Project Description:

PROPOSED SITE DEVELOPMENT
6 TODD ROAD
SHELTON, CONNECTICUT

Prepared for:

MANUEL MOUTINHO

DRAINAGE CALCULATIONS

July 21, 2020

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Jose C. Pereira, P.E. CT Reg. No. 21079

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SUMMARY

CLIENT: Manuel Moutinho

PROPERTY LOCATION: 6 Todd Road
Shelton, CT

SOILS: The Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/) as developed by the United States Department of Agriculture (USDA) indicates that onsite soils are Udorthents-Urban land complex (Map Unit Symbol 306). This report is provided for additional information (Appendix B).

EXISTING CONDITIONS: The total site consists of approximately 1.17 acres. The site contains a large concrete slab, apparently remaining from a demolished building. Also, remaining is the associated paved parking and driveway areas. The majority of the site is impervious, covered by either concrete or pavement, with some landscaped areas. The property generally slopes form east to west toward Todd Road. The existing impervious area is 43,737 square feet.

PROPOSED CONDITIONS: The proposed development includes the demolition and removal of all existing concrete, pavement, and appurtenances and the construction of a new retail building, with associated parking lot. The proposed building will be serviced by public sanitary sewer and public water supply. The proposed impervious area is 40,523 square feet.

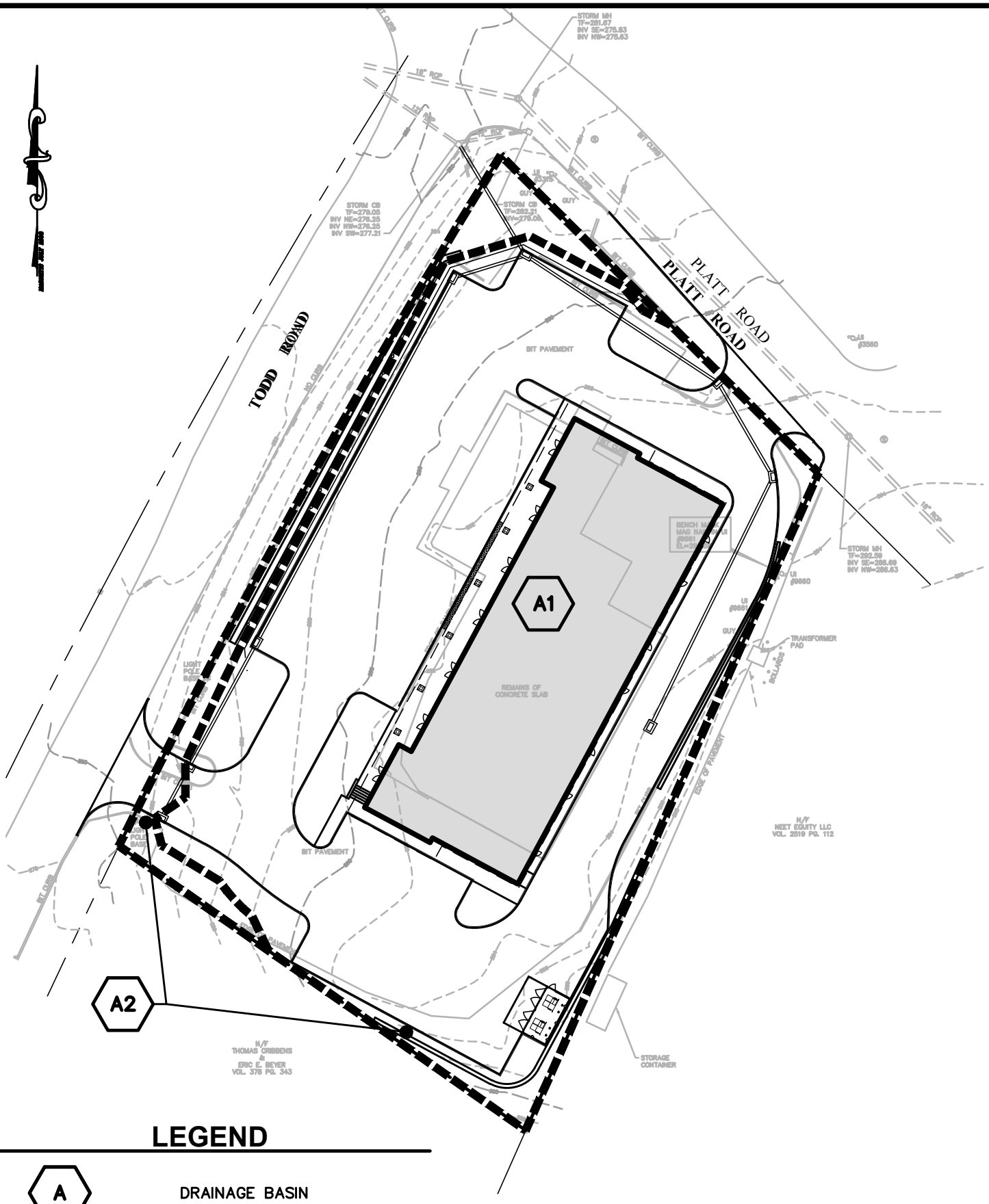
CONCLUSION: The proposed improvements result in a net decrease in runoff for the 2-, 5, 10-, 25-, 50-, and 100-year storm events. The reduction in runoff is due to the reduction in impervious area (increase in landscaping). As a result, Stormwater detention is not required to reduce post-developed peak flows to pre-developed values. The following table summarizes the pre- and post-developed peak flows for the 24-hour, 2-, 5-, 10-, 25-, 50-, and 100-year storm events.

Summary of Peak Flows (cfs)			
Storm Event	Pre-Developed (CFS)	Post-Developed (CFS)	Percent Reduction
2-year	3.76	3.56	5.3%
5-year	5.09	4.87	4.3%
10-year	6.20	5.96	3.9%
25-year	7.68	7.43	3.3%
50-year	8.83	8.57	2.9%
100-year	9.98	9.72	2.6%

In summary, the quantity of stormwater runoff will be reduced and the quality of stormwater runoff will be improved by the proposed stormwater management system. Pre-developed and post-developed hydrographs for the 2-, 5-, 10-, 25-, 50- and 100-year storm events are provided for additional information.

APPENDIX A

DESIGN CALCULATIONS



LEGEND

A — DRAINAGE BASIN

DRAINAGE BASIN BOUNDARY

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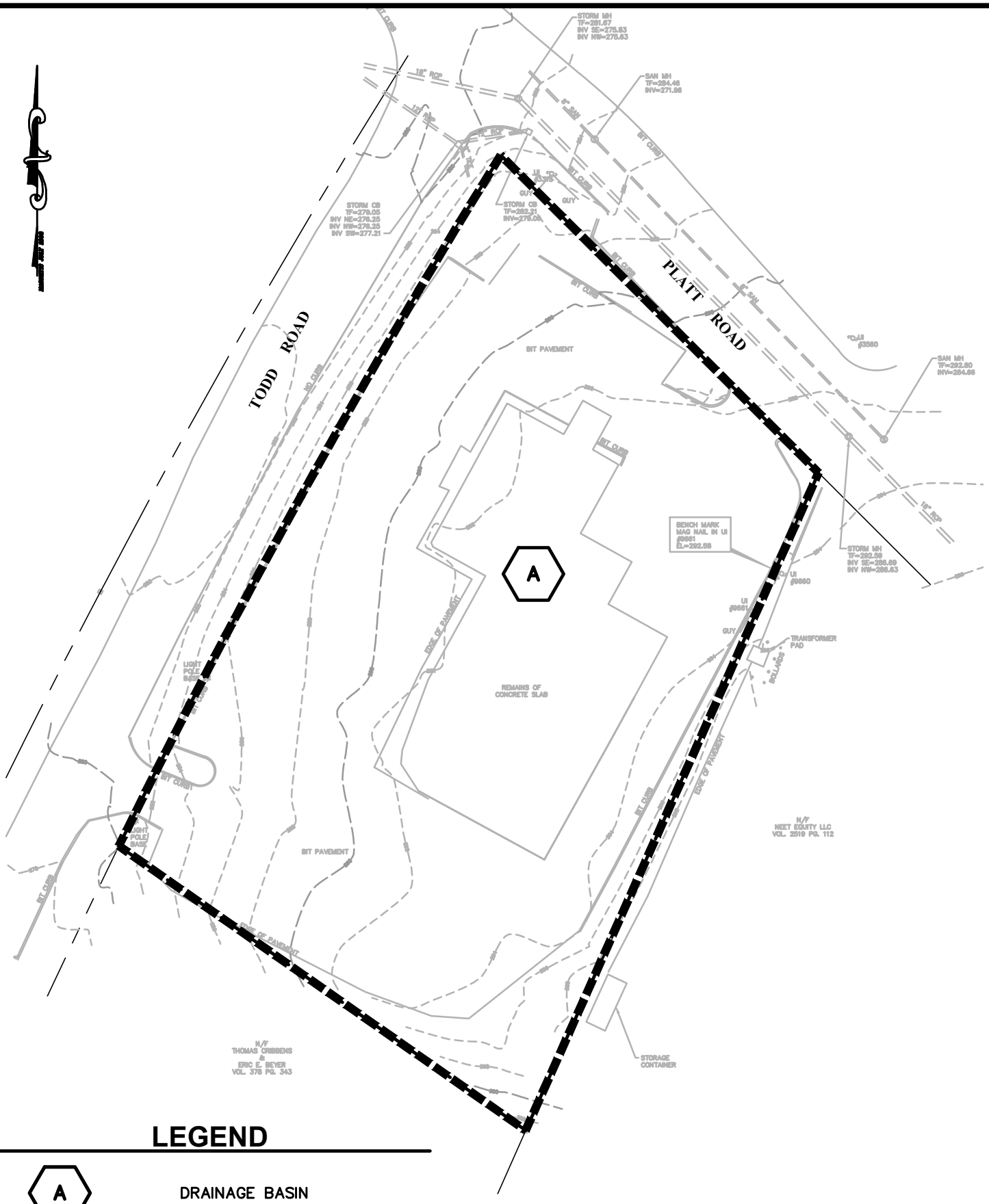
POST-DEVELOPMENT WATERSHED MAP
MANUEL MOUTINHO
6 TODD ROAD
SHELTON, CONNECTICUT

SCALE: 1"=50'

DATE: JULY 20, 2020

WS SHEET 2 OF 2

CAD REF. NO. 0653POST



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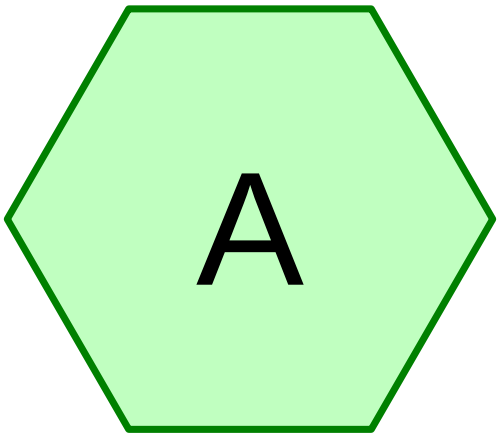
PRE-DEVELOPMENT WATERSHED MAP
MANUEL MOUTINHO
6 TODD ROAD
SHELTON, CONNECTICUT

SCALE: 1"=50'

DATE: JULY 20, 2020

WS SHEET 1 OF 2

CAD REF. NO. 0653PRE



PRE DEV

Subcat Reach Pond Link

Routing Diagram for 0653PRE
Prepared by Pereira Engineering, LLC, Printed 7/16/2020

Time span=0.00-26.00 hrs, dt=0.01 hrs, 2601 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 A: PRE DEV Runoff Area=50,841 sf 86.03% Impervious Runoff Depth=2.73"
Tc=5.0 min CN=92 Runoff=3.76 cfs 11,577 cf

Total Runoff Area = 50,841 sf Runoff Volume = 11,577 cf Average Runoff Depth = 2.73"
13.97% Pervious = 7,104 sf 86.03% Impervious = 43,737 sf

Summary for Subcatchment A: PRE DEV

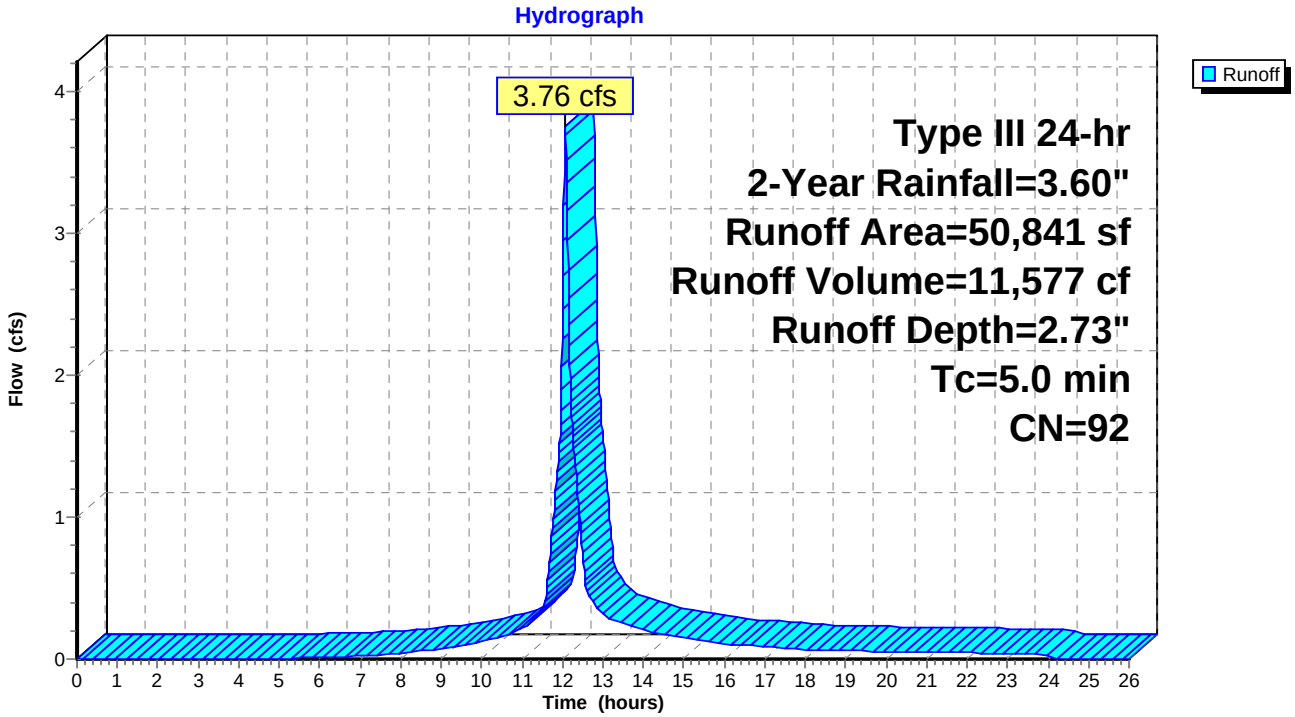
Runoff = 3.76 cfs @ 12.07 hrs, Volume= 11,577 cf, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.60"

	Area (sf)	CN	Description
*	43,737	98	Paved driveway, concrete walks
	7,104	58	Woods/grass comb., Good, HSG B
	50,841	92	Weighted Average
	7,104		13.97% Pervious Area
	43,737		86.03% Impervious Area

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

Subcatchment A: PRE DEV



Time span=0.00-26.00 hrs, dt=0.01 hrs, 2601 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 A: PRE DEV Runoff Area=50,841 sf 86.03% Impervious Runoff Depth=3.77"
Tc=5.0 min CN=92 Runoff=5.09 cfs 15,962 cf

Total Runoff Area = 50,841 sf Runoff Volume = 15,962 cf Average Runoff Depth = 3.77"
13.97% Pervious = 7,104 sf 86.03% Impervious = 43,737 sf

