# STORMWATER DRAINAGE CALULATIONS

Proposed Residential Development 365 Concord Street Rockland, MA 02370

Planning RCVD 1/7/22

APPLICANT: Conrock LLC P.O. Box 1414 Duxbury, MA 02331

SUBMITTED TO: Town of Rockland Planning Board 242 Union Street Rockland, MA 02370

PREPARED BY: Cavanaro Consulting, Inc. 687 Main Street Norwell, MA 02061

**REVISED 1/7/22** 



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# **SECTION I**

STORMWATER REPORT

#### **Existing & Proposed conditions:**

The locus property is approximately 21.3 acres and contains one single family home. Approximately 16.9 acres is upland and 4.4 is wetlands. The property is bordered to the west by the French Stream and an intermittent stream bisects the property. The property is bordered to the north and south by private property and to the east by approximately 100' of frontage on Concord Street and the remainder by private property.

The proposed development consists of 19 new single-family homes and maintaining the existing single family home. The development will only utilize the front portion of the property and not involve a wetland crossing to get to the remainder upland located on the east side of the intermittent stream. The total length of roadway is approximately 980 L.F. and will be constructed with full utilities and a sidewalk on one side. The site is relatively flat with a maximum change in grade of 6± feet and only a 4± foot differential within the area of the development.

#### 1.0 METHODOLOGY

The adequacy of drainage structures and their ability to function properly must be analyzed to minimize detrimental effects due to flooding conditions. The impacts of storm water are mitigated through several mechanisms such as infiltration, transportation and evaporation. The remaining runoff, can be quantified through developed and accepted methods. By determining the characteristics of site specific storm water conditions, mitigating efforts can be taken to avoid floodwater damage by constructing control devices. Designing and analyzing these facilities requires the acquisition of site data through observations, computer modeling the watershed, and the interpretation and application of the calculated values.

#### 2.0 OVERVIEW

Cavanaro Consulting (CC) has analyzed the existing structures on and adjacent to the site utilizing the HydroCad 10.0 Stormwater modeling program. Storm rainfall, run-off curve numbers, and other site characteristics are input into the program. The results of calculations are output into tables and graphs for each area and control structure. The complete calculations are presented in Section IV of this report.

#### 3.0 DESIGN STORMS

CC has computed storm water run-off calculations for the proposed subdivision site, for a 2, 10, 25, and 100 year, Type III, 24-hour storm events. This results in 3.2", 4.6", 5.5", and a 7.0" of rainfall respectively for each storm event.

#### 4.0 EXISTING DRAINAGE AREAS

The existing site is currently divided into four (4) drainage areas: One that flows to the west towards the wetlands associated with the intermittent stream; another flows easterly toward a wetland system which is primarily on adjacent property but also has a portion onsite; the third is a

small area of existing driveway and lawn that discharges easterly into Concord Street; and the fourth flows to the north into a wetland area that is mostly located offsite.

#### 5.0 PROPOSED SUBCATCHMENT AREAS

The proposed site was divided into subcatchment areas as shown on the accompanying plan. Four design control points were established to compare the existing with the proposed conditions. The design control points were chosen at the down slope side of the four existing subcatchment areas as shown on the plan.

#### 6.0 SOIL CONDITIONS

The soil type used to model the entire site was determined using U.S. Conservation Service online data and through soil evaluations. Site soil was modeled as C soils as mapped and confirmed by in situ soil tests. Localized soil data in the vicinity of the proposed subsurface infiltration systems was obtained by conducting in-situ soil tests. Sand (Hydrologic Soil Group A soil) with a corresponding Rawls Rate of 8.27 in/hr was found in the area of the infiltration systems and was used in their design.

#### 7.0 COMPLIANCE WITH STORMWATER STANDARDS

The project is a mix of redevelopment and new development. The new development complies with all Stormwater Standards and the redevelopment complies with the Standards to the maximum extent practicable.

#### Standard 1: No New Stormwater Conveyances of Untreated Stormwater or Erosion Offsite

All proposed road and sidewalk runoff will receive 44% TSS removal for pretreatment and 80% total TSS removal. All new roof runoff will be disconnected from the street runoff and will receive 80% TSS removal. Driveways serving the existing dwelling and detached garage that are presently untreated will be reduced from 23,861 SF to 8,919 SF. Therefore, this Standard is met.

#### Rip Rap sizing:

The size, slope, and invert elevations of the overflow pipe and a detail of the crushed stone pad have been added to the revised Site Plan. The Isbash formula [  $D = V^2 / 2gC^2$  (G -1) ] was used to size the stone for the splash pad:

D = Median stone size (ft)

V = velocity

C = constant - 0.86 for high turbulence

g = 32.2 Ft/ sec.

G = Specific gravity of stone - 2.86

The outlet with the highest velocity was chosen for design, which is the inlet to Pond No. 2, this results in a design stone of 4.5 inches, therefore a 4"-6" stone has been specified for all outlet structures

 $(5.83)^2 / 2(32.2) (0.86)^2 (2.86 - 1) = 0.38$  feet or 4.5 inches

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

All proposed runoff rates and volumes will be reduced from existing conditions during all design storm events as noted below. The proposed improvements are expected to improve offsite drainage conditions.

#### Runoff to Stream - Design Control Point (DCP 1) - To Stream

<u>Storm</u>	Existing (Reach 1E) Peak Rate Volume		Post-development (Reach 1P) Peak Rate Volume		
2–Year-24Hour (3.2")	4.12 cfs	0.622 af	3.71 cfs	0.548 af	
10–Year-24Hour (4.6")	7.72 cfs	1.145 af	7.09 cfs	0.991 af	
25–Year-24Hour (5.5")	10.18 cfs	1.506 af	9.71 cfs	1.328 af	
100–Year-24Hour (7.0")	14.37 cfs	2.133 af	13.86 cfs	1.906 af	

#### Runoff to East Wetland - Design Control Point (DCP 2) - To East Wetland

<b>Storm</b>	Existing (Reach 2E) Peak Rate Volume		Post-development (Reach 2P) Peak Rate Volume		
2–Year-24Hour (3.2")	2.27 cfs	0.327 af	2.19 cfs	0.327 af	
10–Year-24Hour (4.6")	4.50 cfs	0.628 af	4.37 cfs	0.623 af	
25–Year-24Hour (5.5")	6.04 cfs	0.839 af	5.93 cfs	0.837 af	
100–Year-24Hour (7.0")	8.70 cfs	1.210 af	8.59 cfs	1.203af	

#### Runoff to Concord Street - Design Control Point (DCP 3) - To Street

<u>Storm</u>	Existing (R	each 3E)	Post-develor	Post-development (Reach 3P)		
	Peak Rate	Volume	Peak Rate	<u>Volume</u>		
2–Year-24Hour (3.2")	0.06 cfs	0.004 af	0.04 cfs	0.003 af		
10–Year-24Hour (4.6")	0.10 cfs	0.007 af	0.06 cfs	0.004 af		

25–Year-24Hour (5.5")	0.13 cfs	0.009 af	0.07 cfs	0.005 af
100–Year-24Hour (7.0")	0.17 cfs	0.012 af	0.09 cfs	0.007 af

#### Runoff to North Wetland - Design Control Point (DCP 4) - To North Wetland

<u>Storm</u>	Existing (Reach 4E) Peak Rate Volume		Post-development (Reach 4) Peak Rate Volume	
2–Year-24Hour (3.2")	0.64 cfs	0.098 af	0.53 cfs	0.073 af
10-Year-24Hour (4.6")	1.24 cfs	0.186 af	1.06 cfs	0.140 af
25–Year-24Hour (5.5")	1.66 cfs	0.247 af	1.42 cfs	0.187 af
100–Year-24Hour (7.0")	2.37 cfs	0.355 af	2.05 cfs	0.270 af

#### **Standard 3: Recharge**

Recharge will be increased by minimizing the impervious areas discharging directly over ground. The minimum required recharge volume is calculated as follows:

Existing Impervious Area = 33,166 SF SF

Proposed Impervious Area = 97,256

Total Increase in Impervious Area = 64,090 SF

(0.25"/12 x 64,090 SF) = 1,335 CF

The storage capacity of each infiltration BMP is listed below:

Drywells for Houses 1-19:

Volume below outlet elevation=89 CF X 19=1,691 CF

Infiltration System.1:

Volume below outlet elevation = 898 CF

Infiltration System 2:

Volume below outlet elevation =  $4,141 \underline{CF}$ 

Total recharge volume provided:

1,691 CF + 184 CF + 4,141 CF = 6,016 CF >>> 1,335 CF; therefore, this requirement is met.

In order to confirm that the infiltration systems will drain in 72 hours, the volume under the lowest outlet pipe must be divided by the bottom area of the infiltration system and the infiltration rate as follows:

System 1:

$$\frac{\left[\frac{(898 ft^3)}{1,230 ft^2}\right]}{\left(8.27 \frac{in}{hr}\right) \left(\frac{1 ft}{12 in}\right)} = 1.1 hours$$

1.1 hours << 72 hours; therefore, this requirement is met for this infiltration system.

#### System 2:

$$\frac{\left[\frac{(4,141ft^3)}{4,088ft^2}\right]}{\left(8.27\frac{in}{hr}\right)\left(\frac{1ft}{12in}\right)} = 1.5 hours$$

1.5 hours << 72 hours; therefore, this requirement is met for this infiltration system.

Bottom of Basin Floor steady flow rate calculation.

System 1 bottom infiltration calculation:

8.27 In/Hr.(  $\frac{1}{1}$ Hr/  $\frac{3600 \text{ sec.}}{1}$ Ift /  $\frac{12 \text{ in}}{12}$  in (  $\frac{1}{2}$ 30 SF -bottom area of pond) = 0.23 CFS

System 2 bottom infiltration calculation:

8.27 In/Hr.( 1Hr/ 3600 sec.)1ft / 12 in (  $4{,}088$  SF -bottom area of pond) = 0.78 CFS

#### **Standard 4: Water Quality**

Water quality requirements are met for work in critical areas; namely, rapid infiltration soils under the proposed infiltration systems and discharging near a potential vernal pool for System 1 per BETA's request. Pretreatment consists of deep sump catch basins and Stormceptors prior to exfiltration at each infiltration basin. The proposed pretreatment will remove in excess of the required 44% of TSS while the subsurface infiltration systems will provide a total 80% TSS removal with pretreatment. Roof runoff does not require pretreatment. Drywells are proposed to provide 80% TSS removal for each new dwelling.

The WQV required and provided at each infiltration basin is as follows:

#### System 1:

Impervious area directed to System 1=10,533 SF

$$(1"/12"$$
per ft) $(10,533) = 878$  CF

System 1 has a capacity of 898 CF below the lowest outlet elevation. Therefore, this requirement is met.

#### System 2:

Impervious area directed to System 2=38,056 SF

$$(1"/12"$$
per ft) $(38,056 \text{ ft}^2) = 3,171 \text{ ft}^3$ 

System 2 has a capacity of 4,141 CF below the lowest outlet elevation. Therefore, this requirement is met.

Drywells are proposed for House lots 1-19:

Proposed House Lots 1 thru 7 are tributary to a certified vernal pool therefore water Quality Volume is based on 1.0" of runoff.

C soils are expected for the entire site aside from the location of the proposed subsurface in infiltration system locations. Thus, the required WQV for the proposed dwellings is as follows:

Proposed roof areas directed to drywells lots 1 thru 7 = (6 houses x 1,550 SF/house) + (1 house x 1,200 SF/house) = 10,500 SF.

Required WQV= $(1.0^{\circ\prime}/12^{\circ\prime})$  per ft)(10,500 SF) = 875 CF

Proposed roof areas directed to drywells lots 8 thru 19 = (10 houses x 1,550 SF/house) + (2 houses x 1,200 SF/house) = 17,900 SF

Required WQV=(0.5"/12"per ft)(17,900 SF) = 746 CF

$$875 + 746 = 1,621 \text{ CF}$$

Volume capacity provided below outlet elevation=89 CF x 19=1,691 CF

1,691 CF > 1,621 CF. Therefore, this standard is met.

#### Deep Sump Catch Basins:

To obtain 25% TSS removal pre-treatment credit, catch basins may treat up to ½ acre of impervious areas. The total impervious area treated by each catch basin is as follows:

Catch Basin 1: 5,266 SF (0.12 Acres)

Catch Basin 2: 5,267 SF (0.12 Acres)

Catch Basin 3: 6,841 SF (0.16 Acres)

Catch Basin 4: 9,564 SF (0.22 Acres)

Catch Basin 5: 10,856 SF (0.25 Acres)

Catch Basin 6: 10,795 SF (0.25 Acres)

#### Stormceptors:

WQU #1 - 0.24 acres 100% impervious -will generate a WQF of 0.30 CFS for the 1-inch WQ storm. STC model 450i which provides 80% TSS removal for up to 1.0 CFS is proposed.

WQU #2-0.87 acres 100% impervious – will generate a WQF of 1.09 CFS for the 1-inch WQ storm. CDS model 2015-4 which provides 80% TSS removal for up to 1.4 CFS is proposed.

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

The proposed use of the site for single family homes, does not constitute a higher potential pollutant load, therefore this standard does not apply.

#### **Standard 6: Critical Areas**

A portion of the locus does fall within a critical area and since the infiltration rate for the subsurface infiltration basins is greater than 2.4 inches per hour 44% of pretreatment is provided prior to infiltration in both proposed systems.

#### **Standard 7: Redevelopment**

This project is a combination of redevelopment and new development. All new impervious areas have been treated and infiltrated as per the Stormwater Management Standards. The existing pavement areas without treatment have been reduced from 23,861 square feet to 8,919 square feet. The existing paved driveway serving the detached garage will be reduced and moved further away from the wetland from approximately 0' to over 25'. The existing dwelling is only partially within Commission's jurisdiction. The downspout closest to the nearest wetlands daylights approximately 75' from the wetland and travels over lawn before reaching the resource area which should provide ample treatment. Additionally, the total area of disturbed 25' buffer will be reduced from 7,880 SF to 3,780 SF; thus enhancing the buffer immediately upstream the resource areas. This buffer enhancement will improve water quality by providing some treatment to existing untreated pavement runoff. Therefore, we believe this requirement has been met to the maximum extent practicable for the redevelopment portion of the project.

#### <u>Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation</u> <u>Control</u>

The Operation and Maintenance Plan included with this submittal will ensure proper maintenance of the proposed pollution, erosion and sedimentation measures proposed during construction.

#### Standard 9: Long Term Operation and Maintenance Plan

The Long Term Operation and Maintenance Plan is included within the Operation and Maintenance Plan enclosed in this submittal to ensure the proposed drainage improvements are maintained as intended.

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

Routine visual inspections are scheduled as part of the Operations and Maintenance Plan to prevent illicit discharges into the stormwater system. Furthermore, an Illicit Compliance Statement is included in this submittal.

#### **Improvement Over Existing Conditions**

Existing conditions will be improved by reducing peak rate of runoff and volume during all design storm events, improving water quality from existing conditions for the redevelopment portion of the project and restoring disturbed portions of the 25' Buffer Zone.

#### **Low Impact Measures Used:**

The design of the proposed development has incorporated the following low impact development measures:

- Utilizes the natural hydrology to manage Stormwater.
- Treats Stormwater through a combination of stormwater controls.
- Uses natural topography for drainage ways and storage areas.

# **SECTION II**

STORMWATER OPERATION AND MAINTENANCE PLAN

# Construction Period Erosion, Sedimentation, and Pollution Prevention Plan

Proposed Residential Development
"Concord Meadows"

PUD Subdivision – Rockland, MA 02370

Stormwater Management System's Owner: Conrock LLC

System Owner's Address: 365 Concord Street

Party responsible for Operations and Maintenance: Owners of Concord Meadows

It is most important for a drainage system to be maintained in order for it to work properly. The following is an Operation and Maintenance plan to upkeep the existing non-structural and structural best performance practices as outlined in the Massachusetts Department of Environmental Protection's Stormwater Management Policy.

#### **Construction Sequencing:**

The following section provides construction details and highlights the construction sequence and timing of earth moving activities.

#### 1 Installation of Erosion Controls

Erosion and sedimentation controls (silt fence and hay bales) will be installed where needed and inspected at the limits of the work area prior to the commencement of earth moving activities.

#### 2 Clearing

The project area will be cleared of debris and boulders. Materials removed from the site will be transported to an appropriate facility or will be disposed of properly. No large boulders will be buried on the site. All cleared vegetation will be removed from the project site or mulched and stockpiled for future use on the site.

#### 3 Rough Grading

During this phase of construction, rough grades will be established for the project site. If suitable topsoil is found, it will be removed and stockpiled in an upland area outside of the zone of identified wetlands. The stockpiled topsoil will be stored until ready for re-use on site.

#### 4 Drainage System Construction

After rough grading is complete, the drainage collection, conveyance and discharge areas will be installed. The drainage system design and structures for the proposed development will follow the Department of Environmental Protection's Best Management Practice standards.

#### 5 Utility Installation

In this phase of construction, underground utilities including water, sewer, gas, power, telecommunications, etc. will be installed.

#### 6 Roadway Paving

During this phase of construction, the entrance and exit roadways for the development will be paved to binder course only. Final paving will be done after most of the home sites are developed at the discretion of the developer.

#### **7** Foundation and Structure Construction

This phase of construction consists of installation of the foundations and construction of the buildings. The home sites will be made available for construction and occupancy in phases. The phasing will be designed primarily to control construction impacts to the site and also consider current market demand for home sales.

#### **8** Installation of Amenities

Amenities such as signage and landscaping will be installed or completed as required for safety and as the homes become occupied.

#### 9 Site Stabilization

The final phase of the project is the restoration and stabilization of all exposed surfaces. Disturbed areas will be landscaped or seeded as necessary with an erosion control seed mix. Much of the disturbed area is to be rough graded with topsoil and allowed to revegetate with indigenous species and kept thereafter in a natural state as habitat. Permanent restoration and revegetation measures serve to provide additional habitat and to control erosion and sedimentation by establishing a vegetative cover. In the event that weather conditions prevent final restoration, temporary erosion and sedimentation measures will be employed until the weather is suitable for final cleanup. A final inspection will ensure that the project site is cleared of all project debris and that erosion and sedimentation controls are functioning properly. Haybales and silt fencing will not be removed until the site is stabilized and the final inspection is complete.

#### **Operation and Maintenance Plan during Construction:**

#### Sediment and Erosion Control

- Siltation barriers shall be inspected at least once a week and after each rainfall event. Make any required repairs immediately. Repair scoured areas on the back side of fence at this time to prevent future problems.
- Should the fabric of the silt fence tear, decompose or otherwise become ineffective, replace it within 24 hours of discovery.
- Remove silt deposits once they reach 15-30 percent of the height of the silt fence to provide adequate storage volume for the next rain event and to reduce pressure on the fence. Care should be taken to avoid undermining the fence during cleanout process.
- Siltation barriers are to be removed upon stabilization of the contributing drainage area. Accumulated sediment may be spread to form a surface for turf or other vegetation establishment, or disposed of elsewhere. The area should be reshaped to permit natural drainage.
- Crushed stone construction entrances shall be inspected and maintained on a daily basis. Any buildup of material within the apron shall be removed offsite and replaced with clean crushed stone as needed.
- Also at the Construction entrances any sediment tracked onto the public road during the construction process shall be removed immediately and any adjustment of the entrance to prevent additional sediment tracking.

#### Subsurface Infiltration Systems and Drywells

All infiltration areas shall be excavated and installed after the construction of the foundation. No heavy equipment shall traverse the proposed infiltration areas after installation.

Per MA DEP Stormwater Guidelines the following work shall be done to stabilize the site prior to installing the infiltration systems:

- Do not allow runoff from any disturbed areas on the site to flow to the proposed location of the infiltration systems.
- Rope off the area where the infiltration systems are to be placed.
- Accomplish any required excavation with equipment placed just outside the area. If the size of the area intended for exfiltration is too large to accommodate this approach, use trucks with low-pressure tires to minimize compaction. Do not allow any other vehicles within the area to be excavated.
- Keep the area above and immediately surrounding the infiltration systems roped off to all construction vehicles until the final top surface is installed.
- At no time shall the area for the infiltration systems be used as a temporary sediment basin. Stockpiles shall be placed away from the infiltration systems and

sedimentation fences shall be placed around the perimeter of the infiltration area to prevent the accumulation of sediment within the native soils.

**Dust Control:** Sprinkle water as necessary to control dust during construction.

**Material Stockpiling:** Stockpiles of material must be placed outside all wetland resource areas and their buffer zones. If left overnight, material stockpiling must be protected from the weather.

#### **Good housekeeping:**

The following good housekeeping BMP's will be implemented in order to prevent pollution during construction:

- Petroleum products will be stored in tightly sealed containers which are clearly labeled.
- Any asphalt substances used onsite will be applied according to the manufacturer's specifications.
- If portable sanitary units are used, sanitary waste will be removed as necessary to avoid overfilling.
- All paint and other hazardous waste materials will be tightly sealed and stored when not in use. Excess material will not be discharged into the public stormwater system, but will be properly disposed of according to the manufacturer's specifications.
- If spray guns are used, they will be cleaned on a removable tarp.

#### **Temporary Sediment Traps & Basins**

Sediment traps and/or basins shall be constructed as shown on the approved plans and as necessitated by field conditions. Sediment traps/basins should be readily accessible for maintenance and sediment removal, and should remain in operation and be properly maintained until the site area is permanently stabilized by vegetation and/or when permanent structures are in place. Remove basin after drainage area has been permanently stabilized, inspected, and approved. Before removing dam, drain water and remove sediment; place waste material in designated disposal areas. Smooth site to blend with surrounding area and stabilize.

#### **Track out controls at Construction Entrance**

A stabilized stone apron construction entrance shall be at all construction entrances to help prevent vehicle tracking of sediments. All vehicles shall enter and exit the sit via the stabilized construction entrance. The contractor shall inspect the construction entrance daily and after heavy use. If mud and soil clogs the voids in the crushed stone reducing the effectiveness, the pad shall be top dressed with new, clean stone. If the pad becomes completely clogged, replacement of the entire pad may be necessary Dump trucks hauling material from the construction site will be covered with a tarpaulin.

# Long Term Stormwater Operation and Maintenance Plan and Illicit Discharge Statement

Proposed Residential Development
"Concord Meadows"

PUD Subdivision – Rockland, MA 02370

Stormwater Management System's Owner: Conrock LLC

System Owner's Address: 365 Concord Street

Party responsible for Operations and Maintenance: Owners of Concord Meadows

It is most important for a drainage system to be maintained in order for it to work properly. The following is an Operation and Maintenance plan to upkeep the existing non-structural and structural best performance practices as outlined in the Massachusetts Department of Environmental Protection's Stormwater Management Policy.

#### **Operation and Maintenance Plan After Construction:**

#### **Good housekeeping:**

General trash and litter cleanup of the site, inspect all vehicles on a regular basis for detention of leaking oil, gas and other fluids, provide routine visual inspections of potential pollution sources, and maintain an inventory of potential pollution sources stored on site. Initiate and maintain record keeping of activity with regard to the contents of this plan.

#### Spill prevention and response:

In the event of a spill, immediately initiate containment and cleanup procedures appropriate for the material and notify the proper authorities. All attempts must be made to prevent spilled material from entering the drainage system or infiltrating into the ground.

#### Landscape Maintenance:

Maintenance of lawns and landscaped areas: Regularly mow lawn areas and weed landscaped areas.

#### Pipes:

Drainage pipes (inlets and outlets) shall be inspected to ensure that they are free of all obstructions and that they are structurally sound during every catch basin inspection.

#### Street Sweeping:

Sweeping of the parking lots and driveways should be done at least 2 times annually, namely in the spring and fall. It is imperative that sweeping take place immediately following final winter snowmelt to remove winter sand. All sediments containing hydrocarbons shall be handled properly and disposed of in accordance with local, state and federal guidelines and regulations.

#### Catch Basin Cleaning:

Catch basins shall be inspected and sediment removed at least two times per year and at the end of the foliage and snow removal seasons. Sediment must be removed at the required interval or whenever the depth of deposits is greater than or equal to one half the depth of the sump (2 feet). Care must be exercised to not damage the outlet hood when using a clamshell type cleaning bucket. A damaged or dislodged hood must be repaired or replaced immediately.

#### Culverts. pipes. and manholes:

All culverts, pipes, and manholes shall be inspected two times per year and cleaned when drainage impediments are discovered. Flushing of pipes may be required to remove accumulated sediment.

#### Riprap Drain Outfalls:

All riprap drain outfalls shall be inspected two times per year and repaired as necessary. Riprap shall be replaced/repaired as necessary, debris and accumulated sediment removed, and any woody growth removed.

#### Subsurface Infiltration Systems and Drywells:

Inspect inspection port at least quarterly and after every major storm event during the first year. Inspections after every major storm event shall take notice of any water standing after 72 hours after the storm ended. After the first year, inspections must be done at least twice yearly. Remove any debris or sediment within reach that may be clogging the system.

The outlet structures should be inspected for evidence of clogging, structural integrity, outflow release velocities that are greater than design flow and sediment accumulation around the outlet. The surface over and around the infiltration systems shall be checked for potential subsidence, erosion, cracking and tree growth. Any necessary repairs should be made immediately. During inspections, changes vegetative cover or the contributing watershed should be noted.

The subsurface systems are designed to fully drain after a storm event therefore if standing water is observed above the outlet in the drainage manhole immediately upstream of the infiltration system beyond 24 hours since the cessation of inflow to the system from a rainstorm this may be indicatibe of clogging within the system and should be noted on the inspection log and further inspected for repairs. The Owner may need to contact a Registered Professional Engineer to evaluate the system in the event of major problems.

#### Pet Waste Management

All pet owners and keepers are required to immediately and properly dispose of their pet's solid waste deposited on any property, public or private, not owned or possessed by that person.

#### Snow Management

Place snow in pervious areas where it can slowly infiltrate however it should not be placed over any component of the site's stormwater management system, particularly the catch basins. Any sand and debris mixed with snow would block the inlet or be quickly introduced into the drainage system upon snowmelt. At no time shall the stormwater infiltration basins or wetlands be used for the stockpiling of snow.

#### **Estimated Operation and Maintenance Budget:**

Maintenance cost will be approximately \$10,000.00 per year.

#### **Illicit Discharges:**

At no time will the owner or any other individual utilize the stormwater management system for any purpose other than its intended use. The stormwater management system as shown on the attached site plan at no time shall receive discharges other than stormwater, this includes "wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, raw materials, toxic pollutants, hazardous substances, oil or grease."

TO BE SIGNED PRIOR TO CONSTRUCTION

Property Owner (Signature)

CONROCK LLC
Property Owner (Print)



# CDS Guide Operation, Design, Performance and Maintenance



#### **CDS®**

Using patented continuous deflective separation technology, the CDS system screens, separates and traps debris, sediment, and oil and grease from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material without blinding. Flow and screening controls physically separate captured solids, and minimize the re-suspension and release of previously trapped pollutants. Inline units can treat up to 6 cfs, and internally bypass flows in excess of 50 cfs (1416 L/s). Available precast or cast-in-place, offline units can treat flows from 1 to 300 cfs (28.3 to 8495 L/s). The pollutant removal capacity of the CDS system has been proven in lab and field testing.

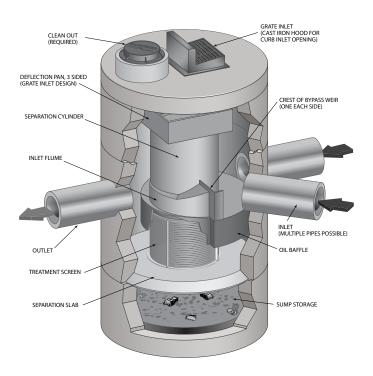
#### **Operation Overview**

Stormwater enters the diversion chamber where the diversion weir guides the flow into the unit's separation chamber and pollutants are removed from the flow. All flows up to the system's treatment design capacity enter the separation chamber and are treated.

Swirl concentration and screen deflection force floatables and solids to the center of the separation chamber where 100% of floatables and neutrally buoyant debris larger than the screen apertures are trapped.

Stormwater then moves through the separation screen, under the oil baffle and exits the system. The separation screen remains clog free due to continuous deflection.

During the flow events exceeding the treatment design capacity, the diversion weir bypasses excessive flows around the separation chamber, so captured pollutants are retained in the separation cylinder.



#### **Design Basics**

There are three primary methods of sizing a CDS system. The Water Quality Flow Rate Method determines which model size provides the desired removal efficiency at a given flow rate for a defined particle size. The Rational Rainfall Method™ or the and Probabilistic Method is used when a specific removal efficiency of the net annual sediment load is required.

Typically in the Unites States, CDS systems are designed to achieve an 80% annual solids load reduction based on lab generated performance curves for a gradation with an average particle size (d50) of 125 microns ( $\mu$ m). For some regulatory environments, CDS systems can also be designed to achieve an 80% annual solids load reduction based on an average particle size (d50) of 75 microns ( $\mu$ m) or 50 microns ( $\mu$ m).

#### **Water Quality Flow Rate Method**

In some cases, regulations require that a specific treatment rate, often referred to as the water quality design flow (WQQ), be treated. This WQQ represents the peak flow rate from either an event with a specific recurrence interval, e.g. the six-month storm, or a water quality depth, e.g. 1/2-inch (13 mm) of rainfall.

The CDS is designed to treat all flows up to the WQQ. At influent rates higher than the WQQ, the diversion weir will direct most flow exceeding the WQQ around the separation chamber. This allows removal efficiency to remain relatively constant in the separation chamber and eliminates the risk of washout during bypass flows regardless of influent flow rates.

Treatment flow rates are defined as the rate at which the CDS will remove a specific gradation of sediment at a specific removal efficiency. Therefore the treatment flow rate is variable, based on the gradation and removal efficiency specified by the design engineer.

#### Rational Rainfall Method™

Differences in local climate, topography and scale make every site hydraulically unique. It is important to take these factors into consideration when estimating the long-term performance of any stormwater treatment system. The Rational Rainfall Method combines site-specific information with laboratory generated performance data, and local historical precipitation records to estimate removal efficiencies as accurately as possible.

Short duration rain gauge records from across the United States and Canada were analyzed to determine the percent of the total annual rainfall that fell at a range of intensities. US stations' depths were totaled every 15 minutes, or hourly, and recorded in 0.01-inch increments. Depths were recorded hourly with 1-mm resolution at Canadian stations. One trend was consistent at all sites; the vast majority of precipitation fell at low intensities and high intensity storms contributed relatively little to the total annual depth.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Rainfall Method. Since most sites are relatively small and highly impervious, the Rational Rainfall Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS system are

determined. Performance efficiency curve determined from full scale laboratory tests on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

#### **Probabilistic Rational Method**

The Probabilistic Rational Method is a sizing program Contech developed to estimate a net annual sediment load reduction for a particular CDS model based on site size, site runoff coefficient, regional rainfall intensity distribution, and anticipated pollutant characteristics.

The Probabilistic Method is an extension of the Rational Method used to estimate peak discharge rates generated by storm events of varying statistical return frequencies (e.g. 2-year storm event). Under the Rational Method, an adjustment factor is used to adjust the runoff coefficient estimated for the 10-year event, correlating a known hydrologic parameter with the target storm event. The rainfall intensities vary depending on the return frequency of the storm event under consideration. In general, these two frequency dependent parameters (rainfall intensity and runoff coefficient) increase as the return frequency increases while the drainage area remains constant.

These intensities, along with the total drainage area and runoff coefficient for each specific site, are translated into flow rates using the Rational Method. Since most sites are relatively small and highly impervious, the Rational Method is appropriate. Based on the runoff flow rates calculated for each intensity, operating rates within a proposed CDS are determined. Performance efficiency curve on defined sediment PSDs is applied to calculate solids removal efficiency. The relative removal efficiency at each operating rate is added to produce a net annual pollutant removal efficiency estimate.

#### **Treatment Flow Rate**

The inlet throat area is sized to ensure that the WQQ passes through the separation chamber at a water surface elevation equal to the crest of the diversion weir. The diversion weir bypasses excessive flows around the separation chamber, thus preventing re-suspension or re-entrainment of previously captured particles.

#### **Hydraulic Capacity**

The hydraulic capacity of a CDS system is determined by the length and height of the diversion weir and by the maximum allowable head in the system. Typical configurations allow hydraulic capacities of up to ten times the treatment flow rate. The crest of the diversion weir may be lowered and the inlet throat may be widened to increase the capacity of the system at a given water surface elevation. The unit is designed to meet project specific hydraulic requirements.

#### **Performance**

#### **Full-Scale Laboratory Test Results**

A full-scale CDS system (Model CDS2020-5B) was tested at the facility of University of Florida, Gainesville, FL. This CDS unit was evaluated under controlled laboratory conditions of influent flow rate and addition of sediment.

