CONCEPTUAL DRAINAGE PLAN
For
RASPBERRY ACRES
2155 W STRONG ROAD
SPOKANE, WA

Prepared for:

RASPBERRY ACRES, LLC
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Prepared by:

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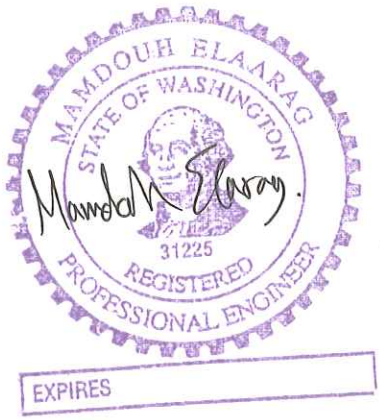
April 17, 2021

Conceptual Drainage Plan
Raspberry Acres
Spokane, WA.

The data, calculations, text and graphic information contained in this document were compiled and published under the supervision and direction of the undersigned, whose seal as a professional engineer licensed to practice as such in the State of Washington, is affixed below.



5-6-21

(Seal)

(Consultant/Professional Engineer)

Date 5-6-21

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I. Introduction

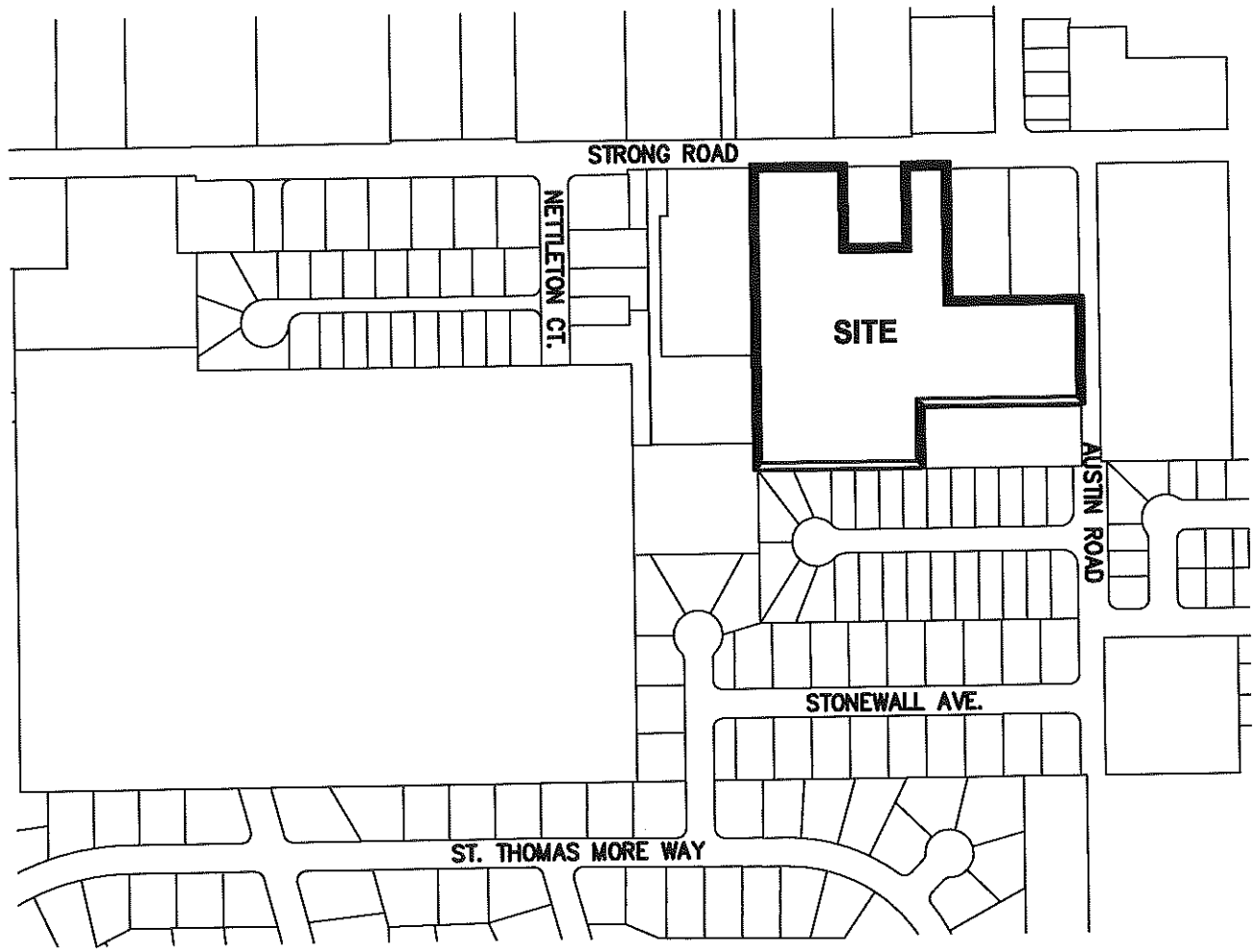
I.1. Site Description

The project site is at 2155 W Strong Road, Spokane Washington. Figure 1 – Location Map shows the proximity of the site with respect to City of Spokane and surrounding area. The subject property is parcel number 26244.0085 with approximately 6.4 acres.

I.2. Proposed Project

The proposed project is to develop existing parcel int thirty-one (31) single family residential lots. Construction will include clearing and grading of the site, installation of underground utilities, on-site paving and concrete work. Figure 4 – Post-Development Conditions shows the layout of the development and proposed improvements.

The project is located within the Five Mile Special District which requires a special connection agreement with the City of Spokane for use of the Austin Ravine Drainage System. The drainage system is designed to provide treatment using the '208' runoff method as described in the SRSM and disposing to the existing storm water system on Austin Road at the assigned rate by the City of Spokane.



MHE ENGINEERING 9702 W. MASTERS LANE CHENEY, WA 99004 509-230-1960 MELAARAGEYAHOO.COM	RASPBERRY ACRES CITY OF SPOKANE, WASHINGTON DRAINAGE REPORT	FIGURE 1 SCALE: NTS DRAWN BY: MHE	VICINITY MAP

II.Background Information

II.1. Topography

The topography of the site slopes from a maximum elevation of approximately 2390-Ft. (NAVD 88) to a low elevation of approximately 2375-Ft. The elevations presented in Figure 3 – Pre-Development Conditions are based on a topographic survey conducted by Landtek, LLC for this project.

II.2. Soils

The National Resources Conservation Service (NRCS), has mapped the soil in the vicinity of the project site. According to the soil survey, the project site is underlain by Brincken, moist-Uhlig complex and Seabold, warm-Brincken. These soils are described as ashy silt loam to extrermely gravelly sandy loam. See Appendix A for additional soil information.

ALLWEST prepared a geotechnical report for this project dated February 10, 2020. The report indicates that soils for this project are mainly Sandy Clay and Clayey Silty Sand. The report recommends using Equation 6-1D of the SRSM to size stormwater swales for this project.

A copy of the geotechnical report is submitted.

II.3. Drainage System Determination

The drainage system will consist of collecting the storm water, providing treatment using the '208' runoff method as described in the SRSM and disposing to the existing storm water system on Austin Road at the assigned rate by the City of Spokane. The City of Spokane assigned 20 gpm/acre for the outflow into the Austin Ravine.

III.Drainage Narrative

III.1. Introduction

This report describes the general drainage conditions on the site in relation to the storm water control requirements of City of Spokane. This design is the result of our analysis of site conditions. Design parameters are based on the requirements set forth in the City of Spokane, the Spokane Regional Storm water Manual (SRSM) and generally accepted engineering practices and theory.

Pre-development flow of any off-site runoff passing through the plat shall not be increased (rate or volume) or concentrated due to development of the plat, based on a 50-year design storm.

III.2.Pre-Development Analysis

In the pre-developed condition, the site is considered as three basins. The basins were determined by the natural topography of the plat. See Figure 3 – Pre-Developed Conditions in Appendix B which shows the pre-developed basins.

Pre-development storm water runoff rates for 2, 10, 50 and 100 year events were modeled using a computer software called HydroCad. The CN factor used was 80 for Soil Group C and cultivated agricultural lands for small grains.

Calculations for the 2, 10, 50 and 100 year storm events were performed (see Appendix B). The following table summarizes the pre-development runoff rates for the basin.

Table No. 1 – Pre-Development Basin Runoff Summary

Basin	2-Year	10-Year	50-Year	100-Year
A	1.21 CFS	1.67 CFS	2.70 CFS	3.25 CFS
B	1.06 CFS	1.47 CFS	2.38 CFS	2.87 CFS
C	0.78 CFS	1.07 CFS	1.69 CFS	2.04 CFS
TOTAL	**3.05 CFS**	**4.21 CFS**	**6.77 CFS**	**8.16 CFS**

III.3. Post-Development

All runoff within the proposed drainage basins will be collected and treated using the '208' runoff method as described in the SRSM. In the developed condition, the project includes seven (7) on-site basin (see Figure 4). Weighted "C" Runoff Coefficients were calculated for each basin of less than 10 acres as required by the SRMS. Table 1 provides the basin size, total impervious areas, and runoff coefficients for the post developed condition.

Table No. 1 – Runoff Coefficient Summary

Basin	Total Area (SF)	Total Area (AC)	'208' Impervious Area (SF)	Total Impervious Area (SF)	Runoff Coefficient "C"
A	6400	0.147	3690	4190	0.64
B	87480	2.00	16570	42155	0.51
C	14030	0.322	5735	6745	0.54
D	43225	0.99	12570	21370	0.52
E	42000	0.964	10880	20920	0.52
F	74470	1.71	13380	32970	0.48
G	13400	0.31	5051	7751	5649

In calculating the '208' impervious area (PGIS) the assumed driveway area was 500 square feet. An assumed roof area of 2,000 square feet per lot was used in the total impervious area.

III.4. '208' Calculations

The '208' storage volume for each basin was designed to adequately contain the runoff created by the first half-inch of rainfall upon the '208' impervious areas within the basin it serves. The provided '208' treatment volume shown in Table 2 is based on pond bottom areas and 3:1 side slopes at a maximum six-inch treatment depth of the swale. See Appendix "C" for swale volume calculations. Table 2 summarizes the requirements and designs of the ponds by basin.

Table No. 2 – '208' Volume Summary

Pond	Pond Bottom Area (SF)	'208' Volume Required (CF)	Provided Pond '208' Volume (CF)	Total Storage Volume (CF)
A	240	154	185	507
B	1035	690	781	2097
C	720	239	545	1467
D	750	524	567	1527
E	1200	453	905	2427
F	954	558	720	1935
G	360	210	275	747

A sub-basin analyses will be completed to demonstrate that the lower swale cells are adequately sized for the tributary PGIS areas.

III.5 Larger Storm Events

An analysis was done to evaluate the effects of larger storm events or failure of proposed facilities. A visual inspection was conducted and the following was concluded:

- The proposed project engineering plans will neither aggravate an existing drainage problem nor create a new drainage problem.
- All storm water runoff from the proposed project will discharge at the natural, pre-developed location and will not adversely affect any private property.
- **The storm water system will be designed with additional storage volume capacity to handle the 100-year storm event.**

III.6 Inlet Capacities

Inlet capacity calculations will be performed for all curb inlets to determine the stormwater runoff to be collected by each drainage structure, and the remaining by-pass flows to be addressed by the next downstream structure. By-pass flows were calculated for each inlet on a continuous grade and added to the following inlet.

Appendix "C" will include inlet capacity calculations. The inlet calculations will include a 50% clogging factor per City Design Standard 6.3-7(d).

III.7 Roadway Flooded Width Calculations

Spokane County Stormwater Guidelines required that a minimum of 12' of non-flooded roadway surface be provided during a storm event for local access streets. Appendix "C" will include the calculated flooded roadway width.

III.8 Post Development Analysis

The proposed Five Mile Grove development will employ a detention system which is the various swale areas which will all drain to the end of the cul-de-sac. A stormwater pump station is designed to discharge the approved outflow into the existing stormwater pipe in Austin Road. The designated outflow rate is 20gpm per acre which is equal to 128 GPM. The facility will be designed such that the release rate does not exceed the pre-developed conditions for multiple storm events. The total post-developed discharge rate shall be limited to the pre-development rates outlined in the following table:

Allowable Discharge Rates

Design Frequency (24 Hr Strom)	Post-developed Discharge Rate
2-year	≤ 2-year pre-developed
10-year	≤10-year pre-developed
50-year	≤50-year pre-developed
100-year	Additional Storage

Computer software called HydroCad was used. HydroCad is a computer aided design program for modeling the hydrology and hydraulics of storm water runoff. It is based largely on hydrology techniques developed by the Soil Conservation Service (now the Natural Resources Conservation Service), combined with other hydrology and hydraulics calculations. For a given rainfall event these techniques are used to generate hydrographs throughout a watershed.

HydroCad was used to generate the peak flows for each sub-basin and to determine the size of swales and pond needed to limit the discharge rates to the pre-developed rates. Each sub-basin will have a drainage swale/pond to store and route the peak flows generated and meet the allowable discharge rates listed above.

Refer to Appendix C of this report for the calculations performed as part of the design of the swales and detention pond. The following tables summarize the calculations.

2-yr Discharge Rates

Sub-Basins	Post-Developed Peak In (cfs)	Post-Developed Peak Out (cfs)
B	1.25	0.98
C	0.26	0.19
D	0.74	0.58
E	0.55	0.40
F	0.97	0.79
TOTAL	**3.77**	**2.94**

Total post-developed peak discharge for a 2-yr storm event = 2.94 cfs minus 0.285 cfs (pump) equals 2.66 which is less than the 3.05 cfs pre-developed peak for Basins A-C.

10-yr Discharge Rates

Sub-Basins	Post-Developed Peak In (cfs)	Post-Developed Peak Out (cfs)
B	1.65	1.31
C	0.34	0.25
D	0.96	0.77
E	0.73	0.55
F	1.28	1.05
TOTAL	**4.53**	**3.93**

Total post-developed peak discharge for a 10-yr storm event = 3.93 cfs minus 0.285 cfs (pump) equals 3.65 which is less than the 4.21 cfs pre-developed peak for Basins A-C.

50-yr Discharge Rates

Sub-Basins	Post-Developed Peak In (cfs)	Post-Developed Peak Out (cfs)
B	2.49	2.01
C	0.51	0.40
D	1.44	1.19
E	1.11	0.86
F	1.95	1.64
TOTAL	**7.5**	**6.1**

Total post-developed peak discharge for a 50-yr storm event = 6.1 cfs minus 0.285 cfs (pump) equals 5.82 which is less than the 6.77 cfs pre-developed peak for Basins A-C.

100-yr Discharge Rates

Sub-Basins	Post-Developed Peak In (cfs)	Post-Developed Peak Out (cfs)
B	2.95	2.38
C	0.60	0.47
D	1.68	1.41
E	1.31	1.03
F	2.3	1.94
TOTAL	**8.84**	**7.23**

Total post-developed peak discharge for a 100-yr storm event = 7.23 cfs minus 0.285 cfs (pump) equals 6.95 which is less than the 8.16 cfs pre-developed peak for Basins A-C.

Runoff Volume Pre-Development vs. Post-Development (CF)

Storm Event	Pre-Developed Runoff Volume Basins A-C	Post-Developed Runoff Volume Basins B-F	Post-Pre	Provided Swale Storage
2-Year	5527	8403	2876	9450
50-year	11559	16344	4785	9450
100-year	13843	19279	5436	9450

IV. Conclusion

As demonstrated by this report and the enclosed calculations, the designed storm drainage facilities for Raspberry Acres will consist of collecting the storm water, providing treatment using the '208' runoff method as described in the SRSM and disposing to the existing storm water system on Austin Road at a lower rate than the pre-developed rate and volume.

APPENDIX A – NRCS SOILS DATA

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Spokane County, Washington

Raspberry Acres

April 25, 2021

Custom Soil Resource Report
Soil Map

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

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

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 1:24,000.

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:
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: Spokane County, Washington
Survey Area Data: Version 12, Jun 4, 2020

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

Date(s) aerial images were photographed: Jun 18, 2019—Jul 23, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3501	Brincken, moist-Uhlig complex, 0 to 8 percent slopes	5.4	82.8%
3505	Seaboldt, warm-Brincken, moist complex, 0 to 8 percent slopes	1.0	15.7%
7140	Urban land-Uhlig, disturbed complex, 0 to 8 percent slopes	0.1	1.5%
7177	Urban land-Seaboldt, warm, disturbed-Brincken, moist, disturbed complex, 0 to 3 percent slopes	0.0	0.0%
Totals for Area of Interest		**6.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

Spokane County, Washington

3501—Brincken, moist-Uhlig complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: qv8w
Elevation: 1,900 to 2,500 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 100 to 130 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Brincken, moist, and similar soils: 45 percent
Uhlig and similar soils: 30 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brincken, Moist

Setting

Landform: Outwash terraces on loess hills
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess mixed with minor amounts of volcanic ash over sandy and gravelly glaciofluvial deposits over an older age of loess

Typical profile

Ap - 0 to 7 inches: ashy silt loam
A - 7 to 13 inches: ashy silt loam
AB - 13 to 19 inches: ashy silt loam
Bw - 19 to 29 inches: ashy silt loam
Bt1 - 29 to 41 inches: extremely gravelly loam
Bt2 - 41 to 57 inches: very gravelly sandy clay loam
2Btb - 57 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F043AY511WA - Warm, Xeric, Loamy Hillsides, Mixed ash surface (Ponderosa Pine/Dry Grass) Pinus ponderosa / Pseudoroegneria spicata, Pinus ponderosa / Festuca idahoensis

Other vegetative classification: ponderosa pine/Idaho fescue (CN140)
Hydric soil rating: No

Description of Uhlig

Setting

Landform: Outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess mixed with minor amounts of volcanic ash over glaciofluvial deposits

Typical profile

Ap1 - 0 to 4 inches: ashy silt loam
Ap2 - 4 to 10 inches: ashy silt loam
A - 10 to 18 inches: ashy loam
Bt1 - 18 to 32 inches: loam
Bt2 - 32 to 42 inches: loam
C - 42 to 60 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F043AY511WA - Warm, Xeric, Loamy Hillsides, Mixed ash surface (Ponderosa Pine/Dry Grass) Pinus ponderosa / Pseudoroegneria spicata, Pinus ponderosa / Festuca idahoensis
Other vegetative classification: ponderosa pine/bluebunch wheatgrass (CN130)
Hydric soil rating: No

Minor Components

Fourmound

Percent of map unit: 14 percent
Landform: Plateaus
Microfeatures of landform position: Mounds
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Other vegetative classification: ponderosa pine/common snowberry (CN170)
Hydric soil rating: No

Seaboldt

Percent of map unit: 6 percent
Landform: Outwash plains on plateaus
Landform position (three-dimensional): Tread

Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: ponderosa pine/common snowberry (CN170)
Hydric soil rating: No

Nez perce

Percent of map unit: 5 percent
Landform: Outwash terraces on loess hills
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: ponderosa pine/bluebunch wheatgrass (CN130)
Hydric soil rating: No

3505—Seaboldt, warm-Brincken, moist complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2mdq0
Elevation: 2,300 to 2,440 feet
Mean annual precipitation: 18 to 20 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Seaboldt, warm, and similar soils: 60 percent
Brincken, moist, and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Seaboldt, Warm

Setting

Landform: Outwash plains on plateaus
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess mixed with minor amounts of volcanic ash over glaciofluvial deposits over residuum from basalt

Typical profile

Ap1 - 0 to 7 inches: ashy loam
Ap2 - 7 to 10 inches: ashy loam
Bw1 - 10 to 16 inches: loam
2Bw2 - 16 to 23 inches: sandy loam
2C - 23 to 28 inches: extremely gravelly sandy loam
3R - 28 to 38 inches: bedrock

Properties and qualities

Slope: 0 to 8 percent

Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F043AY511WA - Warm, Xeric, Loamy Hillsides, Mixed ash surface (Ponderosa Pine/Dry Grass) Pinus ponderosa / Pseudoroegneria spicata, Pinus ponderosa / Festuca idahoensis
Other vegetative classification: ponderosa pine/Idaho fescue (CN140)
Hydric soil rating: No

