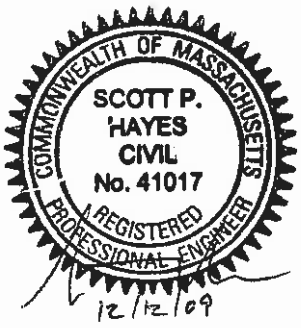
"THE HOMES AT KIMLOCH FARM"

STORMWATER MANGEMENT REPORT

Stormwater Management Plan
Erosion & Sediment Control Plan
Stormwater Operation & Maintenance Plan
Drainage Calculations & Report



December 12, 2009

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CONTENTS

I. Project Description

II. Construction Schedule & Sequence of Development

III. Erosion & Sedimentation Control Procedures During Construction

IV. Erosion & Sedimentation Control Procedures After Construction (Stormwater System Operation & Maintenance Procedures)

V. Drainage Calculations

Appendix A: Portion of USGS Quadrangle, Billerica, Massachusetts, 1987; Scale: 1:25,000

Appendix B: Soil descriptions from United States Natural Resource Conservation Service (NRCS)

Appendix C: Pre Development Drainage Plan (1"=40')

Appendix D: Post Development Drainage Plan (1"=40')

Appendix F: HydroCAD Output

I. Project Description

The Homes at Kimloch Farm in Littleton is a proposed 8-lot residential subdivision on 5.99 acres of land located on the easterly side of Goldsmith Street at the intersection of Goldsmith Street and Tajlea Road identified on Littleton Assessors Maps as Map U-11 Parcel 53-1. There are currently no structures on site and the site is predominantly wooded with the exception of the remains of a horse paddock located in the non-wooded area of the site nearest the intersection of Goldsmith Street and Tajlea Road.

The area proposed for development is the southwest most 2.3-acres of predominantly cleared pasture upland area nearest the intersection of Goldsmith Street and Tajlea Road with access to the site proposed via a proposed access road off Tajlea Road extending into the site approximately 230 feet providing frontage for 6 building lots, with an additional 2 proposed building lots fronting Tajlea Road. Lots will be served by a shared sewage disposal system located on Parcel A in the area of the remains of the existing paddock along the Goldsmith Street frontage.

The area of the site proposed for development has a gentle to moderate grade to the east and the majority of the exiting surface drainage drains easterly and northeasterly to adjacent down gradient wetlands. Minimal tree clearing will be required for development as the bulk of the development is located within areas without any current tree cover, with some minor clearing required for construction of the drainage detention basin and for construction of Lot 6 and Lot 7. Erosion will be controlled through proper construction methods and sequencing, utilizing designated stockpile areas with erosion protection, and installation of erosion control measures during construction to prevent erosion and migration of silt down gradient beyond the limits of work.

Drainage will be managed by a proposed extended detention basin down gradient east of the development that will collect and detain storm water from catch basins, swales and overland flow and provide a controlled release and flow over land eventually reaching the easterly on site wetlands. Peak rates of runoff are maintained or reduced by the proposed drainage system and the natural flow of surface drainage will be maintained following development.

Storm water quality will be maintained Storm water will be treated by 4-ft sump catch basins with oil/gas separator hoods managing runoff from paved surfaces, a sediment forebay in the detention basin and the detention basin itself which will further reduce suspended solids through detention prior to discharge down gradient.

Mitigation of erosion will be accomplished during construction by utilization of erosion control barriers between construction activities and down gradient unaltered areas, storm drain inlet protection to prevent migration of suspended solids and silt, and utilization of a sediment forebay in the proposed detention basin.

II. Construction Schedule & Sequence of Development

Schedule

Construction is proposed to be completed in a single phase. Once construction begins, all work is to be completed within 24 months of start date.

Sequence of Development

1. Install erosion control barriers and demark limit of work.
2. Clear and grub vegetation; stockpile loam and cover with suitable tarp or surround with hay bales.
3. Install crushed stone construction entrance.
4. Construct equipment re-fueling and equipment storage area.
5. Place gravel and rough grade roadway.
6. Construct detention basin and sediment forebay.
7. Install drainage from detention basin working upgradient to catch basins.
8. Install hay bale and silt sack inlet protection in catch basins.
9. Install underground utilities.
10. Install sewage disposal system.
11. Remove crushed stone construction entrances or grade and compact for driveway base material.
12. Place binder course of pavement and cape cod berms.
13. Excavate and construct foundations and dwellings.
14. Install utilities to dwellings.
15. Complete final site grading.
16. Complete site landscaping and stabilization of areas to be vegetated.
17. Raise catch basin grates to finished grade and place finish course of pavement.
18. Remove and dispose of erosion control barrier following inspection and authorization of the project engineer.

III. Erosion & Sedimentation Control Procedures During Construction

Staked Hay bale Siltation Barrier

Staked hay bales are proposed to be installed, as shown on the site plan, around the perimeter of the down-gradient side of the work area. The siltation barrier is to be installed prior to the commencement of any work on site and in accordance with the design plans. An additional supply of hay bales shall be stocked on-site to replace and/or repair erosion control barriers that are damaged by construction activities or intense rainfall events. The lines of erosion control barriers shall be inspected and maintained weekly during construction.

Storm Drain Inlet Protection

A temporary storm inlet protection filter or hay bales will be placed around all catch basin units. The purpose of the filter is to prevent the inflow of sediments into the closed drainage system. The filter or hay bales shall remain in place until a permanent vegetative cover is established and the transport of sediment is no longer visibly apparent. The filter shall be inspected and maintained on a weekly basis and after every storm event during construction. Storm drain inlet protection shall be removed upon completion of site improvements and stabilization of site.

Surface Stabilization

The surface of all disturbed areas shall be stabilized during and after construction. Temporary measures shall be taken during construction to prevent erosion and siltation. All disturbed slopes will be stabilized with a permanent vegetative cover. Some or all of the following measures will be utilized on this project as conditions may warrant.

a. Temporary Seeding
b. Temporary Mulching
c. Permanent Seeding
d. Placement of Sod
e. Hydro seeding
f. Placement of Hay
g. Placement of Jute Netting

IV. Stormwater System Operation & Maintenance Procedures Following Construction

Erosion & Sediment Control

Eroded sediments can adversely affect the performance of the stormwater management system. Eroding or barren areas, particularly on slopes, should have sedimentation build-up removed by hand and eroded areas should be re-vegetated immediately.

Debris and Litter Removal

Trash may collect in the BMP's, potentially causing clogging of the facilities. All debris and litter shall be removed when necessary during construction, and after each storm event.

