Memorandum

To: Town of Pembroke
Planning Board

Date: November 15, 2018

Project #: 14239.00

From: Kenneth Staffier, PE
Arianna Goss, PE

Re: Proposed Urgent Care Facility
Stormwater Management Memorandum

On behalf of D and C Real Estate Trust CTS Fiduciary LLC Trustee (the Applicant), VHB respectfully submits the following Stormwater Management Memorandum, to support the Site Plan Approval application and Site Plans prepared by VHB titled "Proposed Urgent Care Facility" dated November 15, 2018 (the "Project") located at 296 Old Oak Street in Pembroke, MA (the "Site").

Project Summary

Currently, the Site is comprised of an existing 11,250-square-foot footprint retail building and associated paved parking, loading areas, utilities (water, septic system, gas and electric), several leaching catch basins and a stormwater detention basin. The majority of the site is impervious with limited landscaping provided within the paved areas. Specifically, the existing site is comprised of 9.3% roofs ("clean" runoff), 67% impervious surfaces (e.g. pavement, concrete walkways, loading areas, etc.) with little to no treatment, and 23.7% pervious (landscaped) areas.

The proposed Project is a redevelopment of this existing site. The Project proposes to construct a 5,230-square-foot urgent care facility in the northeastern portion of the site, which will replace some of the existing pavement and will require the removal of the existing detention basin in this area. The Project also includes the construction of a new load dock area for the existing retail building that will remain. The northeast portion of the Site will be redeveloped with a new parking layout and new landscaped areas to accommodate the proposed building.

The existing front parking lot will also be improved as part of the Project; landscaped islands will be constructed, and the parking lot will be resurfaced. The rear parking lot will not be altered as part of the Project. The Project will decrease paved surface areas by approximately 9,700 sf and will add approximately 3,200 sf of pervious area. The table below summarizes the change in cover types resulting from the Project:

Table 1

Summary of Existing and Proposed Cover Types

Project Area	*Existing Conditions (% of Total Lot Area)*	*Proposed Conditions (% of Total Lot Area)*
Roof Area	9 %	15 %
Pavement Area	67 %	59 %
Pervious Area	24 %	26 %

11/19/2018

Existing Stormwater Conditions

The existing stormwater management system is comprised of four (4) leaching catch basins and a detention pond. Stormwater runoff from the site flows to the five Design Points listed below. Figure 1 shows the existing drainage patterns at the site.

Summary of Design Points and their Tributary Drainage Areas

- DP-1: The northwest portion of the Site drains to a leaching catch basin in the rear parking lot which provides for infiltration.
- DP-2: The southwest corner of the site drains offsite towards a drainage swale adjacent to Route 3.
- DP-3: The central and southern portions of the front parking lot drain to three (3) interconnected leaching catch basins. Overflow from the leaching basins is piped to the drainage system in Old Oak Street.
- DP-4: The northeastern portion of parking lot drains to a detention pond from which the discharge enters a headwall inlet at the corner of Old Oak Street and Church Street and is then piped to the Town drainage system.
- DP-5: The southwest corner and eastern edge of the site of the Site drain offsite towards Old Oak Street.

Proposed Stormwater Conditions

The Project will not impact the existing drainage areas tributary to Design Points DP-1, DP-2 and DP-5, therefore, changes to the existing stormwater management in these areas has not been proposed. The existing leaching catchbasins tributary to DP-3 will be replaced with a new infiltration system (System P2) that replicates the infiltration capacity of the three (3) existing leaching catchbasin, but with improved water quality prior to discharge to the groundwater. The drainage area tributary to DP-4 is significantly impacted by the proposed Project, thus a new stormwater management system for this drainage area is proposed. Below is a summary of the changes to each of the drainage areas. Figure 2 shows the proposed drainage patterns.

Summary of Changes to Design Points and their Tributary Drainage Areas

- DP-1: The northwest portion of the Site will not be altered as part of the Project. This area will continue to drain to the leaching catch basin in the rear parking lot.
- DP-2: The southwest corner of the site will continue to drain offsite towards the ditch adjacent to Route 3 under post-development conditions. Redevelopment in this portion of the site will slightly increase the drainage area to this design point by about 150 sf. This increase is considered de minimis as it does not result in a change in peak flow rates to this design point.
- DP-3: The central and southern portions of the front parking lot will continue to drain westerly toward Old Oak Street. Redevelopment in this portion of the site will decrease the drainage area to this design point by about 6,000 sf and will increase pervious (landscaped) areas. The three (3) existing leaching catch basins will be replaced with three (3) new catchbasins (with deep sumps and hoods) and a new

subsurface infiltration system (System P2) comprised of 24 Stormtech (SC740) chambers with an isolator row to capture sediment in the stormwater. This system has been designed to replicate the infiltration volume of the existing leaching basins and to treat the first one inch (1") of runoff generated from the paved parking lot. The overflow from the infiltration system will continue to be piped to the drainage system in Old Oak Street. Peak flow rates to DP-3 are decreased under the proposed conditions.

- DP-4: While the Project proposes to redevelop the northeastern portion of the Site, it will continue to drain to the Town drainage system at the corner of Old Oak Street and Church Street.

  Runoff generated in the proposed truck dock area at the existing building and from the proposed parking lot for the urgent care facility will be captured in catchbasins with deep sumps and hoods and directed to a subsurface infiltration system (System P3) comprised of 18 Stormtech (SC740) chambers with an isolator row to capture sediment in the stormwater. This system has been designed to treat the first one inch (1") of runoff generated from the paved parking surfaces. The overflow from this infiltration system will be piped to the northeast to the existing headwall drain pipe that discharges into the drain system at the corner of Old Oak Street and Church Street. The headwall inlet will be replaced with a drain manhole structure.

  The stormwater runoff from the proposed 5,230 SF urgent care building roof will be directed to a separate subsurface infiltration system (System P1) comprised of 21 Stormtech (SC740) chambers. Because stormwater runoff from roofs does not require treatment, the system does not include an isolator row. Outflow from the roof infiltration system will be piped to the proposed drain manhole at the location of the existing headwall at the corner of Old Oak Street and Church Street.

- DP-5: The southwest corner and eastern edge of the Site will continue to drain offsite towards Old Oak Street under post-development conditions. Redevelopment in this portion of the site will increase the drainage area to this design point by about 1000 sf, but will increase pervious area, thus resulting in lower peak flow rates to this design point.

Stormwater Management Standards

As demonstrated below, the proposed Project complies with the Massachusetts Department of Environmental Protection Stormwater Management Standards.

- **Standard 1**: No New Untreated Discharges or Erosion to Wetlands

  The Project does not propose any new stormwater discharges and therefore complies with Standard 1.

- **Standard 2:** Peak Rate Attenuation

  The following table demonstrates the peak flow rates for the 2-, 10-, 50- and 100-year storms under existing and proposed conditions. The proposed project will decrease the peak flow rates for all storms and design points except for the 2- and 10- year storms at DP-4 which were calculated to increase by 0.1 cfs. We do not anticipate that the additional 0.1 cfs will impact this discharge point.

Peak Discharge Rates in cubic feet per second (cfs)

Design Point	*2-year*	*10-year*	*50-year*	*100-year*
Design Point: 1				
Existing	1.0	1.6	2.2	2.5
Proposed	1.0	1.6	2.2	2.5
Design Point: 2				
Existing	0.3	0.5	0.8	0.9
Proposed	0.3	0.5	0.8	0.9
Design Point: 3				
Existing	4.3	6.4	8.8	9.9
Proposed	2.9	4.8	7.0	7.9
Design Point: 4				
Existing	0.8	2.5	3.9	4.6
Proposed	0.9	2.6	3.9	4.4
Design Point: 5				
Existing	0.3	0.6	1.0	1.1
Proposed	0.2	0.5	0.9	1.1

- **Standard 3:** Stormwater Recharge

  The Project proposes to decrease impervious area on the Site, thus increasing stormwater infiltration in the landscaped areas. Additionally, the Project proposes to construct three (3) subsurface infiltration systems to treat and infiltrate the stormwater runoff from the existing main parking field, the new truckdock area at the existing retail building and the new parking lot for the proposed urgent care building. The clean stormwater runoff from the new 5,230 SF urgent care building will also be infiltrated. The recharge volume provided by the proposed infiltration systems exceeds the required recharge volume for the Project.

- **Standard 4:** Water Quality

  Under existing conditions, the main parking field for the retail building has no water quality devices; stormwater is collected with leaching catchbasin that allow stormwater to enter the groundwater untreated. Runoff from the existing building's truckdock area and the side parking field flows over the pavement to a stone channel and into a landscaped area prior to discharging through a headwall into the stormwater system at the Old Oak Street/Church Street intersection.

  The Project proposes to replace the existing leaching catchbasins in the main parking field in front of the existing retail building with modern catchbasins with 4'-deep sumps and oil hoods to clean the stormwater prior to it being directed to a new subsurface infiltration system with an isolator row (System P2). This proposed treatment train will achieve 80% removal of Total Suspended Solids (TSS) from the first 1" of runoff as required for a project site located within a Zone II Wellhead Protection District.

  Similarly, runoff generated in the proposed truck dock area at the existing building and runoff from the proposed parking lot for the urgent care facility will also be treated by catchbasins with deep sumps and hoods and the subsurface infiltration system isolator row in proposed System P3.

- **Standard 5:** Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

  The Project is not considered a LUHPPL and therefore complies with Standard 5.

- **Standard 6:** Critical Areas

  The Project is located within a Zone II Wellhead Protection Area and is designed to comply with the Standards accordingly.

- **Standard 7:** Redevelopments and Other Projects Subject to the Standards only to the Maximum Extent Practicable

  The Project is considered a redevelopment and has been designed to comply with all ten Stormwater Management Standards.

- **Standard 8:** Construction Period Pollution Prevention and Erosion and Sedimentation Controls

  The Project will not disturb more than one (1) acre of land.

- **Standard 9:** Operation and Maintenance Plan

  The stormwater management system and surface areas of the site must be maintained regularly to avoid detrimental effects to the groundwater and the environment. The following is the procedure for maintaining each of the proposed stormwater system components:

  <u>Pavement</u>

  - Check pavement areas frequently for spillage and/or pavement staining and clean as necessary.
  - Perform periodic sweeping to prevent sediment and debris from entering the stormwater system and/or discharging from the Project Site.

  <u>Catchbasins</u>

  - All catch basins shall be inspected at least four times per year and cleaned a minimum of once per year.
  - Sediment (if more than six inches deep) and/or floatable pollutants shall be pumped from the basin and disposed of at an approved offsite facility in accordance with all applicable regulations.
  - Any structural damage or other indication of malfunction will be reported to the site manager and repaired as necessary
  - During colder periods, the catch basin grates must be kept free of leaves, snow and ice.
  - During warmer periods, the catch basin grates must be kept free of leaves, litter, sand, and debris.

Subsurface Infiltration Systems

- The subsurface infiltration systems will be inspected at least once each year by removing the manhole/access port covers and determining the thickness of sediment that has accumulated in the sediment removal (isolator) row.
- If sediment is more than six inches deep, it must be suspended via flushing with clean water and removed using a vacuum truck.
- Follow the manufacturer's specifications and instructions for cleaning the pipe headers.
- Emergency overflow pipes will be examined at least once each year and verified that no blockage has occurred.
- System will be observed after rainfalls to see if it is properly draining.

Roof Leaders

- Perform routine roof inspections quarterly.
- Keep roofs clean and free of debris.
- Keep roof drainage systems clear.
- Keep roof access limited to authorized personnel.
- Clean inlets twice per year or as necessary.

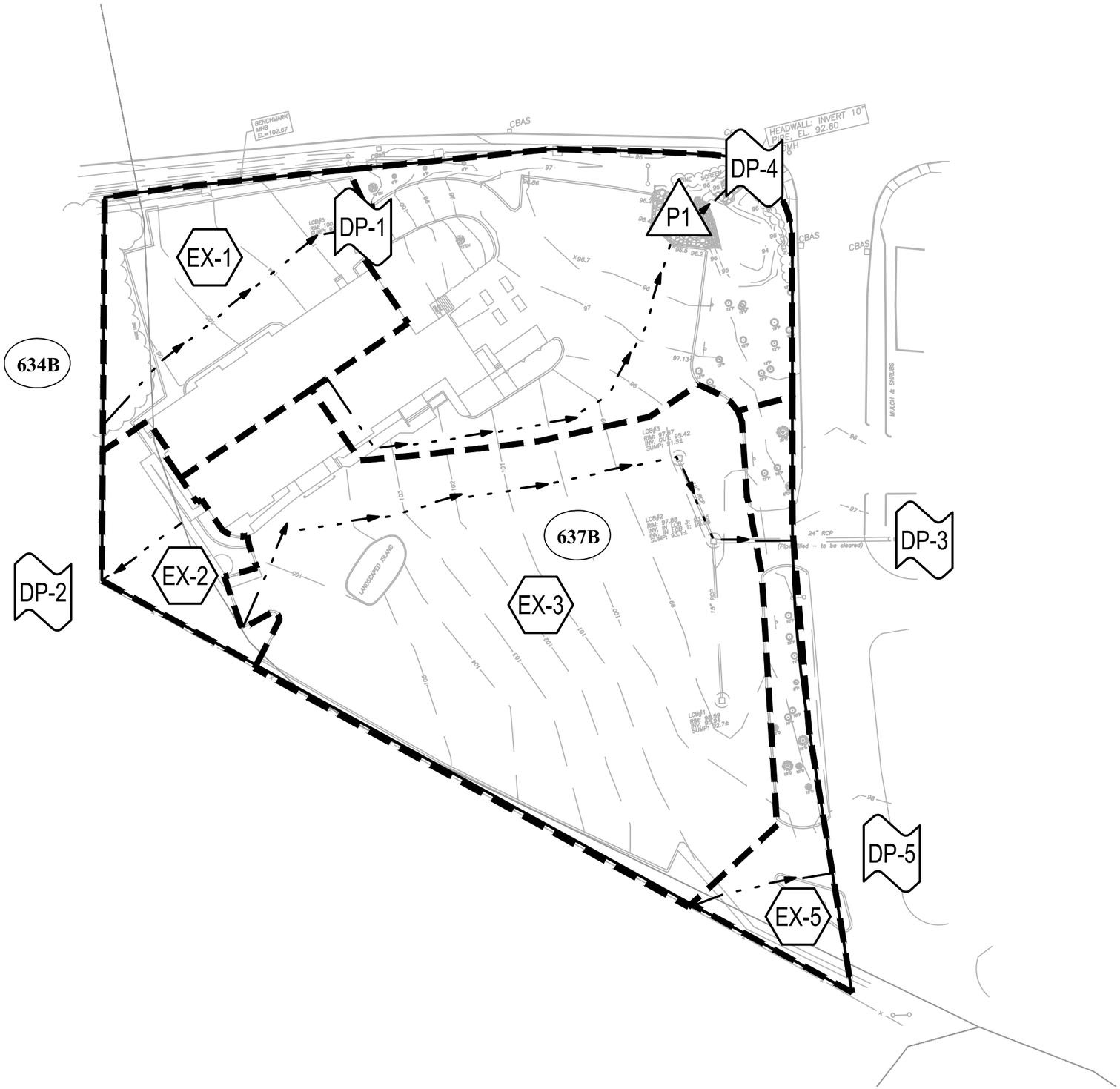
Vegetated Areas

- Inspect planted areas on a semi-annual basis and remove any litter.
- Maintain planted areas adjacent to pavement to prevent soil washout.
- Immediately clean any soil deposited on pavement.
- Re-seed bare areas; install appropriate erosion control measures when native soil is exposed, or erosion channels are forming.
- Plant alternative mixture of grass species in the event of unsuccessful establishment.
- The grass vegetation should be cut to a height between three and four inches.
- Pesticide/Herbicide Usage – No pesticides are to be used unless a single spot treatment is required for a specific control application.
- Fertilizer usage should be avoided. If deemed necessary, slow release fertilizer should be used. Fertilizer may be used to begin the establishment of vegetation in bare or damaged areas but should not be applied on a regular basis unless necessary.
- Annual application of compost amendments and aeration are recommended.

- **Standard 10:** Prohibition of Illicit Discharges

  The Project as designed does not include any proposed illicit discharges and therefore complies with Standard 10.