Description of Brincken, Moist

Setting

Landform: Outwash terraces on loess hills
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess mixed with minor amounts of volcanic ash over sandy and gravelly glaciofluvial deposits over an older age of loess

Typical profile

Ap - 0 to 7 inches: ashy silt loam
A - 7 to 13 inches: ashy silt loam
AB - 13 to 19 inches: ashy silt loam
Bw - 19 to 29 inches: ashy silt loam
Bt1 - 29 to 41 inches: extremely gravelly loam
Bt2 - 41 to 57 inches: very gravelly sandy clay loam
2Btb - 57 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F043AY511WA - Warm, Xeric, Loamy Hillsides, Mixed ash surface (Ponderosa Pine/Dry Grass) Pinus ponderosa / Pseudoroegneria spicata, Pinus ponderosa / Festuca idahoensis
Other vegetative classification: ponderosa pine/Idaho fescue (CN140)

Hydric soil rating: No

Minor Components

Urban land

Percent of map unit: 5 percent
Hydric soil rating: No

Uhlig

Percent of map unit: 5 percent
Landform: Outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: ponderosa pine/bluebunch wheatgrass (CN130)
Hydric soil rating: No

Nez perce

Percent of map unit: 5 percent
Landform: Outwash terraces on loess hills
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: ponderosa pine/bluebunch wheatgrass (CN130)
Hydric soil rating: No

7140—Urban land-Uhlig, disturbed complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2mfrn
Elevation: 2,350 to 2,400 feet
Mean annual precipitation: 18 to 20 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 70 percent
Uhlig, disturbed, and similar soils: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Description of Uhlig, Disturbed

Setting

Landform: Outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess mixed with minor amounts of volcanic ash over glaciofluvial deposits

Typical profile

Ap1 - 0 to 4 inches: ashy silt loam
Ap2 - 4 to 10 inches: ashy silt loam
A - 10 to 18 inches: ashy loam
Bt1 - 18 to 32 inches: loam
Bt2 - 32 to 42 inches: loam
C - 42 to 60 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Other vegetative classification: ponderosa pine/bluebunch wheatgrass (CN130)
Hydric soil rating: No

Minor Components

Seaboldt, warm, disturbed

Percent of map unit: 5 percent
Landform: Outwash plains on plateaus
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: ponderosa pine/Idaho fescue (CN140)
Hydric soil rating: No

Brincken, moist, disturbed

Percent of map unit: 3 percent
Landform: Outwash terraces on loess hills
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: ponderosa pine/Idaho fescue (CN140)
Hydric soil rating: No

Nez perce, disturbed

Percent of map unit: 2 percent
Landform: Plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Other vegetative classification: ponderosa pine/bluebunch wheatgrass (CN130)
Hydric soil rating: No

7177—Urban land-Seaboldt, warm, disturbed-Brincken, moist, disturbed complex, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2mdp2
Elevation: 2,270 to 2,400 feet
Mean annual precipitation: 18 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 45 percent
Seaboldt, warm, disturbed, and similar soils: 25 percent
Brincken, moist, disturbed, and similar soils: 20 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Description of Seaboldt, Warm, Disturbed

Setting

Landform: Outwash plains on plateaus
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess mixed with minor amounts of volcanic ash over glaciofluvial deposits over residuum from basalt

Typical profile

Ap1 - 0 to 7 inches: ashy loam
Ap2 - 7 to 10 inches: ashy loam

Bw1 - 10 to 16 inches: loam
2Bw2 - 16 to 23 inches: sandy loam
2C - 23 to 28 inches: extremely gravelly sandy loam
3R - 28 to 38 inches: bedrock

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C
Ecological site: F043AY511WA - Warm, Xeric, Loamy Hillsides, Mixed ash surface (Ponderosa Pine/Dry Grass) Pinus ponderosa / Pseudoroegneria spicata, Pinus ponderosa / Festuca idahoensis
Other vegetative classification: ponderosa pine/Idaho fescue (CN140)
Hydric soil rating: No

Description of Brincken, Moist, Disturbed

Setting

Landform: Outwash terraces on loess hills
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess mixed with minor amounts of volcanic ash over sandy and gravelly glaciofluvial deposits over an older age of loess

Typical profile

Ap - 0 to 7 inches: ashy silt loam
A - 7 to 13 inches: ashy silt loam
AB - 13 to 19 inches: ashy silt loam
Bw - 19 to 29 inches: ashy silt loam
Bt1 - 29 to 41 inches: extremely gravelly loam
Bt2 - 41 to 57 inches: very gravelly sandy clay loam
2Btb - 57 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Other vegetative classification: ponderosa pine/Idaho fescue (CN140)
Hydric soil rating: No

Minor Components

Nez perce, disturbed

Percent of map unit: 5 percent
Landform: Plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Other vegetative classification: ponderosa pine/bluebunch wheatgrass (CN130)
Hydric soil rating: No

Uhlig, disturbed

Percent of map unit: 3 percent
Landform: Outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: ponderosa pine/bluebunch wheatgrass (CN130)
Hydric soil rating: No

Stutler, disturbed

Percent of map unit: 2 percent
Landform: Outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: ponderosa pine/common snowberry (CN170)
Hydric soil rating: No

APPENDIX B – PRE-DEVELOPMENT CONDITIONS & CALCULATIONS

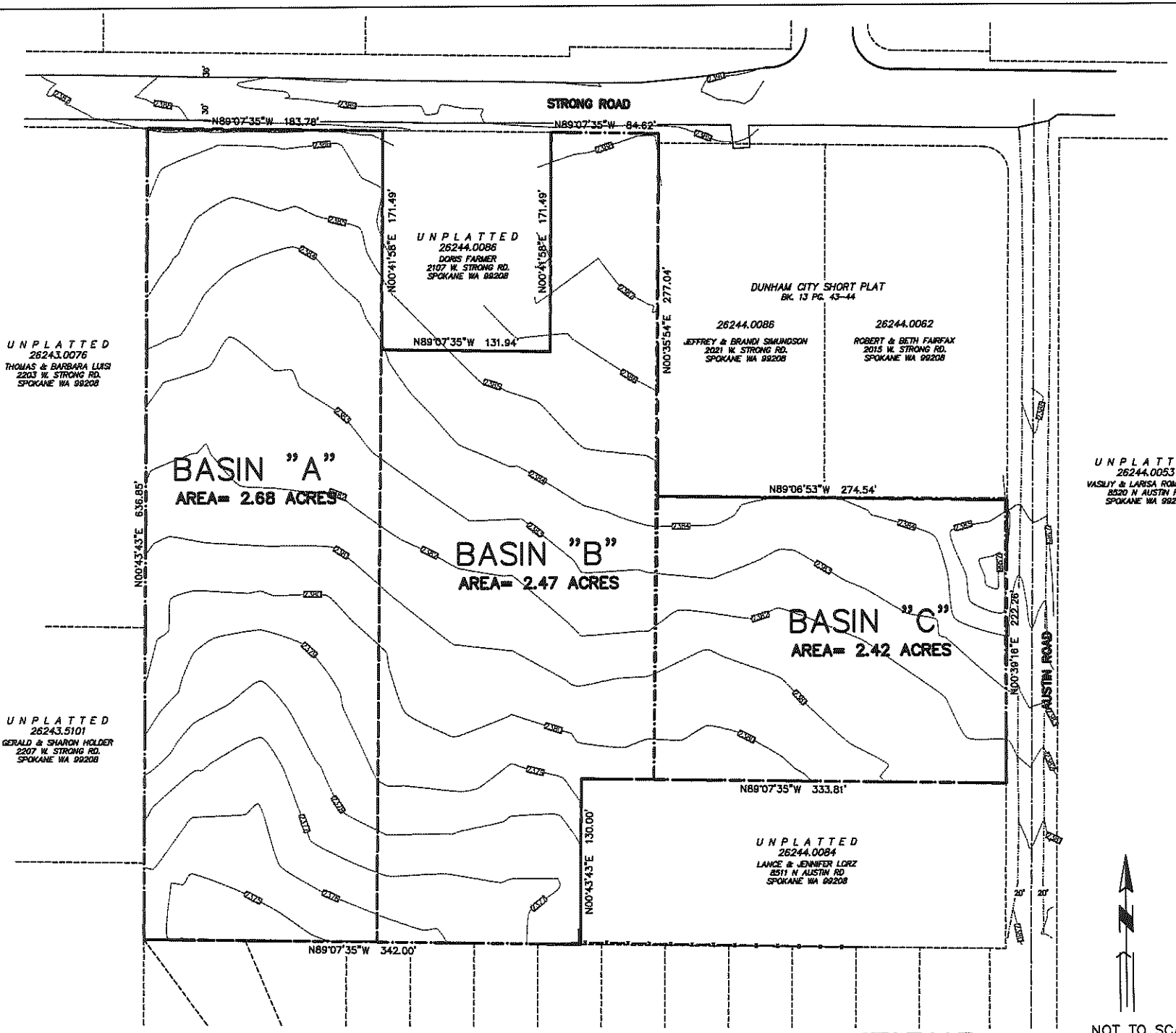


FIGURE 3 - PREDEVELOPMENT CONDITIONS

NOT TO SCALE
CONTOUR INTERVAL = 1'

FIGURE 3
SCALE: NTS
DRAWN BY: MHE

RASPBERRY ACRES
CITY OF SPOKANE, WASHINGTON
DRAINAGE REPORT

MHE ENGINEERING
9702 W. MASTERS LANE
CHENEY, WA 99004
509-230-1960
MELAARAG@YAHOO.COM

Pre-Developed Basin A

Approximate Total Area = 2.68 acres.

Tc:

The length to determine time of concentration = 600'
Slope = 0.02 ft/ft
Tc= 10.1 minutes

Cn:

From the soils map 100% of the basin is Group C with a Cn number of 80.

Weighted Cn = **80**

Pre-Developed Basin B

Approximate Total Area = 2.47 acres.

Tc:

The length to determine time of concentration = 650'
Slope = 0.0185 ft/ft
Tc= 11.4 minutes

Cn:

From the soils map 100% of the basin is Group C with a Cn number of 80.

Weighted Cn = **80**

Pre-Developed Basin C

Approximate Total Area = 1.41 acres.

Tc:

The length to determine time of concentration = 290'
Slope = 0.017 ft/ft
Tc= 5.3 minutes

Cn:

From the soils map 100% of the basin is Group C with a Cn number of 80.

Weighted Cn = **80**

Summary for Subcatchment 1S: PRE BASIN A

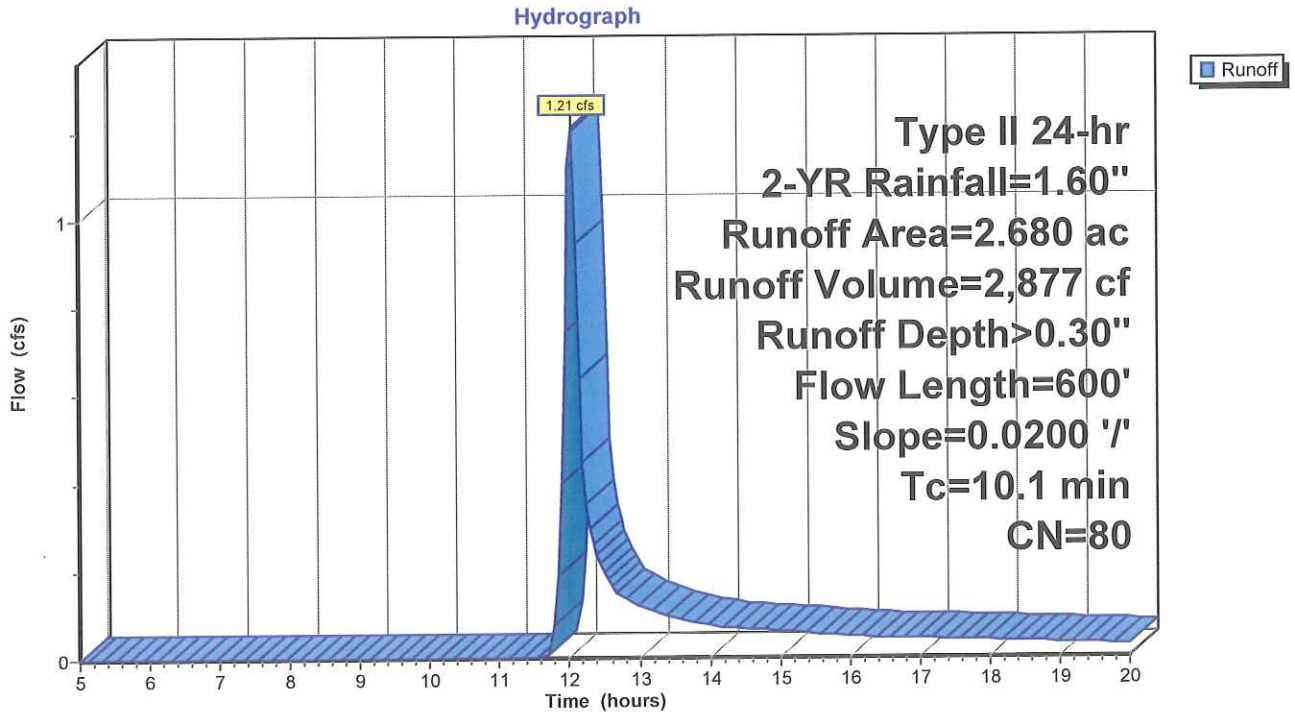
Runoff = 1.21 cfs @ 12.04 hrs, Volume= 2,877 cf, Depth> 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YR Rainfall=1.60"

	Area (ac)	CN	Description
*	2.680	80	
	2.680		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	600	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment 1S: PRE BASIN A



Summary for Subcatchment 1S: PRE BASIN A

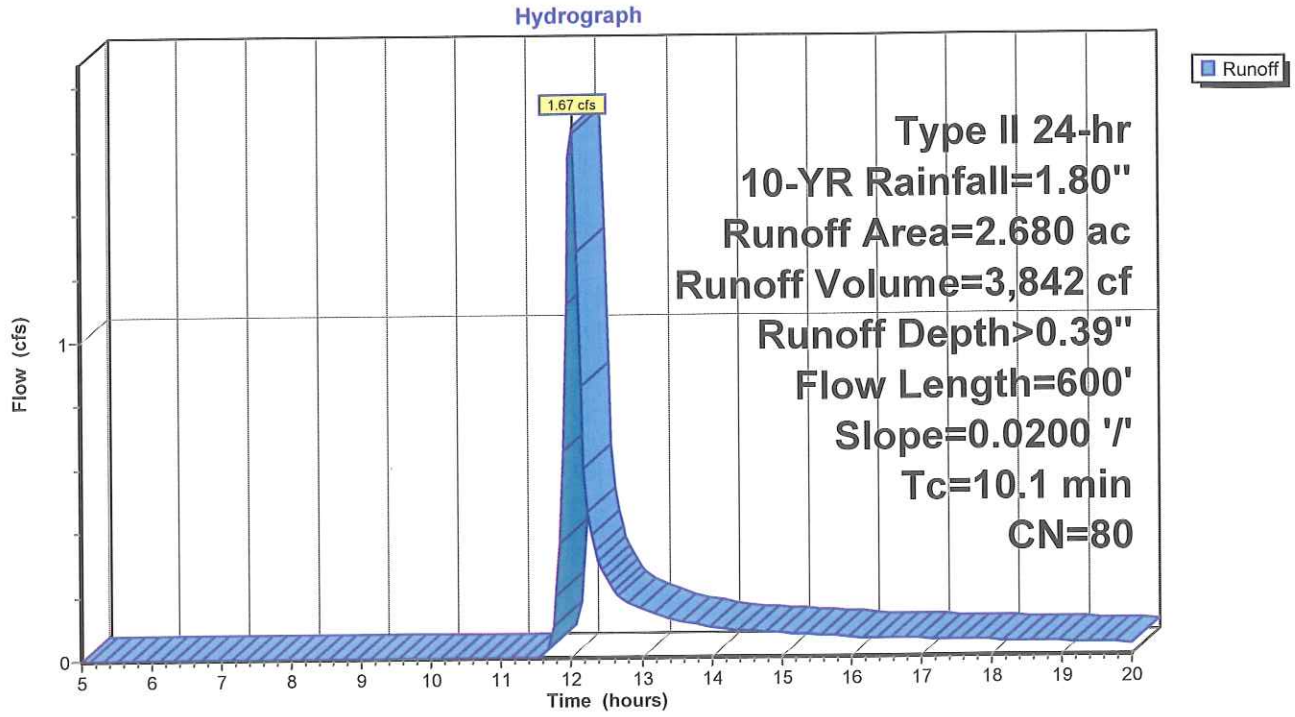
Runoff = 1.67 cfs @ 12.03 hrs, Volume= 3,842 cf, Depth> 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-YR Rainfall=1.80"

	Area (ac)	CN	Description
*	2.680	80	
	2.680		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	600	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment 1S: PRE BASIN A



Summary for Subcatchment 1S: PRE BASIN A

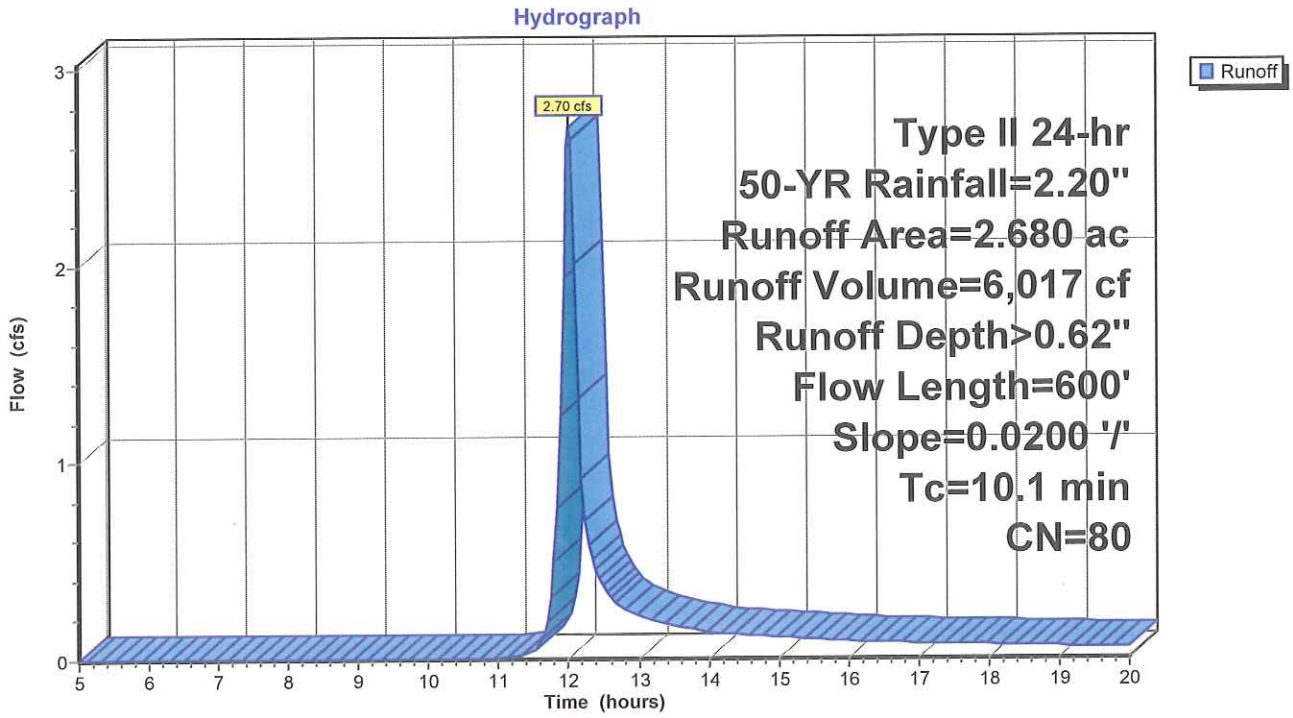
Runoff = 2.70 cfs @ 12.03 hrs, Volume= 6,017 cf, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-YR Rainfall=2.20"