Sediment Forebay

Sediment forebay should be inspected at least twice per year, and maintenance and repairs made as necessary. Inspection involves visual inspection of sediment debris accumulation. Sediment and debris should be removed manually (by hand), at least once per year, or more frequently if warranted. Care should be taken to protect the sediment traps from damage and excessive sediment deposits from snow removal practices.

V. Drainage Calculations

Methodology & References

Methodology:

SCS TR-55 & SCS TR-20 utilizing HydroCAD (v 8.0) software.

References:

A Guide to Hydrologic Analysis Using SCS Methods, Richard McCuen, copyright 1982, Prentice Hall, Inc.

Interim Soil Survey of Middlesex County, Massachusetts, by USDA, issued December 1985

USGS Quadrangle Map, Ayer, Massachusetts, 1987

BASIS OF ANALYSIS:

In the drainage analysis for The Homes at Kimloch Farm, the area of land considered is the portion where development is taking place. The area of proposed construction activities is only 2.731 acres of the total site area of 5.995 acres. The remaining land is proposed open space and is not to be altered by development and therefore is not considered in the drainage analysis. The soils on site are all Paxton, USDA Hydrologic Soil Group C. These soils are primarily fine sandy loam, loam and gravelly sandy loam.

Under pre-development conditions, the site is divided into 3 catchment areas: Subcatchment 1 flows west towards Goldsmith Street, Subcatchment 2 flows off site southeast, and Subcatchment 3 flows overland to wetlands to the northeast.

Under post-development conditions there are a total of Subcatchment areas. Subcatchment 1 and 2 flow in the same manner as Subcathment 1 and 2 under pre-development conditions. The cumulative effect of subcatchment 3, 4 & 5 under post-development conditions (northeasterly flow overland to wetlands) are compared to Subcatchment 3 under pre-development conditions (northeasterly flow overland to wetlands).

The results of the analysis are presented in Table 1 below:

TABLE 1:

Sub-Catchment	Pre-development 2 yr	10 yr	100 yr	Sub-Catchment	Post-development 2 yr	10 yr	100 yr
1	0.65	1.28	2.45	1	0.66	1.24	2.24
2	1.47	2.91	5.51	2	1.44	2.56	4.47
3	0.73	1.56	3.09	3, 4 + 5	0.67	1.19	2.54

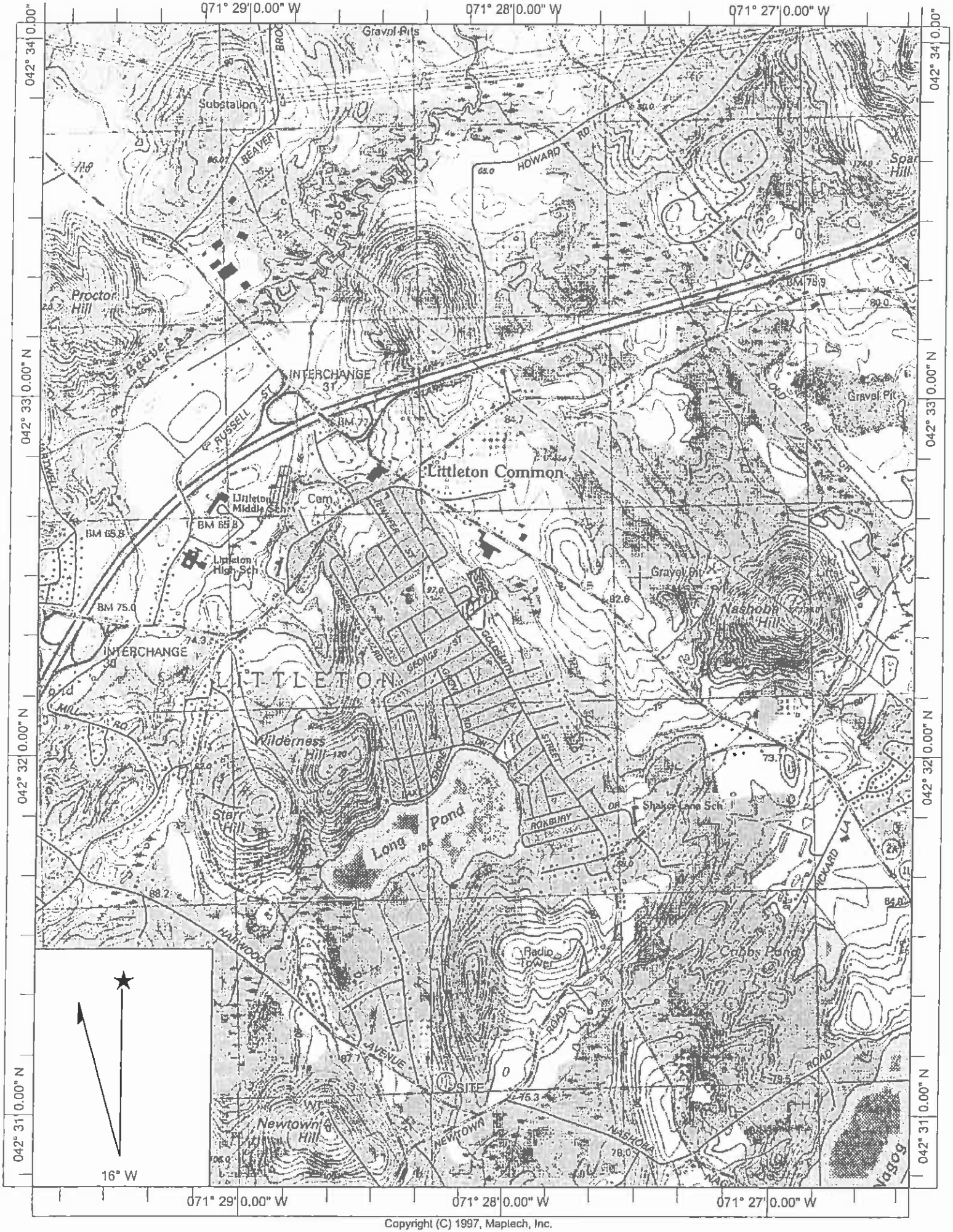
All results are for peak flow in cubic feet per second.

CONCLUSIONS

The proposed drainage system adequately controls the rate of runoff from the site. Storm water runoff quality is adequately mitigated by the proposed deep sump hooded catch basins and extended detention basin.

