



STORMWATER MANAGEMENT STATEMENT

To: Township of Cranford

Project: Hartz Mountain Industries, Inc.
Proposed Residential Redevelopment Plan
Tax Block 541, Lot 2
Township of Cranford, Union County, New Jersey

Dated: March 30, 2020

Reference: Preliminary & Final Major Site Plan
(Prepared by Stonefield Engineering & Design, LLC, dated March 17, 2020)

Hartz Mountain Industries, Inc. is proposing the change of use and site plan modifications to the above referenced property. The subject parcel is designated Block 541, Lot 2, commonly known as 750 Walnut Avenue. The total project area is 30.5 acres and the limit of disturbance is 8.97 acres. The proposed improvements include the removal of the existing parking garage, the addition of loading docks, parking lot reconfiguration, lighting and landscaping upgrades. The site is currently 65.5% impervious and contains two aboveground stormwater management basins to manage stormwater runoff. The project will result in the decrease of impervious areas to 59.9% (75,394 SF).

This Stormwater Management Statement has been prepared to analyze the potential stormwater runoff impacts of the proposed project and discuss measures proposed to conform to the stormwater management requirements set forth by the Township of Cranford, Somerset-Union Soil Conservation District, and the New Jersey Department of Environmental Protection (NJDEP).

PRE-DEVELOPMENT DRAINAGE CONDITIONS

Under pre-development conditions the site is developed and consists of two office buildings and associated parking. About 42% of the site runoff is collected via catch basins and piped to an existing detention basin located at the northeast portion of Walnut Avenue. This basin discharges directly to an 18" RCP in Walnut Avenue, which is part of the municipal system. The remainder of the site is generally tributary to the detention basin located at the southern corner of the property. This basin also discharges directly to the municipal system within Walnut Avenue and connects to a 42" RCP. The 42" RCP is not directly connected to the 18" RCP, and thus two separate point of interests have been analyzed. It should be noted that per our analysis, both of the existing on-site basins are not sized to handle the 100-year storm event. The following table summarizes each existing drainage area utilized in the stormwater analysis.

TABLE 1: PRE-DEVELOPMENT DRAINAGE AREAS

<i>Drainage Area</i>	<i>Description</i>	<i>Area Extents</i>	<i>Impervious Area</i>	<i>Time of Concentration</i>
E-1	Runoff Tributary to Southeast Basin	801,600 SF	630,951 SF	10 Minutes
E-2	Runoff Tributary to Eastern Basin	395,371 SF	255,695 SF	10 Minutes
E-3	Uncollected Runoff	144,697 SF	6,373 SF	10 Minutes



PROPOSED DRAINAGE CONDITIONS

Under proposed conditions, the site will consist of the residential buildings and associated parking areas. The uncovered portion of the site will drain via sheet flow to proposed catch basins on-site. The proposed buildings will drain via roof leaders to connect to the proposed drainage system. The existing southeasterly aboveground basin is to remain and be expanded, while the existing easterly basin is proposed to be removed. Three basins, one aboveground, and two underground are proposed to replace the existing basin and provide further detention so that the all basins are designed for the 100-year storm event.

TABLE 2: POST-DEVELOPMENT DRAINAGE AREAS

<i>Drainage Area</i>	<i>Description</i>	<i>Area Extents</i>	<i>Impervious Area</i>	<i>Time of Concentration</i>
P-1	Runoff Tributary to Southeast Basin	799,131 SF	572,872 SF	10 Minutes
P-2	Runoff Tributary to Eastern Basin	397,839 SF	212,568 SF	10 Minutes
P-3	Uncollected Runoff	144,697 SF	6,373 SF	10 Minutes

STORMWATER MANAGEMENT ANALYSIS

The project disturbs more than one acre of land and is therefore defined as a Major Development as indicated in the Township Ordinance. The project is designed to conform to the stormwater management requirements set forth by the Township, Somerset-Union Soil Conservation District, and the New Jersey Department of Environmental Protection (NJDEP).

WATER QUALITY REQUIREMENTS

As the project results in a net decrease in impervious surfaces, water quality is naturally enhanced via the addition of lawn and landscaped areas. Also, it is worth noting that since the project does not propose more than ¼ acre of new impervious surfaces, the water quality measures per NJAC 7:8-5.4 are not required.

GROUNDWATER RECHARGE REQUIREMENTS

As the site is reducing impervious coverage, groundwater recharge is naturally increased. Additionally, it is worth noting that the subject property is located within an Urban Planning Area defined by the NJDEP as the Metropolitan Planning Area (PA-I), where per NJAC 7:8-5.4, groundwater recharge requirements do not apply in portions of redeveloped area.

RUNOFF QUANTITY REQUIREMENTS

The proposed project will meet stormwater quantity requirements via demonstrating that at no point in time does the post-development hydrograph exceed the pre-development hydrograph. Under proposed conditions, both of the existing aboveground basins are to remain. Compliance with quantity reduction requirements will be achieved due to the overall decrease in impervious coverage and by generally maintaining the existing quantity of runoff tributary to each basin.



TABLE 3: QUANTITY COMPARISON POINTS OF INTEREST

<i>Point of Interest</i>	<i>Area Description</i>	<i>Existing Tributary Drainage Areas</i>	<i>Proposed Tributary Drainage Areas</i>
POI-1	Connection to 42" RCP	E-1, E-3	P-1, P-3
POI-2	Connection to 18" RCP	E-2	P-2

TABLE 4: POI-1 STORMWATER PEAK DISCHARGE & VOLUME ANALYSIS SUMMARY

<i>Storm Event</i>	<i>Pre-Development Peak Discharge</i>	<i>Post-Development Peak Discharge</i>	<i>Pre-Development Runoff Volume</i>	<i>Post-Development Runoff Volume</i>
2-Year	55.74 CFS	54.20 CFS	191,104 CF	184,097 CF
10-Year	92.39 CFS	90.90 CFS	324,604 CF	316,409 CF
100-Year	164.48 CFS	163.09 CFS	595,590 CF	585,934 CF

*A minimum concentration of 10-minutes was utilized for all drainage areas.

TABLE 5: POI-2 STORMWATER PEAK DISCHARGE & VOLUME ANALYSIS SUMMARY

<i>Storm Event</i>	<i>Pre-Development Peak Discharge</i>	<i>Post-Development Peak Discharge</i>	<i>Pre-Development Runoff Volume</i>	<i>Post-Development Runoff Volume</i>
2-Year	23.07 CFS	21.74 CFS	77,268 CF	72,042 CF
10-Year	38.75 CFS	37.57 CFS	133,441 CF	127,572 CF
100-Year	69.21 CFS	68.51 CFS	247,281 CF	241,292 CF

*A minimum concentration of 10-minutes was utilized for all drainage areas.

As shown in the tables above, peak stormwater discharge rates and runoff volumes are reduced for each storm event. Project and comparison hydrographs and more detailed data can be found in the Appendix of this Report.

CONCLUSION

As the project meets Township and State stormwater management requirements and due to the overall decrease in impervious coverage as well as the proposed improvements, no adverse impacts to the municipal drainage system or adjacent properties are anticipated as a result of the project.

Prepared by:

Zachary E. Chaplin PE
New Jersey PE License No. 53605
Stonefield Engineering and Design, LLC

APPENDIX A
PROJECT MAPS



GRAPHIC SCALE IN FEET

1" = 500'

AERIAL MAP

SOURCE: GOOGLE EARTH PRO, IMAGERY DATED 04/19/2016

HARTZ MOUNTAIN PROPOSED RESIDENTIAL REDEVELOPMENT

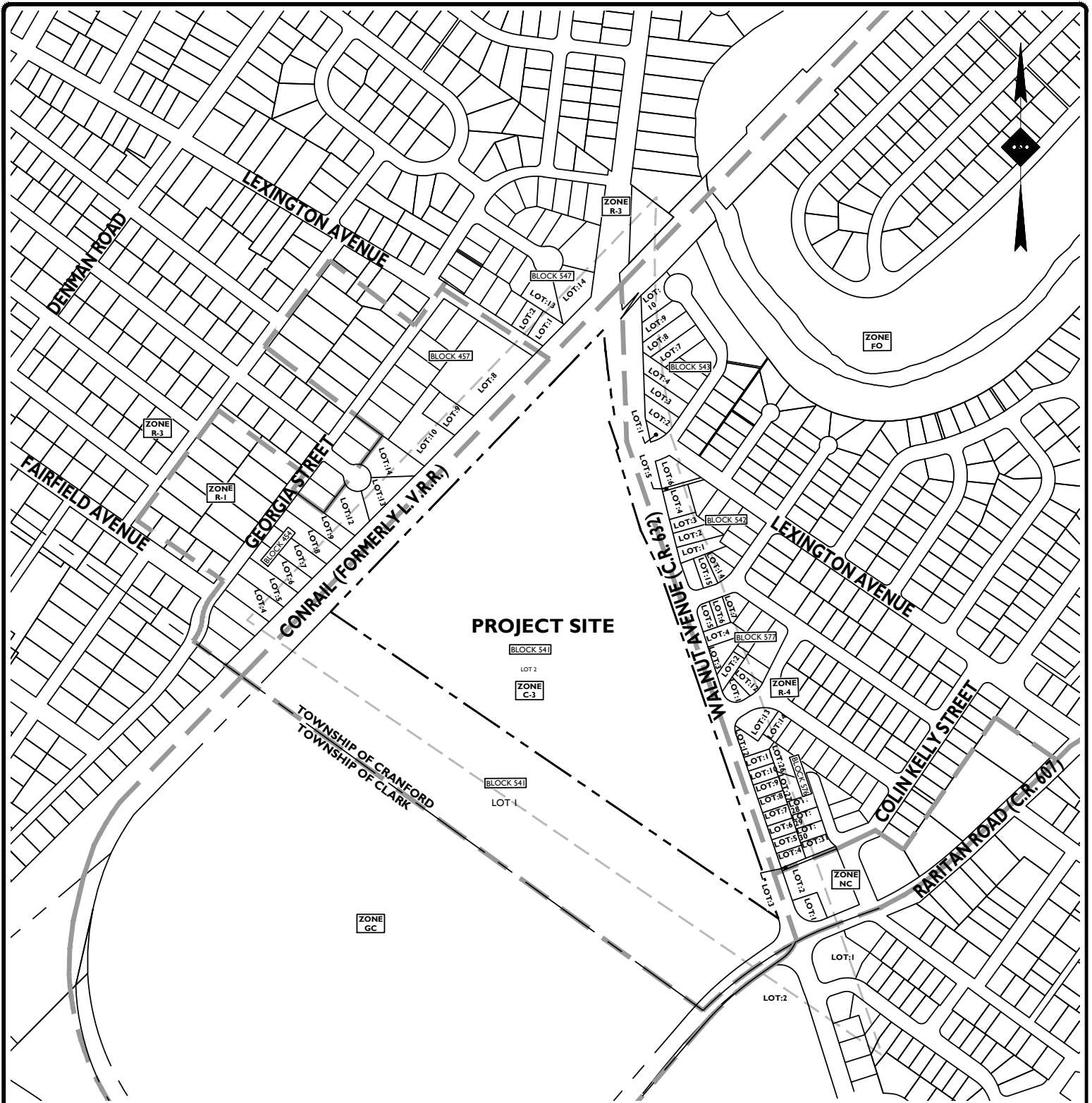
BLOCK 541, LOT 2
750 WALNUT AVENUE (COUNTY ROUTE 632)
TOWNSHIP OF CRANFORD,
UNION COUNTY, NJ

DRAWN BY:	CAM
CHECKED BY:	SO
DATE:	09/05/2018
SCALE:	1" = 500'
PROJECT ID:	T-16509



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Phone 201.340.4468 · Fax 201.340.4472



PROJECT SITE

BLOCK 541
LOT 2
ZONE C-3

BLOCK 541
LOT 1
ZONE C-3

ZONE GC



GRAPHIC SCALE IN FEET

1" = 500'

TAX AND ZONING MAP

SOURCE: TOWNSHIP OF CRANFORD TAX MAP PAGES 96, 97, 129, 133, & 142, AND TOWNSHIP OF CRANFORD ZONING MAP

**HARTZ MOUNTAIN
PROPOSED RESIDENTIAL REDEVELOPMENT**

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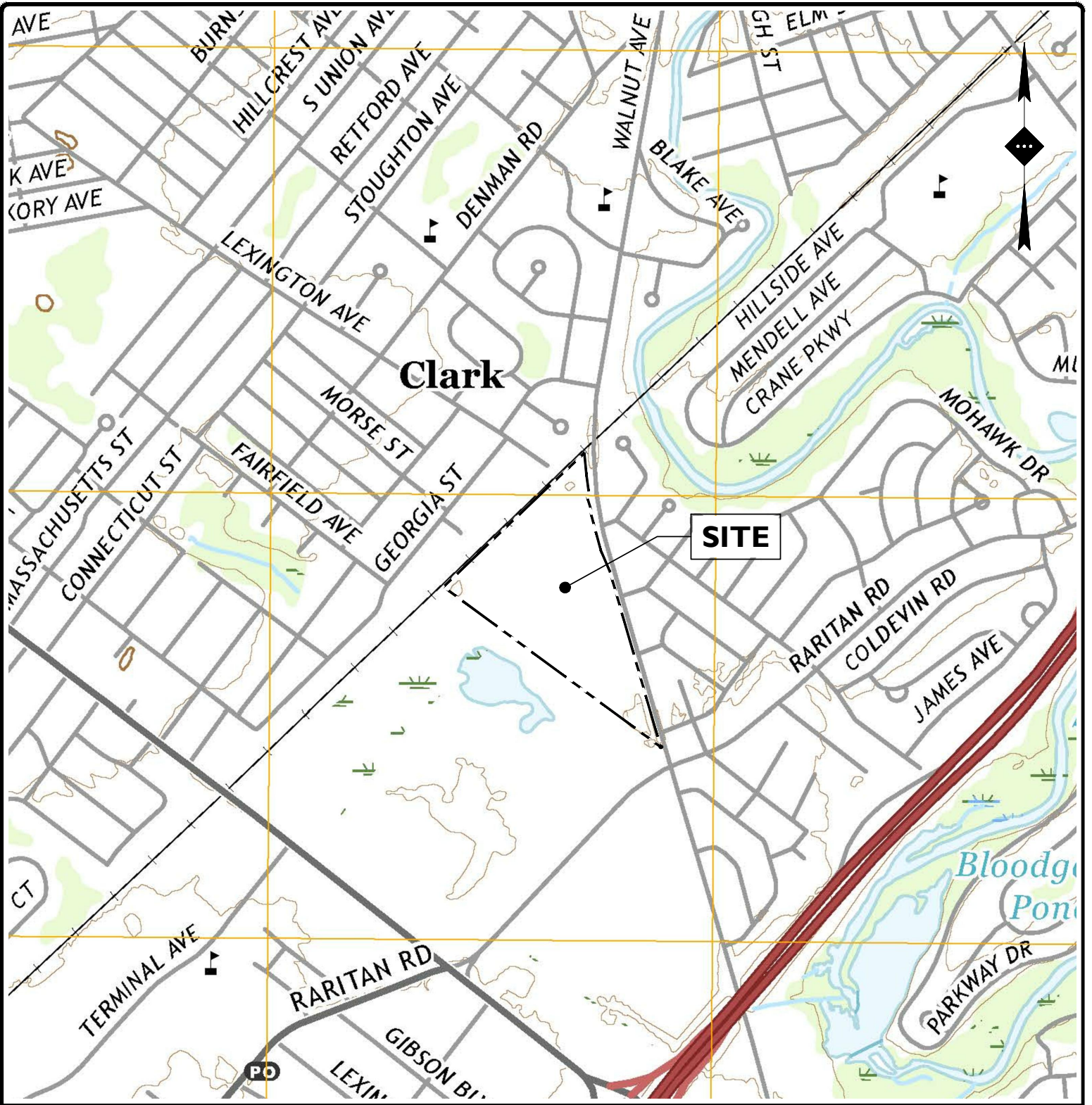


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T:\2016\T-16509 Hartz Mountain - 750 Walnut Avenue, Cranford, NJ\CADD\Es-hb\2018-09-06_Project Maps.dwg



USGS QUADRANGLE MAP



GRAPHIC SCALE IN FEET

1" = 1000'

SOURCE: USGS 7.5 MINUTE SERIES, ROSELLE, NJ QUADRANGLE MAP, DATED 2018 AND 7.5 MINUTE SERIES, PERTH AMBOY, NJ-NY QUADRANGLE MAP, DATED 2018

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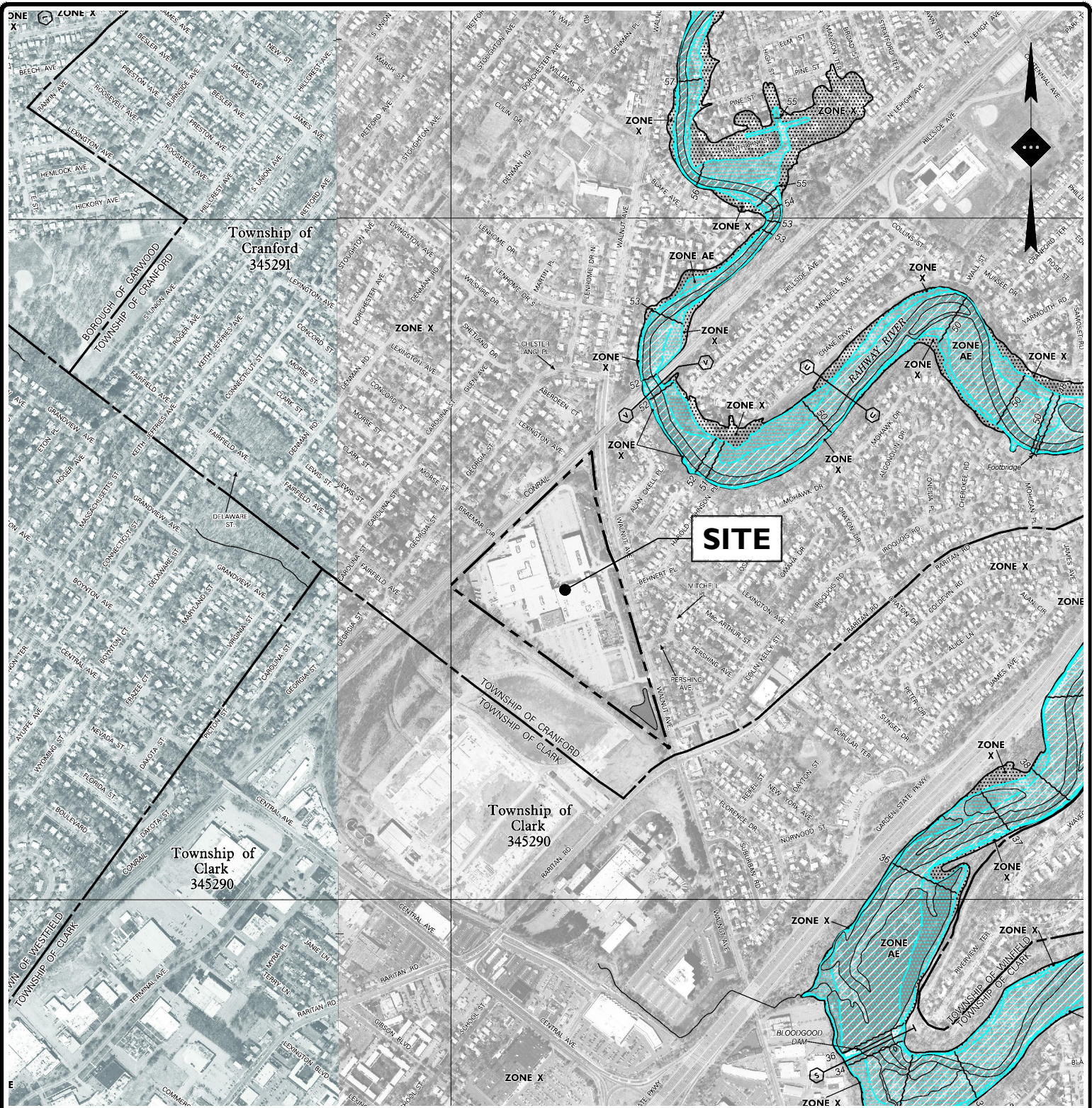


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FEMA FLOOD INSURANCE RATE MAP (FIRM)



GRAPHIC SCALE IN FEET

1" = 1000'

SOURCE: EFFECTIVE FEMA FIRM MAPS 34039C0031F & 34039C0032F, DATED 09/20/2006

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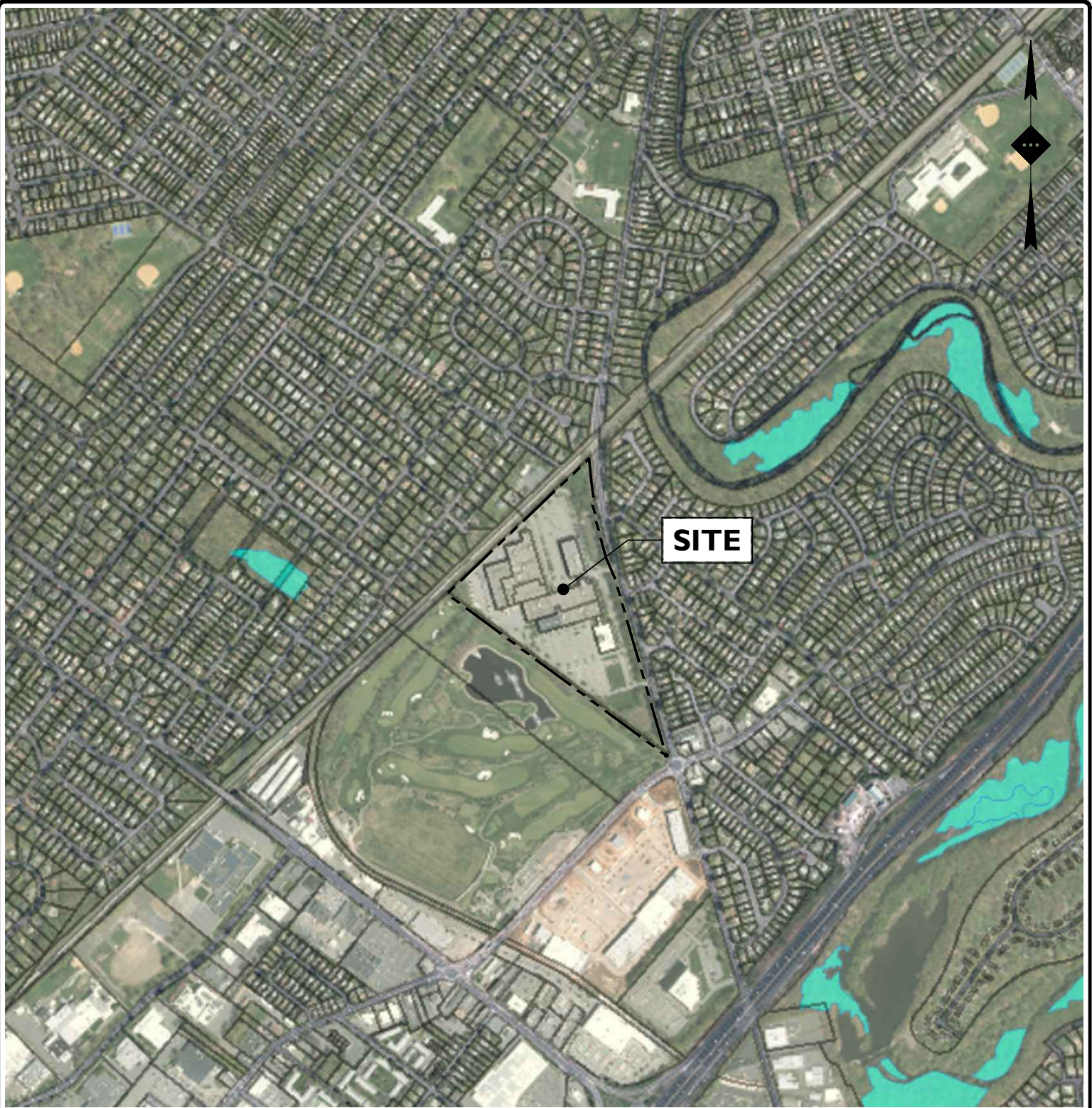