	Area (ac)	CN	Description
*	2.680	80	
	2.680		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	600	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment 1S: PRE BASIN A



Summary for Subcatchment 1S: PRE BASIN A

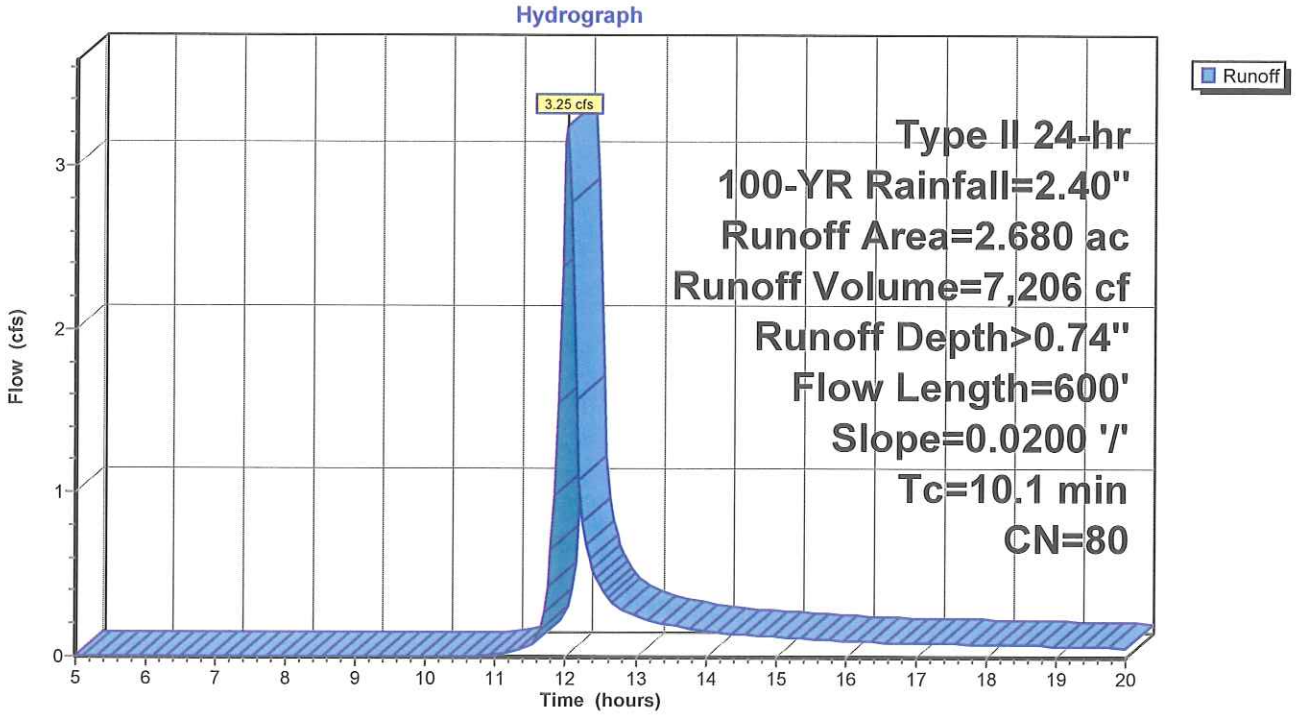
Runoff = 3.25 cfs @ 12.03 hrs, Volume= 7,206 cf, Depth> 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=2.40"

	Area (ac)	CN	Description
*	2.680	80	
	2.680		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	600	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment 1S: PRE BASIN A



Summary for Subcatchment 1S: PRE BASIN B

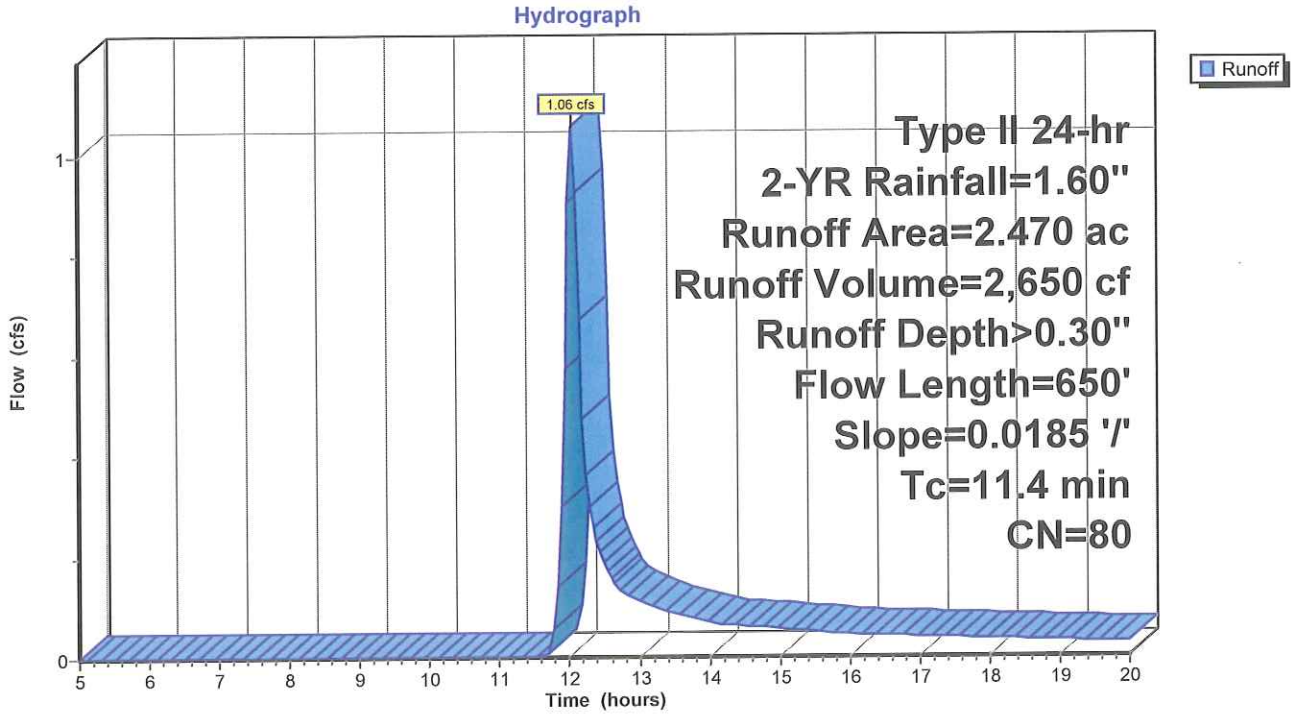
Runoff = 1.06 cfs @ 12.05 hrs, Volume= 2,650 cf, Depth> 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YR Rainfall=1.60"

	Area (ac)	CN	Description
*	2.470	80	
	2.470		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	650	0.0185	0.95		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment 1S: PRE BASIN B



Summary for Subcatchment 1S: PRE BASIN B

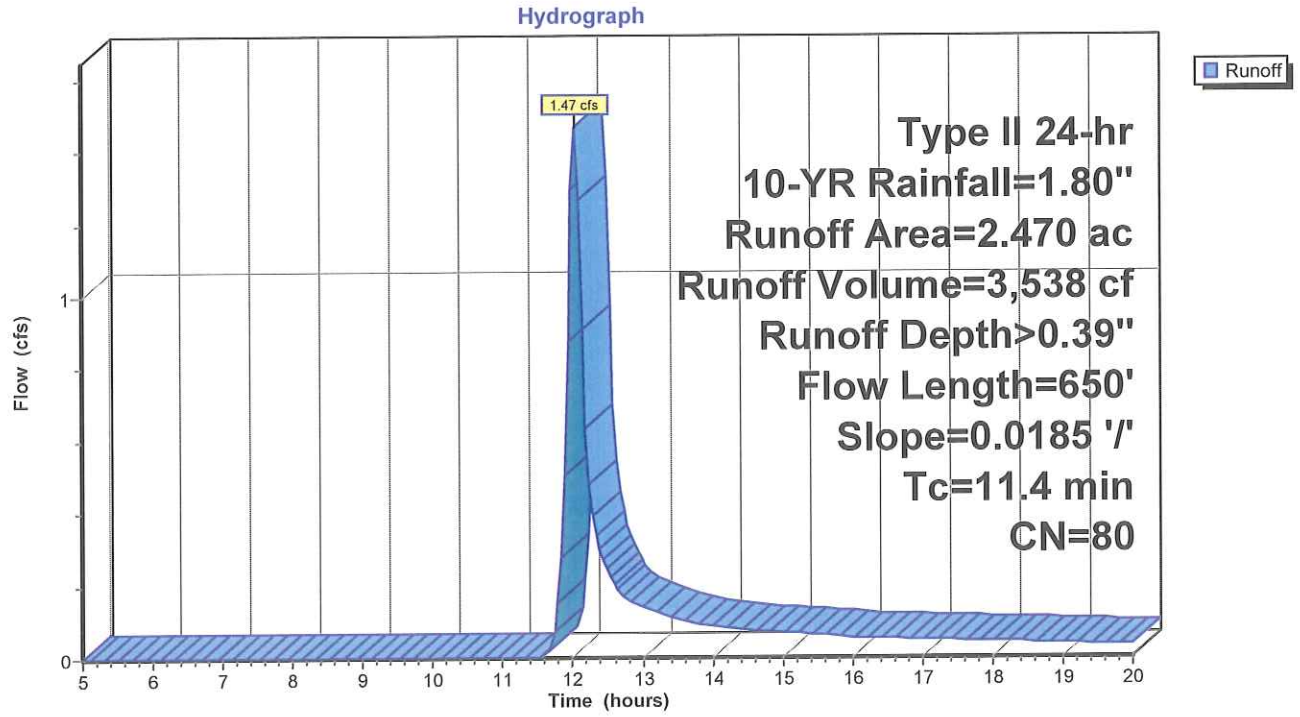
Runoff = 1.47 cfs @ 12.05 hrs, Volume= 3,538 cf, Depth> 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-YR Rainfall=1.80"

	Area (ac)	CN	Description
*	2.470	80	
	2.470		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	650	0.0185	0.95		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment 1S: PRE BASIN B



Summary for Subcatchment 1S: PRE BASIN B

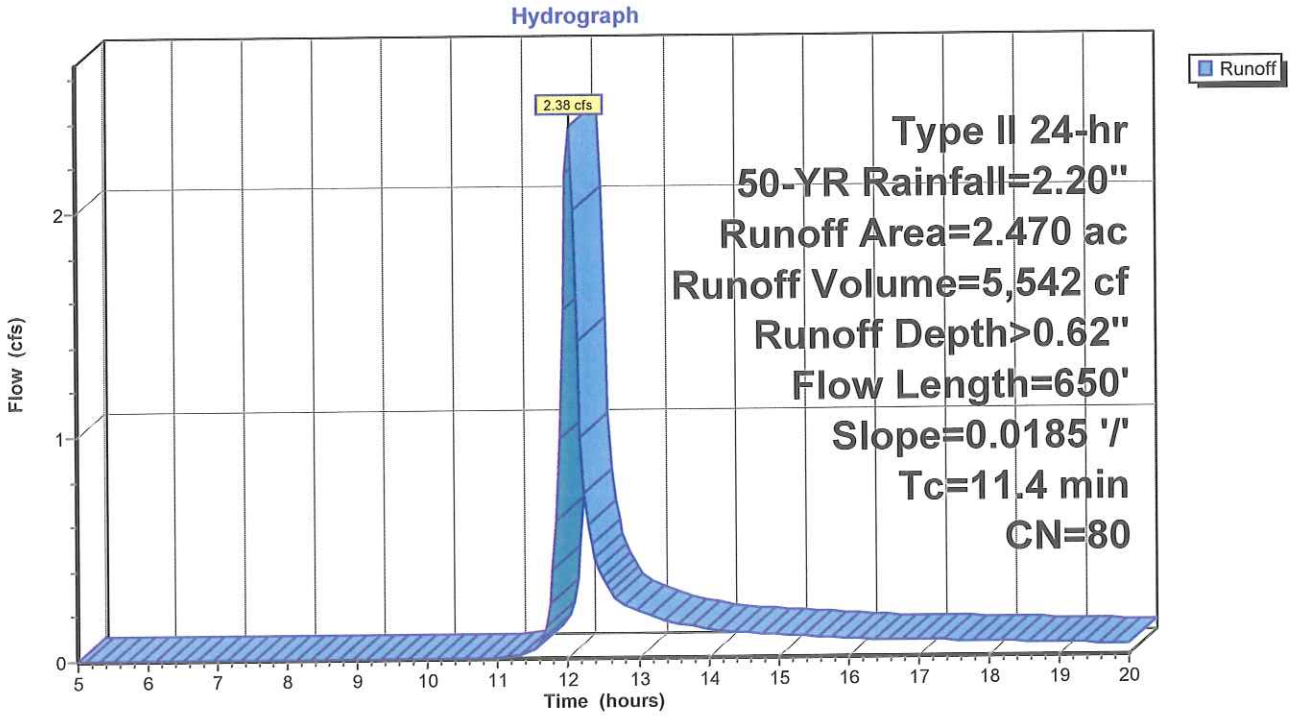
Runoff = 2.38 cfs @ 12.04 hrs, Volume= 5,542 cf, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-YR Rainfall=2.20"

	Area (ac)	CN	Description
*	2.470	80	
	2.470		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	650	0.0185	0.95		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment 1S: PRE BASIN B



Summary for Subcatchment 1S: PRE BASIN B

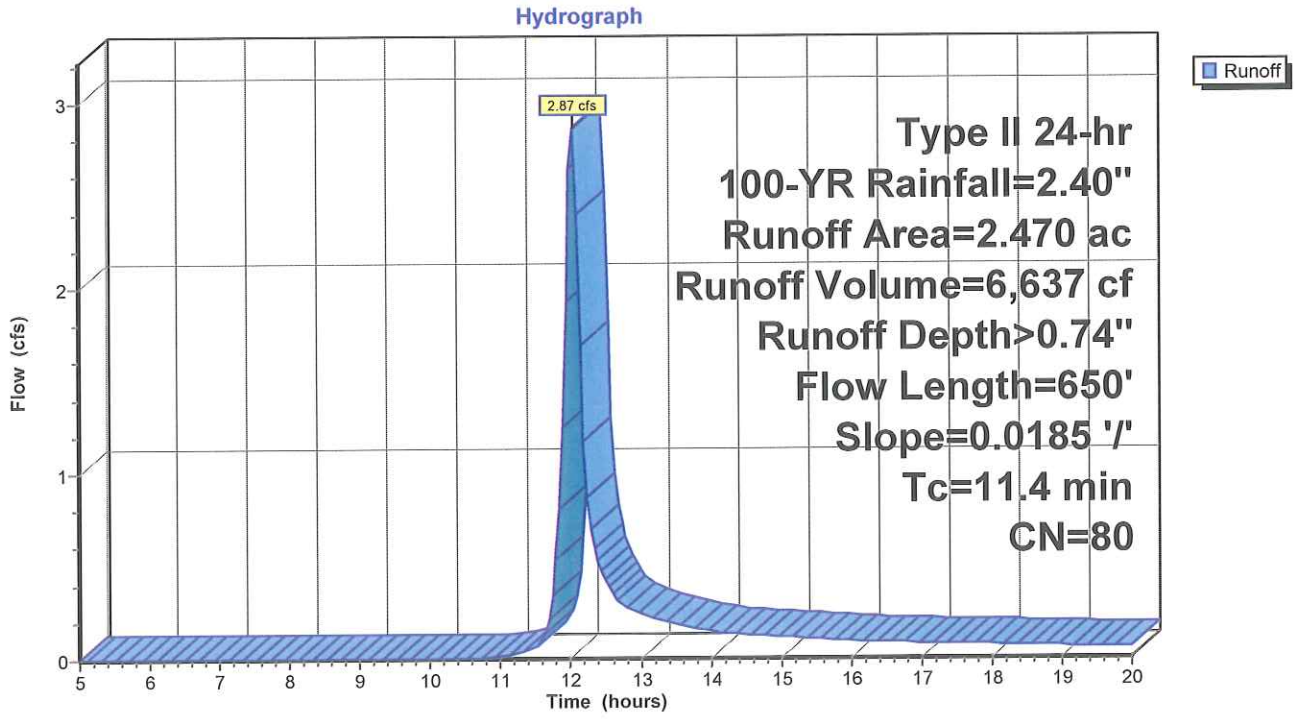
Runoff = 2.87 cfs @ 12.04 hrs, Volume= 6,637 cf, Depth> 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=2.40"

	Area (ac)	CN	Description
*	2.470	80	
	2.470		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	650	0.0185	0.95		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment 1S: PRE BASIN B



Summary for Subcatchment 1S: PRE BASIN C

[49] Hint: Tc<2dt may require smaller dt

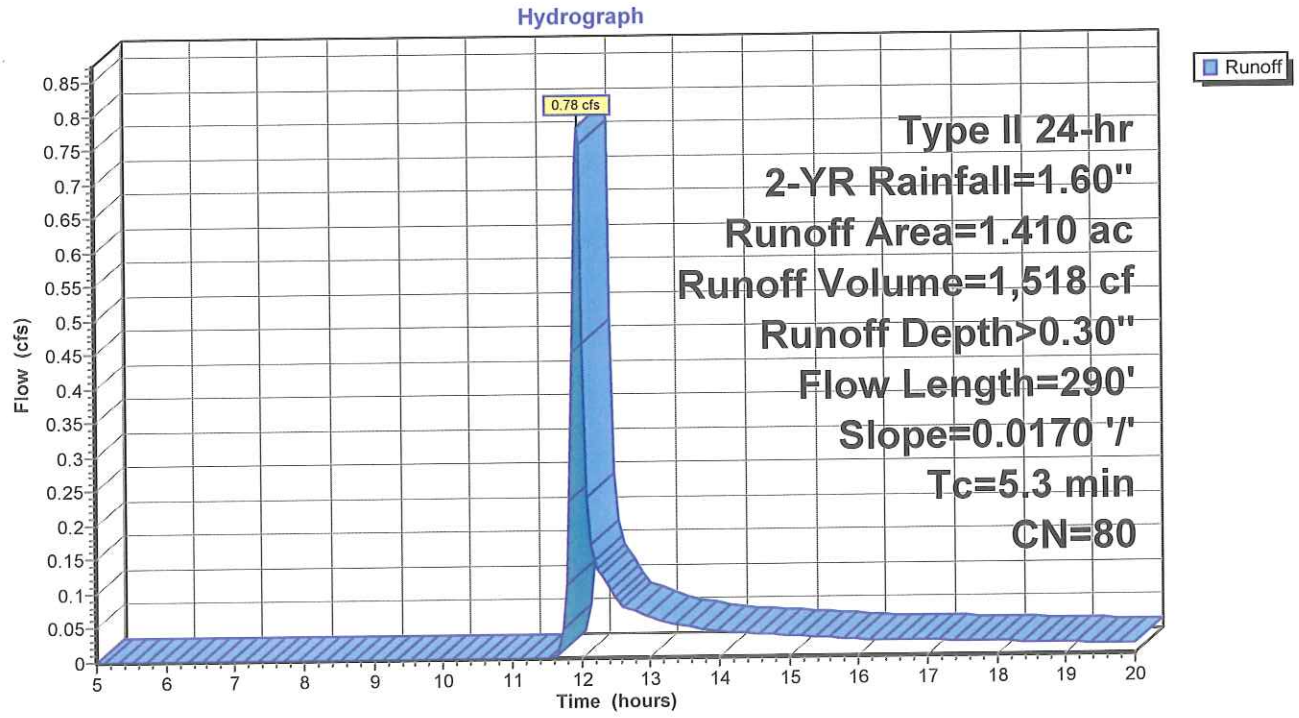
Runoff = 0.78 cfs @ 11.98 hrs, Volume= 1,518 cf, Depth> 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-YR Rainfall=1.60"

	Area (ac)	CN	Description
*	1.410	80	
	1.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	290	0.0170	0.91		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment 1S: PRE BASIN C



