Civil Engineers
Structural Engineers
Traffic Engineers
Land Surveyors
Landscape Architects
Scientists

MSC
A division of TFMoran, Inc.

Job No. 14051

February 2, 2015

Mr. Anthony Gaudiello, Planning Board Chair
c/o Ms. Marcia Gasses, Planner and Land Use Administrator
PO Box 660
Barrington, NH

Re: Stormwater Report for B. R. Peterson Realty, LLC, 4 Smoke Street, Barrington, NH, Map 234, Lot 26

Dear Mr. Gaudiello and Members of the Board:

In conjunction with the application to redevelop of the above referenced property, MSC has prepared this report to quantify the pre- and post-construction stormwater generation from the site.

The site is previously disturbed and has been stripped of much of its original soil and subsoil. The excavated areas of the site either exhibit exposed ledge or very shallow soils covering ledge extending to steep banks. A single structure occupies the site. The only areas left intact from prior to the excavation operation appear to be the area to the front of the structure including the subsurface disposal area and a small portion of the northwest corner of the site that remains wooded.

The applicant proposes to reuse the site for the sale and display of trailers and snow and ice control products. The original building will be kept and reused and a new building will be erected. The proposal also includes the addition of paved parking and access to the site. The area to the northwest of the proposed building will be regraded, loamed and seeded and new sidewalks will be added around the existing building.

At the rear of the site, a retaining wall shall be erected and fill placed and planted with native species of wildflowers.

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Calculation Methods

This analysis and the corresponding drainage it references is based on the 2-year, 10-year, 25-year and 50-year storm events using HydroCAD Software Solutions, LLC's

HydroCAD® Release 10.00. This program is based on the Computer Program for Project Formulation Hydrology, Technical Release Number 20 (TR 20). TR 20 is sometimes referred to as the SCS method. The method was developed by the United States Department of Agriculture Soil Conservation Service (SCS) and is the standard for storm runoff studies with the use of computers.

The SCS Method

- Rainfall: The amounts of rainfall used for this analysis are 3.07 inches for the 2-year, 24 hour storm event, 4.62 inches for the 10-year, 24 hour storm event, 5.84 inches for the 25-year, 24 hour storm event and 6.98 inches for the 50-year, 24 hour storm event per the Extreme Precipitation Tables, Northeast Regional Climate Center.

- Coefficient of Runoff (Cn): This coefficient is used to represent soil permeability. Runoff curve number worksheets show values for Cn given land usage and hydrologic soil group. The USDA Natural Resources Conservation Service maps the site with soil classifications as hydrologic soil group (HSG) A. This may have been true prior to the excavation of the soils on the site, but the current site with its shallow ledge and gravelly soil would need to be considered HSG C at best. As a result, a very high runoff coefficient was used for the excavated areas of the site. Once the group type for the soil is determined, the respective runoff coefficients for the noted soil group are then classified and given a weighted composite number to be used in the drainage analysis.

- Watershed: For this study the extents of the lot lines are being primarily being used for the watershed area to determine the contributing flow. The analysis also includes small areas of Smoke Street and the abutting property to the south. The watershed has a calculated runoff curve number associated with it.

- Concentration Time (Tc): Concentration time is the time it takes for water to flow from the highest elevation to the lowest elevation (collection point) following the longest hydrologic route within a particular subcatchment. This time is determined by calculating the time it takes runoff to travel this route under one of three hydrologic conditions: sheet flow, shallow concentrated flow or channel flow. An alternate method is the Lag or Cn Method, so called because it determines the time of concentration based on the coefficient of runoff (see B above). The advantage of using this method is that it does not require a determination of when stormwater transitions from sheet flow to shallow concentrated flow, etc. A determination of the average slope of the subcatchment (not average slope of the flow path) must be determined along with the length of the flow path. The Lag Method was employed in the preparation of this analysis.

Pre-Development Conditions:

The existing site is previously disturbed and has been extensively excavated. There exists a single structure on the site. Hydrologically, site generated stormwater flows are directed primarily toward Smoke Street and split between heading north along Smoke Street's ditch line or entering the closed drainage system at the intersection of Smoke Street and Route 9. Excavated areas have little or no top soil and what is present is gravelly with sporadic vegetative growth. For this analysis, the site has been divided into three subcatchments; one directing flow to the north along Smoke Street and one each directing flows to the catch basins on Route 9.

The following table lists the hydrologic characteristics of the existing catchments.

Subcatchment	Area (sf)	Cn	Time of Concentration (min)
X-1	47,749	82	5.1
X-2	27,825	85	5.6
X-3	43,411	87	3.4
Totals	**119,015**	**84**	---

Post-Development Conditions:

The proposed development of the site consists of reusing the existing building, constructing a new building, adding paved parking and access. Grassed areas shall be restored on part of the site and the rear area will have a retaining wall with fill behind it where native wildflower species shall be planted. Most of the excavated site area shall be used for trailer display and storage. Stormwater shall be directed in the same general direction as was the predevelopment flows. Site grading was designed to divide the flows such that the post-construction stormwater flows match the pre-construction flows.

As before the hydrologic characteristics of each catchment are listed below.

Subcatchment	Area (sf)	Cn	Time of Concentration (min)
P-1	51,723	78	6.0
P-2	23,851	86	5.9
P-3	43,441	87	3.4
Totals	**119,015**	**83**	---

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Results

The results of the pre- and post-development models are shown below.

	Pre-Construction		Post-Construction	
	Flow to North Along Smoke Street	Flow to South Towards Route 9	Flow to North Along Smoke Street	Flow to South Towards Route 9
Node	**X-1**	**POI**	**P-1**	**POI**
2-Year				
Flow (cfs)	1.89	3.49	1.60	3.34
Volume (cf)	5,701	10,329	5,074	9,933
10-Year				
Flow (cfs)	3.64	6.21	3.33	5.91
Volume (cf)	10,899	18,610	10,299	17,800
25-Year				
Flow (cfs)	5.06	8.38	4.78	7.94
Volume (cf)	15,267	25,409	14,802	24,245
50-Year				
Flow (cfs)	6.40	10.35	6.17	9.80
Volume (cf)	19,471	31,880	19,189	30,373

Note: All results are for a 24 hour time span.

As can be seen from the tabulated values, the result of the proposed development will be a decrease in stormwater flow rate and volume in each of the modeled storm events. This decrease is due to the restoration of grassed areas in good condition on the site where there currently exist nearly impermeable surfaces.

We have attached the following reference material for your use:

- Extreme precipitation table.
- Web Soil Survey results.
- HydroCAD results for pre- and post-development.
- Pre- and post-development drainage plans showing catchment areas.

Should you have any questions or require clarification of any of the above, please contact me directly.

MSC looks forward to working with the Town to make this project mutually beneficial to the Town and to REP.

Respectfully submitted,
MSC, a Division of TFMoran, Inc.

Dennis M. Moulton, PE

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Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New Hampshire
Location	
Longitude	71.012 degrees West
Latitude	43.216 degrees North
Elevation	Unknown/Unavailable
Date/Time	Tue, 13 Jan 2015 17:32:29 -0500

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.49	0.65	0.81	1.02	**1yr**	0.70	0.98	1.19	1.53	1.97	2.55	2.81	**1yr**	2.26	2.70	3.11	3.83	4.40	**1yr**
2yr	0.32	0.49	0.61	0.80	1.01	1.28	**2yr**	0.87	1.16	1.49	1.89	2.40	3.07	3.42	**2yr**	2.72	3.29	3.79	4.51	5.14	**2yr**
5yr	0.37	0.57	0.72	0.96	1.23	1.57	**5yr**	1.06	1.44	1.84	2.36	3.02	3.88	4.37	**5yr**	3.43	4.20	4.82	5.68	6.43	**5yr**
10yr	0.40	0.63	0.80	1.09	1.42	1.84	**10yr**	1.23	1.69	2.17	2.80	3.59	4.62	5.26	**10yr**	4.09	5.06	5.79	6.77	7.62	**10yr**
25yr	0.47	0.74	0.94	1.30	1.73	2.27	**25yr**	1.49	2.09	2.69	3.50	4.53	5.84	6.74	**25yr**	5.17	6.48	7.38	8.55	9.55	**25yr**
50yr	0.52	0.83	1.07	1.49	2.01	2.67	**50yr**	1.74	2.45	3.18	4.15	5.40	6.98	8.13	**50yr**	6.18	7.81	8.87	10.19	11.33	**50yr**
100yr	0.58	0.94	1.22	1.72	2.34	3.13	**100yr**	2.02	2.88	3.74	4.92	6.42	8.34	9.80	**100yr**	7.38	9.43	10.67	12.16	13.45	**100yr**
200yr	0.65	1.06	1.37	1.97	2.72	3.69	**200yr**	2.35	3.40	4.43	5.85	7.66	9.97	11.83	**200yr**	8.82	11.38	12.83	14.52	15.97	**200yr**
500yr	0.77	1.26	1.64	2.38	3.34	4.57	**500yr**	2.88	4.22	5.51	7.33	9.65	12.63	15.18	**500yr**	11.18	14.59	16.39	18.37	20.06	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.24	0.36	0.44	0.60	0.73	0.90	**1yr**	0.63	0.88	0.92	1.25	1.52	1.95	2.48	**1yr**	1.73	2.38	2.91	3.29	3.92	**1yr**
2yr	0.31	0.48	0.60	0.81	0.99	1.18	**2yr**	0.86	1.15	1.35	1.81	2.33	2.98	3.32	**2yr**	2.64	3.19	3.67	4.40	5.02	**2yr**
5yr	0.35	0.54	0.67	0.92	1.16	1.40	**5yr**	1.01	1.37	1.61	2.14	2.76	3.58	4.01	**5yr**	3.17	3.86	4.47	5.33	5.99	**5yr**
10yr	0.38	0.59	0.73	1.02	1.32	1.60	**10yr**	1.14	1.56	1.81	2.43	3.12	4.09	4.64	**10yr**	3.62	4.46	5.17	6.16	6.83	**10yr**
25yr	0.44	0.67	0.83	1.19	1.57	1.91	**25yr**	1.35	1.87	2.12	2.83	3.63	4.87	5.59	**25yr**	4.31	5.37	6.29	7.46	8.23	**25yr**
50yr	0.49	0.74	0.92	1.33	1.79	2.19	**50yr**	1.54	2.14	2.38	3.20	4.06	5.54	6.43	**50yr**	4.91	6.18	7.29	8.62	9.51	**50yr**
100yr	0.55	0.83	1.03	1.49	2.05	2.52	**100yr**	1.77	2.46	2.67	3.59	4.53	6.30	7.38	**100yr**	5.58	7.10	8.46	9.96	10.86	**100yr**
200yr	0.61	0.92	1.16	1.68	2.35	2.89	**200yr**	2.03	2.82	3.00	4.04	5.06	7.16	8.80	**200yr**	6.34	8.46	9.83	11.50	12.44	**200yr**
500yr	0.72	1.06	1.37	1.99	2.83	3.49	**500yr**	2.44	3.41	3.51	4.72	5.88	8.42	10.66	**500yr**	7.45	10.25	11.99	13.93	14.81	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.43	0.53	0.71	0.87	1.07	**1yr**	0.75	1.05	1.23	1.72	2.17	2.76	3.03	**1yr**	2.44	2.91	3.35	4.12	4.74	**1yr**
2yr	0.33	0.50	0.62	0.84	1.03	1.24	**2yr**	0.89	1.21	1.46	1.93	2.50	3.19	3.54	**2yr**	2.82	3.40	3.92	4.64	5.29	**2yr**
5yr	0.39	0.60	0.75	1.02	1.30	1.57	**5yr**	1.13	1.53	1.83	2.46	3.15	4.18	4.71	**5yr**	3.70	4.53	5.19	6.04	6.85	**5yr**
10yr	0.45	0.70	0.87	1.21	1.56	1.90	**10yr**	1.35	1.86	2.21	3.00	3.79	5.16	5.87	**10yr**	4.57	5.65	6.43	7.38	8.33	**10yr**
25yr	0.55	0.84	1.05	1.50	1.97	2.44	**25yr**	1.70	2.38	2.84	3.89	4.86	6.85	7.87	**25yr**	6.06	7.57	8.53	9.71	10.70	**25yr**
50yr	0.64	0.98	1.21	1.75	2.35	2.94	**50yr**	2.03	2.87	3.44	4.73	5.88	8.48	9.84	**50yr**	7.51	9.46	10.59	11.91	13.08	**50yr**
100yr	0.75	1.13	1.42	2.04	2.80	3.54	**100yr**	2.42	3.46	4.16	5.77	7.13	10.51	12.30	**100yr**	9.30	11.83	13.13	14.62	15.96	**100yr**
200yr	0.87	1.31	1.66	2.40	3.34	4.28	**200yr**	2.88	4.18	5.05	7.04	8.64	13.08	15.00	**200yr**	11.57	14.42	16.27	17.93	19.50	**200yr**
500yr	1.06	1.58	2.03	2.95	4.20	5.47	**500yr**	3.62	5.35	6.51	9.17	11.14	17.48	20.09	**500yr**	15.47	19.31	21.62	23.56	25.45	**500yr**

