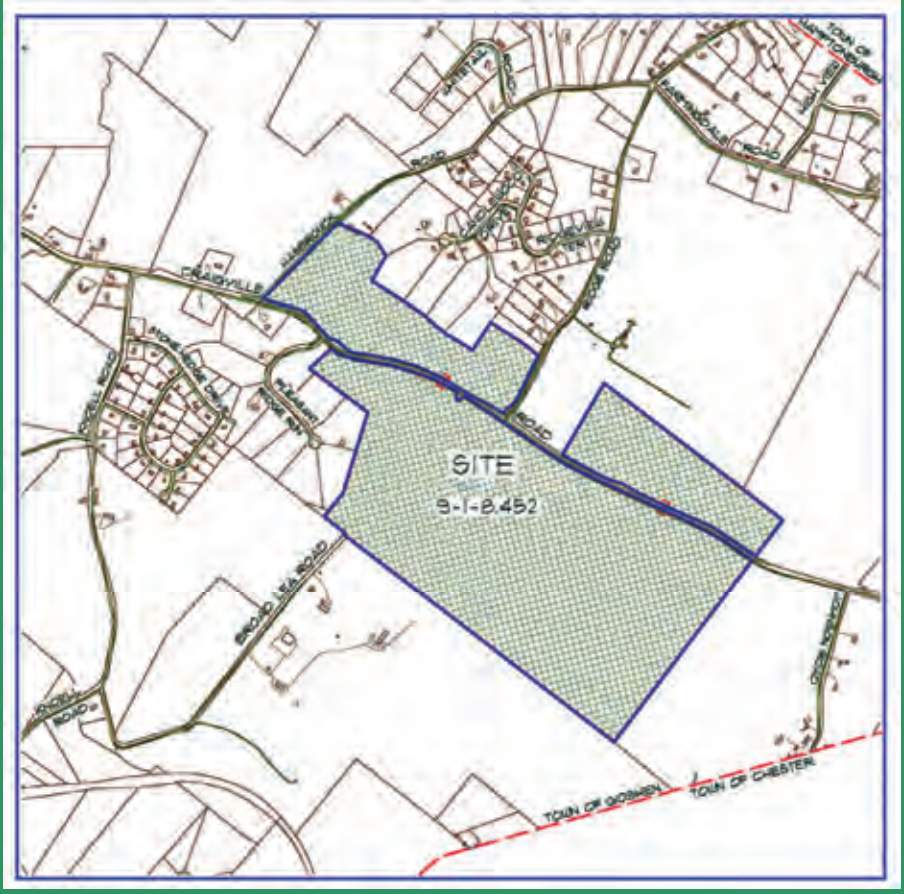
Young's Grove



Draft Environmental Impact Statement

Town of Goshen
Orange County, New York

Volume II

July 2008
Revised December 2009

Young's Grove

Draft Environmental Impact Statement

CRAIGVILLE ROAD & BROADLEA ROAD
TOWN OF GOSHEN
ORANGE COUNTY, NEW YORK

Tax Map Designation: Section 8, Block 1, Lot 8.452

Volume II of III

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A digital copy of the DEIS may be downloaded at www.townofgoshen.org. A printed copy is on file in the Goshen Public Library and Building Inspector's office.

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Submitted:	July 2008
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Deadline Date for Comments on the DEIS:	Ten (10) days after close of Public Hearing

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D. Stormwater Pollution Prevention Plan
Prepared By: Pietrzak & Pfau Engineering & Surveying, PLLC
Dated: June 2008

E. Well Testing Application
Prepared By: Leggette, Brashears & Graham, Inc.
Dated: October 26, 2006, revised April 5, 2007

F. Pump Test Program
Prepared By: Leggette, Brashears & Graham, Inc.
Dated: September 14, 2007, revised October 2007

G. Tree Survey
Prepared By: Pietrzak & Pfau Engineering and Surveying, PLLC
Dated: June 2008

Appendix D

Stormwater Pollution Prevention Plan

YOUNG'S GROVE SUBDIVISION

TOWN OF GOSHEN
ORANGE COUNTY, NEW YORK

STORMWATER POLLUTION PREVENTION PLAN

NARRATIVE

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GOSHEN, NEW YORK 10924

P&P No. 25108.01
April 25, 2008
October 3, 2008
July 6, 2009

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I. Executive Summary

This report shall serve as a stormwater pollution prevention plan for the Young's Grove Subdivision. The proposed project is located to the southwest and northeast sides of Craigville Road, southeast of Hasbrouck Road and approximately 1200± feet northwest of the intersection of Johnson Road and Craigville Road. This project is currently identified as Section 9, Block 1, Lot 8.452 on the Town of Goshen Tax Map. The total site area is approximately 354.01± acres.

This project includes the construction of one hundred and six (106) single family homes and approximately 10,400± feet of new roadway with associated improvements. Each lot will be served by a central water and sewer system.

The drainage design for this project has been incorporated to assure there are no adverse impacts to downstream areas, and to provide a zero net increase in runoff for the project site. This runoff has been calculated for the 2, 10, 25 and 100 year storm events. The proposed design actually provides a decrease in net runoff from the site for all of the design storms studied.

II. Design Point Designation

Four (4) separate design points were defined to analyze the peak run-off of the project. The first design point, for this project has been defined as an existing culvert located under Hasbrouck Road to the northwest of the property. The stormwater enters this culvert via an existing drainage course that travels through the project site and is outletted to the northwest of the site into the lands now or formerly Weyrauch. This design point is defined in the Hydro-Cad model as Pond 1P.

The second design point for this project has been defined as an existing swale located along the southwest side of Craigville Road. Stormwater in this swale flows west away from the project site. This design point is defined in the Hydro-Cad model as Pond 2P.

The third design point for this project is defined as the southeastern property line. The stormwater from this design point flows across the southeastern property line via an existing swale into the lands of now/formerly Johnson Realty. This design point is defined in the Hydro-Cad model as Pond 3P.

The fourth design point for this project is defined as the southwestern property line in the southern corner of the project site. Stormwater from this design point has a general hydrolic path to the south that eventually outlets into the Cromline Stream. This design point is defined in the Hydro-Cad model as Pond 4P.

III. Existing Conditions

As previously mentioned, the Young's Grove project is 354.01± acres of vacant land located on the southwest and northeast side of Craigville Road, southeast of Hasbrouck Road and approximately 1200± feet northwest of the intersection of Johnson Road and Craigville Road, in the Town of Goshen.

The soils located within the drainage basins on the project site have been identified in accordance with the Orange County Soils Survey. The site consists of soils from Hydrologic Soil Groups A, C and D. The soils located on the site are Alden, Erie, Hoosic, Madalin and Mardin. (See Appendix 4 for further information of these particular soils).

Coverage on the site consists mainly of woods with some large pockets of New York State DEC wetlands and some small pockets of ACOE Wetlands.

Topography on this site consists mainly of slopes in the 0% to 10% range (58% of site), 10% to 15% (25% of site), 15% or greater range (17% of site).

In modeling the existing site for the drainage analysis, the drainage area was taken to consist of ten (10) separate drainage basins. The first existing drainage basin, identified in the Hydro-Cad Output as Sub-catchment 1S, includes approximately 44.99 acres of land located on the northwest portion of the site (see Appendix 1 for the location of drainage areas). This area is made up of approximately 0.92 acres of existing impervious area, 0.31 acres of meadow on Hydrologic Soils Group C, 15.5 acres of grass cover, in fair condition, on Hydrologic Soils Group C, and 28.26 acres of woods, in good condition, on Hydrologic Soils Group C. This area is tributary to Existing Culvert 2, defined in the Hydro-Cad model as Catch Basin 6P. Stormwater from this culvert enters an existing stream defined in the Hydro-Cad model as Reach 1R that outlets through the previously defined Design Point 1. Stormwater flows that exceed the capacity of Existing Culvert 2 enter an existing swale, previously defined as Design Point 2.

The second existing drainage basin, identified in the Hydro-Cad Output as Sub-catchment 2S, includes approximately 10.35 acres of land located in the northwestern portion of the site, adjacent to Sub-catchment 1S. This drainage area is made up of approximately 0.08 acres of impervious area, 0.12 acres of meadow on Hydrologic Soils Group C, and 10.15 acres of woods, in fair condition, on Hydrologic Soils Group C. This area is tributary to Existing Culvert 3, defined in the Hydro-Cad model as Catch Basin 7P. Stormwater from this culvert enters an existing stream defined in the Hydro-Cad model as Reach 2R that outlets through the previously defined Design Point 1. Stormwater flows that exceed the capacity of Existing Culvert 3 enter an existing swale, defined in the Hydro-Cad model as Reach 6R that outlets to Existing Culvert 2.

The third existing drainage basin, identified in the Hydro-Cad output as Sub-catchment 3S, includes approximately 70.48 acres of land located in the

center of the site to the southwest of Sub-catchments 1S and 2S. This drainage area is made up of approximately 0.45 acres of impervious area, 0.68 acres of meadow on Hydrologic Soils Group C, 0.87 acres of meadow on Hydrologic Soils Group D, 58.44 acres of woods, in fair condition, on Hydrologic Soils Group C and 10.04 acres of woods, in fair condition, on Hydrologic Soils Group D. This area is tributary to Existing Culvert 4, defined in the Hydro-Cad model as Catch Basin 8P. Stormwater from this culvert enters an existing stream defined in the Hydro-Cad model as Reach 3R that outlets through the previously defined Design Point 1.

The fourth existing drainage basin, identified in the Hydro-Cad output as Sub-catchment 4S, includes approximately 11.36 acres of land located in the center of the site and to the northeast side of Craigville Road. This drainage area is made up of approximately 0.17 acres of impervious area, 0.09 acres of meadow on Hydrologic soils Group C, 0.22 acres of meadow on Hydrologic Soils Group D, 0.05 acres of woods, in fair condition, on Hydrologic Soils Group A, 10.67 acres of woods, in fair condition, on Hydrologic Soils C, and 0.16 acres of woods, in fair condition, on Hydrologic Soils Group D. This area is tributary to Existing Culvert 5, defined in the Hydro-Cad model as Catch Basin 9P. Stormwater from this culvert enters an existing stream defined in the Hydro-Cad model as Reach 4R that outlets through the previously defined Design Point 1. Stormwater flows that exceed the capacity of Existing Culvert 5 flow to an existing swale that outlets directly into Reach 3R.

The fifth existing drainage basin, identified in the Hydro-Cad output as Sub-catchment 5S, includes approximately 5.02 acres of land located in the center of the site and to the northeast of Craigville Road. This drainage area is made up of approximately 0.23 acres of impervious area, 0.38 acres of meadow on Hydrologic Soils Group C, and 4.41 acres of woods, in fair condition, on Hydrologic Soils C. This area is tributary to Existing Culvert 6 defined in the Hydro-Cad model as Catch Basin 10P. Stormwater from this culvert enters an Existing Wetland Pocket, defined in the Hydro-Cad model as Pond 5P. Pond 5P enters an existing

stream modeled in the Hydro-Cad Output as Reach 5R. Reach 5R outlets through the previously defined Design Point 1.

The sixth existing drainage basin, identified in the Hydro-Cad output as Sub-catchment 6S, includes approximately 7.52 acres of land located in the center of the site and to the southeast of Sub-catchment 3S. This drainage area is made up of approximately 0.09 acres of impervious area, 0.48 acres of meadow on Hydrologic Soils Group C, 0.05 acres of meadow on Hydrologic Soils Group D, 6.60 acres of woods, in fair condition, on Hydrologic Soils C, and 0.30 acres of woods, in fair condition, on Hydrologic Soils D. This area is tributary to Existing Culvert 9, defined in the Hydro-Cad model as Catch Basin 11P. Stormwater from this culvert enters the previously mentioned Existing Wetlands Pocket identified in the Hydro-Cad Output as Pond 5P.

The seventh existing drainage basin, identified in the Hydro-Cad output as Sub-catchment 7S, includes approximately 140.44 acres of land located on the southeastern side of the site and includes areas on both sides of Craigville Road. This drainage area is made up of approximately 1.11 acres of impervious area, 8.01 acres of meadow on Hydrologic Soils Group C, and 10.18 acres of meadow on Hydrologic Soils Group D, 0.87 acres of woods, in fair condition, on Hydrologic Soils Group A, 100.00 acres of woods, in fair condition, on Hydrologic Soils Group C, and 20.27 acres of woods, in fair condition, on Hydrologic Soils Group D. This area is tributary to the previously mentioned Existing Wetlands Pocket identified in the Hydro-Cad Output as Pond 5P.

The eighth existing drainage basin, identified in the Hydro-Cad output as Sub-catchment 8S, includes approximately 9.09 acres of land located near the eastern corner of the site and on the northeast side of Craigville Road. This drainage area is made up of approximately 0.12 acres of impervious area, 0.24 acres of meadow on Hydrologic Soils Group C, and 8.73 acres of woods, in fair condition, on Hydrologic Soils Group C. This area is tributary to Existing Culvert 11

defined in the Hydro-Cad model as Catch Basin 12P. Stormwater from this culvert enters the previously mentioned Existing Wetland Pocket identified in the Hydro-Cad Output as Pond 5P.

The ninth existing drainage basin, identified in the Hydro-Cad output as Sub-catchment 9S, includes approximately 13.93 acres of land located near the eastern property corner and to the southwest side of Craigville Road. This drainage area is made up of approximately 0.18 acres of impervious area, 0.26 acres of meadow on Hydrologic Soils Group C, 0.04 acres of meadow on Hydrologic Soils Group D, 13.16 acres of woods, in fair condition, on Hydrologic Soils Group C, and 0.29 of woods, in fair condition, on Hydrologic Soils Group D. This area is tributary to previously defined Design Point 3.

The tenth existing drainage basin, identified in the Hydro-Cad output as Sub-catchment 10S, includes approximately 34.54 acres of land located in the southern corner of the project site to the southwest of Sub-catchment 7S. This drainage area is made up of approximately 1.09 acres of woods, in fair condition, on Hydrologic Soils Group A, 31.25 acres of woods, in fair condition, on Hydrologic Soils Group C, and 2.20 acres of woods, in fair condition, on Hydrologic Soils Group D. This area is tributary to previously defined Design Point 4.

IV. Proposed Conditions

In modeling the project site for the proposed condition, the site was taken to consist of fourteen (14) separate drainage basins. The first drainage basin, still identified in the Hydro-Cad Output as Sub-catchment 1S, has been reduced to contain approximately 36.78 acres of land. The area now consists of approximately 0.92 acres of existing impervious area, 0.30 acres of proposed impervious area, 16.31 acres of landscape lawns, in fair condition, on Hydrologic Soils Group C, 0.21 acres of meadow on Hydrologic Soils Group C, and 19.04

acres of woods, in fair condition, on Hydrologic Soils Group C. The stormwater from this area continues to be tributary to Existing Culvert 2, modeled in the Hydro-Cad output as Catch Basin 6P.

The second drainage basin, still identified in the Hydro-Cad Output as Sub-catchment 2S, has been reduced to approximately 2.08 acres of land. This area now consists of approximately 0.08 acres of existing impervious area, 0.36 acres of proposed impervious area, 1.06 acres of landscaped lawns, in fair condition, on Hydrologic Soils Group C. 0.08 acres of meadow on Hydrologic Soils Group C, and 0.50 acres of woods, in fair condition, on Hydrologic Soils Group C. The stormwater from this area continues to be tributary to Existing Culvert 3, modeled in the Hydro-Cad Output as Catch Basin 7P.

The third drainage basin, still identified in the Hydro-Cad Output as Sub-catchment 3S, has been reduced to contain approximately 49.74 acres of land. This area now consists of approximately 0.45 acres of existing impervious area, 1.95 acres of proposed impervious area, 5.21 acres of landscaped lawns, in fair condition, on Hydrologic Soils Group C, 0.31 acres of meadow on Hydrologic Soils Group C, 0.87 acres of meadow of Hydrologic Soils Group D, 30.91 acres of woods, in fair condition, on Hydrologic Soils Group C, and 10.04 acres of woods, in fair condition, on Hydrologic Soils Group D. The stormwater from this area continues to be tributary to Existing Culvert 4, modeled in the Hydro-Cad Output as Catch Basin 8P.

The fourth drainage basin, still identified in the Hydro-Cad Output as Sub-catchment 4S, remains unchanged in the proposed condition. This basin continues to contain approximately 11.36 acres of land and is tributary to Existing Culvert 5, modeled in the Hydro-Cad Output as Catch Basin 9P.

The fifth drainage basin, still identified in the Hydro-Cad Output as Sub-catchment 5S, remains unchanged in the proposed condition. This basin

continues to contain approximately 5.02 acres of land and is tributary to Existing Culvert 6, modeled in the Hydro-Cad Output as Catch Basin 10P.

The sixth drainage basin, still identified in the Hydro-Cad Output as Sub-catchment 6S, has been reduced to contain approximately 6.10 acres of land. This area now consists of approximately 0.09 acres of existing impervious area, 0.03 acres of proposed impervious area, 0.10 acres of landscaped lawns, in fair condition, on Hydrologic Soils Group C, 0.48 acres of meadow on Hydrologic Soils Group C, and 0.05 acres of meadow on Hydrologic Soils Group D, 5.05 acres of woods, in fair condition, on Hydrologic Soils Group C, and 0.30 acres of woods, in fair condition, on Hydrologic Soils Group D. The stormwater from this area continues to be tributary to Existing Culvert 9, modeled in the Hydro-Cad Output as Catch Basin 11P.

The seventh drainage basin, still identified in the Hydro-Cad Output as Sub-catchment 7S, has been reduced to contain approximately 120.31 acres of land. This area now consists of approximately 1.11 acres of existing impervious area, 1.73 acres of proposed impervious area, 6.81 acres of landscaped lawns, in fair condition, on Hydrologic Soils Group C, 0.10 acres of landscaped lawns, in fair condition, on Hydrologic Soils Group D, 7.16 acres of meadow on Hydrologic Soils Group C, and 10.12 acres of meadow on Hydrologic Soils Group D, 0.87 acres of woods, in fair condition, on Hydrologic Soils Group A, 72.18 acres of woods, in fair condition, on Hydrologic Soils Group C, and 20.23 acres of woods, in fair condition, on Hydrologic Soils Group D. The stormwater from this area continues to be tributary to the Existing Wetlands Pocket, modeled in the Hydro-Cad Output as Pond 5P.

The eighth drainage basin, still identified in the Hydro-Cad Output as Sub-catchment 8S, remains unchanged in the proposed condition. This basin continues to contain approximately 9.09 acres of land and is tributary to Existing Culvert 11, modeled in the Hydro-Cad Output as Catch Basin 12P.

The ninth drainage basin, still identified in the Hydro-Cad Output as Sub-catchment 9S, has been reduced to contain approximately 12.07 acres of land. This area now consists of approximately 0.16 acres of existing impervious area, 0.15 acres of proposed impervious area, 0.58 acres of landscaped lawns, in fair condition, on Hydrologic Soils Group C, 0.24 acres of meadow on Hydrologic Soils Group C, 0.04 acres of meadow on Hydrologic Soils Group D, 10.61 acres of woods, in fair condition, on Hydrologic Soils Group C, and 0.29 acres of woods, in fair condition, on Hydrologic Soils Group D. The stormwater from this area continues to be tributary to Design Point 3, modeled in the Hydro-Cad Output as Pond 3P.

The tenth drainage basin, still identified in the Hydro-Cad Output as Sub-catchment 10S, has been reduced to contain approximately 34.36 acres of land. This area now consists of approximately 0.30 acres of proposed impervious area, 0.88 acres of landscaped lawns, fair condition, on Hydrologic Soils Group C, 1.09 acres of woods, in fair condition, on Hydrologic Soils Group A, 29.89 acres of woods, in fair condition, on Hydrologic Soils Group C, and 2.20 acres of woods, in fair condition, on Hydrologic Soils Group D. The stormwater from this area continues to be tributary to Design Point 4, modeled in the Hydro-Cad Output as Pond 4P.

Due to the proposed project four (4) additional drainage areas have been delineated based on the proposed grading and the installation of drainage infrastructure. The first additional drainage basin, is identified in the Hydro-Cad Output as Sub-catchment 11S, and encompasses approximately 20.05 acres of land. This area is made up of approximately 5.82 acres of landscaped lawns, in fair condition, on Hydrologic Soils Group C, 0.10 acres of meadow on Hydrologic Soils Group C, 10.69 acres of woods, in fair condition, on Hydrologic Soils Group C, and 3.44 acres of impervious area made up of proposed buildings and pavement. Stormwater from this area is collected by a series of stormwater infrastructure and conveyed to a proposed stormwater detention/treatment pond,

identified in the Hydro-Cad Output as Pond 13P, which outlets to Catch Basin 7P. This pond will be discussed in the Stormwater Management section of the report. (See Appendix 1 for drainage basin mapping).

The second additional drainage area created from the proposed project is defined in the Hydro-Cad Output as Sub-catchment 12S, and it encompasses approximately 11.42 acres of land. The area is made up of approximately 4.20 acres of landscaped lawns, in fair condition, on Hydrologic Soils Group C, 4.94 acres of woods, in fair condition, on Hydrologic Soils Group C, and 2.28 acres of impervious area made up of proposed buildings and pavement. The stormwater from this area is collected by a series of stormwater infrastructure and conveyed to a proposed stormwater detention/treatment pond, identified in the Hydro-Cad Output as Pond 14P, which outlets to Catch Basin 8P. This pond will be discussed in the Stormwater Management section of the report. (See Appendix 1 for drainage basin mapping).

The third additional drainage area created from the proposed project is defined in the Hydro-Cad Output as Sub-catchment 13S, and it encompasses approximately 26.95 acres of land. The area is made up of approximately 8.58 acres of landscaped lawns, in fair condition, on Hydrologic Soils Group C, 13.24 acres of woods, in fair condition, on Hydrologic Soils Group C, and 5.13 acres of impervious area made up of proposed buildings and pavement. The stormwater from this area is collected by a series of stormwater infrastructure and conveyed to a proposed stormwater detention/treatment pond identified in the Hydro-Cad Output as Pond 15P, which outlets to Pond 5P. This pond will be discussed in the Stormwater Management section of the report. (See Appendix 1 for drainage basin mapping).

The fourth additional drainage area created from the proposed project is defined in the Hydro-Cad Output as Sub-catchment 14S, and it emcompasses approximately 2.39 acres of land. The area is made up of approximately 1.57

acres of landscaped lawns, in fair condition, on Hydrologic Soils Group C, 0.01 acres of woods, in fair condition, on Hydrologic Soils Group C, and 0.81 acres of impervious area made up of proposed buildings and pavement. The stormwater from this area is collected by a series of stormwater infrastructure and conveyed to a proposed stormwater detention/treatment pond identified in the Hydro-Cad Output as Pond 16P, which outlets to Design Point 3 (Pond 3P). This pond will be discussed in the Stormwater Management section of the report. (See Appendix 1 for drainage basin mapping).

V. Stormwater Management

The goal of this drainage design is to match or decrease the peak flow runoff from the project site for the 2, 10, 25, and 100 year storm events in the proposed condition as compared to the existing condition. The detention/treatment ponds 13P, 14P, and 15P have been selected as the best management practice for this project, as defined by the New York State D.E.C. The stormwater runoff from the project site is collected by subdivision roads and is conveyed, via the proposed roadside swales and culverts to the ponds previously mentioned. The stormwater is then detained in the detention/treatment pond to reduce the peak outflows, in the proposed condition, to a level that is equivalent to or less than the existing runoff condition for the design storms studied.

As can be seen in the following tables, the peak flows for the proposed conditions have been decreased for all design storm studies (See appendix 2 and 3 for Hydro-Cad output). Additionally, tables have been provided showing the water surface elevations in the proposed detention/treatment ponds. The elevations presented in these tables illustrates the results of analysis for the 2, 10, 25 and 100 year storm events, and indicates that a minimum 1 foot of freeboard has been provided for these ponds to protect from overtopping.

EXISTING CULVERT UNDER HASBROUCK ROAD (POND 1P)

Storm Event	Pre-Developed Peak Flow (cfs) Q out	Post Developed Peak Flow (cfs) Q out	Change (cfs)	Change (%)
2 Year	92.27	79.46	-12.81	13.9
10 Year	192.94	190.88	-2.06	1.1
25 Year	231.29	226.92	-4.37	1.9
100 Year	292.15	286.54	-5.61	1.9

EXISTING SWALE ALONG CRAIGVILLE ROAD (POND 2P)

Storm Event	Pre-Developed Peak Flow (cfs) Q out	Post Developed Peak Flow (cfs) Q out	Change (cfs)	Change (%)
2 Year	0.00	0.00	0.00	0.0
10 Year	27.69	23.78	-3.91	14.1
25 Year	52.79	52.39	-0.40	0.8
100 Year	93.55	93.53	-0.02	0.0

SOUTHEASTERN PROPERTY LINE (POND 3P)

Storm Event	Pre-Developed Peak Flow (cfs) Q out	Post Developed Peak Flow (cfs) Q out	Change (cfs)	Change (%)
2 Year	13.30	12.35	-0.95	7.1
10 Year	31.66	30.74	-0.92	2.9
25 Year	41.65	40.29	-1.36	3.3
100 Year	57.35	56.18	-1.17	2.0

SOUTHWESTERN PROPERTY LINE (POND 4P)

Storm Event	Pre-Developed Peak Flow (cfs) Q out	Post Developed Peak Flow (cfs) Q out	Change (cfs)	Change (%)
2 Year	19.88	19.77	-0.11	0.6
10 Year	51.02	50.75	-0.27	0.5
25 Year	68.36	68.01	-0.35	0.5
100 Year	95.54	95.04	-0.50	0.5

PROPOSED DETENTION/TREATMENT POND 13P

Storm Event	Post Developed Peak Water Surface Elevation	Freeboard (Pond Top at 466.00)
2 Year	461.11	4.9’
10 Year	462.91	3.1’
25 Year	463.81	2.2’
100 Year	464.99	1.0’

PROPOSED DETENTION/TREATMENT POND 14P

Storm Event	Post Developed Peak Water Surface Elevation	Freeboard (Pond Top at 500.00)
2 Year	495.40	4.6’
10 Year	497.00	3.0’
25 Year	497.96	2.0’
100 Year	498.99	1.0’

PROPOSED DETENTION/TREATMENT POND 15P

Storm Event	Post Developed Peak Water Surface Elevation	Freeboard (Pond Top at 496.00)
2 Year	490.94	5.1’
10 Year	492.90	3.1’
25 Year	493.81	2.2’
100 Year	495.04	1.0’

PROPOSED DETENTION/TREATMENT POND 16P

Storm Event	Post Developed Peak Water Surface Elevation	Freeboard (Pond Top at 506.00)
2 Year	503.26	2.7’
10 Year	504.09	1.9’
25 Year	504.53	1.5’
100 Year	504.99	1.0’

VI. Stormwater Quality

The construction of the proposed impervious and semi-impervious surfaces can result in an increase of pollutants deposited from the atmosphere, leaked from vehicles, or windblown in from adjacent areas. During storm events, these pollutants will quickly wash off and enter into the proposed stormwater system. Some of the potential pollutants for this project include sediment or suspended solids, bacteria, and nutrients such as phosphorus and nitrogen. (See Appendix 5 for pollutant loading analysis).

To treat stormwater runoff for sediment and pollutants, the use of catch basin sumps, existing vegetative areas, individual dry wells, sedimentation basins and wet ponds designed to New York State D.E.C. specifications were chosen as the best management practices for the Young's Grove Subdivision. The vegetative areas are defined as the natural grass, brush, and wooded areas that exist prior to stormwater entering the existing and/or proposed drainage systems. The catch basin sumps, vegetative areas, and pond forebays serve as an excellent means of sediment removal while the individual dry wells and wet ponds, serves as an effective means of water quality treatment for pollutant loading. Stormwater quality has been designed in accordance with the New York State D.E.C. Stormwater Management Design Manual. Calculations for the specifics of the water quality design can be found in Appendix 5.

The design for this water quality system has been prepared to not only provide water quality, but to provide downstream channel protection, and downstream protection from extreme storm events, as per the above referenced design manual. Water quality has been provided for in the wet ponds by the provision of 24 hours of extended detention for the water quality design storm. The water quality design storm will be released from the pond at a rate such that the runoff will be discharged over a 24 hour period after the design storm. Downstream channel protection has been provided by 24 hours of extended storage for the entire one year design storm. Again, the outflow from the pond for

this storm has been designed such that runoff will be discharged over a 24 hour period after the design storm event. Downstream over-bank flood protection has been provided by the calculations performed for the 10 year design storm to ensure that the downstream flows for this design storm shall not exceed those of the existing conditions. Stream flood protection for downstream areas has been provided, based upon the analysis of the 100 year design storm and the design to accommodate this storm ensuring that no increases in flow rates shall be experienced downstream from this design storm.

The proposed ponds will insure that the tributary area receives adequate treatment to provide the required levels of water quality for the discharge off of the project site. The areas of impervious surfaces, which will not drain into these ponds to receive treatment, will enter individual dry wells or will be filtered by overland flow passing over the grassed areas and brush areas between these impervious surfaces and the discharge point of the site.

VII. Erosion and Sediment Control

Full erosion and sediment control measures will be incorporated into the project construction. These practices will be in accordance with those set forth in the New York State Department of Environmental Conservation publication entitled “New York State Standards and Specifications for Erosion and Sediment Control” and the "New York State Stormwater Management Design Manual".

Erosion Control Measures:

The following erosion control measures will be incorporated to minimize erosion potential:

- Filter fabric silt fence:

  Silt fence shall be used to control erosion from sheet flow on slopes not to exceed two horizontal to one vertical. Concentrated flows shall not be

directed toward silt fence and spacing shall vary from 50' to 200' depending on slope steepness.

- Permanent and temporary seeding mixtures:

  Permanent and temporary seeding, mulch, fertilizer, soil amendments, and slope stabilization will be used on seeded areas. Land that is stripped of vegetation will be left bare for the shortest time possible. Any area that will remain cleared, but not under construction for 20 days or longer, will be seeded with a temporary mixture. Topsoil shall be stockpiled, stabilized with temporary seeding, and saved for reuse on the site.

- Slope Stabilization:

  All slopes shall be stabilized to minimize erosion. Slopes shall be stabilized with temporary seeding mixtures and straw mulch. Slopes in excess of four horizontal to one vertical shall be stabilized with jute netting and hydro-seed. Existing vegetation, which is not to be removed, will also act as filter strips to protect down-slope areas. Runoff will be diverted from newly graded areas to prevent erosion until a permanent ground cover has been established.

- Dust Control:

  Measures for dust control during construction shall be implemented as needed (daily water sprays will be used during dry conditions and Calcium Chloride will be used only if necessary). In addition to water sprays, temporary plantings will aid in minimizing dust.

- Temporary Diversion Swales:

  Temporary diversion swales shall be constructed to either divert clean stormwater runoff from newly graded areas or direct sediment laden runoff to a sediment trapping device.

- Channel Stabilization:

  Drainage channels and temporary diversion swales shall be stabilized with seed, jute netting or riprap, as specified, to minimize deterioration of the channel bed.

- Sediment Traps:

  Sediment traps shall be constructed in the location, and be of size and type specified to collect sediment from sediment laden stormwater runoff. Sediment traps shall be constructed downstream of disturbed areas and be in place prior to disturbance within the contributory area.

- Stabilized Construction Entrance:

  Town roads will be protected by installation of crushed stone blanket for cleaning construction vehicle wheels. Blankets shall be placed at any intersection of a construction road with a paved or publicly owned road. Stabilized construction entrances shall be installed in the location and be of size and type specified.

- Tree Protection:

  Trees to be preserved within areas of construction shall be protected. In areas of concentrated construction activity temporary fencing will be placed around the driplines. In all other areas, construction workers will be directed to avoid the storing of equipment or soil under trees to be preserved, in order to prevent soil compaction. If necessary, trees will be preserved with tree wells in fill areas, and retaining walls in cut areas.

Erosion Control Sequence

Prior to any site disturbance, the developer should thoroughly review and familiarize the approved erosion control plan. The installation of erosion control measures should begin with the most downstream device, then working upstream.

When installing erosion control measures, the sequence should generally be as follows:

- Prior to commencing construction activities, the limits of clearing and grading shall be clearly marked. Perimeter silt fence and stabilized construction entrances shall be put in place.

- Upon completion of clearing and grubbing activities, topsoil shall be stripped from all areas to be disturbed and stockpiled. Stockpiled topsoil shall be stabilized by temporary seeding and surrounded with a perimeter silt fence.

- Temporary erosion control devices shall be installed prior to commencing earth moving activities. This includes the installation of sediment traps, diversion swales, and check dams beginning at the most downstream portions of the site and then working upstream.

- Immediately after completion of rough grading, remaining temporary erosion control shall be installed as specified, including additional silt fence, diversion swales, and check dams. Any areas not requiring further earth work shall be fine graded topsoiled and stabilized as early as possible.

Maintenance of Erosion Control Devices

The maintenance of erosion control devices will be the responsibility of the developer. A critical part of an effective erosion control plan is a conscientious maintenance program. All erosion control devices will be cleaned and restored throughout construction to maintain their effectiveness. The Job Superintendent will monitor the condition of all devices and clean or replace them as conditions require. All erosion control devices shall be installed and maintained in

accordance with the approved plans, manufacturer's recommendations, and as directed by Town representatives including the Town engineer, highway superintendent, and building inspector.

Specific maintenance shall include:

- Maintaining seeded areas including reseeding weak areas, regrading wash outs and fertilizing.
- Maintaining mulched areas including replacement of disturbed mulched areas.
- All devices shall be inspected after each rain and repaired as needed.
- Sediment shall be removed from behind silt fence when bulges start to occur and fencing reset to original condition.
- Outlets in sediment basins shall be free of silt and debris by hand raking and cleaning after each rain storm.
- Construction equipment shall not unnecessarily cross drainage swales. Crossing of drainage channels shall be by means of bridges, culverts or other approved methods.
- Culverts shall be maintained free of silt or debris.
- Tree protection fencing to be inspected daily during grading and finish grading operations.
- Daily water sprays will be used as needed or as directed by the Consulting Engineer or Town representatives. Water sprays will be used to prevent pollution from dust until construction is completed and soil cover is established.

Removal of Erosion Control Devices:

No erosion control structures shall be removed until all work upstream has been completed, stabilized, and approved by the Consulting Engineer and Town Representatives.

The removal of erosion control devices should generally be as follows:

- After construction, the temporary erosion control structures are to be removed in reverse order with the most upstream structure removed first and thence proceeding downstream.
- All hay bales shall be removed and properly disposed of off-site.
- All tree protection fencing shall be removed after adjacent areas have been graded, topsoiled, seeded, and vegetation has been established.
- All temporary construction culverts shall be removed and areas graded, topsoiled, and seeded.
- Any washouts shall be re-topsoiled and seeded.

VIII. Stormwater Infrastructure Maintenance:

Long term maintenance of all drainage structures, pipes, and treatment devices will be the responsibility of the Town of Goshen.

Long term maintenance shall include the following:

Inspection: The infiltration devices should be inspected periodically for the first few months after construction and on an annual basis thereafter. The drainage infrastructure should also be inspected after major storm events to ensure that the orifices, if any and inlets remain open. Particular attention should be given to:

- Evidence of clogging
- Erosion of the flow path
- Condition of the embankments
- Condition of the spillways
- Accumulation of sediment at the outlets and sumps
- Erosion of bio-swales or riprap aprons
- Sources of erosion in the contributory drainage, which should be stabilized.

Debris and Litter Control: Removal of debris and litter should be accomplished during mowing operations. Particular attention should be given to removing debris and trash around outlets to prevent clogging.

Erosion Control: Eroding soils in drainage areas should be stabilized immediately with vegetative practices or other erosion control practices. Potential problems are erosion that may occur on the embankment, slopes, and spillways of grassed bio-swales. Also, attention should be given to repositioning protective riprap where appropriate.

Sediment Removal: Sediment should be removed periodically in order to preserve the available stormwater treatment capacity of the infiltration devices, and to prevent outlets or filtering mediums from becoming clogged. Also, unless removed, accumulated sediment may become unsightly. While more frequent clean-out may be needed around outlets, a typical clean-out cycle for the entire stormwater infrastructure should range from 5 to 10 years.

IX. Pipe Analysis

Stormwater management for the Young's Grove Subdivision project will be accomplished via a network of pipes, drainage swales, treatment, and storage facilities. In sizing the drainage pipes, a pipe analysis was performed using the Rational Method to study all drainage areas tributary to the piping network. In performing the Rational Method analysis, the values of the runoff coefficient (C) were taken to be 0.9 for all impervious areas, 0.3 for wooded areas, and 0.35 for landscaped lawns. A worst-case rainfall intensity of 6.5 inches per hour was used, as taken from the Orange County Rainfall Intensity Curves for the 25 year storm event. A minimum time of concentration of 10 minutes has been utilized. Data and calculations can be found in Appendix 6.

AT/lak
25108 SWPPP 09-07-06
04-25-08
10-02-08
07-06-09

APPENDIX

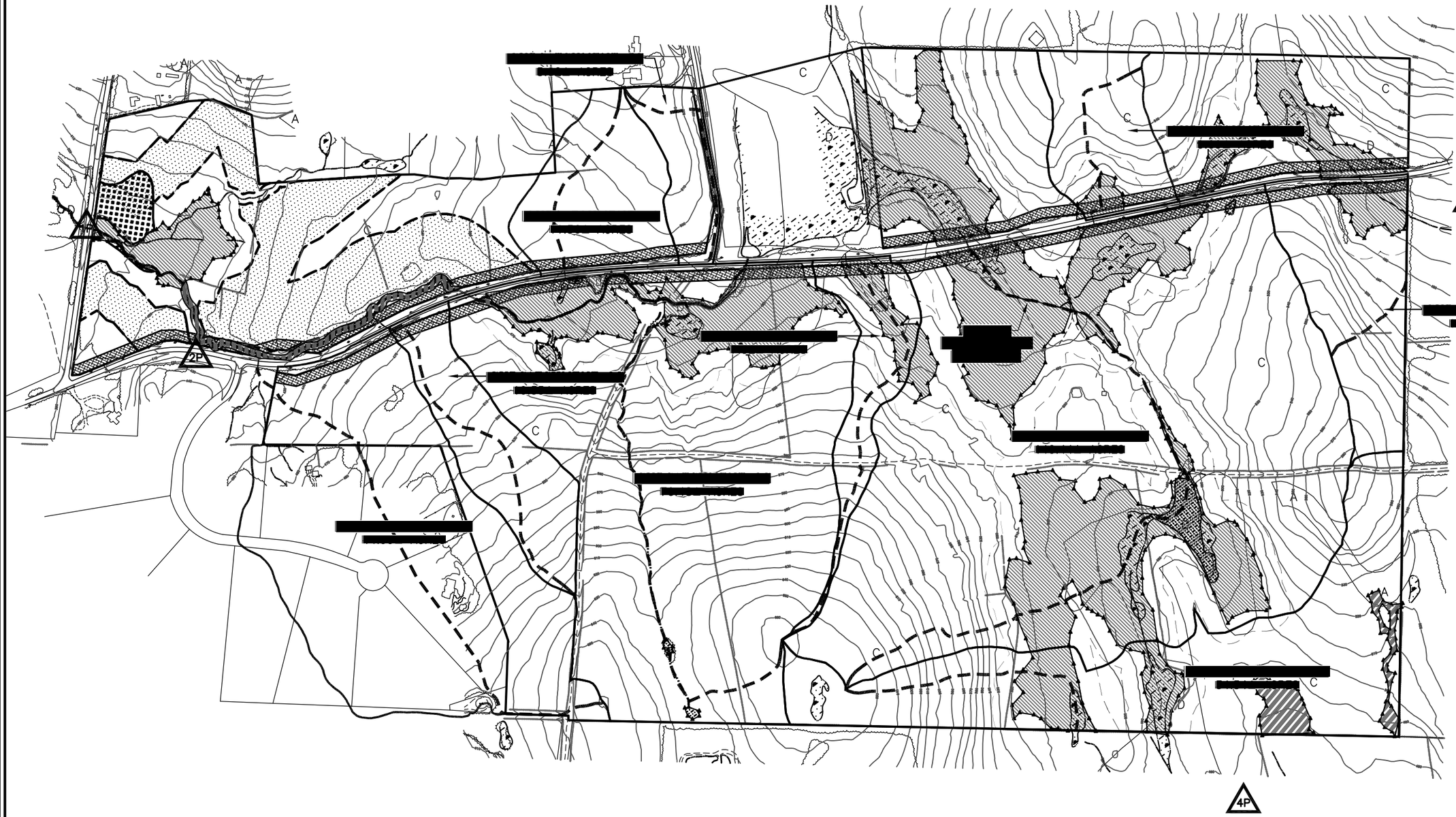
APPENDIX 1

DRAINAGE BASIN MAPS

GRAPHIC SCALE

500 0 250 500 1000 2000

(IN FEET)
1 inch = 500 ft.



07-06-09	ORIGINAL PREPARATION DATE	AT
DATE	DESCRIPTION	INITIALS

REVISIONS

MAP CHECK DATE: 00/00/00 INITIALED BY: --_--

PIETRZAK & PFAU
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P.L.S. LICENSE NO. 050075
N.J.P.L.S. LICENSE NO. 35396

SIGNATURE DATE

PROJECT TITLE

YOUNG'S GROVE

TOWN OF GOSHEN
ORANGE COUNTY, NEW YORK

DRAWING TITLE

DRAINAGE BASIN MAP
EXISTING CONDITIONS

SECTION 9 BLOCK 1 LOT 8.452

UNAUTHORIZED ALTERATION OR ADDITION TO A PLAN BEARING A LICENSED LAND SURVEYOR'S OR PROFESSIONAL ENGINEER'S SEAL IS A VIOLATION OF SECTION 7209, SUBDIVISION 2 OF THE N.Y. STATE EDUCATION LAW.

O.C.H.D. SHEET NO	D.E.C. SHEET NO	DRAWING NUMBER
N/A OF #	N/A OF #	1 OF 2
SCALE	CAD REFERENCE	PROJECT NUMBER
1"=500'	25108DRAINAGE	25108.01

GRAPHIC SCALE

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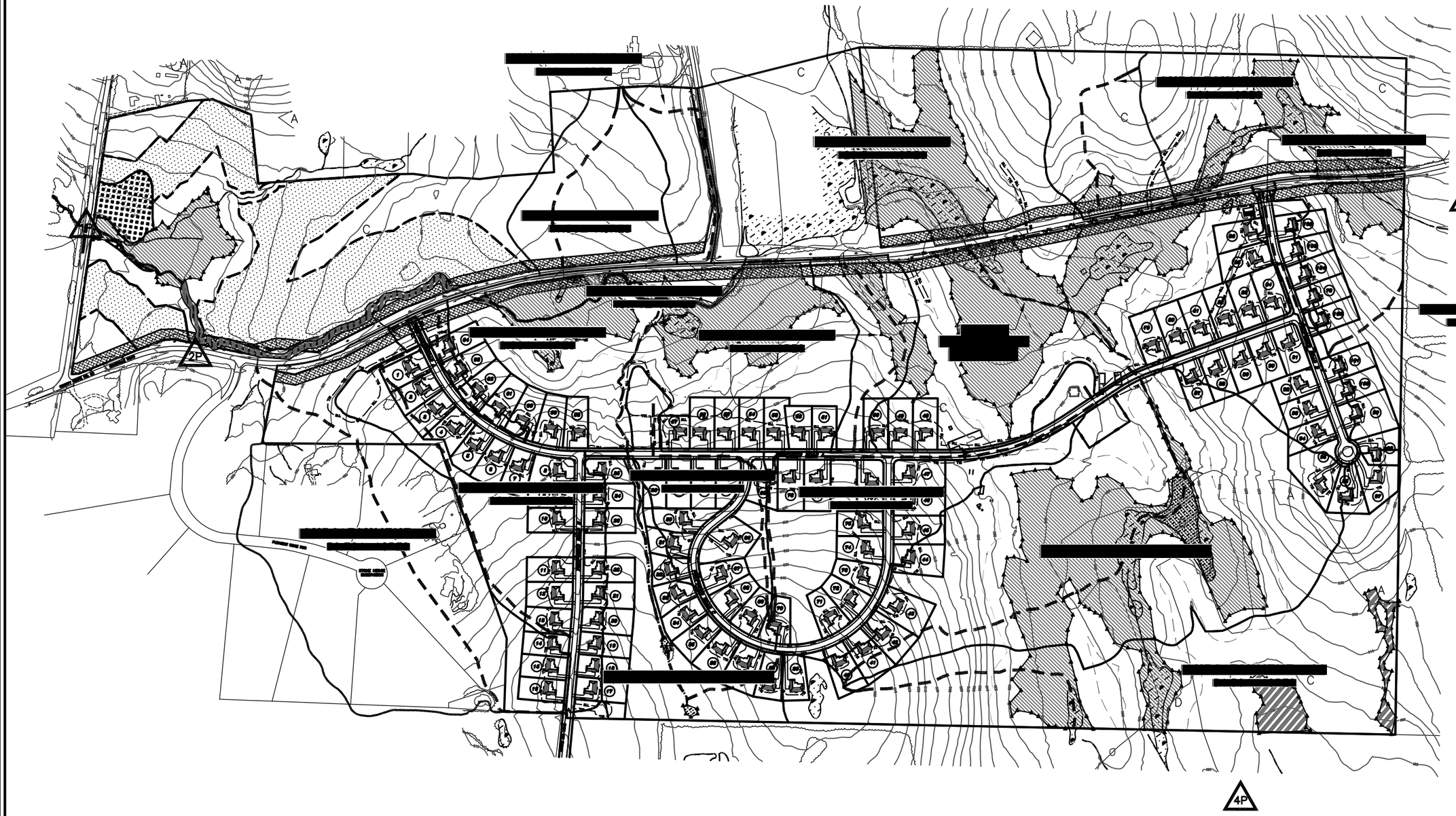
(IN FEET)
1 inch = 500 ft.



DATE	DESCRIPTION	INITIALS
07-06-09	ORIGINAL PREPARATION DATE	AT

REVISIONS

MAP CHECK DATE: 00/00/00 INITIALED BY: -_-

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P.L.S. LICENSE NO. 050075
N.J.P.L.S. LICENSE NO. 35386

SIGNATURE DATE

YOUNG'S GROVE

TOWN OF GOSHEN
ORANGE COUNTY, NEW YORK

PROJECT TITLE

DRAINAGE BASIN MAP PROPOSED CONDITIONS

SECTION 9 BLOCK 1 LOT 8.452

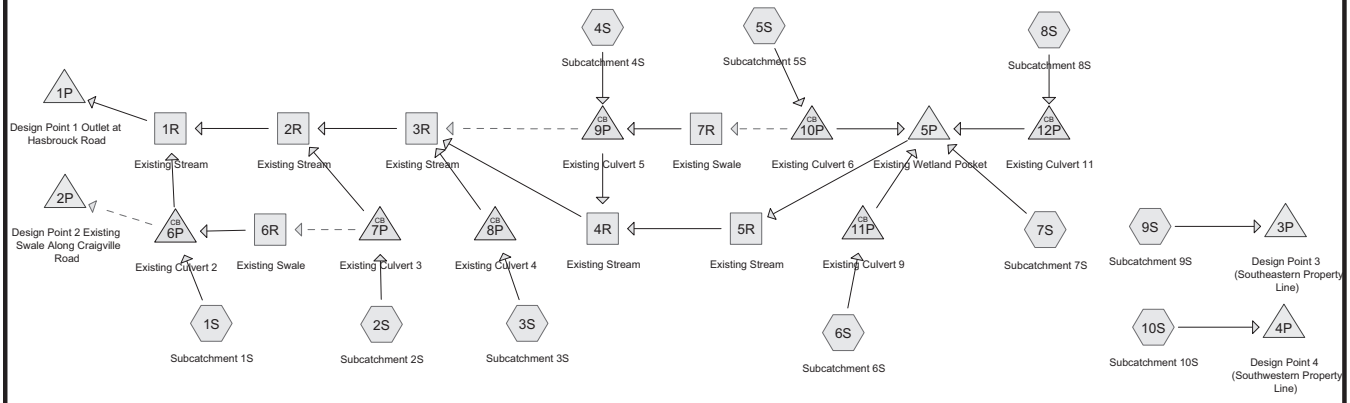
DRAWING TITLE

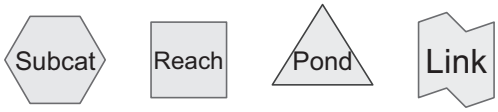
UNAUTHORIZED ALTERATION OR ADDITION TO A PLAN BEARING A LICENSED LAND SURVEYOR'S OR PROFESSIONAL ENGINEER'S SEAL IS A VIOLATION OF SECTION 7209, SUBDIVISION 2 OF THE N.Y. STATE EDUCATION LAW.

O.C.H.D. SHEET NO	D.E.C. SHEET NO	DRAWING NUMBER
N/A OF #	N/A OF #	2 OF 2
SCALE	CAD REFERENCE	PROJECT NUMBER
1"=500'	25108DRAINAGE	25108.01

APPENDIX 2

TR-20 HYDROCAD CALCULATIONS
EXISTING CONDITIONS





Drainage Diagram for Existing Conditions
Prepared by Pietrzak & Pfau, PLLC 7/6/2009
HydroCAD® 7.00 s/n 001436 © 1986-2003 Applied Microcomputer Systems

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

Subcatchment 1S: Subcatchment 1S Runoff Area=44.990 ac Runoff Depth=1.24"
Flow Length=2,651' Tc=39.2 min CN=76 Runoff=34.82 cfs 4.640 af

Subcatchment 2S: Subcatchment 2S Runoff Area=10.350 ac Runoff Depth=1.07"
Flow Length=1,752' Tc=27.2 min CN=73 Runoff=8.03 cfs 0.921 af

Subcatchment 3S: Subcatchment 3S Runoff Area=70.480 ac Runoff Depth=1.11"
Flow Length=4,060' Tc=53.6 min CN=74 Runoff=41.14 cfs 6.527 af

Subcatchment 4S: Subcatchment 4S Runoff Area=11.360 ac Runoff Depth=1.07"
Flow Length=986' Tc=27.1 min CN=73 Runoff=8.83 cfs 1.011 af

Subcatchment 5S: Subcatchment 5S Runoff Area=5.020 ac Runoff Depth=1.12"
Flow Length=1,150' Tc=41.7 min CN=74 Runoff=3.37 cfs 0.467 af

Subcatchment 6S: Subcatchment 6S Runoff Area=7.520 ac Runoff Depth=1.06"
Flow Length=2,174' Tc=37.3 min CN=73 Runoff=5.04 cfs 0.666 af

Subcatchment 7S: Subcatchment 7S Runoff Area=140.440 ac Runoff Depth=1.09"
Flow Length=3,523' Tc=92.9 min CN=74 Runoff=57.80 cfs 12.750 af

Subcatchment 8S: Subcatchment 8S Runoff Area=9.090 ac Runoff Depth=1.07"
Flow Length=952' Tc=25.2 min CN=73 Runoff=7.28 cfs 0.809 af

Subcatchment 9S: Subcatchment 9S Runoff Area=13.930 ac Runoff Depth=1.07"
Flow Length=526' Tc=16.3 min CN=73 Runoff=13.30 cfs 1.245 af

Subcatchment 10S: Subcatchment 10S Runoff Area=34.540 ac Runoff Depth=0.90"
Flow Length=1,359' Tc=34.6 min CN=70 Runoff=19.88 cfs 2.596 af

Reach 1R: Existing Stream Peak Depth=1.39' Max Vel=2.9 fps Inflow=94.05 cfs 27.073 af
n=0.080 L=1,210.0' S=0.0279 '/' Capacity=2,412.63 cfs Outflow=92.27 cfs 26.871 af

Reach 2R: Existing Stream Peak Depth=1.00' Max Vel=3.2 fps Inflow=66.20 cfs 22.518 af
n=0.080 L=609.0' S=0.0361 '/' Capacity=11,130.94 cfs Outflow=66.01 cfs 22.433 af

Reach 3R: Existing Stream Peak Depth=1.03' Max Vel=2.8 fps Inflow=62.61 cfs 21.676 af
n=0.080 L=541.0' S=0.0299 '/' Capacity=9,486.07 cfs Outflow=62.42 cfs 21.597 af

Reach 4R: Existing Stream Peak Depth=0.37' Max Vel=0.7 fps Inflow=32.51 cfs 15.293 af
n=0.080 L=432.0' S=0.0051 '/' Capacity=6,025.46 cfs Outflow=32.47 cfs 15.107 af

Reach 5R: Existing Stream Peak Depth=0.53' Max Vel=0.8 fps Inflow=31.60 cfs 14.716 af
n=0.080 L=1,188.0' S=0.0051 '/' Capacity=5,559.50 cfs Outflow=31.41 cfs 14.325 af

Reach 6R: Existing Swale Peak Depth=0.00' Max Vel=0.0 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=520.0' S=0.0615 '/' Capacity=93.65 cfs Outflow=0.00 cfs 0.000 af

Reach 7R: Existing Swale Peak Depth=0.00' Max Vel=0.0 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=436.0' S=0.0275 '/' Capacity=6,984.86 cfs Outflow=0.00 cfs 0.000 af

Pond 1P: Design Point 1 Outlet at Hasbrouck Road Inflow=92.27 cfs 26.871 af
Primary=92.27 cfs 26.871 af

Pond 2P: Design Point 2 Existing Swale Along Craigville Road Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond 3P: Design Point 3 (Southeastern Property Line) Inflow=13.30 cfs 1.245 af
Primary=13.30 cfs 1.245 af

Pond 4P: Design Point 4 (Southwestern Property Line) Inflow=19.88 cfs 2.596 af
Primary=19.88 cfs 2.596 af

Pond 5P: Existing Wetland Pocket Peak Elev=468.37' Storage=153,179 cf Inflow=62.47 cfs 14.692 af
36.0" x 60.0' Culvert Outflow=31.60 cfs 14.716 af

Pond 6P: Existing Culvert 2 Peak Elev=420.17' Inflow=34.82 cfs 4.640 af
Primary=34.82 cfs 4.640 af Secondary=0.00 cfs 0.000 af Outflow=34.82 cfs 4.640 af

Pond 7P: Existing Culvert 3 Peak Elev=454.49' Inflow=8.03 cfs 0.921 af
Primary=8.03 cfs 0.921 af Secondary=0.00 cfs 0.000 af Outflow=8.03 cfs 0.921 af

Pond 8P: Existing Culvert 4 Peak Elev=460.13' Inflow=41.14 cfs 6.527 af
60.0" x 95.1' Culvert Outflow=41.14 cfs 6.527 af

Pond 9P: Existing Culvert 5 Peak Elev=469.10' Inflow=8.83 cfs 1.011 af
Primary=6.82 cfs 0.968 af Secondary=2.01 cfs 0.042 af Outflow=8.83 cfs 1.011 af

Pond 10P: Existing Culvert 6 Peak Elev=478.51' Inflow=3.37 cfs 0.467 af
Primary=3.37 cfs 0.467 af Secondary=0.00 cfs 0.000 af Outflow=3.37 cfs 0.467 af

Pond 11P: Existing Culvert 9 Peak Elev=473.51' Inflow=5.04 cfs 0.666 af
Outflow=5.04 cfs 0.666 af

Pond 12P: Existing Culvert 11 Peak Elev=483.29' Inflow=7.28 cfs 0.809 af
Outflow=7.28 cfs 0.809 af

Total Runoff Area = 347.720 ac Runoff Volume = 31.632 af Average Runoff Depth = 1.09"

Subcatchment 1S: Subcatchment 1S

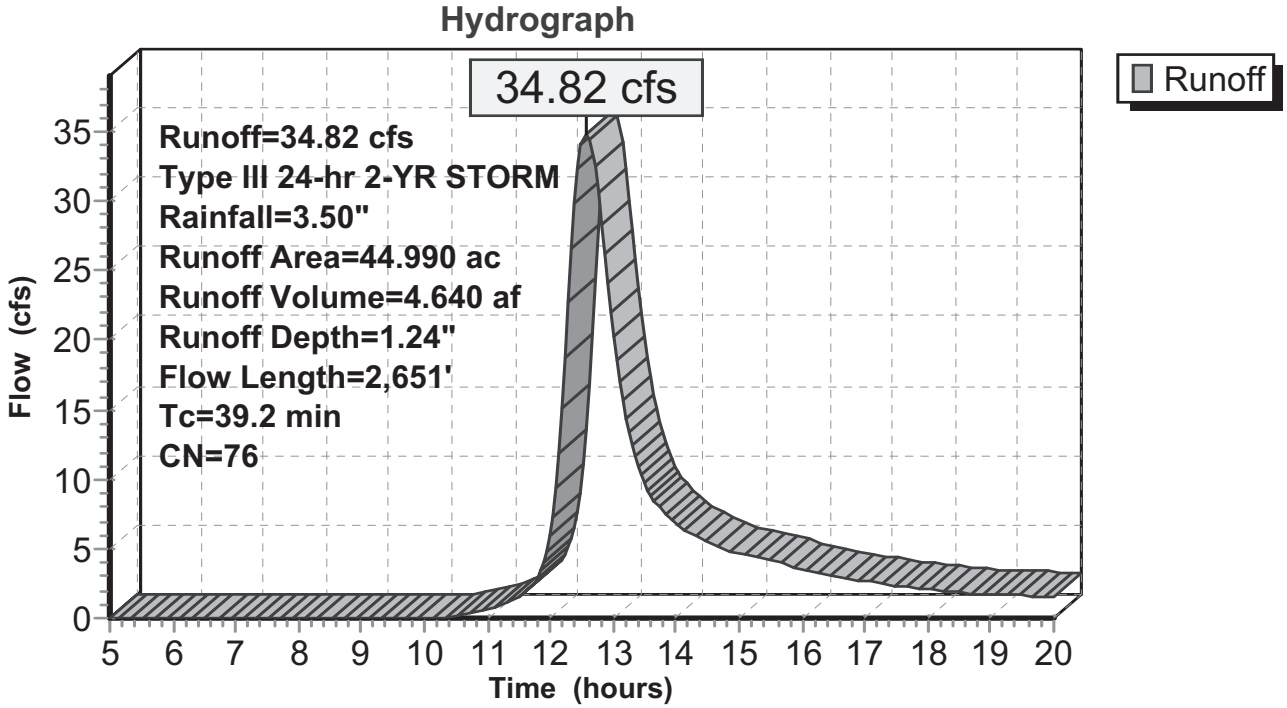
Runoff = 34.82 cfs @ 12.57 hrs, Volume= 4.640 af, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.920	98	Existing pavement
0.310	71	Meadow, non-grazed, HSG C
15.500	79	50-75% Grass cover, Fair, HSG C
28.260	73	Woods, Fair, HSG C
44.990	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0622	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
10.9	947	0.0846	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.5	598	0.1003	2.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.8	1,006	0.0962	1.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
39.2	2,651	Total			

Subcatchment 1S: Subcatchment 1S



Subcatchment 2S: Subcatchment 2S

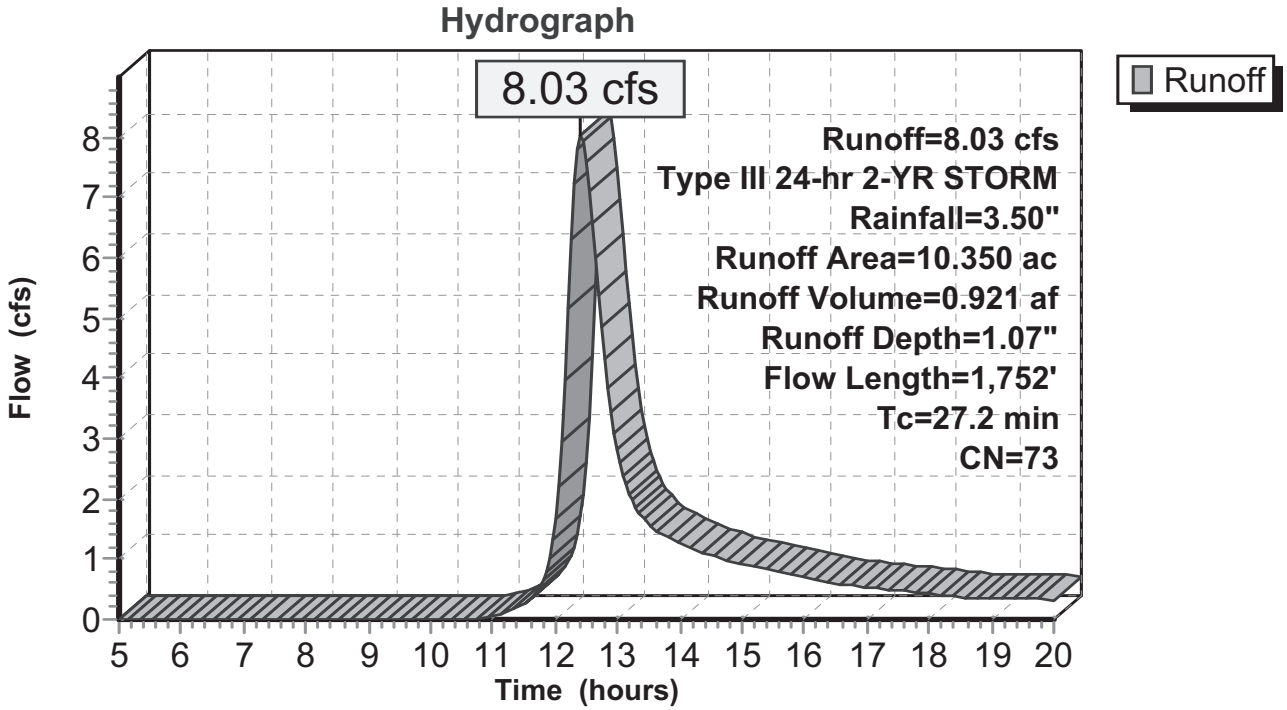
Runoff = 8.03 cfs @ 12.41 hrs, Volume= 0.921 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.080	98	Existing pavement
0.120	71	Meadow, non-grazed, HSG C
10.150	73	Woods, Fair, HSG C
10.350	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.1300	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
17.2	1,589	0.0944	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.3	63	0.0625	3.8		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
27.2	1,752	Total			

Subcatchment 2S: Subcatchment 2S



Subcatchment 3S: Subcatchment 3S

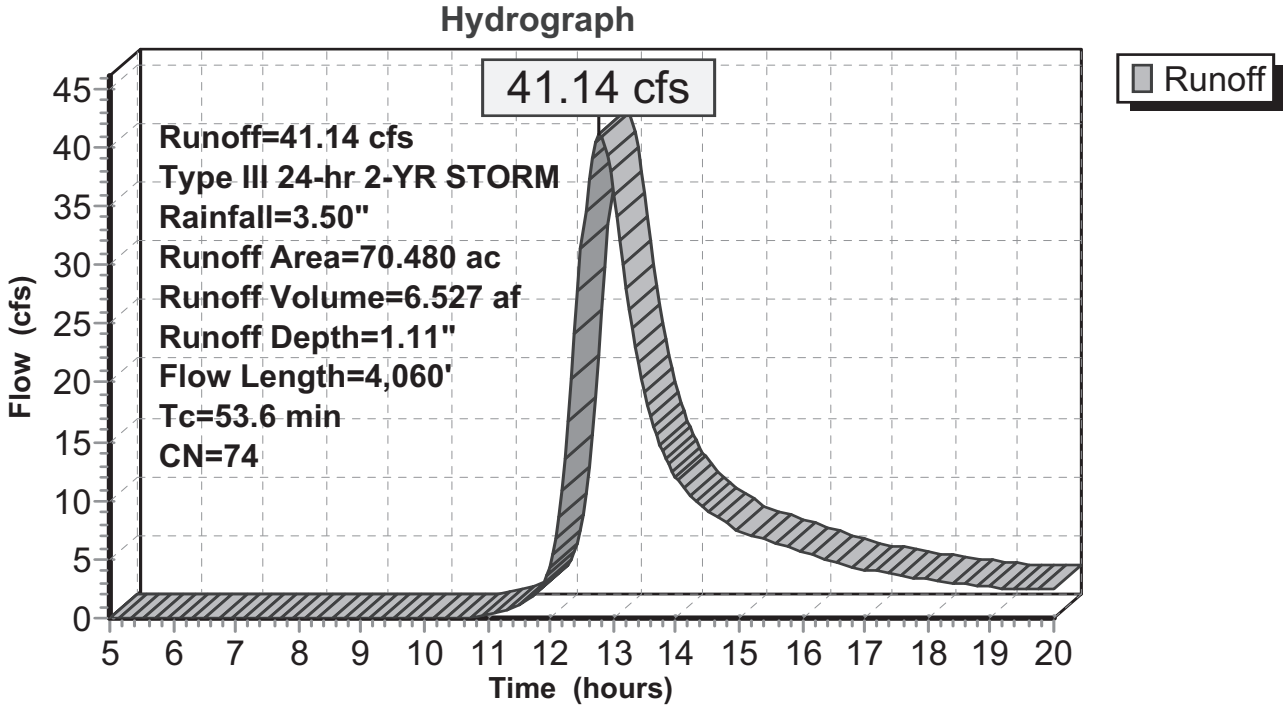
Runoff = 41.14 cfs @ 12.78 hrs, Volume= 6.527 af, Depth= 1.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.450	98	Existing pavement
0.680	71	Meadow, non-grazed, HSG C
0.870	78	Meadow, non-grazed, HSG D
58.440	73	Woods, Fair, HSG C
10.040	79	Woods, Fair, HSG D
70.480	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	100	0.0155	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
14.4	914	0.0445	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.8	1,806	0.0836	3.8	43.28	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=1.50' Z= 5.0 '/' n= 0.091
8.7	1,240	0.0081	2.4	5.22	**Channel Flow,** Area= 2.2 sf Perim= 10.4' r= 0.21' n= 0.020
53.6	4,060	Total			

Subcatchment 3S: Subcatchment 3S



Subcatchment 4S: Subcatchment 4S

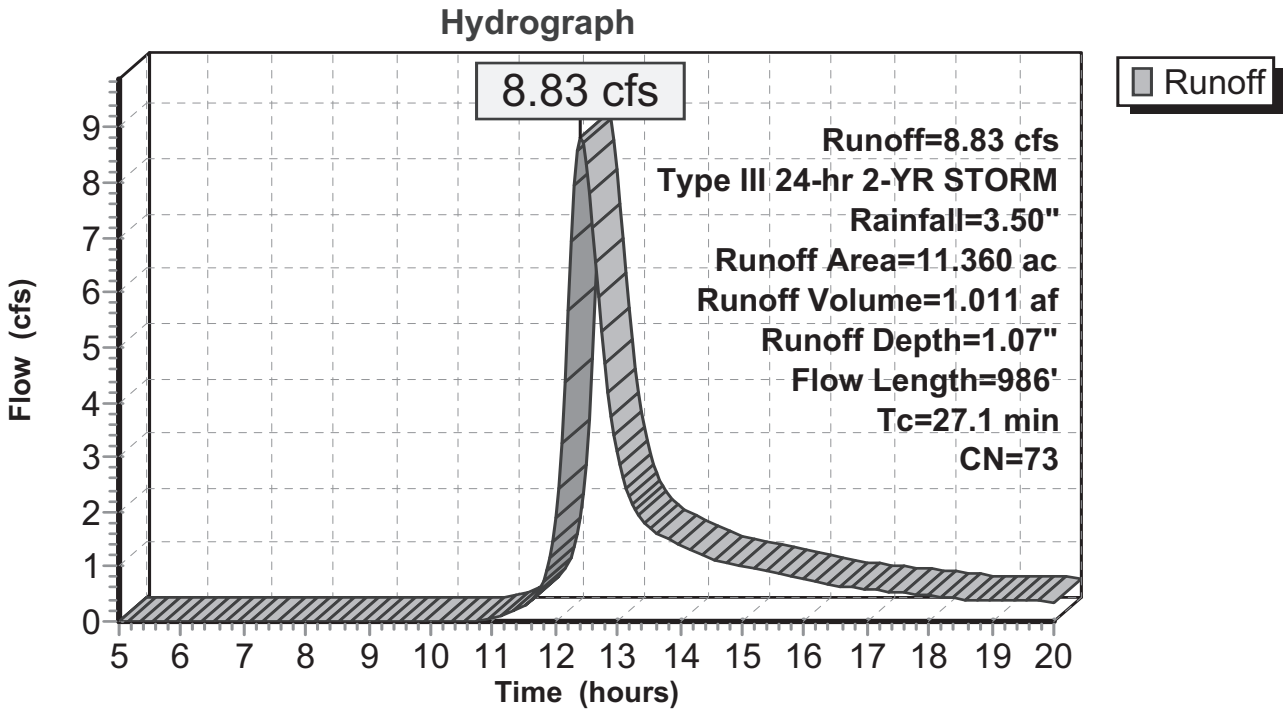
Runoff = 8.83 cfs @ 12.41 hrs, Volume= 1.011 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.170	98	Existing pavement
0.090	71	Meadow, non-grazed, HSG C
0.220	78	Meadow, non-grazed, HSG D
0.050	36	Woods, Fair, HSG A
10.670	73	Woods, Fair, HSG C
0.160	79	Woods, Fair, HSG D
11.360	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0432	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
12.0	886	0.0601	1.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.1	986	Total			

Subcatchment 4S: Subcatchment 4S



Subcatchment 5S: Subcatchment 5S

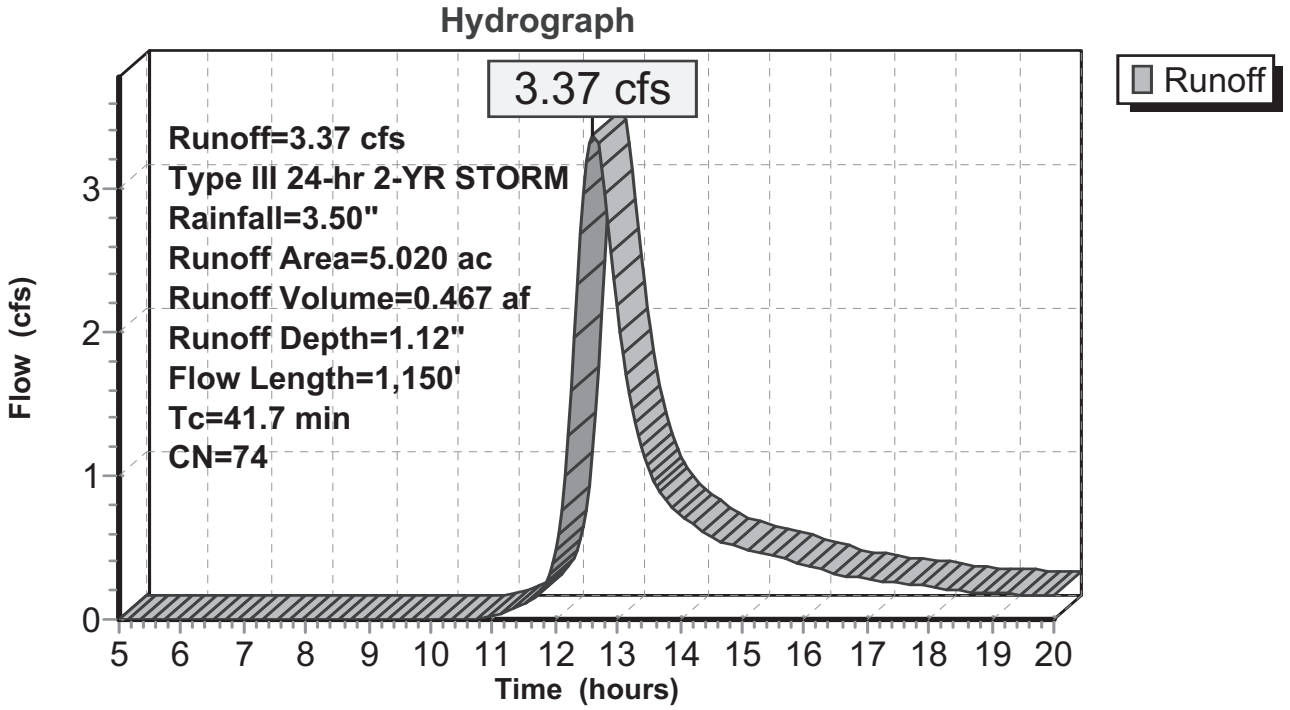
Runoff = 3.37 cfs @ 12.62 hrs, Volume= 0.467 af, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.230	98	Existing pavement
0.380	71	Meadow, non-grazed, HSG C
4.410	73	Woods, Fair, HSG C
5.020	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0457	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.2	175	0.0340	0.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	133	0.2400	2.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.8	742	0.0060	0.5		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
41.7	1,150	Total			

Subcatchment 5S: Subcatchment 5S



Subcatchment 6S: Subcatchment 6S

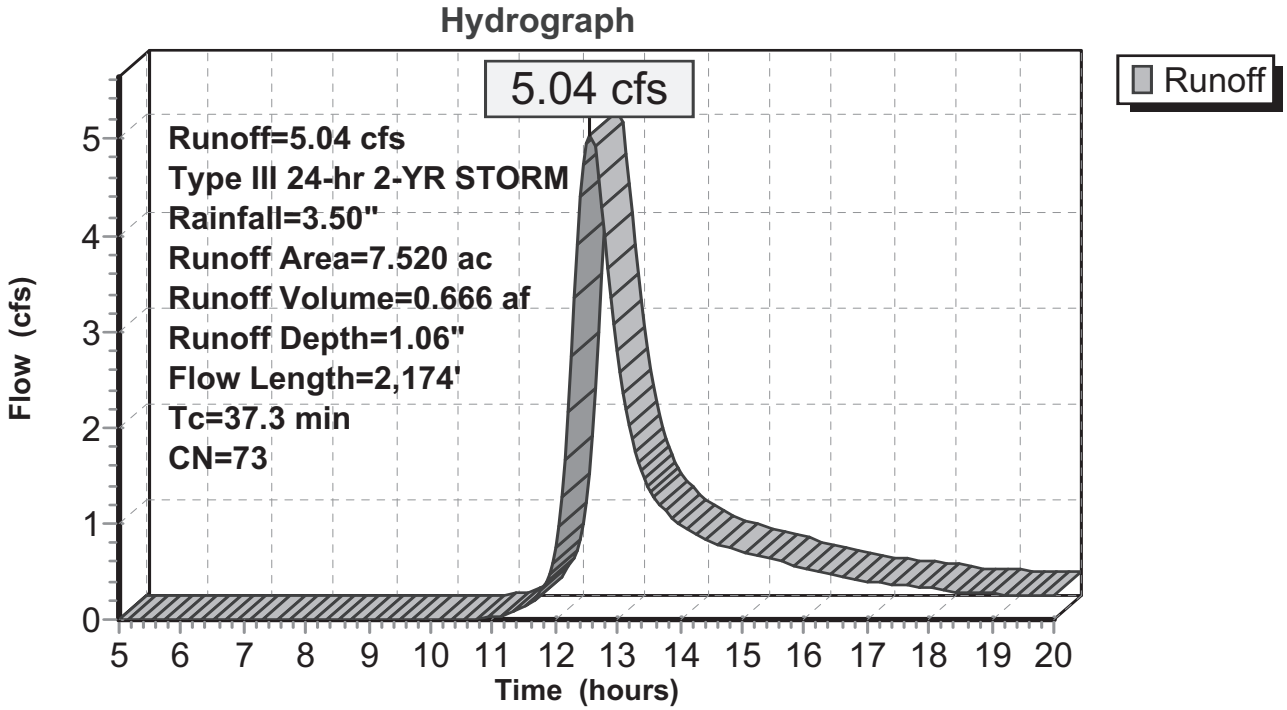
Runoff = 5.04 cfs @ 12.56 hrs, Volume= 0.666 af, Depth= 1.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.090	98	Existing pavement
0.480	71	Meadow, non-grazed, HSG C
0.050	78	Meadow, non-grazed, HSG D
6.600	73	Woods, Fair, HSG C
0.300	79	Woods, Fair, HSG D
7.520	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	100	0.0422	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
11.6	1,268	0.1323	1.8		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	78	0.2051	2.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.3	409	0.0674	1.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.6	319	0.0273	1.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
37.3	2,174	Total			

Subcatchment 6S: Subcatchment 6S



Subcatchment 7S: Subcatchment 7S

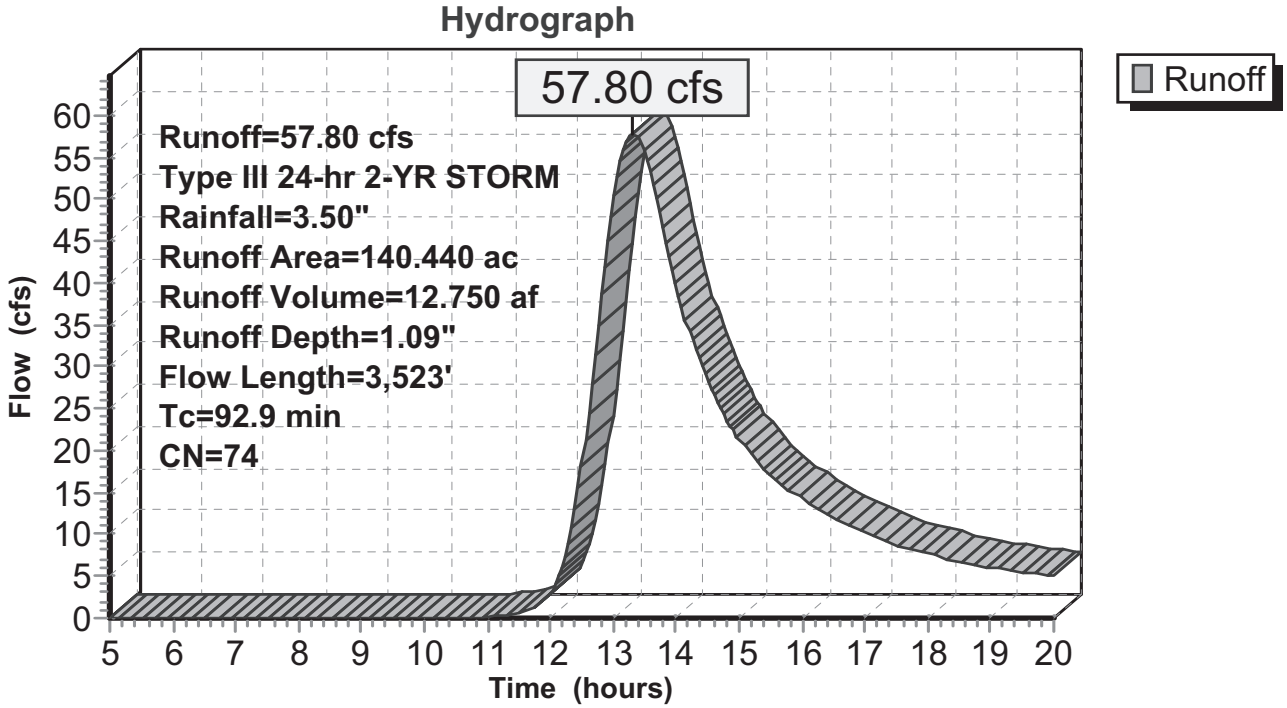
Runoff = 57.80 cfs @ 13.31 hrs, Volume= 12.750 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
1.110	98	Existing pavement
8.010	71	Meadow, non-grazed, HSG C
10.180	78	Meadow, non-grazed, HSG D
0.870	36	Woods, Fair, HSG A
100.000	73	Woods, Fair, HSG C
20.270	79	Woods, Fair, HSG D
140.440	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	100	0.0188	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
19.1	1,761	0.0943	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
52.8	1,662	0.0110	0.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
92.9	3,523	Total			

Subcatchment 7S: Subcatchment 7S



Subcatchment 8S: Subcatchment 8S

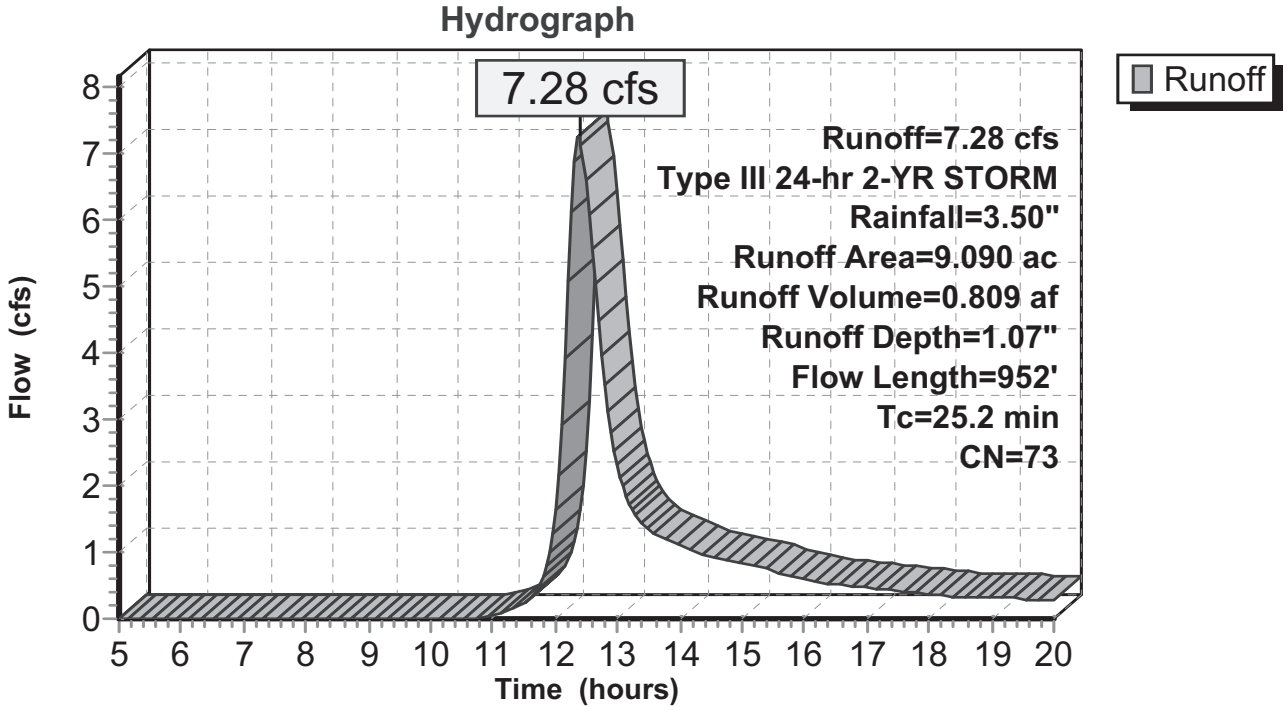
Runoff = 7.28 cfs @ 12.38 hrs, Volume= 0.809 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.120	98	Existing pavement
0.240	71	Meadow, non-grazed, HSG C
8.730	73	Woods, Fair, HSG C
9.090	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0435	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
10.2	852	0.0780	1.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
25.2	952	Total			

Subcatchment 8S: Subcatchment 8S



Subcatchment 9S: Subcatchment 9S

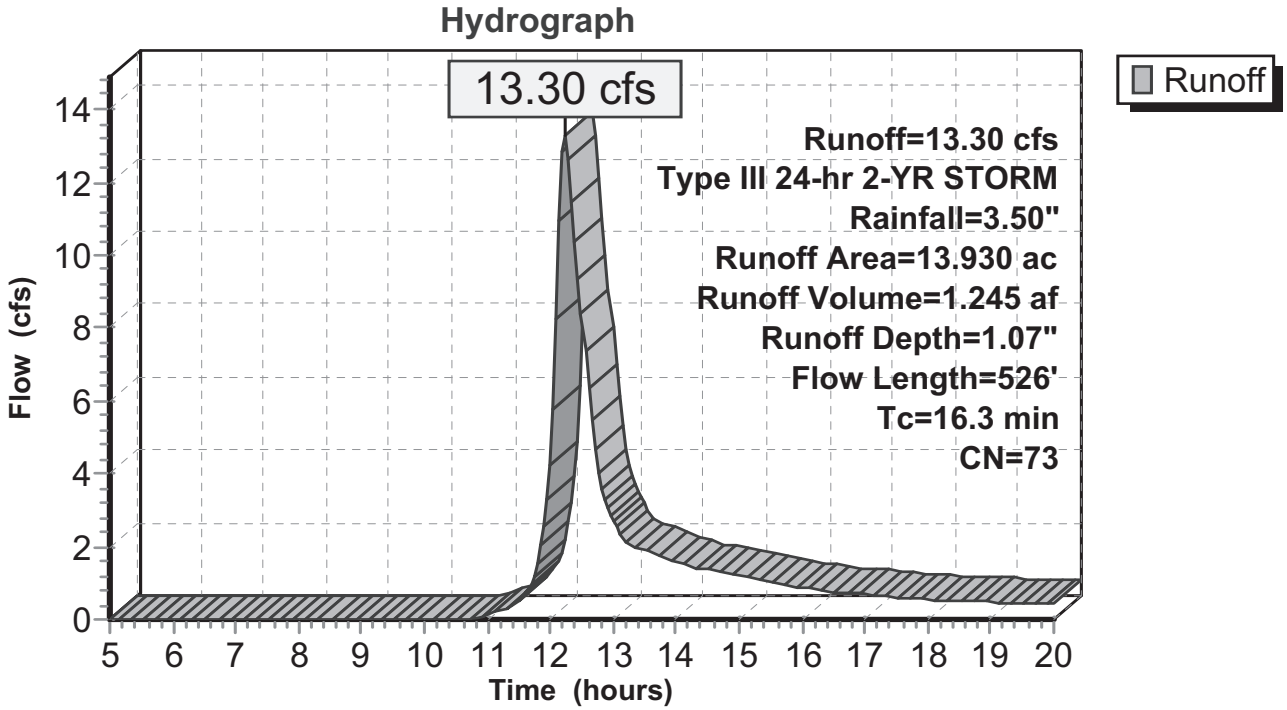
Runoff = 13.30 cfs @ 12.24 hrs, Volume= 1.245 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.180	98	Existing pavement
0.260	71	Meadow, non-grazed, HSG C
0.040	78	Meadow, non-grazed, HSG D
13.160	73	Woods, Fair, HSG C
0.290	79	Woods, Fair, HSG D
13.930	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0660	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.6	426	0.1575	2.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.3	526	Total			

Subcatchment 9S: Subcatchment 9S



Subcatchment 10S: Subcatchment 10S

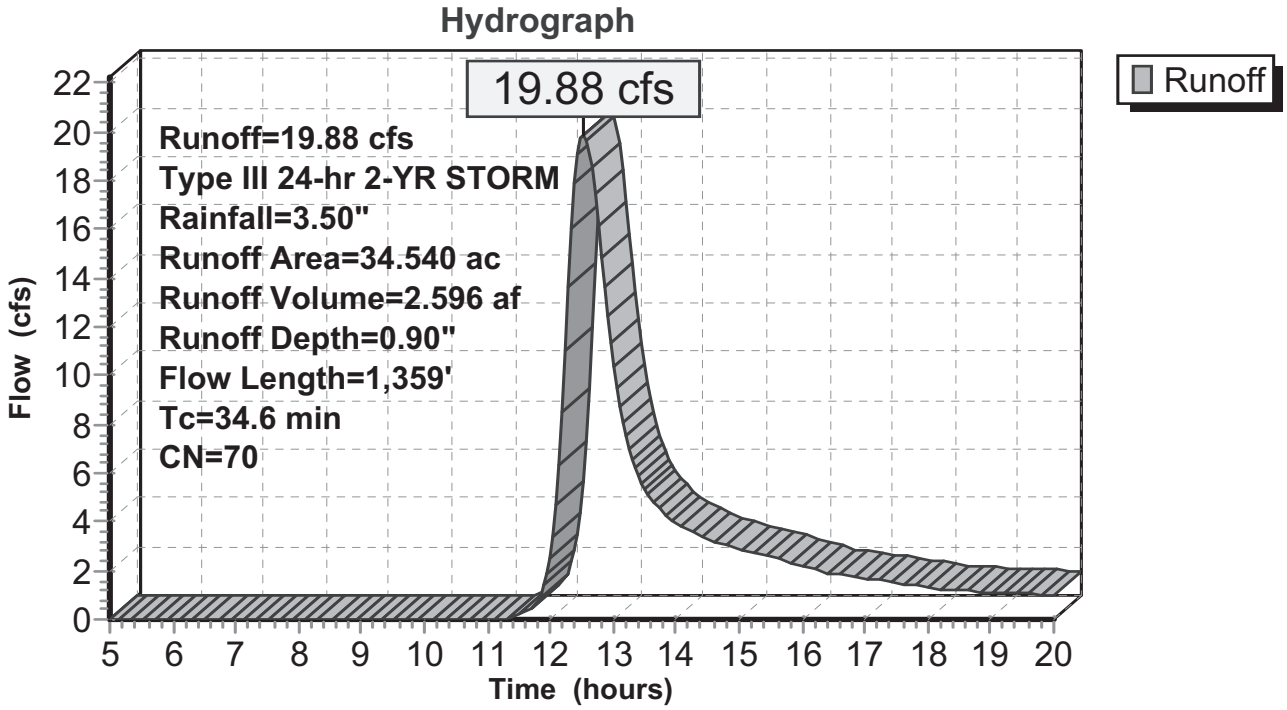
Runoff = 19.88 cfs @ 12.53 hrs, Volume= 2.596 af, Depth= 0.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
1.090	36	Woods, Fair, HSG A
31.250	70	Woods, Good, HSG C
2.200	79	Woods, Fair, HSG D
34.540	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0252	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	528	0.1545	2.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.8	133	0.3459	2.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.6	598	0.0356	0.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.6	1,359	Total			

Subcatchment 10S: Subcatchment 10S



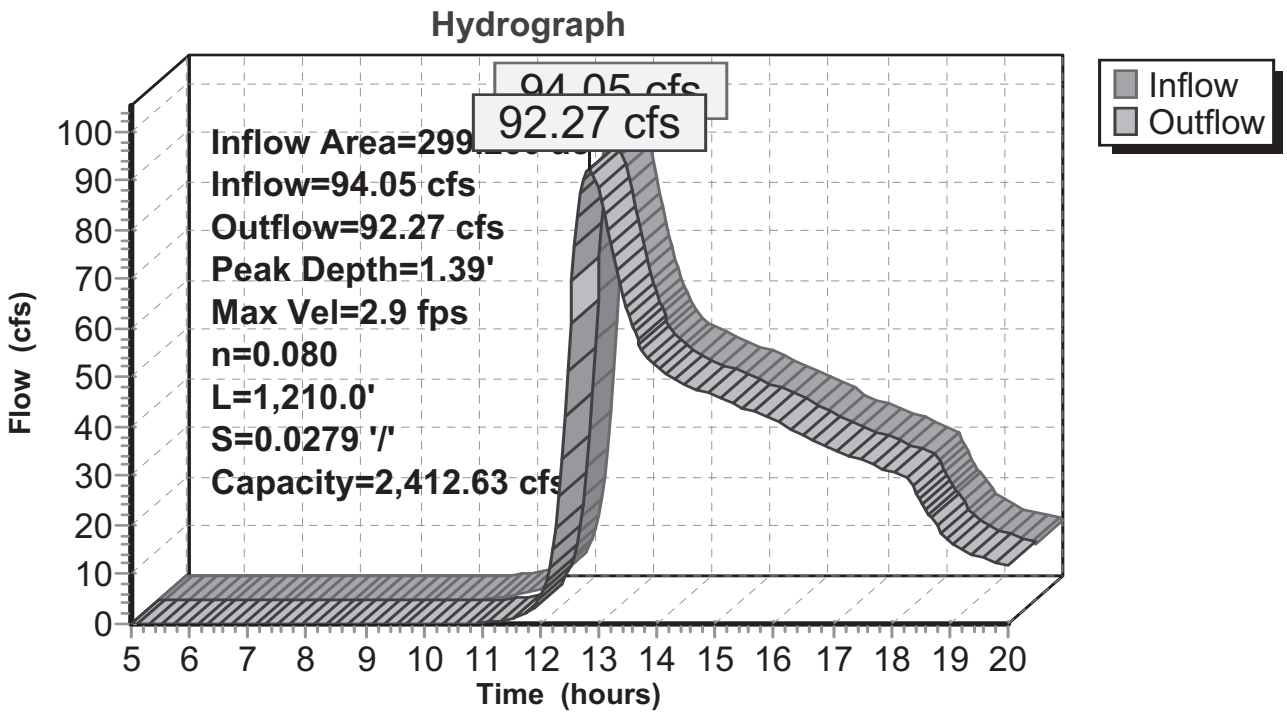
Reach 1R: Existing Stream

Inflow Area = 299.250 ac, Inflow Depth = 1.09" for 2-YR STORM event
Inflow = 94.05 cfs @ 12.75 hrs, Volume= 27.073 af
Outflow = 92.27 cfs @ 12.85 hrs, Volume= 26.871 af, Atten= 2%, Lag= 6.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.9 fps, Min. Travel Time= 7.0 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 10.5 min

Peak Depth= 1.39' @ 12.85 hrs
Capacity at bank full= 2,412.63 cfs
Inlet Invert= 416.82', Outlet Invert= 383.06'
10.50' x 5.80' deep channel, n= 0.080 Length= 1,210.0' Slope= 0.0279 '/'
Side Slope Z-value= 9.4 8.5 '/'

Reach 1R: Existing Stream



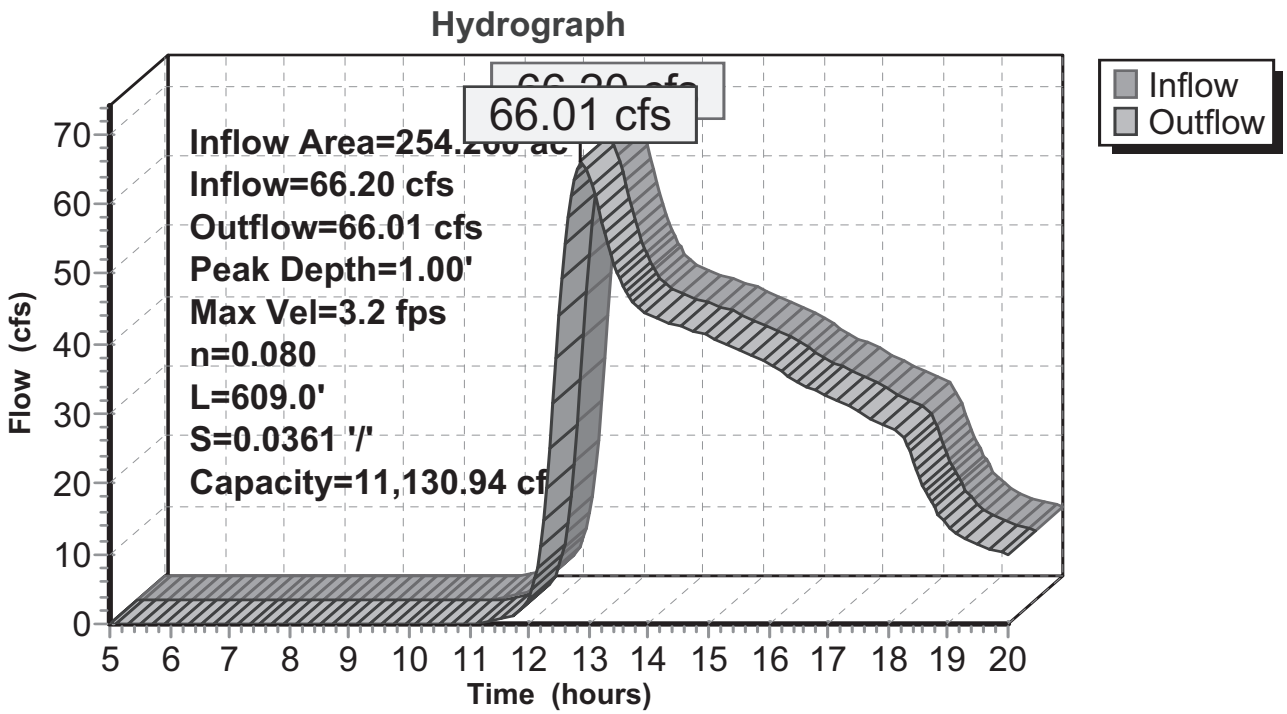
Reach 2R: Existing Stream

Inflow Area = 254.260 ac, Inflow Depth = 1.06" for 2-YR STORM event
Inflow = 66.20 cfs @ 12.84 hrs, Volume= 22.518 af
Outflow = 66.01 cfs @ 12.88 hrs, Volume= 22.433 af, Atten= 0%, Lag= 2.2 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.2 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 2.2 fps, Avg. Travel Time= 4.5 min

Peak Depth= 1.00' @ 12.88 hrs
Capacity at bank full= 11,130.94 cfs
Inlet Invert= 440.00', Outlet Invert= 418.00'
18.00' x 14.50' deep channel, n= 0.080 Length= 609.0' Slope= 0.0361 '/'
Side Slope Z-value= 2.7 2.2 '/'

Reach 2R: Existing Stream



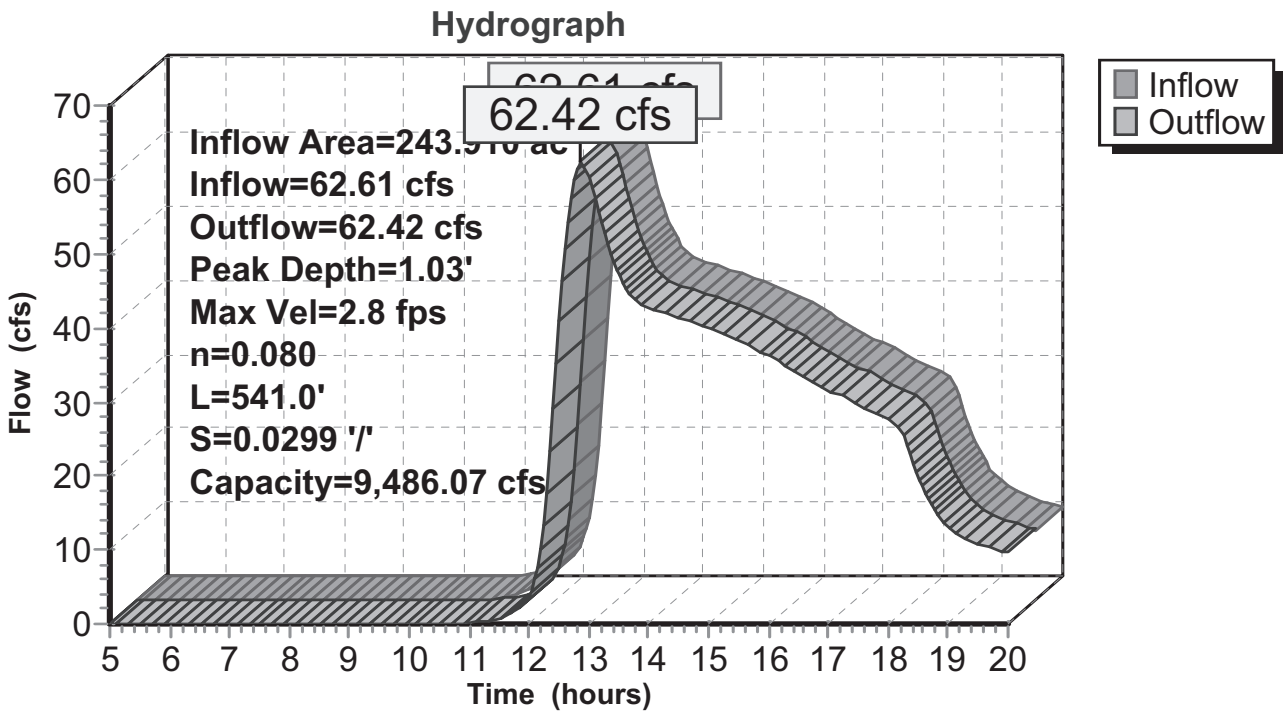
Reach 3R: Existing Stream

Inflow Area = 243.910 ac, Inflow Depth = 1.07" for 2-YR STORM event
Inflow = 62.61 cfs @ 12.83 hrs, Volume= 21.676 af
Outflow = 62.42 cfs @ 12.87 hrs, Volume= 21.597 af, Atten= 0%, Lag= 2.6 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.8 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 4.6 min

Peak Depth= 1.03' @ 12.87 hrs
Capacity at bank full= 9,486.07 cfs
Inlet Invert= 456.17', Outlet Invert= 440.00'
15.50' x 10.82' deep channel, n= 0.080 Length= 541.0' Slope= 0.0299 '/'
Side Slope Z-value= 7.3 5.3 '/'

Reach 3R: Existing Stream



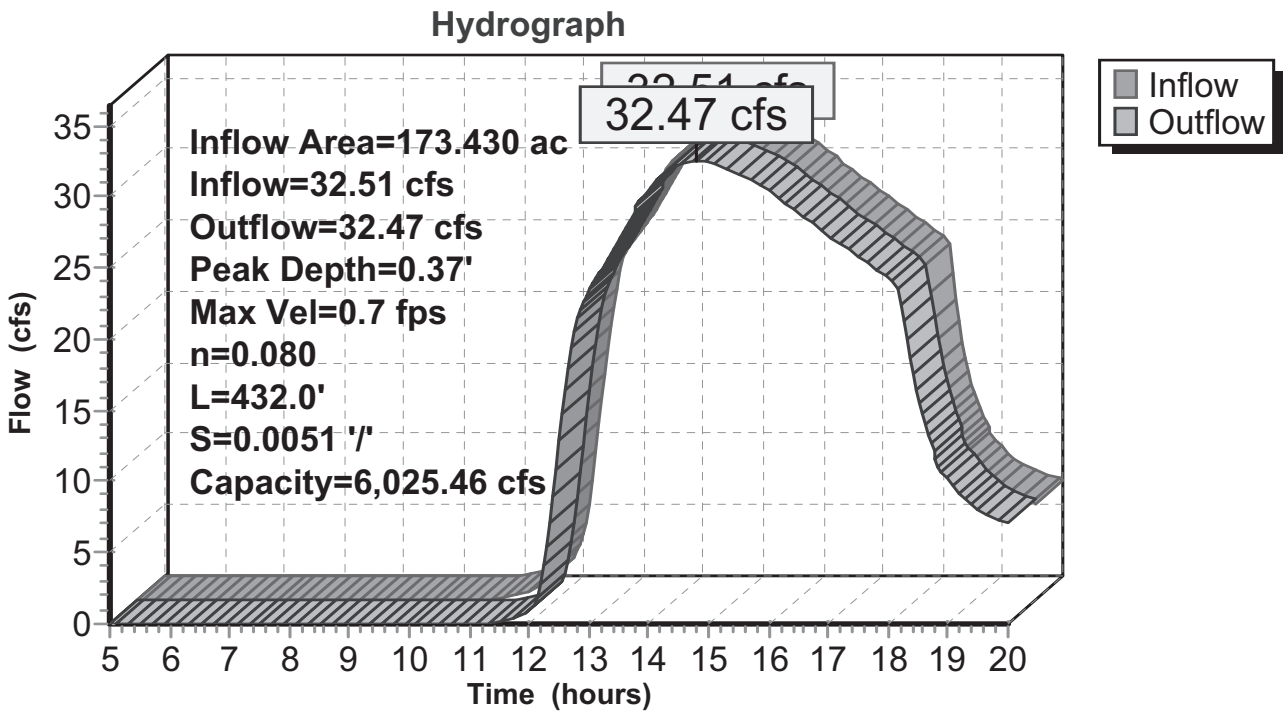
Reach 4R: Existing Stream

Inflow Area = 173.430 ac, Inflow Depth = 1.06" for 2-YR STORM event
Inflow = 32.51 cfs @ 14.70 hrs, Volume= 15.293 af
Outflow = 32.47 cfs @ 14.82 hrs, Volume= 15.107 af, Atten= 0%, Lag= 7.4 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.7 fps, Min. Travel Time= 10.9 min
Avg. Velocity = 0.5 fps, Avg. Travel Time= 14.1 min

Peak Depth= 0.37' @ 14.82 hrs
Capacity at bank full= 6,025.46 cfs
Inlet Invert= 460.18', Outlet Invert= 457.96'
124.00' x 6.50' deep channel, n= 0.080 Length= 432.0' Slope= 0.0051 '/'
Side Slope Z-value= 10.4 33.3 '/'

Reach 4R: Existing Stream



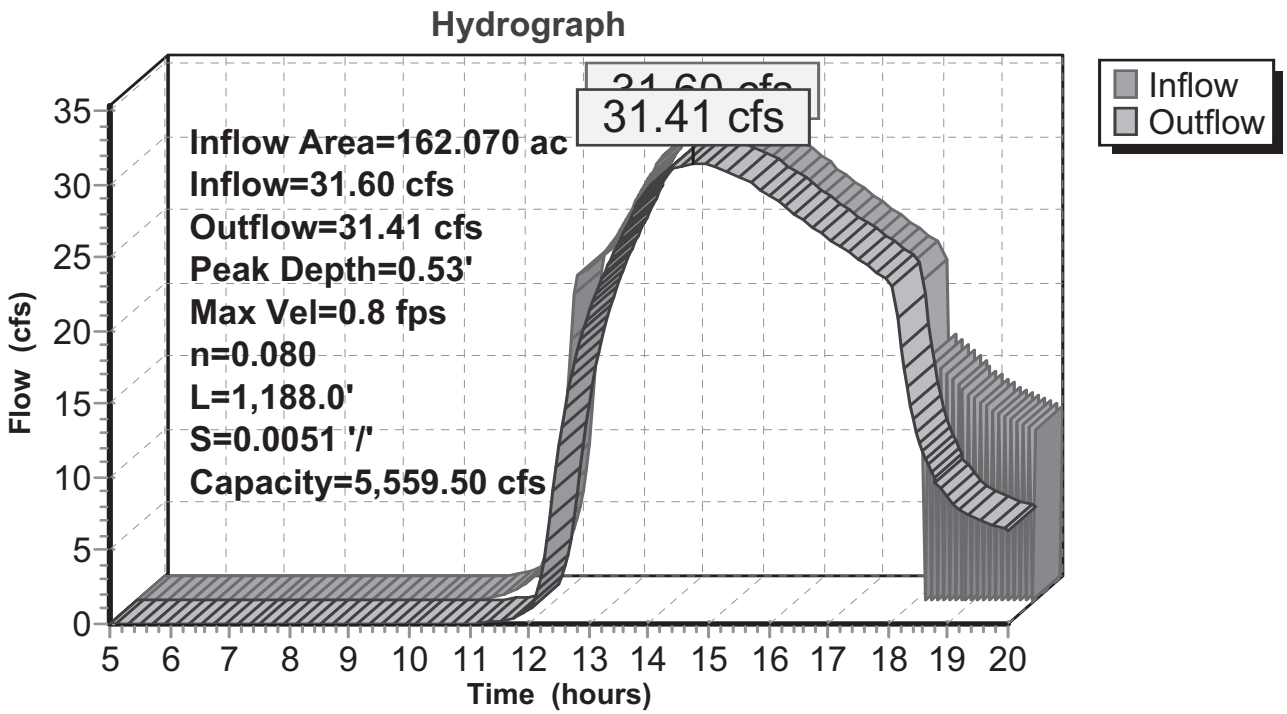
Reach 5R: Existing Stream

Inflow Area = 162.070 ac, Inflow Depth = 1.09" for 2-YR STORM event
Inflow = 31.60 cfs @ 14.44 hrs, Volume= 14.716 af
Outflow = 31.41 cfs @ 14.75 hrs, Volume= 14.325 af, Atten= 1%, Lag= 18.8 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.8 fps, Min. Travel Time= 24.3 min
Avg. Velocity = 0.6 fps, Avg. Travel Time= 32.1 min

Peak Depth= 0.53' @ 14.75 hrs
Capacity at bank full= 5,559.50 cfs
Inlet Invert= 466.24', Outlet Invert= 460.18'
64.50' x 8.00' deep channel, n= 0.080 Length= 1,188.0' Slope= 0.0051 '/'
Side Slope Z-value= 18.9 10.7 '/'

Reach 5R: Existing Stream



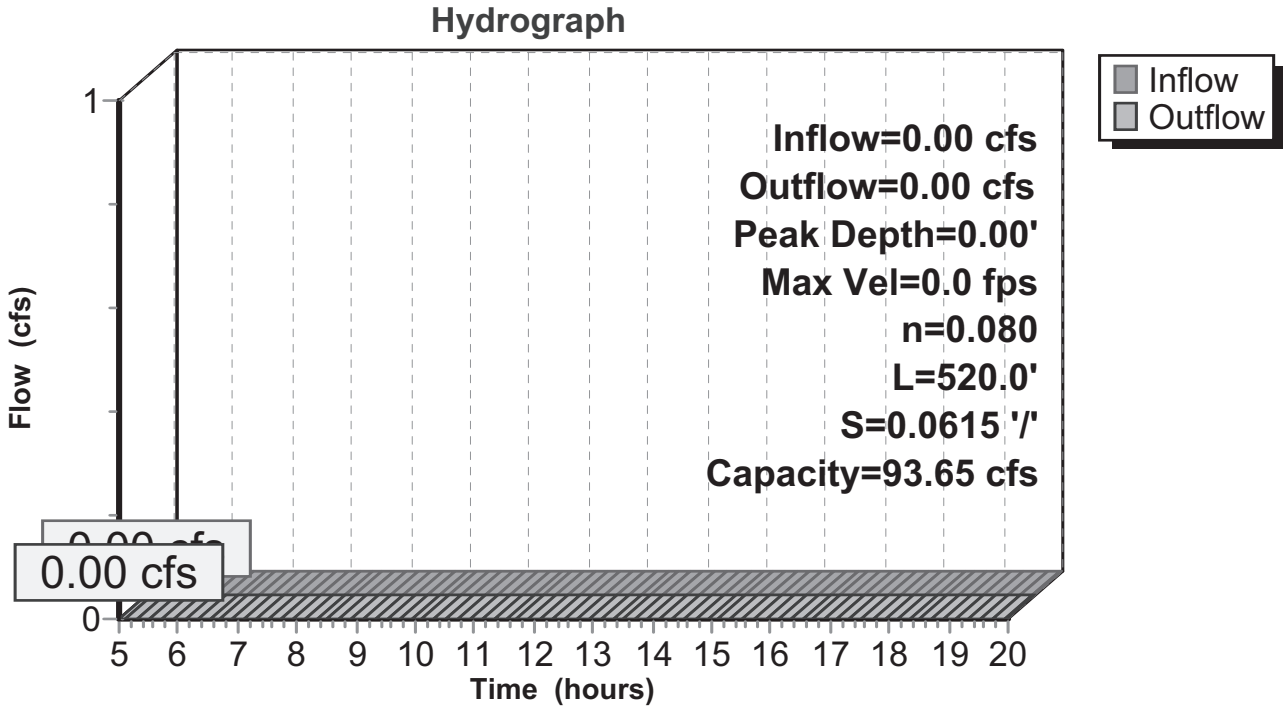
Reach 6R: Existing Swale

Inflow	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.0 fps, Avg. Travel Time= 0.0 min

Peak Depth= 0.00' @ 5.00 hrs
Capacity at bank full= 93.65 cfs
Inlet Invert= 454.00', Outlet Invert= 422.00'
0.00' x 2.00' deep channel, n= 0.080 Length= 520.0' Slope= 0.0615 '/'
Side Slope Z-value= 3.6 6.7 '/'

Reach 6R: Existing Swale



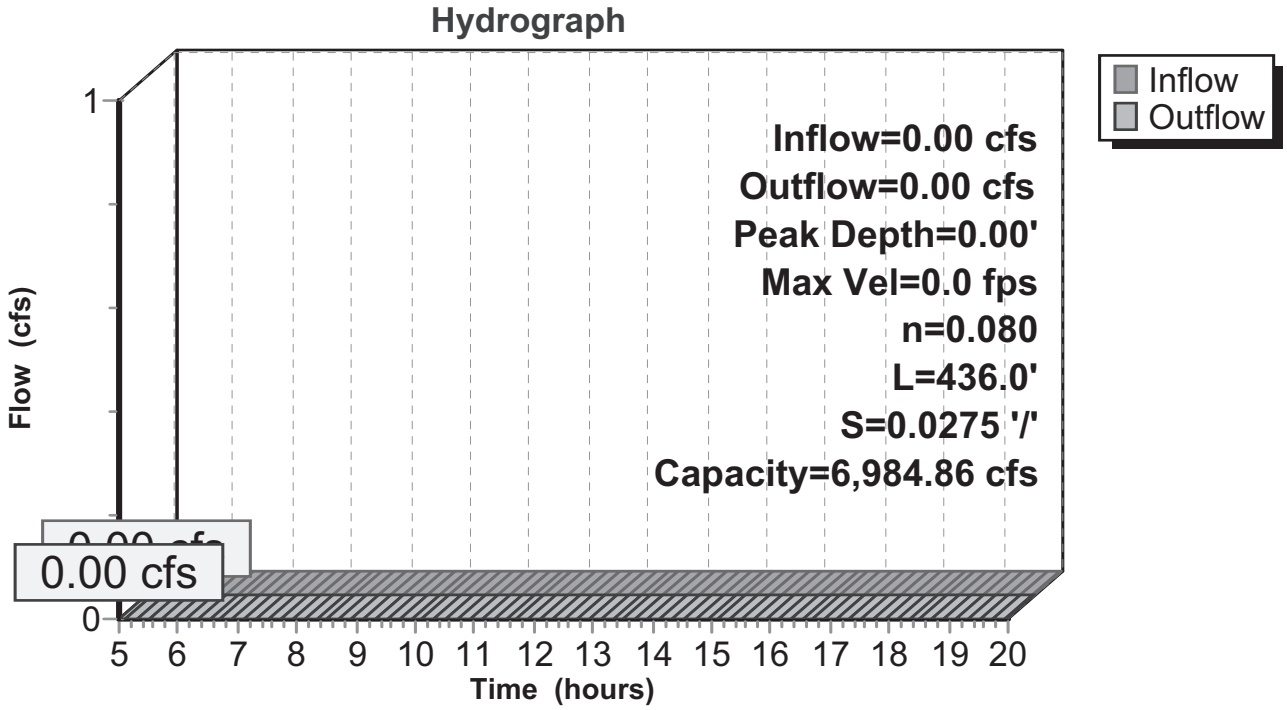
Reach 7R: Existing Swale

Inflow	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.0 fps, Avg. Travel Time= 0.0 min

Peak Depth= 0.00' @ 5.00 hrs
Capacity at bank full= 6,984.86 cfs
Inlet Invert= 480.00', Outlet Invert= 468.00'
0.00' x 11.90' deep channel, n= 0.080 Length= 436.0' Slope= 0.0275 '/'
Side Slope Z-value= 6.8 3.1 '/'

Reach 7R: Existing Swale

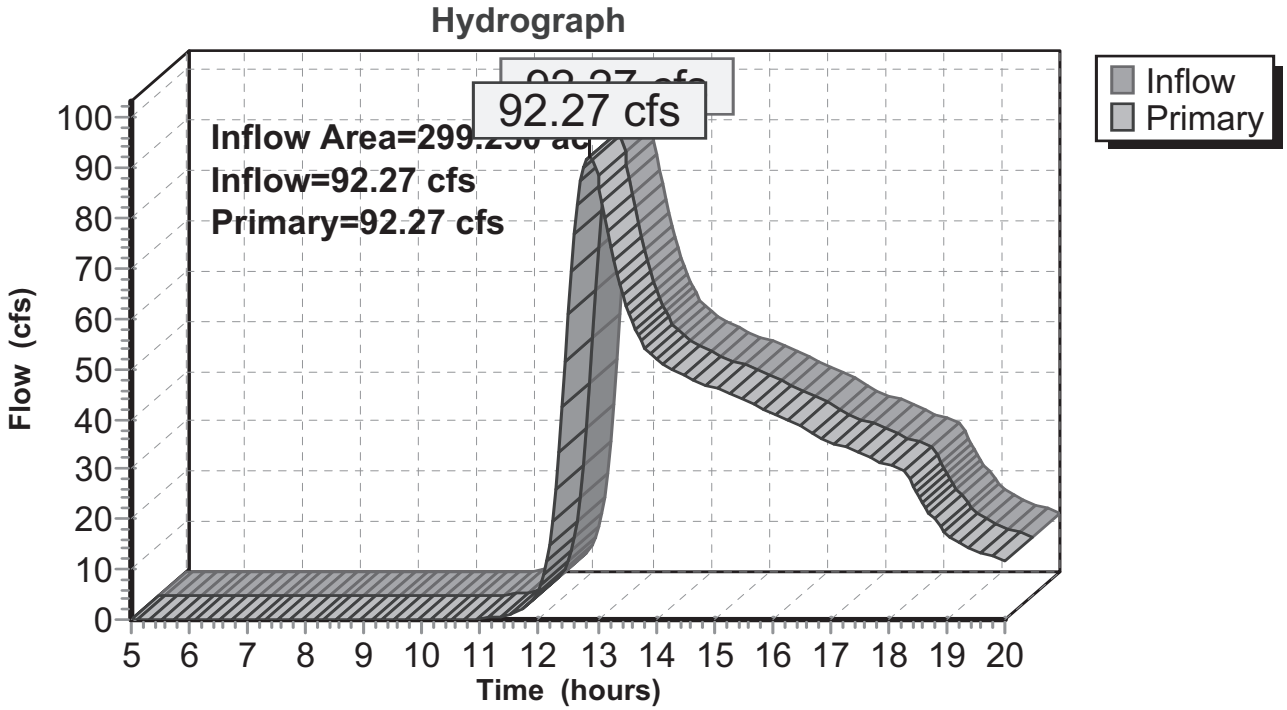


Pond 1P: Design Point 1 Outlet at Hasbrouck Road

Inflow Area = 299.250 ac, Inflow Depth = 1.08" for 2-YR STORM event
Inflow = 92.27 cfs @ 12.85 hrs, Volume= 26.871 af
Primary = 92.27 cfs @ 12.85 hrs, Volume= 26.871 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1 Outlet at Hasbrouck Road

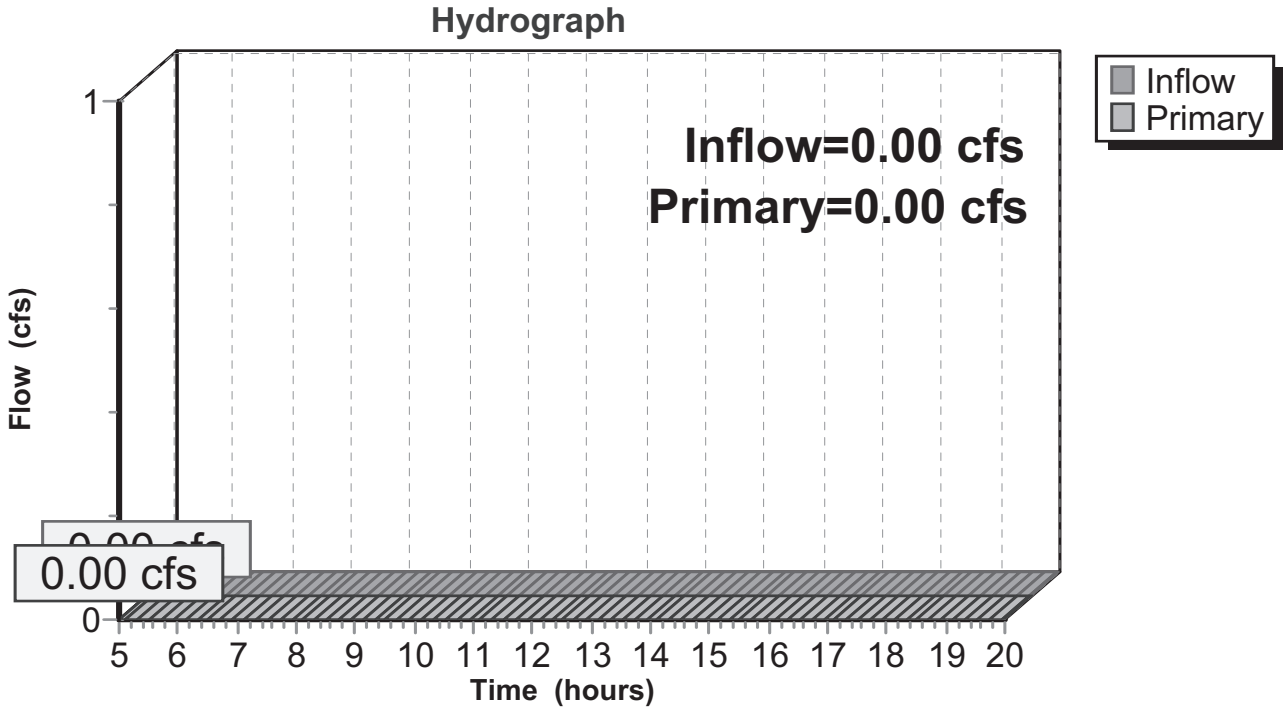


Pond 2P: Design Point 2 Existing Swale Along Craigville Road

Inflow	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af
Primary	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 2P: Design Point 2 Existing Swale Along Craigville Road

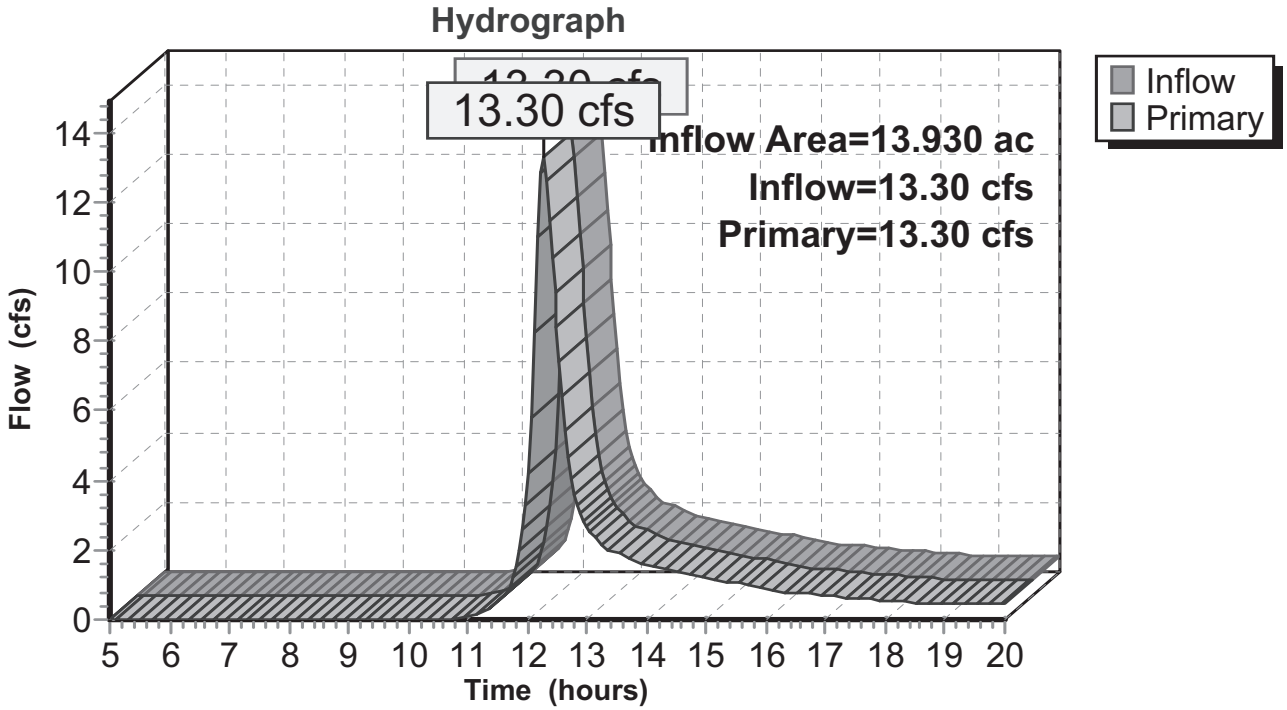


Pond 3P: Design Point 3 (Southeastern Property Line)

Inflow Area = 13.930 ac, Inflow Depth = 1.07" for 2-YR STORM event
Inflow = 13.30 cfs @ 12.24 hrs, Volume= 1.245 af
Primary = 13.30 cfs @ 12.24 hrs, Volume= 1.245 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 3P: Design Point 3 (Southeastern Property Line)

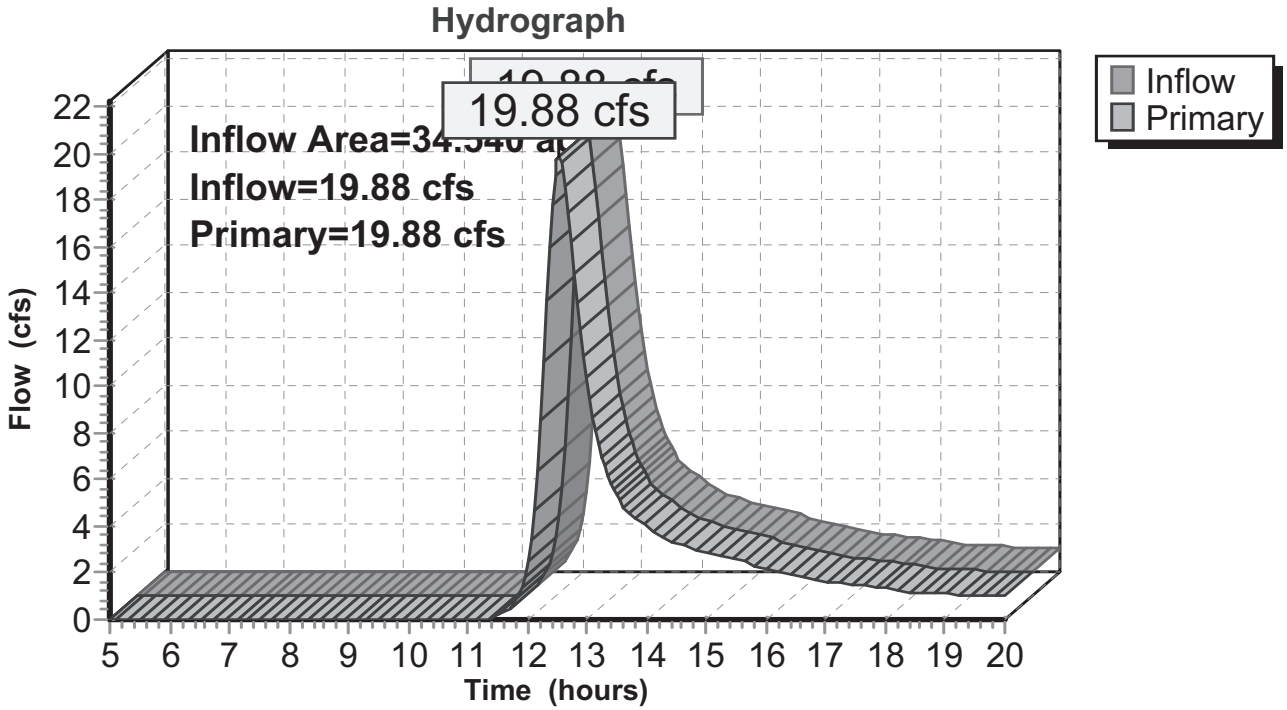


Pond 4P: Design Point 4 (Southwestern Property Line)

Inflow Area = 34.540 ac, Inflow Depth = 0.90" for 2-YR STORM event
Inflow = 19.88 cfs @ 12.53 hrs, Volume= 2.596 af
Primary = 19.88 cfs @ 12.53 hrs, Volume= 2.596 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 4P: Design Point 4 (Southwestern Property Line)



Pond 5P: Existing Wetland Pocket

Inflow Area = 162.070 ac, Inflow Depth = 1.09" for 2-YR STORM event
Inflow = 62.47 cfs @ 13.29 hrs, Volume= 14.692 af
Outflow = 31.60 cfs @ 14.44 hrs, Volume= 14.716 af, Atten= 49%, Lag= 69.2 min
Primary = 31.60 cfs @ 14.44 hrs, Volume= 14.716 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 468.37' @ 14.44 hrs Surf.Area= 0 sf Storage= 153,179 cf
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

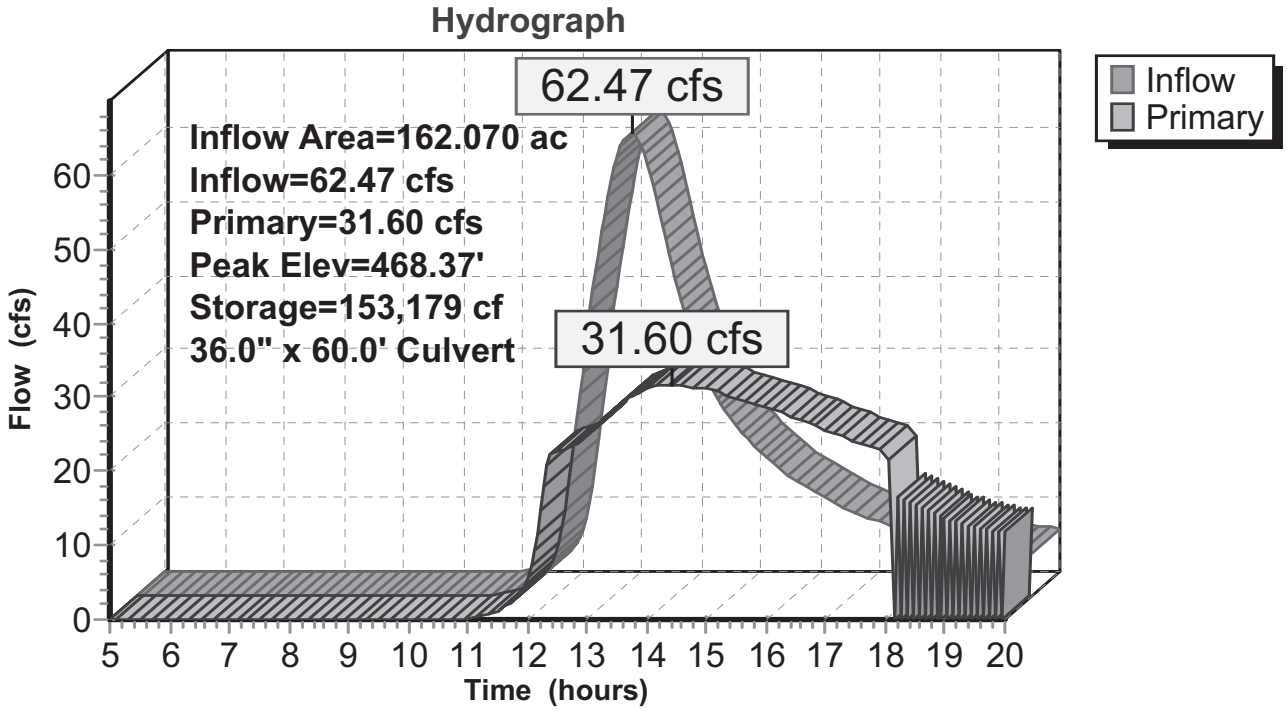
#	Invert	Avail.Storage	Storage Description
1	468.00'	4,153,277 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
468.00	0
470.00	838,050
472.00	2,316,286
474.00	4,153,277

#	Routing	Invert	Outlet Devices
1	Primary	466.24'	**36.0" x 60.0' long Culvert X 2.00** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 466.24' S= 0.0000 '/' n= 0.011 Cc= 0.900

Primary OutFlow Max=31.60 cfs @ 14.44 hrs HW=468.37' TW=466.77' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 31.60 cfs @ 4.1 fps)

Pond 5P: Existing Wetland Pocket



Pond 6P: Existing Culvert 2

Inflow Area =	44.990 ac,	Inflow Depth =	1.24"	for	2-YR STORM event
Inflow =	34.82 cfs @	12.57 hrs,	Volume=	4.640 af	
Outflow =	34.82 cfs @	12.57 hrs,	Volume=	4.640 af,	Atten= 0%, Lag= 0.0 min
Primary =	34.82 cfs @	12.57 hrs,	Volume=	4.640 af	
Secondary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af	

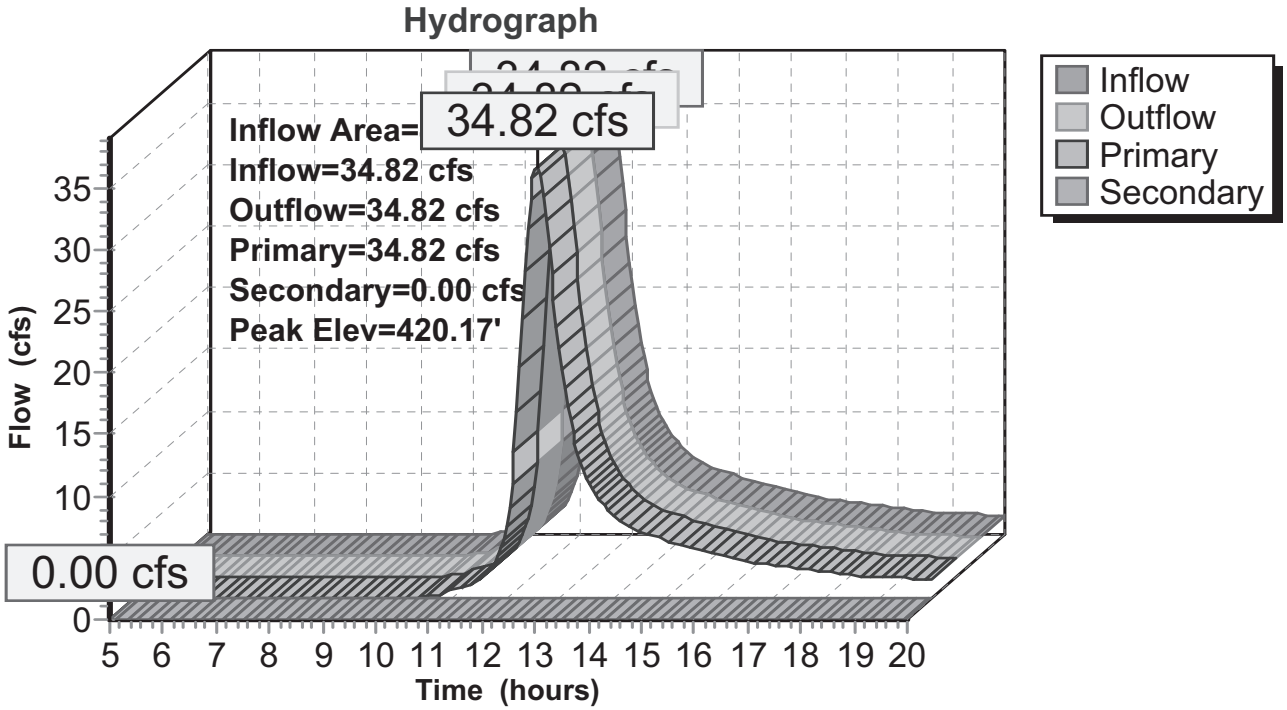
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 420.17' @ 12.57 hrs
Flood Elev= 424.00'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	417.23'	**36.0" x 45.0' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 416.82' S= 0.0091 '/' n= 0.011 Cc= 0.900
2	Secondary	421.50'	**22.0' long x 6.3' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.67 2.68 2.71 2.75 2.82

Primary OutFlow Max=34.73 cfs @ 12.57 hrs HW=420.16' TW=418.06' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 34.73 cfs @ 6.3 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=417.23' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 6P: Existing Culvert 2



Pond 7P: Existing Culvert 3

Inflow Area =	10.350 ac,	Inflow Depth =	1.07"	for	2-YR STORM event
Inflow =	8.03 cfs @	12.41 hrs,	Volume=	0.921 af	
Outflow =	8.03 cfs @	12.41 hrs,	Volume=	0.921 af,	Atten= 0%, Lag= 0.0 min
Primary =	8.03 cfs @	12.41 hrs,	Volume=	0.921 af	
Secondary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af	

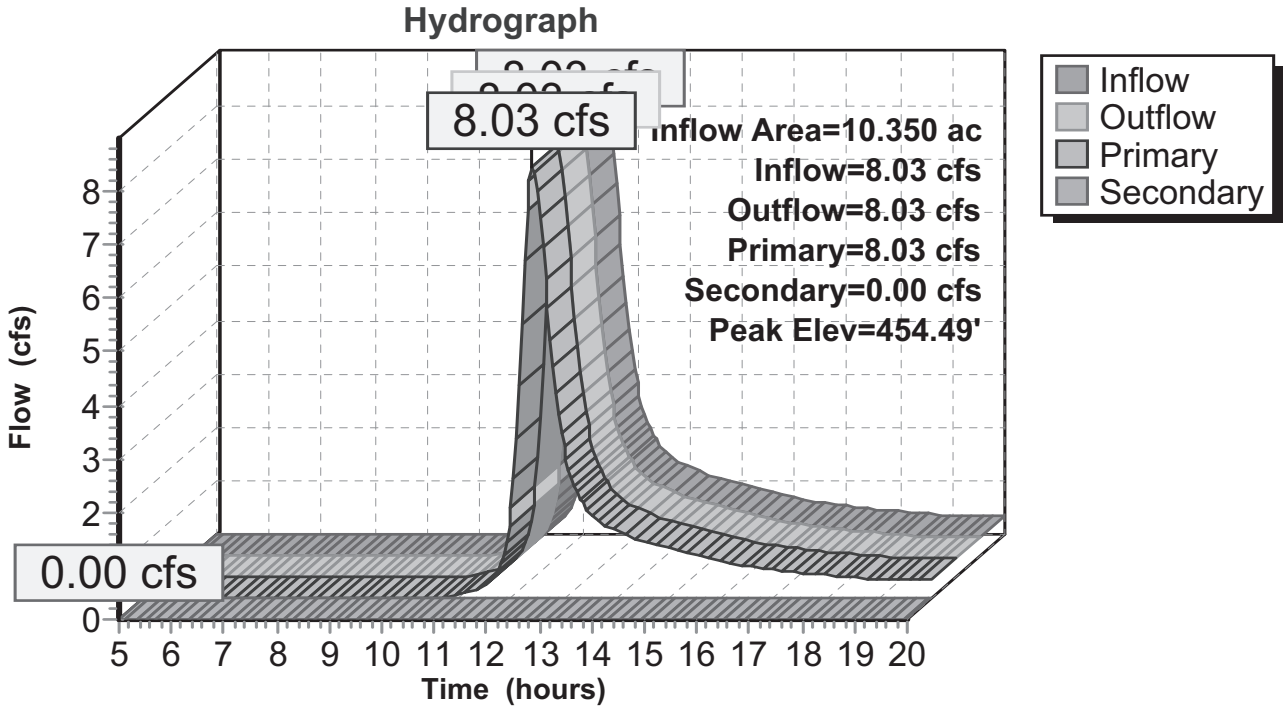
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 454.49' @ 12.41 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	452.60'	**18.0" x 45.6' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 451.11' S= 0.0327 '/' n= 0.011 Cc= 0.900
2	Secondary	455.50'	**6.5' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=8.01 cfs @ 12.41 hrs HW=454.49' TW=440.66' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 8.01 cfs @ 4.5 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=452.60' TW=454.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Existing Culvert 3



Pond 8P: Existing Culvert 4

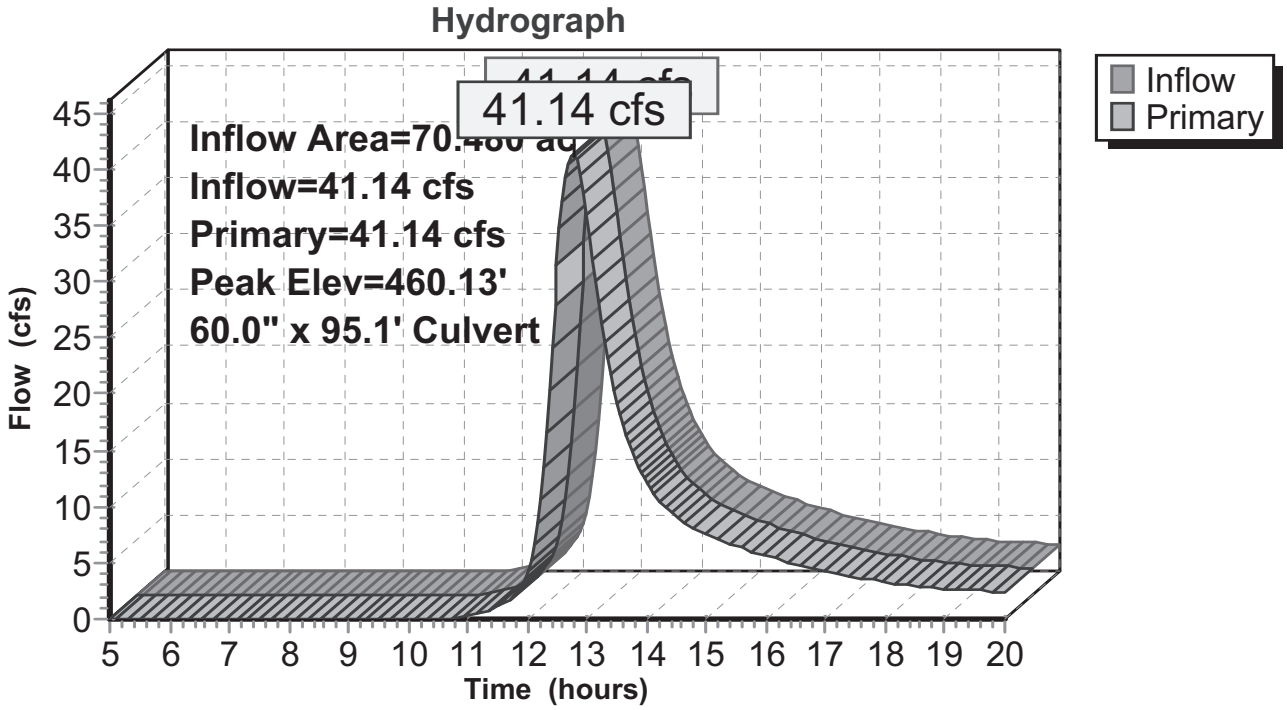
Inflow Area =	70.480 ac,	Inflow Depth =	1.11"	for	2-YR STORM event
Inflow =	41.14 cfs @	12.78 hrs,	Volume=	6.527 af	
Outflow =	41.14 cfs @	12.78 hrs,	Volume=	6.527 af,	Atten= 0%, Lag= 0.0 min
Primary =	41.14 cfs @	12.78 hrs,	Volume=	6.527 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 460.13' @ 12.78 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	457.96'	**60.0" x 95.1' long Culvert** CMP, square edge headwall, Ke= 0.500 Outlet Invert= 456.17' S= 0.0188 '/' n= 0.011 Cc= 0.900

Primary OutFlow Max=41.06 cfs @ 12.78 hrs HW=460.13' TW=457.19' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 41.06 cfs @ 5.0 fps)

Pond 8P: Existing Culvert 4



Pond 9P: Existing Culvert 5

Inflow Area =	11.360 ac,	Inflow Depth =	1.07"	for	2-YR STORM event
Inflow =	8.83 cfs @	12.41 hrs,	Volume=	1.011 af	
Outflow =	8.83 cfs @	12.41 hrs,	Volume=	1.011 af,	Atten= 0%, Lag= 0.0 min
Primary =	6.82 cfs @	12.41 hrs,	Volume=	0.968 af	
Secondary =	2.01 cfs @	12.41 hrs,	Volume=	0.042 af	

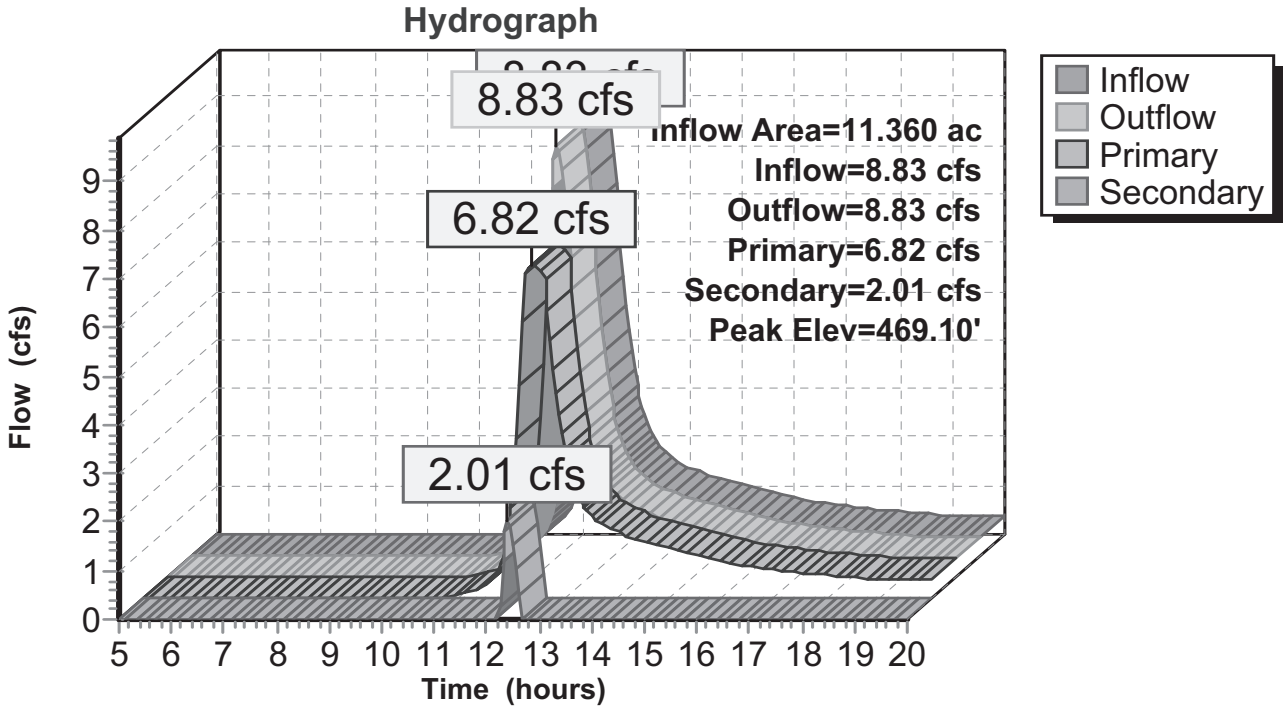
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 469.10' @ 12.41 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	466.76'	**15.0" x 50.3' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 465.61' S= 0.0229 '/' n= 0.011 Cc= 0.900
2	Secondary	469.00'	**25.0' long x 60.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=6.82 cfs @ 12.41 hrs HW=469.10' TW=460.36' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 6.82 cfs @ 5.6 fps)

Secondary OutFlow Max=1.99 cfs @ 12.41 hrs HW=469.10' TW=456.86' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 1.99 cfs @ 0.8 fps)

Pond 9P: Existing Culvert 5



Pond 10P: Existing Culvert 6

Inflow Area =	5.020 ac,	Inflow Depth =	1.12"	for	2-YR STORM event
Inflow =	3.37 cfs @	12.62 hrs,	Volume=	0.467 af	
Outflow =	3.37 cfs @	12.62 hrs,	Volume=	0.467 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.37 cfs @	12.62 hrs,	Volume=	0.467 af	
Secondary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af	

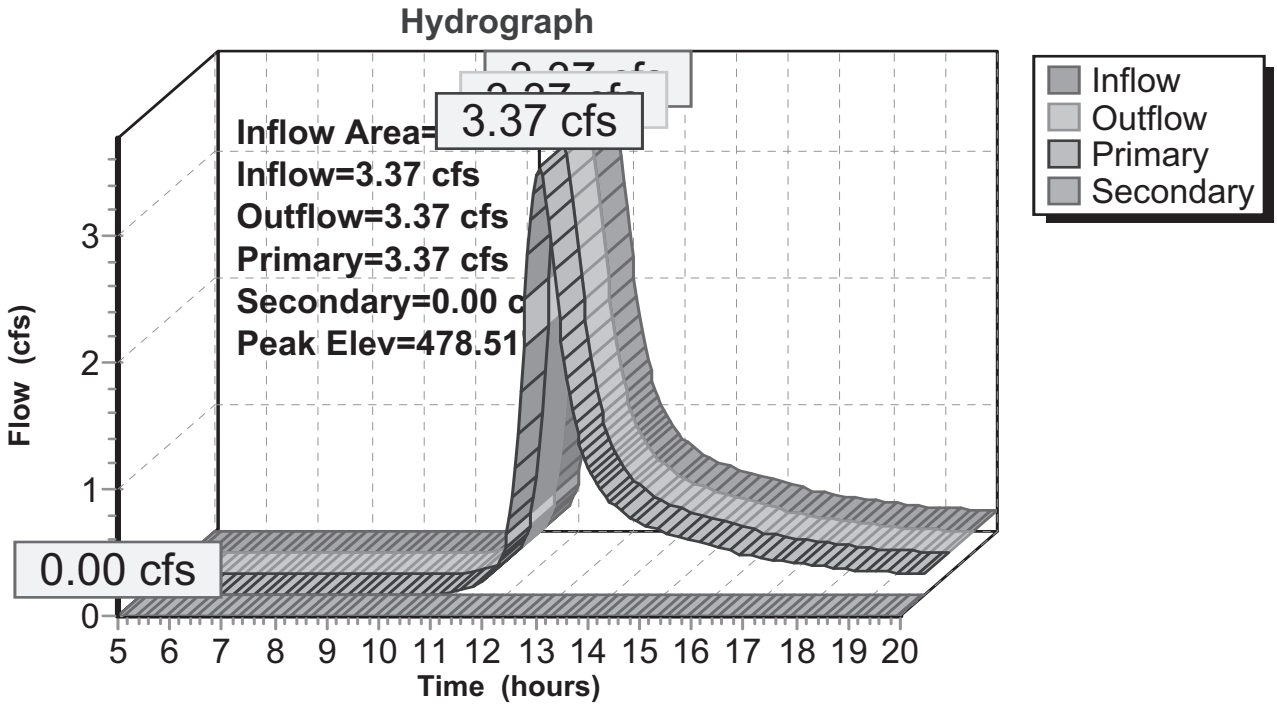
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 478.51' @ 12.62 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	477.46'	**15.0" x 54.0' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 475.67' S= 0.0331 '/' n= 0.011 Cc= 0.900
2	Secondary	481.50'	**160.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=3.36 cfs @ 12.62 hrs HW=478.50' TW=468.02' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.36 cfs @ 3.1 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=477.46' TW=480.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 10P: Existing Culvert 6



Pond 11P: Existing Culvert 9

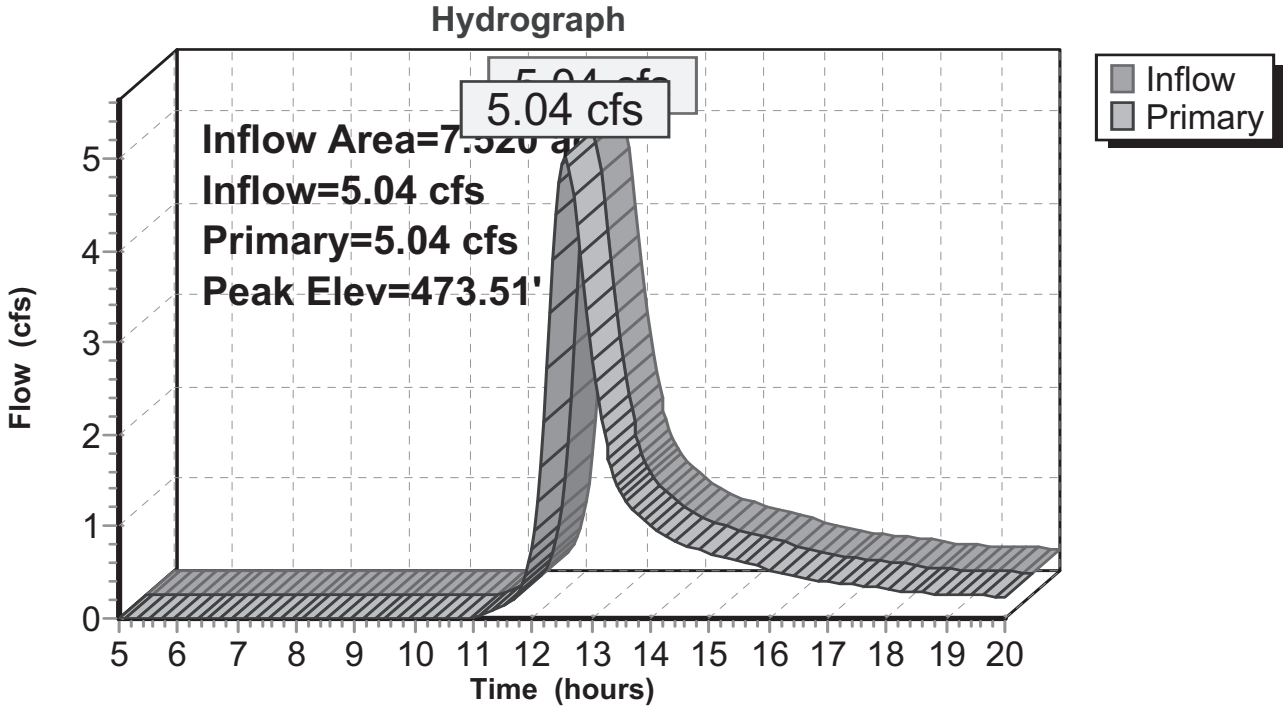
Inflow Area =	7.520 ac,	Inflow Depth =	1.06"	for	2-YR STORM event
Inflow =	5.04 cfs @	12.56 hrs,	Volume=	0.666 af	
Outflow =	5.04 cfs @	12.56 hrs,	Volume=	0.666 af,	Atten= 0%, Lag= 0.0 min
Primary =	5.04 cfs @	12.56 hrs,	Volume=	0.666 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 473.51' @ 12.56 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	471.95'	**15.0" x 45.5' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 471.00' S= 0.0209 '/' n= 0.011 Cc= 0.900
2	Primary	474.50'	**35.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=5.04 cfs @ 12.56 hrs HW=473.51' TW=468.01' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 5.04 cfs @ 4.1 fps)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 11P: Existing Culvert 9



Pond 12P: Existing Culvert 11

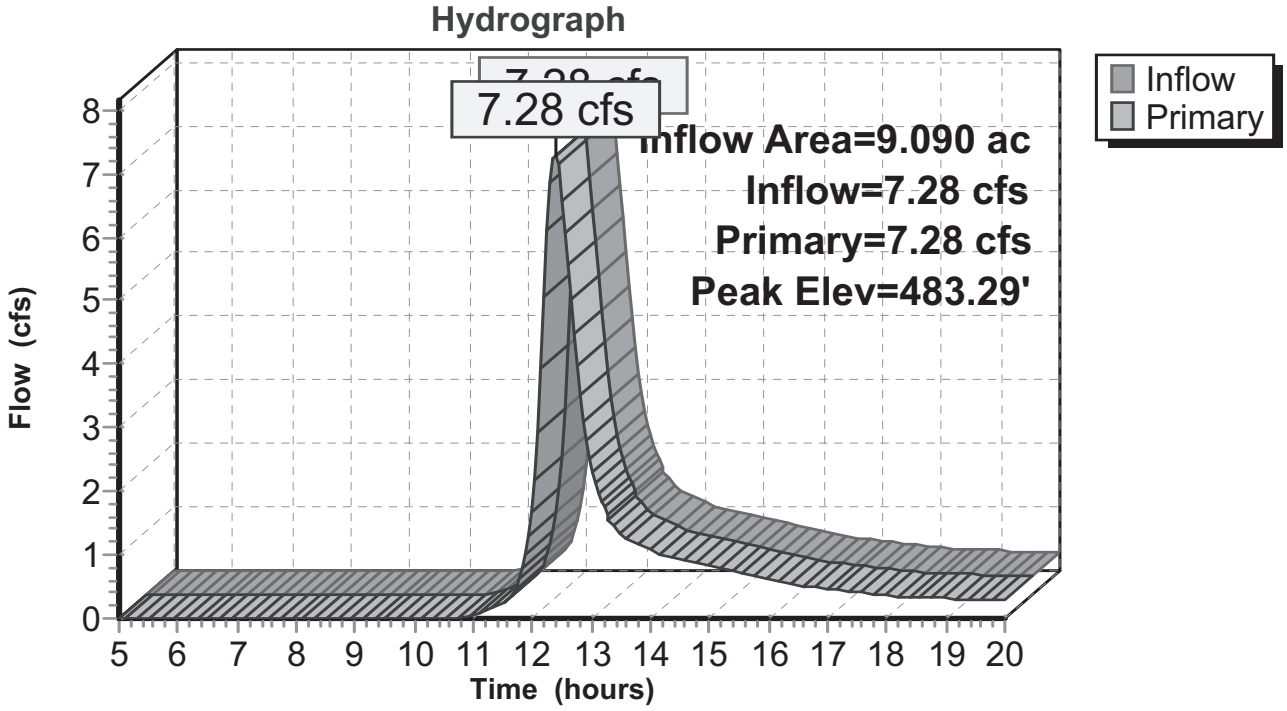
Inflow Area =	9.090 ac,	Inflow Depth =	1.07"	for	2-YR STORM event
Inflow =	7.28 cfs @	12.38 hrs,	Volume=	0.809 af	
Outflow =	7.28 cfs @	12.38 hrs,	Volume=	0.809 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.28 cfs @	12.38 hrs,	Volume=	0.809 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 483.29' @ 12.38 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	480.71'	**15.0" x 53.4' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 479.74' S= 0.0182 '/' n= 0.011 Cc= 0.900
2	Primary	483.50'	**4.0' long x 125.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=7.25 cfs @ 12.38 hrs HW=483.27' TW=468.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.25 cfs @ 5.9 fps)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 12P: Existing Culvert 11



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

Subcatchment 1S: Subcatchment 1S Runoff Area=44.990 ac Runoff Depth=2.72"
Flow Length=2,651' Tc=39.2 min CN=76 Runoff=77.27 cfs 10.191 af

Subcatchment 2S: Subcatchment 2S Runoff Area=10.350 ac Runoff Depth=2.47"
Flow Length=1,752' Tc=27.2 min CN=73 Runoff=19.08 cfs 2.127 af

Subcatchment 3S: Subcatchment 3S Runoff Area=70.480 ac Runoff Depth=2.53"
Flow Length=4,060' Tc=53.6 min CN=74 Runoff=95.57 cfs 14.842 af

Subcatchment 4S: Subcatchment 4S Runoff Area=11.360 ac Runoff Depth=2.47"
Flow Length=986' Tc=27.1 min CN=73 Runoff=20.97 cfs 2.334 af

Subcatchment 5S: Subcatchment 5S Runoff Area=5.020 ac Runoff Depth=2.54"
Flow Length=1,150' Tc=41.7 min CN=74 Runoff=7.82 cfs 1.062 af

Subcatchment 6S: Subcatchment 6S Runoff Area=7.520 ac Runoff Depth=2.46"
Flow Length=2,174' Tc=37.3 min CN=73 Runoff=11.97 cfs 1.539 af

Subcatchment 7S: Subcatchment 7S Runoff Area=140.440 ac Runoff Depth=2.49"
Flow Length=3,523' Tc=92.9 min CN=74 Runoff=134.95 cfs 29.090 af

Subcatchment 8S: Subcatchment 8S Runoff Area=9.090 ac Runoff Depth=2.47"
Flow Length=952' Tc=25.2 min CN=73 Runoff=17.34 cfs 1.869 af

Subcatchment 9S: Subcatchment 9S Runoff Area=13.930 ac Runoff Depth=2.48"
Flow Length=526' Tc=16.3 min CN=73 Runoff=31.66 cfs 2.874 af

Subcatchment 10S: Subcatchment 10S Runoff Area=34.540 ac Runoff Depth=2.21"
Flow Length=1,359' Tc=34.6 min CN=70 Runoff=51.02 cfs 6.347 af

Reach 1R: Existing Stream Peak Depth=1.96' Max Vel=3.5 fps Inflow=194.94 cfs 57.177 af
n=0.080 L=1,210.0' S=0.0279 '/' Capacity=2,412.63 cfs Outflow=192.94 cfs 56.680 af

Reach 2R: Existing Stream Peak Depth=1.55' Max Vel=4.2 fps Inflow=141.98 cfs 47.885 af
n=0.080 L=609.0' S=0.0361 '/' Capacity=11,130.94 cfs Outflow=141.67 cfs 47.685 af

Reach 3R: Existing Stream Peak Depth=1.53' Max Vel=3.4 fps Inflow=131.44 cfs 46.147 af
n=0.080 L=541.0' S=0.0299 '/' Capacity=9,486.07 cfs Outflow=131.09 cfs 45.949 af

Reach 4R: Existing Stream Peak Depth=0.53' Max Vel=0.8 fps Inflow=60.05 cfs 31.233 af
n=0.080 L=432.0' S=0.0051 '/' Capacity=6,025.46 cfs Outflow=60.01 cfs 30.744 af

Reach 5R: Existing Stream Peak Depth=0.76' Max Vel=1.0 fps Inflow=58.22 cfs 30.512 af
n=0.080 L=1,188.0' S=0.0051 '/' Capacity=5,559.50 cfs Outflow=57.96 cfs 29.459 af

Reach 6R: Existing Swale Peak Depth=0.73' Max Vel=2.3 fps Inflow=6.78 cfs 0.190 af
n=0.080 L=520.0' S=0.0615 '/' Capacity=93.65 cfs Outflow=6.44 cfs 0.190 af

Reach 7R: Existing Swale Peak Depth=0.00' Max Vel=0.0 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=436.0' S=0.0275 '/' Capacity=6,984.86 cfs Outflow=0.00 cfs 0.000 af

Pond 1P: Design Point 1 Outlet at Hasbrouck Road Inflow=192.94 cfs 56.680 af
Primary=192.94 cfs 56.680 af

Pond 2P: Design Point 2 Existing Swale Along Craigville Road Inflow=27.69 cfs 0.888 af
Primary=27.69 cfs 0.888 af

Pond 3P: Design Point 3 (Southeastern Property Line) Inflow=31.66 cfs 2.874 af
Primary=31.66 cfs 2.874 af

Pond 4P: Design Point 4 (Southwestern Property Line) Inflow=51.02 cfs 6.347 af
Primary=51.02 cfs 6.347 af

Pond 5P: Existing Wetland Pocket Peak Elev=469.29' Storage=541,304 cf Inflow=145.35 cfs 33.561 af
36.0" x 60.0' Culvert Outflow=58.22 cfs 30.512 af

Pond 6P: Existing Culvert 2 Peak Elev=422.10' Inflow=82.83 cfs 10.381 af
Primary=55.14 cfs 9.493 af Secondary=27.69 cfs 0.888 af Outflow=82.83 cfs 10.381 af

Pond 7P: Existing Culvert 3 Peak Elev=456.03' Inflow=19.08 cfs 2.127 af
Primary=12.30 cfs 1.936 af Secondary=6.78 cfs 0.190 af Outflow=19.08 cfs 2.127 af

Pond 8P: Existing Culvert 4 Peak Elev=461.51' Inflow=95.57 cfs 14.842 af
60.0" x 95.1' Culvert Outflow=95.57 cfs 14.842 af

Pond 9P: Existing Culvert 5 Peak Elev=469.35' Inflow=20.97 cfs 2.334 af
Primary=7.30 cfs 1.774 af Secondary=13.67 cfs 0.561 af Outflow=20.97 cfs 2.334 af

Pond 10P: Existing Culvert 6 Peak Elev=480.33' Inflow=7.82 cfs 1.062 af
Primary=7.82 cfs 1.062 af Secondary=0.00 cfs 0.000 af Outflow=7.82 cfs 1.062 af

Pond 11P: Existing Culvert 9 Peak Elev=474.63' Inflow=11.97 cfs 1.539 af
Outflow=11.97 cfs 1.539 af

Pond 12P: Existing Culvert 11 Peak Elev=484.35' Inflow=17.34 cfs 1.869 af
Outflow=17.34 cfs 1.869 af

Total Runoff Area = 347.720 ac Runoff Volume = 72.276 af Average Runoff Depth = 2.49"

Subcatchment 1S: Subcatchment 1S

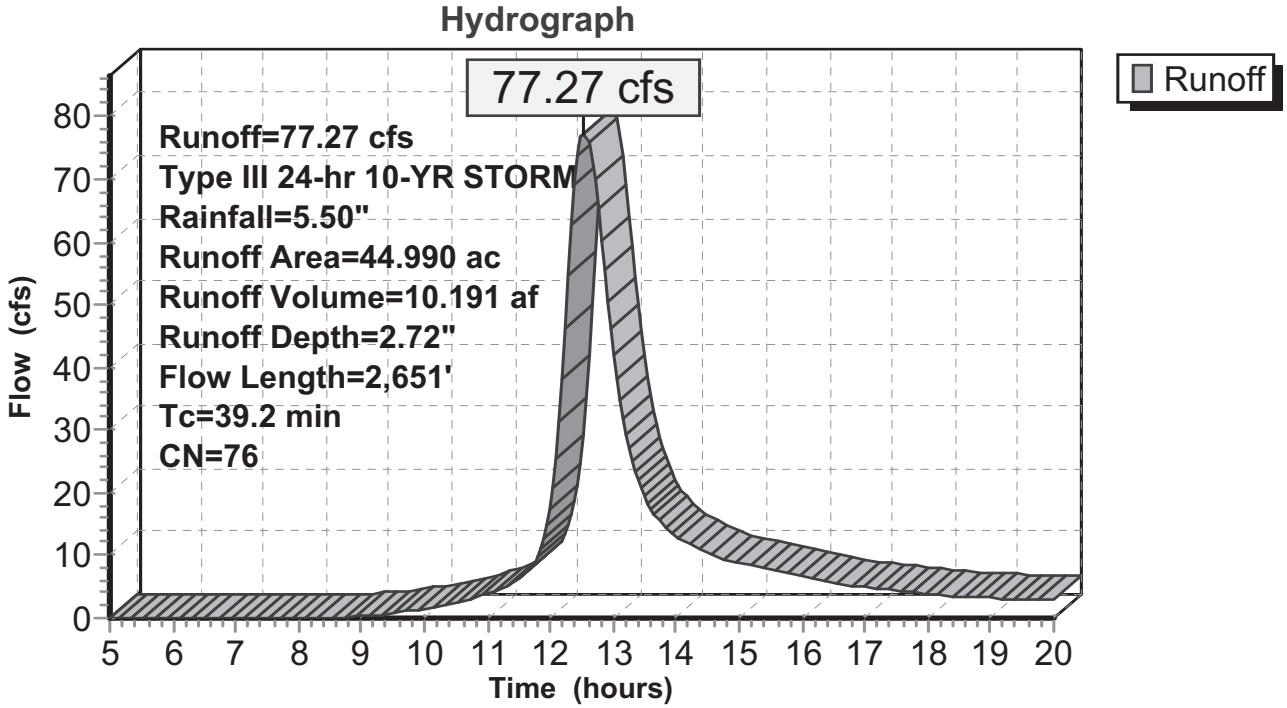
Runoff = 77.27 cfs @ 12.55 hrs, Volume= 10.191 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.920	98	Existing pavement
0.310	71	Meadow, non-grazed, HSG C
15.500	79	50-75% Grass cover, Fair, HSG C
28.260	73	Woods, Fair, HSG C
44.990	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0622	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
10.9	947	0.0846	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.5	598	0.1003	2.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.8	1,006	0.0962	1.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
39.2	2,651	Total			

Subcatchment 1S: Subcatchment 1S



Subcatchment 2S: Subcatchment 2S

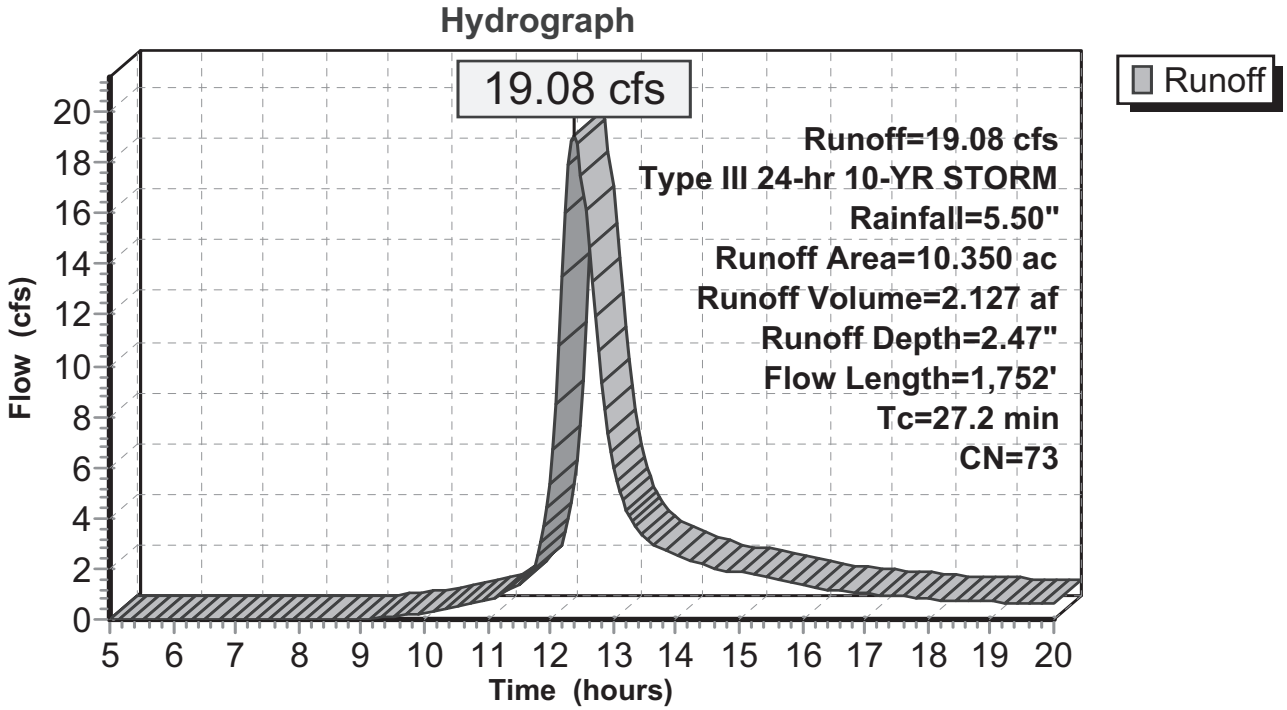
Runoff = 19.08 cfs @ 12.39 hrs, Volume= 2.127 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.080	98	Existing pavement
0.120	71	Meadow, non-grazed, HSG C
10.150	73	Woods, Fair, HSG C
10.350	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.1300	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
17.2	1,589	0.0944	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.3	63	0.0625	3.8		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
27.2	1,752	Total			

Subcatchment 2S: Subcatchment 2S



Subcatchment 3S: Subcatchment 3S

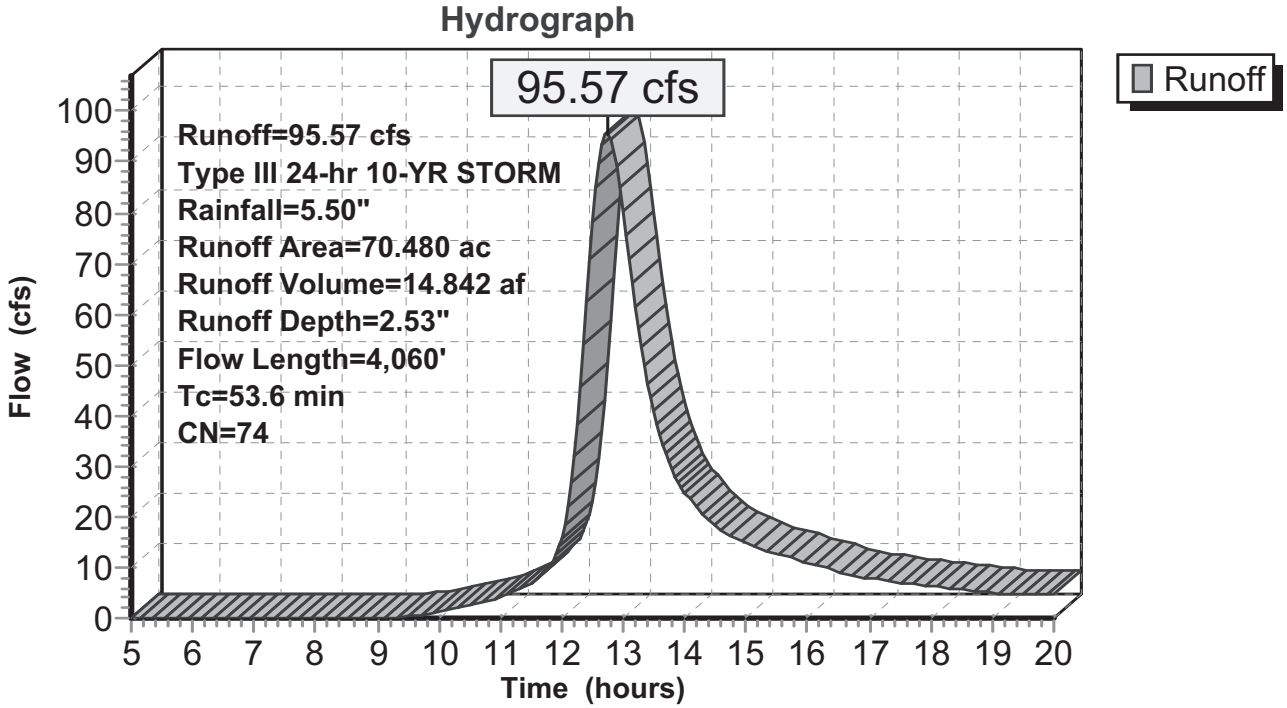
Runoff = 95.57 cfs @ 12.74 hrs, Volume= 14.842 af, Depth= 2.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.450	98	Existing pavement
0.680	71	Meadow, non-grazed, HSG C
0.870	78	Meadow, non-grazed, HSG D
58.440	73	Woods, Fair, HSG C
10.040	79	Woods, Fair, HSG D
70.480	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	100	0.0155	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
14.4	914	0.0445	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.8	1,806	0.0836	3.8	43.28	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=1.50' Z= 5.0 '/' n= 0.091
8.7	1,240	0.0081	2.4	5.22	**Channel Flow,** Area= 2.2 sf Perim= 10.4' r= 0.21' n= 0.020
53.6	4,060	Total			

Subcatchment 3S: Subcatchment 3S



Subcatchment 4S: Subcatchment 4S

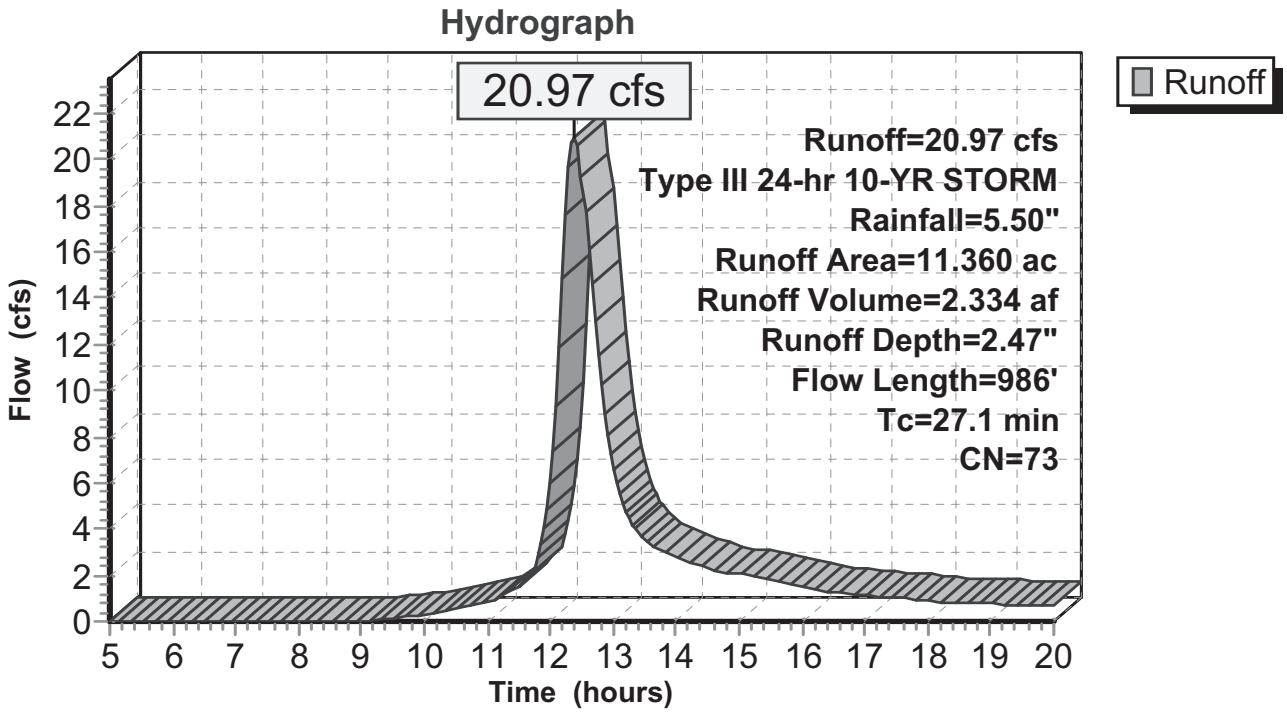
Runoff = 20.97 cfs @ 12.39 hrs, Volume= 2.334 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.170	98	Existing pavement
0.090	71	Meadow, non-grazed, HSG C
0.220	78	Meadow, non-grazed, HSG D
0.050	36	Woods, Fair, HSG A
10.670	73	Woods, Fair, HSG C
0.160	79	Woods, Fair, HSG D
11.360	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0432	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
12.0	886	0.0601	1.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.1	986	Total			

Subcatchment 4S: Subcatchment 4S



Subcatchment 5S: Subcatchment 5S

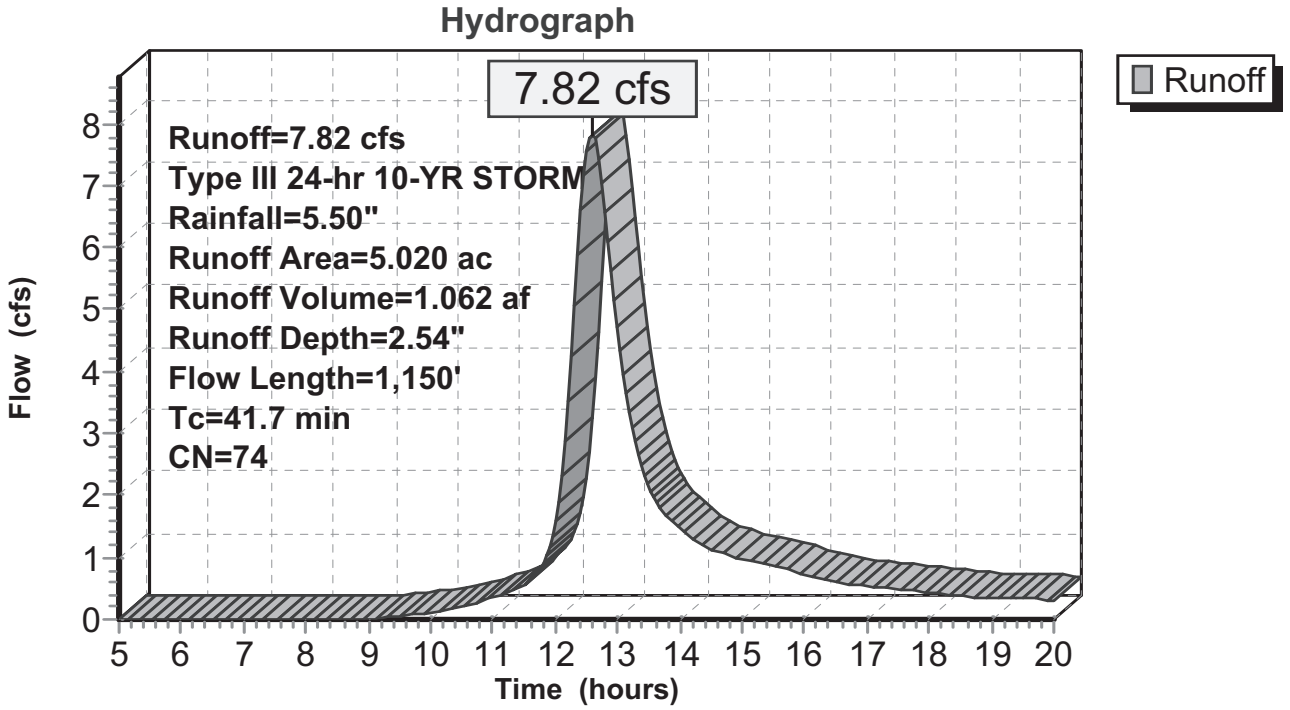
Runoff = 7.82 cfs @ 12.58 hrs, Volume= 1.062 af, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.230	98	Existing pavement
0.380	71	Meadow, non-grazed, HSG C
4.410	73	Woods, Fair, HSG C
5.020	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0457	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.2	175	0.0340	0.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	133	0.2400	2.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.8	742	0.0060	0.5		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
41.7	1,150	Total			

Subcatchment 5S: Subcatchment 5S



Subcatchment 6S: Subcatchment 6S

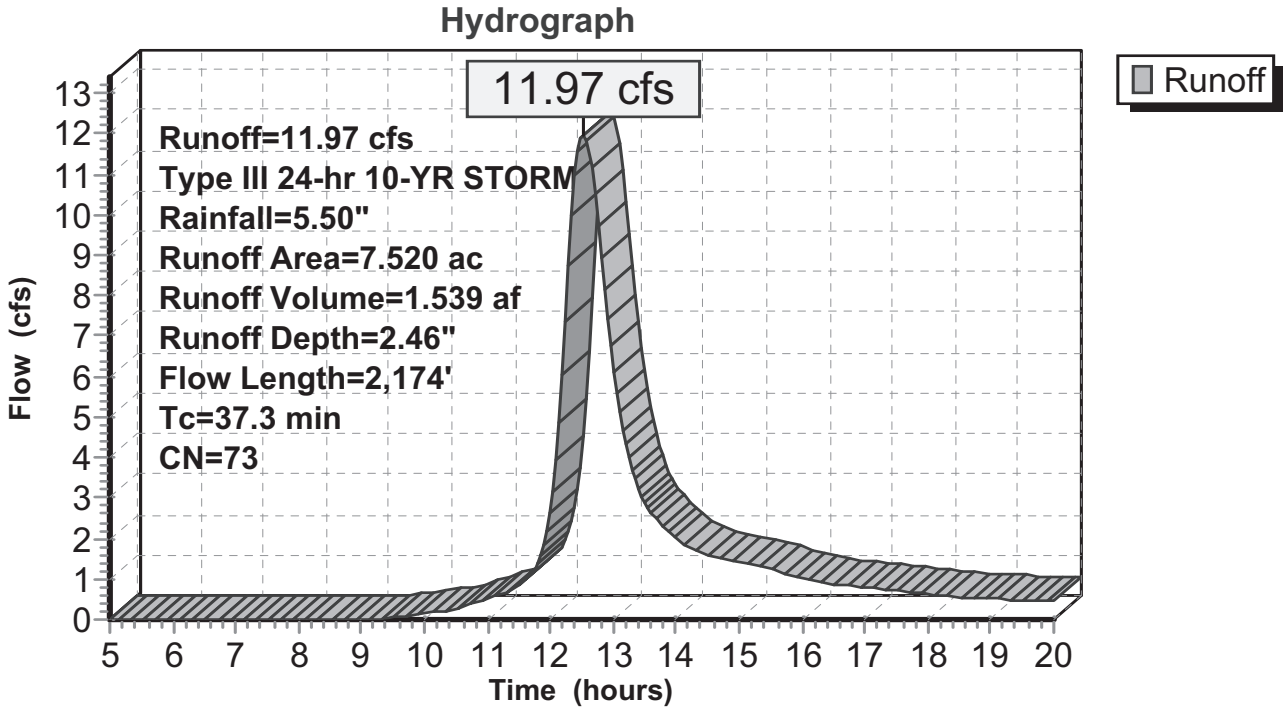
Runoff = 11.97 cfs @ 12.53 hrs, Volume= 1.539 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.090	98	Existing pavement
0.480	71	Meadow, non-grazed, HSG C
0.050	78	Meadow, non-grazed, HSG D
6.600	73	Woods, Fair, HSG C
0.300	79	Woods, Fair, HSG D
7.520	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	100	0.0422	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
11.6	1,268	0.1323	1.8		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	78	0.2051	2.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.3	409	0.0674	1.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.6	319	0.0273	1.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
37.3	2,174	Total			

Subcatchment 6S: Subcatchment 6S



Subcatchment 7S: Subcatchment 7S

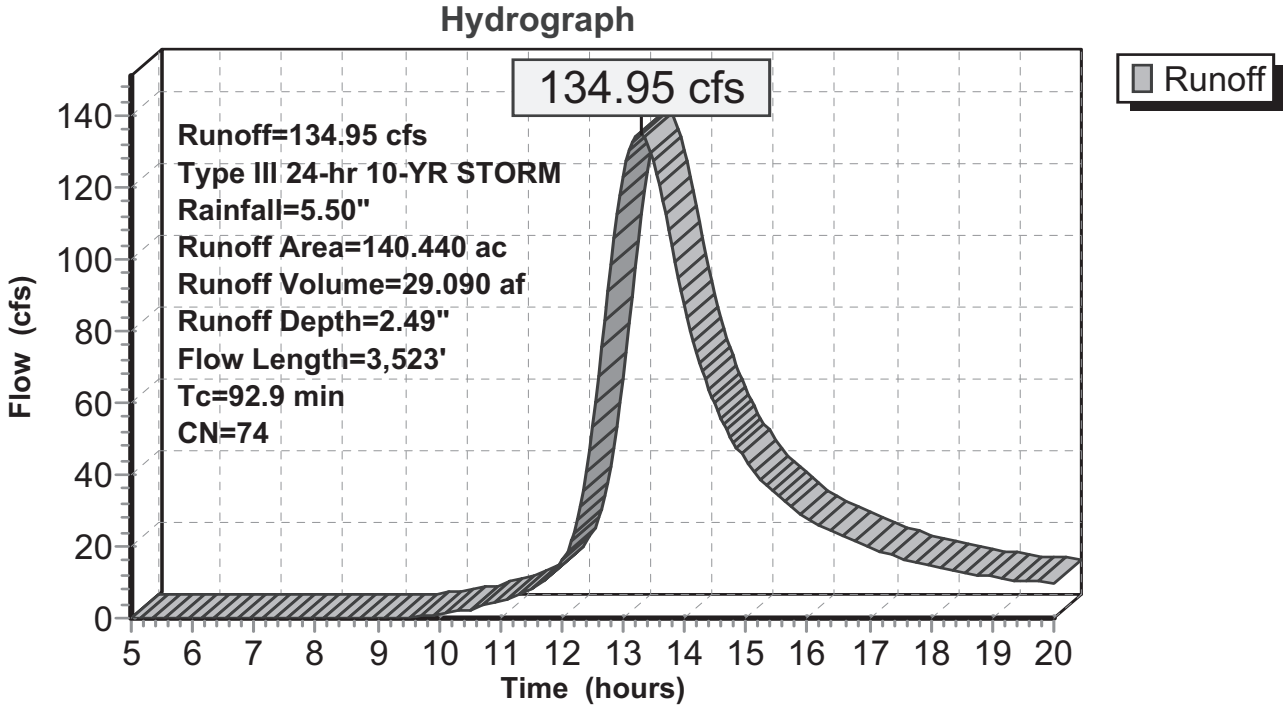
Runoff = 134.95 cfs @ 13.28 hrs, Volume= 29.090 af, Depth= 2.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
1.110	98	Existing pavement
8.010	71	Meadow, non-grazed, HSG C
10.180	78	Meadow, non-grazed, HSG D
0.870	36	Woods, Fair, HSG A
100.000	73	Woods, Fair, HSG C
20.270	79	Woods, Fair, HSG D
140.440	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	100	0.0188	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
19.1	1,761	0.0943	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
52.8	1,662	0.0110	0.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
92.9	3,523	Total			

Subcatchment 7S: Subcatchment 7S



Subcatchment 8S: Subcatchment 8S

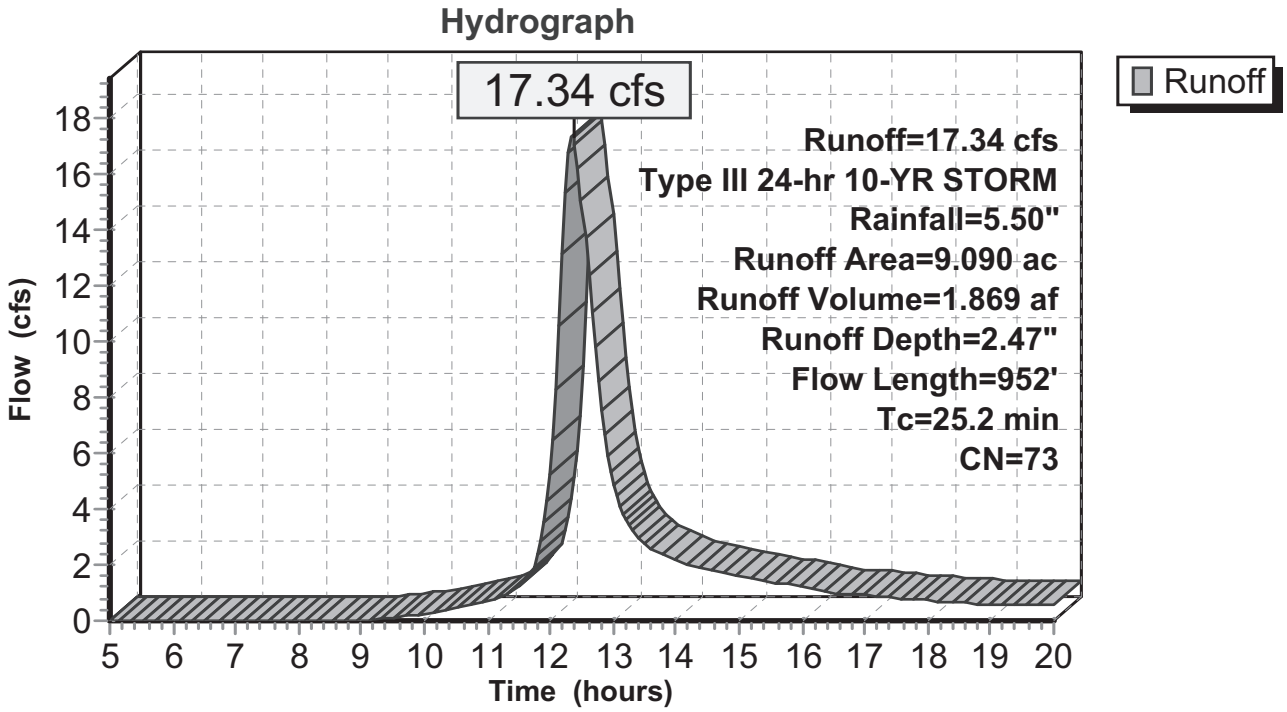
Runoff = 17.34 cfs @ 12.36 hrs, Volume= 1.869 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.120	98	Existing pavement
0.240	71	Meadow, non-grazed, HSG C
8.730	73	Woods, Fair, HSG C
9.090	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0435	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
10.2	852	0.0780	1.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
25.2	952	Total			

Subcatchment 8S: Subcatchment 8S



Subcatchment 9S: Subcatchment 9S

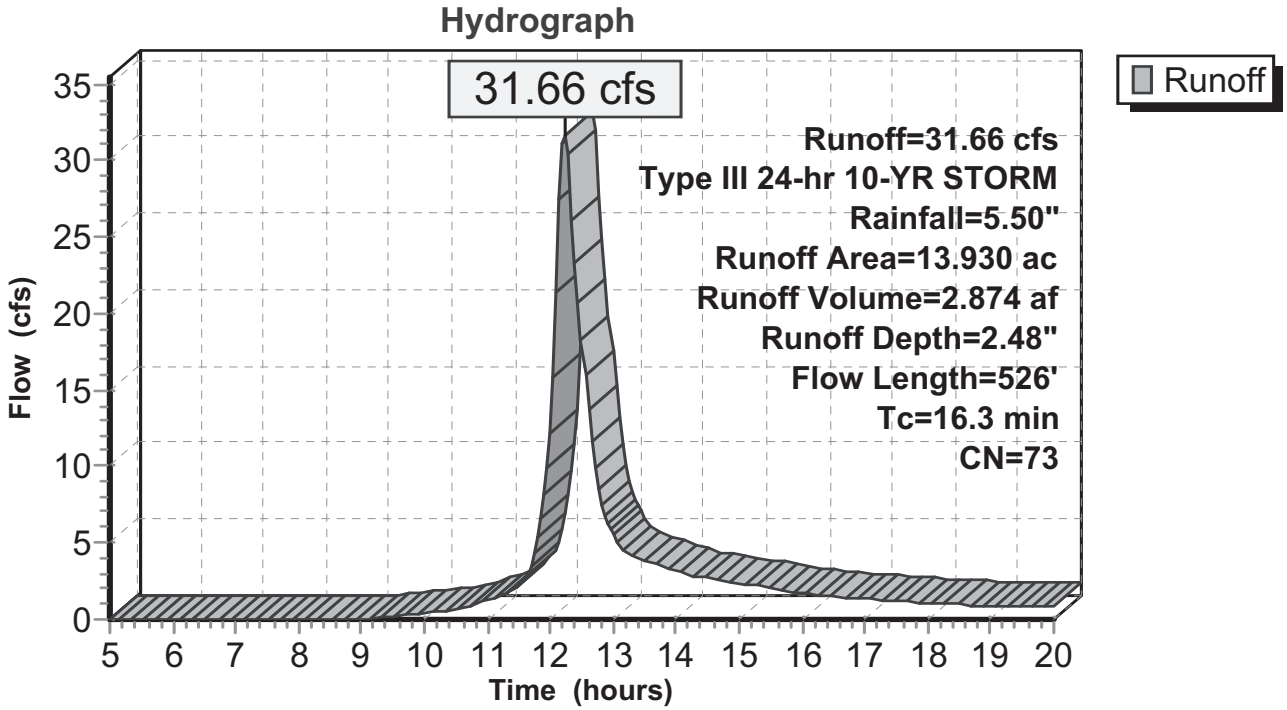
Runoff = 31.66 cfs @ 12.23 hrs, Volume= 2.874 af, Depth= 2.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.180	98	Existing pavement
0.260	71	Meadow, non-grazed, HSG C
0.040	78	Meadow, non-grazed, HSG D
13.160	73	Woods, Fair, HSG C
0.290	79	Woods, Fair, HSG D
13.930	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0660	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.6	426	0.1575	2.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.3	526	Total			