Summary for Subcatchment A: PRE DEV

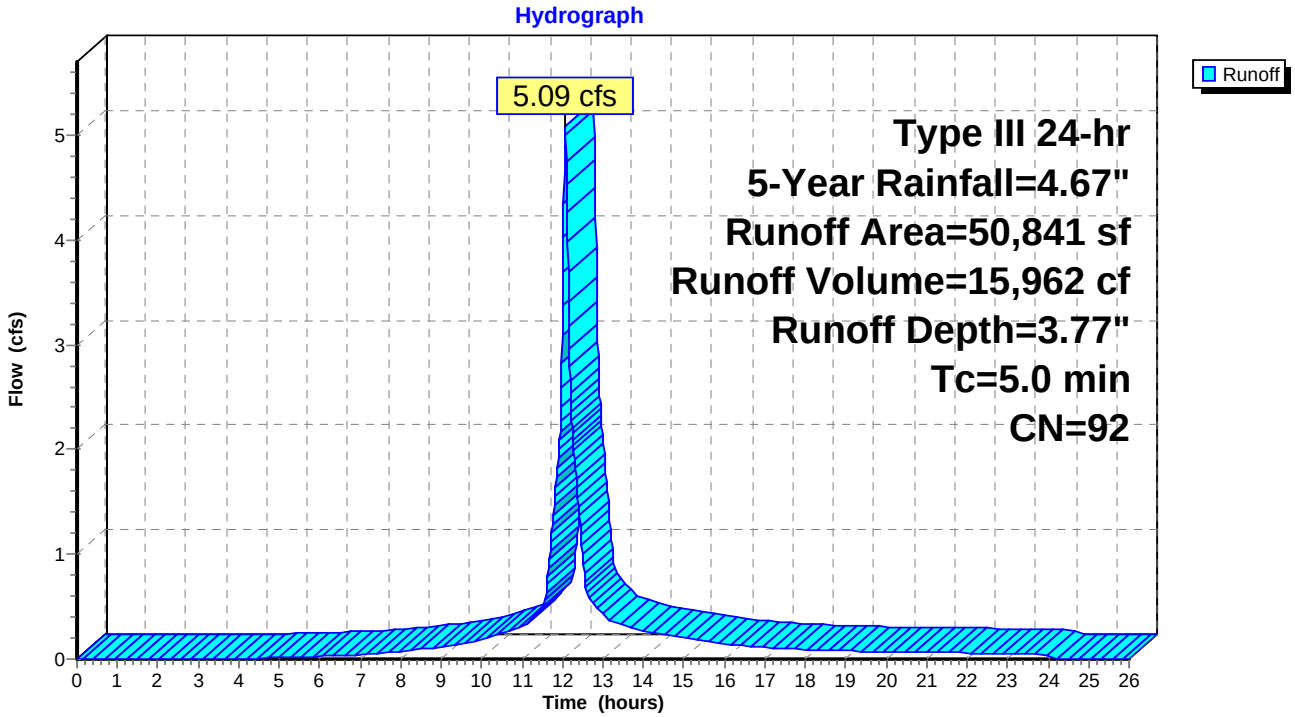
Runoff = 5.09 cfs @ 12.07 hrs, Volume= 15,962 cf, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year Rainfall=4.67"

	Area (sf)	CN	Description
*	43,737	98	Paved driveway, concrete walks
	7,104	58	Woods/grass comb., Good, HSG B
	50,841	92	Weighted Average
	7,104		13.97% Pervious Area
	43,737		86.03% Impervious Area

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

Subcatchment A: PRE DEV



Time span=0.00-26.00 hrs, dt=0.01 hrs, 2601 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 A: PRE DEV Runoff Area=50,841 sf 86.03% Impervious Runoff Depth=4.64"
Tc=5.0 min CN=92 Runoff=6.20 cfs 19,647 cf

Total Runoff Area = 50,841 sf Runoff Volume = 19,647 cf Average Runoff Depth = 4.64"
13.97% Pervious = 7,104 sf 86.03% Impervious = 43,737 sf

Summary for Subcatchment A: PRE DEV

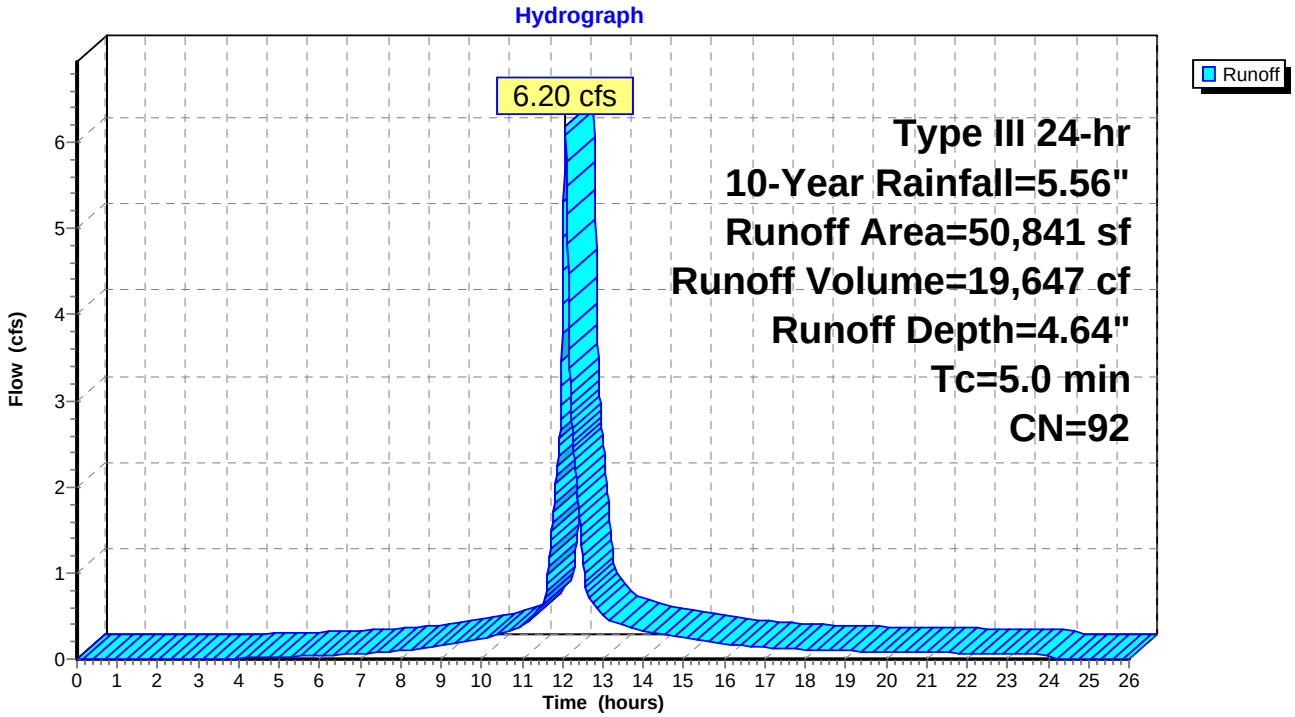
Runoff = 6.20 cfs @ 12.07 hrs, Volume= 19,647 cf, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.56"

	Area (sf)	CN	Description
*	43,737	98	Paved driveway, concrete walks
	7,104	58	Woods/grass comb., Good, HSG B
	50,841	92	Weighted Average
	7,104		13.97% Pervious Area
	43,737		86.03% Impervious Area

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

Subcatchment A: PRE DEV



Time span=0.00-26.00 hrs, dt=0.01 hrs, 2601 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 A: PRE DEV Runoff Area=50,841 sf 86.03% Impervious Runoff Depth=5.83"
Tc=5.0 min CN=92 Runoff=7.68 cfs 24,691 cf

Total Runoff Area = 50,841 sf Runoff Volume = 24,691 cf Average Runoff Depth = 5.83"
13.97% Pervious = 7,104 sf 86.03% Impervious = 43,737 sf

Summary for Subcatchment A: PRE DEV

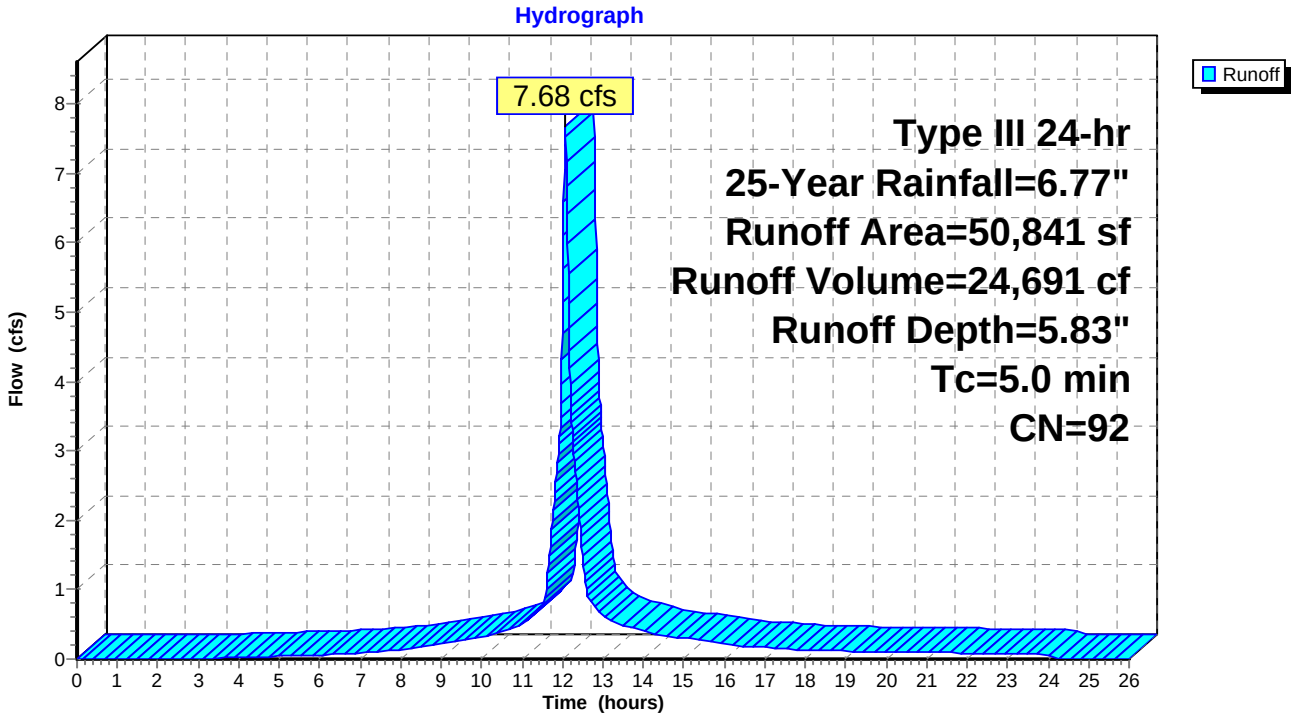
Runoff = 7.68 cfs @ 12.07 hrs, Volume= 24,691 cf, Depth= 5.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.77"

	Area (sf)	CN	Description
*	43,737	98	Paved driveway, concrete walks
	7,104	58	Woods/grass comb., Good, HSG B
	50,841	92	Weighted Average
	7,104		13.97% Pervious Area
	43,737		86.03% Impervious Area

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

Subcatchment A: PRE DEV



Time span=0.00-26.00 hrs, dt=0.01 hrs, 2601 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 A: PRE DEV Runoff Area=50,841 sf 86.03% Impervious Runoff Depth=6.76"
Tc=5.0 min CN=92 Runoff=8.83 cfs 28,626 cf

Total Runoff Area = 50,841 sf Runoff Volume = 28,626 cf Average Runoff Depth = 6.76"
13.97% Pervious = 7,104 sf 86.03% Impervious = 43,737 sf

Summary for Subcatchment A: PRE DEV

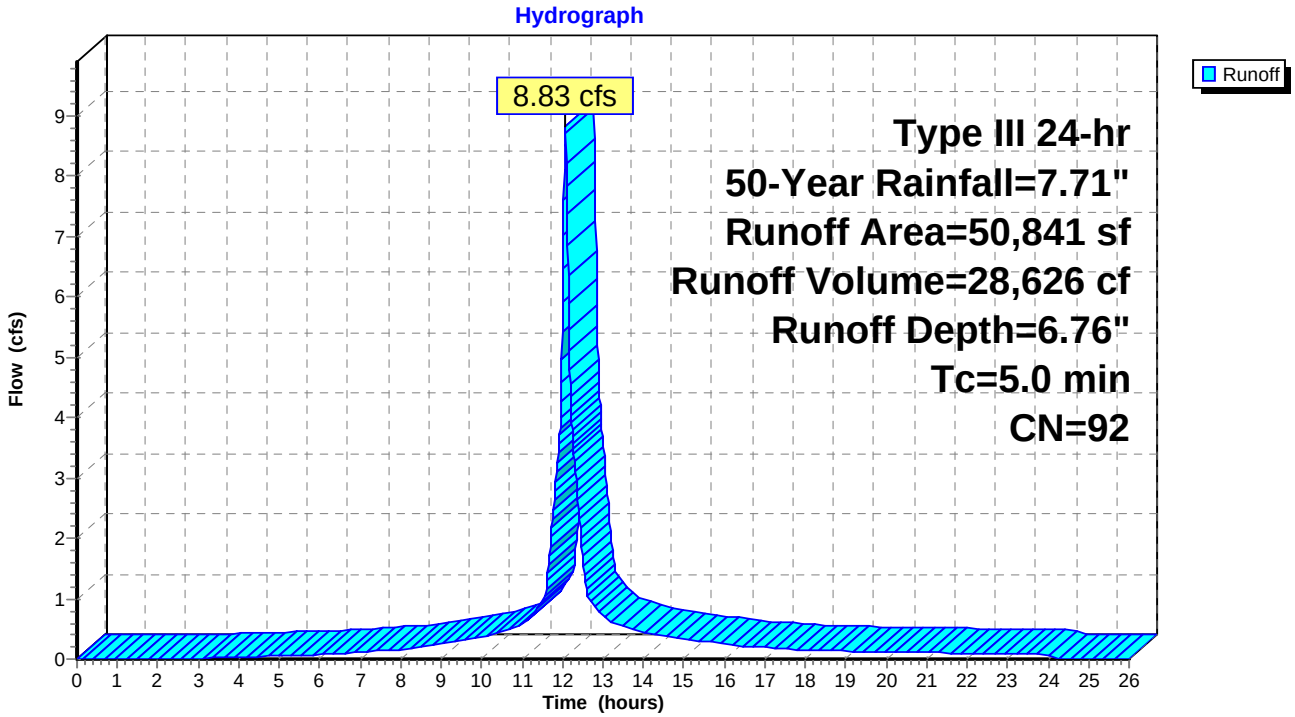
Runoff = 8.83 cfs @ 12.07 hrs, Volume= 28,626 cf, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=7.71"

	Area (sf)	CN	Description
*	43,737	98	Paved driveway, concrete walks
	7,104	58	Woods/grass comb., Good, HSG B
	50,841	92	Weighted Average
	7,104		13.97% Pervious Area
	43,737		86.03% Impervious Area

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

Subcatchment A: PRE DEV



Time span=0.00-26.00 hrs, dt=0.01 hrs, 2601 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 A: PRE DEV Runoff Area=50,841 sf 86.03% Impervious Runoff Depth=7.69"
Tc=5.0 min CN=92 Runoff=9.98 cfs 32,570 cf

Total Runoff Area = 50,841 sf Runoff Volume = 32,570 cf Average Runoff Depth = 7.69"
13.97% Pervious = 7,104 sf 86.03% Impervious = 43,737 sf

Summary for Subcatchment A: PRE DEV

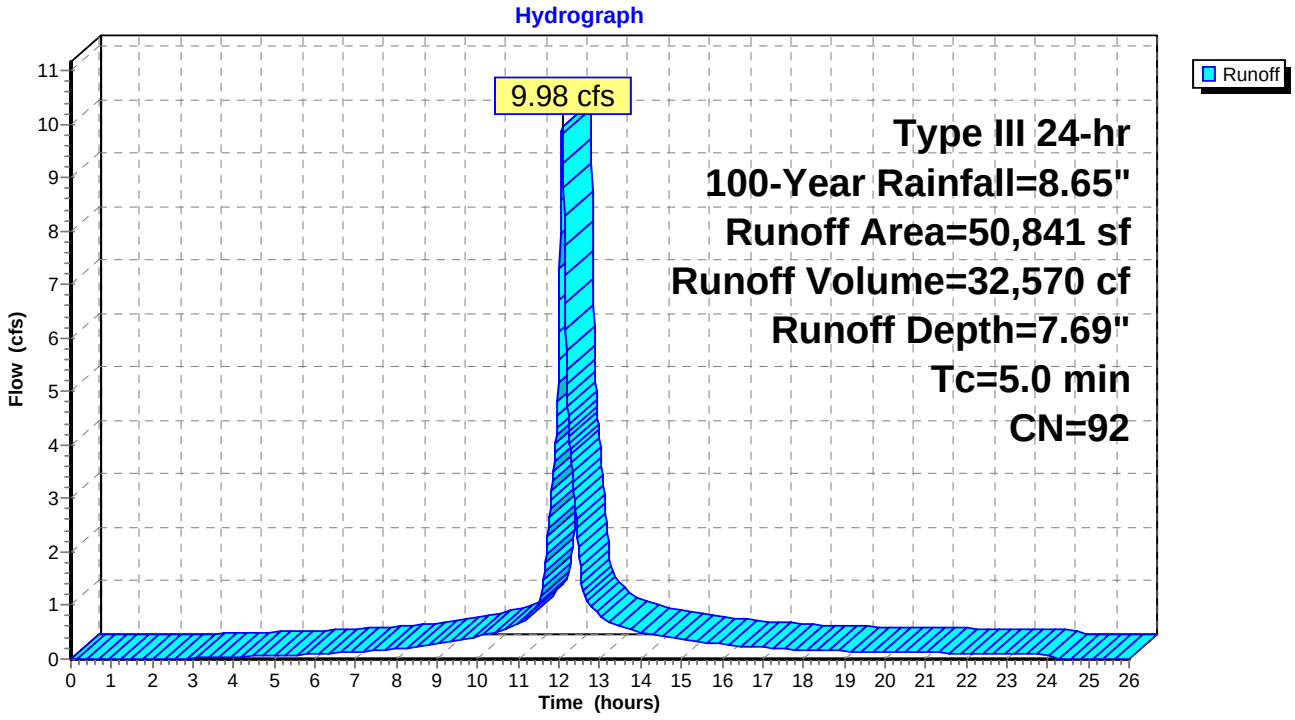
Runoff = 9.98 cfs @ 12.07 hrs, Volume= 32,570 cf, Depth= 7.69"

