph Type III 24-hr 10-year Rainfall=4.88" Runoff Area=10,949 sf Runoff Volume=3.924 cf	
343 80 >75% Grass cover, Good, HSG D 802 61 >75% Grass cover, Good, HSG B 10,949 95 Weighted Average 1,145 10.46% Pervious Area 9,804 89.54% Impervious Area Tc Length Slope Velocity Capacity 0,610 (ft/ft) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 2C: 2C Hydrograph Type III 24-hr 1 10-year Rainfall=4.88" Runoff Area=10,949 sf Runoff Runoff Volume=3.924 cf	
802 61 >75% Grass cover, Good, HSG B 10,949 95 Weighted Average 1,145 10.46% Pervious Area 9,804 89.54% Impervious Area Tc Length Slope Velocity Capacity 0,804 Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 2C: 2C Hydrograph Type III 24-hr 1 10-year Rainfall=4.88" Runoff Area=10,949 sf Runoff Area=10,949 sf 1 Runoff Volume=3.924 cf	
10,949 95 Weighted Average 1,145 10.46% Pervious Area 9,804 89.54% Impervious Area Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 2C: 2C Hydrograph Type III 24-hr 10-year Rainfall=4.88" Runoff Area=10,949 sf Runoff Volume=3.924 cf	
1,145 10.46% Pervious Area 9,804 89.54% Impervious Area Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 2C: 2C Hydrograph Type III 24-hr 10-year Rainfall=4.88" Runoff Area=10,949 sf Runoff Volume=3.924 cf	
9,804 89.54% Impervious Area Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 2C: 2C Hydrograph 1 12165 Type III 24-hr 1 10-year Rainfall=4.88" Runoff Area=10,949 sf Runoff Volume=3.924 cf Runoff Volume=3.924 cf	
Tc Length (feet) Slope (ft/ft) Velocity (cfs) Description 5.0 Direct Entry, Subcatchment 2C: 2C Hydrograph 1 1216 Type III 24-hr 1 10-year Rainfall=4.88" Runoff Area=10,949 sf Runoff Volume=3.924 cf Runoff Volume=3.924 cf	
(min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 2C: 2C Hydrograph 10-year Rainfall=4.88" Runoff Area=10,949 sf Runoff Volume=3.924 cf	
5.0 Direct Entry, Subcatchment 2C: 2C Hydrograph Type III 24-hr 10-year Rainfall=4.88" Runoff Area=10,949 sf Runoff Volume=3.924 cf	
Subcatchment 2C: 2C Hydrograph Type III 24-hr 10-year Rainfall=4.88" Runoff Area=10,949 sf Runoff Volume=3.924 cf	
Hydrograph Type III 24-hr 10-year Rainfall=4.88" Runoff Area=10,949 sf Runoff Volume=3.924 cf	
Type III 24-hr 10-year Rainfall=4.88" Runoff Area=10,949 sf Runoff Volume=3.924 cf	
Type III 24-hr 10-year Rainfall=4.88" Runoff Area=10,949 sf Runoff Volume=3.924 cf	
Image: Second state of the second s	ff

Summary for Subcatchment 2D: 2D

Runoff = 10.21 cfs @ 12.07 hrs, Volume= 32,769 cf, Depth= 4.19"

Area	a (sf)	CN	Description		
74	1,350	98	Paved park	ing, HSG D	D
19	9,198	80	>75% Gras	s cover, Go	bood, HSG D
	310	61	>75% Gras	s cover, Go	Good, HSG B
93	8,858	94	Weighted A	verage	
19	9,508		20.78% Per	vious Area	а
74	1,350		79.22% Imp	pervious Ar	rea
Tc L _(min)	ength (feet)	Slop (ft/ft	e Velocity) (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 2D: 2D



Summary for Subcatchment 3A: 3A

Runoff = 2.35 cfs @ 12.07 hrs, Volume= 7,652 cf, Depth= 4.30"

Are	ea (sf)	CN E	Description			
1	8,380	98 F	aved park	ing, HSG D		
	2,971	80 >	·75% Ġras	s cover, Go	ood, HSG D	
2	1,351	95 V	Veighted A	verage		
	2,971	1	3.92% Pe	rvious Area	3	
1	8,380	8	6.08% Imp	pervious Ar	rea	
				-		
	Length	Slope	Velocity	Capacity	Description	
(min)	(teet)	(π/π)	(π/sec)	(CIS)		
5.0					Direct Entry,	
				Subca	atchment 3A: 3A	
				Hydro	ograph	
1						Runoff
-			2.35 cfs			
					Type III 24-hr	
2-*						
-					RUNOIT Area=21,351 St	
-					Runoff Volume=7,652 cf	
(cfs)					Runoff Depth=4.30"	
NO .				1 1 1 1 1 1 1 1 1 1 1 1 1	Tc=5.0 min	
1-1	& - - + - + - 			+ - - + - + - 	CN=95	
1						
				IIIIII		
0			fuufuufuufuu	i <u>i i i i i i i i i i i i i i i i i i </u>	, and and a stand and a stand a	
0 1	1234	5678	9 10 11 12 13 ⁻	14 15 16 17 18 1 Tim	19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 ne (hours)	

Summary for Subcatchment 4B: 4B

Runoff = 0.35 cfs @ 12.07 hrs, Volume= 1,197 cf, Depth= 4.64"



Summary for Subcatchment 4C: 4C

Runoff = 3.09 cfs @ 12.07 hrs, Volume= 9,643 cf, Depth= 3.87"

Area (sf)	CN Description	
18,733	3 98 Paved parking, HSG D	
11,200	0 80 >75% Grass cover, Good, HSG D	
29,933	3 91 Weighted Average	
11,200	0 37.42% Pervious Area	
18,733	3 62.58% Impervious Area	
To Lenat	th Slope Velocity Capacity Description	
(min) (feet	et) (ft/ft) (ft/sec) (cfs)	
5.0	Direct Entry,	
	Outra statum ant 40a 40	
	Subcatchment 4C: 4C	
	Hydrograph	
		Runoff
3-1-1-+-	Type III 24-hr	
	10-year Rainfall=4 88"	
	$\mathbf{D} = \mathbf{D} + $	
	Runon Area-29,955 Si	
	Runoff Volume=9,643 cf	
(cts)	Runoff Depth=3.87"	
E E	Tc=5.0 min	
	CN=91	
1-		
-		
	$ \int_{-\infty}^{\infty} \int_{-\infty}^{$	
0123	Time (hours)	
Summary for Pond INF 1B: INF 1B

Inflow Area	a =	8,063 sf,	78.66% Impervious,	Inflow Depth = 4.19	' for 10-year event
Inflow	=	0.88 cfs @	12.07 hrs, Volume=	2,815 cf	
Outflow	=	0.79 cfs @	12.11 hrs, Volume=	2,146 cf, Att	en= 11%, Lag= 2.3 min
Primary	=	0.79 cfs @	12.11 hrs, Volume=	2,146 cf	-

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 17.85' @ 12.11 hrs Surf.Area= 745 sf Storage= 893 cf

Plug-Flow detention time= 156.2 min calculated for 2,146 cf (76% of inflow) Center-of-Mass det. time= 73.6 min (846.9 - 773.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	15.90'	587 cf	11.00'W x 67.70'L x 3.50'H Field A
			2,606 cf Overall - 827 cf Embedded = 1,779 cf x 33.0% Voids
#2A	16.40'	827 cf	ADS_StormTech SC-740 +Cap x 18 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			2 Rows of 9 Chambers
		1,414 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	17.40'	12.0" Vert. Orifice/Grate	C= 0.600

Primary OutFlow Max=0.78 cfs @ 12.11 hrs HW=17.85' (Free Discharge) —1=Orifice/Grate (Orifice Controls 0.78 cfs @ 2.28 fps)

Pond INF 1B: INF 1B - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

9 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 65.70' Row Length +12.0" End Stone x 2 = 67.70' Base Length 2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

