



Stormwater Report
In Support of

Comprehensive Permit Filing
for

Essex Pastures
42-44 Essex Road
(Map 54A, Parcel 14A; Map 54C, parcels 22, 22a, 23, and 24)
Ipswich, MA

Prepared By:
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Prepared For:
Essex Pastures, LLC
March, 2020
Revised August, 2020

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Table of Contents

Introduction

Standard 1: No New Untreated Discharges

Standard 2: Peak Rate Attenuation

Standard 3: Recharge

Standard 4: Water Quality

Standard 5: Land Uses with Higher Potential Pollutant Loads

Standard 6: Critical Areas

Standard 7: Redevelopment

Standard 8: Construction Period Pollution Prevention and Erosion & Sedimentation Control

Standard 9: Operations and Maintenance Plan

Standard 10: Prohibition of Illicit Discharges

Appendix

- I. NRCS Soils Map
- II. Soil Testing Results
- III. FEMA Firmette
- IV. Stormwater Checklist
- V. Existing and Proposed Drainage Figures
- VI. Hydrocad Output
- VII. Recharge Calculations
- VIII. Operations and Maintenance Log

Introduction

Essex Pastures, LLC proposes to develop 191 residential units (173 apartment, and 18 townhomes) and 1,000 sf of office space at 42-44 Essex Road (Route 133) in Ipswich, MA. The site is approximately 13.2+/- Acres in size with approximately 780 feet of frontage along Route 133. A portion of the site has been previously developed, with a mix of residential, office, and commercial uses. The current approach is to construct seven (7) garden-style apartment buildings and 18 townhomes, expand the existing medical building, and construct a clubhouse and amenity area.

The topography is gently sloping, with the majority of the site flowing towards the resource area in the northwest section of the property. Soils found on-site vary greatly from hydrologic group A soils, to group D soils. Available NRCS soil data, and test pit information (performed by Bayside Engineering and their sub consultants) was used as the basis of the hydrologic analysis. Additional testing will be performed at locations of stormwater facilities in paved areas this coming spring.

Site improvements and the proposed stormwater management system were designed to meet the Stormwater Management Standards described in the MassDEP Stormwater Handbook. The following report describes the project's compliance with these standards. The proposed stormwater management system will collect and treat surface and roof runoff, while mitigating any increase in peak flows due to development of the site. The system will achieve this goal by utilizing deep sump catch basins, hydrodynamic separators, underground infiltration areas, and a centrally-located detention basin. Roof drainage will be collected at the individual buildings, and routed through one of the infiltration areas to promote groundwater recharge before flowing to the central detention basin. Surface runoff will be collected by deep-sump catch basins, suspended solids will be removed by hydrodynamic separators, prior to being routed through infiltration areas and discharge to the central detention basin.

Standard 1: No New Untreated Discharges

The Massachusetts Stormwater Handbook states that no new stormwater conveyances may discharge untreated stormwater directly to or cause erosions in wetlands or waters of the Commonwealth. The project will not include new stormwater conveyances.

Standard 2: Peak Rate Attenuation

The Massachusetts Stormwater Handbook states that stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. A summary of the existing and proposed discharge rates follows. The proposed condition discharge rates of runoff are at or below the existing rates to the same discharge points. Please see the attached "Existing Drainage Areas" and "Proposed Drainage Areas" figures (Appendix V) and Hydrocad output (Appendix VI) for more information.

For the purpose of these calculations the following assumptions were made:

- The same total watershed area of the drainage areas is used to compare the existing and proposed conditions.
- The Natural Resources Conservation Service (NRCS) Web Soil Survey of Essex County defines some soils in the project area as NR, or not rated. Hydrologic soil groups (A through D) were assigned to these particular areas based on adjacent soil types. Further testing will be performed to clarify soil conditions in these, and paved areas of the site.

In the proposed condition a stormwater management system will collect stormwater runoff from the developed site. A series of infiltration areas, and the central detention basin will encourage groundwater

recharge, and mitigate post-development peak flows. The individual drainage areas, and system routing is included in Appendix VI of this report.

The following table compares the peak rates of runoff under the existing and proposed conditions:

Discharge Point	2-Year Storm		10-Year Storm		25-Year Storm		100-Year Storm	
	Existing (cfs)	Proposed (cfs)						
OA	12.49	4.34	28.24	16.40	38.93	33.14	55.86	47.91

cfs - Cubic Feet per Second

Standard 3: Recharge

The Massachusetts Stormwater Handbook states that loss of annual recharge to groundwater shall be eliminated or minimized. The annual recharge from the post-development site shall approximate the annual recharge from the pre-development conditions based on soil type. As discussed above, there are varying Hydrologic Soil Groups throughout the site. Therefore, the required recharge volume is calculated based on the summation of individual impervious areas for each particular Soil Group. The required volume for each area is included in Appendix VII. The required volume has been adjusted to account for 65% of the impervious area being directed to a recharge area.

The Massachusetts Stormwater Handbook states that the recharge volume must drain within 72 hours. Upon completion of the additional soil testing, calculations for all infiltration areas will be prepared to confirm that this requirement can be met

Standard 4: Water Quality

The Massachusetts Stormwater Handbook states that systems shall be designed to remove 80% of the average annual post-development construction load of Total Suspended Solids (TSS).

Stormwater runoff from the proposed roof is considered “clean” and will drain directly to the chamber systems (infiltration areas). Stormwater runoff from the proposed paved pedestrian and vehicular areas will sheet flow to deep sump catch basins, then to hydrodynamic separators to remove suspended soils prior to discharge to one of the infiltration areas. Upon further development of the drainage design, individual structures will be sized, and TSS removal (and water quality volume) calculations will be provided to confirm that this requirement is met.

Standard 5: Land Uses with Higher Potential Pollutant Loads

The proposed project is not considered a Land Use with Higher Potential Pollutant Loads.

Standard 6: Critical Areas

The proposed project is not in a critical area. Therefore this standard is not applicable.

Standard 7: Redevelopment

The proposed project is not considered a redevelopment.

Standard 8: Construction Period Pollution Prevention and Erosion & Sedimentation Control

Best management practices (BMP) for erosion and sedimentation control are staked straw wattles, filter fences, hydro seeding, and phased development. Many stormwater BMP technologies (e.g., infiltration technologies) are not designed to handle the high concentrations of sediments typically found in construction runoff and must be protected from construction-related sediment loadings. Construction BMP's **must** be maintained. In developing the proposed project certain measures will be implemented to minimize impacts erosion and sedimentation could have on surrounding areas. This section addresses items that involve proper construction techniques, close surveillance of workmanship, and immediate response to emergency situations. The developer must be prepared to provide whatever reasonable measures are necessary to protect the environment during construction and to stabilize all disturbed areas as soon as construction ends.

Pre-Construction

1. The contractor shall have a stockpile of materials required to control erosion on-site to be used to supplement or repair erosion control devices. These materials shall include, but are not limited to straw wattles, silt fence and crushed stone.
2. The contractor is responsible for erosion control on site and shall utilize erosion control measures where needed, regardless of whether the measures are specified on the plan or in the order of conditions.

Preliminary Site Work

1. Excavated materials should be stockpiled, separating the topsoil for future use on the site. Erosion control shall be utilized along the down slope side of the piles and side slopes shall not exceed 2:1.
2. If intense rainfall is anticipated, the installation of supplemental straw bale dikes, silt fences, or armored dikes shall be considered.
3. Unsuitable excavated material shall be removed from the site.
4. Construction entrance shall be installed.
5. Existing catchbasins shall be protected with silt sacks.

Ongoing Site Work

1. Erosion control measures shall be regularly inspected and replaced as needed.
2. Dewatering shall be done in a manner so as not to transmit silt, sand or particulate matter to the receiving water or existing drainage system.

Landscaping

1. Landscaping shall occur as soon as possible to provide permanent stabilization of disturbed surfaces.
2. If the season or adverse weather conditions do not allow the establishment of vegetation, temporary mulching with straw or wood chips weighted with snow fence or branches, or other methods shall be provided.
3. A minimum of 4 inches of topsoil shall be placed and its surface smoothed to the specified grades.
4. The use of herbicides is strongly discouraged.
5. Hydro seeding is encouraged for steep slopes. Application rates on slopes greater than 3:1 shall have a minimum seeding rate of 5-lbs/1000 SF. A latex or fiber tackifier shall be used on these slopes at a minimum rate of 50 lbs. of tackifier per 500 gallons of water used.

Standard 9: Operations and Maintenance Plan

The information provided herein is intended to provide the base information for operation and maintenance of the site in perpetuity subject to updates and revisions as required at a future date. As such, all future property owners must be notified in writing of this plan and be provided with a copy of this plan, a complete set of the design drawings and/or a completed as-built plan showing all the drainage features as they were constructed, which are considered part of this document. Please see the attached Operations and Maintenance Log (Appendix VII).

Stormwater management system owner: Essex Pastures, LLC
The party responsible for operation and maintenance: Essex Pastures, LLC
(attn. John Bruni (978) 239-1573)

Illicit Discharge - Practices to Minimize Storm Water Contamination

- All waste materials will be collected and stored in a securely lidded metal dumpster.
- All trash and debris from the site will be deposited in the dumpster. The dumpster will be emptied on a regular schedule prior to being over full.
- All personnel will be instructed regarding the correct procedure for waste disposal.
- Good housekeeping and spill control practices will be followed to minimize storm water contamination from petroleum products, paints, and cleaning products.
- All site vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage.
- Spill kits will be provided with any activity that could provide contamination.
- All paint containers and curing compounds will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewers, but will be properly disposed according to the manufacturer's instructions.
- All spills will be cleaned up immediately upon discovery. Spills large enough to reach the storm sewers will be reported to the Massachusetts Department of Environmental Protection Northeast Regional Office at 1-888-304-1133.

Infiltration BMP

The infiltration BMP (subsurface chamber systems and detention basin) shall be inspected after every major storm for the first few months to ensure it is stabilized and functioning properly. If necessary, corrective action shall be taken until the system functions properly. Inspectors should note how long water remains standing in the inspection port after a storm; standing water within the basin 48 to 72 hours after a storm indicates that the infiltration capacity may have been overestimated. If the ponding is due to clogging, immediately address the reasons for the clogging. Thereafter, inspect the infiltration BMP at least twice per year.

Roof Drain Leaders

Routine roof inspections shall be performed two times per year. The roof shall be kept clean and free of debris, and the roof drainage systems shall be kept clear. Gutters and downspouts shall be cleaned at least twice per year, or more frequently as necessary.

Permeable Pavers

Permeable pavers shall be installed and maintained per the manufacturer's guidelines. The pavers shall be cleaned and inspected quarterly.

Vegetated Areas Maintenance

Although not a structural component of the drainage system, the maintenance of vegetated areas may affect the functioning of stormwater management practices. This includes the health/density of vegetative cover and activities such as the application and disposal of lawn and garden care products, disposal of leaves and yard trimmings.

Initial Post-Construction Inspection

During the initial period of vegetation establishment, pruning and weeding are required twice in the first year by contractor or owner. Any dead vegetation/plantings found after the first year will be replaced. Proper mulching is mandatory and regular watering may be required initially to ensure proper establishment of new vegetation.

Long-Term Maintenance

The planted areas shall be inspected on a semi-annual basis and any litter removed. Weeds and invasive plant species shall be removed by hand. Maintain planted areas adjacent to pavement to prevent soil washout. Immediately clean any soil deposits on pavement. Leaf litter and other detritus shall be removed twice per year. If needed to maintain aesthetic appearance, perennial plantings may be trimmed at the end of the growing season.

Trees and shrubs shall be inspected twice per year to evaluate health and attended to as necessary. Seeded ground cover or grass areas shall not receive mulching. Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming. Plant alternative mixtures of grass species in the event of unsuccessful establishment. The grass vegetation should not be cut to a height less than four inches.

Pesticide/Herbicide Usage

No pesticides are to be used unless a single spot treatment is required for a specific control application.

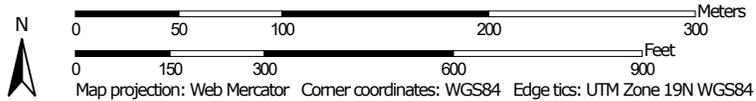
Appendix I. NRCS Soils Map

Soil Map—Essex County, Massachusetts, Southern Part
(Essex Pastures)



Soil Map may not be valid at this scale.

Map Scale: 1:3,640 if printed on A portrait (8.5" x 11") sheet.



MAP LEGEND

	Area of Interest (AOI)		Spoil Area
	Area of Interest (AOI)		Stony Spot
Soils			Very Stony Spot
	Soil Map Unit Polygons		Wet Spot
	Soil Map Unit Lines		Other
	Soil Map Unit Points		Special Line Features
Special Point Features		Water Features	
	Blowout		Streams and Canals
	Borrow Pit	Transportation	
	Clay Spot		Rails
	Closed Depression		Interstate Highways
	Gravel Pit		US Routes
	Gravelly Spot		Major Roads
	Landfill		Local Roads
	Lava Flow	Background	
	Marsh or swamp		Aerial Photography
	Mine or Quarry		
	Miscellaneous Water		
	Perennial Water		
	Rock Outcrop		
	Saline Spot		
	Sandy Spot		
	Severely Eroded Spot		
	Sinkhole		
	Slide or Slip		
	Sodic Spot		

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Essex County, Massachusetts, Southern Part
Survey Area Data: Version 16, Sep 13, 2019

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

Date(s) aerial images were photographed: Dec 31, 2009—Sep 12, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	0.0	0.1%
14B	Scitico silt loam, 0 to 5 percent slopes	10.1	16.8%
53A	Freetown muck, ponded, 0 to 1 percent slopes	1.4	2.3%
220B	Boxford silt loam, 3 to 8 percent slopes	17.4	28.8%
220C	Boxford silt loam, 8 to 15 percent slopes	2.9	4.7%
225B	Belgrade very fine sandy loam, 0 to 8 percent slopes	0.1	0.1%
242B	Hinckley gravelly fine sandy loam, 3 to 8 percent slopes	1.0	1.6%
242C	Hinckley loamy sand, 8 to 15 percent slopes	4.6	7.7%
242D	Hinckley loamy sand, 15 to 25 percent slopes	2.7	4.4%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	0.2	0.3%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	5.5	9.2%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	3.0	4.9%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	3.0	5.0%
306D	Paxton fine sandy loam, 15 to 25 percent slopes, very stony	2.8	4.7%
602	Urban land	1.3	2.2%
723B	Elmridge fine sandy loam, 3 to 8 percent slopes	4.4	7.3%
Totals for Area of Interest		60.4	100.0%

Appendix II. Soil Testing Results (by others)

COMMONWEALTH OF MASSACHUSETTS

IPSWICH, MASSACHUSETTS

SOIL SUITABILITY ASSESSMENT FOR ON-SITE STORMWATER DRAINAGE

SITE INFORMATION

Thursday, September 18th, 2014

Street Address: #36 Essex Road City/Town: Ipswich State: Massachusetts County: Essex Zip Code: 01938

Land Use: Agricultural field Latitude: ~42°39'58.9"N Longitude: ~70°50'03.4"W Elevation: ~45' - 55' AMSL

PUBLISHED SOIL DATA AND MAP UNIT DESCRIPTION

Physiographic Division: Appalachian Highlands Physio. Province: New England Physio. Section: Seaboard lowland section

Soil map unit: 220B - Boxford silt loam (Fine, mixed, mesic, Aquic Dystric Eutrochrepts) 3-8% slopes

Soil map unit: 305B - Paxton fine sandy loam (Coarse-loamy, mixed, mesic, Typic Fragiochrepts) 3-8% slopes

NRCS/USDA web soil survey: Essex County, Massachusetts, Southern part Map Scale: 1:600'

Soil hydric or upland: Upland Average depth to water table: 18-36" Depth to restrictive feature: ~36"

Frequency of flooding: None Frequency of ponding: None Available water capacity: High (9.2") and High (9.2")

Drainage Class: Moderately well drained/ well drained Hydrologic Soil Group: C Ksat: Low (0.00 - 0.20 in/hr)

Soil limitations: Low permeability, dense substratum, low saturated hydraulic conductivity, shallow water tables.

WETLAND AREA & USGS WELL MEASUREMENTS

National Wetland Inventory Map: NA Wetlands Conservancy Program: NA Bordering vegetative wetland: >100 feet

Current Water Resource Condition (USGS): Well Site # 424520070562401- MA-NIW 27 Newbury, MA

Well completed in Sand and gravel aquifers and ice-contact deposits, including kames and eskers.

Well depth: 19.8 feet Land surface altitude: 55.00 feet above NGVD29 Latitude: ~42°45'19.3"N Longitude: ~70°56'22.1"

Most recent data value: 9.47' on 09/15/14 (depth to water level in feet below land surface). Range: Normal

NATIONAL FLOOD INSURANCE RATE MAP

Above 500 year flood boundary? Yes Within 500 year flood boundary? No Within 100 year flood boundary? No

SURFICIAL GEOLOGY:

Surficial geology map: Surficial Geology Ipswich Quadrangle, 1958-59 Map scale: 1:24,000'

Surficial geology: Ogm: Late Pleistocene glaciomarine deposits & Ogm: Early Pleistocene ground moraine

Geologic parent material: Dense clayey till and Gravel, sand, silt & clay deposited in neritic near-shore environment, silty clay is predominant.

Geomorphic landform: Valley and ridge Landform position (2D): Shoulder Landform position (3D): Side slope

Slope gradient: ~3-8% Down slope shape: Linear Across slope shape: Concave Slope complexity: Simple

Bedrock outcropping in vicinity: None Glacial erratics in vicinity: None

TP-3 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

Date: September 18, 2014

Time: 11:52

Weather: Clear, cool, 65°F, calm, dry

Position on landscape: Shoulder of ridge Slope aspect: Southerly Vegetation: Lightly wooded

Property line: 30+ feet Drainage way: 50+ feet Drinking water well: 150+ feet

Wetlands: 100+ feet Open water body: 400+ feet Abutting septic system: 50+ feet

SOIL PROFILE ► TP-3

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (EarthColors)	Redoxomorphic Features from ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00 → 22"	A _p	Sandy Loam	10YR32 very dark brown	none observed	Plowed horizon. Soft, fine to medium granular structure (moderate grade), silty cohesive matrix, fine grained mineral content, dry matrix, many fine to medium grass roots, free of clasts, clear wavy boundary.
22 → 114"	C	Sandy Loam gravelly	10YR54 yellowish brown	@ 50" (c,2,d)	Firm, compact, massive structure (strong grade), mixed very fine to fine grained mineral content, damp, weak iron cementing observed as nodules within the matrix, gritty, moderate silt content, weakly stratified (imbrication of long prismatic clasts >3"), 45% sub-rounded to angular gravel content and 35% sub-rounded to sharp angular cobble content, clasts tightly nested in matrix, no observed apparent groundwater and no bedrock refusal at test hole depth.

Depth to bedrock: >114" Hydrologic Soil Group: C Drainage Class: Well drained

Soil map unit: 305B – Faxton fine sandy loam (Coarse-loamy, mixed, mesic, Typic Fragiochrepts) 3-8% slopes

TP-3 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

DEPTH TO APPARENT/ PHREATIC GROUNDWATER TABLE: *Not Observed*

Apparent water seeping from pit face: _____ (Below land surface) Depth to stabilized apparent water: _____ (Below land surface)

Soil moisture state: Slightly damp

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 50" (below land surface)

Type: Masses on grain surfaces and ped interior Abundance: Common Size: Fine to medium Contrast: Distinct

Shape: Irregular/ stringy and spherical and nodular Moisture state: Slightly moist Location: C matrix

Hardness: Soft Boundary: Diffuse Concentration color: 2.5YR46 (red) Reduction color: 10Y71 (light greenish gray)

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to stabilized phreatic water: _____ inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to redoximorphic features: 50" inches below grade

Groundwater adjustment: _____

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 7.66 feet

Depth of naturally occurring pervious material in TP-3 Upper boundary: 22"
Lower boundary: 114"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848
Printed name of evaluator & license number

June 1998
Date of Soil Evaluator Certification

Unofficial exploratory soil testing
Town witness

09/18/14
Date of soil testing

TP-4 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

Date: September 18, 2014

Time: 11:52

Weather: Clear, cool, 65°F, calm, dry

Position on landscape: Shoulder of ridge Slope aspect: Southerly Vegetation: Lightly wooded

Property line: 30+ feet Drainage way: 50+ feet Drinking water well: 150+ feet

Wetlands: 100+ feet Open water body: 400+ feet Abutting septic system: 50+ feet

SOIL PROFILE ► TP-4

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (EarthColors)	Redoxomorphic Features from ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00 → 07"	A _p	Sandy Loam	10YR32 very dark brown	none observed	Plowed horizon. Soft, fine to medium granular structure (moderate grade), silty cohesive matrix, fine grained mineral content, dry matrix, many fine to medium grass roots, free of clasts, clear wavy boundary.
07 → 17"	B _w	Sandy Loam	10YR56 yellowish brown	none observed	Soft, fine to medium blocky structure (moderate grade), slightly gritty, weak cohesive matrix, fine to medium grained mineral content, damp matrix, few fine to medium roots, free of clasts, diffuse smooth boundary.
17 → 110"	C	Sandy Loam gravelly	10YR54 yellowish brown	@ 51" (c,2,d)	Firm, compact, massive structure (strong grade), mixed very fine to fine grained mineral content, damp, weak iron cementing observed as nodules within the matrix, gritty, moderate silt content, weakly stratified (imbrication of long prismatic clasts >3"), 45% sub-rounded to angular gravel content and 35% sub-rounded to sharp angular cobble content, clasts tightly nested in matrix, no observed apparent groundwater and no bedrock refusal at test hole depth.

Depth to bedrock: >110" Hydrologic Soil Group: C Drainage Class: Well drained

Soil map unit: 305B – Paxton fine sandy loam (Coarse-loamy, mixed, mesic, Typic Fragiochrepts) 3-8% slopes

TP-4 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

DEPTH TO APPARENT/ PHREATIC GROUNDWATER TABLE: Not Observed

Apparent water seeping from pit face: _____ (Below land surface) Depth to stabilized apparent water: _____ (Below land surface)

Soil moisture state: Slightly damp

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 51" (below land surface)

Type: Masses on grain surfaces and ped interior Abundance: Common Size: Fine to medium Contrast: Distinct

Shape: Irregular/ stringy and spherical and nodular Moisture state: Slightly moist Location: C matrix

Hardness: Soft Boundary: Diffuse Concentration color: 2.5YR46 (red) Reduction color: 10Y71 (light greenish gray)

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to stabilized phreatic water: _____ inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to redoximorphic features: 51" inches below grade

Groundwater adjustment: _____

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 8.58 feet

Depth of naturally occurring pervious material in TP-4 Upper boundary: 22"
Lower boundary: 114"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

June 1998

Printed name of evaluator & license number

Date of Soil Evaluator Certification

Unofficial exploratory soil testing

09/18/14

Town witness

Date of soil testing

TP-5 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

Date: September 18, 2014

Time: 12:10

Weather: Clear, cool, 65°F, calm, dry

Position on landscape: Shoulder of ridge Slope aspect: Southerly Vegetation: Field grass and low brush

Property line: 30+ feet Drainage way: 50+ feet Drinking water well: 150+ feet

Wetlands: 100+ feet Open water body: 400+ feet Abutting septic system: 50+ feet

SOIL PROFILE ► TP-5

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (EarthColors)	Redoxomorphic Features from BSHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00 → 08"	A _p	Sandy Loam	10YR32 very dark brown	none observed	Plowed horizon. Soft, fine to medium granular structure (moderate grade), silty cohesive matrix, fine grained mineral content, dry matrix, many fine to medium grass roots, free of clasts, clear wavy boundary.
08 → 16"	B _w	Sandy Loam	10YR56 yellowish brown	none observed	Soft, fine to medium blocky structure (moderate grade), slightly gritty, weak cohesive matrix, fine to medium grained mineral content, damp matrix, few fine to medium roots, free of clasts, diffuse smooth boundary.
16 → 115"	C	Sandy Loam gravelly	10YR54 yellowish brown	@ 52" (c,2,d)	Firm, compact, massive structure (strong grade), mixed very fine to fine grained mineral content, damp, weak iron cementing observed as nodules within the matrix, gritty, moderate silt content, weakly stratified (imbrication of long prismatic clasts >3"), 45% sub-rounded to angular gravel content and 35% % sub-rounded to sharp angular cobble content, clasts tightly nested in matrix, no observed apparent groundwater and no bedrock refusal at test hole depth.

Depth to bedrock: >115" Hydrologic Soil Group: C Drainage Class: Well drained

Soil map unit: 305B – Paxton fine sandy loam (Coarse-loamy, mixed, mesic, Typic Fragiochrepts) 3-8% slopes

TP-5 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

DEPTH TO APPARENT/ PHREATIC GROUNDWATER TABLE: *Not Observed*

Apparent water seeping from pit face: _____ (Below land surface) Depth to stabilized apparent water: _____ (Below land surface)

Soil moisture state: Slightly damp

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 52" (below land surface)

Type: Masses on grain surfaces and ped interior Abundance: Common Size: Fine to medium Contrast: Distinct

Shape: Irregular/ stringy and spherical and nodular Moisture state: Slightly moist Location: C matrix

Hardness: Soft Boundary: Diffuse Concentration color: 2.5YR46 (red) Reduction color: 10Y71 (light greenish gray)

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to stabilized phreatic water: _____ inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to redoximorphic features: 52" inches below grade

Groundwater adjustment: _____

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 8.91 feet

Depth of naturally occurring pervious material in TP-5 Upper boundary: 22"
Lower boundary: 114"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848
Printed name of evaluator & license number

June 1998
Date of Soil Evaluator Certification

Unofficial exploratory soil testing
Town witness

09/18/14
Date of soil testing

TP-6 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

Date: September 18, 2014

Time: 12:25

Weather: Clear, cool, 65°F, calm, dry

Position on landscape: Shoulder of ridge Slope aspect: Southerly Vegetation: Field grass and low brush

Property line: 30+ feet Drainage way: 50+ feet Drinking water well: 150+ feet

Wetlands: 100+ feet Open water body: 400+ feet Abutting septic system: 50+ feet

SOIL PROFILE ► TP-6

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (EarthColors)	Redoxomorphic Features from ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00 → 04"	A _p	Sandy Loam	10YR32 very dark brown	none observed	Plowed horizon. Soft, fine to medium granular structure (moderate grade), silty cohesive matrix, fine grained mineral content, dry matrix, many fine to medium grass roots, free of clasts, clear wavy boundary.
04 → 15"	B _w	Sandy Loam	10YR56 yellowish brown	none observed	Soft, fine to medium blocky structure (moderate grade), slightly gritty, weak cohesive matrix, fine to medium grained mineral content, damp matrix, few fine to medium roots, free of clasts, diffuse smooth boundary.
15 → 60"	C ₁	Sandy Loam gravelly	10YR54 yellowish brown	@ 45" (c,2,d)	Firm, compact, massive structure (strong grade), mixed very fine to fine grained mineral content, damp, weak iron cementing observed as nodules within the matrix, gritty, moderate silt content, weakly stratified (imbrication of long prismatic clasts >3"), 45% sub-rounded to angular gravel content and 35% sub-rounded to sharp angular cobble content, clasts tightly nested in matrix
60 → 109"	C ₂	Sand gravelly	10YR46 yellowish brown		Loose, structure less, unstable matrix, stratified and poorly graded, mixed fine to medium grained mineral content, gritty, free of silts (sharp), free of gravel and cobble content, variegated colors observed at textural changes within stratified matrix, no bedrock refusal at test hole depth.

Depth to bedrock: >109" Hydrologic Soil Group: C Drainage Class: Well drained

Soil map unit: 305B – Paxton fine sandy loam (Coarse-loamy, mixed, mesic, Typic Fragiochrepts) 3-8% slopes

TP-6 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

DEPTH TO APPARENT/ PHREATIC GROUNDWATER TABLE: Not Observed

Apparent water seeping from pit face: _____ (Below land surface) Depth to stabilized apparent water: _____ (Below land surface)

Soil moisture state: Slightly damp

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 45" (below land surface)

Type: Masses on grain surfaces and ped interior Abundance: Common Size: Fine to medium Contrast: Distinct

Shape: Irregular/ stringy and spherical and nodular Moisture state: Slightly moist Location: C matrix

Hardness: Soft Boundary: Diffuse Concentration color: 2.5YR46 (red) Reduction color: 10Y71 (light greenish gray)

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to stabilized phreatic water: _____ inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to redoximorphic features: 45" inches below grade

Groundwater adjustment: _____

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 8.75 feet

Depth of naturally occurring pervious material in TP-6 Upper boundary: 04"
Lower boundary: 109"

Certification

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Alexander F. Parker License #1848

June 1998

Printed name of evaluator & license number

Date of Soil Evaluator Certification

Unofficial exploratory soil testing

09/18/14

Town witness

Date of soil testing

TP-7 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

Date: September 18, 2014

Time: 12:36

Weather: Clear, cool, 65°F, calm, dry

Position on landscape: Shoulder of ridge Slope aspect: Southerly Vegetation: Field grass and low brush

Property line: 30+ feet Drainage way: 50+ feet Drinking water well: 150+ feet

Wetlands: 100+ feet Open water body: 400+ feet Abutting septic system: 50+ feet

SOIL PROFILE ► TP-7

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (EarthColors)	Redoxomorphic Features from ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00 → 08"	A _p	Sandy Loam	10YR32 very dark brown	none observed	Plowed horizon. Soft, fine to medium granular structure (moderate grade), silty cohesive matrix, fine grained mineral content, dry matrix, many fine to medium grass roots, free of clasts, clear wavy boundary.
08 → 24"	B _w	Sandy Loam	10YR56 yellowish brown	none observed	Soft, fine to medium blocky structure (moderate grade), slightly gritty, weak cohesive matrix, fine to medium grained mineral content, damp matrix, few fine to medium roots, free of clasts, diffuse smooth boundary.
24 → 47"	C ₁	Loamy Sand gravelly	2.5Y64 light yellowish brown	@ 45" (c,2,d)	Firm, compact, massive structure (strong grade), mixed very fine to fine grained mineral content, damp, weak iron cementing observed as nodules within the matrix, gritty, moderate silt content, weakly stratified (imbrication of long prismatic clasts >3"), 45% sub-rounded to angular gravel content and 35% sub-rounded to sharp angular cobble content, clasts tightly nested in matrix
47 → 111"	C ₂	Silt Loam	2.5Y53 light olive brown		Firm, massive structure (strong grade), dense cohesive matrix, high silt content, moist, moderately plastic and slightly sticky, ribbons to 1.5", holds stable cast, wire rolled to 2", free of clasts

Depth to bedrock: >111" Hydrologic Soil Group: C Drainage Class: Well drained

Soil map unit: 305B – Paxton fine sandy loam (Coarse-loamy, mixed, mesic, Typic Fragiochrepts) 3-8% slopes

TP-7 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

DEPTH TO APPARENT/ PHREATIC GROUNDWATER TABLE: *Not Observed*

Apparent water seeping from pit face: _____ (Below land surface) Depth to stabilized apparent water: _____ (Below land surface)

Soil moisture state: Slightly damp

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 45" (below land surface)

Type: Masses on grain surfaces and ped interior Abundance: Common Size: Fine to medium Contrast: Distinct

Shape: Irregular/ stringy and spherical and nodular Moisture state: Slightly moist Location: C matrix

Hardness: Soft Boundary: Diffuse Concentration color: 2.5YR46 (red) Reduction color: 10Y71 (light greenish gray)

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to stabilized phreatic water: _____ inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to redoximorphic features: 45" inches below grade

Groundwater adjustment: _____

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 8.58 feet

Depth of naturally occurring pervious material in TP-7 Upper boundary: 08"

Lower boundary: 111"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Printed name of evaluator & license number

June 1998

Date of Soil Evaluator Certification

Unofficial exploratory soil testing

Town witness

09/18/14

Date of soil testing

TP-8 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

Date: September 18, 2014

Time: 12:49

Weather: Clear, cool, 65°F, calm, dry

Position on landscape: Shoulder of ridge Slope aspect: Southerly Vegetation: Field grass and low brush

Property line: 30+ feet Drainage way: 50+ feet Drinking water well: 150+ feet

Wetlands: 100+ feet Open water body: 400+ feet Abutting septic system: 50+ feet

SOIL PROFILE ► TP-8

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (EarthColors)	Redoxomorphic Features from ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00 → 12"	A _p	Sandy Loam	10YR32 very dark brown	none observed	Plowed horizon. Soft, fine to medium granular structure (moderate grade), silty cohesive matrix, fine grained mineral content, dry matrix, many fine to medium grass roots, free of clasts, clear wavy boundary.
12 → 24"	B _w	Sandy Loam	10YR56 yellowish brown	none observed	Soft, fine to medium blocky structure (moderate grade), slightly gritty, weak cohesive matrix, fine to medium grained mineral content, damp matrix, few fine to medium roots, free of clasts, diffuse smooth boundary.
24 → 100"	C	Silt Loam	2.5Y53 light olive brown	@ 41" (c,2,d)	Firm, massive structure (strong grade), dense cohesive matrix, high silt content, moist, moderately plastic and slightly sticky, ribbons to 1.5", holds stable cast, wire rolled to 2", free of clasts.

