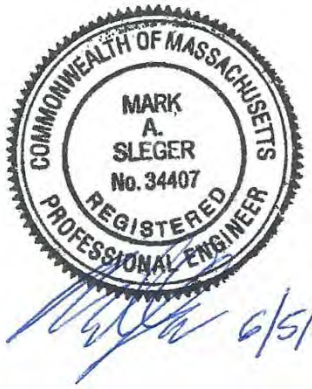
DEVELOPMENT IMPACT STATEMENT

SHERMAN TERRACE
WOBURN, MA

JUNE 5, 2020

PREPARED FOR:
ARNOLD T. PAULSON, Jr.
62 RICHARDSON DRIVE
FITCHBURG, MA 01462



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1.0 Existing Site Conditions

1.1 Project Location

The project site consists of the Sherman Terrace right of way and an existing residential lot on the south side of the right of way. Sherman Terrace is an existing variable width, private right of way off Sherman Place, approximately 650 feet northeast of Montvale Avenue. The residential lot contains 26,338 square feet of land and has frontage on both Sherman Place and Sherman Terrace. The parcel is identified as Assessor's Parcel 44-08-23.

The property is in the Single Family (R-1) zoning district and is not in any of the City's overlay districts. A Locus Map is provided in Appendix A.

1.2 Site Description and Current Use

The right of way is approximately 23 feet wide at west end, where it intersects Sherman Place, and narrows to less than 18 feet wide at the east end where it dead-ends. The total length of the right of way is approximately 240 feet. The street has a paved length of approximately 175 feet from the gutter line of Sherman Place, and ranges between 12 feet and 16 feet wide. Sherman Terrace currently provides access to two existing homes, 31 Sherman Place and 4 Sherman Terrace. Approximately 75 feet of the east end of Sherman Terrace was never constructed.

The subject property, 3 Sherman Terrace, contains a 3-bedroom single family residence. The driveway providing access to the house comes off Sherman Place at the southwest corner of the lot. The lot slopes downward southwesterly from Sherman Terrace with an average slope of approximately 12 percent. The lot is primarily lawn and has a small wooded area at the eastern end of the lot.

1.3 Utilities

There are no sewer, water, or gas mains within Sherman Terrace; however, individual sewer, water, and gas services for number 4 Sherman Terrace are located within the right of way. Overhead electric and telecommunications are on the north side of Sherman Terrace.

1.4 Environmental Resources

1.4.1 Wetland Resources

There are no wetland resource areas on or within 150 feet, or perennial streams within 200 feet of the subject property. Therefore; the site is not within the jurisdiction of the Woburn Conservation Commission.

1.4.2 Flood Plain

According the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map 25017C0407E, effective June 4, 2010, the site does not lie within a Zone A Special Flood Hazard Area. Additionally, the site is not located within a locally established flood plain.

1.4.3 Ground Water Protection District

According to Woburn GIS, the subject property is not located within the Groundwater Protection District Zone II.

2.0 Proposed Development

The proposed project is to subdivide the existing lot at 3 Sherman Terrace into 2 residential building lots. The existing house will be removed and two new homes will be constructed. The two new homes will have their driveways off Sherman Terrace.

Sherman Terrace will be widened to a 30-foot right of way for approximately 211 feet and will be reconstructed with 24 feet of pavement. A conventional cul-de-sac is not proposed; however, the last two driveways will be directly opposite each other to provide a tee-style turnaround. A second tee-turnaround, constructed with stabilized turf, is proposed between the two new homes.

2.1 Utilities

Public utilities available to the site are discussed in Section 1.3. Lot 1 will be serviced with overhead electric and telecommunications services while those services will be provided to lot 2 in underground conduits. Both new houses will have municipal sewer and natural gas services extended from Sherman Place. A utility easement will be provided along the southern side of lot 1 to service lot 2.

2.1.1 Water

A new 8-inch cement lined ductile iron water main will be installed along the southern side of Sherman Terrace and will end with a hydrant between lots 1 and 2. The existing water service for 4 Sherman Terrace and the two new homes will be serviced by the new main.

Water design flows are provided in 314 CMR 7.15. The design flow for residential developments is 110 gallons per day per bedroom. The removal of the existing 3-bedroom home and the addition of 2 new 4-bedroom homes will result in a net increase of 5 bedrooms. This will result in a net increase of 550 gallons per day of water supply demand. This increase is not expected to adversely impact the service in the surrounding neighborhood.

2.1.2 Sewer

The two new homes will be served by individual 6-inch SDR-35 PVC sewer services coming off the existing sewer main in Sherman Place. Sewer design flows are provided in 314 CMR 7.15 The design flow for residential developments is 110 gallons per day per bedroom, resulting in a net increase of 550 gallons per day from the two new homes.

2.2 Environmental Impacts

Since there are no wetland resource area or rivers within 200 feet of the site no environmental resource areas will be impacted by the site.

2.3 Storm Water Management

The project site is situated on the side of large hill that slopes downward in a southwesterly direction. A portion of the storm runoff that enters the site from the northeast is intercepted by Sherman Terrace and collected by the City drainage system via catch basin at the intersection Sherman Place and Sherman Terrace. The remainder of the runoff flows overland to the abutting properties to the southwest of the site. Pre development and post development drainage maps are provided in Appendix B.

The widening and lengthening of the road along with the redevelopment of the residential lot will create additional impervious areas which will, in turn, result in additional surface runoff from the site. In order to control the additional storm runoff a storm water management system has been designed to control the peak rate of runoff leaving the site. The system will include two subsurface storm water detention systems to control roadway runoff, and subsurface infiltration systems on each lot to collect roof runoff.

The reconstruction of Sherman Terrace will include two new deep sump catch basins, with each discharging to a subsurface storm water detention system. The storm water detention systems will be lined with a high density polyethylene barrier to prevent groundwater intrusion into the systems. The two detention systems will be connected in series and will store and slowly release storm water into the City drainage system in Sherman Place at a controlled rate so that existing system doesn't become overburdened.

A comparative analysis of post development storm runoff rates and pre development conditions was performed to ensure that the site will not adversely affect adjacent properties. The results of the analysis are provided in Table 1. As the results show post development peak runoff rates will be less than pre development conditions. Therefore, the development of the site will not adversely affect down-gradient properties or the City's existing drainage system. Complete drainage calculations are provided in Appendix C.

2.4 Street Ownership

Sherman Terrace is currently a private way, owned by the abutting properties; however, the City's Public Works Department plows the road in the winter. It is intended that Sherman Terrace will remain a private way, owned by the abutting properties. A homeowners' association will be established to maintain the street. The home owners' association will also be responsible for maintaining the roadway drainage in Sherman Terrace and the two subsurface storm water detention systems. The Public Works Department will continue to provide snow removal but will not be responsible for any other maintenance or repairs.

TABLE 1

Comparative Hydrologic Summary

Sherman Terrace

Woburn, MA

June 5, 2020

2 Year Storm - 3.1 inches

Point of Analysis	Pre Development	Post Development
	Peak Rate (c.f.s.)	Peak Rate (c.f.s.)
Runoff to Existing CB	1.09	0.85
Runoff to Southwest	0.45	0.37
Runoff to Southeast	0.30	0.26

10 Year Storm - 4.5 inches

Point of Analysis	Pre Development	Post Development
	Peak Rate (c.f.s.)	Peak Rate (c.f.s.)
Runoff to Existing CB	1.94	1.40
Runoff to Southwest	0.92	0.83
Runoff to Southeast	0.65	0.58

