HOWARD STEIN HUDSON
Engineers + Planners

SUPPLEMENTAL DATA REPORT

Sheldon West

1139 West Street and
20 Hancock Street

Wrentham, Massachusetts

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Existing Conditions

The subject site for the Sheldon West Development exists as the western portion of property located at 1139 West Street and 20 Hancock Street, Wrentham, MA. The subject site is considered a single lot in common ownership, however for the purposes of the Sheldon West Development, this report will focus on a new 20-acre lot that will be created from a portion of 1139 West Street and a portion of 20 Hancock Street. This new lot will utilize frontage from West Street.

The property is located in the R-87 Agricultural and Residential Zoning District. The parcel remains undeveloped as an open field with a large wetland system to the rear, as well as a perennial stream to the east.

The parcel contains a mixture of open grassed field, woodlands, and wetland. Throughout the field portion of the site, the topography is fairly flat, generally sloping from north to south. Where the site maintains frontage along West Street, the site climbs approximately 10' in elevation to the road from the field. The open grassed field represents approximately 7.5 acres of upland.

The existing parcel entirely drains to a single analysis point, the wetland system surrounding the south, east, and west sides of the property.

Soil conditions on site are characterized as mainly Sudbury fine sandy loam, Scarboro and Birdsall soils which have hydrologic soil groups of B and A/D, respectively. Soil testing has been performed and has confirmed these soil groups.

While the site has no active utility connections, electric and water connections are available via the West Street Right of Way.

Proposed Conditions

The Sheldon West Development proposes to construct 9 single family homes within a Senior Living Community. An exterior walking loop is being provided to add to the existing wooded trails that navigate through the wooded, natural areas.

The homes within the community have been designed as a cluster around a common open space, with the road looping around the exterior of the cluster. This allows the creation of an interior common open space including a walkway which interconnects to each unit, as well as green space available for use by residents.

The roadway has been designed at 22' wide, per the SLC design standards, and totals approximately 1,366 LF in length. The exterior of the road is proposed to be curbed, while the interior of the road is proposed as a 10' pervious parking shoulder. This will reduce the amount of runoff while also providing adequate parking for the community.

Electric, cable, and communications service as well as water service will be provided through the available connections within West Street. Sewer will be serviced through an on-site community septic system. The septic system is proposed to be located beneath the centralized green space within the loop.

The proposed stormwater management utilizes treatment best management practices (BMP's), grassed swales, as well as an infiltration basin on the east side of the entry drive. The main entry drive is proposed to be superelevated towards the east, where the stormwater will enter a curb cut, be treated, and flow to the infiltration basin. The loop will be superelevated towards the outside of the road, enter one of two grassed swales through several curb cuts. Each curb cut contains a treatment BMP prior to entering the swale. The swales will carry the stormwater to one of two outlets, where they will exit the swales and enter the infiltration basin.

Using these series of treatment BMP's, swales, and the infiltration basin, the stormwater management system is designed to capture, treat, and infiltrate stormwater as required by the Massachusetts Stormwater Standards, as well as the local Wrentham Board of Health Stormwater Regulations. See the hydrology section of this report for further detail and information.

Zoning

The proposed parcel will remain within the R-87 Agricultural and Residential Zoning District. Within this district, a Senior Living Community (SLC) is approvable via a Site Plan and Special Permit Application to the Planning Board. This section with demonstrate compliance with appropriate dimensional requirements and special permit criteria as it relates to Section 13.5 (Senior Living Community) of the Wrentham Zoning Bylaws.

Dimensional Requirements

While the parcel exists within the R-87 Agricultural and Residential Zoning District, the SLC Special Permit allows adjusted dimensional requirements from the R-87 Agricultural and Residential Zoning District.

1139 West Street, Wrentham, MA
R-87 Agricultural and Residential
Proposed Use: Senior Living Community

Dimensional Requirements (R-87 Agricultural and Residential) (SLC)	Required	Proposed
Lot Area (SLC)	871,200 SF (20 AC)	888,602 SF (20.4 AC)
Continuous Lot Frontage (SLC)	100’ min.	253’±
Minimum Front Yard (SLC)	30’ min.	308’±
Minimum Side Yard (SLC)	30’ min.	68’±
Minimum Rear Yard (SLC)	30’ min.	1,486’±
Maximum Building Coverage (SLC)	35% max.	2.6%
Minimum Open Space (SLC)	30% min.	39%
Maximum Stories (SLC)	2 max.	2
Maximum Building Height (SLC)	28’ max.	23’-8”
Maximum Density (SLC)	4 Units/AC	0.45 Units/AC
Minimum Distance Between (SLC)	15’	15’
Parking Requirements	**Required**	**Proposed**
Number of Parking Spaces	23 Spaces	18 Garage Spaces 26 Surface Spaces 44 Total Spaces

OPEN SPACE CALCULATION

Total Site Area = 888,602 SF
Total Wetland Area = 524,432 SF
Total Non-Usable Space = 80,533 SF
Required Open Space = (0.30) * 888,602 SF = 266,581 SF*
**Per the requirements of the SLC, not more than 25% of the required common open space may be wetland.'*
Allowable Wetland Area = (0.25) * 266,581 SF = 66,646 SF
Upland Open Space = 888,602 SF – (524,432 SF + 80,533 SF) = 283,637 SF
Total Open Space = 283,637 + 66,646 = 350,283 SF
Open Space % = 350,283 SF / 888,602 SF = 39%

Senior Living Community – Special Permit Criteria

Per Wrentham Bylaws Section 13.5.4 – Basic Requirements

A. A Senior Living Community Shall Comply with the following density regulations: 4 Units/Acre

   As shown within the Zoning Table, the Sheldon West project has an overall density of 0.45 Units/Acre.

B. Maximum building coverage shall not exceed thirty-five percent (35%) of the lot area for new construction or expansion of existing structures.

   The proposed building coverage on site totals 2.6%.

C. For single family, cottage dwellings, duplexes or triplex style dwellings, the minimum setback shall be thirty feet (30') from all property lines in the Residential Districts, unless the Planning Board determines that a reduced setback is necessary to achieve the purposes of this section and will not have a detrimental impact on the neighborhood.

   All units on site are proposed as single family. All proposed buildings remain at least thirty feet from all property lines.

D. No dwelling unit in a SLC shall have more than two bedrooms.

   No dwelling unit is proposed to have more than two (2) bedrooms.

E. The minimum distance between buildings in any SLC shall be fifteen feet (15').

The minimum distance between buildings proposed on site is more than 15', the lowest being 15.8'. Many of the buildings maintain approximately 20' or more of separation.

F. The minimum common open space in the development shall be thirty percent (30%) of the lot area and not more than twenty-five percent (25%) of the required minimum common open space shall consist of wetlands (as defined in MGL c.131, s40). The upland open space shall be contiguous and usable by residents of the development. A permanent Conversation Restriction running to or enforceable by the Town shall be recorded for the common open space area and shall include restrictions that the land be retained in perpetuity for conservation or passive recreation.

See Dimensional Requirements section for calculation of Common Open Space.

G. All SLC dwelling units shall be subject to an age restriction described in a deed, deed rider, restrictive covenant, or other document approved by the Planning Board that shall be recorded at the Registry of Deeds and/or Land Court. The age restriction shall limit occupancy of dwelling units to at least one individual age fifty-five (55) or over ad their spouse/partner and may provide for time-limited guest visitation rights of not more than one (1) month per year. The restriction, if the Planning Board so approved and specifies in the special permit, may authorize special exceptions that allow persons of all ages to live in a dwelling unit together with a senior resident for purposes such as care of a senior in ill health or enabling seniors to fulfill legal responsibilities of guardianship or custody. The special permit including age restriction shall run with the land in perpetuity and shall be enforceable by the Town and/or any owner(s) of the SLC dwelling units. In the event of the death of a qualifying owner or occupant(s) of a dwelling unit, or foreclosure or other involuntary transfer of a unit within the SLC, a one-year exemption to the restriction shall be allowed for the transfer of the unit to another eligible occupant.

This requirement is understood and agreeable to the applicant.

H. Minimum off-street parking requirements shall comply with Article 6.4, except as modified by the following standards:

   a. Single Family or Cottage style dwellings: two (2) spaces per unit

   b. Guest parking: one (1) space per two (2) units or three (3) beds, as applicable.

Per these requirements, the project is subject to the requirement of 23 parking spaces. The project proposes a total of 18 garage spaces and 26 surface spaces for a total of 44 proposed parking spaces on site.

I. All streets within a SLC shall be private, and all sewerage, drainage facilities and utilities shall be designed and constructed in compliance with the Town of Wrentham Subdivision Rules and Regulations, except as modified by the following standards:

   a. The minimum width of paved roadways shall be twenty-two feet (22').

   b. There shall be a five-foot (5') sidewalk installed along one side of the roadway.

The roadway within the proposed SLC is shown at 22' wide, with an additional 10' wide pervious paver shoulder and a 6' sidewalk along the exterior loop of the roadway with direct connection to the intersection of West Street.

J. A SLC may have one (1) free standing sign at each principal access to the development from a public way, indicating the name and/or street address of the SLC. Such sign shall not exceed twelve (12) square feet in area per side or four (4') feet in height. The provisions of Article 18 shall also apply to signage within the SLC.

Signage has not been proposed at this time. Proposed signage will be designed and addressed at a later date further along in the permitting process and will meet the requirements of the SLC.

K. A SLC shall have an amenity structure designed to allow for a variety of passive and active recreational activities that support the residents of the SLC. Such uses that may be considered are community program spaces, fitness/therapeutic space, educational, recreational and accessory space; areas for neighborhood meetings and event space; and any other amenities and opportunities that are intended to create and promote an integrated neighborhood type environment.

A community amenity space has been provided within the common green area on the interior of the proposed units. This space can be utilized for a number of different activities and includes an interconnected walking loop to each unit, as well an open green space to be utilized as desired by the residents. The project is also serviced by a 6' wide meandering sidewalk with benches placed intermittently at the outside of the project allowing a longer, uninterrupted loop at the edge of the wetland and forested areas for the use of the residents.

Per Wrentham Bylaws Section 13.5.8 – Development Standards

As part of the Planning Board's special permit review process, the Board shall evaluate the proposed Senior Living Community (SLC) for conformance to the following minimum design standards.

A. Architectural planning and design shall incorporate energy efficient design techniques, such as natural heating and cooling systems, use of sun and wind energy generation systems, and so forth.

The architectural design of the single-family homes of the development will incorporate solar panel ready roof design for future installation of solar panels by unit owners. Also, all habitable rooms will have operable double hung window to take advantage of natural cooling/ventilation at the unit owners' discretion. The building envelope will be high efficiency so that mechanical system design loads can be reduced and be more energy efficient. The mechanical heating and cooling systems will be high efficiency electric heat pump split systems in conjunction with electric high efficiency water heaters.

Also, exterior bollard style pedestrian lighting for the interior green space is a solar charged light fixture.

B. Structures located near the project property lines shall be designed and located in a manner that reflects consistency and compatibility with neighboring areas, and shall include appropriate use of building density, heights, and design to minimize intrusion on neighbors.

Though the structures are not near the property lines due to the nature of the development, the new homes being constructed could possibly be seen by adjacent abutting properties, so attention has been given to the design of the new homes as if they were close to the adjacent property lines. All the new homes are over 50' from adjacent property lines. The new homes being built are consistent with the existing neighborhood in building footprint as well as in building height. The design of the roof lines is consistent with the surrounding neighborhood incorporating a main gable roof, gable and shed dormers, asphalt shingle roofs, horizontal lap and shake siding and double hung windows. Options are provided to allow for diversity within the development and provide visual interest. Providing (3) garage door styles and (3) exterior siding color options also provide further design diversity within the development. Most importantly, the development is treating the new homes as having (2) front elevations – one front elevation facing the ring road and the adjacent abutters as well as one front elevation facing inward to the "village green". The architectural design will not detract from the current feel of the surrounding neighborhood as this development enhances, reflects and is consistent with the surrounding existing neighborhood.

C. Outdoor recreation or gathering areas, particularly those that may generate significant noise and/or light and glare, shall be located to minimize intrusion on neighboring properties.

The outdoor gathering area is located away from all property lines within the center of all the units, proposed as a "village green". All noise, light, or glare generated from this area will be shielded by the proposed structures. There is also a meandering perimeter sidewalk along the ring road of the development that allows for pedestrian walking without having to cross individual home driveways making for an uninterrupted walk within benches placed intermittently along the path. This increases the safety of pedestrians walking in and around the development. Lighting is provided along the ring road that are full cut off light fixtures so that there will not be any light spillage or glare onto adjacent abutting properties. These measures minimize any intrusion on neighboring properties.

D. Structures shall be clustered to reduce site disturbance and protect open spaces, natural and environmentally sensitive areas.

The proposed new homes are clustered around an internal "village green" common area to minimize site disturbance and protect open spaces on the site. The site plan and building placement respects natural land features and environmentally sensitive areas of the site.

E. Site design shall limit large grass areas and provide adequate access to shared amenities.

The site has been designed utilizing interior sidewalks within the formal greenspace and an exterior walking loop to interconnect and create universal accessibility to all areas on site. Large grass areas are avoided and the natural environment is celebrated by clustering the project and limiting the land disturbance to allow for existing natural areas to be preserved by this development.

F. Building design shall avoid use of long unbroken facades, and shall include use of balconies, offset wall, trellises and other design elements to provide visual interest.

The structures have been designed with several gables to break up long facades on both the exterior facing and interior faces of the structure. Patios and porches have also been incorporated into the design to provide visual interest to the exterior of the building.

G. Building design, colors and materials shall generally correspond to the natural setting of the project site and promote the appearance of the Town's New England character.

The buildings have been designed with the New England aesthetic in mind utilizing colors such as brown, blue, and gray with vinyl shake siding, and vinyl lap siding. The visual design also promotes the New England aesthetic by incorporating gables to the structure.

H. Walking trails shall be accessible to all abilities and installed throughout the project.

An exterior walking loop has been proposed to meander around the exterior of the site. This walking loop, as well as the interior sidewalks interconnecting the units, has been proposed to be paved and adhere to all current ADA requirements.

I. The development shall be served by public water.

This development will be served by public water, accessed from the West Street Right of Way.

Hydrology

Standard 1. No New Untreated Discharges

The Massachusetts Stormwater Handbook requires that the project demonstrates that no new stormwater conveyances (e.g. outfalls) discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

The proposed project will not discharge stormwater directly to, or cause erosion in, wetlands or water of the Commonwealth and will treat stormwater prior to discharge or infiltration.

The infiltration basin is adjacent to a wetland and has been proposed with an outlet weir to allow treated discharge to flow from the pond to the wetland. All outlets have been designed to incorporate rip rap to minimize or eliminate erosion to wetlands.

Storm Event	2-inch	2-year	10-year	50-year	100-year
P1 Peak Discharge (fps)	0.00	0.00	1.24	2.05	2.30

Standard 2. Post-development Peak Discharge Rates Not to Exceed Pre-development Peak Discharge Rates

Post-development peak discharge rates do not exceed the pre-development peak discharge rates and total runoff volumes for all storm events. The proposed condition reduces rates by collecting and controlling the stormwater runoff within the stormwater management system.

Storm Event	2-inch	2-year	10-year	50-year	100-year
Pre-development rates (cfs) AP1 *to Wetland System*	0.11	2.12	7.61	18.39	25.31
Volume (cf)	2,102	12,421	33,789	75,772	103,076
Post-development rates (cfs) AP1 *to Wetland System*	0.06	0.89	5.59	17.91	25.21
Volume (cf)	1,021	5,561	18,340	49,874	70,762
Rate reductions (cfs)	**-0.05**	**-1.23**	**-2.02**	**-0.48**	**-0.10**
Volume Reductions (cf)	**-1,081**	**-6,860**	**-15,449**	**-25,898**	**-32,314**

Standard 3. Minimize or Eliminate Loss of Annual Recharge to Groundwater

Groundwater recharge will be accomplished using the surface infiltration practices. As shown in the table summary for Standard 2, the project decreases the total volume and runoff for all storm events. All storms have a significant decrease over the existing condition for both volume and rate of runoff. This reduction in volume is generated by collecting and infiltrating all the impervious surfaces created on site.

RECHARGE VOLUME REQUIREMENT

- Rv = F x impervious area
- Rv = Required Recharge Volume, expressed in Ft3, cubic yards, or acre-feet
- F= Target Depth Factor associated with each Hydrologic Soil Group
- Impervious Area = pavement and rooftop area on site

RECHARGE VOLUME FOR THE ENTIRE SITE

Hydrologic Group Volume to Recharge (x Total Impervious Area)

A: 0.60 inches of runoff	No Impervious located within A Soils
B: 0.35 inches of runoff	0.35 in x (1 ft/12 in) x 86,097 sf = 2,511 cf
C: 0.25 inches of runoff	No C soils were found on site
D: 0.10 inches of runoff	No D soils were found on site

TOTAL SITE RECHARGE PROVIDED = 5,634 CF RECHARGE VOLUME (BELOW OUTLET WEIR) (P1) > 2,511 CF REQUIRED

100-YEAR DRAWDOWN WITHIN 72 HOURS

- Pond P1: 5,634 cf / [(8.27 in/hr)*(1 ft/12 in)*(8,187 sf)] = 1.0 hours < 72 hours, OK

10-YEAR DRAWDOWN WITHIN 24 HOURS

- Pond P1: 5,634 cf / [(8.27 in/hr)*(1 ft/12 in)*(8,187 sf)] = 1.0 hours < 24 hours, OK

Volumes and surface area for ponds acquired from HydroCAD stage storage tables. These tables are attached as an appendix at the end of the HydroCAD analysis.

Standard 4. Stormwater Management System to Remove 80% of the Average Annual Load of Total Suspended Solids (TSS)

The stormwater management system is designed to remove > 80% annual total suspended solids (TSS) from the proposed roadway, driveways, and sidewalks.

TSS REMOVAL CALCULATION

TREATMENT TRAIN #1 – RG1, RG3, RG4 TO INFILTRATION BASIN P1

Area of Impervious = 19,807 SF

- ACF Rain Guardian
  - 100% * 88% = 88% *Removed*
  - 100% - 88% = 12% *Remaining*

TSS Pretreatment Removal = 88% ≥ 44%

- ACF Rain Guardian
  - 100% * 88% = 88% *Removed*
  - 100% - 88% = 12% *Remaining*
- Infiltration Pond (with pretreatment):
  - 12% * 80% = 9% *Removed*
  - 12% - 9% = 3% *Remaining*

TSS Removal of the proposed drainage = 88% + 9% = 97%

TREATMENT TRAIN #2 – RG2, RG5, RG6, FH TO INFILTRATION BASIN P1

Area of Impervious = 46,669 SF

- ACF Rain Guardian
  - 100% * 79% = 79% *Removed*
  - 100% - 79% = 21% *Remaining*

TSS Pretreatment Removal = 79% ≥ 44%

- ACF Rain Guardian
  - 100% * 79% = 79% *Removed*
  - 100% - 79% = 21% *Remaining*
- Infiltration Pond (with pretreatment):
  - 21% * 80% = 16% *Removed*
  - 21% - 16% = 5% *Remaining*

TSS Removal of the proposed drainage = 79% + 16% = 95%

TREATMENT TRAIN #3 – UNTREATED SIDEWALKS

Area of Impervious = 8,822 SF

- No Treatment – 0%

WEIGHTED TSS REMOVAL CALCULATION

On-Site Impervious Area – 75,298
(Total analyzed impervious[86,097 SF] – off-site impervious [10,799 SF])

- Treatment Train # 1 – 19,807 SF
  Percentage of Site Impervious = 19,807 SF / 75,298 SF = 26.3%

Weighted TSS Removal = 97% x 26.3% = 25.5%

- Treatment Train # 2 – 46,669 SF
  Percentage of Site Impervious = 46,669 SF / 75,298 SF = 61.9%

Weighted TSS Removal = 95% x 61.9% = 58.8%

- Treatment Train # 3 – 8,822 SF
  Percentage of Site Impervious = 8,822 SF / 75,298 SF = 11.8%

Weighted TSS Removal = 0% x 11.8% = 0%

Total Sitewide TSS removal = 25.5% + 58.8% = 84.3% > 80% OK

WATER QUALITY VOLUME

For new development, stormwater management systems must be designed to remove 80% of the average annual load (post-development conditions) of Total Suspended Solids (TSS). It is presumed that this standard is met when:

a) Suitable nonstructural practices for source control and pollution prevention are implemented.
b) Stormwater management best management practices (BMPs) are sized to capture the prescribed runoff volume; and
c) Stormwater management BMPs are maintained as designed.

In order to achieve the rated TSS Removal Rates, each BMP must be sized adequately. This development proposes to use ACF Rain Guardian Turrets, ACF Rain Guardian Foxholes, as well as an infiltration basin. The ACF Rain Guardian Turrets and ACF Rain Guardian Foxholes are flow based devices, and the flow calculations can be found below.

ACF Rain Guardian Turret 1 (RG1):

ACF Rain Guardian Turret rated for 88% removal up to 0.25 cfs
ACF Rain Guardian Turret rated for 79% removal up to 0.50 cfs

Flow rate associated with ACF Rain Guardian Turret 1:
Q = (qu)*(A)*(WQV), where:
Q = Peak flow rate associated with first 1-inch of runoff
qu = the unit peak discharge, in csm/in (774 csm/in for Tc associated with 6 minutes)
A = impervious surface drainage area (in square miles) – 8,702 sf = 0.000312 square miles
WQV = water quality volume in watershed inches

Q = (774 csm/in)*(0.000312 square miles)*(1 inch)
Q = 0.24 CFS

Required Capacity = 0.24 CFS
ACF Turret 88% Removal Capacity = 0.25 CFS (See Appendix D for calculation)

0.25 CFS > 0.24 CFS, **OK 88% Removal**

ACF Rain Guardian Turret 2 (RG2):

ACF Rain Guardian Turret rated for 88% removal up to 0.25 cfs
ACF Rain Guardian Turret rated for 79% removal up to 0.50 cfs

Flow rate associated with ACF Rain Guardian Turret 2:
Q = (qu)*(A)*(WQV), where:
Q = Peak flow rate associated with first 1-inch of runoff
qu = the unit peak discharge, in csm/in (774 csm/in for Tc associated with 6 minutes)
A = impervious surface drainage area (in square miles) – 11,183 sf = 0.000401 square miles
WQV = water quality volume in watershed inches

Q = (774 csm/in)*(0.000401 square miles)*(1 inch)
Q = 0.31 CFS

Required Capacity = 0.31 CFS
ACF Turret 79% Removal Capacity = 0.50 CFS (See Appendix D for calculation)

0.50 CFS > 0.31 CFS, **OK 79% Removal**

ACF Rain Guardian Turret 3 (RG3):

ACF Rain Guardian Turret rated for 88% removal up to 0.25 cfs
ACF Rain Guardian Turret rated for 79% removal up to 0.50 cfs

Flow rate associated with ACF Rain Guardian Turret 3:
Q = (qu)*(A)*(WQV), where:
Q = Peak flow rate associated with first 1-inch of runoff
qu = the unit peak discharge, in csm/in (774 csm/in for Tc associated with 6 minutes)
A = impervious surface drainage area (in square miles) – 5,738 sf = 0.000206 square miles
WQV = water quality volume in watershed inches

Q = (774 csm/in)*(0.000206 square miles)*(1 inch)
Q = 0.16 CFS

Required Capacity = 0.16 CFS
ACF Turret 88% Removal Capacity = 0.25 CFS (See Appendix D for calculation)

0.25 CFS > 0.16 CFS, **OK 88% Removal**

ACF Rain Guardian Turret 4 (RG4):

ACF Rain Guardian Turret rated for 88% removal up to 0.25 cfs
ACF Rain Guardian Turret rated for 79% removal up to 0.50 cfs

Flow rate associated with ACF Rain Guardian Turret 4:
Q = (qu)*(A)*(WQV), where:
Q = Peak flow rate associated with first 1-inch of runoff
qu = the unit peak discharge, in csm/in (774 csm/in for Tc associated with 6 minutes)
A = impervious surface drainage area (in square miles) – 5,367 sf = 0.000193 square miles
WQV = water quality volume in watershed inches

Q = (774 csm/in)*(0.000193 square miles)*(1 inch)
Q = 0.15 CFS

Required Capacity = 0.15 CFS
ACF Turret 88% Removal Capacity = 0.25 CFS (See Appendix D for calculation)

0.25 CFS > 0.15 CFS, **OK 88% Removal**

ACF Rain Guardian Turret 5 (RG5):

ACF Rain Guardian Turret rated for 88% removal up to 0.25 cfs
ACF Rain Guardian Turret rated for 79% removal up to 0.50 cfs

Flow rate associated with ACF Rain Guardian Turret 5:
Q = (qu)*(A)*(WQV), where:
Q = Peak flow rate associated with first 1-inch of runoff
qu = the unit peak discharge, in csm/in (774 csm/in for Tc associated with 6 minutes)
A = impervious surface drainage area (in square miles) – 11,403 sf = 0.000409 square miles
WQV = water quality volume in watershed inches

Q = (774 csm/in)*(0.000409 square miles)*(1 inch)
Q = 0.32 CFS

Required Capacity = 0.32 CFS
ACF Turret 79% Removal Capacity = 0.50 CFS (See Appendix D for calculation)

0.50 CFS > 0.32 CFS, **OK 79% Removal**

ACF Rain Guardian Turret 6 (RG6):

ACF Rain Guardian Turret rated for 88% removal up to 0.25 cfs
ACF Rain Guardian Turret rated for 79% removal up to 0.50 cfs

Flow rate associated with ACF Rain Guardian Turret 6:
Q = (qu)*(A)*(WQV), where:
Q = Peak flow rate associated with first 1-inch of runoff
qu = the unit peak discharge, in csm/in (774 csm/in for Tc associated with 6 minutes)
A = impervious surface drainage area (in square miles) – 9,809 sf = 0.000352 square miles
WQV = water quality volume in watershed inches

Q = (774 csm/in)*(0.000352 square miles)*(1 inch)
Q = 0.27 CFS

Required Capacity = 0.27 CFS
ACF Turret 79% Removal Capacity = 0.50 CFS (See Appendix D for calculation)

0.50 CFS > 0.27 CFS, **OK 79% Removal**

ACF Rain Guardian Foxhole (FH):

ACF Rain Guardian Foxhole rated for 79% removal up to 0.50 cfs

Flow rate associated with ACF Rain Guardian Foxhole:

Q = (qu)*(A)*(WQV), where:

Q = Peak flow rate associated with first 1-inch of runoff

qu = the unit peak discharge, in csm/in (774 csm/in for Tc associated with 6 minutes)

A = impervious surface drainage area (in square miles) – 14,274 sf = 0.000512 square miles

WQV = water quality volume in watershed inches

Q = (774 csm/in)*(0.000512 square miles)*(1 inch)

Q = 0.40 CFS

Required Capacity = 0.40 CFS

ACF Turret 79% Removal Capacity = 0.50 CFS (See Appendix D for calculation)

0.50 CFS > 0.40 CFS, **OK 79% Removal**

Standard 5. Land Uses with Higher Potential Pollutant Loads

The development is not considered a land use that generally produces higher potential pollutant loads.

