PROJECT SITE DESIGN AND DRAINAGE REPORT

FOR

BLOCK 55 LOT 2
DELAWARE TOWNSHIP
HUNTERDON COUNTY, NEW JERSEY
July 28, 2020

Prepared for:

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For
28 Sandy Ridge Road
Stockton NJ 08559

REV 1 – 05-28-2021

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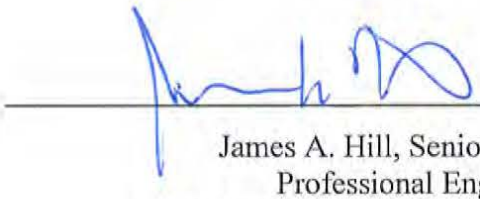
Date 5/28/2021



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I. PROJECT LOCATION, DESCRIPTION, AND EXISTING CONDITIONS

The project site is located on the South side of Sandy Ridge Road, in Stockton, about 850 feet east of the intersection of County Route 523 (Sergeantsville Road). Historically the site has been and is part of an active farm owned by the family. The general location and surrounding areas are shown in Figure 1

Figure 1

The site is located on Block 55 Lot 2 which consists of a parcel of land that is 30.078 (acres (gross) as bounded by Sandy Ridge Road and adjoining lots. There is one existing 75" wide overhead wires utility easement on the west side of the lot for PSE&G. In addition, there is a proposed 50' wide underground natural gasline easement reserved for Penn East for if and when there may ever be approval for that project. Thus, the westerly 125' of the lot is reserved for utility easements. The north end of the lot fronts on Sandy ridge Road with the title line for the lot shown as being approximately in the center of the 50' right of way for Sandy Ridge Road. The lot is bound on the east side by a 50' wide driveway which is part and parcel of Lot 2.03 (the home lot for the farm) also owned by the Switzler family.

The site has access from Co. Rte. 523 through Sandy Ridge Road. The road has an average paved width of 20+- feet. With gravel shoulders about 1 foot wide. The drainage along the frontage is a surface ditch that flows both east and west in the vicinity of the site. Proposed access to the site is to be through an existing farm road access driveway located just outside of the easements on the west side, Figure 2 depicts the location of the existing farm access.

Figure 2 - Farm Driveway

The area proposed for the Tennis Training Center (TTC) is currently in long-term hay meadow cover, as is all of Lot 2 except for hedgerows and the tree line along Sandy Ridge Road. Figures 3 and 4 are onsite photos of the approximate location for the facility.

Figure 3 – View Easterly along Hedgerow near proposed parking and storm basin

Figure 4 – View northwesterly through proposed location for facility

In discussions with the Board of Adjustment at the first Public Hearing it was requested that the applicant note that the proposed subdivision of lands would include use of emaining lands. In that case the current plans show an approximate equal division of the land into two lots, one for the Tennis Center, the second for a potential Single-Family Dwelling (SFD) on lands which would be considered agricultural uses except for the SFD exception. Soils logs for a potential SFD location are scheduled but could not be done until June 1-=2. 2021.

A review of the current versions of NJDEP GeoWeb and the NJDEP Land Use Permit Screening Web Applications place the property in the Skylands Landscape Project area, wherein the information database does not catalog presence or observation of species of interest on the parcel under its #1 ranking. The site is also located in the Delaware and Raritan Canal Comm Review Zone: B which will require submission of copies of plans and reports prepared as defined in N.J.A.C. 7:45.

Currently, on the site, there are no defined drainage features. The drainage area for the TTC, which is to be located just north of the existing hedgerow has four (4) subareas, Figure 7, draining to a point on the west side on Driveway of Lot 2 in the vicinity of the hedgerow in the field (Figure 6). The first subarea is the offsite lands east of the driveway to Lot 2.03 which flows to an existing 12" culvert located just north of the hedgerow south of the TTC location, Figure 5.

Figure 5 Culvert Location Driveway Lot 2.03

The second sub area is from the height of land south of the hedgerow that drains 3.06 acres of meadow through and along the hedgerow, Figure 3, showing front side of hedgerow

The third sub area is a narrow band of drainage accumulation that picks up the culvert from the east and flows along the Hedgerow, Figure 6

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Figure 6 Subarea 3 along Hedgerow

Subarea 3 picks up Subarea 1, Subarea 2 south of the hedgerow, and Subarea 4, the remaining onsite drainage from the area along Sandy Ridge Road, Subarea 4 (9.82 acres). The surface swale in the area along the hedgerow is densely covered with woody and herbaceous growth and has no defined bed or bank, Figure 6. On the westerly property line, the hedgerow is also a densely vegetated hedgerow, Figure 7.

Figure 7 – Westerly Hedgerow

From that discharge point the flow is westerly across adjacent Lot 8, which is also in a meadow condition. There is no defined flow pattern crossing the fields see Figure 1. Figure 8 below is the general outline of the drainage areas for the site plan. The initial development of the drainage areas for offsite lands was by using a program called Stream Stats, which electronically determines a drainage area based upon the closest point of a known drainage feature, which in this case occurs on Lot 8 in the near vicinity of the horse exercise area as shown in the aerial image on Sheet C-2. and in Figure 9

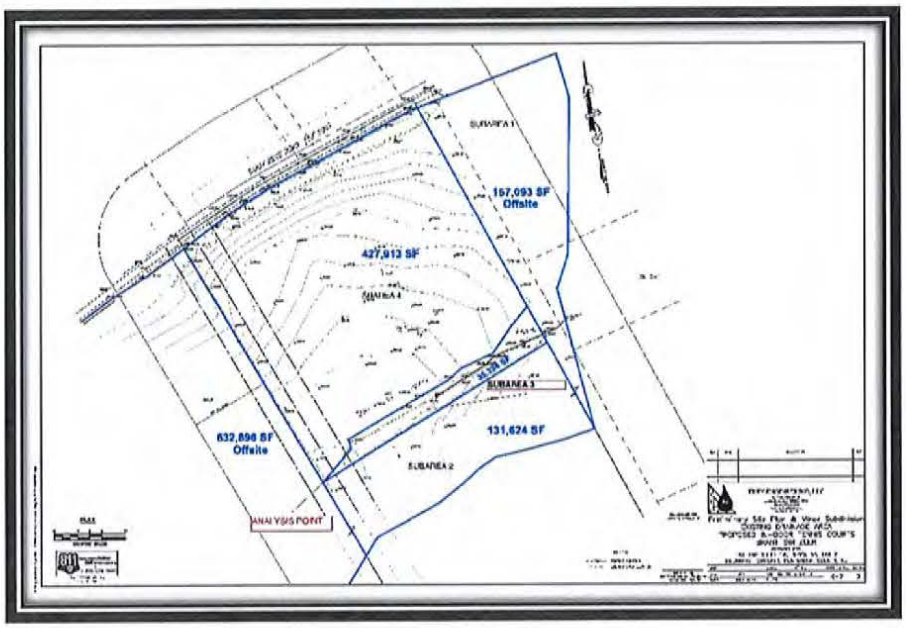


Figure 8 Existing conditions drainage

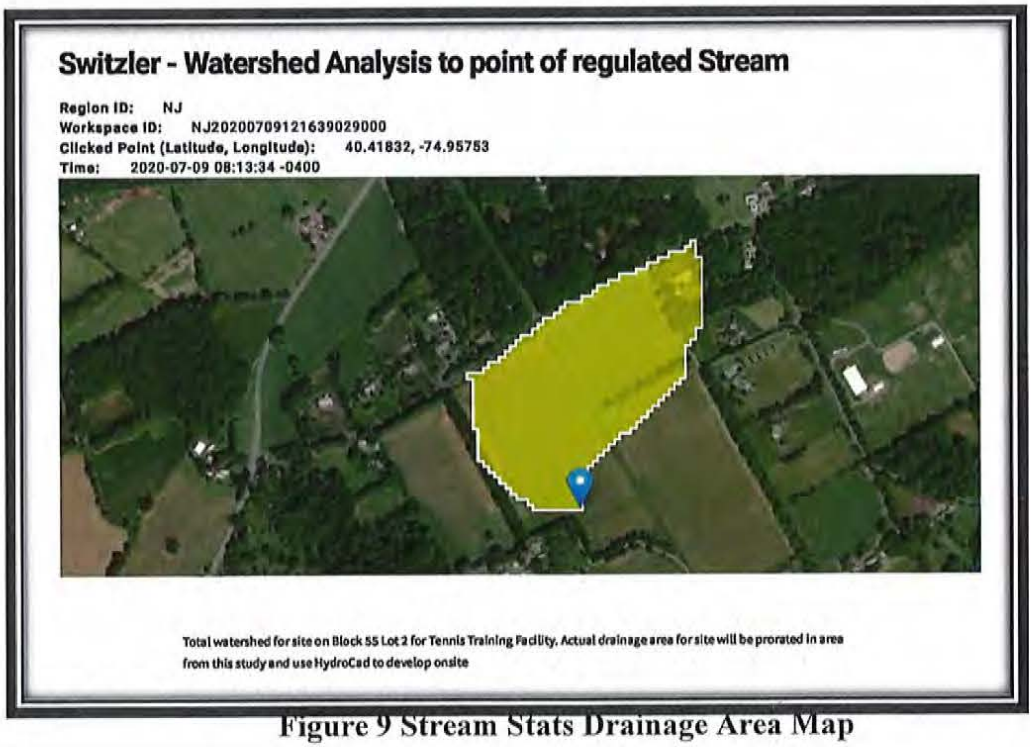


Figure 9 Stream Stats Drainage Area Map

The soils for the site are shown on Sheet C-2 Existing Conditions, derived from the online USDA Basically, on the TTC portion of the site there are 3 soils units noted in the table

USDA-NRCC WEB SOIL SURVEY		
Map Unit Symbol	**Map Unit Name**	**Hydrologic Soil Groups (HSG)**
AbrB	Abbottstown silt loam, 2 to 6 percent slopes	C
HdyC2	Hazleton channery loam, 6 to 12 percent slopes, eroded	B
LbmB	Lansdale loam, 2 to 6 percent slopes	B

II. PROJECT DESIGN METHODOLOGY AND CONSTRAINTS

This report is intended to analyze the changes in site conditions, on and offsite, changes in storm water runoff between the existing and proposed conditions plans, and generally anticipated changes in overall use of public facilities (roads). This analysis is in support of the request for approval for a change in use from Agricultural to Commercial status, and for Preliminary and Final Site Plan.

A. Stormwater Management

For Stormwater Management the standard requirements to meet are found in the NJDEP 2004 Regulations under N.J.A.C. 7:8, as amended to date, the Delaware Township Storm Water Ordinances (which incorporates N.J.A.J. 7:8), the Delaware Raritan Canal Commission regulations for Zone B, and for Soil Erosion Control the USDA-NRCS Chapter 251 regulations.. All regulations are used as guidance for controlling peak storm flows from the site, for required recharge to groundwater, and for control of erosion on the site. The plan has been updated to the requirements of the March 2020 NJDEP NJAC 7:8 requirements, adopted by Delaware Township in March 2021.

The site plan, as proposed, is considered a Major Development under the regulations noted above. Lot 2 currently is comprised of 30.08 acres of which approximately 14.1 +- net acres will be assigned to the TTC and the remainder of 6.0+- acres (including flag lot stem) will be divided off divided off if the use variance is approved. The new proposed lot size being dedicated to the site plan for the TTC is for the purpose of keeping the imperious cover below 10% as required by the A-1 zone. The gross area of this portion would be 13.71 acres with 0.366 acres dedicated to the 50' right of way for Sandy Ridge Road. The flag stem for the other lot will occupy 50 feet of the road frontage.

Of the 13.1 acres approximately 4.29 acres will be disturbed for the purpose of installing the TTC, of which 1.11 acres is considered impervious, which creates the need for the net size of the lot be 11.84+- acres of the 13.1 acres being provided. The remainder of the proposed new lot will be maintained in long-term hay meadow or lawn with five (5) plus acres in meadow to maintain agricultural use on the new lot and lands remaining. The lands remaining for the subdivision of Lot 2 (16 +- acres) will continue in long-term hay meadow with a SFD exception area.

B. Proposed Use of Site

As previously noted, the TTC will consist of a single Agricultural style building 120' wide by 140' long, with the long side paralleling Sandy Ridge Road. Uses in the structure will be two (2) standard size tennis

courts for daily use for classes and recreational play, a viewing area, office, pro-shop, exercise gym, and an apartment for the manager upstairs. The facility will be open seven (7) days a week from 8:00 am from November to March with the anticipation that outdoor facilities
in the area would function from June to October. The use of the site is shown in Table 1.

Time	Mon	Tues	Wed	Thu	Fri	Sat	Sun
8:00	6	6	6	6	6	4	4
8:30							
9:00						4	4
9:30	6	4	6	4	6		
10:00						8	4
10:30		4		4			
11:00	4		4		4		4
11:30		4		4			
12:00	4		4		4	8	4
12:30		4		4			
1:00	4		4		4		4
1:30		4		4			
2:00	4		4		4	8	4
2:30							
3:00	1	1	1	1	1		4
3:30							
4:00	8	1	8	1	8	8	4
4:30							
5:00		1		1			4
5:30							
6:00	8	8	8	8	8	4	4
6:30							
7:00						4	4
7:30							
8:00							

Table 1 Single Court Anticipated Use

TYPE OF CLASS	NUMBER OF PEOPLE	INSTRUCTOR(S)
Adult Classes:	2-6 people,	1 instructor:
Rented Time:	1-4 people	1 instructor
Private Time:	1 person	1 instructor
Junior Classes:	2-8 people	1-2 instructors

There are two courts proposed with each court being able to function as shown in Table 1. The revisied parking lot of 38 spaces is anticipating overlap between arrivals and departures and parents staying to observe as noted with Table 10, based upon the traffic study conducted for the site.

The Applicant, based upon experience in the business and upon Table 10 indicated the following need for parking.

"Above *is the max capacity schedule for the single indoor court. This kind of schedule would likely operate between November and March.* ***June through October business would take place on existing outdoor courts in the area****. The number in the top right corner of each box represents the maximum number of attendees for each time slot.*

The parking lot would have to be able to accommodate a maximum of 24 cars. Assuming a junior class has 8 kids, and there are two classes back to bac. At 6:00pm there would be 8 parents picking up and 8 parents dropping off, plus potentially 2 instructor cars. No other class has the potential for this many people at once. A 24-car parking lot should be able to always fit the maximum class size with 6 miscellaneous spots still available.

The driveway would have to be able to handle 45-70 entrances and exits throughout an 8:00am-8:00pm workday. As illustrated above, most of the traffic would occur in the mornings and evenings during group classes. "

To follow up on the analysis. The center would be able to operate 10 hours a day, with the 4:00 pm to 8:00 pm classes creating the peak use of the driveway entrance. During those periods there would be 24 round trips at 4:00 pm to 8:00 pm. That is 12 trips in and 12 trips out split by the time of the classes. The maximum use would be at the end/beginning of classes. On Saturday this peak would shift to 10:00 am to 6:00 pm. With two courts the need is for 45 spaces with one (2) Handicapped space as required by ADA regulations and guidelines.

C. Environmental Features of Concern –

Using the Online Screening Programs from NJDEP Geo Web and NJDEP Land Use Permit Screening Web Application programs the following information was obtained

1. Wetlands – No Wetlands are mapped on Lot 2 in either program, a site inspection by Environmental Technologies Inc. has been conducted and the results are forthcoming.
2. Well Head Protection – the site is not located in the well head protection zone for Community or Non-Community systems. The nearest Community area being on the westerly half of Lot 8 adjoining to the west. It is presumed the well will be installed under the Non-Community designation by the Hunterdon County Department of Health Service.
3. The site is not located in or near any FEMA/NJDEP delineated floodplain areas
4. The site is mapped as Grassland, Rank 1, No related records were found for various species of concern.
5. The site is mapped in the Central Delaware Recharge area (groundwater recharge, Rank B 10-14 inches per year). Under the stormwater management plan the area meets the requirements for annual recharge.

III. STORMWATER MANAGEMENT - EXISTING 2020 SITE CONDITIONS ANALYSIS

The existing drainage area conditions for those portions of lot 2 proposed for site plan, including offsite drainage on the northeast quadrant and south of the hedgerow, is 17.26+- acres as shown in Table 2, and depicted in Figure 8.

TABLE 2 – EXISTING SITE CONDITIONS (751,954 S.F. ENCOMPASSED)			
SUB AREA	TYPE OF COVER	AREA (S.F.)	PERVIOUS/ IMPERVIOUS
1	EXISTING SFDS, ON 2+ ACRE LOTS 12% IMPERVIOUS	157,093	PERVIOUS 88%
2	MEADOW SOUTH OF HEDGEROW	131,264	PERVIOUS
3	HEDGEROW/MEADOW SOUTH OF SITE PLAN	35,324	PERVIOUS
4	SITE PLAN AND REMAIING LANDS	427,933	PERVIOUS

The existing single-family dwellings, in subarea 1, on east side of driveway for Lot 2.03 are heavily wooded or brushy outside of the cleared areas for the homes as seen in Figures 10 and 11. They drain to the south along the driveway to the 12" culvert.

Figures 10 & 11

The general continuous hay meadow conditions are sub area 4, for the area to be developed, is depicted in Figure 12.

Figure 12 Site Plan area as viewed from lot 2.03

TABLE 3 is a synopsis of peak flows from the Hydro Cad™ program analysis for existing conditions, with the areas, as defined in the ordinance, totaled in the program for each site condition shown in Table 1. The actual areas were figured from AutoCAD™ drawings from each site condition presented. Table 3 provides the NJAC 7:8 required peak flow reductions for the 100, 10 and 2-year storms, as measured at the westerly property line (these flows include the unchanged contribution of the offsite drainage areas which will not change in cover type).

TABLE 3
EXISTING CONDITIONS PEAK FLOWS
NO STORMWATER CONTROL FOR TOTAL SITE
AT SOUTHWEST PROPERTY LINE W/ LOT 8 (LINK EXISTING)

STORM EVENT	PEAK Q(CFS) MAIN LOT ONSITE TO WEST PROPERTY LINE	+PEAK Q(CFS) OFFSITE AND HEDGEROW SWALE	TOTAL additive SITE PEAK Q (CFS)^	*TOTAL combined SITE PEAK Q (CFS)
NJWQ	0	0.15	0.15	0.15
2-Year	1.57	2.34	3.91	2.88
10-Year	7.59	5.66	13.25	11.85
25-Year	12.79	8.41	21.20	19.75
100-Year	23.59	13.77	37.16	35.74

^ PEAKS ADDED TOGETHER GENERALLY EXCEED COMBINED PEAKS DUE TO TRAVEL TIME TO ANLALYSIS POINTS BEING DIFFERENT.
+ OFF SITE PEAKS ARE NOT CONTROLLED BY SITE PLAN AND DO NOT REQUIRE REDUCTION
*COMBINED FLOW MERGES THE PEAKS OF ON AND OFF SITE

TABLE 4
EXISTING CONDITIONS REDUCED PEAK FLOWS
REQUIRED BY NJAC 7:8
AT SOUTHWEST PROPERTY LINE W/ LOT 8 (LINK PROPOSED)

STORM EVENT	REQUIRED REDUCTION	MAIN LOT PEAK	**REDUCED MAIN LOT PEAK**	OFFSITE PEAKS **NO REDUCTION**	***REQUIRED PEAK TOTAL FLOWS AT PROPERTY LINE**
	N/A	0	**N/A**	0.15	**N/A**
2-Year	50%	1.57	**0.79**	2.34	**3.13**
10-Year	25%	7.59	**5.69**	5.66	**9.35**
25-Year	N/A	12.79	**N/A**	8.41	**N/A**
100-Year	20%	23.59	**18.87**	13.77	**32.64**

***COMBINED FLOW MERGES THE PEAKS OF ON AND OFF SITE**

IV. PROPOSED SITE CONDITIONS

The application before the Zoning Board of Adjustment calls for approving a commercial use in an Agricultural zone. The applicant proposes to construct and operate a minimal Tennis Training Center on the north end of Lot 2, just north of the existing hedgerow, see Figure 13.
The facility will consist of one structure, a 120' x 140' simple agricultural style (barn) building with 40' peak height and low eave elevation, with colors to blend in with the agricultural uses in the area. The building will house two (2) tennis courts and on one end a two-story space for a small gym/viewing area,

bathrooms, offices, laundry and pro-shop. There will be a twenty-four foot (24') wide paved driveway with a parking area behind (south of) the building. The parking will be primarily Geo-pave unit siwth paving only for the Handicapped spaces, with landscape island for 38 parking spaces as shown in Figure 13 and on Sheet C-3

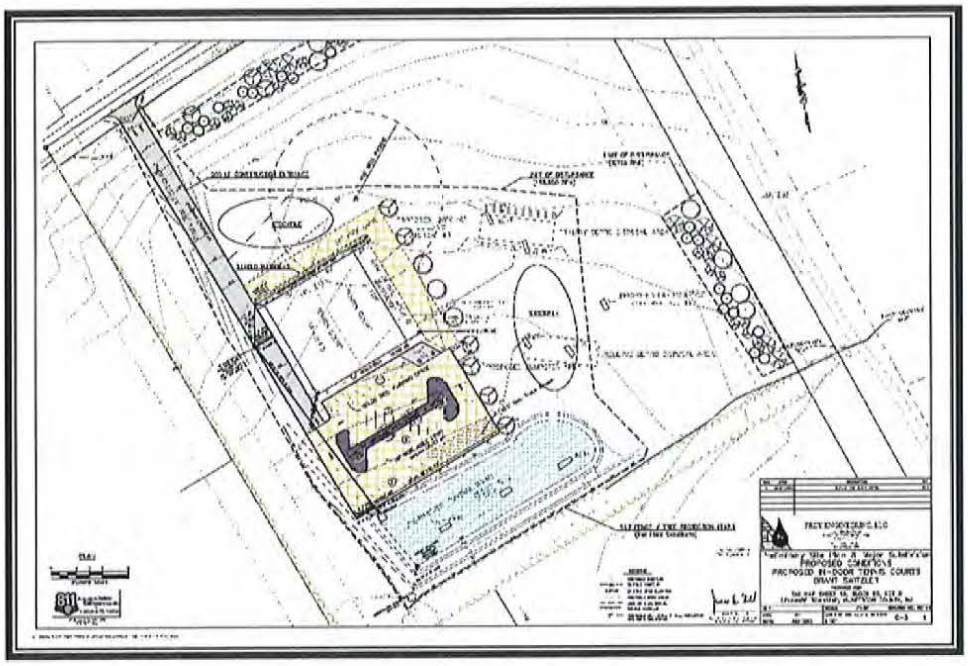


Figure 13 – Proposed Site Plan

Also, as shown in Figure 13 and on Sheet C-3 of the plans there are proposed landscape berm areas along Sandy Ridge Road and west of the driveway to Lot 2.03 to mitigate views to the site from nearby single-family dwelling locations. Figures 14 to 16 show existing views to the site from Sandy Ridge Road as viewed from the road. The road surface is approximately 10' above the first floor of existing single-family dwellings on the north side of the road. Figure 12 shows the view toward the site from the. Driveway for Lot 2.03

Figure 14 View to Project Site from Existing Farm driveway west side of lot

Figure 15 View to Project Site from mid-point of Lot 2

Figure 16 View from Road East, from near existing farm driveway

The site was analyzed for developed conditions for stormwater peak flow and storage, based upon the use of an Infiltration Basin under NJDEP BMP 9.5 for the developed portion. In addition, the Geopave units on the parking lot also meet the requirements of BMP 9.7 for pervious paving and provide as a forebay for any runoff from the paved areas. The GeoPave has not been included in the infiltration capacity needs for the site but will add additional recharge above and beyond that required by NJAC 7:8. Additional GeoPave units have been added for use as a fire lane around the building.

The proposed area for the basin was tested for infiltration rates, during septic system testing, under Appendix E of NJAC 7:8. The result was a Soil Permeability Class Rating of K3, bumped down to K2 (0.6 – 2"/hr.) due to over 55% fine and very fine sands. In the same vicinity a Pit Bail Test was conducted with a 2"/hour result. Under BMP 9.5 the allowed infiltration rate is 1" per hour, to meet the factor of safety reduction of 2 required for permeability. The roofs will be piped directly to the main basin. All of the flow reduction required will take place in the developed portion of the lot. Offsite areas will continue to drain as found in the existing conditions. The developed conditions peak flows, at the westerly property line are outlined in Table 5. As noted, the full requirements of NJAC 7:8 have been met

TABLE 5
PROPOSED CONDITIONS PEAK FLOWS
WITH STORMWATER CONTROL
AT WESTERLY PROPERTYLINE BY HEDGEROW

STORM EVENT	REQUIRED PEAK Q (CFS) From Table 4	PEAK FLOWS PROVIDED (PROPOSED FLOWS)
NJWQ	**N/A**	0.16
2 - Year	**3.13**	2.61
10-Year	**9.35**	7.28
25- Year	**N/A**	10.87
100-Year	**32.64**	17.87

The requirements for groundwater recharge, NJAC 7:8-5.4 are met with the stormwater basin infiltration. According to GSR-32 17,941.6 s.f. of surface is needed, the basin provides 21,000 s.f. A copy of GSR-32 is provided in Appendix C.

The scour basin at the outlet for the storm basin is designed in accordance with Chapter 251 SESC controls for a 25-year event. This analysis requires the storm to be calculated as if the infiltration in the basin did not exist. Under the no infiltration analysis, the Proposed Flow to the basin Scour Hole and offsite is 3.37 cfs. Figure 17 is also in Appendix B.

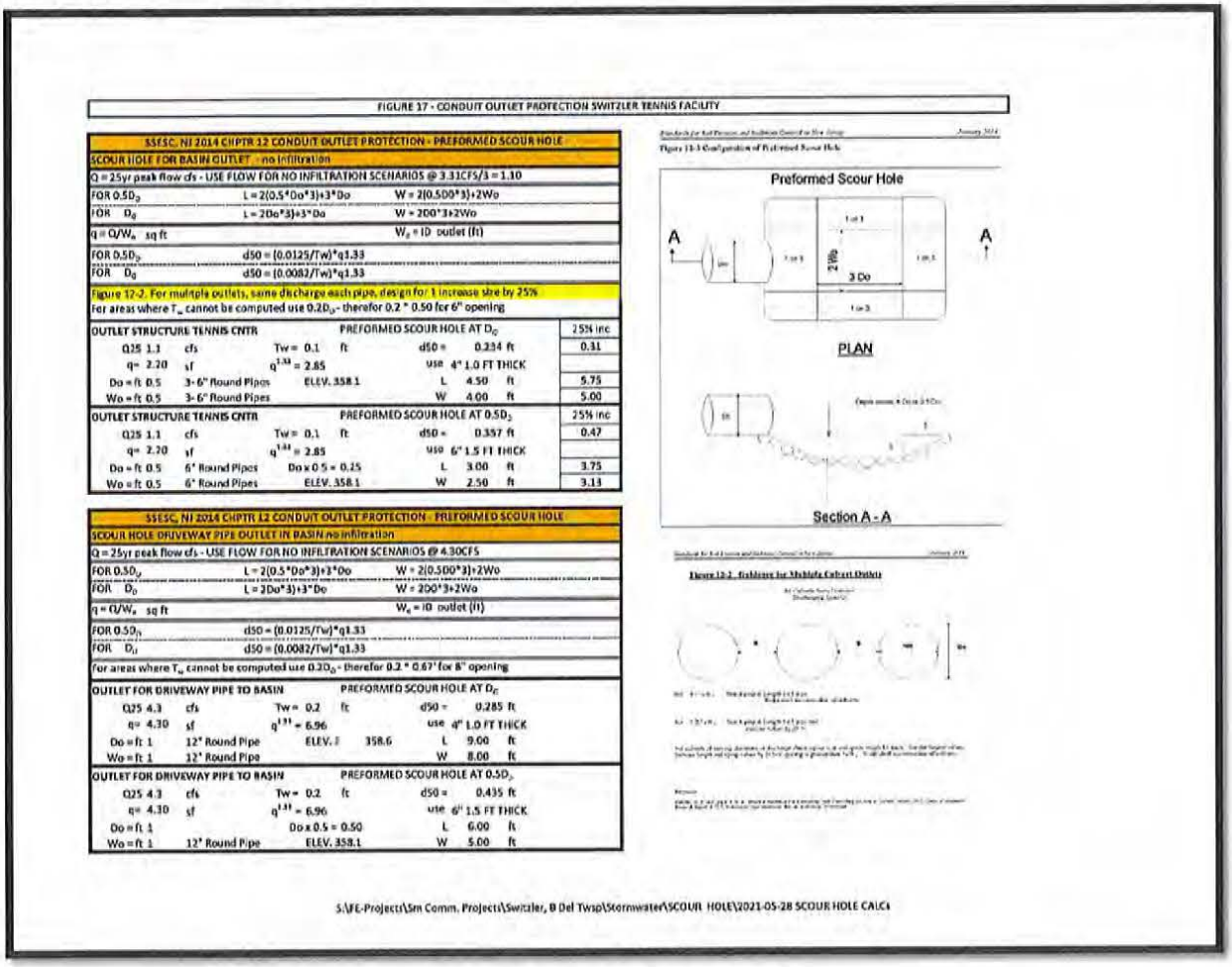


FIGURE 17 - CONDUIT OUTLET PROTECTION SWITZLER TENNIS FACILITY

SSESC, NJ 2014 CHPTR 12 CONDUIT OUTLET PROTECTION - PREFORMED SCOUR HOLE

SCOUR HOLE FOR BASIN OUTLET - no infiltration

Q = 25yr peak flow cfs - USE FLOW FOR NO INFILTRATION SCENARIOS @ 3.31CFS/3 = 1.10

FOR $0.5D_o$ L = 2(0.5*Do*3)+3*Do W = 2(0.500*3)+2Wo

FOR D_o L = 2Do*3)+3*Do W = 2Do*3+2Wo

$q = Q/W_o$ sq ft W_o = ID outlet (ft)

FOR $0.5D_o$ d50 = (0.0125/Tw)*q1.33

FOR D_o d50 = (0.0082/Tw)*q1.33

Figure 12-2. For multiple outlets, same discharge each pipe, design for 1 increase size by 25%

For areas where T_w cannot be computed use $0.2D_o$ - therefor 0.2 * 0.50 for 6" opening

OUTLET STRUCTURE TENNIS CNTR			PREFORMED SCOUR HOLE AT D_o		25% inc
Q25 1.1	cfs	Tw = 0.1 ft	d50 = 0.334 ft		0.31
q= 2.20	sf	$q^{1.33}$ = 2.85	use 4" 1.0 FT THICK		
Do = ft 0.5	3- 6" Round Pipes	ELEV. 358.1	L 4.50 ft		5.75
Wo = ft 0.5	3- 6" Round Pipes		W 4.00 ft		5.00
OUTLET STRUCTURE TENNIS CNTR			PREFORMED SCOUR HOLE AT $0.5D_o$		25% inc
Q25 1.1	cfs	Tw = 0.1 ft	d50 = 0.357 ft		0.47
q= 2.20	sf	$q^{1.33}$ = 2.85	use 6" 1.5 FT THICK		
Do = ft 0.5	6" Round Pipes	Do x 0.5 = 0.25	L 3.00 ft		3.75
Wo = ft 0.5	6" Round Pipes	ELEV. 358.1	W 2.50 ft		3.13

SSESC, NJ 2014 CHPTR 12 CONDUIT OUTLET PROTECTION - PREFORMED SCOUR HOLE

SCOUR HOLE DRIVEWAY PIPE OUTLET IN BASIN no infiltration

Q = 25yr peak flow cfs - USE FLOW FOR NO INFILTRATION SCENARIOS @ 4.30CFS

FOR $0.5D_o$ L = 2(0.5*Do*3)+3*Do W = 2(0.500*3)+2Wo

FOR D_o L = 2Do*3)+3*Do W = 2Do*3+2Wo

$q = Q/W_o$ sq ft W_o = ID outlet (ft)

FOR $0.5D_o$ d50 = (0.0125/Tw)*q1.33

FOR D_o d50 = (0.0082/Tw)*q1.33

For areas where T_w cannot be computed use $0.2D_o$ - therefor 0.2 * 0.67' for 8" opening

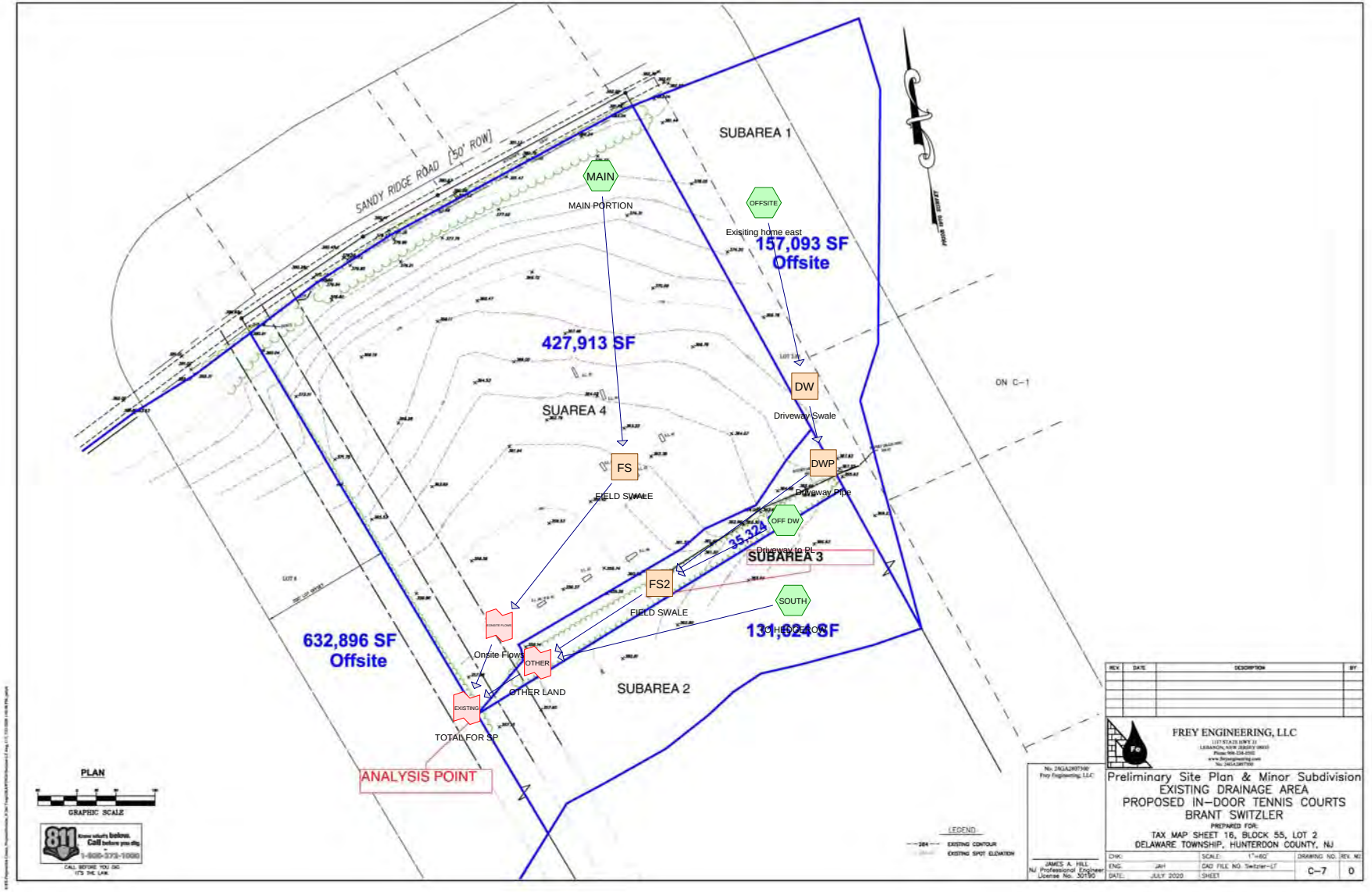
OUTLET FOR DRIVEWAY PIPE TO BASIN			PREFORMED SCOUR HOLE AT D_o	
Q25 4.3	cfs	Tw = 0.2 ft	d50 = 0.285 ft	
q= 4.30	sf	$q^{1.33}$ = 6.96	use 4" 1.0 FT THICK	
Do = ft 1	12" Round Pipe	ELEV. 358.6	L 9.00 ft	
Wo = ft 1	12" Round Pipe		W 8.00 ft	
OUTLET FOR DRIVEWAY PIPE TO BASIN			PREFORMED SCOUR HOLE AT $0.5D_o$	
Q25 4.3	cfs	Tw = 0.2 ft	d50 = 0.435 ft	
q= 4.30	sf	$q^{1.33}$ = 6.96	use 6" 1.5 FT THICK	
Do = ft 1		Do x 0.5 = 0.50	L 6.00 ft	
Wo = ft 1	12" Round Pipe	ELEV. 358.1	W 5.00 ft	

S:\FE-Projects\Sm Comm. Projects\Switzler, B Del Twsp\Stormwater\SCOUR HOLE\2021-05-28 SCOUR HOLE CALCs

Figure 17 Scour Hole Calculations

The last analysis is called the "blocked outlet" conditions to analyze the impact upon the emergency spillway. In the blocked conditions any flow not stored in the basin must exit the pond through the Emergency Spillway (EMSPY). The maximum flow under this analysis is 9.34 cfs. which flows through a 20' wide spillway, with a crest elevation of 360.80. The flow through the spillway reaches 361.12 or a flow depth of 0.32 feet at 1.33 feet/sec. The soils in and around the EMSPY are Abbottstown silt loams, which in Chapter 251are allowed up to 3.0 feet/sec. This analysis is the last section of Appendix B.