Subcatchment 9S: Subcatchment 9S



Subcatchment 10S: Subcatchment 10S

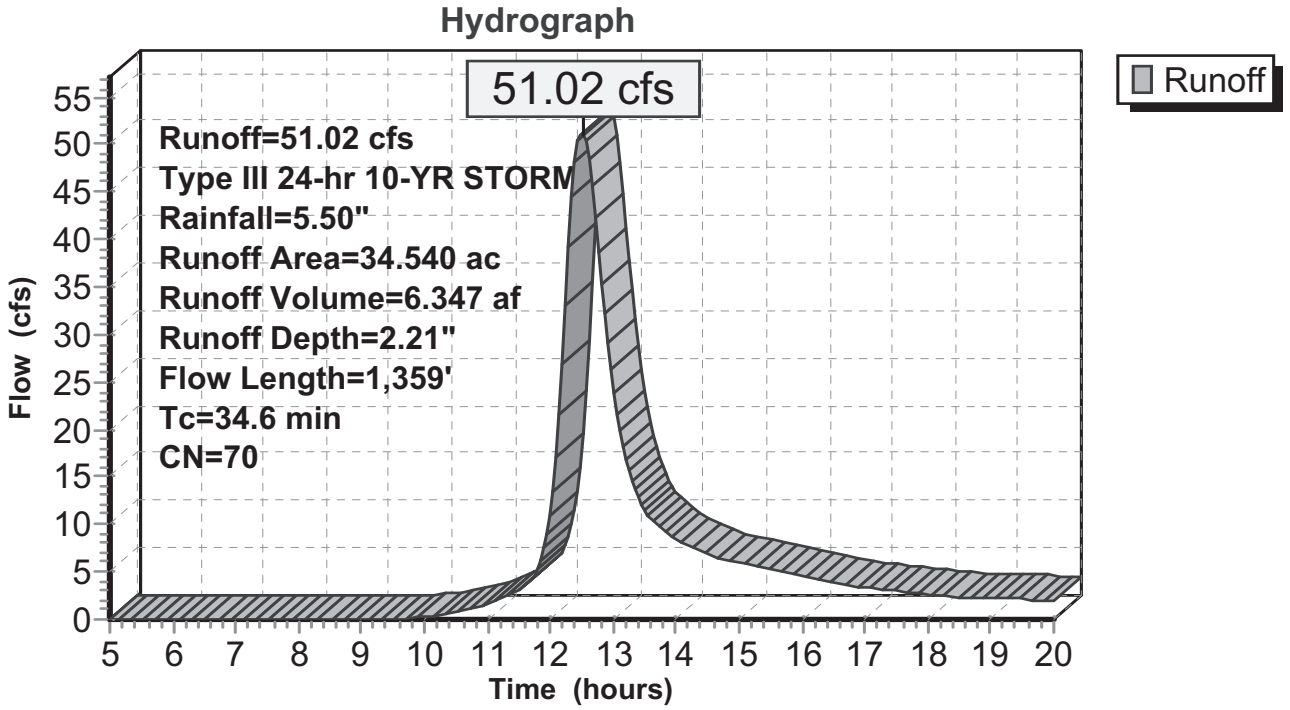
Runoff = 51.02 cfs @ 12.50 hrs, Volume= 6.347 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
1.090	36	Woods, Fair, HSG A
31.250	70	Woods, Good, HSG C
2.200	79	Woods, Fair, HSG D
34.540	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0252	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	528	0.1545	2.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.8	133	0.3459	2.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.6	598	0.0356	0.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.6	1,359	Total			

Subcatchment 10S: Subcatchment 10S



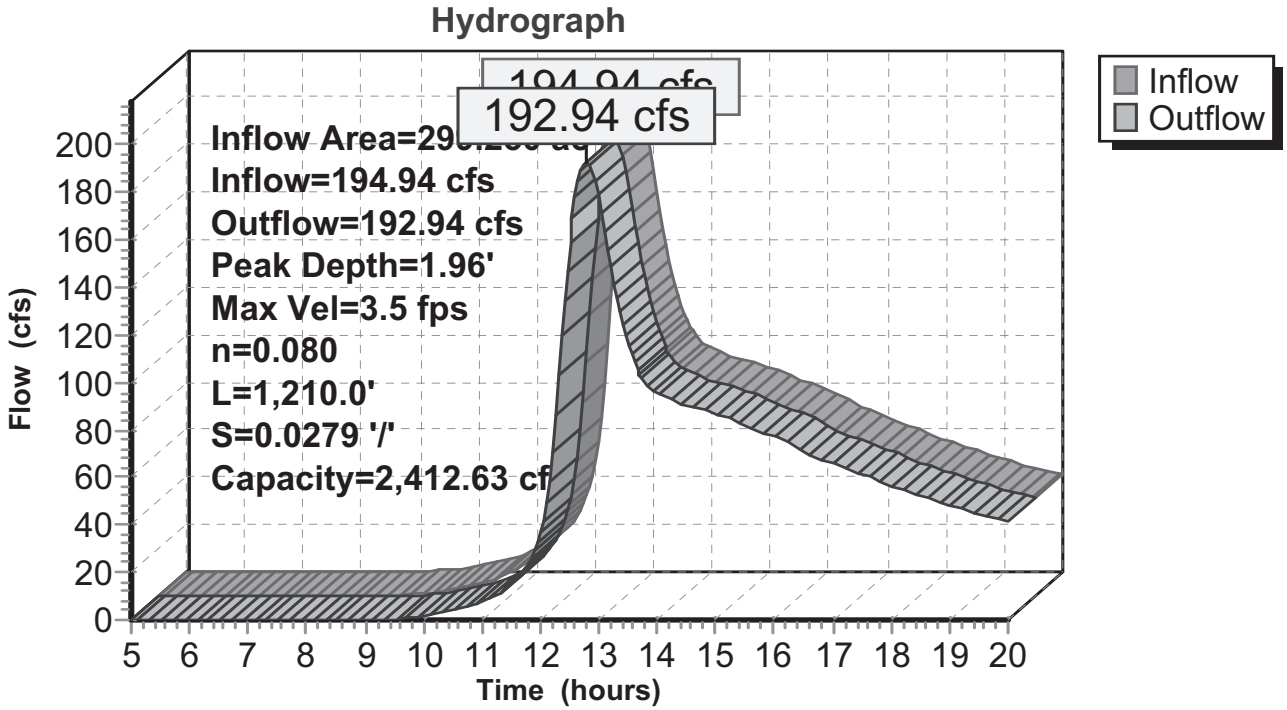
Reach 1R: Existing Stream

Inflow Area = 299.250 ac, Inflow Depth = 2.29" for 10-YR STORM event
Inflow = 194.94 cfs @ 12.73 hrs, Volume= 57.177 af
Outflow = 192.94 cfs @ 12.80 hrs, Volume= 56.680 af, Atten= 1%, Lag= 4.3 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.5 fps, Min. Travel Time= 5.8 min
Avg. Velocity = 2.2 fps, Avg. Travel Time= 9.2 min

Peak Depth= 1.96' @ 12.80 hrs
Capacity at bank full= 2,412.63 cfs
Inlet Invert= 416.82', Outlet Invert= 383.06'
10.50' x 5.80' deep channel, n= 0.080 Length= 1,210.0' Slope= 0.0279 '/'
Side Slope Z-value= 9.4 8.5 '/'

Reach 1R: Existing Stream



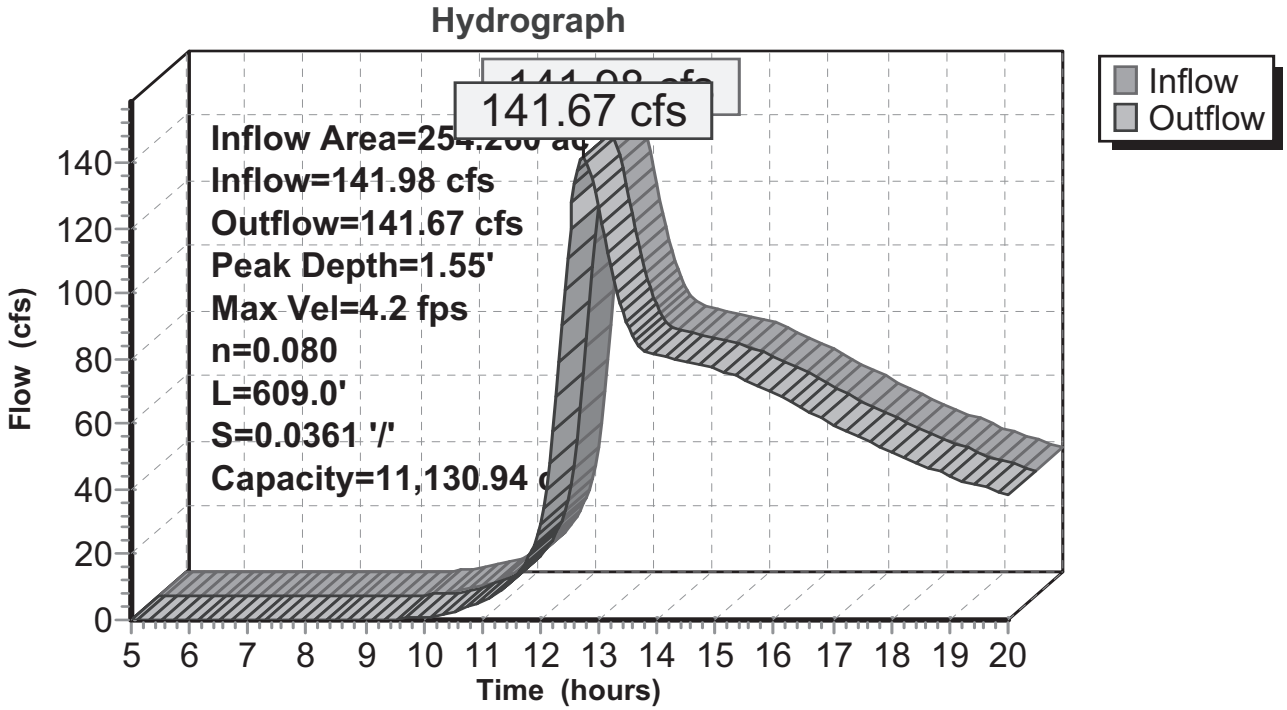
Reach 2R: Existing Stream

Inflow Area = 254.260 ac, Inflow Depth = 2.26" for 10-YR STORM event
Inflow = 141.98 cfs @ 12.72 hrs, Volume= 47.885 af
Outflow = 141.67 cfs @ 12.75 hrs, Volume= 47.685 af, Atten= 0%, Lag= 1.7 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.2 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 2.7 fps, Avg. Travel Time= 3.8 min

Peak Depth= 1.55' @ 12.75 hrs
Capacity at bank full= 11,130.94 cfs
Inlet Invert= 440.00', Outlet Invert= 418.00'
18.00' x 14.50' deep channel, n= 0.080 Length= 609.0' Slope= 0.0361 '/'
Side Slope Z-value= 2.7 2.2 '/'

Reach 2R: Existing Stream



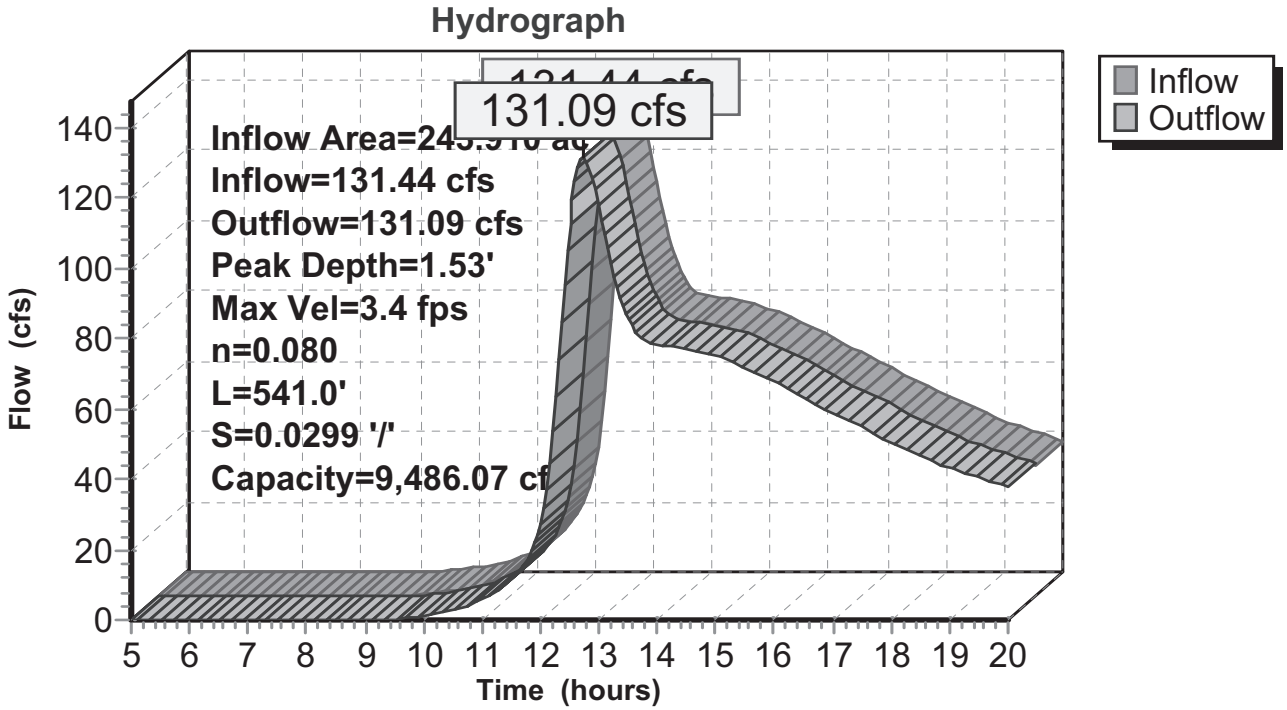
Reach 3R: Existing Stream

Inflow Area = 243.910 ac, Inflow Depth = 2.27" for 10-YR STORM event
Inflow = 131.44 cfs @ 12.71 hrs, Volume= 46.147 af
Outflow = 131.09 cfs @ 12.75 hrs, Volume= 45.949 af, Atten= 0%, Lag= 2.1 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.4 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 2.3 fps, Avg. Travel Time= 4.0 min

Peak Depth= 1.53' @ 12.75 hrs
Capacity at bank full= 9,486.07 cfs
Inlet Invert= 456.17', Outlet Invert= 440.00'
15.50' x 10.82' deep channel, n= 0.080 Length= 541.0' Slope= 0.0299 '/'
Side Slope Z-value= 7.3 5.3 '/'

Reach 3R: Existing Stream



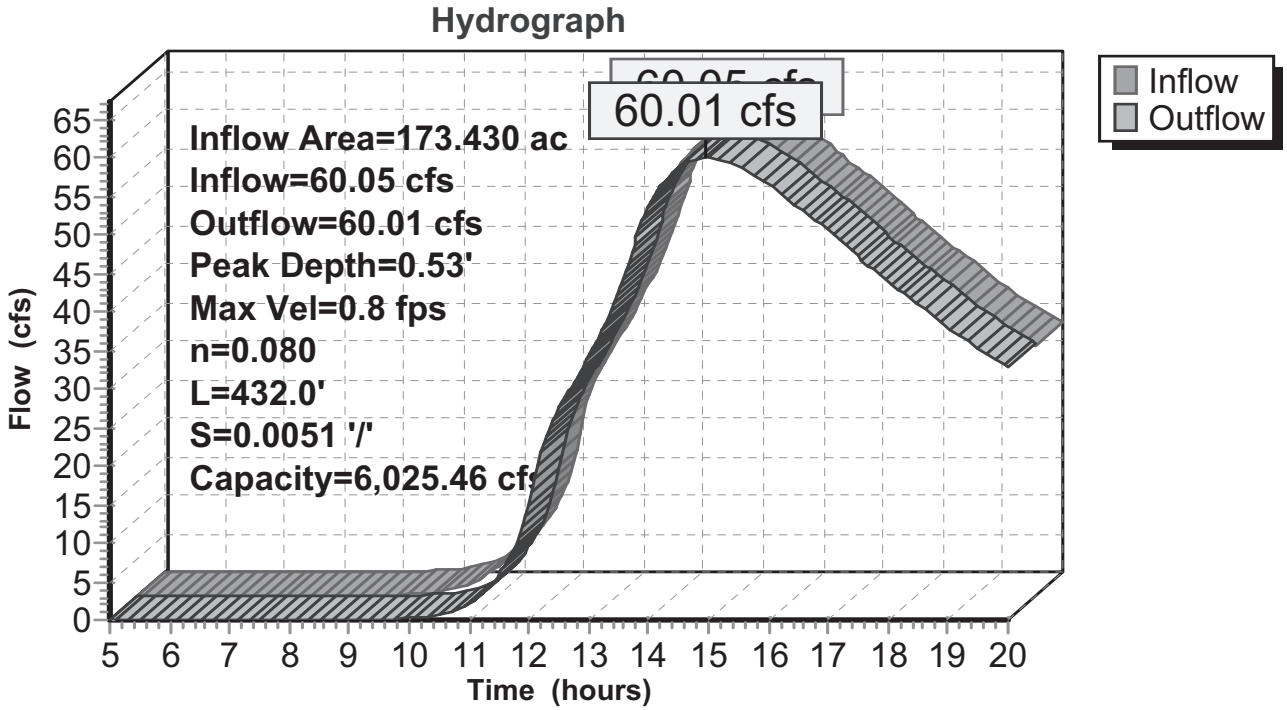
Reach 4R: Existing Stream

Inflow Area = 173.430 ac, Inflow Depth = 2.16" for 10-YR STORM event
Inflow = 60.05 cfs @ 14.85 hrs, Volume= 31.233 af
Outflow = 60.01 cfs @ 14.95 hrs, Volume= 30.744 af, Atten= 0%, Lag= 5.7 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.8 fps, Min. Travel Time= 8.7 min
Avg. Velocity = 0.6 fps, Avg. Travel Time= 11.9 min

Peak Depth= 0.53' @ 14.95 hrs
Capacity at bank full= 6,025.46 cfs
Inlet Invert= 460.18', Outlet Invert= 457.96'
124.00' x 6.50' deep channel, n= 0.080 Length= 432.0' Slope= 0.0051 '/'
Side Slope Z-value= 10.4 33.3 '/'

Reach 4R: Existing Stream



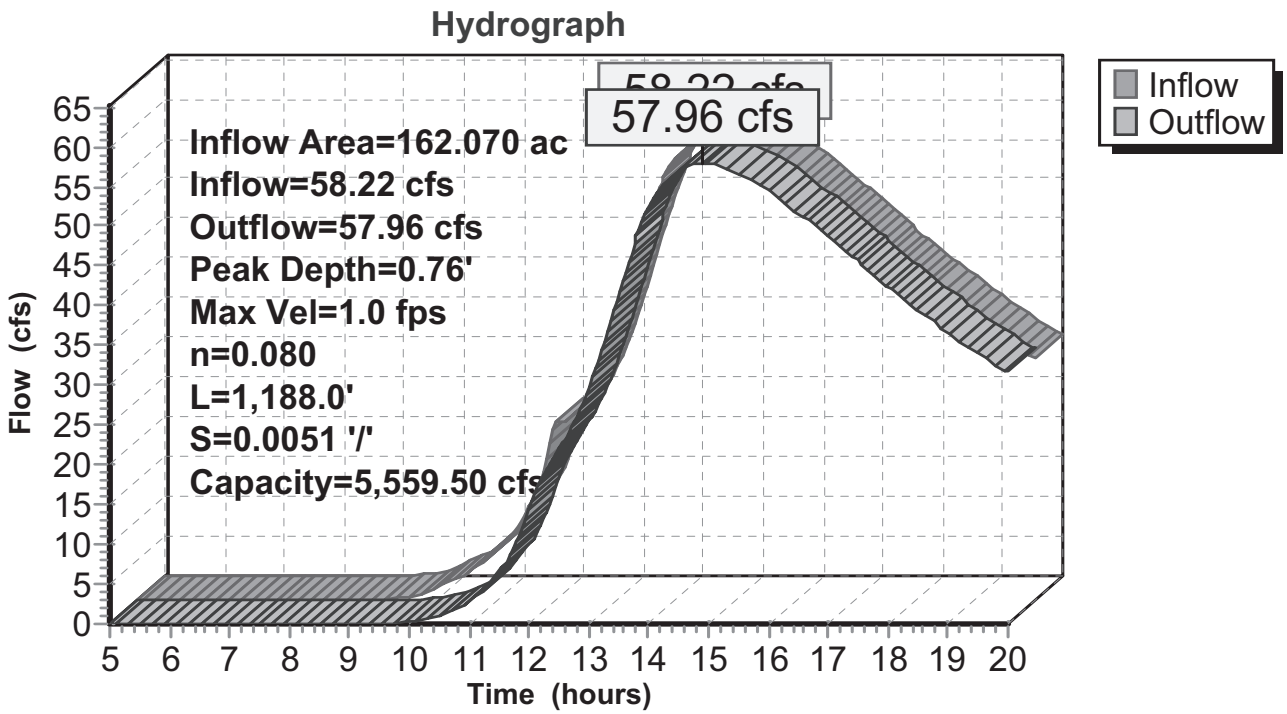
Reach 5R: Existing Stream

Inflow Area = 162.070 ac, Inflow Depth = 2.26" for 10-YR STORM event
Inflow = 58.22 cfs @ 14.65 hrs, Volume= 30.512 af
Outflow = 57.96 cfs @ 14.91 hrs, Volume= 29.459 af, Atten= 0%, Lag= 15.3 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.0 fps, Min. Travel Time= 19.6 min
Avg. Velocity = 0.7 fps, Avg. Travel Time= 27.0 min

Peak Depth= 0.76' @ 14.91 hrs
Capacity at bank full= 5,559.50 cfs
Inlet Invert= 466.24', Outlet Invert= 460.18'
64.50' x 8.00' deep channel, n= 0.080 Length= 1,188.0' Slope= 0.0051 '/'
Side Slope Z-value= 18.9 10.7 '/'

Reach 5R: Existing Stream



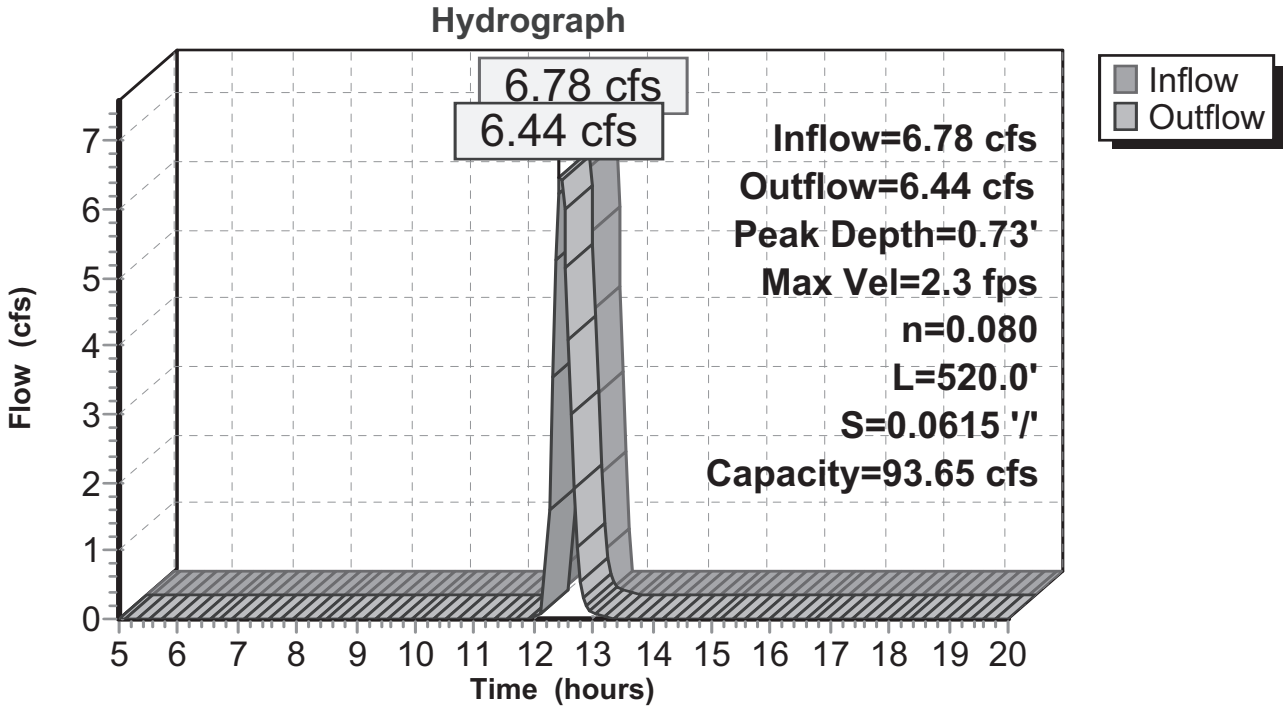
Reach 6R: Existing Swale

Inflow	=	6.78 cfs @	12.39 hrs,	Volume=	0.190 af
Outflow	=	6.44 cfs @	12.44 hrs,	Volume=	0.190 af, Atten= 5%, Lag= 3.2 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.3 fps, Min. Travel Time= 3.7 min
Avg. Velocity = 0.6 fps, Avg. Travel Time= 15.7 min

Peak Depth= 0.73' @ 12.44 hrs
Capacity at bank full= 93.65 cfs
Inlet Invert= 454.00', Outlet Invert= 422.00'
0.00' x 2.00' deep channel, n= 0.080 Length= 520.0' Slope= 0.0615 '/'
Side Slope Z-value= 3.6 6.7 '/'

Reach 6R: Existing Swale



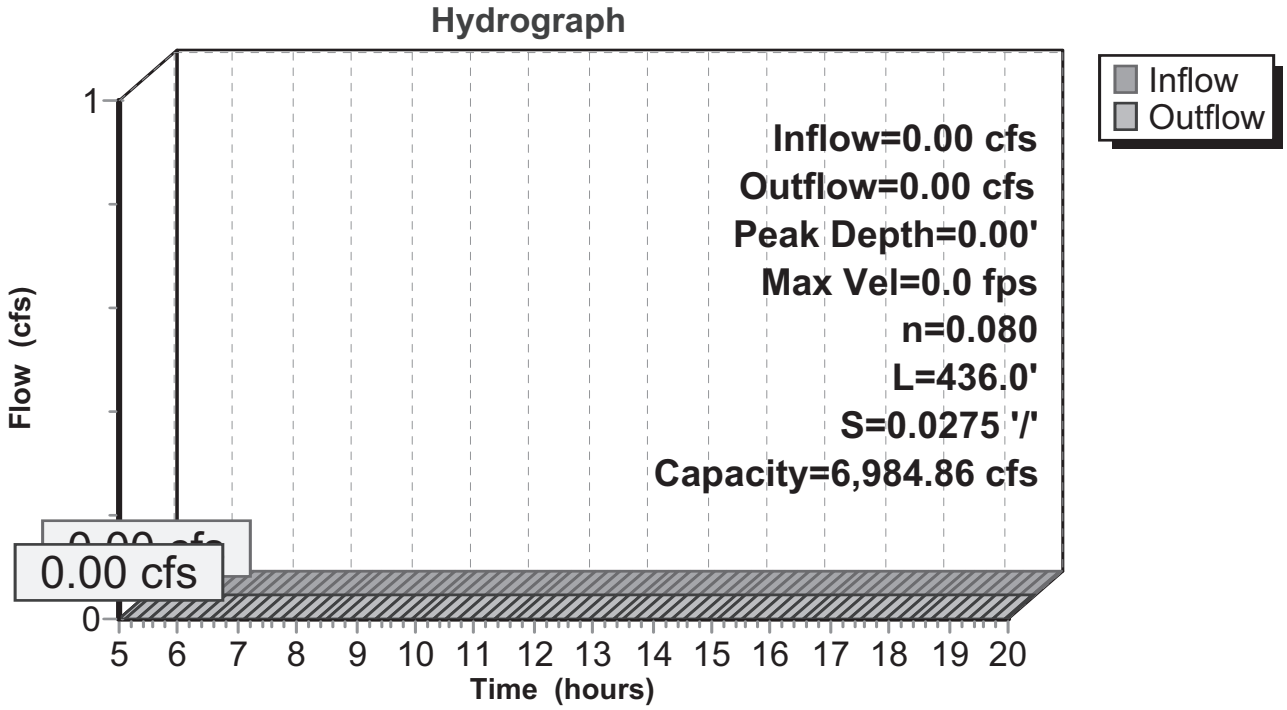
Reach 7R: Existing Swale

Inflow	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.0 fps, Avg. Travel Time= 0.0 min

Peak Depth= 0.00' @ 5.00 hrs
Capacity at bank full= 6,984.86 cfs
Inlet Invert= 480.00', Outlet Invert= 468.00'
0.00' x 11.90' deep channel, n= 0.080 Length= 436.0' Slope= 0.0275 '/'
Side Slope Z-value= 6.8 3.1 '/'

Reach 7R: Existing Swale

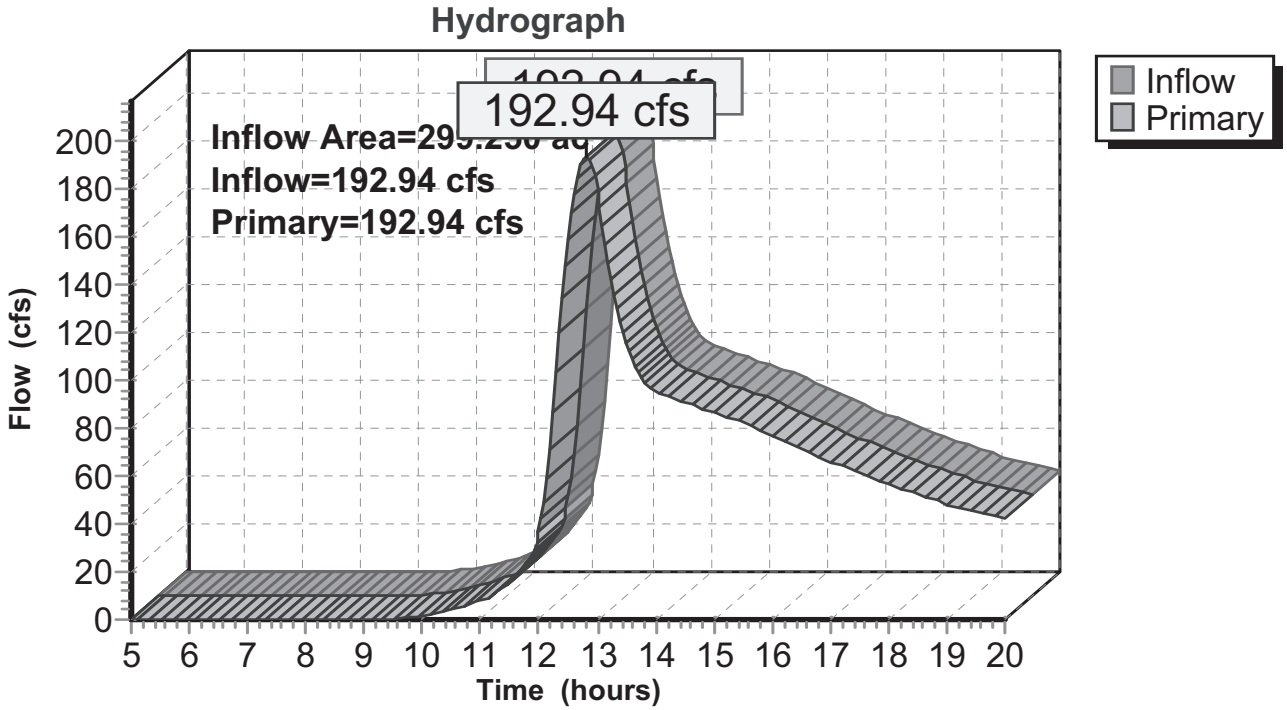


Pond 1P: Design Point 1 Outlet at Hasbrouck Road

Inflow Area = 299.250 ac, Inflow Depth = 2.27" for 10-YR STORM event
Inflow = 192.94 cfs @ 12.80 hrs, Volume= 56.680 af
Primary = 192.94 cfs @ 12.80 hrs, Volume= 56.680 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1 Outlet at Hasbrouck Road

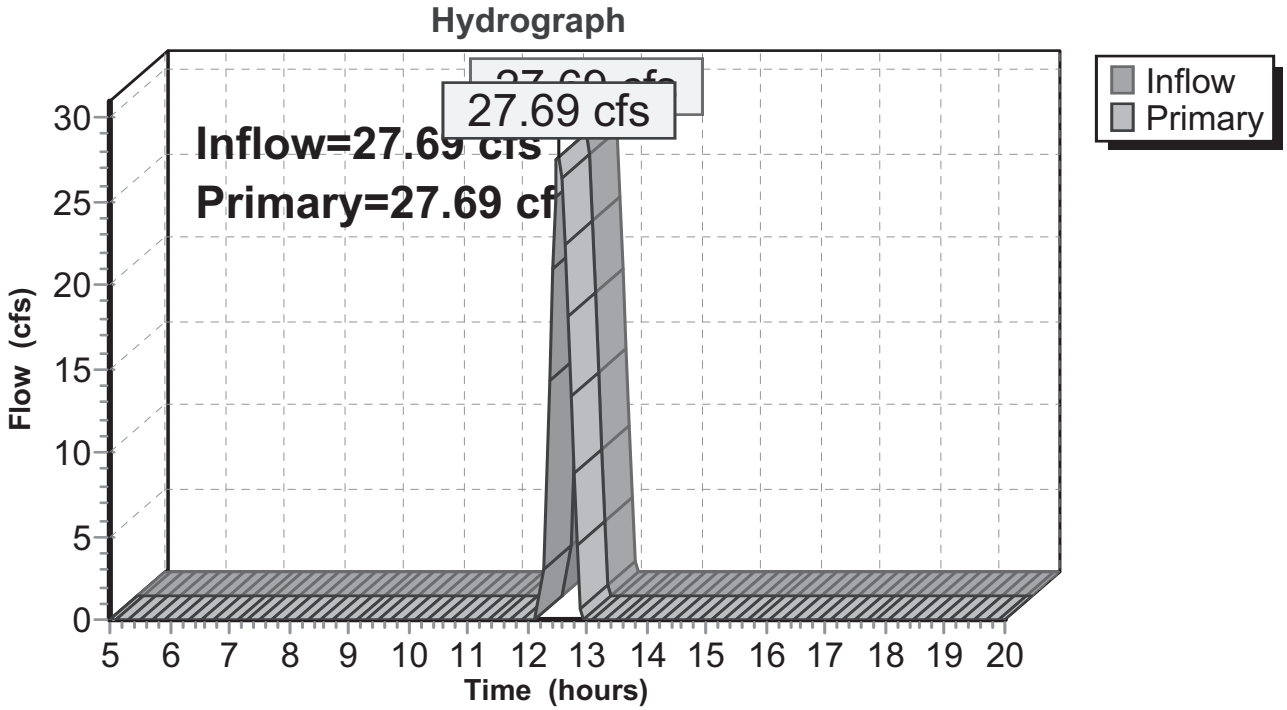


Pond 2P: Design Point 2 Existing Swale Along Craigville Road

Inflow	=	27.69 cfs @	12.52 hrs,	Volume=	0.888 af
Primary	=	27.69 cfs @	12.52 hrs,	Volume=	0.888 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 2P: Design Point 2 Existing Swale Along Craigville Road

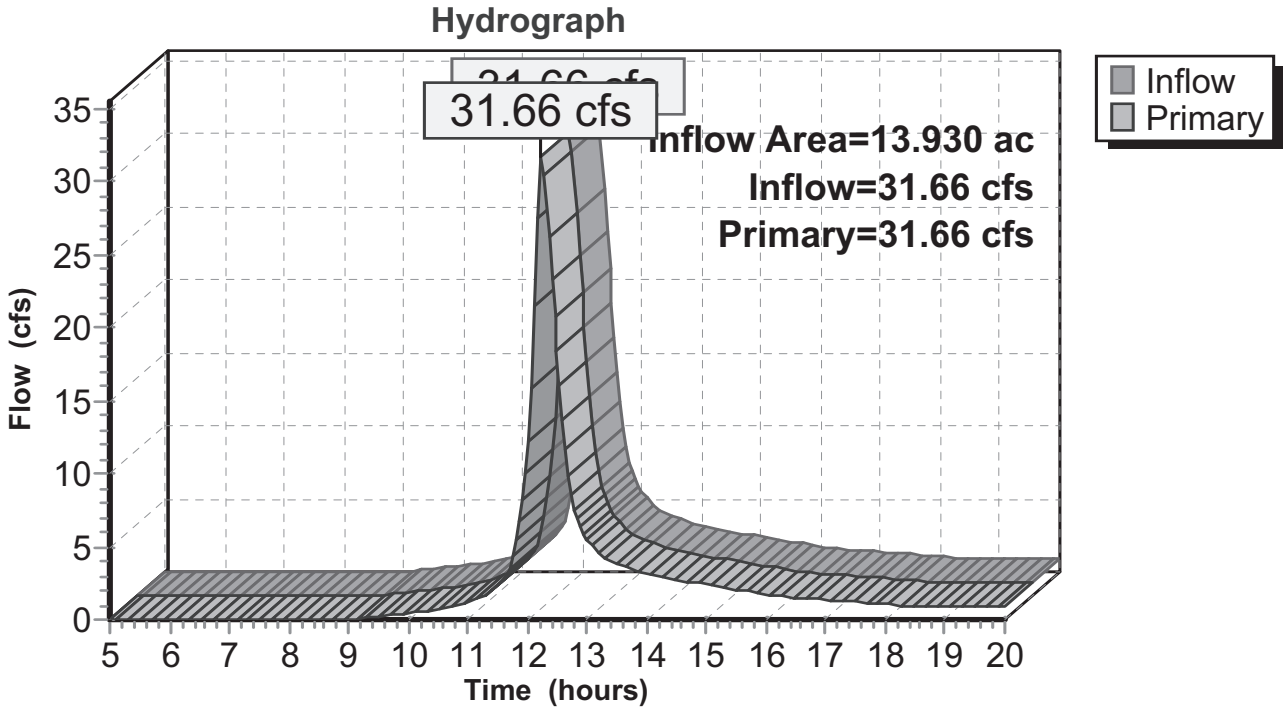


Pond 3P: Design Point 3 (Southeastern Property Line)

Inflow Area = 13.930 ac, Inflow Depth = 2.48" for 10-YR STORM event
Inflow = 31.66 cfs @ 12.23 hrs, Volume= 2.874 af
Primary = 31.66 cfs @ 12.23 hrs, Volume= 2.874 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 3P: Design Point 3 (Southeastern Property Line)

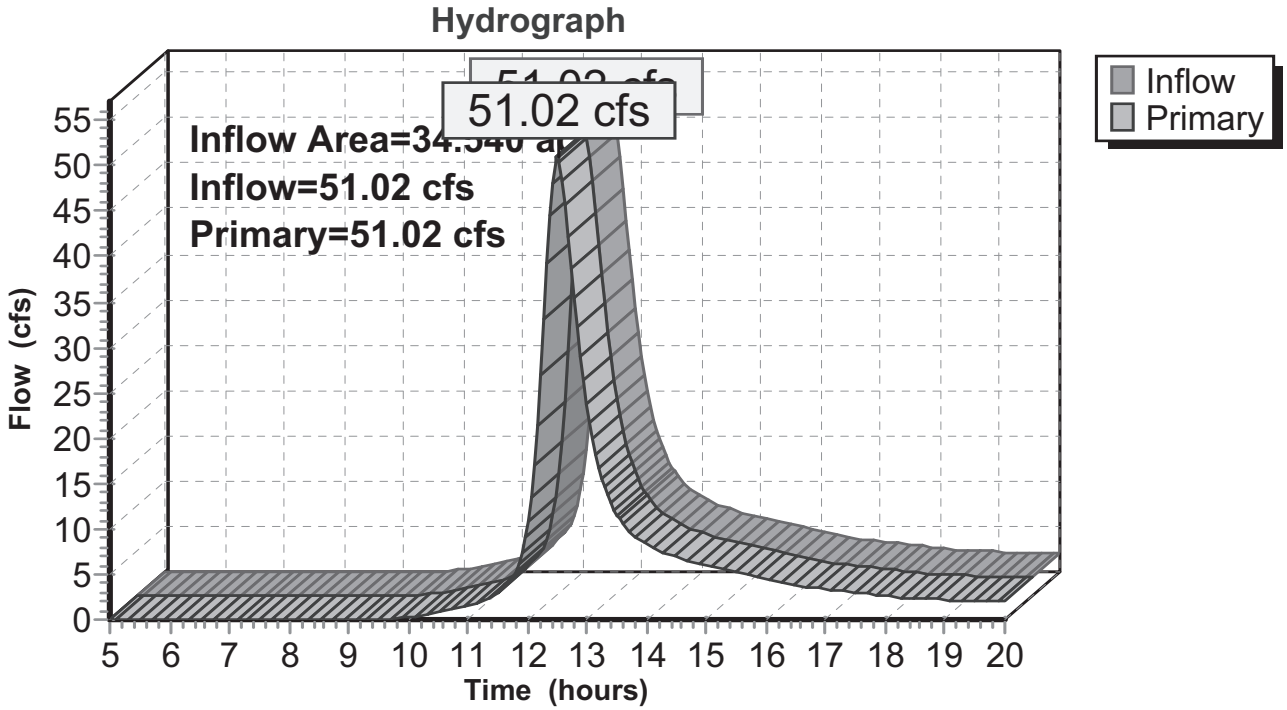


Pond 4P: Design Point 4 (Southwestern Property Line)

Inflow Area = 34.540 ac, Inflow Depth = 2.21" for 10-YR STORM event
Inflow = 51.02 cfs @ 12.50 hrs, Volume= 6.347 af
Primary = 51.02 cfs @ 12.50 hrs, Volume= 6.347 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 4P: Design Point 4 (Southwestern Property Line)



Pond 5P: Existing Wetland Pocket

Inflow Area = 162.070 ac, Inflow Depth = 2.48" for 10-YR STORM event
Inflow = 145.35 cfs @ 13.21 hrs, Volume= 33.561 af
Outflow = 58.22 cfs @ 14.65 hrs, Volume= 30.512 af, Atten= 60%, Lag= 86.6 min
Primary = 58.22 cfs @ 14.65 hrs, Volume= 30.512 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 469.29' @ 14.65 hrs Surf.Area= 0 sf Storage= 541,304 cf
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

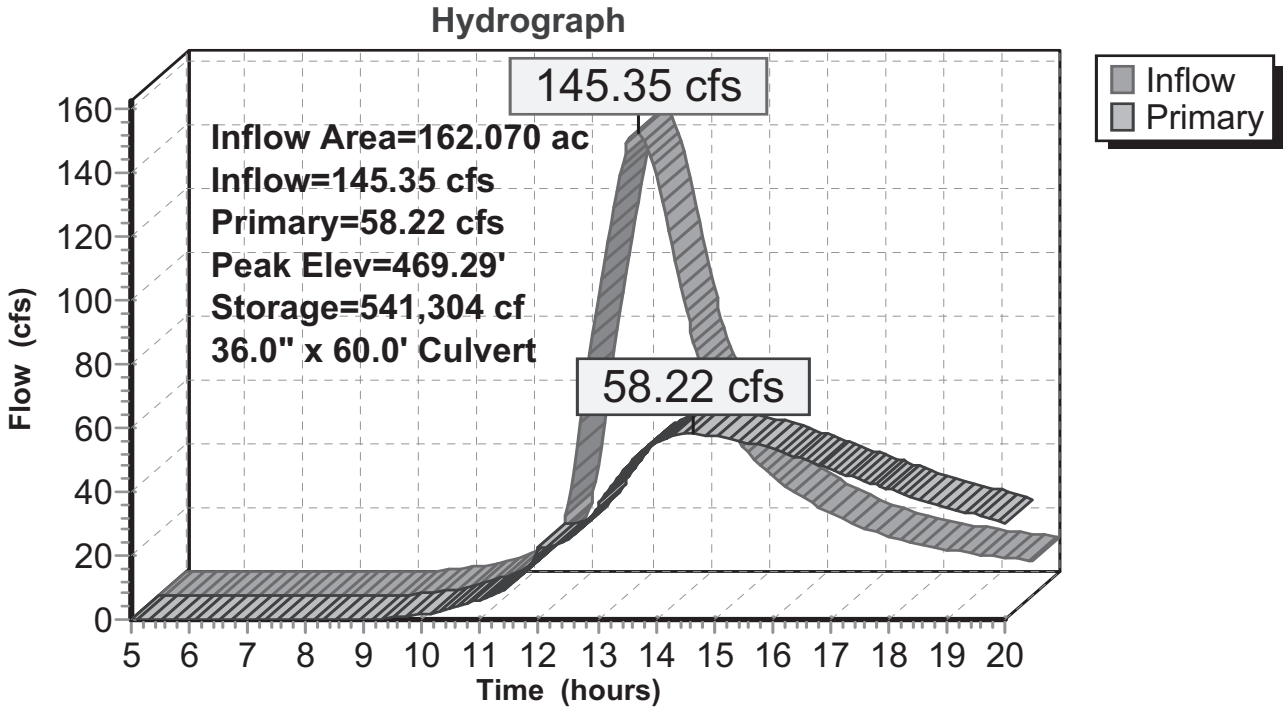
#	Invert	Avail.Storage	Storage Description
1	468.00'	4,153,277 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
468.00	0
470.00	838,050
472.00	2,316,286
474.00	4,153,277

#	Routing	Invert	Outlet Devices
1	Primary	466.24'	**36.0" x 60.0' long Culvert X 2.00** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 466.24' S= 0.0000 '/' n= 0.011 Cc= 0.900

Primary OutFlow Max=58.22 cfs @ 14.65 hrs HW=469.29' TW=467.00' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 58.22 cfs @ 5.0 fps)

Pond 5P: Existing Wetland Pocket



Pond 6P: Existing Culvert 2

Inflow Area =	44.990 ac,	Inflow Depth =	2.77"	for	10-YR STORM event
Inflow =	82.83 cfs @	12.52 hrs,	Volume=	10.381 af	
Outflow =	82.83 cfs @	12.52 hrs,	Volume=	10.381 af,	Atten= 0%, Lag= 0.0 min
Primary =	55.14 cfs @	12.52 hrs,	Volume=	9.493 af	
Secondary =	27.69 cfs @	12.52 hrs,	Volume=	0.888 af	

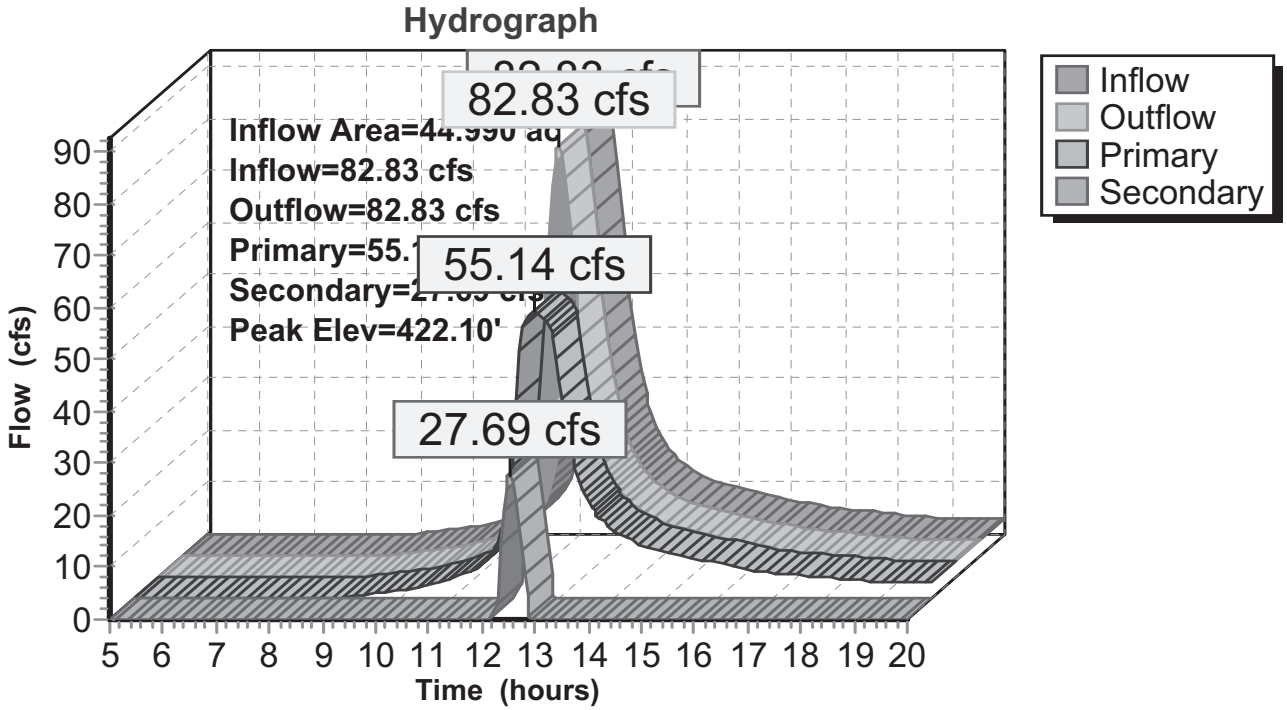
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 422.10' @ 12.52 hrs
Flood Elev= 424.00'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	417.23'	**36.0" x 45.0' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 416.82' S= 0.0091 '/' n= 0.011 Cc= 0.900
2	Secondary	421.50'	**22.0' long x 6.3' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.67 2.68 2.71 2.75 2.82

Primary OutFlow Max=55.11 cfs @ 12.52 hrs HW=422.10' TW=418.64' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 55.11 cfs @ 7.8 fps)

Secondary OutFlow Max=27.41 cfs @ 12.52 hrs HW=422.10' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 27.41 cfs @ 2.1 fps)

Pond 6P: Existing Culvert 2



Pond 7P: Existing Culvert 3

Inflow Area =	10.350 ac,	Inflow Depth =	2.47"	for	10-YR STORM event
Inflow =	19.08 cfs @	12.39 hrs,	Volume=	2.127 af	
Outflow =	19.08 cfs @	12.39 hrs,	Volume=	2.127 af,	Atten= 0%, Lag= 0.0 min
Primary =	12.30 cfs @	12.39 hrs,	Volume=	1.936 af	
Secondary =	6.78 cfs @	12.39 hrs,	Volume=	0.190 af	

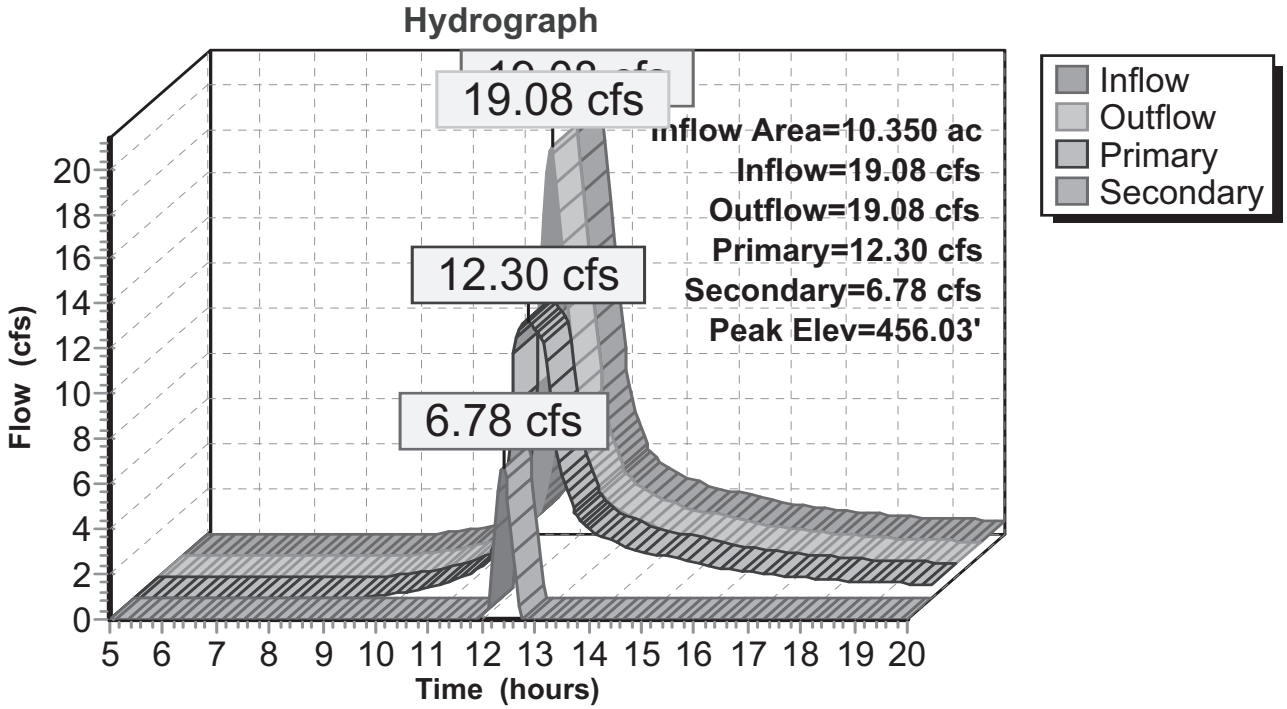
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 456.03' @ 12.39 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	452.60'	**18.0" x 45.6' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 451.11' S= 0.0327 '/' n= 0.011 Cc= 0.900
2	Secondary	455.50'	**6.5' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=12.29 cfs @ 12.39 hrs HW=456.03' TW=441.26' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 12.29 cfs @ 7.0 fps)

Secondary OutFlow Max=6.72 cfs @ 12.39 hrs HW=456.03' TW=454.71' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 6.72 cfs @ 1.9 fps)

Pond 7P: Existing Culvert 3



Pond 8P: Existing Culvert 4

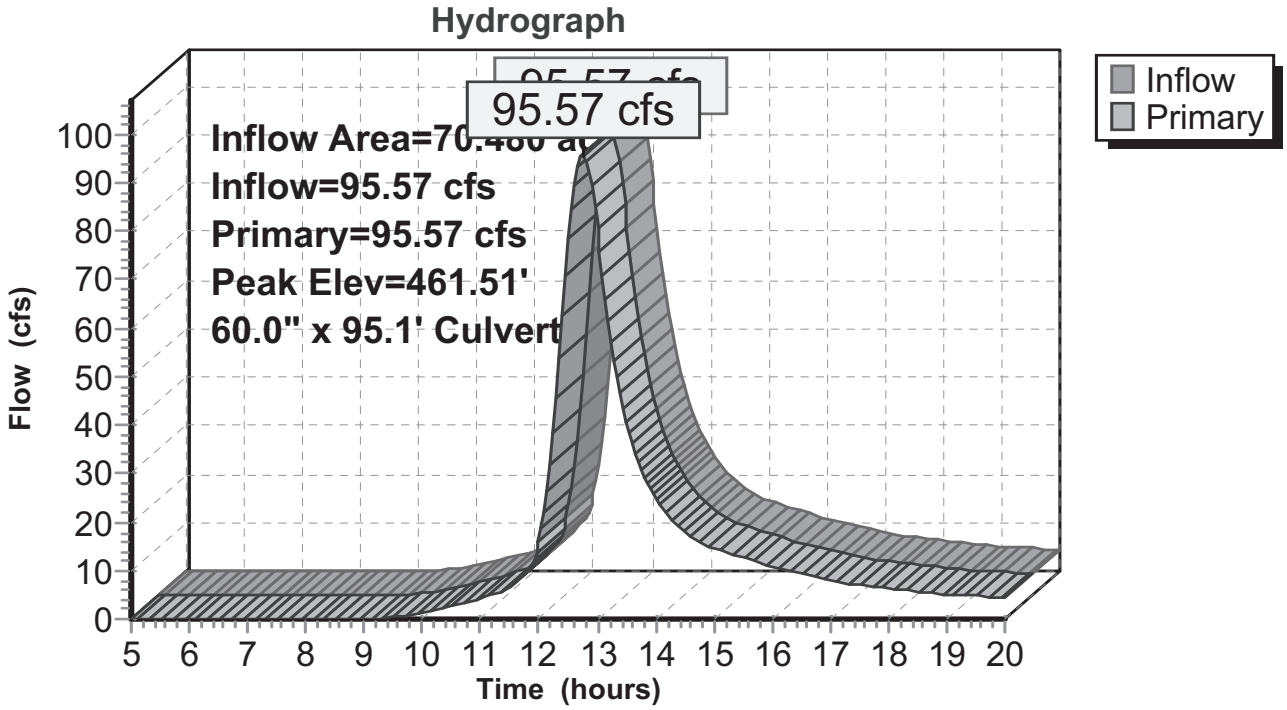
Inflow Area =	70.480 ac,	Inflow Depth =	2.53"	for	10-YR STORM event	
Inflow =	95.57 cfs @	12.74 hrs,	Volume=		14.842 af	
Outflow =	95.57 cfs @	12.74 hrs,	Volume=		14.842 af,	Atten= 0%, Lag= 0.0 min
Primary =	95.57 cfs @	12.74 hrs,	Volume=		14.842 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 461.51' @ 12.74 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	457.96'	**60.0" x 95.1' long Culvert** CMP, square edge headwall, Ke= 0.500 Outlet Invert= 456.17' S= 0.0188 '/' n= 0.011 Cc= 0.900

Primary OutFlow Max=95.48 cfs @ 12.74 hrs HW=461.51' TW=457.70' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 95.48 cfs @ 6.4 fps)

Pond 8P: Existing Culvert 4



Pond 9P: Existing Culvert 5

Inflow Area =	11.360 ac,	Inflow Depth =	2.47"	for	10-YR STORM event
Inflow =	20.97 cfs @	12.39 hrs,	Volume=	2.334 af	
Outflow =	20.97 cfs @	12.39 hrs,	Volume=	2.334 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.30 cfs @	12.39 hrs,	Volume=	1.774 af	
Secondary =	13.67 cfs @	12.39 hrs,	Volume=	0.561 af	

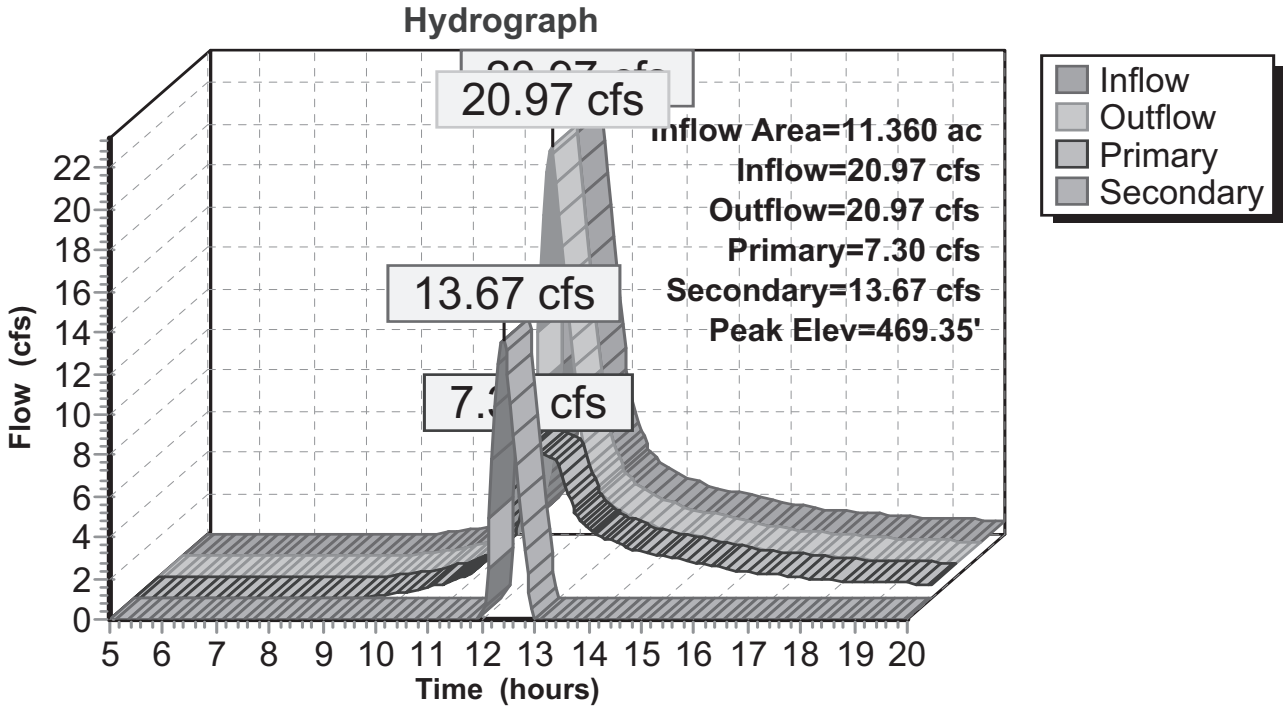
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 469.35' @ 12.39 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	466.76'	**15.0" x 50.3' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 465.61' S= 0.0229 '/' n= 0.011 Cc= 0.900
2	Secondary	469.00'	**25.0' long x 60.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=7.30 cfs @ 12.39 hrs HW=469.34' TW=460.50' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.30 cfs @ 5.9 fps)

Secondary OutFlow Max=13.60 cfs @ 12.39 hrs HW=469.34' TW=457.44' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 13.60 cfs @ 1.6 fps)

Pond 9P: Existing Culvert 5



Pond 10P: Existing Culvert 6

Inflow Area =	5.020 ac,	Inflow Depth =	2.54"	for	10-YR STORM event
Inflow =	7.82 cfs @	12.58 hrs,	Volume=	1.062 af	
Outflow =	7.82 cfs @	12.58 hrs,	Volume=	1.062 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.82 cfs @	12.58 hrs,	Volume=	1.062 af	
Secondary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af	

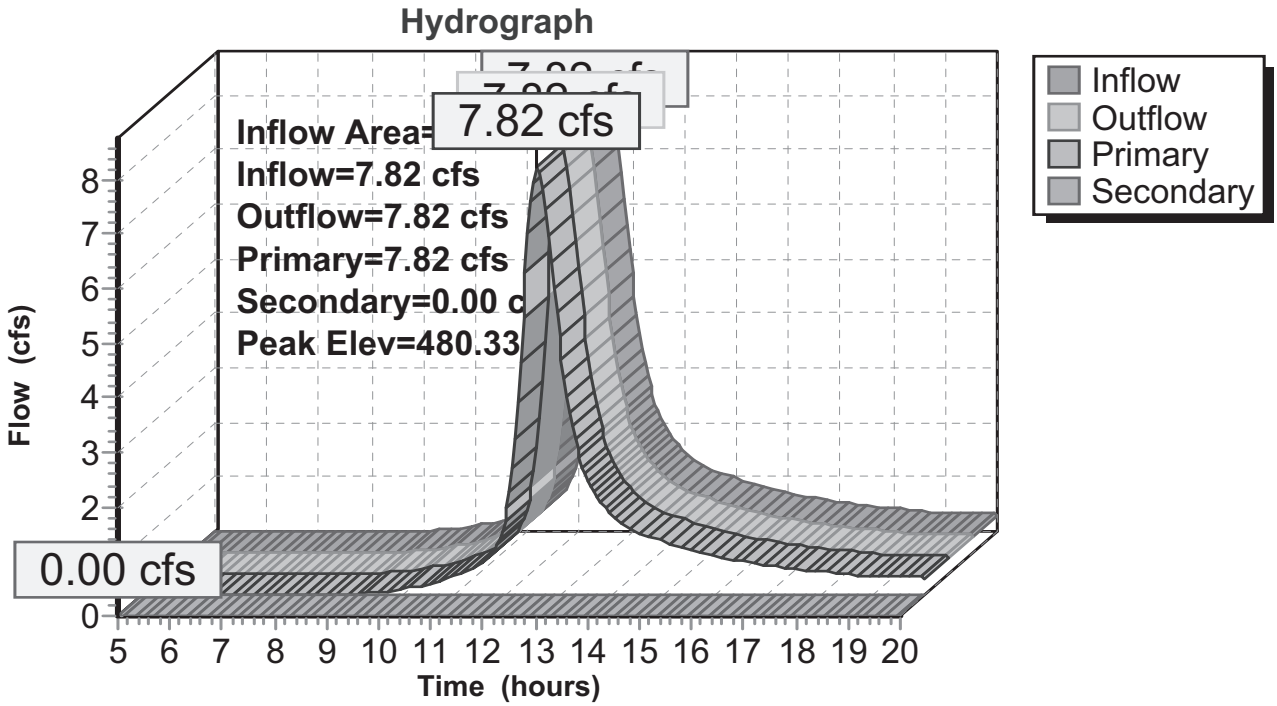
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 480.33' @ 12.58 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	477.46'	**15.0" x 54.0' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 475.67' S= 0.0331 '/' n= 0.011 Cc= 0.900
2	Secondary	481.50'	**160.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=7.80 cfs @ 12.58 hrs HW=480.32' TW=468.18' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.80 cfs @ 6.4 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=477.46' TW=480.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 10P: Existing Culvert 6



Pond 11P: Existing Culvert 9

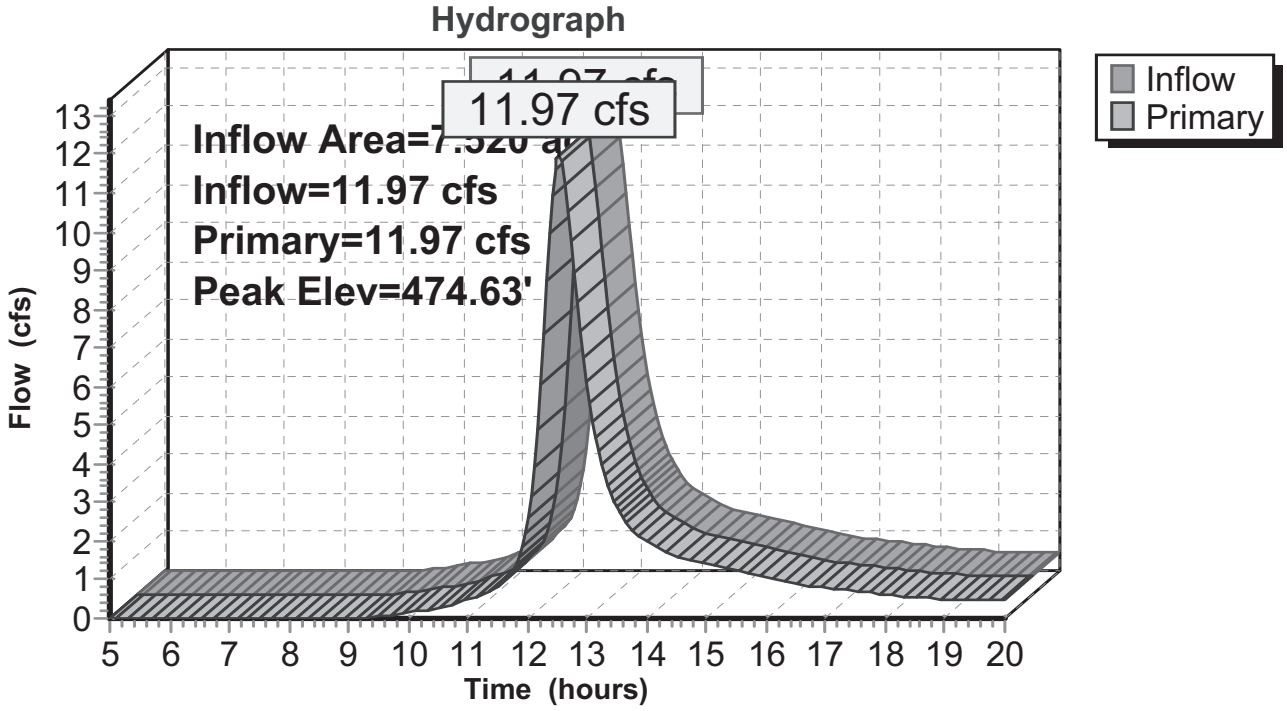
Inflow Area = 7.520 ac, Inflow Depth = 2.46" for 10-YR STORM event
Inflow = 11.97 cfs @ 12.53 hrs, Volume= 1.539 af
Outflow = 11.97 cfs @ 12.53 hrs, Volume= 1.539 af, Atten= 0%, Lag= 0.0 min
Primary = 11.97 cfs @ 12.53 hrs, Volume= 1.539 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 474.63' @ 12.53 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	471.95'	**15.0" x 45.5' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 471.00' S= 0.0209 '/' n= 0.011 Cc= 0.900
2	Primary	474.50'	**35.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=11.93 cfs @ 12.53 hrs HW=474.63' TW=468.15' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.48 cfs @ 6.1 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 4.46 cfs @ 1.0 fps)

Pond 11P: Existing Culvert 9



Pond 12P: Existing Culvert 11

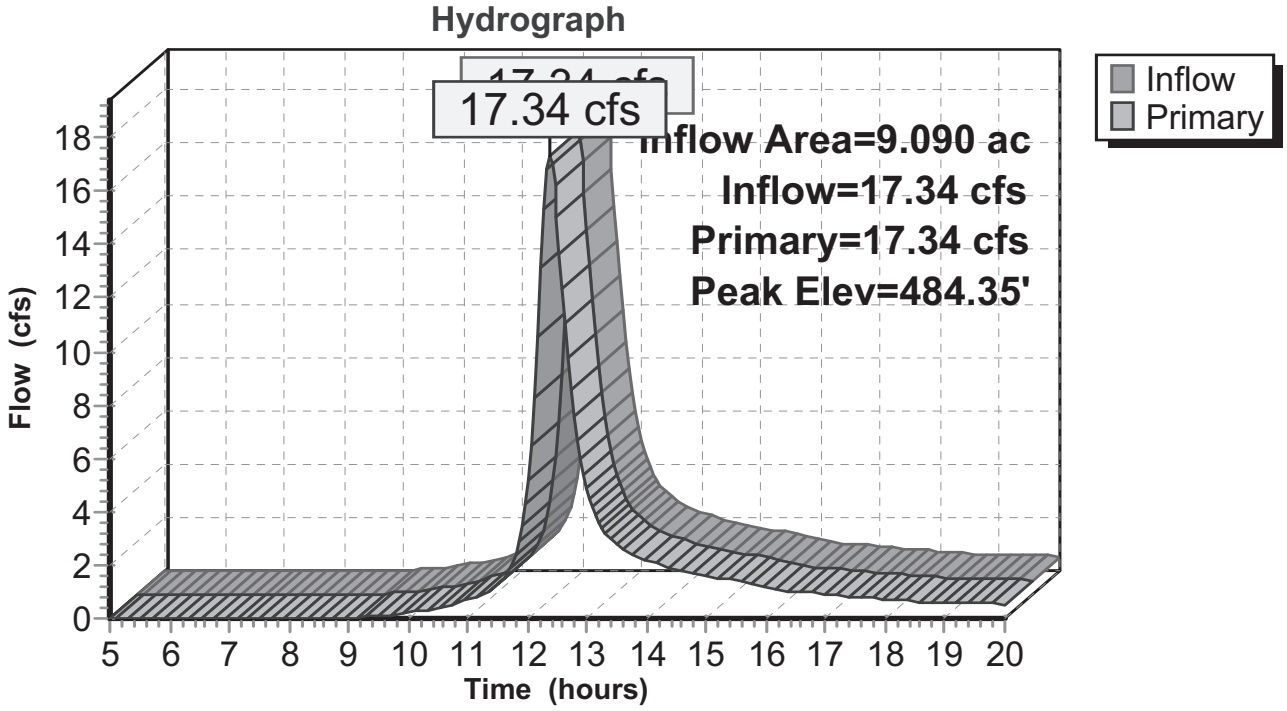
Inflow Area =	9.090 ac,	Inflow Depth =	2.47"	for	10-YR STORM event
Inflow =	17.34 cfs @	12.36 hrs,	Volume=	1.869 af	
Outflow =	17.34 cfs @	12.36 hrs,	Volume=	1.869 af,	Atten= 0%, Lag= 0.0 min
Primary =	17.34 cfs @	12.36 hrs,	Volume=	1.869 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 484.35' @ 12.36 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	480.71'	**15.0" x 53.4' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 479.74' S= 0.0182 '/' n= 0.011 Cc= 0.900
2	Primary	483.50'	**4.0' long x 125.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=17.28 cfs @ 12.36 hrs HW=484.35' TW=468.07' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 9.05 cfs @ 7.4 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 8.23 cfs @ 2.4 fps)

Pond 12P: Existing Culvert 11



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

Subcatchment 1S: Subcatchment 1S Runoff Area=44.990 ac Runoff Depth=3.53"
Flow Length=2,651' Tc=39.2 min CN=76 Runoff=99.92 cfs 13.222 af

Subcatchment 2S: Subcatchment 2S Runoff Area=10.350 ac Runoff Depth=3.24"
Flow Length=1,752' Tc=27.2 min CN=73 Runoff=25.09 cfs 2.798 af

Subcatchment 3S: Subcatchment 3S Runoff Area=70.480 ac Runoff Depth=3.31"
Flow Length=4,060' Tc=53.6 min CN=74 Runoff=125.10 cfs 19.443 af

Subcatchment 4S: Subcatchment 4S Runoff Area=11.360 ac Runoff Depth=3.24"
Flow Length=986' Tc=27.1 min CN=73 Runoff=27.58 cfs 3.071 af

Subcatchment 5S: Subcatchment 5S Runoff Area=5.020 ac Runoff Depth=3.32"
Flow Length=1,150' Tc=41.7 min CN=74 Runoff=10.23 cfs 1.391 af

Subcatchment 6S: Subcatchment 6S Runoff Area=7.520 ac Runoff Depth=3.23"
Flow Length=2,174' Tc=37.3 min CN=73 Runoff=15.74 cfs 2.025 af

Subcatchment 7S: Subcatchment 7S Runoff Area=140.440 ac Runoff Depth=3.26"
Flow Length=3,523' Tc=92.9 min CN=74 Runoff=176.76 cfs 38.142 af

Subcatchment 8S: Subcatchment 8S Runoff Area=9.090 ac Runoff Depth=3.25"
Flow Length=952' Tc=25.2 min CN=73 Runoff=22.80 cfs 2.459 af

Subcatchment 9S: Subcatchment 9S Runoff Area=13.930 ac Runoff Depth=3.26"
Flow Length=526' Tc=16.3 min CN=73 Runoff=41.65 cfs 3.780 af

Subcatchment 10S: Subcatchment 10S Runoff Area=34.540 ac Runoff Depth=2.95"
Flow Length=1,359' Tc=34.6 min CN=70 Runoff=68.36 cfs 8.478 af

Reach 1R: Existing Stream Peak Depth=2.13' Max Vel=3.7 fps Inflow=233.19 cfs 72.572 af
n=0.080 L=1,210.0' S=0.0279 '/' Capacity=2,412.63 cfs Outflow=231.29 cfs 71.991 af

Reach 2R: Existing Stream Peak Depth=1.77' Max Vel=4.5 fps Inflow=179.13 cfs 61.307 af
n=0.080 L=609.0' S=0.0361 '/' Capacity=11,130.94 cfs Outflow=178.87 cfs 61.077 af

Reach 3R: Existing Stream Peak Depth=1.73' Max Vel=3.7 fps Inflow=167.81 cfs 59.157 af
n=0.080 L=541.0' S=0.0299 '/' Capacity=9,486.07 cfs Outflow=167.35 cfs 58.927 af

Reach 4R: Existing Stream Peak Depth=0.61' Max Vel=0.9 fps Inflow=74.73 cfs 39.352 af
n=0.080 L=432.0' S=0.0051 '/' Capacity=6,025.46 cfs Outflow=74.69 cfs 38.793 af

Reach 5R: Existing Stream Peak Depth=0.86' Max Vel=1.1 fps Inflow=72.37 cfs 38.406 af
n=0.080 L=1,188.0' S=0.0051 '/' Capacity=5,559.50 cfs Outflow=72.12 cfs 37.195 af

Reach 6R: Existing Swale Peak Depth=0.92' Max Vel=2.7 fps Inflow=12.22 cfs 0.418 af
n=0.080 L=520.0' S=0.0615 '/' Capacity=93.65 cfs Outflow=11.92 cfs 0.418 af

Reach 7R: Existing Swale Peak Depth=0.28' Max Vel=0.9 fps Inflow=0.58 cfs 0.007 af
n=0.080 L=436.0' S=0.0275 '/' Capacity=6,984.86 cfs Outflow=0.35 cfs 0.007 af

Pond 1P: Design Point 1 Outlet at Hasbrouck Road Inflow=231.29 cfs 71.991 af
Primary=231.29 cfs 71.991 af

Pond 2P: Design Point 2 Existing Swale Along Craigville Road Inflow=52.79 cfs 2.145 af
Primary=52.79 cfs 2.145 af

Pond 3P: Design Point 3 (Southeastern Property Line) Inflow=41.65 cfs 3.780 af
Primary=41.65 cfs 3.780 af

Pond 4P: Design Point 4 (Southwestern Property Line) Inflow=68.36 cfs 8.478 af
Primary=68.36 cfs 8.478 af

Pond 5P: Existing Wetland Pocket Peak Elev=469.81' Storage=758,090 cf Inflow=190.43 cfs 44.010 af
36.0" x 60.0' Culvert Outflow=72.37 cfs 38.406 af

Pond 6P: Existing Culvert 2 Peak Elev=422.43' Inflow=110.44 cfs 13.640 af
Primary=57.75 cfs 11.495 af Secondary=52.79 cfs 2.145 af Outflow=110.44 cfs 13.640 af

Pond 7P: Existing Culvert 3 Peak Elev=456.29' Inflow=25.09 cfs 2.798 af
Primary=12.88 cfs 2.380 af Secondary=12.22 cfs 0.418 af Outflow=25.09 cfs 2.798 af

Pond 8P: Existing Culvert 4 Peak Elev=462.22' Inflow=125.10 cfs 19.443 af
60.0" x 95.1' Culvert Outflow=125.10 cfs 19.443 af

Pond 9P: Existing Culvert 5 Peak Elev=469.45' Inflow=27.58 cfs 3.078 af
Primary=7.48 cfs 2.157 af Secondary=20.09 cfs 0.921 af Outflow=27.58 cfs 3.078 af

Pond 10P: Existing Culvert 6 Peak Elev=481.51' Inflow=10.23 cfs 1.391 af
Primary=9.65 cfs 1.384 af Secondary=0.58 cfs 0.007 af Outflow=10.23 cfs 1.391 af

Pond 11P: Existing Culvert 9 Peak Elev=474.70' Inflow=15.74 cfs 2.025 af
Outflow=15.74 cfs 2.025 af

Pond 12P: Existing Culvert 11 Peak Elev=484.67' Inflow=22.80 cfs 2.459 af
Outflow=22.80 cfs 2.459 af

Total Runoff Area = 347.720 ac Runoff Volume = 94.808 af Average Runoff Depth = 3.27"

Subcatchment 1S: Subcatchment 1S

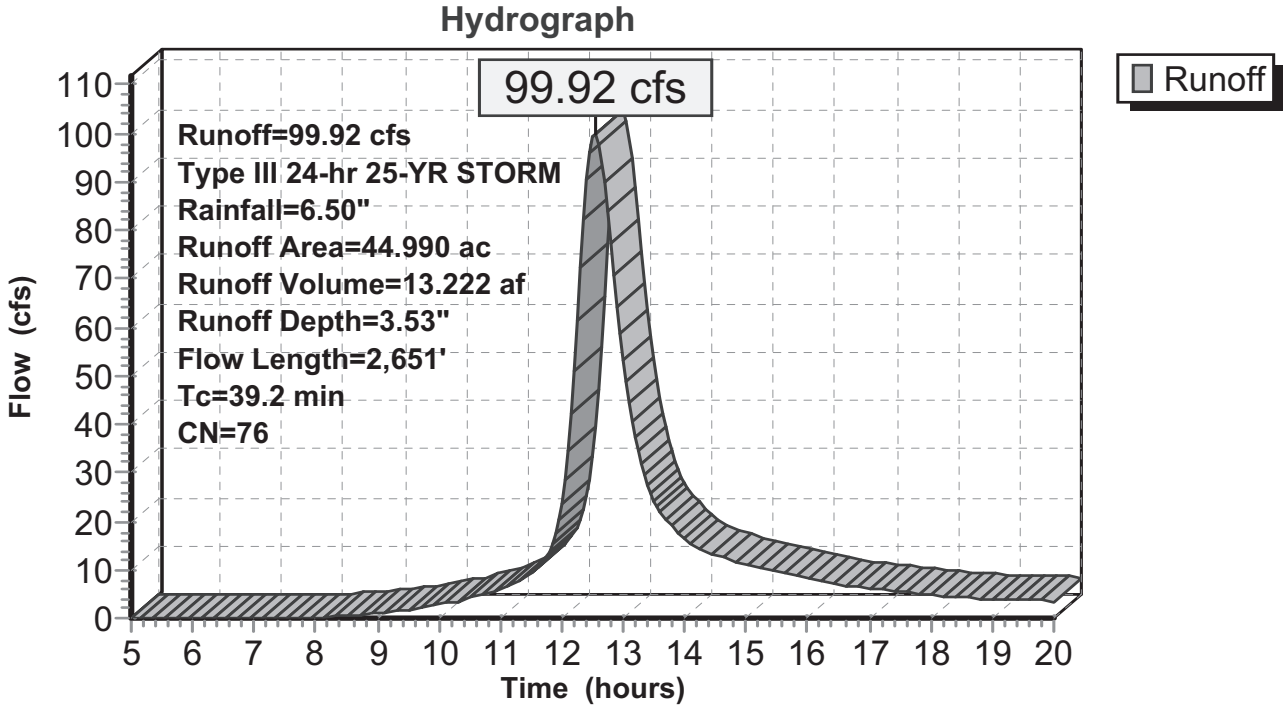
Runoff = 99.92 cfs @ 12.54 hrs, Volume= 13.222 af, Depth= 3.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.920	98	Existing pavement
0.310	71	Meadow, non-grazed, HSG C
15.500	79	50-75% Grass cover, Fair, HSG C
28.260	73	Woods, Fair, HSG C
44.990	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0622	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
10.9	947	0.0846	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.5	598	0.1003	2.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.8	1,006	0.0962	1.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
39.2	2,651	Total			

Subcatchment 1S: Subcatchment 1S



Subcatchment 2S: Subcatchment 2S

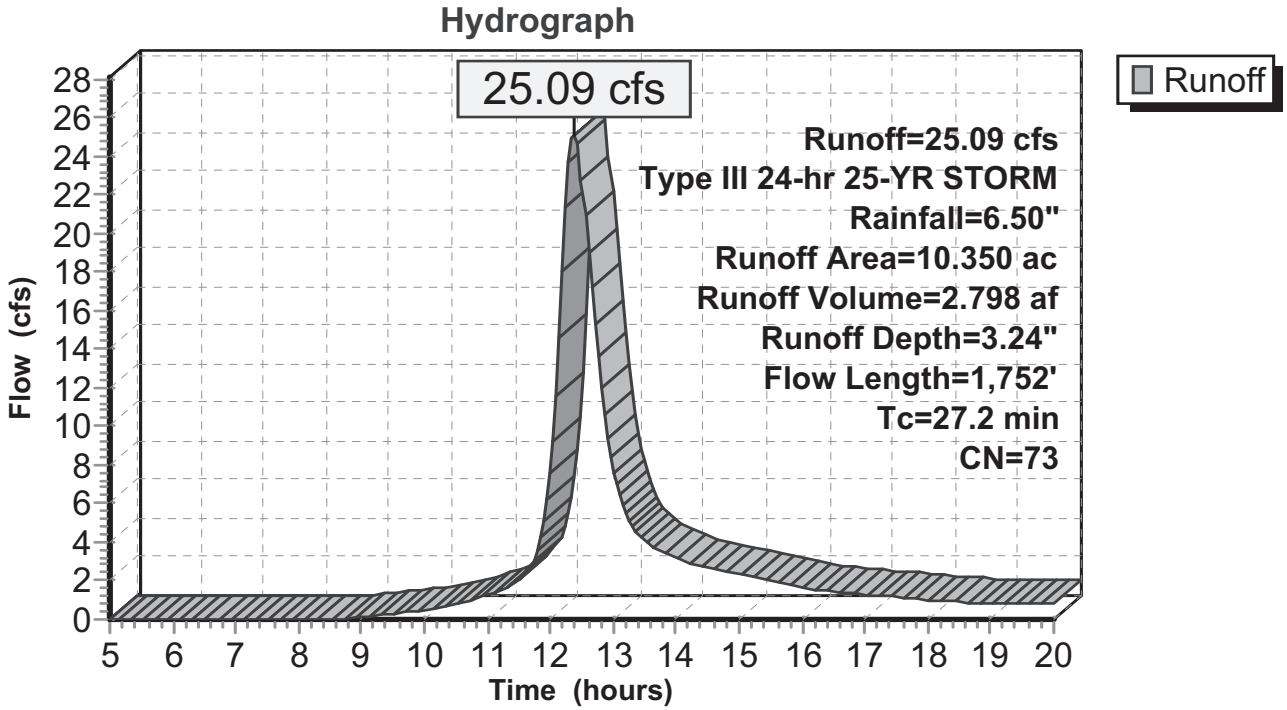
Runoff = 25.09 cfs @ 12.38 hrs, Volume= 2.798 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.080	98	Existing pavement
0.120	71	Meadow, non-grazed, HSG C
10.150	73	Woods, Fair, HSG C
10.350	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.1300	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
17.2	1,589	0.0944	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.3	63	0.0625	3.8		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
27.2	1,752	Total			

Subcatchment 2S: Subcatchment 2S



Subcatchment 3S: Subcatchment 3S

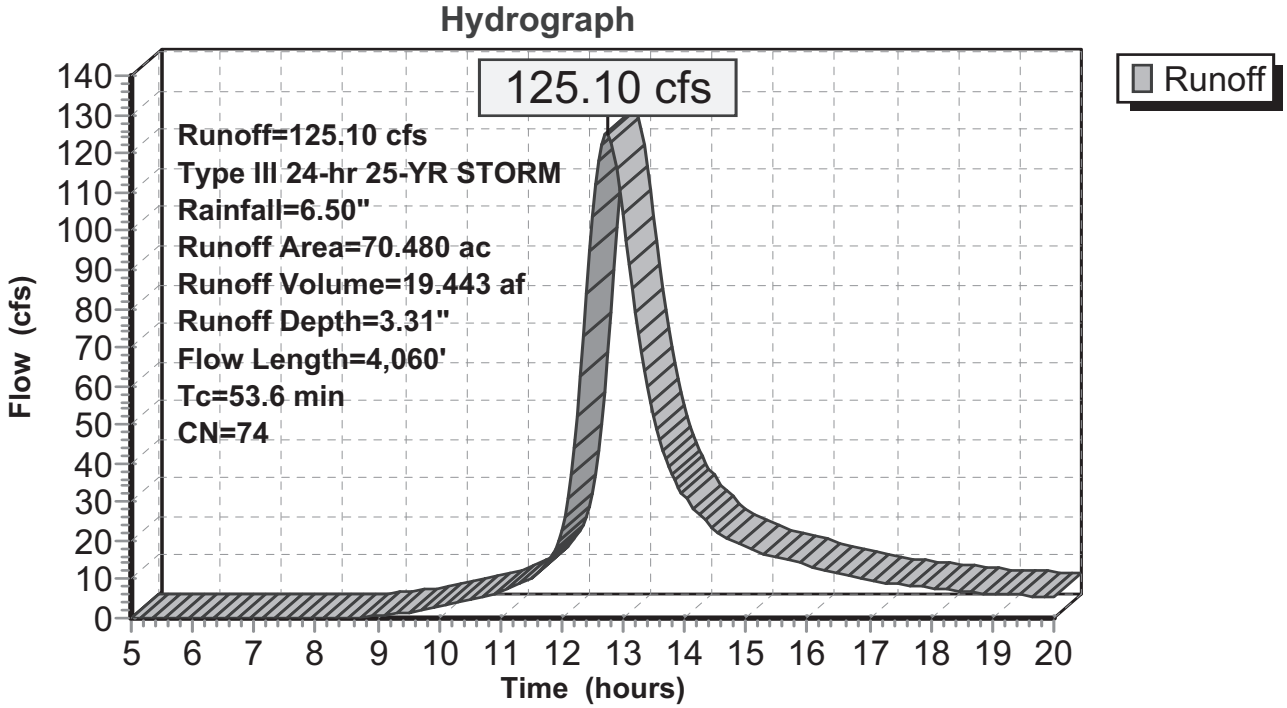
Runoff = 125.10 cfs @ 12.73 hrs, Volume= 19.443 af, Depth= 3.31"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.450	98	Existing pavement
0.680	71	Meadow, non-grazed, HSG C
0.870	78	Meadow, non-grazed, HSG D
58.440	73	Woods, Fair, HSG C
10.040	79	Woods, Fair, HSG D
70.480	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	100	0.0155	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
14.4	914	0.0445	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.8	1,806	0.0836	3.8	43.28	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=1.50' Z= 5.0 '/' n= 0.091
8.7	1,240	0.0081	2.4	5.22	**Channel Flow,** Area= 2.2 sf Perim= 10.4' r= 0.21' n= 0.020
53.6	4,060	Total			

Subcatchment 3S: Subcatchment 3S



Subcatchment 4S: Subcatchment 4S

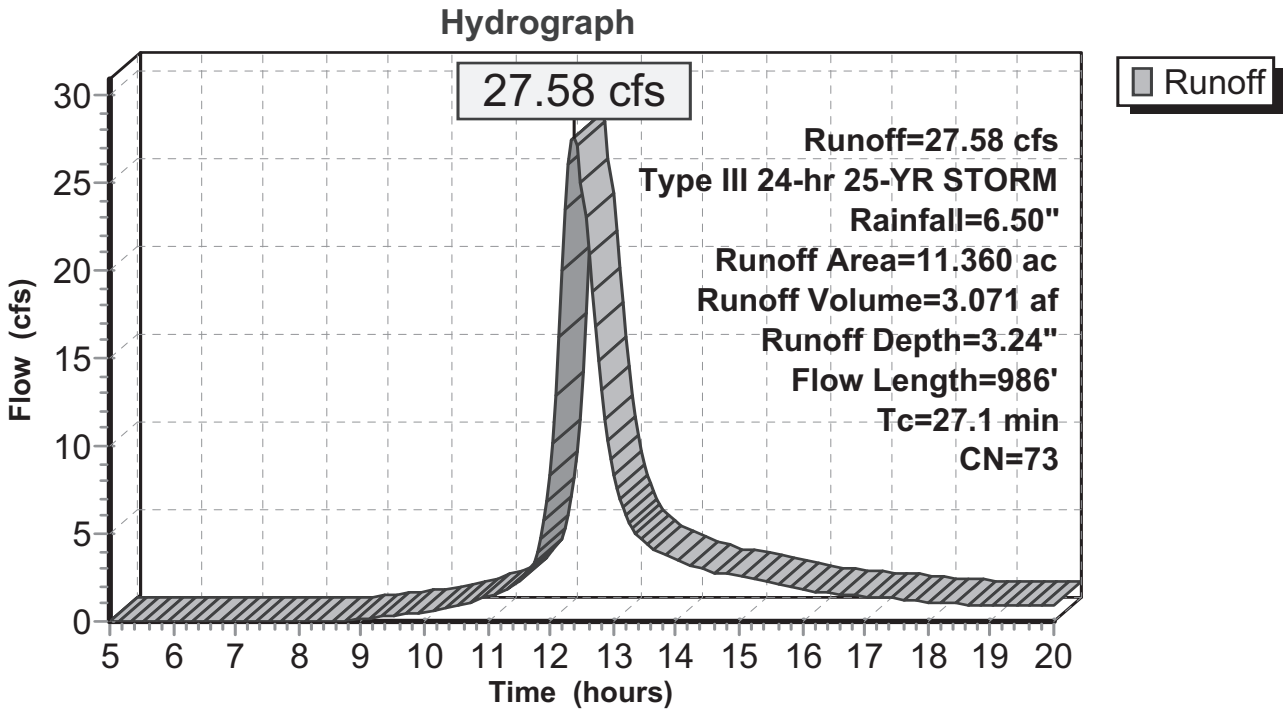
Runoff = 27.58 cfs @ 12.38 hrs, Volume= 3.071 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.170	98	Existing pavement
0.090	71	Meadow, non-grazed, HSG C
0.220	78	Meadow, non-grazed, HSG D
0.050	36	Woods, Fair, HSG A
10.670	73	Woods, Fair, HSG C
0.160	79	Woods, Fair, HSG D
11.360	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0432	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
12.0	886	0.0601	1.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.1	986	Total			

Subcatchment 4S: Subcatchment 4S



Subcatchment 5S: Subcatchment 5S

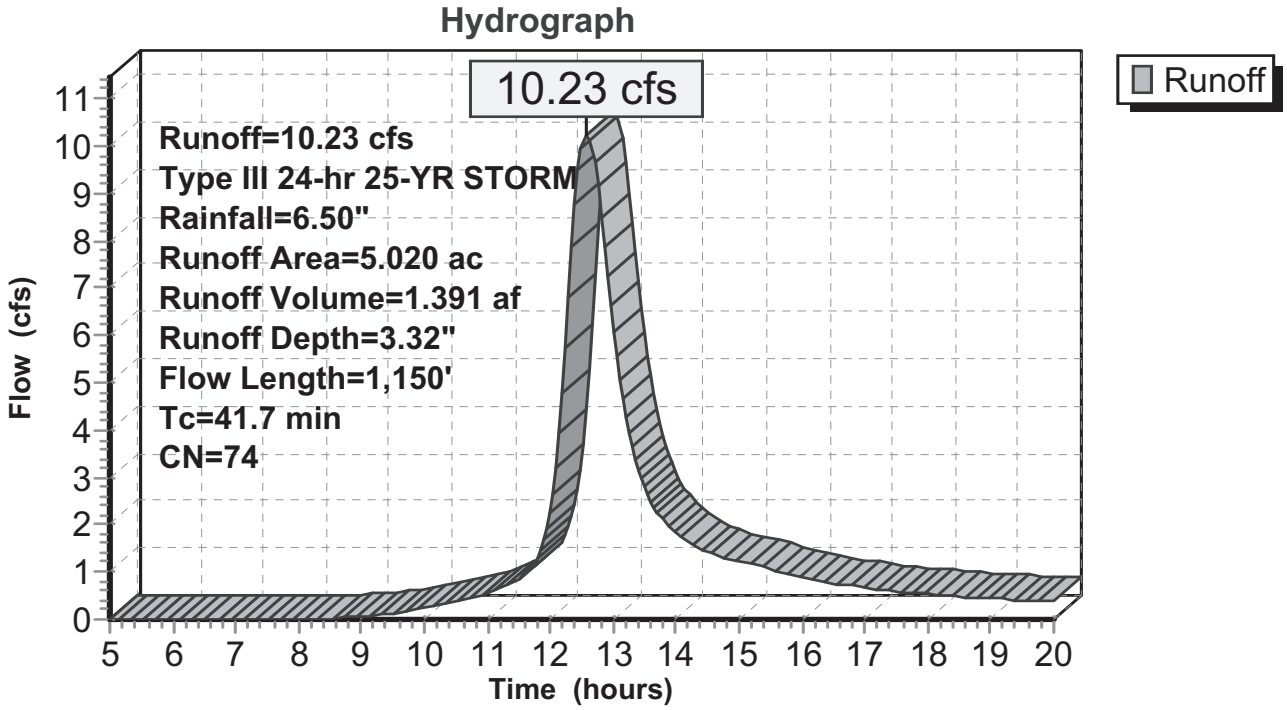
Runoff = 10.23 cfs @ 12.57 hrs, Volume= 1.391 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.230	98	Existing pavement
0.380	71	Meadow, non-grazed, HSG C
4.410	73	Woods, Fair, HSG C
5.020	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0457	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.2	175	0.0340	0.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	133	0.2400	2.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.8	742	0.0060	0.5		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
41.7	1,150	Total			

Subcatchment 5S: Subcatchment 5S



Subcatchment 6S: Subcatchment 6S

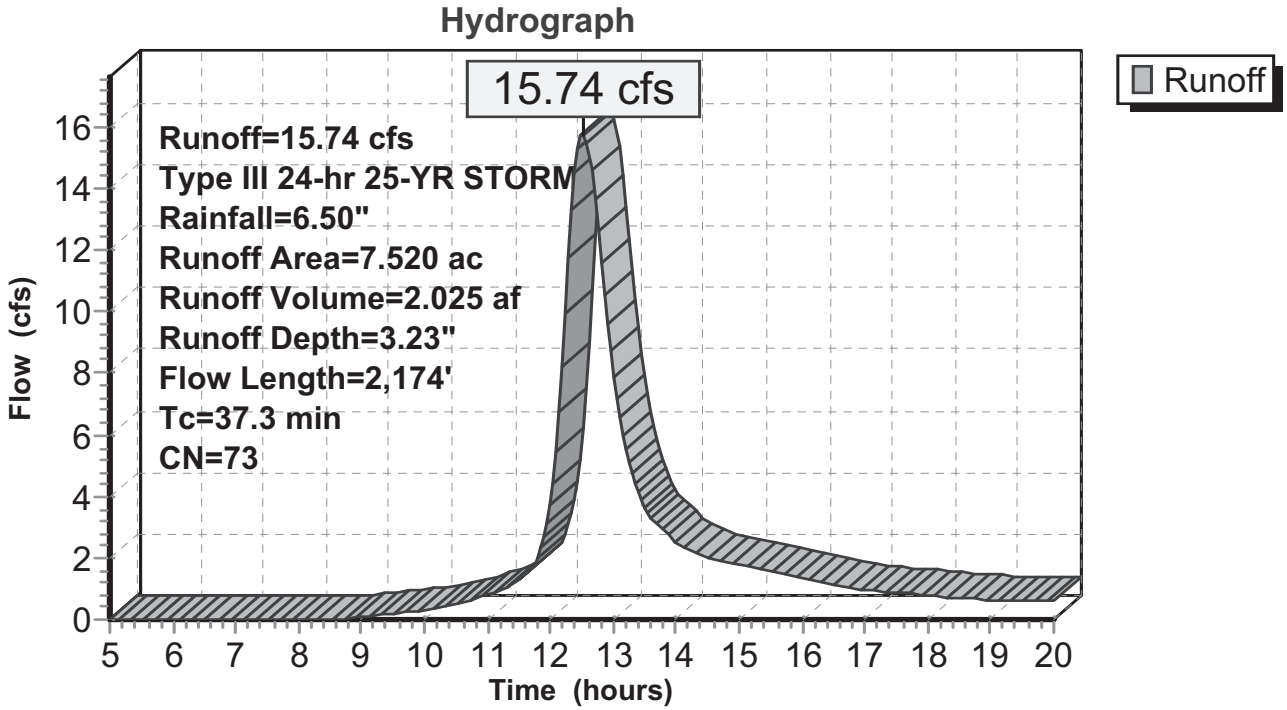
Runoff = 15.74 cfs @ 12.52 hrs, Volume= 2.025 af, Depth= 3.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.090	98	Existing pavement
0.480	71	Meadow, non-grazed, HSG C
0.050	78	Meadow, non-grazed, HSG D
6.600	73	Woods, Fair, HSG C
0.300	79	Woods, Fair, HSG D
7.520	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	100	0.0422	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
11.6	1,268	0.1323	1.8		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	78	0.2051	2.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.3	409	0.0674	1.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.6	319	0.0273	1.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
37.3	2,174	Total			

Subcatchment 6S: Subcatchment 6S



Subcatchment 7S: Subcatchment 7S

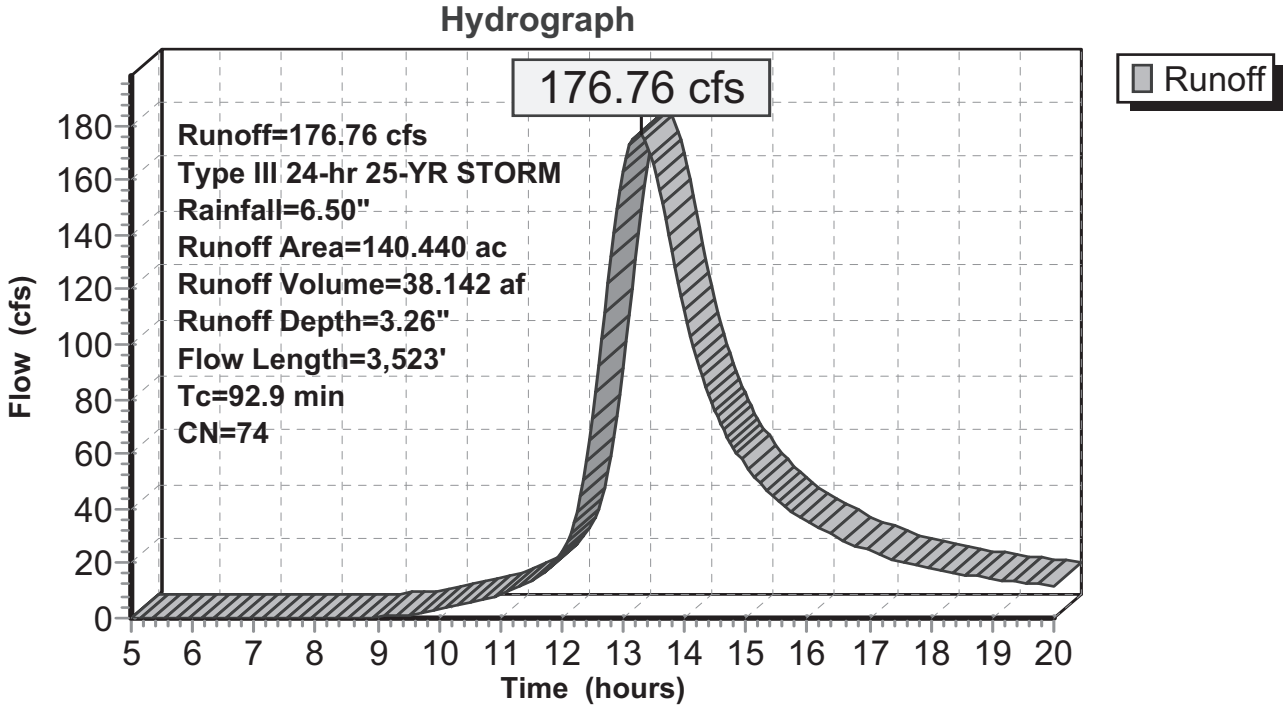
Runoff = 176.76 cfs @ 13.28 hrs, Volume= 38.142 af, Depth= 3.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
1.110	98	Existing pavement
8.010	71	Meadow, non-grazed, HSG C
10.180	78	Meadow, non-grazed, HSG D
0.870	36	Woods, Fair, HSG A
100.000	73	Woods, Fair, HSG C
20.270	79	Woods, Fair, HSG D
140.440	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	100	0.0188	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
19.1	1,761	0.0943	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
52.8	1,662	0.0110	0.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
92.9	3,523	Total			

Subcatchment 7S: Subcatchment 7S



Subcatchment 8S: Subcatchment 8S

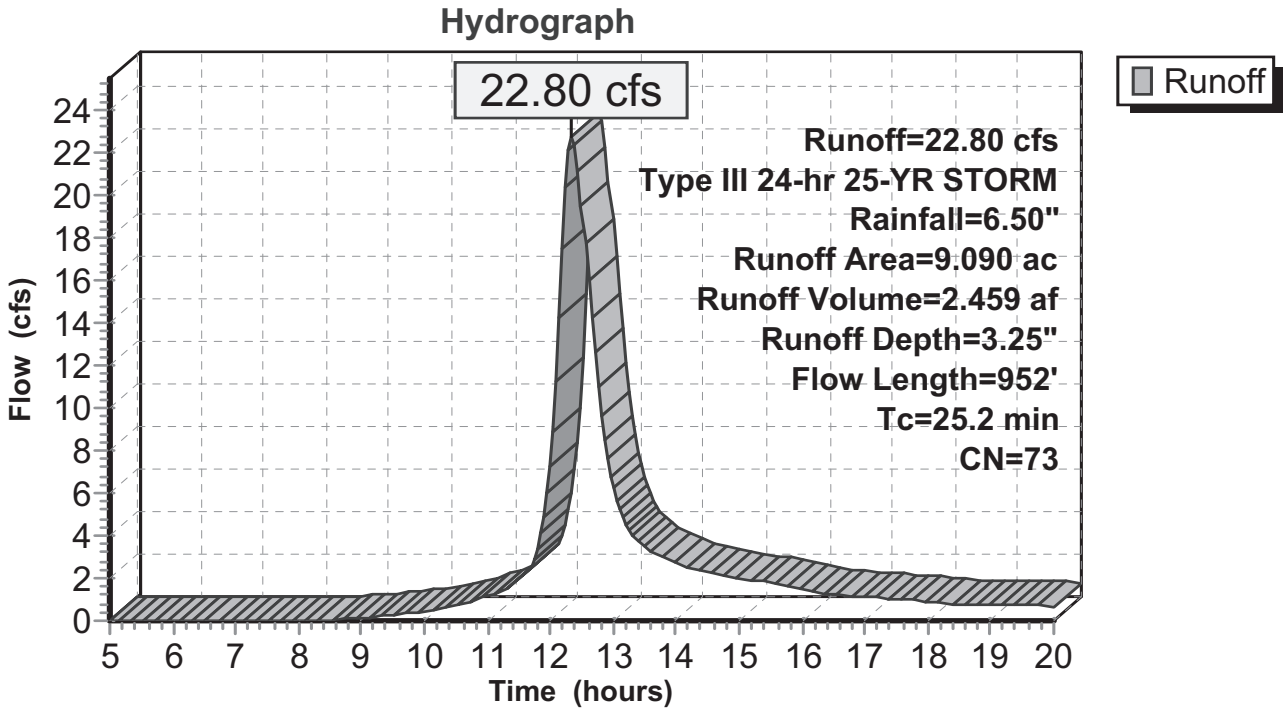
Runoff = 22.80 cfs @ 12.35 hrs, Volume= 2.459 af, Depth= 3.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.120	98	Existing pavement
0.240	71	Meadow, non-grazed, HSG C
8.730	73	Woods, Fair, HSG C
9.090	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0435	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
10.2	852	0.0780	1.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
25.2	952	Total			

Subcatchment 8S: Subcatchment 8S



Subcatchment 9S: Subcatchment 9S

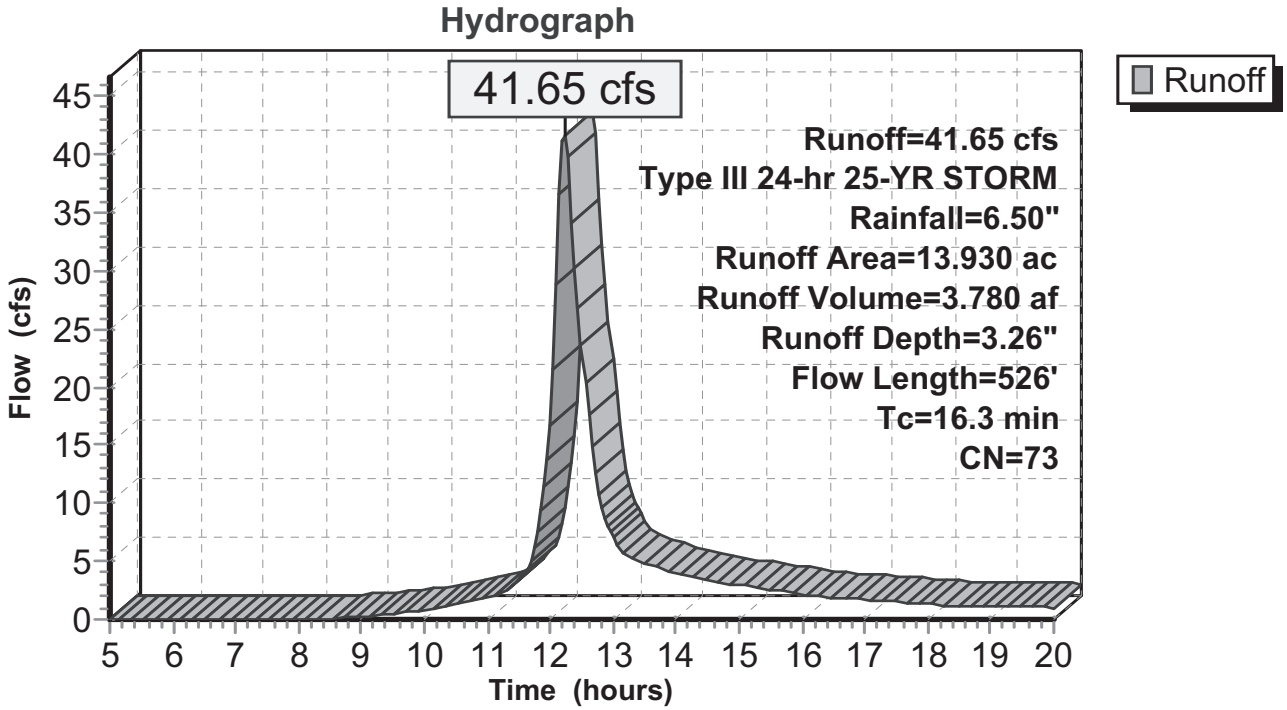
Runoff = 41.65 cfs @ 12.23 hrs, Volume= 3.780 af, Depth= 3.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.180	98	Existing pavement
0.260	71	Meadow, non-grazed, HSG C
0.040	78	Meadow, non-grazed, HSG D
13.160	73	Woods, Fair, HSG C
0.290	79	Woods, Fair, HSG D
13.930	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0660	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.6	426	0.1575	2.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.3	526	Total			

Subcatchment 9S: Subcatchment 9S



Subcatchment 10S: Subcatchment 10S

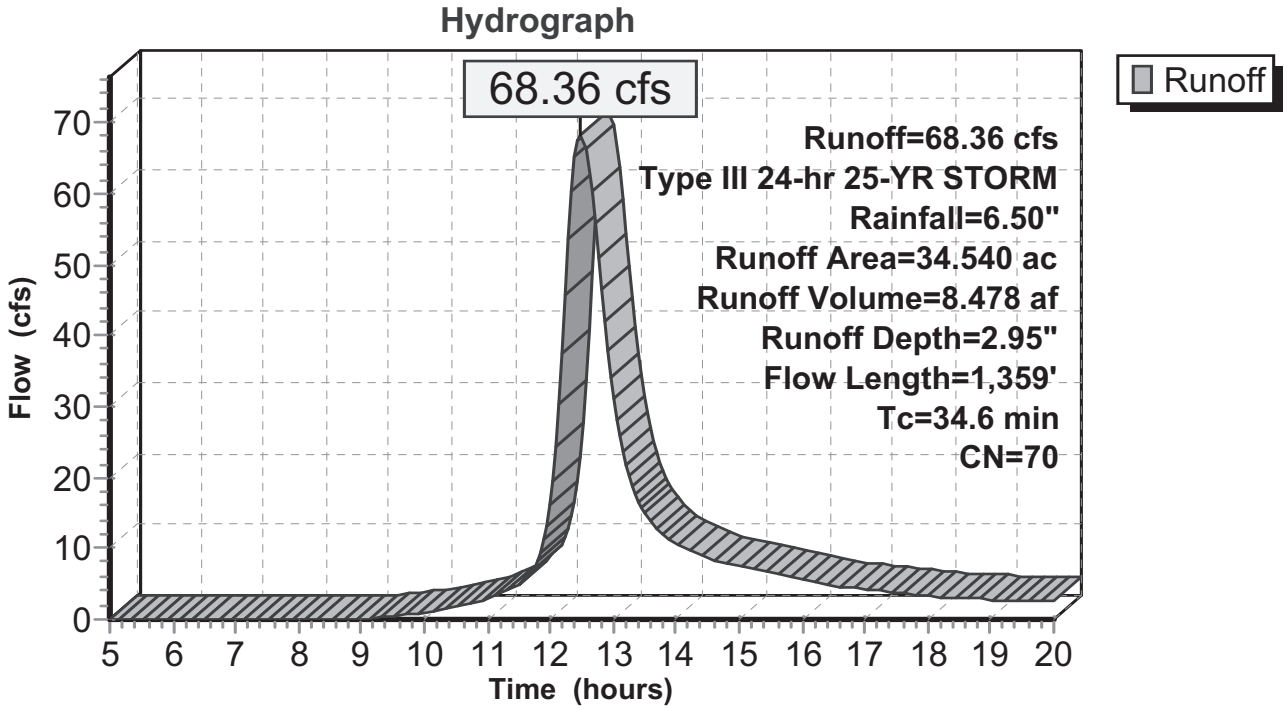
Runoff = 68.36 cfs @ 12.49 hrs, Volume= 8.478 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
1.090	36	Woods, Fair, HSG A
31.250	70	Woods, Good, HSG C
2.200	79	Woods, Fair, HSG D
34.540	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0252	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	528	0.1545	2.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.8	133	0.3459	2.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.6	598	0.0356	0.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.6	1,359	Total			

Subcatchment 10S: Subcatchment 10S



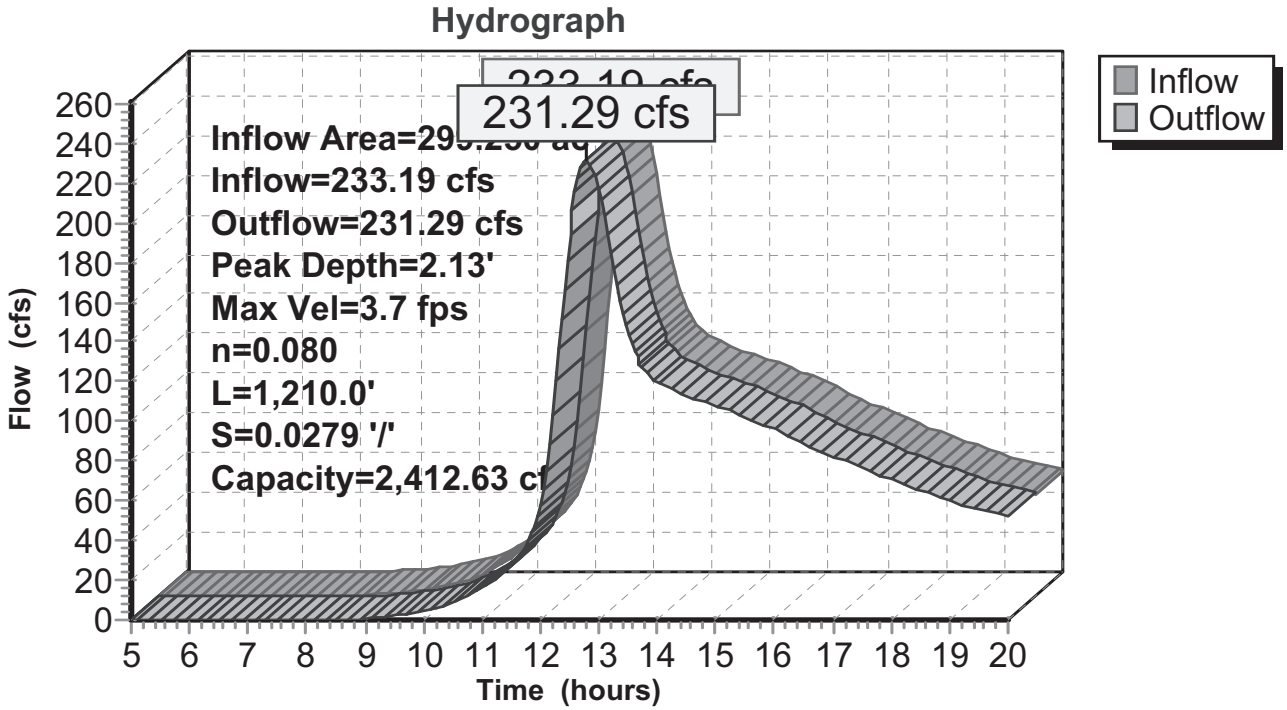
Reach 1R: Existing Stream

Inflow Area = 299.250 ac, Inflow Depth = 2.91" for 25-YR STORM event
Inflow = 233.19 cfs @ 12.73 hrs, Volume= 72.572 af
Outflow = 231.29 cfs @ 12.80 hrs, Volume= 71.991 af, Atten= 1%, Lag= 4.3 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 5.5 min
Avg. Velocity = 2.3 fps, Avg. Travel Time= 8.8 min

Peak Depth= 2.13' @ 12.80 hrs
Capacity at bank full= 2,412.63 cfs
Inlet Invert= 416.82', Outlet Invert= 383.06'
10.50' x 5.80' deep channel, n= 0.080 Length= 1,210.0' Slope= 0.0279 '/'
Side Slope Z-value= 9.4 8.5 '/'

Reach 1R: Existing Stream



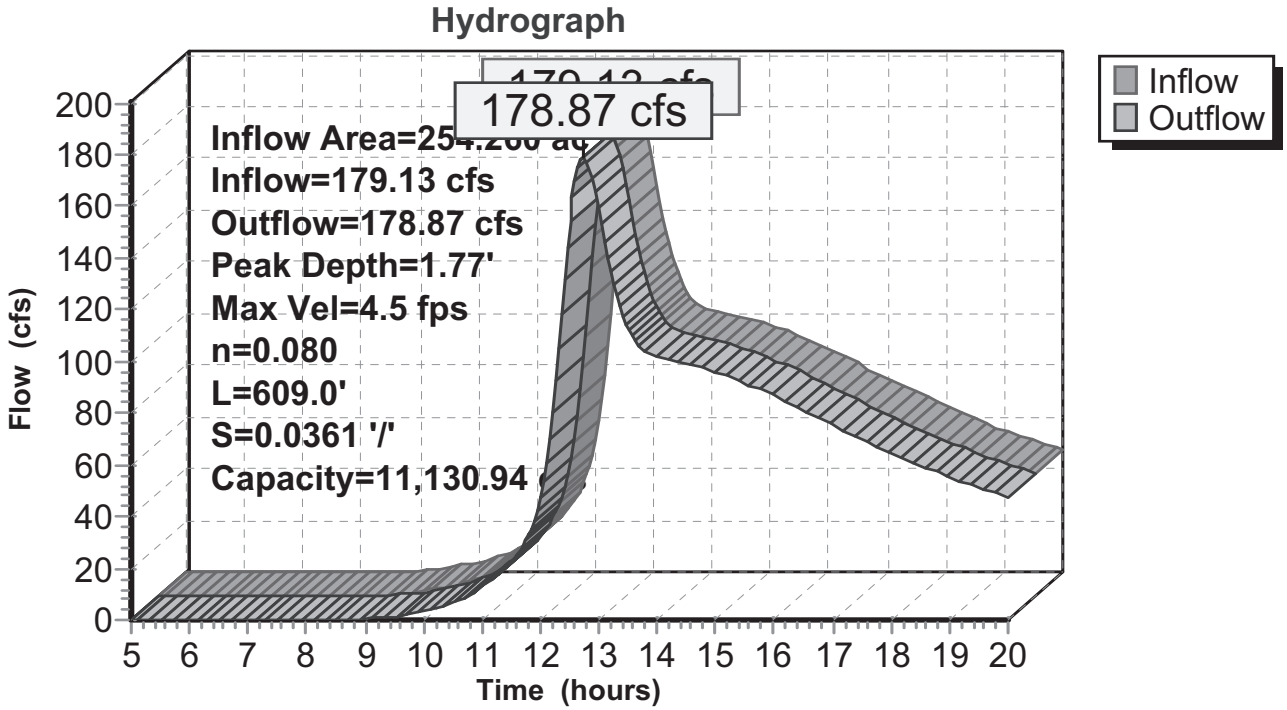
Reach 2R: Existing Stream

Inflow Area = 254.260 ac, Inflow Depth = 2.89" for 25-YR STORM event
Inflow = 179.13 cfs @ 12.72 hrs, Volume= 61.307 af
Outflow = 178.87 cfs @ 12.75 hrs, Volume= 61.077 af, Atten= 0%, Lag= 1.6 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.5 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 2.8 fps, Avg. Travel Time= 3.6 min

Peak Depth= 1.77' @ 12.75 hrs
Capacity at bank full= 11,130.94 cfs
Inlet Invert= 440.00', Outlet Invert= 418.00'
18.00' x 14.50' deep channel, n= 0.080 Length= 609.0' Slope= 0.0361 '/'
Side Slope Z-value= 2.7 2.2 '/'

Reach 2R: Existing Stream



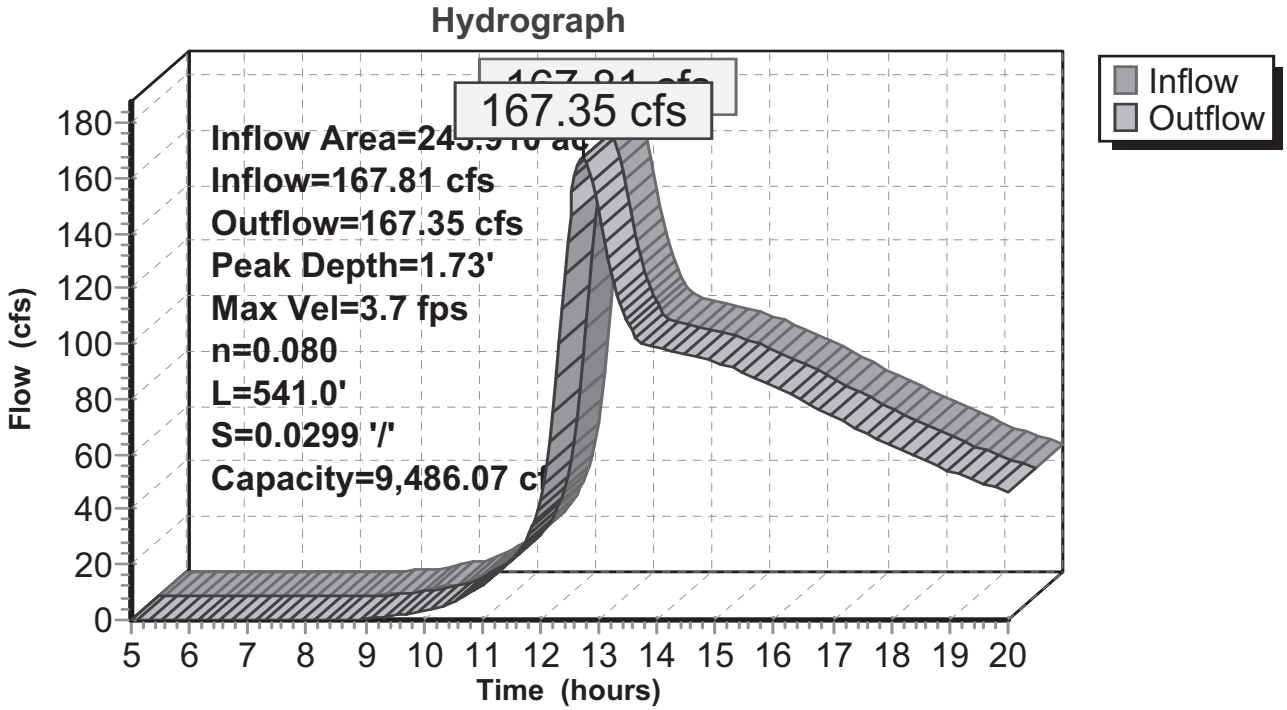
Reach 3R: Existing Stream

Inflow Area = 243.910 ac, Inflow Depth = 2.91" for 25-YR STORM event
Inflow = 167.81 cfs @ 12.70 hrs, Volume= 59.157 af
Outflow = 167.35 cfs @ 12.73 hrs, Volume= 58.927 af, Atten= 0%, Lag= 1.9 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 2.4 fps, Avg. Travel Time= 3.8 min

Peak Depth= 1.73' @ 12.73 hrs
Capacity at bank full= 9,486.07 cfs
Inlet Invert= 456.17', Outlet Invert= 440.00'
15.50' x 10.82' deep channel, n= 0.080 Length= 541.0' Slope= 0.0299 '/'
Side Slope Z-value= 7.3 5.3 '/'

Reach 3R: Existing Stream



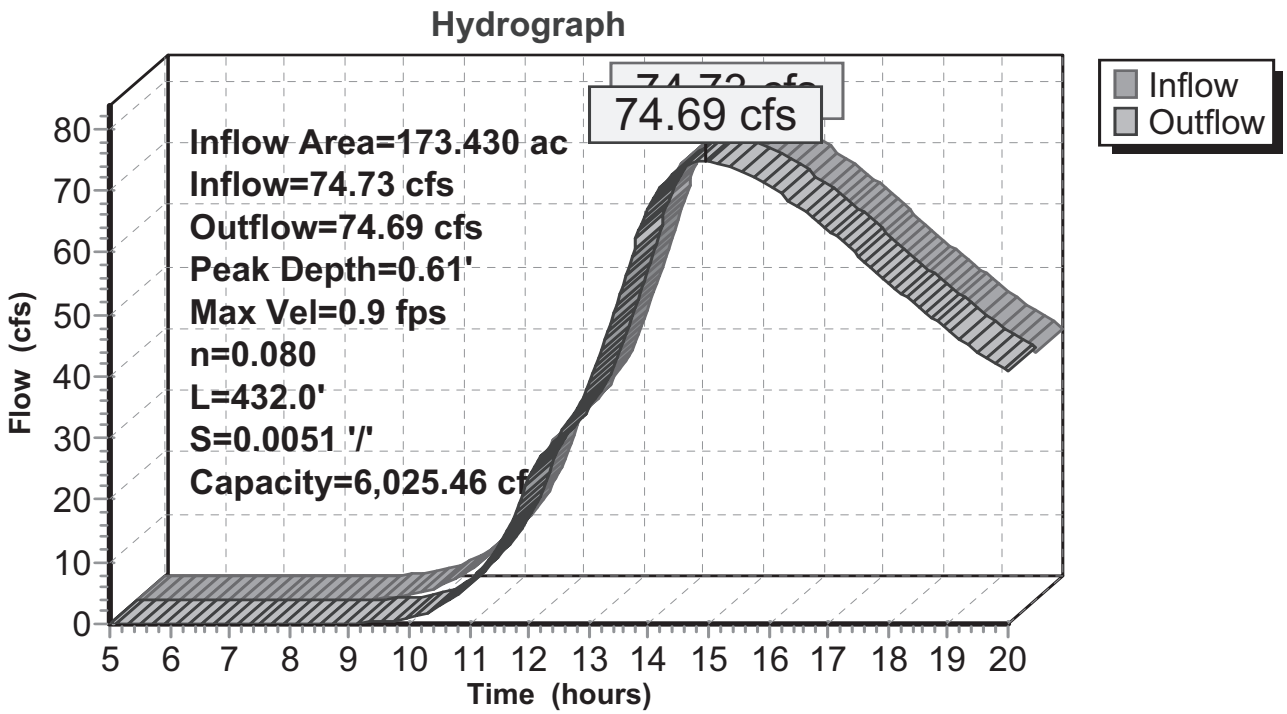
Reach 4R: Existing Stream

Inflow Area = 173.430 ac, Inflow Depth = 2.72" for 25-YR STORM event
Inflow = 74.73 cfs @ 14.87 hrs, Volume= 39.352 af
Outflow = 74.69 cfs @ 14.95 hrs, Volume= 38.793 af, Atten= 0%, Lag= 5.4 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.9 fps, Min. Travel Time= 8.0 min
Avg. Velocity = 0.6 fps, Avg. Travel Time= 11.3 min

Peak Depth= 0.61' @ 14.95 hrs
Capacity at bank full= 6,025.46 cfs
Inlet Invert= 460.18', Outlet Invert= 457.96'
124.00' x 6.50' deep channel, n= 0.080 Length= 432.0' Slope= 0.0051 '/'
Side Slope Z-value= 10.4 33.3 '/'

Reach 4R: Existing Stream



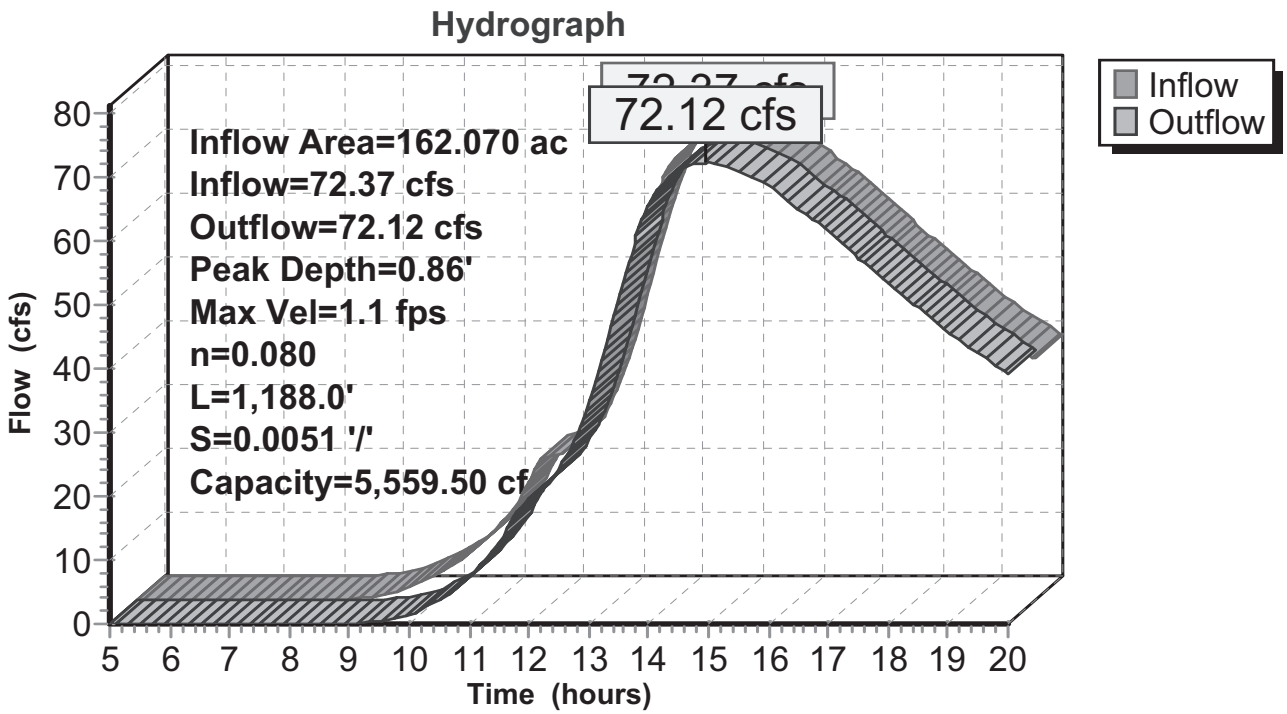
Reach 5R: Existing Stream

Inflow Area = 162.070 ac, Inflow Depth = 2.84" for 25-YR STORM event
Inflow = 72.37 cfs @ 14.69 hrs, Volume= 38.406 af
Outflow = 72.12 cfs @ 14.93 hrs, Volume= 37.195 af, Atten= 0%, Lag= 14.5 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.1 fps, Min. Travel Time= 18.3 min
Avg. Velocity = 0.8 fps, Avg. Travel Time= 25.7 min

Peak Depth= 0.86' @ 14.93 hrs
Capacity at bank full= 5,559.50 cfs
Inlet Invert= 466.24', Outlet Invert= 460.18'
64.50' x 8.00' deep channel, n= 0.080 Length= 1,188.0' Slope= 0.0051 '/'
Side Slope Z-value= 18.9 10.7 '/'

Reach 5R: Existing Stream



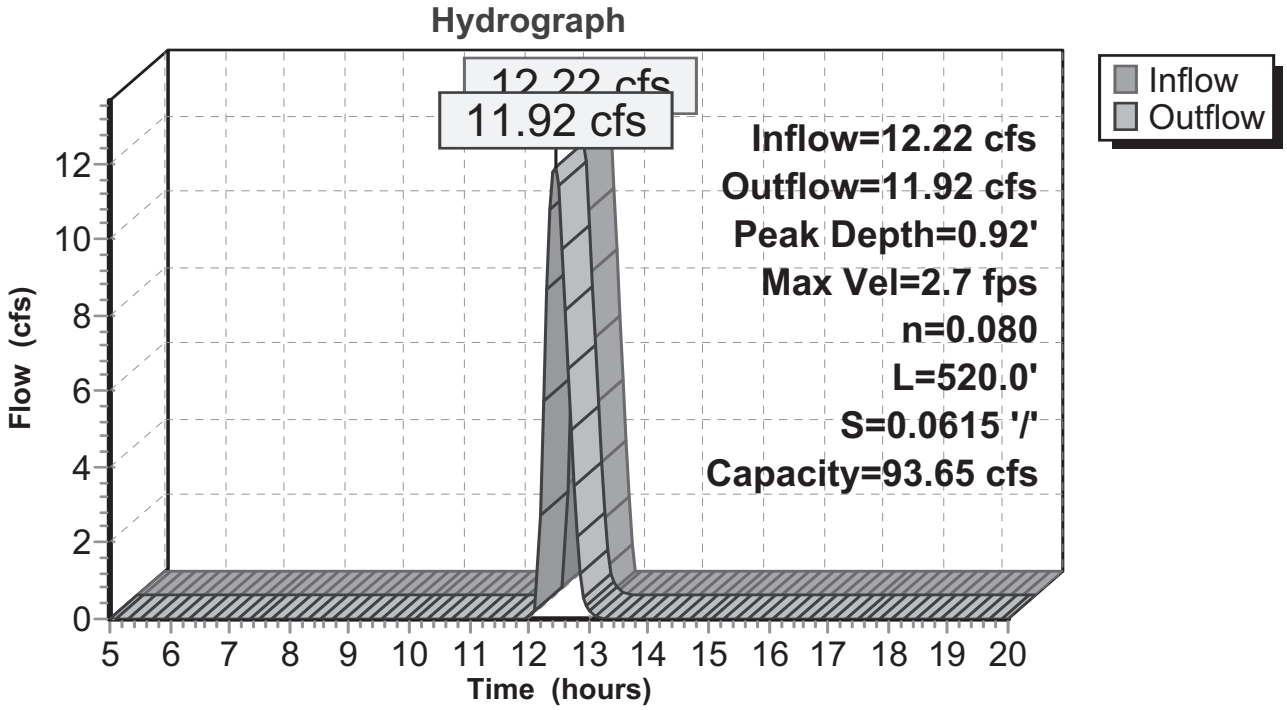
Reach 6R: Existing Swale

Inflow	=	12.22 cfs @	12.38 hrs,	Volume=	0.418 af
Outflow	=	11.92 cfs @	12.42 hrs,	Volume=	0.418 af, Atten= 2%, Lag= 2.7 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.7 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 0.7 fps, Avg. Travel Time= 13.3 min

Peak Depth= 0.92' @ 12.42 hrs
Capacity at bank full= 93.65 cfs
Inlet Invert= 454.00', Outlet Invert= 422.00'
0.00' x 2.00' deep channel, n= 0.080 Length= 520.0' Slope= 0.0615 '/'
Side Slope Z-value= 3.6 6.7 '/'

Reach 6R: Existing Swale



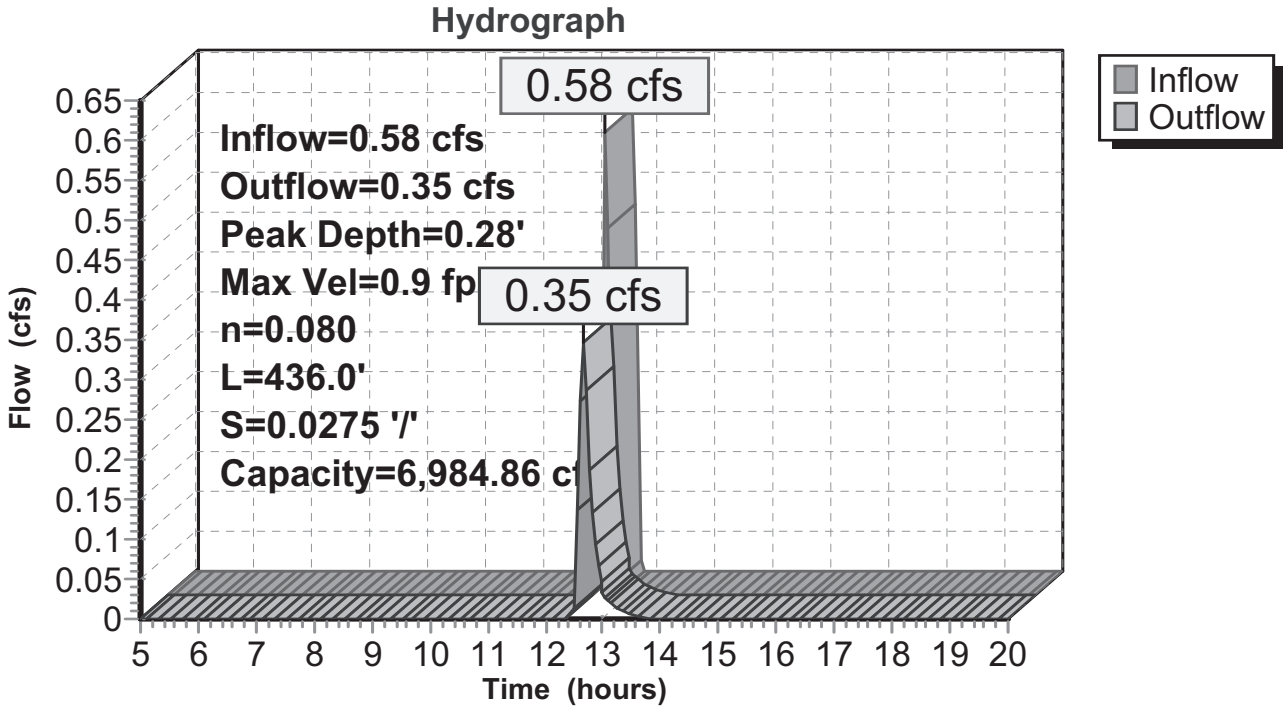
Reach 7R: Existing Swale

Inflow	=	0.58 cfs @	12.57 hrs,	Volume=	0.007 af
Outflow	=	0.35 cfs @	12.65 hrs,	Volume=	0.007 af, Atten= 41%, Lag= 4.7 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.9 fps, Min. Travel Time= 8.5 min
Avg. Velocity = 0.5 fps, Avg. Travel Time= 14.2 min

Peak Depth= 0.28' @ 12.65 hrs
Capacity at bank full= 6,984.86 cfs
Inlet Invert= 480.00', Outlet Invert= 468.00'
0.00' x 11.90' deep channel, n= 0.080 Length= 436.0' Slope= 0.0275 '/'
Side Slope Z-value= 6.8 3.1 '/'

Reach 7R: Existing Swale

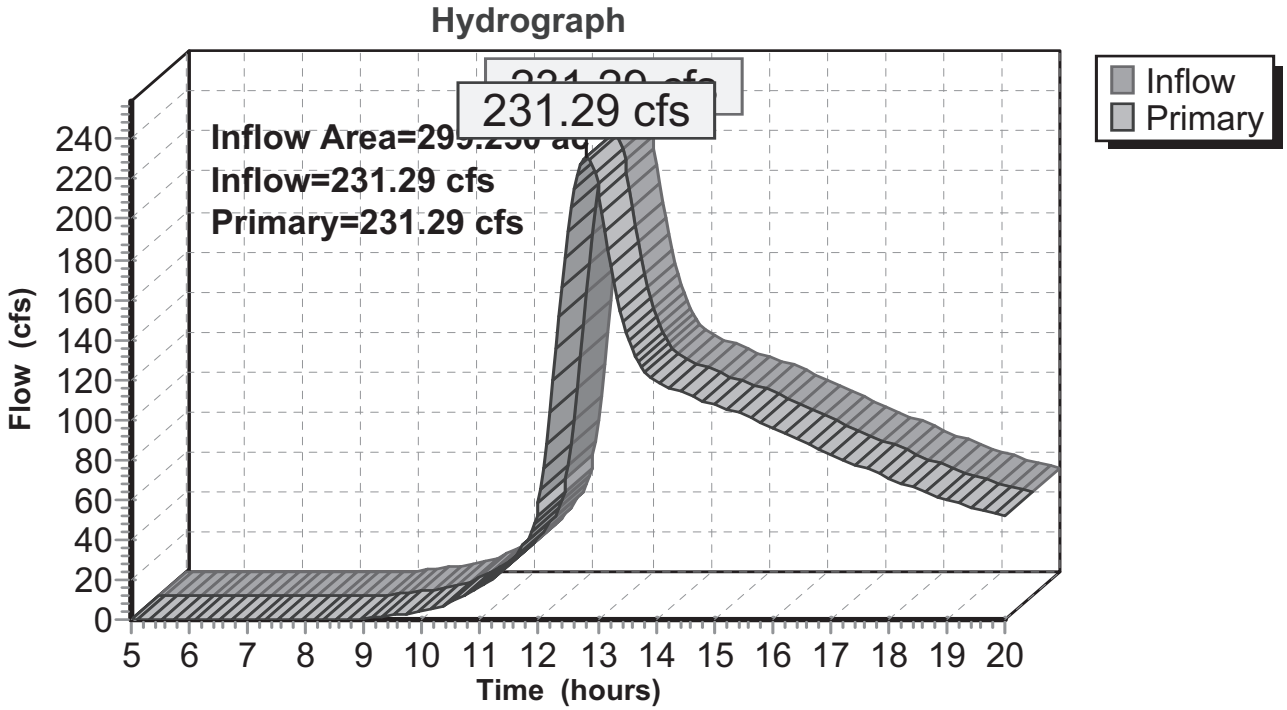


Pond 1P: Design Point 1 Outlet at Hasbrouck Road

Inflow Area = 299.250 ac, Inflow Depth = 2.89" for 25-YR STORM event
Inflow = 231.29 cfs @ 12.80 hrs, Volume= 71.991 af
Primary = 231.29 cfs @ 12.80 hrs, Volume= 71.991 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1 Outlet at Hasbrouck Road

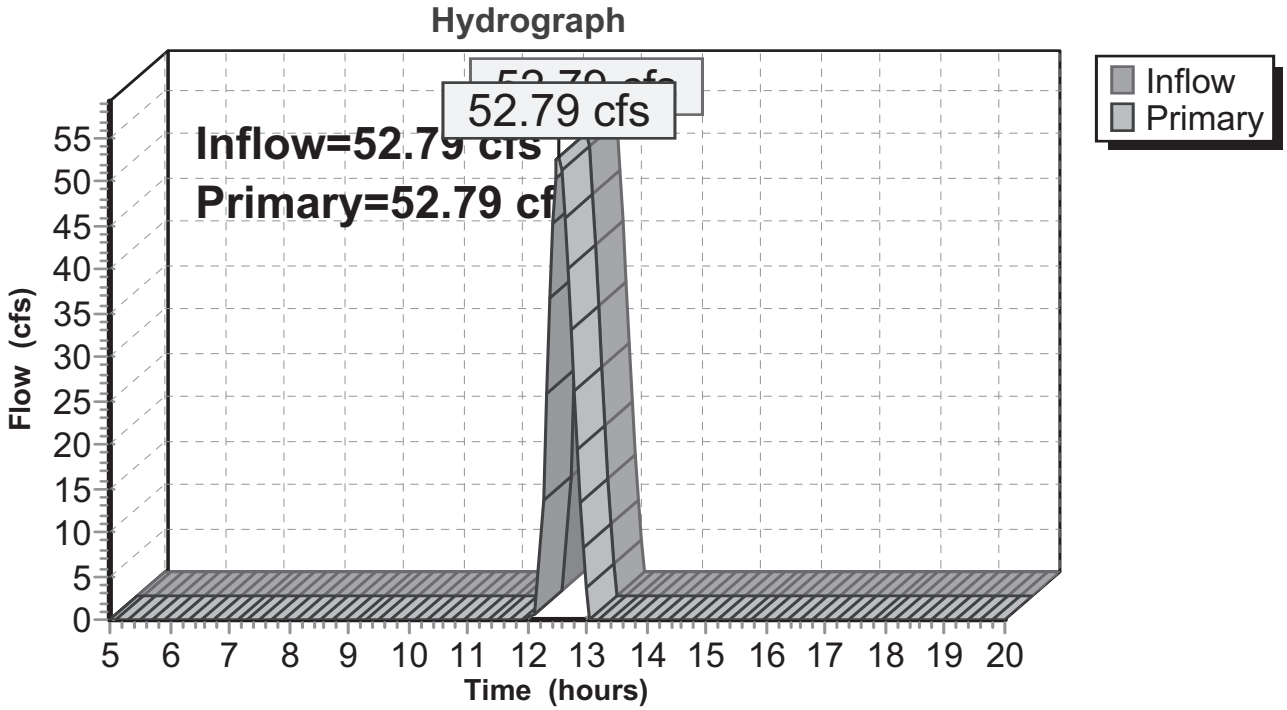


Pond 2P: Design Point 2 Existing Swale Along Craigville Road

Inflow	=	52.79 cfs @	12.52 hrs,	Volume=	2.145 af
Primary	=	52.79 cfs @	12.52 hrs,	Volume=	2.145 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 2P: Design Point 2 Existing Swale Along Craigville Road

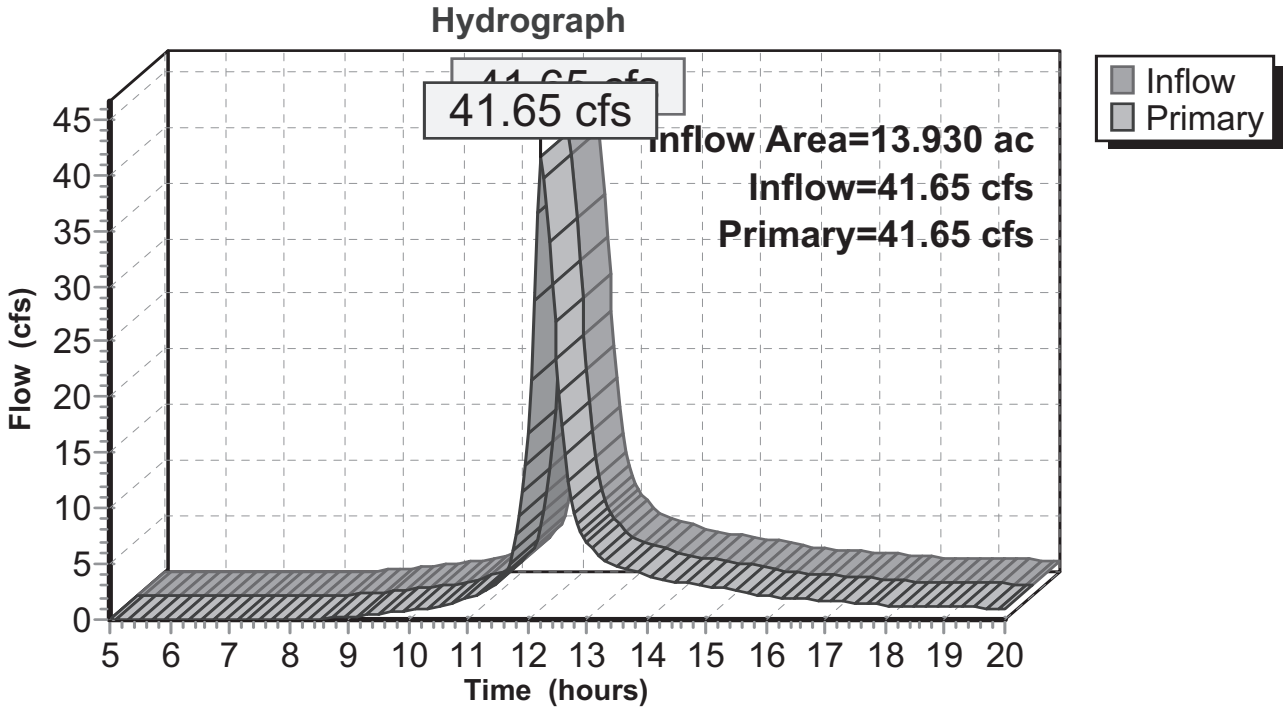


Pond 3P: Design Point 3 (Southeastern Property Line)

Inflow Area = 13.930 ac, Inflow Depth = 3.26" for 25-YR STORM event
Inflow = 41.65 cfs @ 12.23 hrs, Volume= 3.780 af
Primary = 41.65 cfs @ 12.23 hrs, Volume= 3.780 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 3P: Design Point 3 (Southeastern Property Line)

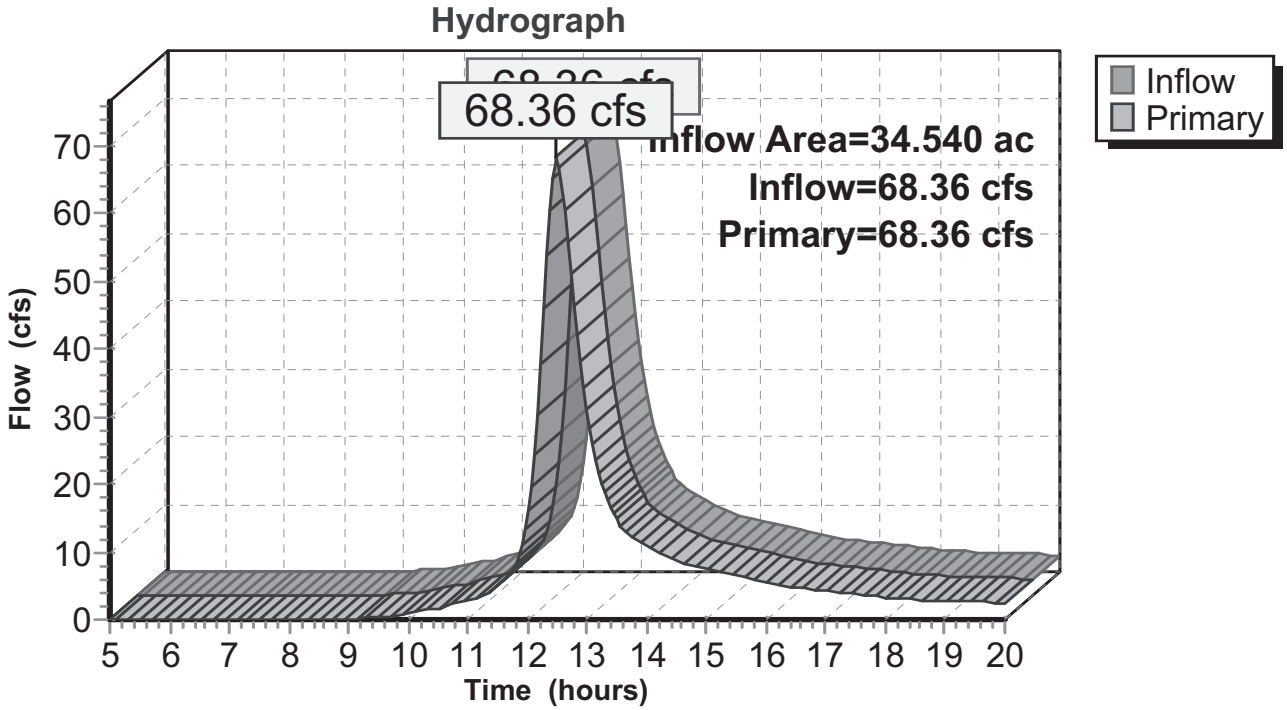


Pond 4P: Design Point 4 (Southwestern Property Line)

Inflow Area =	34.540 ac,	Inflow Depth =	2.95"	for	25-YR STORM event
Inflow =	68.36 cfs @	12.49 hrs,	Volume=		8.478 af
Primary =	68.36 cfs @	12.49 hrs,	Volume=		8.478 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 4P: Design Point 4 (Southwestern Property Line)



Pond 5P: Existing Wetland Pocket

Inflow Area =	162.070 ac,	Inflow Depth =	3.26"	for	25-YR STORM event
Inflow =	190.43 cfs @	13.19 hrs,	Volume=	44.010 af	
Outflow =	72.37 cfs @	14.69 hrs,	Volume=	38.406 af,	Atten= 62%, Lag= 89.8 min
Primary =	72.37 cfs @	14.69 hrs,	Volume=	38.406 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 469.81' @ 14.69 hrs Surf.Area= 0 sf Storage= 758,090 cf
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

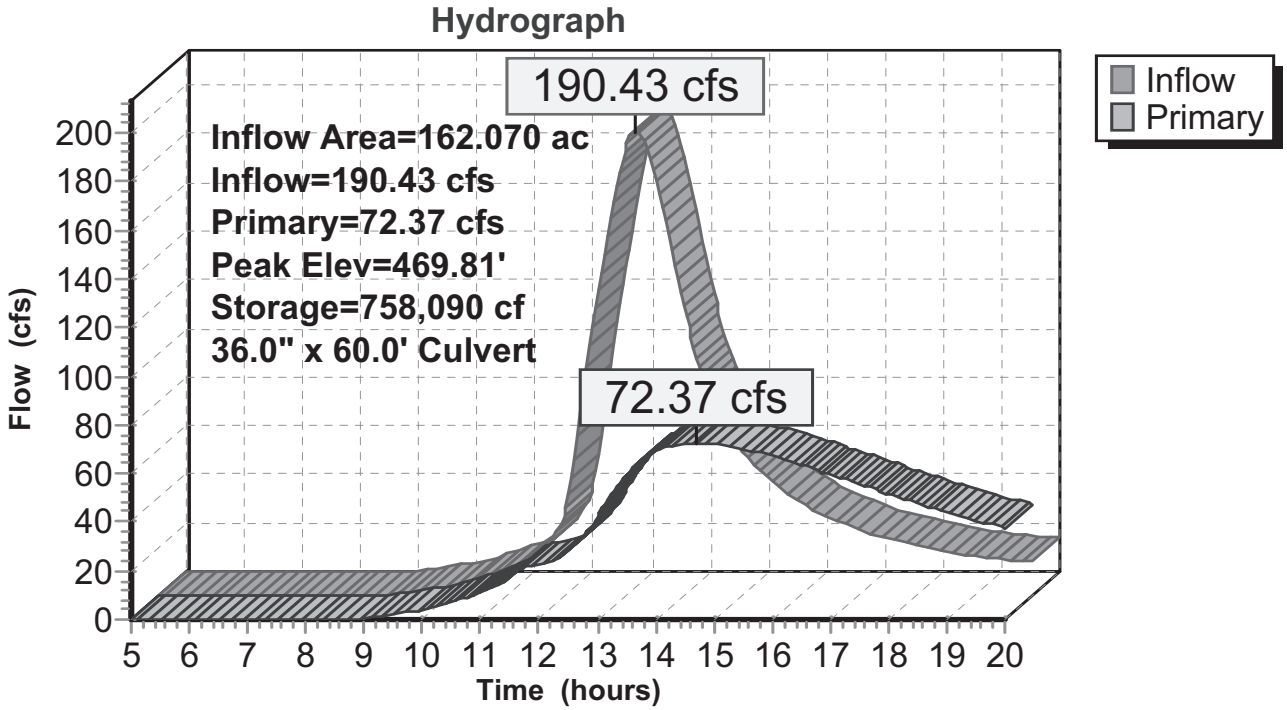
#	Invert	Avail.Storage	Storage Description
1	468.00'	4,153,277 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
468.00	0
470.00	838,050
472.00	2,316,286
474.00	4,153,277

#	Routing	Invert	Outlet Devices
1	Primary	466.24'	**36.0" x 60.0' long Culvert X 2.00** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 466.24' S= 0.0000 '/' n= 0.011 Cc= 0.900

Primary OutFlow Max=72.37 cfs @ 14.69 hrs HW=469.81' TW=467.10' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 72.37 cfs @ 5.4 fps)

Pond 5P: Existing Wetland Pocket



Pond 6P: Existing Culvert 2

Inflow Area =	44.990 ac,	Inflow Depth =	3.64"	for	25-YR STORM event
Inflow =	110.44 cfs @	12.51 hrs,	Volume=	13.640 af	
Outflow =	110.44 cfs @	12.51 hrs,	Volume=	13.640 af,	Atten= 0%, Lag= 0.0 min
Primary =	57.75 cfs @	12.49 hrs,	Volume=	11.495 af	
Secondary =	52.79 cfs @	12.52 hrs,	Volume=	2.145 af	

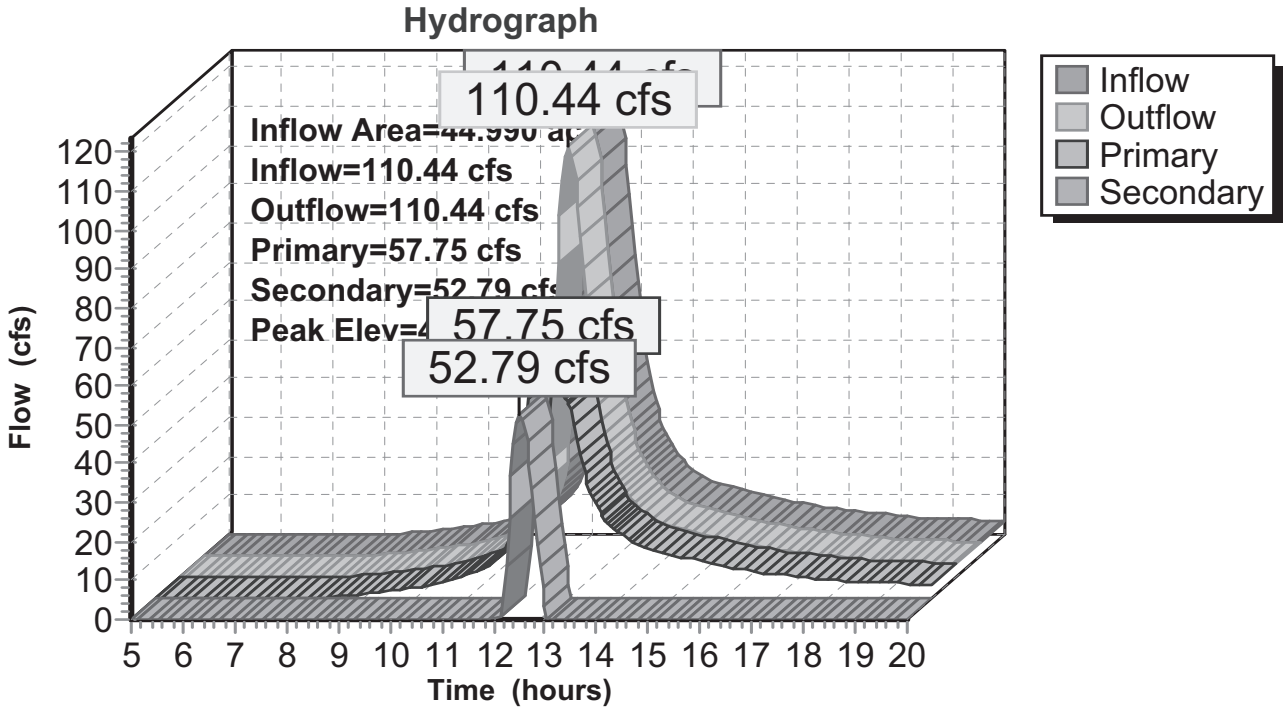
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 422.43' @ 12.52 hrs
Flood Elev= 424.00'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	417.23'	**36.0" x 45.0' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 416.82' S= 0.0091 '/' n= 0.011 Cc= 0.900
2	Secondary	421.50'	**22.0' long x 6.3' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.67 2.68 2.71 2.75 2.82

Primary OutFlow Max=57.34 cfs @ 12.49 hrs HW=422.42' TW=418.78' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 57.34 cfs @ 8.1 fps)

Secondary OutFlow Max=52.48 cfs @ 12.52 hrs HW=422.43' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 52.48 cfs @ 2.6 fps)

Pond 6P: Existing Culvert 2



Pond 7P: Existing Culvert 3

Inflow Area =	10.350 ac,	Inflow Depth =	3.24"	for	25-YR STORM event
Inflow =	25.09 cfs @	12.38 hrs,	Volume=	2.798 af	
Outflow =	25.09 cfs @	12.38 hrs,	Volume=	2.798 af,	Atten= 0%, Lag= 0.0 min
Primary =	12.88 cfs @	12.38 hrs,	Volume=	2.380 af	
Secondary =	12.22 cfs @	12.38 hrs,	Volume=	0.418 af	

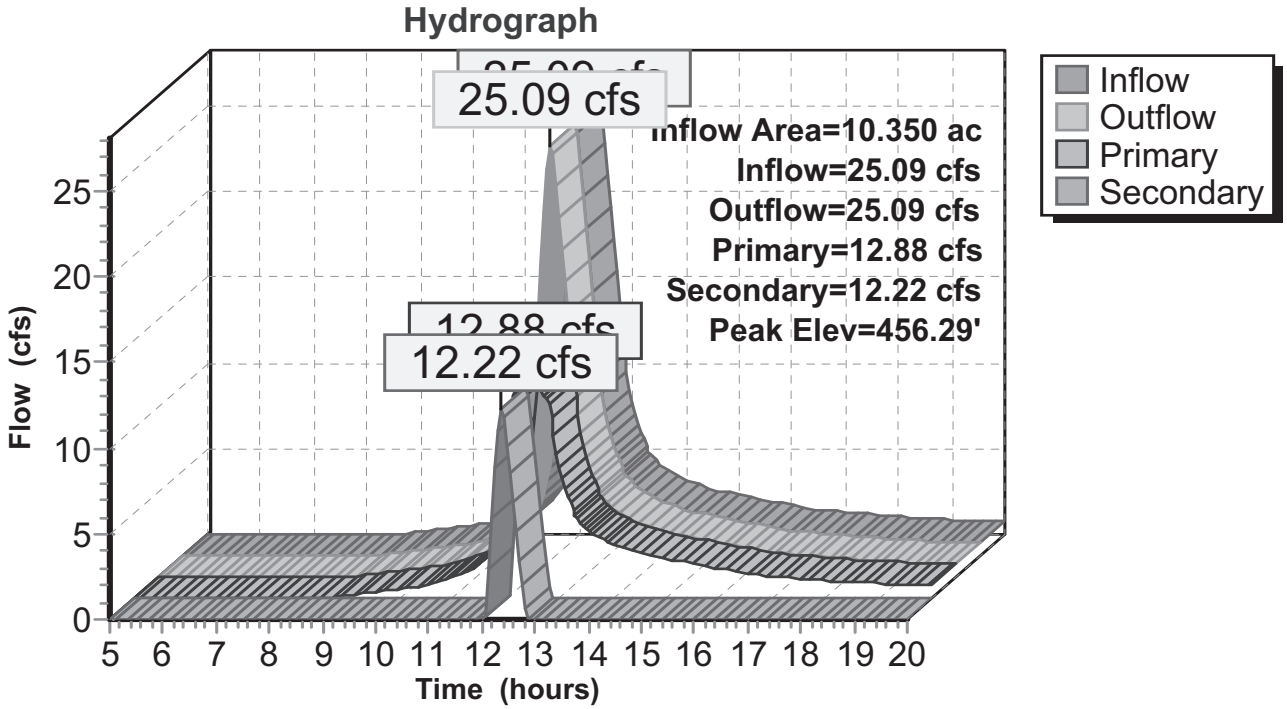
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 456.29' @ 12.38 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	452.60'	**18.0" x 45.6' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 451.11' S= 0.0327 '/' n= 0.011 Cc= 0.900
2	Secondary	455.50'	**6.5' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=12.87 cfs @ 12.38 hrs HW=456.29' TW=441.45' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 12.87 cfs @ 7.3 fps)

Secondary OutFlow Max=12.12 cfs @ 12.38 hrs HW=456.29' TW=454.91' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 12.12 cfs @ 2.4 fps)

Pond 7P: Existing Culvert 3



Pond 8P: Existing Culvert 4

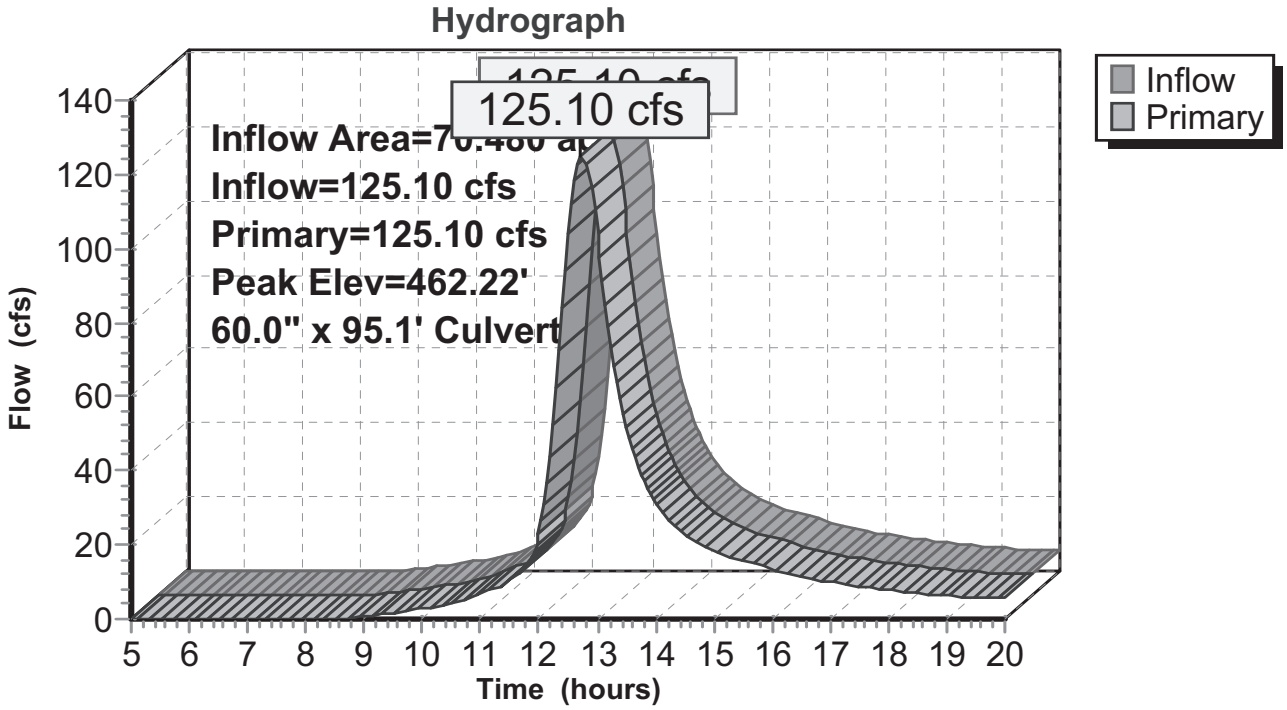
Inflow Area = 70.480 ac, Inflow Depth = 3.31" for 25-YR STORM event
Inflow = 125.10 cfs @ 12.73 hrs, Volume= 19.443 af
Outflow = 125.10 cfs @ 12.73 hrs, Volume= 19.443 af, Atten= 0%, Lag= 0.0 min
Primary = 125.10 cfs @ 12.73 hrs, Volume= 19.443 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 462.22' @ 12.73 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	457.96'	**60.0" x 95.1' long Culvert** CMP, square edge headwall, Ke= 0.500 Outlet Invert= 456.17' S= 0.0188 '/' n= 0.011 Cc= 0.900

Primary OutFlow Max=124.93 cfs @ 12.73 hrs HW=462.21' TW=457.90' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 124.93 cfs @ 7.0 fps)

Pond 8P: Existing Culvert 4



Pond 9P: Existing Culvert 5

Inflow Area =	11.360 ac,	Inflow Depth =	3.25"	for	25-YR STORM event
Inflow =	27.58 cfs @	12.38 hrs,	Volume=	3.078 af	
Outflow =	27.58 cfs @	12.38 hrs,	Volume=	3.078 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.48 cfs @	12.38 hrs,	Volume=	2.157 af	
Secondary =	20.09 cfs @	12.38 hrs,	Volume=	0.921 af	

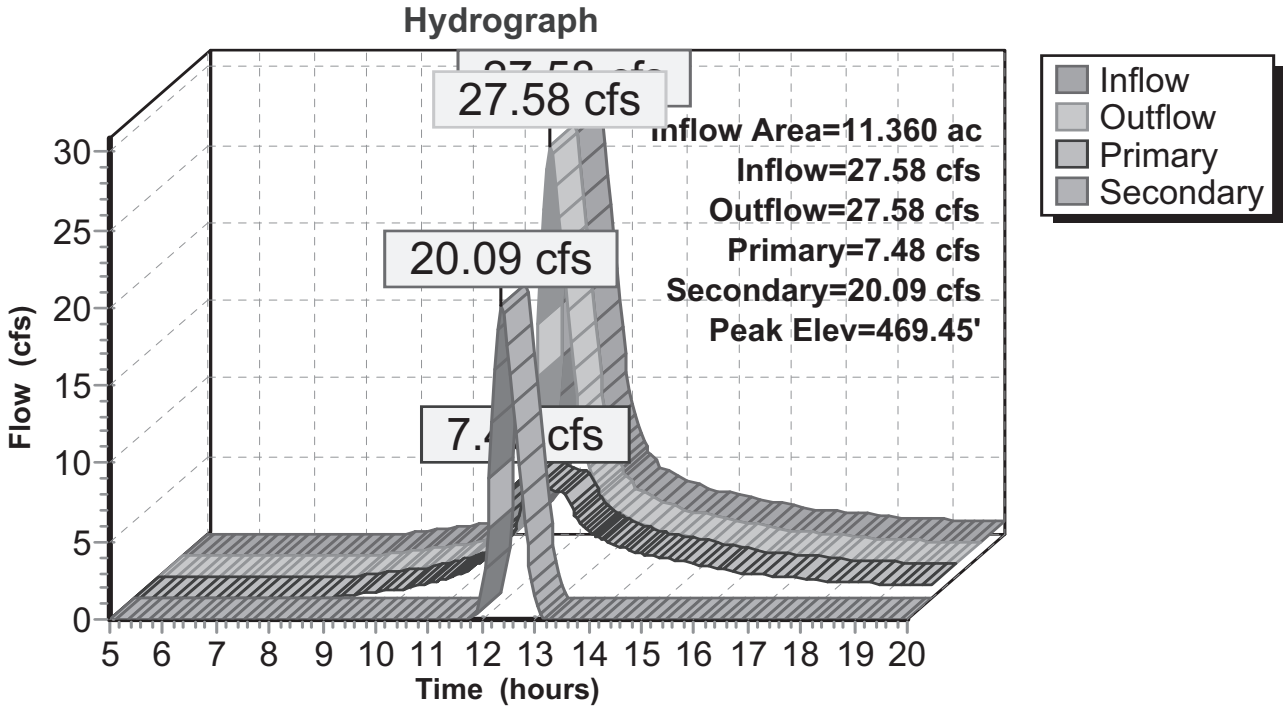
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 469.45' @ 12.38 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	466.76'	**15.0" x 50.3' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 465.61' S= 0.0229 '/' n= 0.011 Cc= 0.900
2	Secondary	469.00'	**25.0' long x 60.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=7.48 cfs @ 12.38 hrs HW=469.44' TW=460.53' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.48 cfs @ 6.1 fps)

Secondary OutFlow Max=19.98 cfs @ 12.38 hrs HW=469.44' TW=457.63' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 19.98 cfs @ 1.8 fps)

Pond 9P: Existing Culvert 5



Pond 10P: Existing Culvert 6

Inflow Area =	5.020 ac,	Inflow Depth =	3.32"	for	25-YR STORM event
Inflow =	10.23 cfs @	12.57 hrs,	Volume=	1.391 af	
Outflow =	10.23 cfs @	12.57 hrs,	Volume=	1.391 af,	Atten= 0%, Lag= 0.0 min
Primary =	9.65 cfs @	12.55 hrs,	Volume=	1.384 af	
Secondary =	0.58 cfs @	12.57 hrs,	Volume=	0.007 af	

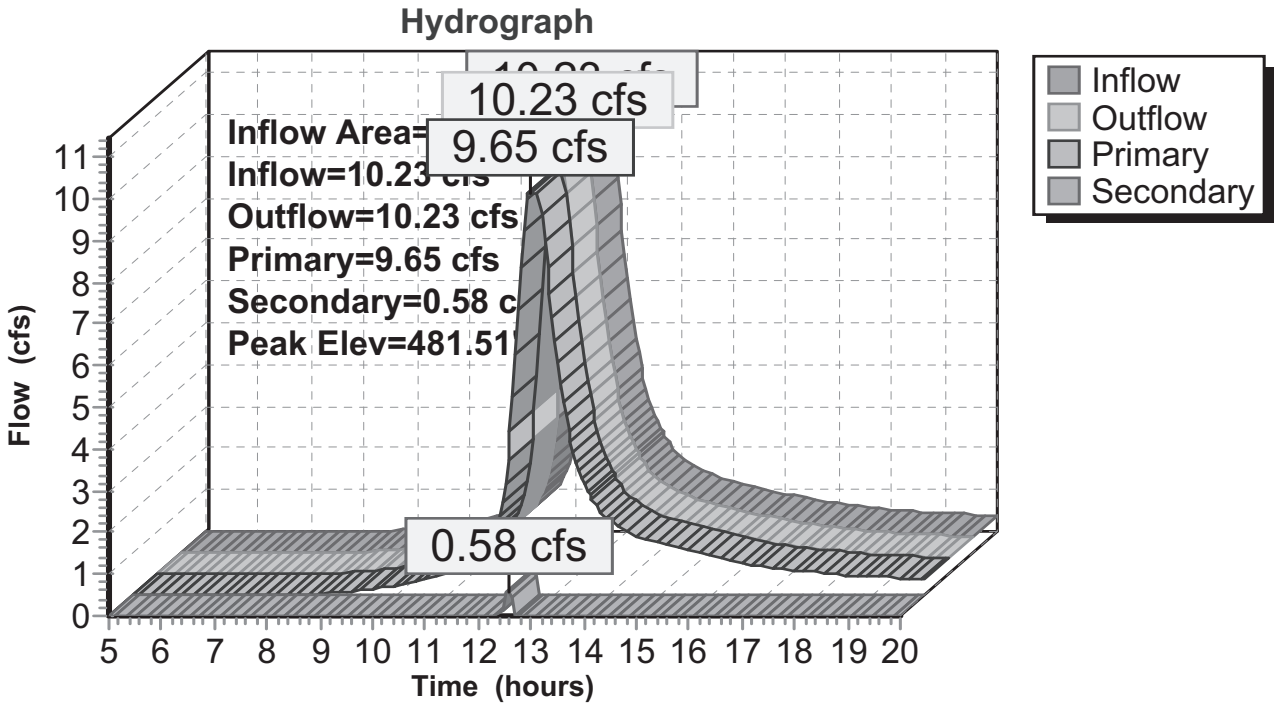
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 481.51' @ 12.55 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	477.46'	**15.0" x 54.0' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 475.67' S= 0.0331 '/' n= 0.011 Cc= 0.900
2	Secondary	481.50'	**160.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=9.65 cfs @ 12.55 hrs HW=481.51' TW=468.27' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 9.65 cfs @ 7.9 fps)

Secondary OutFlow Max=0.55 cfs @ 12.57 hrs HW=481.51' TW=480.22' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.55 cfs @ 0.3 fps)

Pond 10P: Existing Culvert 6



Pond 11P: Existing Culvert 9

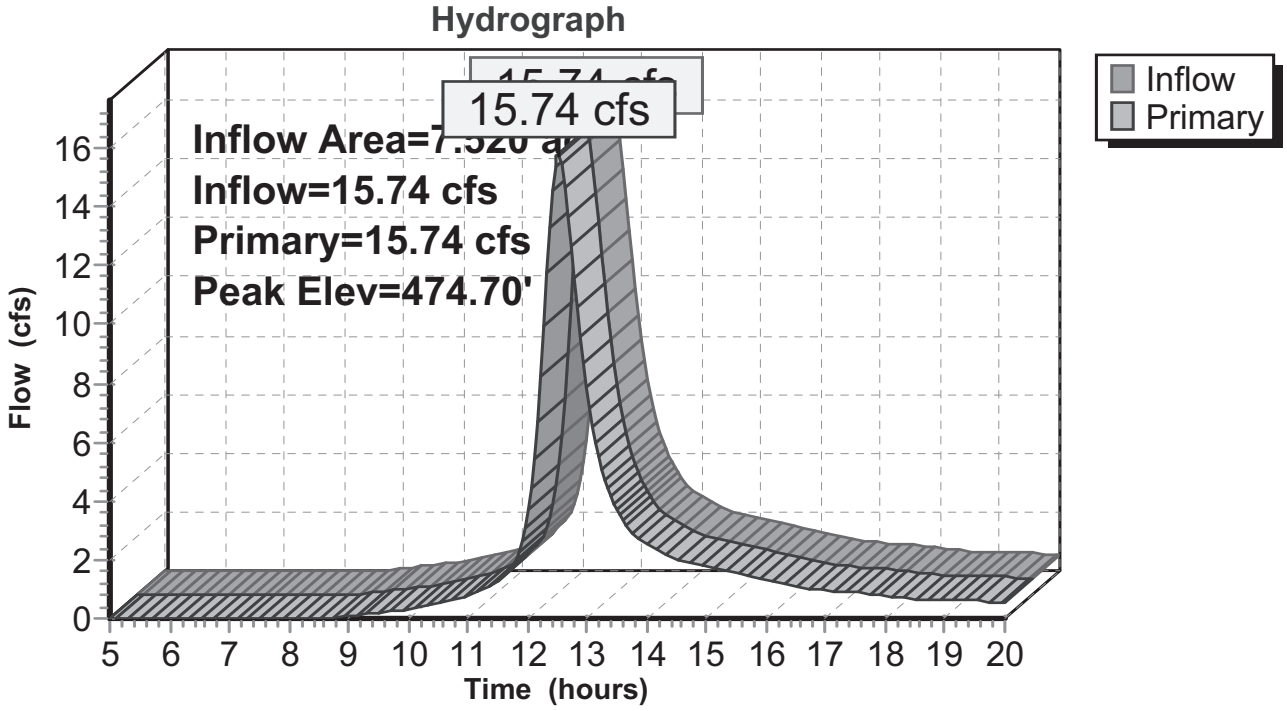
Inflow Area =	7.520 ac,	Inflow Depth =	3.23"	for	25-YR STORM event
Inflow =	15.74 cfs @	12.52 hrs,	Volume=	2.025 af	
Outflow =	15.74 cfs @	12.52 hrs,	Volume=	2.025 af,	Atten= 0%, Lag= 0.0 min
Primary =	15.74 cfs @	12.52 hrs,	Volume=	2.025 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 474.70' @ 12.52 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	471.95'	**15.0" x 45.5' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 471.00' S= 0.0209 '/' n= 0.011 Cc= 0.900
2	Primary	474.50'	**35.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=15.70 cfs @ 12.52 hrs HW=474.70' TW=468.25' (Dynamic Tailwater)
- **1=Culvert** (Inlet Controls 7.59 cfs @ 6.2 fps)
- **2=Broad-Crested Rectangular Weir** (Weir Controls 8.10 cfs @ 1.2 fps)

Pond 11P: Existing Culvert 9



Pond 12P: Existing Culvert 11

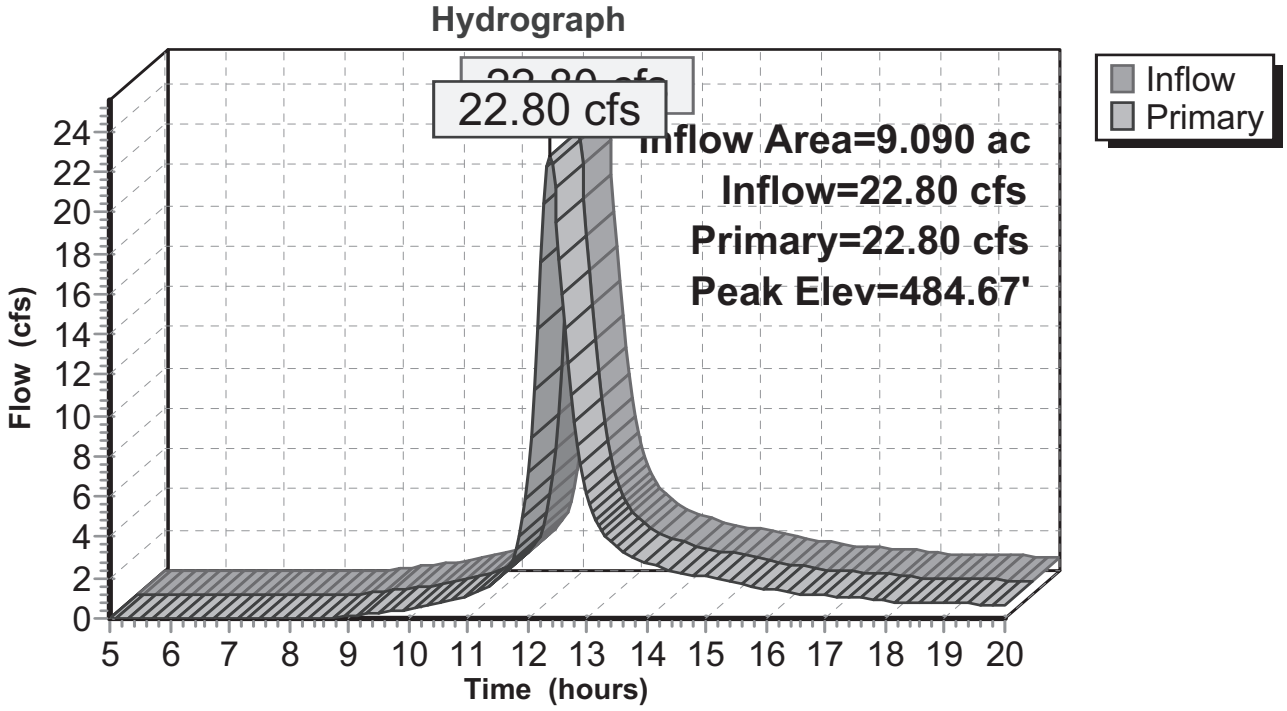
Inflow Area =	9.090 ac,	Inflow Depth =	3.25"	for	25-YR STORM event
Inflow =	22.80 cfs @	12.35 hrs,	Volume=	2.459 af	
Outflow =	22.80 cfs @	12.35 hrs,	Volume=	2.459 af,	Atten= 0%, Lag= 0.0 min
Primary =	22.80 cfs @	12.35 hrs,	Volume=	2.459 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 484.67' @ 12.35 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	480.71'	**15.0" x 53.4' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 479.74' S= 0.0182 '/' n= 0.011 Cc= 0.900
2	Primary	483.50'	**4.0' long x 125.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=22.77 cfs @ 12.35 hrs HW=484.66' TW=468.13' (Dynamic Tailwater)
- **1=Culvert** (Inlet Controls 9.51 cfs @ 7.8 fps)
- **2=Broad-Crested Rectangular Weir** (Weir Controls 13.25 cfs @ 2.8 fps)

Pond 12P: Existing Culvert 11



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

Subcatchment 1S: Subcatchment 1S Runoff Area=44.990 ac Runoff Depth=4.79"
Flow Length=2,651' Tc=39.2 min CN=76 Runoff=134.66 cfs 17.955 af

Subcatchment 2S: Subcatchment 2S Runoff Area=10.350 ac Runoff Depth=4.47"
Flow Length=1,752' Tc=27.2 min CN=73 Runoff=34.45 cfs 3.855 af

Subcatchment 3S: Subcatchment 3S Runoff Area=70.480 ac Runoff Depth=4.54"
Flow Length=4,060' Tc=53.6 min CN=74 Runoff=170.92 cfs 26.670 af

Subcatchment 4S: Subcatchment 4S Runoff Area=11.360 ac Runoff Depth=4.47"
Flow Length=986' Tc=27.1 min CN=73 Runoff=37.85 cfs 4.231 af

Subcatchment 5S: Subcatchment 5S Runoff Area=5.020 ac Runoff Depth=4.56"
Flow Length=1,150' Tc=41.7 min CN=74 Runoff=13.96 cfs 1.907 af

Subcatchment 6S: Subcatchment 6S Runoff Area=7.520 ac Runoff Depth=4.45"
Flow Length=2,174' Tc=37.3 min CN=73 Runoff=21.59 cfs 2.791 af

Subcatchment 7S: Subcatchment 7S Runoff Area=140.440 ac Runoff Depth=4.47"
Flow Length=3,523' Tc=92.9 min CN=74 Runoff=241.28 cfs 52.370 af

Subcatchment 8S: Subcatchment 8S Runoff Area=9.090 ac Runoff Depth=4.47"
Flow Length=952' Tc=25.2 min CN=73 Runoff=31.27 cfs 3.388 af

Subcatchment 9S: Subcatchment 9S Runoff Area=13.930 ac Runoff Depth=4.49"
Flow Length=526' Tc=16.3 min CN=73 Runoff=57.35 cfs 5.207 af

Subcatchment 10S: Subcatchment 10S Runoff Area=34.540 ac Runoff Depth=4.12"
Flow Length=1,359' Tc=34.6 min CN=70 Runoff=95.54 cfs 11.869 af

Reach 1R: Existing Stream Peak Depth=2.36' Max Vel=3.9 fps Inflow=294.57 cfs 95.393 af
n=0.080 L=1,210.0' S=0.0279 '/' Capacity=2,412.63 cfs Outflow=292.15 cfs 94.662 af

Reach 2R: Existing Stream Peak Depth=2.09' Max Vel=5.0 fps Inflow=239.14 cfs 81.381 af
n=0.080 L=609.0' S=0.0361 '/' Capacity=11,130.94 cfs Outflow=238.80 cfs 81.098 af

Reach 3R: Existing Stream Peak Depth=2.02' Max Vel=4.0 fps Inflow=227.26 cfs 78.645 af
n=0.080 L=541.0' S=0.0299 '/' Capacity=9,486.07 cfs Outflow=226.76 cfs 78.359 af

Reach 4R: Existing Stream Peak Depth=0.67' Max Vel=1.0 fps Inflow=89.32 cfs 51.019 af
n=0.080 L=432.0' S=0.0051 '/' Capacity=6,025.46 cfs Outflow=89.29 cfs 50.329 af

Reach 5R: Existing Stream Peak Depth=0.95' Max Vel=1.1 fps Inflow=86.25 cfs 49.805 af
n=0.080 L=1,188.0' S=0.0051 '/' Capacity=5,559.50 cfs Outflow=86.04 cfs 48.301 af

Reach 6R: Existing Swale Peak Depth=1.13' Max Vel=3.1 fps Inflow=20.85 cfs 0.833 af
n=0.080 L=520.0' S=0.0615 '/' Capacity=93.65 cfs Outflow=20.51 cfs 0.833 af

Reach 7R: Existing Swale Peak Depth=0.72' Max Vel=1.5 fps Inflow=4.25 cfs 0.133 af
n=0.080 L=436.0' S=0.0275 '/' Capacity=6,984.86 cfs Outflow=4.00 cfs 0.133 af

Pond 1P: Design Point 1 Outlet at Hasbrouck Road Inflow=292.15 cfs 94.662 af
Primary=292.15 cfs 94.662 af

Pond 2P: Design Point 2 Existing Swale Along Craigville Road Inflow=93.55 cfs 4.492 af
Primary=93.55 cfs 4.492 af

Pond 3P: Design Point 3 (Southeastern Property Line) Inflow=57.35 cfs 5.207 af
Primary=57.35 cfs 5.207 af

Pond 4P: Design Point 4 (Southwestern Property Line) Inflow=95.54 cfs 11.869 af
Primary=95.54 cfs 11.869 af

Pond 5P: Existing Wetland Pocket Peak Elev=470.40' Storage=1,135,754 cf Inflow=260.21 cfs 60.324 af
36.0" x 60.0' Culvert Outflow=86.25 cfs 49.805 af

Pond 6P: Existing Culvert 2 Peak Elev=422.87' Inflow=152.99 cfs 18.788 af
Primary=60.02 cfs 14.295 af Secondary=93.55 cfs 4.492 af Outflow=152.99 cfs 18.788 af

Pond 7P: Existing Culvert 3 Peak Elev=456.63' Inflow=34.45 cfs 3.855 af
Primary=13.60 cfs 3.022 af Secondary=20.85 cfs 0.833 af Outflow=34.45 cfs 3.855 af

Pond 8P: Existing Culvert 4 Peak Elev=463.73' Inflow=170.92 cfs 26.670 af
60.0" x 95.1' Culvert Outflow=170.92 cfs 26.670 af

Pond 9P: Existing Culvert 5 Peak Elev=469.59' Inflow=38.48 cfs 4.364 af
Primary=7.75 cfs 2.718 af Secondary=30.74 cfs 1.646 af Outflow=38.48 cfs 4.364 af

Pond 10P: Existing Culvert 6 Peak Elev=481.55' Inflow=13.96 cfs 1.907 af
Primary=9.70 cfs 1.775 af Secondary=4.25 cfs 0.133 af Outflow=13.96 cfs 1.907 af

Pond 11P: Existing Culvert 9 Peak Elev=474.78' Inflow=21.59 cfs 2.791 af
Outflow=21.59 cfs 2.791 af

Pond 12P: Existing Culvert 11 Peak Elev=485.09' Inflow=31.27 cfs 3.388 af
Outflow=31.27 cfs 3.388 af

Total Runoff Area = 347.720 ac Runoff Volume = 130.243 af Average Runoff Depth = 4.49"

Subcatchment 1S: Subcatchment 1S

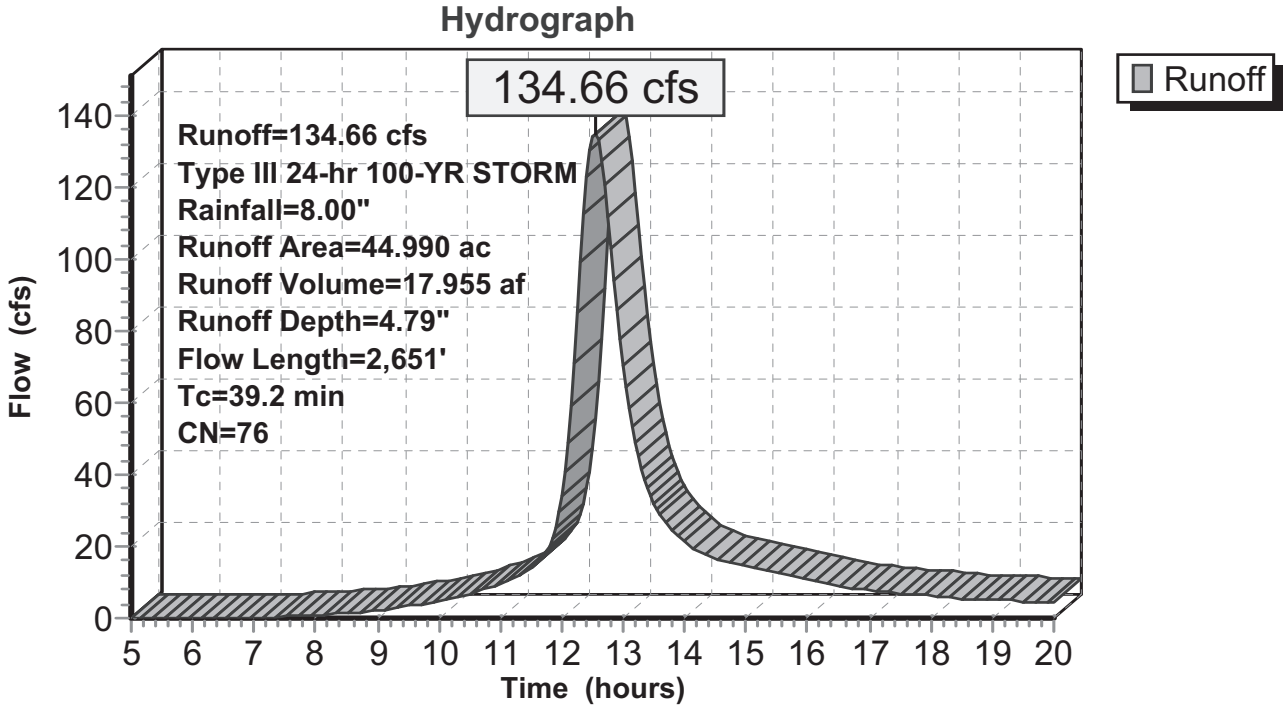
Runoff = 134.66 cfs @ 12.53 hrs, Volume= 17.955 af, Depth= 4.79"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.920	98	Existing pavement
0.310	71	Meadow, non-grazed, HSG C
15.500	79	50-75% Grass cover, Fair, HSG C
28.260	73	Woods, Fair, HSG C
44.990	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	100	0.0622	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
10.9	947	0.0846	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.5	598	0.1003	2.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.8	1,006	0.0962	1.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
39.2	2,651	Total			