Summary for Subcatchment 1S: PRE BASIN C

[49] Hint: Tc<2dt may require smaller dt

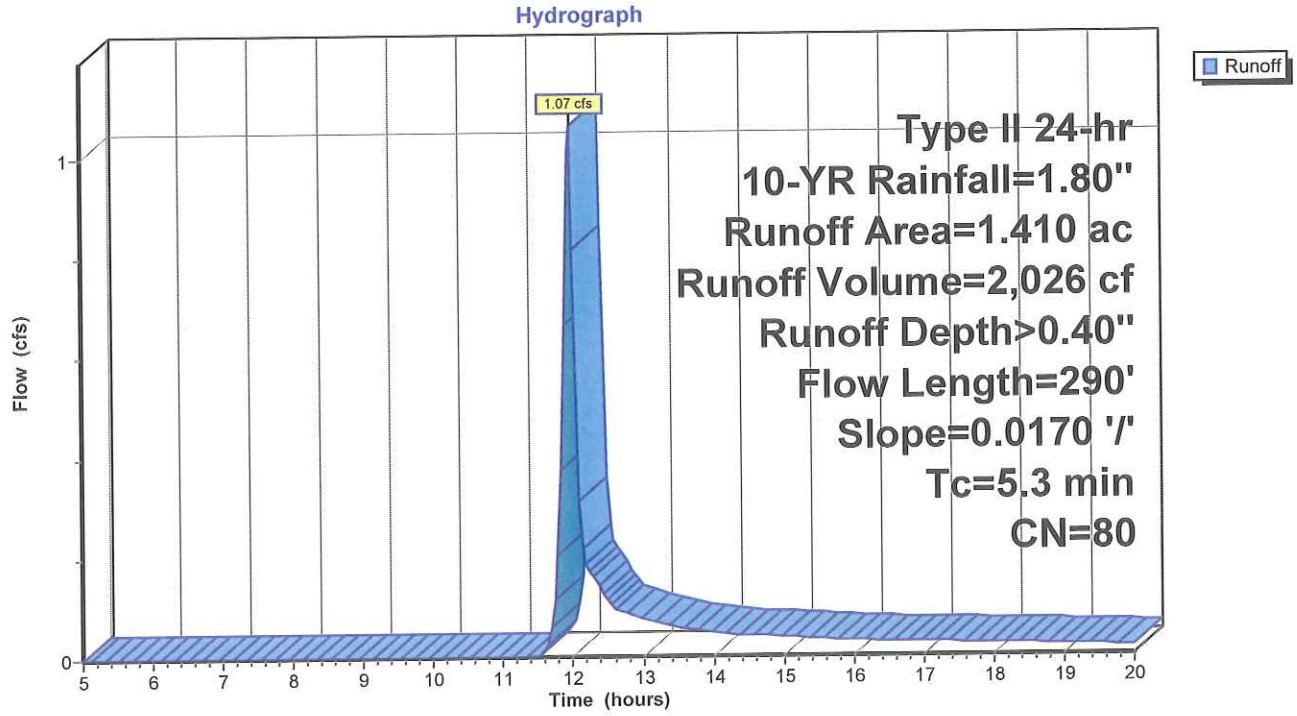
Runoff = 1.07 cfs @ 11.98 hrs, Volume= 2,026 cf, Depth> 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-YR Rainfall=1.80"

	Area (ac)	CN	Description
*	1.410	80	
	1.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	290	0.0170	0.91		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment 1S: PRE BASIN C



Summary for Subcatchment 1S: PRE BASIN C

[49] Hint: Tc<2dt may require smaller dt

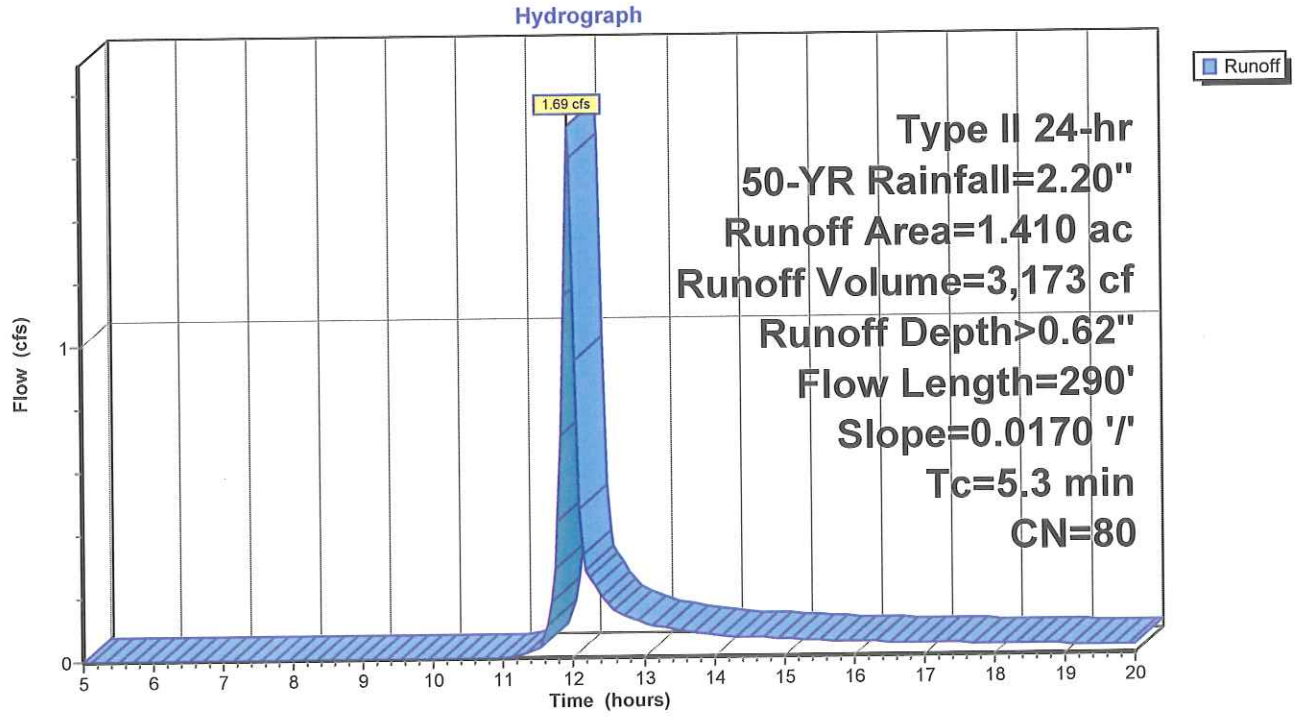
Runoff = 1.69 cfs @ 11.97 hrs, Volume= 3,173 cf, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-YR Rainfall=2.20"

	Area (ac)	CN	Description
*	1.410	80	
	1.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	290	0.0170	0.91		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment 1S: PRE BASIN C



Summary for Subcatchment 1S: PRE BASIN C

[49] Hint: Tc<2dt may require smaller dt

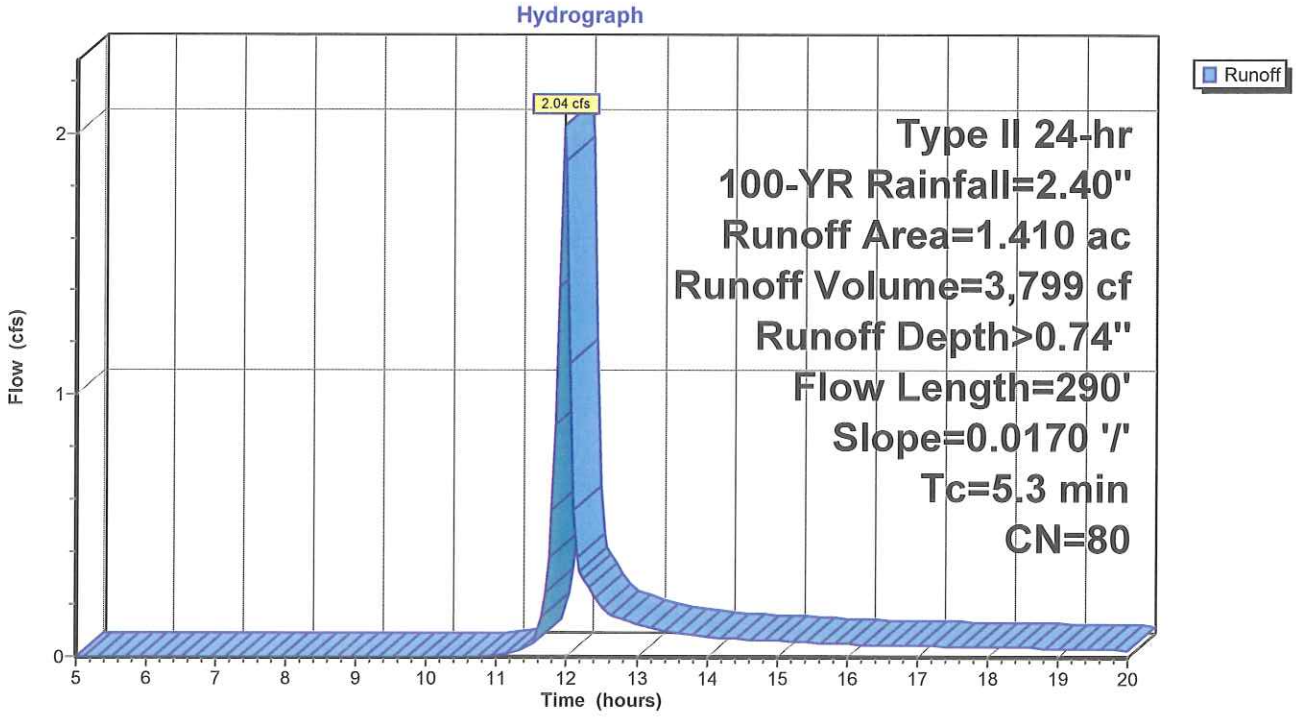
Runoff = 2.04 cfs @ 11.97 hrs, Volume= 3,799 cf, Depth> 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=2.40"

	Area (ac)	CN	Description
*	1.410	80	
	1.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	290	0.0170	0.91		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps

Subcatchment 1S: PRE BASIN C



APPENDIX C – POST-DEVELOPMENT CONDITIONS & CALCULATIONS

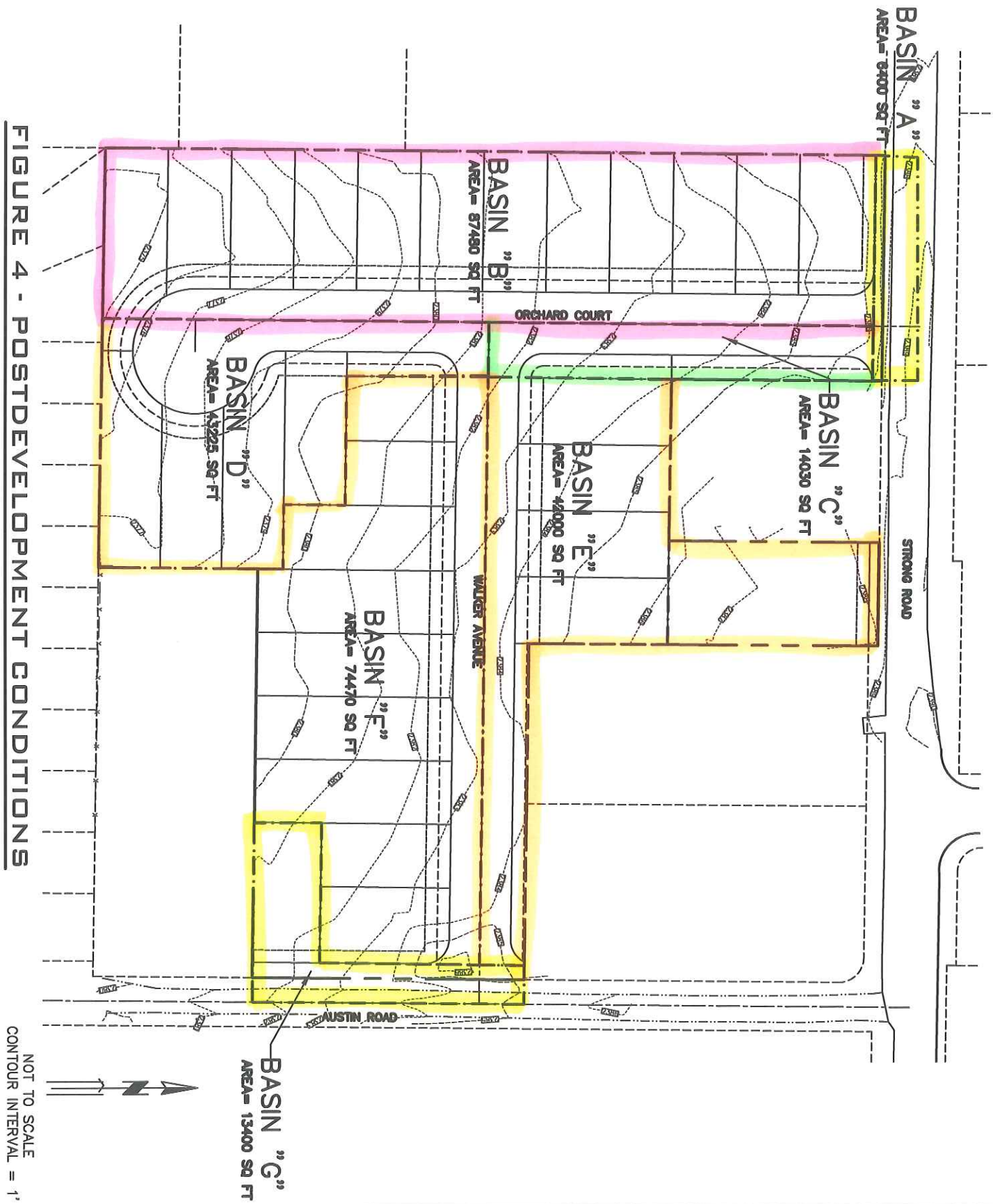


FIGURE 4 - POSTDEVELOPMENT CONDITIONS

MHE ENGINEERING 9702 W. MASTERS LANE CHENEY, WA 99004 509-230-1960 MELAARAG@YAHOO.COM	RASPBERRY ACRES CITY OF SPOKANE, WASHINGTON DRAINAGE REPORT	FIGURE 4 SCALE: NTS DRAWN BY: MHE

BASIN "A"

Total Area = 6400 sf = 0.147 acres.

Roof Area

0

Paved Area (including curb & gutter)

180' x 20.5' = 3690 Ft²

Total Paved Area = 3690 Ft² C=0.90

Concrete Sidewalk

100' x 5' = 500 Ft² C=0.90

Lawns

6400 – 4190= 2210 sf C=0.15

Weighted "C" Factor

(0.9 x 4190) + (0.15 x 2210) divided by 6400

= 0.64

Required Swale Volume

V = 1815 A, where
V= Volume of swale (cubic feet)
A= Pollution generating impervious surface (acres)

V = 1815 x 0.085 acres

= 154 CF

Provided Swale Volume = 185 CF

Swale Along Strong Road		
Pond Side Slope	3	:1
Bottom Length (ft)	80	
Bottom Width (ft)	3	
Bottom Area (SF)	240	
Treatment Depth (ft)	0.5	
Treatment Area (SF)	498	
Treatment Volume (CF)	185	
Storage Depth (ft)	1	
Storage Area (SF)	774	
Storage Volume (CF)	507	

BASIN "B"

Total Area = 87480 sf = 2.00 acres.

Roof Area

(2000 sf x 12) = 24,000 sf C=0.90

Paved Area (includes curb & gutter)

(533.5' x 18.5') + 700 = 10,570 Ft²

Total Paved Area = 10,570 Ft² C=0.90

Concrete Driveways & Sidewalk

500sf x 12 = 6,000 Ft² C=0.90
317' x 5' = 1585 Ft²

Lawns

87480 – 42155 = 45325 sf C=0.15

Weighted "C" Factor

(0.9 x 42155) + (0.15 x 45325) divided by 87480

= 0.51

Required Swale Volume

V = 1815 A, where
V= Volume of swale (cubic feet)
A= Pollution generating impervious surface (acres)

V = 1815 x 0.38 acres

=690 CF

Provided swale volume = 781 CF

Swale Along West Side of Orchard CT.		
Pond Side Slope	3	:1
Bottom Length (ft)	345	
Bottom Width (ft)	3	
Bottom Area (SF)	1035	
Treatment Depth (ft)	0.5	
Treatment Area (SF)	2088	
Treatment Volume (CF)	781	
Storage Depth (ft)	1	
Storage Area (SF)	3159	
Storage Volume (CF)	2097	

Summary for Pond 2P: SWALE B

Inflow Area = 87,120 sf, 38.00% Impervious, Inflow Depth > 0.39" for 2-YR event
Inflow = 1.25 cfs @ 12.03 hrs, Volume= 2,836 cf
Outflow = 0.98 cfs @ 12.10 hrs, Volume= 2,809 cf, Atten= 22%, Lag= 4.2 min
Primary = 0.98 cfs @ 12.10 hrs, Volume= 2,809 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.29' @ 12.10 hrs Surf.Area= 1,638 sf Storage= 384 cf

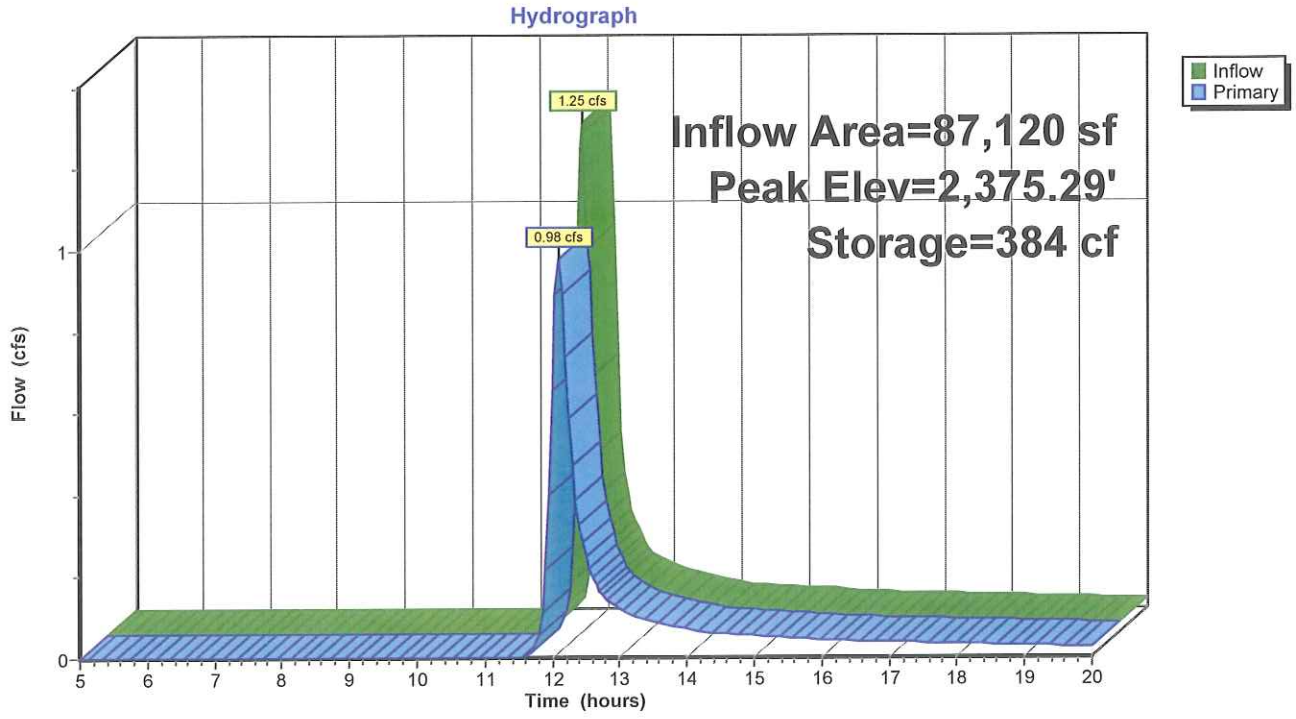
Plug-Flow detention time= 10.3 min calculated for 2,800 cf (99% of inflow)
Center-of-Mass det. time= 6.9 min (825.9 - 819.0)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	2,091 cf	**3.00'W x 345.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.98 cfs @ 12.10 hrs HW=2,375.29' (Free Discharge)
└**1=Sharp-Crested Rectangular Weir** (Weir Controls 0.98 cfs @ 1.75 fps)