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Northeast Regional Climate Center

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Soil Map—Strafford County, New Hampshire
(14051 - REP)

Map Scale: 1:1,670 if printed on A landscape (11" x 8.5") sheet.

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

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MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Strafford County, New Hampshire
Survey Area Data: Version 14, Sep 15, 2014

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

Date(s) aerial images were photographed: Jun 20, 2010—May 1, 2011

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

Map Unit Legend

Strafford County, New Hampshire (NH017)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
DeA	Deerfield loamy sand, 0 to 3 percent slopes	0.5	7.7%
WdB	Windsor loamy sand, 3 to 8 percent slopes	5.5	92.3%
Totals for Area of Interest		**5.9**	**100.0%**

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Strafford County, New Hampshire

DeA—Deerfield loamy sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9d6y
Elevation: 0 to 1,000 feet
Mean annual precipitation: 27 to 55 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 200 days
Farmland classification: Farmland of local importance

Map Unit Composition

Deerfield and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Deerfield

Setting

Parent material: Sandy outwash derived mainly from granite, gneiss and schist

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D

Minor Components

Not named

Percent of map unit: 10 percent

Saugatuck

Percent of map unit: 5 percent

Landform: Outwash terraces

Data Source Information

Soil Survey Area: Strafford County, New Hampshire
Survey Area Data: Version 14, Sep 15, 2014

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Strafford County, New Hampshire

WdB—Windsor loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2svkf
Elevation: 0 to 1,040 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of local importance

Map Unit Composition

Windsor, loamy sand, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor, Loamy Sand

Setting

Landform: Outwash terraces, deltas, outwash plains, dunes
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

Typical profile

O - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: loamy sand
Bw - 3 to 25 inches: loamy sand
C - 25 to 65 inches: sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s

Hydrologic Soil Group: A

Minor Components

Hinckley, loamy sand

Percent of map unit: 10 percent
Landform: Eskers, deltas, outwash plains, kames
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear

Deerfield, loamy sand

Percent of map unit: 5 percent
Landform: Outwash plains, terraces, deltas
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear

Data Source Information

Soil Survey Area: Strafford County, New Hampshire
Survey Area Data: Version 14, Sep 15, 2014

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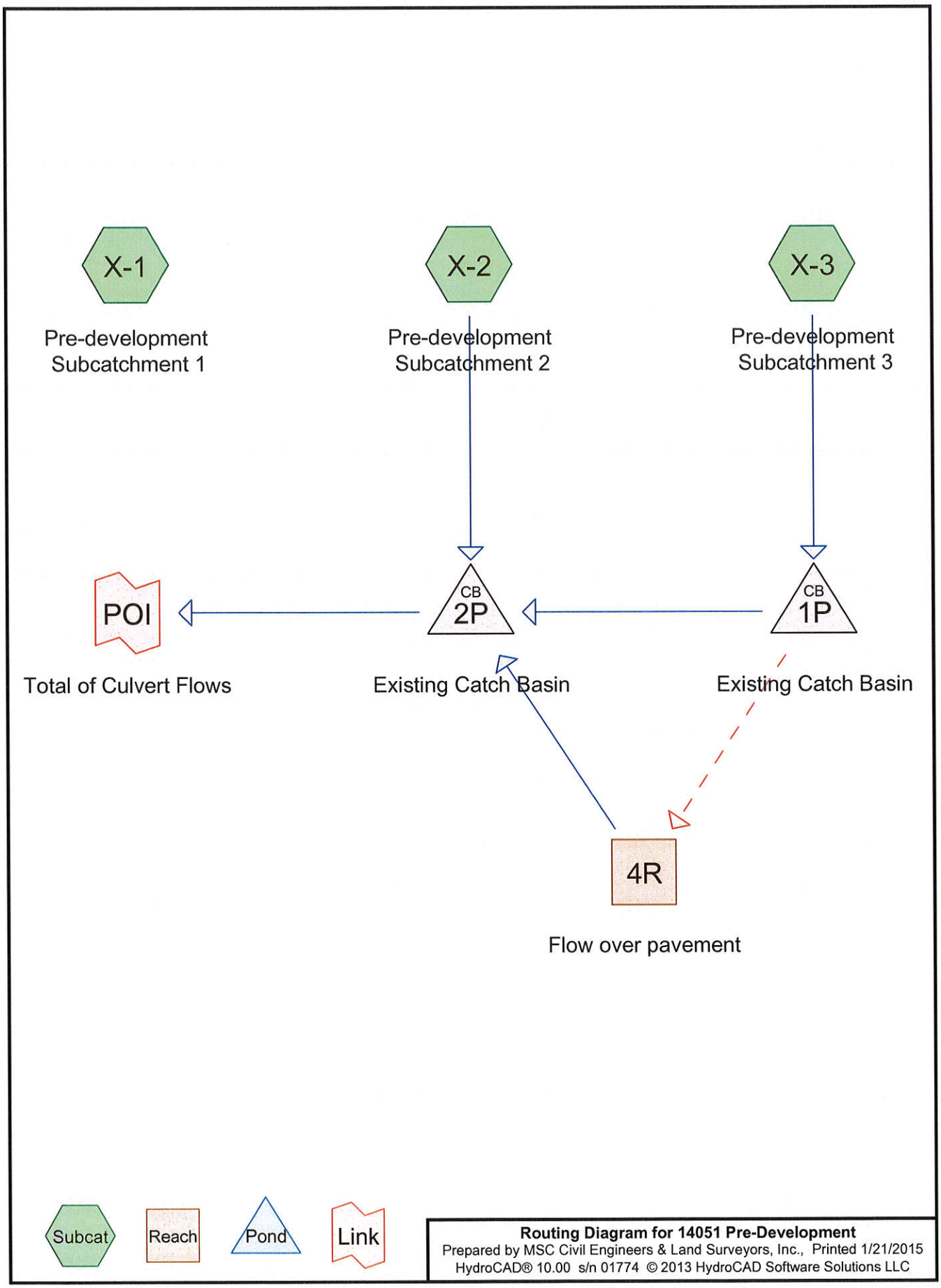

Routing Diagram for 14051 Pre-Development
Prepared by MSC Civil Engineers & Land Surveyors, Inc., Printed 1/21/2015
HydroCAD® 10.00 s/n 01774 © 2013 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
9,961	96	Compacted Gravel (X-1, X-2, X-3)
47,338	90	Excavated Gravel / Shallow Ledge (X-1, X-2)
31,439	90	Excavated Gravel / Shallow Ledge, HSG C (X-3)
8,048	98	Ledge (X-1, X-2)
5,776	98	Paved Road and Accessway (X-1, X-2, X-3)
2,235	98	Roof (X-2, X-3)
14,218	30	Woods, Good, HSG A (X-1, X-2, X-3)
119,015	**84**	**TOTAL AREA**

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
14,218	HSG A	X-1, X-2, X-3
0	HSG B	
31,439	HSG C	X-3
0	HSG D	
73,358	Other	X-1, X-2, X-3
119,015		**TOTAL AREA**

Summary for Subcatchment X-1: Pre-development Subcatchment 1

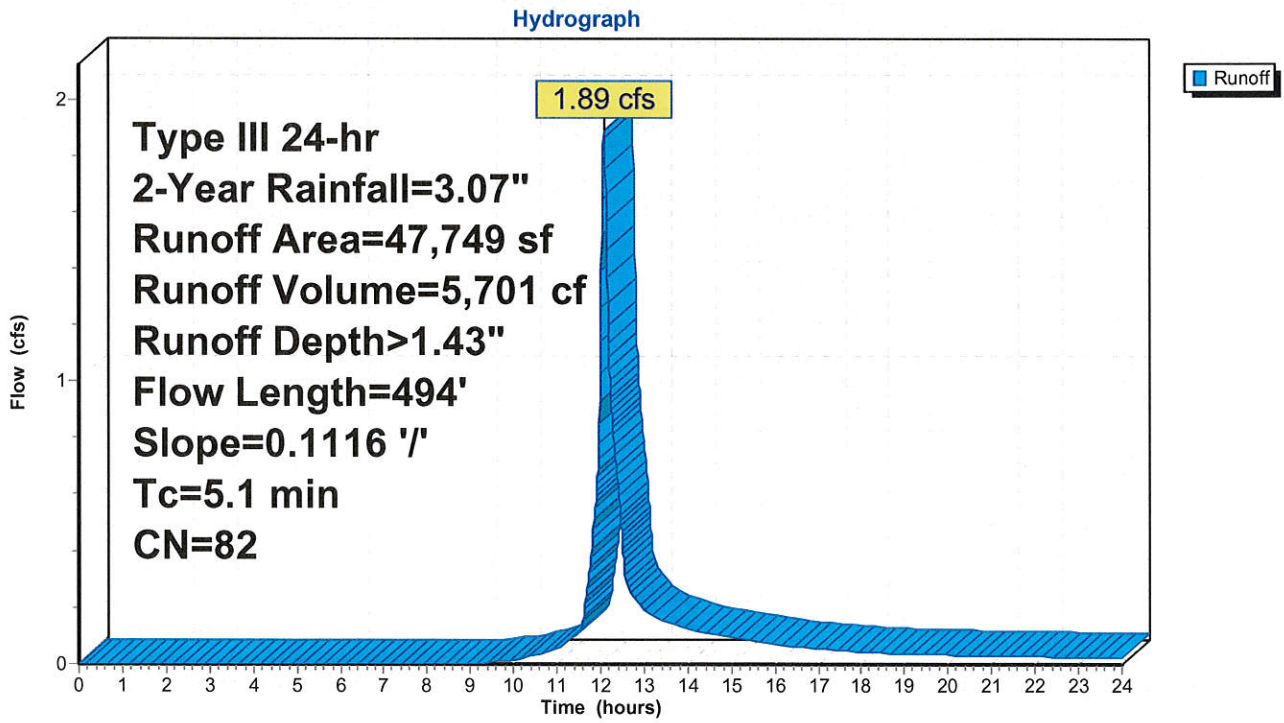
Runoff = 1.89 cfs @ 12.08 hrs, Volume= 5,701 cf, Depth> 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.07"