18 Chambers x 45.9 cf = 826.9 cf Chamber Storage

2,606.3 cf Field - 826.9 cf Chambers = 1,779.4 cf Stone x 33.0% Voids = 587.2 cf Stone Storage

Chamber Storage + Stone Storage = 1,414.1 cf = 0.032 afOverall Storage Efficiency = 54.3%Overall System Size = $67.70' \times 11.00' \times 3.50'$

18 Chambers 96.5 cy Field 65.9 cy Stone



Pond INF 1B: INF 1B



Summary for Pond INF 2B: INF 2B

Inflow Area	a =	25,908 sf, 87.4	45% Impervious, I	nflow Depth = 4.19"	for 10-year event
Inflow	=	2.82 cfs @ 12.0)7 hrs, Volume=	9,045 cf	
Outflow	=	1.49 cfs @ 12.1	9 hrs, Volume=	6,639 cf, Atter	n= 47%, Lag= 6.9 min
Primary	=	1.49 cfs @ 12.1	9 hrs, Volume=	6,639 cf	-

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 16.65' @ 12.19 hrs Surf.Area= 3,327 sf Storage= 3,987 cf

Plug-Flow detention time= 198.2 min calculated for 6,639 cf (73% of inflow) Center-of-Mass det. time= 111.0 min (884.2 - 773.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	14.80'	2,479 cf	25.25'W x 131.78'L x 3.50'H Field A
			11,646 cf Overall - 4,135 cf Embedded = 7,511 cf x 33.0% Voids
#2A	15.30'	4,135 cf	ADS_StormTech SC-740 +Cap x 90 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			5 Rows of 18 Chambers
		6,613 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	16.00'	12.0" Vert. Orifice/Grate	C= 0.600

Primary OutFlow Max=1.49 cfs @ 12.19 hrs HW=16.65' (Free Discharge) —1=Orifice/Grate (Orifice Controls 1.49 cfs @ 2.75 fps)

Pond INF 2B: INF 2B - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length) Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length 5 Rows x 51.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

90 Chambers x 45.9 cf = 4,134.6 cf Chamber Storage

11,645.8 cf Field - 4,134.6 cf Chambers = 7,511.2 cf Stone x 33.0% Voids = 2,478.7 cf Stone Storage

Chamber Storage + Stone Storage = 6,613.3 cf = 0.152 af Overall Storage Efficiency = 56.8% Overall System Size = 131.78' x 25.25' x 3.50'

90 Chambers 431.3 cy Field 278.2 cy Stone





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Pond INF 2B: INF 2B



Summary for Pond INF 2C: INF 2C

Inflow Area	a =	10,949 sf,	89.54% Impervious,	Inflow Depth = 4.3	30" for 10-year event
Inflow	=	1.21 cfs @	12.07 hrs, Volume=	3,924 cf	
Outflow	=	1.09 cfs @	12.11 hrs, Volume=	3,133 cf, A	Atten= 9%, Lag= 2.1 min
Primary	=	1.09 cfs @	12.11 hrs, Volume=	3,133 cf	-

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 16.14' @ 12.11 hrs Surf.Area= 810 sf Storage= 1,080 cf

Plug-Flow detention time= 144.8 min calculated for 3,133 cf (80% of inflow) Center-of-Mass det. time= 68.9 min (836.8 - 767.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	14.00'	633 cf	25.25'W x 32.10'L x 3.50'H Field A
			2,837 cf Overall - 919 cf Embedded = 1,918 cf x 33.0% Voids
#2A	14.50'	919 cf	ADS_StormTech SC-740 +Cap x 20 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			5 Rows of 4 Chambers
		1,552 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	15.60'	12.0" Vert. Orifice/Grate C= 0.600	

Primary OutFlow Max=1.09 cfs @ 12.11 hrs HW=16.14' (Free Discharge) —1=Orifice/Grate (Orifice Controls 1.09 cfs @ 2.51 fps)

Pond INF 2C: INF 2C - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length 5 Rows x 51.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

20 Chambers x 45.9 cf = 918.8 cf Chamber Storage

2,836.5 cf Field - 918.8 cf Chambers = 1,917.7 cf Stone x 33.0% Voids = 632.9 cf Stone Storage

Chamber Storage + Stone Storage = 1,551.7 cf = 0.036 afOverall Storage Efficiency = 54.7%Overall System Size = $32.10' \times 25.25' \times 3.50'$

20 Chambers 105.1 cy Field 71.0 cy Stone





Pond INF 2C: INF 2C

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Summary for Pond INF 4B: INF 4B

Inflow Area	a =	3,093 sf,	100.00% Impervious,	Inflow Depth = 4.64	4" for 10-year event
Inflow	=	0.35 cfs @	12.07 hrs, Volume=	1,197 cf	
Outflow	=	0.33 cfs @	12.10 hrs, Volume=	951 cf, A	tten= 7%, Lag= 1.8 min
Primary	=	0.33 cfs @	12.10 hrs, Volume=	951 cf	

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 20.28' @ 12.10 hrs Surf.Area= 379 sf Storage= 316 cf

Plug-Flow detention time= 156.2 min calculated for 951 cf (79% of inflow) Center-of-Mass det. time= 77.9 min (825.4 - 747.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	18.80'	316 cf	6.25'W x 60.58'L x 3.50'H Field A
			1,325 cf Overall - 368 cf Embedded = 958 cf x 33.0% Voids
#2A	19.30'	368 cf	ADS_StormTech SC-740 +Cap x 8 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		684 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	20.00'	12.0" Vert. Orifice/Grate C= 0.600	
Primary OutFlow Max=0.33 cfs @ 12.10 hrs HW=20.28' (Free Discharge) ←1=Orifice/Grate (Orifice Controls 0.33 cfs @ 1.80 fps)				

Pond INF 4B: INF 4B - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

8 Chambers x 45.9 cf = 367.5 cf Chamber Storage

1,325.1 cf Field - 367.5 cf Chambers = 957.6 cf Stone x 33.0% Voids = 316.0 cf Stone Storage

Chamber Storage + Stone Storage = 683.5 cf = 0.016 afOverall Storage Efficiency = 51.6%Overall System Size = $60.58' \times 6.25' \times 3.50'$

8 Chambers 49.1 cy Field 35.5 cy Stone





Pond INF 4B: INF 4B



Summary for Link DP-1: DP-1

Inflow A	Area	=	41,610 sf	, 89.22% Ir	mpervious,	Inflow Depth = 4.	.27" for 10)-year event
Inflow	=	=	4.50 cfs @	12.08 hrs,	Volume=	14,803 cf		
Primary	y =	=	4.50 cfs @	12.08 hrs,	Volume=	14,803 cf,	Atten= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-1: DP-1

Summary for Link DP-2: DP-2

Inflow A	Area =	=	130,715 sf	,81.71% Ir	mpervious,	Inflow Depth = 3.91	I" for 10-year event
Inflow	=		12.20 cfs @	12.08 hrs,	Volume=	42,541 cf	
Primary	y =		12.20 cfs @	12.08 hrs,	Volume=	42,541 cf, At	ten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-2: DP-2

Summary for Link DP-3: DP-3

Inflow A	Area =	21,351 sf	,86.08% Ir	npervious,	Inflow Depth = 4	.30" for 1	0-year event
Inflow	=	2.35 cfs @	12.07 hrs,	Volume=	7,652 cf		
Primary	y =	2.35 cfs @	12.07 hrs,	Volume=	7,652 cf,	Atten= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-3: DP-3

Summary for Link DP-4: DP-4

Inflow /	Area	=	33,026 sf	66.09% Ir	npervious,	Inflow Depth =	3.85"	for 10	-year event
Inflow	=	=	3.40 cfs @	12.07 hrs,	Volume=	10,594 c	f		
Primar	y =	=	3.40 cfs @	12.07 hrs,	Volume=	10,594 c	f, Atter	ר= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-4: DP-4