APPENDIX A
EXISTING CONDITIONS



Subcat Reach Pond Link

Routing Diagram for 2020-10-19 EXISTING

Prepared by {enter your company name here}, Printed 10/19/2020

HydroCAD® 10.00-26 s/n 06187 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.606	65	2 acre lots, 12% imp, HSG B (OFFSITE)
0.811	65	Brush, Good, HSG C (OFF DW)
9.824	58	Meadow, non-grazed, HSG B (MAIN)
3.022	71	Meadow, non-grazed, HSG C (SOUTH)
17.262	**62**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
13.430	HSG B	MAIN, OFFSITE
3.833	HSG C	OFF DW, SOUTH
0.000	HSG D	
0.000	Other	
17.262		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	3.606	0.000	0.000	0.000	3.606	2 acre lots, 12% imp	OFFSITE
0.000	0.000	0.811	0.000	0.000	0.811	Brush, Good	OFF DW
0.000	9.824	3.022	0.000	0.000	12.845	Meadow, non-grazed	MAIN, SOUTH
0.000	**13.430**	**3.833**	**0.000**	**0.000**	**17.262**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	DWP	366.81	365.17	16.0	0.1025	0.012	12.0	0.0	0.0

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 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 MAIN: MAIN PORTION Runoff Area=427,913 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=650' Tc=17.9 min CN=58 Runoff=0.00 cfs 0.000 af

Subcatchment OFF DW: Driveway to PL Runoff Area=35,324 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=400' Slope=0.0100 '/' Tc=34.7 min CN=65 Runoff=0.01 cfs 0.000 af

Subcatchment OFFSITE: Exisiting home Runoff Area=157,093 sf 12.00% Impervious Runoff Depth=0.01"
Flow Length=400' Tc=32.9 min CN=65 Runoff=0.03 cfs 0.002 af

Subcatchment SOUTH: TO HEDGEROW Runoff Area=131,624 sf 0.00% Impervious Runoff Depth=0.04"
Flow Length=300' Tc=17.8 min CN=71 Runoff=0.15 cfs 0.010 af

Reach DW: Driveway Swale Avg. Flow Depth=0.12' Max Vel=0.39 fps Inflow=0.03 cfs 0.002 af
n=0.100 L=200.0' S=0.0300 '/' Capacity=45.58 cfs Outflow=0.03 cfs 0.002 af

Reach DWP: Driveway Pipe Avg. Flow Depth=0.03' Max Vel=3.20 fps Inflow=0.03 cfs 0.002 af
12.0" Round Pipe n=0.012 L=16.0' S=0.1025 '/' Capacity=12.36 cfs Outflow=0.03 cfs 0.002 af

Reach FS: FIELD SWALE Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.100 L=400.0' S=0.0179 '/' Capacity=86.50 cfs Outflow=0.00 cfs 0.000 af

Reach FS2: FIELD SWALE Avg. Flow Depth=0.02' Max Vel=0.12 fps Inflow=0.03 cfs 0.002 af
n=0.100 L=575.0' S=0.0125 '/' Capacity=72.15 cfs Outflow=0.01 cfs 0.002 af

Link EONSITE FLOWS: Onsite Flows Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link EXISTING: TOTAL FOR SP Inflow=0.15 cfs 0.012 af
Primary=0.15 cfs 0.012 af

Link OTHER: OTHER LAND Inflow=0.15 cfs 0.012 af
Primary=0.15 cfs 0.012 af

Total Runoff Area = 17.262 ac Runoff Volume = 0.012 af Average Runoff Depth = 0.01"
97.49% Pervious = 16.830 ac 2.51% Impervious = 0.433 ac

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 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 MAIN: MAIN PORTION Runoff Area=427,913 sf 0.00% Impervious Runoff Depth>0.34"
Flow Length=650' Tc=17.9 min CN=58 Runoff=1.89 cfs 0.276 af

Subcatchment OFF DW: Driveway to PL Runoff Area=35,324 sf 0.00% Impervious Runoff Depth>0.59"
Flow Length=400' Slope=0.0100 '/' Tc=34.7 min CN=65 Runoff=0.27 cfs 0.040 af

Subcatchment OFFSITE: Exisiting home Runoff Area=157,093 sf 12.00% Impervious Runoff Depth>0.59"
Flow Length=400' Tc=32.9 min CN=65 Runoff=1.25 cfs 0.177 af

Subcatchment SOUTH: TO HEDGEROW Runoff Area=131,624 sf 0.00% Impervious Runoff Depth>0.87"
Flow Length=300' Tc=17.8 min CN=71 Runoff=2.33 cfs 0.219 af

Reach DW: Driveway Swale Avg. Flow Depth=0.52' Max Vel=1.03 fps Inflow=1.25 cfs 0.177 af
n=0.100 L=200.0' S=0.0300 '/' Capacity=45.58 cfs Outflow=1.23 cfs 0.176 af

Reach DWP: Driveway Pipe Avg. Flow Depth=0.21' Max Vel=10.04 fps Inflow=1.23 cfs 0.176 af
12.0" Round Pipe n=0.012 L=16.0' S=0.1025 '/' Capacity=12.36 cfs Outflow=1.23 cfs 0.176 af

Reach FS: FIELD SWALE Avg. Flow Depth=0.30' Max Vel=0.74 fps Inflow=1.89 cfs 0.276 af
n=0.100 L=400.0' S=0.0179 '/' Capacity=86.50 cfs Outflow=1.57 cfs 0.269 af

Reach FS2: FIELD SWALE Avg. Flow Depth=0.28' Max Vel=0.60 fps Inflow=1.49 cfs 0.215 af
n=0.100 L=575.0' S=0.0125 '/' Capacity=72.15 cfs Outflow=1.21 cfs 0.207 af

Link EONSITE FLOWS: Onsite Flows Inflow=1.57 cfs 0.269 af
Primary=1.57 cfs 0.269 af

Link EXISTING: TOTAL FOR SP Inflow=2.88 cfs 0.695 af
Primary=2.88 cfs 0.695 af

Link OTHER: OTHER LAND Inflow=2.34 cfs 0.426 af
Primary=2.34 cfs 0.426 af

Total Runoff Area = 17.262 ac Runoff Volume = 0.712 af Average Runoff Depth = 0.49"
97.49% Pervious = 16.830 ac 2.51% Impervious = 0.433 ac

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 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 MAIN: MAIN PORTION Runoff Area=427,913 sf 0.00% Impervious Runoff Depth>1.02"
Flow Length=650' Tc=17.9 min CN=58 Runoff=8.37 cfs 0.832 af

Subcatchment OFF DW: Driveway to PL Runoff Area=35,324 sf 0.00% Impervious Runoff Depth>1.45"
Flow Length=400' Slope=0.0100 '/' Tc=34.7 min CN=65 Runoff=0.76 cfs 0.098 af

Subcatchment OFFSITE: Exisiting home Runoff Area=157,093 sf 12.00% Impervious Runoff Depth>1.46"
Flow Length=400' Tc=32.9 min CN=65 Runoff=3.48 cfs 0.438 af

Subcatchment SOUTH: TO HEDGEROW Runoff Area=131,624 sf 0.00% Impervious Runoff Depth>1.90"
Flow Length=300' Tc=17.8 min CN=71 Runoff=5.33 cfs 0.480 af

Reach DW: Driveway Swale Avg. Flow Depth=0.76' Max Vel=1.33 fps Inflow=3.48 cfs 0.438 af
n=0.100 L=200.0' S=0.0300 '/' Capacity=45.58 cfs Outflow=3.45 cfs 0.436 af

Reach DWP: Driveway Pipe Avg. Flow Depth=0.36' Max Vel=13.48 fps Inflow=3.45 cfs 0.436 af
12.0" Round Pipe n=0.012 L=16.0' S=0.1025 '/' Capacity=12.36 cfs Outflow=3.45 cfs 0.436 af

Reach FS: FIELD SWALE Avg. Flow Depth=0.66' Max Vel=1.15 fps Inflow=8.37 cfs 0.832 af
n=0.100 L=400.0' S=0.0179 '/' Capacity=86.50 cfs Outflow=7.59 cfs 0.821 af

Reach FS2: FIELD SWALE Avg. Flow Depth=0.51' Max Vel=0.83 fps Inflow=4.20 cfs 0.534 af
n=0.100 L=575.0' S=0.0125 '/' Capacity=72.15 cfs Outflow=3.71 cfs 0.521 af

Link EONSITE FLOWS: Onsite Flows Inflow=7.59 cfs 0.821 af
Primary=7.59 cfs 0.821 af

Link EXISTING: TOTAL FOR SP Inflow=11.85 cfs 1.822 af
Primary=11.85 cfs 1.822 af

Link OTHER: OTHER LAND Inflow=5.66 cfs 1.001 af
Primary=5.66 cfs 1.001 af

Total Runoff Area = 17.262 ac Runoff Volume = 1.847 af Average Runoff Depth = 1.28"
97.49% Pervious = 16.830 ac 2.51% Impervious = 0.433 ac

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 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 MAIN: MAIN PORTION Runoff Area=427,913 sf 0.00% Impervious Runoff Depth>1.60"
Flow Length=650' Tc=17.9 min CN=58 Runoff=13.92 cfs 1.310 af

Subcatchment OFF DW: Driveway to PL Runoff Area=35,324 sf 0.00% Impervious Runoff Depth>2.15"
Flow Length=400' Slope=0.0100 '/' Tc=34.7 min CN=65 Runoff=1.14 cfs 0.145 af

Subcatchment OFFSITE: Exisiting home Runoff Area=157,093 sf 12.00% Impervious Runoff Depth>2.15"
Flow Length=400' Tc=32.9 min CN=65 Runoff=5.25 cfs 0.647 af

Subcatchment SOUTH: TO HEDGEROW Runoff Area=131,624 sf 0.00% Impervious Runoff Depth>2.69"
Flow Length=300' Tc=17.8 min CN=71 Runoff=7.56 cfs 0.678 af

Reach DW: Driveway Swale Avg. Flow Depth=0.89' Max Vel=1.47 fps Inflow=5.25 cfs 0.647 af
n=0.100 L=200.0' S=0.0300 '/' Capacity=45.58 cfs Outflow=5.20 cfs 0.644 af

Reach DWP: Driveway Pipe Avg. Flow Depth=0.45' Max Vel=15.05 fps Inflow=5.20 cfs 0.644 af
12.0" Round Pipe n=0.012 L=16.0' S=0.1025 '/' Capacity=12.36 cfs Outflow=5.20 cfs 0.644 af

Reach FS: FIELD SWALE Avg. Flow Depth=0.85' Max Vel=1.32 fps Inflow=13.92 cfs 1.310 af
n=0.100 L=400.0' S=0.0179 '/' Capacity=86.50 cfs Outflow=12.79 cfs 1.296 af

Reach FS2: FIELD SWALE Avg. Flow Depth=0.63' Max Vel=0.93 fps Inflow=6.33 cfs 0.789 af
n=0.100 L=575.0' S=0.0125 '/' Capacity=72.15 cfs Outflow=5.70 cfs 0.774 af

Link EONSITE FLOWS: Onsite Flows Inflow=12.79 cfs 1.296 af
Primary=12.79 cfs 1.296 af

Link EXISTING: TOTAL FOR SP Inflow=19.75 cfs 2.748 af
Primary=19.75 cfs 2.748 af

Link OTHER: OTHER LAND Inflow=8.41 cfs 1.453 af
Primary=8.41 cfs 1.453 af

Total Runoff Area = 17.262 ac Runoff Volume = 2.780 af Average Runoff Depth = 1.93"
97.49% Pervious = 16.830 ac 2.51% Impervious = 0.433 ac

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 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 MAIN: MAIN PORTION Runoff Area=427,913 sf 0.00% Impervious Runoff Depth>2.81"
Flow Length=650' Tc=17.9 min CN=58 Runoff=25.20 cfs 2.298 af

Subcatchment OFF DW: Driveway to PL Runoff Area=35,324 sf 0.00% Impervious Runoff Depth>3.53"
Flow Length=400' Slope=0.0100 '/' Tc=34.7 min CN=65 Runoff=1.89 cfs 0.238 af

Subcatchment OFFSITE: Exisiting home Runoff Area=157,093 sf 12.00% Impervious Runoff Depth>3.53"
Flow Length=400' Tc=32.9 min CN=65 Runoff=8.68 cfs 1.061 af

Subcatchment SOUTH: TO HEDGEROW Runoff Area=131,624 sf 0.00% Impervious Runoff Depth>4.21"
Flow Length=300' Tc=17.8 min CN=71 Runoff=11.73 cfs 1.061 af

Reach DW: Driveway Swale Avg. Flow Depth=1.07' Max Vel=1.67 fps Inflow=8.68 cfs 1.061 af
n=0.100 L=200.0' S=0.0300 '/' Capacity=45.58 cfs Outflow=8.60 cfs 1.057 af

Reach DWP: Driveway Pipe Avg. Flow Depth=0.61' Max Vel=16.99 fps Inflow=8.60 cfs 1.057 af
12.0" Round Pipe n=0.012 L=16.0' S=0.1025 '/' Capacity=12.36 cfs Outflow=8.60 cfs 1.057 af

Reach FS: FIELD SWALE Avg. Flow Depth=1.13' Max Vel=1.55 fps Inflow=25.20 cfs 2.298 af
n=0.100 L=400.0' S=0.0179 '/' Capacity=86.50 cfs Outflow=23.59 cfs 2.280 af

Reach FS2: FIELD SWALE Avg. Flow Depth=0.81' Max Vel=1.07 fps Inflow=10.48 cfs 1.296 af
n=0.100 L=575.0' S=0.0125 '/' Capacity=72.15 cfs Outflow=9.67 cfs 1.276 af

Link EONSITE FLOWS: Onsite Flows Inflow=23.59 cfs 2.280 af
Primary=23.59 cfs 2.280 af

Link EXISTING: TOTAL FOR SP Inflow=35.74 cfs 4.617 af
Primary=35.74 cfs 4.617 af

Link OTHER: OTHER LAND Inflow=13.77 cfs 2.337 af
Primary=13.77 cfs 2.337 af

Total Runoff Area = 17.262 ac Runoff Volume = 4.658 af Average Runoff Depth = 3.24"
97.49% Pervious = 16.830 ac 2.51% Impervious = 0.433 ac

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	3.606	0.000	0.000	0.000	3.606	2 acre lots, 12% imp	OFFSITE
0.000	0.000	0.811	0.000	0.000	0.811	Brush, Good	OFF DW
0.000	9.824	3.022	0.000	0.000	12.845	Meadow, non-grazed	MAIN, SOUTH
0.000	**13.430**	**3.833**	**0.000**	**0.000**	**17.262**	**TOTAL AREA**	

Summary for Subcatchment MAIN: MAIN PORTION

LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B

[45] Hint: Runoff=Zero

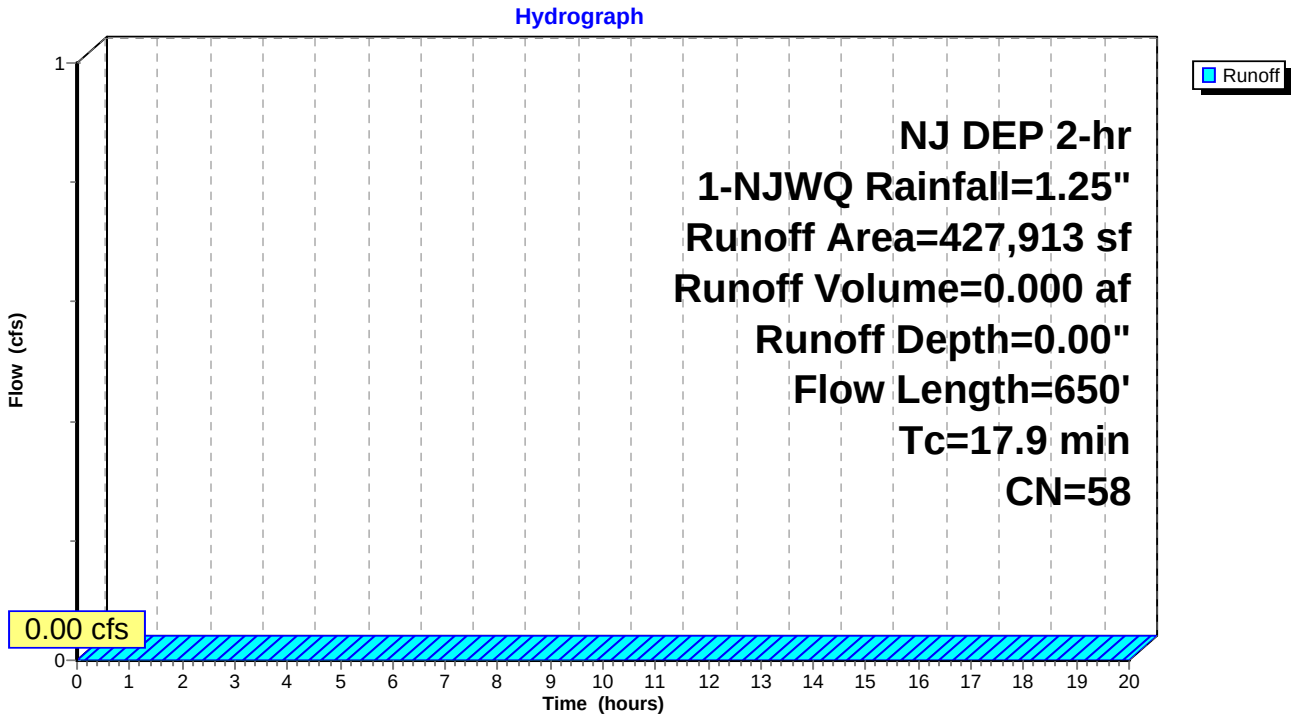
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-NJWQ Rainfall=1.25"

Area (sf)	CN	Description
427,913	58	Meadow, non-grazed, HSG B
427,913		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0500	0.17		**Sheet Flow, Meadow** Grass: Dense n= 0.240 P2= 3.38"
8.3	550	0.0250	1.11		**Shallow Concentrated Flow, Meadow** Short Grass Pasture Kv= 7.0 fps
17.9	650	Total			

Subcatchment MAIN: MAIN PORTION



Summary for Subcatchment OFF DW: Driveway to PL

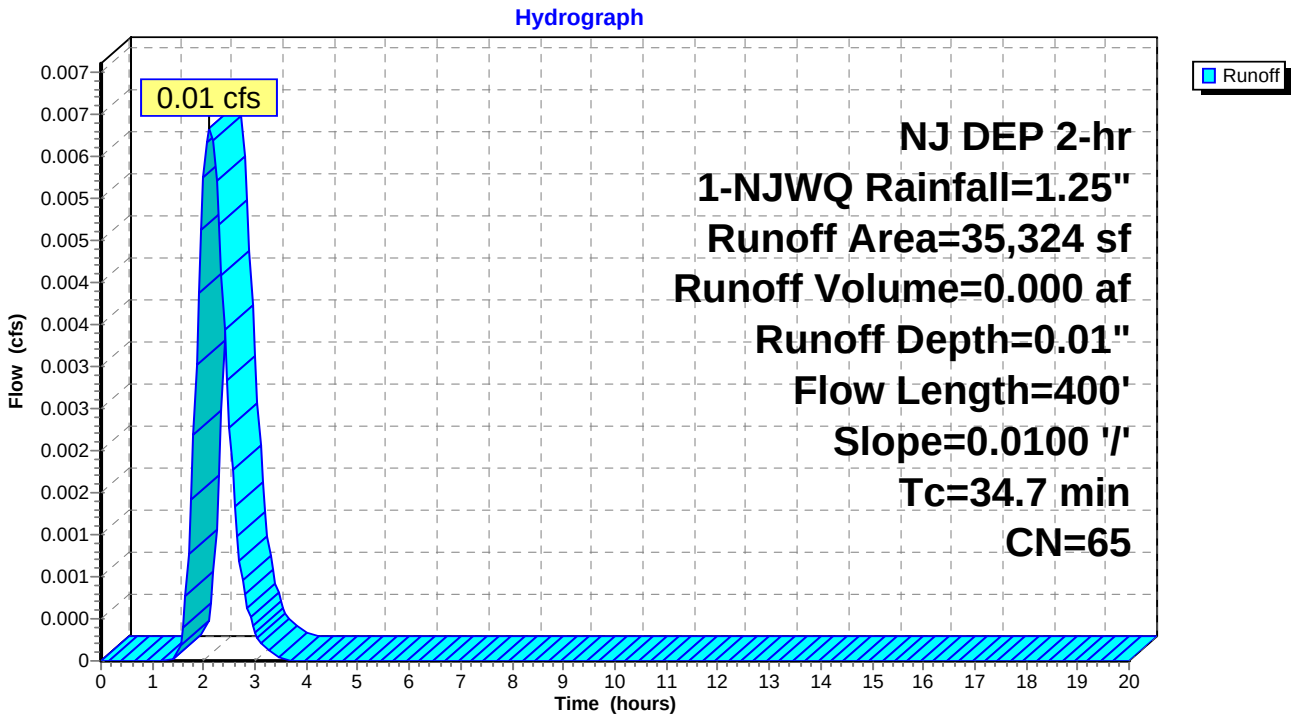
Runoff = 0.01 cfs @ 2.12 hrs, Volume= 0.000 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-NJWQ Rainfall=1.25"

Area (sf)	CN	Description
35,324	65	Brush, Good, HSG C
35,324		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	100	0.0100	0.06		**Sheet Flow, SURACE FLOW** Woods: Light underbrush n= 0.400 P2= 3.38"
7.1	300	0.0100	0.70		**Shallow Concentrated Flow, Un defined swale area** Short Grass Pasture Kv= 7.0 fps
34.7	400	Total			

Subcatchment OFF DW: Driveway to PL



Summary for Subcatchment OFFSITE: Exisiting home east

LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B

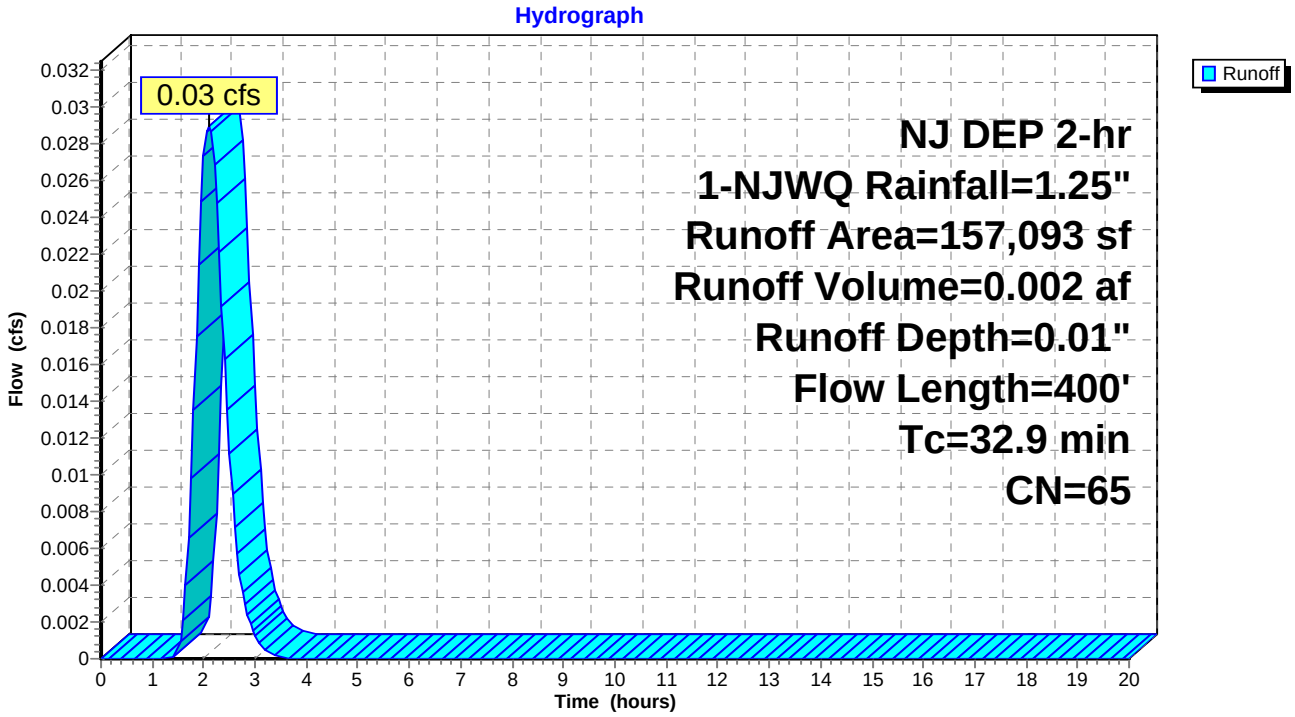
Runoff = 0.03 cfs @ 2.09 hrs, Volume= 0.002 af, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-NJWQ Rainfall=1.25"

Area (sf)	CN	Description
157,093	65	2 acre lots, 12% imp, HSG B
138,242		88.00% Pervious Area
18,851		12.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	100	0.0400	0.06		**Sheet Flow, Woods and Shrubs** Woods: Dense underbrush n= 0.800 P2= 3.38"
5.3	300	0.0350	0.94		**Shallow Concentrated Flow, Woods and Shrubs** Woodland Kv= 5.0 fps
32.9	400	Total			

Subcatchment OFFSITE: Exisiting home east



Summary for Subcatchment SOUTH: TO HEDGEROW

AbrB—Abbottstown silt loam, 2 to 6 percent slopes HSG C

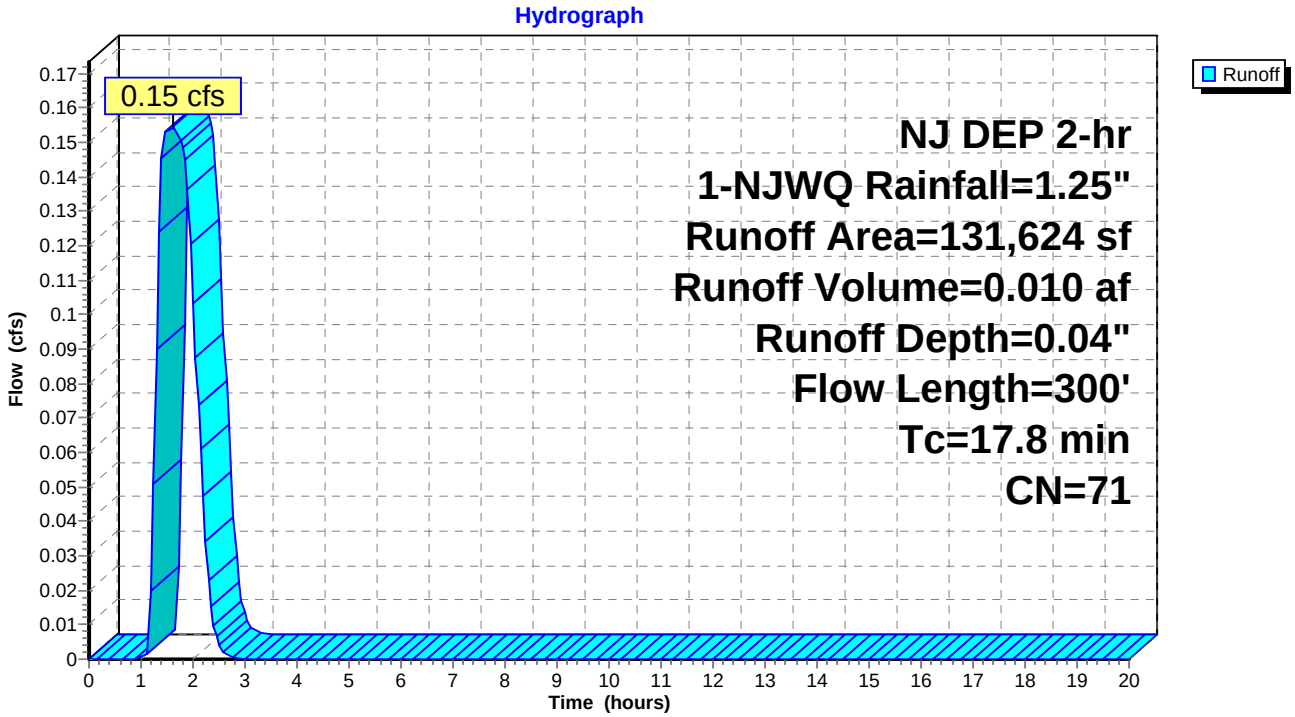
Runoff = 0.15 cfs @ 1.63 hrs, Volume= 0.010 af, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-NJWQ Rainfall=1.25"

Area (sf)	CN	Description
131,624	71	Meadow, non-grazed, HSG C
131,624		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0200	0.12		**Sheet Flow, Meadow** Grass: Dense n= 0.240 P2= 3.38"
3.9	200	0.0150	0.86		**Shallow Concentrated Flow, Meadow** Short Grass Pasture Kv= 7.0 fps
17.8	300	Total			

Subcatchment SOUTH: TO HEDGEROW



Summary for Reach DW: Driveway Swale

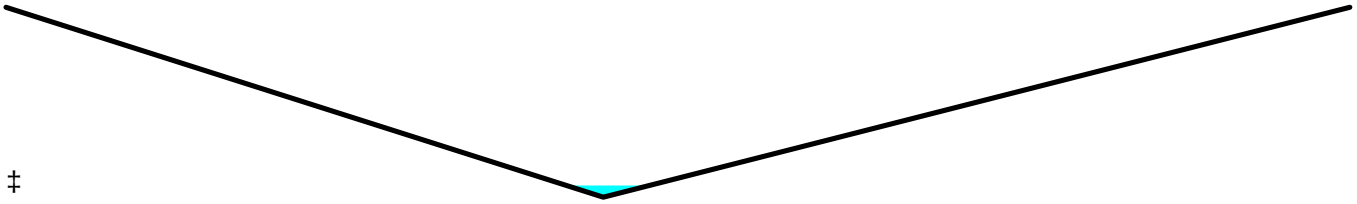
Existing sweale, no bed no banks, in hedgrow along edge of field

Inflow Area = 3.606 ac, 12.00% Impervious, Inflow Depth = 0.01" for 1-NJWQ event
Inflow = 0.03 cfs @ 2.09 hrs, Volume= 0.002 af
Outflow = 0.03 cfs @ 2.35 hrs, Volume= 0.002 af, Atten= 8%, Lag= 15.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.39 fps, Min. Travel Time= 8.4 min
Avg. Velocity = 0.20 fps, Avg. Travel Time= 16.3 min

Peak Storage= 14 cf @ 2.20 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 45.58 cfs

0.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 4.0 5.0 '/' Top Width= 18.00'
Length= 200.0' Slope= 0.0300 '/'
Inlet Invert= 367.00', Outlet Invert= 361.00'



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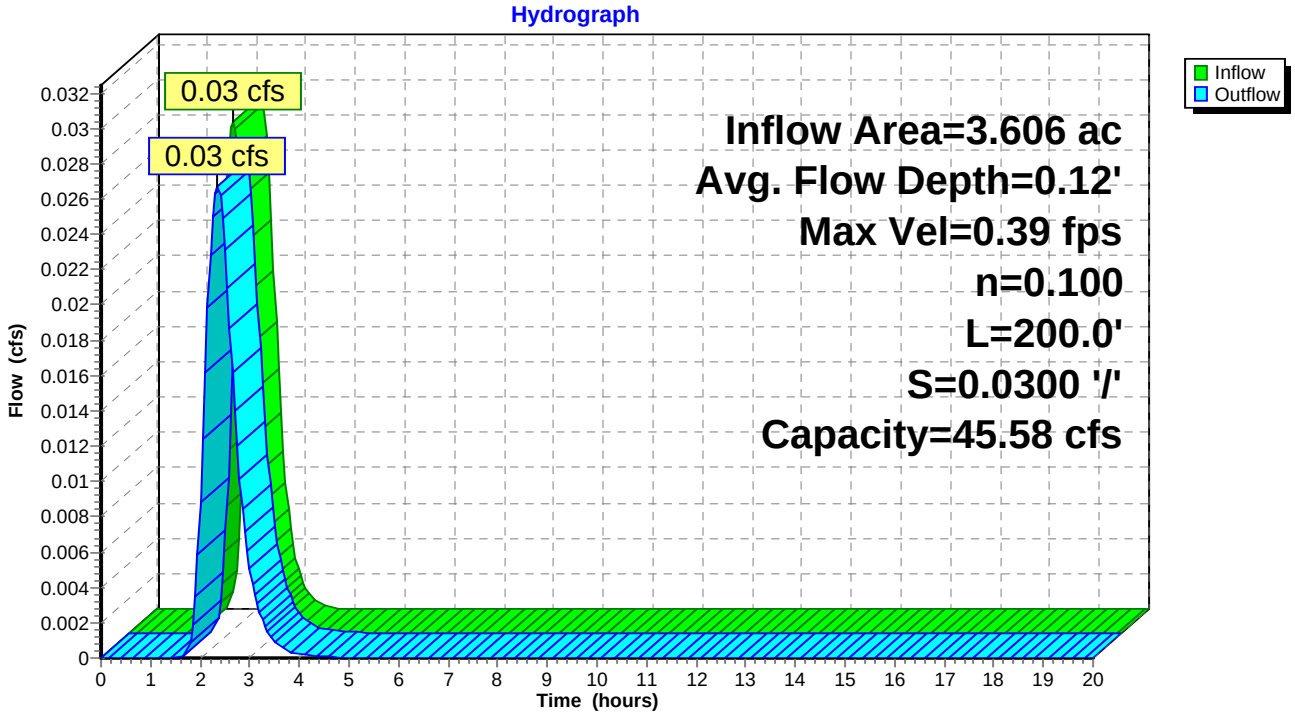
Reach DW: Driveway Swale



Summary for Reach DWP: Driveway Pipe

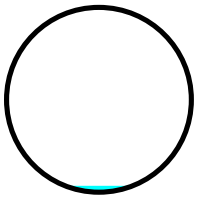
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach DW OUTLET depth by 5.81' @ 0.00 hrs

Inflow Area = 3.606 ac, 12.00% Impervious, Inflow Depth = 0.01" for 1-NJWQ event
Inflow = 0.03 cfs @ 2.35 hrs, Volume= 0.002 af
Outflow = 0.03 cfs @ 2.35 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.1 min

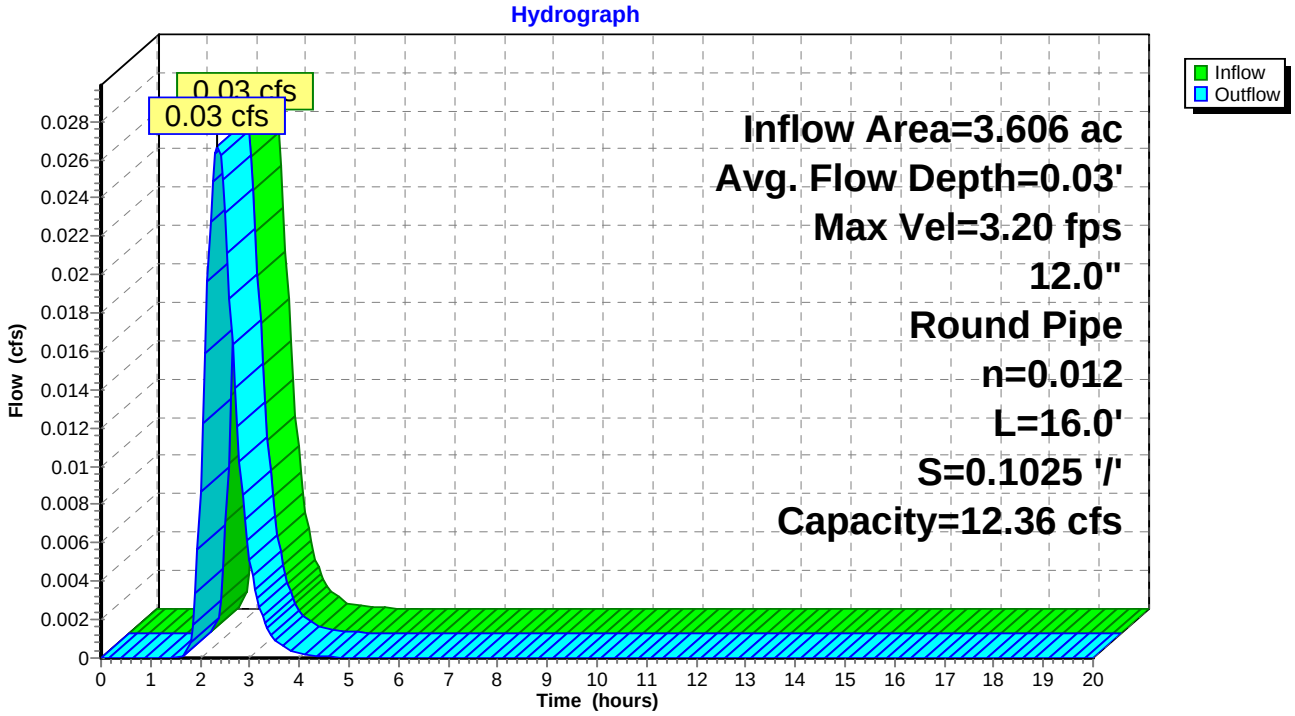
Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.20 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.02 fps, Avg. Travel Time= 0.1 min

Peak Storage= 0 cf @ 2.35 hrs
Average Depth at Peak Storage= 0.03'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 12.36 cfs

12.0" Round Pipe
n= 0.012 Concrete pipe, finished
Length= 16.0' Slope= 0.1025 '/'
Inlet Invert= 366.81', Outlet Invert= 365.17'



Reach DWP: Driveway Pipe



Summary for Reach FS: FIELD SWALE

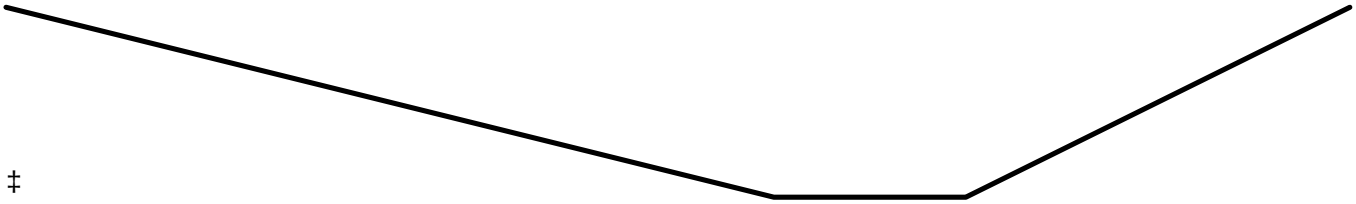
Existing sweale, no bed no banks, in hedgrow along edge of field

Inflow Area = 9.824 ac, 0.00% Impervious, Inflow Depth = 0.00" for 1-NJWQ event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 2.00' Flow Area= 40.0 sf, Capacity= 86.50 cfs

5.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 10.0 5.0 '/' Top Width= 35.00'
Length= 400.0' Slope= 0.0179 '/'
Inlet Invert= 365.17', Outlet Invert= 358.00'



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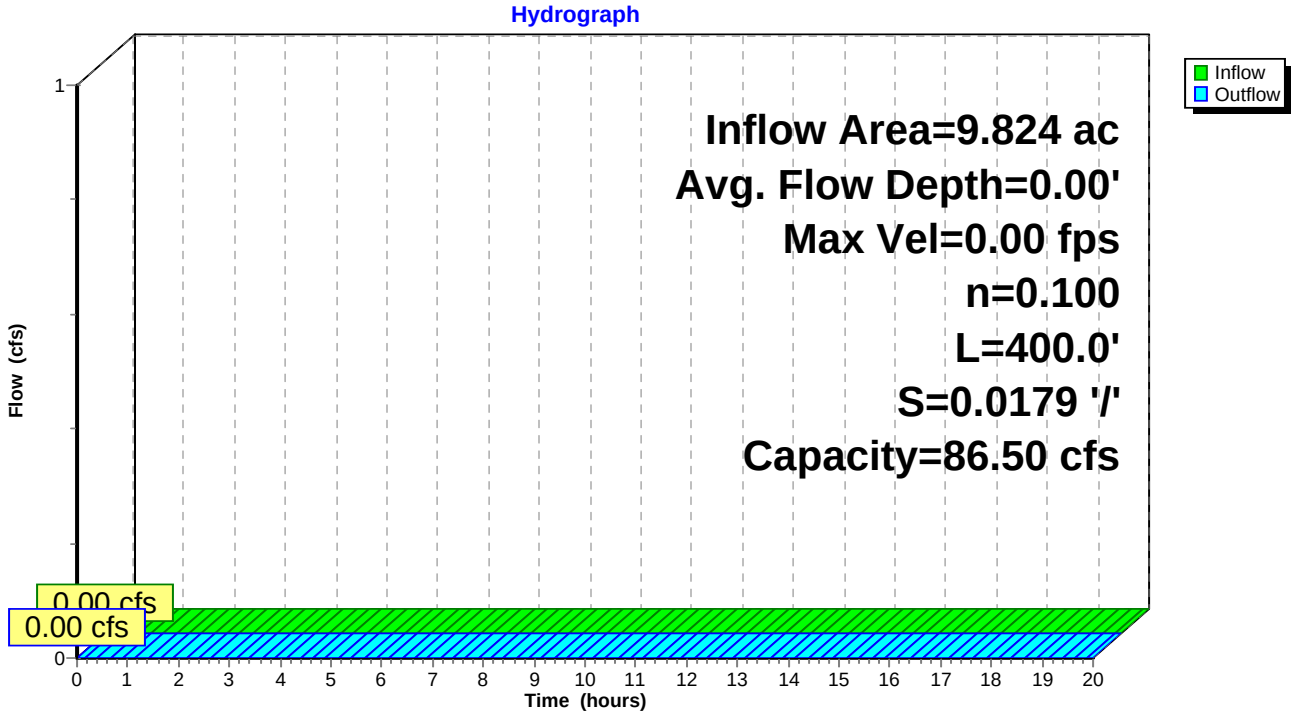
Reach FS: FIELD SWALE



Summary for Reach FS2: FIELD SWALE

Existing sweale, no bed no banks, in hedgrow along edge of field

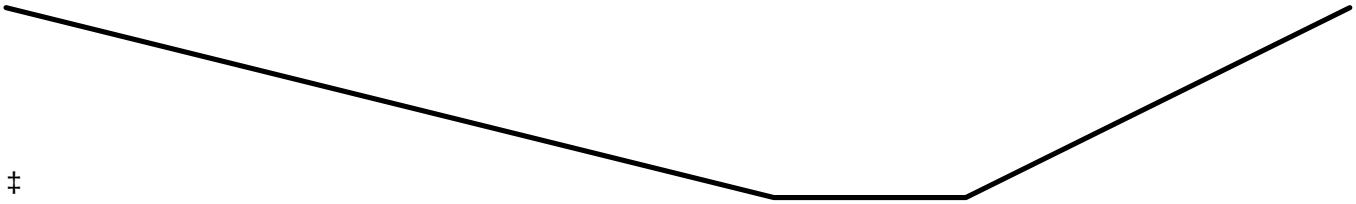
[62] Hint: Exceeded Reach DWP OUTLET depth by 0.01' @ 3.75 hrs

Inflow Area = 4.417 ac, 9.80% Impervious, Inflow Depth = 0.01" for 1-NJWQ event
Inflow = 0.03 cfs @ 2.31 hrs, Volume= 0.002 af
Outflow = 0.01 cfs @ 4.13 hrs, Volume= 0.002 af, Atten= 65%, Lag= 109.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.12 fps, Min. Travel Time= 79.9 min
Avg. Velocity = 0.12 fps, Avg. Travel Time= 79.9 min

Peak Storage= 53 cf @ 2.80 hrs
Average Depth at Peak Storage= 0.02'
Bank-Full Depth= 2.00' Flow Area= 40.0 sf, Capacity= 72.15 cfs

5.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 10.0 5.0 '/' Top Width= 35.00'
Length= 575.0' Slope= 0.0125 '/'
Inlet Invert= 365.17', Outlet Invert= 358.00'



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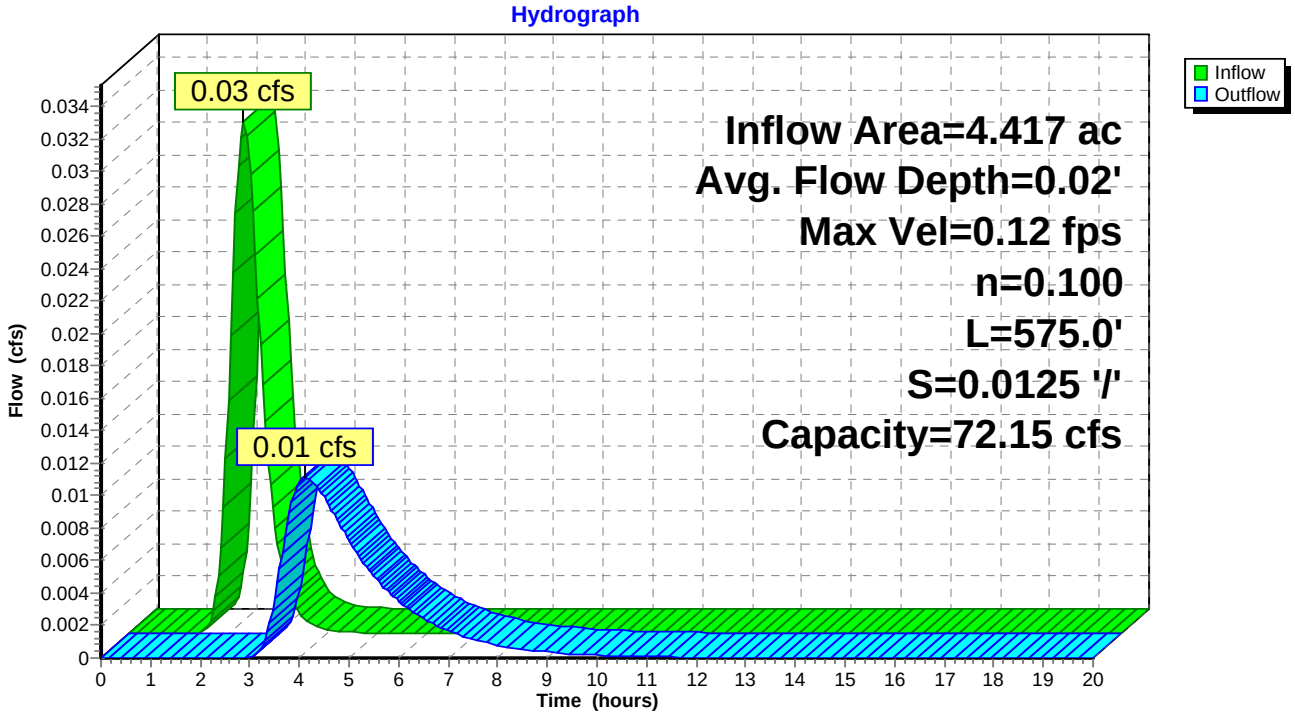
Reach FS2: FIELD SWALE

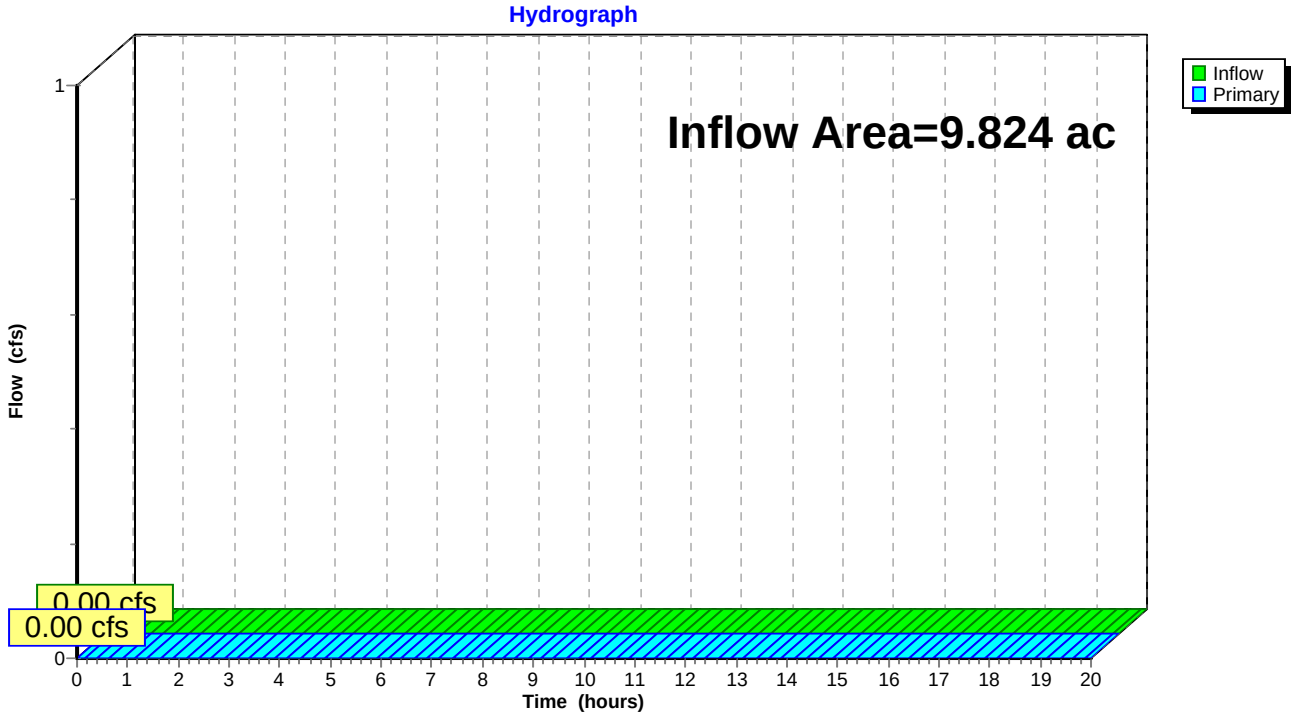


Summary for Link EONSITE FLOWS: Onsite Flows

Inflow Area = 9.824 ac, 0.00% Impervious, Inflow Depth = 0.00" for 1-NJWQ event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link EONSITE FLOWS: Onsite Flows