Depth to bedrock: >100" Hydrologic Soil Group: C Drainage Class: Moderately well drained

Soil map unit: 220B – Boxford silt loam (Fine, mixed, mesic, Aquic Dystric Eutrochrepts) 3-8% slopes

TP-8 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

DEPTH TO APPARENT/ PHREATIC GROUNDWATER TABLE: Not Observed

Apparent water seeping from pit face: _____ (Below land surface) Depth to stabilized apparent water: _____ (Below land surface)

Soil moisture state: Slightly damp

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 41" (below land surface)

Type: Masses on grain surfaces and ped interior Abundance: Common Size: Fine to medium Contrast: Distinct

Shape: Irregular/ stringy and spherical and nodular Moisture state: Slightly moist Location: C matrix

Hardness: Soft Boundary: Diffuse Concentration color: 2.5YR46 (red) Reduction color: 10Y71 (light greenish gray)

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to stabilized phreatic water: _____ inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to redoximorphic features: 41" inches below grade

Groundwater adjustment: _____

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 7.33 feet

Depth of naturally occurring pervious material in TP-8 Upper boundary: 12"
Lower boundary: 100"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Printed name of evaluator & license number

June 1998

Date of Soil Evaluator Certification

Unofficial exploratory soil testing

Town witness

09/18/14

Date of soil testing

TP-9 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

Date: September 18, 2014

Time: 12:59

Weather: Clear, cool, 65°F, calm, dry

Position on landscape: Shoulder of ridge Slope aspect: Southerly Vegetation: Lightly wooded

Property line: 30+ feet Drainage way: 50+ feet Drinking water well: 150+ feet

Wetlands: 100+ feet Open water body: 400+ feet Abutting septic system: 50+ feet

SOIL PROFILE ► TP-9

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (EarthColors)	Redoxomorphic Features from ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00 → 24"	A _p	Sandy Loam	10YR32 very dark brown	none observed	Plowed horizon. Soft, fine to medium granular structure (moderate grade), silty cohesive matrix, fine grained mineral content, dry matrix, many fine to medium grass roots, free of clasts, clear wavy boundary.
24 → 100"	C	Silt Loam	2.5Y53 light olive brown	@ 33" (c,2,d)	Firm, massive structure (strong grade), dense cohesive matrix, high silt content, moist, moderately plastic and slightly sticky, ribbons to 1.5", holds stable cast, wire rolled to 2", free of clasts.

Depth to bedrock: >110" Hydrologic Soil Group: C Drainage Class: Moderately well drained

Soil map unit: 220B – Boxford silt loam (Fine, mixed, mesic, Aquic Dystric Eutrochrepts) 3-8% slopes

TP-9 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

DEPTH TO APPARENT/ PHREATIC GROUNDWATER TABLE: *Not Observed*

Apparent water seeping from pit face: _____ (Below land surface) Depth to stabilized apparent water: _____ (Below land surface)

Soil moisture state: Slightly damp

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 33" (below land surface)

Type: Masses on grain surfaces and ped interior Abundance: Common Size: Fine to medium Contrast: Distinct

Shape: Irregular/ stringy and spherical and nodular Moisture state: Slightly moist Location: C matrix

Hardness: Soft Boundary: Diffuse Concentration color: 2.5YR46 (red) Reduction color: 10Y71 (light greenish gray)

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to stabilized phreatic water: _____ inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to redoximorphic features: 33" inches below grade

Groundwater adjustment: _____

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 7.16 feet

Depth of naturally occurring pervious material in TP-9 Upper boundary: 24"
Lower boundary: 110"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848
Printed name of evaluator & license number

June 1998
Date of Soil Evaluator Certification

Unofficial exploratory soil testing
Town witness

09/18/14
Date of soil testing

TP-10 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

Date: September 18, 2014

Time: 13:13

Weather: Clear, cool, 65°F, calm, dry

Position on landscape: Shoulder of ridge Slope aspect: Southerly Vegetation: Lightly wooded and open field

Property line: 30+ feet Drainage way: 50+ feet Drinking water well: 150+ feet

Wetlands: 100+ feet Open water body: 400+ feet Abutting septic system: 50+ feet

SOIL PROFILE ► TP-10

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (EarthColors)	Redoxomorphic Features from ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00 → 43"	[^] C/A _p	Sandy Loam	10YR32 very dark brown	none observed	Plowed horizon. Soft, fine to medium granular structure (moderate grade), silty cohesive matrix, fine grained mineral content, dry matrix, many fine to medium grass roots, free of clasts, clear wavy boundary.
43 → 107"	C	Loamy Sand	2.5Y64 light olive brown	@ 52" (c,2,d)	Firm, compact, massive structure (strong grade), mixed very fine to fine grained mineral content, damp, weak iron cementing observed as nodules within the matrix, gritty, moderate silt content, weakly stratified (imbrication of long prismoidal clasts >3"), 45% sub-rounded to angular gravel content and 35% % sub-rounded to sharp angular cobble content, clasts tightly nested in matrix

Depth to bedrock: >107" Hydrologic Soil Group: C Drainage Class: Moderately well drained

Soil map unit: 220B – Boxford silt loam (Fine, mixed, mesic, Aquic Dystric Eutrochrepts) 3-8% slopes

TP-10 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

DEPTH TO APPARENT/ PHREATIC GROUNDWATER TABLE: *Not Observed*

Apparent water seeping from pit face: _____ (Below land surface) Depth to stabilized apparent water: _____ (Below land surface)

Soil moisture state: Slightly damp

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 52" (below land surface)

Type: Masses on grain surfaces and ped interior Abundance: Common Size: Fine to medium Contrast: Distinct

Shape: Irregular/ stringy and spherical and nodular Moisture state: Slightly moist Location: C matrix

Hardness: Soft Boundary: Diffuse Concentration color: 2.5YR46 (red) Reduction color: 10Y71 (light greenish gray)

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to stabilized phreatic water: _____ inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to redoximorphic features: 52" inches below grade

Groundwater adjustment: _____

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 5.33 feet

Depth of naturally occurring pervious material in TP-10 Upper boundary: 43"
Lower boundary: 107"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

June 1998

Printed name of evaluator & license number

Date of Soil Evaluator Certification

Unofficial exploratory soil testing

09/18/14

Town witness

Date of soil testing

TP-11 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

Date: September 18, 2014

Time: 13:27

Weather: Clear, cool, 65°F, calm, dry

Position on landscape: Shoulder of ridge Slope aspect: Southerly Vegetation: Field grass and low brush

Property line: 30⁺ feet Drainage way: 50⁺ feet Drinking water well: 150⁺ feet

Wetlands: 100⁺ feet Open water body: 400⁺ feet Abutting septic system: 50⁺ feet

SOIL PROFILE ► TP-11

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/NRCS)	Soil Color (EarthColors)	Redoxomorphic Features from ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00 → 13"	A _p	Sandy Loam	10YR32 very dark brown	none observed	Plowed horizon, Soft, fine to medium granular structure (moderate grade), silty cohesive matrix, fine grained mineral content, dry matrix, many fine to medium grass roots, free of clasts, clear wavy boundary.
13 → 19"	B _w	Sandy Loam	10YR56 yellowish brown	none observed	Soft, fine to medium blocky structure (moderate grade), slightly gritty, weak cohesive matrix, fine to medium grained mineral content, damp matrix, few fine to medium roots, free of clasts, diffuse smooth boundary.
19 → 100"	C	Silt Loam	2.5Y53 light olive brown	@ 33" (c,2,d)	Firm, massive structure (strong grade), dense cohesive matrix, high silt content, moist, moderately plastic and slightly sticky, ribbons to 1.5", holds stable cast, wire rolled to 2", free of clasts.

Depth to bedrock: >100" Hydrologic Soil Group: C Drainage Class: Moderately well drained

Soil map unit: 220B – Boxford silt loam (Fine, mixed, mesic, Aquic Dystric Entrochrepts) 3-8% slopes

TP-11 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

DEPTH TO APPARENT/ PHREATIC GROUNDWATER TABLE: *Not Observed*

Apparent water seeping from pit face: _____ (Below land surface) Depth to stabilized apparent water: _____ (Below land surface)

Soil moisture state: Slightly damp

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 33" (below land surface)

Type: Masses on grain surfaces and ped interior Abundance: Common Size: Fine to medium Contrast: Distinct

Shape: Irregular/ stringy and spherical and nodular Moisture state: Slightly moist Location: C matrix

Hardness: Soft Boundary: Diffuse Concentration color: 2.5YR46 (red) Reduction color: 10Y71 (light greenish gray)

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to stabilized phreatic water: _____ inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to redoximorphic features: 33" inches below grade

Groundwater adjustment: _____

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 7.25 feet

Depth of naturally occurring pervious material in TP-11 Upper boundary: 13"

Lower boundary: 100"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Printed name of evaluator & license number

June 1998

Date of Soil Evaluator Certification

Unofficial exploratory soil testing

Town witness

09/18/14

Date of soil testing

TP-12 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

Date: September 18, 2014

Time: 13:48

Weather: Clear, cool, 65°F, calm, dry

Position on landscape: Shoulder of ridge Slope aspect: Southerly Vegetation: Lightly wooded and open field

Property line: 30+ feet Drainage way: 50+ feet Drinking water well: 150+ feet

Wetlands: 100+ feet Open water body: 400+ feet Abutting septic system: 50+ feet

SOIL PROFILE ► TP-12

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (EarthColors)	Redoxomorphic Features from BSHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00 → 15"	<u>^C/A_p</u>	Sandy Loam	10YR32 very dark brown	none observed	Plowed horizon. Soft, fine to medium granular structure (moderate grade), silty cohesive matrix, fine grained mineral content, dry matrix, many fine to medium grass roots, free of clasts, clear wavy boundary.
15 → 105"	<u>C</u>	Loamy Sand gravelly	2.5Y64 light olive brown	<u>@ 77"</u> (c,2,d)	Firm, compact, massive structure (strong grade), mixed very fine to fine grained mineral content, damp, weak iron cementing observed as nodules within the matrix, gritty, moderate silt content, weakly stratified (imbrication of long prismatic clasts >3"), 45% sub-rounded to angular gravel content and 35% sub-rounded to sharp angular cobble content, clasts tightly nested in matrix.

Depth to bedrock: >105" Hydrologic Soil Group: C Drainage Class: Moderately well drained

Soil map unit: 220B – Boxford silt loam (Fine, mixed, mesic, Aquic Dystric Eutrochrepts) 3-8% slopes

TP-12 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

DEPTH TO APPARENT/ PHREATIC GROUNDWATER TABLE: *Not Observed*

Apparent water seeping from pit face: _____ (Below land surface) Depth to stabilized apparent water: _____ (Below land surface)

Soil moisture state: Slightly damp

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 77" (below land surface)

Type: Masses on grain surfaces and ped interior Abundance: Common Size: Fine to medium Contrast: Distinct

Shape: Irregular/ stringy and spherical and nodular Moisture state: Slightly moist Location: C matrix

Hardness: Soft Boundary: Diffuse Concentration color: 2.5YR46 (red) Reduction color: 10Y71 (light greenish gray)

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to stabilized phreatic water: _____ inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to redoximorphic features: 77" inches below grade

Groundwater adjustment: _____

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 7.50 feet

Depth of naturally occurring pervious material in TP-12 Upper boundary: 15"
Lower boundary: 105"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Printed name of evaluator & license number

June 1998

Date of Soil Evaluator Certification

Unofficial exploratory soil testing

Town witness

09/18/14

Date of soil testing

TP-13 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

Date: September 18, 2014

Time: 13:57

Weather: Clear, cool, 65°F, calm, dry

Position on landscape: Shoulder of ridge Slope aspect: Southerly Vegetation: Field grass and low brush

Property line: 30+ feet Drainage way: 50+ feet Drinking water well: 150+ feet

Wetlands: 100+ feet Open water body: 400+ feet Abutting septic system: 50+ feet

SOIL PROFILE ► TP-13

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (EarthColors)	Redoxomorphic Features from ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00 → 18"	A _p	Sandy Loam	10YR32 very dark brown	none observed	Plowed horizon. Soft, fine to medium granular structure (moderate grade), silty cohesive matrix, fine grained mineral content, dry matrix, many fine to medium grass roots, free of clasts, clear wavy boundary.
18 → 24"	B _w	Sandy Loam	10YR56 yellowish brown	none observed	Soft, fine to medium blocky structure (moderate grade), slightly gritty, weak cohesive matrix, fine to medium grained mineral content, damp matrix, few fine to medium roots, free of clasts, diffuse smooth boundary.
24 → 54"	C ₁	Loamy Sand gravelly	2.5Y64 light yellowish brown	@ 41" (c,2,d)	Firm, compact, massive structure (strong grade), mixed very fine to fine grained mineral content, damp, weak iron cementing observed as nodules within the matrix, gritty, moderate silt content, weakly stratified (imbrication of long prismatic clasts >3"), 45% sub-rounded to angular gravel content and 35% sub-rounded to sharp angular cobble content, clasts tightly nested in matrix
54 → 111"	C ₂	Silt Loam	2.5Y53 light olive brown		Firm, massive structure (strong grade), dense cohesive matrix, high silt content, moist, moderately plastic and slightly sticky, ribbons to 1.5", holds stable cast, wire rolled to 2", free of clasts

Depth to bedrock: >111" Hydrologic Soil Group: C Drainage Class: Well drained

Soil map unit: 305B – Paxton fine sandy loam (Coarse-loamy, mixed, mesic, Typic Fragiochrepts) 3-8% slopes

TP-13 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

DEPTH TO APPARENT/ PHREATIC GROUNDWATER TABLE: *Not Observed*

Apparent water seeping from pit face: _____ (Below land surface) Depth to stabilized apparent water: _____ (Below land surface)

Soil moisture state: Slightly damp

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 41" (below land surface)

Type: Masses on grain surfaces and ped interior Abundance: Common Size: Fine to medium Contrast: Distinct

Shape: Irregular/ stringy and spherical and nodular Moisture state: Slightly moist Location: C matrix

Hardness: Soft Boundary: Diffuse Concentration color: 2.5YR46 (red) Reduction color: 10Y71 (light greenish gray)

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to stabilized phreatic water: _____ inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to redoximorphic features: 41" inches below grade

Groundwater adjustment: _____

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 7.75 feet

Depth of naturally occurring pervious material in TP-13 Upper boundary: 08"
Lower boundary: 111"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848
Printed name of evaluator & license number

June 1998
Date of Soil Evaluator Certification

Unofficial exploratory soil testing
Town witness

09/18/14
Date of soil testing

TP-14 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

Date: September 18, 2014

Time: 14:16

Weather: Clear, cool, 65°F, calm, dry

Position on landscape: Shoulder of ridge Slope aspect: Southerly Vegetation: Field grass and low brush

Property line: 30+ feet Drainage way: 50+ feet Drinking water well: 150+ feet

Wetlands: 100+ feet Open water body: 400+ feet Abutting septic system: 50+ feet

SOIL PROFILE ► TP-14

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (EarthColors)	Redoxomorphic Features from ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00 — 19"	A _p	Sandy Loam	10YR32 very dark brown	none observed	Plowed horizon. Soft, fine to medium granular structure (moderate grade), silty cohesive matrix, fine grained mineral content, dry matrix, many fine to medium grass roots, free of clasts, clear wavy boundary.
19 → 30"	B _w	Sandy Loam	10YR56 yellowish brown	none observed	Soft, fine to medium blocky structure (moderate grade), slightly gritty, weak cohesive matrix, fine to medium grained mineral content, damp matrix, few fine to medium roots, free of clasts, diffuse smooth boundary.
30 — 100"	C	Silt Loam	2.5Y53 light olive brown	@ 31" (c,2,d)	Firm, massive structure (strong grade), dense cohesive matrix, high silt content, moist, moderately plastic and slightly sticky, ribbons to 1.5", holds stable cast, wire rolled to 2", free of clasts.

Depth to bedrock: >100" Hydrologic Soil Group: C Drainage Class: Moderately well drained

Soil map unit: 220B – Boxford silt loam (Fine, mixed, mesic, Aquic Dystric Eutrochrepts) 3-8% slopes

TP-14 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

DEPTH TO APPARENT/ PHREATIC GROUNDWATER TABLE: *Not Observed*

Apparent water seeping from pit face: _____ (Below land surface) Depth to stabilized apparent water: _____ (Below land surface)

Soil moisture state: Slightly damp

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE:

Depth of Estimated Seasonal High Groundwater Table: 31" (below land surface)

Type: Masses on grain surfaces and ped interior Abundance: Common Size: Fine to medium Contrast: Distinct

Shape: Irregular/ stringy and spherical and nodular Moisture state: Slightly moist Location: C matrix

Hardness: Soft Boundary: Diffuse Concentration color: 2.5YR46 (red) Reduction color: 10Y71 (light greenish gray)

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to stabilized phreatic water: _____ inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to redoximorphic features: 31" inches below grade

Groundwater adjustment: _____

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 6.75 feet

Depth of naturally occurring pervious material in TP-14 Upper boundary: 19"

Lower boundary: 100"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

Alexander F. Parker License #1848

Printed name of evaluator & license number

June 1998

Date of Soil Evaluator Certification

Unofficial exploratory soil testing

Town witness

09/18/14

Date of soil testing

TP-15 DEEP OBSERVATION HOLE

#36 Essex Road, Ipswich, Massachusetts

Date: September 18, 2014

Time: 14:36

Weather: Clear, cool, 65°F, calm, dry

Position on landscape: Shoulder of ridge Slope aspect: Southerly Vegetation: Lightly wooded

Property line: 30⁺ feet Drainage way: 50⁺ feet Drinking water well: 150⁺ feet

Wetlands: 100⁺ feet Open water body: 400⁺ feet Abutting septic system: 50⁺ feet

SOIL PROFILE ► TP-15

Depth below land surface (inches)	Soil Horizon/ Layer	Soil Texture (USDA/ NRCS)	Soil Color (EarthColors)	Redoxomorphic Features from ESHGWT	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00 → 24"	A _p	Sandy Loam	10YR32 very dark brown	none observed	Plowed horizon. Soft, fine to medium granular structure (moderate grade), silty cohesive matrix, fine grained mineral content, dry matrix, many fine to medium grass roots, free of clasts, clear wavy boundary.
24 → 100"	C	Silty clay loam	2.5Y42 dark grayish brown	@ 26" (c,2,d)	Firm, massive structure (strong grade), dense cohesive matrix, high silt and clay content, moist, plastic and very sticky, ribbons to 4.0", holds stable cast, wire rolled to 4.5", free of clasts, no bedrock refusal at test hole depth and no phreatic water observed.

Depth to bedrock: >100" Hydrologic Soil Group: C Drainage Class: Moderately well drained

Soil map unit: 220B – Boxford silt loam (Fine, mixed, mesic, Aquic Dystric Eutrochrepts) 3-8% slopes



TEST PIT LOG

TEST PIT# BEI-1

Client/Job:		Essex Pastures					Date: 7/24/2018			
Logged By:		Bree Sullivan, P.E.					Topo Setting: on slope			
Vegetation:		crop/pasture					Land Use:			
Slope:		3% - 8%					Comments:			
Lot Location:										
				Structure						
Depth	Color	Mottles	Texture	G	SH	S	Moisture	Consistence	Comments	
16"	10YR 3/2		FSL	W	GR	F	W	FR		
21"	10YR 4/2	2.5YR 5/8	FSL	W	GR	F	W	FR	MOTTLES @ 21" C,2,D	
60"	2.5 Y 5/1		SiCL	S	PL	F	W	XFIRM	No phreatic water surface	

Key: Texture: V = Very, F = Fine, Co = Coarse, S = Sand, C = Clay, L = Loam, Si = Silt, Gr = Gravelly, Cb = Cobbly, ST = Stony

Structure: Grade (G) w = weak, m = moderate

Shape (SH) gr = granular, sbk = subangular blocky, abk = angular blocky, pl = platy

Size (S) f = fine, m = medium, c = coarse, v tn = very thin, vtk = very thick

Moisture: m = moist, w = wet, d = dry

Consistence: l = loose, fr = friable, fi = firm, vfr = very friable, vfi = very firm, xfi = extremely firm

Boundary: Distinctness (D) g = gradual, a = abrupt

Color: Munsell Soil Color Chart (1994) codes refer to Hue, Value & Chroma

Mottles: Expressed as abundance/size/contrast

Abundance: f=few; m=many; c=common

Size: 1=fine; 2=medium; 3=coarse

Contrast: f=faint; d=distinct; p=prominent

Topography (T) s = smooth, i = irregular, w = wavy

ESHW = estimated seasonal high groundwater table

BGS = below ground surface



TEST PIT LOG

TEST PIT# BEI-2

Client/Job:		Essex Pastures					Date: 7/24/2018			
Logged By:		Bree Sullivan, P.E.					Topo Setting: on slope			
Vegetation:		crop/pasture					Land Use:			
Slope:		3% - 8%					Comments:			
Lot Location:										
				Structure						
Depth	Color	Mottles	Texture	G	SH	S	Moisture	Consistence	Comments	
12"	10YR 3/2	N	FSL	W	GR	M	M	VFR	ROOTS	
24"	2.5Y 6/2	N	SiCIL	S	PL	V THIN	M	XFIRM		
56"	7.5YR 4/3	N	Xgr CS	S	GR	C	M	FR	Glacial till; no phreatic water	

Key: Texture: V = Very, F = Fine, Co = Coarse, S = Sand, C = Clay, L = Loam, Si = Silt, Gr = Gravelly, Cb = Cobbly, ST = Stony

Structure: Grade (G) w = weak, m = moderate

Shape (SH) gr = granular, sbk = subangular blocky, abk = angular blocky, pl = platy

Size (S) f = fine, m = medium, c = coarse, v tn = very thin, vtk = very thick

Moisture: m = moist, w = wet, d = dry

Consistence: l = loose, fr = friable, fi = firm, vfr = very friable, vfi = very firm, xfi = extremely firm

Boundary: Distinctness (D) g = gradual, a = abrupt

Color: Munsell Soil Color Chart (1994) codes refer to Hue, Value & Chroma

Mottles: Expressed as abundance/size/contrast

Abundance: f=few; m=many; c=common

Size: 1=fine; 2=medium; 3=coarse

Contrast: f=faint; d=distinct; p=prominent

Topography (T) s = smooth, i = irregular, w = wavy

ESHW = estimated seasonal high groundwater table

BGS = below ground surface



TEST PIT LOG

TEST PIT# BEI-3

Client/Job: Essex Pastures				Date: 7/24/2018					
Logged By: Bree Sullivan, P.E.				Topo Setting: on slope					
Vegetation: crop/pasture				Land Use:					
Slope: 3% - 8%				Comments:					
Lot Location:									
				Structure					
Depth	Color	Mottles	Texture	G	SH	S	Moisture	Consistence	Comments
12"	10YR 4/2		FSL	W	GR	F	M	VFR	
72"	10YR 5/4	5YR 5/8 2.5Y 7/2	SiCIL	S	PL	V THIN	M	XFIRM	MOTTLES @ 36" C,2,D
									NO PHREATIC WATER

Key: Texture: V = Very, F = Fine, Co = Coarse, S = Sand, C = Clay, L = Loam, Si = Silt, Gr = Gravelly, Cb = Cobbly, ST = Stony

Structure: Grade (G) w = weak, m = moderate

Shape (SH) gr = granular, sbk = subangular blocky, abk = angular blocky, pl = platy

Size (S) f = fine, m = medium, c = coarse, v tn = very thin, vtk = very thick

Moisture: m = moist, w = wet, d = dry

Consistence: l = loose, fr = friable, fi = firm, vfr = very friable, vfi = very firm, xfi = extremely firm

Boundary: Distinctness (D) g = gradual, a = abrupt

Color: Munsell Soil Color Chart (1994) codes refer to Hue, Value & Chroma

Mottles: Expressed as abundance/size/contrast

Abundance: f=few; m=many; c=common

Size: 1=fine; 2=medium; 3=coarse

Contrast: f=faint; d=distinct; p=prominent

Topography (T) s = smooth, i = irregular, w = wavy

ESHWG = estimated seasonal high groundwater table

BGS = below ground surface



TEST PIT LOG

TEST PIT# BEI-4

Client/Job: Essex Pastures				Date: 7/24/2018					
Logged By: Bree Sullivan, P.E.				Topo Setting: on slope					
Vegetation: crop/pasture				Land Use:					
Slope: 3% - 8%				Comments:					
Lot Location:									
				Structure					
Depth	Color	Mottles	Texture	G	SH	S	Moisture	Consistence	Comments
12"	10YR 4/3		FSL	W	GR	F	M	VFR	
84"	2.5Y 5/3	5YR 5/6	SiCl	S	PL	VT	M	XFIRM	MOTTLES @ 42" F,2,F
									NO PHREATIC WATER

Key: Texture: V = Very, F = Fine, Co = Coarse, S = Sand, C = Clay, L = Loam, Si = Silt, Gr = Gravelly, Cb = Cobbly, ST = Stony

Structure: Grade (G) w = weak, m = moderate

Shape (SH) gr = granular, sbk = subangular blocky, abk = angular blocky, pl = platy

Size (S) f = fine, m = medium, c = coarse, v tn = very thin, vtk = very thick

Moisture: m = moist, w = wet, d = dry

Consistence: l = loose, fr = friable, fi = firm, vfr = very friable, vfi = very firm, xfi = extremely firm

Boundary: Distinctness (D) g = gradual, a = abrupt

Color: Munsell Soil Color Chart (1994) codes refer to Hue, Value & Chroma

Mottles: Expressed as abundance/size/contrast

Abundance: f=few; m=many; c=common

Size: 1=fine; 2=medium; 3=coarse

Contrast: f=faint; d=distinct; p=prominent

Topography (T) s = smooth, i = irregular, w = wavy

ESHW = estimated seasonal high groundwater table

BGS = below ground surface



TEST PIT LOG

TEST PIT# BEI-5

Client/Job: Essex Pastures		Date: 7/24/2018							
Logged By: Bree Sullivan, P.E.			Topo Setting: on slope						
Vegetation: crop/pasture			Land Use:						
Slope: 3% - 8%			Comments:						
Lot Location:									
				Structure					
Depth	Color	Mottles	Texture	G	SH	S	Moisture	Consistence	Comments
12"	10YR 3/2		FSL	W	GR	F	M	VFR	
84"	2.5Y 5/3	7.5YR 5/8 2.5Y 6/3	SiCl	S	PL	VTHI N	M	XFIRM	MOTTLES AT 42" C,2,P
									NO PHREATIC WATER

Key: Texture: V = Very, F = Fine, Co = Coarse, S = Sand, C = Clay, L = Loam, Si = Silt, Gr = Gravelly, Cb = Cobbly, ST = Stony

Structure: Grade (G) w = weak, m = moderate

Shape (SH) gr = granular, sbk = subangular blocky, abk = angular blocky, pl = platy

Size (S) f = fine, m = medium, c = coarse, v tn = very thin, vtk = very thick

Moisture: m = moist, w = wet, d = dry

Consistence: l = loose, fr = friable, fi = firm, vfr = very friable, vfi = very firm, xfi = extremely firm

Boundary: Distinctness (D) g= gradual, a = abrupt

Color: Munsell Soil Color Chart (1994) codes refer to Hue, Value & Chroma

Mottles: Expressed as abundance/size/contrast

Abundance: f=few; m=many; c=common

Size: 1=fine; 2=medium; 3=coarse

Contrast: f=faint; d=district; p=prominent

Topography (T) s = smooth, i = irregular, w = wavy

ESHGW = estimated seasonal high groundwater table

BGS = below ground surface



TEST PIT LOG

TEST PIT# BEI-6

Client/Job:		Essex Pastures					Date: 7/24/2018			
Logged By:		Bree Sullivan, P.E.					Topo Setting: on slope			
Vegetation:		crop/pasture					Land Use:			
Slope:		3% - 8%					Comments:			
Lot Location:										
				Structure						
Depth	Color	Mottles	Texture	G	SH	S	Moisture	Consistence	Comments	
8"	10YR 3/2	-	SL	W	GR	F	M	L		
36"	10YR 4/4	-	XGrLS	M	GR	M	M	L	ROOTS	
84"	2.5Y 5/6	-	XGrLS	M	GR	M	M	L	FEW COBBLES	
									NO PHREATIC WATER	

Key: Texture: V = Very, F = Fine, Co = Coarse, S = Sand, C = Clay, L = Loam, Si = Silt, Gr = Gravelly, Cb = Cobbly, ST = Stony

Structure: Grade (G) w = weak, m = moderate

Shape (SH) gr = granular, sbk = subangular blocky, abk = angular blocky, pl = platy

Size (S) f = fine, m = medium, c = coarse, v tn = very thin, vtk = very thick

Moisture: m = moist, w = wet, d = dry

Consistence: l = loose, fr = friable, fi = firm, vfr = very friable, vfi = very firm, xfi = extremely firm

Boundary: Distinctness (D) g = gradual, a = abrupt

Color: Munsell Soil Color Chart (1994) codes refer to Hue, Value & Chroma

Mottles: Expressed as abundance/size/contrast

Abundance: f=few; m=many; c=common

Size: 1=fine; 2=medium; 3=coarse

Contrast: f=faint; d=distinct; p=prominent

Topography (T) s = smooth, i = irregular, w = wavy

ESHW = estimated seasonal high groundwater table

BGS = below ground surface



TEST PIT LOG

TEST PIT# BEI-7

Client/Job:		Essex Pastures					Date: 9/14/2018			
Logged By:		Bree Sullivan, P.E.					Topo Setting: on slope			
Vegetation:		crop/pasture					Land Use:			
Slope:		3% - 8%					Comments:			
Lot Location:										
				Structure						
Depth	Color	Mottles	Texture	G	SH	S	Moisture	Consistence	Comments	
24"	10YR 3/2		FSL	W	GR	F	W	FR	FILL	
36"	10YR 4/3		FSL	W	GR	F	W	FR		
47"	2.5 Y 6/4		SiL	S	PL	F	W	XFIRM		
96"	2.5 Y 5/3	2.5YR 5/8	SiL	S	PL	F	W	XFIRM	MOTTLES @ 48" F,1,D No phreatic water surface	

Key: Texture: V = Very, F = Fine, Co = Coarse, S = Sand, C = Clay, L = Loam, Si = Silt, Gr = Gravelly, Cb = Cobbly, ST = Stony

Structure: Grade (G) w = weak, m = moderate

Shape (SH) gr = granular, sbk = subangular blocky, abk = angular blocky, pl = platy

Size (S) f = fine, m = medium, c = coarse, v tn = very thin, vtk = very thick

Moisture: m = moist, w = wet, d = dry

Consistence: l = loose, fr = friable, fi = firm, vfr = very friable, vfi = very firm, xfi = extremely firm

Boundary: Distinctness (D) g = gradual, a = abrupt

Color: Munsell Soil Color Chart (1994) codes refer to Hue, Value & Chroma

Mottles: Expressed as abundance/size/contrast

Abundance: f=few; m=many; c=common

Size: 1=fine; 2=medium; 3=coarse

Contrast: f=faint; d=district; p=prominent

Topography (T) s = smooth, i = irregular, w = wavy

ESHGW = estimated seasonal high groundwater table

BGS = below ground surface



TEST PIT LOG

TEST PIT# BEI-8

Client/Job:		Essex Pastures					Date: 9/14/2018			
Logged By:		Bree Sullivan, P.E.					Topo Setting: on slope			
Vegetation:		crop/pasture					Land Use:			
Slope:		3% - 8%					Comments:			
Lot Location:										
				Structure						
Depth	Color	Mottles	Texture	G	SH	S	Moisture	Consistence	Comments	
12"	10YR 3/2	N	FSL	W	GR	M	M	VFR		
72"	10YR 5/6	N	LS	W	GR	M	M	loose	extremely gravelly	
									No mottles - DISTURBED SOIL?	