Two different gradations of silica sand material (UF Sediment & OK-110) were used in the CDS performance evaluation. The particle size distributions (PSDs) of the test materials were analyzed using standard method "Gradation ASTM D-422 "Standard Test Method for Particle-Size Analysis of Soils" by a certified laboratory.

UF Sediment is a mixture of three different products produced by the U.S. Silica Company: "Sil-Co-Sil 106", "#1 DRY" and "20/40 Oil Frac". Particle size distribution analysis shows that the UF Sediment has a very fine gradation (d50 = 20 to 30  $\mu$ m) covering a wide size range (Coefficient of Uniformity, C averaged at 10.6). In comparison with the hypothetical TSS gradation specified in the NJDEP (New Jersey Department of Environmental Protection) and NJCAT (New Jersey Corporation for Advanced Technology) protocol for lab testing, the UF Sediment covers a similar range of particle size but with a finer d50 (d50 for NJDEP is approximately 50  $\mu$ m) (NJDEP, 2003).

The OK-110 silica sand is a commercial product of U.S. Silica Sand. The particle size distribution analysis of this material, also included in Figure 1, shows that 99.9% of the OK-110 sand is finer than 250 microns, with a mean particle size (d50) of 106 microns. The PSDs for the test material are shown in Figure 1.

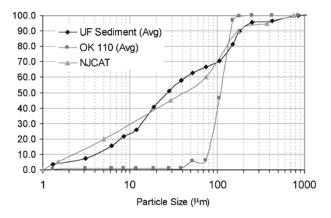


Figure 1. Particle size distributions

Tests were conducted to quantify the performance of a specific CDS unit (1.1 cfs (31.3-L/s) design capacity) at various flow rates, ranging from 1% up to 125% of the treatment design capacity of the unit, using the 2400 micron screen. All tests were conducted with controlled influent concentrations of approximately 200 mg/L. Effluent samples were taken at equal time intervals across the entire duration of each test run. These samples were then processed with a Dekaport Cone sample splitter to obtain representative sub-samples for Suspended Sediment Concentration (SSC) testing using ASTM D3977-97 "Standard Test Methods for Determining Sediment Concentration in Water Samples", and particle size distribution analysis.

#### **Results and Modeling**

Based on the data from the University of Florida, a performance model was developed for the CDS system. A regression analysis was used to develop a fitting curve representative of the scattered data points at various design flow rates. This model, which demonstrated good agreement with the laboratory data, can then be used to predict CDS system performance with respect

to SSC removal for any particle size gradation, assuming the particles are inorganic sandy-silt. Figure 2 shows CDS predictive performance for two typical particle size gradations (NJCAT gradation and OK-110 sand) as a function of operating rate.

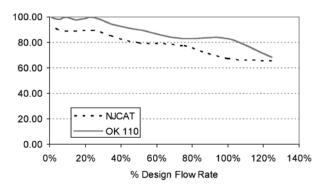


Figure 2. CDS stormwater treatment predictive performance for various particle gradations as a function of operating rate.

Many regulatory jurisdictions set a performance standard for hydrodynamic devices by stating that the devices shall be capable of achieving an 80% removal efficiency for particles having a mean particle size (d50) of 125 microns (e.g. Washington State Department of Ecology — WASDOE - 2008). The model can be used to calculate the expected performance of such a PSD (shown in Figure 3). The model indicates (Figure 4) that the CDS system with 2400 micron screen achieves approximately 80% removal at the design (100%) flow rate, for this particle size distribution (d50 = 125  $\mu$ m).

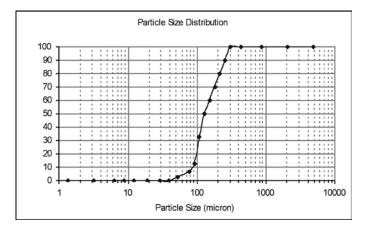
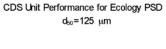


Figure 3. WASDOE PSD



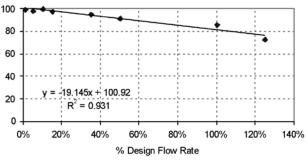


Figure 4. Modeled performance for WASDOE PSD.

#### Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

#### Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified



during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

#### Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be cleaned to ensure it is free of trash and debris.

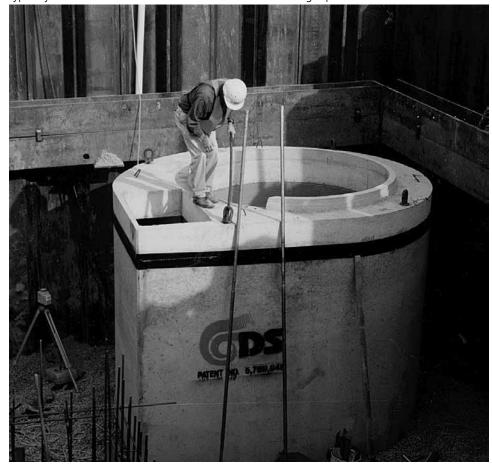
Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes. Check your local regulations for specific requirements on disposal.



CDS Model	Dian	neter		Water Surface ediment Pile	Sediment Sto	rage Capacity
	ft	m	ft	m	y³	m³
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.5	3.0	0.9	1.3	1.0
CDS2020	5	1.5	3.5	1.1	1.3	1.0
CDS2025	5	1.5	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Note: To avoid underestimating the volume of sediment in the chamber, carefully lower the measuring device to the top of the sediment pile. Finer silty particles at the top of the pile may be more difficult to feel with a measuring stick. These finer particles typically offer less resistance to the end of the rod than larger particles toward the bottom of the pile.



# **CDS Inspection & Maintenance Log**

CDS Model:	Location:

Date	Water depth to sediment <sup>1</sup>	Floatable Layer Thickness <sup>2</sup>	Describe Maintenance Performed	Maintenance Personnel	Comments

<sup>1.</sup> The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.

<sup>2.</sup> For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

#### **SUPPORT**

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from our engineers.



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## Stormceptor® STC Owner's Manual





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For patent information, go to www.ContechES.com/ip.

Your selection of a Stormceptor® means that you have chosen the most recognized and efficient stormwater oil/sediment separator available for protecting the environment. Stormceptor is a pollution control device often referred to as a "Hydrodynamic Separator (HDS)" or an "Oil Grit Separator (OGS)", engineered to remove and retain pollutants from stormwater runoff to protect our lakes, rivers and streams from the harmful effects of non-point source pollution.

#### 1 - Stormceptor Overview

Stormceptor is a patented stormwater quality structure most often utilized as a treatment component of the underground storm drain network for stormwater pollution prevention. Stormceptor is designed to remove sediment, total suspended solids (TSS), other pollutants attached to sediment, hydrocarbons and free oil from stormwater runoff. Collectively the Stormceptor provides spill protection and prevents non-point source pollution from entering downstream waterways.

Key benefits of Stormceptor include:

- Removes sediment, suspended solids, debris, nutrients, heavy metals, and hydrocarbons (oil and grease) from runoff and snowmelt.
- Will not scour or re-suspend trapped pollutants.
- · Provides sediment and oil storage.
- Provides spill control for accidents, commercial and industrial developments.
- Easy to inspect and maintain (vacuum truck).
- "STORMCEPTOR" is clearly marked on the access cover (excluding inlet designs).
- Relatively small footprint.
- 3rd Party tested and independently verified.
- Dedicated team of experts available to provide support.

#### Model Types:

- STC (Standard)
- EOS (Extended Oil Storage)
- OSR (Oil and Sand Removal)
- MAX (Custom designed unit, specific to site)

#### Configuration Types:

- Inlet unit (accommodates inlet flow entry, and multi-pipe entry)
- In-Line (accommodates multi-pipe entry)
- Submerged Unit (accommodates the site's tailwater conditions)
- Series Unit (combines treatment in two systems)

#### PLEASE MAINTAIN YOUR STORMCEPTOR

To ensure long-term environmental protection through continued performance as originally designed for your site, Stormceptor must be maintained, as any stormwater treatment practice does. The need for maintenance is determined through inspection of the Stormceptor. Procedures for inspection are provided within this document. Maintenance of the Stormceptor is performed from the surface via vacuum truck.

If you require information about Stormceptor, or assistance in finding resources to facilitate inspections or maintenance of your Stormceptor please call Contech at 1-800-338-1122.

#### 2 - Stormceptor Operation & Components

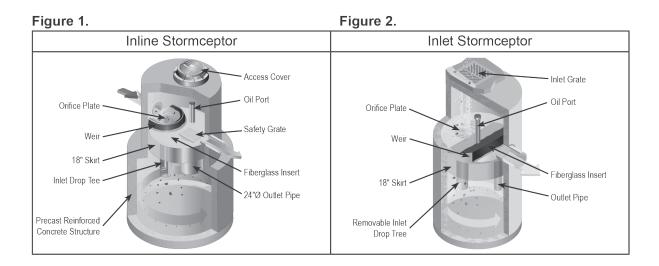
Stormceptor is a flexibly designed underground stormwater quality treatment device that is unparalleled in its effectiveness for pollutant capture and retention using patented flow separation technology. Stormceptor creates a non-turbulent treatment environment below the insert platform within the system. The insert diverts water into the lower chamber, allowing free oils and debris to rise, and sediment to settle under relatively low velocity conditions. These pollutants are trapped and stored below the insert and protected from large runoff events for later removal during the maintenance procedure.

With thousands of units operating worldwide, Stormceptor delivers reliable protection every day, in every storm. The patented Stormceptor design prohibits the scour and release of captured pollutants, ensuring superior water quality treatment and protection during even the most extreme storm events. Stormceptor's proven performance is backed by the longest record of lab and field verification in the industry.

#### Stormceptor Schematic and Component Functions

Below are schematics of two common Stormceptor configurations with key components identified and their functions briefly described.

- Manhole access cover provides access to the subsurface components
- Precast reinforced concrete structure provides the vessel's watertight structural support
- Fiberglass insert separates vessel into upper and lower chambers
- Weir directs incoming stormwater and oil spills into the lower chamber
- Orifice plate prevents scour of accumulated pollutants
- Inlet drop tee conveys stormwater into the lower chamber
- **Fiberglass skirt** provides double-wall containment of hydrocarbons
- Outlet riser pipe conveys treated water to the upper chamber; primary vacuum line access port for sediment removal
- Oil inspection port primary access for measuring oil depth and oil removal
- Safety grate safety measure to cover riser pipe in the event of manned entry into vessel



#### 3 - Stormceptor Identification

Stormceptor is available in both precast concrete and fiberglass vessels, with precast concrete often being the dominant material of construction.

In the Stormceptor, a patented, engineered fiberglass insert separates the structure into an upper chamber and lower chamber. The lower chamber will remain full of water, as this is where the pollutants are sequestered for later removal. Multiple Stormceptor model (STC, OSR, EOS and MAX) configurations exist, each to be inspected and maintained in a similar fashion.

Each unit is easily identifiable as a Stormceptor by the trade name "Stormceptor" embossed on each access cover at the surface. To determine the location of "inlet" Stormceptor units with horizontal catch basin inlet, look down into the grate as the Stormceptor insert will be visible. The name "Stormceptor" is not embossed on inlet models due to the variability of inlet grates used/approved across North America.

Once the location of the Stormceptor is determined, the model number may be identified by comparing the measured depth from the fiberglass insert level at the outlet pipe's invert (water level) to the bottom of the tank using Table 1.

In addition, starting in 1996 a metal serial number tag containing the model number has been affixed to the inside of the unit, on the fiberglass insert. If the unit does not have a serial number, or if there is any uncertainty regarding the size of the unit using depth measurements, please contact your local Contech Representative for assistance.

#### Sizes/Models

Typical general dimensions and capacities of the standard precast STC, EOS & OSR Stormceptor models are provided in Tables 1 and 2. Typical rim to invert measurements are provided later in this document. The total depth for cleaning will be the sum of the depth from outlet pipe invert (generally the water level) to rim (grade) and the depth from outlet pipe invert to the precast bottom of the unit. Note that depths and capacities may vary slightly between regions.

Table 1. Stormceptor Dimensions - Insert to Base of Structure				
STC Model	Insert to Base (in.)			
450	60			
900	55			
1200	71			
1800	105			
2400	94			
3600	134			
4800	128			
6000	150			
200	134			
11000*	128			
13000*	150			
16000*	134			

1	V	n	†	0	ς	

<sup>1.</sup> Depth Below Pipe Inlet Invert to the Bottom of Base Slab can vary slightly by manufacturing facility, and can be modified to accommodate specific site designs, pollutant loads or site conditions. Contact your local representative for assistance

Table 2. Storage Capacities		
STC Model	Hydrocarbon Storage	Sediment Capacity
	Capacity (gal)	(ft³)
450	86	46
900	251	89
1200	251	127
1800	251	207
2400	840	205
3600	840	373
4800	909	543
6000	909	687
200	1059	839
11000*	2797	1089
13000*	2797	1374
16000*	3055	1677

#### Notes:

#### 4 – Stormceptor Inspection & Maintenance

Regular inspection and maintenance is a proven, cost-effective way to maximize water resource protection for all stormwater pollution control practices, and is required to insure proper functioning of the Stormceptor. Both inspection and maintenance of the Stormceptor is easily performed from the surface. Stormceptor's patented technology has no moving parts, simplifying the inspection and maintenance process.

Please refer to the following information and guidelines before conducting inspection and maintenance activities.

#### When is inspection needed?

- Post-construction inspection is required prior to putting the Stormceptor into service.
- Routine inspections are recommended during the first year of operation to accurately assess the sediment accumulation.
- Inspection frequency in subsequent years is based on the maintenance plan developed in the first year.
- Inspections should also be performed immediately after oil, fuel, or other chemical spills.

#### When is maintenance cleaning needed?

 For optimum performance, the unit should be cleaned out once the sediment depth reaches the recommended maintenance sediment depth, which is approximately 15% of the unit's total storage capacity (see Table 3). The frequency should be adjusted based on historical inspection results due to variable site pollutant loading.

- Sediment removal is easier when removed on a regular basis at or prior to the recommended maintenance sediment depths, as sediment build-up can compact making removal more difficult.
- The unit should be cleaned out immediately after an oil, fuel or chemical spill.

# What conditions can compromise Stormceptor performance?

- If construction sediment and debris is not removed prior to activating the Stormceptor unit, maintenance frequency may be reduced.
- If the system is not maintained regularly and fills with sediment and debris beyond the capacity as indicated in Table 2, pollutant removal efficiency may be reduced.
- If an oil spill(s) exceeds the oil capacity of the system, subsequent spills may not be captured.
- If debris clogs the inlet of the system, removal efficiency of sediment and hydrocarbons may be reduced.
- If a downstream blockage occurs, a backwater condition may occur for the Stormceptor and removal efficiency of sediment and hydrocarbons may be reduced.

#### What training is required?

The Stormceptor is to be inspected and maintained by professional vacuum cleaning service providers with experience in the maintenance of underground tanks, sewers and catch basins. For typical inspection and maintenance activities, no specific supplemental training is required

<sup>\*</sup>Consist of two chamber structures in series.

<sup>1.</sup> Hydrocarbon & Sediment capacities can be modified to accommodate specific site design requirements, contact your local representative for assistance

<sup>\*</sup>Consist of two chamber structures in series

#### Recommended Stormceptor Inspection Procedure:

- Stormceptor is to be inspected from grade through a standard surface manhole access cover.
- Sediment and oil depth inspections are performed with a sediment probe and oil dipstick.
- Oil depth is measured through the oil inspection port, either a 4-inch or 6-inch diameter port.
- Sediment depth can be measured through the oil inspection port or the 24-inch diameter outlet riser pipe.
- Inspections also involve a visual inspection of the internal components of the system.

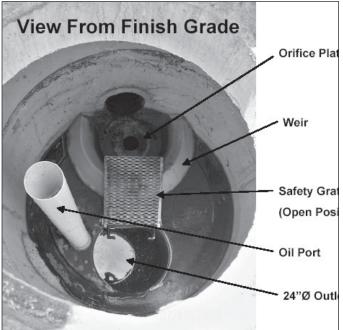
Figure 3.



# What equipment is typically required for maintenance?

- Vacuum truck equipped with water hose and jet nozzle
- Small pump and tubing for oil removal
- Manhole access cover lifting tool
- Oil dipstick / Sediment probe with ball valve (typically <sup>3</sup>/<sub>4</sub>-inch to 1-inch diameter)
- Flashlight
- Camera
- Data log / Inspection Report
- Safety cones
- Hard hats, safety shoes, safety glasses, chemical-resistant gloves, and hearing protection for service providers
- Gas analyzer, respiratory gear, hoist and safety harness for specially trained personnel if confined space entry is required

Figure 4.



#### Recommended Stormceptor Maintenance Procedure

Maintenance of Stormceptor is performed using a vacuum truck. No entry into the unit is required for maintenance. DO NOT ENTER THE STORMCEPTOR CHAMBER unless you have the proper personal safety equipment, have been trained and are qualified to enter a confined space, as identified by local Occupational Safety and Health Regulations (e.g. 29 CFR 1910.146). Without the proper equipment, training and permit, entry into confined spaces can result in serious bodily harm and potentially death. Consult local and/or state regulations to determine the requirements for confined space entry. Be aware, and take precaution that the Stormceptor fiberglass insert may be slippery. In addition, be aware that some units do not have a safety grate to cover the outlet riser pipe that leads to the submerged, lower chamber.

- Ideally maintenance should be conducted during dry weather conditions when no flow is entering the unit.
- Stormceptor is to be maintained through a standard surface manhole access cover.
- Insert the oil dipstick into the oil inspection port. If oil is present, pump off the oil layer into separate containment using a small pump and tubing.
- Maintenance cleaning of accumulated sediment is performed with a vacuum truck.
  - For 6-ft diameter models and larger, the vacuum hose is inserted into the lower chamber via the 24-inch outlet riser pipe (See Fig. 5).
  - » For 4-ft diameter model, the removable drop tee is lifted out, and the vacuum hose is inserted into the lower chamber via the 12-inch drop tee hole (See Fig. 6).

Figure 5.

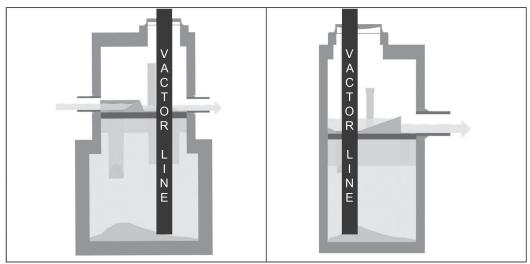


Figure 6.

- Using the vacuum hose, decant the water from the lower chamber into a separate containment tank or to the sanitary sewer, if permitted by the local regulating authority.
- Remove the sediment sludge from the bottom of the unit using the vacuum hose. For large Stormceptor units, a flexible hose is often connected to the primary vacuum line for ease of movement in the lower chamber.
- Units that have not been maintained regularly, have surpassed the maximum recommended sediment capacity, or contain damaged components may require manned entry by trained personnel using safe and proper confined space entry procedures.

#### What is required for proper disposal?

The requirements for the disposal of material removed from Stormceptor units are similar to that of any other stormwater treatment Best Management Practices (BMP). Local guidelines should be consulted prior to disposal of the separator contents. In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as hazardous waste. This could be site and pollutant dependent. In some cases, approval from the disposal facility operator/agency may be required.

#### What about oil spills?

Stormceptor is often implemented in areas where there is high potential for oil, fuel or other hydrocarbon or chemical spills. Stormceptor units should be cleaned immediately after a spill occurs by a licensed liquid waste hauler. You should also notify the appropriate regulatory agencies as required in the event of a spill.

#### What if I see an oil rainbow or sheen at the Stormceptor outlet?

With a steady influx of water with high concentrations of oil, a sheen may be noticeable at the Stormceptor outlet. This may occur because a hydrocarbon rainbow or sheen can be seen at very small oil concentrations (< 10 ppm). Stormceptor is effective at removing 95% of free oil, and the appearance of a sheen at the outlet with high influent oil concentrations does not mean unit is not working to this level of removal. In addition, if the influent oil is emulsified, the Stormceptor will not be able to remove it. The Stormceptor is designed for free oil removal and not emulsified or dissolved oil conditions.

#### What factors affect the costs involved with inspection/maintenance?

The Vacuum Service Industry for stormwater drainage and sewer systems is a well-established sector of the service industry that cleans underground tanks, sewers and catch basins. Costs to clean Stormceptor units will vary. Inspection and maintenance costs are most often based on unit size, the number of units on a site, sediment/oil/hazardous material loads, transportation distances, tipping fees, disposal requirements and other local regulations.

#### What factors predict maintenance frequency?

Maintenance frequency will vary with the amount of pollution on your site (number of hydrocarbon spills, amount of sediment, site activity and use, etc.). It is recommended that the frequency of maintenance be increased or reduced based on local conditions. If the sediment load is high from an unstable site or sediment loads transported from upstream catchments, maintenance may be required semi-annually. Conversely once a site has stabilized, maintenance may be required less frequently (for example: two to seven year, site and situation dependent). Maintenance should be performed immediately after an oil spill or once the sediment depth in Stormceptor reaches the value specified in Table 3 based on the unit size.

Table 3. Recommended Sediment Depths Indicating Maintenance		
STC Model	Maintenance Sediment Depth (in)	
450	8	
900	8	
1200	10	
1800	15	
2400	12	
3600	17	
4800	15	
6000	18	
200	15	
11000*	17	
13000*	20	
16000*	17	

#### Notes:

#### Replacement parts

Since there are no moving parts during operation in a Stormceptor, broken, damaged, or worn parts are not typically encountered. Therefore, inspection and maintenance activities are generally focused on pollutant removal. However, if replacements parts are necessary, they may be purchased by contacting your local Contech Representative or call 800-338-1122.

The benefits of regular inspection and maintenance are many – from ensuring maximum operation efficiency, to keeping maintenance costs low, to the continued protection of natural waterways – and provide the key to Stormceptor's long and effective service life.

<sup>1.</sup> The values above are for typical standard units.

<sup>\*</sup> Per structure.

Stormceptor Inspection and Maintenance Log
Stormceptor Model No:
Allowable Sediment Depth:
Serial Number:
Installation Date:
Location Description of Unit:
Other Comments:

## 5 - Contact Information

Questions regarding the Stormceptor can be addressed by contacting your local Contech representative or by calling 800-338-1122.



#### **SUPPORT**

- Drawings and specifications are available at www.ContechES.com.
- Site-specific design support is available from our engineers.

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Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, and earth stabilization products. For information, visit www.ContechES.com or call 800.338.1122

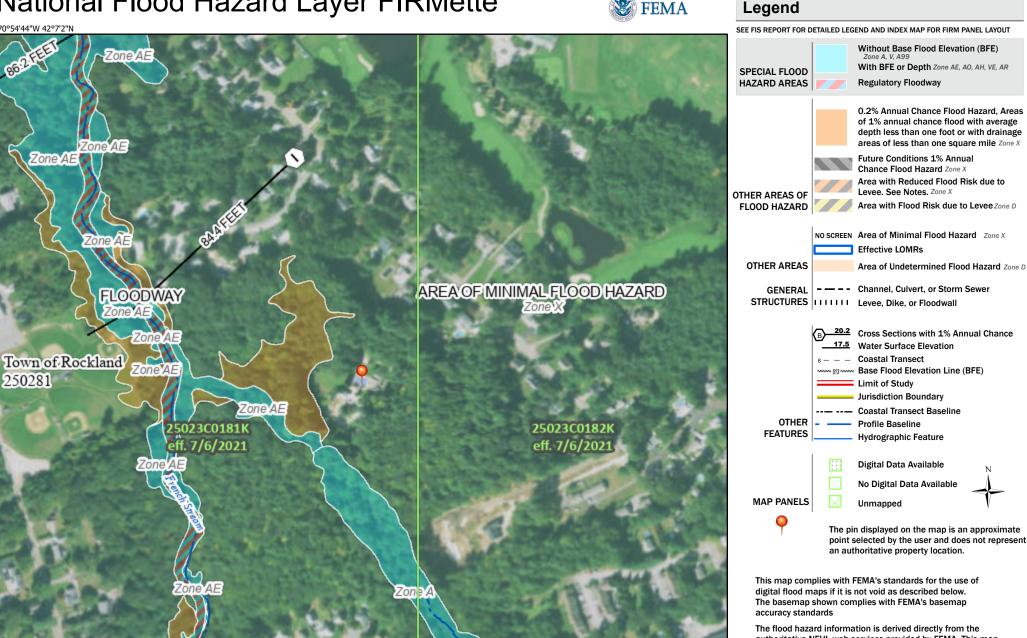
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# **SECTION III**

**FIGURES** 

# National Flood Hazard Layer FIRMette





authoritative NFHL web services provided by FEMA. This map was exported on 9/8/2021 at 12:47 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

1:6.000 250 500 1,000 1,500 2.000 Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Feet

Zone AE Zone AE

# **SECTION IV**

DRAINAGE CALCULATIONS & SUPPLEMENTAL DRAINAGE INFORMATION

Project: Concord Meadows Location: Rockland, MA

Prepared For: Cavanaro Consulting / Carmen Hudson



**Purpose:** To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is

derived from the first 1" of runoff from the contributing impervious surface.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of

Agriculture Natural Resources Conservation Service TR-55 Manual

**Procedure:** Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using

the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the

following units: cfs/mi<sup>2</sup>/watershed inches (csm/in).

Compute Q Rate using the following equation:

Q = (qu) (A) (WQV)

where:

Q = flow rate associated with first 1" of runoff

qu = the unit peak discharge, in csm/in.

A = impervious surface drainage area (in square miles)

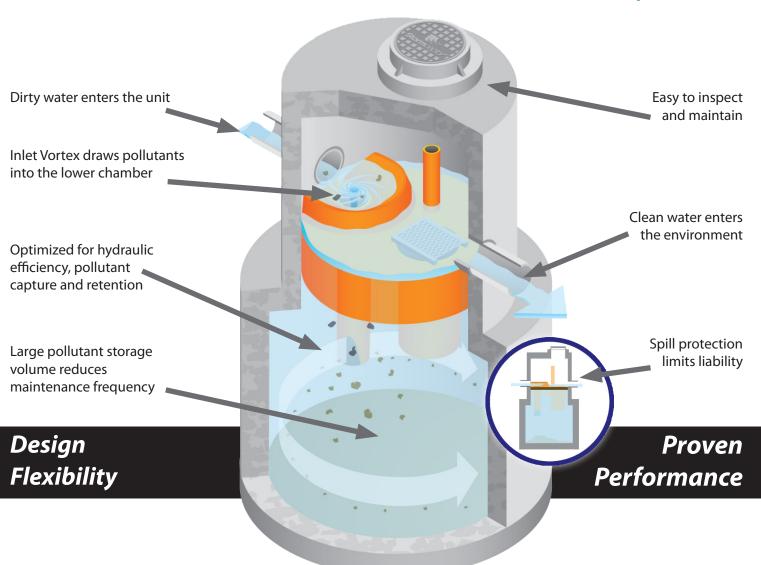
WQV = water quality volume in watershed inches (1" in this case)

Structure Name	Impv. (acres)	A (miles <sup>2</sup> )	t <sub>c</sub> (min)	t <sub>c</sub> (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
WQU #1	0.24	0.0003766	5.0	0.083	1.00	795.00	0.30
WQU #2	0.87	0.0013650	5.0	0.083	1.00	795.00	1.09



# **Stormwater Treatment Made Simple!**

TSS & Oil Removal ■ Scour Prevention ■ Small Footprint



Environmentally Engineered Stormwater Solutions... that exceed your client's needs!





Stormceptor® is an underground stormwater quality treatment device that is unparalleled in its effectiveness for pollutant capture and retention. With thousands of systems operating worldwide, Stormceptor delivers protection every day in every storm.

With patented technology, optimal treatment occurs by allowing free oil to rise and sediment to settle. The Stormceptor design prohibits scour and release of previously captured pollutants, ensuring superior treatment and protection during even the most extreme storm events.

Stormceptor is very easy to design and provides flexibility under varying site constraints such as tight right-of-ways, zero lot lines and retrofit projects. Design flexibility allows for a cost-effective approach to stormwater treatment. Stormceptor has proven performance backed by the longest record of lab and field verification in the industry.

## **Tested Performance**

■ Fine particle capture

■ Prevents scour or release

95%+ Oil removal

## Massachusetts - Water Quality (Q) Flow Rate

Stormceptor STC Model	Inside Diameter	Typical Depth Below Inlet Pipe Invert <sup>1</sup>	Water Quality Flow Rate Q <sup>2</sup>	Peak Conveyance Flow Rate <sup>3</sup>	Hydrocarbon Capacity ⁴	Maximum Sediment Capacity <sup>4</sup>
	(ft)	(in)	(cfs)	(cfs)	(Gallons)	(ft³)
STC 450i	4	68	0.40	5.5	86	46
STC 900	6	63	0.89	22	251	89
STC 2400	8	104	1.58	22	840	205
STC 4800	10	140	2.47	22	909	543
STC 7200	12	148	3.56	22	1,059	839
STC 11000	2 x 10	142	4.94	48	2,792	1,086
STC 16000	2 x 12	148	7.12	48	3,055	1,677

<sup>&</sup>lt;sup>1</sup> Depth Below Pipe Inlet Invert to the Bottom of Base Slab, and Maximum Sediment Capacity can vary to accommodate specific site designs and pollutant loads. Depths can vary to accommodate special designs or site conditions. Contact your local representative for assistance.



 $<sup>^2</sup>$  Water Quality Flow Rate (Q) is based on 80% annual average TSS removal of the OK110 particle size distribution.

<sup>&</sup>lt;sup>3</sup> Peak Conveyance Flow Rate is based upon ideal velocity of 3 feet per second and outlet pipe diameters of 18-inch, 36-inch, and 54-inch diameters.

<sup>&</sup>lt;sup>4</sup> Hydrocarbon & Sediment capacities can be modified to accommodate specific site design requirements, contact your local representative for assistance.





#### CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION **BASED ON THE RATIONAL RAINFALL METHOD**

### **CONCORD MEADOWS ROCKLAND, MA**

Area 0.87 ac Unit Site Designation **WQU #2** Weighted C

Rainfall Station # 0.9 69

5 min

CDS Model 2015-4 **CDS Treatment Capacity** 1.4 cfs

<u>Rainfall</u> <u>Intensity<sup>1</sup></u> (in/hr)	Percent Rainfall Volume <sup>1</sup>	<u>Cumulative</u> <u>Rainfall Volume</u>	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.02	0.02	10.2
0.04	9.6%	19.8%	0.03	0.03	9.6
0.06	9.4%	29.3%	0.05	0.05	9.4
0.08	7.7%	37.0%	0.06	0.06	7.7
0.10	8.6%	45.6%	0.08	0.08	8.5
0.12	6.3%	51.9%	0.09	0.09	6.2
0.14	4.7%	56.5%	0.11	0.11	4.6
0.16	4.6%	61.2%	0.13	0.13	4.5
0.18	3.5%	64.7%	0.14	0.14	3.4
0.20	4.3%	69.1%	0.16	0.16	4.2
0.25	8.0%	77.1%	0.20	0.20	7.6
0.30	5.6%	82.7%	0.24	0.24	5.2
0.35	4.4%	87.0%	0.28	0.28	4.0
0.40	2.5%	89.5%	0.31	0.31	2.3
0.45	2.5%	92.1%	0.35	0.35	2.3
0.50	1.4%	93.5%	0.39	0.39	1.2
0.75	5.0%	98.5%	0.59	0.59	4.1
1.00	1.0%	99.5%	0.79	0.79	0.8
1.50	0.0%	99.5%	1.18	1.18	0.0
2.00	0.0%	99.5%	1.57	1.40	0.0
3.00	0.5%	100.0%	2.36	1.40	0.2
	·			·	95.8

Removal Efficiency Adjustment<sup>2</sup> =

6.5%

Predicted % Annual Rainfall Treated =

93.3%

Predicted Net Annual Load Removal Efficiency = 89.4%

<sup>1 -</sup> Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA

<sup>2 -</sup> Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

### Stage-Area-Storage for Pond P1: POND SC 310

Elevation	Storage	Elevation	Storage	Elevation	Storago
(feet)	(cubic-feet)	(feet)	(cubic-feet)	(feet)	Storage (cubic-feet)
86.50	0	87.56	776	88.62	1,468
86.52	10	87.58	770 794	88.64	1,477
86.54	20	87.60	811	88.66	1,487
86.56	30	87.62	829	88.68	1,497
86.58	39	87.64	846	88.70	1,507
86.60	49	87.66	863	88.72	1,517
86.62	59	87.68	881	88.74	1,527
86.64	69	87.70	898	88.76	1,536
86.66	79	87.72	914	88.78	1,546
86.68	89	87.74	931	88.80	1,556
86.70	98	87.76	948		•
86.72	108	87.78	964		
86.74	118	87.80	980		
86.76	128	87.82	996		
86.78	138	87.84	1,012		
86.80	148	87.86	1,028		
86.82	157	87.88	1,044		
86.84	167	87.90	1,059		
86.86	177	87.92	1,074		
86.88	187	87.94	1,089		
86.90	197	87.96	1,104		
86.92	207	87.98	1,118		
86.94	216	88.00	1,133		
86.96	226	88.02	1,147		
86.98	236	88.04	1,160		
87.00 87.03	246	88.06	1,173		
87.02 87.04	266 285	88.08 88.10	1,186		
87.06	305	88.12	1,199 1,211		
87.08	325	88.14	1,223		
87.10	344	88.16	1,235		
87.12	364	88.18	1,246		
87.14	383	88.20	1,257		
87.16	403	88.22	1,268		
87.18	422	88.24	1,279		
87.20	442	88.26	1,289		
87.22	461	88.28	1,300		
87.24	480	88.30	1,310		
87.26	499	88.32	1,320		
87.28	518	88.34	1,330		
87.30	537	88.36	1,340		
87.32	556	88.38	1,350		
87.34	575	88.40	1,359		
87.36	594	88.42	1,369		
87.38	612	88.44	1,379		
87.40	631	88.46	1,389		
87.42	649	88.48	1,399		
87.44 87.46	668 686	88.50 88.52	1,409 1,418		
87.48	704	88.54	1,428		
87.50	704	88.56	1,428		
87.52	740	88.58	1,448		
87.54	758	88.60	1,458		
			.,	l	

### Stage-Area-Storage for Pond P2: POND 2 SC 740

		J	J
Elevation (feet)	Storage (cubic-feet)	Elevation (feet)	Storage (cubic-feet)
85.00	0	87.65	7,361
85.05	82	87.70	7,471
85.10	164	87.75	7,574
85.15	245	87.80	7,671
85.20	327	87.85	7,763
85.25	409	87.90	7,851
85.30	491	87.95	7,937
85.35	572	88.00	8,020
85.40	654	88.05	8,102
85.45	736	88.10	8,184
85.50	818	88.15	8,266
85.55	989	88.20	8,347
85.60	1,161	88.25	8,429
85.65	1,332	88.30	8,511
85.70 85.75	1,502	88.35	8,593
85.75 85.80	1,673	88.40	8,674
85.80 85.85	1,842 2,011	88.45 88.50	8,756 <b>8,838</b>
85.90	2,180	00.00	0,030
85.95	2,348		
86.00	2,515		
86.05	2,681		
86.10	2,847		
86.15	3,011		
86.20	3,175		
86.25	3,339		
86.30	3,501		
86.35	3,662		
86.40 86.45	3,823		
86.50	3,982 4,141		
86.55	4,298		
86.60	4,455		
86.65	4,610		
86.70	4,764		
86.75	4,916		
86.80	5,068		
86.85	5,218		
86.90	5,366		
86.95	5,513		
87.00	5,659		
87.05	5,803		
87.10 97.15	5,946		
87.15 87.20	6,086		
87.25	6,225 6,361		
87.30	6,495		
87.35	6,627		
87.40	6,756		
87.45	6,884		
87.50	7,008		
87.55	7,129		
87.60	7,247		
	ļ	1	

# Hydrograph for Pond P1: POND SC 310

Time	Inflow	Storage	Elevation	Outflow	Discarded	Primary
(hours)	(cfs)	(cubic-feet)	(feet)	(cfs)	(cfs)	(cfs)
0.00	0.00	0	86.50	0.00	0.00	0.00
1.00	0.00	0	86.50	0.00	0.00	0.00
2.00	0.00	0	86.50	0.00	0.00	0.00
3.00	0.00	0	86.50	0.00	0.00	0.00
4.00	0.01	0	86.50	0.01	0.01	0.00
5.00	0.01	0	86.50	0.01	0.01	0.00
6.00	0.02	0	86.50	0.02	0.02	0.00
7.00	0.02	0	86.50	0.02	0.02	0.00
8.00	0.04	0	86.50	0.04	0.04	0.00
9.00	0.06	0	86.50	0.06	0.06	0.00
10.00	0.09	0	86.50	0.09	0.09	0.00
11.00	0.14	0	86.50	0.14	0.14	0.00
12.00	1.52	698	87.47	0.23	0.23	0.00
13.00	0.18	904	87.71	0.23	0.23	0.00
14.00	0.12	601	87.37	0.23	0.23	0.00
15.00	0.09	141	86.79	0.23	0.23	0.00
16.00	0.06	0	86.50	0.00	0.00	0.00
17.00	0.05	0	86.50	0.00	0.00	0.00
18.00	0.04	0	86.50	0.00	0.00	0.00
19.00	0.03	0	86.50	0.00	0.00	0.00
20.00	0.03	0	86.50	0.00	0.00	0.00
21.00	0.03	0	86.50	0.00	0.00	0.00
22.00	0.03	0	86.50	0.00	0.00	0.00
23.00	0.02	0	86.50	0.00	0.00	0.00
24.00	0.02	0	86.50	0.00	0.00	0.00
25.00	0.00	0	86.50	0.00	0.00	0.00
26.00	0.00	0	86.50	0.00	0.00	0.00
27.00	0.00	0	86.50	0.00	0.00	0.00
28.00	0.00	0	86.50	0.00	0.00	0.00
29.00	0.00	0	86.50	0.00	0.00	0.00
30.00	0.00	0	86.50	0.00	0.00	0.00
31.00	0.00	0	86.50	0.00	0.00	0.00
32.00	0.00	0	86.50	0.00	0.00	0.00
33.00	0.00	0	86.50	0.00	0.00	0.00
34.00	0.00	0	86.50	0.00	0.00	0.00
35.00	0.00	0	86.50	0.00	0.00	0.00

### Hydrograph for Pond P2: POND 2 SC 740

Time	Inflow	Storage	Elevation	Outflow	Discarded	Primary
(hours)	(cfs)	(cubic-feet)	(feet)	(cfs)	(cfs)	(cfs)
0.00	0.00	0	85.00	0.00	0.00	0.00
1.00	0.00	0	85.00	0.00	0.00	0.00
2.00	0.00	0	85.00	0.00	0.00	0.00
3.00	0.00	0	85.00	0.00	0.00	0.00
4.00	0.00	0	85.00	0.00	0.00	0.00
5.00	0.02	0	85.00	0.02	0.02	0.00
6.00	0.04	0	85.00	0.04	0.04	0.00
7.00	0.08	0	85.00	0.08	0.08	0.00
8.00	0.13	0	85.00	0.13	0.13	0.00
9.00	0.23	0	85.00	0.23	0.23	0.00
10.00	0.35	0	85.00	0.35	0.35	0.00
11.00	0.60	0	85.00	0.60	0.60	0.00
12.00	6.97	3,700	86.36	0.78	0.78	0.00
13.00	0.88	6,017	87.13	1.84	0.78	1.06
14.00	0.56	4,475	86.61	0.82	0.78	0.04
15.00	0.43	3,417	86.27	0.78	0.78	0.00
16.00	0.30	1,920	85.82	0.78	0.78	0.00
17.00	0.24	74	85.05	0.78	0.78	0.00
18.00	0.18	0	85.00	0.37	0.37	0.00
19.00	0.16	0	85.00	0.33	0.33	0.00
20.00	0.15	0	85.00	0.29	0.29	0.00
21.00	0.13	0	85.00	0.27	0.27	0.00
22.00	0.12	0	85.00	0.24	0.24	0.00
23.00	0.11	0	85.00	0.22	0.22	0.00
24.00	0.10	0	85.00	0.19	0.19	0.00
25.00	0.00	0	85.00	0.00	0.00	0.00
26.00	0.00	0	85.00	0.00	0.00	0.00
27.00	0.00	0	85.00	0.00	0.00	0.00
28.00	0.00	0	85.00	0.00	0.00	0.00
29.00	0.00	0	85.00	0.00	0.00	0.00
30.00	0.00	0	85.00	0.00	0.00	0.00
31.00	0.00	0	85.00	0.00	0.00	0.00
32.00	0.00	0	85.00	0.00	0.00	0.00
33.00	0.00	0	85.00	0.00	0.00	0.00
34.00	0.00	0	85.00	0.00	0.00	0.00
35.00	0.00	0	85.00	0.00	0.00	0.00

#### SUBSURFACE INFILTRATION SYSTEM 1

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.

Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

	Input Values		, , , , , , , , , , , , , , , , , , , ,	inch/h	our feet/	day
I	16.4000	$\boldsymbol{R}$	Recharge (infiltration) rate (feet/day)		0.67	1.33
I	0.280	Sy	Specific yield, Sy (dimensionless, between 0 and 1)			
ı	800.00	K	Horizontal hydraulic conductivity, Kh (feet/day)*		2.00	4.00 In the report accompanying this spreadsheet
ı	44.200	x	1/2 length of basin (x direction, in feet)			(USGS SIR 2010-5102), vertical soil permeability
ı	5.200	У	1/2 width of basin (y direction, in feet)	hours	days	
ı	0.500	t	duration of infiltration period (days)		36	1.50 hydraulic conductivity (ft/d).
ı	25.400	hi(0)	initial thickness of saturated zone (feet)			

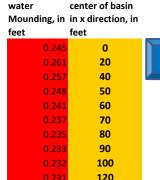
**Conversion Table** 

25.645 h(max) maximum thickness of saturated zone (beneath center of basin at end of infiltration period)

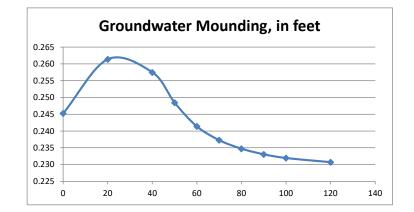
0.245 Δh(max) maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground- Distance from

use consistent units (e.g. feet & days or inches & hours)







#### **Disclaimer**

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

#### SUBSURFACE INFILTRATION SYSTEM 2

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.

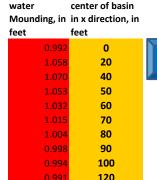
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

Input Values		, ,	inch/h	our feet/	day
16.4000	$\boldsymbol{R}$	Recharge (infiltration) rate (feet/day)		0.67	1.33
0.260	Sy	Specific yield, Sy (dimensionless, between 0 and 1)			
800.00	K	Horizontal hydraulic conductivity, Kh (feet/day)*		2.00	4.00 In the report accompanying this spreadsheet
50.850	x	1/2 length of basin (x direction, in feet)			(USGS SIR 2010-5102), vertical soil permeability
17.400	у	1/2 width of basin (y direction, in feet)	hours	days	
0.830	t	duration of infiltration period (days)		36	1.50 hydraulic conductivity (ft/d).
23.400	hi(0)	initial thickness of saturated zone (feet)			

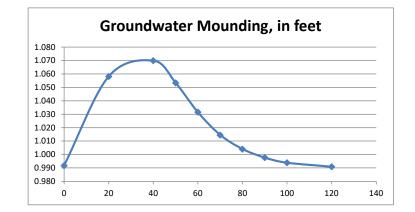
**Conversion Table** 

24.392 h(max) maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
 0.992 Δh(max) maximum groundwater mounding (beneath center of basin at end of infiltration period)
 Ground- Distance from

use consistent units (e.g. feet & days or inches & hours)

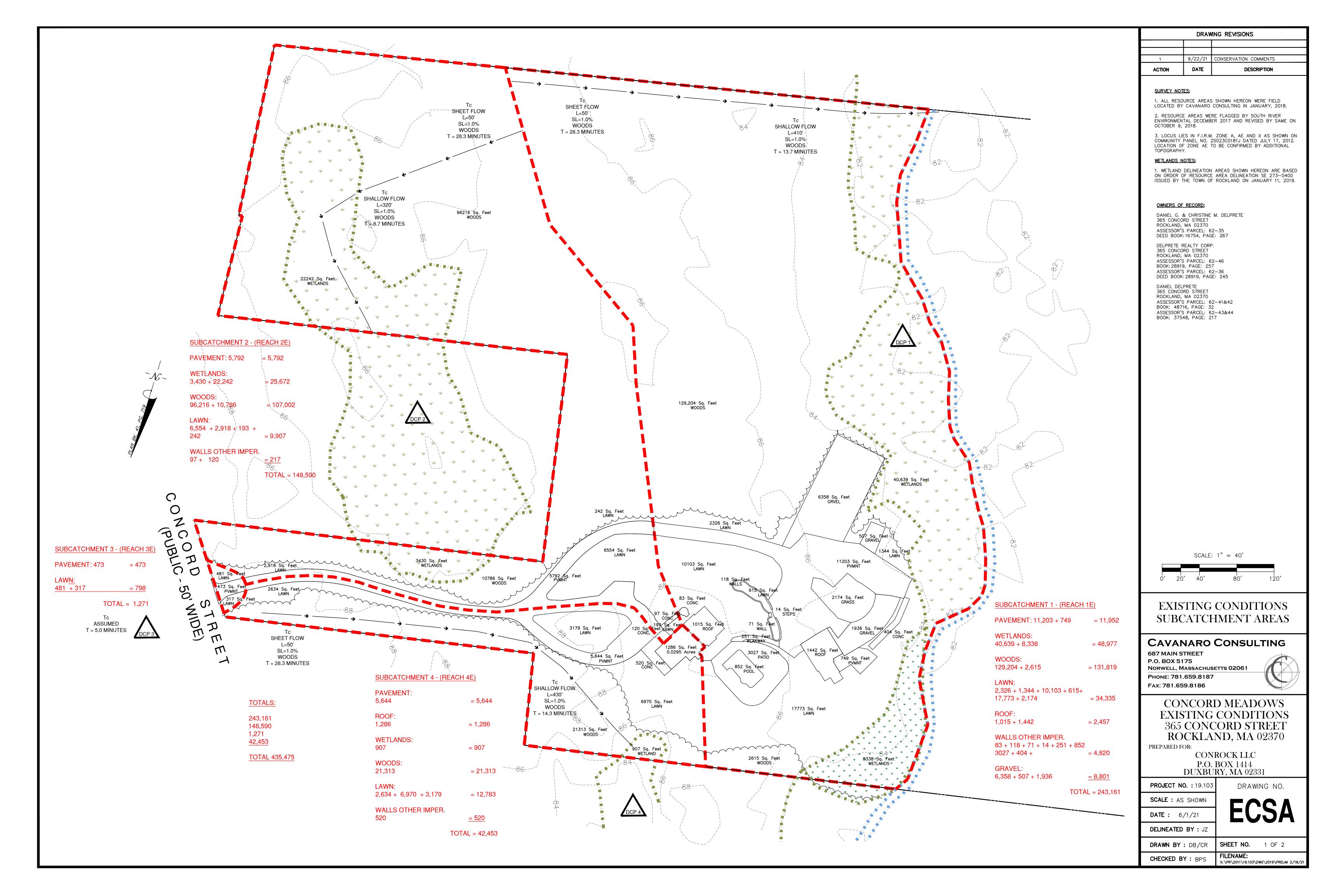


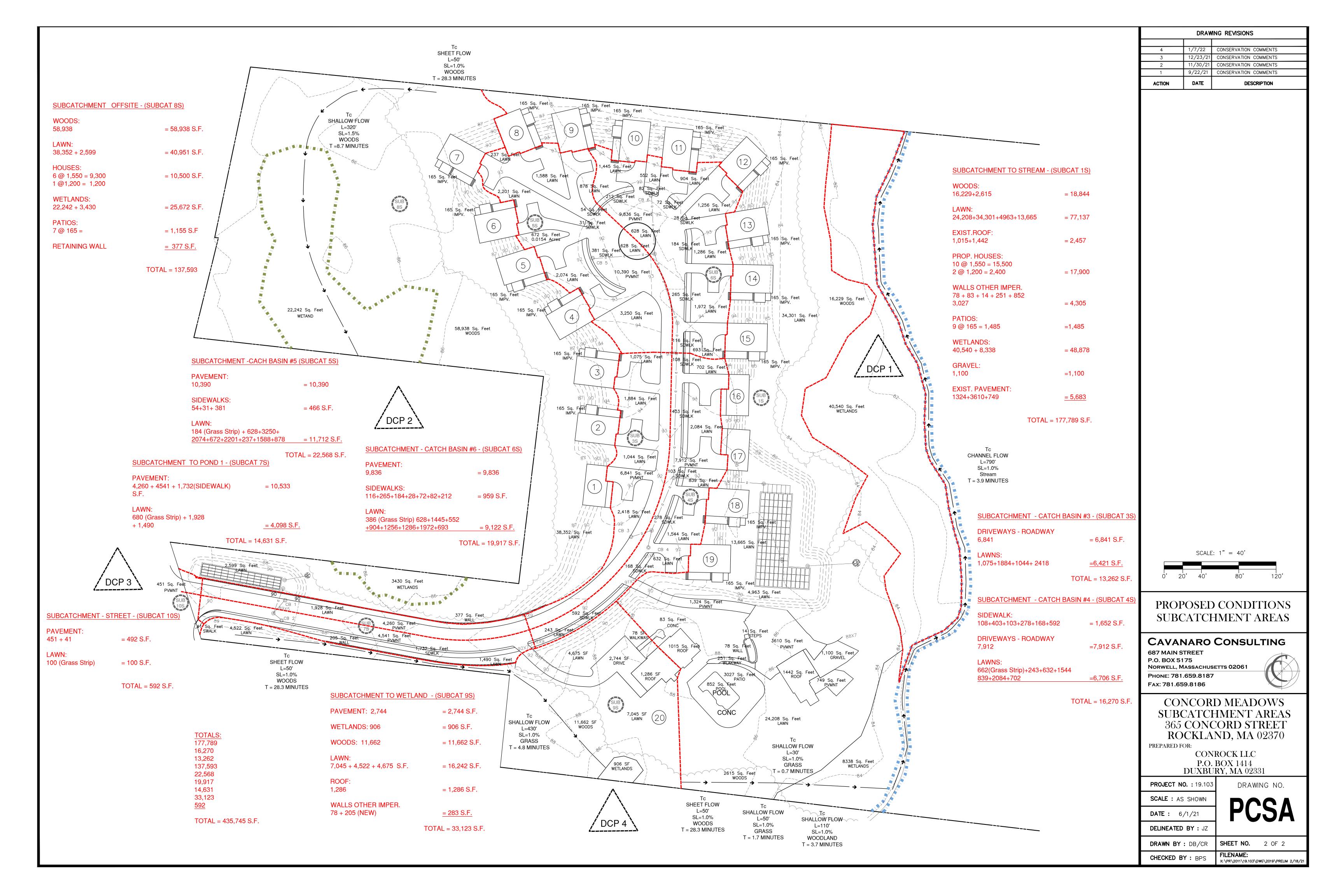


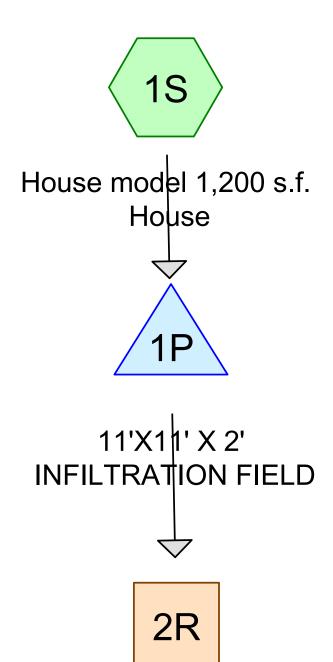


#### **Disclaimer**

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.







1R









Type III 24-hr 2 Year Event Rainfall=3.20"
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Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: House model 1,200 s.f.** Runoff Area=1,200 sf 100.00% Impervious Runoff Depth=2.97" Tc=5.0 min CN=98 Runoff=0.09 cfs 297 cf

Reach 2R: 1R Inflow=0.08 cfs 134 cf

Outflow=0.08 cfs 134 cf

Pond 1P: 11'X11' X 2' INFILTRATION FIELD Peak Elev=99.70' Storage=99 cf Inflow=0.09 cfs 297 cf Discarded=0.00 cfs 118 cf Primary=0.08 cfs 134 cf Outflow=0.08 cfs 252 cf

Total Runoff Area = 1,200 sf Runoff Volume = 297 cf Average Runoff Depth = 2.97" 0.00% Pervious = 0 sf 100.00% Impervious = 1,200 sf Prepared by Cavanaro Consulting

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#### Summary for Subcatchment 1S: House model 1,200 s.f. House

Runoff = 0.09 cfs @ 12.07 hrs, Volume= 297 cf, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 2 Year Event Rainfall=3.20"

_	Α	rea (sf)	CN [	Description		
*		1,200	98			
		1,200	1	00.00% Im	npervious A	Area
		Length	•	•		Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	5.0					Direct Entry,

#### Summary for Reach 2R: 1R

Inflow Area = 1,200 sf,100.00% Impervious, Inflow Depth = 1.34" for 2 Year Event event Inflow = 0.08 cfs @ 12.09 hrs, Volume= 134 cf

Outflow = 0.08 cfs @ 12.09 hrs, Volume= 134 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

#### Summary for Pond 1P: 11'X11' X 2' INFILTRATION FIELD

Inflow Area =	1,200 sf,100.00% Impervious,	Inflow Depth = 2.97" for 2 Year Event event
Inflow =	0.09 cfs @ 12.07 hrs, Volume=	297 cf
Outflow =	0.08 cfs @ 12.09 hrs, Volume=	252 cf, Atten= 4%, Lag= 1.4 min
Discarded =	0.00 cfs @ 12.09 hrs, Volume=	118 cf
Primary =	0.08 cfs @ 12.09 hrs, Volume=	134 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 99.70' @ 12.09 hrs Surf.Area= 121 sf Storage= 99 cf

Plug-Flow detention time= 281.2 min calculated for 252 cf (85% of inflow) Center-of-Mass det. time= 216.3 min (971.8 - 755.5)

Volume	Invert	Avail.Storage	Storage Description
#1	98.00'	86 cf	Custom Stage Data (Irregular) Listed below
			242 cf Overall - 28 cf Embedded = 214 cf x 40.0% Voids
#2	98.50'	28 cf	Cultec C-100 x 2 Inside #1
			Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
			Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		114 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
98.00	121	44.0	0	0	121
100.00	121	44.0	242	242	209

Type III 24-hr 2 Year Event Rainfall=3.20"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	98.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	99.50'	4.0" Vert. Orifice/Grate C= 0.600

**Discarded OutFlow** Max=0.00 cfs @ 12.09 hrs HW=99.70' (Free Discharge) 1=Exfiltration (Exfiltration Controls 0.00 cfs)

**Primary OutFlow** Max=0.08 cfs @ 12.09 hrs HW=99.70' (Free Discharge) **2=Orifice/Grate** (Orifice Controls 0.08 cfs @ 1.52 fps)

Type III 24-hr 10 Year Event Rainfall=4.60"

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Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: House model 1,200 s.f.** Runoff Area=1,200 sf 100.00% Impervious Runoff Depth=4.36" Tc=5.0 min CN=98 Runoff=0.13 cfs 436 cf

**Reach 2R: 1R**Inflow=0.12 cfs 265 cf

Outflow=0.12 cfs 265 cf

Pond 1P: 11'X11' X 2' INFILTRATION FIELD Peak Elev=99.76' Storage=102 cf Inflow=0.13 cfs 436 cf Discarded=0.00 cfs 124 cf Primary=0.12 cfs 265 cf Outflow=0.12 cfs 389 cf

Total Runoff Area = 1,200 sf Runoff Volume = 436 cf Average Runoff Depth = 4.36" 0.00% Pervious = 0 sf 100.00% Impervious = 1,200 sf

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#### Summary for Subcatchment 1S: House model 1,200 s.f. House

Runoff = 0.13 cfs @ 12.07 hrs, Volume= 436 cf, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 10 Year Event Rainfall=4.60"

_	Α	rea (sf)	CN [	Description		
*		1,200	98			
		1,200	1	00.00% Im	npervious A	Area
		Length	•	•		Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	5.0					Direct Entry,

#### Summary for Reach 2R: 1R

Inflow Area = 1,200 sf,100.00% Impervious, Inflow Depth = 2.65" for 10 Year Event event

Inflow = 0.12 cfs @ 12.09 hrs, Volume= 265 cf

Outflow = 0.12 cfs @ 12.09 hrs, Volume= 265 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

#### Summary for Pond 1P: 11'X11' X 2' INFILTRATION FIELD

Inflow Area =	1,200 sf,100.00% Impervious,	Inflow Depth = 4.36" for 10 Year Event event
Inflow =	0.13 cfs @ 12.07 hrs, Volume=	436 cf
Outflow =	0.12 cfs @ 12.09 hrs, Volume=	389 cf, Atten= 3%, Lag= 1.1 min
Discarded =	0.00 cfs @ 12.09 hrs, Volume=	124 cf
Primary =	0.12 cfs @ 12.09 hrs, Volume=	265 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 99.76' @ 12.09 hrs Surf.Area= 121 sf Storage= 102 cf

Plug-Flow detention time= 205.6 min calculated for 389 cf (89% of inflow) Center-of-Mass det. time= 152.9 min (901.4 - 748.5)

Volume	Invert	Avail.Storage	Storage Description
#1	98.00'	86 cf	Custom Stage Data (Irregular) Listed below
			242 cf Overall - 28 cf Embedded = 214 cf x 40.0% Voids
#2	98.50'	28 cf	Cultec C-100 x 2 Inside #1
			Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
			Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		114 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
98.00	121	44.0	0	0	121
100 00	121	44 0	242	242	209

Type III 24-hr 10 Year Event Rainfall=4.60"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	98.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	99.50'	4.0" Vert. Orifice/Grate C= 0.600

**Discarded OutFlow** Max=0.00 cfs @ 12.09 hrs HW=99.76' (Free Discharge) **1=Exfiltration** (Exfiltration Controls 0.00 cfs)

**Primary OutFlow** Max=0.12 cfs @ 12.09 hrs HW=99.76' (Free Discharge) **2=Orifice/Grate** (Orifice Controls 0.12 cfs @ 1.72 fps)

Type III 24-hr 25 Year Event Rainfall=5.60" Printed 12/21/2021

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Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: House model 1,200 s.f.** Runoff Area=1,200 sf 100.00% Impervious Runoff Depth=5.36" Tc=5.0 min CN=98 Runoff=0.16 cfs 536 cf

Reach 2R: 1R Inflow=0.15 cfs 362 cf
Outflow=0.15 cfs 362 cf

Pond 1P: 11'X11' X 2' INFILTRATION FIELD Peak Elev=99.79' Storage=104 cf Inflow=0.16 cfs 536 cf Discarded=0.00 cfs 126 cf Primary=0.15 cfs 362 cf Outflow=0.15 cfs 489 cf

Total Runoff Area = 1,200 sf Runoff Volume = 536 cf Average Runoff Depth = 5.36" 0.00% Pervious = 0 sf 100.00% Impervious = 1,200 sf

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#### Summary for Subcatchment 1S: House model 1,200 s.f. House

Runoff = 0.16 cfs @ 12.07 hrs, Volume= 536 cf, Depth= 5.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 25 Year Event Rainfall=5.60"

_	Α	rea (sf)	CN [	Description		
*		1,200	98			
		1,200	1	00.00% Im	npervious A	Area
		Length	•	•		Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	5.0					Direct Entry,

#### Summary for Reach 2R: 1R

Inflow Area = 1,200 sf,100.00% Impervious, Inflow Depth = 3.62" for 25 Year Event event

Inflow = 0.15 cfs @ 12.09 hrs, Volume= 362 cf

Outflow = 0.15 cfs @ 12.09 hrs, Volume= 362 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

#### Summary for Pond 1P: 11'X11' X 2' INFILTRATION FIELD

Inflow Area = 1,200 sf,100.00% Impervious, Inflow Depth = 5.36" for 25 Year Event event Inflow = 0.16 cfs @ 12.07 hrs, Volume= 536 cf

Outflow = 0.15 cfs @ 12.09 hrs, Volume= 489 cf, Atten= 3%, Lag= 1.1 min

Discarded = 0.00 cfs @ 12.09 hrs, Volume= 126 cf

Primary = 0.15 cfs @ 12.09 hrs, Volume= 362 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 99.79' @ 12.09 hrs Surf.Area= 121 sf Storage= 104 cf

Plug-Flow detention time= 176.5 min calculated for 489 cf (91% of inflow) Center-of-Mass det. time= 130.6 min (875.9 - 745.3)

Volume	Invert	Avail.Storage	Storage Description
#1	98.00'	86 cf	Custom Stage Data (Irregular) Listed below
			242 cf Overall - 28 cf Embedded = 214 cf x 40.0% Voids
#2	98.50'	28 cf	Cultec C-100 x 2 Inside #1
			Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
			Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		11/ cf	Total Available Storage

#### 114 cf Total Available Storage

Elevation	Surf.Area	Perim.	Inc.Store	Cum.Store	Wet.Area
(feet)	(sq-ft)	(feet)	(cubic-feet)	(cubic-feet)	(sq-ft)
98.00	121	44.0	0	0	121
100.00	121	44.0	242	242	209

Type III 24-hr 25 Year Event Rainfall=5.60"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	98.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	99.50'	4.0" Vert. Orifice/Grate C= 0.600

**Discarded OutFlow** Max=0.00 cfs @ 12.09 hrs HW=99.79' (Free Discharge) **1=Exfiltration** (Exfiltration Controls 0.00 cfs)

**Primary OutFlow** Max=0.15 cfs @ 12.09 hrs HW=99.79' (Free Discharge) **2=Orifice/Grate** (Orifice Controls 0.15 cfs @ 1.85 fps)

Type III 24-hr 100 Year Event Rainfall=7.00"

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Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: House model 1,200 s.f.** Runoff Area=1,200 sf 100.00% Impervious Runoff Depth=6.76" Tc=5.0 min CN=98 Runoff=0.20 cfs 676 cf

Reach 2R: 1R Inflow=0.19 cfs 499 cf Outflow=0.19 cfs 499 cf

Pond 1P: 11'X11' X 2' INFILTRATION FIELD Peak Elev=99.86' Storage=107 cf Inflow=0.20 cfs 676 cf Discarded=0.00 cfs 129 cf Primary=0.19 cfs 499 cf Outflow=0.19 cfs 628 cf

Total Runoff Area = 1,200 sf Runoff Volume = 676 cf Average Runoff Depth = 6.76" 0.00% Pervious = 0 sf 100.00% Impervious = 1,200 sf Prepared by Cavanaro Consulting

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### Summary for Subcatchment 1S: House model 1,200 s.f. House

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 676 cf, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 100 Year Event Rainfall=7.00"

_	Α	rea (sf)	CN [	Description		
*		1,200	98			
		1,200	1	00.00% Im	npervious A	Area
		Length	•	•		Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	5.0					Direct Entry,

#### Summary for Reach 2R: 1R

Inflow Area = 1,200 sf,100.00% Impervious, Inflow Depth = 4.99" for 100 Year Event event

Inflow = 0.19 cfs @ 12.09 hrs, Volume= 499 cf

Outflow = 0.19 cfs @ 12.09 hrs, Volume= 499 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

#### Summary for Pond 1P: 11'X11' X 2' INFILTRATION FIELD

Inflow Area =	1,200 sf,100.00% Impervious,	Inflow Depth = 6.76" for 100 Year Event event
Inflow =	0.20 cfs @ 12.07 hrs, Volume=	676 cf
Outflow =	0.19 cfs @ 12.09 hrs, Volume=	628 cf, Atten= 4%, Lag= 1.4 min
Discarded =	0.00 cfs @ 12.09 hrs, Volume=	129 cf
Primary =	0.19 cfs @ 12.09 hrs, Volume=	499 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 99.86' @ 12.09 hrs Surf.Area= 121 sf Storage= 107 cf

Plug-Flow detention time= 148.8 min calculated for 628 cf (93% of inflow) Center-of-Mass det. time= 110.1 min (852.1 - 742.0)

Volume	Invert	Avail.Storage	Storage Description
#1	98.00'	86 cf	Custom Stage Data (Irregular) Listed below
			242 cf Overall - 28 cf Embedded = 214 cf x 40.0% Voids
#2	98.50'	28 cf	Cultec C-100 x 2 Inside #1
			Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
			Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		111 of	Total Available Storage

#### 114 cf Total Available Storage

Elevation	Surf.Area	Perim.	Inc.Store	Cum.Store	Wet.Area
(feet)	(sq-ft)	(feet)	(cubic-feet)	(cubic-feet)	(sq-ft)
98.00	121	44.0	0	0	121
100.00	121	44.0	242	242	209

Type III 24-hr 100 Year Event Rainfall=7.00"

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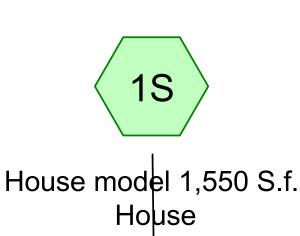
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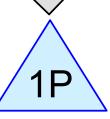
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Device	Routing	Invert	Outlet Devices
#1	Discarded	98.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	99.50'	4.0" Vert. Orifice/Grate C= 0.600