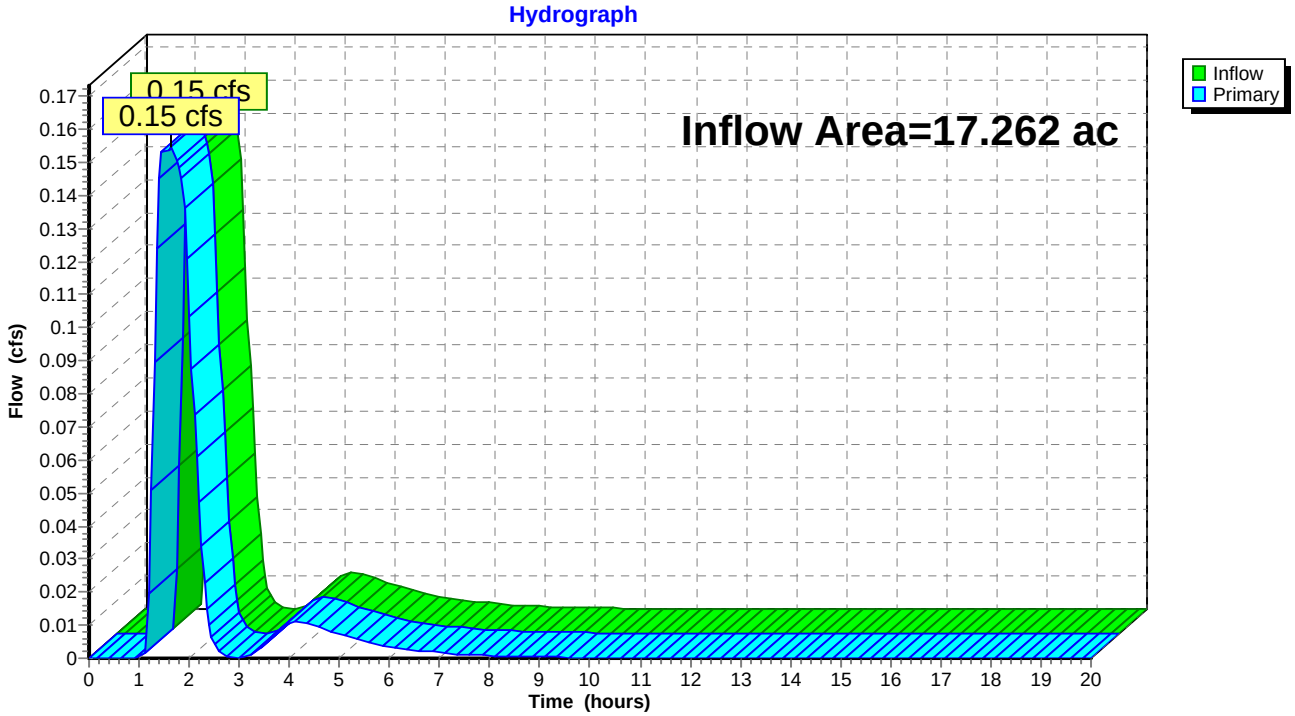


Summary for Link EXISTING: TOTAL FOR SP

Inflow Area = 17.262 ac, 2.51% Impervious, Inflow Depth = 0.01" for 1-NJWQ event
Inflow = 0.15 cfs @ 1.63 hrs, Volume= 0.012 af
Primary = 0.15 cfs @ 1.63 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link EXISTING: TOTAL FOR SP

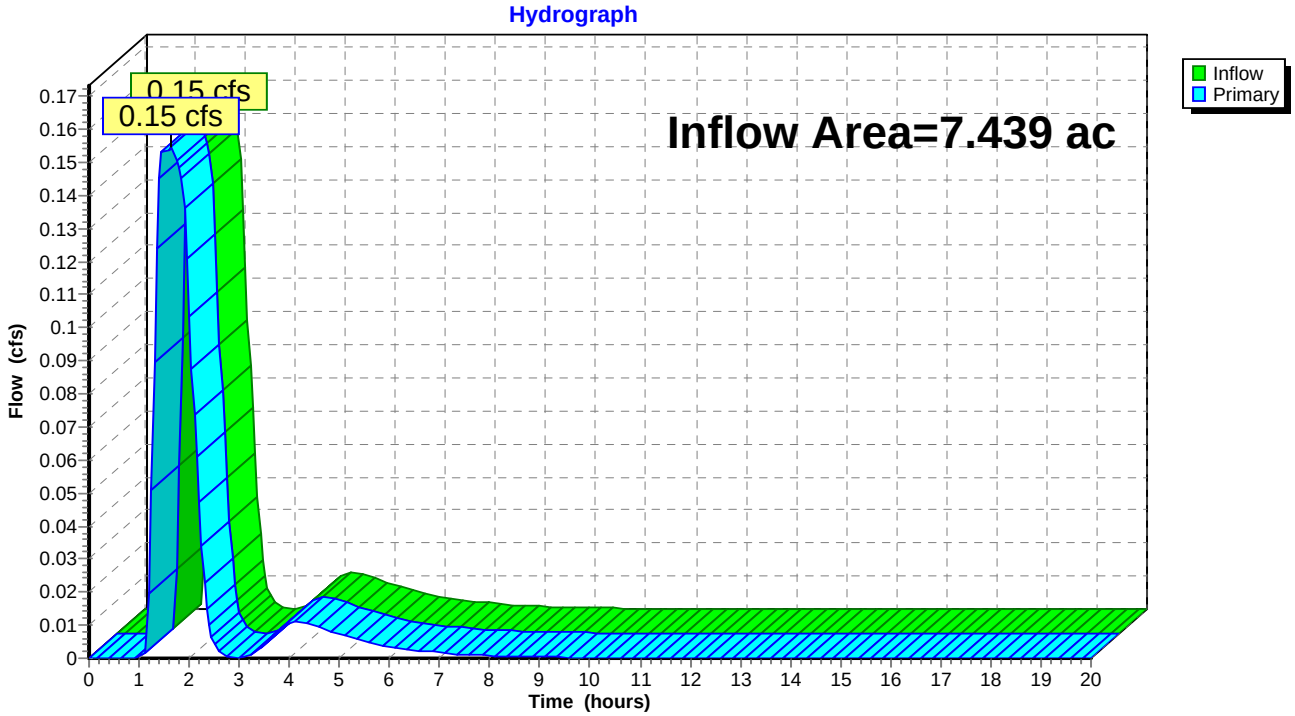


Summary for Link OTHER: OTHER LAND

Inflow Area = 7.439 ac, 5.82% Impervious, Inflow Depth = 0.02" for 1-NJWQ event
Inflow = 0.15 cfs @ 1.63 hrs, Volume= 0.012 af
Primary = 0.15 cfs @ 1.63 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link OTHER: OTHER LAND



Summary for Subcatchment MAIN: MAIN PORTION

LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B

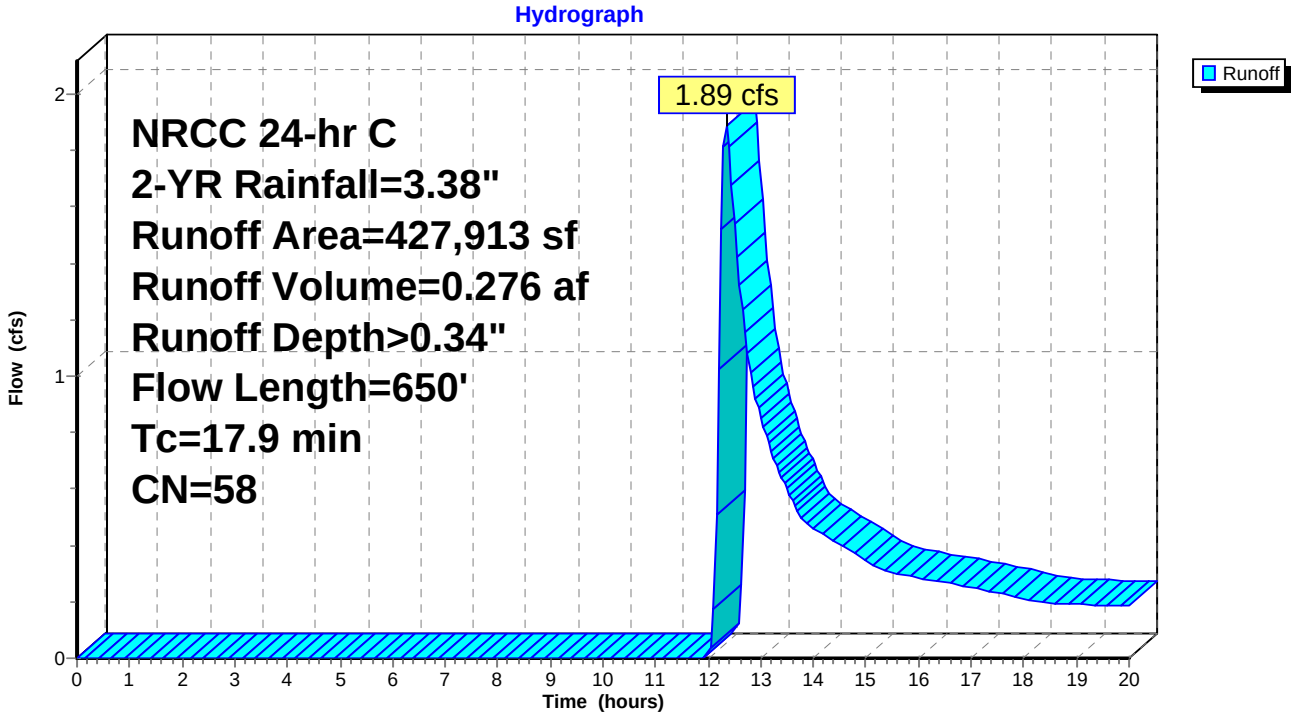
Runoff = 1.89 cfs @ 12.35 hrs, Volume= 0.276 af, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 2-YR Rainfall=3.38"

Area (sf)	CN	Description
427,913	58	Meadow, non-grazed, HSG B
427,913		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0500	0.17		**Sheet Flow, Meadow** Grass: Dense n= 0.240 P2= 3.38"
8.3	550	0.0250	1.11		**Shallow Concentrated Flow, Meadow** Short Grass Pasture Kv= 7.0 fps
17.9	650	Total			

Subcatchment MAIN: MAIN PORTION



Summary for Subcatchment OFF DW: Driveway to PL

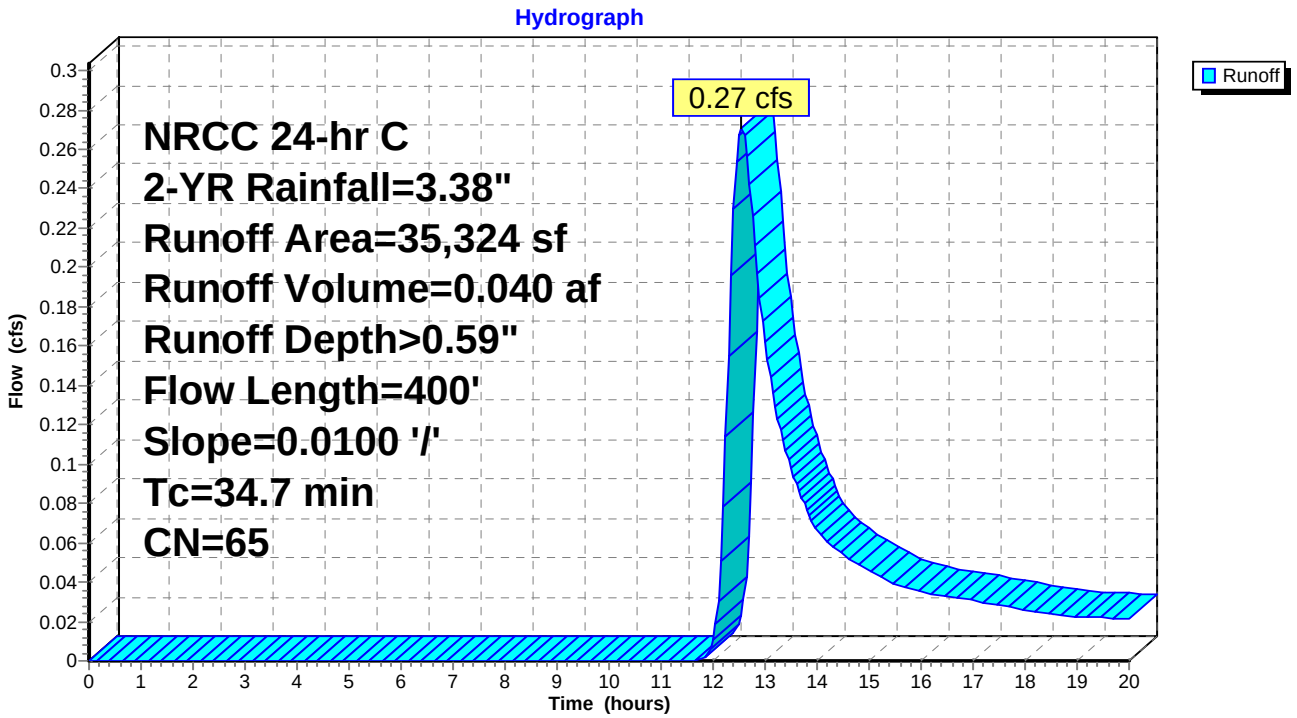
Runoff = 0.27 cfs @ 12.55 hrs, Volume= 0.040 af, Depth> 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 2-YR Rainfall=3.38"

Area (sf)	CN	Description
35,324	65	Brush, Good, HSG C
35,324		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	100	0.0100	0.06		**Sheet Flow, SURACE FLOW** Woods: Light underbrush n= 0.400 P2= 3.38"
7.1	300	0.0100	0.70		**Shallow Concentrated Flow, Un defined swale area** Short Grass Pasture Kv= 7.0 fps
34.7	400	Total			

Subcatchment OFF DW: Driveway to PL



Summary for Subcatchment OFFSITE: Exisiting home east

LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B

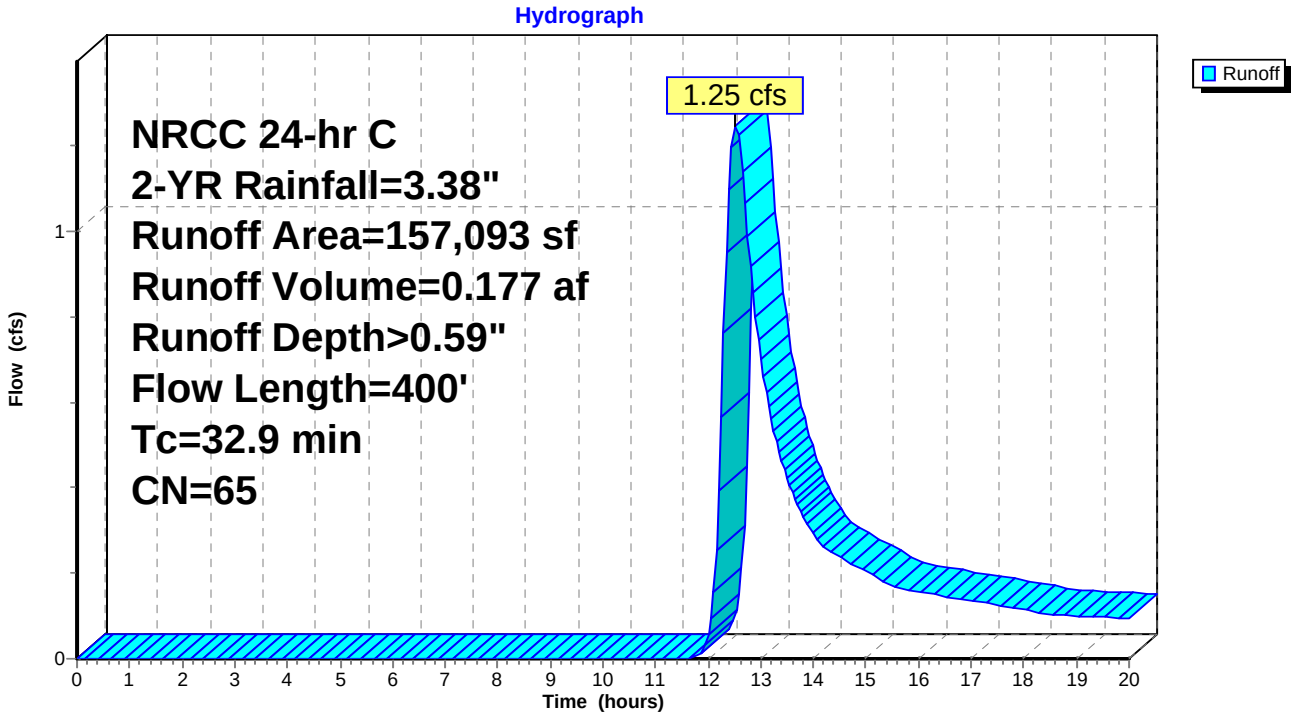
Runoff = 1.25 cfs @ 12.53 hrs, Volume= 0.177 af, Depth> 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 2-YR Rainfall=3.38"

Area (sf)	CN	Description
157,093	65	2 acre lots, 12% imp, HSG B
138,242		88.00% Pervious Area
18,851		12.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	100	0.0400	0.06		**Sheet Flow, Woods and Shrubs** Woods: Dense underbrush n= 0.800 P2= 3.38"
5.3	300	0.0350	0.94		**Shallow Concentrated Flow, Woods and Shrubs** Woodland Kv= 5.0 fps
32.9	400	Total			

Subcatchment OFFSITE: Exisiting home east



Summary for Subcatchment SOUTH: TO HEDGEROW

AbrB—Abbottstown silt loam, 2 to 6 percent slopes HSG C

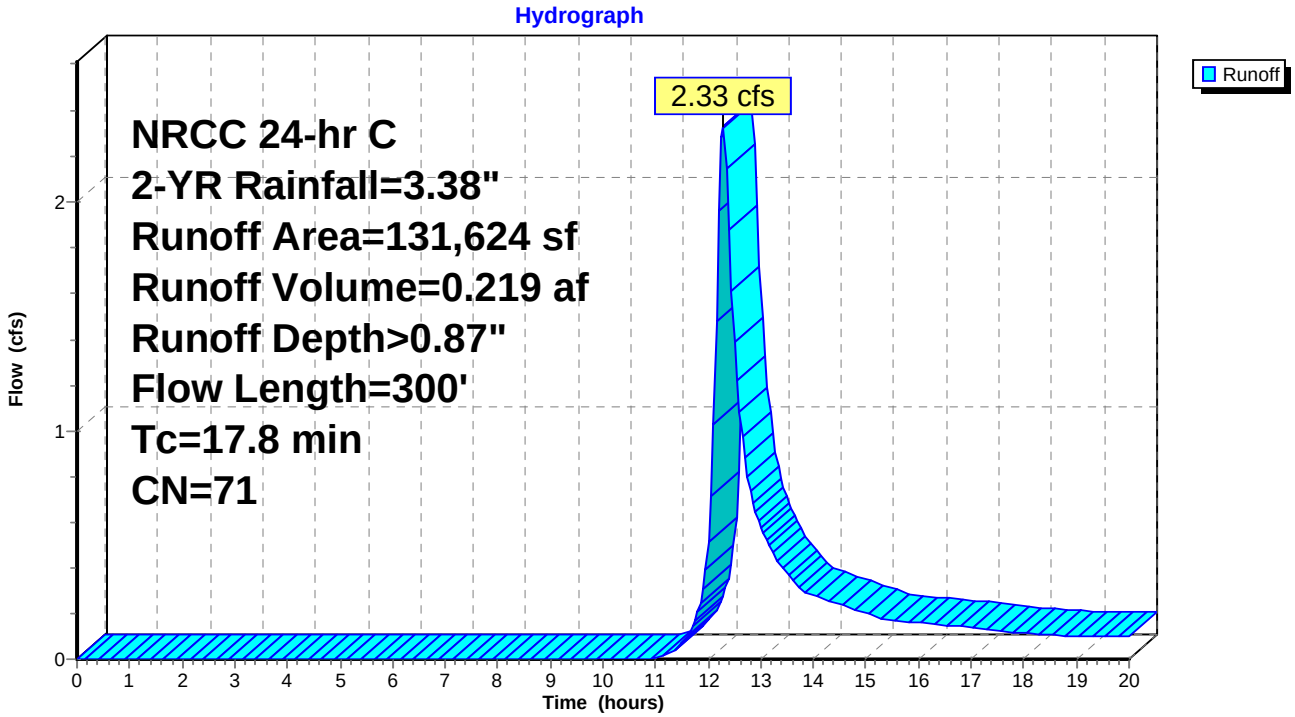
Runoff = 2.33 cfs @ 12.28 hrs, Volume= 0.219 af, Depth> 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 2-YR Rainfall=3.38"

Area (sf)	CN	Description
131,624	71	Meadow, non-grazed, HSG C
131,624		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0200	0.12		**Sheet Flow, Meadow** Grass: Dense n= 0.240 P2= 3.38"
3.9	200	0.0150	0.86		**Shallow Concentrated Flow, Meadow** Short Grass Pasture Kv= 7.0 fps
17.8	300	Total			

Subcatchment SOUTH: TO HEDGEROW



Summary for Reach DW: Driveway Swale

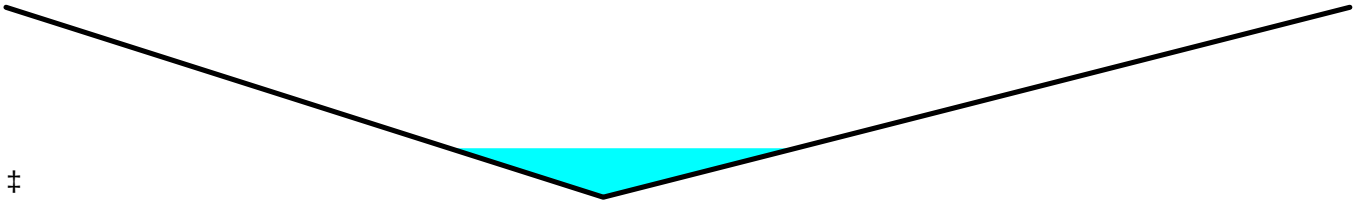
Existing sweale, no bed no banks, in hedgrow along edge of field

Inflow Area = 3.606 ac, 12.00% Impervious, Inflow Depth > 0.59" for 2-YR event
Inflow = 1.25 cfs @ 12.53 hrs, Volume= 0.177 af
Outflow = 1.23 cfs @ 12.62 hrs, Volume= 0.176 af, Atten= 1%, Lag= 5.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.03 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 5.2 min

Peak Storage= 240 cf @ 12.57 hrs
Average Depth at Peak Storage= 0.52'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 45.58 cfs

0.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 4.0 5.0 '/' Top Width= 18.00'
Length= 200.0' Slope= 0.0300 '/'
Inlet Invert= 367.00', Outlet Invert= 361.00'



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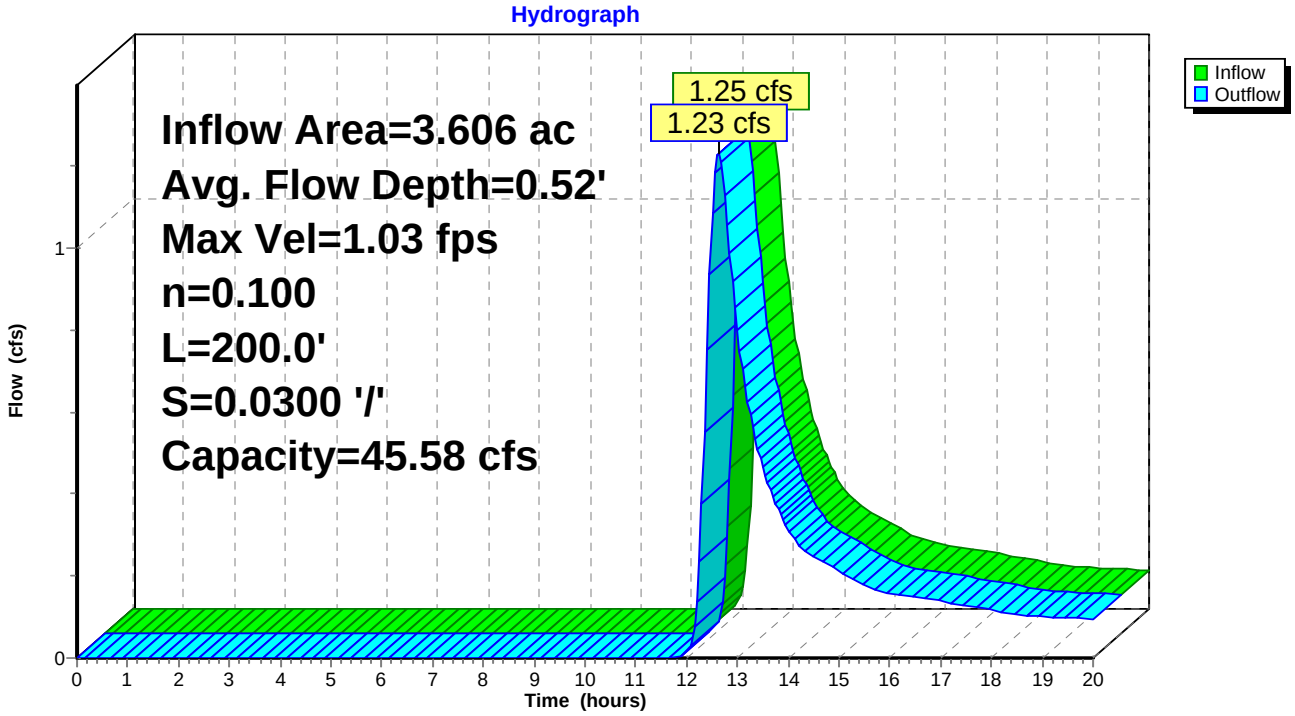
Reach DW: Driveway Swale



Summary for Reach DWP: Driveway Pipe

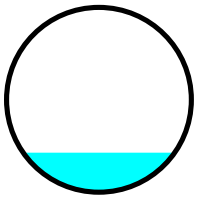
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach DW OUTLET depth by 5.81' @ 0.00 hrs

Inflow Area = 3.606 ac, 12.00% Impervious, Inflow Depth > 0.58" for 2-YR event
Inflow = 1.23 cfs @ 12.62 hrs, Volume= 0.176 af
Outflow = 1.23 cfs @ 12.63 hrs, Volume= 0.176 af, Atten= 0%, Lag= 0.1 min

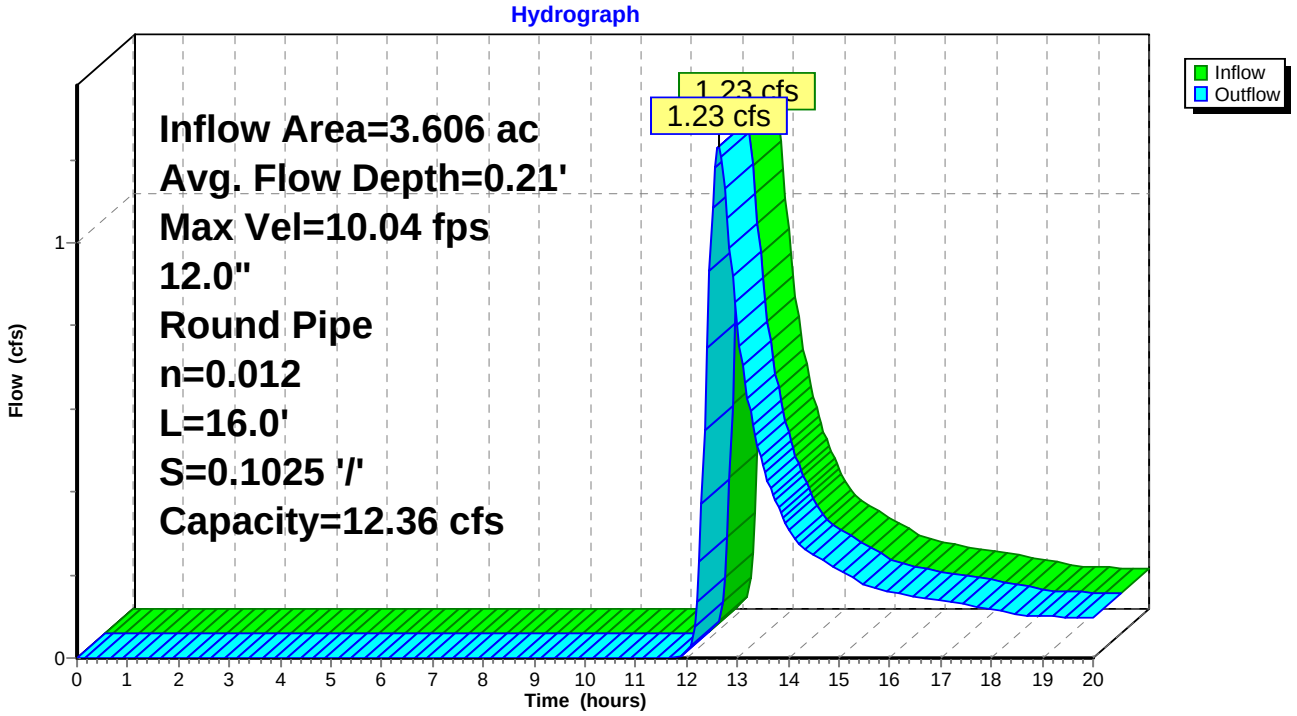
Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 10.04 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 5.83 fps, Avg. Travel Time= 0.0 min

Peak Storage= 2 cf @ 12.62 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 12.36 cfs

12.0" Round Pipe
n= 0.012 Concrete pipe, finished
Length= 16.0' Slope= 0.1025 '/'
Inlet Invert= 366.81', Outlet Invert= 365.17'



Reach DWP: Driveway Pipe



Summary for Reach FS: FIELD SWALE

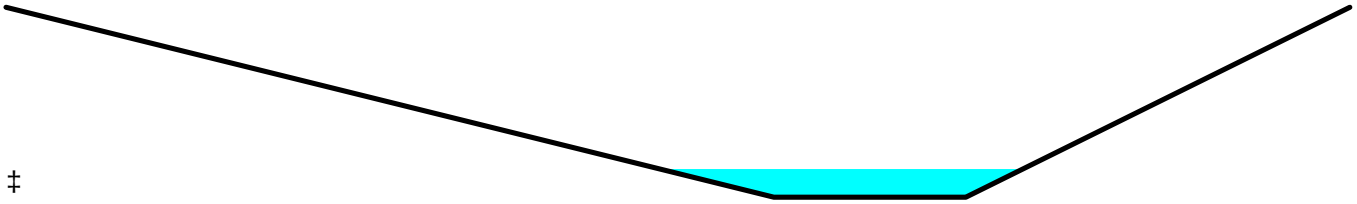
Existing sweale, no bed no banks, in hedgrow along edge of field

Inflow Area = 9.824 ac, 0.00% Impervious, Inflow Depth > 0.34" for 2-YR event
Inflow = 1.89 cfs @ 12.35 hrs, Volume= 0.276 af
Outflow = 1.57 cfs @ 12.65 hrs, Volume= 0.269 af, Atten= 17%, Lag= 17.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.74 fps, Min. Travel Time= 9.0 min
Avg. Velocity = 0.45 fps, Avg. Travel Time= 14.7 min

Peak Storage= 854 cf @ 12.49 hrs
Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 2.00' Flow Area= 40.0 sf, Capacity= 86.50 cfs

5.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 10.0 5.0 '/' Top Width= 35.00'
Length= 400.0' Slope= 0.0179 '/'
Inlet Invert= 365.17', Outlet Invert= 358.00'



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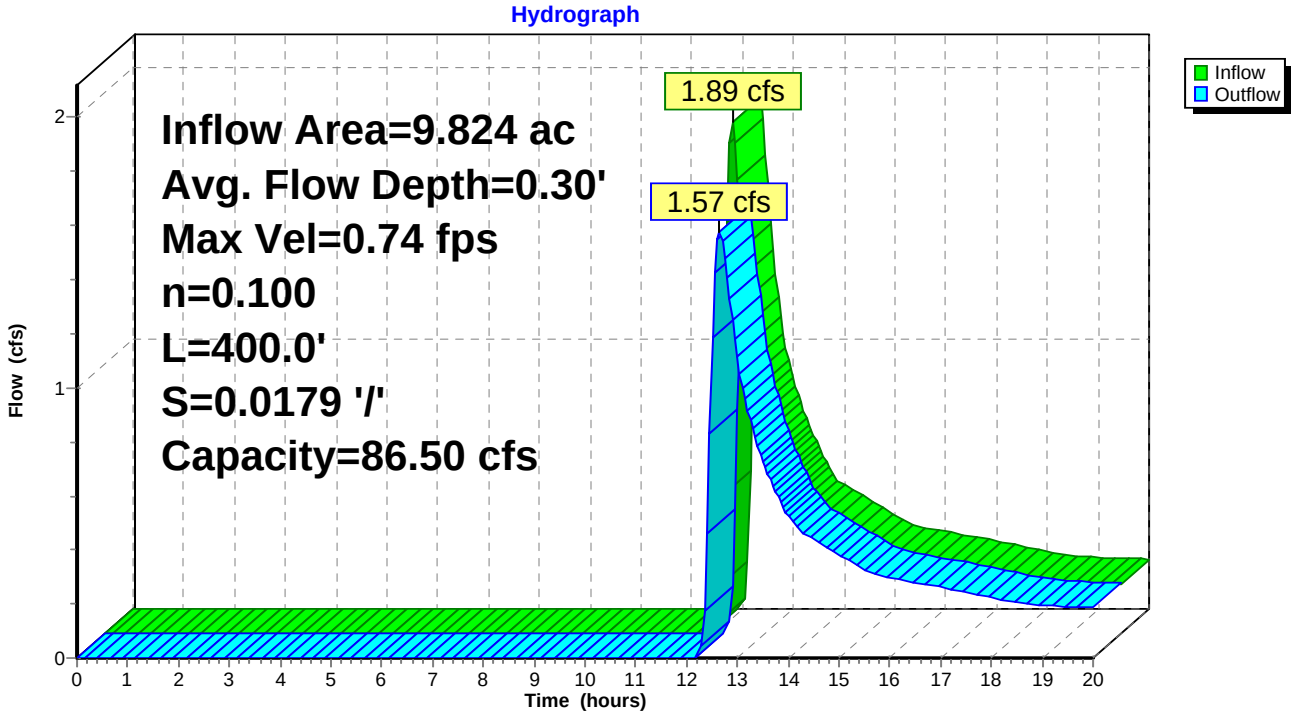
Reach FS: FIELD SWALE



Summary for Reach FS2: FIELD SWALE

Existing sweale, no bed no banks, in hedgrow along edge of field

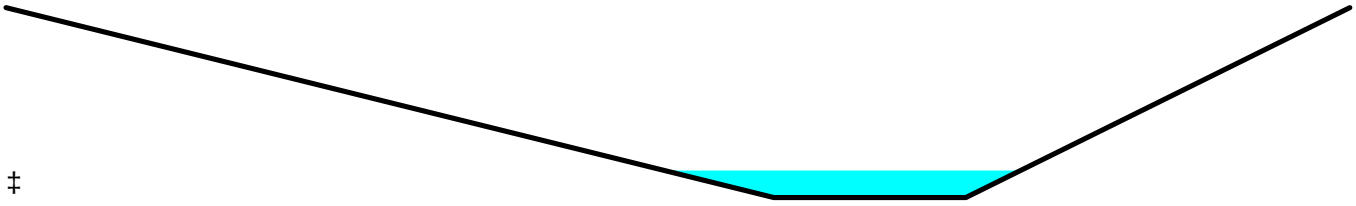
[62] Hint: Exceeded Reach DWP OUTLET depth by 0.10' @ 13.00 hrs

Inflow Area = 4.417 ac, 9.80% Impervious, Inflow Depth > 0.59" for 2-YR event
Inflow = 1.49 cfs @ 12.61 hrs, Volume= 0.215 af
Outflow = 1.21 cfs @ 13.10 hrs, Volume= 0.207 af, Atten= 19%, Lag= 29.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.60 fps, Min. Travel Time= 16.0 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 27.0 min

Peak Storage= 1,165 cf @ 12.83 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 2.00' Flow Area= 40.0 sf, Capacity= 72.15 cfs

5.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 10.0 5.0 '/' Top Width= 35.00'
Length= 575.0' Slope= 0.0125 '/'
Inlet Invert= 365.17', Outlet Invert= 358.00'



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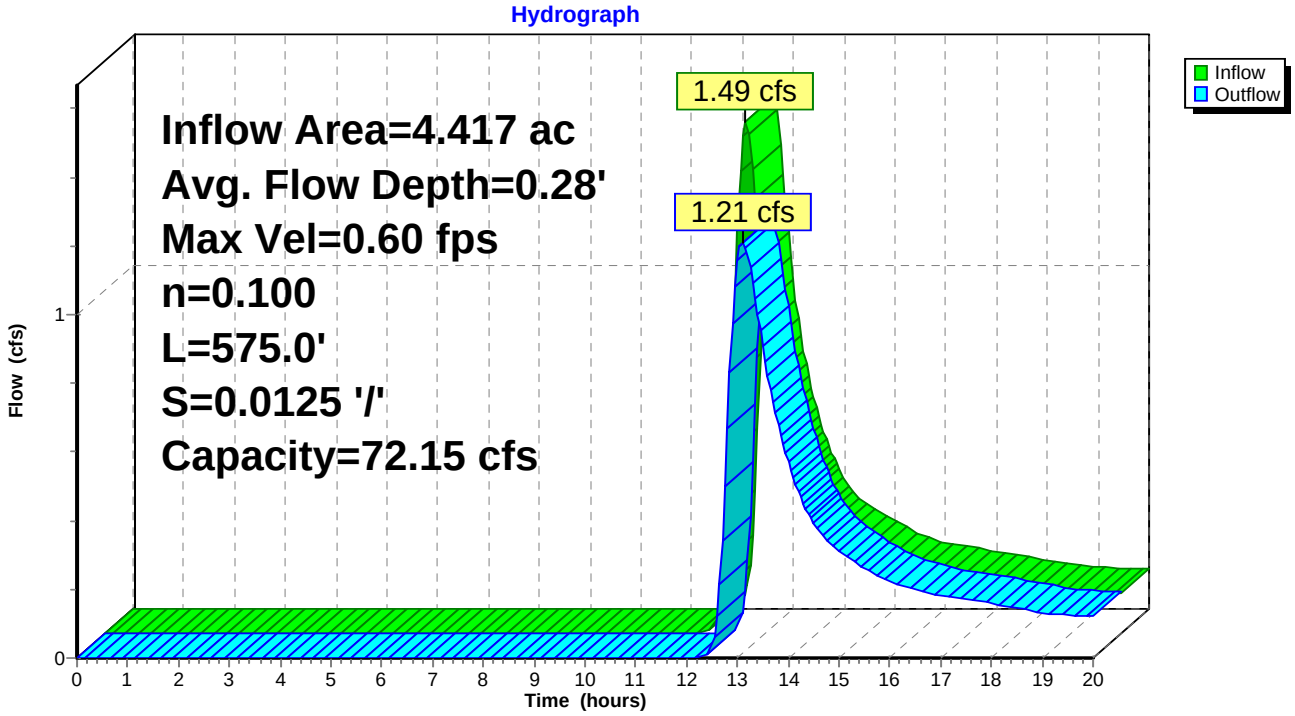
Reach FS2: FIELD SWALE

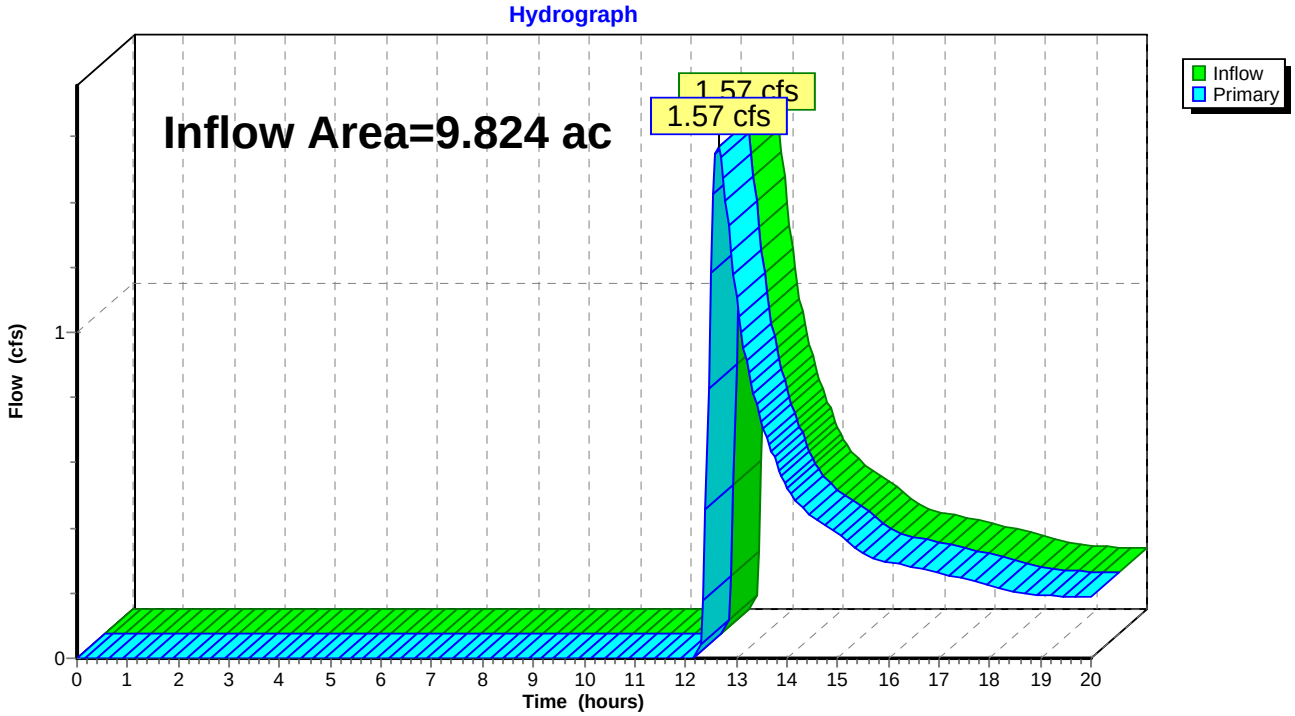


Summary for Link EONSITE FLOWS: Onsite Flows

Inflow Area = 9.824 ac, 0.00% Impervious, Inflow Depth > 0.33" for 2-YR event
Inflow = 1.57 cfs @ 12.65 hrs, Volume= 0.269 af
Primary = 1.57 cfs @ 12.65 hrs, Volume= 0.269 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link EONSITE FLOWS: Onsite Flows