Figure 1: Existing Drainage Conditions



Legend

SYMBOLS

- X — **DESIGN POINT**
- X — **DRAINAGE AREA DESIGNATION**
- X — **POND**

LINETYPES

- **DRAINAGE AREA BOUNDARY**
- **TIME OF CONCENTRATION FLOW LINE**
- **SOIL TYPE BOUNDARY**
- **100' BUFFER ZONE**
- 4–220 4–219 — **WETLAND BOUNDARY**

SCS SOIL CLASSIFICATIONS

- 634B — **BIRCHWOOD - URBAN LAND COMPLEX, O TO 8 PERCENT SLOPES, HSG B/D**
- 637B — **CARVER - URBAN LAND COMPLEX, 0 TO 8 PERCENT SLOPES, HSG A**

0 30 60 Feet

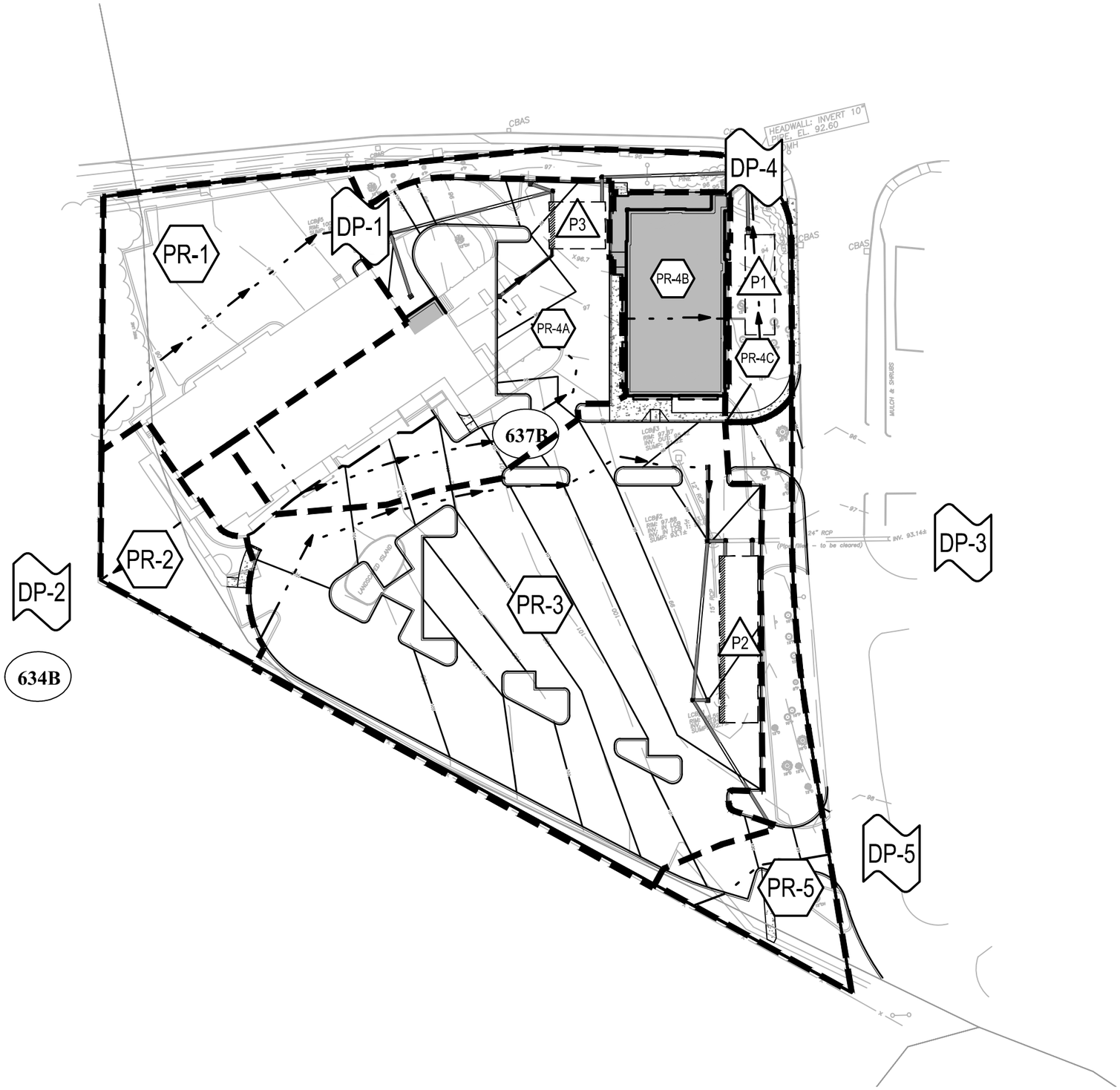
vhb

Existing Drainage Conditions — **Figure 1**

296 Old Oak Street
Pembroke, MA

11/15/2018

Figure 2: Proposed Drainage Conditions



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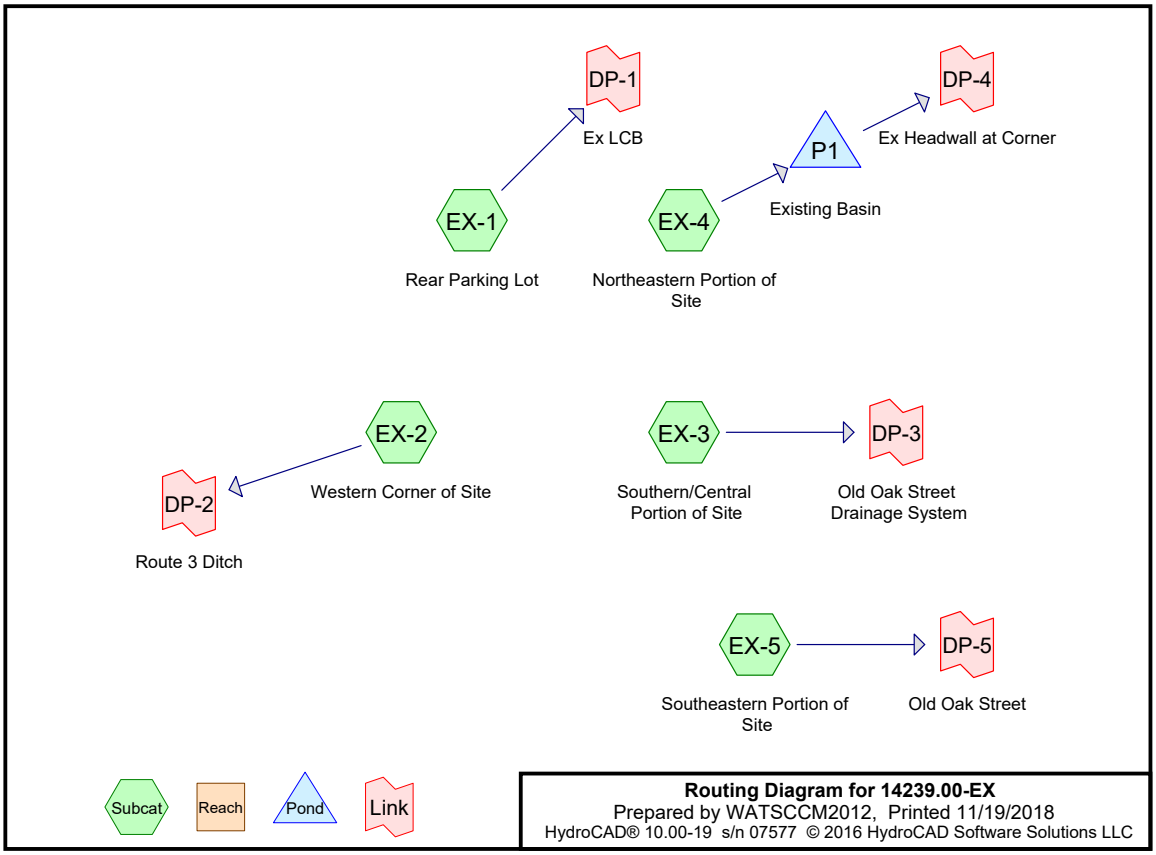
Proposed Drainage Conditions

296 Old Oak Street
Pembroke, MA

Figure 2

11/15/2018

HydroCAD Analysis: Existing Conditions



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEX-1: Rear Parking Lot Runoff Area=18,641 sf 79.21% Impervious Runoff Depth=2.52"
Flow Length=164' Tc=12.9 min CN=92 Runoff=1.0 cfs 3,918 cf

SubcatchmentEX-2: Western Corner of Site Runoff Area=6,095 sf 19.06% Impervious Runoff Depth=1.76"
Flow Length=50' Slope=0.0125 '/' Tc=6.6 min CN=83 Runoff=0.3 cfs 893 cf

SubcatchmentEX-3: Southern/CentralPortion of Site Runoff Area=55,302 sf 96.06% Impervious Runoff Depth=3.04"
Flow Length=355' Tc=5.0 min CN=97 Runoff=4.3 cfs 13,988 cf

SubcatchmentEX-4: NortheasternPortion of Site Runoff Area=33,110 sf 61.14% Impervious Runoff Depth=1.47"
Flow Length=319' Tc=5.0 min CN=79 Runoff=1.3 cfs 4,065 cf

SubcatchmentEX-5: SoutheasternPortion of Site Runoff Area=8,955 sf 45.11% Impervious Runoff Depth=1.10"
Flow Length=76' Tc=5.0 min CN=73 Runoff=0.3 cfs 821 cf

Pond P1: Existing Basin Peak Elev=95.92' Storage=1,220 cf Inflow=1.3 cfs 4,065 cf
Outflow=0.8 cfs 3,019 cf

Link DP-1: Ex LCB Inflow=1.0 cfs 3,918 cf
Primary=1.0 cfs 3,918 cf

Link DP-2: Route 3 Ditch Inflow=0.3 cfs 893 cf
Primary=0.3 cfs 893 cf

Link DP-3: Old Oak Street Drainage System Inflow=4.3 cfs 13,988 cf
Primary=4.3 cfs 13,988 cf

Link DP-4: Ex Headwall at Corner Inflow=0.8 cfs 3,019 cf
Primary=0.8 cfs 3,019 cf

Link DP-5: Old Oak Street Inflow=0.3 cfs 821 cf
Primary=0.3 cfs 821 cf

Total Runoff Area = 122,103 sf Runoff Volume = 23,685 cf Average Runoff Depth = 2.33"
23.56% Pervious = 28,768 sf 76.44% Impervious = 93,335 sf

Summary for Subcatchment EX-1: Rear Parking Lot

Runoff = 1.0 cfs @ 12.17 hrs, Volume= 3,918 cf, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.38"

	Area (sf)	CN	Description
	1,224	49	50-75% Grass cover, Fair, HSG A
*	9,629	98	Impervious
*	5,137	98	Roof
	2,651	79	Woods, Fair, HSG D
	18,641	92	Weighted Average
	3,875		20.79% Pervious Area
	14,766		79.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	41	0.0125	0.06		**Sheet Flow, Wooded**
					Woods: Light underbrush n= 0.400 P2= 3.40"
0.6	123	0.0330	3.69		**Shallow Concentrated Flow, Pavement**
					Paved Kv= 20.3 fps
12.9	164	Total			

Summary for Subcatchment EX-2: Western Corner of Site

Runoff = 0.3 cfs @ 12.10 hrs, Volume= 893 cf, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.38"

	Area (sf)	CN	Description
	685	49	50-75% Grass cover, Fair, HSG A
*	1,162	98	Impervious
	4,248	84	50-75% Grass cover, Fair, HSG D
	6,095	83	Weighted Average
	4,933		80.94% Pervious Area
	1,162		19.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	50	0.0125	0.13		**Sheet Flow, Grassed** Grass: Short n= 0.150 P2= 3.40"

Summary for Subcatchment EX-3: Southern/Central Portion of Site

Runoff = 4.3 cfs @ 12.07 hrs, Volume= 13,988 cf, Depth= 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.38"

	Area (sf)	CN	Description
	933	49	50-75% Grass cover, Fair, HSG A
*	50,149	98	Impervious
*	2,973	98	Roof
	1,247	84	50-75% Grass cover, Fair, HSG D
	55,302	97	Weighted Average
	2,180		3.94% Pervious Area
	53,122		96.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0150	1.10		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.40"
1.0	213	0.0320	3.63		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.1	50	0.0290	8.37	6.57	**Pipe Channel, Piped System** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.3	42	0.0010	2.47	7.75	**Pipe Channel, Piped System** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
2.2	355	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment EX-4: Northeastern Portion of Site

Runoff = 1.3 cfs @ 12.08 hrs, Volume= 4,065 cf, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.38"

	Area (sf)	CN	Description
	12,865	49	50-75% Grass cover, Fair, HSG A
*	17,187	98	Impervious
*	3,058	98	Roof
	33,110	79	Weighted Average
	12,865		38.86% Pervious Area
	20,245		61.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	38	0.3300	3.59		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.9	225	0.0400	4.06		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
2.0	56	0.0010	0.47		**Shallow Concentrated Flow, Basin/RipRap** Grassed Waterway Kv= 15.0 fps
3.1	319	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment EX-5: Southeastern Portion of Site

Runoff = 0.3 cfs @ 12.08 hrs, Volume= 821 cf, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.38"

	Area (sf)	CN	Description
	4,410	49	50-75% Grass cover, Fair, HSG A
*	4,040	98	Impervious
	505	84	50-75% Grass cover, Fair, HSG D
	8,955	73	Weighted Average
	4,915		54.89% Pervious Area
	4,040		45.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	18	0.0110	0.10		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.40"
0.4	32	0.0280	1.29		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.40"
0.1	26	0.0280	3.40		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
3.6	76	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P1: Existing Basin

Inflow Area = 33,110 sf, 61.14% Impervious, Inflow Depth = 1.47" for 2-yr event
Inflow = 1.3 cfs @ 12.08 hrs, Volume= 4,065 cf
Outflow = 0.8 cfs @ 12.18 hrs, Volume= 3,019 cf, Atten= 40%, Lag= 6.2 min
Primary = 0.8 cfs @ 12.18 hrs, Volume= 3,019 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 95.92' @ 12.18 hrs Surf.Area= 1,470 sf Storage= 1,220 cf

Plug-Flow detention time= 146.6 min calculated for 3,019 cf (74% of inflow)
Center-of-Mass det. time= 54.3 min (896.5 - 842.2)

Volume	Invert	Avail.Storage	Storage Description
#1	95.00'	2,149 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	1,183	0	0
96.00	1,495	1,339	1,339
96.50	1,745	810	2,149

Device	Routing	Invert	Outlet Devices
#1	Primary	92.60'	**10.0" Round Culvert** L= 20.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 92.60' / 92.50' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.55 sf
#2	Device 1	95.80'	**8.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.8 cfs @ 12.18 hrs HW=95.92' (Free Discharge)
↑**1=Culvert** (Passes 0.8 cfs of 4.5 cfs potential flow)
↑**2=Broad-Crested Rectangular Weir**(Weir Controls 0.8 cfs @ 0.84 fps)

Summary for Link DP-1: Ex LCB

Inflow Area = 18,641 sf, 79.21% Impervious, Inflow Depth = 2.52" for 2-yr event
Inflow = 1.0 cfs @ 12.17 hrs, Volume= 3,918 cf
Primary = 1.0 cfs @ 12.17 hrs, Volume= 3,918 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Route 3 Ditch

Inflow Area = 6,095 sf, 19.06% Impervious, Inflow Depth = 1.76" for 2-yr event
Inflow = 0.3 cfs @ 12.10 hrs, Volume= 893 cf
Primary = 0.3 cfs @ 12.10 hrs, Volume= 893 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Old Oak Street Drainage System

Inflow Area = 55,302 sf, 96.06% Impervious, Inflow Depth = 3.04" for 2-yr event
Inflow = 4.3 cfs @ 12.07 hrs, Volume= 13,988 cf
Primary = 4.3 cfs @ 12.07 hrs, Volume= 13,988 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Ex Headwall at Corner

Inflow Area = 33,110 sf, 61.14% Impervious, Inflow Depth = 1.09" for 2-yr event
Inflow = 0.8 cfs @ 12.18 hrs, Volume= 3,019 cf
Primary = 0.8 cfs @ 12.18 hrs, Volume= 3,019 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Old Oak Street