Pond 2P: SWALE B



Summary for Pond 2P: SWALE B

Inflow Area = 87,120 sf, 38.00% Impervious, Inflow Depth > 0.51" for 10-YR event
Inflow = 1.65 cfs @ 12.03 hrs, Volume= 3,668 cf
Outflow = 1.31 cfs @ 12.09 hrs, Volume= 3,638 cf, Atten= 21%, Lag= 4.0 min
Primary = 1.31 cfs @ 12.09 hrs, Volume= 3,638 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.35' @ 12.09 hrs Surf.Area= 1,770 sf Storage= 491 cf

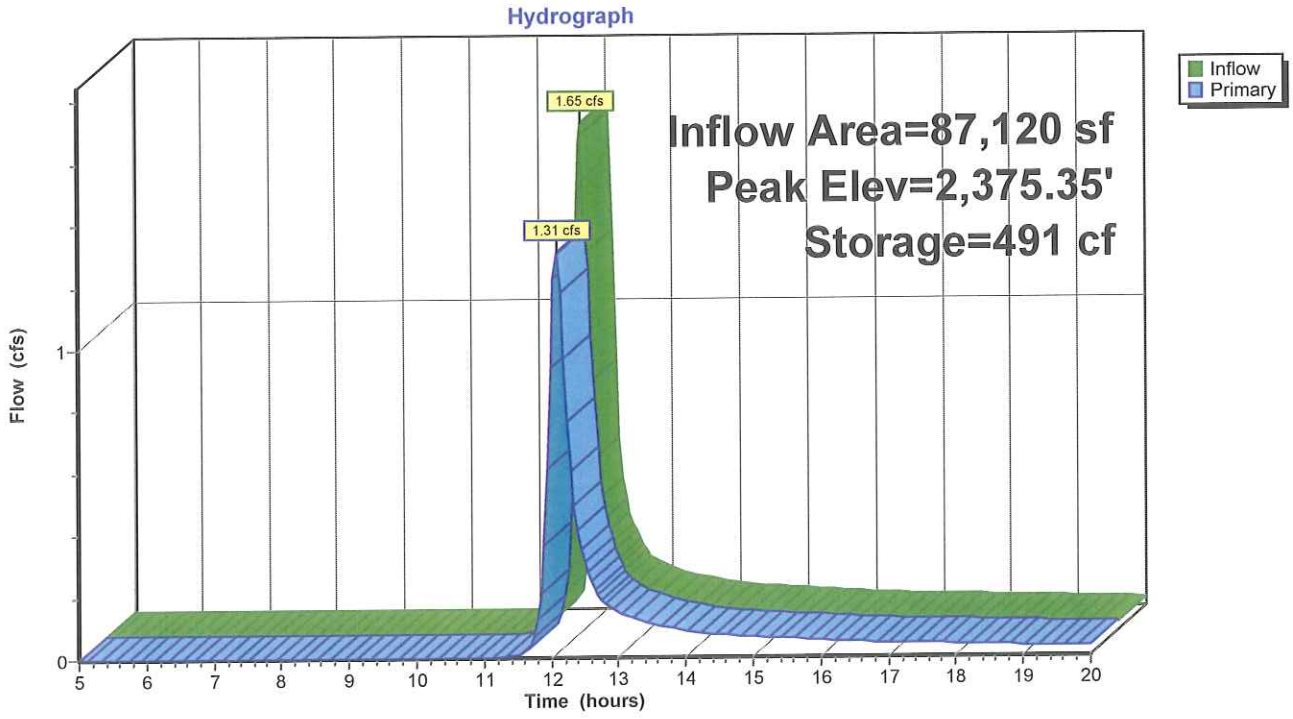
Plug-Flow detention time= 9.7 min calculated for 3,638 cf (99% of inflow)
Center-of-Mass det. time= 6.5 min (819.8 - 813.3)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	2,091 cf	**3.00'W x 345.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.30 cfs @ 12.09 hrs HW=2,375.35' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 1.30 cfs @ 1.93 fps)

Pond 2P: SWALE B



Summary for Pond 2P: SWALE B

Inflow Area = 87,120 sf, 38.00% Impervious, Inflow Depth > 0.76" for 50-YR event
Inflow = 2.49 cfs @ 12.02 hrs, Volume= 5,501 cf
Outflow = 2.01 cfs @ 12.09 hrs, Volume= 5,464 cf, Atten= 19%, Lag= 3.9 min
Primary = 2.01 cfs @ 12.09 hrs, Volume= 5,464 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.47' @ 12.09 hrs Surf.Area= 2,025 sf Storage= 719 cf

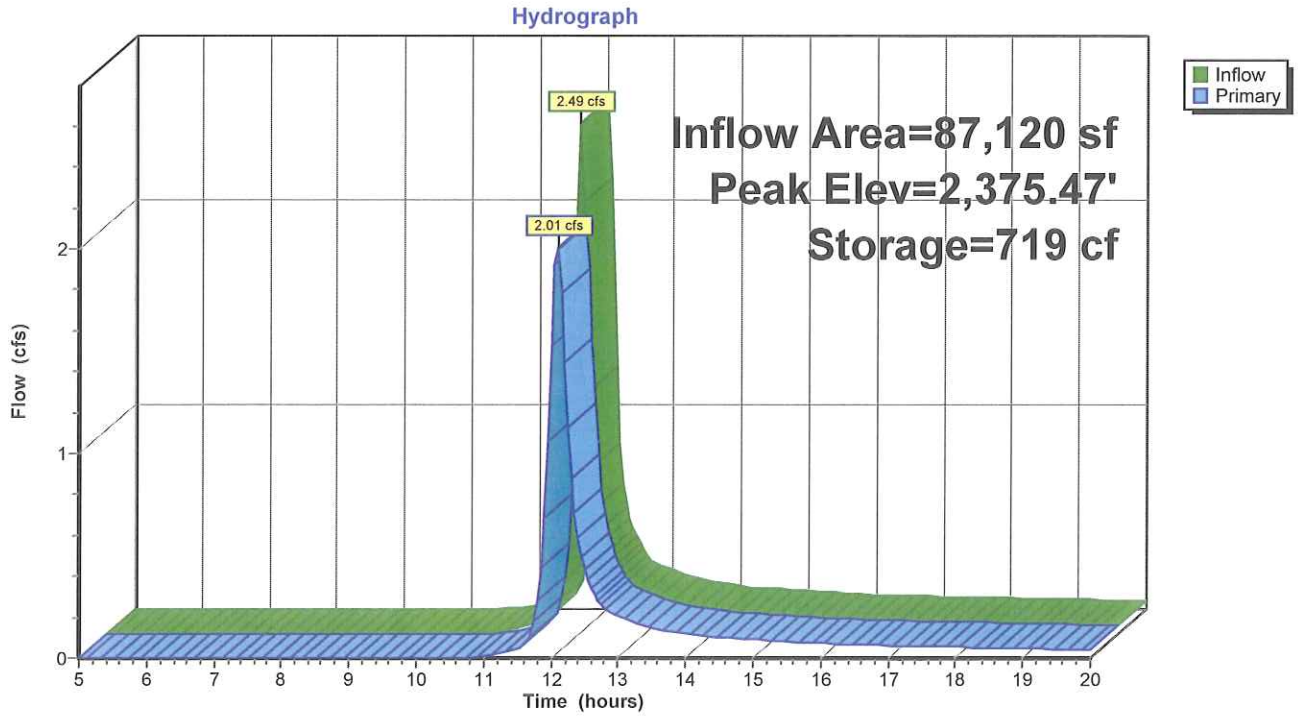
Plug-Flow detention time= 8.8 min calculated for 5,446 cf (99% of inflow)
Center-of-Mass det. time= 6.2 min (810.9 - 804.7)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	2,091 cf	**3.00'W x 345.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.98 cfs @ 12.09 hrs HW=2,375.47' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 1.98 cfs @ 2.23 fps)

Pond 2P: SWALE B



Summary for Pond 2P: SWALE B

Inflow Area = 87,120 sf, 38.00% Impervious, Inflow Depth > 0.89" for 100-YR event
Inflow = 2.95 cfs @ 12.02 hrs, Volume= 6,485 cf
Outflow = 2.38 cfs @ 12.09 hrs, Volume= 6,444 cf, Atten= 19%, Lag= 3.9 min
Primary = 2.38 cfs @ 12.09 hrs, Volume= 6,444 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.53' @ 12.09 hrs Surf.Area= 2,149 sf Storage= 841 cf

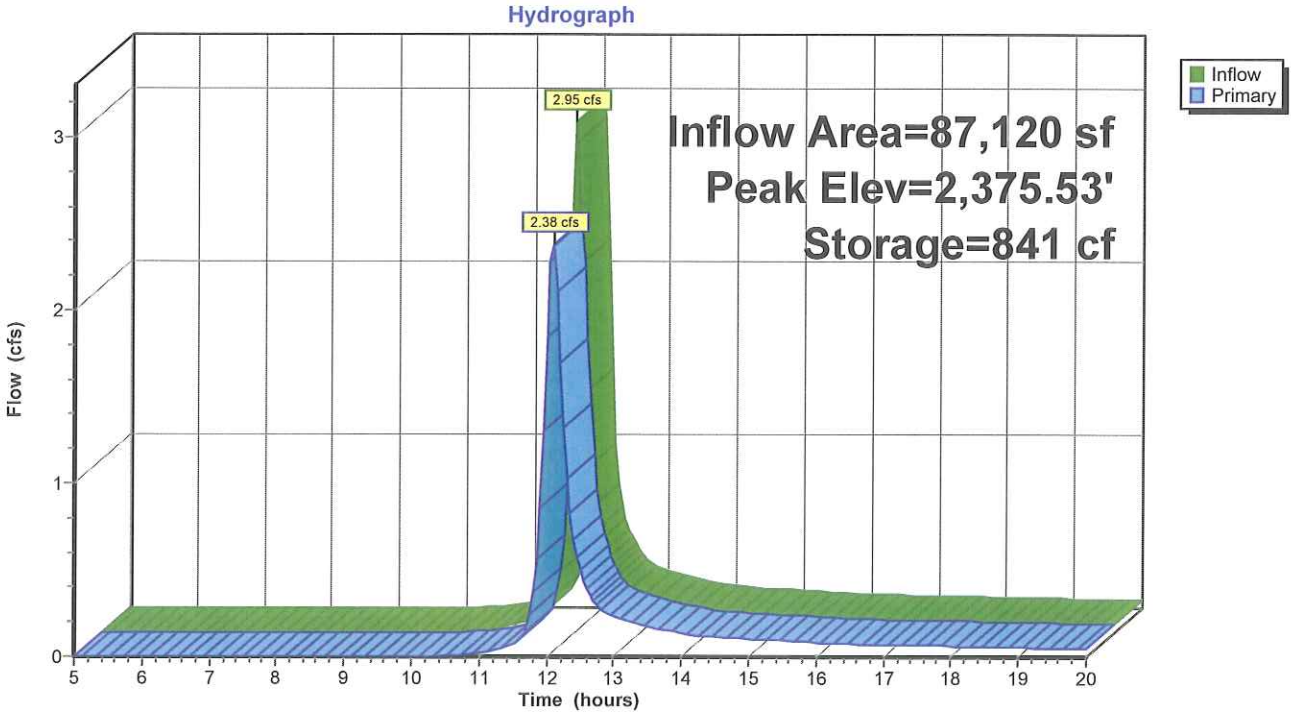
Plug-Flow detention time= 8.5 min calculated for 6,423 cf (99% of inflow)
Center-of-Mass det. time= 6.0 min (807.3 - 801.3)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	2,091 cf	**3.00'W x 345.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=2.35 cfs @ 12.09 hrs HW=2,375.52' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 2.35 cfs @ 2.37 fps)

Pond 2P: SWALE B



BASIN "C"

Total Area = 14030 sf = 0.322 acres.

Roof Area

0

Paved Area (includes curb & gutter)

(310' x 18.5') = 5735 Ft²

Total Paved Area = 5735 Ft² = 0.33 acres C=0.90

Concrete Driveways & Sidewalk

310' x 5' = 1550 Ft² C=0.90

Lawns

14030 – 7285 = 6745 C=0.15

Weighted "C" Factor

(0.9 x 7285) + (0.15 x 6745) divided by 14030

= 0.54

Required Swale Volume

V = 1815 A, where
V= Volume of swale (cubic feet)
A= Pollution generating impervious surface (acres)

V = 1815 x 0.1316 acres

=239 CF

Provided swale volume = 545 CF

Swale Along NE Orchard Ct.		
Pond Side Slope	3	:1
Bottom Length (ft)	240	
Bottom Width (ft)	3	
Bottom Area (SF)	720	
Treatment Depth (ft)	0.5	
Treatment Area (SF)	1458	
Treatment Volume (CF)	545	
Storage Depth (ft)	1	
Storage Area (SF)	2214	
Storage Volume (CF)	1467	

Summary for Pond 2P: SWALE C

Inflow Area = 14,026 sf, 38.00% Impervious, Inflow Depth > 0.39" for 2-YR event
Inflow = 0.26 cfs @ 11.95 hrs, Volume= 458 cf
Outflow = 0.19 cfs @ 12.01 hrs, Volume= 453 cf, Atten= 28%, Lag= 3.4 min
Primary = 0.19 cfs @ 12.01 hrs, Volume= 453 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.09' @ 12.01 hrs Surf.Area= 858 sf Storage= 74 cf

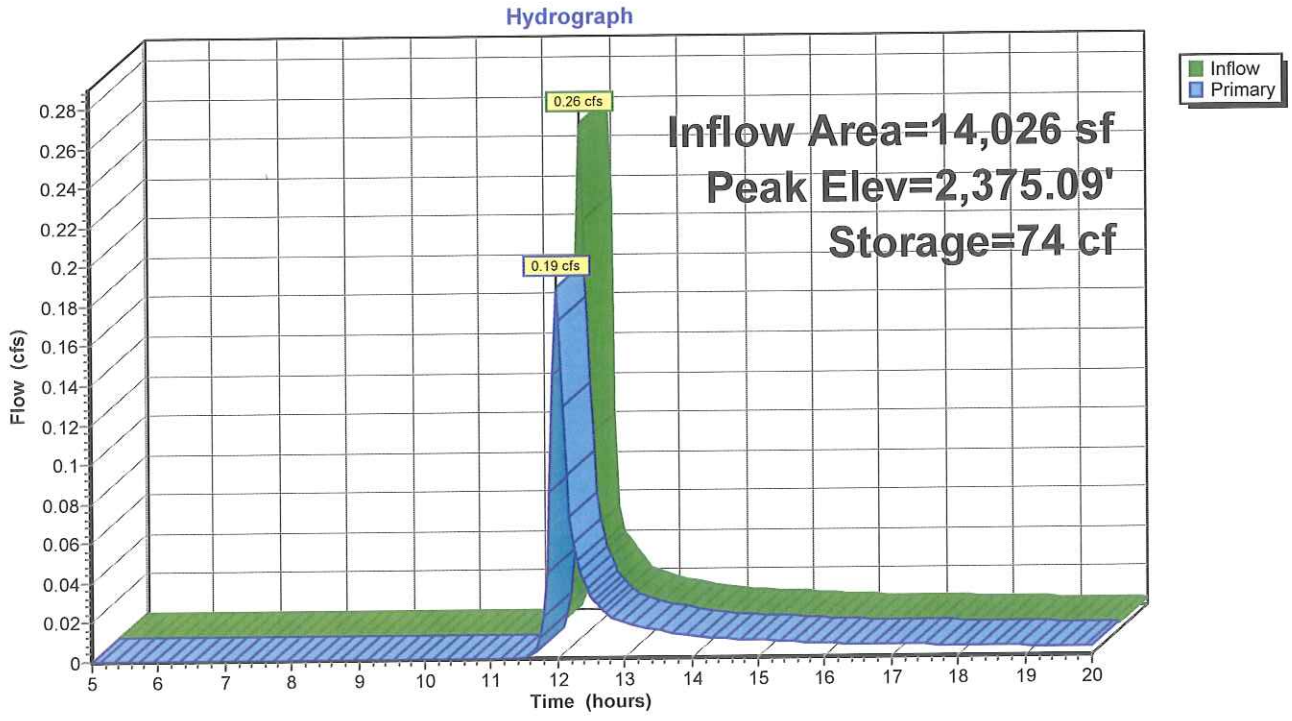
Plug-Flow detention time= 12.1 min calculated for 452 cf (99% of inflow)
Center-of-Mass det. time= 8.3 min (822.7 - 814.5)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	1,461 cf	**3.00'W x 240.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.18 cfs @ 12.01 hrs HW=2,375.09' (Free Discharge)
↑—1=Sharp-Crested Rectangular Weir (Weir Controls 0.18 cfs @ 0.99 fps)

Pond 2P: SWALE C



Summary for Pond 2P: SWALE C

Inflow Area = 14,026 sf, 38.00% Impervious, Inflow Depth > 0.51" for 10-YR event
Inflow = 0.34 cfs @ 11.95 hrs, Volume= 592 cf
Outflow = 0.25 cfs @ 12.01 hrs, Volume= 587 cf, Atten= 25%, Lag= 3.2 min
Primary = 0.25 cfs @ 12.01 hrs, Volume= 587 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.12' @ 12.01 hrs Surf.Area= 889 sf Storage= 93 cf

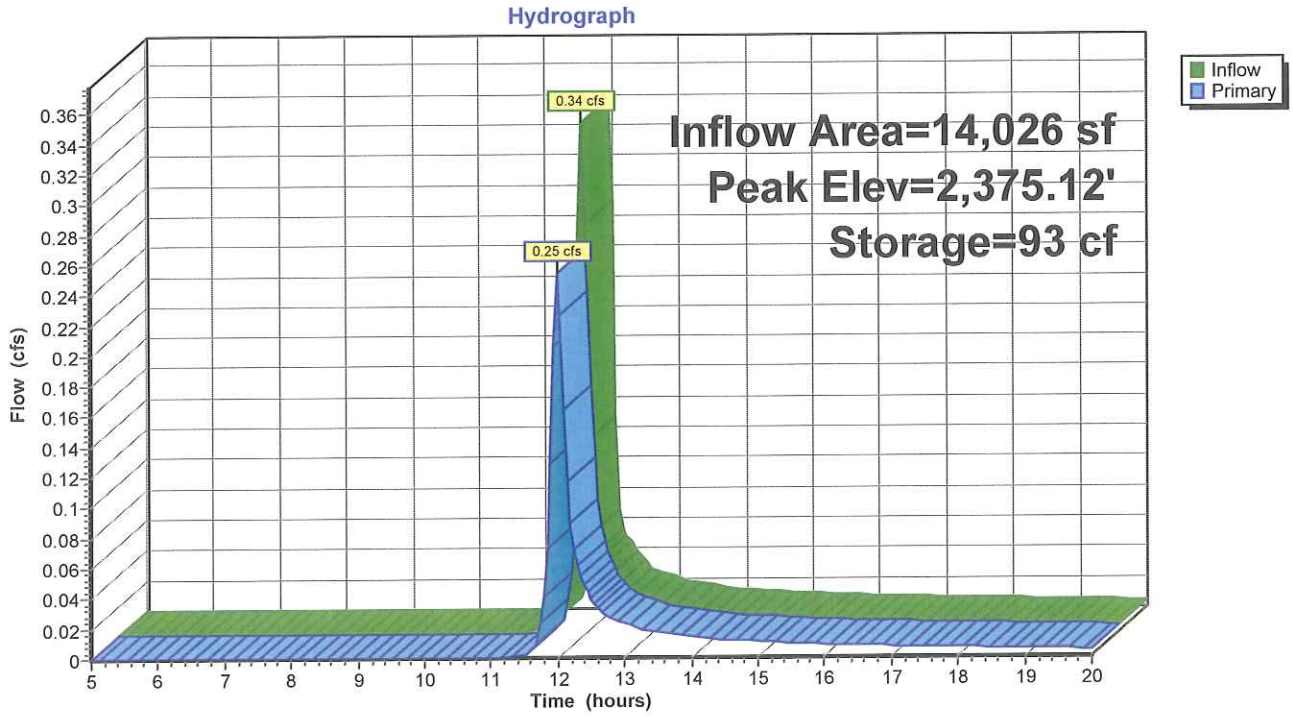
Plug-Flow detention time= 11.2 min calculated for 585 cf (99% of inflow)
Center-of-Mass det. time= 7.6 min (816.3 - 808.7)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	1,461 cf	**3.00'W x 240.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.25 cfs @ 12.01 hrs HW=2,375.11' (Free Discharge)
↑—1=Sharp-Crested Rectangular Weir (Weir Controls 0.25 cfs @ 1.11 fps)