25 Year Storm - 5.4 inches

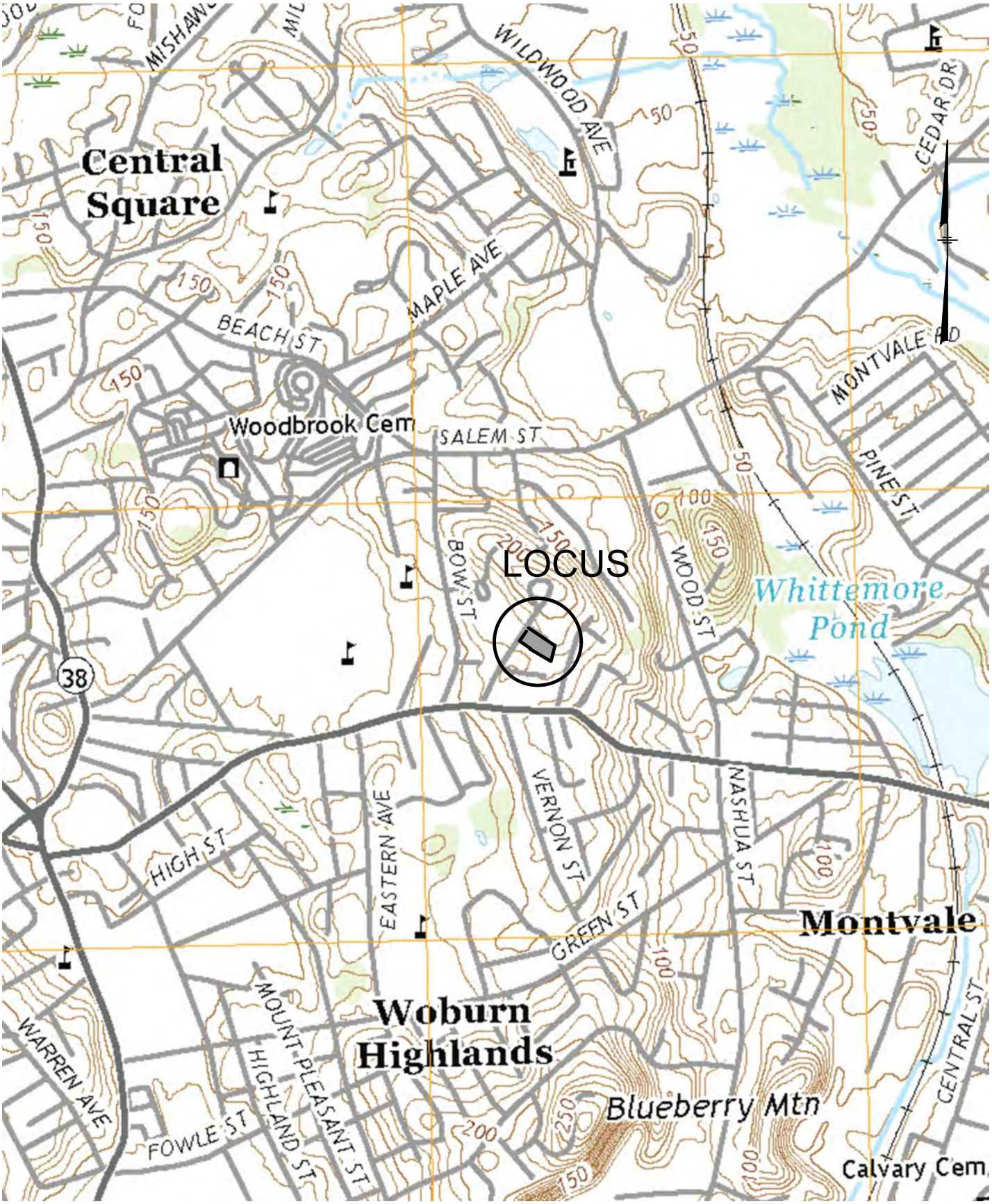
Point of Analysis	Pre Development	Post Development
	Peak Rate (c.f.s.)	Peak Rate (c.f.s.)
Runoff to Existing CB	2.50	1.77
Runoff to Southwest	1.25	1.11
Runoff to Southeast	0.90	0.77

100 Year Storm - 6.5 inches

Point of Analysis	Pre Development	Post Development
	Peak Rate (c.f.s.)	Peak Rate (c.f.s.)
Runoff to Existing CB	3.19	2.21
Runoff to Southwest	1.66	1.46
Runoff to Southeast	1.22	1.01

Appendix A

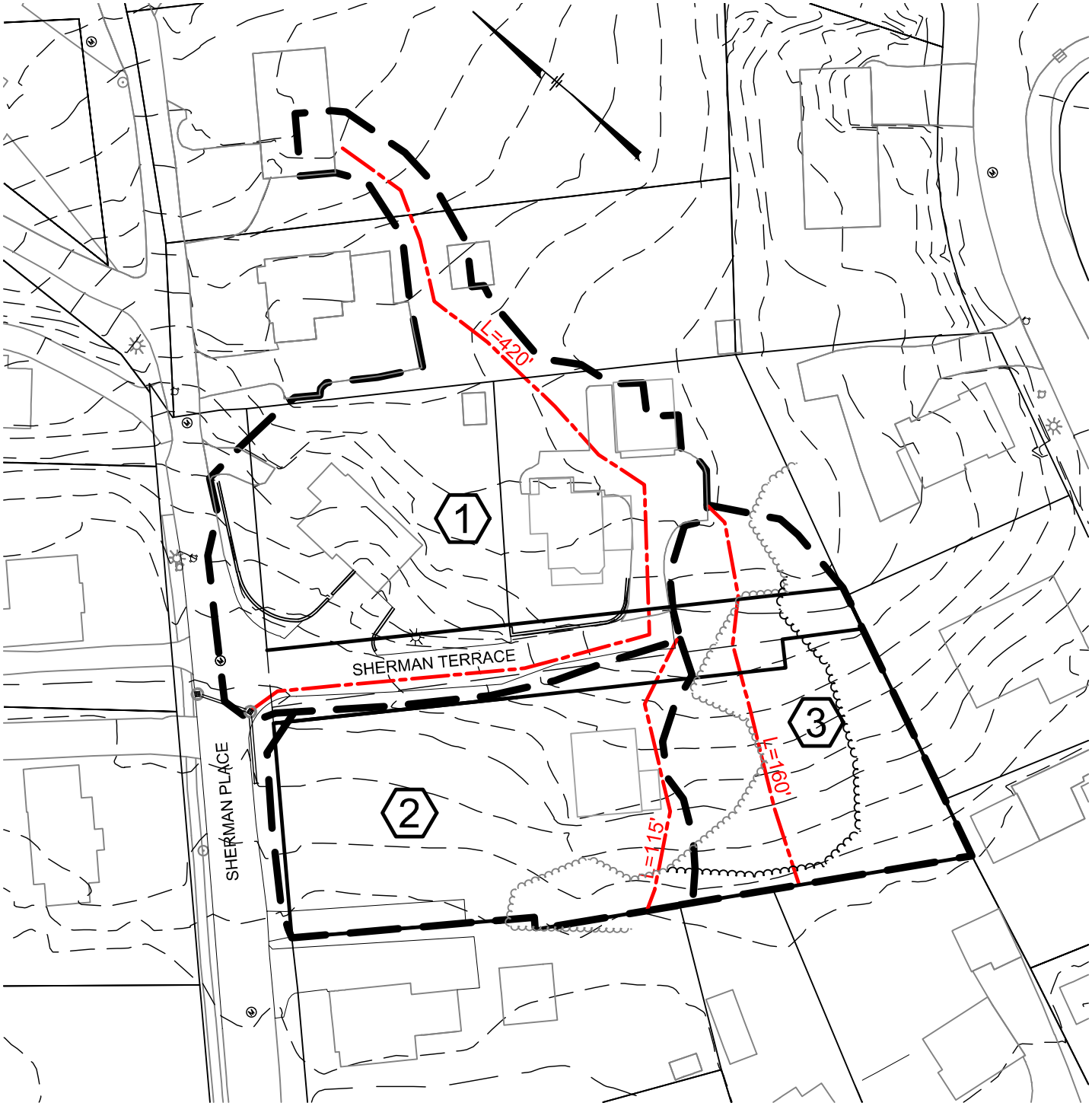
Locus Map



USGS LOCUS MAP SHERMAN TERRACE WOBURN, MA 01801	ALAN ENGINEERING, L.L.C. 110 WINN STREET, SUITE 209 WOBURN, MA 01801	JUNE 5, 2020 SCALE: 1"=1,000'