Inflow Area = 8,955 sf, 45.11% Impervious, Inflow Depth = 1.10" for 2-yr event
Inflow = 0.3 cfs @ 12.08 hrs, Volume= 821 cf
Primary = 0.3 cfs @ 12.08 hrs, Volume= 821 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEX-1: Rear Parking Lot Runoff Area=18,641 sf 79.21% Impervious Runoff Depth=4.13"
Flow Length=164' Tc=12.9 min CN=92 Runoff=1.6 cfs 6,413 cf

SubcatchmentEX-2: Western Corner of Site Runoff Area=6,095 sf 19.06% Impervious Runoff Depth=3.21"
Flow Length=50' Slope=0.0125 '/' Tc=6.6 min CN=83 Runoff=0.5 cfs 1,631 cf

SubcatchmentEX-3: Southern/CentralPortion of Site Runoff Area=55,302 sf 96.06% Impervious Runoff Depth=4.69"
Flow Length=355' Tc=5.0 min CN=97 Runoff=6.4 cfs 21,600 cf

SubcatchmentEX-4: NortheasternPortion of Site Runoff Area=33,110 sf 61.14% Impervious Runoff Depth=2.84"
Flow Length=319' Tc=5.0 min CN=79 Runoff=2.6 cfs 7,825 cf

SubcatchmentEX-5: SoutheasternPortion of Site Runoff Area=8,955 sf 45.11% Impervious Runoff Depth=2.31"
Flow Length=76' Tc=5.0 min CN=73 Runoff=0.6 cfs 1,725 cf

Pond P1: Existing Basin Peak Elev=96.05' Storage=1,414 cf Inflow=2.6 cfs 7,825 cf
Outflow=2.5 cfs 6,779 cf

Link DP-1: Ex LCB Inflow=1.6 cfs 6,413 cf
Primary=1.6 cfs 6,413 cf

Link DP-2: Route 3 Ditch Inflow=0.5 cfs 1,631 cf
Primary=0.5 cfs 1,631 cf

Link DP-3: Old Oak Street Drainage System Inflow=6.4 cfs 21,600 cf
Primary=6.4 cfs 21,600 cf

Link DP-4: Ex Headwall at Corner Inflow=2.5 cfs 6,779 cf
Primary=2.5 cfs 6,779 cf

Link DP-5: Old Oak Street Inflow=0.6 cfs 1,725 cf
Primary=0.6 cfs 1,725 cf

Total Runoff Area = 122,103 sf Runoff Volume = 39,194 cf Average Runoff Depth = 3.85"
23.56% Pervious = 28,768 sf 76.44% Impervious = 93,335 sf

Summary for Subcatchment EX-1: Rear Parking Lot

Runoff = 1.6 cfs @ 12.17 hrs, Volume= 6,413 cf, Depth= 4.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.04"

	Area (sf)	CN	Description
	1,224	49	50-75% Grass cover, Fair, HSG A
*	9,629	98	Impervious
*	5,137	98	Roof
	2,651	79	Woods, Fair, HSG D
	18,641	92	Weighted Average
	3,875		20.79% Pervious Area
	14,766		79.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	41	0.0125	0.06		**Sheet Flow, Wooded** Woods: Light underbrush n= 0.400 P2= 3.40"
0.6	123	0.0330	3.69		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
12.9	164	Total			

Summary for Subcatchment EX-2: Western Corner of Site

Runoff = 0.5 cfs @ 12.09 hrs, Volume= 1,631 cf, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.04"

	Area (sf)	CN	Description
	685	49	50-75% Grass cover, Fair, HSG A
*	1,162	98	Impervious
	4,248	84	50-75% Grass cover, Fair, HSG D
	6,095	83	Weighted Average
	4,933		80.94% Pervious Area
	1,162		19.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	50	0.0125	0.13		**Sheet Flow, Grassed** Grass: Short n= 0.150 P2= 3.40"

Summary for Subcatchment EX-3: Southern/Central Portion of Site

Runoff = 6.4 cfs @ 12.07 hrs, Volume= 21,600 cf, Depth= 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.04"

	Area (sf)	CN	Description
	933	49	50-75% Grass cover, Fair, HSG A
*	50,149	98	Impervious
*	2,973	98	Roof
	1,247	84	50-75% Grass cover, Fair, HSG D
	55,302	97	Weighted Average
	2,180		3.94% Pervious Area
	53,122		96.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0150	1.10		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.40"
1.0	213	0.0320	3.63		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.1	50	0.0290	8.37	6.57	**Pipe Channel, Piped System** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.3	42	0.0010	2.47	7.75	**Pipe Channel, Piped System** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
2.2	355	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment EX-4: Northeastern Portion of Site

Runoff = 2.6 cfs @ 12.07 hrs, Volume= 7,825 cf, Depth= 2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.04"

	Area (sf)	CN	Description
	12,865	49	50-75% Grass cover, Fair, HSG A
*	17,187	98	Impervious
*	3,058	98	Roof
	33,110	79	Weighted Average
	12,865		38.86% Pervious Area
	20,245		61.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	38	0.3300	3.59		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.9	225	0.0400	4.06		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
2.0	56	0.0010	0.47		**Shallow Concentrated Flow, Basin/RipRap** Grassed Waterway Kv= 15.0 fps
3.1	319	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment EX-5: Southeastern Portion of Site

Runoff = 0.6 cfs @ 12.08 hrs, Volume= 1,725 cf, Depth= 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.04"

	Area (sf)	CN	Description
	4,410	49	50-75% Grass cover, Fair, HSG A
*	4,040	98	Impervious
	505	84	50-75% Grass cover, Fair, HSG D
	8,955	73	Weighted Average
	4,915		54.89% Pervious Area
	4,040		45.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	18	0.0110	0.10		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.40"
0.4	32	0.0280	1.29		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.40"
0.1	26	0.0280	3.40		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
3.6	76	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P1: Existing Basin

Inflow Area = 33,110 sf, 61.14% Impervious, Inflow Depth = 2.84" for 10-yr event
Inflow = 2.6 cfs @ 12.07 hrs, Volume= 7,825 cf
Outflow = 2.5 cfs @ 12.10 hrs, Volume= 6,779 cf, Atten= 6%, Lag= 1.6 min
Primary = 2.5 cfs @ 12.10 hrs, Volume= 6,779 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 96.05' @ 12.10 hrs Surf.Area= 1,520 sf Storage= 1,414 cf

Plug-Flow detention time= 90.5 min calculated for 6,779 cf (87% of inflow)
Center-of-Mass det. time= 30.5 min (853.6 - 823.2)

Volume	Invert	Avail.Storage	Storage Description
#1	95.00'	2,149 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	1,183	0	0
96.00	1,495	1,339	1,339
96.50	1,745	810	2,149

Device	Routing	Invert	Outlet Devices
#1	Primary	92.60'	**10.0" Round Culvert** L= 20.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 92.60' / 92.50' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.55 sf
#2	Device 1	95.80'	**8.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=2.5 cfs @ 12.10 hrs HW=96.05' (Free Discharge)
↑**1=Culvert** (Passes 2.5 cfs of 4.6 cfs potential flow)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 2.5 cfs @ 1.24 fps)

Summary for Link DP-1: Ex LCB

Inflow Area = 18,641 sf, 79.21% Impervious, Inflow Depth = 4.13" for 10-yr event
Inflow = 1.6 cfs @ 12.17 hrs, Volume= 6,413 cf
Primary = 1.6 cfs @ 12.17 hrs, Volume= 6,413 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Route 3 Ditch

Inflow Area = 6,095 sf, 19.06% Impervious, Inflow Depth = 3.21" for 10-yr event
Inflow = 0.5 cfs @ 12.09 hrs, Volume= 1,631 cf
Primary = 0.5 cfs @ 12.09 hrs, Volume= 1,631 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Old Oak Street Drainage System

Inflow Area = 55,302 sf, 96.06% Impervious, Inflow Depth = 4.69" for 10-yr event
Inflow = 6.4 cfs @ 12.07 hrs, Volume= 21,600 cf
Primary = 6.4 cfs @ 12.07 hrs, Volume= 21,600 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Ex Headwall at Corner

Inflow Area = 33,110 sf, 61.14% Impervious, Inflow Depth = 2.46" for 10-yr event
Inflow = 2.5 cfs @ 12.10 hrs, Volume= 6,779 cf
Primary = 2.5 cfs @ 12.10 hrs, Volume= 6,779 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Old Oak Street

Inflow Area = 8,955 sf, 45.11% Impervious, Inflow Depth = 2.31" for 10-yr event
Inflow = 0.6 cfs @ 12.08 hrs, Volume= 1,725 cf
Primary = 0.6 cfs @ 12.08 hrs, Volume= 1,725 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEX-1: Rear Parking Lot Runoff Area=18,641 sf 79.21% Impervious Runoff Depth=5.93"
Flow Length=164' Tc=12.9 min CN=92 Runoff=2.2 cfs 9,206 cf

SubcatchmentEX-2: Western Corner of Site Runoff Area=6,095 sf 19.06% Impervious Runoff Depth=4.91"
Flow Length=50' Slope=0.0125 '/' Tc=6.6 min CN=83 Runoff=0.8 cfs 2,491 cf

SubcatchmentEX-3: Southern/CentralPortion of Site Runoff Area=55,302 sf 96.06% Impervious Runoff Depth=6.51"
Flow Length=355' Tc=5.0 min CN=97 Runoff=8.8 cfs 30,012 cf

SubcatchmentEX-4: NortheasternPortion of Site Runoff Area=33,110 sf 61.14% Impervious Runoff Depth=4.47"
Flow Length=319' Tc=5.0 min CN=79 Runoff=4.1 cfs 12,321 cf

SubcatchmentEX-5: SoutheasternPortion of Site Runoff Area=8,955 sf 45.11% Impervious Runoff Depth=3.82"
Flow Length=76' Tc=5.0 min CN=73 Runoff=1.0 cfs 2,853 cf

Pond P1: Existing Basin Peak Elev=96.13' Storage=1,545 cf Inflow=4.1 cfs 12,321 cf
Outflow=3.9 cfs 11,275 cf

Link DP-1: Ex LCB Inflow=2.2 cfs 9,206 cf
Primary=2.2 cfs 9,206 cf

Link DP-2: Route 3 Ditch Inflow=0.8 cfs 2,491 cf
Primary=0.8 cfs 2,491 cf

Link DP-3: Old Oak Street Drainage System Inflow=8.8 cfs 30,012 cf
Primary=8.8 cfs 30,012 cf

Link DP-4: Ex Headwall at Corner Inflow=3.9 cfs 11,275 cf
Primary=3.9 cfs 11,275 cf

Link DP-5: Old Oak Street Inflow=1.0 cfs 2,853 cf
Primary=1.0 cfs 2,853 cf

Total Runoff Area = 122,103 sf Runoff Volume = 56,884 cf Average Runoff Depth = 5.59"
23.56% Pervious = 28,768 sf 76.44% Impervious = 93,335 sf

Summary for Subcatchment EX-1: Rear Parking Lot

Runoff = 2.2 cfs @ 12.17 hrs, Volume= 9,206 cf, Depth= 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=6.87"

	Area (sf)	CN	Description
	1,224	49	50-75% Grass cover, Fair, HSG A
*	9,629	98	Impervious
*	5,137	98	Roof
	2,651	79	Woods, Fair, HSG D
	18,641	92	Weighted Average
	3,875		20.79% Pervious Area
	14,766		79.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	41	0.0125	0.06		**Sheet Flow, Wooded**
					Woods: Light underbrush n= 0.400 P2= 3.40"
0.6	123	0.0330	3.69		**Shallow Concentrated Flow, Pavement**
					Paved Kv= 20.3 fps
12.9	164	Total			

Summary for Subcatchment EX-2: Western Corner of Site

Runoff = 0.8 cfs @ 12.09 hrs, Volume= 2,491 cf, Depth= 4.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=6.87"

	Area (sf)	CN	Description
	685	49	50-75% Grass cover, Fair, HSG A
*	1,162	98	Impervious
	4,248	84	50-75% Grass cover, Fair, HSG D
	6,095	83	Weighted Average
	4,933		80.94% Pervious Area
	1,162		19.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	50	0.0125	0.13		**Sheet Flow, Grassed** Grass: Short n= 0.150 P2= 3.40"

Summary for Subcatchment EX-3: Southern/Central Portion of Site

Runoff = 8.8 cfs @ 12.07 hrs, Volume= 30,012 cf, Depth= 6.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=6.87"

	Area (sf)	CN	Description
	933	49	50-75% Grass cover, Fair, HSG A
*	50,149	98	Impervious
*	2,973	98	Roof
	1,247	84	50-75% Grass cover, Fair, HSG D
	55,302	97	Weighted Average
	2,180		3.94% Pervious Area
	53,122		96.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0150	1.10		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.40"
1.0	213	0.0320	3.63		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.1	50	0.0290	8.37	6.57	**Pipe Channel, Piped System** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.3	42	0.0010	2.47	7.75	**Pipe Channel, Piped System** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
2.2	355	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment EX-4: Northeastern Portion of Site

Runoff = 4.1 cfs @ 12.07 hrs, Volume= 12,321 cf, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=6.87"

	Area (sf)	CN	Description
	12,865	49	50-75% Grass cover, Fair, HSG A
*	17,187	98	Impervious
*	3,058	98	Roof
	33,110	79	Weighted Average
	12,865		38.86% Pervious Area
	20,245		61.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	38	0.3300	3.59		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.9	225	0.0400	4.06		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
2.0	56	0.0010	0.47		**Shallow Concentrated Flow, Basin/RipRap** Grassed Waterway Kv= 15.0 fps
3.1	319	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment EX-5: Southeastern Portion of Site

Runoff = 1.0 cfs @ 12.07 hrs, Volume= 2,853 cf, Depth= 3.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=6.87"

	Area (sf)	CN	Description
	4,410	49	50-75% Grass cover, Fair, HSG A
*	4,040	98	Impervious
	505	84	50-75% Grass cover, Fair, HSG D
	8,955	73	Weighted Average
	4,915		54.89% Pervious Area
	4,040		45.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	18	0.0110	0.10		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.40"
0.4	32	0.0280	1.29		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.40"
0.1	26	0.0280	3.40		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
3.6	76	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P1: Existing Basin

Inflow Area = 33,110 sf, 61.14% Impervious, Inflow Depth = 4.47" for 50-yr event
Inflow = 4.1 cfs @ 12.07 hrs, Volume= 12,321 cf
Outflow = 3.9 cfs @ 12.10 hrs, Volume= 11,275 cf, Atten= 4%, Lag= 1.4 min
Primary = 3.9 cfs @ 12.10 hrs, Volume= 11,275 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 96.13' @ 12.10 hrs Surf.Area= 1,562 sf Storage= 1,545 cf

Plug-Flow detention time= 67.0 min calculated for 11,271 cf (91% of inflow)
Center-of-Mass det. time= 24.2 min (834.4 - 810.2)

Volume	Invert	Avail.Storage	Storage Description
#1	95.00'	2,149 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	1,183	0	0
96.00	1,495	1,339	1,339
96.50	1,745	810	2,149

Device	Routing	Invert	Outlet Devices
#1	Primary	92.60'	**10.0" Round Culvert** L= 20.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 92.60' / 92.50' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.55 sf
#2	Device 1	95.80'	**8.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=3.9 cfs @ 12.10 hrs HW=96.13' (Free Discharge)
↑**1=Culvert** (Passes 3.9 cfs of 4.6 cfs potential flow)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 3.9 cfs @ 1.46 fps)

Summary for Link DP-1: Ex LCB

Inflow Area = 18,641 sf, 79.21% Impervious, Inflow Depth = 5.93" for 50-yr event
Inflow = 2.2 cfs @ 12.17 hrs, Volume= 9,206 cf
Primary = 2.2 cfs @ 12.17 hrs, Volume= 9,206 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Route 3 Ditch

Inflow Area = 6,095 sf, 19.06% Impervious, Inflow Depth = 4.91" for 50-yr event
Inflow = 0.8 cfs @ 12.09 hrs, Volume= 2,491 cf
Primary = 0.8 cfs @ 12.09 hrs, Volume= 2,491 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Old Oak Street Drainage System

Inflow Area = 55,302 sf, 96.06% Impervious, Inflow Depth = 6.51" for 50-yr event
Inflow = 8.8 cfs @ 12.07 hrs, Volume= 30,012 cf
Primary = 8.8 cfs @ 12.07 hrs, Volume= 30,012 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Ex Headwall at Corner