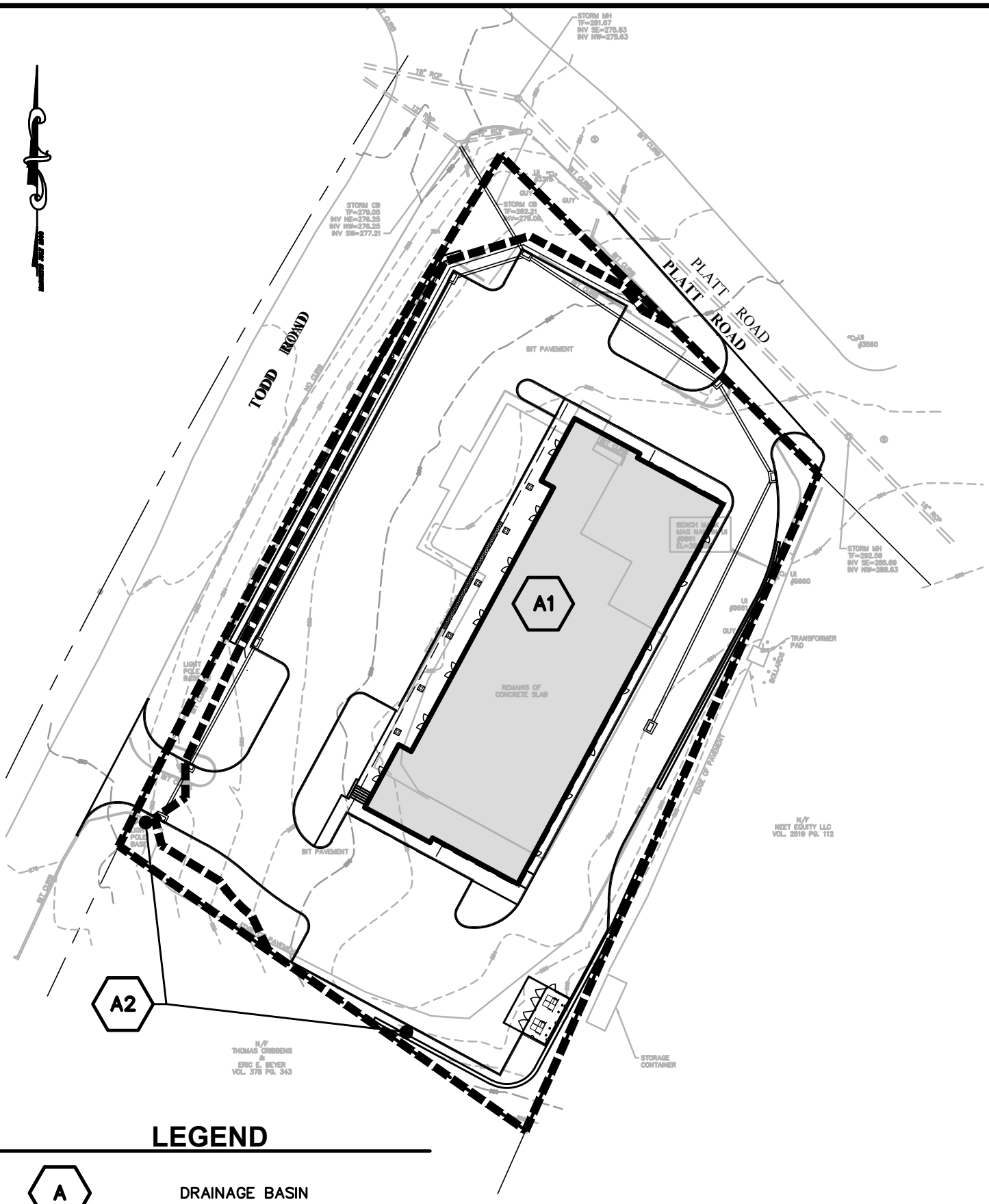
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.65"

	Area (sf)	CN	Description
*	43,737	98	Paved driveway, concrete walks
	7,104	58	Woods/grass comb., Good, HSG B
	50,841	92	Weighted Average
	7,104		13.97% Pervious Area
	43,737		86.03% Impervious Area

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

Subcatchment A: PRE DEV





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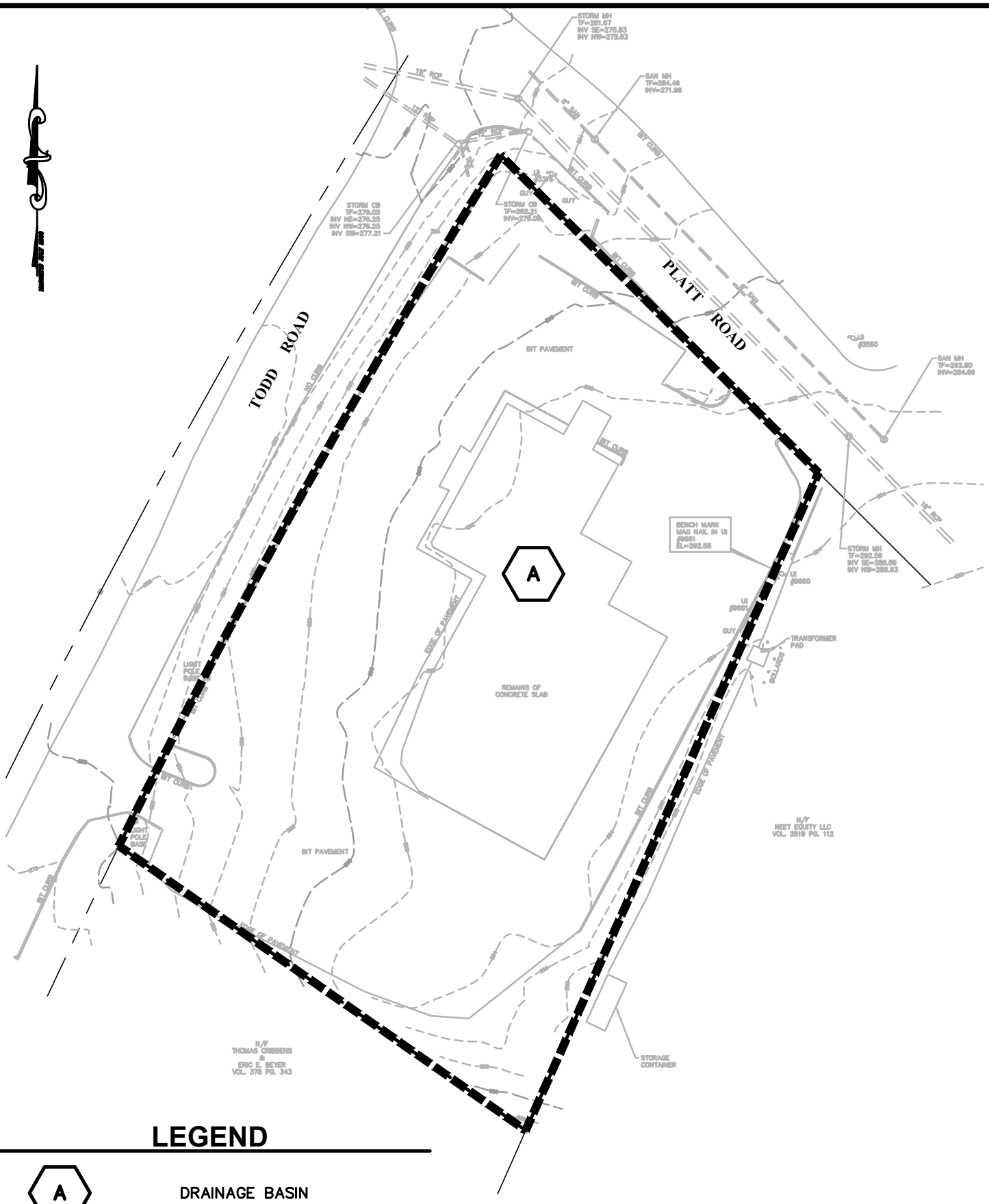
POST-DEVELOPMENT WATERSHED MAP
MANUEL MOUTINHO
6 TODD ROAD
SHELTON, CONNECTICUT

SCALE: 1"=50'

DATE: JULY 20, 2020

WS SHEET 2 OF 2

CAD REF. NO. 0653POST



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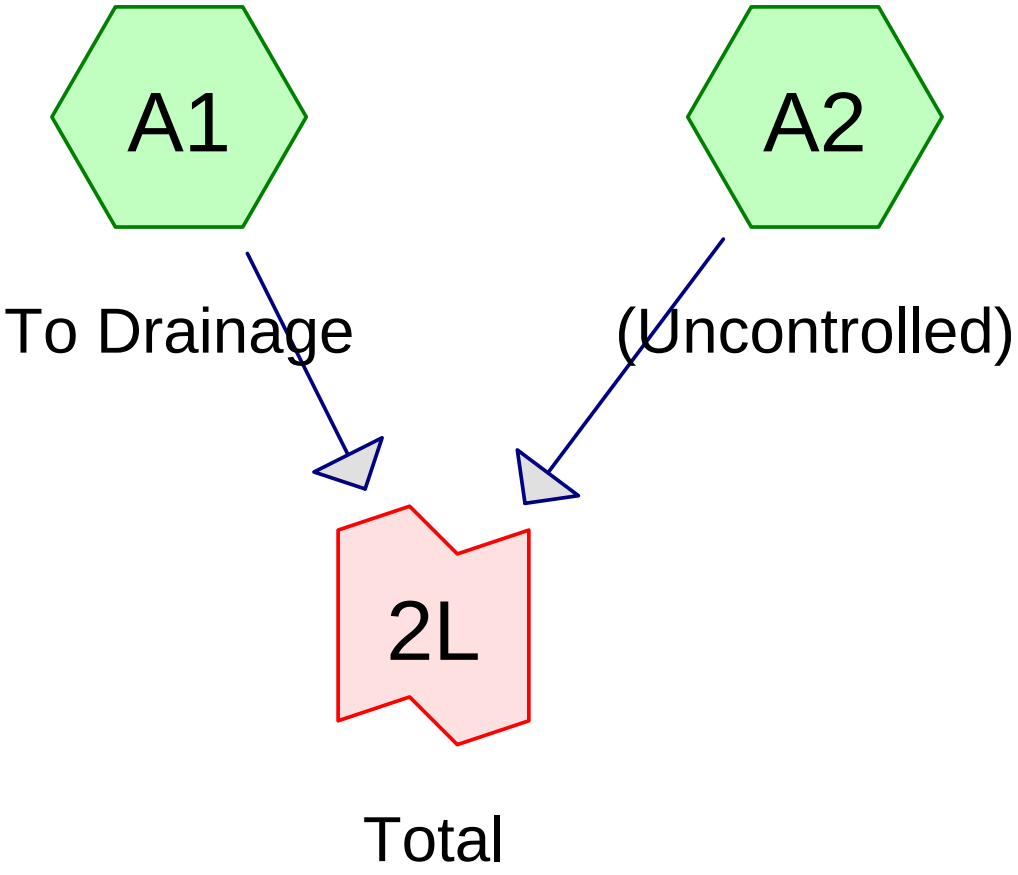
PRE-DEVELOPMENT WATERSHED MAP
MANUEL MOUTINHO
6 TODD ROAD
SHELTON, CONNECTICUT

SCALE: 1"=50'

DATE: JULY 20, 2020

WS SHEET 1 OF 2

CAD REF. NO. 0653PRE



Subcat Reach Pond Link

Routing Diagram for 0653POST
Prepared by Pereira Engineering, LLC, Printed 7/16/2020

Time span=0.00-26.00 hrs, dt=0.01 hrs, 2601 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 A1: To Drainage Runoff Area=47,403 sf 84.90% Impervious Runoff Depth=2.73"
Tc=5.0 min CN=92 Runoff=3.50 cfs 10,794 cf

Subcatchment A2: (Uncontrolled) Runoff Area=3,438 sf 8.12% Impervious Runoff Depth=0.76"
Tc=5.0 min CN=64 Runoff=0.06 cfs 217 cf

Link 2L: Total Inflow=3.56 cfs 11,011 cf
Primary=3.56 cfs 11,011 cf

Total Runoff Area = 50,841 sf Runoff Volume = 11,011 cf Average Runoff Depth = 2.60"
20.29% Pervious = 10,318 sf 79.71% Impervious = 40,523 sf

Summary for Subcatchment A1: To Drainage

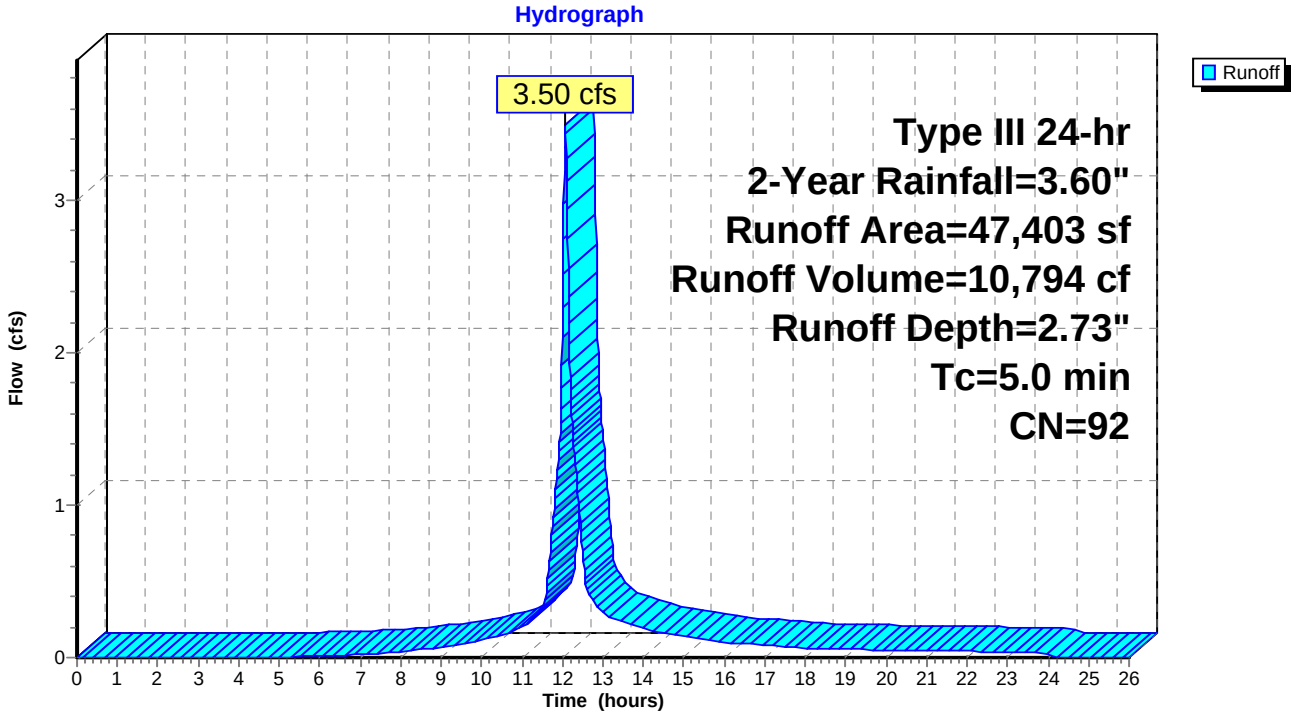
Runoff = 3.50 cfs @ 12.07 hrs, Volume= 10,794 cf, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.60"