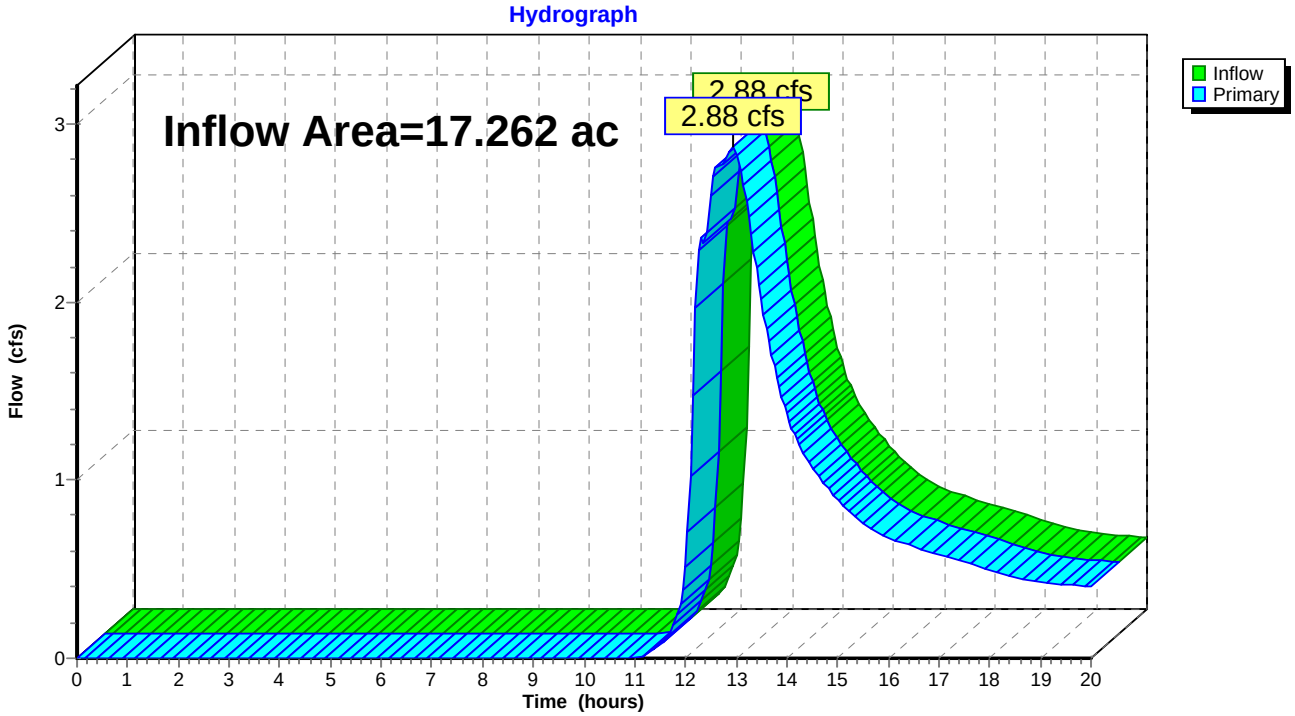


Summary for Link EXISTING: TOTAL FOR SP

Inflow Area = 17.262 ac, 2.51% Impervious, Inflow Depth > 0.48" for 2-YR event
Inflow = 2.88 cfs @ 12.93 hrs, Volume= 0.695 af
Primary = 2.88 cfs @ 12.93 hrs, Volume= 0.695 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link EXISTING: TOTAL FOR SP

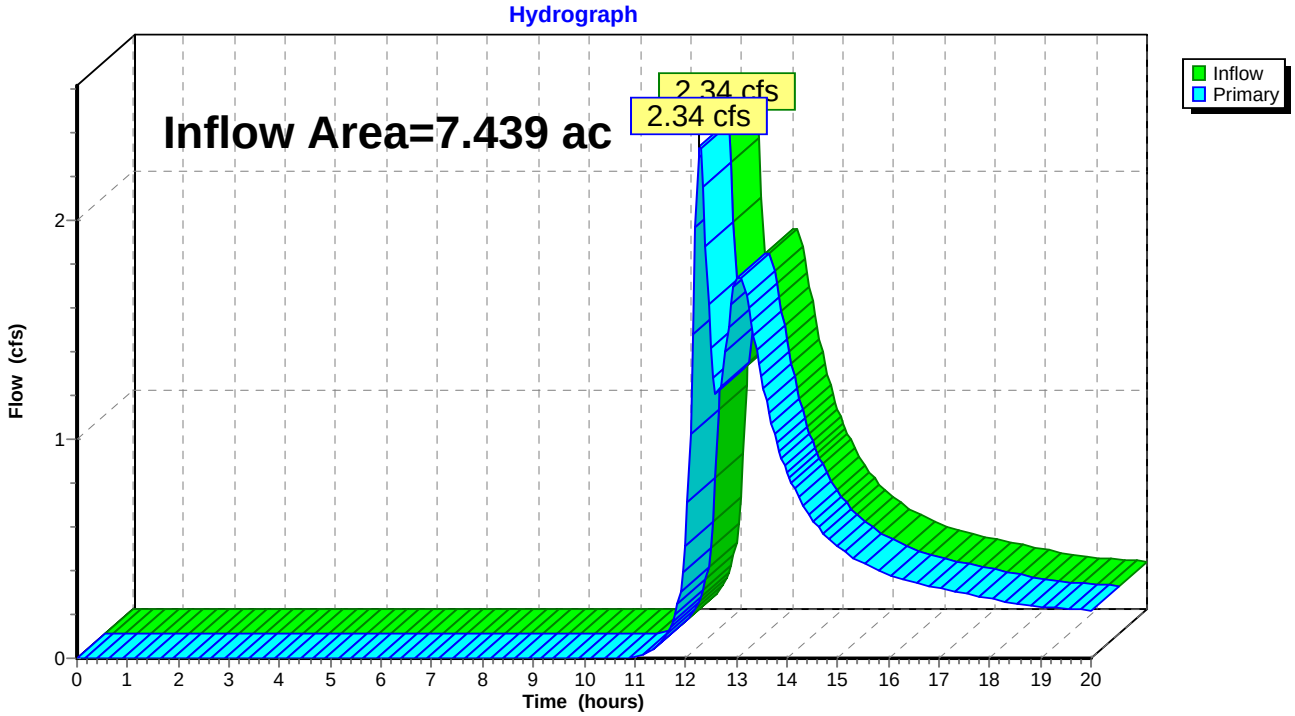


Summary for Link OTHER: OTHER LAND

Inflow Area = 7.439 ac, 5.82% Impervious, Inflow Depth > 0.69" for 2-YR event
Inflow = 2.34 cfs @ 12.28 hrs, Volume= 0.426 af
Primary = 2.34 cfs @ 12.28 hrs, Volume= 0.426 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link OTHER: OTHER LAND



Summary for Subcatchment MAIN: MAIN PORTION

LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B

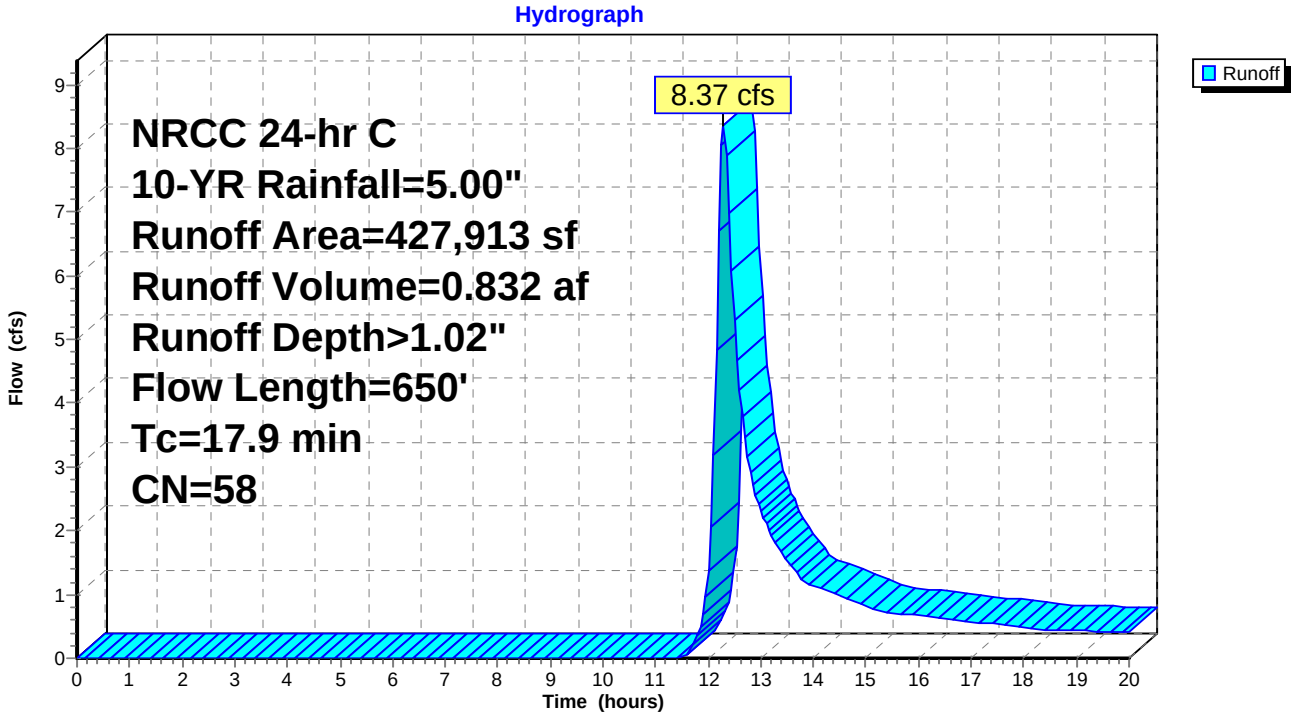
Runoff = 8.37 cfs @ 12.30 hrs, Volume= 0.832 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-YR Rainfall=5.00"

Area (sf)	CN	Description
427,913	58	Meadow, non-grazed, HSG B
427,913		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0500	0.17		**Sheet Flow, Meadow** Grass: Dense n= 0.240 P2= 3.38"
8.3	550	0.0250	1.11		**Shallow Concentrated Flow, Meadow** Short Grass Pasture Kv= 7.0 fps
17.9	650	Total			

Subcatchment MAIN: MAIN PORTION



Summary for Subcatchment OFF DW: Driveway to PL

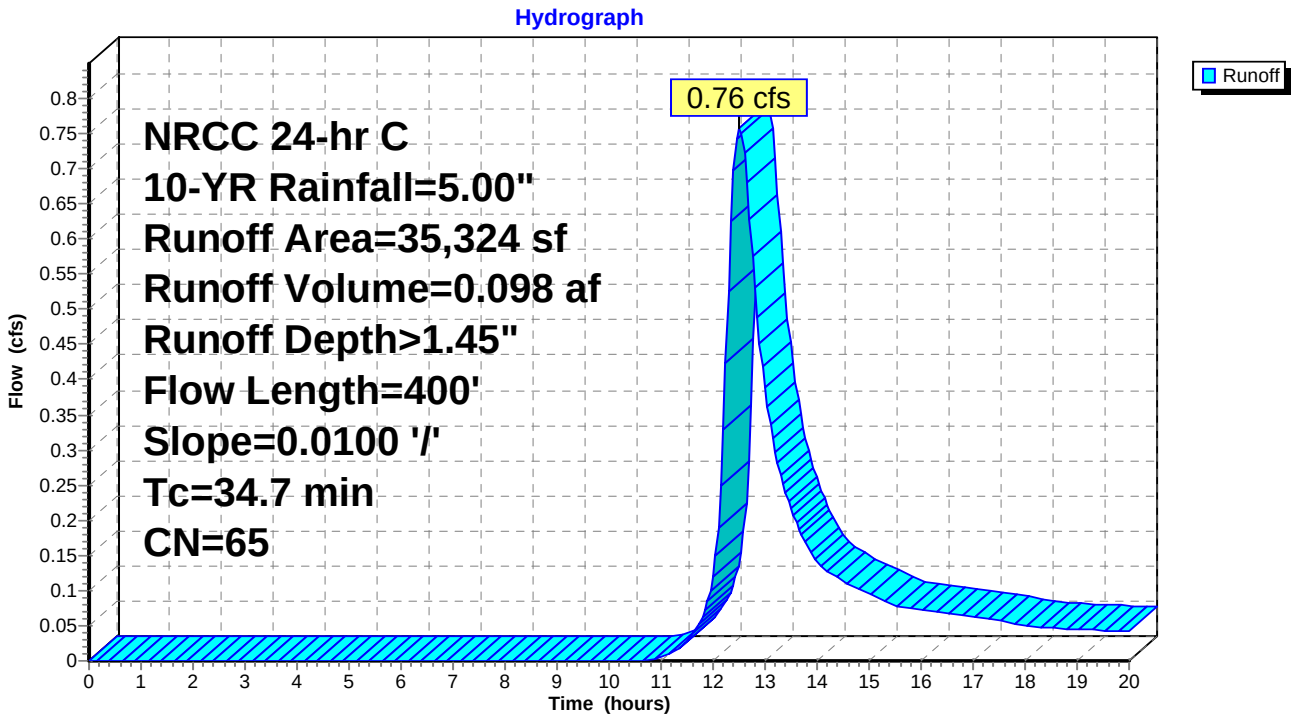
Runoff = 0.76 cfs @ 12.51 hrs, Volume= 0.098 af, Depth> 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-YR Rainfall=5.00"

Area (sf)	CN	Description
35,324	65	Brush, Good, HSG C
35,324		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	100	0.0100	0.06		**Sheet Flow, SURACE FLOW** Woods: Light underbrush n= 0.400 P2= 3.38"
7.1	300	0.0100	0.70		**Shallow Concentrated Flow, Un defined swale area** Short Grass Pasture Kv= 7.0 fps
34.7	400	Total			

Subcatchment OFF DW: Driveway to PL



Summary for Subcatchment OFFSITE: Exisiting home east

LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B

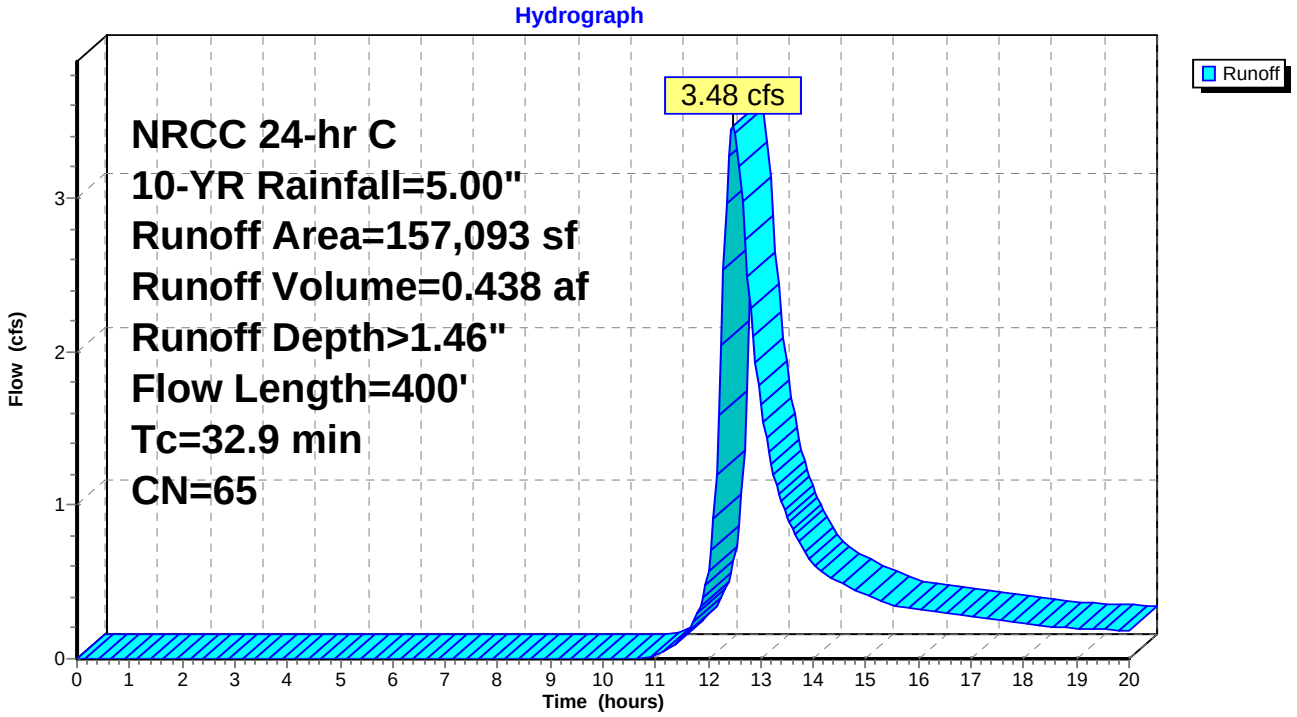
Runoff = 3.48 cfs @ 12.49 hrs, Volume= 0.438 af, Depth> 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-YR Rainfall=5.00"

Area (sf)	CN	Description
157,093	65	2 acre lots, 12% imp, HSG B
138,242		88.00% Pervious Area
18,851		12.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	100	0.0400	0.06		**Sheet Flow, Woods and Shrubs** Woods: Dense underbrush n= 0.800 P2= 3.38"
5.3	300	0.0350	0.94		**Shallow Concentrated Flow, Woods and Shrubs** Woodland Kv= 5.0 fps
32.9	400	Total			

Subcatchment OFFSITE: Exisiting home east



Summary for Subcatchment SOUTH: TO HEDGEROW

AbrB—Abbottstown silt loam, 2 to 6 percent slopes HSG C

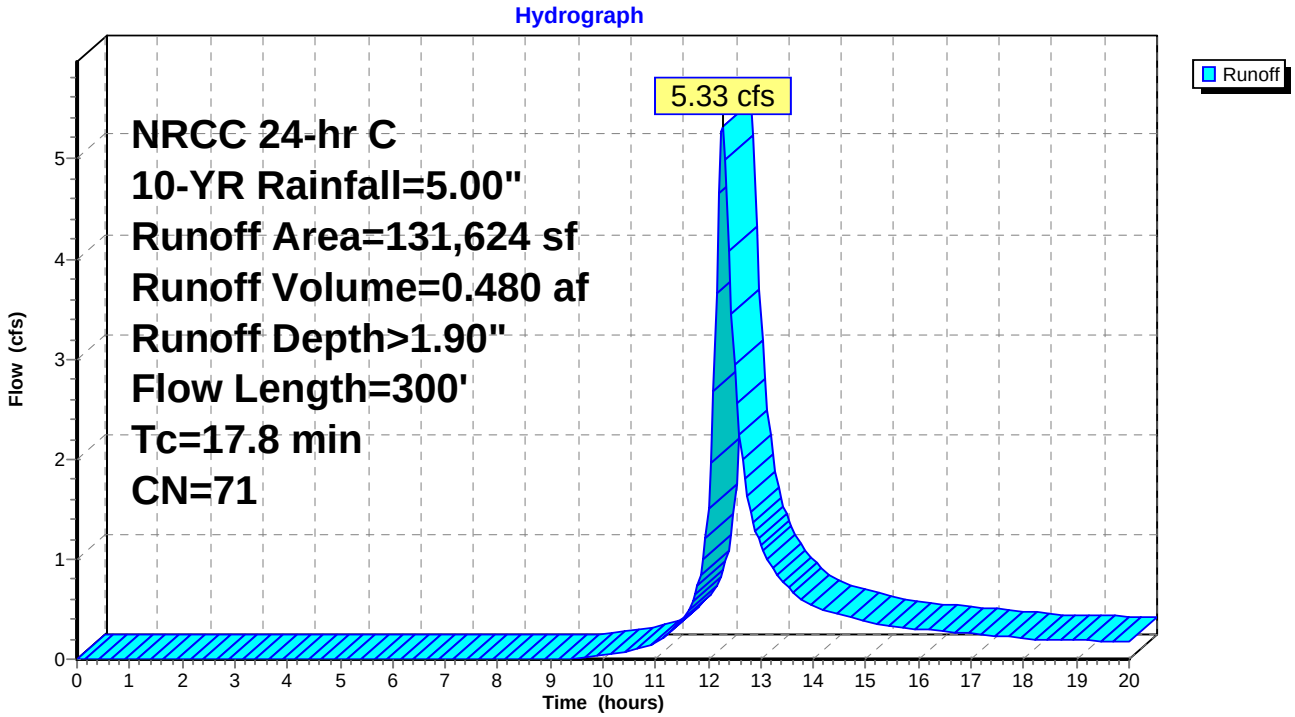
Runoff = 5.33 cfs @ 12.27 hrs, Volume= 0.480 af, Depth> 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 10-YR Rainfall=5.00"

Area (sf)	CN	Description
131,624	71	Meadow, non-grazed, HSG C
131,624		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0200	0.12		**Sheet Flow, Meadow** Grass: Dense n= 0.240 P2= 3.38"
3.9	200	0.0150	0.86		**Shallow Concentrated Flow, Meadow** Short Grass Pasture Kv= 7.0 fps
17.8	300	Total			

Subcatchment SOUTH: TO HEDGEROW



Summary for Reach DW: Driveway Swale

Existing sweale, no bed no banks, in hedgrow along edge of field

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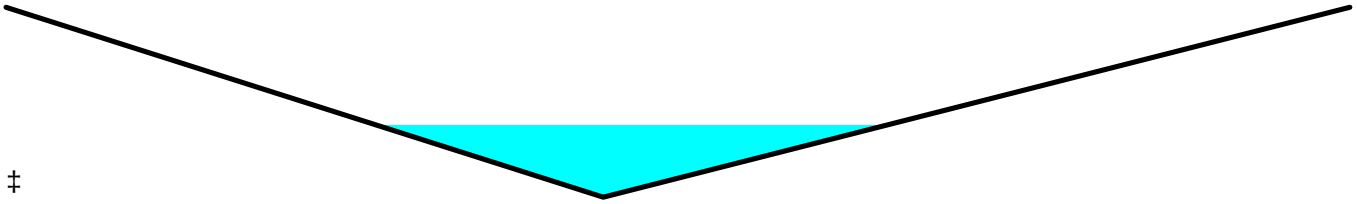
Inflow Area = 3.606 ac, 12.00% Impervious, Inflow Depth > 1.46" for 10-YR event
Inflow = 3.48 cfs @ 12.49 hrs, Volume= 0.438 af
Outflow = 3.45 cfs @ 12.56 hrs, Volume= 0.436 af, Atten= 1%, Lag= 4.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.33 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 0.75 fps, Avg. Travel Time= 4.5 min

Peak Storage= 520 cf @ 12.52 hrs
Average Depth at Peak Storage= 0.76'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 45.58 cfs

0.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 4.0 5.0 '/' Top Width= 18.00'
Length= 200.0' Slope= 0.0300 '/'
Inlet Invert= 367.00', Outlet Invert= 361.00'



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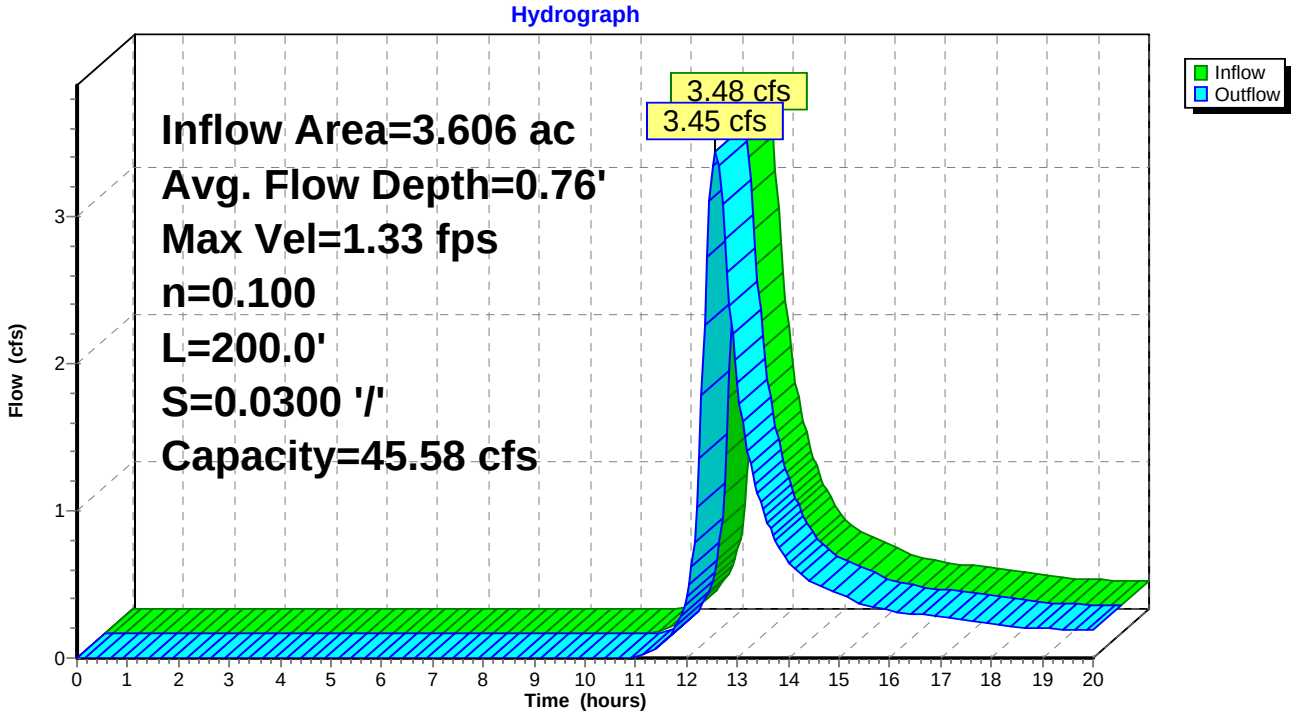
Reach DW: Driveway Swale



Summary for Reach DWP: Driveway Pipe

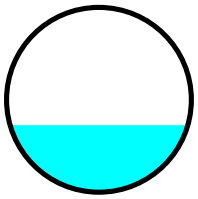
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach DW OUTLET depth by 5.81' @ 0.00 hrs

Inflow Area = 3.606 ac, 12.00% Impervious, Inflow Depth > 1.45" for 10-YR event
Inflow = 3.45 cfs @ 12.56 hrs, Volume= 0.436 af
Outflow = 3.45 cfs @ 12.56 hrs, Volume= 0.436 af, Atten= 0%, Lag= 0.0 min

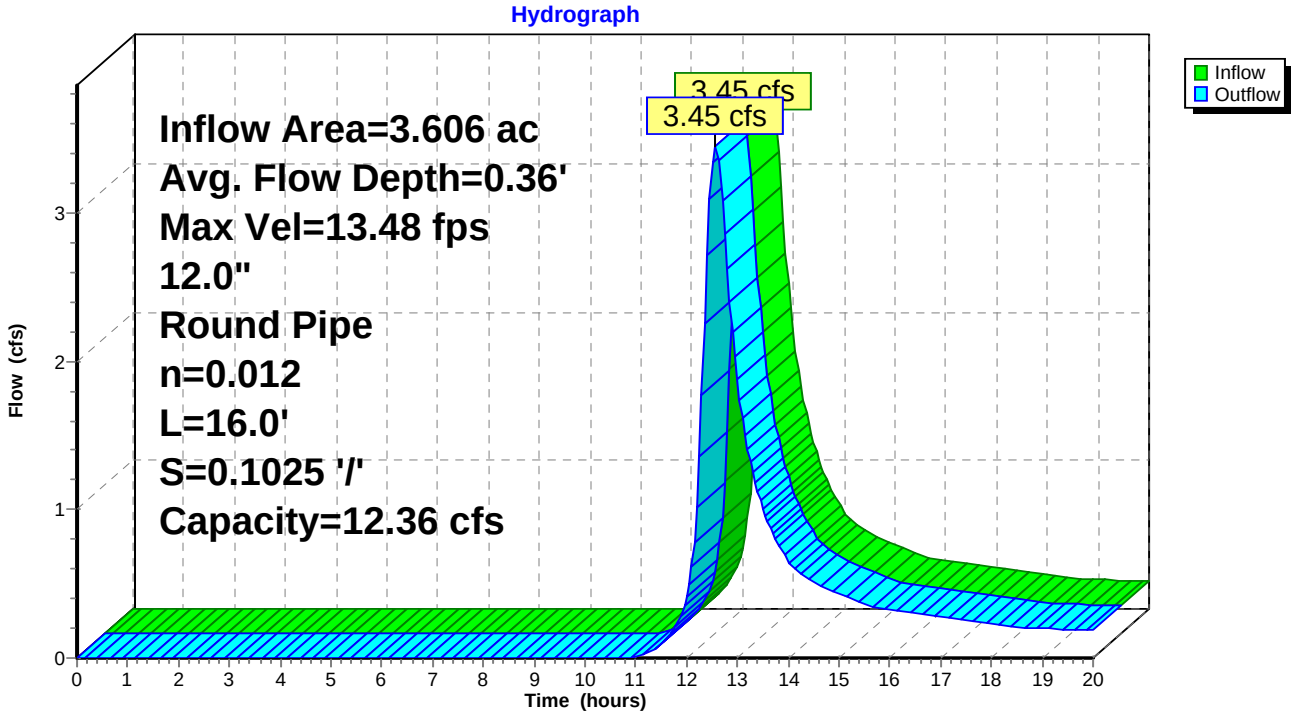
Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 13.48 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 7.05 fps, Avg. Travel Time= 0.0 min

Peak Storage= 4 cf @ 12.56 hrs
Average Depth at Peak Storage= 0.36'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 12.36 cfs

12.0" Round Pipe
n= 0.012 Concrete pipe, finished
Length= 16.0' Slope= 0.1025 '/'
Inlet Invert= 366.81', Outlet Invert= 365.17'



Reach DWP: Driveway Pipe



Summary for Reach FS: FIELD SWALE

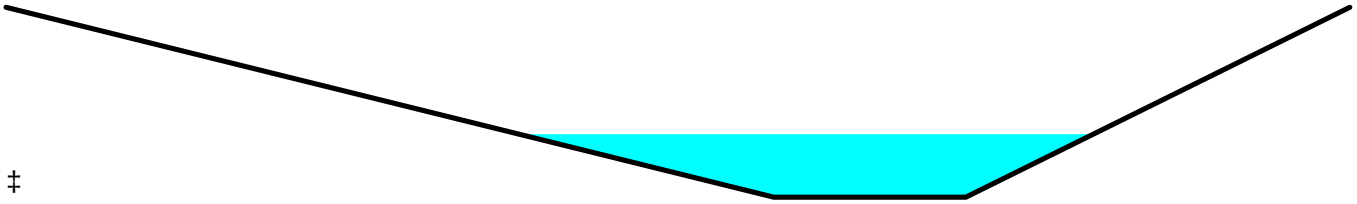
Existing sweale, no bed no banks, in hedgrow along edge of field

Inflow Area = 9.824 ac, 0.00% Impervious, Inflow Depth > 1.02" for 10-YR event
Inflow = 8.37 cfs @ 12.30 hrs, Volume= 0.832 af
Outflow = 7.59 cfs @ 12.47 hrs, Volume= 0.821 af, Atten= 9%, Lag= 10.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.15 fps, Min. Travel Time= 5.8 min
Avg. Velocity = 0.60 fps, Avg. Travel Time= 11.1 min

Peak Storage= 2,646 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.66'
Bank-Full Depth= 2.00' Flow Area= 40.0 sf, Capacity= 86.50 cfs

5.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 10.0 5.0 '/' Top Width= 35.00'
Length= 400.0' Slope= 0.0179 '/'
Inlet Invert= 365.17', Outlet Invert= 358.00'



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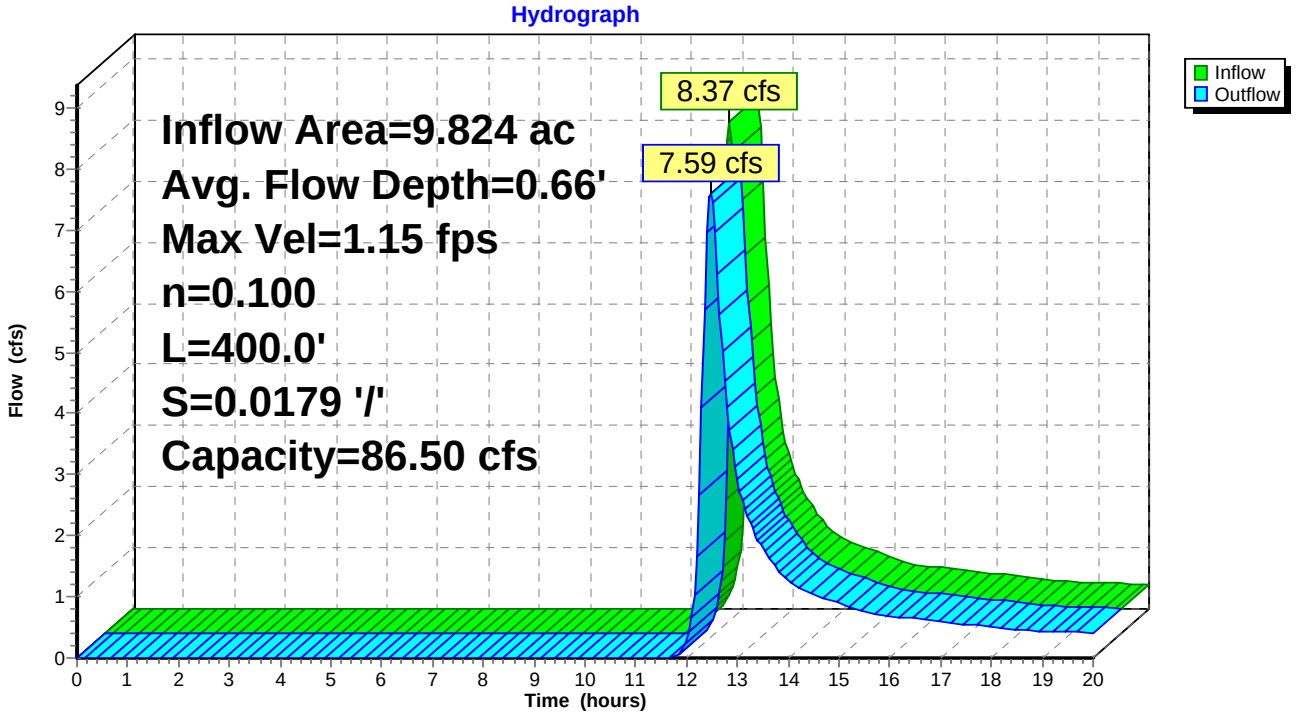
Reach FS: FIELD SWALE



Summary for Reach FS2: FIELD SWALE

Existing sweale, no bed no banks, in hedgrow along edge of field

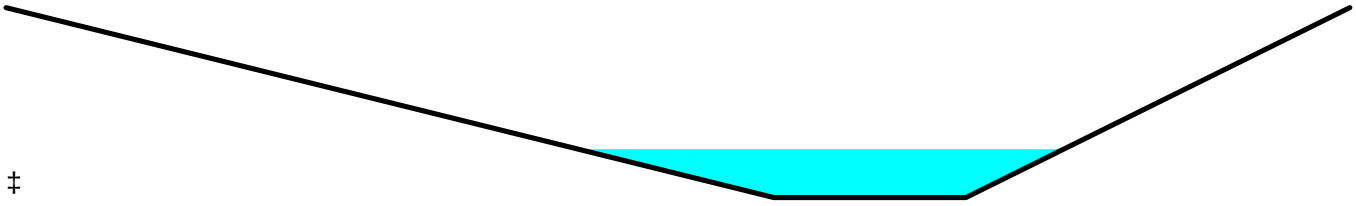
[62] Hint: Exceeded Reach DWP OUTLET depth by 0.19' @ 12.85 hrs

Inflow Area = 4.417 ac, 9.80% Impervious, Inflow Depth > 1.45" for 10-YR event
Inflow = 4.20 cfs @ 12.56 hrs, Volume= 0.534 af
Outflow = 3.71 cfs @ 12.90 hrs, Volume= 0.521 af, Atten= 12%, Lag= 20.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.83 fps, Min. Travel Time= 11.6 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 22.0 min

Peak Storage= 2,576 cf @ 12.70 hrs
Average Depth at Peak Storage= 0.51'
Bank-Full Depth= 2.00' Flow Area= 40.0 sf, Capacity= 72.15 cfs

5.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 10.0 5.0 '/' Top Width= 35.00'
Length= 575.0' Slope= 0.0125 '/'
Inlet Invert= 365.17', Outlet Invert= 358.00'



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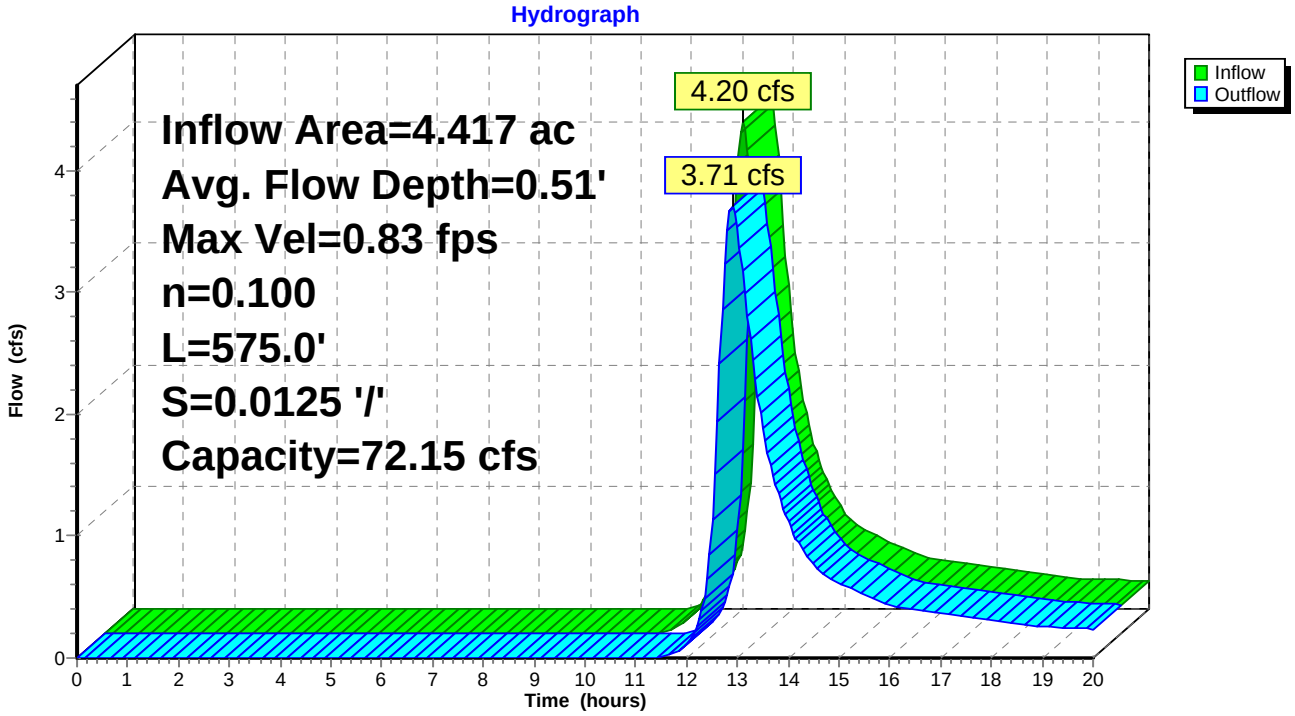
Reach FS2: FIELD SWALE

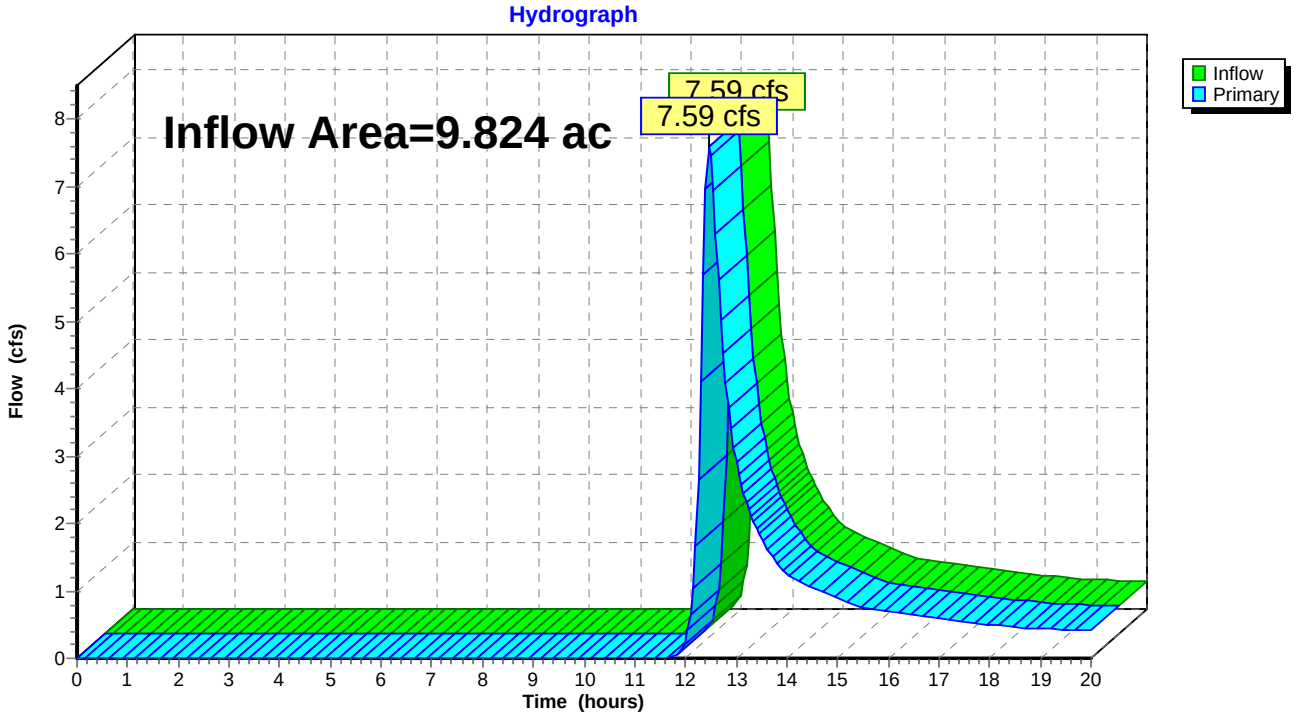


Summary for Link EONSITE FLOWS: Onsite Flows

Inflow Area = 9.824 ac, 0.00% Impervious, Inflow Depth > 1.00" for 10-YR event
Inflow = 7.59 cfs @ 12.47 hrs, Volume= 0.821 af
Primary = 7.59 cfs @ 12.47 hrs, Volume= 0.821 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link EONSITE FLOWS: Onsite Flows

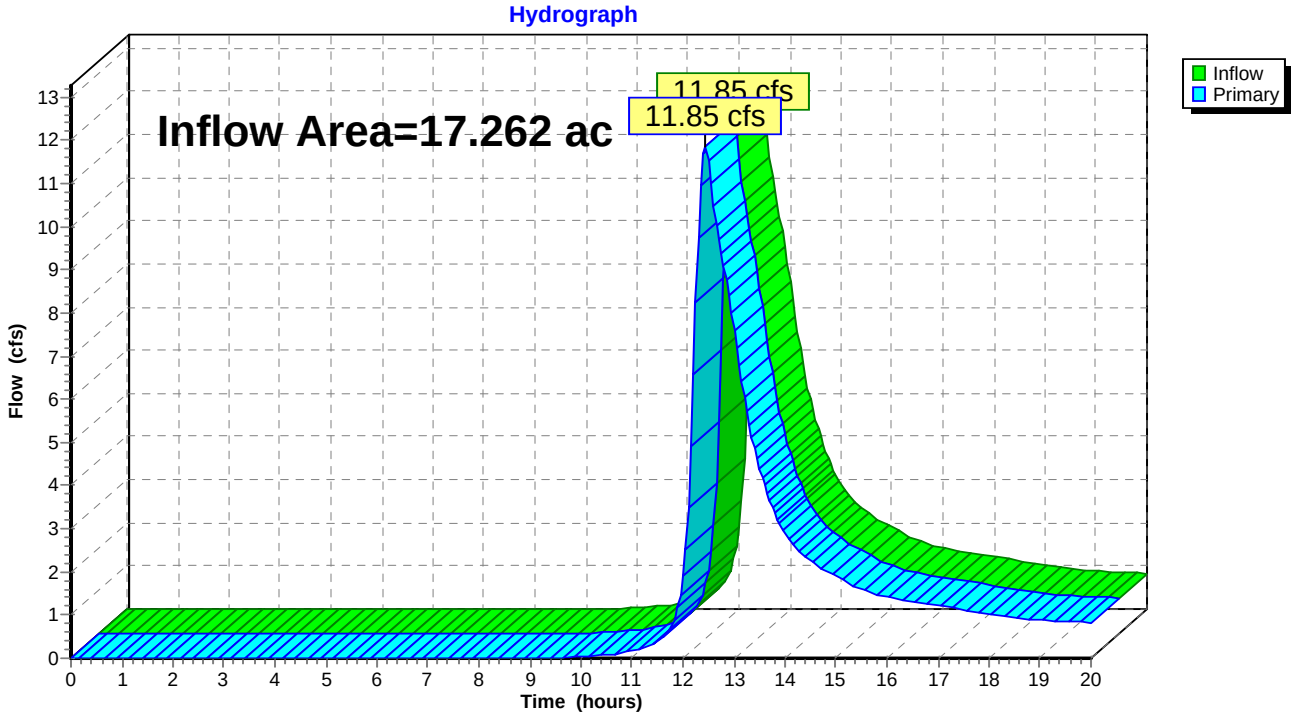


Summary for Link EXISTING: TOTAL FOR SP

Inflow Area = 17.262 ac, 2.51% Impervious, Inflow Depth > 1.27" for 10-YR event
Inflow = 11.85 cfs @ 12.44 hrs, Volume= 1.822 af
Primary = 11.85 cfs @ 12.44 hrs, Volume= 1.822 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link EXISTING: TOTAL FOR SP