**Discarded OutFlow** Max=0.00 cfs @ 12.09 hrs HW=99.86' (Free Discharge) **1=Exfiltration** (Exfiltration Controls 0.00 cfs)

**Primary OutFlow** Max=0.19 cfs @ 12.09 hrs HW=99.86' (Free Discharge) **2=Orifice/Grate** (Orifice Controls 0.19 cfs @ 2.13 fps)









1R









Type III 24-hr 2 Year Event Rainfall=3.20"
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Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: House model 1,550 S.f.** Runoff Area=1,550 sf 100.00% Impervious Runoff Depth=2.97" Tc=5.0 min CN=98 Runoff=0.11 cfs 383 cf

Reach 2R: 1R Inflow=0.11 cfs 216 cf
Outflow=0.11 cfs 216 cf

Pond 1P: 11'X11' X 2' INFILTRATION FIELD Peak Elev=99.74' Storage=101 cf Inflow=0.11 cfs 383 cf Discarded=0.00 cfs 121 cf Primary=0.11 cfs 216 cf Outflow=0.11 cfs 336 cf

Total Runoff Area = 1,550 sf Runoff Volume = 383 cf Average Runoff Depth = 2.97" 0.00% Pervious = 0 sf 100.00% Impervious = 1,550 sf

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#### Summary for Subcatchment 1S: House model 1,550 S.f. House

Runoff = 0.11 cfs @ 12.07 hrs, Volume= 383 cf, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 2 Year Event Rainfall=3.20"

	Α	rea (sf)	CN [	Description		
*		1,550	98			
		1,550	1	100.00% Im	npervious A	Area
	Тс	Length	Slope	Velocity	Capacity	Description
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	5.0					Direct Entry,

#### Summary for Reach 2R: 1R

Inflow Area = 1,550 sf,100.00% Impervious, Inflow Depth = 1.67" for 2 Year Event event

Inflow = 0.11 cfs @ 12.09 hrs, Volume= 216 cf

Outflow = 0.11 cfs @ 12.09 hrs, Volume= 216 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

#### Summary for Pond 1P: 11'X11' X 2' INFILTRATION FIELD

Inflow Area = 1,550 sf,100.00% Impervious, Inflow Depth = 2.97" for 2 Year Event event Inflow = 0.11 cfs @ 12.07 hrs, Volume= 383 cf

Outflow = 0.11 cfs @ 12.09 hrs, Volume= 336 cf, Atten= 3%, Lag= 1.1 min

Discarded = 0.00 cfs @ 12.09 hrs, Volume= 121 cf

Primary = 0.11 cfs @ 12.09 hrs, Volume= 216 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 99.74' @ 12.09 hrs Surf.Area= 121 sf Storage= 101 cf

Plug-Flow detention time= 225.3 min calculated for 336 cf (88% of inflow) Center-of-Mass det. time= 168.8 min (924.2 - 755.5)

Volume	Invert	Avail.Storage	Storage Description
#1	98.00'	86 cf	Custom Stage Data (Irregular) Listed below
			242 cf Overall - 28 cf Embedded = 214 cf x 40.0% Voids
#2	98.50'	28 cf	Cultec C-100 x 2 Inside #1
			Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
			Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		114 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
98.00	121	44.0	0	0	121
100.00	121	44.0	242	242	209

Type III 24-hr 2 Year Event Rainfall=3.20"

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Device Routing Invert Outlet Devices

#1 Discarded #2 Primary 99.50' 4.0" Vert. Orifice/Grate C= 0.600

**Discarded OutFlow** Max=0.00 cfs @ 12.09 hrs HW=99.74' (Free Discharge) **1=Exfiltration** (Exfiltration Controls 0.00 cfs)

**Primary OutFlow** Max=0.11 cfs @ 12.09 hrs HW=99.74' (Free Discharge) **2=Orifice/Grate** (Orifice Controls 0.11 cfs @ 1.66 fps)

Type III 24-hr 10 Year Event Rainfall=4.60"

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Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: House model 1,550 S.f.** Runoff Area=1,550 sf 100.00% Impervious Runoff Depth=4.36" Tc=5.0 min CN=98 Runoff=0.17 cfs 564 cf

Reach 2R: 1R Inflow=0.16 cfs 390 cf
Outflow=0.16 cfs 390 cf

Pond 1P: 11'X11' X 2' INFILTRATION FIELD Peak Elev=99.81' Storage=104 cf Inflow=0.17 cfs 564 cf Discarded=0.00 cfs 126 cf Primary=0.16 cfs 390 cf Outflow=0.16 cfs 516 cf

Total Runoff Area = 1,550 sf Runoff Volume = 564 cf Average Runoff Depth = 4.36" 0.00% Pervious = 0 sf 100.00% Impervious = 1,550 sf

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#### Summary for Subcatchment 1S: House model 1,550 S.f. House

Runoff = 0.17 cfs @ 12.07 hrs, Volume= 564 cf, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 10 Year Event Rainfall=4.60"

	Α	rea (sf)	CN [	Description		
*		1,550	98			
_		1,550	1	00.00% Im	npervious A	Area
		Length	•	•		Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	5.0					Direct Entry,

#### Summary for Reach 2R: 1R

Inflow Area = 1,550 sf,100.00% Impervious, Inflow Depth = 3.02" for 10 Year Event event

Inflow = 0.16 cfs @ 12.09 hrs, Volume= 390 cf

Outflow = 0.16 cfs @ 12.09 hrs, Volume= 390 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

#### Summary for Pond 1P: 11'X11' X 2' INFILTRATION FIELD

Inflow Area =	1,550 sf,100.00% Impervious,	Inflow Depth = 4.36" for 10 Year Event event
Inflow =	0.17 cfs @ 12.07 hrs, Volume=	564 cf
Outflow =	0.16 cfs @ 12.09 hrs, Volume=	516 cf, Atten= 3%, Lag= 1.2 min
Discarded =	0.00 cfs @ 12.09 hrs, Volume=	126 cf
Primary =	0.16 cfs @ 12.09 hrs, Volume=	390 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 99.81' @ 12.09 hrs Surf.Area= 121 sf Storage= 104 cf

Plug-Flow detention time= 168.2 min calculated for 516 cf (92% of inflow) Center-of-Mass det. time= 124.3 min (872.8 - 748.5)

Volume	Invert	Avail.Storage	Storage Description
#1	98.00'	86 cf	Custom Stage Data (Irregular) Listed below
			242 cf Overall - 28 cf Embedded = 214 cf x 40.0% Voids
#2	98.50'	28 cf	Cultec C-100 x 2 Inside #1
			Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
			Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		444 6	T ( ) A ( ) ) ) O

#### 114 cf Total Available Storage

Elevation	Surf.Area	Perim.	Inc.Store	Cum.Store	Wet.Area
(feet)	(sq-ft)	(feet)	(cubic-feet)	(cubic-feet)	(sq-ft)
98.00	121	44.0	0	0	121
100.00	121	44.0	242	242	209

# **Concord ST one house with infiltration 1550**

Type III 24-hr 10 Year Event Rainfall=4.60"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	98.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	99.50'	4.0" Vert. Orifice/Grate C= 0.600

**Discarded OutFlow** Max=0.00 cfs @ 12.09 hrs HW=99.81' (Free Discharge) **1=Exfiltration** (Exfiltration Controls 0.00 cfs)

**Primary OutFlow** Max=0.16 cfs @ 12.09 hrs HW=99.81' (Free Discharge) **2=Orifice/Grate** (Orifice Controls 0.16 cfs @ 1.89 fps)

## **Concord ST one house with infiltration 1550**

Type III 24-hr 25 Year Event Rainfall=5.60" Printed 12/21/2021

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Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: House model 1,550 S.f.** Runoff Area=1,550 sf 100.00% Impervious Runoff Depth=5.36" Tc=5.0 min CN=98 Runoff=0.20 cfs 693 cf

Reach 2R: 1R Inflow=0.19 cfs 516 cf
Outflow=0.19 cfs 516 cf

Pond 1P: 11'X11' X 2' INFILTRATION FIELD Peak Elev=99.87' Storage=107 cf Inflow=0.20 cfs 693 cf Discarded=0.00 cfs 128 cf Primary=0.19 cfs 516 cf Outflow=0.19 cfs 645 cf

Total Runoff Area = 1,550 sf Runoff Volume = 693 cf Average Runoff Depth = 5.36" 0.00% Pervious = 0 sf 100.00% Impervious = 1,550 sf

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## Summary for Subcatchment 1S: House model 1,550 S.f. House

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 693 cf, Depth= 5.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 25 Year Event Rainfall=5.60"

_	Α	rea (sf)	CN E	Description		
*		1,550	98			
		1,550	1	00.00% Im	npervious A	Area
	Тс	Length	Slope	Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	5.0					Direct Entry,

### Summary for Reach 2R: 1R

Inflow Area = 1,550 sf,100.00% Impervious, Inflow Depth = 4.00" for 25 Year Event event

Inflow = 0.19 cfs @ 12.09 hrs, Volume= 516 cf

Outflow = 0.19 cfs @ 12.09 hrs, Volume= 516 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

## Summary for Pond 1P: 11'X11' X 2' INFILTRATION FIELD

Inflow Area =	1,550 sf,100.00% Impervious,	Inflow Depth = 5.36" for 25 Year Event event
Inflow =	0.20 cfs @ 12.07 hrs, Volume=	693 cf
Outflow =	0.19 cfs @ 12.09 hrs, Volume=	645 cf, Atten= 5%, Lag= 1.4 min
Discarded =	0.00 cfs @ 12.09 hrs, Volume=	128 cf
Primary =	0.19 cfs @ 12.09 hrs, Volume=	516 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 99.87' @ 12.09 hrs Surf.Area= 121 sf Storage= 107 cf

Plug-Flow detention time= 144.5 min calculated for 645 cf (93% of inflow) Center-of-Mass det. time= 106.7 min (852.0 - 745.3)

Volume	Invert	Avail.Storage	Storage Description
#1	98.00'	86 cf	Custom Stage Data (Irregular) Listed below
			242 cf Overall - 28 cf Embedded = 214 cf x 40.0% Voids
#2	98.50'	28 cf	Cultec C-100 x 2 Inside #1
			Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
			Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		444.5	Tatal Assillable Otomore

#### 114 cf Total Available Storage

Elevation	Surf.Area	Perim.	Inc.Store	Cum.Store	Wet.Area
(feet)	(sq-ft)	(feet)	(cubic-feet)	(cubic-feet)	(sq-ft)
98.00	121	44.0	0	0	121
100.00	121	44.0	242	242	209

## **Concord ST one house with infiltration 1550**

Type III 24-hr 25 Year Event Rainfall=5.60"

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Device	Routing	Invert	Outlet Devices
#1	Discarded	98.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	99.50'	4.0" Vert. Orifice/Grate C= 0.600

**Discarded OutFlow** Max=0.00 cfs @ 12.09 hrs HW=99.87' (Free Discharge) **1=Exfiltration** (Exfiltration Controls 0.00 cfs)

**Primary OutFlow** Max=0.19 cfs @ 12.09 hrs HW=99.87' (Free Discharge) **2=Orifice/Grate** (Orifice Controls 0.19 cfs @ 2.19 fps)

#### Concord ST one house with infiltration 1550

Type III 24-hr 100 Year Event Rainfall=7.00"

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Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S: House model 1,550 S.f.** Runoff Area=1,550 sf 100.00% Impervious Runoff Depth=6.76" Tc=5.0 min CN=98 Runoff=0.25 cfs 873 cf

**Reach 2R: 1R**Inflow=0.24 cfs 694 cf

Outflow=0.24 cfs 694 cf

Pond 1P: 11'X11' X 2' INFILTRATION FIELD Peak Elev=99.98' Storage=113 cf Inflow=0.25 cfs 873 cf Discarded=0.00 cfs 131 cf Primary=0.24 cfs 694 cf Outflow=0.24 cfs 825 cf

Total Runoff Area = 1,550 sf Runoff Volume = 873 cf Average Runoff Depth = 6.76" 0.00% Pervious = 0 sf 100.00% Impervious = 1,550 sf

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## Summary for Subcatchment 1S: House model 1,550 S.f. House

Runoff = 0.25 cfs @ 12.07 hrs, Volume= 873 cf, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 100 Year Event Rainfall=7.00"

_	Α	rea (sf)	CN E	Description		
*		1,550	98			
		1,550	1	00.00% Im	npervious A	Area
	Тс	Length	Slope	Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	5.0					Direct Entry,

### Summary for Reach 2R: 1R

Inflow Area = 1,550 sf,100.00% Impervious, Inflow Depth = 5.38" for 100 Year Event event Inflow = 0.24 cfs @ 12.10 hrs, Volume= 694 cf

Outflow = 0.24 cfs @ 12.10 hrs, Volume= 694 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

## Summary for Pond 1P: 11'X11' X 2' INFILTRATION FIELD

Inflow Area =	1,550 sf,100.00% Impervious,	Inflow Depth = 6.76" for 100 Year Event event
Inflow =	0.25 cfs @ 12.07 hrs, Volume=	873 cf
Outflow =	0.24 cfs @ 12.10 hrs, Volume=	825 cf, Atten= 6%, Lag= 1.7 min
Discarded =	0.00 cfs @ 12.10 hrs, Volume=	131 cf
Primary =	0.24 cfs @ 12.10 hrs, Volume=	694 cf

Routing by Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 99.98' @ 12.10 hrs Surf.Area= 121 sf Storage= 113 cf

Plug-Flow detention time= 121.9 min calculated for 825 cf (95% of inflow) Center-of-Mass det. time= 90.1 min (832.1 - 742.0)

Volume	Invert	Avail.Storage	Storage Description
#1	98.00'	86 cf	Custom Stage Data (Irregular) Listed below
			242 cf Overall - 28 cf Embedded = 214 cf x 40.0% Voids
#2	98.50'	28 cf	Cultec C-100 x 2 Inside #1
			Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf
			Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap
		114 cf	Total Available Storage

Elevation	Surf.Area	Perim.	Inc.Store	Cum.Store	Wet.Area
(feet)	(sq-ft)	(feet)	(cubic-feet)	(cubic-feet)	(sq-ft)
98.00	121	44.0	0	0	121
100.00	121	44.0	242	242	209

# Concord ST one house with infiltration 1550

Type III 24-hr 100 Year Event Rainfall=7.00"

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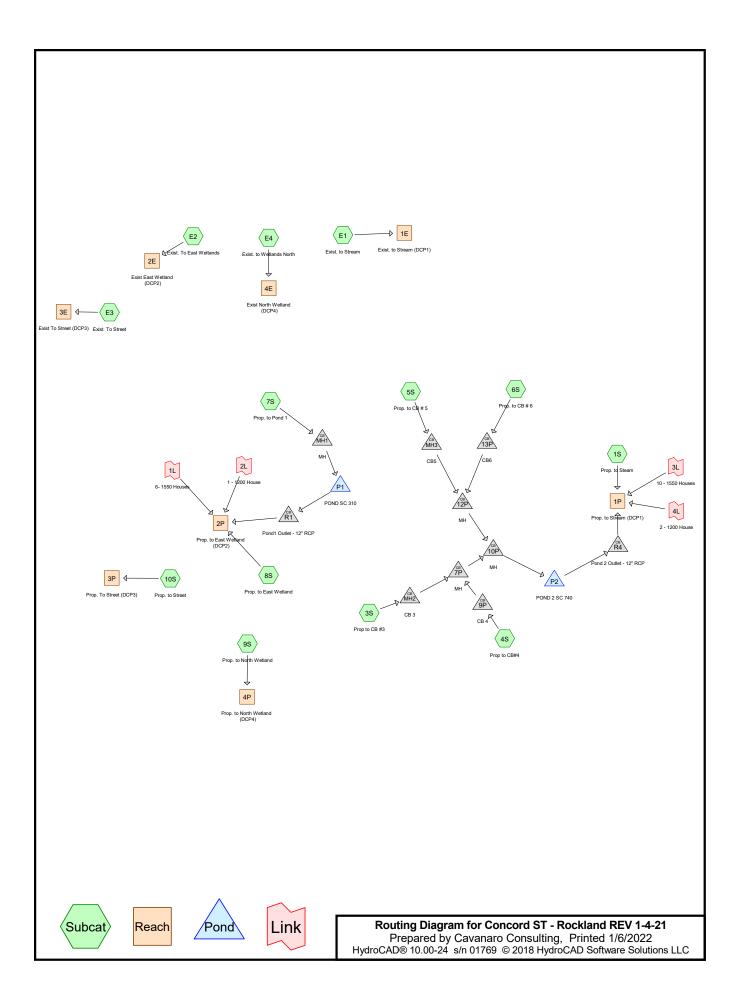
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Device	Routing	Invert	Outlet Devices
#1	Discarded	98.00'	0.270 in/hr Exfiltration over Wetted area
#2	Primary	99.50'	4.0" Vert. Orifice/Grate C= 0.600

**Discarded OutFlow** Max=0.00 cfs @ 12.10 hrs HW=99.98' (Free Discharge) **1=Exfiltration** (Exfiltration Controls 0.00 cfs)

**Primary OutFlow** Max=0.24 cfs @ 12.10 hrs HW=99.98' (Free Discharge) **2=Orifice/Grate** (Orifice Controls 0.24 cfs @ 2.71 fps)



Type III 24-hr 2 Year Event Rainfall=3.20"

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Outflow=2.27 cfs 0.327 af

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Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Reach routing by Dyn-Stor-in	a method - Pond routing by Dyn-Stor-Ind method
Subcatchment 1S: Prop. to Steam Flow Length=1,030'	Runoff Area=159,889 sf 38.35% Impervious Runoff Depth=1.61" Slope=0.0100 '/' Tc=38.3 min CN=83 Runoff=3.48 cfs 0.492 af
Subcatchment 3S: Prop to CB #3	Runoff Area=13,262 sf 51.58% Impervious Runoff Depth=1.84" Tc=5.0 min CN=86 Runoff=0.68 cfs 0.047 af
Subcatchment 4S: Prop to CB#4	Runoff Area=16,270 sf 58.78% Impervious Runoff Depth=2.00" Tc=5.0 min CN=88 Runoff=0.90 cfs 0.062 af
Subcatchment 5S: Prop. to CB # 5	Runoff Area=22,568 sf 48.10% Impervious Runoff Depth=1.84" Tc=5.0 min CN=86 Runoff=1.16 cfs 0.079 af
Subcatchment 6S: Prop. to CB # 6	Runoff Area=19,917 sf 54.20% Impervious Runoff Depth=1.91" Tc=5.0 min CN=87 Runoff=1.06 cfs 0.073 af
Subcatchment 7S: Prop. to Pond 1	Runoff Area=14,631 sf 71.99% Impervious Runoff Depth=2.26" Tc=5.0 min CN=91 Runoff=0.91 cfs 0.063 af
	Runoff Area=127,093 sf 20.50% Impervious Runoff Depth=1.21" Flow Length=370' Tc=37.0 min CN=77 Runoff=2.06 cfs 0.295 af
	d Runoff Area=33,123 sf 15.76% Impervious Runoff Depth=1.15" Slope=0.0100 '/' Tc=33.1 min CN=76 Runoff=0.53 cfs 0.073 af
Subcatchment 10S: Prop. to Street	Runoff Area=592 sf 83.11% Impervious Runoff Depth=2.54" Tc=5.0 min CN=94 Runoff=0.04 cfs 0.003 af
Subcatchment E1: Exist. to Stream Flow Length=460'	Runoff Area=243,161 sf 28.05% Impervious Runoff Depth=1.34" Slope=0.0100 '/' Tc=42.0 min CN=79 Runoff=4.12 cfs 0.622 af
Subcatchment E2: Exist. To East	Runoff Area=148,590 sf 21.32% Impervious Runoff Depth=1.15" Flow Length=370' Tc=37.0 min CN=76 Runoff=2.27 cfs 0.327 af
Subcatchment E3: Exist. To Street	Runoff Area=1,271 sf 37.21% Impervious Runoff Depth=1.61" Tc=5.0 min CN=83 Runoff=0.06 cfs 0.004 af
	thRunoff Area=42,453 sf 19.69% Impervious Runoff Depth=1.21" Slope=0.0100 '/' Tc=42.6 min CN=77 Runoff=0.64 cfs 0.098 af
Reach 1E: Exist. to Stream (DCP1)	Inflow=4.12 cfs 0.622 af Outflow=4.12 cfs 0.622 af
Reach 1P: Prop. to Stream (DCP1)	Inflow=3.71 cfs 0.548 af Outflow=3.71 cfs 0.548 af
Reach 2E: Exist East Wetland (DCP2)	Inflow=2.27 cfs 0.327 af

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Pond R4: Pond 2 Outlet - 12" RCP

Type III 24-hr 2 Year Event Rainfall=3.20"

Peak Elev=85.00' Inflow=0.00 cfs 0.000 af

12.0" Round Culvert n=0.011 L=35.0' S=0.0143 '/' Outflow=0.00 cfs 0.000 af

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Reach 2P: Prop. to East W	Inflow=2.19 cfs 0.327 af Outflow=2.19 cfs 0.327 af	
Reach 3E: Exist To Street	Inflow=0.06 cfs 0.004 af Outflow=0.06 cfs 0.004 af	
Reach 3P: Prop. To Street	Inflow=0.04 cfs 0.003 af Outflow=0.04 cfs 0.003 af	
Reach 4E: Exist North Wet	Inflow=0.64 cfs 0.098 af Outflow=0.64 cfs 0.098 af	
Reach 4P: Prop. to North V	Inflow=0.53 cfs 0.073 af Outflow=0.53 cfs 0.073 af	
Pond 7P: MH	Peak Elev=88.15.0" Round Culvert n=0.011 L=60.0' S=0.0100'	17' Inflow=1.58 cfs 0.109 af " Outflow=1.58 cfs 0.109 af
Pond 9P: CB 4	Peak Elev=88.3 12.0" Round Culvert n=0.011 L=22.0' S=0.0100'	33' Inflow=0.90 cfs 0.062 af " Outflow=0.90 cfs 0.062 af
Pond 10P: MH	Peak Elev=87.7 18.0" Round Culvert n=0.011 L=95.0' S=0.0142'	78' Inflow=3.80 cfs 0.261 af " Outflow=3.80 cfs 0.261 af
Pond 12P: MH	Peak Elev=89.3 15.0" Round Culvert n=0.011 L=240.0' S=0.0075'	39' Inflow=2.22 cfs 0.152 af " Outflow=2.22 cfs 0.152 af
Pond 13P: CB6	Peak Elev=89.5 12.0" Round Culvert n=0.011 L=62.0' S=0.0089'	31' Inflow=1.06 cfs 0.073 af " Outflow=1.06 cfs 0.073 af
Pond MH1: MH	Peak Elev=87.5 12.0" Round Culvert n=0.011 L=40.0' S=0.0050'	56' Inflow=0.91 cfs 0.063 af " Outflow=0.91 cfs 0.063 af
Pond MH2: CB 3	Peak Elev=88.2 12.0" Round Culvert n=0.011 L=22.0' S=0.0100 '	29' Inflow=0.68 cfs 0.047 af " Outflow=0.68 cfs 0.047 af
Pond MH3: CB5	Peak Elev=89.8 12.0" Round Culvert n=0.011 L=65.0' S=0.0085 '	84' Inflow=1.16 cfs 0.079 af " Outflow=1.16 cfs 0.079 af
Pond P1: POND SC 310	Peak Elev=87.30' Storage=534 Discarded=0.23 cfs 0.063 af Primary=0.00 cfs 0.000 a	
Pond P2: POND 2 SC 740	Peak Elev=86.06' Storage=2,709 Discarded=0.78 cfs 0.261 af Primary=0.00 cfs 0.000 a	
Pond R1: Pond1 Outlet - 12	<b>2" RCP</b> Peak Elev=86.9 12.0" Round Culvert n=0.011 L=25.0' S=0.0120'	50' Inflow=0.00 cfs 0.000 af " Outflow=0.00 cfs 0.000 af

Type III 24-hr 2 Year Event Rainfall=3.20"

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**Link**2 Year Event Outflow Imported from 1 house with inf. 1550~Reach 2R.hce x 6.00 Inflow=0.11 cfs 0.005 af Area= 0.036 ac 100.00% Imperv. Primary=0.66 cfs 0.030 af

Link 2L: 1 - 2 Year Event Outflow Imported from 1 house w inf. 1200~Reach 2R.hce Inflow=0.08 cfs 0.003 af Area= 0.028 ac 100.00% Imperv. Primary=0.08 cfs 0.003 af

Link Year Event Outflow Imported from 1 house with inf. 1550~Reach 2R.hce x 10.00 Inflow=0.11 cfs 0.005 af Area= 0.036 ac 100.00% Imperv. Primary=1.10 cfs 0.050 af

Link 2 Year Event Outflow Imported from 1 house w inf. 1200~Reach 2R.hce x 2.00 Inflow=0.08 cfs 0.003 af Area= 0.028 ac 100.00% Imperv. Primary=0.17 cfs 0.006 af

Total Runoff Area = 19.348 ac Runoff Volume = 2.238 af Average Runoff Depth = 1.39" 70.29% Pervious = 13.600 ac 29.71% Impervious = 5.748 ac

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## **Summary for Subcatchment 1S: Prop. to Steam**

Runoff = 3.48 cfs @ 12.55 hrs, Volume= 0.492 af, Depth= 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 2 Year Event Rainfall=3.20"

	Α	rea (sf)	CN [	Description						
*		48,878	98 V	98 Water Surface Wetlands, HSG C						
		77,137		,						
*		4,305	98 v							
		1,100								
		18,844	70 V	·						
*		2,457	98 E	Exisit,. Roo	f					
*		5,683	98 E	Exisit. Pave	ement					
*		1,485	74 F	Prop. Patios	3					
	1	59,889	83 V	Veighted A	verage					
		98,566			vious Area					
		61,323	3	88.35% Imp	ervious Ar	ea				
	Tc	Length	Slope	Velocity	Capacity	Description				
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
	28.3	50	0.0100	0.03		Sheet Flow,				
						Woods: Dense underbrush n= 0.800 P2= 3.20"				
	1.7	50	0.0100	0.50		Shallow Concentrated Flow,				
						Woodland Kv= 5.0 fps				
	0.7	30	0.0100	0.70		Shallow Concentrated Flow,				
						Short Grass Pasture Kv= 7.0 fps				
	3.7	110	0.0100	0.50		Shallow Concentrated Flow, shallow				
						Woodland Kv= 5.0 fps				
	3.9	790	0.0100	3.35	20.11	Channel Flow, Stream				
						Area= 6.0 sf Perim= 7.0' r= 0.86'				
_						n= 0.040 Earth, cobble bottom, clean sides				
	38.3	1,030	Total							

### **Summary for Subcatchment 3S: Prop to CB #3**

Runoff = 0.68 cfs @ 12.07 hrs, Volume= 0.047 af, Depth= 1.84"

 Area (sf)	CN	Description				
6,841	98	Paved parking, HSG C				
 6,421	74	>75% Grass cover, Good, HSG C				
13,262	86	Weighted Average				
6,421		48.42% Pervious Area				
6,841		51.58% Impervious Area				

Type III 24-hr 2 Year Event Rainfall=3.20"

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Tc	Length	Slope	Velocity	Capacity	Description
 (min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
5.0					Direct Entry, DIRECT

## Summary for Subcatchment 4S: Prop to CB#4

Runoff = 0.90 cfs @ 12.07 hrs, Volume= 0.062 af, Depth= 2.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 2 Year Event Rainfall=3.20"

	Area (sf)	CN	Description	Description						
*	1,652	98	Paved park	Paved parking, HSG C-Sidewalk						
	7,912	98	Paved park	Paved parking, HSG C						
	6,706	74	>75% Gras	>75% Grass cover, Good, HSG C						
	16,270	88	Weighted A	Weighted Average						
	6,706		41.22% Per	41.22% Pervious Area						
	9,564		58.78% lm	pervious Ar	rea					
	Tc Length		,	Capacity	Description					
(n	nin) (feet	t) (ft/	ft) (ft/sec)	(cfs)						
	5.0				Direct Entry, DIRECT					

## Summary for Subcatchment 5S: Prop. to CB # 5

Runoff = 1.16 cfs @ 12.07 hrs, Volume= 0.079 af, Depth= 1.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 2 Year Event Rainfall=3.20"

_	Α	rea (sf)	CN	Description							
*	•	466	98	Paved parking, HSG C - Sidewalk							
*		10,390	98	Paved parking, HSG C - rroad-drives							
_		11,712	74	>75% Grass cover, Good, HSG C							
_		22,568	86	Weighted Average							
		11,712		51.90% Pervious Area							
		10,856		48.10% Impervious Area							
	Тс	Length	Slope	Velocity	Capacity	Description					
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)						
	5.0					Direct Entry.					