Standard 6. Stormwater Discharges to Critical Areas

The proposed stormwater system does not discharge to a critical area.

Standard 7. Redevelopment Projects

The project is not considered a redevelopment project.

Standard 8. Control Construction-related Impacts

The project will install erosion and sediment controls prior to any earthwork activity. Erosion control barriers will be placed down slope from the proposed construction to prevent erosion and sedimentation into the surrounding areas. The barriers will be maintained and inspected periodically during construction; sediment buildup will be removed, and any damaged barrier will be replaced as needed.

Standard 9. Long-Term Operation and Maintenance Plan

See **Appendix A** for the operation and maintenance requirements of the stormwater management system.

Standard 10. No Illicit Discharges

An illicit discharge compliance statement will be provided by the property owner under separate cover.

Appendix A – Operation and Maintenance Plan

Infiltration Basin

System Owner: Sheldon West, LLC, or future owner.
Estimated Annual Maintenance: $1,000
(Per DEP Stormwater Structural BMP's Vol 2)

In many cases, a landscaping contractor working elsewhere on the site can complete maintenance tasks. Inspect the basin and outlet structure to ensure no structural damage has occurred and that they are functioning properly and up to design standards.

Inspection and preventive maintenance is required at least twice per year, and after each major storm event. Note how long water remains standing in the basin after a storm. If water remains standing after 48 to 72 hours after a storm, the infiltration basin may be clogged.

At least twice per year, mow the buffer area, side slopes, and basin bottom. Remove grass clippings, accumulated organic matter, trash and debris at this time.

Remove sediment from the basin as necessary when the basin is dry. Use light equipment when removing the top layer, as to not compact the underlying soil. Use deep tilling to break and remove any clogged surfaces and revegetate immediately.

Important items to check during inspections include:

- Signs of differential settlement
- Cracking
- Erosion
- Leakage in the embankments
- Tree growth on the embankments
- Condition of rip rap
- Sediment accumulation
- Health of vegetation, turf

**** Paying careful attention to pretreatment, and operation and maintenance can extend the life of the soil media***

Date	Inspector	Condition	Maintenance Performed*

**Evidence of maintenance (i.e. receipts) must be provided.*

Grassed Swale

System Owner: Sheldon West, LLC, or future owner.
Estimated Annual Maintenance: $1,000
(Per DEP Stormwater Structural BMP's Vol 2)

Inspect semi-annually for the first year and at least once per year thereafter. Inspect the grass for growth and the side slopes for signs of erosion and formation of rills and gullies. If original grass cover is not successfully established, contact the Design Engineer for evaluation. If grass growth is impaired by winter road salt or other deicer use, re-establish grass in the spring.

Sediment Removal: Check on a yearly basis and clean as needed. Use hand methods (i.e., a person with a shovel) when cleaning to minimize disturbance to vegetation and underlying soils. Sediment build up in the grass swale reduces its capacity to convey water events.

**** Paying careful attention to pretreatment, and operation and maintenance can extend the life of the soil media***

Date	Inspector	Condition	Maintenance Performed*

**Evidence of maintenance (i.e. receipts) must be provided.*

ACF Rain Guardian

System Owner: Sheldon West, LLC, or future owner.

Estimated Annual Maintenance: $250-$500
(Per Manufacturer)

Depending on the characteristics of the contributing watershed and seasonal variation, common maintenance needs include periodic removal of accumulated leaves (and other organic debris) and garbage from the top grate and sediment and fine debris from the concrete dry filter box. Contributing watersheds with high sediment concentrations may require inspections monthly and clean them out at least four times a year. More frequent visits may be needed to satisfy maintenance needs.

If sediment accumulates beyond an acceptable level in the system, it will be necessary to remove. This can be done by manual removal with a shovel or mechanical device. The filter screen can be cleaned manually through brushing or with pressurized water.

Date	Inspector	Condition	Maintenance Performed*

**Evidence of maintenance (i.e. receipts) must be provided.*

Appendix B – Erosion and Sediment Control Notes and General Construction Sequence

Erosion and Sediment Control Notes

1) Erosion and sediment control measures must be installed prior to the start of construction and maintained and upgraded as necessary during construction by the contractor. It is the contractor's responsibility to inspect and install additional control measures as needed during construction.
2) All catch basins receiving drainage from the project site must be provided with a catch basin filter.
3) Stabilization of all re-graded and soil stockpile areas must be maintained during all phases of construction.
4) Sediment removed from erosion and sediment control devices must be properly removed and disposed. All damaged controls must be removed and replaced.
5) The contractor is responsible for implementing the erosion and sediment control plan. This includes the installation and maintenance of control measures, informing all parties engaged on the construction site of the requirements and objectives of the plan, and notifying the proper city agency of any transfer of this responsibility.
6) The contractor shall be responsible for controlling wind erosion and dust throughout the life of his contract. Dust control may include, but is not limited to, sprinkling of water on exposed soils and street sweeping adjacent roadways.
7) If final grading is to be delayed for more than 21 days after land disturbance activities cease, temporary vegetation or mulch shall be used to stabilize soils within 14 days of the last disturbance.
8) If a disturbed area will be exposed for greater than one year, permanent grasses or other approved cover must be installed.
9) The contractor must keep on-site at all times additional silt fence and hay bales for the installation at the direction of the engineer or the city to mitigate any emergency condition.
10) The construction fencing and erosion and sediment controls as shown may not be practical during all stages of construction. Earthwork activity on-site must be done in a manner such that runoff is directed to a sediment control device or infiltrated to the ground.
11) Demolition and construction debris must be properly contained and disposed of.
12) Disposal of all demolished materials is the responsibility of the contractor and must be hauled off-site in accordance with all federal, state, and local requirements.

General Construction Sequence

1) Install erosion and sediment controls prior to starting any earthworks activity.
2) Begin clearing, grubbing and demolition.
3) Begin utility installations.
4) Construct building foundation.
5) Install site furnishings.
6) Install landscaping.
7) Erosion and sediment controls shall be maintained until permanent cover is established.

Appendix C – ACF Rain Guardian Supplemental Information

RAIN GUARDIAN TURRET AND FOXHOLE
ENGINEERING PROPERTIES

RAIN GUARDIAN TURRET:

Turret Flow Rate Capacity:

Outflow is possible through three locations. Please note the vertical filter within the chamber was assumed to be 100% clogged because its primary function is to allow the chamber to dry out between rain events.

1) Filter overflow – water can pass between the top of the filter and the bottom of the metal grate; calculated using the continuity equation (i.e. Q=V*A)

2) Grate overflow – water can pass through the top metal grate beyond the vertical filter wall; calculated using an orifice equation (i.e. $Q=0.0108*A*\sqrt{d}$)

3) High volume overflow – water can overtop the front debris wall onto the splash pad; calculated using a standard broad crested weir equation (i.e. Q=C*L*H^(3/2))

Filter overflow – 0.45 CFS

Grate overflow – 2.59 CFS

Emergency overflow - 0.41 CFS

TOTAL: 3.45 CFS

Turret Internal Storage Vol: (i.e. storage capacity below the top of the filter wall): **4.02 ft^3**

RAIN GUARDIAN FOXHOLE:

Below are the flow and storage data for the Rain Guardian Foxhole with an inlet, middle, and outlet (i.e. 6' top lid). (the addition of mid section (for longer units) would improve the sediment storage capacity).

Foxhole Flow Rate Capacity:
Outflow is possible through three locations. Please note the vertical filter within the chamber was assumed to be 100% clogged because its primary function is to allow the chamber to dry out between rain events.

1) Filter overflow – water can pass between the top of the filter and the bottom of the metal grate; calculated using the continuity equation (i.e. Q=V*A)

2) Grate overflow – water can pass through the top metal grate beyond the vertical filter wall; calculated using an orifice equation (i.e. $Q=0.0108*A*\sqrt{d}$)

3) High volume overflow – water can overtop the front debris wall onto the splash pad; calculated using a standard broad crested weir equation (i.e. $Q=C*L*H^{(3/2)}$)

Filter overflow – 0.30 CFS

Grate overflow – 2.69 CFS

Emergency overflow - 0.52 CFS

TOTAL: **3.51 CFS**

<u>Foxhole Internal Storage Volume</u> (i.e. storage capacity below the top of the filter wall):

Inlet + Outlet: 2.0 ft^3

Middle: 2.65 ft^3

TOTAL: **4.65 ft^3**

From: Lee Jones
To: Patrick Bogle
Subject: FW: ACF Environmental - Rain Guardians
Date: Friday, December 4, 2020 9:30:52 AM
Attachments: 2017.11.21 Flow Data.pdf

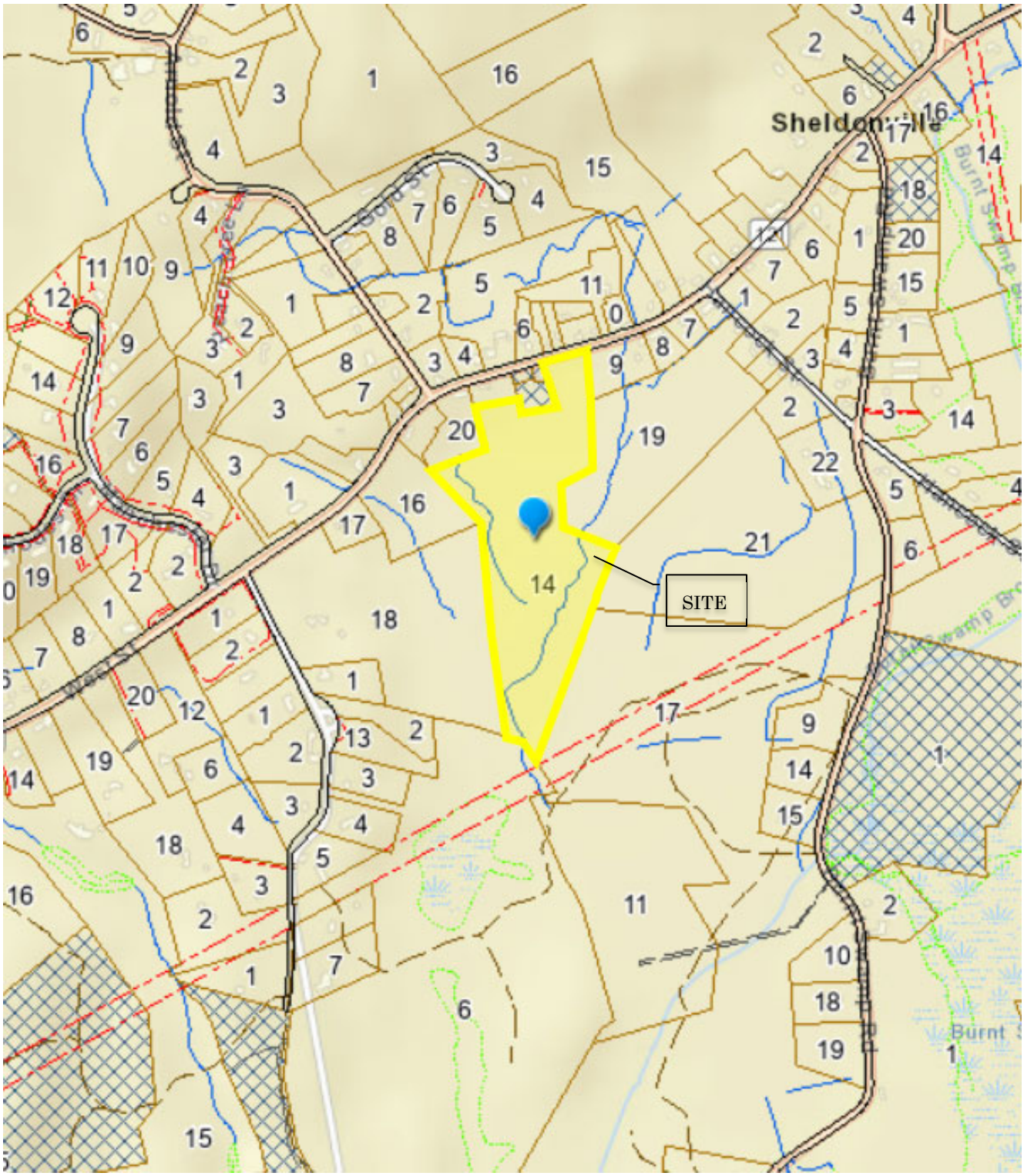
Patrick,
Good morning
Great talking with you yesterday.
Per our discussion, I have reviewed the study.
The study was performed by flow rates which are shown and not by storm events.
I am also attaching the Flow Data pdf.

- Rain Guardian Gross Solids and Sediment Removal Report
  - Bunker sediment capture – 75.6% at 0.5 CFS and 91.7% at 0.25 CFS
  - Bunker gross solids capture – 61.4% at 0.5 CFS and 78.8% at 0.25 CFS
  - Turret sediment capture – 79.1% at 0.5 CFS and 88.4% at 0.25 CFS
  - Turret gross solids capture – 72.4% at 0.5 CFS and 86.7% at 0.25 CFS
  - NOTE: Grass and rock lined inlets were also tested and achieved similar removal efficiencies. While the grass lined inlet and rock lined inlets removed similar amounts of sediment under the flow rates tested, the ease of maintenance, long-term effectiveness, storage capacity, and stability of the Rain Guardians set them apart from the grass and rock. The 'Maintenance Considerations' section (5.4) on pages 65 – 68 of the report highlights some advantages of the Rain Guardian products.

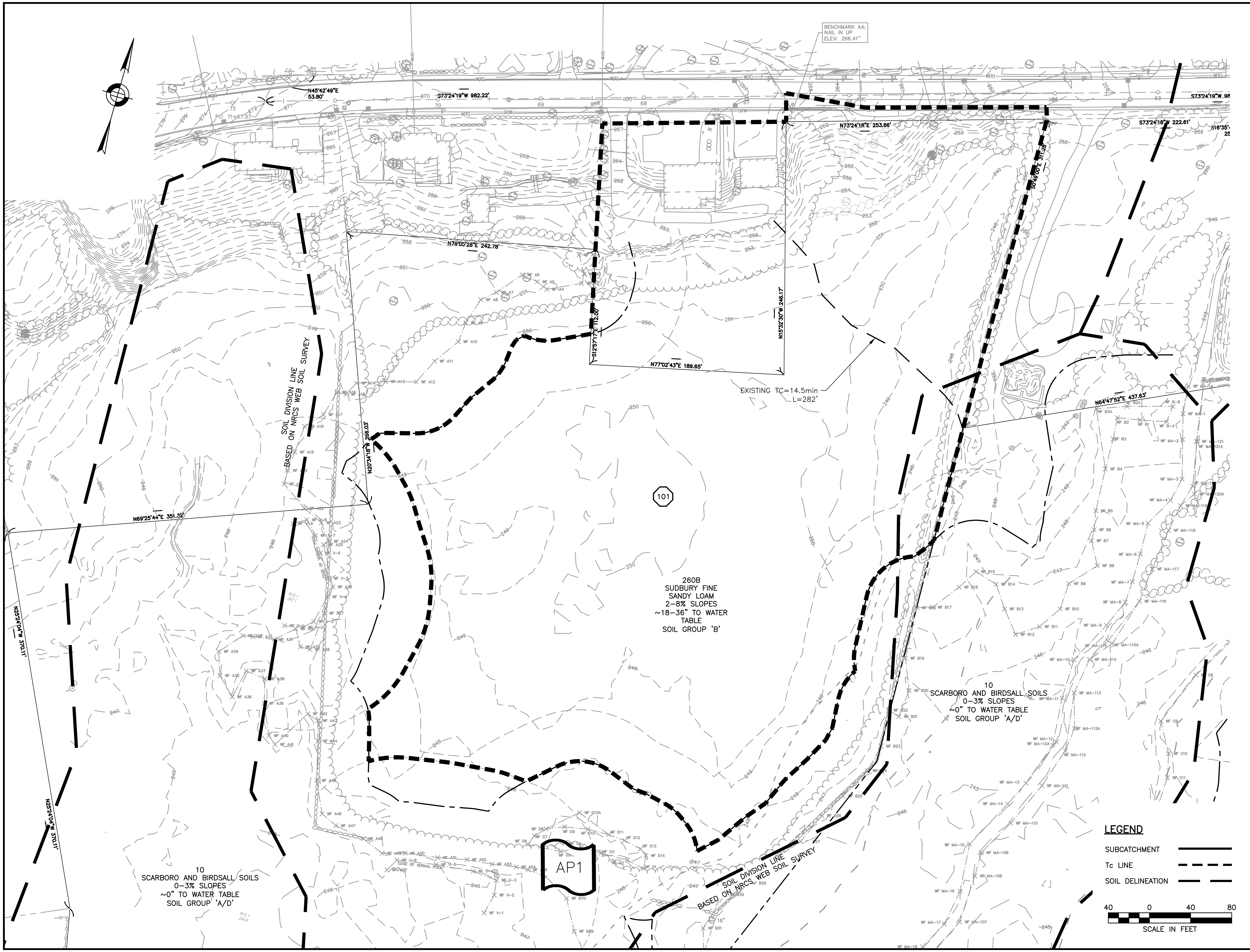
Please let me know if I can be of help
Best regards,
Lee

Leland (Lee) Jones, QSM
BMP Specialist – New England
ACF Environmental
508-745-7052 cell
ljones@acfenv.com
www.acfenvironmental.com
"Start each day with a positive thought and a grateful heart"
Roy T. Bennett

Appendix D – Locus Map


SITE
Sheldonville

Appendix E – Pre and Post Drainage Maps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NAIL IN UP
ELEV: 266.41'
S73°24'19"W 982.22'
N45°42'49"E
53.80'
N73°24'18"E 253.66'
S73°24'18"W 222.61'
N76°05'28"E 242.78'
N77°02'43"E 189.65'
N69°25'44"E 351.32'
N64°47'52"E 437.63'
EXISTING TC=14.5min
L=282'
SOIL DIVISION LINE
BASED ON NRCS WEB SOIL SURVEY
101
260B
SUDBURY FINE
SANDY LOAM
2-8% SLOPES
~18-36" TO WATER
TABLE
SOIL GROUP 'B'
10
SCARBORO AND BIRDSALL SOILS
0-3% SLOPES
~0" TO WATER TABLE
SOIL GROUP 'A/D'
10
SCARBORO AND BIRDSALL SOILS
0-3% SLOPES
~0" TO WATER TABLE
SOIL GROUP 'A/D'
AP1
LEGEND
SUBCATCHMENT
Tc LINE
SOIL DELINEATION
40 0 40 80
SCALE IN FEET

HOWARD STEIN HUDSON
114 Turnpike Road, Suite 2C
Chelmsford, MA 01824
www.hshassoc.com

PREPARED FOR:

SHELDON WEST, LLC
480 TURNPIKE STREET
SOUTH EASTON, MA 02375

SHELDON WEST
1139 WEST STREET
WRENTHAM, MA 02093
NORFOLK COUNTY

REVISIONS:

NO	BY	DATE	DESCRIPTION

SITE PLAN

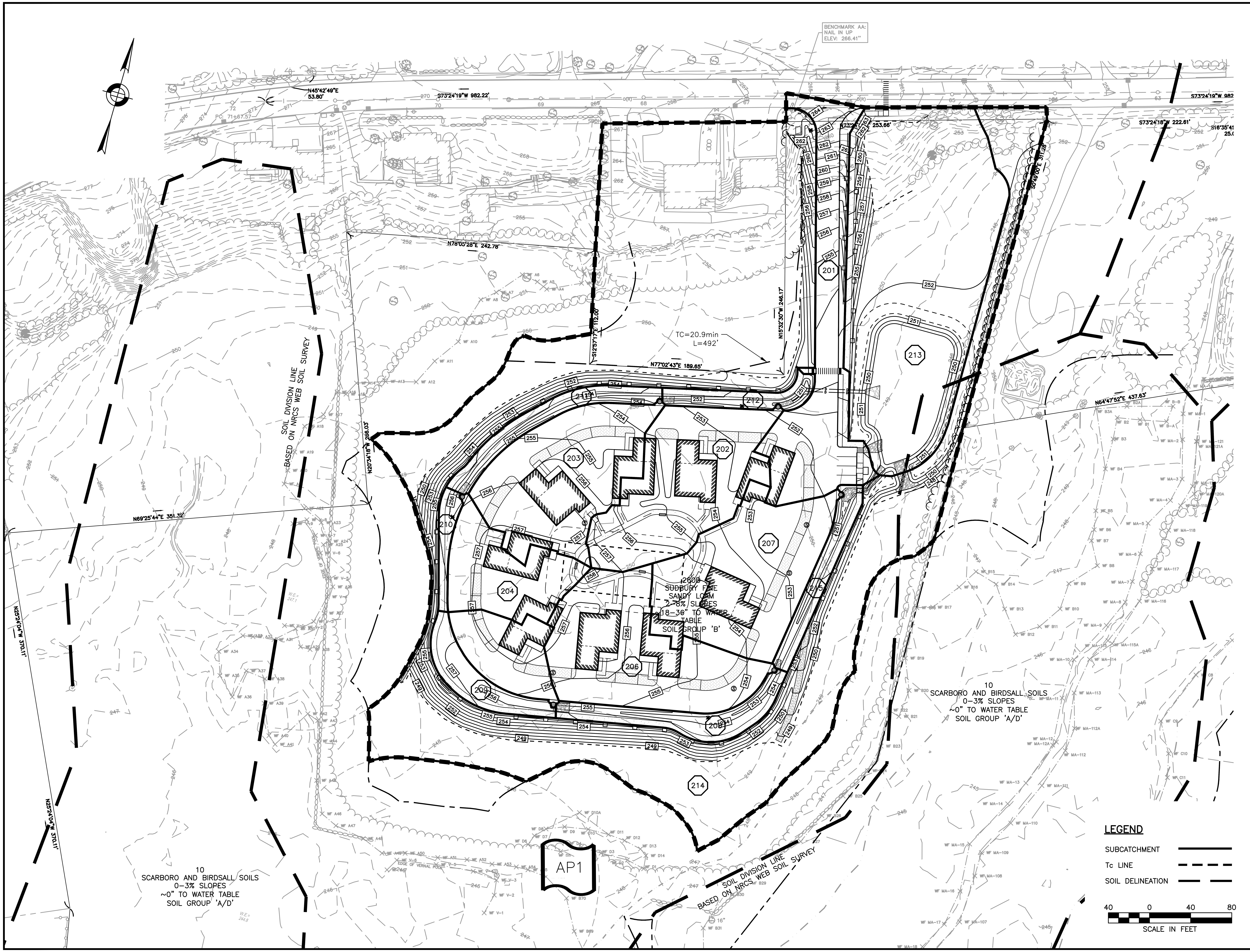
PRE DEVELOPMENT DRAINAGE MAP

DATE:	MARCH 4, 2022
PROJECT NUMBER:	19227.01
DESIGNED BY:	KF/KL
DRAWN BY:	KF
CHECKED BY:	KE

1

SHEET 1 OF 2

3/7/2022 L:\19227\West St - CURRENT\19227 - Drainage.dwg
Last Saved by: PBOGLE
Printed by: Patrick Bogle


BENCHMARK AA:
NAIL IN UP
ELEV: 266.41"
N45°42'49"E
53.80'
S73°24'19"W 982.22'
S73°24'19"W
S73°24'18"W 222.61'
253.66'
N78°00'28"E 242.78'
TC=20.9min
L=492'
N77°02'43"E 189.65'
N15°32'30"W 246.17'
S12°51'17"E 112.00'
N64°47'52"E 437.63'
N69°25'44"E 351.32'
N20°34'18"W 288.03'
N25°24'04"W 370.11'
SOIL DIVISION LINE
BASED ON NRCS WEB SOIL SURVEY
260B
SUDBURY FINE
SANDY LOAM
2-8% SLOPES
18-36" TO WATER
TABLE
SOIL GROUP 'B'
10
SCARBORO AND BIRDSALL SOILS
0-3% SLOPES
~0" TO WATER TABLE
SOIL GROUP 'A/D'
201
202
203
204
206
207
208
209
210
212
213
214
215
AP1
LEGEND
SUBCATCHMENT
Tc LINE
SOIL DELINEATION
40 0 40 80
SCALE IN FEET

HOWARD STEIN HUDSON
114 Turnpike Road, Suite 2C
Chelmsford, MA 01824
www.hshassoc.com

PREPARED FOR:

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480 TURNPIKE STREET
SOUTH EASTON, MA 02375

SHELDON WEST
1139 WEST STREET
WRENTHAM, MA 02093
NORFOLK COUNTY

REVISIONS:

NO	BY	DATE	DESCRIPTION

SITE
PLAN

POST DEVELOPMENT DRAINAGE MAP

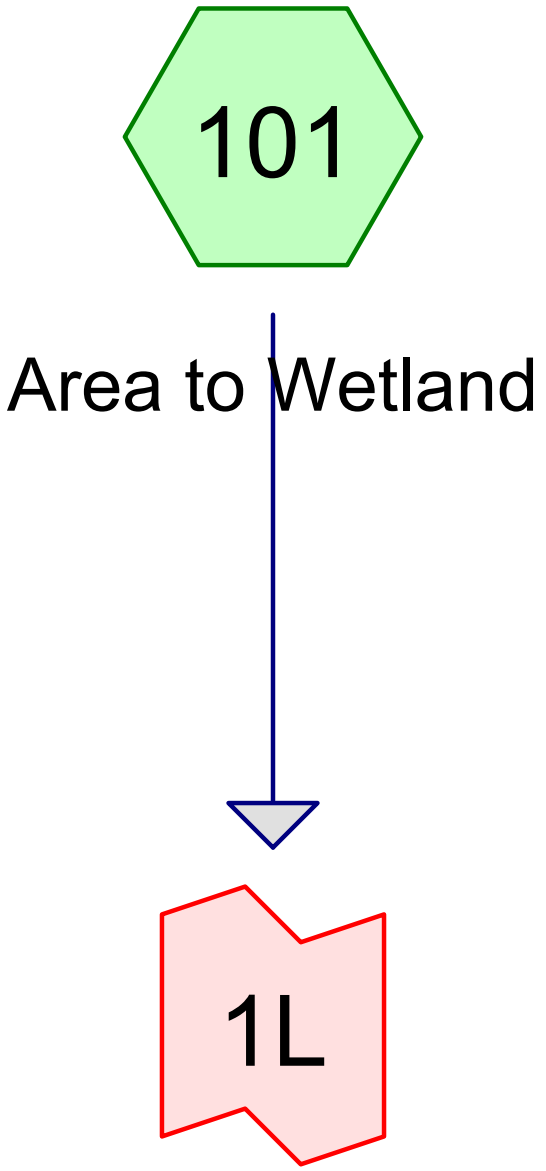
DATE:	MARCH 4, 2022
PROJECT NUMBER:	19227.01
DESIGNED BY:	KF/KL
DRAWN BY:	KF
CHECKED BY:	KE

2

SHEET 2 OF 2

4/8/2022 L:\19227\West St - CURRENT\19227 - Drainage.dwg
Last Saved by: MBAKER
Printed by: Kasey Ferreira

Appendix F – HydroCAD, Stage Storage and Hydrographs



Subcat Reach Pond Link

Routing Diagram for PreDevelopment
Prepared by Howard Stein Hudson, Printed 3/1/2022

Project Notes

Rainfall events imported from "19227 - Post Dev_West St.hcp"

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Inch	Type III 24-hr		Default	24.00	1	2.00	2
2	2-yr	Type III 24-hr		Default	24.00	1	3.27	2
3	10-yr	Type III 24-hr		Default	24.00	1	4.92	2
4	50-yr	Type III 24-hr		Default	24.00	1	7.42	2
5	100-yr	Type III 24-hr		Default	24.00	1	8.86	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
4,850	39	>75% Grass cover, Good, HSG A (101)
259,865	61	>75% Grass cover, Good, HSG B (101)
8,418	98	Paved parking, HSG B (101)
3,519	98	Roofs, HSG B (101)
2,367	30	Woods, Good, HSG A (101)
13,927	55	Woods, Good, HSG B (101)
292,946	**62**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
7,217	HSG A	101
285,729	HSG B	101
0	HSG C	
0	HSG D	
0	Other	
292,946		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
4,850	259,865	0	0	0	264,715	>75% Grass cover, Good	
0	8,418	0	0	0	8,418	Paved parking	
0	3,519	0	0	0	3,519	Roofs	
2,367	13,927	0	0	0	16,294	Woods, Good	
7,217	**285,729**	**0**	**0**	**0**	**292,946**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment101: Area to Wetland Runoff Area=292,946 sf 4.07% Impervious Runoff Depth>0.09"
Flow Length=282' Tc=14.5 min CN=62 Runoff=0.11 cfs 2,102 cf

Link 1L: Wetland Inflow=0.11 cfs 2,102 cf
Primary=0.11 cfs 2,102 cf

Total Runoff Area = 292,946 sf Runoff Volume = 2,102 cf Average Runoff Depth = 0.09"
95.93% Pervious = 281,009 sf 4.07% Impervious = 11,937 sf

Summary for Subcatchment 101: Area to Wetland

Runoff = 0.11 cfs @ 12.60 hrs, Volume= 2,102 cf, Depth> 0.09"
Routed to Link 1L : Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Inch Rainfall=2.00"

Area (sf)	CN	Description
4,850	39	>75% Grass cover, Good, HSG A
13,927	55	Woods, Good, HSG B
2,367	30	Woods, Good, HSG A
8,418	98	Paved parking, HSG B
3,519	98	Roofs, HSG B
259,865	61	>75% Grass cover, Good, HSG B
292,946	62	Weighted Average
281,009		95.93% Pervious Area
11,937		4.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	35	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.27"
1.7	15	0.0330	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.27"
3.1	194	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	38	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.5	282	Total			

Summary for Link 1L: Wetland

Inflow Area = 292,946 sf, 4.07% Impervious, Inflow Depth > 0.09" for 2-Inch event
Inflow = 0.11 cfs @ 12.60 hrs, Volume= 2,102 cf
Primary = 0.11 cfs @ 12.60 hrs, Volume= 2,102 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment101: Area to Wetland Runoff Area=292,946 sf 4.07% Impervious Runoff Depth>0.51"
Flow Length=282' Tc=14.5 min CN=62 Runoff=2.12 cfs 12,421 cf

Link 1L: Wetland Inflow=2.12 cfs 12,421 cf
Primary=2.12 cfs 12,421 cf

Total Runoff Area = 292,946 sf Runoff Volume = 12,421 cf Average Runoff Depth = 0.51"
95.93% Pervious = 281,009 sf 4.07% Impervious = 11,937 sf

Summary for Subcatchment 101: Area to Wetland

Runoff = 2.12 cfs @ 12.27 hrs, Volume= 12,421 cf, Depth> 0.51"
Routed to Link 1L : Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
4,850	39	>75% Grass cover, Good, HSG A
13,927	55	Woods, Good, HSG B
2,367	30	Woods, Good, HSG A
8,418	98	Paved parking, HSG B
3,519	98	Roofs, HSG B
259,865	61	>75% Grass cover, Good, HSG B
292,946	62	Weighted Average
281,009		95.93% Pervious Area
11,937		4.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	35	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.27"
1.7	15	0.0330	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.27"
3.1	194	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	38	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.5	282	Total			

Summary for Link 1L: Wetland

Inflow Area = 292,946 sf, 4.07% Impervious, Inflow Depth > 0.51" for 2-yr event
Inflow = 2.12 cfs @ 12.27 hrs, Volume= 12,421 cf
Primary = 2.12 cfs @ 12.27 hrs, Volume= 12,421 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment101: Area to Wetland Runoff Area=292,946 sf 4.07% Impervious Runoff Depth>1.38"
Flow Length=282' Tc=14.5 min CN=62 Runoff=7.61 cfs 33,789 cf

Link 1L: Wetland Inflow=7.61 cfs 33,789 cf
Primary=7.61 cfs 33,789 cf

Total Runoff Area = 292,946 sf Runoff Volume = 33,789 cf Average Runoff Depth = 1.38"
95.93% Pervious = 281,009 sf 4.07% Impervious = 11,937 sf

Summary for Subcatchment 101: Area to Wetland

Runoff = 7.61 cfs @ 12.22 hrs, Volume= 33,789 cf, Depth> 1.38"
Routed to Link 1L : Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=4.92"

Area (sf)	CN	Description
4,850	39	>75% Grass cover, Good, HSG A
13,927	55	Woods, Good, HSG B
2,367	30	Woods, Good, HSG A
8,418	98	Paved parking, HSG B
3,519	98	Roofs, HSG B
259,865	61	>75% Grass cover, Good, HSG B
292,946	62	Weighted Average
281,009		95.93% Pervious Area
11,937		4.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	35	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.27"
1.7	15	0.0330	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.27"
3.1	194	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	38	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.5	282	Total			

Summary for Link 1L: Wetland

Inflow Area = 292,946 sf, 4.07% Impervious, Inflow Depth > 1.38" for 10-yr event
Inflow = 7.61 cfs @ 12.22 hrs, Volume= 33,789 cf
Primary = 7.61 cfs @ 12.22 hrs, Volume= 33,789 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment101: Area to Wetland Runoff Area=292,946 sf 4.07% Impervious Runoff Depth>3.10"
Flow Length=282' Tc=14.5 min CN=62 Runoff=18.39 cfs 75,772 cf

Link 1L: Wetland Inflow=18.39 cfs 75,772 cf
Primary=18.39 cfs 75,772 cf

Total Runoff Area = 292,946 sf Runoff Volume = 75,772 cf Average Runoff Depth = 3.10"
95.93% Pervious = 281,009 sf 4.07% Impervious = 11,937 sf

Summary for Subcatchment 101: Area to Wetland

Runoff = 18.39 cfs @ 12.21 hrs, Volume= 75,772 cf, Depth> 3.10"
Routed to Link 1L : Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-yr Rainfall=7.42"

Area (sf)	CN	Description
4,850	39	>75% Grass cover, Good, HSG A
13,927	55	Woods, Good, HSG B
2,367	30	Woods, Good, HSG A
8,418	98	Paved parking, HSG B
3,519	98	Roofs, HSG B
259,865	61	>75% Grass cover, Good, HSG B
292,946	62	Weighted Average
281,009		95.93% Pervious Area
11,937		4.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	35	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.27"
1.7	15	0.0330	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.27"
3.1	194	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	38	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.5	282	Total			

Summary for Link 1L: Wetland

Inflow Area = 292,946 sf, 4.07% Impervious, Inflow Depth > 3.10" for 50-yr event
Inflow = 18.39 cfs @ 12.21 hrs, Volume= 75,772 cf
Primary = 18.39 cfs @ 12.21 hrs, Volume= 75,772 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment101: Area to Wetland Runoff Area=292,946 sf 4.07% Impervious Runoff Depth>4.22"
Flow Length=282' Tc=14.5 min CN=62 Runoff=25.31 cfs 103,076 cf

Link 1L: Wetland Inflow=25.31 cfs 103,076 cf
Primary=25.31 cfs 103,076 cf

Total Runoff Area = 292,946 sf Runoff Volume = 103,076 cf Average Runoff Depth = 4.22"
95.93% Pervious = 281,009 sf 4.07% Impervious = 11,937 sf

Summary for Subcatchment 101: Area to Wetland

Runoff = 25.31 cfs @ 12.21 hrs, Volume= 103,076 cf, Depth> 4.22"
Routed to Link 1L : Wetland

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.86"

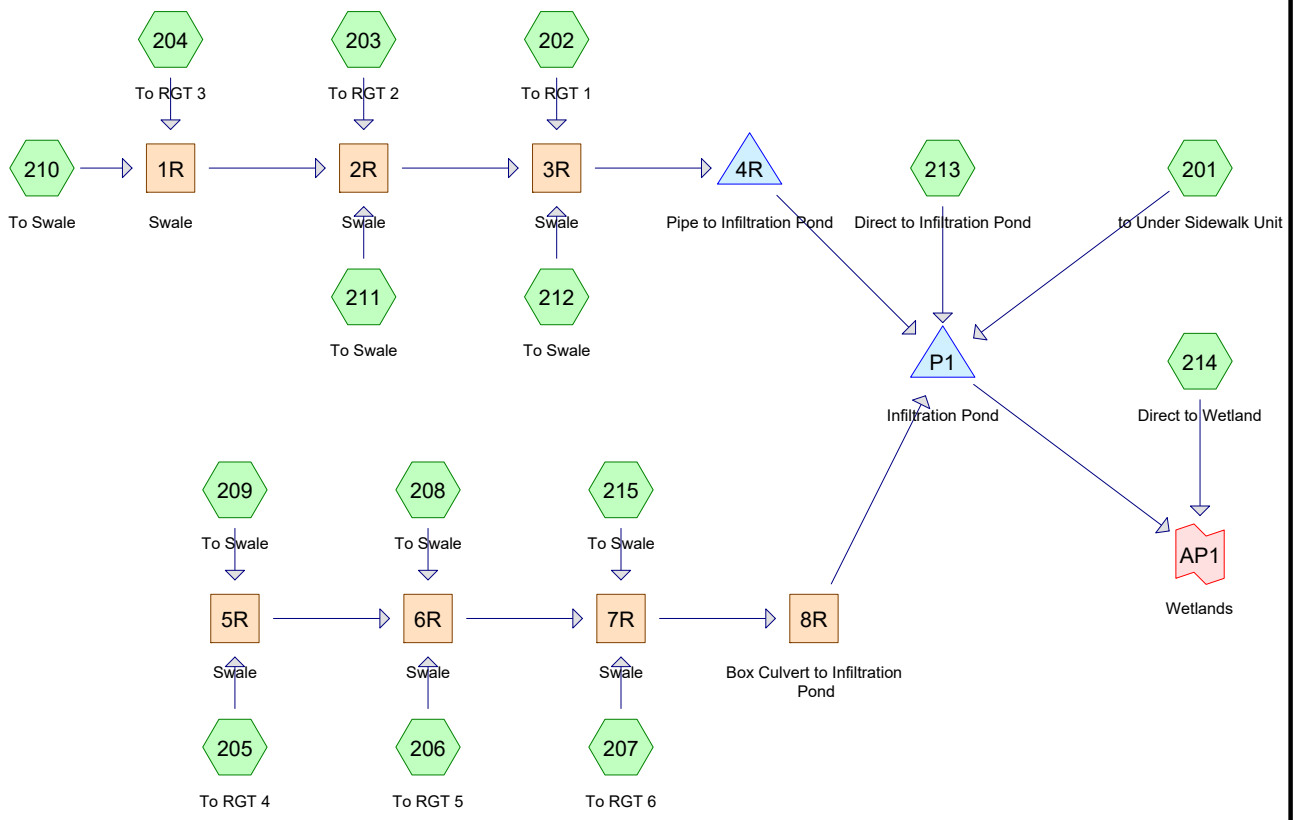
Area (sf)	CN	Description
4,850	39	>75% Grass cover, Good, HSG A
13,927	55	Woods, Good, HSG B
2,367	30	Woods, Good, HSG A
8,418	98	Paved parking, HSG B
3,519	98	Roofs, HSG B
259,865	61	>75% Grass cover, Good, HSG B
292,946	62	Weighted Average
281,009		95.93% Pervious Area
11,937		4.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	35	0.1000	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.27"
1.7	15	0.0330	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.27"
3.1	194	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.3	38	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
14.5	282	Total			

Summary for Link 1L: Wetland

Inflow Area = 292,946 sf, 4.07% Impervious, Inflow Depth > 4.22" for 100-yr event
Inflow = 25.31 cfs @ 12.21 hrs, Volume= 103,076 cf
Primary = 25.31 cfs @ 12.21 hrs, Volume= 103,076 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs



Subcat Reach Pond Link

Routing Diagram for PostDevelopment
Prepared by Howard Stein Hudson, Printed 4/8/2022

Project Notes

Rainfall events imported from "PreDevelopment.hcp"

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Inch	Type III 24-hr		Default	24.00	1	2.00	2
2	2-yr	Type III 24-hr		Default	24.00	1	3.27	2
3	10-yr	Type III 24-hr		Default	24.00	1	4.92	2
4	50-yr	Type III 24-hr		Default	24.00	1	7.42	2
5	100-yr	Type III 24-hr		Default	24.00	1	8.86	2

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
6,167	39	>75% Grass cover, Good, HSG A (213, 214)
189,826	61	>75% Grass cover, Good, HSG B (201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215)
62,930	98	Paved parking, HSG B (201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215)
23,167	98	Roofs, HSG B (201, 202, 203, 204, 205, 206, 207, 214)
1,050	30	Woods, Good, HSG A (214)
9,806	55	Woods, Good, HSG B (214)
292,946	**71**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
7,217	HSG A	213, 214
285,729	HSG B	201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215
0	HSG C	
0	HSG D	
0	Other	
292,946		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
6,167	189,826	0	0	0	195,993	>75% Grass cover, Good	
0	62,930	0	0	0	62,930	Paved parking	
0	23,167	0	0	0	23,167	Roofs	
1,050	9,806	0	0	0	10,856	Woods, Good	
7,217	**285,729**	**0**	**0**	**0**	**292,946**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	8R	250.00	249.97	6.0	0.0050	0.040	60.0	18.0	0.0
2	4R	250.00	249.72	55.0	0.0051	0.012	0.0	15.0	0.0

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 3
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 201: to Under Sidewalk Unit Runoff Area=17,748 sf 80.43% Impervious Runoff Depth>1.16"
Tc=6.0 min CN=91 Runoff=0.56 cfs 1,719 cf

Subcatchment 202: To RGT 1 Runoff Area=17,947 sf 48.49% Impervious Runoff Depth>0.52"
Tc=6.0 min CN=79 Runoff=0.23 cfs 780 cf

Subcatchment 203: To RGT 2 Runoff Area=17,507 sf 63.88% Impervious Runoff Depth>0.79"
Tc=6.0 min CN=85 Runoff=0.37 cfs 1,158 cf

Subcatchment 204: To RGT 3 Runoff Area=9,147 sf 62.73% Impervious Runoff Depth>0.74"
Tc=6.0 min CN=84 Runoff=0.18 cfs 566 cf

Subcatchment 205: To RGT 4 Runoff Area=6,183 sf 86.80% Impervious Runoff Depth>1.31"
Tc=6.0 min CN=93 Runoff=0.22 cfs 677 cf

Subcatchment 206: To RGT 5 Runoff Area=18,720 sf 60.91% Impervious Runoff Depth>0.74"
Tc=6.0 min CN=84 Runoff=0.36 cfs 1,159 cf

Subcatchment 207: To RGT 6 Runoff Area=19,445 sf 50.44% Impervious Runoff Depth>0.56"
Tc=6.0 min CN=80 Runoff=0.27 cfs 910 cf

Subcatchment 208: To Swale Runoff Area=4,919 sf 31.45% Impervious Runoff Depth>0.32"
Tc=6.0 min CN=73 Runoff=0.03 cfs 131 cf

Subcatchment 209: To Swale Runoff Area=3,858 sf 28.90% Impervious Runoff Depth>0.29"
Tc=6.0 min CN=72 Runoff=0.02 cfs 94 cf

Subcatchment 210: To Swale Runoff Area=1,505 sf 48.11% Impervious Runoff Depth>0.52"
Tc=6.0 min CN=79 Runoff=0.02 cfs 65 cf

Subcatchment 211: To Swale Runoff Area=4,032 sf 35.99% Impervious Runoff Depth>0.35"
Tc=6.0 min CN=74 Runoff=0.03 cfs 117 cf

Subcatchment 212: To Swale Runoff Area=2,719 sf 32.88% Impervious Runoff Depth>0.32"
Tc=6.0 min CN=73 Runoff=0.02 cfs 72 cf

Subcatchment 213: Direct to Infiltration Runoff Area=43,710 sf 4.37% Impervious Runoff Depth>0.07"
Tc=6.0 min CN=61 Runoff=0.01 cfs 265 cf

Subcatchment 214: Direct to Wetland Runoff Area=122,030 sf 8.85% Impervious Runoff Depth>0.10"
Flow Length=492' Tc=20.9 min CN=63 Runoff=0.06 cfs 1,021 cf

Subcatchment 215: To Swale Runoff Area=3,476 sf 33.92% Impervious Runoff Depth>0.35"
Tc=6.0 min CN=74 Runoff=0.02 cfs 101 cf

Reach 1R: Swale Avg. Flow Depth=0.07' Max Vel=1.62 fps Inflow=0.20 cfs 632 cf
n=0.030 L=24.0' S=0.0417 '/' Capacity=69.88 cfs Outflow=0.20 cfs 632 cf

Reach 2R: Swale Avg. Flow Depth=0.18' Max Vel=1.56 fps Inflow=0.59 cfs 1,907 cf
n=0.030 L=230.0' S=0.0130 '/' Capacity=39.10 cfs Outflow=0.56 cfs 1,902 cf

Reach 3R: Swale Avg. Flow Depth=0.22' Max Vel=1.74 fps Inflow=0.80 cfs 2,754 cf
n=0.030 L=149.0' S=0.0134 '/' Capacity=39.66 cfs Outflow=0.78 cfs 2,749 cf

Reach 5R: Swale Avg. Flow Depth=0.09' Max Vel=1.42 fps Inflow=0.24 cfs 770 cf
n=0.030 L=139.0' S=0.0234 '/' Capacity=52.35 cfs Outflow=0.23 cfs 769 cf

Reach 6R: Swale Avg. Flow Depth=0.20' Max Vel=1.48 fps Inflow=0.62 cfs 2,059 cf
n=0.030 L=167.0' S=0.0105 '/' Capacity=35.05 cfs Outflow=0.60 cfs 2,055 cf

Reach 7R: Swale Avg. Flow Depth=0.28' Max Vel=1.31 fps Inflow=0.89 cfs 3,066 cf
n=0.030 L=259.0' S=0.0058 '/' Capacity=26.05 cfs Outflow=0.82 cfs 3,055 cf

Reach 8R: Box Culvert to Infiltration Avg. Flow Depth=0.19' Max Vel=0.84 fps Inflow=0.82 cfs 3,055 cf
60.0" x 18.0" Box Pipe n=0.040 L=6.0' S=0.0050 '/' Capacity=13.65 cfs Outflow=0.82 cfs 3,054 cf

Pond 4R: Pipe to Infiltration Pond Peak Elev=250.33' Storage=16 cf Inflow=0.78 cfs 2,749 cf
15.0" Round Culvert x 2.00 n=0.012 L=55.0' S=0.0051 '/' Outflow=0.78 cfs 2,748 cf

Pond P1: Infiltration Pond Peak Elev=249.28' Storage=244 cf Inflow=2.06 cfs 7,787 cf
Discarded=1.60 cfs 7,785 cf Primary=0.00 cfs 0 cf Outflow=1.60 cfs 7,785 cf

Link AP1: Wetlands Inflow=0.06 cfs 1,021 cf
Primary=0.06 cfs 1,021 cf

Total Runoff Area = 292,946 sf Runoff Volume = 8,837 cf Average Runoff Depth = 0.36"
70.61% Pervious = 206,849 sf 29.39% Impervious = 86,097 sf

Summary for Subcatchment 201: to Under Sidewalk Unit

Runoff = 0.56 cfs @ 12.09 hrs, Volume= 1,719 cf, Depth> 1.16"
Routed to Pond P1 : Infiltration Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Inch Rainfall=2.00"

Area (sf)	CN	Description
13,365	98	Paved parking, HSG B
3,474	61	>75% Grass cover, Good, HSG B
909	98	Roofs, HSG B
17,748	91	Weighted Average
3,474		19.57% Pervious Area
14,274		80.43% Impervious Area

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

Summary for Subcatchment 202: To RGT 1

Runoff = 0.23 cfs @ 12.10 hrs, Volume= 780 cf, Depth> 0.52"
Routed to Reach 3R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Inch Rainfall=2.00"

Area (sf)	CN	Description
4,676	98	Paved parking, HSG B
9,245	61	>75% Grass cover, Good, HSG B
4,026	98	Roofs, HSG B
17,947	79	Weighted Average
9,245		51.51% Pervious Area
8,702		48.49% Impervious Area

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

Summary for Subcatchment 203: To RGT 2

Runoff = 0.37 cfs @ 12.09 hrs, Volume= 1,158 cf, Depth> 0.79"
Routed to Reach 2R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Inch Rainfall=2.00"

Area (sf)	CN	Description
7,022	98	Paved parking, HSG B
6,324	61	>75% Grass cover, Good, HSG B
4,161	98	Roofs, HSG B
17,507	85	Weighted Average
6,324		36.12% Pervious Area
11,183		63.88% Impervious Area

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

Summary for Subcatchment 204: To RGT 3

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 566 cf, Depth> 0.74"
Routed to Reach 1R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Inch Rainfall=2.00"

Area (sf)	CN	Description
3,638	98	Paved parking, HSG B
3,409	61	>75% Grass cover, Good, HSG B
2,100	98	Roofs, HSG B
9,147	84	Weighted Average
3,409		37.27% Pervious Area
5,738		62.73% Impervious Area

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

Summary for Subcatchment 205: To RGT 4

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 677 cf, Depth> 1.31"
Routed to Reach 5R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Inch Rainfall=2.00"

Area (sf)	CN	Description
4,135	98	Paved parking, HSG B
816	61	>75% Grass cover, Good, HSG B
1,232	98	Roofs, HSG B
6,183	93	Weighted Average
816		13.20% Pervious Area
5,367		86.80% Impervious Area

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

Summary for Subcatchment 206: To RGT 5

Runoff = 0.36 cfs @ 12.09 hrs, Volume= 1,159 cf, Depth> 0.74"
Routed to Reach 6R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Inch Rainfall=2.00"

Area (sf)	CN	Description
7,564	98	Paved parking, HSG B
7,317	61	>75% Grass cover, Good, HSG B
3,839	98	Roofs, HSG B
18,720	84	Weighted Average
7,317		39.09% Pervious Area
11,403		60.91% Impervious Area

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

Summary for Subcatchment 207: To RGT 6

Runoff = 0.27 cfs @ 12.10 hrs, Volume= 910 cf, Depth> 0.56"
Routed to Reach 7R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Inch Rainfall=2.00"

Area (sf)	CN	Description
6,428	98	Paved parking, HSG B
9,636	61	>75% Grass cover, Good, HSG B
3,381	98	Roofs, HSG B
19,445	80	Weighted Average
9,636		49.56% Pervious Area
9,809		50.44% Impervious Area

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

Summary for Subcatchment 208: To Swale

Runoff = 0.03 cfs @ 12.11 hrs, Volume= 131 cf, Depth> 0.32"
Routed to Reach 6R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Inch Rainfall=2.00"

Area (sf)	CN	Description
1,547	98	Paved parking, HSG B
3,372	61	>75% Grass cover, Good, HSG B
4,919	73	Weighted Average
3,372		68.55% Pervious Area
1,547		31.45% Impervious Area

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

Summary for Subcatchment 209: To Swale

Runoff = 0.02 cfs @ 12.12 hrs, Volume= 94 cf, Depth> 0.29"
Routed to Reach 5R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Inch Rainfall=2.00"