Appendix A

Portion of USGS Quadrangle Map, Billerica, Massachusetts, 1987
(Scale: 1:25,000)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071° 28' 0.00" W
071° 27' 0.00" W
042° 34' 0.00" N
042° 33' 0.00" N
042° 32' 0.00" N
042° 31' 0.00" N
Gravel Pits
Substation
BEAVER
HOWARD RD
Spar Hill
Proctor Hill
Beaver
INTERCHANGE 31
RUSSELL ST
BM 75.9
Littleton Common
Littleton Middle Sch
Cem
BM 65.8
Littleton High Sch
Gravel Pit
Nashoba Hill
BM 75.0
INTERCHANGE 30
LITTLETON
MILL RD
Wilderness Hill
Star Hill
Long Pond
Shaker Lane Sch
ROXBURY
Radio Tower
Cobbs Pond
HARWOOD AVENUE
SITE
Newtown Hill
NEWTOWN ROAD
NASHOBA ROAD
16° W
Copyright (C) 1997, Maplech, Inc.

Appendix B

Soil descriptions from "Interim Soil Survey of Middlesex County, Massachusetts", December 1985, USDA

Soil Map—Middlesex County, Massachusetts
(KIMLOCH FARM)

USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:2,800 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 19N NAD83

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 9, Apr 15, 2009

Date(s) aerial images were photographed: 7/28/2003

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.

NARRAGANSETT-HOLLIS-ROCK OUTCROP COMPLEX consists of gently sloping to strongly sloping, very deep and shallow soils on uplands where the relief is affected by the surface of underlying bedrock. The components of this complex occur in such intricate patterns it is not practical to separate them. The complex is approximately 45 percent Narragansett soil, 20 percent Hollis soil, 10 percent Rock outcrop and 25 percent other soils. Major limitations are due to rockiness, slope and depth to bedrock. See "Narragansett" and "Hollis" series descriptions for more information.

NEWPORT series consists of gently sloping to very steep, deep (5+ ft.), dark colored, well drained soils on drumlins in the Boston Basin. They formed in compact glacial till. Newport soils have friable silt loam surface soil and subsoil with moderate permeability over a firm or very firm fine sandy loam to loam substratum (hardpan) at a depth of 15 to 30 inches which has slow or very slow permeability. Newport soils have a very stony surface except where stones have been removed, and have stones below the surface. Major limitations are related to slow permeability in the substratum, slope and stoniness.

NEWPORT-URBAN LAND COMPLEX consists of undulating and rolling, very deep, well drained Newport soils and areas of urban land in the Boston basin. Although urban land development has altered the soils and landscapes in these areas, the soil can be identified at widely separated points, and the general nature of the areas can be can be determined. Broad delineations are made on the map. This map unit consists of about 50 percent Urban land and about 35 percent Newport soils and about 15 percent other soils. Urban land consists of streets, parking lots, buildings and other impermeable structures. For information on Newport soils see "Newport" series description.

OCCUM series consists of nearly level, deep (5+ ft.), well drained soils on floodplains. They formed in recent alluvium. Occum soils have fine sandy loam or sandy loam surface soil and subsoil with moderately rapid permeability or a loamy fine sand to sand substratum at 20 to 40 inches with rapid permeability. Major limitations are related to flooding.

PAXTON series consists of gently sloping to very steep, deep (5+ ft.), well drained soils on drumlins. They formed in compact glacial till. Paxton soils have friable fine sandy loam surface soil and subsoil with moderate permeability over a firm or very firm fine sandy loam substratum (hardpan) at 15 to 38 inches which has slow or very slow permeability. Paxton soils have a very stony or extremely stony surface, except where stones have been removed, and have stones below the surface. Major limitations are related to slow permeability in the substratum, slope and stoniness.

Appendix C

Pre-development Drainage Plan
(Scale: 1 inch = 50-ft)

Appendix D

Post-development Drainage Plan
(Scale: 1" = 50-ft)

Appendix E

HydroCAD Output

Front Middle Back

Drainage Diagram for 1269drain-pre2
Prepared by Foresite Engineering 11/16/2009

Area Listing (all nodes)

Area (acres)	CN	Description (subcats)
0.581	70	Woods, Good, HSG C (3S)
2.150	74	>75% Grass cover, Good, HSG C (1S,2S,3S)
2.731		

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Front Runoff Area=0.557 ac Runoff Depth>0.95"
Flow Length=230' Tc=4.8 min CN=74 Runoff=0.65 cfs 0.044 af

Subcatchment 2S: Middle Runoff Area=1.293 ac Runoff Depth>0.95"
Flow Length=345' Tc=5.9 min CN=74 Runoff=1.47 cfs 0.102 af

Subcatchment 3S: Back Runoff Area=0.881 ac Runoff Depth>0.79"
Flow Length=375' Tc=9.0 min CN=71 Runoff=0.73 cfs 0.058 af

Total Runoff Area = 2.731 ac **Runoff Volume = 0.204 af Average Runoff Depth = 0.90"**
100.00% Pervious Area = 2.731 ac **0.00% Impervious Area = 0.000 ac**

Subcatchment 1S: Front

Runoff = 0.65 cfs @ 12.08 hrs, Volume= 0.044 af, Depth> 0.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.20"

Area (ac)	CN	Description
0.557	74	>75% Grass cover, Good, HSG C
0.557		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.23		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
1.1	180	0.0300	2.79		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
4.8	230	Total			

Subcatchment 2S: Middle

Runoff = 1.47 cfs @ 12.10 hrs, Volume= 0.102 af, Depth> 0.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.20"

Area (ac)	CN	Description
1.293	74	>75% Grass cover, Good, HSG C
1.293		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.10"
1.6	295	0.0367	3.08		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
5.9	345	Total			

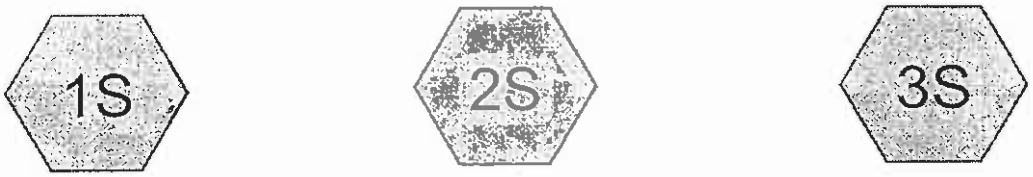
Subcatchment 3S: Back

Runoff = 0.73 cfs @ 12.15 hrs, Volume= 0.058 af, Depth> 0.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.20"

Area (ac)	CN	Description
0.581	70	Woods, Good, HSG C
0.300	74	>75% Grass cover, Good, HSG C
0.881	71	Weighted Average
0.881		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0600	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.10"
0.9	325	0.1380	5.98		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
9.0	375	Total			