## Summary for Subcatchment 6S: Prop. to CB # 6

Runoff = 1.06 cfs @ 12.07 hrs, Volume= 0.073 af, Depth= 1.91"

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	Area (sf)	) CN	Description	Description						
*	959	98	Paved park	Paved parking, HSG C - Sidewalk						
*	9,836	98	Paved park	Paved parking, HSG C - rroad-drives						
	9,122	2 74	>75% Gras	>75% Grass cover, Good, HSG C						
	19,917	7 87	Weighted Average							
	9,122	2	45.80% Pei	45.80% Pervious Area						
	10,795	5	54.20% lmp	pervious Ar	rea					
	Tc Lengt		,	Capacity	·					
<u>(r</u>	min) (fee	t) (ft/	ft) (ft/sec)	(cfs)						
	5.0				Direct Entry,					

## Summary for Subcatchment 7S: Prop. to Pond 1

Runoff = 0.91 cfs @ 12.07 hrs, Volume=

0.063 af, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 2 Year Event Rainfall=3.20"

Ar	ea (sf)	CN	Description						
•	10,533		Paved parking, HSG C						
	4,098	74	>75% Grass cover, Good, HSG C						
	14,631 4,098		Weighted Average 28.01% Pervious Area						
•	10,533		71.99% Imp	pervious Ar	rea				
Tc (min)	Length (feet)	Slope (ft/ft	,	Capacity (cfs)	Description				
5.0	•	•			Direct Entry, DIRECT				

# Summary for Subcatchment 8S: Prop. to East Wetland

Runoff = 2.06 cfs @ 12.54 hrs, Volume=

0.295 af, Depth= 1.21"

	Area (sf)	CN	Description
*	25,672	98	Water Surface Wetlands, HSG C
	40,951	74	>75% Grass cover, Good, HSG C
	58,938	70	Woods, Good, HSG C
*	1,155	74	Patio
*	377	98	ret wall
	127,093	77	Weighted Average
	101,044		79.50% Pervious Area
	26,049		20.50% Impervious Area

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	Tc	Length	Slope	Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	·
	28.3	50	0.0100	0.03		Sheet Flow,
						Woods: Dense underbrush n= 0.800 P2= 3.20"
	8.7	320	0.0150	0.61		Shallow Concentrated Flow, shallow
						Woodland Kv= 5.0 fps
	37.0	370	Total			

## Summary for Subcatchment 9S: Prop. to North Wetland

Runoff = 0.53 cfs @ 12.48 hrs, Volume=

0.073 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 2 Year Event Rainfall=3.20"

	Α	rea (sf)	CN [	Description					
*		906	98 \	Water Surface Wetlands, HSG C					
		2,744	98 F	Paved parking, HSG C					
		16,242	74 >	>75% Grass cover, Good, HSG C					
		1,286	98 F	Roofs, HSG C - infiltrated					
*		283	98 v	walls othe rimp.					
		11,662	70 \	70 Woods, Good, HSG C					
		33,123	76 Weighted Average						
		27,904	8	34.24% Pei	rvious Area				
		5,219	•	15.76% Imp	pervious Are	ea			
	Тс	Length	Slope	Velocity	Capacity	Description			
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)				
	28.3	50	0.0100	0.03		Sheet Flow, Sheet			
						Woods: Dense underbrush n= 0.800 P2= 3.20"			
	4.8	430	0.0100	1.50		Shallow Concentrated Flow, shallow			
						Grassed Waterway Kv= 15.0 fps			
	33.1	480	Total	·					

### Summary for Subcatchment 10S: Prop. to Street

Runoff = 0.04 cfs @ 12.07 hrs, Volume= 0.003 af, Depth= 2.54"

Area (sf)	CN	Description
492	98	Paved parking, HSG C
100	74	>75% Grass cover, Good, HSG C
592	94	Weighted Average
100		16.89% Pervious Area
492		83.11% Impervious Area

## Type III 24-hr 2 Year Event Rainfall=3.20"

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Tc	Length	Slope	Velocity	Capacity	Description
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
5.0					Direct Entry, DIRECT

### **Summary for Subcatchment E1: Exist. to Stream**

Runoff = 4.12 cfs @ 12.60 hrs, Volume= 0.622 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 2 Year Event Rainfall=3.20"

	Α	rea (sf)	CN	Description				
*		48,977	98	Water Surfa	ace Wetlan	ds, HSG C		
		11,952	98	Paved park	ing, HSG C			
		34,335	74	>75% Gras	s cover, Go	ood, HSG C		
		2,457	98	Roofs, HSC	G C			
*		4,820	98	walls othe r	imp.			
		8,801	87	Dirt roads,	HSG C			
	1	31,819	70	Woods, Go	od, HSG C			
	2	43,161	79	Weighted A	verage			
	1	74,955		71.95% Pervious Area				
		68,206		28.05% lmp	pervious Are	ea		
	Тс	Length	Slope	<ul><li>Velocity</li></ul>	Capacity	Description		
(	min)	(feet)	(ft/ft)	(ft/sec)	(cfs)			
	28.3	50	0.0100	0.03		Sheet Flow, Sheet		
						Woods: Dense underbrush n= 0.800 P2= 3.20"		
	13.7	410	0.0100	0.50		Shallow Concentrated Flow, shallow - woods		
						Woodland Kv= 5.0 fps		
	42 0	460	Total					

## **Summary for Subcatchment E2: Exist. To East Weltands**

Runoff = 2.27 cfs @ 12.54 hrs, Volume= 0.327 af, Depth= 1.15"

	Area (sf)	CN	Description
*	25,672	98	Water Surface Wetlands, HSG C
	5,792	98	Paved parking, HSG C
	9,907	74	>75% Grass cover, Good, HSG C
*	217	98	walls othe rimp.
	107,002	70	Woods, Good, HSG C
	148,590	76	Weighted Average
	116,909		78.68% Pervious Area
	31,681		21.32% Impervious Area

Type III 24-hr 2 Year Event Rainfall=3.20"

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Tc	Length	Slope	Velocity	Capacity	Description
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	·
28.3	50	0.0100	0.03		Sheet Flow, Sheet
					Woods: Dense underbrush n= 0.800 P2= 3.20"
8.7	320	0.0150	0.61		Shallow Concentrated Flow, shallow - woods
					Woodland Kv= 5.0 fps
37 N	370	Total			

# **Summary for Subcatchment E3: Exist. To Street**

0.06 cfs @ 12.08 hrs, Volume= 0.004 af, Depth= 1.61" Runoff

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 2 Year Event Rainfall=3.20"

	Area (sf)	CN	Description				
	473	98	Paved parking, HSG C				
	798	74	>75% Grass cover, Good, HSG C				
	1,271	83	33 Weighted Average				
	798		62.79% Pervious Area				
	473		37.21% lmp	pervious Ar	rea		
Т	c Length	Slope	e Velocity	Capacity	Description		
ı miı)		(ft/ft	,	(cfs)	·		
5.		(1411	(14000)	(3.3)	Direct Entry,		

Direct Entry,

#### Summary for Subcatchment E4: Exist. to Wetlands North

0.098 af, Depth= 1.21" Runoff 0.64 cfs @ 12.63 hrs, Volume=

	Area (sf)	CN	Description
*	907	98	Water Surface Wetlands, HSG C
	5,644	98	Paved parking, HSG C
	12,783	74	>75% Grass cover, Good, HSG C
*	520	98	walls othe rimp.
	21,313	70	Woods, Good, HSG C
	1,286	98	Roofs, HSG C
	42,453	77	Weighted Average
	34,096		80.31% Pervious Area
	8,357		19.69% Impervious Area

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	Тс	Length	Slope	Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	28.3	50	0.0100	0.03		Sheet Flow, Sheet
						Woods: Dense underbrush n= 0.800 P2= 3.20"
	14.3	430	0.0100	0.50		Shallow Concentrated Flow, shallow - woods
_						Woodland Kv= 5.0 fps
	42.6	480	Total			

## **Summary for Reach 1E: Exist. to Stream (DCP1)**

Inflow Area = 5.582 ac, 28.05% Impervious, Inflow Depth = 1.34" for 2 Year Event event

Inflow = 4.12 cfs @ 12.60 hrs, Volume= 0.622 af

Outflow = 4.12 cfs @ 12.60 hrs, Volume= 0.622 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

## **Summary for Reach 1P: Prop. to Stream (DCP1)**

Inflow Area = 5.387 ac, 43.52% Impervious, Inflow Depth = 1.22" for 2 Year Event event

Inflow = 3.71 cfs @ 12.51 hrs, Volume= 0.548 af

Outflow = 3.71 cfs @ 12.51 hrs, Volume= 0.548 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

## **Summary for Reach 2E: Exist East Wetland (DCP2)**

Inflow Area = 3.411 ac, 21.32% Impervious, Inflow Depth = 1.15" for 2 Year Event event

Inflow = 2.27 cfs @ 12.54 hrs, Volume= 0.327 af

Outflow = 2.27 cfs @ 12.54 hrs, Volume= 0.327 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

# Summary for Reach 2P: Prop. to East Wetland (DCP2)

Inflow Area = 3.317 ac, 27.22% Impervious, Inflow Depth = 1.18" for 2 Year Event event

Inflow = 2.19 cfs @ 12.53 hrs, Volume= 0.327 af

Outflow = 2.19 cfs @ 12.53 hrs, Volume= 0.327 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

# **Summary for Reach 3E: Exist To Street (DCP3)**

Inflow Area = 0.029 ac, 37.21% Impervious, Inflow Depth = 1.61" for 2 Year Event event

Inflow = 0.06 cfs @ 12.08 hrs, Volume= 0.004 af

Outflow = 0.06 cfs @ 12.08 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

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## Summary for Reach 3P: Prop. To Street (DCP3)

Inflow Area = 0.014 ac, 83.11% Impervious, Inflow Depth = 2.54" for 2 Year Event event

Inflow = 0.04 cfs @ 12.07 hrs, Volume= 0.003 af

Outflow = 0.04 cfs @ 12.07 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

## **Summary for Reach 4E: Exist North Wetland (DCP4)**

Inflow Area = 0.975 ac, 19.69% Impervious, Inflow Depth = 1.21" for 2 Year Event event

Inflow = 0.64 cfs @ 12.63 hrs, Volume= 0.098 af

Outflow = 0.64 cfs @ 12.63 hrs, Volume= 0.098 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

### Summary for Reach 4P: Prop. to North Wetland (DCP4)

Inflow Area = 0.760 ac, 15.76% Impervious, Inflow Depth = 1.15" for 2 Year Event event

Inflow = 0.53 cfs @ 12.48 hrs, Volume= 0.073 af

Outflow = 0.53 cfs @ 12.48 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

## **Summary for Pond 7P: MH**

Inflow Area = 0.678 ac, 55.55% Impervious, Inflow Depth = 1.92" for 2 Year Event event

Inflow = 1.58 cfs @ 12.07 hrs, Volume= 0.109 af

Outflow = 1.58 cfs @ 12.07 hrs, Volume= 0.109 af, Atten= 0%, Lag= 0.0 min

Primary = 1.58 cfs @ 12.07 hrs, Volume= 0.109 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 88.17' @ 12.08 hrs

 Device
 Routing
 Invert
 Outlet Devices

 #1
 Primary
 87.45'
 15.0" Round Culvert L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 87.45' / 86.85' S= 0.0100 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=1.57 cfs @ 12.07 hrs HW=88.17' TW=87.78' (Dynamic Tailwater) 1=Culvert (Outlet Controls 1.57 cfs @ 3.08 fps)

# Summary for Pond 9P: CB 4

Inflow Area = 0.374 ac, 58.78% Impervious, Inflow Depth = 2.00" for 2 Year Event event

Inflow = 0.90 cfs @ 12.07 hrs, Volume= 0.062 af

Outflow = 0.90 cfs @ 12.07 hrs, Volume= 0.062 af, Atten= 0%, Lag= 0.0 min

Primary = 0.90 cfs @ 12.07 hrs, Volume= 0.062 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

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Peak Elev= 88.33' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.67'	<b>12.0" Round Culvert</b> L= 22.0' Ke= 0.500
			Inlet / Outlet Invert= 87.67' / 87.45' S= 0.0100 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.88 cfs @ 12.07 hrs HW=88.33' TW=88.17' (Dynamic Tailwater) 1=Culvert (Outlet Controls 0.88 cfs @ 2.26 fps)

### **Summary for Pond 10P: MH**

Inflow Area = 1.653 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event

Inflow = 3.80 cfs @ 12.07 hrs, Volume= 0.261 af

Outflow = 3.80 cfs @ 12.07 hrs, Volume= 0.261 af, Atten= 0%, Lag= 0.0 min

Primary = 3.80 cfs @ 12.07 hrs, Volume= 0.261 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 87.78' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	86.85'	<b>18.0" Round Culvert</b> L= 95.0' Ke= 0.500
			Inlet / Outlet Invert= 86.85' / 85.50' S= 0.0142 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf

Primary OutFlow Max=3.79 cfs @ 12.07 hrs HW=87.78' TW=85.59' (Dynamic Tailwater) 1=Culvert (Inlet Controls 3.79 cfs @ 3.29 fps)

## **Summary for Pond 12P: MH**

Inflow Area = 0.975 ac, 50.96% Impervious, Inflow Depth = 1.87" for 2 Year Event event

Inflow = 2.22 cfs @ 12.07 hrs, Volume= 0.152 af

Outflow = 2.22 cfs @ 12.07 hrs, Volume= 0.152 af, Atten= 0%, Lag= 0.0 min

Primary = 2.22 cfs @ 12.07 hrs, Volume= 0.152 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 89.39' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	88.65'	<b>15.0" Round Culvert</b> L= 240.0' Ke= 0.500
			Inlet / Outlet Invert= 88.65' / 86.85' S= 0.0075 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=2.21 cfs @ 12.07 hrs HW=89.39' TW=87.78' (Dynamic Tailwater) 1=Culvert (Outlet Controls 2.21 cfs @ 4.18 fps)

Type III 24-hr 2 Year Event Rainfall=3.20"

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## **Summary for Pond 13P: CB6**

Inflow Area = 0.457 ac, 54.20% Impervious, Inflow Depth = 1.91" for 2 Year Event event

Inflow = 1.06 cfs @ 12.07 hrs, Volume= 0.073 af

Outflow = 1.06 cfs @ 12.07 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min

Primary = 1.06 cfs @ 12.07 hrs, Volume= 0.073 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 89.81' @ 12.08 hrs

 Device
 Routing
 Invert
 Outlet Devices

 #1
 Primary
 89.20'
 12.0" Round Culvert L= 62.0' Ke= 0.500 Inlet / Outlet Invert= 89.20' / 88.65' S= 0.0089 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.05 cfs @ 12.07 hrs HW=89.81' TW=89.39' (Dynamic Tailwater) 1=Culvert (Outlet Controls 1.05 cfs @ 3.00 fps)

### **Summary for Pond MH1: MH**

Inflow Area = 0.336 ac, 71.99% Impervious, Inflow Depth = 2.26" for 2 Year Event event

Inflow = 0.91 cfs @ 12.07 hrs, Volume= 0.063 af

Outflow = 0.91 cfs @ 12.07 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

Primary = 0.91 cfs @ 12.07 hrs, Volume= 0.063 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 87.56' @ 12.07 hrs

Flood Elev= 89.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	87.00'	<b>12.0" Round Culvert</b> L= 40.0' Ke= 0.500
			Inlet / Outlet Invert= 87.00' / 86.80' S= 0.0050 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.91 cfs @ 12.07 hrs HW=87.56' TW=86.97' (Dynamic Tailwater) 1=Culvert (Barrel Controls 0.91 cfs @ 2.92 fps)

## **Summary for Pond MH2: CB 3**

Inflow Area = 0.304 ac, 51.58% Impervious, Inflow Depth = 1.84" for 2 Year Event event

Inflow = 0.68 cfs @ 12.07 hrs, Volume= 0.047 af

Outflow = 0.68 cfs @ 12.07 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min

Primary = 0.68 cfs @ 12.07 hrs, Volume= 0.047 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 88.29' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices		
#1	Primary	87.67'	<b>12.0" Round Culvert</b> L= 22.0' Ke= 0.500		
			Inlet / Outlet Invert= 87.67' / 87.45' S= 0.0100 '/' Cc= 0.900		
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf		

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Primary OutFlow Max=0.65 cfs @ 12.07 hrs HW=88.28' TW=88.17' (Dynamic Tailwater) 1=Culvert (Outlet Controls 0.65 cfs @ 1.86 fps)

### **Summary for Pond MH3: CB5**

Inflow Area = 0.518 ac, 48.10% Impervious, Inflow Depth = 1.84" for 2 Year Event event

Inflow = 1.16 cfs @ 12.07 hrs, Volume= 0.079 af

Outflow = 1.16 cfs @ 12.07 hrs, Volume= 0.079 af, Atten= 0%, Lag= 0.0 min

Primary = 1.16 cfs @ 12.07 hrs, Volume= 0.079 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 89.84' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	89.20'	<b>12.0" Round Culvert</b> L= 65.0' Ke= 0.500
			Inlet / Outlet Invert= 89.20' / 88.65' S= 0.0085 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.15 cfs @ 12.07 hrs HW=89.84' TW=89.39' (Dynamic Tailwater) 1=Culvert (Outlet Controls 1.15 cfs @ 3.08 fps)

### **Summary for Pond P1: POND SC 310**

Inflow Area =	0.336 ac, 71.99% Impervious, Inflow D	epth = 2.26" for 2 Year Event event
Inflow =	0.91 cfs @ 12.07 hrs, Volume=	0.063 af
Outflow =	0.23 cfs @ 11.87 hrs, Volume=	0.063 af, Atten= 75%, Lag= 0.0 min
Discarded =	0.23 cfs @ 11.87 hrs, Volume=	0.063 af
Primary =	0.00 cfs @ 0.00 hrs, Volume=	0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 87.30' @ 12.44 hrs Surf.Area= 1,230 sf Storage= 534 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 11.2 min (812.8 - 801.5)

Volume	Invert	Avail	.Storage	Storage Description	n		
#1	86.50'	' 849 cf		<b>Custom Stage Da</b>	ta (Irregular) Liste	d below (Recalc)	
				•		= 2,121 cf x 40.0% Void	s
#2	87.00'		708 cf	ADS_StormTech			
						2.07 sf x 7.12'L = 14.7 cf	f
						6'L with 0.44' Overlap	
				48 Chambers in 4	Rows		
			1,556 cf	Total Available Sto	rage		
		_					
Elevation	Surf.		Perim.	Inc.Store	Cum.Store	Wet.Area	
(feet)	(9	sq-ft)	(feet)	(cubic-feet)	(cubic-feet)	<u>(sq-ft)</u>	
86.50	1	,230	203.0	0	0	1,230	
88.80 1,230 203.0		2,829	2,829	1,697			

Type III 24-hr 2 Year Event Rainfall=3.20"

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Device	Routing	Invert	Outlet Devices		
#1	Primary	87.70'	6.0" Horiz. Orifice/Grate	C= 0.600	Limited to weir flow at low heads
#2	Discarded	86.50'	0.23 cfs Exfiltration wher	above 86.	50'

**Discarded OutFlow** Max=0.23 cfs @ 11.87 hrs HW=86.53' (Free Discharge) **2=Exfiltration** (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=86.50' TW=86.50' (Dynamic Tailwater) 1=Orifice/Grate (Controls 0.00 cfs)

#### **Summary for Pond P2: POND 2 SC 740**

Inflow Area = 1.653 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 1.89 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84% Impervious, Inflow Depth = 1.89" for 2 Year Event event 2.80 ac, 52.84 ac,

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 86.06' @ 12.50 hrs Surf.Area= 4,088 sf Storage= 2,709 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow) Center-of-Mass det. time= 19.1 min ( 837.9 - 818.8 )

Volume	Invert	Avai	I.Storage	Storage Description				
#1	85.00'		3,647 cf	Custom Stage Data (Irregular) Listed below (Recalc)				
				•	$ed = 9,117 cf \times 40.0\% Voids$			
#2	85.50'		5,191 cf	ADS_StormTech S	•			
				Effective Size= 44.	6"W x 30.0"H => 6	6.45 sf x 7.12'L = 45.9 cf		
				Overall Size= 51.0'	'W x 30.0"H x 7.56	6'L with 0.44' Overlap		
				113 Chambers in 1	2 Rows	·		
8,838 cf		Total Available Storage						
Elevation	on Su	rf.Area	Perim.	Inc.Store	Cum.Store	Wet.Area		
					_			
(fee		(sq-ft)	(feet)	(cubic-feet)	(cubic-feet)	(sq-ft)		
85.0	00	4,088	320.0	0	0	4,088		
88.5	50	4,088	320.0	14,308	14,308	5,208		
Device	Routing	In	vert Outle	et Devices				
#1	Primary			Vert. Orifice/Grate	C= 0.600			
	•							
#2 Discarded 85.00' <b>0.78 c</b>			cfs Exfiltration who	en above 85.00				

**Discarded OutFlow** Max=0.78 cfs @ 11.85 hrs HW=85.04' (Free Discharge) **2=Exfiltration** (Exfiltration Controls 0.78 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=85.00' TW=85.00' (Dynamic Tailwater) 1=Orifice/Grate (Controls 0.00 cfs)

Type III 24-hr 2 Year Event Rainfall=3.20"

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## Summary for Pond R1: Pond1 Outlet - 12" RCP

Inflow Area = 0.336 ac, 71.99% Impervious, Inflow Depth = 0.00" for 2 Year Event event

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 86.50' @ 0.00 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	86.50'	<b>12.0"</b> Round Culvert L= 25.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 86.50' / 86.20' S= 0.0120 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=86.50' TW=0.00' (Dynamic Tailwater) 1=Culvert (Controls 0.00 cfs)

### Summary for Pond R4: Pond 2 Outlet - 12" RCP

Inflow Area = 1.653 ac, 52.84% Impervious, Inflow Depth = 0.00" for 2 Year Event event

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 85.00' @ 0.00 hrs

Device	Routing	Invert	Outlet Devices		
#1	Primary	85.00'	<b>12.0" Round Culvert</b> L= 35.0' Ke= 0.500		
			Inlet / Outlet Invert= 85.00' / 84.50' S= 0.0143 '/' Cc= 0.900		
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf		

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=85.00' TW=0.00' (Dynamic Tailwater) 1=Culvert (Controls 0.00 cfs)

## Summary for Link 1L: 6- 1550 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 1.67" for 2 Year Event event

Inflow = 0.11 cfs @ 12.09 hrs, Volume= 0.005 af

Primary = 0.66 cfs @ 12.09 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 6.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

2 Year Event Outflow Imported from 1 house with inf. 1550~Reach 2R.hce

Type III 24-hr 2 Year Event Rainfall=3.20"

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## Summary for Link 2L: 1 - 1200 House

Inflow Area = 0.028 ac,100.00% Impervious, Inflow Depth = 1.34" for 2 Year Event event

Inflow = 0.08 cfs @ 12.09 hrs, Volume= 0.003 af

Primary = 0.08 cfs @ 12.09 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

2 Year Event Outflow Imported from 1 house w inf. 1200~Reach 2R.hce

## Summary for Link 3L: 10 - 1550 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 1.67" for 2 Year Event event

Inflow = 0.11 cfs @ 12.09 hrs, Volume= 0.005 af

Primary = 1.10 cfs @ 12.09 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 10.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

2 Year Event Outflow Imported from 1 house with inf. 1550~Reach 2R.hce

### Summary for Link 4L: 2 - 1200 House

Inflow Area = 0.028 ac,100.00% Impervious, Inflow Depth = 1.34" for 2 Year Event event

Inflow = 0.08 cfs @ 12.09 hrs, Volume= 0.003 af

Primary = 0.17 cfs @ 12.09 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 2.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

2 Year Event Outflow Imported from 1 house w inf. 1200~Reach 2R.hce

Type III 24-hr 10 Year Event Rainfall=4.60"

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Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

reach routing by byn-otor-	The method - 1 one routing by byn-otor-me method
Subcatchment 1S: Prop. to Steam Flow Length=1,03	Runoff Area=159,889 sf 38.35% Impervious Runoff Depth=2.81" 0' Slope=0.0100 '/' Tc=38.3 min CN=83 Runoff=6.09 cfs 0.861 af
Subcatchment 3S: Prop to CB #3	Runoff Area=13,262 sf 51.58% Impervious Runoff Depth=3.10" Tc=5.0 min CN=86 Runoff=1.13 cfs 0.079 af
Subcatchment 4S: Prop to CB#4	Runoff Area=16,270 sf 58.78% Impervious Runoff Depth=3.29" Tc=5.0 min CN=88 Runoff=1.47 cfs 0.102 af
Subcatchment 5S: Prop. to CB # 5	Runoff Area=22,568 sf 48.10% Impervious Runoff Depth=3.10" Tc=5.0 min CN=86 Runoff=1.93 cfs 0.134 af
Subcatchment 6S: Prop. to CB # 6	Runoff Area=19,917 sf 54.20% Impervious Runoff Depth=3.19" Tc=5.0 min CN=87 Runoff=1.75 cfs 0.122 af
Subcatchment 7S: Prop. to Pond 1	Runoff Area=14,631 sf 71.99% Impervious Runoff Depth=3.59" Tc=5.0 min CN=91 Runoff=1.41 cfs 0.101 af
Subcatchment 8S: Prop. to East Wetlan	Runoff Area=127,093 sf 20.50% Impervious Runoff Depth=2.29" Flow Length=370' Tc=37.0 min CN=77 Runoff=4.00 cfs 0.557 af
	and Runoff Area=33,123 sf 15.76% Impervious Runoff Depth=2.21" o' Slope=0.0100 '/' Tc=33.1 min CN=76 Runoff=1.06 cfs 0.140 af
Subcatchment 10S: Prop. to Street	Runoff Area=592 sf 83.11% Impervious Runoff Depth=3.91" Tc=5.0 min CN=94 Runoff=0.06 cfs 0.004 af
Subcatchment E1: Exist. to Stream Flow Length=46	Runoff Area=243,161 sf 28.05% Impervious Runoff Depth=2.46" O' Slope=0.0100 '/' Tc=42.0 min CN=79 Runoff=7.72 cfs 1.145 af
Subcatchment E2: Exist. To East	Runoff Area=148,590 sf 21.32% Impervious Runoff Depth=2.21" Flow Length=370' Tc=37.0 min CN=76 Runoff=4.50 cfs 0.628 af
Subcatchment E3: Exist. To Street	Runoff Area=1,271 sf 37.21% Impervious Runoff Depth=2.81" Tc=5.0 min CN=83 Runoff=0.10 cfs 0.007 af
	orthRunoff Area=42,453 sf 19.69% Impervious Runoff Depth=2.29" 0' Slope=0.0100 '/' Tc=42.6 min CN=77 Runoff=1.24 cfs 0.186 af
Reach 1E: Exist. to Stream (DCP1)	Inflow=7.72 cfs 1.145 af Outflow=7.72 cfs 1.145 af
Reach 1P: Prop. to Stream (DCP1)	Inflow=7.09 cfs 0.991 af Outflow=7.09 cfs 0.991 af
Reach 2E: Exist East Wetland (DCP2)	Inflow=4.50 cfs 0.628 af Outflow=4.50 cfs 0.628 af

Concord ST - Rockland REV 1-4-21	Type III 24-hr 10 Year Event Rainfall=4.60	"
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Reach 2P: Prop. to East Wetland (DCP2)  Inflow=4.37 cfs Outflow=4.37 cfs				
Reach 3E: Exist To Street (DCP3)		Inflow=0.10 cfs 0.007 af Outflow=0.10 cfs 0.007 af		
Reach 3P: Prop. To Street (DCP3)		Inflow=0.06 cfs 0.004 af Outflow=0.06 cfs 0.004 af		
Reach 4E: Exist North Wetland (DC	CP4)	Inflow=1.24 cfs 0.186 af Outflow=1.24 cfs 0.186 af		
Reach 4P: Prop. to North Wetland	(DCP4)	Inflow=1.06 cfs 0.140 af Outflow=1.06 cfs 0.140 af		
Pond 7P: MH 15.0	Peak Elev=88.5 " Round Culvert n=0.011 L=60.0' S=0.0100 '/'	1' Inflow=2.60 cfs 0.181 af Outflow=2.60 cfs 0.181 af		
Pond 9P: CB 4	Peak Elev=88.60 " Round Culvert_n=0.011_L=22.0'_S=0.0100 '/'	6' Inflow=1.47 cfs 0.102 af Outflow=1.47 cfs 0.102 af		
<b>Pond 10P: MH</b> 18.0°	Peak Elev=88.14 " Round Culvert_n=0.011_L=95.0'_S=0.0142 '/'	4' Inflow=6.28 cfs 0.436 af Outflow=6.28 cfs 0.436 af		
Pond 12P: MH 15.0"	Peak Elev=89.70 Round Culvert n=0.011 L=240.0' S=0.0075 '/'	O' Inflow=3.68 cfs 0.255 af Outflow=3.68 cfs 0.255 af		
Pond 13P: CB6	Peak Elev=90.09 " Round Culvert n=0.011 L=62.0' S=0.0089 '/'	9' Inflow=1.75 cfs 0.122 af Outflow=1.75 cfs 0.122 af		
	" Round Culvert n=0.011 L=40.0' S=0.0050 '/'			
	" Round Culvert n=0.011 L=22.0' S=0.0100 '/'			
	" Round Culvert n=0.011 L=65.0' S=0.0085 '/'			
	Peak Elev=87.84' Storage=1,009 od=0.23 cfs 0.095 af Primary=0.26 cfs 0.006 af	Outflow=0.49 cfs 0.101 af		
	Peak Elev=86.95' Storage=5,527 d=0.78 cfs 0.408 af Primary=0.64 cfs 0.028 af	Outflow=1.42 cfs 0.436 af		
	" Round Culvert n=0.011 L=25.0' S=0.0120 '/'			
Pond R4: Pond 2 Outlet - 12" RCP 12.0	Peak Elev=85.4 " Round Culvert n=0.011 L=35.0' S=0.0143 '/'	O' Inflow=0.64 cfs 0.028 af Outflow=0.64 cfs 0.028 af		

Type III 24-hr 10 Year Event Rainfall=4.60"

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**Link**0 Year Event Outflow Imported from 1 house with inf. 1550~Reach 2R.hce x 6.00 Inflow=0.16 cfs 0.009 af Area= 0.036 ac 100.00% Imperv. Primary=0.95 cfs 0.054 af

Link 2L: 1 - 10 Year Event Outflow Imported from 1 house w inf. 1200~Reach 2R.hce Inflow=0.12 cfs 0.006 af Area= 0.028 ac 100.00% Imperv. Primary=0.12 cfs 0.006 af

Line Year Event Outflow Imported from 1 house with inf. 1550~Reach 2R.hce x 10.00 Inflow=0.16 cfs 0.009 af Area= 0.036 ac 100.00% Imperv. Primary=1.59 cfs 0.090 af

Link 10 Year Event Outflow Imported from 1 house w inf. 1200~Reach 2R.hce x 2.00 Inflow=0.12 cfs 0.006 af Area= 0.028 ac 100.00% Imperv. Primary=0.25 cfs 0.012 af

Total Runoff Area = 19.348 ac Runoff Volume = 4.065 af Average Runoff Depth = 2.52" 70.29% Pervious = 13.600 ac 29.71% Impervious = 5.748 ac

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## **Summary for Subcatchment 1S: Prop. to Steam**

Runoff = 6.09 cfs @ 12.55 hrs, Volume= 0.861 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 10 Year Event Rainfall=4.60"

	Α	rea (sf)	CN [	Description					
*		48,878	98 V	98 Water Surface Wetlands, HSG C					
		77,137	74 >	74 >75% Grass cover, Good, HSG C					
*		4,305	98 v	valls othe r	imp.				
		1,100		Dirt roads, I					
		18,844		Voods, Go	od, HSG C				
*		2,457		Exisit,. Roo	f				
*		5,683		Exisit. Pave					
*		1,485	74 F	Prop. Patios	S				
		59,889		Veighted A					
		98,566	_		vious Area				
		61,323	3	88.35% Imp	pervious Ar	ea			
	Tc	Length	Slope	Velocity		Description			
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)				
	28.3	50	0.0100	0.03		Sheet Flow,			
						Woods: Dense underbrush n= 0.800 P2= 3.20"			
	1.7	50	0.0100	0.50		Shallow Concentrated Flow,			
						Woodland Kv= 5.0 fps			
	0.7	30	0.0100	0.70		Shallow Concentrated Flow,			
						Short Grass Pasture Kv= 7.0 fps			
	3.7	110	0.0100	0.50		Shallow Concentrated Flow, shallow			
						Woodland Kv= 5.0 fps			
	3.9	790	0.0100	3.35	20.11	Channel Flow, Stream			
						Area= 6.0 sf Perim= 7.0' r= 0.86'			
_						n= 0.040 Earth, cobble bottom, clean sides			
	38.3	1,030	Total						

### Summary for Subcatchment 3S: Prop to CB #3

Runoff = 1.13 cfs @ 12.07 hrs, Volume= 0.079 af, Depth= 3.10"

 Area (sf)	CN	Description
6,841	98	Paved parking, HSG C
 6,421	74	>75% Grass cover, Good, HSG C
13,262	86	Weighted Average
6,421		48.42% Pervious Area
6,841		51.58% Impervious Area

Type III 24-hr 10 Year Event Rainfall=4.60"

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Tc	Length	Slope	Velocity	Capacity	Description
 (min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
5.0					Direct Entry, DIRECT

## Summary for Subcatchment 4S: Prop to CB#4

Runoff = 1.47 cfs @ 12.07 hrs, Volume= 0.102 af, Depth= 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 10 Year Event Rainfall=4.60"

	Area (sf)	CN	Description	Description						
*	1,652	98	Paved park	Paved parking, HSG C-Sidewalk						
	7,912	98	Paved park	ing, HSG (						
	6,706	74	>75% Gras	s cover, Go	ood, HSG C					
	16,270	88	Weighted A	Weighted Average						
	6,706		41.22% Per	rvious Area	a					
	9,564		58.78% lm	pervious Ar	rea					
	Tc Length		,	Capacity	Description					
(n	nin) (feet	t) (ft/	ft) (ft/sec)	(cfs)						
	5.0				Direct Entry, DIRECT					

## Summary for Subcatchment 5S: Prop. to CB # 5

Runoff = 1.93 cfs @ 12.07 hrs, Volume= 0.134 af, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 10 Year Event Rainfall=4.60"

	A	rea (sf)	CN	Description							
*		466	98	Paved parking, HSG C - Sidewalk							
*		10,390	98	Paved parking, HSG C - rroad-drives							
		11,712	74	>75% Grass cover, Good, HSG C							
		22,568	86	Weighted A	verage						
		11,712	;	51.90% Per	vious Area	a					
		10,856		48.10% lmp	pervious Ar	rea					
	Тс	Length	Slope	,	Capacity	·					
(	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)						
	5.0					Direct Entry,					

## Summary for Subcatchment 6S: Prop. to CB # 6

Runoff = 1.75 cfs @ 12.07 hrs, Volume= 0.122 af, Depth= 3.19"

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	Area (sf)	CN	Description	Description						
*	959	98	Paved park	Paved parking, HSG C - Sidewalk						
*	9,836	98	Paved park	Paved parking, HSG C - rroad-drives						
	9,122	74	>75% Gras	s cover, Go	ood, HSG C					
	19,917	87	Weighted A	verage						
	9,122		45.80% Per	vious Area	a					
	10,795		54.20% lmp	pervious Ar	rea					
	T. 1	01	Note the	0	December 6					
,	Tc Length	Slop	,	Capacity	Description					
(	(min) (feet)	(ft/1	ft) (ft/sec)	(cfs)						
	5.0				Direct Entry,					

## Summary for Subcatchment 7S: Prop. to Pond 1

Runoff = 1.41 cfs @ 12.07 hrs, Volume= 0.101 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 10 Year Event Rainfall=4.60"

A	rea (sf)	CN	Description						
	10,533	98	Paved parking, HSG C						
	4,098	74	>75% Grass cover, Good, HSG C						
	14,631	91	Weighted Average						
	4,098		28.01% Per	rvious Area	1				
	10,533		71.99% lm	pervious Ar	rea				
Tc (min)	Length (feet)	Slope (ft/ft	,	Capacity (cfs)	Description				
5.0	(.501)	(1010	, (.900)	(0.0)	Direct Entry, DIRECT				

# Summary for Subcatchment 8S: Prop. to East Wetland

Runoff = 4.00 cfs @ 12.54 hrs, Volume= 0.557 af, Depth= 2.29"

	Area (sf)	CN	Description
*	25,672	98	Water Surface Wetlands, HSG C
	40,951	74	>75% Grass cover, Good, HSG C
	58,938	70	Woods, Good, HSG C
*	1,155	74	Patio
*	377	98	ret wall
	127,093	77	Weighted Average
	101,044		79.50% Pervious Area
	26,049		20.50% Impervious Area