	Area (sf)	CN	Description
*	1,843	98	Paved Road and Accessway
*	2,602	96	Compacted Gravel
*	4,488	98	Ledge
*	31,302	90	Excavated Gravel / Shallow Ledge
	7,514	30	Woods, Good, HSG A
	47,749	82	Weighted Average
	41,418		86.74% Pervious Area
	6,331		13.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	494	0.1116	1.62		**Lag/CN Method,** Contour Length= 5,328' Interval= 1'

Subcatchment X-1: Pre-development Subcatchment 1



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Summary for Subcatchment X-2: Pre-development Subcatchment 2

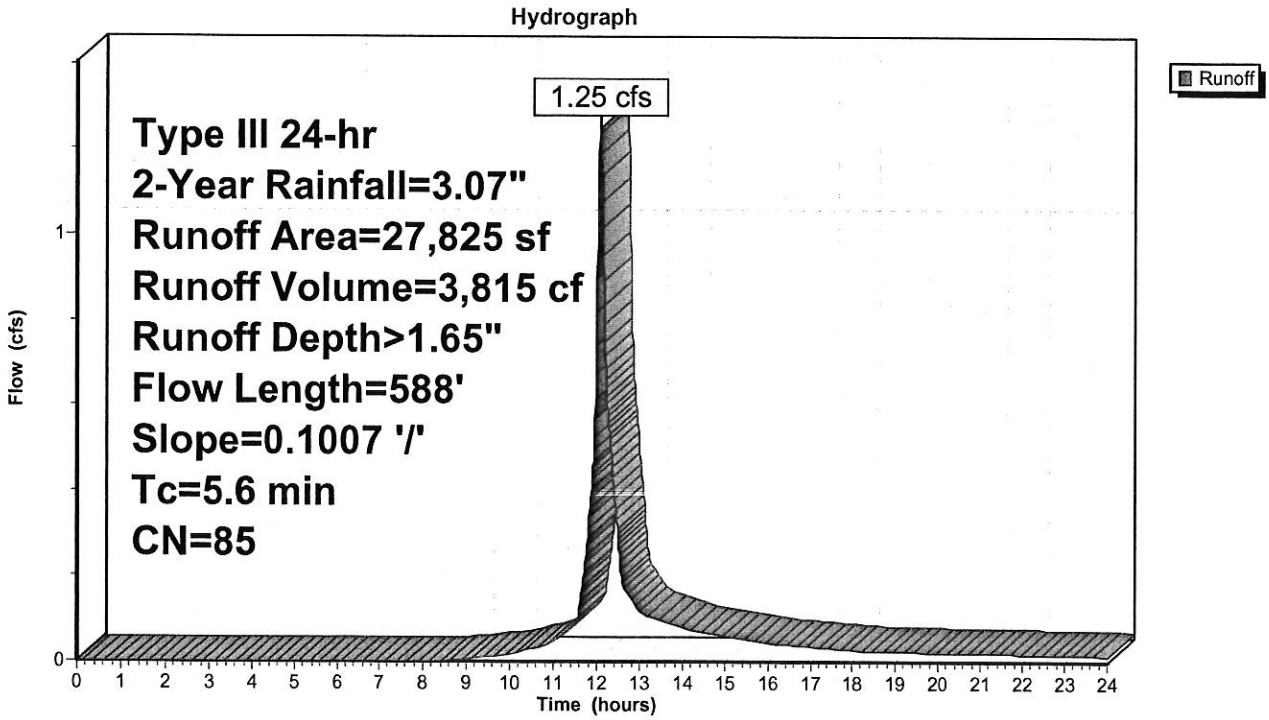
Runoff = 1.25 cfs @ 12.08 hrs, Volume= 3,815 cf, Depth> 1.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.07"

	Area (sf)	CN	Description
*	2,568	98	Paved Road and Accessway
*	1,358	96	Compacted Gravel
*	820	98	Roof
*	3,560	98	Ledge
*	16,036	90	Excavated Gravel / Shallow Ledge
	3,483	30	Woods, Good, HSG A
	27,825	85	Weighted Average
	20,877		75.03% Pervious Area
	6,948		24.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	588	0.1007	1.77		**Lag/CN Method,** Contour Length= 2,803' Interval= 1'

Subcatchment X-2: Pre-development Subcatchment 2



Summary for Subcatchment X-3: Pre-development Subcatchment 3

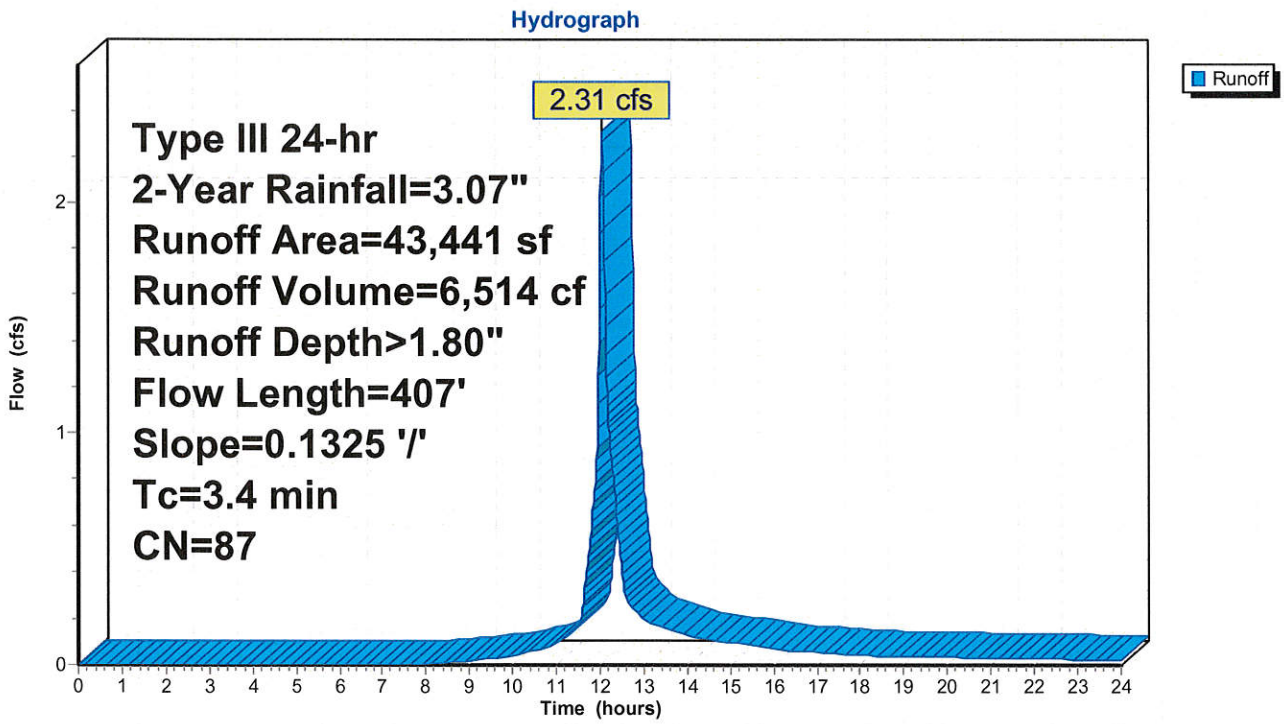
Runoff = 2.31 cfs @ 12.05 hrs, Volume= 6,514 cf, Depth> 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.07"

	Area (sf)	CN	Description
*	1,365	98	Paved Road and Accessway
*	6,001	96	Compacted Gravel
*	1,415	98	Roof
*	31,439	90	Excavated Gravel / Shallow Ledge, HSG C
	3,221	30	Woods, Good, HSG A
	43,441	87	Weighted Average
	40,661		93.60% Pervious Area
	2,780		6.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	407	0.1325	2.02		**Lag/CN Method,** Contour Length= 5,757' Interval= 1'

Subcatchment X-3: Pre-development Subcatchment 3



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Summary for Reach 4R: Flow over pavement

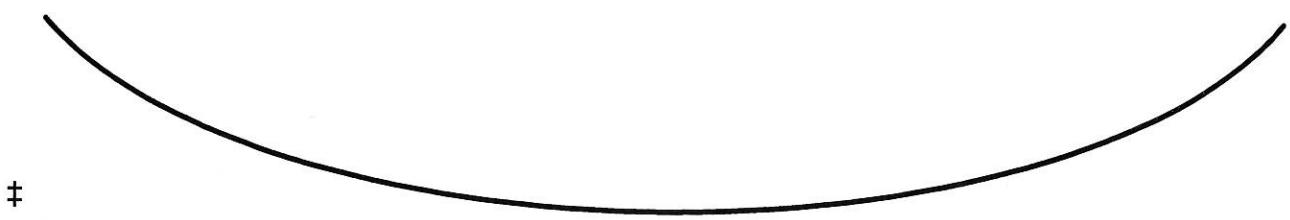
[81] Warning: Exceeded Pond 1P by 3.63' @ 0.00 hrs

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.10' Flow Area= 1.7 sf, Capacity= 2.10 cfs

25.00' x 0.10' deep Parabolic Channel, n= 0.013 Asphalt, smooth
Length= 40.0' Slope= 0.0045 '/'
Inlet Invert= 191.00', Outlet Invert= 190.82'