Front Middle Back

Drainage Diagram for 1269drain-pre10
Prepared by Foresite Engineering 11/16/2009

Area Listing (all nodes)

Area (acres)	CN	Description (subcats)
0.881	70	Woods, Good, HSG C (3S)
1.850	74	>75% Grass cover, Good, HSG C (1S,2S)
2.731		

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Front Runoff Area=0.557 ac Runoff Depth>1.82"
Flow Length=230' Tc=4.8 min CN=74 Runoff=1.28 cfs 0.085 af

Subcatchment 2S: Middle Runoff Area=1.293 ac Runoff Depth>1.82"
Flow Length=345' Tc=5.9 min CN=74 Runoff=2.91 cfs 0.196 af

Subcatchment 3S: Back Runoff Area=0.881 ac Runoff Depth>1.53"
Flow Length=375' Tc=9.0 min CN=70 Runoff=1.48 cfs 0.113 af

Total Runoff Area = 2.731 ac Runoff Volume = 0.393 af Average Runoff Depth = 1.73"
100.00% Pervious Area = 2.731 ac 0.00% Impervious Area = 0.000 ac

Subcatchment 1S: Front

Runoff = 1.28 cfs @ 12.08 hrs, Volume= 0.085 af, Depth> 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=4.50"

Area (ac)	CN	Description
0.557	74	>75% Grass cover, Good, HSG C
0.557		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	50	0.0600	0.23		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.10"
1.1	180	0.0300	2.79		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
4.8	230	Total			

Subcatchment 2S: Middle

Runoff = 2.91 cfs @ 12.09 hrs, Volume= 0.196 af, Depth> 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=4.50"

Area (ac)	CN	Description
1.293	74	>75% Grass cover, Good, HSG C
1.293		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.10"
1.6	295	0.0367	3.08		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
5.9	345	Total			

Subcatchment 3S: Back

Runoff = 1.48 cfs @ 12.14 hrs, Volume= 0.113 af, Depth> 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=4.50"

Area (ac)	CN	Description
0.881	70	Woods, Good, HSG C
0.881		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0600	0.10		**Sheet Flow, Sheet Flow**
					Woods: Light underbrush n= 0.400 P2= 3.10"
0.9	325	0.1380	5.98		**Shallow Concentrated Flow, Shallow Conc**
					Unpaved Kv= 16.1 fps
9.0	375	Total			

Front Middle Back

Drainage Diagram **for 1269drain-pre100**
Prepared **by** Foresite **Engineering** 11/16/2009
HydroCAD® 8.00 **s/n** 001697 © 2008 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcats)
0.881	70	Woods, Good, HSG C (3S)
1.850	74	>75% Grass cover, Good, HSG C (1S,2S)
2.731		

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Front Runoff Area=0.557 ac Runoff Depth>3.45"
Flow Length=230' Tc=4.7 min CN=74 Runoff=2.46 cfs 0.160 af

Subcatchment 2S: Middle Runoff Area=1.293 ac Runoff Depth>3.45"
Flow Length=345' Tc=5.9 min CN=74 Runoff=5.51 cfs 0.371 af

Subcatchment 3S: Back Runoff Area=0.881 ac Runoff Depth>3.05"
Flow Length=375' Tc=8.8 min CN=70 Runoff=3.01 cfs 0.224 af

Total Runoff Area = 2.731 ac Runoff Volume = 0.756 af Average Runoff Depth = 3.32"
100.00% Pervious Area = 2.731 ac 0.00% Impervious Area = 0.000 ac

Subcatchment 1S: Front

Runoff = 2.46 cfs @ 12.07 hrs, Volume= 0.160 af, Depth> 3.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=6.60"

Area (ac)	CN	Description
0.557	74	>75% Grass cover, Good, HSG C
0.557		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	50	0.0600	0.23		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.20"
1.1	180	0.0300	2.79		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
4.7	230	Total			

Subcatchment 2S: Middle

Runoff = 5.51 cfs @ 12.09 hrs, Volume= 0.371 af, Depth> 3.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=6.60"

Area (ac)	CN	Description
1.293	74	>75% Grass cover, Good, HSG C
1.293		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.20		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.20"
1.6	295	0.0367	3.08		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
5.9	345	Total			