Appendix B

Pre Development and Post Development Drainage Maps



LEGEND

DRAINAGE AREA BOUNDARY

DRAINAGE AREA NUMBER 2

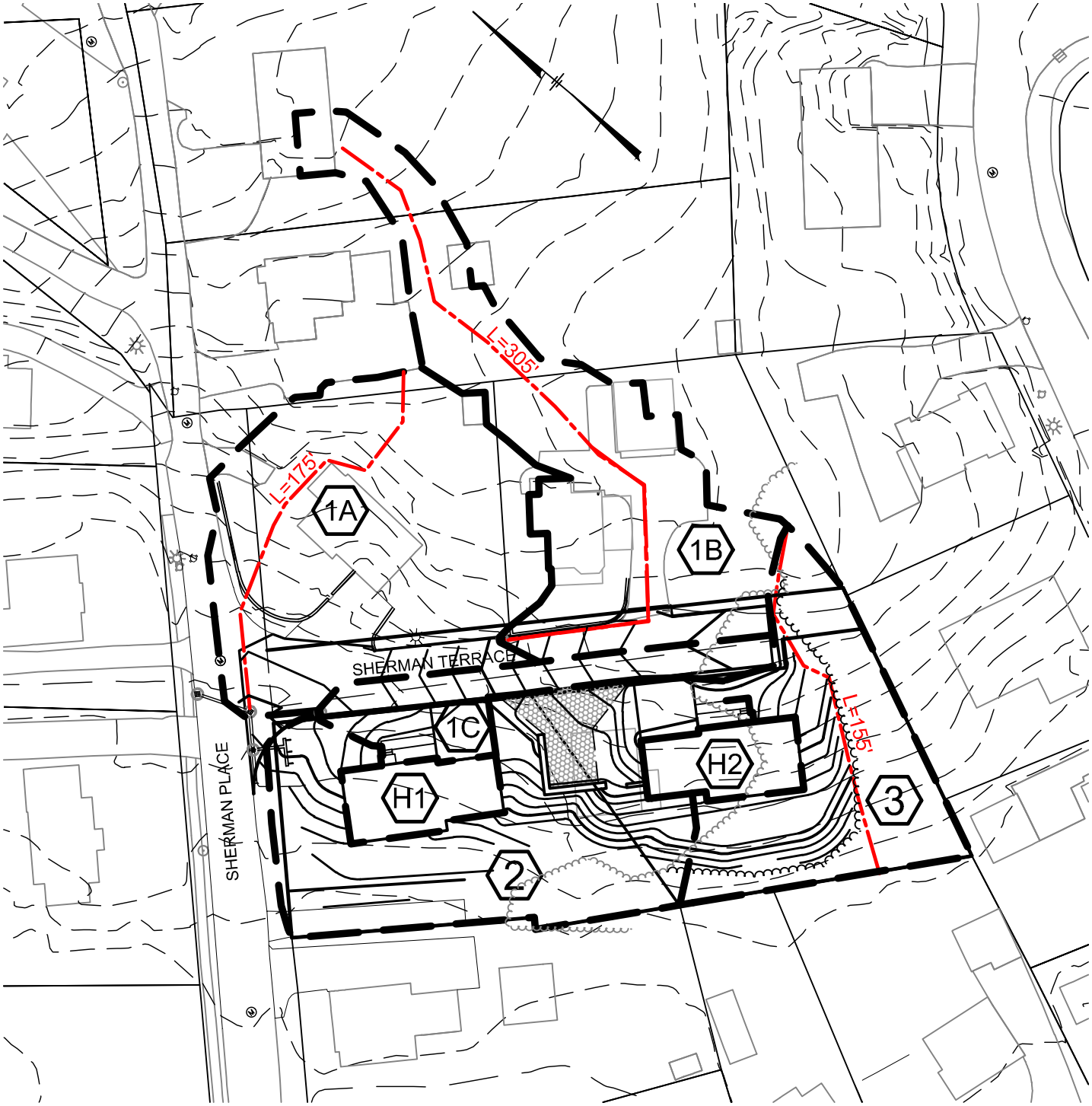
Tc FLOW PATH

PRE DEVELOPMENT DRAINAGE MAP
SHERMAN TERRACE
WOBURN, MA 01801

ALAN ENGINEERING, L.L.C.
110 WINN STREET, SUITE 209
WOBURN, MA 01801

JUNE 5, 2020

SCALE: 1"=60'



LEGEND

DRAINAGE AREA BOUNDARY

DRAINAGE AREA NUMBER 2

Tc FLOW PATH

POST DEVELOPMENT DRAINAGE MAP
SHERMAN TERRACE
WOBURN, MA 01801

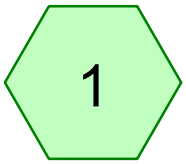
ALAN ENGINEERING, L.L.C.
110 WINN STREET, SUITE 209
WOBURN, MA 01801

JUNE 5, 2020

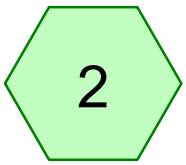
SCALE: 1"=60'

Appendix C

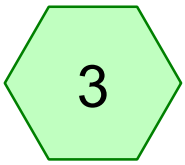
Drainage Calculations



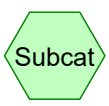
Exist CB

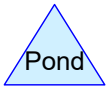


Southwest



Southeast





Routing Diagram for Pre Development
Prepared by ALAN Engineering, L.L.C.

Pre Development

Prepared by ALAN Engineering, L.L.C.

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
34,285	74	>75% Grass cover, Good, HSG C (1, 2, 3)
9,845	98	Paved parking, HSG C (1, 2)
1,745	98	Unconnected roofs, HSG C (1, 2)
10,940	72	Woods/grass comb., Good, HSG C (2, 3)
56,815	**79**	**TOTAL AREA**

Summary for Subcatchment 1: Exist CB

Runoff = 1.09 cfs @ 12.10 hrs, Volume= 3,507 cf, Depth> 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Storm Rainfall=3.10"

Area (sf)	CN	Description
17,780	74	>75% Grass cover, Good, HSG C
9,155	98	Paved parking, HSG C
645	98	Unconnected roofs, HSG C
27,580	83	Weighted Average
17,780		64.47% Pervious Area
9,800		35.53% Impervious Area
645		6.58% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
1.1	115	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	255	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.8	420	Total			

Summary for Subcatchment 2: Southwest

Runoff = 0.45 cfs @ 12.09 hrs, Volume= 1,454 cf, Depth> 1.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Storm Rainfall=3.10"

Area (sf)	CN	Description
690	98	Paved parking, HSG C
1,100	98	Unconnected roofs, HSG C
12,930	74	>75% Grass cover, Good, HSG C
1,410	72	Woods/grass comb., Good, HSG C
16,130	76	Weighted Average
14,340		88.90% Pervious Area
1,790		11.10% Impervious Area
1,100		61.45% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	50	0.1200	0.20		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.4	65	0.1200	2.42		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.5	115	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment 3: Southeast

Runoff = 0.30 cfs @ 12.10 hrs, Volume= 1,003 cf, Depth> 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Storm Rainfall=3.10"

Area (sf)	CN	Description
3,575	74	>75% Grass cover, Good, HSG C
9,530	72	Woods/grass comb., Good, HSG C
13,105	73	Weighted Average
13,105		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
1.1	110	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.9	160	Total			

Summary for Subcatchment 1: Exist CB

Runoff = 1.94 cfs @ 12.10 hrs, Volume= 6,258 cf, Depth> 2.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Storm Rainfall=4.50"

Area (sf)	CN	Description
17,780	74	>75% Grass cover, Good, HSG C
9,155	98	Paved parking, HSG C
645	98	Unconnected roofs, HSG C
27,580	83	Weighted Average
17,780		64.47% Pervious Area
9,800		35.53% Impervious Area
645		6.58% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
1.1	115	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	255	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.8	420	Total			

Summary for Subcatchment 2: Southwest

Runoff = 0.92 cfs @ 12.08 hrs, Volume= 2,861 cf, Depth> 2.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Storm Rainfall=4.50"

Area (sf)	CN	Description
690	98	Paved parking, HSG C
1,100	98	Unconnected roofs, HSG C
12,930	74	>75% Grass cover, Good, HSG C
1,410	72	Woods/grass comb., Good, HSG C
16,130	76	Weighted Average
14,340		88.90% Pervious Area
1,790		11.10% Impervious Area
1,100		61.45% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	50	0.1200	0.20		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.4	65	0.1200	2.42		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.5	115	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment 3: Southeast

Runoff = 0.65 cfs @ 12.10 hrs, Volume= 2,068 cf, Depth> 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Storm Rainfall=4.50"

Area (sf)	CN	Description
3,575	74	>75% Grass cover, Good, HSG C
9,530	72	Woods/grass comb., Good, HSG C
13,105	73	Weighted Average
13,105		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
1.1	110	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.9	160	Total			

Summary for Subcatchment 1: Exist CB

Runoff = 2.50 cfs @ 12.10 hrs, Volume= 8,124 cf, Depth> 3.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Storm Rainfall=5.40"

Area (sf)	CN	Description
17,780	74	>75% Grass cover, Good, HSG C
9,155	98	Paved parking, HSG C
645	98	Unconnected roofs, HSG C
27,580	83	Weighted Average
17,780		64.47% Pervious Area
9,800		35.53% Impervious Area
645		6.58% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
1.1	115	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	255	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.8	420	Total			

Summary for Subcatchment 2: Southwest

Runoff = 1.25 cfs @ 12.08 hrs, Volume= 3,853 cf, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Storm Rainfall=5.40"

Area (sf)	CN	Description
690	98	Paved parking, HSG C
1,100	98	Unconnected roofs, HSG C
12,930	74	>75% Grass cover, Good, HSG C
1,410	72	Woods/grass comb., Good, HSG C
16,130	76	Weighted Average
14,340		88.90% Pervious Area
1,790		11.10% Impervious Area
1,100		61.45% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	50	0.1200	0.20		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.4	65	0.1200	2.42		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.5	115	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment 3: Southeast

Runoff = 0.90 cfs @ 12.09 hrs, Volume= 2,835 cf, Depth> 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year Storm Rainfall=5.40"

Area (sf)	CN	Description
3,575	74	>75% Grass cover, Good, HSG C
9,530	72	Woods/grass comb., Good, HSG C
13,105	73	Weighted Average
13,105		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
1.1	110	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.9	160	Total			

Summary for Subcatchment 1: Exist CB

Runoff = 3.19 cfs @ 12.10 hrs, Volume= 10,465 cf, Depth> 4.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Storm Rainfall=6.50"

Area (sf)	CN	Description
17,780	74	>75% Grass cover, Good, HSG C
9,155	98	Paved parking, HSG C
645	98	Unconnected roofs, HSG C
27,580	83	Weighted Average
17,780		64.47% Pervious Area
9,800		35.53% Impervious Area
645		6.58% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
1.1	115	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	255	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.8	420	Total			

Summary for Subcatchment 2: Southwest

Runoff = 1.66 cfs @ 12.08 hrs, Volume= 5,125 cf, Depth> 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Storm Rainfall=6.50"