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_	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	28.3	50	0.0100	0.03		Sheet Flow,
						Woods: Dense underbrush n= 0.800 P2= 3.20"
	8.7	320	0.0150	0.61		Shallow Concentrated Flow, shallow
						Woodland Kv= 5.0 fps
	37.0	370	Total			

# Summary for Subcatchment 9S: Prop. to North Wetland

Runoff = 1.06 cfs @ 12.47 hrs, Volume=

0.140 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 10 Year Event Rainfall=4.60"

	Α	rea (sf)	CN E	Description						
*		906	98 V	Water Surface Wetlands, HSG C						
		2,744	98 F	Paved park	ing, HSG C					
		16,242	74 >	·75% Ġras	s cover, Go	ood, HSG C				
		1,286	98 F	Roofs, HSG	C - infiltra	ted				
*		283	98 v	valls othe r	imp.					
		11,662	70 V	Voods, Go	od, HSG C					
		33,123	76 V	Veighted A						
		27,904	8	4.24% Per	vious Area					
		5,219	1	5.76% Imp	ervious Ar	ea				
				•						
	Tc	Length	Slope	Velocity	Capacity	Description				
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	·				
	28.3	50	0.0100	0.03		Sheet Flow, Sheet				
						Woods: Dense underbrush n= 0.800 P2= 3.20"				
	4.8	430	0.0100	1.50		Shallow Concentrated Flow, shallow				
						Grassed Waterway Kv= 15.0 fps				
	33.1	480	Total							

## Summary for Subcatchment 10S: Prop. to Street

Runoff = 0.06 cfs @ 12.07 hrs, Volume= 0.004

0.004 af, Depth= 3.91"

Area (sf)	CN	Description
492	98	Paved parking, HSG C
100	74	>75% Grass cover, Good, HSG C
592	94	Weighted Average
100		16.89% Pervious Area
492		83.11% Impervious Area

Type III 24-hr 10 Year Event Rainfall=4.60"

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•	5.0				, ,	Direct Entry, DIRECT
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	Tc	Length	Slope	Velocity	Capacity	Description

## **Summary for Subcatchment E1: Exist. to Stream**

Runoff = 7.72 cfs @ 12.56 hrs, Volume= 1.145 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 10 Year Event Rainfall=4.60"

	Α	rea (sf)	CN	Description							
*		48,977	98	Water Surfa	Water Surface Wetlands, HSG C						
		11,952	98	Paved park	ing, HSG C						
		34,335	74	>75% Gras	s cover, Go	ood, HSG C					
		2,457	98	Roofs, HSC	G C						
*		4,820	98	walls othe r	imp.						
		8,801		Dirt roads,							
_	1	31,819	70	Woods, Go	od, HSG C						
	2	43,161	79	Weighted A	Average						
	1	74,955		71.95% Per	rvious Area						
		68,206		28.05% Imp	pervious Are	ea					
	Тс	Length	Slope		Capacity	Description					
_	(min)	(feet)	(ft/ft	) (ft/sec)	(cfs)						
	28.3	50	0.0100	0.03		Sheet Flow, Sheet					
						Woods: Dense underbrush n= 0.800 P2= 3.20"					
	13.7	410	0.0100	0.50		Shallow Concentrated Flow, shallow - woods					
_						Woodland Kv= 5.0 fps					
	42 0	460	Total								

## **Summary for Subcatchment E2: Exist. To East Weltands**

Runoff = 4.50 cfs @ 12.54 hrs, Volume= 0.628 af, Depth= 2.21"

	Area (sf)	CN	Description
*	25,672	98	Water Surface Wetlands, HSG C
	5,792	98	Paved parking, HSG C
	9,907	74	>75% Grass cover, Good, HSG C
*	217	98	walls othe rimp.
	107,002	70	Woods, Good, HSG C
	148,590	76	Weighted Average
	116,909		78.68% Pervious Area
	31,681		21.32% Impervious Area

Type III 24-hr 10 Year Event Rainfall=4.60"

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	Tc	Length	Slope	Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	28.3	50	0.0100	0.03		Sheet Flow, Sheet
						Woods: Dense underbrush n= 0.800 P2= 3.20"
	8.7	320	0.0150	0.61		Shallow Concentrated Flow, shallow - woods
						Woodland Kv= 5.0 fps
	37.0	370	Total			<u> </u>

## **Summary for Subcatchment E3: Exist. To Street**

0.10 cfs @ 12.07 hrs, Volume= 0.007 af, Depth= 2.81" Runoff

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 10 Year Event Rainfall=4.60"

A	rea (sf)	CN	Description					
	473	98	Paved parking, HSG C					
	798	74	>75% Grass cover, Good, HSG C					
	1,271	83	Weighted Average					
	798		62.79% Pervious Area					
	473		37.21% Impervious Area					
Tc (min)	Length (feet)	Slope (ft/ft)	,	Capacity (cfs)	Description			
5.0	,		,	•	Direct Entry,			

Direct Entry,

### **Summary for Subcatchment E4: Exist. to Wetlands North**

0.186 af, Depth= 2.29" Runoff 1.24 cfs @ 12.59 hrs, Volume=

	Area (sf)	CN	Description
*	907	98	Water Surface Wetlands, HSG C
	5,644	98	Paved parking, HSG C
	12,783	74	>75% Grass cover, Good, HSG C
*	520	98	walls othe rimp.
	21,313	70	Woods, Good, HSG C
	1,286	98	Roofs, HSG C
	42,453	77	Weighted Average
	34,096		80.31% Pervious Area
	8,357		19.69% Impervious Area

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	Тс	Length	Slope	Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	28.3	50	0.0100	0.03		Sheet Flow, Sheet
						Woods: Dense underbrush n= 0.800 P2= 3.20"
	14.3	430	0.0100	0.50		Shallow Concentrated Flow, shallow - woods
_						Woodland Kv= 5.0 fps
	42.6	480	Total			

## **Summary for Reach 1E: Exist. to Stream (DCP1)**

Inflow Area = 5.582 ac, 28.05% Impervious, Inflow Depth = 2.46" for 10 Year Event event

Inflow = 7.72 cfs @ 12.56 hrs, Volume= 1.145 af

Outflow = 7.72 cfs @ 12.56 hrs, Volume= 1.145 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

## **Summary for Reach 1P: Prop. to Stream (DCP1)**

Inflow Area = 5.387 ac, 43.52% Impervious, Inflow Depth = 2.21" for 10 Year Event event

Inflow = 7.09 cfs @ 12.48 hrs, Volume= 0.991 af

Outflow = 7.09 cfs @ 12.48 hrs, Volume= 0.991 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

## **Summary for Reach 2E: Exist East Wetland (DCP2)**

Inflow Area = 3.411 ac, 21.32% Impervious, Inflow Depth = 2.21" for 10 Year Event event

Inflow = 4.50 cfs @ 12.54 hrs, Volume= 0.628 af

Outflow = 4.50 cfs @ 12.54 hrs, Volume= 0.628 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

# Summary for Reach 2P: Prop. to East Wetland (DCP2)

Inflow Area = 3.317 ac, 27.22% Impervious, Inflow Depth = 2.25" for 10 Year Event event

Inflow = 4.37 cfs @ 12.46 hrs, Volume= 0.623 af

Outflow = 4.37 cfs @ 12.46 hrs, Volume= 0.623 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

# **Summary for Reach 3E: Exist To Street (DCP3)**

Inflow Area = 0.029 ac, 37.21% Impervious, Inflow Depth = 2.81" for 10 Year Event event

Inflow = 0.10 cfs @ 12.07 hrs, Volume= 0.007 af

Outflow = 0.10 cfs @ 12.07 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

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## Summary for Reach 3P: Prop. To Street (DCP3)

Inflow Area = 0.014 ac, 83.11% Impervious, Inflow Depth = 3.91" for 10 Year Event event

Inflow = 0.06 cfs @ 12.07 hrs, Volume= 0.004 af

Outflow = 0.06 cfs @ 12.07 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

### Summary for Reach 4E: Exist North Wetland (DCP4)

Inflow Area = 0.975 ac, 19.69% Impervious, Inflow Depth = 2.29" for 10 Year Event event

Inflow = 1.24 cfs @ 12.59 hrs, Volume= 0.186 af

Outflow = 1.24 cfs @ 12.59 hrs, Volume= 0.186 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

### Summary for Reach 4P: Prop. to North Wetland (DCP4)

Inflow Area = 0.760 ac, 15.76% Impervious, Inflow Depth = 2.21" for 10 Year Event event

Inflow = 1.06 cfs @ 12.47 hrs, Volume= 0.140 af

Outflow = 1.06 cfs @ 12.47 hrs, Volume= 0.140 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

## **Summary for Pond 7P: MH**

Inflow Area = 0.678 ac, 55.55% Impervious, Inflow Depth = 3.20" for 10 Year Event event

Inflow = 2.60 cfs @ 12.07 hrs, Volume= 0.181 af

Outflow = 2.60 cfs @ 12.07 hrs, Volume= 0.181 af, Atten= 0%, Lag= 0.0 min

Primary = 2.60 cfs @ 12.07 hrs, Volume= 0.181 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 88.51' @ 12.08 hrs

Primary OutFlow Max=2.56 cfs @ 12.07 hrs HW=88.50' TW=88.14' (Dynamic Tailwater) 1=Culvert (Outlet Controls 2.56 cfs @ 3.14 fps)

## Summary for Pond 9P: CB 4

Inflow Area = 0.374 ac, 58.78% Impervious, Inflow Depth = 3.29" for 10 Year Event event

Inflow = 1.47 cfs @ 12.07 hrs, Volume= 0.102 af

Outflow = 1.47 cfs @ 12.07 hrs, Volume= 0.102 af, Atten= 0%, Lag= 0.0 min

Primary = 1.47 cfs @ 12.07 hrs, Volume= 0.102 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Type III 24-hr 10 Year Event Rainfall=4.60"

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Peak Elev= 88.66' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.67'	<b>12.0" Round Culvert</b> L= 22.0' Ke= 0.500
			Inlet / Outlet Invert= 87.67' / 87.45' S= 0.0100 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.38 cfs @ 12.07 hrs HW=88.65' TW=88.50' (Dynamic Tailwater) 1=Culvert (Outlet Controls 1.38 cfs @ 2.24 fps)

#### **Summary for Pond 10P: MH**

Inflow Area = 1.653 ac, 52.84% Impervious, Inflow Depth = 3.17" for 10 Year Event event

Inflow = 6.28 cfs @ 12.07 hrs, Volume= 0.436 af

Outflow 6.28 cfs @ 12.07 hrs, Volume= 0.436 af, Atten= 0%, Lag= 0.0 min =

6.28 cfs @ 12.07 hrs, Volume= 0.436 af Primary

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 88.14' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	86.85'	<b>18.0" Round Culvert</b> L= 95.0' Ke= 0.500
			Inlet / Outlet Invert= 86.85' / 85.50' S= 0.0142 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf

Primary OutFlow Max=6.27 cfs @ 12.07 hrs HW=88.14' TW=86.06' (Dynamic Tailwater) 1=Culvert (Inlet Controls 6.27 cfs @ 3.87 fps)

# **Summary for Pond 12P: MH**

0.975 ac, 50.96% Impervious, Inflow Depth = 3.14" for 10 Year Event event Inflow Area = 3.68 cfs @ 12.07 hrs, Volume= Inflow = 0.255 af

3.68 cfs @ 12.07 hrs, Volume= Outflow = 0.255 af, Atten= 0%, Lag= 0.0 min

Primary = 3.68 cfs @ 12.07 hrs, Volume= 0.255 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 89.70' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	88.65'	<b>15.0" Round Culvert</b> L= 240.0' Ke= 0.500 Inlet / Outlet Invert= 88.65' / 86.85' S= 0.0075 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=3.66 cfs @ 12.07 hrs HW=89.69' TW=88.14' (Dynamic Tailwater) 1=Culvert (Outlet Controls 3.66 cfs @ 4.52 fps)

Type III 24-hr 10 Year Event Rainfall=4.60"

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# **Summary for Pond 13P: CB6**

Inflow Area = 0.457 ac, 54.20% Impervious, Inflow Depth = 3.19" for 10 Year Event event

Inflow = 1.75 cfs @ 12.07 hrs, Volume= 0.122 af

Outflow = 1.75 cfs @ 12.07 hrs, Volume= 0.122 af, Atten= 0%, Lag= 0.0 min

Primary = 1.75 cfs @ 12.07 hrs, Volume= 0.122 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 90.09' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	89.20'	<b>12.0"</b> Round Culvert L= 62.0' Ke= 0.500 Inlet / Outlet Invert= 89.20' / 88.65' S= 0.0089 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.72 cfs @ 12.07 hrs HW=90.09' TW=89.69' (Dynamic Tailwater) 1=Culvert (Outlet Controls 1.72 cfs @ 3.10 fps)

### **Summary for Pond MH1: MH**

Inflow Area = 0.336 ac, 71.99% Impervious, Inflow Depth = 3.59" for 10 Year Event event

Inflow = 1.41 cfs @ 12.07 hrs, Volume= 0.101 af

Outflow = 1.41 cfs @ 12.07 hrs, Volume= 0.101 af, Atten= 0%, Lag= 0.0 min

Primary = 1.41 cfs @ 12.07 hrs, Volume= 0.101 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 87.86' @ 12.32 hrs

Flood Elev= 89.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	87.00'	<b>12.0" Round Culvert</b> L= 40.0' Ke= 0.500
			Inlet / Outlet Invert= 87.00' / 86.80' S= 0.0050 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.41 cfs @ 12.07 hrs HW=87.72' TW=87.31' (Dynamic Tailwater) 1=Culvert (Barrel Controls 1.41 cfs @ 3.24 fps)

# **Summary for Pond MH2: CB 3**

Inflow Area = 0.304 ac, 51.58% Impervious, Inflow Depth = 3.10" for 10 Year Event event

Inflow = 1.13 cfs @ 12.07 hrs, Volume= 0.079 af

Outflow = 1.13 cfs @ 12.07 hrs, Volume= 0.079 af, Atten= 0%, Lag= 0.0 min

Primary = 1.13 cfs @ 12.07 hrs, Volume= 0.079 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 88.61' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.67'	<b>12.0" Round Culvert</b> L= 22.0' Ke= 0.500
	_		Inlet / Outlet Invert= 87.67' / 87.45' S= 0.0100 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean. Flow Area= 0.79 sf

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Primary OutFlow Max=1.04 cfs @ 12.07 hrs HW=88.60' TW=88.50' (Dynamic Tailwater) 1=Culvert (Outlet Controls 1.04 cfs @ 1.79 fps)

### **Summary for Pond MH3: CB5**

Inflow Area = 0.518 ac, 48.10% Impervious, Inflow Depth = 3.10" for 10 Year Event event

Inflow = 1.93 cfs @ 12.07 hrs, Volume= 0.134 af

Outflow = 1.93 cfs @ 12.07 hrs, Volume= 0.134 af, Atten= 0%, Lag= 0.0 min

Primary = 1.93 cfs @, 12.07 hrs, Volume = 0.134 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 90.14' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	89.20'	<b>12.0" Round Culvert</b> L= 65.0' Ke= 0.500
			Inlet / Outlet Invert= 89.20' / 88.65' S= 0.0085 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.90 cfs @ 12.07 hrs HW=90.13' TW=89.69' (Dynamic Tailwater) 1=Culvert (Outlet Controls 1.90 cfs @ 3.25 fps)

### **Summary for Pond P1: POND SC 310**

Inflow Area =	0.336 ac, 71.99% Impervious, Inflow D	Depth = 3.59" for 10 Year Event even	t
Inflow =	1.41 cfs @ 12.07 hrs, Volume=	0.101 af	
Outflow =	0.49 cfs @ 12.33 hrs, Volume=	0.101 af, Atten= 66%, Lag= 15.6 min	
Discarded =	0.23 cfs @ 11.73 hrs, Volume=	0.095 af	
Primary =	0.26 cfs @ 12.33 hrs, Volume=	0.006 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 87.84' @ 12.33 hrs Surf.Area= 1,230 sf Storage= 1,009 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 21.4 min ( 810.1 - 788.7 )

Volume	Invert	Avail.Storage	Storage Descriptio	n				
#1	86.50'	849 cf		Custom Stage Data (Irregular) Listed below (Recalc)				
#2	87.00'	708 cf	2,829 cf Overall - 708 cf Embedded = 2,121 cf x 40.0% Voids <b>ADS_StormTech SC-310 +Cap</b> x 48 Inside #1  Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf  Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap					
			48 Chambers in 4	Rows				
		1,556 cf	Total Available Sto	orage				
Elevation (feet)	Surf.A (sc	rea Perim. q-ft) (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)			
86.50	1,2	230 203.0	0	0	1,230			
88.80	1.2	230 203.0	2.829	2.829	1.697			

Type III 24-hr 10 Year Event Rainfall=4.60"

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Device	Routing	Invert	Outlet Devices			
#1	Primary	87.70'	6.0" Horiz. Orifice/Grate	C= 0.600	Limited to weir flow at low heads	
#2	Discarded	86.50'	0.23 cfs Exfiltration when above 86.50'			

**Discarded OutFlow** Max=0.23 cfs @ 11.73 hrs HW=86.53' (Free Discharge) **2=Exfiltration** (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=0.26 cfs @ 12.33 hrs HW=87.84' TW=86.75' (Dynamic Tailwater) 1=Orifice/Grate (Weir Controls 0.26 cfs @ 1.20 fps)

### **Summary for Pond P2: POND 2 SC 740**

Inflow Area =	1.653 ac, 52.84% Impervious, Inflow D	epth = 3.17"	for 10 Year Event event
Inflow =	6.28 cfs @ 12.07 hrs, Volume=	0.436 af	
Outflow =	1.42 cfs @ 12.47 hrs, Volume=	0.436 af, Atte	n= 77%, Lag= 24.0 min
Discarded =	0.78 cfs @ 11.70 hrs, Volume=	0.408 af	_
Primary =	0.64 cfs @ 12.47 hrs, Volume=	0.028 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 86.95' @ 12.47 hrs Surf.Area= 4,088 sf Storage= 5,527 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow) Center-of-Mass det. time= 39.5 min ( 843.7 - 804.2 )

Volume	Invert	Avail	l.Storage	Storage Descriptio	n	
#1	85.00'		3,647 cf	Custom Stage Date	<b>ta (Irregular)</b> Listed	l below (Recalc)
						d = 9,117  cf  x 40.0%  Voids
#2	85.50'		5,191 cf	ADS_StormTech S		
						.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
				113 Chambers in 1	2 Rows	
	8,838 cf		Total Available Sto	Total Available Storage		
					J	
Elevatio	n Sur	f.Area	Perim.	Inc.Store	Cum.Store	Wet.Area
(fee	t)	(sq-ft)	(feet)	(cubic-feet)	(cubic-feet)	(sq-ft)
85.0	00	4,088	320.0	0	0	4,088
88.5	50	4,088	320.0	14,308	14,308	5,208
Device	Routing	Inv	vert Outle	et Devices		
#1	Primary	86	.50' <b>9.0"</b>	Vert. Orifice/Grate	C= 0.600	
#2	Discarded	85	.00' <b>0.78</b>	cfs Exfiltration wh	en above 85.00'	

**Discarded OutFlow** Max=0.78 cfs @ 11.70 hrs HW=85.04' (Free Discharge) **2=Exfiltration** (Exfiltration Controls 0.78 cfs)

Primary OutFlow Max=0.64 cfs @ 12.47 hrs HW=86.95' TW=85.40' (Dynamic Tailwater) 1=Orifice/Grate (Orifice Controls 0.64 cfs @ 2.30 fps)

Type III 24-hr 10 Year Event Rainfall=4.60"

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# Summary for Pond R1: Pond1 Outlet - 12" RCP

Inflow Area = 0.336 ac, 71.99% Impervious, Inflow Depth = 0.21" for 10 Year Event event

Inflow = 0.26 cfs @ 12.33 hrs, Volume= 0.006 af

Outflow = 0.26 cfs @ 12.33 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Primary = 0.26 cfs @ 12.33 hrs, Volume= 0.006 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 86.75' @ 12.33 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	86.50'	<b>12.0"</b> Round Culvert L= 25.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 86.50' / 86.20' S= 0.0120 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.26 cfs @ 12.33 hrs HW=86.75' TW=0.00' (Dynamic Tailwater) 1=Culvert (Inlet Controls 0.26 cfs @ 1.69 fps)

### Summary for Pond R4: Pond 2 Outlet - 12" RCP

Inflow Area = 1.653 ac, 52.84% Impervious, Inflow Depth = 0.21" for 10 Year Event event

Inflow = 0.64 cfs @ 12.47 hrs, Volume= 0.028 af

Outflow = 0.64 cfs @ 12.47 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min

Primary = 0.64 cfs @ 12.47 hrs, Volume= 0.028 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 85.40' @ 12.47 hrs

Device	Routing	Invert	Outlet Devices			
#1	Primary	85.00'	<b>12.0" Round Culvert</b> L= 35.0' Ke= 0.500			
			Inlet / Outlet Invert= 85.00' / 84.50' S= 0.0143 '/' Cc= 0.900			
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf			

Primary OutFlow Max=0.64 cfs @ 12.47 hrs HW=85.40' TW=0.00' (Dynamic Tailwater) 1=Culvert (Inlet Controls 0.64 cfs @ 2.16 fps)

# Summary for Link 1L: 6- 1550 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 3.02" for 10 Year Event event

Inflow = 0.16 cfs @ 12.09 hrs, Volume= 0.009 af

Primary = 0.95 cfs @ 12.09 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 6.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

10 Year Event Outflow Imported from 1 house with inf. 1550~Reach 2R.hce

Type III 24-hr 10 Year Event Rainfall=4.60"

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# Summary for Link 2L: 1 - 1200 House

Inflow Area = 0.028 ac,100.00% Impervious, Inflow Depth = 2.65" for 10 Year Event event

Inflow = 0.12 cfs @ 12.09 hrs, Volume= 0.006 af

Primary = 0.12 cfs @ 12.09 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

10 Year Event Outflow Imported from 1 house w inf. 1200~Reach 2R.hce

# Summary for Link 3L: 10 - 1550 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 3.02" for 10 Year Event event

Inflow = 0.16 cfs @ 12.09 hrs, Volume= 0.009 af

Primary = 1.59 cfs @ 12.09 hrs, Volume= 0.090 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 10.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

10 Year Event Outflow Imported from 1 house with inf. 1550~Reach 2R.hce

### Summary for Link 4L: 2 - 1200 House

Inflow Area = 0.028 ac,100.00% Impervious, Inflow Depth = 2.65" for 10 Year Event event

Inflow = 0.12 cfs @ 12.09 hrs, Volume= 0.006 af

Primary = 0.25 cfs @ 12.09 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 2.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

10 Year Event Outflow Imported from 1 house w inf. 1200~Reach 2R.hce

Type III 24-hr 25 Year Event Rainfall=5.50"

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Outflow=6.04 cfs 0.839 af

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Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Prop. to Steam Flow Length=1,030	Runoff Area=159,889 sf 38.35% Impervious Runoff Depth=3.63" Slope=0.0100 '/' Tc=38.3 min CN=83 Runoff=7.82 cfs 1.110 af
Subcatchment 3S: Prop to CB #3	Runoff Area=13,262 sf 51.58% Impervious Runoff Depth=3.94" Tc=5.0 min CN=86 Runoff=1.43 cfs 0.100 af
Subcatchment 4S: Prop to CB#4	Runoff Area=16,270 sf 58.78% Impervious Runoff Depth=4.15" Tc=5.0 min CN=88 Runoff=1.83 cfs 0.129 af
Subcatchment 5S: Prop. to CB # 5	Runoff Area=22,568 sf 48.10% Impervious Runoff Depth=3.94" Tc=5.0 min CN=86 Runoff=2.43 cfs 0.170 af
Subcatchment 6S: Prop. to CB # 6	Runoff Area=19,917 sf 54.20% Impervious Runoff Depth=4.04" Tc=5.0 min CN=87 Runoff=2.19 cfs 0.154 af
Subcatchment 7S: Prop. to Pond 1	Runoff Area=14,631 sf 71.99% Impervious Runoff Depth=4.47" Tc=5.0 min CN=91 Runoff=1.73 cfs 0.125 af
Subcatchment 8S: Prop. to East Wetland	Runoff Area=127,093 sf 20.50% Impervious Runoff Depth=3.05" Flow Length=370' Tc=37.0 min CN=77 Runoff=5.33 cfs 0.741 af
	<b>d</b> Runoff Area=33,123 sf 15.76% Impervious Runoff Depth=2.95" Slope=0.0100 '/' Tc=33.1 min CN=76 Runoff=1.42 cfs 0.187 af
Subcatchment 10S: Prop. to Street	Runoff Area=592 sf 83.11% Impervious Runoff Depth=4.80" Tc=5.0 min CN=94 Runoff=0.07 cfs 0.005 af
Subcatchment E1: Exist. to Stream Flow Length=460'	Runoff Area=243,161 sf 28.05% Impervious Runoff Depth=3.24" Slope=0.0100 '/' Tc=42.0 min CN=79 Runoff=10.18 cfs 1.506 af
Subcatchment E2: Exist. To East	Runoff Area=148,590 sf 21.32% Impervious Runoff Depth=2.95" Flow Length=370' Tc=37.0 min CN=76 Runoff=6.04 cfs 0.839 af
Subcatchment E3: Exist. To Street	Runoff Area=1,271 sf 37.21% Impervious Runoff Depth=3.63" Tc=5.0 min CN=83 Runoff=0.13 cfs 0.009 af
	rthRunoff Area=42,453 sf 19.69% Impervious Runoff Depth=3.05"   Slope=0.0100 '/' Tc=42.6 min CN=77 Runoff=1.66 cfs 0.247 af
Reach 1E: Exist. to Stream (DCP1)	Inflow=10.18 cfs 1.506 af Outflow=10.18 cfs 1.506 af
Reach 1P: Prop. to Stream (DCP1)	Inflow=9.71 cfs 1.328 af Outflow=9.71 cfs 1.328 af
Reach 2E: Exist East Wetland (DCP2)	Inflow=6.04 cfs 0.839 af

Concord ST - Rockland REV 1-4-21
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Type III 24-hr 25 Year Event Rainfall=5.50"

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Booch 2D: Prop. to East Wetland (D	(CB2)	Inflow=5.93 cfs 0.837 af						
Reach 2P: Prop. to East Wetland (D	GP2)	Outflow=5.93 cfs 0.837 af						
		Cullion clos die cloch al						
Reach 3E: Exist To Street (DCP3)		Inflow=0.13 cfs 0.009 af						
		Outflow=0.13 cfs 0.009 af						
Reach 3P: Prop. To Street (DCP3)		Inflow=0.07 cfs 0.005 af						
Reach 3F. Flop. 10 Street (DCF3)		Outflow=0.07 cfs 0.005 af						
Reach 4E: Exist North Wetland (DC	P4)	Inflow=1.66 cfs 0.247 af						
		Outflow=1.66 cfs 0.247 af						
Reach 4P: Prop. to North Wetland	(DCP4)	Inflow=1.42 cfs 0.187 af						
	(20.1)	Outflow=1.42 cfs 0.187 af						
Pond 7P: MH	Peak Elev=88.79 Round Culvert n=0.011 L=60.0' S=0.0100 '/'	' Inflow=3.26 cfs 0.229 af						
15.0	Round Culvert 11-0.011 L-00.0 S-0.0100 /	Outilow=3.20 cis 0.229 ai						
Pond 9P: CB 4	Peak Elev=89.01	' Inflow=1.83 cfs 0.129 af						
12.0"	Round Culvert n=0.011 L=22.0' S=0.0100 '/'	Outflow=1.83 cfs 0.129 af						
David 40D: MII	Dook Flore 90 46							
Pond 10P: MH	Round Culvert n=0.011 L=95.0' S=0.0142 '/'	' Inflow=7.88 cfs 0.553 af						
10.0	1.00110 Galvert 11 0.011 L 00.0 G 0.0142 /	7.00 010 0.000 ui						
Pond 12P: MH		' Inflow=4.62 cfs 0.324 af						
15.0"	Round Culvert n=0.011 L=240.0' S=0.0075 '/'	Outflow=4.62 cfs 0.324 af						
Pond 13P: CB6	Peak Flev=90 32	' Inflow=2.19 cfs 0.154 af						
	Round Culvert n=0.011 L=62.0' S=0.0089 '/'							
Pond MH1: MH		5' Inflow=1.73 cfs 0.125 af						
12.0	Round Culvert n=0.011 L=40.0' S=0.0050 '/'	Outflow=1.73 cfs 0.125 at						
Pond MH2: CB 3	Peak Elev=88.93	' Inflow=1.43 cfs 0.100 af						
12.0"	Round Culvert n=0.011 L=22.0' S=0.0100 '/'	Outflow=1.43 cfs 0.100 af						
David MU2. OD5	Dook Florence 20	l Inflam-0 40 afa 0 470 af						
Pond MH3: CB5	Round Culvert n=0.011 L=65.0' S=0.0085 '/'	' Inflow=2.43 cfs 0.170 af						
12.0	Tround Galvert II 0.011 L 00.0 C 0.0000 /	Odinow 2.40 010 0.170 di						
Pond P1: POND SC 310	Peak Elev=88.00' Storage=1,135 c							
Discarded:	=0.23 cfs 0.109 af Primary=0.52 cfs 0.016 af	Outflow=0.75 cfs 0.125 af						
Pond P2: POND 2 SC 740	Peak Elev=87.35' Storage=6,639 c	f Inflow=7.88 cfs 0.553 af						
	=0.78 cfs 0.470 af Primary=1.47 cfs 0.083 af							
= 12 031 40 4								
Pond R1: Pond1 Outlet - 12" RCP		o' Inflow=0.52 cfs 0.016 af						
12.0"	Round Culvert n=0.011 L=25.0' S=0.0120 '/'	Outflow=0.52 cts 0.016 af						
Pond R4: Pond 2 Outlet - 12" RCP	Peak Flev=85 65	' Inflow=1.47 cfs 0.083 af						
	Pound Culvert n=0.011 L=35.0' S=0.0143.1"							

12.0" Round Culvert n=0.011 L=35.0' S=0.0143 '/' Outflow=1.47 cfs 0.083 af

Type III 24-hr 25 Year Event Rainfall=5.50"

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Ling5 Year Event Outflow Imported from 1 house with inf. 1550~Reach 2R.hce x 6.00 Inflow=0.19 cfs 0.012 af
Area= 0.036 ac 100.00% Imperv. Primary=1.15 cfs 0.071 af

Link 2L: 1 - 25 Year Event Outflow Imported from 1 house w inf. 1200~Reach 2R.hce Inflow=0.15 cfs 0.008 af Area= 0.028 ac 100.00% Imperv. Primary=0.15 cfs 0.008 af

Lias Year Event Outflow Imported from 1 house with inf. 1550~Reach 2R.hce x 10.00 Inflow=0.19 cfs 0.012 af Area= 0.036 ac 100.00% Imperv. Primary=1.92 cfs 0.119 af

Link 25 Year Event Outflow Imported from 1 house w inf. 1200~Reach 2R.hce x 2.00 Inflow=0.15 cfs 0.008 af Area= 0.028 ac 100.00% Imperv. Primary=0.30 cfs 0.017 af

Total Runoff Area = 19.348 ac Runoff Volume = 5.323 af Average Runoff Depth = 3.30" 70.29% Pervious = 13.600 ac 29.71% Impervious = 5.748 ac

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# **Summary for Subcatchment 1S: Prop. to Steam**

Runoff = 7.82 cfs @ 12.52 hrs, Volume= 1.110 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 25 Year Event Rainfall=5.50"

	Α	rea (sf)	CN E	escription						
*		48,878		•						
		77,137		,						
*		4,305								
		1,100	87 E							
		18,844	70 V	Voods, Go	od, HSG C					
*		2,457	98 E	xisit,. Roo	f					
*		5,683	98 E	xisit. Pave	ement					
*		1,485	74 F	Prop. Patios	S					
	1	59,889	83 V	Veighted A	verage					
		98,566	6	1.65% Per	vious Area					
		61,323	3	8.35% lmp	ervious Ar	ea				
	Тс	Length	Slope	Velocity	Capacity	Description				
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
	28.3	50	0.0100	0.03		Sheet Flow,				
						Woods: Dense underbrush n= 0.800 P2= 3.20"				
	1.7	50	0.0100	0.50		Shallow Concentrated Flow,				
						Woodland Kv= 5.0 fps				
	0.7	30	0.0100	0.70		Shallow Concentrated Flow,				
						Short Grass Pasture Kv= 7.0 fps				
	3.7	110	0.0100	0.50		Shallow Concentrated Flow, shallow				
						Woodland Kv= 5.0 fps				
	3.9	790	0.0100	3.35	20.11	Channel Flow, Stream				
						Area= 6.0 sf Perim= 7.0' r= 0.86'				
						n= 0.040 Earth, cobble bottom, clean sides				
	38.3	1,030	Total							