Pond 2P: SWALE C



Summary for Pond 2P: SWALE C

Inflow Area = 14,026 sf, 38.00% Impervious, Inflow Depth > 0.76" for 50-YR event
Inflow = 0.51 cfs @ 11.95 hrs, Volume= 888 cf
Outflow = 0.40 cfs @ 12.00 hrs, Volume= 880 cf, Atten= 21%, Lag= 3.0 min
Primary = 0.40 cfs @ 12.00 hrs, Volume= 880 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.16' @ 12.00 hrs Surf.Area= 949 sf Storage= 130 cf

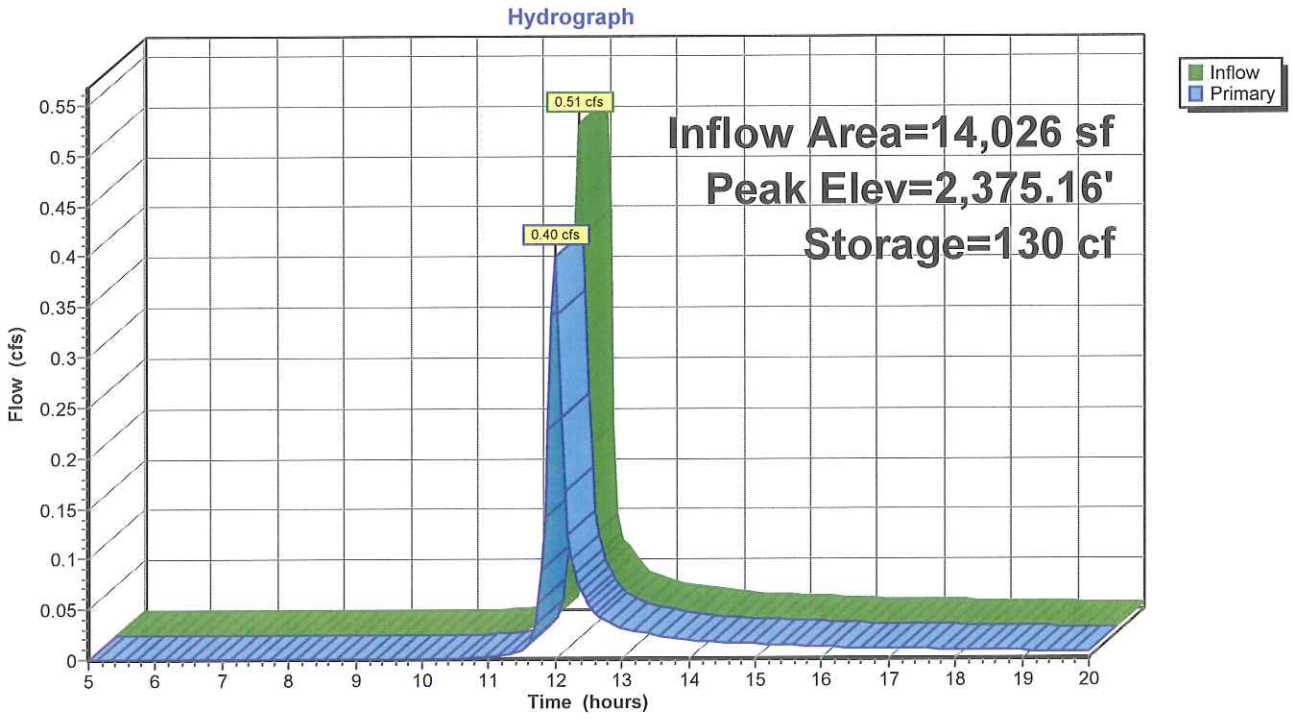
Plug-Flow detention time= 10.0 min calculated for 880 cf (99% of inflow)
Center-of-Mass det. time= 6.7 min (806.8 - 800.1)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	1,461 cf	**3.00'W x 240.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.40 cfs @ 12.00 hrs HW=2,375.16' (Free Discharge)
↑—1=Sharp-Crested Rectangular Weir (Weir Controls 0.40 cfs @ 1.29 fps)

Pond 2P: SWALE C



Summary for Pond 2P: SWALE C

Inflow Area = 14,026 sf, 38.00% Impervious, Inflow Depth > 0.90" for 100-YR event
Inflow = 0.60 cfs @ 11.95 hrs, Volume= 1,047 cf
Outflow = 0.47 cfs @ 12.00 hrs, Volume= 1,039 cf, Atten= 20%, Lag= 2.9 min
Primary = 0.47 cfs @ 12.00 hrs, Volume= 1,039 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.18' @ 12.00 hrs Surf.Area= 978 sf Storage= 149 cf

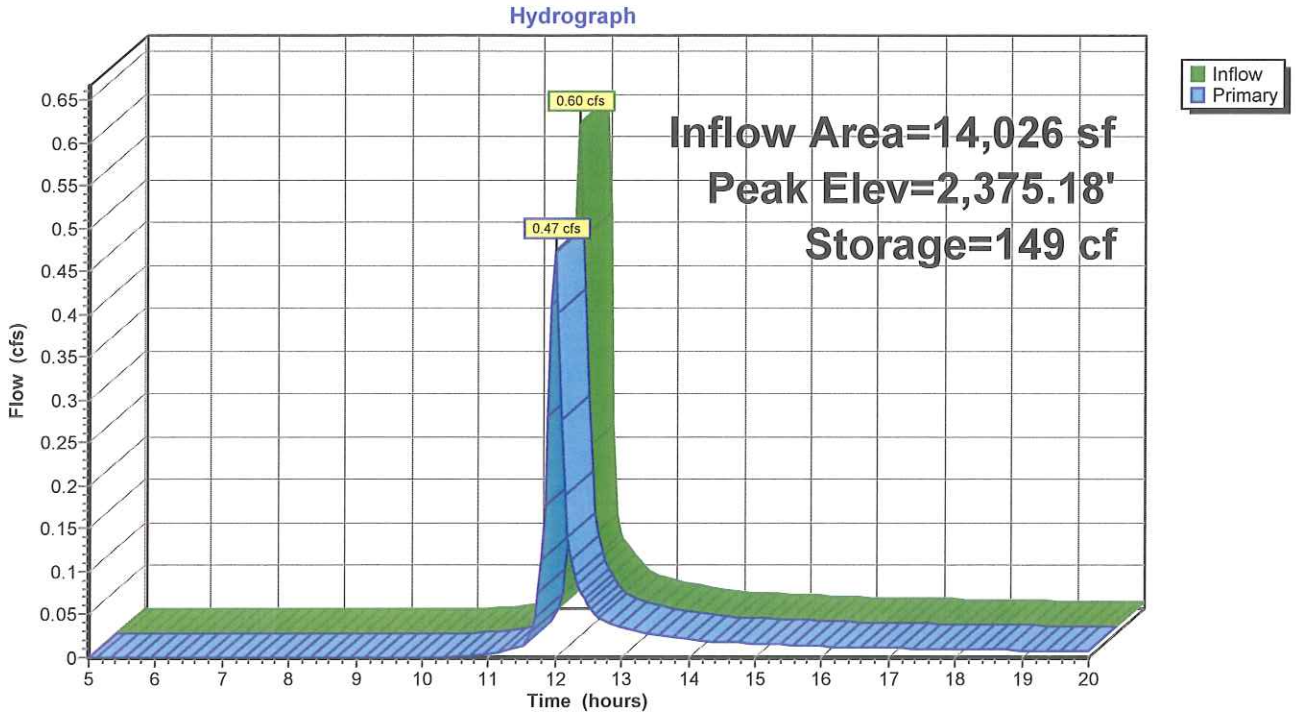
Plug-Flow detention time= 9.5 min calculated for 1,035 cf (99% of inflow)
Center-of-Mass det. time= 6.5 min (803.1 - 796.6)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	1,461 cf	**3.00'W x 240.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.47 cfs @ 12.00 hrs HW=2,375.18' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 0.47 cfs @ 1.37 fps)

Pond 2P: SWALE C



BASIN "D"

Total Area = 43225 sf = 0.99 acres.

Roof Area

(2000 sf x 4) = 8,000 sf C=0.90

Paved Area (includes curb & gutter)

(355' x 18.5') + 4000 = 10,570 Ft²

Total Paved Area = 10,570 Ft² C=0.90

Concrete Driveways & Sidewalk

500sf x 4 = 2000 Ft² C=0.90
160' x 5' = 800 Ft²

Lawns

43225 – 21370 = 21855 sf C=0.15

Weighted "C" Factor

(0.9 x 21370) + (0.15 x 21855) divided by 43225

= 0.52

Required Swale Volume

V = 1815 A, where
V= Volume of swale (cubic feet)
A= Pollution generating impervious surface (acres)

V = 1815 x 0.289 acres

=524 CF

Provided swale volume = 567 CF

Swale Along SE Orchard CT.		
Pond Side Slope	3	:1
Bottom Length (ft)	250	
Bottom Width (ft)	3	
Bottom Area (SF)	750	
Treatment Depth (ft)	0.5	
Treatment Area (SF)	1518	
Treatment Volume (CF)	567	
Storage Depth (ft)	1	
Storage Area (SF)	2304	
Storage Volume (CF)	1527	

Summary for Pond 2P: SWALE D

Inflow Area = 43,124 sf, 38.00% Impervious, Inflow Depth > 0.39" for 2-YR event
Inflow = 0.74 cfs @ 11.98 hrs, Volume= 1,407 cf
Outflow = 0.58 cfs @ 12.03 hrs, Volume= 1,395 cf, Atten= 21%, Lag= 3.1 min
Primary = 0.58 cfs @ 12.03 hrs, Volume= 1,395 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.20' @ 12.03 hrs Surf.Area= 1,058 sf Storage= 183 cf

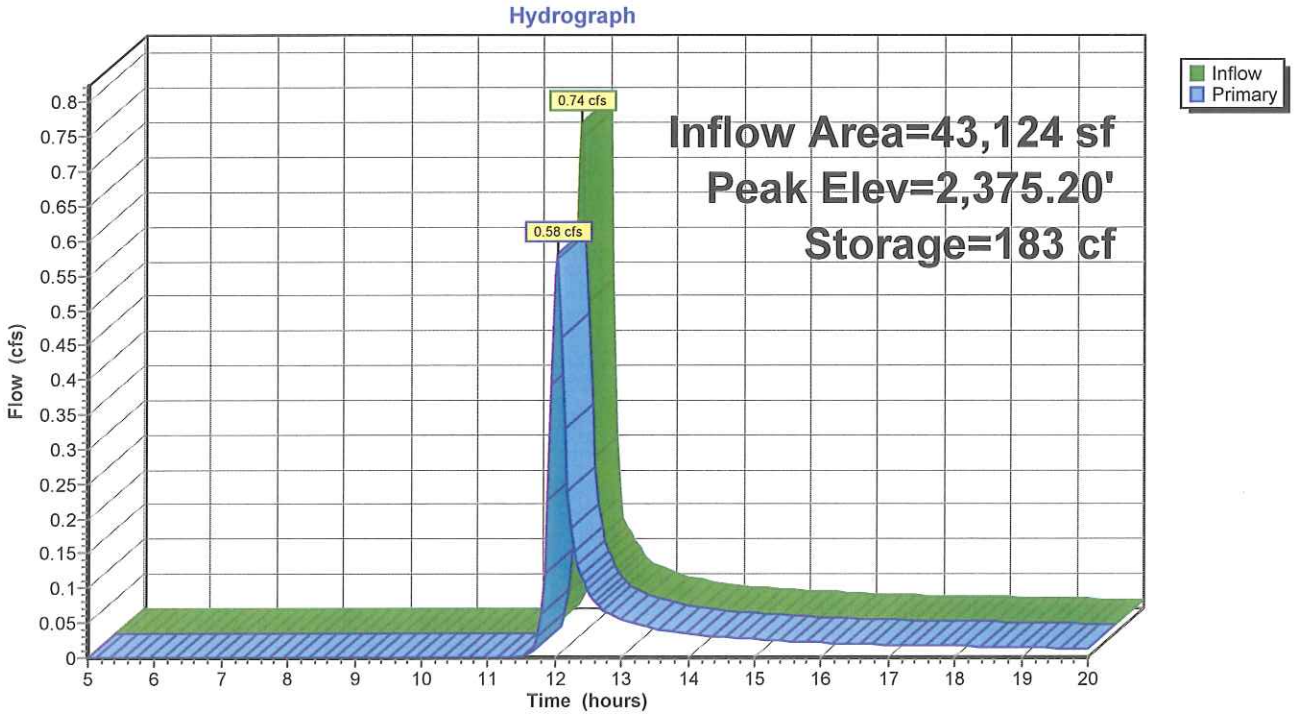
Plug-Flow detention time= 9.1 min calculated for 1,390 cf (99% of inflow)
Center-of-Mass det. time= 6.0 min (821.9 - 815.9)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	1,521 cf	**3.00'W x 250.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.57 cfs @ 12.03 hrs HW=2,375.20' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 0.57 cfs @ 1.46 fps)

Pond 2P: SWALE D



Summary for Pond 2P: SWALE D

Inflow Area = 43,124 sf, 38.00% Impervious, Inflow Depth > 0.51" for 10-YR event
Inflow = 0.96 cfs @ 11.98 hrs, Volume= 1,819 cf
Outflow = 0.77 cfs @ 12.03 hrs, Volume= 1,806 cf, Atten= 19%, Lag= 2.9 min
Primary = 0.77 cfs @ 12.03 hrs, Volume= 1,806 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.25' @ 12.03 hrs Surf.Area= 1,125 sf Storage= 230 cf

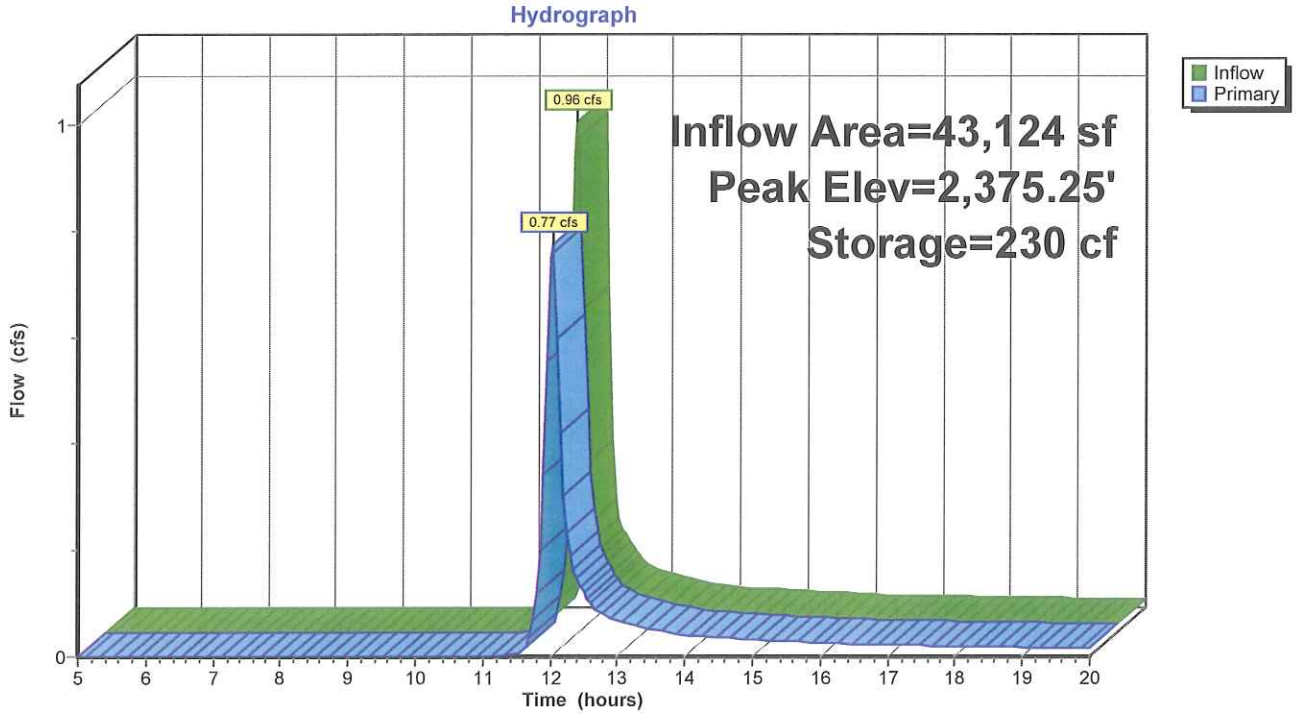
Plug-Flow detention time= 8.5 min calculated for 1,806 cf (99% of inflow)
Center-of-Mass det. time= 5.6 min (815.8 - 810.2)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	1,521 cf	**3.00'W x 250.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.75 cfs @ 12.03 hrs HW=2,375.24' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 0.75 cfs @ 1.60 fps)

Pond 2P: SWALE D



Summary for Pond 2P: SWALE D

Inflow Area = 43,124 sf, 38.00% Impervious, Inflow Depth > 0.76" for 50-YR event
Inflow = 1.44 cfs @ 11.98 hrs, Volume= 2,728 cf
Outflow = 1.19 cfs @ 12.02 hrs, Volume= 2,711 cf, Atten= 17%, Lag= 2.7 min
Primary = 1.19 cfs @ 12.02 hrs, Volume= 2,711 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.33' @ 12.02 hrs Surf.Area= 1,254 sf Storage= 330 cf

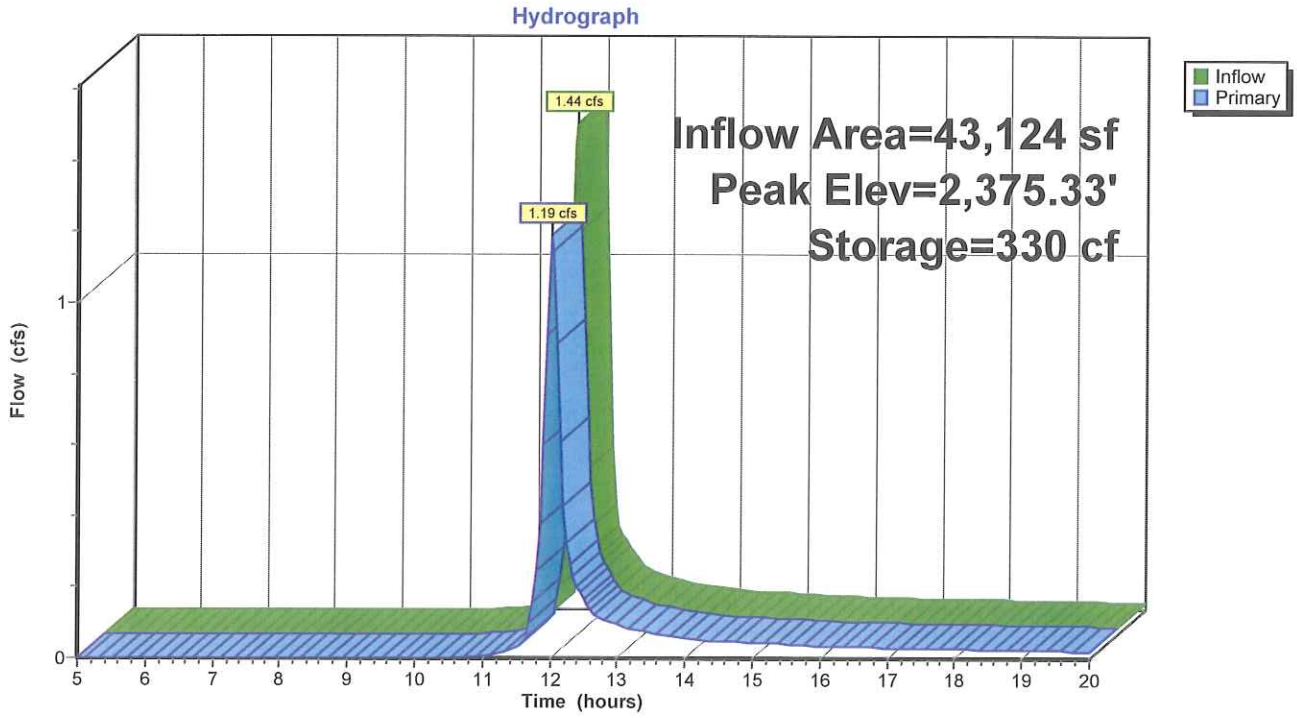
Plug-Flow detention time= 7.6 min calculated for 2,711 cf (99% of inflow)
Center-of-Mass det. time= 5.2 min (806.8 - 801.5)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	1,521 cf	**3.00'W x 250.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.16 cfs @ 12.02 hrs HW=2,375.32' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 1.16 cfs @ 1.86 fps)