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NJDEP GEOWEB - FRESHWATER WETLANDS MAP



GRAPHIC SCALE IN FEET

1" = 1000'

SOURCE: NJDEP GEOWEB

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NJDEP GEOWEB - SPECIES HABITAT MAP



GRAPHIC SCALE IN FEET

1" = 1000'

SOURCE: NJDEP GEOWEB

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NJDEP GEOWEB - WELLHEAD PROTECTION AREA MAP



GRAPHIC SCALE IN FEET

1" = 1000'

SOURCE: NJDEP GEOWEB - WELLDRILLERS MAP

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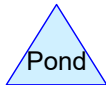
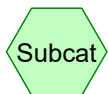
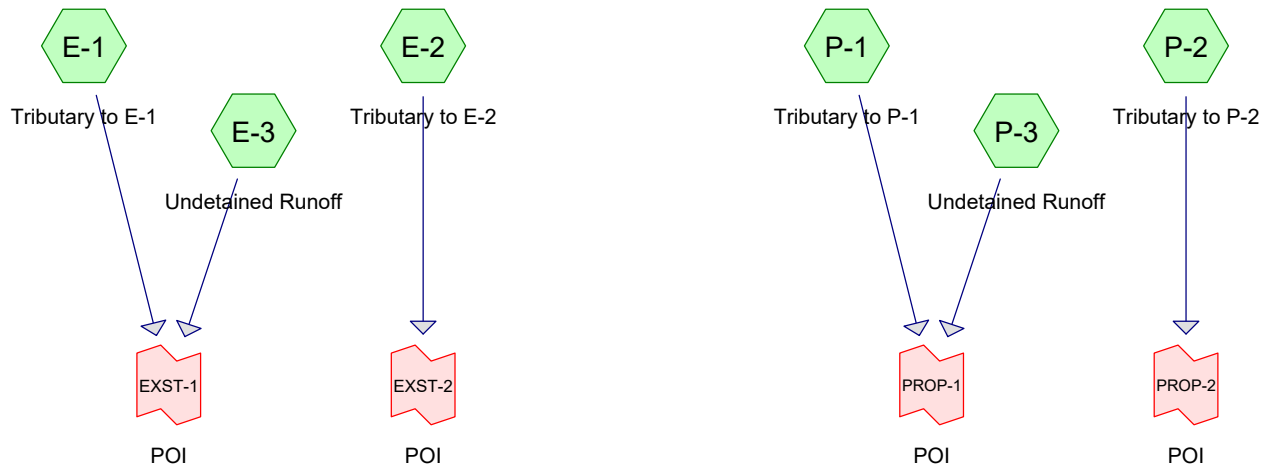
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APPENDIX B
HYDROCAD DATA & ANALYSIS RESULTS



Routing Diagram for 2020-03-29 Calculations
 Prepared by {enter your company name here}, Printed 4/1/2020
 HydroCAD® 10.00-22 s/n 06682 © 2018 HydroCAD Software Solutions LLC

2020-03-29 Calculations

NOAA 24-hr C 2-Year Rainfall=3.39"

Prepared by {enter your company name here}

Printed 4/1/2020

HydroCAD® 10.00-22 s/n 06682 © 2018 HydroCAD Software Solutions LLC

Page 1

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: Tributary to E-1	Runoff Area=801,600 sf 78.71% Impervious Runoff Depth=2.63" Tc=10.0 min CN=93 Runoff=51.11 cfs 175,596 cf
Subcatchment E-2: Tributary to E-2	Runoff Area=395,371 sf 64.67% Impervious Runoff Depth=2.35" Tc=10.0 min CN=90 Runoff=23.07 cfs 77,268 cf
Subcatchment E-3: Undetained Runoff	Runoff Area=144,697 sf 4.40% Impervious Runoff Depth=1.29" Tc=10.0 min CN=76 Runoff=4.65 cfs 15,508 cf
Subcatchment P-1: Tributary to P-1	Runoff Area=799,131 sf 71.69% Impervious Runoff Depth=2.53" Tc=10.0 min CN=92 Runoff=49.56 cfs 168,590 cf
Subcatchment P-2: Tributary to P-2	Runoff Area=398,645 sf 53.32% Impervious Runoff Depth=2.17" Tc=10.0 min CN=88 Runoff=21.74 cfs 72,042 cf
Subcatchment P-3: Undetained Runoff	Runoff Area=144,697 sf 4.40% Impervious Runoff Depth=1.29" Tc=10.0 min CN=76 Runoff=4.65 cfs 15,508 cf
Link EXST-1: POI	Inflow=55.74 cfs 191,104 cf Primary=55.74 cfs 191,104 cf
Link EXST-2: POI	Inflow=23.07 cfs 77,268 cf Primary=23.07 cfs 77,268 cf
Link PROP-1: POI	Inflow=54.20 cfs 184,097 cf Primary=54.20 cfs 184,097 cf
Link PROP-2: POI	Inflow=21.74 cfs 72,042 cf Primary=21.74 cfs 72,042 cf

Summary for Subcatchment E-1: Tributary to E-1

Runoff = 51.11 cfs @ 12.17 hrs, Volume= 175,596 cf, Depth= 2.63"

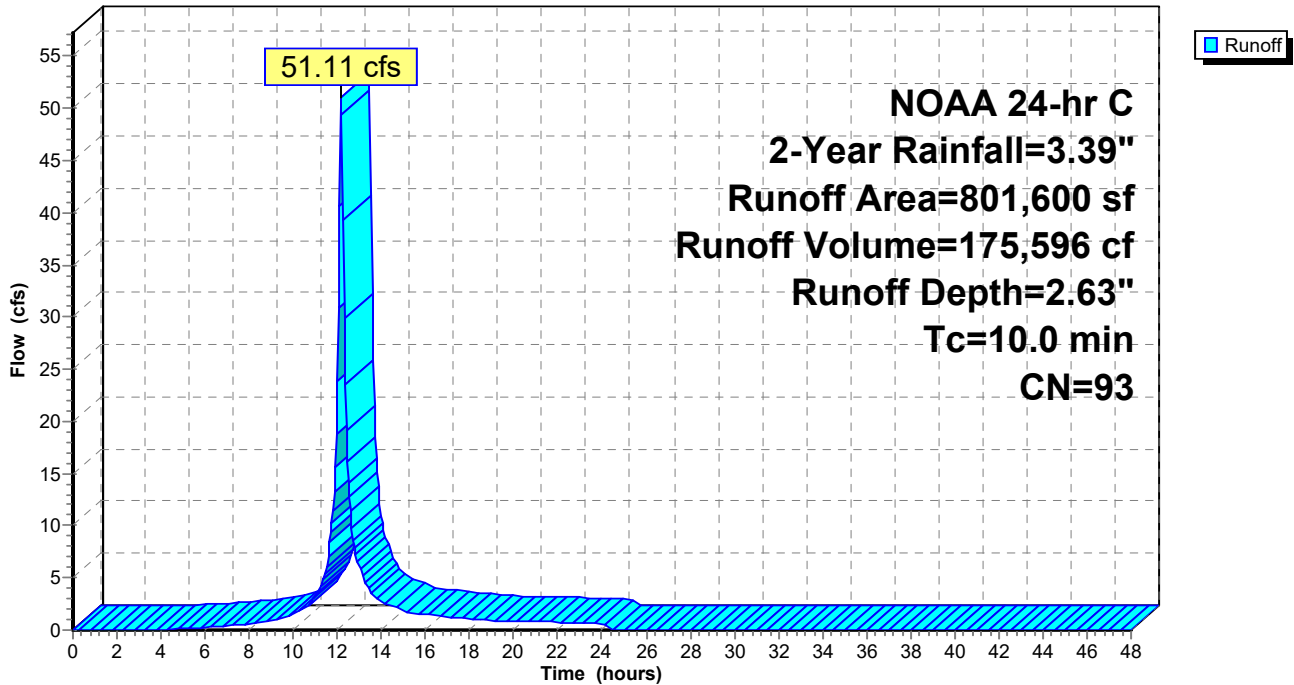
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.39"

	Area (sf)	CN	Description
*	630,951	98	Impervious Surfaces
	92,120	74	>75% Grass cover, Good, HSG C
	78,529	80	>75% Grass cover, Good, HSG D
	801,600	93	Weighted Average
	170,649		21.29% Pervious Area
	630,951		78.71% Impervious Area

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

Subcatchment E-1: Tributary to E-1

Hydrograph



Summary for Subcatchment E-2: Tributary to E-2

Runoff = 23.07 cfs @ 12.17 hrs, Volume= 77,268 cf, Depth= 2.35"

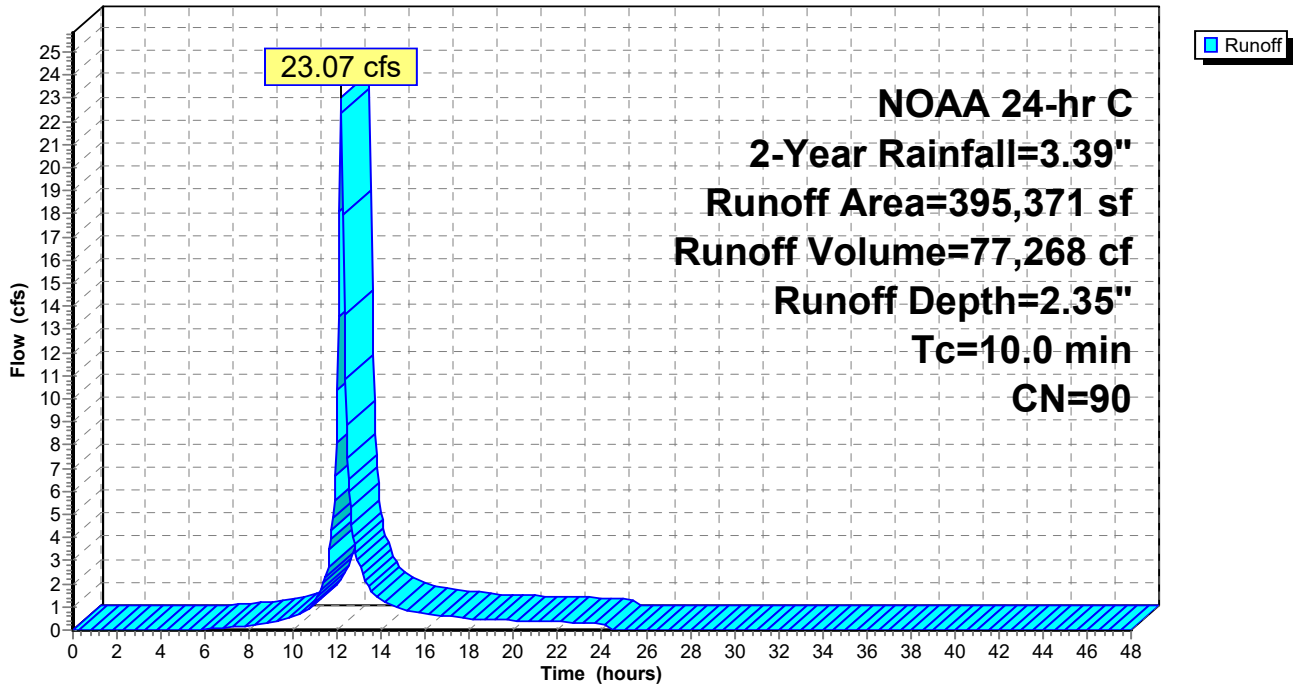
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.39"

	Area (sf)	CN	Description
*	255,695	98	Impervious Surfaces
	109,755	74	>75% Grass cover, Good, HSG C
	29,921	80	>75% Grass cover, Good, HSG D
	395,371	90	Weighted Average
	139,676		35.33% Pervious Area
	255,695		64.67% Impervious Area

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

Subcatchment E-2: Tributary to E-2

Hydrograph



Summary for Subcatchment E-3: Undetained Runoff

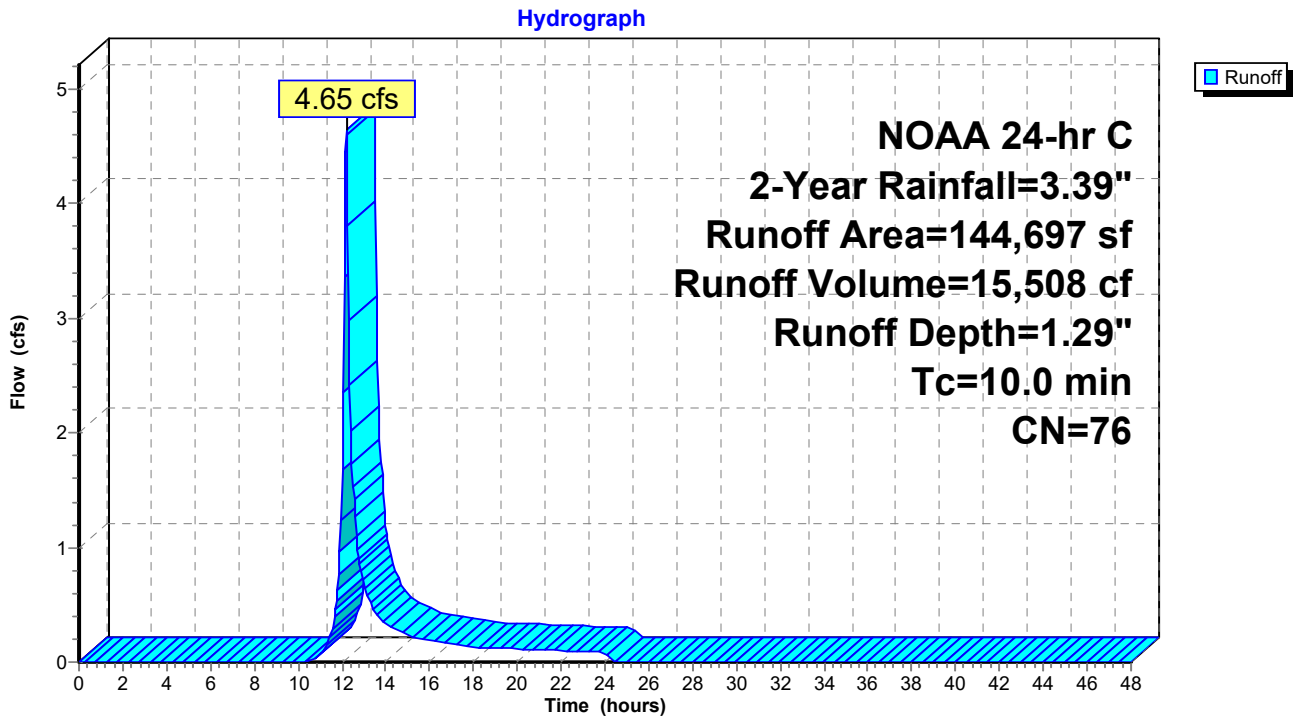
Runoff = 4.65 cfs @ 12.18 hrs, Volume= 15,508 cf, Depth= 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.39"

Area (sf)	CN	Description
* 6,373	98	Impervious Surfaces
124,884	74	>75% Grass cover, Good, HSG C
13,440	80	>75% Grass cover, Good, HSG D
144,697	76	Weighted Average
138,324		95.60% Pervious Area
6,373		4.40% Impervious Area

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

Subcatchment E-3: Undetained Runoff



Summary for Subcatchment P-1: Tributary to P-1

Runoff = 49.56 cfs @ 12.17 hrs, Volume= 168,590 cf, Depth= 2.53"

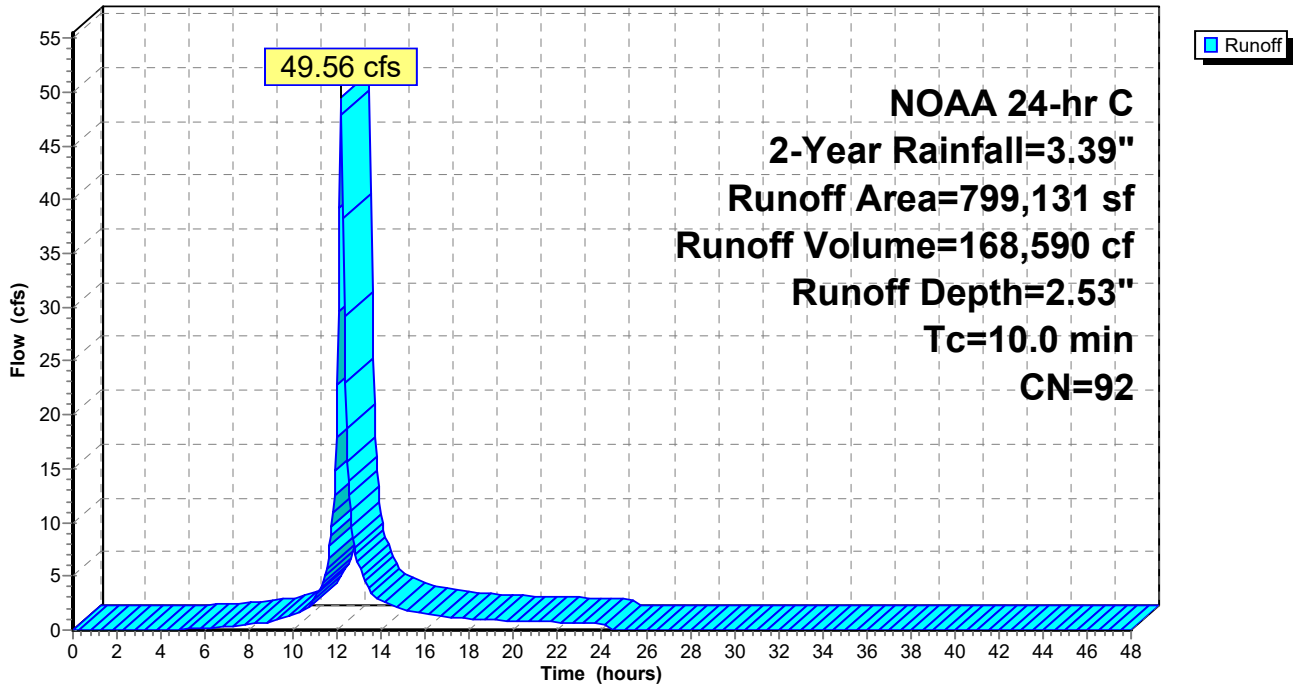
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.39"

	Area (sf)	CN	Description
*	572,872	98	Impervious Surfaces
	99,763	74	>75% Grass cover, Good, HSG C
	126,496	80	>75% Grass cover, Good, HSG D
	799,131	92	Weighted Average
	226,259		28.31% Pervious Area
	572,872		71.69% Impervious Area

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

Subcatchment P-1: Tributary to P-1

Hydrograph



Summary for Subcatchment P-2: Tributary to P-2

Runoff = 21.74 cfs @ 12.17 hrs, Volume= 72,042 cf, Depth= 2.17"

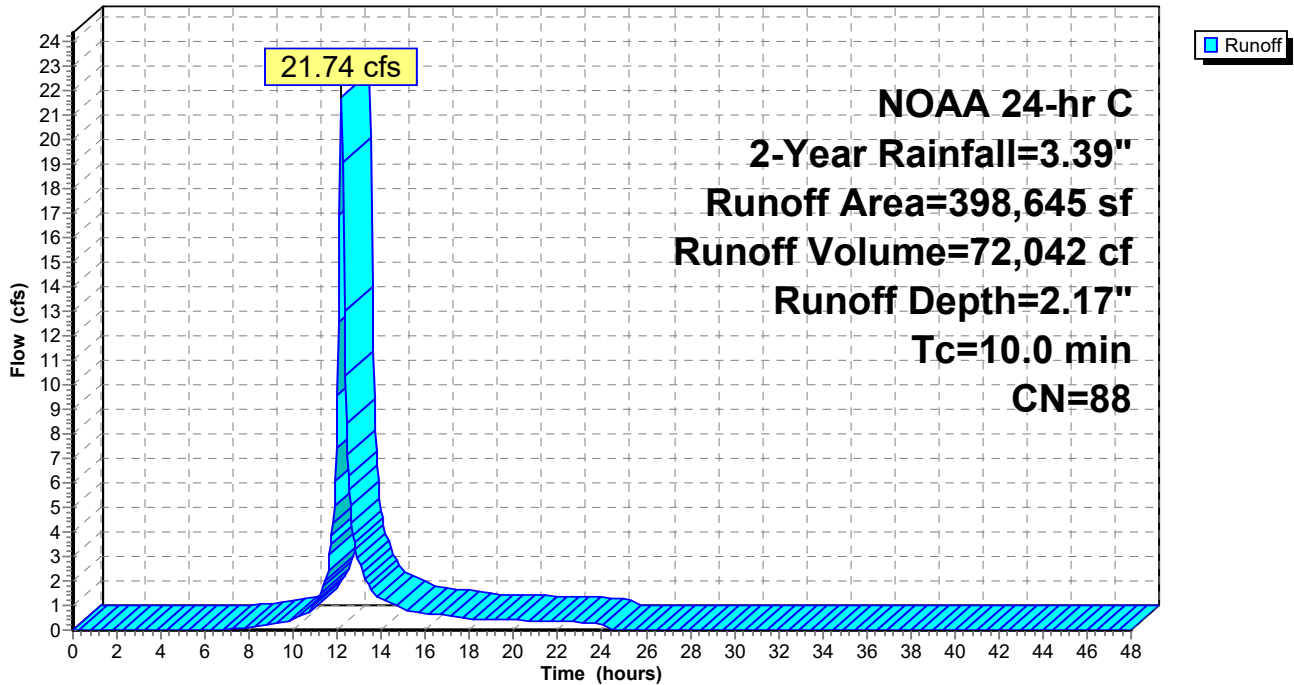
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.39"