### Summary for Subcatchment 3S: Prop to CB #3

Runoff = 1.43 cfs @ 12.07 hrs, Volume= 0.100 af, Depth= 3.94"

 Area (sf)	CN	Description			
 6,841	98	Paved parking, HSG C			
 6,421	74	>75% Grass cover, Good, HSG C			
 13,262	86	Weighted Average			
6,421		48.42% Pervious Area			
6,841		51.58% Impervious Area			

Type III 24-hr 25 Year Event Rainfall=5.50"

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Tc	Length	Slope	Velocity	Capacity	Description
 (min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
5.0					Direct Entry, DIRECT

# Summary for Subcatchment 4S: Prop to CB#4

Runoff = 1.83 cfs @ 12.07 hrs, Volume= 0.129 af, Depth= 4.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 25 Year Event Rainfall=5.50"

	Area	(sf)	CN I	Description						
*	1,6	352	98 F	Paved parking, HSG C-Sidewalk						
	7,9	912	98 F	Paved park	ing, HSG C					
	6,7	706	74 >	>75% Grass cover, Good, HSG C						
	16,2	270	88 \	Weighted Average						
	6,7	706	4	41.22% Pervious Area						
	9,5	564	į	58.78% Imp	ervious Ar	rea				
		ngth	Slope	,	Capacity	Description				
(m	in) (f	eet)	(ft/ft)	(ft/sec)	(cfs)					
5	5.0					Direct Entry, DIRECT				

# Summary for Subcatchment 5S: Prop. to CB # 5

Runoff = 2.43 cfs @ 12.07 hrs, Volume= 0.170 af, Depth= 3.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 25 Year Event Rainfall=5.50"

	Α	rea (sf)	CN	Description						
*		466	98	Paved park	ing, HSG C	C - Sidewalk				
*		10,390	98	Paved park	ing, HSG C	C - rroad-drives				
		11,712	74	>75% Gras	s cover, Go	ood, HSG C				
		22,568	86	6 Weighted Average						
		11,712		51.90% Pervious Area						
		10,856		48.10% lm <mark>լ</mark>	pervious Ar	rea				
	Тс	Length	Slope	,	Capacity	·				
(	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
	5.0					Direct Entry,				

\_...**,** 

# Summary for Subcatchment 6S: Prop. to CB # 6

Runoff = 2.19 cfs @ 12.07 hrs, Volume= 0.154 af, Depth= 4.04"

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	Area (	sf) CN	Description	Description				
*	9	59 98	Paved parl	king, HSG (	C - Sidewalk			
*	9,8	36 98	Paved parl	king, HSG (	C - rroad-drives			
	9,1	22 74	>75% Gras	ss cover, G	Good, HSG C			
	19,9	17 87	Weighted /	Average				
	9,1	22	45.80% Pe	rvious Area	a			
	10,7	95	54.20% Im	pervious Ar	rea			
	Tc Ler (min) (fe	•	ope Velocity t/ft) (ft/sec)	Capacity (cfs)	·			
	5.0				Direct Entry,			

# Summary for Subcatchment 7S: Prop. to Pond 1

Runoff = 1.73 cfs @ 12.07 hrs, Volume=

0.125 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 25 Year Event Rainfall=5.50"

A	rea (sf)	CN	Description					
	10,533	98	Paved park	ing, HSG C				
	4,098	74	>75% Gras	s cover, Go	ood, HSG C			
	14,631	91	Weighted A	verage				
	4,098		28.01% Per	vious Area	1			
	10,533	71.99% Impervious Area						
т.	1 41.	01	V/-1	0	D			
Tc	Length	Slope	,	Capacity	Description			
(min)	(feet)	(ft/ft	(ft/sec)	(cfs)				
5.0					Direct Entry, DIRECT			

# Summary for Subcatchment 8S: Prop. to East Wetland

Runoff = 5.33 cfs @ 12.53 hrs, Volume=

0.741 af, Depth= 3.05"

	Area (sf)	CN	Description
*	25,672	98	Water Surface Wetlands, HSG C
	40,951	74	>75% Grass cover, Good, HSG C
	58,938	70	Woods, Good, HSG C
*	1,155	74	Patio
*	377	98	ret wall
	127,093	77	Weighted Average
	101,044		79.50% Pervious Area
	26,049		20.50% Impervious Area

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	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	28.3	50	0.0100	0.03		Sheet Flow,
	8.7	320	0.0150	0.61		Woods: Dense underbrush n= 0.800 P2= 3.20" <b>Shallow Concentrated Flow, shallow</b> Woodland Kv= 5.0 fps
-	37.0	370	Total			

# Summary for Subcatchment 9S: Prop. to North Wetland

Runoff = 1.42 cfs @ 12.47 hrs, Volume= 0.187 af,

0.187 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 25 Year Event Rainfall=5.50"

	Α	rea (sf)	CN E	Description		
*		906	98 V	Vater Surfa	ace Wetlan	ds, HSG C
		2,744	98 F	Paved park	ing, HSG C	
		16,242	74 >	·75% Ġras	s cover, Go	ood, HSG C
1,286 98 Roofs, HSG C - infiltrated					ted	
*		283	98 v	valls othe r	imp.	
		11,662	70 V	Voods, Go	od, HSG C	
		33,123	76 V	Veighted A	verage	
		27,904	8	4.24% Per	vious Area	
		5,219	1	5.76% Imp	ervious Ar	ea
				•		
	Tc	Length	Slope	Velocity	Capacity	Description
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	·
	28.3	50	0.0100	0.03		Sheet Flow, Sheet
						Woods: Dense underbrush n= 0.800 P2= 3.20"
	4.8	430	0.0100	1.50		Shallow Concentrated Flow, shallow
						Grassed Waterway Kv= 15.0 fps
	33.1	480	Total			

### Summary for Subcatchment 10S: Prop. to Street

Runoff = 0.07 cfs @ 12.07 hrs, Volume= 0.005 af, Depth= 4.80"

Area (sf)	CN	Description
492	98	Paved parking, HSG C
100	74	>75% Grass cover, Good, HSG C
592	94	Weighted Average
100		16.89% Pervious Area
492		83.11% Impervious Area

Type III 24-hr 25 Year Event Rainfall=5.50"

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Tc	Length	Slope	Velocity	Capacity	Description	
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)		
5.0					Direct Entry, DIRECT	

# Summary for Subcatchment E1: Exist. to Stream

Runoff = 10.18 cfs @ 12.56 hrs, Volume= 1.506 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 25 Year Event Rainfall=5.50"

	Α	rea (sf)	CN I	Description		
*		48,977	98 \	Nater Surfa	ace Wetlan	ds, HSG C
		11,952	98 I	Paved park	ing, HSG C	
		34,335	74	>75% Gras	s cover, Go	ood, HSG C
		2,457	98 I	Roofs, HSG	S C	
*		4,820	98 v	walls othe r	imp.	
		8,801		Dirt roads, l		
_	1	31,819	70 \	Noods, Go	od, HSG C	
	2	243,161	79 \	Neighted A	verage	
	1	74,955	71.95% Per 28.05% Imp		rvious Area	
		68,206			pervious Ar	ea
	Тс	Length	Slope		Capacity	Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	28.3	50	0.0100	0.03		Sheet Flow, Sheet
						Woods: Dense underbrush n= 0.800 P2= 3.20"
	13.7	410	0.0100	0.50		Shallow Concentrated Flow, shallow - woods
_						Woodland Kv= 5.0 fps
	42.0	460	Total			

# **Summary for Subcatchment E2: Exist. To East Weltands**

Runoff = 6.04 cfs @ 12.53 hrs, Volume= 0.839 af, Depth= 2.95"

	Area (sf)	CN	Description
*	25,672	98	Water Surface Wetlands, HSG C
	5,792	98	Paved parking, HSG C
	9,907	74	>75% Grass cover, Good, HSG C
*	217	98	walls othe rimp.
	107,002	70	Woods, Good, HSG C
	148,590	76	Weighted Average
	116,909		78.68% Pervious Area
	31,681		21.32% Impervious Area

Type III 24-hr 25 Year Event Rainfall=5.50"

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Тс	Length	Slope	Velocity	Capacity	Description
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	<u> </u>
28.3	50	0.0100	0.03		Sheet Flow, Sheet
					Woods: Dense underbrush n= 0.800 P2= 3.20"
8.7	320	0.0150	0.61		Shallow Concentrated Flow, shallow - woods
					Woodland Kv= 5.0 fps
37.0	370	Total			<u> </u>

# **Summary for Subcatchment E3: Exist. To Street**

Runoff = 0.13 cfs @ 12.07 hrs, Volume= 0.009 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 25 Year Event Rainfall=5.50"

A	rea (sf)	CN	Description					
	473	98	Paved park	ing, HSG C				
	798	74	>75% Gras	>75% Grass cover, Good, HSG C				
	1,271	83	Weighted A	verage				
	798		62.79% Pervious Area					
	473		37.21% Impervious Area					
Tc (min)	Length (feet)	Slope (ft/ft	,	Capacity (cfs)	Description			
5.0					Direct Entry,			

### Summary for Subcatchment E4: Exist. to Wetlands North

Runoff = 1.66 cfs @ 12.59 hrs, Volume= 0.247 af, Depth= 3.05"

	Area (sf)	CN	Description
*	907	98	Water Surface Wetlands, HSG C
	5,644	98	Paved parking, HSG C
	12,783	74	>75% Grass cover, Good, HSG C
*	520	98	walls othe rimp.
	21,313	70	Woods, Good, HSG C
	1,286	98	Roofs, HSG C
	42,453	77	Weighted Average
	34,096		80.31% Pervious Area
	8,357		19.69% Impervious Area

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	Тс	Length	Slope	Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	28.3	50	0.0100	0.03		Sheet Flow, Sheet
						Woods: Dense underbrush n= 0.800 P2= 3.20"
	14.3	430	0.0100	0.50		Shallow Concentrated Flow, shallow - woods
_						Woodland Kv= 5.0 fps
	42.6	480	Total			

# **Summary for Reach 1E: Exist. to Stream (DCP1)**

Inflow Area = 5.582 ac, 28.05% Impervious, Inflow Depth = 3.24" for 25 Year Event event

Inflow = 10.18 cfs @ 12.56 hrs, Volume= 1.506 af

Outflow = 10.18 cfs @ 12.56 hrs, Volume= 1.506 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

### **Summary for Reach 1P: Prop. to Stream (DCP1)**

Inflow Area = 5.387 ac, 43.52% Impervious, Inflow Depth = 2.96" for 25 Year Event event

Inflow = 9.71 cfs @ 12.47 hrs, Volume= 1.328 af

Outflow = 9.71 cfs @ 12.47 hrs, Volume= 1.328 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

# **Summary for Reach 2E: Exist East Wetland (DCP2)**

Inflow Area = 3.411 ac, 21.32% Impervious, Inflow Depth = 2.95" for 25 Year Event event

Inflow = 6.04 cfs @ 12.53 hrs, Volume= 0.839 af

Outflow = 6.04 cfs @ 12.53 hrs, Volume= 0.839 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

# Summary for Reach 2P: Prop. to East Wetland (DCP2)

Inflow Area = 3.317 ac, 27.22% Impervious, Inflow Depth = 3.03" for 25 Year Event event

Inflow = 5.93 cfs @ 12.45 hrs, Volume= 0.837 af

Outflow = 5.93 cfs @ 12.45 hrs, Volume= 0.837 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

# Summary for Reach 3E: Exist To Street (DCP3)

Inflow Area = 0.029 ac, 37.21% Impervious, Inflow Depth = 3.63" for 25 Year Event event

Inflow = 0.13 cfs @ 12.07 hrs, Volume= 0.009 af

Outflow = 0.13 cfs @ 12.07 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

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# Summary for Reach 3P: Prop. To Street (DCP3)

Inflow Area = 0.014 ac, 83.11% Impervious, Inflow Depth = 4.80" for 25 Year Event event

Inflow = 0.07 cfs @ 12.07 hrs, Volume= 0.005 af

Outflow = 0.07 cfs @ 12.07 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

# **Summary for Reach 4E: Exist North Wetland (DCP4)**

Inflow Area = 0.975 ac, 19.69% Impervious, Inflow Depth = 3.05" for 25 Year Event event

Inflow = 1.66 cfs @ 12.59 hrs, Volume= 0.247 af

Outflow = 1.66 cfs @ 12.59 hrs, Volume= 0.247 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

### Summary for Reach 4P: Prop. to North Wetland (DCP4)

Inflow Area = 0.760 ac, 15.76% Impervious, Inflow Depth = 2.95" for 25 Year Event event

Inflow = 1.42 cfs @ 12.47 hrs, Volume= 0.187 af

Outflow = 1.42 cfs @ 12.47 hrs, Volume= 0.187 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

# **Summary for Pond 7P: MH**

Inflow Area = 0.678 ac, 55.55% Impervious, Inflow Depth = 4.05" for 25 Year Event event

Inflow = 3.26 cfs @ 12.07 hrs, Volume= 0.229 af

Outflow = 3.26 cfs @ 12.07 hrs, Volume= 0.229 af, Atten= 0%, Lag= 0.0 min

Primary = 3.26 cfs @ 12.07 hrs, Volume= 0.229 af

Routing by Dyn-Stor-Ind method. Time Span= 0.00-35.00 hrs. dt= 0.01 hrs

Peak Elev= 88.79' @ 12.08 hrs

Primary OutFlow Max=3.18 cfs @ 12.07 hrs HW=88.78' TW=88.46' (Dynamic Tailwater) 1=Culvert (Outlet Controls 3.18 cfs @ 3.03 fps)

# Summary for Pond 9P: CB 4

Inflow Area = 0.374 ac, 58.78% Impervious, Inflow Depth = 4.15" for 25 Year Event event

Inflow = 1.83 cfs @ 12.07 hrs, Volume= 0.129 af

Outflow = 1.83 cfs @ 12.07 hrs, Volume= 0.129 af, Atten= 0%, Lag= 0.0 min

Primary = 1.83 cfs @ 12.07 hrs, Volume= 0.129 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Type III 24-hr 25 Year Event Rainfall=5.50"

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Peak Elev= 89.01' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.67'	<b>12.0" Round Culvert</b> L= 22.0' Ke= 0.500
			Inlet / Outlet Invert= 87.67' / 87.45' S= 0.0100 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.68 cfs @ 12.07 hrs HW=88.98' TW=88.78' (Dynamic Tailwater) 1=Culvert (Inlet Controls 1.68 cfs @ 2.14 fps)

### **Summary for Pond 10P: MH**

Inflow Area = 1.653 ac, 52.84% Impervious, Inflow Depth = 4.01" for 25 Year Event event

Inflow = 7.88 cfs @ 12.07 hrs, Volume= 0.553 af

Outflow = 7.88 cfs @ 12.07 hrs, Volume= 0.553 af, Atten= 0%, Lag= 0.0 min

Primary = 7.88 cfs @ 12.07 hrs, Volume= 0.553 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 88.46' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	86.85'	<b>18.0" Round Culvert</b> L= 95.0' Ke= 0.500
			Inlet / Outlet Invert= 86.85' / 85.50' S= 0.0142 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf

Primary OutFlow Max=7.87 cfs @ 12.07 hrs HW=88.46' TW=86.40' (Dynamic Tailwater) 1=Culvert (Inlet Controls 7.87 cfs @ 4.45 fps)

# **Summary for Pond 12P: MH**

Inflow Area = 0.975 ac, 50.96% Impervious, Inflow Depth = 3.98" for 25 Year Event event Inflow = 0.324 af

Outflow = 4.62 cfs @ 12.07 hrs, Volume= 0.324 af, Atten= 0%, Lag= 0.0 min

Primary = 4.62 cfs @ 12.07 hrs, Volume= 0.324 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 89.93' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	88.65'	<b>15.0" Round Culvert</b> L= 240.0' Ke= 0.500
			Inlet / Outlet Invert= 88.65' / 86.85' S= 0.0075 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=4.59 cfs @ 12.07 hrs HW=89.93' TW=88.46' (Dynamic Tailwater) 1=Culvert (Outlet Controls 4.59 cfs @ 4.54 fps)

Type III 24-hr 25 Year Event Rainfall=5.50"

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# **Summary for Pond 13P: CB6**

Inflow Area = 0.457 ac, 54.20% Impervious, Inflow Depth = 4.04" for 25 Year Event event

Inflow = 2.19 cfs @ 12.07 hrs, Volume= 0.154 af

Outflow = 2.19 cfs @ 12.07 hrs, Volume= 0.154 af, Atten= 0%, Lag= 0.0 min

Primary = 2.19 cfs @ 12.07 hrs, Volume= 0.154 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 90.32' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	89.20'	<b>12.0" Round Culvert</b> L= 62.0' Ke= 0.500 Inlet / Outlet Invert= 89.20' / 88.65' S= 0.0089 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.13 cfs @ 12.07 hrs HW=90.30' TW=89.93' (Dynamic Tailwater) 1=Culvert (Outlet Controls 2.13 cfs @ 3.06 fps)

### **Summary for Pond MH1: MH**

Inflow Area = 0.336 ac, 71.99% Impervious, Inflow Depth = 4.47" for 25 Year Event event

Inflow = 1.73 cfs @ 12.07 hrs, Volume= 0.125 af

Outflow = 1.73 cfs @ 12.07 hrs, Volume= 0.125 af, Atten= 0%, Lag= 0.0 min

Primary = 1.73 cfs @ 12.07 hrs, Volume= 0.125 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 88.05' @ 12.23 hrs

Flood Elev= 89.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	87.00'	<b>12.0" Round Culvert</b> L= 40.0' Ke= 0.500
			Inlet / Outlet Invert= 87.00' / 86.80' S= 0.0050 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.59 cfs @ 12.07 hrs HW=87.86' TW=87.55' (Dynamic Tailwater) 1=Culvert (Outlet Controls 1.59 cfs @ 2.98 fps)

# **Summary for Pond MH2: CB 3**

Inflow Area = 0.304 ac, 51.58% Impervious, Inflow Depth = 3.94" for 25 Year Event event

Inflow = 1.43 cfs @ 12.07 hrs, Volume= 0.100 af

Outflow = 1.43 cfs @ 12.07 hrs, Volume= 0.100 af, Atten= 0%, Lag= 0.0 min

Primary = 1.43 cfs @ 12.07 hrs, Volume= 0.100 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 88.93' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.67'	<b>12.0" Round Culvert</b> L= 22.0' Ke= 0.500
	-		Inlet / Outlet Invert= 87.67' / 87.45' S= 0.0100 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

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Primary OutFlow Max=1.25 cfs @ 12.07 hrs HW=88.89' TW=88.78' (Dynamic Tailwater) 1=Culvert (Inlet Controls 1.25 cfs @ 1.59 fps)

### **Summary for Pond MH3: CB5**

Inflow Area = 0.518 ac, 48.10% Impervious, Inflow Depth = 3.94" for 25 Year Event event

Inflow = 2.43 cfs @ 12.07 hrs, Volume= 0.170 af

Outflow = 2.43 cfs @ 12.07 hrs, Volume= 0.170 af, Atten= 0%, Lag= 0.0 min

Primary = 2.43 cfs @ 12.07 hrs, Volume= 0.170 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 90.38' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	89.20'	<b>12.0" Round Culvert</b> L= 65.0' Ke= 0.500
			Inlet / Outlet Invert= 89.20' / 88.65' S= 0.0085 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.37 cfs @ 12.07 hrs HW=90.37' TW=89.93' (Dynamic Tailwater) 1=Culvert (Outlet Controls 2.37 cfs @ 3.26 fps)

### **Summary for Pond P1: POND SC 310**

Inflow Area =	0.336 ac, 71.99% Impervious, Inflow D	Depth = 4.47" for 25 Year Event event
Inflow =	1.73 cfs @ 12.07 hrs, Volume=	0.125 af
Outflow =	0.75 cfs @ 12.24 hrs, Volume=	0.125 af, Atten= 57%, Lag= 10.2 min
Discarded =	0.23 cfs @ 11.68 hrs, Volume=	0.109 af
Primary =	0.52 cfs @ 12.24 hrs, Volume=	0.016 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 88.00' @ 12.24 hrs Surf.Area= 1,230 sf Storage= 1,135 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 20.4 min (803.3 - 782.8)

Volume	Invert	Avail.Stora	age	Storage Descript	ion		
#1	86.50'	849	cf	<b>Custom Stage D</b>	ata (Irregular) Lis	ted below (Recalc)	
				2,829 cf Overall -	708 cf Embedde	$d = 2,121 \text{ cf } \times 40.0^{\circ}$	% Voids
#2	87.00'	708	3 cf		ո SC-310 +Cap x -		
						> 2.07 sf x 7.12'L =	
						.56'L with 0.44' Ove	rlap
				48 Chambers in	4 Rows		
		1,556	cf	Total Available S	torage		
	0. 1				0 01	147 . 4	
Elevation	Surf.		rim.	Inc.Store	Cum.Store	Wet.Area	
(feet)	(s	q-ft) (f	eet)	(cubic-feet)	(cubic-feet)	(sq-ft)	
86.50	1	,230 20	0.80	0	0	1,230	
88.80	1,	,230 20	0.80	2,829	2,829	1,697	

Type III 24-hr 25 Year Event Rainfall=5.50"

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Device	Routing	Invert	Outlet Devices		
#1	Primary	87.70'	6.0" Horiz. Orifice/Grate	C= 0.600	Limited to weir flow at low heads
#2	Discarded	86.50'	0.23 cfs Exfiltration wher	above 86.	50'

**Discarded OutFlow** Max=0.23 cfs @ 11.68 hrs HW=86.53' (Free Discharge) **2=Exfiltration** (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=0.52 cfs @ 12.24 hrs HW=88.00' TW=86.86' (Dynamic Tailwater) 1=Orifice/Grate (Orifice Controls 0.52 cfs @ 2.65 fps)

# Summary for Pond P2: POND 2 SC 740

Inflow Area =	1.653 ac, 52.84% Impervious, Inflow	Depth = $4.01$ "	for 25 Year Event event
Inflow =	7.88 cfs @ 12.07 hrs, Volume=	0.553 af	
Outflow =	2.25 cfs @ 12.40 hrs, Volume=	0.553 af, Atte	n= 71%, Lag= 19.8 min
Discarded =	0.78 cfs @ 11.65 hrs, Volume=	0.470 af	_
Primary =	1.47 cfs @ 12.40 hrs, Volume=	0.083 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 87.35' @ 12.40 hrs Surf.Area= 4,088 sf Storage= 6,639 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow) Center-of-Mass det. time= 38.9 min ( 836.5 - 797.6 )

Volume	Invert	Avai	I.Storage	Storage Descriptio	n	
#1	85.00'		3,647 cf	Custom Stage Date	ta (Irregular) Listed	d below (Recalc)
				•		ed = 9,117  cf  x 40.0%  Voids
#2	85.50'		5,191 cf	ADS_StormTech S		
						6.45  sf x  7.12'L = 45.9  cf
				Overall Size= 51.0	"W x 30.0"H x 7.56	6'L with 0.44' Overlap
				113 Chambers in 1	2 Rows	
			8,838 cf	Total Available Sto	rage	
			,		· ·	
Elevation	on Su	rf.Area	Perim.	Inc.Store	Cum.Store	Wet.Area
(fee	et)	(sq-ft)	(feet)	(cubic-feet)	(cubic-feet)	(sq-ft)
85.0	00	4,088	320.0	0	0	4,088
88.5	50	4,088	320.0	14,308	14,308	5,208
Device	Routing	In	vert Outle	et Devices		
#1	Primary	86	5.50' <b>9.0"</b>	Vert. Orifice/Grate	C= 0.600	
#2	Discarded	85	5.00' <b>0.78</b>	cfs Exfiltration wh	en above 85.00'	

**Discarded OutFlow** Max=0.78 cfs @ 11.65 hrs HW=85.04' (Free Discharge) **2=Exfiltration** (Exfiltration Controls 0.78 cfs)

Primary OutFlow Max=1.47 cfs @ 12.40 hrs HW=87.35' TW=85.65' (Dynamic Tailwater) 1=Orifice/Grate (Orifice Controls 1.47 cfs @ 3.33 fps)

Type III 24-hr 25 Year Event Rainfall=5.50"

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# Summary for Pond R1: Pond1 Outlet - 12" RCP

Inflow Area = 0.336 ac, 71.99% Impervious, Inflow Depth = 0.59" for 25 Year Event event

Inflow = 0.52 cfs @ 12.24 hrs, Volume= 0.016 af

Outflow = 0.52 cfs @ 12.24 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Primary = 0.52 cfs @ 12.24 hrs, Volume= 0.016 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 86.86' @ 12.24 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	86.50'	12.0" Round Culvert L= 25.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 86.50' / 86.20' S= 0.0120 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.52 cfs @ 12.24 hrs HW=86.86' TW=0.00' (Dynamic Tailwater) 1=Culvert (Inlet Controls 0.52 cfs @ 2.04 fps)

### Summary for Pond R4: Pond 2 Outlet - 12" RCP

Inflow Area = 1.653 ac, 52.84% Impervious, Inflow Depth = 0.60" for 25 Year Event event

Inflow = 1.47 cfs @ 12.40 hrs, Volume= 0.083 af

Outflow = 1.47 cfs @ 12.40 hrs, Volume= 0.083 af, Atten= 0%, Lag= 0.0 min

Primary = 1.47 cfs @ 12.40 hrs, Volume= 0.083 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 85.65' @ 12.40 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	85.00'	<b>12.0" Round Culvert</b> L= 35.0' Ke= 0.500
			Inlet / Outlet Invert= 85.00' / 84.50' S= 0.0143 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.47 cfs @ 12.40 hrs HW=85.65' TW=0.00' (Dynamic Tailwater) 1=Culvert (Inlet Controls 1.47 cfs @ 2.74 fps)

# Summary for Link 1L: 6- 1550 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 4.00" for 25 Year Event event

Inflow = 0.19 cfs @ 12.09 hrs, Volume= 0.012 af

Primary = 1.15 cfs @ 12.09 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 6.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

25 Year Event Outflow Imported from 1 house with inf. 1550~Reach 2R.hce

Type III 24-hr 25 Year Event Rainfall=5.50"

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# Summary for Link 2L: 1 - 1200 House

Inflow Area = 0.028 ac,100.00% Impervious, Inflow Depth = 3.62" for 25 Year Event event

Inflow = 0.15 cfs @ 12.09 hrs, Volume= 0.008 af

Primary = 0.15 cfs @ 12.09 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

25 Year Event Outflow Imported from 1 house w inf. 1200~Reach 2R.hce

# Summary for Link 3L: 10 - 1550 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 4.00" for 25 Year Event event

Inflow = 0.19 cfs @ 12.09 hrs, Volume= 0.012 af

Primary = 1.92 cfs @ 12.09 hrs, Volume= 0.119 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 10.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

25 Year Event Outflow Imported from 1 house with inf. 1550~Reach 2R.hce

### Summary for Link 4L: 2 - 1200 House

Inflow Area = 0.028 ac,100.00% Impervious, Inflow Depth = 3.62" for 25 Year Event event

Inflow = 0.15 cfs @ 12.09 hrs, Volume= 0.008 af

Primary = 0.30 cfs @ 12.09 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 2.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

25 Year Event Outflow Imported from 1 house w inf. 1200~Reach 2R.hce

Type III 24-hr 100 Year Event Rainfall=7.00"

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Outflow=8.70 cfs 1.210 af

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Time span=0.00-35.00 hrs, dt=0.01 hrs, 3501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

readiffeduling by byil-etol-in	ind method - 1 ond routing by byn-otor-ind method
Subcatchment 1S: Prop. to Steam Flow Length=1,030'	Runoff Area=159,889 sf 38.35% Impervious Runoff Depth=5.03" Slope=0.0100 '/' Tc=38.3 min CN=83 Runoff=10.73 cfs 1.538 af
Subcatchment 3S: Prop to CB #3	Runoff Area=13,262 sf 51.58% Impervious Runoff Depth=5.37" Tc=5.0 min CN=86 Runoff=1.92 cfs 0.136 af
Subcatchment 4S: Prop to CB#4	Runoff Area=16,270 sf 58.78% Impervious Runoff Depth=5.59" Tc=5.0 min CN=88 Runoff=2.43 cfs 0.174 af
Subcatchment 5S: Prop. to CB # 5	Runoff Area=22,568 sf 48.10% Impervious Runoff Depth=5.37" Tc=5.0 min CN=86 Runoff=3.27 cfs 0.232 af
Subcatchment 6S: Prop. to CB # 6	Runoff Area=19,917 sf 54.20% Impervious Runoff Depth=5.48" Tc=5.0 min CN=87 Runoff=2.93 cfs 0.209 af
Subcatchment 7S: Prop. to Pond 1	Runoff Area=14,631 sf 71.99% Impervious Runoff Depth=5.94" Tc=5.0 min CN=91 Runoff=2.27 cfs 0.166 af
Subcatchment 8S: Prop. to East Wetland	Runoff Area=127,093 sf 20.50% Impervious Runoff Depth=4.37" Flow Length=370' Tc=37.0 min CN=77 Runoff=7.63 cfs 1.061 af
	nd Runoff Area=33,123 sf 15.76% Impervious Runoff Depth=4.26" 'Slope=0.0100 '/' Tc=33.1 min CN=76 Runoff=2.05 cfs 0.270 af
Subcatchment 10S: Prop. to Street	Runoff Area=592 sf 83.11% Impervious Runoff Depth=6.29" Tc=5.0 min CN=94 Runoff=0.09 cfs 0.007 af
Subcatchment E1: Exist. to Stream Flow Length=460'	Runoff Area=243,161 sf 28.05% Impervious Runoff Depth=4.58" Slope=0.0100 '/' Tc=42.0 min CN=79 Runoff=14.37 cfs 2.133 af
Subcatchment E2: Exist. To East	Runoff Area=148,590 sf 21.32% Impervious Runoff Depth=4.26" Flow Length=370' Tc=37.0 min CN=76 Runoff=8.70 cfs 1.210 af
Subcatchment E3: Exist. To Street	Runoff Area=1,271 sf 37.21% Impervious Runoff Depth=5.03" Tc=5.0 min CN=83 Runoff=0.17 cfs 0.012 af
	orthRunoff Area=42,453 sf 19.69% Impervious Runoff Depth=4.37"  O' Slope=0.0100 '/' Tc=42.6 min CN=77 Runoff=2.37 cfs 0.355 af
Reach 1E: Exist. to Stream (DCP1)	Inflow=14.37 cfs 2.133 af Outflow=14.37 cfs 2.133 af
Reach 1P: Prop. to Stream (DCP1)	Inflow=13.86 cfs 1.906 af Outflow=13.86 cfs 1.906 af
Reach 2E: Exist East Wetland (DCP2)	Inflow=8.70 cfs 1.210 af

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Type III 24-hr 100 Year Event Rainfall=7.00" Printed 1/6/2022

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Reach 2P: Prop. to East Wetla	nd (DCP2)	Inflow=8.59 cfs 1.203 af
reactive to East Wetter	iiu (BSI 2)	Outflow=8.59 cfs 1.203 af
Reach 3E: Exist To Street (DCI	P3)	Inflow=0.17 cfs 0.012 af
		Outflow=0.17 cfs 0.012 af
Reach 3P: Prop. To Street (DC	P3)	Inflow=0.09 cfs 0.007 af
тошон от таке то ош ост (2 о	,	Outflow=0.09 cfs 0.007 af
Reach 4E: Exist North Wetland	d (DCP4)	Inflow=2.37 cfs 0.355 af Outflow=2.37 cfs 0.355 af
		Outilow-2.57 CIS 0.555 at
Reach 4P: Prop. to North Wetla	and (DCP4)	Inflow=2.05 cfs 0.270 af
·	,	Outflow=2.05 cfs 0.270 af
Pond 7P: MH	Dook Floy-90 6	7' Inflow=4.35 cfs 0.310 af
	15.0" Round Culvert n=0.011 L=60.0' S=0.0100 '/'	
	, , , , , , , , , , , , , , , , , , , ,	
Pond 9P: CB 4		6' Inflow=2.43 cfs 0.174 af
	12.0" Round Culvert n=0.011 L=22.0' S=0.0100 '/'	Outflow=2.43 cfs 0.174 af
Pond 10P: MH	Peak Flev=89 14	' Inflow=10.54 cfs 0.751 af
	8.0" Round Culvert n=0.011 L=95.0' S=0.0142 '/'	
Pond 12P: MH	Peak Elev=91.3 5.0" Round Culvert n=0.011 L=240.0' S=0.0075 '/'	0' Inflow=6.20 cfs 0.440 af
'	3.0 Rodina Culvert 11–0.011 L-240.0 3–0.00737	Outilow-0.20 cis 0.440 ai
Pond 13P: CB6		1' Inflow=2.93 cfs 0.209 af
	12.0" Round Culvert n=0.011 L=62.0' S=0.0089 '/'	Outflow=2.93 cfs 0.209 af
Pond MH1: MH	Peak Flev=88.6	5' Inflow=2.27 cfs 0.166 af
	12.0" Round Culvert n=0.011 L=40.0' S=0.0050 '/'	
Pond MH2: CB 3	Peak Elev=89.9.12.0" Round Culvert n=0.011 L=22.0' S=0.0100 '/'	2' Inflow=1.92 cfs 0.136 af
	12.0 Round Culvert n=0.011 L=22.0 S=0.0100 /	Outliow=1.92 cis 0.136 ai
Pond MH3: CB5	Peak Elev=92.0	7' Inflow=3.27 cfs 0.232 af
	12.0" Round Culvert n=0.011 L=65.0' S=0.0085 '/'	Outflow=3.27 cfs 0.232 af
Pond P1: POND SC 310	Peak Elev=88.56' Storage=1,440	of Inflow=2.27 ofc 0.166 of
	reak Elev-00.00 Storage-1,440 or arded=0.23 cfs	
Pond P2: POND 2 SC 740	Peak Elev=88.44' Storage=8,741 cf	
Disca	arded=0.78 cfs 0.565 af Primary=2.66 cfs 0.186 af	Outflow=3.44 cfs 0.751 af
Pond R1: Pond1 Outlet - 12" R	CP Peak Elev=86.9	8' Inflow=0.88 cfs 0.035 af
	12.0" Round Culvert n=0.011 L=25.0' S=0.0120 '/'	
		01 1 11 0 00 1 0 100 1
Pond R4: Pond 2 Outlet - 12" F	RCP Peak Elev=85.9' 12.0" Pound Culvort n=0.011 L=25.0' S=0.0143.'/'	9' Inflow=2.66 cfs 0.186 af