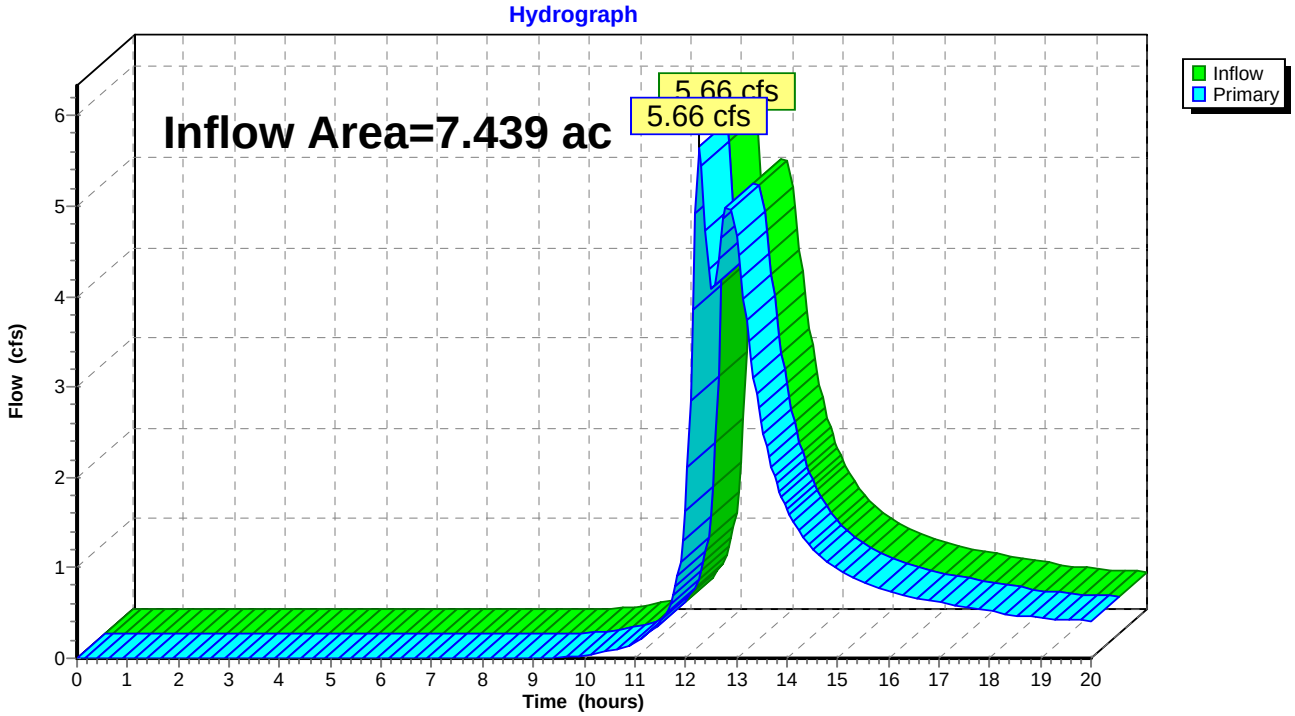


Summary for Link OTHER: OTHER LAND

Inflow Area = 7.439 ac, 5.82% Impervious, Inflow Depth > 1.61" for 10-YR event
Inflow = 5.66 cfs @ 12.28 hrs, Volume= 1.001 af
Primary = 5.66 cfs @ 12.28 hrs, Volume= 1.001 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link OTHER: OTHER LAND



Summary for Subcatchment MAIN: MAIN PORTION

LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B

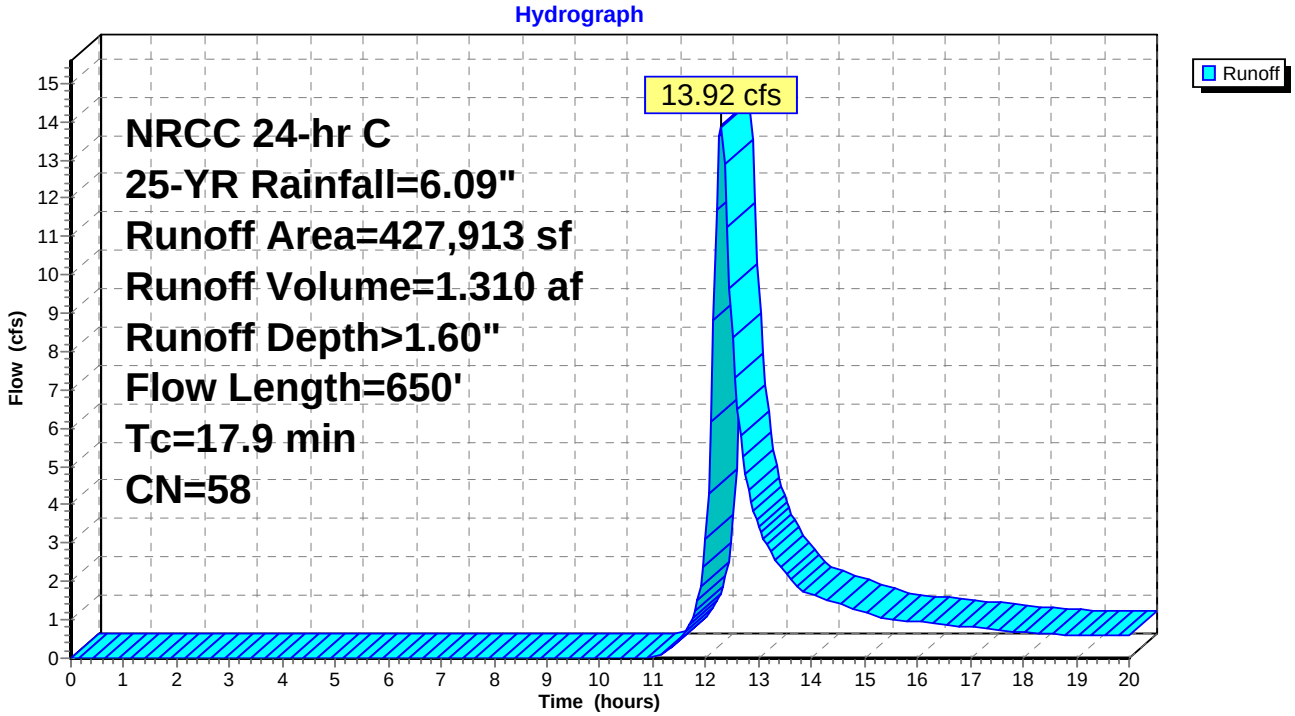
Runoff = 13.92 cfs @ 12.29 hrs, Volume= 1.310 af, Depth> 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 25-YR Rainfall=6.09"

Area (sf)	CN	Description
427,913	58	Meadow, non-grazed, HSG B
427,913		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0500	0.17		**Sheet Flow, Meadow** Grass: Dense n= 0.240 P2= 3.38"
8.3	550	0.0250	1.11		**Shallow Concentrated Flow, Meadow** Short Grass Pasture Kv= 7.0 fps
17.9	650	Total			

Subcatchment MAIN: MAIN PORTION



Summary for Subcatchment OFF DW: Driveway to PL

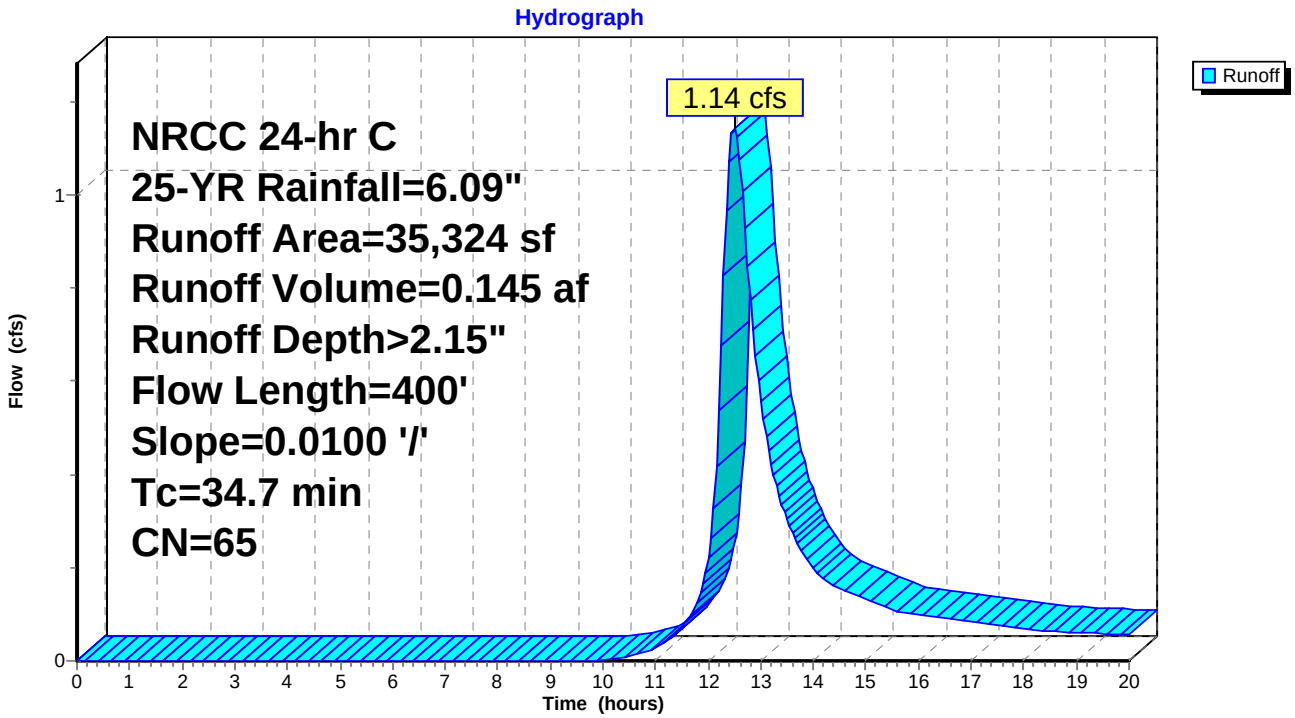
Runoff = 1.14 cfs @ 12.50 hrs, Volume= 0.145 af, Depth> 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 25-YR Rainfall=6.09"

Area (sf)	CN	Description
35,324	65	Brush, Good, HSG C
35,324		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	100	0.0100	0.06		**Sheet Flow, SURACE FLOW** Woods: Light underbrush n= 0.400 P2= 3.38"
7.1	300	0.0100	0.70		**Shallow Concentrated Flow, Un defined swale area** Short Grass Pasture Kv= 7.0 fps
34.7	400	Total			

Subcatchment OFF DW: Driveway to PL



Summary for Subcatchment OFFSITE: Exisiting home east

LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B

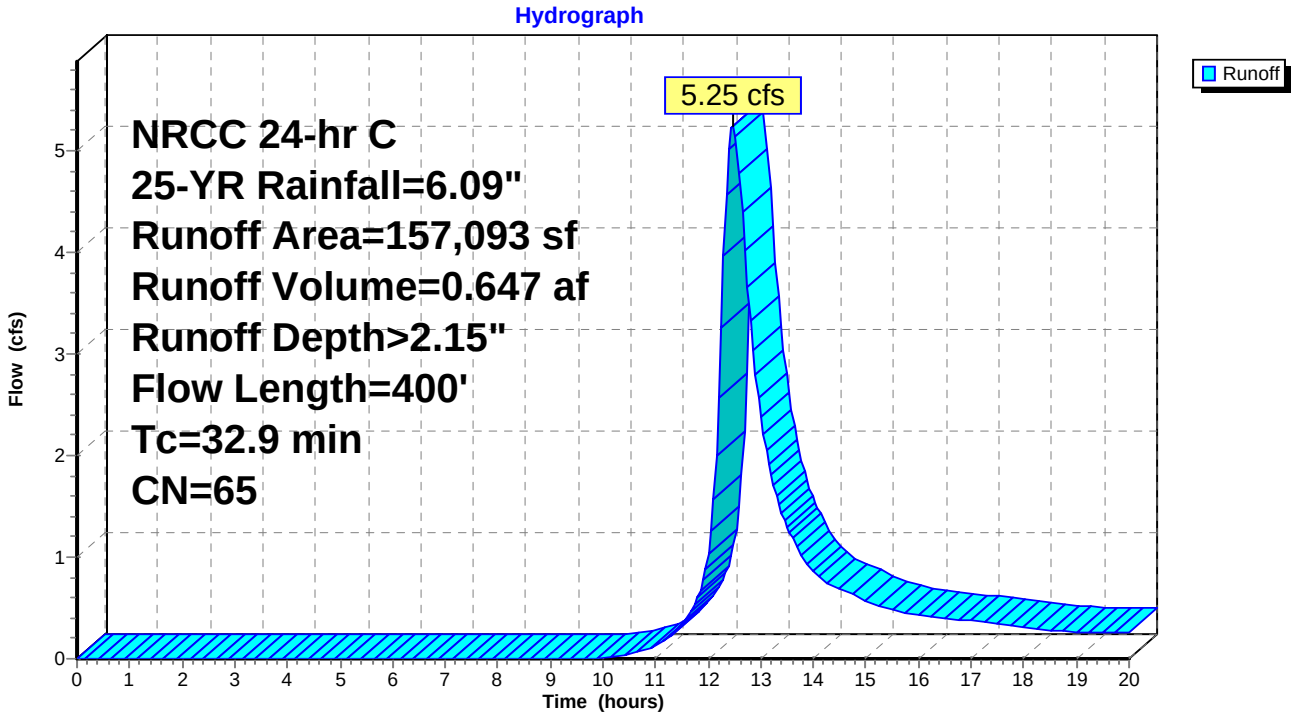
Runoff = 5.25 cfs @ 12.47 hrs, Volume= 0.647 af, Depth> 2.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 25-YR Rainfall=6.09"

Area (sf)	CN	Description
157,093	65	2 acre lots, 12% imp, HSG B
138,242		88.00% Pervious Area
18,851		12.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	100	0.0400	0.06		**Sheet Flow, Woods and Shrubs** Woods: Dense underbrush n= 0.800 P2= 3.38"
5.3	300	0.0350	0.94		**Shallow Concentrated Flow, Woods and Shrubs** Woodland Kv= 5.0 fps
32.9	400	Total			

Subcatchment OFFSITE: Exisiting home east



Summary for Subcatchment SOUTH: TO HEDGEROW

AbrB—Abbottstown silt loam, 2 to 6 percent slopes HSG C

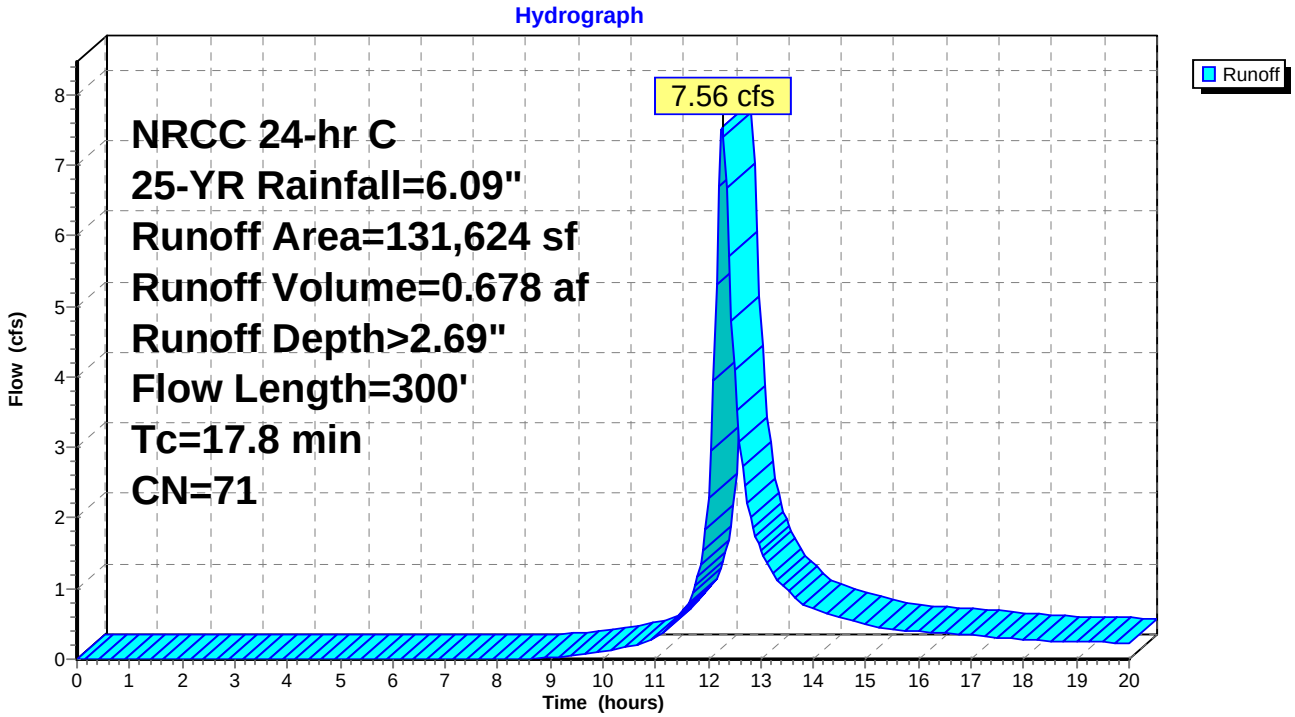
Runoff = 7.56 cfs @ 12.27 hrs, Volume= 0.678 af, Depth> 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 25-YR Rainfall=6.09"

Area (sf)	CN	Description
131,624	71	Meadow, non-grazed, HSG C
131,624		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0200	0.12		**Sheet Flow, Meadow** Grass: Dense n= 0.240 P2= 3.38"
3.9	200	0.0150	0.86		**Shallow Concentrated Flow, Meadow** Short Grass Pasture Kv= 7.0 fps
17.8	300	Total			

Subcatchment SOUTH: TO HEDGEROW



Summary for Reach DW: Driveway Swale

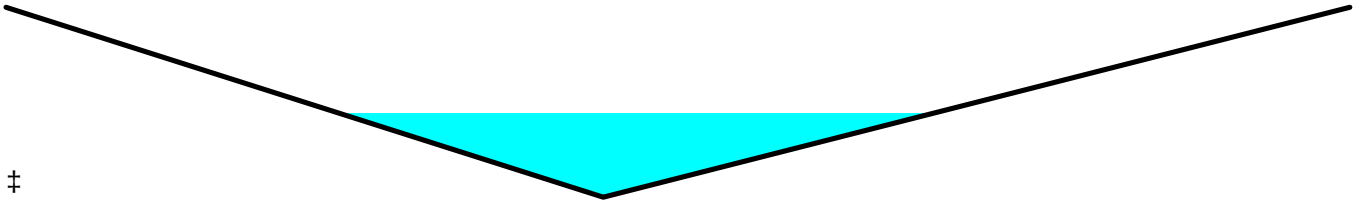
Existing sweale, no bed no banks, in hedgrow along edge of field

Inflow Area = 3.606 ac, 12.00% Impervious, Inflow Depth > 2.15" for 25-YR event
Inflow = 5.25 cfs @ 12.47 hrs, Volume= 0.647 af
Outflow = 5.20 cfs @ 12.55 hrs, Volume= 0.644 af, Atten= 1%, Lag= 4.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.47 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 0.80 fps, Avg. Travel Time= 4.2 min

Peak Storage= 708 cf @ 12.51 hrs
Average Depth at Peak Storage= 0.89'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 45.58 cfs

0.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 4.0 5.0 '/' Top Width= 18.00'
Length= 200.0' Slope= 0.0300 '/'
Inlet Invert= 367.00', Outlet Invert= 361.00'



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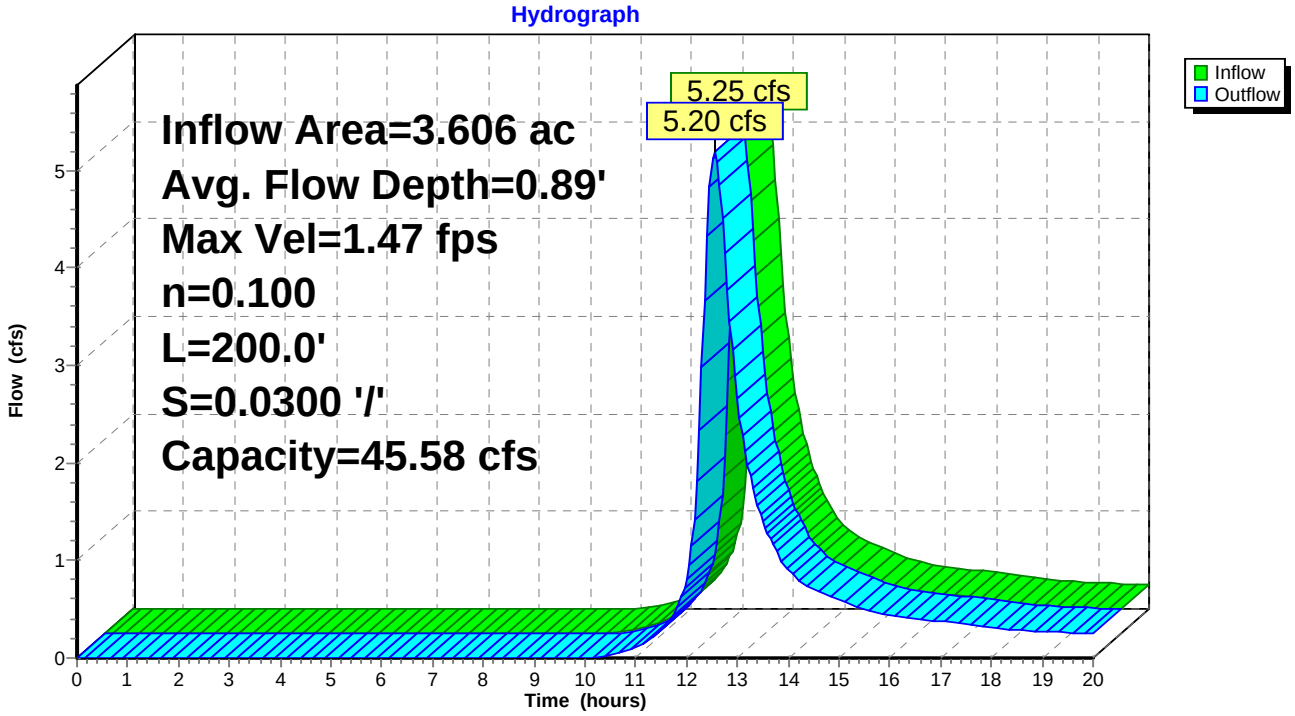
Reach DW: Driveway Swale



Summary for Reach DWP: Driveway Pipe

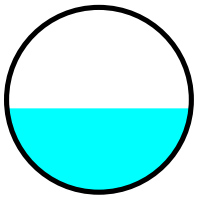
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach DW OUTLET depth by 5.81' @ 0.00 hrs

Inflow Area = 3.606 ac, 12.00% Impervious, Inflow Depth > 2.14" for 25-YR event
Inflow = 5.20 cfs @ 12.55 hrs, Volume= 0.644 af
Outflow = 5.20 cfs @ 12.55 hrs, Volume= 0.644 af, Atten= 0%, Lag= 0.0 min

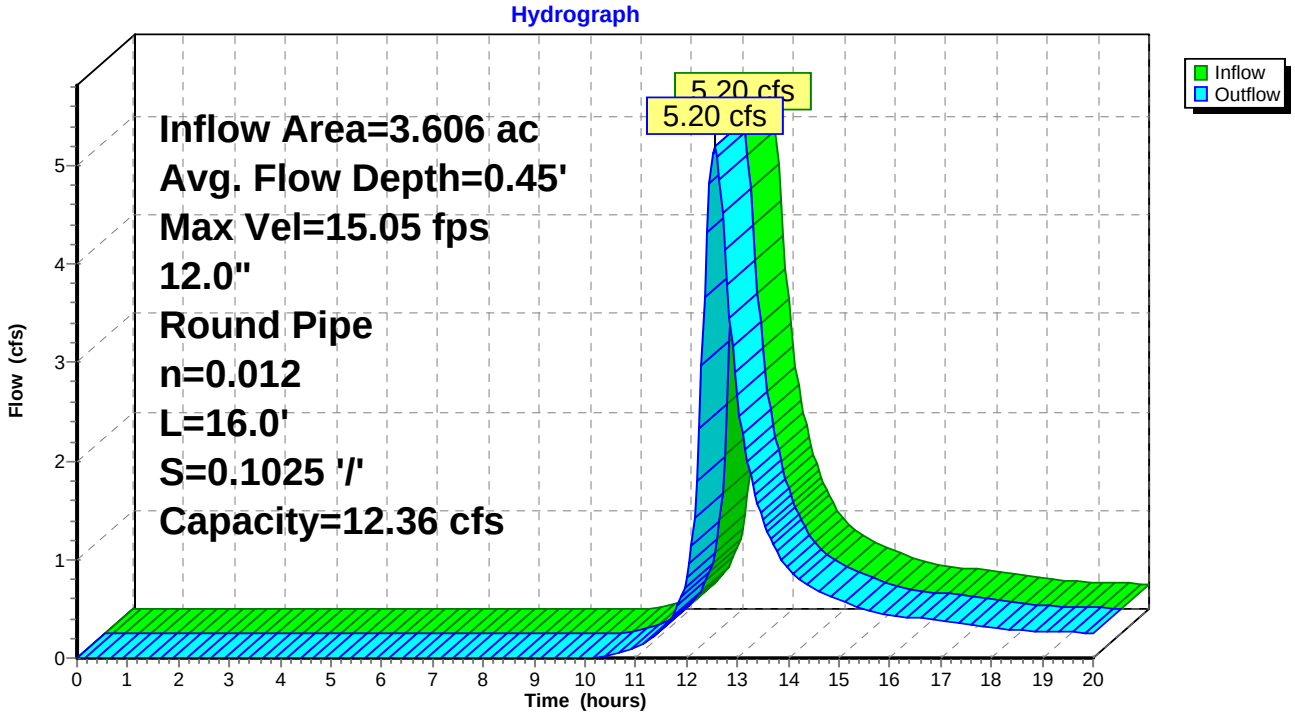
Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 15.05 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 7.60 fps, Avg. Travel Time= 0.0 min

Peak Storage= 6 cf @ 12.55 hrs
Average Depth at Peak Storage= 0.45'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 12.36 cfs

12.0" Round Pipe
n= 0.012 Concrete pipe, finished
Length= 16.0' Slope= 0.1025 '/'
Inlet Invert= 366.81', Outlet Invert= 365.17'



Reach DWP: Driveway Pipe



Summary for Reach FS: FIELD SWALE

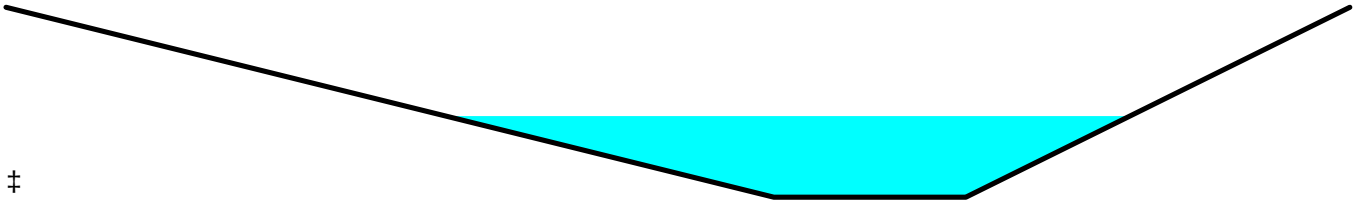
Existing sweale, no bed no banks, in hedgrow along edge of field

Inflow Area = 9.824 ac, 0.00% Impervious, Inflow Depth > 1.60" for 25-YR event
Inflow = 13.92 cfs @ 12.29 hrs, Volume= 1.310 af
Outflow = 12.79 cfs @ 12.44 hrs, Volume= 1.296 af, Atten= 8%, Lag= 9.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.32 fps, Min. Travel Time= 5.0 min
Avg. Velocity = 0.66 fps, Avg. Travel Time= 10.1 min

Peak Storage= 3,902 cf @ 12.35 hrs
Average Depth at Peak Storage= 0.85'
Bank-Full Depth= 2.00' Flow Area= 40.0 sf, Capacity= 86.50 cfs

5.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 10.0 5.0 '/' Top Width= 35.00'
Length= 400.0' Slope= 0.0179 '/'
Inlet Invert= 365.17', Outlet Invert= 358.00'



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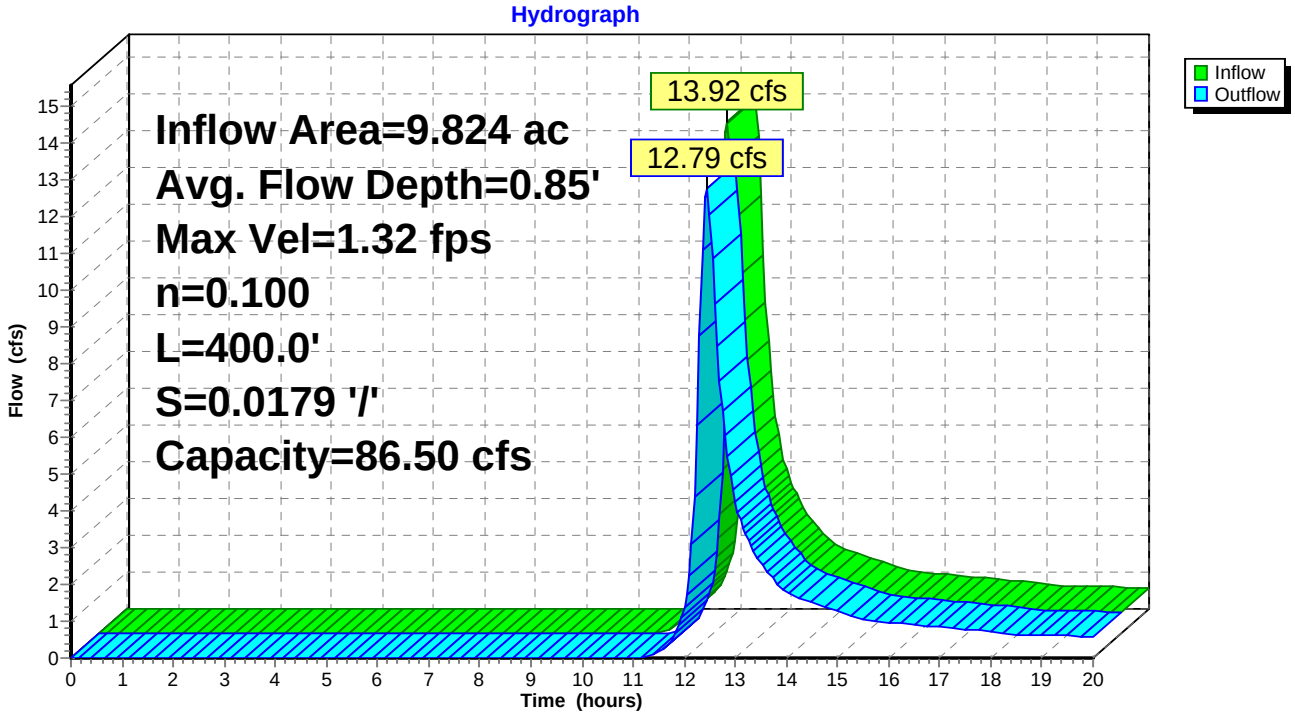
Reach FS: FIELD SWALE



Summary for Reach FS2: FIELD SWALE

Existing sweale, no bed no banks, in hedgrow along edge of field

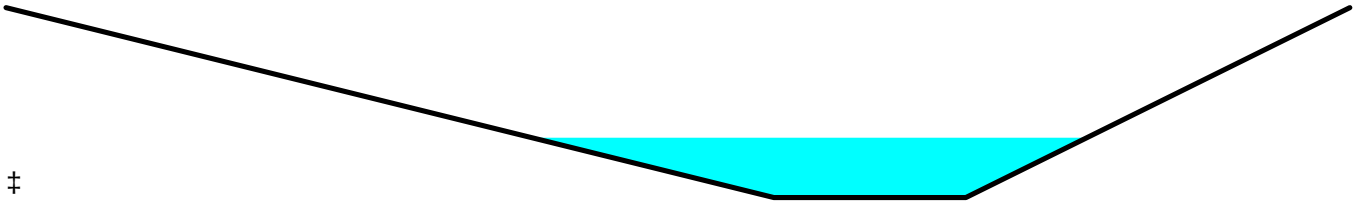
[62] Hint: Exceeded Reach DWP OUTLET depth by 0.23' @ 12.85 hrs

Inflow Area = 4.417 ac, 9.80% Impervious, Inflow Depth > 2.14" for 25-YR event
Inflow = 6.33 cfs @ 12.54 hrs, Volume= 0.789 af
Outflow = 5.70 cfs @ 12.84 hrs, Volume= 0.774 af, Atten= 10%, Lag= 18.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.93 fps, Min. Travel Time= 10.3 min
Avg. Velocity = 0.47 fps, Avg. Travel Time= 20.5 min

Peak Storage= 3,527 cf @ 12.67 hrs
Average Depth at Peak Storage= 0.63'
Bank-Full Depth= 2.00' Flow Area= 40.0 sf, Capacity= 72.15 cfs

5.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 10.0 5.0 '/' Top Width= 35.00'
Length= 575.0' Slope= 0.0125 '/'
Inlet Invert= 365.17', Outlet Invert= 358.00'



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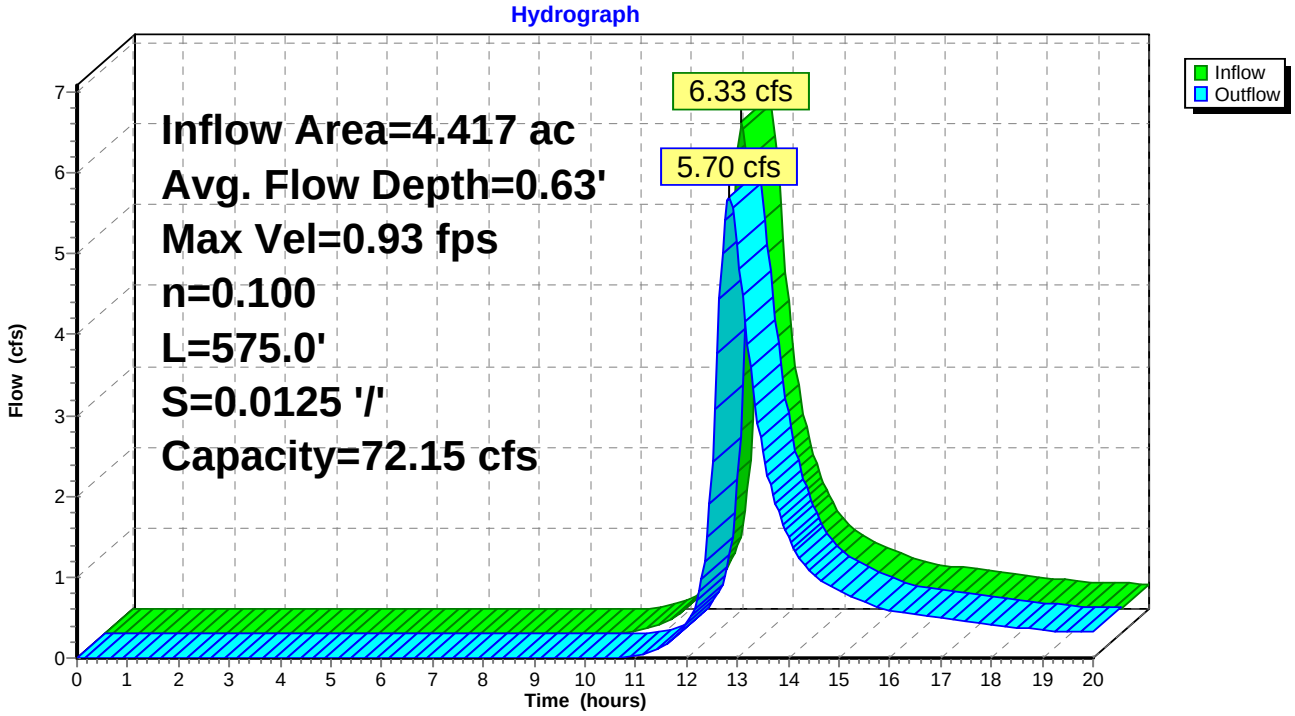
Reach FS2: FIELD SWALE

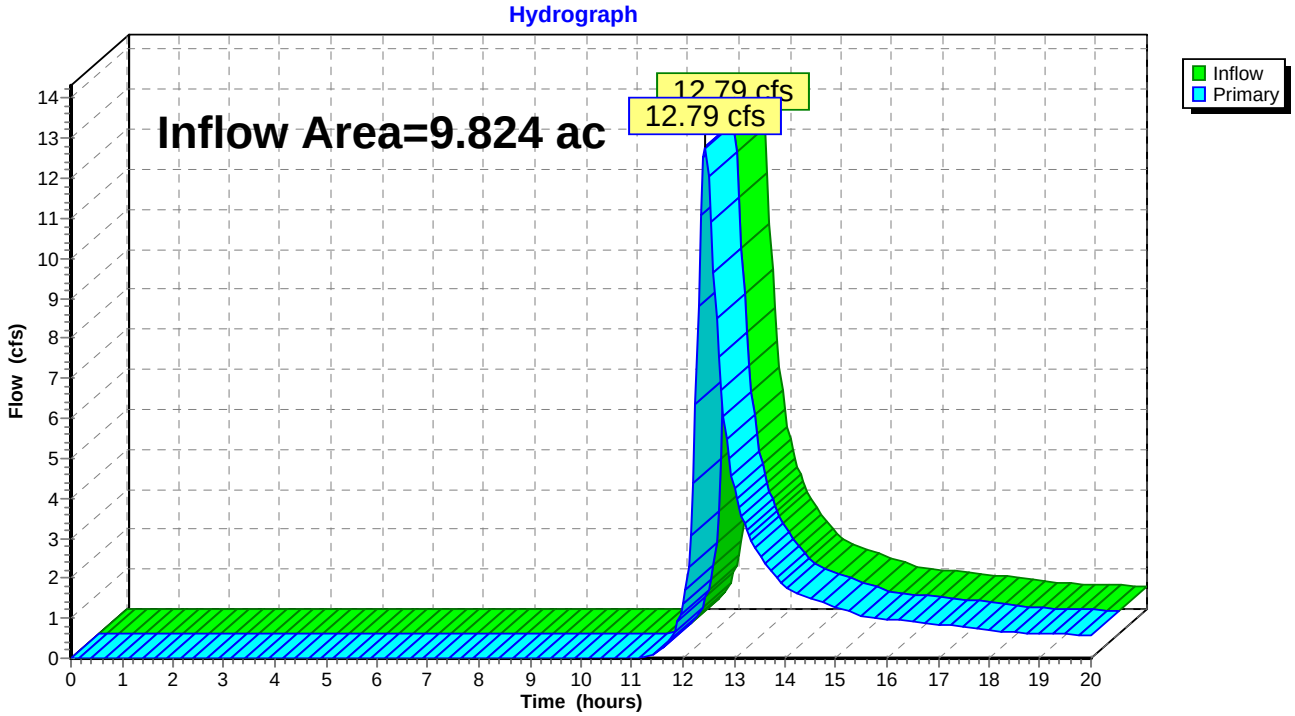


Summary for Link EONSITE FLOWS: Onsite Flows

Inflow Area = 9.824 ac, 0.00% Impervious, Inflow Depth > 1.58" for 25-YR event
Inflow = 12.79 cfs @ 12.44 hrs, Volume= 1.296 af
Primary = 12.79 cfs @ 12.44 hrs, Volume= 1.296 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link EONSITE FLOWS: Onsite Flows

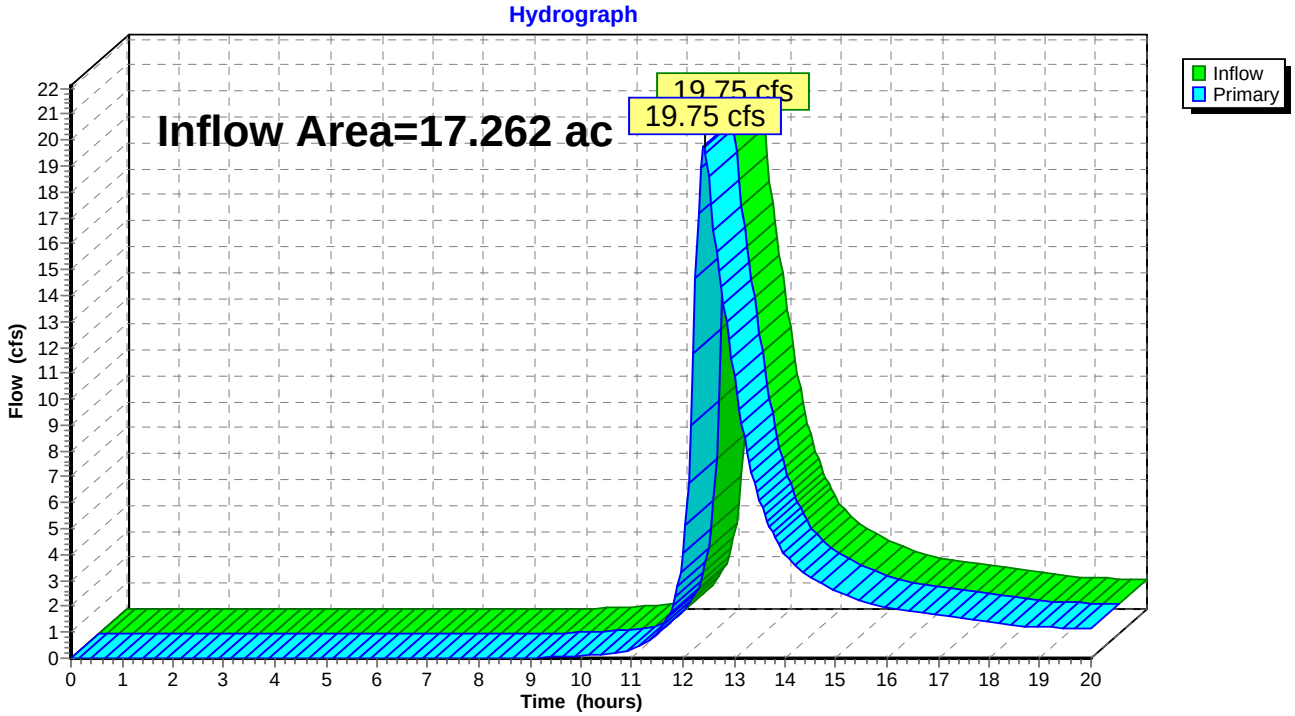


Summary for Link EXISTING: TOTAL FOR SP

Inflow Area = 17.262 ac, 2.51% Impervious, Inflow Depth > 1.91" for 25-YR event
Inflow = 19.75 cfs @ 12.41 hrs, Volume= 2.748 af
Primary = 19.75 cfs @ 12.41 hrs, Volume= 2.748 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link EXISTING: TOTAL FOR SP