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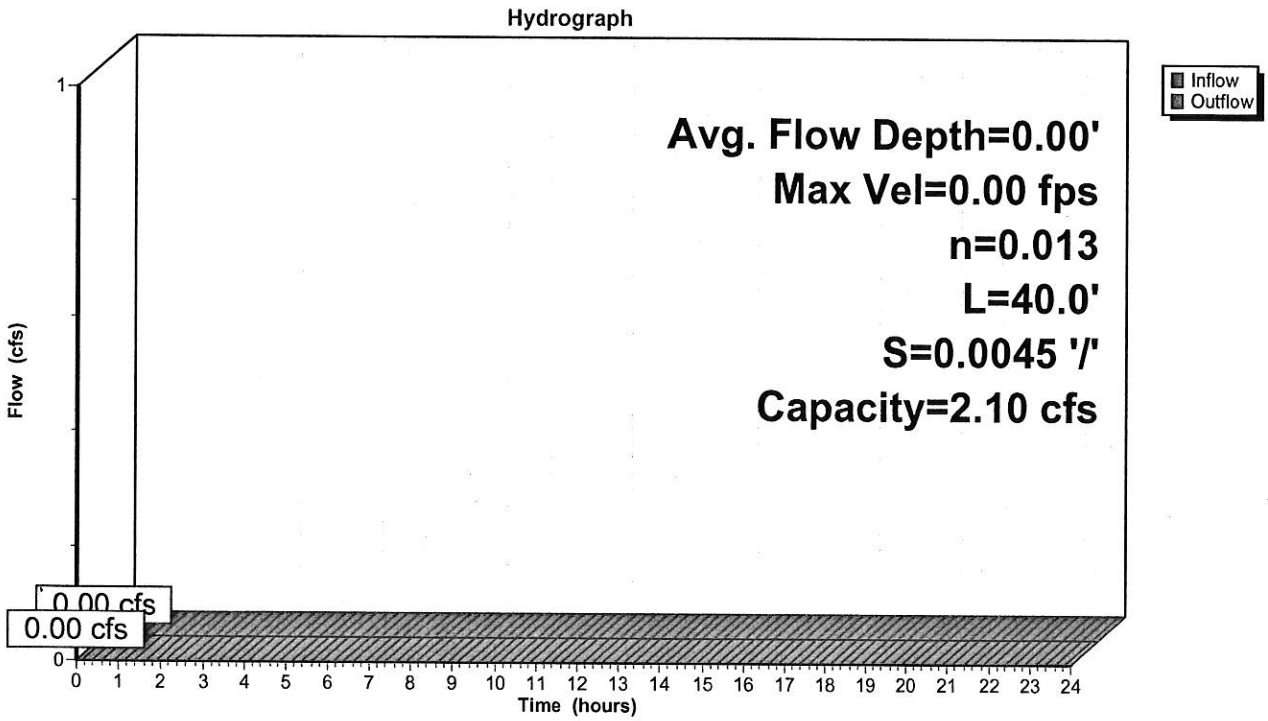
Reach 4R: Flow over pavement



Summary for Pond 1P: Existing Catch Basin

Inflow Area =	43,441 sf,	6.40% Impervious,	Inflow Depth >	1.80"	for 2-Year event
Inflow =	2.31 cfs @	12.05 hrs,	Volume=	6,514 cf	
Outflow =	2.31 cfs @	12.05 hrs,	Volume=	6,514 cf,	Atten= 0%, Lag= 0.0 min
Primary =	2.31 cfs @	12.05 hrs,	Volume=	6,514 cf	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

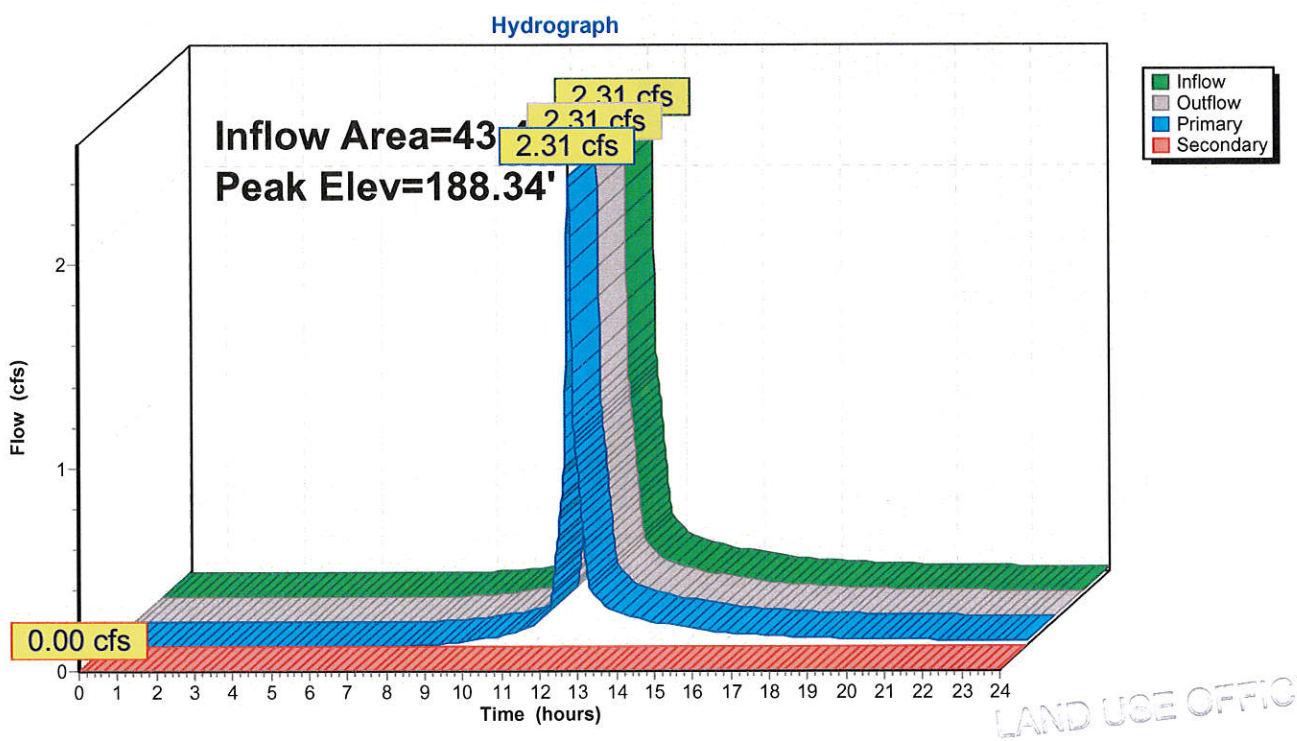
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 188.34' @ 12.05 hrs
Flood Elev= 190.31'

Device	Routing	Invert	Outlet Devices
#1	Primary	187.37'	**15.0" Round Culvert** L= 40.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 187.37' / 186.92' S= 0.0113 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.23 sf
#2	Secondary	190.31'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.31 cfs @ 12.05 hrs HW=188.34' (Free Discharge)
└**1=Culvert** (Barrel Controls 2.31 cfs @ 3.12 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.37' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Existing Catch Basin



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Summary for Pond 2P: Existing Catch Basin

[79] Warning: Submerged Pond 1P Primary device # 1 INLET by 0.76'

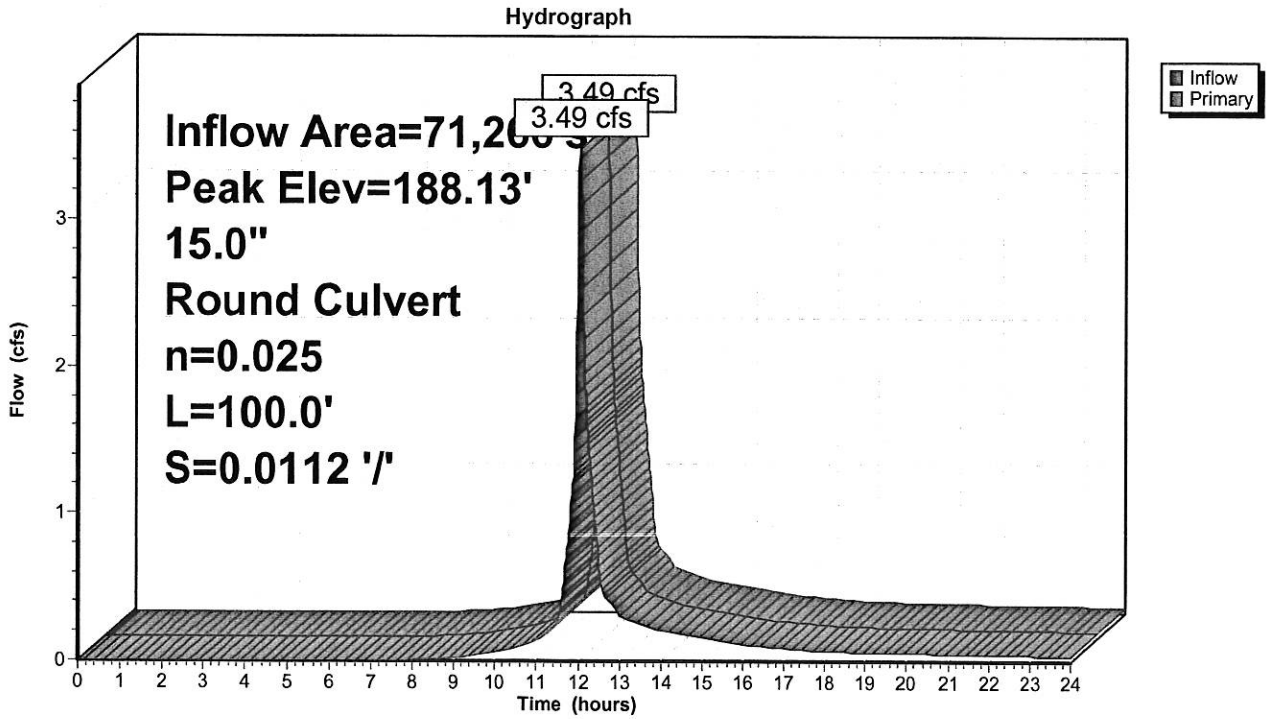
Inflow Area =	71,266 sf, 13.65% Impervious, Inflow Depth > 1.74" for 2-Year event				
Inflow =	3.49 cfs @ 12.06 hrs, Volume=	10,329 cf			
Outflow =	3.49 cfs @ 12.06 hrs, Volume=	10,329 cf, Atten= 0%, Lag= 0.0 min			
Primary =	3.49 cfs @ 12.06 hrs, Volume=	10,329 cf			

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 188.13' @ 12.06 hrs
Flood Elev= 190.82'

Device	Routing	Invert	Outlet Devices
#1	Primary	186.82'	**15.0" Round Culvert** L= 100.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 186.82' / 185.70' S= 0.0112 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.23 sf

Primary OutFlow Max=3.49 cfs @ 12.06 hrs HW=188.13' (Free Discharge)
└**1=Culvert** (Barrel Controls 3.49 cfs @ 3.38 fps)