Area (sf)	CN	Description
1,115	98	Paved parking, HSG B
2,743	61	>75% Grass cover, Good, HSG B
3,858	72	Weighted Average
2,743		71.10% Pervious Area
1,115		28.90% Impervious Area

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

Summary for Subcatchment 210: To Swale

Runoff = 0.02 cfs @ 12.10 hrs, Volume= 65 cf, Depth> 0.52"
Routed to Reach 1R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Inch Rainfall=2.00"

Area (sf)	CN	Description
724	98	Paved parking, HSG B
781	61	>75% Grass cover, Good, HSG B
1,505	79	Weighted Average
781		51.89% Pervious Area
724		48.11% Impervious Area

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

Summary for Subcatchment 211: To Swale

Runoff = 0.03 cfs @ 12.11 hrs, Volume= 117 cf, Depth> 0.35"
Routed to Reach 2R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Inch Rainfall=2.00"

Area (sf)	CN	Description
1,451	98	Paved parking, HSG B
2,581	61	>75% Grass cover, Good, HSG B
4,032	74	Weighted Average
2,581		64.01% Pervious Area
1,451		35.99% Impervious Area

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

Summary for Subcatchment 212: To Swale

Runoff = 0.02 cfs @ 12.11 hrs, Volume= 72 cf, Depth> 0.32"
Routed to Reach 3R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Inch Rainfall=2.00"

Area (sf)	CN	Description
894	98	Paved parking, HSG B
1,825	61	>75% Grass cover, Good, HSG B
2,719	73	Weighted Average
1,825		67.12% Pervious Area
894		32.88% Impervious Area

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

Summary for Subcatchment 213: Direct to Infiltration Pond

Runoff = 0.01 cfs @ 12.50 hrs, Volume= 265 cf, Depth> 0.07"
Routed to Pond P1 : Infiltration Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Inch Rainfall=2.00"

Area (sf)	CN	Description
1,912	98	Paved parking, HSG B
39,571	61	>75% Grass cover, Good, HSG B
2,227	39	>75% Grass cover, Good, HSG A
43,710	61	Weighted Average
41,798		95.63% Pervious Area
1,912		4.37% Impervious Area

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

Summary for Subcatchment 214: Direct to Wetland

Runoff = 0.06 cfs @ 12.66 hrs, Volume= 1,021 cf, Depth> 0.10"
Routed to Link AP1 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Inch Rainfall=2.00"

Area (sf)	CN	Description
7,280	98	Paved parking, HSG B
96,435	61	>75% Grass cover, Good, HSG B
9,806	55	Woods, Good, HSG B
3,519	98	Roofs, HSG B
3,940	39	>75% Grass cover, Good, HSG A
1,050	30	Woods, Good, HSG A
122,030	63	Weighted Average
111,231		91.15% Pervious Area
10,799		8.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.1600	0.09		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.4	41	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.0	401	0.0075	0.61		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.9	492	Total			

Summary for Subcatchment 215: To Swale

Runoff = 0.02 cfs @ 12.11 hrs, Volume= 101 cf, Depth> 0.35"
Routed to Reach 7R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Inch Rainfall=2.00"

Area (sf)	CN	Description
1,179	98	Paved parking, HSG B
2,297	61	>75% Grass cover, Good, HSG B
3,476	74	Weighted Average
2,297		66.08% Pervious Area
1,179		33.92% Impervious Area

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

Summary for Reach 1R: Swale

Inflow Area = 10,652 sf, 60.66% Impervious, Inflow Depth > 0.71" for 2-Inch event
Inflow = 0.20 cfs @ 12.09 hrs, Volume= 632 cf
Outflow = 0.20 cfs @ 12.10 hrs, Volume= 632 cf, Atten= 0%, Lag= 0.2 min
Routed to Reach 2R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 1.62 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.65 fps, Avg. Travel Time= 0.6 min

Peak Storage= 3 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.07' , Surface Width= 1.86'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 69.88 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 24.0' Slope= 0.0417 '/'
Inlet Invert= 256.00', Outlet Invert= 255.00'

Summary for Reach 2R: Swale

[62] Hint: Exceeded Reach 1R OUTLET depth by 0.11' @ 12.14 hrs

Inflow Area = 32,191 sf, 59.32% Impervious, Inflow Depth > 0.71" for 2-Inch event
Inflow = 0.59 cfs @ 12.10 hrs, Volume= 1,907 cf
Outflow = 0.56 cfs @ 12.12 hrs, Volume= 1,902 cf, Atten= 5%, Lag= 1.7 min
Routed to Reach 3R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 1.56 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 7.2 min

Peak Storage= 83 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 2.42'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 39.10 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 230.0' Slope= 0.0130 '/'
Inlet Invert= 255.00', Outlet Invert= 252.00'

Summary for Reach 3R: Swale

[62] Hint: Exceeded Reach 2R OUTLET depth by 0.04' @ 12.17 hrs

Inflow Area = 52,857 sf, 54.28% Impervious, Inflow Depth > 0.63" for 2-Inch event
Inflow = 0.80 cfs @ 12.12 hrs, Volume= 2,754 cf
Outflow = 0.78 cfs @ 12.13 hrs, Volume= 2,749 cf, Atten= 2%, Lag= 1.0 min
Routed to Pond 4R : Pipe to Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 1.74 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 4.0 min

Peak Storage= 67 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.22' , Surface Width= 2.59'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 39.66 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 149.0' Slope= 0.0134 '/'
Inlet Invert= 252.00', Outlet Invert= 250.00'

Summary for Reach 5R: Swale

Inflow Area = 10,041 sf, 64.56% Impervious, Inflow Depth > 0.92" for 2-Inch event
Inflow = 0.24 cfs @ 12.09 hrs, Volume= 770 cf
Outflow = 0.23 cfs @ 12.11 hrs, Volume= 769 cf, Atten= 2%, Lag= 1.1 min
Routed to Reach 6R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 1.42 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.50 fps, Avg. Travel Time= 4.6 min

Peak Storage= 23 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 1.97'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 52.35 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 139.0' Slope= 0.0234 '/'
Inlet Invert= 257.00', Outlet Invert= 253.75'

Summary for Reach 6R: Swale

[62] Hint: Exceeded Reach 5R OUTLET depth by 0.11' @ 12.13 hrs

Inflow Area = 33,680 sf, 57.70% Impervious, Inflow Depth > 0.73" for 2-Inch event
Inflow = 0.62 cfs @ 12.10 hrs, Volume= 2,059 cf
Outflow = 0.60 cfs @ 12.12 hrs, Volume= 2,055 cf, Atten= 3%, Lag= 1.3 min
Routed to Reach 7R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 1.48 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 0.47 fps, Avg. Travel Time= 5.9 min

Peak Storage= 68 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.20' , Surface Width= 2.51'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 35.05 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 167.0' Slope= 0.0105 '/'
Inlet Invert= 253.75', Outlet Invert= 252.00'

Summary for Reach 7R: Swale

[62] Hint: Exceeded Reach 6R OUTLET depth by 0.09' @ 12.20 hrs

Inflow Area = 56,601 sf, 53.74% Impervious, Inflow Depth > 0.65" for 2-Inch event
Inflow = 0.89 cfs @ 12.11 hrs, Volume= 3,066 cf
Outflow = 0.82 cfs @ 12.15 hrs, Volume= 3,055 cf, Atten= 8%, Lag= 2.3 min
Routed to Reach 8R : Box Culvert to Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 1.31 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 0.43 fps, Avg. Travel Time= 10.0 min

Peak Storage= 161 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.28' , Surface Width= 2.91'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 26.05 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 259.0' Slope= 0.0058 '/'
Inlet Invert= 252.00', Outlet Invert= 250.50'

Summary for Reach 8R: Box Culvert to Infiltration Pond

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 56,601 sf, 53.74% Impervious, Inflow Depth > 0.65" for 2-Inch event
Inflow = 0.82 cfs @ 12.15 hrs, Volume= 3,055 cf
Outflow = 0.82 cfs @ 12.15 hrs, Volume= 3,054 cf, Atten= 0%, Lag= 0.1 min
Routed to Pond P1 : Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 0.84 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.24 fps, Avg. Travel Time= 0.4 min

Peak Storage= 6 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.19' , Surface Width= 5.00'
Bank-Full Depth= 1.50' Flow Area= 7.5 sf, Capacity= 13.65 cfs

60.0" W x 18.0" H Box Pipe
n= 0.040 Earth, cobble bottom, clean sides
Length= 6.0' Slope= 0.0050 '/'
Inlet Invert= 250.00', Outlet Invert= 249.97'

Summary for Pond 4R: Pipe to Infiltration Pond

[62] Hint: Exceeded Reach 3R OUTLET depth by 0.11' @ 12.15 hrs

Inflow Area = 52,857 sf, 54.28% Impervious, Inflow Depth > 0.62" for 2-Inch event
Inflow = 0.78 cfs @ 12.13 hrs, Volume= 2,749 cf
Outflow = 0.78 cfs @ 12.14 hrs, Volume= 2,748 cf, Atten= 0%, Lag= 0.3 min
Primary = 0.78 cfs @ 12.14 hrs, Volume= 2,748 cf
Routed to Pond P1 : Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 250.33' @ 12.14 hrs Surf.Area= 74 sf Storage= 16 cf

Plug-Flow detention time= 0.7 min calculated for 2,747 cf (100% of inflow)
Center-of-Mass det. time= 0.4 min (865.7 - 865.3)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	620 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
250.00	22	0	0
251.00	181	102	102
252.00	855	518	620

Device	Routing	Invert	Outlet Devices
#1	Primary	250.00'	**15.0" Round Culvert X 2.00** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 250.00' / 249.72' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=0.78 cfs @ 12.14 hrs HW=250.33' TW=249.27' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.78 cfs @ 2.29 fps)

Summary for Pond P1: Infiltration Pond

Inflow Area = 170,916 sf, 44.06% Impervious, Inflow Depth > 0.55" for 2-Inch event
Inflow = 2.06 cfs @ 12.13 hrs, Volume= 7,787 cf
Outflow = 1.60 cfs @ 12.22 hrs, Volume= 7,785 cf, Atten= 23%, Lag= 5.5 min
Discarded = 1.60 cfs @ 12.22 hrs, Volume= 7,785 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link AP1 : Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 249.28' @ 12.22 hrs Surf.Area= 8,231 sf Storage= 244 cf

Plug-Flow detention time= 1.1 min calculated for 7,782 cf (100% of inflow)
Center-of-Mass det. time= 0.9 min (860.0 - 859.0)

Volume	Invert	Avail.Storage	Storage Description
#1	249.25'	24,649 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
249.25	8,187	0	0
250.00	9,297	6,557	6,557
251.00	10,866	10,082	16,638
251.70	12,024	8,011	24,649

Device	Routing	Invert	Outlet Devices
#1	Primary	249.90'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Discarded	249.25'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 247.00' Phase-In= 0.01'

Discarded OutFlow Max=1.60 cfs @ 12.22 hrs HW=249.28' (Free Discharge)
↑**2=Exfiltration** (Controls 1.60 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=249.25' TW=0.00' (Dynamic Tailwater)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link AP1: Wetlands

Inflow Area = 292,946 sf, 29.39% Impervious, Inflow Depth > 0.04" for 2-Inch event
Inflow = 0.06 cfs @ 12.66 hrs, Volume= 1,021 cf
Primary = 0.06 cfs @ 12.66 hrs, Volume= 1,021 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 3
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 201: to Under Sidewalk Unit Runoff Area=17,748 sf 80.43% Impervious Runoff Depth>2.32"
Tc=6.0 min CN=91 Runoff=1.09 cfs 3,434 cf

Subcatchment 202: To RGT 1 Runoff Area=17,947 sf 48.49% Impervious Runoff Depth>1.39"
Tc=6.0 min CN=79 Runoff=0.66 cfs 2,075 cf

Subcatchment 203: To RGT 2 Runoff Area=17,507 sf 63.88% Impervious Runoff Depth>1.82"
Tc=6.0 min CN=85 Runoff=0.86 cfs 2,649 cf

Subcatchment 204: To RGT 3 Runoff Area=9,147 sf 62.73% Impervious Runoff Depth>1.74"
Tc=6.0 min CN=84 Runoff=0.43 cfs 1,326 cf

Subcatchment 205: To RGT 4 Runoff Area=6,183 sf 86.80% Impervious Runoff Depth>2.51"
Tc=6.0 min CN=93 Runoff=0.40 cfs 1,294 cf

Subcatchment 206: To RGT 5 Runoff Area=18,720 sf 60.91% Impervious Runoff Depth>1.74"
Tc=6.0 min CN=84 Runoff=0.88 cfs 2,713 cf

Subcatchment 207: To RGT 6 Runoff Area=19,445 sf 50.44% Impervious Runoff Depth>1.45"
Tc=6.0 min CN=80 Runoff=0.76 cfs 2,356 cf

Subcatchment 208: To Swale Runoff Area=4,919 sf 31.45% Impervious Runoff Depth>1.03"
Tc=6.0 min CN=73 Runoff=0.13 cfs 421 cf

Subcatchment 209: To Swale Runoff Area=3,858 sf 28.90% Impervious Runoff Depth>0.97"
Tc=6.0 min CN=72 Runoff=0.09 cfs 312 cf

Subcatchment 210: To Swale Runoff Area=1,505 sf 48.11% Impervious Runoff Depth>1.39"
Tc=6.0 min CN=79 Runoff=0.06 cfs 174 cf

Subcatchment 211: To Swale Runoff Area=4,032 sf 35.99% Impervious Runoff Depth>1.08"
Tc=6.0 min CN=74 Runoff=0.11 cfs 364 cf

Subcatchment 212: To Swale Runoff Area=2,719 sf 32.88% Impervious Runoff Depth>1.03"
Tc=6.0 min CN=73 Runoff=0.07 cfs 233 cf

Subcatchment 213: Direct to Infiltration Runoff Area=43,710 sf 4.37% Impervious Runoff Depth>0.47"
Tc=6.0 min CN=61 Runoff=0.36 cfs 1,719 cf

Subcatchment 214: Direct to Wetland Runoff Area=122,030 sf 8.85% Impervious Runoff Depth>0.55"
Flow Length=492' Tc=20.9 min CN=63 Runoff=0.89 cfs 5,561 cf

Subcatchment 215: To Swale Runoff Area=3,476 sf 33.92% Impervious Runoff Depth>1.08"
Tc=6.0 min CN=74 Runoff=0.10 cfs 313 cf

Reach 1R: Swale Avg. Flow Depth=0.12' Max Vel=2.21 fps Inflow=0.48 cfs 1,500 cf
n=0.030 L=24.0' S=0.0417 '/' Capacity=69.88 cfs Outflow=0.48 cfs 1,499 cf

Reach 2R: Swale Avg. Flow Depth=0.30' Max Vel=2.05 fps Inflow=1.45 cfs 4,512 cf
n=0.030 L=230.0' S=0.0130 '/' Capacity=39.10 cfs Outflow=1.40 cfs 4,503 cf

Reach 3R: Swale Avg. Flow Depth=0.37' Max Vel=2.32 fps Inflow=2.12 cfs 6,811 cf
n=0.030 L=149.0' S=0.0134 '/' Capacity=39.66 cfs Outflow=2.10 cfs 6,804 cf

Reach 5R: Swale Avg. Flow Depth=0.14' Max Vel=1.82 fps Inflow=0.50 cfs 1,606 cf
n=0.030 L=139.0' S=0.0234 '/' Capacity=52.35 cfs Outflow=0.49 cfs 1,604 cf

Reach 6R: Swale Avg. Flow Depth=0.33' Max Vel=1.92 fps Inflow=1.49 cfs 4,738 cf
n=0.030 L=167.0' S=0.0105 '/' Capacity=35.05 cfs Outflow=1.46 cfs 4,731 cf

Reach 7R: Swale Avg. Flow Depth=0.47' Max Vel=1.73 fps Inflow=2.30 cfs 7,401 cf
n=0.030 L=259.0' S=0.0058 '/' Capacity=26.05 cfs Outflow=2.17 cfs 7,383 cf

Reach 8R: Box Culvert to Infiltration Avg. Flow Depth=0.36' Max Vel=1.21 fps Inflow=2.17 cfs 7,383 cf
60.0" x 18.0" Box Pipe n=0.040 L=6.0' S=0.0050 '/' Capacity=13.65 cfs Outflow=2.17 cfs 7,383 cf

Pond 4R: Pipe to Infiltration Pond Peak Elev=250.55' Storage=37 cf Inflow=2.10 cfs 6,804 cf
15.0" Round Culvert x 2.00 n=0.012 L=55.0' S=0.0051 '/' Outflow=2.09 cfs 6,802 cf

Pond P1: Infiltration Pond Peak Elev=249.64' Storage=3,263 cf Inflow=5.60 cfs 19,337 cf
Discarded=1.95 cfs 19,333 cf Primary=0.00 cfs 0 cf Outflow=1.95 cfs 19,333 cf

Link AP1: Wetlands Inflow=0.89 cfs 5,561 cf
Primary=0.89 cfs 5,561 cf

Total Runoff Area = 292,946 sf Runoff Volume = 24,943 cf Average Runoff Depth = 1.02"
70.61% Pervious = 206,849 sf 29.39% Impervious = 86,097 sf

Summary for Subcatchment 201: to Under Sidewalk Unit

Runoff = 1.09 cfs @ 12.09 hrs, Volume= 3,434 cf, Depth> 2.32"
Routed to Pond P1 : Infiltration Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
13,365	98	Paved parking, HSG B
3,474	61	>75% Grass cover, Good, HSG B
909	98	Roofs, HSG B
17,748	91	Weighted Average
3,474		19.57% Pervious Area
14,274		80.43% Impervious Area

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

Summary for Subcatchment 202: To RGT 1

Runoff = 0.66 cfs @ 12.09 hrs, Volume= 2,075 cf, Depth> 1.39"
Routed to Reach 3R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
4,676	98	Paved parking, HSG B
9,245	61	>75% Grass cover, Good, HSG B
4,026	98	Roofs, HSG B
17,947	79	Weighted Average
9,245		51.51% Pervious Area
8,702		48.49% Impervious Area

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

Summary for Subcatchment 203: To RGT 2

Runoff = 0.86 cfs @ 12.09 hrs, Volume= 2,649 cf, Depth> 1.82"
Routed to Reach 2R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
7,022	98	Paved parking, HSG B
6,324	61	>75% Grass cover, Good, HSG B
4,161	98	Roofs, HSG B
17,507	85	Weighted Average
6,324		36.12% Pervious Area
11,183		63.88% Impervious Area

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

Summary for Subcatchment 204: To RGT 3

Runoff = 0.43 cfs @ 12.09 hrs, Volume= 1,326 cf, Depth> 1.74"
Routed to Reach 1R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
3,638	98	Paved parking, HSG B
3,409	61	>75% Grass cover, Good, HSG B
2,100	98	Roofs, HSG B
9,147	84	Weighted Average
3,409		37.27% Pervious Area
5,738		62.73% Impervious Area

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

Summary for Subcatchment 205: To RGT 4

Runoff = 0.40 cfs @ 12.09 hrs, Volume= 1,294 cf, Depth> 2.51"
Routed to Reach 5R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
4,135	98	Paved parking, HSG B
816	61	>75% Grass cover, Good, HSG B
1,232	98	Roofs, HSG B
6,183	93	Weighted Average
816		13.20% Pervious Area
5,367		86.80% Impervious Area

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

Summary for Subcatchment 206: To RGT 5

Runoff = 0.88 cfs @ 12.09 hrs, Volume= 2,713 cf, Depth> 1.74"
Routed to Reach 6R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
7,564	98	Paved parking, HSG B
7,317	61	>75% Grass cover, Good, HSG B
3,839	98	Roofs, HSG B
18,720	84	Weighted Average
7,317		39.09% Pervious Area
11,403		60.91% Impervious Area

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

Summary for Subcatchment 207: To RGT 6

Runoff = 0.76 cfs @ 12.09 hrs, Volume= 2,356 cf, Depth> 1.45"
Routed to Reach 7R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
6,428	98	Paved parking, HSG B
9,636	61	>75% Grass cover, Good, HSG B
3,381	98	Roofs, HSG B
19,445	80	Weighted Average
9,636		49.56% Pervious Area
9,809		50.44% Impervious Area

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

Summary for Subcatchment 208: To Swale

Runoff = 0.13 cfs @ 12.10 hrs, Volume= 421 cf, Depth> 1.03"
Routed to Reach 6R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
1,547	98	Paved parking, HSG B
3,372	61	>75% Grass cover, Good, HSG B
4,919	73	Weighted Average
3,372		68.55% Pervious Area
1,547		31.45% Impervious Area

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

Summary for Subcatchment 209: To Swale

Runoff = 0.09 cfs @ 12.10 hrs, Volume= 312 cf, Depth> 0.97"
Routed to Reach 5R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
1,115	98	Paved parking, HSG B
2,743	61	>75% Grass cover, Good, HSG B
3,858	72	Weighted Average
2,743		71.10% Pervious Area
1,115		28.90% Impervious Area

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

Summary for Subcatchment 210: To Swale

Runoff = 0.06 cfs @ 12.09 hrs, Volume= 174 cf, Depth> 1.39"
Routed to Reach 1R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
724	98	Paved parking, HSG B
781	61	>75% Grass cover, Good, HSG B
1,505	79	Weighted Average
781		51.89% Pervious Area
724		48.11% Impervious Area

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

Summary for Subcatchment 211: To Swale

Runoff = 0.11 cfs @ 12.10 hrs, Volume= 364 cf, Depth> 1.08"
Routed to Reach 2R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
1,451	98	Paved parking, HSG B
2,581	61	>75% Grass cover, Good, HSG B
4,032	74	Weighted Average
2,581		64.01% Pervious Area
1,451		35.99% Impervious Area

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

Summary for Subcatchment 212: To Swale

Runoff = 0.07 cfs @ 12.10 hrs, Volume= 233 cf, Depth> 1.03"
Routed to Reach 3R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
894	98	Paved parking, HSG B
1,825	61	>75% Grass cover, Good, HSG B
2,719	73	Weighted Average
1,825		67.12% Pervious Area
894		32.88% Impervious Area

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

Summary for Subcatchment 213: Direct to Infiltration Pond

Runoff = 0.36 cfs @ 12.12 hrs, Volume= 1,719 cf, Depth> 0.47"
Routed to Pond P1 : Infiltration Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
1,912	98	Paved parking, HSG B
39,571	61	>75% Grass cover, Good, HSG B
2,227	39	>75% Grass cover, Good, HSG A
43,710	61	Weighted Average
41,798		95.63% Pervious Area
1,912		4.37% Impervious Area

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

Summary for Subcatchment 214: Direct to Wetland

Runoff = 0.89 cfs @ 12.38 hrs, Volume= 5,561 cf, Depth> 0.55"
Routed to Link AP1 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
7,280	98	Paved parking, HSG B
96,435	61	>75% Grass cover, Good, HSG B
9,806	55	Woods, Good, HSG B
3,519	98	Roofs, HSG B
3,940	39	>75% Grass cover, Good, HSG A
1,050	30	Woods, Good, HSG A
122,030	63	Weighted Average
111,231		91.15% Pervious Area
10,799		8.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.1600	0.09		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.4	41	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.0	401	0.0075	0.61		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.9	492	Total			

Summary for Subcatchment 215: To Swale

Runoff = 0.10 cfs @ 12.10 hrs, Volume= 313 cf, Depth> 1.08"
Routed to Reach 7R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.27"

Area (sf)	CN	Description
1,179	98	Paved parking, HSG B
2,297	61	>75% Grass cover, Good, HSG B
3,476	74	Weighted Average
2,297		66.08% Pervious Area
1,179		33.92% Impervious Area

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

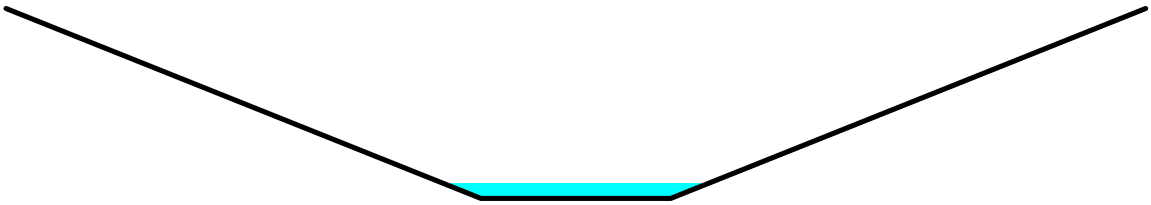
Summary for Reach 1R: Swale

Inflow Area = 10,652 sf, 60.66% Impervious, Inflow Depth > 1.69" for 2-yr event
Inflow = 0.48 cfs @ 12.09 hrs, Volume= 1,500 cf
Outflow = 0.48 cfs @ 12.09 hrs, Volume= 1,499 cf, Atten= 0%, Lag= 0.1 min
Routed to Reach 2R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.21 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.73 fps, Avg. Travel Time= 0.6 min

Peak Storage= 5 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.12' , Surface Width= 2.11'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 69.88 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 24.0' Slope= 0.0417 '/'
Inlet Invert= 256.00', Outlet Invert= 255.00'



Summary for Reach 2R: Swale

[62] Hint: Exceeded Reach 1R OUTLET depth by 0.18' @ 12.13 hrs

Inflow Area = 32,191 sf, 59.32% Impervious, Inflow Depth > 1.68" for 2-yr event
Inflow = 1.45 cfs @ 12.09 hrs, Volume= 4,512 cf
Outflow = 1.40 cfs @ 12.11 hrs, Volume= 4,503 cf, Atten= 3%, Lag= 1.3 min
Routed to Reach 3R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.05 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 0.67 fps, Avg. Travel Time= 5.7 min

Peak Storage= 157 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.30' , Surface Width= 3.01'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 39.10 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 230.0' Slope= 0.0130 '/'
Inlet Invert= 255.00', Outlet Invert= 252.00'