Pond 2P: SWALE D



Summary for Pond 2P: SWALE D

Inflow Area = 43,124 sf, 38.00% Impervious, Inflow Depth > 0.89" for 100-YR event
Inflow = 1.68 cfs @ 11.97 hrs, Volume= 3,215 cf
Outflow = 1.41 cfs @ 12.02 hrs, Volume= 3,197 cf, Atten= 16%, Lag= 2.7 min
Primary = 1.41 cfs @ 12.02 hrs, Volume= 3,197 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.37' @ 12.02 hrs Surf.Area= 1,316 sf Storage= 382 cf

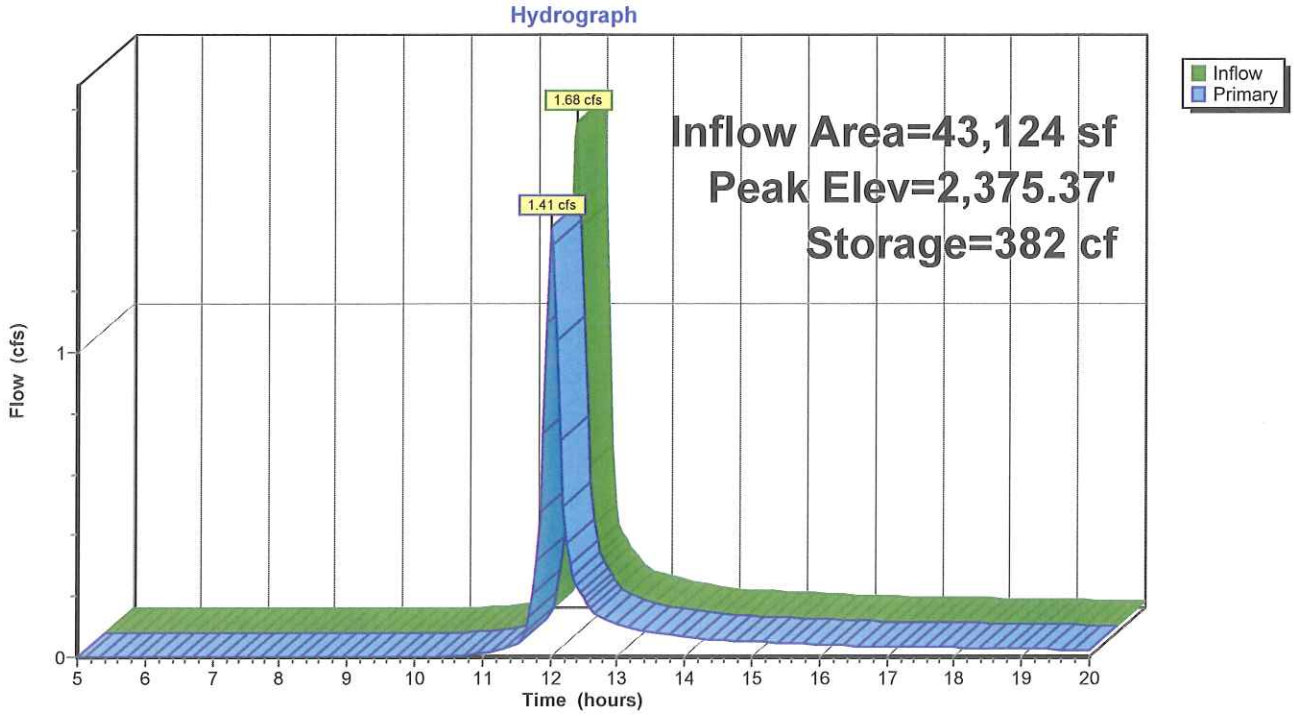
Plug-Flow detention time= 7.3 min calculated for 3,187 cf (99% of inflow)
Center-of-Mass det. time= 5.1 min (803.2 - 798.1)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	1,521 cf	**3.00'W x 250.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.38 cfs @ 12.02 hrs HW=2,375.36' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 1.38 cfs @ 1.97 fps)

Pond 2P: SWALE D



BASIN "E"

Total Area = 42000 sf = 0.964 acres.

Roof Area

(2000 sf x 4) = 8,000 sf — C=0.90

Paved Area (includes curb & gutter)

(480' x 18.5') = 8880 Ft² — C=0.90

Concrete Driveways & Sidewalk

500sf x 4 = 2000 Ft²
408' x 5' = 2040 Ft² — C=0.90

Lawns

42000 – 20920 = 21080 sf — C=0.15

Weighted "C" Factor

(0.9 x 20920) + (0.15 x 21080) divided by 42000

= 0.52

Required Swale Volume

V = 1815 A, where
V= Volume of swale (cubic feet)
A= Pollution generating impervious surface (acres)

V = 1815 x 0.25 acres

=453 CF

Provided swale volume = 905 CF

Swale Along North Walker Ave.		
Pond Side Slope	3	:1
Bottom Length (ft)	400	
Bottom Width (ft)	3	
Bottom Area (SF)	1200	
Treatment Depth (ft)	0.5	
Treatment Area (SF)	2418	
Treatment Volume (CF)	905	
Storage Depth (ft)	1	
Storage Area (SF)	3654	
Storage Volume (CF)	2427	

Summary for Pond 2P: SWALE E

Inflow Area = 41,992 sf, 38.00% Impervious, Inflow Depth > 0.39" for 2-YR event
Inflow = 0.55 cfs @ 12.06 hrs, Volume= 1,365 cf
Outflow = 0.40 cfs @ 12.15 hrs, Volume= 1,347 cf, Atten= 28%, Lag= 5.5 min
Primary = 0.40 cfs @ 12.15 hrs, Volume= 1,347 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.16' @ 12.15 hrs Surf.Area= 1,581 sf Storage= 219 cf

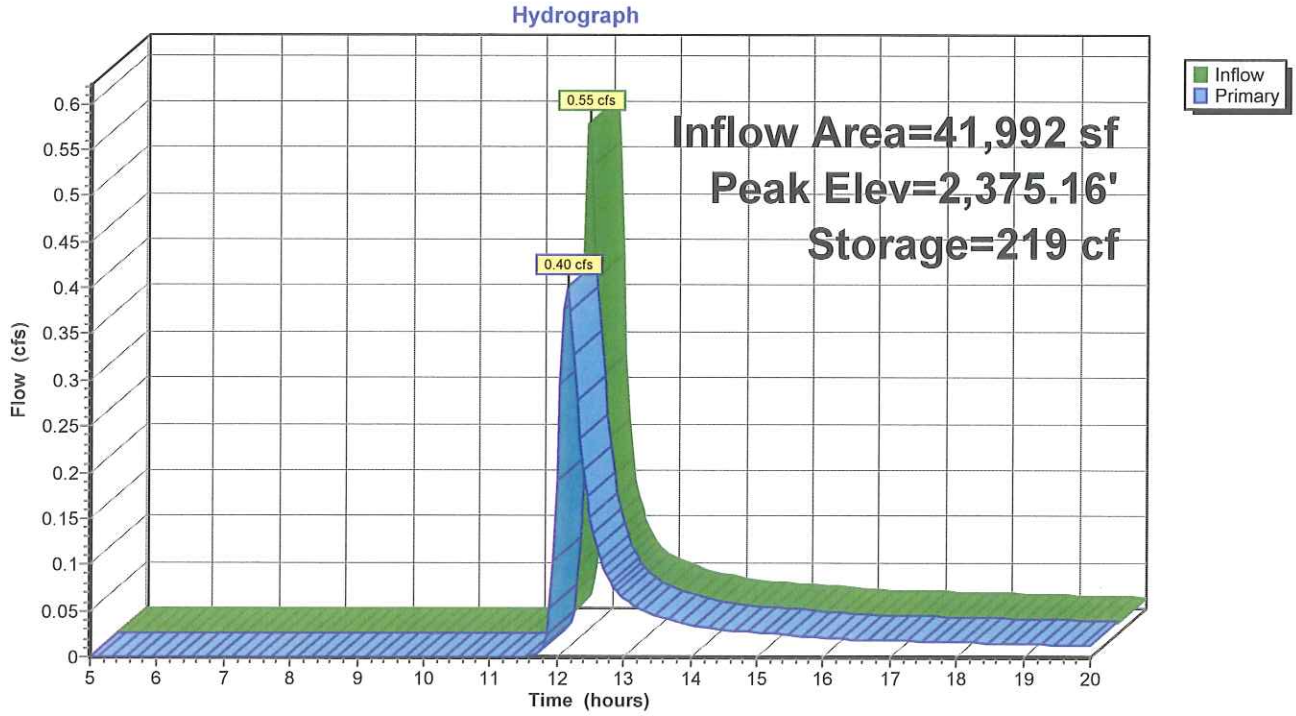
Plug-Flow detention time= 14.7 min calculated for 1,342 cf (98% of inflow)
Center-of-Mass det. time= 9.7 min (830.5 - 820.7)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	2,421 cf	**3.00'W x 400.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.40 cfs @ 12.15 hrs HW=2,375.16' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 0.40 cfs @ 1.30 fps)

Pond 2P: SWALE E



Summary for Pond 2P: SWALE E

Inflow Area = 41,992 sf, 38.00% Impervious, Inflow Depth > 0.50" for 10-YR event
Inflow = 0.73 cfs @ 12.05 hrs, Volume= 1,766 cf
Outflow = 0.55 cfs @ 12.14 hrs, Volume= 1,745 cf, Atten= 25%, Lag= 5.2 min
Primary = 0.55 cfs @ 12.14 hrs, Volume= 1,745 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.19' @ 12.14 hrs Surf.Area= 1,669 sf Storage= 278 cf

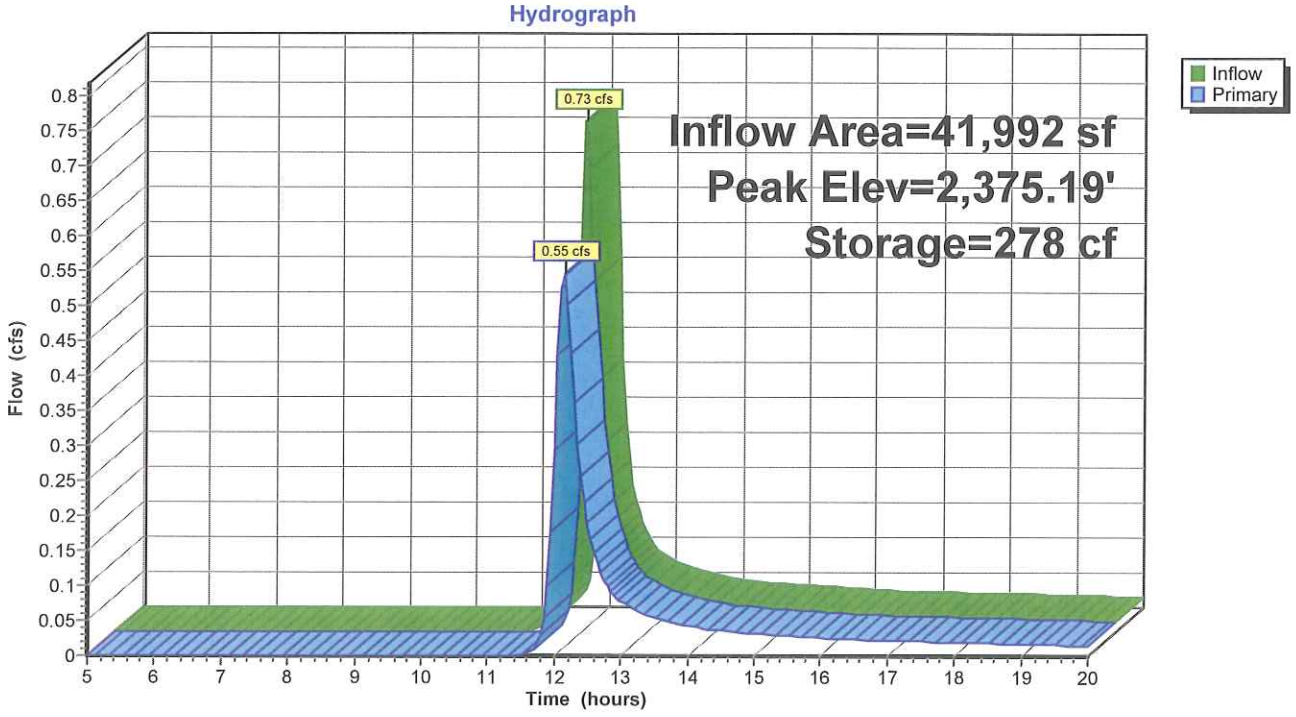
Plug-Flow detention time= 13.7 min calculated for 1,745 cf (99% of inflow)
Center-of-Mass det. time= 9.1 min (824.2 - 815.1)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	2,421 cf	**3.00'W x 400.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.54 cfs @ 12.14 hrs HW=2,375.19' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 0.54 cfs @ 1.43 fps)

Pond 2P: SWALE E



Summary for Pond 2P: SWALE E

Inflow Area = 41,992 sf, 38.00% Impervious, Inflow Depth > 0.76" for 50-YR event
Inflow = 1.11 cfs @ 12.05 hrs, Volume= 2,649 cf
Outflow = 0.86 cfs @ 12.13 hrs, Volume= 2,622 cf, Atten= 22%, Lag= 4.7 min
Primary = 0.86 cfs @ 12.13 hrs, Volume= 2,622 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.26' @ 12.13 hrs Surf.Area= 1,839 sf Storage= 400 cf

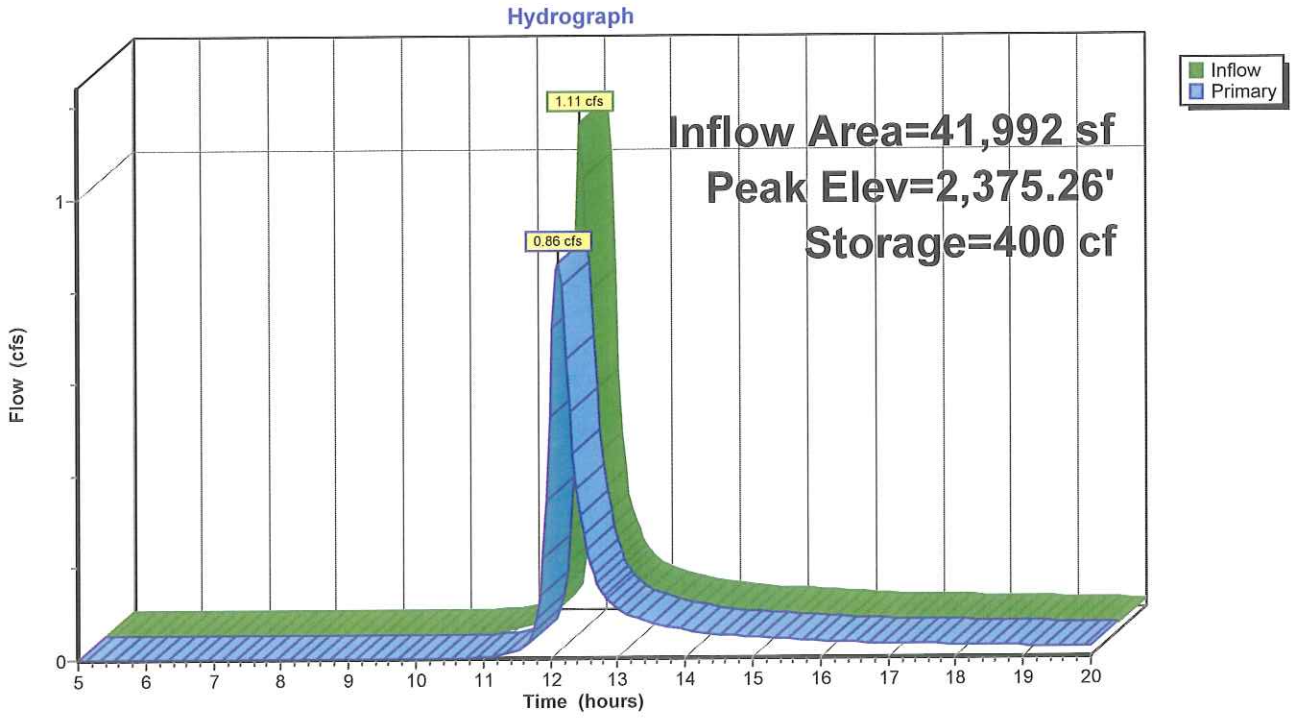
Plug-Flow detention time= 12.2 min calculated for 2,614 cf (99% of inflow)
Center-of-Mass det. time= 8.4 min (814.9 - 806.5)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	2,421 cf	**3.00'W x 400.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.85 cfs @ 12.13 hrs HW=2,375.26' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 0.85 cfs @ 1.67 fps)

Pond 2P: SWALE E



Summary for Pond 2P: SWALE E

Inflow Area = 41,992 sf, 38.00% Impervious, Inflow Depth > 0.89" for 100-YR event
Inflow = 1.31 cfs @ 12.05 hrs, Volume= 3,123 cf
Outflow = 1.03 cfs @ 12.13 hrs, Volume= 3,094 cf, Atten= 22%, Lag= 4.6 min
Primary = 1.03 cfs @ 12.13 hrs, Volume= 3,094 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.30' @ 12.13 hrs Surf.Area= 1,921 sf Storage= 463 cf

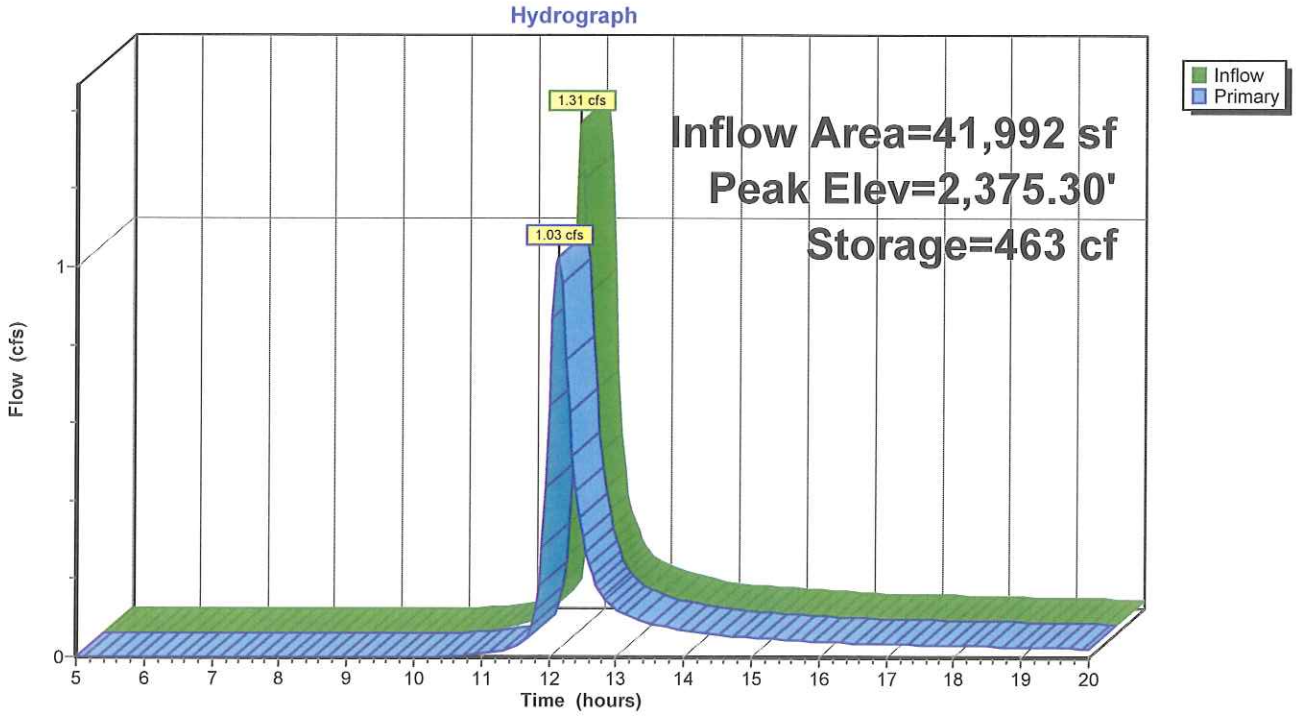
Plug-Flow detention time= 11.8 min calculated for 3,094 cf (99% of inflow)
Center-of-Mass det. time= 8.2 min (811.3 - 803.1)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	2,421 cf	**3.00'W x 400.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.01 cfs @ 12.13 hrs HW=2,375.29' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 1.01 cfs @ 1.77 fps)

Pond 2P: SWALE E



BASIN "F"

Total Area = 74470 sf = 1.71 acres.