Inflow Area = 33,110 sf, 61.14% Impervious, Inflow Depth = 4.09" for 50-yr event
Inflow = 3.9 cfs @ 12.10 hrs, Volume= 11,275 cf
Primary = 3.9 cfs @ 12.10 hrs, Volume= 11,275 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Old Oak Street

Inflow Area = 8,955 sf, 45.11% Impervious, Inflow Depth = 3.82" for 50-yr event
Inflow = 1.0 cfs @ 12.07 hrs, Volume= 2,853 cf
Primary = 1.0 cfs @ 12.07 hrs, Volume= 2,853 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentEX-1: Rear Parking Lot Runoff Area=18,641 sf 79.21% Impervious Runoff Depth=6.72"
Flow Length=164' Tc=12.9 min CN=92 Runoff=2.5 cfs 10,434 cf

SubcatchmentEX-2: Western Corner of Site Runoff Area=6,095 sf 19.06% Impervious Runoff Depth=5.66"
Flow Length=50' Slope=0.0125 '/' Tc=6.6 min CN=83 Runoff=0.9 cfs 2,876 cf

SubcatchmentEX-3: Southern/CentralPortion of Site Runoff Area=55,302 sf 96.06% Impervious Runoff Depth=7.31"
Flow Length=355' Tc=5.0 min CN=97 Runoff=9.9 cfs 33,693 cf

SubcatchmentEX-4: NortheasternPortion of Site Runoff Area=33,110 sf 61.14% Impervious Runoff Depth=5.20"
Flow Length=319' Tc=5.0 min CN=79 Runoff=4.8 cfs 14,352 cf

SubcatchmentEX-5: SoutheasternPortion of Site Runoff Area=8,955 sf 45.11% Impervious Runoff Depth=4.52"
Flow Length=76' Tc=5.0 min CN=73 Runoff=1.1 cfs 3,372 cf

Pond P1: Existing Basin Peak Elev=96.17' Storage=1,597 cf Inflow=4.8 cfs 14,352 cf
Outflow=4.6 cfs 13,305 cf

Link DP-1: Ex LCB Inflow=2.5 cfs 10,434 cf
Primary=2.5 cfs 10,434 cf

Link DP-2: Route 3 Ditch Inflow=0.9 cfs 2,876 cf
Primary=0.9 cfs 2,876 cf

Link DP-3: Old Oak Street Drainage System Inflow=9.9 cfs 33,693 cf
Primary=9.9 cfs 33,693 cf

Link DP-4: Ex Headwall at Corner Inflow=4.6 cfs 13,305 cf
Primary=4.6 cfs 13,305 cf

Link DP-5: Old Oak Street Inflow=1.1 cfs 3,372 cf
Primary=1.1 cfs 3,372 cf

Total Runoff Area = 122,103 sf Runoff Volume = 64,727 cf Average Runoff Depth = 6.36"
23.56% Pervious = 28,768 sf 76.44% Impervious = 93,335 sf

Summary for Subcatchment EX-1: Rear Parking Lot

Runoff = 2.5 cfs @ 12.17 hrs, Volume= 10,434 cf, Depth= 6.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.67"

	Area (sf)	CN	Description
	1,224	49	50-75% Grass cover, Fair, HSG A
*	9,629	98	Impervious
*	5,137	98	Roof
	2,651	79	Woods, Fair, HSG D
	18,641	92	Weighted Average
	3,875		20.79% Pervious Area
	14,766		79.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	41	0.0125	0.06		**Sheet Flow, Wooded** Woods: Light underbrush n= 0.400 P2= 3.40"
0.6	123	0.0330	3.69		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
12.9	164	Total			

Summary for Subcatchment EX-2: Western Corner of Site

Runoff = 0.9 cfs @ 12.09 hrs, Volume= 2,876 cf, Depth= 5.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.67"

	Area (sf)	CN	Description
	685	49	50-75% Grass cover, Fair, HSG A
*	1,162	98	Impervious
	4,248	84	50-75% Grass cover, Fair, HSG D
	6,095	83	Weighted Average
	4,933		80.94% Pervious Area
	1,162		19.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	50	0.0125	0.13		**Sheet Flow, Grassed** Grass: Short n= 0.150 P2= 3.40"

Summary for Subcatchment EX-3: Southern/Central Portion of Site

Runoff = 9.9 cfs @ 12.07 hrs, Volume= 33,693 cf, Depth= 7.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.67"

	Area (sf)	CN	Description
	933	49	50-75% Grass cover, Fair, HSG A
*	50,149	98	Impervious
*	2,973	98	Roof
	1,247	84	50-75% Grass cover, Fair, HSG D
	55,302	97	Weighted Average
	2,180		3.94% Pervious Area
	53,122		96.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0150	1.10		**Sheet Flow, Pavement**
					Smooth surfaces n= 0.011 P2= 3.40"
1.0	213	0.0320	3.63		**Shallow Concentrated Flow, Pavement**
					Paved Kv= 20.3 fps
0.1	50	0.0290	8.37	6.57	**Pipe Channel, Piped System**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.012 Concrete pipe, finished
0.3	42	0.0010	2.47	7.75	**Pipe Channel, Piped System**
					24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'
					n= 0.012 Concrete pipe, finished
2.2	355	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment EX-4: Northeastern Portion of Site

Runoff = 4.8 cfs @ 12.07 hrs, Volume= 14,352 cf, Depth= 5.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.67"

	Area (sf)	CN	Description
	12,865	49	50-75% Grass cover, Fair, HSG A
*	17,187	98	Impervious
*	3,058	98	Roof
	33,110	79	Weighted Average
	12,865		38.86% Pervious Area
	20,245		61.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	38	0.3300	3.59		**Sheet Flow, Roof**
					Smooth surfaces n= 0.011 P2= 3.40"
0.9	225	0.0400	4.06		**Shallow Concentrated Flow, Pavement**
					Paved Kv= 20.3 fps
2.0	56	0.0010	0.47		**Shallow Concentrated Flow, Basin/RipRap**
					Grassed Waterway Kv= 15.0 fps
3.1	319	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment EX-5: Southeastern Portion of Site

Runoff = 1.1 cfs @ 12.07 hrs, Volume= 3,372 cf, Depth= 4.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.67"

	Area (sf)	CN	Description
	4,410	49	50-75% Grass cover, Fair, HSG A
*	4,040	98	Impervious
	505	84	50-75% Grass cover, Fair, HSG D
	8,955	73	Weighted Average
	4,915		54.89% Pervious Area
	4,040		45.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	18	0.0110	0.10		**Sheet Flow, Grass**
					Grass: Short n= 0.150 P2= 3.40"
0.4	32	0.0280	1.29		**Sheet Flow, Pavement**
					Smooth surfaces n= 0.011 P2= 3.40"
0.1	26	0.0280	3.40		**Shallow Concentrated Flow, Pavement**
					Paved Kv= 20.3 fps
3.6	76	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P1: Existing Basin

Inflow Area = 33,110 sf, 61.14% Impervious, Inflow Depth = 5.20" for 100-yr event
Inflow = 4.8 cfs @ 12.07 hrs, Volume= 14,352 cf
Outflow = 4.6 cfs @ 12.09 hrs, Volume= 13,305 cf, Atten= 4%, Lag= 1.3 min
Primary = 4.6 cfs @ 12.09 hrs, Volume= 13,305 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 96.17' @ 12.09 hrs Surf.Area= 1,579 sf Storage= 1,597 cf

Plug-Flow detention time= 60.7 min calculated for 13,305 cf (93% of inflow)
Center-of-Mass det. time= 22.6 min (828.5 - 805.9)

Volume	Invert	Avail.Storage	Storage Description
#1	95.00'	2,149 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
95.00	1,183	0	0
96.00	1,495	1,339	1,339
96.50	1,745	810	2,149

Device	Routing	Invert	Outlet Devices
#1	Primary	92.60'	**10.0" Round Culvert** L= 20.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 92.60' / 92.50' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.55 sf
#2	Device 1	95.80'	**8.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=4.6 cfs @ 12.09 hrs HW=96.17' (Free Discharge)
↑**1=Culvert** (Passes 4.6 cfs of 4.7 cfs potential flow)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 4.6 cfs @ 1.55 fps)

Summary for Link DP-1: Ex LCB

Inflow Area = 18,641 sf, 79.21% Impervious, Inflow Depth = 6.72" for 100-yr event
Inflow = 2.5 cfs @ 12.17 hrs, Volume= 10,434 cf
Primary = 2.5 cfs @ 12.17 hrs, Volume= 10,434 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Route 3 Ditch

Inflow Area = 6,095 sf, 19.06% Impervious, Inflow Depth = 5.66" for 100-yr event
Inflow = 0.9 cfs @ 12.09 hrs, Volume= 2,876 cf
Primary = 0.9 cfs @ 12.09 hrs, Volume= 2,876 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Old Oak Street Drainage System

Inflow Area = 55,302 sf, 96.06% Impervious, Inflow Depth = 7.31" for 100-yr event
Inflow = 9.9 cfs @ 12.07 hrs, Volume= 33,693 cf
Primary = 9.9 cfs @ 12.07 hrs, Volume= 33,693 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Ex Headwall at Corner

Inflow Area = 33,110 sf, 61.14% Impervious, Inflow Depth = 4.82" for 100-yr event
Inflow = 4.6 cfs @ 12.09 hrs, Volume= 13,305 cf
Primary = 4.6 cfs @ 12.09 hrs, Volume= 13,305 cf, Atten= 0%, Lag= 0.0 min

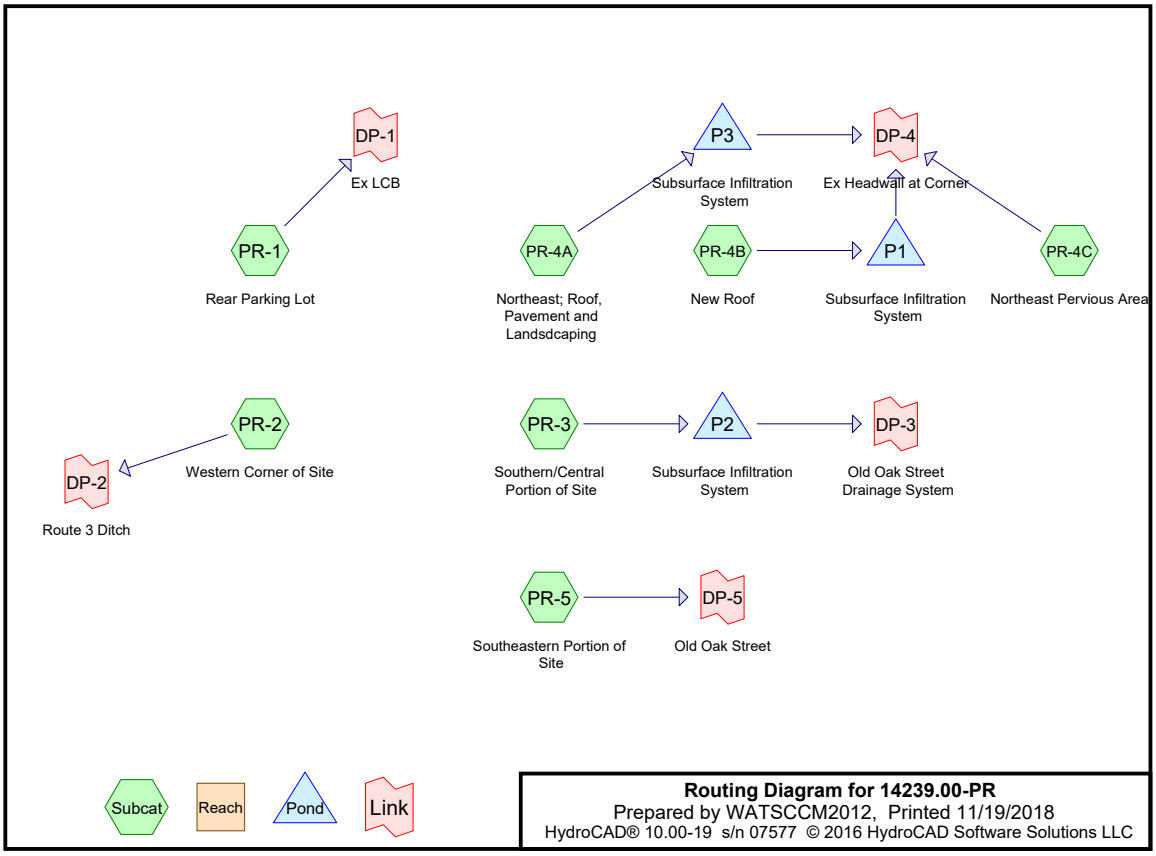
Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Old Oak Street

Inflow Area = 8,955 sf, 45.11% Impervious, Inflow Depth = 4.52" for 100-yr event
Inflow = 1.1 cfs @ 12.07 hrs, Volume= 3,372 cf
Primary = 1.1 cfs @ 12.07 hrs, Volume= 3,372 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

HydroCAD Analysis: Proposed Conditions



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPR-1: Rear Parking Lot Runoff Area=18,641 sf 79.21% Impervious Runoff Depth=2.52"
Flow Length=164' Tc=12.9 min CN=92 Runoff=1.0 cfs 3,918 cf

SubcatchmentPR-2: Western Corner of Site Runoff Area=6,095 sf 19.06% Impervious Runoff Depth=1.76"
Flow Length=50' Slope=0.0125 '/' Tc=6.6 min CN=83 Runoff=0.3 cfs 893 cf

SubcatchmentPR-3: Southern/CentralPortion of Site Runoff Area=49,904 sf 88.92% Impervious Runoff Depth=2.72"
Flow Length=320' Tc=5.0 min CN=94 Runoff=3.6 cfs 11,306 cf

SubcatchmentPR-4A: Northeast; Roof, Pavement and Landsdcaping Runoff Area=23,624 sf 85.40% Impervious Runoff Depth=2.43"
Flow Length=302' Tc=5.0 min CN=91 Runoff=1.6 cfs 4,779 cf

SubcatchmentPR-4B: New Roof Runoff Area=6,522 sf 100.00% Impervious Runoff Depth=3.15"
Flow Length=50' Slope=0.0150 '/' Tc=5.0 min CN=98 Runoff=0.5 cfs 1,710 cf

SubcatchmentPR-4C: Northeast Pervious Area Runoff Area=7,568 sf 3.61% Impervious Runoff Depth=0.19"
Flow Length=137' Tc=5.0 min CN=51 Runoff=0.0 cfs 121 cf

SubcatchmentPR-5: Southeastern Portion of Site Runoff Area=10,239 sf 31.72% Impervious Runoff Depth=0.83"
Flow Length=79' Tc=5.0 min CN=68 Runoff=0.2 cfs 710 cf

Pond P1: Subsurface Infiltration System Peak Elev=93.03' Storage=859 cf Inflow=0.5 cfs 1,710 cf
Discarded=0.0 cfs 1,653 cf Primary=0.0 cfs 0 cf Outflow=0.0 cfs 1,653 cf

Pond P2: Subsurface Infiltration System Peak Elev=94.12' Storage=2,147 cf Inflow=3.6 cfs 11,306 cf
Discarded=0.1 cfs 5,581 cf Primary=2.9 cfs 5,726 cf Outflow=3.0 cfs 11,306 cf

Pond P3: Subsurface Infiltration System Peak Elev=94.74' Storage=1,455 cf Inflow=1.6 cfs 4,779 cf
Discarded=0.0 cfs 1,444 cf Primary=0.9 cfs 2,232 cf Outflow=0.9 cfs 3,676 cf

Link DP-1: Ex LCB Inflow=1.0 cfs 3,918 cf
Primary=1.0 cfs 3,918 cf

Link DP-2: Route 3 Ditch Inflow=0.3 cfs 893 cf
Primary=0.3 cfs 893 cf

Link DP-3: Old Oak Street Drainage System Inflow=2.9 cfs 5,726 cf
Primary=2.9 cfs 5,726 cf

Link DP-4: Ex Headwall at Corner Inflow=0.9 cfs 2,353 cf
Primary=0.9 cfs 2,353 cf

Link DP-5: Old Oak Street Inflow=0.2 cfs 710 cf
Primary=0.2 cfs 710 cf

Total Runoff Area = 122,593 sf Runoff Volume = 23,438 cf Average Runoff Depth = 2.29"
26.16% Pervious = 32,071 sf 73.84% Impervious = 90,522 sf