Key: Texture: V = Very, F = Fine, Co = Coarse, S = Sand, C = Clay, L = Loam, Si = Silt, Gr = Gravelly, Cb = Cobbly, ST = Stony

Structure: Grade (G) w = weak, m = moderate

Shape (SH) gr = granular, sbk = subangular blocky, abk = angular blocky, pl = platy

Size (S) f = fine, m = medium, c = coarse, v tn = very thin, vtk = very thick

Moisture: m = moist, w = wet, d = dry

Consistence: l = loose, fr = friable, fi = firm, vfr = very friable, vfi = very firm, xfi = extremely firm

Boundary: Distinctness (D) g = gradual, a = abrupt

Color: Munsell Soil Color Chart (1994) codes refer to Hue, Value & Chroma

Mottles: Expressed as abundance/size/contrast

Abundance: f=few; m=many; c=common

Size: 1=fine; 2=medium; 3=coarse

Contrast: f=faint; d=district; p=prominent

Topography (T) s = smooth, i = irregular, w = wavy

ESHW = estimated seasonal high groundwater table

BGS = below ground surface



TEST PIT LOG

TEST PIT# BEI-9

Client/Job:		Essex Pastures					Date: 9/14/2018			
Logged By:		Bree Sullivan, P.E.					Topo Setting: on slope			
Vegetation:		crop/pasture					Land Use:			
Slope:		3% - 8%					Comments:			
Lot Location:										
				Structure						
Depth	Color	Mottles	Texture	G	SH	S	Moisture	Consistence	Comments	
24"	10YR 2/2		SiL	S	PL	V THIN	M	FIRM	Fill	
36"	10YR 2/2		SiL	S	PL	V THIN	M	FIRM		
44"	2.5Y 6/3		SiL	S	PL	V THIN	M	XFIRM		
84"	10YR 5/4	2.5YR 5/8	LS	M	GR		M	L	MOTTLES @ 65" F,1,F	
96"	10YR 5/4		CoS	F	GR	F	M	L	Extremely Gravelly	

Key: Texture: V = Very, F = Fine, Co = Coarse, S = Sand, C = Clay, L = Loam, Si = Silt, Gr = Gravelly, Cb = Cobble, ST = Stony

Structure: Grade (G) w = weak, m = moderate

Shape (SH) gr = granular, sbk = subangular blocky, abk = angular blocky, pl = platy

Size (S) f = fine, m = medium, c = coarse, v tn = very thin, vtk = very thick

Moisture: m = moist, w = wet, d = dry

Consistence: l = loose, fr = friable, fi = firm, vfr = very friable, vfi = very firm, xfi = extremely firm

Boundary: Distinctness (D) g = gradual, a = abrupt

Color: Munsell Soil Color Chart (1994) codes refer to Hue, Value & Chroma

Mottles: Expressed as abundance/size/contrast

Abundance: f=few; m=many; c=common

Size: 1=fine; 2=medium; 3=coarse

Contrast: f=faint; d=distinct; p=prominent

Topography (T) s = smooth, i = irregular, w = wavy

ESHW = estimated seasonal high groundwater table

BGS = below ground surface



TEST PIT LOG

TEST PIT# BEI-10

Client/Job:		Essex Pastures					Date: 9/14/2018			
Logged By:		Bree Sullivan, P.E.					Topo Setting: on slope			
Vegetation:		crop/pasture					Land Use:			
Slope:		3% - 8%					Comments:			
Lot Location:										
		Structure								
Depth	Color	Mottles	Texture	G	SH	S	Moisture	Consistence	Comments	
24"	10YR 4/2		SiL	S	PL	THIN	M	FIRM	Fill	
36"	10YR 3/2		SiL	S	PL	THIN	M	FIRM		
44"- 108"	2.5Y 6/3		LS	F	GR	F	M	L	MOTTLES @ 94" F,1,F Extremely Gravelly	

Key: Texture: V = Very, F = Fine, Co = Coarse, S = Sand, C = Clay, L = Loam, Si = Silt, Gr = Gravelly, Cb = Cobbly, ST = Stony

Structure: Grade (G) w = weak, m = moderate

Mottles: Expressed as abundance/size/contrast

Shape (SH) gr = granular, sbk = subangular blocky, abk = angular blocky, pl = platy

Abundance: f=few; m=many; c=common

Size (S) f = fine, m = medium, c = coarse, v tn = very thin, vtk = very thick

Size: 1=fine; 2=medium; 3=coarse

Moisture: m = moist, w = wet, d = dry

Contrast: f=faint; d=district; p=prominent

Consistence: l = loose, fr = friable, fi = firm, vfr = very friable, vfi = very firm, xfi = extremely firm

Topography (T) s = smooth, i = irregular, w = wavy

Boundary: Distinctness (D) g= gradual, a = abrupt

ESHGW = estimated seasonal high groundwater table

Color: Munsell Soil Color Chart (1994) codes refer to Hue, Value & Chroma

BGS = below ground surface



TEST PIT LOG

TEST PIT# BEI-11

Client/Job:		Essex Pastures					Date: 9/14/2018			
Logged By:		Bree Sullivan, P.E.					Topo Setting: on slope			
Vegetation:		crop/pasture					Land Use:			
Slope:		3% - 8%					Comments:			
Lot Location:										
				Structure						
Depth	Color	Mottles	Texture	G	SH	S	Moisture	Consistence	Comments	
12"	10YR 3/2		SiL	S	PL	THIN	M	FIRM	Fill	
24"	10YR 4/2		SiL	S	PL	THIN	M	FIRM		
48"	2.5Y 6/3		SiL	S	PL	THIN	M	XFIRM		
55"	2.5YR 5/3		SiCIL	S	PL	THIN	M	L		
55"-96"	2.5YR 5/4	2.5YR 5/7	LS	S	GR	M	M	L	MOTTLES @ 70" F,1,F Extremely Gravelly	

Key: Texture: V = Very, F = Fine, Co = Coarse, S = Sand, C = Clay, L = Loam, Si = Silt, Gr = Gravelly, Cb = Cobbly, ST = Stony

Structure: Grade (G) w = weak, m = moderate

Shape (SH) gr = granular, sbk = subangular blocky, abk = angular blocky, pl = platy

Size (S) f = fine, m = medium, c = coarse, v tn = very thin, vtk = very thick

Moisture: m = moist, w = wet, d = dry

Consistence: l = loose, fr = friable, fi = firm, vfr = very friable, vfi = very firm, xfi = extremely firm

Boundary: Distinctness (D) g= gradual, a = abrupt

Color: Munsell Soil Color Chart (1994) codes refer to Hue, Value & Chroma

Mottles: Expressed as abundance/size/contrast

Abundance: f=few; m=many; c=common

Size: 1=fine; 2=medium; 3=coarse

Contrast: f=faint; d=distinct; p=prominent

Topography (T) s = smooth, i = irregular, w = wavy

ESHWG = estimated seasonal high groundwater table

BGS = below ground surface



TEST PIT LOG

TEST PIT# BEI-12

Client/Job:		Essex Pastures					Date: 9/14/2018			
Logged By:		Bree Sullivan, P.E.					Topo Setting: on slope			
Vegetation:		crop/pasture					Land Use:			
Slope:		3% - 8%					Comments:			
Lot Location:										
				Structure						
Depth	Color	Mottles	Texture	G	SH	S	Moisture	Consistence	Comments	
12"	10YR 4/4	-	SL	W	GR	M	M	Fr	FILL	
22"	10YR 4/3	-	SL	W	GR	M	M	Fr		
24"	10YR 5/6	-	SiL	M	PL	THIN	M	F		
29"	10YR 6/4	-	SiL	M	PL	THIN	M	F		
84"	10YR 4/3	-	LS	S	GR	M	M	L	EXTREMELY GRAVELLY	
84"-96"	2.5Y 5/6	2.5YR 5/8	SiL	M	PL	THIN	M	F	MOTTLES @ 84" F,1,F	

Key: Texture: V = Very, F = Fine, Co = Coarse, S = Sand, C = Clay, L = Loam, Si = Silt, Gr = Gravelly, Cb = Cobbly, ST = Stony

Structure: Grade (G) w = weak, m = moderate

Shape (SH) gr = granular, sbk = subangular blocky, abk = angular blocky, pl = platy

Size (S) f = fine, m = medium, c = coarse, v tn = very thin, vtk = very thick

Moisture: m = moist, w = wet, d = dry

Consistence: l = loose, fr = friable, fi = firm, vfr = very friable, vfi = very firm, xfi = extremely firm

Boundary: Distinctness (D) g = gradual, a = abrupt

Color: Munsell Soil Color Chart (1994) codes refer to Hue, Value & Chroma

Mottles: Expressed as abundance/size/contrast

Abundance: f=few; m=many; c=common

Size: 1=fine; 2=medium; 3=coarse

Contrast: f=faint; d=distinct; p=prominent

Topography (T) s = smooth, i = irregular, w = wavy

ESHW = estimated seasonal high groundwater table

BGS = below ground surface

Appendix III. FEMA Firmette

National Flood Hazard Layer FIRMette

42°40'6.07"N

70°50'22.23"W

Legend

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

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

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

OTHER AREAS	 NO SCREEN  Area of Minimal Flood Hazard <i>Zone X</i>  Effective LOMIRs  Area of Undetermined Flood Hazard <i>Zone D</i>
GENERAL STRUCTURES	 Channel, Culvert, or Storm Sewer  Levee, Dike, or Floodwall

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

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

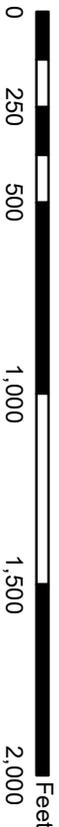
 The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **3/19/2020 at 2:12:01 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

USGS The National Map: Orthoimagery. Data refreshed April, 2019.



Feet

1,6,000

42°39'39.61"N

70°49'44.77"W



Appendix IV. Stormwater Checklist



Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the [Massachusetts Stormwater Handbook](#). The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

¹ The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

² For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- New development
- Redevelopment
- Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- No disturbance to any Wetland Resource Areas
- Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- Reduced Impervious Area (Redevelopment Only)
- Minimizing disturbance to existing trees and shrubs
- LID Site Design Credit Requested:
 - Credit 1
 - Credit 2
 - Credit 3
- Use of “country drainage” versus curb and gutter conveyance and pipe
- Bioretention Cells (includes Rain Gardens)
- Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- Treebox Filter
- Water Quality Swale
- Grass Channel
- Green Roof
- Other (describe): Subsurface Infiltration Systems, Proprietary sedimentation devices

Standard 1: No New Untreated Discharges

- No new untreated discharges
- Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- Soil Analysis provided.
- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - Static
 - Simple Dynamic
 - Dynamic Field¹
- Runoff from all impervious areas at the site discharging to the infiltration BMP.
- Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - Site is comprised solely of C and D soils and/or bedrock at the land surface
 - M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - Solid Waste Landfill pursuant to 310 CMR 19.000
 - Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

¹ 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
 - Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
 - is within the Zone II or Interim Wellhead Protection Area
 - is near or to other critical areas
 - is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - involves runoff from land uses with higher potential pollutant loads.
 - The Required Water Quality Volume is reduced through use of the LID site Design Credits.
 - Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- The BMP is sized (and calculations provided) based on:
 - The ½" or 1" Water Quality Volume or
 - The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- The NPDES Multi-Sector General Permit does **not** cover the land use.
- LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- All exposure has been eliminated.
- All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - Limited Project
 - Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - Bike Path and/or Foot Path
 - Redevelopment Project
 - Redevelopment portion of mix of new and redevelopment.
- Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- The project is **not** covered by a NPDES Construction General Permit.
- The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - Name of the stormwater management system owners;
 - Party responsible for operation and maintenance;
 - Schedule for implementation of routine and non-routine maintenance tasks;
 - Plan showing the location of all stormwater BMPs maintenance access areas;
 - Description and delineation of public safety features;
 - Estimated operation and maintenance budget; and
 - Operation and Maintenance Log Form.
- The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- An Illicit Discharge Compliance Statement is attached;
- NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

Appendix V. Existing and Proposed Drainage Figures

36 ESSEX
ROAD

IPSWICH, MA

HANCOCK ASSOCIATES

Civil Engineers
Land Surveyors
Wetland Scientists

185 CENTRE STREET
DANVERS, MA. 01923
VOICE (978) 777-3050
FAX (978) 774-7816

EXISTING DRAINAGE FIGURE

DATE: 6/1/20

DWG: 23069existing.dwg

SCALE: 1"=120'

DESIGN: GB

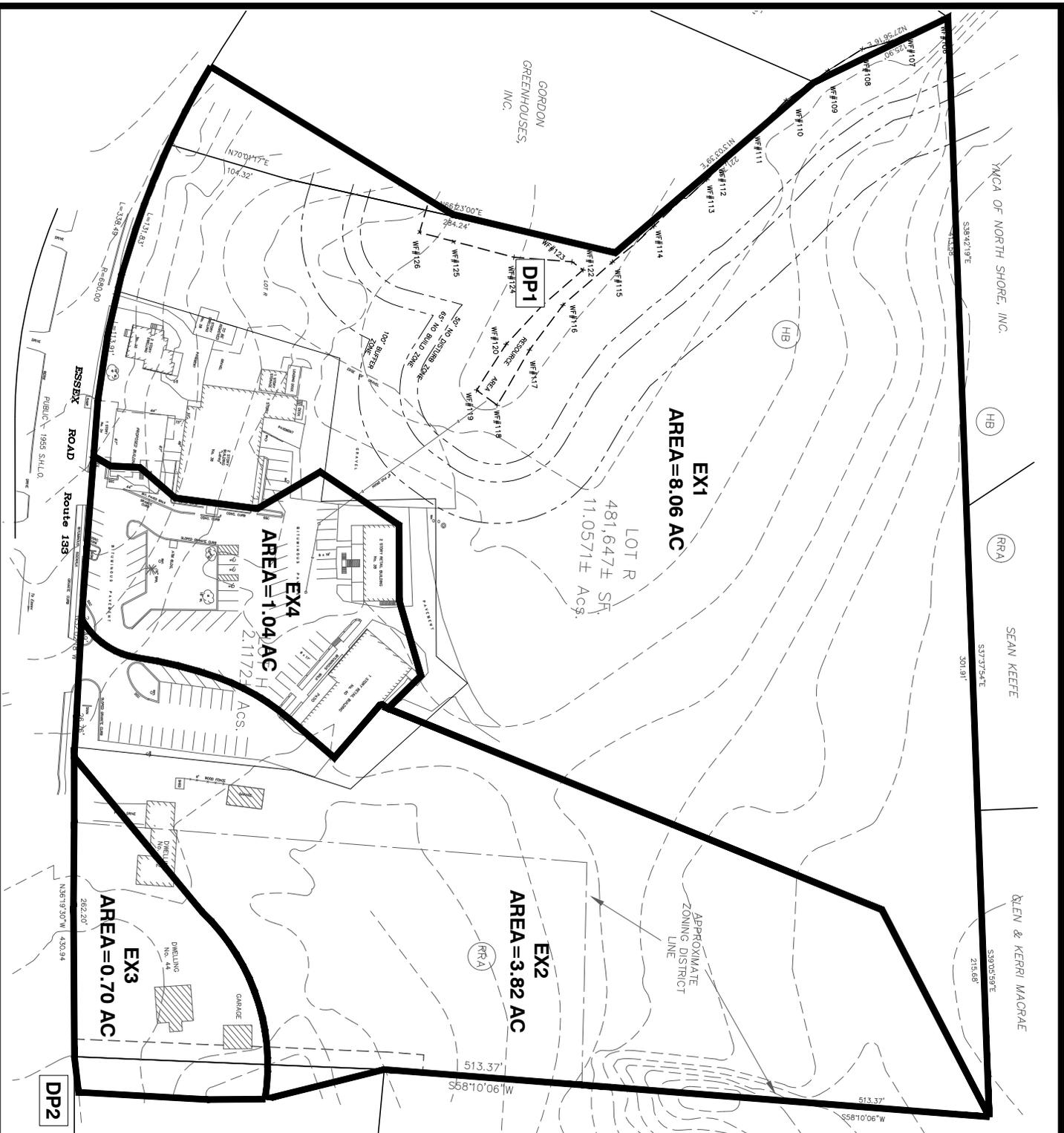
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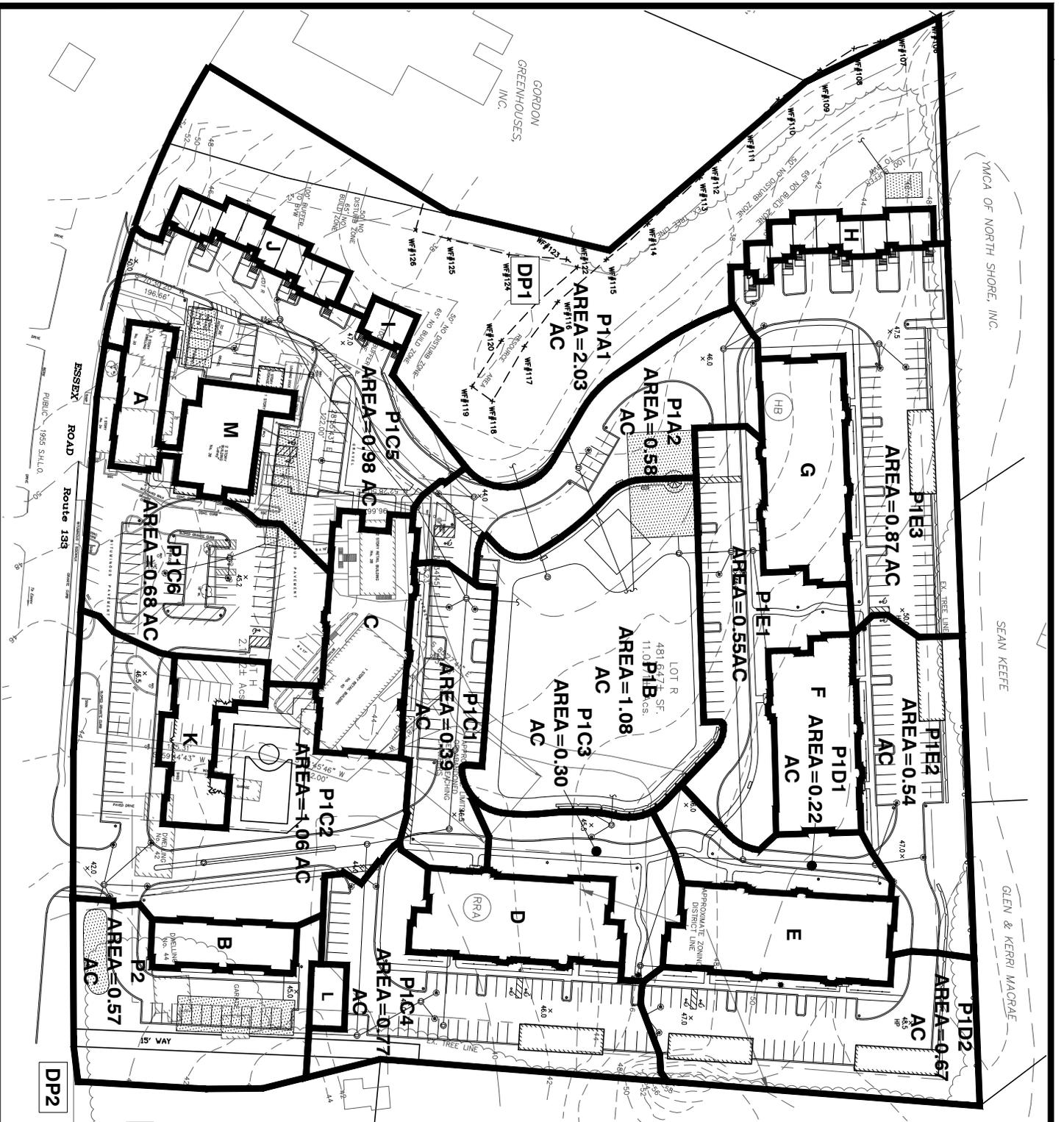
DRAWN: GB

SHEET: 1 OF 2

JOB NO.: 23069

EX





36 ESSEX
ROAD

IPSWICH, MA

**HANCOCK
ASSOCIATES**

Civil Engineers
Land Surveyors
Wetland Scientists

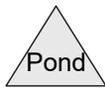
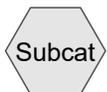
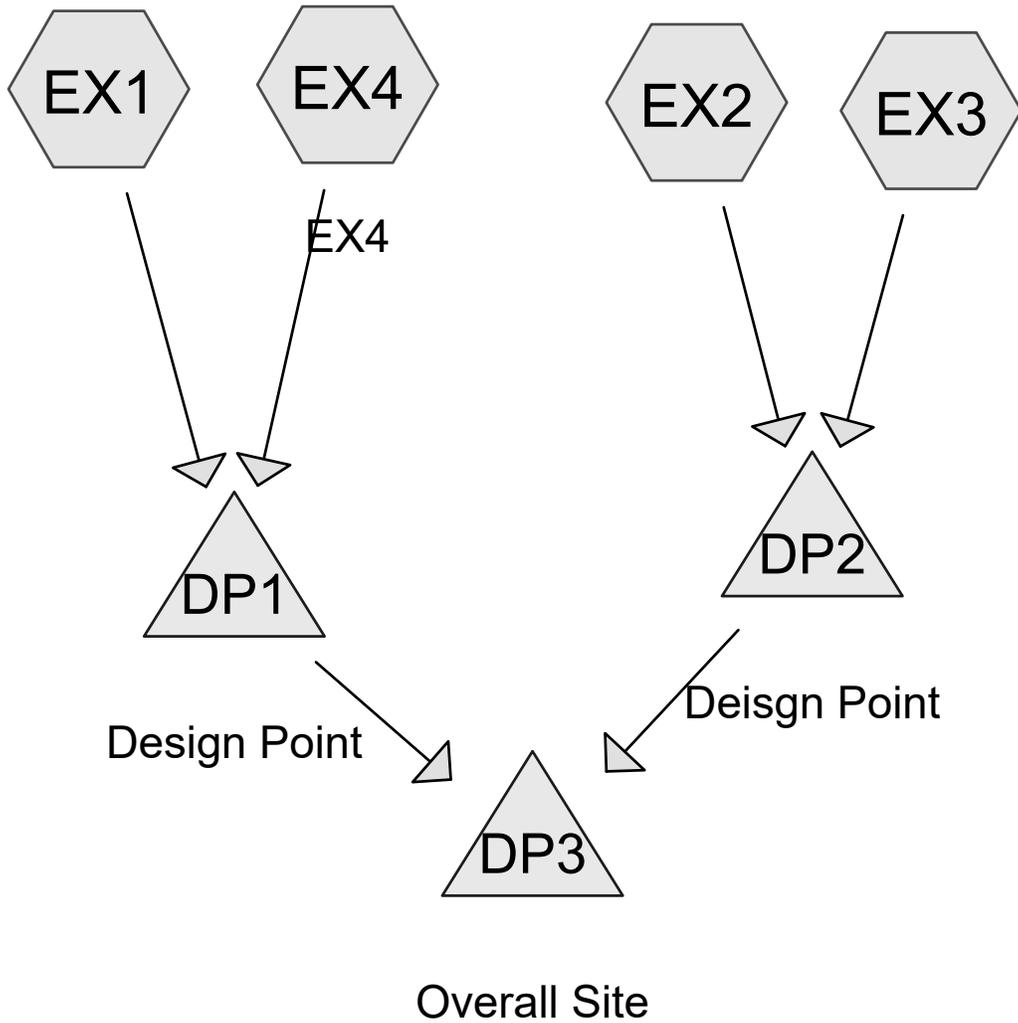
185 CENTRE STREET
DANVERS, MA. 01923
VOICE (978) 777-3050
FAX (978) 774-7816

**PROPOSED
DRAINAGE
FIGURE**

DATE:	6/1/20
DWG:	23069 SP R3-PROPOSED.dwg
SCALE:	1"=120'
DESIGN:	DTW/JJP
LAYOUT:	PR
DRAWN:	DTW/JJP
SHEET:	2 OF 2
JOB NO.:	23069

PR

Appendix VI. Hydrocad Output



23069 EX HydroCAD (JTL)

Type III 24-hr 2-year Rainfall=3.27"

Prepared by {enter your company name here}

Printed 3/19/2020

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Page 2

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX1: Runoff Area=351,268 sf 6.15% Impervious Runoff Depth>1.26"
Flow Length=654' Tc=19.4 min CN=77 Runoff=7.90 cfs 36,766 cf

Subcatchment EX2: Runoff Area=166,395 sf 8.59% Impervious Runoff Depth>0.92"
Flow Length=374' Tc=11.5 min CN=71 Runoff=3.12 cfs 12,722 cf

Subcatchment EX3: Runoff Area=30,455 sf 6.66% Impervious Runoff Depth>1.32"
Flow Length=145' Tc=5.9 min CN=78 Runoff=1.07 cfs 3,358 cf

Subcatchment EX4: EX4 Runoff Area=45,780 sf 80.68% Impervious Runoff Depth>2.61"
Tc=5.0 min CN=94 Runoff=3.19 cfs 9,957 cf

Pond DP1: Design Point Inflow=9.18 cfs 46,723 cf
Primary=9.18 cfs 46,723 cf

Pond DP2: Deisgn Point Inflow=3.92 cfs 16,080 cf
Primary=3.92 cfs 16,080 cf

Pond DP3: Overall Site Inflow=12.49 cfs 62,803 cf
Primary=12.49 cfs 62,803 cf

Total Runoff Area = 593,898 sf Runoff Volume = 62,803 cf Average Runoff Depth = 1.27"
87.39% Pervious = 519,032 sf 12.61% Impervious = 74,866 sf

23069 EX HydroCAD (JTL)

Type III 24-hr 2-year Rainfall=3.27"

Prepared by {enter your company name here}

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Page 3

Summary for Subcatchment EX1:

Runoff = 7.90 cfs @ 12.28 hrs, Volume= 36,766 cf, Depth> 1.26"

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-year Rainfall=3.27"

Area (sf)	CN	Description
121,358	74	>75% Grass cover, Good, HSG C
14,201	39	>75% Grass cover, Good, HSG A
* 79,410	80	>75% Grass cover, Good, HSG D (C/D)
86,946	80	>75% Grass cover, Good, HSG D
* 27,443	80	>75% Grass cover, Good, HSG D (NR)
305	61	>75% Grass cover, Good, HSG B
20,255	98	Paved parking, HSG D
305	98	Paved parking, HSG B
1,045	98	Paved parking, HSG C
351,268	77	Weighted Average
329,663		93.85% Pervious Area
21,605		6.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	100	0.0160	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.0	53	0.0160	0.89		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	55	0.0360	1.33		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.4	86	0.0230	1.06		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	45	0.0440	1.05		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	61	0.0330	1.27		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	45	0.0440	1.47		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	96	0.0210	1.01		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.7	100	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	13	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
19.4	654	Total			

Summary for Subcatchment EX2:

Runoff = 3.12 cfs @ 12.18 hrs, Volume= 12,722 cf, Depth> 0.92"

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-year Rainfall=3.27"

23069 EX HydroCAD (JTL)

Type III 24-hr 2-year Rainfall=3.27"

Prepared by {enter your company name here}

Printed 3/19/2020

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Page 4

Area (sf)	CN	Description
9,795	74	>75% Grass cover, Good, HSG C
42,059	39	>75% Grass cover, Good, HSG A
97,356	80	>75% Grass cover, Good, HSG D
2,888	61	>75% Grass cover, Good, HSG B
11,955	98	Paved parking, HSG D
2,342	98	Paved parking, HSG B
166,395	71	Weighted Average
152,098		91.41% Pervious Area
14,297		8.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	100	0.0340	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.4	32	0.0290	1.19		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	78	0.0260	1.13		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	35	0.0570	1.67		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	37	0.0540	1.63		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	45	0.0440	1.47		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.8	47	0.0210	1.01		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.5	374	Total			

Summary for Subcatchment EX3:

Runoff = 1.07 cfs @ 12.09 hrs, Volume= 3,358 cf, Depth> 1.32"

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-year Rainfall=3.27"

Area (sf)	CN	Description
973	39	>75% Grass cover, Good, HSG A
2,308	61	>75% Grass cover, Good, HSG B
25,147	80	>75% Grass cover, Good, HSG D
1,772	98	Paved parking, HSG D
255	98	Paved parking, HSG B
30,455	78	Weighted Average
28,428		93.34% Pervious Area
2,027		6.66% Impervious Area

23069 EX HydroCAD (JTL)

Type III 24-hr 2-year Rainfall=3.27"

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Page 5

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.4	25	0.0240	1.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	70	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
5.9	145	Total			

Summary for Subcatchment EX4: EX4

Runoff = 3.19 cfs @ 12.07 hrs, Volume= 9,957 cf, Depth> 2.61"

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-year Rainfall=3.27"

Area (sf)	CN	Description
4,051	80	>75% Grass cover, Good, HSG D
* 4,518	80	>75% Grass cover, Good, HSG D (NR)
274	61	>75% Grass cover, Good, HSG B
* 10,198	98	Paved parking, HSG D (NR)
3,084	98	Paved parking, HSG B
23,655	98	Paved parking, HSG D
45,780	94	Weighted Average
8,843		19.32% Pervious Area
36,937		80.68% Impervious Area

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

Summary for Pond DP1: Design Point

Inflow Area = 397,048 sf, 14.74% Impervious, Inflow Depth > 1.41" for 2-year event
 Inflow = 9.18 cfs @ 12.27 hrs, Volume= 46,723 cf
 Primary = 9.18 cfs @ 12.27 hrs, Volume= 46,723 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond DP2: Deisgn Point

Inflow Area = 196,850 sf, 8.29% Impervious, Inflow Depth > 0.98" for 2-year event
 Inflow = 3.92 cfs @ 12.15 hrs, Volume= 16,080 cf
 Primary = 3.92 cfs @ 12.15 hrs, Volume= 16,080 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond DP3: Overall Site

Inflow Area = 593,898 sf, 12.61% Impervious, Inflow Depth > 1.27" for 2-year event
Inflow = 12.49 cfs @ 12.22 hrs, Volume= 62,803 cf
Primary = 12.49 cfs @ 12.22 hrs, Volume= 62,803 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

23069 EX HydroCAD (JTL)

Type III 24-hr 10-year Rainfall=5.15"

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Page 7

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX1: Runoff Area=351,268 sf 6.15% Impervious Runoff Depth>2.74"
Flow Length=654' Tc=19.4 min CN=77 Runoff=17.74 cfs 80,143 cf

Subcatchment EX2: Runoff Area=166,395 sf 8.59% Impervious Runoff Depth>2.22"
Flow Length=374' Tc=11.5 min CN=71 Runoff=8.21 cfs 30,848 cf

Subcatchment EX3: Runoff Area=30,455 sf 6.66% Impervious Runoff Depth>2.84"
Flow Length=145' Tc=5.9 min CN=78 Runoff=2.34 cfs 7,198 cf

Subcatchment EX4: EX4 Runoff Area=45,780 sf 80.68% Impervious Runoff Depth>4.45"
Tc=5.0 min CN=94 Runoff=5.28 cfs 16,988 cf

Pond DP1: Design Point Inflow=19.86 cfs 97,130 cf
Primary=19.86 cfs 97,130 cf

Pond DP2: Deisgn Point Inflow=9.99 cfs 38,046 cf
Primary=9.99 cfs 38,046 cf

Pond DP3: Overall Site Inflow=28.24 cfs 135,176 cf
Primary=28.24 cfs 135,176 cf

Total Runoff Area = 593,898 sf Runoff Volume = 135,176 cf Average Runoff Depth = 2.73"
87.39% Pervious = 519,032 sf 12.61% Impervious = 74,866 sf

Summary for Subcatchment EX1:

Runoff = 17.74 cfs @ 12.27 hrs, Volume= 80,143 cf, Depth> 2.74"

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-year Rainfall=5.15"

Area (sf)	CN	Description
121,358	74	>75% Grass cover, Good, HSG C
14,201	39	>75% Grass cover, Good, HSG A
* 79,410	80	>75% Grass cover, Good, HSG D (C/D)
86,946	80	>75% Grass cover, Good, HSG D
* 27,443	80	>75% Grass cover, Good, HSG D (NR)
305	61	>75% Grass cover, Good, HSG B
20,255	98	Paved parking, HSG D
305	98	Paved parking, HSG B
1,045	98	Paved parking, HSG C
351,268	77	Weighted Average
329,663		93.85% Pervious Area
21,605		6.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	100	0.0160	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.0	53	0.0160	0.89		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	55	0.0360	1.33		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.4	86	0.0230	1.06		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	45	0.0440	1.05		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	61	0.0330	1.27		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	45	0.0440	1.47		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	96	0.0210	1.01		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.7	100	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	13	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
19.4	654	Total			

Summary for Subcatchment EX2:

Runoff = 8.21 cfs @ 12.16 hrs, Volume= 30,848 cf, Depth> 2.22"

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-year Rainfall=5.15"

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Type III 24-hr 10-year Rainfall=5.15"

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Page 9

Area (sf)	CN	Description
9,795	74	>75% Grass cover, Good, HSG C
42,059	39	>75% Grass cover, Good, HSG A
97,356	80	>75% Grass cover, Good, HSG D
2,888	61	>75% Grass cover, Good, HSG B
11,955	98	Paved parking, HSG D
2,342	98	Paved parking, HSG B
166,395	71	Weighted Average
152,098		91.41% Pervious Area
14,297		8.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	100	0.0340	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.4	32	0.0290	1.19		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	78	0.0260	1.13		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	35	0.0570	1.67		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	37	0.0540	1.63		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	45	0.0440	1.47		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.8	47	0.0210	1.01		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.5	374	Total			

Summary for Subcatchment EX3:

Runoff = 2.34 cfs @ 12.09 hrs, Volume= 7,198 cf, Depth> 2.84"

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-year Rainfall=5.15"

Area (sf)	CN	Description
973	39	>75% Grass cover, Good, HSG A
2,308	61	>75% Grass cover, Good, HSG B
25,147	80	>75% Grass cover, Good, HSG D
1,772	98	Paved parking, HSG D
255	98	Paved parking, HSG B
30,455	78	Weighted Average
28,428		93.34% Pervious Area
2,027		6.66% Impervious Area

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Type III 24-hr 10-year Rainfall=5.15"

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Page 10

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.4	25	0.0240	1.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	70	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
5.9	145	Total			

Summary for Subcatchment EX4: EX4

Runoff = 5.28 cfs @ 12.07 hrs, Volume= 16,988 cf, Depth> 4.45"

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-year Rainfall=5.15"

Area (sf)	CN	Description
4,051	80	>75% Grass cover, Good, HSG D
* 4,518	80	>75% Grass cover, Good, HSG D (NR)
274	61	>75% Grass cover, Good, HSG B
* 10,198	98	Paved parking, HSG D (NR)
3,084	98	Paved parking, HSG B
23,655	98	Paved parking, HSG D
45,780	94	Weighted Average
8,843		19.32% Pervious Area
36,937		80.68% Impervious Area

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

Summary for Pond DP1: Design Point

Inflow Area = 397,048 sf, 14.74% Impervious, Inflow Depth > 2.94" for 10-year event
 Inflow = 19.86 cfs @ 12.26 hrs, Volume= 97,130 cf
 Primary = 19.86 cfs @ 12.26 hrs, Volume= 97,130 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond DP2: Deisgn Point

Inflow Area = 196,850 sf, 8.29% Impervious, Inflow Depth > 2.32" for 10-year event
 Inflow = 9.99 cfs @ 12.15 hrs, Volume= 38,046 cf
 Primary = 9.99 cfs @ 12.15 hrs, Volume= 38,046 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond DP3: Overall Site

Inflow Area = 593,898 sf, 12.61% Impervious, Inflow Depth > 2.73" for 10-year event
Inflow = 28.24 cfs @ 12.22 hrs, Volume= 135,176 cf
Primary = 28.24 cfs @ 12.22 hrs, Volume= 135,176 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Type III 24-hr 25-year Rainfall=6.33"

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Page 12

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX1: Runoff Area=351,268 sf 6.15% Impervious Runoff Depth>3.75"
Flow Length=654' Tc=19.4 min CN=77 Runoff=24.35 cfs 109,903 cf