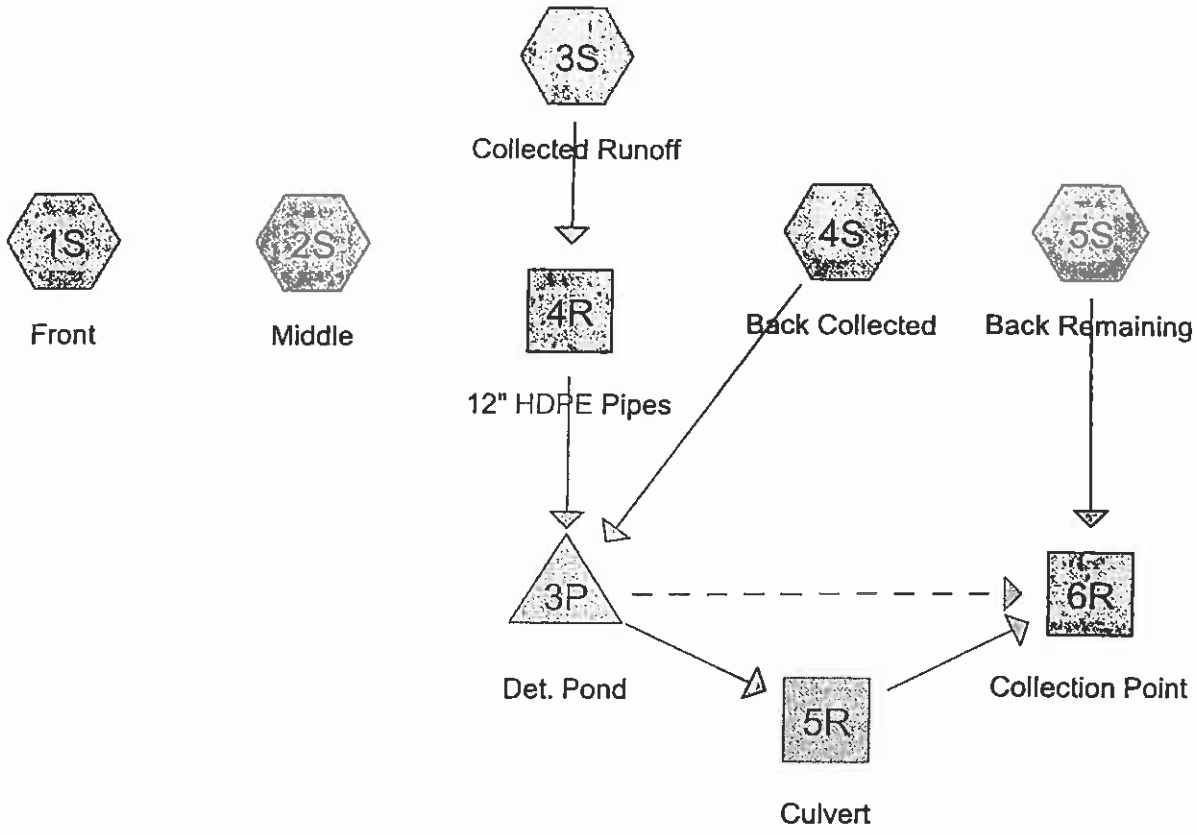
Subcatchment 3S: Back

Runoff = 3.01 cfs @ 12.13 hrs, Volume= 0.224 af, Depth> 3.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=6.60"

Area (ac)	CN	Description
0.881	70	Woods, Good, HSG C
0.881		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.0600	0.10		**Sheet Flow, Sheet Flow**
					Woods: Light underbrush n= 0.400 P2= 3.20"
0.9	325	0.1380	5.98		**Shallow Concentrated Flow, Shallow Conc**
					Unpaved Kv= **16.1** fps
8.8	375	Total			



Subcat Reach Pond Link

Drainage Diagram **for 1269drain-post2**
Prepared by Foresite Engineering **11/16/2009**
HydroCAD® 8.00 s/n 001697 © 2006 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcats)
0.127	70	Woods (5S)
0.120	70	Woods, Good, HSG C (4S)
1.514	74	>75% Grass cover, Good, HSG C (1S,2S,5S)
0.315	74	Lawn (3S,4S)
0.258	98	Impervious (3S)
0.280	98	Paved parking & roofs (2S)
0.056	98	Paved roads w/curbs & sewers (1S)
0.061	98	house (4S)
2.731		

Time span=2.00-20.00 hrs, dt=0.05 hrs, 361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Front Runoff Area=0.500 ac Runoff Depth>1.11"
Flow Length=280' Tc=6.9 min CN=77 Runoff=0.66 cfs 0.046 af

Subcatchment 2S: Middle Runoff Area=1.054 ac Runoff Depth>1.29"
Flow Length=250' Tc=11.0 min CN=80 Runoff=1.44 cfs 0.114 af

Subcatchment 3S: Collected Runoff Runoff Area=0.330 ac Runoff Depth>2.31"
Flow Length=230' Slope=0.0350 '/' Tc=3.4 min CN=93 Runoff=0.98 cfs 0.064 af

Subcatchment 4S: Back Collected Runoff Area=0.424 ac Runoff Depth>1.05"
Flow Length=375' Tc=8.0 min CN=76 Runoff=0.51 cfs 0.037 af

Subcatchment 5S: Back Remaining Runoff Area=0.423 ac Runoff Depth>0.89"
Flow Length=296' Tc=6.5 min CN=73 Runoff=0.44 cfs 0.032 af

Reach 4R: 12" HDPE Pipes Avg. Depth=0.21' Max Vel=8.26 fps Inflow=0.98 cfs 0.064 af
D=12.0" n=0.010 L=280.0' S=0.0500 '/' Capacity=10.36 cfs Outflow=0.94 cfs 0.064 af

Reach 5R: Culvert Avg. Depth=0.13' Max Vel=4.68 fps Inflow=0.28 cfs 0.099 af
D=12.0" n=0.010 L=27.0' S=0.0278 '/' Capacity=7.72 cfs Outflow=0.28 cfs 0.099 af

Reach 6R: Collection Point Inflow=0.67 cfs 0.131 af
Outflow=0.67 cfs 0.131 af

Pond 3P: Det. Pond Peak Elev=273.58' Storage=1,562 cf Inflow=1.38 cfs 0.101 af
Primary=0.28 cfs 0.099 af Secondary=0.00 cfs 0.000 af Outflow=0.28 cfs 0.099 af

Total Runoff Area = 2.731 ac Runoff Volume = 0.292 af Average Runoff Depth = 1.28"
76.02% Pervious Area = 2.076 ac 23.98% Impervious Area = 0.655 ac

Subcatchment 1S: Front

Runoff = 0.66 cfs @ 12.11 hrs, Volume= 0.046 af, Depth> 1.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.20"

Area (ac)	CN	Description
0.444	74	>75% Grass cover, Good, HSG C
0.056	98	Paved roads w/curbs & sewers
0.500	77	Weighted Average
0.444		Pervious Area
0.056		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.20"
1.3	230	0.0350	3.01		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
6.9	280	Total			

Subcatchment 2S: Middle

Runoff = 1.44 cfs @ 12.16 hrs, Volume= 0.114 af, Depth> 1.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.20"

Area (ac)	CN	Description
0.280	98	Paved parking & roofs
0.774	74	>75% Grass cover, Good, HSG C
1.054	80	Weighted Average
0.774		Pervious Area
0.280		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0050	0.09		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.20"
1.2	200	0.0300	2.79		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
11.0	250	Total			

Subcatchment 3S: Collected Runoff

Runoff = 0.98 cfs @ 12.05 hrs, Volume= 0.064 af, Depth> 2.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.20"

Area (ac)	CN	Description
0.258	98	Impervious
0.072	74	Lawn
0.330	93	Weighted Average
0.072		Pervious Area
0.258		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	25	0.0350	0.16		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.20"
0.8	205	0.0350	4.08	2.04	**Channel Flow, Gutter Flow** Area= 0.5 sf Perim= 6.0' r= 0.08' n= 0.013
3.4	230	Total			

Subcatchment 4S: Back Collected

Runoff = 0.51 cfs @ 12.12 hrs, Volume= 0.037 af, Depth> 1.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.20"

Area (ac)	CN	Description
0.120	70	Woods, Good, HSG C
0.243	74	Lawn
0.061	98	house
0.424	76	Weighted Average
0.363		Pervious Area
0.061		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
0.9	325	0.1500	6.24		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
8.0	375	Total			

Subcatchment 5S: Back Remaining

Runoff = 0.44 cfs @ 12.11 hrs, Volume= 0.032 af, Depth> 0.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.20"