Summary for Subcatchment PR-1: Rear Parking Lot

Runoff = 1.0 cfs @ 12.17 hrs, Volume= 3,918 cf, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.38"

	Area (sf)	CN	Description
	1,224	49	50-75% Grass cover, Fair, HSG A
*	9,629	98	Impervious
*	5,137	98	Roof
	2,651	79	Woods, Fair, HSG D
	18,641	92	Weighted Average
	3,875		20.79% Pervious Area
	14,766		79.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	41	0.0125	0.06		**Sheet Flow, Wooded** Woods: Light underbrush n= 0.400 P2= 3.40"
0.6	123	0.0330	3.69		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
12.9	164	Total			

Summary for Subcatchment PR-2: Western Corner of Site

Runoff = 0.3 cfs @ 12.10 hrs, Volume= 893 cf, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.38"

	Area (sf)	CN	Description
	685	49	50-75% Grass cover, Fair, HSG A
*	1,162	98	Impervious
	4,248	84	50-75% Grass cover, Fair, HSG D
	6,095	83	Weighted Average
	4,933		80.94% Pervious Area
	1,162		19.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	50	0.0125	0.13		**Sheet Flow, Grassed**
					Grass: Short n= 0.150 P2= 3.40"

Summary for Subcatchment PR-3: Southern/Central Portion of Site

Runoff = 3.6 cfs @ 12.07 hrs, Volume= 11,306 cf, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.38"

	Area (sf)	CN	Description
	3,882	49	50-75% Grass cover, Fair, HSG A
	43,279	98	Paved parking, HSG A
*	1,097	98	Roof
	1,646	84	50-75% Grass cover, Fair, HSG D
	49,904	94	Weighted Average
	5,528		11.08% Pervious Area
	44,376		88.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0150	1.10		**Sheet Flow, Pavement**
					Smooth surfaces n= 0.011 P2= 3.40"
1.0	220	0.0320	3.63		**Shallow Concentrated Flow, Pavement**
					Paved Kv= 20.3 fps
0.2	50	0.0050	3.47	2.73	**Pipe Channel, Piped System**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.012 Concrete pipe, finished
2.0	320	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-4A: Northeast; Roof, Pavement and Landsdcaping

Runoff = 1.6 cfs @ 12.07 hrs, Volume= 4,779 cf, Depth= 2.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.38"

	Area (sf)	CN	Description
	3,449	49	50-75% Grass cover, Fair, HSG A
	15,045	98	Paved parking, HSG A
*	5,130	98	Roof
	23,624	91	Weighted Average
	3,449		14.60% Pervious Area
	20,175		85.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	38	0.3300	3.59		**Sheet Flow, Roof**
					Smooth surfaces n= 0.011 P2= 3.40"
0.9	225	0.0400	4.06		**Shallow Concentrated Flow, Pavement**
					Paved Kv= 20.3 fps
0.2	39	0.0050	4.17	3.28	**Pipe Channel, Pipe**
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.010 PVC, smooth interior
1.3	302	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-4B: New Roof

Runoff = 0.5 cfs @ 12.07 hrs, Volume= 1,710 cf, Depth= 3.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.38"

	Area (sf)	CN	Description
*	6,522	98	Roof
	6,522		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0150	1.10		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.8	50	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-4C: Northeast Pervious Area

Runoff = 0.0 cfs @ 12.38 hrs, Volume= 121 cf, Depth= 0.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.38"

Area (sf)	CN	Description
7,295	49	50-75% Grass cover, Fair, HSG A
273	98	Paved parking, HSG A
7,568	51	Weighted Average
7,295		96.39% Pervious Area
273		3.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	35	0.0570	0.22		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.40"
1.2	102	0.0090	1.42		**Shallow Concentrated Flow, Grassed** Grassed Waterway Kv= 15.0 fps
3.9	137	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-5: Southeastern Portion of Site

Runoff = 0.2 cfs @ 12.09 hrs, Volume= 710 cf, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.38"

	Area (sf)	CN	Description
	6,035	49	50-75% Grass cover, Fair, HSG A
*	3,248	98	Impervious
	956	84	50-75% Grass cover, Fair, HSG D
	10,239	68	Weighted Average
	6,991		68.28% Pervious Area
	3,248		31.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	18	0.0110	0.10		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.40"
0.6	61	0.0330	1.57		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.40"
3.7	79	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P1: Subsurface Infiltration System

Inflow Area = 6,522 sf,100.00% Impervious, Inflow Depth = 3.15" for 2-yr event
Inflow = 0.5 cfs @ 12.07 hrs, Volume= 1,710 cf
Outflow = 0.0 cfs @ 9.67 hrs, Volume= 1,653 cf, Atten= 96%, Lag= 0.0 min
Discarded = 0.0 cfs @ 9.67 hrs, Volume= 1,653 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 93.03' @ 14.94 hrs Surf.Area= 842 sf Storage= 859 cf

Plug-Flow detention time= 365.9 min calculated for 1,653 cf (97% of inflow)
Center-of-Mass det. time= 345.5 min (1,099.9 - 754.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	91.40'	694 cf	**15.75'W x 53.46'L x 3.50'H Field A** 2,947 cf Overall - 965 cf Embedded = 1,982 cf x 35.0% Voids
#2A	91.90'	965 cf	**ADS_StormTech SC-740 +Cap**x 21 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 3 Rows of 7 Chambers
		1,658 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	94.40'	**12.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 94.40' / 94.30' S= 0.0033 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Discarded	91.40'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 9.67 hrs HW=91.44' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=91.40' (Free Discharge)
↑**1=Culvert** (Controls 0.0 cfs)

Summary for Pond P2: Subsurface Infiltration System

Inflow Area = 49,904 sf, 88.92% Impervious, Inflow Depth = 2.72" for 2-yr event
Inflow = 3.6 cfs @ 12.07 hrs, Volume= 11,306 cf
Outflow = 3.0 cfs @ 12.12 hrs, Volume= 11,306 cf, Atten= 18%, Lag= 3.1 min
Discarded = 0.1 cfs @ 9.48 hrs, Volume= 5,581 cf
Primary = 2.9 cfs @ 12.12 hrs, Volume= 5,726 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 94.12' @ 12.12 hrs Surf.Area= 1,826 sf Storage= 2,147 cf

Plug-Flow detention time= 50.5 min calculated for 11,303 cf (100% of inflow)
Center-of-Mass det. time= 50.4 min (834.8 - 784.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	92.30'	1,465 cf	**20.50'W x 89.06'L x 3.50'H Field A** 6,390 cf Overall - 2,205 cf Embedded = 4,185 cf x 35.0% Voids
#2A	92.80'	2,205 cf	**ADS_StormTech SC-740 +Cap**x 48 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 4 Rows of 12 Chambers
		3,670 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	93.14'	**24.0" Round OCS Outlet Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 93.14' / 93.14' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Discarded	92.30'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#3	Primary	94.90'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.1 cfs @ 9.48 hrs HW=92.34' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=2.9 cfs @ 12.12 hrs HW=94.11' (Free Discharge)
├**1=OCS Outlet Culvert** (Barrel Controls 2.9 cfs @ 2.75 fps)
└**3=Broad-Crested Rectangular Weir**(Controls 0.0 cfs)

Summary for Pond P3: Subsurface Infiltration System

[93] Warning: Storage range exceeded by 0.04'

Inflow Area = 23,624 sf, 85.40% Impervious, Inflow Depth = 2.43" for 2-yr event
Inflow = 1.6 cfs @ 12.07 hrs, Volume= 4,779 cf
Outflow = 0.9 cfs @ 12.08 hrs, Volume= 3,676 cf, Atten= 43%, Lag= 0.7 min
Discarded = 0.0 cfs @ 8.53 hrs, Volume= 1,444 cf
Primary = 0.9 cfs @ 12.08 hrs, Volume= 2,232 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 94.74' @ 12.08 hrs Surf.Area= 749 sf Storage= 1,455 cf

Plug-Flow detention time= 215.3 min calculated for 3,676 cf (77% of inflow)
Center-of-Mass det. time= 133.4 min (932.9 - 799.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	91.20'	628 cf	**30.00'W x 24.98'L x 3.50'H Field A** 2,623 cf Overall - 827 cf Embedded = 1,796 cf x 35.0% Voids
#2A	91.70'	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 6 Rows of 3 Chambers
		1,455 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	94.20'	**12.0" Round Culvert** L= 77.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 94.20' / 93.80' S= 0.0052 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Discarded	91.20'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 8.53 hrs HW=91.24' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.8 cfs @ 12.08 hrs HW=94.72' (Free Discharge)
└**1=Culvert** (Barrel Controls 0.8 cfs @ 2.90 fps)

Summary for Link DP-1: Ex LCB

Inflow Area = 18,641 sf, 79.21% Impervious, Inflow Depth = 2.52" for 2-yr event
Inflow = 1.0 cfs @ 12.17 hrs, Volume= 3,918 cf
Primary = 1.0 cfs @ 12.17 hrs, Volume= 3,918 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Route 3 Ditch

Inflow Area = 6,095 sf, 19.06% Impervious, Inflow Depth = 1.76" for 2-yr event
Inflow = 0.3 cfs @ 12.10 hrs, Volume= 893 cf
Primary = 0.3 cfs @ 12.10 hrs, Volume= 893 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Old Oak Street Drainage System

Inflow Area = 49,904 sf, 88.92% Impervious, Inflow Depth = 1.38" for 2-yr event
Inflow = 2.9 cfs @ 12.12 hrs, Volume= 5,726 cf
Primary = 2.9 cfs @ 12.12 hrs, Volume= 5,726 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Ex Headwall at Corner

Inflow Area = 37,714 sf, 71.51% Impervious, Inflow Depth = 0.75" for 2-yr event
Inflow = 0.9 cfs @ 12.08 hrs, Volume= 2,353 cf
Primary = 0.9 cfs @ 12.08 hrs, Volume= 2,353 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Old Oak Street

Inflow Area = 10,239 sf, 31.72% Impervious, Inflow Depth = 0.83" for 2-yr event
Inflow = 0.2 cfs @ 12.09 hrs, Volume= 710 cf
Primary = 0.2 cfs @ 12.09 hrs, Volume= 710 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPR-1: Rear Parking Lot Runoff Area=18,641 sf 79.21% Impervious Runoff Depth=4.13"
Flow Length=164' Tc=12.9 min CN=92 Runoff=1.6 cfs 6,413 cf

SubcatchmentPR-2: Western Corner of Site Runoff Area=6,095 sf 19.06% Impervious Runoff Depth=3.21"
Flow Length=50' Slope=0.0125 '/' Tc=6.6 min CN=83 Runoff=0.5 cfs 1,631 cf

SubcatchmentPR-3: Southern/CentralPortion of Site Runoff Area=49,904 sf 88.92% Impervious Runoff Depth=4.35"
Flow Length=320' Tc=5.0 min CN=94 Runoff=5.6 cfs 18,080 cf

SubcatchmentPR-4A: Northeast; Roof, Pavement and Landsdcaping Runoff Area=23,624 sf 85.40% Impervious Runoff Depth=4.02"
Flow Length=302' Tc=5.0 min CN=91 Runoff=2.5 cfs 7,916 cf

SubcatchmentPR-4B: New Roof Runoff Area=6,522 sf 100.00% Impervious Runoff Depth=4.80"
Flow Length=50' Slope=0.0150 '/' Tc=5.0 min CN=98 Runoff=0.8 cfs 2,610 cf

SubcatchmentPR-4C: Northeast Pervious Area Runoff Area=7,568 sf 3.61% Impervious Runoff Depth=0.76"
Flow Length=137' Tc=5.0 min CN=51 Runoff=0.1 cfs 482 cf

SubcatchmentPR-5: Southeastern Portion of Site Runoff Area=10,239 sf 31.72% Impervious Runoff Depth=1.91"
Flow Length=79' Tc=5.0 min CN=68 Runoff=0.5 cfs 1,628 cf

Pond P1: Subsurface Infiltration System Peak Elev=94.43' Storage=1,521 cf Inflow=0.8 cfs 2,610 cf
Discarded=0.0 cfs 1,767 cf Primary=0.0 cfs 13 cf Outflow=0.0 cfs 1,780 cf

Pond P2: Subsurface Infiltration System Peak Elev=94.42' Storage=2,519 cf Inflow=5.6 cfs 18,080 cf
Discarded=0.1 cfs 6,821 cf Primary=4.8 cfs 11,258 cf Outflow=4.9 cfs 18,080 cf

Pond P3: Subsurface Infiltration System Peak Elev=95.26' Storage=1,455 cf Inflow=2.5 cfs 7,916 cf
Discarded=0.0 cfs 1,553 cf Primary=2.5 cfs 5,388 cf Outflow=2.5 cfs 6,941 cf

Link DP-1: Ex LCB Inflow=1.6 cfs 6,413 cf
Primary=1.6 cfs 6,413 cf

Link DP-2: Route 3 Ditch Inflow=0.5 cfs 1,631 cf
Primary=0.5 cfs 1,631 cf

Link DP-3: Old Oak Street Drainage System Inflow=4.8 cfs 11,258 cf
Primary=4.8 cfs 11,258 cf

Link DP-4: Ex Headwall at Corner Inflow=2.6 cfs 5,882 cf
Primary=2.6 cfs 5,882 cf

Link DP-5: Old Oak Street Inflow=0.5 cfs 1,628 cf
Primary=0.5 cfs 1,628 cf

Total Runoff Area = 122,593 sf Runoff Volume = 38,760 cf Average Runoff Depth = 3.79"
26.16% Pervious = 32,071 sf 73.84% Impervious = 90,522 sf

Summary for Subcatchment PR-1: Rear Parking Lot

Runoff = 1.6 cfs @ 12.17 hrs, Volume= 6,413 cf, Depth= 4.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.04"

	Area (sf)	CN	Description
	1,224	49	50-75% Grass cover, Fair, HSG A
*	9,629	98	Impervious
*	5,137	98	Roof
	2,651	79	Woods, Fair, HSG D
	18,641	92	Weighted Average
	3,875		20.79% Pervious Area
	14,766		79.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	41	0.0125	0.06		**Sheet Flow, Wooded** Woods: Light underbrush n= 0.400 P2= 3.40"
0.6	123	0.0330	3.69		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
12.9	164	Total			

Summary for Subcatchment PR-2: Western Corner of Site

Runoff = 0.5 cfs @ 12.09 hrs, Volume= 1,631 cf, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.04"

	Area (sf)	CN	Description
	685	49	50-75% Grass cover, Fair, HSG A
*	1,162	98	Impervious
	4,248	84	50-75% Grass cover, Fair, HSG D
	6,095	83	Weighted Average
	4,933		80.94% Pervious Area
	1,162		19.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	50	0.0125	0.13		**Sheet Flow, Grassed** Grass: Short n= 0.150 P2= 3.40"

Summary for Subcatchment PR-3: Southern/Central Portion of Site

Runoff = 5.6 cfs @ 12.07 hrs, Volume= 18,080 cf, Depth= 4.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.04"

	Area (sf)	CN	Description
	3,882	49	50-75% Grass cover, Fair, HSG A
	43,279	98	Paved parking, HSG A
*	1,097	98	Roof
	1,646	84	50-75% Grass cover, Fair, HSG D
	49,904	94	Weighted Average
	5,528		11.08% Pervious Area
	44,376		88.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0150	1.10		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.40"
1.0	220	0.0320	3.63		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.2	50	0.0050	3.47	2.73	**Pipe Channel, Piped System** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
2.0	320	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-4A: Northeast; Roof, Pavement and Landsdcaping

Runoff = 2.5 cfs @ 12.07 hrs, Volume= 7,916 cf, Depth= 4.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.04"

	Area (sf)	CN	Description
	3,449	49	50-75% Grass cover, Fair, HSG A
	15,045	98	Paved parking, HSG A
*	5,130	98	Roof
	23,624	91	Weighted Average
	3,449		14.60% Pervious Area
	20,175		85.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	38	0.3300	3.59		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.9	225	0.0400	4.06		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.2	39	0.0050	4.17	3.28	**Pipe Channel, Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
1.3	302	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-4B: New Roof

Runoff = 0.8 cfs @ 12.07 hrs, Volume= 2,610 cf, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.04"