25-Year Storm Event- Proposed

Type III 24-hr 25-year Rainfall=6.01" Printed 5/23/2018

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Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points Runoff by SCS TR-20 method, UH=SCS, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1B: 1B	Runoff Area=8,063 sf 78.66% Impervious Runoff Depth=5.31" Tc=5.0 min CN=94 Runoff=1.10 cfs 3,566 cf
Subcatchment1C: 1C	Runoff Area=33,547 sf 91.76% Impervious Runoff Depth=5.65" Tc=5.0 min CN=97 Runoff=4.68 cfs 15,807 cf
Subcatchment2B: 2B	Runoff Area=25,908 sf 87.45% Impervious Runoff Depth=5.31" Tc=5.0 min CN=94 Runoff=3.52 cfs 11,457 cf
Subcatchment2C: 2C	Runoff Area=10,949 sf 89.54% Impervious Runoff Depth=5.42" Tc=5.0 min CN=95 Runoff=1.50 cfs 4,947 cf
Subcatchment2D: 2D	Runoff Area=93,858 sf 79.22% Impervious Runoff Depth=5.31" Tc=5.0 min CN=94 Runoff=12.76 cfs 41,505 cf
Subcatchment3A: 3A	Runoff Area=21,351 sf 86.08% Impervious Runoff Depth=5.42" Tc=5.0 min CN=95 Runoff=2.93 cfs 9,646 cf
Subcatchment4B: 4B	Runoff Area=3,093 sf 100.00% Impervious Runoff Depth=5.77" Tc=5.0 min CN=98 Runoff=0.43 cfs 1,488 cf
Subcatchment4C: 4C	Runoff Area=29,933 sf 62.58% Impervious Runoff Depth=4.97" Tc=5.0 min CN=91 Runoff=3.92 cfs 12,390 cf
Pond INF 1B: INF 1B	Peak Elev=17.92' Storage=924 cf Inflow=1.10 cfs 3,566 cf Outflow=1.00 cfs 2,896 cf
Pond INF 2B: INF 2B	Peak Elev=16.84' Storage=4,418 cf Inflow=3.52 cfs 11,457 cf Outflow=2.21 cfs 9,050 cf
Pond INF 2C: INF 2C	Peak Elev=16.22' Storage=1,118 cf Inflow=1.50 cfs 4,947 cf Outflow=1.38 cfs 4,155 cf
Pond INF 4B: INF 4B	Peak Elev=20.32' Storage=325 cf Inflow=0.43 cfs 1,488 cf Outflow=0.41 cfs 1,242 cf
Link DP-1: DP-1	Inflow=5.60 cfs 18,703 cf Primary=5.60 cfs 18,703 cf
Link DP-2: DP-2	Inflow=15.81 cfs 54,711 cf Primary=15.81 cfs 54,711 cf
Link DP-3: DP-3	Inflow=2.93 cfs 9,646 cf Primary=2.93 cfs 9,646 cf
Link DP-4: DP-4	Inflow=4.31 cfs 13,632 cf Primary=4.31 cfs 13,632 cf

Total Runoff Area = 226,702 sf Runoff Volume = 100,804 cf Average Runoff Depth = 5.34" 18.77% Pervious = 42,559 sf 81.23% Impervious = 184,143 sf

Summary for Subcatchment 1B: 1B

Runoff 1.10 cfs @ 12.07 hrs, Volume= 3,566 cf, Depth= 5.31" =



Summary for Subcatchment 1C: 1C

Runoff = 4.68 cfs @ 12.07 hrs, Volume= 15,807 cf, Depth= 5.65"

A	Area (sf)	CN D	escription								
30,784 98 Paved parking, HSG D											
	2,763 80 >75% Grass cover, Good, HSG D										
	33.547 97 Weighted Average										
	2,763	8	.24% Perv	vious Area							
	30,784	9	1.76% Imp	pervious Ar	rea						
Tc	Length	Slope	Velocity	Capacity	Description						
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)							
5.0					Direct Entry,						
Subatabrant 10:10											
	Subcatchment 1C: 1C										
				Hydro	ograph						
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5-			4.68 cfs								
					Type III 24-hr						
	- , , , , , , , , , , , , , , , , , , ,	+	 -+-+-	 + - ⊢ - - + - + -							
4-											
					Runoff Area=33,547 st						
		i i i i 			Runoff Volume=15,807 cf						
(sj : ^{3−}					Runoff Depth=5.65"						
3											
Flo											
2-					CN=97						
1-											
0-			funtantantan								
	0 1 2 3 4	56789	9 10 11 12 13 1	14 15 16 17 18 1 Tim	19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40						

Summary for Subcatchment 2B: 2B

Runoff = 3.52 cfs @ 12.07 hrs, Volume= 11,457 cf, Depth= 5.31"

22,657 98 Paved parking, HSG D 1,214 80 >75% Grass cover, Good, HSG D 2,037 61 >75% Grass cover, Good, HSG D 25,908 94 Weighted Average 3,251 12.55% Pervious Area 22,657 87.45% Impervious Area Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/scc) (cfs) 5.0 Direct Entry, Subcatchment 2B: 2B Hydrograph Type III 24-hr 25-year Rainfall=6.01" Runoff Area=25,908 sf Runoff Volume=11,457 cf 0 0 0 0 0 0 0 0 0 0 0 0 0		Area (sf)	CN I	Description							
1,214 80 >75% Grass cover, Good, HSG D 2,037 61 >75% Grass cover, Good, HSG B 25,908 94 Weighted Average 3,221 12.55% Pervious Area 22,657 87.45% Impervious Area Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 2B: 2B Hydrograph Type III 24-hr 25-year Rainfall=6.01" Runoff Area=25,908 sf Runoff Volume=11,457 cf Runoff Depth=5.31" Tc=5.0 min CN=94	-	22.657 98 Paved parking, HSG D									
2,037 61 >75% Grass cover, Good, HSG B 25,008 94 Weighted Average 3,251 12:55% Pervious Area 22,657 87.45% Impervious Area Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 2B: 2B Hydrograph Type III 24-hr 25-year Rainfall=6.01" Runoff Area=25,908 sf Runoff Volume=11,457 cf Runoff Depth=5.31" Tc=5.0 min CN=94 0 1 2 3 4 5 6 7 8 9 1011121314 (5 16 17 18 18 /2021 22 22 24 55 26 27 28 29 30 31 32 33 34 35 38 37 38 39 40 Tme them by		1,214	80 :	80 >75% Grass cover, Good, HSG D							
25,908 94 Weighted Average 3,251 12.55% Pervious Area 22,657 87.45% Impervious Area Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 2B: 2B Hydrograph Type III 24-hr 25-year Rainfall=6.01" Runoff Area=25,908 sf Runoff Volume=11,457 cf Runoff Depth=5.31" Tc=5.0 min CN=94 0 1 2 3 4 5 6 7 8 9 10111213141516 1710119202122 23 2452627 28 29 30 31 32 33 34 35 38 37 38 39 40 Tme (how) Tme (how)		2,037	61 3	>75% Gras	s cover, Go	bod, HSG B					
3,251 12.55% Pervious Area 22,657 87.45% Impervious Area Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 2B: 2B Hydrograph Type III 24-hr 25-year Rainfall=6.01" Runoff Area=25,908 sf Runoff Volume=11,457 cf Runoff Depth=5.31" Tc=5.0 min CN=94 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 16 19 20 21 22 32 24 25 26 27 28 29 30 31 32 33 24 35 36 37 38 39 40 Tme House		25,908	94	Neighted A	verage						
22,657 87.45% Impervious Area <u>Tc Length Slope Velocity Capacity Description</u> (tift) (tf/sec) (cfs) 5.0 Direct Entry, Subcatchment 2B: 2B Hydrograph Type III 24-hr 25-year Rainfall=6.01" Runoff Area=25,908 sf Runoff Volume=11,457 cf Runoff Depth=5.31" Tc=5.0 min CN=94 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 2021 22 32 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 Tme House		3,251		12.55% Pei	rvious Area	1					
Tc Length (feet) Slope Velocity (ft/sec) Capacity (cfs) Description 5.0 Direct Entry, Subcatchment 2B: 2B Type III 24-hr Of the second of the sec		22,657	8	37.45% Imp	pervious Ar	ea					
Tc Length Slope Velocity Capacity Description (min) (feet) (ft/ft) (ft/sec) (cfs) 5.0 Direct Entry, Subcatchment 2B: 2B Hydrograph Type III 24-hr 25-year Rainfall=6.01" Runoff Area=25,908 sf Runoff Volume=11,457 cf Runoff Depth=5.31" Tc=5.0 min CN=94 0 1 2 3 4 5 6 7 8 9 10111213141516 17 88 190221 22 23 24 55 80 27 88 394 35 38 37 38 394 0 The Market State											
(min) (teet) (t/t/t) (t//sec) (cfs) 5.0 Direct Entry, Subcatchment 2B: 2B Hydrograph Type III 24-hr 25-year Rainfall=6.01" Runoff Area=25,908 sf Runoff Volume=11,457 cf Runoff Depth=5.31" Tc=5.0 min CN=94 0 1 2 3 4 5 6 7 8 9 10111213141516 171819202122232425262728293031323334353637383940 Tme fourse	, T	c Length	Slope	Velocity	Capacity	Description					
5.0 Direct Entry, Subcatchment 2B: 2B Hydrograph Type III 24-hr 25-year Rainfall=6.01" Runoff Area=25,908 sf Runoff Volume=11,457 cf Runoff Depth=5.31" Tc=5.0 min CN=94 0 0 0 0 0 0 0 0 0 0 0 0 0	(mi	n) (feet)	(ft/ft)	(ft/sec)	(cts)						
Buckethment 2B: 2B Furgram	5	.0				Direct Entry,					
Subcatchment 2B: 2B Hydrograph Type III 24-hr 25-year Rainfall=6.01" Runoff Area=25,908 sf Runoff Volume=11,457 cf Runoff Depth=5.31" Tc=5.0 min CN=94 0 0 0 0 0 0 0 0 0 0 0 0 0					Cubaa	tobe and OD: OD					
(%) (%) (%) (%) (%) (%) (%) (%)		Subcatchment 2B: 2B									
(g) (g) (g) (g) (g) (g) (g) (g) (g) (g)					Hydro	ograph					
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 Time (hours)	Flow (cfs)	3 3 - - - - - - - - - - - - -				Type III 24-hr 25-year Rainfall=6.01" Runoff Area=25,908 sf Runoff Volume=11,457 cf Runoff Depth=5.31" Tc=5.0 min CN=94	Runoff				
		0 1 2 3 4	5678	9 10 11 12 13	14 15 16 17 18 1 Tim	9 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 e (hours)					