Pond 2P: Existing Catch Basin

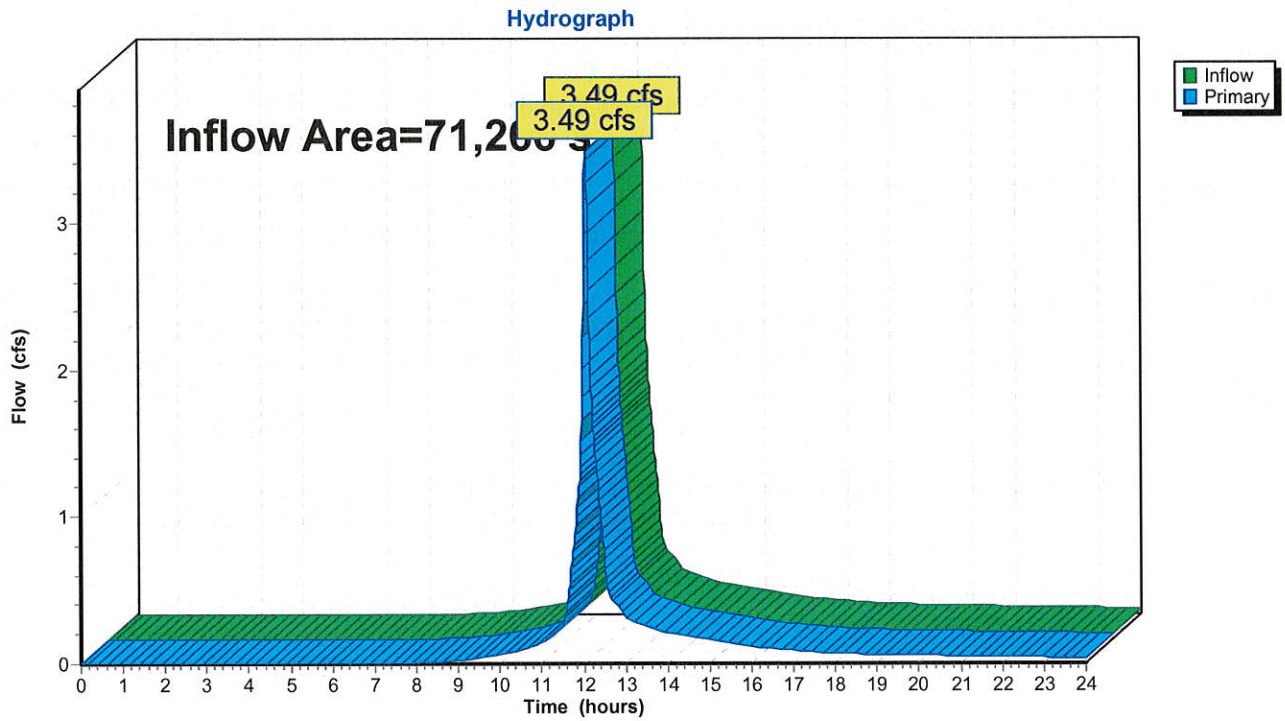


Summary for Link POI: Total of Culvert Flows

Inflow Area =	71,266 sf,	13.65% Impervious,	Inflow Depth >	1.74"	for 2-Year event
Inflow =	3.49 cfs @	12.06 hrs, Volume=	10,329 cf		
Primary =	3.49 cfs @	12.06 hrs, Volume=	10,329 cf,	Atten= 0%,	Lag= 0.0 min

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

Link POI: Total of Culvert Flows



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

Subcatchment X-1: Pre-development Runoff Area=47,749 sf 13.26% Impervious Runoff Depth>2.74"
Flow Length=494' Slope=0.1116 '/' Tc=5.1 min CN=82 Runoff=3.64 cfs 10,899 cf

Subcatchment X-2: Pre-development Runoff Area=27,825 sf 24.97% Impervious Runoff Depth>3.02"
Flow Length=588' Slope=0.1007 '/' Tc=5.6 min CN=85 Runoff=2.28 cfs 6,993 cf

Subcatchment X-3: Pre-development Runoff Area=43,441 sf 6.40% Impervious Runoff Depth>3.21"
Flow Length=407' Slope=0.1325 '/' Tc=3.4 min CN=87 Runoff=4.07 cfs 11,617 cf

Reach 4R: Flow over pavement Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0 cf
n=0.013 L=40.0' S=0.0045 '/' Capacity=2.10 cfs Outflow=0.00 cfs 0 cf

Pond 1P: Existing Catch Basin Peak Elev=188.84' Inflow=4.07 cfs 11,617 cf
Primary=4.07 cfs 11,617 cf Secondary=0.00 cfs 0 cf Outflow=4.07 cfs 11,617 cf

Pond 2P: Existing Catch Basin Peak Elev=190.98' Inflow=6.21 cfs 18,610 cf
15.0" Round Culvert n=0.025 L=100.0' S=0.0112 '/' Outflow=6.21 cfs 18,610 cf

Link POI: Total of Culvert Flows Inflow=6.21 cfs 18,610 cf
Primary=6.21 cfs 18,610 cf

Total Runoff Area = 119,015 sf Runoff Volume = 29,509 cf Average Runoff Depth = 2.98"
86.51% Pervious = 102,956 sf 13.49% Impervious = 16,059 sf

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

SubcatchmentX-1: Pre-development Runoff Area=47,749 sf 13.26% Impervious Runoff Depth>3.84"
Flow Length=494' Slope=0.1116 '/' Tc=5.1 min CN=82 Runoff=5.06 cfs 15,267 cf

SubcatchmentX-2: Pre-development Runoff Area=27,825 sf 24.97% Impervious Runoff Depth>4.15"
Flow Length=588' Slope=0.1007 '/' Tc=5.6 min CN=85 Runoff=3.10 cfs 9,618 cf

SubcatchmentX-3: Pre-development Runoff Area=43,441 sf 6.40% Impervious Runoff Depth>4.36"
Flow Length=407' Slope=0.1325 '/' Tc=3.4 min CN=87 Runoff=5.45 cfs 15,791 cf

Reach 4R: Flow over pavement Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0 cf
n=0.013 L=40.0' S=0.0045 '/' Capacity=2.10 cfs Outflow=0.00 cfs 0 cf

Pond 1P: Existing Catch Basin Peak Elev=189.69' Inflow=5.45 cfs 15,791 cf
Primary=5.45 cfs 15,791 cf Secondary=0.00 cfs 0 cf Outflow=5.45 cfs 15,791 cf

Pond 2P: Existing Catch Basin Peak Elev=194.27' Inflow=8.38 cfs 25,409 cf
15.0" Round Culvert n=0.025 L=100.0' S=0.0112 '/' Outflow=8.38 cfs 25,409 cf

Link POI: Total of Culvert Flows Inflow=8.38 cfs 25,409 cf
Primary=8.38 cfs 25,409 cf

Total Runoff Area = 119,015 sf Runoff Volume = 40,676 cf Average Runoff Depth = 4.10"
86.51% Pervious = 102,956 sf 13.49% Impervious = 16,059 sf

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

Subcatchment X-1: Pre-development Runoff Area=47,749 sf 13.26% Impervious Runoff Depth>4.89"
Flow Length=494' Slope=0.1116 '/' Tc=5.1 min CN=82 Runoff=6.40 cfs 19,471 cf

Subcatchment X-2: Pre-development Runoff Area=27,825 sf 24.97% Impervious Runoff Depth>5.23"
Flow Length=588' Slope=0.1007 '/' Tc=5.6 min CN=85 Runoff=3.87 cfs 12,124 cf

Subcatchment X-3: Pre-development Runoff Area=43,441 sf 6.40% Impervious Runoff Depth>5.46"
Flow Length=407' Slope=0.1325 '/' Tc=3.4 min CN=87 Runoff=6.75 cfs 19,756 cf

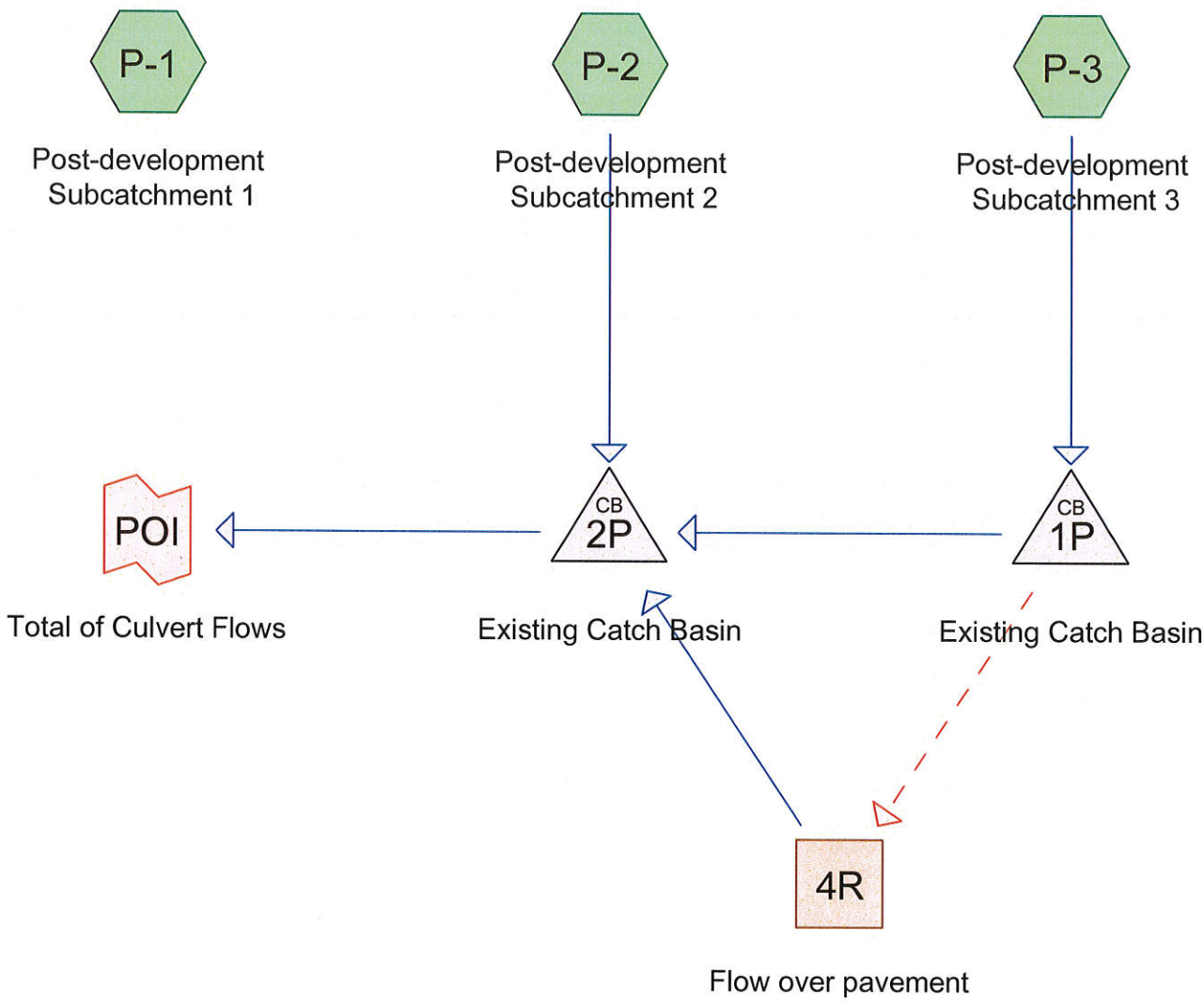
Reach 4R: Flow over pavement Avg. Flow Depth=0.03' Max Vel=0.53 fps Inflow=0.21 cfs 18 cf
n=0.013 L=40.0' S=0.0045 '/' Capacity=2.10 cfs Outflow=0.12 cfs 18 cf

Pond 1P: Existing Catch Basin Peak Elev=190.35' Inflow=6.75 cfs 19,756 cf
Primary=6.53 cfs 19,738 cf Secondary=0.21 cfs 18 cf Outflow=6.75 cfs 19,756 cf

Pond 2P: Existing Catch Basin Peak Elev=198.14' Inflow=10.35 cfs 31,880 cf
15.0" Round Culvert n=0.025 L=100.0' S=0.0112 '/' Outflow=10.35 cfs 31,880 cf

Link POI: Total of Culvert Flows Inflow=10.35 cfs 31,880 cf
Primary=10.35 cfs 31,880 cf

Total Runoff Area = 119,015 sf Runoff Volume = 51,351 cf Average Runoff Depth = 5.18"
86.51% Pervious = 102,956 sf 13.49% Impervious = 16,059 sf