Subcatchment 1S: Subcatchment 1S



Subcatchment 2S: Subcatchment 2S

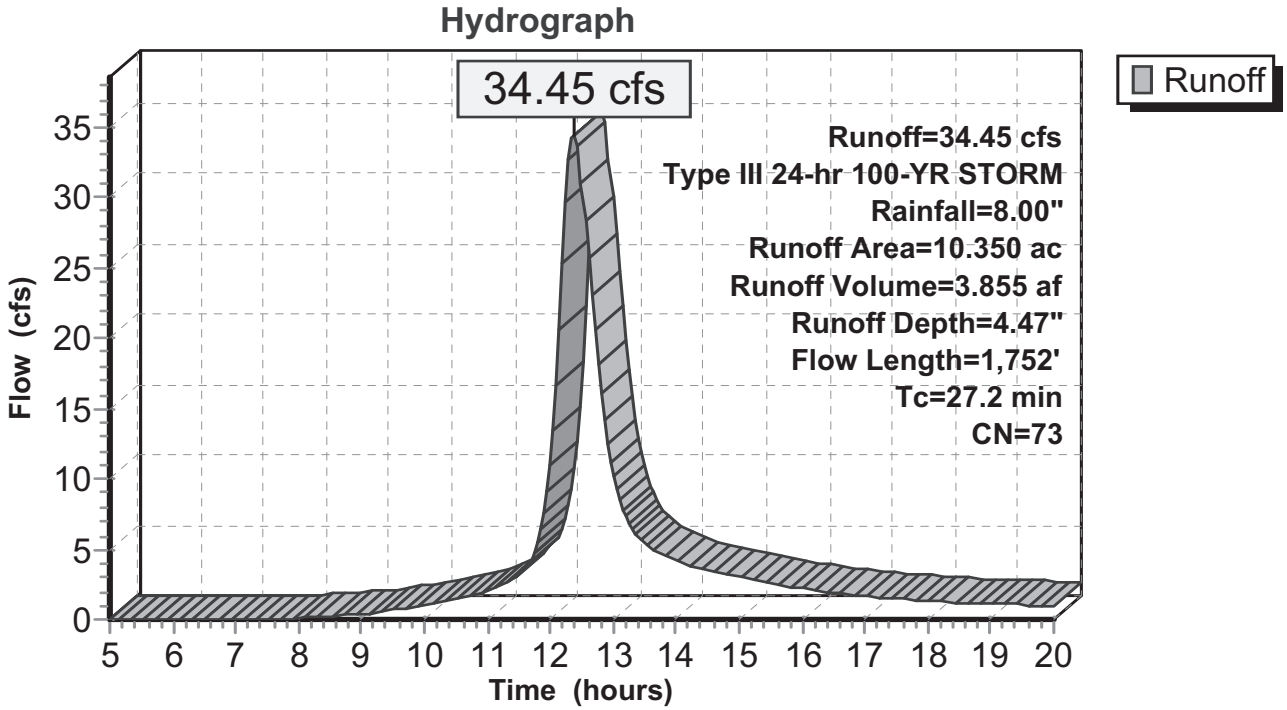
Runoff = 34.45 cfs @ 12.37 hrs, Volume= 3.855 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.080	98	Existing pavement
0.120	71	Meadow, non-grazed, HSG C
10.150	73	Woods, Fair, HSG C
10.350	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.1300	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
17.2	1,589	0.0944	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.3	63	0.0625	3.8		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
27.2	1,752	Total			

Subcatchment 2S: Subcatchment 2S



Subcatchment 3S: Subcatchment 3S

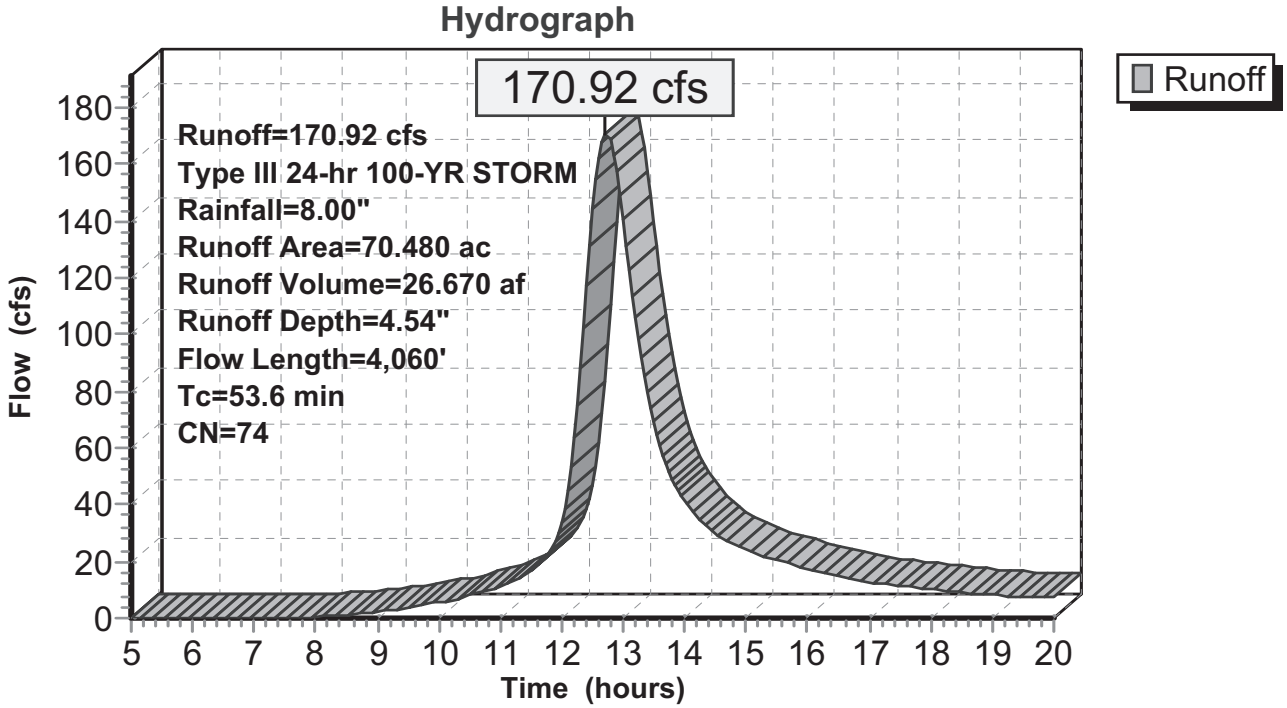
Runoff = 170.92 cfs @ 12.72 hrs, Volume= 26.670 af, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.450	98	Existing pavement
0.680	71	Meadow, non-grazed, HSG C
0.870	78	Meadow, non-grazed, HSG D
58.440	73	Woods, Fair, HSG C
10.040	79	Woods, Fair, HSG D
70.480	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.7	100	0.0155	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
14.4	914	0.0445	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.8	1,806	0.0836	3.8	43.28	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=1.50' Z= 5.0 '/' n= 0.091
8.7	1,240	0.0081	2.4	5.22	**Channel Flow,** Area= 2.2 sf Perim= 10.4' r= 0.21' n= 0.020
53.6	4,060	Total			

Subcatchment 3S: Subcatchment 3S



Subcatchment 4S: Subcatchment 4S

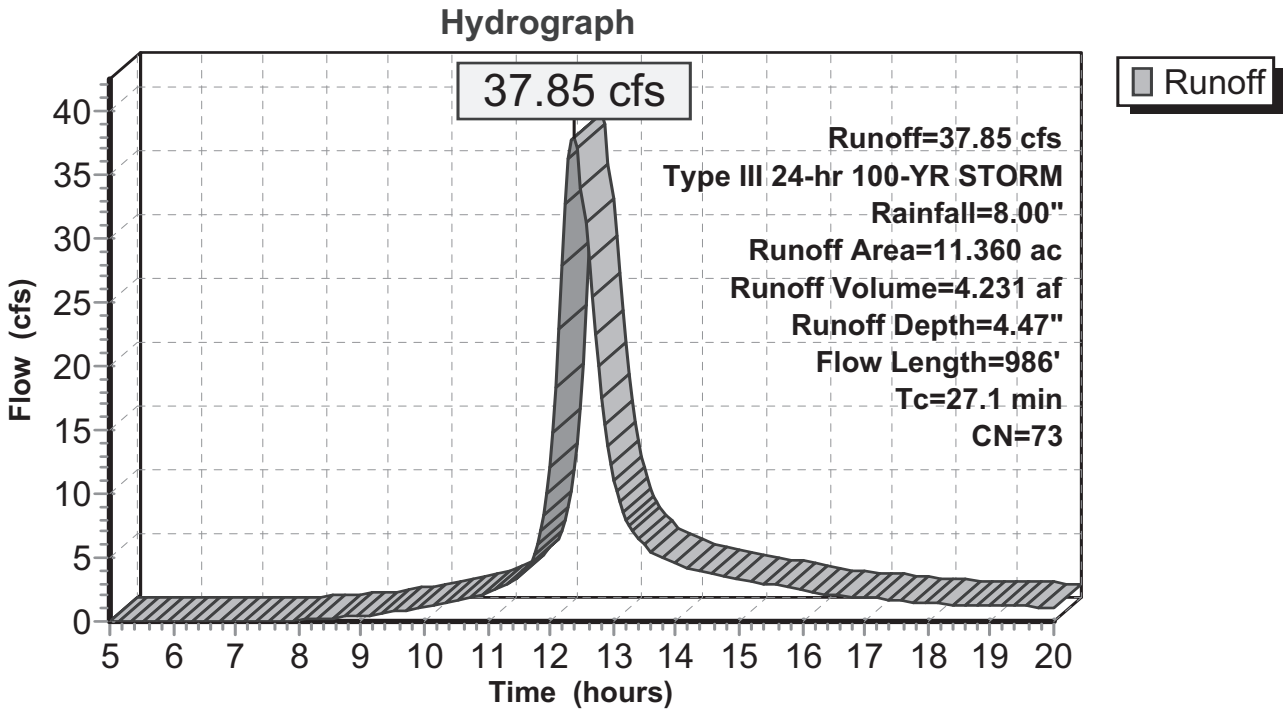
Runoff = 37.85 cfs @ 12.37 hrs, Volume= 4.231 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.170	98	Existing pavement
0.090	71	Meadow, non-grazed, HSG C
0.220	78	Meadow, non-grazed, HSG D
0.050	36	Woods, Fair, HSG A
10.670	73	Woods, Fair, HSG C
0.160	79	Woods, Fair, HSG D
11.360	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0432	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
12.0	886	0.0601	1.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.1	986	Total			

Subcatchment 4S: Subcatchment 4S



Subcatchment 5S: Subcatchment 5S

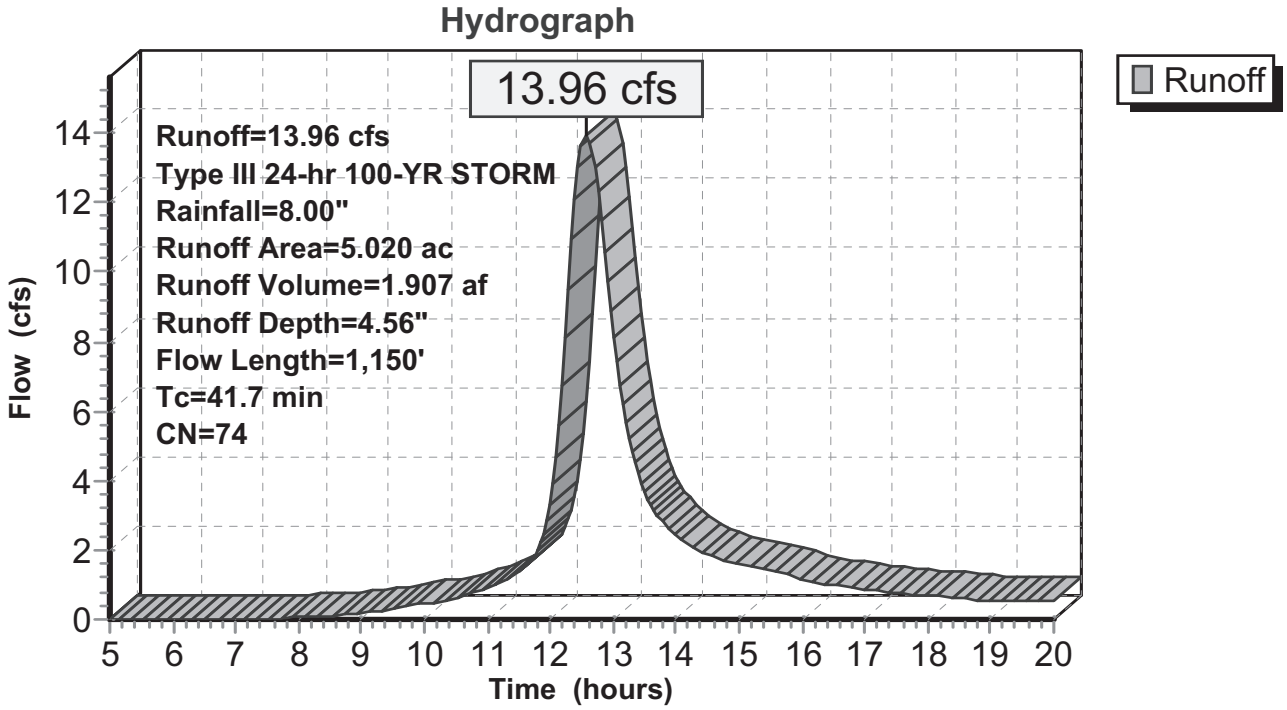
Runoff = 13.96 cfs @ 12.57 hrs, Volume= 1.907 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.230	98	Existing pavement
0.380	71	Meadow, non-grazed, HSG C
4.410	73	Woods, Fair, HSG C
5.020	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0457	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.2	175	0.0340	0.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	133	0.2400	2.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.8	742	0.0060	0.5		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
41.7	1,150	Total			

Subcatchment 5S: Subcatchment 5S



Subcatchment 6S: Subcatchment 6S

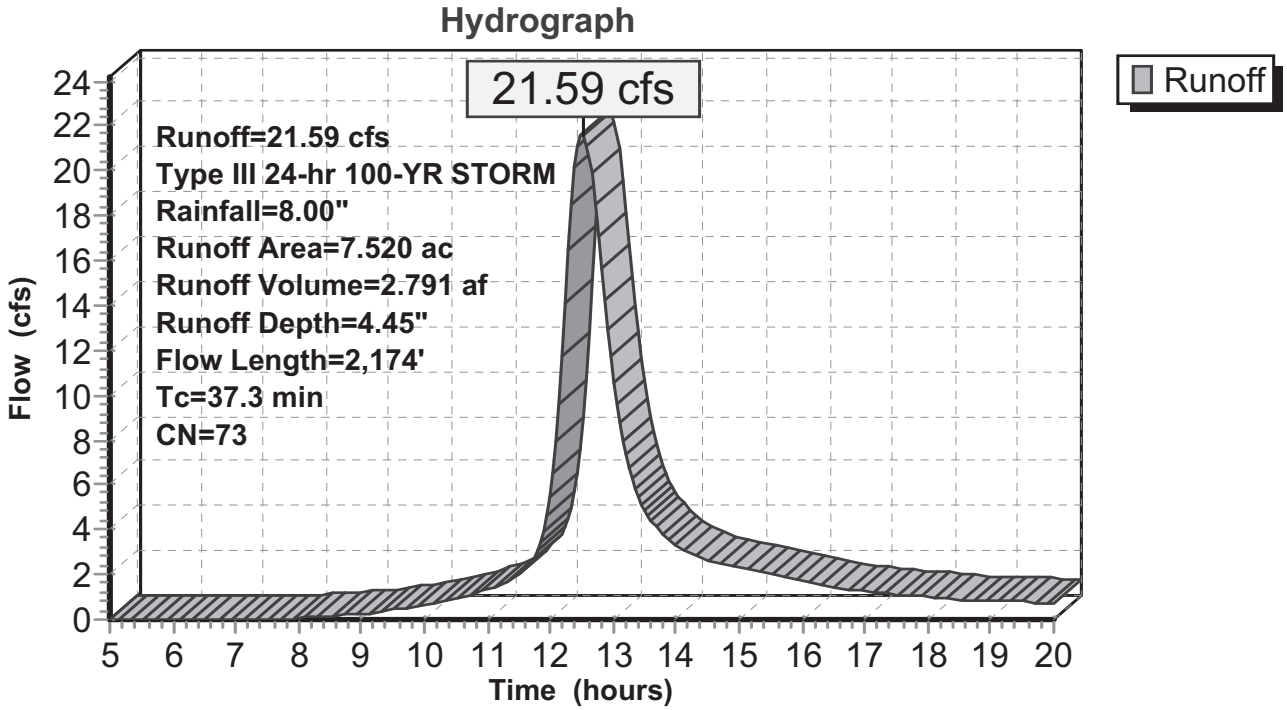
Runoff = 21.59 cfs @ 12.51 hrs, Volume= 2.791 af, Depth= 4.45"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.090	98	Existing pavement
0.480	71	Meadow, non-grazed, HSG C
0.050	78	Meadow, non-grazed, HSG D
6.600	73	Woods, Fair, HSG C
0.300	79	Woods, Fair, HSG D
7.520	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.2	100	0.0422	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
11.6	1,268	0.1323	1.8		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	78	0.2051	2.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
5.3	409	0.0674	1.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.6	319	0.0273	1.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
37.3	2,174	Total			

Subcatchment 6S: Subcatchment 6S



Subcatchment 7S: Subcatchment 7S

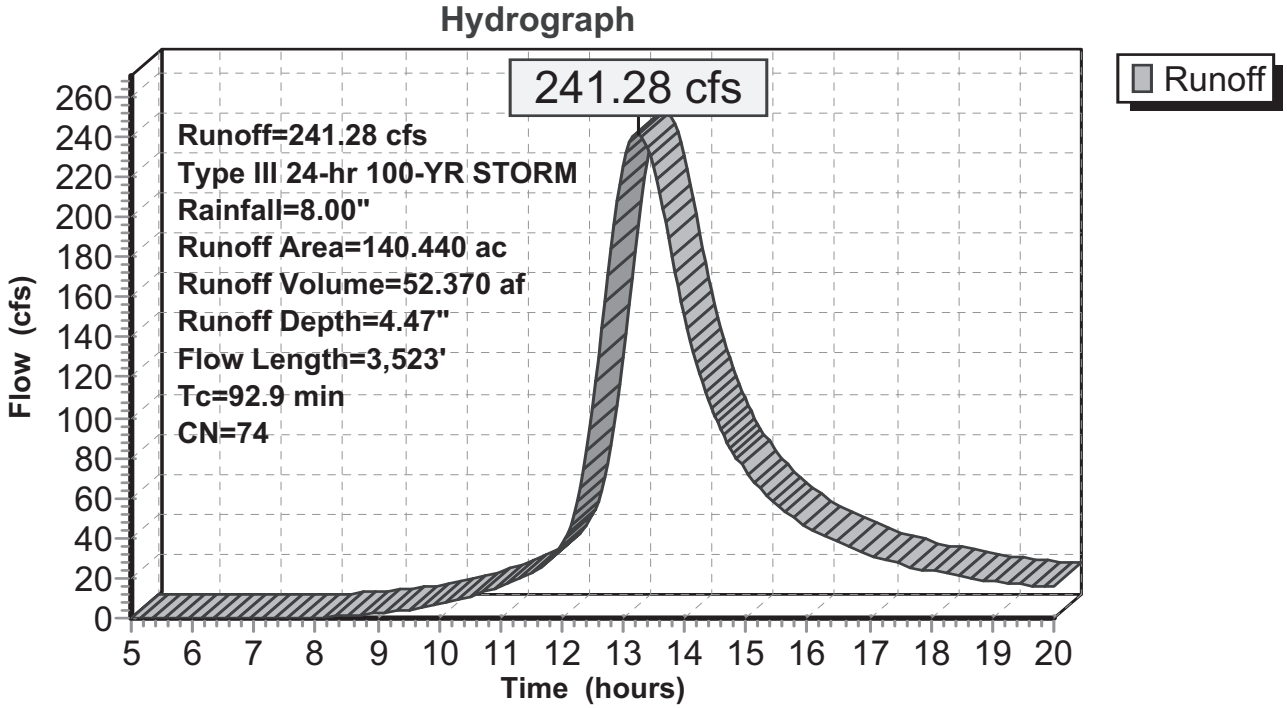
Runoff = 241.28 cfs @ 13.24 hrs, Volume= 52.370 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
1.110	98	Existing pavement
8.010	71	Meadow, non-grazed, HSG C
10.180	78	Meadow, non-grazed, HSG D
0.870	36	Woods, Fair, HSG A
100.000	73	Woods, Fair, HSG C
20.270	79	Woods, Fair, HSG D
140.440	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	100	0.0188	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
19.1	1,761	0.0943	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
52.8	1,662	0.0110	0.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
92.9	3,523	Total			

Subcatchment 7S: Subcatchment 7S



Subcatchment 8S: Subcatchment 8S

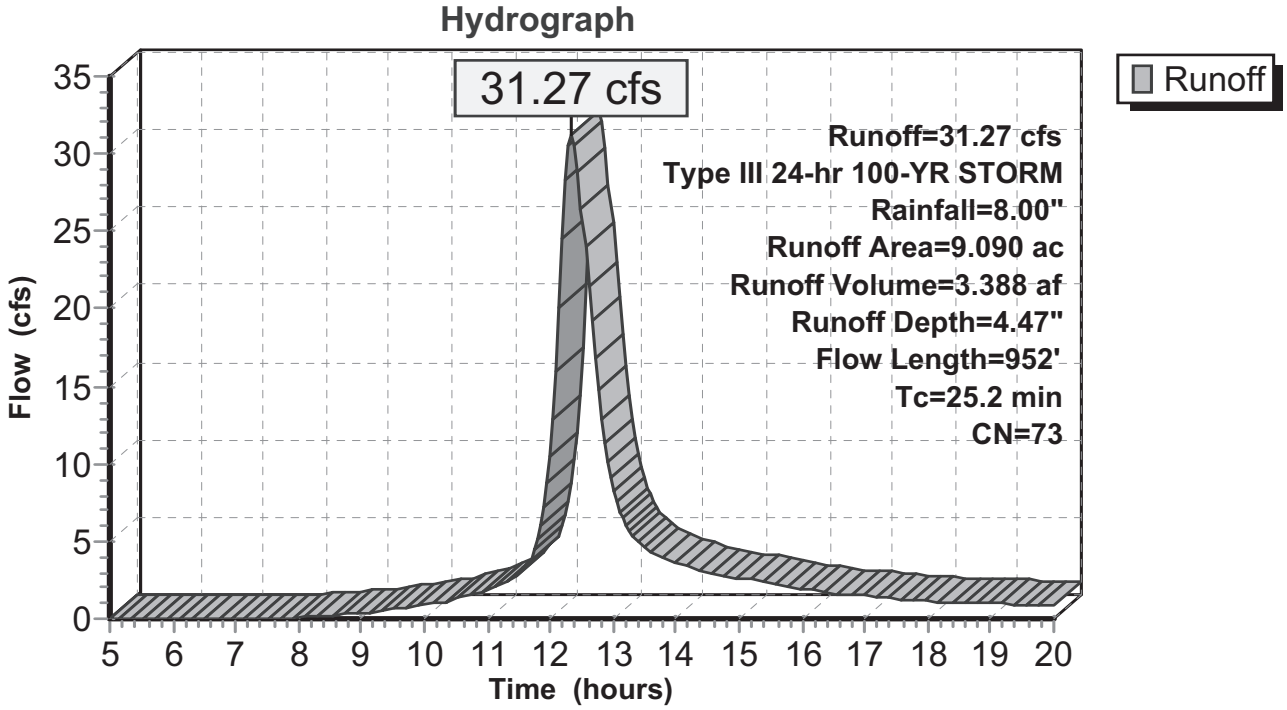
Runoff = 31.27 cfs @ 12.35 hrs, Volume= 3.388 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.120	98	Existing pavement
0.240	71	Meadow, non-grazed, HSG C
8.730	73	Woods, Fair, HSG C
9.090	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0435	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
10.2	852	0.0780	1.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
25.2	952	Total			

Subcatchment 8S: Subcatchment 8S



Subcatchment 9S: Subcatchment 9S

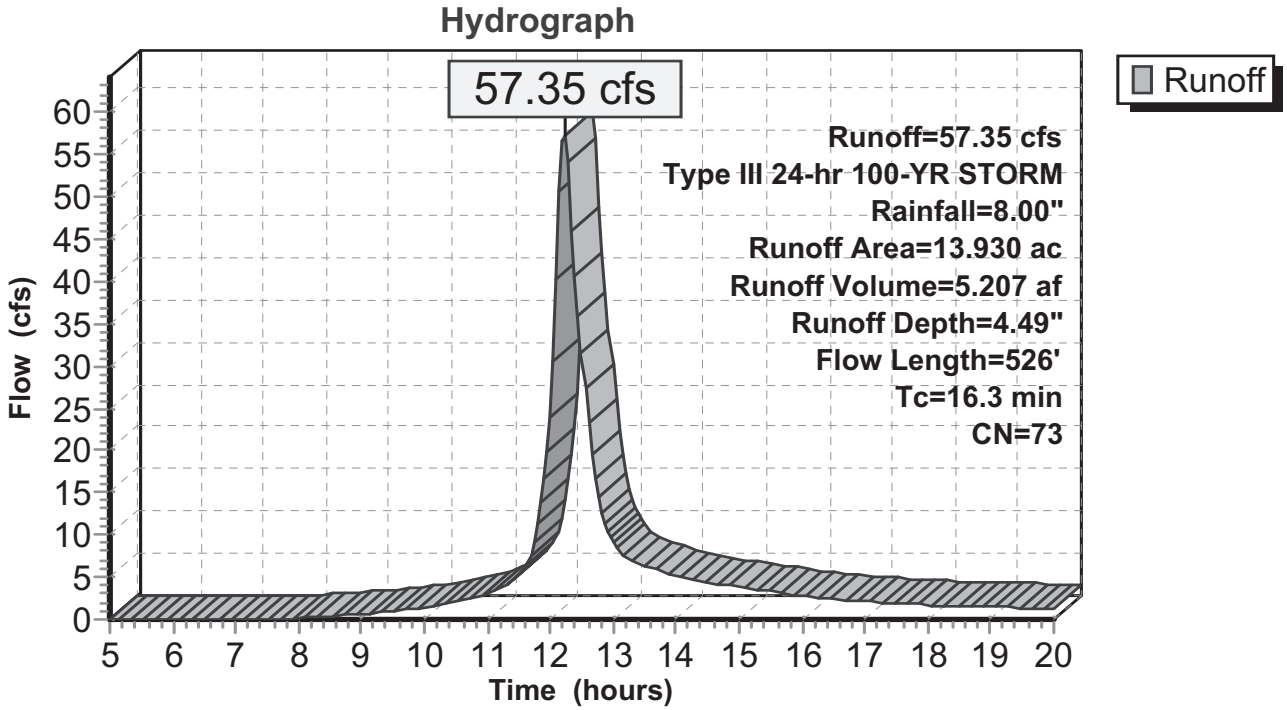
Runoff = 57.35 cfs @ 12.22 hrs, Volume= 5.207 af, Depth= 4.49"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.180	98	Existing pavement
0.260	71	Meadow, non-grazed, HSG C
0.040	78	Meadow, non-grazed, HSG D
13.160	73	Woods, Fair, HSG C
0.290	79	Woods, Fair, HSG D
13.930	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0660	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.6	426	0.1575	2.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.3	526	Total			

Subcatchment 9S: Subcatchment 9S



Subcatchment 10S: Subcatchment 10S

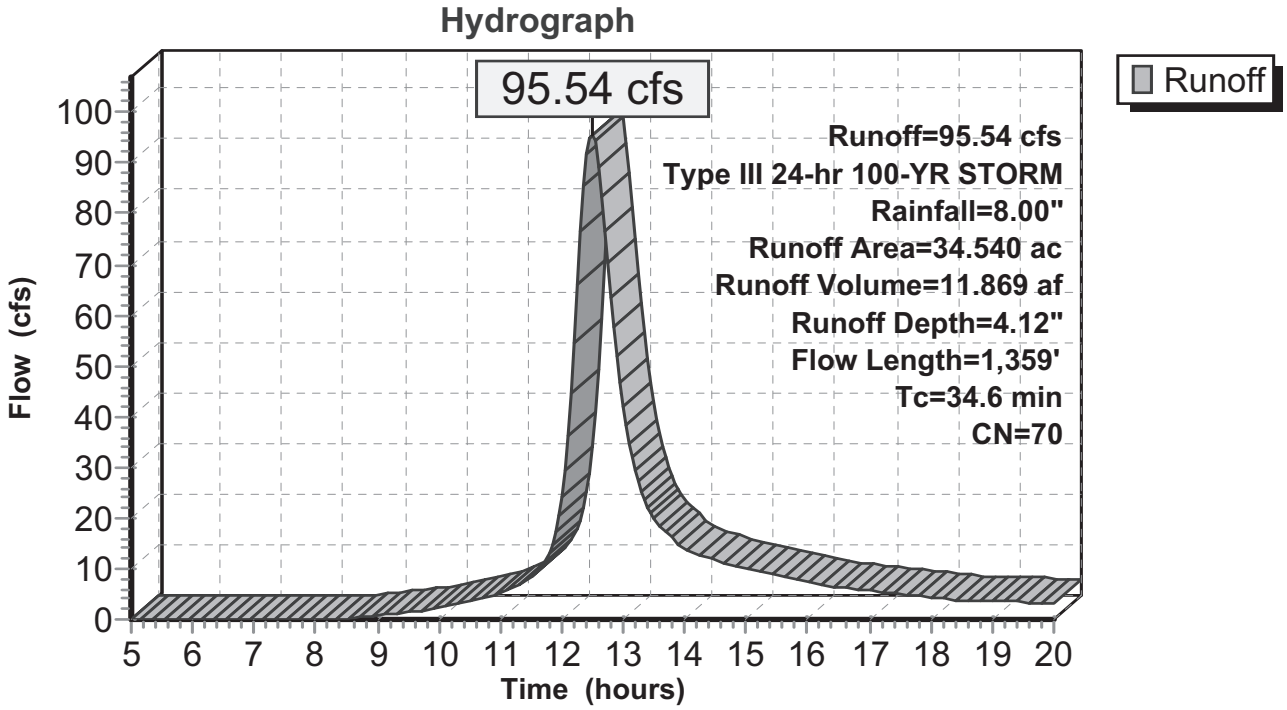
Runoff = 95.54 cfs @ 12.48 hrs, Volume= 11.869 af, Depth= 4.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
1.090	36	Woods, Fair, HSG A
31.250	70	Woods, Good, HSG C
2.200	79	Woods, Fair, HSG D
34.540	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0252	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	528	0.1545	2.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.8	133	0.3459	2.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.6	598	0.0356	0.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.6	1,359	Total			

Subcatchment 10S: Subcatchment 10S



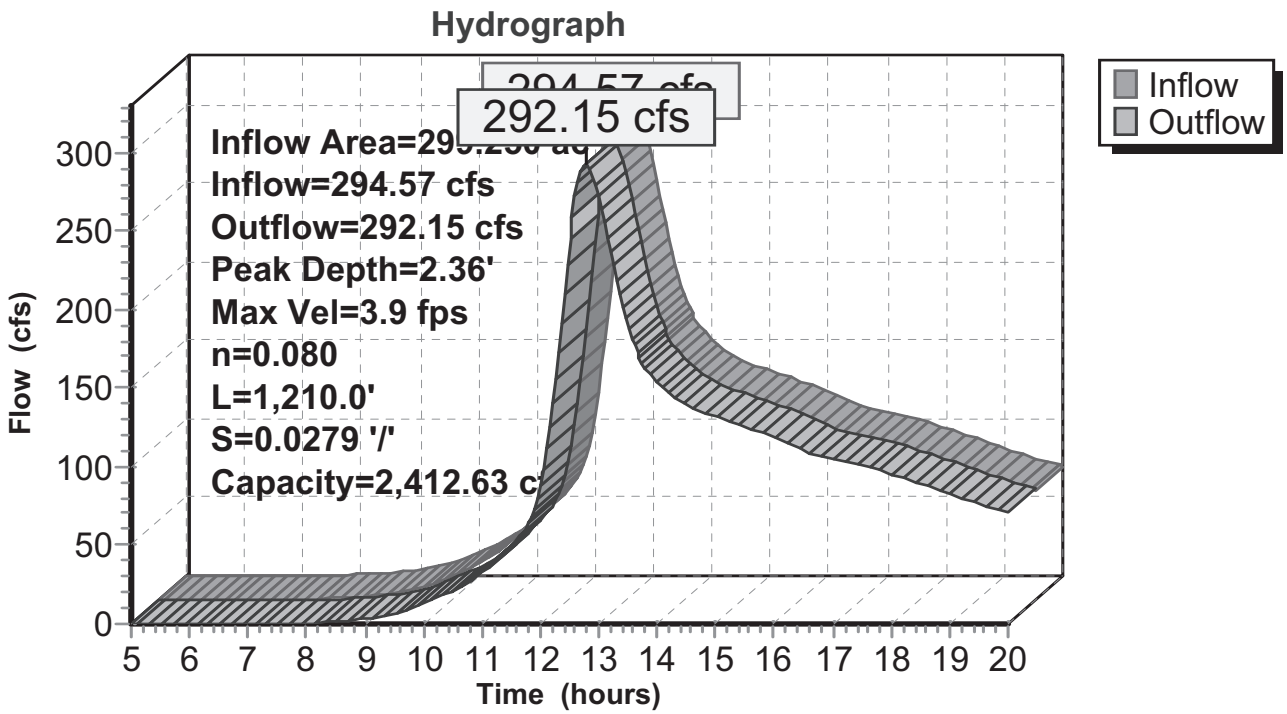
Reach 1R: Existing Stream

Inflow Area = 299.250 ac, Inflow Depth = 3.83" for 100-YR STORM event
Inflow = 294.57 cfs @ 12.72 hrs, Volume= 95.393 af
Outflow = 292.15 cfs @ 12.79 hrs, Volume= 94.662 af, Atten= 1%, Lag= 4.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.9 fps, Min. Travel Time= 5.2 min
Avg. Velocity = 2.4 fps, Avg. Travel Time= 8.4 min

Peak Depth= 2.36' @ 12.79 hrs
Capacity at bank full= 2,412.63 cfs
Inlet Invert= 416.82', Outlet Invert= 383.06'
10.50' x 5.80' deep channel, n= 0.080 Length= 1,210.0' Slope= 0.0279 '/'
Side Slope Z-value= 9.4 8.5 '/'

Reach 1R: Existing Stream



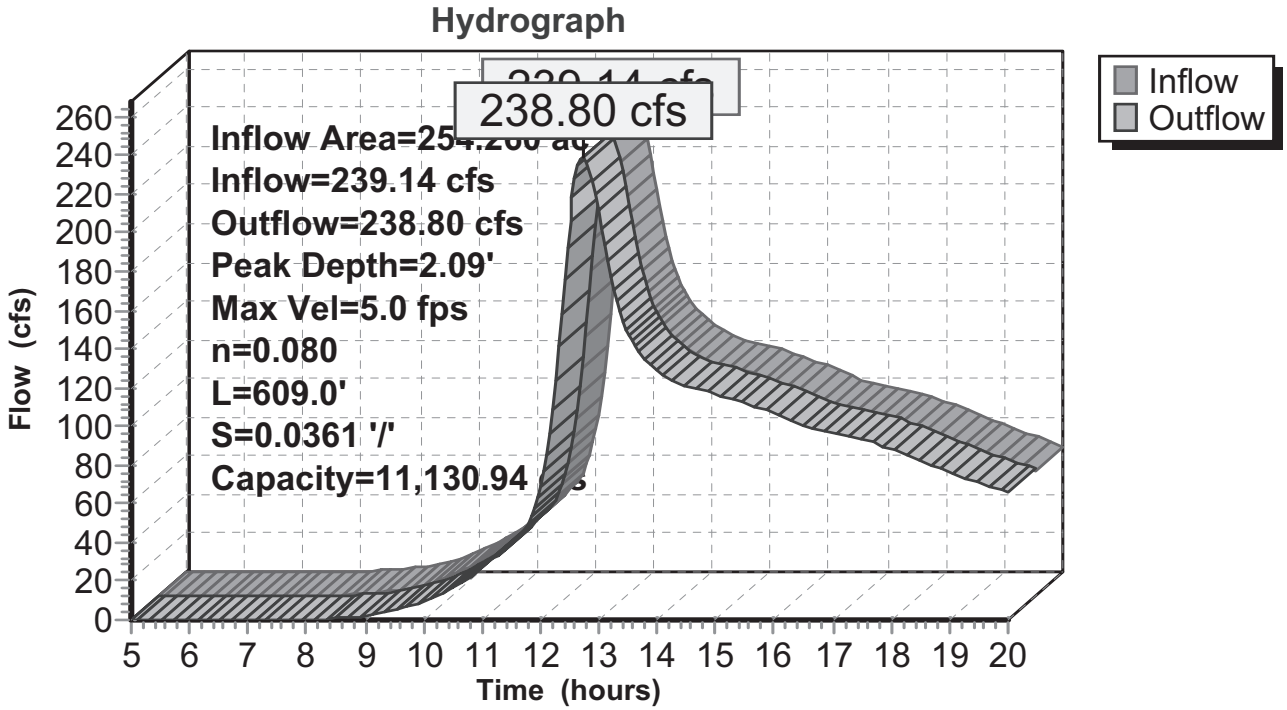
Reach 2R: Existing Stream

Inflow Area = 254.260 ac, Inflow Depth = 3.84" for 100-YR STORM event
Inflow = 239.14 cfs @ 12.71 hrs, Volume= 81.381 af
Outflow = 238.80 cfs @ 12.74 hrs, Volume= 81.098 af, Atten= 0%, Lag= 1.5 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.0 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 3.0 fps, Avg. Travel Time= 3.4 min

Peak Depth= 2.09' @ 12.74 hrs
Capacity at bank full= 11,130.94 cfs
Inlet Invert= 440.00', Outlet Invert= 418.00'
18.00' x 14.50' deep channel, n= 0.080 Length= 609.0' Slope= 0.0361 '/'
Side Slope Z-value= 2.7 2.2 '/'

Reach 2R: Existing Stream



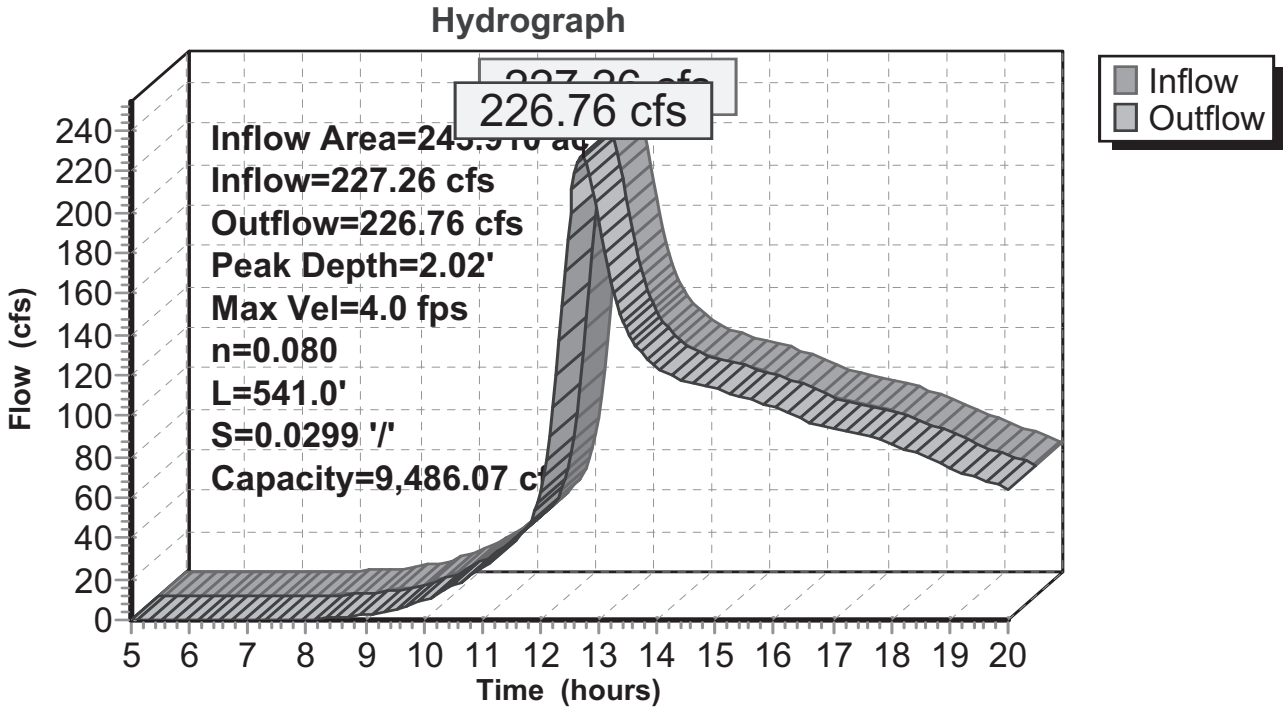
Reach 3R: Existing Stream

Inflow Area = 243.910 ac, Inflow Depth = 3.87" for 100-YR STORM event
Inflow = 227.26 cfs @ 12.69 hrs, Volume= 78.645 af
Outflow = 226.76 cfs @ 12.72 hrs, Volume= 78.359 af, Atten= 0%, Lag= 1.6 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.0 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 2.5 fps, Avg. Travel Time= 3.6 min

Peak Depth= 2.02' @ 12.72 hrs
Capacity at bank full= 9,486.07 cfs
Inlet Invert= 456.17', Outlet Invert= 440.00'
15.50' x 10.82' deep channel, n= 0.080 Length= 541.0' Slope= 0.0299 '/'
Side Slope Z-value= 7.3 5.3 '/'

Reach 3R: Existing Stream



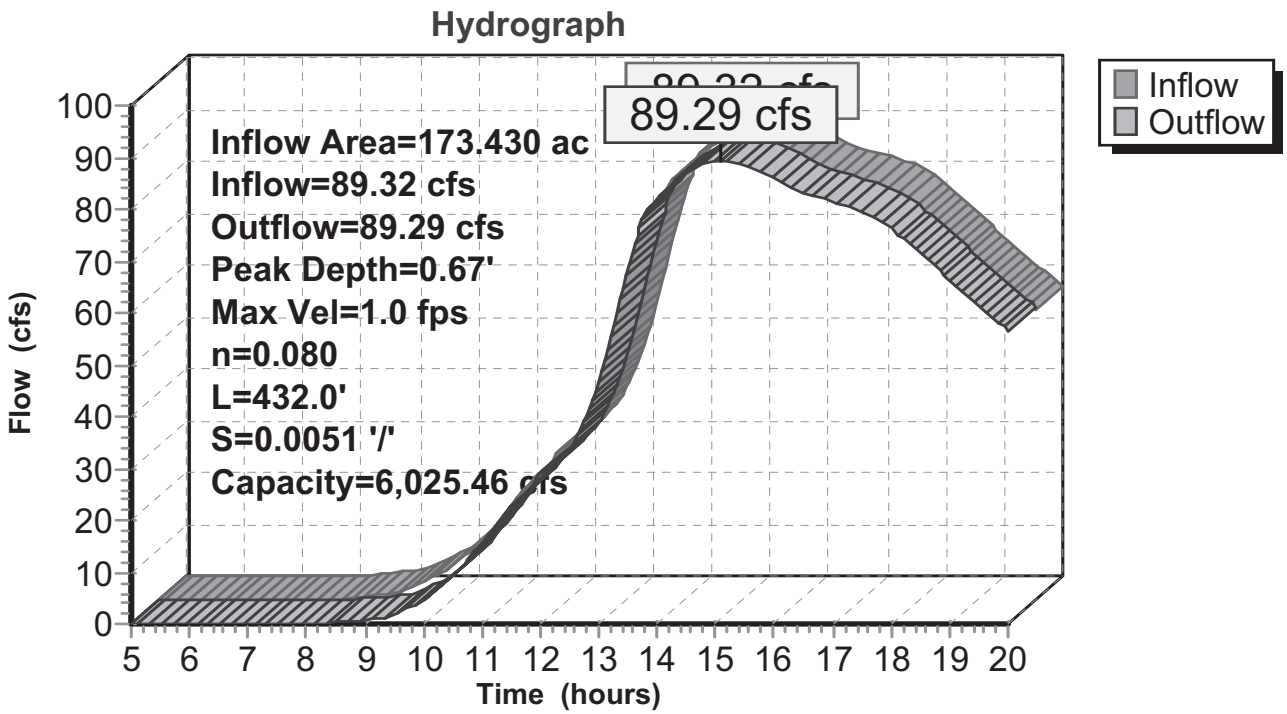
Reach 4R: Existing Stream

Inflow Area = 173.430 ac, Inflow Depth = 3.53" for 100-YR STORM event
Inflow = 89.32 cfs @ 14.99 hrs, Volume= 51.019 af
Outflow = 89.29 cfs @ 15.07 hrs, Volume= 50.329 af, Atten= 0%, Lag= 5.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.0 fps, Min. Travel Time= 7.5 min
Avg. Velocity = 0.7 fps, Avg. Travel Time= 10.7 min

Peak Depth= 0.67' @ 15.07 hrs
Capacity at bank full= 6,025.46 cfs
Inlet Invert= 460.18', Outlet Invert= 457.96'
124.00' x 6.50' deep channel, n= 0.080 Length= 432.0' Slope= 0.0051 '/'
Side Slope Z-value= 10.4 33.3 '/'

Reach 4R: Existing Stream



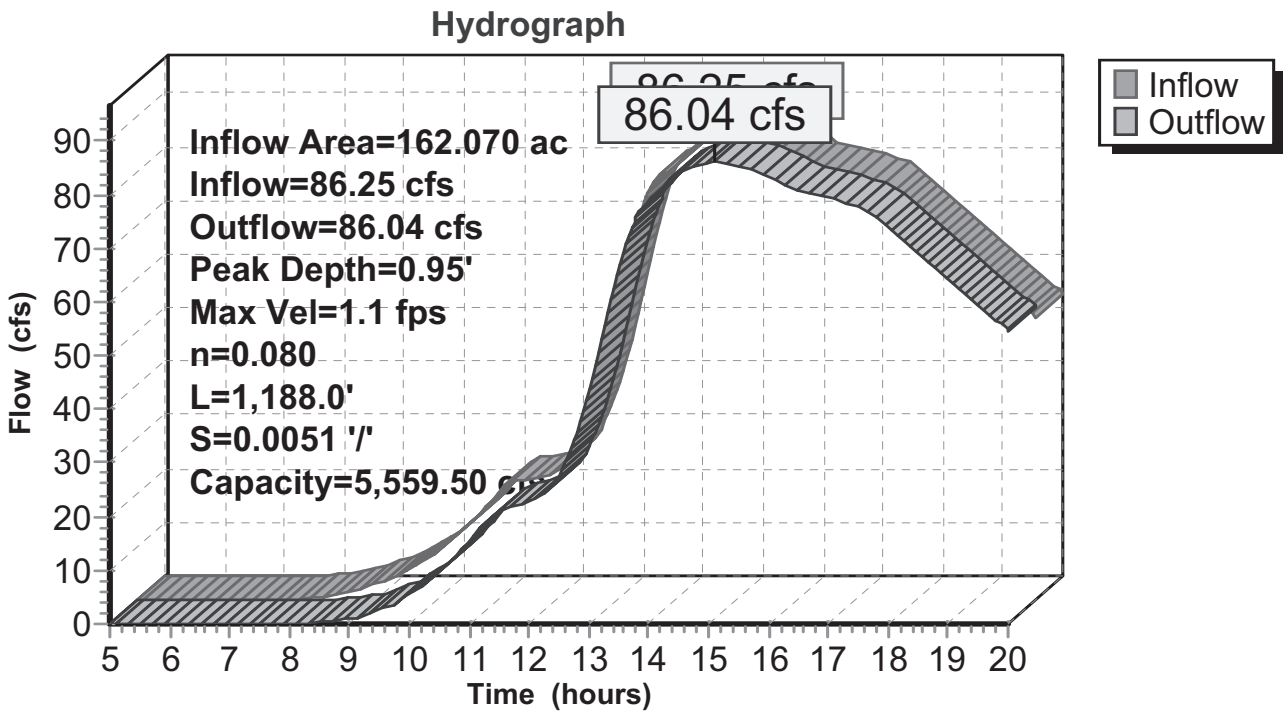
Reach 5R: Existing Stream

Inflow Area = 162.070 ac, Inflow Depth = 3.69" for 100-YR STORM event
Inflow = 86.25 cfs @ 14.86 hrs, Volume= 49.805 af
Outflow = 86.04 cfs @ 15.08 hrs, Volume= 48.301 af, Atten= 0%, Lag= 13.3 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.1 fps, Min. Travel Time= 17.2 min
Avg. Velocity = 0.8 fps, Avg. Travel Time= 24.4 min

Peak Depth= 0.95' @ 15.08 hrs
Capacity at bank full= 5,559.50 cfs
Inlet Invert= 466.24', Outlet Invert= 460.18'
64.50' x 8.00' deep channel, n= 0.080 Length= 1,188.0' Slope= 0.0051 '/'
Side Slope Z-value= 18.9 10.7 '/'

Reach 5R: Existing Stream



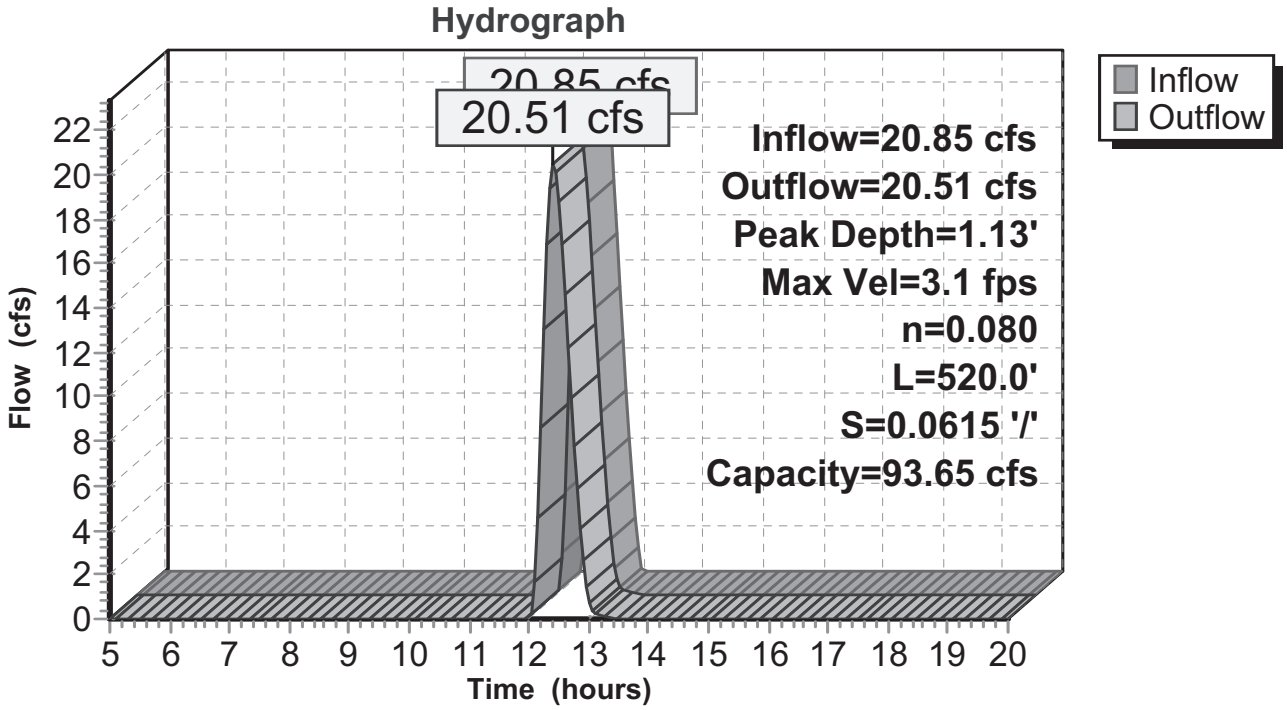
Reach 6R: Existing Swale

Inflow	=	20.85 cfs @	12.37 hrs,	Volume=	0.833 af
Outflow	=	20.51 cfs @	12.41 hrs,	Volume=	0.833 af, Atten= 2%, Lag= 2.3 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.1 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 0.8 fps, Avg. Travel Time= 11.3 min

Peak Depth= 1.13' @ 12.41 hrs
Capacity at bank full= 93.65 cfs
Inlet Invert= 454.00', Outlet Invert= 422.00'
0.00' x 2.00' deep channel, n= 0.080 Length= 520.0' Slope= 0.0615 '/'
Side Slope Z-value= 3.6 6.7 '/'

Reach 6R: Existing Swale



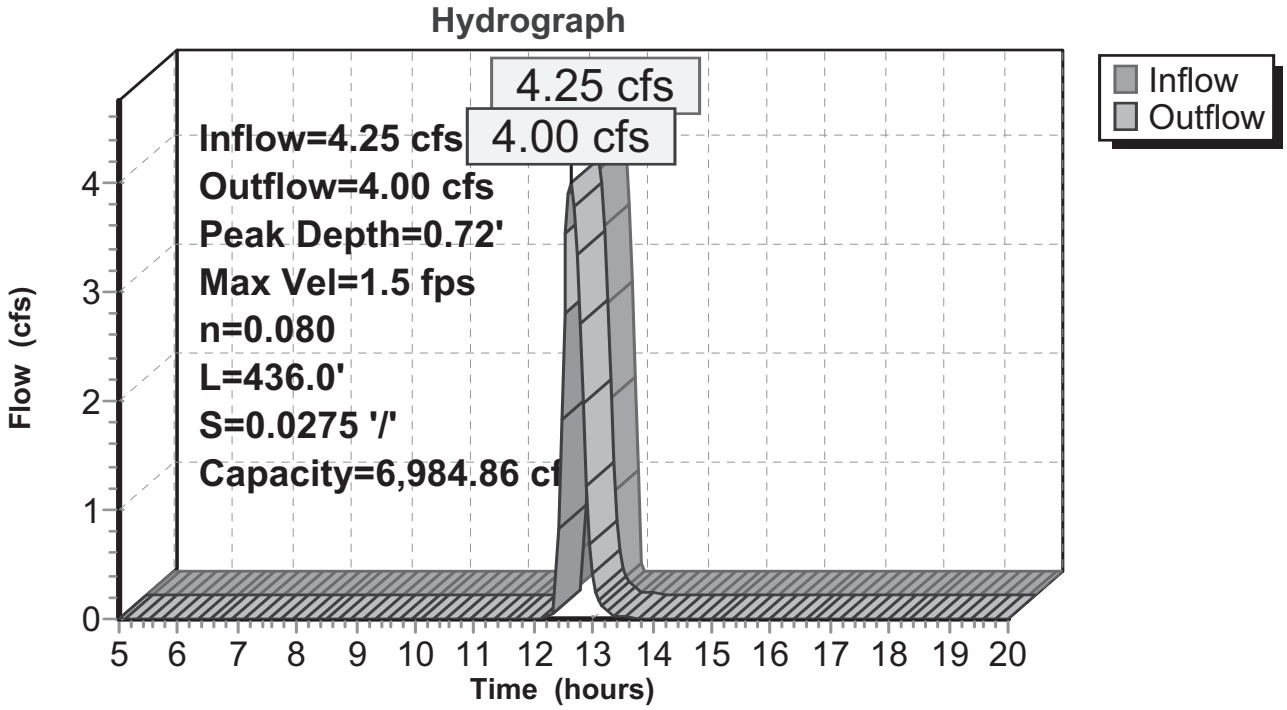
Reach 7R: Existing Swale

Inflow	=	4.25 cfs @	12.57 hrs,	Volume=	0.133 af
Outflow	=	4.00 cfs @	12.64 hrs,	Volume=	0.133 af, Atten= 6%, Lag= 4.2 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.5 fps, Min. Travel Time= 4.7 min
Avg. Velocity = 0.7 fps, Avg. Travel Time= 10.5 min

Peak Depth= 0.72' @ 12.64 hrs
Capacity at bank full= 6,984.86 cfs
Inlet Invert= 480.00', Outlet Invert= 468.00'
0.00' x 11.90' deep channel, n= 0.080 Length= 436.0' Slope= 0.0275 '/'
Side Slope Z-value= 6.8 3.1 '/'

Reach 7R: Existing Swale

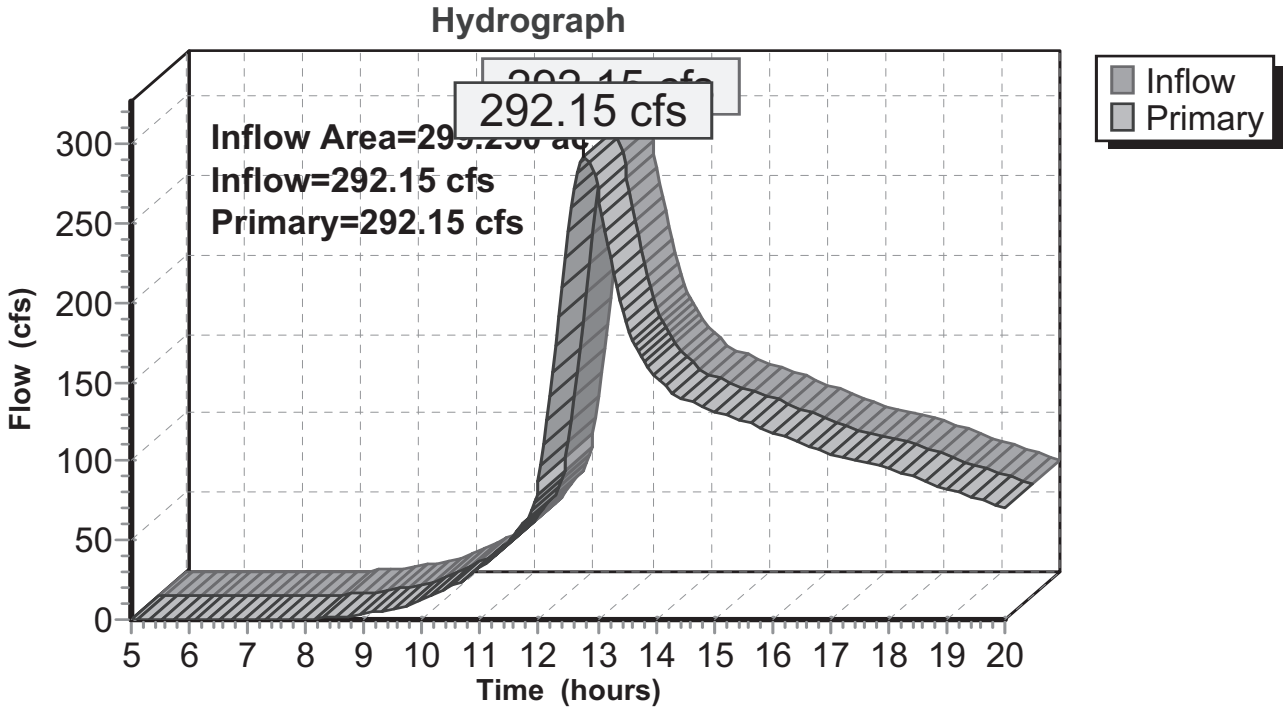


Pond 1P: Design Point 1 Outlet at Hasbrouck Road

Inflow Area = 299.250 ac, Inflow Depth = 3.80" for 100-YR STORM event
Inflow = 292.15 cfs @ 12.79 hrs, Volume= 94.662 af
Primary = 292.15 cfs @ 12.79 hrs, Volume= 94.662 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1 Outlet at Hasbrouck Road

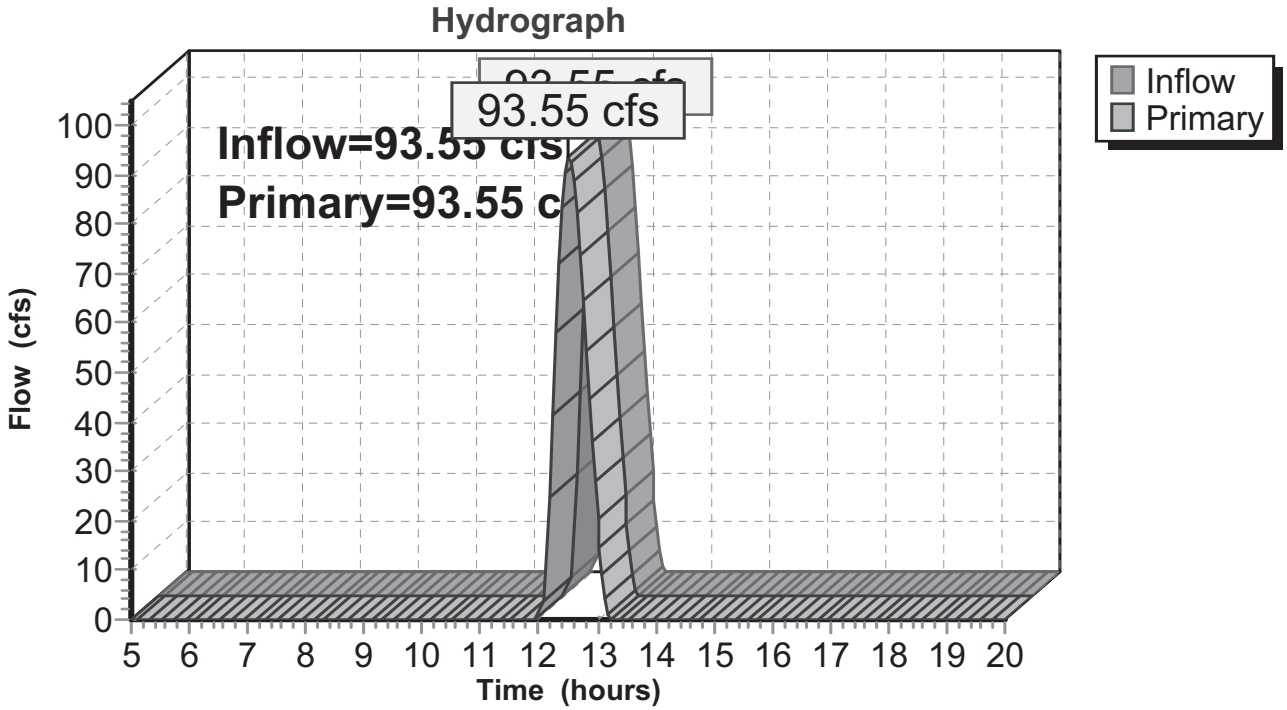


Pond 2P: Design Point 2 Existing Swale Along Craigville Road

Inflow	=	93.55 cfs @	12.51 hrs,	Volume=	4.492 af
Primary	=	93.55 cfs @	12.51 hrs,	Volume=	4.492 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 2P: Design Point 2 Existing Swale Along Craigville Road

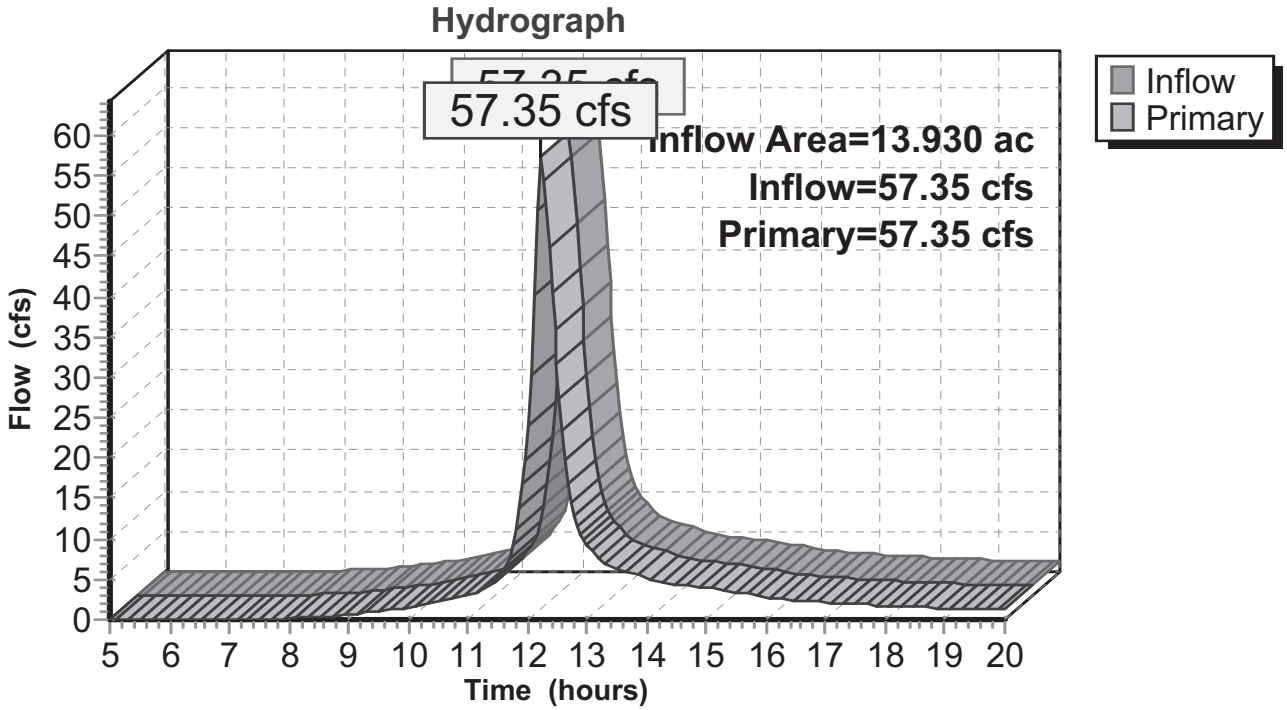


Pond 3P: Design Point 3 (Southeastern Property Line)

Inflow Area = 13.930 ac, Inflow Depth = 4.49" for 100-YR STORM event
Inflow = 57.35 cfs @ 12.22 hrs, Volume= 5.207 af
Primary = 57.35 cfs @ 12.22 hrs, Volume= 5.207 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 3P: Design Point 3 (Southeastern Property Line)

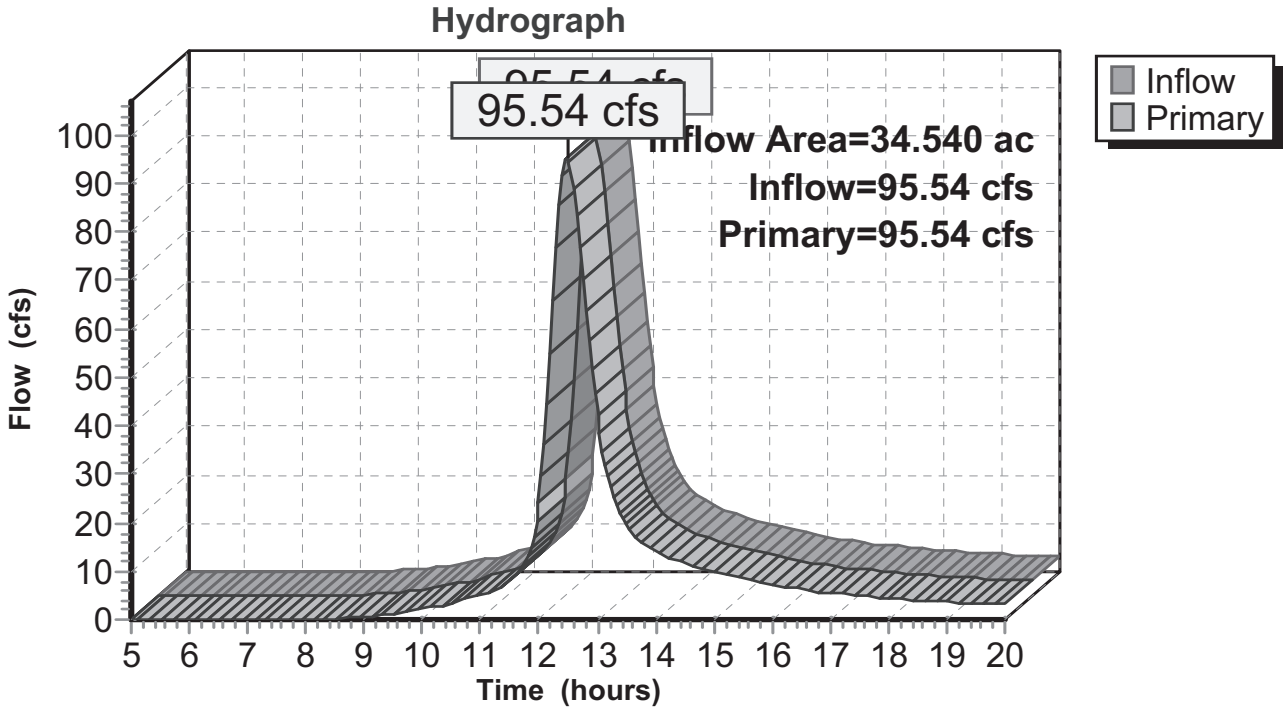


Pond 4P: Design Point 4 (Southwestern Property Line)

Inflow Area = 34.540 ac, Inflow Depth = 4.12" for 100-YR STORM event
Inflow = 95.54 cfs @ 12.48 hrs, Volume= 11.869 af
Primary = 95.54 cfs @ 12.48 hrs, Volume= 11.869 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 4P: Design Point 4 (Southwestern Property Line)



Pond 5P: Existing Wetland Pocket

Inflow Area = 162.070 ac, Inflow Depth = 4.47" for 100-YR STORM event
Inflow = 260.21 cfs @ 13.18 hrs, Volume= 60.324 af
Outflow = 86.25 cfs @ 14.86 hrs, Volume= 49.805 af, Atten= 67%, Lag= 101.0 min
Primary = 86.25 cfs @ 14.86 hrs, Volume= 49.805 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 470.40' @ 14.86 hrs Surf.Area= 0 sf Storage= 1,135,754 cf
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

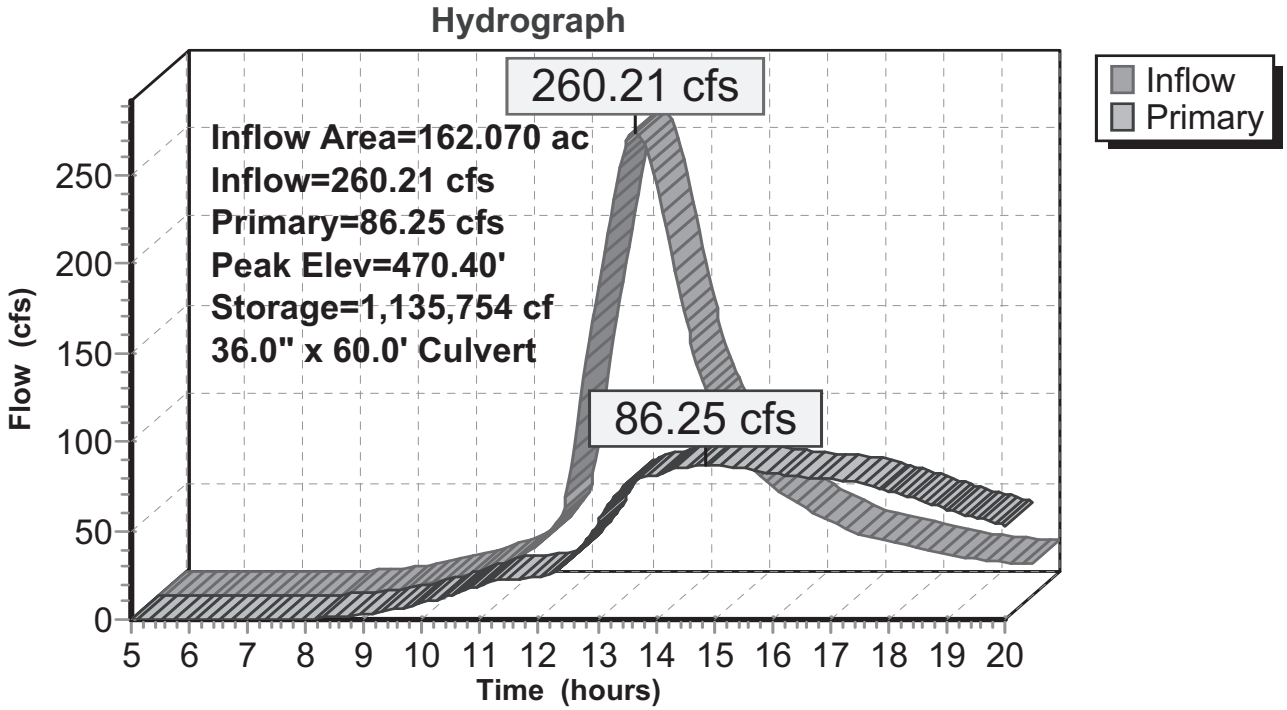
#	Invert	Avail.Storage	Storage Description
1	468.00'	4,153,277 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
468.00	0
470.00	838,050
472.00	2,316,286
474.00	4,153,277

#	Routing	Invert	Outlet Devices
1	Primary	466.24'	**36.0" x 60.0' long Culvert X 2.00** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 466.24' S= 0.0000 '/' n= 0.011 Cc= 0.900

Primary OutFlow Max=86.25 cfs @ 14.86 hrs HW=470.40' TW=467.19' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 86.25 cfs @ 6.1 fps)

Pond 5P: Existing Wetland Pocket



Pond 6P: Existing Culvert 2

Inflow Area =	44.990 ac,	Inflow Depth =	5.01"	for	100-YR STORM event
Inflow =	152.99 cfs @	12.51 hrs,	Volume=	18.788 af	
Outflow =	152.99 cfs @	12.51 hrs,	Volume=	18.788 af,	Atten= 0%, Lag= 0.0 min
Primary =	60.02 cfs @	12.42 hrs,	Volume=	14.295 af	
Secondary =	93.55 cfs @	12.51 hrs,	Volume=	4.492 af	

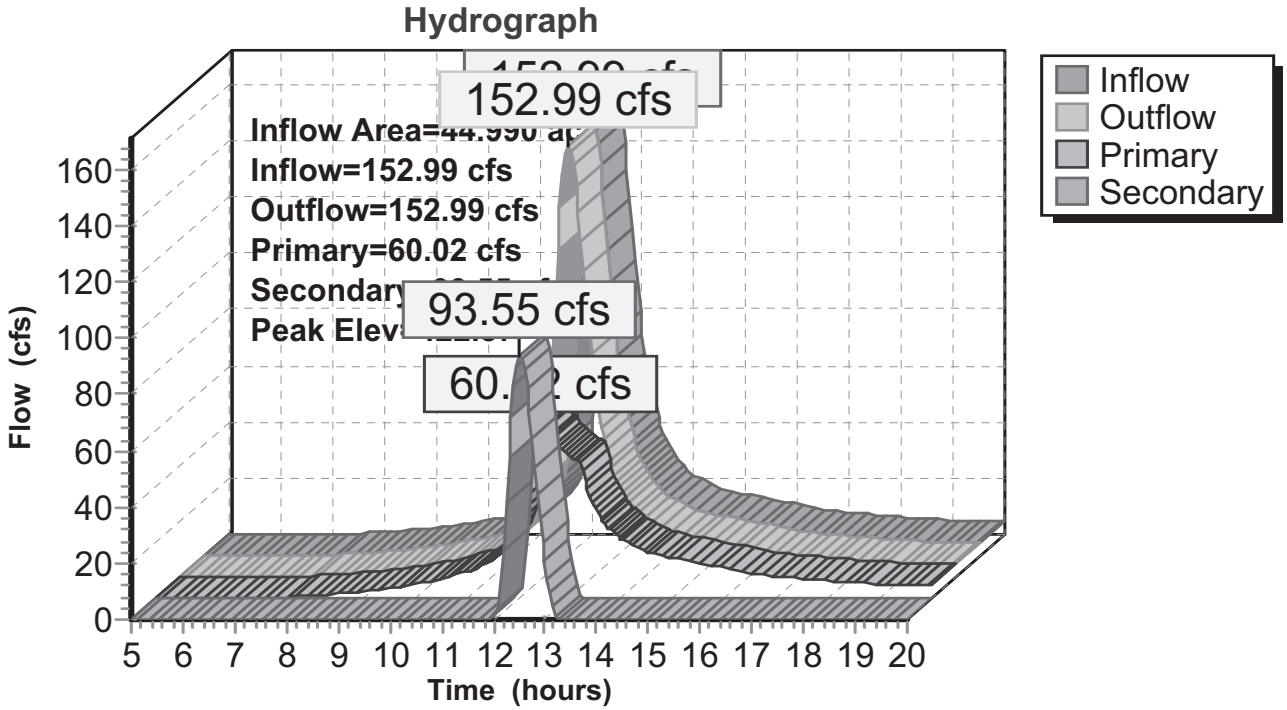
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 422.87' @ 12.51 hrs
Flood Elev= 424.00'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	417.23'	**36.0" x 45.0' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 416.82' S= 0.0091 '/' n= 0.011 Cc= 0.900
2	Secondary	421.50'	**22.0' long x 6.3' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.67 2.68 2.71 2.75 2.82

Primary OutFlow Max=59.33 cfs @ 12.42 hrs HW=422.79' TW=418.89' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 59.33 cfs @ 8.4 fps)

Secondary OutFlow Max=93.17 cfs @ 12.51 hrs HW=422.86' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 93.17 cfs @ 3.1 fps)

Pond 6P: Existing Culvert 2



Pond 7P: Existing Culvert 3

Inflow Area =	10.350 ac,	Inflow Depth =	4.47"	for	100-YR STORM event
Inflow =	34.45 cfs @	12.37 hrs,	Volume=	3.855 af	
Outflow =	34.45 cfs @	12.37 hrs,	Volume=	3.855 af,	Atten= 0%, Lag= 0.0 min
Primary =	13.60 cfs @	12.37 hrs,	Volume=	3.022 af	
Secondary =	20.85 cfs @	12.37 hrs,	Volume=	0.833 af	

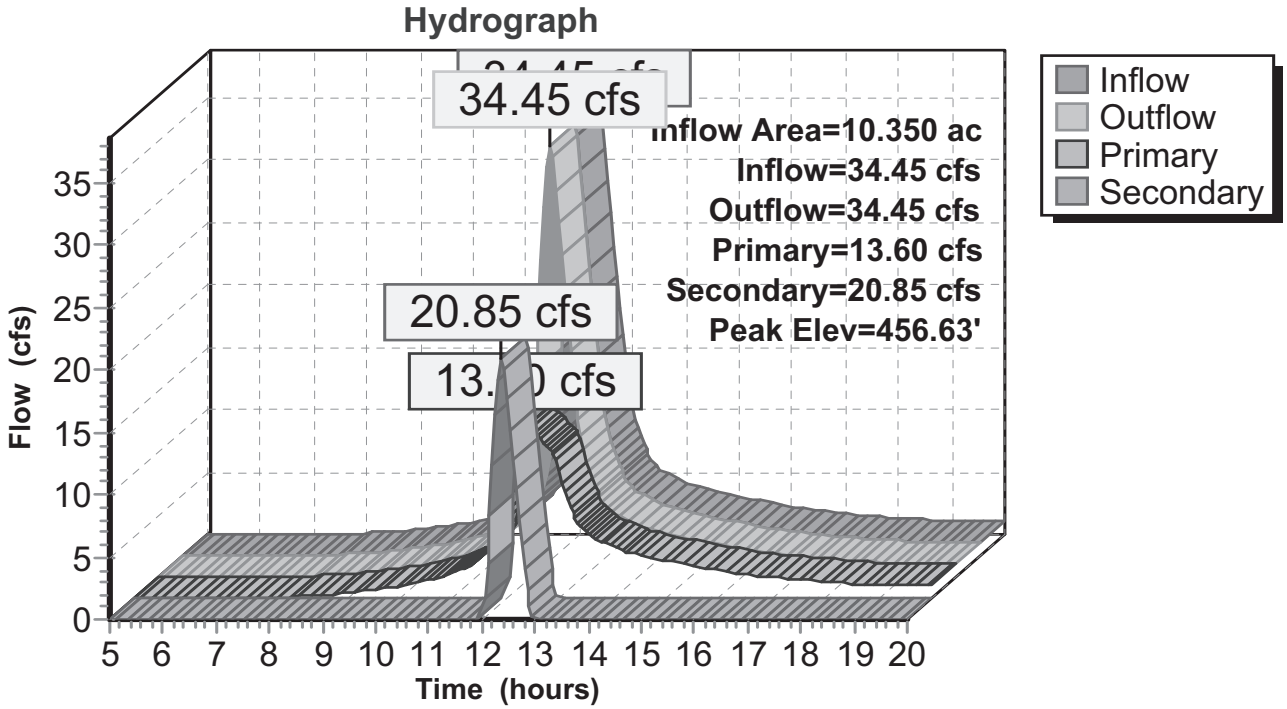
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 456.63' @ 12.37 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	452.60'	**18.0" x 45.6' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 451.11' S= 0.0327 '/' n= 0.011 Cc= 0.900
2	Secondary	455.50'	**6.5' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=13.59 cfs @ 12.37 hrs HW=456.62' TW=441.70' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 13.59 cfs @ 7.7 fps)

Secondary OutFlow Max=20.67 cfs @ 12.37 hrs HW=456.62' TW=455.12' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 20.67 cfs @ 2.8 fps)

Pond 7P: Existing Culvert 3



Pond 8P: Existing Culvert 4

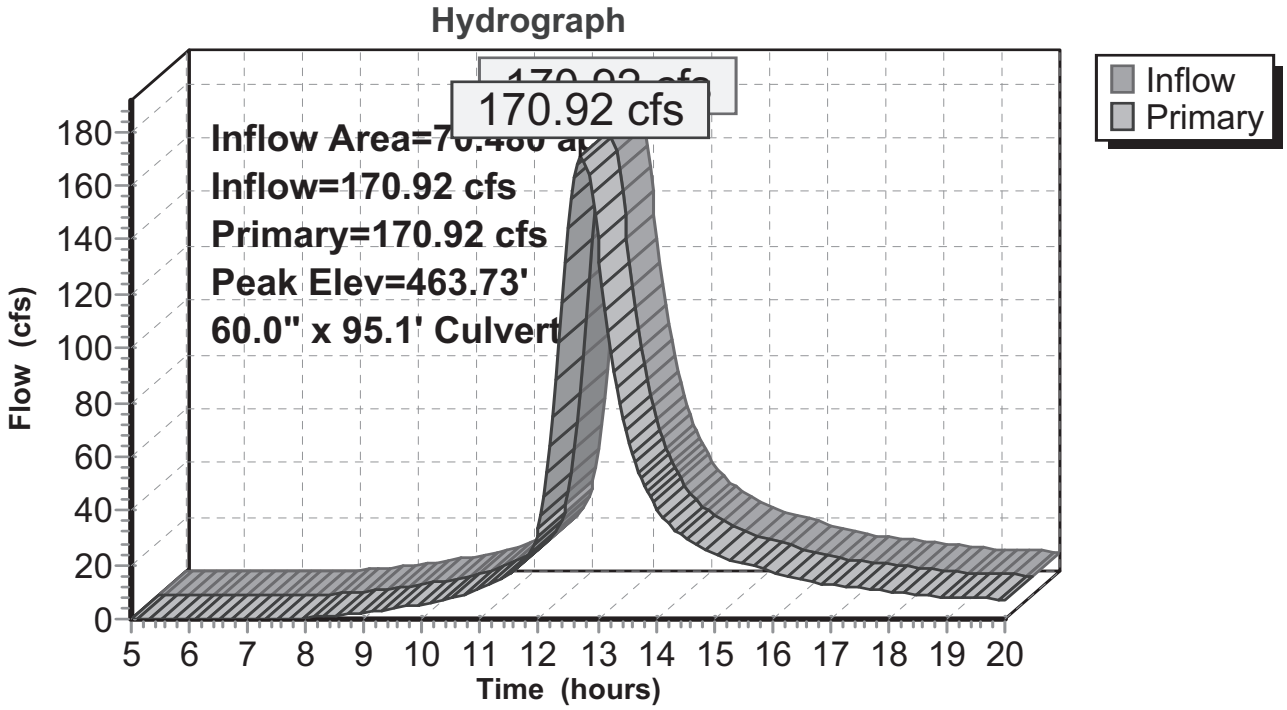
Inflow Area =	70.480 ac,	Inflow Depth =	4.54"	for	100-YR STORM event
Inflow =	170.92 cfs @	12.72 hrs,	Volume=	26.670 af	
Outflow =	170.92 cfs @	12.72 hrs,	Volume=	26.670 af,	Atten= 0%, Lag= 0.0 min
Primary =	170.92 cfs @	12.72 hrs,	Volume=	26.670 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 463.73' @ 12.72 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	457.96'	**60.0" x 95.1' long Culvert** CMP, square edge headwall, Ke= 0.500 Outlet Invert= 456.17' S= 0.0188 '/' n= 0.011 Cc= 0.900

Primary OutFlow Max=170.55 cfs @ 12.72 hrs HW=463.71' TW=458.19' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 170.55 cfs @ 8.7 fps)

Pond 8P: Existing Culvert 4



Pond 9P: Existing Culvert 5

Inflow Area =	11.360 ac,	Inflow Depth =	4.61"	for	100-YR STORM event
Inflow =	38.48 cfs @	12.41 hrs,	Volume=	4.364 af	
Outflow =	38.48 cfs @	12.41 hrs,	Volume=	4.364 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.75 cfs @	12.41 hrs,	Volume=	2.718 af	
Secondary =	30.74 cfs @	12.41 hrs,	Volume=	1.646 af	

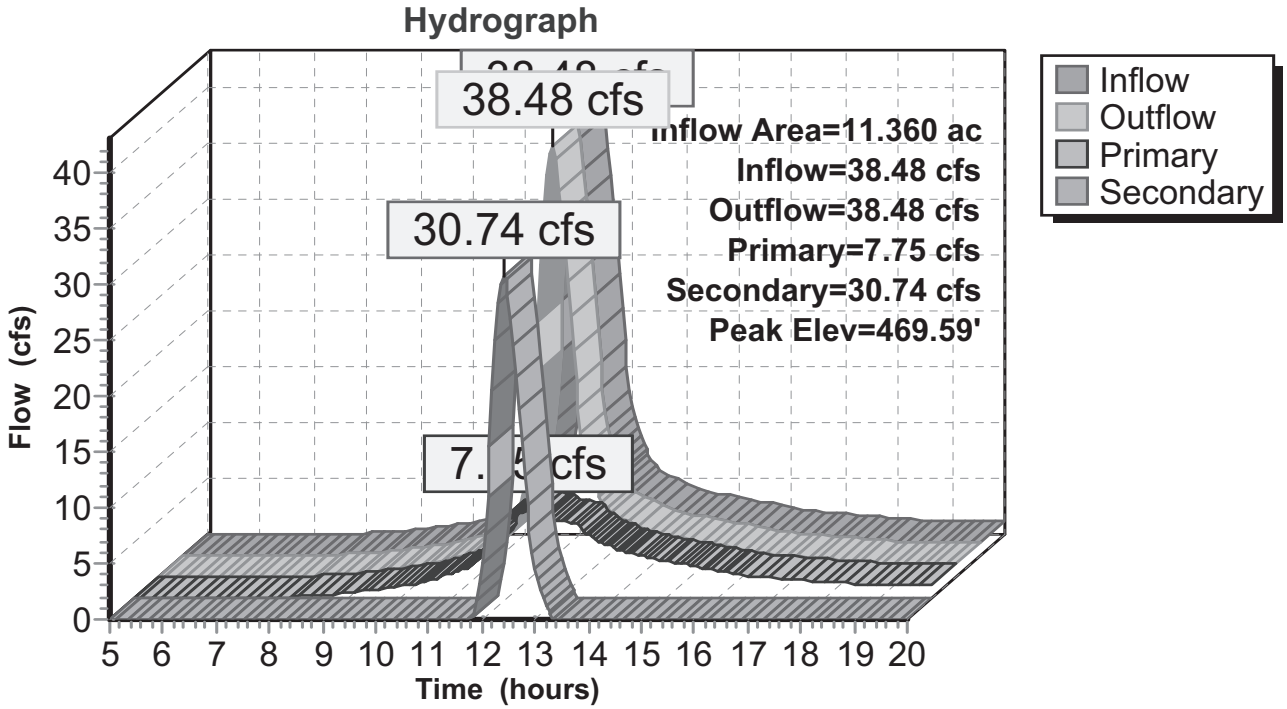
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 469.59' @ 12.41 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	466.76'	**15.0" x 50.3' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 465.61' S= 0.0229 '/' n= 0.011 Cc= 0.900
2	Secondary	469.00'	**25.0' long x 60.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=7.74 cfs @ 12.41 hrs HW=469.59' TW=460.55' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.74 cfs @ 6.3 fps)

Secondary OutFlow Max=30.67 cfs @ 12.41 hrs HW=469.59' TW=457.93' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 30.67 cfs @ 2.1 fps)

Pond 9P: Existing Culvert 5



Pond 10P: Existing Culvert 6

Inflow Area =	5.020 ac,	Inflow Depth =	4.56"	for	100-YR STORM event
Inflow =	13.96 cfs @	12.57 hrs,	Volume=	1.907 af	
Outflow =	13.96 cfs @	12.57 hrs,	Volume=	1.907 af,	Atten= 0%, Lag= 0.0 min
Primary =	9.70 cfs @	12.57 hrs,	Volume=	1.775 af	
Secondary =	4.25 cfs @	12.57 hrs,	Volume=	0.133 af	

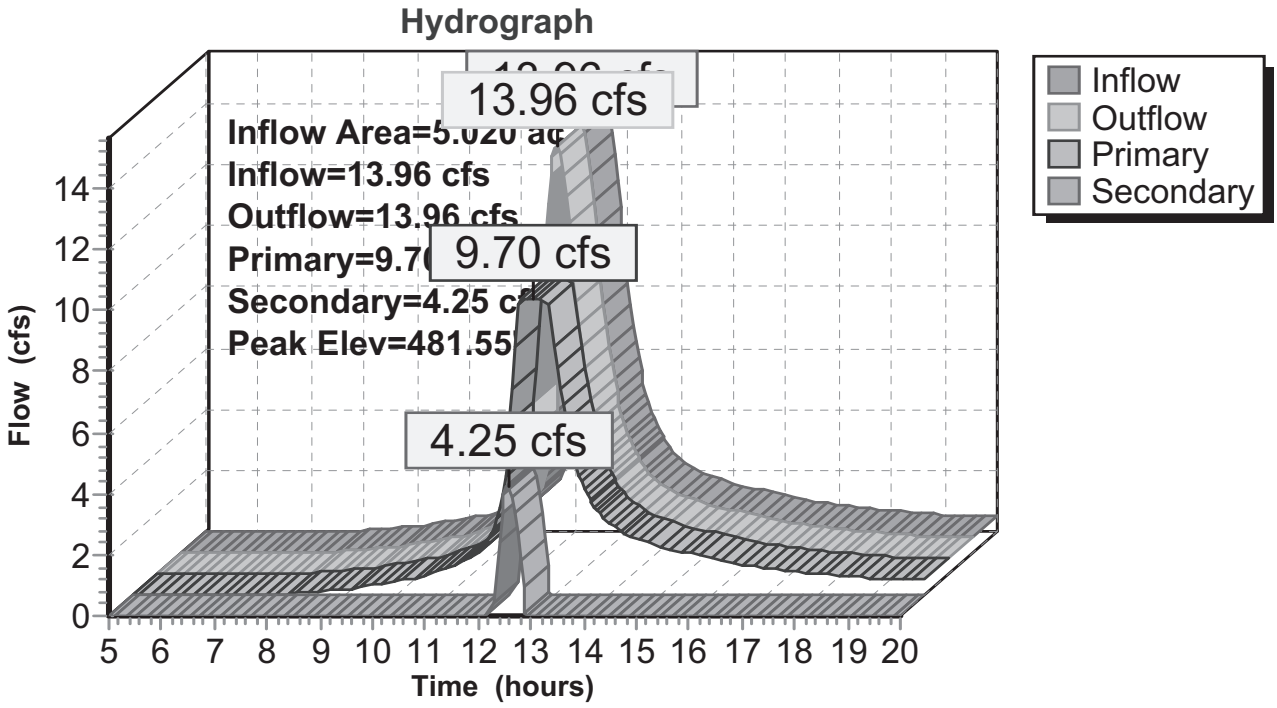
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 481.55' @ 12.57 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	477.46'	**15.0" x 54.0' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 475.67' S= 0.0331 '/' n= 0.011 Cc= 0.900
2	Secondary	481.50'	**160.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=9.70 cfs @ 12.57 hrs HW=481.55' TW=468.50' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 9.70 cfs @ 7.9 fps)

Secondary OutFlow Max=4.21 cfs @ 12.57 hrs HW=481.55' TW=480.70' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 4.21 cfs @ 0.5 fps)

Pond 10P: Existing Culvert 6



Pond 11P: Existing Culvert 9

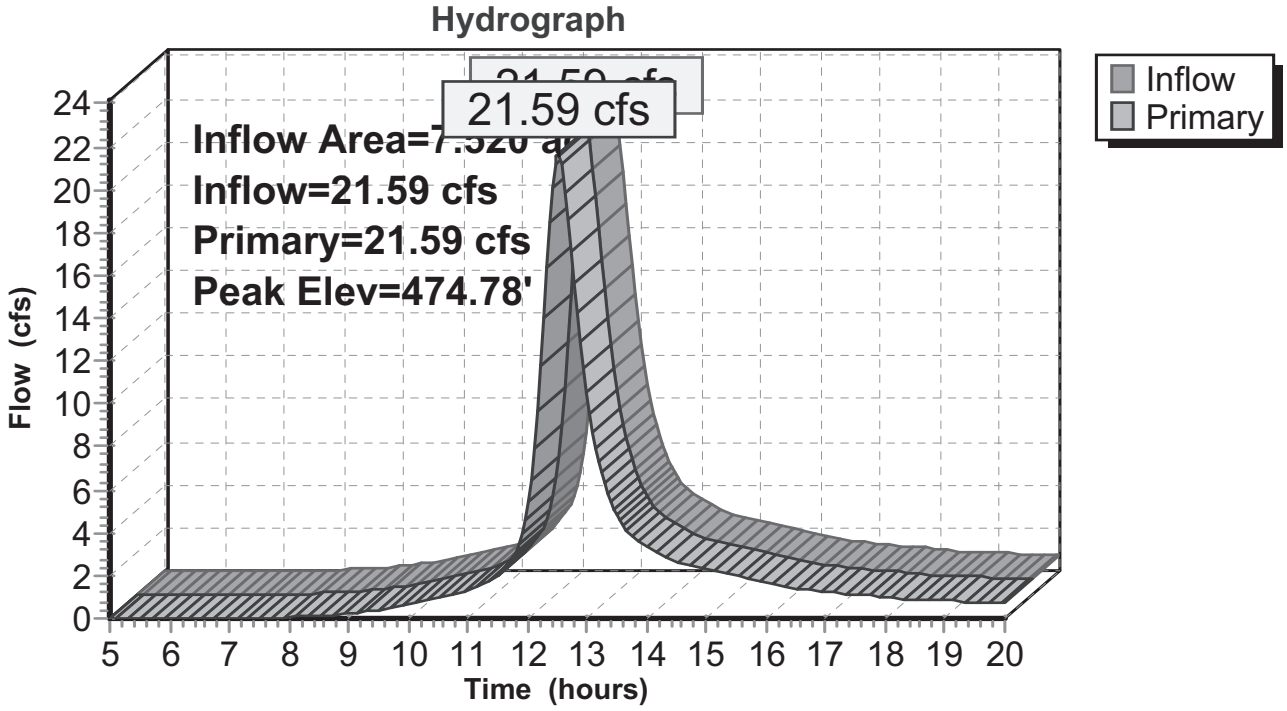
Inflow Area =	7.520 ac,	Inflow Depth =	4.45"	for	100-YR STORM event
Inflow =	21.59 cfs @	12.51 hrs,	Volume=	2.791 af	
Outflow =	21.59 cfs @	12.51 hrs,	Volume=	2.791 af,	Atten= 0%, Lag= 0.0 min
Primary =	21.59 cfs @	12.51 hrs,	Volume=	2.791 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 474.78' @ 12.51 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	471.95'	**15.0" x 45.5' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 471.00' S= 0.0209 '/' n= 0.011 Cc= 0.900
2	Primary	474.50'	**35.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=21.54 cfs @ 12.51 hrs HW=474.78' TW=468.44' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.74 cfs @ 6.3 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 13.80 cfs @ 1.4 fps)

Pond 11P: Existing Culvert 9



Pond 12P: Existing Culvert 11

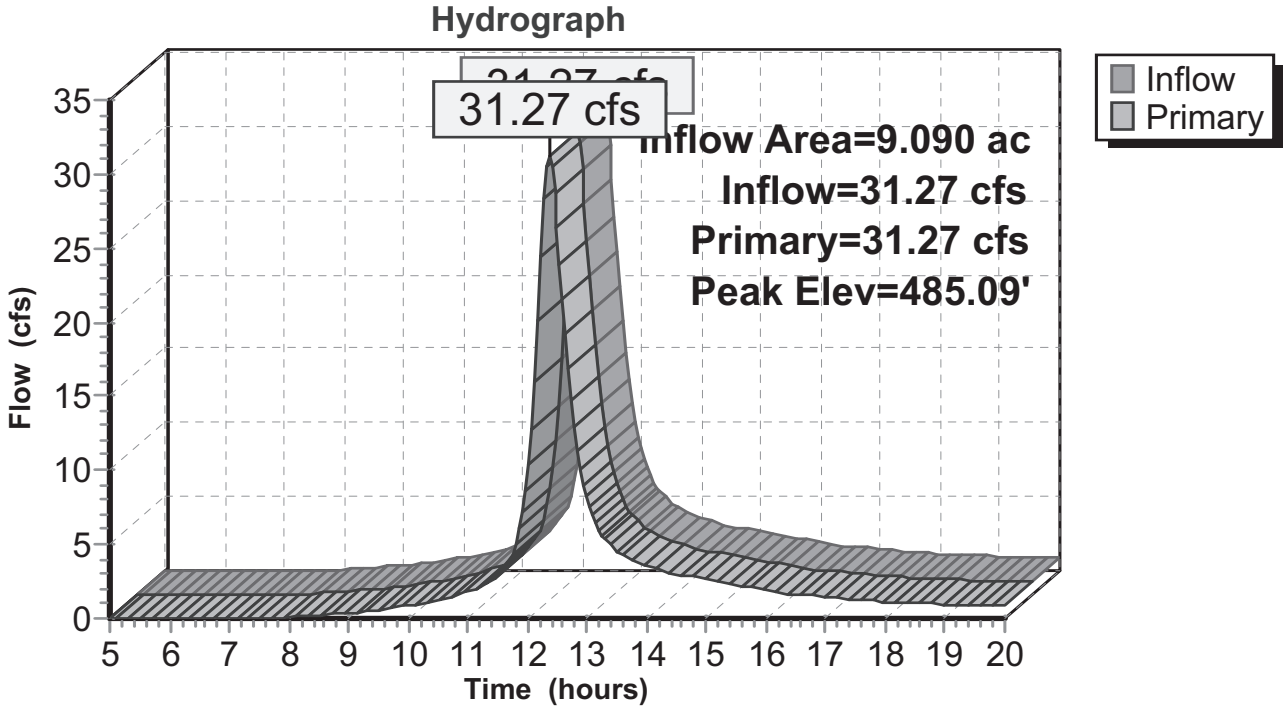
Inflow Area =	9.090 ac,	Inflow Depth =	4.47"	for	100-YR STORM event
Inflow =	31.27 cfs @	12.35 hrs,	Volume=	3.388 af	
Outflow =	31.27 cfs @	12.35 hrs,	Volume=	3.388 af,	Atten= 0%, Lag= 0.0 min
Primary =	31.27 cfs @	12.35 hrs,	Volume=	3.388 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 485.09' @ 12.35 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	480.71'	**15.0" x 53.4' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 479.74' S= 0.0182 '/' n= 0.011 Cc= 0.900
2	Primary	483.50'	**4.0' long x 125.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

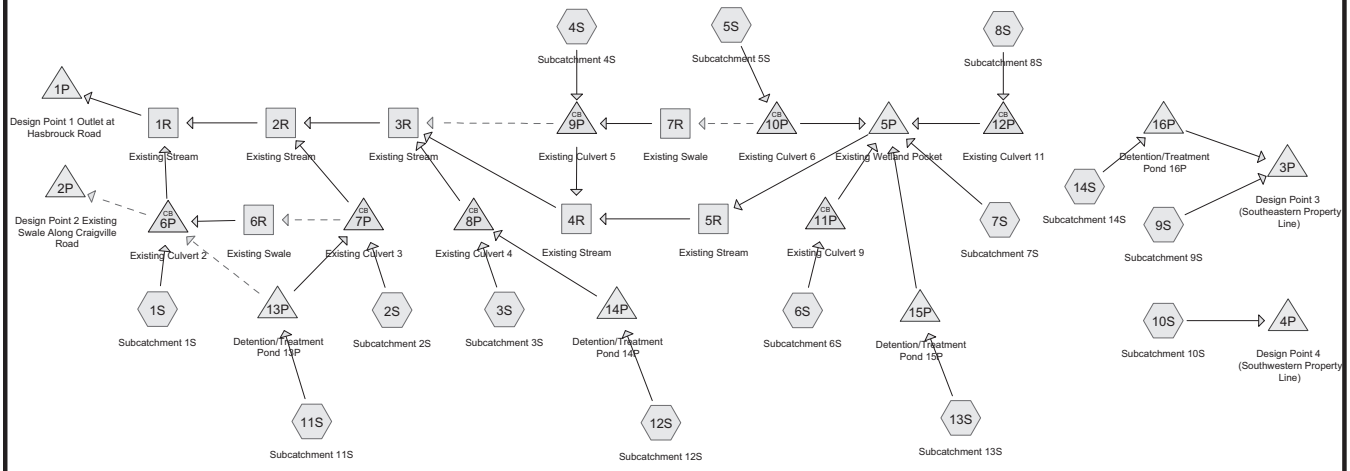
Primary OutFlow Max=31.25 cfs @ 12.35 hrs HW=485.09' TW=468.27' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 10.11 cfs @ 8.2 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 21.14 cfs @ 3.3 fps)

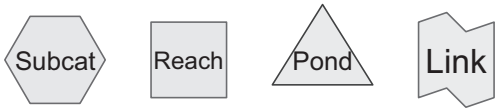
Pond 12P: Existing Culvert 11



APPENDIX 3

TR-20 HYDROCAD CALCULATIONS
PROPOSED CONDITIONS





Drainage Diagram for Proposed Conditions
Prepared by Pietrzak & Pfau, PLLC 7/6/2009
HydroCAD® 7.00 s/n 001436 © 1986-2003 Applied Microcomputer Systems

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

Subcatchment 1S: Subcatchment 1S Runoff Area=36.780 ac Runoff Depth=1.24"
Flow Length=2,450' Tc=33.5 min CN=76 Runoff=30.76 cfs 3.803 af

Subcatchment 2S: Subcatchment 2S Runoff Area=2.080 ac Runoff Depth=1.58"
Flow Length=1,056' Tc=14.0 min CN=81 Runoff=3.20 cfs 0.274 af

Subcatchment 3S: Subcatchment 3S Runoff Area=49.740 ac Runoff Depth=1.23"
Flow Length=3,960' Tc=45.8 min CN=76 Runoff=35.49 cfs 5.115 af

Subcatchment 4S: Subcatchment 4S Runoff Area=11.360 ac Runoff Depth=1.07"
Flow Length=986' Tc=27.1 min CN=73 Runoff=8.83 cfs 1.011 af

Subcatchment 5S: Subcatchment 5S Runoff Area=5.020 ac Runoff Depth=1.12"
Flow Length=1,150' Tc=41.7 min CN=74 Runoff=3.37 cfs 0.467 af

Subcatchment 6S: Subcatchment 6S Runoff Area=6.100 ac Runoff Depth=1.13"
Flow Length=1,134' Tc=23.1 min CN=74 Runoff=5.38 cfs 0.573 af

Subcatchment 7S: Subcatchment 7S Runoff Area=120.310 ac Runoff Depth=1.15"
Flow Length=3,523' Tc=92.9 min CN=75 Runoff=52.44 cfs 11.502 af

Subcatchment 8S: Subcatchment 8S Runoff Area=9.090 ac Runoff Depth=1.07"
Flow Length=952' Tc=25.2 min CN=73 Runoff=7.28 cfs 0.809 af

Subcatchment 9S: Subcatchment 9S Runoff Area=12.070 ac Runoff Depth=1.13"
Flow Length=526' Tc=16.3 min CN=74 Runoff=12.23 cfs 1.137 af

Subcatchment 10S: Subcatchment 10S Runoff Area=34.360 ac Runoff Depth=0.90"
Flow Length=1,359' Tc=34.6 min CN=70 Runoff=19.77 cfs 2.583 af

Subcatchment 11S: Subcatchment 11S Runoff Area=20.050 ac Runoff Depth=1.44"
Flow Length=1,706' Tc=21.3 min CN=79 Runoff=23.83 cfs 2.405 af

Subcatchment 12S: Subcatchment 12S Runoff Area=11.420 ac Runoff Depth=1.51"
Flow Length=1,285' Tc=18.4 min CN=80 Runoff=15.12 cfs 1.436 af

Subcatchment 13S: Subcatchment 13S Runoff Area=26.950 ac Runoff Depth=1.51"
Flow Length=2,559' Tc=22.0 min CN=80 Runoff=33.16 cfs 3.383 af

Subcatchment 14S: Subcatchment 14S Runoff Area=2.390 ac Runoff Depth=1.88"
Flow Length=781' Tc=8.1 min CN=85 Runoff=5.19 cfs 0.375 af

Reach 1R: Existing Stream Peak Depth=1.30' Max Vel=2.8 fps Inflow=81.27 cfs 26.317 af
n=0.080 L=1,210.0' S=0.0279 '/' Capacity=2,412.63 cfs Outflow=79.46 cfs 26.103 af

Reach 2R: Existing Stream Peak Depth=0.93' Max Vel=3.1 fps Inflow=58.49 cfs 22.344 af
n=0.080 L=609.0' S=0.0361 '/' Capacity=11,130.94 cfs Outflow=58.32 cfs 22.253 af

Reach 3R: Existing Stream Peak Depth=0.98' Max Vel=2.7 fps Inflow=57.03 cfs 21.226 af
n=0.080 L=541.0' S=0.0299 '/' Capacity=9,486.07 cfs Outflow=56.78 cfs 21.144 af

Reach 4R: Existing Stream Peak Depth=0.37' Max Vel=0.7 fps Inflow=32.13 cfs 15.551 af
n=0.080 L=432.0' S=0.0051 '/' Capacity=6,025.46 cfs Outflow=32.10 cfs 15.355 af

Reach 5R: Existing Stream Peak Depth=0.53' Max Vel=0.8 fps Inflow=31.22 cfs 15.000 af
n=0.080 L=1,188.0' S=0.0051 '/' Capacity=5,559.50 cfs Outflow=31.05 cfs 14.583 af

Reach 6R: Existing Swale Peak Depth=0.00' Max Vel=0.0 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=520.0' S=0.0615 '/' Capacity=93.65 cfs Outflow=0.00 cfs 0.000 af

Reach 7R: Existing Swale Peak Depth=0.00' Max Vel=0.0 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=436.0' S=0.0275 '/' Capacity=6,984.86 cfs Outflow=0.00 cfs 0.000 af

Pond 1P: Design Point 1 Outlet at Hasbrouck Road Inflow=79.46 cfs 26.103 af
Primary=79.46 cfs 26.103 af

Pond 2P: Design Point 2 Existing Swale Along Craigville Road Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Pond 3P: Design Point 3 (Southeastern Property Line) Inflow=12.35 cfs 1.305 af
Primary=12.35 cfs 1.305 af

Pond 4P: Design Point 4 (Southwestern Property Line) Inflow=19.77 cfs 2.583 af
Primary=19.77 cfs 2.583 af

Pond 5P: Existing Wetland Pocket Peak Elev=468.35' Storage=147,203 cf Inflow=60.41 cfs 14.986 af
36.0" x 60.0' Culvert Outflow=31.22 cfs 15.000 af

Pond 6P: Existing Culvert 2 Peak Elev=419.92' Inflow=30.76 cfs 4.064 af
Primary=30.76 cfs 4.064 af Secondary=0.00 cfs 0.000 af Outflow=30.76 cfs 4.064 af

Pond 7P: Existing Culvert 3 Peak Elev=453.59' Inflow=3.71 cfs 1.199 af
Primary=3.71 cfs 1.199 af Secondary=0.00 cfs 0.000 af Outflow=3.71 cfs 1.199 af

Pond 8P: Existing Culvert 4 Peak Elev=459.98' Inflow=36.04 cfs 5.829 af
60.0" x 95.1' Culvert Outflow=36.04 cfs 5.829 af

Pond 9P: Existing Culvert 5 Peak Elev=469.10' Inflow=8.83 cfs 1.011 af
Primary=6.82 cfs 0.968 af Secondary=2.01 cfs 0.042 af Outflow=8.83 cfs 1.011 af

Pond 10P: Existing Culvert 6 Peak Elev=478.51' Inflow=3.37 cfs 0.467 af
Primary=3.37 cfs 0.467 af Secondary=0.00 cfs 0.000 af Outflow=3.37 cfs 0.467 af

Pond 11P: Existing Culvert 9 Peak Elev=473.64' Inflow=5.38 cfs 0.573 af
Outflow=5.38 cfs 0.573 af

Pond 12P: Existing Culvert 11 Peak Elev=483.29' Inflow=7.28 cfs 0.809 af
Outflow=7.28 cfs 0.809 af

Pond 13P: Detention/Treatment Pond 13P Peak Elev=461.11' Storage=58,905 cf Inflow=23.83 cfs 2.405 af
Primary=2.58 cfs 0.925 af Secondary=1.22 cfs 0.261 af Outflow=3.80 cfs 1.186 af

Pond 14P: Detention/Treatment Pond 14P Peak Elev=495.40' Storage=35,804 cf Inflow=15.12 cfs 1.436 af
Outflow=2.02 cfs 0.713 af

Pond 15P: Detention/Treatment Pond 15P Peak Elev=490.94' Storage=86,749 cf Inflow=33.16 cfs 3.383 af
Outflow=4.37 cfs 1.634 af

Pond 16P: Detention/Treatment Pond 16P Peak Elev=503.26' Storage=10,149 cf Inflow=5.19 cfs 0.375 af
Outflow=0.43 cfs 0.169 af

Total Runoff Area = 347.720 ac Runoff Volume = 34.872 af Average Runoff Depth = 1.20"

Subcatchment 1S: Subcatchment 1S

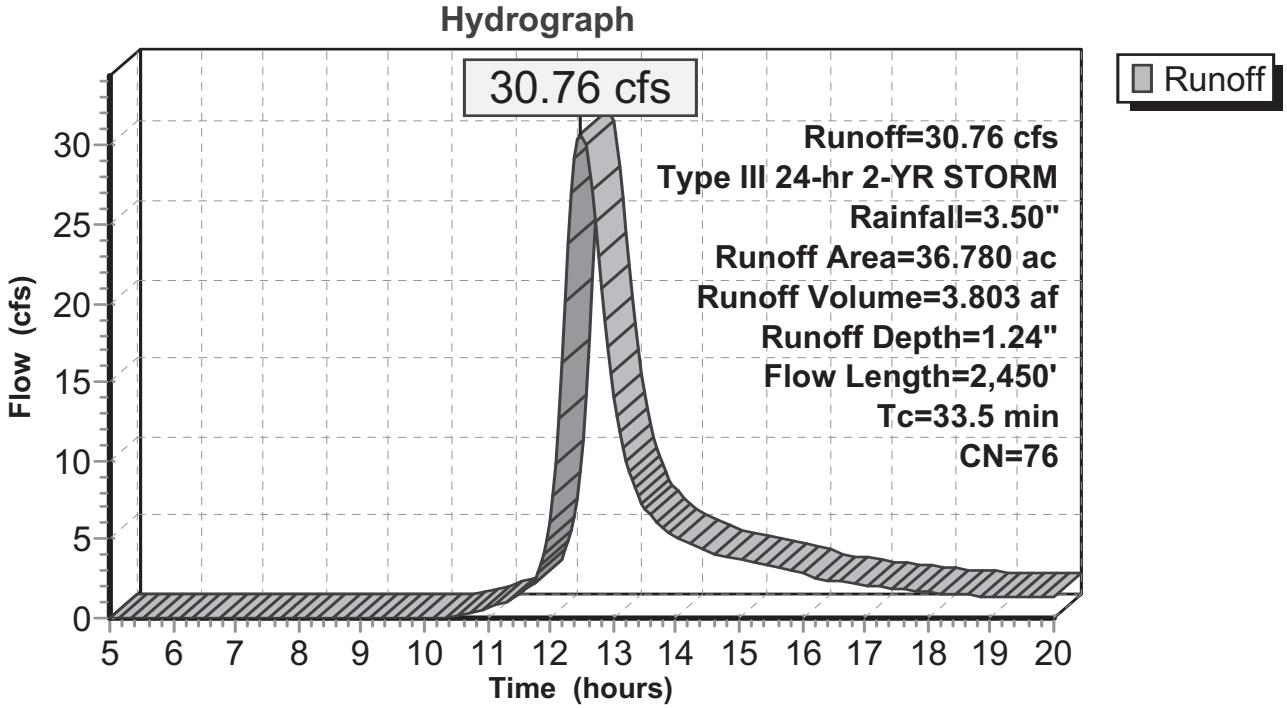
Runoff = 30.76 cfs @ 12.49 hrs, Volume= 3.803 af, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.920	98	Existing pavement
0.300	98	Proposed pavement & roofs
16.310	79	50-75% Grass cover, Fair, HSG C
0.210	71	Meadow, non-grazed, HSG C
19.040	73	Woods, Fair, HSG C
36.780	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.1300	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
8.5	746	0.0846	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.5	598	0.1003	2.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.8	1,006	0.0962	1.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
33.5	2,450	Total			

Subcatchment 1S: Subcatchment 1S



Subcatchment 2S: Subcatchment 2S

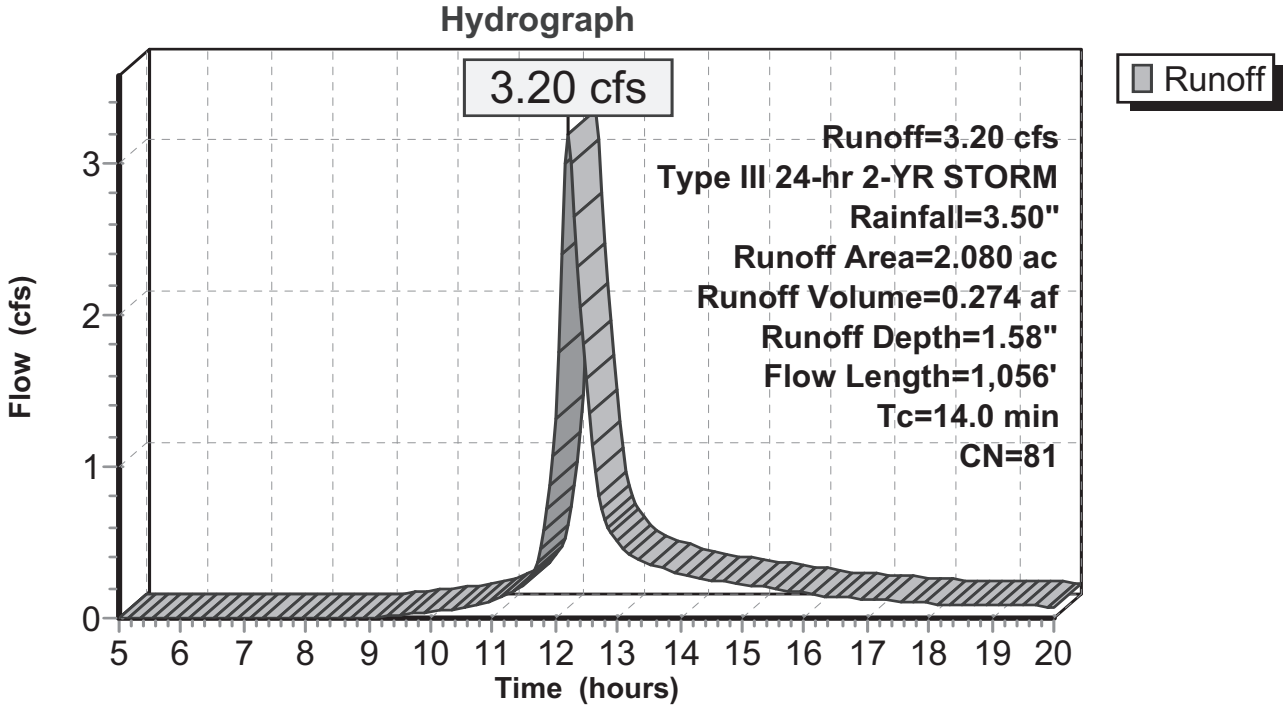
Runoff = 3.20 cfs @ 12.20 hrs, Volume= 0.274 af, Depth= 1.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.080	98	Existing pavement
0.360	98	Proposed pavement & roofs
1.060	79	50-75% Grass cover, Fair, HSG C
0.080	71	Meadow, non-grazed, HSG C
0.500	73	Woods, Fair, HSG C
2.080	81	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0475	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
5.2	646	0.0863	2.1		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.0	80	0.0719	1.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.2	230	0.0435	3.1		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.0	1,056	Total			

Subcatchment 2S: Subcatchment 2S



Subcatchment 3S: Subcatchment 3S

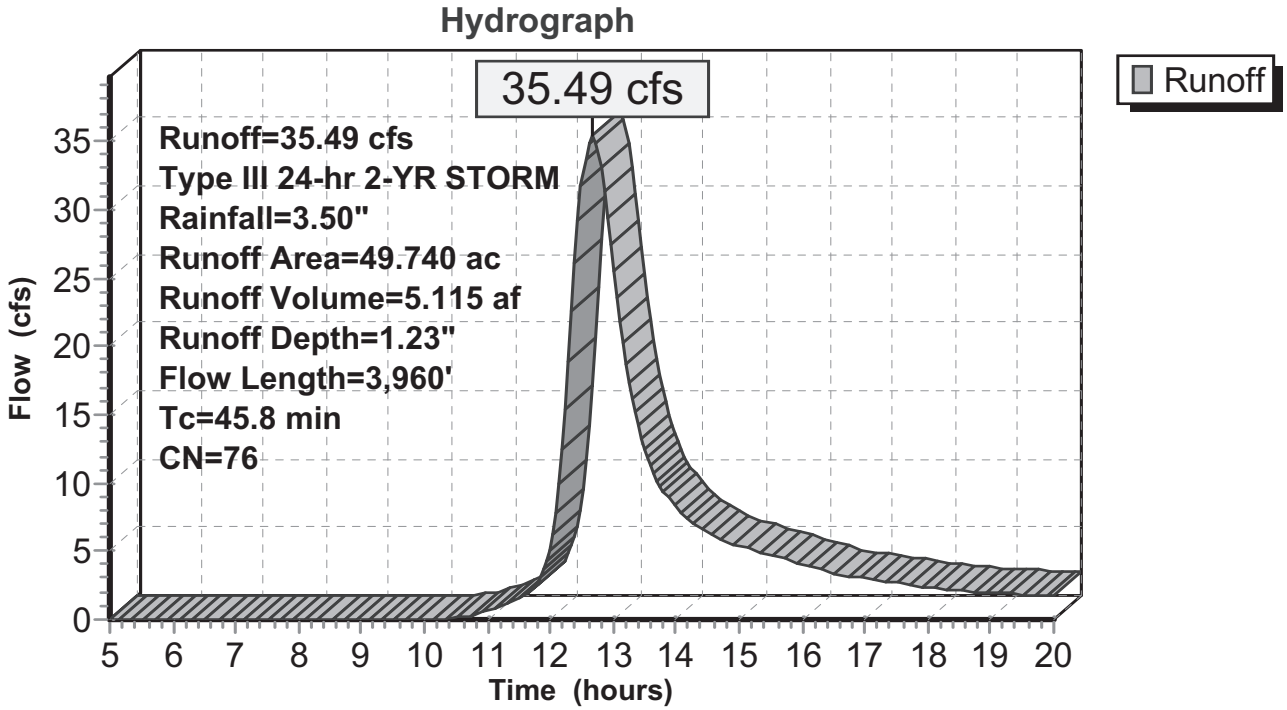
Runoff = 35.49 cfs @ 12.66 hrs, Volume= 5.115 af, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.450	98	Existing pavement
1.950	98	Proposed pavement & roofs
5.210	79	50-75% Grass cover, Fair, HSG C
0.310	71	Meadow, non-grazed, HSG C
0.870	78	Meadow, non-grazed, HSG D
30.910	73	Woods, Fair, HSG C
10.040	79	Woods, Fair, HSG D
49.740	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0350	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
12.9	814	0.0445	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.8	1,806	0.0836	3.8	43.28	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=1.50' Z= 5.0 '/' n= 0.091
8.7	1,240	0.0081	2.4	5.22	**Channel Flow,** Area= 2.2 sf Perim= 10.4' r= 0.21' n= 0.020
45.8	3,960	Total			

Subcatchment 3S: Subcatchment 3S



Subcatchment 4S: Subcatchment 4S

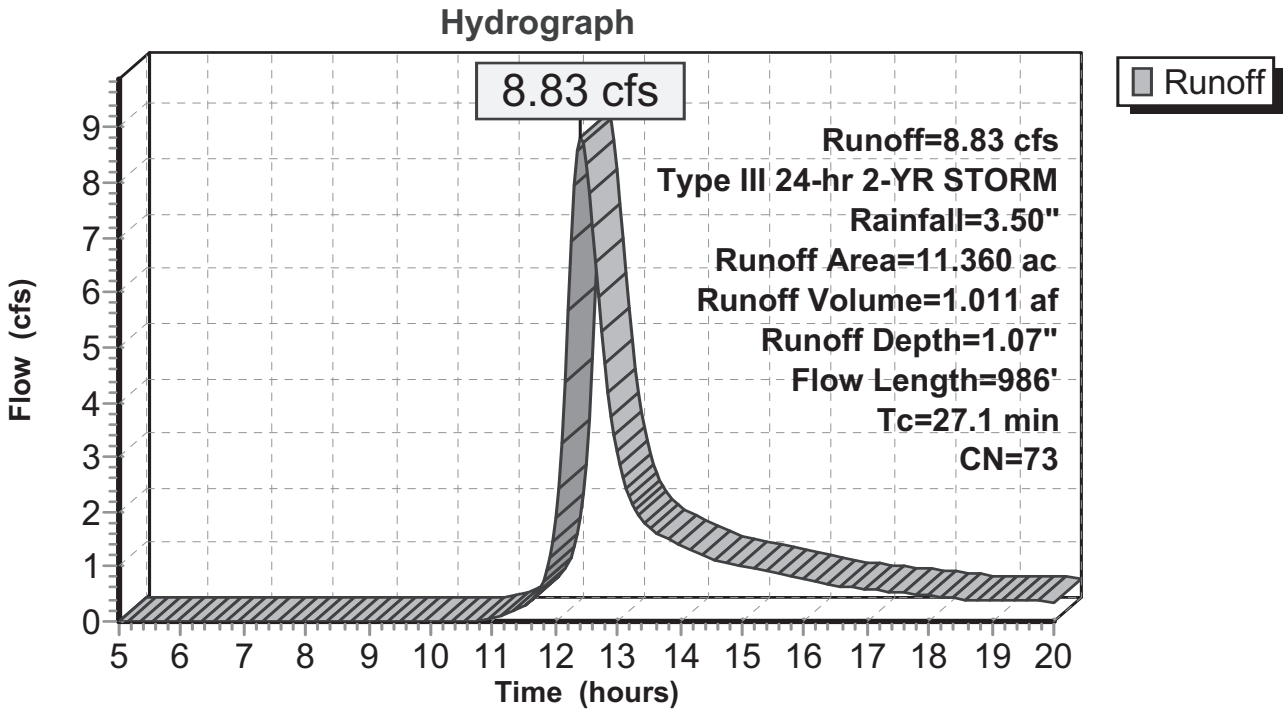
Runoff = 8.83 cfs @ 12.41 hrs, Volume= 1.011 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.170	98	Existing pavement
0.090	71	Meadow, non-grazed, HSG C
0.220	78	Meadow, non-grazed, HSG D
0.050	36	Woods, Fair, HSG A
10.670	73	Woods, Fair, HSG C
0.160	79	Woods, Fair, HSG D
11.360	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0432	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
12.0	886	0.0601	1.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.1	986	Total			

Subcatchment 4S: Subcatchment 4S



Subcatchment 5S: Subcatchment 5S

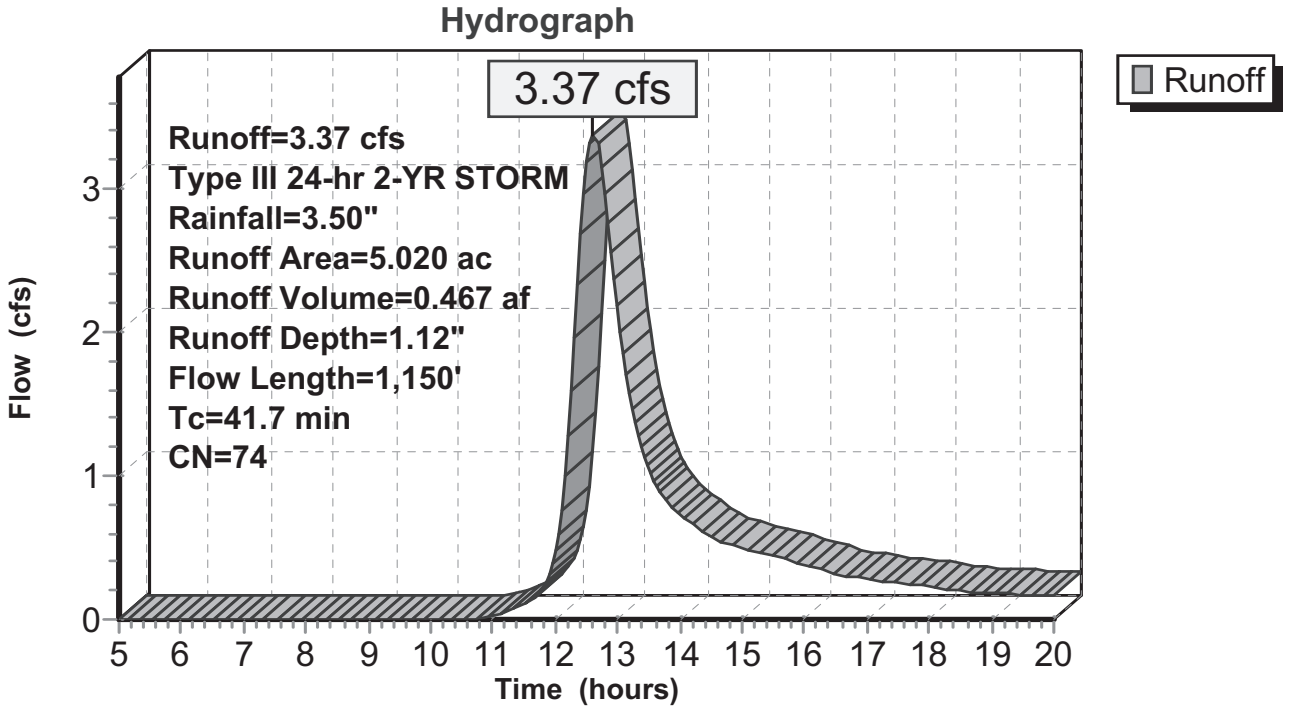
Runoff = 3.37 cfs @ 12.62 hrs, Volume= 0.467 af, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.230	98	Existing pavement
0.380	71	Meadow, non-grazed, HSG C
4.410	73	Woods, Fair, HSG C
5.020	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0457	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.2	175	0.0340	0.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	133	0.2400	2.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.8	742	0.0060	0.5		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
41.7	1,150	Total			

Subcatchment 5S: Subcatchment 5S



Subcatchment 6S: Subcatchment 6S

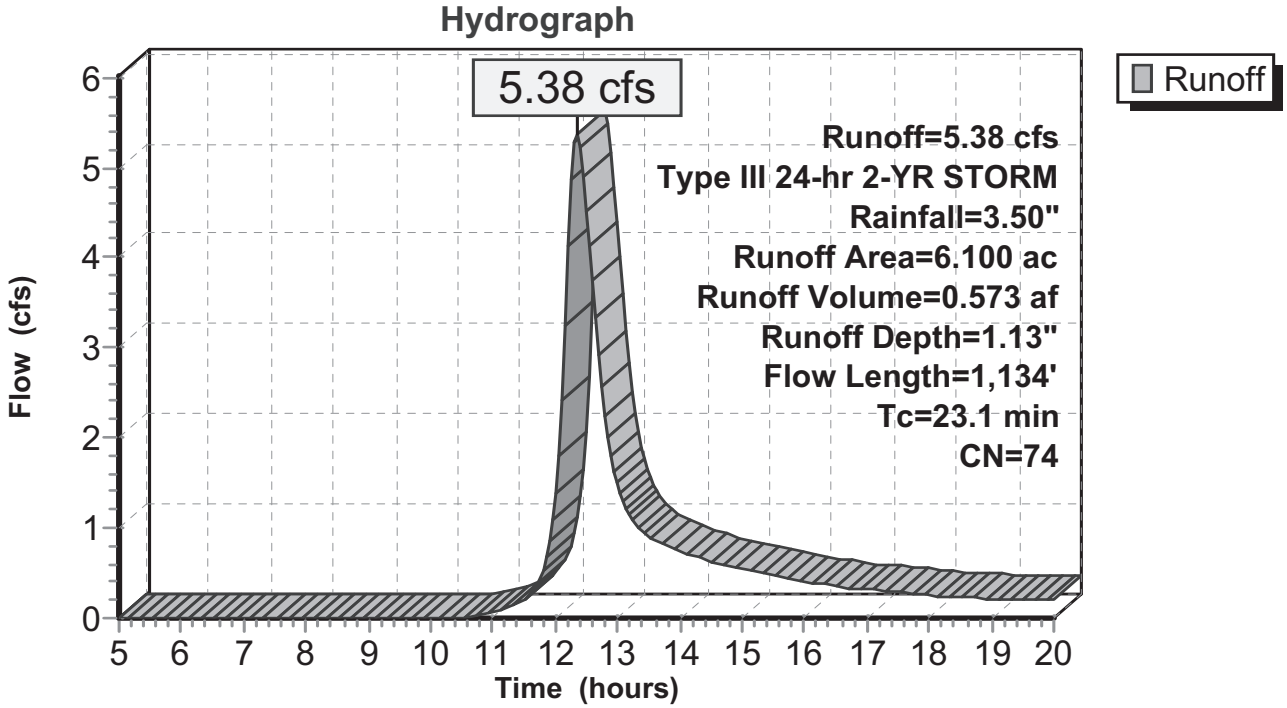
Runoff = 5.38 cfs @ 12.34 hrs, Volume= 0.573 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.090	98	Existing pavement
0.030	98	Proposed pavement & roofs
0.100	79	50-75% Grass cover, Fair, HSG C
0.480	71	Meadow, non-grazed, HSG C
0.050	78	Meadow, non-grazed, HSG D
5.050	73	Woods, Fair, HSG C
0.300	79	Woods, Fair, HSG D
6.100	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	12	0.2042	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
9.3	88	0.1108	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
13.1	1,034	0.0696	1.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.1	1,134	Total			

Subcatchment 6S: Subcatchment 6S



Subcatchment 7S: Subcatchment 7S

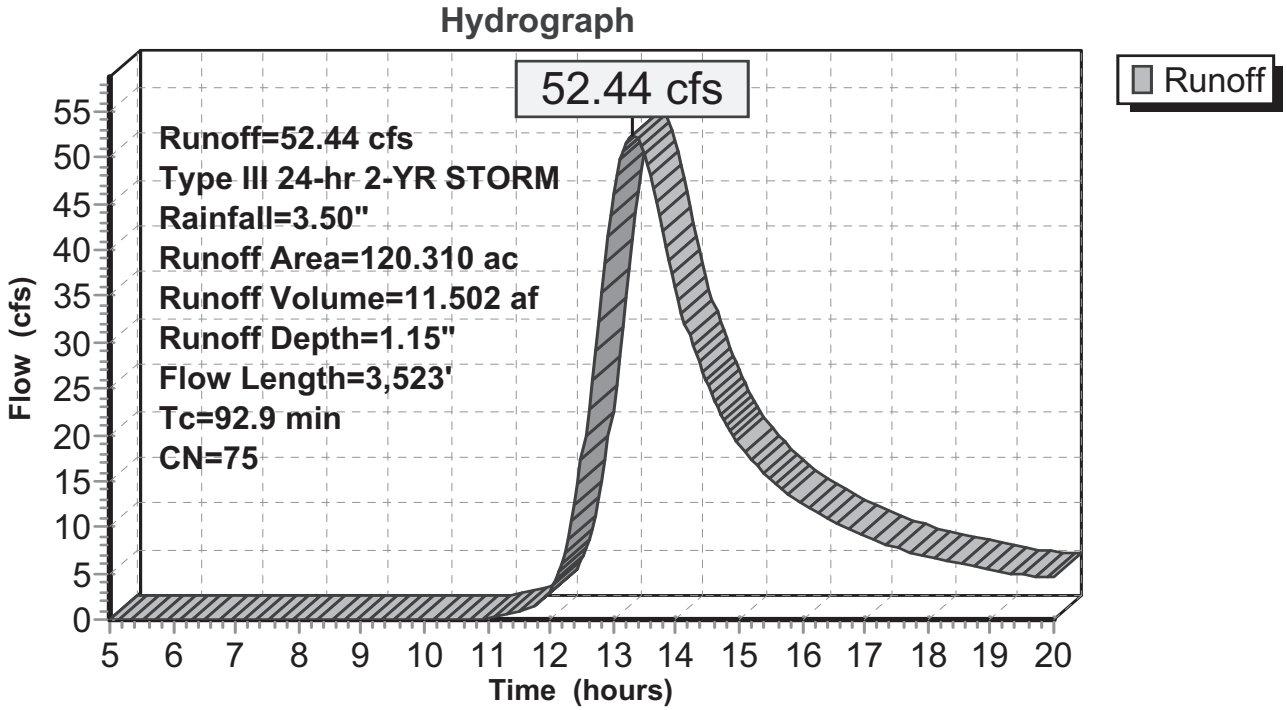
Runoff = 52.44 cfs @ 13.31 hrs, Volume= 11.502 af, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
1.110	98	Existing pavement
1.730	98	Proposed pavement and roofs
6.810	79	50-75% Grass cover, Fair, HSG C
0.100	84	50-75% Grass cover, Fair, HSG D
7.160	71	Meadow, non-grazed, HSG C
10.120	78	Meadow, non-grazed, HSG D
0.870	36	Woods, Fair, HSG A
72.180	73	Woods, Fair, HSG C
20.230	79	Woods, Fair, HSG D
120.310	75	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	100	0.0188	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
19.1	1,761	0.0943	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
52.8	1,662	0.0110	0.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
92.9	3,523	Total			

Subcatchment 7S: Subcatchment 7S



Subcatchment 8S: Subcatchment 8S

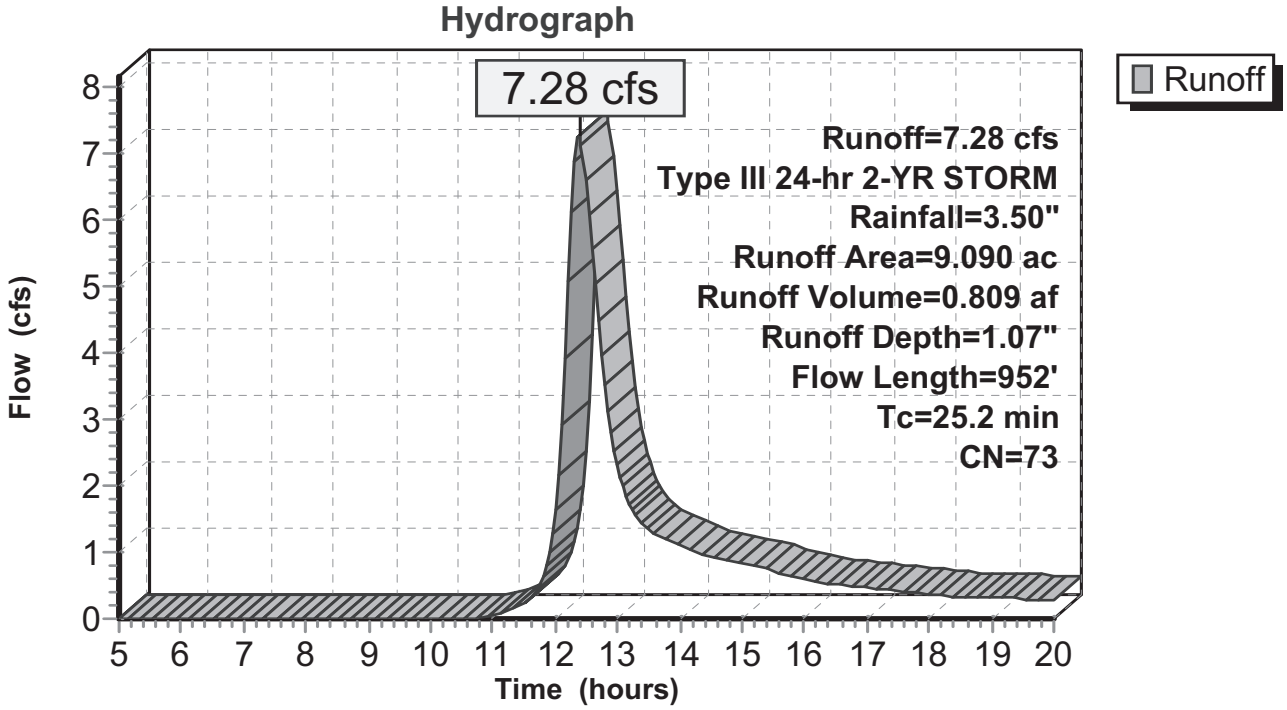
Runoff = 7.28 cfs @ 12.38 hrs, Volume= 0.809 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.120	98	Existing pavement
0.240	71	Meadow, non-grazed, HSG C
8.730	73	Woods, Fair, HSG C
9.090	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0435	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
10.2	852	0.0780	1.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
25.2	952	Total			

Subcatchment 8S: Subcatchment 8S



Subcatchment 9S: Subcatchment 9S

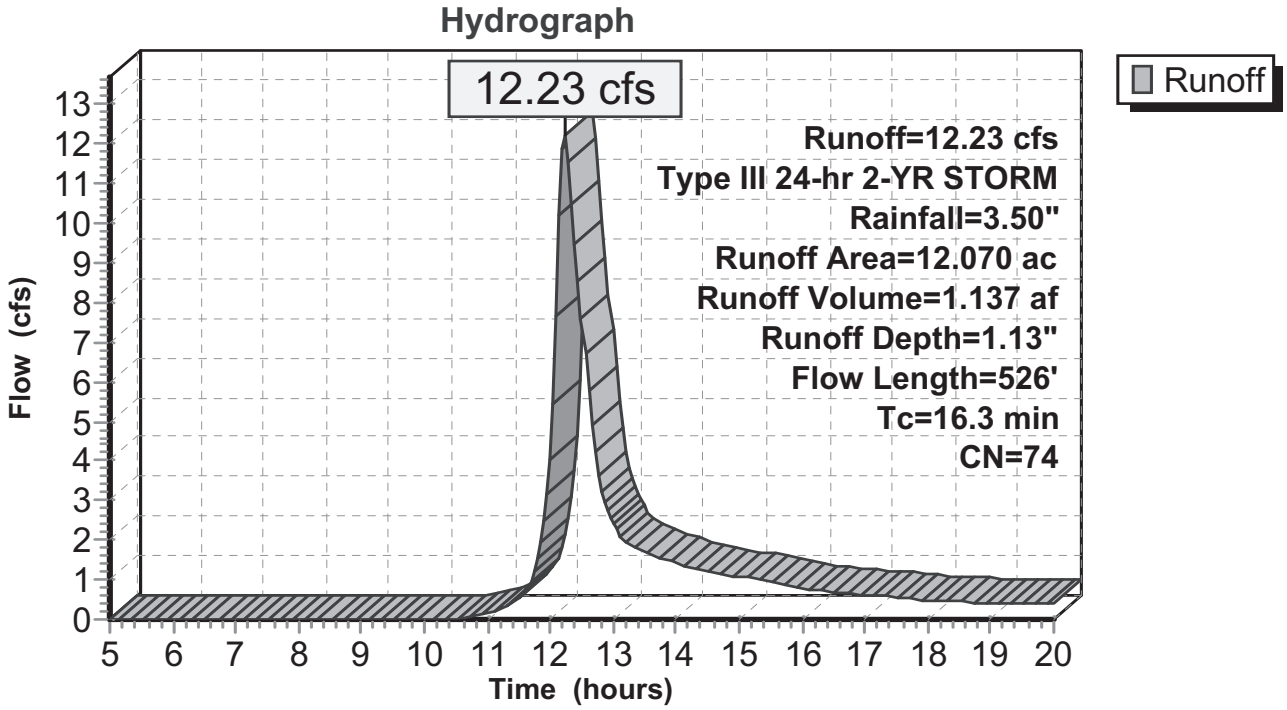
Runoff = 12.23 cfs @ 12.24 hrs, Volume= 1.137 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.160	98	Existing pavement
0.150	98	Proposed pavement & roofs
0.580	79	50-75% Grass cover, Fair, HSG C
0.240	71	Meadow, non-grazed, HSG C
0.040	78	Meadow, non-grazed, HSG D
10.610	73	Woods, Fair, HSG C
0.290	79	Woods, Fair, HSG D
12.070	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0660	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.6	426	0.1575	2.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.3	526	Total			

Subcatchment 9S: Subcatchment 9S



Subcatchment 10S: Subcatchment 10S

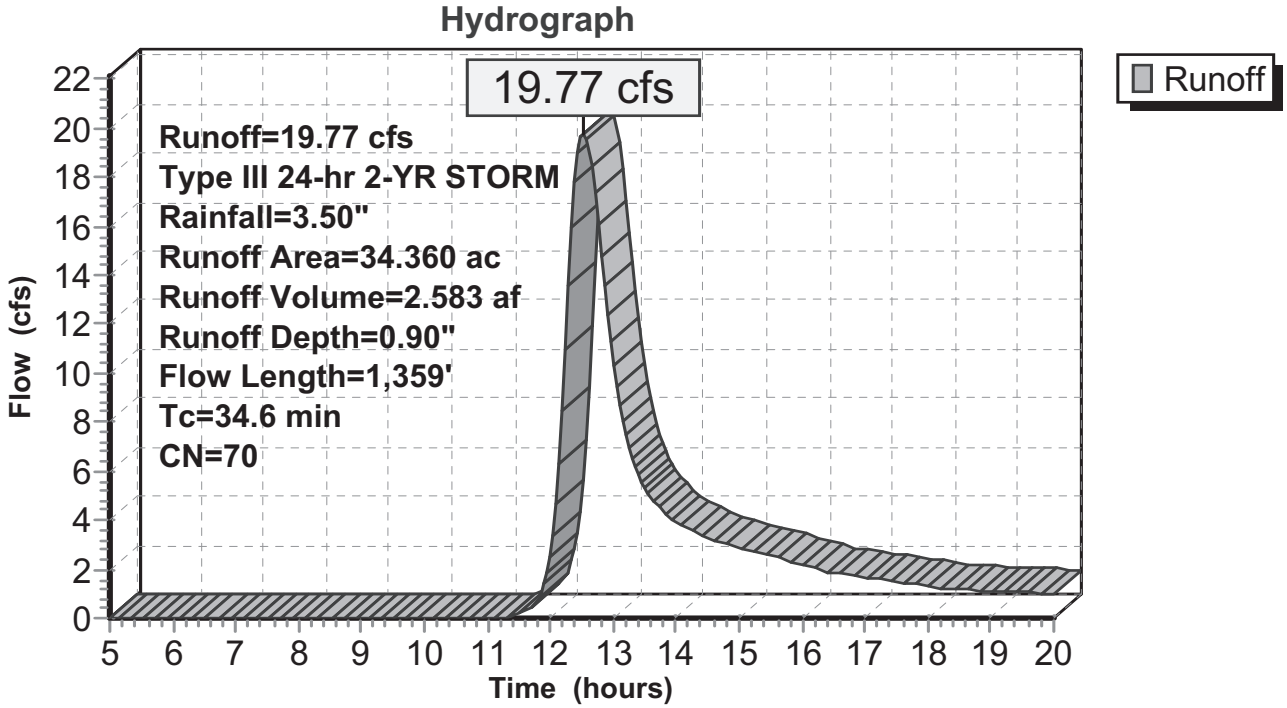
Runoff = 19.77 cfs @ 12.53 hrs, Volume= 2.583 af, Depth= 0.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.300	98	Proposed pavement & roofs
0.880	79	50-75% Grass cover, Fair, HSG C
1.090	36	Woods, Fair, HSG A
29.890	70	Woods, Good, HSG C
2.200	79	Woods, Fair, HSG D
34.360	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0252	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	528	0.1545	2.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.8	133	0.3459	2.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.6	598	0.0356	0.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.6	1,359	Total			

Subcatchment 10S: Subcatchment 10S



Subcatchment 11S: Subcatchment 11S

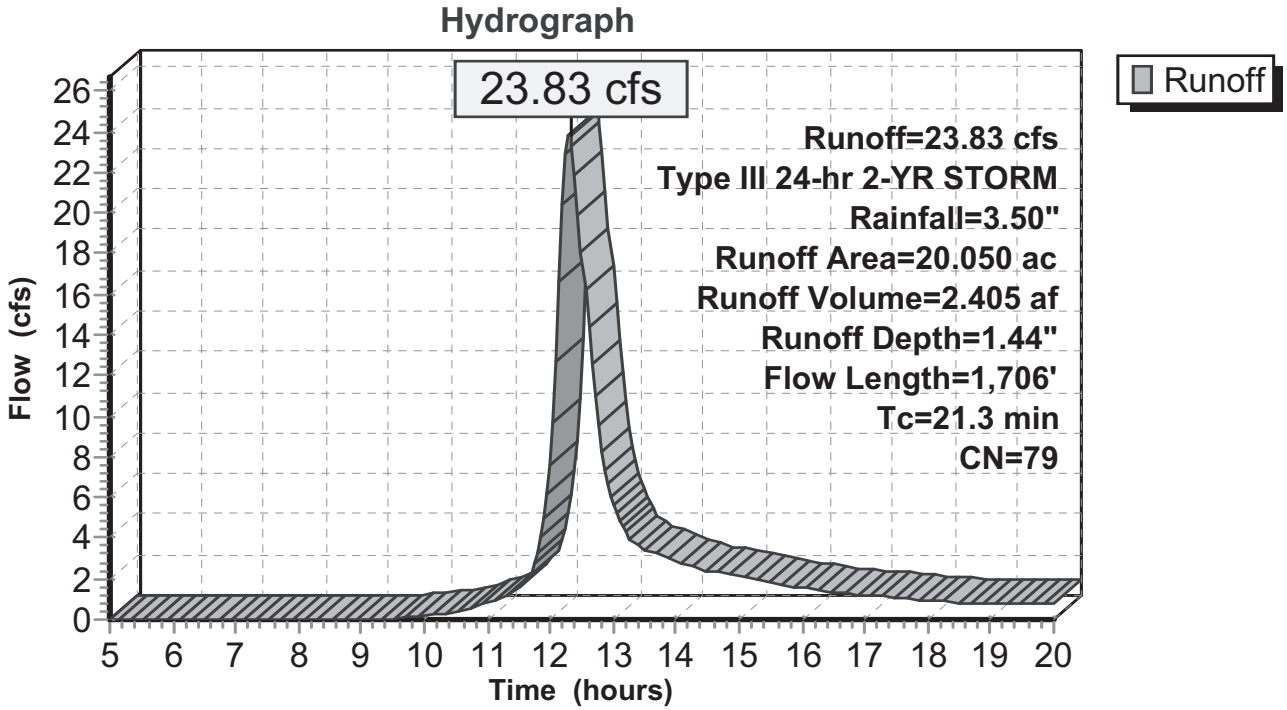
Runoff = 23.83 cfs @ 12.31 hrs, Volume= 2.405 af, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
3.440	98	Proposed pavement & roofs
5.820	79	50-75% Grass cover, Fair, HSG C
0.100	71	Meadow, non-grazed, HSG C
10.690	73	Woods, Fair, HSG C
20.050	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	100	0.1425	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.2	25	0.1500	2.7		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
14.5	1,394	0.1024	1.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	72	0.0375	1.4		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.4	115	0.0742	1.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.3	1,706	Total			

Subcatchment 11S: Subcatchment 11S



Subcatchment 12S: Subcatchment 12S

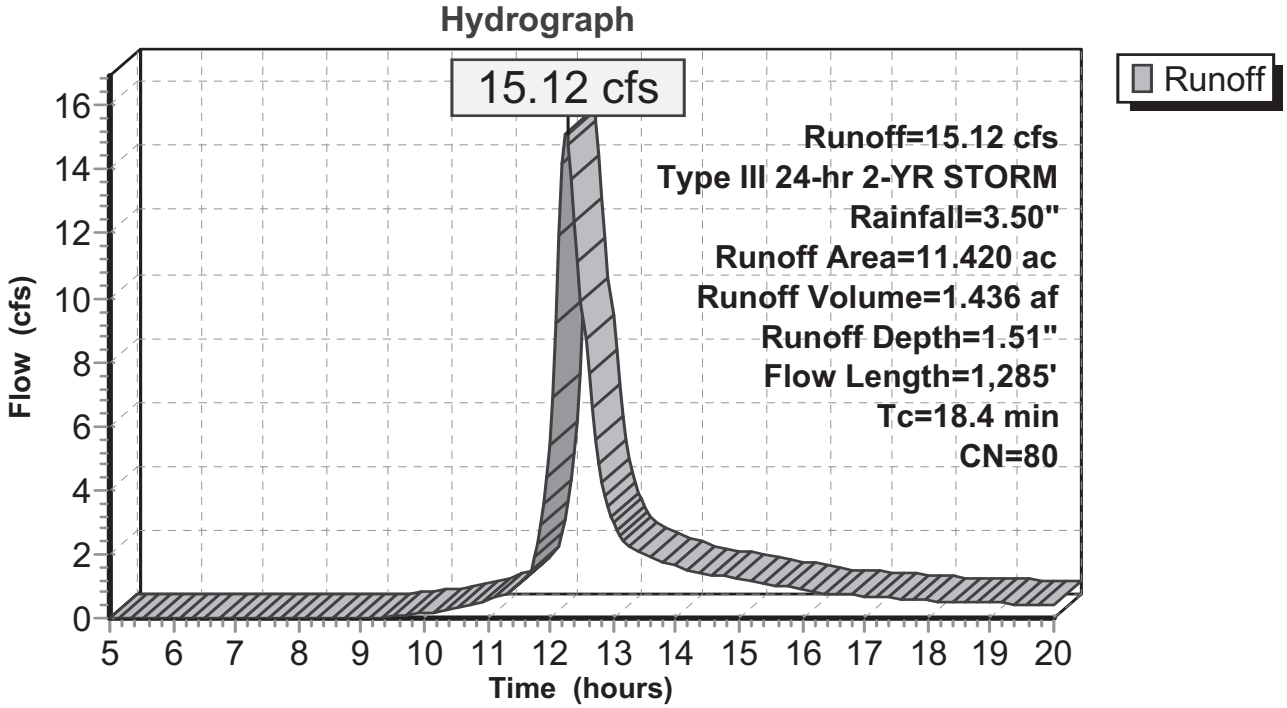
Runoff = 15.12 cfs @ 12.26 hrs, Volume= 1.436 af, Depth= 1.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
2.280	98	Proposed pavement & roofs
4.200	79	50-75% Grass cover, Fair, HSG C
4.940	73	Woods, Fair, HSG C
11.420	80	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	10	0.0300	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
10.5	90	0.0867	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
5.0	565	0.1416	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.0	129	0.0969	2.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.6	491	0.0365	13.4	23.72	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
18.4	1,285	Total			

Subcatchment 12S: Subcatchment 12S



Subcatchment 13S: Subcatchment 13S

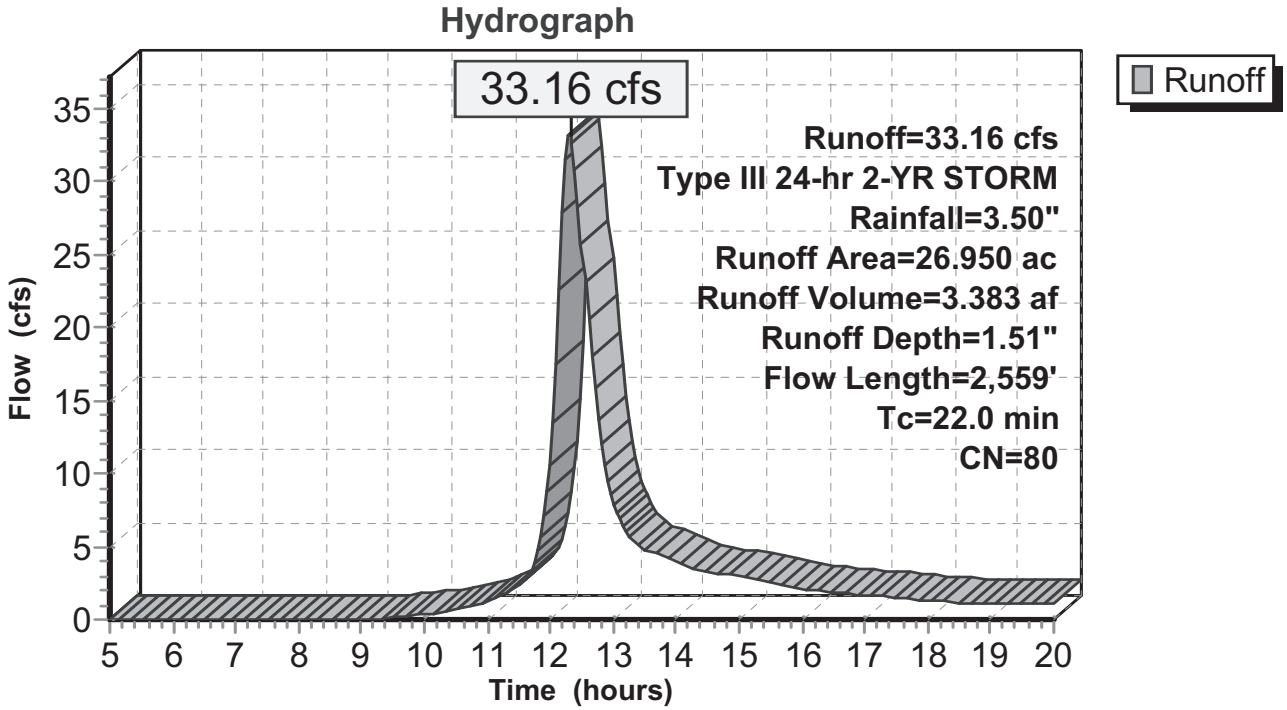
Runoff = 33.16 cfs @ 12.31 hrs, Volume= 3.383 af, Depth= 1.51"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
5.130	98	Proposed pavement & roofs
8.580	79	50-75% Grass cover, Fair, HSG C
13.240	73	Woods, Fair, HSG C
26.950	80	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	15	0.0300	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
10.1	85	0.0853	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.9	556	0.1403	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.0	14	0.5000	4.9		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.6	121	0.0331	1.3		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.2	365	0.0188	2.8		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	1,403	0.0498	15.7	27.70	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
22.0	2,559	Total			

Subcatchment 13S: Subcatchment 13S



Subcatchment 14S: Subcatchment 14S

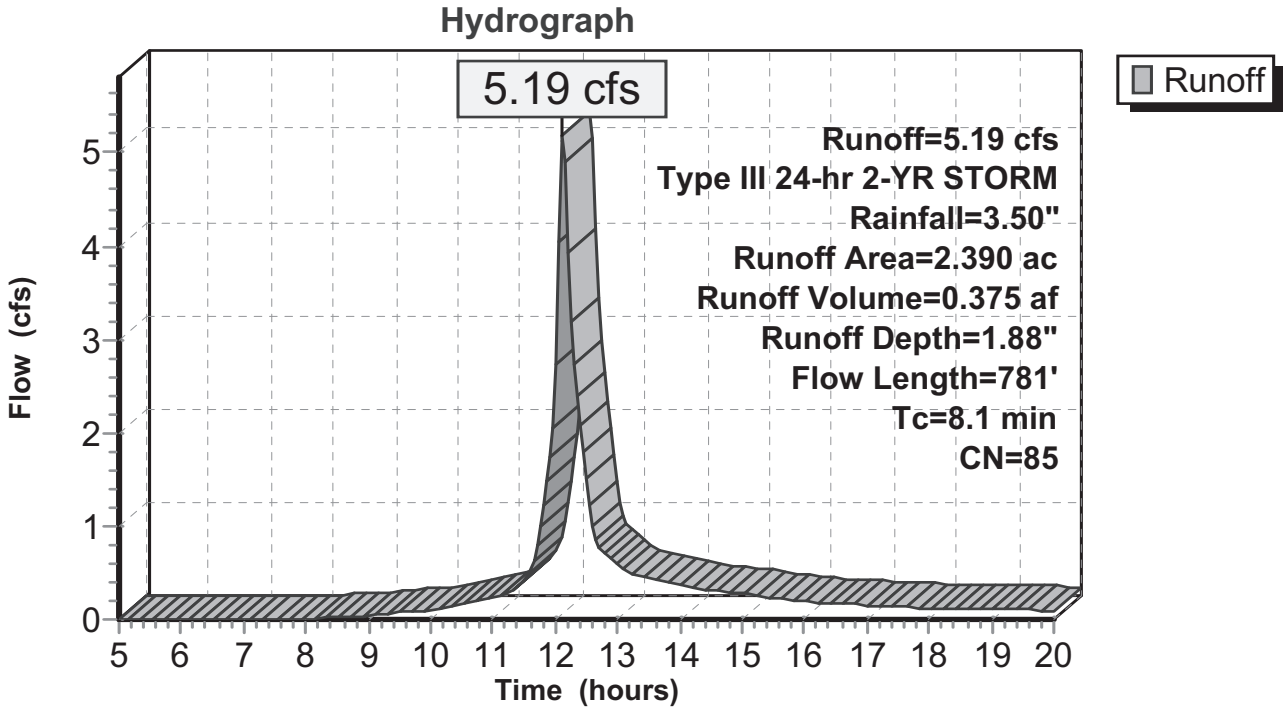
Runoff = 5.19 cfs @ 12.12 hrs, Volume= 0.375 af, Depth= 1.88"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YR STORM Rainfall=3.50"

Area (ac)	CN	Description
0.810	98	Proposed pavement & roofs
1.570	79	50-75% Grass cover, Fair, HSG C
0.010	73	Woods, Fair, HSG C
2.390	85	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0425	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.9	298	0.0714	5.4		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	383	0.0835	20.3	35.87	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
8.1	781	Total			

Subcatchment 14S: Subcatchment 14S



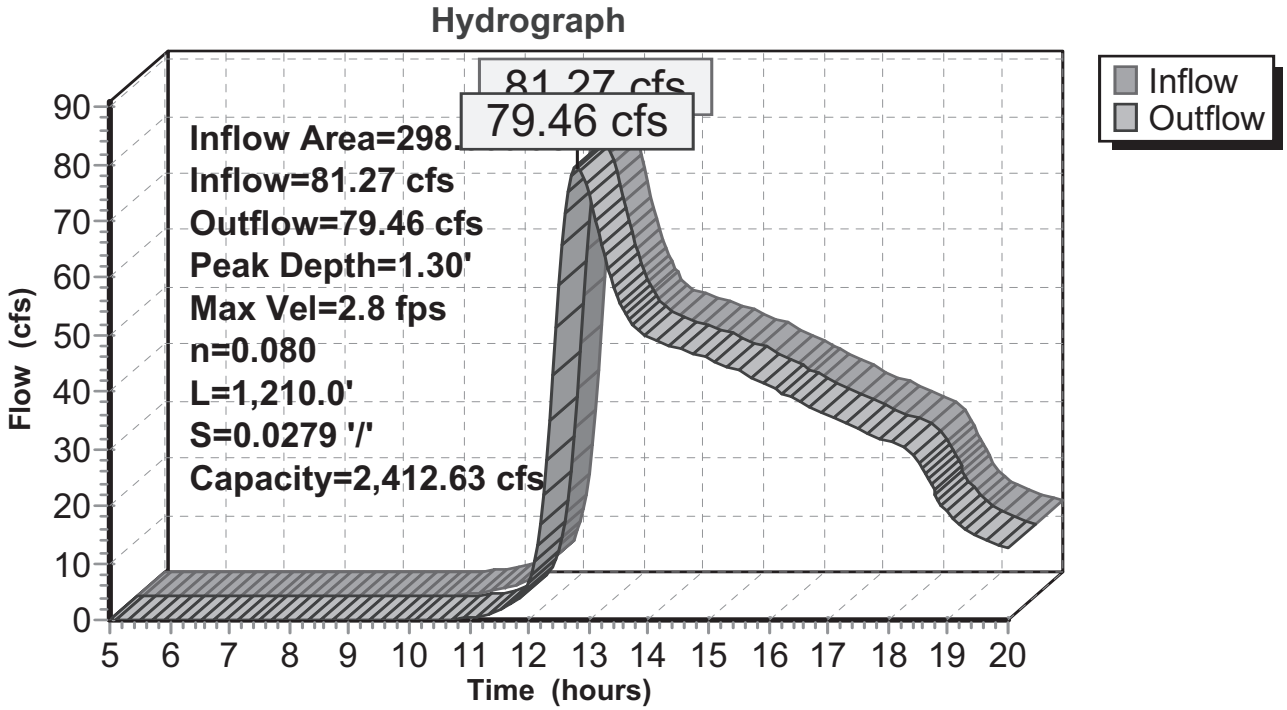
Reach 1R: Existing Stream

Inflow Area = 298.900 ac, Inflow Depth = 1.06" for 2-YR STORM event
Inflow = 81.27 cfs @ 12.67 hrs, Volume= 26.317 af
Outflow = 79.46 cfs @ 12.80 hrs, Volume= 26.103 af, Atten= 2%, Lag= 7.2 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.8 fps, Min. Travel Time= 7.3 min
Avg. Velocity = 1.8 fps, Avg. Travel Time= 11.3 min

Peak Depth= 1.30' @ 12.80 hrs
Capacity at bank full= 2,412.63 cfs
Inlet Invert= 416.82', Outlet Invert= 383.06'
10.50' x 5.80' deep channel, n= 0.080 Length= 1,210.0' Slope= 0.0279 '/'
Side Slope Z-value= 9.4 8.5 '/'

Reach 1R: Existing Stream



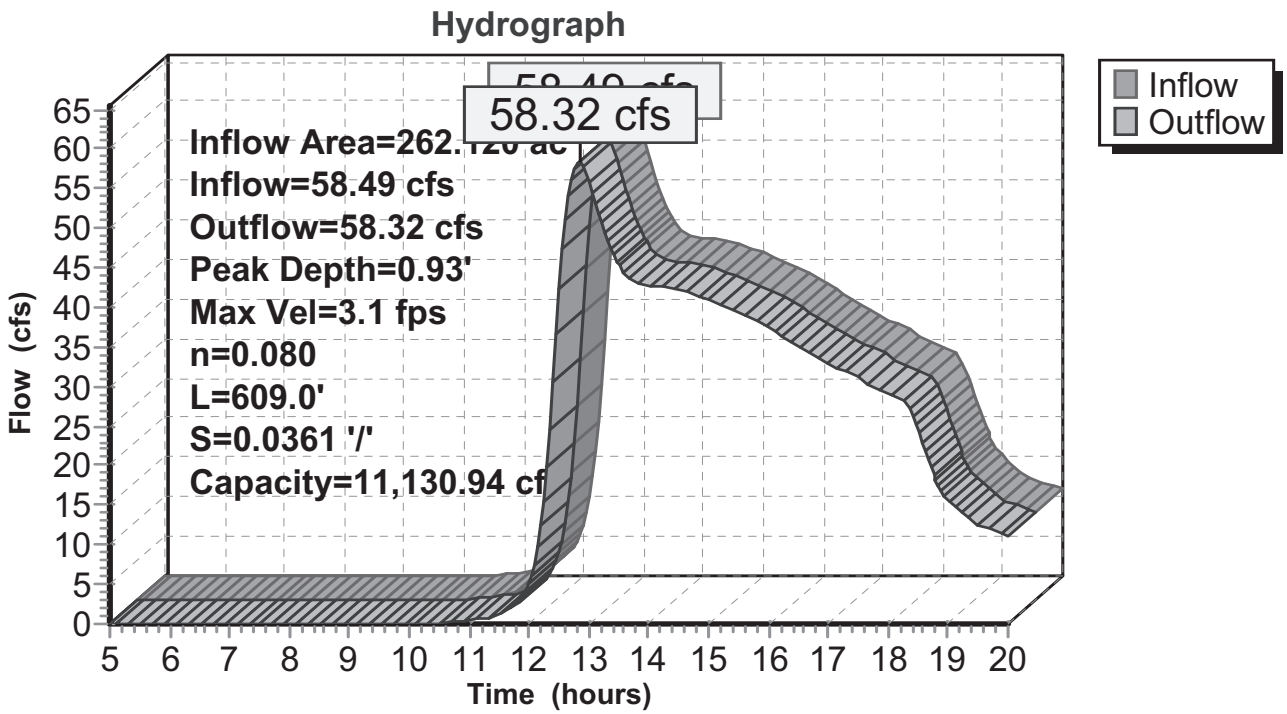
Reach 2R: Existing Stream

Inflow Area = 262.120 ac, Inflow Depth = 1.02" for 2-YR STORM event
Inflow = 58.49 cfs @ 12.80 hrs, Volume= 22.344 af
Outflow = 58.32 cfs @ 12.84 hrs, Volume= 22.253 af, Atten= 0%, Lag= 2.2 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.1 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 2.1 fps, Avg. Travel Time= 4.9 min

Peak Depth= 0.93' @ 12.84 hrs
Capacity at bank full= 11,130.94 cfs
Inlet Invert= 440.00', Outlet Invert= 418.00'
18.00' x 14.50' deep channel, n= 0.080 Length= 609.0' Slope= 0.0361 '/'
Side Slope Z-value= 2.7 2.2 '/'

Reach 2R: Existing Stream



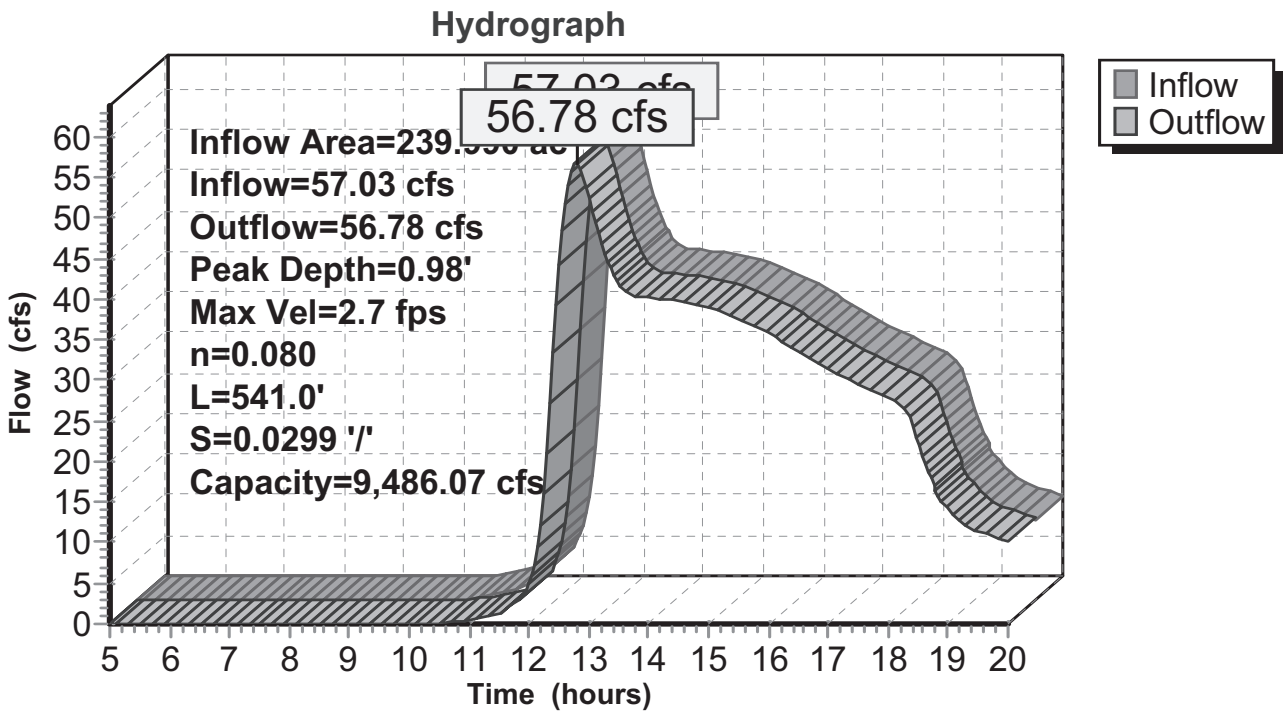
Reach 3R: Existing Stream

Inflow Area = 239.990 ac, Inflow Depth = 1.06" for 2-YR STORM event
Inflow = 57.03 cfs @ 12.75 hrs, Volume= 21.226 af
Outflow = 56.78 cfs @ 12.79 hrs, Volume= 21.144 af, Atten= 0%, Lag= 2.5 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.7 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 4.9 min

Peak Depth= 0.98' @ 12.79 hrs
Capacity at bank full= 9,486.07 cfs
Inlet Invert= 456.17', Outlet Invert= 440.00'
15.50' x 10.82' deep channel, n= 0.080 Length= 541.0' Slope= 0.0299 '/'
Side Slope Z-value= 7.3 5.3 '/'

Reach 3R: Existing Stream



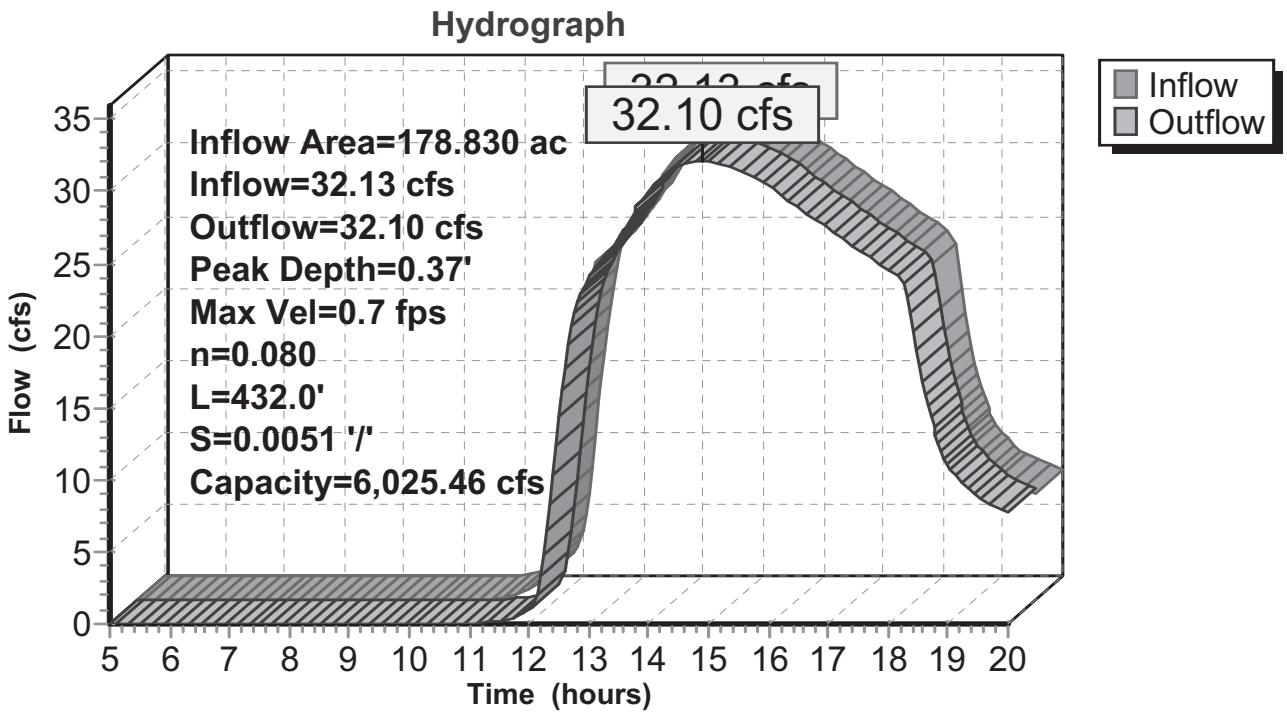
Reach 4R: Existing Stream

Inflow Area = 178.830 ac, Inflow Depth = 1.04" for 2-YR STORM event
Inflow = 32.13 cfs @ 14.75 hrs, Volume= 15.551 af
Outflow = 32.10 cfs @ 14.87 hrs, Volume= 15.355 af, Atten= 0%, Lag= 7.4 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.7 fps, Min. Travel Time= 10.9 min
Avg. Velocity = 0.5 fps, Avg. Travel Time= 14.5 min

Peak Depth= 0.37' @ 14.87 hrs
Capacity at bank full= 6,025.46 cfs
Inlet Invert= 460.18', Outlet Invert= 457.96'
124.00' x 6.50' deep channel, n= 0.080 Length= 432.0' Slope= 0.0051 '/'
Side Slope Z-value= 10.4 33.3 '/'

Reach 4R: Existing Stream



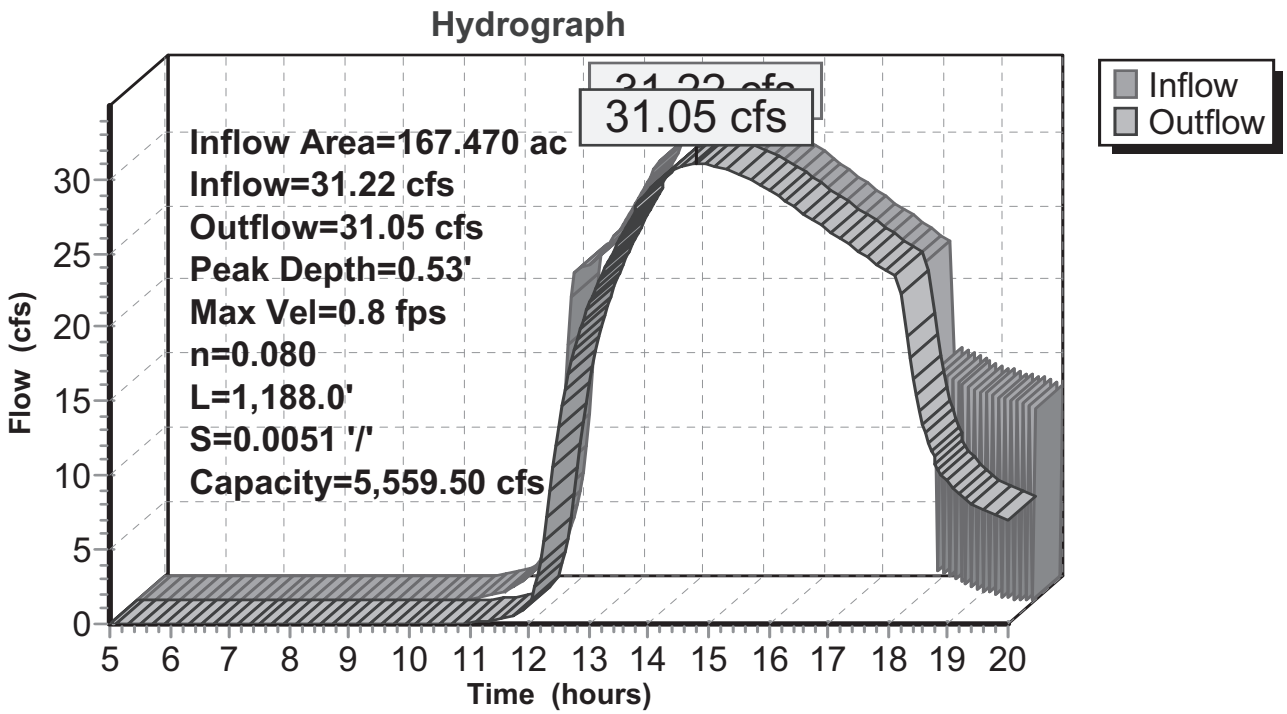
Reach 5R: Existing Stream

Inflow Area = 167.470 ac, Inflow Depth = 1.07" for 2-YR STORM event
Inflow = 31.22 cfs @ 14.50 hrs, Volume= 15.000 af
Outflow = 31.05 cfs @ 14.81 hrs, Volume= 14.583 af, Atten= 1%, Lag= 18.7 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.8 fps, Min. Travel Time= 24.4 min
Avg. Velocity = 0.6 fps, Avg. Travel Time= 33.2 min

Peak Depth= 0.53' @ 14.81 hrs
Capacity at bank full= 5,559.50 cfs
Inlet Invert= 466.24', Outlet Invert= 460.18'
64.50' x 8.00' deep channel, n= 0.080 Length= 1,188.0' Slope= 0.0051 '/'
Side Slope Z-value= 18.9 10.7 '/'

Reach 5R: Existing Stream



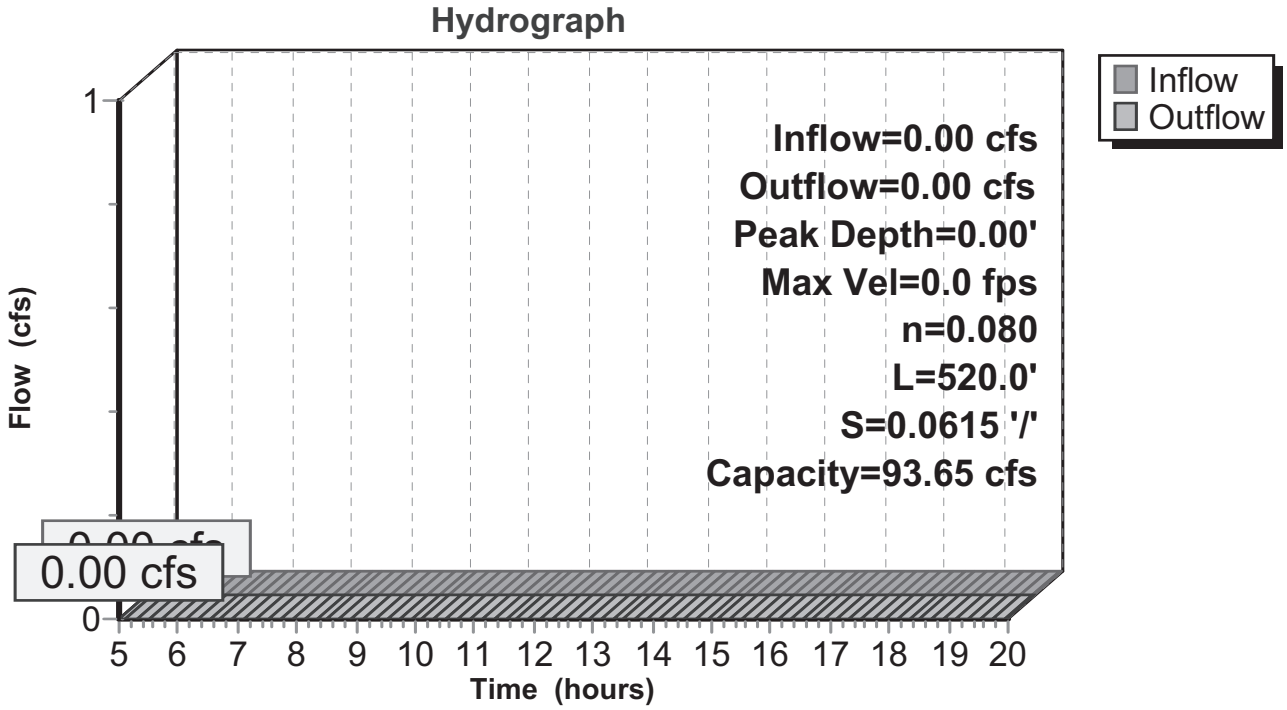
Reach 6R: Existing Swale

Inflow	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.0 fps, Avg. Travel Time= 0.0 min

Peak Depth= 0.00' @ 5.00 hrs
Capacity at bank full= 93.65 cfs
Inlet Invert= 454.00', Outlet Invert= 422.00'
0.00' x 2.00' deep channel, n= 0.080 Length= 520.0' Slope= 0.0615 '/'
Side Slope Z-value= 3.6 6.7 '/'

Reach 6R: Existing Swale



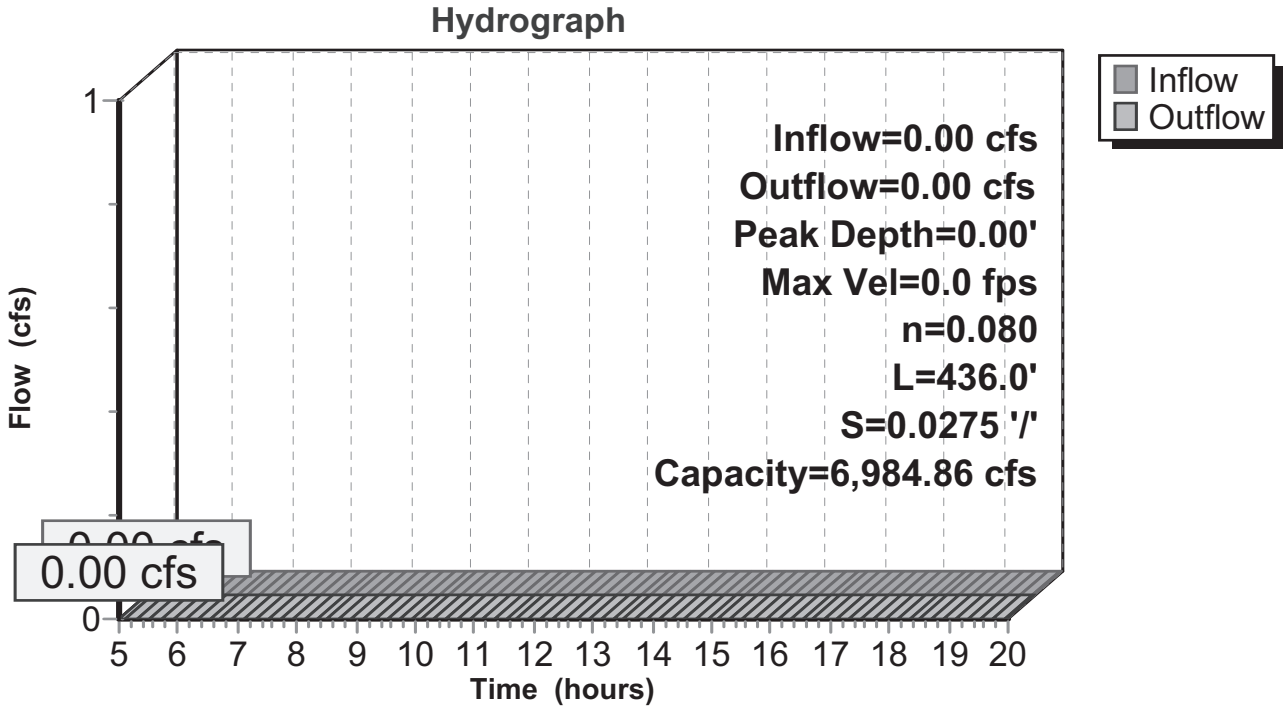
Reach 7R: Existing Swale

Inflow	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.0 fps, Avg. Travel Time= 0.0 min

Peak Depth= 0.00' @ 5.00 hrs
Capacity at bank full= 6,984.86 cfs
Inlet Invert= 480.00', Outlet Invert= 468.00'
0.00' x 11.90' deep channel, n= 0.080 Length= 436.0' Slope= 0.0275 '/'
Side Slope Z-value= 6.8 3.1 '/'

Reach 7R: Existing Swale

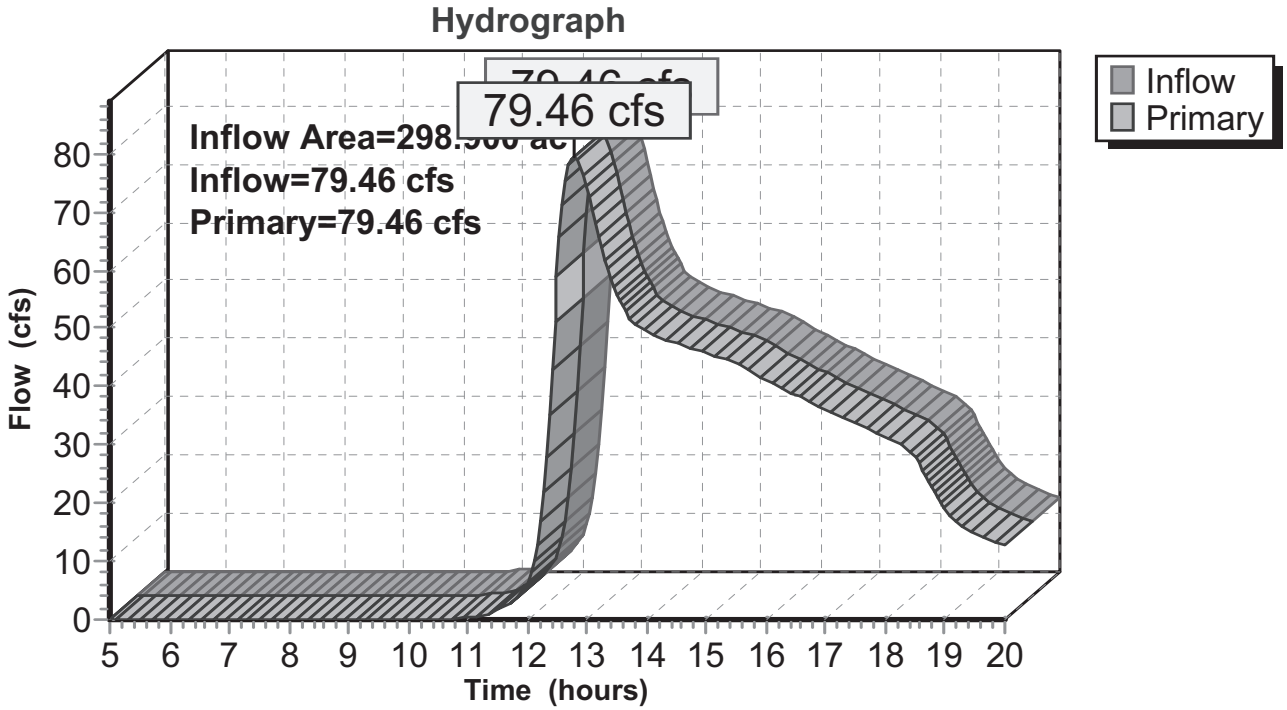


Pond 1P: Design Point 1 Outlet at Hasbrouck Road

Inflow Area = 298.900 ac, Inflow Depth = 1.05" for 2-YR STORM event
Inflow = 79.46 cfs @ 12.80 hrs, Volume= 26.103 af
Primary = 79.46 cfs @ 12.80 hrs, Volume= 26.103 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1 Outlet at Hasbrouck Road

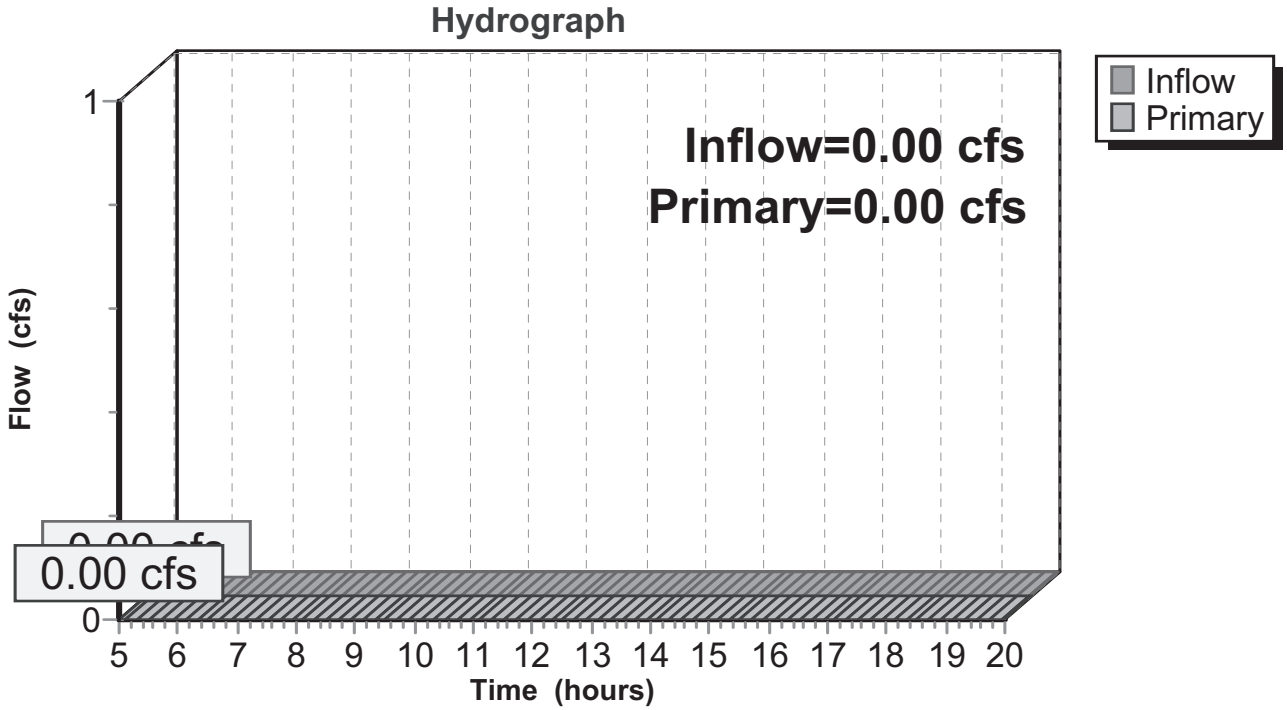


Pond 2P: Design Point 2 Existing Swale Along Craigville Road

Inflow	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af
Primary	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 2P: Design Point 2 Existing Swale Along Craigville Road

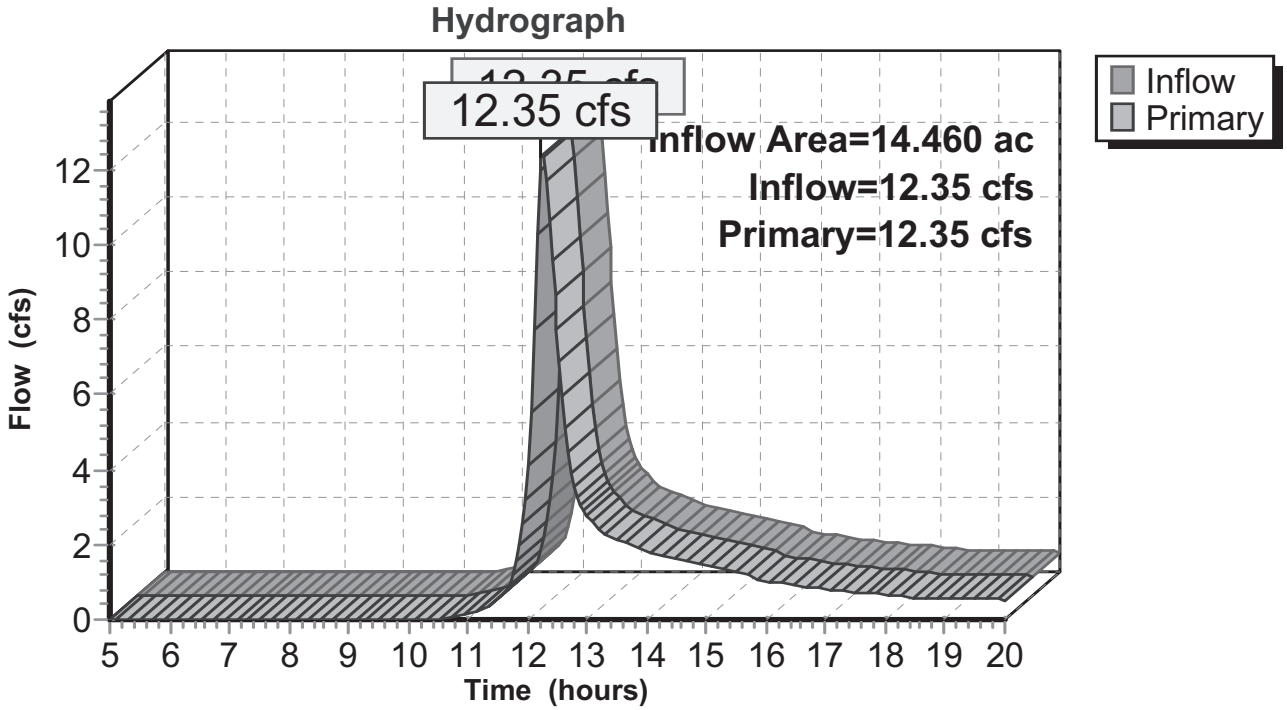


Pond 3P: Design Point 3 (Southeastern Property Line)

Inflow Area = 14.460 ac, Inflow Depth = 1.08" for 2-YR STORM event
Inflow = 12.35 cfs @ 12.24 hrs, Volume= 1.305 af
Primary = 12.35 cfs @ 12.24 hrs, Volume= 1.305 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 3P: Design Point 3 (Southeastern Property Line)

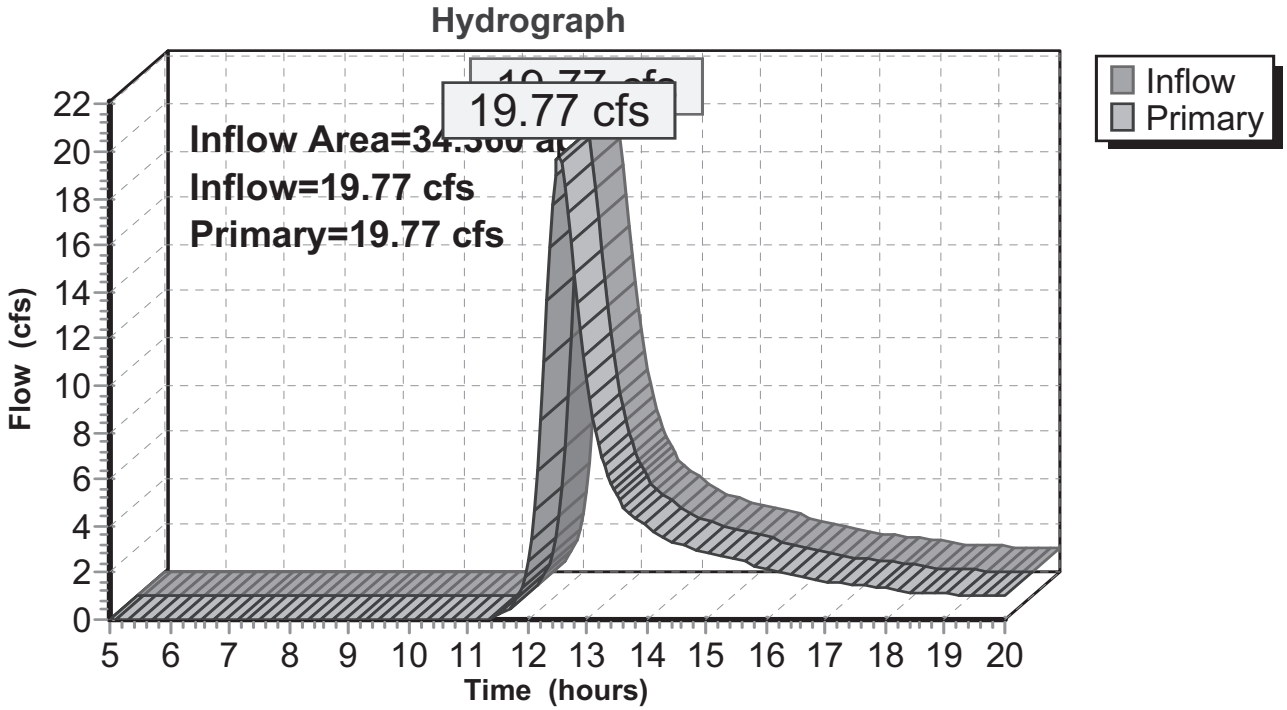


Pond 4P: Design Point 4 (Southwestern Property Line)