Summary for Subcatchment 2C: 2C

Runoff = 1.50 cfs @ 12.07 hrs, Volume= 4,947 cf, Depth= 5.42"

Area (st)	CN Description								
9,804	9.804 98 Paved parking, HSG D								
343	80 >75% Grass cover, Good, HSG D								
802	61 >75% Grass cover, Good, HSG B								
10,949	95 Weighted Average								
1,145	10.46% Pervious Area								
9,804	89.54% Impervious Area								
To Longth									
(min) (feet)	(ft/ft) (ft/sec) (cfs)								
5.0									
0.0	Direct Linty;								
	Subcatchment 2C: 2C								
	Hydrograph								
	Type III 24-hr 25-year Rainfall=6.01" Runoff Area=10,949 sf Runoff Volume=4,947 cf Runoff Depth=5.42" Tc=5.0 min CN=95	1							

Summary for Subcatchment 2D: 2D

Runoff = 12.76 cfs @ 12.07 hrs, Volume= 41,505 cf, Depth= 5.31"

Area (sf)	CN	Description						
74,350	98	Paved park	Paved parking, HSG D					
19,198	80	>75% Gras	s cover, Go	ood, HSG D				
310	61	>75% Gras	s cover, Go	ood, HSG B				
93,858	94	Weighted A	verage					
19,508		20.78% Per	vious Area	l				
74,350		79.22% Imp	pervious Are	ea				
Tc Length	Slop	e Velocity	Capacity	Description				
(min) (feet)	(ft/f	t) (ft/sec)	(cfs)					
5.0				Direct Entry,				
Subcatchment 2D: 2D								
Hydrograph								
12								



Summary for Subcatchment 3A: 3A

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Runoff 2.93 cfs @ 12.07 hrs, Volume= 9,646 cf, Depth= 5.42" =

	Area ((sf)	CN D	Description						
	18.380 98 Paved parking, HSG D									
	2,971 80 >75% Grass cover, Good, HSG D									
	21,351 95 Weighted Average									
	2,9	971	1	3.92% Per	vious Area	l				
	18,3	380	8	6.08% Imp	pervious Ar	ea				
	To ler	nath	Slope	Velocity	Canacity	Descripti	on			
(n	nin) (f	eet)	(ft/ft)	(ft/sec)	(cfs)	Decempt				
	5.0					Direct E	ntry,			
					Subca	itchmen	[3A: 3A	L .		
	4				Hydro	graph				_
										Runoff
	3-			2.93 cfs				T		
								тур		
							25-yea	ar Rain	fall=6.01"	
							Runof	f Area=	21,351 sf	
	2	- + - + -			$\begin{array}{cccccccccccccccccccccccccccccccccccc$	R	unoff \	Volume	=9.646 cf	_
(Is)						 - 	Dur		oth=5 12"	
<u> </u>							i nui		5011-5.42	
음									c=5.0 min	
			 				 T - T - T		CN=95	_
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	0									7
	0 1 2	3 4 5	5678	9 10 11 12 13 1	4 15 16 17 18 1 Tim	9 20 21 22 23 2 e (hours)	24 25 26 27 28	29 30 31 32 33	34 35 36 37 38 39 40	

Summary for Subcatchment 4B: 4B

Runoff = 0.43 cfs @ 12.07 hrs, Volume= 1,488 cf, Depth= 5.77"



Summary for Subcatchment 4C: 4C

Runoff = 3.92 cfs @ 12.07 hrs, Volume= 12,390 cf, Depth= 4.97"

	Area	a (sf)	CN D	escription						
	18.733 98 Paved parking, HSG D									
	11,200 80 >75% Grass cover, Good, HSG D									
	29,933 91 Weighted Average									
	11	,200	3	7.42% Pei	rvious Area	1				
	18	,733	6	2.58% Imp	pervious Ar	ea				
1	IC Le	ength	Slope	Velocity	Capacity	Description				
(m	in)	(teet)	(π/π)	(tt/sec)	(CIS)	-				
5	b .0					Direct Entry,				
	Subcatchment 4C: 4C									
	Hydrograph									
							Runoff			
	4			3.92 cfs						
						i ype iii 24-nr				
						25-year Rainfall=6.01"				
				 -+-+-		- $ -$				
	3-									
						Runoff Volume=12,390 cf				
(cfs)						Runoff Depth=4.97"				
Ň	2				+ + - + -	Tc=5.0 min				
ш						∩N+91				
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	1-{									
	0 1	2 3 4	5678	/////////////////////////////////////	/////////////////////////////////////	ՙՠՠՙՠՠՙՠՠֈՠՠֈՠՠֈՠՠֈՠ ֈՠֈՠֈՠֈՠֈՠֈՠֈՠֈՠֈՠֈ	I			
					Tim	e (hours)				

Summary for Pond INF 1B: INF 1B

Inflow Area	a =	8,063 sf,	78.66% Impervious,	Inflow Depth = 5	.31" for 25-year event
Inflow	=	1.10 cfs @	12.07 hrs, Volume=	3,566 cf	
Outflow	=	1.00 cfs @	12.10 hrs, Volume=	2,896 cf,	Atten= 9%, Lag= 2.1 min
Primary	=	1.00 cfs @	12.10 hrs, Volume=	2,896 cf	