12.0" Round Culvert n=0.011 L=35.0' S=0.0143 '/' Outflow=2.66 cfs 0.186 af

Type III 24-hr 100 Year Event Rainfall=7.00"

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Ling Year Event Outflow Imported from 1 house with inf. 1550~Reach 2R.hce x 6.00 Inflow=0.24 cfs 0.016 af Area= 0.036 ac 100.00% Imperv. Primary=1.42 cfs 0.096 af

Link 2L: 1 100 Year Event Outflow Imported from 1 house w inf. 1200~Reach 2R.hce Inflow=0.19 cfs 0.011 af Area= 0.028 ac 100.00% Imperv. Primary=0.19 cfs 0.011 af

Link Year Event Outflow Imported from 1 house with inf. 1550~Reach 2R.hce x 10.00 Inflow=0.24 cfs 0.016 af Area= 0.036 ac 100.00% Imperv. Primary=2.36 cfs 0.159 af

Link100 Year Event Outflow Imported from 1 house w inf. 1200~Reach 2R.hce x 2.00 Inflow=0.19 cfs 0.011 af
Area= 0.028 ac 100.00% Imperv. Primary=0.37 cfs 0.023 af

Total Runoff Area = 19.348 ac Runoff Volume = 7.503 af Average Runoff Depth = 4.65" 70.29% Pervious = 13.600 ac 29.71% Impervious = 5.748 ac

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# Summary for Subcatchment 1S: Prop. to Steam

10.73 cfs @ 12.51 hrs, Volume= 1.538 af, Depth= 5.03" Runoff

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 100 Year Event Rainfall=7.00"

	Α	rea (sf)	CN E	escription						
*		48,878	98 V	98 Water Surface Wetlands, HSG C						
		77,137		,						
*		4,305		alls othe r		·				
		1,100	87 E	)irt roads, l	HSG C					
		18,844	70 V	Voods, Go	od, HSG C					
*		2,457	98 E	xisit,. Roo	f					
*		5,683	98 E	xisit. Pave	ement					
*		1,485	74 F	Prop. Patios	S					
	1	59,889	83 V	Veighted A	verage					
		98,566		•	vious Area					
		61,323	3	8.35% Imp	ervious Ar	ea				
				•						
	Tc	Length	Slope	Velocity	Capacity	Description				
	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)					
	28.3	50	0.0100	0.03		Sheet Flow,				
						Woods: Dense underbrush n= 0.800 P2= 3.20"				
	1.7	50	0.0100	0.50		Shallow Concentrated Flow,				
						Woodland Kv= 5.0 fps				
	0.7	30	0.0100	0.70		Shallow Concentrated Flow,				
						Short Grass Pasture Kv= 7.0 fps				
	3.7	110	0.0100	0.50		Shallow Concentrated Flow, shallow				
						Woodland Kv= 5.0 fps				
	3.9	790	0.0100	3.35	20.11	Channel Flow, Stream				
						Area= 6.0 sf Perim= 7.0' r= 0.86'				
_						n= 0.040 Earth, cobble bottom, clean sides				
	38.3	1,030	Total							

### Summary for Subcatchment 3S: Prop to CB #3

Runoff 1.92 cfs @ 12.07 hrs, Volume= 0.136 af, Depth= 5.37"

 Area (sf)	CN	Description			
 6,841	98	Paved parking, HSG C			
 6,421	74	>75% Grass cover, Good, HSG C			
 13,262	86	Weighted Average			
6,421		48.42% Pervious Area			
6,841		51.58% Impervious Area			

Type III 24-hr 100 Year Event Rainfall=7.00"

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Tc	Length	Slope	Velocity	Capacity	Description
 (min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
5.0					Direct Entry, DIRECT

# Summary for Subcatchment 4S: Prop to CB#4

Runoff = 2.43 cfs @ 12.07 hrs, Volume= 0.174 af, Depth= 5.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 100 Year Event Rainfall=7.00"

	Area (sf	) CN	Description	Description				
*	1,652	2 98	Paved park	ing, HSG C	C-Sidewalk			
	7,912	2 98	Paved park	ing, HSG (				
	6,70	6 74	>75% Gras	s cover, Go	ood, HSG C			
	16,270	0 88	Weighted A	verage				
	6,70	6	41.22% Per	rvious Area	a			
	9,56	4	58.78% lm	pervious Ar	rea			
	Tc Leng		,	Capacity	Description			
(m	in) (fee	et) (ft/	ft) (ft/sec)	(cfs)				
;	5.0				Direct Entry, DIRECT			

# Summary for Subcatchment 5S: Prop. to CB # 5

Runoff = 3.27 cfs @ 12.07 hrs, Volume= 0.232 af, Depth= 5.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 100 Year Event Rainfall=7.00"

	Area (sf)	CN	Description				
*	466	98	Paved park	ing, HSG C	C - Sidewalk		
*	10,390	98	Paved park	ing, HSG C	C - rroad-drives		
	11,712	74	>75% Gras	s cover, Go	ood, HSG C		
	22,568	86	Weighted A				
	11,712		51.90% Pe				
	10,856		48.10% lm	pervious Ar	rea		
	<b>-</b>	01		0 "			
	Tc Length	Slop	,	Capacity	Description		
<u>(n</u>	nin) (feet)	(ft/f	t) (ft/sec)	(cfs)			
	5.0				Direct Entry,		

# Summary for Subcatchment 6S: Prop. to CB # 6

Runoff = 2.93 cfs @ 12.07 hrs, Volume= 0.209 af, Depth= 5.48"

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	Area (sf)	CN	Description		
*	959	98	Paved park	ing, HSG C	C - Sidewalk
*	9,836	98	Paved park	ing, HSG C	C - rroad-drives
	9,122	74	>75% Gras	s cover, Go	ood, HSG C
	19,917	87	Weighted A	verage	
	9,122		45.80% Pei	vious Area	a
	10,795		54.20% Imp	ervious Ar	rea
	Tc Length	Slop	,	Capacity	Description
(m	in) (feet)	(ft/ft	t) (ft/sec)	(cfs)	
į	5.0				Direct Entry,

# Summary for Subcatchment 7S: Prop. to Pond 1

Runoff = 2.27 cfs @ 12.07 hrs, Volume=

0.166 af, Depth= 5.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 100 Year Event Rainfall=7.00"

Area (sf)	CN	Description					
10,533	98		Paved parking, HSG C				
4,098	74	>75% Gras	>75% Grass cover, Good, HSG C				
14,631 4,098 10,533	91	Weighted A 28.01% Per 71.99% Imp	vious Area				
Tc Length (min) (feet)	Slop (ft/	,	Capacity (cfs)	•			
5.0				Direct Entry, DIRECT			

# Summary for Subcatchment 8S: Prop. to East Wetland

Runoff = 7.63 cfs @ 12.50 hrs, Volume=

1.061 af, Depth= 4.37"

	Area (sf)	CN	Description
*	25,672	98	Water Surface Wetlands, HSG C
	40,951	74	>75% Grass cover, Good, HSG C
	58,938	70	Woods, Good, HSG C
*	1,155	74	Patio
*	377	98	ret wall
	127,093	77	Weighted Average
	101,044		79.50% Pervious Area
	26,049		20.50% Impervious Area

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_	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
	28.3	50	0.0100	0.03		Sheet Flow,
						Woods: Dense underbrush n= 0.800 P2= 3.20"
	8.7	320	0.0150	0.61		Shallow Concentrated Flow, shallow
						Woodland Kv= 5.0 fps
	37.0	370	Total			

# Summary for Subcatchment 9S: Prop. to North Wetland

Runoff = 2.05 cfs @ 12.47 hrs, Volume= 0.270 af, Depth= 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 100 Year Event Rainfall=7.00"

	Α	rea (sf)	CN	Description		
*		906	98	Water Surf	ace Wetlan	ds, HSG C
		2,744	98	Paved park	ing, HSG C	
		16,242	74	>75% Ġras	s cover, Go	ood, HSG C
		1,286	98	Roofs, HSC	G C - infiltra	ted
*		283	98	walls othe r	imp.	
		11,662	70	Woods, Go	od, HSG C	
		33,123	76	Weighted A	verage	
	27,904 84.24% Pervious Area					
	5,219 15.76% Impervious Area					ea
	Тс	Length	Slope	<ul><li>Velocity</li></ul>	Capacity	Description
(n	nin)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
2	28.3	50	0.0100	0.03		Sheet Flow, Sheet
						Woods: Dense underbrush n= 0.800 P2= 3.20"
	4.8	430	0.0100	1.50		Shallow Concentrated Flow, shallow
						Grassed Waterway Kv= 15.0 fps
3	33.1	480	Total			

### Summary for Subcatchment 10S: Prop. to Street

Runoff = 0.09 cfs @ 12.07 hrs, Volume= 0.007 af, Depth= 6.29"

Area (sf)	CN	Description
492	98	Paved parking, HSG C
100	74	>75% Grass cover, Good, HSG C
592	94	Weighted Average
100		16.89% Pervious Area
492		83.11% Impervious Area

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- F O					Dine of Frates	
(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)		
Tc	Length	Slope	Velocity	Capacity	Description	

5.0 **Direct Entry, DIRECT** 

# **Summary for Subcatchment E1: Exist. to Stream**

Runoff = 14.37 cfs @ 12.56 hrs, Volume= 2.133 af, Depth= 4.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 100 Year Event Rainfall=7.00"

	Α	rea (sf)	CN	Description		
*		48,977	98	Water Surfa	ace Wetlan	ds, HSG C
		11,952	98	Paved park	ing, HSG C	
		34,335	74	>75% Gras	s cover, Go	ood, HSG C
		2,457	98	Roofs, HSC	G C	
*		4,820	98	walls othe r	imp.	
		8,801	87	Dirt roads,	HSG C	
	1	31,819	70	Woods, Go	od, HSG C	
	2	43,161	79	Weighted A	verage	
	174,955 71.95% Pervious Area 68,206 28.05% Impervious Area			71.95% Pei	rvious Area	
				28.05% lmp	pervious Are	ea
	Тс	Length	Slope	<ul><li>Velocity</li></ul>	Capacity	Description
(	min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	28.3	50	0.0100	0.03		Sheet Flow, Sheet
						Woods: Dense underbrush n= 0.800 P2= 3.20"
	13.7	410	0.0100	0.50		Shallow Concentrated Flow, shallow - woods
						Woodland Kv= 5.0 fps
	42 0	460	Total			

# Summary for Subcatchment E2: Exist. To East Weltands

Runoff = 8.70 cfs @ 12.50 hrs, Volume= 1.210 af, Depth= 4.26"

	Area (sf)	CN	Description
*	25,672	98	Water Surface Wetlands, HSG C
	5,792	98	Paved parking, HSG C
	9,907	74	>75% Grass cover, Good, HSG C
*	217	98	walls othe rimp.
	107,002	70	Woods, Good, HSG C
	148,590	76	Weighted Average
	116,909		78.68% Pervious Area
	31,681		21.32% Impervious Area

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	Tc	Length	Slope	Velocity	Capacity	Description
_	(min)	(feet)	(ft/ft)	(ft/sec)	(cfs)	
	28.3	50	0.0100	0.03		Sheet Flow, Sheet
						Woods: Dense underbrush n= 0.800 P2= 3.20"
	8.7	320	0.0150	0.61		Shallow Concentrated Flow, shallow - woods
						Woodland Kv= 5.0 fps
	37.0	370	Total			

# Summary for Subcatchment E3: Exist. To Street

Runoff = 0.17 cfs @ 12.07 hrs, Volume= 0.012 af, Depth= 5.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Type III 24-hr 100 Year Event Rainfall=7.00"

A	rea (sf)	CN	Description					
	473	98	Paved parking, HSG C					
	798	74	4 >75% Grass cover, Good, HSG C					
	1,271	83	Weighted A	verage				
	798		62.79% Pervious Area					
	473		37.21% lmp	ervious Ar	ea			
Tc (min)	Length (feet)	Slope (ft/ft	,	Capacity (cfs)	Description			
5.0					Direct Entry,			

### Summary for Subcatchment E4: Exist. to Wetlands North

Runoff = 2.37 cfs @ 12.59 hrs, Volume= 0.355 af, Depth= 4.37"

	Area (sf)	CN	Description
*	907	98	Water Surface Wetlands, HSG C
	5,644	98	Paved parking, HSG C
	12,783	74	>75% Grass cover, Good, HSG C
*	520	98	walls othe rimp.
	21,313	70	Woods, Good, HSG C
	1,286	98	Roofs, HSG C
	42,453	77	Weighted Average
	34,096		80.31% Pervious Area
	8,357		19.69% Impervious Area

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	Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
Ī	28.3	50	0.0100	0.03		Sheet Flow, Sheet
	14.3	430	0.0100	0.50		Woods: Dense underbrush n= 0.800 P2= 3.20"  Shallow Concentrated Flow, shallow - woods
-	42.6	480	Total			Woodland Kv= 5.0 fps

# **Summary for Reach 1E: Exist. to Stream (DCP1)**

Inflow Area = 5.582 ac, 28.05% Impervious, Inflow Depth = 4.58" for 100 Year Event event

Inflow = 14.37 cfs @ 12.56 hrs, Volume= 2.133 af

Outflow = 14.37 cfs @ 12.56 hrs, Volume= 2.133 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

### **Summary for Reach 1P: Prop. to Stream (DCP1)**

Inflow Area = 5.387 ac, 43.52% Impervious, Inflow Depth = 4.25" for 100 Year Event event

Inflow = 13.86 cfs @ 12.47 hrs, Volume= 1.906 af

Outflow = 13.86 cfs @ 12.47 hrs, Volume= 1.906 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

# **Summary for Reach 2E: Exist East Wetland (DCP2)**

Inflow Area = 3.411 ac, 21.32% Impervious, Inflow Depth = 4.26" for 100 Year Event event

Inflow = 8.70 cfs @ 12.50 hrs, Volume= 1.210 af

Outflow = 8.70 cfs @ 12.50 hrs, Volume= 1.210 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

# Summary for Reach 2P: Prop. to East Wetland (DCP2)

Inflow Area = 3.317 ac, 27.22% Impervious, Inflow Depth = 4.35" for 100 Year Event event

Inflow = 8.59 cfs @ 12.46 hrs, Volume= 1.203 af

Outflow = 8.59 cfs @ 12.46 hrs, Volume= 1.203 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

# **Summary for Reach 3E: Exist To Street (DCP3)**

Inflow Area = 0.029 ac, 37.21% Impervious, Inflow Depth = 5.03" for 100 Year Event event

Inflow = 0.17 cfs @ 12.07 hrs, Volume= 0.012 af

Outflow = 0.17 cfs @ 12.07 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

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# Summary for Reach 3P: Prop. To Street (DCP3)

Inflow Area = 0.014 ac, 83.11% Impervious, Inflow Depth = 6.29" for 100 Year Event event

Inflow = 0.09 cfs @ 12.07 hrs, Volume= 0.007 af

Outflow = 0.09 cfs @ 12.07 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

### Summary for Reach 4E: Exist North Wetland (DCP4)

Inflow Area = 0.975 ac, 19.69% Impervious, Inflow Depth = 4.37" for 100 Year Event event

Inflow = 2.37 cfs @ 12.59 hrs, Volume= 0.355 af

Outflow = 2.37 cfs @ 12.59 hrs, Volume= 0.355 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

### Summary for Reach 4P: Prop. to North Wetland (DCP4)

Inflow Area = 0.760 ac, 15.76% Impervious, Inflow Depth = 4.26" for 100 Year Event event

Inflow = 2.05 cfs @ 12.47 hrs, Volume= 0.270 af

Outflow = 2.05 cfs @ 12.47 hrs, Volume= 0.270 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

# **Summary for Pond 7P: MH**

Inflow Area = 0.678 ac, 55.55% Impervious, Inflow Depth = 5.49" for 100 Year Event event

Inflow = 4.35 cfs @ 12.07 hrs, Volume= 0.310 af

Outflow = 4.35 cfs @ 12.07 hrs, Volume= 0.310 af, Atten= 0%, Lag= 0.0 min

Primary = 4.35 cfs @ 12.07 hrs, Volume= 0.310 af

Routing by Dyn-Stor-Ind method. Time Span= 0.00-35.00 hrs. dt= 0.01 hrs

Peak Elev= 89.67' @ 12.08 hrs

 Device
 Routing
 Invert
 Outlet Devices

 #1
 Primary
 87.45'
 15.0" Round Culvert L= 60.0' Ke= 0.500 Inlet / Outlet Invert= 87.45' / 86.85' S= 0.0100 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=4.23 cfs @ 12.07 hrs HW=89.64' TW=89.13' (Dynamic Tailwater)
—1=Culvert (Inlet Controls 4.23 cfs @ 3.45 fps)

# **Summary for Pond 9P: CB 4**

Inflow Area = 0.374 ac, 58.78% Impervious, Inflow Depth = 5.59" for 100 Year Event event

Inflow = 2.43 cfs @ 12.07 hrs, Volume= 0.174 af

Outflow = 2.43 cfs @ 12.07 hrs, Volume= 0.174 af, Atten= 0%, Lag= 0.0 min

Primary = 2.43 cfs @ 12.07 hrs, Volume= 0.174 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Type III 24-hr 100 Year Event Rainfall=7.00"

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Peak Elev= 90.06' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.67'	<b>12.0" Round Culvert</b> L= 22.0' Ke= 0.500
			Inlet / Outlet Invert= 87.67' / 87.45' S= 0.0100 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.13 cfs @ 12.07 hrs HW=89.96' TW=89.64' (Dynamic Tailwater) 1=Culvert (Inlet Controls 2.13 cfs @ 2.71 fps)

### **Summary for Pond 10P: MH**

Inflow Area = 1.653 ac, 52.84% Impervious, Inflow Depth = 5.45" for 100 Year Event event

Inflow = 10.54 cfs @ 12.07 hrs, Volume= 0.751 af

Outflow = 10.54 cfs @ 12.07 hrs, Volume= 0.751 af, Atten= 0%, Lag= 0.0 min

Primary = 10.54 cfs @ 12.07 hrs, Volume= 0.751 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 89.14' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices	
#1 Primary		86.85'	<b>18.0" Round Culvert</b> L= 95.0' Ke= 0.500 Inlet / Outlet Invert= 86.85' / 85.50' S= 0.0142 '/' Cc= 0.900	
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf	

Primary OutFlow Max=10.53 cfs @ 12.07 hrs HW=89.13' TW=87.05' (Dynamic Tailwater) 1=Culvert (Inlet Controls 10.53 cfs @ 5.96 fps)

# **Summary for Pond 12P: MH**

Inflow Area = 0.975 ac, 50.96% Impervious, Inflow Depth = 5.42" for 100 Year Event event

Inflow = 6.20 cfs @ 12.07 hrs, Volume= 0.440 af

Outflow = 6.20 cfs @ 12.07 hrs, Volume= 0.440 af, Atten= 0%, Lag= 0.0 min

Primary = 6.20 cfs @ 12.07 hrs, Volume= 0.440 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 91.30' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	88.65'	<b>15.0" Round Culvert</b> L= 240.0' Ke= 0.500
			Inlet / Outlet Invert= 88.65' / 86.85' S= 0.0075 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.23 sf

Primary OutFlow Max=6.15 cfs @ 12.07 hrs HW=91.28' TW=89.13' (Dynamic Tailwater) 1=Culvert (Outlet Controls 6.15 cfs @ 5.01 fps)

Type III 24-hr 100 Year Event Rainfall=7.00"

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# **Summary for Pond 13P: CB6**

Inflow Area = 0.457 ac, 54.20% Impervious, Inflow Depth = 5.48" for 100 Year Event event

Inflow = 2.93 cfs @ 12.07 hrs, Volume= 0.209 af

Outflow = 2.93 cfs @ 12.07 hrs, Volume= 0.209 af, Atten= 0%, Lag= 0.0 min

Primary = 2.93 cfs @ 12.07 hrs, Volume= 0.209 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 91.91' @ 12.08 hrs

 Device
 Routing
 Invert
 Outlet Devices

 #1
 Primary
 89.20'
 12.0" Round Culvert L= 62.0' Ke= 0.500 Inlet / Outlet Invert= 89.20' / 88.65' S= 0.0089 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.62 cfs @ 12.07 hrs HW=91.78' TW=91.28' (Dynamic Tailwater) 1=Culvert (Outlet Controls 2.62 cfs @ 3.34 fps)

### **Summary for Pond MH1: MH**

Inflow Area = 0.336 ac, 71.99% Impervious, Inflow Depth = 5.94" for 100 Year Event event

Inflow = 2.27 cfs @ 12.07 hrs, Volume= 0.166 af

Outflow = 2.27 cfs @ 12.07 hrs, Volume= 0.166 af, Atten= 0%, Lag= 0.0 min

Primary = 2.27 cfs @ 12.07 hrs, Volume= 0.166 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 88.65' @ 12.19 hrs

Flood Elev= 89.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	87.00'	<b>12.0" Round Culvert</b> L= 40.0' Ke= 0.500
			Inlet / Outlet Invert= 87.00' / 86.80' S= 0.0050 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.01 cfs @ 12.07 hrs HW=88.25' TW=87.97' (Dynamic Tailwater) 1=Culvert (Inlet Controls 2.01 cfs @ 2.56 fps)

# **Summary for Pond MH2: CB 3**

Inflow Area = 0.304 ac, 51.58% Impervious, Inflow Depth = 5.37" for 100 Year Event event

Inflow = 1.92 cfs @ 12.07 hrs, Volume= 0.136 af

Outflow = 1.92 cfs @ 12.07 hrs, Volume= 0.136 af, Atten= 0%, Lag= 0.0 min

Primary = 1.92 cfs @ 12.07 hrs, Volume= 0.136 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 89.92' @ 12.09 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	87.67'	<b>12.0" Round Culvert</b> L= 22.0' Ke= 0.500
	-		Inlet / Outlet Invert= 87.67' / 87.45' S= 0.0100 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

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Primary OutFlow Max=1.54 cfs @ 12.07 hrs HW=89.81' TW=89.64' (Dynamic Tailwater) 1=Culvert (Inlet Controls 1.54 cfs @ 1.96 fps)

### **Summary for Pond MH3: CB5**

Inflow Area = 0.518 ac, 48.10% Impervious, Inflow Depth = 5.37" for 100 Year Event event

Inflow = 3.27 cfs @ 12.07 hrs, Volume= 0.232 af

Outflow = 3.27 cfs @ 12.07 hrs, Volume= 0.232 af, Atten= 0%, Lag= 0.0 min

Primary = 3.27 cfs @ 12.07 hrs, Volume= 0.232 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 92.07' @ 12.08 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	89.20'	<b>12.0" Round Culvert</b> L= 65.0' Ke= 0.500
			Inlet / Outlet Invert= 89.20' / 88.65' S= 0.0085 '/' Cc= 0.900
			n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=3.01 cfs @ 12.07 hrs HW=91.95' TW=91.28' (Dynamic Tailwater) 1=Culvert (Outlet Controls 3.01 cfs @ 3.83 fps)

### **Summary for Pond P1: POND SC 310**

Inflow Area =	0.336 ac, 71.99% Impervious, Inflow Depth = 5.94" for 100 Year Event event
Inflow =	2.27 cfs @ 12.07 hrs, Volume= 0.166 af
Outflow =	1.11 cfs @ 12.20 hrs, Volume= 0.166 af, Atten= 51%, Lag= 7.9 min
Discarded =	0.23 cfs @ 11.61 hrs, Volume= 0.132 af
Primary =	0.88 cfs @ 12.20 hrs, Volume= 0.035 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 88.56' @ 12.20 hrs Surf.Area= 1,230 sf Storage= 1,440 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 19.9 min (795.4 - 775.5)

Volume	Invert	Avail.Stora	age	Storage Descript	ion		
#1	86.50'	849	cf	<b>Custom Stage D</b>	ata (Irregular) Lis	ted below (Recalc)	
				2,829 cf Overall -	708 cf Embedde	$d = 2,121 \text{ cf } \times 40.0^{\circ}$	% Voids
#2	87.00'	708	3 cf		n SC-310 +Cap 🗴		
						> 2.07  sf x  7.12'L =	
						.56'L with 0.44' Ove	rlap
-				48 Chambers in 4	4 Rows		
		1,556	cf	Total Available S	torage		
Flavotion	Curf /	۱roo Do	rina	Ina Ctora	Cum Store	Mot Araa	
Elevation	Surf.A		rim.	Inc.Store	Cum.Store	Wet.Area	
(feet)	(s	q-ft) (f	eet)	(cubic-feet)	(cubic-feet)	(sq-ft)	
86.50	1,	,230 20	0.80	0	0	1,230	
88.80	1,	,230 20	0.80	2,829	2,829	1,697	

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Device	Routing	Invert	Outlet Devices		
#1	Primary	87.70'	6.0" Horiz. Orifice/Grate	C= 0.600	Limited to weir flow at low heads
#2	Discarded	86.50'	0.23 cfs Exfiltration when	above 86.	50'

**Discarded OutFlow** Max=0.23 cfs @ 11.61 hrs HW=86.53' (Free Discharge) **2=Exfiltration** (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=0.88 cfs @ 12.20 hrs HW=88.56' TW=86.98' (Dynamic Tailwater) 1=Orifice/Grate (Orifice Controls 0.88 cfs @ 4.47 fps)

#### **Summary for Pond P2: POND 2 SC 740**

Inflow Area = 1.653 ac, 52.84% Impervious, Inflow Depth = 5.45" for 100 Year Event event 10.54 cfs @ 12.07 hrs, Volume= 0.751 af

Outflow = 3.44 cfs @ 12.35 hrs, Volume= 0.751 af, Atten= 67%, Lag= 16.8 min

Discarded = 0.78 cfs @ 11.44 hrs, Volume= 0.565 af

Primary = 2.66 cfs @ 12.35 hrs, Volume= 0.186 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs Peak Elev= 88.44' @ 12.35 hrs Surf.Area= 4,088 sf Storage= 8,741 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow) Center-of-Mass det. time= 38.2 min ( 827.4 - 789.2 )

Volume	Invert	Avai	l.Storage	Storage Description	า	
#1	85.00'		3,647 cf	<b>Custom Stage Dat</b>	a (Irregular) Listed	d below (Recalc)
				•	•	ed = 9,117  cf  x 40.0%  Voids
#2	85.50'		5,191 cf	ADS_StormTech S		
				Effective Size= 44.0	6"W x 30.0"H => 6	6.45 sf x 7.12'L = 45.9 cf
				Overall Size= 51.0"	W x 30.0"H x 7.56	6'L with 0.44' Overlap
				113 Chambers in 1	2 Rows	·
			8,838 cf	Total Available Stor	rage	
Elevation	on Su	rf.Area	Perim.	Inc.Store	Cum.Store	Wet.Area
(fee		(sq-ft)	(feet)	(cubic-feet)	(cubic-feet)	(sq-ft)
85.0	00	4,088	320.0	0	0	4,088
88.5	50	4,088	320.0	14,308	14,308	5,208
Dovice	Douting	lm	cont Outl	at Davisas		
Device	Routing			et Devices		
#1	Primary	86	.50' <b>9.0''</b>	Vert. Orifice/Grate	C= 0.600	
#2	Discarded	85	.00' <b>0.78</b>	cfs Exfiltration who	en above 85.00'	

**Discarded OutFlow** Max=0.78 cfs @ 11.44 hrs HW=85.04' (Free Discharge) **2=Exfiltration** (Exfiltration Controls 0.78 cfs)

Primary OutFlow Max=2.66 cfs @ 12.35 hrs HW=88.44' TW=85.99' (Dynamic Tailwater) 1=Orifice/Grate (Orifice Controls 2.66 cfs @ 6.02 fps)

Type III 24-hr 100 Year Event Rainfall=7.00"

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# Summary for Pond R1: Pond1 Outlet - 12" RCP

Inflow Area = 0.336 ac, 71.99% Impervious, Inflow Depth = 1.24" for 100 Year Event event

Inflow = 0.88 cfs @ 12.20 hrs, Volume= 0.035 af

Outflow = 0.88 cfs @ 12.20 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

Primary = 0.88 cfs @ 12.20 hrs, Volume= 0.035 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 86.98' @ 12.20 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	86.50'	<b>12.0"</b> Round Culvert L= 25.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 86.50' / 86.20' S= 0.0120 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.88 cfs @ 12.20 hrs HW=86.98' TW=0.00' (Dynamic Tailwater) 1=Culvert (Barrel Controls 0.88 cfs @ 3.45 fps)

### Summary for Pond R4: Pond 2 Outlet - 12" RCP

Inflow Area = 1.653 ac, 52.84% Impervious, Inflow Depth = 1.35" for 100 Year Event event

Inflow = 2.66 cfs @ 12.35 hrs, Volume= 0.186 af

Outflow = 2.66 cfs @ 12.35 hrs, Volume= 0.186 af, Atten= 0%, Lag= 0.0 min

Primary = 2.66 cfs @ 12.35 hrs, Volume= 0.186 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

Peak Elev= 85.99' @ 12.35 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	85.00'	<b>12.0" Round Culvert</b> L= 35.0' Ke= 0.500 Inlet / Outlet Invert= 85.00' / 84.50' S= 0.0143 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.66 cfs @ 12.35 hrs HW=85.99' TW=0.00' (Dynamic Tailwater) 1=Culvert (Inlet Controls 2.66 cfs @ 3.39 fps)

# Summary for Link 1L: 6- 1550 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 5.38" for 100 Year Event event

Inflow = 0.24 cfs @ 12.10 hrs, Volume= 0.016 af

Primary = 1.42 cfs @ 12.10 hrs, Volume= 0.096 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 6.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

100 Year Event Outflow Imported from 1 house with inf. 1550~Reach 2R.hce

Type III 24-hr 100 Year Event Rainfall=7.00"

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# Summary for Link 2L: 1 - 1200 House

Inflow Area = 0.028 ac,100.00% Impervious, Inflow Depth = 4.99" for 100 Year Event event

Inflow = 0.19 cfs @ 12.09 hrs, Volume= 0.011 af

Primary = 0.19 cfs @ 12.09 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

100 Year Event Outflow Imported from 1 house w inf. 1200~Reach 2R.hce

### Summary for Link 3L: 10 - 1550 Houses

Inflow Area = 0.036 ac,100.00% Impervious, Inflow Depth = 5.38" for 100 Year Event event

Inflow = 0.24 cfs @ 12.10 hrs, Volume= 0.016 af

Primary = 2.36 cfs @ 12.10 hrs, Volume= 0.159 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 10.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

100 Year Event Outflow Imported from 1 house with inf. 1550~Reach 2R.hce

### Summary for Link 4L: 2 - 1200 House

Inflow Area = 0.028 ac,100.00% Impervious, Inflow Depth = 4.99" for 100 Year Event event

Inflow = 0.19 cfs @ 12.09 hrs, Volume= 0.011 af

Primary = 0.37 cfs @ 12.09 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow x 2.00, Time Span= 0.00-35.00 hrs, dt= 0.01 hrs

100 Year Event Outflow Imported from 1 house w inf. 1200~Reach 2R.hce

# **SECTION V**

PROJECT PLANS See Attached