Summary for Reach 3R: Swale

[62] Hint: Exceeded Reach 2R OUTLET depth by 0.07' @ 12.15 hrs

Inflow Area = 52,857 sf, 54.28% Impervious, Inflow Depth > 1.55" for 2-yr event
Inflow = 2.12 cfs @ 12.11 hrs, Volume= 6,811 cf
Outflow = 2.10 cfs @ 12.12 hrs, Volume= 6,804 cf, Atten= 1%, Lag= 0.8 min
Routed to Pond 4R : Pipe to Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.32 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 0.78 fps, Avg. Travel Time= 3.2 min

Peak Storage= 134 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.37' , Surface Width= 3.36'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 39.66 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 149.0' Slope= 0.0134 '/'
Inlet Invert= 252.00', Outlet Invert= 250.00'

Summary for Reach 5R: Swale

Inflow Area = 10,041 sf, 64.56% Impervious, Inflow Depth > 1.92" for 2-yr event
Inflow = 0.50 cfs @ 12.09 hrs, Volume= 1,606 cf
Outflow = 0.49 cfs @ 12.10 hrs, Volume= 1,604 cf, Atten= 2%, Lag= 0.9 min
Routed to Reach 6R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 1.82 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.56 fps, Avg. Travel Time= 4.1 min

Peak Storage= 37 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.14' , Surface Width= 2.22'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 52.35 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 139.0' Slope= 0.0234 '/'
Inlet Invert= 257.00', Outlet Invert= 253.75'

Summary for Reach 6R: Swale

[62] Hint: Exceeded Reach 5R OUTLET depth by 0.18' @ 12.12 hrs

Inflow Area = 33,680 sf, 57.70% Impervious, Inflow Depth > 1.69" for 2-yr event
Inflow = 1.49 cfs @ 12.09 hrs, Volume= 4,738 cf
Outflow = 1.46 cfs @ 12.11 hrs, Volume= 4,731 cf, Atten= 2%, Lag= 1.1 min
Routed to Reach 7R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 1.92 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 0.58 fps, Avg. Travel Time= 4.8 min

Peak Storage= 127 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.33' , Surface Width= 3.14'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 35.05 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 167.0' Slope= 0.0105 '/'
Inlet Invert= 253.75', Outlet Invert= 252.00'

Summary for Reach 7R: Swale

[62] Hint: Exceeded Reach 6R OUTLET depth by 0.16' @ 12.18 hrs

Inflow Area = 56,601 sf, 53.74% Impervious, Inflow Depth > 1.57" for 2-yr event
Inflow = 2.30 cfs @ 12.10 hrs, Volume= 7,401 cf
Outflow = 2.17 cfs @ 12.13 hrs, Volume= 7,383 cf, Atten= 5%, Lag= 1.8 min
Routed to Reach 8R : Box Culvert to Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 1.73 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 0.54 fps, Avg. Travel Time= 8.0 min

Peak Storage= 325 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.47' , Surface Width= 3.85'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 26.05 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 259.0' Slope= 0.0058 '/'
Inlet Invert= 252.00', Outlet Invert= 250.50'

Summary for Reach 8R: Box Culvert to Infiltration Pond

[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 56,601 sf, 53.74% Impervious, Inflow Depth > 1.57" for 2-yr event
Inflow = 2.17 cfs @ 12.13 hrs, Volume= 7,383 cf
Outflow = 2.17 cfs @ 12.13 hrs, Volume= 7,383 cf, Atten= 0%, Lag= 0.1 min
Routed to Pond P1 : Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 1.21 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.31 fps, Avg. Travel Time= 0.3 min

Peak Storage= 11 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.36' , Surface Width= 5.00'
Bank-Full Depth= 1.50' Flow Area= 7.5 sf, Capacity= 13.65 cfs

60.0" W x 18.0" H Box Pipe
n= 0.040 Earth, cobble bottom, clean sides
Length= 6.0' Slope= 0.0050 '/'
Inlet Invert= 250.00', Outlet Invert= 249.97'

Summary for Pond 4R: Pipe to Infiltration Pond

[62] Hint: Exceeded Reach 3R OUTLET depth by 0.18' @ 12.13 hrs

Inflow Area = 52,857 sf, 54.28% Impervious, Inflow Depth > 1.54" for 2-yr event
Inflow = 2.10 cfs @ 12.12 hrs, Volume= 6,804 cf
Outflow = 2.09 cfs @ 12.12 hrs, Volume= 6,802 cf, Atten= 0%, Lag= 0.3 min
Primary = 2.09 cfs @ 12.12 hrs, Volume= 6,802 cf
Routed to Pond P1 : Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 250.55' @ 12.12 hrs Surf.Area= 110 sf Storage= 37 cf

Plug-Flow detention time= 0.5 min calculated for 6,802 cf (100% of inflow)
Center-of-Mass det. time= 0.4 min (838.6 - 838.2)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	620 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
250.00	22	0	0
251.00	181	102	102
252.00	855	518	620

Device	Routing	Invert	Outlet Devices
#1	Primary	250.00'	**15.0" Round Culvert X 2.00** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 250.00' / 249.72' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=2.09 cfs @ 12.12 hrs HW=250.55' TW=249.42' (Dynamic Tailwater)
1=Culvert (Barrel Controls 2.09 cfs @ 2.94 fps)

Summary for Pond P1: Infiltration Pond

Inflow Area = 170,916 sf, 44.06% Impervious, Inflow Depth > 1.36" for 2-yr event
Inflow = 5.60 cfs @ 12.12 hrs, Volume= 19,337 cf
Outflow = 1.95 cfs @ 12.47 hrs, Volume= 19,333 cf, Atten= 65%, Lag= 21.0 min
Discarded = 1.95 cfs @ 12.47 hrs, Volume= 19,333 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link AP1 : Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 249.64' @ 12.47 hrs Surf.Area= 8,757 sf Storage= 3,263 cf

Plug-Flow detention time= 9.0 min calculated for 19,333 cf (100% of inflow)
Center-of-Mass det. time= 8.9 min (846.3 - 837.4)

Volume	Invert	Avail.Storage	Storage Description
#1	249.25'	24,649 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
249.25	8,187	0	0
250.00	9,297	6,557	6,557
251.00	10,866	10,082	16,638
251.70	12,024	8,011	24,649

Device	Routing	Invert	Outlet Devices
#1	Primary	249.90'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Discarded	249.25'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 247.00' Phase-In= 0.01'

Discarded OutFlow Max=1.95 cfs @ 12.47 hrs HW=249.64' (Free Discharge)
↑**2=Exfiltration** (Controls 1.95 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=249.25' TW=0.00' (Dynamic Tailwater)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link AP1: Wetlands

Inflow Area = 292,946 sf, 29.39% Impervious, Inflow Depth > 0.23" for 2-yr event
Inflow = 0.89 cfs @ 12.38 hrs, Volume= 5,561 cf
Primary = 0.89 cfs @ 12.38 hrs, Volume= 5,561 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 3
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 201: to Under Sidewalk Unit Runoff Area=17,748 sf 80.43% Impervious Runoff Depth>3.90"
Tc=6.0 min CN=91 Runoff=1.79 cfs 5,769 cf

Subcatchment 202: To RGT 1 Runoff Area=17,947 sf 48.49% Impervious Runoff Depth>2.73"
Tc=6.0 min CN=79 Runoff=1.32 cfs 4,083 cf

Subcatchment 203: To RGT 2 Runoff Area=17,507 sf 63.88% Impervious Runoff Depth>3.29"
Tc=6.0 min CN=85 Runoff=1.54 cfs 4,801 cf

Subcatchment 204: To RGT 3 Runoff Area=9,147 sf 62.73% Impervious Runoff Depth>3.19"
Tc=6.0 min CN=84 Runoff=0.78 cfs 2,435 cf

Subcatchment 205: To RGT 4 Runoff Area=6,183 sf 86.80% Impervious Runoff Depth>4.12"
Tc=6.0 min CN=93 Runoff=0.65 cfs 2,121 cf

Subcatchment 206: To RGT 5 Runoff Area=18,720 sf 60.91% Impervious Runoff Depth>3.19"
Tc=6.0 min CN=84 Runoff=1.60 cfs 4,983 cf

Subcatchment 207: To RGT 6 Runoff Area=19,445 sf 50.44% Impervious Runoff Depth>2.82"
Tc=6.0 min CN=80 Runoff=1.48 cfs 4,570 cf

Subcatchment 208: To Swale Runoff Area=4,919 sf 31.45% Impervious Runoff Depth>2.22"
Tc=6.0 min CN=73 Runoff=0.29 cfs 908 cf

Subcatchment 209: To Swale Runoff Area=3,858 sf 28.90% Impervious Runoff Depth>2.13"
Tc=6.0 min CN=72 Runoff=0.22 cfs 686 cf

Subcatchment 210: To Swale Runoff Area=1,505 sf 48.11% Impervious Runoff Depth>2.73"
Tc=6.0 min CN=79 Runoff=0.11 cfs 342 cf

Subcatchment 211: To Swale Runoff Area=4,032 sf 35.99% Impervious Runoff Depth>2.30"
Tc=6.0 min CN=74 Runoff=0.25 cfs 772 cf

Subcatchment 212: To Swale Runoff Area=2,719 sf 32.88% Impervious Runoff Depth>2.22"
Tc=6.0 min CN=73 Runoff=0.16 cfs 502 cf

Subcatchment 213: Direct to Infiltration Runoff Area=43,710 sf 4.37% Impervious Runoff Depth>1.32"
Tc=6.0 min CN=61 Runoff=1.41 cfs 4,805 cf

Subcatchment 214: Direct to Wetland Runoff Area=122,030 sf 8.85% Impervious Runoff Depth>1.45"
Flow Length=492' Tc=20.9 min CN=63 Runoff=2.92 cfs 14,744 cf

Subcatchment 215: To Swale Runoff Area=3,476 sf 33.92% Impervious Runoff Depth>2.30"
Tc=6.0 min CN=74 Runoff=0.21 cfs 666 cf

Reach 1R: Swale Avg. Flow Depth=0.17' Max Vel=2.69 fps Inflow=0.89 cfs 2,777 cf
n=0.030 L=24.0' S=0.0417 '/' Capacity=69.88 cfs Outflow=0.89 cfs 2,777 cf

Reach 2R: Swale Avg. Flow Depth=0.42' Max Vel=2.44 fps Inflow=2.68 cfs 8,350 cf
n=0.030 L=230.0' S=0.0130 '/' Capacity=39.10 cfs Outflow=2.61 cfs 8,338 cf

Reach 3R: Swale Avg. Flow Depth=0.52' Max Vel=2.78 fps Inflow=4.07 cfs 12,922 cf
n=0.030 L=149.0' S=0.0134 '/' Capacity=39.66 cfs Outflow=4.03 cfs 12,912 cf

Reach 5R: Swale Avg. Flow Depth=0.20' Max Vel=2.17 fps Inflow=0.86 cfs 2,807 cf
n=0.030 L=139.0' S=0.0234 '/' Capacity=52.35 cfs Outflow=0.85 cfs 2,804 cf

Reach 6R: Swale Avg. Flow Depth=0.45' Max Vel=2.28 fps Inflow=2.74 cfs 8,694 cf
n=0.030 L=167.0' S=0.0105 '/' Capacity=35.05 cfs Outflow=2.70 cfs 8,685 cf

Reach 7R: Swale Avg. Flow Depth=0.65' Max Vel=2.06 fps Inflow=4.36 cfs 13,920 cf
n=0.030 L=259.0' S=0.0058 '/' Capacity=26.05 cfs Outflow=4.18 cfs 13,896 cf

Reach 8R: Box Culvert to Infiltration Avg. Flow Depth=0.54' Max Vel=1.54 fps Inflow=4.18 cfs 13,896 cf
60.0" x 18.0" Box Pipe n=0.040 L=6.0' S=0.0050 '/' Capacity=13.65 cfs Outflow=4.18 cfs 13,895 cf

Pond 4R: Pipe to Infiltration Pond Peak Elev=250.80' Storage=69 cf Inflow=4.03 cfs 12,912 cf
15.0" Round Culvert x 2.00 n=0.012 L=55.0' S=0.0051 '/' Outflow=4.03 cfs 12,910 cf

Pond P1: Infiltration Pond Peak Elev=250.11' Storage=7,635 cf Inflow=11.24 cfs 37,379 cf
Discarded=2.46 cfs 33,776 cf Primary=2.67 cfs 3,596 cf Outflow=5.13 cfs 37,372 cf

Link AP1: Wetlands Inflow=5.59 cfs 18,340 cf
Primary=5.59 cfs 18,340 cf

Total Runoff Area = 292,946 sf Runoff Volume = 52,185 cf Average Runoff Depth = 2.14"
70.61% Pervious = 206,849 sf 29.39% Impervious = 86,097 sf

Summary for Subcatchment 201: to Under Sidewalk Unit

Runoff = 1.79 cfs @ 12.08 hrs, Volume= 5,769 cf, Depth> 3.90"
Routed to Pond P1 : Infiltration Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.92"

Area (sf)	CN	Description
13,365	98	Paved parking, HSG B
3,474	61	>75% Grass cover, Good, HSG B
909	98	Roofs, HSG B
17,748	91	Weighted Average
3,474		19.57% Pervious Area
14,274		80.43% Impervious Area

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

Summary for Subcatchment 202: To RGT 1

Runoff = 1.32 cfs @ 12.09 hrs, Volume= 4,083 cf, Depth> 2.73"
Routed to Reach 3R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.92"

Area (sf)	CN	Description
4,676	98	Paved parking, HSG B
9,245	61	>75% Grass cover, Good, HSG B
4,026	98	Roofs, HSG B
17,947	79	Weighted Average
9,245		51.51% Pervious Area
8,702		48.49% Impervious Area

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

Summary for Subcatchment 203: To RGT 2

Runoff = 1.54 cfs @ 12.09 hrs, Volume= 4,801 cf, Depth> 3.29"
Routed to Reach 2R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.92"

Area (sf)	CN	Description
7,022	98	Paved parking, HSG B
6,324	61	>75% Grass cover, Good, HSG B
4,161	98	Roofs, HSG B
17,507	85	Weighted Average
6,324		36.12% Pervious Area
11,183		63.88% Impervious Area

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

Summary for Subcatchment 204: To RGT 3

Runoff = 0.78 cfs @ 12.09 hrs, Volume= 2,435 cf, Depth> 3.19"
Routed to Reach 1R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.92"

Area (sf)	CN	Description
3,638	98	Paved parking, HSG B
3,409	61	>75% Grass cover, Good, HSG B
2,100	98	Roofs, HSG B
9,147	84	Weighted Average
3,409		37.27% Pervious Area
5,738		62.73% Impervious Area

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

Summary for Subcatchment 205: To RGT 4

Runoff = 0.65 cfs @ 12.08 hrs, Volume= 2,121 cf, Depth> 4.12"
Routed to Reach 5R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.92"

Area (sf)	CN	Description
4,135	98	Paved parking, HSG B
816	61	>75% Grass cover, Good, HSG B
1,232	98	Roofs, HSG B
6,183	93	Weighted Average
816		13.20% Pervious Area
5,367		86.80% Impervious Area

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

Summary for Subcatchment 206: To RGT 5

Runoff = 1.60 cfs @ 12.09 hrs, Volume= 4,983 cf, Depth> 3.19"
Routed to Reach 6R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.92"

Area (sf)	CN	Description
7,564	98	Paved parking, HSG B
7,317	61	>75% Grass cover, Good, HSG B
3,839	98	Roofs, HSG B
18,720	84	Weighted Average
7,317		39.09% Pervious Area
11,403		60.91% Impervious Area

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

Summary for Subcatchment 207: To RGT 6

Runoff = 1.48 cfs @ 12.09 hrs, Volume= 4,570 cf, Depth> 2.82"
Routed to Reach 7R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.92"

Area (sf)	CN	Description
6,428	98	Paved parking, HSG B
9,636	61	>75% Grass cover, Good, HSG B
3,381	98	Roofs, HSG B
19,445	80	Weighted Average
9,636		49.56% Pervious Area
9,809		50.44% Impervious Area

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

Summary for Subcatchment 208: To Swale

Runoff = 0.29 cfs @ 12.09 hrs, Volume= 908 cf, Depth> 2.22"
Routed to Reach 6R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.92"

Area (sf)	CN	Description
1,547	98	Paved parking, HSG B
3,372	61	>75% Grass cover, Good, HSG B
4,919	73	Weighted Average
3,372		68.55% Pervious Area
1,547		31.45% Impervious Area

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

Summary for Subcatchment 209: To Swale

Runoff = 0.22 cfs @ 12.09 hrs, Volume= 686 cf, Depth> 2.13"
Routed to Reach 5R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.92"

Area (sf)	CN	Description
1,115	98	Paved parking, HSG B
2,743	61	>75% Grass cover, Good, HSG B
3,858	72	Weighted Average
2,743		71.10% Pervious Area
1,115		28.90% Impervious Area

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

Summary for Subcatchment 210: To Swale

Runoff = 0.11 cfs @ 12.09 hrs, Volume= 342 cf, Depth> 2.73"
Routed to Reach 1R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.92"

Area (sf)	CN	Description
724	98	Paved parking, HSG B
781	61	>75% Grass cover, Good, HSG B
1,505	79	Weighted Average
781		51.89% Pervious Area
724		48.11% Impervious Area

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

Summary for Subcatchment 211: To Swale

Runoff = 0.25 cfs @ 12.09 hrs, Volume= 772 cf, Depth> 2.30"
Routed to Reach 2R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.92"

Area (sf)	CN	Description
1,451	98	Paved parking, HSG B
2,581	61	>75% Grass cover, Good, HSG B
4,032	74	Weighted Average
2,581		64.01% Pervious Area
1,451		35.99% Impervious Area

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

Summary for Subcatchment 212: To Swale

Runoff = 0.16 cfs @ 12.09 hrs, Volume= 502 cf, Depth> 2.22"
Routed to Reach 3R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.92"

Area (sf)	CN	Description
894	98	Paved parking, HSG B
1,825	61	>75% Grass cover, Good, HSG B
2,719	73	Weighted Average
1,825		67.12% Pervious Area
894		32.88% Impervious Area

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

Summary for Subcatchment 213: Direct to Infiltration Pond

Runoff = 1.41 cfs @ 12.10 hrs, Volume= 4,805 cf, Depth> 1.32"
Routed to Pond P1 : Infiltration Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.92"

Area (sf)	CN	Description
1,912	98	Paved parking, HSG B
39,571	61	>75% Grass cover, Good, HSG B
2,227	39	>75% Grass cover, Good, HSG A
43,710	61	Weighted Average
41,798		95.63% Pervious Area
1,912		4.37% Impervious Area

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

Summary for Subcatchment 214: Direct to Wetland

Runoff = 2.92 cfs @ 12.33 hrs, Volume= 14,744 cf, Depth> 1.45"
Routed to Link AP1 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.92"

Area (sf)	CN	Description
7,280	98	Paved parking, HSG B
96,435	61	>75% Grass cover, Good, HSG B
9,806	55	Woods, Good, HSG B
3,519	98	Roofs, HSG B
3,940	39	>75% Grass cover, Good, HSG A
1,050	30	Woods, Good, HSG A
122,030	63	Weighted Average
111,231		91.15% Pervious Area
10,799		8.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.1600	0.09		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.4	41	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.0	401	0.0075	0.61		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.9	492	Total			

Summary for Subcatchment 215: To Swale

Runoff = 0.21 cfs @ 12.09 hrs, Volume= 666 cf, Depth> 2.30"
Routed to Reach 7R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=4.92"

Area (sf)	CN	Description
1,179	98	Paved parking, HSG B
2,297	61	>75% Grass cover, Good, HSG B
3,476	74	Weighted Average
2,297		66.08% Pervious Area
1,179		33.92% Impervious Area

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

Summary for Reach 1R: Swale

Inflow Area = 10,652 sf, 60.66% Impervious, Inflow Depth > 3.13" for 10-yr event
Inflow = 0.89 cfs @ 12.09 hrs, Volume= 2,777 cf
Outflow = 0.89 cfs @ 12.09 hrs, Volume= 2,777 cf, Atten= 0%, Lag= 0.1 min
Routed to Reach 2R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.69 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.81 fps, Avg. Travel Time= 0.5 min

Peak Storage= 8 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 2.36'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 69.88 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 24.0' Slope= 0.0417 '/'
Inlet Invert= 256.00', Outlet Invert= 255.00'

Summary for Reach 2R: Swale

[62] Hint: Exceeded Reach 1R OUTLET depth by 0.25' @ 12.12 hrs

Inflow Area = 32,191 sf, 59.32% Impervious, Inflow Depth > 3.11" for 10-yr event
Inflow = 2.68 cfs @ 12.09 hrs, Volume= 8,350 cf
Outflow = 2.61 cfs @ 12.11 hrs, Volume= 8,338 cf, Atten= 3%, Lag= 1.1 min
Routed to Reach 3R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.44 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.78 fps, Avg. Travel Time= 4.9 min

Peak Storage= 245 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.42' , Surface Width= 3.59'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 39.10 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 230.0' Slope= 0.0130 '/'
Inlet Invert= 255.00', Outlet Invert= 252.00'

Summary for Reach 3R: Swale

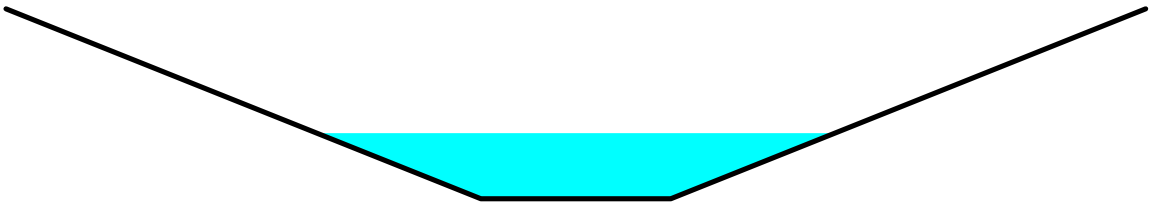
[62] Hint: Exceeded Reach 2R OUTLET depth by 0.10' @ 12.13 hrs

Inflow Area = 52,857 sf, 54.28% Impervious, Inflow Depth > 2.93" for 10-yr event
Inflow = 4.07 cfs @ 12.10 hrs, Volume= 12,922 cf
Outflow = 4.03 cfs @ 12.11 hrs, Volume= 12,912 cf, Atten= 1%, Lag= 0.7 min
Routed to Pond 4R : Pipe to Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.78 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.91 fps, Avg. Travel Time= 2.7 min

Peak Storage= 216 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.52' , Surface Width= 4.09'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 39.66 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 149.0' Slope= 0.0134 '/'
Inlet Invert= 252.00', Outlet Invert= 250.00'



Summary for Reach 5R: Swale

Inflow Area = 10,041 sf, 64.56% Impervious, Inflow Depth > 3.35" for 10-yr event
Inflow = 0.86 cfs @ 12.09 hrs, Volume= 2,807 cf
Outflow = 0.85 cfs @ 12.10 hrs, Volume= 2,804 cf, Atten= 1%, Lag= 0.7 min
Routed to Reach 6R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.17 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 0.63 fps, Avg. Travel Time= 3.7 min

Peak Storage= 55 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.20' , Surface Width= 2.49'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 52.35 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 139.0' Slope= 0.0234 '/'
Inlet Invert= 257.00', Outlet Invert= 253.75'

Summary for Reach 6R: Swale

[62] Hint: Exceeded Reach 5R OUTLET depth by 0.25' @ 12.11 hrs

Inflow Area = 33,680 sf, 57.70% Impervious, Inflow Depth > 3.10" for 10-yr event
Inflow = 2.74 cfs @ 12.09 hrs, Volume= 8,694 cf
Outflow = 2.70 cfs @ 12.11 hrs, Volume= 8,685 cf, Atten= 2%, Lag= 0.9 min
Routed to Reach 7R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.28 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 4.1 min

Peak Storage= 198 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.45' , Surface Width= 3.75'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 35.05 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 167.0' Slope= 0.0105 '/'
Inlet Invert= 253.75', Outlet Invert= 252.00'

Summary for Reach 7R: Swale

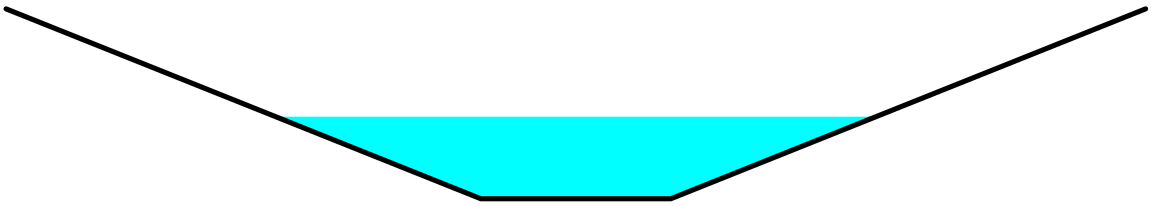
[62] Hint: Exceeded Reach 6R OUTLET depth by 0.21' @ 12.16 hrs

Inflow Area = 56,601 sf, 53.74% Impervious, Inflow Depth > 2.95" for 10-yr event
Inflow = 4.36 cfs @ 12.10 hrs, Volume= 13,920 cf
Outflow = 4.18 cfs @ 12.12 hrs, Volume= 13,896 cf, Atten= 4%, Lag= 1.5 min
Routed to Reach 8R : Box Culvert to Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.06 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 6.7 min

Peak Storage= 525 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.65' , Surface Width= 4.74'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 26.05 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 259.0' Slope= 0.0058 '/'
Inlet Invert= 252.00', Outlet Invert= 250.50'



Summary for Reach 8R: Box Culvert to Infiltration Pond

[52] Hint: Inlet/Outlet conditions not evaluated
[61] Hint: Exceeded Reach 7R outlet invert by 0.04' @ 12.13 hrs

Inflow Area = 56,601 sf, 53.74% Impervious, Inflow Depth > 2.95" for 10-yr event
Inflow = 4.18 cfs @ 12.12 hrs, Volume= 13,896 cf
Outflow = 4.18 cfs @ 12.13 hrs, Volume= 13,895 cf, Atten= 0%, Lag= 0.0 min
Routed to Pond P1 : Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 1.54 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.37 fps, Avg. Travel Time= 0.3 min