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 17.92' @ 12.10 hrs Surf.Area= 745 sf Storage= 924 cf

Plug-Flow detention time= 138.6 min calculated for 2,896 cf (81% of inflow) Center-of-Mass det. time= 65.9 min (833.4 - 767.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	15.90'	587 cf	11.00'W x 67.70'L x 3.50'H Field A
			2,606 cf Overall - 827 cf Embedded = 1,779 cf x 33.0% Voids
#2A	16.40'	827 cf	ADS_StormTech SC-740 +Cap x 18 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			2 Rows of 9 Chambers
		1,414 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	17.40'	12.0" Vert. Orifice/Grate	C= 0.600

Primary OutFlow Max=1.00 cfs @ 12.10 hrs HW=17.91' (Free Discharge) —1=Orifice/Grate (Orifice Controls 1.00 cfs @ 2.44 fps)

Pond INF 1B: INF 1B - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

9 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 65.70' Row Length +12.0" End Stone x 2 = 67.70' Base Length 2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

18 Chambers x 45.9 cf = 826.9 cf Chamber Storage

2,606.3 cf Field - 826.9 cf Chambers = 1,779.4 cf Stone x 33.0% Voids = 587.2 cf Stone Storage

Chamber Storage + Stone Storage = 1,414.1 cf = 0.032 afOverall Storage Efficiency = 54.3%Overall System Size = $67.70' \times 11.00' \times 3.50'$

18 Chambers 96.5 cy Field 65.9 cy Stone



Pond INF 1B: INF 1B

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Summary for Pond INF 2B: INF 2B

Inflow Area	a =	25,908 sf,	87.45% Impervious	, Inflow Depth =	5.31"	for 25-y	/ear event
Inflow	=	3.52 cfs @	12.07 hrs, Volume=	11,457 c	f		
Outflow	=	2.21 cfs @	12.16 hrs, Volume=	9,050 c	f, Atten	ı= 37%,	Lag= 5.3 min
Primary	=	2.21 cfs @	12.16 hrs, Volume=	9,050 c	f		-

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 16.84' @ 12.16 hrs Surf.Area= 3,327 sf Storage= 4,418 cf

Plug-Flow detention time= 174.5 min calculated for 9,048 cf (79% of inflow) Center-of-Mass det. time= 97.2 min (864.8 - 767.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	14.80'	2,479 cf	25.25'W x 131.78'L x 3.50'H Field A
			11,646 cf Overall - 4,135 cf Embedded = 7,511 cf x 33.0% Voids
#2A	15.30'	4,135 cf	ADS_StormTech SC-740 +Cap x 90 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			5 Rows of 18 Chambers
		6,613 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	16.00'	12.0" Vert. Orifice/Grate	C= 0.600

Primary OutFlow Max=2.21 cfs @ 12.16 hrs HW=16.84' (Free Discharge) —1=Orifice/Grate (Orifice Controls 2.21 cfs @ 3.13 fps)

Pond INF 2B: INF 2B - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length) Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length 5 Rows x 51.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

90 Chambers x 45.9 cf = 4,134.6 cf Chamber Storage

11,645.8 cf Field - 4,134.6 cf Chambers = 7,511.2 cf Stone x 33.0% Voids = 2,478.7 cf Stone Storage

Chamber Storage + Stone Storage = 6,613.3 cf = 0.152 af Overall Storage Efficiency = 56.8% Overall System Size = 131.78' x 25.25' x 3.50'

90 Chambers 431.3 cy Field 278.2 cy Stone





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Pond INF 2B: INF 2B



Summary for Pond INF 2C: INF 2C

Inflow Area	a =	10,949 sf,	89.54% Impervious,	Inflow Depth = 5.4	2" for 25-year event
Inflow	=	1.50 cfs @	12.07 hrs, Volume=	4,947 cf	
Outflow	=	1.38 cfs @	12.10 hrs, Volume=	4,155 cf, A	Atten= 8%, Lag= 2.0 min
Primary	=	1.38 cfs @	12.10 hrs, Volume=	4,155 cf	-

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 16.22' @ 12.10 hrs Surf.Area= 810 sf Storage= 1,118 cf

Plug-Flow detention time= 128.6 min calculated for 4,154 cf (84% of inflow) Center-of-Mass det. time= 62.1 min (824.8 - 762.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	14.00'	633 cf	25.25'W x 32.10'L x 3.50'H Field A
			2,837 cf Overall - 919 cf Embedded = 1,918 cf x 33.0% Voids
#2A	14.50'	919 cf	ADS_StormTech SC-740 +Cap x 20 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			5 Rows of 4 Chambers
		1,552 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	15.60'	12.0" Vert. Orifice/Grate	C= 0.600

Primary OutFlow Max=1.38 cfs @ 12.10 hrs HW=16.22' (Free Discharge) 1=Orifice/Grate (Orifice Controls 1.38 cfs @ 2.68 fps)

Pond INF 2C: INF 2C - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length 5 Rows x 51.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

20 Chambers x 45.9 cf = 918.8 cf Chamber Storage

2,836.5 cf Field - 918.8 cf Chambers = 1,917.7 cf Stone x 33.0% Voids = 632.9 cf Stone Storage

Chamber Storage + Stone Storage = 1,551.7 cf = 0.036 afOverall Storage Efficiency = 54.7%Overall System Size = $32.10' \times 25.25' \times 3.50'$

20 Chambers 105.1 cy Field 71.0 cy Stone




Pond INF 2C: INF 2C

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Summary for Pond INF 4B: INF 4B

Inflow Area	a =	3,093 sf,	,100.00% Impervious,	Inflow Depth = 5.	77" for 25-year event
Inflow	=	0.43 cfs @	12.07 hrs, Volume=	1,488 cf	
Outflow	=	0.41 cfs @	12.10 hrs, Volume=	1,242 cf, <i>i</i>	Atten= 6%, Lag= 1.6 min
Primary	=	0.41 cfs @	12.10 hrs, Volume=	1,242 cf	-

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 20.32' @ 12.10 hrs Surf.Area= 379 sf Storage= 325 cf

Plug-Flow detention time= 139.6 min calculated for 1,242 cf (83% of inflow) Center-of-Mass det. time= 70.2 min (814.4 - 744.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	18.80'	316 cf	6.25'W x 60.58'L x 3.50'H Field A
			1,325 cf Overall - 368 cf Embedded = 958 cf x 33.0% Voids
#2A	19.30'	368 cf	ADS_StormTech SC-740 +Cap x 8 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		684 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	20.00'	12.0" Vert. Orifice/Grate C= 0.600
Primary		Max=0.41 cfs@	0 12.10 hrs HW=20.32' (Free Discharge)

1=Orifice/Grate (Orifice Controls 0.41 cfs @ 1.91 fps)

Pond INF 4B: INF 4B - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

8 Chambers x 45.9 cf = 367.5 cf Chamber Storage

1,325.1 cf Field - 367.5 cf Chambers = 957.6 cf Stone x 33.0% Voids = 316.0 cf Stone Storage

Chamber Storage + Stone Storage = 683.5 cf = 0.016 af Overall Storage Efficiency = 51.6% Overall System Size = 60.58' x 6.25' x 3.50'

8 Chambers 49.1 cy Field 35.5 cy Stone





Pond INF 4B: INF 4B



Summary for Link DP-1: DP-1

Inflow A	\rea =	41,610 sf, 89.22% Impervious,	Inflow Depth = 5.39"	for 25-year event
Inflow	=	5.60 cfs @ 12.07 hrs, Volume=	18,703 cf	
Primary	/ =	5.60 cfs @ 12.07 hrs, Volume=	18,703 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-1: DP-1