Inflow Area = 34.360 ac, Inflow Depth = 0.90" for 2-YR STORM event
Inflow = 19.77 cfs @ 12.53 hrs, Volume= 2.583 af
Primary = 19.77 cfs @ 12.53 hrs, Volume= 2.583 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 4P: Design Point 4 (Southwestern Property Line)



Pond 5P: Existing Wetland Pocket

Inflow Area =	167.470 ac,	Inflow Depth =	1.07"	for	2-YR STORM event
Inflow =	60.41 cfs @	13.30 hrs,	Volume=	14.986 af	
Outflow =	31.22 cfs @	14.50 hrs,	Volume=	15.000 af,	Atten= 48%, Lag= 72.3 min
Primary =	31.22 cfs @	14.50 hrs,	Volume=	15.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 468.35' @ 14.50 hrs Surf.Area= 0 sf Storage= 147,203 cf
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

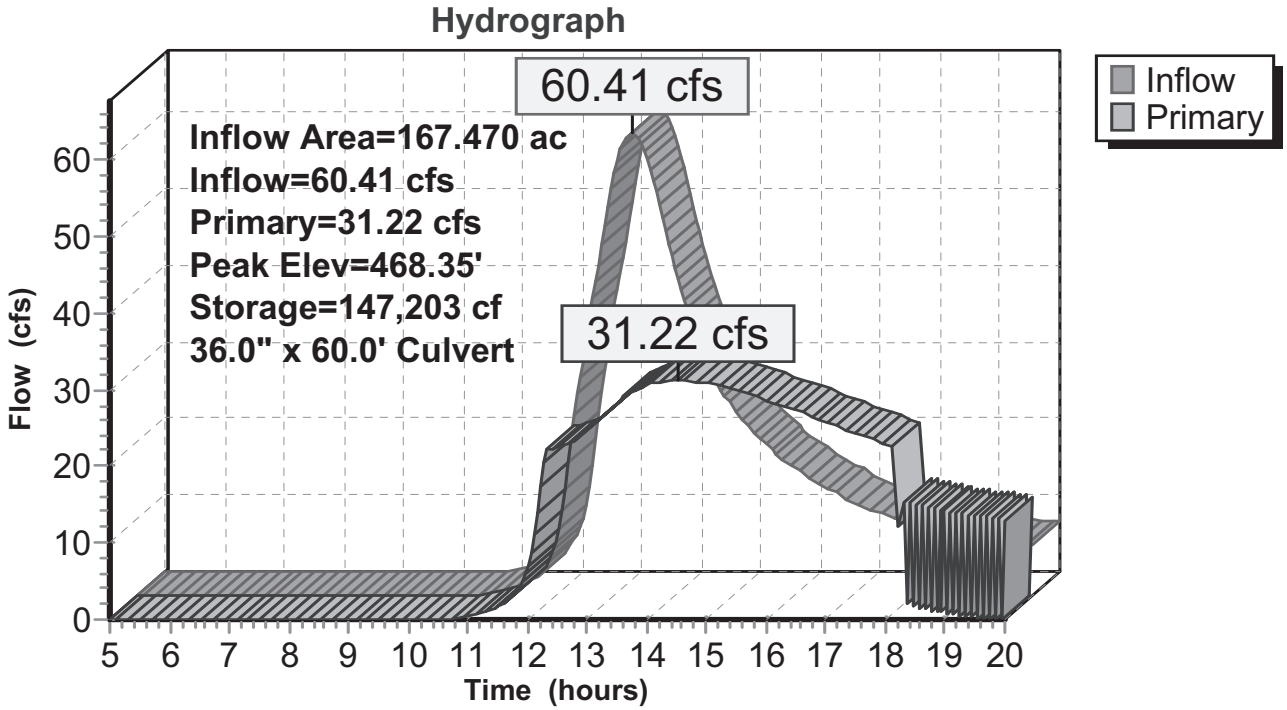
#	Invert	Avail.Storage	Storage Description
1	468.00'	4,153,277 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
468.00	0
470.00	838,050
472.00	2,316,286
474.00	4,153,277

#	Routing	Invert	Outlet Devices
1	Primary	466.24'	**36.0" x 60.0' long Culvert X 2.00** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 466.24' S= 0.0000 '/' n= 0.011 Cc= 0.900

Primary OutFlow Max=31.22 cfs @ 14.50 hrs HW=468.35' TW=466.77' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 31.22 cfs @ 4.1 fps)

Pond 5P: Existing Wetland Pocket



Pond 6P: Existing Culvert 2

Inflow Area =	36.780 ac,	Inflow Depth =	1.33"	for	2-YR STORM event
Inflow =	30.76 cfs @	12.49 hrs,	Volume=	4.064 af	
Outflow =	30.76 cfs @	12.49 hrs,	Volume=	4.064 af,	Atten= 0%, Lag= 0.0 min
Primary =	30.76 cfs @	12.49 hrs,	Volume=	4.064 af	
Secondary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af	

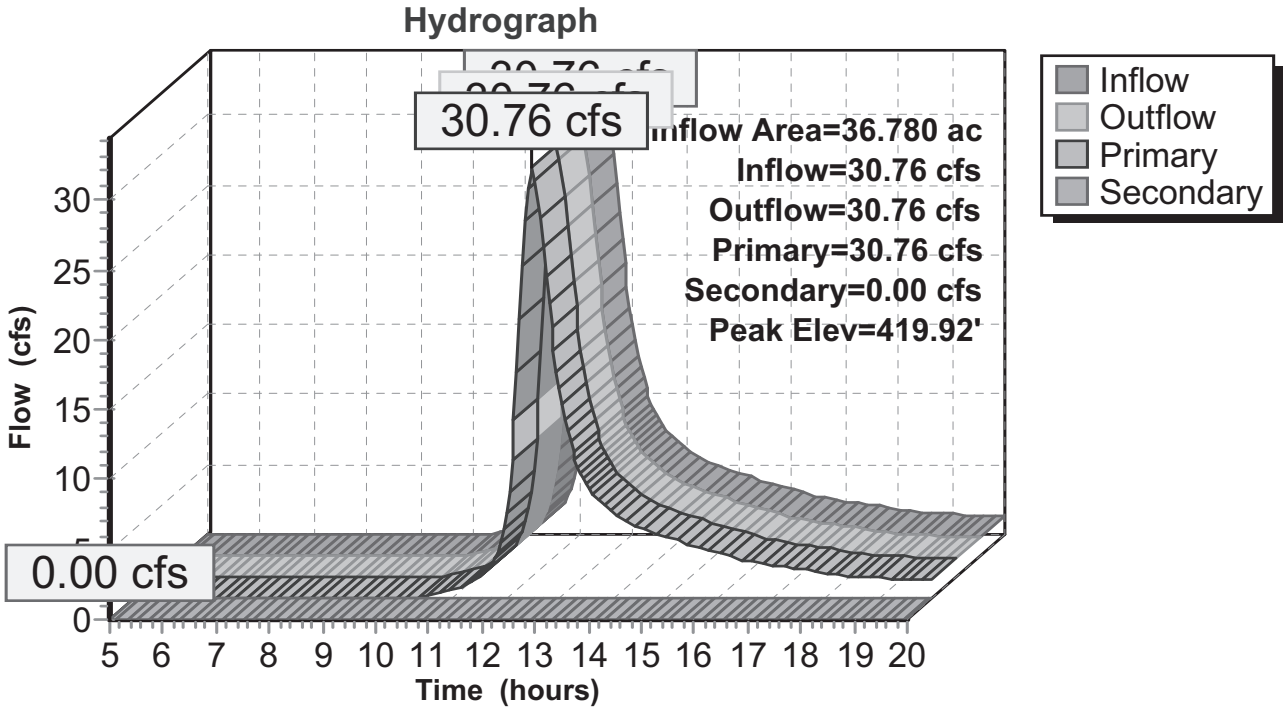
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 419.92' @ 12.49 hrs
Flood Elev= 424.00'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	417.23'	**36.0" x 45.0' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 416.82' S= 0.0091 '/' n= 0.011 Cc= 0.900
2	Secondary	421.50'	**22.0' long x 6.3' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.67 2.68 2.71 2.75 2.82

Primary OutFlow Max=30.71 cfs @ 12.49 hrs HW=419.92' TW=417.93' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 30.71 cfs @ 6.1 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=417.23' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 6P: Existing Culvert 2



Pond 7P: Existing Culvert 3

Inflow Area =	22.130 ac,	Inflow Depth =	0.65"	for	2-YR STORM event
Inflow =	3.71 cfs @	12.21 hrs,	Volume=	1.199 af	
Outflow =	3.71 cfs @	12.21 hrs,	Volume=	1.199 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.71 cfs @	12.21 hrs,	Volume=	1.199 af	
Secondary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af	

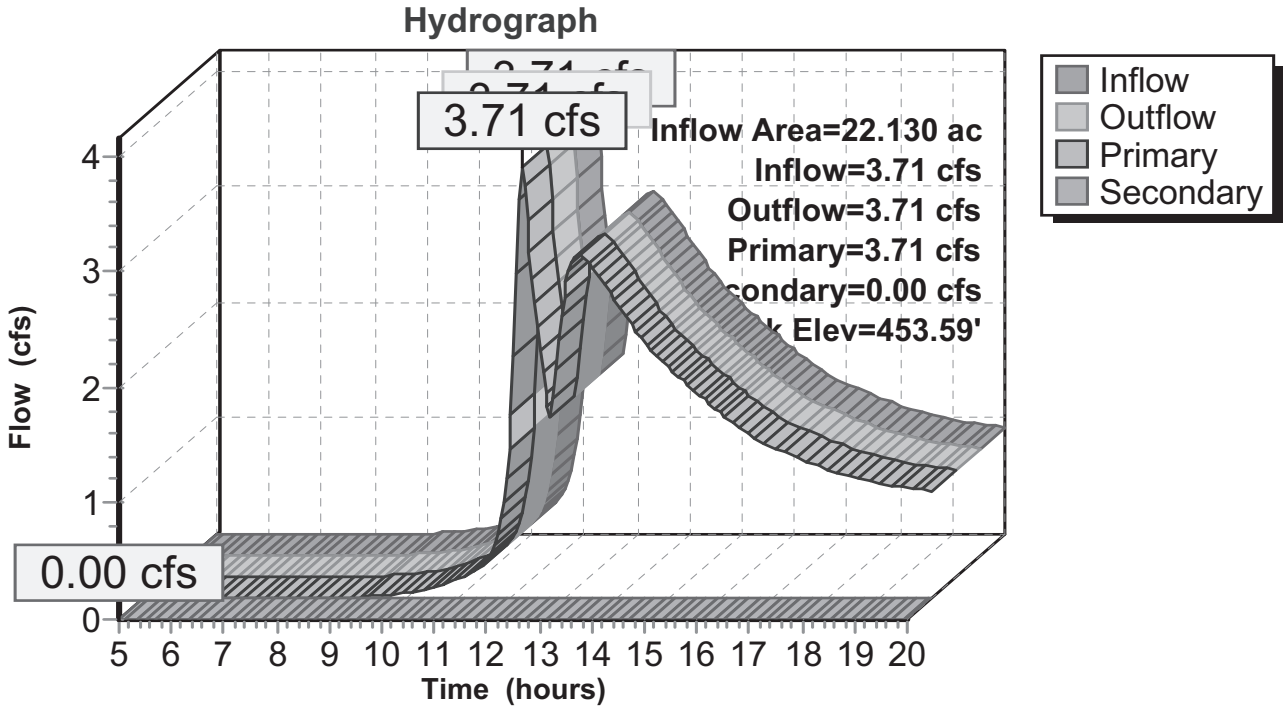
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 453.59' @ 12.21 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	452.60'	**18.0" x 45.6' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 451.11' S= 0.0327 '/' n= 0.011 Cc= 0.900
2	Secondary	455.50'	**6.5' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=3.69 cfs @ 12.21 hrs HW=453.59' TW=440.37' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.69 cfs @ 3.0 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=452.60' TW=454.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Existing Culvert 3



Pond 8P: Existing Culvert 4

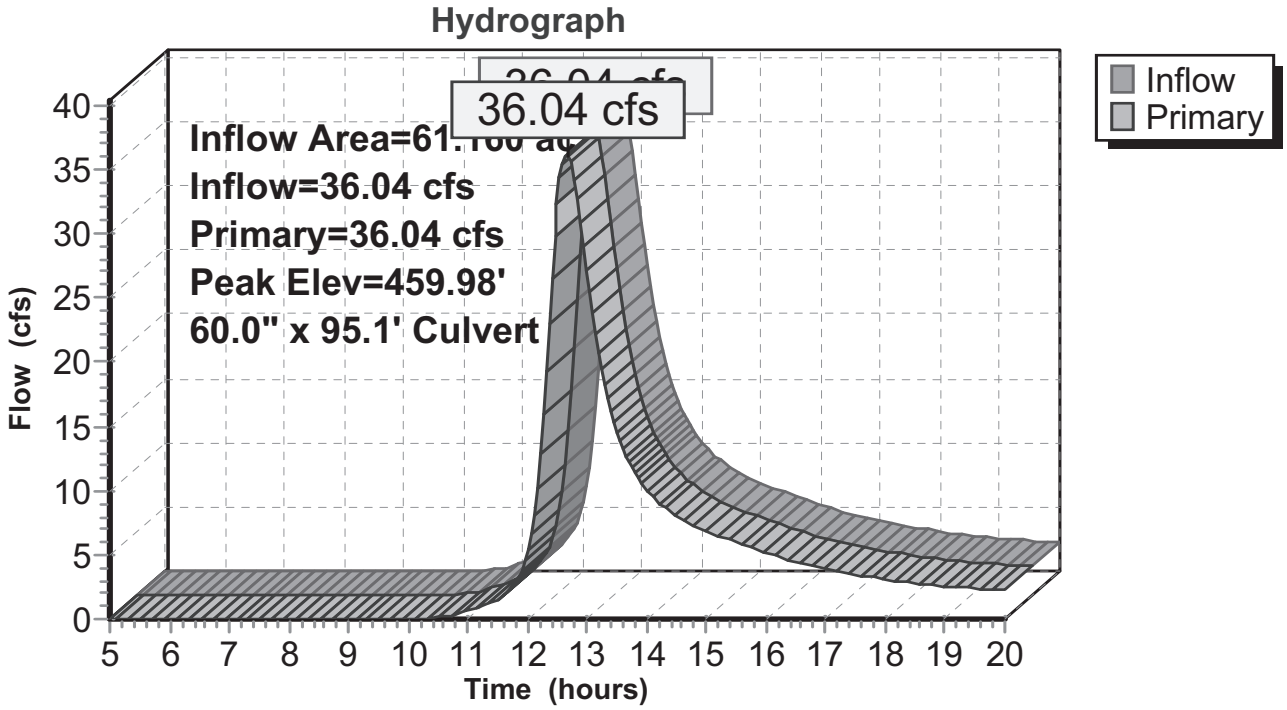
Inflow Area =	61.160 ac,	Inflow Depth =	1.14"	for	2-YR STORM event
Inflow =	36.04 cfs @	12.67 hrs,	Volume=	5.829 af	
Outflow =	36.04 cfs @	12.67 hrs,	Volume=	5.829 af,	Atten= 0%, Lag= 0.0 min
Primary =	36.04 cfs @	12.67 hrs,	Volume=	5.829 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 459.98' @ 12.67 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	457.96'	**60.0" x 95.1' long Culvert** CMP, square edge headwall, Ke= 0.500 Outlet Invert= 456.17' S= 0.0188 '/' n= 0.011 Cc= 0.900

Primary OutFlow Max=35.97 cfs @ 12.67 hrs HW=459.98' TW=457.13' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 35.97 cfs @ 4.8 fps)

Pond 8P: Existing Culvert 4



Pond 9P: Existing Culvert 5

Inflow Area =	11.360 ac,	Inflow Depth =	1.07"	for	2-YR STORM event
Inflow =	8.83 cfs @	12.41 hrs,	Volume=	1.011 af	
Outflow =	8.83 cfs @	12.41 hrs,	Volume=	1.011 af,	Atten= 0%, Lag= 0.0 min
Primary =	6.82 cfs @	12.41 hrs,	Volume=	0.968 af	
Secondary =	2.01 cfs @	12.41 hrs,	Volume=	0.042 af	

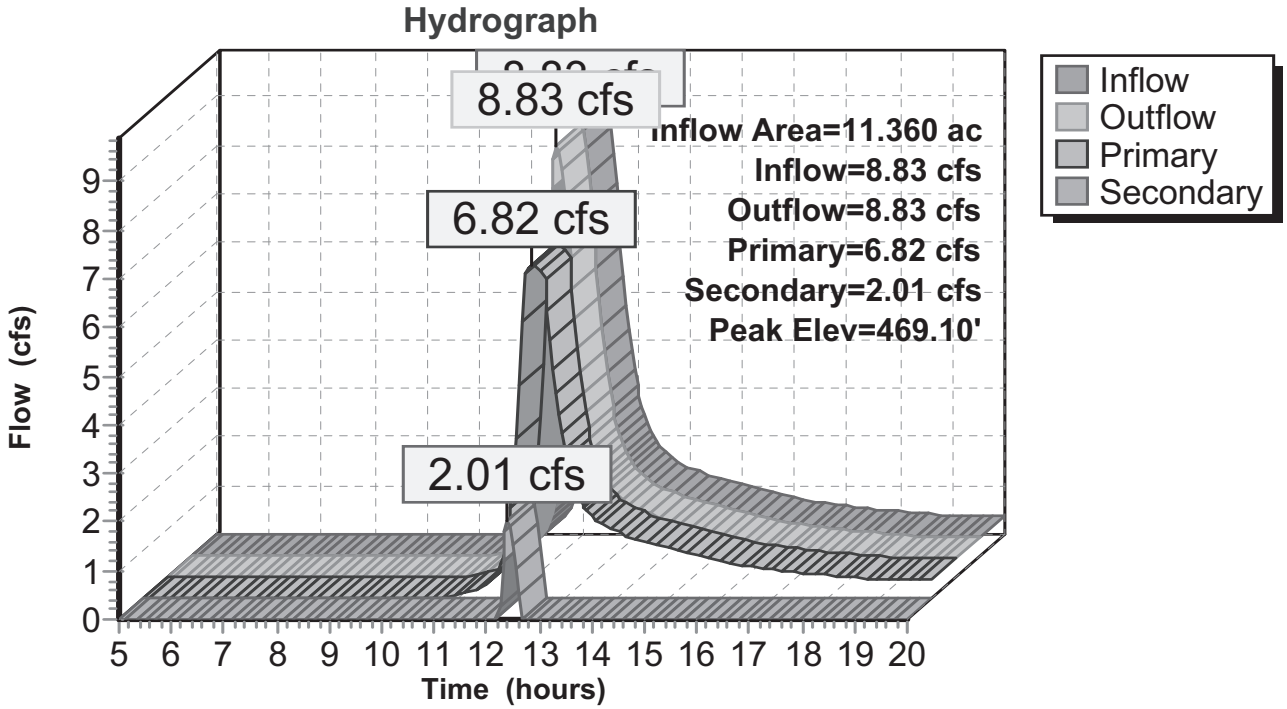
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 469.10' @ 12.41 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	466.76'	**15.0" x 50.3' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 465.61' S= 0.0229 '/' n= 0.011 Cc= 0.900
2	Secondary	469.00'	**25.0' long x 60.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=6.82 cfs @ 12.41 hrs HW=469.10' TW=460.37' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 6.82 cfs @ 5.6 fps)

Secondary OutFlow Max=1.99 cfs @ 12.41 hrs HW=469.10' TW=456.91' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 1.99 cfs @ 0.8 fps)

Pond 9P: Existing Culvert 5



Pond 10P: Existing Culvert 6

Inflow Area =	5.020 ac,	Inflow Depth =	1.12"	for	2-YR STORM event
Inflow =	3.37 cfs @	12.62 hrs,	Volume=	0.467 af	
Outflow =	3.37 cfs @	12.62 hrs,	Volume=	0.467 af,	Atten= 0%, Lag= 0.0 min
Primary =	3.37 cfs @	12.62 hrs,	Volume=	0.467 af	
Secondary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af	

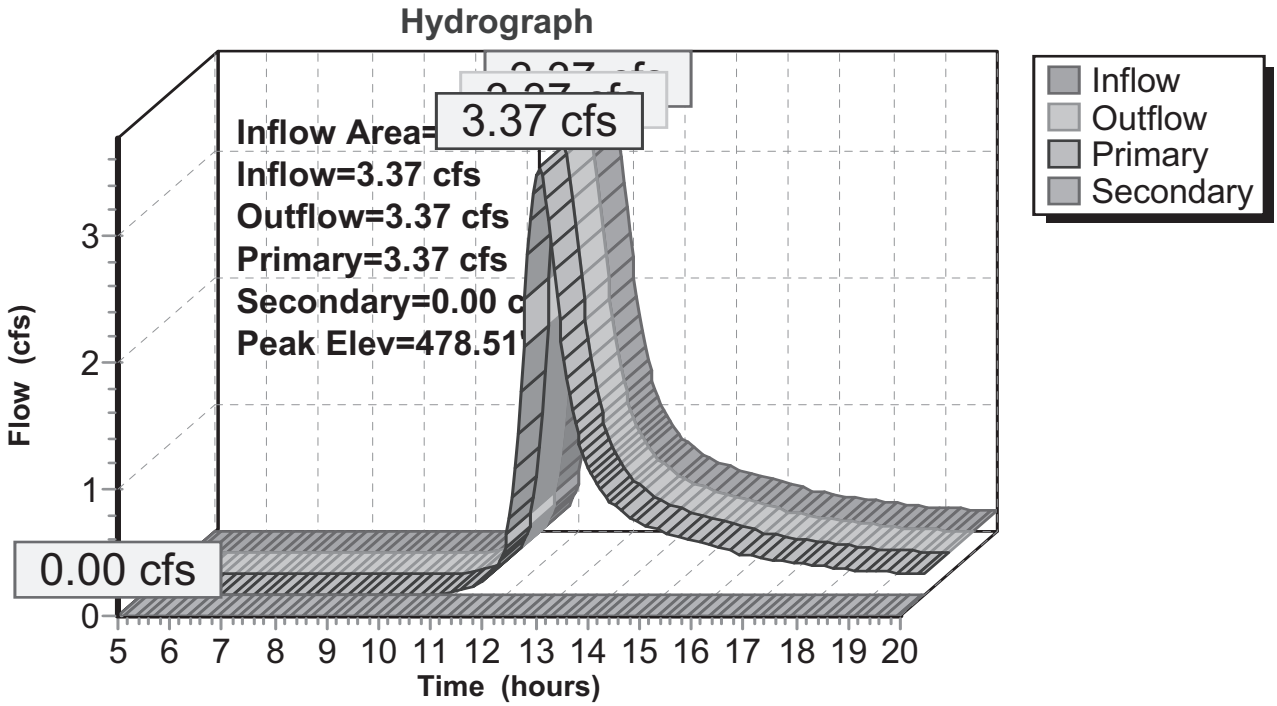
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 478.51' @ 12.62 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	477.46'	**15.0" x 54.0' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 475.67' S= 0.0331 '/' n= 0.011 Cc= 0.900
2	Secondary	481.50'	**160.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=3.36 cfs @ 12.62 hrs HW=478.50' TW=468.02' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.36 cfs @ 3.1 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=477.46' TW=480.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 10P: Existing Culvert 6



Pond 11P: Existing Culvert 9

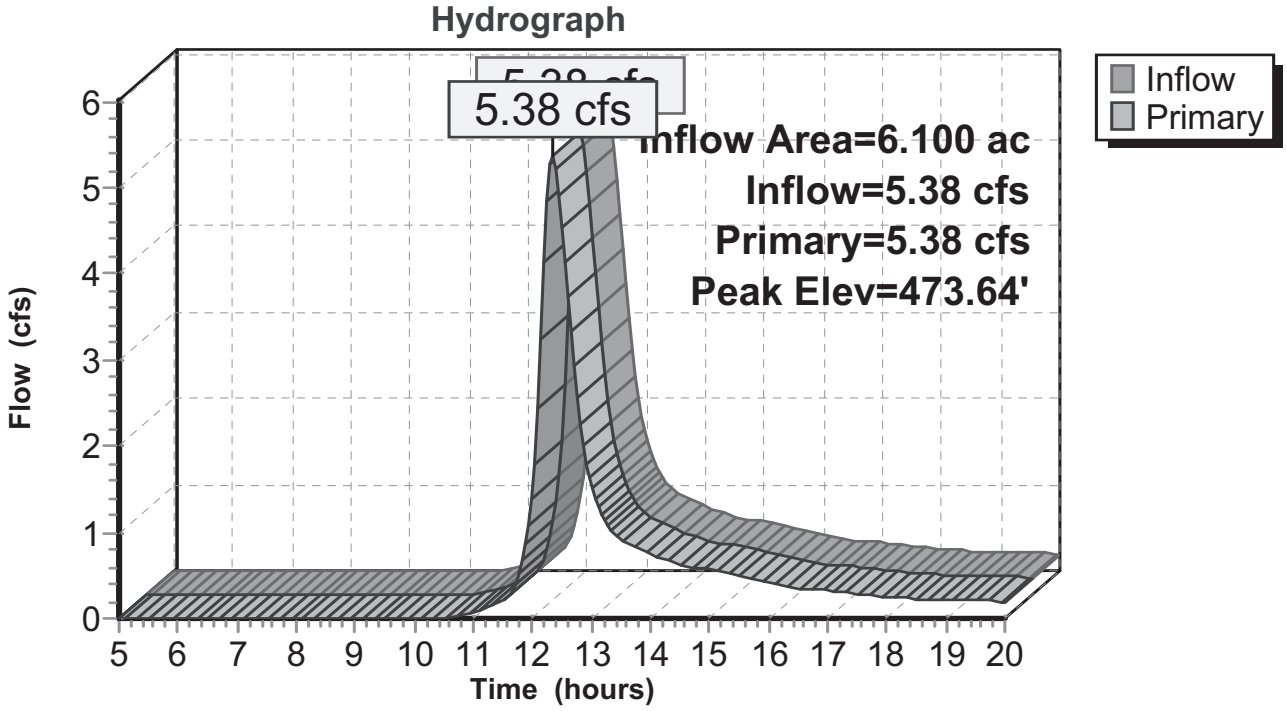
Inflow Area =	6.100 ac,	Inflow Depth =	1.13"	for	2-YR STORM event
Inflow =	5.38 cfs @	12.34 hrs,	Volume=	0.573 af	
Outflow =	5.38 cfs @	12.34 hrs,	Volume=	0.573 af,	Atten= 0%, Lag= 0.0 min
Primary =	5.38 cfs @	12.34 hrs,	Volume=	0.573 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 473.64' @ 12.34 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	471.95'	**15.0" x 45.5' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 471.00' S= 0.0209 '/' n= 0.011 Cc= 0.900
2	Primary	474.50'	**35.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=5.36 cfs @ 12.34 hrs HW=473.63' TW=468.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 5.36 cfs @ 4.4 fps)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 11P: Existing Culvert 9



Pond 12P: Existing Culvert 11

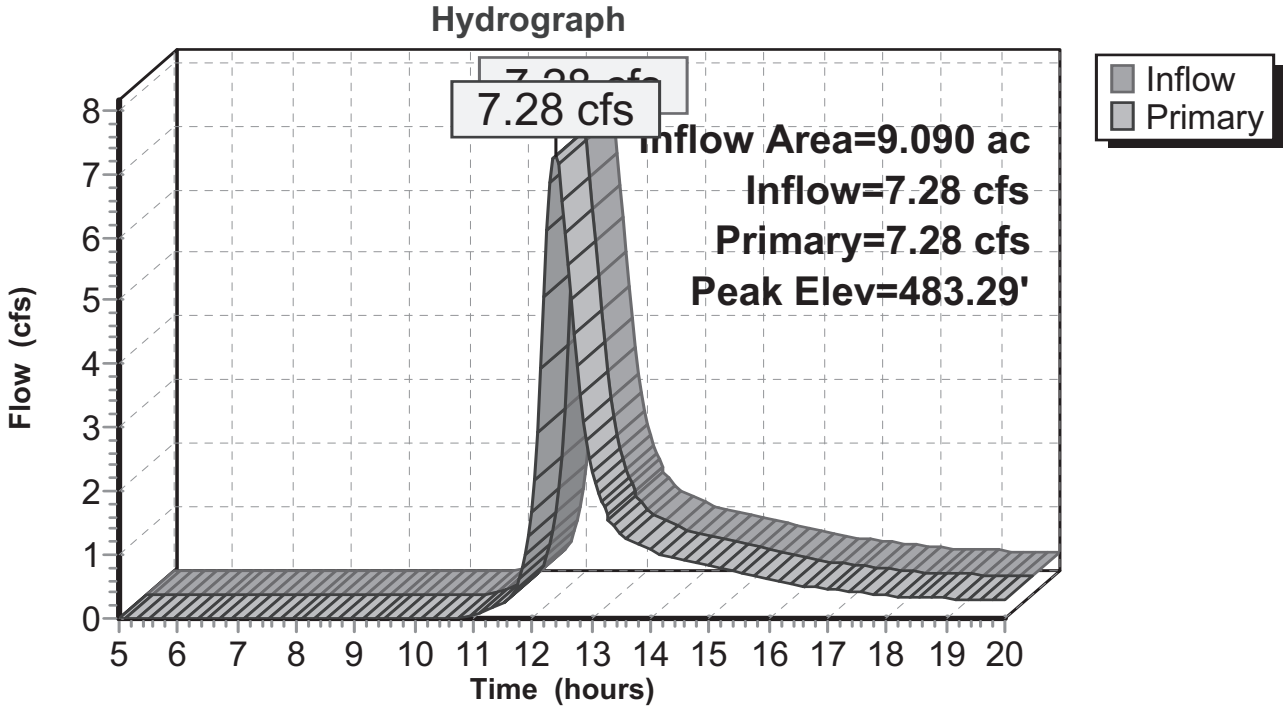
Inflow Area =	9.090 ac,	Inflow Depth =	1.07"	for	2-YR STORM event
Inflow =	7.28 cfs @	12.38 hrs,	Volume=	0.809 af	
Outflow =	7.28 cfs @	12.38 hrs,	Volume=	0.809 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.28 cfs @	12.38 hrs,	Volume=	0.809 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 483.29' @ 12.38 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	480.71'	**15.0" x 53.4' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 479.74' S= 0.0182 '/' n= 0.011 Cc= 0.900
2	Primary	483.50'	**4.0' long x 125.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=7.25 cfs @ 12.38 hrs HW=483.27' TW=468.00' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.25 cfs @ 5.9 fps)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 12P: Existing Culvert 11



Pond 13P: Detention/Treatment Pond 13P

Inflow Area =	20.050 ac,	Inflow Depth =	1.44"	for	2-YR STORM event
Inflow =	23.83 cfs @	12.31 hrs,	Volume=	2.405 af	
Outflow =	3.80 cfs @	13.33 hrs,	Volume=	1.186 af,	Atten= 84%, Lag= 61.3 min
Primary =	2.58 cfs @	13.33 hrs,	Volume=	0.925 af	
Secondary =	1.22 cfs @	13.33 hrs,	Volume=	0.261 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 461.11' @ 13.33 hrs Surf.Area= 0 sf Storage= 58,905 cf
Plug-Flow detention time= 188.5 min calculated for 1.182 af (49% of inflow)
Center-of-Mass det. time= 105.7 min (920.1 - 814.4)

#	Invert	Avail.Storage	Storage Description
1	456.00'	163,490 cf	**Custom Stage Data** Listed below

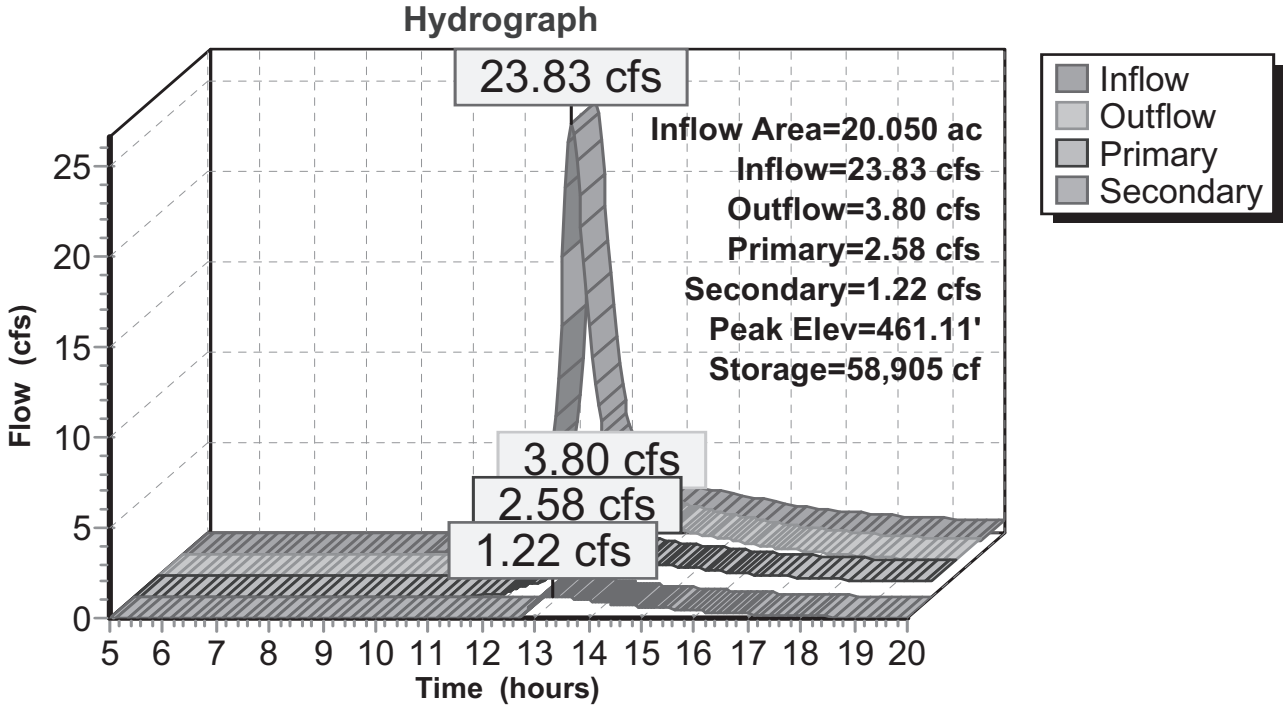
Elevation (feet)	Cum.Store (cubic-feet)
456.00	0
458.00	17,151
460.00	41,271
462.00	73,165
464.00	113,637
466.00	163,490

#	Routing	Invert	Outlet Devices
1	Primary	456.00'	**24.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 446.00' S= 0.1000 '/' n= 0.011 Cc= 0.900
2	Device 1	456.00'	**2.2" Vert. Orifice/Grate** C= 0.600
3	Device 1	456.70'	**3.3" Vert. Orifice/Grate** C= 0.600
4	Device 1	460.73'	**2.30' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	464.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
6	Device 1	465.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Secondary	456.00'	**24.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 446.00' S= 0.1000 '/' n= 0.011 Cc= 0.900
8	Device 7	460.73'	**1.65' x 0.50' Vert. Orifice/Grate** C= 0.600
9	Device 7	462.40'	**1.65' x 0.90' Vert. Orifice/Grate** C= 0.600
10	Device 7	464.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
11	Device 7	465.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
12	Primary	465.50'	**20.0' long x 13.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=2.57 cfs @ 13.33 hrs HW=461.11' TW=453.47' (Dynamic Tailwater)
- **1=Culvert** (Passes 2.57 cfs of 30.65 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.28 cfs @ 10.8 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.59 cfs @ 9.9 fps)
  - **4=Orifice/Grate** (Orifice Controls 1.70 cfs @ 2.0 fps)
  - **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  - **6=Orifice/Grate** (Controls 0.00 cfs)
- **12=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=1.22 cfs @ 13.33 hrs HW=461.11' TW=418.61' (Dynamic Tailwater)
- **7=Culvert** (Passes 1.22 cfs of 30.65 cfs potential flow)
  - **8=Orifice/Grate** (Orifice Controls 1.22 cfs @ 2.0 fps)
  - **9=Orifice/Grate** (Controls 0.00 cfs)
  - **10=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  - **11=Orifice/Grate** (Controls 0.00 cfs)

Pond 13P: Detention/Treatment Pond 13P



Pond 14P: Detention/Treatment Pond 14P

Inflow Area =	11.420 ac,	Inflow Depth =	1.51"	for	2-YR STORM event
Inflow =	15.12 cfs @	12.26 hrs,	Volume=	1.436 af	
Outflow =	2.02 cfs @	13.44 hrs,	Volume=	0.713 af,	Atten= 87%, Lag= 70.6 min
Primary =	2.02 cfs @	13.44 hrs,	Volume=	0.713 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 495.40' @ 13.44 hrs Surf.Area= 0 sf Storage= 35,804 cf
Plug-Flow detention time= 194.5 min calculated for 0.711 af (50% of inflow)
Center-of-Mass det. time= 112.1 min (922.0 - 809.8)

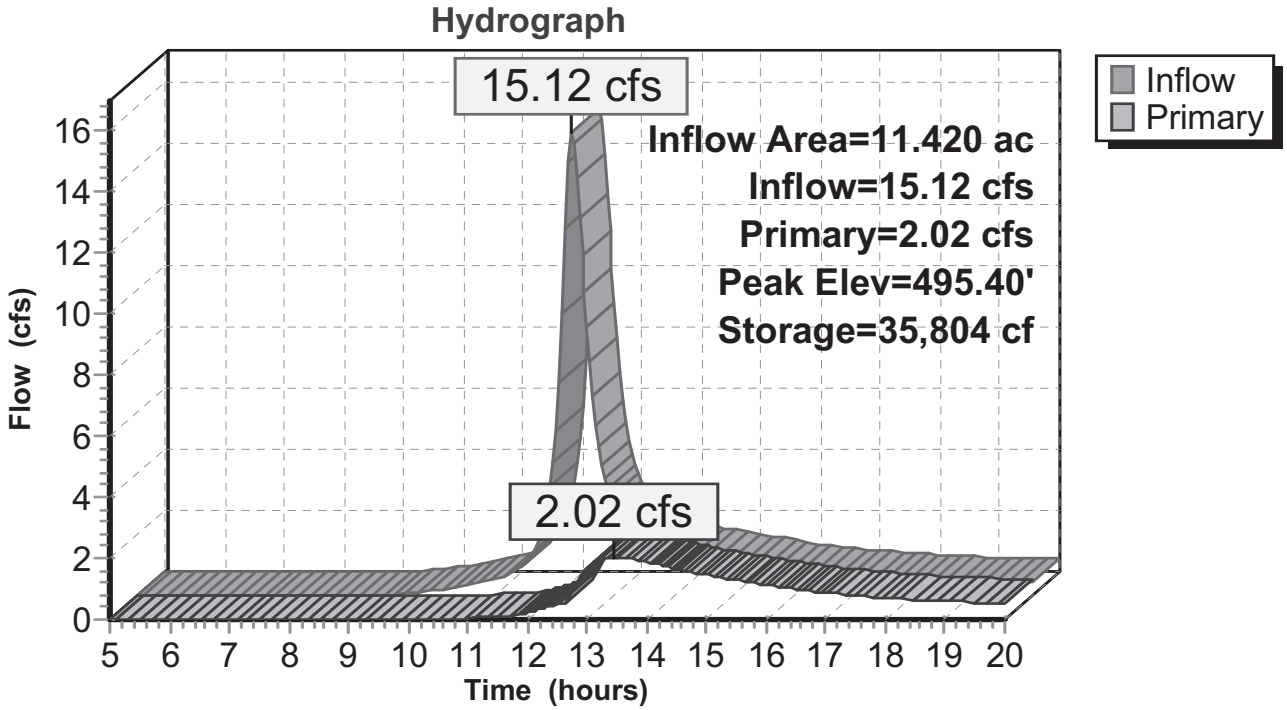
#	Invert	Avail.Storage	Storage Description
1	491.00'	112,422 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
491.00	0
492.00	5,220
494.00	20,281
496.00	42,461
498.00	72,873
500.00	112,422

#	Routing	Invert	Outlet Devices
1	Primary	491.00'	**24.0" x 60.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 490.00' S= 0.0167 '/' n= 0.011 Cc= 0.900
2	Device 1	491.00'	**1.9" Vert. Orifice/Grate** C= 0.600
3	Device 1	491.70'	**2.7" Vert. Orifice/Grate** C= 0.600
4	Device 1	495.00'	**1.80' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	498.25'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32

Primary OutFlow Max=2.02 cfs @ 13.44 hrs HW=495.40' TW=459.25' (Dynamic Tailwater)
└─**1=Culvert** (Passes 2.02 cfs of 27.89 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.20 cfs @ 10.0 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.36 cfs @ 9.1 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 1.46 cfs @ 2.0 fps)
  └─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 14P: Detention/Treatment Pond 14P



Pond 15P: Detention/Treatment Pond 15P

Inflow Area =	26.950 ac,	Inflow Depth =	1.51"	for	2-YR STORM event
Inflow =	33.16 cfs @	12.31 hrs,	Volume=	3.383 af	
Outflow =	4.37 cfs @	13.73 hrs,	Volume=	1.634 af,	Atten= 87%, Lag= 85.1 min
Primary =	4.37 cfs @	13.73 hrs,	Volume=	1.634 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 490.94' @ 13.73 hrs Surf.Area= 0 sf Storage= 86,749 cf
Plug-Flow detention time= 202.3 min calculated for 1.634 af (48% of inflow)
Center-of-Mass det. time= 118.6 min (931.2 - 812.6)

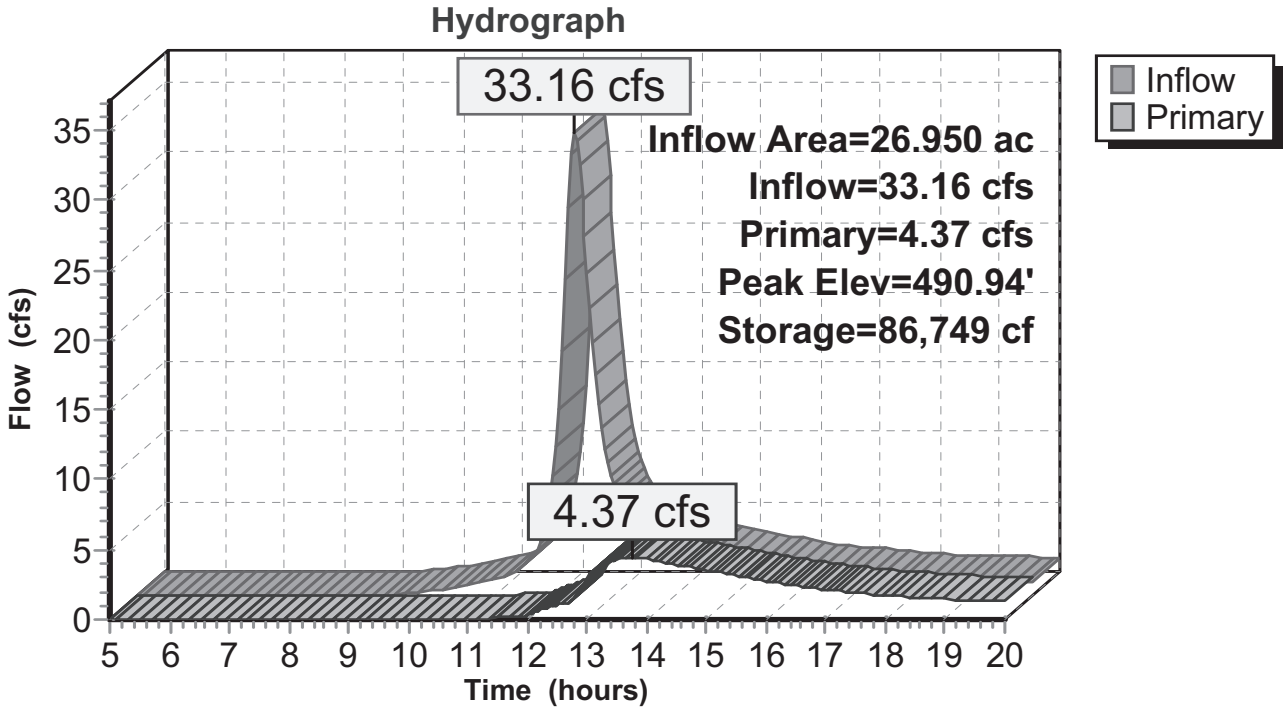
#	Invert	Avail.Storage	Storage Description
1	486.00'	250,174 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
486.00	0
488.00	26,415
490.00	63,689
492.00	112,776
494.00	174,623
496.00	250,174

#	Routing	Invert	Outlet Devices
1	Primary	486.00'	**30.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 482.00' S= 0.0400 '/' n= 0.011 Cc= 0.900
2	Device 1	486.00'	**2.7" Vert. Orifice/Grate** C= 0.600
3	Device 1	486.71'	**4.0" Vert. Orifice/Grate** C= 0.600
4	Device 1	490.47'	**3.00' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	492.43'	**3.00' x 0.75' Vert. Orifice/Grate** C= 0.600
6	Device 1	494.25'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32

Primary OutFlow Max=4.37 cfs @ 13.73 hrs HW=490.94' TW=468.29' (Dynamic Tailwater)
- **1=Culvert** (Passes 4.37 cfs of 45.40 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.42 cfs @ 10.6 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.85 cfs @ 9.7 fps)
  - **4=Orifice/Grate** (Orifice Controls 3.10 cfs @ 2.2 fps)
  - **5=Orifice/Grate** (Controls 0.00 cfs)
  - **6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 15P: Detention/Treatment Pond 15P



Pond 16P: Detention/Treatment Pond 16P

Inflow Area =	2.390 ac,	Inflow Depth =	1.88"	for	2-YR STORM event
Inflow =	5.19 cfs @	12.12 hrs,	Volume=	0.375 af	
Outflow =	0.43 cfs @	13.57 hrs,	Volume=	0.169 af,	Atten= 92%, Lag= 87.1 min
Primary =	0.43 cfs @	13.57 hrs,	Volume=	0.169 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 503.26' @ 13.57 hrs Surf.Area= 0 sf Storage= 10,149 cf
Plug-Flow detention time= 217.4 min calculated for 0.168 af (45% of inflow)
Center-of-Mass det. time= 132.7 min (921.7 - 789.0)

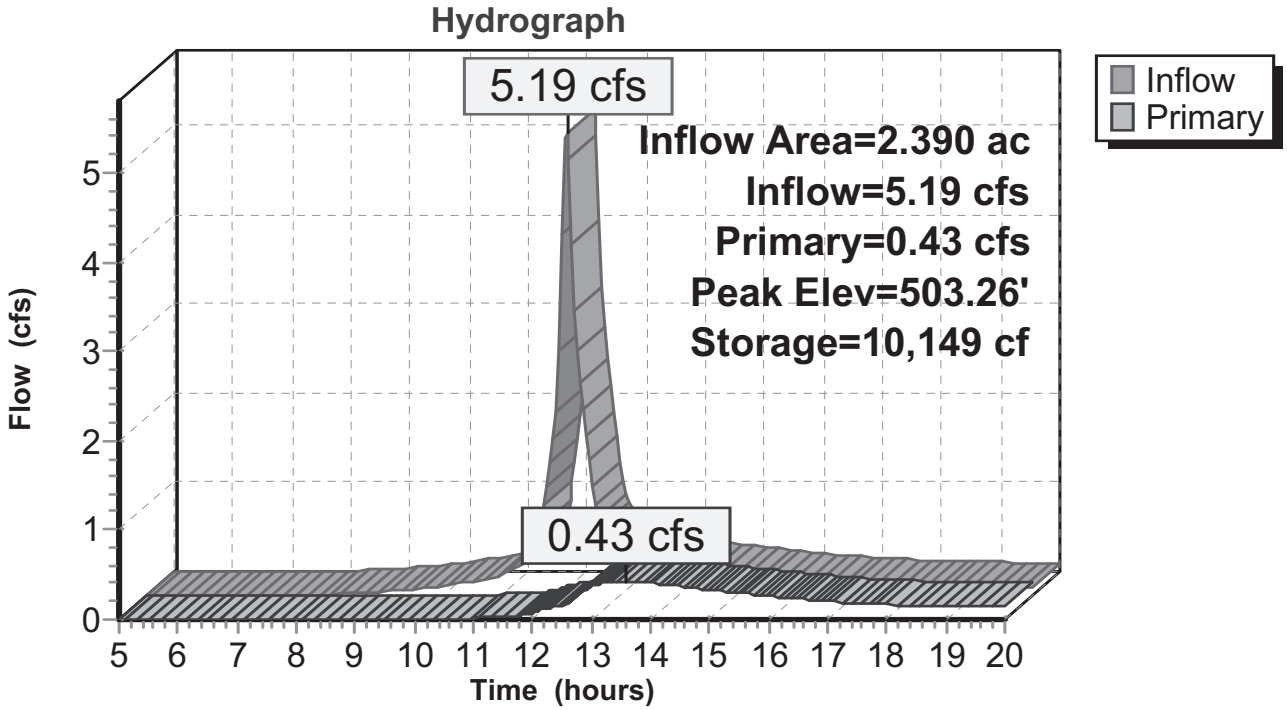
#	Invert	Avail.Storage	Storage Description
1	501.50'	29,657 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
501.50	0
502.00	2,572
504.00	14,626
506.00	29,657

#	Routing	Invert	Outlet Devices
1	Primary	501.50'	**18.0" x 40.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 497.50' S= 0.1000 '/' n= 0.011 Cc= 0.900
2	Device 1	501.50'	**1.3" Vert. Orifice/Grate** C= 0.600
3	Device 1	501.84'	**1.8" Vert. Orifice/Grate** C= 0.600
4	Device 1	503.09'	**1.25' x 0.50' Vert. Orifice/Grate** C= 0.600
5	Device 1	504.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
6	Device 1	505.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Primary	505.50'	**20.0' long x 13.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=0.43 cfs @ 13.57 hrs HW=503.26' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.43 cfs of 8.54 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.06 cfs @ 6.3 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.10 cfs @ 5.6 fps)
  - **4=Orifice/Grate** (Orifice Controls 0.27 cfs @ 1.3 fps)
  - **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  - **6=Orifice/Grate** (Controls 0.00 cfs)
- **7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 16P: Detention/Treatment Pond 16P



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

Subcatchment 1S: Subcatchment 1S Runoff Area=36.780 ac Runoff Depth=2.72"
Flow Length=2,450' Tc=33.5 min CN=76 Runoff=68.30 cfs 8.348 af

Subcatchment 2S: Subcatchment 2S Runoff Area=2.080 ac Runoff Depth=3.21"
Flow Length=1,056' Tc=14.0 min CN=81 Runoff=6.44 cfs 0.556 af

Subcatchment 3S: Subcatchment 3S Runoff Area=49.740 ac Runoff Depth=2.71"
Flow Length=3,960' Tc=45.8 min CN=76 Runoff=78.82 cfs 11.239 af

Subcatchment 4S: Subcatchment 4S Runoff Area=11.360 ac Runoff Depth=2.47"
Flow Length=986' Tc=27.1 min CN=73 Runoff=20.97 cfs 2.334 af

Subcatchment 5S: Subcatchment 5S Runoff Area=5.020 ac Runoff Depth=2.54"
Flow Length=1,150' Tc=41.7 min CN=74 Runoff=7.82 cfs 1.062 af

Subcatchment 6S: Subcatchment 6S Runoff Area=6.100 ac Runoff Depth=2.56"
Flow Length=1,134' Tc=23.1 min CN=74 Runoff=12.48 cfs 1.300 af

Subcatchment 7S: Subcatchment 7S Runoff Area=120.310 ac Runoff Depth=2.57"
Flow Length=3,523' Tc=92.9 min CN=75 Runoff=119.66 cfs 25.793 af

Subcatchment 8S: Subcatchment 8S Runoff Area=9.090 ac Runoff Depth=2.47"
Flow Length=952' Tc=25.2 min CN=73 Runoff=17.34 cfs 1.869 af

Subcatchment 9S: Subcatchment 9S Runoff Area=12.070 ac Runoff Depth=2.56"
Flow Length=526' Tc=16.3 min CN=74 Runoff=28.41 cfs 2.578 af

Subcatchment 10S: Subcatchment 10S Runoff Area=34.360 ac Runoff Depth=2.21"
Flow Length=1,359' Tc=34.6 min CN=70 Runoff=50.75 cfs 6.314 af

Subcatchment 11S: Subcatchment 11S Runoff Area=20.050 ac Runoff Depth=3.01"
Flow Length=1,706' Tc=21.3 min CN=79 Runoff=49.82 cfs 5.030 af

Subcatchment 12S: Subcatchment 12S Runoff Area=11.420 ac Runoff Depth=3.11"
Flow Length=1,285' Tc=18.4 min CN=80 Runoff=31.03 cfs 2.957 af

Subcatchment 13S: Subcatchment 13S Runoff Area=26.950 ac Runoff Depth=3.10"
Flow Length=2,559' Tc=22.0 min CN=80 Runoff=68.04 cfs 6.970 af

Subcatchment 14S: Subcatchment 14S Runoff Area=2.390 ac Runoff Depth=3.61"
Flow Length=781' Tc=8.1 min CN=85 Runoff=9.73 cfs 0.718 af

Reach 1R: Existing Stream Peak Depth=1.95' Max Vel=3.5 fps Inflow=193.08 cfs 57.451 af
n=0.080 L=1,210.0' S=0.0279 '/' Capacity=2,412.63 cfs Outflow=190.88 cfs 56.944 af

Reach 2R: Existing Stream Peak Depth=1.54' Max Vel=4.2 fps Inflow=139.66 cfs 48.637 af
n=0.080 L=609.0' S=0.0361 '/' Capacity=11,130.94 cfs Outflow=139.44 cfs 48.432 af

Reach 3R: Existing Stream Peak Depth=1.51' Max Vel=3.4 fps Inflow=127.90 cfs 45.895 af
n=0.080 L=541.0' S=0.0299 '/' Capacity=9,486.07 cfs Outflow=127.57 cfs 45.695 af

Reach 4R: Existing Stream Peak Depth=0.54' Max Vel=0.8 fps Inflow=62.20 cfs 32.394 af
n=0.080 L=432.0' S=0.0051 '/' Capacity=6,025.46 cfs Outflow=62.16 cfs 31.894 af

Reach 5R: Existing Stream Peak Depth=0.78' Max Vel=1.0 fps Inflow=60.37 cfs 31.699 af
n=0.080 L=1,188.0' S=0.0051 '/' Capacity=5,559.50 cfs Outflow=60.10 cfs 30.620 af

Reach 6R: Existing Swale Peak Depth=0.68' Max Vel=2.2 fps Inflow=5.28 cfs 0.293 af
n=0.080 L=520.0' S=0.0615 '/' Capacity=93.65 cfs Outflow=5.18 cfs 0.293 af

Reach 7R: Existing Swale Peak Depth=0.00' Max Vel=0.0 fps Inflow=0.00 cfs 0.000 af
n=0.080 L=436.0' S=0.0275 '/' Capacity=6,984.86 cfs Outflow=0.00 cfs 0.000 af

Pond 1P: Design Point 1 Outlet at Hasbrouck Road Inflow=190.88 cfs 56.944 af
Primary=190.88 cfs 56.944 af

Pond 2P: Design Point 2 Existing Swale Along Craigville Road Inflow=23.78 cfs 0.713 af
Primary=23.78 cfs 0.713 af

Pond 3P: Design Point 3 (Southeastern Property Line) Inflow=30.74 cfs 3.080 af
Primary=30.74 cfs 3.080 af

Pond 4P: Design Point 4 (Southwestern Property Line) Inflow=50.75 cfs 6.314 af
Primary=50.75 cfs 6.314 af

Pond 5P: Existing Wetland Pocket Peak Elev=469.37' Storage=572,502 cf Inflow=148.62 cfs 35.160 af
36.0" x 60.0' Culvert Outflow=60.37 cfs 31.699 af

Pond 6P: Existing Culvert 2 Peak Elev=422.05' Inflow=78.50 cfs 9.732 af
Primary=54.71 cfs 9.020 af Secondary=23.78 cfs 0.713 af Outflow=78.50 cfs 9.732 af

Pond 7P: Existing Culvert 3 Peak Elev=455.96' Inflow=17.40 cfs 3.235 af
Primary=12.12 cfs 2.942 af Secondary=5.28 cfs 0.293 af Outflow=17.40 cfs 3.235 af

Pond 8P: Existing Culvert 4 Peak Elev=461.38' Inflow=90.02 cfs 13.441 af
60.0" x 95.1' Culvert Outflow=90.02 cfs 13.441 af

Pond 9P: Existing Culvert 5 Peak Elev=469.35' Inflow=20.97 cfs 2.334 af
Primary=7.30 cfs 1.774 af Secondary=13.67 cfs 0.561 af Outflow=20.97 cfs 2.334 af

Pond 10P: Existing Culvert 6 Peak Elev=480.33' Inflow=7.82 cfs 1.062 af
Primary=7.82 cfs 1.062 af Secondary=0.00 cfs 0.000 af Outflow=7.82 cfs 1.062 af

Pond 11P: Existing Culvert 9 Peak Elev=474.64' Inflow=12.48 cfs 1.300 af
Outflow=12.48 cfs 1.300 af

Pond 12P: Existing Culvert 11 Peak Elev=484.35' Inflow=17.34 cfs 1.869 af
Outflow=17.34 cfs 1.869 af

Pond 13P: Detention/Treatment Pond 13P Peak Elev=462.91' Storage=91,632 cf Inflow=49.82 cfs 5.030 af
Primary=15.35 cfs 2.679 af Secondary=7.46 cfs 1.091 af Outflow=22.81 cfs 3.770 af

Pond 14P: Detention/Treatment Pond 14P Peak Elev=497.00' Storage=57,675 cf Inflow=31.03 cfs 2.957 af
Outflow=11.23 cfs 2.202 af

Pond 15P: Detention/Treatment Pond 15 Peak Elev=492.90' Storage=140,733 cf Inflow=68.04 cfs 6.970 af
Outflow=24.71 cfs 5.136 af

Pond 16P: Detention/Treatment Pond 16P Peak Elev=504.09' Storage=15,268 cf Inflow=9.73 cfs 0.718 af
Outflow=2.78 cfs 0.502 af

Total Runoff Area = 347.720 ac Runoff Volume = 77.069 af Average Runoff Depth = 2.66"

Subcatchment 1S: Subcatchment 1S

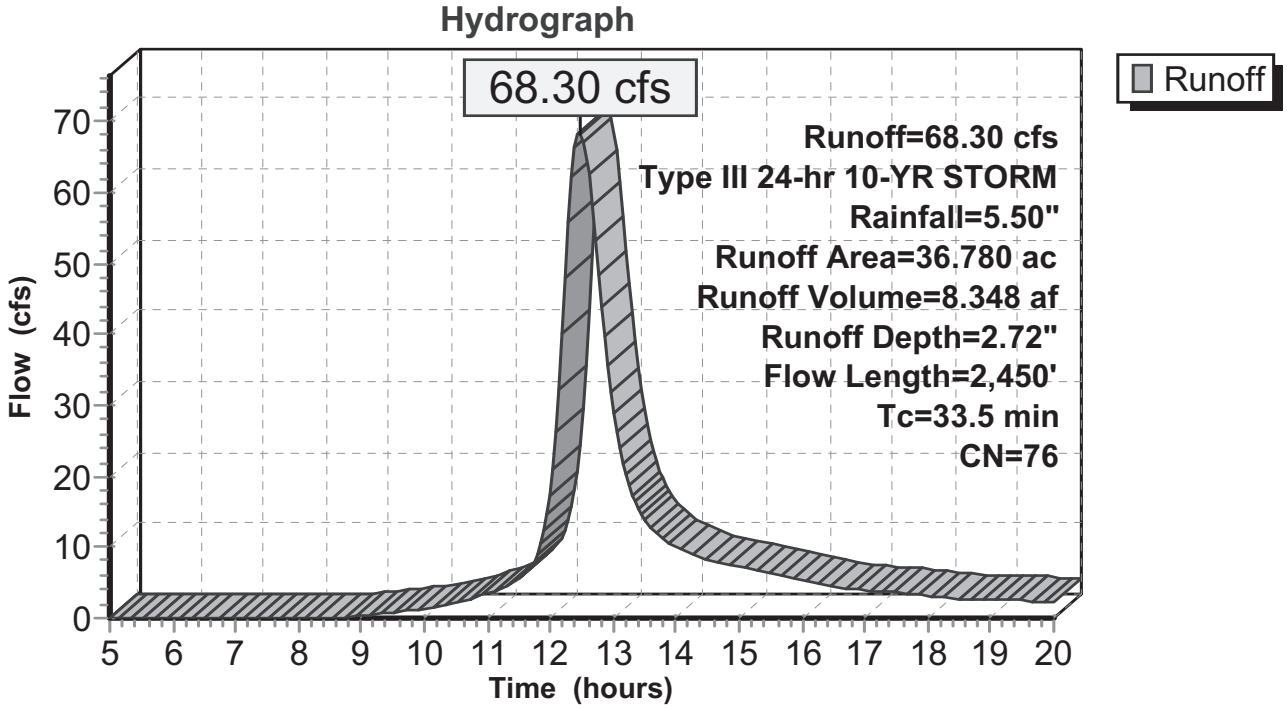
Runoff = 68.30 cfs @ 12.47 hrs, Volume= 8.348 af, Depth= 2.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.920	98	Existing pavement
0.300	98	Proposed pavement & roofs
16.310	79	50-75% Grass cover, Fair, HSG C
0.210	71	Meadow, non-grazed, HSG C
19.040	73	Woods, Fair, HSG C
36.780	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.1300	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
8.5	746	0.0846	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.5	598	0.1003	2.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.8	1,006	0.0962	1.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
33.5	2,450	Total			

Subcatchment 1S: Subcatchment 1S



Subcatchment 2S: Subcatchment 2S

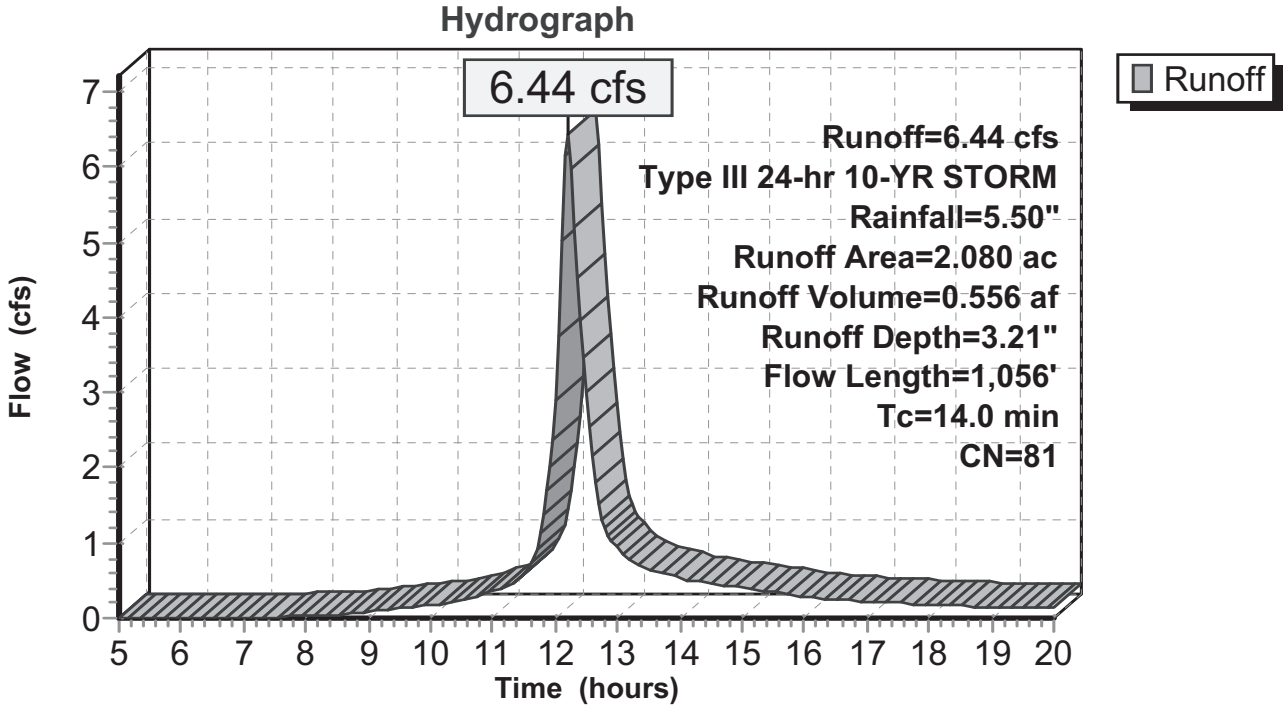
Runoff = 6.44 cfs @ 12.19 hrs, Volume= 0.556 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.080	98	Existing pavement
0.360	98	Proposed pavement & roofs
1.060	79	50-75% Grass cover, Fair, HSG C
0.080	71	Meadow, non-grazed, HSG C
0.500	73	Woods, Fair, HSG C
2.080	81	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0475	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
5.2	646	0.0863	2.1		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.0	80	0.0719	1.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.2	230	0.0435	3.1		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.0	1,056	Total			

Subcatchment 2S: Subcatchment 2S



Subcatchment 3S: Subcatchment 3S

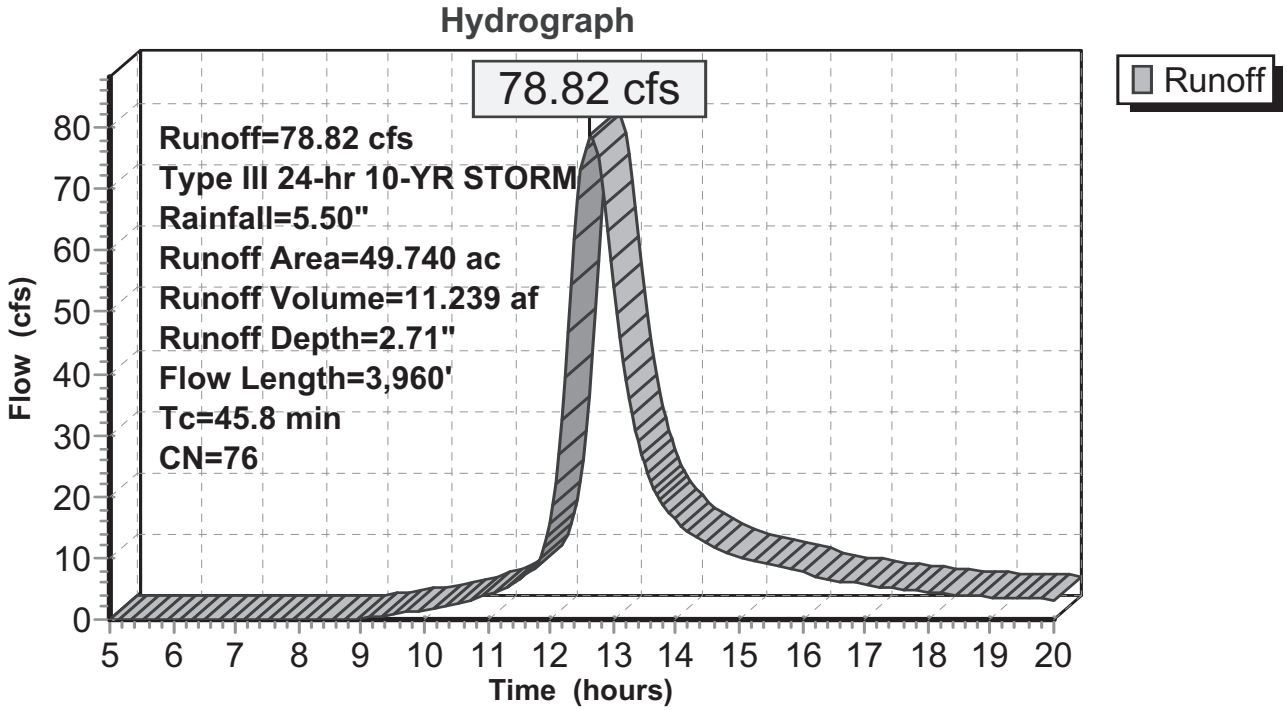
Runoff = 78.82 cfs @ 12.64 hrs, Volume= 11.239 af, Depth= 2.71"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.450	98	Existing pavement
1.950	98	Proposed pavement & roofs
5.210	79	50-75% Grass cover, Fair, HSG C
0.310	71	Meadow, non-grazed, HSG C
0.870	78	Meadow, non-grazed, HSG D
30.910	73	Woods, Fair, HSG C
10.040	79	Woods, Fair, HSG D
49.740	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0350	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
12.9	814	0.0445	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.8	1,806	0.0836	3.8	43.28	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=1.50' Z= 5.0 '/' n= 0.091
8.7	1,240	0.0081	2.4	5.22	**Channel Flow,** Area= 2.2 sf Perim= 10.4' r= 0.21' n= 0.020
45.8	3,960	Total			

Subcatchment 3S: Subcatchment 3S



Subcatchment 4S: Subcatchment 4S

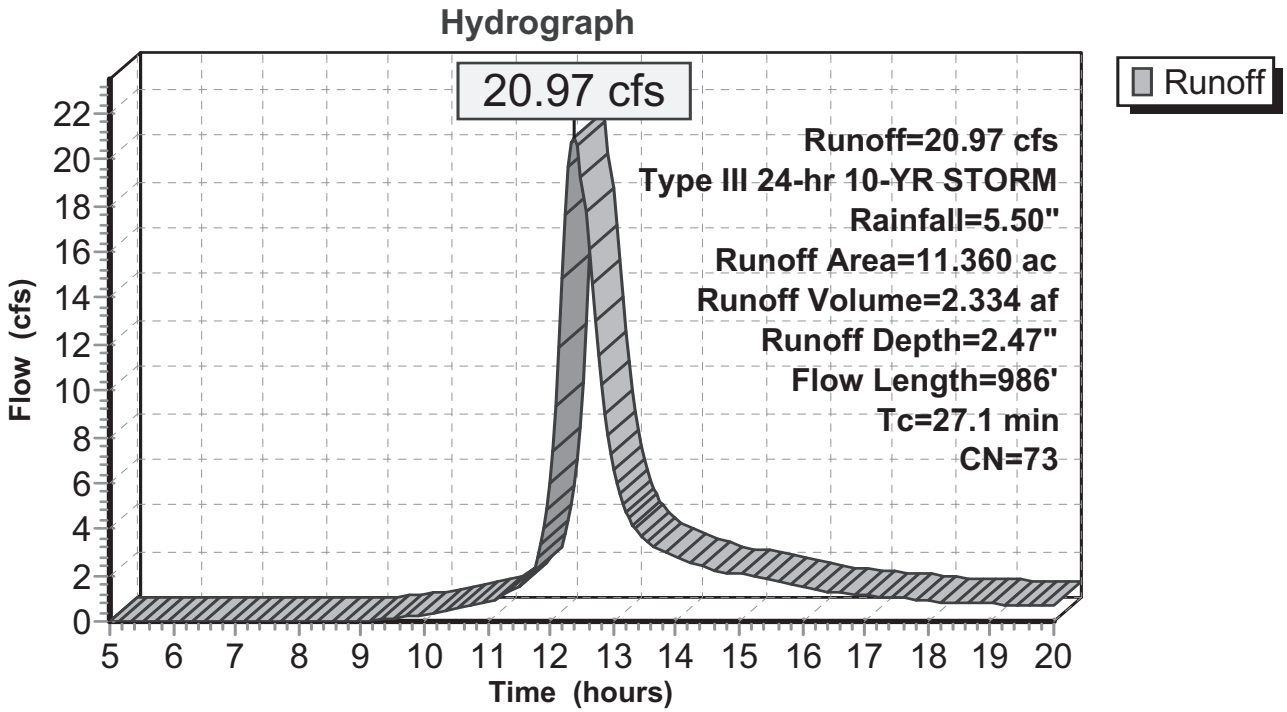
Runoff = 20.97 cfs @ 12.39 hrs, Volume= 2.334 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.170	98	Existing pavement
0.090	71	Meadow, non-grazed, HSG C
0.220	78	Meadow, non-grazed, HSG D
0.050	36	Woods, Fair, HSG A
10.670	73	Woods, Fair, HSG C
0.160	79	Woods, Fair, HSG D
11.360	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0432	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
12.0	886	0.0601	1.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.1	986	Total			

Subcatchment 4S: Subcatchment 4S



Subcatchment 5S: Subcatchment 5S

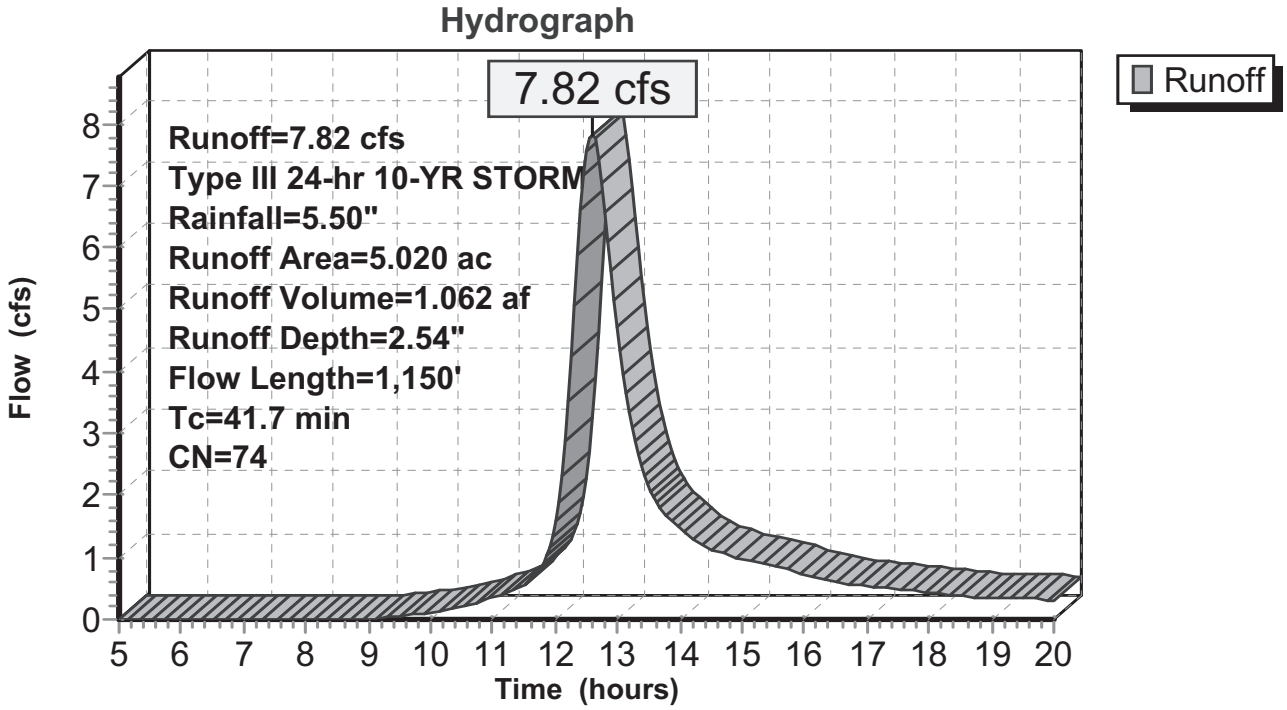
Runoff = 7.82 cfs @ 12.58 hrs, Volume= 1.062 af, Depth= 2.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.230	98	Existing pavement
0.380	71	Meadow, non-grazed, HSG C
4.410	73	Woods, Fair, HSG C
5.020	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0457	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.2	175	0.0340	0.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	133	0.2400	2.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.8	742	0.0060	0.5		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
41.7	1,150	Total			

Subcatchment 5S: Subcatchment 5S



Subcatchment 6S: Subcatchment 6S

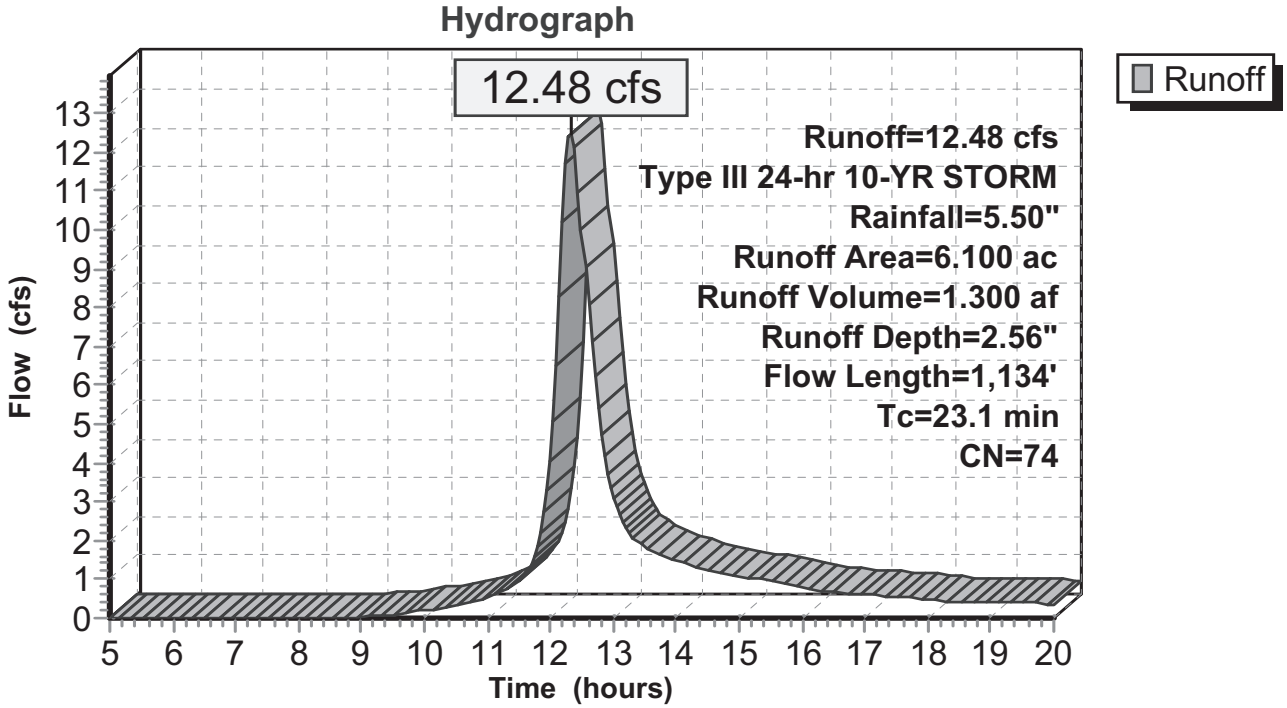
Runoff = 12.48 cfs @ 12.33 hrs, Volume= 1.300 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.090	98	Existing pavement
0.030	98	Proposed pavement & roofs
0.100	79	50-75% Grass cover, Fair, HSG C
0.480	71	Meadow, non-grazed, HSG C
0.050	78	Meadow, non-grazed, HSG D
5.050	73	Woods, Fair, HSG C
0.300	79	Woods, Fair, HSG D
6.100	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	12	0.2042	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
9.3	88	0.1108	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
13.1	1,034	0.0696	1.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.1	1,134	Total			

Subcatchment 6S: Subcatchment 6S



Subcatchment 7S: Subcatchment 7S

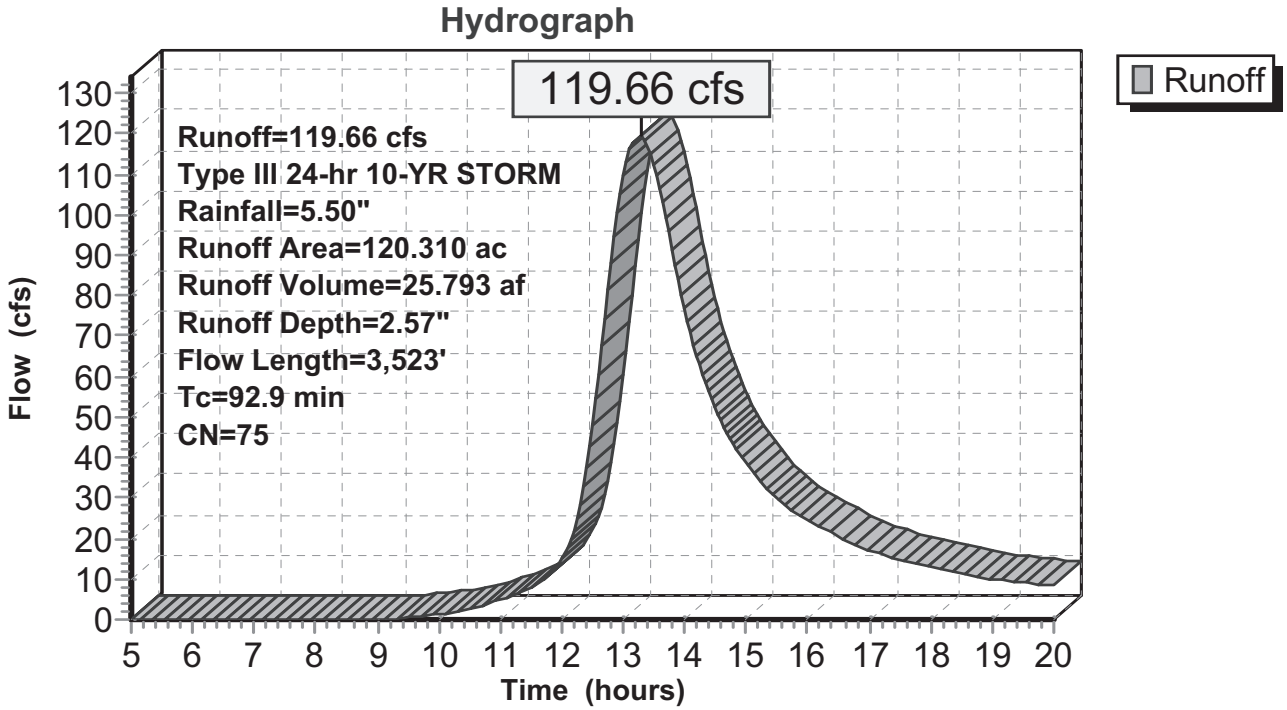
Runoff = 119.66 cfs @ 13.28 hrs, Volume= 25.793 af, Depth= 2.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
1.110	98	Existing pavement
1.730	98	Proposed pavement and roofs
6.810	79	50-75% Grass cover, Fair, HSG C
0.100	84	50-75% Grass cover, Fair, HSG D
7.160	71	Meadow, non-grazed, HSG C
10.120	78	Meadow, non-grazed, HSG D
0.870	36	Woods, Fair, HSG A
72.180	73	Woods, Fair, HSG C
20.230	79	Woods, Fair, HSG D
120.310	75	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	100	0.0188	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
19.1	1,761	0.0943	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
52.8	1,662	0.0110	0.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
92.9	3,523	Total			

Subcatchment 7S: Subcatchment 7S



Subcatchment 8S: Subcatchment 8S

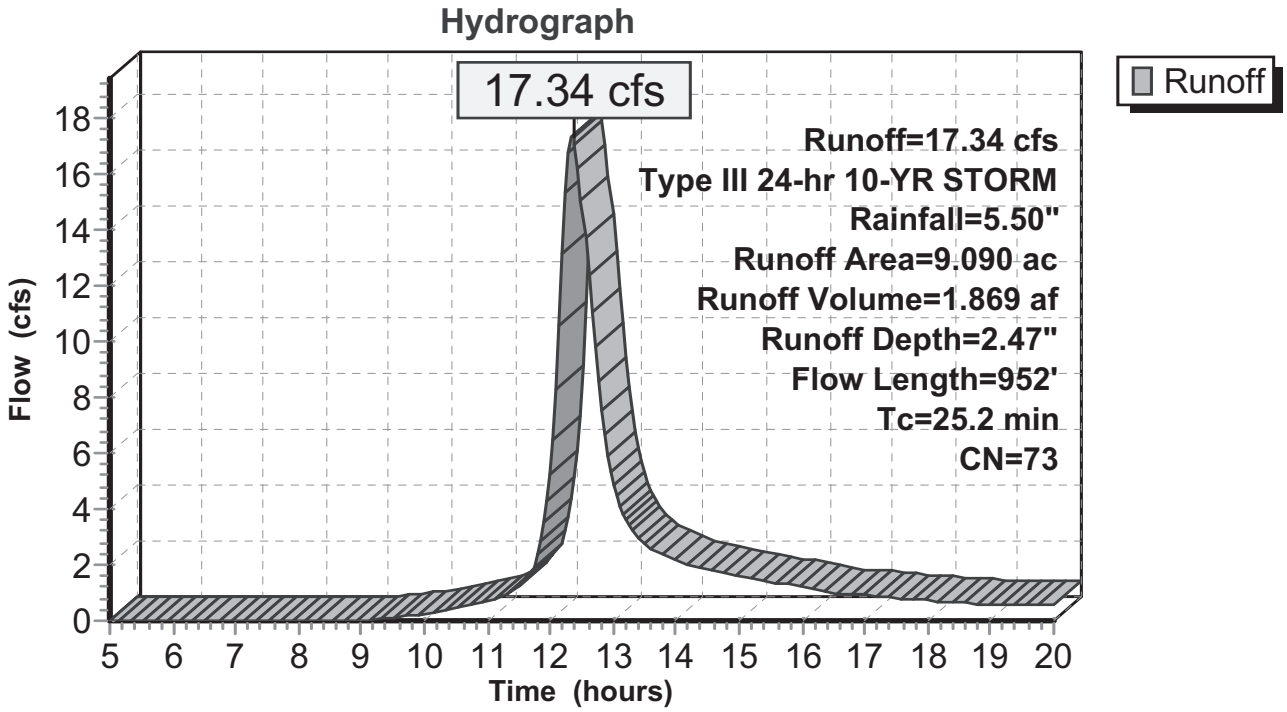
Runoff = 17.34 cfs @ 12.36 hrs, Volume= 1.869 af, Depth= 2.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.120	98	Existing pavement
0.240	71	Meadow, non-grazed, HSG C
8.730	73	Woods, Fair, HSG C
9.090	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0435	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
10.2	852	0.0780	1.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
25.2	952	Total			

Subcatchment 8S: Subcatchment 8S



Subcatchment 9S: Subcatchment 9S

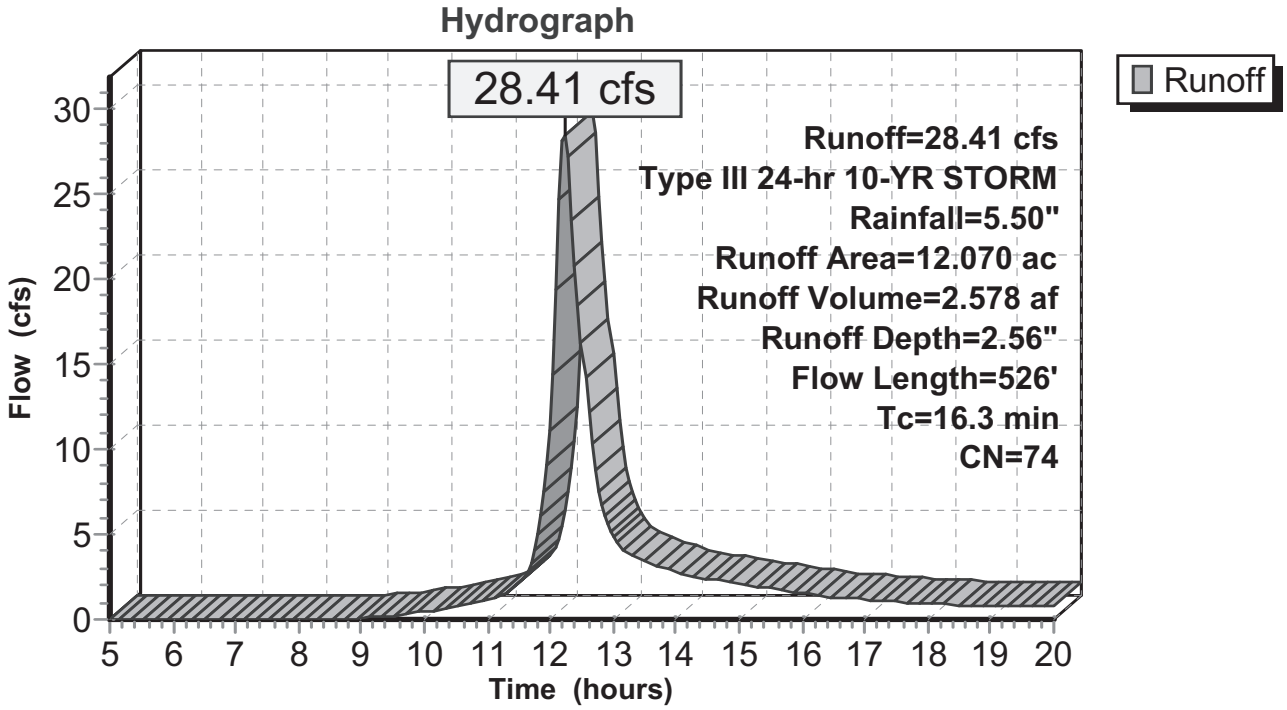
Runoff = 28.41 cfs @ 12.23 hrs, Volume= 2.578 af, Depth= 2.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.160	98	Existing pavement
0.150	98	Proposed pavement & roofs
0.580	79	50-75% Grass cover, Fair, HSG C
0.240	71	Meadow, non-grazed, HSG C
0.040	78	Meadow, non-grazed, HSG D
10.610	73	Woods, Fair, HSG C
0.290	79	Woods, Fair, HSG D
12.070	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0660	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.6	426	0.1575	2.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.3	526	Total			

Subcatchment 9S: Subcatchment 9S



Subcatchment 10S: Subcatchment 10S

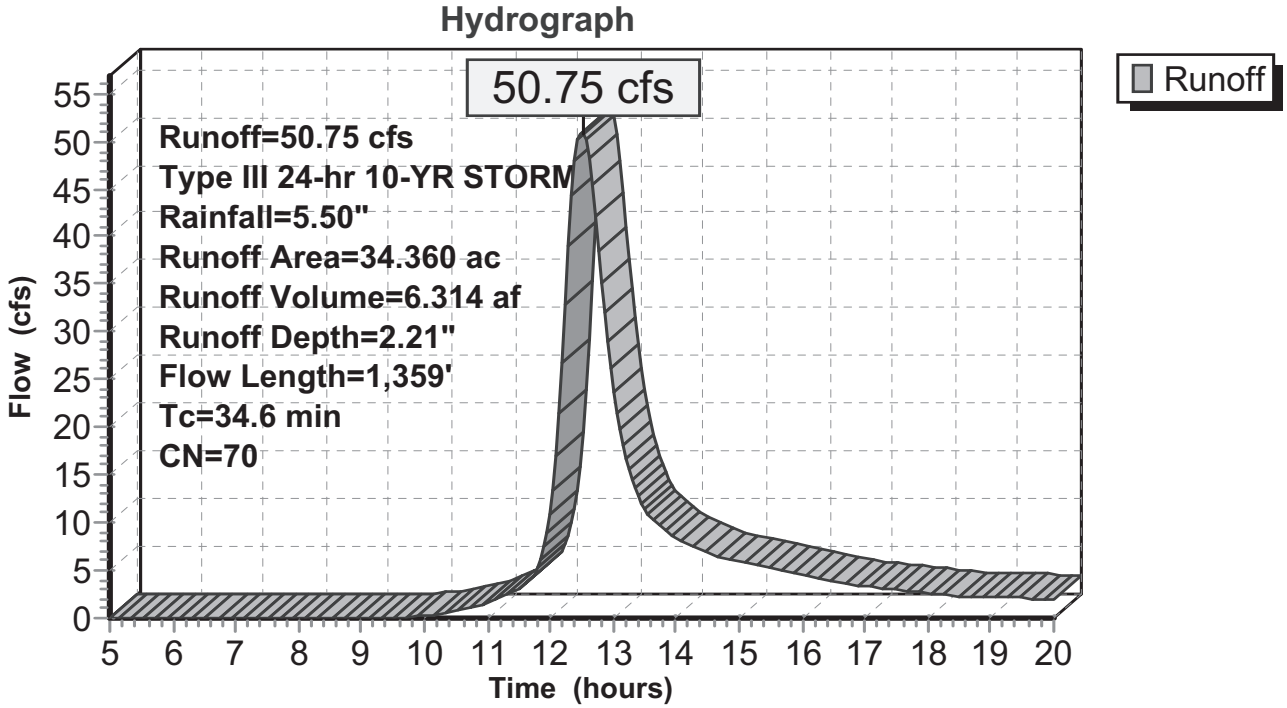
Runoff = 50.75 cfs @ 12.50 hrs, Volume= 6.314 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.300	98	Proposed pavement & roofs
0.880	79	50-75% Grass cover, Fair, HSG C
1.090	36	Woods, Fair, HSG A
29.890	70	Woods, Good, HSG C
2.200	79	Woods, Fair, HSG D
34.360	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0252	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	528	0.1545	2.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.8	133	0.3459	2.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.6	598	0.0356	0.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.6	1,359	Total			

Subcatchment 10S: Subcatchment 10S



Subcatchment 11S: Subcatchment 11S

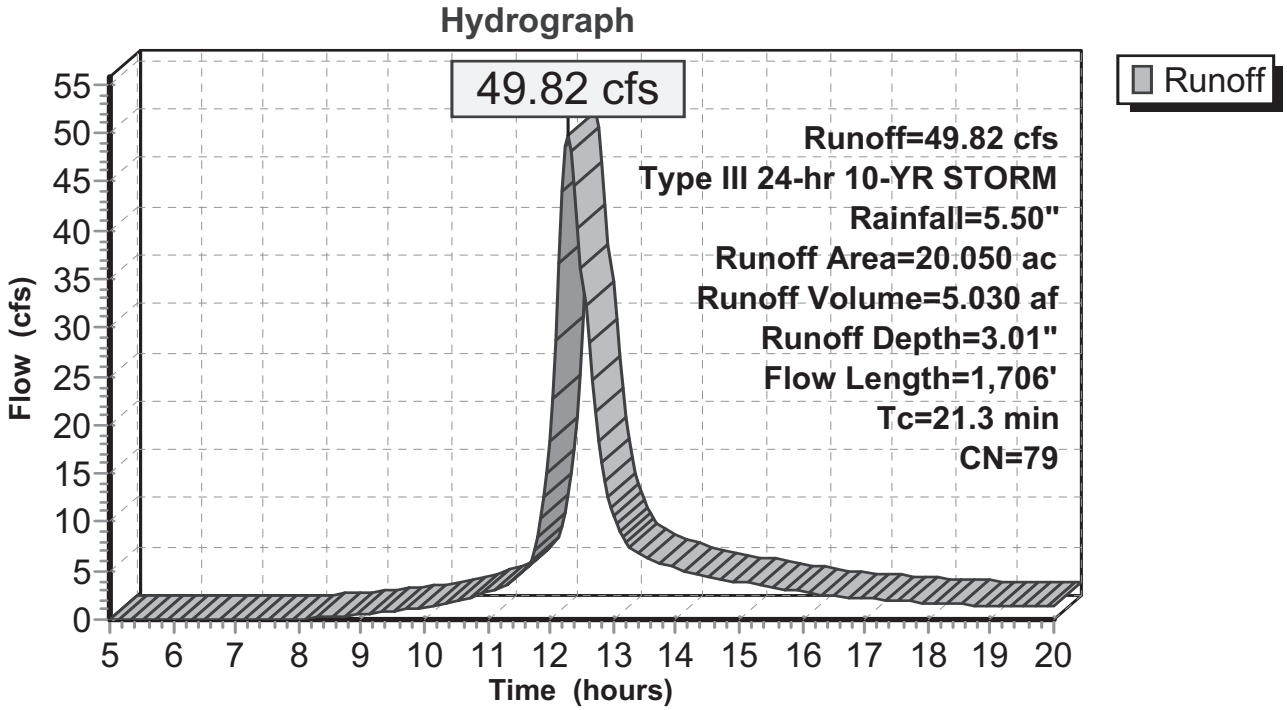
Runoff = 49.82 cfs @ 12.30 hrs, Volume= 5.030 af, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
3.440	98	Proposed pavement & roofs
5.820	79	50-75% Grass cover, Fair, HSG C
0.100	71	Meadow, non-grazed, HSG C
10.690	73	Woods, Fair, HSG C
20.050	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	100	0.1425	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.2	25	0.1500	2.7		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
14.5	1,394	0.1024	1.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	72	0.0375	1.4		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.4	115	0.0742	1.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.3	1,706	Total			

Subcatchment 11S: Subcatchment 11S



Subcatchment 12S: Subcatchment 12S

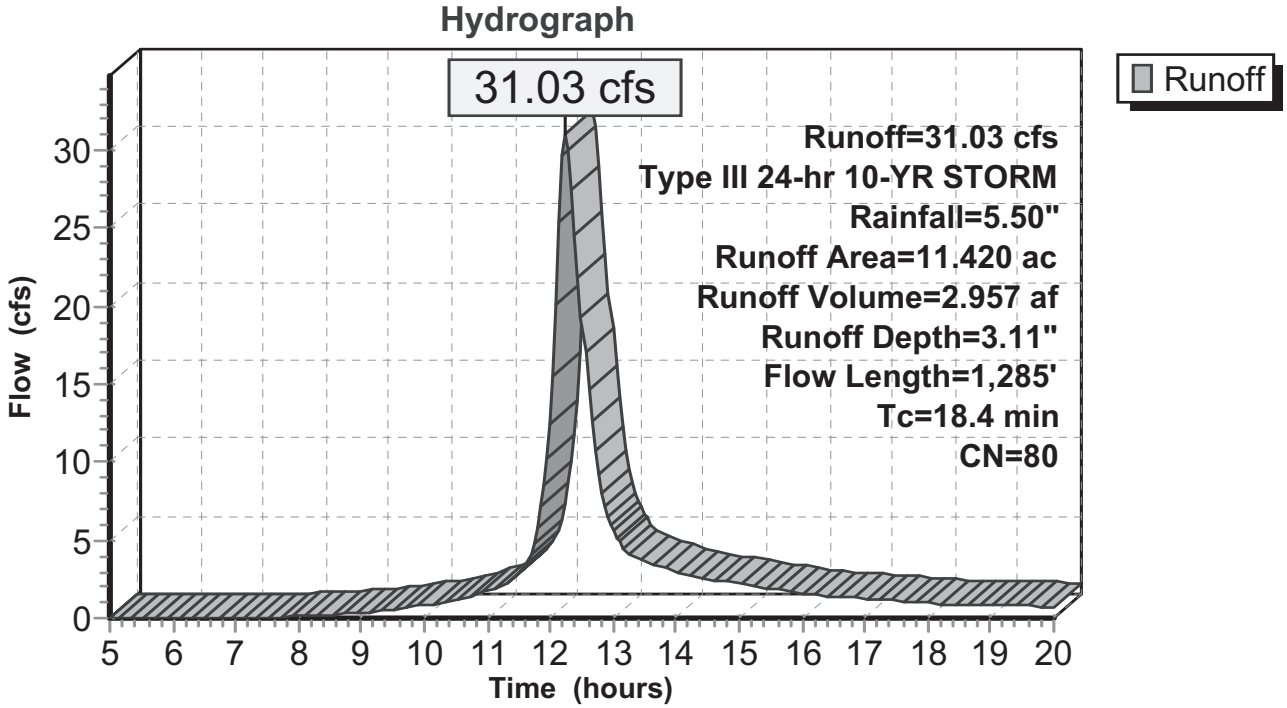
Runoff = 31.03 cfs @ 12.25 hrs, Volume= 2.957 af, Depth= 3.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
2.280	98	Proposed pavement & roofs
4.200	79	50-75% Grass cover, Fair, HSG C
4.940	73	Woods, Fair, HSG C
11.420	80	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	10	0.0300	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
10.5	90	0.0867	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
5.0	565	0.1416	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.0	129	0.0969	2.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.6	491	0.0365	13.4	23.72	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
18.4	1,285	Total			

Subcatchment 12S: Subcatchment 12S



Subcatchment 13S: Subcatchment 13S

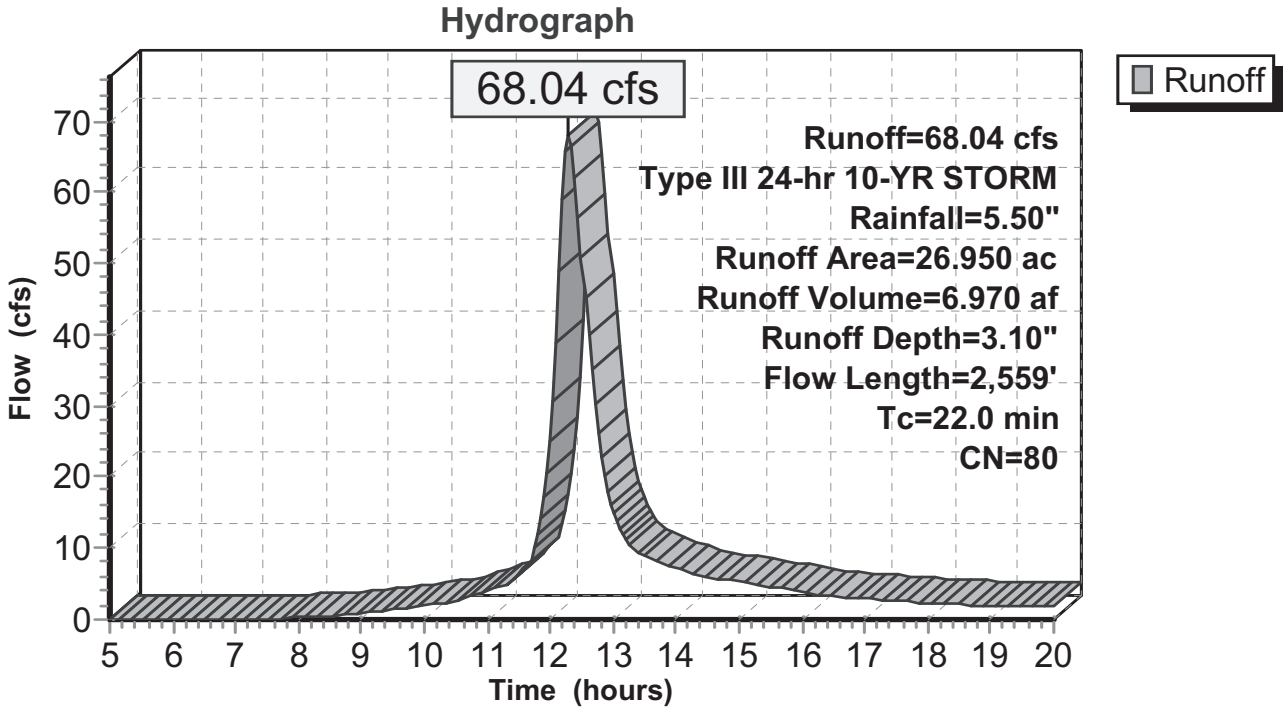
Runoff = 68.04 cfs @ 12.30 hrs, Volume= 6.970 af, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
5.130	98	Proposed pavement & roofs
8.580	79	50-75% Grass cover, Fair, HSG C
13.240	73	Woods, Fair, HSG C
26.950	80	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	15	0.0300	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
10.1	85	0.0853	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.9	556	0.1403	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.0	14	0.5000	4.9		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.6	121	0.0331	1.3		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.2	365	0.0188	2.8		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	1,403	0.0498	15.7	27.70	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
22.0	2,559	Total			

Subcatchment 13S: Subcatchment 13S



Subcatchment 14S: Subcatchment 14S

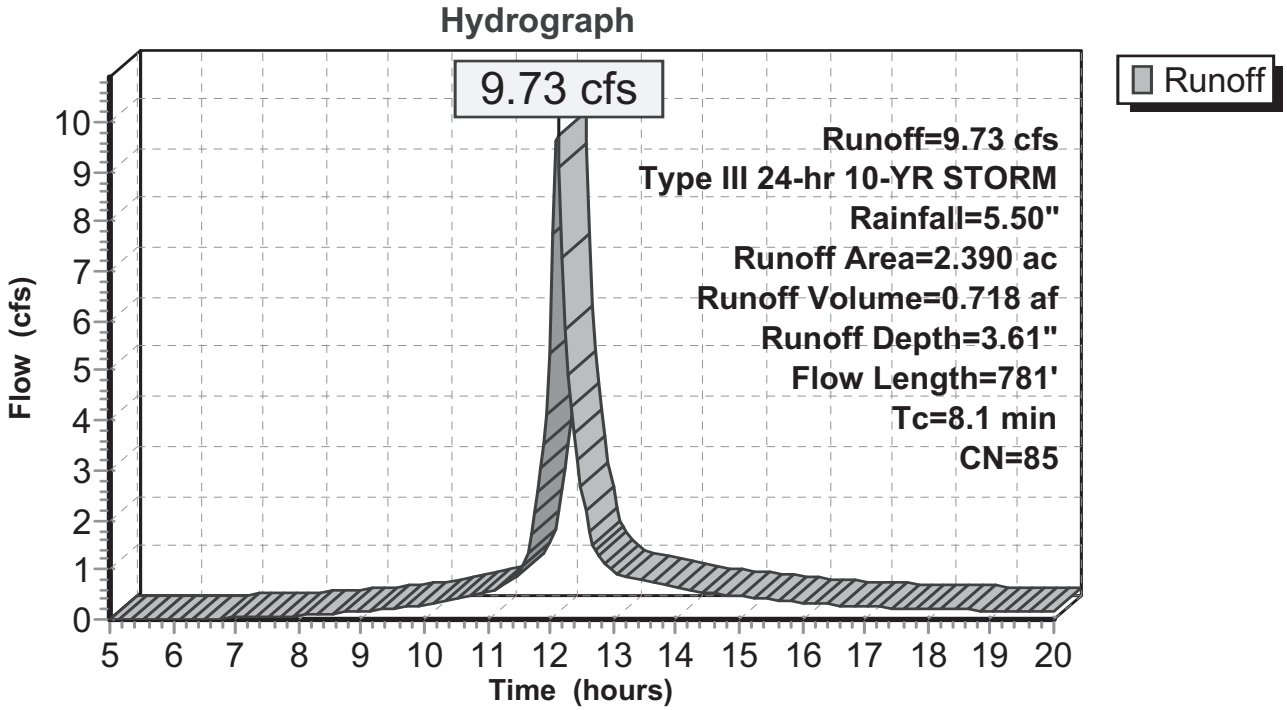
Runoff = 9.73 cfs @ 12.11 hrs, Volume= 0.718 af, Depth= 3.61"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YR STORM Rainfall=5.50"

Area (ac)	CN	Description
0.810	98	Proposed pavement & roofs
1.570	79	50-75% Grass cover, Fair, HSG C
0.010	73	Woods, Fair, HSG C
2.390	85	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0425	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.9	298	0.0714	5.4		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	383	0.0835	20.3	35.87	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
8.1	781	Total			

Subcatchment 14S: Subcatchment 14S



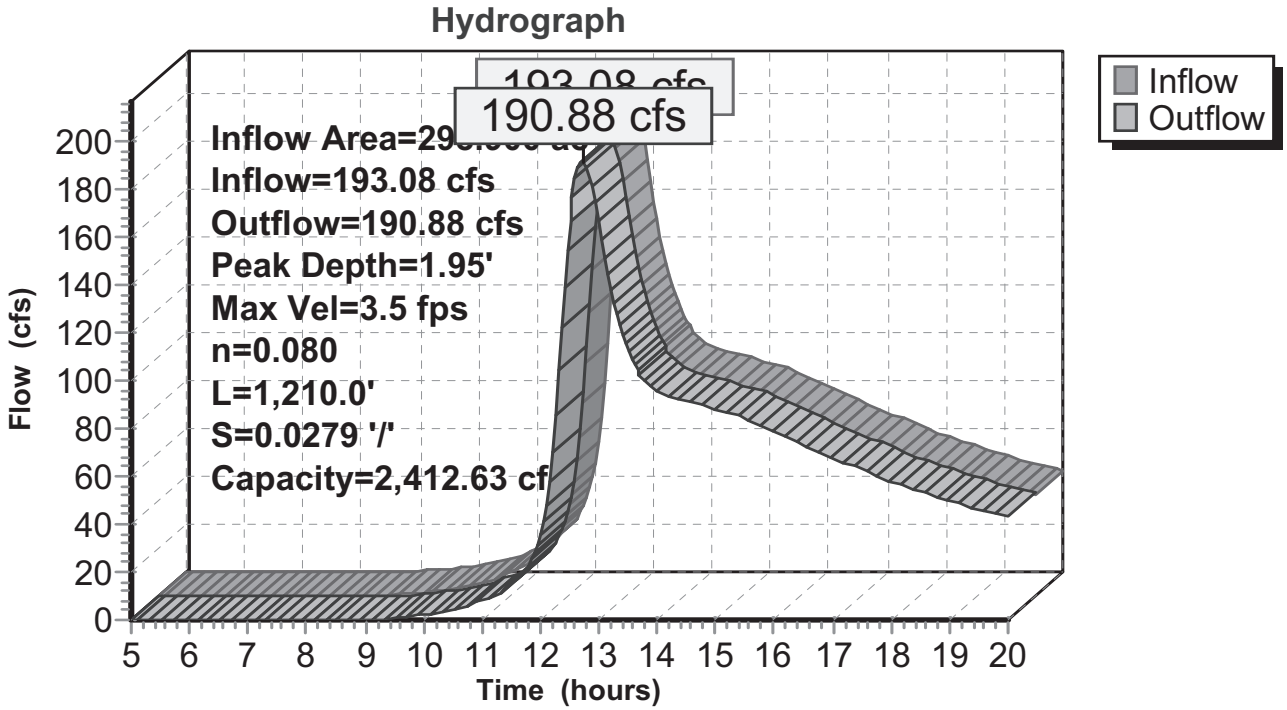
Reach 1R: Existing Stream

Inflow Area = 298.900 ac, Inflow Depth = 2.31" for 10-YR STORM event
Inflow = 193.08 cfs @ 12.65 hrs, Volume= 57.451 af
Outflow = 190.88 cfs @ 12.73 hrs, Volume= 56.944 af, Atten= 1%, Lag= 4.8 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.5 fps, Min. Travel Time= 5.8 min
Avg. Velocity = 2.1 fps, Avg. Travel Time= 9.8 min

Peak Depth= 1.95' @ 12.73 hrs
Capacity at bank full= 2,412.63 cfs
Inlet Invert= 416.82', Outlet Invert= 383.06'
10.50' x 5.80' deep channel, n= 0.080 Length= 1,210.0' Slope= 0.0279 '/'
Side Slope Z-value= 9.4 8.5 '/'

Reach 1R: Existing Stream



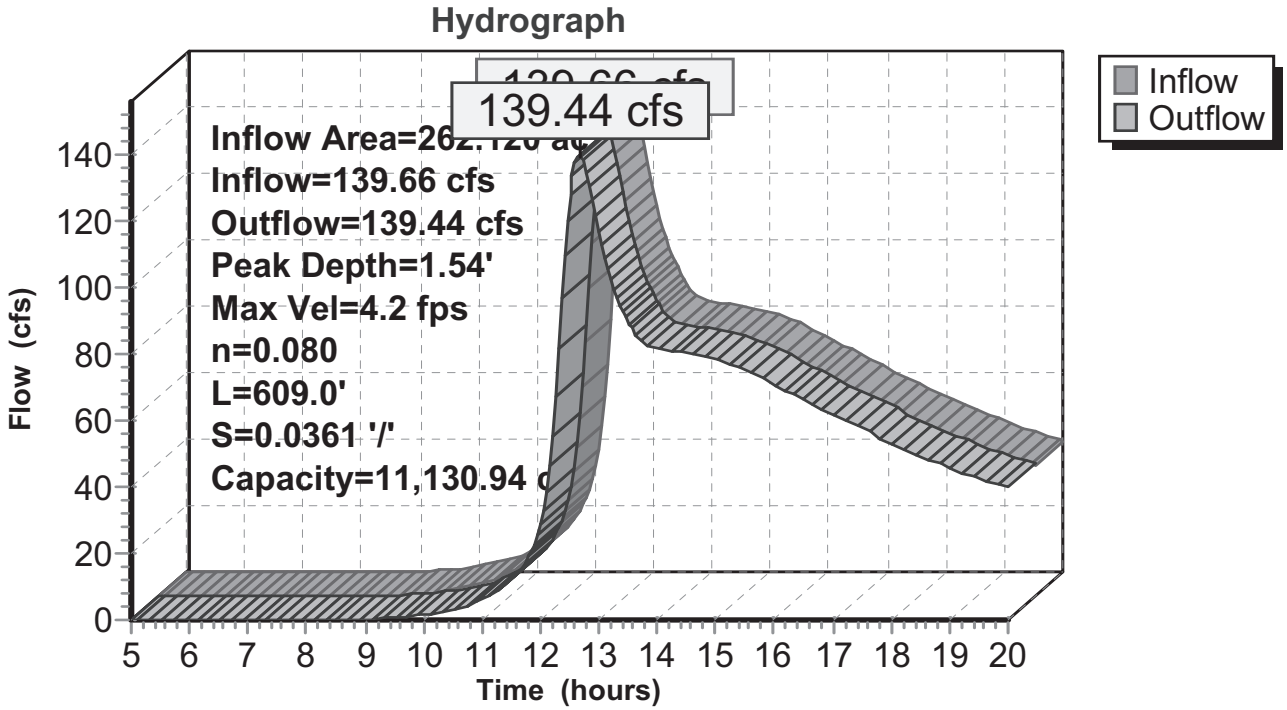
Reach 2R: Existing Stream

Inflow Area = 262.120 ac, Inflow Depth = 2.23" for 10-YR STORM event
Inflow = 139.66 cfs @ 12.64 hrs, Volume= 48.637 af
Outflow = 139.44 cfs @ 12.67 hrs, Volume= 48.432 af, Atten= 0%, Lag= 1.7 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.2 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 2.5 fps, Avg. Travel Time= 4.1 min

Peak Depth= 1.54' @ 12.67 hrs
Capacity at bank full= 11,130.94 cfs
Inlet Invert= 440.00', Outlet Invert= 418.00'
18.00' x 14.50' deep channel, n= 0.080 Length= 609.0' Slope= 0.0361 '/'
Side Slope Z-value= 2.7 2.2 '/'

Reach 2R: Existing Stream



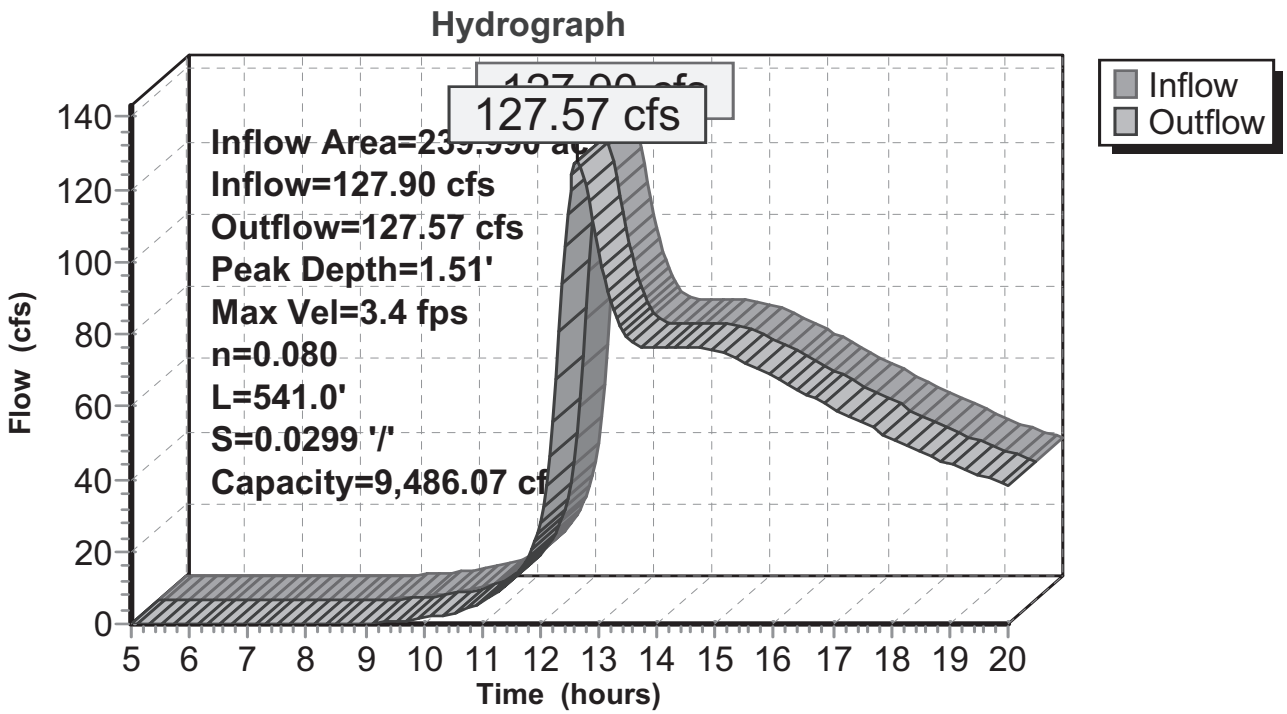
Reach 3R: Existing Stream

Inflow Area = 239.990 ac, Inflow Depth = 2.29" for 10-YR STORM event
Inflow = 127.90 cfs @ 12.61 hrs, Volume= 45.895 af
Outflow = 127.57 cfs @ 12.65 hrs, Volume= 45.695 af, Atten= 0%, Lag= 2.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.4 fps, Min. Travel Time= 2.7 min
Avg. Velocity = 2.2 fps, Avg. Travel Time= 4.2 min

Peak Depth= 1.51' @ 12.65 hrs
Capacity at bank full= 9,486.07 cfs
Inlet Invert= 456.17', Outlet Invert= 440.00'
15.50' x 10.82' deep channel, n= 0.080 Length= 541.0' Slope= 0.0299 '/'
Side Slope Z-value= 7.3 5.3 '/'

Reach 3R: Existing Stream



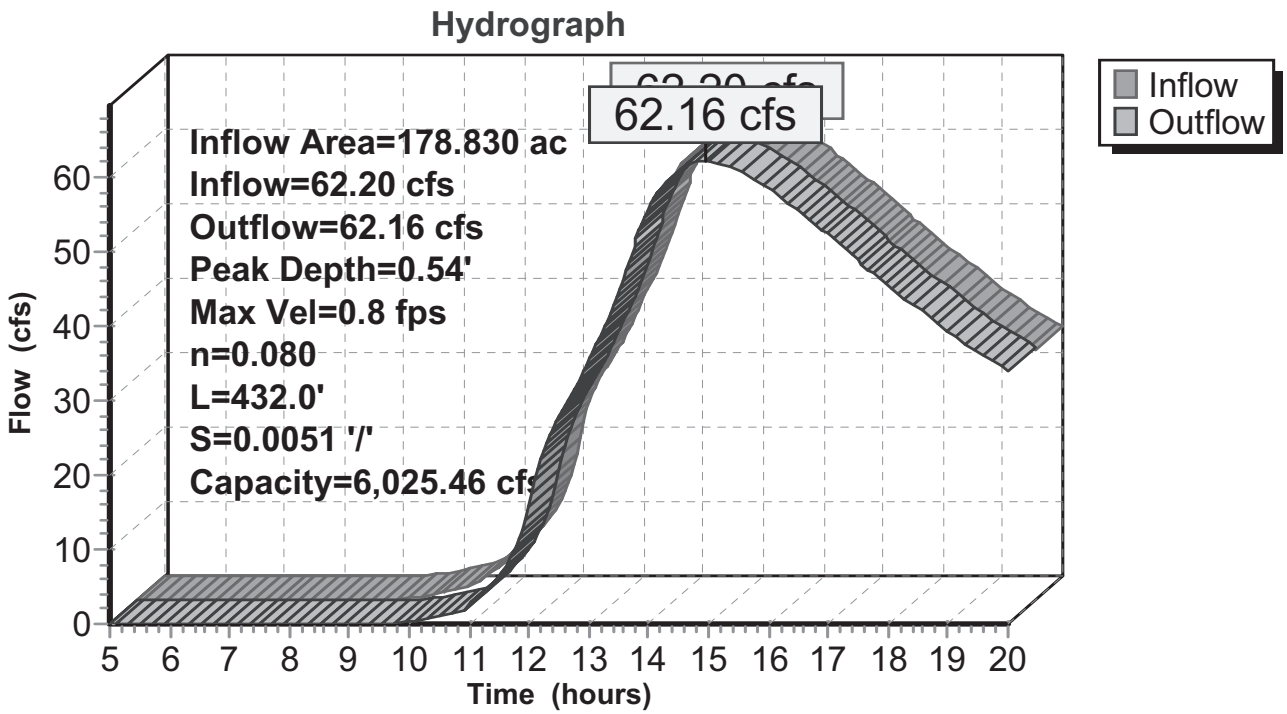
Reach 4R: Existing Stream

Inflow Area = 178.830 ac, Inflow Depth = 2.17" for 10-YR STORM event
Inflow = 62.20 cfs @ 14.84 hrs, Volume= 32.394 af
Outflow = 62.16 cfs @ 14.94 hrs, Volume= 31.894 af, Atten= 0%, Lag= 5.7 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.8 fps, Min. Travel Time= 8.6 min
Avg. Velocity = 0.6 fps, Avg. Travel Time= 12.2 min

Peak Depth= 0.54' @ 14.94 hrs
Capacity at bank full= 6,025.46 cfs
Inlet Invert= 460.18', Outlet Invert= 457.96'
124.00' x 6.50' deep channel, n= 0.080 Length= 432.0' Slope= 0.0051 '/'
Side Slope Z-value= 10.4 33.3 '/'

Reach 4R: Existing Stream



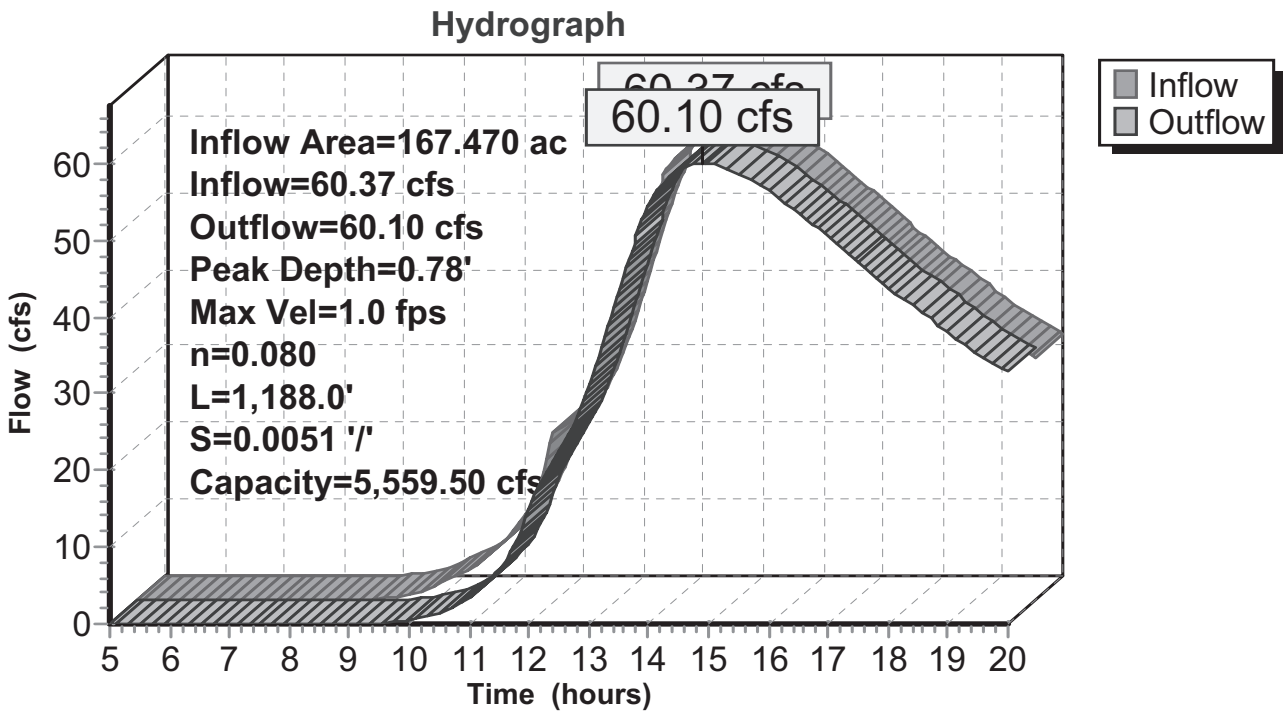
Reach 5R: Existing Stream

Inflow Area = 167.470 ac, Inflow Depth = 2.27" for 10-YR STORM event
Inflow = 60.37 cfs @ 14.64 hrs, Volume= 31.699 af
Outflow = 60.10 cfs @ 14.90 hrs, Volume= 30.620 af, Atten= 0%, Lag= 15.3 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.0 fps, Min. Travel Time= 19.4 min
Avg. Velocity = 0.7 fps, Avg. Travel Time= 27.9 min

Peak Depth= 0.78' @ 14.90 hrs
Capacity at bank full= 5,559.50 cfs
Inlet Invert= 466.24', Outlet Invert= 460.18'
64.50' x 8.00' deep channel, n= 0.080 Length= 1,188.0' Slope= 0.0051 '/'
Side Slope Z-value= 18.9 10.7 '/'

Reach 5R: Existing Stream



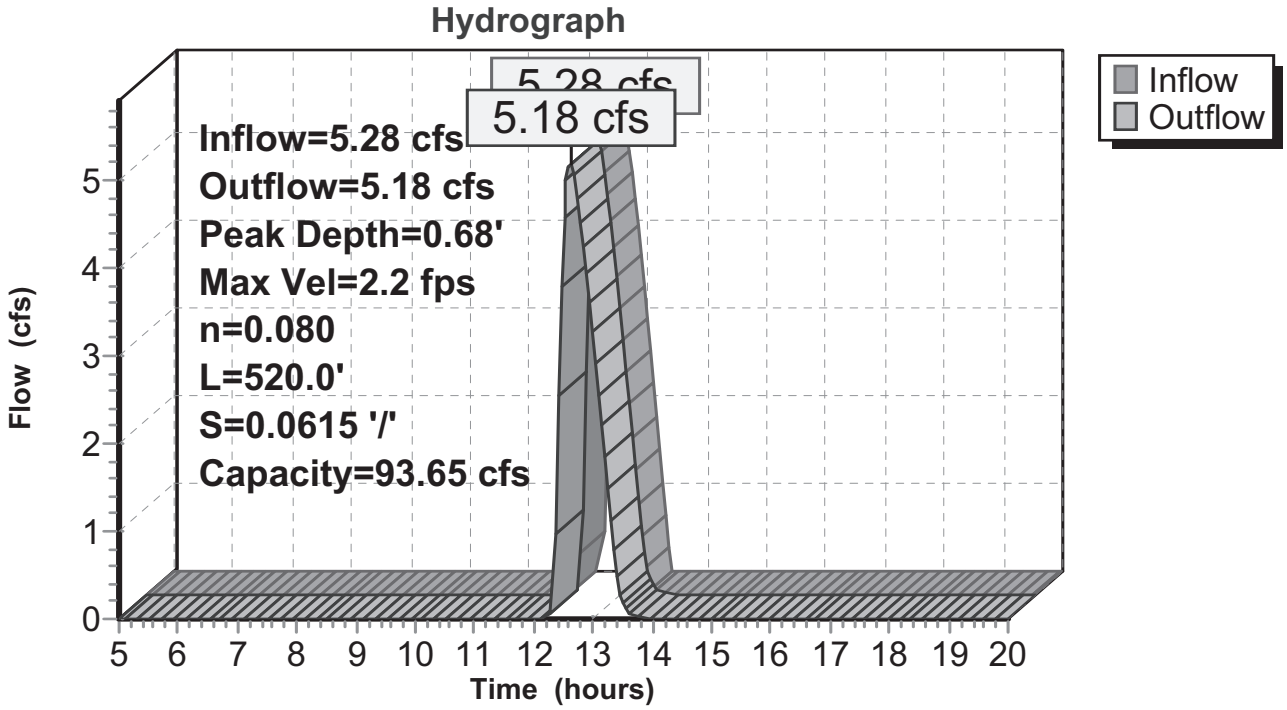
Reach 6R: Existing Swale

Inflow	=	5.28 cfs @	12.56 hrs,	Volume=	0.293 af
Outflow	=	5.18 cfs @	12.62 hrs,	Volume=	0.293 af, Atten= 2%, Lag= 3.7 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.2 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.7 fps, Avg. Travel Time= 12.7 min

Peak Depth= 0.68' @ 12.62 hrs
Capacity at bank full= 93.65 cfs
Inlet Invert= 454.00', Outlet Invert= 422.00'
0.00' x 2.00' deep channel, n= 0.080 Length= 520.0' Slope= 0.0615 '/'
Side Slope Z-value= 3.6 6.7 '/'

Reach 6R: Existing Swale



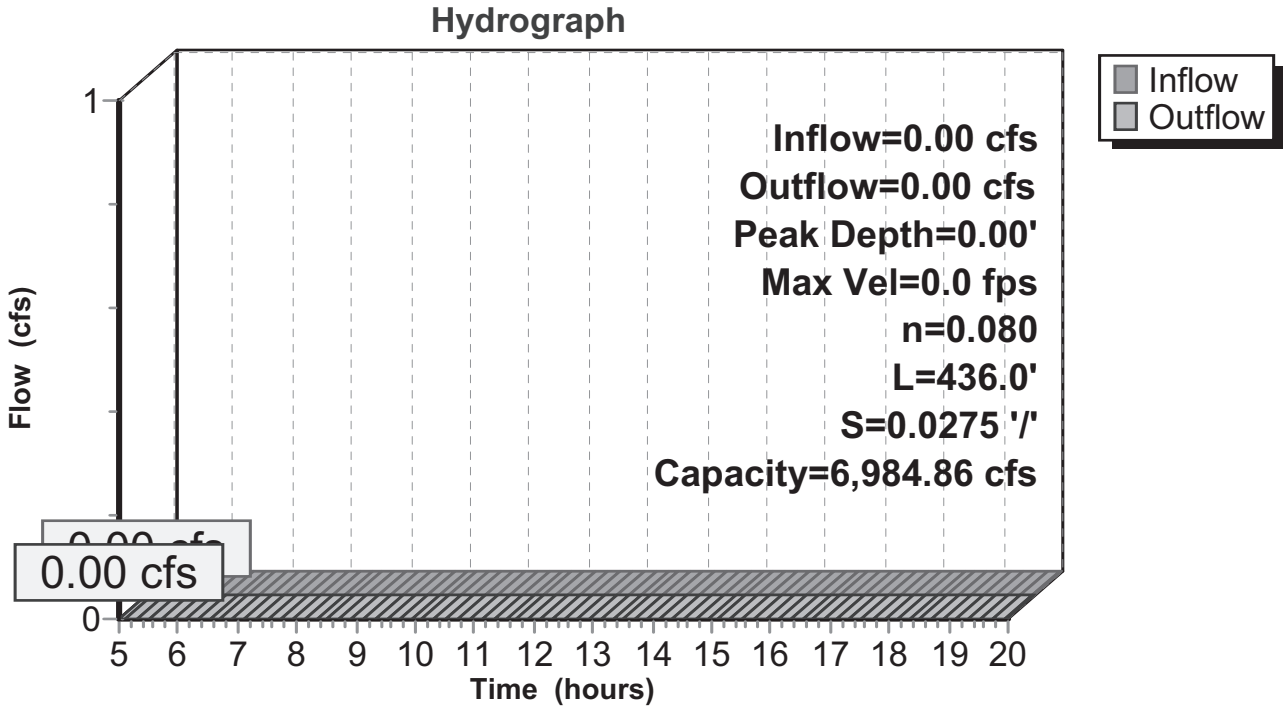
Reach 7R: Existing Swale

Inflow	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	5.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.0 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.0 fps, Avg. Travel Time= 0.0 min

Peak Depth= 0.00' @ 5.00 hrs
Capacity at bank full= 6,984.86 cfs
Inlet Invert= 480.00', Outlet Invert= 468.00'
0.00' x 11.90' deep channel, n= 0.080 Length= 436.0' Slope= 0.0275 '/'
Side Slope Z-value= 6.8 3.1 '/'

Reach 7R: Existing Swale

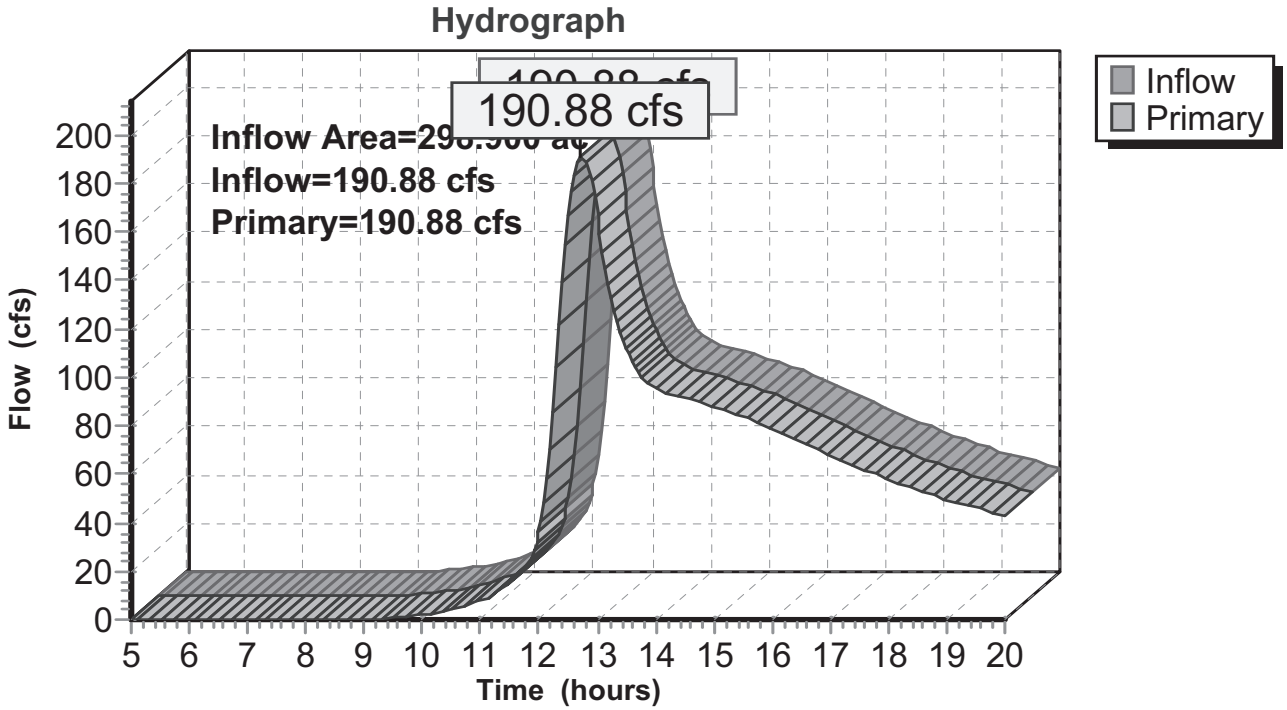


Pond 1P: Design Point 1 Outlet at Hasbrouck Road

Inflow Area = 298.900 ac, Inflow Depth = 2.29" for 10-YR STORM event
Inflow = 190.88 cfs @ 12.73 hrs, Volume= 56.944 af
Primary = 190.88 cfs @ 12.73 hrs, Volume= 56.944 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1 Outlet at Hasbrouck Road

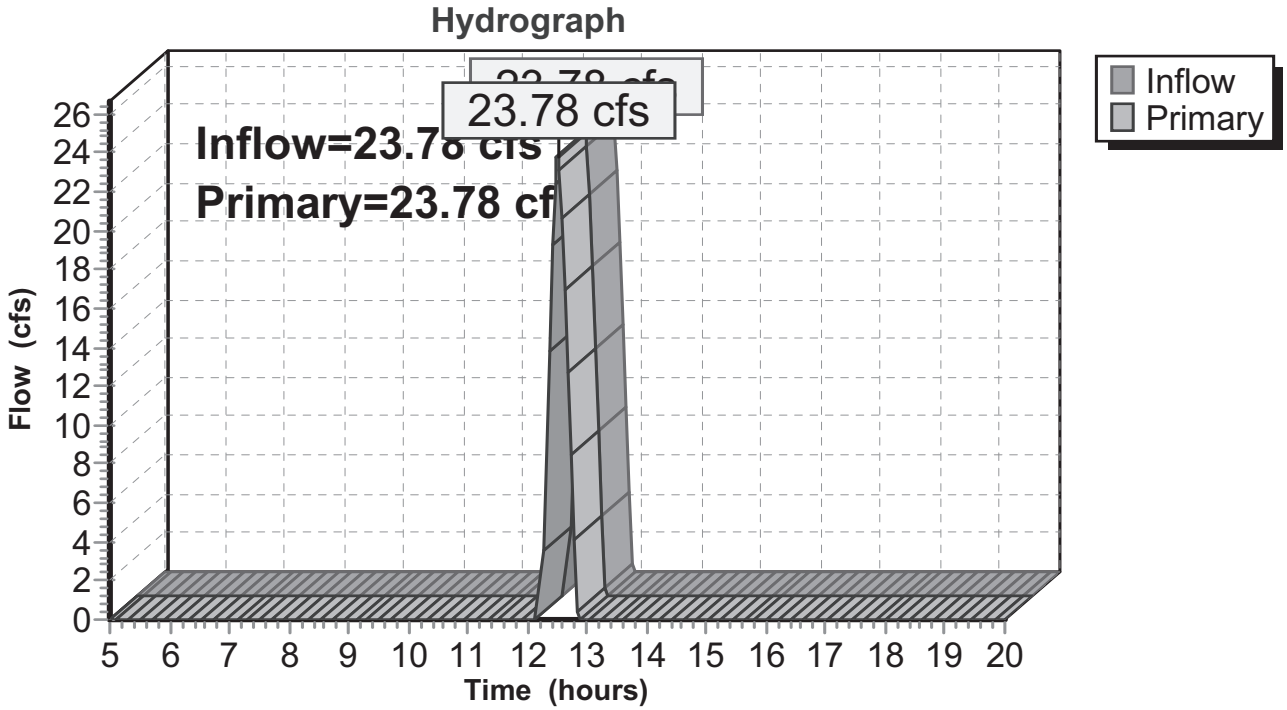


Pond 2P: Design Point 2 Existing Swale Along Craigville Road

Inflow	=	23.78 cfs @	12.51 hrs,	Volume=	0.713 af
Primary	=	23.78 cfs @	12.51 hrs,	Volume=	0.713 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 2P: Design Point 2 Existing Swale Along Craigville Road

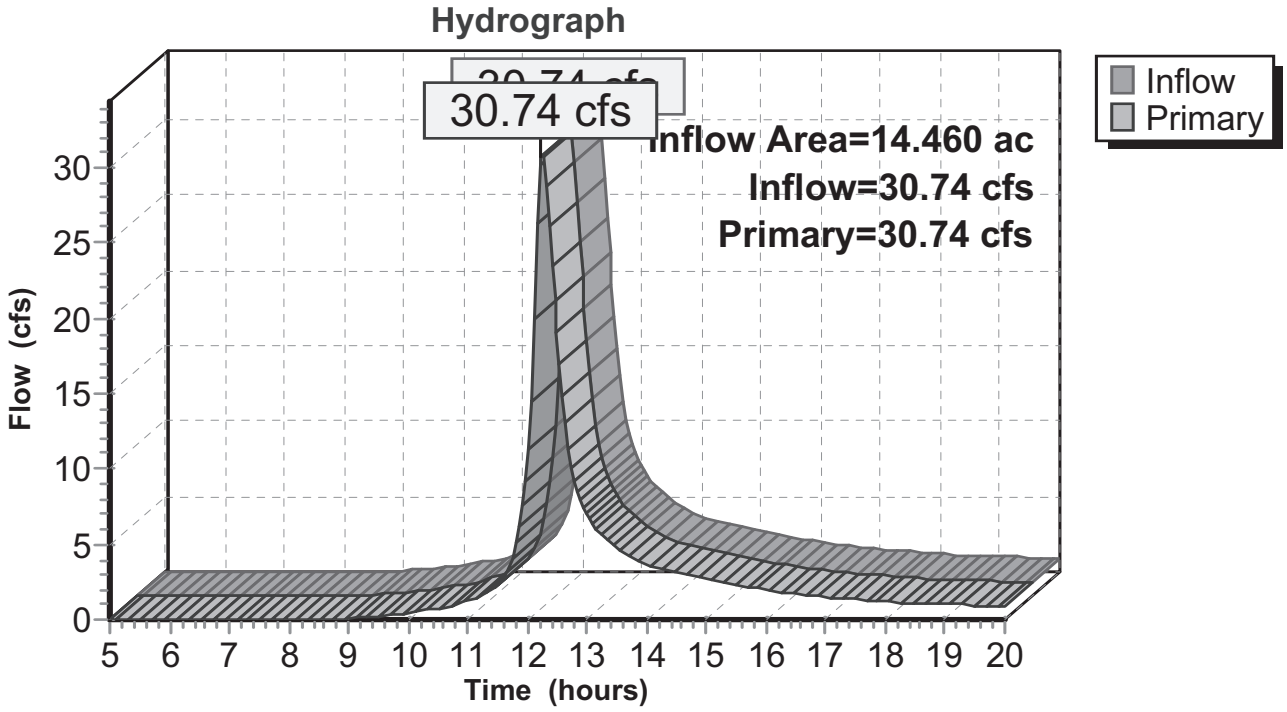


Pond 3P: Design Point 3 (Southeastern Property Line)

Inflow Area =	14.460 ac,	Inflow Depth =	2.56"	for	10-YR STORM event
Inflow =	30.74 cfs @	12.24 hrs,	Volume=		3.080 af
Primary =	30.74 cfs @	12.24 hrs,	Volume=		3.080 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 3P: Design Point 3 (Southeastern Property Line)

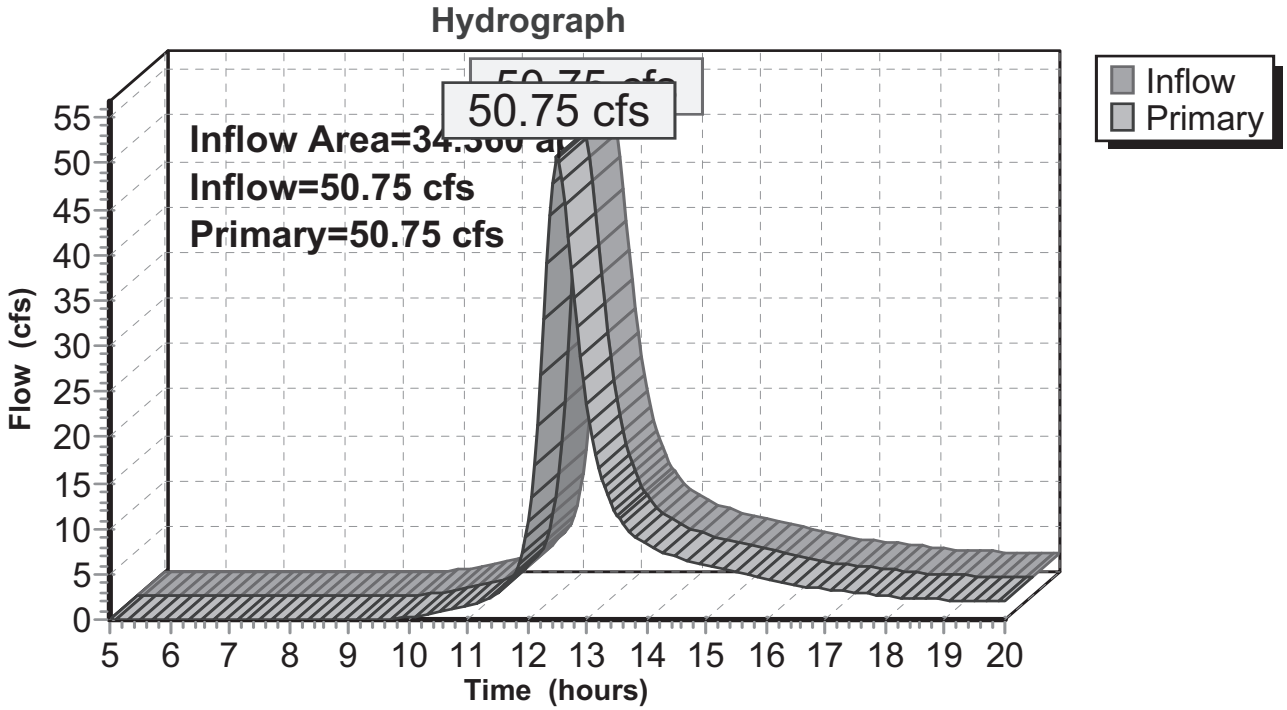


Pond 4P: Design Point 4 (Southwestern Property Line)

Inflow Area = 34.360 ac, Inflow Depth = 2.21" for 10-YR STORM event
Inflow = 50.75 cfs @ 12.50 hrs, Volume= 6.314 af
Primary = 50.75 cfs @ 12.50 hrs, Volume= 6.314 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 4P: Design Point 4 (Southwestern Property Line)



Pond 5P: Existing Wetland Pocket

Inflow Area =	167.470 ac,	Inflow Depth =	2.52"	for	10-YR STORM event
Inflow =	148.62 cfs @	13.15 hrs,	Volume=	35.160 af	
Outflow =	60.37 cfs @	14.64 hrs,	Volume=	31.699 af,	Atten= 59%, Lag= 89.1 min
Primary =	60.37 cfs @	14.64 hrs,	Volume=	31.699 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 469.37' @ 14.64 hrs Surf.Area= 0 sf Storage= 572,502 cf
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

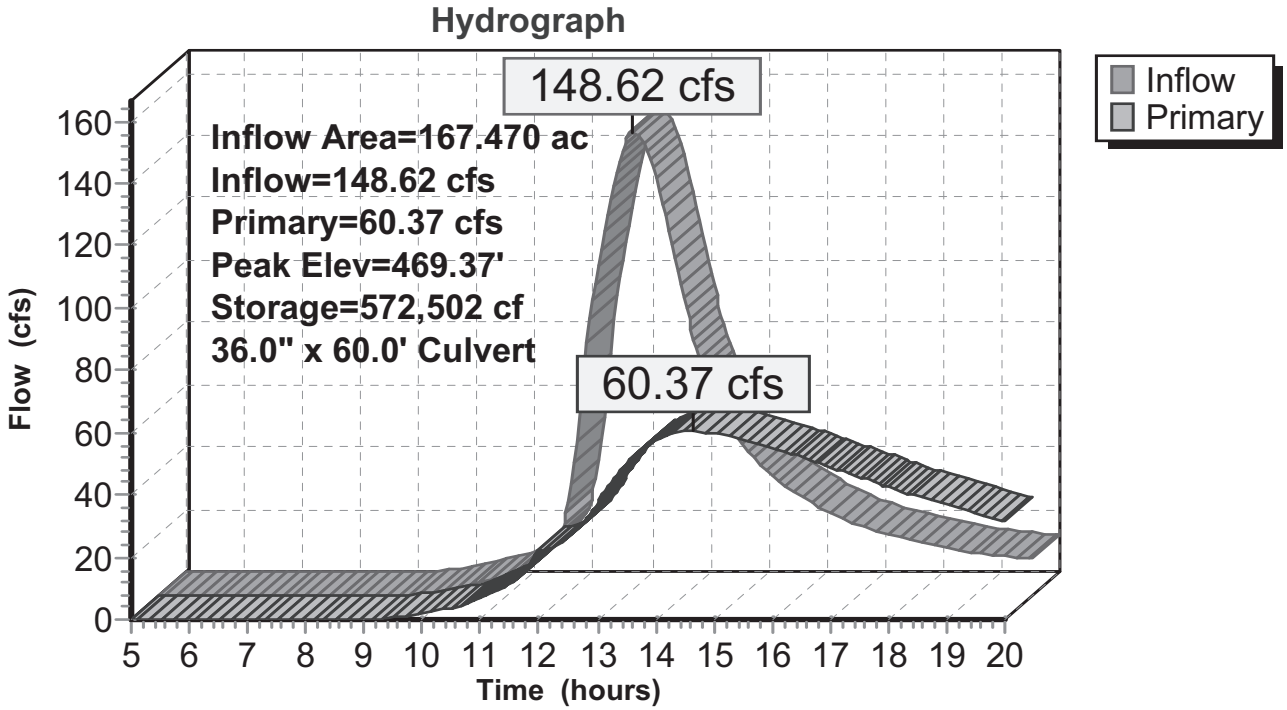
#	Invert	Avail.Storage	Storage Description
1	468.00'	4,153,277 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
468.00	0
470.00	838,050
472.00	2,316,286
474.00	4,153,277

#	Routing	Invert	Outlet Devices
1	Primary	466.24'	**36.0" x 60.0' long Culvert X 2.00** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 466.24' S= 0.0000 '/' n= 0.011 Cc= 0.900

Primary OutFlow Max=60.37 cfs @ 14.64 hrs HW=469.37' TW=467.01' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 60.37 cfs @ 5.1 fps)

Pond 5P: Existing Wetland Pocket



Pond 6P: Existing Culvert 2

Inflow Area =	36.780 ac,	Inflow Depth =	3.18"	for	10-YR STORM event
Inflow =	78.50 cfs @	12.51 hrs,	Volume=	9.732 af	
Outflow =	78.50 cfs @	12.51 hrs,	Volume=	9.732 af,	Atten= 0%, Lag= 0.0 min
Primary =	54.71 cfs @	12.51 hrs,	Volume=	9.020 af	
Secondary =	23.78 cfs @	12.51 hrs,	Volume=	0.713 af	

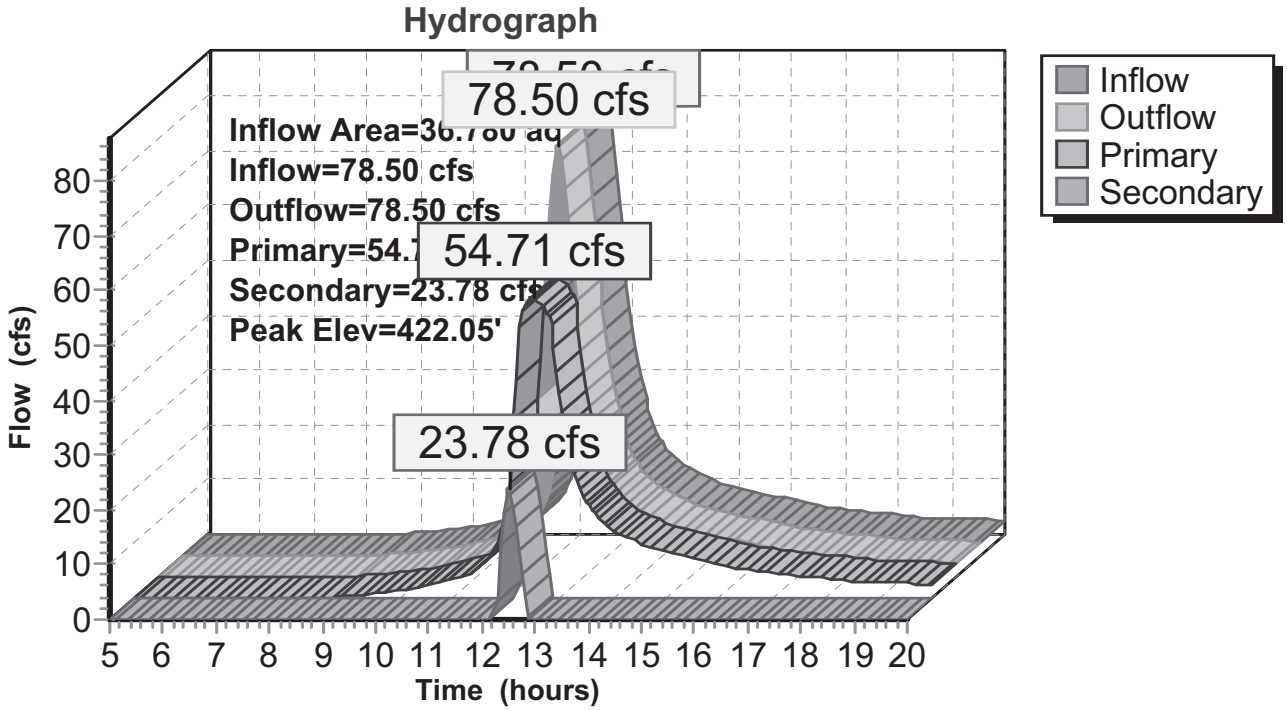
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 422.05' @ 12.51 hrs
Flood Elev= 424.00'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	417.23'	**36.0" x 45.0' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 416.82' S= 0.0091 '/' n= 0.011 Cc= 0.900
2	Secondary	421.50'	**22.0' long x 6.3' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.67 2.68 2.71 2.75 2.82

Primary OutFlow Max=54.70 cfs @ 12.51 hrs HW=422.05' TW=418.66' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 54.70 cfs @ 7.7 fps)

Secondary OutFlow Max=23.65 cfs @ 12.51 hrs HW=422.05' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 23.65 cfs @ 2.0 fps)

Pond 6P: Existing Culvert 2



Pond 7P: Existing Culvert 3

Inflow Area =	22.130 ac,	Inflow Depth =	1.75"	for	10-YR STORM event
Inflow =	17.40 cfs @	12.56 hrs,	Volume=	3.235 af	
Outflow =	17.40 cfs @	12.56 hrs,	Volume=	3.235 af,	Atten= 0%, Lag= 0.0 min
Primary =	12.12 cfs @	12.56 hrs,	Volume=	2.942 af	
Secondary =	5.28 cfs @	12.56 hrs,	Volume=	0.293 af	

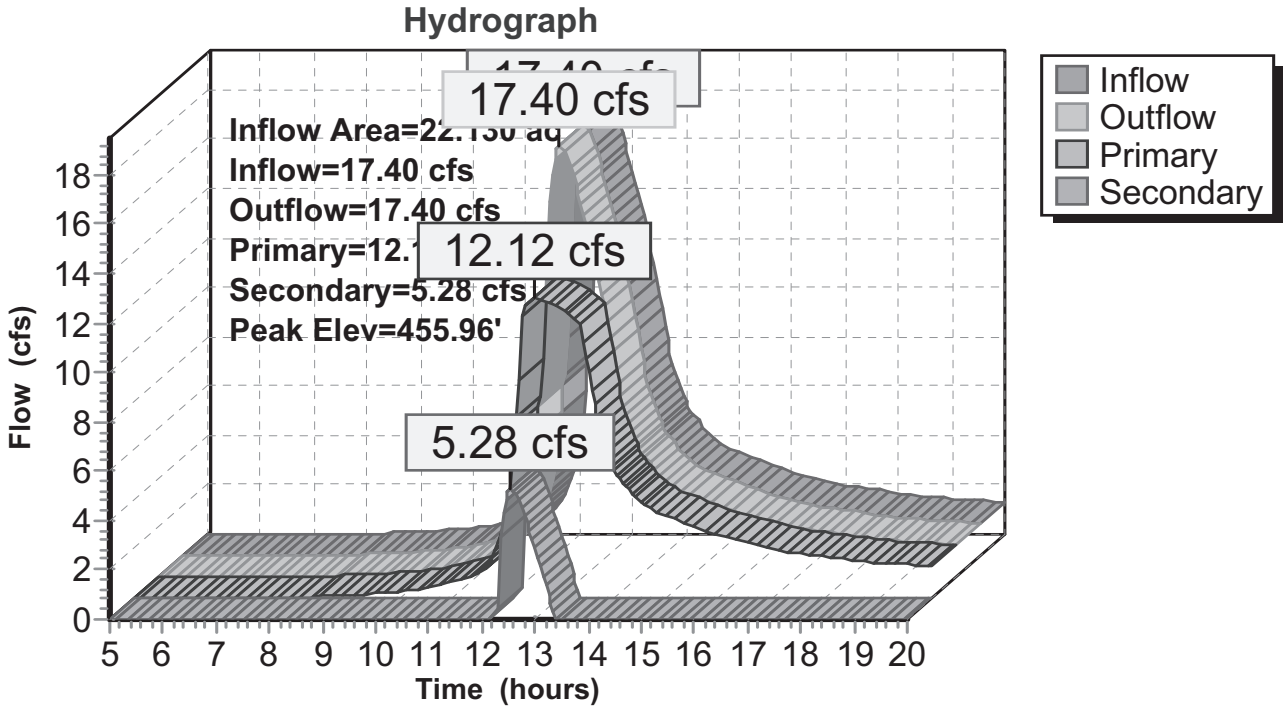
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 455.96' @ 12.56 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	452.60'	**18.0" x 45.6' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 451.11' S= 0.0327 '/' n= 0.011 Cc= 0.900
2	Secondary	455.50'	**6.5' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=12.12 cfs @ 12.56 hrs HW=455.95' TW=441.51' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 12.12 cfs @ 6.9 fps)

Secondary OutFlow Max=5.27 cfs @ 12.56 hrs HW=455.95' TW=454.67' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 5.27 cfs @ 1.8 fps)

Pond 7P: Existing Culvert 3



Pond 8P: Existing Culvert 4

Inflow Area =	61.160 ac,	Inflow Depth =	2.64"	for	10-YR STORM event
Inflow =	90.02 cfs @	12.64 hrs,	Volume=	13.441 af	
Outflow =	90.02 cfs @	12.64 hrs,	Volume=	13.441 af,	Atten= 0%, Lag= 0.0 min
Primary =	90.02 cfs @	12.64 hrs,	Volume=	13.441 af	

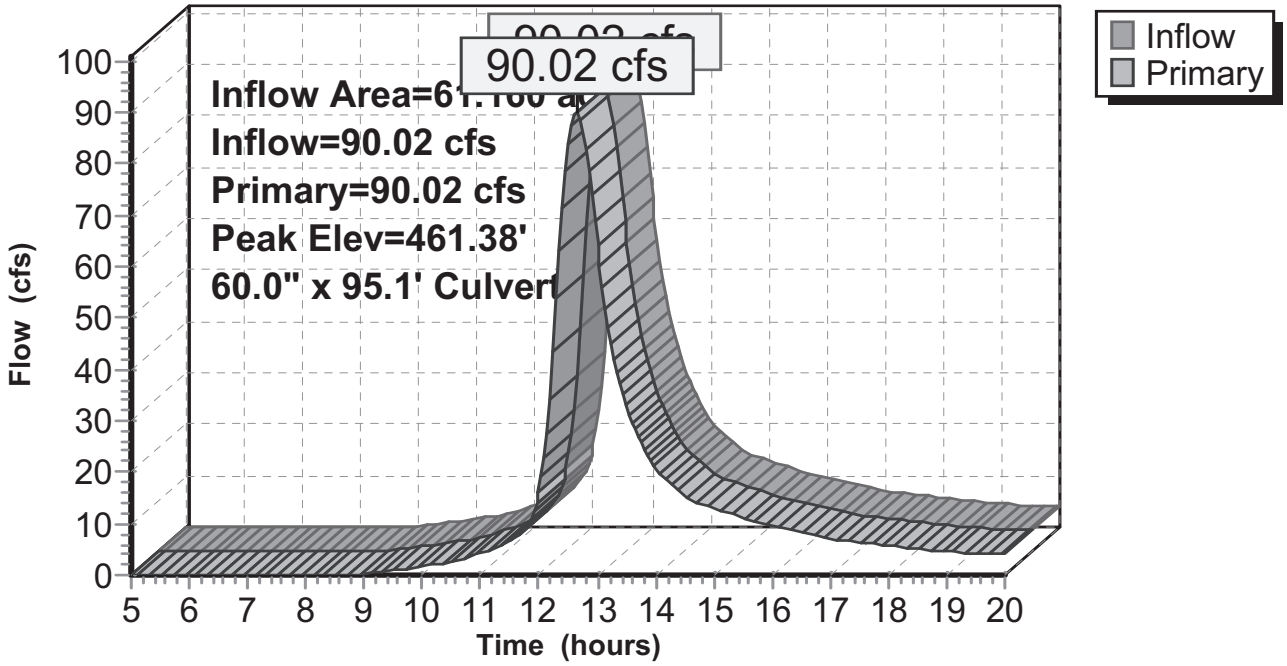
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 461.38' @ 12.64 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	457.96'	**60.0" x 95.1' long Culvert** CMP, square edge headwall, Ke= 0.500 Outlet Invert= 456.17' S= 0.0188 '/' n= 0.011 Cc= 0.900

Primary OutFlow Max=89.89 cfs @ 12.64 hrs HW=461.37' TW=457.68' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 89.89 cfs @ 6.3 fps)

Pond 8P: Existing Culvert 4

Hydrograph



Pond 9P: Existing Culvert 5

Inflow Area =	11.360 ac,	Inflow Depth =	2.47"	for	10-YR STORM event
Inflow =	20.97 cfs @	12.39 hrs,	Volume=	2.334 af	
Outflow =	20.97 cfs @	12.39 hrs,	Volume=	2.334 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.30 cfs @	12.39 hrs,	Volume=	1.774 af	
Secondary =	13.67 cfs @	12.39 hrs,	Volume=	0.561 af	

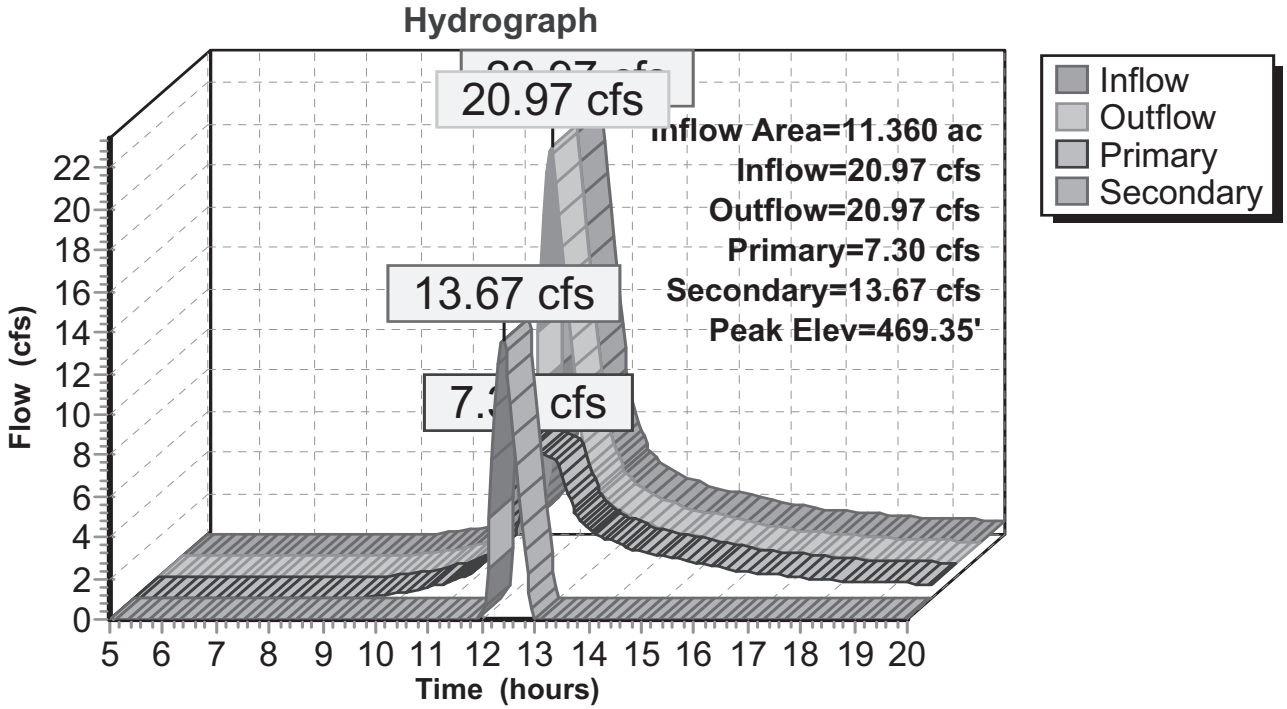
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 469.35' @ 12.39 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	466.76'	**15.0" x 50.3' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 465.61' S= 0.0229 '/' n= 0.011 Cc= 0.900
2	Secondary	469.00'	**25.0' long x 60.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=7.30 cfs @ 12.39 hrs HW=469.34' TW=460.51' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.30 cfs @ 5.9 fps)

Secondary OutFlow Max=13.60 cfs @ 12.39 hrs HW=469.34' TW=457.51' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 13.60 cfs @ 1.6 fps)

Pond 9P: Existing Culvert 5



Pond 10P: Existing Culvert 6

Inflow Area =	5.020 ac,	Inflow Depth =	2.54"	for	10-YR STORM event
Inflow =	7.82 cfs @	12.58 hrs,	Volume=	1.062 af	
Outflow =	7.82 cfs @	12.58 hrs,	Volume=	1.062 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.82 cfs @	12.58 hrs,	Volume=	1.062 af	
Secondary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af	

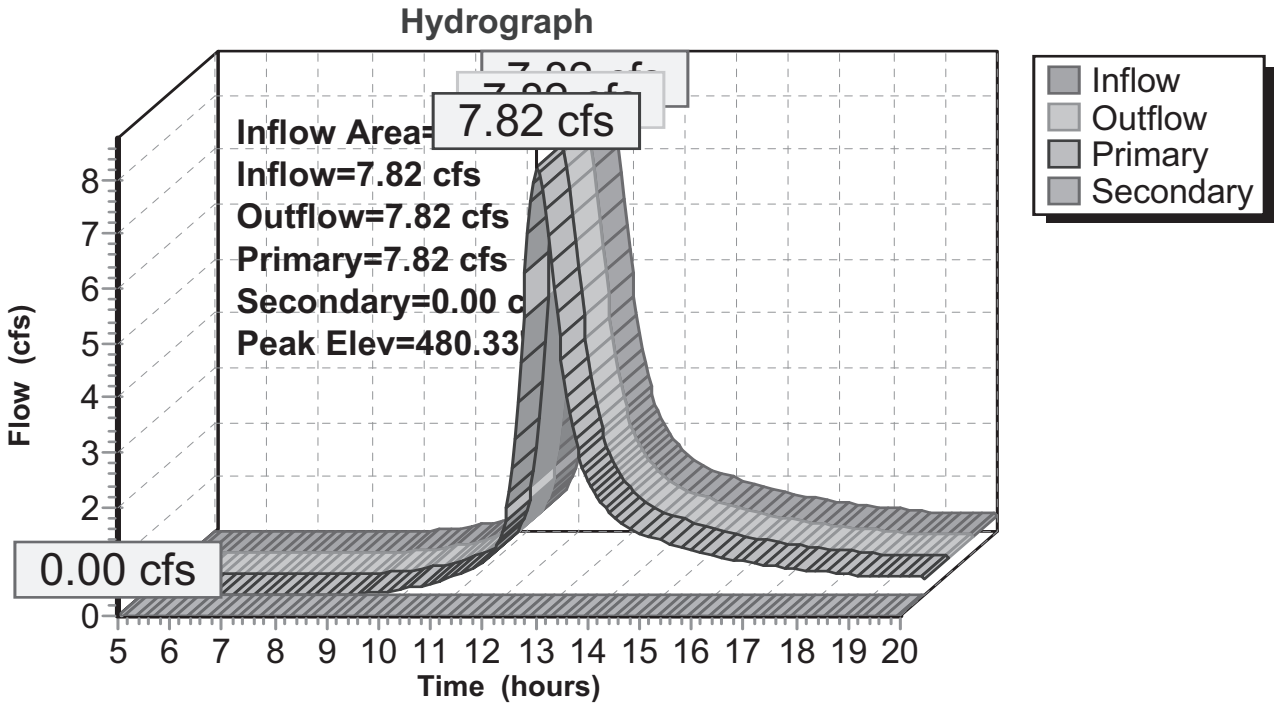
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 480.33' @ 12.58 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	477.46'	**15.0" x 54.0' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 475.67' S= 0.0331 '/' n= 0.011 Cc= 0.900
2	Secondary	481.50'	**160.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=7.80 cfs @ 12.58 hrs HW=480.32' TW=468.22' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.80 cfs @ 6.4 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=477.46' TW=480.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 10P: Existing Culvert 6



Pond 11P: Existing Culvert 9

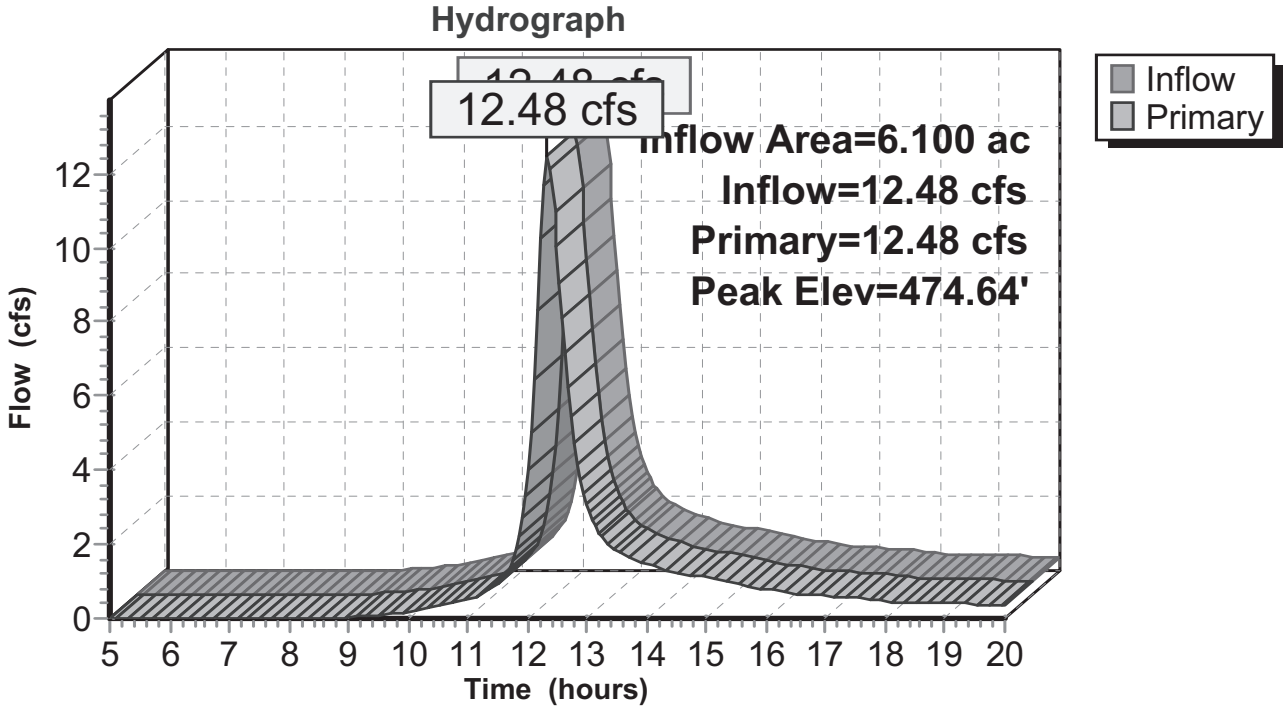
Inflow Area = 6.100 ac, Inflow Depth = 2.56" for 10-YR STORM event
Inflow = 12.48 cfs @ 12.33 hrs, Volume= 1.300 af
Outflow = 12.48 cfs @ 12.33 hrs, Volume= 1.300 af, Atten= 0%, Lag= 0.0 min
Primary = 12.48 cfs @ 12.33 hrs, Volume= 1.300 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 474.64' @ 12.33 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	471.95'	**15.0" x 45.5' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 471.00' S= 0.0209 '/' n= 0.011 Cc= 0.900
2	Primary	474.50'	**35.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=12.41 cfs @ 12.33 hrs HW=474.64' TW=468.07' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.49 cfs @ 6.1 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 4.92 cfs @ 1.0 fps)

Pond 11P: Existing Culvert 9



Pond 12P: Existing Culvert 11

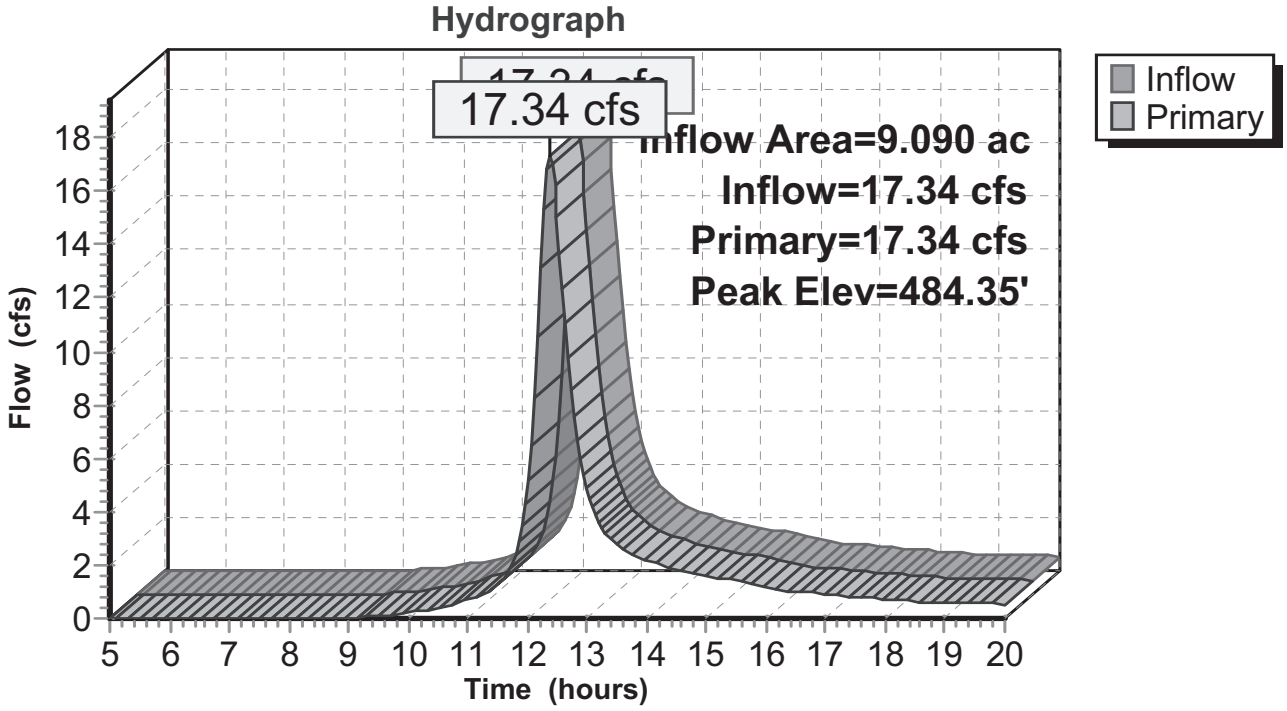
Inflow Area =	9.090 ac,	Inflow Depth =	2.47"	for	10-YR STORM event
Inflow =	17.34 cfs @	12.36 hrs,	Volume=	1.869 af	
Outflow =	17.34 cfs @	12.36 hrs,	Volume=	1.869 af,	Atten= 0%, Lag= 0.0 min
Primary =	17.34 cfs @	12.36 hrs,	Volume=	1.869 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 484.35' @ 12.36 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	480.71'	**15.0" x 53.4' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 479.74' S= 0.0182 '/' n= 0.011 Cc= 0.900
2	Primary	483.50'	**4.0' long x 125.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=17.28 cfs @ 12.36 hrs HW=484.35' TW=468.08' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 9.05 cfs @ 7.4 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 8.23 cfs @ 2.4 fps)

Pond 12P: Existing Culvert 11



Pond 13P: Detention/Treatment Pond 13P

Inflow Area =	20.050 ac,	Inflow Depth =	3.01"	for	10-YR STORM event
Inflow =	49.82 cfs @	12.30 hrs,	Volume=	5.030 af	
Outflow =	22.81 cfs @	12.68 hrs,	Volume=	3.770 af,	Atten= 54%, Lag= 23.1 min
Primary =	15.35 cfs @	12.68 hrs,	Volume=	2.679 af	
Secondary =	7.46 cfs @	12.68 hrs,	Volume=	1.091 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 462.91' @ 12.68 hrs Surf.Area= 0 sf Storage= 91,632 cf
Plug-Flow detention time= 113.9 min calculated for 3.770 af (75% of inflow)
Center-of-Mass det. time= 54.6 min (852.5 - 797.9)

#	Invert	Avail.Storage	Storage Description
1	456.00'	163,490 cf	**Custom Stage Data**Listed below

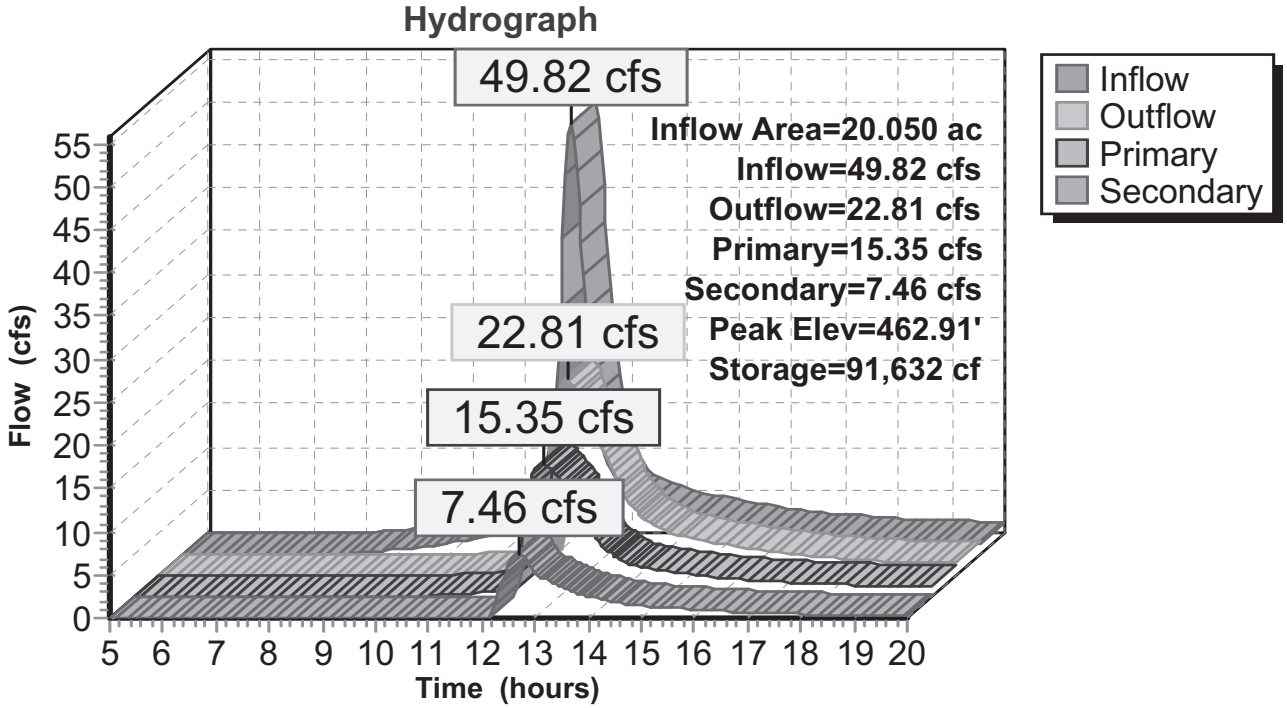
Elevation (feet)	Cum.Store (cubic-feet)
456.00	0
458.00	17,151
460.00	41,271
462.00	73,165
464.00	113,637
466.00	163,490

#	Routing	Invert	Outlet Devices
1	Primary	456.00'	**24.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 446.00' S= 0.1000 '/' n= 0.011 Cc= 0.900
2	Device 1	456.00'	**2.2" Vert. Orifice/Grate** C= 0.600
3	Device 1	456.70'	**3.3" Vert. Orifice/Grate** C= 0.600
4	Device 1	460.73'	**2.30' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	464.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
6	Device 1	465.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Secondary	456.00'	**24.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 446.00' S= 0.1000 '/' n= 0.011 Cc= 0.900
8	Device 7	460.73'	**1.65' x 0.50' Vert. Orifice/Grate** C= 0.600
9	Device 7	462.40'	**1.65' x 0.90' Vert. Orifice/Grate** C= 0.600
10	Device 7	464.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
11	Device 7	465.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
12	Primary	465.50'	**20.0' long x 13.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=15.33 cfs @ 12.68 hrs HW=462.91' TW=455.93' (Dynamic Tailwater)
- **1=Culvert** (Passes 15.33 cfs of 36.77 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.33 cfs @ 12.6 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.70 cfs @ 11.9 fps)
  - **4=Orifice/Grate** (Orifice Controls 14.30 cfs @ 6.2 fps)
  - **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  - **6=Orifice/Grate** (Controls 0.00 cfs)
- **12=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=7.44 cfs @ 12.68 hrs HW=462.91' TW=421.91' (Dynamic Tailwater)
- **7=Culvert** (Passes 7.44 cfs of 36.77 cfs potential flow)
  - **8=Orifice/Grate** (Orifice Controls 5.51 cfs @ 6.7 fps)
  - **9=Orifice/Grate** (Orifice Controls 1.93 cfs @ 2.3 fps)
  - **10=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  - **11=Orifice/Grate** (Controls 0.00 cfs)

Pond 13P: Detention/Treatment Pond 13P



Pond 14P: Detention/Treatment Pond 14P

Inflow Area = 11.420 ac, Inflow Depth = 3.11" for 10-YR STORM event
Inflow = 31.03 cfs @ 12.25 hrs, Volume= 2.957 af
Outflow = 11.23 cfs @ 12.69 hrs, Volume= 2.202 af, Atten= 64%, Lag= 25.9 min
Primary = 11.23 cfs @ 12.69 hrs, Volume= 2.202 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 497.00' @ 12.69 hrs Surf.Area= 0 sf Storage= 57,675 cf
Plug-Flow detention time= 121.3 min calculated for 2.195 af (74% of inflow)
Center-of-Mass det. time= 62.0 min (855.5 - 793.5)

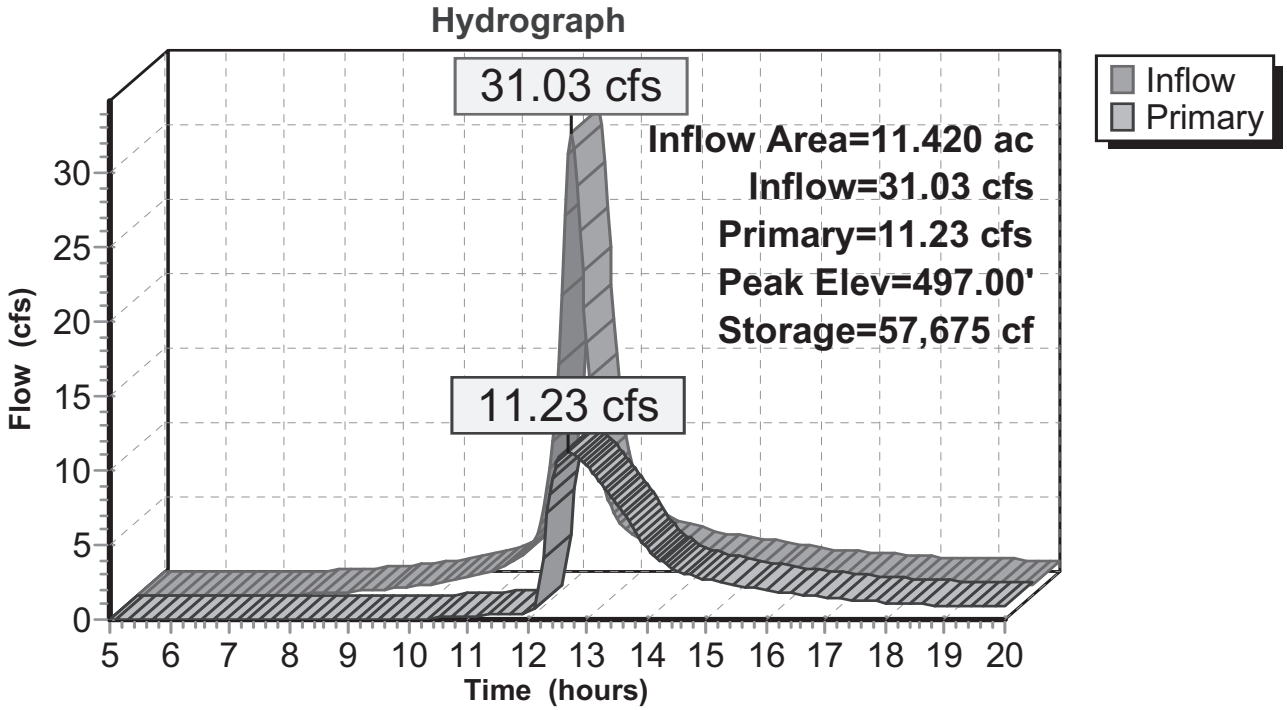
#	Invert	Avail.Storage	Storage Description
1	491.00'	112,422 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
491.00	0
492.00	5,220
494.00	20,281
496.00	42,461
498.00	72,873
500.00	112,422

#	Routing	Invert	Outlet Devices
1	Primary	491.00'	**24.0" x 60.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 490.00' S= 0.0167 '/' n= 0.011 Cc= 0.900
2	Device 1	491.00'	**1.9" Vert. Orifice/Grate** C= 0.600
3	Device 1	491.70'	**2.7" Vert. Orifice/Grate** C= 0.600
4	Device 1	495.00'	**1.80' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	498.25'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32

Primary OutFlow Max=11.23 cfs @ 12.69 hrs HW=497.00' TW=461.36' (Dynamic Tailwater)
└─**1=Culvert** (Passes 11.23 cfs of 33.82 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.23 cfs @ 11.7 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.44 cfs @ 11.0 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 10.56 cfs @ 5.9 fps)
  └─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 14P: Detention/Treatment Pond 14P



Pond 15P: Detention/Treatment Pond 15P

Inflow Area =	26.950 ac,	Inflow Depth =	3.10"	for	10-YR STORM event
Inflow =	68.04 cfs @	12.30 hrs,	Volume=	6.970 af	
Outflow =	24.71 cfs @	12.77 hrs,	Volume=	5.136 af,	Atten= 64%, Lag= 28.1 min
Primary =	24.71 cfs @	12.77 hrs,	Volume=	5.136 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 492.90' @ 12.77 hrs Surf.Area= 0 sf Storage= 140,733 cf
Plug-Flow detention time= 129.3 min calculated for 5.136 af (74% of inflow)
Center-of-Mass det. time= 68.6 min (865.0 - 796.4)

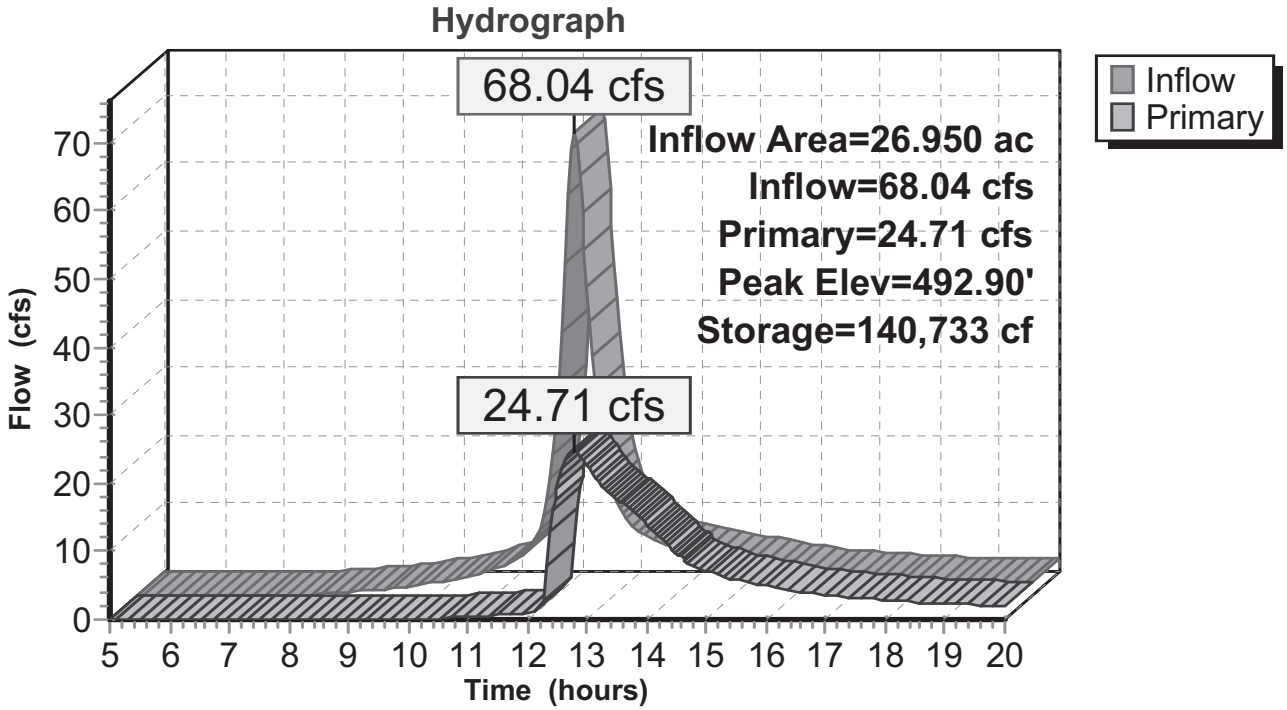
#	Invert	Avail.Storage	Storage Description
1	486.00'	250,174 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
486.00	0
488.00	26,415
490.00	63,689
492.00	112,776
494.00	174,623
496.00	250,174

#	Routing	Invert	Outlet Devices
1	Primary	486.00'	**30.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 482.00' S= 0.0400 '/' n= 0.011 Cc= 0.900
2	Device 1	486.00'	**2.7" Vert. Orifice/Grate** C= 0.600
3	Device 1	486.71'	**4.0" Vert. Orifice/Grate** C= 0.600
4	Device 1	490.47'	**3.00' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	492.43'	**3.00' x 0.75' Vert. Orifice/Grate** C= 0.600
6	Device 1	494.25'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32

Primary OutFlow Max=24.66 cfs @ 12.77 hrs HW=492.90' TW=468.37' (Dynamic Tailwater)
└─**1=Culvert** (Passes 24.66 cfs of 56.19 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.50 cfs @ 12.5 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 1.03 cfs @ 11.8 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 20.02 cfs @ 6.7 fps)
  ├─**5=Orifice/Grate** (Orifice Controls 3.12 cfs @ 2.2 fps)
  └─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 15P: Detention/Treatment Pond 15P



Pond 16P: Detention/Treatment Pond 16P

Inflow Area =	2.390 ac,	Inflow Depth =	3.61"	for	10-YR STORM event
Inflow =	9.73 cfs @	12.11 hrs,	Volume=	0.718 af	
Outflow =	2.78 cfs @	12.49 hrs,	Volume=	0.502 af,	Atten= 71%, Lag= 22.6 min
Primary =	2.78 cfs @	12.49 hrs,	Volume=	0.502 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 504.09' @ 12.49 hrs Surf.Area= 0 sf Storage= 15,268 cf
Plug-Flow detention time= 138.2 min calculated for 0.500 af (70% of inflow)
Center-of-Mass det. time= 73.1 min (846.8 - 773.7)