Area (ac)	CN	Description
0.296	74	>75% Grass cover, Good, HSG C
0.127	70	Woods
0.423	73	Weighted Average
0.423		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.1400	0.15		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
0.8	246	0.1010	5.12		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
6.5	296	Total			

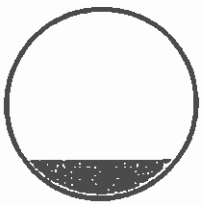
Reach 4R: 12" HDPE Pipes

Inflow Area = 0.330 ac, Inflow Depth > 2.31"
Inflow = 0.98 cfs @ 12.05 hrs, Volume= 0.064 af
Outflow = 0.94 cfs @ 12.07 hrs, Volume= 0.064 af, Atten= 5%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.26 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 2.82 fps, Avg. Travel Time= 1.7 min

Peak Storage= 33 cf @ 12.06 hrs, Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 10.36 cfs

12.0" Diameter Pipe, n= 0.010
Length= 280.0' Slope= 0.0500 '/'
Inlet Invert= 290.00', Outlet Invert= 276.00'



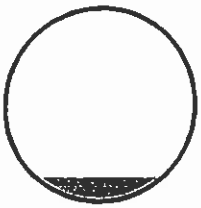
Reach 5R: Culvert

Inflow Area =	0.754 ac,	Inflow Depth >	1.58"	
Inflow =	0.28 cfs @	12.55 hrs, Volume=	0.099 af	
Outflow =	0.28 cfs @	12.56 hrs, Volume=	0.099 af,	Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.68 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.67 fps, Avg. Travel Time= 0.2 min

Peak Storage= 2 cf @ 12.55 hrs, Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.010
Length= 27.0' Slope= 0.0278 '/'
Inlet Invert= 271.25', Outlet Invert= 270.50'



Reach 6R: Collection Point

Inflow Area =	1.177 ac,	Inflow Depth >	1.33"	
Inflow =	0.67 cfs @	12.11 hrs, Volume=	0.131 af	
Outflow =	0.67 cfs @	12.11 hrs, Volume=	0.131 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs

Pond 3P: Det. Pond

Inflow Area =	0.754 ac,	Inflow Depth >	1.60"	
Inflow =	1.38 cfs @	12.09 hrs, Volume=	0.101 af	
Outflow =	0.28 cfs @	12.55 hrs, Volume=	0.099 af,	Atten= 79%, Lag= 27.9 min
Primary =	0.28 cfs @	12.55 hrs, Volume=	0.099 af	
Secondary =	0.00 cfs @	2.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 273.58' @ 12.55 hrs Surf.Area= 1,378 sf Storage= 1,562 cf

Plug-Flow detention time= 60.9 min calculated for 0.099 af (98% of inflow)
Center-of-Mass det. time= 54.1 min (835.4 - 781.3)

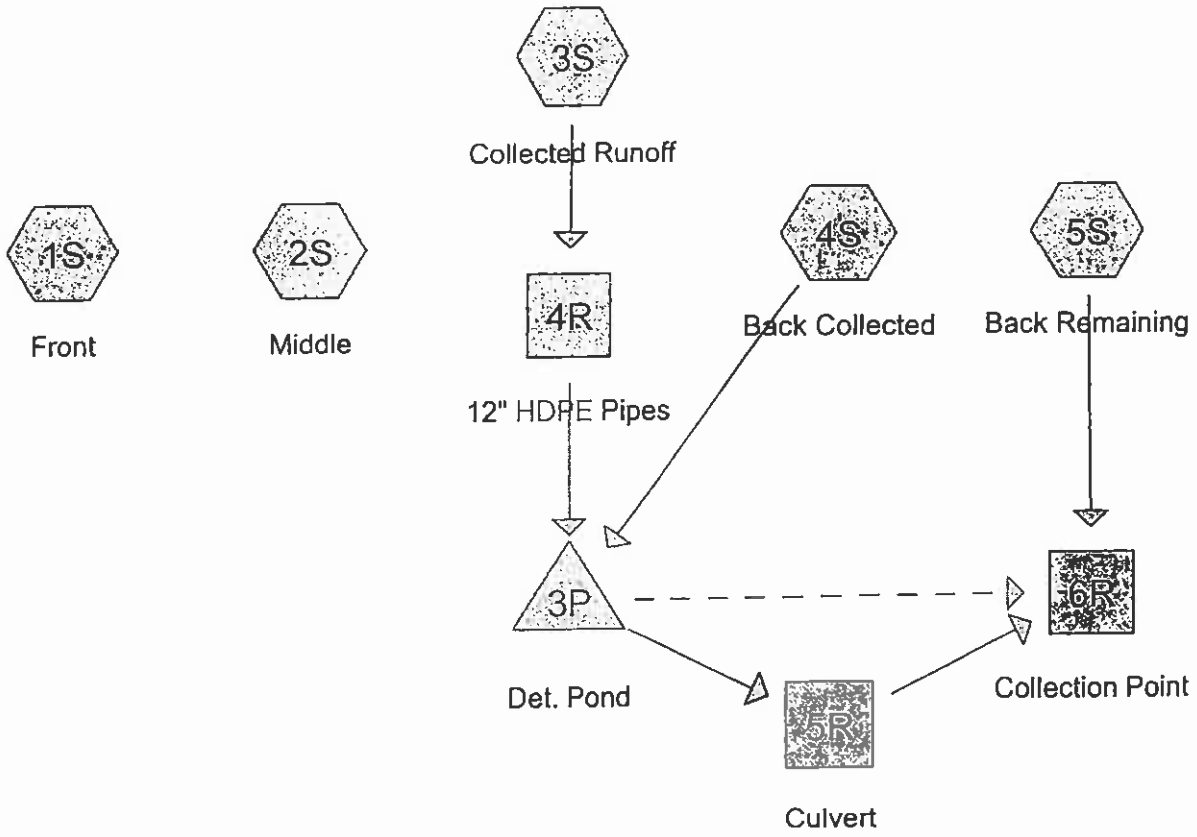
Volume	Invert	Avail.Storage	Storage Description
#1	272.00'	6,483 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
272.00	601	0	0
274.00	1,586	2,187	2,187
276.00	2,710	4,296	6,483

Device	Routing	Invert	Outlet Devices
#1	Primary	275.00'	**1.00' x 1.00' Horiz. Grate** Limited to weir flow C= 0.600
#2	Secondary	275.00'	**10.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#3	Primary	272.00'	**3.0" Vert. Orifice** C= 0.600