Area (sf)	CN	Description
690	98	Paved parking, HSG C
1,100	98	Unconnected roofs, HSG C
12,930	74	>75% Grass cover, Good, HSG C
1,410	72	Woods/grass comb., Good, HSG C
16,130	76	Weighted Average
14,340		88.90% Pervious Area
1,790		11.10% Impervious Area
1,100		61.45% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	50	0.1200	0.20		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.4	65	0.1200	2.42		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.5	115	Total, Increased to minimum Tc = 5.0 min			

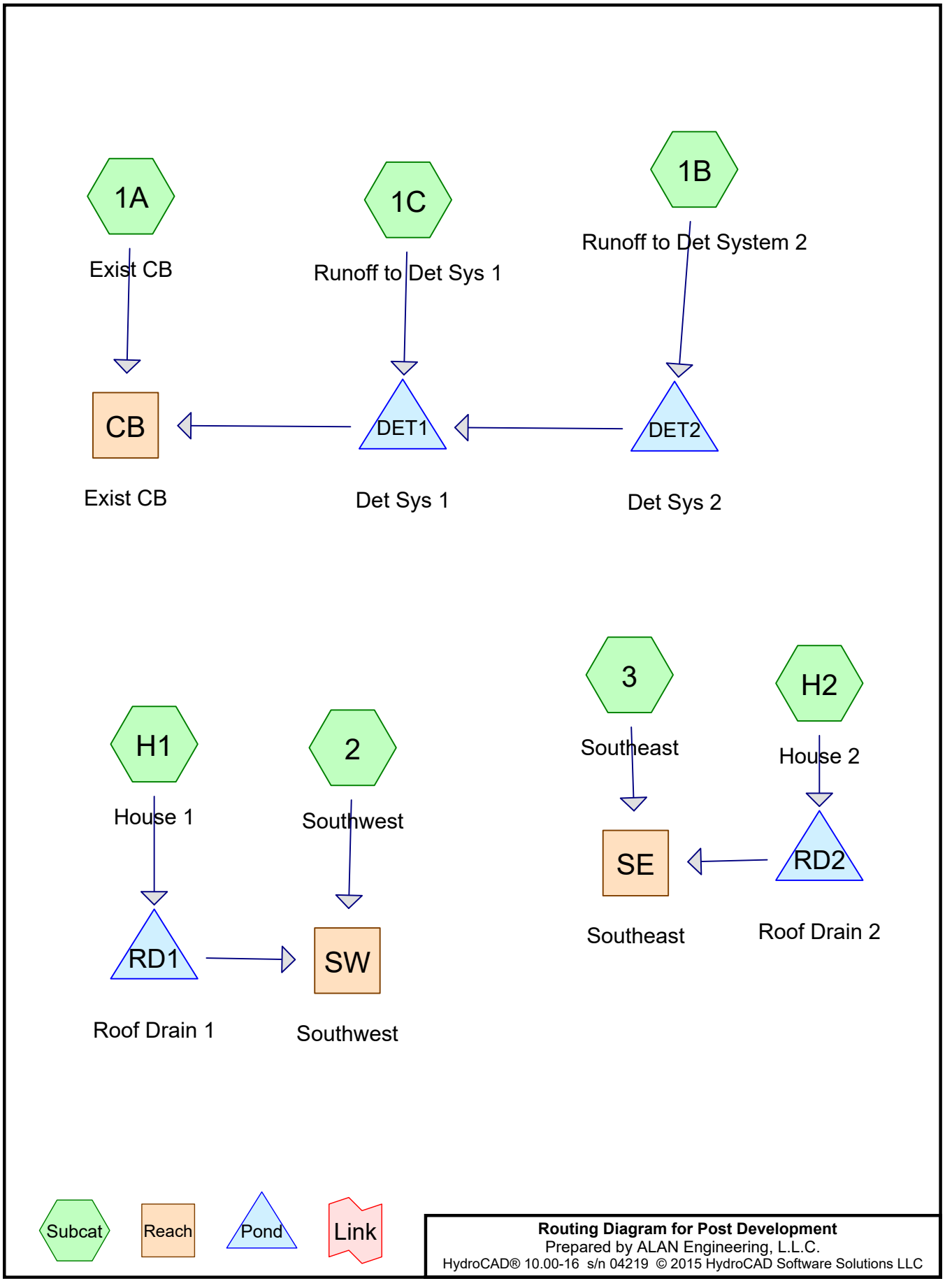
Summary for Subcatchment 3: Southeast

Runoff = 1.22 cfs @ 12.09 hrs, Volume= 3,827 cf, Depth> 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 Year Storm Rainfall=6.50"

Area (sf)	CN	Description
3,575	74	>75% Grass cover, Good, HSG C
9,530	72	Woods/grass comb., Good, HSG C
13,105	73	Weighted Average
13,105		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
1.1	110	0.1200	1.73		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.9	160	Total			



Routing Diagram for Post Development
Prepared by ALAN Engineering, L.L.C.

Post Development

Prepared by ALAN Engineering, L.L.C.

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
32,510	74	>75% Grass cover, Good, HSG C (1A, 1B, 1C, 2, 3)
10,405	98	Paved parking, HSG C (1A, 1B)
3,035	98	Paved roads w/curbs & sewers, HSG C (1C)
3,552	98	Roofs, HSG C (H1, H2)
600	98	Unconnected pavement, HSG C (2)
725	98	Unconnected roofs, HSG C (1A, 1B)
5,960	72	Woods/grass comb., Good, HSG C (2, 3)
56,787	**82**	**TOTAL AREA**

Summary for Subcatchment 1A: Exist CB

Runoff = 0.61 cfs @ 12.08 hrs, Volume= 1,853 cf, Depth> 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-Year Storm Rainfall=3.10"

Area (sf)	CN	Description
10,235	74	>75% Grass cover, Good, HSG C
205	98	Unconnected roofs, HSG C
4,820	98	Paved parking, HSG C
15,260	82	Weighted Average
10,235		67.07% Pervious Area
5,025		32.93% Impervious Area
205		4.08% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.1000	0.19		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.7	85	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.2	175	Total			

Summary for Subcatchment 1B: Runoff to Det System 2

Runoff = 0.58 cfs @ 12.09 hrs, Volume= 1,845 cf, Depth> 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-Year Storm Rainfall=3.10"

Area (sf)	CN	Description
7,145	74	>75% Grass cover, Good, HSG C
5,585	98	Paved parking, HSG C
520	98	Unconnected roofs, HSG C
13,250	85	Weighted Average
7,145		53.92% Pervious Area
6,105		46.08% Impervious Area
520		8.52% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
1.1	115	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.5	140	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.4	305	Total			

Summary for Subcatchment 1C: Runoff to Det Sys 1

Runoff = 0.24 cfs @ 12.07 hrs, Volume= 742 cf, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-Year Storm Rainfall=3.10"

Area (sf)	CN	Description
605	74	>75% Grass cover, Good, HSG C
3,035	98	Paved roads w/curbs & sewers, HSG C
3,640	94	Weighted Average
605		16.62% Pervious Area
3,035		83.38% Impervious Area

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

Summary for Subcatchment 2: Southwest

Runoff = 0.32 cfs @ 12.08 hrs, Volume= 1,024 cf, Depth> 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-Year Storm Rainfall=3.10"

Area (sf)	CN	Adj	Description
1,330	72		Woods/grass comb., Good, HSG C
10,725	74		>75% Grass cover, Good, HSG C
600	98		Unconnected pavement, HSG C
12,655	75	74	Weighted Average, UI Adjusted
12,055			95.26% Pervious Area
600			4.74% Impervious Area
600			100.00% Unconnected

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

Summary for Subcatchment 3: Southeast

Runoff = 0.19 cfs @ 12.09 hrs, Volume= 645 cf, Depth> 0.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-Year Storm Rainfall=3.10"

Area (sf)	CN	Description
4,630	72	Woods/grass comb., Good, HSG C
3,800	74	>75% Grass cover, Good, HSG C
8,430	73	Weighted Average
8,430		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.8	110	0.1200	2.42		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.6	160	Total			

Summary for Subcatchment H1: House 1

Runoff = 0.13 cfs @ 12.07 hrs, Volume= 424 cf, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-Year Storm Rainfall=3.10"

Area (sf)	CN	Description
1,776	98	Roofs, HSG C
1,776		100.00% Impervious Area

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

Summary for Subcatchment H2: House 2

Runoff = 0.13 cfs @ 12.07 hrs, Volume= 424 cf, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 2-Year Storm Rainfall=3.10"

Area (sf)	CN	Description
1,776	98	Roofs, HSG C
1,776		100.00% Impervious Area

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

Summary for Reach CB: Exist CB

Inflow Area = 32,150 sf, 44.06% Impervious, Inflow Depth > 1.65" for 2-Year Storm event
Inflow = 0.85 cfs @ 12.09 hrs, Volume= 4,413 cf
Outflow = 0.85 cfs @ 12.09 hrs, Volume= 4,413 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3