Subcatchment EX2: Runoff Area=166,395 sf 8.59% Impervious Runoff Depth>3.16"
Flow Length=374' Tc=11.5 min CN=71 Runoff=11.79 cfs 43,805 cf

Subcatchment EX3: Runoff Area=30,455 sf 6.66% Impervious Runoff Depth>3.87"
Flow Length=145' Tc=5.9 min CN=78 Runoff=3.18 cfs 9,816 cf

Subcatchment EX4: EX4 Runoff Area=45,780 sf 80.68% Impervious Runoff Depth>5.62"
Tc=5.0 min CN=94 Runoff=6.57 cfs 21,439 cf

Pond DP1: Design Point Inflow=27.00 cfs 131,342 cf
Primary=27.00 cfs 131,342 cf

Pond DP2: Deisgn Point Inflow=14.22 cfs 53,621 cf
Primary=14.22 cfs 53,621 cf

Pond DP3: Overall Site Inflow=38.93 cfs 184,963 cf
Primary=38.93 cfs 184,963 cf

Total Runoff Area = 593,898 sf Runoff Volume = 184,963 cf Average Runoff Depth = 3.74"
87.39% Pervious = 519,032 sf 12.61% Impervious = 74,866 sf

Summary for Subcatchment EX1:

Runoff = 24.35 cfs @ 12.27 hrs, Volume= 109,903 cf, Depth> 3.75"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
121,358	74	>75% Grass cover, Good, HSG C
14,201	39	>75% Grass cover, Good, HSG A
* 79,410	80	>75% Grass cover, Good, HSG D (C/D)
86,946	80	>75% Grass cover, Good, HSG D
* 27,443	80	>75% Grass cover, Good, HSG D (NR)
305	61	>75% Grass cover, Good, HSG B
20,255	98	Paved parking, HSG D
305	98	Paved parking, HSG B
1,045	98	Paved parking, HSG C
351,268	77	Weighted Average
329,663		93.85% Pervious Area
21,605		6.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	100	0.0160	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.0	53	0.0160	0.89		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	55	0.0360	1.33		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.4	86	0.0230	1.06		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	45	0.0440	1.05		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	61	0.0330	1.27		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	45	0.0440	1.47		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	96	0.0210	1.01		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.7	100	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	13	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
19.4	654	Total			

Summary for Subcatchment EX2:

Runoff = 11.79 cfs @ 12.16 hrs, Volume= 43,805 cf, Depth> 3.16"

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 25-year Rainfall=6.33"

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Type III 24-hr 25-year Rainfall=6.33"

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Page 14

Area (sf)	CN	Description
9,795	74	>75% Grass cover, Good, HSG C
42,059	39	>75% Grass cover, Good, HSG A
97,356	80	>75% Grass cover, Good, HSG D
2,888	61	>75% Grass cover, Good, HSG B
11,955	98	Paved parking, HSG D
2,342	98	Paved parking, HSG B
166,395	71	Weighted Average
152,098		91.41% Pervious Area
14,297		8.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	100	0.0340	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.4	32	0.0290	1.19		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	78	0.0260	1.13		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	35	0.0570	1.67		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	37	0.0540	1.63		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	45	0.0440	1.47		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.8	47	0.0210	1.01		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.5	374	Total			

Summary for Subcatchment EX3:

Runoff = 3.18 cfs @ 12.09 hrs, Volume= 9,816 cf, Depth> 3.87"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
973	39	>75% Grass cover, Good, HSG A
2,308	61	>75% Grass cover, Good, HSG B
25,147	80	>75% Grass cover, Good, HSG D
1,772	98	Paved parking, HSG D
255	98	Paved parking, HSG B
30,455	78	Weighted Average
28,428		93.34% Pervious Area
2,027		6.66% Impervious Area

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Type III 24-hr 25-year Rainfall=6.33"

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Page 15

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.4	25	0.0240	1.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	70	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
5.9	145	Total			

Summary for Subcatchment EX4: EX4

Runoff = 6.57 cfs @ 12.07 hrs, Volume= 21,439 cf, Depth> 5.62"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
4,051	80	>75% Grass cover, Good, HSG D
* 4,518	80	>75% Grass cover, Good, HSG D (NR)
274	61	>75% Grass cover, Good, HSG B
* 10,198	98	Paved parking, HSG D (NR)
3,084	98	Paved parking, HSG B
23,655	98	Paved parking, HSG D
45,780	94	Weighted Average
8,843		19.32% Pervious Area
36,937		80.68% Impervious Area

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

Summary for Pond DP1: Design Point

Inflow Area = 397,048 sf, 14.74% Impervious, Inflow Depth > 3.97" for 25-year event
 Inflow = 27.00 cfs @ 12.26 hrs, Volume= 131,342 cf
 Primary = 27.00 cfs @ 12.26 hrs, Volume= 131,342 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond DP2: Deisgn Point

Inflow Area = 196,850 sf, 8.29% Impervious, Inflow Depth > 3.27" for 25-year event
 Inflow = 14.22 cfs @ 12.15 hrs, Volume= 53,621 cf
 Primary = 14.22 cfs @ 12.15 hrs, Volume= 53,621 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond DP3: Overall Site

Inflow Area = 593,898 sf, 12.61% Impervious, Inflow Depth > 3.74" for 25-year event
Inflow = 38.93 cfs @ 12.20 hrs, Volume= 184,963 cf
Primary = 38.93 cfs @ 12.20 hrs, Volume= 184,963 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

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Type III 24-hr 100-year Rainfall=8.14"

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Page 17

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX1: Runoff Area=351,268 sf 6.15% Impervious Runoff Depth>5.38"
Flow Length=654' Tc=19.4 min CN=77 Runoff=34.72 cfs 157,594 cf

Subcatchment EX2: Runoff Area=166,395 sf 8.59% Impervious Runoff Depth>4.69"
Flow Length=374' Tc=11.5 min CN=71 Runoff=17.56 cfs 65,039 cf

Subcatchment EX3: Runoff Area=30,455 sf 6.66% Impervious Runoff Depth>5.52"
Flow Length=145' Tc=5.9 min CN=78 Runoff=4.49 cfs 13,997 cf

Subcatchment EX4: EX4 Runoff Area=45,780 sf 80.68% Impervious Runoff Depth>7.42"
Tc=5.0 min CN=94 Runoff=8.55 cfs 28,293 cf

Pond DP1: Design Point Inflow=38.17 cfs 185,887 cf
Primary=38.17 cfs 185,887 cf

Pond DP2: Deisgn Point Inflow=21.00 cfs 79,036 cf
Primary=21.00 cfs 79,036 cf

Pond DP3: Overall Site Inflow=55.86 cfs 264,923 cf
Primary=55.86 cfs 264,923 cf

Total Runoff Area = 593,898 sf Runoff Volume = 264,923 cf Average Runoff Depth = 5.35"
87.39% Pervious = 519,032 sf 12.61% Impervious = 74,866 sf

Summary for Subcatchment EX1:

Runoff = 34.72 cfs @ 12.26 hrs, Volume= 157,594 cf, Depth> 5.38"

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-year Rainfall=8.14"

Area (sf)	CN	Description
121,358	74	>75% Grass cover, Good, HSG C
14,201	39	>75% Grass cover, Good, HSG A
* 79,410	80	>75% Grass cover, Good, HSG D (C/D)
86,946	80	>75% Grass cover, Good, HSG D
* 27,443	80	>75% Grass cover, Good, HSG D (NR)
305	61	>75% Grass cover, Good, HSG B
20,255	98	Paved parking, HSG D
305	98	Paved parking, HSG B
1,045	98	Paved parking, HSG C
351,268	77	Weighted Average
329,663		93.85% Pervious Area
21,605		6.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	100	0.0160	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.0	53	0.0160	0.89		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	55	0.0360	1.33		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.4	86	0.0230	1.06		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	45	0.0440	1.05		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.8	61	0.0330	1.27		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	45	0.0440	1.47		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.6	96	0.0210	1.01		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.7	100	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	13	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
19.4	654	Total			

Summary for Subcatchment EX2:

Runoff = 17.56 cfs @ 12.16 hrs, Volume= 65,039 cf, Depth> 4.69"

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-year Rainfall=8.14"

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Type III 24-hr 100-year Rainfall=8.14"

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Page 19

Area (sf)	CN	Description
9,795	74	>75% Grass cover, Good, HSG C
42,059	39	>75% Grass cover, Good, HSG A
97,356	80	>75% Grass cover, Good, HSG D
2,888	61	>75% Grass cover, Good, HSG B
11,955	98	Paved parking, HSG D
2,342	98	Paved parking, HSG B
166,395	71	Weighted Average
152,098		91.41% Pervious Area
14,297		8.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	100	0.0340	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.4	32	0.0290	1.19		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	78	0.0260	1.13		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	35	0.0570	1.67		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	37	0.0540	1.63		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.5	45	0.0440	1.47		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.8	47	0.0210	1.01		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.5	374	Total			

Summary for Subcatchment EX3:

Runoff = 4.49 cfs @ 12.08 hrs, Volume= 13,997 cf, Depth> 5.52"

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-year Rainfall=8.14"

Area (sf)	CN	Description
973	39	>75% Grass cover, Good, HSG A
2,308	61	>75% Grass cover, Good, HSG B
25,147	80	>75% Grass cover, Good, HSG D
1,772	98	Paved parking, HSG D
255	98	Paved parking, HSG B
30,455	78	Weighted Average
28,428		93.34% Pervious Area
2,027		6.66% Impervious Area

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Page 20

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.4	25	0.0240	1.08		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.2	70	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
5.9	145	Total			

Summary for Subcatchment EX4: EX4

Runoff = 8.55 cfs @ 12.07 hrs, Volume= 28,293 cf, Depth> 7.42"

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-year Rainfall=8.14"

Area (sf)	CN	Description
4,051	80	>75% Grass cover, Good, HSG D
* 4,518	80	>75% Grass cover, Good, HSG D (NR)
274	61	>75% Grass cover, Good, HSG B
* 10,198	98	Paved parking, HSG D (NR)
3,084	98	Paved parking, HSG B
23,655	98	Paved parking, HSG D
45,780	94	Weighted Average
8,843		19.32% Pervious Area
36,937		80.68% Impervious Area

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

Summary for Pond DP1: Design Point

Inflow Area = 397,048 sf, 14.74% Impervious, Inflow Depth > 5.62" for 100-year event
 Inflow = 38.17 cfs @ 12.26 hrs, Volume= 185,887 cf
 Primary = 38.17 cfs @ 12.26 hrs, Volume= 185,887 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond DP2: Deisgn Point

Inflow Area = 196,850 sf, 8.29% Impervious, Inflow Depth > 4.82" for 100-year event
 Inflow = 21.00 cfs @ 12.14 hrs, Volume= 79,036 cf
 Primary = 21.00 cfs @ 12.14 hrs, Volume= 79,036 cf, Atten= 0%, Lag= 0.0 min

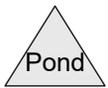
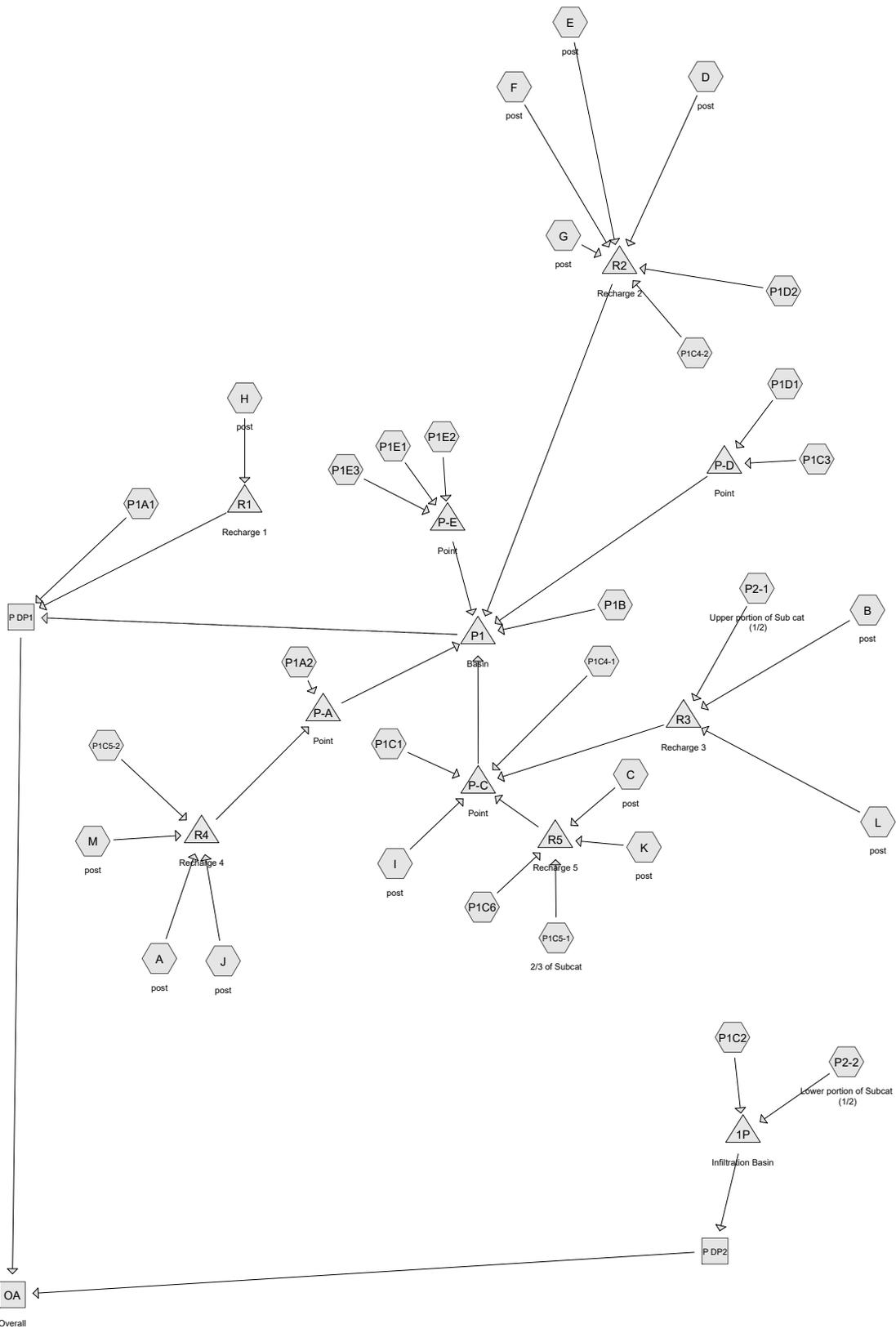
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond DP3: Overall Site

Inflow Area = 593,898 sf, 12.61% Impervious, Inflow Depth > 5.35" for 100-year event
Inflow = 55.86 cfs @ 12.20 hrs, Volume= 264,923 cf
Primary = 55.86 cfs @ 12.20 hrs, Volume= 264,923 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Appendix VII. Recharge Calculations



Routing Diagram for 23069 HydroCAD - Proposed 8 20 R2
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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.611	39	>75% Grass cover, Good, HSG A (P1B, P1C3, P1C4-1, P1C4-2, P1D1, P1D2, P1E1, P2-1, P2-2)
0.198	61	>75% Grass cover, Good, HSG B (P1C2, P1C6)
1.246	74	>75% Grass cover, Good, HSG C (P1A1, P1B, P1D1, P1D2, P1E1, P1E2, P1E3)
2.576	80	>75% Grass cover, Good, HSG D (P1A1, P1A2, P1B, P1C1, P1C2, P1C3, P1C4-1, P1C4-2, P1C5-1, P1C5-2, P1C6, P1D2, P1E1, P1E3, P2-1, P2-2)
1.806	80	>75% Grass cover, Good, HSG D (C/D) (P1A1, P1A2, P1C5-1, P1C5-2)
0.523	80	>75% Grass cover, Good, HSG D (NR) (P1A1, P1C5-1, P1C5-2, P1C6)
0.478	98	Impervious, HSG A (P1C3, P1C4-1, P1D1, P1D2, P1E1)
0.057	98	Impervious, HSG B (P1C2, P1C6)
1.078	98	Impervious, HSG C (P1A1, P1D1, P1D2, P1E1, P1E2, P1E3)
2.037	98	Impervious, HSG D (P1A2, P1B, P1C1, P1C2, P1C3, P1C4-1, P1C4-2, P1C5-1, P1C5-2, P1C6, P1D2, P1E1, P1E3, P2-1, P2-2)
0.332	98	Impervious, HSG D (C/D) (P1A2, P1C5-1, P1C5-2)
0.445	98	Impervious, HSG D (NR) (P1C5-1, P1C5-2, P1C6)
0.254	98	Roofs, HSG A (D, E, F)
0.808	98	Roofs, HSG C (E, F, G, H, I, J, M)
1.298	98	Roofs, HSG D (A, B, C, D, G, H, J, K, L, M)
13.748	86	TOTAL AREA

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Page 3

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: post	Runoff Area=4,838 sf 100.00% Impervious Runoff Depth>3.03" Tc=6.0 min CN=98 Runoff=0.35 cfs 0.028 af
Subcatchment B: post	Runoff Area=4,874 sf 100.00% Impervious Runoff Depth>3.03" Tc=6.0 min CN=98 Runoff=0.36 cfs 0.028 af
Subcatchment C: post	Runoff Area=14,404 sf 100.00% Impervious Runoff Depth>3.03" Tc=6.0 min CN=98 Runoff=1.05 cfs 0.084 af
Subcatchment D: post	Runoff Area=12,187 sf 100.00% Impervious Runoff Depth>3.03" Tc=6.0 min CN=98 Runoff=0.89 cfs 0.071 af
Subcatchment E: post	Runoff Area=13,555 sf 100.00% Impervious Runoff Depth>3.03" Tc=6.0 min CN=98 Runoff=0.99 cfs 0.079 af
Subcatchment F: post	Runoff Area=11,698 sf 100.00% Impervious Runoff Depth>3.03" Tc=6.0 min CN=98 Runoff=0.85 cfs 0.068 af
Subcatchment G: post	Runoff Area=13,555 sf 100.00% Impervious Runoff Depth>3.03" Tc=6.0 min CN=98 Runoff=0.99 cfs 0.079 af
Subcatchment H: post	Runoff Area=5,127 sf 100.00% Impervious Runoff Depth>3.03" Tc=6.0 min CN=98 Runoff=0.37 cfs 0.030 af
Subcatchment I: post	Runoff Area=1,287 sf 100.00% Impervious Runoff Depth>3.03" Tc=6.0 min CN=98 Runoff=0.09 cfs 0.007 af
Subcatchment J: post	Runoff Area=5,123 sf 100.00% Impervious Runoff Depth>3.03" Tc=6.0 min CN=98 Runoff=0.37 cfs 0.030 af
Subcatchment K: post	Runoff Area=8,062 sf 100.00% Impervious Runoff Depth>3.03" Tc=6.0 min CN=98 Runoff=0.59 cfs 0.047 af
Subcatchment L: post	Runoff Area=1,649 sf 100.00% Impervious Runoff Depth>3.03" Tc=6.0 min CN=98 Runoff=0.12 cfs 0.010 af
Subcatchment M: post	Runoff Area=6,435 sf 100.00% Impervious Runoff Depth>3.03" Tc=6.0 min CN=98 Runoff=0.47 cfs 0.037 af
Subcatchment P1A1:	Runoff Area=93,348 sf 0.85% Impervious Runoff Depth>1.38" Flow Length=345' Tc=15.6 min CN=79 Runoff=2.56 cfs 0.247 af
Subcatchment P1A2:	Runoff Area=25,397 sf 53.04% Impervious Runoff Depth>2.23" Tc=6.0 min CN=90 Runoff=1.51 cfs 0.108 af
Subcatchment P1B:	Runoff Area=47,113 sf 5.85% Impervious Runoff Depth>1.26" Tc=6.0 min CN=77 Runoff=1.56 cfs 0.114 af

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Page 4

SubcatchmentP1C1:	Runoff Area=16,895 sf 78.82% Impervious Runoff Depth>2.61" Tc=6.0 min CN=94 Runoff=1.14 cfs 0.084 af
SubcatchmentP1C2:	Runoff Area=46,356 sf 39.05% Impervious Runoff Depth>1.82" Tc=6.0 min CN=85 Runoff=2.27 cfs 0.161 af
SubcatchmentP1C3:	Runoff Area=13,120 sf 36.01% Impervious Runoff Depth>0.87" Tc=6.0 min CN=70 Runoff=0.28 cfs 0.022 af
SubcatchmentP1C4-1:	Runoff Area=15,993 sf 61.16% Impervious Runoff Depth>2.14" Tc=6.0 min CN=89 Runoff=0.92 cfs 0.066 af
SubcatchmentP1C4-2:	Runoff Area=15,993 sf 60.05% Impervious Runoff Depth>2.06" Tc=6.0 min CN=88 Runoff=0.88 cfs 0.063 af
SubcatchmentP1C5-1: 2/3 of Subcat	Runoff Area=28,727 sf 55.12% Impervious Runoff Depth>2.23" Tc=6.0 min CN=90 Runoff=1.71 cfs 0.123 af
SubcatchmentP1C5-2:	Runoff Area=13,891 sf 55.12% Impervious Runoff Depth>2.23" Tc=6.0 min CN=90 Runoff=0.83 cfs 0.059 af
SubcatchmentP1C6:	Runoff Area=29,718 sf 51.00% Impervious Runoff Depth>1.97" Tc=6.0 min CN=87 Runoff=1.58 cfs 0.112 af
SubcatchmentP1D1:	Runoff Area=9,747 sf 44.85% Impervious Runoff Depth>0.97" Tc=6.0 min CN=72 Runoff=0.24 cfs 0.018 af
SubcatchmentP1D2:	Runoff Area=29,119 sf 56.06% Impervious Runoff Depth>1.45" Tc=6.0 min CN=80 Runoff=1.13 cfs 0.081 af
SubcatchmentP1E1:	Runoff Area=24,220 sf 57.97% Impervious Runoff Depth>1.74" Tc=6.0 min CN=84 Runoff=1.14 cfs 0.081 af
SubcatchmentP1E2:	Runoff Area=23,581 sf 58.61% Impervious Runoff Depth>2.06" Tc=6.0 min CN=88 Runoff=1.30 cfs 0.093 af
SubcatchmentP1E3:	Runoff Area=38,111 sf 65.47% Impervious Runoff Depth>2.23" Tc=6.0 min CN=90 Runoff=2.26 cfs 0.163 af
SubcatchmentP2-1: Upper portion of Sub	Runoff Area=12,363 sf 32.94% Impervious Runoff Depth>1.59" Tc=6.0 min CN=82 Runoff=0.53 cfs 0.038 af
SubcatchmentP2-2: Lower portion of	Runoff Area=12,363 sf 32.94% Impervious Runoff Depth>1.59" Tc=6.0 min CN=82 Runoff=0.53 cfs 0.038 af
Reach OA: Overall	Inflow=4.34 cfs 1.169 af Outflow=4.34 cfs 1.169 af
Reach P DP1:	Inflow=4.34 cfs 1.169 af Outflow=4.34 cfs 1.169 af
Reach P DP2:	Inflow=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

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Page 5

Pond 1P: Infiltration Basin Peak Elev=39.44' Storage=4,367 cf Inflow=2.80 cfs 0.199 af
Discarded=0.15 cfs 0.157 af Primary=0.00 cfs 0.000 af Outflow=0.15 cfs 0.157 af

Pond P-A: Point Inflow=1.95 cfs 0.168 af
Primary=1.95 cfs 0.168 af

Pond P-C: Point Inflow=3.51 cfs 0.338 af
Primary=3.51 cfs 0.338 af

Pond P-D: Point Inflow=0.51 cfs 0.040 af
Primary=0.51 cfs 0.040 af

Pond P-E: Point Inflow=4.70 cfs 0.336 af
Primary=4.70 cfs 0.336 af

Pond P1: Basin Peak Elev=41.77' Storage=20,085 cf Inflow=11.86 cfs 1.059 af
Discarded=0.07 cfs 0.069 af Primary=2.68 cfs 0.913 af Outflow=2.74 cfs 0.982 af

Pond R1: Recharge 1 Peak Elev=46.45' Storage=657 cf Inflow=0.37 cfs 0.030 af
Discarded=0.00 cfs 0.007 af Primary=0.11 cfs 0.009 af Outflow=0.11 cfs 0.016 af

Pond R2: Recharge 2 Peak Elev=42.53' Storage=6,733 cf Inflow=5.73 cfs 0.440 af
Discarded=0.36 cfs 0.376 af Primary=0.70 cfs 0.063 af Outflow=1.06 cfs 0.440 af

Pond R3: Recharge 3 Peak Elev=42.04' Storage=1,134 cf Inflow=1.00 cfs 0.076 af
Discarded=0.10 cfs 0.075 af Primary=0.01 cfs 0.000 af Outflow=0.11 cfs 0.075 af

Pond R4: Recharge 4 Peak Elev=47.23' Storage=2,192 cf Inflow=2.02 cfs 0.154 af
Discarded=0.06 cfs 0.077 af Primary=0.95 cfs 0.060 af Outflow=1.01 cfs 0.137 af

Pond R5: Recharge 5 Peak Elev=43.29' Storage=5,112 cf Inflow=4.92 cfs 0.365 af
Discarded=0.10 cfs 0.136 af Primary=2.24 cfs 0.180 af Outflow=2.34 cfs 0.317 af

Total Runoff Area = 13.748 ac Runoff Volume = 2.266 af Average Runoff Depth = 1.98"
50.63% Pervious = 6.961 ac 49.37% Impervious = 6.787 ac

Summary for Subcatchment A: post

Runoff = 0.35 cfs @ 12.08 hrs, Volume= 0.028 af, Depth> 3.03"

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-year Rainfall=3.27"

Area (sf)	CN	Description
4,838	98	Roofs, HSG D
4,838		100.00% Impervious Area

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

Summary for Subcatchment B: post

Runoff = 0.36 cfs @ 12.08 hrs, Volume= 0.028 af, Depth> 3.03"

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-year Rainfall=3.27"

Area (sf)	CN	Description
4,874	98	Roofs, HSG D
4,874		100.00% Impervious Area

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

Summary for Subcatchment C: post

Runoff = 1.05 cfs @ 12.08 hrs, Volume= 0.084 af, Depth> 3.03"

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-year Rainfall=3.27"

Area (sf)	CN	Description
14,404	98	Roofs, HSG D
14,404		100.00% Impervious Area

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

Summary for Subcatchment D: post

Runoff = 0.89 cfs @ 12.08 hrs, Volume= 0.071 af, Depth> 3.03"

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-year Rainfall=3.27"

Area (sf)	CN	Description
11,852	98	Roofs, HSG D
335	98	Roofs, HSG A
12,187	98	Weighted Average
12,187		100.00% Impervious Area

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

Summary for Subcatchment E: post

Runoff = 0.99 cfs @ 12.08 hrs, Volume= 0.079 af, Depth> 3.03"

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-year Rainfall=3.27"

Area (sf)	CN	Description
9,599	98	Roofs, HSG A
3,956	98	Roofs, HSG C
13,555	98	Weighted Average
13,555		100.00% Impervious Area

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

Summary for Subcatchment F: post

Runoff = 0.85 cfs @ 12.08 hrs, Volume= 0.068 af, Depth> 3.03"

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-year Rainfall=3.27"

Area (sf)	CN	Description
10,566	98	Roofs, HSG C
1,132	98	Roofs, HSG A
11,698	98	Weighted Average
11,698		100.00% Impervious Area

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Type III 24-hr 2-year Rainfall=3.27"

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Page 8

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

Summary for Subcatchment G: post

Runoff = 0.99 cfs @ 12.08 hrs, Volume= 0.079 af, Depth> 3.03"

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-year Rainfall=3.27"

Area (sf)	CN	Description
12,204	98	Roofs, HSG C
1,351	98	Roofs, HSG D
13,555	98	Weighted Average
13,555		100.00% Impervious Area

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

Summary for Subcatchment H: post

Runoff = 0.37 cfs @ 12.08 hrs, Volume= 0.030 af, Depth> 3.03"

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-year Rainfall=3.27"

Area (sf)	CN	Description
4,470	98	Roofs, HSG C
657	98	Roofs, HSG D
5,127	98	Weighted Average
5,127		100.00% Impervious Area

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

Summary for Subcatchment I: post

Runoff = 0.09 cfs @ 12.08 hrs, Volume= 0.007 af, Depth> 3.03"

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-year Rainfall=3.27"

Area (sf)	CN	Description
1,287	98	Roofs, HSG C
1,287		100.00% Impervious Area

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Page 9

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

Summary for Subcatchment J: post

Runoff = 0.37 cfs @ 12.08 hrs, Volume= 0.030 af, Depth> 3.03"

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-year Rainfall=3.27"

Area (sf)	CN	Description
2,688	98	Roofs, HSG D
2,435	98	Roofs, HSG C
5,123	98	Weighted Average
5,123		100.00% Impervious Area

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

Summary for Subcatchment K: post

Runoff = 0.59 cfs @ 12.08 hrs, Volume= 0.047 af, Depth> 3.03"

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-year Rainfall=3.27"

Area (sf)	CN	Description
8,062	98	Roofs, HSG D
8,062		100.00% Impervious Area

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

Summary for Subcatchment L: post

Runoff = 0.12 cfs @ 12.08 hrs, Volume= 0.010 af, Depth> 3.03"

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-year Rainfall=3.27"

Area (sf)	CN	Description
1,649	98	Roofs, HSG D
1,649		100.00% Impervious Area

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Page 10

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

Summary for Subcatchment M: post

Runoff = 0.47 cfs @ 12.08 hrs, Volume= 0.037 af, Depth> 3.03"

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-year Rainfall=3.27"

Area (sf)	CN	Description
6,175	98	Roofs, HSG D
260	98	Roofs, HSG C
6,435	98	Weighted Average
6,435		100.00% Impervious Area

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

Summary for Subcatchment P1A1:

Runoff = 2.56 cfs @ 12.22 hrs, Volume= 0.247 af, Depth> 1.38"

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-year Rainfall=3.27"

Area (sf)	CN	Description
* 789	98	Impervious, HSG C
17,998	74	>75% Grass cover, Good, HSG C
4,121	80	>75% Grass cover, Good, HSG D
* 61,469	80	>75% Grass cover, Good, HSG D (C/D)
* 8,971	80	>75% Grass cover, Good, HSG D (NR)
93,348	79	Weighted Average
92,559		99.15% Pervious Area
789		0.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	100	0.0900	0.14		Sheet Flow, Grass/Tree Canopy Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	245	0.0240	1.08		Shallow Concentrated Flow, Slope to Wet area Short Grass Pasture Kv= 7.0 fps
15.6	345	Total			

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Page 11

Summary for Subcatchment P1A2:

Runoff = 1.51 cfs @ 12.09 hrs, Volume= 0.108 af, Depth> 2.23"

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-year Rainfall=3.27"

	Area (sf)	CN	Description
*	11,010	98	Impervious, HSG D
*	2,461	98	Impervious, HSG D (C/D)
	455	80	>75% Grass cover, Good, HSG D
*	11,471	80	>75% Grass cover, Good, HSG D (C/D)
	25,397	90	Weighted Average
	11,926		46.96% Pervious Area
	13,471		53.04% Impervious Area

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

Summary for Subcatchment P1B:

Runoff = 1.56 cfs @ 12.09 hrs, Volume= 0.114 af, Depth> 1.26"

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-year Rainfall=3.27"

	Area (sf)	CN	Description
*	2,756	98	Impervious, HSG D
	57	74	>75% Grass cover, Good, HSG C
	39,860	80	>75% Grass cover, Good, HSG D
	4,440	39	>75% Grass cover, Good, HSG A
	47,113	77	Weighted Average
	44,357		94.15% Pervious Area
	2,756		5.85% Impervious Area

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

Summary for Subcatchment P1C1:

Runoff = 1.14 cfs @ 12.08 hrs, Volume= 0.084 af, Depth> 2.61"

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-year Rainfall=3.27"

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Page 12

Area (sf)	CN	Description
* 13,316	98	Impervious, HSG D
3,579	80	>75% Grass cover, Good, HSG D
16,895	94	Weighted Average
3,579		21.18% Pervious Area
13,316		78.82% Impervious Area

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

Summary for Subcatchment P1C2:

Runoff = 2.27 cfs @ 12.09 hrs, Volume= 0.161 af, Depth> 1.82"

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-year Rainfall=3.27"

Area (sf)	CN	Description
* 15,673	98	Impervious, HSG D
* 2,429	98	Impervious, HSG B
5,446	61	>75% Grass cover, Good, HSG B
22,808	80	>75% Grass cover, Good, HSG D
46,356	85	Weighted Average
28,254		60.95% Pervious Area
18,102		39.05% Impervious Area

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

Summary for Subcatchment P1C3:

Runoff = 0.28 cfs @ 12.10 hrs, Volume= 0.022 af, Depth> 0.87"

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-year Rainfall=3.27"

Area (sf)	CN	Description
* 1,653	98	Impervious, HSG A
* 3,071	98	Impervious, HSG D
5,374	39	>75% Grass cover, Good, HSG A
3,022	80	>75% Grass cover, Good, HSG D
13,120	70	Weighted Average
8,396		63.99% Pervious Area
4,724		36.01% Impervious Area

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Page 13

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

Summary for Subcatchment P1C4-1:

Runoff = 0.92 cfs @ 12.09 hrs, Volume= 0.066 af, Depth> 2.14"

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-year Rainfall=3.27"

Area (sf)	CN	Description
* 178	98	Impervious, HSG A
* 9,603	98	Impervious, HSG D
771	39	>75% Grass cover, Good, HSG A
5,441	80	>75% Grass cover, Good, HSG D
15,993	89	Weighted Average
6,212		38.84% Pervious Area
9,781		61.16% Impervious Area

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

Summary for Subcatchment P1C4-2:

Runoff = 0.88 cfs @ 12.09 hrs, Volume= 0.063 af, Depth> 2.06"

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-year Rainfall=3.27"

Area (sf)	CN	Description
* 9,603	98	Impervious, HSG D
949	39	>75% Grass cover, Good, HSG A
5,441	80	>75% Grass cover, Good, HSG D
15,993	88	Weighted Average
6,390		39.95% Pervious Area
9,603		60.05% Impervious Area

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

Summary for Subcatchment P1C5-1: 2/3 of Subcat

This subcat is approx. 2/3 of the area of Subcat P1C5 on the drainage area map. This area will drain to the central pond

Runoff = 1.71 cfs @ 12.09 hrs, Volume= 0.123 af, Depth> 2.23"

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Page 14

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-year Rainfall=3.27"

	Area (sf)	CN	Description
*	1,803	98	Impervious, HSG D
*	8,084	98	Impervious, HSG D (C/D)
*	5,946	98	Impervious, HSG D (NR)
	3,196	80	>75% Grass cover, Good, HSG D
*	3,853	80	>75% Grass cover, Good, HSG D (C/D)
*	5,845	80	>75% Grass cover, Good, HSG D (NR)
	28,727	90	Weighted Average
	12,894		44.88% Pervious Area
	15,833		55.12% Impervious Area

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

Summary for Subcatchment P1C5-2:

This subcat is approx. 1/3 of the area of Subcat P1C5 on the drainage area map. This area will drain to Recharge system #4

Runoff = 0.83 cfs @ 12.09 hrs, Volume= 0.059 af, Depth> 2.23"

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-year Rainfall=3.27"

	Area (sf)	CN	Description
*	872	98	Impervious, HSG D
*	3,910	98	Impervious, HSG D (C/D)
*	2,875	98	Impervious, HSG D (NR)
	1,544	80	>75% Grass cover, Good, HSG D
*	1,862	80	>75% Grass cover, Good, HSG D (C/D)
*	2,828	80	>75% Grass cover, Good, HSG D (NR)
	13,891	90	Weighted Average
	6,234		44.88% Pervious Area
	7,657		55.12% Impervious Area

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

Summary for Subcatchment P1C6:

Runoff = 1.58 cfs @ 12.09 hrs, Volume= 0.112 af, Depth> 1.97"

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-year Rainfall=3.27"

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Page 15

Area (sf)	CN	Description
71	98	Impervious, HSG B
* 4,536	98	Impervious, HSG D
* 10,550	98	Impervious, HSG D (NR)
6,218	80	>75% Grass cover, Good, HSG D
* 5,159	80	>75% Grass cover, Good, HSG D (NR)
3,184	61	>75% Grass cover, Good, HSG B
29,718	87	Weighted Average
14,561		49.00% Pervious Area
15,157		51.00% Impervious Area

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

Summary for Subcatchment P1D1:

Runoff = 0.24 cfs @ 12.10 hrs, Volume= 0.018 af, Depth> 0.97"

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-year Rainfall=3.27"

Area (sf)	CN	Description
1,027	98	Impervious, HSG C
* 3,345	98	Impervious, HSG A
3,453	39	>75% Grass cover, Good, HSG A
1,922	74	>75% Grass cover, Good, HSG C
9,747	72	Weighted Average
5,375		55.15% Pervious Area
4,372		44.85% Impervious Area

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

Summary for Subcatchment P1D2:

Runoff = 1.13 cfs @ 12.09 hrs, Volume= 0.081 af, Depth> 1.45"

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-year Rainfall=3.27"

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Page 16

Area (sf)	CN	Description
* 268	98	Impervious, HSG D
3,763	98	Impervious, HSG C
12,292	98	Impervious, HSG A
6,063	39	>75% Grass cover, Good, HSG A
6,259	74	>75% Grass cover, Good, HSG C
474	80	>75% Grass cover, Good, HSG D
29,119	80	Weighted Average
12,796		43.94% Pervious Area
16,323		56.06% Impervious Area

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

Summary for Subcatchment P1E1:

Runoff = 1.14 cfs @ 12.09 hrs, Volume= 0.081 af, Depth> 1.74"

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-year Rainfall=3.27"

Area (sf)	CN	Description
* 6,409	98	Impervious, HSG D
4,261	98	Impervious, HSG C
* 3,371	98	Impervious, HSG A
3,166	39	>75% Grass cover, Good, HSG A
5,768	74	>75% Grass cover, Good, HSG C
1,245	80	>75% Grass cover, Good, HSG D
24,220	84	Weighted Average
10,179		42.03% Pervious Area
14,041		57.97% Impervious Area

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

Summary for Subcatchment P1E2:

Runoff = 1.30 cfs @ 12.09 hrs, Volume= 0.093 af, Depth> 2.06"

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-year Rainfall=3.27"

Area (sf)	CN	Description
13,822	98	Impervious, HSG C
9,759	74	>75% Grass cover, Good, HSG C
23,581	88	Weighted Average
9,759		41.39% Pervious Area
13,822		58.61% Impervious Area

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Page 17

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

Summary for Subcatchment P1E3:

Runoff = 2.26 cfs @ 12.09 hrs, Volume= 0.163 af, Depth> 2.23"

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-year Rainfall=3.27"

Area (sf)	CN	Description
23,288	98	Impervious, HSG C
1,664	98	Impervious, HSG D
12,525	74	>75% Grass cover, Good, HSG C
634	80	>75% Grass cover, Good, HSG D
38,111	90	Weighted Average
13,159		34.53% Pervious Area
24,952		65.47% Impervious Area

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

Summary for Subcatchment P2-1: Upper portion of Sub cat (1/2)

Runoff = 0.53 cfs @ 12.09 hrs, Volume= 0.038 af, Depth> 1.59"

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-year Rainfall=3.27"

Area (sf)	CN	Description
4,072	98	Impervious, HSG D
1,205	39	>75% Grass cover, Good, HSG A
7,086	80	>75% Grass cover, Good, HSG D
12,363	82	Weighted Average
8,291		67.06% Pervious Area
4,072		32.94% Impervious Area

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

Summary for Subcatchment P2-2: Lower portion of Subcat (1/2)

Runoff = 0.53 cfs @ 12.09 hrs, Volume= 0.038 af, Depth> 1.59"

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-year Rainfall=3.27"

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Page 18

Area (sf)	CN	Description
4,072	98	Impervious, HSG D
1,205	39	>75% Grass cover, Good, HSG A
7,086	80	>75% Grass cover, Good, HSG D
12,363	82	Weighted Average
8,291		67.06% Pervious Area
4,072		32.94% Impervious Area

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

Summary for Reach OA: Overall

Inflow Area = 13.748 ac, 49.37% Impervious, Inflow Depth > 1.02" for 2-year event
 Inflow = 4.34 cfs @ 12.32 hrs, Volume= 1.169 af
 Outflow = 4.34 cfs @ 12.32 hrs, Volume= 1.169 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach P DP1:

Inflow Area = 12.400 ac, 50.63% Impervious, Inflow Depth > 1.13" for 2-year event
 Inflow = 4.34 cfs @ 12.32 hrs, Volume= 1.169 af
 Outflow = 4.34 cfs @ 12.32 hrs, Volume= 1.169 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach P DP2:

Inflow Area = 1.348 ac, 37.76% Impervious, Inflow Depth = 0.00" for 2-year event
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Infiltration Basin

Inflow Area = 1.348 ac, 37.76% Impervious, Inflow Depth > 1.77" for 2-year event
 Inflow = 2.80 cfs @ 12.09 hrs, Volume= 0.199 af
 Outflow = 0.15 cfs @ 14.67 hrs, Volume= 0.157 af, Atten= 95%, Lag= 155.1 min
 Discarded = 0.15 cfs @ 14.67 hrs, Volume= 0.157 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 39.44' @ 14.67 hrs Surf.Area= 2,721 sf Storage= 4,367 cf

Plug-Flow detention time= 278.4 min calculated for 0.157 af (79% of inflow)
 Center-of-Mass det. time= 198.8 min (1,025.2 - 826.3)

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Page 19

Volume	Invert	Avail.Storage	Storage Description
#1	37.50'	5,963 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.50	1,850	0	0
38.00	2,000	963	963
39.00	2,500	2,250	3,213
40.00	3,000	2,750	5,963

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.50'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	39.75'	25.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.15 cfs @ 14.67 hrs HW=39.44' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=37.50' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P-A: Point

Inflow Area = 1.278 ac, 67.39% Impervious, Inflow Depth > 1.58" for 2-year event
 Inflow = 1.95 cfs @ 12.13 hrs, Volume= 0.168 af
 Primary = 1.95 cfs @ 12.13 hrs, Volume= 0.168 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-C: Point

Inflow Area = 3.076 ac, 66.01% Impervious, Inflow Depth > 1.32" for 2-year event
 Inflow = 3.51 cfs @ 12.15 hrs, Volume= 0.338 af
 Primary = 3.51 cfs @ 12.15 hrs, Volume= 0.338 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-D: Point

Inflow Area = 0.525 ac, 39.78% Impervious, Inflow Depth > 0.91" for 2-year event
 Inflow = 0.51 cfs @ 12.10 hrs, Volume= 0.040 af
 Primary = 0.51 cfs @ 12.10 hrs, Volume= 0.040 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-E: Point

Inflow Area = 1.972 ac, 61.48% Impervious, Inflow Depth > 2.04" for 2-year event
 Inflow = 4.70 cfs @ 12.09 hrs, Volume= 0.336 af
 Primary = 4.70 cfs @ 12.09 hrs, Volume= 0.336 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P1: Basin

Inflow Area = 10.139 ac, 60.58% Impervious, Inflow Depth > 1.25" for 2-year event
 Inflow = 11.86 cfs @ 12.10 hrs, Volume= 1.059 af
 Outflow = 2.74 cfs @ 12.85 hrs, Volume= 0.982 af, Atten= 77%, Lag= 44.9 min
 Discarded = 0.07 cfs @ 12.85 hrs, Volume= 0.069 af
 Primary = 2.68 cfs @ 12.85 hrs, Volume= 0.913 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 41.77' @ 12.85 hrs Surf.Area= 10,727 sf Storage= 20,085 cf

Plug-Flow detention time= 146.2 min calculated for 0.982 af (93% of inflow)
 Center-of-Mass det. time= 111.4 min (920.5 - 809.1)

Volume	Invert	Avail.Storage	Storage Description
#1	39.50'	119,125 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.50	7,003	0	0
40.00	7,787	3,698	3,698
41.00	9,414	8,601	12,298
42.00	11,112	10,263	22,561
43.00	14,766	12,939	35,500
44.00	21,276	18,021	53,521
45.00	31,959	26,618	80,139
46.00	46,014	38,987	119,125

Device	Routing	Invert	Outlet Devices
#1	Primary	39.00'	24.0" Round Culvert L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 39.00' / 38.70' S= 0.0054 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Device 1	39.75'	6.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	40.75'	8.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	41.70'	10.0" Vert. Orifice/Grate C= 0.600
#5	Device 1	43.05'	24.0" x 24.0" Horiz. Orifice/Grate X 2.00 C= 0.600 in 48.0" x 24.0" Grate (100% open area) Limited to weir flow at low heads
#6	Discarded	39.50'	0.270 in/hr Exfiltration over Surface area Phase-In= 0.01'

Discarded OutFlow Max=0.07 cfs @ 12.85 hrs HW=41.77' (Free Discharge)

↳ **6=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=2.68 cfs @ 12.85 hrs HW=41.77' (Free Discharge)

↳ **1=Culvert** (Passes 2.68 cfs of 18.05 cfs potential flow)

↳ **2=Orifice/Grate** (Orifice Controls 1.26 cfs @ 6.41 fps)

↳ **3=Orifice/Grate** (Orifice Controls 1.40 cfs @ 4.00 fps)

↳ **4=Orifice/Grate** (Orifice Controls 0.02 cfs @ 0.92 fps)

↳ **5=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond R1: Recharge 1

Inflow Area = 0.118 ac, 100.00% Impervious, Inflow Depth > 3.03" for 2-year event

Inflow = 0.37 cfs @ 12.08 hrs, Volume= 0.030 af

Outflow = 0.11 cfs @ 12.40 hrs, Volume= 0.016 af, Atten= 70%, Lag= 19.1 min

Discarded = 0.00 cfs @ 6.20 hrs, Volume= 0.007 af

Primary = 0.11 cfs @ 12.40 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 46.45' @ 12.40 hrs Surf.Area= 681 sf Storage= 657 cf

Plug-Flow detention time= 200.6 min calculated for 0.016 af (53% of inflow)

Center-of-Mass det. time= 82.2 min (837.5 - 755.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	44.80'	494 cf	21.50'W x 31.68'L x 2.33'H Field A 1,589 cf Overall - 354 cf Embedded = 1,235 cf x 40.0% Voids
#2A	45.30'	354 cf	ADS_StormTech RC-310 +Cap x 24 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 6 Rows of 4 Chambers
		848 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.80'	0.270 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	46.30'	15.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.30' / 42.00' S= 0.1433 1/1' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.00 cfs @ 6.20 hrs HW=44.83' (Free Discharge)

↳ **1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.11 cfs @ 12.40 hrs HW=46.45' (Free Discharge)

↳ **2=Culvert** (Inlet Controls 0.11 cfs @ 1.31 fps)

Summary for Pond R2: Recharge 2

Inflow Area = 2.206 ac, 80.04% Impervious, Inflow Depth > 2.39" for 2-year event
 Inflow = 5.73 cfs @ 12.09 hrs, Volume= 0.440 af
 Outflow = 1.06 cfs @ 12.54 hrs, Volume= 0.440 af, Atten= 81%, Lag= 27.0 min
 Discarded = 0.36 cfs @ 11.18 hrs, Volume= 0.376 af
 Primary = 0.70 cfs @ 12.54 hrs, Volume= 0.063 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 42.53' @ 12.54 hrs Surf.Area= 6,509 sf Storage= 6,733 cf

Plug-Flow detention time= 106.3 min calculated for 0.440 af (100% of inflow)
 Center-of-Mass det. time= 105.8 min (885.2 - 779.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	41.00'	5,805 cf	87.00'W x 74.82'L x 3.50'H Field A 22,782 cf Overall - 8,269 cf Embedded = 14,512 cf x 40.0% Voids
#2A	41.50'	8,269 cf	ADS_StormTech SC-740 +Cap x 180 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 18 Rows of 10 Chambers
		14,074 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.00'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	42.10'	18.0" Round Culvert L= 70.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.10' / 41.75' S= 0.0050 ' /' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Discarded OutFlow Max=0.36 cfs @ 11.18 hrs HW=41.04' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.36 cfs)

Primary OutFlow Max=0.70 cfs @ 12.54 hrs HW=42.53' (Free Discharge)
 ↑2=Culvert (Barrel Controls 0.70 cfs @ 2.52 fps)

Summary for Pond R3: Recharge 3

Inflow Area = 0.434 ac, 56.10% Impervious, Inflow Depth > 2.09" for 2-year event
 Inflow = 1.00 cfs @ 12.09 hrs, Volume= 0.076 af
 Outflow = 0.11 cfs @ 12.87 hrs, Volume= 0.075 af, Atten= 89%, Lag= 46.9 min
 Discarded = 0.10 cfs @ 11.62 hrs, Volume= 0.075 af
 Primary = 0.01 cfs @ 12.87 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 42.04' @ 12.87 hrs Surf.Area= 1,848 sf Storage= 1,134 cf

Plug-Flow detention time= 82.1 min calculated for 0.075 af (100% of inflow)
 Center-of-Mass det. time= 81.8 min (876.6 - 794.8)

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Page 23

Volume	Invert	Avail.Storage	Storage Description
#1A	41.00'	1,312 cf	24.83'W x 74.40'L x 2.33'H Field A 4,311 cf Overall - 1,032 cf Embedded = 3,279 cf x 40.0% Voids
#2A	41.50'	1,032 cf	ADS_StormTech RC-310 +Cap x 70 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 7 Rows of 10 Chambers
		2,344 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.00'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	42.00'	15.0" Round Culvert L= 350.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.00' / 40.25' S= 0.0050 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.10 cfs @ 11.62 hrs HW=41.02' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.01 cfs @ 12.87 hrs HW=42.04' (Free Discharge)

↑**2=Culvert** (Barrel Controls 0.01 cfs @ 0.63 fps)

Summary for Pond R4: Recharge 4

Inflow Area =	0.695 ac, 79.42% Impervious, Inflow Depth > 2.67" for 2-year event
Inflow =	2.02 cfs @ 12.08 hrs, Volume= 0.154 af
Outflow =	1.01 cfs @ 12.23 hrs, Volume= 0.137 af, Atten= 50%, Lag= 8.7 min
Discarded =	0.06 cfs @ 9.82 hrs, Volume= 0.077 af
Primary =	0.95 cfs @ 12.23 hrs, Volume= 0.060 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4

Peak Elev= 47.23' @ 12.23 hrs Surf.Area= 2,344 sf Storage= 2,192 cf

Plug-Flow detention time= 142.3 min calculated for 0.137 af (88% of inflow)

Center-of-Mass det. time= 88.4 min (863.0 - 774.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	45.70'	1,657 cf	34.83'W x 67.28'L x 2.33'H Field A 5,468 cf Overall - 1,327 cf Embedded = 4,142 cf x 40.0% Voids
#2A	46.20'	1,327 cf	ADS_StormTech RC-310 +Cap x 90 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 10 Rows of 9 Chambers
		2,983 cf	Total Available Storage

Storage Group A created with Chamber Wizard

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Page 24

Device	Routing	Invert	Outlet Devices
#1	Discarded	45.70'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.10'
#2	Primary	46.70'	15.0" Round Culvert L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.70' / 46.30' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.06 cfs @ 9.82 hrs HW=45.82' (Free Discharge)

↳ **1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.95 cfs @ 12.23 hrs HW=47.23' (Free Discharge)

↳ **2=Culvert** (Barrel Controls 0.95 cfs @ 2.80 fps)

Summary for Pond R5: Recharge 5

Inflow Area =	1.857 ac, 66.07% Impervious, Inflow Depth > 2.36" for 2-year event
Inflow =	4.92 cfs @ 12.09 hrs, Volume= 0.365 af
Outflow =	2.34 cfs @ 12.25 hrs, Volume= 0.317 af, Atten= 53%, Lag= 9.9 min
Discarded =	0.10 cfs @ 9.19 hrs, Volume= 0.136 af
Primary =	2.24 cfs @ 12.25 hrs, Volume= 0.180 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 43.29' @ 12.25 hrs Surf.Area= 4,167 sf Storage= 5,112 cf

Plug-Flow detention time= 122.3 min calculated for 0.317 af (87% of inflow)
Center-of-Mass det. time= 62.7 min (853.9 - 791.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	41.50'	3,739 cf	30.00'W x 138.90'L x 3.50'H Field A 14,584 cf Overall - 5,237 cf Embedded = 9,347 cf x 40.0% Voids
#2A	42.00'	5,237 cf	ADS_StormTech SC-740 +Cap x 114 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 6 Rows of 19 Chambers
		8,976 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.50'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	42.50'	18.0" Round Culvert L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.50' / 42.00' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Discarded OutFlow Max=0.10 cfs @ 9.19 hrs HW=41.54' (Free Discharge)

↳ **1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=2.24 cfs @ 12.25 hrs HW=43.29' (Free Discharge)

↳ **2=Culvert** (Barrel Controls 2.24 cfs @ 3.45 fps)

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Page 25

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: post	Runoff Area=4,838 sf 100.00% Impervious Runoff Depth>4.91" Tc=6.0 min CN=98 Runoff=0.56 cfs 0.045 af
Subcatchment B: post	Runoff Area=4,874 sf 100.00% Impervious Runoff Depth>4.91" Tc=6.0 min CN=98 Runoff=0.56 cfs 0.046 af
Subcatchment C: post	Runoff Area=14,404 sf 100.00% Impervious Runoff Depth>4.91" Tc=6.0 min CN=98 Runoff=1.67 cfs 0.135 af
Subcatchment D: post	Runoff Area=12,187 sf 100.00% Impervious Runoff Depth>4.91" Tc=6.0 min CN=98 Runoff=1.41 cfs 0.114 af
Subcatchment E: post	Runoff Area=13,555 sf 100.00% Impervious Runoff Depth>4.91" Tc=6.0 min CN=98 Runoff=1.57 cfs 0.127 af
Subcatchment F: post	Runoff Area=11,698 sf 100.00% Impervious Runoff Depth>4.91" Tc=6.0 min CN=98 Runoff=1.35 cfs 0.110 af
Subcatchment G: post	Runoff Area=13,555 sf 100.00% Impervious Runoff Depth>4.91" Tc=6.0 min CN=98 Runoff=1.57 cfs 0.127 af
Subcatchment H: post	Runoff Area=5,127 sf 100.00% Impervious Runoff Depth>4.91" Tc=6.0 min CN=98 Runoff=0.59 cfs 0.048 af
Subcatchment I: post	Runoff Area=1,287 sf 100.00% Impervious Runoff Depth>4.91" Tc=6.0 min CN=98 Runoff=0.15 cfs 0.012 af
Subcatchment J: post	Runoff Area=5,123 sf 100.00% Impervious Runoff Depth>4.91" Tc=6.0 min CN=98 Runoff=0.59 cfs 0.048 af
Subcatchment K: post	Runoff Area=8,062 sf 100.00% Impervious Runoff Depth>4.91" Tc=6.0 min CN=98 Runoff=0.93 cfs 0.076 af
Subcatchment L: post	Runoff Area=1,649 sf 100.00% Impervious Runoff Depth>4.91" Tc=6.0 min CN=98 Runoff=0.19 cfs 0.015 af
Subcatchment M: post	Runoff Area=6,435 sf 100.00% Impervious Runoff Depth>4.91" Tc=6.0 min CN=98 Runoff=0.74 cfs 0.060 af
Subcatchment P1A1:	Runoff Area=93,348 sf 0.85% Impervious Runoff Depth>2.92" Flow Length=345' Tc=15.6 min CN=79 Runoff=5.50 cfs 0.522 af
Subcatchment P1A2:	Runoff Area=25,397 sf 53.04% Impervious Runoff Depth>4.02" Tc=6.0 min CN=90 Runoff=2.65 cfs 0.195 af
Subcatchment P1B:	Runoff Area=47,113 sf 5.85% Impervious Runoff Depth>2.75" Tc=6.0 min CN=77 Runoff=3.49 cfs 0.247 af

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Page 26

SubcatchmentP1C1:	Runoff Area=16,895 sf 78.82% Impervious Runoff Depth>4.45" Tc=6.0 min CN=94 Runoff=1.88 cfs 0.144 af
SubcatchmentP1C2:	Runoff Area=46,356 sf 39.05% Impervious Runoff Depth>3.50" Tc=6.0 min CN=85 Runoff=4.33 cfs 0.311 af
SubcatchmentP1C3:	Runoff Area=13,120 sf 36.01% Impervious Runoff Depth>2.15" Tc=6.0 min CN=70 Runoff=0.75 cfs 0.054 af
SubcatchmentP1C4-1:	Runoff Area=15,993 sf 61.16% Impervious Runoff Depth>3.91" Tc=6.0 min CN=89 Runoff=1.63 cfs 0.120 af
SubcatchmentP1C4-2:	Runoff Area=15,993 sf 60.05% Impervious Runoff Depth>3.81" Tc=6.0 min CN=88 Runoff=1.60 cfs 0.117 af
SubcatchmentP1C5-1: 2/3 of Subcat	Runoff Area=28,727 sf 55.12% Impervious Runoff Depth>4.02" Tc=6.0 min CN=90 Runoff=2.99 cfs 0.221 af
SubcatchmentP1C5-2:	Runoff Area=13,891 sf 55.12% Impervious Runoff Depth>4.02" Tc=6.0 min CN=90 Runoff=1.45 cfs 0.107 af
SubcatchmentP1C6:	Runoff Area=29,718 sf 51.00% Impervious Runoff Depth>3.71" Tc=6.0 min CN=87 Runoff=2.91 cfs 0.211 af
SubcatchmentP1D1:	Runoff Area=9,747 sf 44.85% Impervious Runoff Depth>2.31" Tc=6.0 min CN=72 Runoff=0.60 cfs 0.043 af
SubcatchmentP1D2:	Runoff Area=29,119 sf 56.06% Impervious Runoff Depth>3.02" Tc=6.0 min CN=80 Runoff=2.37 cfs 0.168 af
SubcatchmentP1E1:	Runoff Area=24,220 sf 57.97% Impervious Runoff Depth>3.40" Tc=6.0 min CN=84 Runoff=2.20 cfs 0.158 af
SubcatchmentP1E2:	Runoff Area=23,581 sf 58.61% Impervious Runoff Depth>3.81" Tc=6.0 min CN=88 Runoff=2.36 cfs 0.172 af
SubcatchmentP1E3:	Runoff Area=38,111 sf 65.47% Impervious Runoff Depth>4.02" Tc=6.0 min CN=90 Runoff=3.97 cfs 0.293 af
SubcatchmentP2-1: Upper portion of Sub	Runoff Area=12,363 sf 32.94% Impervious Runoff Depth>3.21" Tc=6.0 min CN=82 Runoff=1.07 cfs 0.076 af
SubcatchmentP2-2: Lower portion of	Runoff Area=12,363 sf 32.94% Impervious Runoff Depth>3.21" Tc=6.0 min CN=82 Runoff=1.07 cfs 0.076 af
Reach OA: Overall	Inflow=16.40 cfs 2.816 af Outflow=16.40 cfs 2.816 af
Reach P DP1:	Inflow=14.98 cfs 2.695 af Outflow=14.98 cfs 2.695 af
Reach P DP2:	Inflow=2.97 cfs 0.120 af Outflow=2.97 cfs 0.120 af

Pond 1P: Infiltration Basin Peak Elev=39.88' Storage=5,610 cf Inflow=5.39 cfs 0.387 af
Discarded=0.16 cfs 0.187 af Primary=2.97 cfs 0.120 af Outflow=3.14 cfs 0.307 af

Pond P-A: Point Inflow=5.24 cfs 0.344 af
Primary=5.24 cfs 0.344 af

Pond P-C: Point Inflow=9.08 cfs 0.739 af
Primary=9.08 cfs 0.739 af

Pond P-D: Point Inflow=1.35 cfs 0.097 af
Primary=1.35 cfs 0.097 af

Pond P-E: Point Inflow=8.53 cfs 0.622 af
Primary=8.53 cfs 0.622 af

Pond P1: Basin Peak Elev=43.29' Storage=40,094 cf Inflow=28.97 cfs 2.331 af
Discarded=0.10 cfs 0.085 af Primary=11.77 cfs 2.147 af Outflow=11.87 cfs 2.232 af

Pond R1: Recharge 1 Peak Elev=46.65' Storage=716 cf Inflow=0.59 cfs 0.048 af
Discarded=0.00 cfs 0.008 af Primary=0.56 cfs 0.026 af Outflow=0.56 cfs 0.034 af

Pond R2: Recharge 2 Peak Elev=43.18' Storage=9,840 cf Inflow=9.87 cfs 0.764 af
Discarded=0.36 cfs 0.482 af Primary=3.76 cfs 0.281 af Outflow=4.12 cfs 0.763 af

Pond R3: Recharge 3 Peak Elev=42.44' Storage=1,624 cf Inflow=1.82 cfs 0.137 af
Discarded=0.10 cfs 0.103 af Primary=0.70 cfs 0.034 af Outflow=0.80 cfs 0.137 af

Pond R4: Recharge 4 Peak Elev=47.69' Storage=2,665 cf Inflow=3.34 cfs 0.261 af
Discarded=0.06 cfs 0.085 af Primary=2.79 cfs 0.149 af Outflow=2.84 cfs 0.234 af

Pond R5: Recharge 5 Peak Elev=43.93' Storage=6,946 cf Inflow=8.50 cfs 0.642 af
Discarded=0.10 cfs 0.152 af Primary=5.88 cfs 0.429 af Outflow=5.98 cfs 0.581 af

Total Runoff Area = 13.748 ac Runoff Volume = 4.198 af Average Runoff Depth = 3.66"
50.63% Pervious = 6.961 ac 49.37% Impervious = 6.787 ac

Summary for Subcatchment A: post

Runoff = 0.56 cfs @ 12.08 hrs, Volume= 0.045 af, Depth> 4.91"

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-year Rainfall=5.15"

Area (sf)	CN	Description
4,838	98	Roofs, HSG D
4,838		100.00% Impervious Area

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

Summary for Subcatchment B: post

Runoff = 0.56 cfs @ 12.08 hrs, Volume= 0.046 af, Depth> 4.91"

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-year Rainfall=5.15"

Area (sf)	CN	Description
4,874	98	Roofs, HSG D
4,874		100.00% Impervious Area

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

Summary for Subcatchment C: post

Runoff = 1.67 cfs @ 12.08 hrs, Volume= 0.135 af, Depth> 4.91"

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-year Rainfall=5.15"

Area (sf)	CN	Description
14,404	98	Roofs, HSG D
14,404		100.00% Impervious Area

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

Summary for Subcatchment D: post

Runoff = 1.41 cfs @ 12.08 hrs, Volume= 0.114 af, Depth> 4.91"

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-year Rainfall=5.15"

Area (sf)	CN	Description
11,852	98	Roofs, HSG D
335	98	Roofs, HSG A
12,187	98	Weighted Average
12,187		100.00% Impervious Area

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

Summary for Subcatchment E: post

Runoff = 1.57 cfs @ 12.08 hrs, Volume= 0.127 af, Depth> 4.91"

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-year Rainfall=5.15"

Area (sf)	CN	Description
9,599	98	Roofs, HSG A
3,956	98	Roofs, HSG C
13,555	98	Weighted Average
13,555		100.00% Impervious Area

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

Summary for Subcatchment F: post

Runoff = 1.35 cfs @ 12.08 hrs, Volume= 0.110 af, Depth> 4.91"

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-year Rainfall=5.15"

Area (sf)	CN	Description
10,566	98	Roofs, HSG C
1,132	98	Roofs, HSG A
11,698	98	Weighted Average
11,698		100.00% Impervious Area

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Page 30

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

Summary for Subcatchment G: post

Runoff = 1.57 cfs @ 12.08 hrs, Volume= 0.127 af, Depth> 4.91"

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-year Rainfall=5.15"

Area (sf)	CN	Description
12,204	98	Roofs, HSG C
1,351	98	Roofs, HSG D
13,555	98	Weighted Average
13,555		100.00% Impervious Area

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

Summary for Subcatchment H: post

Runoff = 0.59 cfs @ 12.08 hrs, Volume= 0.048 af, Depth> 4.91"

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-year Rainfall=5.15"

Area (sf)	CN	Description
4,470	98	Roofs, HSG C
657	98	Roofs, HSG D
5,127	98	Weighted Average
5,127		100.00% Impervious Area

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

Summary for Subcatchment I: post

Runoff = 0.15 cfs @ 12.08 hrs, Volume= 0.012 af, Depth> 4.91"

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-year Rainfall=5.15"

Area (sf)	CN	Description
1,287	98	Roofs, HSG C
1,287		100.00% Impervious Area

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Type III 24-hr 10-year Rainfall=5.15"

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Page 31

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

Summary for Subcatchment J: post

Runoff = 0.59 cfs @ 12.08 hrs, Volume= 0.048 af, Depth> 4.91"

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-year Rainfall=5.15"

Area (sf)	CN	Description
2,688	98	Roofs, HSG D
2,435	98	Roofs, HSG C
5,123	98	Weighted Average
5,123		100.00% Impervious Area

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

Summary for Subcatchment K: post

Runoff = 0.93 cfs @ 12.08 hrs, Volume= 0.076 af, Depth> 4.91"

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-year Rainfall=5.15"

Area (sf)	CN	Description
8,062	98	Roofs, HSG D
8,062		100.00% Impervious Area

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

Summary for Subcatchment L: post

Runoff = 0.19 cfs @ 12.08 hrs, Volume= 0.015 af, Depth> 4.91"

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-year Rainfall=5.15"

Area (sf)	CN	Description
1,649	98	Roofs, HSG D
1,649		100.00% Impervious Area

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Type III 24-hr 10-year Rainfall=5.15"

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Page 32

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

Summary for Subcatchment M: post

Runoff = 0.74 cfs @ 12.08 hrs, Volume= 0.060 af, Depth> 4.91"

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-year Rainfall=5.15"

Area (sf)	CN	Description
6,175	98	Roofs, HSG D
260	98	Roofs, HSG C
6,435	98	Weighted Average
6,435		100.00% Impervious Area

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

Summary for Subcatchment P1A1:

Runoff = 5.50 cfs @ 12.22 hrs, Volume= 0.522 af, Depth> 2.92"

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-year Rainfall=5.15"

Area (sf)	CN	Description
* 789	98	Impervious, HSG C
17,998	74	>75% Grass cover, Good, HSG C
4,121	80	>75% Grass cover, Good, HSG D
* 61,469	80	>75% Grass cover, Good, HSG D (C/D)
* 8,971	80	>75% Grass cover, Good, HSG D (NR)
93,348	79	Weighted Average
92,559		99.15% Pervious Area
789		0.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	100	0.0900	0.14		Sheet Flow, Grass/Tree Canopy Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	245	0.0240	1.08		Shallow Concentrated Flow, Slope to Wet area Short Grass Pasture Kv= 7.0 fps
15.6	345	Total			

Summary for Subcatchment P1A2:

Runoff = 2.65 cfs @ 12.08 hrs, Volume= 0.195 af, Depth> 4.02"

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-year Rainfall=5.15"

	Area (sf)	CN	Description
*	11,010	98	Impervious, HSG D
*	2,461	98	Impervious, HSG D (C/D)
	455	80	>75% Grass cover, Good, HSG D
*	11,471	80	>75% Grass cover, Good, HSG D (C/D)
	25,397	90	Weighted Average
	11,926		46.96% Pervious Area
	13,471		53.04% Impervious Area