	Area (sf)	CN	Description
*	6,522	98	Roof
	6,522		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0150	1.10		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.8	50	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-4C: Northeast Pervious Area

Runoff = 0.1 cfs @ 12.10 hrs, Volume= 482 cf, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.04"

Area (sf)	CN	Description
7,295	49	50-75% Grass cover, Fair, HSG A
273	98	Paved parking, HSG A
7,568	51	Weighted Average
7,295		96.39% Pervious Area
273		3.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	35	0.0570	0.22		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.40"
1.2	102	0.0090	1.42		**Shallow Concentrated Flow, Grassed** Grassed Waterway Kv= 15.0 fps
3.9	137	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-5: Southeastern Portion of Site

Runoff = 0.5 cfs @ 12.08 hrs, Volume= 1,628 cf, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.04"

	Area (sf)	CN	Description
	6,035	49	50-75% Grass cover, Fair, HSG A
*	3,248	98	Impervious
	956	84	50-75% Grass cover, Fair, HSG D
	10,239	68	Weighted Average
	6,991		68.28% Pervious Area
	3,248		31.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	18	0.0110	0.10		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.40"
0.6	61	0.0330	1.57		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.40"
3.7	79	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P1: Subsurface Infiltration System

Inflow Area = 6,522 sf,100.00% Impervious, Inflow Depth = 4.80" for 10-yr event
Inflow = 0.8 cfs @ 12.07 hrs, Volume= 2,610 cf
Outflow = 0.0 cfs @ 15.71 hrs, Volume= 1,780 cf, Atten= 97%, Lag= 218.4 min
Discarded = 0.0 cfs @ 8.42 hrs, Volume= 1,767 cf
Primary = 0.0 cfs @ 15.71 hrs, Volume= 13 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 94.43' @ 15.71 hrs Surf.Area= 842 sf Storage= 1,521 cf

Plug-Flow detention time= 403.0 min calculated for 1,779 cf (68% of inflow)
Center-of-Mass det. time= 305.1 min (1,052.0 - 747.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	91.40'	694 cf	**15.75'W x 53.46'L x 3.50'H Field A** 2,947 cf Overall - 965 cf Embedded = 1,982 cf x 35.0% Voids
#2A	91.90'	965 cf	**ADS_StormTech SC-740 +Cap**x 21 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 3 Rows of 7 Chambers
		1,658 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	94.40'	**12.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 94.40' / 94.30' S= 0.0033 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Discarded	91.40'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 8.42 hrs HW=91.44' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 15.71 hrs HW=94.43' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 0.0 cfs @ 0.47 fps)

Summary for Pond P2: Subsurface Infiltration System

Inflow Area = 49,904 sf, 88.92% Impervious, Inflow Depth = 4.35" for 10-yr event
Inflow = 5.6 cfs @ 12.07 hrs, Volume= 18,080 cf
Outflow = 4.9 cfs @ 12.11 hrs, Volume= 18,080 cf, Atten= 12%, Lag= 2.4 min
Discarded = 0.1 cfs @ 8.19 hrs, Volume= 6,821 cf
Primary = 4.8 cfs @ 12.11 hrs, Volume= 11,258 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 94.42' @ 12.11 hrs Surf.Area= 1,826 sf Storage= 2,519 cf

Plug-Flow detention time= 46.4 min calculated for 18,073 cf (100% of inflow)
Center-of-Mass det. time= 46.4 min (818.7 - 772.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	92.30'	1,465 cf	**20.50'W x 89.06'L x 3.50'H Field A** 6,390 cf Overall - 2,205 cf Embedded = 4,185 cf x 35.0% Voids
#2A	92.80'	2,205 cf	**ADS_StormTech SC-740 +Cap**x 48 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 4 Rows of 12 Chambers
		3,670 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	93.14'	**24.0" Round OCS Outlet Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 93.14' / 93.14' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Discarded	92.30'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#3	Primary	94.90'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.1 cfs @ 8.19 hrs HW=92.34' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=4.8 cfs @ 12.11 hrs HW=94.42' (Free Discharge)
├**1=OCS Outlet Culvert** (Barrel Controls 4.8 cfs @ 3.26 fps)
└**3=Broad-Crested Rectangular Weir**(Controls 0.0 cfs)

Summary for Pond P3: Subsurface Infiltration System

[93] Warning: Storage range exceeded by 0.56'

Inflow Area = 23,624 sf, 85.40% Impervious, Inflow Depth = 4.02" for 10-yr event
Inflow = 2.5 cfs @ 12.07 hrs, Volume= 7,916 cf
Outflow = 2.5 cfs @ 12.07 hrs, Volume= 6,941 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.0 cfs @ 6.89 hrs, Volume= 1,553 cf
Primary = 2.5 cfs @ 12.07 hrs, Volume= 5,388 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 95.26' @ 12.07 hrs Surf.Area= 749 sf Storage= 1,455 cf

Plug-Flow detention time= 133.4 min calculated for 6,938 cf (88% of inflow)
Center-of-Mass det. time= 77.4 min (863.0 - 785.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	91.20'	628 cf	**30.00'W x 24.98'L x 3.50'H Field A** 2,623 cf Overall - 827 cf Embedded = 1,796 cf x 35.0% Voids
#2A	91.70'	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 6 Rows of 3 Chambers
		1,455 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	94.20'	**12.0" Round Culvert** L= 77.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 94.20' / 93.80' S= 0.0052 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Discarded	91.20'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 6.89 hrs HW=91.24' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=2.5 cfs @ 12.07 hrs HW=95.26' (Free Discharge)
└**1=Culvert** (Barrel Controls 2.5 cfs @ 3.73 fps)

Summary for Link DP-1: Ex LCB

Inflow Area = 18,641 sf, 79.21% Impervious, Inflow Depth = 4.13" for 10-yr event
Inflow = 1.6 cfs @ 12.17 hrs, Volume= 6,413 cf
Primary = 1.6 cfs @ 12.17 hrs, Volume= 6,413 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Route 3 Ditch

Inflow Area = 6,095 sf, 19.06% Impervious, Inflow Depth = 3.21" for 10-yr event
Inflow = 0.5 cfs @ 12.09 hrs, Volume= 1,631 cf
Primary = 0.5 cfs @ 12.09 hrs, Volume= 1,631 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Old Oak Street Drainage System

Inflow Area = 49,904 sf, 88.92% Impervious, Inflow Depth = 2.71" for 10-yr event
Inflow = 4.8 cfs @ 12.11 hrs, Volume= 11,258 cf
Primary = 4.8 cfs @ 12.11 hrs, Volume= 11,258 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Ex Headwall at Corner

Inflow Area = 37,714 sf, 71.51% Impervious, Inflow Depth = 1.87" for 10-yr event
Inflow = 2.6 cfs @ 12.07 hrs, Volume= 5,882 cf
Primary = 2.6 cfs @ 12.07 hrs, Volume= 5,882 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Old Oak Street

Inflow Area = 10,239 sf, 31.72% Impervious, Inflow Depth = 1.91" for 10-yr event
Inflow = 0.5 cfs @ 12.08 hrs, Volume= 1,628 cf
Primary = 0.5 cfs @ 12.08 hrs, Volume= 1,628 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPR-1: Rear Parking Lot Runoff Area=18,641 sf 79.21% Impervious Runoff Depth=5.93"
Flow Length=164' Tc=12.9 min CN=92 Runoff=2.2 cfs 9,206 cf

SubcatchmentPR-2: Western Corner of Site Runoff Area=6,095 sf 19.06% Impervious Runoff Depth=4.91"
Flow Length=50' Slope=0.0125 '/' Tc=6.6 min CN=83 Runoff=0.8 cfs 2,491 cf

SubcatchmentPR-3: Southern/CentralPortion of Site Runoff Area=49,904 sf 88.92% Impervious Runoff Depth=6.16"
Flow Length=320' Tc=5.0 min CN=94 Runoff=7.8 cfs 25,614 cf

SubcatchmentPR-4A: Northeast; Roof, Pavement and Landsdcaping Runoff Area=23,624 sf 85.40% Impervious Runoff Depth=5.81"
Flow Length=302' Tc=5.0 min CN=91 Runoff=3.6 cfs 11,440 cf

SubcatchmentPR-4B: New Roof Runoff Area=6,522 sf 100.00% Impervious Runoff Depth=6.63"
Flow Length=50' Slope=0.0150 '/' Tc=5.0 min CN=98 Runoff=1.0 cfs 3,604 cf

SubcatchmentPR-4C: Northeast Pervious Area Runoff Area=7,568 sf 3.61% Impervious Runoff Depth=1.68"
Flow Length=137' Tc=5.0 min CN=51 Runoff=0.3 cfs 1,061 cf

SubcatchmentPR-5: Southeastern Portion of Site Runoff Area=10,239 sf 31.72% Impervious Runoff Depth=3.31"
Flow Length=79' Tc=5.0 min CN=68 Runoff=0.9 cfs 2,820 cf

Pond P1: Subsurface Infiltration System Peak Elev=94.74' Storage=1,611 cf Inflow=1.0 cfs 3,604 cf
Discarded=0.0 cfs 1,863 cf Primary=0.3 cfs 814 cf Outflow=0.3 cfs 2,677 cf

Pond P2: Subsurface Infiltration System Peak Elev=94.70' Storage=2,837 cf Inflow=7.8 cfs 25,614 cf
Discarded=0.1 cfs 7,762 cf Primary=7.0 cfs 17,852 cf Outflow=7.1 cfs 25,614 cf

Pond P3: Subsurface Infiltration System Peak Elev=95.98' Storage=1,455 cf Inflow=3.6 cfs 11,440 cf
Discarded=0.0 cfs 1,639 cf Primary=3.6 cfs 8,988 cf Outflow=3.6 cfs 10,626 cf

Link DP-1: Ex LCB Inflow=2.2 cfs 9,206 cf
Primary=2.2 cfs 9,206 cf

Link DP-2: Route 3 Ditch Inflow=0.8 cfs 2,491 cf
Primary=0.8 cfs 2,491 cf

Link DP-3: Old Oak Street Drainage System Inflow=7.0 cfs 17,852 cf
Primary=7.0 cfs 17,852 cf

Link DP-4: Ex Headwall at Corner Inflow=3.9 cfs 10,863 cf
Primary=3.9 cfs 10,863 cf

Link DP-5: Old Oak Street Inflow=0.9 cfs 2,820 cf
Primary=0.9 cfs 2,820 cf

Total Runoff Area = 122,593 sf Runoff Volume = 56,237 cf Average Runoff Depth = 5.50"
26.16% Pervious = 32,071 sf 73.84% Impervious = 90,522 sf

Summary for Subcatchment PR-1: Rear Parking Lot

Runoff = 2.2 cfs @ 12.17 hrs, Volume= 9,206 cf, Depth= 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=6.87"

	Area (sf)	CN	Description
	1,224	49	50-75% Grass cover, Fair, HSG A
*	9,629	98	Impervious
*	5,137	98	Roof
	2,651	79	Woods, Fair, HSG D
	18,641	92	Weighted Average
	3,875		20.79% Pervious Area
	14,766		79.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	41	0.0125	0.06		**Sheet Flow, Wooded** Woods: Light underbrush n= 0.400 P2= 3.40"
0.6	123	0.0330	3.69		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
12.9	164	Total			

Summary for Subcatchment PR-2: Western Corner of Site

Runoff = 0.8 cfs @ 12.09 hrs, Volume= 2,491 cf, Depth= 4.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=6.87"

	Area (sf)	CN	Description
	685	49	50-75% Grass cover, Fair, HSG A
*	1,162	98	Impervious
	4,248	84	50-75% Grass cover, Fair, HSG D
	6,095	83	Weighted Average
	4,933		80.94% Pervious Area
	1,162		19.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	50	0.0125	0.13		**Sheet Flow, Grassed** Grass: Short n= 0.150 P2= 3.40"

Summary for Subcatchment PR-3: Southern/Central Portion of Site

Runoff = 7.8 cfs @ 12.07 hrs, Volume= 25,614 cf, Depth= 6.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=6.87"

	Area (sf)	CN	Description
	3,882	49	50-75% Grass cover, Fair, HSG A
	43,279	98	Paved parking, HSG A
*	1,097	98	Roof
	1,646	84	50-75% Grass cover, Fair, HSG D
	49,904	94	Weighted Average
	5,528		11.08% Pervious Area
	44,376		88.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0150	1.10		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.40"
1.0	220	0.0320	3.63		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.2	50	0.0050	3.47	2.73	**Pipe Channel, Piped System** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
2.0	320	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-4A: Northeast; Roof, Pavement and Landsdcaping

Runoff = 3.6 cfs @ 12.07 hrs, Volume= 11,440 cf, Depth= 5.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=6.87"

	Area (sf)	CN	Description
	3,449	49	50-75% Grass cover, Fair, HSG A
	15,045	98	Paved parking, HSG A
*	5,130	98	Roof
	23,624	91	Weighted Average
	3,449		14.60% Pervious Area
	20,175		85.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	38	0.3300	3.59		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.9	225	0.0400	4.06		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.2	39	0.0050	4.17	3.28	**Pipe Channel, Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
1.3	302	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-4B: New Roof

Runoff = 1.0 cfs @ 12.07 hrs, Volume= 3,604 cf, Depth= 6.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=6.87"

	Area (sf)	CN	Description
*	6,522	98	Roof
	6,522		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0150	1.10		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.8	50	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-4C: Northeast Pervious Area

Runoff = 0.3 cfs @ 12.09 hrs, Volume= 1,061 cf, Depth= 1.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=6.87"

Area (sf)	CN	Description
7,295	49	50-75% Grass cover, Fair, HSG A
273	98	Paved parking, HSG A
7,568	51	Weighted Average
7,295		96.39% Pervious Area
273		3.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	35	0.0570	0.22		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.40"
1.2	102	0.0090	1.42		**Shallow Concentrated Flow, Grassed** Grassed Waterway Kv= 15.0 fps
3.9	137	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-5: Southeastern Portion of Site

Runoff = 0.9 cfs @ 12.08 hrs, Volume= 2,820 cf, Depth= 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=6.87"

	Area (sf)	CN	Description
	6,035	49	50-75% Grass cover, Fair, HSG A
*	3,248	98	Impervious
	956	84	50-75% Grass cover, Fair, HSG D
	10,239	68	Weighted Average
	6,991		68.28% Pervious Area
	3,248		31.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	18	0.0110	0.10		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.40"
0.6	61	0.0330	1.57		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.40"
3.7	79	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P1: Subsurface Infiltration System

Inflow Area = 6,522 sf,100.00% Impervious, Inflow Depth = 6.63" for 50-yr event
Inflow = 1.0 cfs @ 12.07 hrs, Volume= 3,604 cf
Outflow = 0.3 cfs @ 12.35 hrs, Volume= 2,677 cf, Atten= 69%, Lag= 17.0 min
Discarded = 0.0 cfs @ 7.17 hrs, Volume= 1,863 cf
Primary = 0.3 cfs @ 12.35 hrs, Volume= 814 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 94.74' @ 12.35 hrs Surf.Area= 842 sf Storage= 1,611 cf

Plug-Flow detention time= 296.1 min calculated for 2,677 cf (74% of inflow)
Center-of-Mass det. time= 207.1 min (949.4 - 742.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	91.40'	694 cf	**15.75'W x 53.46'L x 3.50'H Field A** 2,947 cf Overall - 965 cf Embedded = 1,982 cf x 35.0% Voids
#2A	91.90'	965 cf	**ADS_StormTech SC-740 +Cap**x 21 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 3 Rows of 7 Chambers
		1,658 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	94.40'	**12.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 94.40' / 94.30' S= 0.0033 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Discarded	91.40'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 7.17 hrs HW=91.44' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.3 cfs @ 12.35 hrs HW=94.74' (Free Discharge)
↑**1=Culvert** (Barrel Controls 0.3 cfs @ 1.96 fps)

Summary for Pond P2: Subsurface Infiltration System

Inflow Area = 49,904 sf, 88.92% Impervious, Inflow Depth = 6.16" for 50-yr event
Inflow = 7.8 cfs @ 12.07 hrs, Volume= 25,614 cf
Outflow = 7.1 cfs @ 12.11 hrs, Volume= 25,614 cf, Atten= 9%, Lag= 2.1 min
Discarded = 0.1 cfs @ 6.85 hrs, Volume= 7,762 cf
Primary = 7.0 cfs @ 12.11 hrs, Volume= 17,852 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 94.70' @ 12.11 hrs Surf.Area= 1,826 sf Storage= 2,837 cf