Summary for Reach SE: Southeast

Inflow Area = 10,206 sf, 17.40% Impervious, Inflow Depth > 1.04" for 2-Year Storm event
Inflow = 0.26 cfs @ 12.12 hrs, Volume= 887 cf
Outflow = 0.26 cfs @ 12.12 hrs, Volume= 887 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3

Summary for Reach SW: Southwest

Inflow Area = 14,431 sf, 16.46% Impervious, Inflow Depth > 1.05" for 2-Year Storm event
Inflow = 0.37 cfs @ 12.11 hrs, Volume= 1,267 cf
Outflow = 0.37 cfs @ 12.11 hrs, Volume= 1,267 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3

Summary for Pond DET1: Det Sys 1

Inflow Area = 16,890 sf, 54.11% Impervious, Inflow Depth > 1.83" for 2-Year Storm event
Inflow = 0.47 cfs @ 12.09 hrs, Volume= 2,574 cf
Outflow = 0.31 cfs @ 12.50 hrs, Volume= 2,560 cf, Atten= 35%, Lag= 24.6 min
Primary = 0.31 cfs @ 12.50 hrs, Volume= 2,560 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3
Peak Elev= 87.54' @ 12.50 hrs Surf.Area= 504 sf Storage= 320 cf

Plug-Flow detention time= 14.7 min calculated for 2,556 cf (99% of inflow)
Center-of-Mass det. time= 11.5 min (834.7 - 823.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	86.50'	450 cf	**16.00'W x 31.50'L x 3.54'H Field A** 1,785 cf Overall - 659 cf Embedded = 1,126 cf x 40.0% Voids
#2A	87.00'	659 cf	**Cultec R-330XLHD** x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,110 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	86.50'	**4.0" Round 4" Culvert** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 86.50' / 86.30' S= 0.0133 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Primary	88.20'	**10.0" Round 10" Culvert** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 88.20' / 88.00' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=0.31 cfs @ 12.50 hrs HW=87.54' TW=0.00' (Dynamic Tailwater)
└─**1=4" Culvert** (Inlet Controls 0.31 cfs @ 3.54 fps)
└─**2=10" Culvert** (Controls 0.00 cfs)

Summary for Pond DET2: Det Sys 2

Inflow Area = 13,250 sf, 46.08% Impervious, Inflow Depth > 1.67" for 2-Year Storm event
Inflow = 0.58 cfs @ 12.09 hrs, Volume= 1,845 cf
Outflow = 0.29 cfs @ 12.27 hrs, Volume= 1,833 cf, Atten= 50%, Lag= 10.6 min
Primary = 0.29 cfs @ 12.27 hrs, Volume= 1,833 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3
Peak Elev= 92.44' @ 12.27 hrs Surf.Area= 504 sf Storage= 280 cf

Plug-Flow detention time= 14.7 min calculated for 1,833 cf (99% of inflow)
Center-of-Mass det. time= 10.7 min (838.0 - 827.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	91.50'	450 cf	**16.00'W x 31.50'L x 3.54'H Field A** 1,785 cf Overall - 659 cf Embedded = 1,126 cf x 40.0% Voids
#2A	92.00'	659 cf	**Cultec R-330XLHD** x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,110 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	90.00'	**12.0" Round 12" Culvert** L= 77.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 90.00' / 87.00' S= 0.0390 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	91.50'	**4.0" Round 4" Culvert** L= 6.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 91.50' / 91.40' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#3	Device 1	93.50'	**10.0" Round 10" Culvert** L= 6.0' CPP, projecting, no headwall, Ke= 0.900

Inlet / Outlet Invert= 93.50' / 93.40' S= 0.0167 '/' Cc= 0.900
n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=0.29 cfs @ 12.27 hrs HW=92.44' TW=87.44' (Dynamic Tailwater)
└**1=12" Culvert** (Passes 0.29 cfs of 5.26 cfs potential flow)
└**2=4" Culvert** (Inlet Controls 0.29 cfs @ 3.33 fps)
└**3=10" Culvert** (Controls 0.00 cfs)

Summary for Pond RD1: Roof Drain 1

Inflow Area = 1,776 sf,100.00% Impervious, Inflow Depth > 2.87" for 2-Year Storm event
Inflow = 0.13 cfs @ 12.07 hrs, Volume= 424 cf
Outflow = 0.08 cfs @ 12.16 hrs, Volume= 242 cf, Atten= 33%, Lag= 5.4 min
Primary = 0.08 cfs @ 12.16 hrs, Volume= 242 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3
Peak Elev= 1.73' @ 12.16 hrs Surf.Area= 208 sf Storage= 207 cf

Plug-Flow detention time= 224.3 min calculated for 242 cf (57% of inflow)
Center-of-Mass det. time= 112.7 min (868.5 - 755.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	167 cf	**4.75'W x 43.75'L x 2.54'H Field A** 528 cf Overall - 111 cf Embedded = 418 cf x 40.0% Voids
#2A	0.50'	111 cf	**Cultec R-150XLHD** x 4 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 1 rows
		278 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	1.50'	**4.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1.50' / 1.40' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.08 cfs @ 12.16 hrs HW=1.73' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.08 cfs @ 1.29 fps)

Summary for Pond RD2: Roof Drain 2

Inflow Area = 1,776 sf,100.00% Impervious, Inflow Depth > 2.87" for 2-Year Storm event
Inflow = 0.13 cfs @ 12.07 hrs, Volume= 424 cf
Outflow = 0.08 cfs @ 12.16 hrs, Volume= 242 cf, Atten= 33%, Lag= 5.4 min
Primary = 0.08 cfs @ 12.16 hrs, Volume= 242 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3

Peak Elev= 1.73' @ 12.16 hrs Surf.Area= 208 sf Storage= 207 cf

Plug-Flow detention time= 224.3 min calculated for 242 cf (57% of inflow)
Center-of-Mass det. time= 112.7 min (868.5 - 755.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	167 cf	**4.75'W x 43.75'L x 2.54'H Field A** 528 cf Overall - 111 cf Embedded = 418 cf x 40.0% Voids
#2A	0.50'	111 cf	**Cultec R-150XLHD** x 4 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 1 rows
		278 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	1.50'	**4.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1.50' / 1.40' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.08 cfs @ 12.16 hrs HW=1.73' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.08 cfs @ 1.29 fps)

Summary for Subcatchment 1A: Exist CB

Runoff = 1.10 cfs @ 12.08 hrs, Volume= 3,350 cf, Depth> 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Storm Rainfall=4.50"

Area (sf)	CN	Description
10,235	74	>75% Grass cover, Good, HSG C
205	98	Unconnected roofs, HSG C
4,820	98	Paved parking, HSG C
15,260	82	Weighted Average
10,235		67.07% Pervious Area
5,025		32.93% Impervious Area
205		4.08% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.1000	0.19		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.7	85	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.2	175	Total			

Summary for Subcatchment 1B: Runoff to Det System 2

Runoff = 1.01 cfs @ 12.09 hrs, Volume= 3,209 cf, Depth> 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Storm Rainfall=4.50"

Area (sf)	CN	Description
7,145	74	>75% Grass cover, Good, HSG C
5,585	98	Paved parking, HSG C
520	98	Unconnected roofs, HSG C
13,250	85	Weighted Average
7,145		53.92% Pervious Area
6,105		46.08% Impervious Area
520		8.52% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
1.1	115	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.5	140	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.4	305	Total			

Summary for Subcatchment 1C: Runoff to Det Sys 1

Runoff = 0.36 cfs @ 12.07 hrs, Volume= 1,157 cf, Depth> 3.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Storm Rainfall=4.50"

Area (sf)	CN	Description
605	74	>75% Grass cover, Good, HSG C
3,035	98	Paved roads w/curbs & sewers, HSG C
3,640	94	Weighted Average
605		16.62% Pervious Area
3,035		83.38% Impervious Area

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

Summary for Subcatchment 2: Southwest

Runoff = 0.68 cfs @ 12.08 hrs, Volume= 2,078 cf, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Storm Rainfall=4.50"

Area (sf)	CN	Adj	Description
1,330	72		Woods/grass comb., Good, HSG C
10,725	74		>75% Grass cover, Good, HSG C
600	98		Unconnected pavement, HSG C
12,655	75	74	Weighted Average, UI Adjusted
12,055			95.26% Pervious Area
600			4.74% Impervious Area
600			100.00% Unconnected

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

Summary for Subcatchment 3: Southeast

Runoff = 0.43 cfs @ 12.09 hrs, Volume= 1,330 cf, Depth> 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Storm Rainfall=4.50"

Area (sf)	CN	Description
4,630	72	Woods/grass comb., Good, HSG C
3,800	74	>75% Grass cover, Good, HSG C
8,430	73	Weighted Average
8,430		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.8	110	0.1200	2.42		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.6	160	Total			

Summary for Subcatchment H1: House 1

Runoff = 0.18 cfs @ 12.07 hrs, Volume= 631 cf, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Storm Rainfall=4.50"

Area (sf)	CN	Description
1,776	98	Roofs, HSG C
1,776		100.00% Impervious Area

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

Summary for Subcatchment H2: House 2

Runoff = 0.18 cfs @ 12.07 hrs, Volume= 631 cf, Depth> 4.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 10-Year Storm Rainfall=4.50"