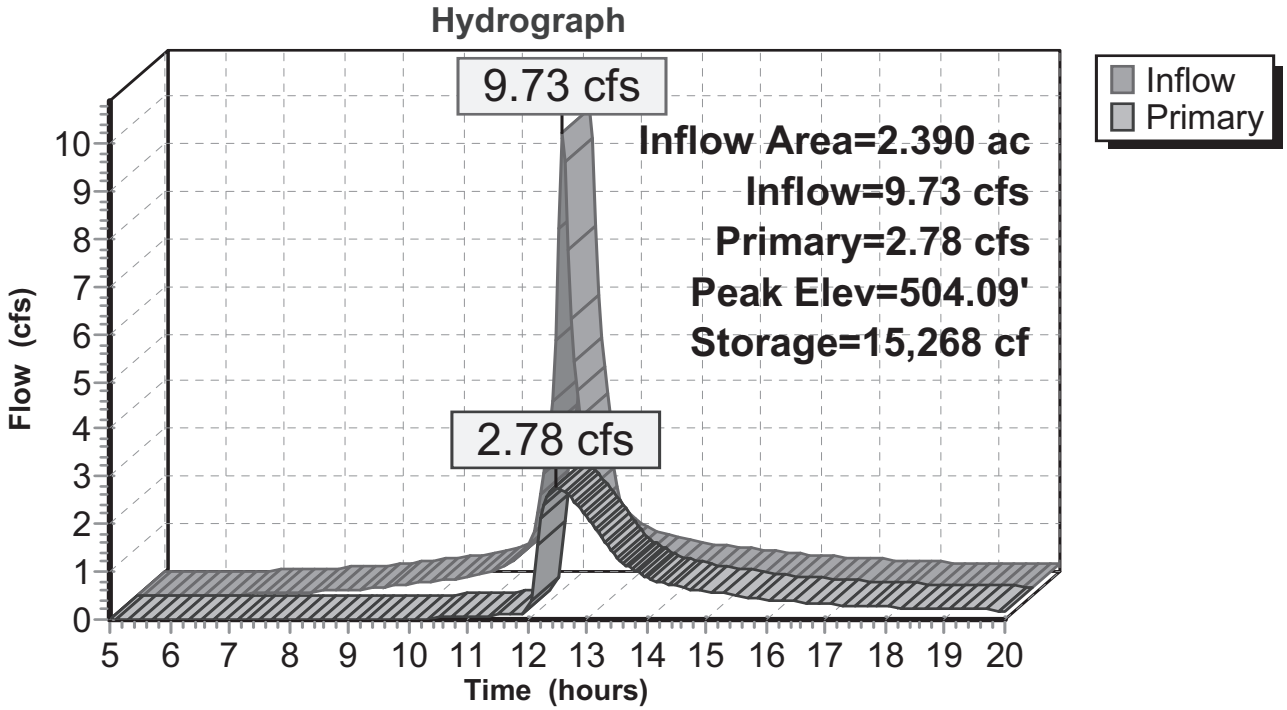
#	Invert	Avail.Storage	Storage Description
1	501.50'	29,657 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
501.50	0
502.00	2,572
504.00	14,626
506.00	29,657

#	Routing	Invert	Outlet Devices
1	Primary	501.50'	**18.0" x 40.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 497.50' S= 0.1000 '/' n= 0.011 Cc= 0.900
2	Device 1	501.50'	**1.3" Vert. Orifice/Grate** C= 0.600
3	Device 1	501.84'	**1.8" Vert. Orifice/Grate** C= 0.600
4	Device 1	503.09'	**1.25' x 0.50' Vert. Orifice/Grate** C= 0.600
5	Device 1	504.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
6	Device 1	505.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Primary	505.50'	**20.0' long x 13.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=2.78 cfs @ 12.49 hrs HW=504.08' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 2.78 cfs of 11.52 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.07 cfs @ 7.7 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.13 cfs @ 7.1 fps)
  - **4=Orifice/Grate** (Orifice Controls 2.58 cfs @ 4.1 fps)
  - **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  - **6=Orifice/Grate** (Controls 0.00 cfs)
- **7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 16P: Detention/Treatment Pond 16P



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

Subcatchment 1S: Subcatchment 1S Runoff Area=36.780 ac Runoff Depth=3.53"
Flow Length=2,450' Tc=33.5 min CN=76 Runoff=88.30 cfs 10.831 af

Subcatchment 2S: Subcatchment 2S Runoff Area=2.080 ac Runoff Depth=4.07"
Flow Length=1,056' Tc=14.0 min CN=81 Runoff=8.11 cfs 0.706 af

Subcatchment 3S: Subcatchment 3S Runoff Area=49.740 ac Runoff Depth=3.52"
Flow Length=3,960' Tc=45.8 min CN=76 Runoff=101.94 cfs 14.584 af

Subcatchment 4S: Subcatchment 4S Runoff Area=11.360 ac Runoff Depth=3.24"
Flow Length=986' Tc=27.1 min CN=73 Runoff=27.58 cfs 3.071 af

Subcatchment 5S: Subcatchment 5S Runoff Area=5.020 ac Runoff Depth=3.32"
Flow Length=1,150' Tc=41.7 min CN=74 Runoff=10.23 cfs 1.391 af

Subcatchment 6S: Subcatchment 6S Runoff Area=6.100 ac Runoff Depth=3.35"
Flow Length=1,134' Tc=23.1 min CN=74 Runoff=16.35 cfs 1.701 af

Subcatchment 7S: Subcatchment 7S Runoff Area=120.310 ac Runoff Depth=3.36"
Flow Length=3,523' Tc=92.9 min CN=75 Runoff=155.70 cfs 33.659 af

Subcatchment 8S: Subcatchment 8S Runoff Area=9.090 ac Runoff Depth=3.25"
Flow Length=952' Tc=25.2 min CN=73 Runoff=22.80 cfs 2.459 af

Subcatchment 9S: Subcatchment 9S Runoff Area=12.070 ac Runoff Depth=3.35"
Flow Length=526' Tc=16.3 min CN=74 Runoff=37.16 cfs 3.374 af

Subcatchment 10S: Subcatchment 10S Runoff Area=34.360 ac Runoff Depth=2.95"
Flow Length=1,359' Tc=34.6 min CN=70 Runoff=68.01 cfs 8.434 af

Subcatchment 11S: Subcatchment 11S Runoff Area=20.050 ac Runoff Depth=3.85"
Flow Length=1,706' Tc=21.3 min CN=79 Runoff=63.39 cfs 6.439 af

Subcatchment 12S: Subcatchment 12S Runoff Area=11.420 ac Runoff Depth=3.96"
Flow Length=1,285' Tc=18.4 min CN=80 Runoff=39.27 cfs 3.769 af

Subcatchment 13S: Subcatchment 13S Runoff Area=26.950 ac Runoff Depth=3.96"
Flow Length=2,559' Tc=22.0 min CN=80 Runoff=86.14 cfs 8.885 af

Subcatchment 14S: Subcatchment 14S Runoff Area=2.390 ac Runoff Depth=4.50"
Flow Length=781' Tc=8.1 min CN=85 Runoff=12.02 cfs 0.897 af

Reach 1R: Existing Stream Peak Depth=2.11' Max Vel=3.7 fps Inflow=229.13 cfs 73.046 af
n=0.080 L=1,210.0' S=0.0279 '/' Capacity=2,412.63 cfs Outflow=226.92 cfs 72.452 af

Reach 2R: Existing Stream Peak Depth=1.74' Max Vel=4.5 fps Inflow=174.08 cfs 62.188 af
n=0.080 L=609.0' S=0.0361 '/' Capacity=11,130.94 cfs Outflow=173.83 cfs 61.952 af

Reach 3R: Existing Stream Peak Depth=1.70' Max Vel=3.6 fps Inflow=161.92 cfs 58.922 af
n=0.080 L=541.0' S=0.0299 '/' Capacity=9,486.07 cfs Outflow=161.56 cfs 58.689 af

Reach 4R: Existing Stream Peak Depth=0.62' Max Vel=0.9 fps Inflow=77.43 cfs 40.988 af
n=0.080 L=432.0' S=0.0051 '/' Capacity=6,025.46 cfs Outflow=77.40 cfs 40.415 af

Reach 5R: Existing Stream Peak Depth=0.88' Max Vel=1.1 fps Inflow=75.06 cfs 40.076 af
n=0.080 L=1,188.0' S=0.0051 '/' Capacity=5,559.50 cfs Outflow=74.82 cfs 38.831 af

Reach 6R: Existing Swale Peak Depth=0.84' Max Vel=2.6 fps Inflow=9.42 cfs 0.677 af
n=0.080 L=520.0' S=0.0615 '/' Capacity=93.65 cfs Outflow=9.34 cfs 0.677 af

Reach 7R: Existing Swale Peak Depth=0.28' Max Vel=0.9 fps Inflow=0.58 cfs 0.007 af
n=0.080 L=436.0' S=0.0275 '/' Capacity=6,984.86 cfs Outflow=0.35 cfs 0.007 af

Pond 1P: Design Point 1 Outlet at Hasbrouck Road Inflow=226.92 cfs 72.452 af
Primary=226.92 cfs 72.452 af

Pond 2P: Design Point 2 Existing Swale Along Craigville Road Inflow=52.39 cfs 2.108 af
Primary=52.39 cfs 2.108 af

Pond 3P: Design Point 3 (Southeastern Property Line) Inflow=40.29 cfs 4.052 af
Primary=40.29 cfs 4.052 af

Pond 4P: Design Point 4 (Southwestern Property Line) Inflow=68.01 cfs 8.434 af
Primary=68.01 cfs 8.434 af

Pond 5P: Existing Wetland Pocket Peak Elev=469.92' Storage=805,875 cf Inflow=197.00 cfs 46.220 af
36.0" x 60.0' Culvert Outflow=75.06 cfs 40.076 af

Pond 6P: Existing Culvert 2 Peak Elev=422.42' Inflow=109.86 cfs 13.202 af
Primary=57.64 cfs 11.093 af Secondary=52.39 cfs 2.108 af Outflow=109.86 cfs 13.202 af

Pond 7P: Existing Culvert 3 Peak Elev=456.16' Inflow=22.01 cfs 4.175 af
Primary=12.59 cfs 3.499 af Secondary=9.42 cfs 0.677 af Outflow=22.01 cfs 4.175 af

Pond 8P: Existing Culvert 4 Peak Elev=462.00' Inflow=116.19 cfs 17.586 af
60.0" x 95.1' Culvert Outflow=116.19 cfs 17.586 af

Pond 9P: Existing Culvert 5 Peak Elev=469.45' Inflow=27.58 cfs 3.078 af
Primary=7.48 cfs 2.157 af Secondary=20.09 cfs 0.921 af Outflow=27.58 cfs 3.078 af

Pond 10P: Existing Culvert 6 Peak Elev=481.51' Inflow=10.23 cfs 1.391 af
Primary=9.65 cfs 1.384 af Secondary=0.58 cfs 0.007 af Outflow=10.23 cfs 1.391 af

Pond 11P: Existing Culvert 9 Peak Elev=474.71' Inflow=16.35 cfs 1.701 af
Outflow=16.35 cfs 1.701 af

Pond 12P: Existing Culvert 11 Peak Elev=484.67' Inflow=22.80 cfs 2.459 af
Outflow=22.80 cfs 2.459 af

Pond 13P: Detention/Treatment Pond 13 Peak Elev=463.81' Storage=109,771 cf Inflow=63.39 cfs 6.439 af
Primary=18.86 cfs 3.470 af Secondary=13.61 cfs 1.694 af Outflow=32.48 cfs 5.164 af

Pond 14P: Detention/Treatment Pond 14P Peak Elev=497.96' Storage=72,198 cf Inflow=39.27 cfs 3.769 af
Outflow=14.28 cfs 3.002 af

Pond 15P: Detention/Treatment Pond 15 Peak Elev=493.81' Storage=168,866 cf Inflow=86.14 cfs 8.885 af
Outflow=36.78 cfs 7.018 af

Pond 16P: Detention/Treatment Pond 16P Peak Elev=504.53' Storage=18,613 cf Inflow=12.02 cfs 0.897 af
Outflow=3.53 cfs 0.678 af

Total Runoff Area = 347.720 ac Runoff Volume = 100.198 af Average Runoff Depth = 3.46"

Subcatchment 1S: Subcatchment 1S

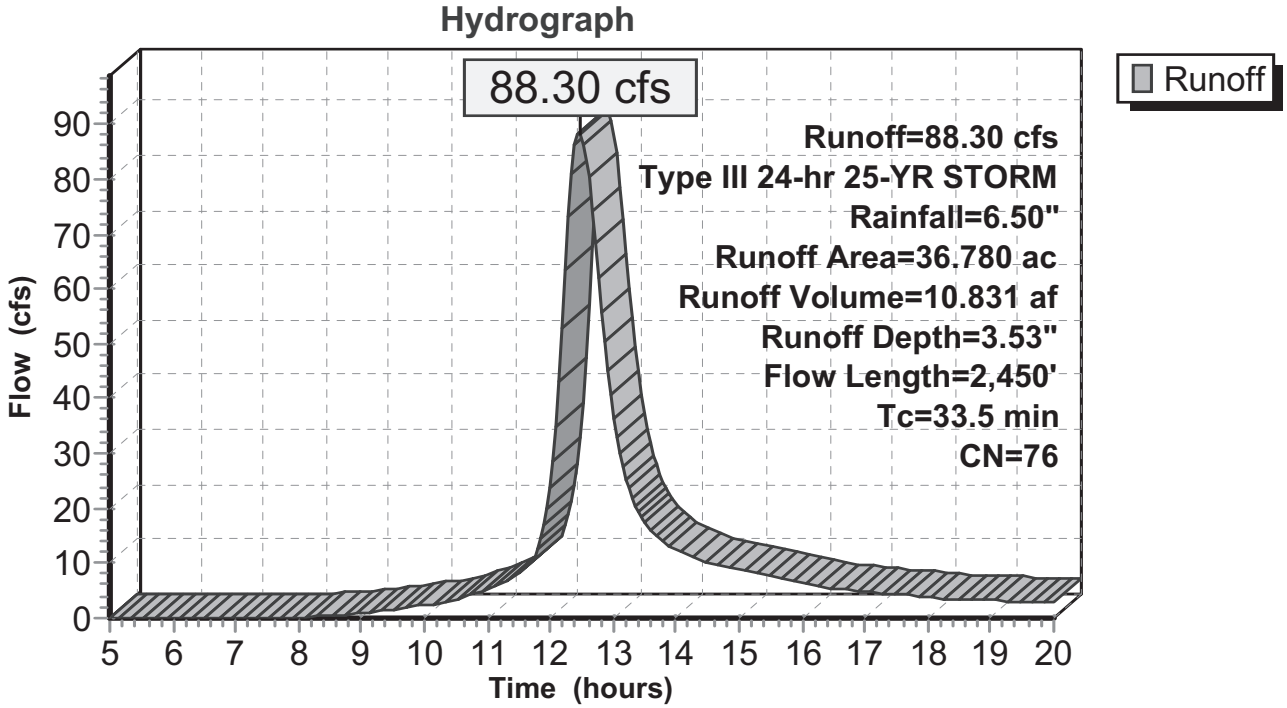
Runoff = 88.30 cfs @ 12.46 hrs, Volume= 10.831 af, Depth= 3.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.920	98	Existing pavement
0.300	98	Proposed pavement & roofs
16.310	79	50-75% Grass cover, Fair, HSG C
0.210	71	Meadow, non-grazed, HSG C
19.040	73	Woods, Fair, HSG C
36.780	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.1300	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
8.5	746	0.0846	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.5	598	0.1003	2.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.8	1,006	0.0962	1.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
33.5	2,450	Total			

Subcatchment 1S: Subcatchment 1S



Subcatchment 2S: Subcatchment 2S

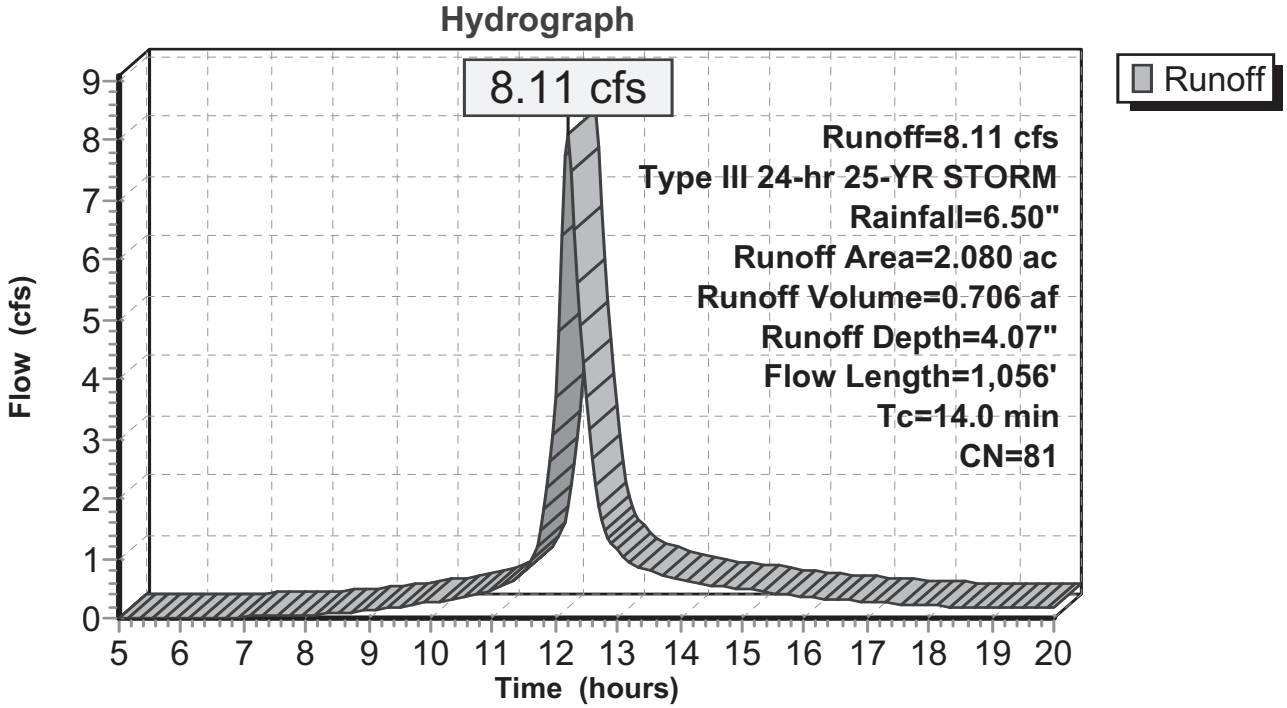
Runoff = 8.11 cfs @ 12.19 hrs, Volume= 0.706 af, Depth= 4.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.080	98	Existing pavement
0.360	98	Proposed pavement & roofs
1.060	79	50-75% Grass cover, Fair, HSG C
0.080	71	Meadow, non-grazed, HSG C
0.500	73	Woods, Fair, HSG C
2.080	81	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0475	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
5.2	646	0.0863	2.1		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.0	80	0.0719	1.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.2	230	0.0435	3.1		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.0	1,056	Total			

Subcatchment 2S: Subcatchment 2S



Subcatchment 3S: Subcatchment 3S

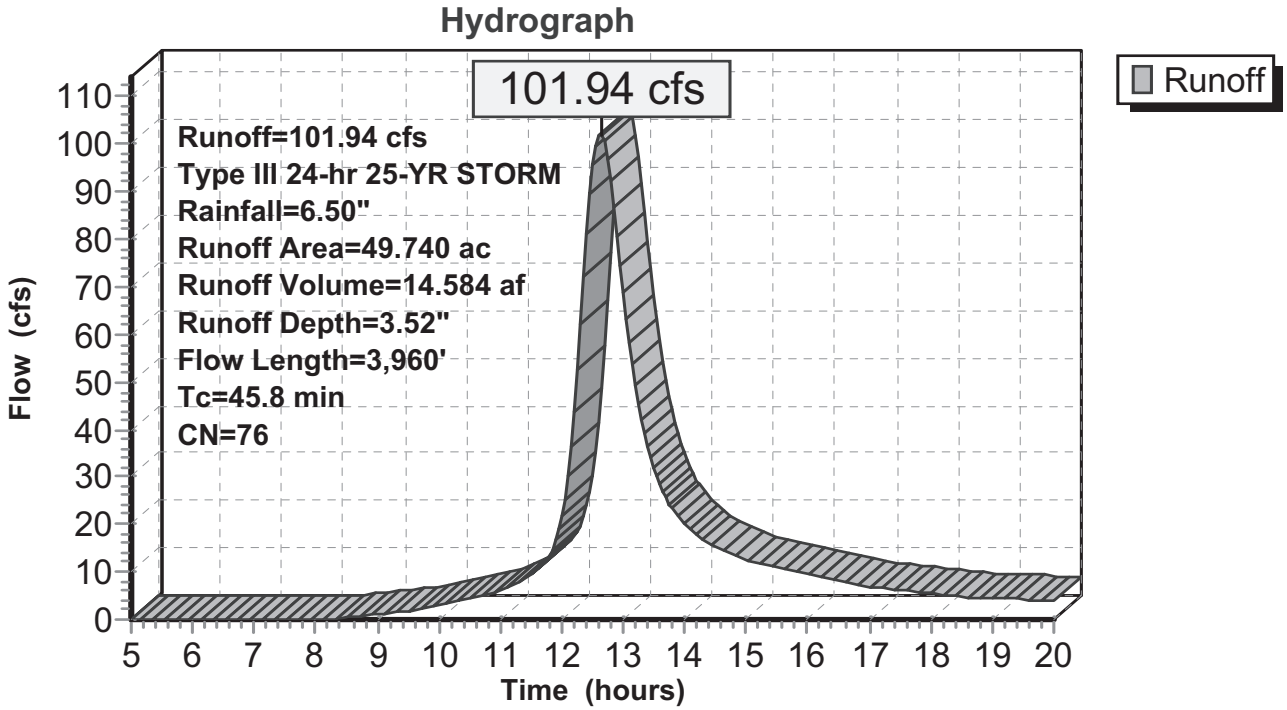
Runoff = 101.94 cfs @ 12.63 hrs, Volume= 14.584 af, Depth= 3.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.450	98	Existing pavement
1.950	98	Proposed pavement & roofs
5.210	79	50-75% Grass cover, Fair, HSG C
0.310	71	Meadow, non-grazed, HSG C
0.870	78	Meadow, non-grazed, HSG D
30.910	73	Woods, Fair, HSG C
10.040	79	Woods, Fair, HSG D
49.740	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0350	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
12.9	814	0.0445	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.8	1,806	0.0836	3.8	43.28	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=1.50' Z= 5.0 '/' n= 0.091
8.7	1,240	0.0081	2.4	5.22	**Channel Flow,** Area= 2.2 sf Perim= 10.4' r= 0.21' n= 0.020
45.8	3,960	Total			

Subcatchment 3S: Subcatchment 3S



Subcatchment 4S: Subcatchment 4S

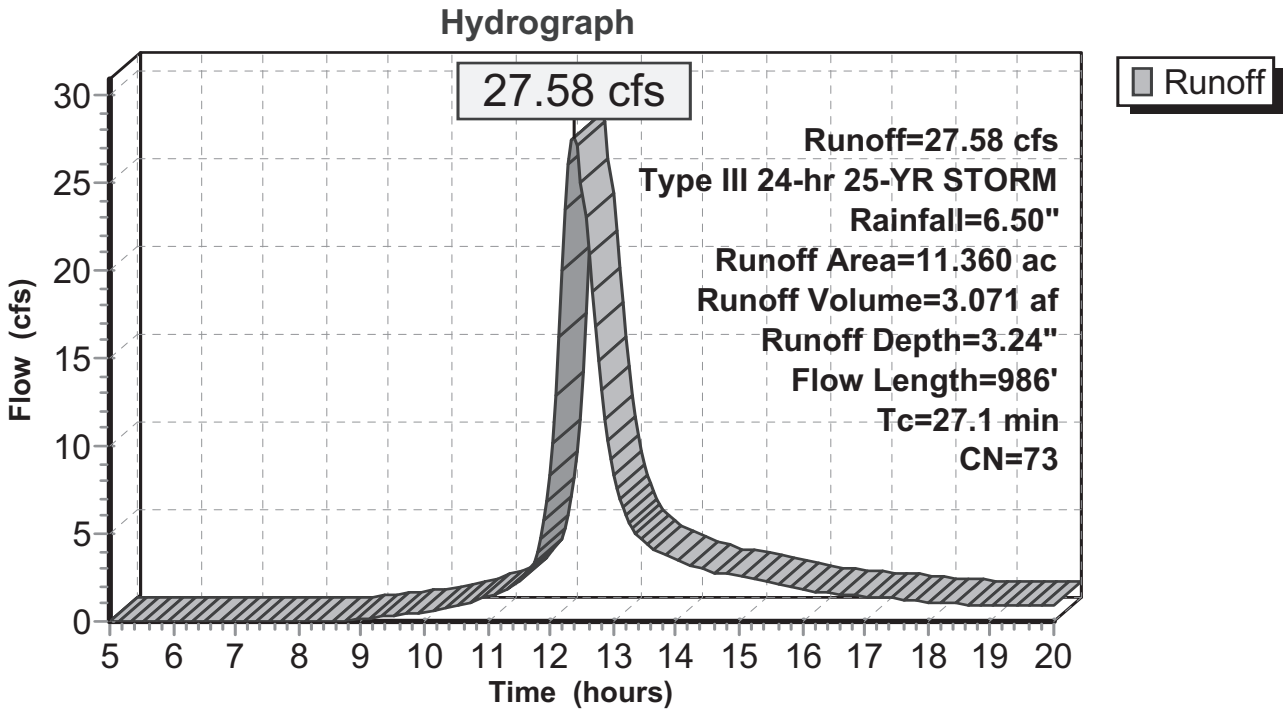
Runoff = 27.58 cfs @ 12.38 hrs, Volume= 3.071 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.170	98	Existing pavement
0.090	71	Meadow, non-grazed, HSG C
0.220	78	Meadow, non-grazed, HSG D
0.050	36	Woods, Fair, HSG A
10.670	73	Woods, Fair, HSG C
0.160	79	Woods, Fair, HSG D
11.360	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0432	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
12.0	886	0.0601	1.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.1	986	Total			

Subcatchment 4S: Subcatchment 4S



Subcatchment 5S: Subcatchment 5S

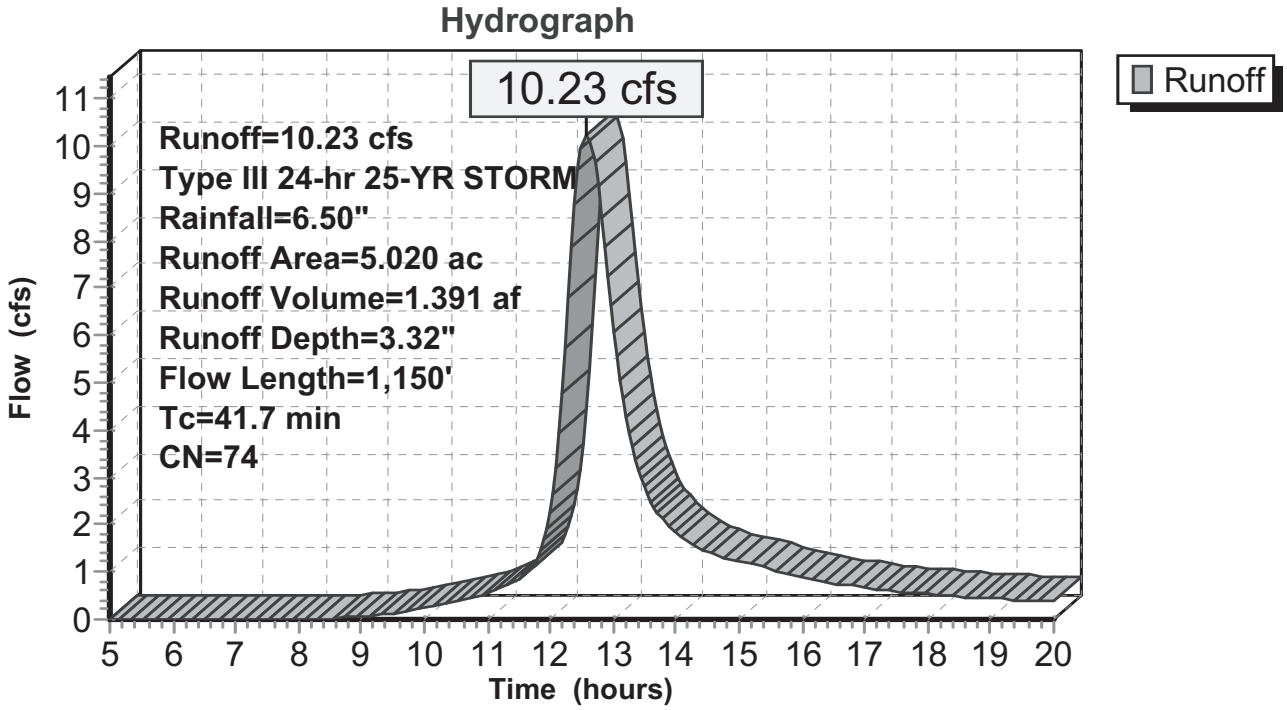
Runoff = 10.23 cfs @ 12.57 hrs, Volume= 1.391 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.230	98	Existing pavement
0.380	71	Meadow, non-grazed, HSG C
4.410	73	Woods, Fair, HSG C
5.020	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0457	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.2	175	0.0340	0.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	133	0.2400	2.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.8	742	0.0060	0.5		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
41.7	1,150	Total			

Subcatchment 5S: Subcatchment 5S



Subcatchment 6S: Subcatchment 6S

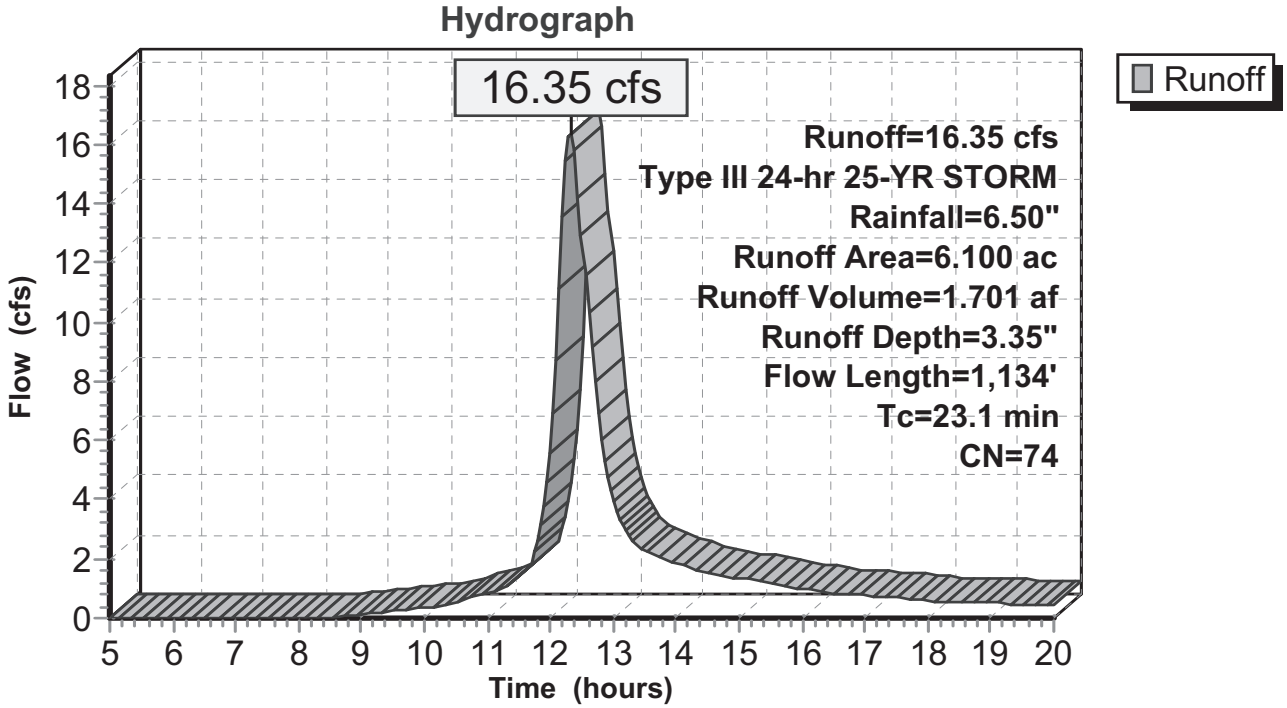
Runoff = 16.35 cfs @ 12.32 hrs, Volume= 1.701 af, Depth= 3.35"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.090	98	Existing pavement
0.030	98	Proposed pavement & roofs
0.100	79	50-75% Grass cover, Fair, HSG C
0.480	71	Meadow, non-grazed, HSG C
0.050	78	Meadow, non-grazed, HSG D
5.050	73	Woods, Fair, HSG C
0.300	79	Woods, Fair, HSG D
6.100	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	12	0.2042	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
9.3	88	0.1108	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
13.1	1,034	0.0696	1.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.1	1,134	Total			

Subcatchment 6S: Subcatchment 6S



Subcatchment 7S: Subcatchment 7S

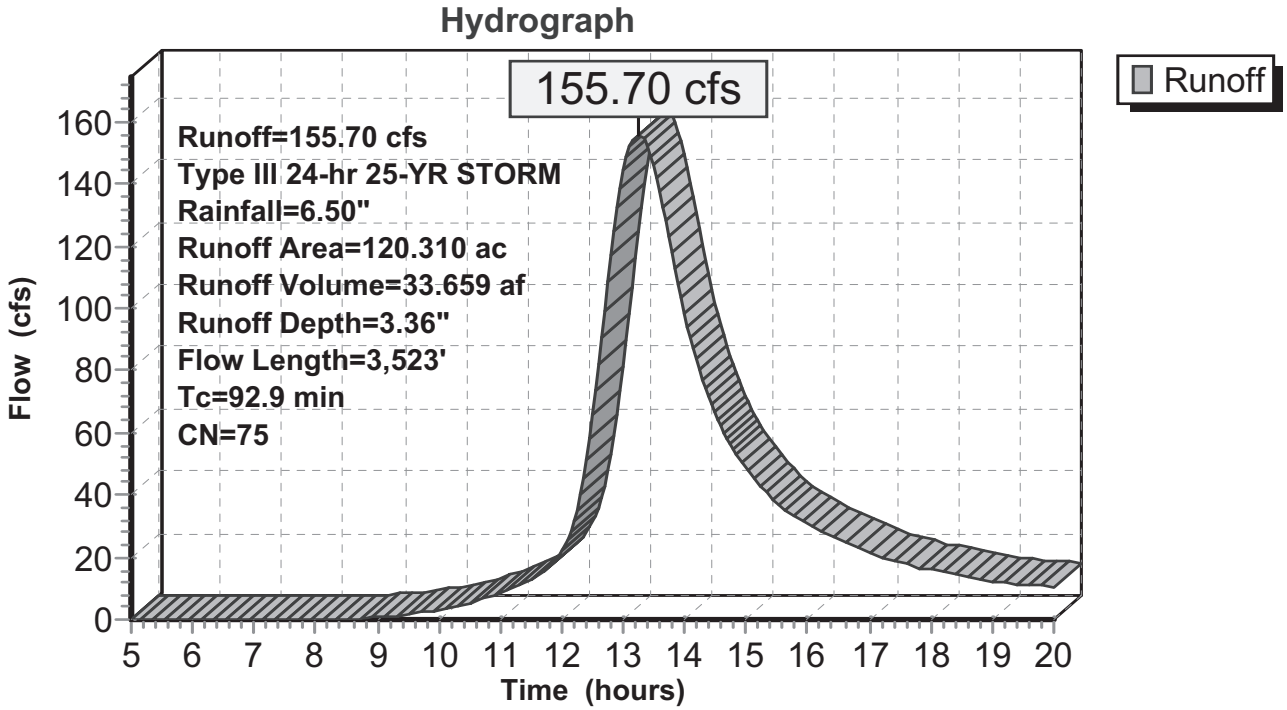
Runoff = 155.70 cfs @ 13.27 hrs, Volume= 33.659 af, Depth= 3.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
1.110	98	Existing pavement
1.730	98	Proposed pavement and roofs
6.810	79	50-75% Grass cover, Fair, HSG C
0.100	84	50-75% Grass cover, Fair, HSG D
7.160	71	Meadow, non-grazed, HSG C
10.120	78	Meadow, non-grazed, HSG D
0.870	36	Woods, Fair, HSG A
72.180	73	Woods, Fair, HSG C
20.230	79	Woods, Fair, HSG D
120.310	75	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	100	0.0188	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
19.1	1,761	0.0943	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
52.8	1,662	0.0110	0.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
92.9	3,523	Total			

Subcatchment 7S: Subcatchment 7S



Subcatchment 8S: Subcatchment 8S

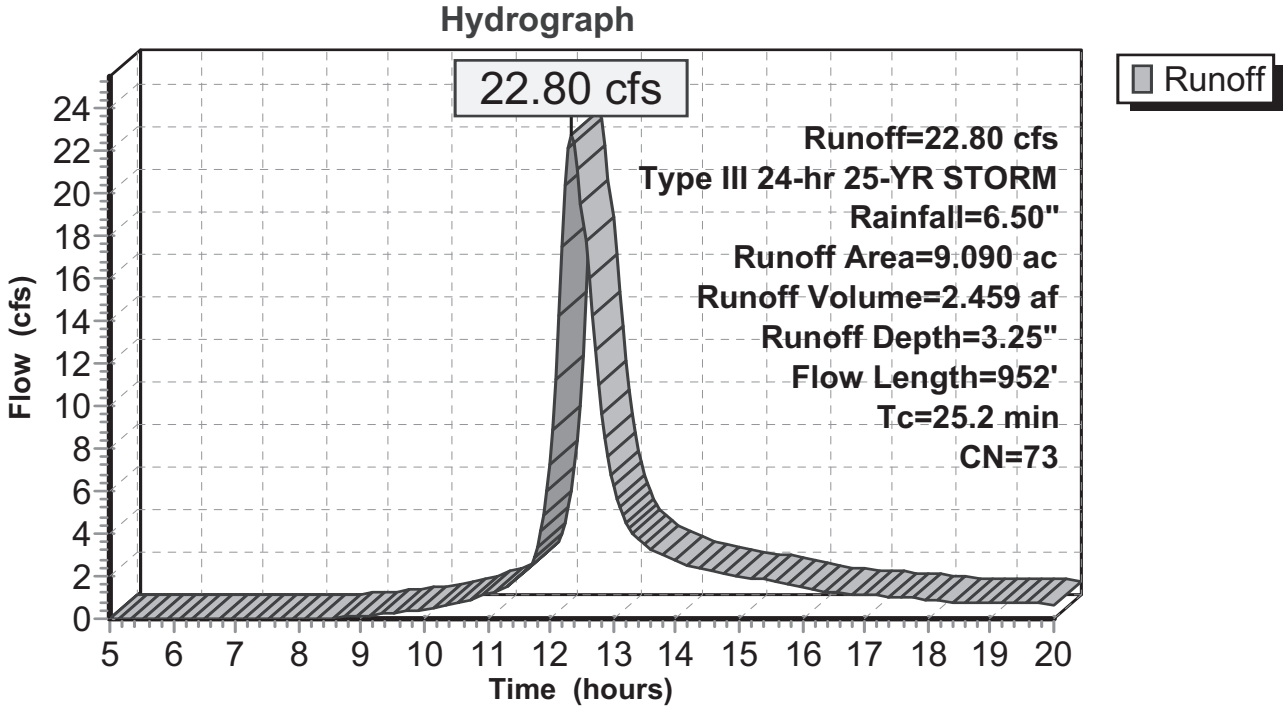
Runoff = 22.80 cfs @ 12.35 hrs, Volume= 2.459 af, Depth= 3.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.120	98	Existing pavement
0.240	71	Meadow, non-grazed, HSG C
8.730	73	Woods, Fair, HSG C
9.090	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0435	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
10.2	852	0.0780	1.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
25.2	952	Total			

Subcatchment 8S: Subcatchment 8S



Subcatchment 9S: Subcatchment 9S

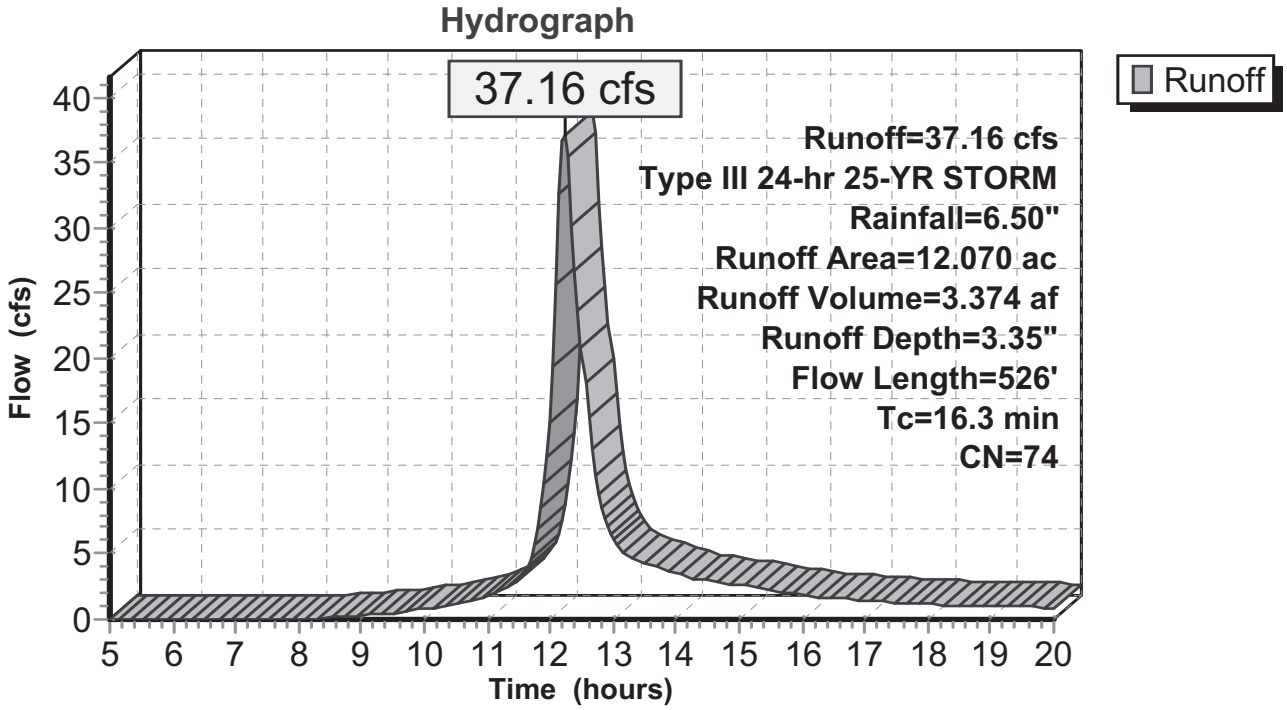
Runoff = 37.16 cfs @ 12.23 hrs, Volume= 3.374 af, Depth= 3.35"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.160	98	Existing pavement
0.150	98	Proposed pavement & roofs
0.580	79	50-75% Grass cover, Fair, HSG C
0.240	71	Meadow, non-grazed, HSG C
0.040	78	Meadow, non-grazed, HSG D
10.610	73	Woods, Fair, HSG C
0.290	79	Woods, Fair, HSG D
12.070	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0660	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.6	426	0.1575	2.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.3	526	Total			

Subcatchment 9S: Subcatchment 9S



Subcatchment 10S: Subcatchment 10S

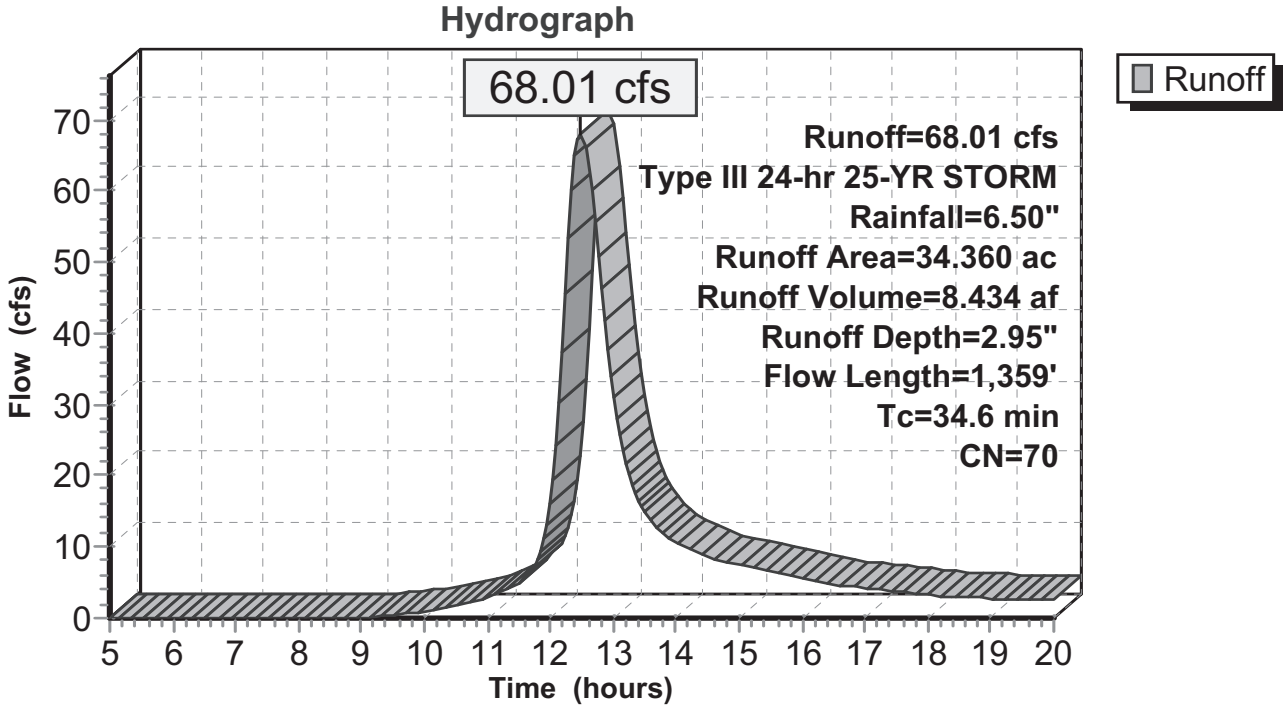
Runoff = 68.01 cfs @ 12.49 hrs, Volume= 8.434 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.300	98	Proposed pavement & roofs
0.880	79	50-75% Grass cover, Fair, HSG C
1.090	36	Woods, Fair, HSG A
29.890	70	Woods, Good, HSG C
2.200	79	Woods, Fair, HSG D
34.360	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0252	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	528	0.1545	2.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.8	133	0.3459	2.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.6	598	0.0356	0.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.6	1,359	Total			

Subcatchment 10S: Subcatchment 10S



Subcatchment 11S: Subcatchment 11S

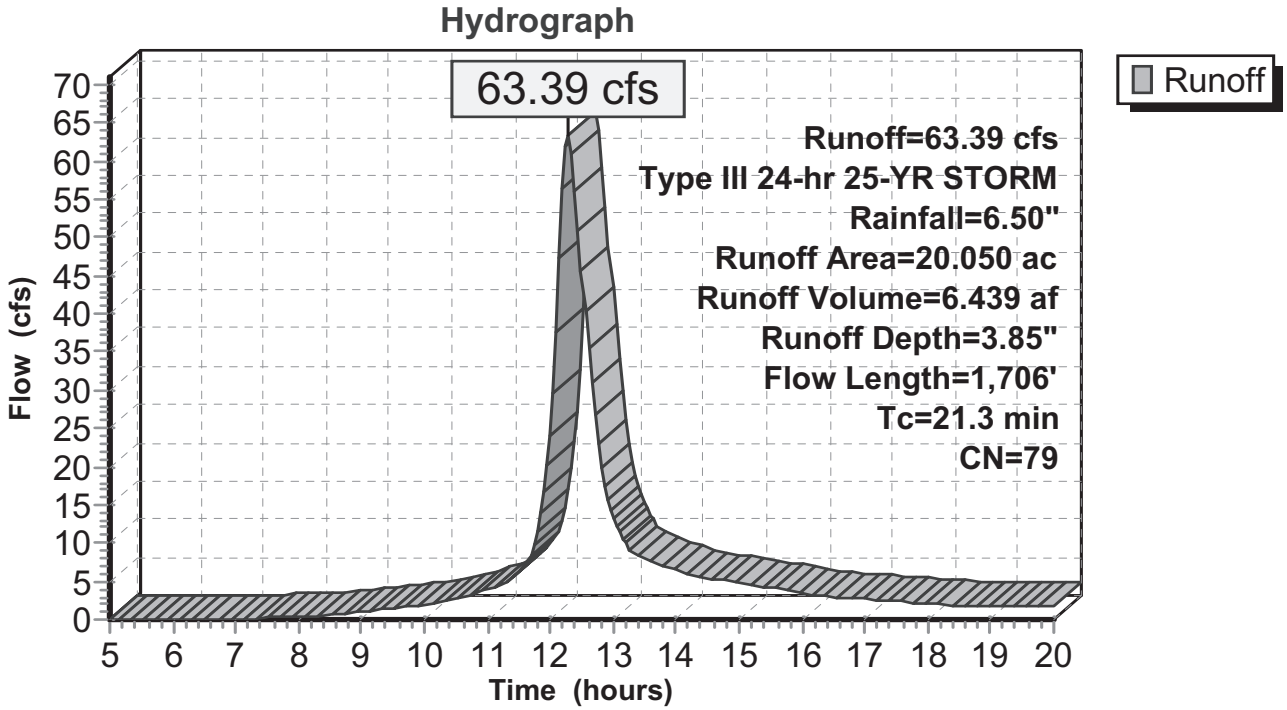
Runoff = 63.39 cfs @ 12.29 hrs, Volume= 6.439 af, Depth= 3.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
3.440	98	Proposed pavement & roofs
5.820	79	50-75% Grass cover, Fair, HSG C
0.100	71	Meadow, non-grazed, HSG C
10.690	73	Woods, Fair, HSG C
20.050	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	100	0.1425	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.2	25	0.1500	2.7		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
14.5	1,394	0.1024	1.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	72	0.0375	1.4		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.4	115	0.0742	1.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.3	1,706	Total			

Subcatchment 11S: Subcatchment 11S



Subcatchment 12S: Subcatchment 12S

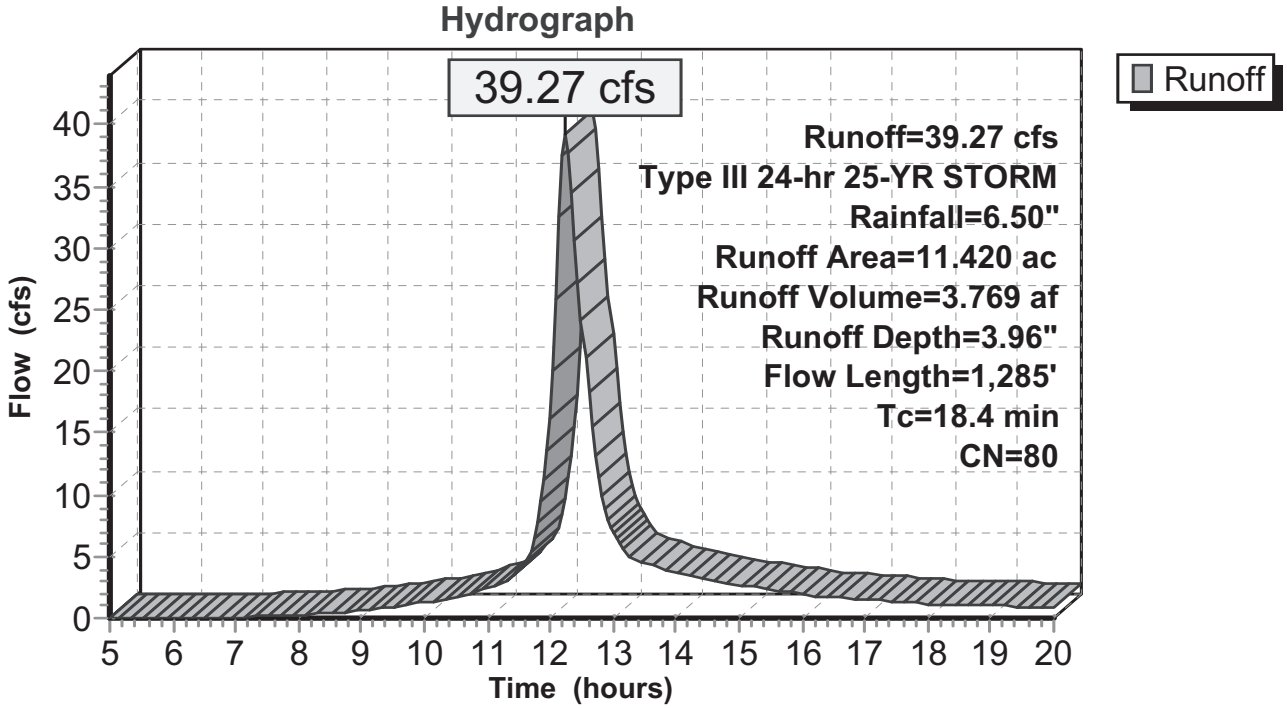
Runoff = 39.27 cfs @ 12.25 hrs, Volume= 3.769 af, Depth= 3.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
2.280	98	Proposed pavement & roofs
4.200	79	50-75% Grass cover, Fair, HSG C
4.940	73	Woods, Fair, HSG C
11.420	80	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	10	0.0300	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
10.5	90	0.0867	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
5.0	565	0.1416	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.0	129	0.0969	2.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.6	491	0.0365	13.4	23.72	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
18.4	1,285	Total			

Subcatchment 12S: Subcatchment 12S



Subcatchment 13S: Subcatchment 13S

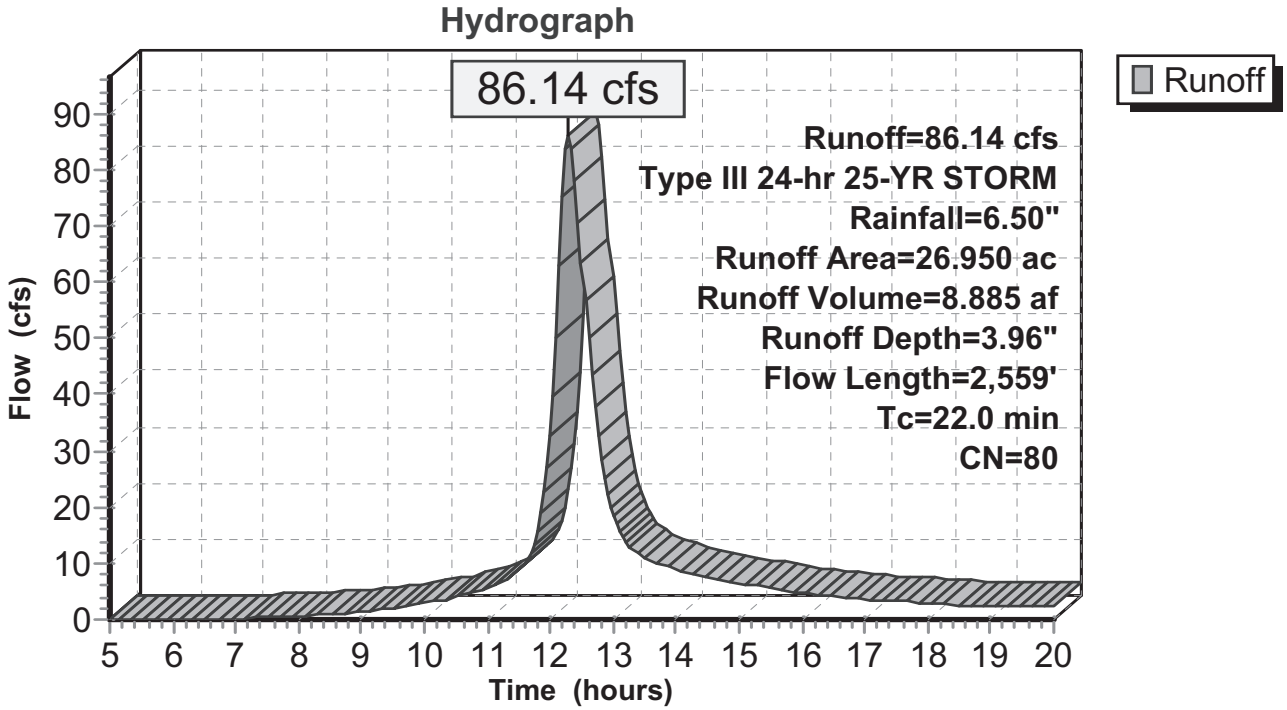
Runoff = 86.14 cfs @ 12.30 hrs, Volume= 8.885 af, Depth= 3.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
5.130	98	Proposed pavement & roofs
8.580	79	50-75% Grass cover, Fair, HSG C
13.240	73	Woods, Fair, HSG C
26.950	80	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	15	0.0300	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
10.1	85	0.0853	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.9	556	0.1403	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.0	14	0.5000	4.9		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.6	121	0.0331	1.3		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.2	365	0.0188	2.8		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	1,403	0.0498	15.7	27.70	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
22.0	2,559	Total			

Subcatchment 13S: Subcatchment 13S



Subcatchment 14S: Subcatchment 14S

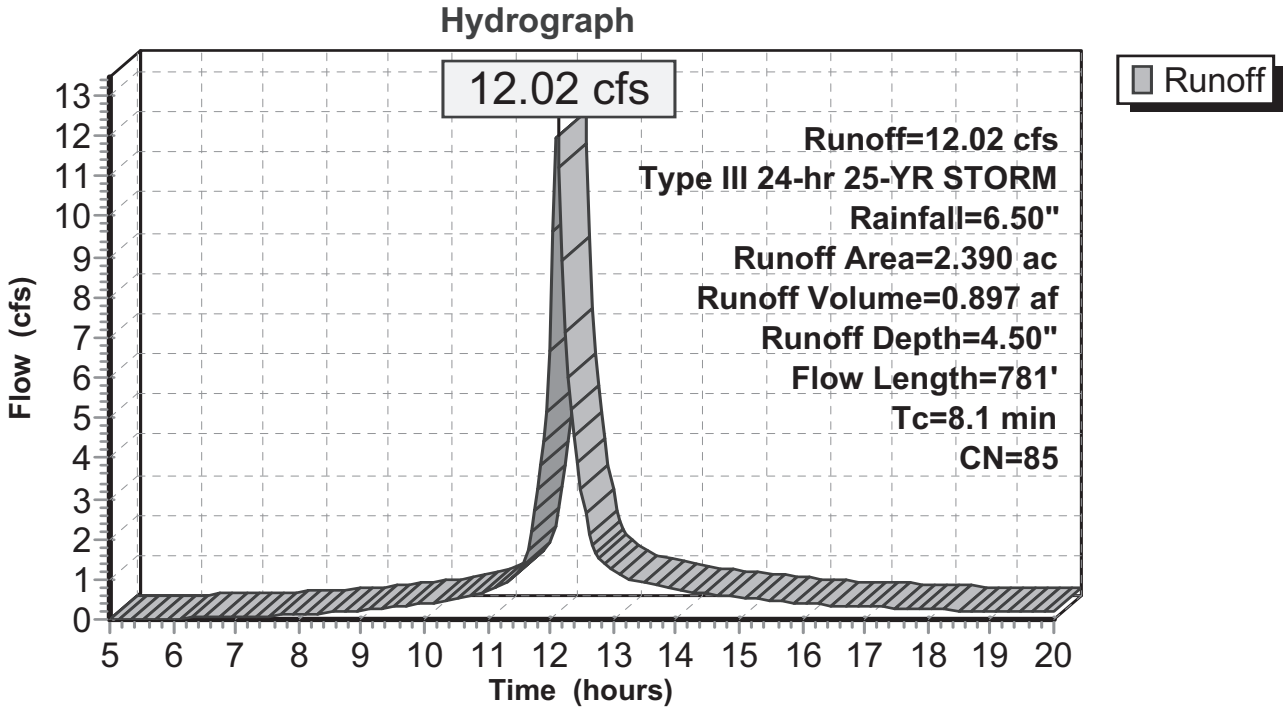
Runoff = 12.02 cfs @ 12.11 hrs, Volume= 0.897 af, Depth= 4.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-YR STORM Rainfall=6.50"

Area (ac)	CN	Description
0.810	98	Proposed pavement & roofs
1.570	79	50-75% Grass cover, Fair, HSG C
0.010	73	Woods, Fair, HSG C
2.390	85	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0425	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.9	298	0.0714	5.4		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	383	0.0835	20.3	35.87	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
8.1	781	Total			

Subcatchment 14S: Subcatchment 14S



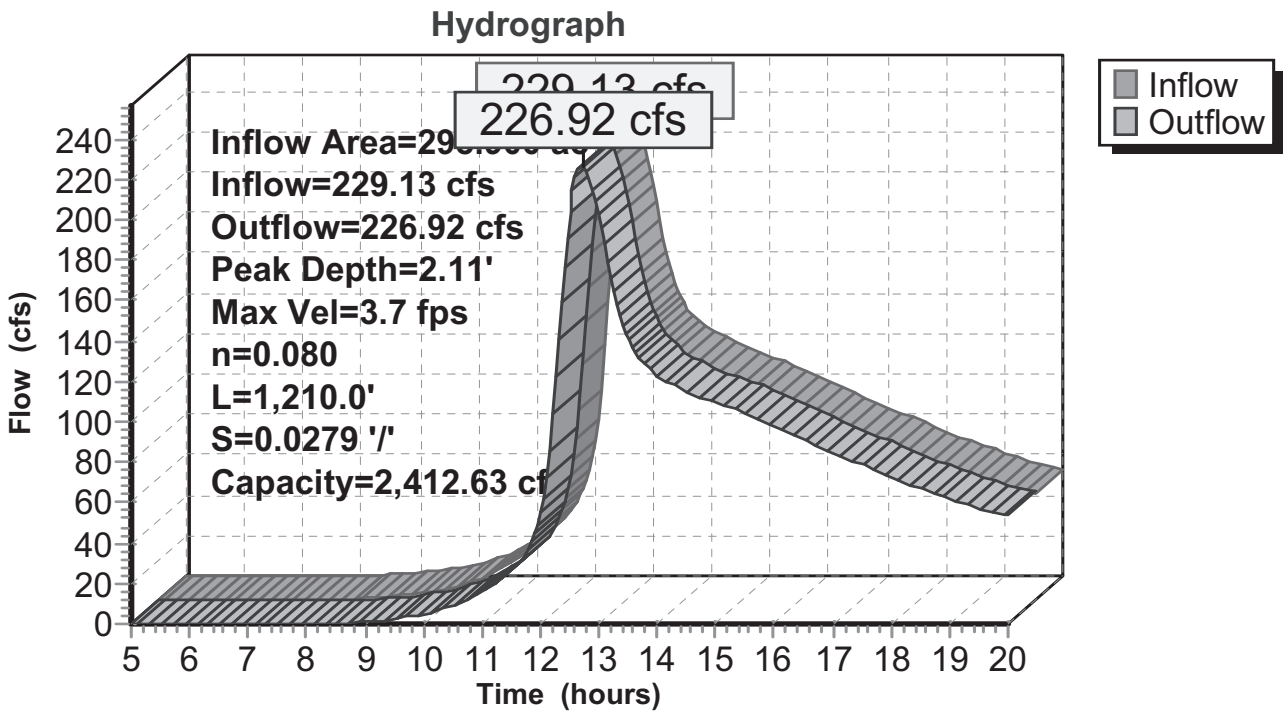
Reach 1R: Existing Stream

Inflow Area = 298.900 ac, Inflow Depth = 2.93" for 25-YR STORM event
Inflow = 229.13 cfs @ 12.64 hrs, Volume= 73.046 af
Outflow = 226.92 cfs @ 12.71 hrs, Volume= 72.452 af, Atten= 1%, Lag= 4.5 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 5.5 min
Avg. Velocity = 2.1 fps, Avg. Travel Time= 9.4 min

Peak Depth= 2.11' @ 12.71 hrs
Capacity at bank full= 2,412.63 cfs
Inlet Invert= 416.82', Outlet Invert= 383.06'
10.50' x 5.80' deep channel, n= 0.080 Length= 1,210.0' Slope= 0.0279 '/'
Side Slope Z-value= 9.4 8.5 '/'

Reach 1R: Existing Stream



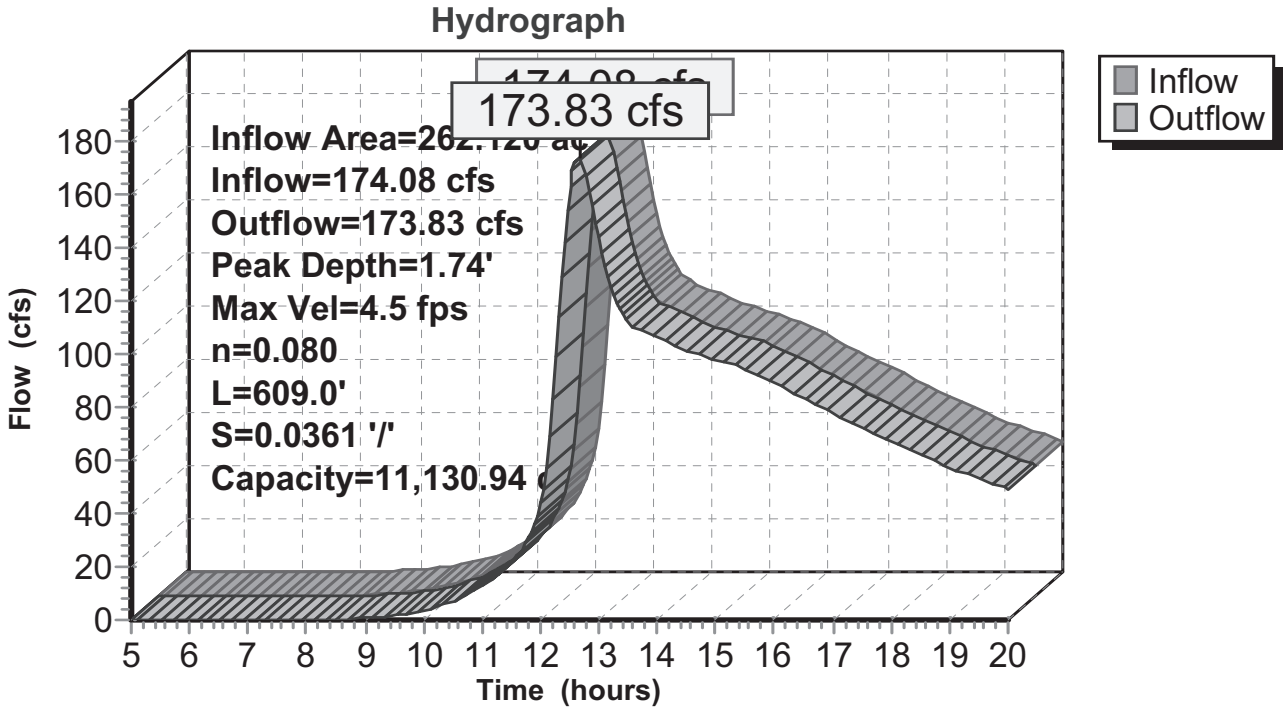
Reach 2R: Existing Stream

Inflow Area = 262.120 ac, Inflow Depth = 2.85" for 25-YR STORM event
Inflow = 174.08 cfs @ 12.63 hrs, Volume= 62.188 af
Outflow = 173.83 cfs @ 12.66 hrs, Volume= 61.952 af, Atten= 0%, Lag= 1.6 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.5 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 2.6 fps, Avg. Travel Time= 3.9 min

Peak Depth= 1.74' @ 12.66 hrs
Capacity at bank full= 11,130.94 cfs
Inlet Invert= 440.00', Outlet Invert= 418.00'
18.00' x 14.50' deep channel, n= 0.080 Length= 609.0' Slope= 0.0361 '/'
Side Slope Z-value= 2.7 2.2 '/'

Reach 2R: Existing Stream



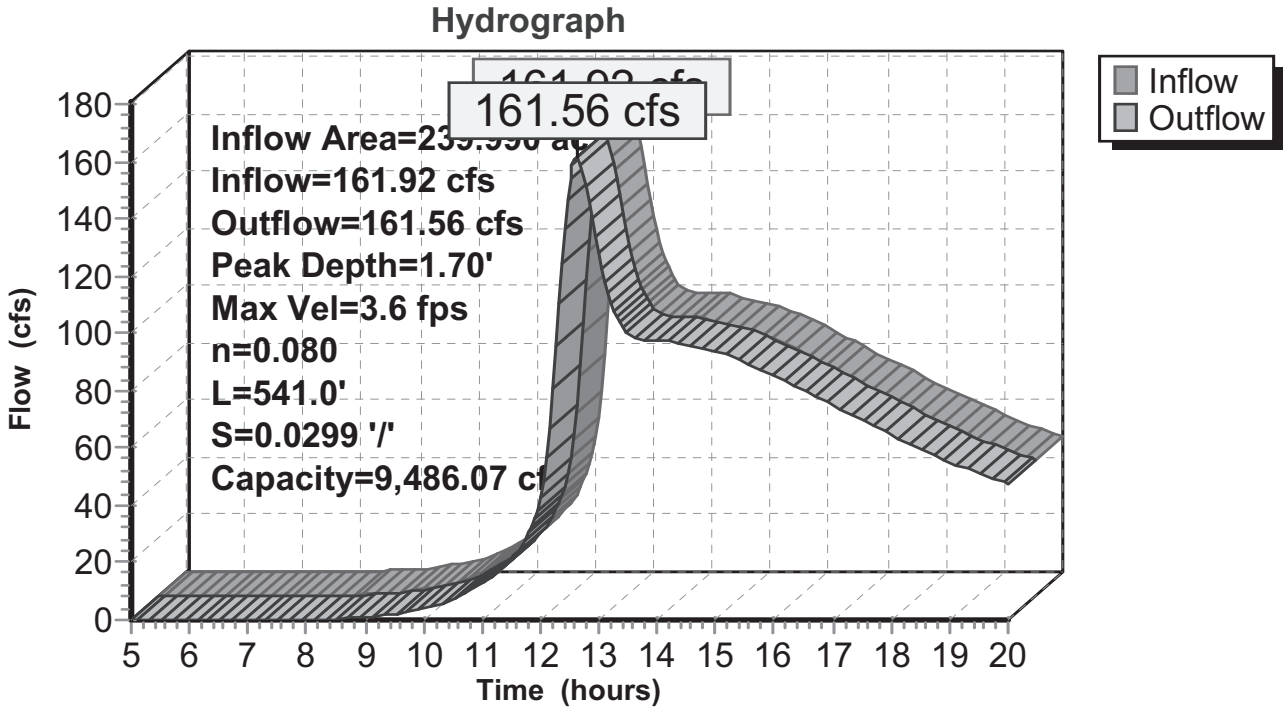
Reach 3R: Existing Stream

Inflow Area = 239.990 ac, Inflow Depth = 2.95" for 25-YR STORM event
Inflow = 161.92 cfs @ 12.60 hrs, Volume= 58.922 af
Outflow = 161.56 cfs @ 12.63 hrs, Volume= 58.689 af, Atten= 0%, Lag= 1.8 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.6 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 2.3 fps, Avg. Travel Time= 4.0 min

Peak Depth= 1.70' @ 12.63 hrs
Capacity at bank full= 9,486.07 cfs
Inlet Invert= 456.17', Outlet Invert= 440.00'
15.50' x 10.82' deep channel, n= 0.080 Length= 541.0' Slope= 0.0299 '/'
Side Slope Z-value= 7.3 5.3 '/'

Reach 3R: Existing Stream



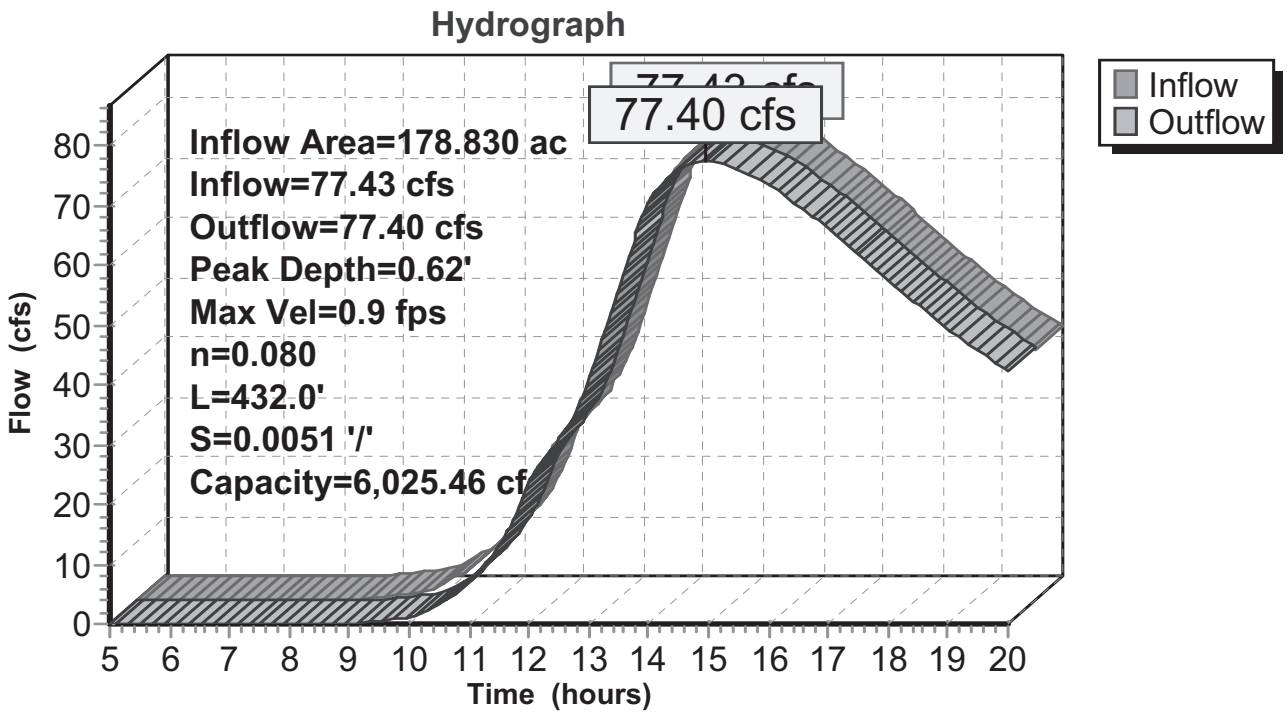
Reach 4R: Existing Stream

Inflow Area = 178.830 ac, Inflow Depth = 2.75" for 25-YR STORM event
Inflow = 77.43 cfs @ 14.86 hrs, Volume= 40.988 af
Outflow = 77.40 cfs @ 14.95 hrs, Volume= 40.415 af, Atten= 0%, Lag= 5.4 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.9 fps, Min. Travel Time= 7.9 min
Avg. Velocity = 0.6 fps, Avg. Travel Time= 11.6 min

Peak Depth= 0.62' @ 14.95 hrs
Capacity at bank full= 6,025.46 cfs
Inlet Invert= 460.18', Outlet Invert= 457.96'
124.00' x 6.50' deep channel, n= 0.080 Length= 432.0' Slope= 0.0051 '/'
Side Slope Z-value= 10.4 33.3 '/'

Reach 4R: Existing Stream



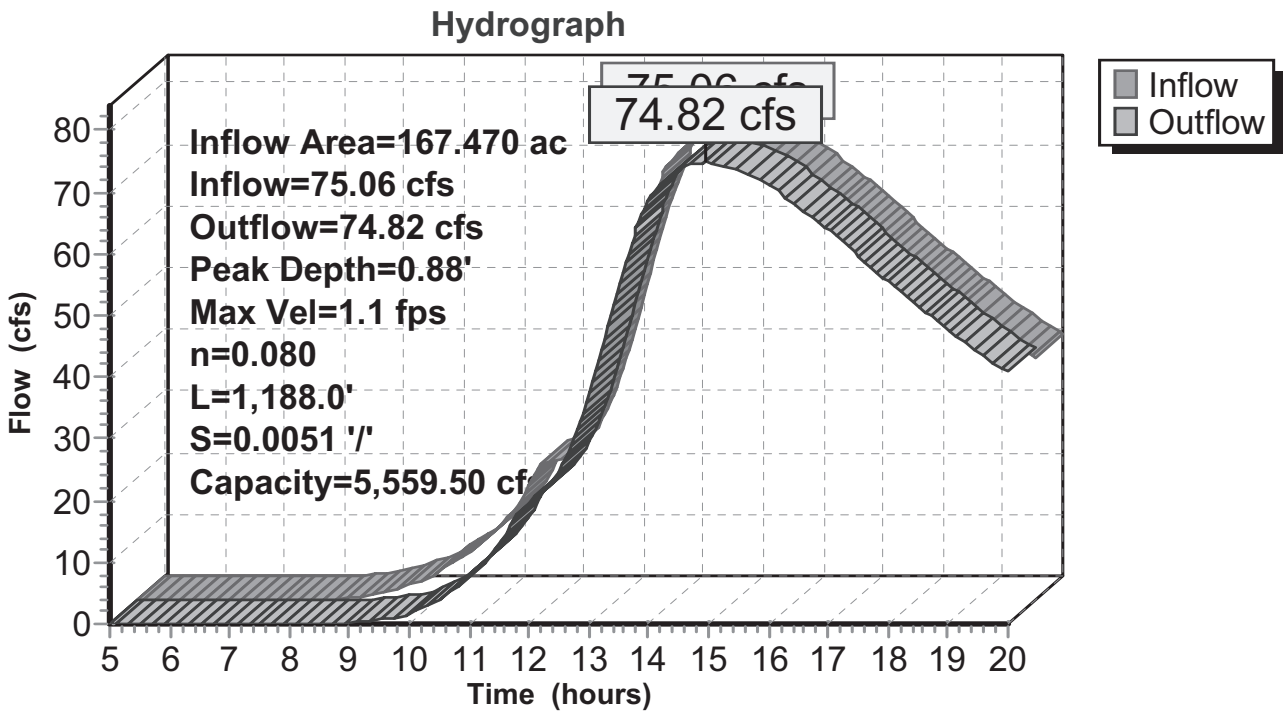
Reach 5R: Existing Stream

Inflow Area = 167.470 ac, Inflow Depth = 2.87" for 25-YR STORM event
Inflow = 75.06 cfs @ 14.69 hrs, Volume= 40.076 af
Outflow = 74.82 cfs @ 14.93 hrs, Volume= 38.831 af, Atten= 0%, Lag= 14.3 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.1 fps, Min. Travel Time= 18.0 min
Avg. Velocity = 0.7 fps, Avg. Travel Time= 26.6 min

Peak Depth= 0.88' @ 14.93 hrs
Capacity at bank full= 5,559.50 cfs
Inlet Invert= 466.24', Outlet Invert= 460.18'
64.50' x 8.00' deep channel, n= 0.080 Length= 1,188.0' Slope= 0.0051 '/'
Side Slope Z-value= 18.9 10.7 '/'

Reach 5R: Existing Stream



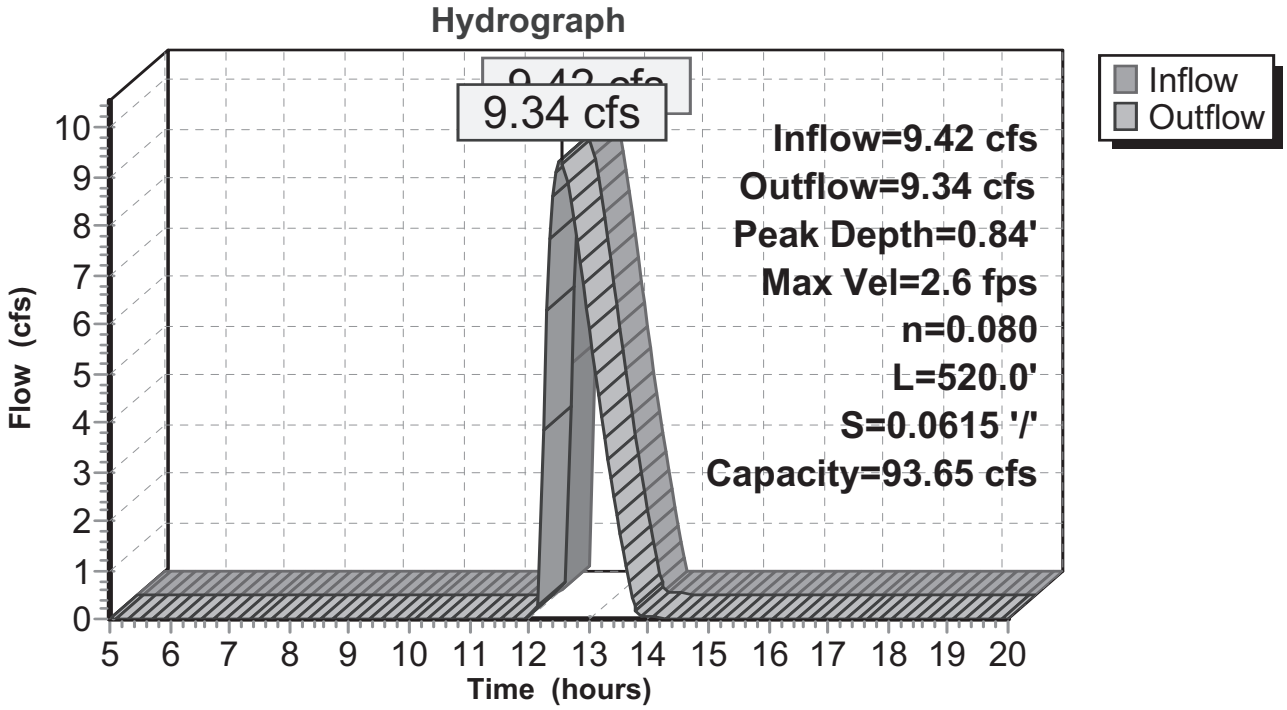
Reach 6R: Existing Swale

Inflow	=	9.42 cfs @	12.48 hrs,	Volume=	0.677 af
Outflow	=	9.34 cfs @	12.53 hrs,	Volume=	0.677 af, Atten= 1%, Lag= 2.8 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.6 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.9 fps, Avg. Travel Time= 10.2 min

Peak Depth= 0.84' @ 12.53 hrs
Capacity at bank full= 93.65 cfs
Inlet Invert= 454.00', Outlet Invert= 422.00'
0.00' x 2.00' deep channel, n= 0.080 Length= 520.0' Slope= 0.0615 '/'
Side Slope Z-value= 3.6 6.7 '/'

Reach 6R: Existing Swale



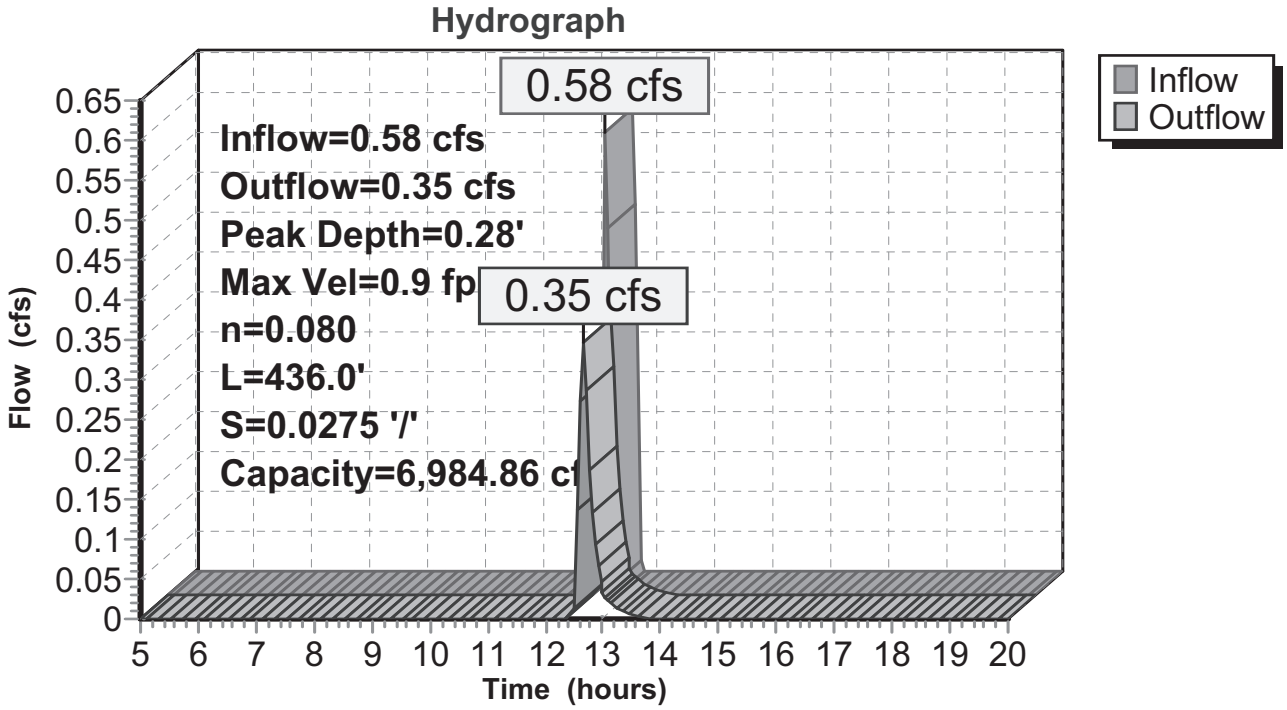
Reach 7R: Existing Swale

Inflow	=	0.58 cfs @	12.57 hrs,	Volume=	0.007 af
Outflow	=	0.35 cfs @	12.65 hrs,	Volume=	0.007 af, Atten= 41%, Lag= 4.7 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.9 fps, Min. Travel Time= 8.5 min
Avg. Velocity = 0.5 fps, Avg. Travel Time= 14.2 min

Peak Depth= 0.28' @ 12.65 hrs
Capacity at bank full= 6,984.86 cfs
Inlet Invert= 480.00', Outlet Invert= 468.00'
0.00' x 11.90' deep channel, n= 0.080 Length= 436.0' Slope= 0.0275 '/'
Side Slope Z-value= 6.8 3.1 '/'

Reach 7R: Existing Swale

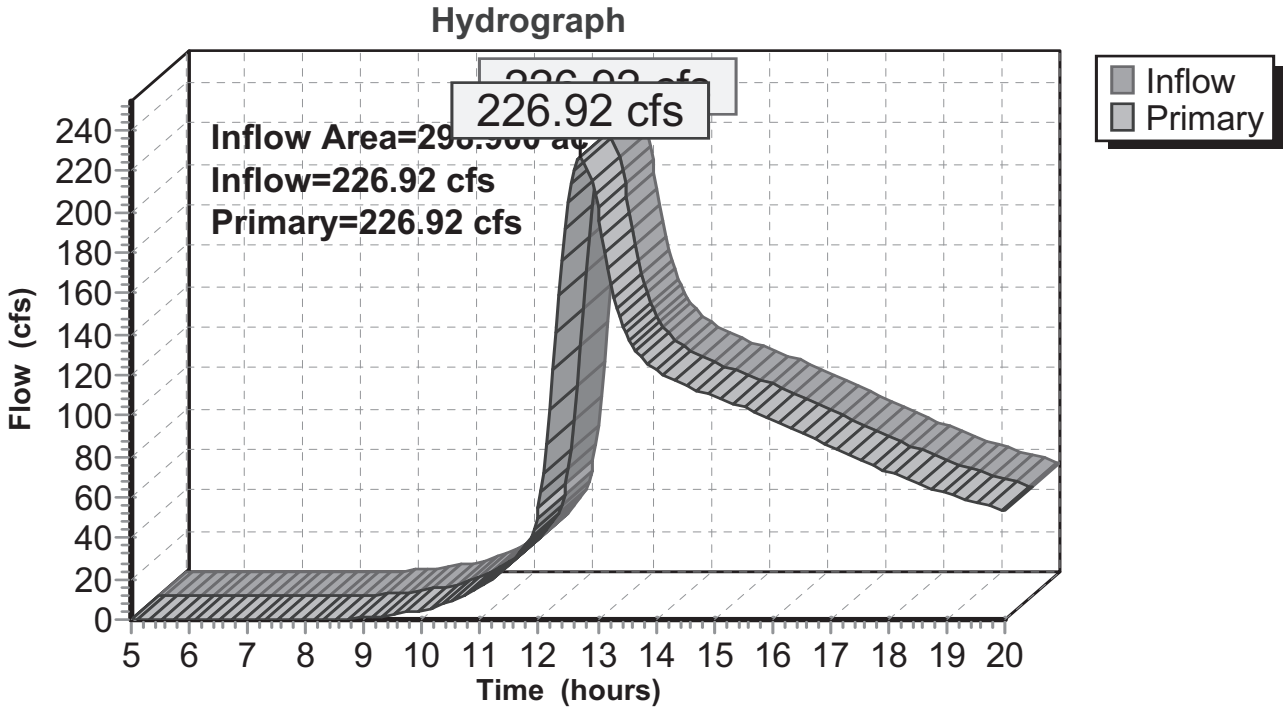


Pond 1P: Design Point 1 Outlet at Hasbrouck Road

Inflow Area = 298.900 ac, Inflow Depth = 2.91" for 25-YR STORM event
Inflow = 226.92 cfs @ 12.71 hrs, Volume= 72.452 af
Primary = 226.92 cfs @ 12.71 hrs, Volume= 72.452 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1 Outlet at Hasbrouck Road

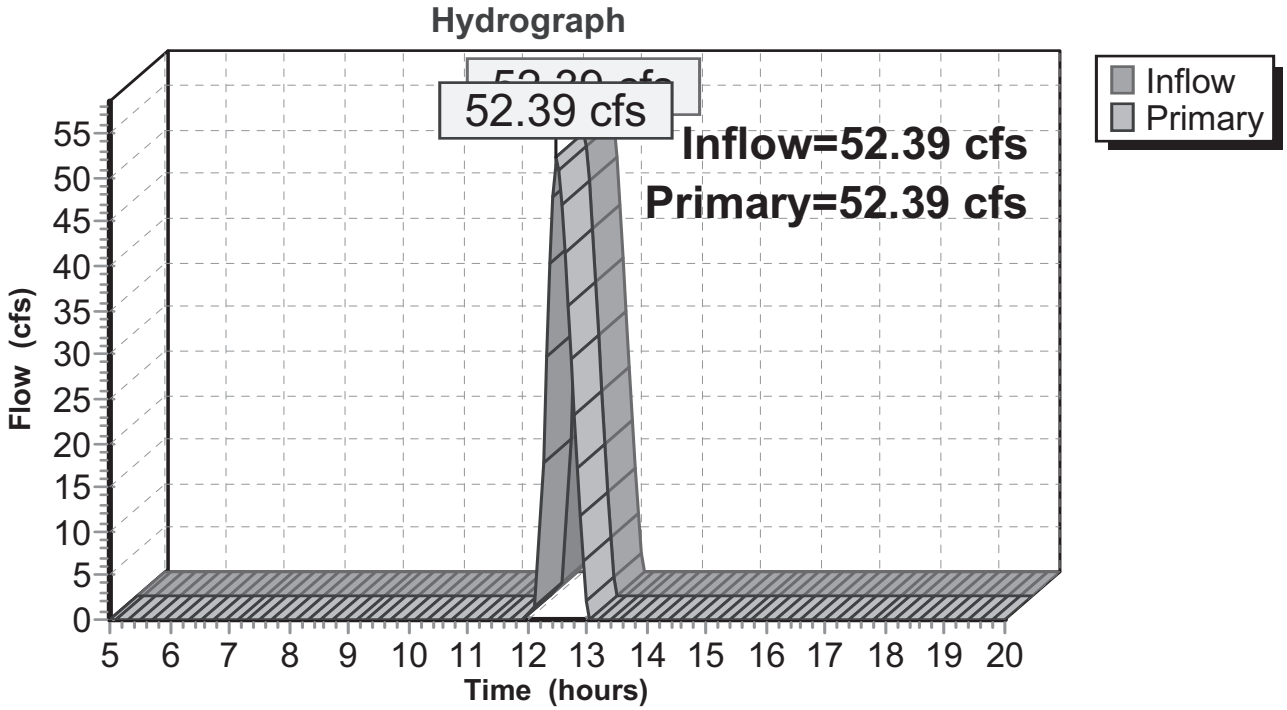


Pond 2P: Design Point 2 Existing Swale Along Craigville Road

Inflow	=	52.39 cfs @	12.49 hrs,	Volume=	2.108 af
Primary	=	52.39 cfs @	12.49 hrs,	Volume=	2.108 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 2P: Design Point 2 Existing Swale Along Craigville Road

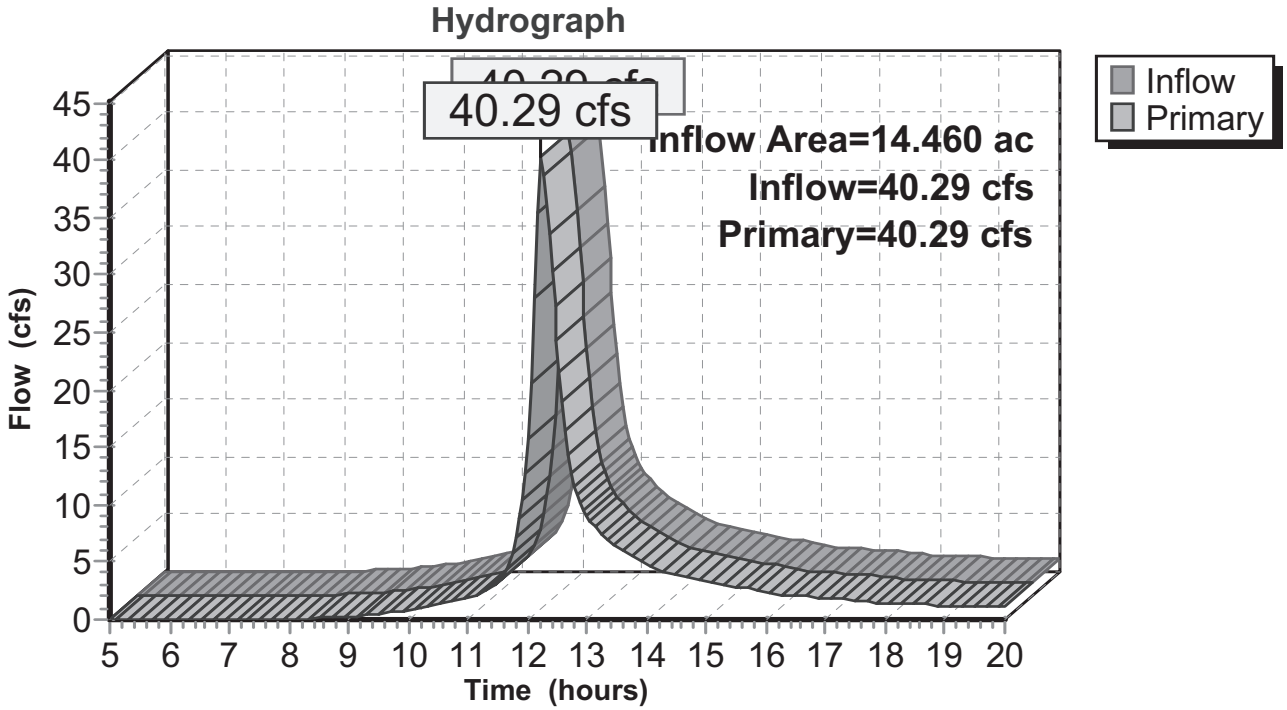


Pond 3P: Design Point 3 (Southeastern Property Line)

Inflow Area = 14.460 ac, Inflow Depth = 3.36" for 25-YR STORM event
Inflow = 40.29 cfs @ 12.23 hrs, Volume= 4.052 af
Primary = 40.29 cfs @ 12.23 hrs, Volume= 4.052 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 3P: Design Point 3 (Southeastern Property Line)

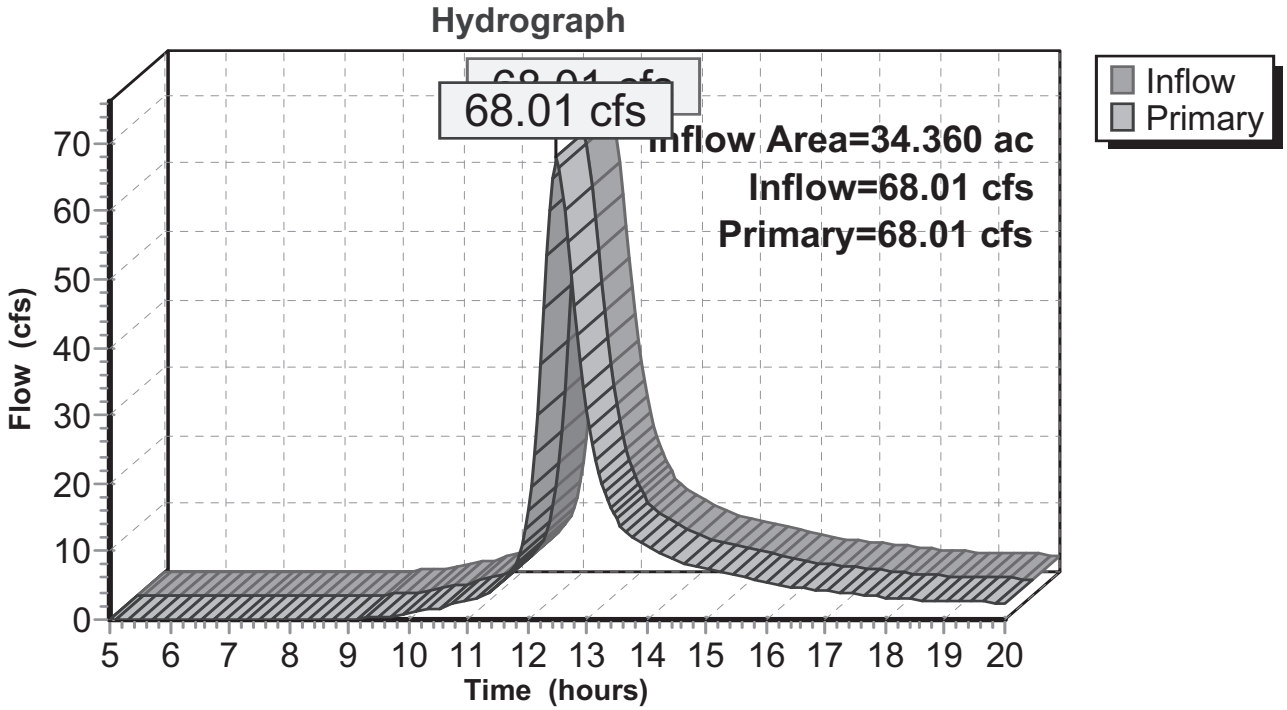


Pond 4P: Design Point 4 (Southwestern Property Line)

Inflow Area = 34.360 ac, Inflow Depth = 2.95" for 25-YR STORM event
Inflow = 68.01 cfs @ 12.49 hrs, Volume= 8.434 af
Primary = 68.01 cfs @ 12.49 hrs, Volume= 8.434 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 4P: Design Point 4 (Southwestern Property Line)



Pond 5P: Existing Wetland Pocket

Inflow Area = 167.470 ac, Inflow Depth = 3.31" for 25-YR STORM event
Inflow = 197.00 cfs @ 13.12 hrs, Volume= 46.220 af
Outflow = 75.06 cfs @ 14.69 hrs, Volume= 40.076 af, Atten= 62%, Lag= 94.6 min
Primary = 75.06 cfs @ 14.69 hrs, Volume= 40.076 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 469.92' @ 14.69 hrs Surf.Area= 0 sf Storage= 805,875 cf
Plug-Flow detention time= 126.9 min calculated for 40.076 af (87% of inflow)
Center-of-Mass det. time= 91.5 min (941.7 - 850.2)

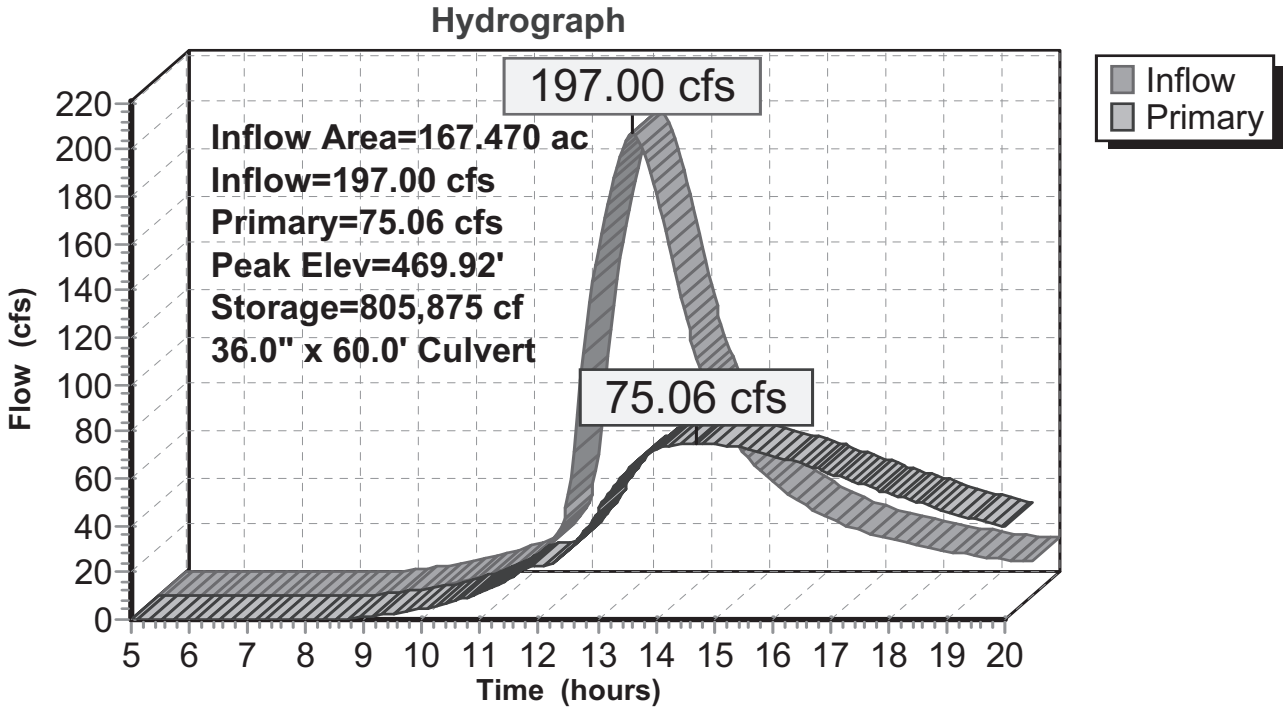
#	Invert	Avail.Storage	Storage Description
1	468.00'	4,153,277 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
468.00	0
470.00	838,050
472.00	2,316,286
474.00	4,153,277

#	Routing	Invert	Outlet Devices
1	Primary	466.24'	**36.0" x 60.0' long Culvert X 2.00** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 466.24' S= 0.0000 '/' n= 0.011 Cc= 0.900

Primary OutFlow Max=75.06 cfs @ 14.69 hrs HW=469.92' TW=467.12' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 75.06 cfs @ 5.5 fps)

Pond 5P: Existing Wetland Pocket



Pond 6P: Existing Culvert 2

Inflow Area =	36.780 ac,	Inflow Depth =	4.31"	for	25-YR STORM event
Inflow =	109.86 cfs @	12.49 hrs,	Volume=	13.202 af	
Outflow =	109.86 cfs @	12.49 hrs,	Volume=	13.202 af,	Atten= 0%, Lag= 0.0 min
Primary =	57.64 cfs @	12.45 hrs,	Volume=	11.093 af	
Secondary =	52.39 cfs @	12.49 hrs,	Volume=	2.108 af	

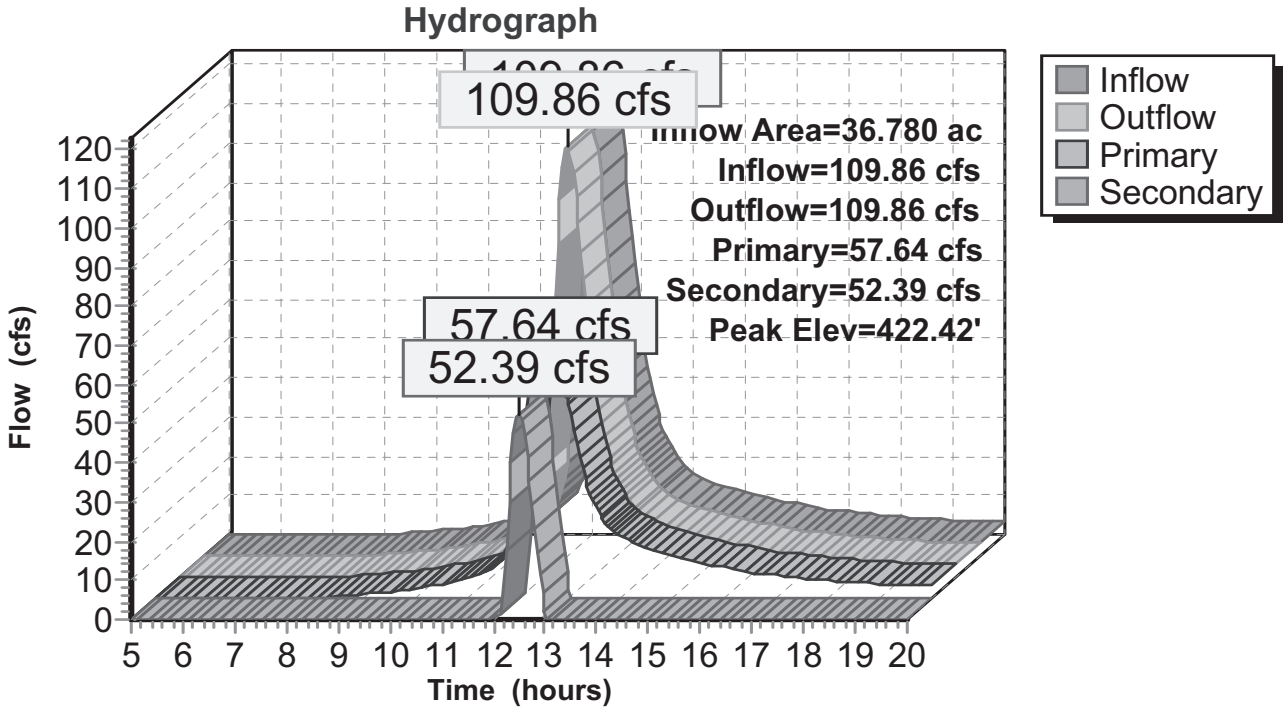
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 422.42' @ 12.49 hrs
Flood Elev= 424.00'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	417.23'	**36.0" x 45.0' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 416.82' S= 0.0091 '/' n= 0.011 Cc= 0.900
2	Secondary	421.50'	**22.0' long x 6.3' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.67 2.68 2.71 2.75 2.82

Primary OutFlow Max=57.27 cfs @ 12.45 hrs HW=422.41' TW=418.78' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 57.27 cfs @ 8.1 fps)

Secondary OutFlow Max=52.24 cfs @ 12.49 hrs HW=422.42' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 52.24 cfs @ 2.6 fps)

Pond 6P: Existing Culvert 2



Pond 7P: Existing Culvert 3

Inflow Area =	22.130 ac,	Inflow Depth =	2.26"	for	25-YR STORM event
Inflow =	22.01 cfs @	12.48 hrs,	Volume=	4.175 af	
Outflow =	22.01 cfs @	12.48 hrs,	Volume=	4.175 af,	Atten= 0%, Lag= 0.0 min
Primary =	12.59 cfs @	12.48 hrs,	Volume=	3.499 af	
Secondary =	9.42 cfs @	12.48 hrs,	Volume=	0.677 af	

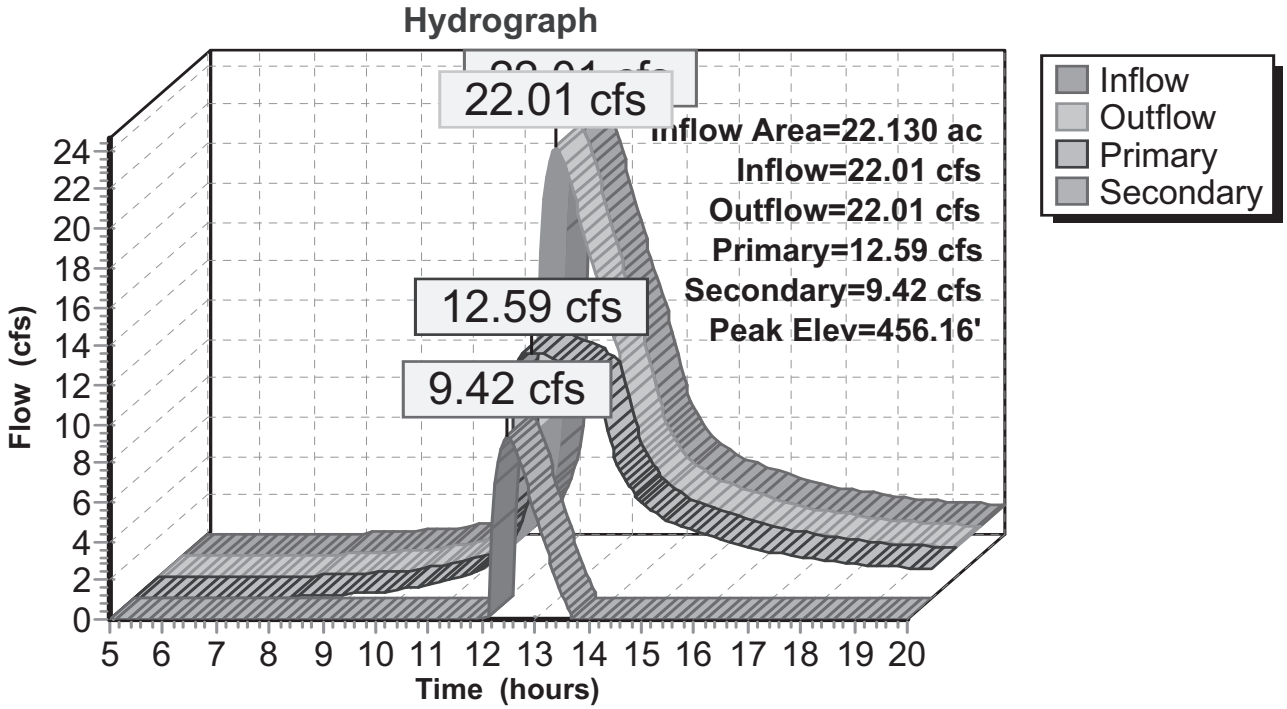
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 456.16' @ 12.48 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	452.60'	**18.0" x 45.6' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 451.11' S= 0.0327 '/' n= 0.011 Cc= 0.900
2	Secondary	455.50'	**6.5' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=12.59 cfs @ 12.48 hrs HW=456.16' TW=441.66' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 12.59 cfs @ 7.1 fps)

Secondary OutFlow Max=9.40 cfs @ 12.48 hrs HW=456.16' TW=454.84' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 9.40 cfs @ 2.2 fps)

Pond 7P: Existing Culvert 3



Pond 8P: Existing Culvert 4

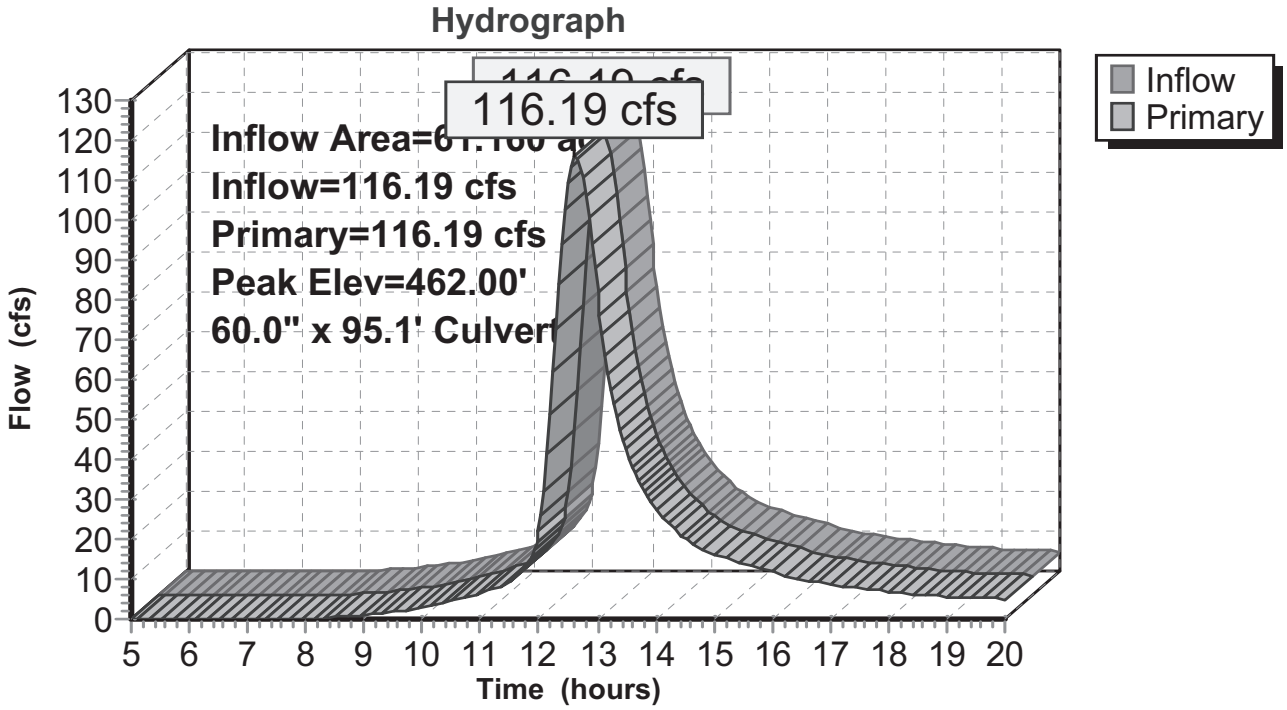
Inflow Area = 61.160 ac, Inflow Depth = 3.45" for 25-YR STORM event
Inflow = 116.19 cfs @ 12.63 hrs, Volume= 17.586 af
Outflow = 116.19 cfs @ 12.63 hrs, Volume= 17.586 af, Atten= 0%, Lag= 0.0 min
Primary = 116.19 cfs @ 12.63 hrs, Volume= 17.586 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 462.00' @ 12.63 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	457.96'	**60.0" x 95.1' long Culvert** CMP, square edge headwall, Ke= 0.500 Outlet Invert= 456.17' S= 0.0188 '/' n= 0.011 Cc= 0.900

Primary OutFlow Max=115.96 cfs @ 12.63 hrs HW=461.99' TW=457.87' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 115.96 cfs @ 6.8 fps)

Pond 8P: Existing Culvert 4



Pond 9P: Existing Culvert 5

Inflow Area =	11.360 ac,	Inflow Depth =	3.25"	for	25-YR STORM event
Inflow =	27.58 cfs @	12.38 hrs,	Volume=	3.078 af	
Outflow =	27.58 cfs @	12.38 hrs,	Volume=	3.078 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.48 cfs @	12.38 hrs,	Volume=	2.157 af	
Secondary =	20.09 cfs @	12.38 hrs,	Volume=	0.921 af	

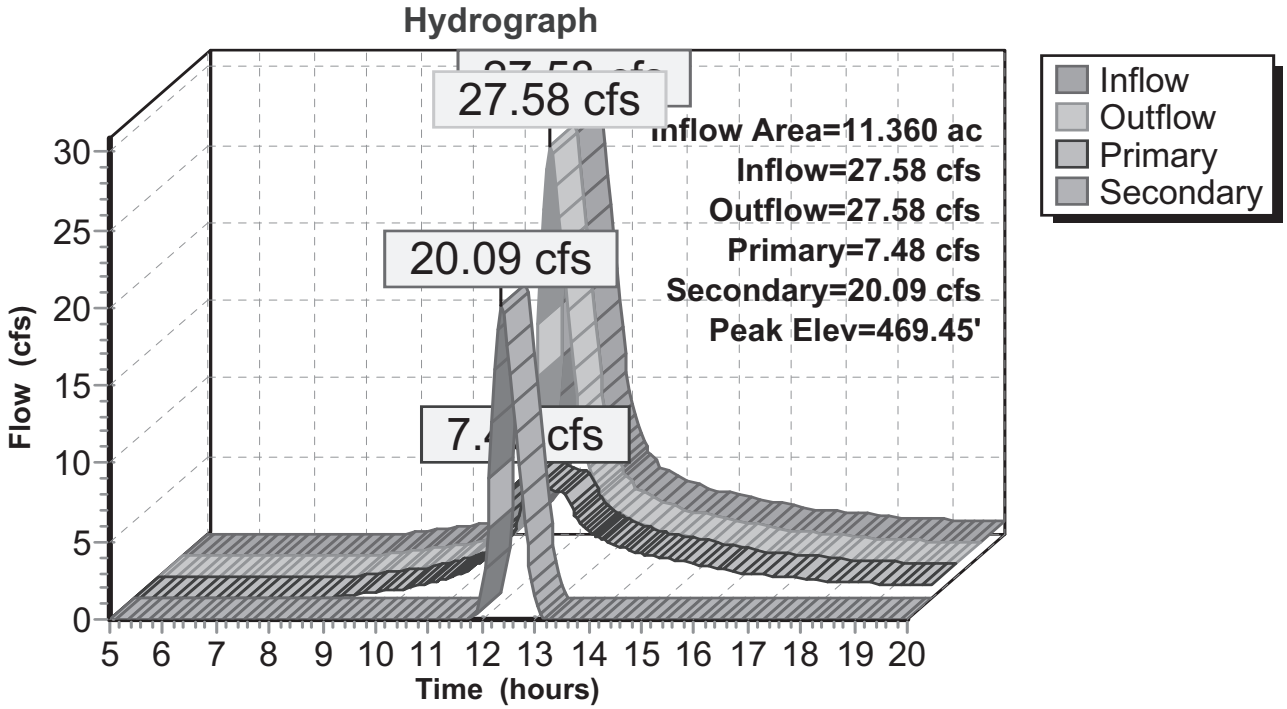
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 469.45' @ 12.38 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	466.76'	**15.0" x 50.3' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 465.61' S= 0.0229 '/' n= 0.011 Cc= 0.900
2	Secondary	469.00'	**25.0' long x 60.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=7.48 cfs @ 12.38 hrs HW=469.44' TW=460.53' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 7.48 cfs @ 6.1 fps)

Secondary OutFlow Max=19.98 cfs @ 12.38 hrs HW=469.44' TW=457.70' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 19.98 cfs @ 1.8 fps)

Pond 9P: Existing Culvert 5



Pond 10P: Existing Culvert 6

Inflow Area =	5.020 ac,	Inflow Depth =	3.32"	for	25-YR STORM event
Inflow =	10.23 cfs @	12.57 hrs,	Volume=	1.391 af	
Outflow =	10.23 cfs @	12.57 hrs,	Volume=	1.391 af,	Atten= 0%, Lag= 0.0 min
Primary =	9.65 cfs @	12.55 hrs,	Volume=	1.384 af	
Secondary =	0.58 cfs @	12.57 hrs,	Volume=	0.007 af	

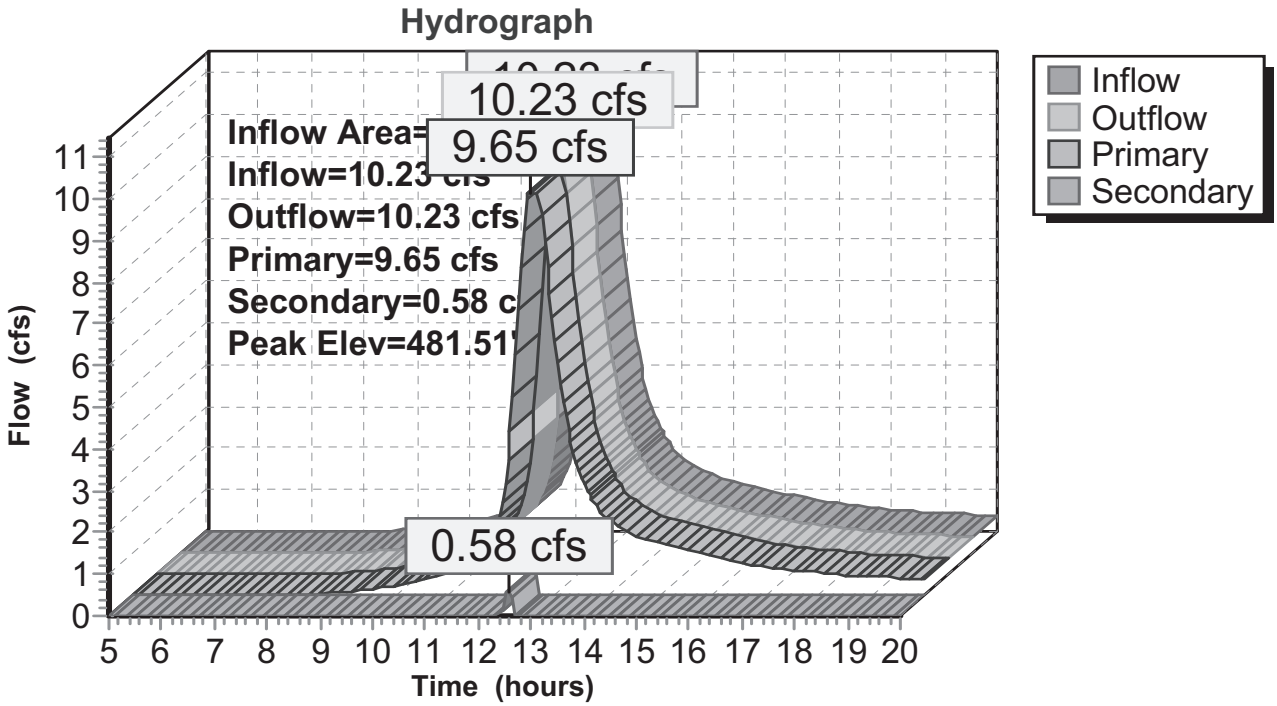
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 481.51' @ 12.55 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	477.46'	**15.0" x 54.0' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 475.67' S= 0.0331 '/' n= 0.011 Cc= 0.900
2	Secondary	481.50'	**160.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=9.65 cfs @ 12.55 hrs HW=481.51' TW=468.34' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 9.65 cfs @ 7.9 fps)

Secondary OutFlow Max=0.55 cfs @ 12.57 hrs HW=481.51' TW=480.22' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.55 cfs @ 0.3 fps)

Pond 10P: Existing Culvert 6



Pond 11P: Existing Culvert 9

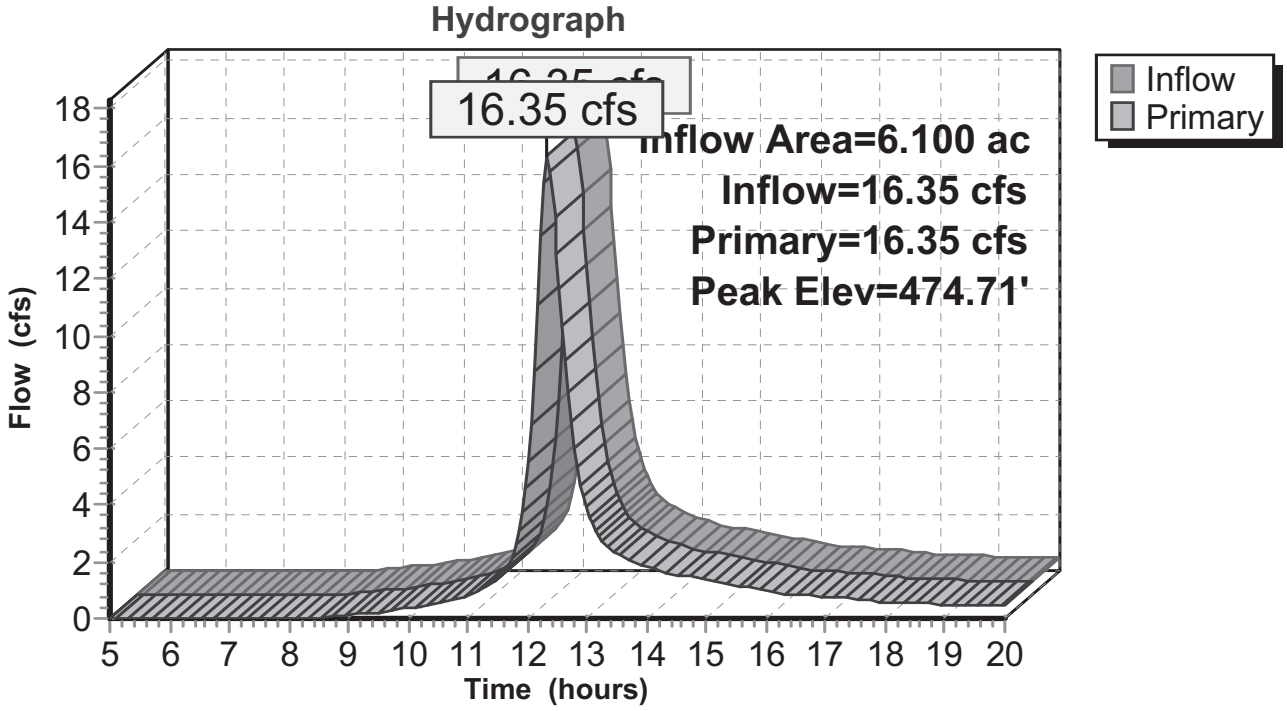
Inflow Area =	6.100 ac,	Inflow Depth =	3.35"	for	25-YR STORM event
Inflow =	16.35 cfs @	12.32 hrs,	Volume=	1.701 af	
Outflow =	16.35 cfs @	12.32 hrs,	Volume=	1.701 af,	Atten= 0%, Lag= 0.0 min
Primary =	16.35 cfs @	12.32 hrs,	Volume=	1.701 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 474.71' @ 12.32 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	471.95'	**15.0" x 45.5' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 471.00' S= 0.0209 '/' n= 0.011 Cc= 0.900
2	Primary	474.50'	**35.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=16.24 cfs @ 12.32 hrs HW=474.70' TW=468.14' (Dynamic Tailwater)
- **1=Culvert** (Inlet Controls 7.61 cfs @ 6.2 fps)
- **2=Broad-Crested Rectangular Weir** (Weir Controls 8.63 cfs @ 1.2 fps)

Pond 11P: Existing Culvert 9



Pond 12P: Existing Culvert 11

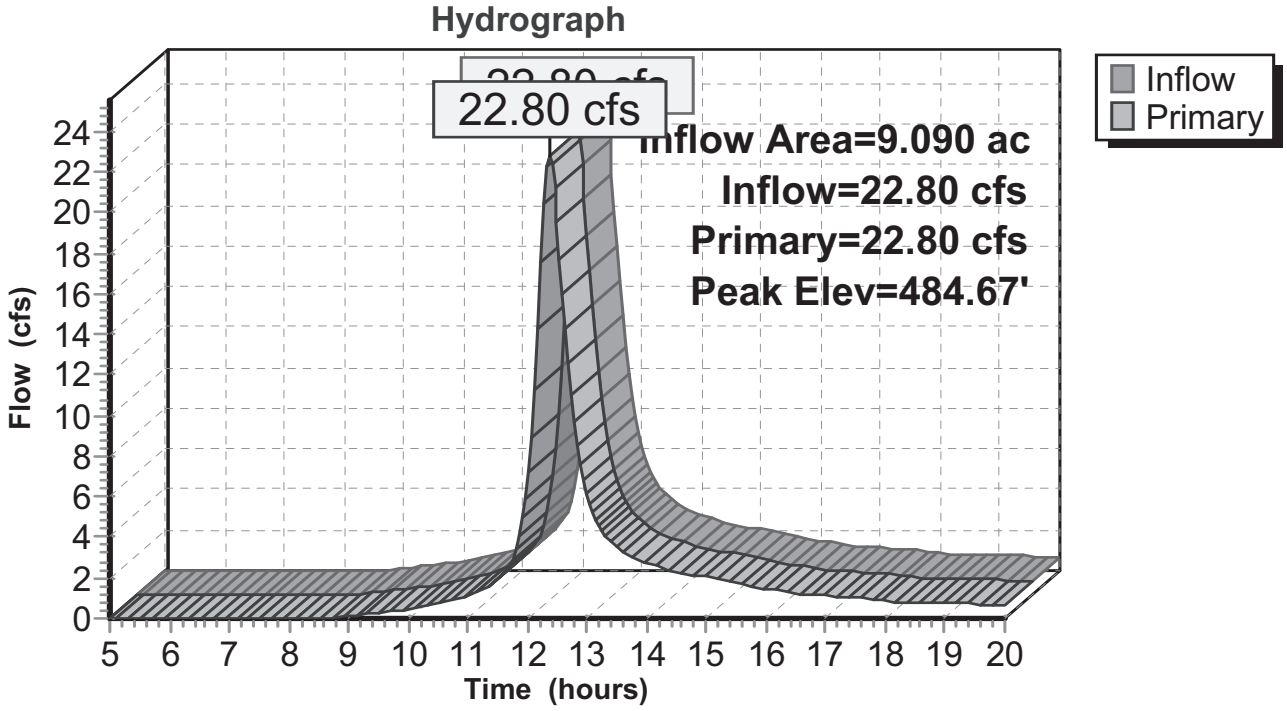
Inflow Area =	9.090 ac,	Inflow Depth =	3.25"	for	25-YR STORM event
Inflow =	22.80 cfs @	12.35 hrs,	Volume=	2.459 af	
Outflow =	22.80 cfs @	12.35 hrs,	Volume=	2.459 af,	Atten= 0%, Lag= 0.0 min
Primary =	22.80 cfs @	12.35 hrs,	Volume=	2.459 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 484.67' @ 12.35 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	480.71'	**15.0" x 53.4' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 479.74' S= 0.0182 '/' n= 0.011 Cc= 0.900
2	Primary	483.50'	**4.0' long x 125.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=22.77 cfs @ 12.35 hrs HW=484.66' TW=468.16' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 9.51 cfs @ 7.8 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 13.25 cfs @ 2.8 fps)

Pond 12P: Existing Culvert 11



Pond 13P: Detention/Treatment Pond 13P

Inflow Area =	20.050 ac,	Inflow Depth =	3.85"	for	25-YR STORM event
Inflow =	63.39 cfs @	12.29 hrs,	Volume=	6.439 af	
Outflow =	32.48 cfs @	12.63 hrs,	Volume=	5.164 af,	Atten= 49%, Lag= 20.5 min
Primary =	18.86 cfs @	12.63 hrs,	Volume=	3.470 af	
Secondary =	13.61 cfs @	12.63 hrs,	Volume=	1.694 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 463.81' @ 12.63 hrs Surf.Area= 0 sf Storage= 109,771 cf
Plug-Flow detention time= 100.6 min calculated for 5.147 af (80% of inflow)
Center-of-Mass det. time= 50.1 min (842.3 - 792.2)

#	Invert	Avail.Storage	Storage Description
1	456.00'	163,490 cf	**Custom Stage Data** Listed below

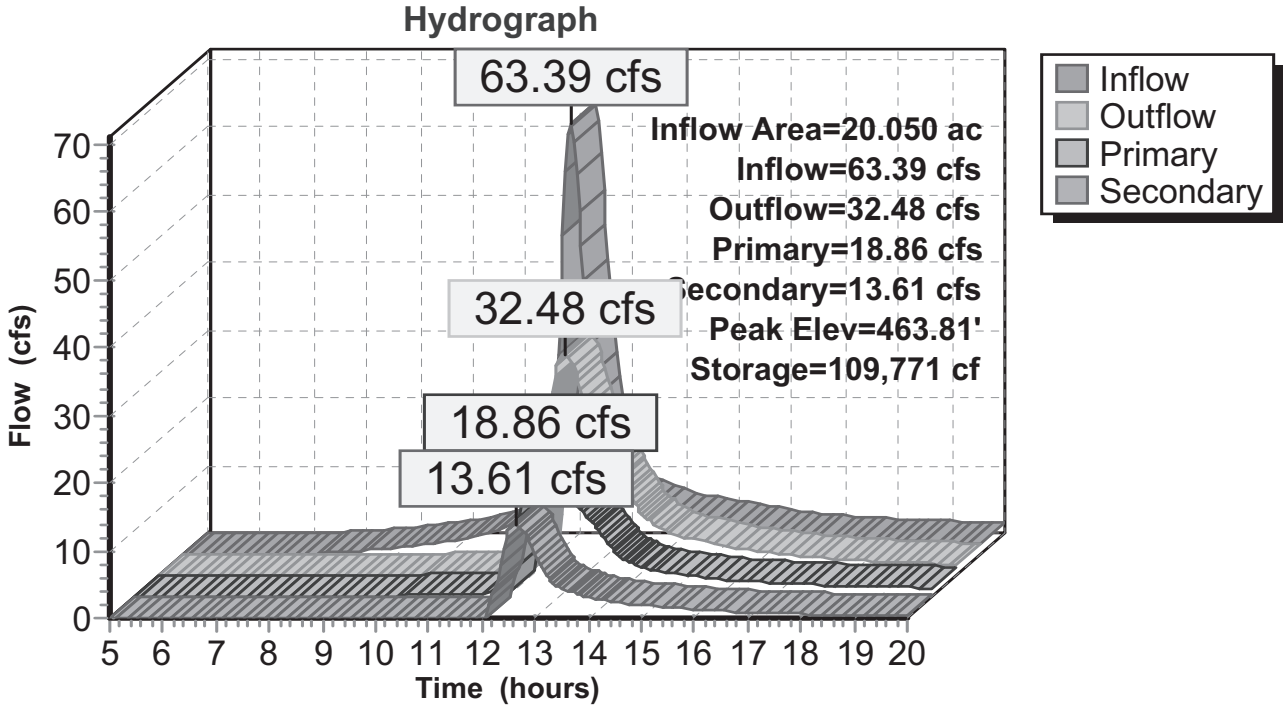
Elevation (feet)	Cum.Store (cubic-feet)
456.00	0
458.00	17,151
460.00	41,271
462.00	73,165
464.00	113,637
466.00	163,490

#	Routing	Invert	Outlet Devices
1	Primary	456.00'	**24.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 446.00' S= 0.1000 '/' n= 0.011 Cc= 0.900
2	Device 1	456.00'	**2.2" Vert. Orifice/Grate** C= 0.600
3	Device 1	456.70'	**3.3" Vert. Orifice/Grate** C= 0.600
4	Device 1	460.73'	**2.30' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	464.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
6	Device 1	465.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Secondary	456.00'	**24.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 446.00' S= 0.1000 '/' n= 0.011 Cc= 0.900
8	Device 7	460.73'	**1.65' x 0.50' Vert. Orifice/Grate** C= 0.600
9	Device 7	462.40'	**1.65' x 0.90' Vert. Orifice/Grate** C= 0.600
10	Device 7	464.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
11	Device 7	465.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
12	Primary	465.50'	**20.0' long x 13.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=18.85 cfs @ 12.63 hrs HW=463.80' TW=456.13' (Dynamic Tailwater)
- **1=Culvert** (Passes 18.85 cfs of 39.46 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.35 cfs @ 13.3 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.75 cfs @ 12.7 fps)
  - **4=Orifice/Grate** (Orifice Controls 17.74 cfs @ 7.7 fps)
  - **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  - **6=Orifice/Grate** (Controls 0.00 cfs)
- **12=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=13.59 cfs @ 12.63 hrs HW=463.80' TW=422.31' (Dynamic Tailwater)
- **7=Culvert** (Passes 13.59 cfs of 39.46 cfs potential flow)
  - **8=Orifice/Grate** (Orifice Controls 6.67 cfs @ 8.1 fps)
  - **9=Orifice/Grate** (Orifice Controls 6.92 cfs @ 4.7 fps)
  - **10=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  - **11=Orifice/Grate** (Controls 0.00 cfs)

Pond 13P: Detention/Treatment Pond 13P



Pond 14P: Detention/Treatment Pond 14P

Inflow Area =	11.420 ac,	Inflow Depth =	3.96"	for	25-YR STORM event
Inflow =	39.27 cfs @	12.25 hrs,	Volume=	3.769 af	
Outflow =	14.28 cfs @	12.68 hrs,	Volume=	3.002 af,	Atten= 64%, Lag= 25.6 min
Primary =	14.28 cfs @	12.68 hrs,	Volume=	3.002 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 497.96' @ 12.68 hrs Surf.Area= 0 sf Storage= 72,198 cf
Plug-Flow detention time= 112.2 min calculated for 2.992 af (79% of inflow)
Center-of-Mass det. time= 60.5 min (848.3 - 787.9)

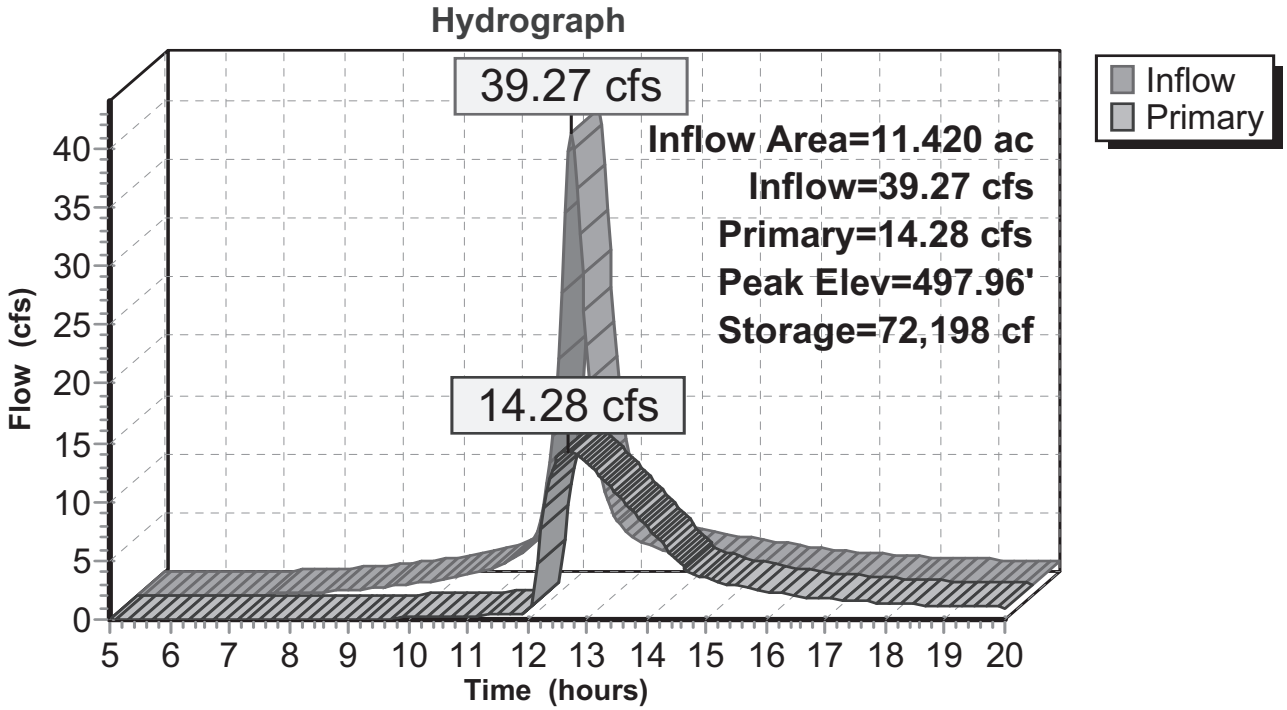
#	Invert	Avail.Storage	Storage Description
1	491.00'	112,422 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
491.00	0
492.00	5,220
494.00	20,281
496.00	42,461
498.00	72,873
500.00	112,422

#	Routing	Invert	Outlet Devices
1	Primary	491.00'	**24.0" x 60.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 490.00' S= 0.0167 '/' n= 0.011 Cc= 0.900
2	Device 1	491.00'	**1.9" Vert. Orifice/Grate** C= 0.600
3	Device 1	491.70'	**2.7" Vert. Orifice/Grate** C= 0.600
4	Device 1	495.00'	**1.80' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	498.25'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32

Primary OutFlow Max=14.27 cfs @ 12.68 hrs HW=497.95' TW=461.97' (Dynamic Tailwater)
└─**1=Culvert** (Passes 14.27 cfs of 36.91 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.25 cfs @ 12.6 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.47 cfs @ 11.9 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 13.55 cfs @ 7.5 fps)
  └─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 14P: Detention/Treatment Pond 14P



Pond 15P: Detention/Treatment Pond 15P

Inflow Area = 26.950 ac, Inflow Depth = 3.96" for 25-YR STORM event
Inflow = 86.14 cfs @ 12.30 hrs, Volume= 8.885 af
Outflow = 36.78 cfs @ 12.71 hrs, Volume= 7.018 af, Atten= 57%, Lag= 24.6 min
Primary = 36.78 cfs @ 12.71 hrs, Volume= 7.018 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 493.81' @ 12.71 hrs Surf.Area= 0 sf Storage= 168,866 cf
Plug-Flow detention time= 116.4 min calculated for 7.018 af (79% of inflow)
Center-of-Mass det. time= 63.2 min (854.0 - 790.7)

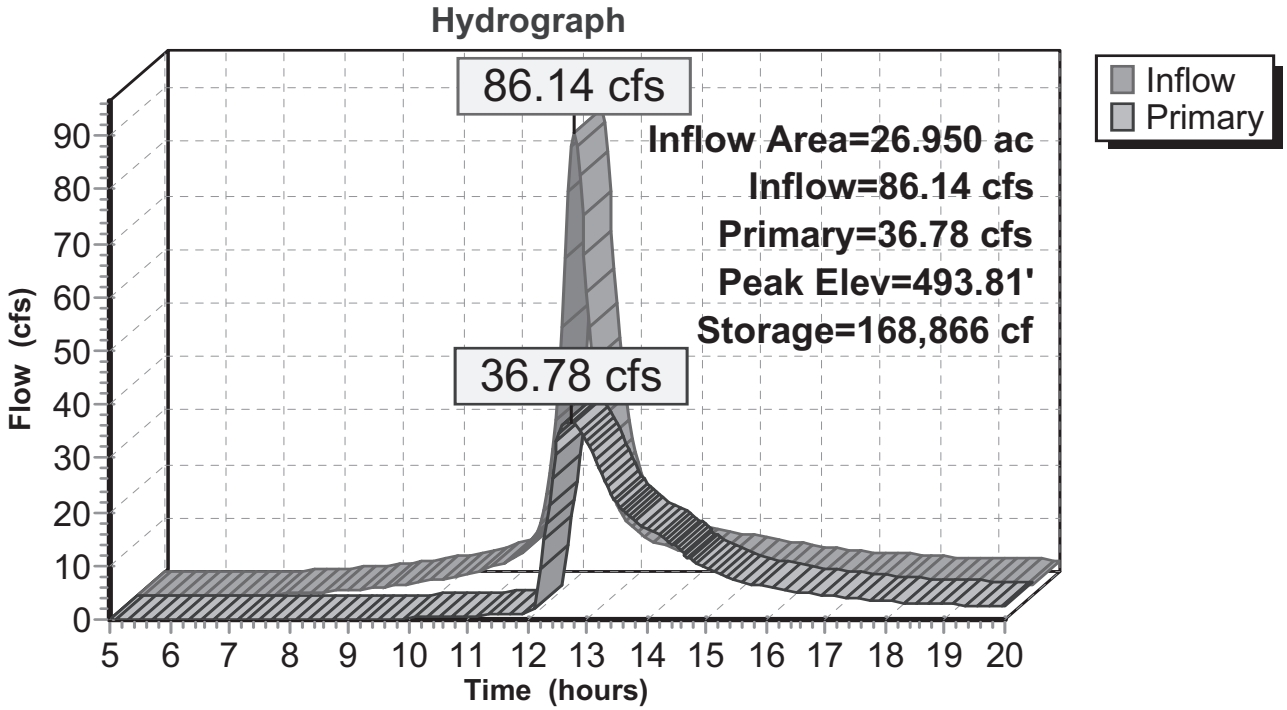
#	Invert	Avail.Storage	Storage Description
1	486.00'	250,174 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
486.00	0
488.00	26,415
490.00	63,689
492.00	112,776
494.00	174,623
496.00	250,174

#	Routing	Invert	Outlet Devices
1	Primary	486.00'	**30.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 482.00' S= 0.0400 '/' n= 0.011 Cc= 0.900
2	Device 1	486.00'	**2.7" Vert. Orifice/Grate** C= 0.600
3	Device 1	486.71'	**4.0" Vert. Orifice/Grate** C= 0.600
4	Device 1	490.47'	**3.00' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	492.43'	**3.00' x 0.75' Vert. Orifice/Grate** C= 0.600
6	Device 1	494.25'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32

Primary OutFlow Max=36.76 cfs @ 12.71 hrs HW=493.81' TW=468.51' (Dynamic Tailwater)
└─**1=Culvert** (Passes 36.76 cfs of 60.54 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.53 cfs @ 13.4 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 1.11 cfs @ 12.7 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 24.32 cfs @ 8.1 fps)
  ├─**5=Orifice/Grate** (Orifice Controls 10.80 cfs @ 4.8 fps)
  └─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 15P: Detention/Treatment Pond 15P



Pond 16P: Detention/Treatment Pond 16P

Inflow Area =	2.390 ac,	Inflow Depth =	4.50"	for	25-YR STORM event
Inflow =	12.02 cfs @	12.11 hrs,	Volume=	0.897 af	
Outflow =	3.53 cfs @	12.48 hrs,	Volume=	0.678 af,	Atten= 71%, Lag= 22.0 min
Primary =	3.53 cfs @	12.48 hrs,	Volume=	0.678 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 504.53' @ 12.48 hrs Surf.Area= 0 sf Storage= 18,613 cf
Plug-Flow detention time= 129.1 min calculated for 0.678 af (76% of inflow)
Center-of-Mass det. time= 69.7 min (838.1 - 768.4)

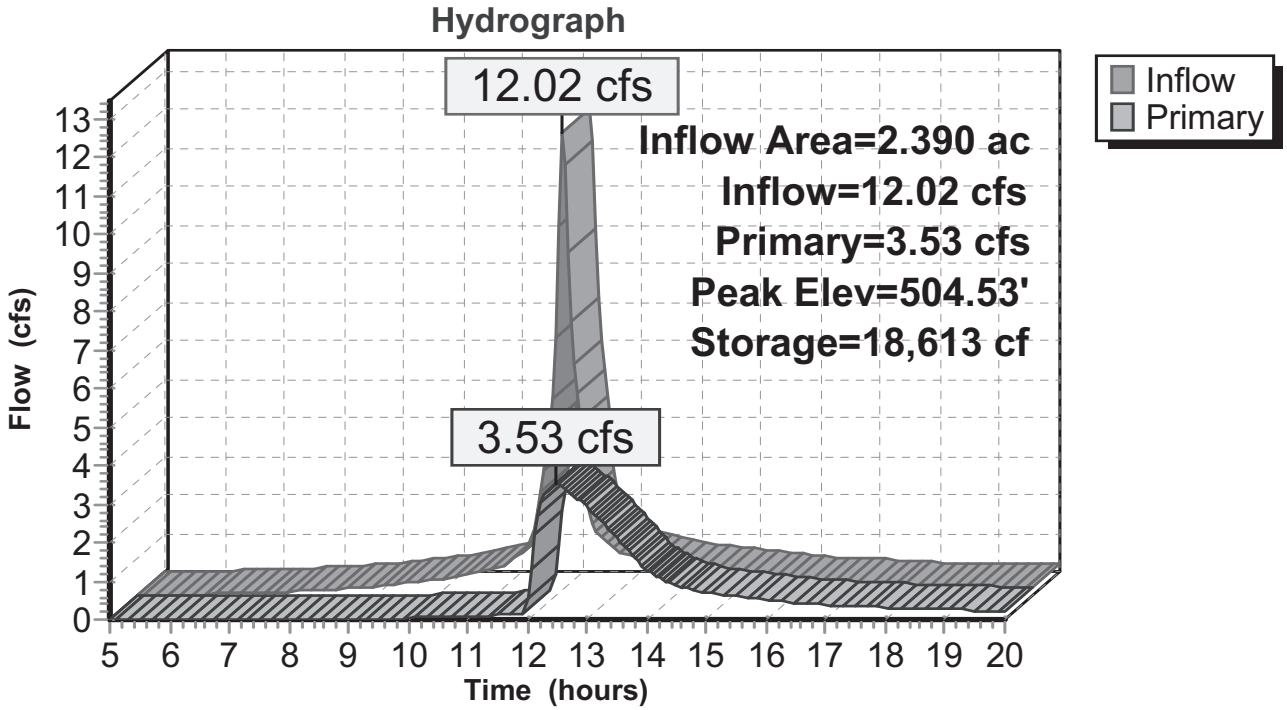
#	Invert	Avail.Storage	Storage Description
1	501.50'	29,657 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
501.50	0
502.00	2,572
504.00	14,626
506.00	29,657

#	Routing	Invert	Outlet Devices
1	Primary	501.50'	**18.0" x 40.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 497.50' S= 0.1000 '/' n= 0.011 Cc= 0.900
2	Device 1	501.50'	**1.3" Vert. Orifice/Grate** C= 0.600
3	Device 1	501.84'	**1.8" Vert. Orifice/Grate** C= 0.600
4	Device 1	503.09'	**1.25' x 0.50' Vert. Orifice/Grate** C= 0.600
5	Device 1	504.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
6	Device 1	505.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Primary	505.50'	**20.0' long x 13.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=3.52 cfs @ 12.48 hrs HW=504.53' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 3.52 cfs of 12.84 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.08 cfs @ 8.3 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.14 cfs @ 7.8 fps)
  - **4=Orifice/Grate** (Orifice Controls 3.28 cfs @ 5.2 fps)
  - **5=Broad-Crested Rectangular Weir**(Weir Controls 0.03 cfs @ 0.5 fps)
  - **6=Orifice/Grate** (Controls 0.00 cfs)
- **7=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond 16P: Detention/Treatment Pond 16P



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

Subcatchment 1S: Subcatchment 1S Runoff Area=36.780 ac Runoff Depth=4.80"
Flow Length=2,450' Tc=33.5 min CN=76 Runoff=118.96 cfs 14.706 af

Subcatchment 2S: Subcatchment 2S Runoff Area=2.080 ac Runoff Depth=5.40"
Flow Length=1,056' Tc=14.0 min CN=81 Runoff=10.63 cfs 0.936 af

Subcatchment 3S: Subcatchment 3S Runoff Area=49.740 ac Runoff Depth=4.78"
Flow Length=3,960' Tc=45.8 min CN=76 Runoff=137.42 cfs 19.807 af

Subcatchment 4S: Subcatchment 4S Runoff Area=11.360 ac Runoff Depth=4.47"
Flow Length=986' Tc=27.1 min CN=73 Runoff=37.85 cfs 4.231 af

Subcatchment 5S: Subcatchment 5S Runoff Area=5.020 ac Runoff Depth=4.56"
Flow Length=1,150' Tc=41.7 min CN=74 Runoff=13.96 cfs 1.907 af

Subcatchment 6S: Subcatchment 6S Runoff Area=6.100 ac Runoff Depth=4.59"
Flow Length=1,134' Tc=23.1 min CN=74 Runoff=22.29 cfs 2.332 af

Subcatchment 7S: Subcatchment 7S Runoff Area=120.310 ac Runoff Depth=4.59"
Flow Length=3,523' Tc=92.9 min CN=75 Runoff=211.50 cfs 45.985 af

Subcatchment 8S: Subcatchment 8S Runoff Area=9.090 ac Runoff Depth=4.47"
Flow Length=952' Tc=25.2 min CN=73 Runoff=31.27 cfs 3.388 af

Subcatchment 9S: Subcatchment 9S Runoff Area=12.070 ac Runoff Depth=4.60"
Flow Length=526' Tc=16.3 min CN=74 Runoff=50.85 cfs 4.625 af

Subcatchment 10S: Subcatchment 10S Runoff Area=34.360 ac Runoff Depth=4.12"
Flow Length=1,359' Tc=34.6 min CN=70 Runoff=95.04 cfs 11.807 af

Subcatchment 11S: Subcatchment 11S Runoff Area=20.050 ac Runoff Depth=5.16"
Flow Length=1,706' Tc=21.3 min CN=79 Runoff=83.99 cfs 8.619 af

Subcatchment 12S: Subcatchment 12S Runoff Area=11.420 ac Runoff Depth=5.28"
Flow Length=1,285' Tc=18.4 min CN=80 Runoff=51.76 cfs 5.023 af

Subcatchment 13S: Subcatchment 13S Runoff Area=26.950 ac Runoff Depth=5.27"
Flow Length=2,559' Tc=22.0 min CN=80 Runoff=113.54 cfs 11.840 af

Subcatchment 14S: Subcatchment 14S Runoff Area=2.390 ac Runoff Depth=5.87"
Flow Length=781' Tc=8.1 min CN=85 Runoff=15.44 cfs 1.169 af

Reach 1R: Existing Stream Peak Depth=2.34' Max Vel=3.9 fps Inflow=289.52 cfs 95.747 af
n=0.080 L=1,210.0' S=0.0279 '/' Capacity=2,412.63 cfs Outflow=286.54 cfs 94.996 af

Reach 2R: Existing Stream Peak Depth=2.06' Max Vel=4.9 fps Inflow=232.95 cfs 82.014 af
n=0.080 L=609.0' S=0.0361 '/' Capacity=11,130.94 cfs Outflow=232.63 cfs 81.722 af

Reach 3R: Existing Stream Peak Depth=1.99' Max Vel=3.9 fps Inflow=220.30 cfs 78.053 af
n=0.080 L=541.0' S=0.0299 '/' Capacity=9,486.07 cfs Outflow=219.81 cfs 77.760 af

Reach 4R: Existing Stream Peak Depth=0.69' Max Vel=1.0 fps Inflow=93.00 cfs 53.073 af
n=0.080 L=432.0' S=0.0051 '/' Capacity=6,025.46 cfs Outflow=92.97 cfs 52.360 af

Reach 5R: Existing Stream Peak Depth=0.97' Max Vel=1.2 fps Inflow=89.90 cfs 51.915 af
n=0.080 L=1,188.0' S=0.0051 '/' Capacity=5,559.50 cfs Outflow=89.71 cfs 50.356 af

Reach 6R: Existing Swale Peak Depth=1.02' Max Vel=2.9 fps Inflow=15.74 cfs 1.358 af
n=0.080 L=520.0' S=0.0615 '/' Capacity=93.65 cfs Outflow=15.61 cfs 1.358 af

Reach 7R: Existing Swale Peak Depth=0.72' Max Vel=1.5 fps Inflow=4.25 cfs 0.133 af
n=0.080 L=436.0' S=0.0275 '/' Capacity=6,984.86 cfs Outflow=4.00 cfs 0.133 af

Pond 1P: Design Point 1 Outlet at Hasbrouck Road Inflow=286.54 cfs 94.996 af
Primary=286.54 cfs 94.996 af

Pond 2P: Design Point 2 Existing Swale Along Craigville Road Inflow=93.53 cfs 4.688 af
Primary=93.53 cfs 4.688 af

Pond 3P: Design Point 3 (Southeastern Property Line) Inflow=56.18 cfs 5.570 af
Primary=56.18 cfs 5.570 af

Pond 4P: Design Point 4 (Southwestern Property Line) Inflow=95.04 cfs 11.807 af
Primary=95.04 cfs 11.807 af

Pond 5P: Existing Wetland Pocket Peak Elev=470.50' Storage=1,210,030 cf Inflow=268.28 cfs 63.410 af
36.0" x 60.0' Culvert Outflow=89.90 cfs 51.915 af

Pond 6P: Existing Culvert 2 Peak Elev=422.87' Inflow=152.80 cfs 18.713 af
Primary=60.08 cfs 14.025 af Secondary=93.53 cfs 4.688 af Outflow=152.80 cfs 18.713 af

Pond 7P: Existing Culvert 3 Peak Elev=456.44' Inflow=28.93 cfs 5.612 af
Primary=13.19 cfs 4.254 af Secondary=15.74 cfs 1.358 af Outflow=28.93 cfs 5.612 af

Pond 8P: Existing Culvert 4 Peak Elev=463.30' Inflow=159.28 cfs 24.047 af
60.0" x 95.1' Culvert Outflow=159.28 cfs 24.047 af

Pond 9P: Existing Culvert 5 Peak Elev=469.59' Inflow=38.48 cfs 4.364 af
Primary=7.75 cfs 2.718 af Secondary=30.74 cfs 1.646 af Outflow=38.48 cfs 4.364 af

Pond 10P: Existing Culvert 6 Peak Elev=481.55' Inflow=13.96 cfs 1.907 af
Primary=9.70 cfs 1.775 af Secondary=4.25 cfs 0.133 af Outflow=13.96 cfs 1.907 af

Pond 11P: Existing Culvert 9 Peak Elev=474.79' Inflow=22.29 cfs 2.332 af
Outflow=22.29 cfs 2.332 af

Pond 12P: Existing Culvert 11 Peak Elev=485.09' Inflow=31.27 cfs 3.388 af
Outflow=31.27 cfs 3.388 af

Pond 13P: Detention/Treatment Pond 13 Peak Elev=464.99' Storage=138,400 cf Inflow=83.99 cfs 8.619 af
Primary=25.14 cfs 4.676 af Secondary=20.89 cfs 2.649 af Outflow=46.04 cfs 7.325 af

Pond 14P: Detention/Treatment Pond 14P Peak Elev=498.99' Storage=92,525 cf Inflow=51.76 cfs 5.023 af
Outflow=21.85 cfs 4.240 af

Pond 15P: Detention/Treatment Pond 1 Peak Elev=495.04' Storage=213,962 cf Inflow=113.54 cfs 11.840 af
Outflow=52.51 cfs 9.931 af

Pond 16P: Detention/Treatment Pond 16P Peak Elev=504.99' Storage=22,032 cf Inflow=15.44 cfs 1.169 af
Outflow=6.51 cfs 0.946 af

Total Runoff Area = 347.720 ac Runoff Volume = 136.374 af Average Runoff Depth = 4.71"

Subcatchment 1S: Subcatchment 1S

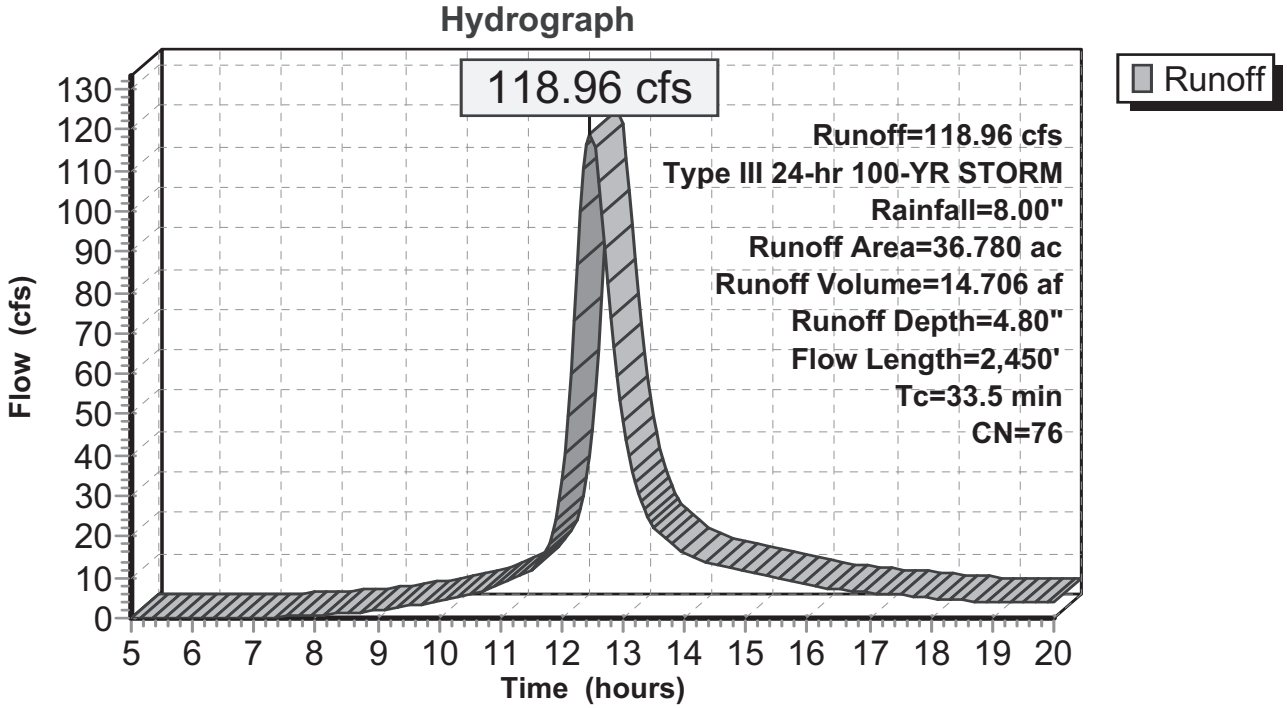
Runoff = 118.96 cfs @ 12.46 hrs, Volume= 14.706 af, Depth= 4.80"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.920	98	Existing pavement
0.300	98	Proposed pavement & roofs
16.310	79	50-75% Grass cover, Fair, HSG C
0.210	71	Meadow, non-grazed, HSG C
19.040	73	Woods, Fair, HSG C
36.780	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7	100	0.1300	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
8.5	746	0.0846	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.5	598	0.1003	2.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.8	1,006	0.0962	1.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
33.5	2,450	Total			

Subcatchment 1S: Subcatchment 1S



Subcatchment 2S: Subcatchment 2S

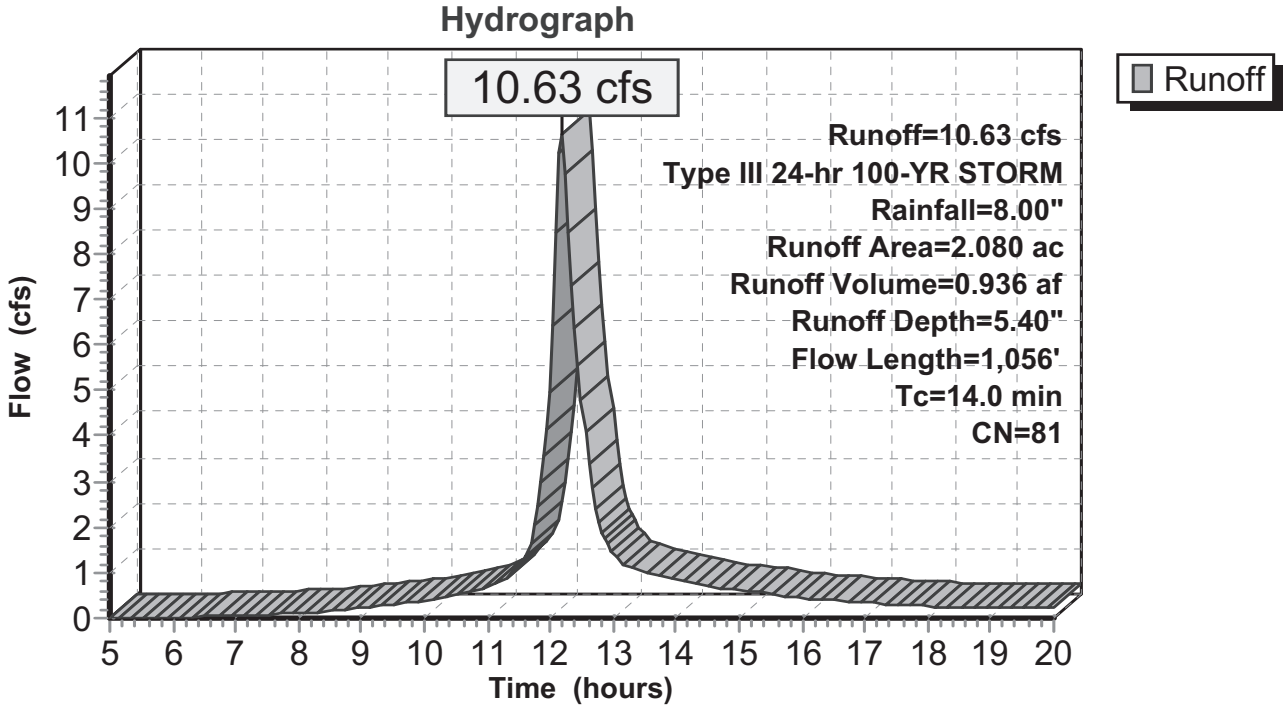
Runoff = 10.63 cfs @ 12.19 hrs, Volume= 0.936 af, Depth= 5.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.080	98	Existing pavement
0.360	98	Proposed pavement & roofs
1.060	79	50-75% Grass cover, Fair, HSG C
0.080	71	Meadow, non-grazed, HSG C
0.500	73	Woods, Fair, HSG C
2.080	81	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	100	0.0475	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
5.2	646	0.0863	2.1		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.0	80	0.0719	1.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.2	230	0.0435	3.1		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.0	1,056	Total			

Subcatchment 2S: Subcatchment 2S



Subcatchment 3S: Subcatchment 3S

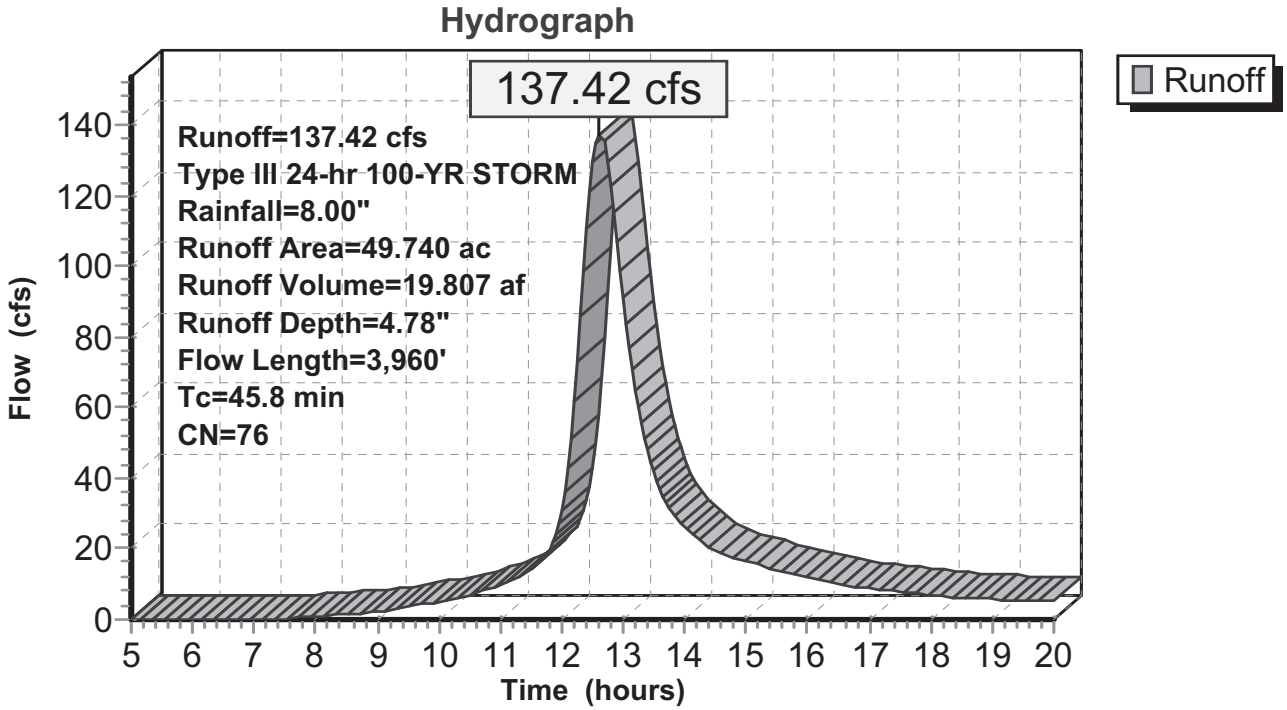
Runoff = 137.42 cfs @ 12.62 hrs, Volume= 19.807 af, Depth= 4.78"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.450	98	Existing pavement
1.950	98	Proposed pavement & roofs
5.210	79	50-75% Grass cover, Fair, HSG C
0.310	71	Meadow, non-grazed, HSG C
0.870	78	Meadow, non-grazed, HSG D
30.910	73	Woods, Fair, HSG C
10.040	79	Woods, Fair, HSG D
49.740	76	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	100	0.0350	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
12.9	814	0.0445	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.8	1,806	0.0836	3.8	43.28	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=1.50' Z= 5.0 '/' n= 0.091
8.7	1,240	0.0081	2.4	5.22	**Channel Flow,** Area= 2.2 sf Perim= 10.4' r= 0.21' n= 0.020
45.8	3,960	Total			

Subcatchment 3S: Subcatchment 3S



Subcatchment 4S: Subcatchment 4S

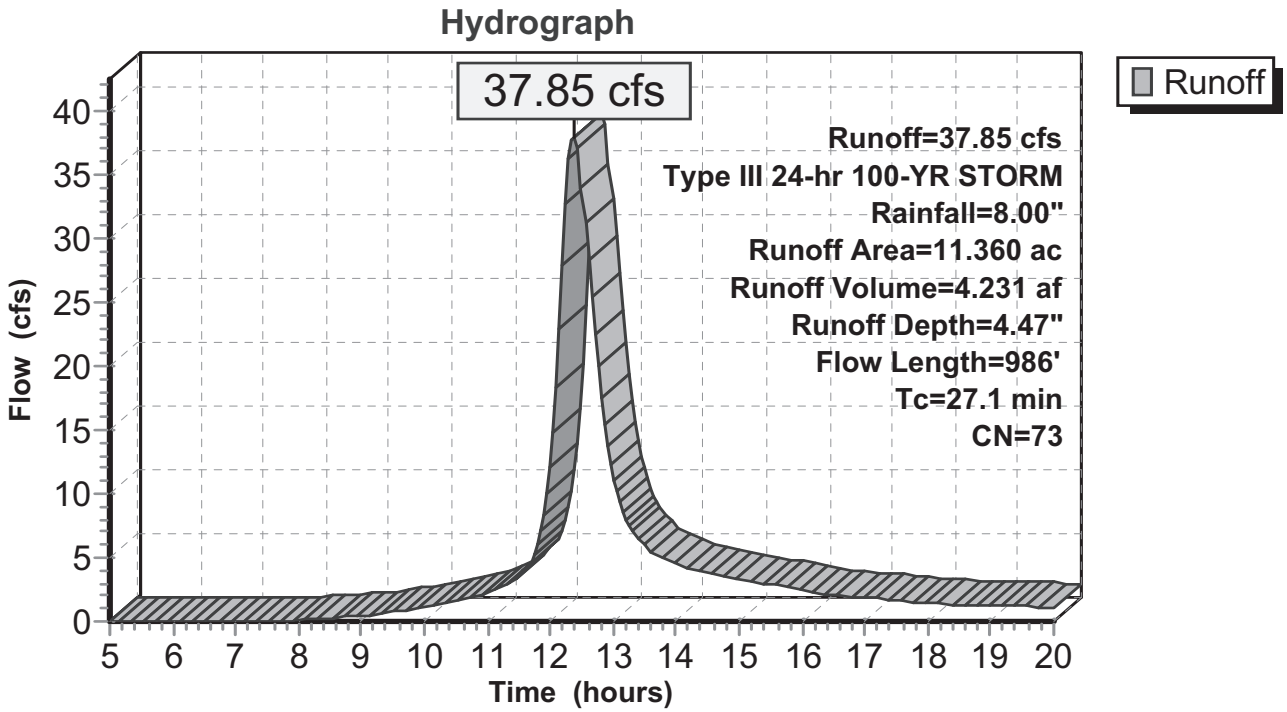
Runoff = 37.85 cfs @ 12.37 hrs, Volume= 4.231 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.170	98	Existing pavement
0.090	71	Meadow, non-grazed, HSG C
0.220	78	Meadow, non-grazed, HSG D
0.050	36	Woods, Fair, HSG A
10.670	73	Woods, Fair, HSG C
0.160	79	Woods, Fair, HSG D
11.360	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.1	100	0.0432	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
12.0	886	0.0601	1.2		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.1	986	Total			

Subcatchment 4S: Subcatchment 4S



Subcatchment 5S: Subcatchment 5S

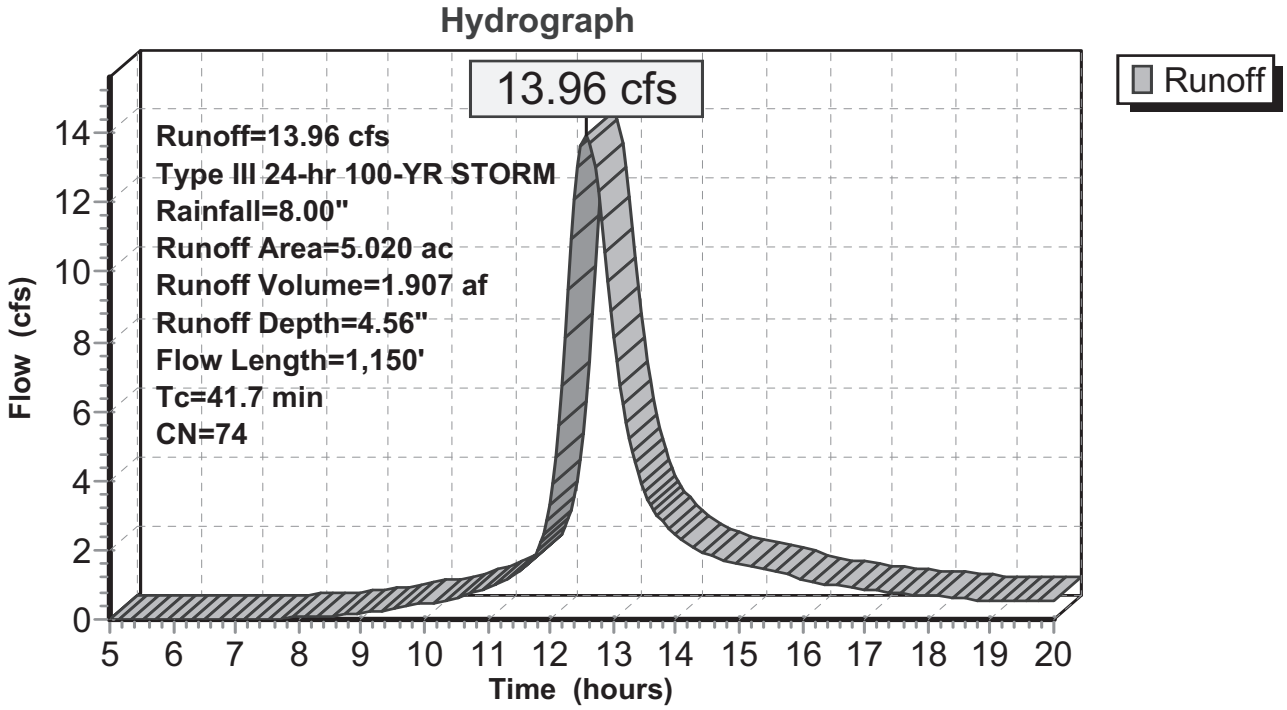
Runoff = 13.96 cfs @ 12.57 hrs, Volume= 1.907 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.230	98	Existing pavement
0.380	71	Meadow, non-grazed, HSG C
4.410	73	Woods, Fair, HSG C
5.020	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0457	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.2	175	0.0340	0.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	133	0.2400	2.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.8	742	0.0060	0.5		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
41.7	1,150	Total			

Subcatchment 5S: Subcatchment 5S



Subcatchment 6S: Subcatchment 6S

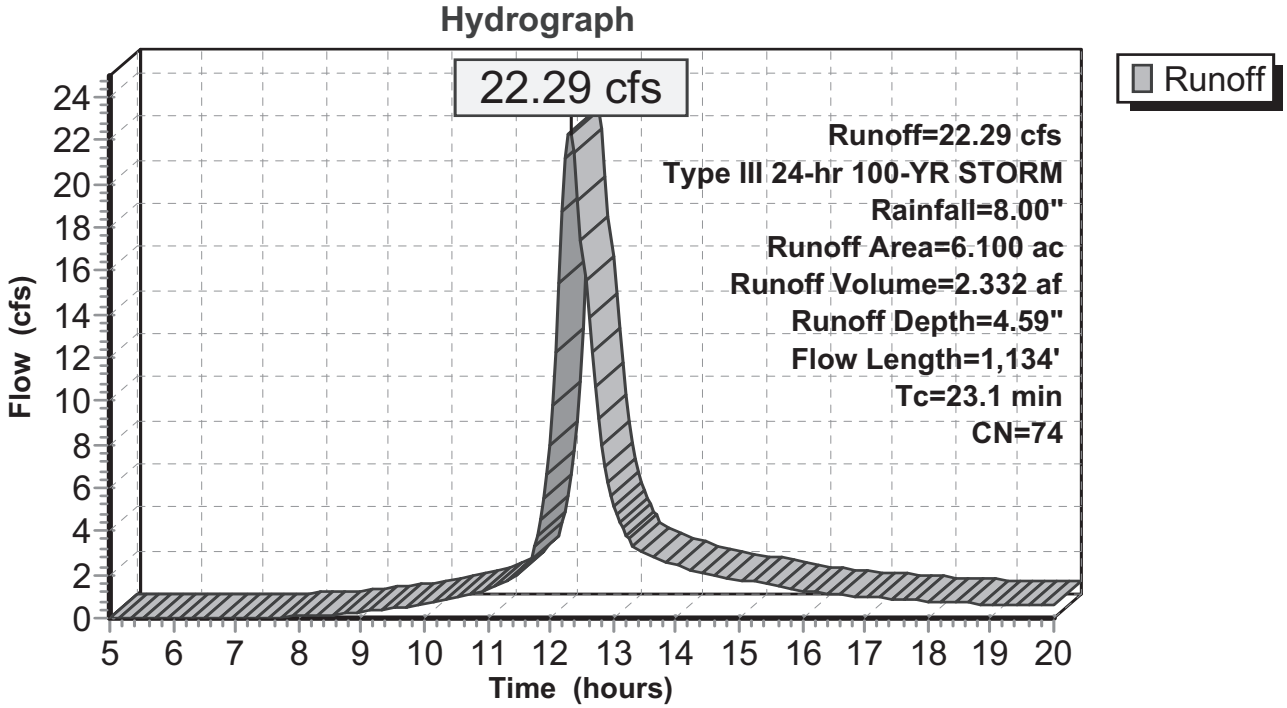
Runoff = 22.29 cfs @ 12.32 hrs, Volume= 2.332 af, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.090	98	Existing pavement
0.030	98	Proposed pavement & roofs
0.100	79	50-75% Grass cover, Fair, HSG C
0.480	71	Meadow, non-grazed, HSG C
0.050	78	Meadow, non-grazed, HSG D
5.050	73	Woods, Fair, HSG C
0.300	79	Woods, Fair, HSG D
6.100	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	12	0.2042	0.3		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
9.3	88	0.1108	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
13.1	1,034	0.0696	1.3		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.1	1,134	Total			

Subcatchment 6S: Subcatchment 6S



Subcatchment 7S: Subcatchment 7S

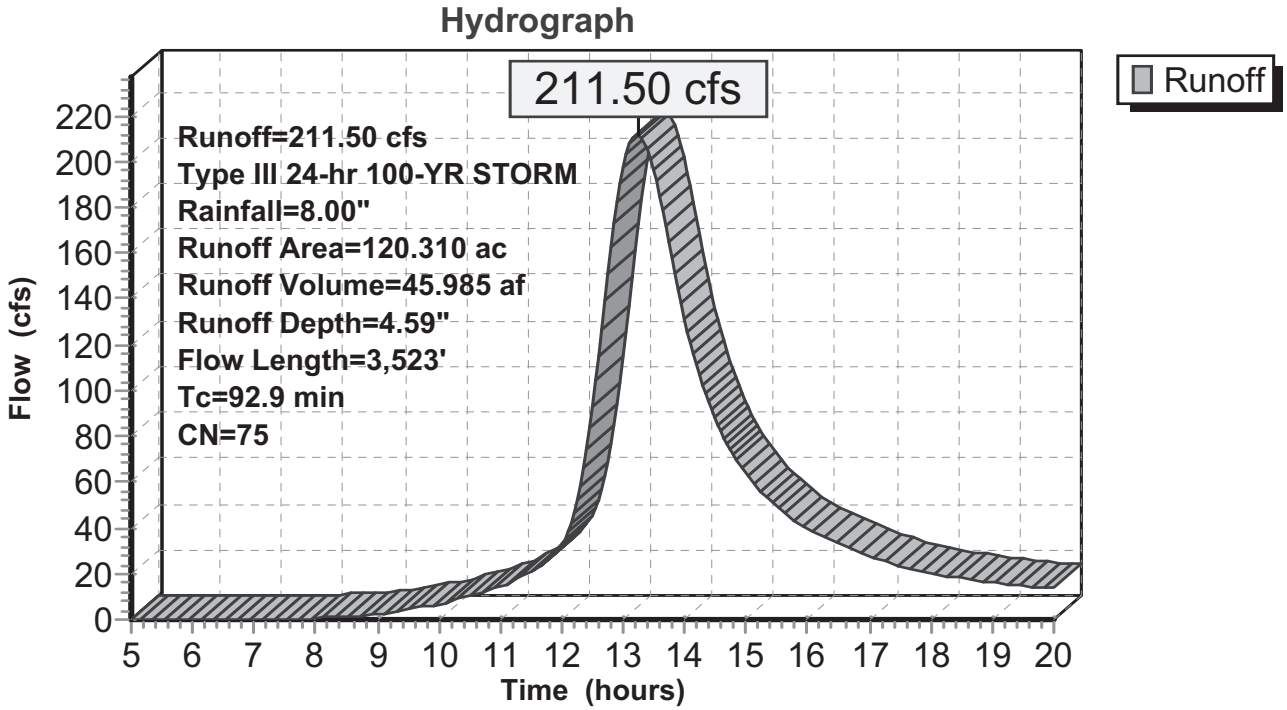
Runoff = 211.50 cfs @ 13.24 hrs, Volume= 45.985 af, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
1.110	98	Existing pavement
1.730	98	Proposed pavement and roofs
6.810	79	50-75% Grass cover, Fair, HSG C
0.100	84	50-75% Grass cover, Fair, HSG D
7.160	71	Meadow, non-grazed, HSG C
10.120	78	Meadow, non-grazed, HSG D
0.870	36	Woods, Fair, HSG A
72.180	73	Woods, Fair, HSG C
20.230	79	Woods, Fair, HSG D
120.310	75	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.0	100	0.0188	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
19.1	1,761	0.0943	1.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
52.8	1,662	0.0110	0.5		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
92.9	3,523	Total			

Subcatchment 7S: Subcatchment 7S



Subcatchment 8S: Subcatchment 8S

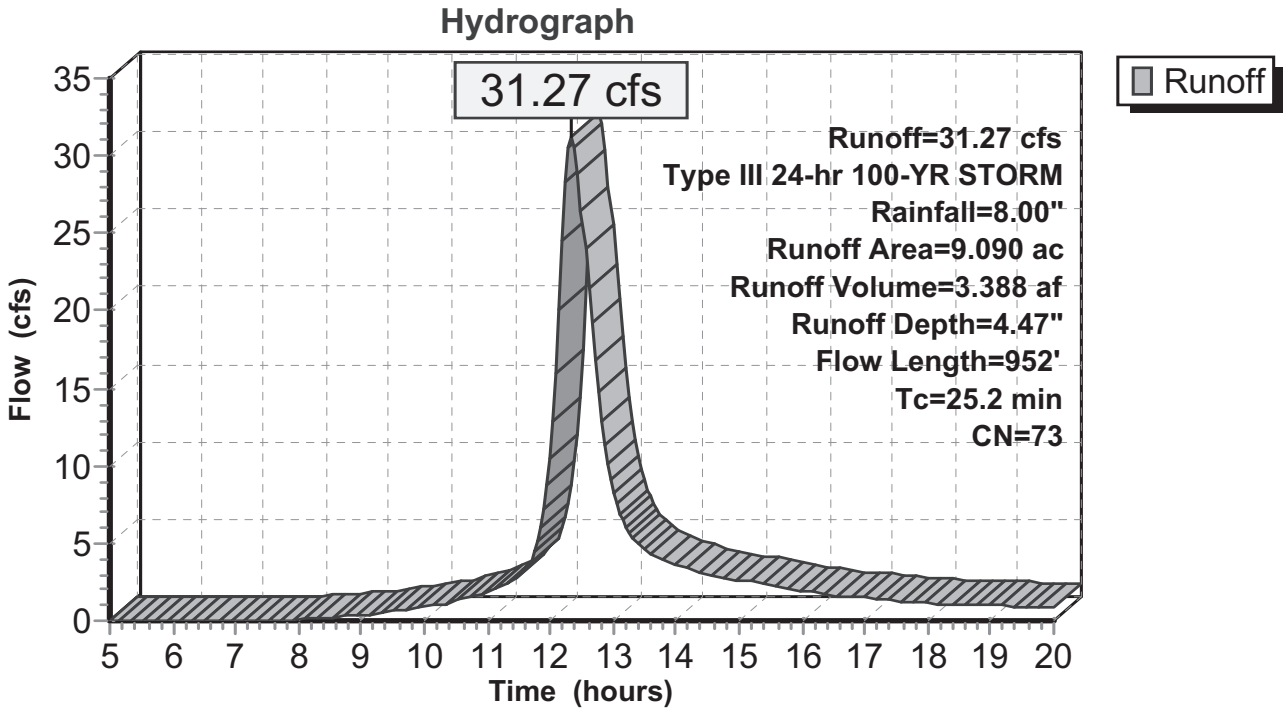
Runoff = 31.27 cfs @ 12.35 hrs, Volume= 3.388 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.120	98	Existing pavement
0.240	71	Meadow, non-grazed, HSG C
8.730	73	Woods, Fair, HSG C
9.090	73	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	100	0.0435	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
10.2	852	0.0780	1.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
25.2	952	Total			

Subcatchment 8S: Subcatchment 8S



Subcatchment 9S: Subcatchment 9S

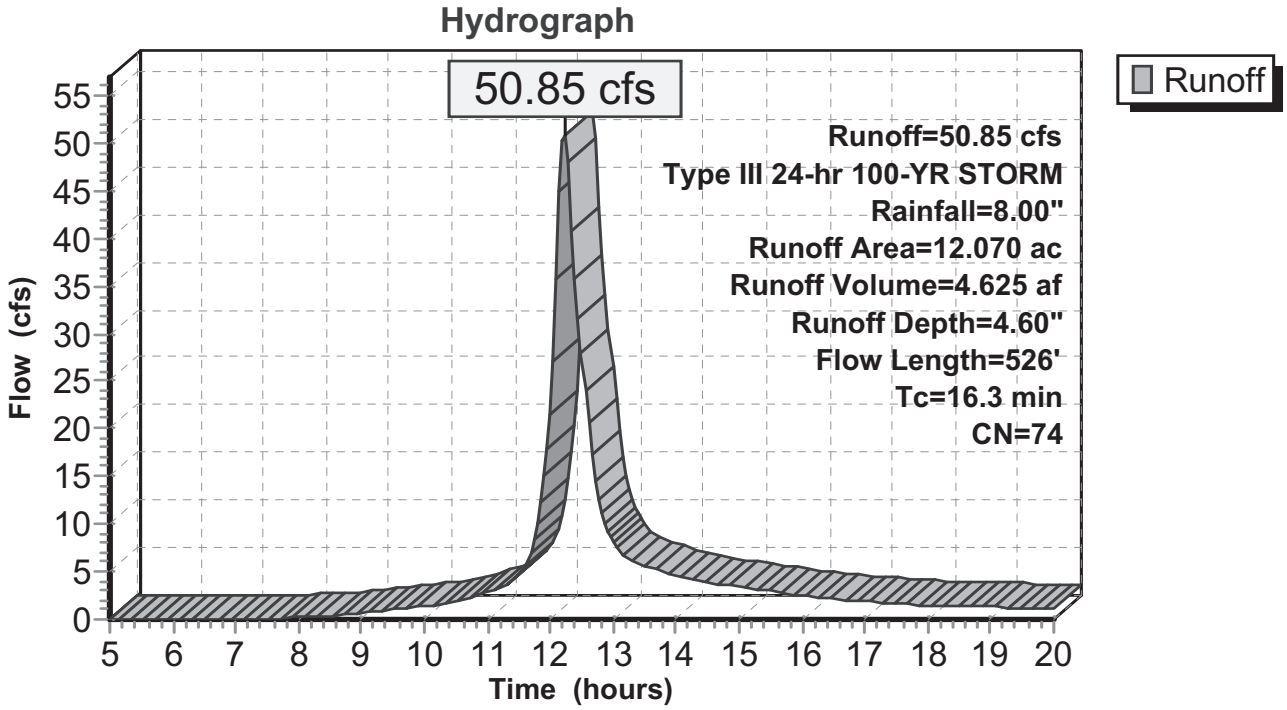
Runoff = 50.85 cfs @ 12.22 hrs, Volume= 4.625 af, Depth= 4.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.160	98	Existing pavement
0.150	98	Proposed pavement & roofs
0.580	79	50-75% Grass cover, Fair, HSG C
0.240	71	Meadow, non-grazed, HSG C
0.040	78	Meadow, non-grazed, HSG D
10.610	73	Woods, Fair, HSG C
0.290	79	Woods, Fair, HSG D
12.070	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.7	100	0.0660	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
3.6	426	0.1575	2.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.3	526	Total			

Subcatchment 9S: Subcatchment 9S



Subcatchment 10S: Subcatchment 10S

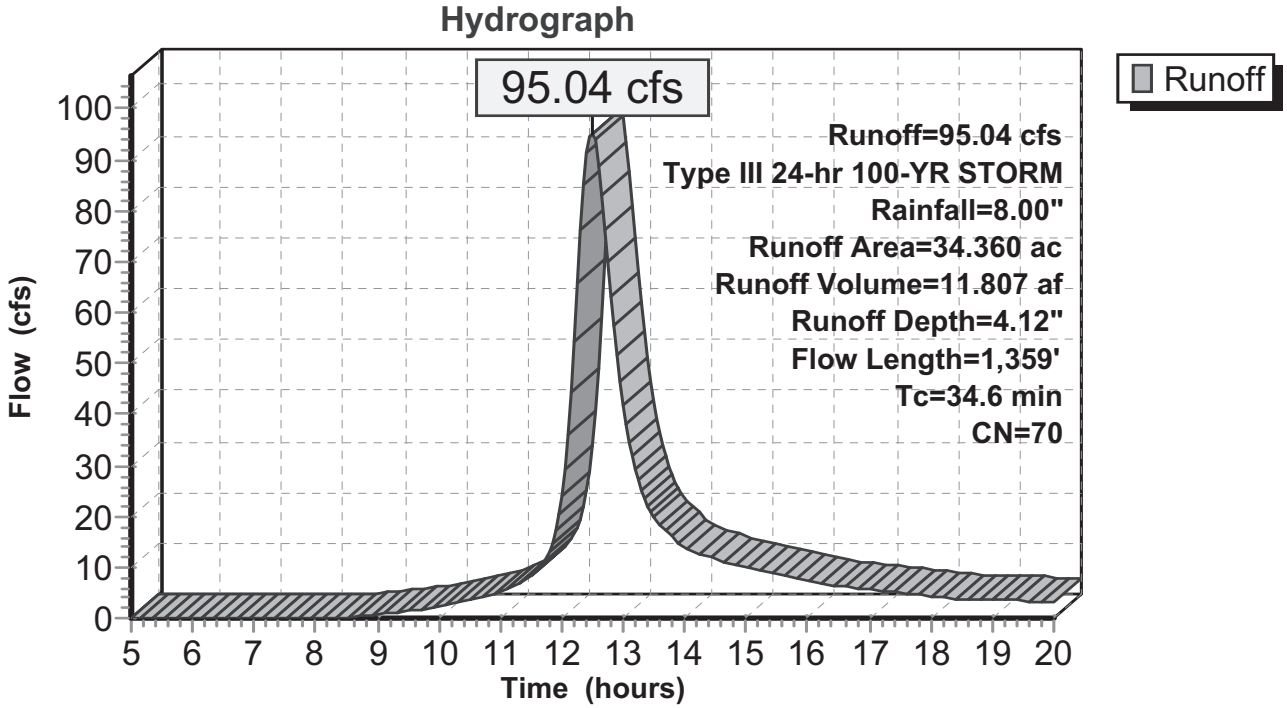
Runoff = 95.04 cfs @ 12.48 hrs, Volume= 11.807 af, Depth= 4.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.300	98	Proposed pavement & roofs
0.880	79	50-75% Grass cover, Fair, HSG C
1.090	36	Woods, Fair, HSG A
29.890	70	Woods, Good, HSG C
2.200	79	Woods, Fair, HSG D
34.360	70	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.7	100	0.0252	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.5	528	0.1545	2.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.8	133	0.3459	2.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.6	598	0.0356	0.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.6	1,359	Total			

Subcatchment 10S: Subcatchment 10S



Subcatchment 11S: Subcatchment 11S

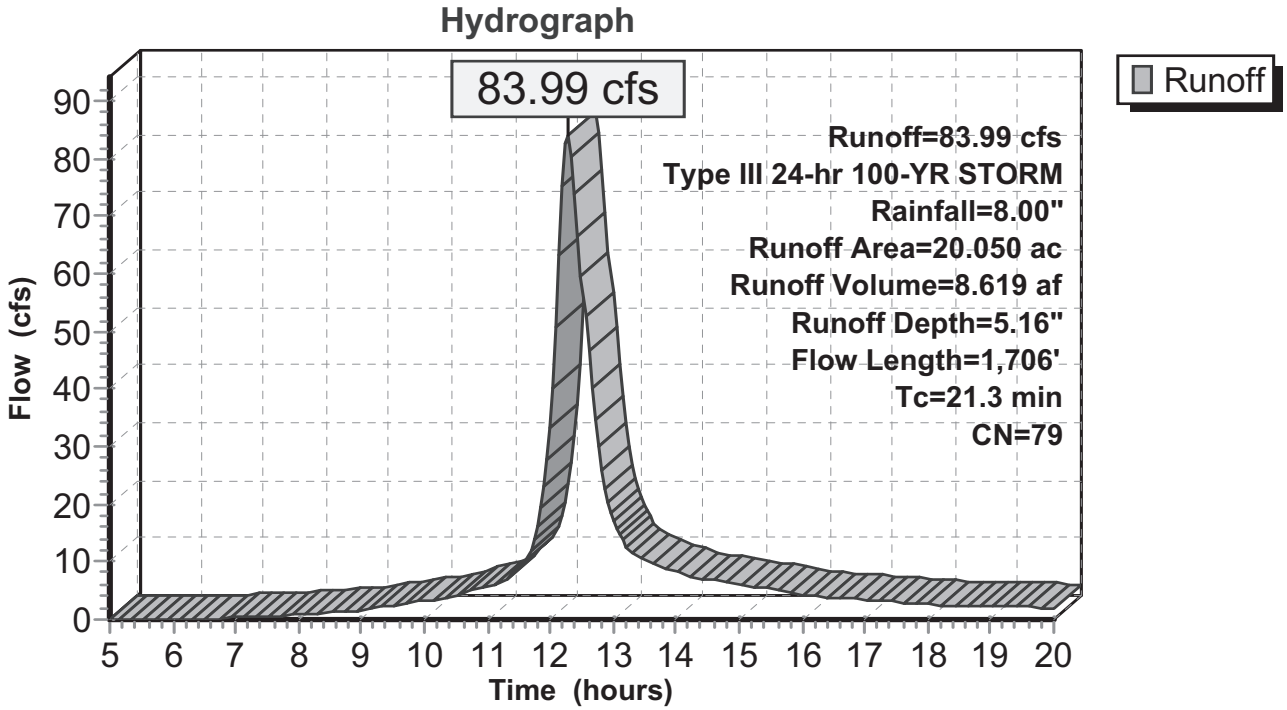
Runoff = 83.99 cfs @ 12.29 hrs, Volume= 8.619 af, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
3.440	98	Proposed pavement & roofs
5.820	79	50-75% Grass cover, Fair, HSG C
0.100	71	Meadow, non-grazed, HSG C
10.690	73	Woods, Fair, HSG C
20.050	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	100	0.1425	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.2	25	0.1500	2.7		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
14.5	1,394	0.1024	1.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	72	0.0375	1.4		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.4	115	0.0742	1.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.3	1,706	Total			