	Area (sf)	CN	Description
*	212,568	98	Impervious Surfaces
	129,238	74	>75% Grass cover, Good, HSG C
	56,839	80	>75% Grass cover, Good, HSG D
	398,645	88	Weighted Average
	186,077		46.68% Pervious Area
	212,568		53.32% Impervious Area

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

Subcatchment P-2: Tributary to P-2

Hydrograph



Summary for Subcatchment P-3: Undetained Runoff

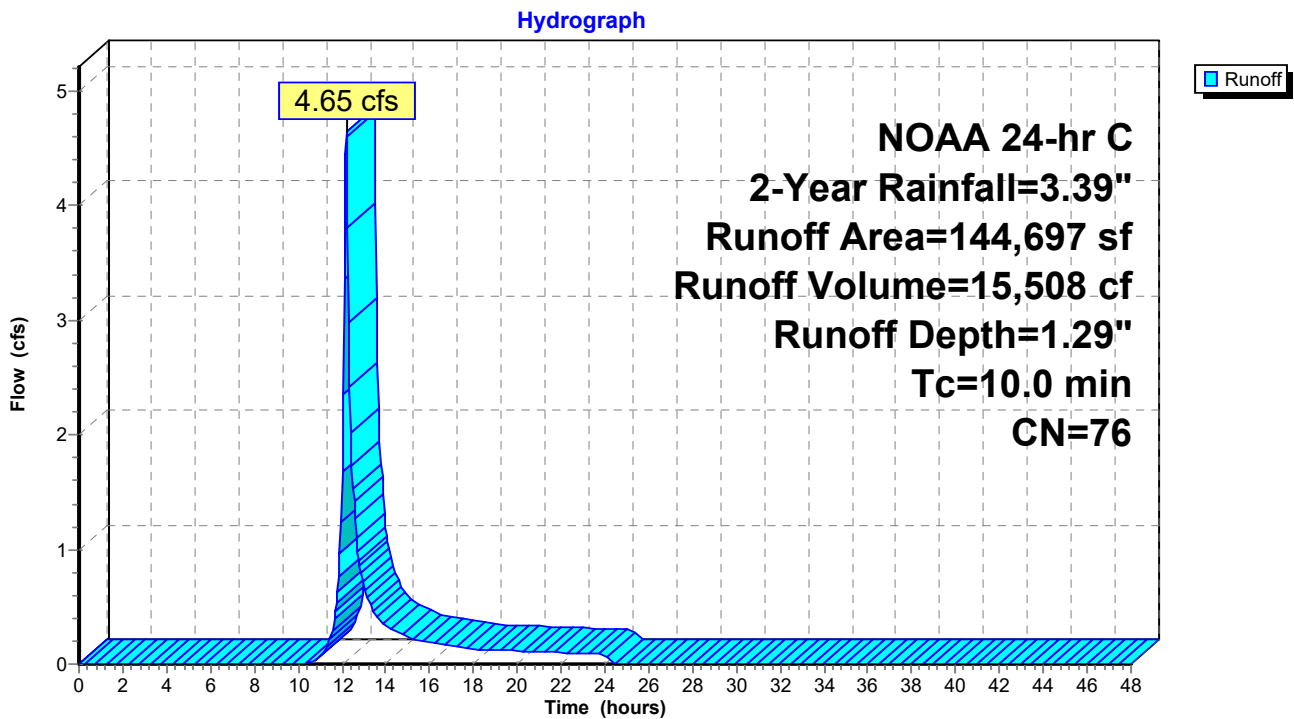
Runoff = 4.65 cfs @ 12.18 hrs, Volume= 15,508 cf, Depth= 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.39"

Area (sf)	CN	Description
* 6,373	98	Impervious Surfaces
124,884	74	>75% Grass cover, Good, HSG C
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144,697	76	Weighted Average
138,324		95.60% Pervious Area
6,373		4.40% Impervious Area

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

Subcatchment P-3: Undetained Runoff



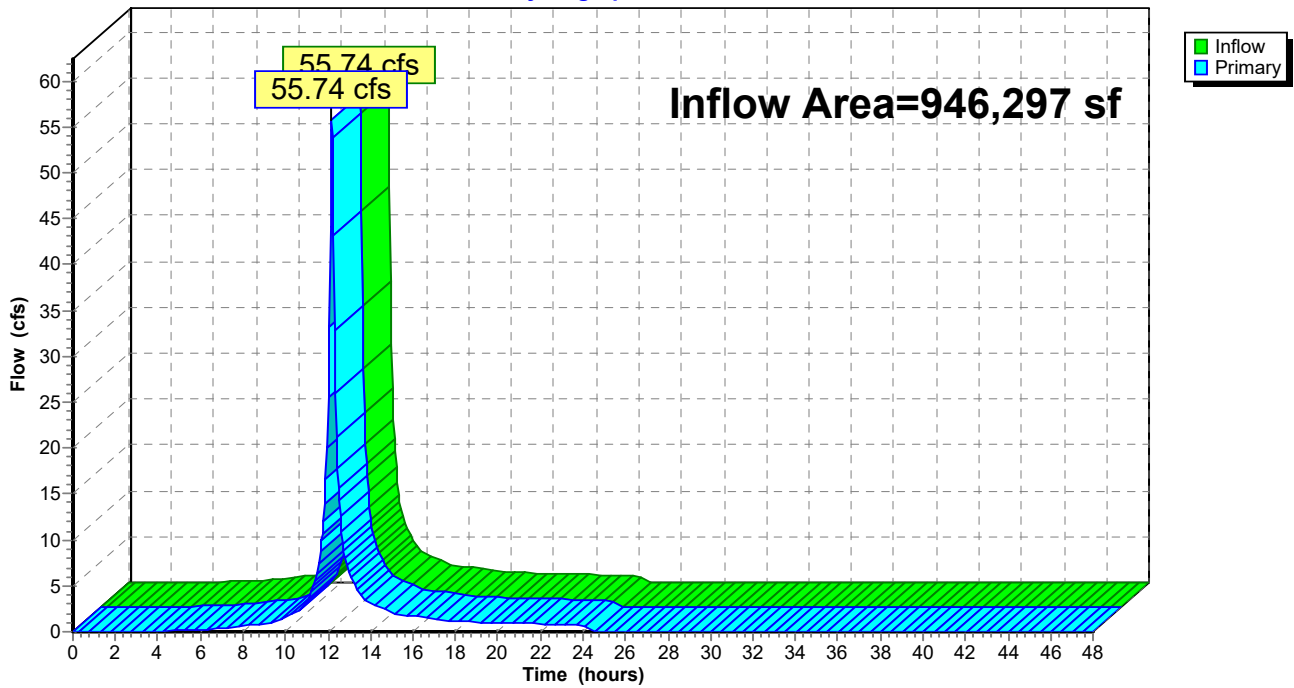
Summary for Link EXST-1: POI

Inflow Area = 946,297 sf, 67.35% Impervious, Inflow Depth = 2.42" for 2-Year event
Inflow = 55.74 cfs @ 12.17 hrs, Volume= 191,104 cf
Primary = 55.74 cfs @ 12.17 hrs, Volume= 191,104 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link EXST-1: POI

Hydrograph



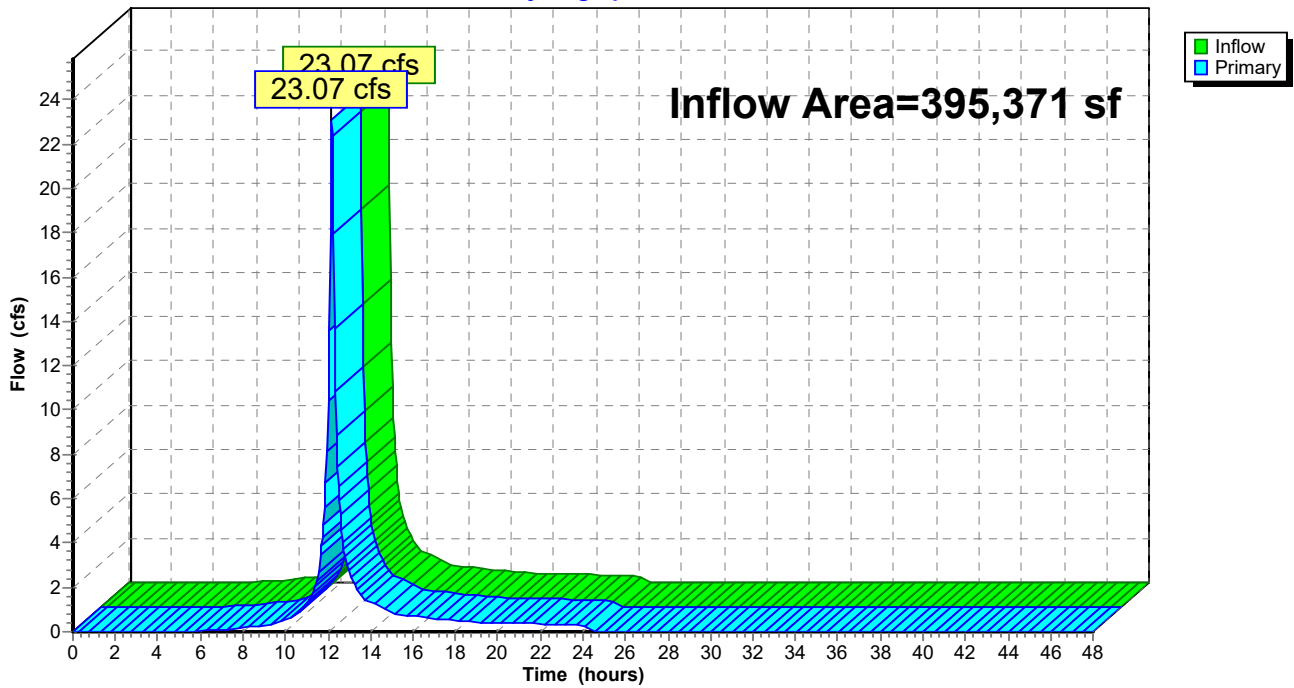
Summary for Link EXST-2: POI

Inflow Area = 395,371 sf, 64.67% Impervious, Inflow Depth = 2.35" for 2-Year event
Inflow = 23.07 cfs @ 12.17 hrs, Volume= 77,268 cf
Primary = 23.07 cfs @ 12.17 hrs, Volume= 77,268 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link EXST-2: POI

Hydrograph



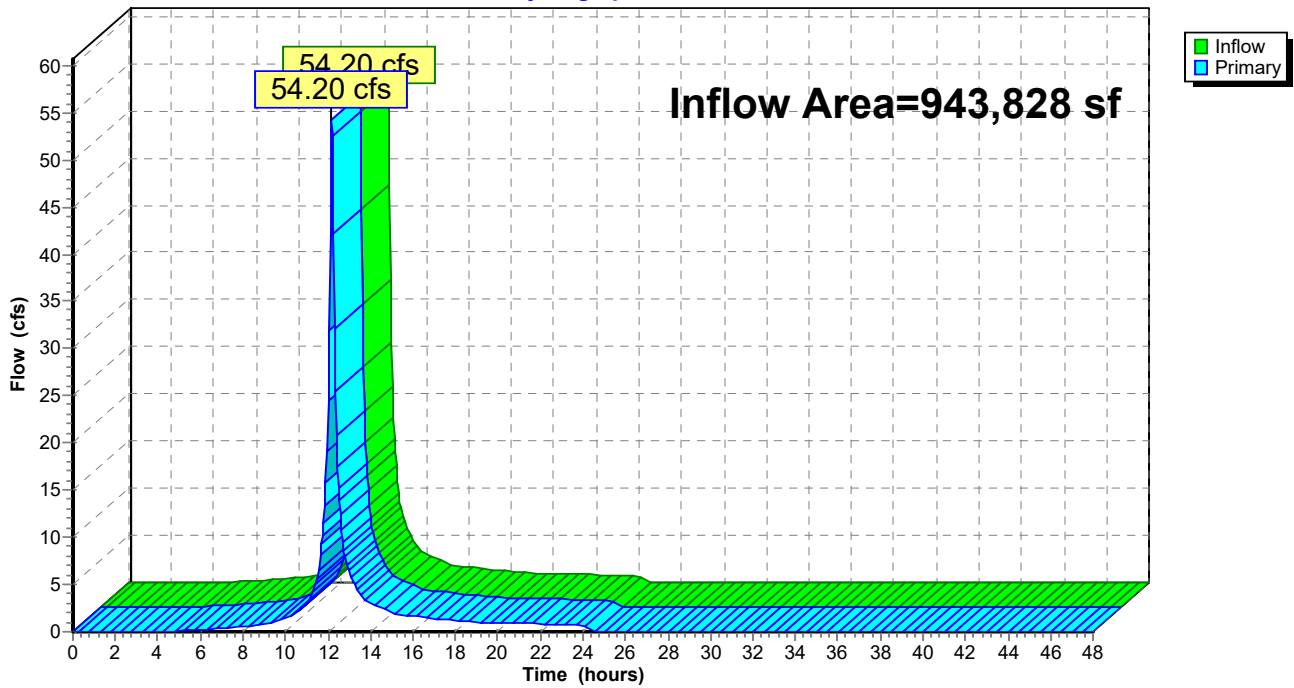
Summary for Link PROP-1: POI

Inflow Area = 943,828 sf, 61.37% Impervious, Inflow Depth = 2.34" for 2-Year event
Inflow = 54.20 cfs @ 12.17 hrs, Volume= 184,097 cf
Primary = 54.20 cfs @ 12.17 hrs, Volume= 184,097 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link PROP-1: POI

Hydrograph



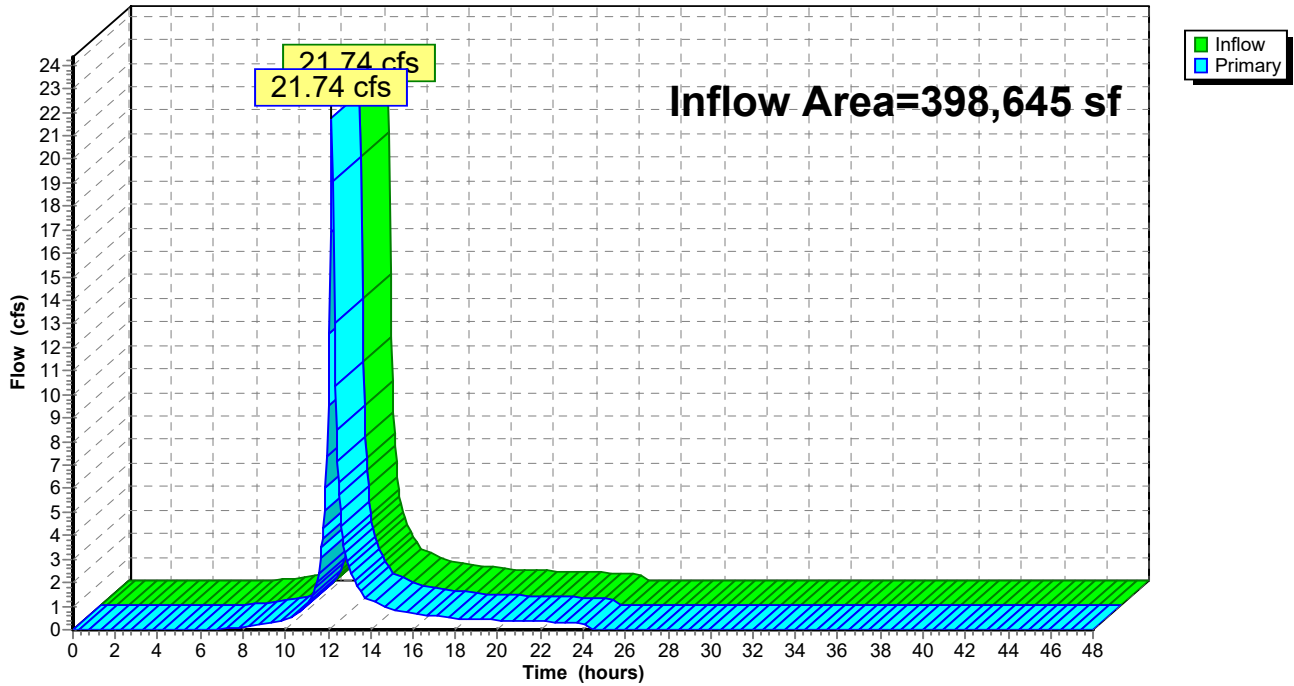
Summary for Link PROP-2: POI

Inflow Area = 398,645 sf, 53.32% Impervious, Inflow Depth = 2.17" for 2-Year event
Inflow = 21.74 cfs @ 12.17 hrs, Volume= 72,042 cf
Primary = 21.74 cfs @ 12.17 hrs, Volume= 72,042 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link PROP-2: POI

Hydrograph



2020-03-29_Calculations

NOAA 24-hr C 10-Year Rainfall=5.18"

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: Tributary to E-1	Runoff Area=801,600 sf 78.71% Impervious Runoff Depth=4.37" Tc=10.0 min CN=93 Runoff=82.53 cfs 292,234 cf
Subcatchment E-2: Tributary to E-2	Runoff Area=395,371 sf 64.67% Impervious Runoff Depth=4.05" Tc=10.0 min CN=90 Runoff=38.75 cfs 133,441 cf
Subcatchment E-3: Undetained Runoff	Runoff Area=144,697 sf 4.40% Impervious Runoff Depth=2.68" Tc=10.0 min CN=76 Runoff=9.86 cfs 32,371 cf
Subcatchment P-1: Tributary to P-1	Runoff Area=799,131 sf 71.69% Impervious Runoff Depth=4.27" Tc=10.0 min CN=92 Runoff=81.04 cfs 284,039 cf
Subcatchment P-2: Tributary to P-2	Runoff Area=398,645 sf 53.32% Impervious Runoff Depth=3.84" Tc=10.0 min CN=88 Runoff=37.57 cfs 127,572 cf
Subcatchment P-3: Undetained Runoff	Runoff Area=144,697 sf 4.40% Impervious Runoff Depth=2.68" Tc=10.0 min CN=76 Runoff=9.86 cfs 32,371 cf
Link EXST-1: POI	Inflow=92.39 cfs 324,604 cf Primary=92.39 cfs 324,604 cf
Link EXST-2: POI	Inflow=38.75 cfs 133,441 cf Primary=38.75 cfs 133,441 cf
Link PROP-1: POI	Inflow=90.90 cfs 316,409 cf Primary=90.90 cfs 316,409 cf
Link PROP-2: POI	Inflow=37.57 cfs 127,572 cf Primary=37.57 cfs 127,572 cf

2020-03-29_Calculations

NOAA 24-hr C 10-Year Rainfall=5.18"

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Summary for Subcatchment E-1: Tributary to E-1

Runoff = 82.53 cfs @ 12.17 hrs, Volume= 292,234 cf, Depth= 4.37"

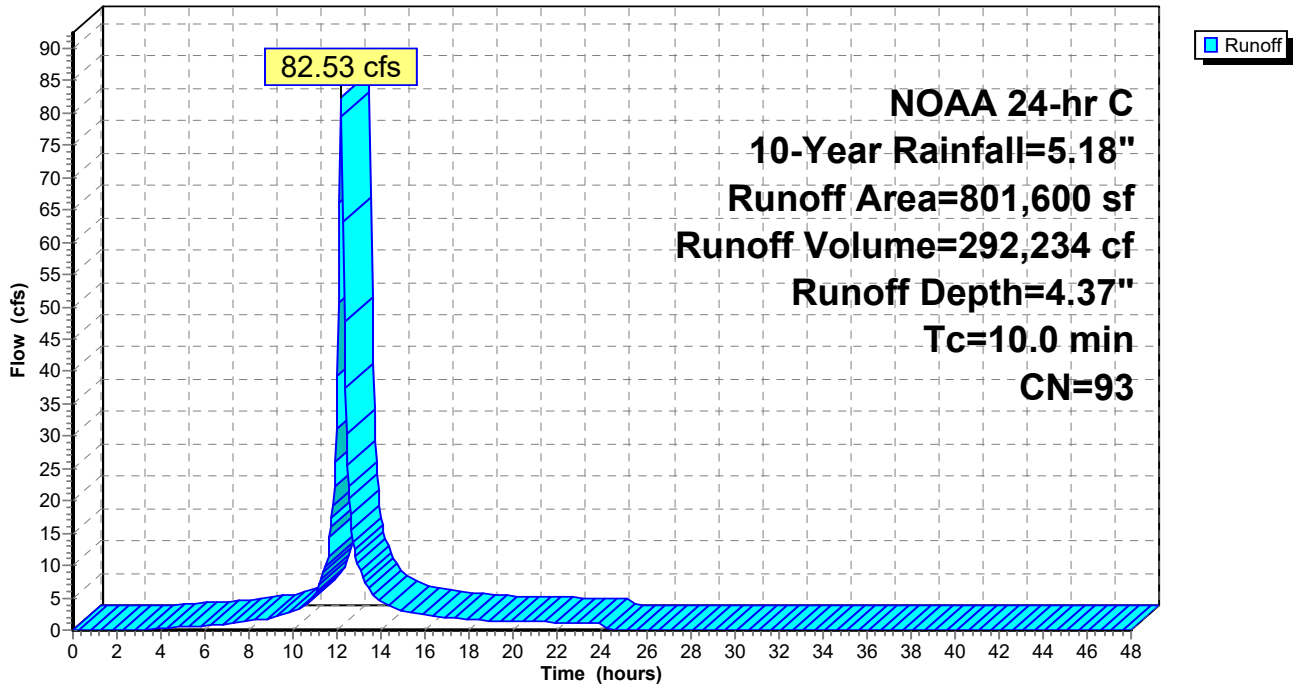
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (sf)	CN	Description
* 630,951	98	Impervious Surfaces
92,120	74	>75% Grass cover, Good, HSG C
78,529	80	>75% Grass cover, Good, HSG D
801,600	93	Weighted Average
170,649		21.29% Pervious Area
630,951		78.71% Impervious Area

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

Subcatchment E-1: Tributary to E-1

Hydrograph



Summary for Subcatchment E-2: Tributary to E-2

Runoff = 38.75 cfs @ 12.17 hrs, Volume= 133,441 cf, Depth= 4.05"