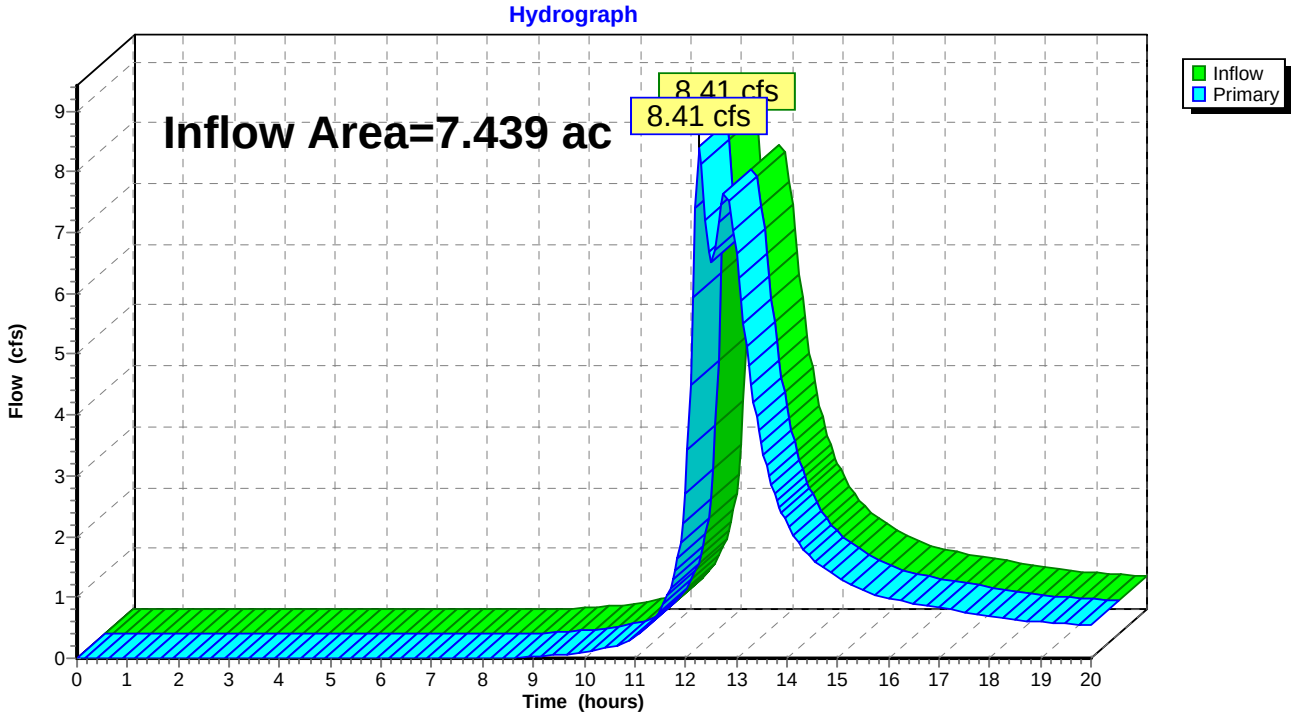


Summary for Link OTHER: OTHER LAND

Inflow Area = 7.439 ac, 5.82% Impervious, Inflow Depth > 2.34" for 25-YR event
Inflow = 8.41 cfs @ 12.28 hrs, Volume= 1.453 af
Primary = 8.41 cfs @ 12.28 hrs, Volume= 1.453 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link OTHER: OTHER LAND



Summary for Subcatchment MAIN: MAIN PORTION

LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B

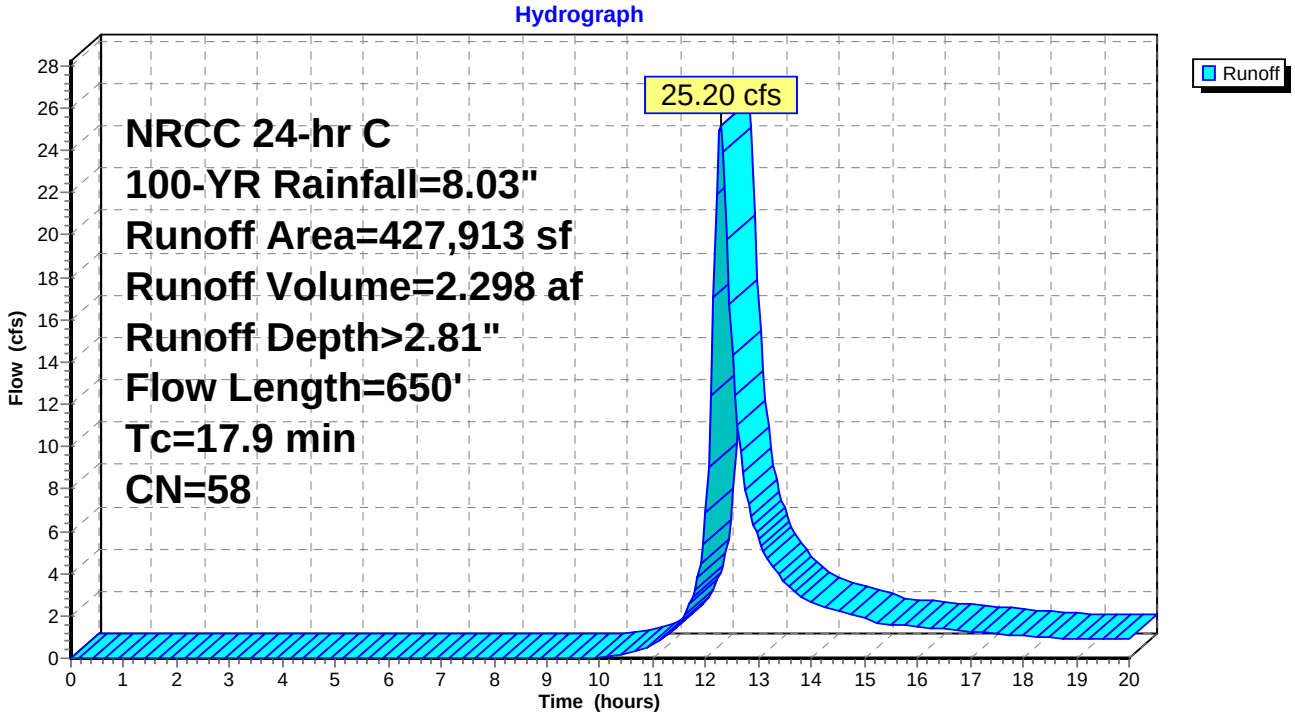
Runoff = 25.20 cfs @ 12.28 hrs, Volume= 2.298 af, Depth> 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-YR Rainfall=8.03"

Area (sf)	CN	Description
427,913	58	Meadow, non-grazed, HSG B
427,913		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0500	0.17		**Sheet Flow, Meadow** Grass: Dense n= 0.240 P2= 3.38"
8.3	550	0.0250	1.11		**Shallow Concentrated Flow, Meadow** Short Grass Pasture Kv= 7.0 fps
17.9	650	Total			

Subcatchment MAIN: MAIN PORTION



Summary for Subcatchment OFF DW: Driveway to PL

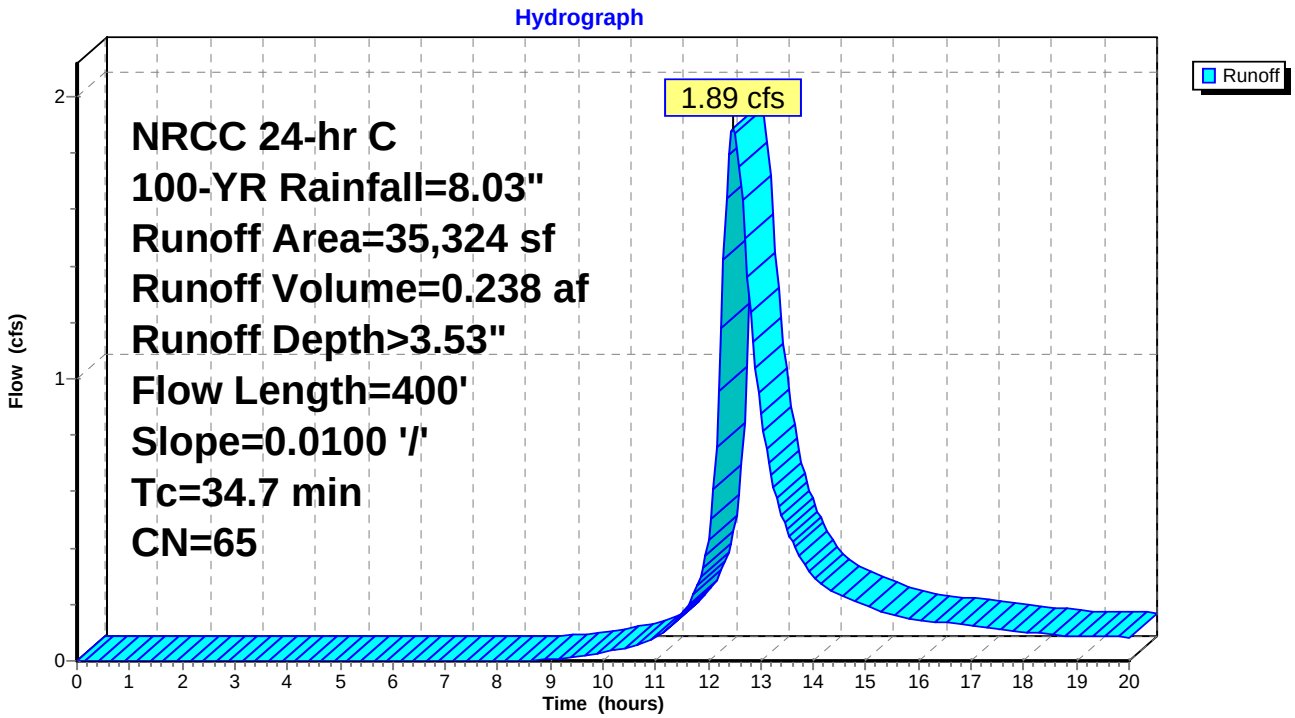
Runoff = 1.89 cfs @ 12.48 hrs, Volume= 0.238 af, Depth> 3.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-YR Rainfall=8.03"

Area (sf)	CN	Description
35,324	65	Brush, Good, HSG C
35,324		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	100	0.0100	0.06		**Sheet Flow, SURACE FLOW** Woods: Light underbrush n= 0.400 P2= 3.38"
7.1	300	0.0100	0.70		**Shallow Concentrated Flow, Un defined swale area** Short Grass Pasture Kv= 7.0 fps
34.7	400	Total			

Subcatchment OFF DW: Driveway to PL



Summary for Subcatchment OFFSITE: Exisiting home east

LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B

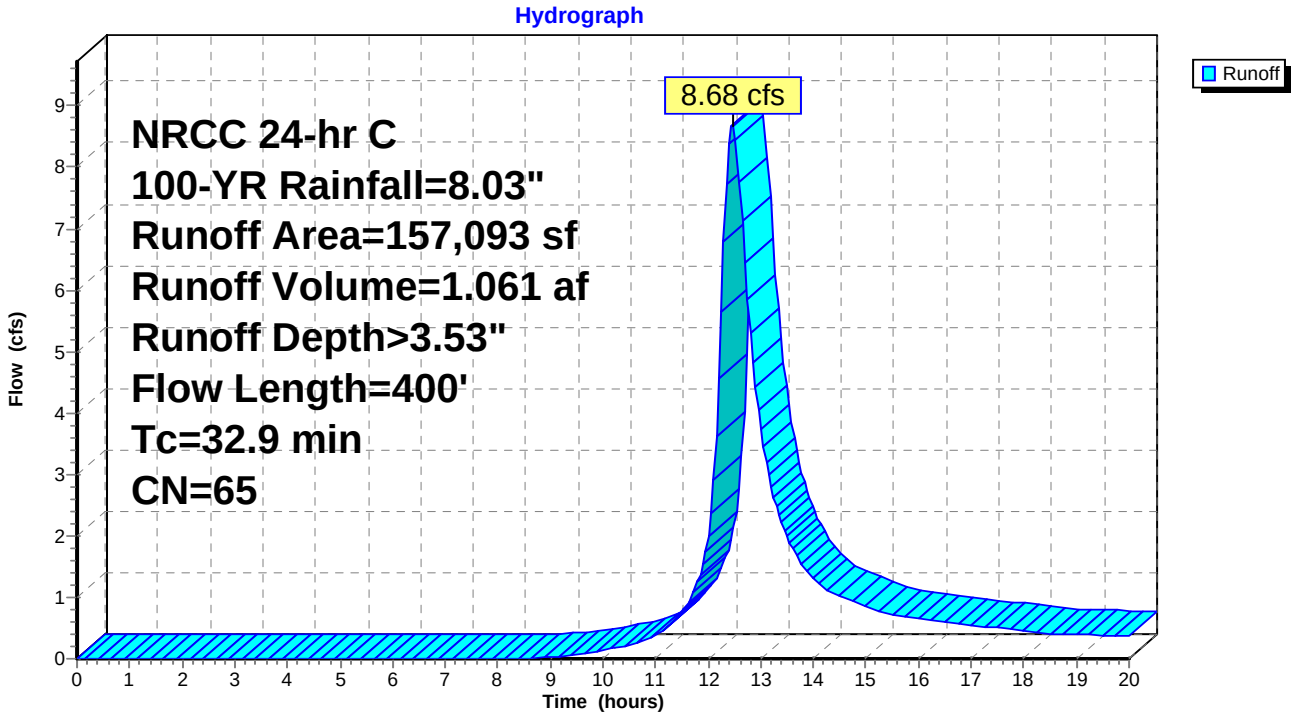
Runoff = 8.68 cfs @ 12.47 hrs, Volume= 1.061 af, Depth> 3.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-YR Rainfall=8.03"

Area (sf)	CN	Description
157,093	65	2 acre lots, 12% imp, HSG B
138,242		88.00% Pervious Area
18,851		12.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	100	0.0400	0.06		**Sheet Flow, Woods and Shrubs** Woods: Dense underbrush n= 0.800 P2= 3.38"
5.3	300	0.0350	0.94		**Shallow Concentrated Flow, Woods and Shrubs** Woodland Kv= 5.0 fps
32.9	400	Total			

Subcatchment OFFSITE: Exisiting home east



Summary for Subcatchment SOUTH: TO HEDGEROW

AbrB—Abbottstown silt loam, 2 to 6 percent slopes HSG C

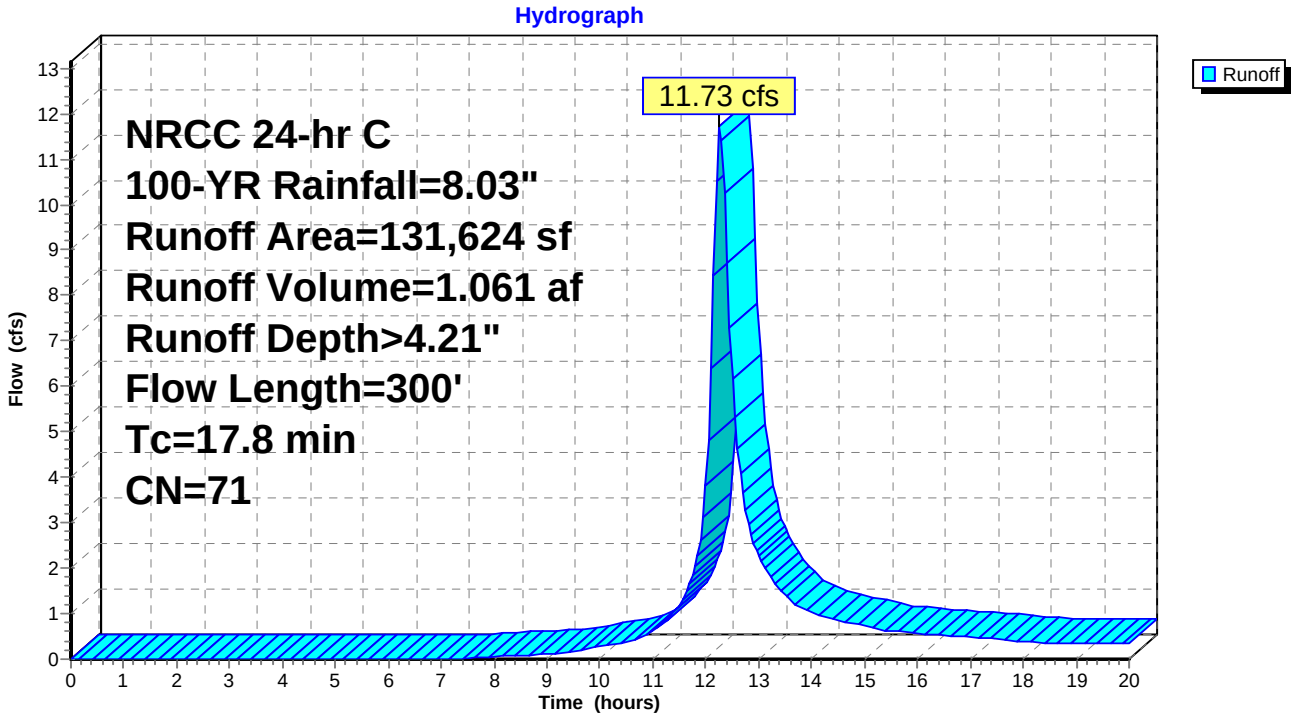
Runoff = 11.73 cfs @ 12.27 hrs, Volume= 1.061 af, Depth> 4.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-YR Rainfall=8.03"

Area (sf)	CN	Description
131,624	71	Meadow, non-grazed, HSG C
131,624		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0200	0.12		**Sheet Flow, Meadow** Grass: Dense n= 0.240 P2= 3.38"
3.9	200	0.0150	0.86		**Shallow Concentrated Flow, Meadow** Short Grass Pasture Kv= 7.0 fps
17.8	300	Total			

Subcatchment SOUTH: TO HEDGEROW



Summary for Reach DW: Driveway Swale

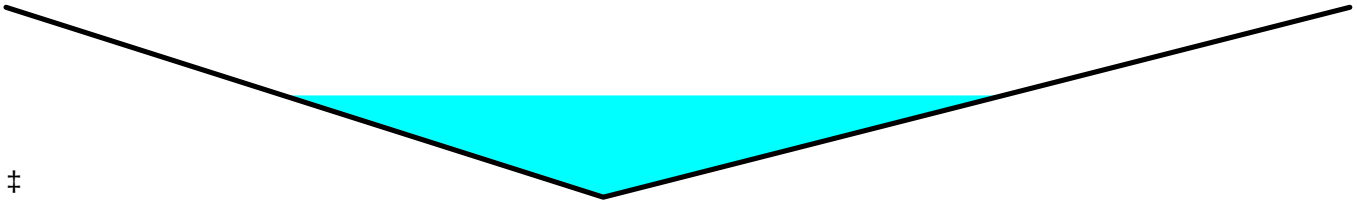
Existing sweale, no bed no banks, in hedgrow along edge of field

Inflow Area = 3.606 ac, 12.00% Impervious, Inflow Depth > 3.53" for 100-YR event
Inflow = 8.68 cfs @ 12.47 hrs, Volume= 1.061 af
Outflow = 8.60 cfs @ 12.53 hrs, Volume= 1.057 af, Atten= 1%, Lag= 3.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.67 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 0.86 fps, Avg. Travel Time= 3.9 min

Peak Storage= 1,034 cf @ 12.49 hrs
Average Depth at Peak Storage= 1.07'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 45.58 cfs

0.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 4.0 5.0 '/' Top Width= 18.00'
Length= 200.0' Slope= 0.0300 '/'
Inlet Invert= 367.00', Outlet Invert= 361.00'



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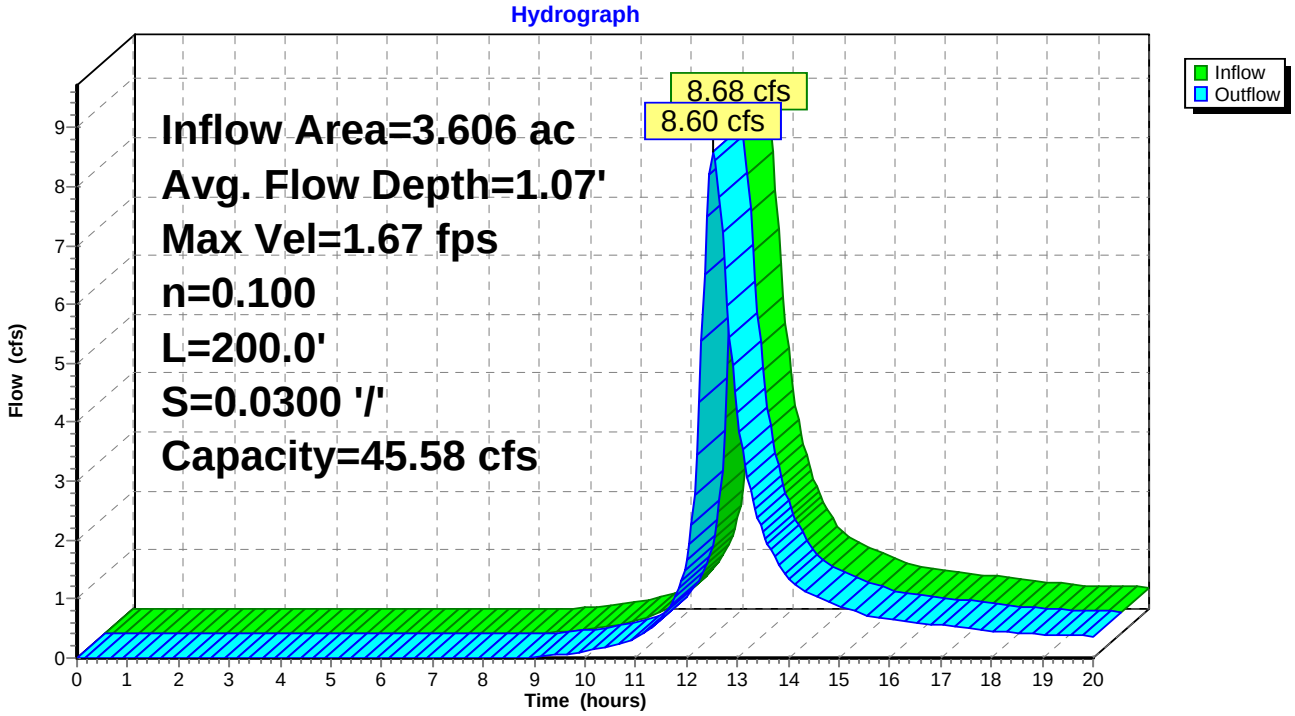
Reach DW: Driveway Swale



Summary for Reach DWP: Driveway Pipe

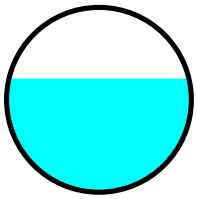
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach DW OUTLET depth by 5.81' @ 0.00 hrs

Inflow Area = 3.606 ac, 12.00% Impervious, Inflow Depth > 3.52" for 100-YR event
Inflow = 8.60 cfs @ 12.53 hrs, Volume= 1.057 af
Outflow = 8.60 cfs @ 12.53 hrs, Volume= 1.057 af, Atten= 0%, Lag= 0.0 min

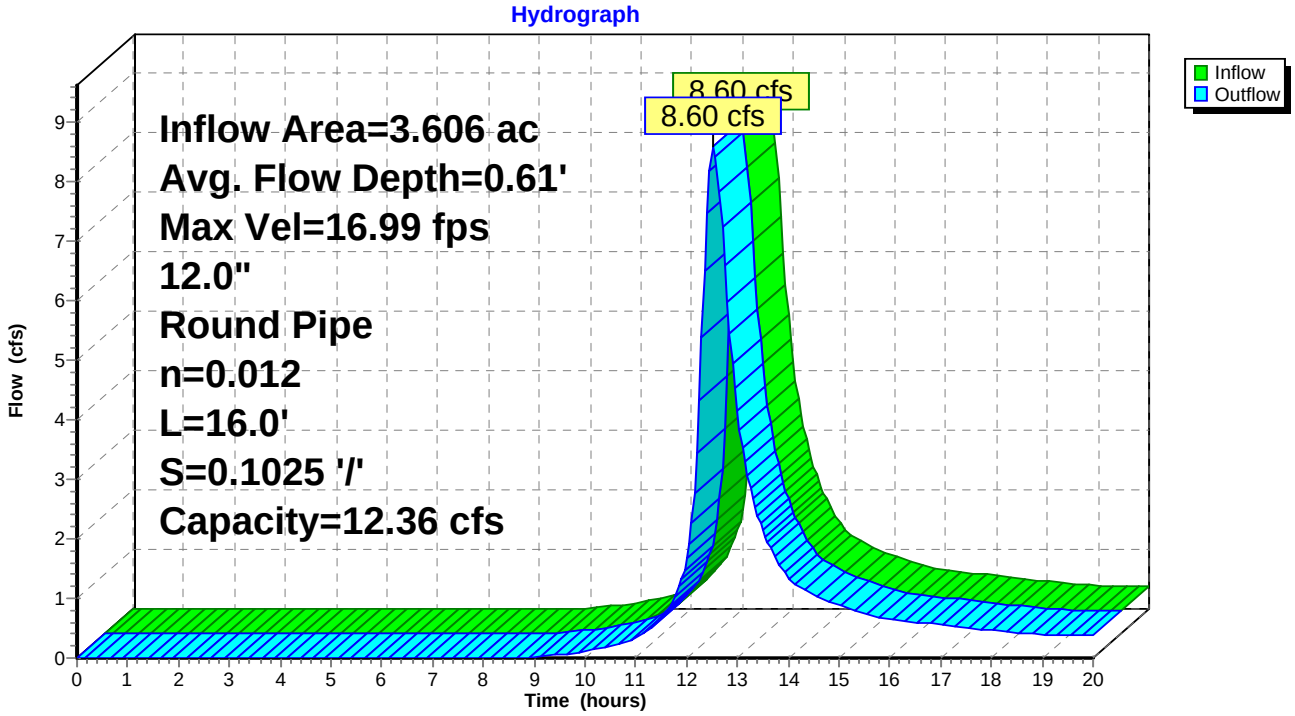
Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 16.99 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 8.27 fps, Avg. Travel Time= 0.0 min

Peak Storage= 8 cf @ 12.53 hrs
Average Depth at Peak Storage= 0.61'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 12.36 cfs

12.0" Round Pipe
n= 0.012 Concrete pipe, finished
Length= 16.0' Slope= 0.1025 '/'
Inlet Invert= 366.81', Outlet Invert= 365.17'



Reach DWP: Driveway Pipe



Summary for Reach FS: FIELD SWALE

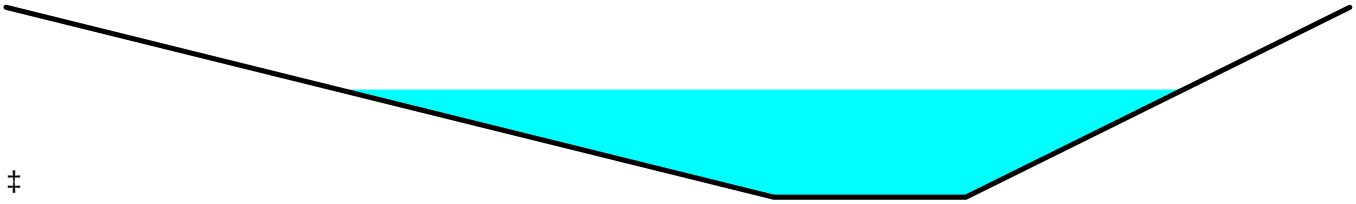
Existing sweale, no bed no banks, in hedgrow along edge of field

Inflow Area = 9.824 ac, 0.00% Impervious, Inflow Depth > 2.81" for 100-YR event
Inflow = 25.20 cfs @ 12.28 hrs, Volume= 2.298 af
Outflow = 23.59 cfs @ 12.41 hrs, Volume= 2.280 af, Atten= 6%, Lag= 7.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.55 fps, Min. Travel Time= 4.3 min
Avg. Velocity = 0.74 fps, Avg. Travel Time= 9.1 min

Peak Storage= 6,127 cf @ 12.33 hrs
Average Depth at Peak Storage= 1.13'
Bank-Full Depth= 2.00' Flow Area= 40.0 sf, Capacity= 86.50 cfs

5.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 10.0 5.0 '/' Top Width= 35.00'
Length= 400.0' Slope= 0.0179 '/'
Inlet Invert= 365.17', Outlet Invert= 358.00'



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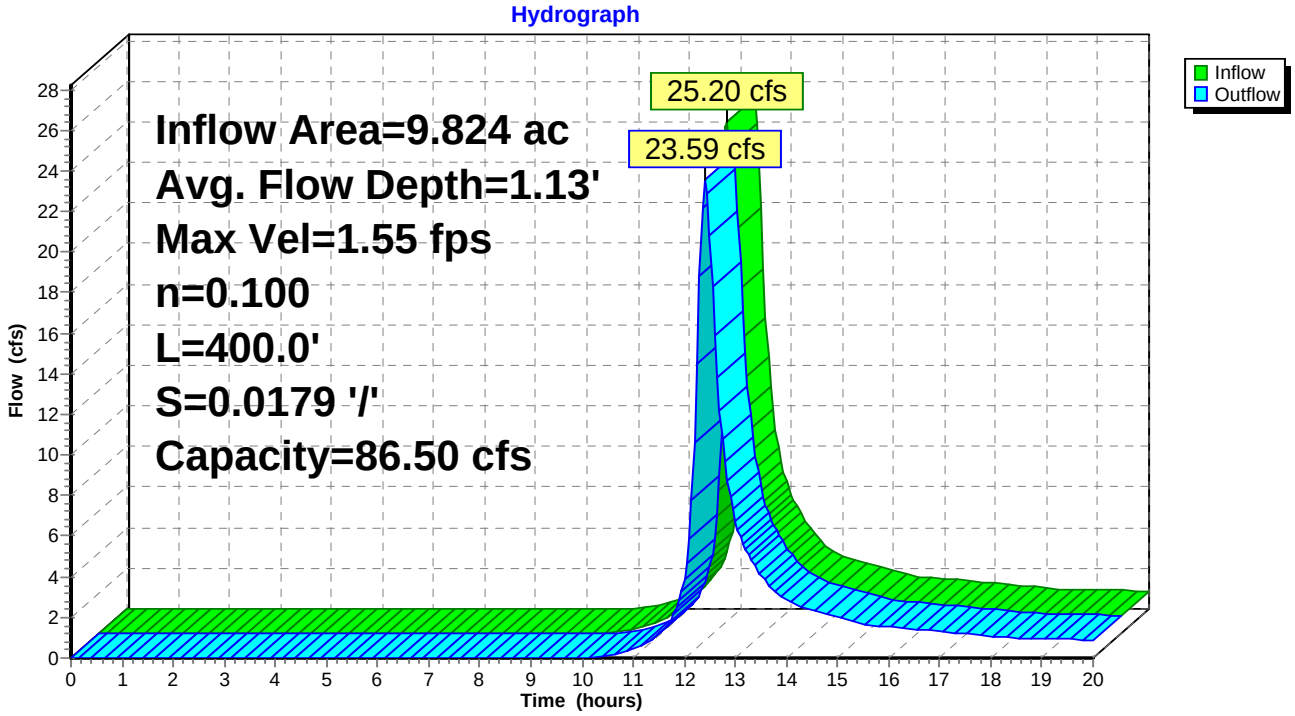
Reach FS: FIELD SWALE



Summary for Reach FS2: FIELD SWALE

Existing sweale, no bed no banks, in hedgrow along edge of field

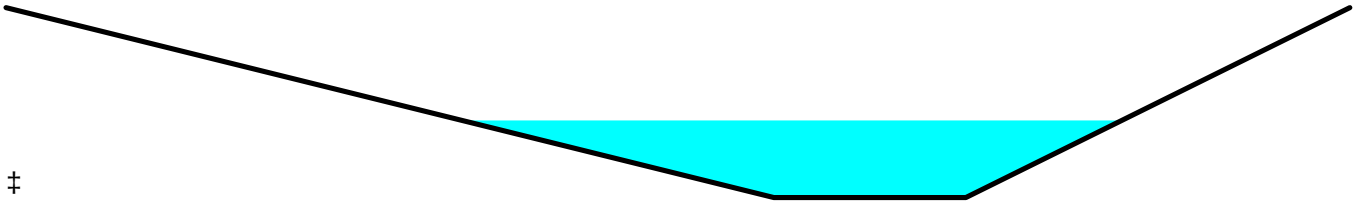
[62] Hint: Exceeded Reach DWP OUTLET depth by 0.27' @ 12.85 hrs

Inflow Area = 4.417 ac, 9.80% Impervious, Inflow Depth > 3.52" for 100-YR event
Inflow = 10.48 cfs @ 12.52 hrs, Volume= 1.296 af
Outflow = 9.67 cfs @ 12.79 hrs, Volume= 1.276 af, Atten= 8%, Lag= 15.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.07 fps, Min. Travel Time= 8.9 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 18.7 min

Peak Storage= 5,178 cf @ 12.64 hrs
Average Depth at Peak Storage= 0.81'
Bank-Full Depth= 2.00' Flow Area= 40.0 sf, Capacity= 72.15 cfs

5.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 10.0 5.0 '/' Top Width= 35.00'
Length= 575.0' Slope= 0.0125 '/'
Inlet Invert= 365.17', Outlet Invert= 358.00'



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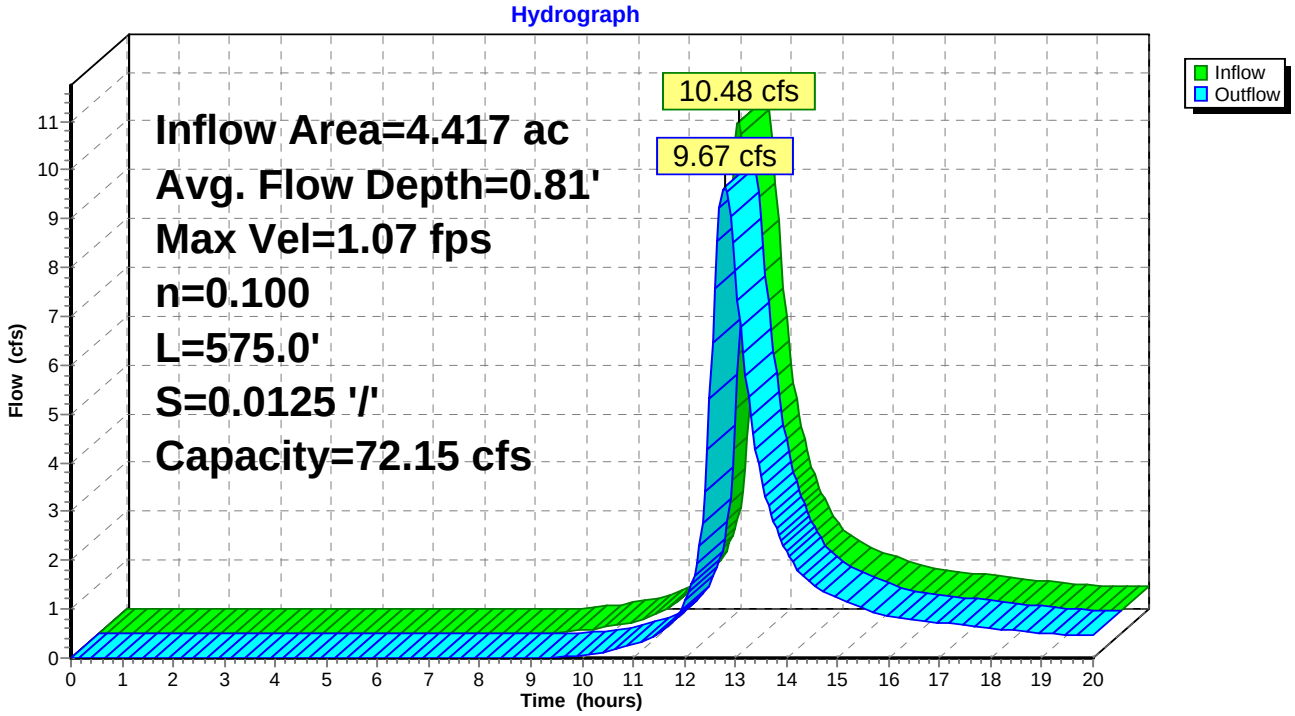
Reach FS2: FIELD SWALE

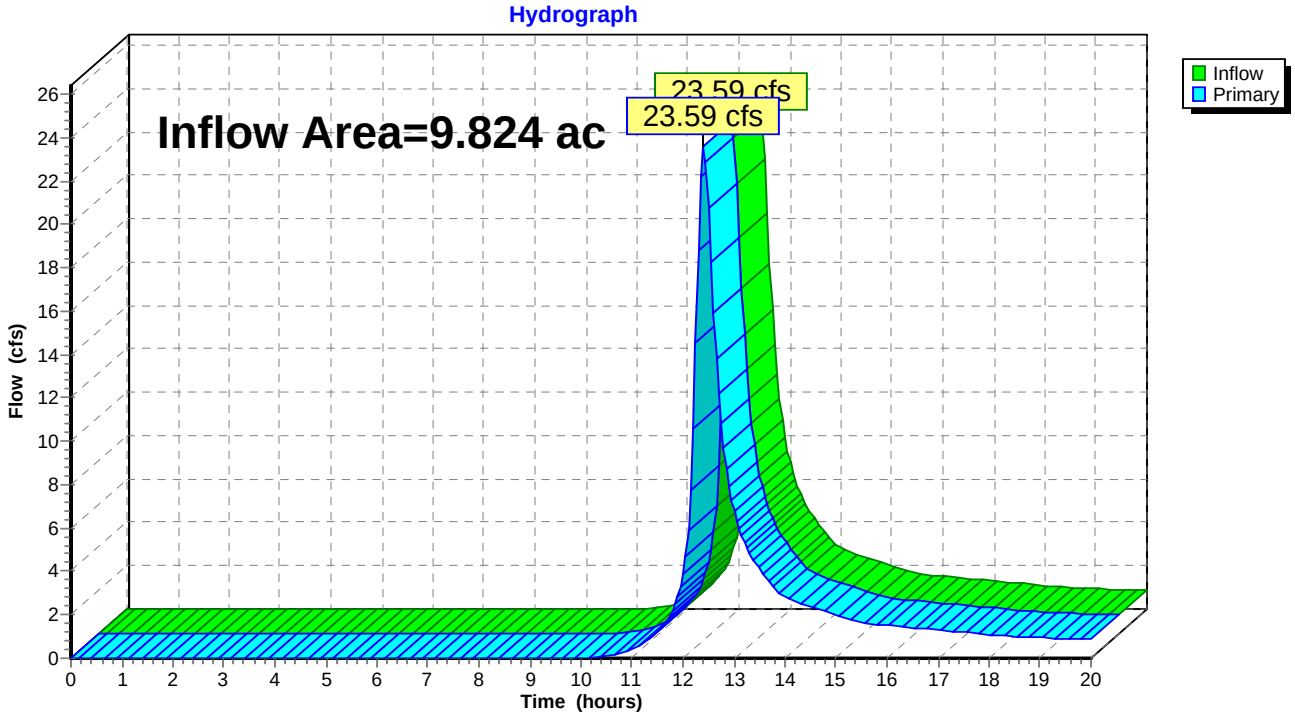


Summary for Link EONSITE FLOWS: Onsite Flows

Inflow Area = 9.824 ac, 0.00% Impervious, Inflow Depth > 2.78" for 100-YR event
Inflow = 23.59 cfs @ 12.41 hrs, Volume= 2.280 af
Primary = 23.59 cfs @ 12.41 hrs, Volume= 2.280 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link EONSITE FLOWS: Onsite Flows

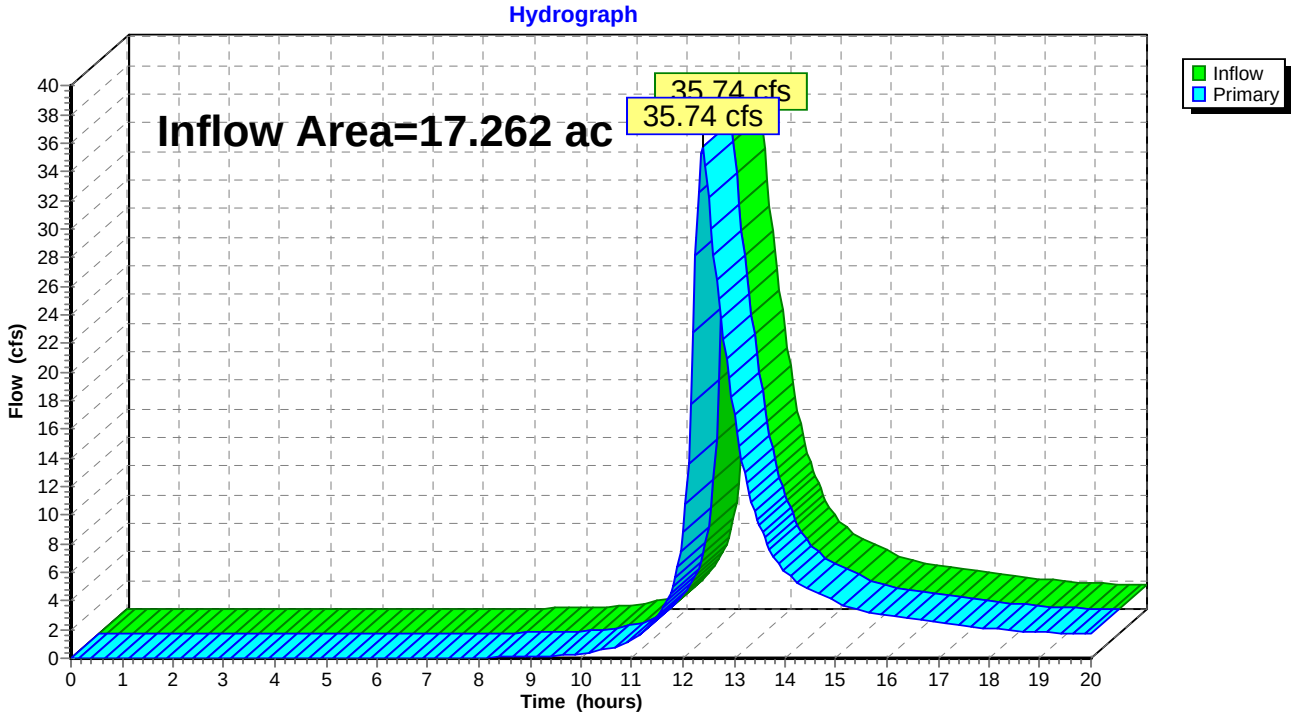


Summary for Link EXISTING: TOTAL FOR SP

Inflow Area = 17.262 ac, 2.51% Impervious, Inflow Depth > 3.21" for 100-YR event
Inflow = 35.74 cfs @ 12.39 hrs, Volume= 4.617 af
Primary = 35.74 cfs @ 12.39 hrs, Volume= 4.617 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link EXISTING: TOTAL FOR SP