	Area (sf)	CN	Description
*	10,172	98	Roof
*	30,072	98	Paved driveway, concrete walks
	7,159	61	>75% Grass cover, Good, HSG B
	47,403	92	Weighted Average
	7,159		15.10% Pervious Area
	40,244		84.90% Impervious Area

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

Subcatchment A1: To Drainage



Summary for Subcatchment A2: (Uncontrolled)

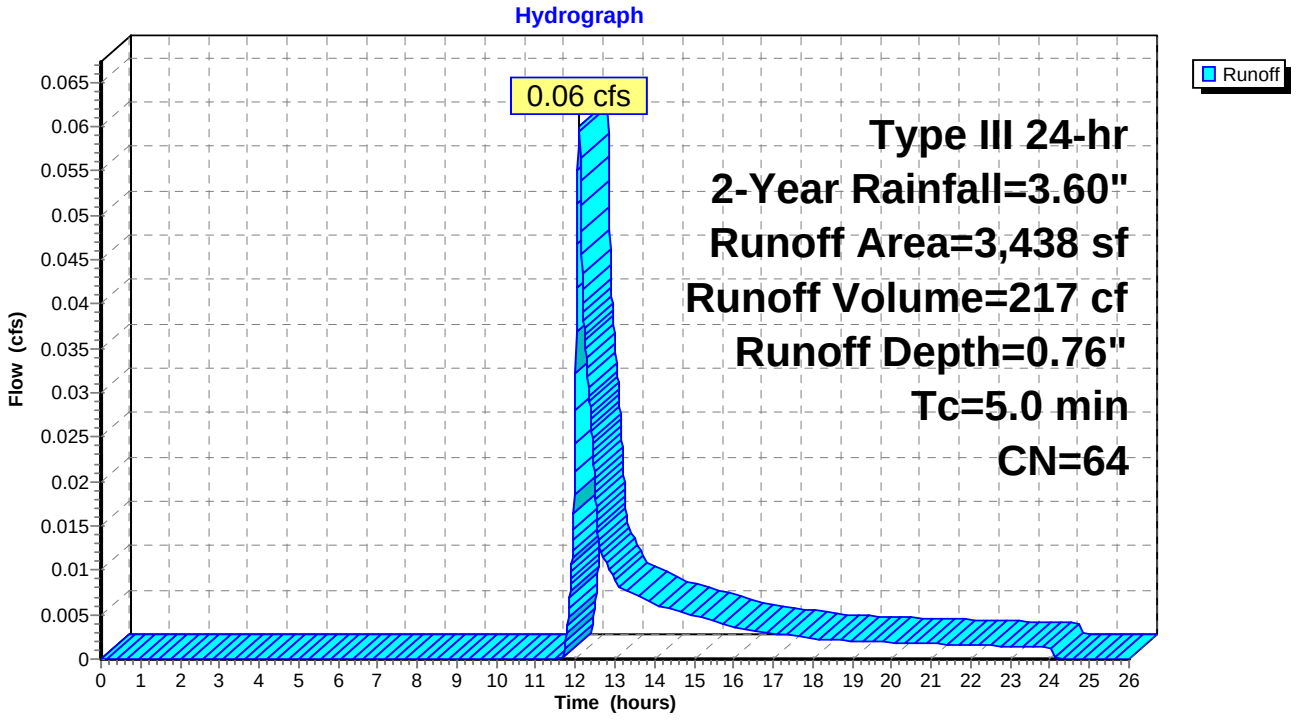
Runoff = 0.06 cfs @ 12.09 hrs, Volume= 217 cf, Depth= 0.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.60"

	Area (sf)	CN	Description
*	279	98	Paved driveway
	3,159	61	>75% Grass cover, Good, HSG B
	3,438	64	Weighted Average
	3,159		91.88% Pervious Area
	279		8.12% Impervious Area

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

Subcatchment A2: (Uncontrolled)

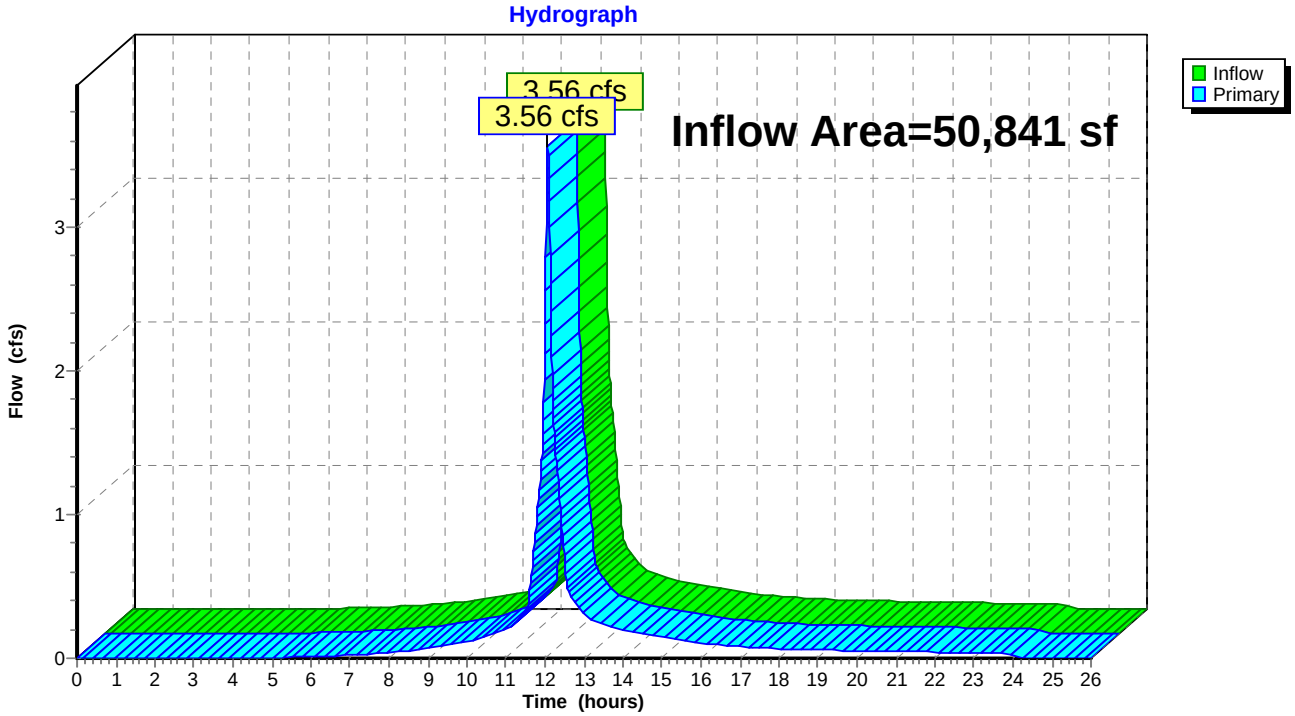


Summary for Link 2L: Total

Inflow Area = 50,841 sf, 79.71% Impervious, Inflow Depth = 2.60" for 2-Year event
Inflow = 3.56 cfs @ 12.07 hrs, Volume= 11,011 cf
Primary = 3.56 cfs @ 12.07 hrs, Volume= 11,011 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs

Link 2L: Total



Time span=0.00-26.00 hrs, dt=0.01 hrs, 2601 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 A1: To Drainage Runoff Area=47,403 sf 84.90% Impervious Runoff Depth=3.77"
Tc=5.0 min CN=92 Runoff=4.75 cfs 14,882 cf

Subcatchment A2: (Uncontrolled) Runoff Area=3,438 sf 8.12% Impervious Runoff Depth=1.37"
Tc=5.0 min CN=64 Runoff=0.12 cfs 393 cf

Link 2L: Total Inflow=4.87 cfs 15,275 cf
Primary=4.87 cfs 15,275 cf

Total Runoff Area = 50,841 sf Runoff Volume = 15,275 cf Average Runoff Depth = 3.61"
20.29% Pervious = 10,318 sf 79.71% Impervious = 40,523 sf

Summary for Subcatchment A1: To Drainage

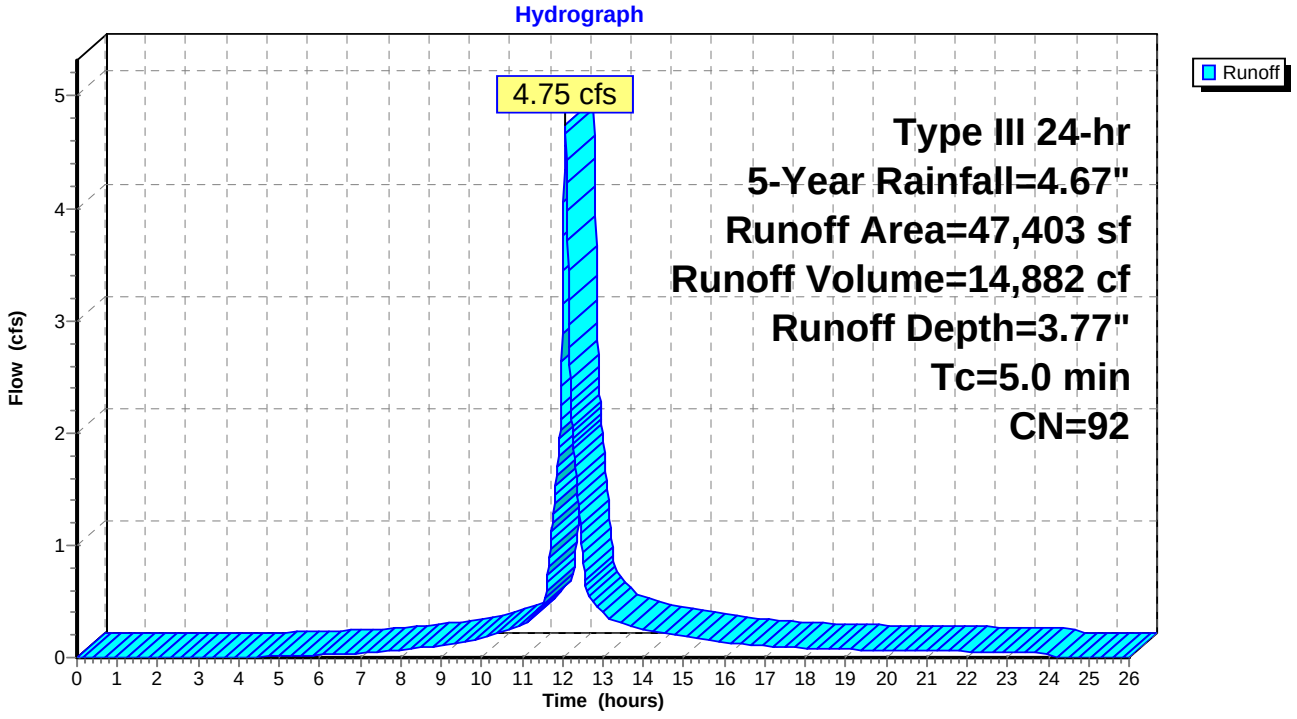
Runoff = 4.75 cfs @ 12.07 hrs, Volume= 14,882 cf, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year Rainfall=4.67"

	Area (sf)	CN	Description
*	10,172	98	Roof
*	30,072	98	Paved driveway, concrete walks
	7,159	61	>75% Grass cover, Good, HSG B
	47,403	92	Weighted Average
	7,159		15.10% Pervious Area
	40,244		84.90% Impervious Area

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

Subcatchment A1: To Drainage



Summary for Subcatchment A2: (Uncontrolled)

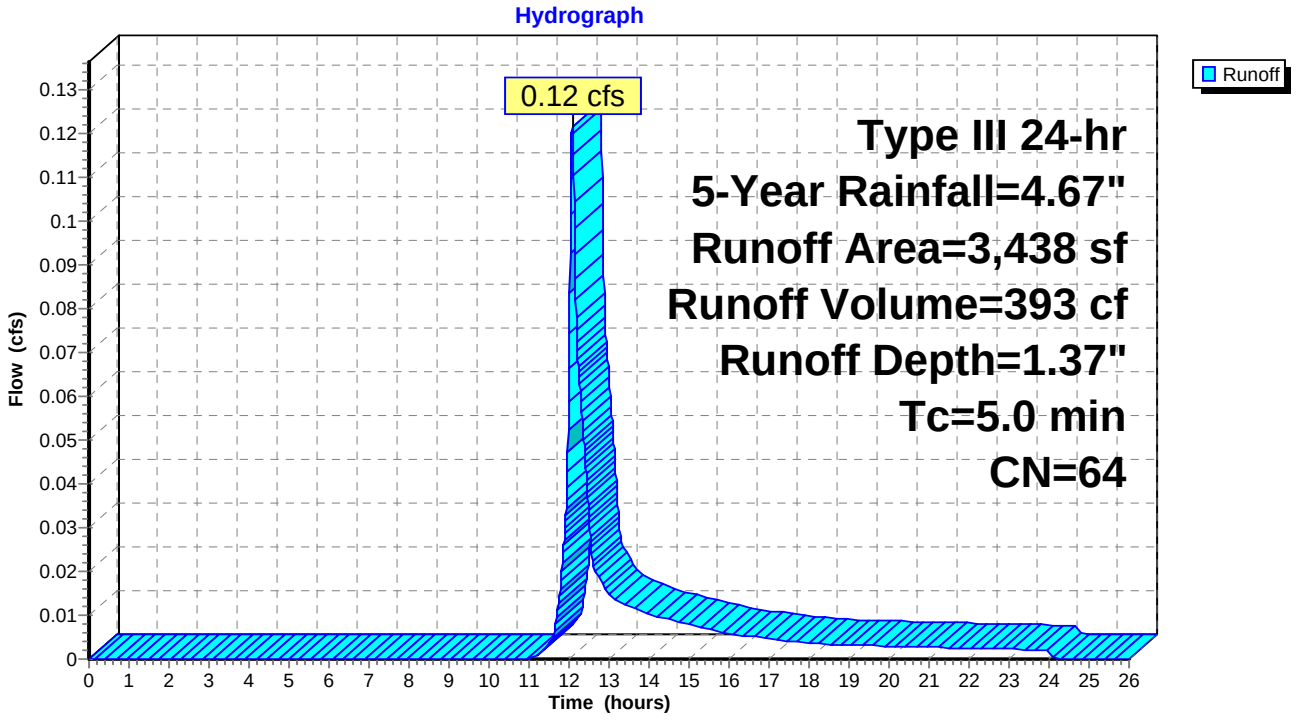
Runoff = 0.12 cfs @ 12.08 hrs, Volume= 393 cf, Depth= 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 5-Year Rainfall=4.67"

	Area (sf)	CN	Description
*	279	98	Paved driveway
	3,159	61	>75% Grass cover, Good, HSG B
	3,438	64	Weighted Average
	3,159		91.88% Pervious Area
	279		8.12% Impervious Area

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

Subcatchment A2: (Uncontrolled)

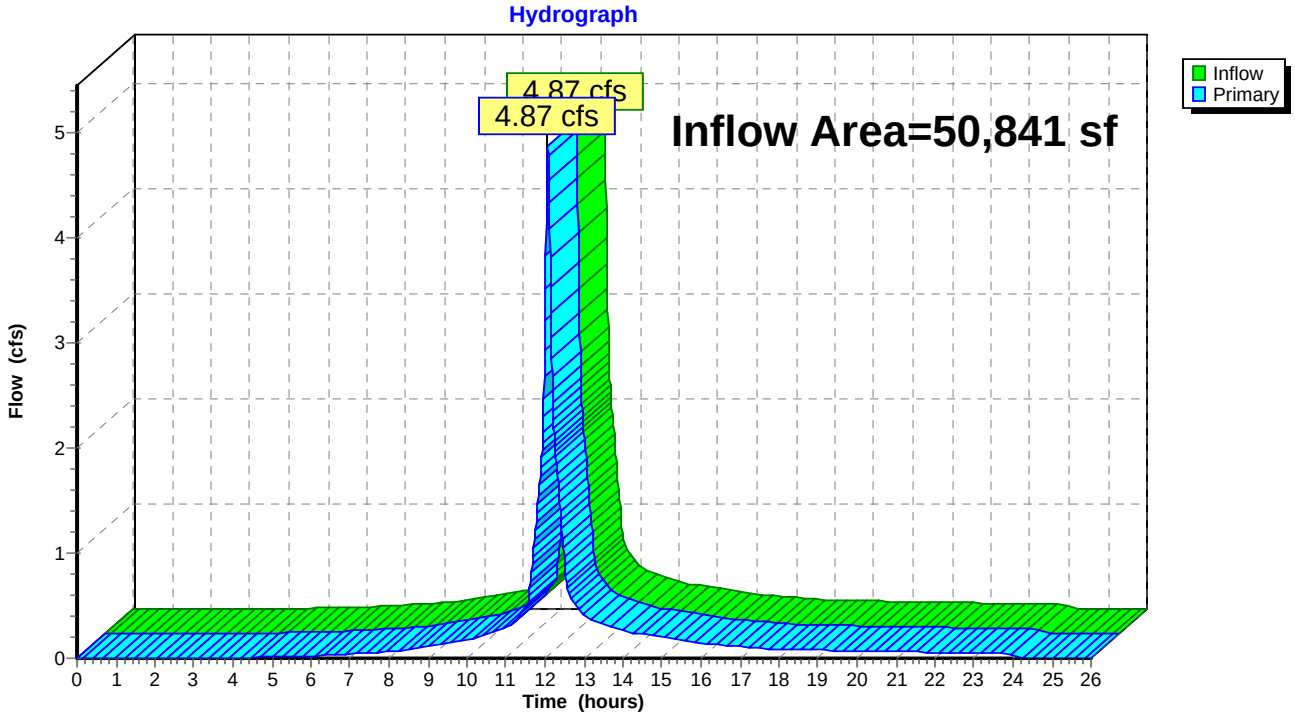


Summary for Link 2L: Total

Inflow Area = 50,841 sf, 79.71% Impervious, Inflow Depth = 3.61" for 5-Year event
Inflow = 4.87 cfs @ 12.07 hrs, Volume= 15,275 cf
Primary = 4.87 cfs @ 12.07 hrs, Volume= 15,275 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs

Link 2L: Total



Time span=0.00-26.00 hrs, dt=0.01 hrs, 2601 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 A1: To Drainage Runoff Area=47,403 sf 84.90% Impervious Runoff Depth=4.64"
Tc=5.0 min CN=92 Runoff=5.78 cfs 18,319 cf

Subcatchment A2: (Uncontrolled) Runoff Area=3,438 sf 8.12% Impervious Runoff Depth=1.96"
Tc=5.0 min CN=64 Runoff=0.18 cfs 560 cf

Link 2L: Total Inflow=5.96 cfs 18,879 cf
Primary=5.96 cfs 18,879 cf

Total Runoff Area = 50,841 sf Runoff Volume = 18,879 cf Average Runoff Depth = 4.46"
20.29% Pervious = 10,318 sf 79.71% Impervious = 40,523 sf

Summary for Subcatchment A1: To Drainage

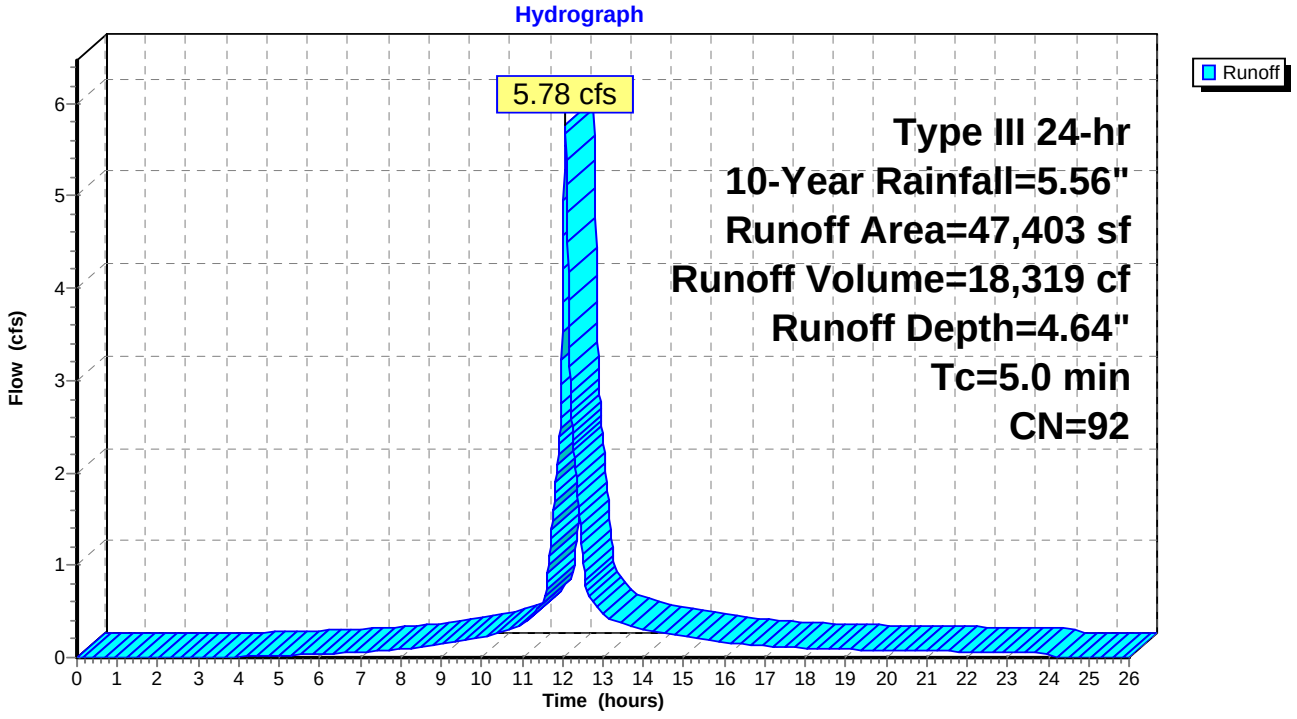
Runoff = 5.78 cfs @ 12.07 hrs, Volume= 18,319 cf, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.56"

	Area (sf)	CN	Description
*	10,172	98	Roof
*	30,072	98	Paved driveway, concrete walks
	7,159	61	>75% Grass cover, Good, HSG B
	47,403	92	Weighted Average
	7,159		15.10% Pervious Area
	40,244		84.90% Impervious Area

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

Subcatchment A1: To Drainage



Summary for Subcatchment A2: (Uncontrolled)

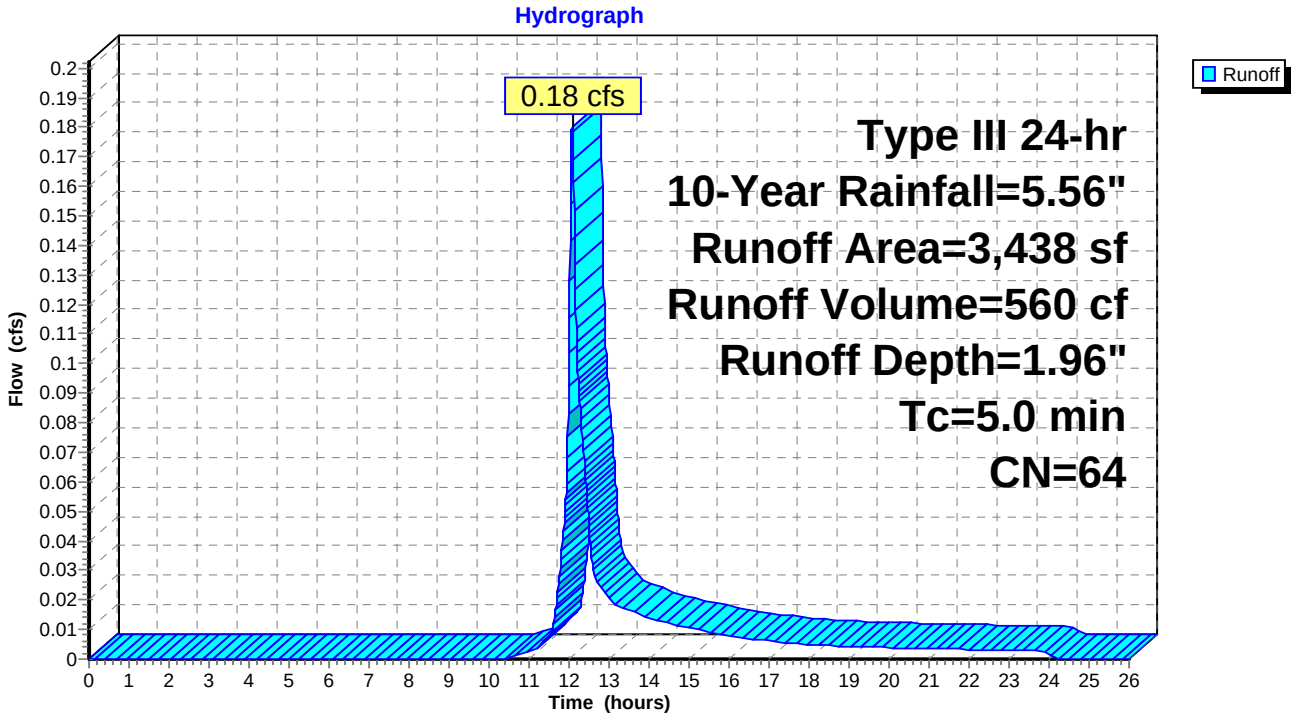
Runoff = 0.18 cfs @ 12.08 hrs, Volume= 560 cf, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.56"

	Area (sf)	CN	Description
*	279	98	Paved driveway
	3,159	61	>75% Grass cover, Good, HSG B
	3,438	64	Weighted Average
	3,159		91.88% Pervious Area
	279		8.12% Impervious Area

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

Subcatchment A2: (Uncontrolled)

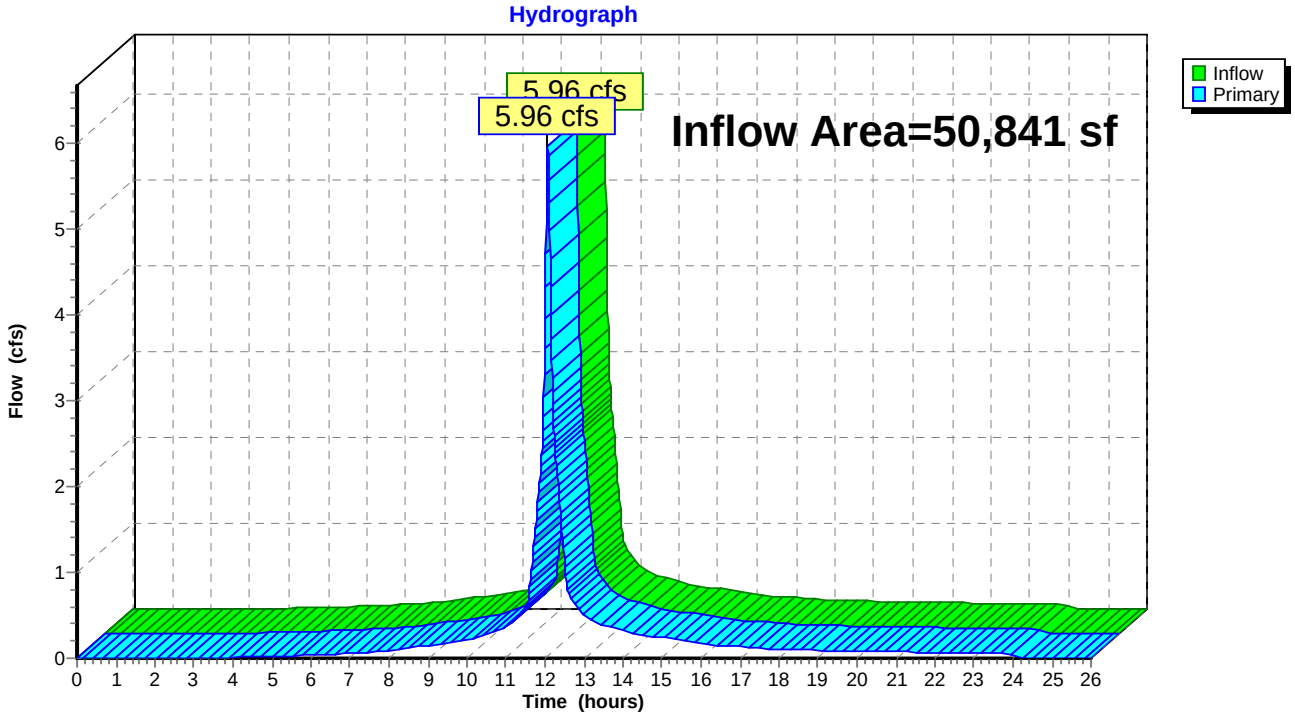


Summary for Link 2L: Total

Inflow Area = 50,841 sf, 79.71% Impervious, Inflow Depth = 4.46" for 10-Year event
Inflow = 5.96 cfs @ 12.07 hrs, Volume= 18,879 cf
Primary = 5.96 cfs @ 12.07 hrs, Volume= 18,879 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs

Link 2L: Total



Time span=0.00-26.00 hrs, dt=0.01 hrs, 2601 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 A1: To Drainage Runoff Area=47,403 sf 84.90% Impervious Runoff Depth=5.83"
Tc=5.0 min CN=92 Runoff=7.16 cfs 23,021 cf

Subcatchment A2: (Uncontrolled) Runoff Area=3,438 sf 8.12% Impervious Runoff Depth=2.83"
Tc=5.0 min CN=64 Runoff=0.27 cfs 810 cf

Link 2L: Total Inflow=7.43 cfs 23,831 cf
Primary=7.43 cfs 23,831 cf

Total Runoff Area = 50,841 sf Runoff Volume = 23,831 cf Average Runoff Depth = 5.62"
20.29% Pervious = 10,318 sf 79.71% Impervious = 40,523 sf

Summary for Subcatchment A1: To Drainage

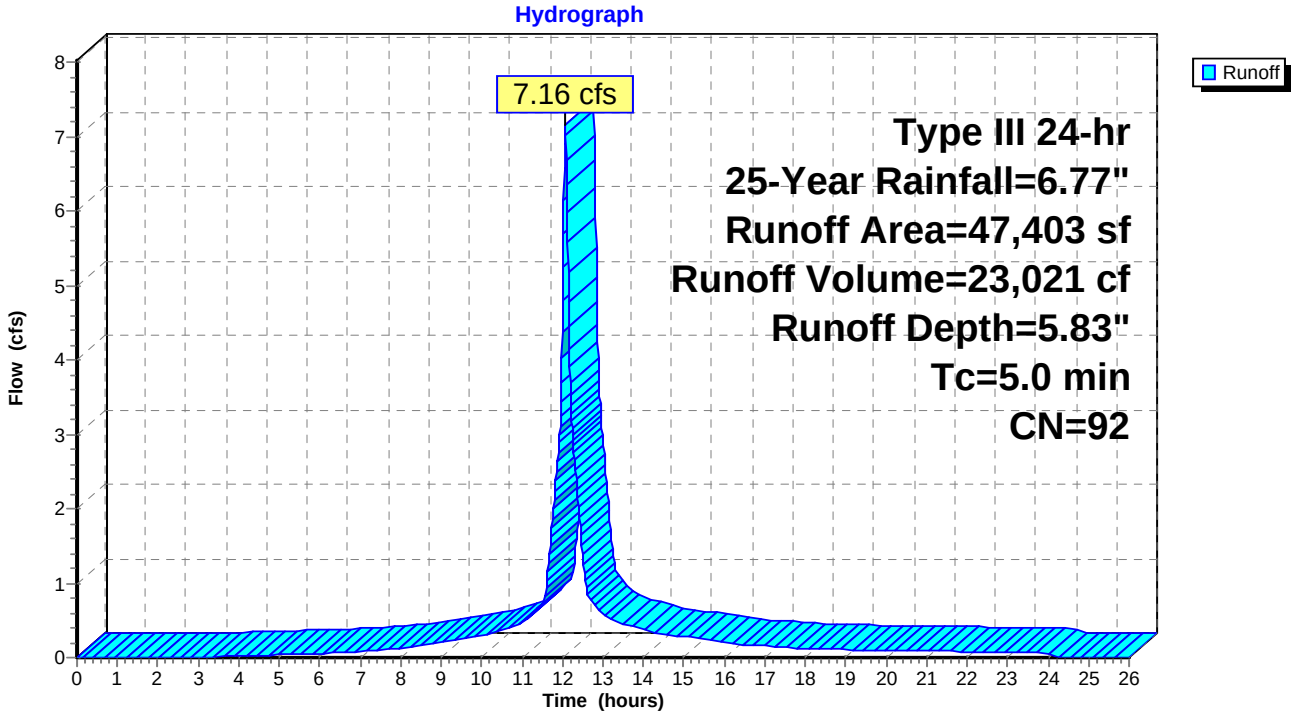
Runoff = 7.16 cfs @ 12.07 hrs, Volume= 23,021 cf, Depth= 5.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.77"

	Area (sf)	CN	Description
*	10,172	98	Roof
*	30,072	98	Paved driveway, concrete walks
	7,159	61	>75% Grass cover, Good, HSG B
	47,403	92	Weighted Average
	7,159		15.10% Pervious Area
	40,244		84.90% Impervious Area