Subcatchment 11S: Subcatchment 11S



Subcatchment 12S: Subcatchment 12S

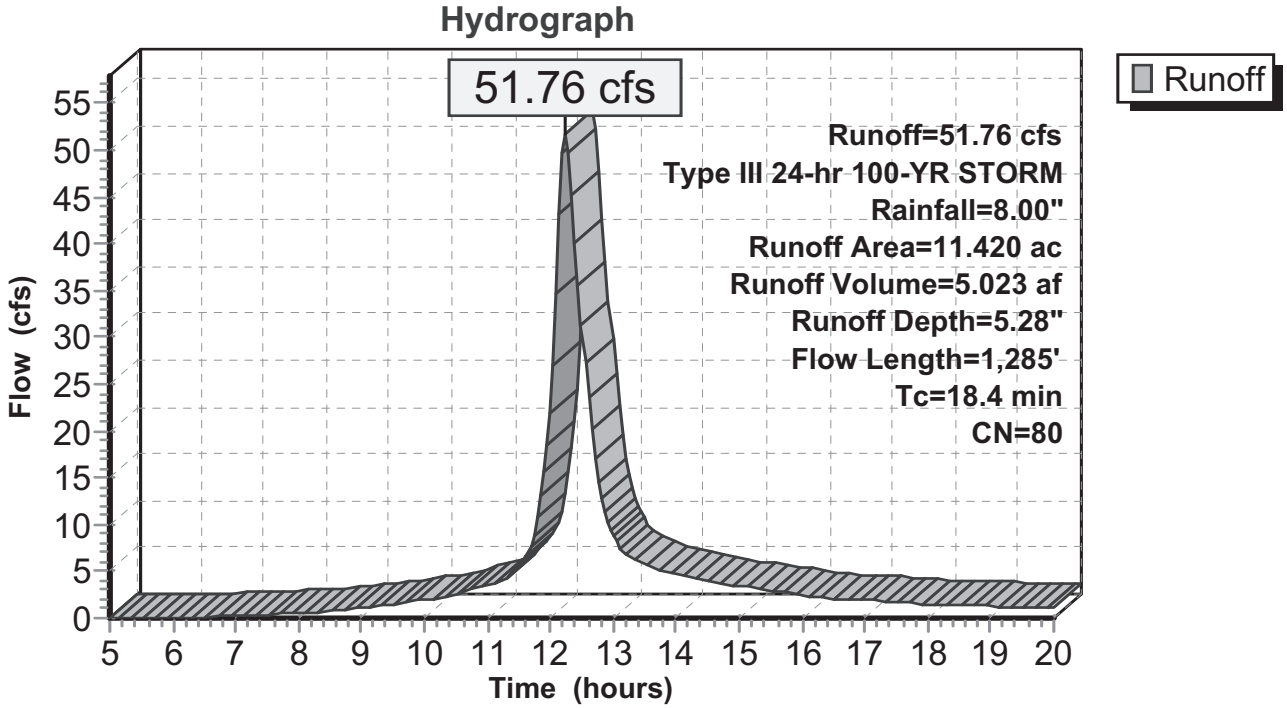
Runoff = 51.76 cfs @ 12.25 hrs, Volume= 5.023 af, Depth= 5.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
2.280	98	Proposed pavement & roofs
4.200	79	50-75% Grass cover, Fair, HSG C
4.940	73	Woods, Fair, HSG C
11.420	80	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	10	0.0300	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
10.5	90	0.0867	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
5.0	565	0.1416	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.0	129	0.0969	2.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.6	491	0.0365	13.4	23.72	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
18.4	1,285	Total			

Subcatchment 12S: Subcatchment 12S



Subcatchment 13S: Subcatchment 13S

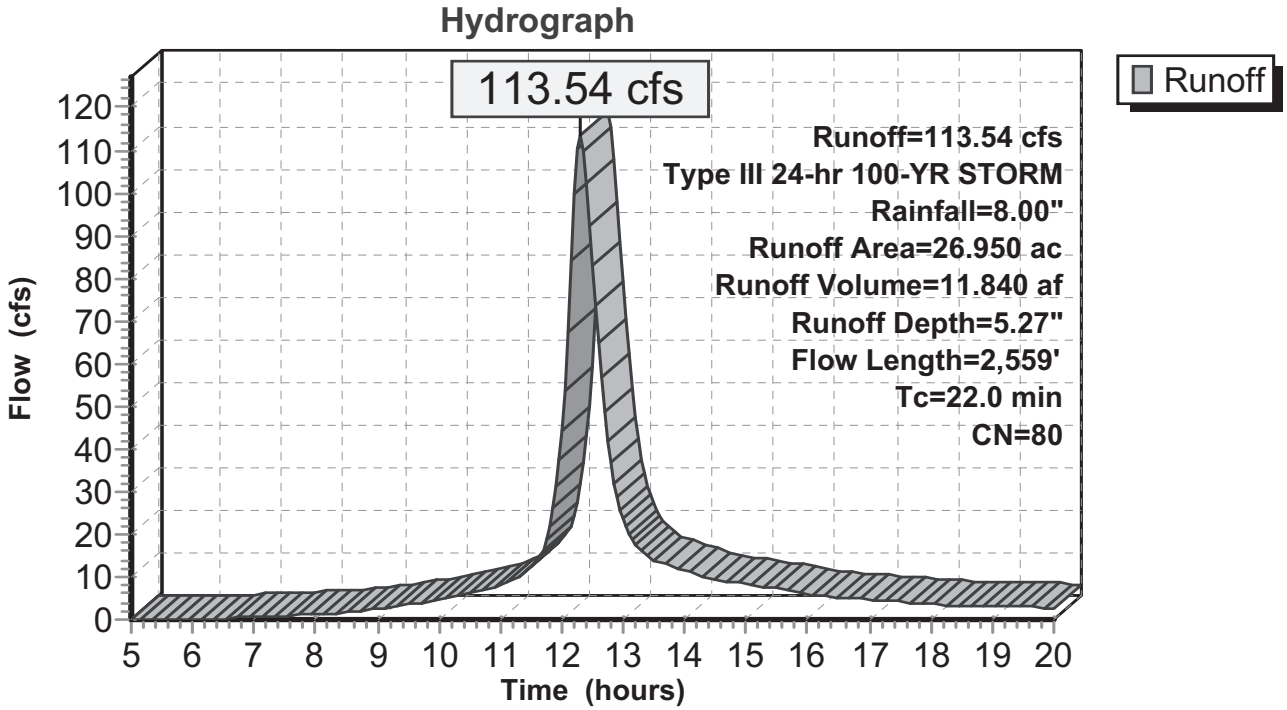
Runoff = 113.54 cfs @ 12.30 hrs, Volume= 11.840 af, Depth= 5.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
5.130	98	Proposed pavement & roofs
8.580	79	50-75% Grass cover, Fair, HSG C
13.240	73	Woods, Fair, HSG C
26.950	80	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	15	0.0300	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
10.1	85	0.0853	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.9	556	0.1403	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.0	14	0.5000	4.9		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.6	121	0.0331	1.3		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.2	365	0.0188	2.8		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	1,403	0.0498	15.7	27.70	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
22.0	2,559	Total			

Subcatchment 13S: Subcatchment 13S



Subcatchment 14S: Subcatchment 14S

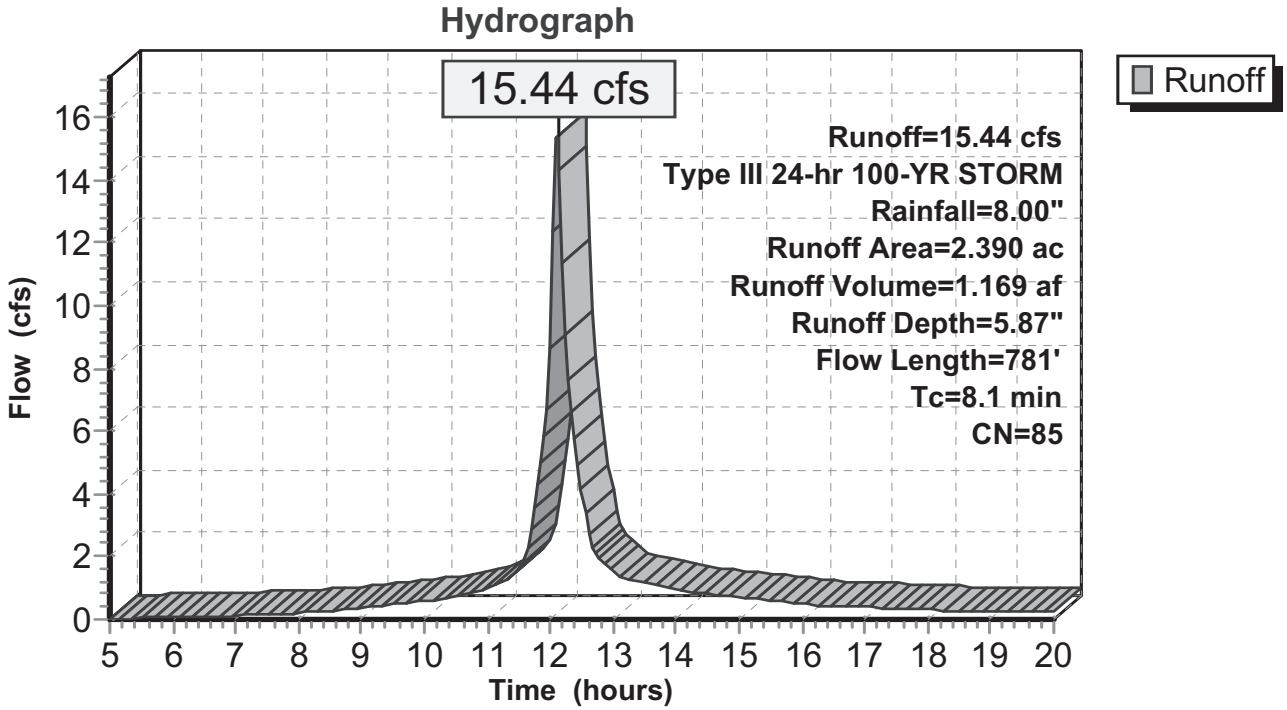
Runoff = 15.44 cfs @ 12.11 hrs, Volume= 1.169 af, Depth= 5.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YR STORM Rainfall=8.00"

Area (ac)	CN	Description
0.810	98	Proposed pavement & roofs
1.570	79	50-75% Grass cover, Fair, HSG C
0.010	73	Woods, Fair, HSG C
2.390	85	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0425	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.9	298	0.0714	5.4		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	383	0.0835	20.3	35.87	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
8.1	781	Total			

Subcatchment 14S: Subcatchment 14S



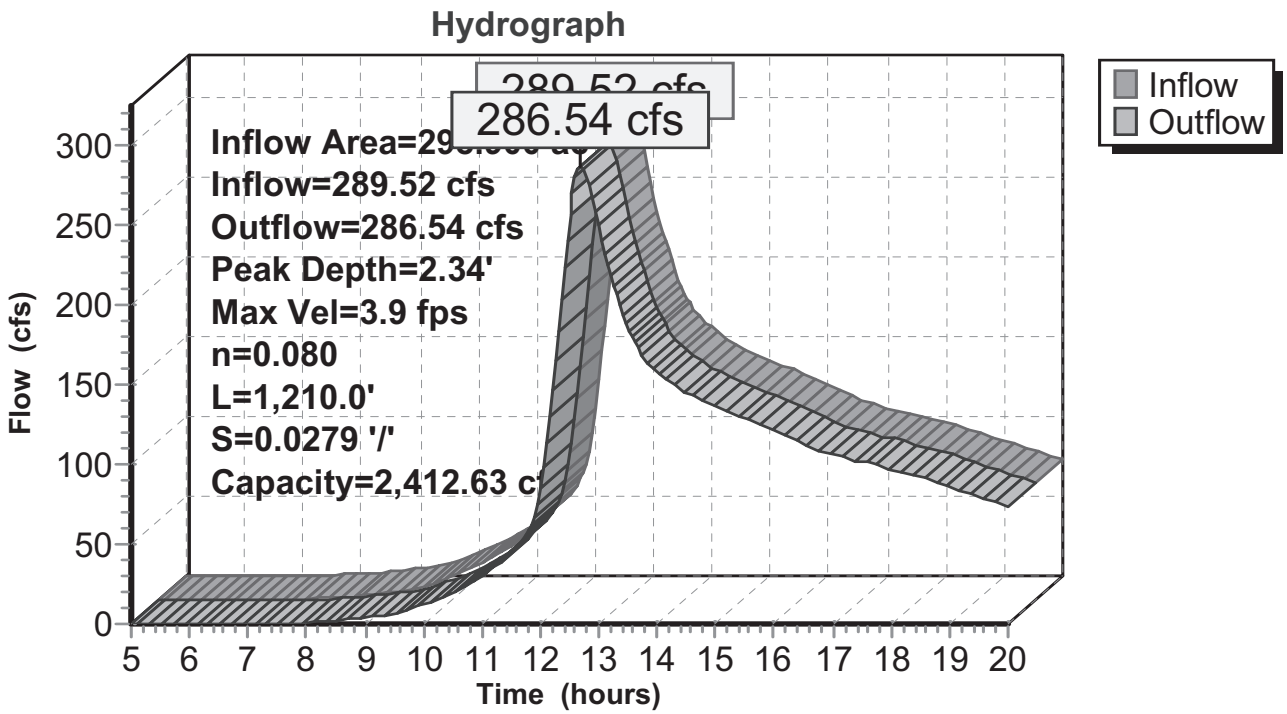
Reach 1R: Existing Stream

Inflow Area = 298.900 ac, Inflow Depth = 3.84" for 100-YR STORM event
Inflow = 289.52 cfs @ 12.64 hrs, Volume= 95.747 af
Outflow = 286.54 cfs @ 12.71 hrs, Volume= 94.996 af, Atten= 1%, Lag= 4.1 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.9 fps, Min. Travel Time= 5.2 min
Avg. Velocity = 2.3 fps, Avg. Travel Time= 8.9 min

Peak Depth= 2.34' @ 12.71 hrs
Capacity at bank full= 2,412.63 cfs
Inlet Invert= 416.82', Outlet Invert= 383.06'
10.50' x 5.80' deep channel, n= 0.080 Length= 1,210.0' Slope= 0.0279 '/'
Side Slope Z-value= 9.4 8.5 '/'

Reach 1R: Existing Stream



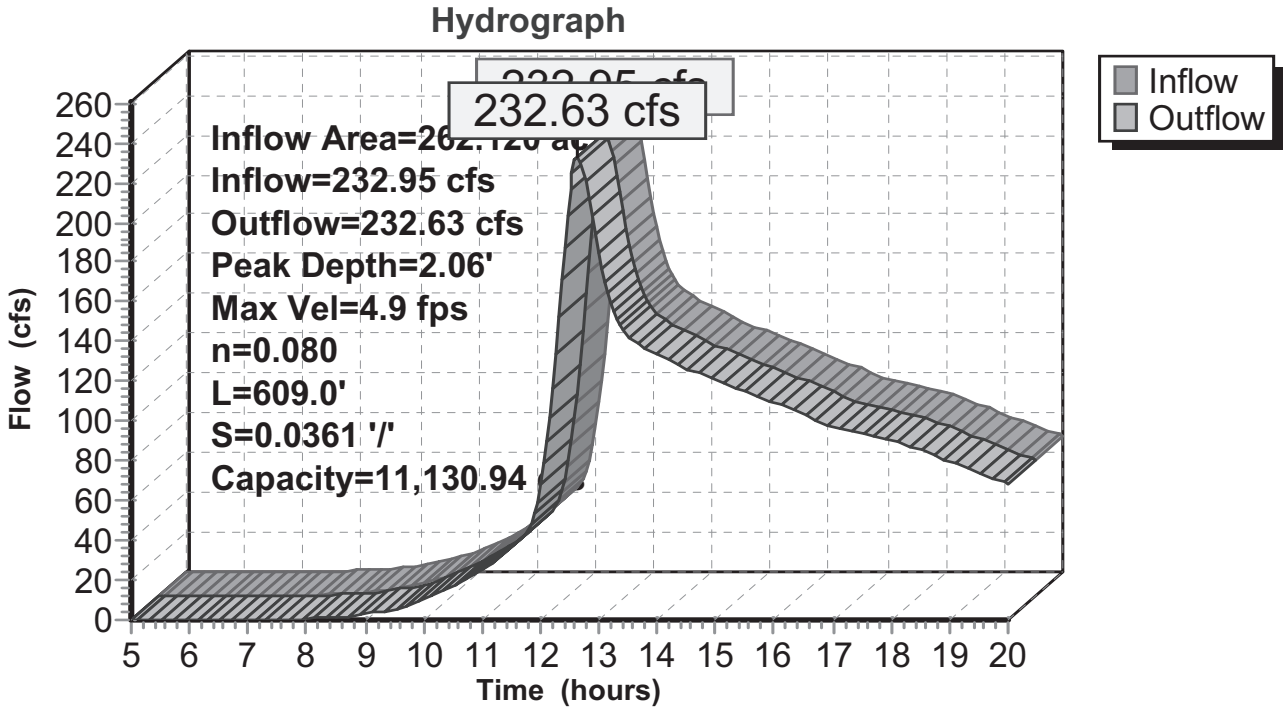
Reach 2R: Existing Stream

Inflow Area = 262.120 ac, Inflow Depth = 3.75" for 100-YR STORM event
Inflow = 232.95 cfs @ 12.63 hrs, Volume= 82.014 af
Outflow = 232.63 cfs @ 12.65 hrs, Volume= 81.722 af, Atten= 0%, Lag= 1.5 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.9 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 2.8 fps, Avg. Travel Time= 3.7 min

Peak Depth= 2.06' @ 12.65 hrs
Capacity at bank full= 11,130.94 cfs
Inlet Invert= 440.00', Outlet Invert= 418.00'
18.00' x 14.50' deep channel, n= 0.080 Length= 609.0' Slope= 0.0361 '/'
Side Slope Z-value= 2.7 2.2 '/'

Reach 2R: Existing Stream



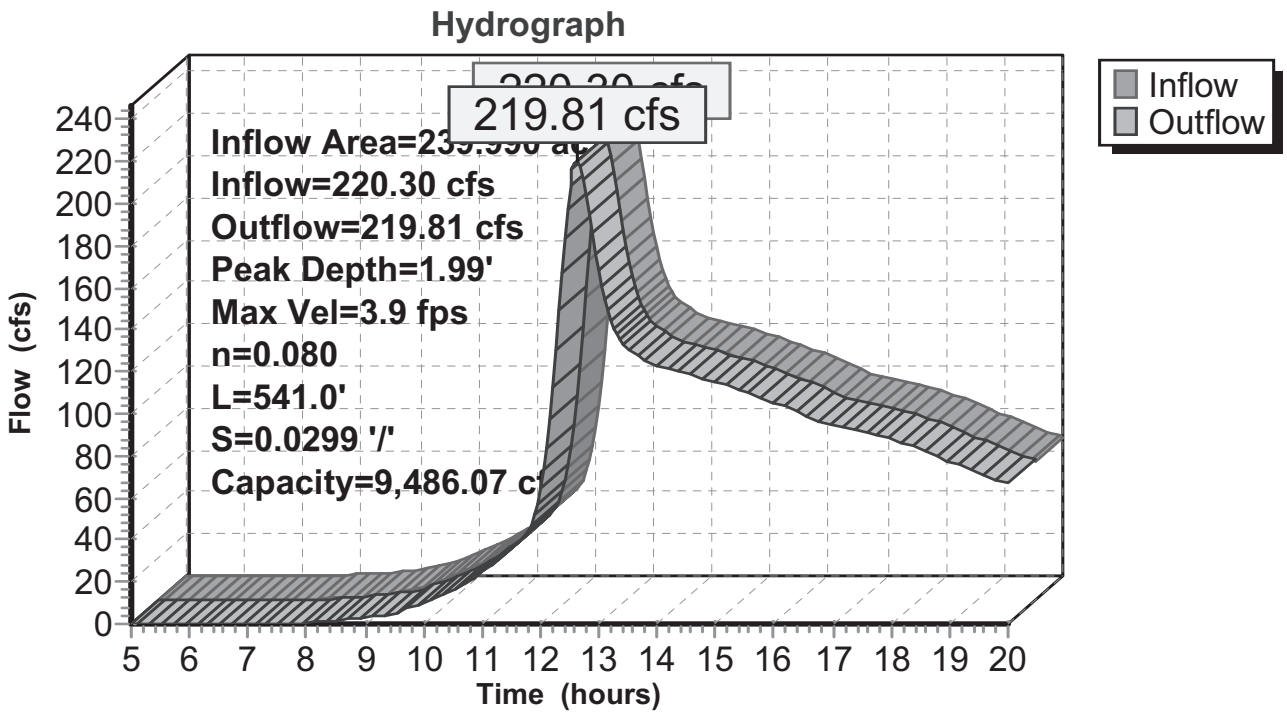
Reach 3R: Existing Stream

Inflow Area = 239.990 ac, Inflow Depth = 3.90" for 100-YR STORM event
Inflow = 220.30 cfs @ 12.60 hrs, Volume= 78.053 af
Outflow = 219.81 cfs @ 12.63 hrs, Volume= 77.760 af, Atten= 0%, Lag= 1.7 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.9 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 2.4 fps, Avg. Travel Time= 3.8 min

Peak Depth= 1.99' @ 12.63 hrs
Capacity at bank full= 9,486.07 cfs
Inlet Invert= 456.17', Outlet Invert= 440.00'
15.50' x 10.82' deep channel, n= 0.080 Length= 541.0' Slope= 0.0299 '/'
Side Slope Z-value= 7.3 5.3 '/'

Reach 3R: Existing Stream



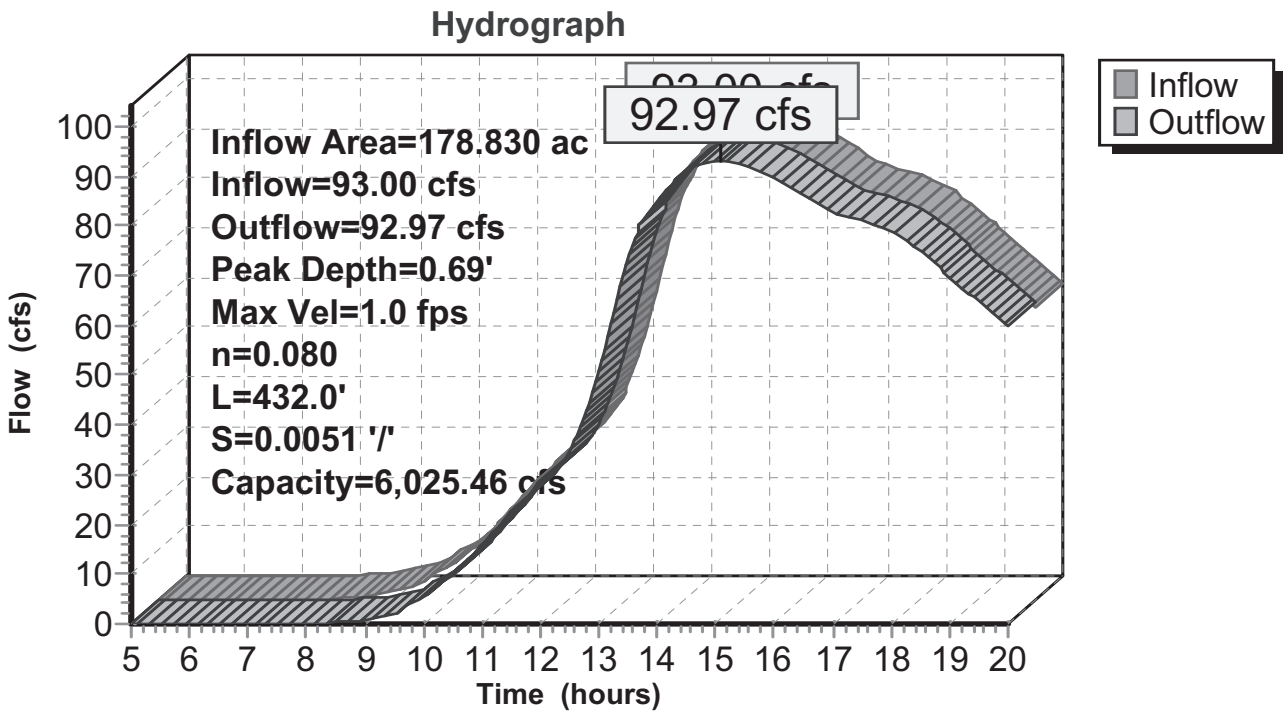
Reach 4R: Existing Stream

Inflow Area = 178.830 ac, Inflow Depth = 3.56" for 100-YR STORM event
Inflow = 93.00 cfs @ 14.98 hrs, Volume= 53.073 af
Outflow = 92.97 cfs @ 15.07 hrs, Volume= 52.360 af, Atten= 0%, Lag= 5.1 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.0 fps, Min. Travel Time= 7.4 min
Avg. Velocity = 0.7 fps, Avg. Travel Time= 11.0 min

Peak Depth= 0.69' @ 15.07 hrs
Capacity at bank full= 6,025.46 cfs
Inlet Invert= 460.18', Outlet Invert= 457.96'
124.00' x 6.50' deep channel, n= 0.080 Length= 432.0' Slope= 0.0051 '/'
Side Slope Z-value= 10.4 33.3 '/'

Reach 4R: Existing Stream



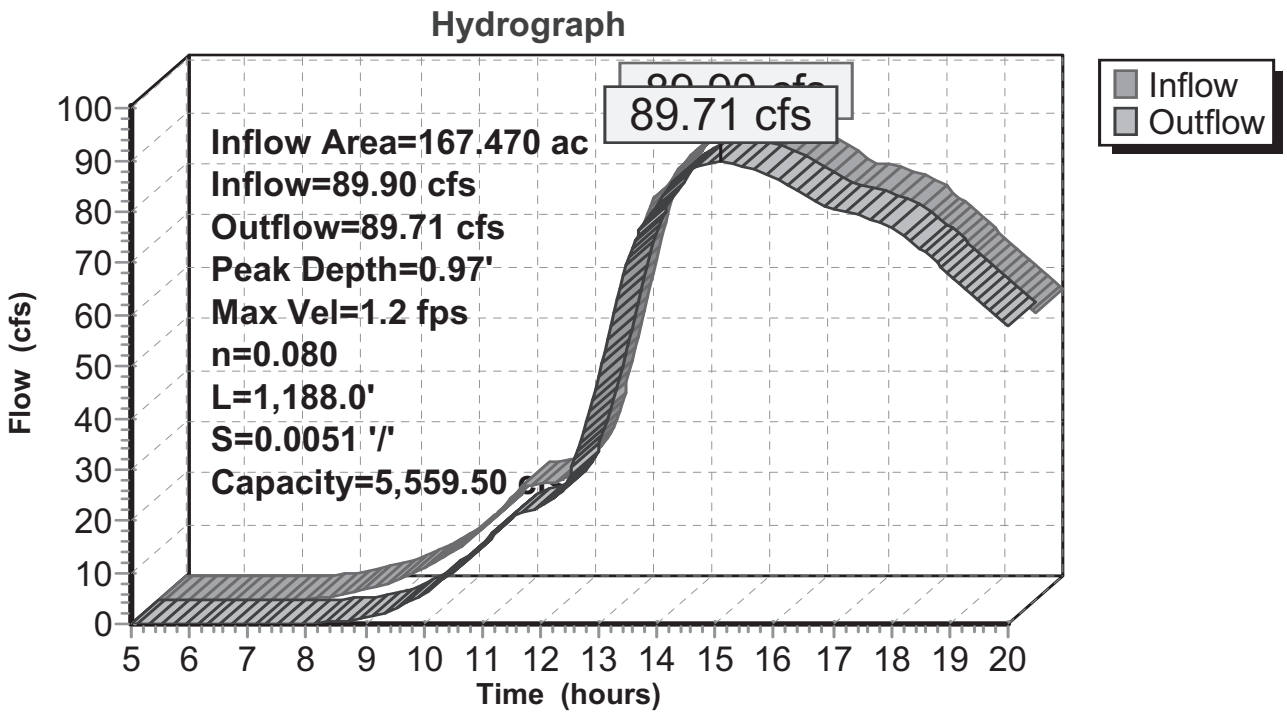
Reach 5R: Existing Stream

Inflow Area = 167.470 ac, Inflow Depth = 3.72" for 100-YR STORM event
Inflow = 89.90 cfs @ 14.86 hrs, Volume= 51.915 af
Outflow = 89.71 cfs @ 15.07 hrs, Volume= 50.356 af, Atten= 0%, Lag= 12.7 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.2 fps, Min. Travel Time= 17.0 min
Avg. Velocity = 0.8 fps, Avg. Travel Time= 25.2 min

Peak Depth= 0.97' @ 15.07 hrs
Capacity at bank full= 5,559.50 cfs
Inlet Invert= 466.24', Outlet Invert= 460.18'
64.50' x 8.00' deep channel, n= 0.080 Length= 1,188.0' Slope= 0.0051 '/'
Side Slope Z-value= 18.9 10.7 '/'

Reach 5R: Existing Stream



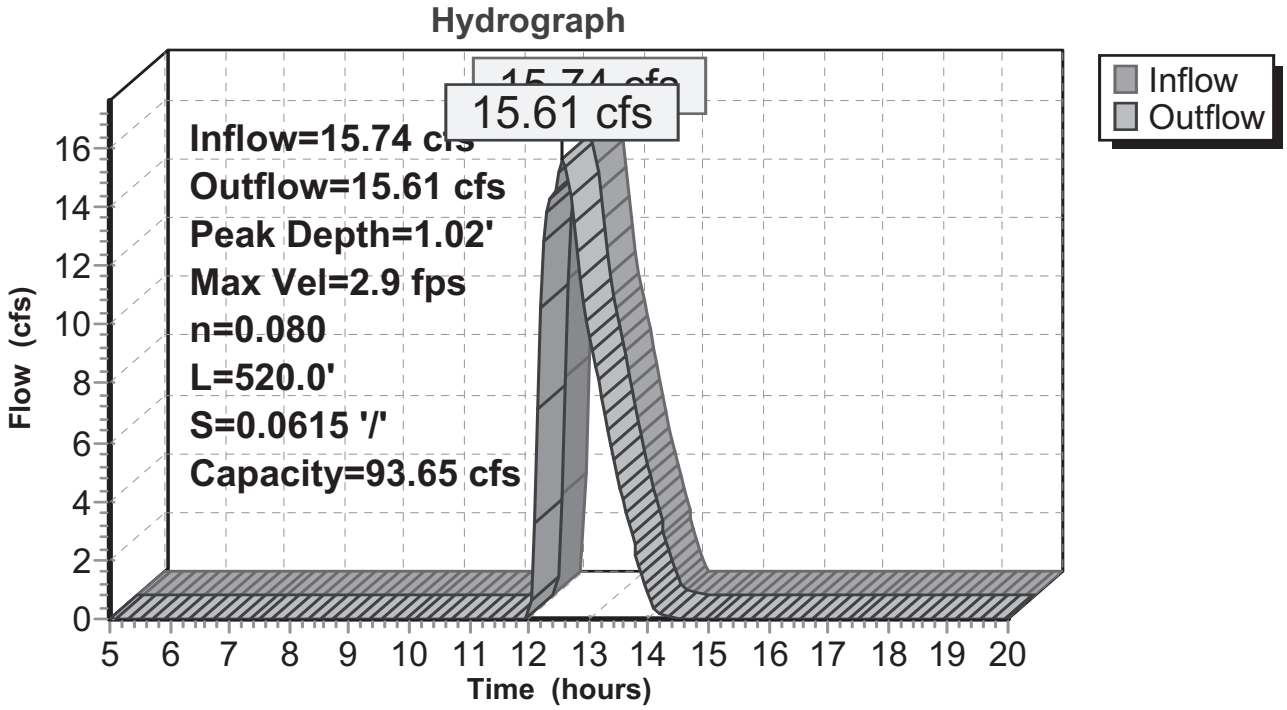
Reach 6R: Existing Swale

Inflow	=	15.74 cfs @	12.54 hrs,	Volume=	1.358 af
Outflow	=	15.61 cfs @	12.57 hrs,	Volume=	1.358 af, Atten= 1%, Lag= 2.1 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.9 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 1.0 fps, Avg. Travel Time= 8.3 min

Peak Depth= 1.02' @ 12.57 hrs
Capacity at bank full= 93.65 cfs
Inlet Invert= 454.00', Outlet Invert= 422.00'
0.00' x 2.00' deep channel, n= 0.080 Length= 520.0' Slope= 0.0615 '/'
Side Slope Z-value= 3.6 6.7 '/'

Reach 6R: Existing Swale



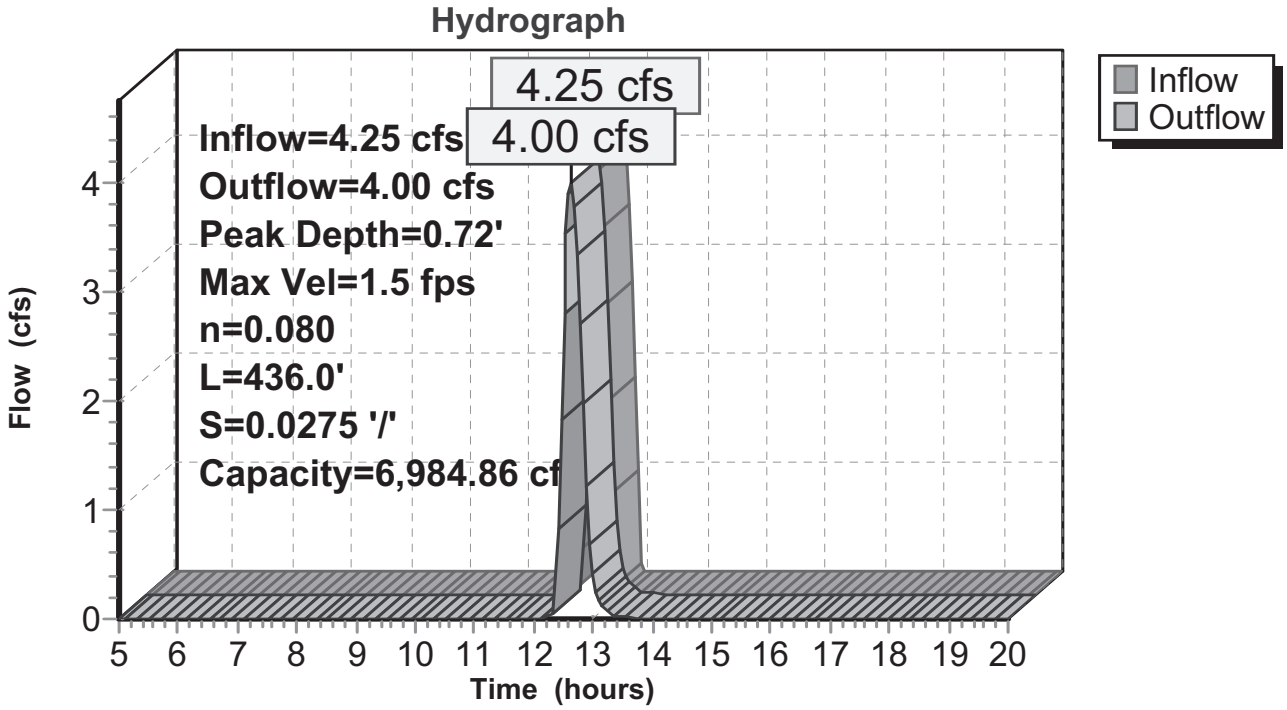
Reach 7R: Existing Swale

Inflow	=	4.25 cfs @	12.57 hrs,	Volume=	0.133 af
Outflow	=	4.00 cfs @	12.64 hrs,	Volume=	0.133 af, Atten= 6%, Lag= 4.2 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.5 fps, Min. Travel Time= 4.7 min
Avg. Velocity = 0.7 fps, Avg. Travel Time= 10.5 min

Peak Depth= 0.72' @ 12.64 hrs
Capacity at bank full= 6,984.86 cfs
Inlet Invert= 480.00', Outlet Invert= 468.00'
0.00' x 11.90' deep channel, n= 0.080 Length= 436.0' Slope= 0.0275 '/'
Side Slope Z-value= 6.8 3.1 '/'

Reach 7R: Existing Swale

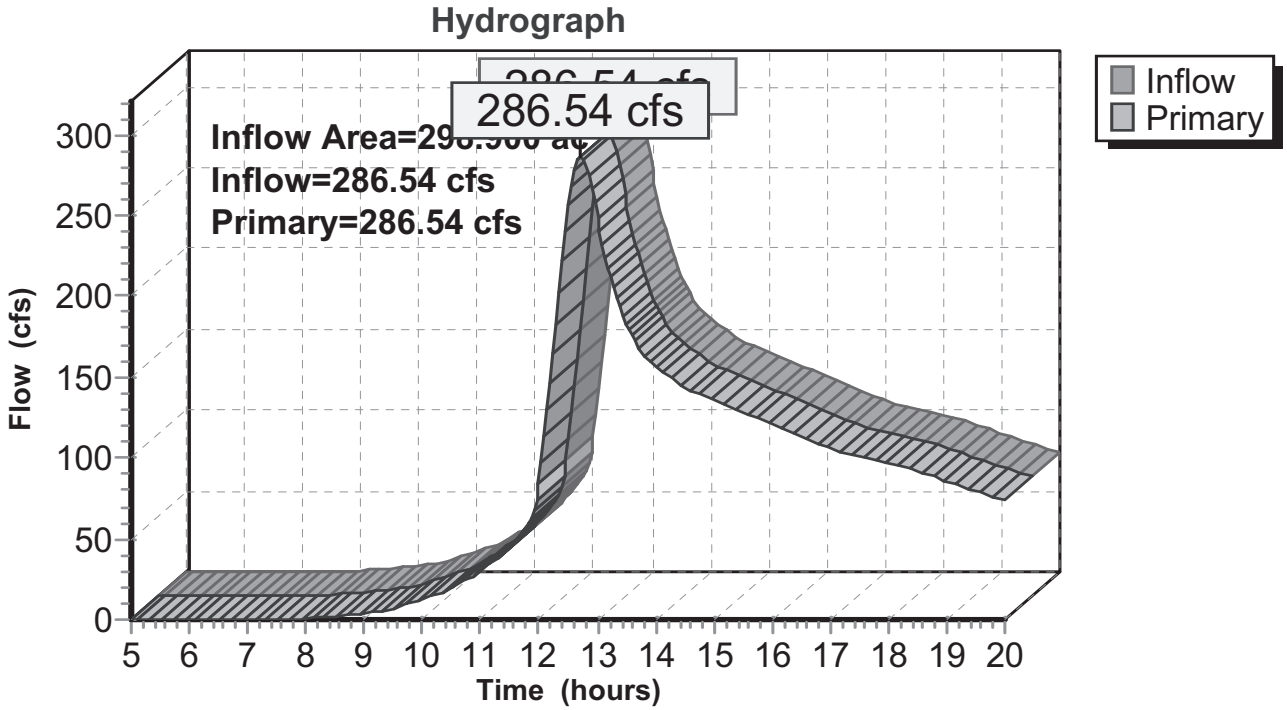


Pond 1P: Design Point 1 Outlet at Hasbrouck Road

Inflow Area = 298.900 ac, Inflow Depth = 3.81" for 100-YR STORM event
Inflow = 286.54 cfs @ 12.71 hrs, Volume= 94.996 af
Primary = 286.54 cfs @ 12.71 hrs, Volume= 94.996 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 1P: Design Point 1 Outlet at Hasbrouck Road

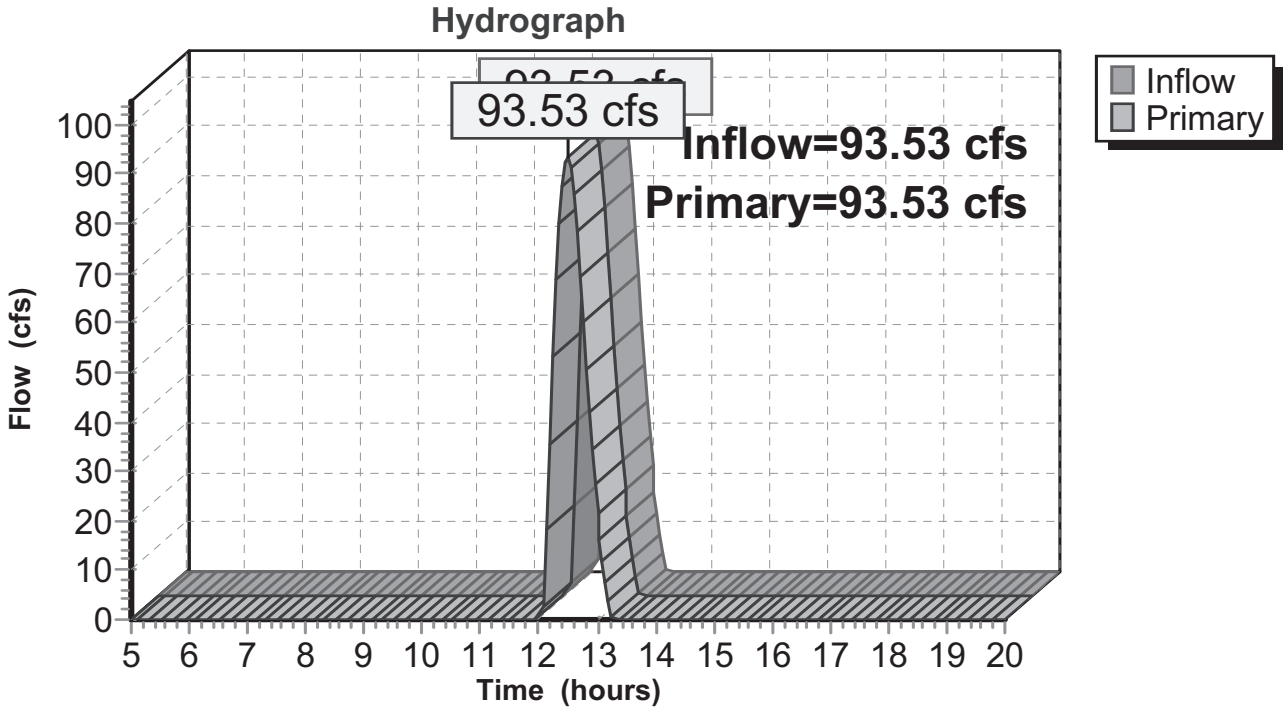


Pond 2P: Design Point 2 Existing Swale Along Craigville Road

Inflow	=	93.53 cfs @	12.49 hrs,	Volume=	4.688 af
Primary	=	93.53 cfs @	12.49 hrs,	Volume=	4.688 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 2P: Design Point 2 Existing Swale Along Craigville Road

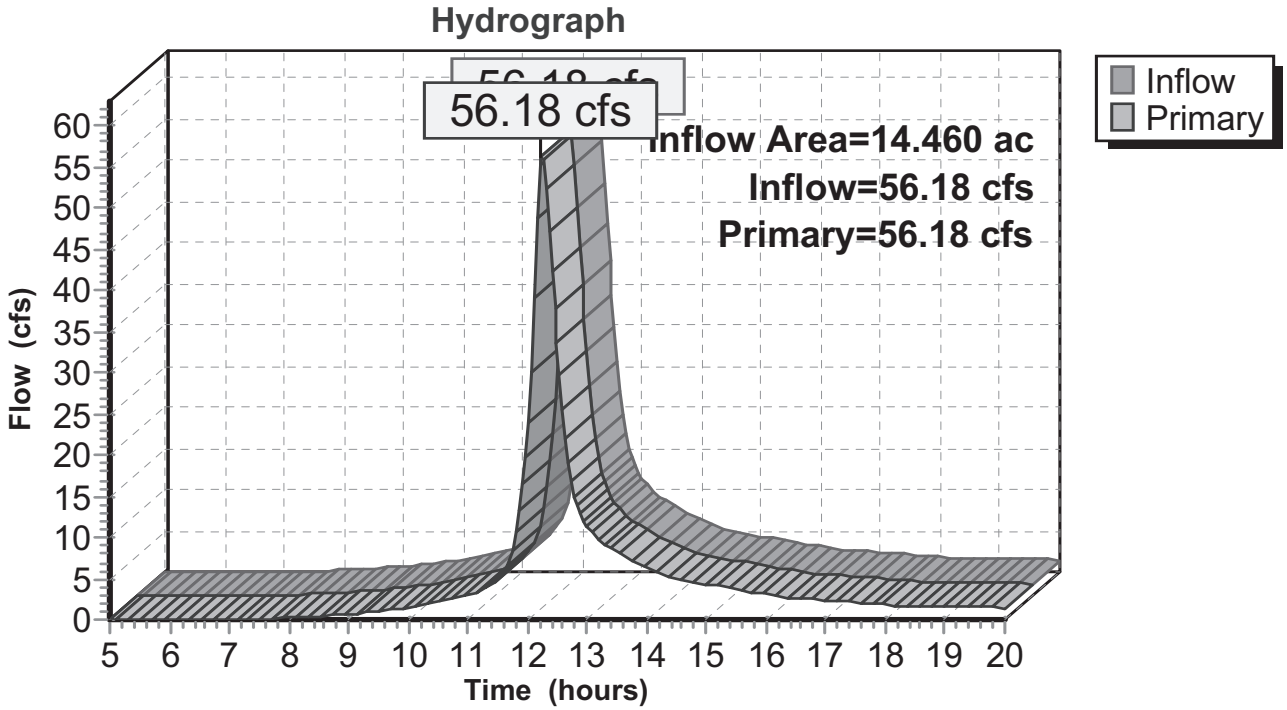


Pond 3P: Design Point 3 (Southeastern Property Line)

Inflow Area = 14.460 ac, Inflow Depth = 4.62" for 100-YR STORM event
Inflow = 56.18 cfs @ 12.23 hrs, Volume= 5.570 af
Primary = 56.18 cfs @ 12.23 hrs, Volume= 5.570 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 3P: Design Point 3 (Southeastern Property Line)

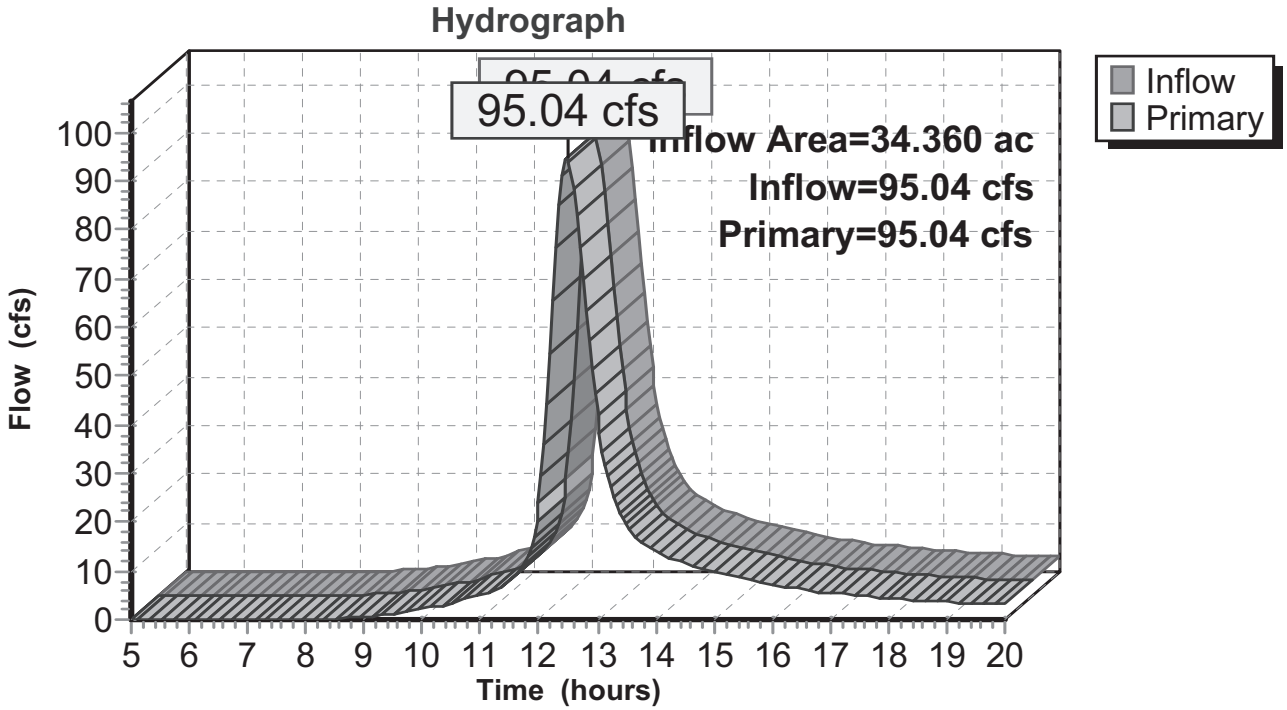


Pond 4P: Design Point 4 (Southwestern Property Line)

Inflow Area = 34.360 ac, Inflow Depth = 4.12" for 100-YR STORM event
Inflow = 95.04 cfs @ 12.48 hrs, Volume= 11.807 af
Primary = 95.04 cfs @ 12.48 hrs, Volume= 11.807 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond 4P: Design Point 4 (Southwestern Property Line)



Pond 5P: Existing Wetland Pocket

Inflow Area = 167.470 ac, Inflow Depth = 4.54" for 100-YR STORM event
Inflow = 268.28 cfs @ 13.12 hrs, Volume= 63.410 af
Outflow = 89.90 cfs @ 14.86 hrs, Volume= 51.915 af, Atten= 66%, Lag= 104.7 min
Primary = 89.90 cfs @ 14.86 hrs, Volume= 51.915 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 470.50' @ 14.86 hrs Surf.Area= 0 sf Storage= 1,210,030 cf
Plug-Flow detention time= 144.3 min calculated for 51.743 af (82% of inflow)
Center-of-Mass det. time= 100.2 min (943.4 - 843.2)

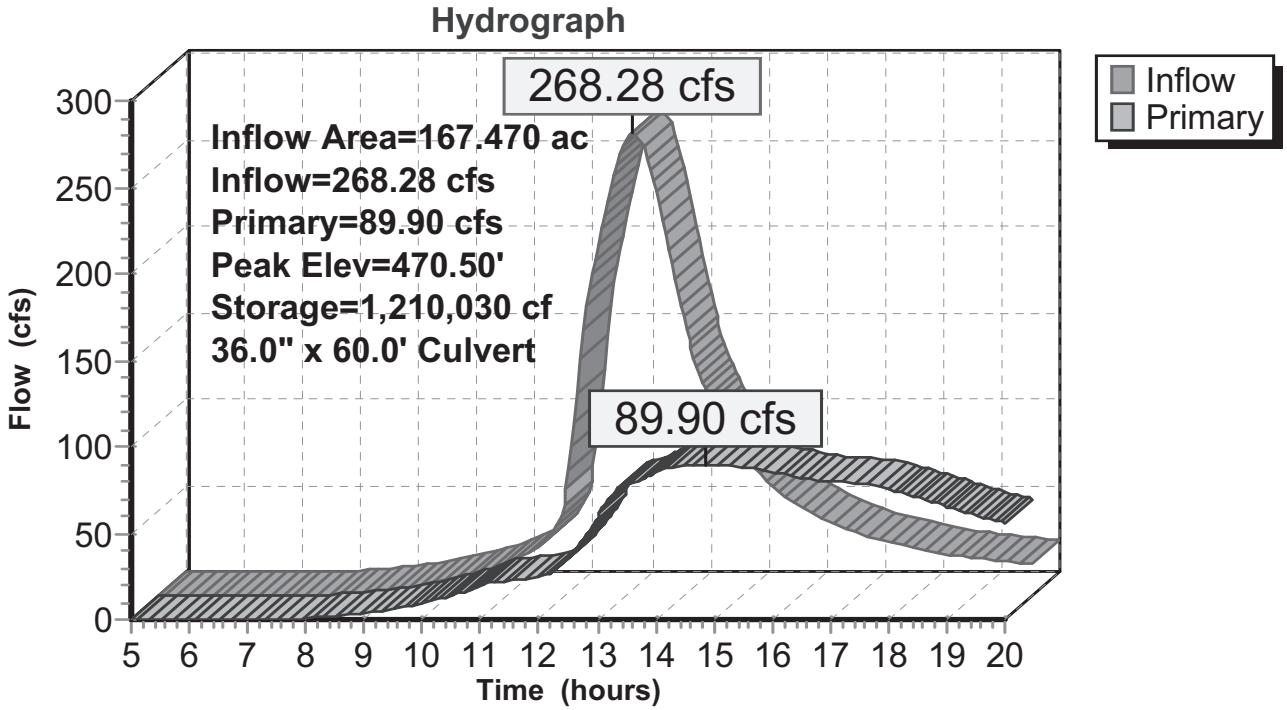
#	Invert	Avail.Storage	Storage Description
1	468.00'	4,153,277 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
468.00	0
470.00	838,050
472.00	2,316,286
474.00	4,153,277

#	Routing	Invert	Outlet Devices
1	Primary	466.24'	**36.0" x 60.0' long Culvert X 2.00** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 466.24' S= 0.0000 '/' n= 0.011 Cc= 0.900

Primary OutFlow Max=89.90 cfs @ 14.86 hrs HW=470.50' TW=467.21' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 89.90 cfs @ 6.4 fps)

Pond 5P: Existing Wetland Pocket



Pond 6P: Existing Culvert 2

Inflow Area =	36.780 ac,	Inflow Depth =	6.11"	for	100-YR STORM event
Inflow =	152.80 cfs @	12.49 hrs,	Volume=	18.713 af	
Outflow =	152.80 cfs @	12.49 hrs,	Volume=	18.713 af,	Atten= 0%, Lag= 0.0 min
Primary =	60.08 cfs @	12.37 hrs,	Volume=	14.025 af	
Secondary =	93.53 cfs @	12.49 hrs,	Volume=	4.688 af	

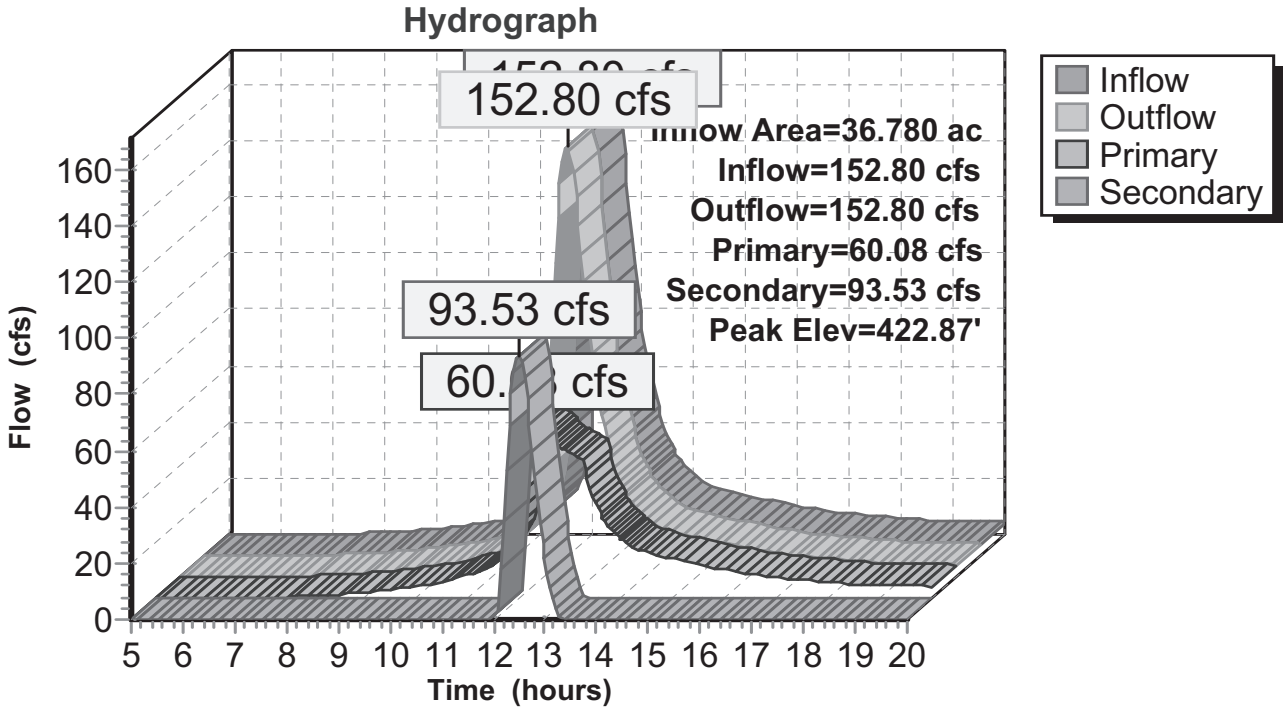
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 422.87' @ 12.49 hrs
Flood Elev= 424.00'
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	417.23'	**36.0" x 45.0' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 416.82' S= 0.0091 '/' n= 0.011 Cc= 0.900
2	Secondary	421.50'	**22.0' long x 6.3' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.52 2.70 2.68 2.68 2.67 2.66 2.65 2.65 2.65 2.66 2.65 2.67 2.68 2.71 2.75 2.82

Primary OutFlow Max=59.30 cfs @ 12.37 hrs HW=422.76' TW=418.86' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 59.30 cfs @ 8.4 fps)

Secondary OutFlow Max=93.35 cfs @ 12.49 hrs HW=422.86' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 93.35 cfs @ 3.1 fps)

Pond 6P: Existing Culvert 2



Pond 7P: Existing Culvert 3

Inflow Area =	22.130 ac,	Inflow Depth =	3.04"	for	100-YR STORM event
Inflow =	28.93 cfs @	12.54 hrs,	Volume=	5.612 af	
Outflow =	28.93 cfs @	12.54 hrs,	Volume=	5.612 af,	Atten= 0%, Lag= 0.0 min
Primary =	13.19 cfs @	12.54 hrs,	Volume=	4.254 af	
Secondary =	15.74 cfs @	12.54 hrs,	Volume=	1.358 af	

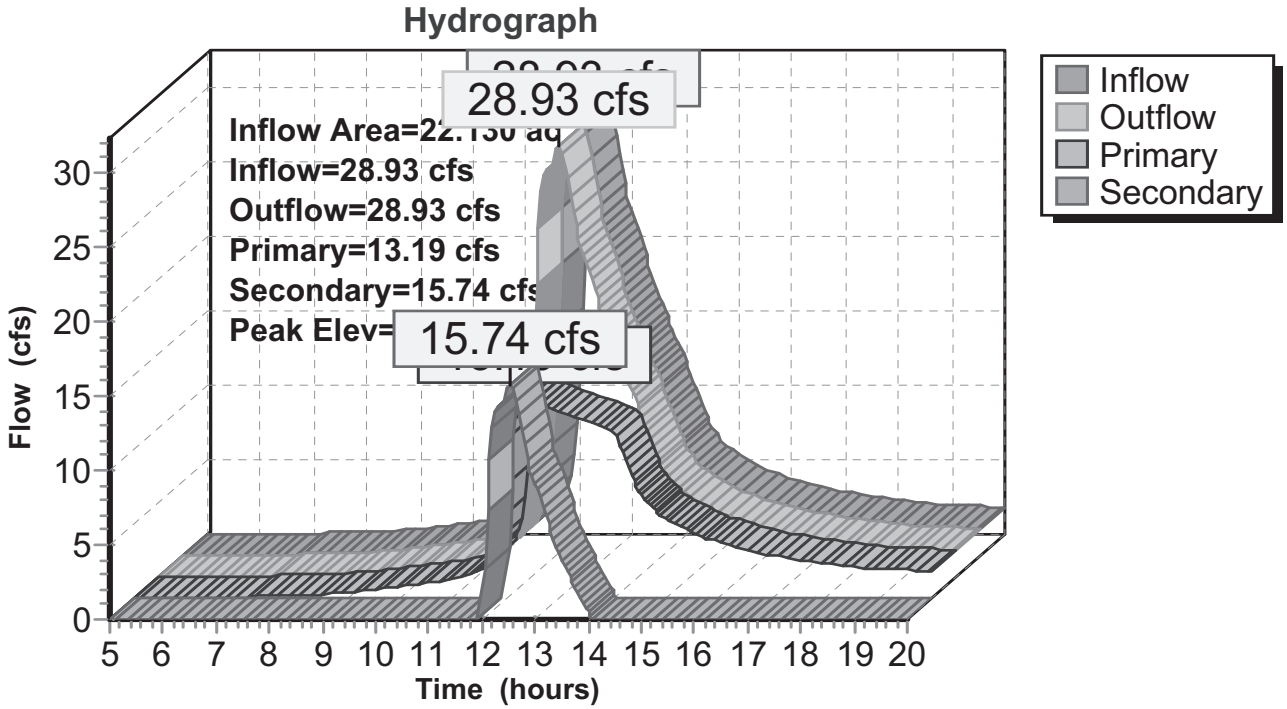
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 456.44' @ 12.54 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	452.60'	**18.0" x 45.6' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 451.11' S= 0.0327 '/' n= 0.011 Cc= 0.900
2	Secondary	455.50'	**6.5' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=13.19 cfs @ 12.54 hrs HW=456.44' TW=442.01' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 13.19 cfs @ 7.5 fps)

Secondary OutFlow Max=15.70 cfs @ 12.54 hrs HW=456.44' TW=455.02' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 15.70 cfs @ 2.6 fps)

Pond 7P: Existing Culvert 3



Pond 8P: Existing Culvert 4

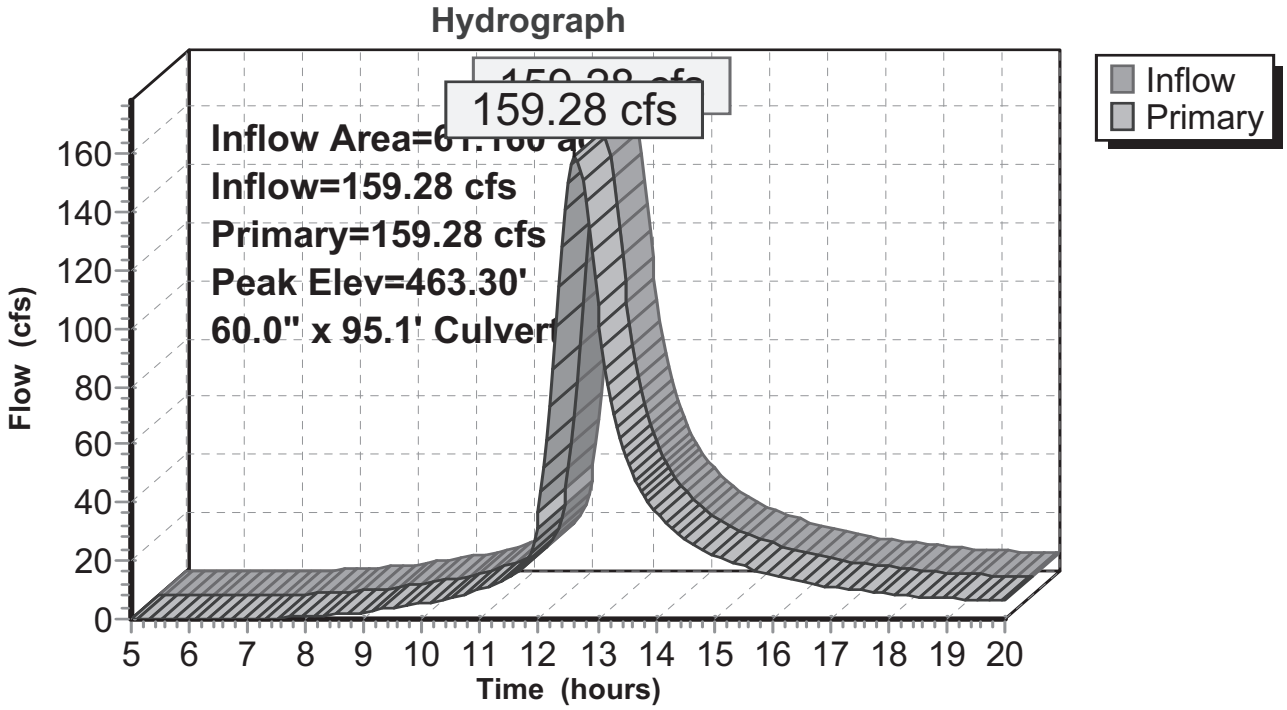
Inflow Area =	61.160 ac,	Inflow Depth =	4.72"	for	100-YR STORM event
Inflow =	159.28 cfs @	12.62 hrs,	Volume=	24.047 af	
Outflow =	159.28 cfs @	12.62 hrs,	Volume=	24.047 af,	Atten= 0%, Lag= 0.0 min
Primary =	159.28 cfs @	12.62 hrs,	Volume=	24.047 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 463.30' @ 12.62 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	457.96'	**60.0" x 95.1' long Culvert** CMP, square edge headwall, Ke= 0.500 Outlet Invert= 456.17' S= 0.0188 '/' n= 0.011 Cc= 0.900

Primary OutFlow Max=158.92 cfs @ 12.62 hrs HW=463.29' TW=458.15' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 158.92 cfs @ 8.1 fps)

Pond 8P: Existing Culvert 4



Pond 9P: Existing Culvert 5

Inflow Area =	11.360 ac,	Inflow Depth =	4.61"	for	100-YR STORM event
Inflow =	38.48 cfs @	12.41 hrs,	Volume=	4.364 af	
Outflow =	38.48 cfs @	12.41 hrs,	Volume=	4.364 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.75 cfs @	12.41 hrs,	Volume=	2.718 af	
Secondary =	30.74 cfs @	12.41 hrs,	Volume=	1.646 af	

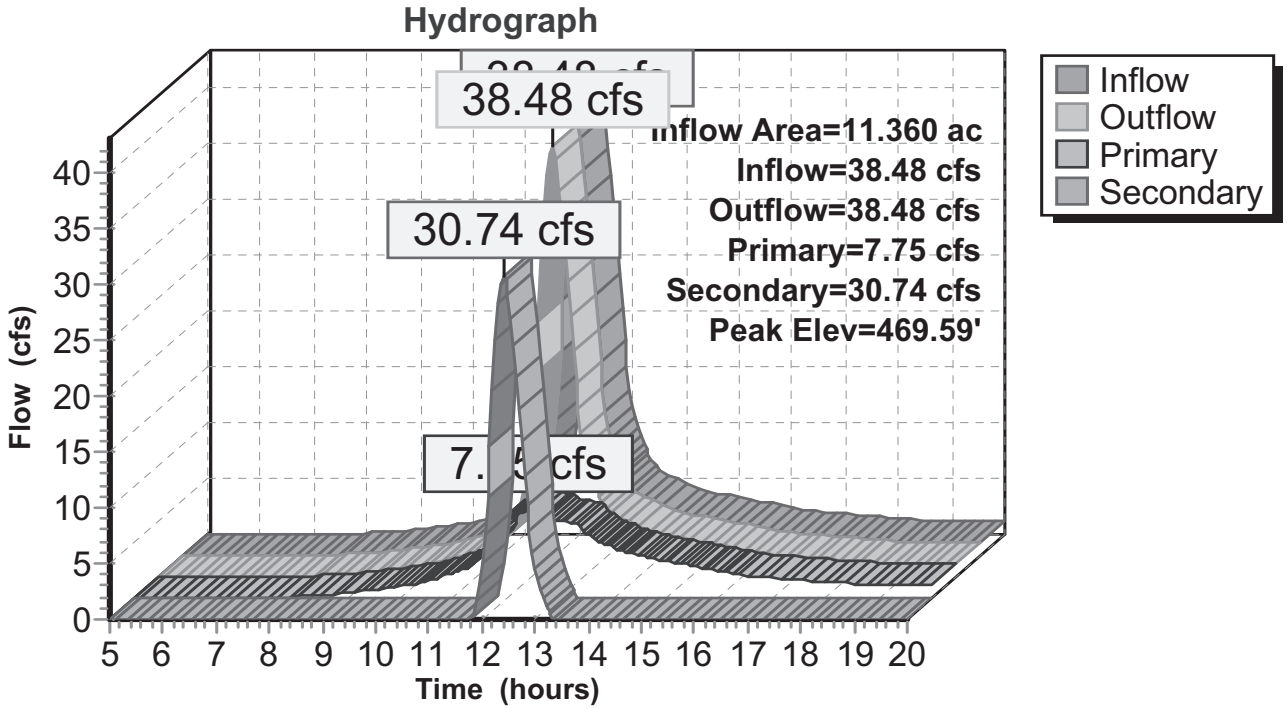
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 469.59' @ 12.41 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	466.76'	**15.0" x 50.3' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 465.61' S= 0.0229 '/' n= 0.011 Cc= 0.900
2	Secondary	469.00'	**25.0' long x 60.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=7.74 cfs @ 12.41 hrs HW=469.59' TW=460.55' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.74 cfs @ 6.3 fps)

Secondary OutFlow Max=30.67 cfs @ 12.41 hrs HW=469.59' TW=457.99' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 30.67 cfs @ 2.1 fps)

Pond 9P: Existing Culvert 5



Pond 10P: Existing Culvert 6

Inflow Area =	5.020 ac,	Inflow Depth =	4.56"	for	100-YR STORM event
Inflow =	13.96 cfs @	12.57 hrs,	Volume=	1.907 af	
Outflow =	13.96 cfs @	12.57 hrs,	Volume=	1.907 af,	Atten= 0%, Lag= 0.0 min
Primary =	9.70 cfs @	12.57 hrs,	Volume=	1.775 af	
Secondary =	4.25 cfs @	12.57 hrs,	Volume=	0.133 af	

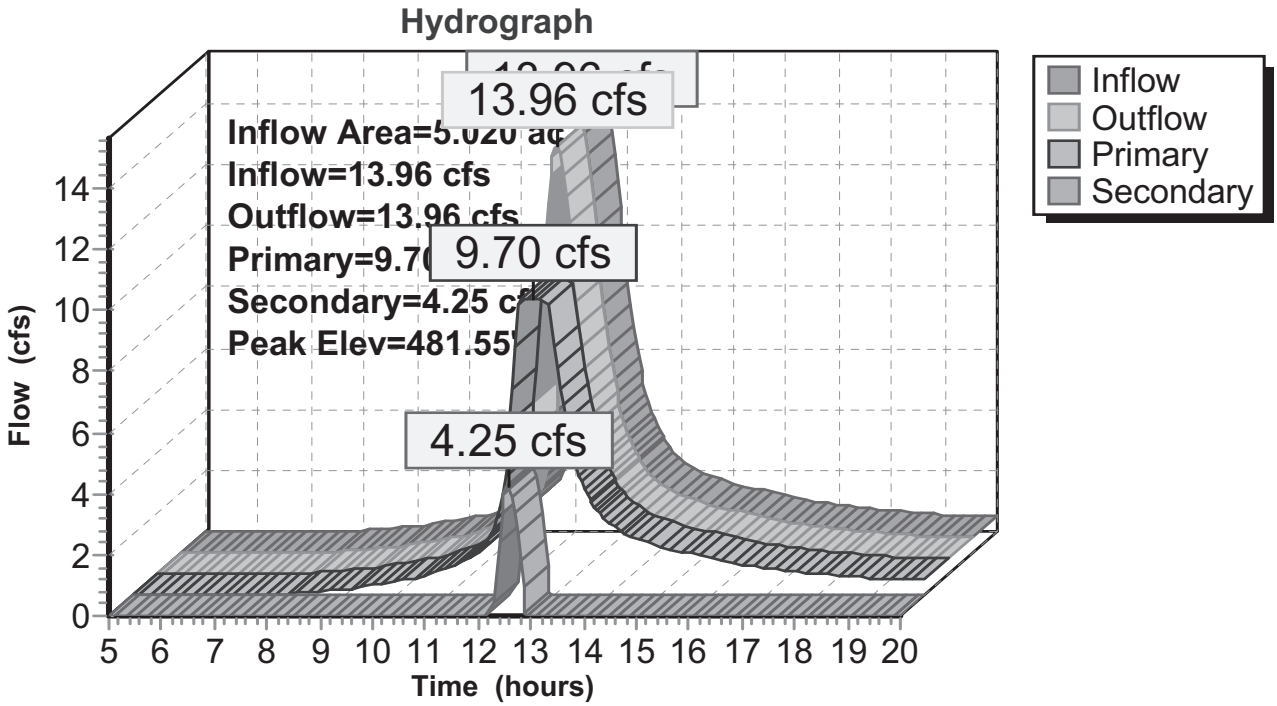
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 481.55' @ 12.57 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	477.46'	**15.0" x 54.0' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 475.67' S= 0.0331 '/' n= 0.011 Cc= 0.900
2	Secondary	481.50'	**160.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=9.70 cfs @ 12.57 hrs HW=481.55' TW=468.62' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 9.70 cfs @ 7.9 fps)

Secondary OutFlow Max=4.21 cfs @ 12.57 hrs HW=481.55' TW=480.70' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 4.21 cfs @ 0.5 fps)

Pond 10P: Existing Culvert 6



Pond 11P: Existing Culvert 9

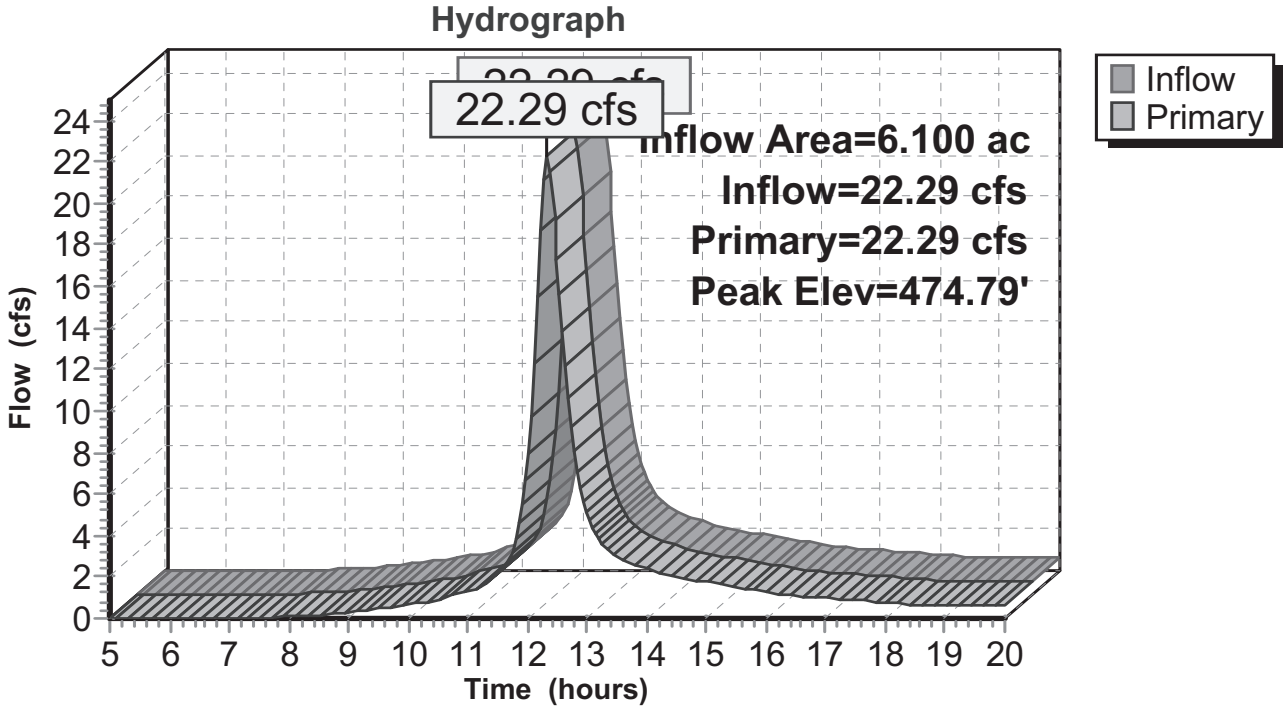
Inflow Area =	6.100 ac,	Inflow Depth =	4.59"	for	100-YR STORM event
Inflow =	22.29 cfs @	12.32 hrs,	Volume=	2.332 af	
Outflow =	22.29 cfs @	12.32 hrs,	Volume=	2.332 af,	Atten= 0%, Lag= 0.0 min
Primary =	22.29 cfs @	12.32 hrs,	Volume=	2.332 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 474.79' @ 12.32 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	471.95'	**15.0" x 45.5' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 471.00' S= 0.0209 '/' n= 0.011 Cc= 0.900
2	Primary	474.50'	**35.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=22.15 cfs @ 12.32 hrs HW=474.79' TW=468.29' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 7.75 cfs @ 6.3 fps)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 14.39 cfs @ 1.4 fps)

Pond 11P: Existing Culvert 9



Pond 12P: Existing Culvert 11

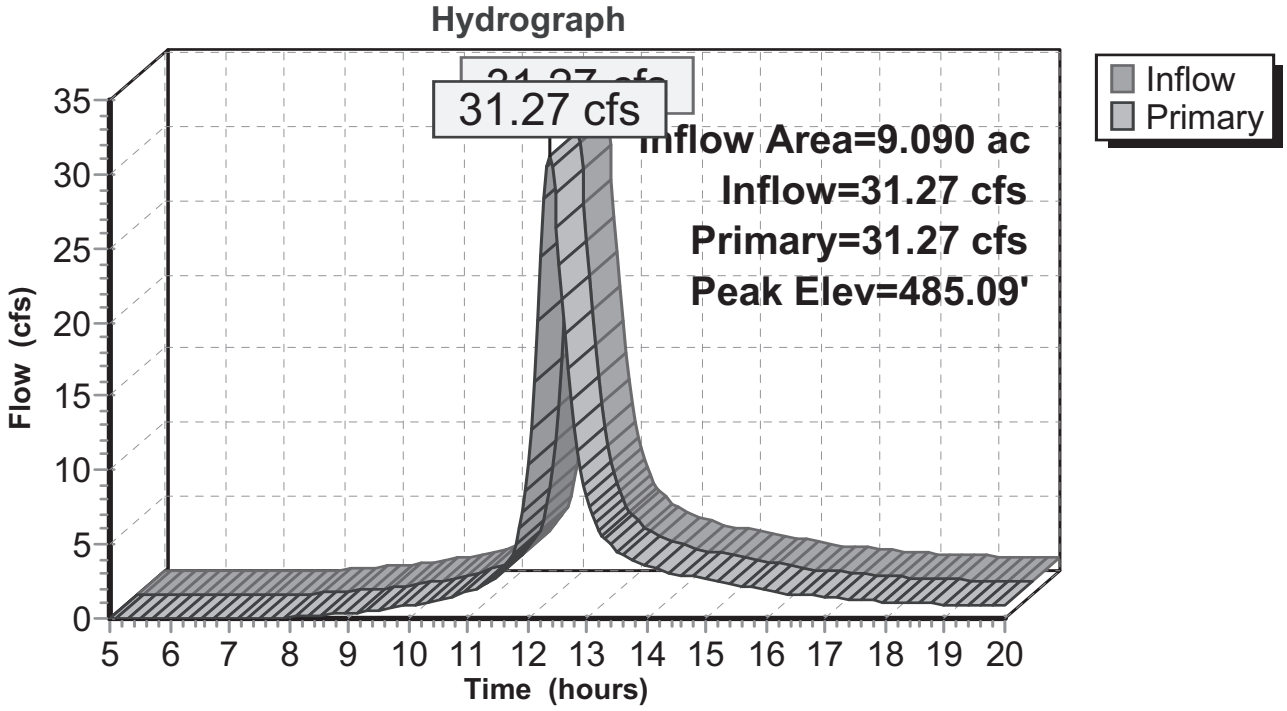
Inflow Area =	9.090 ac,	Inflow Depth =	4.47"	for	100-YR STORM event
Inflow =	31.27 cfs @	12.35 hrs,	Volume=	3.388 af	
Outflow =	31.27 cfs @	12.35 hrs,	Volume=	3.388 af,	Atten= 0%, Lag= 0.0 min
Primary =	31.27 cfs @	12.35 hrs,	Volume=	3.388 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 485.09' @ 12.35 hrs
Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated)

#	Routing	Invert	Outlet Devices
1	Primary	480.71'	**15.0" x 53.4' long Culvert** CMP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 479.74' S= 0.0182 '/' n= 0.011 Cc= 0.900
2	Primary	483.50'	**4.0' long x 125.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=31.25 cfs @ 12.35 hrs HW=485.09' TW=468.33' (Dynamic Tailwater)
- **1=Culvert** (Inlet Controls 10.11 cfs @ 8.2 fps)
- **2=Broad-Crested Rectangular Weir** (Weir Controls 21.14 cfs @ 3.3 fps)

Pond 12P: Existing Culvert 11



Pond 13P: Detention/Treatment Pond 13P

Inflow Area =	20.050 ac,	Inflow Depth =	5.16"	for	100-YR STORM event
Inflow =	83.99 cfs @	12.29 hrs,	Volume=	8.619 af	
Outflow =	46.04 cfs @	12.60 hrs,	Volume=	7.325 af,	Atten= 45%, Lag= 19.0 min
Primary =	25.14 cfs @	12.60 hrs,	Volume=	4.676 af	
Secondary =	20.89 cfs @	12.60 hrs,	Volume=	2.649 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 464.99' @ 12.61 hrs Surf.Area= 0 sf Storage= 138,400 cf
Plug-Flow detention time= 90.3 min calculated for 7.301 af (85% of inflow)
Center-of-Mass det. time= 48.1 min (833.5 - 785.4)

#	Invert	Avail.Storage	Storage Description
1	456.00'	163,490 cf	**Custom Stage Data**Listed below

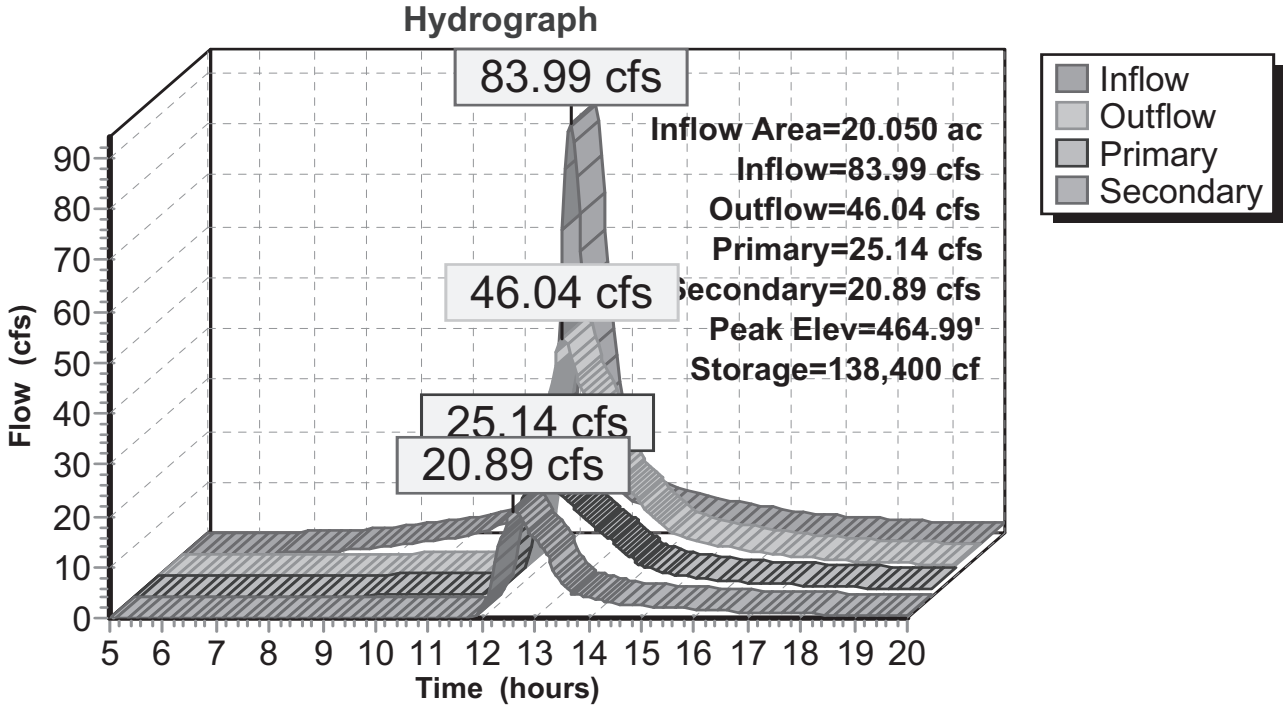
Elevation (feet)	Cum.Store (cubic-feet)
456.00	0
458.00	17,151
460.00	41,271
462.00	73,165
464.00	113,637
466.00	163,490

#	Routing	Invert	Outlet Devices
1	Primary	456.00'	**24.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 446.00' S= 0.1000 '/' n= 0.011 Cc= 0.900
2	Device 1	456.00'	**2.2" Vert. Orifice/Grate** C= 0.600
3	Device 1	456.70'	**3.3" Vert. Orifice/Grate** C= 0.600
4	Device 1	460.73'	**2.30' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	464.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
6	Device 1	465.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Secondary	456.00'	**24.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 446.00' S= 0.1000 '/' n= 0.011 Cc= 0.900
8	Device 7	460.73'	**1.65' x 0.50' Vert. Orifice/Grate** C= 0.600
9	Device 7	462.40'	**1.65' x 0.90' Vert. Orifice/Grate** C= 0.600
10	Device 7	464.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
11	Device 7	465.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
12	Primary	465.50'	**20.0' long x 13.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=25.12 cfs @ 12.60 hrs HW=464.99' TW=456.42' (Dynamic Tailwater)
- **1=Culvert** (Passes 25.12 cfs of 42.76 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.37 cfs @ 14.1 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.82 cfs @ 13.7 fps)
  - **4=Orifice/Grate** (Orifice Controls 21.46 cfs @ 9.3 fps)
  - **5=Broad-Crested Rectangular Weir** (Weir Controls 2.47 cfs @ 2.0 fps)
  - **6=Orifice/Grate** (Controls 0.00 cfs)
- **12=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=20.87 cfs @ 12.60 hrs HW=464.99' TW=422.78' (Dynamic Tailwater)
- **7=Culvert** (Passes 20.87 cfs of 42.76 cfs potential flow)
  - **8=Orifice/Grate** (Orifice Controls 7.95 cfs @ 9.6 fps)
  - **9=Orifice/Grate** (Orifice Controls 10.44 cfs @ 7.0 fps)
  - **10=Broad-Crested Rectangular Weir** (Weir Controls 2.47 cfs @ 2.0 fps)
  - **11=Orifice/Grate** (Controls 0.00 cfs)

Pond 13P: Detention/Treatment Pond 13P



Pond 14P: Detention/Treatment Pond 14P

Inflow Area = 11.420 ac, Inflow Depth = 5.28" for 100-YR STORM event
Inflow = 51.76 cfs @ 12.25 hrs, Volume= 5.023 af
Outflow = 21.85 cfs @ 12.63 hrs, Volume= 4.240 af, Atten= 58%, Lag= 22.6 min
Primary = 21.85 cfs @ 12.63 hrs, Volume= 4.240 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 498.99' @ 12.63 hrs Surf.Area= 0 sf Storage= 92,525 cf
Plug-Flow detention time= 104.7 min calculated for 4.240 af (84% of inflow)
Center-of-Mass det. time= 60.5 min (841.6 - 781.1)

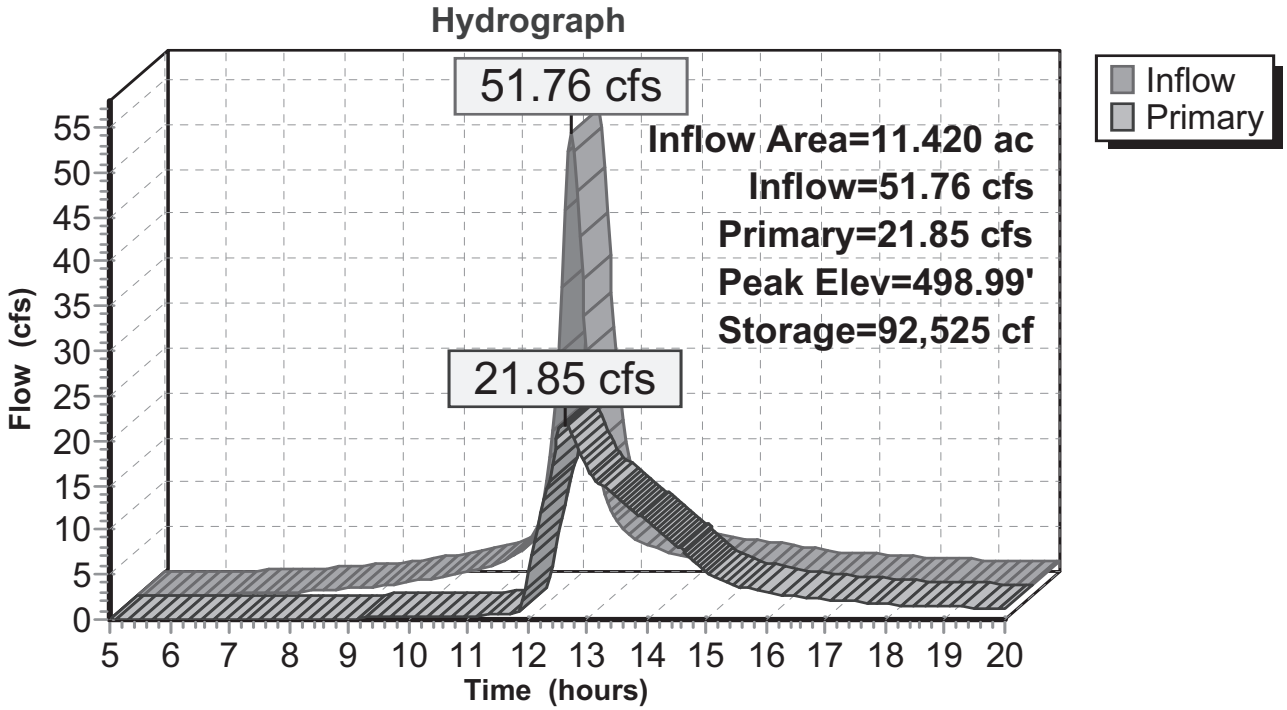
#	Invert	Avail.Storage	Storage Description
1	491.00'	112,422 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
491.00	0
492.00	5,220
494.00	20,281
496.00	42,461
498.00	72,873
500.00	112,422

#	Routing	Invert	Outlet Devices
1	Primary	491.00'	**24.0" x 60.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 490.00' S= 0.0167 '/' n= 0.011 Cc= 0.900
2	Device 1	491.00'	**1.9" Vert. Orifice/Grate** C= 0.600
3	Device 1	491.70'	**2.7" Vert. Orifice/Grate** C= 0.600
4	Device 1	495.00'	**1.80' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	498.25'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32

Primary OutFlow Max=21.80 cfs @ 12.63 hrs HW=498.99' TW=463.28' (Dynamic Tailwater)
└─**1=Culvert** (Passes 21.80 cfs of 39.99 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.27 cfs @ 13.5 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.51 cfs @ 12.9 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 16.18 cfs @ 9.0 fps)
  └─**5=Broad-Crested Rectangular Weir**(Weir Controls 4.84 cfs @ 2.6 fps)

Pond 14P: Detention/Treatment Pond 14P



Pond 15P: Detention/Treatment Pond 15P

Inflow Area = 26.950 ac, Inflow Depth = 5.27" for 100-YR STORM event
Inflow = 113.54 cfs @ 12.30 hrs, Volume= 11.840 af
Outflow = 52.51 cfs @ 12.68 hrs, Volume= 9.931 af, Atten= 54%, Lag= 22.7 min
Primary = 52.51 cfs @ 12.68 hrs, Volume= 9.931 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 495.04' @ 12.68 hrs Surf.Area= 0 sf Storage= 213,962 cf
Plug-Flow detention time= 105.8 min calculated for 9.931 af (84% of inflow)
Center-of-Mass det. time= 60.9 min (844.9 - 784.0)

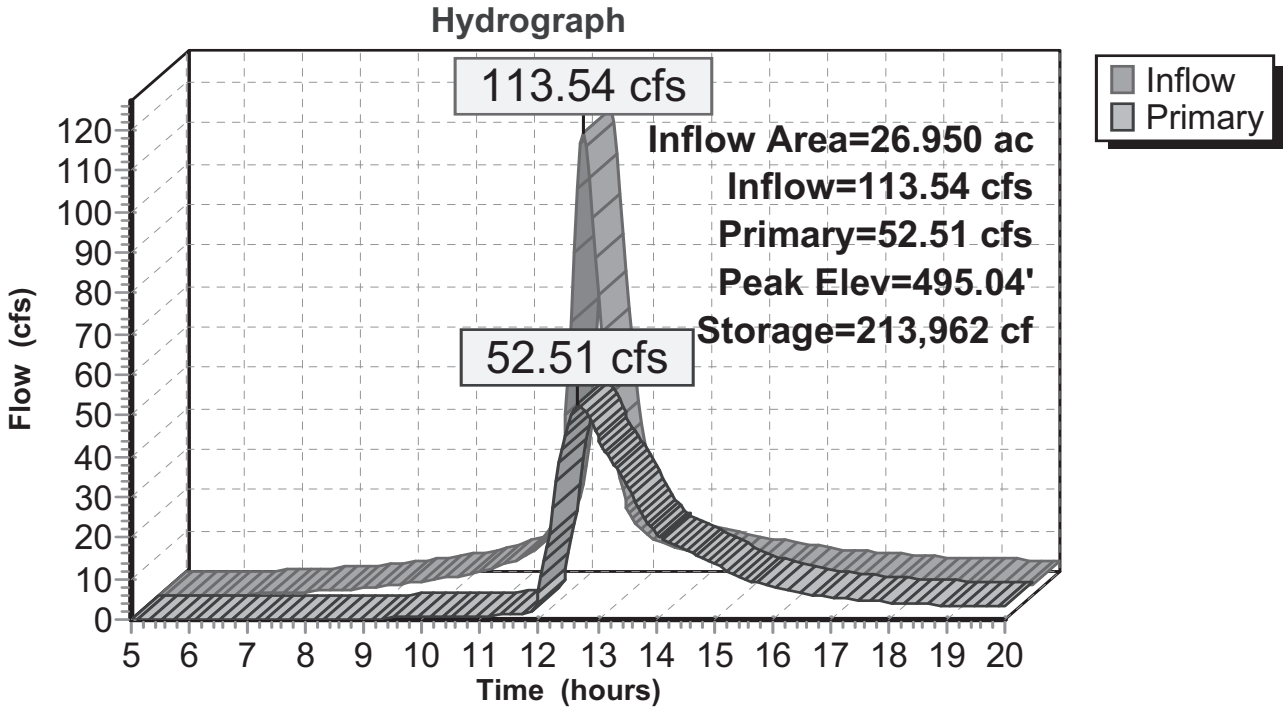
#	Invert	Avail.Storage	Storage Description
1	486.00'	250,174 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
486.00	0
488.00	26,415
490.00	63,689
492.00	112,776
494.00	174,623
496.00	250,174

#	Routing	Invert	Outlet Devices
1	Primary	486.00'	**30.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 482.00' S= 0.0400 '/' n= 0.011 Cc= 0.900
2	Device 1	486.00'	**2.7" Vert. Orifice/Grate** C= 0.600
3	Device 1	486.71'	**4.0" Vert. Orifice/Grate** C= 0.600
4	Device 1	490.47'	**3.00' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	492.43'	**3.00' x 0.75' Vert. Orifice/Grate** C= 0.600
6	Device 1	494.25'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32

Primary OutFlow Max=52.43 cfs @ 12.68 hrs HW=495.04' TW=468.78' (Dynamic Tailwater)
└─**1=Culvert** (Passes 52.43 cfs of 65.96 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.57 cfs @ 14.4 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 1.20 cfs @ 13.8 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 29.11 cfs @ 9.7 fps)
  ├─**5=Orifice/Grate** (Orifice Controls 16.17 cfs @ 7.2 fps)
  └─**6=Broad-Crested Rectangular Weir** (Weir Controls 5.38 cfs @ 2.7 fps)

Pond 15P: Detention/Treatment Pond 15P



Pond 16P: Detention/Treatment Pond 16P

Inflow Area =	2.390 ac,	Inflow Depth =	5.87"	for	100-YR STORM event
Inflow =	15.44 cfs @	12.11 hrs,	Volume=	1.169 af	
Outflow =	6.51 cfs @	12.36 hrs,	Volume=	0.946 af,	Atten= 58%, Lag= 14.9 min
Primary =	6.51 cfs @	12.36 hrs,	Volume=	0.946 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 504.99' @ 12.36 hrs Surf.Area= 0 sf Storage= 22,032 cf
Plug-Flow detention time= 115.4 min calculated for 0.942 af (81% of inflow)
Center-of-Mass det. time= 64.5 min (826.8 - 762.3)

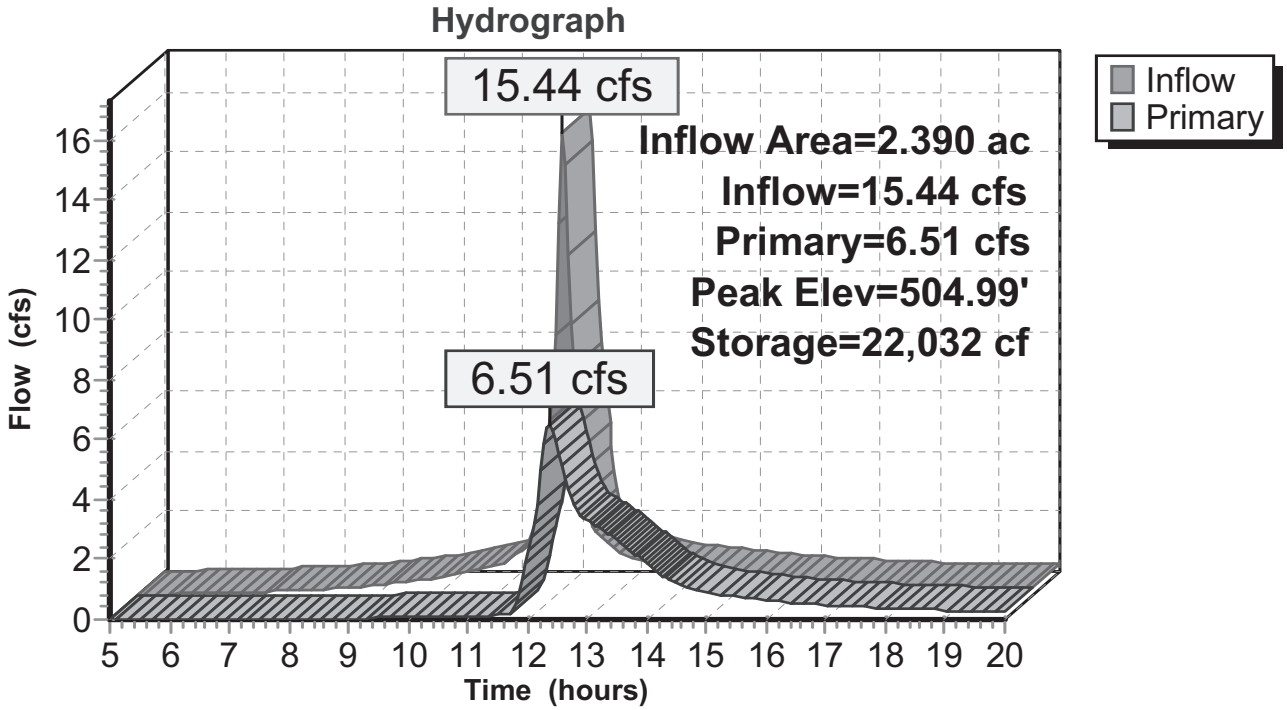
#	Invert	Avail.Storage	Storage Description
1	501.50'	29,657 cf	**Custom Stage Data**Listed below

Elevation (feet)	Cum.Store (cubic-feet)
501.50	0
502.00	2,572
504.00	14,626
506.00	29,657

#	Routing	Invert	Outlet Devices
1	Primary	501.50'	**18.0" x 40.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 497.50' S= 0.1000 '/' n= 0.011 Cc= 0.900
2	Device 1	501.50'	**1.3" Vert. Orifice/Grate** C= 0.600
3	Device 1	501.84'	**1.8" Vert. Orifice/Grate** C= 0.600
4	Device 1	503.09'	**1.25' x 0.50' Vert. Orifice/Grate** C= 0.600
5	Device 1	504.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
6	Device 1	505.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Primary	505.50'	**20.0' long x 13.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=6.49 cfs @ 12.36 hrs HW=504.98' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 6.49 cfs of 14.07 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.08 cfs @ 8.9 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.15 cfs @ 8.4 fps)
  - **4=Orifice/Grate** (Orifice Controls 3.85 cfs @ 6.2 fps)
  - **5=Broad-Crested Rectangular Weir**(Weir Controls 2.41 cfs @ 2.0 fps)
  - **6=Orifice/Grate** (Controls 0.00 cfs)
- **7=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond 16P: Detention/Treatment Pond 16P



APPENDIX 4

TR-20 SUPPORTING DATA

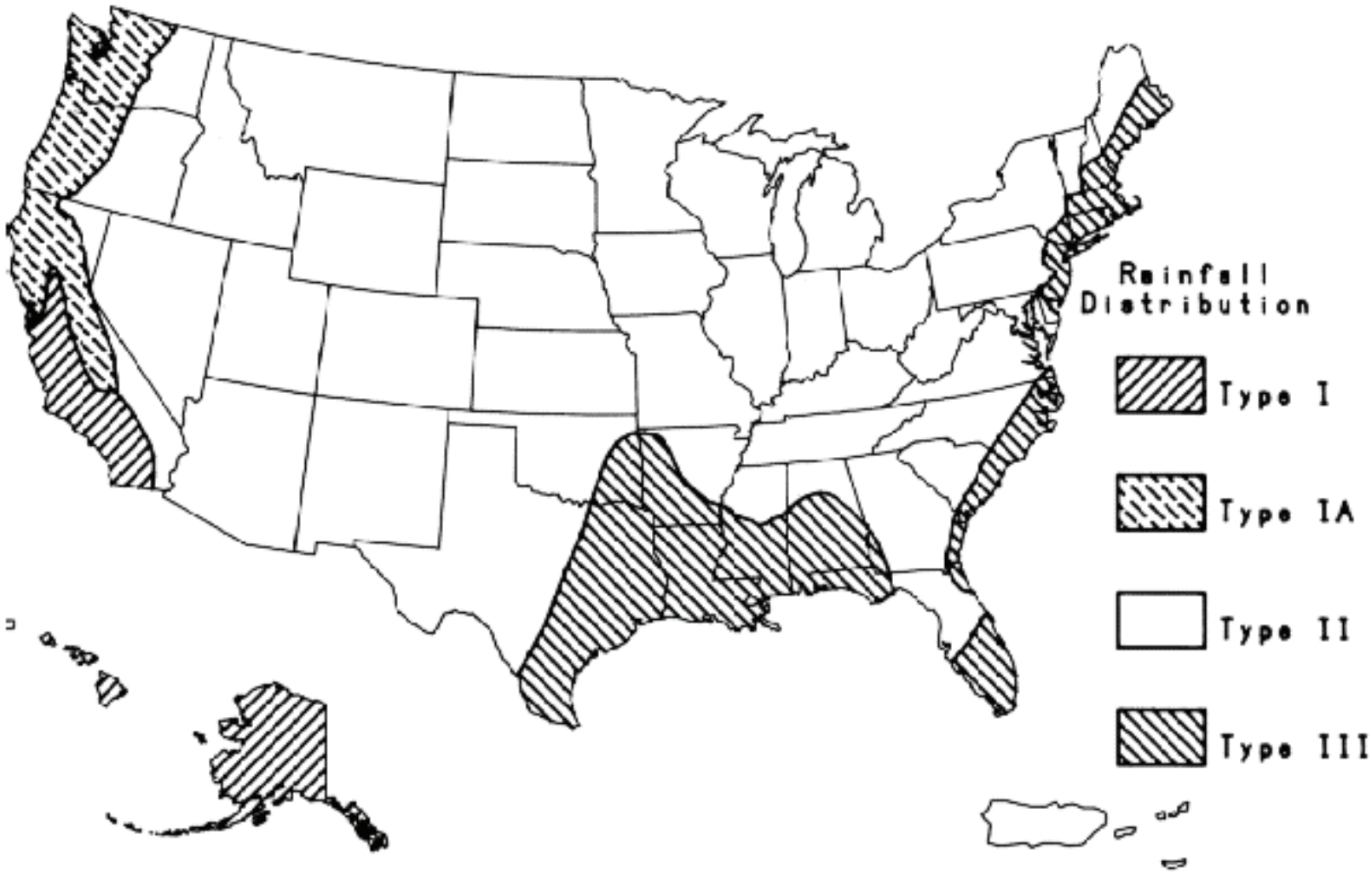


Figure B-2.—Approximate geographic boundaries for SCS rainfall distributions.

Figure B-3 2-year, 24-hr rainfall

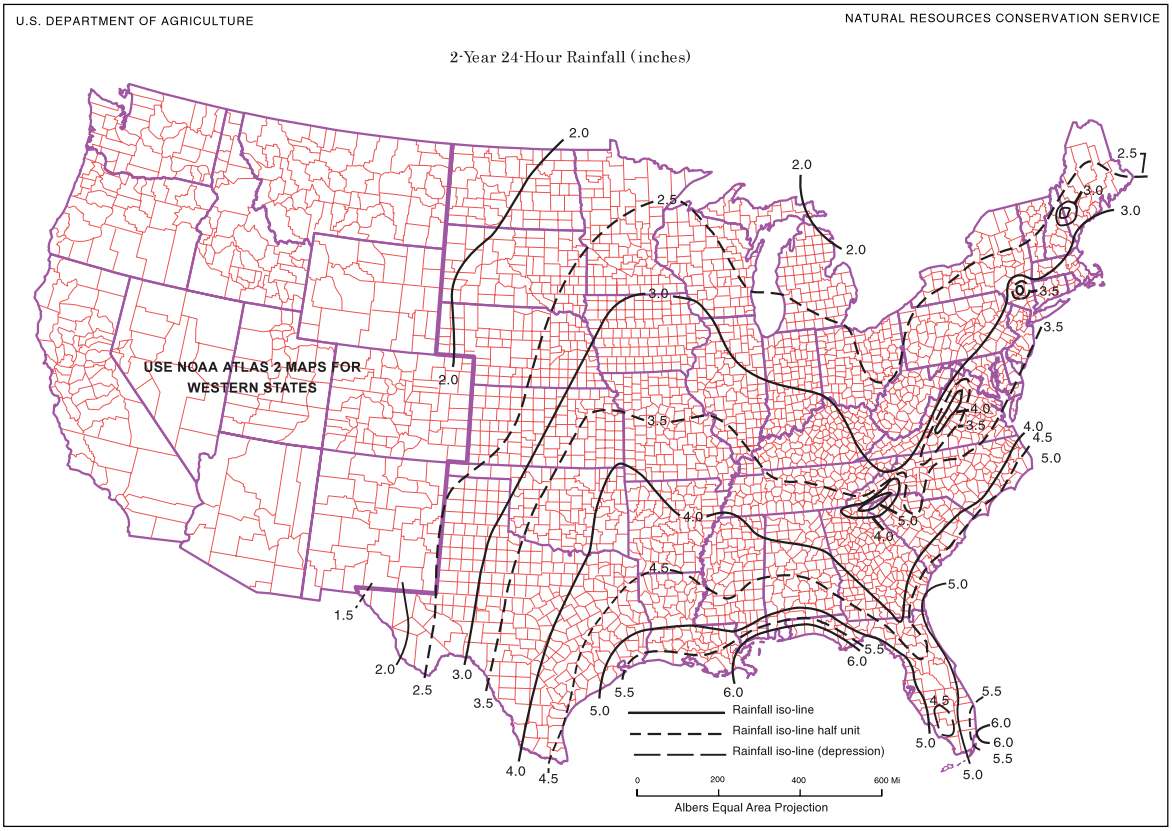


Figure B-4 5-year, 24-hour rainfall

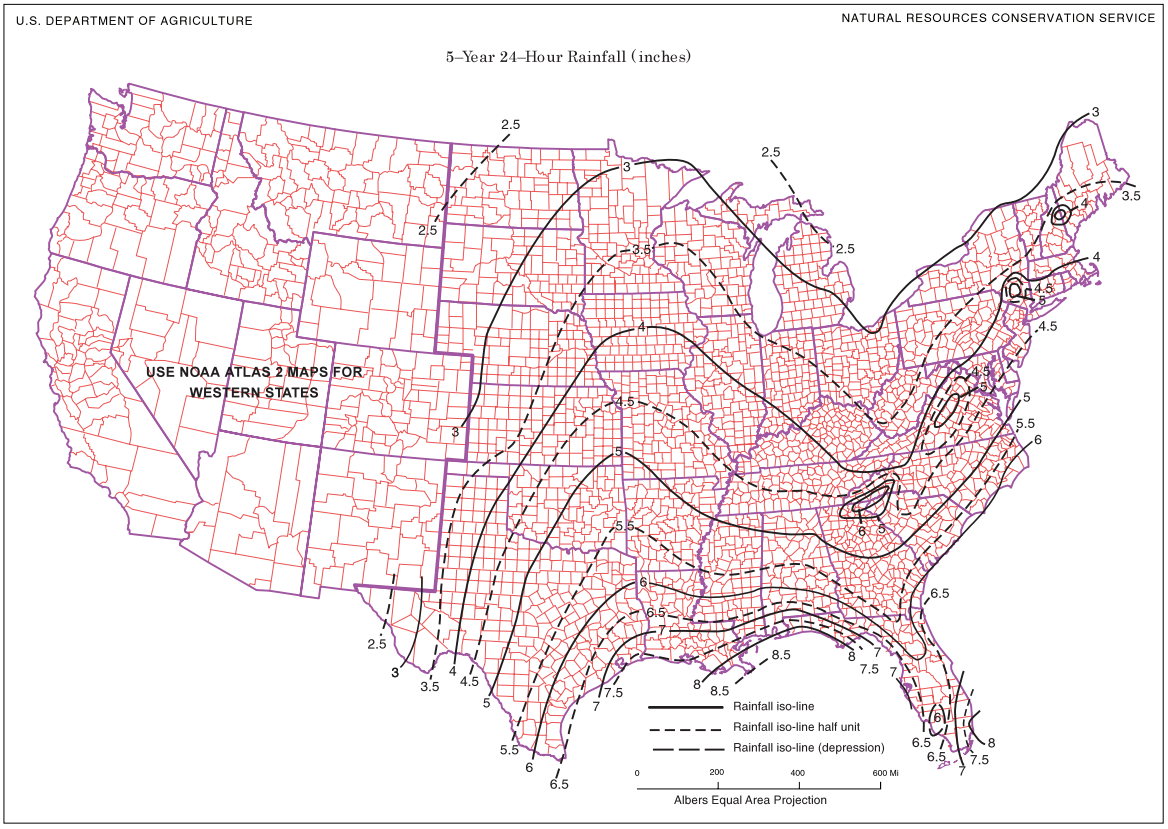


Figure B-5 10-year, 24-hour rainfall

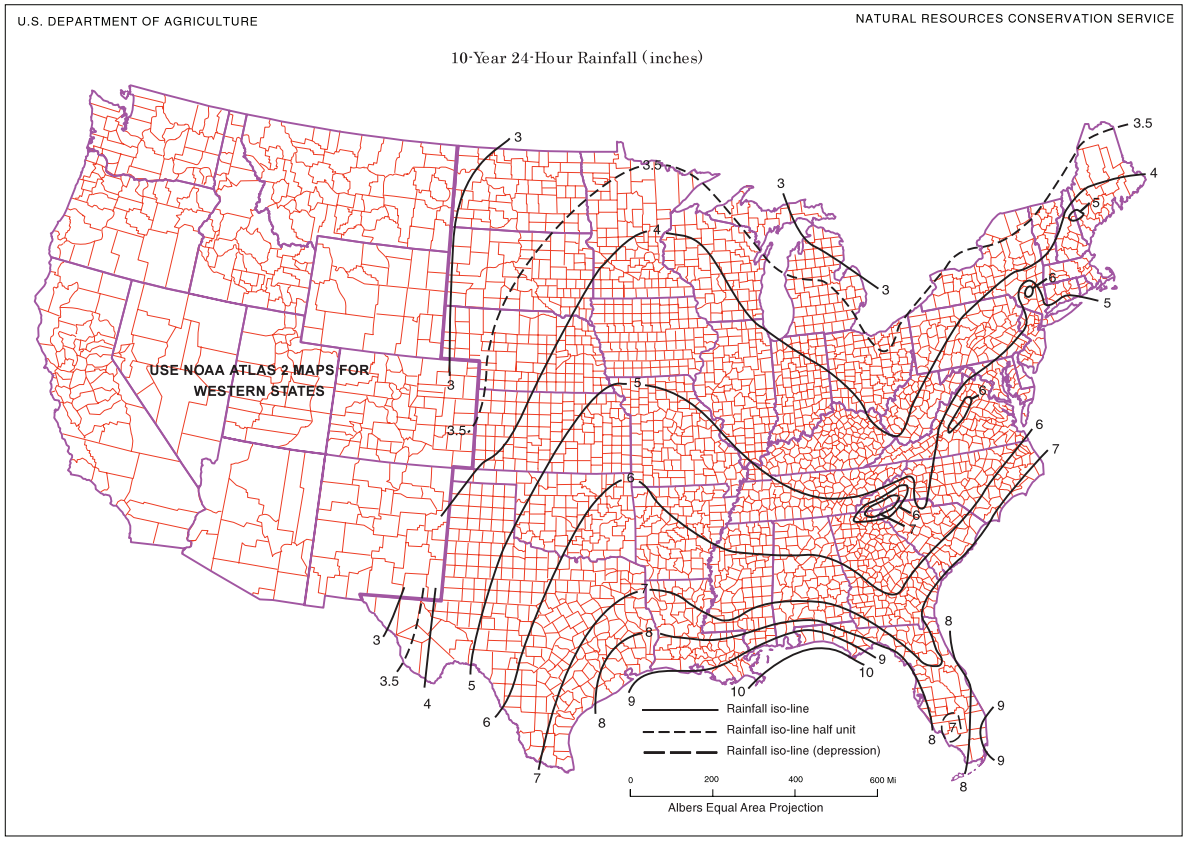


Figure B-6 25-year, 24-hour rainfall

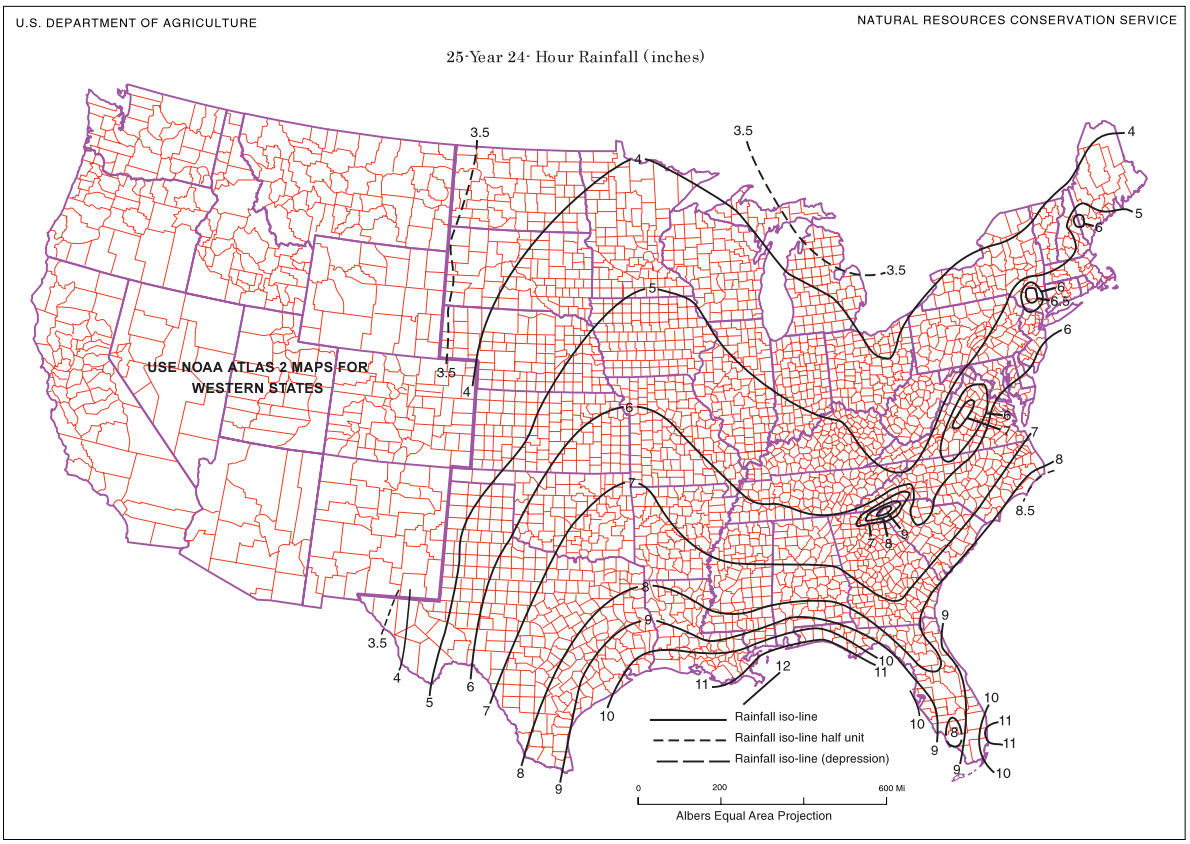


Figure B-7 50-year, 24-hour rainfall

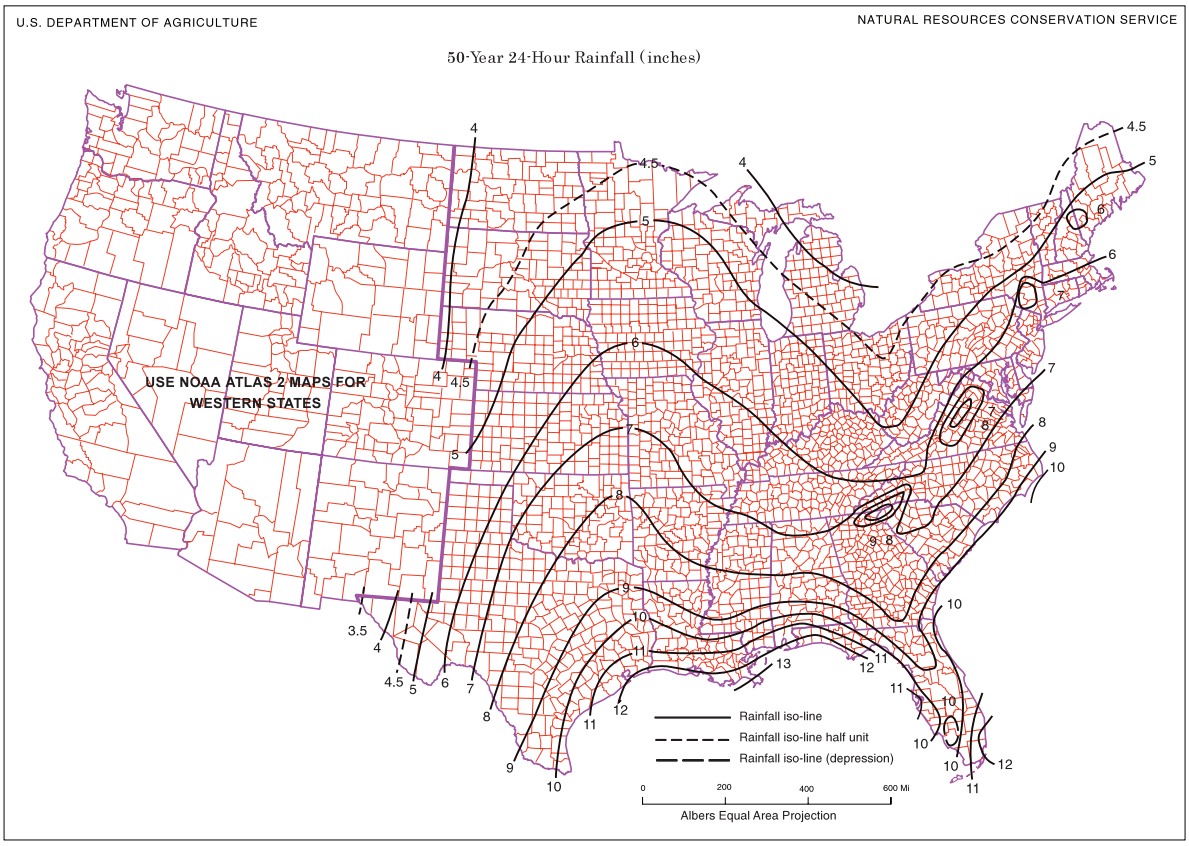
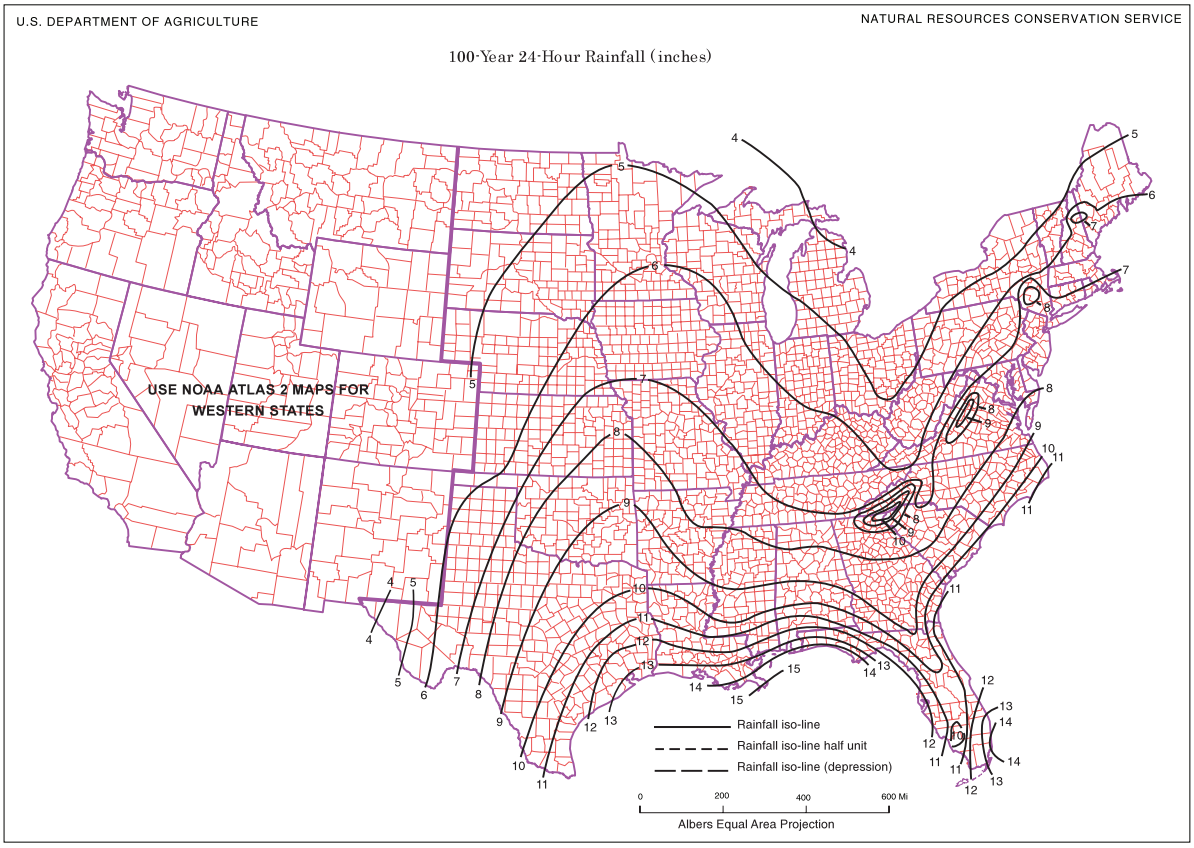


Figure B-8 100-year, 24-hour rainfall



RAINFALL LIST BY COUNTY

24-Hour Rainfall Amounts (inches) for selected counties in New York State.

COUNTY	1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR	Average Annual Rainfall
Columbia	2.5	3.0	4.0	4.7	5.5	6.0	7.8	39.9
Dutchess	2.8	3.5	4.5	5.0	6.0	7.0	8.0	40.2
Orange	2.9	3.5	4.5	5.5	6.5	7.0	8.0	48.0
Putnam	2.7	3.5	4.5	5.0	6.0	7.0	7.5	45.0
Rockland	2.7	3.5	4.5	5.0	6.0	7.0	7.5	51.2
Ulster	3.5	4.0	5.0	6.0	6.5	7.0	8.0	50.4
Westchester	2.8	3.5	4.5	5.0	6.0	7.0	7.5	49.5

Note: The frequency values listed below are average values for the County. In certain areas of a county, jobs may require higher or lower rainfall values.

Orange County, New York Soil Survey

Description Category: NASIS

Ab = Alden silt loam

This soil is very deep and very poorly drained. Slopes range from 0 to 3 percent. The parent material consists of a silty mantle of local deposition overlying loamy till. Depth to the top of a seasonal high water table is 0 inches. Annual ponding is frequent. Shrink-swell potential is low. Available water capacity is high. The Kf erodibility factor assigned to the top mineral soil layer is .32 and the soil loss tolerance factor T is 4.
Hydrologic group: D
Farmland class: not prime farmland
Hydric soil rating: yes
Land capability classification: 5w

Map Unit Setting

- *Elevation:* 300 to 1,500 feet
- *Mean annual precipitation:* 42 to 52 inches
- *Mean annual air temperature:* 46 to 52 degrees F
- *Frost-free period:* 135 to 215 days

Map Unit Composition

- *Alden and similar soils:* 80 percent

Description of Alden

Setting

- *Landform:* Depressions
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Concave
- *Across-slope shape:* Concave
- *Parent material:* A silty mantle of local deposition overlying loamy till

Properties and qualities

- *Slope:* 0 to 3 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Very poorly 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:* About 0 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* Frequent
- *Calcium carbonate, maximum content:* 1 percent
- *Available water capacity:* High (about 9.2 inches)

Interpretive groups

- *Land capability (nonirrigated):* 5w

Typical profile

- *0 to 9 inches:* Silt loam
- *9 to 36 inches:* Silt loam
- *36 to 60 inches:* Gravelly fine sandy loam

ErB = Erie gravelly silt loam, 3 to 8 percent slopes

This soil is very deep and somewhat poorly drained. The parent material consists of loamy till derived from siltstone, sandstone, shale, and limestone. Depth to a restrictive feature is 10 to 21 inches to a fragipan. Depth to the top of a seasonal high water table ranges from 6 to 18 inches. Shrink-swell potential is low. Available water capacity is very low. The Kf erodibility factor assigned to the top mineral soil layer is .32 and the soil loss tolerance factor T is 2.
Hydrologic group: C
Farmland class: farmland of statewide importance
Hydric soil rating: no
Land capability classification: 3w

Map Unit Setting

- *Mean annual precipitation:* 42 to 52 inches
- *Mean annual air temperature:* 46 to 52 degrees F
- *Frost-free period:* 135 to 215 days

Map Unit Composition

- *Erie and similar soils:* 80 percent

Description of Erie

Setting

- *Landform:* Drumlinoid ridges, hills, till plains
- *Landform position (two-dimensional):* Footslope, summit
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Concave
- *Across-slope shape:* Linear
- *Parent material:* Loamy till derived from siltstone, sandstone, shale, and limestone

Properties and qualities

- *Slope:* 3 to 8 percent
- *Depth to restrictive feature:* 10 to 21 inches to fragipan
- *Drainage class:* Somewhat poorly drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* About 6 to 18 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None

- *Calcium carbonate, maximum content:* 15 percent
- *Available water capacity:* Very low (about 2.1 inches)

Interpretive groups

- *Land capability (nonirrigated):* 3w

Typical profile

- *0 to 9 inches:* Gravelly silt loam
- *9 to 18 inches:* Channery silt loam
- *18 to 54 inches:* Channery silt loam
- *54 to 70 inches:* Channery silt loam

ESB = Erie extremely stony soils, gently sloping

Erie— This soil is very deep and somewhat poorly drained. Slopes range from 3 to 8 percent. The parent material consists of loamy till derived from siltstone, sandstone, shale, and limestone. Depth to a restrictive feature is 10 to 21 inches to a fragipan. Depth to the top of a seasonal high water table ranges from 6 to 18 inches. Shrink-swell potential is low. Available water capacity is very low. The Kf erodibility factor assigned to the top mineral soil layer is .32 and the soil loss tolerance factor T is 2.
Hydrologic group: C
Farmland class: not prime farmland
Hydric soil rating: no
Land capability classification: 7s

Map Unit Setting

- *Mean annual precipitation:* 42 to 52 inches
- *Mean annual air temperature:* 46 to 52 degrees F
- *Frost-free period:* 135 to 215 days

Map Unit Composition

- *Erie, extremely stony, and similar soils:* 80 percent

Description of Erie, Extremely Stony

Setting

- *Landform:* Drumlinoid ridges, hills, till plains
- *Landform position (two-dimensional):* Footslope, summit
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Concave
- *Across-slope shape:* Linear
- *Parent material:* Loamy till derived from siltstone, sandstone, shale, and limestone

Properties and qualities

- *Slope:* 3 to 8 percent

- *Surface area covered with cobbles, stones or boulders:* 9.0 percent
- *Depth to restrictive feature:* 10 to 21 inches to fragipan
- *Drainage class:* Somewhat poorly drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* About 6 to 18 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 15 percent
- *Available water capacity:* Very low (about 2.1 inches)

Interpretive groups

- *Land capability (nonirrigated):* 7s

Typical profile

- *0 to 4 inches:* Gravelly silt loam
- *4 to 18 inches:* Channery silt loam
- *18 to 50 inches:* Channery silt loam
- *50 to 70 inches:* Channery silt loam

HoD = Hoosic gravelly sandy loam, 15 to 25 percent slopes

This soil is very deep and somewhat excessively drained. The parent material consists of sandy and gravelly glaciofluvial deposits. Depth to the top of a seasonal high water table is greater than 60 inches. Shrink-swell potential is low. Available water capacity is very low. The Kf erodibility factor assigned to the top mineral soil layer is .24 and the soil loss tolerance factor T is 4.
Hydrologic group: A
Farmland class: not prime farmland
Hydric soil rating: no
Land capability classification: 4e

Map Unit Setting

- *Elevation:* 100 to 1,100 feet
- *Mean annual precipitation:* 42 to 52 inches
- *Mean annual air temperature:* 46 to 52 degrees F
- *Frost-free period:* 135 to 215 days

Map Unit Composition

- *Hoosic and similar soils:* 75 percent

Description of Hoosic

Setting

- *Landform:* Deltas, outwash plains, terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Riser

- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Sandy and gravelly glaciofluvial deposits

Properties and qualities

- *Slope:* 15 to 25 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Somewhat excessively drained
- *Capacity of the most limiting layer to transmit water (Ksat):* High to very high (1.98 to 19.98 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Very low (about 3.0 inches)

Interpretive groups

- *Land capability (nonirrigated):* 4e

Typical profile

- *0 to 5 inches:* Gravelly sandy loam
- *5 to 23 inches:* Very gravelly sandy loam
- *23 to 60 inches:* Very gravelly sand

Ma = Madalin silt loam

This soil is very deep and poorly drained. Slopes range from 0 to 3 percent. The parent material consists of clayey and silty glaciolacustrine deposits. Depth to the top of a seasonal high water table is 0 inches. Annual ponding is frequent. Shrink-swell potential is moderate. Available water capacity is high. The Kf erodibility factor assigned to the top mineral soil layer is .37 and the soil loss tolerance factor T is 3.
Hydrologic group: D
Farmland class: farmland of statewide importance
Hydric soil rating: yes
Land capability classification: 4w

Map Unit Setting

- *Mean annual precipitation:* 42 to 52 inches
- *Mean annual air temperature:* 46 to 52 degrees F
- *Frost-free period:* 135 to 215 days

Map Unit Composition

- *Madalin and similar soils:* 80 percent

Description of Madalin

Setting

- *Landform:* Depressions
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Concave
- *Across-slope shape:* Concave
- *Parent material:* Clayey and silty glaciolacustrine deposits

Properties and qualities

- *Slope:* 0 to 3 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Poorly drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* About 0 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* Frequent
- *Calcium carbonate, maximum content:* 15 percent
- *Available water capacity:* Moderate (about 8.4 inches)

Interpretive groups

- *Land capability (nonirrigated):* 4w

Typical profile

- *0 to 10 inches:* Silt loam
- *10 to 38 inches:* Silty clay loam
- *38 to 60 inches:* Stratified silty clay

MdB = Mardin gravelly silt loam, 3 to 8 percent slopes

This soil is very deep and moderately well drained. The parent material consists of loamy till derived mainly from acid sedimentary rock. Depth to a restrictive feature is 14 to 26 inches to a fragipan. Depth to the top of a seasonal high water table ranges from 18 to 24 inches. Shrink-swell potential is low. Available water capacity is low. The Kf erodibility factor assigned to the top mineral soil layer is .32 and the soil loss tolerance factor T is 2.
Hydrologic group: C
Farmland class: farmland of statewide importance
Hydric soil rating: no
Land capability classification: 2w

Map Unit Setting

- *Elevation:* 800 to 1,800 feet
- *Mean annual precipitation:* 42 to 52 inches
- *Mean annual air temperature:* 46 to 52 degrees F
- *Frost-free period:* 135 to 215 days

Map Unit Composition

- *Mardin and similar soils:* 75 percent

Description of Mardin

Setting

- *Landform:* Drumlinoid ridges, hills, till plains
- *Landform position (two-dimensional):* Summit
- *Landform position (three-dimensional):* Crest
- *Down-slope shape:* Concave
- *Across-slope shape:* Convex
- *Parent material:* Loamy till derived mainly from acid sedimentary rock

Properties and qualities

- *Slope:* 3 to 8 percent
- *Depth to restrictive feature:* 14 to 26 inches to fragipan
- *Drainage class:* Moderately well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* About 18 to 24 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Very low (about 2.6 inches)

Interpretive groups

- *Land capability (nonirrigated):* 2w

Typical profile

- *0 to 8 inches:* Gravelly silt loam
- *8 to 20 inches:* Gravelly silt loam
- *20 to 60 inches:* Channery silt loam

MdC = Mardin gravelly silt loam, 8 to 15 percent slopes

This soil is very deep and moderately well drained. The parent material consists of loamy till derived mainly from acid sedimentary rock. Depth to a restrictive feature is 14 to 26 inches to a fragipan. Depth to the top of a seasonal high water table ranges from 18 to 24 inches. Shrink-swell potential is low. Available water capacity is low. The Kf erodibility factor assigned to the top mineral soil layer is .32 and the soil loss tolerance factor T is 2.
Hydrologic group: C
Farmland class: farmland of statewide importance
Hydric soil rating: no
Land capability classification: 3e

Map Unit Setting

- *Elevation:* 800 to 1,800 feet
- *Mean annual precipitation:* 42 to 52 inches
- *Mean annual air temperature:* 46 to 52 degrees F
- *Frost-free period:* 135 to 215 days

Map Unit Composition

- *Mardin and similar soils:* 75 percent

Description of Mardin

Setting

- *Landform:* Drumlinoid ridges, hills, till plains
- *Landform position (two-dimensional):* Summit
- *Landform position (three-dimensional):* Crest
- *Down-slope shape:* Concave
- *Across-slope shape:* Convex
- *Parent material:* Loamy till derived mainly from acid sedimentary rock

Properties and qualities

- *Slope:* 8 to 15 percent
- *Depth to restrictive feature:* 14 to 26 inches to fragipan
- *Drainage class:* Moderately well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* About 18 to 24 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Very low (about 2.4 inches)

Interpretive groups

- *Land capability (nonirrigated):* 3e

Typical profile

- *0 to 7 inches:* Gravelly silt loam
- *7 to 18 inches:* Gravelly silt loam
- *18 to 60 inches:* Channery silt loam

MdD = Mardin gravelly silt loam, 15 to 25 percent slopes

This soil is very deep and moderately well drained. The parent material consists of loamy till derived mainly from acid sedimentary rock. Depth to a restrictive feature is 14 to 26 inches to a fragipan. Depth to the top of a seasonal high water table ranges from 18 to 24 inches. Shrink-swell potential is low.

Available water capacity is very low. The Kf erodibility factor assigned to the top mineral soil layer is .32 and the soil loss tolerance factor T is 2.
Hydrologic group: C
Farmland class: not prime farmland
Hydric soil rating: no
Land capability classification: 4e

Map Unit Setting

- *Elevation:* 800 to 1,800 feet
- *Mean annual precipitation:* 42 to 52 inches
- *Mean annual air temperature:* 46 to 52 degrees F
- *Frost-free period:* 135 to 215 days

Map Unit Composition

- *Mardin and similar soils:* 80 percent

Description of Mardin

Setting

- *Landform:* Drumlinoid ridges, hills, till plains
- *Landform position (two-dimensional):* Summit
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Concave
- *Across-slope shape:* Convex
- *Parent material:* Loamy till derived mainly from acid sedimentary rock

Properties and qualities

- *Slope:* 15 to 25 percent
- *Depth to restrictive feature:* 14 to 26 inches to fragipan
- *Drainage class:* Moderately well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* About 18 to 24 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Very low (about 2.2 inches)

Interpretive groups

- *Land capability (nonirrigated):* 4e

Typical profile

- *0 to 6 inches:* Gravelly silt loam
- *6 to 16 inches:* Gravelly silt loam
- *16 to 60 inches:* Channery silt loam

MNE = Mardin soils, steep

Mardin— This soil is very deep and moderately well drained. Slopes range from 25 to 35 percent. The parent material consists of loamy till derived mainly from acid sedimentary rock. Depth to a restrictive feature is 14 to 26 inches to a fragipan. Depth to the top of a seasonal high water table ranges from 18 to 24 inches. Shrink-swell potential is low. Available water capacity is very low. The Kf erodibility factor assigned to the top mineral soil layer is .32 and the soil loss tolerance factor T is 2.
Hydrologic group: C
Farmland class: not prime farmland
Hydric soil rating: no
Land capability classification: 6e

Map Unit Setting

- *Elevation:* 800 to 1,800 feet
- *Mean annual precipitation:* 42 to 52 inches
- *Mean annual air temperature:* 46 to 52 degrees F
- *Frost-free period:* 135 to 215 days

Map Unit Composition

- *Mardin and similar soils:* 80 percent

Description of Mardin

Setting

- *Landform:* Drumlinoid ridges, hills, till plains
- *Landform position (two-dimensional):* Summit
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Concave
- *Across-slope shape:* Convex
- *Parent material:* Loamy till derived mainly from acid sedimentary rock

Properties and qualities

- *Slope:* 25 to 35 percent
- *Depth to restrictive feature:* 14 to 26 inches to fragipan
- *Drainage class:* Moderately well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* About 18 to 24 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Very low (about 2.1 inches)

Interpretive groups

- *Land capability (nonirrigated):* 6e

Typical profile

- *0 to 6 inches:* Gravelly silt loam
- *6 to 15 inches:* Gravelly silt loam
- *15 to 60 inches:* Channery silt loam

APPENDIX 5

STORM WATER QUALITY CALCULATIONS & SUPPORTING DATA

STORMWATER DETENTION POND 13P

WATER QUALITY VOLUME, WQv

COMPUTE IMPERVIOUS COVER
TRIBUTARY DRAINAGE AREA (A)= 20.05 ac.
TRIBUTARY IMPERVIOUS AREA= 3.44 ac.

IMPERVIOUS COVER (I)= 17.2%

COMPUTE RUNOFF COEFFICIENT. Rv
Rv=0.05+(I)(0.009)
Rv= 0.20 use min. Rv of 0.2

COMPUTE WQv
WQv=[(P)(Rv)(A)]/12
P= 1.2
Rv= 0.20
A= 20.05

WQv= 0.41 ac-ft
17853 c.f.

DETERMINE PRETREATMENT VOLUME

SIZE WET FOREBAY TO TREAT 10% OF WQv
0.41 x (10%) = 0.04 ac-ft

1785 c.f.

DETERMINE PERMANENT POOL VOLUME AND ED VOLUME

SIZE PERMANENT POOL TO CONTAIN 50% OF WQv
0.41 x (50%) = 0.20 ac-ft
8927 c.f.
*INCLUDES FOREBAY VOLUME

ED VOLUME
0.41 x (50%) = 0.20 ac-ft
8927 c.f.
RELEASE ED OVER 24 HOURS
(ED)ac-ft x 43560 s.f./ac. 0.20 (43560) = 0.10 CFS
24 hrs. x 3600 sec/hr 24 (3600)

STREAM CHANNEL PROTECTION VOLUME, (Cpv)

Cpv GENERATED BY HYDROCAD 1 YEAR STORM ANALYSIS
Cpv= 1.702 ac-ft

DEFINE AVERAGE RELEASE RATE

RELEASE Cpv OVER 24 HOURS
(Cpv)ac-ft x 43560 s.f./ac. 1.702 (43560) = 0.86 CFS
24 hrs. x 3600 sec/hr 24 (3600)

Pond 13P Forebay.txt

Elev	Area	Cumml Avg	Cumml Conic
ft	mi2	ft3	ft3
456.0000	0.0001	3487.2985	3361.8342
454.0000	0.0000	959.8969	935.7460
452.0000	0.0000	0.0000	0.0000

Pond 13P Permanent Pool.txt

Elev	Area	Cumml Avg	Cumml Conic
ft	mi2	ft3	ft3
456.0000	0.0002	14152.7798	13953.8858
454.0000	0.0001	6727.9130	6662.9365
452.0000	0.0001	2570.5970	2535.4752
450.0000	0.0000	0.0000	0.0000

STORMWATER DETENTION POND 14P

WATER QUALITY VOLUME, WQv

COMPUTE IMPERVIOUS COVER
TRIBUTARY DRAINAGE AREA (A)= 11.42 ac.
TRIBUTARY IMPERVIOUS AREA= 2.28 ac.

IMPERVIOUS COVER (I)= 20.0%

COMPUTE RUNOFF COEFFICIENT. Rv
Rv=0.05+(I)(0.009)
Rv= 0.23 use min. Rv of 0.2

COMPUTE WQv
WQv=[(P)(Rv)(A)]/12
P= 1.2
Rv= 0.23
A= 11.42

WQv= 0.26 ac-ft
11426 c.f.

DETERMINE PRETREATMENT VOLUME

SIZE WET FOREBAY TO TREAT 10% OF WQv
0.26 x (10%) = 0.03 ac-ft

1143 c.f.

DETERMINE PERMANENT POOL VOLUME AND ED VOLUME

SIZE PERMANENT POOL TO CONTAIN 50% OF WQv
0.26 x (50%) = 0.13 ac-ft
5713 c.f.
*INCLUDES FOREBAY VOLUME

ED VOLUME
0.26 x (50%) = 0.13 ac-ft
5713 c.f.
RELEASE ED OVER 24 HOURS
(ED)ac-ft x 43560 s.f./ac. 0.13 (43560) = 0.07 CFS
24 hrs. x 3600 sec/hr 24 (3600)

STREAM CHANNEL PROTECTION VOLUME, (Cpv)

Cpv GENERATED BY HYDROCAD 1 YEAR STORM ANALYSIS
Cpv= 1.025 ac-ft

DEFINE AVERAGE RELEASE RATE

RELEASE Cpv OVER 24 HOURS
(Cpv)ac-ft x 43560 s.f./ac. 1.025 (43560) = 0.52 CFS
24 hrs. x 3600 sec/hr 24 (3600)

Pond 14P Forebay.txt

Elev	Area	Cumml Avg	Cumml Conic
ft	mi2	ft3	ft3
491.0000	0.0001	3489.4329	3307.2999
489.0000	0.0000	808.1088	760.0756
487.0000	0.0000	0.0000	0.0000

Pond 14P Permanent Pool.txt

Elev	Area	Cumml Avg	Cumml Conic
ft	mi2	ft3	ft3
491.0000	0.0001	4458.7566	4251.7437
489.0000	0.0000	1413.1844	1343.0025
487.0000	0.0000	351.7061	316.0032
485.0000	0.0000	0.0000	0.0000

STORMWATER DETENTION POND 15P

WATER QUALITY VOLUME, WQv

COMPUTE IMPERVIOUS COVER
TRIBUTARY DRAINAGE AREA (A)= 26.95 ac.
TRIBUTARY IMPERVIOUS AREA= 5.13 ac.

IMPERVIOUS COVER (I)= 19.0%

COMPUTE RUNOFF COEFFICIENT. Rv
Rv=0.05+(I)(0.009)
Rv= 0.22 use min. Rv of 0.2

COMPUTE WQv
WQv=[(P)(Rv)(A)]/12
P= 1.2
Rv= 0.22
A= 26.95

WQv= 0.60 ac-ft
25981 c.f.

DETERMINE PRETREATMENT VOLUME

SIZE WET FOREBAY TO TREAT 10% OF WQv
0.60 x (10%) = 0.06 ac-ft

2598 c.f.

DETERMINE PERMANENT POOL VOLUME AND ED VOLUME

SIZE PERMANENT POOL TO CONTAIN 50% OF WQv
0.60 x (50%) = 0.30 ac-ft
12991 c.f.
*INCLUDES FOREBAY VOLUME

ED VOLUME
0.60 x (50%) = 0.30 ac-ft
12991 c.f.
RELEASE ED OVER 24 HOURS
(ED)ac-ft x 43560 s.f./ac. 0.30 (43560) = 0.15 CFS
24 hrs. x 3600 sec/hr 24 (3600)

STREAM CHANNEL PROTECTION VOLUME, (Cpv)

Cpv GENERATED BY HYDROCAD 1 YEAR STORM ANALYSIS
Cpv= 2.415 ac-ft

DEFINE AVERAGE RELEASE RATE

RELEASE Cpv OVER 24 HOURS
(Cpv)ac-ft x 43560 s.f./ac. 2.415 (43560) = 1.22 CFS
24 hrs. x 3600 sec/hr 24 (3600)

Pond 15P Forebay.txt

Elev	Area	Cumml Avg	Cumml Conic
ft	mi2	ft3	ft3
486.0000	0.0001	6966.6053	6860.5358
484.0000	0.0001	2455.2946	2432.4601
482.0000	0.0000	0.0000	0.0000

Pond 15P Permanent Pool.txt

Elev	Area	Cumml Avg	Cumml Conic
ft	mi2	ft3	ft3
486.0000	0.0003	19828.3542	19486.1379
484.0000	0.0001	9064.6549	8982.5070
482.0000	0.0001	3489.9247	3448.8531
480.0000	0.0000	0.0000	0.0000

STORMWATER DETENTION POND 16P

WATER QUALITY VOLUME, WQv

COMPUTE IMPERVIOUS COVER
TRIBUTARY DRAINAGE AREA (A)= 2.39 ac.
TRIBUTARY IMPERVIOUS AREA= 0.81 ac.

IMPERVIOUS COVER (I)= 33.9%

COMPUTE RUNOFF COEFFICIENT. Rv
Rv=0.05+(I)(0.009)
Rv= 0.36 use min. Rv of 0.2

COMPUTE WQv
WQv=[(P)(Rv)(A)]/12
P= 1.2
Rv= 0.36
A= 2.39

WQv= 0.08 ac-ft
3696 c.f.

DETERMINE PRETREATMENT VOLUME

SIZE WET FOREBAY TO TREAT 10% OF WQv
0.08 x (10%) = 0.01 ac-ft

370 c.f.

DETERMINE PERMANENT POOL VOLUME AND ED VOLUME

SIZE PERMANENT POOL TO CONTAIN 50% OF WQv
0.08 x (50%) = 0.04 ac-ft
1848 c.f.
*INCLUDES FOREBAY VOLUME

ED VOLUME
0.08 x (50%) = 0.04 ac-ft
1848 c.f.
RELEASE ED OVER 24 HOURS
(ED)ac-ft x 43560 s.f./ac. 0.04 (43560) = 0.02 CFS
24 hrs. x 3600 sec/hr 24 (3600)

STREAM CHANNEL PROTECTION VOLUME, (Cpv)

Cpv GENERATED BY HYDROCAD 1 YEAR STORM ANALYSIS
Cpv= 0.278 ac-ft

DEFINE AVERAGE RELEASE RATE

RELEASE Cpv OVER 24 HOURS
(Cpv)ac-ft x 43560 s.f./ac. 0.278 (43560) = 0.14 CFS
24 hrs. x 3600 sec/hr 24 (3600)

Pond 16P Forebay.txt

Elev	Area	Cumml Avg	Cumml Conic
ft	mi2	ft3	ft3
504.0000	0.0001	4070.4352	3930.7492
502.0000	0.0000	1483.2896	1440.4665
500.0000	0.0000	446.6452	425.2317
498.0000	0.0000	0.0000	0.0000

Pond 16P Permanent Pool.txt

Elev	Area	Cumml Avg	Cumml Conic
ft	mi2	ft3	ft3
504.0000	0.0001	9379.0891	9154.8206
502.0000	0.0001	3918.2715	3835.3640
500.0000	0.0000	1296.4216	1247.9794
498.0000	0.0000	0.0000	0.0000

EXISTING CONDITIONS POLLUTANT ANALYSIS

POLLUTANT LOADING FOR SUBBASIN 1

1) CALCULATE RUNOFF COEFFICIENT = Rv

Ia= IMPERVIOUS FRACTION

TRIBUTARY DRAINAGE AREA (A)= 44.99 ac.

TRIBUTARY IMPERVIOUS AREA= 0.92 ac.

IMPERVIOUS COVER (Ia)= 2.0%

Rv=0.05+(Ia)(0.009)

Rv= 0.07

2) CALCULATE ANNUAL RUNOFF (in.) = R

P=ANNUAL RAINFALL (in.)= 42

Pj=FRACTION OF ANNUAL RAINFALL EVENTS THAT PRODUCE RUNOFF= 0.9

Rv= 0.07

R=P * Pj * Rv

R= 2.59 in.

3) POLLUTANT LOADING FOR PHOSPHOROUS

L= ANNUAL LOAD (lbs.)

R= 2.59 in.

C= POLLUTANT CONCENTRATION (mg/l)= 0.26

A= TRIBUTARY DRAINAGE AREA= 44.99 ac.

L=0.226 * R * C * A

L= 6.84 lbs.

4) POLLUTANT LOADING FOR NITROGEN

L= ANNUAL LOAD (lbs.)

R= 2.59 in.

C= POLLUTANT CONCENTRATION (mg/l)= 2.0

A= TRIBUTARY DRAINAGE AREA= 44.99 ac.

L=0.226 * R * C * A

L= 52.58 lbs.

5) POLLUTANT LOADING FOR TSS

L= ANNUAL LOAD (lbs.)

R= 2.59 in.

C= POLLUTANT CONCENTRATION (mg/l)= 54.5

A= TRIBUTARY DRAINAGE AREA= 44.99 ac.

L=0.226 * R * C * A

L= 1432.83 lbs.

6) POLLUTANT LOADING FOR F COLI

L= ANNUAL LOAD (BILLION COLONIES)

R= 2.59 in.

C= BACTERIA CONCENTRATION (1000/Ml)= 1.5

A= TRIBUTARY DRAINAGE AREA= 44.99 ac.

L=103 * R * C * A

L= 17972.91 BILLION COLONIES

POLLUTANT LOADING FOR SUBBASIN 2

1) CALCULATE RUNOFF COEFFICIENT = Rv

Ia= IMPERVIOUS FRACTION

TRIBUTARY DRAINAGE AREA (A)= 10.35 ac.

TRIBUTARY IMPERVIOUS AREA= 0.08 ac.

IMPERVIOUS COVER (Ia)= 0.8%

Rv=0.05+(Ia)(0.009)

Rv= 0.06

2) CALCULATE ANNUAL RUNOFF (in.) = R

P=ANNUAL RAINFALL (in.)= 42

Pj=FRACTION OF ANNUAL RAINFALL EVENTS THAT PRODUCE RUNOFF= 0.9

Rv= 0.06

R=P * Pj * Rv

R= 2.15 in.

3) POLLUTANT LOADING FOR PHOSPHOROUS

L= ANNUAL LOAD (lbs.)

R= 2.15 in.

C= POLLUTANT CONCENTRATION (mg/l)= 0.26

A= TRIBUTARY DRAINAGE AREA= 10.35 ac.

L=0.226 * R * C * A

L= 1.31 lbs.

4) POLLUTANT LOADING FOR NITROGEN

L= ANNUAL LOAD (lbs.)

R= 2.15 lbs.

C= POLLUTANT CONCENTRATION (mg/l)= 2.0

A= TRIBUTARY DRAINAGE AREA= 10.35 ac.

L=0.226 * R * C * A

L= 10.07 lbs.

5) POLLUTANT LOADING FOR TSS

L= ANNUAL LOAD (lbs.)

R= 2.15 in.

C= POLLUTANT CONCENTRATION (mg/l)= 54.5

A= TRIBUTARY DRAINAGE AREA= 10.35 ac.

L=0.226 * R * C * A

L= 274.46 lbs.

6) POLLUTANT LOADING FOR F COLI

L= ANNUAL LOAD (BILLION COLONIES)

R= 2.15 in.

C= BACTERIA CONCENTRATION (1000/Ml)= 1.5

A= TRIBUTARY DRAINAGE AREA= 10.35 ac.

L=103 * R * C * A

L= 3442.74 BILLION COLONIES

POLLUTANT LOADING FOR SUBBASIN 3

1) CALCULATE RUNOFF COEFFICIENT = Rv

Ia= IMPERVIOUS FRACTION

TRIBUTARY DRAINAGE AREA (A)= 70.48 ac.

TRIBUTARY IMPERVIOUS AREA= 0.45 ac.

IMPERVIOUS COVER (Ia)= 0.6%

Rv=0.05+(Ia)(0.009)

Rv= 0.06

2) CALCULATE ANNUAL RUNOFF (in.) = R

P=ANNUAL RAINFALL (in.)= 42

Pj=FRACTION OF ANNUAL RAINFALL EVENTS THAT PRODUCE RUNOFF= 0.9

Rv= 0.06

R=P * Pj * Rv

R= 2.11 in.

3) POLLUTANT LOADING FOR PHOSPHOROUS

L= ANNUAL LOAD (lbs.)

R= 2.11 in.

C= POLLUTANT CONCENTRATION (mg/l)= 0.26

A= TRIBUTARY DRAINAGE AREA= 70.48 ac.

L=0.226 * R * C * A

L= 8.73 lbs.

4) POLLUTANT LOADING FOR NITROGEN

L= ANNUAL LOAD (lbs.)

R= 2.11 in.

C= POLLUTANT CONCENTRATION (mg/l)= 2.0

A= TRIBUTARY DRAINAGE AREA= 70.48 ac.

L=0.226 * R * C * A

L= 67.13 lbs.

5) POLLUTANT LOADING FOR TSS

L= ANNUAL LOAD (lbs.)

R= 2.11 in.

C= POLLUTANT CONCENTRATION (mg/l)= 54.5

A= TRIBUTARY DRAINAGE AREA= 70.48 ac.

L=0.226 * R * C * A

L= 1829.27 lbs.

6) POLLUTANT LOADING FOR F COLI

L= ANNUAL LOAD (BILLION COLONIES)

R= 2.11 in.

C= BACTERIA CONCENTRATION (1000/Ml)= 1.5

A= TRIBUTARY DRAINAGE AREA= 70.48 ac.

L=103 * R * C * A

L= 22945.75 BILLION COLONIES

POLLUTANT LOADING FOR SUBBASIN 4

1) CALCULATE RUNOFF COEFFICIENT = Rv

Ia= IMPERVIOUS FRACTION

TRIBUTARY DRAINAGE AREA (A)= 11.36 ac.

TRIBUTARY IMPERVIOUS AREA= 0.17 ac.

IMPERVIOUS COVER (Ia)= 1.5%

Rv=0.05+(Ia)(0.009)

Rv= 0.06

2) CALCULATE ANNUAL RUNOFF (in.) = R

P=ANNUAL RAINFALL (in.)= 42

Pj=FRACTION OF ANNUAL RAINFALL EVENTS THAT PRODUCE RUNOFF= 0.9

Rv= 0.06

R=P * Pj * Rv

R= 2.40 in.

3) POLLUTANT LOADING FOR PHOSPHOROUS

L= ANNUAL LOAD (lbs.)

R= 2.40 in.

C= POLLUTANT CONCENTRATION (mg/l)= 0.26

A= TRIBUTARY DRAINAGE AREA= 11.36 ac.

L=0.226 * R * C * A

L= 1.60 lbs.

4) POLLUTANT LOADING FOR NITROGEN

L= ANNUAL LOAD (lbs.)

R= 2.40 in.

C= POLLUTANT CONCENTRATION (mg/l)= 2.0

A= TRIBUTARY DRAINAGE AREA= 11.36 ac.

L=0.226 * R * C * A

L= 12.32 lbs.

5) POLLUTANT LOADING FOR TSS

L= ANNUAL LOAD (lbs.)

R= 2.40 in.

C= POLLUTANT CONCENTRATION (mg/l)= 54.5

A= TRIBUTARY DRAINAGE AREA= 11.36 ac.

L=0.226 * R * C * A

L= 335.69 lbs.

6) POLLUTANT LOADING FOR F COLI

L= ANNUAL LOAD (BILLION COLONIES)

R= 2.40 in.

C= BACTERIA CONCENTRATION (1000/Ml)= 1.5

A= TRIBUTARY DRAINAGE AREA= 11.36 ac.

L=103 * R * C * A

L= 4210.71 BILLION COLONIES

POLLUTANT LOADING FOR SUBBASIN 5

1) <u>CALCULATE RUNOFF COEFFICIENT = Rv</u>

Ia= IMPERVIOUS FRACTION

TRIBUTARY DRAINAGE AREA (A)= 5.02 ac.

TRIBUTARY IMPERVIOUS AREA= 0.23 ac.

IMPERVIOUS COVER (Ia)= 4.6%

Rv=0.05+(Ia)(0.009)

Rv= 0.09

2) <u>CALCULATE ANNUAL RUNOFF (in.) = R</u>

P=ANNUAL RAINFALL (in.)= 42

Pj=FRACTION OF ANNUAL RAINFALL EVENTS THAT PRODUCE RUNOFF= 0.9

Rv= 0.09

R=P * Pj * Rv

R= 3.45 in.

<u>3) POLLUTANT LOADING FOR PHOSPHOROUS</u>

L= ANNUAL LOAD (lbs.)

R= 3.45 in.

C= POLLUTANT CONCENTRATION (mg/l)= 0.26

A= TRIBUTARY DRAINAGE AREA= 5.02 ac.

L=0.226 * R * C * A

L= 1.02 lbs.

<u>4) POLLUTANT LOADING FOR NITROGEN</u>

L= ANNUAL LOAD (lbs.)

R= 3.45 in.

C= POLLUTANT CONCENTRATION (mg/l)= 2.0

A= TRIBUTARY DRAINAGE AREA= 5.02 ac.

L=0.226 * R * C * A

L= 7.83 lbs.

<u>5) POLLUTANT LOADING FOR TSS</u>

L= ANNUAL LOAD (lbs.)

R= 3.45 in.

C= POLLUTANT CONCENTRATION (mg/l)= 54.5

A= TRIBUTARY DRAINAGE AREA= 5.02 ac.

L=0.226 * R * C * A

L= 213.24 lbs.

<u>6) POLLUTANT LOADING FOR F COLI</u>

L= ANNUAL LOAD (BILLION COLONIES)

R= 3.45 in.

C= BACTERIA CONCENTRATION (1000/Ml)= 1.5

A= TRIBUTARY DRAINAGE AREA= 5.02 ac.

L=103 * R * C * A

L= 2674.77 BILLION COLONIES

POLLUTANT LOADING FOR SUBBASIN 6

1) CALCULATE RUNOFF COEFFICIENT = Rv

Ia= IMPERVIOUS FRACTION

TRIBUTARY DRAINAGE AREA (A)= 7.52 ac.

TRIBUTARY IMPERVIOUS AREA= 0.09 ac.

IMPERVIOUS COVER (Ia)= 1.2%

Rv=0.05+(Ia)(0.009)

Rv= 0.06

2) CALCULATE ANNUAL RUNOFF (in.) = R

P=ANNUAL RAINFALL (in.)= 42

Pj=FRACTION OF ANNUAL RAINFALL EVENTS THAT PRODUCE RUNOFF= 0.9

Rv= 0.06

R=P * Pj * Rv

R= 2.30 in.

3) POLLUTANT LOADING FOR PHOSPHOROUS

L= ANNUAL LOAD (lbs.)

R= 2.30 in.

C= POLLUTANT CONCENTRATION (mg/l)= 0.26

A= TRIBUTARY DRAINAGE AREA= 7.52 ac.

L=0.226 * R * C * A

L= 1.02 lbs.

4) POLLUTANT LOADING FOR NITROGEN

L= ANNUAL LOAD (lbs.)

R= 2.30 in.

C= POLLUTANT CONCENTRATION (mg/l)= 2.0

A= TRIBUTARY DRAINAGE AREA= 7.52 ac.

L=0.226 * R * C * A

L= 7.81 lbs.

5) POLLUTANT LOADING FOR TSS

L= ANNUAL LOAD (lbs.)

R= 2.30 in.

C= POLLUTANT CONCENTRATION (mg/l)= 54.5

A= TRIBUTARY DRAINAGE AREA= 7.52 ac.

L=0.226 * R * C * A

L= 212.77 lbs.

6) POLLUTANT LOADING FOR F COLI

L= ANNUAL LOAD (BILLION COLONIES)

R= 2.30 in.

C= BACTERIA CONCENTRATION (1000/Ml)= 1.5

A= TRIBUTARY DRAINAGE AREA= 7.52 ac.

L=103 * R * C * A

L= 2668.93 BILLION COLONIES

POLLUTANT LOADING FOR SUBBASIN 7

1) CALCULATE RUNOFF COEFFICIENT = Rv

Ia= IMPERVIOUS FRACTION

TRIBUTARY DRAINAGE AREA (A)= 140.44 ac.

TRIBUTARY IMPERVIOUS AREA= 1.11 ac.

IMPERVIOUS COVER (Ia)= 0.8%

Rv=0.05+(Ia)(0.009)

Rv= 0.06

2) CALCULATE ANNUAL RUNOFF (in.) = R

P=ANNUAL RAINFALL (in.)= 42

Pj=FRACTION OF ANNUAL RAINFALL EVENTS THAT PRODUCE RUNOFF= 0.9

Rv= 0.06

R=P * Pj * Rv

R= 2.16 in.

3) POLLUTANT LOADING FOR PHOSPHOROUS

L= ANNUAL LOAD (lbs.)

R= 2.16 in.

C= POLLUTANT CONCENTRATION (mg/l)= 0.26

A= TRIBUTARY DRAINAGE AREA= 140.44 ac.

L=0.226 * R * C * A

L= 17.82 lbs.

4) POLLUTANT LOADING FOR NITROGEN

L= ANNUAL LOAD (lbs.)

R= 2.16 in.

C= POLLUTANT CONCENTRATION (mg/l)= 2.0

A= TRIBUTARY DRAINAGE AREA= 140.44 ac.

L=0.226 * R * C * A

L= 137.04 lbs.

5) POLLUTANT LOADING FOR TSS

L= ANNUAL LOAD (lbs.)

R= 2.16 in.

C= POLLUTANT CONCENTRATION (mg/l)= 54.5

A= TRIBUTARY DRAINAGE AREA= 140.44 ac.

L=0.226 * R * C * A

L= 3734.44 lbs.

6) POLLUTANT LOADING FOR F COLI

L= ANNUAL LOAD (BILLION COLONIES)

R= 2.16 in.

C= BACTERIA CONCENTRATION (1000/Ml)= 1.5

A= TRIBUTARY DRAINAGE AREA= 140.44 ac.

L=103 * R * C * A

L= 46843.44 BILLION COLONIES

POLLUTANT LOADING FOR SUBBASIN 8

1) CALCULATE RUNOFF COEFFICIENT = Rv

Ia= IMPERVIOUS FRACTION

TRIBUTARY DRAINAGE AREA (A)= 9.09 ac.

TRIBUTARY IMPERVIOUS AREA= 0.12 ac.

IMPERVIOUS COVER (Ia)= 1.3%

Rv=0.05+(Ia)(0.009)

Rv= 0.06

2) CALCULATE ANNUAL RUNOFF (in.) = R

P=ANNUAL RAINFALL (in.)= 42

Pj=FRACTION OF ANNUAL RAINFALL EVENTS THAT PRODUCE RUNOFF= 0.9

Rv= 0.06

R=P * Pj * Rv

R= 2.34 in.

3) POLLUTANT LOADING FOR PHOSPHOROUS

L= ANNUAL LOAD (lbs.)

R= 2.34 in.

C= POLLUTANT CONCENTRATION (mg/l)= 0.26

A= TRIBUTARY DRAINAGE AREA= 9.09 ac.

L=0.226 * R * C * A

L= 1.25 lbs.

4) POLLUTANT LOADING FOR NITROGEN

L= ANNUAL LOAD (lbs.)

R= 2.34 in.

C= POLLUTANT CONCENTRATION (mg/l)= 2.0

A= TRIBUTARY DRAINAGE AREA= 9.09 ac.

L=0.226 * R * C * A

L= 9.61 lbs.

5) POLLUTANT LOADING FOR TSS

L= ANNUAL LOAD (lbs.)

R= 2.34 in.

C= POLLUTANT CONCENTRATION (mg/l)= 54.5

A= TRIBUTARY DRAINAGE AREA= 9.09 ac.

L=0.226 * R * C * A

L= 261.89 lbs.

6) POLLUTANT LOADING FOR F COLI

L= ANNUAL LOAD (BILLION COLONIES)

R= 2.34 in.

C= BACTERIA CONCENTRATION (1000/Ml)= 1.5

A= TRIBUTARY DRAINAGE AREA= 9.09 ac.

L=103 * R * C * A

L= 3285.06 BILLION COLONIES

POLLUTANT LOADING FOR SUBBASIN 9

1) CALCULATE RUNOFF COEFFICIENT = Rv

Ia= IMPERVIOUS FRACTION

TRIBUTARY DRAINAGE AREA (A)= 13.93 ac.

TRIBUTARY IMPERVIOUS AREA= 0.18 ac.

IMPERVIOUS COVER (Ia)= 1.3%

Rv=0.05+(Ia)(0.009)

Rv= 0.06

2) CALCULATE ANNUAL RUNOFF (in.) = R

P=ANNUAL RAINFALL (in.)= 42

Pj=FRACTION OF ANNUAL RAINFALL EVENTS THAT PRODUCE RUNOFF= 0.9

Rv= 0.06

R=P * Pj * Rv

R= 2.33 in.

3) POLLUTANT LOADING FOR PHOSPHOROUS

L= ANNUAL LOAD (lbs.)

R= 2.33 in.

C= POLLUTANT CONCENTRATION (mg/l)= 0.26

A= TRIBUTARY DRAINAGE AREA= 13.93 ac.

L=0.226 * R * C * A

L= 1.91 lbs.

4) POLLUTANT LOADING FOR NITROGEN

L= ANNUAL LOAD (lbs.)

R= 2.33 in.

C= POLLUTANT CONCENTRATION (mg/l)= 2.0

A= TRIBUTARY DRAINAGE AREA= 13.93 ac.

L=0.226 * R * C * A

L= 14.67 lbs.

5) POLLUTANT LOADING FOR TSS

L= ANNUAL LOAD (lbs.)

R= 2.33 in.

C= POLLUTANT CONCENTRATION (mg/l)= 54.5

A= TRIBUTARY DRAINAGE AREA= 13.93 ac.

L=0.226 * R * C * A

L= 399.70 lbs.

6) POLLUTANT LOADING FOR F COLI

L= ANNUAL LOAD (BILLION COLONIES)

R= 2.33 in.

C= BACTERIA CONCENTRATION (1000/Ml)= 1.5

A= TRIBUTARY DRAINAGE AREA= 13.93 ac.

L=103 * R * C * A

L= 5013.73 BILLION COLONIES

POLLUTANT LOADING FOR SUBBASIN 10

1) CALCULATE RUNOFF COEFFICIENT = Rv

Ia= IMPERVIOUS FRACTION

TRIBUTARY DRAINAGE AREA (A)= 35.54 ac.

TRIBUTARY IMPERVIOUS AREA= 0.00 ac.

IMPERVIOUS COVER (Ia)= 0.0%

Rv=0.05+(Ia)(0.009)

Rv= 0.05

2) CALCULATE ANNUAL RUNOFF (in.) = R

P=ANNUAL RAINFALL (in.)= 42

Pj=FRACTION OF ANNUAL RAINFALL EVENTS THAT PRODUCE RUNOFF= 0.9

Rv= 0.05

R=P * Pj * Rv

R= 1.89 in.

3) POLLUTANT LOADING FOR PHOSPHOROUS

L= ANNUAL LOAD (lbs.)

R= 1.89 in.

C= POLLUTANT CONCENTRATION (mg/l)= 0.26

A= TRIBUTARY DRAINAGE AREA= 35.54 ac.

L=0.226 * R * C * A

L= 3.95 lbs.

4) POLLUTANT LOADING FOR NITROGEN

L= ANNUAL LOAD (lbs.)

R= 1.89 in.

C= POLLUTANT CONCENTRATION (mg/l)= 2.0

A= TRIBUTARY DRAINAGE AREA= 35.54 ac.

L=0.226 * R * C * A

L= 30.36 lbs.

5) POLLUTANT LOADING FOR TSS

L= ANNUAL LOAD (lbs.)

R= 1.89 in.

C= POLLUTANT CONCENTRATION (mg/l)= 54.5

A= TRIBUTARY DRAINAGE AREA= 35.54 ac.

L=0.226 * R * C * A

L= 827.34 lbs.

6) POLLUTANT LOADING FOR F COLI

L= ANNUAL LOAD (BILLION COLONIES)

R= 1.89 in.

C= BACTERIA CONCENTRATION (1000/Ml)= 1.5

A= TRIBUTARY DRAINAGE AREA= 35.54 ac.

L=103 * R * C * A

L= 10377.86 BILLION COLONIES

TOTAL POLLUTANT LOADING FOR SUBBASIN 1

POLLUTANT LOADING FOR PHOSPHOROUS	6.84	lbs.
POLLUTANT LOADING FOR NITROGEN	52.58	lbs.
POLLUTANT LOADING FOR TSS	1432.83	lbs.
POLLUTANT LOADING FOR F COLI	17972.91	BILLION COLONIES

TOTAL POLLUTANT LOADING FOR SUBBASIN 2

POLLUTANT LOADING FOR PHOSPHOROUS	1.31	lbs.
POLLUTANT LOADING FOR NITROGEN	10.07	lbs.
POLLUTANT LOADING FOR TSS	274.46	lbs.
POLLUTANT LOADING FOR F COLI	3442.74	BILLION COLONIES

TOTAL POLLUTANT LOADING FOR SUBBASIN 3

POLLUTANT LOADING FOR PHOSPHOROUS	8.73	lbs.
POLLUTANT LOADING FOR NITROGEN	67.13	lbs.
POLLUTANT LOADING FOR TSS	1829.27	lbs.
POLLUTANT LOADING FOR F COLI	22945.75	BILLION COLONIES

TOTAL POLLUTANT LOADING FOR SUBBASIN 4

POLLUTANT LOADING FOR PHOSPHOROUS	1.60	lbs.
POLLUTANT LOADING FOR NITROGEN	12.32	lbs.
POLLUTANT LOADING FOR TSS	335.69	lbs.
POLLUTANT LOADING FOR F COLI	4210.71	BILLION COLONIES

TOTAL POLLUTANT LOADING FOR SUBBASIN 5

POLLUTANT LOADING FOR PHOSPHOROUS	1.02	lbs.
POLLUTANT LOADING FOR NITROGEN	7.83	lbs.
POLLUTANT LOADING FOR TSS	213.24	lbs.
POLLUTANT LOADING FOR F COLI	2674.77	BILLION COLONIES

TOTAL POLLUTANT LOADING FOR SUBBASIN 6

POLLUTANT LOADING FOR PHOSPHOROUS	1.02	lbs.
POLLUTANT LOADING FOR NITROGEN	7.81	lbs.
POLLUTANT LOADING FOR TSS	212.77	lbs.
POLLUTANT LOADING FOR F COLI	2668.93	BILLION COLONIES

TOTAL POLLUTANT LOADING FOR SUBBASIN 7

POLLUTANT LOADING FOR PHOSPHOROUS	17.82	lbs.
POLLUTANT LOADING FOR NITROGEN	137.04	lbs.
POLLUTANT LOADING FOR TSS	3734.44	lbs.
POLLUTANT LOADING FOR F COLI	46843.44	BILLION COLONIES

TOTAL POLLUTANT LOADING FOR SUBBASIN 8

POLLUTANT LOADING FOR PHOSPHOROUS	1.25	lbs.
POLLUTANT LOADING FOR NITROGEN	9.61	lbs.
POLLUTANT LOADING FOR TSS	261.89	lbs.
POLLUTANT LOADING FOR F COLI	3285.06	BILLION COLONIES

TOTAL POLLUTANT LOADING FOR SUBBASIN 9

POLLUTANT LOADING FOR PHOSPHOROUS	1.91	lbs.
POLLUTANT LOADING FOR NITROGEN	14.67	lbs.
POLLUTANT LOADING FOR TSS	399.70	lbs.
POLLUTANT LOADING FOR F COLI	5013.73	BILLION COLONIES

TOTAL POLLUTANT LOADING FOR SUBBASIN 10

POLLUTANT LOADING FOR PHOSPHOROUS	3.95	lbs.
POLLUTANT LOADING FOR NITROGEN	30.36	lbs.
POLLUTANT LOADING FOR TSS	827.34	lbs.
POLLUTANT LOADING FOR F COLI	10377.86	BILLION COLONIES

EXISTING CONDITIONS TOTAL POLLUTANT FROM DRAINAGE BASINS

POLLUTANT LOADING FOR PHOSPHOROUS	**45.42**	**lbs.**
POLLUTANT LOADING FOR NITROGEN	**349.42**	**lbs.**
POLLUTANT LOADING FOR TSS	**9521.63**	**lbs.**
POLLUTANT LOADING FOR F COLI	**119435.89**	**BILLION COLONIES**

PROPOSED CONDITIONS POLLUTANT ANALYSIS

POLLUTANT LOADING FOR AREA TRIBUTARY TO WET PONDS

1) CALCULATE RUNOFF COEFFICIENT = Rv

Ia= IMPERVIOUS FRACTION

TRIBUTARY DRAINAGE AREA (A)= 60.81 ac.

TRIBUTARY IMPERVIOUS AREA= 11.66 ac.

IMPERVIOUS COVER (Ia)= 19.2%

Rv=0.05+(Ia)(0.009)

Rv= 0.22

2) CALCULATE ANNUAL RUNOFF (in.) = R

P=ANNUAL RAINFALL (in.)= 42

Pj=FRACTION OF ANNUAL RAINFALL EVENTS THAT PRODUCE RUNOFF= 0.9

Rv= 0.22

R=P * Pj * Rv

R= 8.41 in.

3) POLLUTANT LOADING FOR PHOSPHOROUS

L= ANNUAL LOAD (lbs.)

R= 8.41 in.

C= POLLUTANT CONCENTRATION (mg/l)= 0.26

A= TRIBUTARY DRAINAGE AREA= 60.81 ac.

L=0.226 * R * C * A

L= 30.06 lbs.

4) POLLUTANT LOADING FOR NITROGEN

L= ANNUAL LOAD (lbs.)

R= 8.41 in.

C= POLLUTANT CONCENTRATION (mg/l)= 2.0

A= TRIBUTARY DRAINAGE AREA= 60.81 ac.

L=0.226 * R * C * A

L= 231.25 lbs.

5) POLLUTANT LOADING FOR TSS

L= ANNUAL LOAD (lbs.)

R= 8.41 in.

C= POLLUTANT CONCENTRATION (mg/l)= 54.5

A= TRIBUTARY DRAINAGE AREA= 60.81 ac.

L=0.226 * R * C * A

L= 6301.43 lbs.

6) POLLUTANT LOADING FOR F COLI

L= ANNUAL LOAD (BILLION COLONIES)

R= 8.41 lbs.

C= BACTERIA CONCENTRATION (1000/Ml)= 1.5

A= TRIBUTARY DRAINAGE AREA= 60.81 ac.

L=103 * R * C * A

L= 79042.83 BILLION COLONIES

POLLUTANT LOADING FOR REMAINDER OF SITE

1) CALCULATE RUNOFF COEFFICIENT = Rv

Ia= IMPERVIOUS FRACTION
TRIBUTARY DRAINAGE AREA (A)= 286.91 ac.
TRIBUTARY IMPERVIOUS AREA= 8.15 ac.
IMPERVIOUS COVER (Ia)= 2.8%

Rv=0.05+(Ia)(0.009)
Rv= 0.08

2) CALCULATE ANNUAL RUNOFF (in.) = R

P=ANNUAL RAINFALL (in.)= 42
Pj=FRACTION OF ANNUAL RAINFALL EVENTS THAT PRODUCE RUNOFF= 0.9
Rv= 0.08
R=P * Pj * Rv
R= 2.86 in.

3) POLLUTANT LOADING FOR PHOSPHOROUS

L= ANNUAL LOAD (lbs.)
R= 2.86 in.
C= POLLUTANT CONCENTRATION (mg/l)= 0.26
A= TRIBUTARY DRAINAGE AREA= 286.91 ac.
L=0.226 * R * C * A
L= 48.16 lbs.

4) POLLUTANT LOADING FOR NITROGEN

L= ANNUAL LOAD (lbs.)
R= 2.86 in.
C= POLLUTANT CONCENTRATION (mg/l)= 2.0
A= TRIBUTARY DRAINAGE AREA= 286.91 ac.
L=0.226 * R * C * A
L= 370.42 lbs.

5) POLLUTANT LOADING FOR TSS

L= ANNUAL LOAD (lbs.)
R= 2.86 in.
C= POLLUTANT CONCENTRATION (mg/l)= 54.5
A= TRIBUTARY DRAINAGE AREA= 286.91 ac.
L=0.226 * R * C * A
L= 10094.06 lbs.