Summary for Link DP-2: DP-2

Inflow A	Area	=	130,715 sf,	, 81.71% Imp	pervious,	Inflow Depth =	5.02"	for 25-year ever	nt
Inflow	=	=	15.81 cfs @	12.08 hrs, V	/olume=	54,711 c	f		
Primary	y =	=	15.81 cfs @	12.08 hrs, V	/olume=	54,711 c	f, Atter	n= 0%, Lag= 0.0 r	min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-2: DP-2

Summary for Link DP-3: DP-3

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Inflow A	Area =	=	21,351 sf	,86.08% Ir	mpervious,	Inflow Depth =	5.42	" for 25-year event
Inflow	=		2.93 cfs @	12.07 hrs,	Volume=	9,646 c	f	
Primary	/ =		2.93 cfs @	12.07 hrs,	Volume=	9,646 c	f, Att	en= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-3: DP-3

Summary for Link DP-4: DP-4

Inflow A	Area =	33,026 sf, 66.09% Impervious,	Inflow Depth = 4.95"	for 25-year event
Inflow	=	4.31 cfs @ 12.07 hrs, Volume=	13,632 cf	
Primary	y =	4.31 cfs @ 12.07 hrs, Volume=	13,632 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-4: DP-4



100-Year Storm Event – Proposed

HydroCAD® 10.00-19 s/n 01038 © 2016 HydroCAD Software Solutions LLC

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points Runoff by SCS TR-20 method, UH=SCS, Weighted-CN Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1B: 1B	Runoff Area=8,063 sf 78.66% Impervious Runoff Depth=7.03" Tc=5.0 min CN=94 Runoff=1.43 cfs 4,726 cf
Subcatchment1C: 1C	Runoff Area=33,547 sf 91.76% Impervious Runoff Depth=7.39" Tc=5.0 min CN=97 Runoff=6.05 cfs 20,662 cf
Subcatchment2B: 2B	Runoff Area=25,908 sf 87.45% Impervious Runoff Depth=7.03" Tc=5.0 min CN=94 Runoff=4.60 cfs 15,185 cf
Subcatchment2C: 2C	Runoff Area=10,949 sf 89.54% Impervious Runoff Depth=7.15" Tc=5.0 min CN=95 Runoff=1.96 cfs 6,526 cf
Subcatchment2D: 2D	Runoff Area=93,858 sf 79.22% Impervious Runoff Depth=7.03" Tc=5.0 min CN=94 Runoff=16.66 cfs 55,011 cf
Subcatchment3A: 3A	Runoff Area=21,351 sf 86.08% Impervious Runoff Depth=7.15" Tc=5.0 min CN=95 Runoff=3.81 cfs 12,726 cf
Subcatchment4B: 4B	Runoff Area=3,093 sf 100.00% Impervious Runoff Depth=7.51" Tc=5.0 min CN=98 Runoff=0.56 cfs 1,936 cf
Subcatchment4C: 4C	Runoff Area=29,933 sf 62.58% Impervious Runoff Depth=6.68" Tc=5.0 min CN=91 Runoff=5.18 cfs 16,657 cf
Pond INF 1B: INF 1B	Peak Elev=18.01' Storage=966 cf Inflow=1.43 cfs 4,726 cf Outflow=1.32 cfs 4,057 cf
Pond INF 2B: INF 2B	Peak Elev=17.09' Storage=4,931 cf Inflow=4.60 cfs 15,185 cf Outflow=2.90 cfs 12,778 cf
Pond INF 2C: INF 2C	Peak Elev=16.34' Storage=1,173 cf Inflow=1.96 cfs 6,526 cf Outflow=1.81 cfs 5,735 cf
Pond INF 4B: INF 4B	Peak Elev=20.36' Storage=337 cf Inflow=0.56 cfs 1,936 cf Outflow=0.53 cfs 1,690 cf
Link DP-1: DP-1	Inflow=7.29 cfs 24,718 cf Primary=7.29 cfs 24,718 cf
Link DP-2: DP-2	Inflow=20.85 cfs 73,524 cf Primary=20.85 cfs 73,524 cf
Link DP-3: DP-3	Inflow=3.81 cfs 12,726 cf Primary=3.81 cfs 12,726 cf
Link DP-4: DP-4	Inflow=5.69 cfs 18,347 cf Primary=5.69 cfs 18,347 cf

Total Runoff Area = 226,702 sf Runoff Volume = 133,428 cf Average Runoff Depth = 7.06" 18.77% Pervious = 42,559 sf 81.23% Impervious = 184,143 sf

Summary for Subcatchment 1B: 1B

Runoff 1.43 cfs @ 12.07 hrs, Volume= 4,726 cf, Depth= 7.03" =

Area (sf)	CN Description	
6,342	98 Paved parking, HSG D	
8,063 1,721 6,342	94 Weighted Average 21.34% Pervious Area 78.66% Impervious Area	
Tc Length (min) (feet)	h Slope Velocity Capacity Description t) (ft/ft) (ft/sec) (cfs)	
5.0	Direct Entry,	
	Subcatchment 1B: 1B	
	Hydrograph	
Elow (cts)	Type III 24-hr 100-year Rainfall=7.75" Runoff Area=8,063 sf Runoff Volume=4,726 cf Runoff Depth=7.03" Tc=5.0 min CN=94	Runoff

Summary for Subcatchment 1C: 1C

Runoff = 6.05 cfs @ 12.07 hrs, Volume= 20,662 cf, Depth= 7.39"

	A	ea (sf)	CN	Description			
		30,784	98	Paved park	ing, HSG D		
		2,763	80	>75% Ġras	s cover, Go	ood, HSG D	
		33,547	97	Weighted A	verage		
		2,763		8.24% Perv	vious Area		
		30,784		91.76% lm	pervious Ar	rea	
	-				o ''		
(m	IC in)	Lengtr	1 SIOP		Capacity	Description	
	5 0	(leet) (171	t) (li/sec)	(CIS)	Direct Entry	
;	5.0					Direct Entry,	
					Subca	atchment 1C: 1C	
					Hydro	ograph	
	ſ						Runoff
				└── └── └── <mark>6.05 cfs</mark>			
	6-1					i ype iii 24-nr	
			+ -		+ - + - + -	100-year Rainfall=7.75"	
	5-					Runoff Area=33 547 sf	
	-						
-	4-				$T - \Gamma - 1 - T - T - T - T - T - T - T - T - T$		
(cfs)	-					Runoff Depth=7.39"	
Ň		/ -!- <u>-</u> -			$\frac{1}{1}$ $ \frac{1}{1}$ $ \frac{1}{1}$ $ \frac{1}{1}$ $ \frac{1}{1}$ $ \frac{1}{1}$ $-$	Tc=5.0 min	
Ē	3-1					CN-07	
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					Tim	ne (hours)	

Summary for Subcatchment 2B: 2B

Runoff = 4.60 cfs @ 12.07 hrs, Volume= 15,185 cf, Depth= 7.03"

	Area (sf)	CN I	Description								
	22,657	98	Paved park	ing, HSG D							
	1,214	80 >	80 >75% Grass cover, Good, HSG D								
	2,037	61 >	>75% Gras	s cover, Go	ood, HSG B						
	25,908	94 \	Weighted A	verage							
	3,251		12.55% Pe	rvious Area	a						
	22,657	8	87.45% Imp	pervious Ar	rea						
	To Longth		Velocity	Capacity	Description						
(r	nin) (feet)	(ft/ft)	(ft/sec)	(cfs)	Description						
	5.0	(10,10)	(10000)	(010)	Direct Entry.						
					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						
				Subca	atchment 2B: 2B						
				Hydro	ograph						
		+ +	- -+-+- +-	+ + - + -							
	5-					Runoff					
	-		4.00 CIS		Type III 24-hr						
					100 yoar Painfall-7 75"						
	4-1			1 1 1 1 1 1 1 1 1		.					
					Runoff Area=25,908 st						
			i i i +	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Runoff Volume=15,185 cf						
(sj	3				Runoff Denth=7.03"						
j v											
Flov					IC=5.0 min						
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					· · ·						