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

Subcatchment A1: To Drainage



Summary for Subcatchment A2: (Uncontrolled)

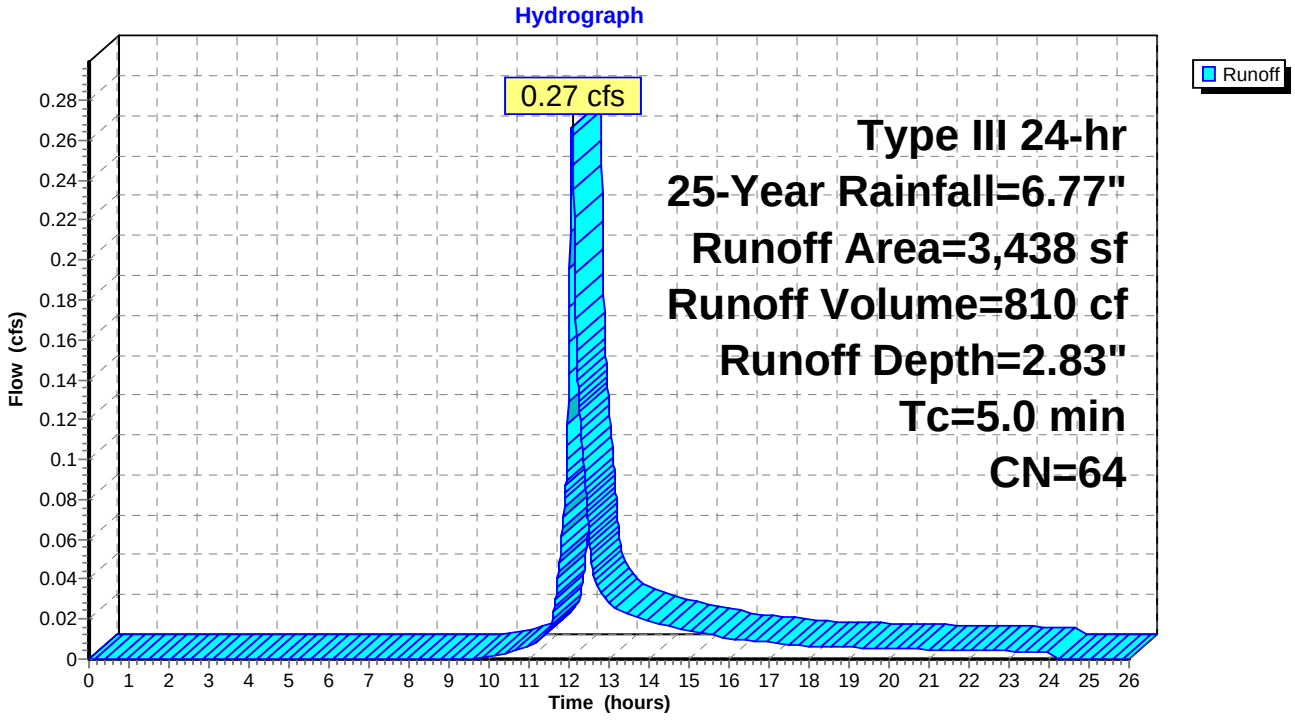
Runoff = 0.27 cfs @ 12.08 hrs, Volume= 810 cf, Depth= 2.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.77"

	Area (sf)	CN	Description
*	279	98	Paved driveway
	3,159	61	>75% Grass cover, Good, HSG B
	3,438	64	Weighted Average
	3,159		91.88% Pervious Area
	279		8.12% Impervious Area

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

Subcatchment A2: (Uncontrolled)

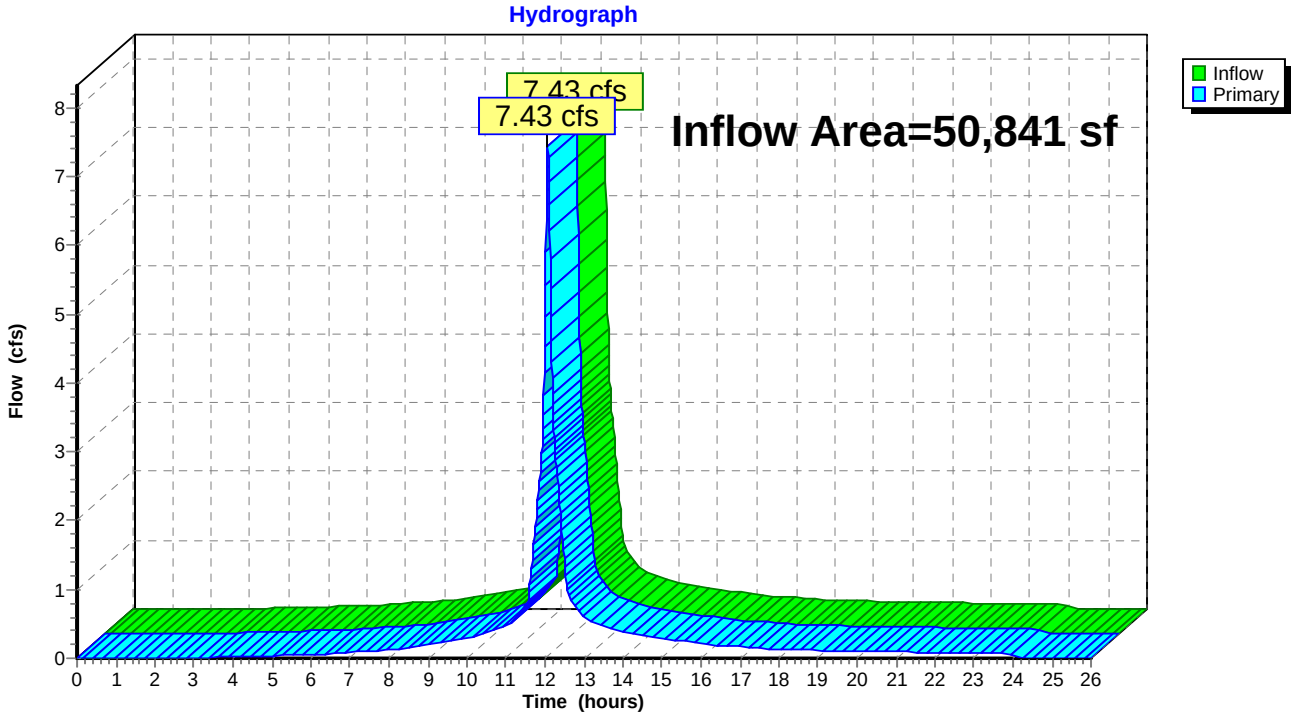


Summary for Link 2L: Total

Inflow Area = 50,841 sf, 79.71% Impervious, Inflow Depth = 5.62" for 25-Year event
Inflow = 7.43 cfs @ 12.07 hrs, Volume= 23,831 cf
Primary = 7.43 cfs @ 12.07 hrs, Volume= 23,831 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs

Link 2L: Total



Time span=0.00-26.00 hrs, dt=0.01 hrs, 2601 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 A1: To Drainage Runoff Area=47,403 sf 84.90% Impervious Runoff Depth=6.76"
Tc=5.0 min CN=92 Runoff=8.24 cfs 26,690 cf

Subcatchment A2: (Uncontrolled) Runoff Area=3,438 sf 8.12% Impervious Runoff Depth=3.55"
Tc=5.0 min CN=64 Runoff=0.34 cfs 1,017 cf

Link 2L: Total Inflow=8.57 cfs 27,707 cf
Primary=8.57 cfs 27,707 cf

Total Runoff Area = 50,841 sf Runoff Volume = 27,707 cf Average Runoff Depth = 6.54"
20.29% Pervious = 10,318 sf 79.71% Impervious = 40,523 sf

Summary for Subcatchment A1: To Drainage

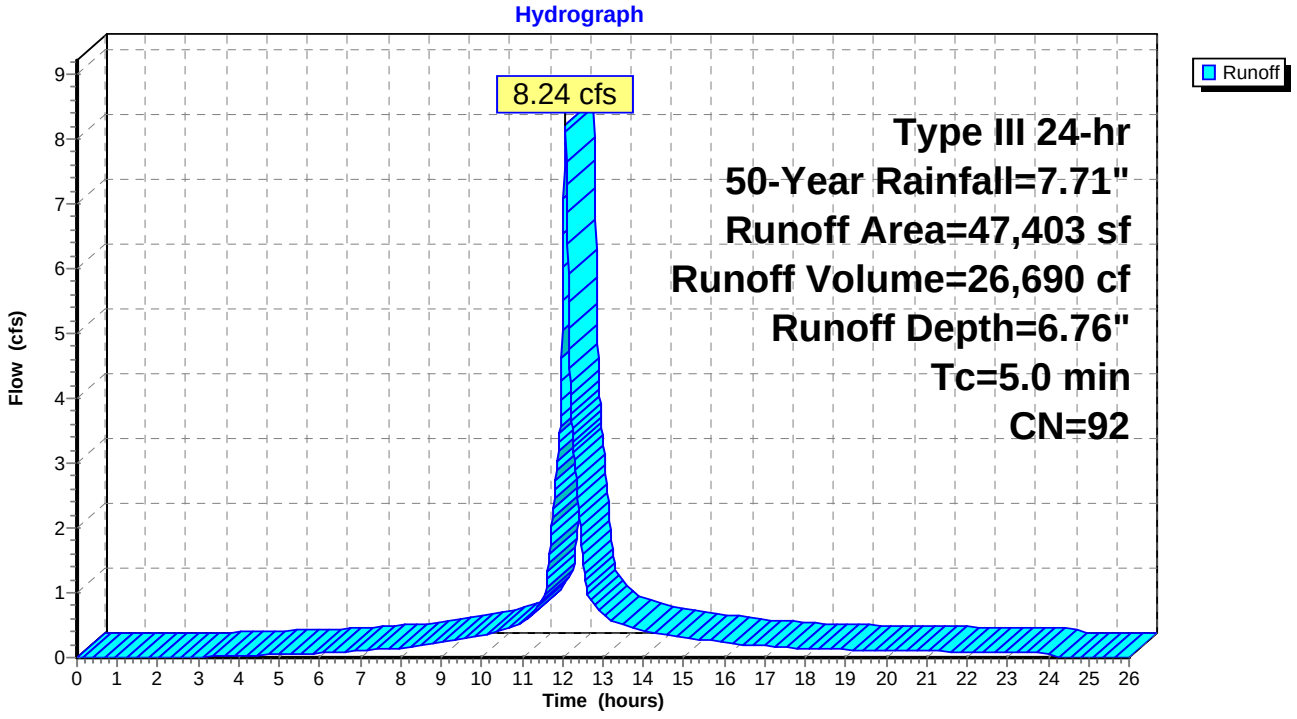
Runoff = 8.24 cfs @ 12.07 hrs, Volume= 26,690 cf, Depth= 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=7.71"

	Area (sf)	CN	Description
*	10,172	98	Roof
*	30,072	98	Paved driveway, concrete walks
	7,159	61	>75% Grass cover, Good, HSG B
	47,403	92	Weighted Average
	7,159		15.10% Pervious Area
	40,244		84.90% Impervious Area

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

Subcatchment A1: To Drainage



Summary for Subcatchment A2: (Uncontrolled)

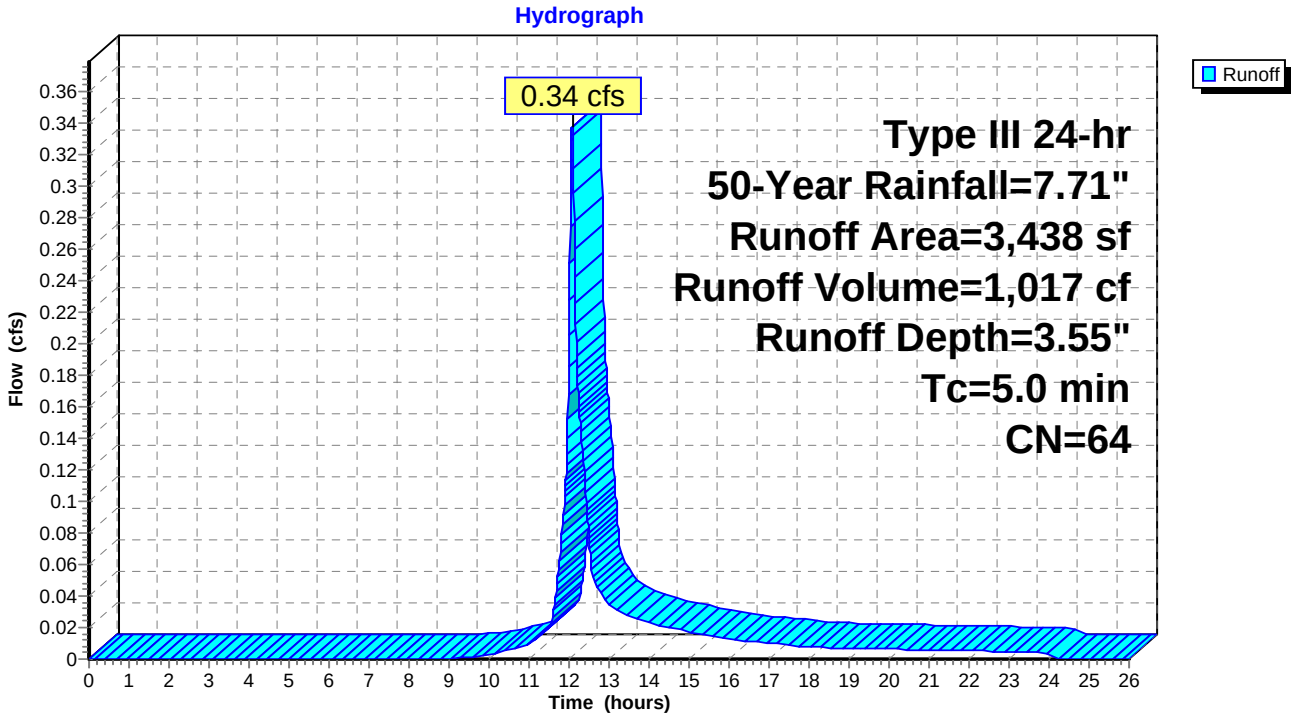
Runoff = 0.34 cfs @ 12.08 hrs, Volume= 1,017 cf, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 50-Year Rainfall=7.71"

	Area (sf)	CN	Description
*	279	98	Paved driveway
	3,159	61	>75% Grass cover, Good, HSG B
	3,438	64	Weighted Average
	3,159		91.88% Pervious Area
	279		8.12% Impervious Area

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

Subcatchment A2: (Uncontrolled)

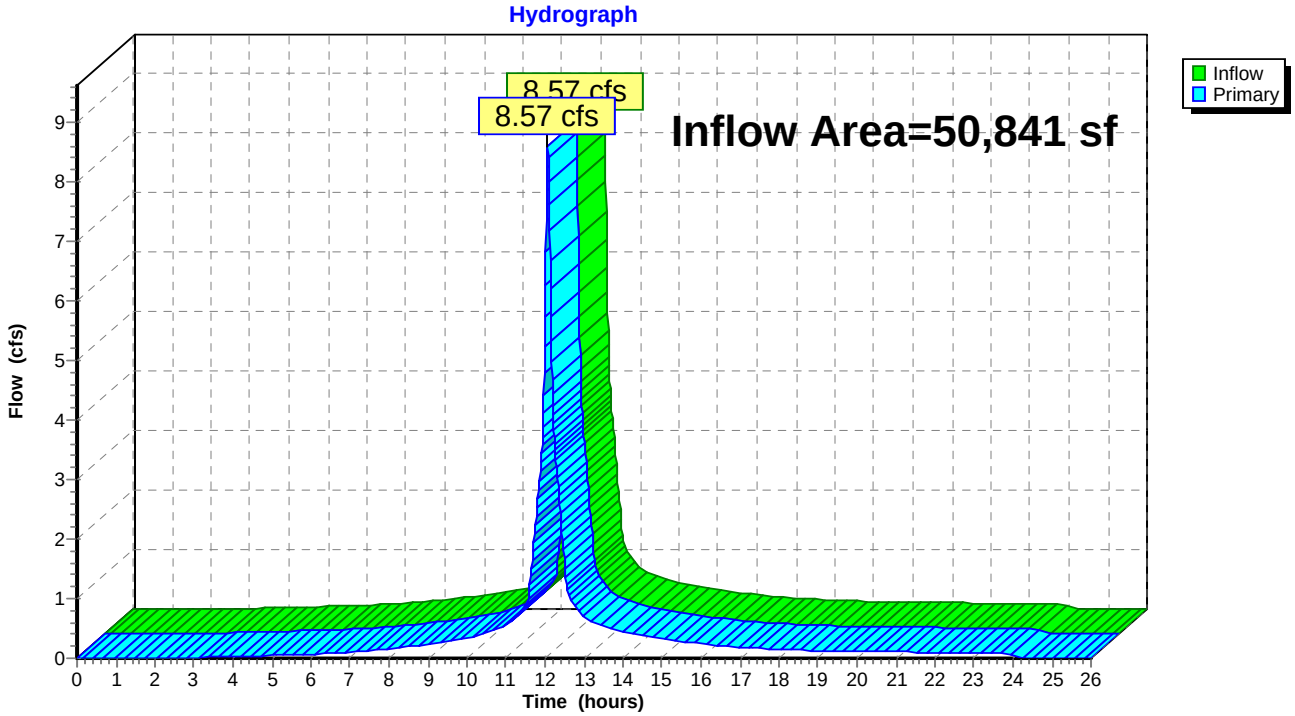


Summary for Link 2L: Total

Inflow Area = 50,841 sf, 79.71% Impervious, Inflow Depth = 6.54" for 50-Year event
Inflow = 8.57 cfs @ 12.07 hrs, Volume= 27,707 cf
Primary = 8.57 cfs @ 12.07 hrs, Volume= 27,707 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs

Link 2L: Total



Time span=0.00-26.00 hrs, dt=0.01 hrs, 2601 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 A1: To Drainage Runoff Area=47,403 sf 84.90% Impervious Runoff Depth=7.69"
Tc=5.0 min CN=92 Runoff=9.30 cfs 30,367 cf

Subcatchment A2: (Uncontrolled) Runoff Area=3,438 sf 8.12% Impervious Runoff Depth=4.31"
Tc=5.0 min CN=64 Runoff=0.41 cfs 1,234 cf

Link 2L: Total Inflow=9.72 cfs 31,601 cf
Primary=9.72 cfs 31,601 cf

Total Runoff Area = 50,841 sf Runoff Volume = 31,601 cf Average Runoff Depth = 7.46"
20.29% Pervious = 10,318 sf 79.71% Impervious = 40,523 sf

Summary for Subcatchment A1: To Drainage

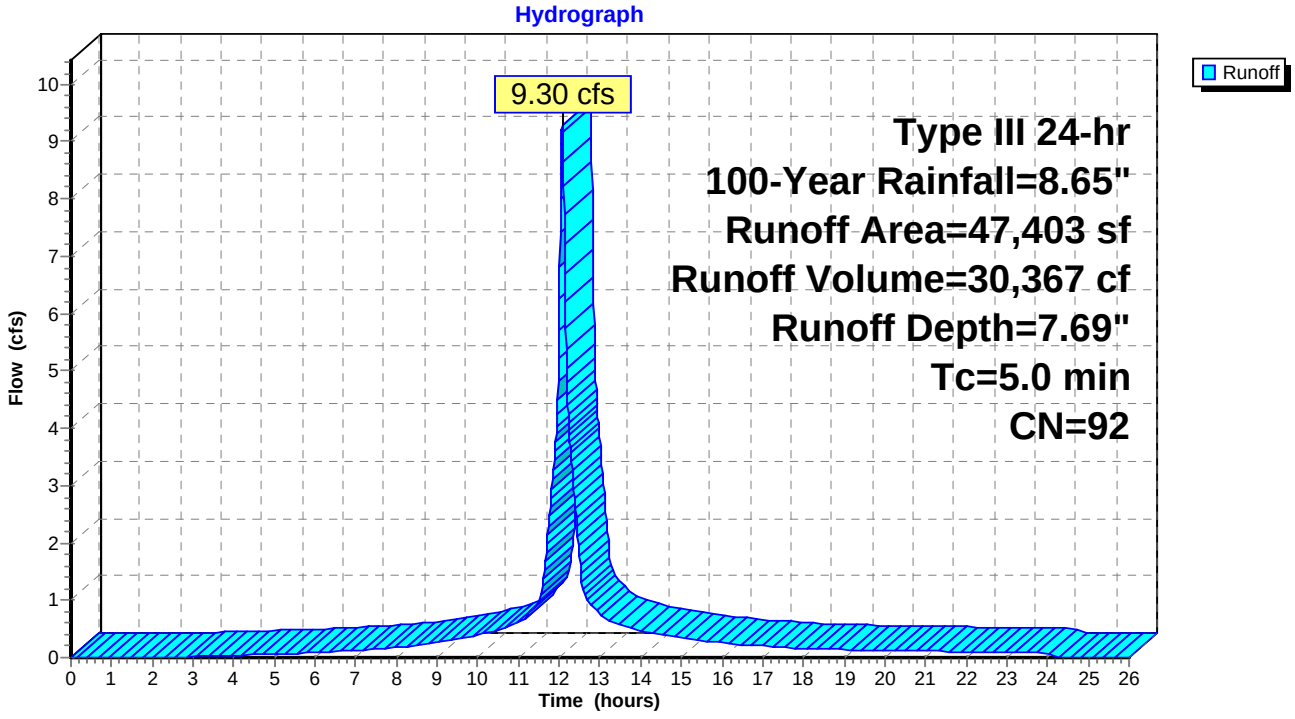
Runoff = 9.30 cfs @ 12.07 hrs, Volume= 30,367 cf, Depth= 7.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.65"

	Area (sf)	CN	Description
*	10,172	98	Roof
*	30,072	98	Paved driveway, concrete walks
	7,159	61	>75% Grass cover, Good, HSG B
	47,403	92	Weighted Average
	7,159		15.10% Pervious Area
	40,244		84.90% Impervious Area

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

Subcatchment A1: To Drainage



Summary for Subcatchment A2: (Uncontrolled)

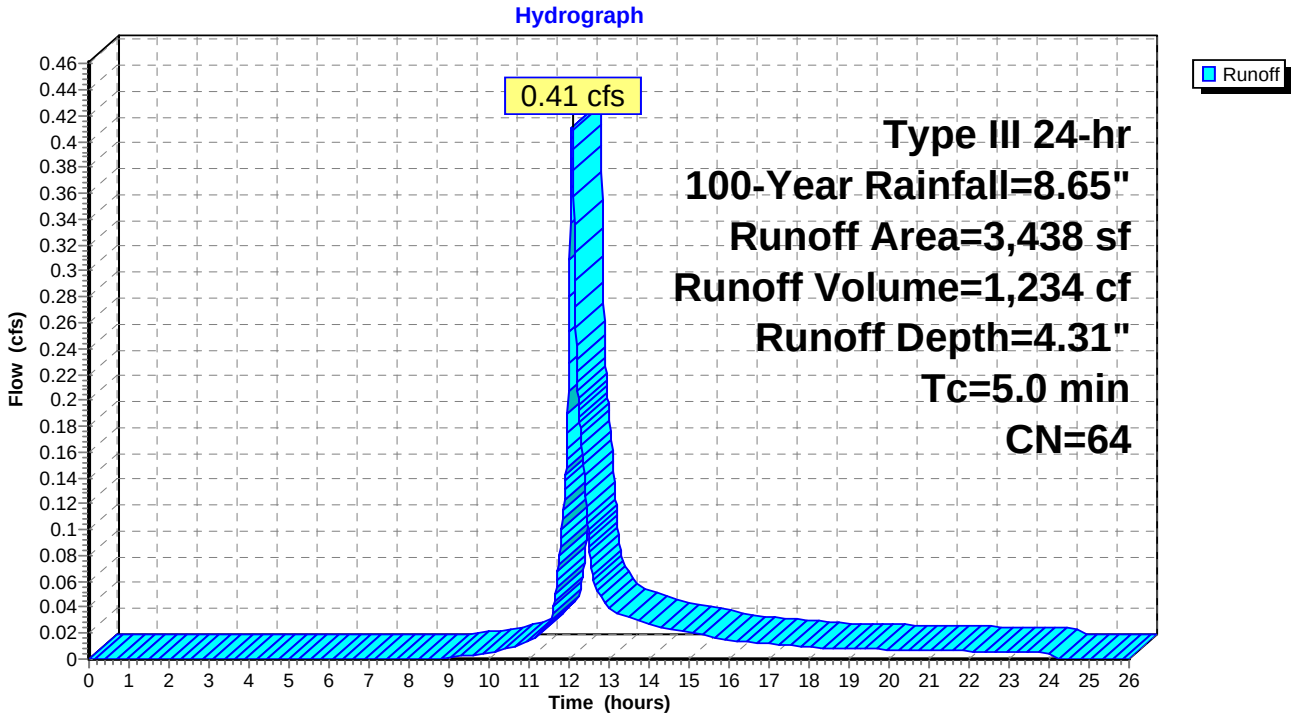
Runoff = 0.41 cfs @ 12.08 hrs, Volume= 1,234 cf, Depth= 4.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.65"

	Area (sf)	CN	Description
*	279	98	Paved driveway
	3,159	61	>75% Grass cover, Good, HSG B
	3,438	64	Weighted Average
	3,159		91.88% Pervious Area
	279		8.12% Impervious Area

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

Subcatchment A2: (Uncontrolled)

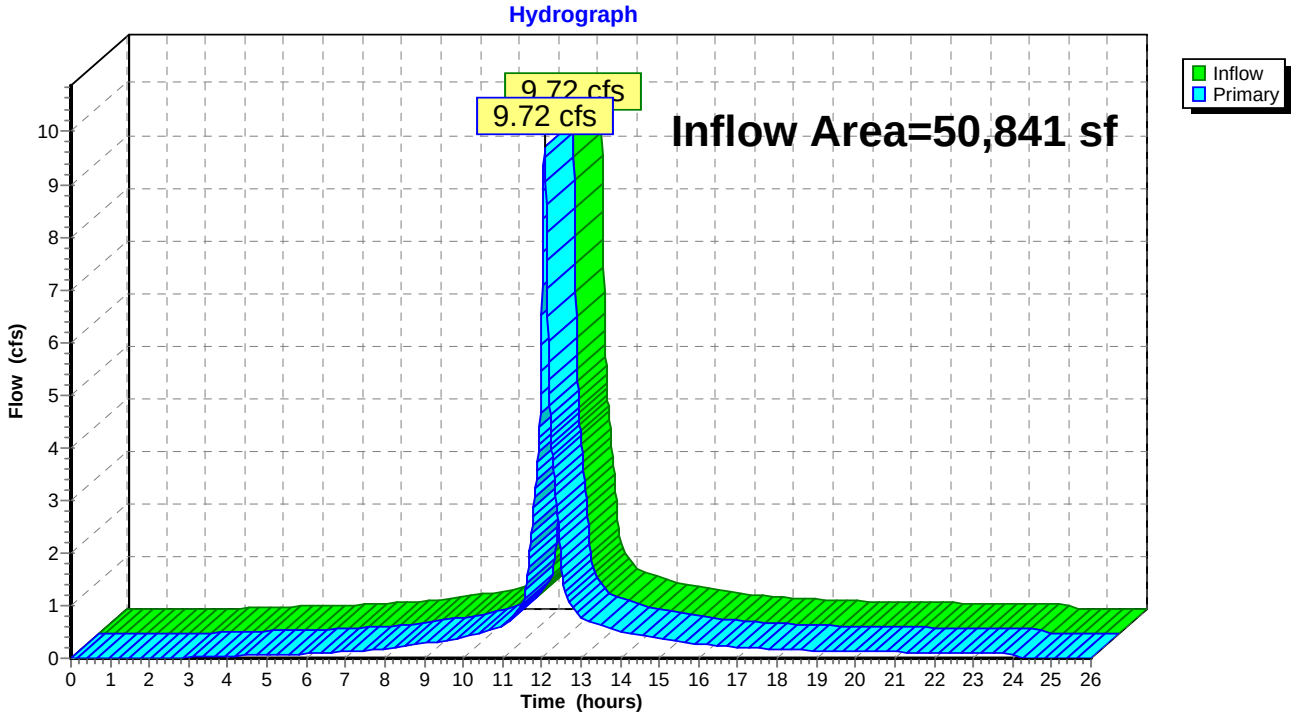


Summary for Link 2L: Total

Inflow Area = 50,841 sf, 79.71% Impervious, Inflow Depth = 7.46" for 100-Year event
Inflow = 9.72 cfs @ 12.07 hrs, Volume= 31,601 cf
Primary = 9.72 cfs @ 12.07 hrs, Volume= 31,601 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-26.00 hrs, dt= 0.01 hrs

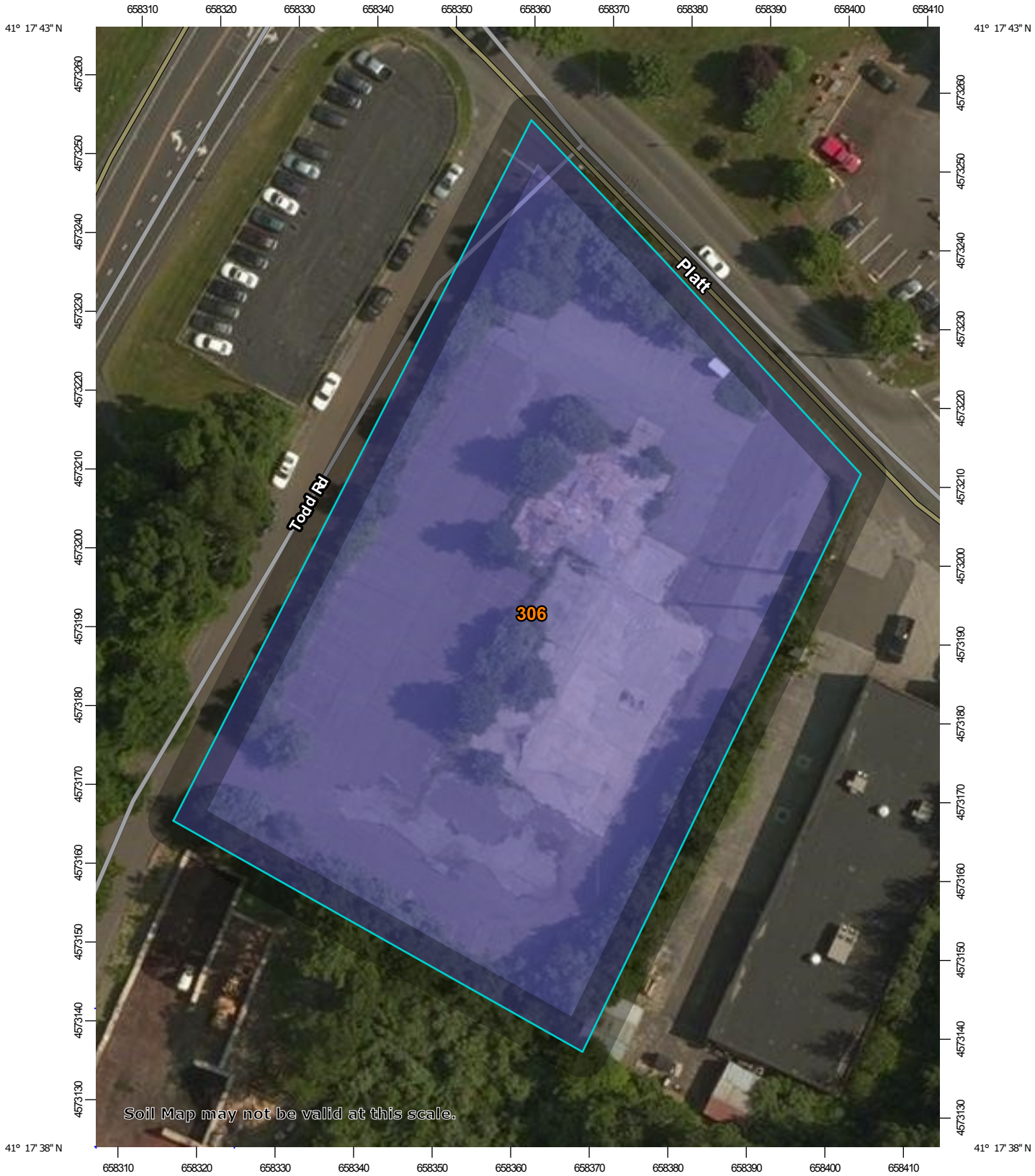
Link 2L: Total



APPENDIX B

SOIL INFORMATION

Hydrologic Soil Group—State of Connecticut
(6 Todd Road, Shelton)



Map Scale: 1:692 if printed on A portrait (8.5" x 11") sheet.