Plug-Flow detention time= 42.2 min calculated for 25,606 cf (100% of inflow)
Center-of-Mass det. time= 42.2 min (806.3 - 764.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	92.30'	1,465 cf	**20.50'W x 89.06'L x 3.50'H Field A** 6,390 cf Overall - 2,205 cf Embedded = 4,185 cf x 35.0% Voids
#2A	92.80'	2,205 cf	**ADS_StormTech SC-740 +Cap**x 48 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 4 Rows of 12 Chambers
		3,670 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	93.14'	**24.0" Round OCS Outlet Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 93.14' / 93.14' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Discarded	92.30'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#3	Primary	94.90'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.1 cfs @ 6.85 hrs HW=92.34' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=7.0 cfs @ 12.11 hrs HW=94.70' (Free Discharge)
├**1=OCS Outlet Culvert** (Barrel Controls 7.0 cfs @ 3.66 fps)
└**3=Broad-Crested Rectangular Weir**(Controls 0.0 cfs)

Summary for Pond P3: Subsurface Infiltration System

[93] Warning: Storage range exceeded by 1.28'
[88] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 23,624 sf, 85.40% Impervious, Inflow Depth = 5.81" for 50-yr event
Inflow = 3.6 cfs @ 12.07 hrs, Volume= 11,440 cf
Outflow = 3.6 cfs @ 12.07 hrs, Volume= 10,626 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.0 cfs @ 5.42 hrs, Volume= 1,639 cf
Primary = 3.6 cfs @ 12.07 hrs, Volume= 8,988 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 95.98' @ 12.07 hrs Surf.Area= 749 sf Storage= 1,455 cf

Plug-Flow detention time= 95.2 min calculated for 10,623 cf (93% of inflow)
Center-of-Mass det. time= 57.5 min (833.5 - 776.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	91.20'	628 cf	**30.00'W x 24.98'L x 3.50'H Field A** 2,623 cf Overall - 827 cf Embedded = 1,796 cf x 35.0% Voids
#2A	91.70'	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 6 Rows of 3 Chambers
		1,455 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	94.20'	**12.0" Round Culvert** L= 77.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 94.20' / 93.80' S= 0.0052 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Discarded	91.20'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 5.42 hrs HW=91.24' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=3.6 cfs @ 12.07 hrs HW=95.98' (Free Discharge)
└**1=Culvert** (Barrel Controls 3.6 cfs @ 4.61 fps)

Summary for Link DP-1: Ex LCB

Inflow Area = 18,641 sf, 79.21% Impervious, Inflow Depth = 5.93" for 50-yr event
Inflow = 2.2 cfs @ 12.17 hrs, Volume= 9,206 cf
Primary = 2.2 cfs @ 12.17 hrs, Volume= 9,206 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Route 3 Ditch

Inflow Area = 6,095 sf, 19.06% Impervious, Inflow Depth = 4.91" for 50-yr event
Inflow = 0.8 cfs @ 12.09 hrs, Volume= 2,491 cf
Primary = 0.8 cfs @ 12.09 hrs, Volume= 2,491 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Old Oak Street Drainage System

Inflow Area = 49,904 sf, 88.92% Impervious, Inflow Depth = 4.29" for 50-yr event
Inflow = 7.0 cfs @ 12.11 hrs, Volume= 17,852 cf
Primary = 7.0 cfs @ 12.11 hrs, Volume= 17,852 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Ex Headwall at Corner

Inflow Area = 37,714 sf, 71.51% Impervious, Inflow Depth = 3.46" for 50-yr event
Inflow = 3.9 cfs @ 12.07 hrs, Volume= 10,863 cf
Primary = 3.9 cfs @ 12.07 hrs, Volume= 10,863 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Old Oak Street

Inflow Area = 10,239 sf, 31.72% Impervious, Inflow Depth = 3.31" for 50-yr event
Inflow = 0.9 cfs @ 12.08 hrs, Volume= 2,820 cf
Primary = 0.9 cfs @ 12.08 hrs, Volume= 2,820 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentPR-1: Rear Parking Lot Runoff Area=18,641 sf 79.21% Impervious Runoff Depth=6.72"
Flow Length=164' Tc=12.9 min CN=92 Runoff=2.5 cfs 10,434 cf

SubcatchmentPR-2: Western Corner of Site Runoff Area=6,095 sf 19.06% Impervious Runoff Depth=5.66"
Flow Length=50' Slope=0.0125 '/' Tc=6.6 min CN=83 Runoff=0.9 cfs 2,876 cf

SubcatchmentPR-3: Southern/CentralPortion of Site Runoff Area=49,904 sf 88.92% Impervious Runoff Depth=6.95"
Flow Length=320' Tc=5.0 min CN=94 Runoff=8.8 cfs 28,919 cf

SubcatchmentPR-4A: Northeast; Roof, Pavement and Landsdcaping Runoff Area=23,624 sf 85.40% Impervious Runoff Depth=6.60"
Flow Length=302' Tc=5.0 min CN=91 Runoff=4.0 cfs 12,991 cf

SubcatchmentPR-4B: New Roof Runoff Area=6,522 sf 100.00% Impervious Runoff Depth=7.43"
Flow Length=50' Slope=0.0150 '/' Tc=5.0 min CN=98 Runoff=1.2 cfs 4,038 cf

SubcatchmentPR-4C: Northeast Pervious Area Runoff Area=7,568 sf 3.61% Impervious Runoff Depth=2.15"
Flow Length=137' Tc=5.0 min CN=51 Runoff=0.4 cfs 1,357 cf

SubcatchmentPR-5: Southeastern Portion of Site Runoff Area=10,239 sf 31.72% Impervious Runoff Depth=3.96"
Flow Length=79' Tc=5.0 min CN=68 Runoff=1.1 cfs 3,379 cf

Pond P1: Subsurface Infiltration System Peak Elev=94.84' Storage=1,641 cf Inflow=1.2 cfs 4,038 cf
Discarded=0.0 cfs 1,897 cf Primary=0.5 cfs 1,180 cf Outflow=0.5 cfs 3,077 cf

Pond P2: Subsurface Infiltration System Peak Elev=94.82' Storage=2,958 cf Inflow=8.8 cfs 28,919 cf
Discarded=0.1 cfs 8,052 cf Primary=7.9 cfs 20,867 cf Outflow=8.0 cfs 28,919 cf

Pond P3: Subsurface Infiltration System Peak Elev=96.25' Storage=1,455 cf Inflow=4.0 cfs 12,991 cf
Discarded=0.0 cfs 1,666 cf Primary=4.0 cfs 10,347 cf Outflow=4.0 cfs 12,013 cf

Link DP-1: Ex LCB Inflow=2.5 cfs 10,434 cf
Primary=2.5 cfs 10,434 cf

Link DP-2: Route 3 Ditch Inflow=0.9 cfs 2,876 cf
Primary=0.9 cfs 2,876 cf

Link DP-3: Old Oak Street Drainage System Inflow=7.9 cfs 20,867 cf
Primary=7.9 cfs 20,867 cf

Link DP-4: Ex Headwall at Corner Inflow=4.4 cfs 12,884 cf
Primary=4.4 cfs 12,884 cf

Link DP-5: Old Oak Street Inflow=1.1 cfs 3,379 cf
Primary=1.1 cfs 3,379 cf

Total Runoff Area = 122,593 sf Runoff Volume = 63,994 cf Average Runoff Depth = 6.26"
26.16% Pervious = 32,071 sf 73.84% Impervious = 90,522 sf

Summary for Subcatchment PR-1: Rear Parking Lot

Runoff = 2.5 cfs @ 12.17 hrs, Volume= 10,434 cf, Depth= 6.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.67"

	Area (sf)	CN	Description
	1,224	49	50-75% Grass cover, Fair, HSG A
*	9,629	98	Impervious
*	5,137	98	Roof
	2,651	79	Woods, Fair, HSG D
	18,641	92	Weighted Average
	3,875		20.79% Pervious Area
	14,766		79.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	41	0.0125	0.06		**Sheet Flow, Wooded** Woods: Light underbrush n= 0.400 P2= 3.40"
0.6	123	0.0330	3.69		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
12.9	164	Total			

Summary for Subcatchment PR-2: Western Corner of Site

Runoff = 0.9 cfs @ 12.09 hrs, Volume= 2,876 cf, Depth= 5.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.67"

	Area (sf)	CN	Description
	685	49	50-75% Grass cover, Fair, HSG A
*	1,162	98	Impervious
	4,248	84	50-75% Grass cover, Fair, HSG D
	6,095	83	Weighted Average
	4,933		80.94% Pervious Area
	1,162		19.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	50	0.0125	0.13		**Sheet Flow, Grassed** Grass: Short n= 0.150 P2= 3.40"

Summary for Subcatchment PR-3: Southern/Central Portion of Site

Runoff = 8.8 cfs @ 12.07 hrs, Volume= 28,919 cf, Depth= 6.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.67"

	Area (sf)	CN	Description
	3,882	49	50-75% Grass cover, Fair, HSG A
	43,279	98	Paved parking, HSG A
*	1,097	98	Roof
	1,646	84	50-75% Grass cover, Fair, HSG D
	49,904	94	Weighted Average
	5,528		11.08% Pervious Area
	44,376		88.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0150	1.10		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.40"
1.0	220	0.0320	3.63		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.2	50	0.0050	3.47	2.73	**Pipe Channel, Piped System** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
2.0	320	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-4A: Northeast; Roof, Pavement and Landsdcaping

Runoff = 4.0 cfs @ 12.07 hrs, Volume= 12,991 cf, Depth= 6.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.67"

	Area (sf)	CN	Description
	3,449	49	50-75% Grass cover, Fair, HSG A
	15,045	98	Paved parking, HSG A
*	5,130	98	Roof
	23,624	91	Weighted Average
	3,449		14.60% Pervious Area
	20,175		85.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	38	0.3300	3.59		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.9	225	0.0400	4.06		**Shallow Concentrated Flow, Pavement** Paved Kv= 20.3 fps
0.2	39	0.0050	4.17	3.28	**Pipe Channel, Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
1.3	302	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-4B: New Roof

Runoff = 1.2 cfs @ 12.07 hrs, Volume= 4,038 cf, Depth= 7.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.67"

	Area (sf)	CN	Description
*	6,522	98	Roof
	6,522		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0150	1.10		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 3.40"
0.8	50	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-4C: Northeast Pervious Area

Runoff = 0.4 cfs @ 12.08 hrs, Volume= 1,357 cf, Depth= 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.67"

Area (sf)	CN	Description
7,295	49	50-75% Grass cover, Fair, HSG A
273	98	Paved parking, HSG A
7,568	51	Weighted Average
7,295		96.39% Pervious Area
273		3.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	35	0.0570	0.22		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.40"
1.2	102	0.0090	1.42		**Shallow Concentrated Flow, Grassed** Grassed Waterway Kv= 15.0 fps
3.9	137	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment PR-5: Southeastern Portion of Site

Runoff = 1.1 cfs @ 12.08 hrs, Volume= 3,379 cf, Depth= 3.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=7.67"

	Area (sf)	CN	Description
	6,035	49	50-75% Grass cover, Fair, HSG A
*	3,248	98	Impervious
	956	84	50-75% Grass cover, Fair, HSG D
	10,239	68	Weighted Average
	6,991		68.28% Pervious Area
	3,248		31.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	18	0.0110	0.10		**Sheet Flow, Grass** Grass: Short n= 0.150 P2= 3.40"
0.6	61	0.0330	1.57		**Sheet Flow, Pavement** Smooth surfaces n= 0.011 P2= 3.40"
3.7	79	Total, Increased to minimum Tc = 5.0 min			

Summary for Pond P1: Subsurface Infiltration System

Inflow Area = 6,522 sf,100.00% Impervious, Inflow Depth = 7.43" for 100-yr event
Inflow = 1.2 cfs @ 12.07 hrs, Volume= 4,038 cf
Outflow = 0.5 cfs @ 12.22 hrs, Volume= 3,077 cf, Atten= 55%, Lag= 9.1 min
Discarded = 0.0 cfs @ 6.73 hrs, Volume= 1,897 cf
Primary = 0.5 cfs @ 12.22 hrs, Volume= 1,180 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 94.84' @ 12.22 hrs Surf.Area= 842 sf Storage= 1,641 cf

Plug-Flow detention time= 265.2 min calculated for 3,076 cf (76% of inflow)
Center-of-Mass det. time= 179.7 min (920.6 - 740.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	91.40'	694 cf	**15.75'W x 53.46'L x 3.50'H Field A** 2,947 cf Overall - 965 cf Embedded = 1,982 cf x 35.0% Voids
#2A	91.90'	965 cf	**ADS_StormTech SC-740 +Cap**x 21 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 3 Rows of 7 Chambers
		1,658 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	94.40'	**12.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 94.40' / 94.30' S= 0.0033 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Discarded	91.40'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 6.73 hrs HW=91.44' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=0.5 cfs @ 12.22 hrs HW=94.84' (Free Discharge)
↑**1=Culvert** (Barrel Controls 0.5 cfs @ 2.24 fps)

Summary for Pond P2: Subsurface Infiltration System

Inflow Area = 49,904 sf, 88.92% Impervious, Inflow Depth = 6.95" for 100-yr event
Inflow = 8.8 cfs @ 12.07 hrs, Volume= 28,919 cf
Outflow = 8.0 cfs @ 12.10 hrs, Volume= 28,919 cf, Atten= 8%, Lag= 2.0 min
Discarded = 0.1 cfs @ 6.42 hrs, Volume= 8,052 cf
Primary = 7.9 cfs @ 12.10 hrs, Volume= 20,867 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 94.82' @ 12.10 hrs Surf.Area= 1,826 sf Storage= 2,958 cf

Plug-Flow detention time= 40.2 min calculated for 28,909 cf (100% of inflow)
Center-of-Mass det. time= 40.2 min (801.7 - 761.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	92.30'	1,465 cf	**20.50'W x 89.06'L x 3.50'H Field A** 6,390 cf Overall - 2,205 cf Embedded = 4,185 cf x 35.0% Voids
#2A	92.80'	2,205 cf	**ADS_StormTech SC-740 +Cap**x 48 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 4 Rows of 12 Chambers
		3,670 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	93.14'	**24.0" Round OCS Outlet Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 93.14' / 93.14' S= 0.0000 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Discarded	92.30'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.01'
#3	Primary	94.90'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Discarded OutFlow Max=0.1 cfs @ 6.42 hrs HW=92.34' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.1 cfs)

Primary OutFlow Max=7.9 cfs @ 12.10 hrs HW=94.82' (Free Discharge)
├**1=OCS Outlet Culvert** (Barrel Controls 7.9 cfs @ 3.81 fps)
└**3=Broad-Crested Rectangular Weir**(Controls 0.0 cfs)

Summary for Pond P3: Subsurface Infiltration System

[93] Warning: Storage range exceeded by 1.55'

Inflow Area = 23,624 sf, 85.40% Impervious, Inflow Depth = 6.60" for 100-yr event
Inflow = 4.0 cfs @ 12.07 hrs, Volume= 12,991 cf
Outflow = 4.0 cfs @ 12.07 hrs, Volume= 12,013 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.0 cfs @ 4.86 hrs, Volume= 1,666 cf
Primary = 4.0 cfs @ 12.07 hrs, Volume= 10,347 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 96.25' @ 12.07 hrs Surf.Area= 749 sf Storage= 1,455 cf

Plug-Flow detention time= 93.9 min calculated for 12,009 cf (92% of inflow)
Center-of-Mass det. time= 54.4 min (827.3 - 772.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	91.20'	628 cf	**30.00'W x 24.98'L x 3.50'H Field A** 2,623 cf Overall - 827 cf Embedded = 1,796 cf x 35.0% Voids
#2A	91.70'	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 6 Rows of 3 Chambers
		1,455 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	94.20'	**12.0" Round Culvert** L= 77.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 94.20' / 93.80' S= 0.0052 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Discarded	91.20'	**1.020 in/hr Exfiltration over Surface area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 4.86 hrs HW=91.24' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.0 cfs)

Primary OutFlow Max=4.0 cfs @ 12.07 hrs HW=96.25' (Free Discharge)
└**1=Culvert** (Barrel Controls 4.0 cfs @ 5.12 fps)

Summary for Link DP-1: Ex LCB

Inflow Area = 18,641 sf, 79.21% Impervious, Inflow Depth = 6.72" for 100-yr event
Inflow = 2.5 cfs @ 12.17 hrs, Volume= 10,434 cf
Primary = 2.5 cfs @ 12.17 hrs, Volume= 10,434 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-2: Route 3 Ditch

Inflow Area = 6,095 sf, 19.06% Impervious, Inflow Depth = 5.66" for 100-yr event
Inflow = 0.9 cfs @ 12.09 hrs, Volume= 2,876 cf
Primary = 0.9 cfs @ 12.09 hrs, Volume= 2,876 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-3: Old Oak Street Drainage System

Inflow Area = 49,904 sf, 88.92% Impervious, Inflow Depth = 5.02" for 100-yr event
Inflow = 7.9 cfs @ 12.10 hrs, Volume= 20,867 cf
Primary = 7.9 cfs @ 12.10 hrs, Volume= 20,867 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-4: Ex Headwall at Corner

Inflow Area = 37,714 sf, 71.51% Impervious, Inflow Depth = 4.10" for 100-yr event
Inflow = 4.4 cfs @ 12.07 hrs, Volume= 12,884 cf
Primary = 4.4 cfs @ 12.07 hrs, Volume= 12,884 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Summary for Link DP-5: Old Oak Street

Inflow Area = 10,239 sf, 31.72% Impervious, Inflow Depth = 3.96" for 100-yr event
Inflow = 1.1 cfs @ 12.08 hrs, Volume= 3,379 cf
Primary = 1.1 cfs @ 12.08 hrs, Volume= 3,379 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Recharge Calculations

Recharge Calculations

Project Name: Urgent Care Facilit **Proj. No.:** 14239.00
Date: 11/14/2018
Project Location: Pembroke, MA **Calculated by:** AFG

Proposed New Impervious Surface Summary

Net Proposed New Impervious Areas by Hydrologic Soil Group (HSG) in acres

Subcatchment	HSG A	HSG B	HSG C	HSG D	Total Area
PR-3	-0.16		0		0
PR-4	0.15		0		0
TOTAL	**-0.01**	**0.00**	**0.00**	**0.00**	**-0.01**

Project proposes to increase impervious area in PR-4.