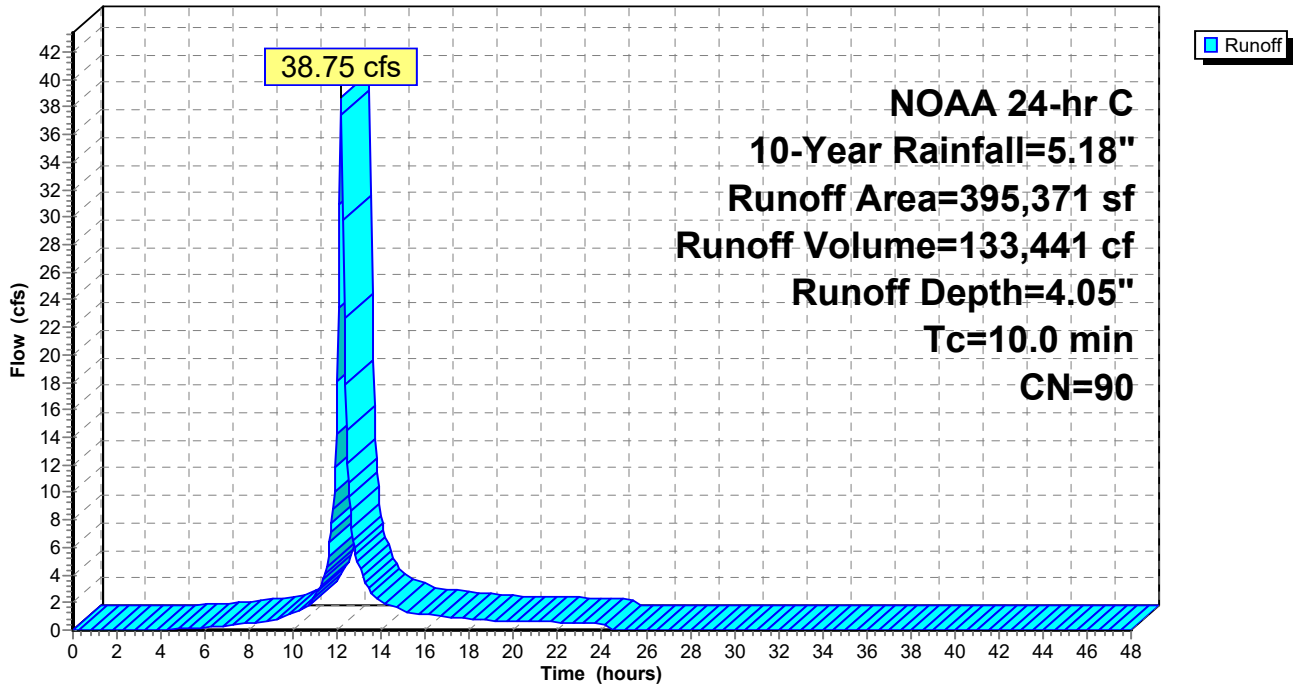
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

	Area (sf)	CN	Description
*	255,695	98	Impervious Surfaces
	109,755	74	>75% Grass cover, Good, HSG C
	29,921	80	>75% Grass cover, Good, HSG D
	395,371	90	Weighted Average
	139,676		35.33% Pervious Area
	255,695		64.67% Impervious Area

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

Subcatchment E-2: Tributary to E-2

Hydrograph



Summary for Subcatchment E-3: Undetained Runoff

Runoff = 9.86 cfs @ 12.18 hrs, Volume= 32,371 cf, Depth= 2.68"

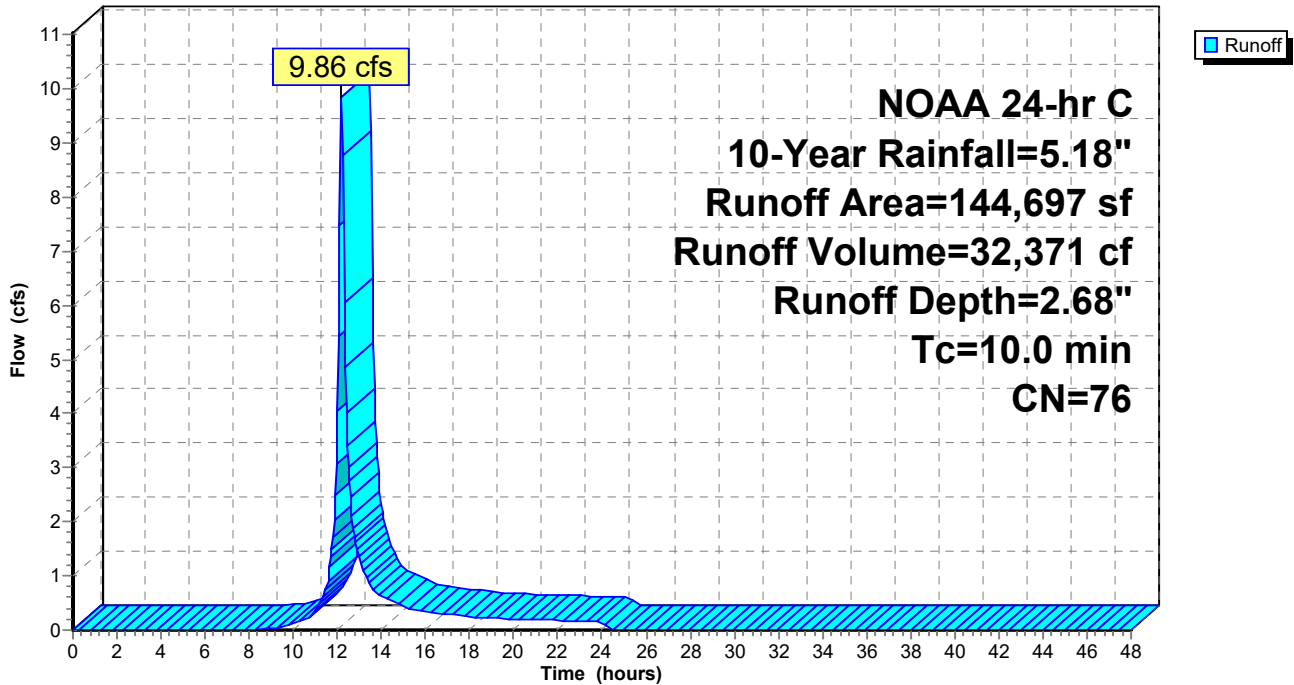
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (sf)	CN	Description
* 6,373	98	Impervious Surfaces
124,884	74	>75% Grass cover, Good, HSG C
13,440	80	>75% Grass cover, Good, HSG D
144,697	76	Weighted Average
138,324		95.60% Pervious Area
6,373		4.40% Impervious Area

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

Subcatchment E-3: Undetained Runoff

Hydrograph



2020-03-29_Calculations

NOAA 24-hr C 10-Year Rainfall=5.18"

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Summary for Subcatchment P-1: Tributary to P-1

Runoff = 81.04 cfs @ 12.17 hrs, Volume= 284,039 cf, Depth= 4.27"

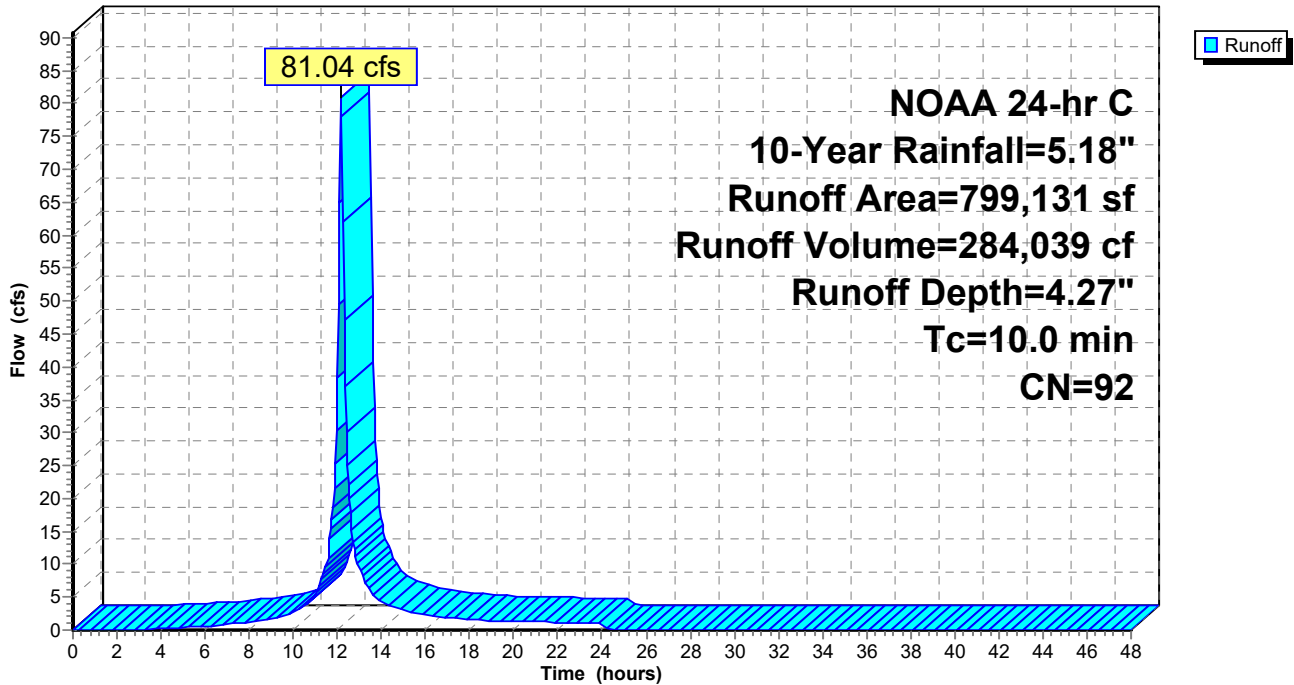
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

	Area (sf)	CN	Description
*	572,872	98	Impervious Surfaces
	99,763	74	>75% Grass cover, Good, HSG C
	126,496	80	>75% Grass cover, Good, HSG D
	799,131	92	Weighted Average
	226,259		28.31% Pervious Area
	572,872		71.69% Impervious Area

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

Subcatchment P-1: Tributary to P-1

Hydrograph



Summary for Subcatchment P-2: Tributary to P-2

Runoff = 37.57 cfs @ 12.17 hrs, Volume= 127,572 cf, Depth= 3.84"

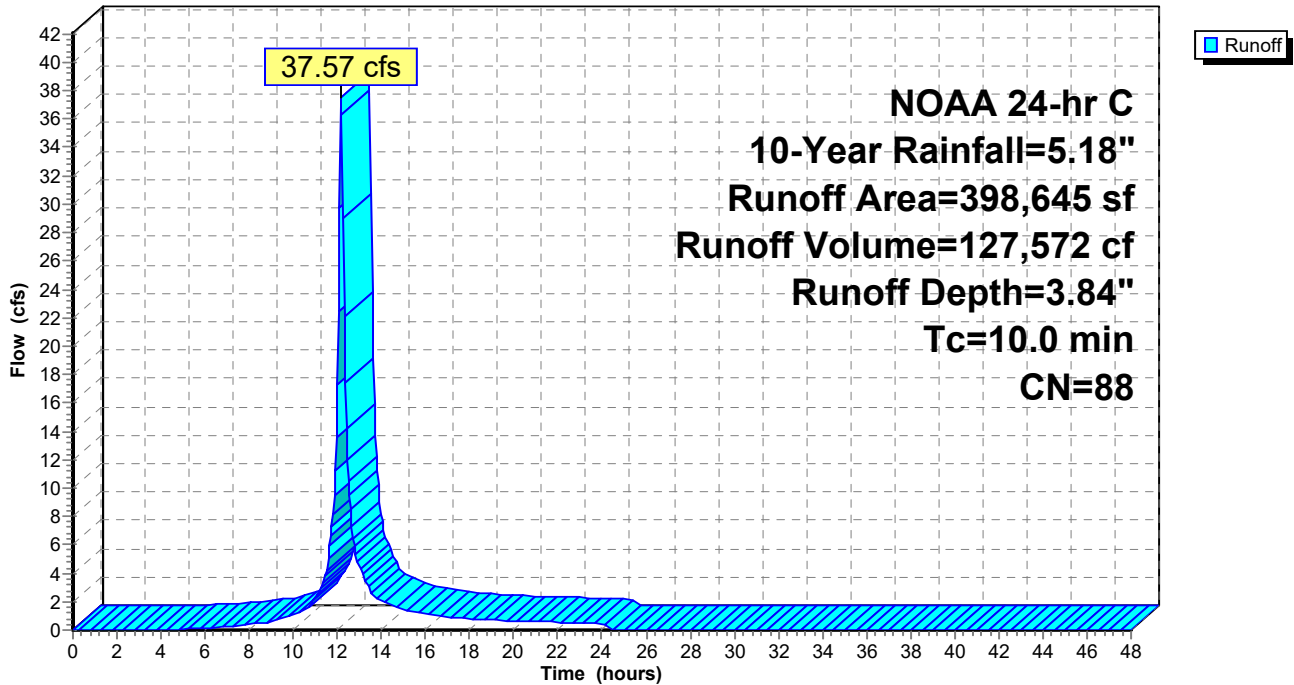
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

	Area (sf)	CN	Description
*	212,568	98	Impervious Surfaces
	129,238	74	>75% Grass cover, Good, HSG C
	56,839	80	>75% Grass cover, Good, HSG D
	398,645	88	Weighted Average
	186,077		46.68% Pervious Area
	212,568		53.32% Impervious Area

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

Subcatchment P-2: Tributary to P-2

Hydrograph



Summary for Subcatchment P-3: Undetained Runoff

Runoff = 9.86 cfs @ 12.18 hrs, Volume= 32,371 cf, Depth= 2.68"

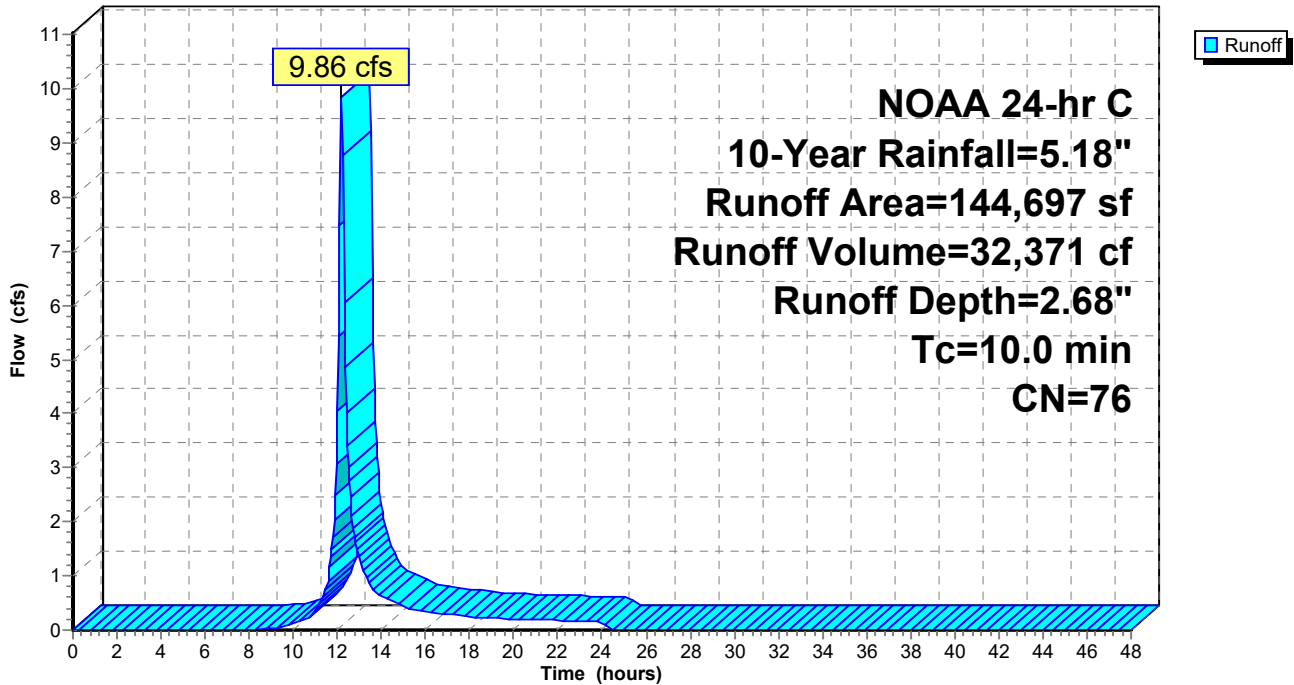
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.18"

Area (sf)	CN	Description
* 6,373	98	Impervious Surfaces
124,884	74	>75% Grass cover, Good, HSG C
13,440	80	>75% Grass cover, Good, HSG D
144,697	76	Weighted Average
138,324		95.60% Pervious Area
6,373		4.40% Impervious Area

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

Subcatchment P-3: Undetained Runoff

Hydrograph



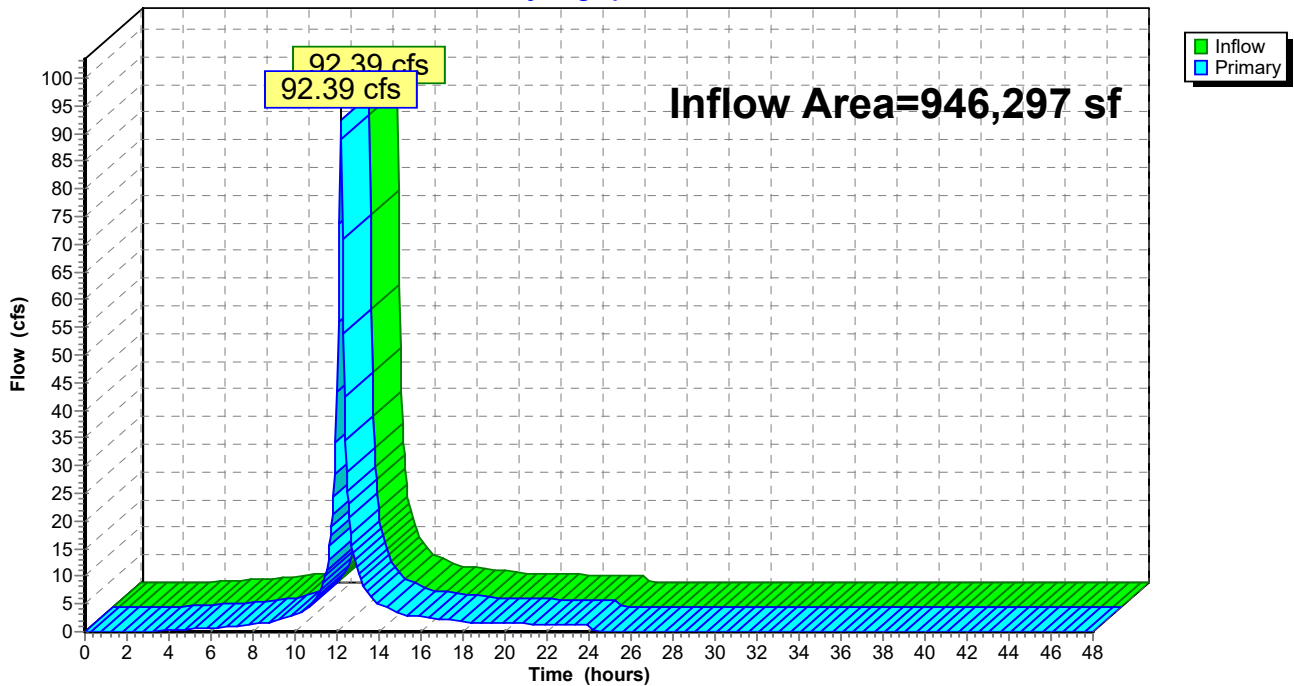
Summary for Link EXST-1: POI

Inflow Area = 946,297 sf, 67.35% Impervious, Inflow Depth = 4.12" for 10-Year event
Inflow = 92.39 cfs @ 12.17 hrs, Volume= 324,604 cf
Primary = 92.39 cfs @ 12.17 hrs, Volume= 324,604 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link EXST-1: POI

Hydrograph



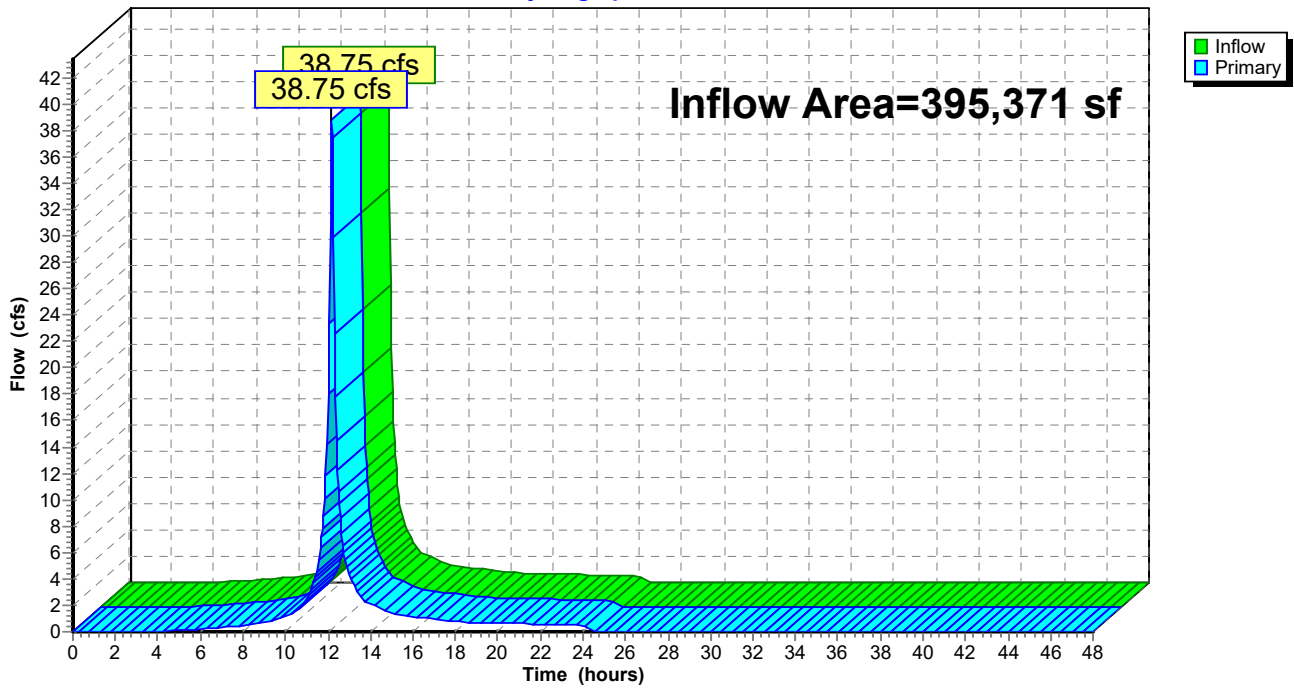
Summary for Link EXST-2: POI

Inflow Area = 395,371 sf, 64.67% Impervious, Inflow Depth = 4.05" for 10-Year event
Inflow = 38.75 cfs @ 12.17 hrs, Volume= 133,441 cf
Primary = 38.75 cfs @ 12.17 hrs, Volume= 133,441 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link EXST-2: POI