Summary for Subcatchment 2C: 2C

Runoff = 1.96 cfs @ 12.07 hrs, Volume= 6,526 cf, Depth= 7.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Type III 24-hr 100-year Rainfall=7.75"

Area (sf)	CN D	escription							
9,804	98 P	aved park	ing, HSG D)					
343	343 80 >75% Grass cover, Good, HSG D								
802	61 >	75% Gras	s cover, Go	ood, HSG B					
10,949	95 W	Veighted A	verage						
1,145	1	0.46% Pei	rvious Area	l					
9,804	8	9.54% Imp	pervious Ar	ea					
Tc Length	Slope	Velocity	Capacity	Description					
(min) (feet)	(ft/̈ft)	(ft/sec)	(cfs)	•					
5.0				Direct Entry,					
			Subca	tchment 2C	: 2C				
			Hydro	graph					
						Runoff			
2-2		1.96 cfs			Type III 24-hr				
				100	vear Rainfall=7.75"				
				Ru	noff Area=10 949 sf				
				Runc	DTT VOIUME=6,526 CT				
(cts)					Runoff Depth=7.15"				
	+		+ + - + - + - + - + - + - + - +		Tc=5.0 min				
					CN-95				
					GN-33				
			Think						

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 Time (hours)

0-

Summary for Subcatchment 2D: 2D

Runoff = 16.66 cfs @ 12.07 hrs, Volume= 55,011 cf, Depth= 7.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Type III 24-hr 100-year Rainfall=7.75"

Area (st	f) CN	Description		
74,35	0 98	Paved park	ing, HSG D	D
19,19	8 80	>75% Gras	s cover, Go	iood, HSG D
31	0 61	>75% Gras	s cover, Go	ood, HSG B
93,85	8 94	Weighted A	verage	
19,50	8	20.78% Pe	rvious Area	a
74,35	0	79.22% Imp	pervious Ar	rea
Tc Leng	jth Slop	be Velocity	Capacity	Description
(min) (fee	et) (ft/	ft) (ft/sec)	(cfs)	
5.0				Direct Entry,
				-

Subcatchment 2D: 2D



Summary for Subcatchment 3A: 3A

Runoff = 3.81 cfs @ 12.07 hrs, Volume= 12,726 cf, Depth= 7.15"

	Area (sf)	CN D	escription					
	18,380	380 98 Paved parking, HSG D						
	2,971	<u>80 ></u>	<u>75% Gras</u>	s cover, Go	ood, HSG D			
	21,351	95 1	3.92% Per	verage vious Area	a			
	18,380	8	6.08% Imp	ervious Ar	rea			
T (mir	c Length	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description			
5.	ý <u>, , , , ,</u> O				Direct Entry,			
				Orchar				
				Subca	atchment 3A: 3A			
				Hydro	ograph			
						Runoff		
	4-*		3.81 cfs		Type III 24 br			
					100-year Rainfail=7.75			
	3				Runoff Area=21,351 sf			
					Runoff Volume=12,726 cf			
(cfs)					Runoff Depth=7.15"			
Ň	2-1				Tc=5.0 min			
Ш.					CN=95			
		$-\frac{1}{1}$ $-\frac{1}{1}$		$\frac{1}{1} - \frac{1}{1} - \frac{1}{1} - \frac{1}{1} - \frac{1}{1} - \frac{1}{1} - \frac{1}{1} - \frac{1}{1}$				
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Summary for Subcatchment 4B: 4B

Runoff = 0.56 cfs @ 12.07 hrs, Volume= 1,936 cf, Depth= 7.51"



Summary for Subcatchment 4C: 4C

Runoff = 5.18 cfs @ 12.07 hrs, Volume= 16,657 cf, Depth= 6.68"

	Ar	rea (sf)	CN E	Description				
	18.733 98 Paved parking, HSG D							
		11,200	80 >	•75% Ġras	s cover, Go	ood, HSG D		
		29,933	91 V	Veighted A	verage			
		11,200	3	87.42% Pe	rvious Area	l i i i i i i i i i i i i i i i i i i i		
		18,733	6	52.58% Imp	pervious Ar	ea		
	т.	1	01	Mala sites	0	Decemination		
(m	IC in)	(feet)	Siope			Description		
	<u>)</u>	(ieet)	(1011)	(10/500)	(015)	Direct Entry		
	0.0					Direct Lintry,		
					Subca	tchment 4C	: 4C	
					Hydro	ograph		
	ſ					1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Runoff
	-			- - + - +				
	5-							
	-					100)-year Rainfall=7.75"	
		/ -i- + - +		-i- + - + -	+ + - + -	R	unoff Area=29,933 sf	
	4					Rund	off Volume=16 657 cf	
â	-							
(cfs	3-						Runon Deptn=6.68	
No.	-						Tc=5.0 min	
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					I IM	e (nours)		

Summary for Pond INF 1B: INF 1B

Inflow Area	a =	8,063 sf,	78.66% Impervious,	Inflow Depth = 7.	03" for 100-year event
Inflow	=	1.43 cfs @	12.07 hrs, Volume=	4,726 cf	
Outflow	=	1.32 cfs @	12.10 hrs, Volume=	4,057 cf,	Atten= 8%, Lag= 1.9 min
Primary	=	1.32 cfs @	12.10 hrs, Volume=	4,057 cf	

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 18.01' @ 12.10 hrs Surf.Area= 745 sf Storage= 966 cf

Plug-Flow detention time= 119.9 min calculated for 4,056 cf (86% of inflow) Center-of-Mass det. time= 58.1 min (819.3 - 761.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	15.90'	587 cf	11.00'W x 67.70'L x 3.50'H Field A
			2,606 cf Overall - 827 cf Embedded = 1,779 cf x 33.0% Voids
#2A	16.40'	827 cf	ADS_StormTech SC-740 +Cap x 18 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			2 Rows of 9 Chambers
		1,414 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	17.40'	12.0" Vert. Orifice/Grate	C= 0.600

Primary OutFlow Max=1.32 cfs @ 12.10 hrs HW=18.01' (Free Discharge) —1=Orifice/Grate (Orifice Controls 1.32 cfs @ 2.65 fps)

Pond INF 1B: INF 1B - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

9 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 65.70' Row Length +12.0" End Stone x 2 = 67.70' Base Length 2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

18 Chambers x 45.9 cf = 826.9 cf Chamber Storage

2,606.3 cf Field - 826.9 cf Chambers = 1,779.4 cf Stone x 33.0% Voids = 587.2 cf Stone Storage

Chamber Storage + Stone Storage = 1,414.1 cf = 0.032 afOverall Storage Efficiency = 54.3%Overall System Size = $67.70' \times 11.00' \times 3.50'$

18 Chambers 96.5 cy Field 65.9 cy Stone



Pond INF 1B: INF 1B

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Summary for Pond INF 2B: INF 2B

Inflow Area	a =	25,908 sf, 87.45% Impervious,	Inflow Depth = 7.03" for 100-year event
Inflow	=	4.60 cfs @ 12.07 hrs, Volume=	15,185 cf
Outflow	=	2.90 cfs @ 12.16 hrs, Volume=	12,778 cf, Atten= 37%, Lag= 5.2 min
Primary	=	2.90 cfs @ 12.16 hrs, Volume=	12,778 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 17.09' @ 12.16 hrs Surf.Area= 3,327 sf Storage= 4,931 cf

Plug-Flow detention time= 151.6 min calculated for 12,778 cf (84% of inflow) Center-of-Mass det. time= 85.2 min (846.4 - 761.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	14.80'	2,479 cf	25.25'W x 131.78'L x 3.50'H Field A
			11,646 cf Overall - 4,135 cf Embedded = 7,511 cf x 33.0% Voids
#2A	15.30'	4,135 cf	ADS_StormTech SC-740 +Cap x 90 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
			5 Rows of 18 Chambers
		6,613 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	16.00'	12.0" Vert. Orifice/Grate	C= 0.600