Peak Storage= 16 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.54' , Surface Width= 5.00'
Bank-Full Depth= 1.50' Flow Area= 7.5 sf, Capacity= 13.65 cfs

60.0" W x 18.0" H Box Pipe
n= 0.040 Earth, cobble bottom, clean sides
Length= 6.0' Slope= 0.0050 '/'
Inlet Invert= 250.00', Outlet Invert= 249.97'

Summary for Pond 4R: Pipe to Infiltration Pond

[62] Hint: Exceeded Reach 3R OUTLET depth by 0.29' @ 12.12 hrs

Inflow Area = 52,857 sf, 54.28% Impervious, Inflow Depth > 2.93" for 10-yr event
Inflow = 4.03 cfs @ 12.11 hrs, Volume= 12,912 cf
Outflow = 4.03 cfs @ 12.12 hrs, Volume= 12,910 cf, Atten= 0%, Lag= 0.3 min
Primary = 4.03 cfs @ 12.12 hrs, Volume= 12,910 cf
Routed to Pond P1 : Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 250.80' @ 12.12 hrs Surf.Area= 150 sf Storage= 69 cf

Plug-Flow detention time= 0.4 min calculated for 12,904 cf (100% of inflow)
Center-of-Mass det. time= 0.3 min (820.2 - 819.9)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	620 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
250.00	22	0	0
251.00	181	102	102
252.00	855	518	620

Device	Routing	Invert	Outlet Devices
#1	Primary	250.00'	**15.0" Round Culvert X 2.00** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 250.00' / 249.72' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=4.02 cfs @ 12.12 hrs HW=250.80' TW=249.79' (Dynamic Tailwater)
1=Culvert (Barrel Controls 4.02 cfs @ 3.43 fps)

Summary for Pond P1: Infiltration Pond

[61] Hint: Exceeded Reach 8R outlet invert by 0.14' @ 12.33 hrs

Inflow Area = 170,916 sf, 44.06% Impervious, Inflow Depth > 2.62" for 10-yr event
Inflow = 11.24 cfs @ 12.11 hrs, Volume= 37,379 cf
Outflow = 5.13 cfs @ 12.33 hrs, Volume= 37,372 cf, Atten= 54%, Lag= 13.3 min
Discarded = 2.46 cfs @ 12.33 hrs, Volume= 33,776 cf
Primary = 2.67 cfs @ 12.33 hrs, Volume= 3,596 cf
Routed to Link AP1 : Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 250.11' @ 12.33 hrs Surf.Area= 9,477 sf Storage= 7,635 cf

Plug-Flow detention time= 16.6 min calculated for 37,372 cf (100% of inflow)
Center-of-Mass det. time= 16.5 min (837.7 - 821.2)

Volume	Invert	Avail.Storage	Storage Description
#1	249.25'	24,649 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
249.25	8,187	0	0
250.00	9,297	6,557	6,557
251.00	10,866	10,082	16,638
251.70	12,024	8,011	24,649

Device	Routing	Invert	Outlet Devices
#1	Primary	249.90'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Discarded	249.25'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 247.00' Phase-In= 0.01'

Discarded OutFlow Max=2.46 cfs @ 12.33 hrs HW=250.11' (Free Discharge)
↑—**2=Exfiltration** (Controls 2.46 cfs)

Primary OutFlow Max=2.67 cfs @ 12.33 hrs HW=250.11' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.67 cfs @ 1.24 fps)

Summary for Link AP1: Wetlands

Inflow Area = 292,946 sf, 29.39% Impervious, Inflow Depth > 0.75" for 10-yr event
Inflow = 5.59 cfs @ 12.33 hrs, Volume= 18,340 cf
Primary = 5.59 cfs @ 12.33 hrs, Volume= 18,340 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 3
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 201: to Under Sidewalk Unit Runoff Area=17,748 sf 80.43% Impervious Runoff Depth>6.35"
Tc=6.0 min CN=91 Runoff=2.83 cfs 9,387 cf

Subcatchment 202: To RGT 1 Runoff Area=17,947 sf 48.49% Impervious Runoff Depth>4.97"
Tc=6.0 min CN=79 Runoff=2.38 cfs 7,426 cf

Subcatchment 203: To RGT 2 Runoff Area=17,507 sf 63.88% Impervious Runoff Depth>5.65"
Tc=6.0 min CN=85 Runoff=2.58 cfs 8,242 cf

Subcatchment 204: To RGT 3 Runoff Area=9,147 sf 62.73% Impervious Runoff Depth>5.53"
Tc=6.0 min CN=84 Runoff=1.33 cfs 4,219 cf

Subcatchment 205: To RGT 4 Runoff Area=6,183 sf 86.80% Impervious Runoff Depth>6.58"
Tc=6.0 min CN=93 Runoff=1.00 cfs 3,391 cf

Subcatchment 206: To RGT 5 Runoff Area=18,720 sf 60.91% Impervious Runoff Depth>5.53"
Tc=6.0 min CN=84 Runoff=2.72 cfs 8,634 cf

Subcatchment 207: To RGT 6 Runoff Area=19,445 sf 50.44% Impervious Runoff Depth>5.08"
Tc=6.0 min CN=80 Runoff=2.63 cfs 8,229 cf

Subcatchment 208: To Swale Runoff Area=4,919 sf 31.45% Impervious Runoff Depth>4.29"
Tc=6.0 min CN=73 Runoff=0.57 cfs 1,761 cf

Subcatchment 209: To Swale Runoff Area=3,858 sf 28.90% Impervious Runoff Depth>4.18"
Tc=6.0 min CN=72 Runoff=0.44 cfs 1,345 cf

Subcatchment 210: To Swale Runoff Area=1,505 sf 48.11% Impervious Runoff Depth>4.97"
Tc=6.0 min CN=79 Runoff=0.20 cfs 623 cf

Subcatchment 211: To Swale Runoff Area=4,032 sf 35.99% Impervious Runoff Depth>4.41"
Tc=6.0 min CN=74 Runoff=0.48 cfs 1,480 cf

Subcatchment 212: To Swale Runoff Area=2,719 sf 32.88% Impervious Runoff Depth>4.29"
Tc=6.0 min CN=73 Runoff=0.31 cfs 973 cf

Subcatchment 213: Direct to Infiltration Runoff Area=43,710 sf 4.37% Impervious Runoff Depth>3.00"
Tc=6.0 min CN=61 Runoff=3.48 cfs 10,945 cf

Subcatchment 214: Direct to Wetland Runoff Area=122,030 sf 8.85% Impervious Runoff Depth>3.20"
Flow Length=492' Tc=20.9 min CN=63 Runoff=6.89 cfs 32,571 cf

Subcatchment 215: To Swale Runoff Area=3,476 sf 33.92% Impervious Runoff Depth>4.41"
Tc=6.0 min CN=74 Runoff=0.41 cfs 1,276 cf

Reach 1R: Swale Avg. Flow Depth=0.23' Max Vel=3.17 fps Inflow=1.53 cfs 4,841 cf
n=0.030 L=24.0' S=0.0417 '/' Capacity=69.88 cfs Outflow=1.53 cfs 4,841 cf

Reach 2R: Swale Avg. Flow Depth=0.55' Max Vel=2.84 fps Inflow=4.59 cfs 14,563 cf
n=0.030 L=230.0' S=0.0130 '/' Capacity=39.10 cfs Outflow=4.50 cfs 14,548 cf

Reach 3R: Swale Avg. Flow Depth=0.68' Max Vel=3.24 fps Inflow=7.16 cfs 22,947 cf
n=0.030 L=149.0' S=0.0134 '/' Capacity=39.66 cfs Outflow=7.11 cfs 22,933 cf

Reach 5R: Swale Avg. Flow Depth=0.26' Max Vel=2.53 fps Inflow=1.44 cfs 4,737 cf
n=0.030 L=139.0' S=0.0234 '/' Capacity=52.35 cfs Outflow=1.43 cfs 4,733 cf

Reach 6R: Swale Avg. Flow Depth=0.59' Max Vel=2.64 fps Inflow=4.71 cfs 15,127 cf
n=0.030 L=167.0' S=0.0105 '/' Capacity=35.05 cfs Outflow=4.65 cfs 15,115 cf

Reach 7R: Swale Avg. Flow Depth=0.85' Max Vel=2.40 fps Inflow=7.65 cfs 24,620 cf
n=0.030 L=259.0' S=0.0058 '/' Capacity=26.05 cfs Outflow=7.40 cfs 24,587 cf

Reach 8R: Box Culvert to Infiltration Avg. Flow Depth=0.79' Max Vel=1.87 fps Inflow=7.40 cfs 24,587 cf
60.0" x 18.0" Box Pipe n=0.040 L=6.0' S=0.0050 '/' Capacity=13.65 cfs Outflow=7.40 cfs 24,586 cf

Pond 4R: Pipe to Infiltration Pond Peak Elev=251.15' Storage=136 cf Inflow=7.11 cfs 22,933 cf
15.0" Round Culvert x 2.00 n=0.012 L=55.0' S=0.0051 '/' Outflow=7.07 cfs 22,930 cf

Pond P1: Infiltration Pond Peak Elev=250.48' Storage=11,191 cf Inflow=20.53 cfs 67,847 cf
Discarded=2.86 cfs 50,532 cf Primary=11.90 cfs 17,303 cf Outflow=14.76 cfs 67,835 cf

Link AP1: Wetlands Inflow=17.91 cfs 49,874 cf
Primary=17.91 cfs 49,874 cf

Total Runoff Area = 292,946 sf Runoff Volume = 100,502 cf Average Runoff Depth = 4.12"
70.61% Pervious = 206,849 sf 29.39% Impervious = 86,097 sf

Summary for Subcatchment 201: to Under Sidewalk Unit

Runoff = 2.83 cfs @ 12.08 hrs, Volume= 9,387 cf, Depth> 6.35"
Routed to Pond P1 : Infiltration Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=7.42"

Area (sf)	CN	Description
13,365	98	Paved parking, HSG B
3,474	61	>75% Grass cover, Good, HSG B
909	98	Roofs, HSG B
17,748	91	Weighted Average
3,474		19.57% Pervious Area
14,274		80.43% Impervious Area

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

Summary for Subcatchment 202: To RGT 1

Runoff = 2.38 cfs @ 12.09 hrs, Volume= 7,426 cf, Depth> 4.97"
Routed to Reach 3R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=7.42"

Area (sf)	CN	Description
4,676	98	Paved parking, HSG B
9,245	61	>75% Grass cover, Good, HSG B
4,026	98	Roofs, HSG B
17,947	79	Weighted Average
9,245		51.51% Pervious Area
8,702		48.49% Impervious Area

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

Summary for Subcatchment 203: To RGT 2

Runoff = 2.58 cfs @ 12.09 hrs, Volume= 8,242 cf, Depth> 5.65"
Routed to Reach 2R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=7.42"

Area (sf)	CN	Description
7,022	98	Paved parking, HSG B
6,324	61	>75% Grass cover, Good, HSG B
4,161	98	Roofs, HSG B
17,507	85	Weighted Average
6,324		36.12% Pervious Area
11,183		63.88% Impervious Area

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

Summary for Subcatchment 204: To RGT 3

Runoff = 1.33 cfs @ 12.09 hrs, Volume= 4,219 cf, Depth> 5.53"
Routed to Reach 1R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=7.42"

Area (sf)	CN	Description
3,638	98	Paved parking, HSG B
3,409	61	>75% Grass cover, Good, HSG B
2,100	98	Roofs, HSG B
9,147	84	Weighted Average
3,409		37.27% Pervious Area
5,738		62.73% Impervious Area

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

Summary for Subcatchment 205: To RGT 4

Runoff = 1.00 cfs @ 12.08 hrs, Volume= 3,391 cf, Depth> 6.58"
Routed to Reach 5R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=7.42"

Area (sf)	CN	Description
4,135	98	Paved parking, HSG B
816	61	>75% Grass cover, Good, HSG B
1,232	98	Roofs, HSG B
6,183	93	Weighted Average
816		13.20% Pervious Area
5,367		86.80% Impervious Area

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

Summary for Subcatchment 206: To RGT 5

Runoff = 2.72 cfs @ 12.09 hrs, Volume= 8,634 cf, Depth> 5.53"
Routed to Reach 6R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=7.42"

Area (sf)	CN	Description
7,564	98	Paved parking, HSG B
7,317	61	>75% Grass cover, Good, HSG B
3,839	98	Roofs, HSG B
18,720	84	Weighted Average
7,317		39.09% Pervious Area
11,403		60.91% Impervious Area

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

Summary for Subcatchment 207: To RGT 6

Runoff = 2.63 cfs @ 12.09 hrs, Volume= 8,229 cf, Depth> 5.08"
Routed to Reach 7R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=7.42"

Area (sf)	CN	Description
6,428	98	Paved parking, HSG B
9,636	61	>75% Grass cover, Good, HSG B
3,381	98	Roofs, HSG B
19,445	80	Weighted Average
9,636		49.56% Pervious Area
9,809		50.44% Impervious Area

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

Summary for Subcatchment 208: To Swale

Runoff = 0.57 cfs @ 12.09 hrs, Volume= 1,761 cf, Depth> 4.29"
Routed to Reach 6R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=7.42"

Area (sf)	CN	Description
1,547	98	Paved parking, HSG B
3,372	61	>75% Grass cover, Good, HSG B
4,919	73	Weighted Average
3,372		68.55% Pervious Area
1,547		31.45% Impervious Area

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

Summary for Subcatchment 209: To Swale

Runoff = 0.44 cfs @ 12.09 hrs, Volume= 1,345 cf, Depth> 4.18"
Routed to Reach 5R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=7.42"

Area (sf)	CN	Description
1,115	98	Paved parking, HSG B
2,743	61	>75% Grass cover, Good, HSG B
3,858	72	Weighted Average
2,743		71.10% Pervious Area
1,115		28.90% Impervious Area

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

Summary for Subcatchment 210: To Swale

Runoff = 0.20 cfs @ 12.09 hrs, Volume= 623 cf, Depth> 4.97"
Routed to Reach 1R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=7.42"

Area (sf)	CN	Description
724	98	Paved parking, HSG B
781	61	>75% Grass cover, Good, HSG B
1,505	79	Weighted Average
781		51.89% Pervious Area
724		48.11% Impervious Area

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

Summary for Subcatchment 211: To Swale

Runoff = 0.48 cfs @ 12.09 hrs, Volume= 1,480 cf, Depth> 4.41"
Routed to Reach 2R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=7.42"

Area (sf)	CN	Description
1,451	98	Paved parking, HSG B
2,581	61	>75% Grass cover, Good, HSG B
4,032	74	Weighted Average
2,581		64.01% Pervious Area
1,451		35.99% Impervious Area

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

Summary for Subcatchment 212: To Swale

Runoff = 0.31 cfs @ 12.09 hrs, Volume= 973 cf, Depth> 4.29"
Routed to Reach 3R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=7.42"

Area (sf)	CN	Description
894	98	Paved parking, HSG B
1,825	61	>75% Grass cover, Good, HSG B
2,719	73	Weighted Average
1,825		67.12% Pervious Area
894		32.88% Impervious Area

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

Summary for Subcatchment 213: Direct to Infiltration Pond

Runoff = 3.48 cfs @ 12.09 hrs, Volume= 10,945 cf, Depth> 3.00"
Routed to Pond P1 : Infiltration Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=7.42"

Area (sf)	CN	Description
1,912	98	Paved parking, HSG B
39,571	61	>75% Grass cover, Good, HSG B
2,227	39	>75% Grass cover, Good, HSG A
43,710	61	Weighted Average
41,798		95.63% Pervious Area
1,912		4.37% Impervious Area

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

Summary for Subcatchment 214: Direct to Wetland

Runoff = 6.89 cfs @ 12.29 hrs, Volume= 32,571 cf, Depth> 3.20"
Routed to Link AP1 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=7.42"

Area (sf)	CN	Description
7,280	98	Paved parking, HSG B
96,435	61	>75% Grass cover, Good, HSG B
9,806	55	Woods, Good, HSG B
3,519	98	Roofs, HSG B
3,940	39	>75% Grass cover, Good, HSG A
1,050	30	Woods, Good, HSG A
122,030	63	Weighted Average
111,231		91.15% Pervious Area
10,799		8.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.1600	0.09		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.4	41	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.0	401	0.0075	0.61		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.9	492	Total			

Summary for Subcatchment 215: To Swale

Runoff = 0.41 cfs @ 12.09 hrs, Volume= 1,276 cf, Depth> 4.41"
Routed to Reach 7R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-yr Rainfall=7.42"

Area (sf)	CN	Description
1,179	98	Paved parking, HSG B
2,297	61	>75% Grass cover, Good, HSG B
3,476	74	Weighted Average
2,297		66.08% Pervious Area
1,179		33.92% Impervious Area

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

Summary for Reach 1R: Swale

Inflow Area = 10,652 sf, 60.66% Impervious, Inflow Depth > 5.45" for 50-yr event
Inflow = 1.53 cfs @ 12.09 hrs, Volume= 4,841 cf
Outflow = 1.53 cfs @ 12.09 hrs, Volume= 4,841 cf, Atten= 0%, Lag= 0.1 min
Routed to Reach 2R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 3.17 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.94 fps, Avg. Travel Time= 0.4 min

Peak Storage= 12 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 2.66'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 69.88 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 24.0' Slope= 0.0417 '/'
Inlet Invert= 256.00', Outlet Invert= 255.00'

Summary for Reach 2R: Swale

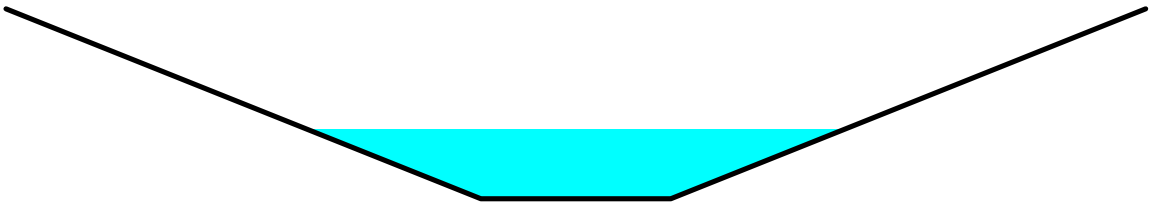
[62] Hint: Exceeded Reach 1R OUTLET depth by 0.32' @ 12.12 hrs

Inflow Area = 32,191 sf, 59.32% Impervious, Inflow Depth > 5.43" for 50-yr event
Inflow = 4.59 cfs @ 12.09 hrs, Volume= 14,563 cf
Outflow = 4.50 cfs @ 12.10 hrs, Volume= 14,548 cf, Atten= 2%, Lag= 1.0 min
Routed to Reach 3R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.84 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 0.91 fps, Avg. Travel Time= 4.2 min

Peak Storage= 365 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.55' , Surface Width= 4.25'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 39.10 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 230.0' Slope= 0.0130 '/'
Inlet Invert= 255.00', Outlet Invert= 252.00'



Summary for Reach 3R: Swale

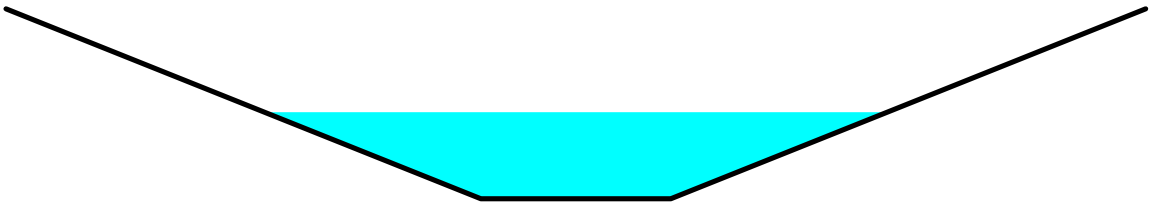
[62] Hint: Exceeded Reach 2R OUTLET depth by 0.13' @ 12.12 hrs

Inflow Area = 52,857 sf, 54.28% Impervious, Inflow Depth > 5.21" for 50-yr event
Inflow = 7.16 cfs @ 12.10 hrs, Volume= 22,947 cf
Outflow = 7.11 cfs @ 12.11 hrs, Volume= 22,933 cf, Atten= 1%, Lag= 0.6 min
Routed to Pond 4R : Pipe to Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 3.24 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.06 fps, Avg. Travel Time= 2.3 min

Peak Storage= 327 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.68' , Surface Width= 4.92'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 39.66 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 149.0' Slope= 0.0134 '/'
Inlet Invert= 252.00', Outlet Invert= 250.00'



Summary for Reach 5R: Swale

Inflow Area = 10,041 sf, 64.56% Impervious, Inflow Depth > 5.66" for 50-yr event
Inflow = 1.44 cfs @ 12.09 hrs, Volume= 4,737 cf
Outflow = 1.43 cfs @ 12.10 hrs, Volume= 4,733 cf, Atten= 1%, Lag= 0.6 min
Routed to Reach 6R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.53 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.73 fps, Avg. Travel Time= 3.2 min

Peak Storage= 78 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.26' , Surface Width= 2.81'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 52.35 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 139.0' Slope= 0.0234 '/'
Inlet Invert= 257.00', Outlet Invert= 253.75'

Summary for Reach 6R: Swale

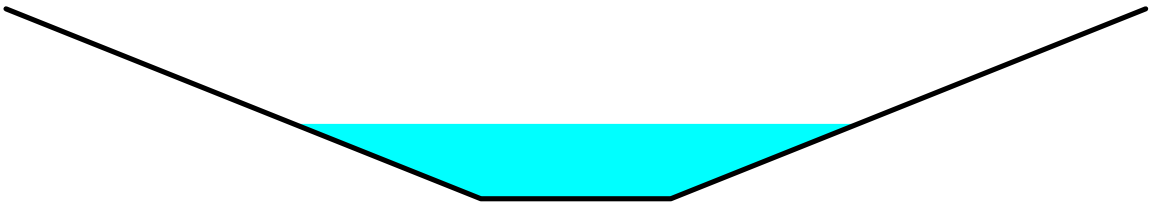
[62] Hint: Exceeded Reach 5R OUTLET depth by 0.33' @ 12.11 hrs

Inflow Area = 33,680 sf, 57.70% Impervious, Inflow Depth > 5.39" for 50-yr event
Inflow = 4.71 cfs @ 12.09 hrs, Volume= 15,127 cf
Outflow = 4.65 cfs @ 12.10 hrs, Volume= 15,115 cf, Atten= 1%, Lag= 0.8 min
Routed to Reach 7R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.64 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 0.80 fps, Avg. Travel Time= 3.5 min

Peak Storage= 294 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.59' , Surface Width= 4.45'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 35.05 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 167.0' Slope= 0.0105 '/'
Inlet Invert= 253.75', Outlet Invert= 252.00'



Summary for Reach 7R: Swale

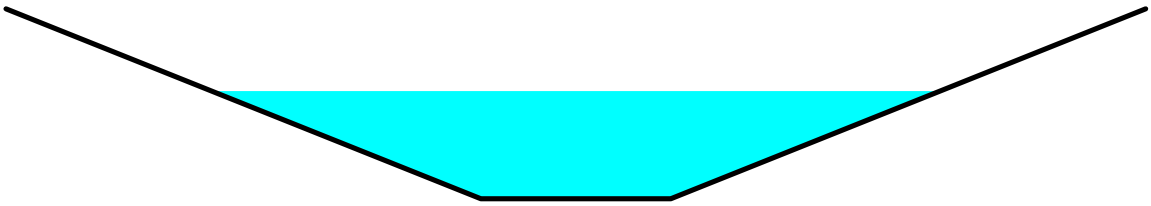
[62] Hint: Exceeded Reach 6R OUTLET depth by 0.28' @ 12.15 hrs

Inflow Area = 56,601 sf, 53.74% Impervious, Inflow Depth > 5.22" for 50-yr event
Inflow = 7.65 cfs @ 12.10 hrs, Volume= 24,620 cf
Outflow = 7.40 cfs @ 12.12 hrs, Volume= 24,587 cf, Atten= 3%, Lag= 1.3 min
Routed to Reach 8R : Box Culvert to Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.40 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 5.7 min

Peak Storage= 799 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.85' , Surface Width= 5.75'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 26.05 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 259.0' Slope= 0.0058 '/'
Inlet Invert= 252.00', Outlet Invert= 250.50'



Summary for Reach 8R: Box Culvert to Infiltration Pond

[52] Hint: Inlet/Outlet conditions not evaluated
[61] Hint: Exceeded Reach 7R outlet invert by 0.29' @ 12.12 hrs

Inflow Area = 56,601 sf, 53.74% Impervious, Inflow Depth > 5.21" for 50-yr event
Inflow = 7.40 cfs @ 12.12 hrs, Volume= 24,587 cf
Outflow = 7.40 cfs @ 12.12 hrs, Volume= 24,586 cf, Atten= 0%, Lag= 0.0 min
Routed to Pond P1 : Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 1.87 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.45 fps, Avg. Travel Time= 0.2 min

Peak Storage= 24 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.79' , Surface Width= 5.00'
Bank-Full Depth= 1.50' Flow Area= 7.5 sf, Capacity= 13.65 cfs

60.0" W x 18.0" H Box Pipe
n= 0.040 Earth, cobble bottom, clean sides
Length= 6.0' Slope= 0.0050 '/'
Inlet Invert= 250.00', Outlet Invert= 249.97'

Summary for Pond 4R: Pipe to Infiltration Pond

[62] Hint: Exceeded Reach 3R OUTLET depth by 0.47' @ 12.12 hrs

Inflow Area = 52,857 sf, 54.28% Impervious, Inflow Depth > 5.21" for 50-yr event
Inflow = 7.11 cfs @ 12.11 hrs, Volume= 22,933 cf
Outflow = 7.07 cfs @ 12.11 hrs, Volume= 22,930 cf, Atten= 1%, Lag= 0.5 min
Primary = 7.07 cfs @ 12.11 hrs, Volume= 22,930 cf
Routed to Pond P1 : Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 251.15' @ 12.11 hrs Surf.Area= 281 sf Storage= 136 cf