Hydrograph



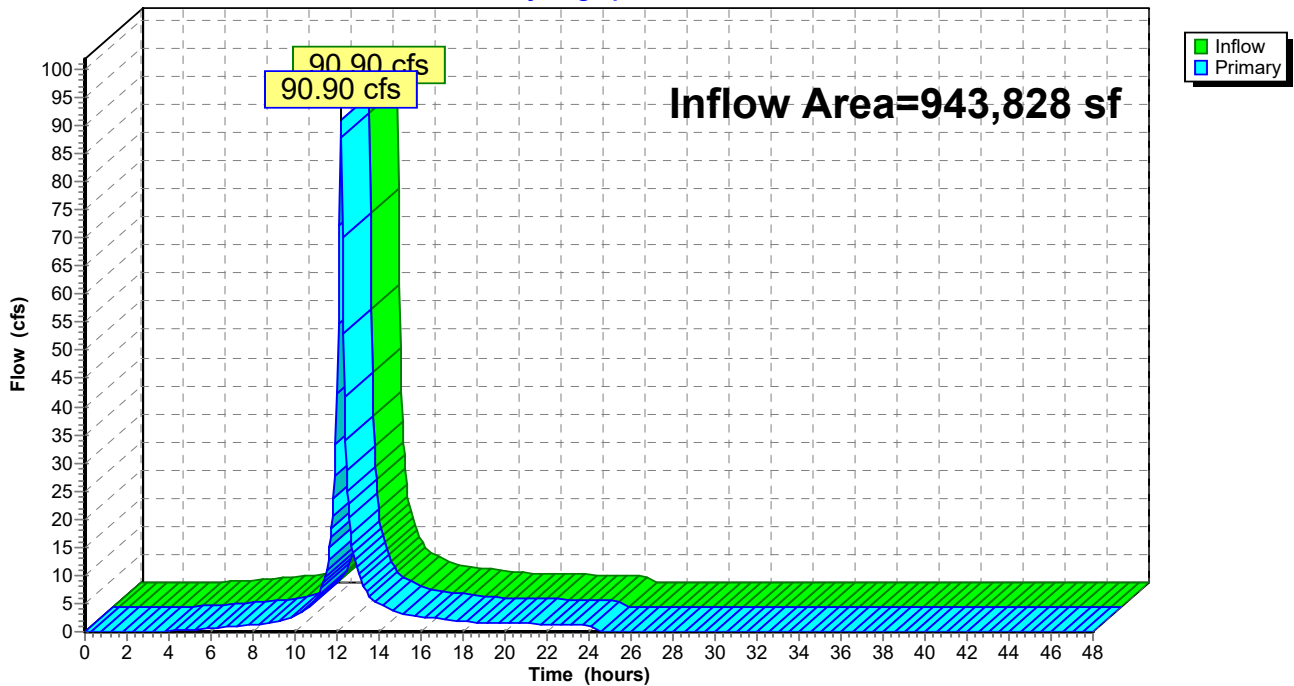
Summary for Link PROP-1: POI

Inflow Area = 943,828 sf, 61.37% Impervious, Inflow Depth = 4.02" for 10-Year event
Inflow = 90.90 cfs @ 12.17 hrs, Volume= 316,409 cf
Primary = 90.90 cfs @ 12.17 hrs, Volume= 316,409 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link PROP-1: POI

Hydrograph



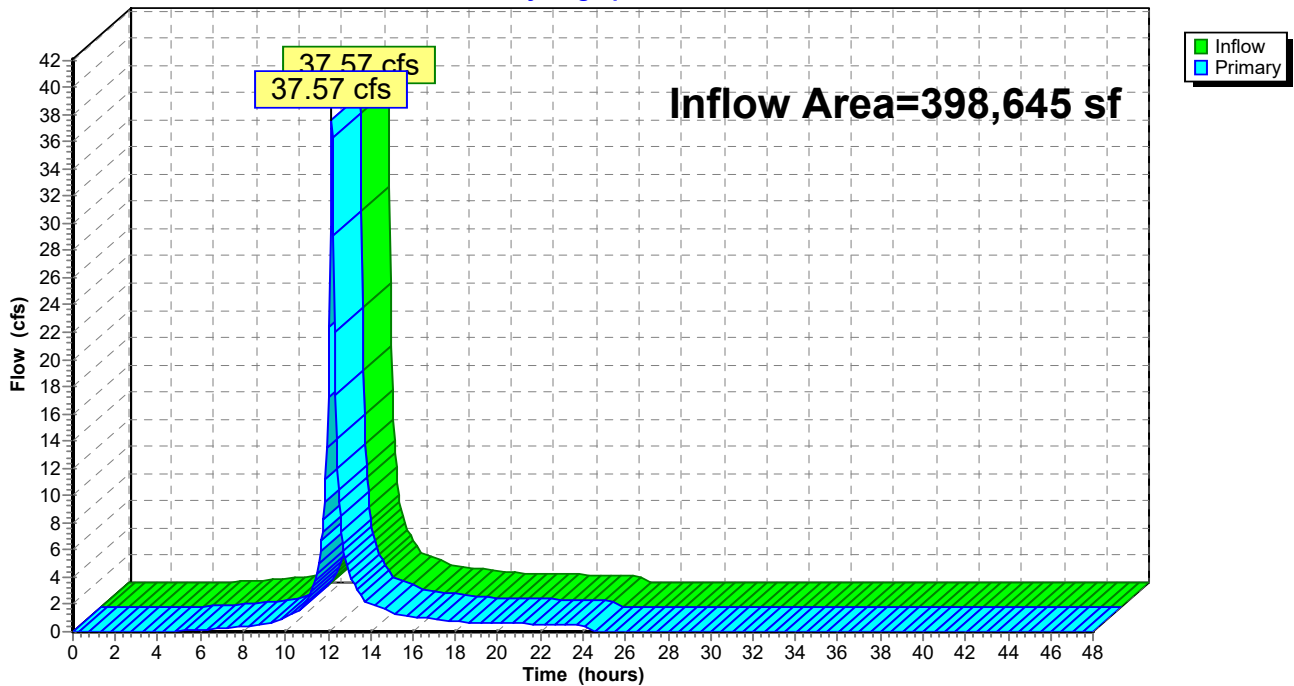
Summary for Link PROP-2: POI

Inflow Area = 398,645 sf, 53.32% Impervious, Inflow Depth = 3.84" for 10-Year event
Inflow = 37.57 cfs @ 12.17 hrs, Volume= 127,572 cf
Primary = 37.57 cfs @ 12.17 hrs, Volume= 127,572 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link PROP-2: POI

Hydrograph



2020-03-29_Calculations

NOAA 24-hr C 100-Year Rainfall=8.71"

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Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: Tributary to E-1 Runoff Area=801,600 sf 78.71% Impervious Runoff Depth=7.87"
Tc=10.0 min CN=93 Runoff=143.47 cfs 525,557 cf

Subcatchment E-2: Tributary to E-2 Runoff Area=395,371 sf 64.67% Impervious Runoff Depth=7.51"
Tc=10.0 min CN=90 Runoff=69.21 cfs 247,281 cf

Subcatchment E-3: Undetained Runoff Runoff Area=144,697 sf 4.40% Impervious Runoff Depth=5.81"
Tc=10.0 min CN=76 Runoff=21.03 cfs 70,034 cf

Subcatchment P-1: Tributary to P-1 Runoff Area=799,131 sf 71.69% Impervious Runoff Depth=7.75"
Tc=10.0 min CN=92 Runoff=142.08 cfs 515,900 cf

Subcatchment P-2: Tributary to P-2 Runoff Area=398,645 sf 53.32% Impervious Runoff Depth=7.26"
Tc=10.0 min CN=88 Runoff=68.51 cfs 241,292 cf

Subcatchment P-3: Undetained Runoff Runoff Area=144,697 sf 4.40% Impervious Runoff Depth=5.81"
Tc=10.0 min CN=76 Runoff=21.03 cfs 70,034 cf

Link EXST-1: POI Inflow=164.48 cfs 595,590 cf
Primary=164.48 cfs 595,590 cf

Link EXST-2: POI Inflow=69.21 cfs 247,281 cf
Primary=69.21 cfs 247,281 cf

Link PROP-1: POI Inflow=163.09 cfs 585,934 cf
Primary=163.09 cfs 585,934 cf

Link PROP-2: POI Inflow=68.51 cfs 241,292 cf
Primary=68.51 cfs 241,292 cf

Summary for Subcatchment E-1: Tributary to E-1

Runoff = 143.47 cfs @ 12.17 hrs, Volume= 525,557 cf, Depth= 7.87"

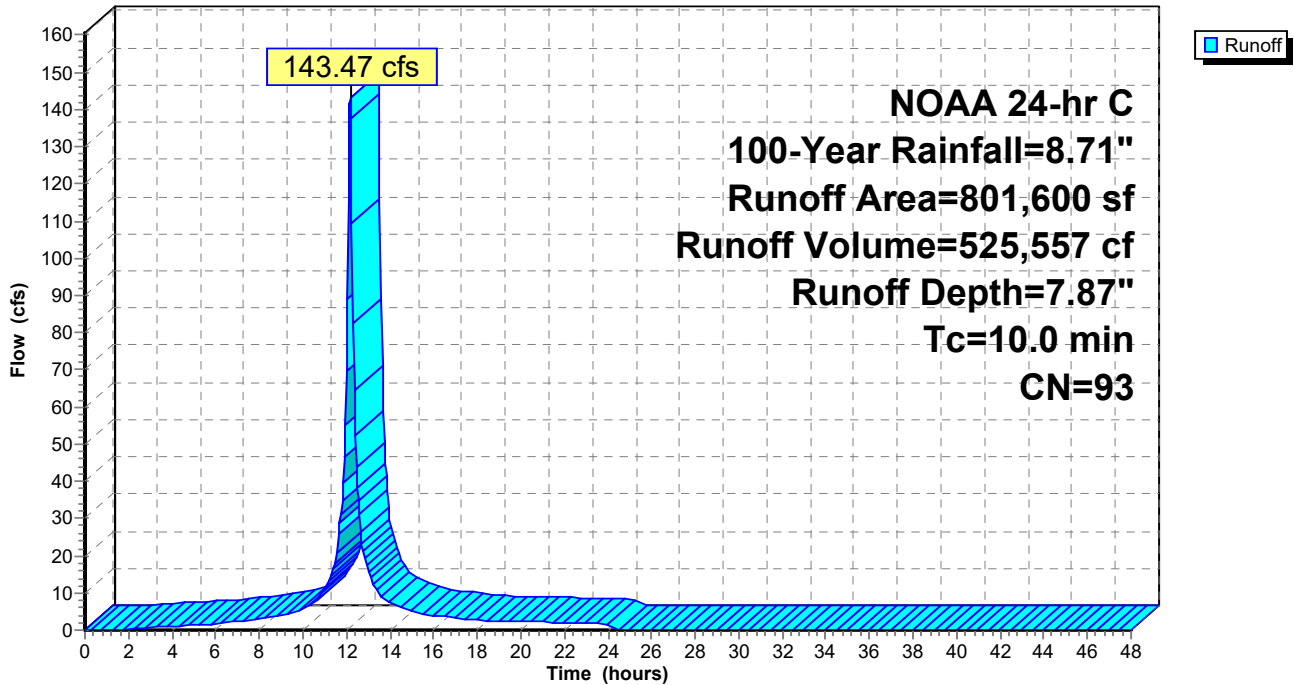
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.71"

	Area (sf)	CN	Description
*	630,951	98	Impervious Surfaces
	92,120	74	>75% Grass cover, Good, HSG C
	78,529	80	>75% Grass cover, Good, HSG D
	801,600	93	Weighted Average
	170,649		21.29% Pervious Area
	630,951		78.71% Impervious Area

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

Subcatchment E-1: Tributary to E-1

Hydrograph



Summary for Subcatchment E-2: Tributary to E-2

Runoff = 69.21 cfs @ 12.17 hrs, Volume= 247,281 cf, Depth= 7.51"

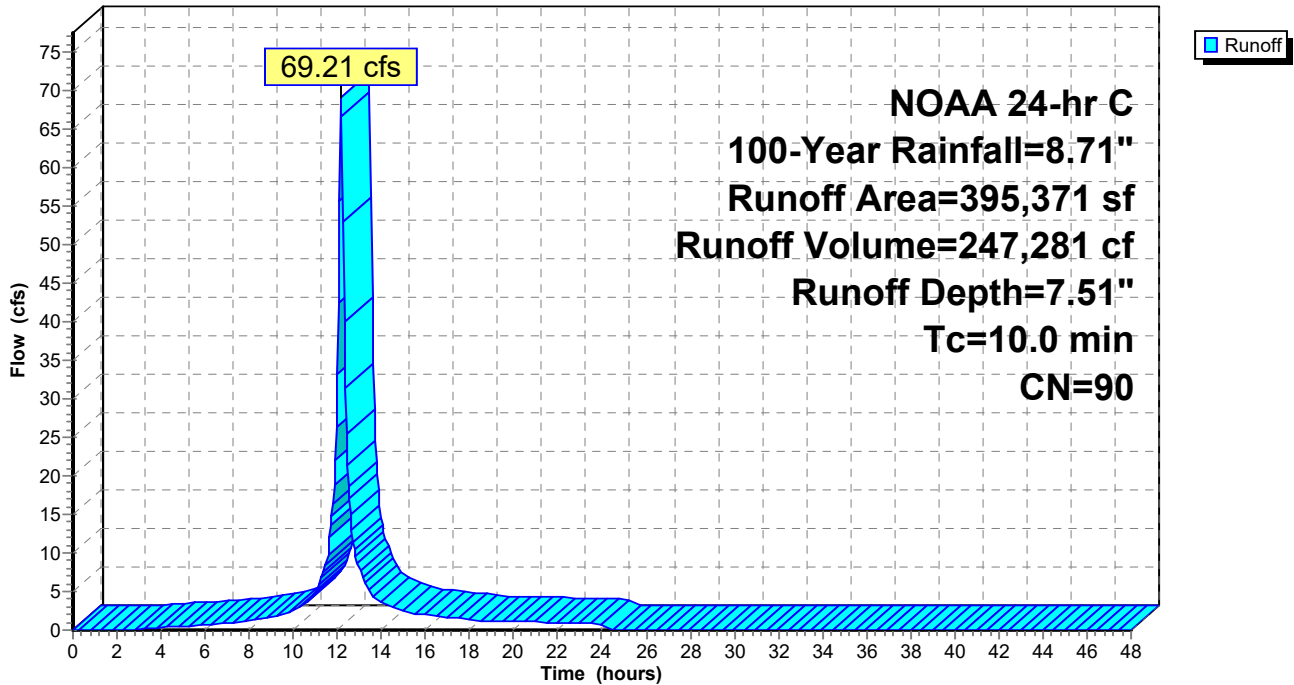
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.71"

	Area (sf)	CN	Description
*	255,695	98	Impervious Surfaces
	109,755	74	>75% Grass cover, Good, HSG C
	29,921	80	>75% Grass cover, Good, HSG D
	395,371	90	Weighted Average
	139,676		35.33% Pervious Area
	255,695		64.67% Impervious Area

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

Subcatchment E-2: Tributary to E-2

Hydrograph



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NOAA 24-hr C 100-Year Rainfall=8.71"

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Summary for Subcatchment E-3: Undetained Runoff

Runoff = 21.03 cfs @ 12.17 hrs, Volume= 70,034 cf, Depth= 5.81"

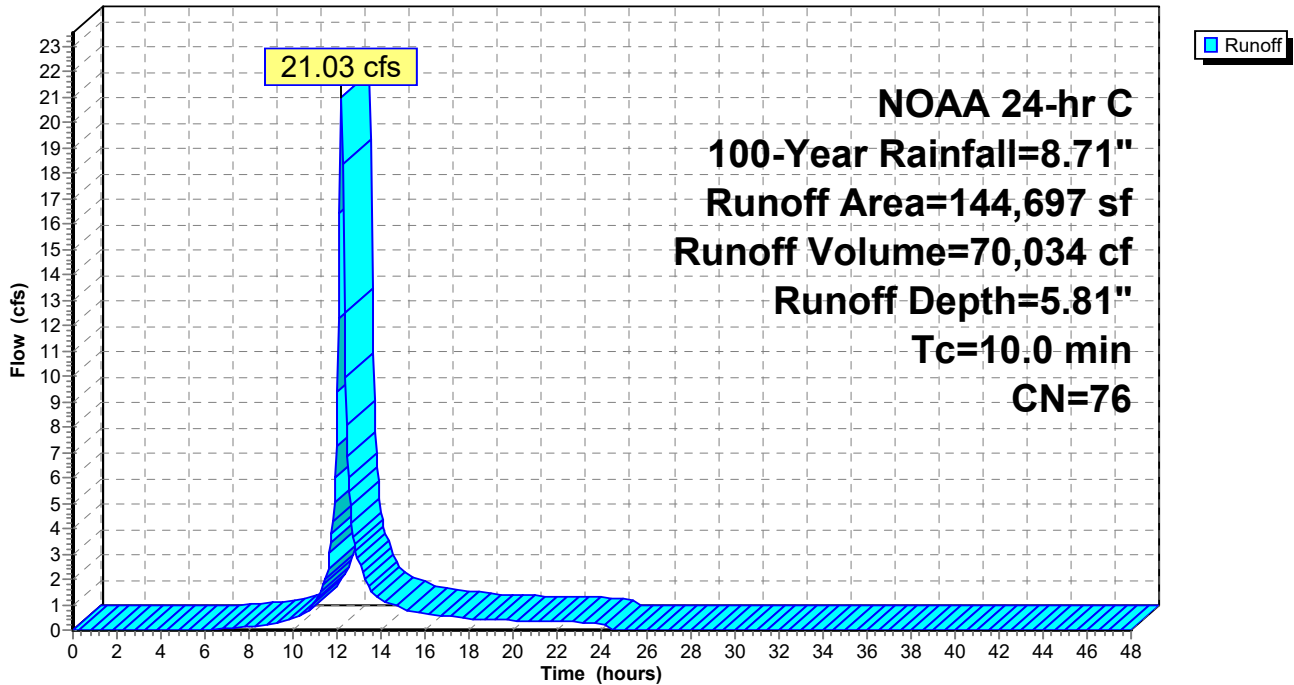
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.71"

Area (sf)	CN	Description
* 6,373	98	Impervious Surfaces
124,884	74	>75% Grass cover, Good, HSG C
13,440	80	>75% Grass cover, Good, HSG D
144,697	76	Weighted Average
138,324		95.60% Pervious Area
6,373		4.40% Impervious Area

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

Subcatchment E-3: Undetained Runoff

Hydrograph



2020-03-29_Calculations

NOAA 24-hr C 100-Year Rainfall=8.71"

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Summary for Subcatchment P-1: Tributary to P-1

Runoff = 142.08 cfs @ 12.17 hrs, Volume= 515,900 cf, Depth= 7.75"

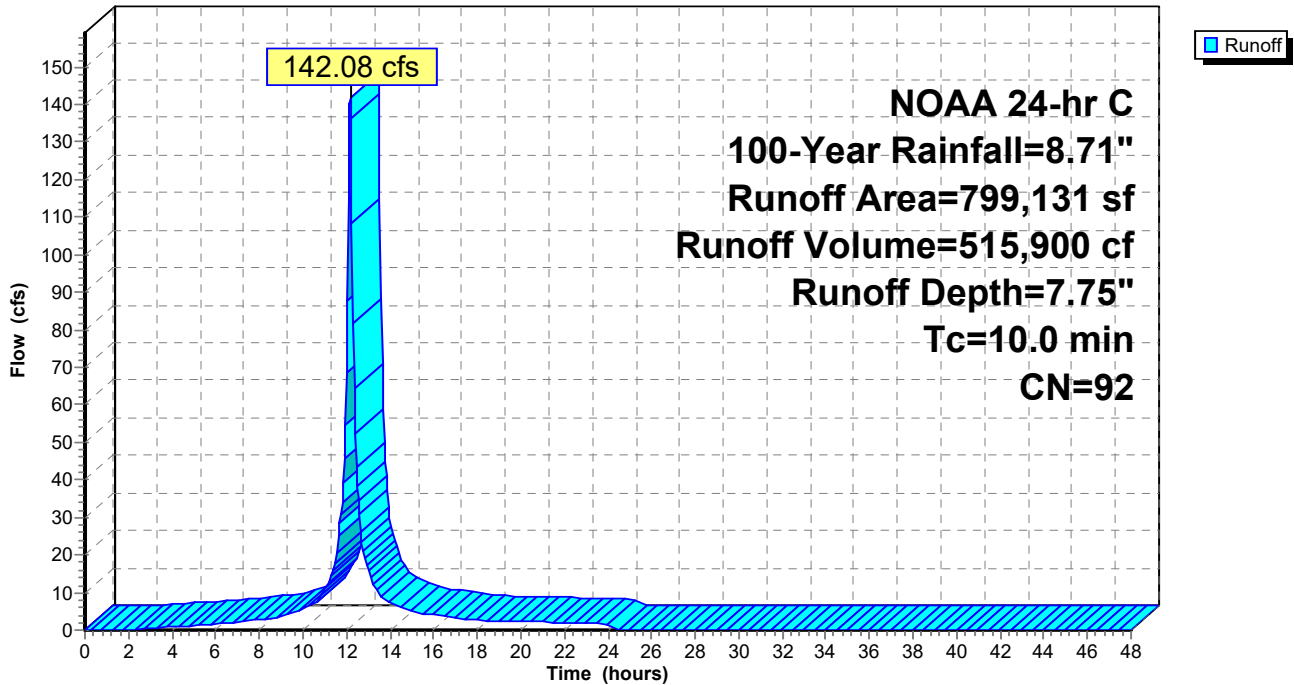
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.71"

	Area (sf)	CN	Description
*	572,872	98	Impervious Surfaces
	99,763	74	>75% Grass cover, Good, HSG C
	126,496	80	>75% Grass cover, Good, HSG D
	799,131	92	Weighted Average
	226,259		28.31% Pervious Area
	572,872		71.69% Impervious Area

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

Subcatchment P-1: Tributary to P-1

Hydrograph



2020-03-29_Calculations

NOAA 24-hr C 100-Year Rainfall=8.71"

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Summary for Subcatchment P-2: Tributary to P-2

Runoff = 68.51 cfs @ 12.17 hrs, Volume= 241,292 cf, Depth= 7.26"