N

0 10 20 40 60 Meters

0 30 60 120 180 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: State of Connecticut
Survey Area Data: Version 16, Sep 15, 2017

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

Date(s) aerial images were photographed: Jun 27, 2014—Jul 22, 2014

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
306	Udorthents-Urban land complex	B	1.3	100.0%
Totals for Area of Interest			**1.3**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX C

NOAA PRECIPITATION FREQUENCY DATA

NOAA Atlas 14, Volume 10, Version 2
Location name: Shelton, Connecticut, USA*
Latitude: 41.2946°, Longitude: -73.1086°
Elevation: 288.75 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.358 (0.281-0.449)	0.426 (0.335-0.536)	0.538 (0.421-0.679)	0.631 (0.491-0.801)	0.759 (0.570-1.00)	0.857 (0.631-1.16)	0.956 (0.682-1.34)	1.08 (0.728-1.54)	1.24 (0.805-1.84)	1.36 (0.862-2.06)
10-min	0.507 (0.398-0.637)	0.604 (0.474-0.759)	0.762 (0.596-0.962)	0.894 (0.695-1.13)	1.08 (0.808-1.42)	1.22 (0.894-1.64)	1.35 (0.966-1.90)	1.53 (1.03-2.19)	1.76 (1.14-2.60)	1.93 (1.22-2.92)
15-min	0.596 (0.469-0.749)	0.710 (0.558-0.893)	0.897 (0.702-1.13)	1.05 (0.818-1.33)	1.26 (0.951-1.67)	1.43 (1.05-1.93)	1.59 (1.14-2.23)	1.80 (1.21-2.57)	2.07 (1.34-3.06)	2.27 (1.44-3.43)
30-min	0.826 (0.649-1.04)	0.985 (0.773-1.24)	1.25 (0.974-1.57)	1.46 (1.14-1.85)	1.76 (1.32-2.32)	1.99 (1.46-2.68)	2.21 (1.58-3.09)	2.49 (1.68-3.56)	2.86 (1.85-4.23)	3.13 (1.98-4.73)
60-min	1.06 (0.830-1.33)	1.26 (0.989-1.59)	1.59 (1.25-2.01)	1.87 (1.45-2.37)	2.25 (1.69-2.97)	2.54 (1.87-3.43)	2.83 (2.02-3.96)	3.18 (2.15-4.56)	3.65 (2.37-5.40)	4.00 (2.53-6.04)
2-hr	1.37 (1.08-1.71)	1.63 (1.29-2.04)	2.05 (1.62-2.57)	2.41 (1.88-3.03)	2.89 (2.19-3.80)	3.27 (2.42-4.39)	3.64 (2.61-5.07)	4.12 (2.79-5.86)	4.76 (3.10-7.00)	5.24 (3.32-7.86)
3-hr	1.58 (1.26-1.97)	1.88 (1.49-2.35)	2.38 (1.88-2.97)	2.79 (2.19-3.50)	3.35 (2.54-4.39)	3.78 (2.81-5.07)	4.21 (3.04-5.86)	4.79 (3.25-6.78)	5.55 (3.62-8.13)	6.12 (3.89-9.15)
6-hr	2.01 (1.61-2.48)	2.40 (1.92-2.97)	3.04 (2.42-3.77)	3.57 (2.82-4.45)	4.30 (3.29-5.61)	4.86 (3.64-6.48)	5.43 (3.94-7.52)	6.19 (4.22-8.72)	7.21 (4.71-10.5)	7.97 (5.08-11.8)
12-hr	2.50 (2.01-3.07)	3.01 (2.42-3.70)	3.85 (3.08-4.74)	4.54 (3.61-5.62)	5.49 (4.22-7.12)	6.22 (4.68-8.25)	6.96 (5.08-9.58)	7.96 (5.45-11.1)	9.29 (6.10-13.4)	10.3 (6.59-15.2)
24-hr	2.95 (2.39-3.60)	3.60 (2.91-4.40)	4.67 (3.76-5.72)	5.56 (4.44-6.84)	6.77 (5.24-8.74)	7.71 (5.84-10.2)	8.65 (6.37-11.9)	10.0 (6.87-13.9)	11.8 (7.76-16.9)	13.1 (8.44-19.2)
2-day	3.32 (2.71-4.02)	4.13 (3.36-5.00)	5.44 (4.41-6.61)	6.53 (5.26-7.98)	8.03 (6.26-10.3)	9.19 (7.02-12.1)	10.3 (7.70-14.2)	12.1 (8.36-16.8)	14.5 (9.59-20.7)	16.3 (10.5-23.7)
3-day	3.61 (2.95-4.35)	4.49 (3.67-5.42)	5.94 (4.83-7.19)	7.13 (5.76-8.68)	8.78 (6.87-11.3)	10.1 (7.71-13.2)	11.3 (8.46-15.5)	13.3 (9.20-18.3)	16.0 (10.6-22.7)	18.0 (11.6-26.0)
4-day	3.88 (3.18-4.66)	4.81 (3.94-5.79)	6.33 (5.16-7.65)	7.60 (6.15-9.22)	9.34 (7.32-11.9)	10.7 (8.20-14.0)	12.0 (8.99-16.4)	14.1 (9.77-19.4)	16.9 (11.2-24.0)	19.0 (12.3-27.4)
7-day	4.64 (3.82-5.54)	5.65 (4.65-6.76)	7.30 (5.98-8.77)	8.67 (7.06-10.5)	10.6 (8.31-13.4)	12.0 (9.25-15.6)	13.5 (10.1-18.2)	15.6 (10.9-21.3)	18.5 (12.3-26.1)	20.7 (13.4-29.6)
10-day	5.37 (4.44-6.40)	6.43 (5.31-7.67)	8.16 (6.71-9.76)	9.60 (7.84-11.5)	11.6 (9.12-14.6)	13.1 (10.1-16.9)	14.6 (10.9-19.6)	16.8 (11.7-22.7)	19.6 (13.1-27.5)	21.7 (14.1-31.1)
20-day	7.59 (6.32-8.98)	8.75 (7.27-10.4)	10.6 (8.80-12.6)	12.2 (10.0-14.6)	14.4 (11.4-17.9)	16.0 (12.4-20.3)	17.7 (13.2-23.2)	19.7 (13.8-26.5)	22.4 (15.0-31.2)	24.5 (15.9-34.7)
30-day	9.42 (7.87-11.1)	10.6 (8.87-12.5)	12.6 (10.5-14.9)	14.3 (11.8-17.0)	16.6 (13.1-20.4)	18.3 (14.1-23.0)	20.1 (14.9-26.1)	22.0 (15.5-29.4)	24.6 (16.5-34.0)	26.5 (17.3-37.5)
45-day	11.7 (9.79-13.7)	13.0 (10.8-15.2)	15.0 (12.5-17.7)	16.8 (13.9-19.9)	19.2 (15.2-23.5)	21.0 (16.3-26.2)	22.9 (16.9-29.4)	24.7 (17.4-32.8)	27.1 (18.2-37.3)	28.9 (18.9-40.7)
60-day	13.5 (11.4-15.8)	14.9 (12.5-17.4)	17.0 (14.2-20.0)	18.8 (15.6-22.2)	21.3 (17.0-26.0)	23.2 (18.0-28.8)	25.1 (18.6-32.1)	26.8 (19.0-35.6)	29.1 (19.7-40.0)	30.8 (20.2-43.3)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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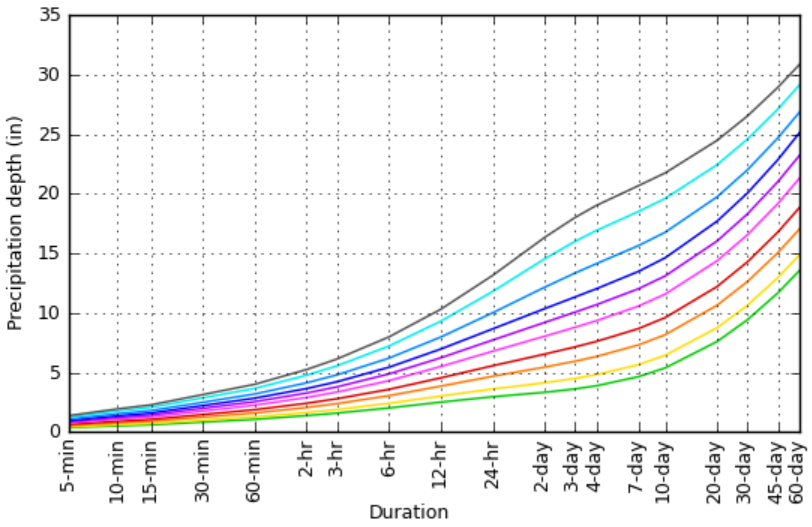
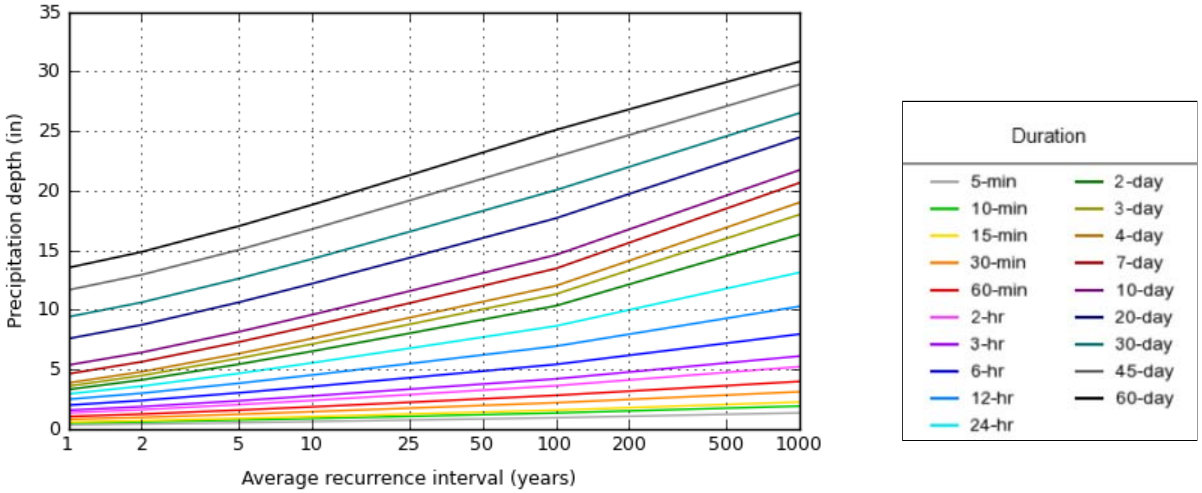
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 41.2946°, Longitude: -73.1086°





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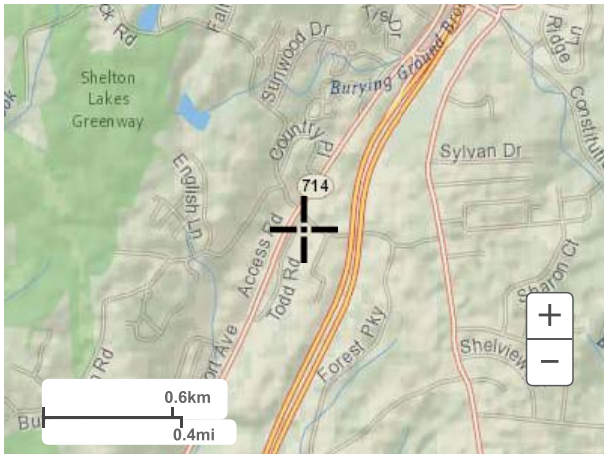
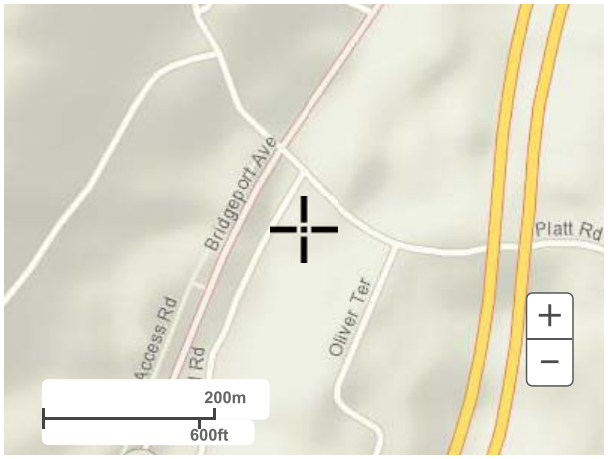
Maps & aerials

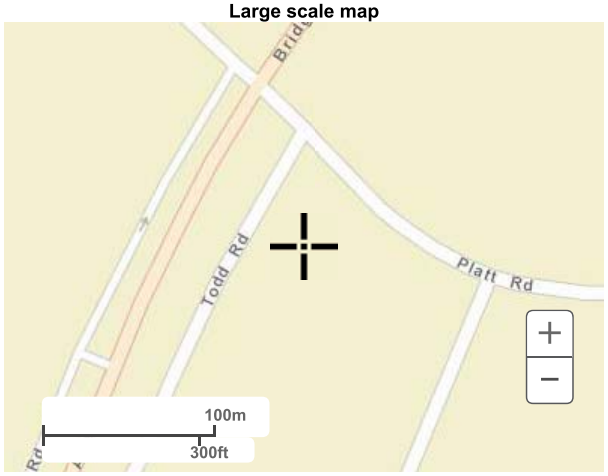
Small scale terrain



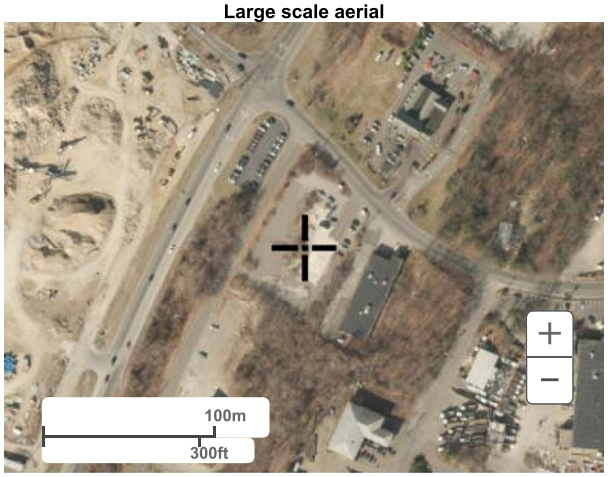
Large scale terrain



Large scale map



Large scale aerial



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Questions?: HDSC.Questions@noaa.gov

Disclaimer

APPENDIX D

STORMWATER OPERATIONS & MAINTENANCE MANUAL

Introduction

Presented herein is a manual for the operation and maintenance of the stormwater structures used to collect, treat, and discharge stormwater. This site was developed with the pre- and post-construction Erosion and Sedimentation Control measures to protect the environment. Enclosed within this manual you will find:

- Descriptions of the Stormwater pollution control devices operations
- Checklist of Stormwater pollution control devices maintenance

Please refer to the applicable sections of this report for reference and reporting procedures to local authorities.

Section 1: Stormwater Operations

Section 2: Stormwater Maintenance

Section 1: Stormwater Structure Operations

This site has been designed with both non-structural and structural stormwater structures that collect, treat and discharge site stormwaters into the Housatonic River. This section will provide an overview of how these structures work to collect stormwater and protect the environment. The following are descriptions and details of the structures used for this site:

Catch Basin with Deep Sump:
The stormwater from the site is mainly collected through inlets placed throughout the site at low points and on slopes which outlet to an underground pipe network. The catch basins have been built with deep sumps to collect sediments picked up by the stormwater from entering the pipe underground pipe network.

Hooded Outlet:
Each catch basin will be protected from floating debris from entering the underground pipe network through the use of Trap Hoods. The trap hood essentially covers the inlet of the pipe and allows water to pass, while holding back the floating debris. Trap hoods are located on the outlets of all catch basins.

Section 2: Stormwater Structure Maintenance

The structures described in the operations section above need regularly scheduled maintenance and inspections to maintain the peak performances required for this site. This section provides recommendations for intervals of inspections and maintenance in order to keep the stormwater structures operating at their peak performance. Below is the inspection timetable and cleaning schedule for each structure:

Catch Basin with Deep Sump:

- Must be ***inspected*** at least once every 6 ***months*** in order to determine if immediate clean out is required should sediments reach within 6" of the outlet pipe.
- Must be ***maintained*** by cleaning out sediments every ***October*** regardless of sediment accumulation.

Hooded Outlet:

- Must be ***inspected*** at least once every ***6 months*** in order to confirm that it is operating freely (without clogging by debris).
- Must be ***maintained*** by cleaning out debris every ***October*** regardless of debris accumulation.

TYPICAL INSPECTION FORM:

Project/Location:
"As Built" Plans Available?:
Date/Time:
Days Since Previous Rainfall and Rainfall amount:
Inspector:

Note:
This form is to be completed and submitted to the City Engineering Department annually.

Maintenance Item	Satisfactory	Unsatisfactory	Comments
Catch Basin with Deep Sump			
Hooded Outlet			
Test discharge for Total Suspended Solids (TSS)			(Annual test results to be sent to the City Engineer)