Roof Area

(2000 sf x 9) = 18,000 sf C=0.90

Paved Area (includes curb & gutter)

(480' x 18.5') = 8880 Ft² C=0.90

Concrete Driveways & Sidewalk

500sf x 9 = 4500 Ft² C=0.90
318' x 5' = 1590 Ft²

Lawns

74470 – 32970 = 41500 sf C=0.15

Weighted "C" Factor

(0.9 x 32970) + (0.15 x 41500) divided by 74470

= 0.48

Required Swale Volume

V = 1815 A, where
V= Volume of swale (cubic feet)
A= Pollution generating impervious surface (acres)

V = 1815 x 0.31 acres

=558 CF

Provided swale volume = 720 CF

Swale Along South Walker Ave.		
Pond Side Slope	3	:1
Bottom Length (ft)	318	
Bottom Width (ft)	3	
Bottom Area (SF)	954	
Treatment Depth (ft)	0.5	
Treatment Area (SF)	1926	
Treatment Volume (CF)	720	
Storage Depth (ft)	1	
Storage Area (SF)	2916	
Storage Volume (CF)	1935	

Summary for Pond 2P: SWALE F

Inflow Area = 74,488 sf, 38.00% Impervious, Inflow Depth > 0.39" for 2-YR event
Inflow = 0.97 cfs @ 12.06 hrs, Volume= 2,421 cf
Outflow = 0.79 cfs @ 12.13 hrs, Volume= 2,399 cf, Atten= 19%, Lag= 4.3 min
Primary = 0.79 cfs @ 12.13 hrs, Volume= 2,399 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.25' @ 12.13 hrs Surf.Area= 1,433 sf Storage= 296 cf

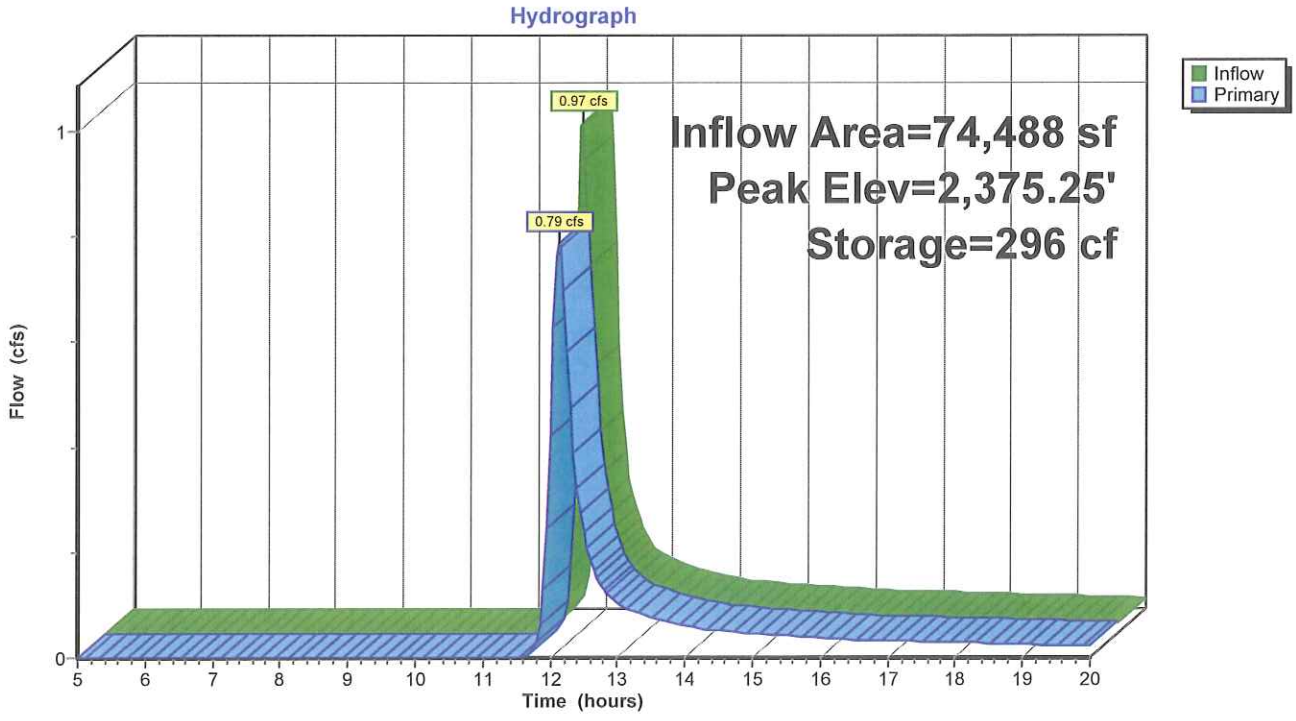
Plug-Flow detention time= 9.9 min calculated for 2,391 cf (99% of inflow)
Center-of-Mass det. time= 6.6 min (827.6 - 821.0)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	1,929 cf	**3.00'W x 318.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.78 cfs @ 12.13 hrs HW=2,375.25' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 0.78 cfs @ 1.62 fps)

Pond 2P: SWALE F



Summary for Pond 2P: SWALE F

Inflow Area = 74,488 sf, 38.00% Impervious, Inflow Depth > 0.50" for 10-YR event
Inflow = 1.28 cfs @ 12.06 hrs, Volume= 3,132 cf
Outflow = 1.05 cfs @ 12.13 hrs, Volume= 3,108 cf, Atten= 18%, Lag= 4.1 min
Primary = 1.05 cfs @ 12.13 hrs, Volume= 3,108 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.30' @ 12.13 hrs Surf.Area= 1,539 sf Storage= 377 cf

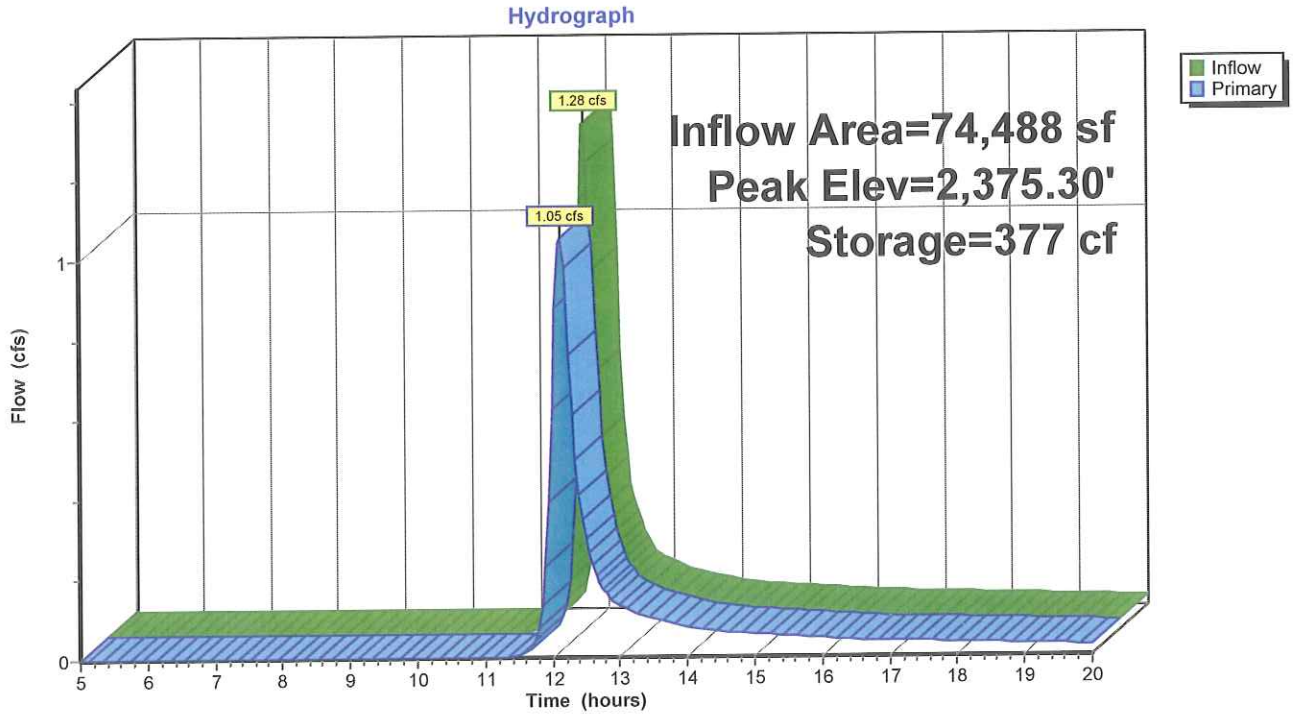
Plug-Flow detention time= 9.3 min calculated for 3,108 cf (99% of inflow)
Center-of-Mass det. time= 6.3 min (821.6 - 815.3)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	1,929 cf	**3.00'W x 318.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.04 cfs @ 12.13 hrs HW=2,375.30' (Free Discharge)
↑—1=Sharp-Crested Rectangular Weir (Weir Controls 1.04 cfs @ 1.79 fps)

Pond 2P: SWALE F



Summary for Pond 2P: SWALE F

Inflow Area = 74,488 sf, 38.00% Impervious, Inflow Depth > 0.76" for 50-YR event
Inflow = 1.95 cfs @ 12.05 hrs, Volume= 4,698 cf
Outflow = 1.64 cfs @ 12.12 hrs, Volume= 4,667 cf, Atten= 16%, Lag= 3.9 min
Primary = 1.64 cfs @ 12.12 hrs, Volume= 4,667 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.41' @ 12.12 hrs Surf.Area= 1,746 sf Storage= 551 cf

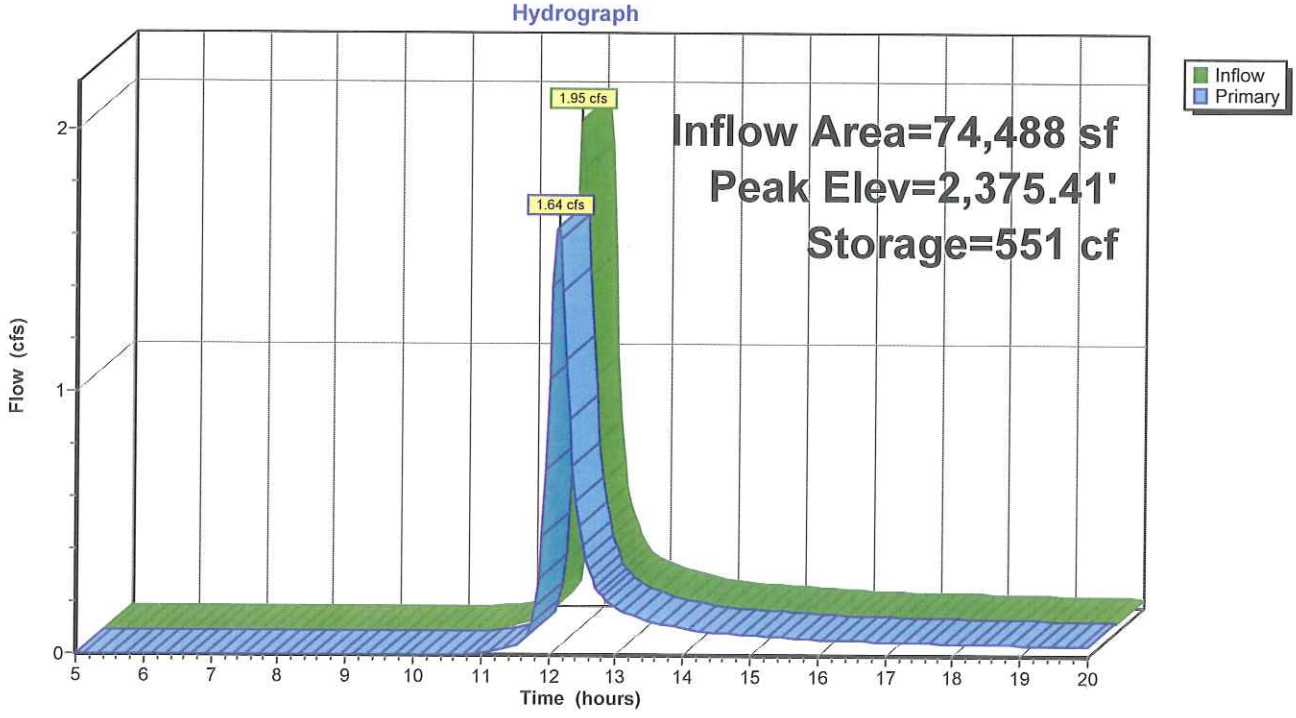
Plug-Flow detention time= 8.4 min calculated for 4,651 cf (99% of inflow)
Center-of-Mass det. time= 5.9 min (812.6 - 806.8)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	1,929 cf	**3.00'W x 318.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.61 cfs @ 12.12 hrs HW=2,375.40' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 1.61 cfs @ 2.08 fps)

Pond 2P: SWALE F



Summary for Pond 2P: SWALE F

Inflow Area = 74,488 sf, 38.00% Impervious, Inflow Depth > 0.89" for 100-YR event
Inflow = 2.30 cfs @ 12.05 hrs, Volume= 5,538 cf
Outflow = 1.94 cfs @ 12.12 hrs, Volume= 5,505 cf, Atten= 16%, Lag= 3.9 min
Primary = 1.94 cfs @ 12.12 hrs, Volume= 5,505 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 2,375.46' @ 12.12 hrs Surf.Area= 1,846 sf Storage= 642 cf

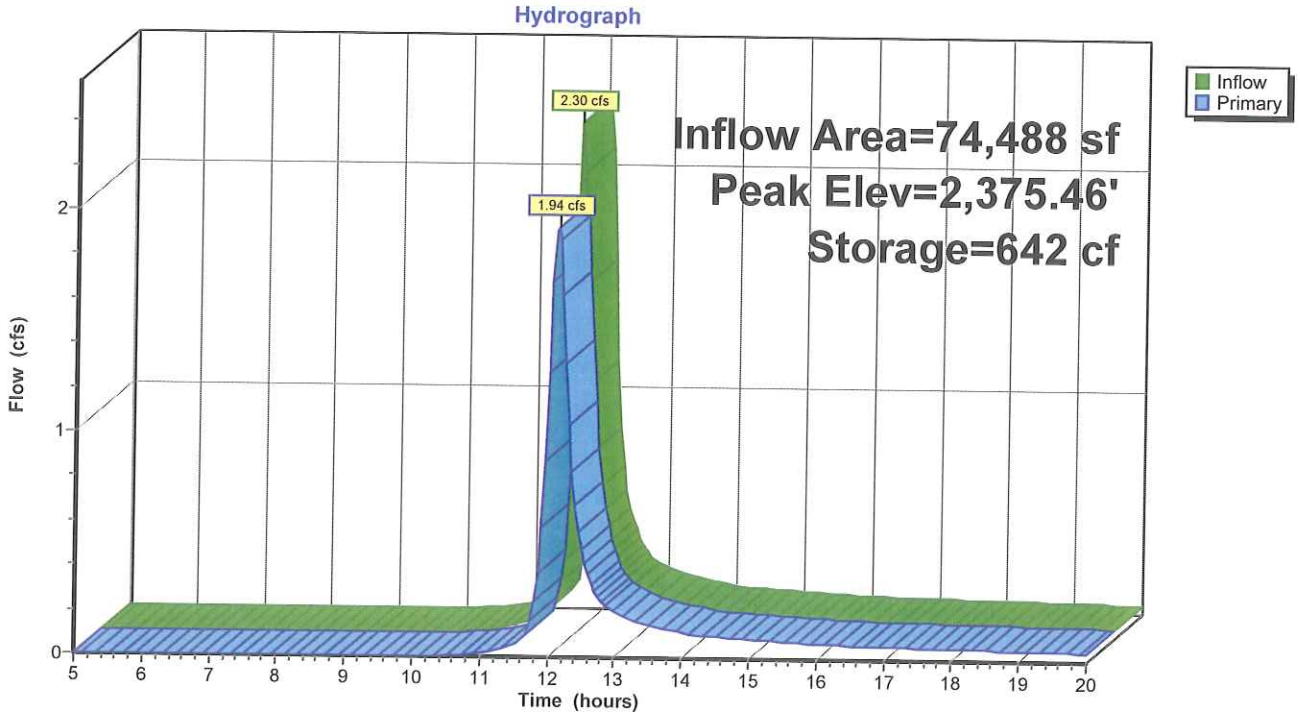
Plug-Flow detention time= 8.1 min calculated for 5,505 cf (99% of inflow)
Center-of-Mass det. time= 5.7 min (809.1 - 803.4)

Volume	Invert	Avail.Storage	Storage Description
#1	2,375.00'	1,929 cf	**3.00'W x 318.00'L x 1.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	2,375.00'	**2.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=1.91 cfs @ 12.12 hrs HW=2,375.45' (Free Discharge)
1=Sharp-Crested Rectangular Weir (Weir Controls 1.91 cfs @ 2.20 fps)

Pond 2P: SWALE F



BASIN "G"

Total Area = 13400 sf = 0.31 acres.

Roof Area

(2000 sf x 1) = 2,000 sf — C=0.90

Paved Area (includes curb & gutter)

(222' x 20.5') = 4551 Ft² — C=0.90

Concrete Driveways & Sidewalk

500sf x 1 = 500 Ft²
140' x 5' = 700 Ft² — C=0.90

Lawns

13400 – 7751 = 5649 sf — C=0.15

Weighted "C" Factor

(0.9 x 7751) + (0.15 x 5649) divided by 13400

= 0.58

Required Swale Volume

V = 1815 A, where
V= Volume of swale (cubic feet)
A= Pollution generating impervious surface (acres)

V = 1815 x 0.116 acres

=210 CF

Provided swale volume = 275 CF

Swale Along Austin		
Pond Side Slope	3	:1
Bottom Length (ft)	120	
Bottom Width (ft)	3	
Bottom Area (SF)	360	
Treatment Depth (ft)	0.5	
Treatment Area (SF)	738	
Treatment Volume (CF)	275	
Storage Depth (ft)	1	
Storage Area (SF)	1134	
Storage Volume (CF)	747	