Plug-Flow detention time= 0.4 min calculated for 22,930 cf (100% of inflow)
Center-of-Mass det. time= 0.3 min (803.9 - 803.6)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	620 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
250.00	22	0	0
251.00	181	102	102
252.00	855	518	620

Device	Routing	Invert	Outlet Devices
#1	Primary	250.00'	**15.0" Round Culvert X 2.00** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 250.00' / 249.72' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=7.06 cfs @ 12.11 hrs HW=251.15' TW=250.35' (Dynamic Tailwater)
1=Culvert (Barrel Controls 7.06 cfs @ 3.92 fps)

Summary for Pond P1: Infiltration Pond

[61] Hint: Exceeded Reach 8R outlet invert by 0.51' @ 12.19 hrs

Inflow Area = 170,916 sf, 44.06% Impervious, Inflow Depth > 4.76" for 50-yr event
Inflow = 20.53 cfs @ 12.11 hrs, Volume= 67,847 cf
Outflow = 14.76 cfs @ 12.19 hrs, Volume= 67,835 cf, Atten= 28%, Lag= 5.0 min
Discarded = 2.86 cfs @ 12.19 hrs, Volume= 50,532 cf
Primary = 11.90 cfs @ 12.19 hrs, Volume= 17,303 cf
Routed to Link AP1 : Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 250.48' @ 12.19 hrs Surf.Area= 10,049 sf Storage= 11,191 cf

Plug-Flow detention time= 15.6 min calculated for 67,807 cf (100% of inflow)
Center-of-Mass det. time= 15.5 min (822.0 - 806.5)

Volume	Invert	Avail.Storage	Storage Description
#1	249.25'	24,649 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
249.25	8,187	0	0
250.00	9,297	6,557	6,557
251.00	10,866	10,082	16,638
251.70	12,024	8,011	24,649

Device	Routing	Invert	Outlet Devices
#1	Primary	249.90'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Discarded	249.25'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 247.00' Phase-In= 0.01'

Discarded OutFlow Max=2.86 cfs @ 12.19 hrs HW=250.48' (Free Discharge)
↑—**2=Exfiltration** (Controls 2.86 cfs)

Primary OutFlow Max=11.89 cfs @ 12.19 hrs HW=250.48' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 11.89 cfs @ 2.05 fps)

Summary for Link AP1: Wetlands

Inflow Area = 292,946 sf, 29.39% Impervious, Inflow Depth > 2.04" for 50-yr event
Inflow = 17.91 cfs @ 12.22 hrs, Volume= 49,874 cf
Primary = 17.91 cfs @ 12.22 hrs, Volume= 49,874 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 3
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 201: to Under Sidewalk Unit Runoff Area=17,748 sf 80.43% Impervious Runoff Depth>7.77"
Tc=6.0 min CN=91 Runoff=3.42 cfs 11,489 cf

Subcatchment 202: To RGT 1 Runoff Area=17,947 sf 48.49% Impervious Runoff Depth>6.31"
Tc=6.0 min CN=79 Runoff=3.00 cfs 9,433 cf

Subcatchment 203: To RGT 2 Runoff Area=17,507 sf 63.88% Impervious Runoff Depth>7.04"
Tc=6.0 min CN=85 Runoff=3.18 cfs 10,269 cf

Subcatchment 204: To RGT 3 Runoff Area=9,147 sf 62.73% Impervious Runoff Depth>6.92"
Tc=6.0 min CN=84 Runoff=1.64 cfs 5,273 cf

Subcatchment 205: To RGT 4 Runoff Area=6,183 sf 86.80% Impervious Runoff Depth>8.01"
Tc=6.0 min CN=93 Runoff=1.21 cfs 4,127 cf

Subcatchment 206: To RGT 5 Runoff Area=18,720 sf 60.91% Impervious Runoff Depth>6.92"
Tc=6.0 min CN=84 Runoff=3.36 cfs 10,791 cf

Subcatchment 207: To RGT 6 Runoff Area=19,445 sf 50.44% Impervious Runoff Depth>6.43"
Tc=6.0 min CN=80 Runoff=3.30 cfs 10,418 cf

Subcatchment 208: To Swale Runoff Area=4,919 sf 31.45% Impervious Runoff Depth>5.57"
Tc=6.0 min CN=73 Runoff=0.74 cfs 2,285 cf

Subcatchment 209: To Swale Runoff Area=3,858 sf 28.90% Impervious Runoff Depth>5.45"
Tc=6.0 min CN=72 Runoff=0.57 cfs 1,752 cf

Subcatchment 210: To Swale Runoff Area=1,505 sf 48.11% Impervious Runoff Depth>6.31"
Tc=6.0 min CN=79 Runoff=0.25 cfs 791 cf

Subcatchment 211: To Swale Runoff Area=4,032 sf 35.99% Impervious Runoff Depth>5.70"
Tc=6.0 min CN=74 Runoff=0.62 cfs 1,914 cf

Subcatchment 212: To Swale Runoff Area=2,719 sf 32.88% Impervious Runoff Depth>5.57"
Tc=6.0 min CN=73 Runoff=0.41 cfs 1,263 cf

Subcatchment 213: Direct to Infiltration Runoff Area=43,710 sf 4.37% Impervious Runoff Depth>4.11"
Tc=6.0 min CN=61 Runoff=4.81 cfs 14,962 cf

Subcatchment 214: Direct to Wetland Runoff Area=122,030 sf 8.85% Impervious Runoff Depth>4.34"
Flow Length=492' Tc=20.9 min CN=63 Runoff=9.43 cfs 44,098 cf

Subcatchment 215: To Swale Runoff Area=3,476 sf 33.92% Impervious Runoff Depth>5.70"
Tc=6.0 min CN=74 Runoff=0.53 cfs 1,650 cf

Reach 1R: Swale Avg. Flow Depth=0.26' Max Vel=3.38 fps Inflow=1.89 cfs 6,064 cf
n=0.030 L=24.0' S=0.0417 '/' Capacity=69.88 cfs Outflow=1.89 cfs 6,063 cf

Reach 2R: Swale Avg. Flow Depth=0.61' Max Vel=3.00 fps Inflow=5.69 cfs 18,246 cf
n=0.030 L=230.0' S=0.0130 '/' Capacity=39.10 cfs Outflow=5.58 cfs 18,228 cf

Reach 3R: Swale Avg. Flow Depth=0.76' Max Vel=3.43 fps Inflow=8.95 cfs 28,924 cf
n=0.030 L=149.0' S=0.0134 '/' Capacity=39.66 cfs Outflow=8.90 cfs 28,908 cf

Reach 5R: Swale Avg. Flow Depth=0.29' Max Vel=2.69 fps Inflow=1.77 cfs 5,880 cf
n=0.030 L=139.0' S=0.0234 '/' Capacity=52.35 cfs Outflow=1.76 cfs 5,875 cf

Reach 6R: Swale Avg. Flow Depth=0.66' Max Vel=2.80 fps Inflow=5.85 cfs 18,951 cf
n=0.030 L=167.0' S=0.0105 '/' Capacity=35.05 cfs Outflow=5.78 cfs 18,937 cf

Reach 7R: Swale Avg. Flow Depth=0.95' Max Vel=2.54 fps Inflow=9.57 cfs 31,004 cf
n=0.030 L=259.0' S=0.0058 '/' Capacity=26.05 cfs Outflow=9.28 cfs 30,967 cf

Reach 8R: Box Culvert to Infiltration Avg. Flow Depth=0.92' Max Vel=2.02 fps Inflow=9.28 cfs 30,967 cf
60.0" x 18.0" Box Pipe n=0.040 L=6.0' S=0.0050 '/' Capacity=13.65 cfs Outflow=9.28 cfs 30,966 cf

Pond 4R: Pipe to Infiltration Pond Peak Elev=251.35' Storage=207 cf Inflow=8.90 cfs 28,908 cf
15.0" Round Culvert x 2.00 n=0.012 L=55.0' S=0.0051 '/' Outflow=8.79 cfs 28,905 cf

Pond P1: Infiltration Pond Peak Elev=250.65' Storage=12,957 cf Inflow=25.97 cfs 86,321 cf
Discarded=3.06 cfs 59,642 cf Primary=17.33 cfs 26,664 cf Outflow=20.38 cfs 86,306 cf

Link AP1: Wetlands Inflow=25.21 cfs 70,762 cf
Primary=25.21 cfs 70,762 cf

Total Runoff Area = 292,946 sf Runoff Volume = 130,513 cf Average Runoff Depth = 5.35"
70.61% Pervious = 206,849 sf 29.39% Impervious = 86,097 sf

Summary for Subcatchment 201: to Under Sidewalk Unit

Runoff = 3.42 cfs @ 12.08 hrs, Volume= 11,489 cf, Depth> 7.77"
Routed to Pond P1 : Infiltration Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.86"

Area (sf)	CN	Description
13,365	98	Paved parking, HSG B
3,474	61	>75% Grass cover, Good, HSG B
909	98	Roofs, HSG B
17,748	91	Weighted Average
3,474		19.57% Pervious Area
14,274		80.43% Impervious Area

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

Summary for Subcatchment 202: To RGT 1

Runoff = 3.00 cfs @ 12.09 hrs, Volume= 9,433 cf, Depth> 6.31"
Routed to Reach 3R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.86"

Area (sf)	CN	Description
4,676	98	Paved parking, HSG B
9,245	61	>75% Grass cover, Good, HSG B
4,026	98	Roofs, HSG B
17,947	79	Weighted Average
9,245		51.51% Pervious Area
8,702		48.49% Impervious Area

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

Summary for Subcatchment 203: To RGT 2

Runoff = 3.18 cfs @ 12.08 hrs, Volume= 10,269 cf, Depth> 7.04"
Routed to Reach 2R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.86"

Area (sf)	CN	Description
7,022	98	Paved parking, HSG B
6,324	61	>75% Grass cover, Good, HSG B
4,161	98	Roofs, HSG B
17,507	85	Weighted Average
6,324		36.12% Pervious Area
11,183		63.88% Impervious Area

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

Summary for Subcatchment 204: To RGT 3

Runoff = 1.64 cfs @ 12.08 hrs, Volume= 5,273 cf, Depth> 6.92"
Routed to Reach 1R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.86"

Area (sf)	CN	Description
3,638	98	Paved parking, HSG B
3,409	61	>75% Grass cover, Good, HSG B
2,100	98	Roofs, HSG B
9,147	84	Weighted Average
3,409		37.27% Pervious Area
5,738		62.73% Impervious Area

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

Summary for Subcatchment 205: To RGT 4

Runoff = 1.21 cfs @ 12.08 hrs, Volume= 4,127 cf, Depth> 8.01"
Routed to Reach 5R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.86"

Area (sf)	CN	Description
4,135	98	Paved parking, HSG B
816	61	>75% Grass cover, Good, HSG B
1,232	98	Roofs, HSG B
6,183	93	Weighted Average
816		13.20% Pervious Area
5,367		86.80% Impervious Area

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

Summary for Subcatchment 206: To RGT 5

Runoff = 3.36 cfs @ 12.08 hrs, Volume= 10,791 cf, Depth> 6.92"
Routed to Reach 6R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.86"

Area (sf)	CN	Description
7,564	98	Paved parking, HSG B
7,317	61	>75% Grass cover, Good, HSG B
3,839	98	Roofs, HSG B
18,720	84	Weighted Average
7,317		39.09% Pervious Area
11,403		60.91% Impervious Area

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

Summary for Subcatchment 207: To RGT 6

Runoff = 3.30 cfs @ 12.09 hrs, Volume= 10,418 cf, Depth> 6.43"
Routed to Reach 7R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.86"

Area (sf)	CN	Description
6,428	98	Paved parking, HSG B
9,636	61	>75% Grass cover, Good, HSG B
3,381	98	Roofs, HSG B
19,445	80	Weighted Average
9,636		49.56% Pervious Area
9,809		50.44% Impervious Area

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

Summary for Subcatchment 208: To Swale

Runoff = 0.74 cfs @ 12.09 hrs, Volume= 2,285 cf, Depth> 5.57"
Routed to Reach 6R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.86"

Area (sf)	CN	Description
1,547	98	Paved parking, HSG B
3,372	61	>75% Grass cover, Good, HSG B
4,919	73	Weighted Average
3,372		68.55% Pervious Area
1,547		31.45% Impervious Area

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

Summary for Subcatchment 209: To Swale

Runoff = 0.57 cfs @ 12.09 hrs, Volume= 1,752 cf, Depth> 5.45"
Routed to Reach 5R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.86"

Area (sf)	CN	Description
1,115	98	Paved parking, HSG B
2,743	61	>75% Grass cover, Good, HSG B
3,858	72	Weighted Average
2,743		71.10% Pervious Area
1,115		28.90% Impervious Area

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

Summary for Subcatchment 210: To Swale

Runoff = 0.25 cfs @ 12.09 hrs, Volume= 791 cf, Depth> 6.31"
Routed to Reach 1R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.86"

Area (sf)	CN	Description
724	98	Paved parking, HSG B
781	61	>75% Grass cover, Good, HSG B
1,505	79	Weighted Average
781		51.89% Pervious Area
724		48.11% Impervious Area

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

Summary for Subcatchment 211: To Swale

Runoff = 0.62 cfs @ 12.09 hrs, Volume= 1,914 cf, Depth> 5.70"
Routed to Reach 2R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.86"

Area (sf)	CN	Description
1,451	98	Paved parking, HSG B
2,581	61	>75% Grass cover, Good, HSG B
4,032	74	Weighted Average
2,581		64.01% Pervious Area
1,451		35.99% Impervious Area

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

Summary for Subcatchment 212: To Swale

Runoff = 0.41 cfs @ 12.09 hrs, Volume= 1,263 cf, Depth> 5.57"
Routed to Reach 3R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.86"

Area (sf)	CN	Description
894	98	Paved parking, HSG B
1,825	61	>75% Grass cover, Good, HSG B
2,719	73	Weighted Average
1,825		67.12% Pervious Area
894		32.88% Impervious Area

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

Summary for Subcatchment 213: Direct to Infiltration Pond

Runoff = 4.81 cfs @ 12.09 hrs, Volume= 14,962 cf, Depth> 4.11"
Routed to Pond P1 : Infiltration Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.86"

Area (sf)	CN	Description
1,912	98	Paved parking, HSG B
39,571	61	>75% Grass cover, Good, HSG B
2,227	39	>75% Grass cover, Good, HSG A
43,710	61	Weighted Average
41,798		95.63% Pervious Area
1,912		4.37% Impervious Area

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

Summary for Subcatchment 214: Direct to Wetland

Runoff = 9.43 cfs @ 12.29 hrs, Volume= 44,098 cf, Depth> 4.34"
Routed to Link AP1 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.86"

Area (sf)	CN	Description
7,280	98	Paved parking, HSG B
96,435	61	>75% Grass cover, Good, HSG B
9,806	55	Woods, Good, HSG B
3,519	98	Roofs, HSG B
3,940	39	>75% Grass cover, Good, HSG A
1,050	30	Woods, Good, HSG A
122,030	63	Weighted Average
111,231		91.15% Pervious Area
10,799		8.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.1600	0.09		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.4	41	0.1000	1.58		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.0	401	0.0075	0.61		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
20.9	492	Total			

Summary for Subcatchment 215: To Swale

Runoff = 0.53 cfs @ 12.09 hrs, Volume= 1,650 cf, Depth> 5.70"
Routed to Reach 7R : Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.86"

Area (sf)	CN	Description
1,179	98	Paved parking, HSG B
2,297	61	>75% Grass cover, Good, HSG B
3,476	74	Weighted Average
2,297		66.08% Pervious Area
1,179		33.92% Impervious Area

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

Summary for Reach 1R: Swale

Inflow Area = 10,652 sf, 60.66% Impervious, Inflow Depth > 6.83" for 100-yr event
Inflow = 1.89 cfs @ 12.09 hrs, Volume= 6,064 cf
Outflow = 1.89 cfs @ 12.09 hrs, Volume= 6,063 cf, Atten= 0%, Lag= 0.1 min
Routed to Reach 2R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 3.38 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.00 fps, Avg. Travel Time= 0.4 min

Peak Storage= 13 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.26' , Surface Width= 2.80'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 69.88 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 24.0' Slope= 0.0417 '/'
Inlet Invert= 256.00', Outlet Invert= 255.00'

Summary for Reach 2R: Swale

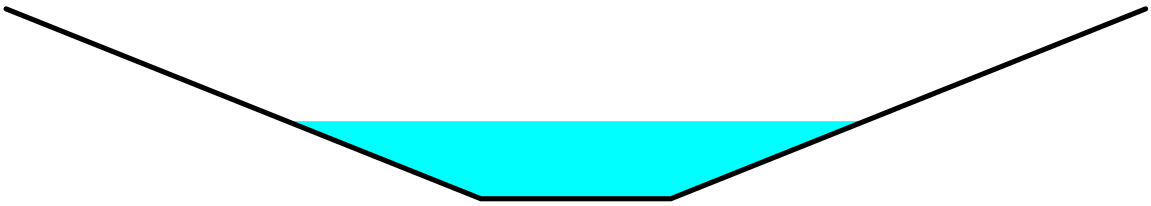
[62] Hint: Exceeded Reach 1R OUTLET depth by 0.36' @ 12.11 hrs

Inflow Area = 32,191 sf, 59.32% Impervious, Inflow Depth > 6.80" for 100-yr event
Inflow = 5.69 cfs @ 12.09 hrs, Volume= 18,246 cf
Outflow = 5.58 cfs @ 12.10 hrs, Volume= 18,228 cf, Atten= 2%, Lag= 0.9 min
Routed to Reach 3R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 3.00 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.97 fps, Avg. Travel Time= 4.0 min

Peak Storage= 427 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.61' , Surface Width= 4.56'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 39.10 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 230.0' Slope= 0.0130 '/'
Inlet Invert= 255.00', Outlet Invert= 252.00'



Summary for Reach 3R: Swale

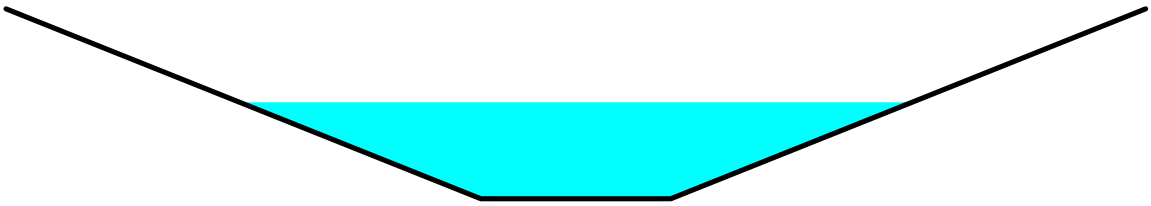
[62] Hint: Exceeded Reach 2R OUTLET depth by 0.15' @ 12.12 hrs

Inflow Area = 52,857 sf, 54.28% Impervious, Inflow Depth > 6.57" for 100-yr event
Inflow = 8.95 cfs @ 12.10 hrs, Volume= 28,924 cf
Outflow = 8.90 cfs @ 12.10 hrs, Volume= 28,908 cf, Atten= 1%, Lag= 0.5 min
Routed to Pond 4R : Pipe to Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 3.43 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.13 fps, Avg. Travel Time= 2.2 min

Peak Storage= 386 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.76' , Surface Width= 5.31'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 39.66 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 149.0' Slope= 0.0134 '/'
Inlet Invert= 252.00', Outlet Invert= 250.00'



Summary for Reach 5R: Swale

Inflow Area = 10,041 sf, 64.56% Impervious, Inflow Depth > 7.03" for 100-yr event
Inflow = 1.77 cfs @ 12.08 hrs, Volume= 5,880 cf
Outflow = 1.76 cfs @ 12.10 hrs, Volume= 5,875 cf, Atten= 1%, Lag= 0.6 min
Routed to Reach 6R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.69 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 0.78 fps, Avg. Travel Time= 3.0 min

Peak Storage= 91 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.29' , Surface Width= 2.96'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 52.35 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 139.0' Slope= 0.0234 '/'
Inlet Invert= 257.00', Outlet Invert= 253.75'

Summary for Reach 6R: Swale

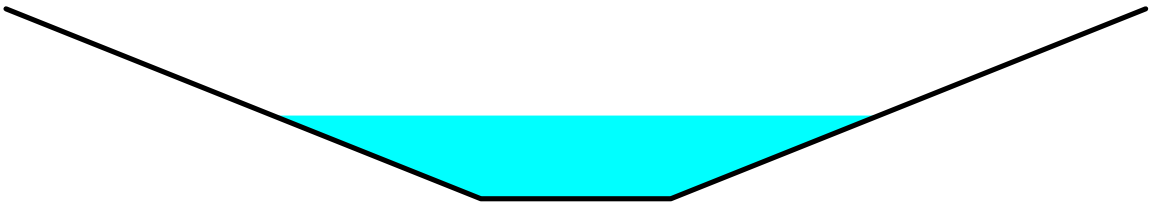
[62] Hint: Exceeded Reach 5R OUTLET depth by 0.37' @ 12.11 hrs

Inflow Area = 33,680 sf, 57.70% Impervious, Inflow Depth > 6.75" for 100-yr event
Inflow = 5.85 cfs @ 12.09 hrs, Volume= 18,951 cf
Outflow = 5.78 cfs @ 12.10 hrs, Volume= 18,937 cf, Atten= 1%, Lag= 0.7 min
Routed to Reach 7R : Swale

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.80 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.86 fps, Avg. Travel Time= 3.2 min

Peak Storage= 345 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.66' , Surface Width= 4.79'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 35.05 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 167.0' Slope= 0.0105 '/'
Inlet Invert= 253.75', Outlet Invert= 252.00'



Summary for Reach 7R: Swale

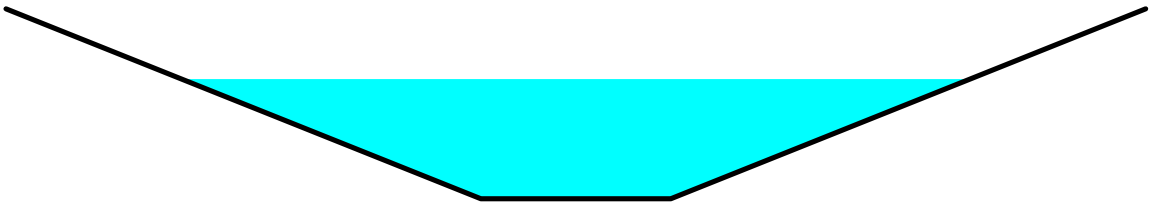
[62] Hint: Exceeded Reach 6R OUTLET depth by 0.30' @ 12.15 hrs

Inflow Area = 56,601 sf, 53.74% Impervious, Inflow Depth > 6.57" for 100-yr event
Inflow = 9.57 cfs @ 12.09 hrs, Volume= 31,004 cf
Outflow = 9.28 cfs @ 12.12 hrs, Volume= 30,967 cf, Atten= 3%, Lag= 1.2 min
Routed to Reach 8R : Box Culvert to Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.54 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 0.81 fps, Avg. Travel Time= 5.3 min

Peak Storage= 946 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.95' , Surface Width= 6.23'
Bank-Full Depth= 1.50' Flow Area= 7.9 sf, Capacity= 26.05 cfs

1.50' x 1.50' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 2.5 '/' Top Width= 9.00'
Length= 259.0' Slope= 0.0058 '/'
Inlet Invert= 252.00', Outlet Invert= 250.50'



Summary for Reach 8R: Box Culvert to Infiltration Pond

[52] Hint: Inlet/Outlet conditions not evaluated
[61] Hint: Exceeded Reach 7R outlet invert by 0.42' @ 12.12 hrs

Inflow Area = 56,601 sf, 53.74% Impervious, Inflow Depth > 6.57" for 100-yr event
Inflow = 9.28 cfs @ 12.12 hrs, Volume= 30,967 cf
Outflow = 9.28 cfs @ 12.12 hrs, Volume= 30,966 cf, Atten= 0%, Lag= 0.0 min
Routed to Pond P1 : Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Max. Velocity= 2.02 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.49 fps, Avg. Travel Time= 0.2 min

Peak Storage= 28 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.92' , Surface Width= 5.00'
Bank-Full Depth= 1.50' Flow Area= 7.5 sf, Capacity= 13.65 cfs

60.0" W x 18.0" H Box Pipe
n= 0.040 Earth, cobble bottom, clean sides
Length= 6.0' Slope= 0.0050 '/'
Inlet Invert= 250.00', Outlet Invert= 249.97'

Summary for Pond 4R: Pipe to Infiltration Pond

[62] Hint: Exceeded Reach 3R OUTLET depth by 0.60' @ 12.12 hrs

Inflow Area = 52,857 sf, 54.28% Impervious, Inflow Depth > 6.56" for 100-yr event
Inflow = 8.90 cfs @ 12.10 hrs, Volume= 28,908 cf
Outflow = 8.79 cfs @ 12.12 hrs, Volume= 28,905 cf, Atten= 1%, Lag= 0.8 min
Primary = 8.79 cfs @ 12.12 hrs, Volume= 28,905 cf
Routed to Pond P1 : Infiltration Pond

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 251.35' @ 12.12 hrs Surf.Area= 418 sf Storage= 207 cf

Plug-Flow detention time= 0.4 min calculated for 28,905 cf (100% of inflow)
Center-of-Mass det. time= 0.3 min (797.5 - 797.2)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	620 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
250.00	22	0	0
251.00	181	102	102
252.00	855	518	620

Device	Routing	Invert	Outlet Devices
#1	Primary	250.00'	**15.0" Round Culvert X 2.00** L= 55.0' Ke= 0.500 Inlet / Outlet Invert= 250.00' / 249.72' S= 0.0051 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 1.23 sf

Primary OutFlow Max=8.78 cfs @ 12.12 hrs HW=251.35' TW=250.57' (Dynamic Tailwater)
1=Culvert (Barrel Controls 8.78 cfs @ 4.12 fps)