6) POLLUTANT LOADING FOR F COLI

L= ANNUAL LOAD (BILLION COLONIES)
R= 2.86 in.
C= BACTERIA CONCENTRATION (1000/Ml)= 1.5
A= TRIBUTARY DRAINAGE AREA= 286.91 ac.
L=103 * R * C * A
L= 126616.29 BILLION COLONIES

TOTAL POLLUTANT LOADING TRIBUTARY TO WET PONDS

POLLUTANT LOADING FOR PHOSPHOROUS	30.06	lbs.
POLLUTANT LOADING FOR NITROGEN	231.25	lbs.
POLLUTANT LOADING FOR TSS	6301.43	lbs.
POLLUTANT LOADING FOR F COLI	79042.83	BILLION COLONIES

REMOVAL FACTORS FOR WET POND (%)	REMAINING POLLUTANT LOADING	
50	15.03	lbs.
35	150.31	lbs.
80	1260.29	lbs.
70	23712.85	BILLION COLONIES

TOTAL POLLUTANT LOADING FOR REMAINDER OF SITE

POLLUTANT LOADING FOR PHOSPHOROUS	48.16	lbs.
POLLUTANT LOADING FOR NITROGEN	370.42	lbs.
POLLUTANT LOADING FOR TSS	10094.06	lbs.
POLLUTANT LOADING FOR F COLI	126616.29	BILLION COLONIES

PROPOSED CONDITIONS TOTAL POLLUTANT FROM DRAINAGE BASINS

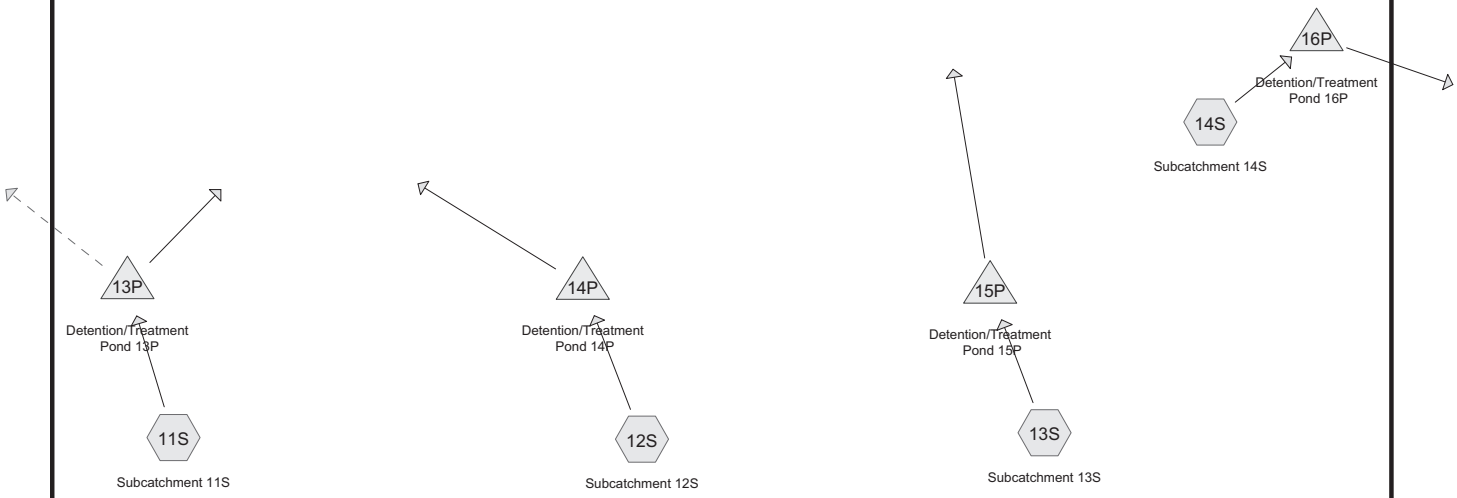
POLLUTANT LOADING FOR PHOSPHOROUS	**63.19**	**lbs.**
POLLUTANT LOADING FOR NITROGEN	**520.73**	**lbs.**
POLLUTANT LOADING FOR TSS	**11354.35**	**lbs.**
POLLUTANT LOADING FOR F COLI	**150329.14**	**BILLION COLONIES**

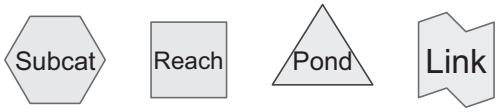
EXISTING CONDITIONS TOTAL POLLUTANT FROM DRAINAGE BASINS

POLLUTANT LOADING FOR PHOSPHOROUS	**45.42**	**lbs.**
POLLUTANT LOADING FOR NITROGEN	**349.42**	**lbs.**
POLLUTANT LOADING FOR TSS	**9521.63**	**lbs.**
POLLUTANT LOADING FOR F COLI	**119435.89**	**BILLION COLONIES**

%INCREASE OF POLLUTANT LOADING FROM EXISTING CONDITIONS

POLLUTANT LOADING FOR PHOSPHOROUS	**39.12**	**% INCREASE**
POLLUTANT LOADING FOR NITROGEN	**49.03**	**% INCREASE**
POLLUTANT LOADING FOR TSS	**19.25**	**% INCREASE**
POLLUTANT LOADING FOR F COLI	**25.87**	**% INCREASE**





Drainage Diagram for Proposed Conditions
Prepared by Pietrzak & Pfau, PLLC 7/6/2009
HydroCAD® 7.00 s/n 001436 © 1986-2003 Applied Microcomputer Systems

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

Subcatchment 11S: Subcatchment 11S Runoff Area=20.050 ac Runoff Depth=0.11"
Flow Length=1,706' Tc=21.3 min CN=79 Runoff=1.19 cfs 0.191 af

Subcatchment 12S: Subcatchment 12S Runoff Area=11.420 ac Runoff Depth=0.13"
Flow Length=1,285' Tc=18.4 min CN=80 Runoff=0.88 cfs 0.126 af

Subcatchment 13S: Subcatchment 13S Runoff Area=26.950 ac Runoff Depth=0.13"
Flow Length=2,559' Tc=22.0 min CN=80 Runoff=1.97 cfs 0.296 af

Subcatchment 14S: Subcatchment 14S Runoff Area=2.390 ac Runoff Depth=0.25"
Flow Length=781' Tc=8.1 min CN=85 Runoff=0.60 cfs 0.049 af

Pond 13P: Detention/Treatment Pond 13P Peak Elev=456.70' Storage=5,983 cf Inflow=1.19 cfs 0.191 af
Primary=0.10 cfs 0.054 af Secondary=0.00 cfs 0.000 af Outflow=0.10 cfs 0.054 af

Pond 14P: Detention/Treatment Pond 14P Peak Elev=491.70' Storage=3,633 cf Inflow=0.88 cfs 0.126 af
Outflow=0.07 cfs 0.043 af

Pond 15P: Detention/Treatment Pond 15P Peak Elev=486.71' Storage=9,351 cf Inflow=1.97 cfs 0.296 af
Outflow=0.15 cfs 0.081 af

Pond 16P: Detention/Treatment Pond 16P Peak Elev=501.80' Storage=1,564 cf Inflow=0.60 cfs 0.049 af
Outflow=0.02 cfs 0.013 af

Total Runoff Area = 60.810 ac Runoff Volume = 0.662 af Average Runoff Depth = 0.13"

Subcatchment 11S: Subcatchment 11S

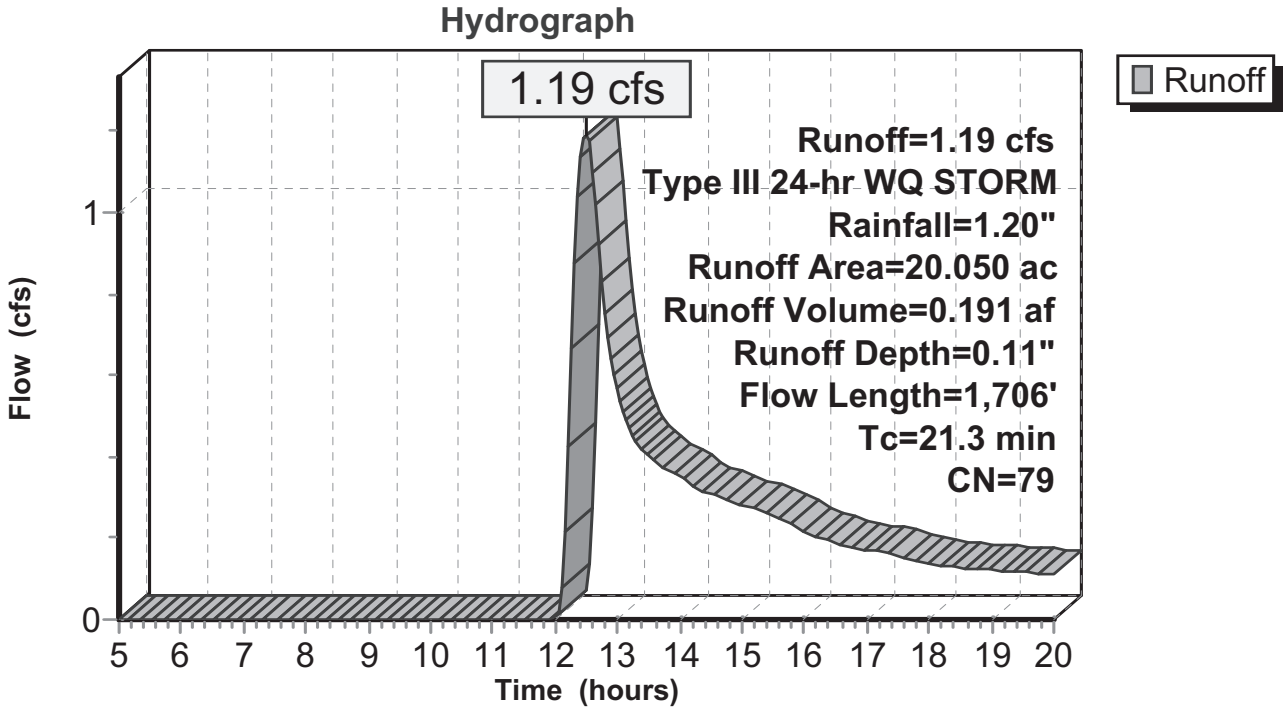
Runoff = 1.19 cfs @ 12.48 hrs, Volume= 0.191 af, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr WQ STORM Rainfall=1.20"

Area (ac)	CN	Description
3.440	98	Proposed pavement & roofs
5.820	79	50-75% Grass cover, Fair, HSG C
0.100	71	Meadow, non-grazed, HSG C
10.690	73	Woods, Fair, HSG C
20.050	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	100	0.1425	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.2	25	0.1500	2.7		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
14.5	1,394	0.1024	1.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	72	0.0375	1.4		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.4	115	0.0742	1.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.3	1,706	Total			

Subcatchment 11S: Subcatchment 11S



Subcatchment 12S: Subcatchment 12S

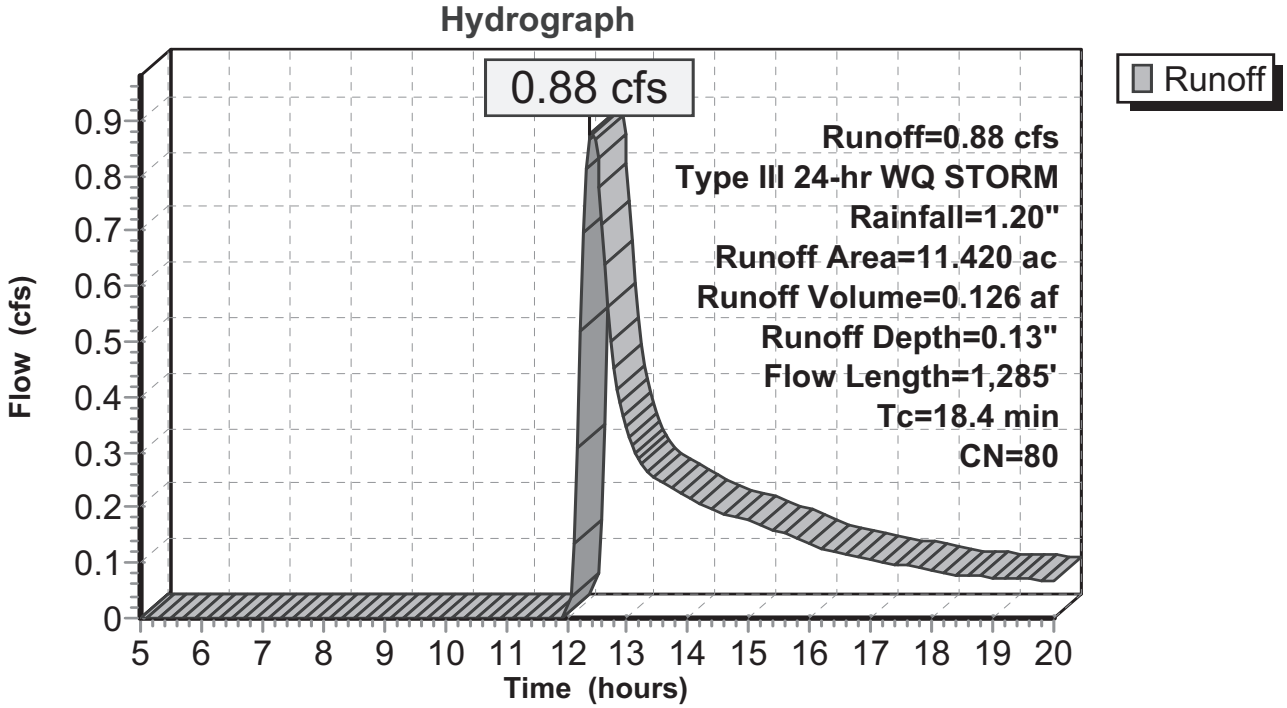
Runoff = 0.88 cfs @ 12.40 hrs, Volume= 0.126 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr WQ STORM Rainfall=1.20"

Area (ac)	CN	Description
2.280	98	Proposed pavement & roofs
4.200	79	50-75% Grass cover, Fair, HSG C
4.940	73	Woods, Fair, HSG C
11.420	80	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	10	0.0300	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
10.5	90	0.0867	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
5.0	565	0.1416	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.0	129	0.0969	2.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.6	491	0.0365	13.4	23.72	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
18.4	1,285	Total			

Subcatchment 12S: Subcatchment 12S



Subcatchment 13S: Subcatchment 13S

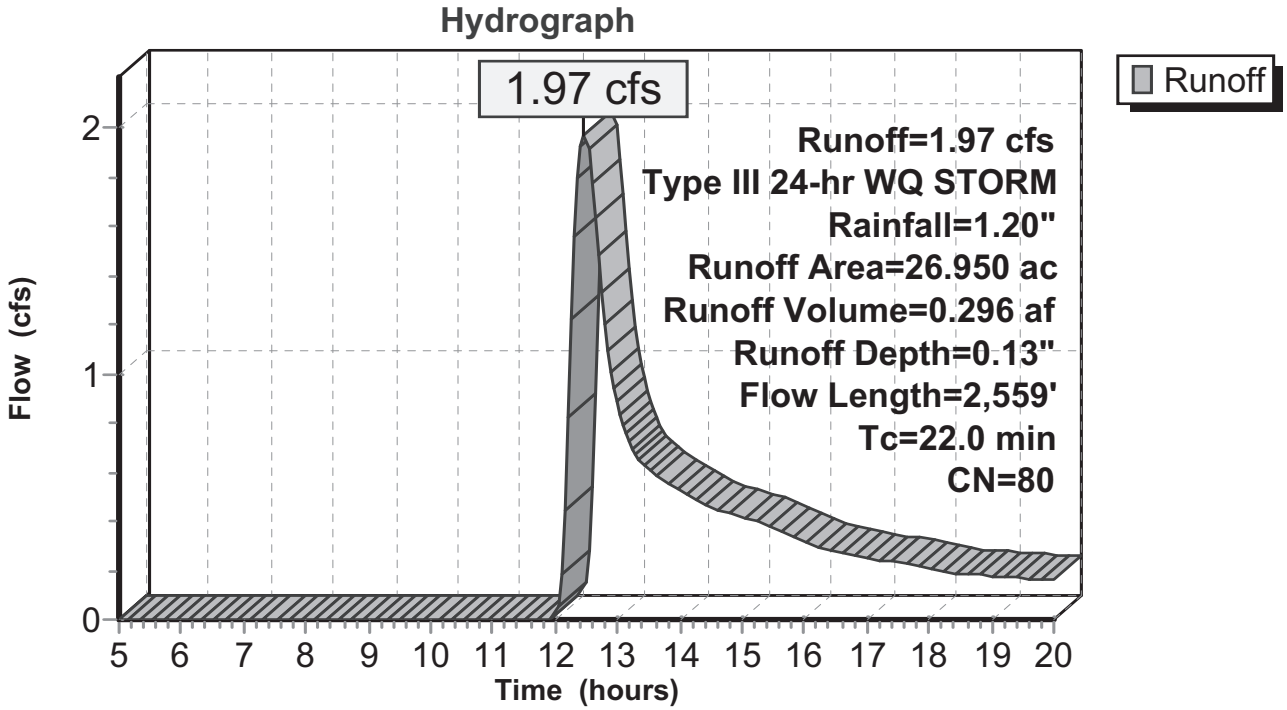
Runoff = 1.97 cfs @ 12.46 hrs, Volume= 0.296 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr WQ STORM Rainfall=1.20"

Area (ac)	CN	Description
5.130	98	Proposed pavement & roofs
8.580	79	50-75% Grass cover, Fair, HSG C
13.240	73	Woods, Fair, HSG C
26.950	80	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	15	0.0300	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
10.1	85	0.0853	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.9	556	0.1403	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.0	14	0.5000	4.9		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.6	121	0.0331	1.3		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.2	365	0.0188	2.8		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	1,403	0.0498	15.7	27.70	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
22.0	2,559	Total			

Subcatchment 13S: Subcatchment 13S



Subcatchment 14S: Subcatchment 14S

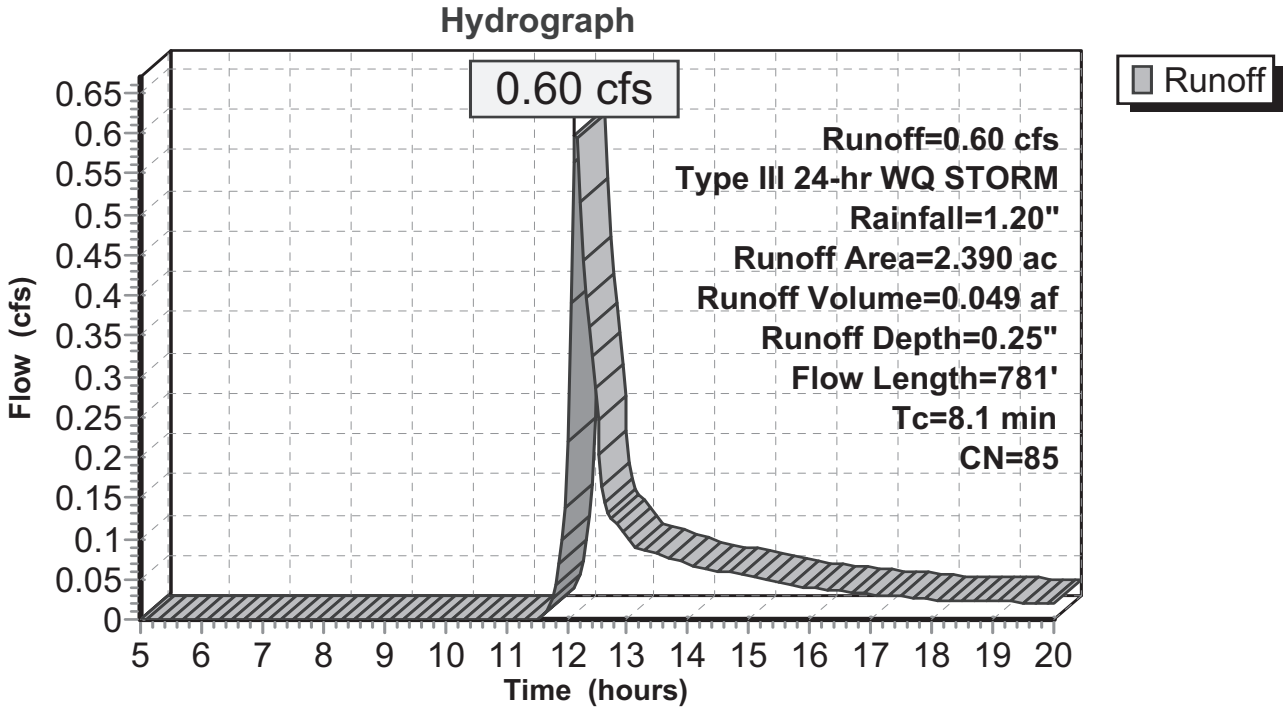
Runoff = 0.60 cfs @ 12.14 hrs, Volume= 0.049 af, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr WQ STORM Rainfall=1.20"

Area (ac)	CN	Description
0.810	98	Proposed pavement & roofs
1.570	79	50-75% Grass cover, Fair, HSG C
0.010	73	Woods, Fair, HSG C
2.390	85	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0425	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.9	298	0.0714	5.4		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	383	0.0835	20.3	35.87	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
8.1	781	Total			

Subcatchment 14S: Subcatchment 14S



Pond 13P: Detention/Treatment Pond 13P

Inflow Area =	20.050 ac,	Inflow Depth =	0.11"	for	WQ STORM event
Inflow =	1.19 cfs @	12.48 hrs,	Volume=	0.191 af	
Outflow =	0.10 cfs @	20.00 hrs,	Volume=	0.054 af,	Atten= 92%, Lag= 451.1 min
Primary =	0.10 cfs @	20.00 hrs,	Volume=	0.054 af	
Secondary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 456.70' @ 20.00 hrs Surf.Area= 0 sf Storage= 5,983 cf
Plug-Flow detention time= 243.0 min calculated for 0.054 af (28% of inflow)
Center-of-Mass det. time= 116.4 min (994.5 - 878.1)

#	Invert	Avail.Storage	Storage Description
1	456.00'	163,490 cf	**Custom Stage Data** Listed below

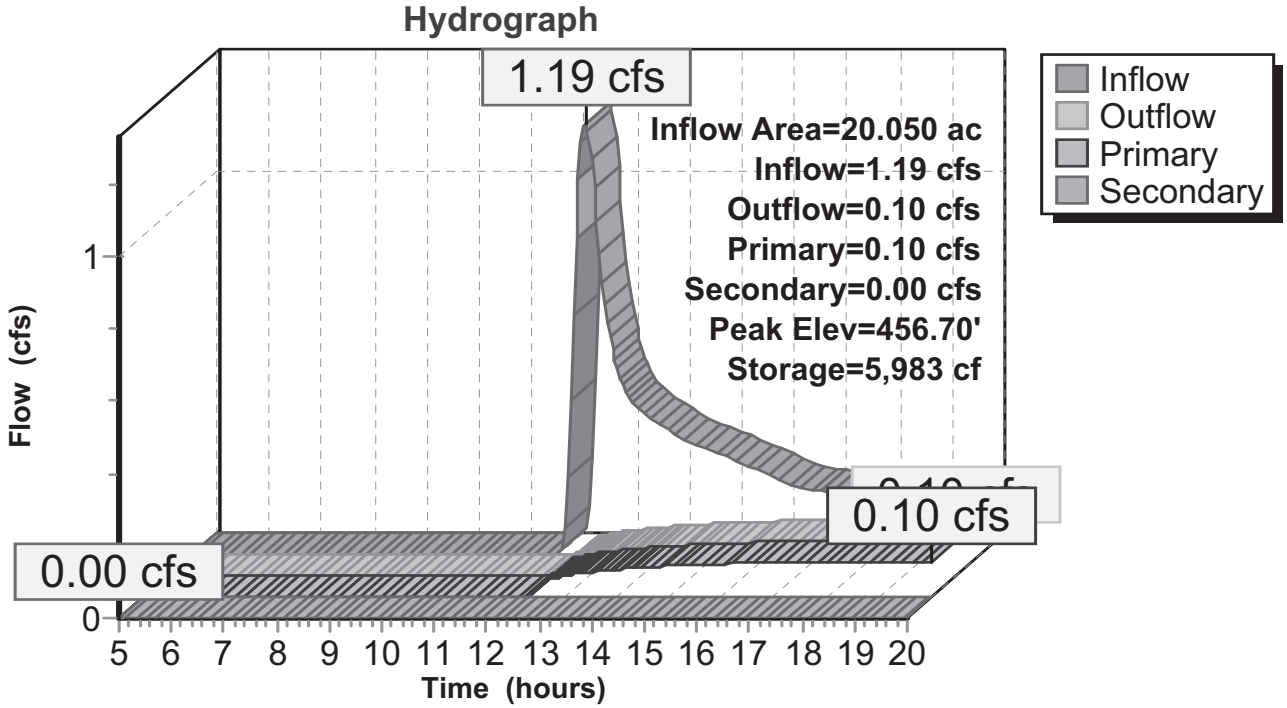
Elevation (feet)	Cum.Store (cubic-feet)
456.00	0
458.00	17,151
460.00	41,271
462.00	73,165
464.00	113,637
466.00	163,490

#	Routing	Invert	Outlet Devices
1	Primary	456.00'	**24.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 446.00' S= 0.1000 '/' n= 0.011 Cc= 0.900
2	Device 1	456.00'	**2.2" Vert. Orifice/Grate** C= 0.600
3	Device 1	456.70'	**3.3" Vert. Orifice/Grate** C= 0.600
4	Device 1	460.73'	**2.30' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	464.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
6	Device 1	465.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Secondary	456.00'	**24.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 446.00' S= 0.1000 '/' n= 0.011 Cc= 0.900
8	Device 7	460.73'	**1.65' x 0.50' Vert. Orifice/Grate** C= 0.600
9	Device 7	462.40'	**1.65' x 0.90' Vert. Orifice/Grate** C= 0.600
10	Device 7	464.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
11	Device 7	465.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
12	Primary	465.50'	**20.0' long x 13.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=0.10 cfs @ 20.00 hrs HW=456.70' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.10 cfs of 2.77 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.10 cfs @ 3.7 fps)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
  - **5=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)
  - **6=Orifice/Grate** (Controls 0.00 cfs)
- **12=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=456.00' TW=417.23' (Dynamic Tailwater)
- **7=Culvert** (Controls 0.00 cfs)
  - **8=Orifice/Grate** (Controls 0.00 cfs)
  - **9=Orifice/Grate** (Controls 0.00 cfs)
  - **10=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)
  - **11=Orifice/Grate** (Controls 0.00 cfs)

Pond 13P: Detention/Treatment Pond 13P



Pond 14P: Detention/Treatment Pond 14P

Inflow Area =	11.420 ac,	Inflow Depth =	0.13"	for	WQ STORM event
Inflow =	0.88 cfs @	12.40 hrs,	Volume=	0.126 af	
Outflow =	0.07 cfs @	18.99 hrs,	Volume=	0.043 af,	Atten= 92%, Lag= 395.7 min
Primary =	0.07 cfs @	18.99 hrs,	Volume=	0.043 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 491.70' @ 18.99 hrs Surf.Area= 0 sf Storage= 3,633 cf
Plug-Flow detention time= 239.0 min calculated for 0.043 af (34% of inflow)
Center-of-Mass det. time= 118.8 min (988.4 - 869.6)

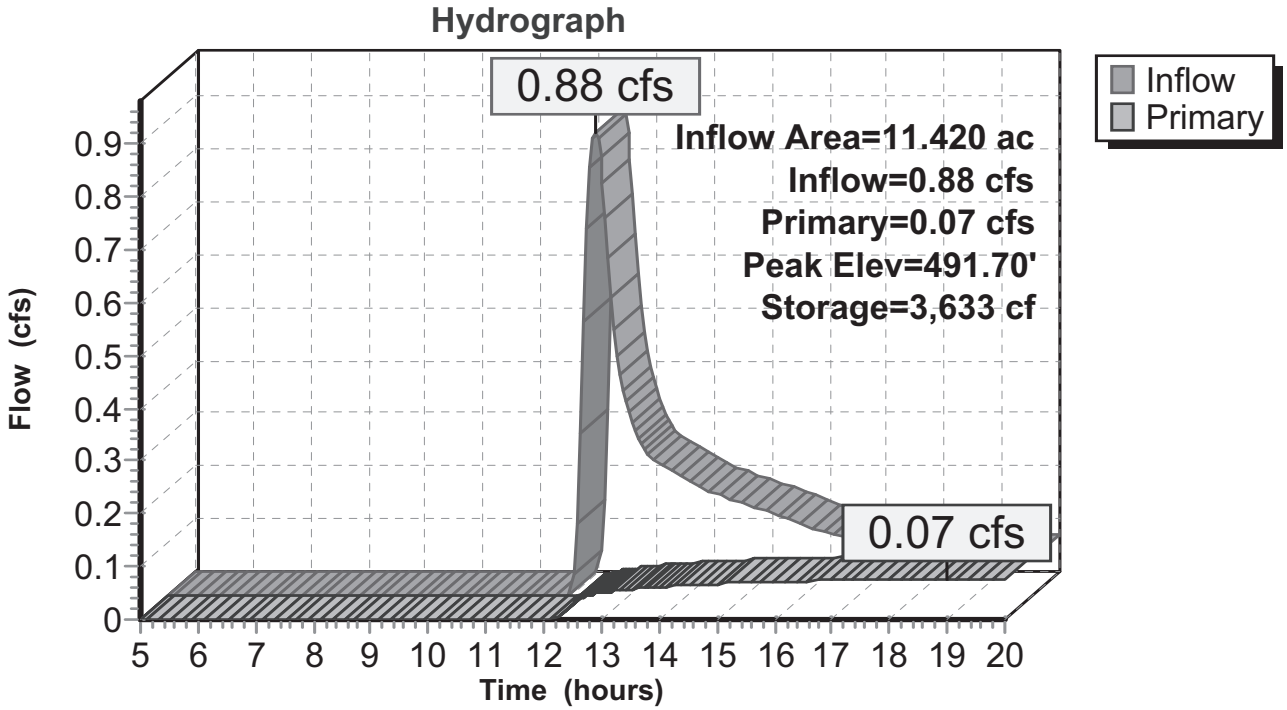
#	Invert	Avail.Storage	Storage Description
1	491.00'	112,422 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
491.00	0
492.00	5,220
494.00	20,281
496.00	42,461
498.00	72,873
500.00	112,422

#	Routing	Invert	Outlet Devices
1	Primary	491.00'	**24.0" x 60.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 490.00' S= 0.0167 '/' n= 0.011 Cc= 0.900
2	Device 1	491.00'	**1.9" Vert. Orifice/Grate** C= 0.600
3	Device 1	491.70'	**2.7" Vert. Orifice/Grate** C= 0.600
4	Device 1	495.00'	**1.80' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	498.25'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32

Primary OutFlow Max=0.07 cfs @ 18.99 hrs HW=491.70' TW=458.14' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.07 cfs of 2.76 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.07 cfs @ 3.8 fps)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  ├─**4=Orifice/Grate** (Controls 0.00 cfs)
  └─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 14P: Detention/Treatment Pond 14P



Pond 15P: Detention/Treatment Pond 15P

Inflow Area =	26.950 ac,	Inflow Depth =	0.13"	for	WQ STORM event
Inflow =	1.97 cfs @	12.46 hrs,	Volume=	0.296 af	
Outflow =	0.15 cfs @	20.00 hrs,	Volume=	0.081 af,	Atten= 93%, Lag= 452.5 min
Primary =	0.15 cfs @	20.00 hrs,	Volume=	0.081 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 486.71' @ 20.00 hrs Surf.Area= 0 sf Storage= 9,351 cf
Plug-Flow detention time= 245.7 min calculated for 0.081 af (27% of inflow)
Center-of-Mass det. time= 121.7 min (993.8 - 872.1)

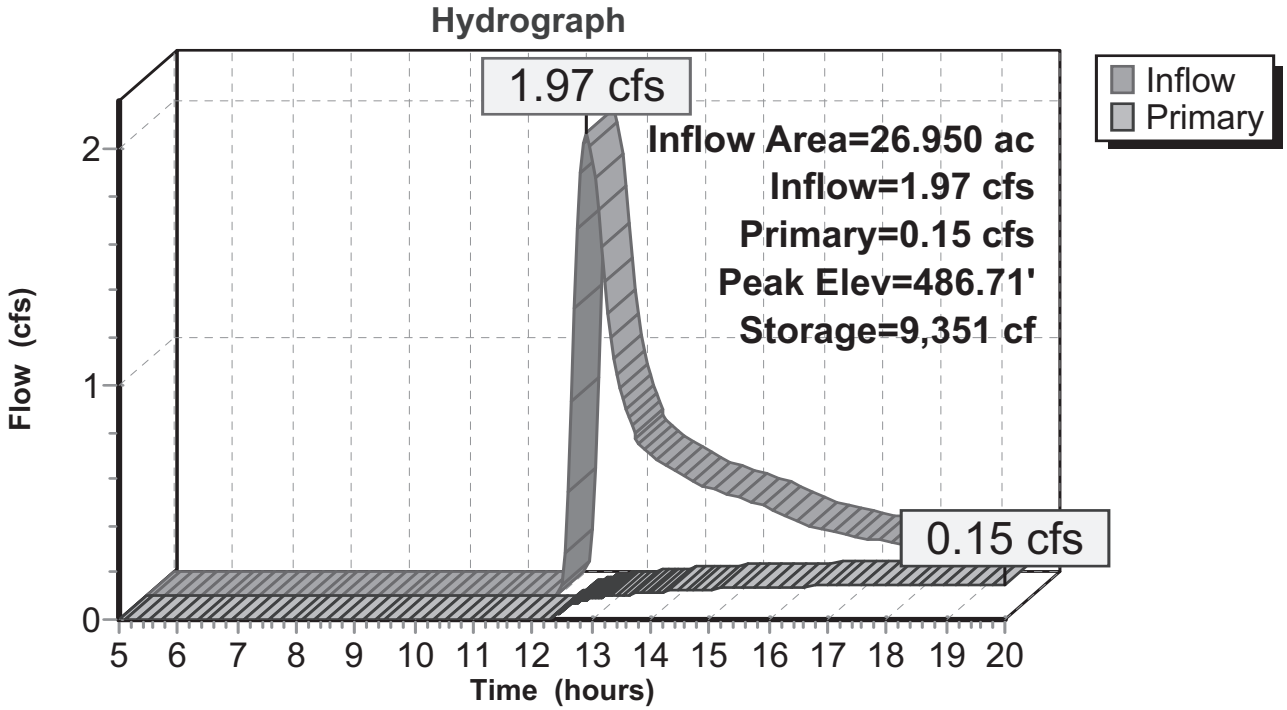
#	Invert	Avail.Storage	Storage Description
1	486.00'	250,174 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
486.00	0
488.00	26,415
490.00	63,689
492.00	112,776
494.00	174,623
496.00	250,174

#	Routing	Invert	Outlet Devices
1	Primary	486.00'	**30.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 482.00' S= 0.0400 '/' n= 0.011 Cc= 0.900
2	Device 1	486.00'	**2.7" Vert. Orifice/Grate** C= 0.600
3	Device 1	486.71'	**4.0" Vert. Orifice/Grate** C= 0.600
4	Device 1	490.47'	**3.00' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	492.43'	**3.00' x 0.75' Vert. Orifice/Grate** C= 0.600
6	Device 1	494.25'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32

Primary OutFlow Max=0.15 cfs @ 20.00 hrs HW=486.71' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.15 cfs of 3.27 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.15 cfs @ 3.7 fps)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  ├─**4=Orifice/Grate** (Controls 0.00 cfs)
  ├─**5=Orifice/Grate** (Controls 0.00 cfs)
  └─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 15P: Detention/Treatment Pond 15P



Pond 16P: Detention/Treatment Pond 16P

Inflow Area =	2.390 ac,	Inflow Depth =	0.25"	for	WQ STORM event
Inflow =	0.60 cfs @	12.14 hrs,	Volume=	0.049 af	
Outflow =	0.02 cfs @	18.90 hrs,	Volume=	0.013 af,	Atten= 96%, Lag= 406.0 min
Primary =	0.02 cfs @	18.90 hrs,	Volume=	0.013 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 501.80' @ 18.90 hrs Surf.Area= 0 sf Storage= 1,564 cf
Plug-Flow detention time= 252.0 min calculated for 0.013 af (27% of inflow)
Center-of-Mass det. time= 144.0 min (979.4 - 835.4)

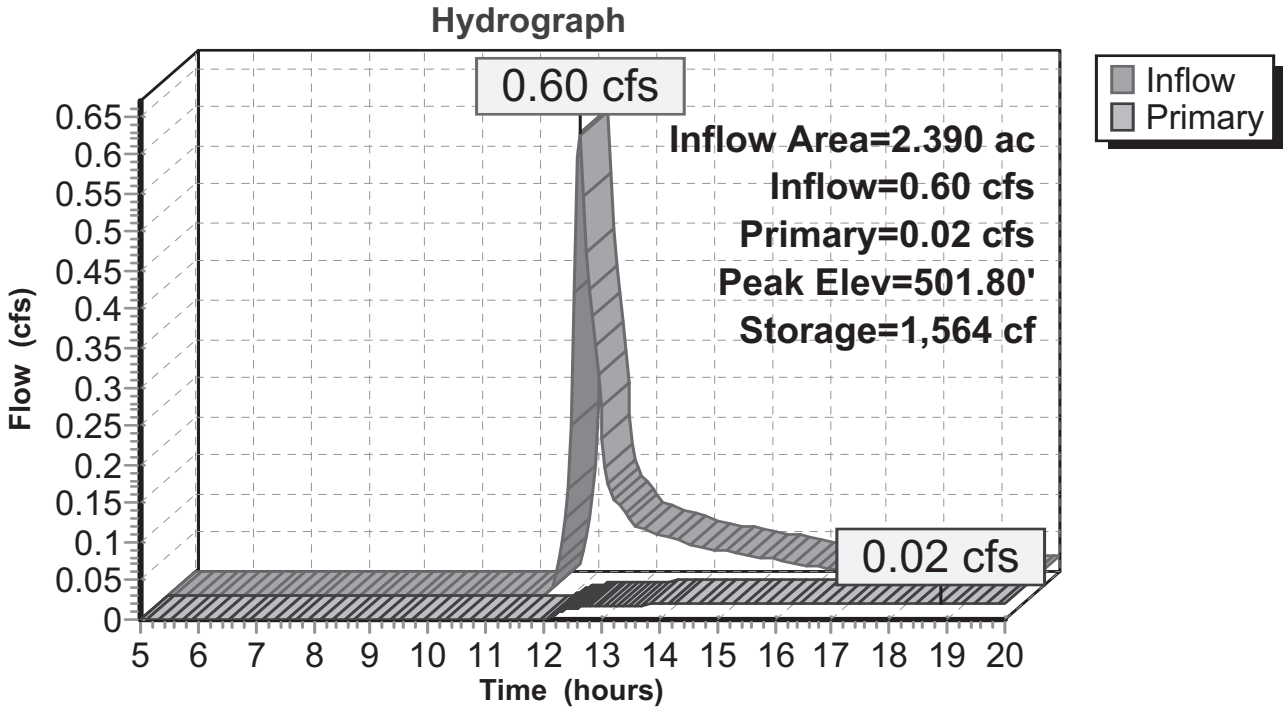
#	Invert	Avail.Storage	Storage Description
1	501.50'	29,657 cf	**Custom Stage Data** Listed below

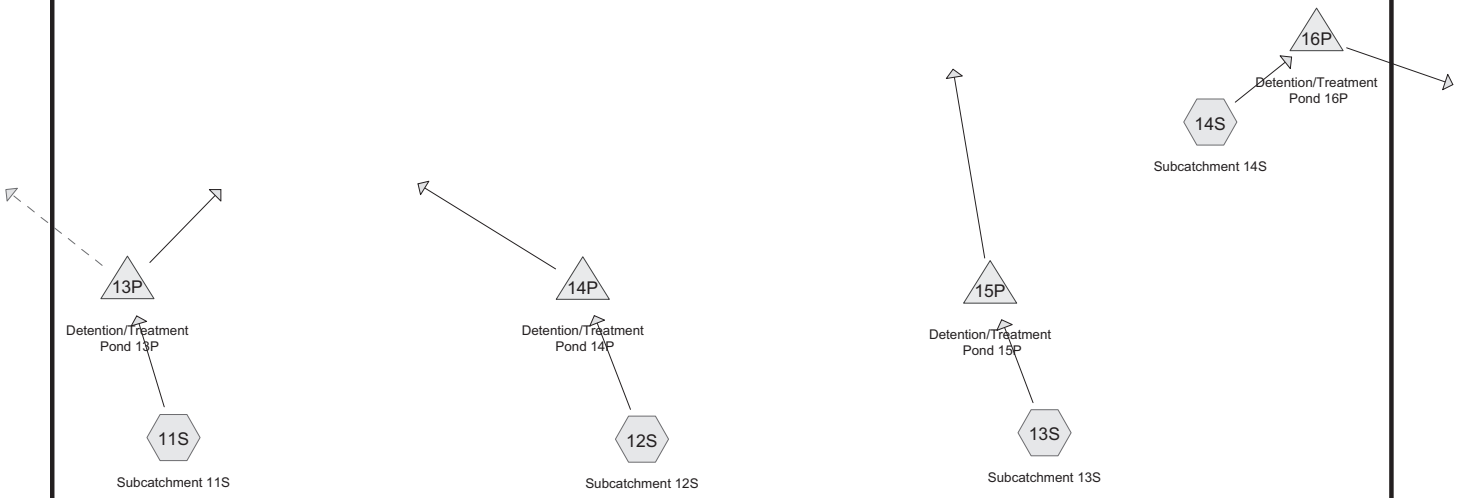
Elevation (feet)	Cum.Store (cubic-feet)
501.50	0
502.00	2,572
504.00	14,626
506.00	29,657

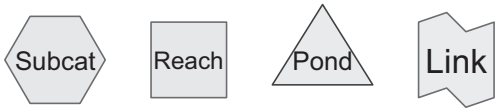
#	Routing	Invert	Outlet Devices
1	Primary	501.50'	**18.0" x 40.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 497.50' S= 0.1000 '/' n= 0.011 Cc= 0.900
2	Device 1	501.50'	**1.3" Vert. Orifice/Grate** C= 0.600
3	Device 1	501.84'	**1.8" Vert. Orifice/Grate** C= 0.600
4	Device 1	503.09'	**1.25' x 0.50' Vert. Orifice/Grate** C= 0.600
5	Device 1	504.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
6	Device 1	505.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Primary	505.50'	**20.0' long x 13.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=0.02 cfs @ 18.90 hrs HW=501.80' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.02 cfs of 0.48 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.02 cfs @ 2.4 fps)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
  - **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  - **6=Orifice/Grate** (Controls 0.00 cfs)
- **7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 16P: Detention/Treatment Pond 16P







Drainage Diagram for Proposed Conditions
Prepared by Pietrzak & Pfau, PLLC 7/6/2009
HydroCAD® 7.00 s/n 001436 © 1986-2003 Applied Microcomputer Systems

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

Subcatchment 11S: Subcatchment 11S Runoff Area=20.050 ac Runoff Depth=1.02"
Flow Length=1,706' Tc=21.3 min CN=79 Runoff=16.68 cfs 1.702 af

Subcatchment 12S: Subcatchment 12S Runoff Area=11.420 ac Runoff Depth=1.08"
Flow Length=1,285' Tc=18.4 min CN=80 Runoff=10.70 cfs 1.025 af

Subcatchment 13S: Subcatchment 13S Runoff Area=26.950 ac Runoff Depth=1.08"
Flow Length=2,559' Tc=22.0 min CN=80 Runoff=23.47 cfs 2.415 af

Subcatchment 14S: Subcatchment 14S Runoff Area=2.390 ac Runoff Depth=1.40"
Flow Length=781' Tc=8.1 min CN=85 Runoff=3.87 cfs 0.278 af

Pond 13P: Detention/Treatment Pond 13P Peak Elev=460.73' Storage=52,988 cf Inflow=16.68 cfs 1.702 af
Primary=0.84 cfs 0.525 af Secondary=0.00 cfs 0.000 af Outflow=0.84 cfs 0.525 af

Pond 14P: Detention/Treatment Pond 14P Peak Elev=495.00' Storage=31,418 cf Inflow=10.70 cfs 1.025 af
Outflow=0.53 cfs 0.336 af

Pond 15P: Detention/Treatment Pond 15P Peak Elev=490.47' Storage=75,271 cf Inflow=23.47 cfs 2.415 af
Outflow=1.20 cfs 0.748 af

Pond 16P: Detention/Treatment Pond 16P Peak Elev=503.01' Storage=8,680 cf Inflow=3.87 cfs 0.278 af
Outflow=0.14 cfs 0.092 af

Total Runoff Area = 60.810 ac Runoff Volume = 5.420 af Average Runoff Depth = 1.07"

Subcatchment 11S: Subcatchment 11S

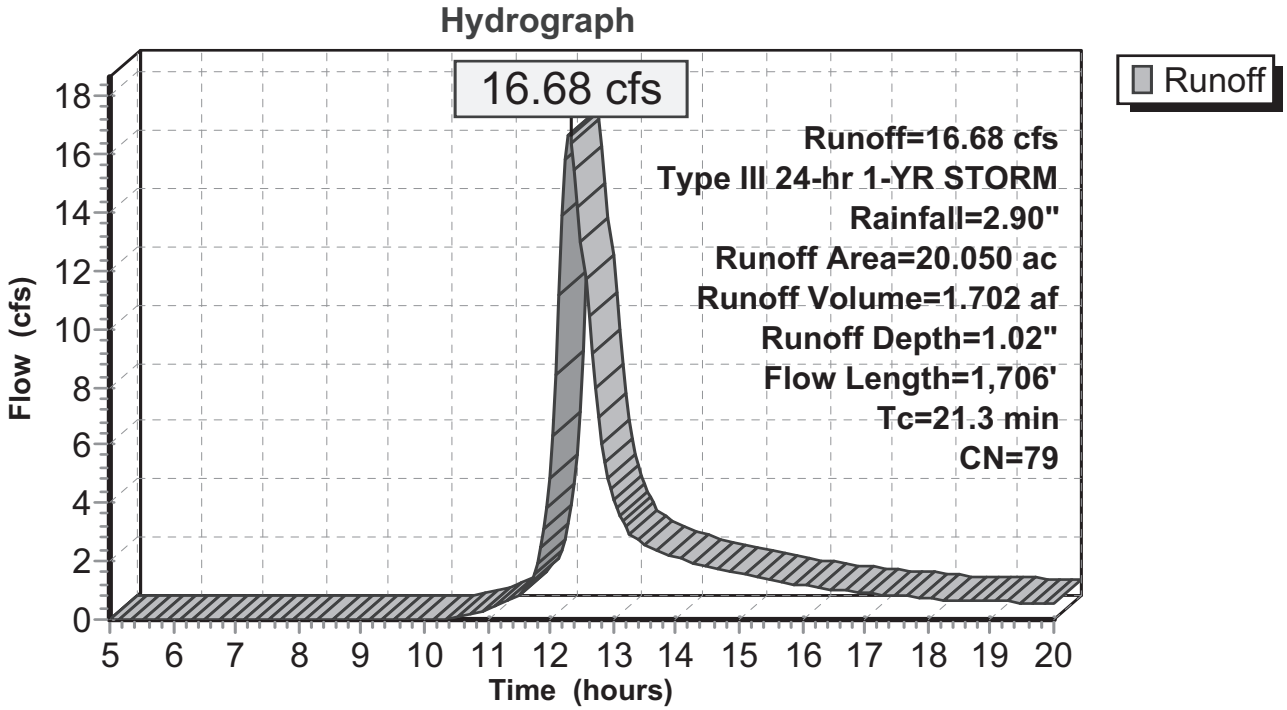
Runoff = 16.68 cfs @ 12.31 hrs, Volume= 1.702 af, Depth= 1.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-YR STORM Rainfall=2.90"

Area (ac)	CN	Description
3.440	98	Proposed pavement & roofs
5.820	79	50-75% Grass cover, Fair, HSG C
0.100	71	Meadow, non-grazed, HSG C
10.690	73	Woods, Fair, HSG C
20.050	79	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	100	0.1425	0.4		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.2	25	0.1500	2.7		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
14.5	1,394	0.1024	1.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.9	72	0.0375	1.4		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.4	115	0.0742	1.4		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
21.3	1,706	Total			

Subcatchment 11S: Subcatchment 11S



Subcatchment 12S: Subcatchment 12S

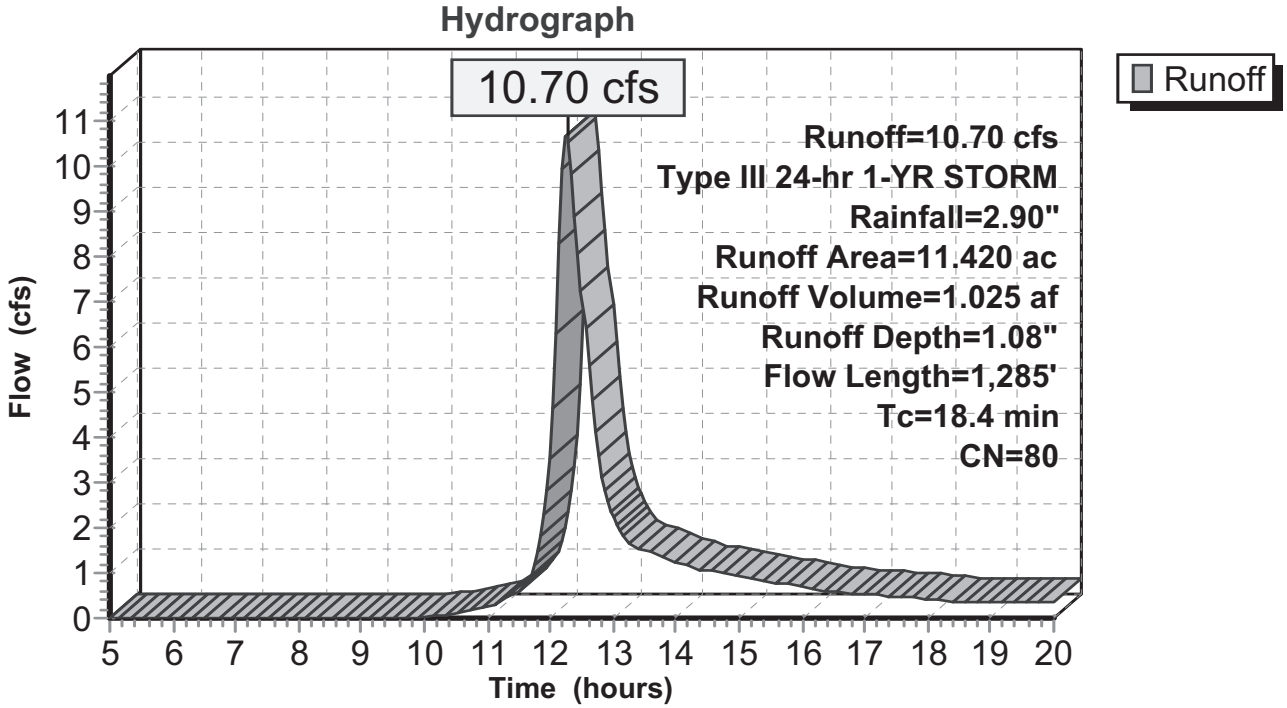
Runoff = 10.70 cfs @ 12.27 hrs, Volume= 1.025 af, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-YR STORM Rainfall=2.90"

Area (ac)	CN	Description
2.280	98	Proposed pavement & roofs
4.200	79	50-75% Grass cover, Fair, HSG C
4.940	73	Woods, Fair, HSG C
11.420	80	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	10	0.0300	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
10.5	90	0.0867	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
5.0	565	0.1416	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.0	129	0.0969	2.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.6	491	0.0365	13.4	23.72	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
18.4	1,285	Total			

Subcatchment 12S: Subcatchment 12S



Subcatchment 13S: Subcatchment 13S

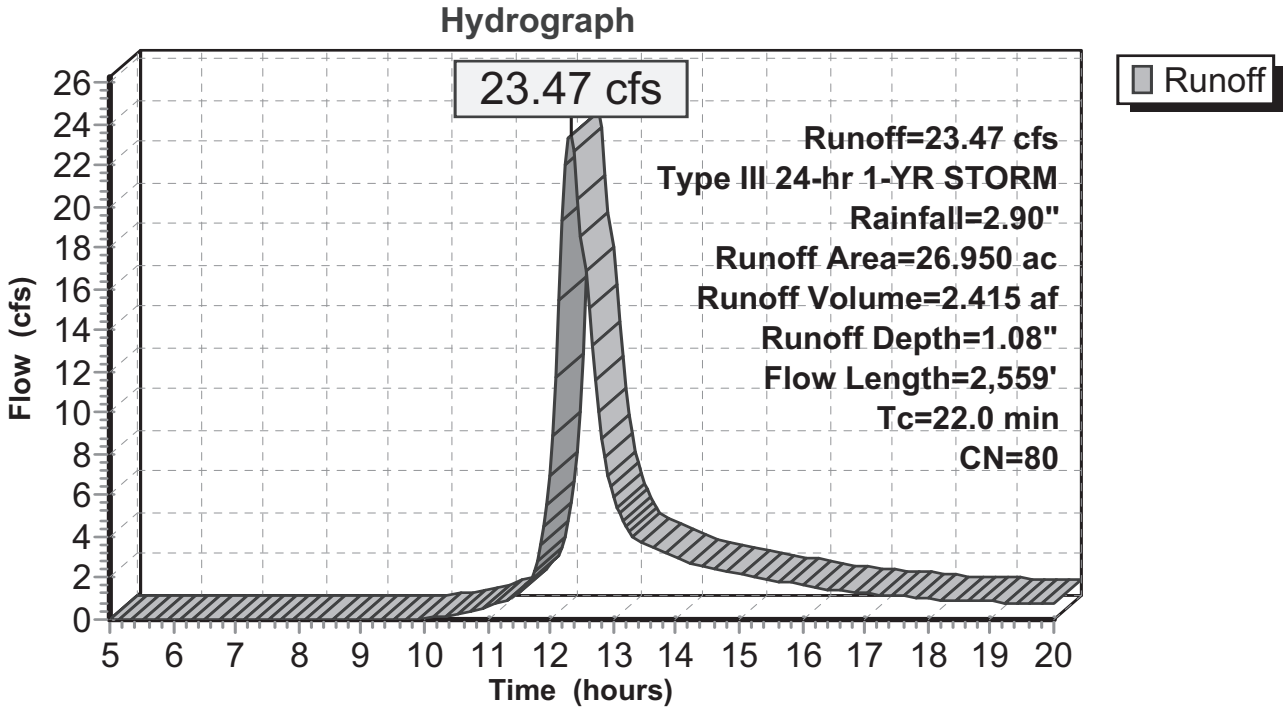
Runoff = 23.47 cfs @ 12.32 hrs, Volume= 2.415 af, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-YR STORM Rainfall=2.90"

Area (ac)	CN	Description
5.130	98	Proposed pavement & roofs
8.580	79	50-75% Grass cover, Fair, HSG C
13.240	73	Woods, Fair, HSG C
26.950	80	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.7	15	0.0300	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
10.1	85	0.0853	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.50"
4.9	556	0.1403	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.0	14	0.5000	4.9		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
1.6	121	0.0331	1.3		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
2.2	365	0.0188	2.8		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
1.5	1,403	0.0498	15.7	27.70	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
22.0	2,559	Total			

Subcatchment 13S: Subcatchment 13S



Subcatchment 14S: Subcatchment 14S

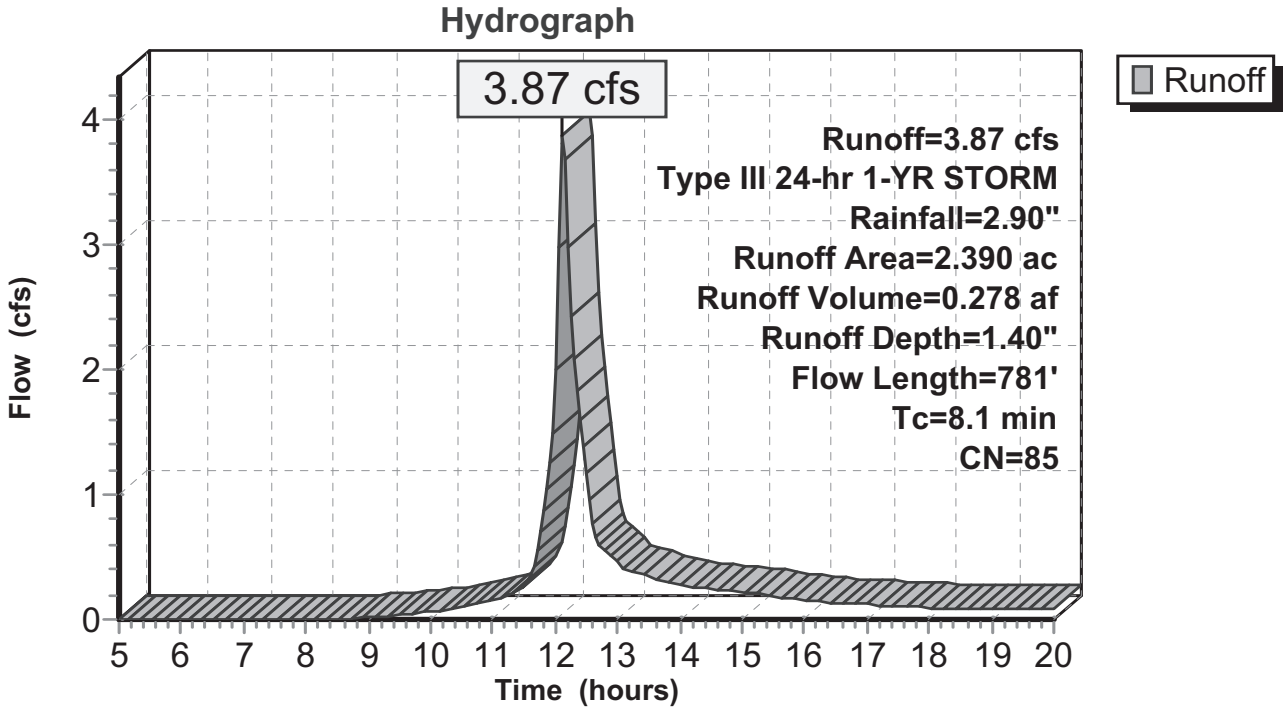
Runoff = 3.87 cfs @ 12.12 hrs, Volume= 0.278 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-YR STORM Rainfall=2.90"

Area (ac)	CN	Description
0.810	98	Proposed pavement & roofs
1.570	79	50-75% Grass cover, Fair, HSG C
0.010	73	Woods, Fair, HSG C
2.390	85	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	100	0.0425	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.9	298	0.0714	5.4		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.3	383	0.0835	20.3	35.87	**Circular Channel (pipe),** Diam= 18.0" Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.011
8.1	781	Total			

Subcatchment 14S: Subcatchment 14S



Pond 13P: Detention/Treatment Pond 13P

Inflow Area =	20.050 ac,	Inflow Depth =	1.02"	for	1-YR STORM event
Inflow =	16.68 cfs @	12.31 hrs,	Volume=	1.702 af	
Outflow =	0.84 cfs @	17.36 hrs,	Volume=	0.525 af,	Atten= 95%, Lag= 302.6 min
Primary =	0.84 cfs @	17.36 hrs,	Volume=	0.525 af	
Secondary =	0.00 cfs @	17.36 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 460.73' @ 17.36 hrs Surf.Area= 0 sf Storage= 52,988 cf
Plug-Flow detention time= 245.4 min calculated for 0.525 af (31% of inflow)
Center-of-Mass det. time= 149.5 min (971.5 - 822.0)

#	Invert	Avail.Storage	Storage Description
1	456.00'	163,490 cf	**Custom Stage Data** Listed below

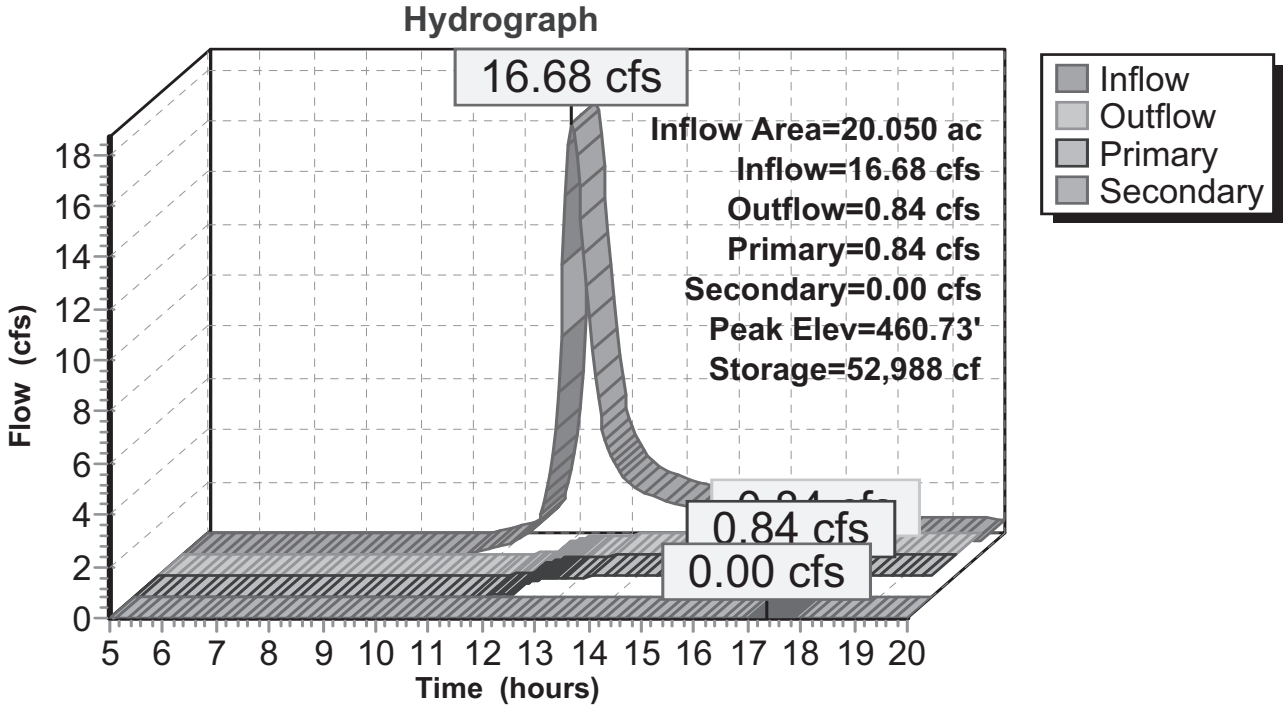
Elevation (feet)	Cum.Store (cubic-feet)
456.00	0
458.00	17,151
460.00	41,271
462.00	73,165
464.00	113,637
466.00	163,490

#	Routing	Invert	Outlet Devices
1	Primary	456.00'	**24.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 446.00' S= 0.1000 '/' n= 0.011 Cc= 0.900
2	Device 1	456.00'	**2.2" Vert. Orifice/Grate** C= 0.600
3	Device 1	456.70'	**3.3" Vert. Orifice/Grate** C= 0.600
4	Device 1	460.73'	**2.30' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	464.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
6	Device 1	465.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Secondary	456.00'	**24.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 446.00' S= 0.1000 '/' n= 0.011 Cc= 0.900
8	Device 7	460.73'	**1.65' x 0.50' Vert. Orifice/Grate** C= 0.600
9	Device 7	462.40'	**1.65' x 0.90' Vert. Orifice/Grate** C= 0.600
10	Device 7	464.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
11	Device 7	465.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
12	Primary	465.50'	**20.0' long x 13.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=0.84 cfs @ 17.36 hrs HW=460.73' TW=453.06' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.84 cfs of 29.23 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.27 cfs @ 10.4 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.56 cfs @ 9.5 fps)
  - **4=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.2 fps)
  - **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  - **6=Orifice/Grate** (Controls 0.00 cfs)
- **12=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 17.36 hrs HW=460.73' TW=417.74' (Dynamic Tailwater)
- **7=Culvert** (Passes 0.00 cfs of 29.23 cfs potential flow)
  - **8=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.2 fps)
  - **9=Orifice/Grate** (Controls 0.00 cfs)
  - **10=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  - **11=Orifice/Grate** (Controls 0.00 cfs)

Pond 13P: Detention/Treatment Pond 13P



Pond 14P: Detention/Treatment Pond 14P

Inflow Area =	11.420 ac,	Inflow Depth =	1.08"	for	1-YR STORM event
Inflow =	10.70 cfs @	12.27 hrs,	Volume=	1.025 af	
Outflow =	0.53 cfs @	16.98 hrs,	Volume=	0.336 af,	Atten= 95%, Lag= 282.9 min
Primary =	0.53 cfs @	16.98 hrs,	Volume=	0.336 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 495.00' @ 16.98 hrs Surf.Area= 0 sf Storage= 31,418 cf
Plug-Flow detention time= 244.6 min calculated for 0.335 af (33% of inflow)
Center-of-Mass det. time= 151.1 min (968.3 - 817.2)

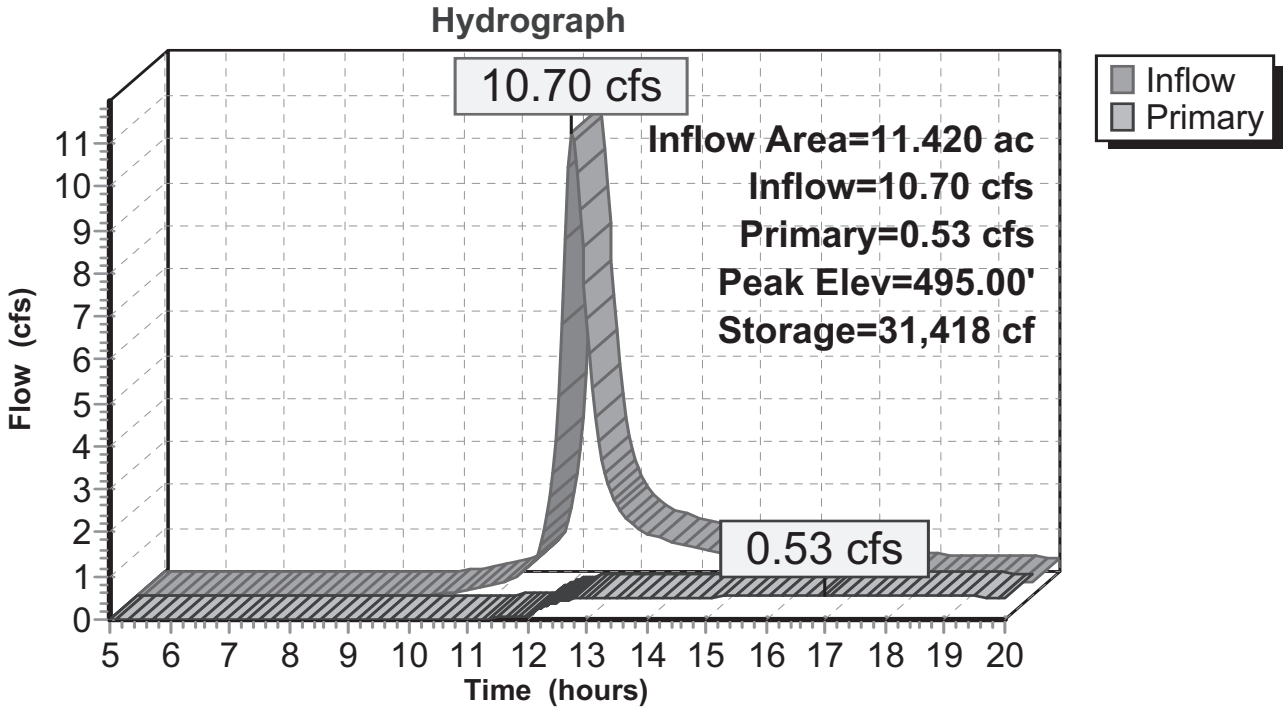
#	Invert	Avail.Storage	Storage Description
1	491.00'	112,422 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
491.00	0
492.00	5,220
494.00	20,281
496.00	42,461
498.00	72,873
500.00	112,422

#	Routing	Invert	Outlet Devices
1	Primary	491.00'	**24.0" x 60.0' long Culvert** CPP, square edge headwall, Ke= 0.500
			Outlet Invert= 490.00' S= 0.0167 '/' n= 0.011 Cc= 0.900
2	Device 1	491.00'	**1.9" Vert. Orifice/Grate** C= 0.600
3	Device 1	491.70'	**2.7" Vert. Orifice/Grate** C= 0.600
4	Device 1	495.00'	**1.80' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	498.25'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50
			Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32

Primary OutFlow Max=0.53 cfs @ 16.98 hrs HW=495.00' TW=458.49' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.53 cfs of 26.22 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.19 cfs @ 9.5 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.34 cfs @ 8.6 fps)
  - **4=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.2 fps)
  - **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 14P: Detention/Treatment Pond 14P



Pond 15P: Detention/Treatment Pond 15P

Inflow Area = 26.950 ac, Inflow Depth = 1.08" for 1-YR STORM event
Inflow = 23.47 cfs @ 12.32 hrs, Volume= 2.415 af
Outflow = 1.20 cfs @ 17.25 hrs, Volume= 0.748 af, Atten= 95%, Lag= 295.9 min
Primary = 1.20 cfs @ 17.25 hrs, Volume= 0.748 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 490.47' @ 17.25 hrs Surf.Area= 0 sf Storage= 75,271 cf
Plug-Flow detention time= 246.8 min calculated for 0.748 af (31% of inflow)
Center-of-Mass det. time= 151.5 min (971.5 - 820.0)

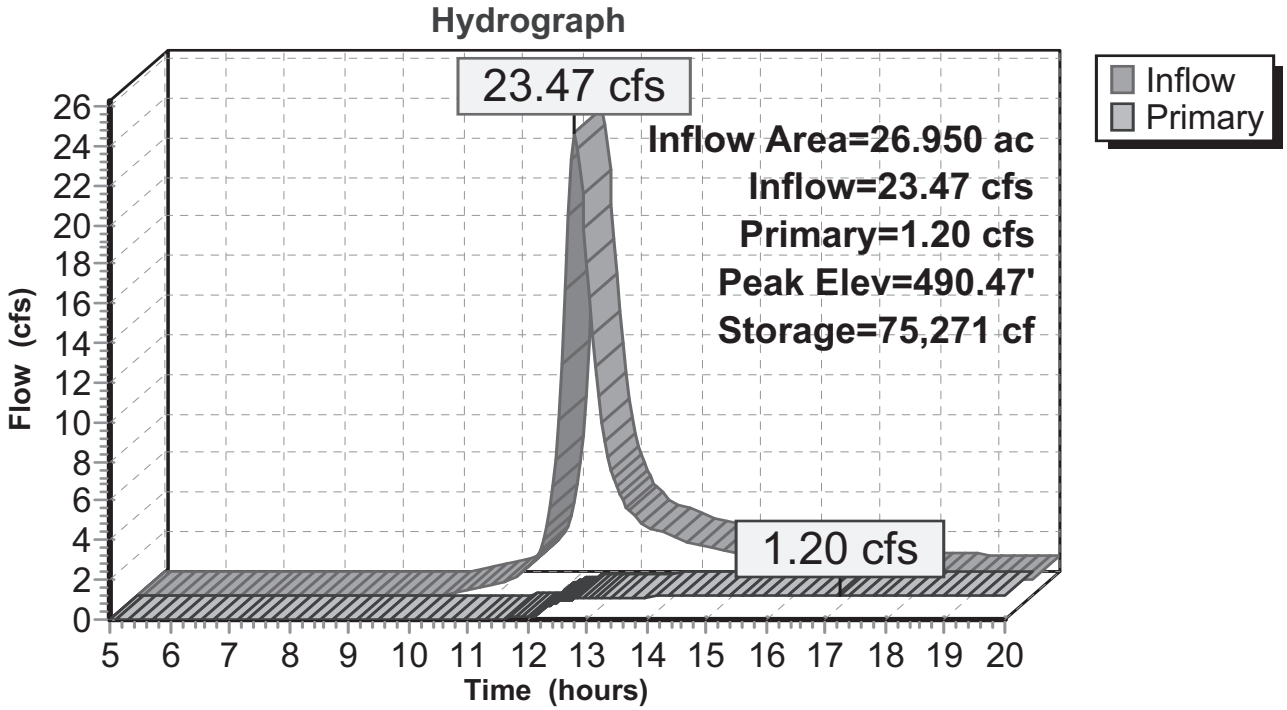
#	Invert	Avail.Storage	Storage Description
1	486.00'	250,174 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
486.00	0
488.00	26,415
490.00	63,689
492.00	112,776
494.00	174,623
496.00	250,174

#	Routing	Invert	Outlet Devices
1	Primary	486.00'	**30.0" x 100.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 482.00' S= 0.0400 '/' n= 0.011 Cc= 0.900
2	Device 1	486.00'	**2.7" Vert. Orifice/Grate** C= 0.600
3	Device 1	486.71'	**4.0" Vert. Orifice/Grate** C= 0.600
4	Device 1	490.47'	**3.00' x 1.00' Vert. Orifice/Grate** C= 0.600
5	Device 1	492.43'	**3.00' x 0.75' Vert. Orifice/Grate** C= 0.600
6	Device 1	494.25'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32

Primary OutFlow Max=1.20 cfs @ 17.25 hrs HW=490.47' TW=468.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 1.20 cfs of 42.42 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.40 cfs @ 10.1 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.80 cfs @ 9.1 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.1 fps)
  ├─**5=Orifice/Grate** (Controls 0.00 cfs)
  └─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 15P: Detention/Treatment Pond 15P



Pond 16P: Detention/Treatment Pond 16P

Inflow Area =	2.390 ac,	Inflow Depth =	1.40"	for	1-YR STORM event
Inflow =	3.87 cfs @	12.12 hrs,	Volume=	0.278 af	
Outflow =	0.14 cfs @	16.25 hrs,	Volume=	0.092 af,	Atten= 96%, Lag= 247.9 min
Primary =	0.14 cfs @	16.25 hrs,	Volume=	0.092 af	

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 503.01' @ 16.25 hrs Surf.Area= 0 sf Storage= 8,680 cf
Plug-Flow detention time= 261.0 min calculated for 0.092 af (33% of inflow)
Center-of-Mass det. time= 166.9 min (962.7 - 795.8)

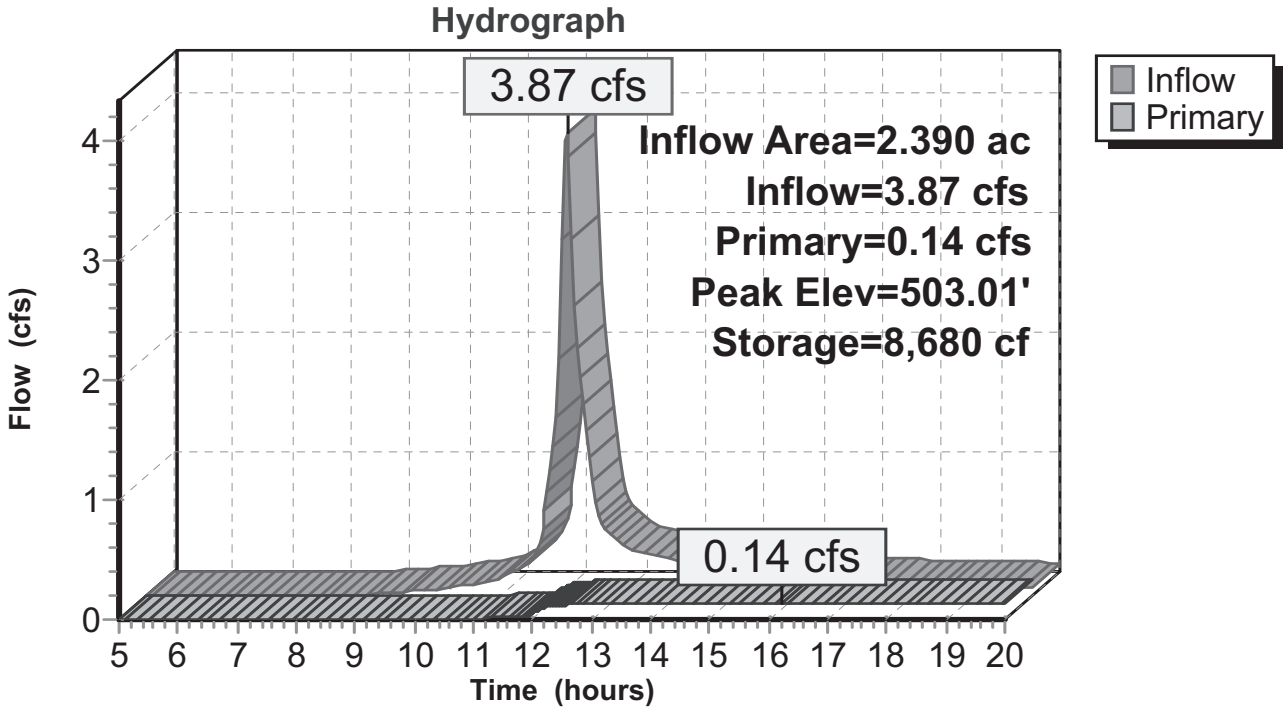
#	Invert	Avail.Storage	Storage Description
1	501.50'	29,657 cf	**Custom Stage Data** Listed below

Elevation (feet)	Cum.Store (cubic-feet)
501.50	0
502.00	2,572
504.00	14,626
506.00	29,657

#	Routing	Invert	Outlet Devices
1	Primary	501.50'	**18.0" x 40.0' long Culvert** CPP, square edge headwall, Ke= 0.500 Outlet Invert= 497.50' S= 0.1000 '/' n= 0.011 Cc= 0.900
2	Device 1	501.50'	**1.3" Vert. Orifice/Grate** C= 0.600
3	Device 1	501.84'	**1.8" Vert. Orifice/Grate** C= 0.600
4	Device 1	503.09'	**1.25' x 0.50' Vert. Orifice/Grate** C= 0.600
5	Device 1	504.50'	**2.5' long x 0.7' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 Coef. (English) 2.76 2.82 2.93 3.09 3.18 3.22 3.27 3.30 3.32 3.31 3.32
6	Device 1	505.25'	**4.00' x 2.50' Horiz. Orifice/Grate** Limited to weir flow C= 0.600
7	Primary	505.50'	**20.0' long x 13.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.60 2.64 2.70 2.66 2.65 2.66 2.65 2.63

Primary OutFlow Max=0.14 cfs @ 16.25 hrs HW=503.01' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 0.14 cfs of 7.43 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.05 cfs @ 5.8 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.09 cfs @ 5.0 fps)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
  - **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
  - **6=Orifice/Grate** (Controls 0.00 cfs)
- **7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 16P: Detention/Treatment Pond 16P



APPENDIX 6

PIPE SIZING CALCULATIONS

YOUNG'S GROVE - PIPE ANALYSIS

TOWN OF GOSHEN

ORANGE COUNTY, NEW YORK

		ASSUMED VALUES				**RUNOFF COEFFICIENTS**				**GENERAL INFORMATION**					
		TIME OF CONCENTRATION:		10	min		IMPERVIOUS:	0.9		CALCULATED BY:		AT			
		RAINFALL INTENSITY:		6.5	in/hr		WOODED AREAS:	0.3							
			n FACTOR:	0.01		LAWNS/LANDSCAPING:		0.35		DATE OF COMPLETION:		5/22/2009			
PIPE RUN		**CONTRIBUTING AREAS (ac)**				**AREAS (ac)**		**STORM FLOWS (cfs)**		**PIPE DESIGN INFORMATION**			**PIPE ANALYSIS**		
FROM	TO	WOODED	LAWNS	IMPERVIOUS	WEIGHTED	SUBBASIN	CUMULATIVE	PEAK FLOW	CUMULATIVE	SIZE	SLOPE	MAX Q	CALC. Q	MAX Q	UTILIZED
		AREA	LANDSCAPING	AREA	C VALUE			(SB ONLY)	FLOW	(in)	(ft/ft)	(cfs)	(cfs)	(cfs)	CAP (%)
CBB-7A	CBB-7	0.11	0.28	0.14	0.48	0.53	0.53	1.67	1.67	18	0.0100	12.41	1.67	12.41	13.46%
CBB-7	CBB-6	0.00	0.00	0.04	0.90	0.04	0.57	0.23	1.90	18	0.0100	12.41	1.90	12.41	15.34%
CBB-6A	CBB-6	0.01	0.28	0.18	0.56	0.47	0.47	1.71	1.71	18	0.0100	12.41	1.71	12.41	13.77%
CBB-6	CBB-5	0.00	0.00	0.04	0.90	0.04	1.08	0.23	3.85	18	0.0680	32.37	3.85	32.37	11.89%
CBB-5A	CBB-5	0.00	0.28	0.16	0.55	0.44	0.44	1.57	1.57	18	0.0100	12.41	1.57	12.41	12.67%
CBB-5	CBB-4	0.00	0.01	0.05	0.81	0.06	1.58	0.32	5.74	18	0.1005	39.36	5.74	39.36	14.58%
CBB-4A	CBB-4	0.02	0.42	0.26	0.55	0.70	0.70	2.52	2.52	18	0.0100	12.41	2.52	12.41	20.26%
CBB-4	CBB-3	0.00	0.00	0.06	0.90	0.06	2.34	0.35	8.60	18	0.1143	41.97	8.60	41.97	20.50%
CBB-3A	CBB-3	0.36	0.17	0.16	0.45	0.69	0.69	2.02	2.02	18	0.0100	12.41	2.02	12.41	16.31%
CBB-3	CBB-2	0.00	0.03	0.06	0.72	0.09	3.12	0.42	11.05	18	0.1203	43.06	11.05	43.06	25.66%
CBB-2A	CBB-2	0.00	0.26	0.16	0.56	0.42	0.42	1.53	1.53	18	0.0100	12.41	1.53	12.41	12.30%
CBB-2	CBB-1	0.00	0.02	0.06	0.76	0.08	3.62	0.40	12.97	18	0.0766	34.36	12.97	34.36	37.75%
CBB-1A	CBB-1	0.00	0.21	0.15	0.58	0.36	0.36	1.36	1.36	18	0.0100	12.41	1.36	12.41	10.92%
CBB-1	CBA-7	0.00	0.02	0.06	0.76	0.08	4.06	0.40	14.72	18	0.0200	17.56	14.72	17.56	83.86%
CBA-7A	CBA-7	0.00	0.00	0.03	0.90	0.03	0.03	0.18	0.18	18	0.0100	12.41	0.18	12.41	1.41%
CBA-7	CBA-6	0.00	0.00	0.01	0.90	0.01	4.10	0.06	14.96	18	0.0428	25.68	14.96	25.68	58.24%
CBA-6A	CBA-6	0.00	0.00	0.04	0.90	0.04	0.04	0.23	0.23	18	0.0100	12.41	0.23	12.41	1.88%
CBA-6	CBA-5	0.00	0.00	0.04	0.90	0.04	4.18	0.23	15.42	18	0.0977	38.80	15.42	38.80	39.75%
CBA-5A	CBA-5	0.00	0.01	0.05	0.81	0.06	0.06	0.32	0.32	18	0.0100	12.41	0.32	12.41	2.54%
CBA-5	CBA-4	0.00	0.01	0.05	0.81	0.06	4.30	0.32	16.06	18	0.0992	39.10	16.06	39.10	41.06%
CBA-4A	CBA-4	0.00	0.05	0.06	0.65	0.11	0.11	0.46	0.46	18	0.0100	12.41	0.46	12.41	3.74%
CBA-4	CBA-3	0.00	0.03	0.06	0.72	0.09	4.50	0.42	16.94	18	0.0992	39.10	16.94	39.10	43.32%
CBA-3A	CBA-3	0.00	0.01	0.06	0.82	0.07	0.07	0.37	0.37	18	0.0100	12.41	0.37	12.41	3.01%
CBA-3	CBA-2	0.00	0.03	0.06	0.72	0.09	4.66	0.42	17.73	18	0.1001	39.28	17.73	39.28	45.15%
CBA-2A	CBA-2	0.00	0.11	0.06	0.54	0.17	0.17	0.60	0.60	18	0.0100	12.41	0.60	12.41	4.84%
CBA-2	DMH-1	0.03	0.13	0.06	0.49	0.22	5.05	0.71	19.04	24	0.0100	26.74	19.04	26.74	71.21%
DMH-1	DMH-2	0.00	0.00	0.00	0.00	0.00	5.05	0.00	19.04	24	0.0100	26.74	19.04	26.74	71.21%
DMH-2	OUTLET	0.00	0.00	0.00	0.00	0.00	5.05	0.00	19.04	24	0.0100	26.74	19.04	26.74	71.21%

PIPE RUN		CONTRIBUTING AREAS (ac)				AREAS (ac)		STORM FLOWS (cfs)		PIPE DESIGN INFORMATION			PIPE ANALYSIS		
FROM	TO	WOODED	LAWNS	IMPERVIOUS	WEIGHTED	SUBBASIN	CUMULATIVE	PEAK FLOW	CUMULATIVE	SIZE	SLOPE	MAX Q	CALC. Q	MAX Q	UTILIZED
		AREA	LANDSCAPING	AREA	C VALUE			(SB ONLY)	FLOW	(in)	(ft/ft)	(cfs)	(cfs)	(cfs)	CAP (%)
CBC-8A	CBC-8	0.00	0.00	0.08	0.90	0.08	0.08	0.47	0.47	18	0.0100	12.41	0.47	12.41	3.77%
CBC-8	CBC-7	0.00	0.00	0.08	0.90	0.08	0.16	0.47	0.94	18	0.0941	38.08	0.94	38.08	2.46%
CBC-7A	CBC-7	0.00	0.05	0.05	0.63	0.10	0.10	0.41	0.41	18	0.0100	12.41	0.41	12.41	3.27%
CBC-7	CBC-6	0.00	0.00	0.04	0.90	0.04	0.30	0.23	1.58	18	0.0981	38.88	1.58	38.88	4.05%
CBC-6A	CBC-6	0.19	0.49	0.11	0.41	0.79	0.79	2.13	2.13	18	0.0100	12.41	2.13	12.41	17.15%
CBC-6	CBC-5	0.00	0.01	0.05	0.81	0.06	1.15	0.32	4.02	18	0.0969	38.64	4.02	38.64	10.40%
CBC-5A	CBC-5	0.01	0.01	0.03	0.67	0.05	0.05	0.22	0.22	18	0.0100	12.41	0.22	12.41	1.75%
CBC-5	CBC-4	0.00	0.01	0.03	0.76	0.04	1.24	0.20	4.44	18	0.0976	38.78	4.44	38.78	11.44%
CBC-4A	CBC-4	0.00	0.00	0.03	0.90	0.03	0.03	0.18	0.18	18	0.0100	12.41	0.18	12.41	1.41%
CBC-4	CBC-3	0.00	0.00	0.03	0.90	0.03	1.30	0.18	4.79	18	0.1017	39.59	4.79	39.59	12.09%
CBC-3A	CBC-3	0.63	0.49	0.38	0.47	1.50	1.50	4.57	4.57	18	0.0100	12.41	4.57	12.41	36.78%
CBC-3	CBC-2	0.00	0.01	0.03	0.76	0.04	2.84	0.20	9.55	18	0.1396	46.38	9.55	46.38	20.59%
CBC-2A	CBC-2	1.18	0.13	0.04	0.32	1.35	1.35	2.83	2.83	18	0.0100	12.41	2.83	12.41	22.80%
CBC-2	CBC-1	0.00	0.02	0.03	0.68	0.05	4.24	0.22	12.60	18	0.0788	34.85	12.60	34.85	36.17%
CBC-1A	CBC-1	0.98	0.15	0.13	0.37	1.26	1.26	3.01	3.01	18	0.0100	12.41	3.01	12.41	24.27%
CBC-1	CBA-10	0.00	0.03	0.05	0.69	0.08	5.58	0.36	15.98	18	0.0250	19.63	15.98	19.63	81.40%
CBA-10A	CBA-10	0.00	0.00	0.04	0.90	0.04	0.04	0.23	0.23	18	0.0100	12.41	0.23	12.41	1.88%
CBA-10	CBA-9	0.00	0.00	0.01	0.90	0.01	5.63	0.06	16.27	18	0.0355	23.39	16.27	23.39	69.56%
CBA-9A	CBA-9	0.00	0.00	0.05	0.90	0.05	0.05	0.29	0.29	18	0.0100	12.41	0.29	12.41	2.36%
CBA-9	CBA-8	0.00	0.00	0.05	0.90	0.05	5.73	0.29	16.85	18	0.0254	19.79	16.85	19.79	85.19%
CBA-8	CBA-8A	1.50	1.88	0.79	0.44	4.17	9.90	11.82	28.68	24	0.0200	37.81	28.68	37.81	75.85%
CBA-8A	DMH-3	0.00	0.00	0.15	0.90	0.15	10.05	0.88	29.56	24	0.1445	101.63	29.56	101.63	29.08%
CBC-9A	CBC-9	0.00	0.02	0.07	0.78	0.09	0.09	0.46	0.46	18	0.0100	12.41	0.46	12.41	3.67%
CBC-9	CBC-10	0.00	0.00	0.07	0.90	0.07	0.16	0.41	0.86	18	0.0890	37.04	0.86	37.04	2.33%
CBC-10A	CBC-10	0.00	0.03	0.05	0.69	0.08	0.08	0.36	0.36	18	0.0100	12.41	0.36	12.41	2.91%
CBC-10	CBC-11	0.15	0.20	0.08	0.43	0.43	0.67	1.22	2.44	18	0.0986	38.98	2.44	38.98	6.26%
CBC-11A	CBC-11	0.26	0.20	0.09	0.42	0.55	0.55	1.49	1.49	18	0.0100	12.41	1.49	12.41	11.99%
CBC-11	CBC-12	0.00	0.17	0.08	0.53	0.25	1.47	0.85	4.78	18	0.0989	39.04	4.78	39.04	12.25%
CBC-12A	CBC-12	0.00	0.00	0.04	0.90	0.04	0.04	0.23	0.23	18	0.0100	12.41	0.23	12.41	1.88%
CBC-12	CBC-13	0.00	0.00	0.04	0.90	0.04	1.55	0.23	5.25	18	0.1025	39.74	5.25	39.74	13.21%
CBC-13A	CBC-13	0.88	1.01	0.46	0.44	2.35	2.35	6.70	6.70	18	0.0100	12.41	6.70	12.41	54.01%
CBC-13	CBC-14	0.00	0.00	0.05	0.90	0.05	3.95	0.29	12.25	18	0.1203	43.06	12.25	43.06	28.45%
CBC-14A	CBC-14	0.18	0.16	0.12	0.47	0.46	0.46	1.42	1.42	18	0.0100	12.41	1.42	12.41	11.41%
CBC-14	CBC-15	0.00	0.01	0.06	0.82	0.07	4.48	0.37	14.04	18	0.0740	33.77	14.04	33.77	41.57%

PIPE RUN		CONTRIBUTING AREAS (ac)				AREAS (ac)		STORM FLOWS (cfs)		PIPE DESIGN INFORMATION			PIPE ANALYSIS		
FROM	TO	WOODED	LAWNS	IMPERVIOUS	WEIGHTED	SUBBASIN	CUMULATIVE	PEAK FLOW	CUMULATIVE	SIZE	SLOPE	MAX Q	CALC. Q	MAX Q	UTILIZED
		AREA	LANDSCAPING	AREA	C VALUE			(SB ONLY)	FLOW	(in)	(ft/ft)	(cfs)	(cfs)	(cfs)	CAP (%)
CBC-15A	CBC-15	1.38	0.51	0.22	0.37	2.11	2.11	5.14	5.14	18	0.0100	12.41	5.14	12.41	41.39%
CBC-15	DMH-1	0.00	0.03	0.05	0.69	0.08	6.67	0.36	19.54	24	0.0100	26.74	19.54	26.74	73.08%
CBA-11A	CBA-11	0.00	0.00	0.10	0.90	0.10	0.10	0.59	0.59	18	0.0100	12.41	0.59	12.41	4.71%
CBA-11	DMH-1	4.42	0.95	0.42	0.35	5.79	5.89	13.24	13.82	18	0.0206	17.82	13.82	17.82	77.58%
DMH-1	CBA-12	0.00	0.00	0.00	0.00	0.00	12.56	0.00	33.36	24	0.0300	46.31	33.36	46.31	72.04%
CBA-12A	CBA-12	0.00	0.00	0.09	0.90	0.09	0.09	0.53	0.53	18	0.0100	12.41	0.53	12.41	4.24%
CBA-12	CBA-13	0.00	0.00	0.02	0.90	0.02	12.67	0.12	34.00	24	0.0794	75.34	34.00	75.34	45.14%
CBA-13A	CBA-13	0.00	0.00	0.05	0.90	0.05	0.05	0.29	0.29	18	0.0100	12.41	0.29	12.41	2.36%
CBA-13	CBA-14	0.00	0.00	0.05	0.90	0.05	12.77	0.29	34.59	24	0.0995	84.33	34.59	84.33	41.02%
CBA-14A	CBA-14	0.00	0.00	0.04	0.90	0.04	0.04	0.23	0.23	18	0.0100	12.41	0.23	12.41	1.88%
CBA-14	CBA-15	0.00	0.00	0.04	0.90	0.04	12.85	0.23	35.06	24	0.0849	77.90	35.06	77.90	45.00%
CBA-15A	CBA-15	0.00	0.00	0.04	0.90	0.04	0.04	0.23	0.23	18	0.0100	12.41	0.23	12.41	1.88%
CBA-15	CBA-16	0.00	0.00	0.04	0.90	0.04	12.93	0.23	35.53	24	0.0313	47.30	35.53	47.30	75.11%
CBA-16A	CBA-16	0.00	0.00	0.04	0.90	0.04	0.04	0.23	0.23	18	0.0100	12.41	0.23	12.41	1.88%
CBA-16	CBA-17	0.00	0.00	0.04	0.90	0.04	13.01	0.23	35.99	30	0.0112	51.30	35.99	51.30	70.16%
CBA-17A	CBA-17	0.00	0.00	0.04	0.90	0.04	0.04	0.23	0.23	18	0.0100	12.41	0.23	12.41	1.88%
CBA-17	CBA-18	2.87	1.24	0.36	0.36	4.47	17.52	10.52	46.75	30	0.0280	81.11	46.75	81.11	57.64%
CBD-7A	CBD-7	0.00	0.02	0.06	0.76	0.08	0.08	0.40	0.40	18	0.0100	12.41	0.40	12.41	3.19%
CBD-7	CBD-6	0.00	0.03	0.06	0.72	0.09	0.17	0.42	0.82	18	0.0755	34.11	0.82	34.11	2.39%
CBD-6A	CBD-6	0.00	0.00	0.06	0.90	0.06	0.06	0.35	0.35	18	0.0100	12.41	0.35	12.41	2.83%
CBD-6	CBD-5	0.00	0.00	0.06	0.90	0.06	0.29	0.35	1.52	18	0.0508	27.98	1.52	27.98	5.42%
CBD-5A	CBD-5	0.05	0.43	0.12	0.46	0.60	0.60	1.78	1.78	18	0.0100	12.41	1.78	12.41	14.32%
CBD-5	CBD-4	0.00	0.00	0.06	0.90	0.06	0.95	0.35	3.65	18	0.0264	20.17	3.65	20.17	18.08%
CBD-4A	CBD-4	0.18	0.09	0.07	0.44	0.34	0.34	0.97	0.97	18	0.0100	12.41	0.97	12.41	7.78%
CBD-4	CBA-24	0.00	0.01	0.06	0.82	0.07	1.36	0.37	4.99	18	0.0579	29.87	4.99	29.87	16.69%
CBA-24A	CBA-24	0.00	0.00	0.01	0.90	0.01	0.01	0.06	0.06	18	0.0100	12.41	0.06	12.41	0.47%
CBA-24	CBA-23	0.00	0.01	0.02	0.72	0.03	1.40	0.14	5.18	18	0.0651	31.67	5.18	31.67	16.37%
CBA-23A	CBA-23	0.00	0.00	0.05	0.90	0.05	0.05	0.29	0.29	18	0.0100	12.41	0.29	12.41	2.36%
CBA-23	CBA-22	0.00	0.00	0.05	0.90	0.05	1.50	0.29	5.77	18	0.0982	38.90	5.77	38.90	14.83%
CBA-22A	CBA-22	0.00	0.00	0.05	0.90	0.05	0.05	0.29	0.29	18	0.0100	12.41	0.29	12.41	2.36%
CBA-22	CBA-21	0.00	0.00	0.05	0.90	0.05	1.60	0.29	6.35	18	0.0501	27.79	6.35	27.79	22.87%
CBA-21A	CBA-21	0.00	0.00	0.05	0.90	0.05	0.05	0.29	0.29	18	0.0100	12.41	0.29	12.41	2.36%
CBA-21	CBA-20	0.00	0.00	0.05	0.90	0.05	1.70	0.29	6.94	18	0.0486	27.37	6.94	27.37	25.35%
CBA-20A	CBA-20	0.00	0.00	0.05	0.90	0.05	0.05	0.29	0.29	18	0.0100	12.41	0.29	12.41	2.36%
CBA-20	CBA-19	2.84	2.04	0.88	0.41	5.76	7.51	15.33	22.56	24	0.0100	26.74	22.56	26.74	84.38%

PIPE RUN		CONTRIBUTING AREAS (ac)				AREAS (ac)		STORM FLOWS (cfs)		PIPE DESIGN INFORMATION			PIPE ANALYSIS		
FROM	TO	WOODED	LAWNS	IMPERVIOUS	WEIGHTED	SUBBASIN	CUMULATIVE	PEAK FLOW	CUMULATIVE	SIZE	SLOPE	MAX Q	CALC. Q	MAX Q	UTILIZED
		AREA	LANDSCAPING	AREA	C VALUE			(SB ONLY)	FLOW	(in)	(ft/ft)	(cfs)	(cfs)	(cfs)	CAP (%)
CBA-19A	CBA-19	0.00	0.01	0.09	0.85	0.10	0.10	0.55	0.55	18	0.0100	12.41	0.55	12.41	4.42%
CBA-19	CBA-18	0.00	0.00	0.09	0.90	0.09	7.70	0.53	23.63	24	0.0100	26.74	23.63	26.74	88.40%
CBA-18	CBA-18A	0.03	0.09	0.05	0.50	0.17	25.39	0.56	70.94	30	0.0300	83.96	70.94	83.96	84.49%
CBA-18A	OUTLET	0.00	0.09	0.05	0.55	0.14	25.53	0.50	71.44	30	0.0300	83.96	71.44	83.96	85.09%
		13.24	7.35	4.94											
CBD-3A	CBD-3	0.00	0.30	0.12	0.51	0.42	0.42	1.38	1.38	18	0.0100	12.41	1.38	12.41	11.15%
CBD-3	CBD-2	0.00	0.01	0.07	0.83	0.08	0.50	0.43	1.82	18	0.0995	39.16	1.82	39.16	4.64%
CBD-2A	CBD-2	0.00	0.32	0.22	0.57	0.54	0.54	2.02	2.02	18	0.0100	12.41	2.02	12.41	16.23%
CBD-2	CBD-1	0.00	0.04	0.04	0.63	0.08	0.62	0.33	2.34	18	0.0846	36.11	2.34	36.11	6.48%
CBD-1A	CBD-1	0.01	0.27	0.20	0.58	0.48	0.48	1.80	1.80	18	0.0100	12.41	1.80	12.41	14.53%
CBD-1	OUTLET	0.01	0.17	0.11	0.56	0.29	0.77	1.05	2.85	18	0.0100	12.41	2.85	12.41	22.99%

Appendix E

Well Testing Application

LEGGETTE, BRASHEARS & GRAHAM, INC.

PROFESSIONAL GROUND-WATER AND ENVIRONMENTAL ENGINEERING SERVICES

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SHELTON, CT 06484
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October 26, 2006
(REVISED April 5, 2007)

Mr. Neil Halloron
Building & Zoning Inspector
Town of Goshen
P.O. Box 217
Goshen, NY 10924

Mr. Joseph Henry
Dufresne-Henry Engineers
600 Stony Brook Court
P. O. Box 3228
Newburgh, NY 12550

RE: Well Testing Application **(Revised)**
Craigville Road Property – Rieger Homes, Inc.
Goshen, New York

Dear Messrs. Halloron & Henry:

Leggette, Brashears & Graham, Inc. (LBG), Professional Ground-Water & Environmental Engineering Services Consultants, has been retained by Rieger Homes, Inc., to conduct multiple 72-hour pumping test events on a high-yielding bedrock well on the above-referenced site. Five existing test production wells have been drilled on the study parcel to date. The wells are shown on Plate 1. This letter is an application for a proposed pumping test of the above-referenced wells, in accordance with the Town's ordinance (Article II - Well Testing, Section 96-9 - Application; notification; liability: Adopted 6-12-1997 by L.L. No.5-1997). The pump test plan has incorporated the Town of Goshen Protocols for Well Installation, Testing and Reporting, as applicable to bedrock wells.

In addition, the pumping test procedure in the Town Protocol guidelines significantly deviates from the New York State Department of Environmental Conservation's (NYSDEC) "Recommended Pump Test Procedures for Water Supply Application", January 2002. The plan submitted conforms with a majority of the Town's Protocol guidelines, and conforms with previous plans submitted and approved by the Town and the Town's review consultants.

Estimated Water Demand

A preliminary water demand for the proposed 130-single family residential homes at full build-out is estimated to be about 52,000 gpd or about 36 gpm. The water demand estimate is summarized on table 1.

The New York State Department of Health (NYSDOH) requires that the water supply for the development shall equal or exceed the design maximum daily demand (twice the average water demand estimate), therefore, the water supply must have the capacity to produce a minimum of about 72.5 gpm. The NYSDOH will require proof of this supply with the best well out of service.

AQUIFER TEST PLAN PROPOSAL OUTLINE

1.0 SITE DATA

1.1 Location of existing wells

Existing onsite Wells 1, 2, 3, 4 and 5 are shown on Plate 1. No additional onsite wells are proposed or required.

1.2 Location of Pertinent Features

The 360-area study parcel is located in the Town of Goshen as shown on Plate 1. The parcel is undeveloped with adjacent property developed for residential and agricultural use. The site is characterize by gently rolling low hillsides and is bisected by an intermittent streams and wetland features on the mid-section and northern half of the study parcel.

2.0 HYDROGEOLOGIC DATA

2.1 Aquifer Parameters

Estimates of transmissivity, storage and hydraulic conductivity from a bedrock well on the formerly Fullam property are reported as follows (Schoor Depalma, January 2003);

transmissivity: 96.41 ft 2/day
hydraulic conductivity: 0.23 ft/day
storativity: 6×10^{-6}

Site-specific aquifer parameters will be calculated from proposed pumping test to be conducted.

2.2 Hydrogeologic Settling

The following summarize the key hydrogeologic features for the study parcel.

2.2.1 Surficial Soils

No significant sand and gravel aquifer(s) are mapped within the immediate area of the study parcel.

The overburden material reported during onsite drilling generally consisted of silty, claying material interbedded with sand and gravel material, consist with till material. Till is not suitable for the development of high-yielding wells.

2.2.2 Bedrock Aquifer

The study parcel and region in underlain by sedimenting bedrock and a significant amount of data is available on the aquifer known as the Martinsburg Formation.

2.2.3 Martinsburg Formation (On)

The name of the dark-gray shale unit underlying the central region of Orange County was reported to be the Normanskill Formation by Offield (1967). Re-evaluation of the characteristics of the unit by Jaffe (1973) identified the prevalent shale unit Orange County as the Martinsburg Formation (**On**) (Landing, 1994). According to the later interpretation, the Martinsburg Formation consists of the following (Jaffe, 1973):

- Penn Argyl Member – shale (Offield's Snake Hill Member)
- Ramseyburg Member – greywacke and sandstone (Offield's Austin Glen Member)
- Bushkill Member - shale and siltstone – (Offield's Mt. Merino Member)

The Penn Argyl Member, consists of dark gray to grayish-black calcareous shale. The Ramseyburg Member comprises greywacke and sandstone. The Bushkill Member consists of dark gray calcareous shale and siltstone. These **On** bedrock units occur in the central region of Orange County. There is a significant amount of data presently inventoried on the yield potential of the bedrock aquifer.

The fractures exhibited in the fine-grained bedrock units are few and mostly closed fractures. These units are resistant to weathering. The unit likely exhibits low permeability based on the porosity of the bedrock unit, and secondary permeability caused by the presence of interconnected fractures can be low to moderate. Water is contained in fractures, joints, bedding planes, contacts and other secondary openings in the bedrock units. Five wells drilled on the study parcel property yielded 3 to 100 gpm, respectively, in the bedrock unit. Three successful wells drilled for the Orange County Correctional Facility yielded 50 to 130 gpm and are completed in the **On** bedrock unit in the study region. Three successful wells for the Lone Oak Estates Project in the Town yielded between 15 and 65 gpm. Several other high-yielding wells (50 to 200 gpm) are completed in the **On** bedrock unit in the study region. The yield of the onsite wells reported at completion of drilling is noted above.

Wells drilled at favorable well sites would likely yield between 25 and 100 gpm. The average and median yields of 56 gpm and 30 gpm, respectively, with yields ranging from 3 to 225 gpm for this unit. Higher yields would likely result from moderately to highly fractured units with a relatively high degree of interconnection (GWRS, LBG 1995).

2.3 Local Recharge/Discharge Estimates

A ground-water balance compares the available recharge to a property with the estimated water-supply demand of a proposed development. This comparison determines if the property is self-sufficient in providing the water that will be required by the proposed development, or whether the proposed water demand exceeds the available recharge. If the projected demand exceeds the estimated available recharge, periodically ground-water recharge would have to be drawn from beyond the property boundaries. For sites with tight water balances, water availability within the watershed becomes important to determine if the proposed demand would oversubscribe the available resource. If onsite recharge meets or exceeds the proposed demand, the water supply should be reliable and not adversely affect the aquifer in offsite areas. Although water-budget analyses are useful in estimating available ground water resources, drilling and testing supply wells is the only definitive indicator of ground water availability from the aquifer source and any potential impacts to neighboring water supplies.

Recharge is generally related to precipitation, but the amount of rainfall, which becomes ground-water recharge is difficult to measure directly. In Orange County, the average precipitation is about 43 inches per year (LBG, 2003). About half this amount is lost to evaporation and transpiration processes; the remainder is available to become surface-water and ground-water runoff. Ground-water recharge results from the portion of total rainfall and snowmelt that infiltrates the soil and overburden materials. The sand and gravel aquifers are recharged from precipitation which falls directly on the surface of the aquifer, from ground-water flow from surrounding hills and mountains and, most importantly, from significant streams or overlying surface-water bodies. A portion of the total runoff that infiltrates into the soil and overburden materials (including sand and gravel aquifers) eventually recharges the bedrock fracture system and is available for capture by bedrock wells.

LBG has conducted extensive reviews of several published studies to develop estimates of ground-water recharge to aquifers in Orange County for the Orange County Water Authority (LBG 1995, LBG 2003).

The most appropriate study to apply to the subject area is the 1980 report developed for the Fishkill-Beacon area (Snavely, 1980) which indicates that recharge to the till-covered metasedimentary bedrock is approximately 400,000 gpd/sq. mi. or about 8 inches annually. This recharge to bedrock represents approximately 19 percent of the average annual local precipitation. Recharge directly to the 360-acre study parcels would indicate recharge to the bedrock aquifer to be about 225,000 gpd. The average one-year-in-30 drought record for Orange County indicates average precipitation of 29.5 inches (LBG, 2003). The average drought precipitation is approximately 69 percent of the average annual precipitation in Orange County which indicates recharge would be reduced to about 155,250 gpd for the study parcels. The recharge estimates are significantly greater than the estimated water demands (52,000 gpd) for the proposed residential developments under normal and drought conditions. As discussed above, although the water-budget analyses are useful in estimating available ground-water resources, drilling and testing supply wells is the only definitive indicator of ground-water availability from the aquifer source and any potential impacts to neighboring water supplies.

Local discharge estimates from the study parcel from an unnamed tributary, wetland features and underflow from the site would be difficult to estimate.

2.4 Ground Water Withdrawals Within 2,500 feet of a Well

An inventory of public ground water supply wells within 2,500 feet from onsite Wells 1, 2 and 5 finds no sources; with the exception of a low density of individual homeowner wells.

3.0 WELL DATA

3.1 Permits

Well permits for Wells 1, 2, 3, 4 and 5 were issued by the NYSDEC #07055, 07027, 07803, 07804, and 07808.

4.0 TEST DESCRIPTION

4.1 Step – Drawdown Pumping Test

Considering Wells 1 and 2 will be pumped (50+ gpm) each during simultaneous pumping conditions; the combined yield will be greater than 2 times the average water demand (30 gpm) of the project and at rates reflective of the driller's preliminary yield estimate, no step-drawdown pumping tests are proposed on Wells 1 and 2. Well 5 will be pumped at about 80+ gpm and no step-drawdown pumping test will be conducted. The proposed yield will demonstrate surplus water from the proposed sources, if available.

In response to the comments received from the Town of Goshen Town Engineer, step-testing will be completed on Wells 1, 2 and 5 prior to the completion of the 72-hour pumping tests. The wells will be pumped at five different rates or steps, 50%, 75%, 100%, 150% and 200% of the estimated yields of the wells. Therefore, Wells 1 and 2 will be pumped at 20 gpm, 30 gpm, 40 gpm, 60 gpm and 80 gpm. Well 5 will be pumped at 40 gpm, 60 gpm, 80 gpm, 120 gpm and 160 gpm. At each step, the pumping rate will be held for one hour. If the highest rates can not be achieved, then the lower yield will be maintained and held for one hour.

4.2 Aquifer

The bedrock wells are completed in a **semi-confined** aquifer. The aquifer storativity and transmissivity will be calculated.

4.3 72-Hour Pumping Test Program

The formal testing program as proposed will include a simultaneous 72-hour pumping test of Wells 1 and 2. The goal will be to demonstrate the maximum yield of Wells 1 and 2 during a minimum of a 72-hour pumping test event and demonstrate 6 hours of stabilized yield and drawdown during the last 6 hours as required by the regulatories.

Following completion of the test event on Wells 1 and 2, an individual 72-hour pumping test will be conducted on Well 5 at a maximizing yield to demonstrate Well 5 is the "best well". The test will be conducted for a minimum duration of 72 hours and demonstrate 6 hours of stabilized yield and drawdown during the last 6 hours of the test as required by the regulatories.

The pumping test is scheduled for a date approved by the Town, however, at this time it is tentatively scheduled for November 2006.

Pump horsepower (hp) and estimated volume in gpm of testing:

Well 1 = 10 hp – 40 ± gpm

Well 2 = 10 hp – 40 ± gpm

Well 5 = 20 hp – 80 ± gpm

The flow rate of the pumping wells will be monitored with a flow meter and the flow rate from the meter confirmed/calibrated with a measured bucket and stop watch. A majority of flow meters are off by about ±5% of reported yield, therefore, accuracy of a meter is confirmed with a pre-measured bucket/stop watch.

During the simultaneous 72-hour pumping test on Wells 1 and 2, a well monitoring program will be conducted including onsite Wells 3, 4 and 5; and adjacent domestic wells in the region within 1,500-foot radius from the pumping wells. During the test event on Well 5, Wells 1, 2, 3 and 4 will be included in the onsite well monitoring program. In areas of concern, LBG may include domestic wells at a greater distance from the required 1,500-foot radius to obtain a representative number of wells. All wells within 500 feet of the proposed wells shall be monitored, if permission is granted. The impact to wells located along key fracture trend up to 2,500 feet from the test shall be included in the program, if permission is received from homeowners. The 1,500-foot and 2,500-foot radius from Wells 1, 2 and 5 are shown on Plate 1.

Approximately 10 offsite wells will be monitored during the test, subject to securing permission from the applicable owner. A copy of the permission request letter is attached (Appendix I).

Homeowner solicitation has been completed for the offsite well monitoring program. Eight (8) homeowners have agreed to participate in the program. The homeowner locations are shown on figure 1.

The onsite and offsite wells will be monitored using a dedicated pressure transducer.

Prior to shutdown, LBG will collect water samples for analyses for all constituents listed in the New York State Sanitary Code, Subpart 5-1, as well as for radon gas. In addition, because the proposed wells are located within 200 feet of a surface-water body, they will require micropatriculate analysis to determine if the well is under direct influence of surface water as determined by the Surface Water Treatment Rule.

5.0 IDENTIFICATION OF EXTERNAL INFLUENCES

5.1 Precipitation

Yes.

5.2 Barometric pressure

Yes.

5.3 Tidal influences

No, the site is not located in a coastal setting.

5.4 External pumpages

Minimal, considering the closest offsite public water-supply wells (Stone Hedge) are about 4,800 feet to the west of study parcel. Existing domestic wells are located within the 2,500 feet of proposed pumping wells, however, the low density would be attributed to minimal ground-water withdrawal (non-consumptive).

5.5 Surface Water

Minimal, considering the wells are completed in a **semi-confined** bedrock aquifer. Direct hydraulic connection between the bedrock aquifer and adjacent stream and wetland features is considered low risk under pumping conditions.

LBG will install piezometers in onsite wetlands and streams adjacent to the pumping wells to determine any direct hydraulic interconnection with the surface-water features/saturated overburden material and the bedrock aquifer in accordance with Section 1.6 of the Town's Protocol.

Ground-water withdrawals from the wells from the **semi-confined** bedrock aquifer system are not expected to impact stream flows, therefore, stream flows will not be gauged.

6.0 MONITORING SCHEDULE OF PRE-TEST PERIOD

6.1 Length of Period and Monitoring Frequency and Monitoring of Relevant External Influences

Monitoring of relevant external influences will include precipitation, barometric pressure. external pumpages and surface water/wetland features. External pumpage can only be quantified from the daily operation reports from public supply wells.

Background monitoring period for external influences will begin at about 72 hours prior to the start of the test. All external influences shall be monitored at least 6-hour intervals during a 48-hour background period prior to start of the test, as prescribed by the Town's Protocol (Section 2.0). Limited data will be collected during overnight hours during the pre-test period.

Dataloggers will be used to collected water-level measurements from both onsite and offsite wells, and will be set to record measurements at one minute intervals. Two of the homeowners participating in the well monitoring program have well caps which do not allow access with dataloggers, therefore hand measurements may have to be collected. Modifications to the wells will be attempted, with the homeowners consent, to allow access for the dataloggers. However, if the modifications are not successful, limited hand measurements will be collected during the overnight periods.

7.0 MONITORING SCHEDULE FOR OBSERVATION WELLS

The onsite observation will consist of Wells 1, 2, 3, 4 and 5. No additional onsite wells are proposed. Additional observation wells will include up to 10 offsite wells as discussed under Section 4.3 of this plan. Pre-test water-level data will be collected at a minimum of one-hour interval during a 48-hour pre-test period prior to the start of the test. The water-level readings during the testing period will be collected as prescribed in NYSDEC, Level Two Protocol (Appendix I). Recovery reading will be collected as prescribed under Section 4.0 of the Town Protocol.

8.0 Monitoring Schedule for Pumping Well

8.1 Monitoring Schedule

Pre-test water-level data will be collected from proposed onsite pumping Wells 1, 2 and 3 as prescribed under Section 2.0 of the Town Protocol, if required. The monitoring schedule during the testing period will confirm with schedule outlined in NYSDEC, Level Two Protocol (Appendix I). Recovery reading will be collected as prescribed under Section 4.0 of the Town Protocol.

8.2 Water-Level Data Collection

Wells 1, 2 and 5 will be monitored using dedicated pressure transducer with manual reading collected as back-up, during the 72-hour duration testing program.

8.3 Proposed Pumping Rate

The proposed pumping rates are indicated under Section 4.3 of the aquifer test plan proposed outline.

8.4 Discharging – Measuring Method and Frequency

The pumping rate for the wells will be measured using a flow meter. Manually monitored back-up data will be collected using a pre-measure bucket and stop watch. The discharge flow rate shall be monitored and recorded manually at least every 15 minutes during the first hour of the test and every two hours thereafter.

8.5 Discharge Locations from Pumping Wells

Ground-water discharge from pumping Wells 1, 2 and 5 will be discharged into the stream or wetland at a point close to the discharge point from the site.

Approximate discharge locations are shown on plate 1. Wells 1 and 5 will be discharged to adjacent wetland features, downgradient of the piezometers, which discharge water from the site. Well 2 will discharge to the drainage swale located along Craigville Road. The drainage swale discharges to a wetland feature which will discharge the water offsite.

9.0 MONITORING SCHEDULE OF EXTERNAL INFLUENCES

9.1 Precipitation

As prescribed under Section 1.5 of the Town Protocol.

9.2 Barometric Pressure

Measuring air pressure readings as prescribed under Section 1.4 of the Town Protocol.

9.3 External Pumpage

No significant external pumpage has been inventoried within 2,500 feet of onsite pumping wells.

9.4 Surface Water

Surface water will be monitored as outlined in Section 1.6 of the Town Protocol, with the exception of collecting data every two to four hours during the test.

9.5 Monitoring Techniques

The monitoring techniques are detailed above and will confirm with requirements under the Town Protocol.

10.0 LENGTH OF PERIOD: MONITORING AND FREQUENCY DURING POST TEST PERIOD

The post-test water-level conditions in the external influence will continue for a minimum of eight hours or extended until the water level in the pumping wells has recovered within 90 percent of the drawdown. Post-test ready for external influences will continue at one-hour intervals for the first three hours following shutdown of the last pumping test and at six-hour intervals thereafter until appropriate data are collected. Minimal data will be collected during overnight hours during the post-test period **from wells which do not contain dataloggers (i.e. homeowner wells requiring hand measurements).**

11.0 APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS AND PERMITS

The water supply requires permit numbers for drilling initial test wells which has been completed. Following approval of the project, a water-supply taking permit will be required from the NYSDEC. This permit cannot be applied for until appropriate Town approvals have been received.

11.1 Hydrogeologic Report

Following completion of the pumping test program, a report will be submitted in compliance with the Town Protocol and in accordance with outlines in Appendix III. LBG requires further clarification of section not applicable to bedrock wells.

LBG would like to begin step-testing and homeowner datalogger installation during the week of April 16, 2007, pending receipt of approval of the well test application.

Should you have any questions, please do not hesitate to contact me.

Very truly yours,

LEGGETTE, BRASHEARS & GRAHAM, INC.

Thomas P. Cusack, CPG
Vice President

TPC:kd

cc: Steve Esposito
Steve Rieger
Dave Harwood
Neil Halloran

H:\RIEGERHM\2007\Revised Well testing application 4-5-07.doc

TABLE

TABLE 1

CRAIGVILLE ROAD PROPERTY – RIEGER HOMES, INC.
GOSHEN, NEW YORK

Water Demand Estate

Number of Units Single-Family Dwellings	Number of Bedrooms	GPD per Bedroom	Total Water Demand Estimate
130	4	100	52,000 gpd

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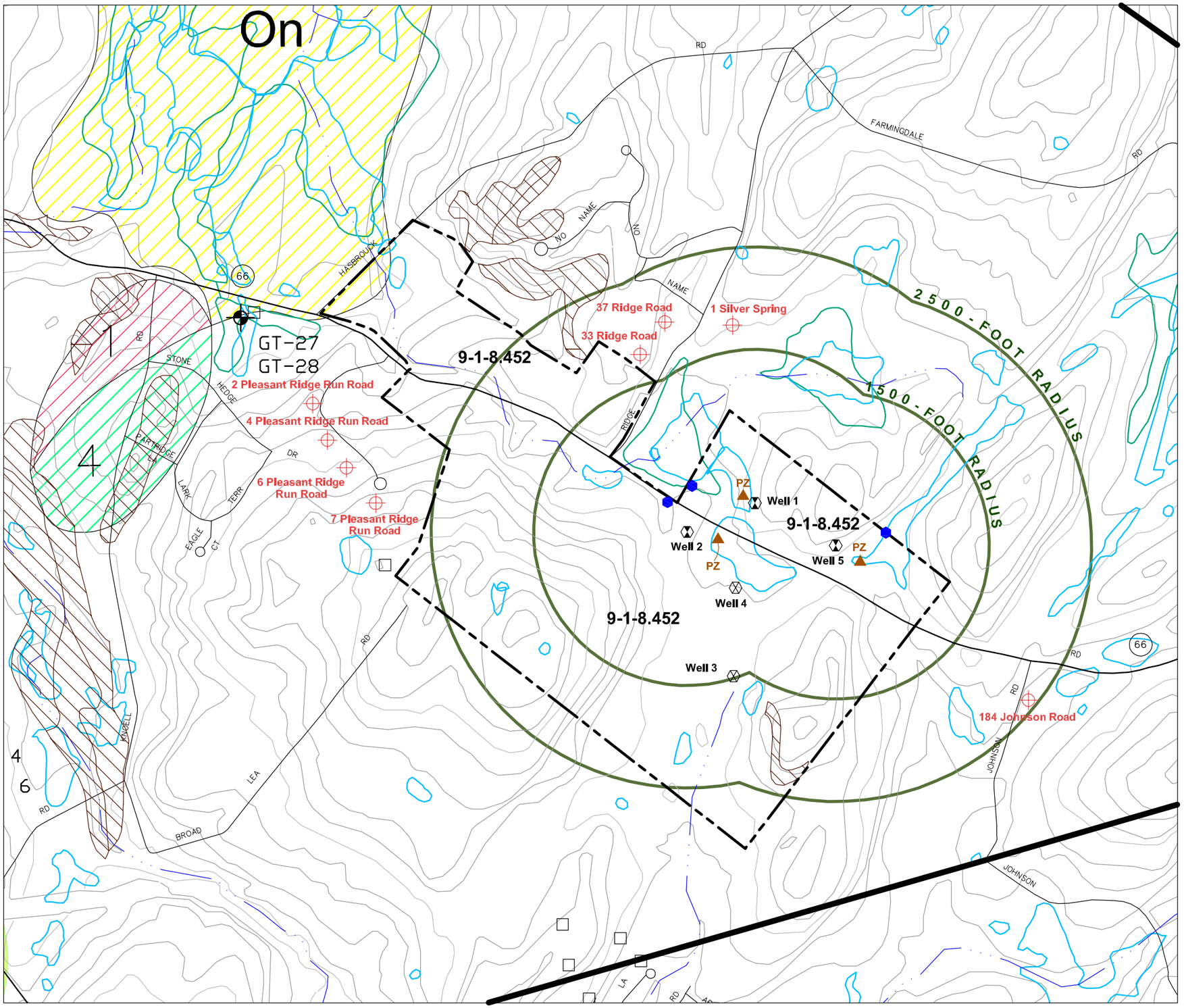
FIGURE



LEGEND

- OFFSITE WELL MONITORING LOCATION
- ONSITE MONITOR WELL LOCATION
- ONSITE PUMPING WELL LOCATION
- APPROXIMATE PIEZOMETER LOCATION
- APPROXIMATE WELL DISCHARGE LOCATION

0 1000
SCALE IN FEET

RIEGER HOMES INC.
CRAIGVILLE ROAD PROPERTY
TOWN OF GOSHEN, NEW YORK

OFFSITE WELL MONITORING LOCATIONS

DATE	REVISED

PREPARED BY: LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Ground-Water and Environmental Engineering Services
4 Research Drive
Suite 301
Shelton, Connecticut 06484
(203) 929-8555

DRAWN:	FCS	CHECKED:	TPC	DATE:	4/6/07	FIGURE:	1

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APPENDIX I

LEGGETTE, BRASHEARS & GRAHAM, INC.

PROFESSIONAL GROUND-WATER AND ENVIRONMENTAL ENGINEERING SERVICES

4 RESEARCH DRIVE SUITE 301
SHELTON, CT 06484
203-929-8555
FAX 203-926-9140
www.lbgweb.com

October 26, 2006

RE: Well Monitoring Program
Rieger Homes, Inc. Subdivision
Goshen, New York

Dear Well Owner:

Leggette, Brashears & Graham, Inc. (LBG), Professional Ground-Water & Environmental Engineering Services Consultants, has been retained by the Town of Goshen to conduct a well monitoring program of wells located in proximity to the proposed Rieger Homes, Inc. Subdivision.

We request your participation in a well monitoring program. If you choose to participate, water levels in residential wells will be monitored for a two to three week period in November/December 2006 to determine the potential for affecting the water level, if any, during the pumping test of the wells located in the subdivision.

Monitoring would consist of daily measurements of depth to water in your well. The measurements would be taken by removing the well cap or opening the access hole in the well cap, depending on the type of well cap, and taking a measurement of the depth to water using a clean electric dropline. An electric dropline, also called an M-scope, is a battery-operated instrument with a probe at the end of a depth-calibrated two-wire cable. Contact with the water in the well by the probe completes a simple electrical circuit, so that the exact position of the water level can be determined. The electrical dropline is dipped in chlorine solution for sterilization prior to each use.

Selected wells will also be monitored using a dedicated pressure transducer. The pressure transducer, or Troll as it is called, can be setup to record water-level measurements automatically at a programmed interval. The data is stored on the device and retrieved later using a laptop computer. The transducer allows for accurate water measurements to be taken at a greater frequency than the hand measurements would. This in turn produces a better water-level

record, which highlights regional trends, daily water usage and any potential impact or interference from nearby wells.

The measurement procedure does not interfere with the normal use of your well water. A sufficient number of measurements would be taken so that effects due to operating cycles of your own pump could be distinguished from any drawdown caused by the pumping of the study wells, if any. At the conclusion of the test, LBG would provide you with a simple graph of the water-level measurements from your well, with a letter of explanation.

Such monitoring programs have been carried out successfully and without incident in yours and other nearby communities. Both the developer and LBG are adequately insured in the event of any unforeseen difficulty.

We request that each participating well owner endorse the permission form below on a duplicate of this letter. Please return the permission request from within seven days of receipt of this letter. If possible fax the signed permission form to LBG at (203) 926-9140. Authorization must be received by November 15, 2006 if you are to participate in this study.

If you have any questions, please contact me at (203) 929-8555. Please retain the extra copy of this letter for your records.

Very truly yours,

LEGGETTE, BRASHEARS & GRAHAM, INC.

Stacy Stieber
Hydrogeologist II

SS:etn
H:\RIEGERHM\2006\Homeowner solicitation letter.doc

This will authorize representatives of Leggette, Brashears & Graham, Inc., acting on behalf of the Town of Goshen to enter upon my property for the sole purpose of making water-level measurements in my water-supply well. I understand that I will receive copies of the data collected, as described above.

Signed: _____

Printed Name: _____

Address of Premises: _____

_____

Telephone: _____

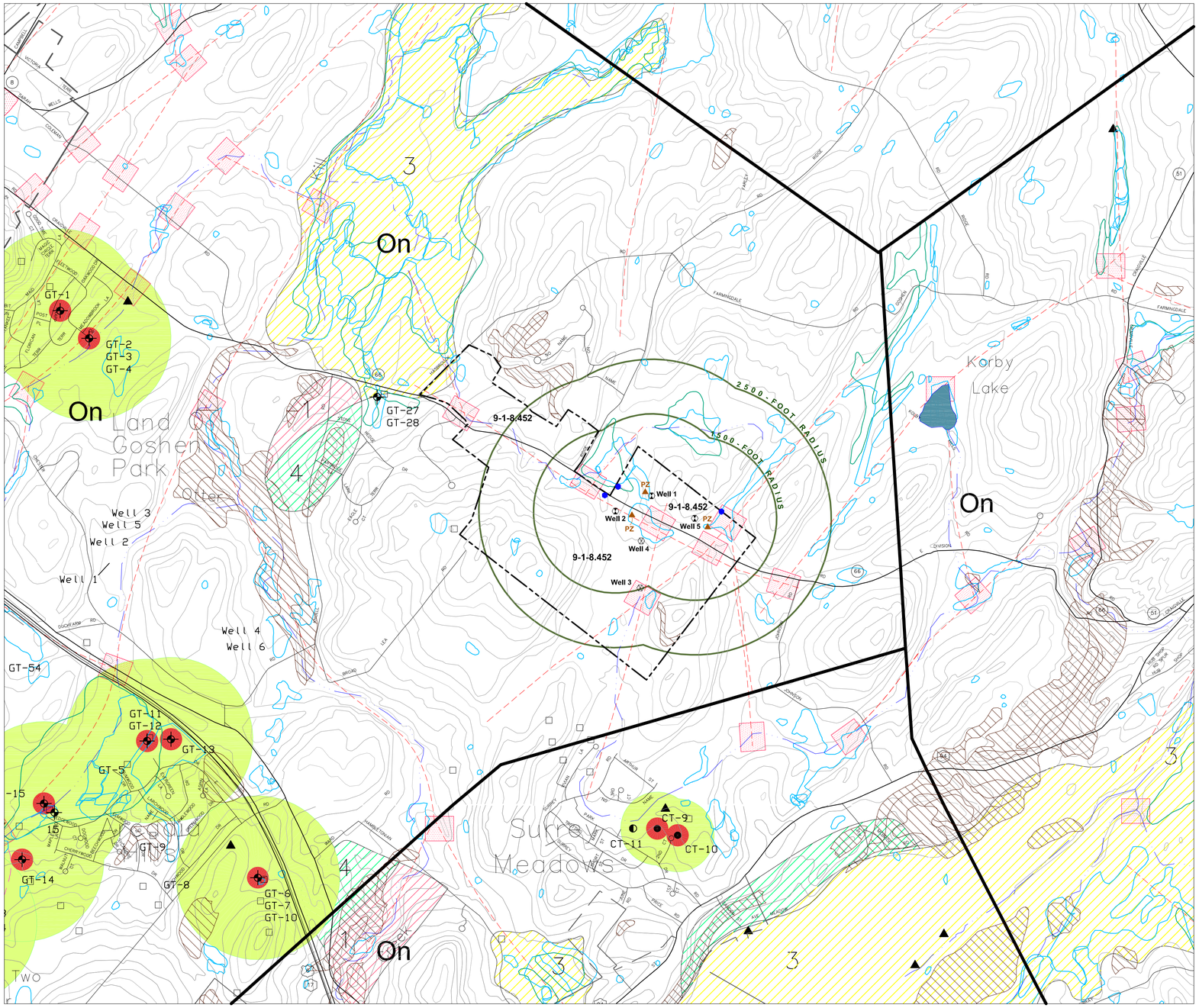
Date: _____

Mailing address if different:

_____

_____

Well Information (if available):
Well depth _____ feet.
Depth of pump _____ feet.



LEGEND

- STRATIFIED SAND AND GRAVEL AT LAND SURFACE, VERTICAL THICKNESS UNKNOWN
- BG-8 — MUNICIPAL/COMMUNITY BEDROCK SUPPLY WELL – IN SERVICE
- BG-10 — MUNICIPAL/COMMUNITY BEDROCK SUPPLY WELL – NOT IN SERVICE
- 1 — MUNICIPAL/COMMUNITY SAND AND GRAVEL SUPPLY WELL – IN SERVICE
- 16 — MUNICIPAL/COMMUNITY SAND AND GRAVEL SUPPLY WELL – NOT IN SERVICE
- EXISTING GROUND–WATER CONTAMINATION SITE *
- POTENTIAL GROUND–WATER CONTAMINATION SITE *
- ONSITE MONITOR WELL LOCATION
- ONSITE PUMPING WELL LOCATION
- APPROXIMATE PIEZOMETER LOCATION
- APPROXIMATE WELL DISCHARGE LOCATION
- FAVORABLE LOCATION FOR TARGETING HIGH YIELDING BEDROCK WELL
- FAULT
- GEOLOGIC CONTACT
- FRACTURE TRACE
- UNCONFORMITY
- WETLAND NYSDEC (STATE)
- WETLAND FEDERAL

* LOCATIONS APPROXIMATE, FIELD VERIFICATION REQUIRED.

BEDROCK GEOLOGY

On — MARTINSBURG FORMATION – SHALE, SILTSTONE, SANDSTONE AND GRAYWACKE

UNCONSOLIDATED DEPOSITS

- 1 — STRATIFIED SAND AND GRAVEL AT LAND SURFACE AND BELOW THE WATER TABLE
- 2 — STRATIFIED SAND AND GRAVEL BELOW CLAY OR SILT AND THE WATER TABLE
- 3 — STRATIFIED CLAY AND SILT WITH NO OR THIN LAYERS OF SAND AND GRAVEL AT LAND SURFACE AND BELOW THE WATER TABLE
- 4 — STRATIFIED SAND AND GRAVEL AT LAND SURFACE AND ABOVE THE WATER TABLE
- REGION WITH PERTINENT HYDROGEOLOGIC DATA TO POSSIBLY DEVELOP HIGH–YEILDING WELL FIELDS

NOTE:

IT SHOULD BE UNDERSTOOD THAT NOT ALL OF THE MAPPED SAND AND GRAVEL DEPOSITS WOULD BE SUITABLE FOR GROUND–WATER SUPPLY DEVELOPMENT.

THE FRACTURE–TRACE MAPS OF THE COUNTY DESIGNATE FAVORABLE LOCATIONS FOR THE DEVELOPMENT OF HIGH–YIELDING BEDROCK WELLS. EXPLORATION FOR WATER FROM BEDROCK SOURCES IS AN INEXACT SCIENCE IN WHICH NOT ALL TEST WELLS CAN BE EXPECTED TO PRODUCE ENOUGH WATER FOR PUBLIC USE IN ADDITION NOT ALL FRACTURES OR FRACTURE TRACES ARE WATER BEARING.

0 — 1000
SCALE IN FEET

RIEGER HOMES INC.
CRAIGVILLE ROAD PROPERTY
TOWN OF GOSHEN, NEW YORK

SITE MAP

DATE	REVISED

PREPARED BY:

LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Ground-Water and Environmental Engineering Services
4 Research Drive
Suite 301
Shelton, Connecticut 06484
(203) 929-8555

DRAWN:	FCS	CHECKED:	TPC	DATE:	4/06/07	PLATE:	1

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Appendix F

Pump Test Program

LEGGETTE, BRASHEARS & GRAHAM, INC.

PROFESSIONAL GROUND-WATER AND
ENVIRONMENTAL ENGINEERING SERVICES

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4 RESEARCH DRIVE, SUITE 301
SHELTON, CT 06484
(203) 929-8555
FAX (203) 926-9140
www.lbgweb.com

September 14, 2007
(Revised October 2007)
(Revised May 2008)

Mr. Steven Rieger
Rieger Homes, Inc.
6 Old North Plank Road
Newburgh, NY 12550

RE: Pumping Test Program, Wells 1, 2 and 5
Rieger Homes, Inc.
Craigville Road
Goshen, New York

Dear Mr. Rieger:

Leggette, Brashears & Graham, Inc. (LBG), Professional Ground-Water and Environmental Engineering Services Consultants, has been retained by Rieger Homes, Inc. to conduct multiple 72-hour pumping test events on high-yielding bedrock wells which have been drilled on the Rieger Homes study parcel. Five test well locations have been drilled on the parcel to date. Based upon the driller's yield estimates for the wells, Wells 1, 2 and 5 were determined to have sufficient yields to meet the water demands of the proposed subdivision.

The pumping test program for Wells 1, 2 and 5 incorporates both the Town of Goshen Pumping Test Protocols and the New York State Department of Environmental Conservation (NYSDEC) "Recommended Pump Test Procedures for Water Supply Application", January 2002. The proposed pumping test program was outlined in a Well Testing Application (LBG dated October 26, 2006) submitted to the Town for approval. The Town's consultant, Stantec Engineering, reviewed the application and responded to LBG with a comment letter dated March 5, 2007. A revised Well Testing Application (LBG dated April 5, 2007) addressing the Town's comments was resubmitted. Verbal permission to proceed with the pumping tests was received on April 12, 2007.

ESTIMATED WATER DEMAND

The preliminary average water demand estimate for the proposed 127 single-family, 4-bedroom residential homes at full build-out is 50,800 gpd (gallons per day) or about 35.3 gpm (gallons per minute). This equates to 400 gpd per residence.

The New York State Department of Health (NYSDOH) requires that the water supply for a development shall equal or exceed the design maximum daily demand (twice the average water demand estimate). Therefore, the water supply for the Rieger Homes project must have the capacity to produce a minimum of 101,600 gpd or about 70.6 gpm. The NYSDOH requires proof of this supply with the best well out of service.

HYDROGEOLOGIC SETTING

Surficial Soils

No significant sand and gravel aquifer(s) are mapped within the immediate area of the study parcel.

The overburden material reported during onsite drilling generally consisted of silty, clayey material interbedded with sand and gravel material, consistent with glacial till deposits. Till is not suitable for the development of high-yielding wells.

Bedrock Aquifer

The study parcel and region in underlain by sedimentary bedrock and a significant amount of data are available on the aquifer known as the Martinsburg Formation (Plate 1).

Martinsburg Formation (On)

The name of the dark-gray shale unit underlying the central region of Orange County was reported to be the Normanskill Formation by Offield (1967). Re-evaluation of the characteristics of the unit by Jaffe (1973) identified the prevalent shale unit in Orange County as the Martinsburg Formation (**On**) (Landing, 1994). According to the later interpretation, the Martinsburg Formation consists of the following (Jaffe, 1973):

- Penn Argyl Member – shale (Offield's Snake Hill Member)
- Ramseyburg Member – greywacke and sandstone (Offield's Austin Glen Member)
- Bushkill Member – shale and siltstone – (Offield's Mt. Merino Member)

The Penn Argyl Member consists of dark gray to grayish-black calcareous shale. The Ramseyburg Member comprises greywacke and sandstone. The Bushkill Member consists of

dark gray calcareous shale and siltstone. These **On** bedrock units occur in the central region of Orange County. There is a significant amount of data presently inventoried on the yield potential of this bedrock aquifer.

The fractures exhibited in the fine-grained bedrock units are few and mostly closed fractures. These units are resistant to weathering. The units likely exhibits low permeability based on the porosity of the bedrock, and secondary permeability caused by the presence of interconnected fractures can be low to moderate. Water is contained in fractures, joints, bedding planes, contacts and other secondary openings in the bedrock units. The five bedrock wells drilled on the study parcel have estimated yields ranging from 3 to 100(+) gpm. Four successful wells drilled on the Heritage at Goshen Property yielded 50 to 110 gpm and are also completed in the **On** bedrock unit in the study region. Two successful wells for the Maplewood Project yielded between 200 and 300 gpm. Several other high-yielding wells (50 to 200 gpm) have also been completed in the **On** bedrock unit in the study area.

Local Recharge/Discharge Estimates

A ground-water balance compares the available recharge to a property with the estimated water-supply demand of a proposed development. This comparison determines if the property is self-sufficient in providing the water that will be required by the proposed development, or whether the proposed water demand exceeds the available recharge. If the projected demand exceeds the estimated available recharge, periodically ground-water recharge would have to be drawn from beyond the property boundaries. For sites with tight water balances, water availability within the watershed becomes important to determine if the proposed demand would oversubscribe the available resource. If onsite recharge meets or exceeds the proposed demand, the water supply should be reliable and not adversely affect the aquifer in offsite areas. Although water-budget analyses are useful in estimating available ground water resources, drilling and testing supply wells is the only definitive indicator of ground-water availability from the aquifer source and any potential impacts to neighboring water supplies.

Recharge is generally related to precipitation, but the amount of rainfall, which becomes ground-water recharge is difficult to measure directly. In Orange County, the average precipitation is about 43 inches per year (LBG, 2003). About half this amount is lost to evaporation and transpiration processes; the remainder is available to become surface-water and ground-water runoff. Ground-water recharge results from the portion of total rainfall and

snowmelt that infiltrates the soil and overburden materials. A portion of the total runoff that infiltrates into the soil and overburden materials eventually recharges the bedrock fracture system and is available for capture by bedrock wells.

LBG has conducted extensive reviews of several published studies to develop estimates of ground-water recharge to aquifers in Orange County for the Orange County Water Authority (LBG 1995, LBG 2003).

The most appropriate study to apply to the subject area is the 1980 report developed for the Fishkill-Beacon area (Snavely, 1980) which indicates that recharge to the till-covered metasedimentary bedrock is approximately 400,000 gpd/sq. mi. or about 8 inches annually. This recharge to bedrock represents approximately 19 percent of the average annual local precipitation. Recharge directly to the 360-acre study parcel would indicate recharge to the bedrock aquifer to be about 225,000 gpd. The average one-year-in-30 drought record for Orange County indicates average precipitation of 29.5 inches (LBG, 2003). The average drought precipitation is approximately 69 percent of the average annual precipitation in Orange County which indicates recharge would be reduced to about 155,250 gpd for the study parcel. The recharge estimates are significantly greater than the estimated water demand (50,800 gpd) for the proposed residential development under normal and drought conditions. As discussed above, although the water-budget analyses are useful in estimating available ground-water resources, drilling and testing supply wells is the only definitive indicator of ground-water availability from the aquifer source and any potential impacts to neighboring water supplies.

Ground Water Withdrawals Within 2,500 feet of a Well

An inventory of public ground water supply wells within 2,500 feet from onsite Wells 1, 2 and 5 finds no sources with the exception of a low density of individual homeowner wells.

Bedrock Test Wells

Five existing bedrock test wells have been drilled to date on the study parcel. Two wells (Wells 1 and 2) were drilled by David H. Tompkins & Sons, Inc. in September 2005. Three additional wells (Wells 3, 4 and 5) were drilled by Northern Drilling, Inc. in September 2006. The locations of the wells are shown on figure 1 and the well completion reports are located in Appendix I. A summary of the well depths and yields are as follows:

Well ID	Depth (feet)	Preliminary Yield (gpm)
Well 1	500	60
Well 2	550	50
Well 3	520	3
Well 4	650	3
Well 5	540	100 (+)

PUMPING TEST PROGRAM

The pumping test program began with the completion of short duration step-drawdown pumping tests of Wells 1, 2 and 5 between May 21, 2007 and May 23, 2007. The formal 72-hour pumping tests of Wells 1, 2 and 5 were conducted between June 4, 2007 and June 14, 2007. Equipment, piezometer and well pump installation and automated weather station set-up for the 72-hour pumping tests was initiated on May 30, 2007. All equipment was removed on June 18, 2007.

Step-Drawdown Pumping Tests

The short duration step-drawdown tests were conducted prior to the completion of the 72-hour pumping tests. Data collected from the step tests to determine aquifer parameters, well log coefficient and well efficiency, which is the main reason to conduct such a test, is not technically appropriate for bedrock wells. This type of test is more typical and appropriate for sand and gravel wells. However, the step-drawdown tests were completed as required by the Town of Goshen Pumping Test Protocol.

Ground-water flow in bedrock aquifers is strongly influenced by fractures in the rock formation. Consequently, the conventional well-flow equations, developed for isotropic homogeneous aquifers of infinite aerial extent, do not adequately describe the flow in fractured rock, except in the rare instance where fracture density is great enough that the system acts as a porous-media aquifer. This exception is not the case in the Goshen area.

Another complicating factor when attempting to use aquifer parameters to estimate the long-term yield of the bedrock wells is that the extent of the fracture pattern is typically unknown. This may lead to instances in which attempts are made to calculate regional aquifer parameters (so that the long-term yield and well interference effect can be estimated) from a network of monitor wells tapping fractures that are not interconnected. If the aquifer parameters

calculated for the above described monitor well network were used to estimate long-term well yield, the results would be grossly inaccurate. Added to this complexity is the fact that the theory of fluid flow in fractured bedrock is not as established as that in porous media. Because of this, contradictory results sometimes occur when analyzing drawdown data, even if the fracture pattern is reasonably understood (Kruseman and Ridder, "Analysis and Evaluation of Pumping Test Data", International Institute for Land Reclamation and Improvement, The Netherlands, 1990). Therefore, the resulting regional aquifer parameters would once again produce inaccurate estimates of long-term yield.

Another factor which causes complications in proper completion of step-drawdown tests is the diameter of the well borehole. Typically, bedrock wells are drilled with a 6-inch diameter borehole which limits the size (diameter/horsepower) of the pump which can be installed in the well. The highest rated pump which can fit inside a 6-inch diameter well will, at best under ideal circumstances, pump a maximum of 90 gpm. Therefore, attaining the 150% or 200% steps with wells yielding greater than 50 gpm becomes impossible and in wells with higher yields, 100(+) gpm, even the lower steps cannot be attained. This mechanical limitation precludes the collection of data necessary for the completion of aquifer parameter calculations.

Well 1

The step-drawdown test on Well 1 was completed on May 21, 2007. Pumping of the well was started at 1055 hours. After several adjustments, a pumping rate of 20 gpm was achieved at 1107 hours and held for one hour. At 1207 hours, the pumping rate in the well was increased to 30 gpm and held for one hour. At 1308 hours, the pumping rate was increased 40 gpm and held for one hour. At 1408 hours, the pumping rate was increased to 60 gpm and held for one hour. At 1508 hours, the pumping rate was increased to 80 gpm and held for one hour. At this point, the maximum yield capacity of the pump in Well 1 had been reached and no further increases in yield could be attempted. Well 1 was shut down at 1608 hours on May 21, 2007. A hydrograph showing water-level measurements collected from Well 1 during the step-drawdown test is located in Appendix II.

Well 2

The step-drawdown test on Well 2 was completed on May 23, 2007. Pumping of the well was started at 0936 hours. At 0938-hours, a pumping rate of 20 gpm was achieved and held for

one hour. At 1038 hours, the pumping rate of the well was increased and, after several attempts, a pumping rate of 30 gpm was achieved at 1048 hours were it was held for one hour. At 1150 hours, the pumping rate was increased to 40 gpm and held for one hour. At 1250 hours, the pumping rate was increased to 60 gpm and held for one hour. At 1350 hours, the pumping rate of the well was increased to 68 gpm (the maximum rate the pump could produce with lose of head in the well and increase in friction in the discharge piping) and held for one hour. A hydrograph showing water-level measurements collected from Well 2 during the step-drawdown test is located in Appendix II.

Well 5

The step-drawdown test on Well 5 was completed on May 22, 2007. Pumping of the well was started at 0931 hours. At approximately 0933 hours, a gasket seal on the discharge pipe ruptured due to the back pressure on the well. The well pump was temporarily shut down while the discharge line was repaired. Well 5 was restarted at 0938 hours. At 0940 hours, a pumping rate of 40 gpm was achieved and held for one hour. At 1040 hours, the pumping rate of the well was increased to 60 gpm and held for one hour. At 1140 hours, the pumping rate was increased to 80 gpm. Over the next 60 minutes, attempts were made to maintain the 80 gpm pumping rate until, at approximately 1240 hours, the maximum capacity of the pump was reached. Due to the increased friction in the discharge piping and the lose of head in the well because of the rapidly declining water level, the pumping rate had decreased to 67 gpm by 1300 hours. At 1300 hours, the water level in the well had dropped to the maximum measurable depth, at which time the rate was manually decreased to 64 gpm were it was held for one hour. Well 5 was shutdown at 1402 hours. A hydrograph showing water-level measurements collected from Well 5 during the step-drawdown test is located in Appendix II.

72-Hour Pumping Tests

Based on the step draw-down pumping test data, Well 1 was determined to be the most productive well (i.e. the “best” well) contrary to the original driller’s estimated yields. Therefore, because of the NYSDOH’s requirement of proving that the supply can meet twice the average estimated water demand with the best well out of service, Wells 2 and 5 were tested simultaneously during the first 72-hour pumping test event, followed by an individual 72-hour pumping test event on Well 1.

Well 2

The pump in Well 2 was started at 0859 hours on June 4, 2007. Prior to the start of the pumping test the static water-level in Well 2 was overflowing the top of casing. Well 2 was pumped at a rate of 45 gpm for the duration of the pumping test. The pumping rate of the well was measured from a totalizing meter attached to the discharge line and confirmed with a calibrated bucket and stopwatch. The discharge location for Well 2 is shown on figure 1.

The final pumping water-level just prior to the shut down of the test at 1502 hours on June 7, 2007 was 141.38 ft btoc (feet below top of casing), for a drawdown of 141.38 feet at the end of the test. The pumping rate and water-level were stable for the last 32 hours of the testing period. Well 2 was pumped for a total of 78 hours and 3 minutes. Well 2 was 90% recovered within 11 hours of shut down of the pump. The water level in Well 2 had recovered to 93.5% of static by 1200 hours on June 8, 2007, 21 hours after shutdown of the test, at which point the pump was removed from the well for utilization in Well 1 for the next pumping test. A table summarizing water-level measurements and a hydrograph for Well 2 is located in Appendix III.

Well 5

The pump in Well 5 was started at 1459 hours on June 4, 2007, 6 hours after the start of Well 2. The static water-level in Well 5 prior to the start of the pumping test was 29.29 ft btoc. Well 5 was pumped at a rate of 40 gpm for the duration of the test. The pumping rate of the well was measured from a totalizing meter attached to the discharge line and confirmed with a calibrated bucket and stopwatch. The discharge location for Well 5 is shown on figure 1.

The final pumping water level just prior to the shut down of the test at 1500 hours on June 7, 2007 was 123.57 ft btoc (feet below top of casing), for a drawdown of 94.28 feet at the end of the test. The pumping rate and water-level were stable for the last 31 hours of the testing period. Well 5 was pumped for a total of 72 hours and 1 minute. Well 5 was 90% recovered within 26 hours of shut down of the pump and 97% recovered after 72 hours. A table summarizing water-level measurements and a hydrograph for Well 5 is located in Appendix III.

Well 1

Following the completion of the simultaneous 72-hour pumping test event on Wells 2 and 5, the 72-hour pumping test on Well 1 was completed June 11, 2007 through June 14, 2007. The pump in Well 1 was started at 0959-hours on June 11, 2007. The static water-level in Well 1

prior to the start of the pumping test was 16.21 ft btoc. Well 1 was pumped at a rate of 78 gpm for the duration of the test. The pumping rate of the well was measured from a totalizing meter attached to the discharge line and confirmed with a calibrated bucket and stopwatch. The discharge location for Well 1 is shown on figure 1.

The final pumping water-level just prior to the shut down of the test at 1000 hours on June 14, 2007 was 174.76 ft btoc (feet below top of casing), for a drawdown of 158.55 feet at the end of the test. The pumping rate and water-level were stable for the last 37 hours of the testing period. Well 1 was pumped for a total of 72 hours and 1 minute. Well 1 was 90% recovered within 8 hours of shut down of the pump and 98.7% recovered after 72 hours. A table summarizing water-level measurements and a hydrograph for Well 1 is located in Appendix III.

WELL MONITORING PRORAM

During the 72-hour pumping test events on Wells 1, 2 and 5, a well monitoring program was conducted which included onsite bedrock Wells 1, 2, 3, 4 and 5, two hand dug wells located on the property, identified as DW-1 and DW-2, three onsite piezometers located in wetland areas adjacent to the pumping wells, eight homeowner wells, and a bedrock test well (Well 6) located on the nearby Heritage at Goshen property. The location of the points monitored during the pumping test events are shown on figure 1. Four other dug wells were located on the study parcel prior to the start of the pumping test events; however these additional wells were dry and no water-level measurements could be collected from them during the testing period.

With the exception of one homeowner well, water-level measurements were collected using dedicated pressure transducers. For the homeowner well which was not accessible with a pressure transducer, manual measurements were collected with an electric tape (M-scope).

The purpose of the well monitoring program was to determine if the pumping of Wells 1, 2 and 5 for a minimum of 72 hours at pumping rates exceeding twice the average water demand of the project would significantly affect water-level and/or yields of existing neighboring wells. LBG installed three piezometers into the onsite wetland feature, adjacent to the pumping wells, to determine any hydraulic connection between the bedrock aquifer and the wetlands under pumping conditions.

A portable weather station was also set-up on the study parcel in the vicinity of Well 2 during the pumping test event. Precipitation, barometric pressure and temperature measurements

were collected between May 30, 2007 and June 18, 2007. A graph of the measurements collected by the portable weather station is located in Appendix IV.

Onsite Wells

Onsite bedrock Wells 1, 2, 3, 4 and 5 and overburden dug wells DW-1 and DW-2 were monitored during the pumping test events.

Data from the pumping test on Wells 2 and 5 showed water-level drawdown in the three onsite bedrock wells monitored. Water-level drawdown ranging from approximately 1.0 to 34.9 feet was observed in onsite bedrock Wells 2, 3, 4 and 5 during the pumping test for Well 1. No water-level drawdown attributed to pumping of the test wells was measured in the onsite dug wells monitored. Hydrographs for the wells are located in Appendix V along with a table summarizing the water-level drawdown measured at each well location.

Offsite Wells

Eight offsite homeowner wells and a bedrock test well, Well 6, located on the Heritage at Goshen Property were monitored during the pumping test events. During the pumping test event on Wells 1, 2 and 5, water-level drawdown was observed in three of the offsite residential wells located on Ridge Road, 33 Ridge Road, 37 Ridge Road; and 1 Silver Spring Road, northwest of the pumping wells (figure 1). During the pumping test on Wells 2 and 5, water-level drawdown ranged from approximately 4.0 to 8.0 feet in the residential wells and during the test on Well 1, water-level drawdown ranged from approximately 7.5 to 10.9 feet. A table summarizing observed water-level drawdown and hydrographs showing the water-level measurements collected from the offsite wells are located in Appendix V.

During the pumping test events, Wells 1, 2 and 5 were pumped at rates 2.2 times the average water demand of the proposed development. Water-level interference in offsite wells which will occur from normal (12- to 18-hour daily pumping cycles) and rotational use of the supply wells to meet the actual water demands of the project would be significantly less than what was observed during the recent tests. Even pumping at 2.2 times the average water demand, the normal performance of the neighboring domestic wells was not effected. Therefore, normal operational use of Wells 1, 2 and 5 to meet the projected water demands will not result in significant impact to the offsite wells or impact their water usage.

Piezometers

Piezometers PZ-A, PZ-B and PZ-C are located in the wetland areas adjacent to the pumping wells on the study parcel (figure 1). Water-level measurements collected from the piezometers during the tests show no discernible water-level drawdown causing by the pumping of Wells 1, 2 and 5. Hydrographs for the piezometers are located in Appendix V.

WATER QUALITY

Ground-water samples were collected from Wells 1, 2 and 5 during the last two hours of their respective pumping test events, as outlined in the Town of Goshen Pumping Test Protocol. The samples were analyzed for parameters specified in the NYSDOH Sanitary Code, Part 5, Subpart 5-1. In addition, microparticulate analyses (MPA's) were collected for all of the wells because of their location within 200 feet of a surface-water body.

Part 5, Subpart 5-1

The water-quality results for Well 1 meet all New York State Department of Health Drinking Water Standards with the exception of the presence of odor (hydrogen sulfide) and iron. Laboratory results report an odor value of 50 units for Well 1. The MCL (maximum concentration level) for odor is 3 units. The reported concentration of iron in Well 1 was 1.0 mg/l, the MCL for iron is 0.3 mg/l.

The water-quality results for Wells 2 and 5 meet all NYSDOH Drinking Water Standards with the exception of odor (hydrogen sulfide). Laboratory results reported odor values of 100 units and 50 units, respectively.

Elevated iron and hydrogen sulfide odor are typical of wells in Orange County. Well 1 will require iron treatment system when placed in service. All three wells reported elevated odor which can be effectively treated through chemical oxidation by chlorination, followed by aeration, if additional treatment is required.

Microparticulate Analysis/Physical Parameters

The MPA results for Well 1 reported the presence of non-chlorophyll fluorescent plant debris and unidentified nematode species. The results for Well 5 reported the presence of

chlorophyll fluorescent plant debris and unidentified nematode species. Well 2 was negative for the presence of any organisms or plant debris.

In conjunction with MPA analyses, physical parameter measurements are also considered by the NYSDOH as useful references in the determination of potential GWUDI (Ground Water Under the Direct Influence of Surface Water). The data are most useful when collected over an extended period of time when seasonal changes in the parameters can be evaluated; however, as part of the pumping test program physical parameters including pH, temperature, conductivity and turbidity were collected from the discharge water of Wells 2 and 5 and their adjacent surface-water bodies during the 72-hour pumping test. No surface water was present in the vicinity of Well 1 during the test; therefore no measurements were collected for that well. A table summarizing the measurements collected and graphs comparing the discharge water and surface water are located in Appendix VII.

Temperature and conductivity specifically are considered by the NYSDOH as the best indicator parameters for potential GWUDI. Temperature variation in Well 2 and the adjacent surface water body were 1.62^{o}C and 4.13^{o}C, respectively and temperature variation in Well 5 and the adjacent surface water body were 3.44^{o}C and 5.77^{o}C, respectively, over the pumping test period. For both wells, the surface water temperature fluctuations were greater than the ground water.

Conductivity variation in Well 2 and the adjacent surface water body were 0.012 mS/cm and 0.154 mS/cm, respectively, and conductivity variation in Well 5 and the adjacent surface water body were 0.041 mS/cm and 0.130 mS/cm, respectively, over the pumping test period. Again, for both wells, the surface water conductivity fluctuations were greater than the ground water. Also, for conductivity, ground water in the bedrock aquifer not under the influence of surface water should report significantly higher conductivity values than surface water. Both Wells 2 and 5 had significantly higher conductivity values than their adjacent surface water bodies.

Based on the MPA data, the risk for Well 1 of GWUDI is low. Both the non-chlorophyll fluorescent plant debris and nematodes are classified as secondary indicators of GWUDI. The absence of any corresponding primary indicators such as algae, diatoms and rotifers in the sample indicate the risk is low.

For Well 2, the absence of any indicator organisms in the MPA sample and the data from the physical parameter measurements indicate that Well 2 is also at low risk for GWUDI.

The MPA sample results for Well 5 reported chlorophyll fluorescent plant debris and nematodes. The chlorophyll fluorescent plant debris is a primary indicator of GWUDI; however, typically a well designated as GWUDI would report multiple primary indicators (algae, diatoms, etc.) and the presence of the plant debris in the well may have resulted from airborne debris entering the open topped well during the test or during the pump installation. The physical parameter data collected for Well 5 does not indicate GWUDI for this well. Therefore, the potential for GWUDI in Well 5 appears low to moderate. The collection of additional MPA samples from Well 5 is recommended to make a clear determination.

CONCLUSIONS/RECOMMENDATIONS

- The average water demand for the proposed 127-single family residential homes at full build-out is estimated to be 50,800 gpd or about 35.3 gpm. The NYSDOH requires that the water supply for the development shall equal or exceed the design maximum daily demand (twice the average water demand estimate); therefore, the water supply must have the capacity to produce a minimum of 101,600 gpd or about 70.6 gpm, with the best well out of service.

- The data from the pumping test of Wells 2 and 5 indicate the individual yields of the wells as 45 and 40 gpm, respectively, for a combined yield of about 85 gpm (122,400 gpd). Data from the pumping test of Well 1, the best well, indicates the well can be pumped independently at a rate of up to 78 gpm (112,320 gpd).

- Recharge directly to the bedrock aquifer underlying the 360-acre study parcel under normal conditions is about 225,000 gpd and under drought conditions would be reduced to about 155,250 gpd for the study parcel. These recharge estimates under both normal and drought conditions are significantly greater than the estimated water demands (50,800 gpd) for the proposed residential development.

- Water-level drawdown in onsite bedrock wells monitored during the pumping test on Wells 2 and 5 ranged from approximately 5.0 to 35.0 feet and during the test on Well 1 from approximately 1.0 to 34.9 feet. No water-level drawdown attributed to the pumping of the wells was observed in the dug wells or the piezometers during either pumping test.

- Water-level drawdown caused by pumping of the onsite test wells was observed in three of the nine offsite wells monitored. Water-level drawdown measured during the pumping tests on Wells 2 and 5 and Well 1, with the wells pumping more than 2.2 times the average water demand, ranged from 4.0 to 8.0 feet and 7.5 to 10.9 feet, respectively. With normal 12- to 18-hour pumping cycles and rotational use of the wells, water-level drawdown would be significantly less than what was observed during the pumping tests and would not effect water usage or yield in neighboring wells.

- The water quality is generally good in Wells 1, 2 and 5 and meets NYSDOH Drinking Water Standards with the exception of iron in Well 1 and odor (hydrogen sulfide) in all three of the wells. Iron treatment for Well 1 will be necessary once the well is placed in service and the elevated odor can be treated through chemical oxidation by chlorination, followed by aeration, if necessary.

- MPA results for Wells 1, 2 and 5, along with physical parameter data collection indicate low risk for GWUDI in Wells 1 and 2 and low to moderate risk for Well 5. Additional MPA sample collection from Well 5 is recommended to clarify the risk assessment.

- The pumping test data from June 2007 for Wells 1, 2 and 5 demonstrates that an adequate water supply has been developed to serve the proposed project, and that this well supply did not adversely impact neighboring wells or adjacent surface water features during the

tests. The testing conducted to date is deemed satisfactory for SEQRA purposes until the final configuration of the project is determined by Town officials.

Very truly yours,

LEGGETTE, BRASHEARS & GRAHAM, INC.

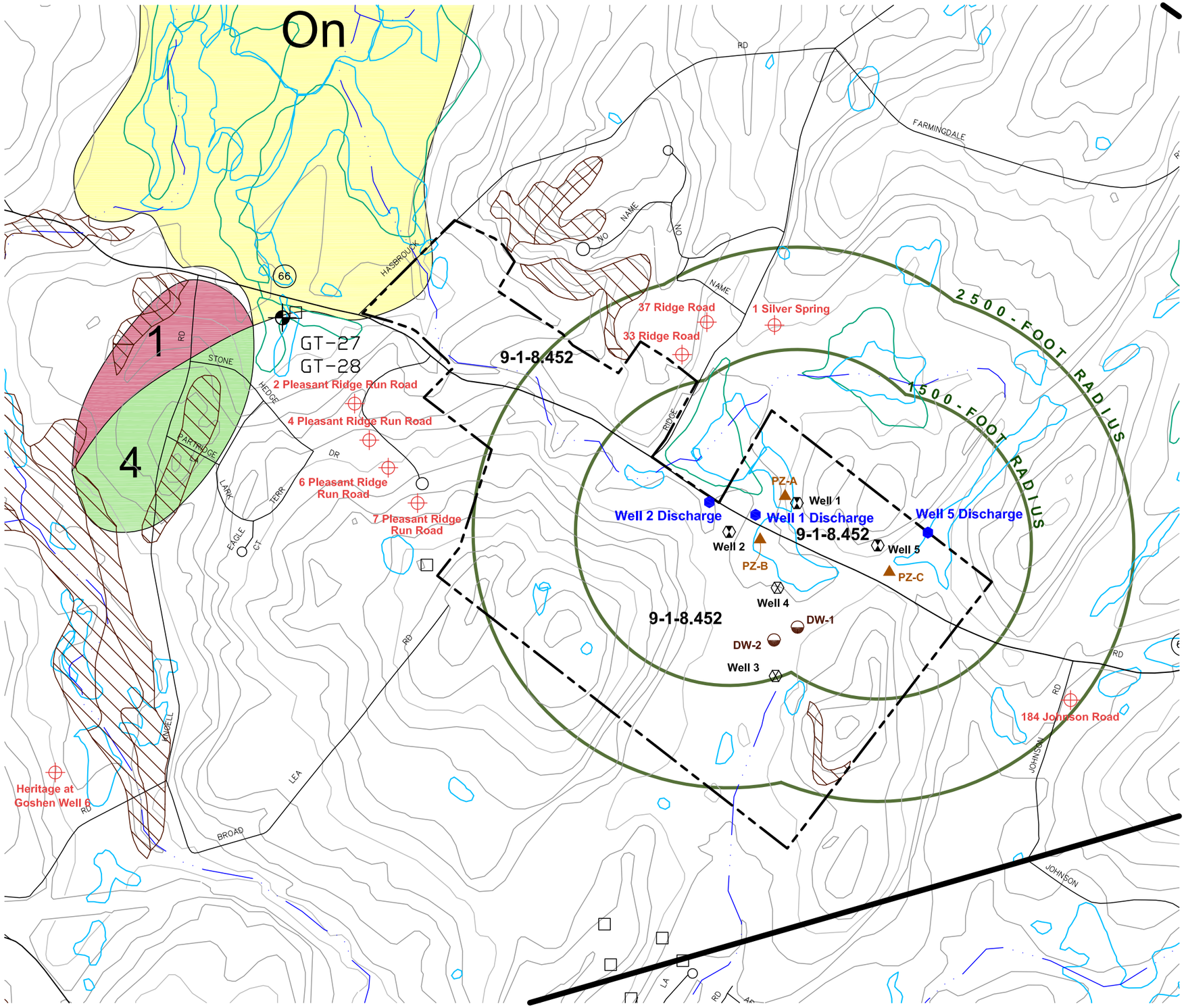
Stacy Stieber
Hydrogeologist II

Reviewed by:

Thomas P. Cusack, CPG
Principal

SS:cmm
Enclosures
cc: S. Esposito
J. Petroccione
H:\RIEGERHM\2008\72-hour Pumping Test Report.doc

FIGURE



LEGEND

- OFFSITE WELL MONITORING LOCATION
- ONSITE MONITOR WELL LOCATION
- ONSITE PUMPING WELL LOCATION
- APPROXIMATE PIEZOMETER LOCATION
- APPROXIMATE WELL DISCHARGE LOCATION
- APPROXIMATE DUG WELL LOCATION

0 1000
SCALE IN FEET

RIEGER HOMES INC.
CRAIGVILLE ROAD PROPERTY
TOWN OF GOSHEN, NEW YORK

SITE MAP AND OFFSITE WELL MONITORING LOCATIONS

DATE	REVISED

PREPARED BY: LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Ground-Water and Environmental Engineering Services
4 Research Drive
Suite 301
Shelton, Connecticut 06484
(203) 929-8555

DRAWN:	MRV	CHECKED:	TPC	DATE:	10/31/07	FIGURE:	1

O:\DWG\ORANGE\RIEGER\2007\Figure-1.dwg, Figure, 5/5/2008 3:43:31 PM, Adobe PDF

APPENDIX I

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

(1) COUNTY

(2) TOWN

(3) DEC Well Number

WATER WELL COMPLETION REPORT

(4) OWNER

(5) ADDRESS

(6) LOCATION OF WELL (See Instructions On Reverse)
Show Lat/Long if available and method used

☐ GPS ☐ Map Interpolation

(7) DEPTH OF WELL BELOW LAND SURFACE (feet)

(8) DEPTH TO GROUNDWATER BELOW LAND SURFACE (feet) DATE MEASURED

CASINGS

(9) DIAMETER in. | in. | in. | in.

(10) LENGTH ft. | ft. | ft. | in.

(11) GROUT TYPE / SEALING

(12) GROUT / SEALING INTERVAL (feet) FROM TO

SCREENS

(13) MAKE & MATERIAL

(14) OPENINGS

(15) DIAMETER in. | in. | in. | in.

(16) LENGTH ft. | ft. | ft. | in.

(17) DEPTH TO TOP OF SCREEN, FROM TOP OF CASING (Feet)

YIELD TEST

(18) DATE

(19) DURATION OF TEST

(20) LIFT METHOD ☐ Pump ☐ Air Lift ☐ Bail

(21) STABILIZED DISCHARGE (GPM) 60

(22) STATIC LEVEL PRIOR TO TEST (feet/inches below top of casing)

(23) MAXIMUM DRAWDOWN (feet/inches below top of casing)

(24) RECOVERY (Time in hours/minutes)

(25) Was the water produced during the test discharged away from immediate area? Yes No

PUMP INSTALLATION

(26) PUMP INSTALLED? YES NO

(27) DATE

(28) PUMP INSTALLED

(29) TYPE

(30) MAKE

(31) MODEL

(32) MAXIMUM CAPACITY (GPM)

(33) PUMP INSTALLATION LEVEL FROM TOP OF CASING (Feet)

(34) METHOD OF DRILLING ☐ Rotary ☐ Cable Tool ☐ Other

(35) USE OF WATER (See instructions for choices)

(36) DATE DRILLING WORK STARTED

(37) DATE DRILLING WORK COMPLETED

(38) DATE REPORT FILED

(39) REGISTERED COMPANY

(40) DEC REGISTRATION NO. NYRD

(41) CERTIFIED DRILLER (Print name)

(42) CERTIFIED DRILLER SIGNATURE

* Show log of geologic materials encountered with depth below ground surface, water bearing beds and water levels in each; casings, screens; pump; additional pumping tests and other matters of interest, e.g., water quality (sulphur, salt, methane). Describe repair work. Attach separate sheet if necessary.

LOG *

Ground Surface EL. ft. above sea level

Top Of Casing is located ft. above (+) or below (-) ground surface

TOP OF WELL

0-71	sand gravel
71-80	silt sand
80-100	silt clay
100-[illegible]	sand gravel

BOTTOM OF HOLE

OWNER COPY

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

(1) COUNTY [illegible]

(2) TOWN [illegible]

(3) DEC Well Number [illegible]

WATER WELL COMPLETION REPORT

(4) OWNER [illegible]

(5) ADDRESS [illegible]

(6) LOCATION OF WELL (See instructions on Reverse) Show Lat/Long if available and method used

☒ GPS ☐ Map Interpolation [illegible]

(7) DEPTH OF WELL BELOW LAND SURFACE (feet) 60

(8) DEPTH TO GROUNDWATER BELOW LAND SURFACE (feet) DATE MEASURED

CASINGS

(9) DIAMETER 6 in. | in. | in. | in.

(10) LENGTH 60 ft | ft. | ft | in

(11) GROUT TYPE / SEALING [illegible]

(12) GROUT / SEALING INTERVAL (feet) FROM 10 TO 20

SCREENS

(13) MAKE & MATERIAL

(14) OPENINGS

(15) DIAMETER in. | in | in | in.

(16) LENGTH ft | ft | ft | in

(17) DEPTH TO TOP OF SCREEN, FROM TOP OF CASING (Feet)

YIELD TEST

(18) DATE 9-12-05

(19) DURATION OF TEST 5 hrs

(20) OFT METHOD ☐ Pump ☒ Air Lift ☐ Bail

(21) STABILIZED DISCHARGE (GPM) 50

(22) STATIC LEVEL PRIOR TO TEST (feet/inches below top of casing)

(23) MAXIMUM DRAWDOWN (Stabilized) (feet/inches below top of casing)

(24) RECOVERY (Time in hours/minutes)

(25) Was the water produced during the test discharged away from immediate area? Yes ☒ No ____

PUMP INSTALLATION

(26) PUMP INSTALLED? YES NO ____

(27) DATE

(28) PUMP INSTALLER

(29) TYPE

(30) MAKE

(31) MODEL

(32) MAXIMUM CAPACITY (GPM)

(33) PUMP INSTALLATION LEVEL FROM TOP OF CASING (Feet)

(34) METHOD OF DRILLING ☒ Rotary ☐ Cable Tool ☐ Other ____

(35) USE OF WATER (See instructions for choices) [illegible]

(36) DATE DRILLING WORK STARTED [illegible]

(37) DATE DRILLING WORK COMPLETED [illegible]

(38) DATE REPORT FILED [illegible]

(39) REGISTERED COMPANY [illegible]

(40) DEC REGISTRATION NO. NYRD [illegible]

(41) CERTIFIED DRILLER (Print name) [illegible]

(42) CERTIFIED DRILLER SIGNATURE [illegible]

* Show log of geologic materials encountered with depth below ground surface, water bearing beds and water levels in each; casings, screens; pump, additional pumping tests and other matters of interest, e.g., water quality (sulphur, salt, methane). Describe repair work. Attach separate sheet if necessary.

LOG *

Ground Surface El. [illegible] ft. above sea level

Top Of Casing is located 2 ft. above (+) or below (-) ground surface

TOP OF WELL

0-45		[illegible]
45-60		[illegible]
60-70		[illegible]
70-80		[illegible]

BOTTOM OF HOLE

OWNER COPY

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

(1) COUNTY ORANGE

(2) TOWN GOSHEN

(3) DEC Well Number 07804

WATER WELL COMPLETION REPORT

(4) OWNER
RIEGER HOMES INC.

(5) ADDRESS
6 OLD NORTH PLANK RD. NEWBURGH, NY

(6) LOCATION OF WELL (See Instructions On Reverse)
Show Lat/Long if available and method used. SECT 1 BLK 1 LOT 2.452 RIEGER TOWN OF GOSHEN TEST #1 WELL #3 GOSHEN, NY

☑ GPS ☐ Map Interpolation 41 24' 202" N 074 16' 204" W

(7) DEPTH OF WELL BELOW LAND SURFACE (feet) 52'

(8) DEPTH TO GROUNDWATER BELOW LAND SURFACE (feet) 30' DATE MEASURED 9-8-06

CASINGS

(9) DIAMETER 6" in. | in. | in. | in.

(10) LENGTH 60' ft. | ft. | ft. | in.

(11) GROUT TYPE / SEALING BEN SEAL

(12) GROUT / SEALING INTERVAL (feet) FROM 2' TO 60'

SCREENS

(13) MAKE & MATERIAL

(14) OPENINGS

(15) DIAMETER in. | in. | in. | in.

(16) LENGTH ft. | ft. | ft. | in.

(17) DEPTH TO TOP OF SCREEN, FROM TOP OF CASING (Feet)

YIELD TEST

(18) DATE 9-11-06

(19) DURATION OF TEST 4

(20) LIFT METHOD ☐ Pump ☐ Air Lift ☐ Bail

(21) STABILIZED DISCHARGE (GPM) 3

(22) STATIC LEVEL PRIOR TO TEST (feet/inches below top of casing)

(23) MAXIMUM DRAWDOWN (Stabilized) (feet/inches below top of casing)

(24) RECOVERY (Time in hours/minutes)

(25) Was the water produced during the test discharged away from immediate area? Yes ✓ No ____

PUMP INSTALLATION

(26) PUMP INSTALLED? YES ____ NO ____

(27) DATE

(28) PUMP INSTALLER

(29) TYPE

(30) MAKE

(31) MODEL

(32) MAXIMUM CAPACITY (GPM)

(33) PUMP INSTALLATION LEVEL FROM TOP OF CASING (Feet)

(34) METHOD OF DRILLING ☑ Rotary ☐ Cable Tool ☐ Other Hammer

(35) USE OF WATER (See instructions for choices)

(36) DATE DRILLING WORK STARTED 9-5-06

(37) DATE DRILLING WORK COMPLETED 9-11-06

(38) DATE REPORT FILED 9-8-06

(39) REGISTERED COMPANY NORTHEN DRILL INC

(40) DEC REGISTRATION NO. NYRD 10177

(41) CERTIFIED DRILLER (Print name) MIKE TURNER

(42) CERTIFIED DRILLER SIGNATURE Mike Turner

LOG *

Ground Surface EL. 510 ft. above sea level

Top Of Casing is located 1' ft. above (+) or below (-) ground surface

TOP OF WELL

0'

20' — HOMEOW & INSULATION

5' — SAND GRAVEL BOULDER & ROCK

60' — SLATE SET 6" CASING

6" DRIVE SHOE

40' — FRACTURE 3 gpm

52' — BOTTOM OF HOLE

* Show log of geologic materials encountered with depth below ground surface, water bearing beds and water levels in each; casings; screens; pump; additional pumping tests and other matters of interest, e.g., water quality (sulphur, salt, methane). Describe repair work. Attach separate sheet if necessary.

OWNER COPY

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

(1) COUNTY ORANGE

(2) TOWN GOSHEN

(3) DEC Well Number 07803

WATER WELL COMPLETION REPORT

(4) OWNER
RIEGER HOMES INC.

(5) ADDRESS
6 OLD NORTH PLANK RD. NEWBURGH, NY

(6) LOCATION OF WELL (See Instructions On Reverse)
Show Lat/Long if available and method used: SECT 9 BLK 1 LOT 8.452 RIEGER WELL #2 WELL #4 TEST #2 GOSHEN, NY

☑ GPS ☐ Map Interpolation 41.23.296'N 074.16.104 W

(7) DEPTH OF WELL BELOW LAND SURFACE (feet) 650'

(8) DEPTH TO GROUNDWATER BELOW LAND SURFACE (feet) 0 DATE MEASURED 6-12-06

CASINGS

(9) DIAMETER 6" in. | in. | in. | in.

(10) LENGTH 50' ft. | ft. | ft. | in.

(11) GROUT TYPE / SEALING BEN SEAL

(12) GROUT / SEALING INTERVAL (feet) FROM 0' TO 50'

SCREENS

(13) MAKE & MATERIAL

(14) OPENINGS

(15) DIAMETER in. | in. | in. | in.

(16) LENGTH ft. | ft. | ft. | in.

(17) DEPTH TO TOP OF SCREEN, FROM TOP OF CASING (Feet)

YIELD TEST

(18) DATE 6-13-06

(19) DURATION OF TEST 4

(20) LIFT METHOD ☐ Pump ☑ Air Lift ☐ Bail

(21) STABILIZED DISCHARGE (GPM) 3

(22) STATIC LEVEL PRIOR TO TEST (feet/inches below top of casing)

(23) MAXIMUM DRAWDOWN (Stabilized) (feet/inches below top of casing)

(24) RECOVERY (Time in hours/minutes)

(25) Was the water produced during the test discharged away from immediate area? Yes ✓ No ____

PUMP INSTALLATION

(26) PUMP INSTALLED? YES ____ NO ____

(27) DATE

(28) PUMP INSTALLER

(29) TYPE

(30) MAKE

(31) MODEL

(32) MAXIMUM CAPACITY (GPM)

(33) PUMP INSTALLATION LEVEL FROM TOP OF CASING (Feet)

(34) METHOD OF DRILLING ☐ Rotary ☐ Cable Tool ☐ Other Hammer

(35) USE OF WATER (See instructions for choices) D

(36) DATE DRILLING WORK STARTED 6-12-06

(37) DATE DRILLING WORK COMPLETED 6-13-06

(38) DATE REPORT FILED 6-12-06

(39) REGISTERED COMPANY NORTHERN DRILLING INC

(40) DEC REGISTRATION NO NYRD 10177

(41) CERTIFIED DRILLER (Print name)

(42) CERTIFIED DRILLER SIGNATURE

LOG *

Ground Surface EL. 981' ft. above sea level

Top Of Casing is located 1' ft. above (+) or below (-) ground surface

TOP OF WELL

0'		
45'		5 bag grout to rock
50'		Slope 0.5 gpm
6 DRILL SITE		
622'	5	fracture 350'
650'		

BOTTOM OF HOLE

* Show log of geologic materials encountered with depth below ground surface, water bearing beds and water levels in each; casings; screens; pump; additional pumping tests and other matters of interest, e.g., water quality (sulphur, salt, methane). Describe repair work. Attach

OWNER COPY

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

(1) COUNTY ORANGE

(2) TOWN GOSHEN

(3) DEC Well Number 07808

WATER WELL COMPLETION REPORT

(4) OWNER: RIEGER HOMES

(5) ADDRESS: 6 OLD NORTH PLANK RD. NEWBURGH, NY

(6) LOCATION OF WELL (See Instructions On Reverse) Show Lat/Long if available and method used: Sect 7 Blk 1 Lot 8.452 Test #3 Test well #3 Well #5 Goshen NY

☒ GPS ☐ Map Interpolation 41.20.968 N 074.15.962 W

(7) DEPTH OF WELL BELOW LAND SURFACE (feet): 540'

(8) DEPTH TO GROUNDWATER BELOW LAND SURFACE (feet): 40 DATE MEASURED: 9-28-06

CASINGS

(9) DIAMETER: 6" in. | in. | in. | in.

(10) LENGTH: 100' ft. | ft. | ft. | in.

(11) GROUT TYPE / SEALING: BEN SEAL

(12) GROUT / SEALING INTERVAL (feet) FROM 0' TO 120'

SCREENS

(13) MAKE & MATERIAL

(14) OPENINGS

(15) DIAMETER: in. | in. | in. | in.

(16) LENGTH: ft. | ft. | ft. | in.

(17) DEPTH TO TOP OF SCREEN, FROM TOP OF CASING (Feet)

YIELD TEST

(18) DATE: 9-28-06

(19) DURATION OF TEST: 4

(20) LIFT METHOD ☐ Pump ☒ Air Lift ☐ Bail

(21) STABILIZED DISCHARGE (GPM): 100 gpm

(22) STATIC LEVEL PRIOR TO TEST (feet/inches below top of casing)

(23) MAXIMUM DRAWDOWN (Stabilized) (feet/inches below top of casing)

(24) RECOVERY (Time in hours/minutes)

(25) Was the water produced during the test discharged away from immediate area? Yes ✓ No ____

PUMP INSTALLATION

(26) PUMP INSTALLED? YES ____ NO ____

(27) DATE

(28) PUMP INSTALLER

(29) TYPE

(30) MAKE

(31) MODEL

(32) MAXIMUM CAPACITY (GPM)

(33) PUMP INSTALLATION LEVEL FROM TOP OF CASING (Feet)

(34) METHOD OF DRILLING ☐ Rotary ☐ Cable Tool ☐ Other Hammer

(35) USE OF WATER (See instructions for choices)

(36) DATE DRILLING WORK STARTED: 9-28-06

(37) DATE DRILLING WORK COMPLETED: 9-28-06

(38) DATE REPORT FILED: 9-28-06

(39) REGISTERED COMPANY: NORMAN DRILLING INC

(40) DEC REGISTRATION NO. NYRD 10177

(41) CERTIFIED DRILLER (Print name): MARK TUNNICLIFF

(42) CERTIFIED DRILLER SIGNATURE: Mark Tunnicliff

LOG *

Ground Surface EL. 357 ft. above sea level

Top Of Casing is located 1' ft. above (+) or below (-) ground surface

TOP OF WELL		
0'		
65'		Hard pan & Boulders to rock
100'		Slate set 6" casing
6' drilled slate	9	
140'	5	Fracture 270 gpm
220'	5	Fracture 10 gpm
533'	5	Large fracture 100 gpm
540'		
BOTTOM OF HOLE		

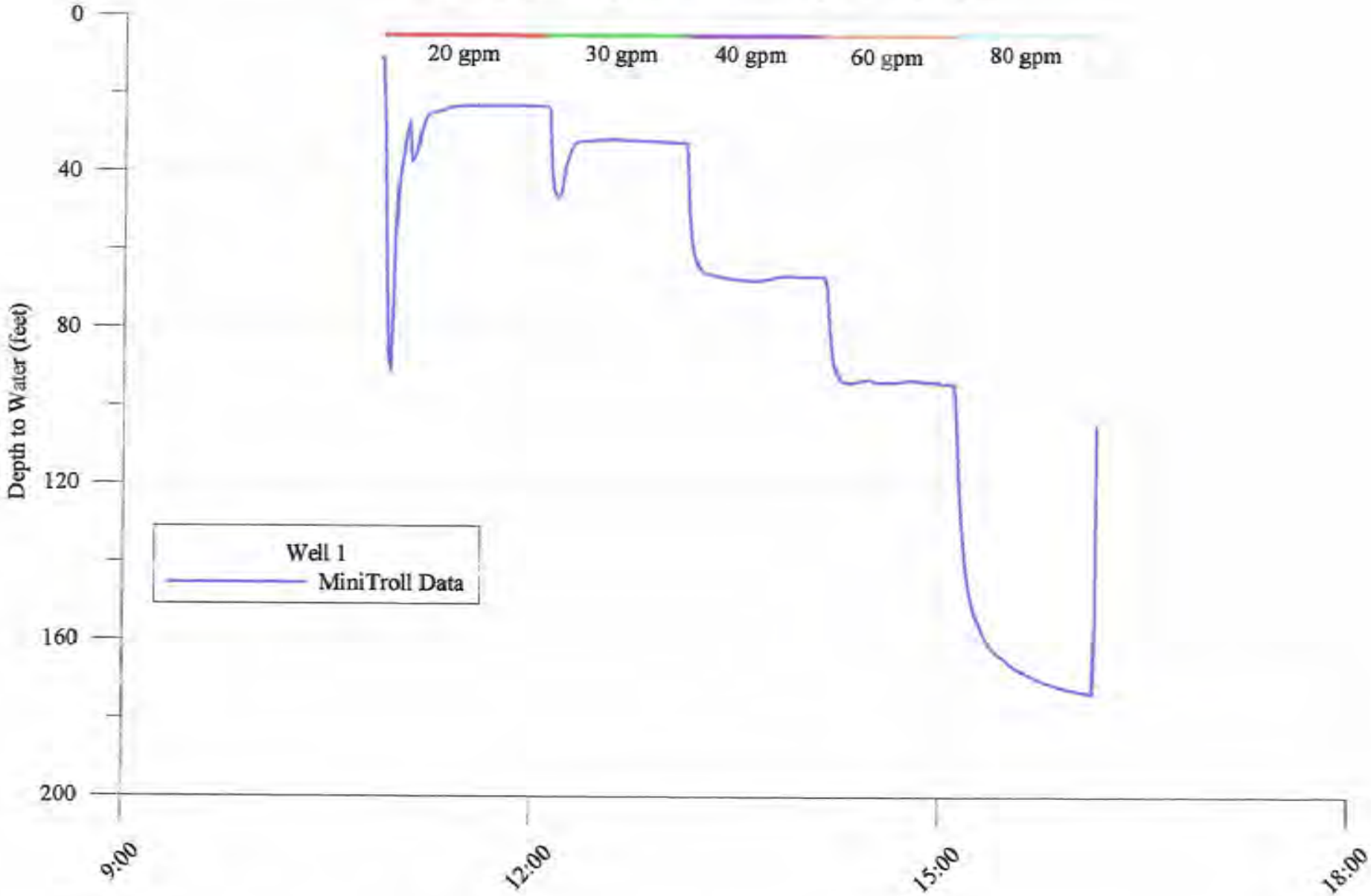
* Show log of geologic materials encountered with depth below ground surface, water bearing beds and water levels in each; casings; screens; pump; additional pumping tests and other matters of interest, e.g., water quality (sulphur, salt, methane). Describe repair work. Attach separate sheet if necessary.

OWNER COPY

APPENDIX II

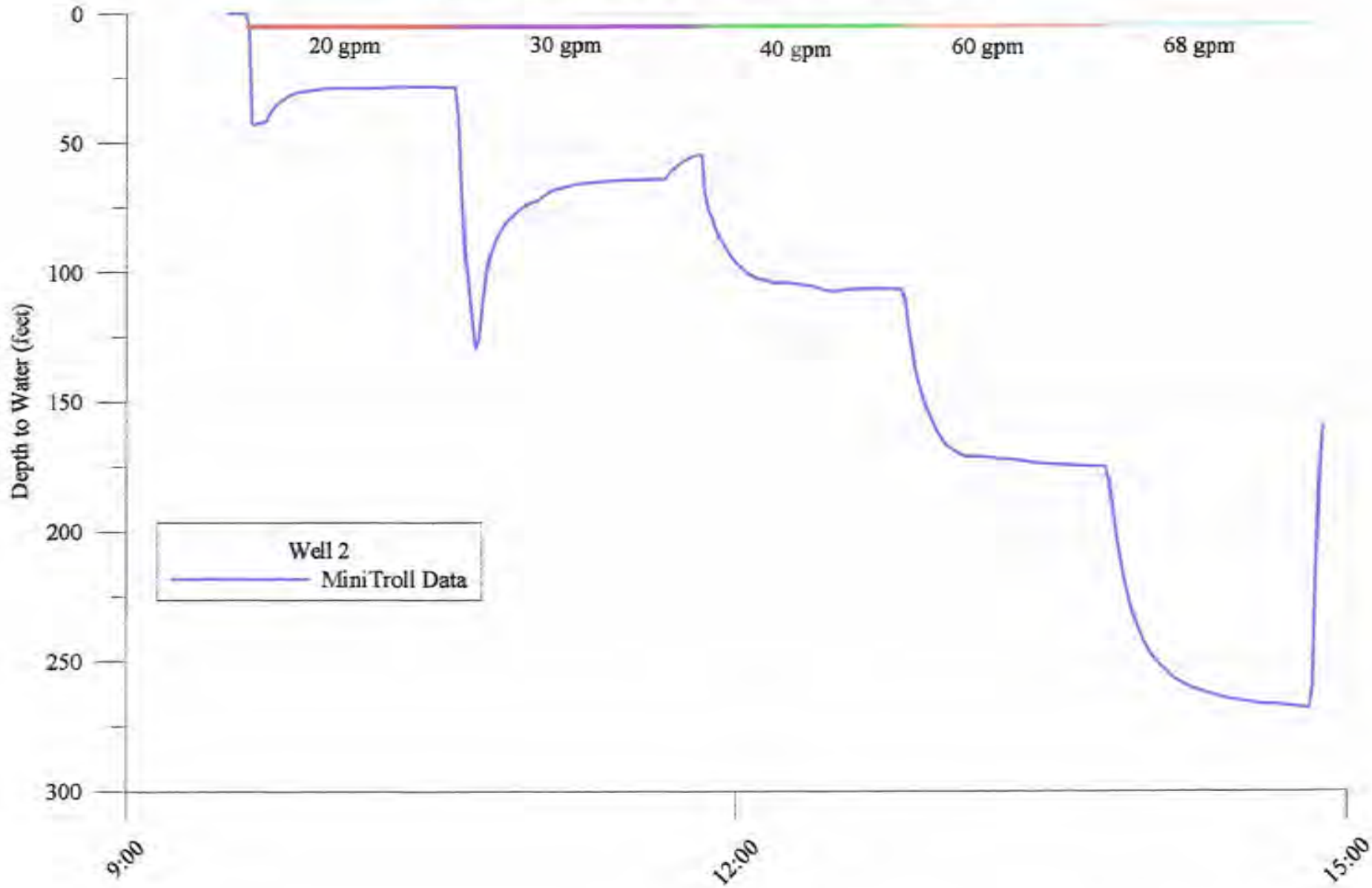
RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Step Test of Well 1 Completed May 21, 2007



RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

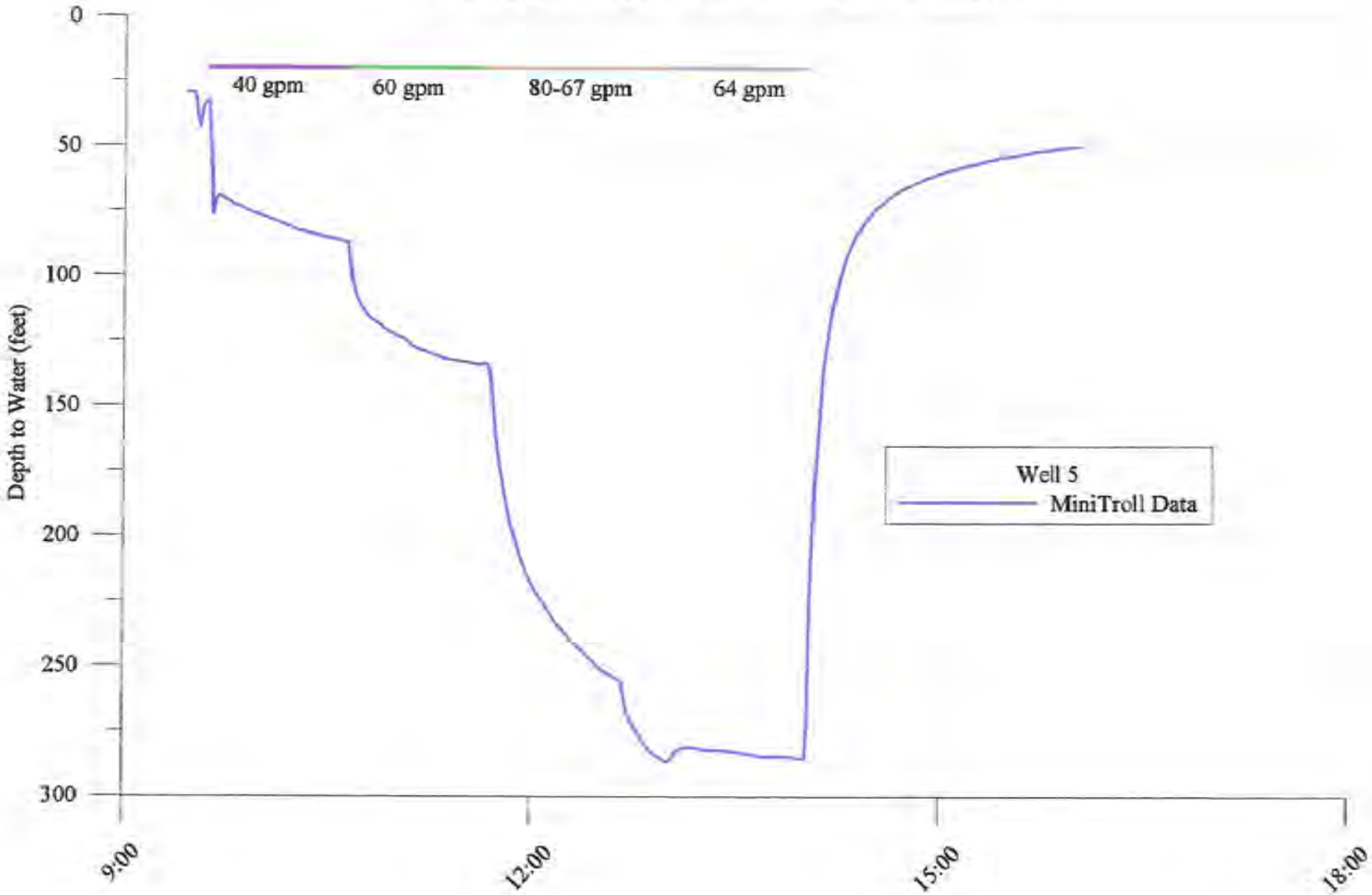
Hydrograph of Step Test of Well 2 Completed May 23, 2007



LEGGETTE, BRASHEARS & GRAHAM, INC.

RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Step Test of Well 5 Completed May 22, 2007



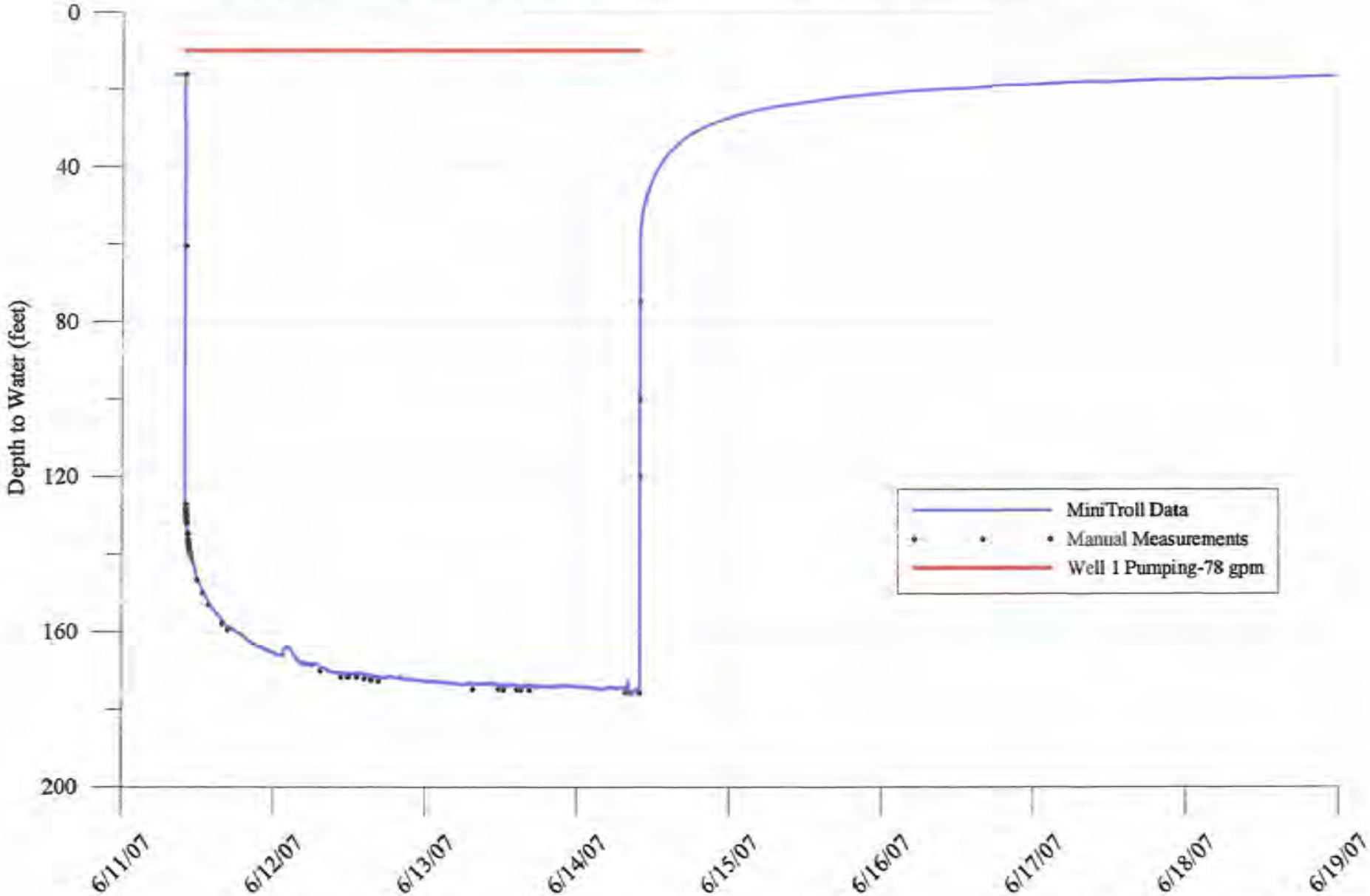
LEGGETTE, BRASHEARS & GRAHAM, INC.

APPENDIX III

WELL 1

RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Well 1 During 72-Hour Pumping Test of Well 1, June 11, 2007 Through June 14, 2007



LEGGETTE, BRASHEARS & GRAHAM, INC.

RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Summary of Depth Water Measurements Collected from Well 1

Date	Time	Depth to Water (ft btoc)	Comments
6/1/2007	11:00	12.71	MiniTroll Installed
6/1/2007	12:00	12.73	
6/1/2007	13:00	12.73	
6/1/2007	14:00	12.71	
6/1/2007	15:00	12.69	
6/1/2007	16:00	12.65	
6/1/2007	17:00	12.61	
6/1/2007	18:00	12.59	
6/1/2007	19:00	12.57	
6/1/2007	20:00	12.57	
6/1/2007	21:00	12.57	
6/1/2007	22:00	12.58	
6/1/2007	23:00	12.60	
6/2/2007	0:00	12.60	
6/2/2007	1:00	12.60	
6/2/2007	2:00	12.58	
6/2/2007	3:00	12.57	
6/2/2007	4:00	12.56	
6/2/2007	5:00	12.54	
6/2/2007	6:00	12.54	
6/2/2007	7:00	12.56	
6/2/2007	8:00	12.59	
6/2/2007	9:00	12.63	
6/2/2007	10:00	12.66	
6/2/2007	11:00	12.70	
6/2/2007	12:00	12.73	
6/2/2007	13:00	12.73	
6/2/2007	14:00	12.72	
6/2/2007	15:00	12.70	
6/2/2007	16:00	12.67	
6/2/2007	17:00	12.64	
6/2/2007	18:00	12.61	
6/2/2007	19:00	12.58	
6/2/2007	20:00	12.58	
6/2/2007	21:00	12.58	
6/2/2007	22:00	12.58	
6/2/2007	23:00	12.60	
6/3/2007	0:00	12.61	
6/3/2007	1:00	12.61	
6/3/2007	2:00	12.60	
6/3/2007	3:00	12.59	
6/3/2007	4:00	12.57	
6/3/2007	5:00	12.55	
6/3/2007	6:00	12.55	
6/3/2007	7:00	12.55	
6/3/2007	8:00	12.57	
6/3/2007	9:00	12.60	
6/3/2007	10:00	12.63	
6/3/2007	11:00	12.67	
6/3/2007	12:00	12.70	
6/3/2007	13:00	12.72	
6/3/2007	14:00	12.72	
6/3/2007	15:00	12.72	
6/3/2007	16:00	12.69	
6/3/2007	17:00	12.67	
6/3/2007	18:00	12.64	
6/3/2007	19:00	12.61	
6/3/2007	20:00	12.59	
6/3/2007	21:00	12.58	
6/3/2007	22:00	12.58	
6/3/2007	23:00	12.57	

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Summary of Depth Water Measurements Collected from Well 1

Date	Time	Depth to Water (ft btoc)	Comments
6/4/2007	0:00	12.57	
6/4/2007	1:00	12.57	
6/4/2007	2:00	12.59	
6/4/2007	3:00	12.60	
6/4/2007	4:00	12.57	
6/4/2007	5:00	12.56	
6/4/2007	6:00	12.56	
6/4/2007	7:00	12.58	
6/4/2007	8:00	12.59	
6/4/2007	8:59	12.56	Pump in Well 2 started.
6/4/2007	9:00	12.56	
6/4/2007	10:00	15.60	
6/4/2007	11:00	17.97	
6/4/2007	12:00	19.76	
6/4/2007	13:00	21.22	
6/4/2007	14:00	22.47	
6/4/2007	14:59	23.51	Pump in Well 5 started.
6/4/2007	15:00	23.52	
6/4/2007	16:00	24.92	
6/4/2007	17:00	26.56	
6/4/2007	18:00	28.16	
6/4/2007	19:00	29.64	
6/4/2007	20:00	30.98	
6/4/2007	21:00	32.19	
6/4/2007	22:00	33.30	
6/4/2007	23:00	34.30	
6/5/2007	0:00	35.23	
6/5/2007	1:00	36.15	
6/5/2007	2:00	36.91	
6/5/2007	3:00	37.57	
6/5/2007	4:00	38.23	
6/5/2007	5:00	38.78	
6/5/2007	6:00	39.27	
6/5/2007	7:00	39.74	
6/5/2007	8:00	40.20	
6/5/2007	9:00	40.63	
6/5/2007	10:00	41.03	
6/5/2007	11:00	41.46	
6/5/2007	12:00	41.69	
6/5/2007	13:00	42.00	
6/5/2007	14:00	42.26	
6/5/2007	15:00	42.51	
6/5/2007	16:00	42.74	
6/5/2007	17:00	42.93	
6/6/2007	18:00	43.11	
6/5/2007	19:00	43.28	
6/5/2007	20:00	43.44	
6/5/2007	21:00	43.59	
6/5/2007	22:00	43.75	
6/5/2007	23:00	43.91	
6/6/2007	0:00	44.06	
6/6/2007	1:00	44.20	
6/6/2007	2:00	44.35	
6/6/2007	3:00	44.48	
6/6/2007	4:00	44.60	
6/6/2007	5:00	44.72	
6/6/2007	6:00	44.83	
6/6/2007	7:00	44.94	
6/6/2007	8:00	45.04	
6/6/2007	9:00	45.15	
6/6/2007	10:00	45.25	

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Summary of Depth Water Measurements Collected from Well 1

Date	Time	Depth to Water (ft btoc)	Comments
6/6/2007	11:00	45.36	
6/6/2007	12:00	45.47	
6/6/2007	13:00	45.56	
6/6/2007	14:00	45.66	
6/6/2007	15:00	45.75	
6/6/2007	16:00	45.84	
6/6/2007	17:00	45.91	
6/6/2007	18:00	45.97	
6/6/2007	19:00	46.03	
6/6/2007	20:00	46.09	
6/6/2007	21:00	46.15	
6/6/2007	22:00	46.22	
6/6/2007	23:00	46.29	
6/7/2007	0:00	46.37	
6/7/2007	1:00	46.45	
6/7/2007	2:00	46.53	
6/7/2007	3:00	46.61	
6/7/2007	4:00	46.68	
6/7/2007	5:00	46.74	
6/7/2007	6:00	46.81	
6/7/2007	7:00	46.86	
6/7/2007	8:00	46.91	
6/7/2007	9:00	46.96	
6/7/2007	10:00	47.01	
6/7/2007	11:00	47.06	
6/7/2007	12:00	47.11	
6/7/2007	13:00	47.17	
6/7/2007	14:00	47.24	
6/7/2007	15:00	47.29	Pump in Well 5 shut down.
6/7/2007	15:02	47.29	Pump in Well 2 shut down.
6/7/2007	16:00	43.99	
6/7/2007	17:00	40.83	
6/7/2007	18:00	38.45	
6/7/2007	19:00	36.53	
6/7/2007	20:00	34.89	
6/7/2007	21:00	33.48	
6/7/2007	22:00	32.25	
6/7/2007	23:00	31.16	
6/8/2007	0:00	30.19	
6/8/2007	1:00	29.33	
6/8/2007	2:00	28.55	
6/8/2007	3:00	27.84	
6/8/2007	4:00	27.20	
6/8/2007	5:00	26.61	
6/8/2007	6:00	26.06	
6/8/2007	7:00	25.56	
6/8/2007	8:00	25.08	
6/8/2007	9:00	24.63	
6/8/2007	10:00	24.20	
6/8/2007	11:00	23.81	
6/8/2007	12:00	23.46	
6/8/2007	13:00	23.13	MiniTroll removed. Pump set in well.
6/11/2007	9:00	16.25	MiniTroll reinstalled.
6/11/2007	9:58	16.21	
6/11/2007	9:59	28.35	Pump in Well 1 started.
6/11/2007	10:00	74.18	Pumping rate 78 gpm
6/11/2007	10:00	74.18	
6/11/2007	10:01	100.48	
6/11/2007	10:02	116.26	
6/11/2007	10:03	123.46	
6/11/2007	10:04	125.96	Pumping rate 78 gpm

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Summary of Depth Water Measurements Collected from Well 1

Date	Time	Depth to Water (ft btoc)	Comments
6/11/2007	10:05	126.60	Pumping rate 78 gpm.
6/11/2007	10:06	127.31	
6/11/2007	10:07	127.83	
6/11/2007	10:08	128.54	
6/11/2007	10:09	129.09	
6/11/2007	10:10	129.63	
6/11/2007	10:11	130.05	
6/11/2007	10:12	130.63	
6/11/2007	10:13	131.13	
6/11/2007	10:14	131.49	
6/11/2007	10:15	131.87	
6/11/2007	10:16	132.25	
6/11/2007	10:17	132.52	
6/11/2007	10:18	132.69	
6/11/2007	10:19	132.94	
6/11/2007	10:20	133.21	
6/11/2007	10:21	133.41	
6/11/2007	10:22	133.88	
6/11/2007	10:23	134.30	
6/11/2007	10:24	134.55	
6/11/2007	10:25	134.86	
6/11/2007	10:26	135.08	
6/11/2007	10:27	135.33	
6/11/2007	10:28	135.56	
6/11/2007	10:29	135.69	
6/11/2007	10:30	136.03	
6/11/2007	10:31	136.20	
6/11/2007	10:32	136.27	
6/11/2007	10:33	136.48	
6/11/2007	10:34	136.76	
6/11/2007	10:35	136.85	
6/11/2007	10:36	137.03	
6/11/2007	10:37	137.19	
6/11/2007	10:38	137.28	
6/11/2007	10:39	137.55	
6/11/2007	10:40	137.70	
6/11/2007	10:41	137.93	
6/11/2007	10:42	138.02	
6/11/2007	10:43	138.17	
6/11/2007	10:44	138.44	
6/11/2007	10:45	138.62	
6/11/2007	10:46	138.53	
6/11/2007	10:47	138.75	
6/11/2007	10:48	138.86	
6/11/2007	10:49	139.11	
6/11/2007	10:50	139.20	
6/11/2007	10:51	139.43	
6/11/2007	10:52	139.52	
6/11/2007	10:53	139.51	
6/11/2007	10:54	139.81	
6/11/2007	10:55	139.90	
6/11/2007	10:56	139.96	
6/11/2007	10:57	140.12	
6/11/2007	10:58	140.26	
6/11/2007	10:59	140.34	
6/11/2007	11:00	140.43	
6/11/2007	12:00	146.43	
6/11/2007	13:00	149.87	
6/11/2007	14:00	152.74	
6/11/2007	15:00	155.47	
6/11/2007	16:00	157.27	Pumping rate 78 gpm.