Primary OutFlow Max=2.90 cfs @ 12.16 hrs HW=17.09' (Free Discharge) —1=Orifice/Grate (Orifice Controls 2.90 cfs @ 3.69 fps)

Pond INF 2B: INF 2B - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

18 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 129.78' Row Length +12.0" End Stone x 2 = 131.78' Base Length 5 Rows x 51.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

90 Chambers x 45.9 cf = 4,134.6 cf Chamber Storage

11,645.8 cf Field - 4,134.6 cf Chambers = 7,511.2 cf Stone x 33.0% Voids = 2,478.7 cf Stone Storage

Chamber Storage + Stone Storage = 6,613.3 cf = 0.152 af Overall Storage Efficiency = 56.8% Overall System Size = 131.78' x 25.25' x 3.50'

90 Chambers 431.3 cy Field 278.2 cy Stone





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Pond INF 2B: INF 2B



Summary for Pond INF 2C: INF 2C

Inflow Area	a =	10,949 sf,	89.54% Impervious,	Inflow Depth = 7	.15" fo	or 100-year event
Inflow	=	1.96 cfs @	12.07 hrs, Volume=	6,526 cf		
Outflow	=	1.81 cfs @	12.10 hrs, Volume=	5,735 cf,	Atten=	7%, Lag= 1.8 min
Primary	=	1.81 cfs @	12.10 hrs, Volume=	5,735 cf		-

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 16.34' @ 12.10 hrs Surf.Area= 810 sf Storage= 1,173 cf

Plug-Flow detention time= 110.8 min calculated for 5,733 cf (88% of inflow) Center-of-Mass det. time= 54.6 min (811.4 - 756.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	14.00'	633 cf	25.25'W x 32.10'L x 3.50'H Field A 2,837 cf Overall - 919 cf Embedded = 1,918 cf x 33.0% Voids
#2A	14.50'	919 cf	ADS_StormTech SC-740 +Cap x 20 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 5 Rows of 4 Chambers
		1,552 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices	
#1	Primary	15.60'	12.0" Vert. Orifice/Grate	C= 0.600

Primary OutFlow Max=1.81 cfs @ 12.10 hrs HW=16.34' (Free Discharge) —1=Orifice/Grate (Orifice Controls 1.81 cfs @ 2.92 fps)

Pond INF 2C: INF 2C - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

4 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 30.10' Row Length +12.0" End Stone x 2 = 32.10' Base Length 5 Rows x 51.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 25.25' Base Width 6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

20 Chambers x 45.9 cf = 918.8 cf Chamber Storage

2,836.5 cf Field - 918.8 cf Chambers = 1,917.7 cf Stone x 33.0% Voids = 632.9 cf Stone Storage

Chamber Storage + Stone Storage = 1,551.7 cf = 0.036 afOverall Storage Efficiency = 54.7%Overall System Size = $32.10' \times 25.25' \times 3.50'$

20 Chambers 105.1 cy Field 71.0 cy Stone





Pond INF 2C: INF 2C

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Summary for Pond INF 4B: INF 4B

Inflow Area	a =	3,093 sf,	100.00% Imper	rvious, Inflo	w Depth =	7.51"	for 10	0-year event
Inflow	=	0.56 cfs @	12.07 hrs, Vol	lume=	1,936 cf	-		
Outflow	=	0.53 cfs @	12.09 hrs, Vol	lume=	1,690 cf	, Atten	= 5%,	Lag= 1.5 min
Primary	=	0.53 cfs @	12.09 hrs, Vol	lume=	1,690 cf	-		-

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs Peak Elev= 20.36' @ 12.09 hrs Surf.Area= 379 sf Storage= 337 cf

Plug-Flow detention time= 120.5 min calculated for 1,690 cf (87% of inflow) Center-of-Mass det. time= 61.3 min (802.0 - 740.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	18.80'	316 cf	6.25'W x 60.58'L x 3.50'H Field A
			1,325 cf Overall - 368 cf Embedded = 958 cf x 33.0% Voids
#2A	19.30'	368 cf	ADS_StormTech SC-740 +Cap x 8 Inside #1
			Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf
			Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		684 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	20.00'	12.0" Vert. Orifice/Grate C= 0.600
Primary	OutFlow M	lax=0.53 cfs @ (Orifice Contro) 12.09 hrs HW=20.36' (Free Discharge) ls 0.53 cfs @ 2.05 fps)

Pond INF 4B: INF 4B - Chamber Wizard Field A

Chamber Model = ADS_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

8 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 58.58' Row Length +12.0" End Stone x 2 = 60.58' Base Length
1 Rows x 51.0" Wide + 12.0" Side Stone x 2 = 6.25' Base Width
6.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.50' Field Height

8 Chambers x 45.9 cf = 367.5 cf Chamber Storage

1,325.1 cf Field - 367.5 cf Chambers = 957.6 cf Stone x 33.0% Voids = 316.0 cf Stone Storage

Chamber Storage + Stone Storage = 683.5 cf = 0.016 afOverall Storage Efficiency = 51.6%Overall System Size = $60.58' \times 6.25' \times 3.50'$

8 Chambers 49.1 cy Field 35.5 cy Stone





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Pond INF 4B: INF 4B



Summary for Link DP-1: DP-1

Inflow A	Area =	41,610 sf, 89.22% Impervious,	Inflow Depth = 7.13"	for 100-year event
Inflow	=	7.29 cfs @ 12.07 hrs, Volume=	24,718 cf	
Primary	/ =	7.29 cfs @ 12.07 hrs, Volume=	24,718 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-1: DP-1

Summary for Link DP-2: DP-2

Inflow A	Area =	130,715 sf, 81.71% Impervious,	Inflow Depth = 6.75"	for 100-year event
Inflow	=	20.85 cfs @ 12.08 hrs, Volume=	73,524 cf	
Primar	y =	20.85 cfs @ 12.08 hrs, Volume=	73,524 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link DP-2: DP-2



Summary for Link DP-3: DP-3

Inflow A	rea =	21,351 sf, 86.08% Impervious,	Inflow Depth = 7.15" for 1	100-year event
Inflow	=	3.81 cfs @ 12.07 hrs, Volume=	12,726 cf	
Primary		3.81 cfs @ 12.07 hrs, Volume=	12,726 cf, Atten= 0%	, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-3: DP-3

Summary for Link DP-4: DP-4

Inflow A	\rea =	33,026 sf, 66.09% Impervious,	Inflow Depth = 6.67"	for 100-year event
Inflow	=	5.69 cfs @ 12.07 hrs, Volume=	18,347 cf	
Primary	/ =	5.69 cfs @ 12.07 hrs, Volume=	18,347 cf, Atter	n= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs



Link DP-4: DP-4


StormCAD Table (Hydraulic Spreadsheet)

Scenario: Base



Proposed StormCAD.stsw 5/24/2018

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FlexTable: Conduit Table

Label	Start Node	Stop Node	Elevation Ground (Start) (ft)	Hydraulic Grade Line (In) (ft)	Invert (Start) (ft)	Elevation Ground (Stop) (ft)	Hydraulic Grade Line (Out) (ft)	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Section Type	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)
1B	CB-CL 1	EX CB 1 (DP-1)	20.40	17.89	17.40	18.15	15.81	15.40	182.0	0.011	Circle	12.0	0.013	1.32	4.34	3.73	35.3
2B	DCB-CL 2	EX CB 2	18.50	16.92	16.00	18.55	16.13	15.40	110.0	0.005	Circle	12.0	0.013	2.90	3.69	2.63	110.2
2C OUT	INF 2C	DMH 3 (DP-2)	18.40	16.17	15.60	19.10	15.00	14.50	110.0	0.010	Circle	12.0	0.013	1.81	4.56	3.56	50.8
4B	CB 6	EX CB 6 (DP-4)	23.20	20.30	20.00	19.00	16.29	16.10	99.0	0.039	Circle	12.0	0.013	0.53	5.28	7.07	7.5

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