Primary **OutFlow** Max=0.28 cfs @ 12.55 hrs HW=273.58' (Free Discharge)
↑—**1=Grate** (Controls 0.00 cfs)
└—3=Orifice (Orifice Controls 0.28 cfs @ 5.80 fps)

Secondary **OutFlow** Max=0.00 cfs @ 2.00 hrs HW=272.00' (Free Discharge)
↑—2=Broad-Crested **Rectangular Weir** (Controls 0.00 cfs)



Subcat Reach Pond Link

Drainage Diagram for 1269drain-post10
Prepared by Foresite Engineering 11/16/2009
HydroCAD® 8.00 s/n 001697 © 2006 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcats)
0.127	70	Woods (5S)
0.120	70	Woods, Good, HSG C (4S)
1.514	74	>75% Grass cover, Good, HSG C (1S,2S,5S)
0.315	74	Lawn (3S,4S)
0.258	98	Impervious (3S)
0.280	98	Paved parking & roofs (2S)
0.056	98	Paved roads w/curbs & sewers (1S)
0.061	98	house (4S)
2.731		

Time span=2.00-20.00 hrs, dt=0.05 hrs, 361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Front Runoff Area=0.500 ac Runoff Depth>2.05"
Flow Length=280' Tc=6.9 min CN=77 Runoff=1.24 cfs 0.085 af

Subcatchment 2S: Middle Runoff Area=1.054 ac Runoff Depth>2.29"
Flow Length=250' Tc=11.0 min CN=80 Runoff=2.56 cfs 0.201 af

Subcatchment 3S: Collected Runoff Runoff Area=0.330 ac Runoff Depth>3.52"
Flow Length=230' Slope=0.0350 '/' Tc=3.4 min CN=93 Runoff=1.46 cfs 0.097 af

Subcatchment 4S: Back Collected Runoff Area=0.424 ac Runoff Depth>1.97"
Flow Length=375' Tc=8.0 min CN=76 Runoff=0.97 cfs 0.070 af

Subcatchment 5S: Back Remaining Runoff Area=0.423 ac Runoff Depth>1.75"
Flow Length=296' Tc=6.5 min CN=73 Runoff=0.90 cfs 0.062 af

Reach 4R: 12" HDPE Pipes Avg. Depth=0.25' Max Vel=9.27 fps Inflow=1.46 cfs 0.097 af
D=12.0" n=0.010 L=280.0' S=0.0500 '/' Capacity=10.36 cfs Outflow=1.39 cfs 0.097 af

Reach 5R: Culvert Avg. Depth=0.15' Max Vel=5.00 fps Inflow=0.36 cfs 0.164 af
D=12.0" n=0.010 L=27.0' S=0.0278 '/' Capacity=7.72 cfs Outflow=0.36 cfs 0.164 af

Reach 6R: Collection Point Inflow=1.19 cfs 0.226 af
Outflow=1.19 cfs 0.226 af

Pond 3P: Det. Pond Peak Elev=274.40' Storage=2,866 cf Inflow=2.25 cfs 0.166 af
Primary=0.36 cfs 0.164 af Secondary=0.00 cfs 0.000 af Outflow=0.36 cfs 0.164 af

Total Runoff Area = 2.731 ac Runoff Volume = 0.515 af Average Runoff Depth = 2.26"
76.02% Pervious Area = 2.076 ac 23.98% Impervious Area = 0.655 ac

Subcatchment 1S: Front

Runoff = 1.24 cfs @ 12.10 hrs, Volume= 0.085 af, Depth> 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=4.50"

Area (ac)	CN	Description
0.444	74	>75% Grass cover, Good, HSG C
0.056	98	Paved roads w/curbs & sewers
0.500	77	Weighted Average
0.444		Pervious Area
0.056		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.20"
1.3	230	0.0350	3.01		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
6.9	280	Total			

Subcatchment 2S: Middle

Runoff = 2.56 cfs @ 12.16 hrs, Volume= 0.201 af, Depth> 2.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=4.50"

Area (ac)	CN	Description
0.280	98	Paved parking & roofs
0.774	74	>75% Grass cover, Good, HSG C
1.054	80	Weighted Average
0.774		Pervious Area
0.280		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0050	0.09		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.20"
1.2	200	0.0300	2.79		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
11.0	250	Total			

Area Listing (all nodes)

Area (acres)	CN	Description (subcats)
0.127	70	Woods (5S)
0.120	70	Woods, Good, HSG C (4S)
1.514	74	>75% Grass cover, Good, HSG C (1S,2S,5S)
0.315	74	Lawn (3S,4S)
0.258	98	Impervious (3S)
0.280	98	Paved parking & roofs (2S)
0.056	98	Paved roads w/curbs & sewers (1S)
0.061	98	house (4S)
2.731		

Time span=2.00-20.00 hrs, dt=0.05 hrs, 361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Front Runoff Area=0.500 ac Runoff Depth>3.75"
Flow Length=280' Tc=6.9 min CN=77 Runoff=2.24 cfs 0.156 af

Subcatchment 2S: Middle Runoff Area=1.054 ac Runoff Depth>4.06"
Flow Length=250' Tc=11.0 min CN=80 Runoff=4.47 cfs 0.356 af

Subcatchment 3S: Collected Runoff Runoff Area=0.330 ac Runoff Depth>5.49"
Flow Length=230' Slope=0.0350 '/' Tc=3.4 min CN=93 Runoff=2.21 cfs 0.151 af

Subcatchment 4S: Back Collected Runoff Area=0.424 ac Runoff Depth>3.65"
Flow Length=375' Tc=8.0 min CN=76 Runoff=1.79 cfs 0.129 af

Subcatchment 5S: Back Remaining Runoff Area=0.423 ac Runoff Depth>3.35"
Flow Length=296' Tc=6.5 min CN=73 Runoff=1.72 cfs 0.118 af

Reach 4R: 12" HDPE Pipes Avg. Depth=0.31' Max Vel=10.46 fps Inflow=2.21 cfs 0.151 af
D=12.0" n=0.010 L=280.0' S=0.0500 '/' Capacity=10.36 cfs Outflow=2.13 cfs 0.151 af

Reach 5R: Culvert Avg. Depth=0.23' Max Vel=6.55 fps Inflow=0.89 cfs 0.255 af
D=12.0" n=0.010 L=27.0' S=0.0278 '/' Capacity=7.72 cfs Outflow=0.89 cfs 0.255 af

Reach 6R: Collection Point Inflow=2.54 cfs 0.393 af
Outflow=2.54 cfs 0.393 af

Pond 3P: Det. Pond Peak Elev=275.11' Storage=4,292 cf Inflow=3.72 cfs 0.280 af
Primary=0.89 cfs 0.255 af Secondary=0.87 cfs 0.020 af Outflow=1.75 cfs 0.275 af