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

Summary for Subcatchment P1B:

Runoff = 3.49 cfs @ 12.09 hrs, Volume= 0.247 af, Depth> 2.75"

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-year Rainfall=5.15"

	Area (sf)	CN	Description
*	2,756	98	Impervious, HSG D
	57	74	>75% Grass cover, Good, HSG C
	39,860	80	>75% Grass cover, Good, HSG D
	4,440	39	>75% Grass cover, Good, HSG A
	47,113	77	Weighted Average
	44,357		94.15% Pervious Area
	2,756		5.85% Impervious Area

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

Summary for Subcatchment P1C1:

Runoff = 1.88 cfs @ 12.08 hrs, Volume= 0.144 af, Depth> 4.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
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Page 34

	Area (sf)	CN	Description
*	13,316	98	Impervious, HSG D
	3,579	80	>75% Grass cover, Good, HSG D
	16,895	94	Weighted Average
	3,579		21.18% Pervious Area
	13,316		78.82% Impervious Area

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

Summary for Subcatchment P1C2:

Runoff = 4.33 cfs @ 12.09 hrs, Volume= 0.311 af, Depth> 3.50"

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-year Rainfall=5.15"

	Area (sf)	CN	Description
*	15,673	98	Impervious, HSG D
*	2,429	98	Impervious, HSG B
	5,446	61	>75% Grass cover, Good, HSG B
	22,808	80	>75% Grass cover, Good, HSG D
	46,356	85	Weighted Average
	28,254		60.95% Pervious Area
	18,102		39.05% Impervious Area

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

Summary for Subcatchment P1C3:

Runoff = 0.75 cfs @ 12.09 hrs, Volume= 0.054 af, Depth> 2.15"

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-year Rainfall=5.15"

	Area (sf)	CN	Description
*	1,653	98	Impervious, HSG A
*	3,071	98	Impervious, HSG D
	5,374	39	>75% Grass cover, Good, HSG A
	3,022	80	>75% Grass cover, Good, HSG D
	13,120	70	Weighted Average
	8,396		63.99% Pervious Area
	4,724		36.01% Impervious Area

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

Summary for Subcatchment P1C4-1:

Runoff = 1.63 cfs @ 12.09 hrs, Volume= 0.120 af, Depth> 3.91"

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-year Rainfall=5.15"

Area (sf)	CN	Description
* 178	98	Impervious, HSG A
* 9,603	98	Impervious, HSG D
771	39	>75% Grass cover, Good, HSG A
5,441	80	>75% Grass cover, Good, HSG D
15,993	89	Weighted Average
6,212		38.84% Pervious Area
9,781		61.16% Impervious Area

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

Summary for Subcatchment P1C4-2:

Runoff = 1.60 cfs @ 12.09 hrs, Volume= 0.117 af, Depth> 3.81"

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-year Rainfall=5.15"

Area (sf)	CN	Description
* 9,603	98	Impervious, HSG D
949	39	>75% Grass cover, Good, HSG A
5,441	80	>75% Grass cover, Good, HSG D
15,993	88	Weighted Average
6,390		39.95% Pervious Area
9,603		60.05% Impervious Area

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

Summary for Subcatchment P1C5-1: 2/3 of Subcat

This subcat is approx. 2/3 of the area of Subcat P1C5 on the drainage area map. This area will drain to the central pond

Runoff = 2.99 cfs @ 12.08 hrs, Volume= 0.221 af, Depth> 4.02"

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Page 36

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-year Rainfall=5.15"

	Area (sf)	CN	Description
*	1,803	98	Impervious, HSG D
*	8,084	98	Impervious, HSG D (C/D)
*	5,946	98	Impervious, HSG D (NR)
	3,196	80	>75% Grass cover, Good, HSG D
*	3,853	80	>75% Grass cover, Good, HSG D (C/D)
*	5,845	80	>75% Grass cover, Good, HSG D (NR)
	28,727	90	Weighted Average
	12,894		44.88% Pervious Area
	15,833		55.12% Impervious Area

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

Summary for Subcatchment P1C5-2:

This subcat is approx. 1/3 of the area of Subcat P1C5 on the drainage area map. This area will drain to Recharge system #4

Runoff = 1.45 cfs @ 12.08 hrs, Volume= 0.107 af, Depth> 4.02"

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-year Rainfall=5.15"

	Area (sf)	CN	Description
*	872	98	Impervious, HSG D
*	3,910	98	Impervious, HSG D (C/D)
*	2,875	98	Impervious, HSG D (NR)
	1,544	80	>75% Grass cover, Good, HSG D
*	1,862	80	>75% Grass cover, Good, HSG D (C/D)
*	2,828	80	>75% Grass cover, Good, HSG D (NR)
	13,891	90	Weighted Average
	6,234		44.88% Pervious Area
	7,657		55.12% Impervious Area

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

Summary for Subcatchment P1C6:

Runoff = 2.91 cfs @ 12.09 hrs, Volume= 0.211 af, Depth> 3.71"

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-year Rainfall=5.15"

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Page 37

Area (sf)	CN	Description
71	98	Impervious, HSG B
* 4,536	98	Impervious, HSG D
* 10,550	98	Impervious, HSG D (NR)
6,218	80	>75% Grass cover, Good, HSG D
* 5,159	80	>75% Grass cover, Good, HSG D (NR)
3,184	61	>75% Grass cover, Good, HSG B
29,718	87	Weighted Average
14,561		49.00% Pervious Area
15,157		51.00% Impervious Area

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

Summary for Subcatchment P1D1:

Runoff = 0.60 cfs @ 12.09 hrs, Volume= 0.043 af, Depth> 2.31"

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-year Rainfall=5.15"

Area (sf)	CN	Description
1,027	98	Impervious, HSG C
* 3,345	98	Impervious, HSG A
3,453	39	>75% Grass cover, Good, HSG A
1,922	74	>75% Grass cover, Good, HSG C
9,747	72	Weighted Average
5,375		55.15% Pervious Area
4,372		44.85% Impervious Area

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

Summary for Subcatchment P1D2:

Runoff = 2.37 cfs @ 12.09 hrs, Volume= 0.168 af, Depth> 3.02"

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-year Rainfall=5.15"

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Page 38

Area (sf)	CN	Description
*	268	98 Impervious, HSG D
	3,763	98 Impervious, HSG C
	12,292	98 Impervious, HSG A
	6,063	39 >75% Grass cover, Good, HSG A
	6,259	74 >75% Grass cover, Good, HSG C
	474	80 >75% Grass cover, Good, HSG D
	29,119	80 Weighted Average
	12,796	43.94% Pervious Area
	16,323	56.06% Impervious Area

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

Summary for Subcatchment P1E1:

Runoff = 2.20 cfs @ 12.09 hrs, Volume= 0.158 af, Depth> 3.40"

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-year Rainfall=5.15"

Area (sf)	CN	Description
*	6,409	98 Impervious, HSG D
	4,261	98 Impervious, HSG C
*	3,371	98 Impervious, HSG A
	3,166	39 >75% Grass cover, Good, HSG A
	5,768	74 >75% Grass cover, Good, HSG C
	1,245	80 >75% Grass cover, Good, HSG D
	24,220	84 Weighted Average
	10,179	42.03% Pervious Area
	14,041	57.97% Impervious Area

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

Summary for Subcatchment P1E2:

Runoff = 2.36 cfs @ 12.09 hrs, Volume= 0.172 af, Depth> 3.81"

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-year Rainfall=5.15"

Area (sf)	CN	Description
	13,822	98 Impervious, HSG C
	9,759	74 >75% Grass cover, Good, HSG C
	23,581	88 Weighted Average
	9,759	41.39% Pervious Area
	13,822	58.61% Impervious Area

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Page 39

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

Summary for Subcatchment P1E3:

Runoff = 3.97 cfs @ 12.08 hrs, Volume= 0.293 af, Depth> 4.02"

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-year Rainfall=5.15"

Area (sf)	CN	Description
23,288	98	Impervious, HSG C
1,664	98	Impervious, HSG D
12,525	74	>75% Grass cover, Good, HSG C
634	80	>75% Grass cover, Good, HSG D
38,111	90	Weighted Average
13,159		34.53% Pervious Area
24,952		65.47% Impervious Area

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

Summary for Subcatchment P2-1: Upper portion of Sub cat (1/2)

Runoff = 1.07 cfs @ 12.09 hrs, Volume= 0.076 af, Depth> 3.21"

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-year Rainfall=5.15"

Area (sf)	CN	Description
4,072	98	Impervious, HSG D
1,205	39	>75% Grass cover, Good, HSG A
7,086	80	>75% Grass cover, Good, HSG D
12,363	82	Weighted Average
8,291		67.06% Pervious Area
4,072		32.94% Impervious Area

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

Summary for Subcatchment P2-2: Lower portion of Subcat (1/2)

Runoff = 1.07 cfs @ 12.09 hrs, Volume= 0.076 af, Depth> 3.21"

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-year Rainfall=5.15"

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Page 40

Area (sf)	CN	Description
4,072	98	Impervious, HSG D
1,205	39	>75% Grass cover, Good, HSG A
7,086	80	>75% Grass cover, Good, HSG D
12,363	82	Weighted Average
8,291		67.06% Pervious Area
4,072		32.94% Impervious Area

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

Summary for Reach OA: Overall

Inflow Area = 13.748 ac, 49.37% Impervious, Inflow Depth > 2.46" for 10-year event
 Inflow = 16.40 cfs @ 12.45 hrs, Volume= 2.816 af
 Outflow = 16.40 cfs @ 12.45 hrs, Volume= 2.816 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach P DP1:

Inflow Area = 12.400 ac, 50.63% Impervious, Inflow Depth > 2.61" for 10-year event
 Inflow = 14.98 cfs @ 12.47 hrs, Volume= 2.695 af
 Outflow = 14.98 cfs @ 12.47 hrs, Volume= 2.695 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach P DP2:

Inflow Area = 1.348 ac, 37.76% Impervious, Inflow Depth = 1.07" for 10-year event
 Inflow = 2.97 cfs @ 12.20 hrs, Volume= 0.120 af
 Outflow = 2.97 cfs @ 12.20 hrs, Volume= 0.120 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Infiltration Basin

Inflow Area = 1.348 ac, 37.76% Impervious, Inflow Depth > 3.44" for 10-year event
 Inflow = 5.39 cfs @ 12.09 hrs, Volume= 0.387 af
 Outflow = 3.14 cfs @ 12.20 hrs, Volume= 0.307 af, Atten= 42%, Lag= 6.8 min
 Discarded = 0.16 cfs @ 12.20 hrs, Volume= 0.187 af
 Primary = 2.97 cfs @ 12.20 hrs, Volume= 0.120 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 39.88' @ 12.20 hrs Surf.Area= 2,941 sf Storage= 5,610 cf

Plug-Flow detention time= 176.2 min calculated for 0.307 af (79% of inflow)
 Center-of-Mass det. time= 99.3 min (906.7 - 807.4)

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Type III 24-hr 10-year Rainfall=5.15"

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Page 41

Volume	Invert	Avail.Storage	Storage Description
#1	37.50'	5,963 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.50	1,850	0	0
38.00	2,000	963	963
39.00	2,500	2,250	3,213
40.00	3,000	2,750	5,963

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.50'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	39.75'	25.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.16 cfs @ 12.20 hrs HW=39.88' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=2.96 cfs @ 12.20 hrs HW=39.88' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Weir Controls 2.96 cfs @ 0.90 fps)

Summary for Pond P-A: Point

Inflow Area = 1.278 ac, 67.39% Impervious, Inflow Depth > 3.23" for 10-year event
 Inflow = 5.24 cfs @ 12.11 hrs, Volume= 0.344 af
 Primary = 5.24 cfs @ 12.11 hrs, Volume= 0.344 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-C: Point

Inflow Area = 3.076 ac, 66.01% Impervious, Inflow Depth > 2.88" for 10-year event
 Inflow = 9.08 cfs @ 12.13 hrs, Volume= 0.739 af
 Primary = 9.08 cfs @ 12.13 hrs, Volume= 0.739 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-D: Point

Inflow Area = 0.525 ac, 39.78% Impervious, Inflow Depth > 2.22" for 10-year event
 Inflow = 1.35 cfs @ 12.09 hrs, Volume= 0.097 af
 Primary = 1.35 cfs @ 12.09 hrs, Volume= 0.097 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-E: Point

Inflow Area = 1.972 ac, 61.48% Impervious, Inflow Depth > 3.79" for 10-year event
 Inflow = 8.53 cfs @ 12.09 hrs, Volume= 0.622 af
 Primary = 8.53 cfs @ 12.09 hrs, Volume= 0.622 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P1: Basin

Inflow Area = 10.139 ac, 60.58% Impervious, Inflow Depth > 2.76" for 10-year event
 Inflow = 28.97 cfs @ 12.11 hrs, Volume= 2.331 af
 Outflow = 11.87 cfs @ 12.50 hrs, Volume= 2.232 af, Atten= 59%, Lag= 23.3 min
 Discarded = 0.10 cfs @ 12.50 hrs, Volume= 0.085 af
 Primary = 11.77 cfs @ 12.50 hrs, Volume= 2.147 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 43.29' @ 12.50 hrs Surf.Area= 16,669 sf Storage= 40,094 cf

Plug-Flow detention time= 110.5 min calculated for 2.232 af (96% of inflow)
 Center-of-Mass det. time= 88.0 min (882.5 - 794.6)

Volume	Invert	Avail.Storage	Storage Description
#1	39.50'	119,125 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.50	7,003	0	0
40.00	7,787	3,698	3,698
41.00	9,414	8,601	12,298
42.00	11,112	10,263	22,561
43.00	14,766	12,939	35,500
44.00	21,276	18,021	53,521
45.00	31,959	26,618	80,139
46.00	46,014	38,987	119,125

Device	Routing	Invert	Outlet Devices
#1	Primary	39.00'	24.0" Round Culvert L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 39.00' / 38.70' S= 0.0054 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Device 1	39.75'	6.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	40.75'	8.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	41.70'	10.0" Vert. Orifice/Grate C= 0.600
#5	Device 1	43.05'	24.0" x 24.0" Horiz. Orifice/Grate X 2.00 C= 0.600 in 48.0" x 24.0" Grate (100% open area) Limited to weir flow at low heads
#6	Discarded	39.50'	0.270 in/hr Exfiltration over Surface area Phase-In= 0.01'

Discarded OutFlow Max=0.10 cfs @ 12.50 hrs HW=43.29' (Free Discharge)

↳6=Exfiltration (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=11.74 cfs @ 12.50 hrs HW=43.29' (Free Discharge)

↳1=Culvert (Passes 11.74 cfs of 27.45 cfs potential flow)

↳2=Orifice/Grate (Orifice Controls 1.72 cfs @ 8.74 fps)

↳3=Orifice/Grate (Orifice Controls 2.50 cfs @ 7.16 fps)

↳4=Orifice/Grate (Orifice Controls 2.85 cfs @ 5.22 fps)

↳5=Orifice/Grate (Weir Controls 4.68 cfs @ 1.61 fps)

Summary for Pond R1: Recharge 1

Inflow Area = 0.118 ac, 100.00% Impervious, Inflow Depth > 4.91" for 10-year event

Inflow = 0.59 cfs @ 12.08 hrs, Volume= 0.048 af

Outflow = 0.56 cfs @ 12.11 hrs, Volume= 0.034 af, Atten= 5%, Lag= 1.6 min

Discarded = 0.00 cfs @ 3.63 hrs, Volume= 0.008 af

Primary = 0.56 cfs @ 12.11 hrs, Volume= 0.026 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Peak Elev= 46.65' @ 12.11 hrs Surf.Area= 681 sf Storage= 716 cf

Plug-Flow detention time= 154.9 min calculated for 0.034 af (71% of inflow)

Center-of-Mass det. time= 61.3 min (808.2 - 747.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	44.80'	494 cf	21.50'W x 31.68'L x 2.33'H Field A 1,589 cf Overall - 354 cf Embedded = 1,235 cf x 40.0% Voids
#2A	45.30'	354 cf	ADS_StormTech RC-310 +Cap x 24 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 6 Rows of 4 Chambers
		848 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.80'	0.270 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	46.30'	15.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.30' / 42.00' S= 0.1433 1/1' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.00 cfs @ 3.63 hrs HW=44.83' (Free Discharge)

↳1=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.56 cfs @ 12.11 hrs HW=46.65' (Free Discharge)

↳2=Culvert (Inlet Controls 0.56 cfs @ 2.01 fps)

Summary for Pond R2: Recharge 2

Inflow Area = 2.206 ac, 80.04% Impervious, Inflow Depth > 4.15" for 10-year event
 Inflow = 9.87 cfs @ 12.08 hrs, Volume= 0.764 af
 Outflow = 4.12 cfs @ 12.29 hrs, Volume= 0.763 af, Atten= 58%, Lag= 12.2 min
 Discarded = 0.36 cfs @ 9.95 hrs, Volume= 0.482 af
 Primary = 3.76 cfs @ 12.29 hrs, Volume= 0.281 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 43.18' @ 12.29 hrs Surf.Area= 6,509 sf Storage= 9,840 cf

Plug-Flow detention time= 89.2 min calculated for 0.763 af (100% of inflow)
 Center-of-Mass det. time= 88.7 min (859.2 - 770.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	41.00'	5,805 cf	87.00'W x 74.82'L x 3.50'H Field A 22,782 cf Overall - 8,269 cf Embedded = 14,512 cf x 40.0% Voids
#2A	41.50'	8,269 cf	ADS_StormTech SC-740 +Cap x 180 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 18 Rows of 10 Chambers
		14,074 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.00'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	42.10'	18.0" Round Culvert L= 70.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.10' / 41.75' S= 0.0050 ' /' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Discarded OutFlow Max=0.36 cfs @ 9.95 hrs HW=41.04' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.36 cfs)

Primary OutFlow Max=3.76 cfs @ 12.29 hrs HW=43.18' (Free Discharge)
 ↑**2=Culvert** (Barrel Controls 3.76 cfs @ 3.85 fps)

Summary for Pond R3: Recharge 3

Inflow Area = 0.434 ac, 56.10% Impervious, Inflow Depth > 3.80" for 10-year event
 Inflow = 1.82 cfs @ 12.09 hrs, Volume= 0.137 af
 Outflow = 0.80 cfs @ 12.28 hrs, Volume= 0.137 af, Atten= 56%, Lag= 11.4 min
 Discarded = 0.10 cfs @ 11.06 hrs, Volume= 0.103 af
 Primary = 0.70 cfs @ 12.28 hrs, Volume= 0.034 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 42.44' @ 12.28 hrs Surf.Area= 1,848 sf Storage= 1,624 cf

Plug-Flow detention time= 73.0 min calculated for 0.137 af (100% of inflow)
 Center-of-Mass det. time= 72.6 min (856.9 - 784.3)

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Page 45

Volume	Invert	Avail.Storage	Storage Description
#1A	41.00'	1,312 cf	24.83'W x 74.40'L x 2.33'H Field A 4,311 cf Overall - 1,032 cf Embedded = 3,279 cf x 40.0% Voids
#2A	41.50'	1,032 cf	ADS_StormTech RC-310 +Cap x 70 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 7 Rows of 10 Chambers
		2,344 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.00'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	42.00'	15.0" Round Culvert L= 350.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.00' / 40.25' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.10 cfs @ 11.06 hrs HW=41.02' (Free Discharge)

↑1=Exfiltration (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.70 cfs @ 12.28 hrs HW=42.44' (Free Discharge)

↑2=Culvert (Barrel Controls 0.70 cfs @ 2.66 fps)

Summary for Pond R4: Recharge 4

Inflow Area =	0.695 ac, 79.42% Impervious, Inflow Depth > 4.50" for 10-year event
Inflow =	3.34 cfs @ 12.08 hrs, Volume= 0.261 af
Outflow =	2.84 cfs @ 12.13 hrs, Volume= 0.234 af, Atten= 15%, Lag= 3.0 min
Discarded =	0.06 cfs @ 8.28 hrs, Volume= 0.085 af
Primary =	2.79 cfs @ 12.13 hrs, Volume= 0.149 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4

Peak Elev= 47.69' @ 12.13 hrs Surf.Area= 2,344 sf Storage= 2,665 cf

Plug-Flow detention time= 97.4 min calculated for 0.234 af (90% of inflow)

Center-of-Mass det. time= 47.2 min (811.4 - 764.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	45.70'	1,657 cf	34.83'W x 67.28'L x 2.33'H Field A 5,468 cf Overall - 1,327 cf Embedded = 4,142 cf x 40.0% Voids
#2A	46.20'	1,327 cf	ADS_StormTech RC-310 +Cap x 90 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 10 Rows of 9 Chambers
		2,983 cf	Total Available Storage

Storage Group A created with Chamber Wizard

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Page 46

Device	Routing	Invert	Outlet Devices
#1	Discarded	45.70'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.10' 15.0" Round Culvert L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.70' / 46.30' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Primary	46.70'	

Discarded OutFlow Max=0.06 cfs @ 8.28 hrs HW=45.82' (Free Discharge)

↳ **1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=2.78 cfs @ 12.13 hrs HW=47.69' (Free Discharge)

↳ **2=Culvert** (Barrel Controls 2.78 cfs @ 3.65 fps)

Summary for Pond R5: Recharge 5

Inflow Area = 1.857 ac, 66.07% Impervious, Inflow Depth > 4.15" for 10-year event
 Inflow = 8.50 cfs @ 12.08 hrs, Volume= 0.642 af
 Outflow = 5.98 cfs @ 12.16 hrs, Volume= 0.581 af, Atten= 30%, Lag= 4.7 min
 Discarded = 0.10 cfs @ 7.52 hrs, Volume= 0.152 af
 Primary = 5.88 cfs @ 12.16 hrs, Volume= 0.429 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 43.93' @ 12.16 hrs Surf.Area= 4,167 sf Storage= 6,946 cf

Plug-Flow detention time= 85.1 min calculated for 0.581 af (90% of inflow)
 Center-of-Mass det. time= 38.1 min (816.7 - 778.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	41.50'	3,739 cf	30.00'W x 138.90'L x 3.50'H Field A 14,584 cf Overall - 5,237 cf Embedded = 9,347 cf x 40.0% Voids
#2A	42.00'	5,237 cf	ADS_StormTech SC-740 +Cap x 114 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 6 Rows of 19 Chambers
		8,976 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.50'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01' 18.0" Round Culvert L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.50' / 42.00' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Primary	42.50'	

Discarded OutFlow Max=0.10 cfs @ 7.52 hrs HW=41.54' (Free Discharge)

↳ **1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=5.87 cfs @ 12.16 hrs HW=43.93' (Free Discharge)

↳ **2=Culvert** (Barrel Controls 5.87 cfs @ 4.33 fps)

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Page 47

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: post	Runoff Area=4,838 sf 100.00% Impervious Runoff Depth>6.09" Tc=6.0 min CN=98 Runoff=0.69 cfs 0.056 af
Subcatchment B: post	Runoff Area=4,874 sf 100.00% Impervious Runoff Depth>6.09" Tc=6.0 min CN=98 Runoff=0.69 cfs 0.057 af
Subcatchment C: post	Runoff Area=14,404 sf 100.00% Impervious Runoff Depth>6.09" Tc=6.0 min CN=98 Runoff=2.05 cfs 0.168 af
Subcatchment D: post	Runoff Area=12,187 sf 100.00% Impervious Runoff Depth>6.09" Tc=6.0 min CN=98 Runoff=1.74 cfs 0.142 af
Subcatchment E: post	Runoff Area=13,555 sf 100.00% Impervious Runoff Depth>6.09" Tc=6.0 min CN=98 Runoff=1.93 cfs 0.158 af
Subcatchment F: post	Runoff Area=11,698 sf 100.00% Impervious Runoff Depth>6.09" Tc=6.0 min CN=98 Runoff=1.67 cfs 0.136 af
Subcatchment G: post	Runoff Area=13,555 sf 100.00% Impervious Runoff Depth>6.09" Tc=6.0 min CN=98 Runoff=1.93 cfs 0.158 af
Subcatchment H: post	Runoff Area=5,127 sf 100.00% Impervious Runoff Depth>6.09" Tc=6.0 min CN=98 Runoff=0.73 cfs 0.060 af
Subcatchment I: post	Runoff Area=1,287 sf 100.00% Impervious Runoff Depth>6.09" Tc=6.0 min CN=98 Runoff=0.18 cfs 0.015 af
Subcatchment J: post	Runoff Area=5,123 sf 100.00% Impervious Runoff Depth>6.09" Tc=6.0 min CN=98 Runoff=0.73 cfs 0.060 af
Subcatchment K: post	Runoff Area=8,062 sf 100.00% Impervious Runoff Depth>6.09" Tc=6.0 min CN=98 Runoff=1.15 cfs 0.094 af
Subcatchment L: post	Runoff Area=1,649 sf 100.00% Impervious Runoff Depth>6.09" Tc=6.0 min CN=98 Runoff=0.23 cfs 0.019 af
Subcatchment M: post	Runoff Area=6,435 sf 100.00% Impervious Runoff Depth>6.09" Tc=6.0 min CN=98 Runoff=0.92 cfs 0.075 af
Subcatchment P1A1:	Runoff Area=93,348 sf 0.85% Impervious Runoff Depth>3.96" Flow Length=345' Tc=15.6 min CN=79 Runoff=7.43 cfs 0.708 af
Subcatchment P1A2:	Runoff Area=25,397 sf 53.04% Impervious Runoff Depth>5.16" Tc=6.0 min CN=90 Runoff=3.35 cfs 0.251 af
Subcatchment P1B:	Runoff Area=47,113 sf 5.85% Impervious Runoff Depth>3.76" Tc=6.0 min CN=77 Runoff=4.78 cfs 0.339 af

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Page 48

SubcatchmentP1C1:	Runoff Area=16,895 sf 78.82% Impervious Runoff Depth>5.62" Tc=6.0 min CN=94 Runoff=2.34 cfs 0.182 af
SubcatchmentP1C2:	Runoff Area=46,356 sf 39.05% Impervious Runoff Depth>4.61" Tc=6.0 min CN=85 Runoff=5.63 cfs 0.409 af
SubcatchmentP1C3:	Runoff Area=13,120 sf 36.01% Impervious Runoff Depth>3.07" Tc=6.0 min CN=70 Runoff=1.08 cfs 0.077 af
SubcatchmentP1C4-1:	Runoff Area=15,993 sf 61.16% Impervious Runoff Depth>5.05" Tc=6.0 min CN=89 Runoff=2.08 cfs 0.155 af
SubcatchmentP1C4-2:	Runoff Area=15,993 sf 60.05% Impervious Runoff Depth>4.94" Tc=6.0 min CN=88 Runoff=2.05 cfs 0.151 af
SubcatchmentP1C5-1: 2/3 of Subcat	Runoff Area=28,727 sf 55.12% Impervious Runoff Depth>5.16" Tc=6.0 min CN=90 Runoff=3.79 cfs 0.284 af
SubcatchmentP1C5-2:	Runoff Area=13,891 sf 55.12% Impervious Runoff Depth>5.16" Tc=6.0 min CN=90 Runoff=1.83 cfs 0.137 af
SubcatchmentP1C6:	Runoff Area=29,718 sf 51.00% Impervious Runoff Depth>4.83" Tc=6.0 min CN=87 Runoff=3.74 cfs 0.275 af
SubcatchmentP1D1:	Runoff Area=9,747 sf 44.85% Impervious Runoff Depth>3.26" Tc=6.0 min CN=72 Runoff=0.86 cfs 0.061 af
SubcatchmentP1D2:	Runoff Area=29,119 sf 56.06% Impervious Runoff Depth>4.08" Tc=6.0 min CN=80 Runoff=3.18 cfs 0.227 af
SubcatchmentP1E1:	Runoff Area=24,220 sf 57.97% Impervious Runoff Depth>4.50" Tc=6.0 min CN=84 Runoff=2.89 cfs 0.209 af
SubcatchmentP1E2:	Runoff Area=23,581 sf 58.61% Impervious Runoff Depth>4.94" Tc=6.0 min CN=88 Runoff=3.02 cfs 0.223 af
SubcatchmentP1E3:	Runoff Area=38,111 sf 65.47% Impervious Runoff Depth>5.16" Tc=6.0 min CN=90 Runoff=5.03 cfs 0.376 af
SubcatchmentP2-1: Upper portion of Sub	Runoff Area=12,363 sf 32.94% Impervious Runoff Depth>4.29" Tc=6.0 min CN=82 Runoff=1.41 cfs 0.101 af
SubcatchmentP2-2: Lower portion of	Runoff Area=12,363 sf 32.94% Impervious Runoff Depth>4.29" Tc=6.0 min CN=82 Runoff=1.41 cfs 0.101 af
Reach OA: Overall	Inflow=33.14 cfs 3.950 af Outflow=33.14 cfs 3.950 af
Reach P DP1:	Inflow=30.14 cfs 3.728 af Outflow=30.14 cfs 3.728 af
Reach P DP2:	Inflow=6.46 cfs 0.223 af Outflow=6.46 cfs 0.223 af

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Page 49

Pond 1P: Infiltration Basin Peak Elev=39.97' Storage=5,874 cf Inflow=7.04 cfs 0.510 af
Discarded=0.17 cfs 0.197 af Primary=6.46 cfs 0.223 af Outflow=6.63 cfs 0.419 af

Pond P-A: Point Inflow=6.71 cfs 0.459 af
Primary=6.71 cfs 0.459 af

Pond P-C: Point Inflow=12.70 cfs 1.009 af
Primary=12.70 cfs 1.009 af

Pond P-D: Point Inflow=1.94 cfs 0.138 af
Primary=1.94 cfs 0.138 af

Pond P-E: Point Inflow=10.94 cfs 0.808 af
Primary=10.94 cfs 0.808 af

Pond P1: Basin Peak Elev=43.60' Storage=45,518 cf Inflow=40.89 cfs 3.192 af
Discarded=0.12 cfs 0.091 af Primary=23.64 cfs 2.982 af Outflow=23.75 cfs 3.073 af

Pond R1: Recharge 1 Peak Elev=46.69' Storage=728 cf Inflow=0.73 cfs 0.060 af
Discarded=0.00 cfs 0.008 af Primary=0.70 cfs 0.038 af Outflow=0.70 cfs 0.046 af

Pond R2: Recharge 2 Peak Elev=43.63' Storage=11,635 cf Inflow=12.49 cfs 0.972 af
Discarded=0.36 cfs 0.525 af Primary=6.29 cfs 0.439 af Outflow=6.65 cfs 0.964 af

Pond R3: Recharge 3 Peak Elev=42.66' Storage=1,833 cf Inflow=2.34 cfs 0.177 af
Discarded=0.10 cfs 0.116 af Primary=1.46 cfs 0.061 af Outflow=1.56 cfs 0.177 af

Pond R4: Recharge 4 Peak Elev=47.87' Storage=2,831 cf Inflow=4.17 cfs 0.328 af
Discarded=0.06 cfs 0.089 af Primary=3.56 cfs 0.209 af Outflow=3.62 cfs 0.298 af

Pond R5: Recharge 5 Peak Elev=44.30' Storage=7,777 cf Inflow=10.74 cfs 0.820 af
Discarded=0.10 cfs 0.159 af Primary=7.62 cfs 0.597 af Outflow=7.71 cfs 0.756 af

Total Runoff Area = 13.748 ac Runoff Volume = 5.462 af Average Runoff Depth = 4.77"
50.63% Pervious = 6.961 ac 49.37% Impervious = 6.787 ac

Summary for Subcatchment A: post

Runoff = 0.69 cfs @ 12.08 hrs, Volume= 0.056 af, Depth> 6.09"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
4,838	98	Roofs, HSG D
4,838		100.00% Impervious Area

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

Summary for Subcatchment B: post

Runoff = 0.69 cfs @ 12.08 hrs, Volume= 0.057 af, Depth> 6.09"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
4,874	98	Roofs, HSG D
4,874		100.00% Impervious Area

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

Summary for Subcatchment C: post

Runoff = 2.05 cfs @ 12.08 hrs, Volume= 0.168 af, Depth> 6.09"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
14,404	98	Roofs, HSG D
14,404		100.00% Impervious Area

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

Summary for Subcatchment D: post

Runoff = 1.74 cfs @ 12.08 hrs, Volume= 0.142 af, Depth> 6.09"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
11,852	98	Roofs, HSG D
335	98	Roofs, HSG A
12,187	98	Weighted Average
12,187		100.00% Impervious Area

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

Summary for Subcatchment E: post

Runoff = 1.93 cfs @ 12.08 hrs, Volume= 0.158 af, Depth> 6.09"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
9,599	98	Roofs, HSG A
3,956	98	Roofs, HSG C
13,555	98	Weighted Average
13,555		100.00% Impervious Area

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

Summary for Subcatchment F: post

Runoff = 1.67 cfs @ 12.08 hrs, Volume= 0.136 af, Depth> 6.09"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
10,566	98	Roofs, HSG C
1,132	98	Roofs, HSG A
11,698	98	Weighted Average
11,698		100.00% Impervious Area

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Page 52

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

Summary for Subcatchment G: post

Runoff = 1.93 cfs @ 12.08 hrs, Volume= 0.158 af, Depth> 6.09"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
12,204	98	Roofs, HSG C
1,351	98	Roofs, HSG D
13,555	98	Weighted Average
13,555		100.00% Impervious Area

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

Summary for Subcatchment H: post

Runoff = 0.73 cfs @ 12.08 hrs, Volume= 0.060 af, Depth> 6.09"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
4,470	98	Roofs, HSG C
657	98	Roofs, HSG D
5,127	98	Weighted Average
5,127		100.00% Impervious Area