Area (sf)	CN	Description
1,776	98	Roofs, HSG C
1,776		100.00% Impervious Area

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

Summary for Reach CB: Exist CB

Inflow Area = 32,150 sf, 44.06% Impervious, Inflow Depth > 2.87" for 10-Year Storm event
Inflow = 1.40 cfs @ 12.08 hrs, Volume= 7,682 cf
Outflow = 1.40 cfs @ 12.08 hrs, Volume= 7,682 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3

Summary for Reach SE: Southeast

Inflow Area = 10,206 sf, 17.40% Impervious, Inflow Depth > 2.09" for 10-Year Storm event
Inflow = 0.58 cfs @ 12.09 hrs, Volume= 1,779 cf
Outflow = 0.58 cfs @ 12.09 hrs, Volume= 1,779 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3

Summary for Reach SW: Southwest

Inflow Area = 14,431 sf, 16.46% Impervious, Inflow Depth > 2.10" for 10-Year Storm event
Inflow = 0.83 cfs @ 12.08 hrs, Volume= 2,526 cf
Outflow = 0.83 cfs @ 12.08 hrs, Volume= 2,526 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3

Summary for Pond DET1: Det Sys 1

Inflow Area = 16,890 sf, 54.11% Impervious, Inflow Depth > 3.09" for 10-Year Storm event
Inflow = 0.68 cfs @ 12.09 hrs, Volume= 4,350 cf
Outflow = 0.42 cfs @ 12.61 hrs, Volume= 4,333 cf, Atten= 39%, Lag= 31.0 min
Primary = 0.42 cfs @ 12.61 hrs, Volume= 4,333 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3
Peak Elev= 88.23' @ 12.61 hrs Surf.Area= 504 sf Storage= 594 cf

Plug-Flow detention time= 16.7 min calculated for 4,333 cf (100% of inflow)
Center-of-Mass det. time= 14.2 min (825.7 - 811.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	86.50'	450 cf	**16.00'W x 31.50'L x 3.54'H Field A** 1,785 cf Overall - 659 cf Embedded = 1,126 cf x 40.0% Voids
#2A	87.00'	659 cf	**Cultec R-330XLHD** x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,110 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	86.50'	**4.0" Round 4" Culvert** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 86.50' / 86.30' S= 0.0133 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Primary	88.20'	**10.0" Round 10" Culvert** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 88.20' / 88.00' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=0.42 cfs @ 12.61 hrs HW=88.23' TW=0.00' (Dynamic Tailwater)
↑—**1=4" Culvert** (Inlet Controls 0.41 cfs @ 4.75 fps)
└—**2=10" Culvert** (Inlet Controls 0.00 cfs @ 0.46 fps)

Summary for Pond DET2: Det Sys 2

Inflow Area = 13,250 sf, 46.08% Impervious, Inflow Depth > 2.91" for 10-Year Storm event
Inflow = 1.01 cfs @ 12.09 hrs, Volume= 3,209 cf
Outflow = 0.42 cfs @ 12.33 hrs, Volume= 3,194 cf, Atten= 58%, Lag= 14.0 min
Primary = 0.42 cfs @ 12.33 hrs, Volume= 3,194 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3
Peak Elev= 93.26' @ 12.33 hrs Surf.Area= 504 sf Storage= 604 cf

Plug-Flow detention time= 16.2 min calculated for 3,188 cf (99% of inflow)
Center-of-Mass det. time= 13.3 min (824.7 - 811.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	91.50'	450 cf	**16.00'W x 31.50'L x 3.54'H Field A** 1,785 cf Overall - 659 cf Embedded = 1,126 cf x 40.0% Voids
#2A	92.00'	659 cf	**Cultec R-330XLHD** x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,110 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	90.00'	**12.0" Round 12" Culvert** L= 77.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 90.00' / 87.00' S= 0.0390 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	91.50'	**4.0" Round 4" Culvert** L= 6.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 91.50' / 91.40' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#3	Device 1	93.50'	**10.0" Round 10" Culvert** L= 6.0' CPP, projecting, no headwall, Ke= 0.900

Inlet / Outlet Invert= 93.50' / 93.40' S= 0.0167 '/' Cc= 0.900
n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=0.42 cfs @ 12.33 hrs HW=93.26' TW=88.03' (Dynamic Tailwater)
└**1=12" Culvert** (Passes 0.42 cfs of 6.28 cfs potential flow)
└**2=4" Culvert** (Inlet Controls 0.42 cfs @ 4.79 fps)
└**3=10" Culvert** (Controls 0.00 cfs)

Summary for Pond RD1: Roof Drain 1

Inflow Area = 1,776 sf,100.00% Impervious, Inflow Depth > 4.26" for 10-Year Storm event
Inflow = 0.18 cfs @ 12.07 hrs, Volume= 631 cf
Outflow = 0.16 cfs @ 12.12 hrs, Volume= 448 cf, Atten= 15%, Lag= 2.9 min
Primary = 0.16 cfs @ 12.12 hrs, Volume= 448 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3
Peak Elev= 1.89' @ 12.12 hrs Surf.Area= 208 sf Storage= 223 cf

Plug-Flow detention time= 178.9 min calculated for 447 cf (71% of inflow)
Center-of-Mass det. time= 87.2 min (835.7 - 748.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	167 cf	**4.75'W x 43.75'L x 2.54'H Field A** 528 cf Overall - 111 cf Embedded = 418 cf x 40.0% Voids
#2A	0.50'	111 cf	**Cultec R-150XLHD** x 4 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 1 rows
		278 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	1.50'	**4.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1.50' / 1.40' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.16 cfs @ 12.12 hrs HW=1.89' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.16 cfs @ 1.78 fps)

Summary for Pond RD2: Roof Drain 2

Inflow Area = 1,776 sf,100.00% Impervious, Inflow Depth > 4.26" for 10-Year Storm event
Inflow = 0.18 cfs @ 12.07 hrs, Volume= 631 cf
Outflow = 0.16 cfs @ 12.12 hrs, Volume= 448 cf, Atten= 15%, Lag= 2.9 min
Primary = 0.16 cfs @ 12.12 hrs, Volume= 448 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3

Peak Elev= 1.89' @ 12.12 hrs Surf.Area= 208 sf Storage= 223 cf

Plug-Flow detention time= 178.9 min calculated for 447 cf (71% of inflow)
Center-of-Mass det. time= 87.2 min (835.7 - 748.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	167 cf	**4.75'W x 43.75'L x 2.54'H Field A** 528 cf Overall - 111 cf Embedded = 418 cf x 40.0% Voids
#2A	0.50'	111 cf	**Cultec R-150XLHD** x 4 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 1 rows
		278 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	1.50'	**4.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1.50' / 1.40' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.16 cfs @ 12.12 hrs HW=1.89' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.16 cfs @ 1.78 fps)

Summary for Subcatchment 1A: Exist CB

Runoff = 1.43 cfs @ 12.08 hrs, Volume= 4,370 cf, Depth> 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25-Year Storm Rainfall=5.40"

Area (sf)	CN	Description
10,235	74	>75% Grass cover, Good, HSG C
205	98	Unconnected roofs, HSG C
4,820	98	Paved parking, HSG C
15,260	82	Weighted Average
10,235		67.07% Pervious Area
5,025		32.93% Impervious Area
205		4.08% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.1000	0.19		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.7	85	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.2	175	Total			

Summary for Subcatchment 1B: Runoff to Det System 2

Runoff = 1.28 cfs @ 12.09 hrs, Volume= 4,125 cf, Depth> 3.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25-Year Storm Rainfall=5.40"

Area (sf)	CN	Description
7,145	74	>75% Grass cover, Good, HSG C
5,585	98	Paved parking, HSG C
520	98	Unconnected roofs, HSG C
13,250	85	Weighted Average
7,145		53.92% Pervious Area
6,105		46.08% Impervious Area
520		8.52% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
1.1	115	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.5	140	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.4	305	Total			

Summary for Subcatchment 1C: Runoff to Det Sys 1

Runoff = 0.44 cfs @ 12.07 hrs, Volume= 1,426 cf, Depth> 4.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25-Year Storm Rainfall=5.40"

Area (sf)	CN	Description
605	74	>75% Grass cover, Good, HSG C
3,035	98	Paved roads w/curbs & sewers, HSG C
3,640	94	Weighted Average
605		16.62% Pervious Area
3,035		83.38% Impervious Area

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

Summary for Subcatchment 2: Southwest

Runoff = 0.94 cfs @ 12.08 hrs, Volume= 2,832 cf, Depth> 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25-Year Storm Rainfall=5.40"

Area (sf)	CN	Adj	Description
1,330	72		Woods/grass comb., Good, HSG C
10,725	74		>75% Grass cover, Good, HSG C
600	98		Unconnected pavement, HSG C
12,655	75	74	Weighted Average, UI Adjusted
12,055			95.26% Pervious Area
600			4.74% Impervious Area
600			100.00% Unconnected