Total Runoff Area = 2.731 ac Runoff Volume = 0.910 af Average Runoff Depth = 4.00"
76.02% Pervious Area = 2.076 ac 23.98% Impervious Area = 0.655 ac

Subcatchment 1S: Front

Runoff = 2.24 cfs @ 12.10 hrs, Volume= 0.156 af, Depth> 3.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=6.60"

Area (ac)	CN	Description
0.444	74	>75% Grass cover, Good, HSG C
0.056	98	Paved roads w/curbs & sewers
0.500	77	Weighted Average
0.444		Pervious Area
0.056		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.20"
1.3	230	0.0350	3.01		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
6.9	280	Total			

Subcatchment 2S: Middle

Runoff = 4.47 cfs @ 12.15 hrs, Volume= 0.356 af, Depth> 4.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=6.60"

Area (ac)	CN	Description
0.280	98	Paved parking & roofs
0.774	74	>75% Grass cover, Good, HSG C
1.054	80	Weighted Average
0.774		Pervious Area
0.280		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.8	50	0.0050	0.09		**Sheet Flow, Sheet Flow** Grass: Short n= 0.150 P2= 3.20"
1.2	200	0.0300	2.79		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
11.0	250	Total			

Subcatchment 3S: Collected Runoff

Runoff = 2.21 cfs @ 12.05 hrs, Volume= 0.151 af, Depth> 5.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=6.60"

Area (ac)	CN	Description
0.258	98	Impervious
0.072	74	Lawn
0.330	93	Weighted Average
0.072		Pervious Area
0.258		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	25	0.0350	0.16		**Sheet Flow, Sheet** Grass: Short n= 0.150 P2= 3.20"
0.8	205	0.0350	4.08	2.04	**Channel Flow, Gutter Flow** Area= 0.5 sf Perim= 6.0' r= 0.08' n= 0.013
3.4	230	Total			

Subcatchment 4S: Back Collected

Runoff = 1.79 cfs @ 12.11 hrs, Volume= 0.129 af, Depth> 3.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=6.60"

Area (ac)	CN	Description
0.120	70	Woods, Good, HSG C
0.243	74	Lawn
0.061	98	house
0.424	76	Weighted Average
0.363		Pervious Area
0.061		Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	50	0.0800	0.12		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
0.9	325	0.1500	6.24		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
8.0	375	Total			

Subcatchment 5S: Back Remaining

Runoff = 1.72 cfs @ 12.10 hrs, Volume= 0.118 af, Depth> 3.35"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=6.60"

Area (ac)	CN	Description
0.296	74	>75% Grass cover, Good, HSG C
0.127	70	Woods
0.423	73	Weighted Average
0.423		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.1400	0.15		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.20"
0.8	246	0.1010	5.12		**Shallow Concentrated Flow, Shallow Conc** Unpaved Kv= 16.1 fps
6.5	296	Total			

Reach 4R: 12" HDPE Pipes

Inflow Area = 0.330 ac, Inflow Depth > 5.49" 0.151 af
Inflow = 2.21 cfs @ 12.05 hrs, Volume=
Outflow = 2.13 cfs @ 12.06 hrs, Volume= 0.151 af, Atten= 4%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.46 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 3.52 fps, Avg. Travel Time= 1.3 min

Peak Storage= 59 cf @ 12.06 hrs, Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 10.36 cfs

12.0" Diameter Pipe, n= 0.010
Length= 280.0' Slope= 0.0500 '/'
Inlet Invert= 290.00', Outlet Invert= 276.00'

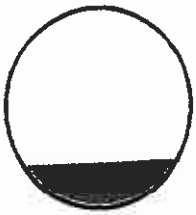
Reach 5R: Culvert

Inflow Area =	0.754 ac,	Inflow Depth > 4.05"	
Inflow =	0.89 cfs @	12.31 hrs, Volume=	0.255 af
Outflow =	0.89 cfs @	12.31 hrs, Volume=	0.255 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.55 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.50 fps, Avg. Travel Time= 0.1 min

Peak Storage= 4 cf @ 12.31 hrs, Average Depth at Peak Storage= 0.23'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 7.72 cfs

12.0" Diameter Pipe, n= 0.010
Length= 27.0' Slope= 0.0278 '/'
Inlet Invert= 271.25', Outlet Invert= 270.50'



Reach 6R: Collection Point

Inflow Area =	1.177 ac,	Inflow Depth > 4.00"	
Inflow =	2.54 cfs @	12.30 hrs, Volume=	0.393 af
Outflow =	2.54 cfs @	12.30 hrs, Volume=	0.393 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs

Pond 3P: Det. Pond

Inflow Area =	0.754 ac,	Inflow Depth > 4.45"	
Inflow =	3.72 cfs @	12.09 hrs, Volume=	0.280 af
Outflow =	1.75 cfs @	12.31 hrs, Volume=	0.275 af, Atten= 53%, Lag= 13.6 min
Primary =	0.89 cfs @	12.31 hrs, Volume=	0.255 af
Secondary =	0.87 cfs @	12.31 hrs, Volume=	0.020 af

Routing by Stor-Ind method, Time Span= 2.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 275.11' @ 12.31 hrs Surf.Area= 2,209 sf Storage= 4,292 cf

Plug-Flow detention time= 98.2 min calculated for 0.274 af (98% of inflow)
Center-of-Mass det. time= 90.5 min (852.7 - 762.2)

Volume	Invert	Avail.Storage	Storage Description
#1	272.00'	6,483 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc Store (cubic-feet)	Cum.Store (cubic-feet)
272.00	601	0	0
274.00	1,586	2,187	2,187
276.00	2,710	4,296	6,483

Device	Routing	Invert	Outlet Devices
#1	Primary	275.00'	**1.00' x 1.00' Horiz. Grate** Limited to weir flow C= 0.600
#2	Secondary	275.00'	**10.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#3	Primary	272.00'	**3.0" Vert. Orifice** C= 0.600

Primary OutFlow Max=0.86 cfs @ 12.31 hrs HW=275.11' (Free Discharge)
↑—**1=Grate** (Weir Controls 0.46 cfs @ 1.07 fps)
└—**3=Orifice** (Orifice Controls 0.41 cfs @ 8.31 fps)

Secondary OutFlow Max=0.83 cfs @ 12.31 hrs HW=275.11' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.83 cfs @ 0.77 fps)