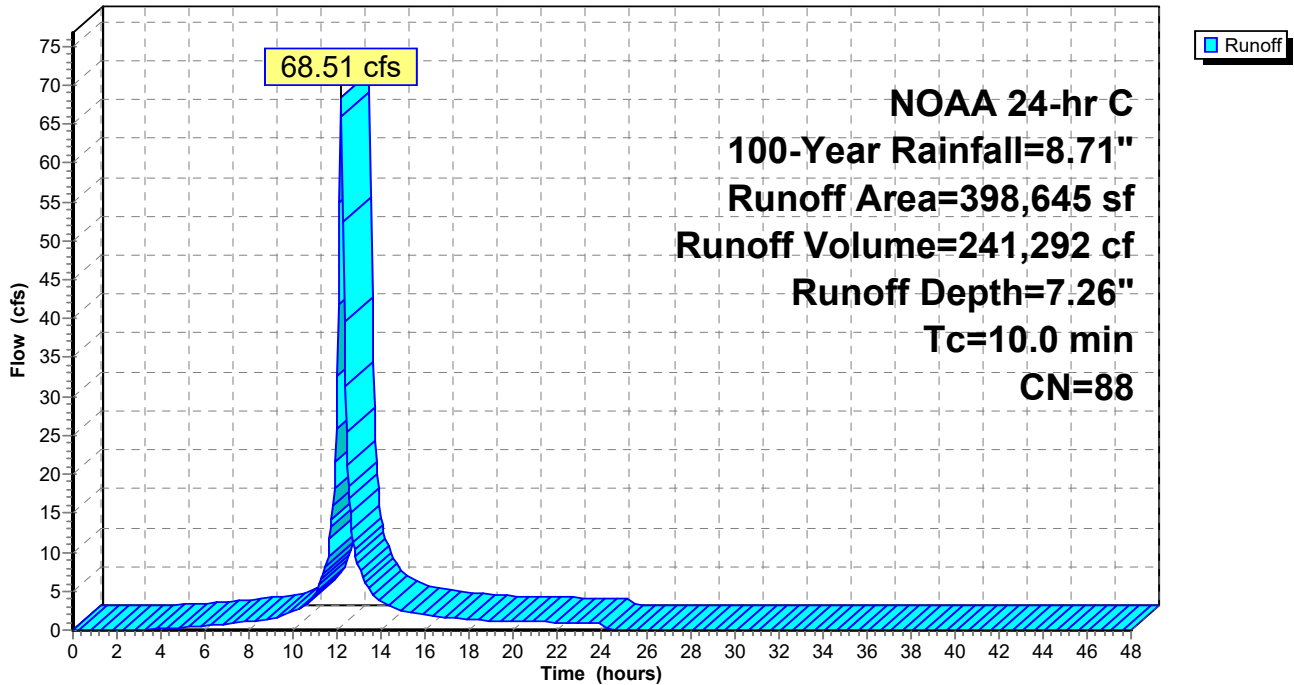
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.71"

	Area (sf)	CN	Description
*	212,568	98	Impervious Surfaces
	129,238	74	>75% Grass cover, Good, HSG C
	56,839	80	>75% Grass cover, Good, HSG D
	398,645	88	Weighted Average
	186,077		46.68% Pervious Area
	212,568		53.32% Impervious Area

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

Subcatchment P-2: Tributary to P-2

Hydrograph



Summary for Subcatchment P-3: Undetained Runoff

Runoff = 21.03 cfs @ 12.17 hrs, Volume= 70,034 cf, Depth= 5.81"

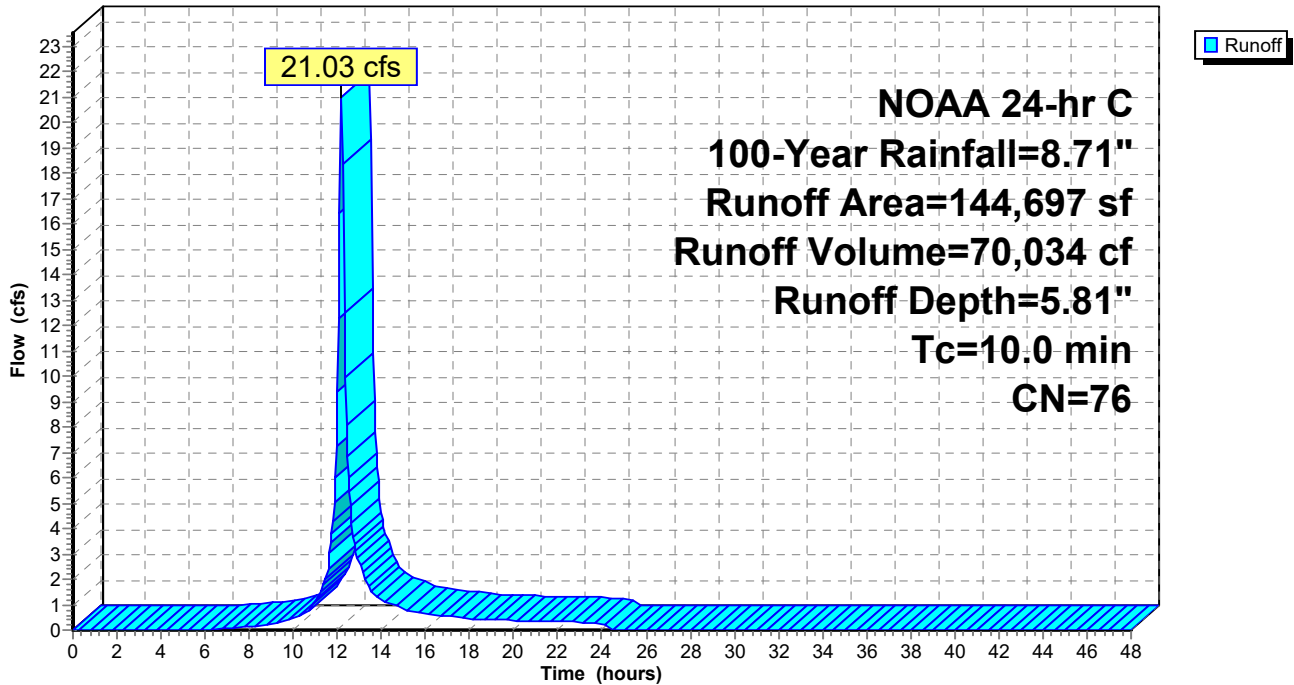
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.71"

Area (sf)	CN	Description
* 6,373	98	Impervious Surfaces
124,884	74	>75% Grass cover, Good, HSG C
13,440	80	>75% Grass cover, Good, HSG D
144,697	76	Weighted Average
138,324		95.60% Pervious Area
6,373		4.40% Impervious Area

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

Subcatchment P-3: Undetained Runoff

Hydrograph



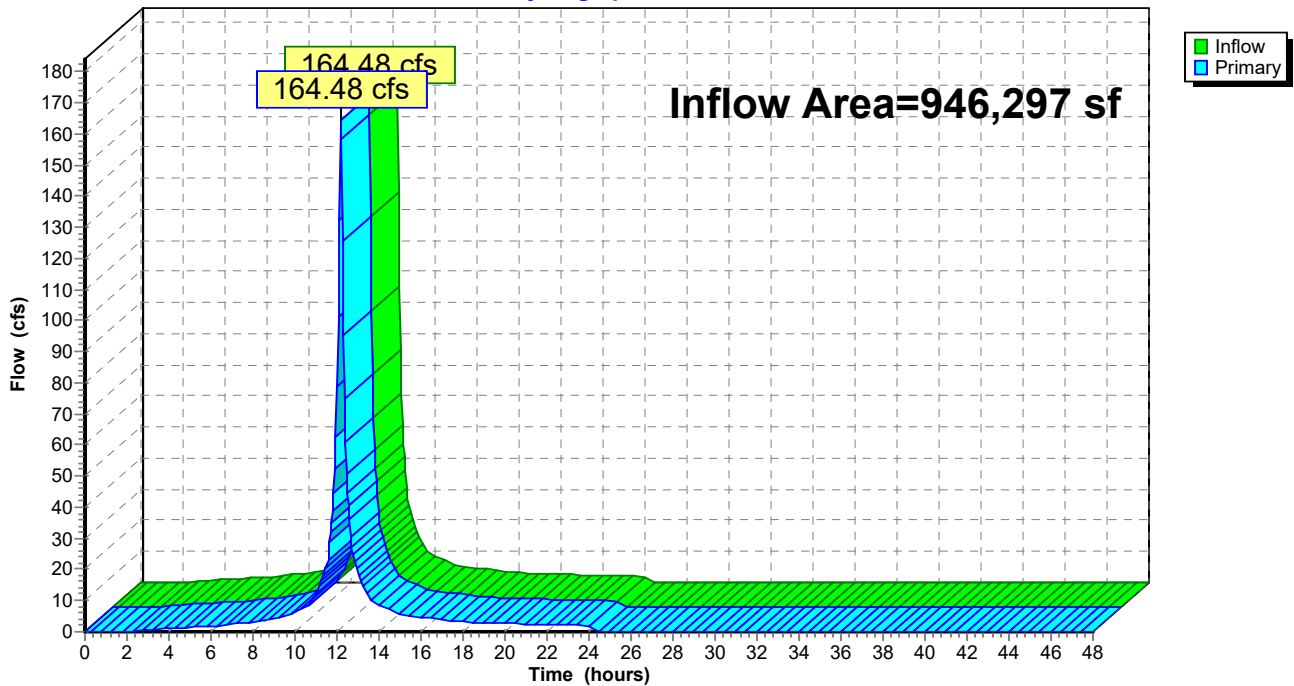
Summary for Link EXST-1: POI

Inflow Area = 946,297 sf, 67.35% Impervious, Inflow Depth = 7.55" for 100-Year event
Inflow = 164.48 cfs @ 12.17 hrs, Volume= 595,590 cf
Primary = 164.48 cfs @ 12.17 hrs, Volume= 595,590 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link EXST-1: POI

Hydrograph



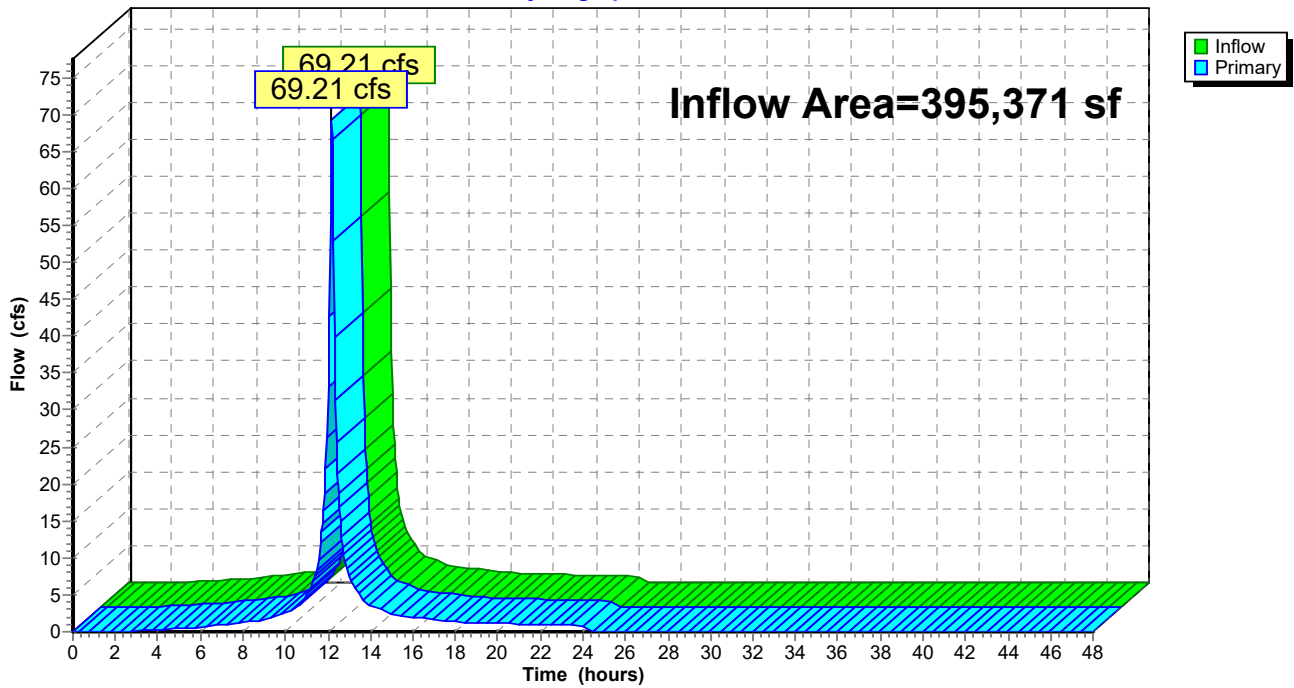
Summary for Link EXST-2: POI

Inflow Area = 395,371 sf, 64.67% Impervious, Inflow Depth = 7.51" for 100-Year event
Inflow = 69.21 cfs @ 12.17 hrs, Volume= 247,281 cf
Primary = 69.21 cfs @ 12.17 hrs, Volume= 247,281 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link EXST-2: POI

Hydrograph



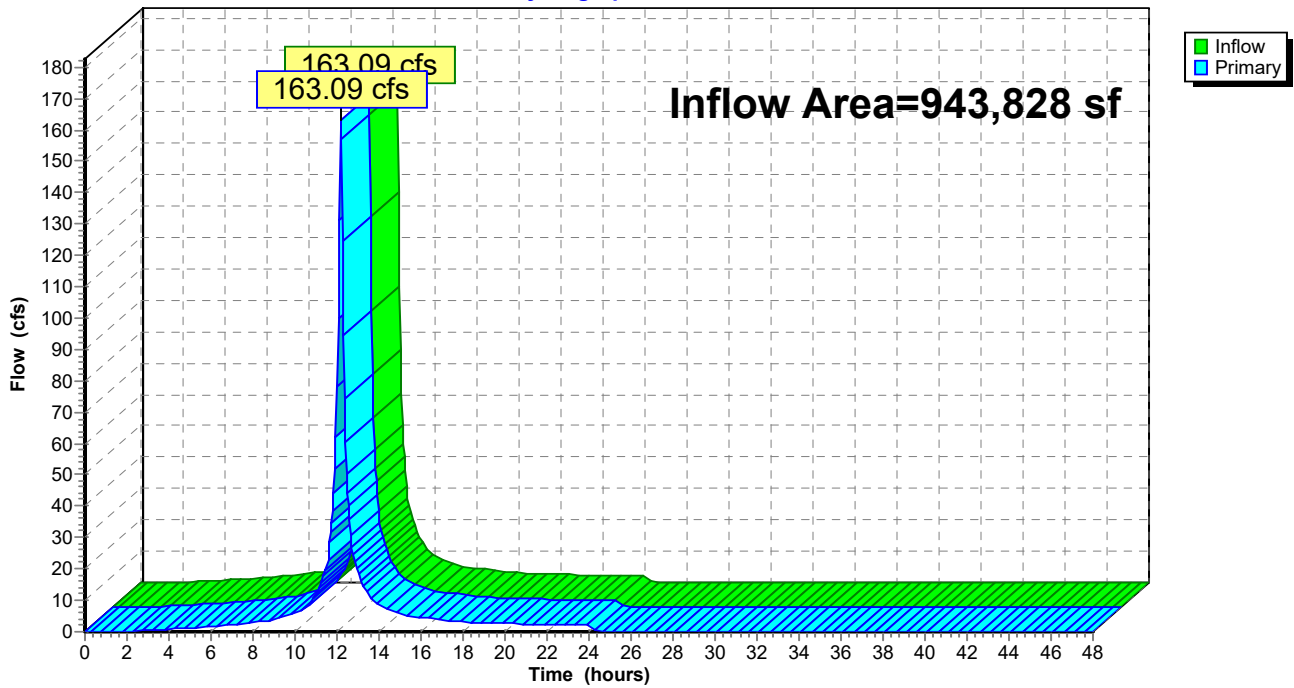
Summary for Link PROP-1: POI

Inflow Area = 943,828 sf, 61.37% Impervious, Inflow Depth = 7.45" for 100-Year event
Inflow = 163.09 cfs @ 12.17 hrs, Volume= 585,934 cf
Primary = 163.09 cfs @ 12.17 hrs, Volume= 585,934 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link PROP-1: POI

Hydrograph



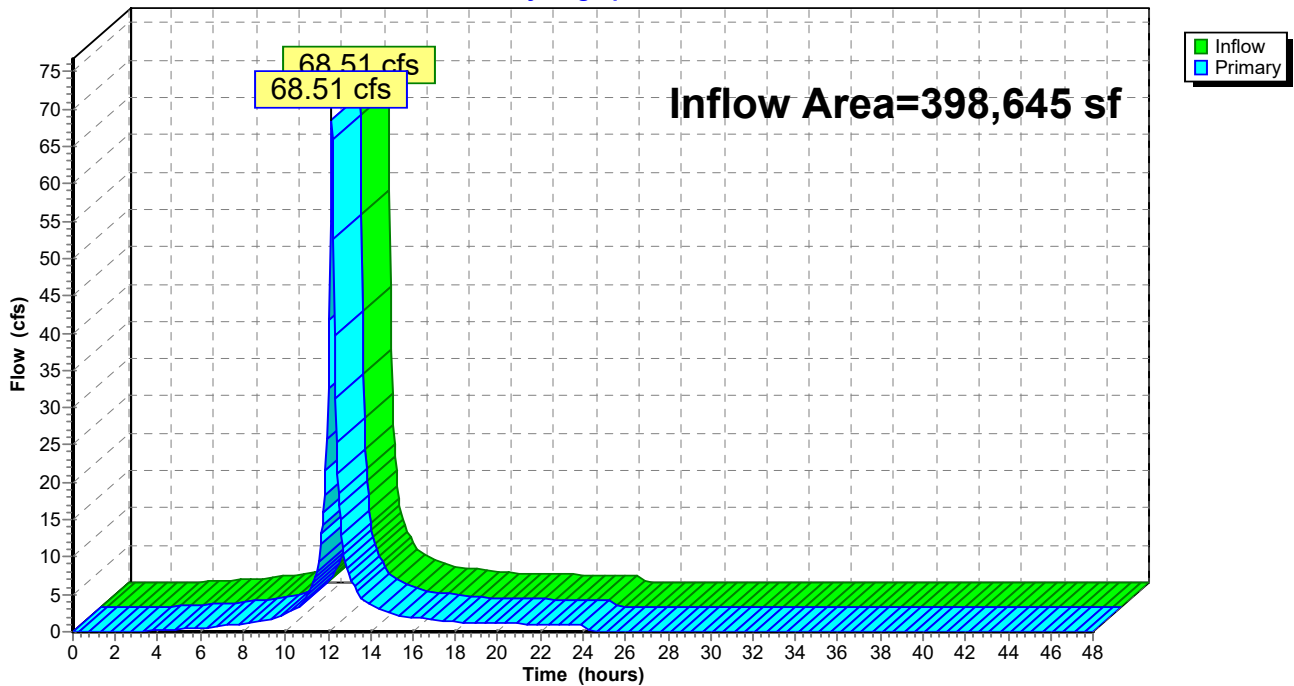
Summary for Link PROP-2: POI

Inflow Area = 398,645 sf, 53.32% Impervious, Inflow Depth = 7.26" for 100-Year event
Inflow = 68.51 cfs @ 12.17 hrs, Volume= 241,292 cf
Primary = 68.51 cfs @ 12.17 hrs, Volume= 241,292 cf, Atten= 0%, Lag= 0.0 min

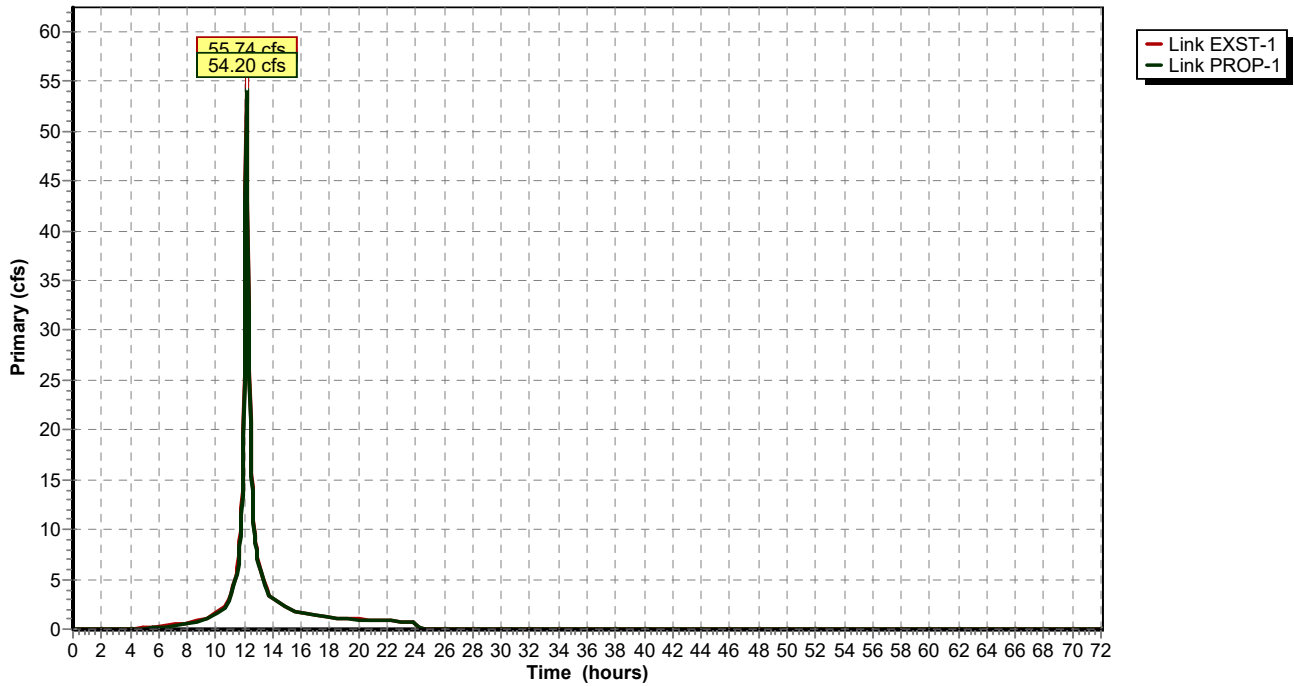
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link PROP-2: POI

Hydrograph



Primary Comparison



2020-03-29_Calculations

NOAA 24-hr C 2-Year Rainfall=3.39"