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

Summary for Subcatchment 3: Southeast

Runoff = 0.59 cfs @ 12.09 hrs, Volume= 1,824 cf, Depth> 2.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25-Year Storm Rainfall=5.40"

Area (sf)	CN	Description
4,630	72	Woods/grass comb., Good, HSG C
3,800	74	>75% Grass cover, Good, HSG C
8,430	73	Weighted Average
8,430		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.8	110	0.1200	2.42		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.6	160	Total			

Summary for Subcatchment H1: House 1

Runoff = 0.22 cfs @ 12.07 hrs, Volume= 764 cf, Depth> 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25-Year Storm Rainfall=5.40"

Area (sf)	CN	Description
1,776	98	Roofs, HSG C
1,776		100.00% Impervious Area

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

Summary for Subcatchment H2: House 2

Runoff = 0.22 cfs @ 12.07 hrs, Volume= 764 cf, Depth> 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 25-Year Storm Rainfall=5.40"

Area (sf)	CN	Description
1,776	98	Roofs, HSG C
1,776		100.00% Impervious Area

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

Summary for Reach CB: Exist CB

Inflow Area = 32,150 sf, 44.06% Impervious, Inflow Depth > 3.69" for 25-Year Storm event
Inflow = 1.77 cfs @ 12.08 hrs, Volume= 9,885 cf
Outflow = 1.77 cfs @ 12.08 hrs, Volume= 9,885 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3

Summary for Reach SE: Southeast

Inflow Area = 10,206 sf, 17.40% Impervious, Inflow Depth > 2.83" for 25-Year Storm event
Inflow = 0.77 cfs @ 12.09 hrs, Volume= 2,404 cf
Outflow = 0.77 cfs @ 12.09 hrs, Volume= 2,404 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3

Summary for Reach SW: Southwest

Inflow Area = 14,431 sf, 16.46% Impervious, Inflow Depth > 2.84" for 25-Year Storm event
Inflow = 1.11 cfs @ 12.08 hrs, Volume= 3,412 cf
Outflow = 1.11 cfs @ 12.08 hrs, Volume= 3,412 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3

Summary for Pond DET1: Det Sys 1

Inflow Area = 16,890 sf, 54.11% Impervious, Inflow Depth > 3.93" for 25-Year Storm event
Inflow = 0.84 cfs @ 12.24 hrs, Volume= 5,534 cf
Outflow = 0.70 cfs @ 12.37 hrs, Volume= 5,514 cf, Atten= 17%, Lag= 7.7 min
Primary = 0.70 cfs @ 12.37 hrs, Volume= 5,514 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3
Peak Elev= 88.49' @ 12.37 hrs Surf.Area= 504 sf Storage= 693 cf

Plug-Flow detention time= 16.1 min calculated for 5,505 cf (99% of inflow)
Center-of-Mass det. time= 14.0 min (819.8 - 805.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	86.50'	450 cf	**16.00'W x 31.50'L x 3.54'H Field A** 1,785 cf Overall - 659 cf Embedded = 1,126 cf x 40.0% Voids
#2A	87.00'	659 cf	**Cultec R-330XLHD** x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,110 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	86.50'	**4.0" Round 4" Culvert** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 86.50' / 86.30' S= 0.0133 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Primary	88.20'	**10.0" Round 10" Culvert** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 88.20' / 88.00' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=0.70 cfs @ 12.37 hrs HW=88.49' TW=0.00' (Dynamic Tailwater)
└─**1=4" Culvert** (Inlet Controls 0.45 cfs @ 5.14 fps)
└─**2=10" Culvert** (Inlet Controls 0.25 cfs @ 1.45 fps)

Summary for Pond DET2: Det Sys 2

Inflow Area = 13,250 sf, 46.08% Impervious, Inflow Depth > 3.74" for 25-Year Storm event
Inflow = 1.28 cfs @ 12.09 hrs, Volume= 4,125 cf
Outflow = 0.66 cfs @ 12.25 hrs, Volume= 4,108 cf, Atten= 49%, Lag= 9.7 min
Primary = 0.66 cfs @ 12.25 hrs, Volume= 4,108 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3
Peak Elev= 93.75' @ 12.25 hrs Surf.Area= 504 sf Storage= 783 cf

Plug-Flow detention time= 16.5 min calculated for 4,101 cf (99% of inflow)
Center-of-Mass det. time= 13.9 min (818.3 - 804.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	91.50'	450 cf	**16.00'W x 31.50'L x 3.54'H Field A** 1,785 cf Overall - 659 cf Embedded = 1,126 cf x 40.0% Voids
#2A	92.00'	659 cf	**Cultec R-330XLHD** x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,110 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	90.00'	**12.0" Round 12" Culvert** L= 77.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 90.00' / 87.00' S= 0.0390 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	91.50'	**4.0" Round 4" Culvert** L= 6.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 91.50' / 91.40' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#3	Device 1	93.50'	**10.0" Round 10" Culvert** L= 6.0' CPP, projecting, no headwall, Ke= 0.900

Inlet / Outlet Invert= 93.50' / 93.40' S= 0.0167 '/' Cc= 0.900
n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=0.65 cfs @ 12.25 hrs HW=93.74' TW=88.33' (Dynamic Tailwater)
└**1=12" Culvert** (Passes 0.65 cfs of 6.81 cfs potential flow)
└**2=4" Culvert** (Inlet Controls 0.48 cfs @ 5.47 fps)
└**3=10" Culvert** (Inlet Controls 0.17 cfs @ 1.32 fps)

Summary for Pond RD1: Roof Drain 1

Inflow Area = 1,776 sf,100.00% Impervious, Inflow Depth > 5.16" for 25-Year Storm event
Inflow = 0.22 cfs @ 12.07 hrs, Volume= 764 cf
Outflow = 0.18 cfs @ 12.12 hrs, Volume= 581 cf, Atten= 16%, Lag= 3.0 min
Primary = 0.18 cfs @ 12.12 hrs, Volume= 581 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3
Peak Elev= 1.98' @ 12.12 hrs Surf.Area= 208 sf Storage= 230 cf

Plug-Flow detention time= 164.3 min calculated for 581 cf (76% of inflow)
Center-of-Mass det. time= 79.8 min (825.3 - 745.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	167 cf	**4.75'W x 43.75'L x 2.54'H Field A** 528 cf Overall - 111 cf Embedded = 418 cf x 40.0% Voids
#2A	0.50'	111 cf	**Cultec R-150XLHD** x 4 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 1 rows
		278 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	1.50'	**4.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1.50' / 1.40' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.18 cfs @ 12.12 hrs HW=1.97' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.18 cfs @ 2.10 fps)

Summary for Pond RD2: Roof Drain 2

Inflow Area = 1,776 sf,100.00% Impervious, Inflow Depth > 5.16" for 25-Year Storm event
Inflow = 0.22 cfs @ 12.07 hrs, Volume= 764 cf
Outflow = 0.18 cfs @ 12.12 hrs, Volume= 581 cf, Atten= 16%, Lag= 3.0 min
Primary = 0.18 cfs @ 12.12 hrs, Volume= 581 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3

Peak Elev= 1.98' @ 12.12 hrs Surf.Area= 208 sf Storage= 230 cf

Plug-Flow detention time= 164.3 min calculated for 581 cf (76% of inflow)
Center-of-Mass det. time= 79.8 min (825.3 - 745.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	167 cf	**4.75'W x 43.75'L x 2.54'H Field A** 528 cf Overall - 111 cf Embedded = 418 cf x 40.0% Voids
#2A	0.50'	111 cf	**Cultec R-150XLHD** x 4 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 1 rows
		278 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	1.50'	**4.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1.50' / 1.40' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.18 cfs @ 12.12 hrs HW=1.97' TW=0.00' (Dynamic Tailwater)
1=Culvert (Inlet Controls 0.18 cfs @ 2.10 fps)

Summary for Subcatchment 1A: Exist CB

Runoff = 1.84 cfs @ 12.08 hrs, Volume= 5,654 cf, Depth> 4.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Storm Rainfall=6.50"

Area (sf)	CN	Description
10,235	74	>75% Grass cover, Good, HSG C
205	98	Unconnected roofs, HSG C
4,820	98	Paved parking, HSG C
15,260	82	Weighted Average
10,235		67.07% Pervious Area
5,025		32.93% Impervious Area
205		4.08% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.4	50	0.1000	0.19		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.7	85	0.0800	1.98		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
5.2	175	Total			

Summary for Subcatchment 1B: Runoff to Det System 2

Runoff = 1.63 cfs @ 12.09 hrs, Volume= 5,269 cf, Depth> 4.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Storm Rainfall=6.50"

Area (sf)	CN	Description
7,145	74	>75% Grass cover, Good, HSG C
5,585	98	Paved parking, HSG C
520	98	Unconnected roofs, HSG C
13,250	85	Weighted Average
7,145		53.92% Pervious Area
6,105		46.08% Impervious Area
520		8.52% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
1.1	115	0.0600	1.71		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.5	140	0.0600	4.97		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
6.4	305	Total			