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

Summary for Subcatchment I: post

Runoff = 0.18 cfs @ 12.08 hrs, Volume= 0.015 af, Depth> 6.09"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
1,287	98	Roofs, HSG C
1,287		100.00% Impervious Area

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Page 53

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

Summary for Subcatchment J: post

Runoff = 0.73 cfs @ 12.08 hrs, Volume= 0.060 af, Depth> 6.09"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
2,688	98	Roofs, HSG D
2,435	98	Roofs, HSG C
5,123	98	Weighted Average
5,123		100.00% Impervious Area

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

Summary for Subcatchment K: post

Runoff = 1.15 cfs @ 12.08 hrs, Volume= 0.094 af, Depth> 6.09"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
8,062	98	Roofs, HSG D
8,062		100.00% Impervious Area

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

Summary for Subcatchment L: post

Runoff = 0.23 cfs @ 12.08 hrs, Volume= 0.019 af, Depth> 6.09"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
1,649	98	Roofs, HSG D
1,649		100.00% Impervious Area

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Page 54

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

Summary for Subcatchment M: post

Runoff = 0.92 cfs @ 12.08 hrs, Volume= 0.075 af, Depth> 6.09"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
6,175	98	Roofs, HSG D
260	98	Roofs, HSG C
6,435	98	Weighted Average
6,435		100.00% Impervious Area

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

Summary for Subcatchment P1A1:

Runoff = 7.43 cfs @ 12.22 hrs, Volume= 0.708 af, Depth> 3.96"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
* 789	98	Impervious, HSG C
17,998	74	>75% Grass cover, Good, HSG C
4,121	80	>75% Grass cover, Good, HSG D
* 61,469	80	>75% Grass cover, Good, HSG D (C/D)
* 8,971	80	>75% Grass cover, Good, HSG D (NR)
93,348	79	Weighted Average
92,559		99.15% Pervious Area
789		0.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	100	0.0900	0.14		Sheet Flow, Grass/Tree Canopy Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	245	0.0240	1.08		Shallow Concentrated Flow, Slope to Wet area Short Grass Pasture Kv= 7.0 fps
15.6	345	Total			

Summary for Subcatchment P1A2:

Runoff = 3.35 cfs @ 12.08 hrs, Volume= 0.251 af, Depth> 5.16"

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 25-year Rainfall=6.33"

	Area (sf)	CN	Description
*	11,010	98	Impervious, HSG D
*	2,461	98	Impervious, HSG D (C/D)
	455	80	>75% Grass cover, Good, HSG D
*	11,471	80	>75% Grass cover, Good, HSG D (C/D)
	25,397	90	Weighted Average
	11,926		46.96% Pervious Area
	13,471		53.04% Impervious Area

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

Summary for Subcatchment P1B:

Runoff = 4.78 cfs @ 12.09 hrs, Volume= 0.339 af, Depth> 3.76"

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 25-year Rainfall=6.33"

	Area (sf)	CN	Description
*	2,756	98	Impervious, HSG D
	57	74	>75% Grass cover, Good, HSG C
	39,860	80	>75% Grass cover, Good, HSG D
	4,440	39	>75% Grass cover, Good, HSG A
	47,113	77	Weighted Average
	44,357		94.15% Pervious Area
	2,756		5.85% Impervious Area

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

Summary for Subcatchment P1C1:

Runoff = 2.34 cfs @ 12.08 hrs, Volume= 0.182 af, Depth> 5.62"

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 25-year Rainfall=6.33"

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Page 56

Area (sf)	CN	Description
* 13,316	98	Impervious, HSG D
3,579	80	>75% Grass cover, Good, HSG D
16,895	94	Weighted Average
3,579		21.18% Pervious Area
13,316		78.82% Impervious Area

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

Summary for Subcatchment P1C2:

Runoff = 5.63 cfs @ 12.09 hrs, Volume= 0.409 af, Depth> 4.61"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
* 15,673	98	Impervious, HSG D
* 2,429	98	Impervious, HSG B
5,446	61	>75% Grass cover, Good, HSG B
22,808	80	>75% Grass cover, Good, HSG D
46,356	85	Weighted Average
28,254		60.95% Pervious Area
18,102		39.05% Impervious Area

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

Summary for Subcatchment P1C3:

Runoff = 1.08 cfs @ 12.09 hrs, Volume= 0.077 af, Depth> 3.07"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
* 1,653	98	Impervious, HSG A
* 3,071	98	Impervious, HSG D
5,374	39	>75% Grass cover, Good, HSG A
3,022	80	>75% Grass cover, Good, HSG D
13,120	70	Weighted Average
8,396		63.99% Pervious Area
4,724		36.01% Impervious Area

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Page 57

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

Summary for Subcatchment P1C4-1:

Runoff = 2.08 cfs @ 12.08 hrs, Volume= 0.155 af, Depth> 5.05"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
* 178	98	Impervious, HSG A
* 9,603	98	Impervious, HSG D
771	39	>75% Grass cover, Good, HSG A
5,441	80	>75% Grass cover, Good, HSG D
15,993	89	Weighted Average
6,212		38.84% Pervious Area
9,781		61.16% Impervious Area

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

Summary for Subcatchment P1C4-2:

Runoff = 2.05 cfs @ 12.08 hrs, Volume= 0.151 af, Depth> 4.94"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
* 9,603	98	Impervious, HSG D
949	39	>75% Grass cover, Good, HSG A
5,441	80	>75% Grass cover, Good, HSG D
15,993	88	Weighted Average
6,390		39.95% Pervious Area
9,603		60.05% Impervious Area

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

Summary for Subcatchment P1C5-1: 2/3 of Subcat

This subcat is approx. 2/3 of the area of Subcat P1C5 on the drainage area map. This area will drain to the central pond

Runoff = 3.79 cfs @ 12.08 hrs, Volume= 0.284 af, Depth> 5.16"

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Page 58

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 25-year Rainfall=6.33"

	Area (sf)	CN	Description
*	1,803	98	Impervious, HSG D
*	8,084	98	Impervious, HSG D (C/D)
*	5,946	98	Impervious, HSG D (NR)
	3,196	80	>75% Grass cover, Good, HSG D
*	3,853	80	>75% Grass cover, Good, HSG D (C/D)
*	5,845	80	>75% Grass cover, Good, HSG D (NR)
	28,727	90	Weighted Average
	12,894		44.88% Pervious Area
	15,833		55.12% Impervious Area

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

Summary for Subcatchment P1C5-2:

This subcat is approx. 1/3 of the area of Subcat P1C5 on the drainage area map. This area will drain to Recharge system #4

Runoff = 1.83 cfs @ 12.08 hrs, Volume= 0.137 af, Depth> 5.16"

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 25-year Rainfall=6.33"

	Area (sf)	CN	Description
*	872	98	Impervious, HSG D
*	3,910	98	Impervious, HSG D (C/D)
*	2,875	98	Impervious, HSG D (NR)
	1,544	80	>75% Grass cover, Good, HSG D
*	1,862	80	>75% Grass cover, Good, HSG D (C/D)
*	2,828	80	>75% Grass cover, Good, HSG D (NR)
	13,891	90	Weighted Average
	6,234		44.88% Pervious Area
	7,657		55.12% Impervious Area

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

Summary for Subcatchment P1C6:

Runoff = 3.74 cfs @ 12.09 hrs, Volume= 0.275 af, Depth> 4.83"

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 25-year Rainfall=6.33"

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Page 59

Area (sf)	CN	Description
71	98	Impervious, HSG B
* 4,536	98	Impervious, HSG D
* 10,550	98	Impervious, HSG D (NR)
6,218	80	>75% Grass cover, Good, HSG D
* 5,159	80	>75% Grass cover, Good, HSG D (NR)
3,184	61	>75% Grass cover, Good, HSG B
29,718	87	Weighted Average
14,561		49.00% Pervious Area
15,157		51.00% Impervious Area

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

Summary for Subcatchment P1D1:

Runoff = 0.86 cfs @ 12.09 hrs, Volume= 0.061 af, Depth> 3.26"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
1,027	98	Impervious, HSG C
* 3,345	98	Impervious, HSG A
3,453	39	>75% Grass cover, Good, HSG A
1,922	74	>75% Grass cover, Good, HSG C
9,747	72	Weighted Average
5,375		55.15% Pervious Area
4,372		44.85% Impervious Area

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

Summary for Subcatchment P1D2:

Runoff = 3.18 cfs @ 12.09 hrs, Volume= 0.227 af, Depth> 4.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
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Page 60

Area (sf)	CN	Description
*	268	98 Impervious, HSG D
	3,763	98 Impervious, HSG C
	12,292	98 Impervious, HSG A
	6,063	39 >75% Grass cover, Good, HSG A
	6,259	74 >75% Grass cover, Good, HSG C
	474	80 >75% Grass cover, Good, HSG D
	29,119	80 Weighted Average
	12,796	43.94% Pervious Area
	16,323	56.06% Impervious Area

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

Summary for Subcatchment P1E1:

Runoff = 2.89 cfs @ 12.09 hrs, Volume= 0.209 af, Depth> 4.50"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
*	6,409	98 Impervious, HSG D
	4,261	98 Impervious, HSG C
*	3,371	98 Impervious, HSG A
	3,166	39 >75% Grass cover, Good, HSG A
	5,768	74 >75% Grass cover, Good, HSG C
	1,245	80 >75% Grass cover, Good, HSG D
	24,220	84 Weighted Average
	10,179	42.03% Pervious Area
	14,041	57.97% Impervious Area

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

Summary for Subcatchment P1E2:

Runoff = 3.02 cfs @ 12.08 hrs, Volume= 0.223 af, Depth> 4.94"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
	13,822	98 Impervious, HSG C
	9,759	74 >75% Grass cover, Good, HSG C
	23,581	88 Weighted Average
	9,759	41.39% Pervious Area
	13,822	58.61% Impervious Area

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Type III 24-hr 25-year Rainfall=6.33"

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Page 61

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

Summary for Subcatchment P1E3:

Runoff = 5.03 cfs @ 12.08 hrs, Volume= 0.376 af, Depth> 5.16"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
23,288	98	Impervious, HSG C
1,664	98	Impervious, HSG D
12,525	74	>75% Grass cover, Good, HSG C
634	80	>75% Grass cover, Good, HSG D
38,111	90	Weighted Average
13,159		34.53% Pervious Area
24,952		65.47% Impervious Area

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

Summary for Subcatchment P2-1: Upper portion of Sub cat (1/2)

Runoff = 1.41 cfs @ 12.09 hrs, Volume= 0.101 af, Depth> 4.29"

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 25-year Rainfall=6.33"

Area (sf)	CN	Description
4,072	98	Impervious, HSG D
1,205	39	>75% Grass cover, Good, HSG A
7,086	80	>75% Grass cover, Good, HSG D
12,363	82	Weighted Average
8,291		67.06% Pervious Area
4,072		32.94% Impervious Area

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

Summary for Subcatchment P2-2: Lower portion of Subcat (1/2)

Runoff = 1.41 cfs @ 12.09 hrs, Volume= 0.101 af, Depth> 4.29"

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 25-year Rainfall=6.33"

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Page 62

Area (sf)	CN	Description
4,072	98	Impervious, HSG D
1,205	39	>75% Grass cover, Good, HSG A
7,086	80	>75% Grass cover, Good, HSG D
12,363	82	Weighted Average
8,291		67.06% Pervious Area
4,072		32.94% Impervious Area

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

Summary for Reach OA: Overall

Inflow Area = 13.748 ac, 49.37% Impervious, Inflow Depth > 3.45" for 25-year event
 Inflow = 33.14 cfs @ 12.29 hrs, Volume= 3.950 af
 Outflow = 33.14 cfs @ 12.29 hrs, Volume= 3.950 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach P DP1:

Inflow Area = 12.400 ac, 50.63% Impervious, Inflow Depth > 3.61" for 25-year event
 Inflow = 30.14 cfs @ 12.30 hrs, Volume= 3.728 af
 Outflow = 30.14 cfs @ 12.30 hrs, Volume= 3.728 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach P DP2:

Inflow Area = 1.348 ac, 37.76% Impervious, Inflow Depth = 1.98" for 25-year event
 Inflow = 6.46 cfs @ 12.12 hrs, Volume= 0.223 af
 Outflow = 6.46 cfs @ 12.12 hrs, Volume= 0.223 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Infiltration Basin

Inflow Area = 1.348 ac, 37.76% Impervious, Inflow Depth > 4.54" for 25-year event
 Inflow = 7.04 cfs @ 12.09 hrs, Volume= 0.510 af
 Outflow = 6.63 cfs @ 12.12 hrs, Volume= 0.419 af, Atten= 6%, Lag= 1.8 min
 Discarded = 0.17 cfs @ 12.12 hrs, Volume= 0.197 af
 Primary = 6.46 cfs @ 12.12 hrs, Volume= 0.223 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 39.97' @ 12.12 hrs Surf.Area= 2,985 sf Storage= 5,874 cf

Plug-Flow detention time= 136.8 min calculated for 0.419 af (82% of inflow)
 Center-of-Mass det. time= 66.2 min (865.9 - 799.7)

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Page 63

Volume	Invert	Avail.Storage	Storage Description
#1	37.50'	5,963 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.50	1,850	0	0
38.00	2,000	963	963
39.00	2,500	2,250	3,213
40.00	3,000	2,750	5,963

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.50'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	39.75'	25.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.17 cfs @ 12.12 hrs HW=39.97' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=6.44 cfs @ 12.12 hrs HW=39.97' (Free Discharge)
 ↑**2=Broad-Crested Rectangular Weir** (Weir Controls 6.44 cfs @ 1.17 fps)

Summary for Pond P-A: Point

Inflow Area = 1.278 ac, 67.39% Impervious, Inflow Depth > 4.31" for 25-year event
 Inflow = 6.71 cfs @ 12.10 hrs, Volume= 0.459 af
 Primary = 6.71 cfs @ 12.10 hrs, Volume= 0.459 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-C: Point

Inflow Area = 3.076 ac, 66.01% Impervious, Inflow Depth > 3.94" for 25-year event
 Inflow = 12.70 cfs @ 12.13 hrs, Volume= 1.009 af
 Primary = 12.70 cfs @ 12.13 hrs, Volume= 1.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-D: Point

Inflow Area = 0.525 ac, 39.78% Impervious, Inflow Depth > 3.15" for 25-year event
 Inflow = 1.94 cfs @ 12.09 hrs, Volume= 0.138 af
 Primary = 1.94 cfs @ 12.09 hrs, Volume= 0.138 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-E: Point

Inflow Area = 1.972 ac, 61.48% Impervious, Inflow Depth > 4.92" for 25-year event
 Inflow = 10.94 cfs @ 12.09 hrs, Volume= 0.808 af
 Primary = 10.94 cfs @ 12.09 hrs, Volume= 0.808 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P1: Basin

Inflow Area = 10.139 ac, 60.58% Impervious, Inflow Depth > 3.78" for 25-year event
 Inflow = 40.89 cfs @ 12.11 hrs, Volume= 3.192 af
 Outflow = 23.75 cfs @ 12.33 hrs, Volume= 3.073 af, Atten= 42%, Lag= 13.5 min
 Discarded = 0.12 cfs @ 12.33 hrs, Volume= 0.091 af
 Primary = 23.64 cfs @ 12.33 hrs, Volume= 2.982 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 43.60' @ 12.33 hrs Surf.Area= 18,667 sf Storage= 45,518 cf

Plug-Flow detention time= 93.4 min calculated for 3.073 af (96% of inflow)
 Center-of-Mass det. time= 73.3 min (863.1 - 789.8)

Volume	Invert	Avail.Storage	Storage Description
#1	39.50'	119,125 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.50	7,003	0	0
40.00	7,787	3,698	3,698
41.00	9,414	8,601	12,298
42.00	11,112	10,263	22,561
43.00	14,766	12,939	35,500
44.00	21,276	18,021	53,521
45.00	31,959	26,618	80,139
46.00	46,014	38,987	119,125

Device	Routing	Invert	Outlet Devices
#1	Primary	39.00'	24.0" Round Culvert L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 39.00' / 38.70' S= 0.0054 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Device 1	39.75'	6.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	40.75'	8.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	41.70'	10.0" Vert. Orifice/Grate C= 0.600
#5	Device 1	43.05'	24.0" x 24.0" Horiz. Orifice/Grate X 2.00 C= 0.600 in 48.0" x 24.0" Grate (100% open area) Limited to weir flow at low heads
#6	Discarded	39.50'	0.270 in/hr Exfiltration over Surface area Phase-In= 0.01'

Discarded OutFlow Max=0.12 cfs @ 12.33 hrs HW=43.60' (Free Discharge)

↳ **6=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=23.63 cfs @ 12.33 hrs HW=43.60' (Free Discharge)

↳ **1=Culvert** (Passes 23.63 cfs of 28.70 cfs potential flow)

↳ **2=Orifice/Grate** (Orifice Controls 1.79 cfs @ 9.13 fps)

↳ **3=Orifice/Grate** (Orifice Controls 2.67 cfs @ 7.64 fps)

↳ **4=Orifice/Grate** (Orifice Controls 3.20 cfs @ 5.86 fps)

↳ **5=Orifice/Grate** (Weir Controls 15.97 cfs @ 2.42 fps)

Summary for Pond R1: Recharge 1

Inflow Area = 0.118 ac, 100.00% Impervious, Inflow Depth > 6.09" for 25-year event
 Inflow = 0.73 cfs @ 12.08 hrs, Volume= 0.060 af
 Outflow = 0.70 cfs @ 12.11 hrs, Volume= 0.046 af, Atten= 4%, Lag= 1.3 min
 Discarded = 0.00 cfs @ 2.81 hrs, Volume= 0.008 af
 Primary = 0.70 cfs @ 12.11 hrs, Volume= 0.038 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 46.69' @ 12.11 hrs Surf.Area= 681 sf Storage= 728 cf

Plug-Flow detention time= 143.1 min calculated for 0.046 af (76% of inflow)

Center-of-Mass det. time= 58.8 min (802.6 - 743.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	44.80'	494 cf	21.50'W x 31.68'L x 2.33'H Field A 1,589 cf Overall - 354 cf Embedded = 1,235 cf x 40.0% Voids
#2A	45.30'	354 cf	ADS_StormTech RC-310 +Cap x 24 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 6 Rows of 4 Chambers
		848 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.80'	0.270 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	46.30'	15.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.30' / 42.00' S= 0.1433 1/1' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.00 cfs @ 2.81 hrs HW=44.83' (Free Discharge)

↳ **1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.70 cfs @ 12.11 hrs HW=46.69' (Free Discharge)

↳ **2=Culvert** (Inlet Controls 0.70 cfs @ 2.13 fps)

Summary for Pond R2: Recharge 2

Inflow Area = 2.206 ac, 80.04% Impervious, Inflow Depth > 5.29" for 25-year event
 Inflow = 12.49 cfs @ 12.08 hrs, Volume= 0.972 af
 Outflow = 6.65 cfs @ 12.21 hrs, Volume= 0.964 af, Atten= 47%, Lag= 7.7 min
 Discarded = 0.36 cfs @ 9.18 hrs, Volume= 0.525 af
 Primary = 6.29 cfs @ 12.21 hrs, Volume= 0.439 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 43.63' @ 12.21 hrs Surf.Area= 6,509 sf Storage= 11,635 cf

Plug-Flow detention time= 83.8 min calculated for 0.964 af (99% of inflow)
 Center-of-Mass det. time= 78.5 min (845.1 - 766.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	41.00'	5,805 cf	87.00'W x 74.82'L x 3.50'H Field A 22,782 cf Overall - 8,269 cf Embedded = 14,512 cf x 40.0% Voids
#2A	41.50'	8,269 cf	ADS_StormTech SC-740 +Cap x 180 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 18 Rows of 10 Chambers
		14,074 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.00'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	42.10'	18.0" Round Culvert L= 70.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.10' / 41.75' S= 0.0050 ' /' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Discarded OutFlow Max=0.36 cfs @ 9.18 hrs HW=41.04' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.36 cfs)

Primary OutFlow Max=6.29 cfs @ 12.21 hrs HW=43.63' (Free Discharge)
 ↑**2=Culvert** (Barrel Controls 6.29 cfs @ 4.35 fps)

Summary for Pond R3: Recharge 3

Inflow Area = 0.434 ac, 56.10% Impervious, Inflow Depth > 4.91" for 25-year event
 Inflow = 2.34 cfs @ 12.09 hrs, Volume= 0.177 af
 Outflow = 1.56 cfs @ 12.17 hrs, Volume= 0.177 af, Atten= 33%, Lag= 5.2 min
 Discarded = 0.10 cfs @ 10.47 hrs, Volume= 0.116 af
 Primary = 1.46 cfs @ 12.17 hrs, Volume= 0.061 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 42.66' @ 12.17 hrs Surf.Area= 1,848 sf Storage= 1,833 cf

Plug-Flow detention time= 66.7 min calculated for 0.177 af (100% of inflow)
 Center-of-Mass det. time= 66.3 min (845.8 - 779.5)

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Type III 24-hr 25-year Rainfall=6.33"

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Page 67

Volume	Invert	Avail.Storage	Storage Description
#1A	41.00'	1,312 cf	24.83'W x 74.40'L x 2.33'H Field A 4,311 cf Overall - 1,032 cf Embedded = 3,279 cf x 40.0% Voids
#2A	41.50'	1,032 cf	ADS_StormTech RC-310 +Cap x 70 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 7 Rows of 10 Chambers
		2,344 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.00'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	42.00'	15.0" Round Culvert L= 350.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.00' / 40.25' S= 0.0050 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.10 cfs @ 10.47 hrs HW=41.02' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=1.46 cfs @ 12.17 hrs HW=42.66' (Free Discharge)

↑**2=Culvert** (Barrel Controls 1.46 cfs @ 3.25 fps)

Summary for Pond R4: Recharge 4

Inflow Area =	0.695 ac, 79.42% Impervious, Inflow Depth > 5.66" for 25-year event
Inflow =	4.17 cfs @ 12.08 hrs, Volume= 0.328 af
Outflow =	3.62 cfs @ 12.13 hrs, Volume= 0.298 af, Atten= 13%, Lag= 2.7 min
Discarded =	0.06 cfs @ 7.38 hrs, Volume= 0.089 af
Primary =	3.56 cfs @ 12.13 hrs, Volume= 0.209 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4

Peak Elev= 47.87' @ 12.13 hrs Surf.Area= 2,344 sf Storage= 2,831 cf

Plug-Flow detention time= 84.6 min calculated for 0.298 af (91% of inflow)

Center-of-Mass det. time= 38.1 min (798.0 - 760.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	45.70'	1,657 cf	34.83'W x 67.28'L x 2.33'H Field A 5,468 cf Overall - 1,327 cf Embedded = 4,142 cf x 40.0% Voids
#2A	46.20'	1,327 cf	ADS_StormTech RC-310 +Cap x 90 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 10 Rows of 9 Chambers
		2,983 cf	Total Available Storage

Storage Group A created with Chamber Wizard

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Page 68

Device	Routing	Invert	Outlet Devices
#1	Discarded	45.70'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.10'
#2	Primary	46.70'	15.0" Round Culvert L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.70' / 46.30' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.06 cfs @ 7.38 hrs HW=45.82' (Free Discharge)

↳ **1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=3.56 cfs @ 12.13 hrs HW=47.87' (Free Discharge)

↳ **2=Culvert** (Barrel Controls 3.56 cfs @ 3.87 fps)

Summary for Pond R5: Recharge 5

Inflow Area =	1.857 ac, 66.07% Impervious, Inflow Depth > 5.30" for 25-year event
Inflow =	10.74 cfs @ 12.08 hrs, Volume= 0.820 af
Outflow =	7.71 cfs @ 12.16 hrs, Volume= 0.756 af, Atten= 28%, Lag= 4.5 min
Discarded =	0.10 cfs @ 6.66 hrs, Volume= 0.159 af
Primary =	7.62 cfs @ 12.16 hrs, Volume= 0.597 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
Peak Elev= 44.30' @ 12.16 hrs Surf.Area= 4,167 sf Storage= 7,777 cf

Plug-Flow detention time= 75.2 min calculated for 0.756 af (92% of inflow)
Center-of-Mass det. time= 34.3 min (807.7 - 773.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	41.50'	3,739 cf	30.00'W x 138.90'L x 3.50'H Field A 14,584 cf Overall - 5,237 cf Embedded = 9,347 cf x 40.0% Voids
#2A	42.00'	5,237 cf	ADS_StormTech SC-740 +Cap x 114 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 6 Rows of 19 Chambers
		8,976 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.50'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	42.50'	18.0" Round Culvert L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.50' / 42.00' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Discarded OutFlow Max=0.10 cfs @ 6.66 hrs HW=41.54' (Free Discharge)

↳ **1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=7.62 cfs @ 12.16 hrs HW=44.30' (Free Discharge)

↳ **2=Culvert** (Barrel Controls 7.62 cfs @ 4.56 fps)

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Type III 24-hr 100-year Rainfall=8.14"

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Page 69

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: post	Runoff Area=4,838 sf 100.00% Impervious Runoff Depth>7.89" Tc=6.0 min CN=98 Runoff=0.89 cfs 0.073 af
Subcatchment B: post	Runoff Area=4,874 sf 100.00% Impervious Runoff Depth>7.89" Tc=6.0 min CN=98 Runoff=0.89 cfs 0.074 af
Subcatchment C: post	Runoff Area=14,404 sf 100.00% Impervious Runoff Depth>7.89" Tc=6.0 min CN=98 Runoff=2.64 cfs 0.218 af
Subcatchment D: post	Runoff Area=12,187 sf 100.00% Impervious Runoff Depth>7.89" Tc=6.0 min CN=98 Runoff=2.24 cfs 0.184 af
Subcatchment E: post	Runoff Area=13,555 sf 100.00% Impervious Runoff Depth>7.89" Tc=6.0 min CN=98 Runoff=2.49 cfs 0.205 af
Subcatchment F: post	Runoff Area=11,698 sf 100.00% Impervious Runoff Depth>7.89" Tc=6.0 min CN=98 Runoff=2.15 cfs 0.177 af
Subcatchment G: post	Runoff Area=13,555 sf 100.00% Impervious Runoff Depth>7.89" Tc=6.0 min CN=98 Runoff=2.49 cfs 0.205 af
Subcatchment H: post	Runoff Area=5,127 sf 100.00% Impervious Runoff Depth>7.89" Tc=6.0 min CN=98 Runoff=0.94 cfs 0.077 af
Subcatchment I: post	Runoff Area=1,287 sf 100.00% Impervious Runoff Depth>7.89" Tc=6.0 min CN=98 Runoff=0.24 cfs 0.019 af
Subcatchment J: post	Runoff Area=5,123 sf 100.00% Impervious Runoff Depth>7.89" Tc=6.0 min CN=98 Runoff=0.94 cfs 0.077 af
Subcatchment K: post	Runoff Area=8,062 sf 100.00% Impervious Runoff Depth>7.89" Tc=6.0 min CN=98 Runoff=1.48 cfs 0.122 af
Subcatchment L: post	Runoff Area=1,649 sf 100.00% Impervious Runoff Depth>7.89" Tc=6.0 min CN=98 Runoff=0.30 cfs 0.025 af
Subcatchment M: post	Runoff Area=6,435 sf 100.00% Impervious Runoff Depth>7.89" Tc=6.0 min CN=98 Runoff=1.18 cfs 0.097 af
Subcatchment P1A1:	Runoff Area=93,348 sf 0.85% Impervious Runoff Depth>5.62" Flow Length=345' Tc=15.6 min CN=79 Runoff=10.45 cfs 1.004 af
Subcatchment P1A2:	Runoff Area=25,397 sf 53.04% Impervious Runoff Depth>6.94" Tc=6.0 min CN=90 Runoff=4.43 cfs 0.337 af
Subcatchment P1B:	Runoff Area=47,113 sf 5.85% Impervious Runoff Depth>5.40" Tc=6.0 min CN=77 Runoff=6.79 cfs 0.486 af

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Page 70

SubcatchmentP1C1:	Runoff Area=16,895 sf 78.82% Impervious Runoff Depth>7.42" Tc=6.0 min CN=94 Runoff=3.05 cfs 0.240 af
SubcatchmentP1C2:	Runoff Area=46,356 sf 39.05% Impervious Runoff Depth>6.34" Tc=6.0 min CN=85 Runoff=7.63 cfs 0.562 af
SubcatchmentP1C3:	Runoff Area=13,120 sf 36.01% Impervious Runoff Depth>4.58" Tc=6.0 min CN=70 Runoff=1.62 cfs 0.115 af
SubcatchmentP1C4-1:	Runoff Area=15,993 sf 61.16% Impervious Runoff Depth>6.82" Tc=6.0 min CN=89 Runoff=2.76 cfs 0.209 af
SubcatchmentP1C4-2:	Runoff Area=15,993 sf 60.05% Impervious Runoff Depth>6.70" Tc=6.0 min CN=88 Runoff=2.73 cfs 0.205 af
SubcatchmentP1C5-1: 2/3 of Subcat	Runoff Area=28,727 sf 55.12% Impervious Runoff Depth>6.94" Tc=6.0 min CN=90 Runoff=5.01 cfs 0.381 af
SubcatchmentP1C5-2:	Runoff Area=13,891 sf 55.12% Impervious Runoff Depth>6.94" Tc=6.0 min CN=90 Runoff=2.42 cfs 0.184 af
SubcatchmentP1C6:	Runoff Area=29,718 sf 51.00% Impervious Runoff Depth>6.58" Tc=6.0 min CN=87 Runoff=5.02 cfs 0.374 af
SubcatchmentP1D1:	Runoff Area=9,747 sf 44.85% Impervious Runoff Depth>4.81" Tc=6.0 min CN=72 Runoff=1.26 cfs 0.090 af
SubcatchmentP1D2:	Runoff Area=29,119 sf 56.06% Impervious Runoff Depth>5.75" Tc=6.0 min CN=80 Runoff=4.44 cfs 0.320 af
SubcatchmentP1E1:	Runoff Area=24,220 sf 57.97% Impervious Runoff Depth>6.22" Tc=6.0 min CN=84 Runoff=3.93 cfs 0.288 af
SubcatchmentP1E2:	Runoff Area=23,581 sf 58.61% Impervious Runoff Depth>6.70" Tc=6.0 min CN=88 Runoff=4.03 cfs 0.302 af
SubcatchmentP1E3:	Runoff Area=38,111 sf 65.47% Impervious Runoff Depth>6.94" Tc=6.0 min CN=90 Runoff=6.65 cfs 0.506 af
SubcatchmentP2-1: Upper portion of Sub	Runoff Area=12,363 sf 32.94% Impervious Runoff Depth>5.99" Tc=6.0 min CN=82 Runoff=1.95 cfs 0.142 af
SubcatchmentP2-2: Lower portion of	Runoff Area=12,363 sf 32.94% Impervious Runoff Depth>5.99" Tc=6.0 min CN=82 Runoff=1.95 cfs 0.142 af
Reach OA: Overall	Inflow=47.91 cfs 5.745 af Outflow=47.91 cfs 5.745 af
Reach P DP1:	Inflow=41.56 cfs 5.356 af Outflow=41.56 cfs 5.356 af
Reach P DP2:	Inflow=9.56 cfs 0.389 af Outflow=9.56 cfs 0.389 af

Pond 1P: Infiltration Basin Peak Elev=40.03' Storage=5,963 cf Inflow=9.58 cfs 0.704 af
Discarded=0.17 cfs 0.210 af Primary=9.56 cfs 0.389 af Outflow=9.73 cfs 0.599 af

Pond P-A: Point Inflow=8.73 cfs 0.639 af
Primary=8.73 cfs 0.639 af

Pond P-C: Point Inflow=17.84 cfs 1.430 af
Primary=17.84 cfs 1.430 af

Pond P-D: Point Inflow=2.88 cfs 0.205 af
Primary=2.88 cfs 0.205 af

Pond P-E: Point Inflow=14.61 cfs 1.096 af
Primary=14.61 cfs 1.096 af

Pond P1: Basin Peak Elev=44.19' Storage=57,815 cf Inflow=57.53 cfs 4.553 af
Discarded=0.15 cfs 0.101 af Primary=30.97 cfs 4.297 af Outflow=31.12 cfs 4.397 af

Pond R1: Recharge 1 Peak Elev=46.75' Storage=744 cf Inflow=0.94 cfs 0.077 af
Discarded=0.00 cfs 0.008 af Primary=0.91 cfs 0.055 af Outflow=0.91 cfs 0.063 af

Pond R2: Recharge 2 Peak Elev=44.50' Storage=14,073 cf Inflow=16.52 cfs 1.295 af
Discarded=0.36 cfs 0.555 af Primary=9.51 cfs 0.697 af Outflow=9.87 cfs 1.253 af

Pond R3: Recharge 3 Peak Elev=42.93' Storage=2,042 cf Inflow=3.14 cfs 0.240 af
Discarded=0.10 cfs 0.134 af Primary=2.64 cfs 0.106 af Outflow=2.74 cfs 0.240 af

Pond R4: Recharge 4 Peak Elev=48.06' Storage=2,983 cf Inflow=5.43 cfs 0.432 af
Discarded=0.06 cfs 0.094 af Primary=4.31 cfs 0.302 af Outflow=4.36 cfs 0.396 af

Pond R5: Recharge 5 Peak Elev=45.14' Storage=8,976 cf Inflow=14.15 cfs 1.095 af
Discarded=0.10 cfs 0.168 af Primary=9.96 cfs 0.856 af Outflow=10.06 cfs 1.023 af

Total Runoff Area = 13.748 ac Runoff Volume = 7.440 af Average Runoff Depth = 6.49"
50.63% Pervious = 6.961 ac 49.37% Impervious = 6.787 ac

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Page 72

Summary for Subcatchment A: post

Runoff = 0.89 cfs @ 12.08 hrs, Volume= 0.073 af, Depth> 7.89"

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-year Rainfall=8.14"