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Primary Comparison

Time (hours)	Link EXST-1 (cfs)	Link PROP-1 (cfs)	Time (hours)	Link EXST-1 (cfs)	Link PROP-1 (cfs)
0.00	0.00	0.00	26.50	0.00	0.00
0.50	0.00	0.00	27.00	0.00	0.00
1.00	0.00	0.00	27.50	0.00	0.00
1.50	0.00	0.00	28.00	0.00	0.00
2.00	0.00	0.00	28.50	0.00	0.00
2.50	0.00	0.00	29.00	0.00	0.00
3.00	0.00	0.00	29.50	0.00	0.00
3.50	0.00	0.00	30.00	0.00	0.00
4.00	0.02	0.00	30.50	0.00	0.00
4.50	0.07	0.02	31.00	0.00	0.00
5.00	0.13	0.07	31.50	0.00	0.00
5.50	0.18	0.12	32.00	0.00	0.00
6.00	0.24	0.17	32.50	0.00	0.00
6.50	0.32	0.24	33.00	0.00	0.00
7.00	0.41	0.33	33.50	0.00	0.00
7.50	0.52	0.43	34.00	0.00	0.00
8.00	0.64	0.54	34.50	0.00	0.00
8.50	0.76	0.66	35.00	0.00	0.00
9.00	0.90	0.79	35.50	0.00	0.00
9.50	1.20	1.06	36.00	0.00	0.00
10.00	1.58	1.42	36.50	0.00	0.00
10.50	2.02	1.84	37.00	0.00	0.00
11.00	3.30	3.06	37.50	0.00	0.00
11.50	6.03	5.68	38.00	0.00	0.00
12.00	25.51	24.54	38.50	0.00	0.00
12.50	15.60	15.29	39.00	0.00	0.00
13.00	6.70	6.59	39.50	0.00	0.00
13.50	4.16	4.09	40.00	0.00	0.00
14.00	3.09	3.04	40.50	0.00	0.00
14.50	2.60	2.56	41.00	0.00	0.00
15.00	2.10	2.07	41.50	0.00	0.00
15.50	1.82	1.79	42.00	0.00	0.00
16.00	1.68	1.66	42.50	0.00	0.00
16.50	1.55	1.53	43.00	0.00	0.00
17.00	1.42	1.40	43.50	0.00	0.00
17.50	1.29	1.27	44.00	0.00	0.00
18.00	1.15	1.14	44.50	0.00	0.00
18.50	1.08	1.06	45.00	0.00	0.00
19.00	1.04	1.03	45.50	0.00	0.00
19.50	1.01	1.00	46.00	0.00	0.00
20.00	0.98	0.97	46.50	0.00	0.00
20.50	0.94	0.93	47.00	0.00	0.00
21.00	0.91	0.90	47.50	0.00	0.00
21.50	0.88	0.87	48.00	0.00	0.00
22.00	0.85	0.83			
22.50	0.81	0.80			
23.00	0.78	0.77			
23.50	0.75	0.74			
24.00	0.75	0.74			
24.50	0.00	0.00			
25.00	0.00	0.00			
25.50	0.00	0.00			
26.00	0.00	0.00			

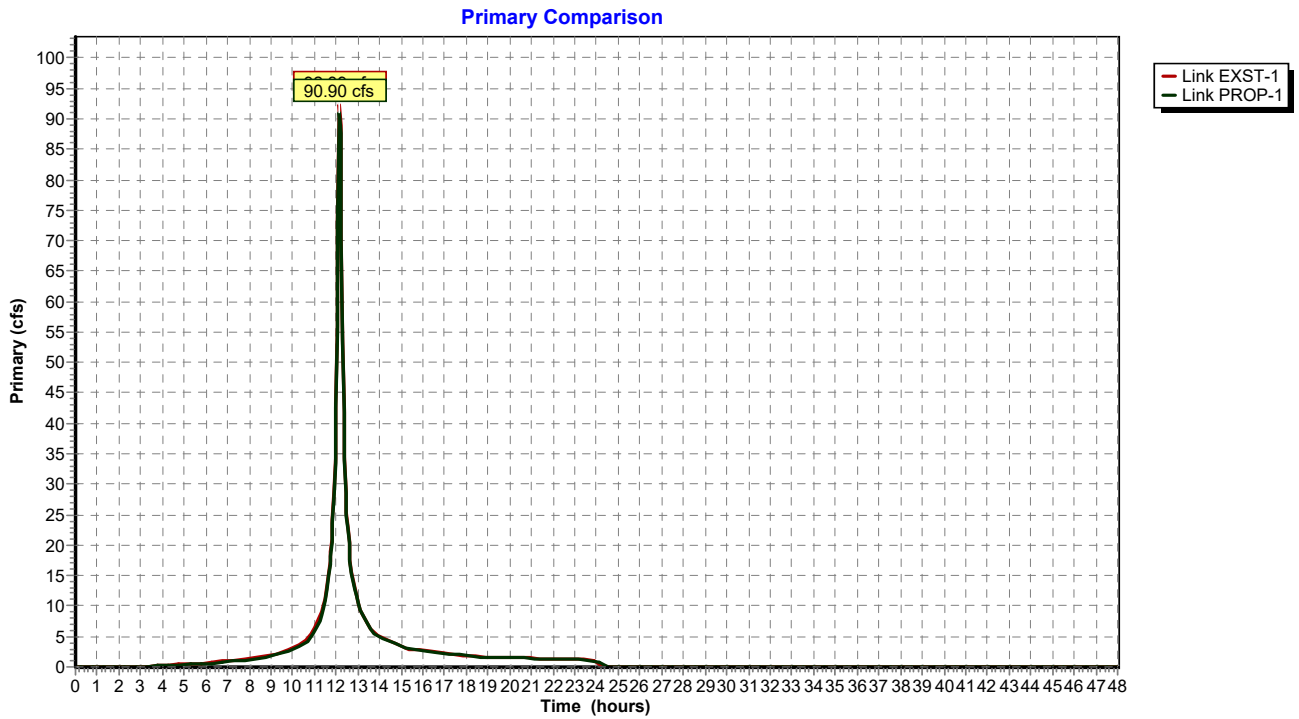
2020-03-29_Calculations

Prepared by {enter your company name here}

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NOAA 24-hr C 10-Year Rainfall=5.18"

Printed 4/1/2020



2020-03-29_Calculations

NOAA 24-hr C 10-Year Rainfall=5.18"

Prepared by {enter your company name here}

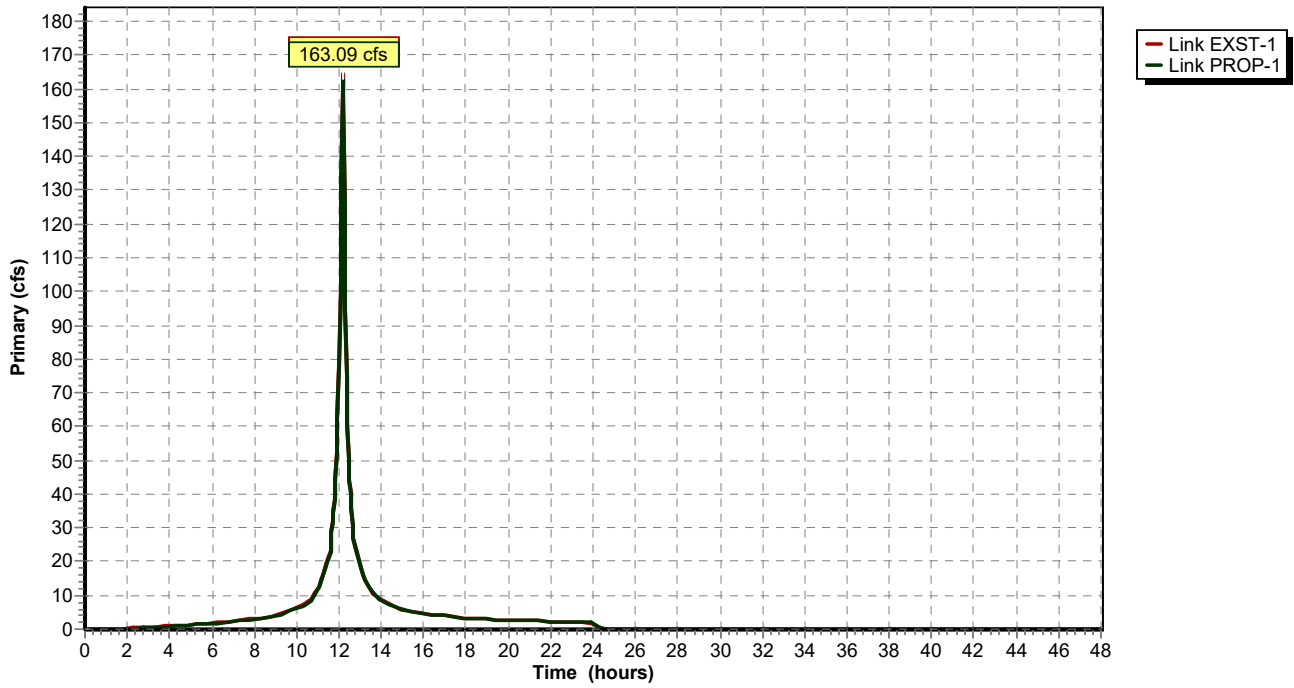
Printed 4/1/2020

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Primary Comparison

Time (hours)	Link EXST-1 (cfs)	Link PROP-1 (cfs)	Time (hours)	Link EXST-1 (cfs)	Link PROP-1 (cfs)
0.00	0.00	0.00	26.50	0.00	0.00
0.50	0.00	0.00	27.00	0.00	0.00
1.00	0.00	0.00	27.50	0.00	0.00
1.50	0.00	0.00	28.00	0.00	0.00
2.00	0.00	0.00	28.50	0.00	0.00
2.50	0.00	0.00	29.00	0.00	0.00
3.00	0.07	0.00	29.50	0.00	0.00
3.50	0.17	0.09	30.00	0.00	0.00
4.00	0.28	0.19	30.50	0.00	0.00
4.50	0.38	0.28	31.00	0.00	0.00
5.00	0.48	0.38	31.50	0.00	0.00
5.50	0.57	0.47	32.00	0.00	0.00
6.00	0.67	0.56	32.50	0.00	0.00
6.50	0.81	0.70	33.00	0.00	0.00
7.00	0.99	0.87	33.50	0.00	0.00
7.50	1.18	1.05	34.00	0.00	0.00
8.00	1.39	1.25	34.50	0.00	0.00
8.50	1.60	1.46	35.00	0.00	0.00
9.00	1.84	1.70	35.50	0.00	0.00
9.50	2.40	2.24	36.00	0.00	0.00
10.00	3.11	2.92	36.50	0.00	0.00
10.50	3.88	3.68	37.00	0.00	0.00
11.00	6.14	5.87	37.50	0.00	0.00
11.50	10.82	10.44	38.00	0.00	0.00
12.00	43.43	42.47	38.50	0.00	0.00
12.50	25.30	25.01	39.00	0.00	0.00
13.00	10.78	10.68	39.50	0.00	0.00
13.50	6.66	6.60	40.00	0.00	0.00
14.00	4.95	4.90	40.50	0.00	0.00
14.50	4.15	4.11	41.00	0.00	0.00
15.00	3.35	3.32	41.50	0.00	0.00
15.50	2.90	2.87	42.00	0.00	0.00
16.00	2.68	2.66	42.50	0.00	0.00
16.50	2.47	2.45	43.00	0.00	0.00
17.00	2.26	2.24	43.50	0.00	0.00
17.50	2.05	2.03	44.00	0.00	0.00
18.00	1.83	1.82	44.50	0.00	0.00
18.50	1.71	1.70	45.00	0.00	0.00
19.00	1.66	1.65	45.50	0.00	0.00
19.50	1.61	1.59	46.00	0.00	0.00
20.00	1.55	1.54	46.50	0.00	0.00
20.50	1.50	1.49	47.00	0.00	0.00
21.00	1.45	1.44	47.50	0.00	0.00
21.50	1.39	1.38	48.00	0.00	0.00
22.00	1.34	1.33			
22.50	1.28	1.28			
23.00	1.23	1.22			
23.50	1.18	1.17			
24.00	1.19	1.18			
24.50	0.00	0.00			
25.00	0.00	0.00			
25.50	0.00	0.00			
26.00	0.00	0.00			

Primary Comparison



2020-03-29_Calculations

NOAA 24-hr C 100-Year Rainfall=8.71"

Prepared by {enter your company name here}

Printed 4/1/2020

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Primary Comparison

Time (hours)	Link EXST-1 (cfs)	Link PROP-1 (cfs)	Time (hours)	Link EXST-1 (cfs)	Link PROP-1 (cfs)
0.00	0.00	0.00	26.50	0.00	0.00
0.50	0.00	0.00	27.00	0.00	0.00
1.00	0.00	0.00	27.50	0.00	0.00
1.50	0.00	0.00	28.00	0.00	0.00
2.00	0.15	0.03	28.50	0.00	0.00
2.50	0.38	0.25	29.00	0.00	0.00
3.00	0.60	0.46	29.50	0.00	0.00
3.50	0.81	0.66	30.00	0.00	0.00
4.00	1.00	0.85	30.50	0.00	0.00
4.50	1.19	1.04	31.00	0.00	0.00
5.00	1.36	1.21	31.50	0.00	0.00
5.50	1.52	1.37	32.00	0.00	0.00
6.00	1.69	1.54	32.50	0.00	0.00
6.50	2.00	1.84	33.00	0.00	0.00
7.00	2.36	2.19	33.50	0.00	0.00
7.50	2.74	2.57	34.00	0.00	0.00
8.00	3.13	2.96	34.50	0.00	0.00
8.50	3.53	3.36	35.00	0.00	0.00
9.00	3.95	3.78	35.50	0.00	0.00
9.50	5.02	4.84	36.00	0.00	0.00
10.00	6.35	6.14	36.50	0.00	0.00
10.50	7.73	7.52	37.00	0.00	0.00
11.00	11.94	11.66	37.50	0.00	0.00
11.50	20.45	20.09	38.00	0.00	0.00
12.00	78.91	78.01	38.50	0.00	0.00
12.50	44.32	44.04	39.00	0.00	0.00
13.00	18.78	18.67	39.50	0.00	0.00
13.50	11.58	11.51	40.00	0.00	0.00
14.00	8.58	8.54	40.50	0.00	0.00
14.50	7.19	7.15	41.00	0.00	0.00
15.00	5.79	5.76	41.50	0.00	0.00
15.50	5.01	4.99	42.00	0.00	0.00
16.00	4.64	4.62	42.50	0.00	0.00
16.50	4.27	4.25	43.00	0.00	0.00
17.00	3.90	3.89	43.50	0.00	0.00
17.50	3.53	3.52	44.00	0.00	0.00
18.00	3.16	3.15	44.50	0.00	0.00
18.50	2.96	2.94	45.00	0.00	0.00
19.00	2.86	2.85	45.50	0.00	0.00
19.50	2.77	2.76	46.00	0.00	0.00
20.00	2.68	2.67	46.50	0.00	0.00
20.50	2.58	2.57	47.00	0.00	0.00
21.00	2.49	2.48	47.50	0.00	0.00
21.50	2.40	2.39	48.00	0.00	0.00
22.00	2.31	2.30			
22.50	2.21	2.20			
23.00	2.12	2.11			
23.50	2.04	2.03			
24.00	2.05	2.04			
24.50	0.00	0.00			
25.00	0.00	0.00			
25.50	0.00	0.00			
26.00	0.00	0.00			

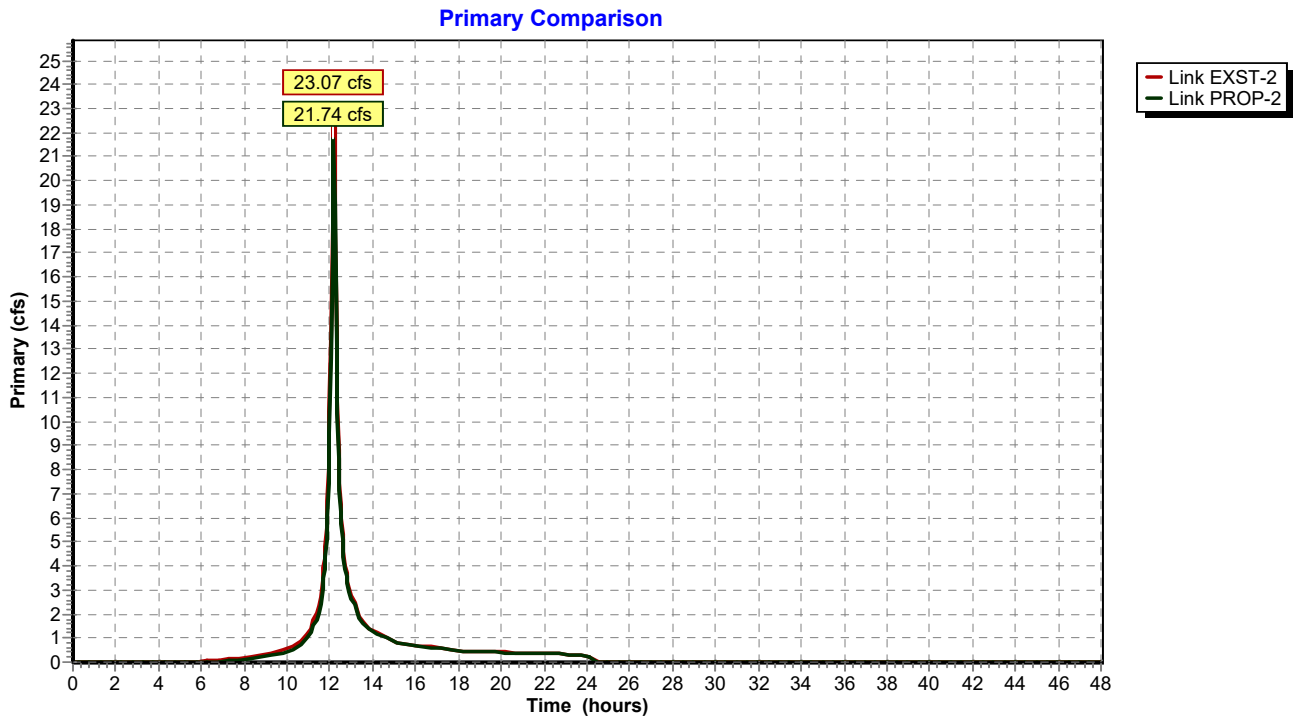
2020-03-29_Calculations

Prepared by {enter your company name here}

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NOAA 24-hr C 2-Year Rainfall=3.39"

Printed 4/1/2020



2020-03-29_Calculations

NOAA 24-hr C 2-Year Rainfall=3.39"

Prepared by {enter your company name here}

Printed 4/1/2020

HydroCAD® 10.00-22 s/n 06682 © 2018 HydroCAD Software Solutions LLC

Primary Comparison

Time (hours)	Link EXST-2 (cfs)	Link PROP-2 (cfs)	Time (hours)	Link EXST-2 (cfs)	Link PROP-2 (cfs)
0.00	0.00	0.00	26.50	0.00	0.00
0.50	0.00	0.00	27.00	0.00	0.00
1.00	0.00	0.00	27.50	0.00	0.00
1.50	0.00	0.00	28.00	0.00	0.00
2.00	0.00	0.00	28.50	0.00	0.00
2.50	0.00	0.00	29.00	0.00	0.00
3.00	0.00	0.00	29.50	0.00	0.00
3.50	0.00	0.00	30.00	0.00	0.00
4.00	0.00	0.00	30.50	0.00	0.00
4.50	0.00	0.00	31.00	0.00	0.00
5.00	0.00	0.00	31.50	0.00	0.00
5.50	0.01	0.00	32.00	0.00	0.00
6.00	0.03	0.00	32.50	0.00	0.00
6.50	0.06	0.01	33.00	0.00	0.00
7.00	0.09	0.04	33.50	0.00	0.00
7.50	0.14	0.08	34.00	0.00	0.00
8.00	0.18	0.12	34.50	0.00	0.00
8.50	0.24	0.16	35.00	0.00	0.00
9.00	0.29	0.21	35.50	0.00	0.00
9.50	0.41	0.31	36.00	0.00	0.00
10.00	0.57	0.45	36.50	0.00	0.00
10.50	0.75	0.62	37.00	0.00	0.00
11.00	1.26	1.07	37.50	0.00	0.00
11.50	2.37	2.08	38.00	0.00	0.00
12.00	10.39	9.56	38.50	0.00	0.00
12.50	6.52	6.26	39.00	0.00	0.00
13.00	2.81	2.72	39.50	0.00	0.00
13.50	1.74	1.69	40.00	0.00	0.00
14.00	1.30	1.26	40.50	0.00	0.00
14.50	1.09	1.06	41.00	0.00	0.00
15.00	0.88	0.86	41.50	0.00	0.00
15.50	0.76	0.74	42.00	0.00	0.00
16.00	0.71	0.69	42.50	0.00	0.00
16.50	0.65	0.64	43.00	0.00	0.00
17.00	0.60	0.58	43.50	0.00	0.00
17.50	0.54	0.53	44.00	0.00	0.00
18.00	0.48	0.47	44.50	0.00	0.00
18.50	0.45	0.44	45.00	0.00	0.00
19.00	0.44	0.43	45.50	0.00	0.00
19.50	0.43	0.42	46.00	0.00	0.00
20.00	0.41	0.40	46.50	0.00	0.00
20.50	0.40	0.39	47.00	0.00	0.00
21.00	0.38	0.38	47.50	0.00	0.00
21.50	0.37	0.36	48.00	0.00	0.00
22.00	0.36	0.35			
22.50	0.34	0.33			
23.00	0.33	0.32			
23.50	0.31	0.31			
24.00	0.32	0.31			
24.50	0.00	0.00			
25.00	0.00	0.00			
25.50	0.00	0.00			
26.00	0.00	0.00			