Summary for Subcatchment 1C: Runoff to Det Sys 1

Runoff = 0.53 cfs @ 12.07 hrs, Volume= 1,756 cf, Depth> 5.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Storm Rainfall=6.50"

Area (sf)	CN	Description
605	74	>75% Grass cover, Good, HSG C
3,035	98	Paved roads w/curbs & sewers, HSG C
3,640	94	Weighted Average
605		16.62% Pervious Area
3,035		83.38% Impervious Area

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

Summary for Subcatchment 2: Southwest

Runoff = 1.26 cfs @ 12.08 hrs, Volume= 3,804 cf, Depth> 3.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Storm Rainfall=6.50"

Area (sf)	CN	Adj	Description
1,330	72		Woods/grass comb., Good, HSG C
10,725	74		>75% Grass cover, Good, HSG C
600	98		Unconnected pavement, HSG C
12,655	75	74	Weighted Average, UI Adjusted
12,055			95.26% Pervious Area
600			4.74% Impervious Area
600			100.00% Unconnected

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

Summary for Subcatchment 3: Southeast

Runoff = 0.80 cfs @ 12.09 hrs, Volume= 2,462 cf, Depth> 3.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Storm Rainfall=6.50"

Area (sf)	CN	Description
4,630	72	Woods/grass comb., Good, HSG C
3,800	74	>75% Grass cover, Good, HSG C
8,430	73	Weighted Average
8,430		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.0800	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.8	110	0.1200	2.42		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
5.6	160	Total			

Summary for Subcatchment H1: House 1

Runoff = 0.27 cfs @ 12.07 hrs, Volume= 926 cf, Depth> 6.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Storm Rainfall=6.50"

Area (sf)	CN	Description
1,776	98	Roofs, HSG C
1,776		100.00% Impervious Area

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

Summary for Subcatchment H2: House 2

Runoff = 0.27 cfs @ 12.07 hrs, Volume= 926 cf, Depth> 6.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs
Type III 24-hr 100-Year Storm Rainfall=6.50"

Area (sf)	CN	Description
1,776	98	Roofs, HSG C
1,776		100.00% Impervious Area

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

Summary for Reach CB: Exist CB

Inflow Area = 32,150 sf, 44.06% Impervious, Inflow Depth > 4.72" for 100-Year Storm event
Inflow = 2.21 cfs @ 12.08 hrs, Volume= 12,638 cf
Outflow = 2.21 cfs @ 12.08 hrs, Volume= 12,638 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3

Summary for Reach SE: Southeast

Inflow Area = 10,206 sf, 17.40% Impervious, Inflow Depth > 3.77" for 100-Year Storm event
Inflow = 1.01 cfs @ 12.09 hrs, Volume= 3,205 cf
Outflow = 1.01 cfs @ 12.09 hrs, Volume= 3,205 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3

Summary for Reach SW: Southwest

Inflow Area = 14,431 sf, 16.46% Impervious, Inflow Depth > 3.78" for 100-Year Storm event
Inflow = 1.46 cfs @ 12.08 hrs, Volume= 4,547 cf
Outflow = 1.46 cfs @ 12.08 hrs, Volume= 4,547 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3

Summary for Pond DET1: Det Sys 1

Inflow Area = 16,890 sf, 54.11% Impervious, Inflow Depth > 4.98" for 100-Year Storm event
Inflow = 1.52 cfs @ 12.17 hrs, Volume= 7,006 cf
Outflow = 1.27 cfs @ 12.24 hrs, Volume= 6,984 cf, Atten= 16%, Lag= 4.4 min
Primary = 1.27 cfs @ 12.24 hrs, Volume= 6,984 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3
Peak Elev= 88.76' @ 12.24 hrs Surf.Area= 504 sf Storage= 790 cf

Plug-Flow detention time= 14.8 min calculated for 6,984 cf (100% of inflow)
Center-of-Mass det. time= 12.9 min (812.0 - 799.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	86.50'	450 cf	**16.00'W x 31.50'L x 3.54'H Field A** 1,785 cf Overall - 659 cf Embedded = 1,126 cf x 40.0% Voids
#2A	87.00'	659 cf	**Cultec R-330XLHD** x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,110 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	86.50'	**4.0" Round 4" Culvert** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 86.50' / 86.30' S= 0.0133 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Primary	88.20'	**10.0" Round 10" Culvert** L= 15.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 88.20' / 88.00' S= 0.0133 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=1.27 cfs @ 12.24 hrs HW=88.76' TW=0.00' (Dynamic Tailwater)
↑—**1=4" Culvert** (Inlet Controls 0.48 cfs @ 5.51 fps)
└—**2=10" Culvert** (Inlet Controls 0.79 cfs @ 2.02 fps)

Summary for Pond DET2: Det Sys 2

Inflow Area = 13,250 sf, 46.08% Impervious, Inflow Depth > 4.77" for 100-Year Storm event
Inflow = 1.63 cfs @ 12.09 hrs, Volume= 5,269 cf
Outflow = 1.21 cfs @ 12.18 hrs, Volume= 5,250 cf, Atten= 26%, Lag= 5.1 min
Primary = 1.21 cfs @ 12.18 hrs, Volume= 5,250 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3
Peak Elev= 94.03' @ 12.18 hrs Surf.Area= 504 sf Storage= 879 cf

Plug-Flow detention time= 15.2 min calculated for 5,250 cf (100% of inflow)
Center-of-Mass det. time= 12.9 min (810.5 - 797.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	91.50'	450 cf	**16.00'W x 31.50'L x 3.54'H Field A** 1,785 cf Overall - 659 cf Embedded = 1,126 cf x 40.0% Voids
#2A	92.00'	659 cf	**Cultec R-330XLHD** x 12 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		1,110 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	90.00'	**12.0" Round 12" Culvert** L= 77.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 90.00' / 87.00' S= 0.0390 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	91.50'	**4.0" Round 4" Culvert** L= 6.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 91.50' / 91.40' S= 0.0167 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#3	Device 1	93.50'	**10.0" Round 10" Culvert** L= 6.0' CPP, projecting, no headwall, Ke= 0.900

Inlet / Outlet Invert= 93.50' / 93.40' S= 0.0167 '/' Cc= 0.900
n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=1.16 cfs @ 12.18 hrs HW=94.01' TW=88.61' (Dynamic Tailwater)
└**1=12" Culvert** (Passes 1.16 cfs of 7.09 cfs potential flow)
└**2=4" Culvert** (Inlet Controls 0.51 cfs @ 5.82 fps)
└**3=10" Culvert** (Barrel Controls 0.66 cfs @ 2.67 fps)

Summary for Pond RD1: Roof Drain 1

Inflow Area = 1,776 sf,100.00% Impervious, Inflow Depth > 6.26" for 100-Year Storm event
Inflow = 0.27 cfs @ 12.07 hrs, Volume= 926 cf
Outflow = 0.22 cfs @ 12.13 hrs, Volume= 743 cf, Atten= 18%, Lag= 3.2 min
Primary = 0.22 cfs @ 12.13 hrs, Volume= 743 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3
Peak Elev= 2.10' @ 12.13 hrs Surf.Area= 208 sf Storage= 241 cf

Plug-Flow detention time= 149.5 min calculated for 743 cf (80% of inflow)
Center-of-Mass det. time= 73.1 min (815.8 - 742.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	167 cf	**4.75'W x 43.75'L x 2.54'H Field A** 528 cf Overall - 111 cf Embedded = 418 cf x 40.0% Voids
#2A	0.50'	111 cf	**Cultec R-150XLHD** x 4 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 1 rows
		278 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	1.50'	**4.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1.50' / 1.40' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.22 cfs @ 12.13 hrs HW=2.09' TW=0.00' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.22 cfs @ 2.48 fps)

Summary for Pond RD2: Roof Drain 2

Inflow Area = 1,776 sf,100.00% Impervious, Inflow Depth > 6.26" for 100-Year Storm event
Inflow = 0.27 cfs @ 12.07 hrs, Volume= 926 cf
Outflow = 0.22 cfs @ 12.13 hrs, Volume= 743 cf, Atten= 18%, Lag= 3.2 min
Primary = 0.22 cfs @ 12.13 hrs, Volume= 743 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.04 hrs / 3

Peak Elev= 2.10' @ 12.13 hrs Surf.Area= 208 sf Storage= 241 cf

Plug-Flow detention time= 149.5 min calculated for 743 cf (80% of inflow)
Center-of-Mass det. time= 73.1 min (815.8 - 742.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	167 cf	**4.75'W x 43.75'L x 2.54'H Field A** 528 cf Overall - 111 cf Embedded = 418 cf x 40.0% Voids
#2A	0.50'	111 cf	**Cultec R-150XLHD** x 4 Inside #1 Effective Size= 29.8"W x 18.0"H => 2.65 sf x 10.25'L = 27.2 cf Overall Size= 33.0"W x 18.5"H x 11.00'L with 0.75' Overlap Row Length Adjustment= +0.75' x 2.65 sf x 1 rows
		278 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	1.50'	**4.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1.50' / 1.40' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.22 cfs @ 12.13 hrs HW=2.09' TW=0.00' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.22 cfs @ 2.48 fps)