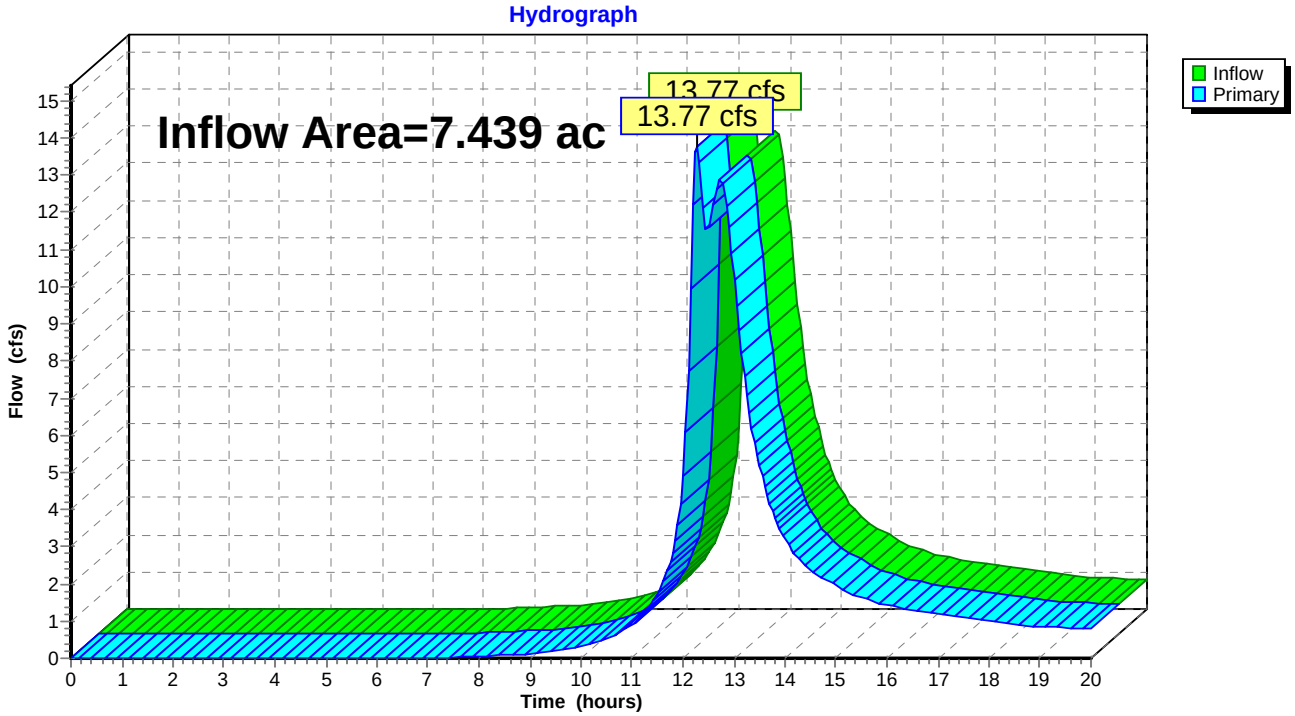


Summary for Link OTHER: OTHER LAND

Inflow Area = 7.439 ac, 5.82% Impervious, Inflow Depth > 3.77" for 100-YR event
Inflow = 13.77 cfs @ 12.28 hrs, Volume= 2.337 af
Primary = 13.77 cfs @ 12.28 hrs, Volume= 2.337 af, Atten= 0%, Lag= 0.0 min

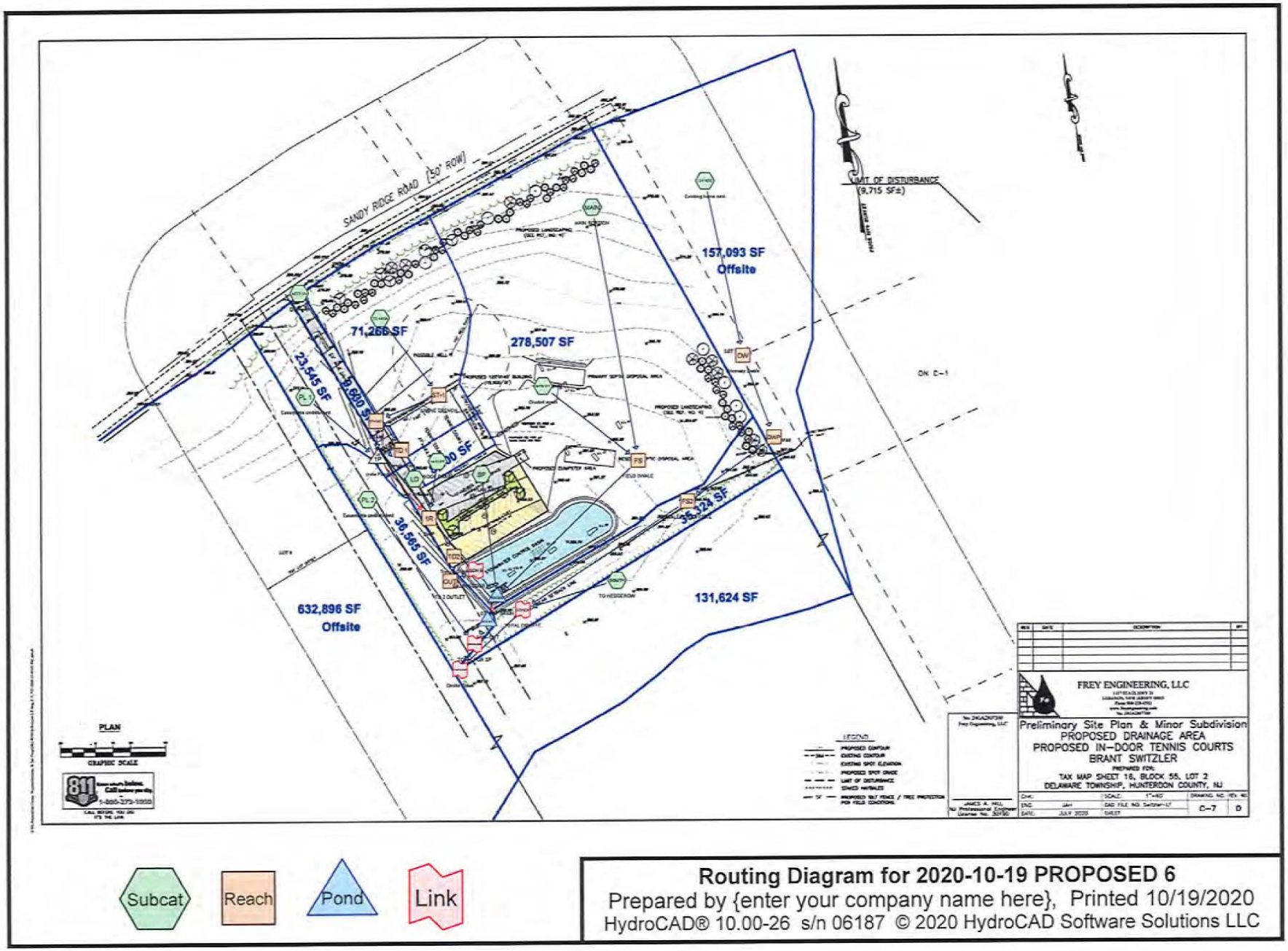
Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Link OTHER: OTHER LAND



APPENDIX B
PROPOSED OR DEVELOPED CONDITIONS

1. PROPOSED CONDITIONS – BASIN SIZING
2. PROPOSED CONDITIONS – NO INFILTRATION – SCOUR HOLE
3. PROPOSED CONDITIONS – BLOCKED OUTLET – EMERGENCY SPILLWAY
4. SCOUR HOLE CALCULATIONS



Subcat Reach Pond Link

Routing Diagram for 2020-10-19 PROPOSED 6

Prepared by {enter your company name here}, Printed 10/19/2020

HydroCAD® 10.00-26 s/n 06187 © 2020 HydroCAD Software Solutions LLC

2021-05-28 PROPOSED
Prepared by Frey Engineering, LLC

TABLE OF CONTENTS

25-YR Event

100-YR Event

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-NJWQ	NJ DEP 2-hr		Default	2.00	1	1.25	2
2	2-YR	NRCC 24-hr	C	Default	24.00	1	3.38	2
3	10-YR	NRCC 24-hr	C	Default	24.00	1	5.00	2
4	25-YR	NRCC 24-hr	C	Default	24.00	1	6.09	2
5	100-YR	NRCC 24-hr	C	Default	24.00	1	8.03	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.048	98	1/4 Roof, HSG B (1/4 ROOF)
3.606	65	2 acre lots, 12% imp, HSG B (OFFSITE)
1.249	61	>75% Grass cover, Good, HSG B (SEPTIC ETC)
0.811	65	Brush, Good, HSG C (OFF DW)
0.541	67	Brush, Poor, HSG B (PL 1)
0.839	67	Easements undidsturbed (PL 2)
0.058	82	GeoPave Area (LD)
0.117	85	GeoPave Fire Lane HSG B (TD AREA)
0.010	85	Geopave HSG B (SP)
0.083	85	Geopave units fire lane, HSG B (SEPTIC ETC)
0.485	85	Geopaves, HSG B (SP)
0.026	98	Handicapped Locations (SP)
0.062	61	LANDSCAPE ISLAND Good, HSG B (SP)
0.057	58	Landscape Berm (TD AREA)
4.916	58	Meadow, non-grazed, HSG B (MAIN, TD AREA)
3.022	71	Meadow, non-grazed, HSG C (SOUTH)
0.193	98	North Half of Tennis Roof HSG B (TD AREA)
0.124	98	Paved driveway, HSG B (LD)
0.007	98	Paved pad Dumpster HSG B (SP)
0.221	98	Paved parking, HSG B (ACCESS)
0.042	98	Sidewalk Unconnected pavement, HSG B (SP)
0.520	98	Water Surface, 0% imp, HSG B (SEPTIC ETC)
0.223	55	Woods, Good, HSG B (MAIN)
17.262	**67**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
12.449	HSG B	1/4 ROOF, ACCESS, LD, MAIN, OFFSITE, PL 1, SEPTIC ETC, SP, TD AREA
3.833	HSG C	OFF DW, SOUTH
0.000	HSG D	
0.981	Other	LD, PL 2, SP, TD AREA
17.262		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.048	0.000	0.000	0.000	0.048	1/4 Roof	1/4 ROOF
0.000	3.606	0.000	0.000	0.000	3.606	2 acre lots, 12% imp	OFFSITE
0.000	1.249	0.000	0.000	0.000	1.249	>75% Grass cover, Good	SEPTIC ETC
0.000	0.000	0.811	0.000	0.000	0.811	Brush, Good	OFF DW
0.000	0.541	0.000	0.000	0.000	0.541	Brush, Poor	PL 1
0.000	0.000	0.000	0.000	0.839	0.839	Easements undidsturbed	PL 2
0.000	0.000	0.000	0.000	0.058	0.058	GeoPave Area	LD
0.000	0.117	0.000	0.000	0.000	0.117	GeoPave Fire Lane	TD AREA
0.000	0.010	0.000	0.000	0.000	0.010	Geopave	SP
0.000	0.083	0.000	0.000	0.000	0.083	Geopave units fire lane	SEPTIC ETC
0.000	0.485	0.000	0.000	0.000	0.485	Geopaves	SP
0.000	0.000	0.000	0.000	0.026	0.026	Handicapped Locations	SP
0.000	0.062	0.000	0.000	0.000	0.062	LANDSCAPE ISLAND Good	SP
0.000	0.000	0.000	0.000	0.057	0.057	Landscape Berm	TD AREA
0.000	4.916	3.022	0.000	0.000	7.938	Meadow, non-grazed	MAIN, SOUTH, TD AREA
0.000	0.193	0.000	0.000	0.000	0.193	North Half of Tennis Roof	TD AREA
0.000	0.124	0.000	0.000	0.000	0.124	Paved driveway	LD
0.000	0.007	0.000	0.000	0.000	0.007	Paved pad Dumpster	SP
0.000	0.221	0.000	0.000	0.000	0.221	Paved parking	ACCESS
0.000	0.042	0.000	0.000	0.000	0.042	Sidewalk Unconnected pavement	SP
0.000	0.520	0.000	0.000	0.000	0.520	Water Surface, 0% imp	SEPTIC ETC
0.000	0.223	0.000	0.000	0.000	0.223	Woods, Good	MAIN
0.000	**12.449**	**3.833**	**0.000**	**0.981**	**17.262**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	1R	361.00	358.50	238.0	0.0105	0.013	0.0	12.0	0.0
2	DWP	366.81	365.17	16.0	0.1025	0.012	0.0	12.0	0.0
3	OUT	359.90	359.50	10.0	0.0400	0.010	0.0	8.0	0.0
4	ST-OUT	361.90	361.40	48.0	0.0104	0.010	0.0	8.0	0.0
5	BASIN	358.50	358.10	34.0	0.0118	0.010	0.0	6.0	0.0

Notes Listing (all nodes)

Line#	Node Number	Notes
1	1/4 ROOF	Roof Drain tied into driveway drain
2	LD	Flows across GeoPave to basin
3	MAIN	LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
4		LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
5		HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B
6	OFFSITE	LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
7		LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
8		HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B
9	PL 1	Undisturbed by Site Plan
10	PL 2	Undisturbed by Sie Plan
11		Flows to Hedgerow by scour hole
12	SEPTIC ETC	Area outside of site plan and access lanes, includes storm basin area
13	SOUTH	AbrB—Abbottstown silt loam, 2 to 6 percent slopes HSG C
14	TD AREA	Roof drain tied into combination drain
15	DW	Existing sweale, no bed no banks, in hedgrow along edge of field
16	FS	Existing sweale, no bed no banks, in hedgrow along edge of field
17	FS2	Existing sweale, no bed no banks, in hedgrow along edge of field
18	SCH OUT	SCOUR HOLE

Time span=0.00-60.00 hrs, dt=0.05 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1/4 ROOF: ROOF DRAIN Runoff Area=2,100 sf 100.00% Impervious Runoff Depth=1.03"
Flow Length=30' Tc=6.0 min CN=98 Runoff=0.14 cfs 0.004 af

SubcatchmentACCESS: Driveway Runoff Area=9,630 sf 100.00% Impervious Runoff Depth=1.03"
Flow Length=550' Tc=6.6 min CN=98 Runoff=0.63 cfs 0.019 af

SubcatchmentLD: Lower Driveway Runoff Area=7,942 sf 68.27% Impervious Runoff Depth=0.65"
Flow Length=550' Tc=6.6 min CN=93 Runoff=0.35 cfs 0.010 af

SubcatchmentMAIN: MAIN PORTION Runoff Area=168,584 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=650' Tc=17.9 min CN=58 Runoff=0.00 cfs 0.000 af

SubcatchmentOFF DW: Driveway to PL Runoff Area=35,324 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=400' Slope=0.0100 '/' Tc=34.7 min CN=65 Runoff=0.01 cfs 0.000 af

SubcatchmentOFFSITE: Exisiting home east Runoff Area=157,093 sf 12.00% Impervious Runoff Depth=0.01"
Flow Length=400' Tc=32.9 min CN=65 Runoff=0.03 cfs 0.002 af

SubcatchmentPL 1: Easements undisturbed Runoff Area=23,545 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=250' Slope=0.0500 '/' Tc=29.7 min CN=67 Runoff=0.01 cfs 0.001 af

SubcatchmentPL 2: Easements unditsturbed Runoff Area=36,565 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=220' Tc=29.1 min CN=67 Runoff=0.02 cfs 0.001 af

SubcatchmentSEPTIC ETC: Graded areas Runoff Area=80,677 sf 0.00% Impervious Runoff Depth=0.05"
Flow Length=400' Tc=42.4 min CN=72 Runoff=0.10 cfs 0.008 af

SubcatchmentSOUTH: TO HEDGEROW Runoff Area=131,624 sf 0.00% Impervious Runoff Depth=0.04"
Flow Length=300' Tc=17.8 min CN=71 Runoff=0.15 cfs 0.010 af

SubcatchmentSP: SITE PLAN AREA Runoff Area=27,578 sf 11.98% Impervious Runoff Depth=0.27"
Flow Length=60' Slope=0.1000 '/' Tc=0.4 min CN=84 Runoff=0.63 cfs 0.014 af

SubcatchmentTD AREA: ROAD TO TD2 Runoff Area=71,266 sf 11.79% Impervious Runoff Depth=0.01"
Flow Length=260' Tc=15.2 min CN=65 Runoff=0.02 cfs 0.001 af

Reach 1R: DWP Avg. Flow Depth=0.28' Max Vel=3.45 fps Inflow=0.62 cfs 0.020 af
12.0" Round Pipe n=0.013 L=238.0' S=0.0105 '/' Capacity=3.65 cfs Outflow=0.60 cfs 0.020 af

Reach DW: Driveway Swale Avg. Flow Depth=0.12' Max Vel=0.39 fps Inflow=0.03 cfs 0.002 af
n=0.100 L=200.0' S=0.0300 '/' Capacity=45.58 cfs Outflow=0.03 cfs 0.002 af

Reach DWP: Driveway Pipe Avg. Flow Depth=0.03' Max Vel=3.20 fps Inflow=0.03 cfs 0.002 af
12.0" Round Pipe n=0.012 L=16.0' S=0.1025 '/' Capacity=12.36 cfs Outflow=0.03 cfs 0.002 af

Reach FS: FIELD SWALE Avg. Flow Depth=0.06' Max Vel=0.29 fps Inflow=0.14 cfs 0.012 af
n=0.100 L=400.0' S=0.0179 '/' Capacity=18.09 cfs Outflow=0.09 cfs 0.012 af

Reach FS2: SWALE FOR OFFSITE Avg. Flow Depth=0.02' Max Vel=0.12 fps Inflow=0.03 cfs 0.002 af
n=0.100 L=575.0' S=0.0125 '/' Capacity=15.09 cfs Outflow=0.01 cfs 0.002 af

Reach OUT: TD 2 OUTLET Avg. Flow Depth=0.15' Max Vel=5.87 fps Inflow=0.35 cfs 0.010 af
8.0" Round Pipe n=0.010 L=10.0' S=0.0400 '/' Capacity=3.14 cfs Outflow=0.35 cfs 0.010 af

Reach ST-1: STONE TRENCH Avg. Flow Depth=0.01' Max Vel=0.58 fps Inflow=0.02 cfs 0.001 af
n=0.013 L=155.0' S=0.0065 '/' Capacity=11.57 cfs Outflow=0.02 cfs 0.001 af

Reach ST-OUT: DRAIN Avg. Flow Depth=0.05' Max Vel=1.51 fps Inflow=0.02 cfs 0.001 af
8.0" Round Pipe n=0.010 L=48.0' S=0.0104 '/' Capacity=1.60 cfs Outflow=0.02 cfs 0.001 af

Reach TD 1: Trench Drain Avg. Flow Depth=0.11' Max Vel=2.86 fps Inflow=0.63 cfs 0.019 af
n=0.013 L=22.0' S=0.0136 '/' Capacity=40.75 cfs Outflow=0.62 cfs 0.019 af

Reach TD2: Trench Drain Avg. Flow Depth=0.09' Max Vel=1.95 fps Inflow=0.35 cfs 0.010 af
n=0.013 L=24.0' S=0.0083 '/' Capacity=13.15 cfs Outflow=0.35 cfs 0.010 af

Pond 1P: (new Pond) Peak Elev=361.50' Inflow=0.62 cfs 0.020 af
Primary=0.62 cfs 0.020 af Secondary=0.00 cfs 0.000 af Outflow=0.62 cfs 0.020 af

Pond BASIN: STORM BASIN Peak Elev=358.06' Storage=288 cf Inflow=1.33 cfs 0.057 af
Discarded=1.00 cfs 0.057 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=1.00 cfs 0.057 af

Pond SCH OUT: SCH- OUT Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link OTHER: TOTAL OFFSITE Inflow=0.15 cfs 0.012 af
Primary=0.15 cfs 0.012 af

Link PROP FLOWS: Onsite Flows Inflow=0.16 cfs 0.013 af
Primary=0.16 cfs 0.013 af

Link PROPOSED: TOTAL FOR SP Inflow=0.02 cfs 0.001 af
Primary=0.02 cfs 0.001 af

Link SCH B: BASIN SCOUR HOLE Inflow=0.95 cfs 0.030 af
Primary=0.95 cfs 0.030 af

Total Runoff Area = 17.262 ac Runoff Volume = 0.070 af Average Runoff Depth = 0.05"
93.66% Pervious = 16.167 ac 6.34% Impervious = 1.095 ac

Time span=0.00-60.00 hrs, dt=0.05 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentA1/4 ROOF: ROOF DRAIN Runoff Area=2,100 sf 100.00% Impervious Runoff Depth=3.15"
Flow Length=30' Tc=6.0 min CN=98 Runoff=0.16 cfs 0.013 af

SubcatchmentACCESS: Driveway Runoff Area=9,630 sf 100.00% Impervious Runoff Depth=3.15"
Flow Length=550' Tc=6.6 min CN=98 Runoff=0.73 cfs 0.058 af

SubcatchmentLD: Lower Driveway Runoff Area=7,942 sf 68.27% Impervious Runoff Depth=2.62"
Flow Length=550' Tc=6.6 min CN=93 Runoff=0.55 cfs 0.040 af

SubcatchmentMAIN: MAIN PORTION Runoff Area=168,584 sf 0.00% Impervious Runoff Depth=0.41"
Flow Length=650' Tc=17.9 min CN=58 Runoff=0.75 cfs 0.131 af

SubcatchmentOFF DW: Driveway to PL Runoff Area=35,324 sf 0.00% Impervious Runoff Depth=0.69"
Flow Length=400' Slope=0.0100 '/' Tc=34.7 min CN=65 Runoff=0.27 cfs 0.047 af

SubcatchmentOFFSITE: Exisiting home east Runoff Area=157,093 sf 12.00% Impervious Runoff Depth=0.69"
Flow Length=400' Tc=32.9 min CN=65 Runoff=1.25 cfs 0.207 af

SubcatchmentPL 1: Easements undisturbed Runoff Area=23,545 sf 0.00% Impervious Runoff Depth=0.78"
Flow Length=250' Slope=0.0500 '/' Tc=29.7 min CN=67 Runoff=0.24 cfs 0.035 af

SubcatchmentPL 2: Easements unditsturbed Runoff Area=36,565 sf 0.00% Impervious Runoff Depth=0.78"
Flow Length=220' Tc=29.1 min CN=67 Runoff=0.37 cfs 0.055 af

SubcatchmentSEPTIC ETC: Graded areas Runoff Area=80,677 sf 0.00% Impervious Runoff Depth=1.04"
Flow Length=400' Tc=42.4 min CN=72 Runoff=0.96 cfs 0.161 af

SubcatchmentSOUTH: TO HEDGEROW Runoff Area=131,624 sf 0.00% Impervious Runoff Depth=0.99"
Flow Length=300' Tc=17.8 min CN=71 Runoff=2.33 cfs 0.249 af

SubcatchmentSP: SITE PLAN AREA Runoff Area=27,578 sf 11.98% Impervious Runoff Depth=1.83"
Flow Length=60' Slope=0.1000 '/' Tc=0.4 min CN=84 Runoff=1.63 cfs 0.097 af

SubcatchmentTD AREA: ROAD TO TD2 Runoff Area=71,266 sf 11.79% Impervious Runoff Depth=0.69"
Flow Length=260' Tc=15.2 min CN=65 Runoff=0.85 cfs 0.094 af

Reach 1R: DWP Avg. Flow Depth=0.41' Max Vel=4.23 fps Inflow=1.27 cfs 0.187 af
12.0" Round Pipe n=0.013 L=238.0' S=0.0105 '/' Capacity=3.65 cfs Outflow=1.26 cfs 0.187 af

Reach DW: Driveway Swale Avg. Flow Depth=0.52' Max Vel=1.03 fps Inflow=1.25 cfs 0.207 af
n=0.100 L=200.0' S=0.0300 '/' Capacity=45.58 cfs Outflow=1.23 cfs 0.207 af

Reach DWP: Driveway Pipe Avg. Flow Depth=0.21' Max Vel=10.04 fps Inflow=1.23 cfs 0.207 af
12.0" Round Pipe n=0.012 L=16.0' S=0.1025 '/' Capacity=12.36 cfs Outflow=1.23 cfs 0.207 af

Reach FS: FIELD SWALE Avg. Flow Depth=0.28' Max Vel=0.72 fps Inflow=1.53 cfs 0.305 af
n=0.100 L=400.0' S=0.0179 '/' Capacity=18.09 cfs Outflow=1.46 cfs 0.305 af

Reach FS2: SWALE FOR OFFSITE Avg. Flow Depth=0.28' Max Vel=0.60 fps Inflow=1.49 cfs 0.254 af
n=0.100 L=575.0' S=0.0125 '/' Capacity=15.09 cfs Outflow=1.21 cfs 0.254 af

Reach OUT: TD 2 OUTLET Avg. Flow Depth=0.19' Max Vel=6.73 fps Inflow=0.54 cfs 0.040 af
8.0" Round Pipe n=0.010 L=10.0' S=0.0400 '/' Capacity=3.14 cfs Outflow=0.54 cfs 0.040 af

Reach ST-1: STONE TRENCH Avg. Flow Depth=0.17' Max Vel=2.50 fps Inflow=0.85 cfs 0.094 af
n=0.013 L=155.0' S=0.0065 '/' Capacity=11.57 cfs Outflow=0.83 cfs 0.094 af

Reach ST-OUT: DRAIN Avg. Flow Depth=0.34' Max Vel=4.63 fps Inflow=0.83 cfs 0.094 af
8.0" Round Pipe n=0.010 L=48.0' S=0.0104 '/' Capacity=1.60 cfs Outflow=0.83 cfs 0.094 af

Reach TD 1: Trench Drain Avg. Flow Depth=0.12' Max Vel=3.01 fps Inflow=0.73 cfs 0.058 af
n=0.013 L=22.0' S=0.0136 '/' Capacity=40.75 cfs Outflow=0.73 cfs 0.058 af

Reach TD2: Trench Drain Avg. Flow Depth=0.12' Max Vel=2.32 fps Inflow=0.55 cfs 0.040 af
n=0.013 L=24.0' S=0.0083 '/' Capacity=13.15 cfs Outflow=0.54 cfs 0.040 af

Pond 1P: (new Pond) Peak Elev=361.69' Inflow=1.27 cfs 0.187 af
Primary=1.27 cfs 0.187 af Secondary=0.00 cfs 0.000 af Outflow=1.27 cfs 0.187 af

Pond BASIN: STORM BASIN Peak Elev=358.67' Storage=5,747 cf Inflow=2.65 cfs 0.629 af
Discarded=1.00 cfs 0.629 af Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=1.00 cfs 0.629 af

Pond SCH OUT: SCH- OUT Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link OTHER: TOTAL OFFSITE Inflow=2.34 cfs 0.503 af
Primary=2.34 cfs 0.503 af

Link PROP FLOWS: Onsite Flows Inflow=2.61 cfs 0.558 af
Primary=2.61 cfs 0.558 af

Link PROPOSED: TOTAL FOR SP Inflow=0.37 cfs 0.055 af
Primary=0.37 cfs 0.055 af

Link SCH B: BASIN SCOUR HOLE Inflow=1.61 cfs 0.227 af
Primary=1.61 cfs 0.227 af

Total Runoff Area = 17.262 ac Runoff Volume = 1.186 af Average Runoff Depth = 0.82"
93.66% Pervious = 16.167 ac 6.34% Impervious = 1.095 ac

Time span=0.00-60.00 hrs, dt=0.05 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1/4 ROOF: ROOF DRAIN Runoff Area=2,100 sf 100.00% Impervious Runoff Depth=4.76"
Flow Length=30' Tc=6.0 min CN=98 Runoff=0.24 cfs 0.019 af

SubcatchmentACCESS: Driveway Runoff Area=9,630 sf 100.00% Impervious Runoff Depth=4.76"
Flow Length=550' Tc=6.6 min CN=98 Runoff=1.09 cfs 0.088 af

SubcatchmentLD: Lower Driveway Runoff Area=7,942 sf 68.27% Impervious Runoff Depth=4.20"
Flow Length=550' Tc=6.6 min CN=93 Runoff=0.85 cfs 0.064 af

SubcatchmentMAIN: MAIN PORTION Runoff Area=168,584 sf 0.00% Impervious Runoff Depth=1.17"
Flow Length=650' Tc=17.9 min CN=58 Runoff=3.30 cfs 0.377 af

SubcatchmentOFF DW: Driveway to PL Runoff Area=35,324 sf 0.00% Impervious Runoff Depth=1.65"
Flow Length=400' Slope=0.0100 '/' Tc=34.7 min CN=65 Runoff=0.76 cfs 0.112 af

SubcatchmentOFFSITE: Exisiting home east Runoff Area=157,093 sf 12.00% Impervious Runoff Depth=1.65"
Flow Length=400' Tc=32.9 min CN=65 Runoff=3.48 cfs 0.497 af

SubcatchmentPL 1: Easements undisturbed Runoff Area=23,545 sf 0.00% Impervious Runoff Depth=1.80"
Flow Length=250' Slope=0.0500 '/' Tc=29.7 min CN=67 Runoff=0.61 cfs 0.081 af

SubcatchmentPL 2: Easements unditsturbed Runoff Area=36,565 sf 0.00% Impervious Runoff Depth=1.80"
Flow Length=220' Tc=29.1 min CN=67 Runoff=0.96 cfs 0.126 af

SubcatchmentSEPTIC ETC: Graded areas Runoff Area=80,677 sf 0.00% Impervious Runoff Depth=2.20"
Flow Length=400' Tc=42.4 min CN=72 Runoff=2.14 cfs 0.339 af

SubcatchmentSOUTH: TO HEDGEROW Runoff Area=131,624 sf 0.00% Impervious Runoff Depth=2.12"
Flow Length=300' Tc=17.8 min CN=71 Runoff=5.33 cfs 0.533 af

SubcatchmentSP: SITE PLAN AREA Runoff Area=27,578 sf 11.98% Impervious Runoff Depth=3.27"
Flow Length=60' Slope=0.1000 '/' Tc=0.4 min CN=84 Runoff=2.85 cfs 0.173 af

SubcatchmentTD AREA: ROAD TO TD2 Runoff Area=71,266 sf 11.79% Impervious Runoff Depth=1.65"
Flow Length=260' Tc=15.2 min CN=65 Runoff=2.34 cfs 0.225 af

Reach 1R: DWP Avg. Flow Depth=0.65' Max Vel=5.12 fps Inflow=2.84 cfs 0.394 af
12.0" Round Pipe n=0.013 L=238.0' S=0.0105 '/' Capacity=3.65 cfs Outflow=2.75 cfs 0.394 af

Reach DW: Driveway Swale Avg. Flow Depth=0.76' Max Vel=1.33 fps Inflow=3.48 cfs 0.497 af
n=0.100 L=200.0' S=0.0300 '/' Capacity=45.58 cfs Outflow=3.45 cfs 0.497 af

Reach DWP: Driveway Pipe Avg. Flow Depth=0.36' Max Vel=13.48 fps Inflow=3.45 cfs 0.497 af
12.0" Round Pipe n=0.012 L=16.0' S=0.1025 '/' Capacity=12.36 cfs Outflow=3.45 cfs 0.497 af

Reach FS: FIELD SWALE Avg. Flow Depth=0.50' Max Vel=0.99 fps Inflow=4.68 cfs 0.735 af
n=0.100 L=400.0' S=0.0179 '/' Capacity=18.09 cfs Outflow=4.38 cfs 0.735 af

Reach FS2: SWALE FOR OFFSITE Avg. Flow Depth=0.51' Max Vel=0.83 fps Inflow=4.20 cfs 0.609 af
n=0.100 L=575.0' S=0.0125 '/' Capacity=15.09 cfs Outflow=3.71 cfs 0.609 af

Reach OUT: TD 2 OUTLET Avg. Flow Depth=0.24' Max Vel=7.62 fps Inflow=0.85 cfs 0.064 af
8.0" Round Pipe n=0.010 L=10.0' S=0.0400 '/' Capacity=3.14 cfs Outflow=0.85 cfs 0.064 af

Reach ST-1: STONE TRENCH Avg. Flow Depth=0.32' Max Vel=3.60 fps Inflow=2.34 cfs 0.225 af
n=0.013 L=155.0' S=0.0065 '/' Capacity=11.57 cfs Outflow=2.31 cfs 0.225 af

Reach ST-OUT: DRAIN Avg. Flow Depth=0.67' Max Vel=5.22 fps Inflow=2.31 cfs 0.225 af
8.0" Round Pipe n=0.010 L=48.0' S=0.0104 '/' Capacity=1.60 cfs Outflow=1.60 cfs 0.225 af

Reach TD 1: Trench Drain Avg. Flow Depth=0.16' Max Vel=3.49 fps Inflow=1.09 cfs 0.088 af
n=0.013 L=22.0' S=0.0136 '/' Capacity=40.75 cfs Outflow=1.08 cfs 0.088 af

Reach TD2: Trench Drain Avg. Flow Depth=0.16' Max Vel=2.73 fps Inflow=0.85 cfs 0.064 af
n=0.013 L=24.0' S=0.0083 '/' Capacity=13.15 cfs Outflow=0.85 cfs 0.064 af

Pond 1P: (new Pond) Peak Elev=362.16' Inflow=2.84 cfs 0.394 af
Primary=2.84 cfs 0.394 af Secondary=0.00 cfs 0.000 af Outflow=2.84 cfs 0.394 af

Pond BASIN: STORM BASIN Peak Elev=359.23' Storage=16,159 cf Inflow=7.30 cfs 1.366 af
Discarded=1.00 cfs 0.958 af Primary=1.96 cfs 0.408 af Secondary=0.00 cfs 0.000 af Outflow=2.96 cfs 1.366 af

Pond SCH OUT: SCH- OUT Inflow=1.96 cfs 0.408 af
Primary=1.96 cfs 0.408 af

Link OTHER: TOTAL OFFSITE Inflow=5.66 cfs 1.142 af
Primary=5.66 cfs 1.142 af

Link PROP FLOWS: Onsite Flows Inflow=7.28 cfs 1.676 af
Primary=7.28 cfs 1.676 af

Link PROPOSED: TOTAL FOR SP Inflow=2.26 cfs 0.534 af
Primary=2.26 cfs 0.534 af

Link SCH B: BASIN SCOUR HOLE Inflow=3.41 cfs 0.458 af
Primary=3.41 cfs 0.458 af

Total Runoff Area = 17.262 ac Runoff Volume = 2.634 af Average Runoff Depth = 1.83"
93.66% Pervious = 16.167 ac 6.34% Impervious = 1.095 ac

Time span=0.00-60.00 hrs, dt=0.05 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1/4 ROOF: ROOF DRAIN Runoff Area=2,100 sf 100.00% Impervious Runoff Depth=5.85"
Flow Length=30' Tc=6.0 min CN=98 Runoff=0.29 cfs 0.024 af

SubcatchmentACCESS: Driveway Runoff Area=9,630 sf 100.00% Impervious Runoff Depth=5.85"
Flow Length=550' Tc=6.6 min CN=98 Runoff=1.33 cfs 0.108 af

SubcatchmentLD: Lower Driveway Runoff Area=7,942 sf 68.27% Impervious Runoff Depth=5.27"
Flow Length=550' Tc=6.6 min CN=93 Runoff=1.05 cfs 0.080 af

SubcatchmentMAIN: MAIN PORTION Runoff Area=168,584 sf 0.00% Impervious Runoff Depth=1.81"
Flow Length=650' Tc=17.9 min CN=58 Runoff=5.48 cfs 0.585 af

SubcatchmentOFF DW: Driveway to PL Runoff Area=35,324 sf 0.00% Impervious Runoff Depth=2.42"
Flow Length=400' Slope=0.0100 '/' Tc=34.7 min CN=65 Runoff=1.14 cfs 0.163 af

SubcatchmentOFFSITE: Exisiting home east Runoff Area=157,093 sf 12.00% Impervious Runoff Depth=2.42"
Flow Length=400' Tc=32.9 min CN=65 Runoff=5.25 cfs 0.726 af

SubcatchmentPL 1: Easements undisturbed Runoff Area=23,545 sf 0.00% Impervious Runoff Depth=2.60"
Flow Length=250' Slope=0.0500 '/' Tc=29.7 min CN=67 Runoff=0.90 cfs 0.117 af

SubcatchmentPL 2: Easements unditsturbed Runoff Area=36,565 sf 0.00% Impervious Runoff Depth=2.60"
Flow Length=220' Tc=29.1 min CN=67 Runoff=1.42 cfs 0.182 af

SubcatchmentSEPTIC ETC: Graded areas Runoff Area=80,677 sf 0.00% Impervious Runoff Depth=3.07"
Flow Length=400' Tc=42.4 min CN=72 Runoff=3.02 cfs 0.473 af

SubcatchmentSOUTH: TO HEDGEROW Runoff Area=131,624 sf 0.00% Impervious Runoff Depth=2.97"
Flow Length=300' Tc=17.8 min CN=71 Runoff=7.56 cfs 0.748 af

SubcatchmentSP: SITE PLAN AREA Runoff Area=27,578 sf 11.98% Impervious Runoff Depth=4.28"
Flow Length=60' Slope=0.1000 '/' Tc=0.4 min CN=84 Runoff=3.68 cfs 0.226 af

SubcatchmentTD AREA: ROAD TO TD2 Runoff Area=71,266 sf 11.79% Impervious Runoff Depth=2.42"
Flow Length=260' Tc=15.2 min CN=65 Runoff=3.50 cfs 0.330 af

Reach 1R: DWP Avg. Flow Depth=0.75' Max Vel=5.27 fps Inflow=3.31 cfs 0.554 af
12.0" Round Pipe n=0.013 L=238.0' S=0.0105 '/' Capacity=3.65 cfs Outflow=3.29 cfs 0.554 af

Reach DW: Driveway Swale Avg. Flow Depth=0.89' Max Vel=1.47 fps Inflow=5.25 cfs 0.726 af
n=0.100 L=200.0' S=0.0300 '/' Capacity=45.58 cfs Outflow=5.20 cfs 0.726 af

Reach DWP: Driveway Pipe Avg. Flow Depth=0.45' Max Vel=15.05 fps Inflow=5.20 cfs 0.726 af
12.0" Round Pipe n=0.012 L=16.0' S=0.1025 '/' Capacity=12.36 cfs Outflow=5.20 cfs 0.726 af

Reach FS: FIELD SWALE Avg. Flow Depth=0.64' Max Vel=1.12 fps Inflow=7.42 cfs 1.082 af
n=0.100 L=400.0' S=0.0179 '/' Capacity=18.09 cfs Outflow=6.98 cfs 1.082 af

Reach FS2: SWALE FOR OFFSITE Avg. Flow Depth=0.63' Max Vel=0.93 fps Inflow=6.33 cfs 0.890 af
n=0.100 L=575.0' S=0.0125 '/' Capacity=15.09 cfs Outflow=5.70 cfs 0.890 af

Reach OUT: TD 2 OUTLET Avg. Flow Depth=0.27' Max Vel=8.08 fps Inflow=1.05 cfs 0.080 af
8.0" Round Pipe n=0.010 L=10.0' S=0.0400 '/' Capacity=3.14 cfs Outflow=1.05 cfs 0.080 af

Reach ST-1: STONE TRENCH Avg. Flow Depth=0.43' Max Vel=4.11 fps Inflow=3.50 cfs 0.330 af
n=0.013 L=155.0' S=0.0065 '/' Capacity=11.57 cfs Outflow=3.46 cfs 0.330 af

Reach ST-OUT: DRAIN Avg. Flow Depth=0.67' Max Vel=5.18 fps Inflow=3.46 cfs 0.330 af
8.0" Round Pipe n=0.010 L=48.0' S=0.0104 '/' Capacity=1.60 cfs Outflow=1.71 cfs 0.330 af

Reach TD 1: Trench Drain Avg. Flow Depth=0.18' Max Vel=3.75 fps Inflow=1.33 cfs 0.108 af
n=0.013 L=22.0' S=0.0136 '/' Capacity=40.75 cfs Outflow=1.32 cfs 0.108 af

Reach TD2: Trench Drain Avg. Flow Depth=0.18' Max Vel=2.95 fps Inflow=1.05 cfs 0.080 af
n=0.013 L=24.0' S=0.0083 '/' Capacity=13.15 cfs Outflow=1.05 cfs 0.080 af

Pond 1P: (new Pond) Peak Elev=362.37' Inflow=3.31 cfs 0.554 af
Primary=3.31 cfs 0.554 af Secondary=0.00 cfs 0.000 af Outflow=3.31 cfs 0.554 af

Pond BASIN: STORM BASIN Peak Elev=359.74' Storage=26,267 cf Inflow=10.48 cfs 1.942 af
Discarded=1.00 cfs 1.120 af Primary=2.82 cfs 0.821 af Secondary=0.00 cfs 0.000 af Outflow=3.82 cfs 1.942 af

Pond SCH OUT: SCH- OUT Inflow=2.82 cfs 0.821 af
Primary=2.82 cfs 0.821 af

Link OTHER: TOTAL OFFSITE Inflow=8.41 cfs 1.638 af
Primary=8.41 cfs 1.638 af

Link PROP FLOWS: Onsite Flows Inflow=10.87 cfs 2.641 af
Primary=10.87 cfs 2.641 af

Link PROPOSED: TOTAL FOR SP Inflow=3.23 cfs 1.003 af
Primary=3.23 cfs 1.003 af

Link SCH B: BASIN SCOUR HOLE Inflow=4.30 cfs 0.634 af
Primary=4.30 cfs 0.634 af

Total Runoff Area = 17.262 ac Runoff Volume = 3.762 af Average Runoff Depth = 2.61"
93.66% Pervious = 16.167 ac 6.34% Impervious = 1.095 ac

Time span=0.00-60.00 hrs, dt=0.05 hrs, 1201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1/4 ROOF: ROOF DRAIN Runoff Area=2,100 sf 100.00% Impervious Runoff Depth=7.79"
Flow Length=30' Tc=6.0 min CN=98 Runoff=0.39 cfs 0.031 af

SubcatchmentACCESS: Driveway Runoff Area=9,630 sf 100.00% Impervious Runoff Depth=7.79"
Flow Length=550' Tc=6.6 min CN=98 Runoff=1.75 cfs 0.144 af

SubcatchmentLD: Lower Driveway Runoff Area=7,942 sf 68.27% Impervious Runoff Depth=7.19"
Flow Length=550' Tc=6.6 min CN=93 Runoff=1.41 cfs 0.109 af

SubcatchmentMAIN: MAIN PORTION Runoff Area=168,584 sf 0.00% Impervious Runoff Depth=3.13"
Flow Length=650' Tc=17.9 min CN=58 Runoff=9.93 cfs 1.011 af

SubcatchmentOFF DW: Driveway to PL Runoff Area=35,324 sf 0.00% Impervious Runoff Depth=3.92"
Flow Length=400' Slope=0.0100 '/' Tc=34.7 min CN=65 Runoff=1.89 cfs 0.265 af

SubcatchmentOFFSITE: Exisiting home east Runoff Area=157,093 sf 12.00% Impervious Runoff Depth=3.92"
Flow Length=400' Tc=32.9 min CN=65 Runoff=8.68 cfs 1.178 af

SubcatchmentPL 1: Easements undisturbed Runoff Area=23,545 sf 0.00% Impervious Runoff Depth=4.15"
Flow Length=250' Slope=0.0500 '/' Tc=29.7 min CN=67 Runoff=1.46 cfs 0.187 af

SubcatchmentPL 2: Easements unditsturbed Runoff Area=36,565 sf 0.00% Impervious Runoff Depth=4.15"
Flow Length=220' Tc=29.1 min CN=67 Runoff=2.29 cfs 0.290 af

SubcatchmentSEPTIC ETC: Graded areas Runoff Area=80,677 sf 0.00% Impervious Runoff Depth=4.72"
Flow Length=400' Tc=42.4 min CN=72 Runoff=4.67 cfs 0.729 af

SubcatchmentSOUTH: TO HEDGEROW Runoff Area=131,624 sf 0.00% Impervious Runoff Depth=4.61"
Flow Length=300' Tc=17.8 min CN=71 Runoff=11.73 cfs 1.160 af

SubcatchmentSP: SITE PLAN AREA Runoff Area=27,578 sf 11.98% Impervious Runoff Depth=6.12"
Flow Length=60' Slope=0.1000 '/' Tc=0.4 min CN=84 Runoff=5.15 cfs 0.323 af

SubcatchmentTD AREA: ROAD TO TD2 Runoff Area=71,266 sf 11.79% Impervious Runoff Depth=3.92"
Flow Length=260' Tc=15.2 min CN=65 Runoff=5.76 cfs 0.534 af

Reach 1R: DWP Avg. Flow Depth=0.94' Max Vel=5.30 fps Inflow=4.01 cfs 0.865 af
12.0" Round Pipe n=0.013 L=238.0' S=0.0105 '/' Capacity=3.65 cfs Outflow=3.90 cfs 0.865 af