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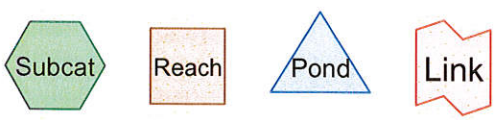

Routing Diagram for 14051 Post-Development
Prepared by MSC Civil Engineers & Land Surveyors, Inc., Printed 2/2/2015
HydroCAD® 10.00 s/n 01774 © 2013 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
181	39	>75% Grass cover, Good, HSG A (P-3)
14,851	74	>75% Grass cover, Good, HSG C (P-1, P-2)
8,508	96	Compacted Gravel (P-1, P-2, P-3)
24,307	90	Excavated Gravel / Shallow Ledge (P-1, P-2)
30,883	90	Excavated Gravel / Shallow Ledge, HSG C (P-3)
5,504	98	Ledge (P-1, P-2)
15,808	98	Paved Road and Accessway (P-1, P-2, P-3)
4,755	98	Roof (P-1, P-2, P-3)
14,218	30	Woods, Good, HSG A (P-1, P-2, P-3)
119,015	**83**	**TOTAL AREA**

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Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
14,399	HSG A	P-1, P-2, P-3
0	HSG B	
45,734	HSG C	P-1, P-2, P-3
0	HSG D	
58,882	Other	P-1, P-2, P-3
119,015		**TOTAL AREA**

Summary for Subcatchment P-1: Post-development Subcatchment 1

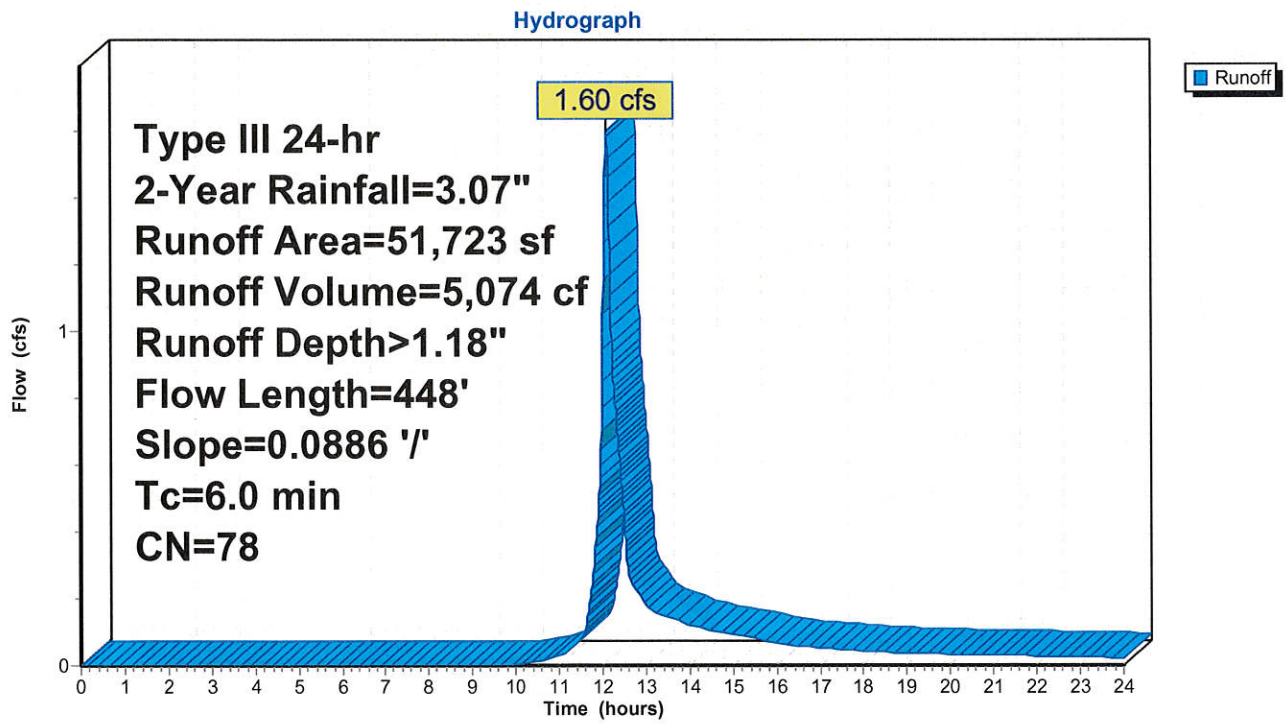
Runoff = 1.60 cfs @ 12.09 hrs, Volume= 5,074 cf, Depth> 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.07"

	Area (sf)	CN	Description
*	2,520	98	Roof
*	10,627	98	Paved Road and Accessway
*	1,166	96	Compacted Gravel
*	2,816	98	Ledge
*	12,335	90	Excavated Gravel / Shallow Ledge
	8,670	30	Woods, Good, HSG A
	13,589	74	>75% Grass cover, Good, HSG C
	51,723	78	Weighted Average
	35,760		69.14% Pervious Area
	15,963		30.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	448	0.0886	1.25		**Lag/CN Method,** Contour Length= 4,581' Interval= 1'

Subcatchment P-1: Post-development Subcatchment 1



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Summary for Subcatchment P-2: Post-development Subcatchment 2

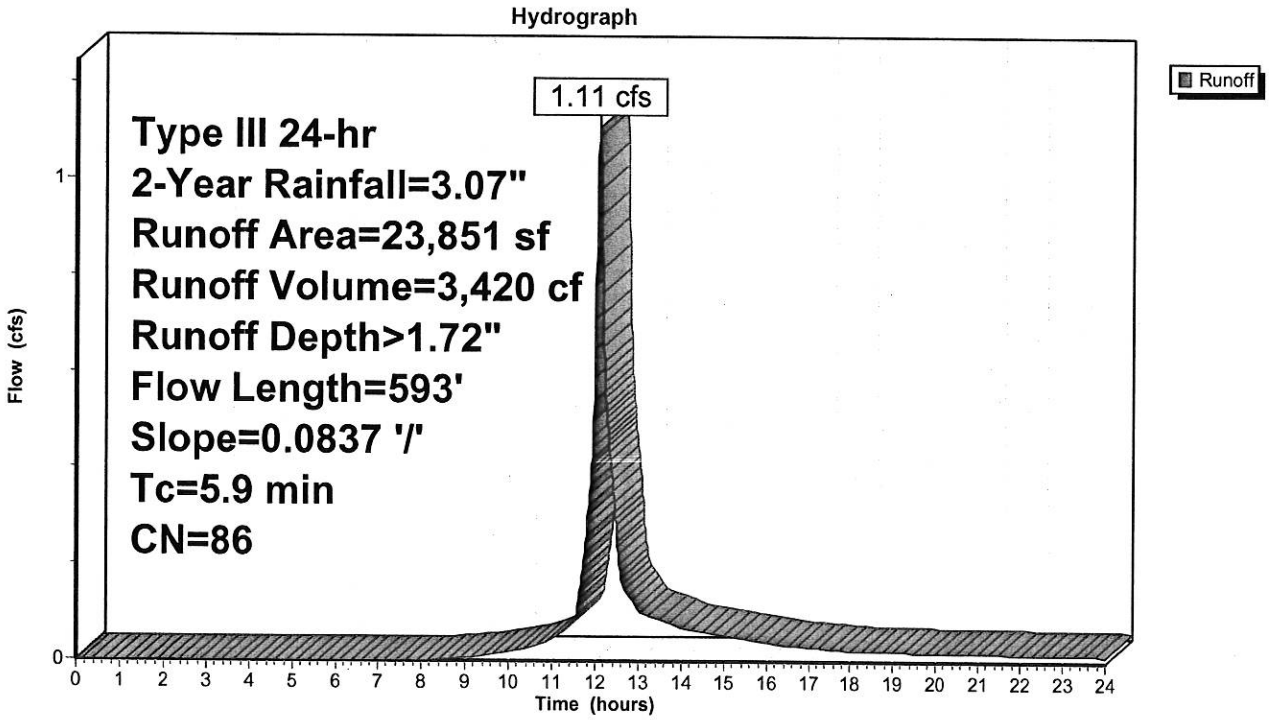
Runoff = 1.11 cfs @ 12.09 hrs, Volume= 3,420 cf, Depth> 1.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.07"

	Area (sf)	CN	Description
*	3,399	98	Paved Road and Accessway
*	1,383	96	Compacted Gravel
*	820	98	Roof
*	2,688	98	Ledge
*	11,972	90	Excavated Gravel / Shallow Ledge
	2,327	30	Woods, Good, HSG A
	1,262	74	>75% Grass cover, Good, HSG C
	23,851	86	Weighted Average
	16,944		71.04% Pervious Area
	6,907		28.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.9	593	0.0837	1.67		**Lag/CN Method,** Contour Length= 1,997' Interval= 1'

Subcatchment P-2: Post-development Subcatchment 2



Summary for Subcatchment P-3: Post-development Subcatchment 3

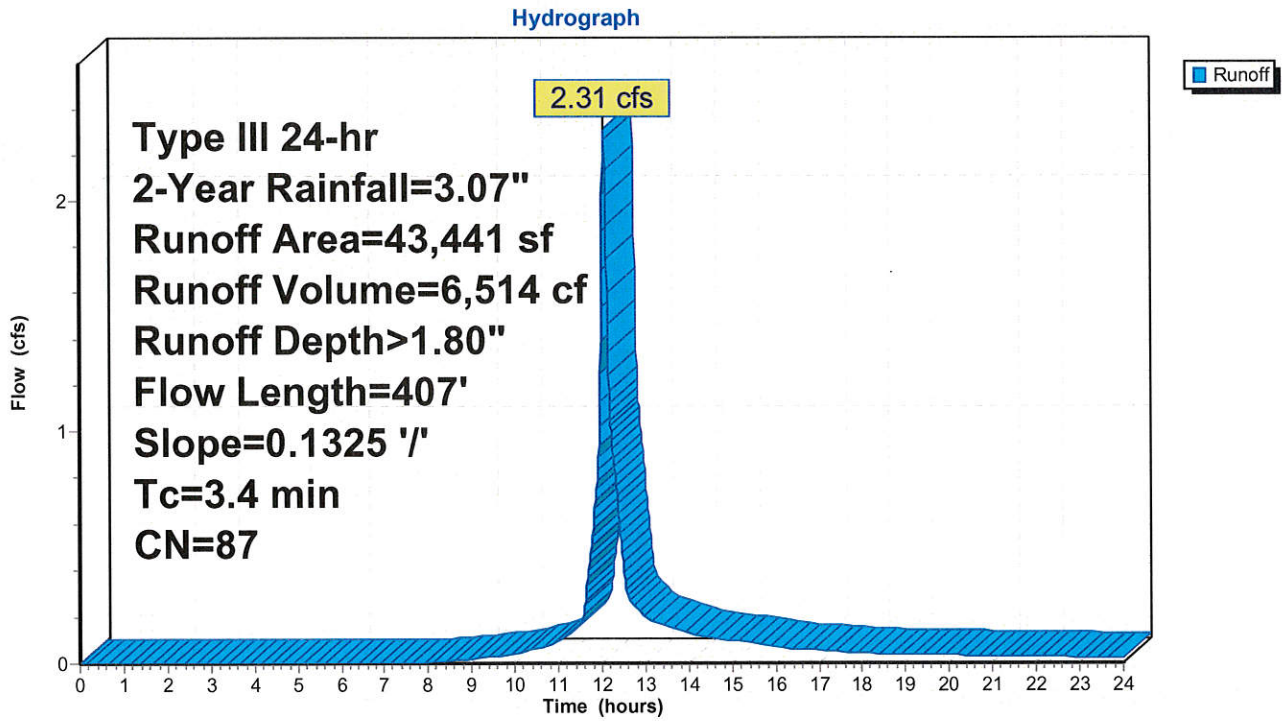
Runoff = 2.31 cfs @ 12.05 hrs, Volume= 6,514 cf, Depth> 1.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.07"