Summary for Pond P1: Infiltration Pond

[61] Hint: Exceeded Reach 8R outlet invert by 0.68' @ 12.17 hrs

Inflow Area = 170,916 sf, 44.06% Impervious, Inflow Depth > 6.06" for 100-yr event
Inflow = 25.97 cfs @ 12.11 hrs, Volume= 86,321 cf
Outflow = 20.38 cfs @ 12.17 hrs, Volume= 86,306 cf, Atten= 22%, Lag= 4.1 min
Discarded = 3.06 cfs @ 12.17 hrs, Volume= 59,642 cf
Primary = 17.33 cfs @ 12.17 hrs, Volume= 26,664 cf
Routed to Link AP1 : Wetlands

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 3
Peak Elev= 250.65' @ 12.17 hrs Surf.Area= 10,321 sf Storage= 12,957 cf

Plug-Flow detention time= 15.5 min calculated for 86,271 cf (100% of inflow)
Center-of-Mass det. time= 15.4 min (816.0 - 800.6)

Volume	Invert	Avail.Storage	Storage Description
#1	249.25'	24,649 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
249.25	8,187	0	0
250.00	9,297	6,557	6,557
251.00	10,866	10,082	16,638
251.70	12,024	8,011	24,649

Device	Routing	Invert	Outlet Devices
#1	Primary	249.90'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63
#2	Discarded	249.25'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 247.00' Phase-In= 0.01'

Discarded OutFlow Max=3.05 cfs @ 12.17 hrs HW=250.65' (Free Discharge)
↑—**2=Exfiltration** (Controls 3.05 cfs)

Primary OutFlow Max=17.31 cfs @ 12.17 hrs HW=250.65' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 17.31 cfs @ 2.30 fps)

Summary for Link AP1: Wetlands

Inflow Area = 292,946 sf, 29.39% Impervious, Inflow Depth > 2.90" for 100-yr event
Inflow = 25.21 cfs @ 12.20 hrs, Volume= 70,762 cf
Primary = 25.21 cfs @ 12.20 hrs, Volume= 70,762 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Stage-Area-Storage for Pond 4R: Pipe to Infiltration Pond

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
250.00	22	0	250.53	106	34
250.01	24	0	250.54	108	35
250.02	25	0	250.55	109	36
250.03	27	1	250.56	111	37
250.04	28	1	250.57	113	38
250.05	30	1	250.58	114	40
250.06	32	2	250.59	116	41
250.07	33	2	250.60	117	42
250.08	35	2	250.61	119	43
250.09	36	3	250.62	121	44
250.10	38	3	250.63	122	45
250.11	39	3	250.64	124	47
250.12	41	4	250.65	125	48
250.13	43	4	250.66	127	49
250.14	44	5	250.67	129	50
250.15	46	5	250.68	130	52
250.16	47	6	250.69	132	53
250.17	49	6	250.70	133	54
250.18	51	7	250.71	135	56
250.19	52	7	250.72	136	57
250.20	54	8	250.73	138	58
250.21	55	8	250.74	140	60
250.22	57	9	250.75	141	61
250.23	59	9	250.76	143	63
250.24	60	10	250.77	144	64
250.25	62	10	250.78	146	66
250.26	63	11	250.79	148	67
250.27	65	12	250.80	149	68
250.28	67	12	250.81	151	70
250.29	68	13	250.82	152	71
250.30	70	14	250.83	154	73
250.31	71	14	250.84	156	75
250.32	73	15	250.85	157	76
250.33	74	16	250.86	159	78
250.34	76	17	250.87	160	79
250.35	78	17	250.88	162	81
250.36	79	18	250.89	164	83
250.37	81	19	250.90	165	84
250.38	82	20	250.91	167	86
250.39	84	21	250.92	168	88
250.40	86	22	250.93	170	89
250.41	87	22	250.94	171	91
250.42	89	23	250.95	173	93
250.43	90	24	250.96	175	94
250.44	92	25	250.97	176	96
250.45	94	26	250.98	178	98
250.46	95	27	250.99	179	100
250.47	97	28	251.00	181	102
250.48	98	29	251.01	188	103
250.49	100	30	251.02	194	105
250.50	102	31	251.03	201	107
250.51	103	32	251.04	208	109
250.52	105	33	251.05	215	111

Stage-Area-Storage for Pond 4R: Pipe to Infiltration Pond (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
251.06	221	114
251.07	228	116
251.08	235	118
251.09	242	121
251.10	248	123
251.11	255	125
251.12	262	128
251.13	269	131
251.14	275	133
251.15	282	136
251.16	289	139
251.17	296	142
251.18	302	145
251.19	309	148
251.20	316	151
251.21	323	154
251.22	329	158
251.23	336	161
251.24	343	164
251.25	350	168
251.26	356	171
251.27	363	175
251.28	370	179
251.29	376	182
251.30	383	186
251.31	390	190
251.32	397	194
251.33	403	198
251.34	410	202
251.35	417	206
251.36	424	210
251.37	430	215
251.38	437	219
251.39	444	223
251.40	451	228
251.41	457	232
251.42	464	237
251.43	471	242
251.44	478	246
251.45	484	251
251.46	491	256
251.47	498	261
251.48	505	266
251.49	511	271
251.50	518	276
251.51	525	281
251.52	531	287
251.53	538	292
251.54	545	298
251.55	552	303
251.56	558	309
251.57	565	314
251.58	572	320
251.59	579	326
251.60	585	331
251.61	592	337
251.62	599	343
251.63	606	349
251.64	612	355
251.65	619	362
251.66	626	368
251.67	633	374
251.68	639	380
251.69	646	387
251.70	653	393
251.71	660	400
251.72	666	407
251.73	673	413
251.74	680	420
251.75	687	427
251.76	693	434
251.77	700	441
251.78	707	448
251.79	713	455
251.80	720	462
251.81	727	469
251.82	734	477
251.83	740	484
251.84	747	491
251.85	754	499
251.86	761	506
251.87	767	514
251.88	774	522
251.89	781	530
251.90	788	537
251.91	794	545
251.92	801	553
251.93	808	561
251.94	815	569
251.95	821	578
251.96	828	586
251.97	835	594
251.98	842	603
251.99	848	611
252.00	**855**	**620**

Stage-Area-Storage for Pond P1: Infiltration Pond

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
249.25	8,187	0	249.78	8,971	4,547
249.26	8,202	82	249.79	8,986	4,637
249.27	8,217	164	249.80	9,001	4,727
249.28	8,231	246	249.81	9,016	4,817
249.29	8,246	329	249.82	9,031	4,907
249.30	8,261	411	249.83	9,045	4,997
249.31	8,276	494	249.84	9,060	5,088
249.32	8,291	577	249.85	9,075	5,179
249.33	8,305	660	249.86	9,090	5,269
249.34	8,320	743	249.87	9,105	5,360
249.35	8,335	826	249.88	9,119	5,452
249.36	8,350	910	249.89	9,134	5,543
249.37	8,365	993	249.90	9,149	5,634
249.38	8,379	1,077	249.91	9,164	5,726
249.39	8,394	1,161	249.92	9,179	5,817
249.40	8,409	1,245	249.93	9,193	5,909
249.41	8,424	1,329	249.94	9,208	6,001
249.42	8,439	1,413	249.95	9,223	6,093
249.43	8,453	1,498	249.96	9,238	6,186
249.44	8,468	1,582	249.97	9,253	6,278
249.45	8,483	1,667	249.98	9,267	6,371
249.46	8,498	1,752	249.99	9,282	6,464
249.47	8,513	1,837	250.00	9,297	6,557
249.48	8,527	1,922	250.01	9,313	6,650
249.49	8,542	2,008	250.02	9,328	6,743
249.50	8,557	2,093	250.03	9,344	6,836
249.51	8,572	2,179	250.04	9,360	6,930
249.52	8,587	2,264	250.05	9,375	7,023
249.53	8,601	2,350	250.06	9,391	7,117
249.54	8,616	2,436	250.07	9,407	7,211
249.55	8,631	2,523	250.08	9,423	7,305
249.56	8,646	2,609	250.09	9,438	7,400
249.57	8,661	2,696	250.10	9,454	7,494
249.58	8,675	2,782	250.11	9,470	7,589
249.59	8,690	2,869	250.12	9,485	7,683
249.60	8,705	2,956	250.13	9,501	7,778
249.61	8,720	3,043	250.14	9,517	7,873
249.62	8,735	3,130	250.15	9,532	7,969
249.63	8,749	3,218	250.16	9,548	8,064
249.64	8,764	3,305	250.17	9,564	8,160
249.65	8,779	3,393	250.18	9,579	8,255
249.66	8,794	3,481	250.19	9,595	8,351
249.67	8,809	3,569	250.20	9,611	8,447
249.68	8,823	3,657	250.21	9,626	8,543
249.69	8,838	3,746	250.22	9,642	8,640
249.70	8,853	3,834	250.23	9,658	8,736
249.71	8,868	3,923	250.24	9,674	8,833
249.72	8,883	4,011	250.25	9,689	8,930
249.73	8,897	4,100	250.26	9,705	9,027
249.74	8,912	4,189	250.27	9,721	9,124
249.75	8,927	4,279	250.28	9,736	9,221
249.76	8,942	4,368	250.29	9,752	9,319
249.77	8,957	4,457	250.30	9,768	9,416

Stage-Area-Storage for Pond P1: Infiltration Pond (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
250.31	9,783	9,514	250.84	10,615	14,920
250.32	9,799	9,612	250.85	10,631	15,026
250.33	9,815	9,710	250.86	10,646	15,132
250.34	9,830	9,808	250.87	10,662	15,239
250.35	9,846	9,907	250.88	10,678	15,345
250.36	9,862	10,005	250.89	10,693	15,452
250.37	9,878	10,104	250.90	10,709	15,559
250.38	9,893	10,203	250.91	10,725	15,666
250.39	9,909	10,302	250.92	10,740	15,774
250.40	9,925	10,401	250.93	10,756	15,881
250.41	9,940	10,500	250.94	10,772	15,989
250.42	9,956	10,600	250.95	10,788	16,097
250.43	9,972	10,699	250.96	10,803	16,205
250.44	9,987	10,799	250.97	10,819	16,313
250.45	10,003	10,899	250.98	10,835	16,421
250.46	10,019	10,999	250.99	10,850	16,529
250.47	10,034	11,099	251.00	10,866	16,638
250.48	10,050	11,200	251.01	10,883	16,747
250.49	10,066	11,300	251.02	10,899	16,856
250.50	10,082	11,401	251.03	10,916	16,965
250.51	10,097	11,502	251.04	10,932	17,074
250.52	10,113	11,603	251.05	10,949	17,183
250.53	10,129	11,704	251.06	10,965	17,293
250.54	10,144	11,806	251.07	10,982	17,403
250.55	10,160	11,907	251.08	10,998	17,513
250.56	10,176	12,009	251.09	11,015	17,623
250.57	10,191	12,111	251.10	11,031	17,733
250.58	10,207	12,213	251.11	11,048	17,843
250.59	10,223	12,315	251.12	11,065	17,954
250.60	10,238	12,417	251.13	11,081	18,065
250.61	10,254	12,520	251.14	11,098	18,175
250.62	10,270	12,622	251.15	11,114	18,287
250.63	10,285	12,725	251.16	11,131	18,398
250.64	10,301	12,828	251.17	11,147	18,509
250.65	10,317	12,931	251.18	11,164	18,621
250.66	10,333	13,034	251.19	11,180	18,732
250.67	10,348	13,138	251.20	11,197	18,844
250.68	10,364	13,241	251.21	11,213	18,956
250.69	10,380	13,345	251.22	11,230	19,069
250.70	10,395	13,449	251.23	11,246	19,181
250.71	10,411	13,553	251.24	11,263	19,293
250.72	10,427	13,657	251.25	11,280	19,406
250.73	10,442	13,761	251.26	11,296	19,519
250.74	10,458	13,866	251.27	11,313	19,632
250.75	10,474	13,971	251.28	11,329	19,745
250.76	10,489	14,075	251.29	11,346	19,859
250.77	10,505	14,180	251.30	11,362	19,972
250.78	10,521	14,285	251.31	11,379	20,086
250.79	10,537	14,391	251.32	11,395	20,200
250.80	10,552	14,496	251.33	11,412	20,314
250.81	10,568	14,602	251.34	11,428	20,428
250.82	10,584	14,708	251.35	11,445	20,542
250.83	10,599	14,813	251.36	11,462	20,657

Stage-Area-Storage for Pond P1: Infiltration Pond (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
251.37	11,478	20,772
251.38	11,495	20,887
251.39	11,511	21,002
251.40	11,528	21,117
251.41	11,544	21,232
251.42	11,561	21,348
251.43	11,577	21,463
251.44	11,594	21,579
251.45	11,610	21,695
251.46	11,627	21,811
251.47	11,644	21,928
251.48	11,660	22,044
251.49	11,677	22,161
251.50	11,693	22,278
251.51	11,710	22,395
251.52	11,726	22,512
251.53	11,743	22,629
251.54	11,759	22,747
251.55	11,776	22,865
251.56	11,792	22,982
251.57	11,809	23,100
251.58	11,825	23,219
251.59	11,842	23,337
251.60	11,859	23,455
251.61	11,875	23,574
251.62	11,892	23,693
251.63	11,908	23,812
251.64	11,925	23,931
251.65	11,941	24,050
251.66	11,958	24,170
251.67	11,974	24,290
251.68	11,991	24,409
251.69	12,007	24,529
251.70	**12,024**	**24,649**

Stage-Area-Storage for Pond 4R: Pipe to Infiltration Pond

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
250.00	22	0	250.53	106	34
250.01	24	0	250.54	108	35
250.02	25	0	250.55	109	36
250.03	27	1	250.56	111	37
250.04	28	1	250.57	113	38
250.05	30	1	250.58	114	40
250.06	32	2	250.59	116	41
250.07	33	2	250.60	117	42
250.08	35	2	250.61	119	43
250.09	36	3	250.62	121	44
250.10	38	3	250.63	122	45
250.11	39	3	250.64	124	47
250.12	41	4	250.65	125	48
250.13	43	4	250.66	127	49
250.14	44	5	250.67	129	50
250.15	46	5	250.68	130	52
250.16	47	6	250.69	132	53
250.17	49	6	250.70	133	54
250.18	51	7	250.71	135	56
250.19	52	7	250.72	136	57
250.20	54	8	250.73	138	58
250.21	55	8	250.74	140	60
250.22	57	9	250.75	141	61
250.23	59	9	250.76	143	63
250.24	60	10	250.77	144	64
250.25	62	10	250.78	146	66
250.26	63	11	250.79	148	67
250.27	65	12	250.80	149	68
250.28	67	12	250.81	151	70
250.29	68	13	250.82	152	71
250.30	70	14	250.83	154	73
250.31	71	14	250.84	156	75
250.32	73	15	250.85	157	76
250.33	74	16	250.86	159	78
250.34	76	17	250.87	160	79
250.35	78	17	250.88	162	81
250.36	79	18	250.89	164	83
250.37	81	19	250.90	165	84
250.38	82	20	250.91	167	86
250.39	84	21	250.92	168	88
250.40	86	22	250.93	170	89
250.41	87	22	250.94	171	91
250.42	89	23	250.95	173	93
250.43	90	24	250.96	175	94
250.44	92	25	250.97	176	96
250.45	94	26	250.98	178	98
250.46	95	27	250.99	179	100
250.47	97	28	251.00	181	102
250.48	98	29	251.01	188	103
250.49	100	30	251.02	194	105
250.50	102	31	251.03	201	107
250.51	103	32	251.04	208	109
250.52	105	33	251.05	215	111

Stage-Area-Storage for Pond 4R: Pipe to Infiltration Pond (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
251.06	221	114
251.07	228	116
251.08	235	118
251.09	242	121
251.10	248	123
251.11	255	125
251.12	262	128
251.13	269	131
251.14	275	133
251.15	282	136
251.16	289	139
251.17	296	142
251.18	302	145
251.19	309	148
251.20	316	151
251.21	323	154
251.22	329	158
251.23	336	161
251.24	343	164
251.25	350	168
251.26	356	171
251.27	363	175
251.28	370	179
251.29	376	182
251.30	383	186
251.31	390	190
251.32	397	194
251.33	403	198
251.34	410	202
251.35	417	206
251.36	424	210
251.37	430	215
251.38	437	219
251.39	444	223
251.40	451	228
251.41	457	232
251.42	464	237
251.43	471	242
251.44	478	246
251.45	484	251
251.46	491	256
251.47	498	261
251.48	505	266
251.49	511	271
251.50	518	276
251.51	525	281
251.52	531	287
251.53	538	292
251.54	545	298
251.55	552	303
251.56	558	309
251.57	565	314
251.58	572	320
251.59	579	326
251.60	585	331
251.61	592	337
251.62	599	343
251.63	606	349
251.64	612	355
251.65	619	362
251.66	626	368
251.67	633	374
251.68	639	380
251.69	646	387
251.70	653	393
251.71	660	400
251.72	666	407
251.73	673	413
251.74	680	420
251.75	687	427
251.76	693	434
251.77	700	441
251.78	707	448
251.79	713	455
251.80	720	462
251.81	727	469
251.82	734	477
251.83	740	484
251.84	747	491
251.85	754	499
251.86	761	506
251.87	767	514
251.88	774	522
251.89	781	530
251.90	788	537
251.91	794	545
251.92	801	553
251.93	808	561
251.94	815	569
251.95	821	578
251.96	828	586
251.97	835	594
251.98	842	603
251.99	848	611
252.00	**855**	**620**

Stage-Area-Storage for Pond P1: Infiltration Pond

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
249.25	8,187	0	249.78	8,971	4,547
249.26	8,202	82	249.79	8,986	4,637
249.27	8,217	164	249.80	9,001	4,727
249.28	8,231	246	249.81	9,016	4,817
249.29	8,246	329	249.82	9,031	4,907
249.30	8,261	411	249.83	9,045	4,997
249.31	8,276	494	249.84	9,060	5,088
249.32	8,291	577	249.85	9,075	5,179
249.33	8,305	660	249.86	9,090	5,269
249.34	8,320	743	249.87	9,105	5,360
249.35	8,335	826	249.88	9,119	5,452
249.36	8,350	910	249.89	9,134	5,543
249.37	8,365	993	249.90	9,149	5,634
249.38	8,379	1,077	249.91	9,164	5,726
249.39	8,394	1,161	249.92	9,179	5,817
249.40	8,409	1,245	249.93	9,193	5,909
249.41	8,424	1,329	249.94	9,208	6,001
249.42	8,439	1,413	249.95	9,223	6,093
249.43	8,453	1,498	249.96	9,238	6,186
249.44	8,468	1,582	249.97	9,253	6,278
249.45	8,483	1,667	249.98	9,267	6,371
249.46	8,498	1,752	249.99	9,282	6,464
249.47	8,513	1,837	250.00	9,297	6,557
249.48	8,527	1,922	250.01	9,313	6,650
249.49	8,542	2,008	250.02	9,328	6,743
249.50	8,557	2,093	250.03	9,344	6,836
249.51	8,572	2,179	250.04	9,360	6,930
249.52	8,587	2,264	250.05	9,375	7,023
249.53	8,601	2,350	250.06	9,391	7,117
249.54	8,616	2,436	250.07	9,407	7,211
249.55	8,631	2,523	250.08	9,423	7,305
249.56	8,646	2,609	250.09	9,438	7,400
249.57	8,661	2,696	250.10	9,454	7,494
249.58	8,675	2,782	250.11	9,470	7,589
249.59	8,690	2,869	250.12	9,485	7,683
249.60	8,705	2,956	250.13	9,501	7,778
249.61	8,720	3,043	250.14	9,517	7,873
249.62	8,735	3,130	250.15	9,532	7,969
249.63	8,749	3,218	250.16	9,548	8,064
249.64	8,764	3,305	250.17	9,564	8,160
249.65	8,779	3,393	250.18	9,579	8,255
249.66	8,794	3,481	250.19	9,595	8,351
249.67	8,809	3,569	250.20	9,611	8,447
249.68	8,823	3,657	250.21	9,626	8,543
249.69	8,838	3,746	250.22	9,642	8,640
249.70	8,853	3,834	250.23	9,658	8,736
249.71	8,868	3,923	250.24	9,674	8,833
249.72	8,883	4,011	250.25	9,689	8,930
249.73	8,897	4,100	250.26	9,705	9,027
249.74	8,912	4,189	250.27	9,721	9,124
249.75	8,927	4,279	250.28	9,736	9,221
249.76	8,942	4,368	250.29	9,752	9,319
249.77	8,957	4,457	250.30	9,768	9,416

Stage-Area-Storage for Pond P1: Infiltration Pond (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
250.31	9,783	9,514	250.84	10,615	14,920
250.32	9,799	9,612	250.85	10,631	15,026
250.33	9,815	9,710	250.86	10,646	15,132
250.34	9,830	9,808	250.87	10,662	15,239
250.35	9,846	9,907	250.88	10,678	15,345
250.36	9,862	10,005	250.89	10,693	15,452
250.37	9,878	10,104	250.90	10,709	15,559
250.38	9,893	10,203	250.91	10,725	15,666
250.39	9,909	10,302	250.92	10,740	15,774
250.40	9,925	10,401	250.93	10,756	15,881
250.41	9,940	10,500	250.94	10,772	15,989
250.42	9,956	10,600	250.95	10,788	16,097
250.43	9,972	10,699	250.96	10,803	16,205
250.44	9,987	10,799	250.97	10,819	16,313
250.45	10,003	10,899	250.98	10,835	16,421
250.46	10,019	10,999	250.99	10,850	16,529
250.47	10,034	11,099	251.00	10,866	16,638
250.48	10,050	11,200	251.01	10,883	16,747
250.49	10,066	11,300	251.02	10,899	16,856
250.50	10,082	11,401	251.03	10,916	16,965
250.51	10,097	11,502	251.04	10,932	17,074
250.52	10,113	11,603	251.05	10,949	17,183
250.53	10,129	11,704	251.06	10,965	17,293
250.54	10,144	11,806	251.07	10,982	17,403
250.55	10,160	11,907	251.08	10,998	17,513
250.56	10,176	12,009	251.09	11,015	17,623
250.57	10,191	12,111	251.10	11,031	17,733
250.58	10,207	12,213	251.11	11,048	17,843
250.59	10,223	12,315	251.12	11,065	17,954
250.60	10,238	12,417	251.13	11,081	18,065
250.61	10,254	12,520	251.14	11,098	18,175
250.62	10,270	12,622	251.15	11,114	18,287
250.63	10,285	12,725	251.16	11,131	18,398
250.64	10,301	12,828	251.17	11,147	18,509
250.65	10,317	12,931	251.18	11,164	18,621
250.66	10,333	13,034	251.19	11,180	18,732
250.67	10,348	13,138	251.20	11,197	18,844
250.68	10,364	13,241	251.21	11,213	18,956
250.69	10,380	13,345	251.22	11,230	19,069
250.70	10,395	13,449	251.23	11,246	19,181
250.71	10,411	13,553	251.24	11,263	19,293
250.72	10,427	13,657	251.25	11,280	19,406
250.73	10,442	13,761	251.26	11,296	19,519
250.74	10,458	13,866	251.27	11,313	19,632
250.75	10,474	13,971	251.28	11,329	19,745
250.76	10,489	14,075	251.29	11,346	19,859
250.77	10,505	14,180	251.30	11,362	19,972
250.78	10,521	14,285	251.31	11,379	20,086
250.79	10,537	14,391	251.32	11,395	20,200
250.80	10,552	14,496	251.33	11,412	20,314
250.81	10,568	14,602	251.34	11,428	20,428
250.82	10,584	14,708	251.35	11,445	20,542
250.83	10,599	14,813	251.36	11,462	20,657

Stage-Area-Storage for Pond P1: Infiltration Pond (continued)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
251.37	11,478	20,772
251.38	11,495	20,887
251.39	11,511	21,002
251.40	11,528	21,117
251.41	11,544	21,232
251.42	11,561	21,348
251.43	11,577	21,463
251.44	11,594	21,579
251.45	11,610	21,695
251.46	11,627	21,811
251.47	11,644	21,928
251.48	11,660	22,044
251.49	11,677	22,161
251.50	11,693	22,278
251.51	11,710	22,395
251.52	11,726	22,512
251.53	11,743	22,629
251.54	11,759	22,747
251.55	11,776	22,865
251.56	11,792	22,982
251.57	11,809	23,100
251.58	11,825	23,219
251.59	11,842	23,337
251.60	11,859	23,455
251.61	11,875	23,574
251.62	11,892	23,693
251.63	11,908	23,812
251.64	11,925	23,931
251.65	11,941	24,050
251.66	11,958	24,170
251.67	11,974	24,290
251.68	11,991	24,409
251.69	12,007	24,529
251.70	**12,024**	**24,649**

Appendix G – Mounding Calculations

Sheldon West - Infiltration Basin 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)

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

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

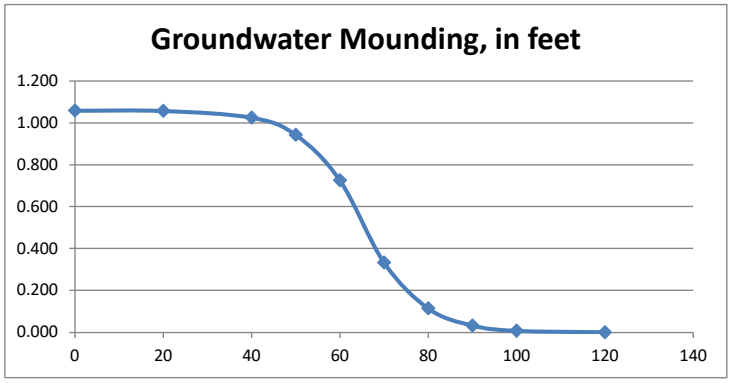
Input Values

0.2830	***R***	**Recharge (infiltration) rate (feet/day)**
0.260	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
2.83	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
65.000	**x**	**1/2 length of basin (x direction, in feet)**
31.000	**y**	**1/2 width of basin (y direction, in feet)**
1.000	**t**	**duration of infiltration period (days)**
15.000	**hi(0)**	**initial thickness of saturated zone (feet)**

16.058	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
1.058	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
1.058	0
1.057	20
1.025	40
0.942	50
0.725	60
0.333	70
0.114	80
0.032	90
0.007	100
0.001	120

Re-Calculate Now



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.