Required Recharge Volume in PR-4 (Cubic Feet)

HSG	Area (acres)	Recharge Depth* (in.)	Volume (c.f.)
A	0.1	0.60	317
B	0.0	0.35	0
C	0.0	0.25	0
D	0.0	0.10	0
TOTAL			**317**

Assumptions:

* Massachusetts DEP Infiltration requirement: HSG A = 0.60 in; HSG B = 0.35 in; HSG C = 0.25 in; HSG D = 0.10 in.

Capture Area Adjustment

Required Recharge Volume	317	c.f.
Total Impervious Area in PR-4	0.15	acres
Total Impervious Area Draining to Recharge Facilities in PR-4	0.15	acres
Capture Area Adjustment Factor	1.00	-
Adjusted Required Recharge Volume:	**317**	**c.f.**

Subcatchment PR-3

Project does not result in an increase in impervious area in PR-4.
Project proposes to remove the three existing leaching catch basins in this scubcatchment and replace their infiltration capacity with Subsurface System P2.

Estimated Storage Provided By Existing LCBs to be Removed:

LCBs are ±3' deep. Assume LCBs are 8' diameter with 4' perimiter of stone.

Volume provided by each Existing LCB =	603	cf
Total Volume Provided by Existing LCBs=	1809	cf

Infiltration Volume Provided by System P2 & Surrounding Stone: 3670 cf*
*From HydroCAD Model

Subcatchment PR-4

Project results in an increase in impervious area in PR-3 by 0.15 ac.
Project proposes to infiltrate runoff in Subsurface Infiltration Systems P1 and P3.

Infiltration Volume Provided by System P1 & Surrounding Stone: 1658 cf*
*From HydroCAD Model

Infiltration Volume Provided by System P3 & Surrounding Stone: 1455 cf*
*From HydroCAD Model

Drawdown Calculations

Hydrograph for Pond P1: Subsurface Infiltration System

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.0	0	91.40	0.0	0.0	0.0
2.00	0.0	4	91.41	0.0	0.0	0.0
4.00	0.0	7	91.42	0.0	0.0	0.0
6.00	0.0	10	91.43	0.0	**0.0**	0.0
8.00	0.0	34	91.51	0.0	**0.0**	0.0
10.00	0.1	188	91.96	0.0	0.0	0.0
12.00	**0.8**	**1,067**	**93.39**	**0.0**	0.0	**0.0**
14.00	**0.1**	**1,548**	**94.53**	**0.1**	0.0	**0.0**
16.00	0.0	1,533	94.47	0.0	0.0	0.0
18.00	0.0	1,518	94.42	0.0	0.0	0.0
20.00	0.0	1,494	94.34	0.0	0.0	0.0
22.00	0.0	1,451	94.21	0.0	0.0	0.0
24.00	0.0	1,389	94.05	0.0	0.0	0.0
26.00	0.0	1,248	93.74	0.0	0.0	0.0
28.00	0.0	1,105	93.46	0.0	0.0	0.0
30.00	0.0	962	93.21	0.0	0.0	0.0
32.00	0.0	819	92.96	0.0	0.0	0.0
34.00	0.0	676	92.73	0.0	0.0	0.0
36.00	0.0	533	92.50	0.0	0.0	0.0
38.00	0.0	390	92.27	0.0	0.0	0.0
40.00	0.0	246	92.05	0.0	0.0	0.0
42.00	0.0	103	91.75	0.0	0.0	0.0
44.00	0.0	0	91.40	0.0	0.0	0.0
46.00	0.0	0	91.40	0.0	0.0	0.0
48.00	0.0	0	91.40	0.0	0.0	0.0
50.00	0.0	0	91.40	0.0	0.0	0.0
52.00	0.0	0	91.40	0.0	0.0	0.0
54.00	0.0	0	91.40	0.0	0.0	0.0
56.00	0.0	0	91.40	0.0	0.0	0.0
58.00	0.0	0	91.40	0.0	0.0	0.0
60.00	0.0	0	91.40	0.0	0.0	0.0
62.00	0.0	0	91.40	0.0	0.0	0.0
64.00	0.0	0	91.40	0.0	0.0	0.0
66.00	0.0	0	91.40	0.0	0.0	0.0
68.00	0.0	0	91.40	0.0	0.0	0.0
70.00	0.0	0	91.40	0.0	0.0	0.0
72.00	0.0	0	91.40	0.0	0.0	0.0
74.00	0.0	0	91.40	0.0	0.0	0.0
76.00	0.0	0	91.40	0.0	0.0	0.0
78.00	0.0	0	91.40	0.0	0.0	0.0
80.00	0.0	0	91.40	0.0	0.0	0.0
82.00	0.0	0	91.40	0.0	0.0	0.0
84.00	0.0	0	91.40	0.0	0.0	0.0
86.00	0.0	0	91.40	0.0	0.0	0.0
88.00	0.0	0	91.40	0.0	0.0	0.0
90.00	0.0	0	91.40	0.0	0.0	0.0
92.00	0.0	0	91.40	0.0	0.0	0.0
94.00	0.0	0	91.40	0.0	0.0	0.0
96.00	0.0	0	91.40	0.0	0.0	0.0

Hydrograph for Pond P2: Subsurface Infiltration System

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.0	0	92.30	0.0	0.0	0.0
2.00	0.0	1	92.30	0.0	0.0	0.0
4.00	0.0	10	92.32	0.0	0.0	0.0
6.00	0.1	19	92.33	0.1	**0.1**	0.0
8.00	0.2	242	92.68	0.1	**0.1**	0.0
10.00	0.4	1,238	93.44	0.3	0.1	0.2
12.00	**5.9**	**2,420**	**94.34**	**4.4**	0.1	**4.3**
14.00	**0.4**	**1,352**	**93.52**	**0.5**	0.1	**0.4**
16.00	0.2	1,187	93.40	0.3	0.1	0.2
18.00	0.1	1,065	93.31	0.2	0.1	0.1
20.00	0.1	984	93.26	0.1	0.1	0.0
22.00	0.1	912	93.21	0.1	0.1	0.0
24.00	0.1	782	93.12	0.1	0.1	0.0
26.00	0.0	70	92.41	0.1	0.1	0.0
28.00	0.0	0	92.30	0.0	0.0	0.0
30.00	0.0	0	92.30	0.0	0.0	0.0
32.00	0.0	0	92.30	0.0	0.0	0.0
34.00	0.0	0	92.30	0.0	0.0	0.0
36.00	0.0	0	92.30	0.0	0.0	0.0
38.00	0.0	0	92.30	0.0	0.0	0.0
40.00	0.0	0	92.30	0.0	0.0	0.0
42.00	0.0	0	92.30	0.0	0.0	0.0
44.00	0.0	0	92.30	0.0	0.0	0.0
46.00	0.0	0	92.30	0.0	0.0	0.0
48.00	0.0	0	92.30	0.0	0.0	0.0
50.00	0.0	0	92.30	0.0	0.0	0.0
52.00	0.0	0	92.30	0.0	0.0	0.0
54.00	0.0	0	92.30	0.0	0.0	0.0
56.00	0.0	0	92.30	0.0	0.0	0.0
58.00	0.0	0	92.30	0.0	0.0	0.0
60.00	0.0	0	92.30	0.0	0.0	0.0
62.00	0.0	0	92.30	0.0	0.0	0.0
64.00	0.0	0	92.30	0.0	0.0	0.0
66.00	0.0	0	92.30	0.0	0.0	0.0
68.00	0.0	0	92.30	0.0	0.0	0.0
70.00	0.0	0	92.30	0.0	0.0	0.0
72.00	0.0	0	92.30	0.0	0.0	0.0
74.00	0.0	0	92.30	0.0	0.0	0.0
76.00	0.0	0	92.30	0.0	0.0	0.0
78.00	0.0	0	92.30	0.0	0.0	0.0
80.00	0.0	0	92.30	0.0	0.0	0.0
82.00	0.0	0	92.30	0.0	0.0	0.0
84.00	0.0	0	92.30	0.0	0.0	0.0
86.00	0.0	0	92.30	0.0	0.0	0.0
88.00	0.0	0	92.30	0.0	0.0	0.0
90.00	0.0	0	92.30	0.0	0.0	0.0
92.00	0.0	0	92.30	0.0	0.0	0.0
94.00	0.0	0	92.30	0.0	0.0	0.0
96.00	0.0	0	92.30	0.0	0.0	0.0

Hydrograph for Pond P3: Subsurface Infiltration System

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.0	0	91.20	0.0	0.0	0.0
2.00	0.0	0	91.20	0.0	0.0	0.0
4.00	0.0	6	91.22	0.0	**0.0**	0.0
6.00	0.0	39	91.35	0.0	**0.0**	0.0
8.00	0.1	258	91.92	0.0	0.0	0.0
10.00	0.2	**940**	93.21	0.0	0.0	0.0
12.00	**2.7**	**1,455**	**95.33**	**2.7**	0.0	**2.7**
14.00	**0.2**	1,388	**94.44**	**0.2**	0.0	**0.2**
16.00	0.1	1,369	94.37	0.1	0.0	0.1
18.00	0.1	1,357	94.33	0.1	0.0	0.1
20.00	0.1	1,352	94.31	0.1	0.0	0.0
22.00	0.0	1,348	94.29	0.0	0.0	0.0
24.00	0.0	1,345	94.28	0.0	0.0	0.0
26.00	0.0	1,217	93.85	0.0	0.0	0.0
28.00	0.0	1,090	93.53	0.0	0.0	0.0
30.00	0.0	963	93.25	0.0	0.0	0.0
32.00	0.0	835	92.99	0.0	0.0	0.0
34.00	0.0	708	92.74	0.0	0.0	0.0
36.00	0.0	580	92.50	0.0	0.0	0.0
38.00	0.0	453	92.27	0.0	0.0	0.0
40.00	0.0	326	92.04	0.0	0.0	0.0
42.00	0.0	198	91.82	0.0	0.0	0.0
44.00	0.0	71	91.47	0.0	0.0	0.0
46.00	0.0	0	91.20	0.0	0.0	0.0
48.00	0.0	0	91.20	0.0	0.0	0.0
50.00	0.0	0	91.20	0.0	0.0	0.0
52.00	0.0	0	91.20	0.0	0.0	0.0
54.00	0.0	0	91.20	0.0	0.0	0.0
56.00	0.0	0	91.20	0.0	0.0	0.0
58.00	0.0	0	91.20	0.0	0.0	0.0
60.00	0.0	0	91.20	0.0	0.0	0.0
62.00	0.0	0	91.20	0.0	0.0	0.0
64.00	0.0	0	91.20	0.0	0.0	0.0
66.00	0.0	0	91.20	0.0	0.0	0.0
68.00	0.0	0	91.20	0.0	0.0	0.0
70.00	0.0	0	91.20	0.0	0.0	0.0
72.00	0.0	0	91.20	0.0	0.0	0.0
74.00	0.0	0	91.20	0.0	0.0	0.0
76.00	0.0	0	91.20	0.0	0.0	0.0
78.00	0.0	0	91.20	0.0	0.0	0.0
80.00	0.0	0	91.20	0.0	0.0	0.0
82.00	0.0	0	91.20	0.0	0.0	0.0
84.00	0.0	0	91.20	0.0	0.0	0.0
86.00	0.0	0	91.20	0.0	0.0	0.0
88.00	0.0	0	91.20	0.0	0.0	0.0
90.00	0.0	0	91.20	0.0	0.0	0.0
92.00	0.0	0	91.20	0.0	0.0	0.0
94.00	0.0	0	91.20	0.0	0.0	0.0
96.00	0.0	0	91.20	0.0	0.0	0.0

Water Quality Volume Calculations

Water Quality Volume Calculations

Project Name: Urgent Care Facility | **Proj. No.:** 14239.00
Date: Nov-18
Project Location: Pembroke, MA | **Calculated by:** AFG

Drainage Area PR-3

Water Quality Volume

Total Area of Impervious Cover (acres) = 1.0 Does not include roof areas.

Required WQV:

Required:	Runoff Depth to be Treated (in.)	Required Volume (cu.ft.)
	1.00	**3,607**

Subsurface Infiltration Basin P2

WQV (cu.ft.) Provided by SC-740 Chambers & Surrounding Stone = 3670*
*From HydroCAD Model

Drainage Area PR-4

Water Quality Volume

Total Area of Impervious Cover (acres) = 0.3 Does not include roof areas.

Required WQV:

Required:	Runoff Depth to be Treated (in.)	Required Volume (cu.ft.)
	1.00	**1,244**

Subsurface Infiltration Basin P3

WQV (cu.ft.) Provided by SC-740 Chambers & Surrounding Stone = 1455*
*From HydroCAD Model

TSS Removal Calculations

TSS Removal Calculation Worksheet

101 Walnut Street
Post Office Box 9151
Watertown, MA 02471
P 617.924.1770

Project Name:	**Urgent Care Facility**	Sheet:	**1 of 1**
Project Number:	**14239.00**	Date:	**14-Nov-2018**
Location:	**Pembroke, MA**	Computed by:	**AFG**
Discharge Point:	**DP-3 & DP-4**	Checked by:	**SRC**
Drainage Area(s):	**PR-3 & PR-4**		

1. Pre-Treatment prior to Infiltration

BMP*	TSS Removal Rate*	Starting TSS Load**	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**25%**	**100%**	**25%**	**75%**
Isolator Row	**25%**	**75%**	**19%**	**56%**
	0%	**56%**	**0%**	**56%**

Pre-Treatment TSS Removal = **44%**

2. Total TSS Removal including Pretreatment 1.

BMP*	TSS Removal Rate*	Starting TSS Load**	Amount Removed (C*D)	Remaining Load (D-E)
Subsurface Infiltration Structure	**80%**	**100%**	**80%**	**20%**
	0%	**20%**	**0%**	**20%**
	0%	**20%**	**0%**	**20%**
	0%	**20%**	**0%**	**20%**

* BMP and TSS Removal Rate Values from the MassDEP Stormwater Handbook Vol. 1.
** Equals remaining load from previous BMP (E)

Treatment Train TSS Removal = **80%**