	Area (sf)	CN	Description
*	1,782	98	Paved Road and Accessway
*	5,959	96	Compacted Gravel
*	1,415	98	Roof
*	30,883	90	Excavated Gravel / Shallow Ledge, HSG C
	3,221	30	Woods, Good, HSG A
	181	39	>75% Grass cover, Good, HSG A
	43,441	87	Weighted Average
	40,244		92.64% Pervious Area
	3,197		7.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	407	0.1325	2.02		**Lag/CN Method,** Contour Length= 5,757' Interval= 1'

Subcatchment P-3: Post-development Subcatchment 3



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Summary for Reach 4R: Flow over pavement

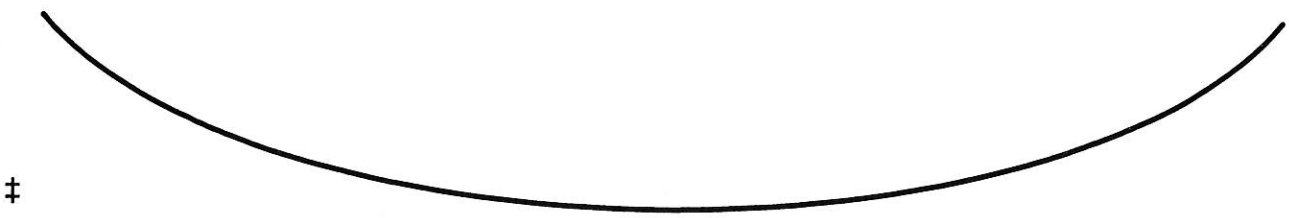
[81] Warning: Exceeded Pond 1P by 3.63' @ 0.00 hrs

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 0.10' Flow Area= 1.7 sf, Capacity= 2.10 cfs

25.00' x 0.10' deep Parabolic Channel, n= 0.013 Asphalt, smooth
Length= 40.0' Slope= 0.0045 '/'
Inlet Invert= 191.00', Outlet Invert= 190.82'



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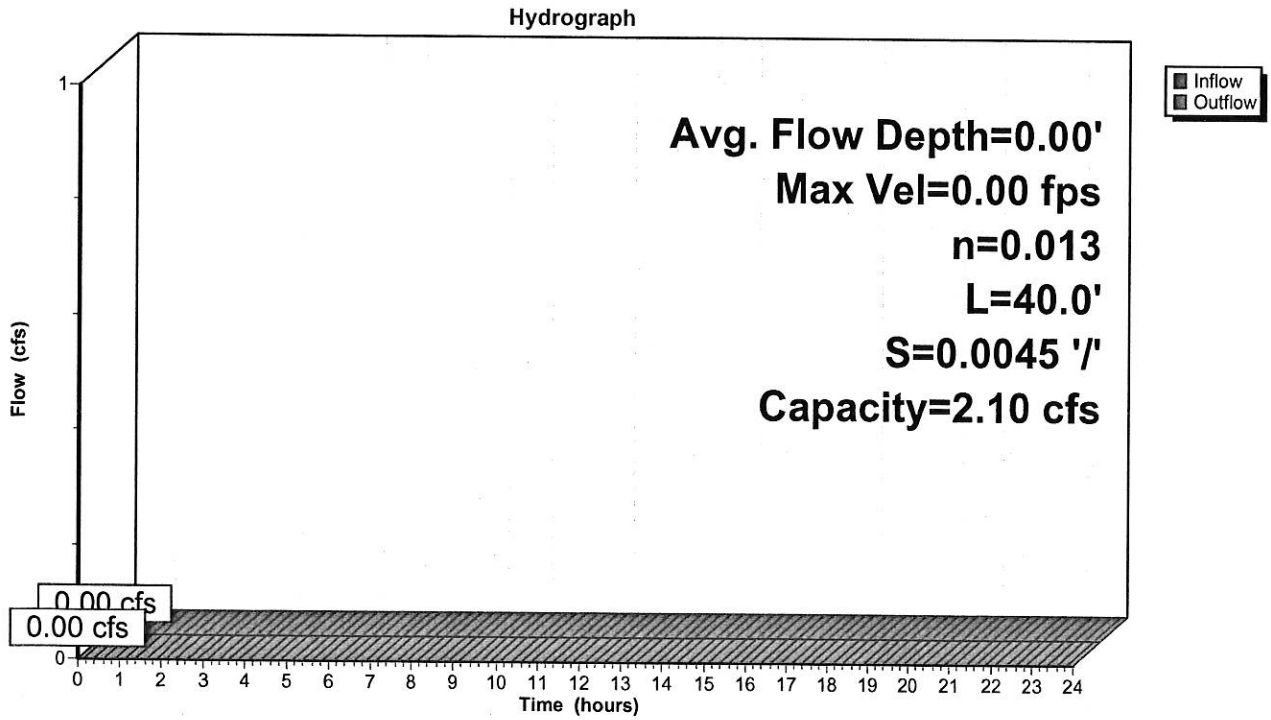
Reach 4R: Flow over pavement



Summary for Pond 1P: Existing Catch Basin

Inflow Area =	43,441 sf,	7.36% Impervious,	Inflow Depth >	1.80"	for 2-Year event
Inflow =	2.31 cfs @	12.05 hrs, Volume=	6,514 cf		
Outflow =	2.31 cfs @	12.05 hrs, Volume=	6,514 cf,	Atten= 0%,	Lag= 0.0 min
Primary =	2.31 cfs @	12.05 hrs, Volume=	6,514 cf		
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0 cf		

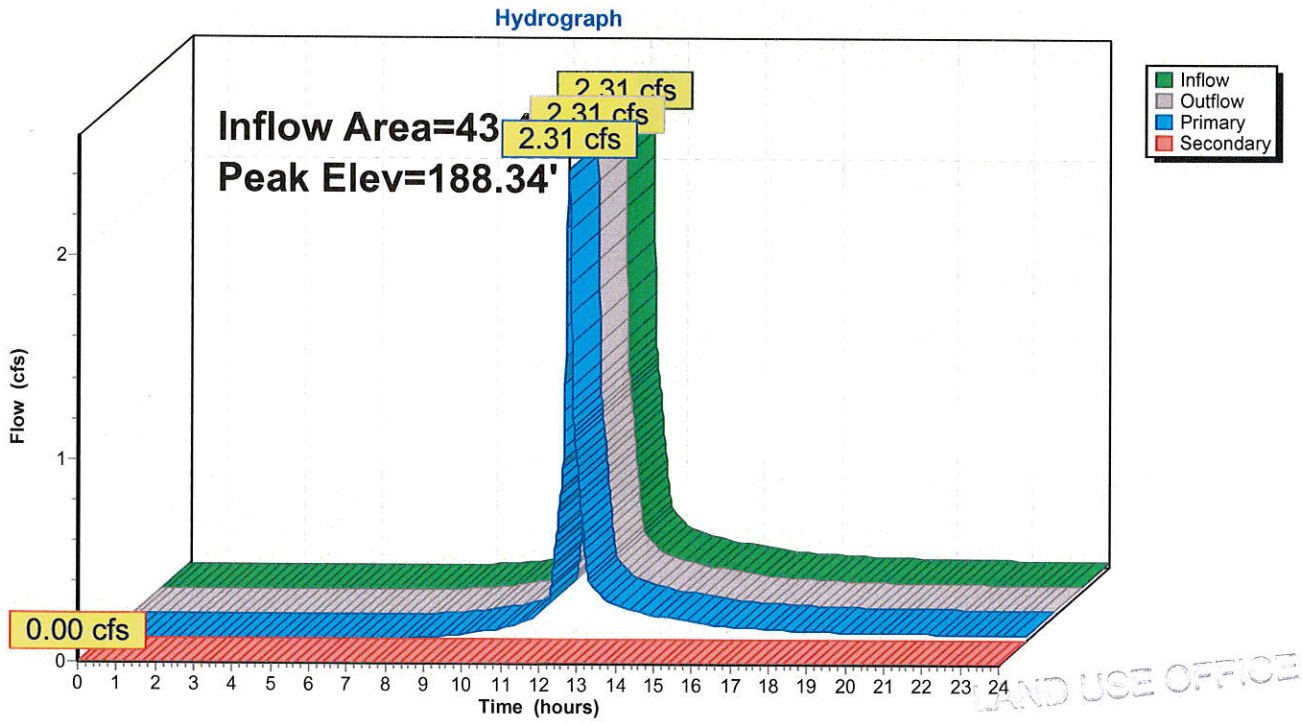
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 188.34' @ 12.05 hrs
Flood Elev= 190.31'

Device	Routing	Invert	Outlet Devices
#1	Primary	187.37'	**15.0" Round Culvert** L= 40.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 187.37' / 186.92' S= 0.0113 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.23 sf
#2	Secondary	190.31'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.31 cfs @ 12.05 hrs HW=188.34' (Free Discharge)
└**1=Culvert** (Barrel Controls 2.31 cfs @ 3.12 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.37' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Existing Catch Basin



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Summary for Pond 2P: Existing Catch Basin

[79] Warning: Submerged Pond 1P Primary device # 1 INLET by 0.71'