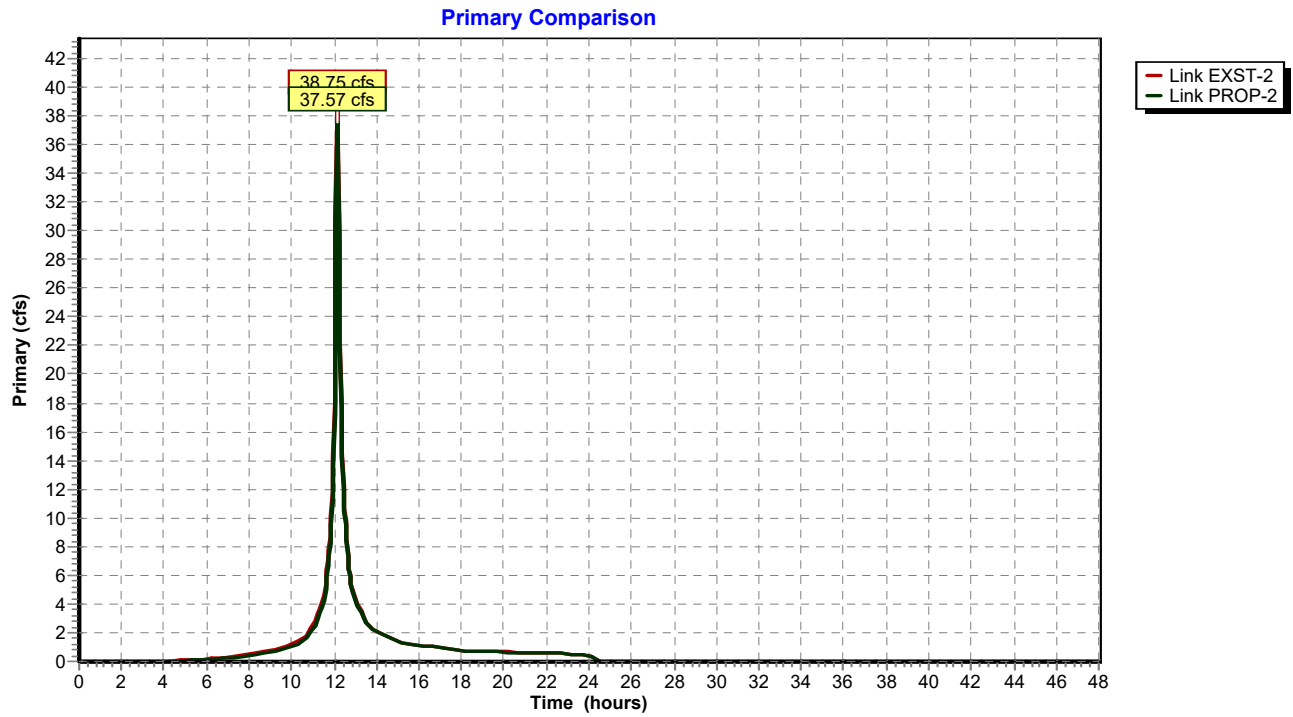
2020-03-29_Calculations

Prepared by {enter your company name here}

HydroCAD® 10.00-22 s/n 06682 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr C 10-Year Rainfall=5.18"

Printed 4/1/2020



2020-03-29_Calculations

NOAA 24-hr C 10-Year Rainfall=5.18"

Prepared by {enter your company name here}

Printed 4/1/2020

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Primary Comparison

Time (hours)	Link EXST-2 (cfs)	Link PROP-2 (cfs)	Time (hours)	Link EXST-2 (cfs)	Link PROP-2 (cfs)
0.00	0.00	0.00	26.50	0.00	0.00
0.50	0.00	0.00	27.00	0.00	0.00
1.00	0.00	0.00	27.50	0.00	0.00
1.50	0.00	0.00	28.00	0.00	0.00
2.00	0.00	0.00	28.50	0.00	0.00
2.50	0.00	0.00	29.00	0.00	0.00
3.00	0.00	0.00	29.50	0.00	0.00
3.50	0.00	0.00	30.00	0.00	0.00
4.00	0.02	0.00	30.50	0.00	0.00
4.50	0.07	0.01	31.00	0.00	0.00
5.00	0.11	0.04	31.50	0.00	0.00
5.50	0.15	0.08	32.00	0.00	0.00
6.00	0.19	0.12	32.50	0.00	0.00
6.50	0.25	0.18	33.00	0.00	0.00
7.00	0.33	0.24	33.50	0.00	0.00
7.50	0.41	0.31	34.00	0.00	0.00
8.00	0.50	0.40	34.50	0.00	0.00
8.50	0.59	0.49	35.00	0.00	0.00
9.00	0.70	0.58	35.50	0.00	0.00
9.50	0.92	0.79	36.00	0.00	0.00
10.00	1.22	1.06	36.50	0.00	0.00
10.50	1.54	1.37	37.00	0.00	0.00
11.00	2.48	2.24	37.50	0.00	0.00
11.50	4.43	4.10	38.00	0.00	0.00
12.00	18.10	17.28	38.50	0.00	0.00
12.50	10.64	10.45	39.00	0.00	0.00
13.00	4.54	4.47	39.50	0.00	0.00
13.50	2.80	2.77	40.00	0.00	0.00
14.00	2.08	2.06	40.50	0.00	0.00
14.50	1.75	1.73	41.00	0.00	0.00
15.00	1.41	1.39	41.50	0.00	0.00
15.50	1.22	1.21	42.00	0.00	0.00
16.00	1.13	1.12	42.50	0.00	0.00
16.50	1.04	1.03	43.00	0.00	0.00
17.00	0.95	0.94	43.50	0.00	0.00
17.50	0.86	0.85	44.00	0.00	0.00
18.00	0.77	0.76	44.50	0.00	0.00
18.50	0.72	0.72	45.00	0.00	0.00
19.00	0.70	0.69	45.50	0.00	0.00
19.50	0.68	0.67	46.00	0.00	0.00
20.00	0.65	0.65	46.50	0.00	0.00
20.50	0.63	0.63	47.00	0.00	0.00
21.00	0.61	0.60	47.50	0.00	0.00
21.50	0.59	0.58	48.00	0.00	0.00
22.00	0.56	0.56			
22.50	0.54	0.54			
23.00	0.52	0.52			
23.50	0.50	0.49			
24.00	0.50	0.50			
24.50	0.00	0.00			
25.00	0.00	0.00			
25.50	0.00	0.00			
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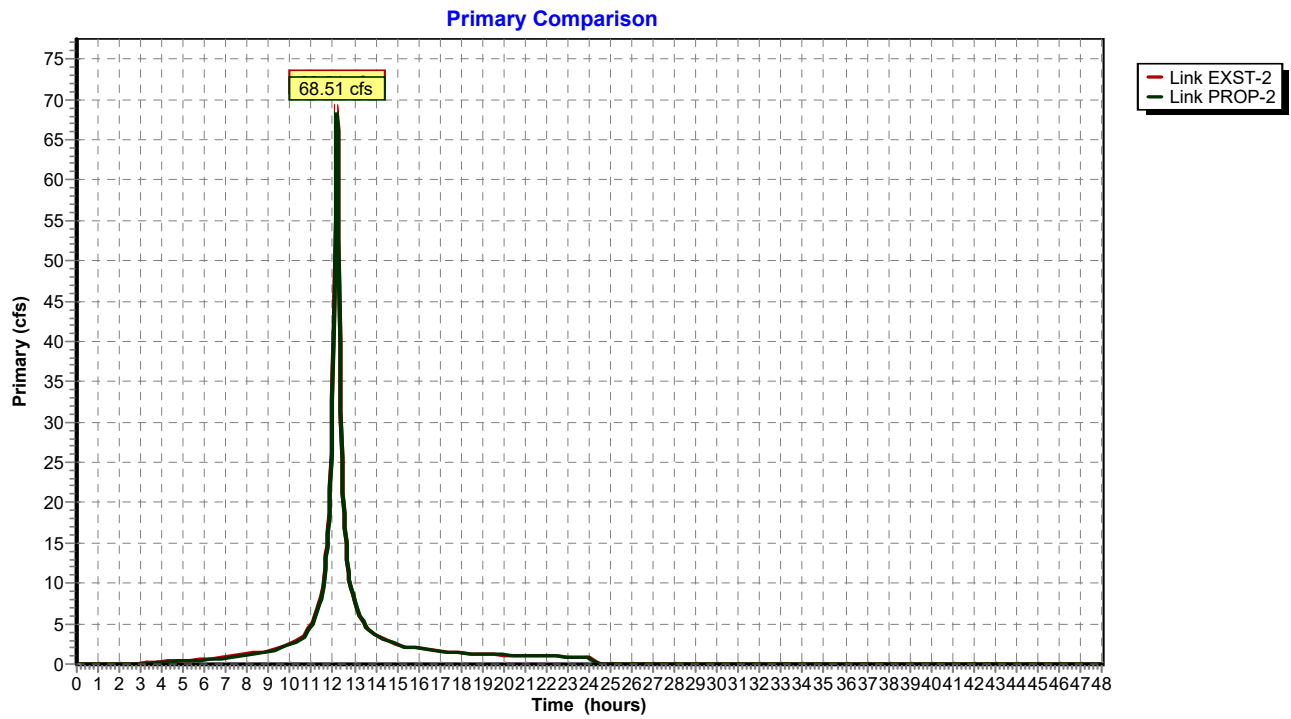
2020-03-29_Calculations

NOAA 24-hr C 100-Year Rainfall=8.71"

Prepared by {enter your company name here}

Printed 4/1/2020

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2020-03-29_Calculations

NOAA 24-hr C 100-Year Rainfall=8.71"

Prepared by {enter your company name here}

Printed 4/1/2020

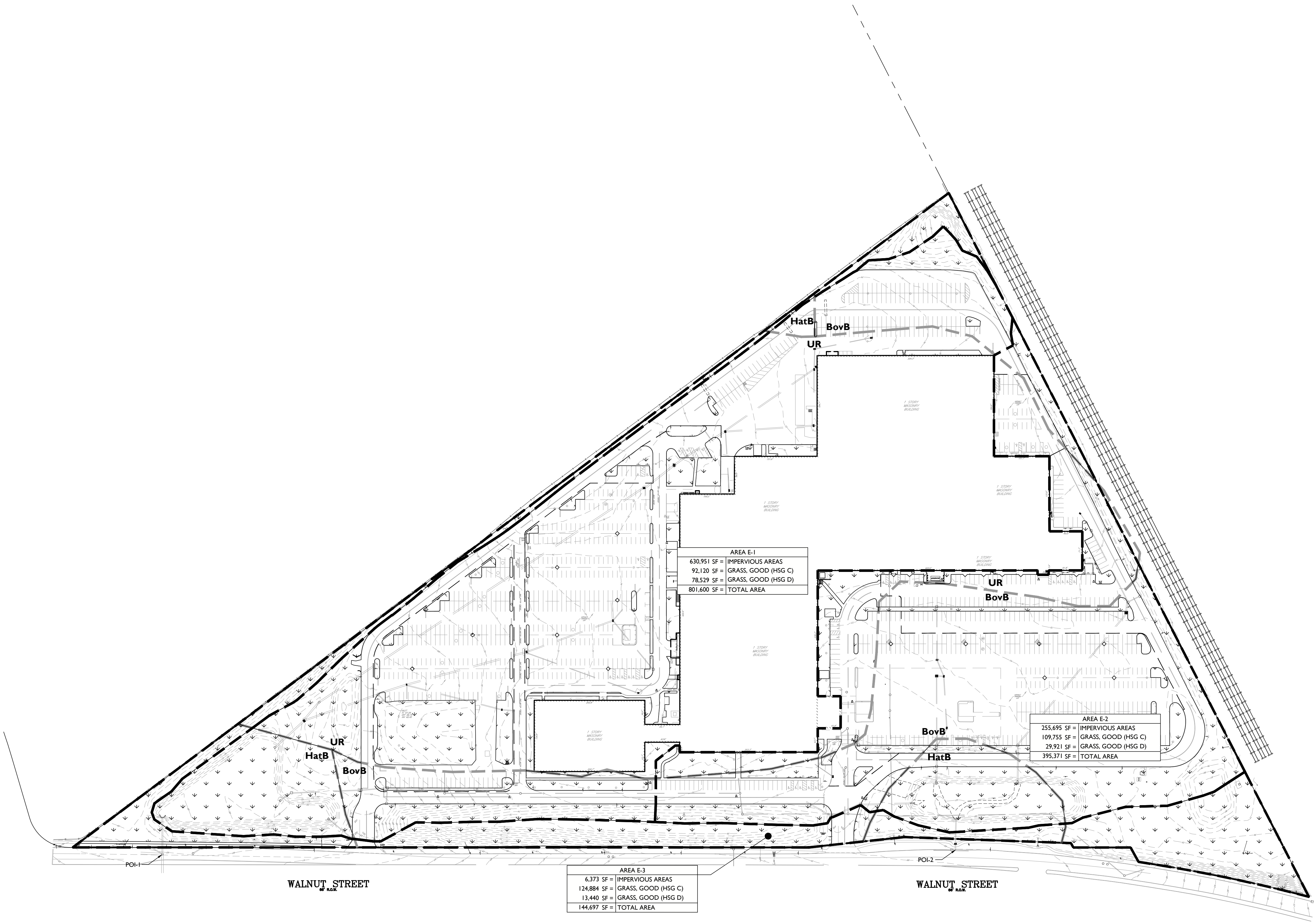
HydroCAD® 10.00-22 s/n 06682 © 2018 HydroCAD Software Solutions LLC

Primary Comparison

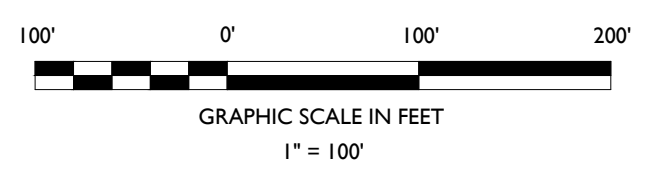
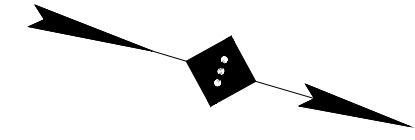
Time (hours)	Link EXST-2 (cfs)	Link PROP-2 (cfs)	Time (hours)	Link EXST-2 (cfs)	Link PROP-2 (cfs)
0.00	0.00	0.00	26.50	0.00	0.00
0.50	0.00	0.00	27.00	0.00	0.00
1.00	0.00	0.00	27.50	0.00	0.00
1.50	0.00	0.00	28.00	0.00	0.00
2.00	0.00	0.00	28.50	0.00	0.00
2.50	0.02	0.00	29.00	0.00	0.00
3.00	0.12	0.03	29.50	0.00	0.00
3.50	0.21	0.11	30.00	0.00	0.00
4.00	0.30	0.19	30.50	0.00	0.00
4.50	0.38	0.28	31.00	0.00	0.00
5.00	0.47	0.36	31.50	0.00	0.00
5.50	0.55	0.44	32.00	0.00	0.00
6.00	0.63	0.51	32.50	0.00	0.00
6.50	0.75	0.63	33.00	0.00	0.00
7.00	0.91	0.78	33.50	0.00	0.00
7.50	1.07	0.93	34.00	0.00	0.00
8.00	1.24	1.10	34.50	0.00	0.00
8.50	1.42	1.27	35.00	0.00	0.00
9.00	1.60	1.46	35.50	0.00	0.00
9.50	2.05	1.89	36.00	0.00	0.00
10.00	2.61	2.43	36.50	0.00	0.00
10.50	3.20	3.01	37.00	0.00	0.00
11.00	4.97	4.74	37.50	0.00	0.00
11.50	8.57	8.26	38.00	0.00	0.00
12.00	33.19	32.58	38.50	0.00	0.00
12.50	18.63	18.56	39.00	0.00	0.00
13.00	7.89	7.88	39.50	0.00	0.00
13.50	4.86	4.86	40.00	0.00	0.00
14.00	3.60	3.60	40.50	0.00	0.00
14.50	3.02	3.02	41.00	0.00	0.00
15.00	2.43	2.43	41.50	0.00	0.00
15.50	2.11	2.11	42.00	0.00	0.00
16.00	1.95	1.95	42.50	0.00	0.00
16.50	1.79	1.80	43.00	0.00	0.00
17.00	1.64	1.64	43.50	0.00	0.00
17.50	1.48	1.48	44.00	0.00	0.00
18.00	1.33	1.33	44.50	0.00	0.00
18.50	1.24	1.24	45.00	0.00	0.00
19.00	1.20	1.20	45.50	0.00	0.00
19.50	1.16	1.16	46.00	0.00	0.00
20.00	1.12	1.13	46.50	0.00	0.00
20.50	1.08	1.09	47.00	0.00	0.00
21.00	1.05	1.05	47.50	0.00	0.00
21.50	1.01	1.01	48.00	0.00	0.00
22.00	0.97	0.97			
22.50	0.93	0.93			
23.00	0.89	0.89			
23.50	0.85	0.86			
24.00	0.86	0.86			
24.50	0.00	0.00			
25.00	0.00	0.00			
25.50	0.00	0.00			
26.00	0.00	0.00			

APPENDIX C
DRAINAGE AREA MAPS

T:\2016\16871 HARTZ INDUSTRIES - 200 WALNUT AVENUE CRANFORD, NJ\CADD\DWG\16871 DRN AREA MAP.DWG



SYMBOL	DESCRIPTION
---	EXISTING DRAINAGE AREA
---	SOIL TYPE BOUNDARY
▽	EXISTING GRASSED AREA



ISSUE	DATE	BY	DESCRIPTION
1	04/01/2020	KG	ISSUED FOR REVIEW

NOT APPROVED FOR CONSTRUCTION

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Phone 201.340.4468 · Fax 201.340.4472

DRAINAGE AREA MAPS

HARTZ MOUNTAIN INDUSTRIES

PROPOSED REDEVELOPMENT PLAN

BLOCK 541, LOT 2
750 WALNUT AVENUE
TOWNSHIP OF CRANFORD
UNION COUNTY, NEW JERSEY

JEFFREY A. MARTELL, P.E.
NEW JERSEY LICENSE No. 47290
LICENSED PROFESSIONAL ENGINEER

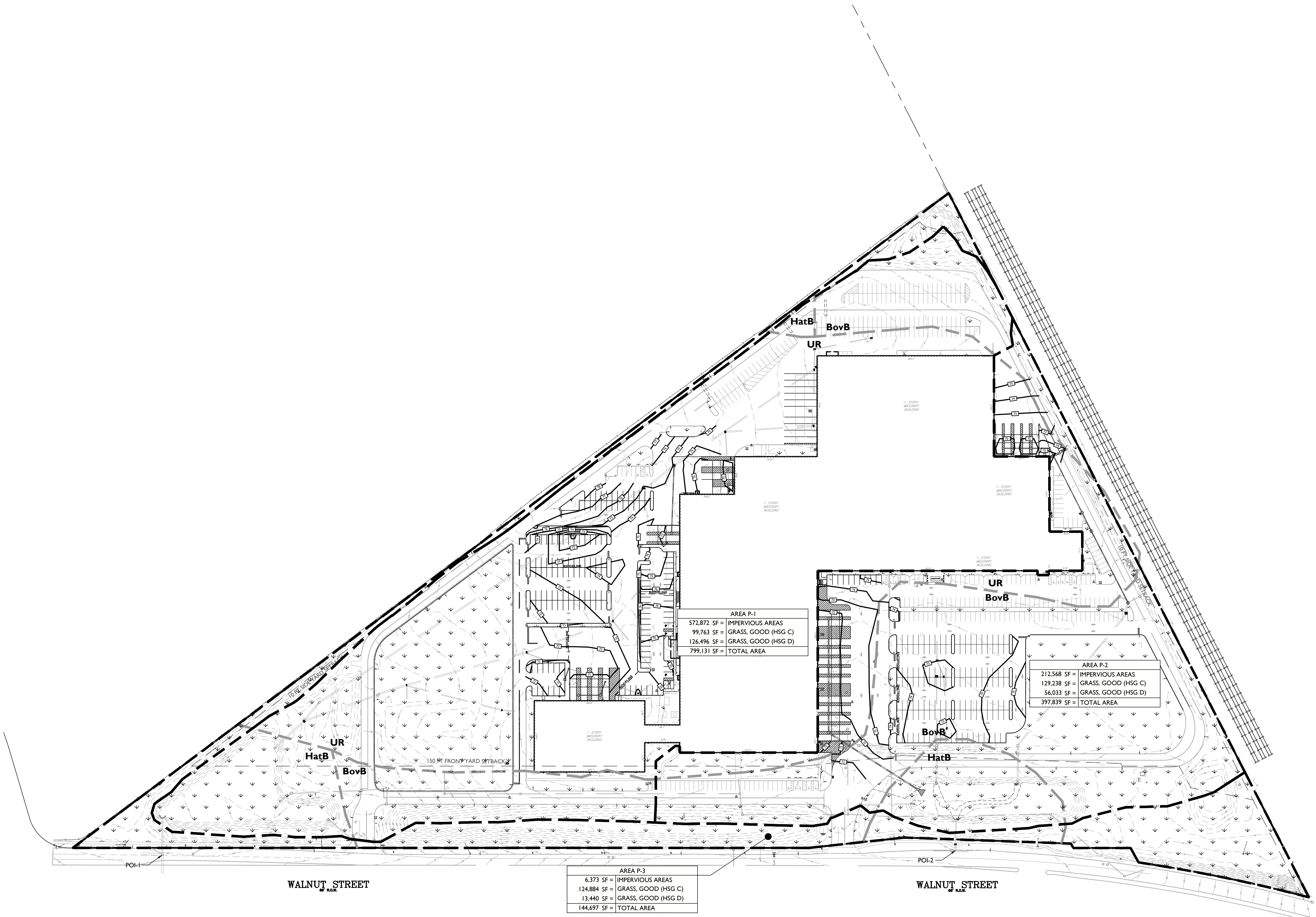
STONEFIELD
engineering & design

SCALE: 1" = 100' PROJECT ID: T-16509

TITLE:
EXISTING DRAINAGE AREA MAP

DRAWING:
1 OF 2

T:\2016\16871 HARTZ INDUSTRIES - 20 WALNUT AVENUE CRANFORD, NJ\CADD\DWG\16871 DRN AREA MAP.DWG

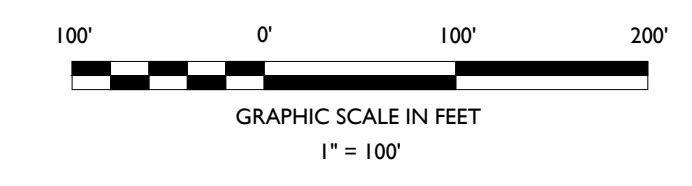


SYMBOL	DESCRIPTION
	PROPOSED DRAINAGE AREA
	SOIL TYPE BOUNDARY
	PROPOSED GRASSED AREA

AREA P-1	
572,872 SF	= IMPERVIOUS AREAS
99,763 SF	= GRASS, GOOD (HSG C)
126,496 SF	= GRASS, GOOD (HSG D)
799,131 SF	= TOTAL AREA

AREA P-2	
212,568 SF	= IMPERVIOUS AREAS
129,238 SF	= GRASS, GOOD (HSG C)
56,033 SF	= GRASS, GOOD (HSG D)
397,839 SF	= TOTAL AREA

AREA P-3	
6,373 SF	= IMPERVIOUS AREAS
124,884 SF	= GRASS, GOOD (HSG C)
13,440 SF	= GRASS, GOOD (HSG D)
144,697 SF	= TOTAL AREA



ISSUE	DATE	BY	DESCRIPTION
1	07/07/20	KG	ISSUED FOR REVIEW

NOT APPROVED FOR CONSTRUCTION

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DRAINAGE AREA MAPS

HARTZ MOUNTAIN INDUSTRIES

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LICENSED PROFESSIONAL ENGINEER

STONEFIELD
engineering & design

SCALE: 1" = 100' PROJECT ID: T-16509

TITLE:
PROPOSED DRAINAGE AREA MAP

DRAWING:
2 OF 2