Area (sf)	CN	Description
4,838	98	Roofs, HSG D
4,838		100.00% Impervious Area

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

Summary for Subcatchment B: post

Runoff = 0.89 cfs @ 12.08 hrs, Volume= 0.074 af, Depth> 7.89"

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-year Rainfall=8.14"

Area (sf)	CN	Description
4,874	98	Roofs, HSG D
4,874		100.00% Impervious Area

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

Summary for Subcatchment C: post

Runoff = 2.64 cfs @ 12.08 hrs, Volume= 0.218 af, Depth> 7.89"

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-year Rainfall=8.14"

Area (sf)	CN	Description
14,404	98	Roofs, HSG D
14,404		100.00% Impervious Area

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

Summary for Subcatchment D: post

Runoff = 2.24 cfs @ 12.08 hrs, Volume= 0.184 af, Depth> 7.89"

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-year Rainfall=8.14"

Area (sf)	CN	Description
11,852	98	Roofs, HSG D
335	98	Roofs, HSG A
12,187	98	Weighted Average
12,187		100.00% Impervious Area

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

Summary for Subcatchment E: post

Runoff = 2.49 cfs @ 12.08 hrs, Volume= 0.205 af, Depth> 7.89"

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-year Rainfall=8.14"

Area (sf)	CN	Description
9,599	98	Roofs, HSG A
3,956	98	Roofs, HSG C
13,555	98	Weighted Average
13,555		100.00% Impervious Area

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

Summary for Subcatchment F: post

Runoff = 2.15 cfs @ 12.08 hrs, Volume= 0.177 af, Depth> 7.89"

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-year Rainfall=8.14"

Area (sf)	CN	Description
10,566	98	Roofs, HSG C
1,132	98	Roofs, HSG A
11,698	98	Weighted Average
11,698		100.00% Impervious Area

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Page 74

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

Summary for Subcatchment G: post

Runoff = 2.49 cfs @ 12.08 hrs, Volume= 0.205 af, Depth> 7.89"

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-year Rainfall=8.14"

Area (sf)	CN	Description
12,204	98	Roofs, HSG C
1,351	98	Roofs, HSG D
13,555	98	Weighted Average
13,555		100.00% Impervious Area

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

Summary for Subcatchment H: post

Runoff = 0.94 cfs @ 12.08 hrs, Volume= 0.077 af, Depth> 7.89"

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-year Rainfall=8.14"

Area (sf)	CN	Description
4,470	98	Roofs, HSG C
657	98	Roofs, HSG D
5,127	98	Weighted Average
5,127		100.00% Impervious Area

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

Summary for Subcatchment I: post

Runoff = 0.24 cfs @ 12.08 hrs, Volume= 0.019 af, Depth> 7.89"

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-year Rainfall=8.14"

Area (sf)	CN	Description
1,287	98	Roofs, HSG C
1,287		100.00% Impervious Area

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Page 75

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

Summary for Subcatchment J: post

Runoff = 0.94 cfs @ 12.08 hrs, Volume= 0.077 af, Depth> 7.89"

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-year Rainfall=8.14"

Area (sf)	CN	Description
2,688	98	Roofs, HSG D
2,435	98	Roofs, HSG C
5,123	98	Weighted Average
5,123		100.00% Impervious Area

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

Summary for Subcatchment K: post

Runoff = 1.48 cfs @ 12.08 hrs, Volume= 0.122 af, Depth> 7.89"

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-year Rainfall=8.14"

Area (sf)	CN	Description
8,062	98	Roofs, HSG D
8,062		100.00% Impervious Area

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

Summary for Subcatchment L: post

Runoff = 0.30 cfs @ 12.08 hrs, Volume= 0.025 af, Depth> 7.89"

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-year Rainfall=8.14"

Area (sf)	CN	Description
1,649	98	Roofs, HSG D
1,649		100.00% Impervious Area

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Page 76

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

Summary for Subcatchment M: post

Runoff = 1.18 cfs @ 12.08 hrs, Volume= 0.097 af, Depth> 7.89"

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-year Rainfall=8.14"

Area (sf)	CN	Description
6,175	98	Roofs, HSG D
260	98	Roofs, HSG C
6,435	98	Weighted Average
6,435		100.00% Impervious Area

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

Summary for Subcatchment P1A1:

Runoff = 10.45 cfs @ 12.21 hrs, Volume= 1.004 af, Depth> 5.62"

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-year Rainfall=8.14"

Area (sf)	CN	Description
* 789	98	Impervious, HSG C
17,998	74	>75% Grass cover, Good, HSG C
4,121	80	>75% Grass cover, Good, HSG D
* 61,469	80	>75% Grass cover, Good, HSG D (C/D)
* 8,971	80	>75% Grass cover, Good, HSG D (NR)
93,348	79	Weighted Average
92,559		99.15% Pervious Area
789		0.85% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	100	0.0900	0.14		Sheet Flow, Grass/Tree Canopy Woods: Light underbrush n= 0.400 P2= 3.20"
3.8	245	0.0240	1.08		Shallow Concentrated Flow, Slope to Wet area Short Grass Pasture Kv= 7.0 fps
15.6	345	Total			

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Page 77

Summary for Subcatchment P1A2:

Runoff = 4.43 cfs @ 12.08 hrs, Volume= 0.337 af, Depth> 6.94"

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-year Rainfall=8.14"

	Area (sf)	CN	Description
*	11,010	98	Impervious, HSG D
*	2,461	98	Impervious, HSG D (C/D)
	455	80	>75% Grass cover, Good, HSG D
*	11,471	80	>75% Grass cover, Good, HSG D (C/D)
	25,397	90	Weighted Average
	11,926		46.96% Pervious Area
	13,471		53.04% Impervious Area

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

Summary for Subcatchment P1B:

Runoff = 6.79 cfs @ 12.09 hrs, Volume= 0.486 af, Depth> 5.40"

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-year Rainfall=8.14"

	Area (sf)	CN	Description
*	2,756	98	Impervious, HSG D
	57	74	>75% Grass cover, Good, HSG C
	39,860	80	>75% Grass cover, Good, HSG D
	4,440	39	>75% Grass cover, Good, HSG A
	47,113	77	Weighted Average
	44,357		94.15% Pervious Area
	2,756		5.85% Impervious Area

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

Summary for Subcatchment P1C1:

Runoff = 3.05 cfs @ 12.08 hrs, Volume= 0.240 af, Depth> 7.42"

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-year Rainfall=8.14"

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Page 78

Area (sf)	CN	Description
* 13,316	98	Impervious, HSG D
3,579	80	>75% Grass cover, Good, HSG D
16,895	94	Weighted Average
3,579		21.18% Pervious Area
13,316		78.82% Impervious Area

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

Summary for Subcatchment P1C2:

Runoff = 7.63 cfs @ 12.09 hrs, Volume= 0.562 af, Depth> 6.34"

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-year Rainfall=8.14"

Area (sf)	CN	Description
* 15,673	98	Impervious, HSG D
* 2,429	98	Impervious, HSG B
5,446	61	>75% Grass cover, Good, HSG B
22,808	80	>75% Grass cover, Good, HSG D
46,356	85	Weighted Average
28,254		60.95% Pervious Area
18,102		39.05% Impervious Area

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

Summary for Subcatchment P1C3:

Runoff = 1.62 cfs @ 12.09 hrs, Volume= 0.115 af, Depth> 4.58"

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-year Rainfall=8.14"

Area (sf)	CN	Description
* 1,653	98	Impervious, HSG A
* 3,071	98	Impervious, HSG D
5,374	39	>75% Grass cover, Good, HSG A
3,022	80	>75% Grass cover, Good, HSG D
13,120	70	Weighted Average
8,396		63.99% Pervious Area
4,724		36.01% Impervious Area

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Page 79

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

Summary for Subcatchment P1C4-1:

Runoff = 2.76 cfs @ 12.08 hrs, Volume= 0.209 af, Depth> 6.82"

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-year Rainfall=8.14"

Area (sf)	CN	Description
* 178	98	Impervious, HSG A
* 9,603	98	Impervious, HSG D
771	39	>75% Grass cover, Good, HSG A
5,441	80	>75% Grass cover, Good, HSG D
15,993	89	Weighted Average
6,212		38.84% Pervious Area
9,781		61.16% Impervious Area

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

Summary for Subcatchment P1C4-2:

Runoff = 2.73 cfs @ 12.08 hrs, Volume= 0.205 af, Depth> 6.70"

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-year Rainfall=8.14"

Area (sf)	CN	Description
* 9,603	98	Impervious, HSG D
949	39	>75% Grass cover, Good, HSG A
5,441	80	>75% Grass cover, Good, HSG D
15,993	88	Weighted Average
6,390		39.95% Pervious Area
9,603		60.05% Impervious Area

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

Summary for Subcatchment P1C5-1: 2/3 of Subcat

This subcat is approx. 2/3 of the area of Subcat P1C5 on the drainage area map. This area will drain to the central pond

Runoff = 5.01 cfs @ 12.08 hrs, Volume= 0.381 af, Depth> 6.94"

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Page 80

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-year Rainfall=8.14"

	Area (sf)	CN	Description
*	1,803	98	Impervious, HSG D
*	8,084	98	Impervious, HSG D (C/D)
*	5,946	98	Impervious, HSG D (NR)
	3,196	80	>75% Grass cover, Good, HSG D
*	3,853	80	>75% Grass cover, Good, HSG D (C/D)
*	5,845	80	>75% Grass cover, Good, HSG D (NR)
	28,727	90	Weighted Average
	12,894		44.88% Pervious Area
	15,833		55.12% Impervious Area

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

Summary for Subcatchment P1C5-2:

This subcat is approx. 1/3 of the area of Subcat P1C5 on the drainage area map. This area will drain to Recharge system #4

Runoff = 2.42 cfs @ 12.08 hrs, Volume= 0.184 af, Depth> 6.94"

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-year Rainfall=8.14"

	Area (sf)	CN	Description
*	872	98	Impervious, HSG D
*	3,910	98	Impervious, HSG D (C/D)
*	2,875	98	Impervious, HSG D (NR)
	1,544	80	>75% Grass cover, Good, HSG D
*	1,862	80	>75% Grass cover, Good, HSG D (C/D)
*	2,828	80	>75% Grass cover, Good, HSG D (NR)
	13,891	90	Weighted Average
	6,234		44.88% Pervious Area
	7,657		55.12% Impervious Area

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

Summary for Subcatchment P1C6:

Runoff = 5.02 cfs @ 12.08 hrs, Volume= 0.374 af, Depth> 6.58"

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-year Rainfall=8.14"

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Page 81

Area (sf)	CN	Description
71	98	Impervious, HSG B
* 4,536	98	Impervious, HSG D
* 10,550	98	Impervious, HSG D (NR)
6,218	80	>75% Grass cover, Good, HSG D
* 5,159	80	>75% Grass cover, Good, HSG D (NR)
3,184	61	>75% Grass cover, Good, HSG B
29,718	87	Weighted Average
14,561		49.00% Pervious Area
15,157		51.00% Impervious Area

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

Summary for Subcatchment P1D1:

Runoff = 1.26 cfs @ 12.09 hrs, Volume= 0.090 af, Depth> 4.81"

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-year Rainfall=8.14"

Area (sf)	CN	Description
1,027	98	Impervious, HSG C
* 3,345	98	Impervious, HSG A
3,453	39	>75% Grass cover, Good, HSG A
1,922	74	>75% Grass cover, Good, HSG C
9,747	72	Weighted Average
5,375		55.15% Pervious Area
4,372		44.85% Impervious Area

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

Summary for Subcatchment P1D2:

Runoff = 4.44 cfs @ 12.09 hrs, Volume= 0.320 af, Depth> 5.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
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Page 82

Area (sf)	CN	Description
*	268	98 Impervious, HSG D
	3,763	98 Impervious, HSG C
	12,292	98 Impervious, HSG A
	6,063	39 >75% Grass cover, Good, HSG A
	6,259	74 >75% Grass cover, Good, HSG C
	474	80 >75% Grass cover, Good, HSG D
	29,119	80 Weighted Average
	12,796	43.94% Pervious Area
	16,323	56.06% Impervious Area

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

Summary for Subcatchment P1E1:

Runoff = 3.93 cfs @ 12.09 hrs, Volume= 0.288 af, Depth> 6.22"

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-year Rainfall=8.14"

Area (sf)	CN	Description
*	6,409	98 Impervious, HSG D
	4,261	98 Impervious, HSG C
*	3,371	98 Impervious, HSG A
	3,166	39 >75% Grass cover, Good, HSG A
	5,768	74 >75% Grass cover, Good, HSG C
	1,245	80 >75% Grass cover, Good, HSG D
	24,220	84 Weighted Average
	10,179	42.03% Pervious Area
	14,041	57.97% Impervious Area

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

Summary for Subcatchment P1E2:

Runoff = 4.03 cfs @ 12.08 hrs, Volume= 0.302 af, Depth> 6.70"

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-year Rainfall=8.14"

Area (sf)	CN	Description
	13,822	98 Impervious, HSG C
	9,759	74 >75% Grass cover, Good, HSG C
	23,581	88 Weighted Average
	9,759	41.39% Pervious Area
	13,822	58.61% Impervious Area

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Page 83

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

Summary for Subcatchment P1E3:

Runoff = 6.65 cfs @ 12.08 hrs, Volume= 0.506 af, Depth> 6.94"

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-year Rainfall=8.14"

Area (sf)	CN	Description
23,288	98	Impervious, HSG C
1,664	98	Impervious, HSG D
12,525	74	>75% Grass cover, Good, HSG C
634	80	>75% Grass cover, Good, HSG D
38,111	90	Weighted Average
13,159		34.53% Pervious Area
24,952		65.47% Impervious Area

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

Summary for Subcatchment P2-1: Upper portion of Sub cat (1/2)

Runoff = 1.95 cfs @ 12.09 hrs, Volume= 0.142 af, Depth> 5.99"

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-year Rainfall=8.14"

Area (sf)	CN	Description
4,072	98	Impervious, HSG D
1,205	39	>75% Grass cover, Good, HSG A
7,086	80	>75% Grass cover, Good, HSG D
12,363	82	Weighted Average
8,291		67.06% Pervious Area
4,072		32.94% Impervious Area

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

Summary for Subcatchment P2-2: Lower portion of Subcat (1/2)

Runoff = 1.95 cfs @ 12.09 hrs, Volume= 0.142 af, Depth> 5.99"

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-year Rainfall=8.14"

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Page 84

Area (sf)	CN	Description
4,072	98	Impervious, HSG D
1,205	39	>75% Grass cover, Good, HSG A
7,086	80	>75% Grass cover, Good, HSG D
12,363	82	Weighted Average
8,291		67.06% Pervious Area
4,072		32.94% Impervious Area

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

Summary for Reach OA: Overall

Inflow Area = 13.748 ac, 49.37% Impervious, Inflow Depth > 5.02" for 100-year event
 Inflow = 47.91 cfs @ 12.16 hrs, Volume= 5.745 af
 Outflow = 47.91 cfs @ 12.16 hrs, Volume= 5.745 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach P DP1:

Inflow Area = 12.400 ac, 50.63% Impervious, Inflow Depth > 5.18" for 100-year event
 Inflow = 41.56 cfs @ 12.22 hrs, Volume= 5.356 af
 Outflow = 41.56 cfs @ 12.22 hrs, Volume= 5.356 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Reach P DP2:

Inflow Area = 1.348 ac, 37.76% Impervious, Inflow Depth = 3.46" for 100-year event
 Inflow = 9.56 cfs @ 12.09 hrs, Volume= 0.389 af
 Outflow = 9.56 cfs @ 12.09 hrs, Volume= 0.389 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Infiltration Basin

Inflow Area = 1.348 ac, 37.76% Impervious, Inflow Depth > 6.27" for 100-year event
 Inflow = 9.58 cfs @ 12.09 hrs, Volume= 0.704 af
 Outflow = 9.73 cfs @ 12.09 hrs, Volume= 0.599 af, Atten= 0%, Lag= 0.2 min
 Discarded = 0.17 cfs @ 12.06 hrs, Volume= 0.210 af
 Primary = 9.56 cfs @ 12.09 hrs, Volume= 0.389 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 40.03' @ 12.09 hrs Surf.Area= 3,000 sf Storage= 5,963 cf

Plug-Flow detention time= 104.4 min calculated for 0.599 af (85% of inflow)
 Center-of-Mass det. time= 41.4 min (832.2 - 790.8)

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Page 85

Volume	Invert	Avail.Storage	Storage Description
#1	37.50'	5,963 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
37.50	1,850	0	0
38.00	2,000	963	963
39.00	2,500	2,250	3,213
40.00	3,000	2,750	5,963

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.50'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	39.75'	25.0' long x 10.0' 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) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.17 cfs @ 12.06 hrs HW=40.02' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=9.52 cfs @ 12.09 hrs HW=40.03' (Free Discharge)
 ↑2=Broad-Crested Rectangular Weir (Weir Controls 9.52 cfs @ 1.34 fps)

Summary for Pond P-A: Point

Inflow Area = 1.278 ac, 67.39% Impervious, Inflow Depth > 5.99" for 100-year event
 Inflow = 8.73 cfs @ 12.09 hrs, Volume= 0.639 af
 Primary = 8.73 cfs @ 12.09 hrs, Volume= 0.639 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-C: Point

Inflow Area = 3.076 ac, 66.01% Impervious, Inflow Depth > 5.58" for 100-year event
 Inflow = 17.84 cfs @ 12.13 hrs, Volume= 1.430 af
 Primary = 17.84 cfs @ 12.13 hrs, Volume= 1.430 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-D: Point

Inflow Area = 0.525 ac, 39.78% Impervious, Inflow Depth > 4.68" for 100-year event
 Inflow = 2.88 cfs @ 12.09 hrs, Volume= 0.205 af
 Primary = 2.88 cfs @ 12.09 hrs, Volume= 0.205 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P-E: Point

Inflow Area = 1.972 ac, 61.48% Impervious, Inflow Depth > 6.67" for 100-year event
 Inflow = 14.61 cfs @ 12.08 hrs, Volume= 1.096 af
 Primary = 14.61 cfs @ 12.08 hrs, Volume= 1.096 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Pond P1: Basin

Inflow Area = 10.139 ac, 60.58% Impervious, Inflow Depth > 5.39" for 100-year event
 Inflow = 57.53 cfs @ 12.10 hrs, Volume= 4.553 af
 Outflow = 31.12 cfs @ 12.35 hrs, Volume= 4.397 af, Atten= 46%, Lag= 15.2 min
 Discarded = 0.15 cfs @ 12.35 hrs, Volume= 0.101 af
 Primary = 30.97 cfs @ 12.35 hrs, Volume= 4.297 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 44.19' @ 12.35 hrs Surf.Area= 23,333 sf Storage= 57,815 cf

Plug-Flow detention time= 79.1 min calculated for 4.396 af (97% of inflow)
 Center-of-Mass det. time= 60.3 min (845.0 - 784.7)

Volume	Invert	Avail.Storage	Storage Description
#1	39.50'	119,125 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
39.50	7,003	0	0
40.00	7,787	3,698	3,698
41.00	9,414	8,601	12,298
42.00	11,112	10,263	22,561
43.00	14,766	12,939	35,500
44.00	21,276	18,021	53,521
45.00	31,959	26,618	80,139
46.00	46,014	38,987	119,125

Device	Routing	Invert	Outlet Devices
#1	Primary	39.00'	24.0" Round Culvert L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 39.00' / 38.70' S= 0.0054 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#2	Device 1	39.75'	6.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	40.75'	8.0" Vert. Orifice/Grate C= 0.600
#4	Device 1	41.70'	10.0" Vert. Orifice/Grate C= 0.600
#5	Device 1	43.05'	24.0" x 24.0" Horiz. Orifice/Grate X 2.00 C= 0.600 in 48.0" x 24.0" Grate (100% open area) Limited to weir flow at low heads
#6	Discarded	39.50'	0.270 in/hr Exfiltration over Surface area Phase-In= 0.01'

Discarded OutFlow Max=0.15 cfs @ 12.35 hrs HW=44.19' (Free Discharge)

↳ **6=Exfiltration** (Exfiltration Controls 0.15 cfs)

Primary OutFlow Max=30.97 cfs @ 12.35 hrs HW=44.19' (Free Discharge)

↳ **1=Culvert** (Inlet Controls 30.97 cfs @ 9.86 fps)

↳ **2=Orifice/Grate** (Passes < 1.94 cfs potential flow)

↳ **3=Orifice/Grate** (Passes < 2.96 cfs potential flow)

↳ **4=Orifice/Grate** (Passes < 3.78 cfs potential flow)

↳ **5=Orifice/Grate** (Passes < 41.17 cfs potential flow)

Summary for Pond R1: Recharge 1

Inflow Area = 0.118 ac, 100.00% Impervious, Inflow Depth > 7.89" for 100-year event
 Inflow = 0.94 cfs @ 12.08 hrs, Volume= 0.077 af
 Outflow = 0.91 cfs @ 12.10 hrs, Volume= 0.063 af, Atten= 3%, Lag= 1.2 min
 Discarded = 0.00 cfs @ 1.99 hrs, Volume= 0.008 af
 Primary = 0.91 cfs @ 12.10 hrs, Volume= 0.055 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 46.75' @ 12.10 hrs Surf.Area= 681 sf Storage= 744 cf

Plug-Flow detention time= 129.8 min calculated for 0.063 af (82% of inflow)
 Center-of-Mass det. time= 56.3 min (796.8 - 740.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	44.80'	494 cf	21.50'W x 31.68'L x 2.33'H Field A 1,589 cf Overall - 354 cf Embedded = 1,235 cf x 40.0% Voids
#2A	45.30'	354 cf	ADS_StormTech RC-310 +Cap x 24 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 6 Rows of 4 Chambers
		848 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	44.80'	0.270 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	46.30'	15.0" Round Culvert L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.30' / 42.00' S= 0.1433 1/1' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.00 cfs @ 1.99 hrs HW=44.83' (Free Discharge)

↳ **1=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.91 cfs @ 12.10 hrs HW=46.75' (Free Discharge)

↳ **2=Culvert** (Inlet Controls 0.91 cfs @ 2.28 fps)

Summary for Pond R2: Recharge 2

Inflow Area = 2.206 ac, 80.04% Impervious, Inflow Depth > 7.05" for 100-year event
 Inflow = 16.52 cfs @ 12.08 hrs, Volume= 1.295 af
 Outflow = 9.87 cfs @ 12.19 hrs, Volume= 1.253 af, Atten= 40%, Lag= 6.3 min
 Discarded = 0.36 cfs @ 8.40 hrs, Volume= 0.555 af
 Primary = 9.51 cfs @ 12.19 hrs, Volume= 0.697 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 44.50' @ 12.19 hrs Surf.Area= 6,509 sf Storage= 14,073 cf

Plug-Flow detention time= 76.6 min calculated for 1.252 af (97% of inflow)
 Center-of-Mass det. time= 56.7 min (818.7 - 762.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	41.00'	5,805 cf	87.00'W x 74.82'L x 3.50'H Field A 22,782 cf Overall - 8,269 cf Embedded = 14,512 cf x 40.0% Voids
#2A	41.50'	8,269 cf	ADS_StormTech SC-740 +Cap x 180 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 18 Rows of 10 Chambers
		14,074 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.00'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	42.10'	18.0" Round Culvert L= 70.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.10' / 41.75' S= 0.0050 '/ Cc= 0.900 n= 0.013, Flow Area= 1.77 sf

Discarded OutFlow Max=0.36 cfs @ 8.40 hrs HW=41.04' (Free Discharge)
 ↑**1=Exfiltration** (Exfiltration Controls 0.36 cfs)

Primary OutFlow Max=9.51 cfs @ 12.19 hrs HW=44.50' (Free Discharge)
 ↑**2=Culvert** (Barrel Controls 9.51 cfs @ 5.38 fps)

Summary for Pond R3: Recharge 3

Inflow Area = 0.434 ac, 56.10% Impervious, Inflow Depth > 6.65" for 100-year event
 Inflow = 3.14 cfs @ 12.08 hrs, Volume= 0.240 af
 Outflow = 2.74 cfs @ 12.13 hrs, Volume= 0.240 af, Atten= 13%, Lag= 2.7 min
 Discarded = 0.10 cfs @ 9.65 hrs, Volume= 0.134 af
 Primary = 2.64 cfs @ 12.13 hrs, Volume= 0.106 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 42.93' @ 12.13 hrs Surf.Area= 1,848 sf Storage= 2,042 cf

Plug-Flow detention time= 60.5 min calculated for 0.240 af (100% of inflow)
 Center-of-Mass det. time= 60.2 min (833.9 - 773.7)

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Page 89

Volume	Invert	Avail.Storage	Storage Description
#1A	41.00'	1,312 cf	24.83'W x 74.40'L x 2.33'H Field A 4,311 cf Overall - 1,032 cf Embedded = 3,279 cf x 40.0% Voids
#2A	41.50'	1,032 cf	ADS_StormTech RC-310 +Cap x 70 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 7 Rows of 10 Chambers
		2,344 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.00'	2.410 in/hr Exfiltration over Surface area Phase-In= 0.01'
#2	Primary	42.00'	15.0" Round Culvert L= 350.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.00' / 40.25' S= 0.0050 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=0.10 cfs @ 9.65 hrs HW=41.02' (Free Discharge)

↑**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=2.64 cfs @ 12.13 hrs HW=42.93' (Free Discharge)

↑**2=Culvert** (Barrel Controls 2.64 cfs @ 3.77 fps)

Summary for Pond R4: Recharge 4

Inflow Area =	0.695 ac, 79.42% Impervious, Inflow Depth > 7.46" for 100-year event
Inflow =	5.43 cfs @ 12.08 hrs, Volume= 0.432 af
Outflow =	4.36 cfs @ 12.09 hrs, Volume= 0.396 af, Atten= 20%, Lag= 0.5 min
Discarded =	0.06 cfs @ 6.24 hrs, Volume= 0.094 af
Primary =	4.31 cfs @ 12.09 hrs, Volume= 0.302 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4

Peak Elev= 48.06' @ 12.09 hrs Surf.Area= 2,344 sf Storage= 2,983 cf

Plug-Flow detention time= 76.5 min calculated for 0.396 af (92% of inflow)

Center-of-Mass det. time= 33.0 min (788.2 - 755.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	45.70'	1,657 cf	34.83'W x 67.28'L x 2.33'H Field A 5,468 cf Overall - 1,327 cf Embedded = 4,142 cf x 40.0% Voids
#2A	46.20'	1,327 cf	ADS_StormTech RC-310 +Cap x 90 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap 10 Rows of 9 Chambers
		2,983 cf	Total Available Storage

Storage Group A created with Chamber Wizard

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Page 90

Device	Routing	Invert	Outlet Devices
#1	Discarded	45.70'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.10' 15.0" Round Culvert L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 46.70' / 46.30' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Primary	46.70'	

Discarded OutFlow Max=0.06 cfs @ 6.24 hrs HW=45.82' (Free Discharge)

↳ **1=Exfiltration** (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=4.29 cfs @ 12.09 hrs HW=48.05' (Free Discharge)

↳ **2=Culvert** (Barrel Controls 4.29 cfs @ 4.02 fps)

Summary for Pond R5: Recharge 5

Inflow Area = 1.857 ac, 66.07% Impervious, Inflow Depth > 7.07" for 100-year event
 Inflow = 14.15 cfs @ 12.08 hrs, Volume= 1.095 af
 Outflow = 10.06 cfs @ 12.13 hrs, Volume= 1.023 af, Atten= 29%, Lag= 2.8 min
 Discarded = 0.10 cfs @ 5.36 hrs, Volume= 0.168 af
 Primary = 9.96 cfs @ 12.13 hrs, Volume= 0.856 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 45.14' @ 12.13 hrs Surf.Area= 4,167 sf Storage= 8,976 cf

Plug-Flow detention time= 66.8 min calculated for 1.023 af (93% of inflow)
 Center-of-Mass det. time= 31.5 min (798.7 - 767.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	41.50'	3,739 cf	30.00'W x 138.90'L x 3.50'H Field A 14,584 cf Overall - 5,237 cf Embedded = 9,347 cf x 40.0% Voids
#2A	42.00'	5,237 cf	ADS_StormTech SC-740 +Cap x 114 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 6 Rows of 19 Chambers
		8,976 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	41.50'	1.020 in/hr Exfiltration over Surface area Phase-In= 0.01' 18.0" Round Culvert L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 42.50' / 42.00' S= 0.0050 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Primary	42.50'	

Discarded OutFlow Max=0.10 cfs @ 5.36 hrs HW=41.54' (Free Discharge)

↳ **1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=9.91 cfs @ 12.13 hrs HW=45.13' (Free Discharge)

↳ **2=Culvert** (Barrel Controls 9.91 cfs @ 5.61 fps)

23069-ipswich
Prelim Drainage Areas-prop
3/18/2020
23069 SP R3-drainage

Building Areas

Building	Footprint (SF)	Soil Type	Req Recharge Volume (CF)
A	4,838	D	40.3
B	4,874	D	40.6
C	14,404	D	120.0
D	12,187	D	101.6
E	9,596	A	479.8
	3,959	C	82.5
F	1,130	A	56.5
	10,568	C	220.2
G	12,204	C	254.3
	1,351	D	11.3
H	5,127	C	106.8
I	1,287	C/D	10.7
J	5,123	C/D	42.7
K	8,062	D	67.2
L	1,649	D	13.7
M	6,435	D	53.6

TOTAL BUILDING AREA	102,794	SF	
Recharge Volume required for Buildings			1701.8 CF
Impervious (Parking)	192,250	SF	
Recharge Volume required for Pavement			3277.7 CF
total Impervious	295,044	SF	
Total recharge volume req.			4979.4 CF
65% of impervious area routed to infiltration/recharge locations			
Adjusted Required recharge volume			7660.6 CF
Surface Catchments			

Storage provided	
Location	Volume (CF)
Recharge 1	606
Recharge 2	6,594
Recharge 3	553
Recharge 4	866
Recharge 5	1,597
Inf. Basin	5,228
Total	15,444

(Cubic Feet)

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Surface Catchments

	Area (SF)	Area(Ac)	Soil Type(s)	Recharge requirement (CF)
P1A1				
TOTAL	91,808	2.11		
IMPERVIOUS	0	0.00	N/A	
GRASS	91,808	2.11		
P1A2				
TOTAL	25,413	0.58		
IMPERVIOUS	15,930	0.37	D	133
GRASS	9,483	0.22		
P1B				
TOTAL	47,113	1.08		
IMPERVIOUS	2,756	0.06	D	23
GRASS	44,357	1.02		
P1C1				
TOTAL	16,935	0.39		
IMPERVIOUS	13,191	0.30	D	110
GRASS	3,744	0.09		
P1C2				
TOTAL	45,779	1.05		
IMPERVIOUS	2,367	0.05	B	69
IMPERVIOUS	13,358	0.31	D	111
GRASS	30,054	0.69		
P1C3				
TOTAL	12,738	0.29		
IMPERVIOUS	1,273	0.03	A	64
IMPERVIOUS	3,070	0.07	D	26
GRASS	8,395	0.19		
P1C4				
TOTAL	31,810	0.73		
IMPERVIOUS	19,385	0.45	D	162
GRASS	12,425	0.29		

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Surface Catchments

	Area (SF)	Area(Ac)	Soil Type(s)	Recharge requirement (CF)
P1C5				
TOTAL	40,633	0.93		
IMPERVIOUS	11,179	0.26	C	233
IMPERVIOUS	11,179	0.26	D	93
GRASS	18,275	0.42	*Assume 50/50 split bet. C and D soils	
P1C6				
TOTAL	29,767	0.68		
IMPERVIOUS	11,052	0.25	C	230
IMPERVIOUS	4,535	0.10	D	38
GRASS	14,180	0.33	*Assume NR are C soils	
P1D1				
TOTAL	9,807	0.23		
IMPERVIOUS	1,027	0.02	A	51
IMPERVIOUS	3,405	0.08	C	71
GRASS	5,375	0.12		
P1D2				
TOTAL	29,249	0.67		
IMPERVIOUS	12,237	0.28	A	612
IMPERVIOUS	3,710	0.09	C	77
GRASS	13,302	0.31		
P1E1				
TOTAL	24,220	0.56		
IMPERVIOUS	2,759	0.06	A	138
IMPERVIOUS	4,261	0.10	C	89
IMPERVIOUS	6,408	0.15	D	53
GRASS	10,792	0.25		
P1E2				
TOTAL	23,771	0.55		
IMPERVIOUS	14,714	0.34	C	307
GRASS	9,057	0.21		

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Surface Catchments

	Area (SF)	Area(Ac)	Soil Type(s)	Recharge requirement (CF)
P1E3				
TOTAL	37,311	0.86		
IMPERVIOUS	24,127	0.55	C	503
IMPERVIOUS	1,597	0.04	D	13
GRASS	11,587	0.27		
P2				
TOTAL	24,728	0.57		
IMPERVIOUS	8,730	0.20	D	73
GRASS	15,998	0.37		
Total Impervious	192,250	22.55	Recharge req'ment for pavment 3,278	
BUILDINGS	102,794	2.36		
TOTAL	295,044	24.91		

Appendix VIII. Operations and Maintenance Log

Essex Pastures - Ipswich, Massachusetts
Stormwater Operation and Maintenance Plan

INSPECTION SCHEDULE AND EVALUATION CHECKLIST

Best Management practice	Inspection Frequency	Date Inspected	Contractor	Current Conditions and Minimum Maintenance / Repairs, If Necessary	Completed Maintenance / Repair (i.e. date, contractor, tasks complete, etc.)
Catch Basins	Quarterly				
Infiltration Systems	Biannual				
Detention Basin	Quarterly				
Stormceptors	Quarterly				
Overall Site Condition	Quarterly				

Property Manager: _____ Date: _____