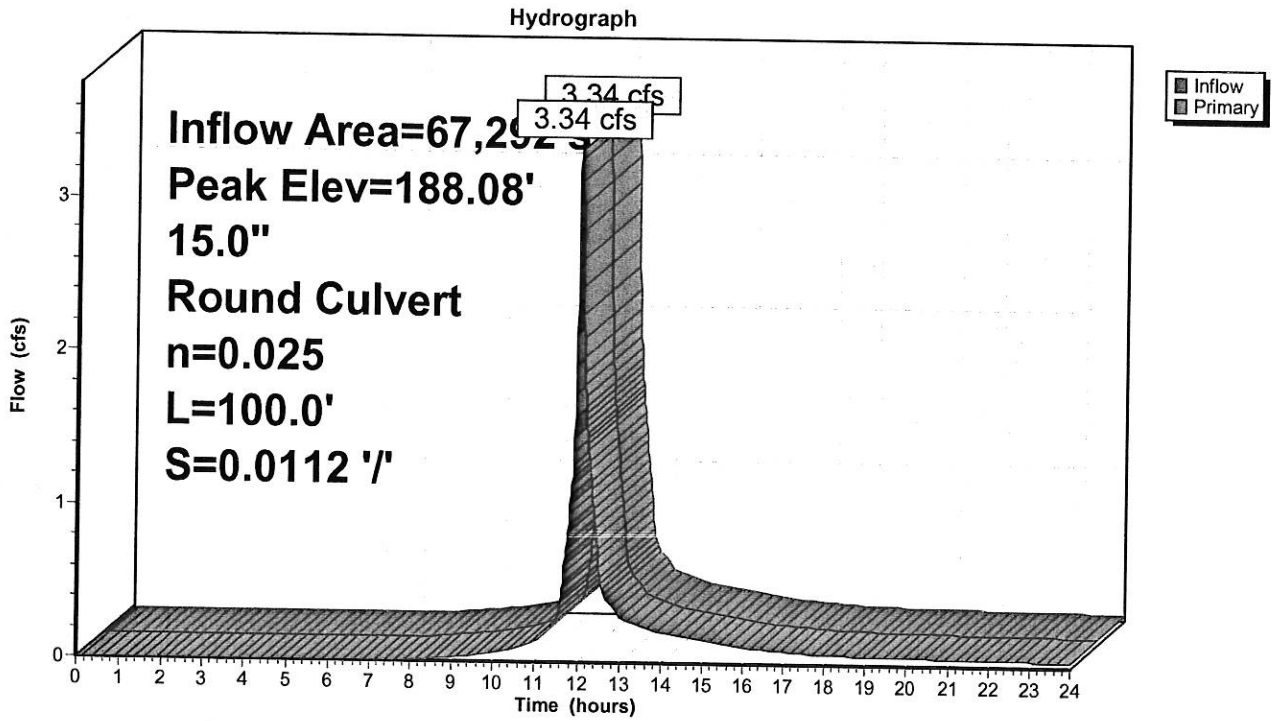
Inflow Area =	67,292 sf,	15.02% Impervious,	Inflow Depth >	1.77"	for 2-Year event
Inflow =	3.34 cfs @	12.06 hrs, Volume=	9,933 cf		
Outflow =	3.34 cfs @	12.06 hrs, Volume=	9,933 cf,	Atten= 0%,	Lag= 0.0 min
Primary =	3.34 cfs @	12.06 hrs, Volume=	9,933 cf		

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 188.08' @ 12.06 hrs
Flood Elev= 190.82'

Device	Routing	Invert	Outlet Devices
#1	Primary	186.82'	**15.0" Round Culvert** L= 100.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 186.82' / 185.70' S= 0.0112 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 1.23 sf

Primary OutFlow Max=3.34 cfs @ 12.06 hrs HW=188.08' (Free Discharge)
└**1=Culvert** (Barrel Controls 3.34 cfs @ 3.36 fps)

Pond 2P: Existing Catch Basin

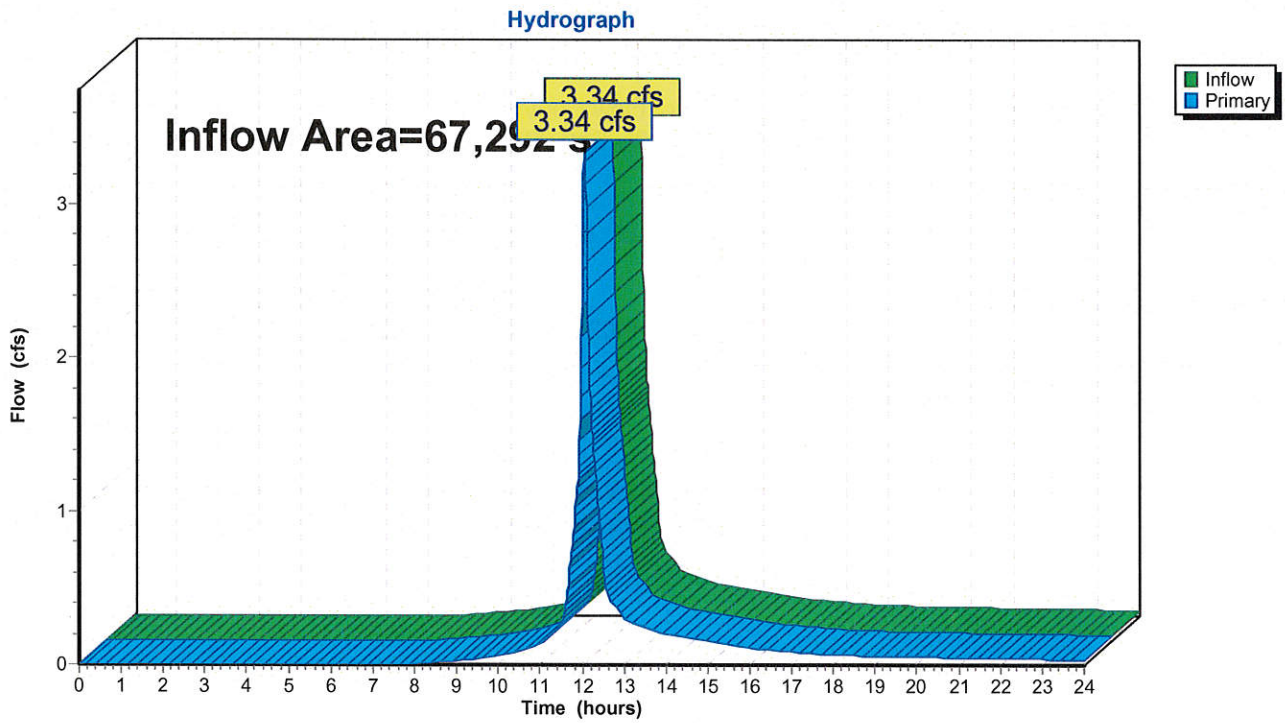


Summary for Link POI: Total of Culvert Flows

Inflow Area =	67,292 sf,	15.02% Impervious,	Inflow Depth >	1.77"	for 2-Year event
Inflow =	3.34 cfs @	12.06 hrs, Volume=	9,933 cf		
Primary =	3.34 cfs @	12.06 hrs, Volume=	9,933 cf,	Atten= 0%,	Lag= 0.0 min

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

Link POI: Total of Culvert Flows



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

Subcatchment P-1: Post-development Runoff Area=51,723 sf 30.86% Impervious Runoff Depth>2.39"
Flow Length=448' Slope=0.0886 '/' Tc=6.0 min CN=78 Runoff=3.33 cfs 10,299 cf

Subcatchment P-2: Post-development Runoff Area=23,851 sf 28.96% Impervious Runoff Depth>3.11"
Flow Length=593' Slope=0.0837 '/' Tc=5.9 min CN=86 Runoff=1.99 cfs 6,183 cf

Subcatchment P-3: Post-development Runoff Area=43,441 sf 7.36% Impervious Runoff Depth>3.21"
Flow Length=407' Slope=0.1325 '/' Tc=3.4 min CN=87 Runoff=4.07 cfs 11,617 cf

Reach 4R: Flow over pavement Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0 cf
n=0.013 L=40.0' S=0.0045 '/' Capacity=2.10 cfs Outflow=0.00 cfs 0 cf

Pond 1P: Existing Catch Basin Peak Elev=188.84' Inflow=4.07 cfs 11,617 cf
Primary=4.07 cfs 11,617 cf Secondary=0.00 cfs 0 cf Outflow=4.07 cfs 11,617 cf

Pond 2P: Existing Catch Basin Peak Elev=190.59' Inflow=5.91 cfs 17,800 cf
15.0" Round Culvert n=0.025 L=100.0' S=0.0112 '/' Outflow=5.91 cfs 17,800 cf

Link POI: Total of Culvert Flows Inflow=5.91 cfs 17,800 cf
Primary=5.91 cfs 17,800 cf

Total Runoff Area = 119,015 sf Runoff Volume = 28,099 cf Average Runoff Depth = 2.83"
78.10% Pervious = 92,948 sf 21.90% Impervious = 26,067 sf

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

Subcatchment P-1: Post-development Runoff Area=51,723 sf 30.86% Impervious Runoff Depth>3.43"
Flow Length=448' Slope=0.0886 '/' Tc=6.0 min CN=78 Runoff=4.78 cfs 14,802 cf

Subcatchment P-2: Post-development Runoff Area=23,851 sf 28.96% Impervious Runoff Depth>4.25"
Flow Length=593' Slope=0.0837 '/' Tc=5.9 min CN=86 Runoff=2.68 cfs 8,454 cf

Subcatchment P-3: Post-development Runoff Area=43,441 sf 7.36% Impervious Runoff Depth>4.36"
Flow Length=407' Slope=0.1325 '/' Tc=3.4 min CN=87 Runoff=5.45 cfs 15,791 cf

Reach 4R: Flow over pavement Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0 cf
n=0.013 L=40.0' S=0.0045 '/' Capacity=2.10 cfs Outflow=0.00 cfs 0 cf

Pond 1P: Existing Catch Basin Peak Elev=189.69' Inflow=5.45 cfs 15,791 cf
Primary=5.45 cfs 15,791 cf Secondary=0.00 cfs 0 cf Outflow=5.45 cfs 15,791 cf

Pond 2P: Existing Catch Basin Peak Elev=193.54' Inflow=7.94 cfs 24,245 cf
15.0" Round Culvert n=0.025 L=100.0' S=0.0112 '/' Outflow=7.94 cfs 24,245 cf

Link POI: Total of Culvert Flows Inflow=7.94 cfs 24,245 cf
Primary=7.94 cfs 24,245 cf

Total Runoff Area = 119,015 sf Runoff Volume = 39,047 cf Average Runoff Depth = 3.94"
78.10% Pervious = 92,948 sf 21.90% Impervious = 26,067 sf

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

Subcatchment P-1: Post-development Runoff Area=51,723 sf 30.86% Impervious Runoff Depth>4.45"
Flow Length=448' Slope=0.0886 '/' Tc=6.0 min CN=78 Runoff=6.17 cfs 19,189 cf

Subcatchment P-2: Post-development Runoff Area=23,851 sf 28.96% Impervious Runoff Depth>5.34"
Flow Length=593' Slope=0.0837 '/' Tc=5.9 min CN=86 Runoff=3.33 cfs 10,617 cf

Subcatchment P-3: Post-development Runoff Area=43,441 sf 7.36% Impervious Runoff Depth>5.46"
Flow Length=407' Slope=0.1325 '/' Tc=3.4 min CN=87 Runoff=6.75 cfs 19,756 cf

Reach 4R: Flow over pavement Avg. Flow Depth=0.03' Max Vel=0.53 fps Inflow=0.21 cfs 18 cf
n=0.013 L=40.0' S=0.0045 '/' Capacity=2.10 cfs Outflow=0.12 cfs 18 cf

Pond 1P: Existing Catch Basin Peak Elev=190.35' Inflow=6.75 cfs 19,756 cf
Primary=6.53 cfs 19,738 cf Secondary=0.21 cfs 18 cf Outflow=6.75 cfs 19,756 cf

Pond 2P: Existing Catch Basin Peak Elev=196.98' Inflow=9.80 cfs 30,373 cf
15.0" Round Culvert n=0.025 L=100.0' S=0.0112 '/' Outflow=9.80 cfs 30,373 cf

Link POI: Total of Culvert Flows Inflow=9.80 cfs 30,373 cf
Primary=9.80 cfs 30,373 cf

Total Runoff Area = 119,015 sf Runoff Volume = 49,561 cf Average Runoff Depth = 5.00"
78.10% Pervious = 92,948 sf 21.90% Impervious = 26,067 sf