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Summary of Depth Water Measurements Collected from Well 1

Date	Time	Depth to Water (ft btoc)	Comments
6/11/2007	17:00	158.88	Pumping rate 78 gpm.
6/11/2007	18:00	159.77	
6/11/2007	19:00	160.80	
6/11/2007	20:00	162.30	
6/11/2007	21:00	163.28	
6/11/2007	22:00	164.07	
6/11/2007	23:00	164.74	
6/12/2007	0:00	165.46	
6/12/2007	1:00	166.08	
6/12/2007	2:00	164.22	
6/12/2007	3:00	165.34	
6/12/2007	4:00	167.34	
6/12/2007	5:00	168.21	
6/12/2007	6:00	168.39	
6/12/2007	7:00	168.50	
6/12/2007	8:00	169.37	
6/12/2007	9:00	170.49	
6/12/2007	10:00	170.76	
6/12/2007	11:00	170.72	
6/12/2007	12:00	170.96	
6/12/2007	13:00	170.85	
6/12/2007	14:00	170.78	
6/12/2007	15:00	171.25	
6/12/2007	16:00	171.85	
6/12/2007	17:00	171.97	
6/12/2007	18:00	171.92	
6/12/2007	19:00	171.75	
6/12/2007	20:00	172.13	
6/12/2007	21:00	172.44	
6/12/2007	22:00	172.39	
6/12/2007	23:00	172.68	
6/13/2007	0:00	172.91	
6/13/2007	1:00	172.91	
6/13/2007	2:00	172.93	
6/13/2007	3:00	172.95	
6/13/2007	4:00	173.29	
6/13/2007	5:00	173.36	
6/13/2007	6:00	173.55	
6/13/2007	7:00	173.42	
6/13/2007	8:00	173.44	
6/13/2007	9:00	173.60	
6/13/2007	10:00	173.56	
6/13/2007	11:00	173.46	
6/13/2007	12:00	174.07	
6/13/2007	13:00	173.67	
6/13/2007	14:00	174.05	
6/13/2007	15:00	173.98	
6/13/2007	16:00	174.16	
6/13/2007	17:00	174.14	
6/13/2007	18:00	174.38	
6/13/2007	19:00	174.22	
6/13/2007	20:00	174.18	
6/13/2007	21:00	173.87	
6/13/2007	22:00	174.11	
6/13/2007	23:00	174.03	
6/14/2007	0:00	174.09	
6/14/2007	1:00	174.32	
6/14/2007	2:00	174.41	
6/14/2007	3:00	174.54	
6/14/2007	4:00	174.83	
6/14/2007	5:00	174.54	Pumping rate 78 gpm.

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Summary of Depth Water Measurements Collected from Well 1

Date	Time	Depth to Water (ft btoc)	Comments
6/14/2007	6:00	174.54	Pumping rate 78 gpm
6/14/2007	7:00	174.20	
6/14/2007	8:00	174.67	
6/14/2007	9:00	175.26	
6/14/2007	9:59	174.76	Pumping rate 78 gpm
6/14/2007	10:00	174.72	Pump in Well 1 shut down
6/14/2007	10:01	131.38	
6/14/2007	10:02	97.10	
6/14/2007	10:03	78.68	
6/14/2007	10:04	68.35	
6/14/2007	10:05	62.56	
6/14/2007	10:06	59.52	
6/14/2007	10:07	57.95	
6/14/2007	10:08	56.98	
6/14/2007	10:09	56.31	
6/14/2007	10:10	55.49	
6/14/2007	10:11	55.63	
6/14/2007	10:12	55.53	
6/14/2007	10:13	55.32	
6/14/2007	10:14	55.07	
6/14/2007	10:15	54.84	
6/14/2007	10:16	54.59	
6/14/2007	10:17	54.35	
6/14/2007	10:18	54.14	
6/14/2007	10:19	53.91	
6/14/2007	10:20	53.71	
6/14/2007	10:21	53.48	
6/14/2007	10:22	53.29	
6/14/2007	10:23	53.10	
6/14/2007	10:24	52.92	
6/14/2007	10:25	52.74	
6/14/2007	10:26	52.56	
6/14/2007	10:27	52.38	
6/14/2007	10:28	52.21	
6/14/2007	10:29	52.05	
6/14/2007	10:30	51.89	
6/14/2007	10:31	51.73	
6/14/2007	10:32	51.58	
6/14/2007	10:33	51.42	
6/14/2007	10:34	51.26	
6/14/2007	10:35	51.13	
6/14/2007	10:36	50.98	
6/14/2007	10:37	50.83	
6/14/2007	10:38	50.69	
6/14/2007	10:39	50.55	
6/14/2007	10:40	50.42	
6/14/2007	10:41	50.29	
6/14/2007	10:42	50.16	
6/14/2007	10:43	50.03	
6/14/2007	10:44	49.89	
6/14/2007	10:45	49.77	
6/14/2007	10:46	49.65	
6/14/2007	10:47	49.52	
6/14/2007	10:48	49.39	
6/14/2007	10:49	49.29	
6/14/2007	10:50	49.16	
6/14/2007	10:51	49.04	
6/14/2007	10:52	48.93	
6/14/2007	10:53	48.82	
6/14/2007	10:54	48.71	
6/14/2007	10:55	48.59	

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Summary of Depth Water Measurements Collected from Well 1

Date	Time	Depth to Water (ft btoc)	Comments
6/14/2007	10:56	48.48	
6/14/2007	10:57	48.37	
6/14/2007	10:58	48.27	
6/14/2007	10:59	48.16	
6/14/2007	11:00	48.05	
6/14/2007	12:00	43.25	
6/14/2007	13:00	40.08	
6/14/2007	14:00	37.70	
6/14/2007	15:00	35.78	
6/14/2007	16:00	34.22	
6/14/2007	17:00	32.92	
6/14/2007	18:00	31.78	90% Water-level recovery.
6/14/2007	19:00	30.82	
6/14/2007	20:00	29.99	
6/14/2007	21:00	29.27	
6/14/2007	22:00	28.59	
6/14/2007	23:00	28.01	
6/15/2007	0:00	27.47	
6/15/2007	1:00	26.97	
6/15/2007	2:00	26.50	
6/15/2007	3:00	26.06	
6/15/2007	4:00	25.64	
6/15/2007	5:00	25.26	
6/15/2007	6:00	24.94	
6/15/2007	7:00	24.65	
6/15/2007	8:00	24.40	
6/15/2007	9:00	24.16	
6/15/2007	10:00	23.93	
6/15/2007	11:00	23.73	
6/15/2007	12:00	23.49	
6/15/2007	13:00	23.28	
6/15/2007	14:00	23.04	
6/15/2007	15:00	22.81	
6/15/2007	16:00	22.57	
6/15/2007	17:00	22.36	
6/15/2007	18:00	22.14	
6/15/2007	19:00	21.96	
6/15/2007	20:00	21.78	
6/15/2007	21:00	21.63	
6/15/2007	22:00	21.49	
6/15/2007	23:00	21.34	
6/16/2007	0:00	21.21	
6/16/2007	1:00	21.09	
6/16/2007	2:00	20.94	
6/16/2007	3:00	20.80	
6/16/2007	4:00	20.65	
6/16/2007	5:00	20.53	
6/16/2007	6:00	20.40	
6/16/2007	7:00	20.31	
6/16/2007	8:00	20.24	
6/16/2007	9:00	20.17	
6/16/2007	10:00	20.12	
6/16/2007	11:00	20.06	
6/16/2007	12:00	19.99	
6/16/2007	13:00	19.90	
6/16/2007	14:00	19.81	
6/16/2007	15:00	19.68	
6/16/2007	16:00	19.57	
6/16/2007	17:00	19.47	
6/16/2007	18:00	19.35	
6/16/2007	19:00	19.25	

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Summary of Depth Water Measurements Collected from Well 1

Date	Time	Depth to Water (ft btoc)	Comments
6/16/2007	20:00	19.15	
6/16/2007	21:00	19.08	
6/16/2007	22:00	19.01	
6/16/2007	23:00	18.94	
6/17/2007	0:00	18.89	
6/17/2007	1:00	18.81	
6/17/2007	2:00	18.74	
6/17/2007	3:00	18.65	
6/17/2007	4:00	18.56	
6/17/2007	5:00	18.47	
6/17/2007	6:00	18.41	
6/17/2007	7:00	18.36	
6/17/2007	8:00	18.31	
6/17/2007	9:00	18.27	
6/17/2007	10:00	18.25	
6/17/2007	11:00	18.22	
6/17/2007	12:00	18.20	
6/17/2007	13:00	18.16	
6/17/2007	14:00	18.13	
6/17/2007	15:00	18.05	
6/17/2007	16:00	18.00	
6/17/2007	17:00	17.93	
6/17/2007	18:00	17.87	
6/17/2007	19:00	17.82	
6/17/2007	20:00	17.76	
6/17/2007	21:00	17.73	
6/17/2007	22:00	17.71	
6/17/2007	23:00	17.71	
6/18/2007	0:00	17.69	
6/18/2007	1:00	17.67	
6/18/2007	2:00	17.64	
6/18/2007	3:00	17.60	
6/18/2007	4:00	17.55	
6/18/2007	5:00	17.49	
6/18/2007	6:00	17.46	
6/18/2007	7:00	17.42	
6/18/2007	8:00	17.38	
6/18/2007	9:00	17.37	
6/18/2007	10:00	17.35	
6/18/2007	11:00	17.37	
6/18/2007	12:00	17.37	
6/18/2007	13:00	17.37	
6/18/2007	14:00	17.33	
6/18/2007	15:00	17.28	
6/18/2007	16:00	17.24	
6/18/2007	17:00	17.19	
6/18/2007	18:00	17.11	
6/18/2007	19:00	17.06	
6/18/2007	20:00	17.01	
6/18/2007	21:00	16.97	
6/18/2007	22:00	16.95	
6/18/2007	23:00	16.93	
6/19/2007	0:00	16.90	
6/19/2007	1:00	16.90	
6/19/2007	2:00	16.86	
6/19/2007	3:00	16.84	
6/19/2007	4:00	16.81	
6/19/2007	5:00	16.77	
6/19/2007	6:00	16.73	
6/19/2007	7:00	16.70	
6/19/2007	8:00	16.68	

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Summary of Depth Water Measurements Collected from Well 1

Date	Time	Depth to Water (ft btoc)	Comments
6/19/2007	9:00	16.66	
6/19/2007	10:00	16.66	MiniTroll removed.

ft btoc Feet below top of casing
gpm Gallons per minute

WELL 2

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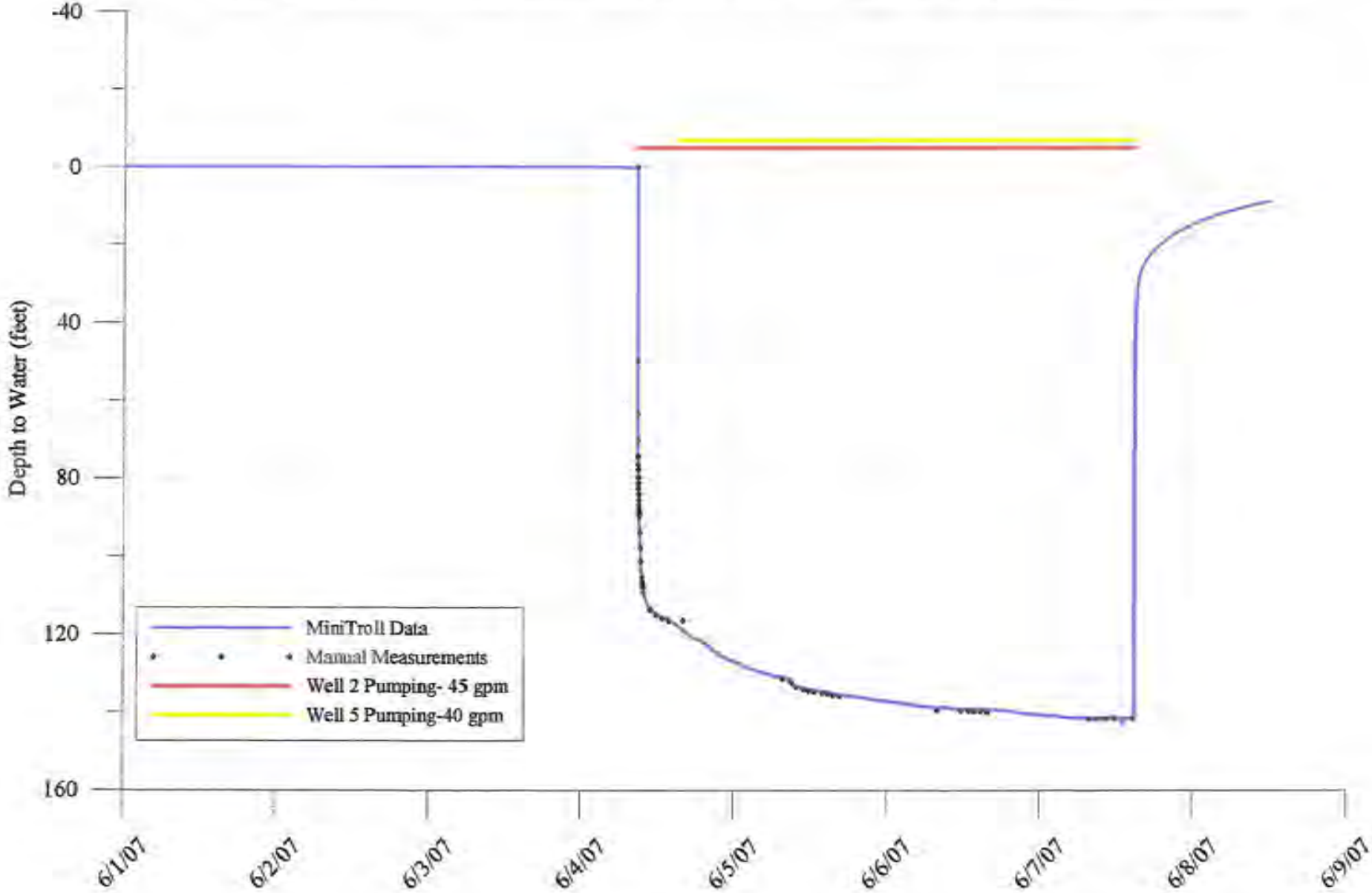
Hydrograph of Well 2 During 72-Hour Pumping Test of Wells 2 and 5, June 4, 2007 Through June 7, 2007



LEGGETTE, BRASHEARS & GRAHAM, INC.

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Summary of Depth Water Measurements Collected from Well 2

Date	Time	Depth to Water (ft btoc)	Comments
5/31/2007	13:00	0.02	MiniTroll Installed
5/31/2007	14:00	0.01	
5/31/2007	15:00	0.00	
5/31/2007	16:00	0.00	
5/31/2007	17:00	0.01	
5/31/2007	18:00	0.00	
5/31/2007	19:00	0.00	
5/31/2007	20:00	0.00	
5/31/2007	21:00	0.01	
5/31/2007	22:00	0.00	
5/31/2007	23:00	0.00	
6/1/2007	0:00	0.00	
6/1/2007	1:00	0.00	
6/1/2007	2:00	0.00	
6/1/2007	3:00	0.01	
6/1/2007	4:00	0.02	
6/1/2007	5:00	0.00	
6/1/2007	6:00	0.00	
6/1/2007	7:00	0.00	
6/1/2007	8:00	0.00	
6/1/2007	9:00	0.00	
6/1/2007	10:00	0.01	
6/1/2007	11:00	0.00	
6/1/2007	12:00	0.00	
6/1/2007	13:00	0.00	
6/1/2007	14:00	0.00	
6/1/2007	15:00	0.00	
6/1/2007	16:00	0.00	
6/1/2007	17:00	0.00	
6/1/2007	18:00	0.00	
6/1/2007	19:00	0.00	
6/1/2007	20:00	0.00	
6/1/2007	21:00	0.00	
6/1/2007	22:00	0.00	
6/1/2007	23:00	0.00	
6/2/2007	0:00	0.00	
6/2/2007	1:00	0.00	
6/2/2007	2:00	0.01	
6/2/2007	3:00	0.00	
6/2/2007	4:00	0.00	
6/2/2007	5:00	0.00	
6/2/2007	6:00	0.01	
6/2/2007	7:00	0.00	
6/2/2007	8:00	0.00	
6/2/2007	9:00	0.00	
6/2/2007	10:00	0.01	
6/2/2007	11:00	0.00	
6/2/2007	12:00	0.01	
6/2/2007	13:00	0.00	
6/2/2007	14:00	0.00	
6/2/2007	15:00	0.00	
6/2/2007	16:00	0.00	
6/2/2007	17:00	0.00	
6/2/2007	18:00	0.00	
6/2/2007	19:00	-0.02	
6/2/2007	20:00	-0.02	
6/2/2007	21:00	0.00	
6/2/2007	22:00	-0.02	
6/2/2007	23:00	0.00	
6/3/2007	0:00	0.00	
6/3/2007	1:00	0.00	

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Summary of Depth Water Measurements Collected from Well 2

Date	Time	Depth to Water (ft btoc)	Comments
6/3/2007	2:00	0.00	
6/3/2007	3:00	0.00	
6/3/2007	4:00	0.00	
6/3/2007	5:00	0.00	
6/3/2007	6:00	-0.02	
6/3/2007	7:00	-0.02	
6/3/2007	8:00	0.00	
6/3/2007	9:00	0.00	
6/3/2007	10:00	0.00	
6/3/2007	11:00	0.00	
6/3/2007	12:00	0.00	
6/3/2007	13:00	0.00	
6/3/2007	14:00	0.00	
6/3/2007	15:00	-0.02	
6/3/2007	16:00	0.00	
6/3/2007	17:00	-0.01	
6/3/2007	18:00	-0.02	
6/3/2007	19:00	0.00	
6/3/2007	20:00	-0.02	
6/3/2007	21:00	-0.02	
6/3/2007	22:00	-0.02	
6/3/2007	23:00	-0.02	
6/4/2007	0:00	0.00	
6/4/2007	1:00	-0.02	
6/4/2007	2:00	-0.02	
6/4/2007	3:00	0.00	
6/4/2007	4:00	0.03	
6/4/2007	5:00	0.07	
6/4/2007	6:00	0.11	
6/4/2007	7:00	0.16	
6/4/2007	8:00	0.18	
6/4/2007	8:58	0.01	
6/4/2007	8:59	4.30	Pump in Well 2 started
6/4/2007	9:00	37.78	Pumping rate 45 gpm.
6/4/2007	9:01	57.03	
6/4/2007	9:02	68.55	
6/4/2007	9:03	74.99	
6/4/2007	9:04	75.62	
6/4/2007	9:05	77.47	
6/4/2007	9:06	79.55	
6/4/2007	9:07	80.59	
6/4/2007	9:08	82.40	
6/4/2007	9:09	83.90	
6/4/2007	9:10	85.20	
6/4/2007	9:11	86.52	
6/4/2007	9:12	87.72	
6/4/2007	9:13	88.55	
6/4/2007	9:14	89.53	
6/4/2007	9:15	90.34	
6/4/2007	9:16	91.17	
6/4/2007	9:17	92.05	
6/4/2007	9:18	92.76	
6/4/2007	9:19	93.43	
6/4/2007	9:20	94.35	
6/4/2007	9:21	95.00	
6/4/2007	9:22	95.78	
6/4/2007	9:23	96.66	
6/4/2007	9:24	97.37	
6/4/2007	9:25	98.12	
6/4/2007	9:26	98.92	
6/4/2007	9:27	99.57	Pumping rate 45 gpm.

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Summary of Depth Water Measurements Collected from Well 2

Date	Time	Depth to Water (ft btoc)	Comments
6/4/2007	9:28	100.29	Pumping rate 45 gpm
6/4/2007	9:29	100.91	
6/4/2007	9:30	101.50	
6/4/2007	9:31	102.10	
6/4/2007	9:32	102.69	
6/4/2007	9:33	103.18	
6/4/2007	9:34	103.67	
6/4/2007	9:35	104.09	
6/4/2007	9:36	104.52	
6/4/2007	9:37	104.83	
6/4/2007	9:38	105.17	
6/4/2007	9:39	105.52	
6/4/2007	9:40	105.66	
6/4/2007	9:41	105.99	
6/4/2007	9:42	106.24	
6/4/2007	9:43	106.38	
6/4/2007	9:44	106.64	
6/4/2007	9:45	106.82	
6/4/2007	9:46	107.01	
6/4/2007	9:47	107.28	
6/4/2007	9:48	107.39	
6/4/2007	9:49	107.65	
6/4/2007	9:50	107.79	
6/4/2007	9:51	107.84	
6/4/2007	9:52	108.01	
6/4/2007	9:53	108.13	
6/4/2007	9:54	108.28	
6/4/2007	9:55	108.55	
6/4/2007	9:56	108.73	
6/4/2007	9:57	108.67	
6/4/2007	9:58	108.85	
6/4/2007	9:59	109.05	
6/4/2007	10:00	109.25	
6/4/2007	11:00	113.59	
6/4/2007	12:00	115.05	
6/4/2007	13:00	115.61	
6/4/2007	14:00	116.20	
6/4/2007	14:59	117.54	Pump in Well 5 started
6/4/2007	15:00	117.70	
6/4/2007	16:00	118.82	
6/4/2007	17:00	120.25	
6/4/2007	18:00	121.24	
6/4/2007	19:00	121.98	
6/4/2007	20:00	123.03	
6/4/2007	21:00	124.22	
6/4/2007	22:00	125.22	
6/4/2007	23:00	126.25	
6/4/2007	0:00	126.84	
6/5/2007	0:00	126.84	
6/5/2007	1:00	127.51	
6/5/2007	2:00	128.41	
6/5/2007	3:00	129.03	
6/5/2007	4:00	129.57	
6/5/2007	5:00	130.13	
6/5/2007	6:00	130.31	
6/5/2007	7:00	130.83	
6/5/2007	8:00	131.07	
6/5/2007	9:00	131.68	
6/5/2007	10:00	133.42	
6/5/2007	11:00	133.84	
6/5/2007	12:00	134.20	Pumping rate 45 gpm

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Summary of Depth Water Measurements Collected from Well 2

Date	Time	Depth to Water (ft btoc)	Comments
6/5/2007	13:00	134.32	Pumping rate 45 gpm
6/5/2007	14:00	134.56	
6/5/2007	15:00	135.03	
6/5/2007	16:00	135.35	
6/5/2007	17:00	135.50	
6/5/2007	18:00	135.68	
6/5/2007	19:00	135.88	
6/5/2007	20:00	136.20	
6/5/2007	21:00	136.33	
6/5/2007	22:00	136.55	
6/5/2007	23:00	137.02	
6/6/2007	0:00	137.12	
6/6/2007	1:00	137.32	
6/6/2007	2:00	137.52	
6/6/2007	3:00	137.77	
6/6/2007	4:00	138.01	
6/6/2007	5:00	138.44	
6/6/2007	6:00	138.21	
6/6/2007	7:00	138.66	
6/6/2007	8:00	138.77	
6/6/2007	9:00	138.70	
6/6/2007	10:00	138.93	
6/6/2007	11:00	139.22	
6/6/2007	12:00	139.25	
6/6/2007	13:00	139.29	
6/6/2007	14:00	139.34	
6/6/2007	15:00	139.02	
6/6/2007	16:00	139.58	
6/6/2007	17:00	139.40	
6/6/2007	18:00	139.33	
6/6/2007	19:00	139.58	
6/6/2007	20:00	139.78	
6/6/2007	21:00	140.23	
6/6/2007	22:00	140.48	
6/6/2007	23:00	140.43	
6/7/2007	0:00	140.68	
6/7/2007	1:00	140.88	
6/7/2007	2:00	140.75	
6/7/2007	3:00	141.17	
6/7/2007	4:00	141.35	
6/7/2007	5:00	141.33	
6/7/2007	6:00	141.58	
6/7/2007	7:00	141.55	
6/7/2007	8:00	141.64	
6/7/2007	9:00	141.71	
6/7/2007	10:00	141.37	
6/7/2007	11:00	141.48	
6/7/2007	12:00	141.33	
6/7/2007	13:00	142.09	
6/7/2007	14:00	141.38	
6/7/2007	15:00	141.31	Pump in Well 5 shut down
6/7/2007	15:01	141.38	Pumping rate 45 gpm
6/7/2007	15:02	131.39	Pump in Well 2 Shut down
6/7/2007	15:03	111.25	
6/7/2007	15:04	96.84	
6/7/2007	15:05	86.97	
6/7/2007	15:06	79.66	
6/7/2007	15:07	72.48	
6/7/2007	15:08	67.48	
6/7/2007	15:09	63.49	
6/7/2007	15:10	60.01	

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Summary of Depth Water Measurements Collected from Well 2

Date	Time	Depth to Water (ft btoc)	Comments
6/7/2007	15:11	57.00	
6/7/2007	15:12	54.38	
6/7/2007	15:13	52.06	
6/7/2007	15:14	50.00	
6/7/2007	15:15	48.13	
6/7/2007	15:16	46.43	
6/7/2007	15:17	44.89	
6/7/2007	15:18	43.49	
6/7/2007	15:19	42.23	
6/7/2007	15:20	41.06	
6/7/2007	15:21	40.02	
6/7/2007	15:22	39.07	
6/7/2007	15:23	38.21	
6/7/2007	15:24	37.39	
6/7/2007	15:25	36.63	
6/7/2007	15:26	35.96	
6/7/2007	15:27	35.33	
6/7/2007	15:28	34.75	
6/7/2007	15:29	34.23	
6/7/2007	15:30	33.74	
6/7/2007	15:31	33.29	
6/7/2007	15:32	32.87	
6/7/2007	15:33	32.48	
6/7/2007	15:34	32.11	
6/7/2007	15:35	31.79	
6/7/2007	15:36	31.48	
6/7/2007	15:37	31.18	
6/7/2007	15:38	30.91	
6/7/2007	15:39	30.66	
6/7/2007	15:40	30.42	
6/7/2007	15:41	30.20	
6/7/2007	15:42	29.98	
6/7/2007	15:43	29.78	
6/7/2007	15:44	29.61	
6/7/2007	15:45	29.42	
6/7/2007	15:46	29.26	
6/7/2007	15:47	29.10	
6/7/2007	15:48	28.96	
6/7/2007	15:49	28.81	
6/7/2007	15:50	28.68	
6/7/2007	15:51	28.54	
6/7/2007	15:52	28.43	
6/7/2007	15:53	28.30	
6/7/2007	15:54	28.19	
6/7/2007	15:55	28.08	
6/7/2007	15:56	27.97	
6/7/2007	15:57	27.86	
6/7/2007	15:58	27.77	
6/7/2007	15:59	27.68	
6/7/2007	16:00	27.58	
6/7/2007	17:00	24.07	
6/7/2007	18:00	21.96	
6/7/2007	19:00	20.36	
6/7/2007	20:00	18.99	
6/7/2007	21:00	17.82	
6/7/2007	22:00	16.80	
6/7/2007	23:00	15.92	
6/8/2007	0:00	15.10	
6/8/2007	1:00	14.36	
6/8/2007	2:00	13.71	90% Water-level recovery.
6/8/2007	3:00	13.11	

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Summary of Depth Water Measurements Collected from Well 2

Date	Time	Depth to Water (ft btoc)	Comments
6/8/2007	4:00	12.54	
6/8/2007	5:00	12.02	
6/8/2007	6:00	11.53	
6/8/2007	7:00	11.07	
6/8/2007	8:00	10.65	
6/8/2007	9:00	10.23	
6/8/2007	10:00	9.84	
6/8/2007	11:00	9.46	
6/8/2007	12:00	9.13	MiniTroll removed from well to remove pump.
6/11/2007	9:00	0.00	MiniTroll reset
6/11/2007	9:59	0.00	Pump in Well 1 started
6/11/2007	10:00	0.00	
6/11/2007	11:00	5.79	
6/11/2007	12:00	10.04	
6/11/2007	13:00	13.06	
6/11/2007	14:00	15.40	
6/11/2007	15:00	17.32	
6/11/2007	16:00	18.93	
6/11/2007	17:00	20.29	
6/11/2007	18:00	21.45	
6/11/2007	19:00	22.46	
6/11/2007	20:00	23.34	
6/11/2007	21:00	24.12	
6/11/2007	22:00	24.81	
6/11/2007	23:00	25.42	
6/12/2007	0:00	25.94	
6/12/2007	1:00	26.41	
6/12/2007	2:00	26.82	
6/12/2007	3:00	27.09	
6/12/2007	4:00	27.48	
6/12/2007	5:00	27.89	
6/12/2007	6:00	28.26	
6/12/2007	7:00	28.59	
6/12/2007	8:00	28.91	
6/12/2007	9:00	29.21	
6/12/2007	10:00	29.51	
6/12/2007	11:00	29.75	
6/12/2007	12:00	29.97	
6/12/2007	13:00	30.16	
6/12/2007	14:00	30.31	
6/12/2007	15:00	30.47	
6/12/2007	16:00	30.64	
6/12/2007	17:00	30.82	
6/12/2007	18:00	31.00	
6/12/2007	19:00	31.17	
6/12/2007	20:00	31.34	
6/12/2007	21:00	31.51	
6/12/2007	22:00	31.67	
6/12/2007	23:00	31.81	
6/13/2007	0:00	31.94	
6/13/2007	1:00	32.06	
6/13/2007	2:00	32.18	
6/13/2007	3:00	32.29	
6/13/2007	4:00	32.41	
6/13/2007	5:00	32.54	
6/13/2007	6:00	32.67	
6/13/2007	7:00	32.81	
6/13/2007	8:00	32.94	
6/13/2007	9:00	33.07	
6/13/2007	10:00	33.17	
6/13/2007	11:00	33.27	

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Summary of Depth Water Measurements Collected from Well 2

Date	Time	Depth to Water (ft btoc)	Comments
6/13/2007	12:00	33.36	
6/13/2007	13:00	33.43	
6/13/2007	14:00	33.49	
6/13/2007	15:00	33.55	
6/13/2007	16:00	33.60	
6/13/2007	17:00	33.65	
6/13/2007	18:00	33.72	
6/13/2007	19:00	33.81	
6/13/2007	20:00	33.89	
6/13/2007	21:00	33.98	
6/13/2007	22:00	34.06	
6/13/2007	23:00	34.13	
6/14/2007	0:00	34.20	
6/14/2007	1:00	34.24	
6/14/2007	2:00	34.29	
6/14/2007	3:00	34.34	
6/14/2007	4:00	34.39	
6/14/2007	5:00	34.45	
6/14/2007	6:00	34.50	
6/14/2007	7:00	34.57	
6/14/2007	8:00	34.65	
6/14/2007	9:00	34.77	
6/14/2007	10:00	34.84	Pump in Well 1 shut down
6/14/2007	11:00	28.71	
6/14/2007	12:00	24.73	
6/14/2007	13:00	22.12	
6/14/2007	14:00	20.20	
6/14/2007	15:00	18.69	
6/14/2007	16:00	17.38	
6/14/2007	17:00	16.26	
6/14/2007	18:00	15.30	
6/14/2007	19:00	14.47	
6/14/2007	20:00	13.74	
6/14/2007	21:00	13.09	
6/14/2007	22:00	12.50	
6/14/2007	23:00	11.97	
6/15/2007	0:00	11.48	
6/15/2007	1:00	11.01	
6/15/2007	2:00	10.58	
6/15/2007	3:00	10.17	
6/15/2007	4:00	9.78	
6/15/2007	5:00	9.44	
6/15/2007	6:00	9.12	
6/15/2007	7:00	8.83	
6/15/2007	8:00	8.58	
6/15/2007	9:00	8.34	
6/15/2007	10:00	8.11	
6/15/2007	11:00	7.88	
6/15/2007	12:00	7.66	
6/15/2007	13:00	7.43	
6/15/2007	14:00	7.19	
6/15/2007	15:00	6.94	
6/15/2007	16:00	6.70	
6/15/2007	17:00	6.47	
6/15/2007	18:00	6.25	
6/15/2007	19:00	6.05	
6/15/2007	20:00	5.87	
6/15/2007	21:00	5.70	
6/15/2007	22:00	5.55	
6/15/2007	23:00	5.40	
6/16/2007	0:00	5.25	

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Summary of Depth Water Measurements Collected from Well 2

Date	Time	Depth to Water (ft btoc)	Comments
6/16/2007	1:00	5.10	
6/16/2007	2:00	4.94	
6/16/2007	3:00	4.78	
6/16/2007	4:00	4.63	
6/16/2007	5:00	4.48	
6/16/2007	6:00	4.35	
6/16/2007	7:00	4.23	
6/16/2007	8:00	4.13	
6/16/2007	9:00	4.04	
6/16/2007	10:00	3.96	
6/16/2007	11:00	3.88	
6/16/2007	12:00	3.79	
6/16/2007	13:00	3.69	
6/16/2007	14:00	3.58	
6/16/2007	15:00	3.45	
6/16/2007	16:00	3.32	
6/16/2007	17:00	3.19	
6/16/2007	18:00	3.06	
6/16/2007	19:00	2.94	
6/16/2007	20:00	2.84	
6/16/2007	21:00	2.74	
6/16/2007	22:00	2.65	
6/16/2007	23:00	2.57	
6/17/2007	0:00	2.49	
6/17/2007	1:00	2.40	
6/17/2007	2:00	2.31	
6/17/2007	3:00	2.20	
6/17/2007	4:00	2.11	
6/17/2007	5:00	2.01	
6/17/2007	6:00	1.92	
6/17/2007	7:00	1.85	
6/17/2007	8:00	1.79	
6/17/2007	9:00	1.73	
6/17/2007	10:00	1.68	
6/17/2007	11:00	1.64	
6/17/2007	12:00	1.60	
6/17/2007	13:00	1.55	
6/17/2007	14:00	1.48	
6/17/2007	15:00	1.40	
6/17/2007	16:00	1.32	
6/17/2007	17:00	1.23	
6/17/2007	18:00	1.15	
6/17/2007	19:00	1.07	
6/17/2007	20:00	1.01	
6/17/2007	21:00	0.96	
6/17/2007	22:00	0.93	
6/17/2007	23:00	0.90	
6/18/2007	0:00	0.87	
6/18/2007	1:00	0.83	
6/18/2007	2:00	0.79	
6/18/2007	3:00	0.74	
6/18/2007	4:00	0.68	
6/18/2007	5:00	0.62	
6/18/2007	6:00	0.56	
6/18/2007	7:00	0.52	
6/18/2007	8:00	0.48	
6/18/2007	9:00	0.45	
6/18/2007	10:00	0.43	
6/18/2007	11:00	0.41	
6/18/2007	12:00	0.39	
6/18/2007	13:00	0.37	

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Summary of Depth Water Measurements Collected from Well 2

Date	Time	Depth to Water (ft btoc)	Comments
6/18/2007	14:00	0.33	
6/18/2007	15:00	0.28	
6/18/2007	16:00	0.22	
6/18/2007	17:00	0.15	
6/18/2007	17:00	0.15	
6/18/2007	18:00	0.07	
6/18/2007	19:00	0.01	
6/18/2007	20:00	-0.03	
6/18/2007	21:00	-0.03	
6/18/2007	22:00	-0.04	
6/18/2007	23:00	-0.04	
6/19/2007	0:00	-0.04	
6/19/2007	1:00	-0.04	
6/19/2007	2:00	-0.05	
6/19/2007	3:00	-0.04	
6/19/2007	4:00	-0.05	
6/19/2007	5:00	-0.05	
6/19/2007	6:00	-0.05	
6/19/2007	7:00	-0.05	
6/19/2007	8:00	-0.05	
6/19/2007	9:00	-0.05	
6/19/2007	10:00	-0.05	
6/19/2007	11:00	-0.05	MiniTroll removed

ft btoc Feet below top of casing
gpm Gallons per minute

WELL 5

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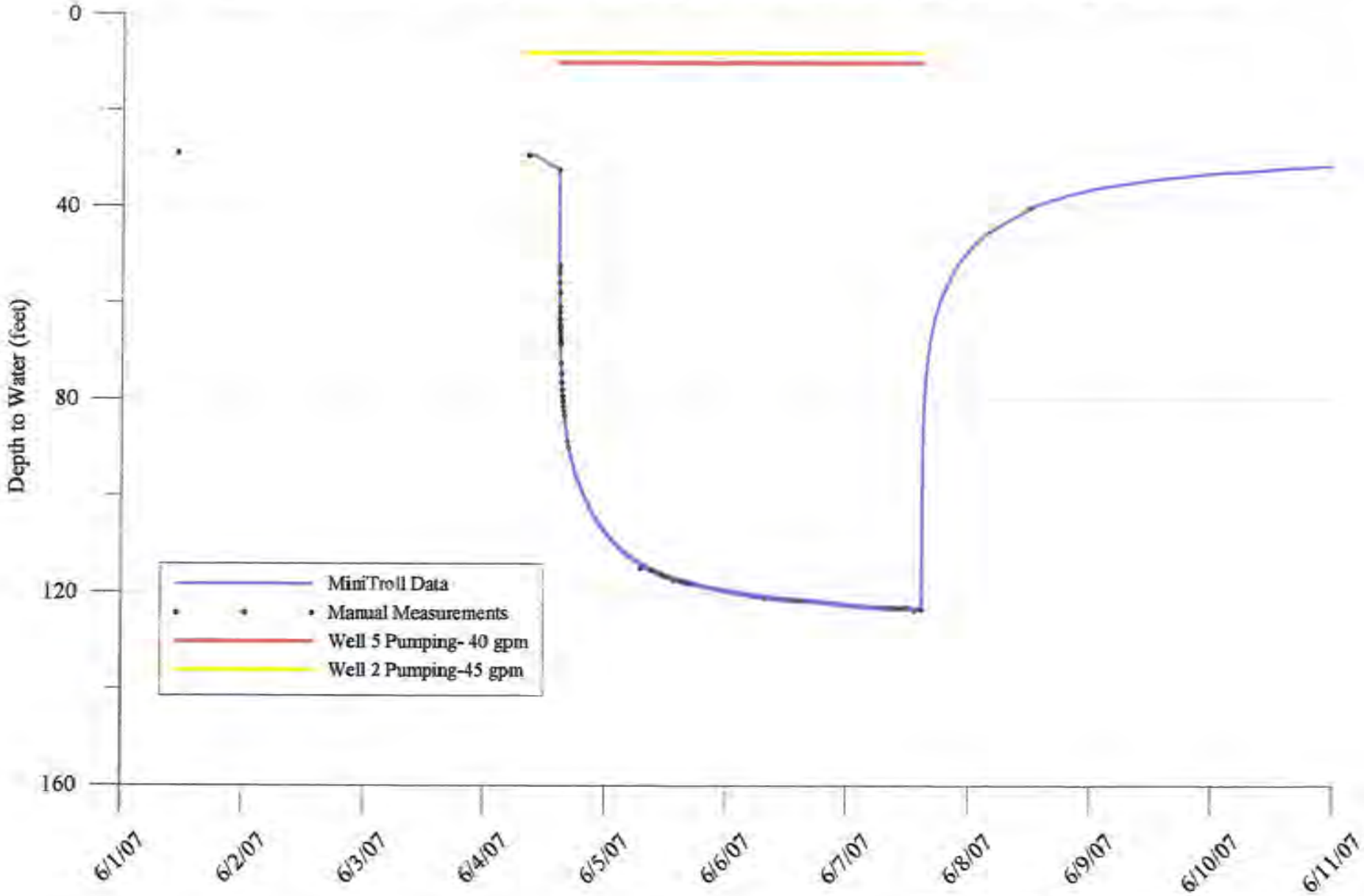
Hydrograph of Well 5 During 72-Hour Pumping Test of Wells 2 and 5, June 4, 2007 Through June 7, 2007



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Summary of Depth Water Measurements Collected from Well 5

Date	Time	Depth to Water (ft btoc)	Comments
6/4/2007	8:51	29.31	MiniTroll installed.
6/4/2007	8:59	29.29	Pump in Well 2 started.
6/4/2007	9:00	29.29	
6/4/2007	10:00	29.46	
6/4/2007	11:00	29.97	
6/4/2007	12:00	30.60	
6/4/2007	13:00	31.27	
6/4/2007	14:00	31.84	
6/4/2007	14:58	32.35	
6/4/2007	14:59	32.38	Pump in Well 5 started.
6/4/2007	15:00	44.85	Pumping rate 40 gpm.
6/4/2007	15:01	52.56	
6/4/2007	15:02	54.57	
6/4/2007	15:03	58.13	
6/4/2007	15:04	56.75	
6/4/2007	15:05	57.58	
6/4/2007	15:06	60.11	
6/4/2007	15:07	59.78	
6/4/2007	15:08	65.28	
6/4/2007	15:09	62.28	
6/4/2007	15:10	65.97	
6/4/2007	15:11	66.36	
6/4/2007	15:12	67.13	
6/4/2007	15:13	67.61	
6/4/2007	15:14	68.96	
6/4/2007	15:15	68.98	
6/4/2007	15:16	70.30	
6/4/2007	15:17	70.34	
6/4/2007	15:18	71.31	
6/4/2007	15:19	71.31	
6/4/2007	15:20	72.15	
6/4/2007	15:21	72.30	
6/4/2007	15:22	73.87	
6/4/2007	15:23	73.61	
6/4/2007	15:24	74.11	
6/4/2007	15:25	75.04	
6/4/2007	15:26	74.65	
6/4/2007	15:27	75.08	
6/4/2007	15:28	75.64	
6/4/2007	15:29	76.54	
6/4/2007	15:30	76.09	
6/4/2007	15:31	76.15	
6/4/2007	15:32	76.89	
6/4/2007	15:33	77.45	
6/4/2007	15:34	77.60	
6/4/2007	15:35	77.62	
6/4/2007	15:36	77.97	
6/4/2007	15:37	78.74	
6/4/2007	15:38	79.00	
6/4/2007	15:39	79.26	
6/4/2007	15:40	79.02	
6/4/2007	15:41	79.97	
6/4/2007	15:42	80.14	
6/4/2007	15:43	80.10	
6/4/2007	15:44	80.40	
6/4/2007	15:45	80.58	
6/4/2007	15:46	81.03	
6/4/2007	15:47	80.77	
6/4/2007	15:48	80.51	
6/4/2007	15:49	81.42	
6/4/2007	15:50	81.59	Pumping rate 40 gpm.

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Summary of Depth Water Measurements Collected from Well 5

Date	Time	Depth to Water (ft btoc)	Comments
6/4/2007	15:51	81.39	Pumping rate 40 gpm
6/4/2007	15:52	81.39	
6/4/2007	15:53	82.13	
6/4/2007	15:54	82.60	
6/4/2007	15:55	82.75	
6/4/2007	15:56	82.30	
6/4/2007	15:57	82.49	
6/4/2007	15:58	82.71	
6/4/2007	15:59	83.37	
6/4/2007	16:00	83.25	
6/4/2007	17:00	90.02	
6/4/2007	18:00	94.20	
6/4/2007	19:00	97.30	
6/4/2007	20:00	100.04	
6/4/2007	21:00	102.39	
6/4/2007	22:00	103.96	
6/4/2007	23:00	106.03	
6/5/2007	0:00	107.35	
6/5/2007	1:00	108.56	
6/5/2007	2:00	109.83	
6/5/2007	3:00	110.82	
6/5/2007	4:00	111.77	
6/5/2007	5:00	112.46	
6/5/2007	6:00	113.13	
6/5/2007	7:00	114.01	
6/5/2007	8:00	114.62	
6/5/2007	9:00	115.16	
6/5/2007	10:00	115.46	
6/5/2007	11:00	116.13	
6/5/2007	12:00	116.64	
6/5/2007	13:00	116.92	
6/5/2007	14:00	117.20	
6/5/2007	15:00	117.72	
6/5/2007	16:00	117.89	
6/5/2007	17:00	117.94	
6/5/2007	18:00	118.39	
6/5/2007	19:00	118.24	
6/5/2007	20:00	118.89	
6/5/2007	21:00	119.04	
6/5/2007	22:00	119.02	
6/5/2007	23:00	119.45	
6/6/2007	0:00	119.40	
6/6/2007	1:00	119.75	
6/6/2007	2:00	119.71	
6/6/2007	3:00	120.09	
6/6/2007	4:00	120.57	
6/6/2007	5:00	120.63	
6/6/2007	6:00	120.89	
6/6/2007	7:00	120.53	
6/6/2007	8:00	121.04	
6/6/2007	9:00	121.30	
6/6/2007	10:00	121.11	
6/6/2007	11:00	121.19	
6/6/2007	12:00	121.47	
6/6/2007	13:00	121.37	
6/6/2007	14:00	121.47	
6/6/2007	15:00	121.58	
6/6/2007	16:00	121.88	
6/6/2007	17:00	121.76	
6/6/2007	18:00	121.65	
6/6/2007	19:00	121.87	Pumping rate 40 gpm

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Summary of Depth Water Measurements Collected from Well 5

Date	Time	Depth to Water (ft btoc)	Comments
6/6/2007	20:00	121.97	Pumping rate 40 gpm.
6/6/2007	21:00	122.34	
6/6/2007	22:00	122.40	
6/6/2007	23:00	122.53	
6/7/2007	0:00	122.34	
6/7/2007	1:00	122.62	
6/7/2007	2:00	122.66	
6/7/2007	3:00	122.86	
6/7/2007	4:00	122.79	
6/7/2007	5:00	122.92	
6/7/2007	6:00	123.18	
6/7/2007	7:00	123.05	
6/7/2007	8:00	123.50	
6/7/2007	9:00	123.48	
6/7/2007	10:00	123.20	
6/7/2007	11:00	123.29	
6/7/2007	12:00	123.09	
6/7/2007	13:00	123.20	
6/7/2007	14:00	123.27	
6/7/2007	14:59	123.38	Pumping rate 40 gpm.
6/7/2007	15:00	123.57	Pump in Well 5 shut down.
6/7/2007	15:01	118.74	
6/7/2007	15:02	112.20	Pump in Well 2 shutdown.
6/7/2007	15:03	108.01	
6/7/2007	15:04	104.67	
6/7/2007	15:05	101.89	
6/7/2007	15:06	99.64	
6/7/2007	15:07	97.70	
6/7/2007	15:08	95.93	
6/7/2007	15:09	94.37	
6/7/2007	15:10	93.01	
6/7/2007	15:11	91.78	
6/7/2007	15:12	90.70	
6/7/2007	15:13	89.72	
6/7/2007	15:14	88.86	
6/7/2007	15:15	88.06	
6/7/2007	15:16	87.32	
6/7/2007	15:17	86.61	
6/7/2007	15:18	85.98	
6/7/2007	15:19	85.38	
6/7/2007	15:20	84.81	
6/7/2007	15:21	84.27	
6/7/2007	15:22	83.77	
6/7/2007	15:23	83.28	
6/7/2007	15:24	82.83	
6/7/2007	15:25	82.41	
6/7/2007	15:26	82.00	
6/7/2007	15:27	81.59	
6/7/2007	15:28	81.23	
6/7/2007	15:29	80.88	
6/7/2007	15:30	80.51	
6/7/2007	15:31	80.19	
6/7/2007	15:32	79.86	
6/7/2007	15:33	79.56	
6/7/2007	15:34	79.26	
6/7/2007	15:35	78.98	
6/7/2007	15:36	78.70	
6/7/2007	15:37	78.44	
6/7/2007	15:38	78.15	
6/7/2007	15:39	77.89	
6/7/2007	15:40	77.63	

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Summary of Depth Water Measurements Collected from Well 5

Date	Time	Depth to Water (ft btoc)	Comments
6/7/2007	15:41	77.40	
6/7/2007	15:42	77.14	
6/7/2007	15:43	76.92	
6/7/2007	15:44	76.68	
6/7/2007	15:45	76.44	
6/7/2007	15:46	76.25	
6/7/2007	15:47	76.03	
6/7/2007	15:48	75.82	
6/7/2007	15:49	75.60	
6/7/2007	15:50	75.41	
6/7/2007	15:51	75.23	
6/7/2007	15:52	75.02	
6/7/2007	15:53	74.84	
6/7/2007	15:54	74.65	
6/7/2007	15:55	74.48	
6/7/2007	15:56	74.28	
6/7/2007	15:57	74.11	
6/7/2007	15:58	73.96	
6/7/2007	15:59	73.78	
6/7/2007	16:00	73.61	
6/7/2007	17:00	66.50	
6/7/2007	18:00	62.06	
6/7/2007	19:00	58.83	
6/7/2007	20:00	56.24	
6/7/2007	21:00	54.13	
6/7/2007	22:00	52.32	
6/7/2007	23:00	50.79	
6/8/2007	0:00	49.46	
6/8/2007	1:00	48.32	
6/8/2007	2:00	47.29	
6/8/2007	3:00	46.38	
6/8/2007	4:00	45.57	
6/8/2007	5:00	44.84	
6/8/2007	6:00	44.15	
6/8/2007	7:00	43.53	
6/8/2007	8:00	42.93	
6/8/2007	9:00	42.40	
6/8/2007	10:00	41.88	
6/8/2007	13:00	40.00	
6/8/2007	14:00	39.39	
6/8/2007	15:00	39.22	
6/8/2007	16:00	38.88	
6/8/2007	17:00	38.55	90% Water-level recovery
6/8/2007	18:00	38.25	
6/8/2007	19:00	37.95	
6/8/2007	20:00	37.67	
6/8/2007	21:00	37.39	
6/8/2007	22:00	37.11	
6/8/2007	23:00	36.84	
6/9/2007	0:00	36.61	
6/9/2007	1:00	36.41	
6/9/2007	2:00	36.17	
6/9/2007	3:00	36.00	
6/9/2007	4:00	35.85	
6/9/2007	5:00	35.69	
6/9/2007	6:00	35.54	
6/9/2007	7:00	35.39	
6/9/2007	8:00	35.22	
6/9/2007	9:00	35.07	
6/9/2007	10:00	34.92	
6/9/2007	11:00	34.74	

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Summary of Depth Water Measurements Collected from Well 5

Date	Time	Depth to Water (ft btoc)	Comments
6/9/2007	12:00	34.59	
6/9/2007	13:00	34.46	
6/9/2007	14:00	34.33	
6/9/2007	15:00	34.20	
6/9/2007	16:00	34.11	
6/9/2007	17:00	34.02	
6/9/2007	18:00	33.91	
6/9/2007	19:00	33.81	
6/9/2007	20:00	33.72	
6/9/2007	21:00	33.59	
6/9/2007	22:00	33.50	
6/9/2007	23:00	33.38	
6/10/2007	0:00	33.26	
6/10/2007	1:00	33.17	
6/10/2007	2:00	33.08	
6/10/2007	3:00	33.02	
6/10/2007	4:00	32.97	
6/10/2007	5:00	32.91	
6/10/2007	6:00	32.89	
6/10/2007	7:00	32.85	
6/10/2007	8:00	32.76	
6/10/2007	9:00	32.70	
6/10/2007	10:00	32.60	
6/10/2007	11:00	32.52	
6/10/2007	12:00	32.43	
6/10/2007	13:00	32.34	
6/10/2007	14:00	32.26	
6/10/2007	15:00	32.18	
6/10/2007	16:00	32.13	
6/10/2007	17:00	32.06	
6/10/2007	18:00	32.02	
6/10/2007	19:00	31.98	
6/10/2007	20:00	31.93	
6/10/2007	21:00	31.90	
6/10/2007	22:00	31.81	
6/10/2007	23:00	31.74	
6/11/2007	0:00	31.67	
6/11/2007	1:00	31.59	
6/11/2007	2:00	31.54	
6/11/2007	3:00	31.53	
6/11/2007	4:00	31.50	
6/11/2007	5:00	31.49	
6/11/2007	6:00	31.48	
6/11/2007	7:00	31.48	
6/11/2007	8:00	31.46	
6/11/2007	9:00	31.44	
6/11/2007	9:59	31.39	Pump in Well 1 started.
6/11/2007	10:00	31.40	
6/11/2007	11:00	32.36	
6/11/2007	12:00	33.90	
6/11/2007	13:00	35.42	
6/11/2007	14:00	36.80	
6/11/2007	17:00	39.32	
6/11/2007	18:00	40.28	
6/11/2007	19:00	41.16	
6/11/2007	20:00	41.96	
6/11/2007	21:00	42.68	
6/11/2007	22:00	43.33	
6/11/2007	23:00	43.90	
6/12/2007	0:00	44.42	
6/12/2007	1:00	44.89	

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Summary of Depth Water Measurements Collected from Well 5

Date	Time	Depth to Water (ft btoc)	Comments
6/12/2007	2:00	45.33	
6/12/2007	3:00	45.72	
6/12/2007	4:00	46.10	
6/12/2007	5:00	46.49	
6/12/2007	6:00	46.87	
6/12/2007	7:00	47.22	
6/12/2007	8:00	47.55	
6/12/2007	9:00	47.84	
6/12/2007	10:00	48.11	
6/12/2007	11:00	48.33	
6/12/2007	12:00	48.52	
6/12/2007	13:00	48.68	
6/12/2007	14:00	48.82	
6/12/2007	15:00	48.97	
6/12/2007	16:00	49.11	
6/12/2007	17:00	49.27	
6/12/2007	18:00	49.42	
6/12/2007	19:00	49.58	
6/12/2007	20:00	49.74	
6/12/2007	21:00	49.89	
6/12/2007	22:00	50.02	
6/12/2007	23:00	50.14	
6/13/2007	0:00	50.24	
6/13/2007	1:00	50.33	
6/13/2007	2:00	50.42	
6/13/2007	3:00	50.52	
6/13/2007	4:00	50.63	
6/13/2007	5:00	50.74	
6/13/2007	6:00	50.87	
6/13/2007	7:00	51.02	
6/13/2007	8:00	51.15	
6/13/2007	9:00	51.28	
6/13/2007	10:00	51.38	
6/13/2007	11:00	51.45	
6/13/2007	12:00	51.51	
6/13/2007	13:00	51.54	
6/13/2007	14:00	51.56	
6/13/2007	15:00	51.57	
6/13/2007	16:00	51.59	
6/13/2007	17:00	51.62	
6/13/2007	18:00	51.67	
6/13/2007	19:00	51.73	
6/13/2007	20:00	51.80	
6/13/2007	21:00	51.88	
6/13/2007	22:00	51.95	
6/13/2007	23:00	52.00	
6/14/2007	0:00	52.04	
6/14/2007	1:00	52.06	
6/14/2007	2:00	52.08	
6/14/2007	3:00	52.11	
6/14/2007	4:00	52.14	
6/14/2007	5:00	52.20	
6/14/2007	6:00	52.26	
6/14/2007	7:00	52.35	
6/14/2007	8:00	52.44	
6/14/2007	9:00	52.53	
6/14/2007	10:00	52.61	Pump in Well 1 shutdown.
6/14/2007	11:00	51.75	
6/14/2007	12:00	50.24	
6/14/2007	13:00	48.79	
6/14/2007	14:00	47.47	

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Summary of Depth Water Measurements Collected from Well 5

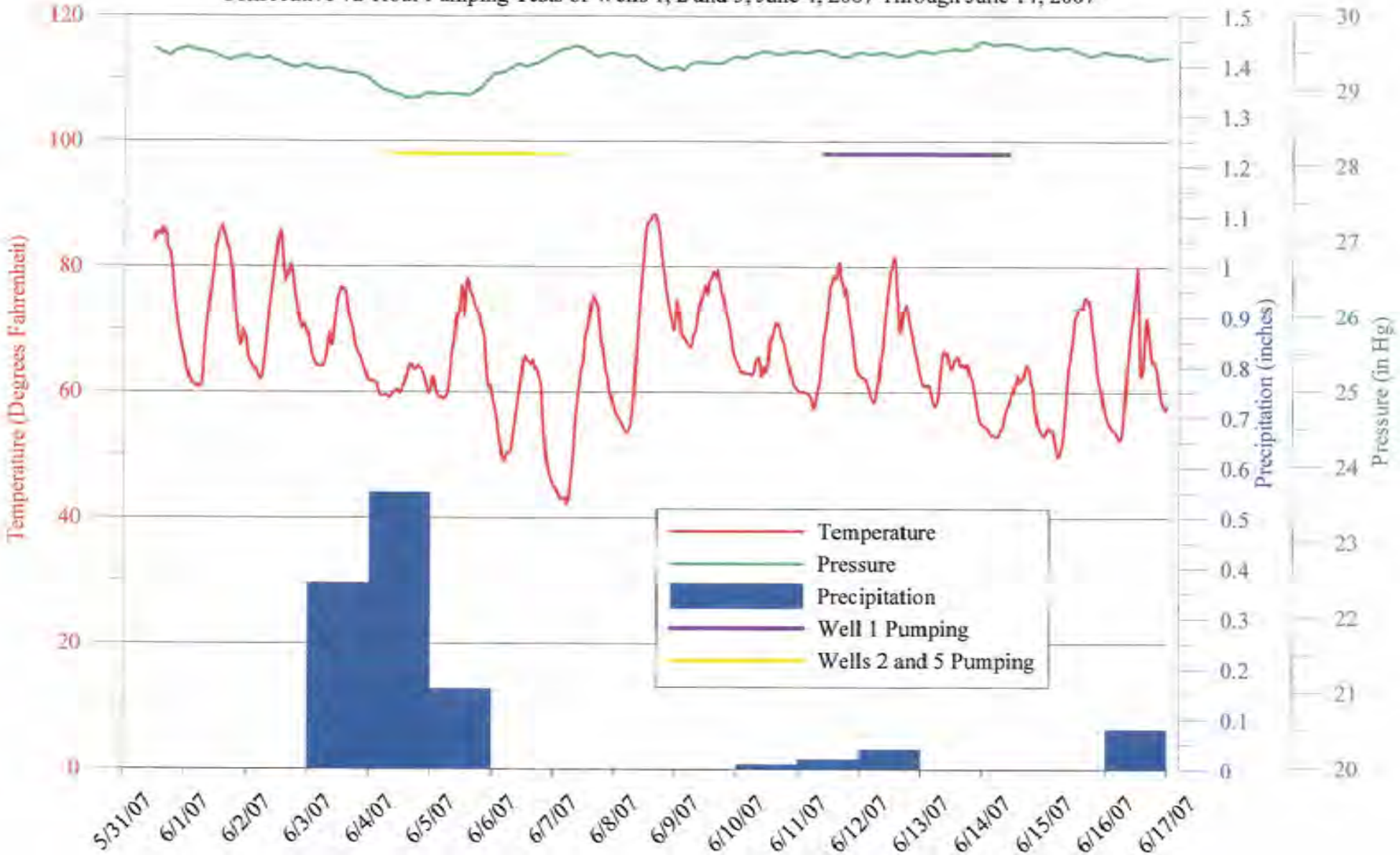
Date	Time	Depth to Water (ft btoc)	Comments
6/14/2007	15:00	46.29	
6/14/2007	16:00	45.23	
6/14/2007	17:00	44.28	
6/14/2007	18:00	43.45	
6/14/2007	19:00	42.71	
6/14/2007	20:00	42.06	
6/14/2007	21:00	41.47	
6/14/2007	22:00	40.93	
6/14/2007	23:00	40.43	
6/15/2007	0:00	39.96	
6/15/2007	1:00	39.52	
6/15/2007	2:00	39.10	
6/15/2007	3:00	38.70	
6/15/2007	4:00	38.34	
6/15/2007	5:00	38.01	
6/15/2007	6:00	37.73	
6/15/2007	7:00	37.48	
6/15/2007	8:00	37.27	
6/15/2007	9:00	37.08	
6/15/2007	10:00	36.89	
6/15/2007	11:00	36.71	
6/15/2007	12:00	36.51	
6/15/2007	13:00	36.30	
6/15/2007	14:00	36.08	
6/15/2007	15:00	35.85	
6/15/2007	16:00	35.63	
6/15/2007	17:00	35.41	
6/15/2007	18:00	35.21	
6/15/2007	19:00	35.04	
6/15/2007	20:00	34.89	
6/15/2007	21:00	34.76	
6/15/2007	22:00	34.64	
6/15/2007	23:00	34.52	
6/16/2007	0:00	34.40	
6/16/2007	1:00	34.28	
6/16/2007	2:00	34.14	
6/16/2007	3:00	34.01	
6/16/2007	4:00	33.88	
6/16/2007	5:00	33.76	
6/16/2007	6:00	33.66	
6/16/2007	7:00	33.58	
6/16/2007	8:00	33.53	
6/16/2007	9:00	33.50	
6/16/2007	10:00	33.46	
6/16/2007	11:00	33.43	
6/16/2007	12:00	33.38	
6/16/2007	13:00	33.31	
6/16/2007	14:00	33.22	
6/16/2007	15:00	33.10	MiniTroll test ended.

ft btoc Feet below top of casing
gpm Gallons per minute

APPENDIX IV

RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Graph of Temperature, Precipitation, and Barometric Pressure Readings Collected During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



H:\Spreadsheet\Reiger\June 2007 Pumping Test\Hydrographs\Weather Station Hydrograph.grf

LEGGETTE, BRASHEARS & GRAHAM, INC.

APPENDIX V

REIGER HOMES SUBDIVISION
GOSHEN, NEW YORK

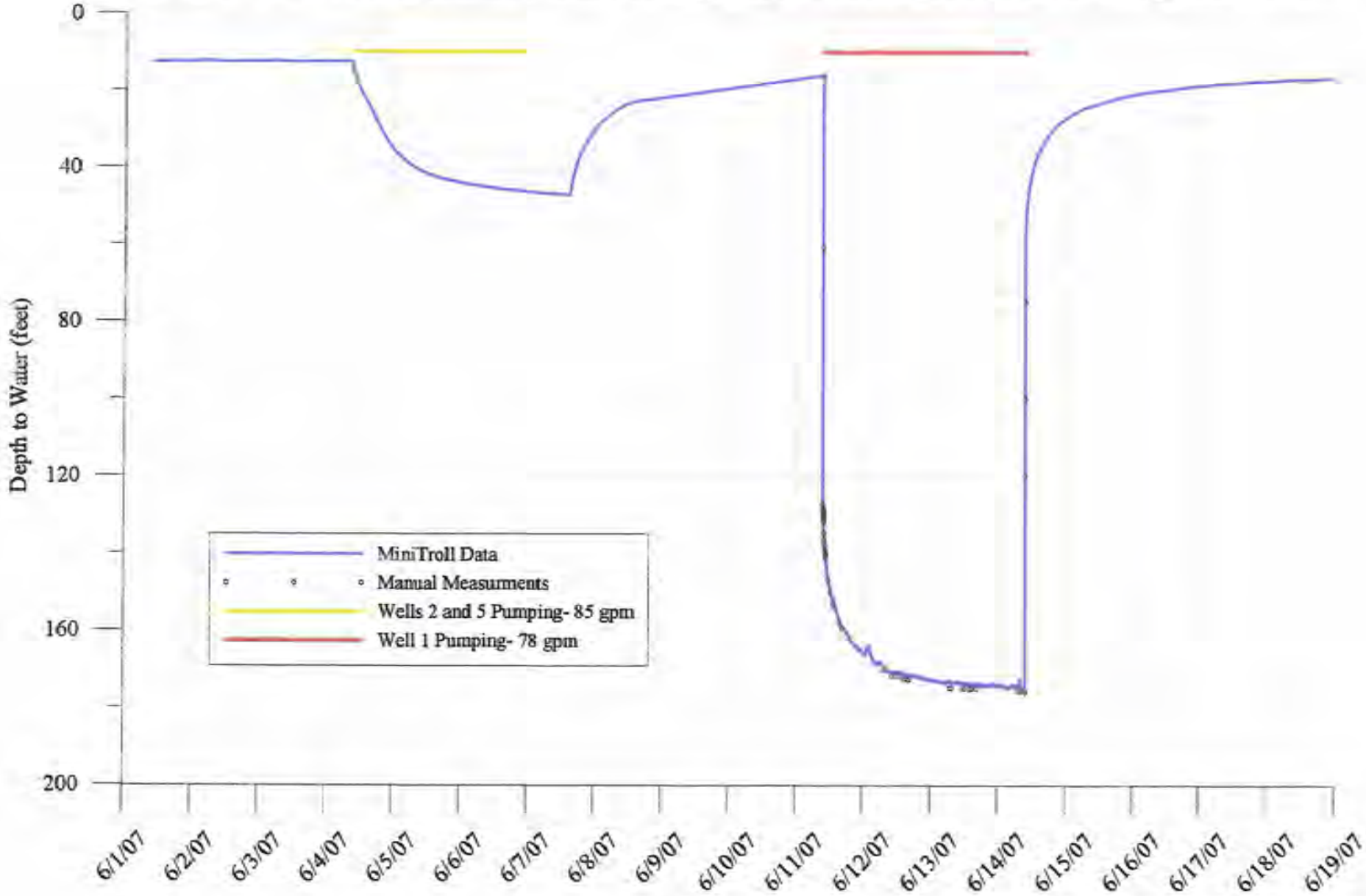
Summary of Approximate Drawdown Observed During the Pumping of Wells 1, 2 and 5 and Approximate Distance to Pumping Wells

Location ID	Approximate Drawdown Observed During Test of Wells 2 and 5 (feet)	Approximate Drawdown Observed During Test of Well 1 (feet)	Approximate Distance from Well 1 (feet)	Approximate Distance from Well 2 (feet)	Approximate Distance from Well 5 (feet)
OnSite Wells					
Well 1	35.0	--	--	700	900
Well 2	--	34.9	700	--	1,450
Well 3	5.0	1.0	1,700	1,500	1,600
Well 4	21.4	1.9	900	700	1,050
Well 5	--	20.2	900	1,450	--
PZ-A	ND	ND	200	700	1,000
PZ-B	ND	ND	500	300	1,150
PZ-C	ND	ND	1,100	1,650	300
DW-1	ND	ND	1,200	1,050	1,250
DW-2	ND	ND	1,500	1,150	1,500
Off Site Wells					
Heritage at Goshen Well 6	ND	ND	7,600	7,000	8,000
184 Johnson Road	ND	ND	3,250	3,700	2,400
1 Silver Spring Road	4.0	7.5	1,750	2,100	2,400
33 Ridge Road	7.6	10.9	1,850	1,800	2,650
37 Ridge Road	8.0	10.2	2,000	2,050	2,750
2 Pleasant Ridge Run	ND	ND	4,400	3,800	5,250
4 Pleasant Ridge Run	ND	ND	4,200	3,600	5,000
6 Pleasant Ridge Run	ND	ND	4,000	3,400	4,800
7 Pleasant Ridge Run	ND	ND	3,700	3,050	4,500

ND- Not discernable

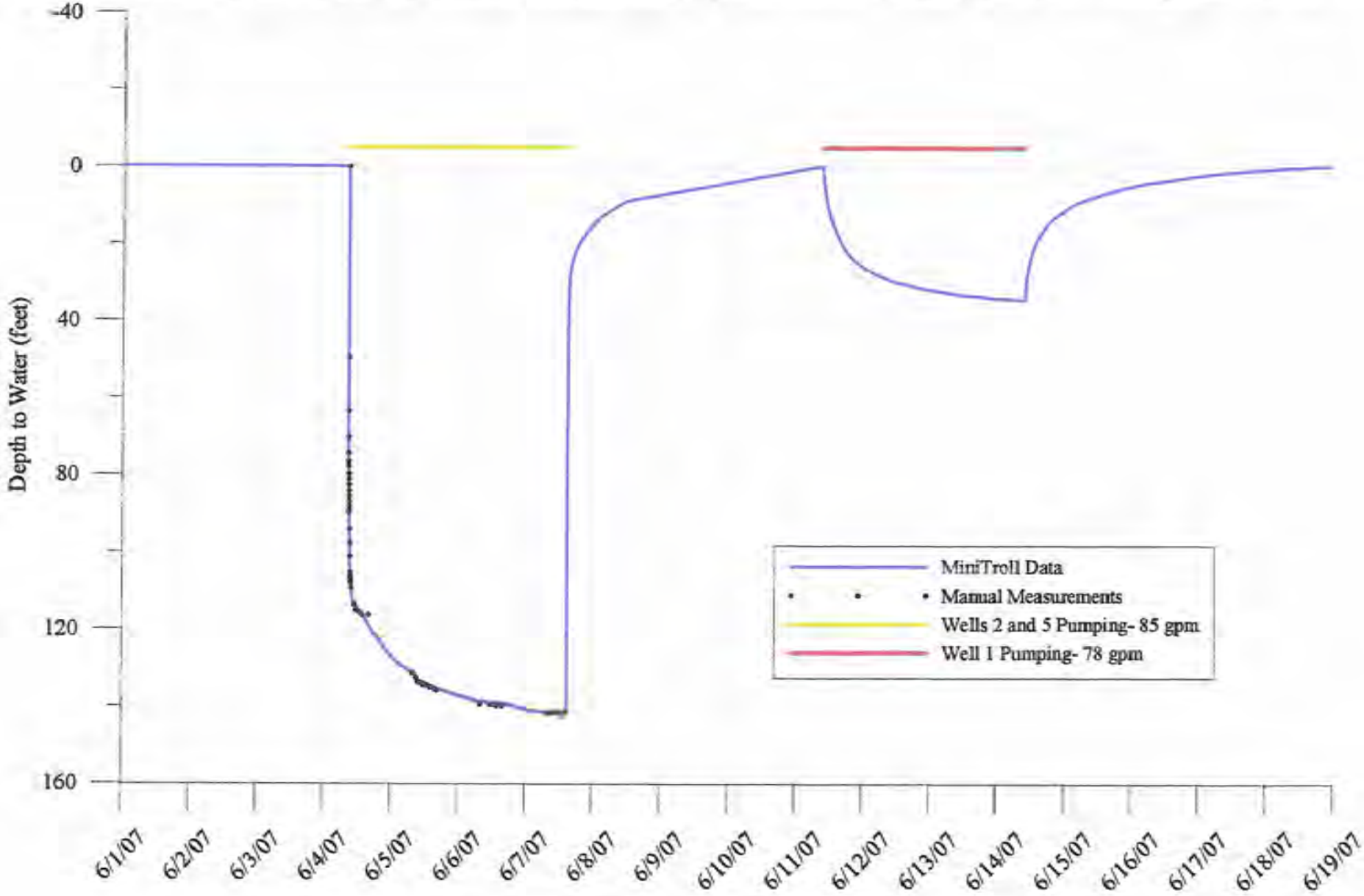
RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Well 1 During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



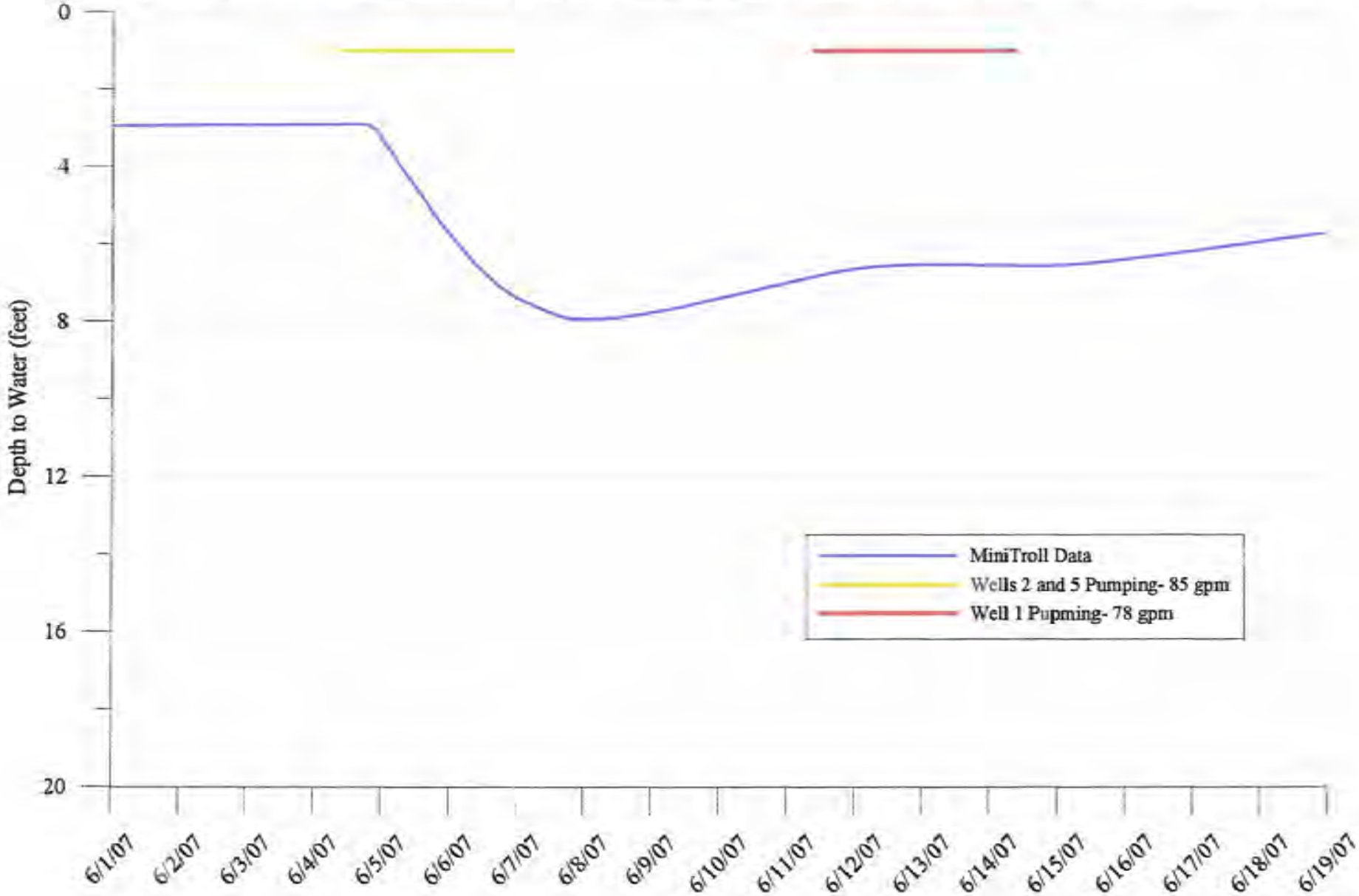
RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Well 2 During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

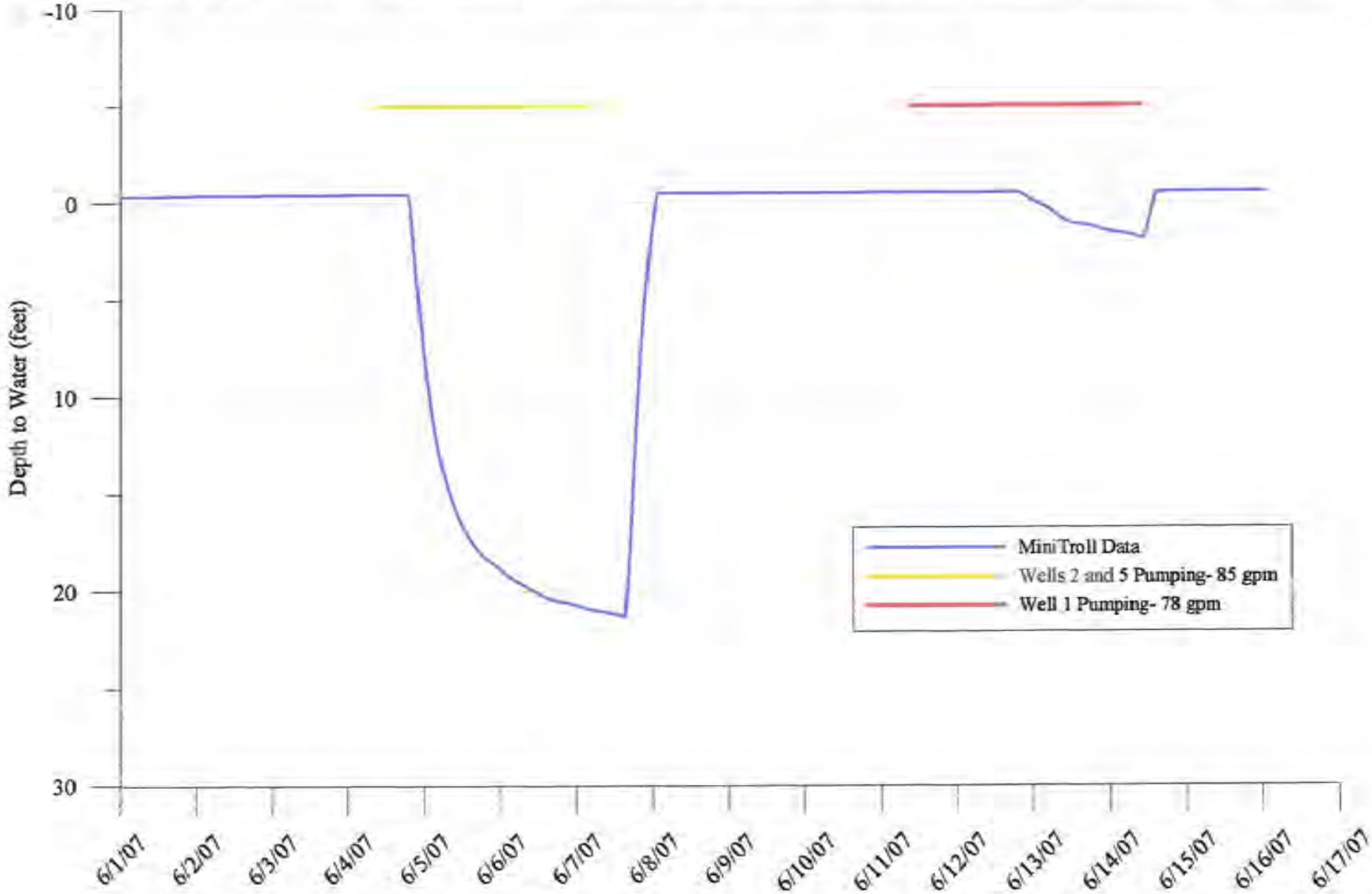
Hydrograph of Well 3 During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



LEGGETTE, BRASHEARS & GRAHAM, INC.

RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

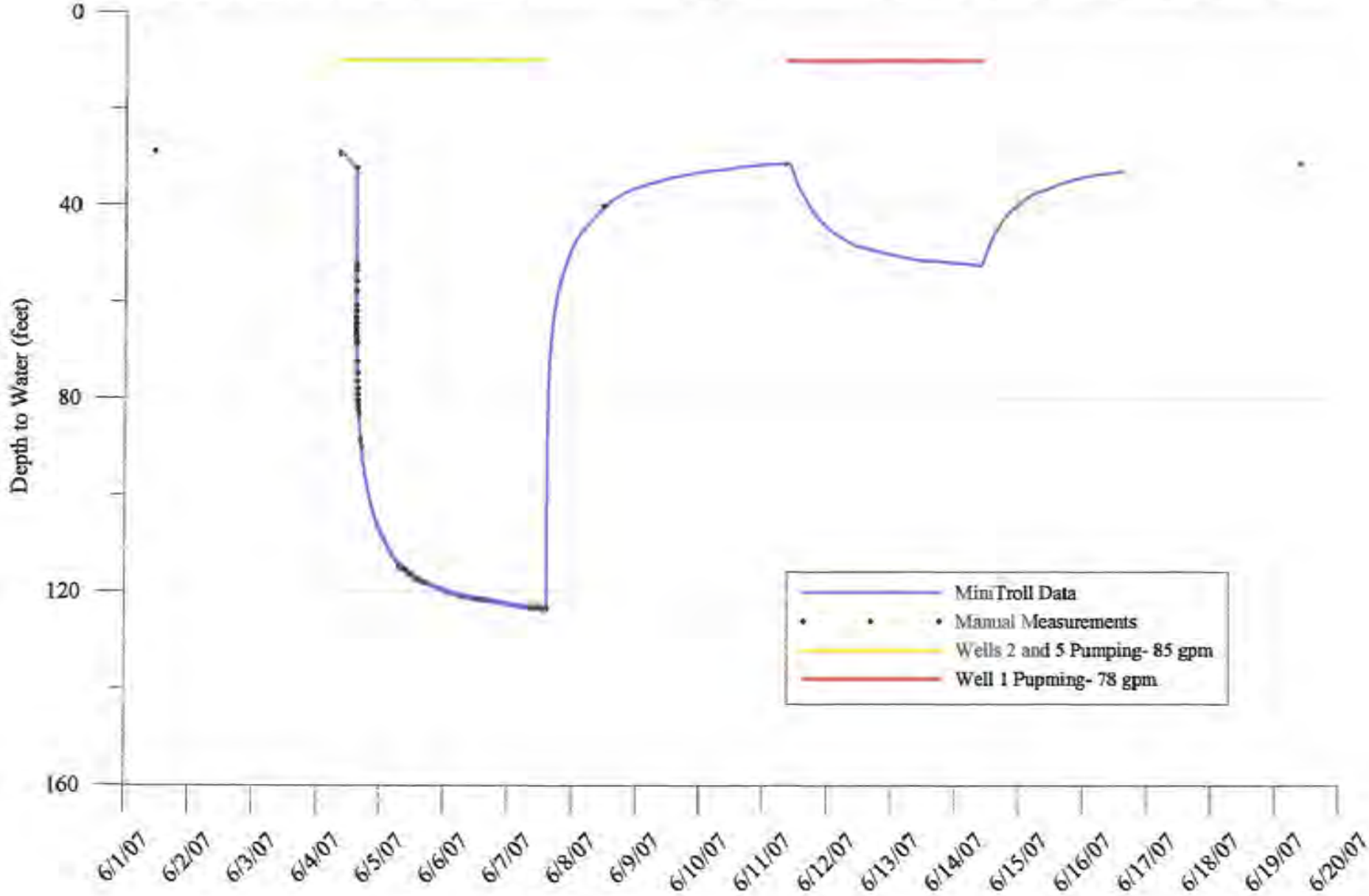
Hydrograph of Well 4 During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



LEGGETTE, BRASHEARS & GRAHAM, INC.

RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Well 5 During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



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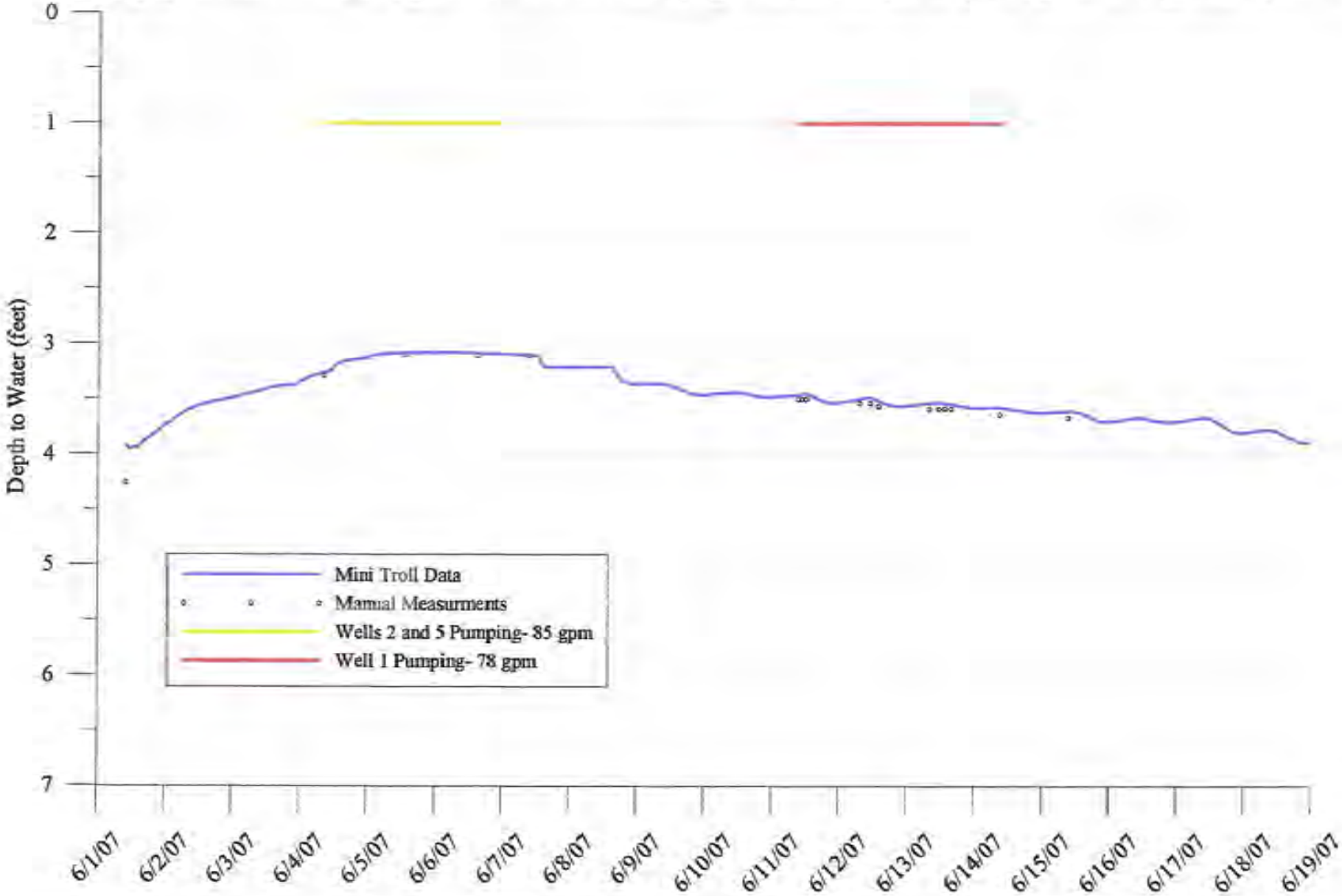
RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Piezometer A During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



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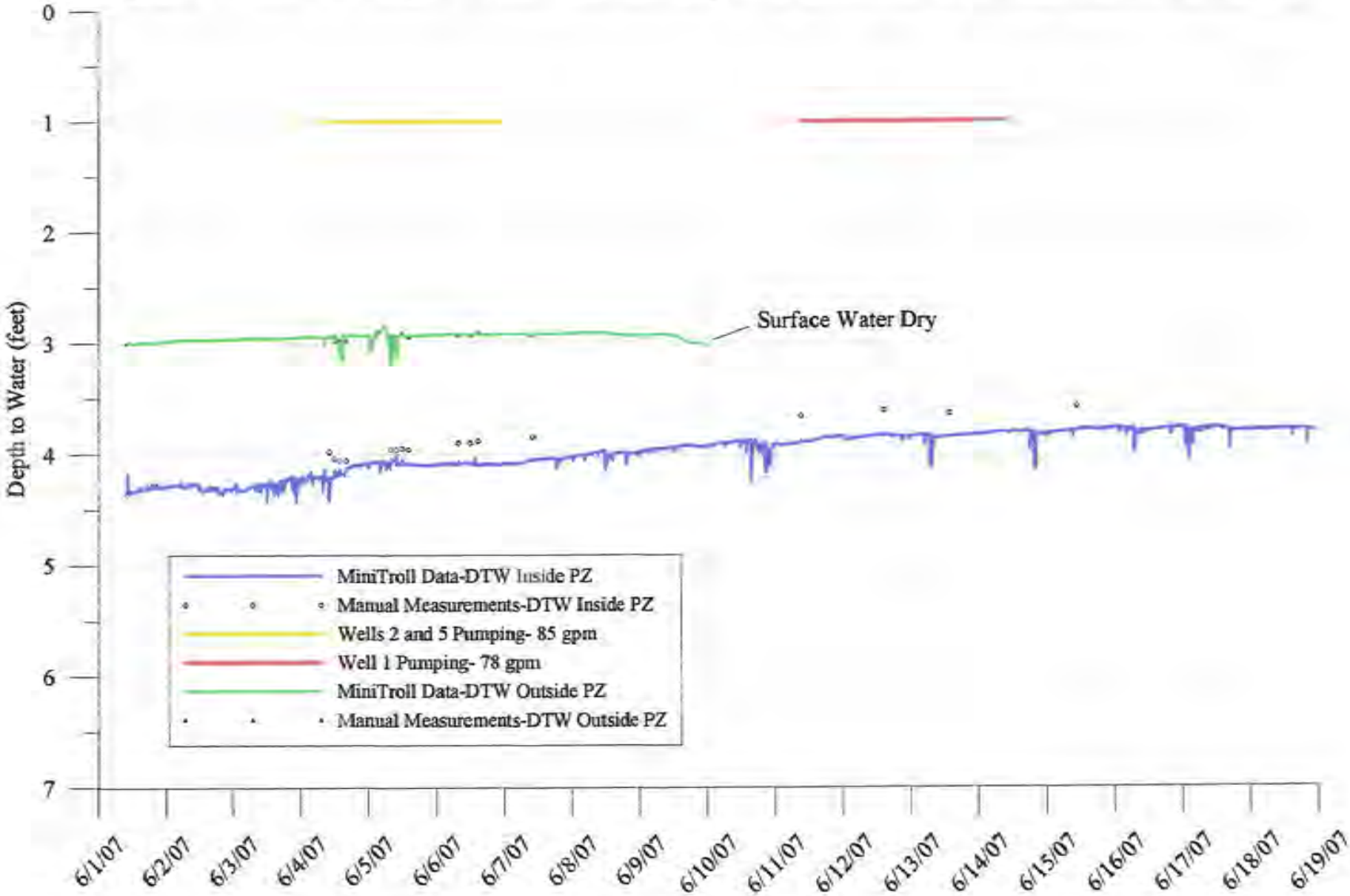
RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Piezometer B During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



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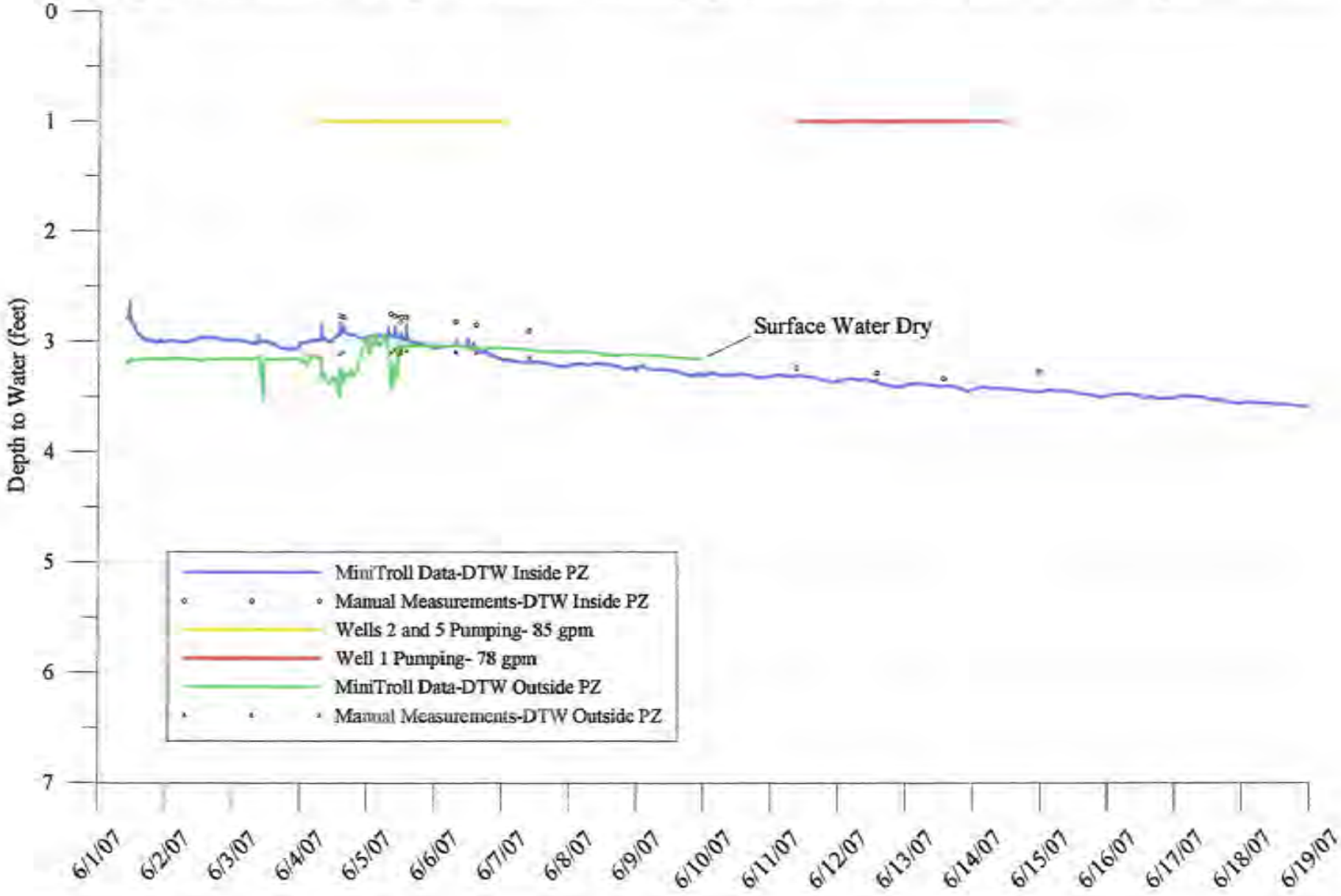
RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Piezometer C During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



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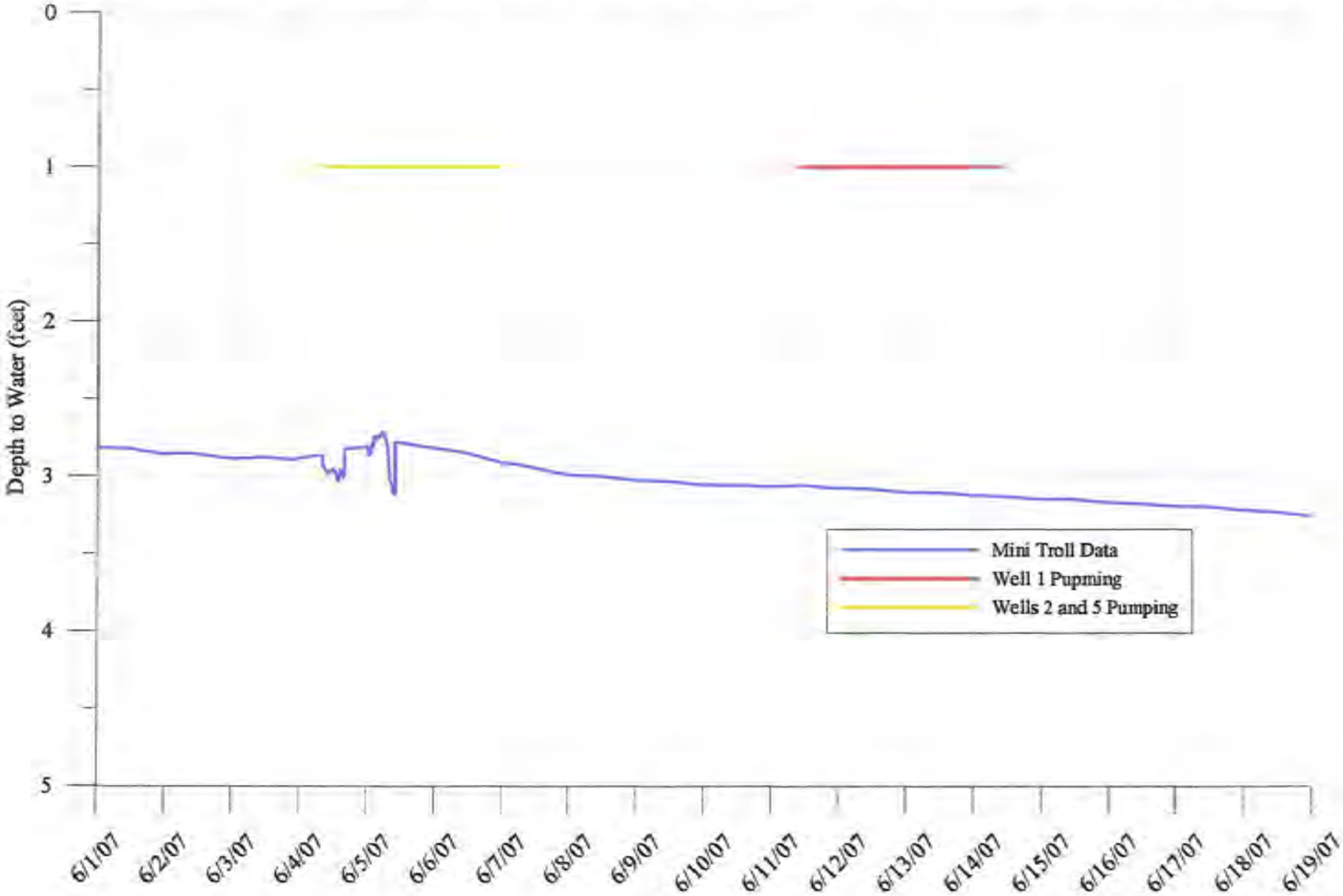
RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Hand Dug Well 1 During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



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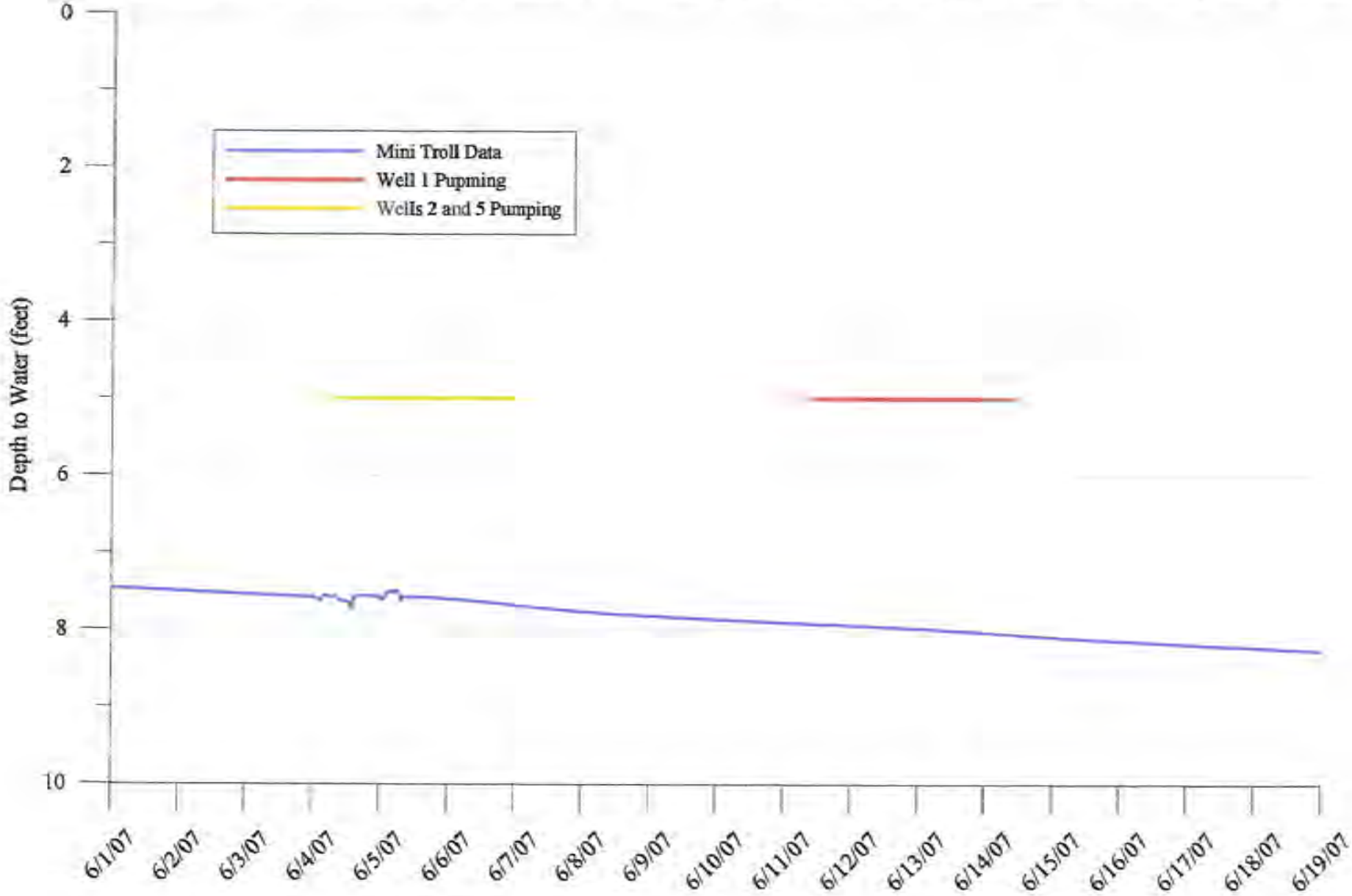
RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Hand Dug Well 2 During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



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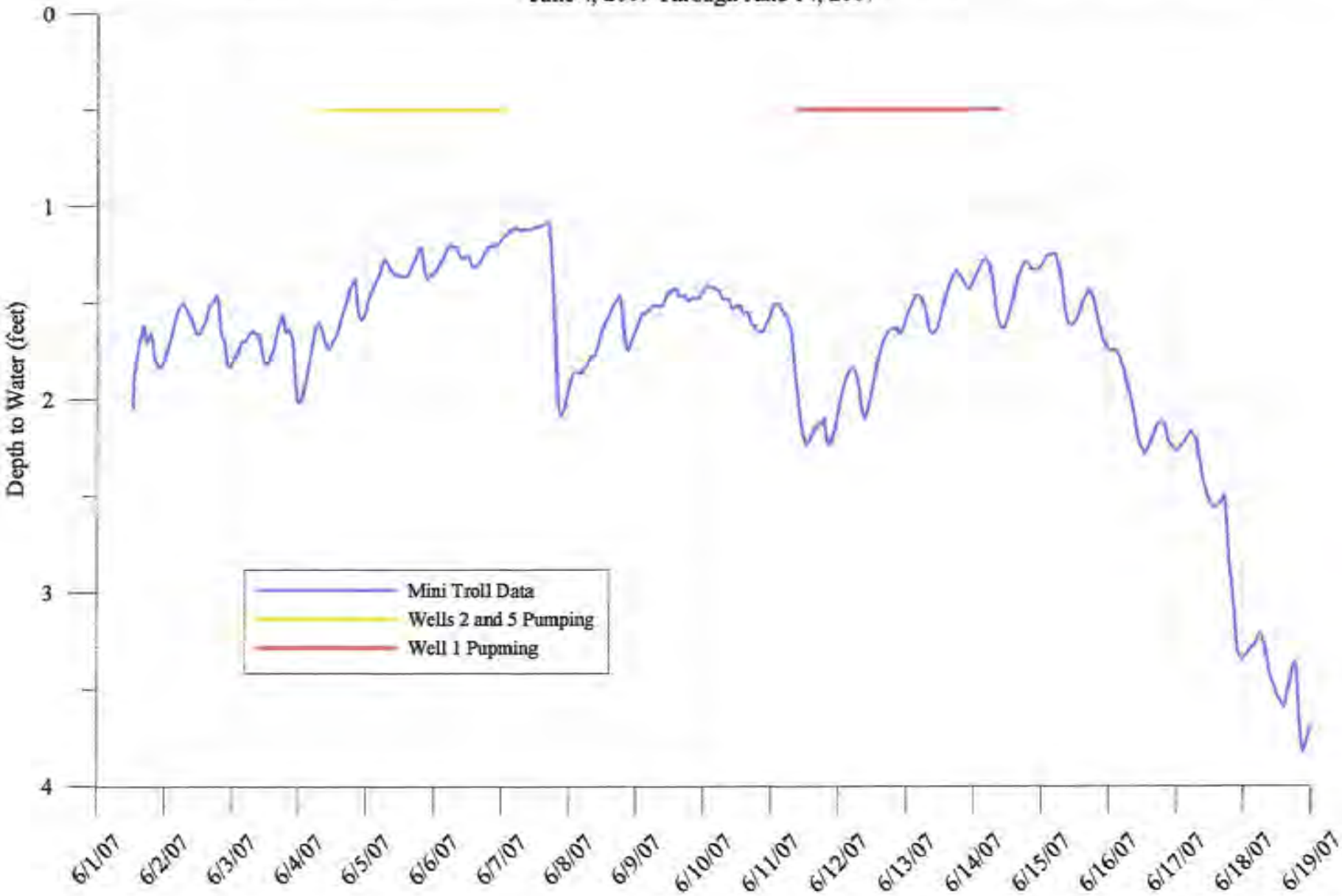
RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

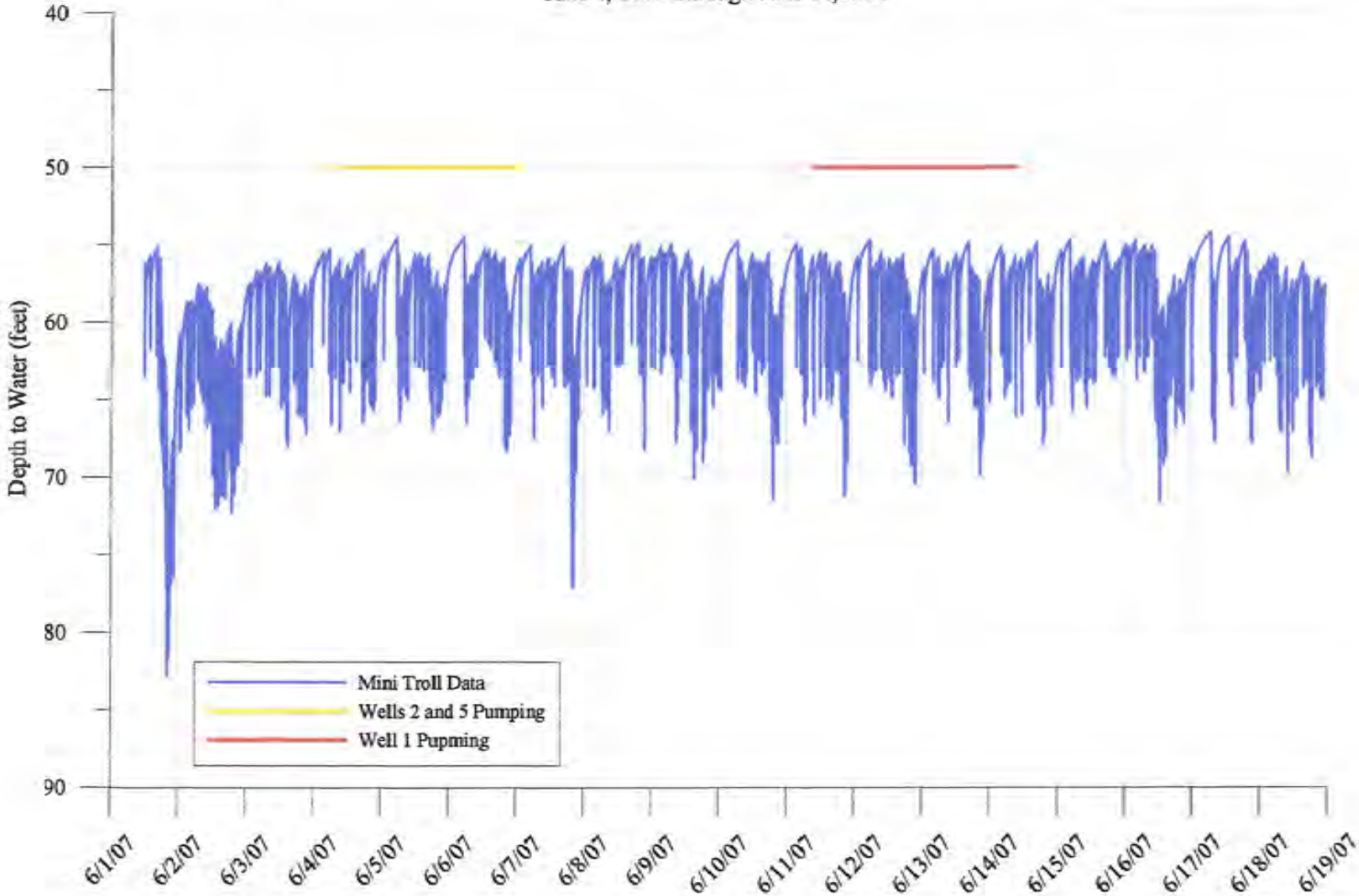
Hydrograph of Heritage at Goshen Well 6 During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5,
June 4, 2007 Through June 14, 2007



LEGGETTE, BRASHEARS & GRAHAM, INC.

RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

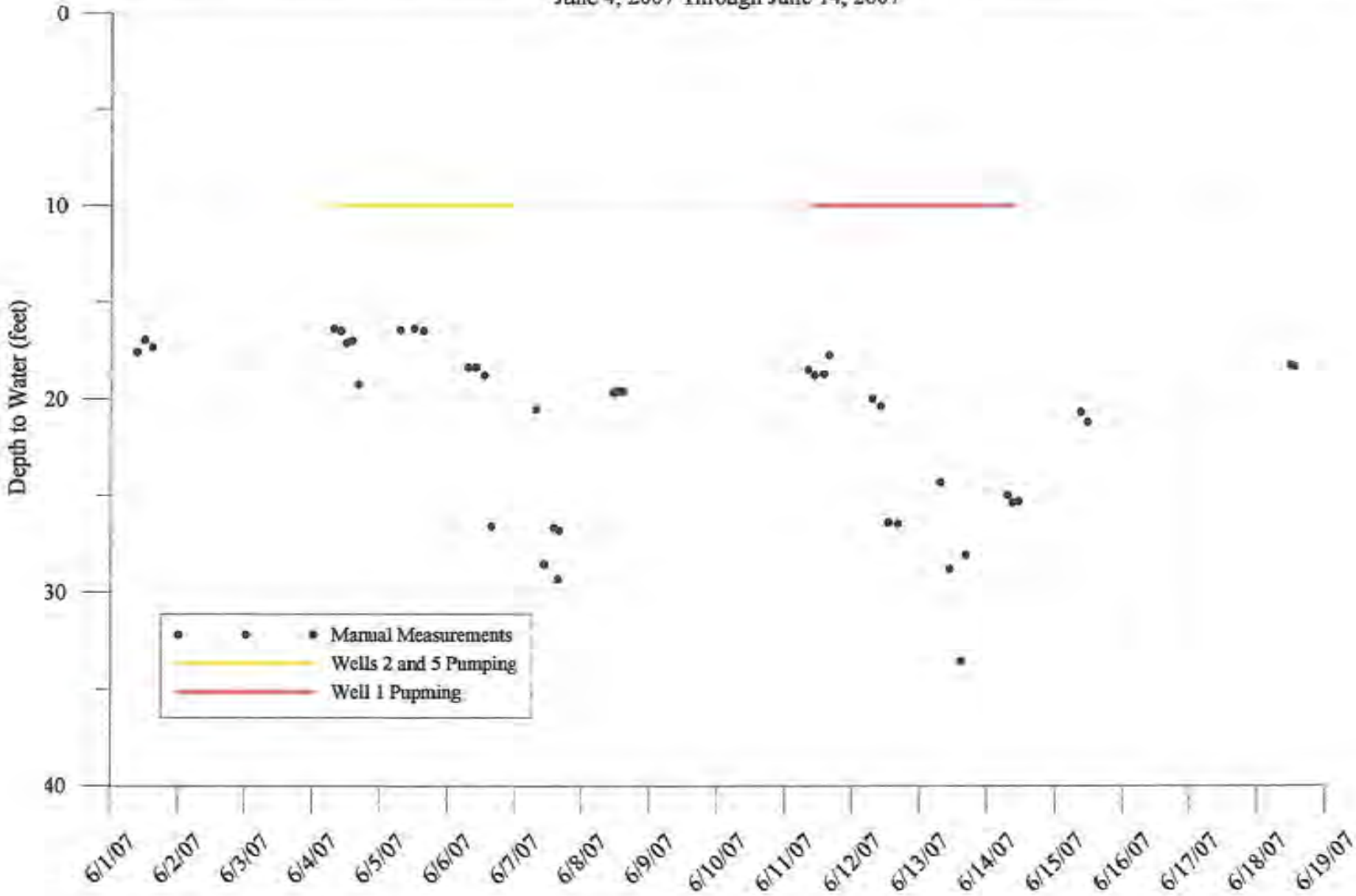
Hydrograph of Residential Well Located at 184 Johnson Road During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



LEGGETTE, BRASHEARS & GRAHAM, INC.

RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

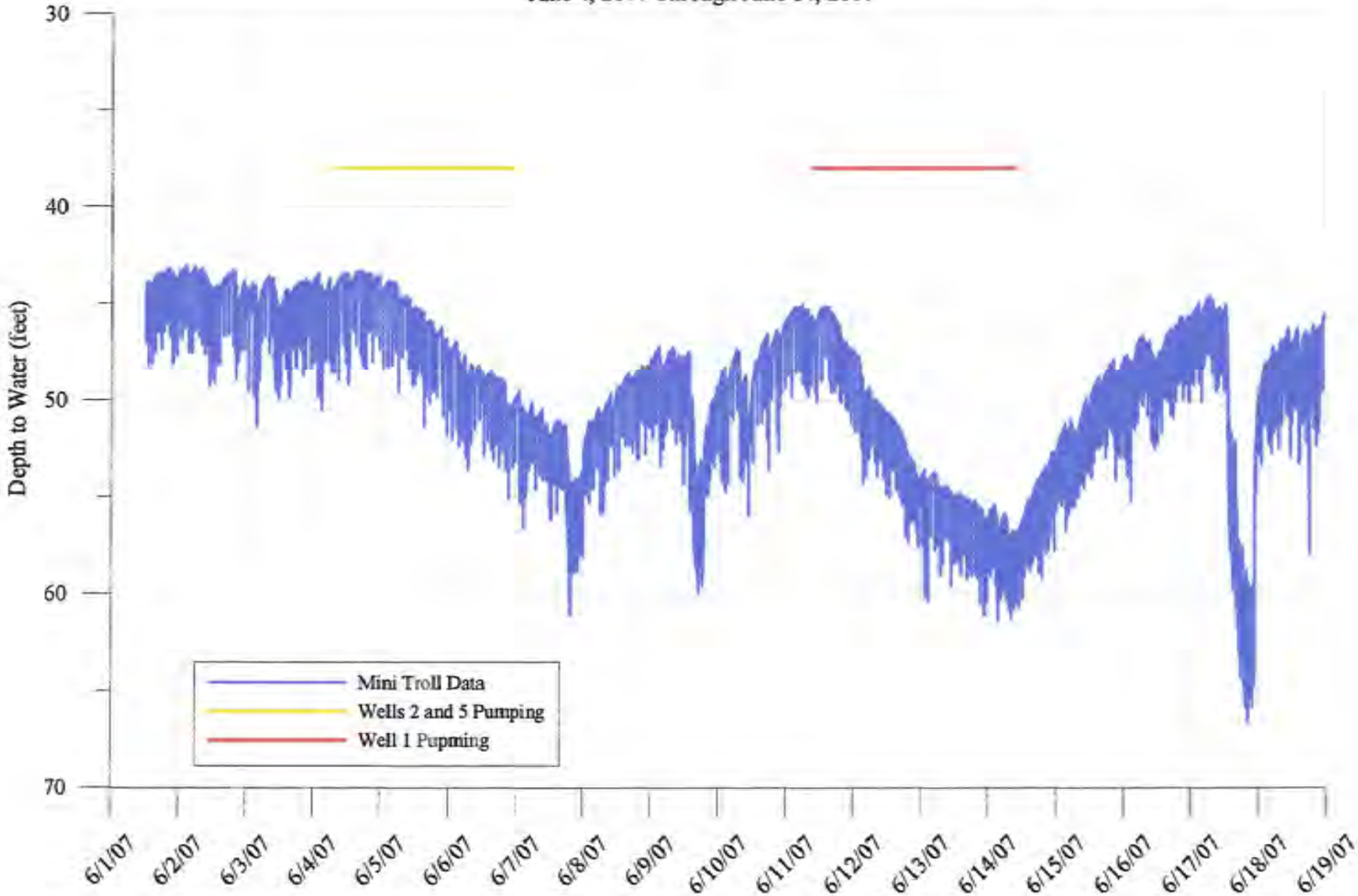
Hydrograph of Residential Well Located at 1 Silver Spring Road During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



LEGGETTE, BRASHEARS & GRAHAM, INC.

RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Residential Well Located at 33 Ridge Road During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



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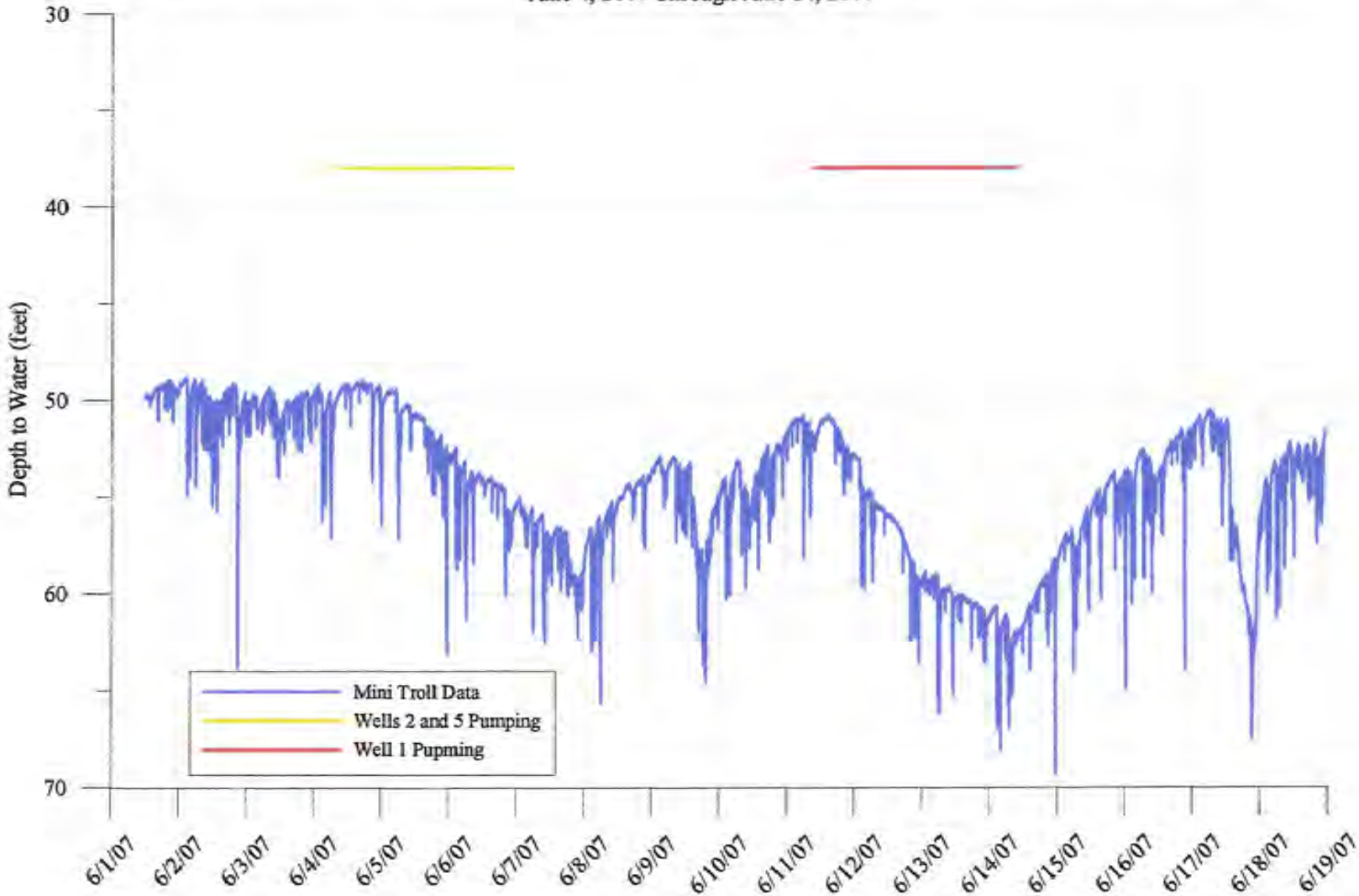
RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Residential Well Located at 37 Ridge Road During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



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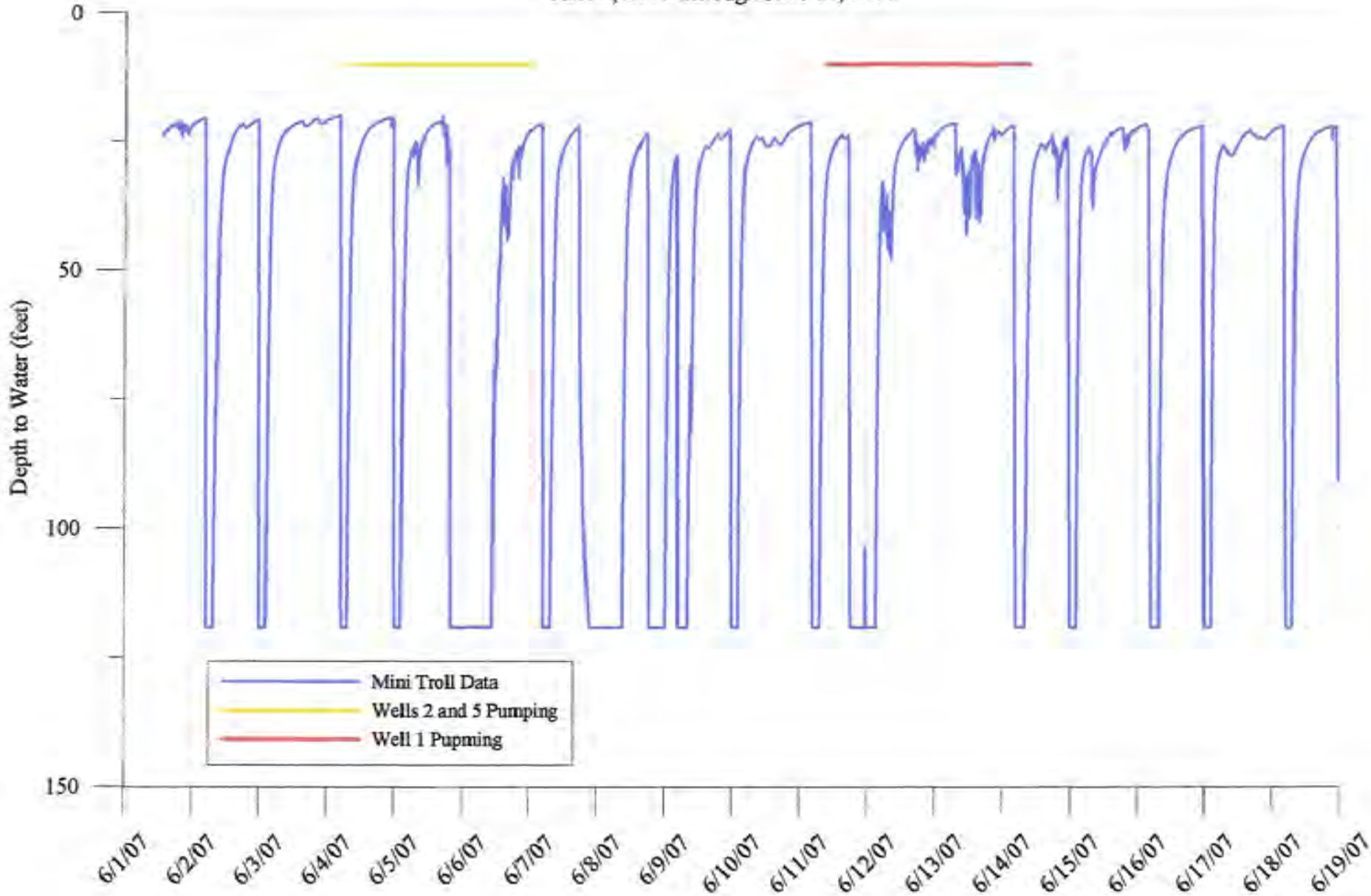
RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Residential Well Located at 2 Pleasant Ridge Run During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



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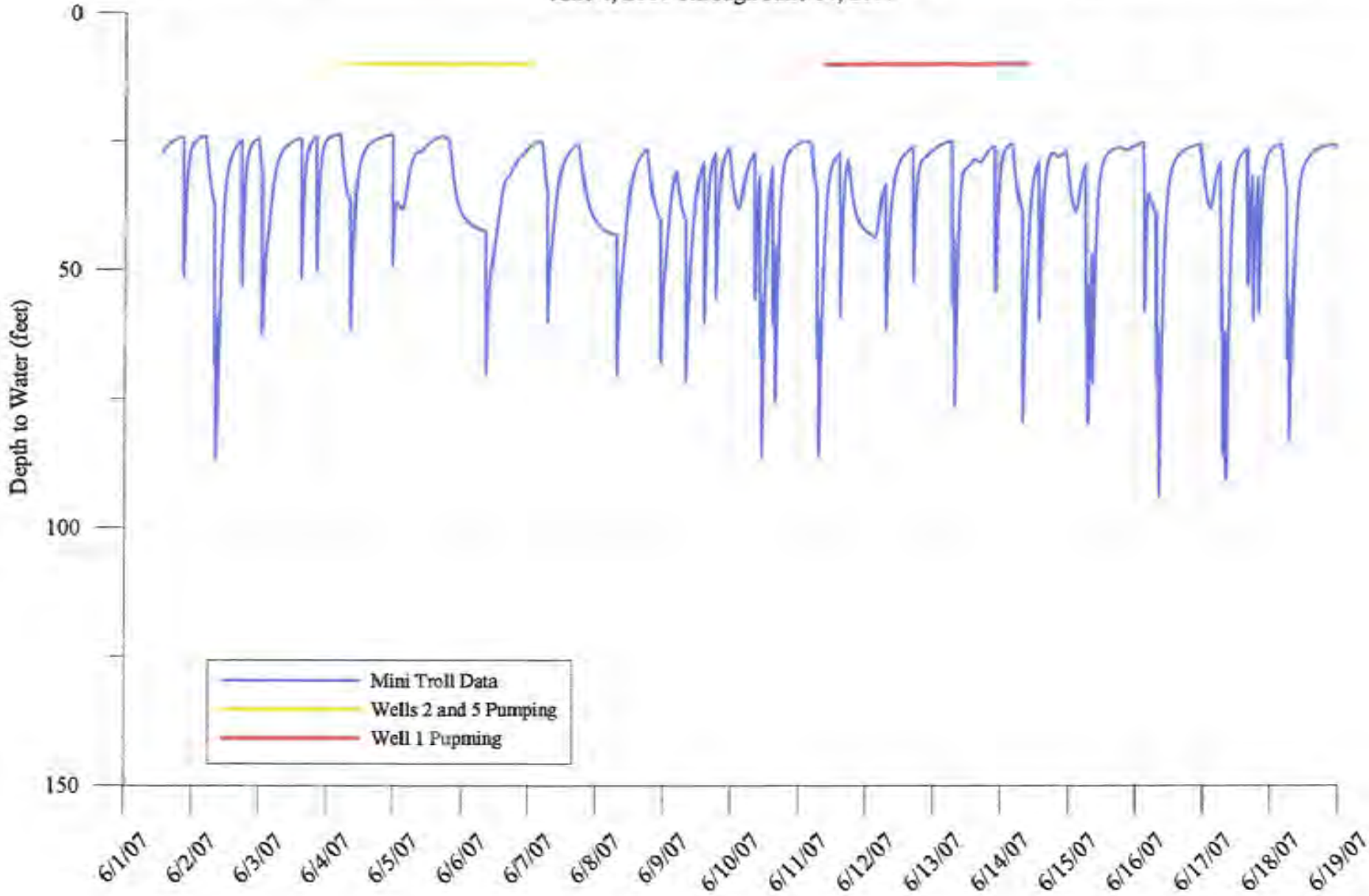
RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Residential Well Located at 4 Pleasant Ridge Run During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



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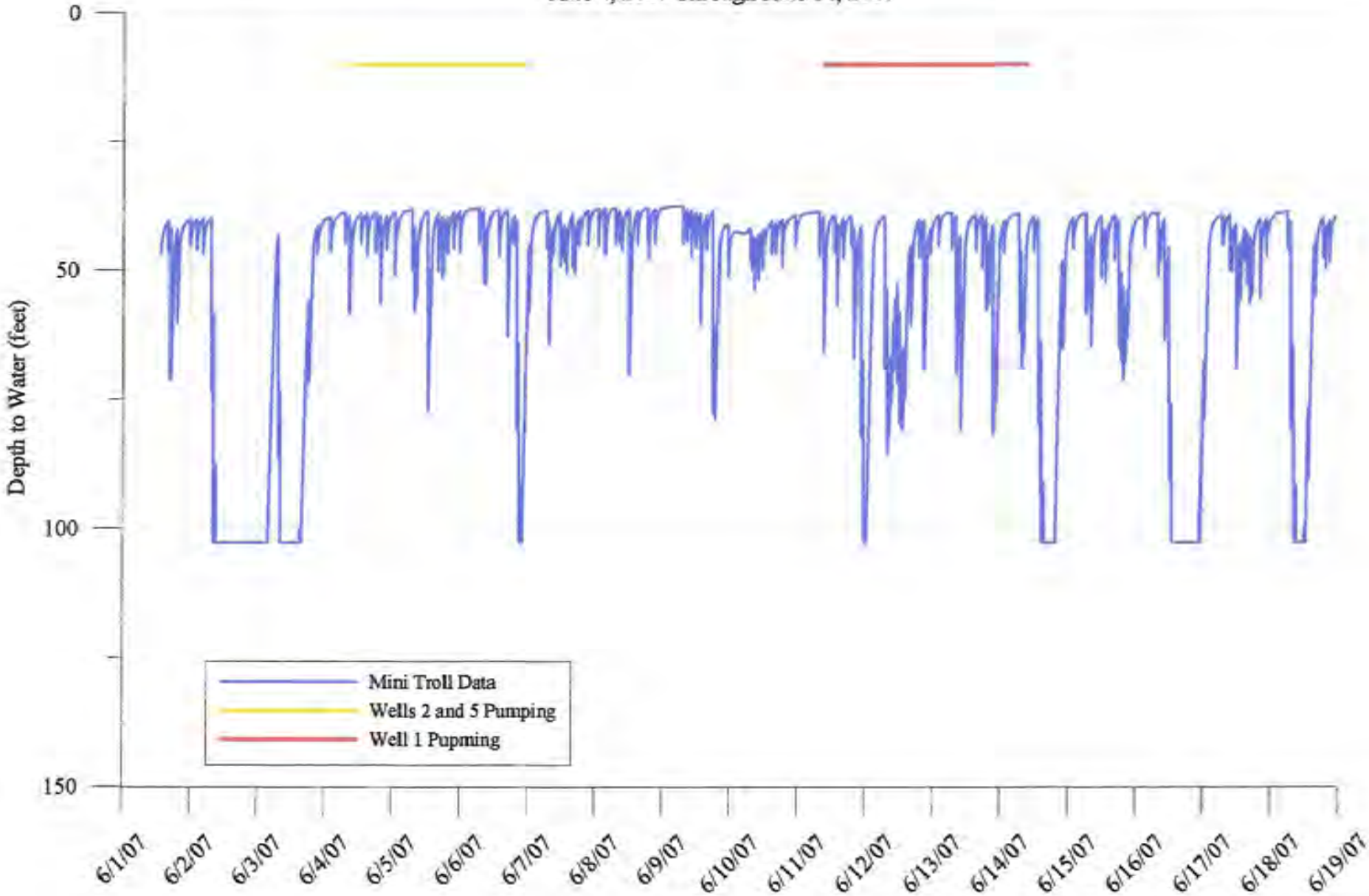
RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Residential Well Located at 6 Pleasant Ridge Run During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



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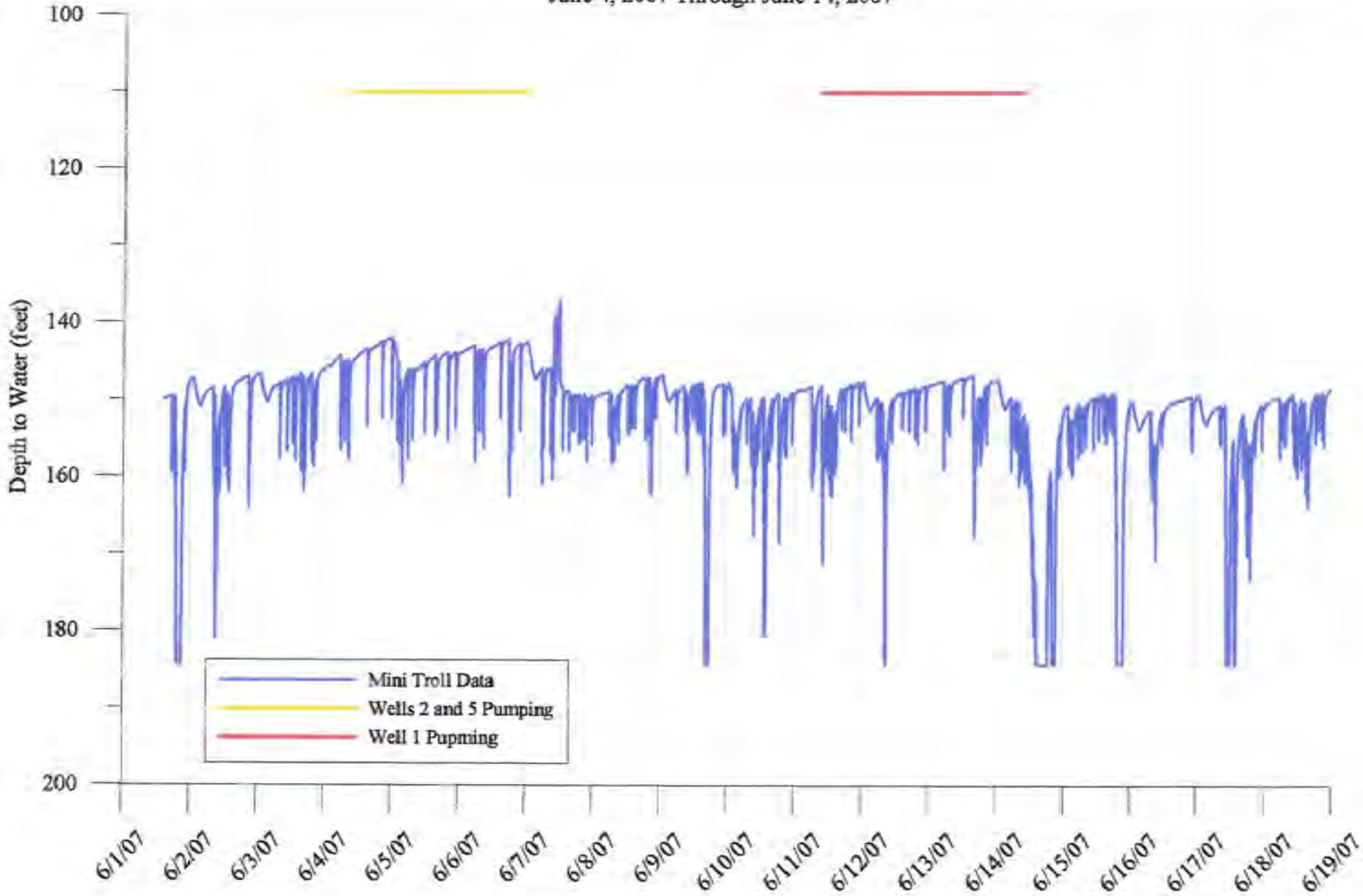
RIEGER HOMES SUBDIVISION
GOSHEN, NEW YORK

Hydrograph of Residential Well Located at 7 Pleasant Ridge Run During Consecutive 72-Hour Pumping Tests of Wells 1, 2 and 5, June 4, 2007 Through June 14, 2007



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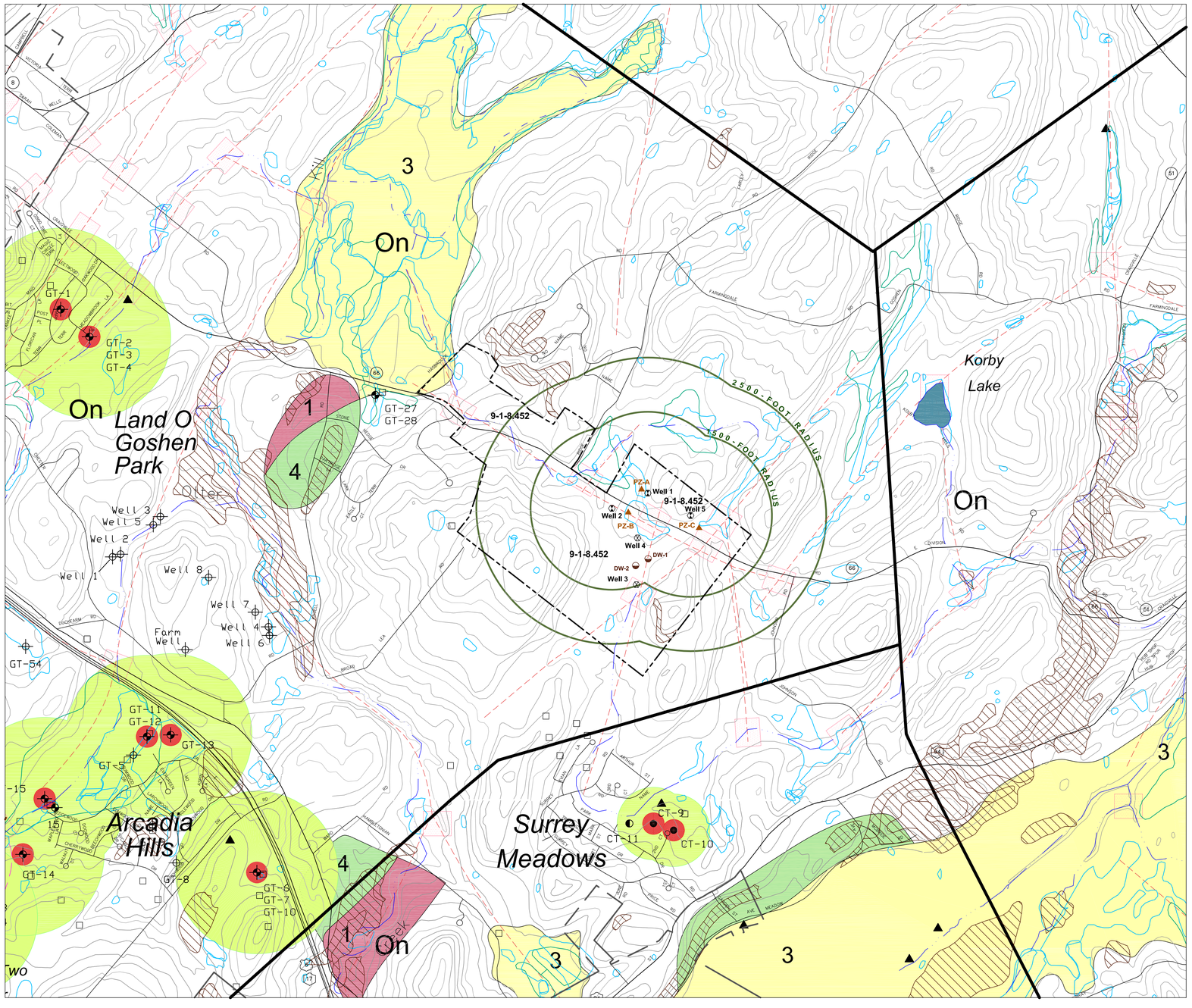

LEGEND

- STRATIFIED SAND AND GRAVEL AT LAND SURFACE, VERTICAL THICKNESS UNKNOWN
- BG-8 — MUNICIPAL/COMMUNITY BEDROCK SUPPLY WELL – IN SERVICE
- BG-10 — MUNICIPAL/COMMUNITY BEDROCK SUPPLY WELL – NOT IN SERVICE
- 1 — MUNICIPAL/COMMUNITY SAND AND GRAVEL SUPPLY WELL – IN SERVICE
- 16 — MUNICIPAL/COMMUNITY SAND AND GRAVEL SUPPLY WELL – NOT IN SERVICE
- EXISTING GROUND–WATER CONTAMINATION SITE *
- POTENTIAL GROUND–WATER CONTAMINATION SITE *
- ONSITE MONITOR WELL LOCATION
- ONSITE PUMPING WELL LOCATION
- APPROXIMATE PIEZOMETER LOCATION
- APPROXIMATE DUG WELL LOCATION
- FAVORABLE LOCATION FOR TARGETING HIGH YIELDING BEDROCK WELL
- FAULT
- GEOLOGIC CONTACT
- FRACTURE TRACE
- UNCONFORMITY
- WETLAND NYSDEC (STATE)
- WETLAND FEDERAL

* LOCATIONS APPROXIMATE, FIELD VERIFICATION REQUIRED.

BEDROCK GEOLOGY

On MARTINSBURG FORMATION – SHALE, SILTSTONE, SANDSTONE AND GRAYWACKE

UNCONSOLIDATED DEPOSITS

1. STRATIFIED SAND AND GRAVEL AT LAND SURFACE AND BELOW THE WATER TABLE
2. STRATIFIED SAND AND GRAVEL BELOW CLAY OR SILT AND THE WATER TABLE
3. STRATIFIED CLAY AND SILT WITH NO OR THIN LAYERS OF SAND AND GRAVEL AT LAND SURFACE AND BELOW THE WATER TABLE
4. STRATIFIED SAND AND GRAVEL AT LAND SURFACE AND ABOVE THE WATER TABLE

REGION WITH PERTINENT HYDROGEOLOGIC DATA TO POSSIBLY DEVELOP HIGH–YEILDING WELL FIELDS

NOTE:

IT SHOULD BE UNDERSTOOD THAT NOT ALL OF THE MAPPED SAND AND GRAVEL DEPOSITS WOULD BE SUITABLE FOR GROUND–WATER SUPPLY DEVELOPMENT.

THE FRACTURE–TRACE MAPS OF THE COUNTY DESIGNATE FAVORABLE LOCATIONS FOR THE DEVELOPMENT OF HIGH–YIELDING BEDROCK WELLS. EXPLORATION FOR WATER FROM BEDROCK SOURCES IS AN INEXACT SCIENCE IN WHICH NOT ALL TEST WELLS CAN BE EXPECTED TO PRODUCE ENOUGH WATER FOR PUBLIC USE IN ADDITION NOT ALL FRACTURES OR FRACTURE TRACES ARE WATER BEARING.

0 1000
SCALE IN FEET

RIEGER HOMES INC.
CRAIGVILLE ROAD PROPERTY
TOWN OF GOSHEN, NEW YORK

BEDROCK GEOLOGY AND FRACTURE TRACE

DATE	REVISED

PREPARED BY:
LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Ground-Water and Environmental Engineering Services
4 Research Drive
Suite 301
Shelton, Connecticut 06484
(203) 929-8555

DRAWN:	FCS	CHECKED:	TPC	DATE:	7/26/07	PLATE:	1

O:\DWG\ORANGE\RIEGER\2007\PL-1.dwg, Plate1, 5/5/2008 3:46:40 PM, Adobe PDF

Appendix G

Tree Survey

Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)
1	Oak	12	**37**	Cherry	12	**73**	Maple	18
2	Oak	15	**38**	Oak	16	**74**	Split Cherry	14
3	Oak	15	**39**	Ash	28	**75**	Cherry	19
4	Oak	14	**40**	Maple	40	**76**	Ash	13
5	Oak	13	**41**	Maple	24	**77**	Cherry	16
6	Oak	22	**42**	Cherry	15	**78**	Cherry	15
7	Oak	20	**43**	Maple	16	**79**	Cherry	16
8	Oak	16	**44**	Maple	12	**80**	Ash	16
9	oak	21	**45**	Maple	14	**81**	Cherry	19
10	Oak	20	**46**	Cherry	18	**82**	Ash	12
11	Oak	21	**47**	Maple	21	**83**	Maple	40
12	Maple	18	**48**	Cherry	20	**84**	Maple	16
13	Ash	20	**49**	Oak	26	**85**	Split Ash	30
14	Oak	14	**50**	Cherry	15	**86**	Black Birch	12
15	Maple	36	**51**	Cherry	18	**87**	Maple	14
16	Cherry	24	**52**	Split Cherry	17	**88**	Split Ash	20
17	Oak	12	**53**	Oak	32	**89**	Oak	16
18	Oak	14	**54**	Maple	19	**90**	Ash	17
19	Ash	12	**55**	Oak	24	**91**	Ash	20
20	Oak	12	**56**	Maple	13	**92**	Oak	16
21	Oak	12	**57**	Cherry	16	**93**	Cherry	24
22	Maple	12	**58**	Cherry	14	**94**	Ash	17
23	Maple	14	**59**	Ash	18	**95**	Ash	15
24	Oak	22	**60**	Cherry	20	**96**	Ash	19
25	Maple	25	**61**	Maple	24	**97**	Oak	14
26	Oak	17	**62**	Maple	14	**98**	Ash	16
27	Ash	13	**63**	Ash	13	**99**	Oak	13
28	Ash	22	**64**	Maple	15	**100**	Ash	17
29	Maple	13	**65**	Cherry	24	**101**	Ash	16
30	Elm	12	**66**	Cherry	18	**102**	Oak	13
31	Cherry	17	**67**	Oak	32	**103**	Oak	14
32	Oak	12	**68**	Maple	16	**104**	Oak	46
33	Ash	21	**69**	Cherry	13	**105**	Oak	20
34	Maple	23	**70**	Oak	12	**106**	Oak	26
35	Ash	21	**71**	Maple	22	**107**	Oak	24
36	Split Cherry	14	**72**	Ash	22	**108**	Oak	28

Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)
109	Oak	26	***145***	Cherry	14	***181***	Maple	14
110	Oak	14	***146***	Oak	14	***182***	Oak	18
111	Oak	22	***147***	Ash	20	***183***	Ash	14
112	Ash	21	***148***	Oak	18	***184***	Cherry	19
113	Oak	17	***149***	Maple	30	***185***	Oak	16
114	Oak	21	***150***	Cherry	12	***186***	Maple	18
115	Ash	16	***151***	Ash	16	***187***	Maple	14
116	Oak	18	***152***	Ash	18	***188***	Oak	26
117	Ash	22	***153***	Cherry	13	***189***	Split Maple	38
118	Oak	14	***154***	Ash	24	***190***	Ash	16
119	Oak	12	***155***	Maple	20	***191***	Maple	13
120	Oak	12	***156***	Ash	14	***192***	Pin Oak	15
121	Cherry	18	***157***	Oak	36	***193***	Pin Oak	24
122	Oak	24	***158***	Ash	13	***194***	Maple	14
123	Cherry	13	***159***	Maple	40	***195***	Ash	15
124	Cherry	12	***160***	Ash	16	***196***	Maple	12
125	Cherry	14	***161***	Ash	20	***197***	Oak	12
126	Cherry	16	***162***	Oak	14	***198***	Oak	26
127	Oak	13	***163***	Maple	22	***199***	Oak	25
128	Split Cherry	14	***164***	Maple	20	***200***	Cherry	14
129	Cherry	14	***165***	Oak	19	***201***	Oak	18
130	Cherry	14	***166***	Maple	26	***202***	Oak	22
131	Ash	16	***167***	Maple	13	***203***	Ash	24
132	Cherry	14	***168***	Maple	30	***204***	Oak	14
133	Split Oak	18	***169***	Oak	14	***205***	Oak	18
134	Oak	18	***170***	Maple	18	***206***	Cherry	14
135	Oak	20	***171***	Cherry	14	***207***	Split Maple	38
136	Oak	20	***172***	Cherry	16	***208***	Maple	18
137	Cherry	12	***173***	Oak	25	***209***	Maple	16
138	Cherry	12	***174***	Cherry	16	***210***	Cherry	14
139	Cherry	15	***175***	Cherry	19	***211***	Maple	14
140	Cherry	14	***176***	Ash	17	***212***	Oak	20
141	Cherry	16	***177***	Cherry	12	***213***	Oak	13
142	Cherry	14	***178***	Oak	14	***214***	Oak	13
143	Oak	14	***179***	Split Cherry	19	***215***	Oak	31
144	Oak	27	***180***	Maple	24	***216***	Ash	19

Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)
217	Oak	15	***253***	Maple	22	***289***	Ash	23
218	Ash	15	***254***	Elm	14	***290***	Oak	16
219	Oak	16	***255***	Oak	15	***291***	Oak	14
220	Ash	24	***256***	Maple	16	***292***	Oak	17
221	Ash	26	***257***	Maple	26	***293***	Walnut	13
222	Split Maple	16	***258***	Maple	14	***294***	Oak	17
223	Oak	28	***259***	Oak	14	***295***	Oak	18
224	Ash	23	***260***	Maple	13	***296***	Walnut	15
225	Ash	19	***261***	Maple	17	***297***	Maple	18
226	Slpit Maple	17	***262***	Oak	28	***298***	Maple	22
227	Maple	15	***263***	Maple	14	***299***	Oak	17
228	Oak	18	***264***	Oak	20	***300***	Walnut	36
229	Ash	18	***265***	Oak	20	***301***	Split Ash	18
230	Pin Oak	14	***266***	Split Maple	16	***302***	Ash	20
231	Ash	18	***267***	Oak	16	***303***	Maple	14
232	Pin Oak	14	***268***	Maple	18	***304***	Ash	14
233	Maple	23	***269***	A	18	***305***	Maple	13
234	Maple	14	***270***	Maple	22	***306***	Ash	19
235	Cherry	16	***271***	Oak	20	***307***	Oak	14
236	Ash	18	***272***	Ash	20	***308***	Ash	17
237	Ash	15	***273***	Oak	15	***309***	Split Walnut	15
238	Maple	16	***274***	Maple	14	***310***	White Oak	38
239	Split Apple	16	***275***	Maple	16	***311***	White Oak	34
240	Maple	12	***276***	Oak	16	***312***	Splitm	16
241	Apple	13	***277***	Oak	20	***313***	Maple	12
242	Cherry	12	***278***	Oak	12	***314***	Maple	22
243	Oak	13	***279***	Oak	13	***315***	Oak	13
244	Maple	20	***280***	Oak	12	***316***	Maple	15
245	Maple	14	***281***	Apple	13	***317***	Oak	17
246	Maple	15	***282***	Maple	26	***318***	Oak	47
247	Maple	16	***283***	Maple	26	***319***	Maple	12
248	Oak	15	***284***	Oak	24	***320***	Cherry	22
249	Maple	15	***285***	Cherry	15	***321***	Oak	13
250	Elm	16	***286***	Oak	20	***322***	Maple	38
251	Maple	16	***287***	Oak	44	***323***	Maple	25
252	Oak	4	***288***	Maple	18	***324***	Maple	48

Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)
325	Oak	14	***361***	Ash	14	***397***	Ash	12
326	Maple	43	***362***	Ash	16	***398***	Walnut	22
327	Oak	14	***363***	Walnut	15	***399***	Ash	12
328	Maple	14	***364***	Maple	13	***400***	Oak	13
329	Ash	13	***365***	Maple	15	***401***	Ash	13
330	Maple	15	***366***	Maple	18	***402***	Walnut	20
331	Oak	13	***367***	Ash	22	***403***	Maple	13
332	Ash	12	***368***	Ash	12	***404***	Maple	12
333	Ash	13	***369***	Maple	14	***405***	Walnut	14
334	Oak	32	***370***	Ash	13	***406***	Walnut	14
335	Maple	16	***371***	Maple	13	***407***	Walnut	15
336	Oak	44	***372***	Maple	16	***408***	Walnut	18
337	Oak	16	***373***	Cherry	14	***409***	Walnut	14
338	Oak	26	***374***	Hickory	22	***410***	Walnut	15
339	Walnut	16	***375***	Maple	16	***411***	Walnut	13
340	Oak	16	***376***	Maple	26	***412***	Walnut	17
341	Split Walnut	16	***377***	Maple	14	***413***	Walnut	18
342	Oak	21	***378***	Maple	13	***414***	Walnut	12
343	Walnut	19	***379***	Maple	20	***415***	Walnut	16
344	Ash	30	***380***	Maple	17	***416***	Walnut	20
345	Walnut	14	***381***	Maple	13	***417***	Walnut	17
346	Oak	15	***382***	Walnut	16	***418***	Walnut	21
347	Maple	13	***383***	Ash	16	***419***	Walnut	16
348	Maple	20	***384***	Maple	16	***420***	Walnut	14
349	Oak	30	***385***	Ash	16	***421***	Walnut	17
350	Maple	20	***386***	Walnut	12	***422***	Walnut	23
351	Oak	15	***387***	Ash	16	***423***	Walnut	24
352	Maple	17	***388***	Ash	15	***424***	Walnut	44
353	Pine	40	***389***	Ash	14	***425***	Walnut	14
354	Cherry	40	***390***	Ash	12	***426***	Walnut	13
355	Maple	29	***391***	Ash	14	***427***	Walnut	16
356	Cherry	14	***392***	Maple	18	***428***	Walnut	17
357	Maple	15	***393***	Ash	20	***429***	Walnut	28
358	Maple	18	***394***	Ash	13	***430***	Walnut	28
359	Maple	13	***395***	Maple	14	***431***	Walnut	25
360	Oak	16	***396***	Ash	14	***432***	Maple	12

Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)
433	Walnut	34	***469***	Maple	16	***505***	Maple	22
434	Cherry	14	***470***	Ash	15	***506***	Ash	15
435	Ash	16	***471***	Ash	12	***507***	Elm	12
436	Ash	12	***472***	Ash	18	***508***	Ash	14
437	Oak	28	***473***	Oak	14	***509***	Ash	17
438	Oak	13	***474***	Ash	13	***510***	Ash	14
439	Oak	29	***475***	Oak	12	***511***	Oak	19
440	Oak	34	***476***	Ash	16	***512***	Oak	15
441	Ash	12	***477***	Ash	16	***513***	Maple	12
442	Oak	20	***478***	Ash	12	***514***	Ash	14
443	Cherry	14	***479***	Black Birch	12	***515***	Apple	15
444	Oak	24	***480***	Ash	14	***516***	Ash	12
445	Oak	24	***481***	Ash	18	***517***	Apple	12
446	Oak	21	***482***	Ash	20	***518***	Maple	12
447	Cherry	12	***483***	Maple	17	***519***	Ash	20
448	Maple	12	***484***	Split Ash	17	***520***	Split Ash	14
449	Maple	12	***485***	Ash	12	***521***	Oak	22
450	Ash	14	***486***	Ash	18	***522***	Oak	13
451	Oak	16	***487***	Ash	13	***523***	Oak	12
452	Oak	15	***488***	Split Ash	24	***524***	Ash	12
453	Oak	17	***489***	Ash	14	***525***	Ash	15
454	Ash	20	***490***	Ash	14	***526***	Oak	14
455	Ash	12	***491***	Oak	18	***527***	Ash	13
456	Ash	12	***492***	Maple	13	***528***	Oak	13
457	Ash	12	***493***	Ash	13	***529***	Ash	12
458	Oak	19	***494***	Ash	14	***530***	Ash	12
459	Oak	16	***495***	Ash	20	***531***	Elm	12
460	Oak	16	***496***	Ash	14	***532***	Maple	13
461	Maple	15	***497***	Oak	18	***533***	Ash	13
462	Ash	13	***498***	Oak	22	***534***	Ash	18
463	Ash	12	***499***	Ash	16	***536***	Ash	15
464	Ash	15	***500***	Oak	18	***537***	Oak	12
465	Ash	19	***501***	Ash	15	***538***	Oak	18
466	Oak	16	***502***	Split Oak	15	***539***	Oak	13
467	Maple	14	***503***	Oak	20	***540***	Oak	18
468	Ash	12	***504***	Maple	12	***541***	Oak	16

Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)
542	Split Maple	48	***578***	Ash	14	***614***	Oak	12
543	Oak	14	***579***	Oak	12	***615***	Maple	15
544	Black Birch	12	***580***	Oak	12	***616***	Ash	18
545	Green Ash	13	***581***	Ash	17	***617***	Split Ash	12
546	Oak	13	***582***	Ash	13	***618***	Ash	15
547	White Oak	12	***583***	Ash	17	***619***	Ash	16
548	Oak	15	***584***	Ash	14	***620***	Split Ash	18
549	Ash	15	***585***	Ash	16	***621***	Ash	18
550	Ash	12	***586***	Ash	16	***622***	Ash	14
551	Elm	16	***587***	Ash	15	***623***	Oak	13
552	Ash	12	***588***	Ash	14	***624***	Ash	18
553	Ash	20	***589***	Oak	12	***625***	Split Ash	12
554	Ash	12	***590***	Ash	13	***626***	Ash	16
555	Oak	12	***591***	Maple	13	***627***	Ash	13
556	Split Ash	13	***592***	Ash	14	***628***	Ash	15
557	Cherry	12	***593***	Ash	12	***629***	Ash	12
558	Split Maple	20	***594***	Oak	28	***630***	Split Ash	16
559	Ash	13	***595***	Ash	12	***631***	Split Maple	22
560	Cherry	16	***596***	Oak	13	***632***	Split Maple	14
561	Ash	34	***597***	Oak	21	***633***	Ash	13
562	Oak	16	***598***	Black Birch	14	***634***	Maple	24
563	Split Maple	20	***599***	Maple	35	***635***	Maple	13
564	Ash	12	***600***	Oak	24	***636***	Split Maple	40
565	Ash	14	***601***	Ash	12	***637***	Split Ash	13
566	Ash	13	***602***	Ash	18	***638***	Oak	20
567	Maple	18	***603***	Oak	12	***639***	Ash	16
568	Ash	13	***604***	Maple	16	***640***	Split Ash	32
569	Oak	15	***605***	Split Ash	17	***641***	Oak	12
570	Oak	12	***606***	Ash	15	***642***	Ash	13
571	Elm	12	***607***	Split Maple	13	***643***	Split Ash	14
572	Split Ash	15	***608***	Split Ash	12	***644***	Maple	15
573	Oak	16	***609***	Oak	19	***645***	Split Ash	18
574	Split Ash	44	***610***	Maple	28	***646***	Maple	16
575	Ash	19	***611***	Ash	20	***647***	Maple	12
576	Oak	14	***612***	Maple	12	***648***	Split Ash	12
577	Split Ash	15	***613***	Oak	15	***649***	Split Ash	13

Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)
650	Split Ash	12	***686***	Ash	14	***722***	Split Ash	12
651	Ash	17	***687***	Split Ash	14	***723***	Oak	24
652	Ash	14	***688***	Maple	15	***724***	Ash	14
653	Ash	14	***689***	Ash	14	***725***	Oak	22
654	Maple	13	***690***	Maple	15	***726***	Ash	12
655	Cherry	13	***691***	Maple	17	***727***	Ash	14
656	Split Ash	16	***692***	Maple	18	***728***	Ash	13
657	Ash	15	***693***	Maple	13	***729***	Maple	13
658	Split Ash	15	***694***	Oak	25	***730***	Ash	16
659	Cherry	13	***695***	Oak	14	***731***	Ash	13
660	Slplit as	18	***696***	Cherry	12	***732***	Oak	18
661	Maple	16	***697***	Split Ash	12	***733***	Oak	14
662	Maple	14	***698***	Split Maple	14	***734***	Oak	34
663	Oak	14	***699***	Ash	15	***735***	Maple	12
664	Split Ash	14	***700***	Ash	13	***736***	Maple	22
665	Cherry	14	***701***	Maple	12	***737***	Oak	15
666	Maple	14	***702***	Maple	14	***738***	Maple	13
667	Maple	16	***703***	Ash	18	***739***	Maple	13
668	Cherry	12	***704***	Oak	12	***740***	Oak	43
669	Maple	14	***705***	Ash	20	***741***	Oak	14
670	Maple	15	***706***	Split Ash	14	***742***	Oak	30
671	Oak	12	***707***	Ash	14	***743***	Oak	12
672	Split Maple	16	***708***	Ash	13	***744***	Maple	14
673	Maple	16	***709***	Maple	13	***745***	Oak	28
674	Cherry	12	***710***	Ash	16	***746***	Maple	16
675	Split Ash	12	***711***	Split Cherry	12	***747***	Oak	17
676	Split Ash	14	***712***	Maple	16	***748***	Maple	14
677	Maple	13	***713***	Split Ash	12	***749***	Split Cherry	19
678	Maple	18	***714***	Ash	13	***750***	Oak	18
679	Maple	12	***715***	Oak	12	***751***	Cherry	14
680	Split Ash	16	***716***	Split Ash	13	***752***	Oak	16
681	Ash	18	***717***	Oak	18	***753***	Split Maple	16
682	Split Maple	14	***718***	Ash	16	***754***	Maple	13
683	Split Ash	12	***719***	Ash	14	***755***	Split Maple	28
684	Maple	12	***720***	Oak	12	***756***	Oak	12
685	Oak	12	***721***	Oak	24	***757***	Oak	13

Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)
758	Oak	12	***794***	Oak	13	***830***	Maple	24
759	Maple	14	***795***	Oak	45	***831***	Split Ash	14
760	Maple	16	***796***	Ash	13	***832***	Ash	13
761	Maple	12	***797***	Ash	20	***833***	Oak	23
762	Ash	14	***798***	Split Maple	19	***834***	Oak	16
763	Oak	15	***799***	Maple	12	***835***	Oak	13
764	Maple	14	***800***	Oak	23	***836***	Oak	15
765	Maple	20	***801***	Maple	14	***837***	Maple	12
766	Ash	24	***802***	Beech	12	***838***	Maple	21
767	Cherry	14	***803***	Maple	13	***839***	Ash	18
768	Oak	18	***804***	Maple	12	***840***	Ash	19
769	Ash	13	***805***	Maple	16	***841***	Oak	34
770	Oak	13	***806***	Split Ash	15	***842***	Ash	13
771	Oak	48	***807***	Oak	12	***843***	Maple	14
772	Split Ash	13	***808***	Split Oak	47	***844***	Maple	30
773	Oak	20	***809***	Maple	20	***845***	Ash	18
774	Split Maple	14	***810***	Oak	30	***846***	Oak	18
775	Oak	22	***811***	Maple	14	***847***	Ash	13
776	Maple	14	***812***	Black Birch	16	***848***	Maple	14
777	Oak	14	***813***	Oak	18	***849***	Split Ash	16
778	Maple	17	***814***	Oak	17	***850***	Ash	12
779	Oak	13	***815***	Ash	14	***851***	Oak	16
780	Oak	18	***816***	Maple	12	***852***	Oak	17
781	Oak	18	***817***	Maple	16	***853***	Maple	18
782	Black Birch	16	***818***	Ash	16	***854***	Ash	12
783	Oak	14	***819***	Split Ash	18	***855***	Maple	20
784	Hickory	13	***820***	Maple	13	***856***	Maple	14
785	Split Ash	15	***821***	Oak	18	***857***	Ash	18
786	Oak	21	***822***	Maple	14	***858***	Oak	12
787	Black Birch	16	***823***	Oak	19	***859***	Ash	32
788	Oak	44	***824***	Oak	19	***860***	Oak	16
789	Oak	12	***825***	Maple	22	***861***	Maple	20
790	Oak	19	***826***	Maple	12	***862***	Split Ash	16
791	Ash	14	***827***	Oak	15	***863***	Maple	14
792	Split Black Birch	13	***828***	Oak	22	***864***	Maple	12
793	Oak	12	***829***	Maple	13	***865***	Maple	18

Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)
866	Oak	16	**902**	Oak	22	**938**	Maple	34
867	Maple	12	**903**	Oak	13	**939**	Oak	25
868	Oak	18	**904**	Oak	20	**940**	Maple	12
869	Oak	12	**905**	Oak	24	**941**	Maple	12
870	Ash	26	**906**	Split Maple	20	**942**	Oak	16
871	Maple	12	**907**	Oak	24	**943**	Oak	12
872	Maple	13	**908**	Oak	24	**944**	Maple	16
873	Maple	12	**909**	Oak	14	**945**	Maple	16
874	Ash	16	**910**	Beech	14	**946**	wa	22
875	Ash	20	**911**	Hornbeam	12	**947**	Oak	20
876	Ash	18	**912**	Oak	22	**948**	Oak	16
877	Ash	20	**913**	Oak	22	**949**	Ash	16
878	Oak	12	**914**	Split Maple	16	**950**	Walnut	12
879	Maple	14	**915**	Split Maple	34	**951**	Oak	19
880	Maple	12	**916**	Maple	23	**952**	Oak	21
881	Maple	16	**917**	Ash	20	**953**	Oak	18
882	Ash	15	**918**	Maple	14	**954**	Ash	14
883	Ash	14	**919**	Split Maple	39	**955**	Oak	12
884	Ash	14	**920**	Split Maple	46	**956**	Maple	13
885	Maple	18	**921**	Maple	13	**957**	Ash	17
886	Maple	12	**922**	Maple	12	**958**	Apple	12
887	Ash	14	**923**	Ash	22	**959**	Maple	13
888	Ash	14	**924**	Maple	15	**960**	Maple	14
889	Ash	38	**925**	Maple	17	**961**	Split Maple	12
890	Maple	12	**926**	Oak	16	**962**	Maple	12
891	Ash	14	**927**	Black Birch	13	**963**	Oak	26
892	Oak	12	**928**	Maple	22	**964**	Maple	14
893	Split Maple	20	**929**	Ash	18	**965**	Ash	15
894	Ash	16	**930**	Oak	13	**966**	Oak	29
895	Ash	13	**931**	Maple	13	**967**	Oak	13
896	Ash	22	**932**	Walnut	24	**968**	Oak	15
897	Cherry	14	**933**	Oak	12	**969**	Split Maple	12
898	Oak	18	**934**	Split Maple	36	**970**	Oak	16
899	Oak	12	**935**	Oak	13	**971**	Split Oak	14
900	Ash	22	**936**	Split Maple	32	**972**	Split Oak	16
901	Split Maple	12	**937**	Oak	28	**973**	Split Maple	14

Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)
974	Oak	12	***1010***	Ash	18	***1046***	Maple	13
975	Oak	14	***1011***	Maple	14	***1047***	Oak	33
976	Maple	12	***1012***	Maple	16	***1048***	Walnut	38
977	Maple	12	***1013***	Walnut	32	***1049***	Walnut	16
978	Ash	16	***1014***	Split Maple	13	***1050***	Walnut	25
979	Split Ash	12	***1015***	Oak	16	***1051***	Maple	12
980	Tri-Stemed Oak	14	***1016***	Maple	13	***1052***	Maple	14
981	Maple	12	***1017***	Walnut	26	***1053***	Walnut	21
982	Ash	16	***1018***	Ash	15	***1054***	Walnut	16
983	Maple	13	***1019***	Oak	14	***1055***	Ash	12
984	Maple	23	***1020***	Maple	21	***1056***	Ash	16
985	Ash	14	***1021***	Maple	16	***1057***	Maple	12
986	Oak	28	***1022***	Maple	20	***1058***	Maple	12
987	Split Maple	12	***1023***	Oak	12	***1059***	Walnut	16
988	Maple	12	***1024***	Oak	14	***1060***	Walnut	24
989	Maple	17	***1025***	Maple	13	***1061***	Walnut	21
990	Oak	12	***1026***	Maple	21	***1062***	Ash	16
991	Oak	13	***1027***	Maple	20	***1063***	Ash	20
992	Oak	14	***1028***	Walnut	15	***1064***	Oak	14
993	Maple	14	***1029***	Maple	16	***1065***	Walnut	18
994	Oak	18	***1030***	Oak	28	***1066***	Maple	26
995	Oak	14	***1031***	Oak	22	***1067***	Maple	20
996	Split Maple	12	***1032***	Oak	14	***1068***	Ash	19
997	Maple	14	***1033***	Hickory	24	***1069***	Oak	30
998	Maple	14	***1034***	Oak	34	***1070***	Split Oak	16
999	Oak	13	***1035***	Split Ash	20	***1071***	Oak	18
1000	Maple	13	***1036***	Walnut	21	***1072***	Maple	16
1001	Maple	16	***1037***	Maple	12	***1073***	Maple	14
1002	Walnut	20	***1038***	Oak	12	***1074***	Maple	18
1003	Maple	30	***1039***	Hickory	15	***1075***	Split Ash	26
1004	Ash	13	***1040***	Oak	24	***1076***	Maple	24
1005	Oak	12	***1041***	Maple	17	***1077***	Black Birch	13
1006	Oak	12	***1042***	Walnut	27	***1078***	Maple	19
1007	Ash	15	***1043***	Walnut	16	***1079***	Maple	15
1008	Maple	13	***1044***	Walnut	16	***1080***	Beech	14
1009	Maple	18	***1045***	Hickory	26	***1081***	Ash	26

Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)
1082	Oak	20	***1118***	Maple	18	***1154***	Ash	18
1083	Oak	14	***1119***	Maple	21	***1155***	Maple	16
1084	Maple	16	***1120***	Maple	22	***1156***	Maple	14
1085	Ash	12	***1121***	Maple	14	***1157***	Maple	20
1086	Maple	13	***1122***	Maple	15	***1158***	Maple	32
1087	Maple	12	***1123***	Maple	19	***1159***	Cherry	20
1088	Maple	18	***1124***	Maple	18	***1160***	Maple	18
1089	Maple	14	***1125***	Maple	13	***1161***	Maple	30
1090	Maple	14	***1126***	Maple	12	***1162***	Cherry	16
1091	Maple	12	***1127***	Maple	19	***1163***	Maple	20
1092	Maple	12	***1128***	Maple	20	***1164***	Oak	51
1093	Maple	22	***1129***	Maple	40	***1165***	Ash	18
1094	Maple	12	***1130***	Maple	31	***1166***	Oak	21
1095	Maple	12	***1131***	Maple	28	***1167***	Oak	14
1096	Maple	14	***1132***	Oak	13	***1168***	Maple	12
1097	Oak	14	***1133***	Oak	15	***1169***	Ash	29
1098	Maple	18	***1134***	Split Maple	36	***1170***	Oak	12
1099	Ash	17	***1135***	Black Birch	14	***1171***	Elm	12
1100	Black Birch	18	***1136***	Oak	34	***1172***	Split Maple	18
1101	Maple	25	***1137***	Ash	12	***1173***	Oak	12
1102	Maple	18	***1138***	Oak	19	***1174***	Maple	18
1103	Oak	36	***1139***	Ash	14	***1175***	Oak	14
1104	Maple	13	***1140***	Maple	13	***1176***	Ash	12
1105	Black Birch	16	***1141***	Maple	21	***1177***	Oak	17
1106	Oak	40	***1142***	Maple	14	***1178***	Maple	14
1107	Maple	16	***1143***	Maple	14	***1179***	Oak	20
1108	Maple	17	***1144***	Ash	15	***1180***	Ash	13
1109	Maple	15	***1145***	Split Maple	48	***1181***	Oak	12
1110	Maple	17	***1146***	Split Maple	40	***1182***	Ash	17
1111	Hickory	14	***1147***	Ash	12	***1183***	Maple	17
1112	Oak	22	***1148***	Maple	16	***1184***	Maple	12
1113	Maple	13	***1149***	Maple	26	***1185***	Oak	13
1114	Oak	16	***1150***	Maple	23	***1186***	Oak	12
1115	Maple	22	***1151***	Maple	29	***1187***	Maple	13
1116	Maple	13	***1152***	Maple	18	***1188***	Maple	16
1117	Maple	24	***1153***	Maple	18	***1189***	Maple	13

Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)
1190	Maple	24	***1226***	Maple	16	***1262***	S Maple	18
1191	Maple	24	***1227***	Oak	12	***1263***	R Maple	20
1192	Split Maple	20	***1228***	Oak	28	***1264***	R Maple	12
1193	Ash	13	***1229***	Oak	24	***1265***	Ash	15
1194	Ash	14	***1230***	Ash	18	***1266***	R Oak	16
1195	Maple	12	***1231***	Oak	12	***1267***	Ash	13
1196	Split Maple	18	***1232***	Split Maple	16	***1268***	Oak	21
1197	Maple	17	***1233***	Maple	21	***1269***	Ash	12
1198	Maple	15	***1234***	Oak	35	***1270***	Ash	12
1199	Ash	12	***1235***	Maple	16	***1271***	W Oak	15
1200	Oak	22	***1236***	Oak	26	***1272***	R Maple	12
1201	Maple	30	***1237***	Maple	13	***1273***	Oak	18
1202	Ash	16	***1238***	Maple	18	***1274***	Pin Oak	22
1203	Maple	17	***1239***	Maple	18	***1275***	Black Birch	14
1204	Ash	15	***1240***	Maple	18	***1276***	Ash	15
1205	Maple	18	***1241***	Pin Oak	13	***1277***	Split S Maple	52
1206	Maple	17	***1242***	Split Maple	26	***1278***	Ash	13
1207	Maple	17	***1243***	Split Maple	20	***1279***	Split S Maple	50
1208	Ash	23	***1244***	Maple	13	***1280***	Ash	15
1209	Oak	13	***1245***	Ash	17	***1281***	R Maple	12
1210	Maple	17	***1246***	Maple	25	***1282***	Ash	12
1211	Maple	18	***1247***	Oak	13	***1283***	S Maple	20
1212	Maple	13	***1248***	Maple	15	***1284***	S Maple	16
1213	Maple	12	***1249***	Maple	19	***1285***	S Maple	18
1214	Maple	18	***1250***	Maple	15	***1286***	R Oak	14
1215	Cherry	19	***1251***	Maple	12	***1287***	Split R Maple	14
1216	Maple	21	***1252***	Ash	14	***1288***	R Oak	15
1217	Oak	13	***1253***	Split Ash	18	***1289***	Ash	15
1218	Split Maple	18	***1254***	Oak	32	***1290***	R Maple	13
1219	Oak	23	***1255***	Maple	21	***1291***	Ash	12
1220	Maple	12	***1256***	Ash	13	***1292***	Ash	15
1221	Maple	17	***1257***	Split Maple	14	***1293***	R Maple	15
1222	Oak	22	***1258***	Maple	12	***1294***	R Maple	16
1223	Oak	26	***1259***	Ash	16	***1295***	R Maple	13
1224	Oak	13	***1260***	Ash	18	***1296***	R Oak	15
1225	Maple	15	***1261***	Ash	15	***1297***	R Maple	13

Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)
1298	R Maple	13	***1334***	Ash	14	***1370***	R Maple	18
1299	Cherry	12	***1335***	R Maple	12	***1371***	Split R Maple	28
1300	R Maple	12	***1336***	Split Oak	24	***1372***	Cherry	12
1301	R Maple	12	***1337***	R Oak	27	***1373***	R Maple	20
1302	R Maple	19	***1338***	Oak	12	***1374***	Split R Maple	12
1303	R Maple	14	***1339***	Pin Oak	24	***1375***	R Oak	19
1304	S Maple	13	***1340***	R Maple	17	***1376***	Cherry	20
1305	R Maple	14	***1341***	Hickory	16	***1377***	Cherry	12
1306	R Oak	13	***1342***	Oak	24	***1378***	Ash	12
1307	R Maple	12	***1343***	Oak	14	***1379***	Oak	18
1308	Ash	12	***1344***	Cherry	16	***1380***	Ash	12
1309	Ash	12	***1345***	R Oak	13	***1381***	R Oak	18
1310	Ash	15	***1346***	Oak	13	***1382***	Ash	12
1311	S Maple	12	***1347***	R Oak	20	***1383***	Cherry	20
1312	R Maple	12	***1348***	Oak	12	***1384***	Ash	16
1313	R Oak	12	***1349***	Oak	16	***1385***	Ash	13
1314	R Oak	14	***1350***	R Maple	12	***1386***	Ash	12
1315	R Maple	12	***1351***	S Maple	12	***1387***	Oak	13
1316	Ash	12	***1352***	R Maple	21	***1388***	Ash	12
1317	R Oak	12	***1353***	S Maple	12	***1389***	S Maple	12
1318	Split R Maple	24	***1354***	R Maple	20	***1390***	Ash	12
1319	S Maple	13	***1355***	R Oak	12	***1391***	S Maple	12
1320	Split R Maple	36	***1356***	R Maple	14	***1392***	Ash	14
1321	R Oak	13	***1357***	R Maple	12	***1393***	R Maple	17
1322	R Maple	20	***1358***	R Oak	19	***1394***	Ash	15
1323	S Maple	14	***1359***	R Oak	16	***1395***	Maple	14
1324	Oak	13	***1360***	Cherry	16	***1396***	R Oak	16
1325	R Oak	13	***1361***	Ash	12	***1397***	Ash	18
1326	R Oak	21	***1362***	Oak	21	***1398***	S Maple	16
1327	Black Birch	12	***1363***	Split R Maple	14	***1399***	Cherry	14
1328	Black Birch	12	***1364***	R Maple	13	***1400***	Cherry	15
1329	R Maple	12	***1365***	R Maple	18	***1401***	Pin Oak	18
1330	R Oak	20	***1366***	R Oak	12	***1402***	Ash	14
1331	R Maple	34	***1367***	Elm	15	***1403***	R Oak	16
1332	R Oak	19	***1368***	C Oak	12"-16"	***1404***	Ash	15
1333	Ash	12	***1369***	R Maple	20	***1405***	Oak	17

Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)
1406	R Maple	15	**1442**	Oak	12	**1479**	Hickory	12
1407	Cherry	27	**1443**	Ash	12	**1480**	Ash	26
1408	Cherry	12	**1444**	Oak	13	**1481**	Cherry	16
1409	Cherry	12	**1445**	Ash	15	**1482**	Ash	16
1410	Oak	13	**1446**	Maple	20	**1483**	Elm	13
1411	Oak	15	**1447**	Maple	19	**1484**	Ash	17
1412	Oak	50	**1448**	Maple	14	**1485**	Ash	21
1413	Oak	18	**1449**	Maple	12	**1486**	Split R Maple	16
1414	Cherry	20	**1450**	Hickory	14	**1487**	R Maple	14
1415	Split S Maple	12	**1451**	Maple	15	**1488**	Oak	15
1416	Oak	14	**1452**	Oak	18	**1489**	R Maple	15
1417	S Maple	12	**1453**	c	12	**1490**	Oak	15
1418	Split Ash	12	**1454**	Oak	18	**1491**	W Oak	19
1419	S Maple	20	**1455**	Oak	16	**1492**	R Maple	35
1420	Split S Maple	18	**1456**	Oak	16	**1493**	Oak	12
1421	Oak	14	**1457**	Oak	16	**1494**	Maple	12
1422	Ash	16	**1458**	Maple	12	**1495**	Maple	14
1423	Maple	17	**1459**	Maple	13	**1496**	Maple	18
1424	Maple	16	**1460**	Oak	20	**1497**	Split Maple	14
1425	Maple	21	**1461**	Maple	13	**1498**	S Maple	24
1426	Oak	22	**1462**	Hickory	24	**1499**	S Maple	19
1427	Maple	18	**1463**	Oak	13	**1500**	Split Maple	50
1428	S Maple	16	**1464**	Maple	12	**1501**	Oak	12
1429	Ash	15	**1465**	R Maple	28	**1502**	Oak	28
1430	R Maple	16	**1466**	Split R Maple	12	**1503**	Maple	18
1431	Hickory	12	**1467**	Ash	12	**1504**	Maple	12
1432	Split Ash	17	**1468**	W Oak	21	**1505**	Split Oak	20
1433	S Maple	25	**1469**	Hickory	12	**1506**	Maple	13
1434	Ash	12	**1470**	R Maple	12	**1507**	Split Maple	14
1435	Hickory	12	**1471**	Split R Maple	28	**1508**	R Maple	14
1436	Maple	15	**1472**	Split R Maple	40	**1509**	R Maple	12
1437	Cherry	13	**1473**	Elm	12	**1510**	Split Maple	14
1438	Ash	12	**1474**	R Maple	12	**1511**	Maple	16
1439	Split Maple	14	**1475**	R Maple	12	**1512**	Split R Maple	34
1440	Ash	14	**1476**	R Maple	29	**1513**	R Maple	12
1441	Split Ash	12	**1478**	R Oak	12	**1514**	Split R Maple	12

Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)
1515	Maple	23	***1551***	S Maple	12	***1587***	R Maple	12
1516	Maple	12	***1552***	R Maple	12	***1588***	Split G Ash	16
1517	R Maple	16	***1553***	R Maple	12	***1589***	R Maple	12
1518	Ash	15	***1554***	Split R Maple	46	***1590***	Split R Oak	12
1519	Oak	25	***1555***	Split R Maple	38	***1591***	R Maple	20
1520	Black Birch	14	***1556***	R Maple	12	***1592***	R Maple	20
1521	Split Ash	14	***1557***	Hickory	12	***1593***	R Maple	12
1522	R Maple	12	***1558***	R Maple	12	***1594***	Split R Oak	13
1523	R Maple	18	***1559***	Cherry	14	***1595***	Oak	12
1524	R Maple	15	***1560***	S Maple	12	***1596***	Oak	14
1525	R Maple	12	***1561***	R Maple	14	***1597***	Oak	14
1526	R Maple	14	***1562***	Walnut	14	***1598***	Oak	19
1527	R Maple	12	***1563***	Elm	13	***1599***	Maple	16
1528	Split R Maple	54	***1564***	R Maple	14	***1600***	Maple	14
1529	R Maple	23	***1565***	R Maple	12	***1601***	Black Birch	12
1530	Split R Maple	14	***1566***	R Maple	15	***1602***	Black Birch	12
1531	Ash	14	***1567***	R Maple	30	***1603***	W Oak	24
1532	R Maple	12	***1568***	R Maple	13	***1604***	Elm	12
1533	Split R Maple	38	***1569***	R Maple	13	***1605***	R Oak	14
1534	Split Maple	14	***1570***	Oak	12	***1606***	R Oak	12
1535	Split Maple	12	***1571***	Cherry	17	***1607***	R Oak	12
1536	Split Maple	14	***1572***	Ash	12	***1608***	Elm	12
1537	Maple	14	***1573***	Elm	15	***1609***	Pin Oak	12
1538	Maple	22	***1574***	Pin Oak	12	***1610***	Elm	13
1539	Multi Maple	15	***1575***	Elm	12	***1611***	Pin Oak	26
1540	Split Maple	12	***1576***	Split Elm	12	***1612***	Pin Oak	25
1541	Maple	12	***1577***	Green Ash	12	***1613***	Pin Oak	13
1542	Maple	12	***1578***	R Maple	18	***1614***	Pin Oak	13
1543	R Maple	14	***1579***	R Maple	16	***1615***	Pin Oak	18
1544	Split Maple	13	***1580***	Ash	12	***1616***	Pin Oak	12
1545	R Maple	13	***1581***	Split R Maple	12	***1617***	Maple	20
1546	Split R Maple	38	***1582***	Maple	12	***1618***	Maple	14
1547	Split R Maple	35	***1583***	Maple	16	***1619***	Ash	16
1548	Split R Maple	22	***1584***	Pin Oak	12	***1620***	Ash	16
1549	R Maple	28	***1585***	Pin Oak	14	***1621***	S Maple	23
1550	Cherry	22	***1586***	R Maple	14	***1622***	R Maple	12

Tree Number	Tree Species	Size (DBH)	Tree Number	Tree Species	Size (DBH)
1623	Ash	18	***1659***	Cherry	12
1624	R Maple	14	***1660***	Dbl. Cherry	12
1625	Pin Oak	13	***1661***	R Oak	13
1626	Elm	12	***1662***	R Oak	25
1627	Black Birch	18	***1663***	R Maple	13
1628	Pin Oak	13	***1664***	R Maple	12
1629	R Maple	12	***1665***	Cherry	16
1630	Hickory	13	***1666***	S Maple	19
1631	Hickory	20	***1667***	R Maple	13
1632	Pin Oak	12	***1668***	R Maple	16
1633	Pin Oak	12	***1669***	R Maple	16
1634	Elm	12	***1670***	R Maple	16
1635	R Maple	17	***1671***	Hickory	18
1636	Elm	14	***1672***	R Maple	12
1637	Maple	13	***1673***	R Maple	16
1638	Oak	23	***1674***	R Maple	12
1639	Pin Oak	12	***1675***	R Maple	15
1640	Elm	12	***1676***	Ash	16
1641	R Maple	13	***1677***	R Maple	14
1642	Oak	22	***1678***	R Maple	12
1643	Oak	12	***1679***	Maple	12
1644	Cherry	14			
1645	Cherry	14			
1646	S Maple	13			
1647	Oak	13			
1648	Cherry	12			
1649	Cherry	12			
1650	Cherry	13			
1651	Elm	12			
1652	Maple	16			
1653	Cherry	14			
1654	Cherry	12			
1655	Oak	24			
1656	Cherry	12			
1657	Cherry	12			
1658	Cherry	14			

GRAPHIC SCALE

150 0 75 150 300 600

(In Feet)
1 in. = 150 ft.

6/23/08	ORIGINAL PREPARATION DATE	AT
DATE	DESCRIPTION	INITIALS
REVISIONS		
MAP CHECK DATE: 00/00/00	INITIALED BY: -_-	

PIETRZAK & PFAU
ENGINEERING & SURVEYING, PLLC

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(845) 294-0606

2 HAMILTON AVENUE
MONTICELLO, NEW YORK 12701
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JOHN P. PETROCCIONE, P.E.
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VINCENT A. PIETRZAK P.E., P.L.S.
P.E. LICENSE NO. 078936
P.L.S. LICENSE NO. 050075
N.J.P.L.S. LICENSE NO. 35396

SIGNATURE DATE

YOUNG'S GROVE

TOWN OF GOSHEN
COUNTY OF ORANGE, NEW YORK

PROJECT TITLE

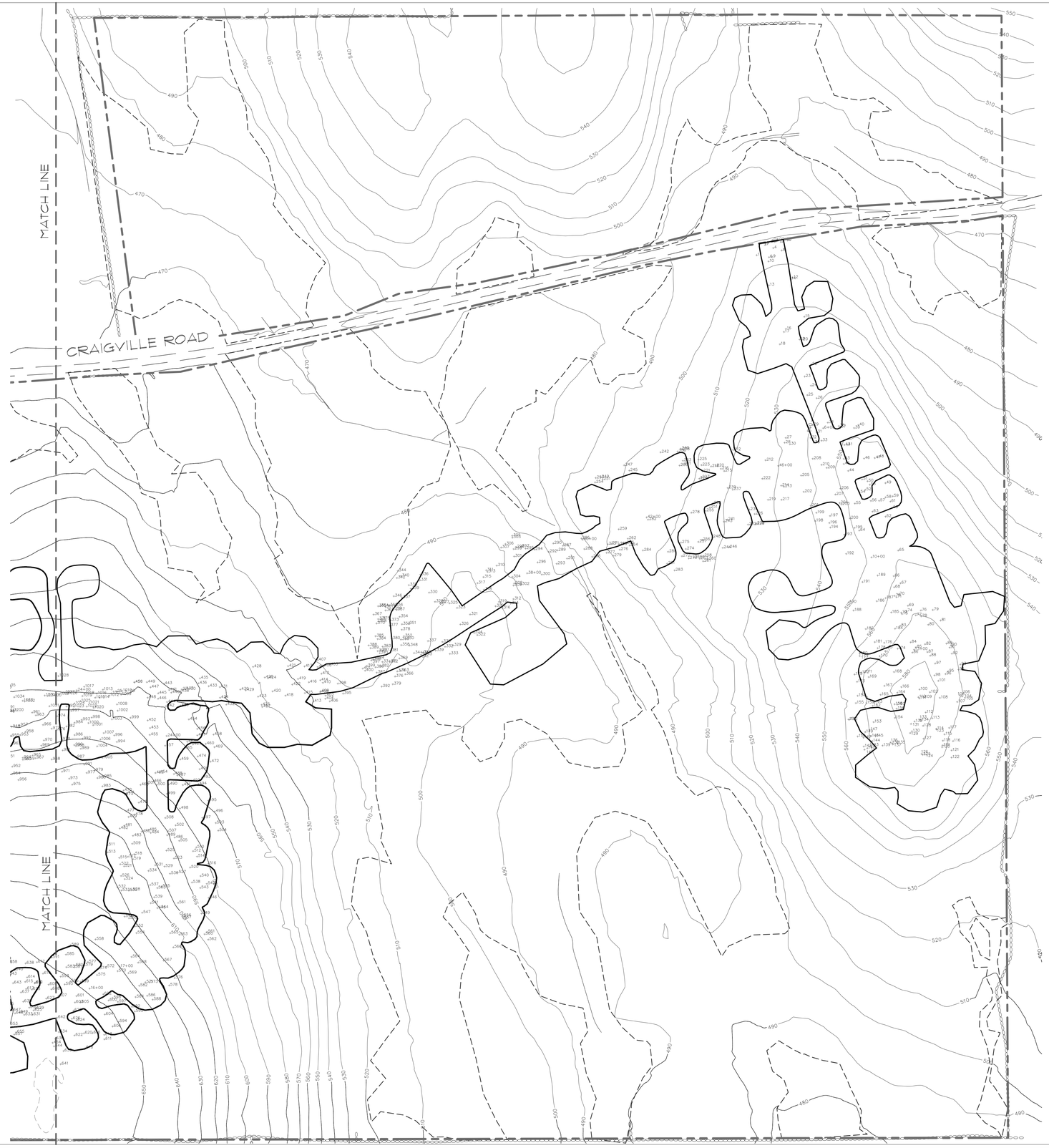
TREE SURVEY

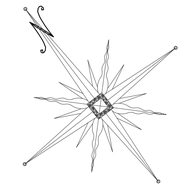
SECTION 9 BLOCK 1 LOTS 8.452

DRAWING TITLE

UNAUTHORIZED ALTERATION OR ADDITION TO A PLAN BEARING A LICENSED LAND SURVEYOR'S OR PROFESSIONAL ENGINEER'S SEAL IS A VIOLATION OF SECTION 7209, SUB-DIVISION 2 OF THE N.Y. STATE EDUCATION LAW.

O.C.H.D. SHEET NO	D.E.C. SHEET NO	DRAWING NUMBER
# OF #	# OF #	1 OF 2
SCALE	CAD REFERENCE	PROJECT NUMBER
1"=150'	-----	25108.01





GRAPHIC SCALE

150 0 75 150 300 600

(In Feet)
1 in. = 150 ft.

6/23/08	ORIGINAL PREPARATION DATE	AT
DATE	DESCRIPTION	INITIALS

REVISIONS

MAP CHECK DATE: 00/00/00 | INITIALED BY: -_-

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P.E. LICENSE NO. 076938
P.L.S. LICENSE NO. 050075
N.J.P.L.S. LICENSE NO. 35396

SIGNATURE DATE

YOUNG'S GROVE

TOWN OF GOSHEN
COUNTY OF ORANGE, NEW YORK

PROJECT TITLE

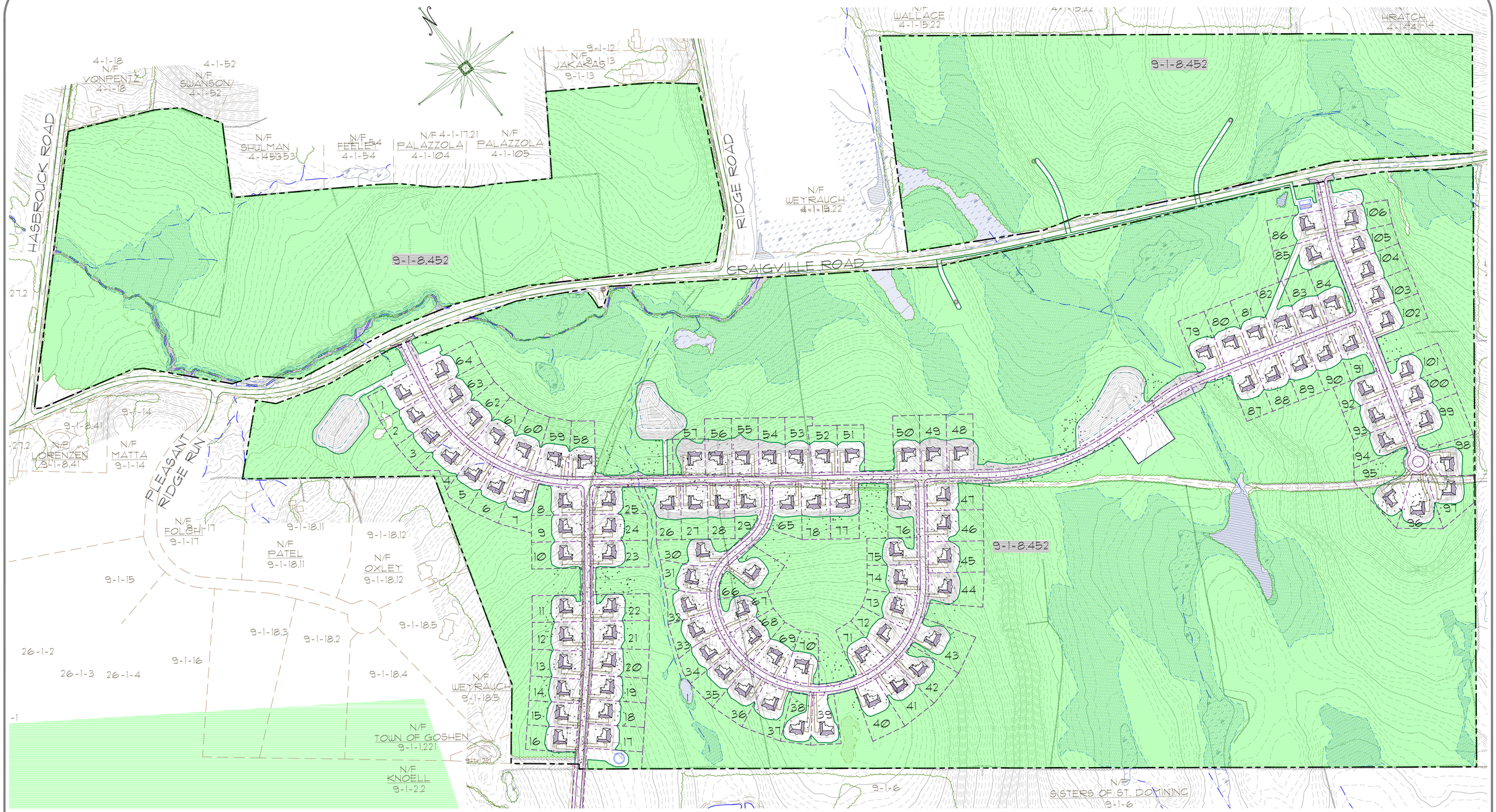
TREE SURVEY

SECTION 9 BLOCK 1 LOTS 8.452

DRAWING TITLE

UNAUTHORIZED ALTERATION OR ADDITION TO A PLAN BEARING A LICENSED LAND SURVEYOR'S OR PROFESSIONAL ENGINEER'S SEAL IS A VIOLATION OF SECTION 7209, SUB-DIVISION 2 OF THE N.Y. STATE EDUCATION LAW.

O.C.H.D. SHEET NO	D.E.C. SHEET NO	DRAWING NUMBER
# OF #	# OF #	2 OF 2
SCALE 1"=150'	CAD REFERENCE ------	PROJECT NUMBER 25108.01



GRAPHIC SCALE

200 0 100 200 400 800

(In Feet)
1 in. = 200 ft.

REFERENCES:

1. TOTAL SITE AREA - 354.01± ACRES
2. TOTAL DEVELOPMENT (AFFECTED) AREA - 59.54± ACRES
3. TOTAL AREA REMAINING UNDEVELOPED POST-CONSTRACTION - 294.47± ACRES
4. TOTAL OPEN SPACE PRESERVED IN PERPETUITY - 266.89± ACRES

YOUNG'S GROVE

TOWN OF GOSHEN

TAX MAP: SEC. 9, BLK. 1, LOT 8.452

CLEARING LIMITS

ESPOSITO & ASSOCIATES
262 GREENWICH AVENUE, SUITE B
GOSHEN NY, 10924
845.294.0558 Fax 845.294.0580