Reach DW: Driveway Swale Avg. Flow Depth=1.07' Max Vel=1.67 fps Inflow=8.68 cfs 1.178 af
n=0.100 L=200.0' S=0.0300 '/' Capacity=45.58 cfs Outflow=8.60 cfs 1.178 af

Reach DWP: Driveway Pipe Avg. Flow Depth=0.61' Max Vel=16.99 fps Inflow=8.60 cfs 1.178 af
12.0" Round Pipe n=0.012 L=16.0' S=0.1025 '/' Capacity=12.36 cfs Outflow=8.60 cfs 1.178 af

Reach FS: FIELD SWALE Avg. Flow Depth=0.83' Max Vel=1.31 fps Inflow=12.92 cfs 1.771 af
n=0.100 L=400.0' S=0.0179 '/' Capacity=18.09 cfs Outflow=12.22 cfs 1.771 af

Reach FS2: SWALE FOR OFFSITE Avg. Flow Depth=0.81' Max Vel=1.07 fps Inflow=10.48 cfs 1.442 af
n=0.100 L=575.0' S=0.0125 '/' Capacity=15.09 cfs Outflow=9.67 cfs 1.442 af

Reach OUT: TD 2 OUTLET Avg. Flow Depth=0.31' Max Vel=8.73 fps Inflow=1.41 cfs 0.109 af
8.0" Round Pipe n=0.010 L=10.0' S=0.0400 '/' Capacity=3.14 cfs Outflow=1.41 cfs 0.109 af

Reach ST-1: STONE TRENCH Avg. Flow Depth=0.60' Max Vel=4.78 fps Inflow=5.76 cfs 0.534 af
n=0.013 L=155.0' S=0.0065 '/' Capacity=11.57 cfs Outflow=5.71 cfs 0.534 af

Reach ST-OUT: DRAIN Avg. Flow Depth=0.67' Max Vel=5.16 fps Inflow=5.71 cfs 0.534 af
8.0" Round Pipe n=0.010 L=48.0' S=0.0104 '/' Capacity=1.60 cfs Outflow=1.71 cfs 0.534 af

Reach TD 1: Trench Drain Avg. Flow Depth=0.21' Max Vel=4.14 fps Inflow=1.75 cfs 0.144 af
n=0.013 L=22.0' S=0.0136 '/' Capacity=40.75 cfs Outflow=1.75 cfs 0.144 af

Reach TD2: Trench Drain Avg. Flow Depth=0.22' Max Vel=3.27 fps Inflow=1.41 cfs 0.109 af
n=0.013 L=24.0' S=0.0083 '/' Capacity=13.15 cfs Outflow=1.41 cfs 0.109 af

Pond 1P: (new Pond) Peak Elev=362.72' Inflow=4.01 cfs 0.865 af
Primary=4.01 cfs 0.865 af Secondary=0.00 cfs 0.000 af Outflow=4.01 cfs 0.865 af

Pond BASIN: STORM BASIN Peak Elev=360.70' Storage=46,624 cf Inflow=16.74 cfs 3.067 af
Discarded=1.00 cfs 1.344 af Primary=3.90 cfs 1.724 af Secondary=0.00 cfs 0.000 af Outflow=4.90 cfs 3.067 af

Pond SCH OUT: SCH- OUT Inflow=3.90 cfs 1.724 af
Primary=3.90 cfs 1.724 af

Link OTHER: TOTAL OFFSITE Inflow=13.77 cfs 2.602 af
Primary=13.77 cfs 2.602 af

Link PROP FLOWS: Onsite Flows Inflow=17.87 cfs 4.616 af
Primary=17.87 cfs 4.616 af

Link PROPOSED: TOTAL FOR SP Inflow=5.01 cfs 2.014 af
Primary=5.01 cfs 2.014 af

Link SCH B: BASIN SCOUR HOLE Inflow=5.23 cfs 0.974 af
Primary=5.23 cfs 0.974 af

Total Runoff Area = 17.262 ac Runoff Volume = 5.960 af Average Runoff Depth = 4.14"
93.66% Pervious = 16.167 ac 6.34% Impervious = 1.095 ac

Summary for Subcatchment 1/4 ROOF: ROOF DRAIN

Roof Drain tied into driveway drain

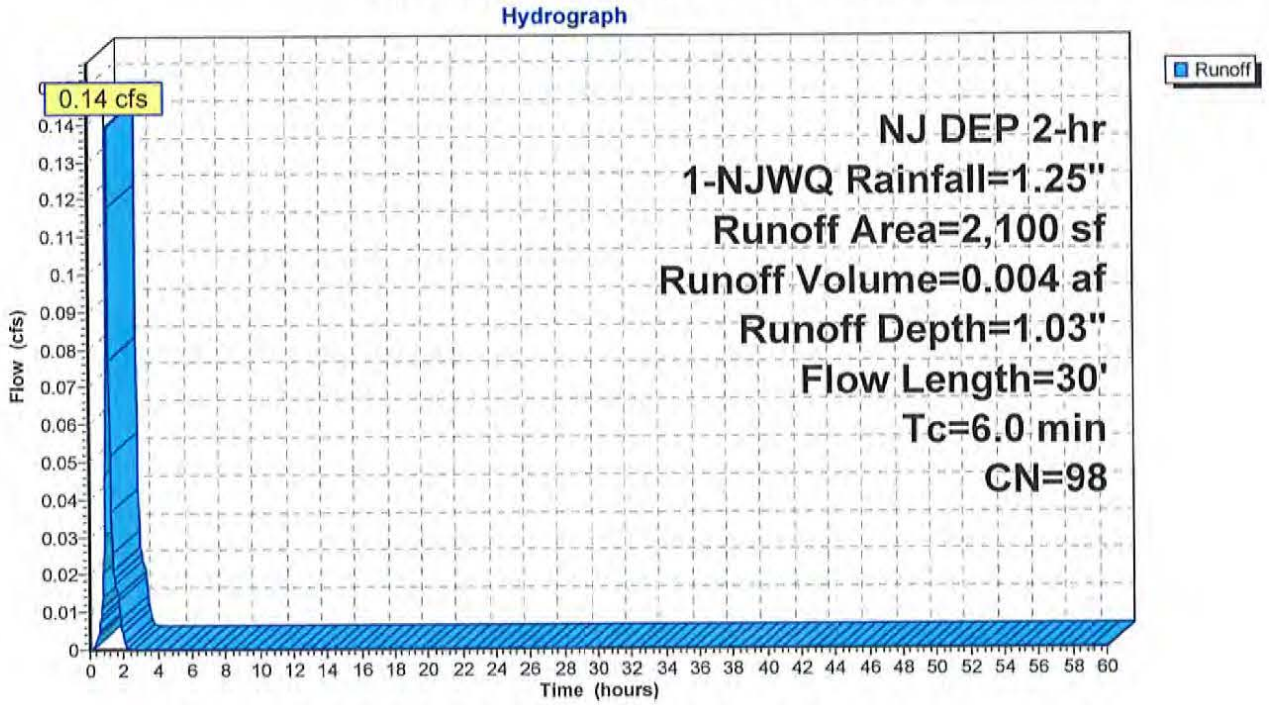
Runoff = 0.14 cfs @ 1.09 hrs, Volume= 0.004 af, Depth= 1.03"
Routed to Reach FS : FIELD SWALE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-NJWQ Rainfall=1.25"

	Area (sf)	CN	Description
*	2,100	98	1/4 Roof, HSG B
	2,100		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	30		0.08		**Direct Entry, Roof Drain**

Subcatchment 1/4 ROOF: ROOF DRAIN



Summary for Subcatchment ACCESS: Driveway

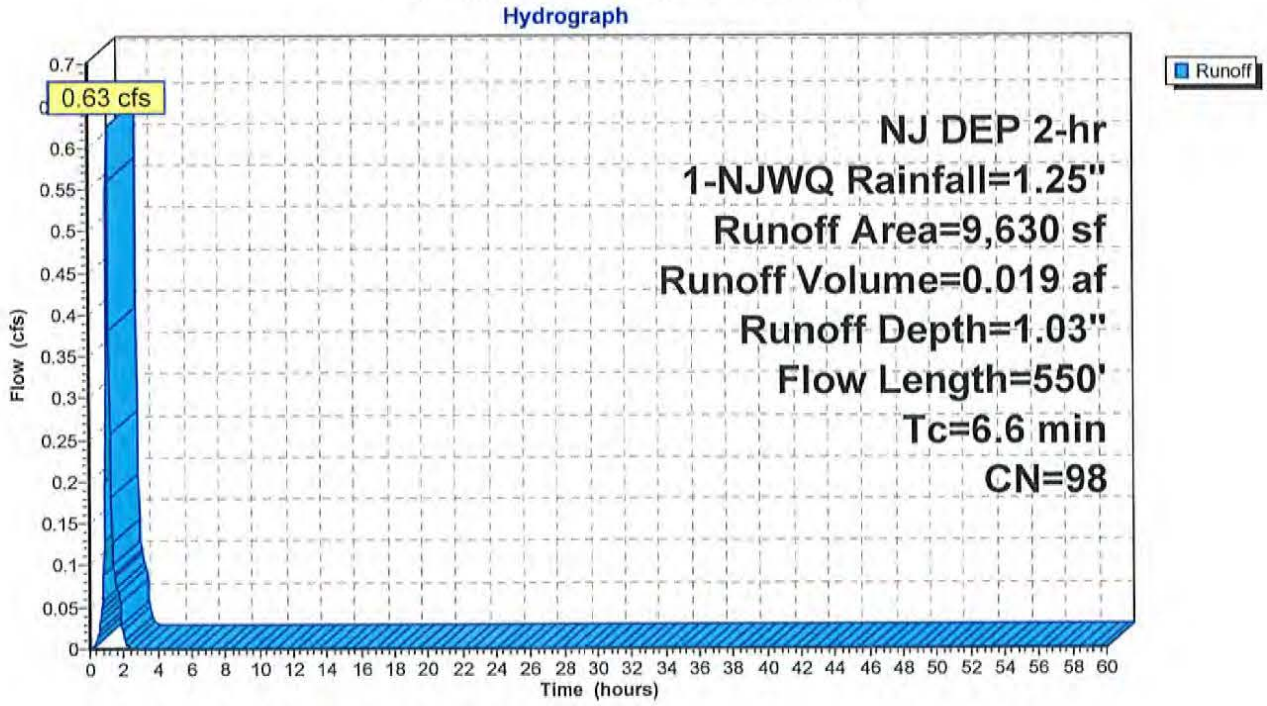
Runoff = 0.63 cfs @ 1.10 hrs, Volume= 0.019 af, Depth= 1.03"
Routed to Reach TD 1 : Trench Drain

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-NJWQ Rainfall=1.25"

Area (sf)	CN	Description
9,630	98	Paved parking, HSG B
9,630		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	100	0.0600	2.19		**Sheet Flow, Paved** Smooth surfaces n= 0.011 P2= 3.38"
5.8	450	0.0040	1.28		**Shallow Concentrated Flow, Paved** Paved Kv= 20.3 fps
6.6	550	Total			

Subcatchment ACCESS: Driveway



Summary for Subcatchment LD: Lower Driveway

Flows across GeoPave to basin

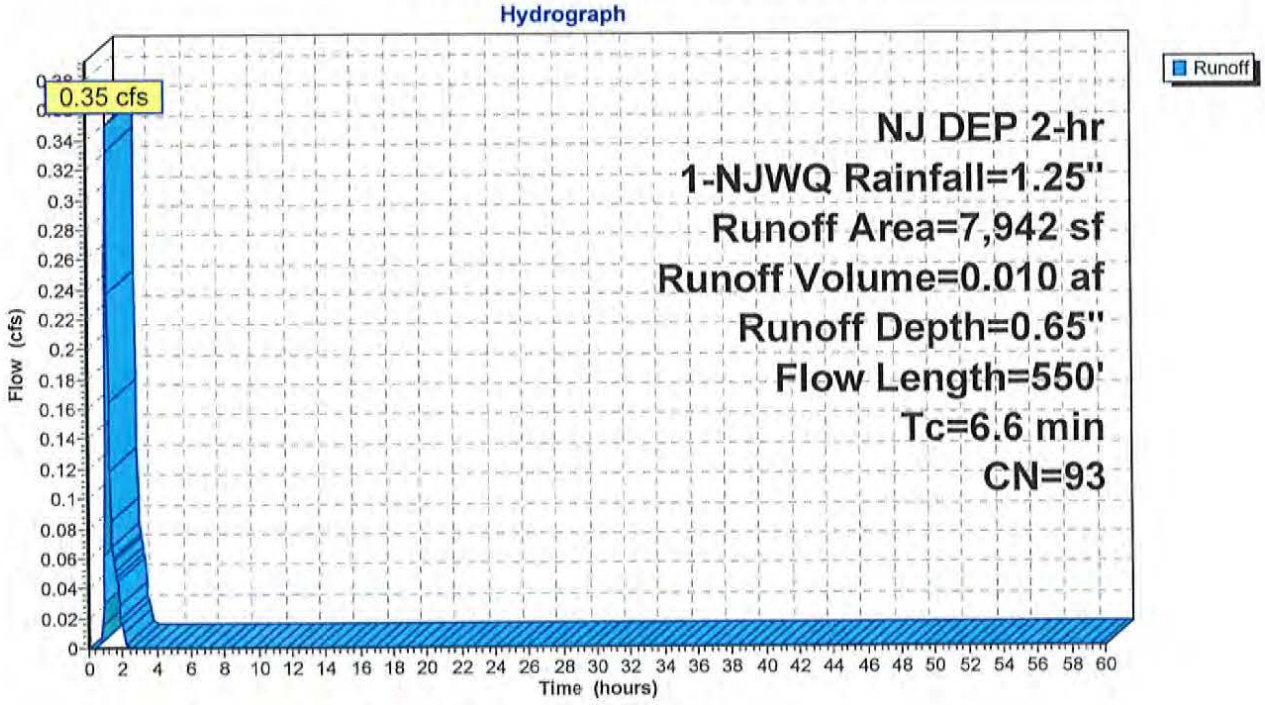
Runoff = 0.35 cfs @ 1.12 hrs, Volume= 0.010 af, Depth= 0.65"
Routed to Reach TD2 : Trench Drain

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-NJWQ Rainfall=1.25"

	Area (sf)	CN	Description
*	5,422	98	Paved driveway, HSG B
*	2,520	82	GeoPave Area
	7,942	93	Weighted Average
	2,520		31.73% Pervious Area
	5,422		68.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	100	0.0600	2.19		**Sheet Flow, Paved** Smooth surfaces n= 0.011 P2= 3.38"
5.8	450	0.0040	1.28		**Shallow Concentrated Flow, Paved** Paved Kv= 20.3 fps
6.6	550	Total			

Subcatchment LD: Lower Driveway



Summary for Subcatchment MAIN: MAIN PORTION

LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B

[45] Hint: Runoff=Zero

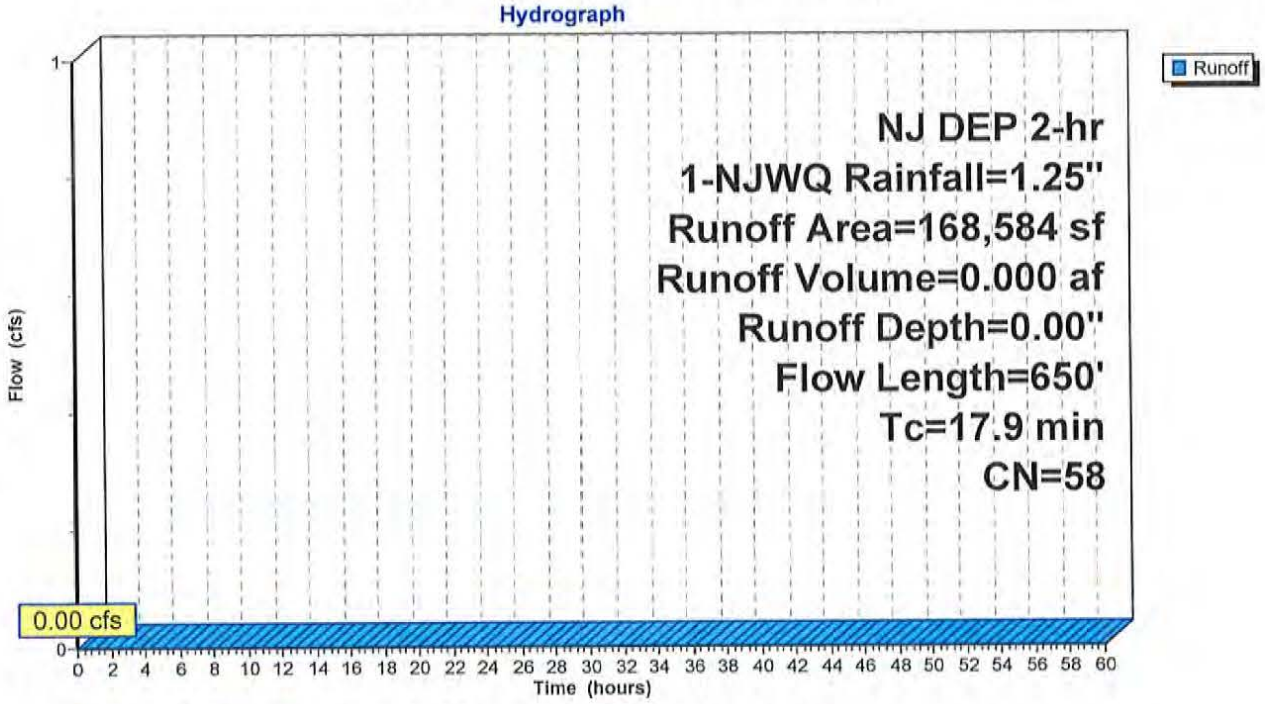
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Reach FS : FIELD SWALE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-NJWQ Rainfall=1.25"

Area (sf)	CN	Description
158,869	58	Meadow, non-grazed, HSG B
9,715	55	Woods, Good, HSG B
168,584	58	Weighted Average
168,584		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0500	0.17		**Sheet Flow, Meadow** Grass: Dense n= 0.240 P2= 3.38"
8.3	550	0.0250	1.11		**Shallow Concentrated Flow, Meadow** Short Grass Pasture Kv= 7.0 fps
17.9	650	Total			

Subcatchment MAIN: MAIN PORTION



Summary for Subcatchment OFF DW: Driveway to PL

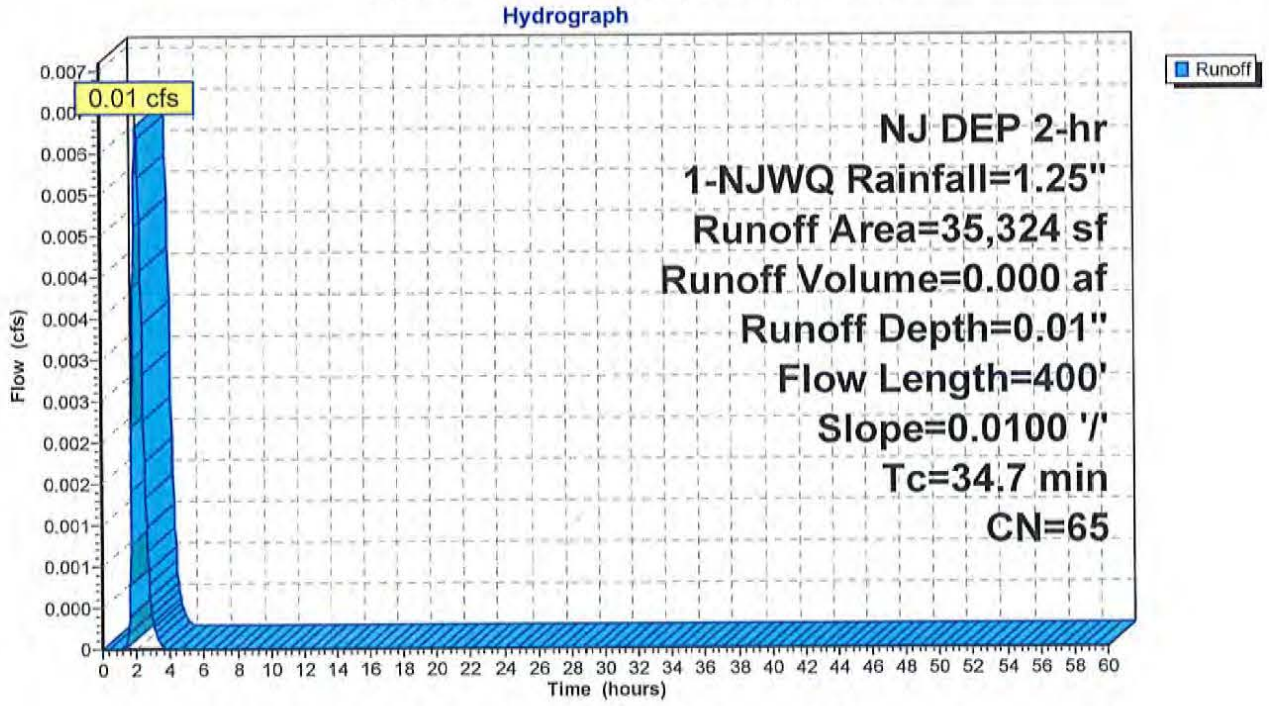
Runoff = 0.01 cfs @ 2.12 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Reach FS2 : SWALE FOR OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-NJWQ Rainfall=1.25"

Area (sf)	CN	Description
35,324	65	Brush, Good, HSG C
35,324		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	100	0.0100	0.06		**Sheet Flow, SURACE FLOW** Woods: Light underbrush n= 0.400 P2= 3.38"
7.1	300	0.0100	0.70		**Shallow Concentrated Flow, Un defined swale area** Short Grass Pasture Kv= 7.0 fps
34.7	400	Total			

Subcatchment OFF DW: Driveway to PL



Summary for Subcatchment OFFSITE: Exisiting home east

LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B

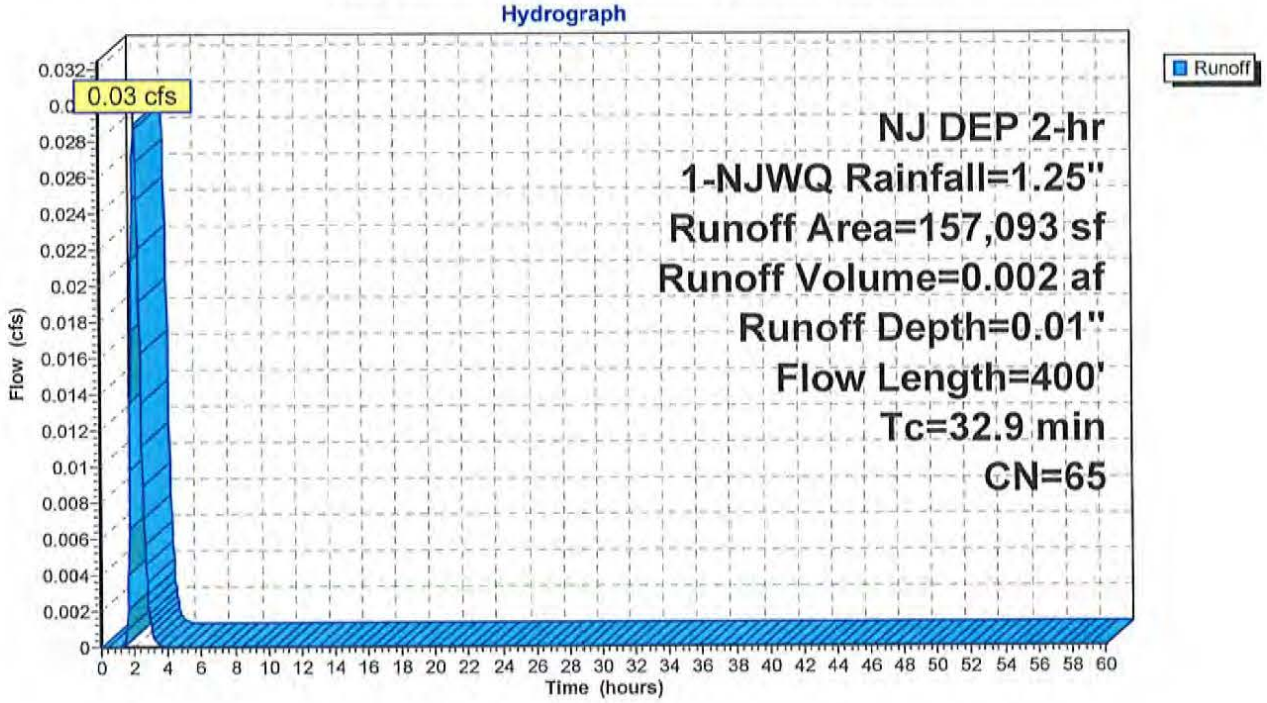
Runoff = 0.03 cfs @ 2.09 hrs, Volume= 0.002 af, Depth= 0.01"
Routed to Reach DW : Driveway Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-NJWQ Rainfall=1.25"

Area (sf)	CN	Description
157,093	65	2 acre lots, 12% imp, HSG B
138,242		88.00% Pervious Area
18,851		12.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	100	0.0400	0.06		**Sheet Flow, Woods and Shrubs** Woods: Dense underbrush n= 0.800 P2= 3.38"
5.3	300	0.0350	0.94		**Shallow Concentrated Flow, Woods and Shrubs** Woodland Kv= 5.0 fps
32.9	400	Total			

Subcatchment OFFSITE: Exisiting home east



Summary for Subcatchment PL 1: Easements undisturbed

Undisturbed by Site Plan

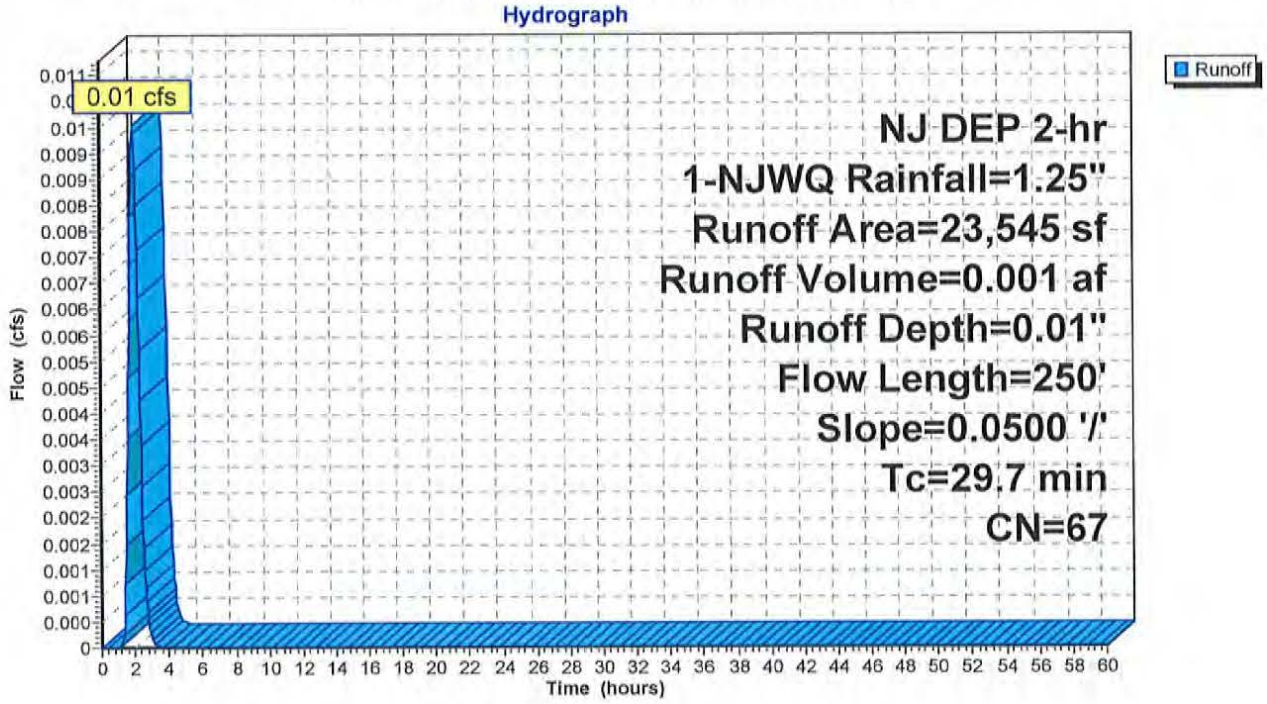
Runoff = 0.01 cfs @ 1.98 hrs, Volume= 0.001 af, Depth= 0.01"
Routed to Pond E-1 : E INLET

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-NJWQ Rainfall=1.25"

Area (sf)	CN	Description
23,545	67	Brush, Poor, HSG B
23,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.2	100	0.0500	0.07		**Sheet Flow, Hedgerow/Meadow** Woods: Dense underbrush n= 0.800 P2= 3.38"
4.5	150	0.0500	0.56		**Shallow Concentrated Flow, Hedgerow/Meadow** Forest w/Heavy Litter Kv= 2.5 fps
29.7	250	Total			

Subcatchment PL 1: Easements undisturbed



Summary for Subcatchment PL 2: Easements unditsturbed

Undisturbed by Sie Plan
Flows to Hedgerow by scour hole

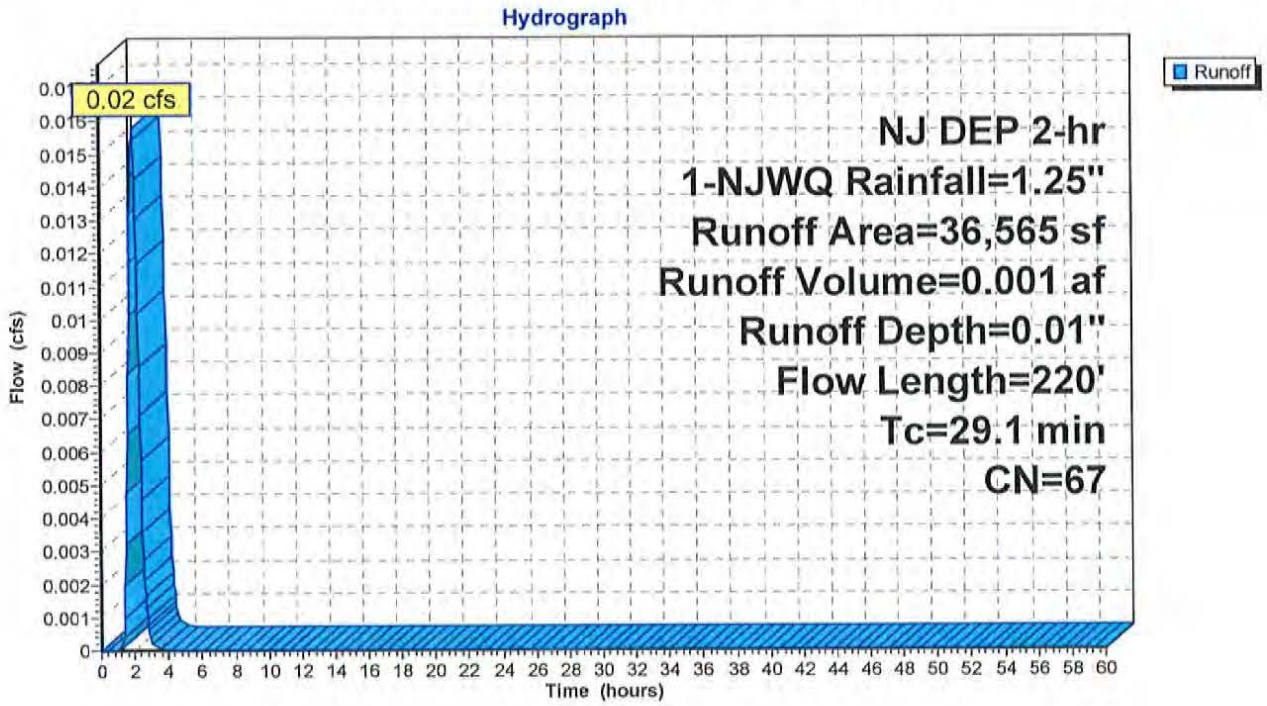
Runoff = 0.02 cfs @ 1.97 hrs, Volume= 0.001 af, Depth= 0.01"
Routed to Link PROPOSED : TOTAL FOR SP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-NJWQ Rainfall=1.25"

	Area (sf)	CN	Description
*	36,565	67	Easements undidsturbed
	36,565		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	100	0.0450	0.06		**Sheet Flow, Hedgerow/Meadow** Woods: Dense underbrush n= 0.800 P2= 3.38"
2.8	120	0.0200	0.71		**Shallow Concentrated Flow, Hegerow/Meadow** Woodland Kv= 5.0 fps
29.1	220	Total			

Subcatchment PL 2: Easements unditsturbed



Summary for Subcatchment SEPTIC ETC: Graded areas

Area outside of site plan and access lanes, includes storm basin area

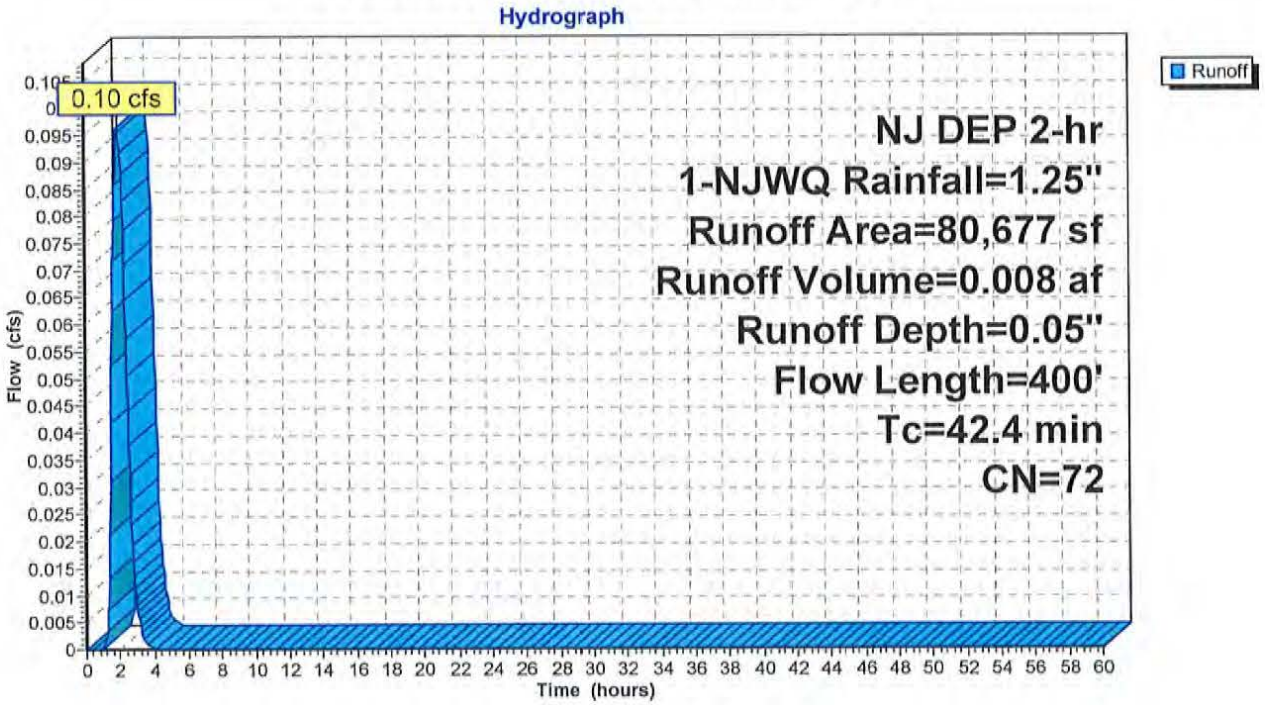
Runoff = 0.10 cfs @ 1.95 hrs, Volume= 0.008 af, Depth= 0.05"
Routed to Reach FS : FIELD SWALE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-NJWQ Rainfall=1.25"

	Area (sf)	CN	Description
	54,407	61	>75% Grass cover, Good, HSG B
	22,670	98	Water Surface, 0% imp, HSG B
*	3,600	85	Geopave units fire lane, HSG B
	80,677	72	Weighted Average
	80,677		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	100	0.0300	0.14		**Sheet Flow, Lawn Area** Grass: Dense n= 0.240 P2= 3.38"
30.6	300	0.0250	0.16		**Sheet Flow, Lawn Areas** Grass: Dense n= 0.240 P2= 3.38"
42.4	400	Total			

Subcatchment SEPTIC ETC: Graded areas



Summary for Subcatchment SOUTH: TO HEDGEROW

AbrB—Abbottstown silt loam, 2 to 6 percent slopes HSG C

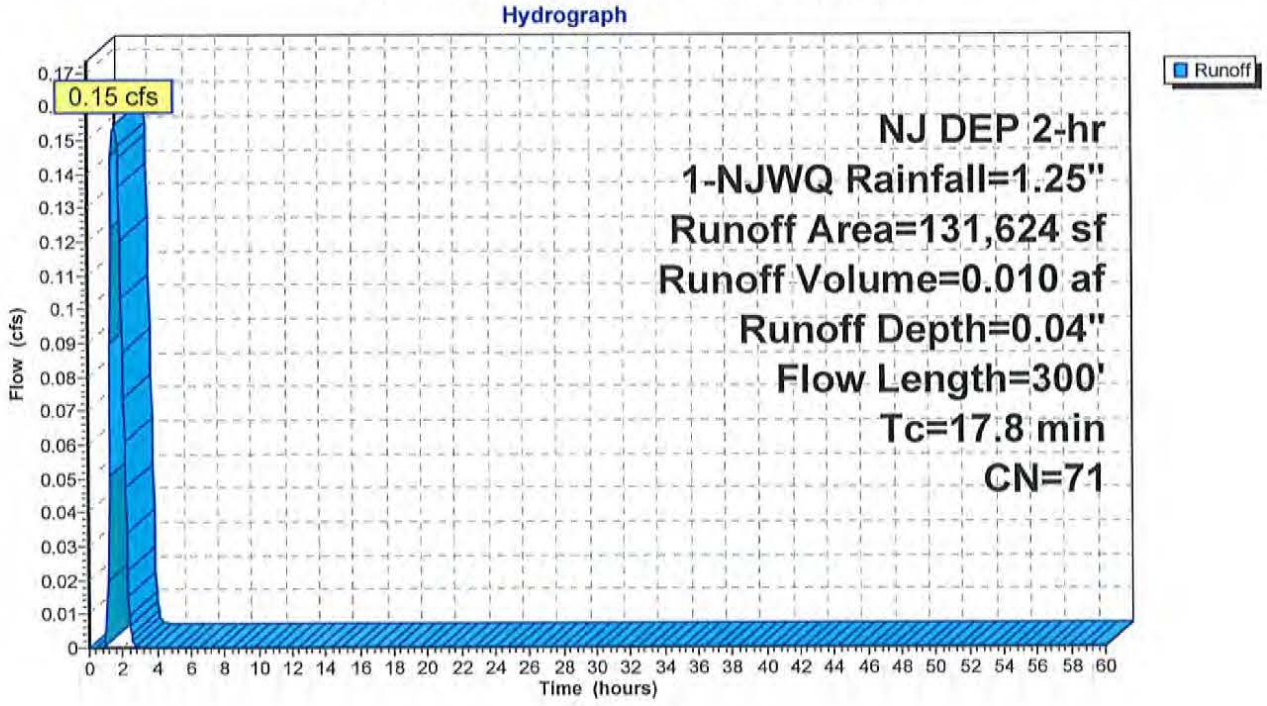
Runoff = 0.15 cfs @ 1.63 hrs, Volume= 0.010 af, Depth= 0.04"
Routed to Link OTHER : TOTAL OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-NJWQ Rainfall=1.25"

Area (sf)	CN	Description
131,624	71	Meadow, non-grazed, HSG C
131,624		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0200	0.12		**Sheet Flow, Meadow** Grass: Dense n= 0.240 P2= 3.38"
3.9	200	0.0150	0.86		**Shallow Concentrated Flow, Meadow** Short Grass Pasture Kv= 7.0 fps
17.8	300	Total			

Subcatchment SOUTH: TO HEDGEROW



Summary for Subcatchment SP: SITE PLAN AREA

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

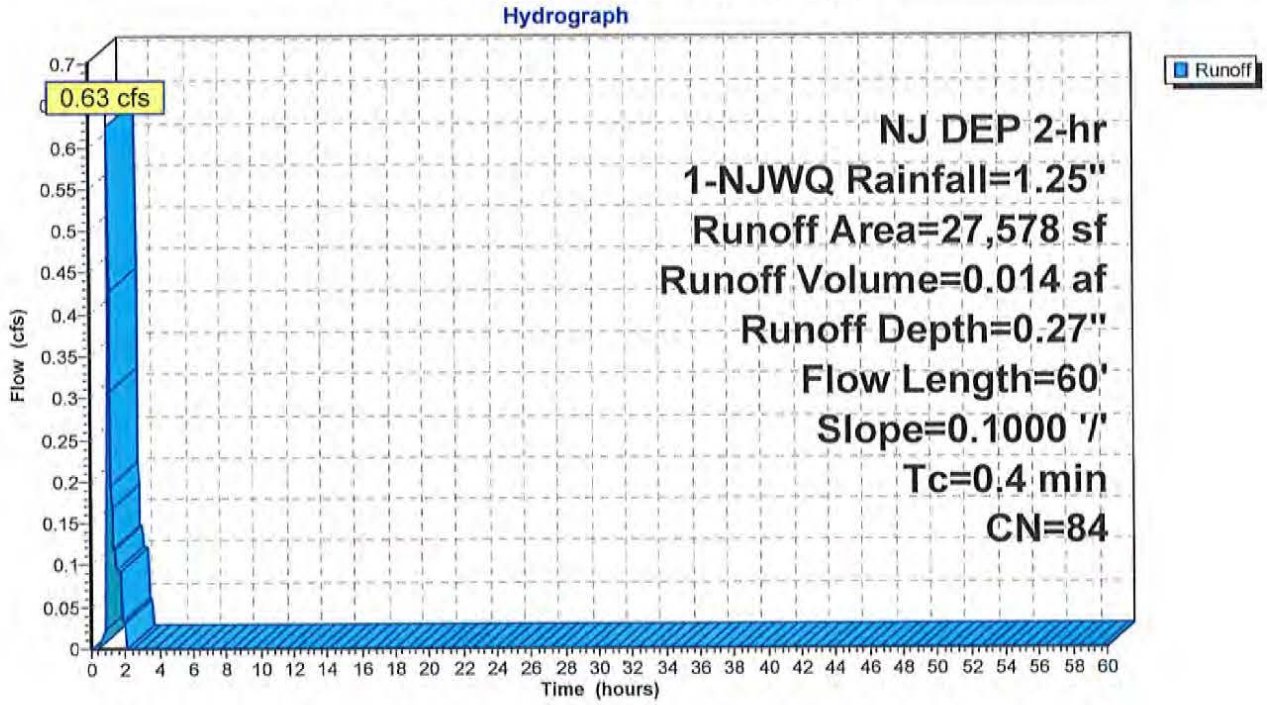
Runoff = 0.63 cfs @ 1.05 hrs, Volume= 0.014 af, Depth= 0.27"
Routed to Pond BASIN : STORM BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-NJWQ Rainfall=1.25"

	Area (sf)	CN	Description
*	1,132	98	Handicapped Locations
*	2,711	61	LANDSCAPE ISLAND Good, HSG B
*	21,127	85	Geopaves, HSG B
*	1,848	98	Sidewalk Unconnected pavement, HSG B
*	324	98	Paved pad Dumpster HSG B
*	436	85	Geopave HSG B
	27,578	84	Weighted Average
	24,274		88.02% Pervious Area
	3,304		11.98% Impervious Area
	1,848		55.93% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	60	0.1000	2.43		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 3.38"

Subcatchment SP: SITE PLAN AREA



Summary for Subcatchment TD AREA: ROAD TO TD2

Roof drain tied into combination drain

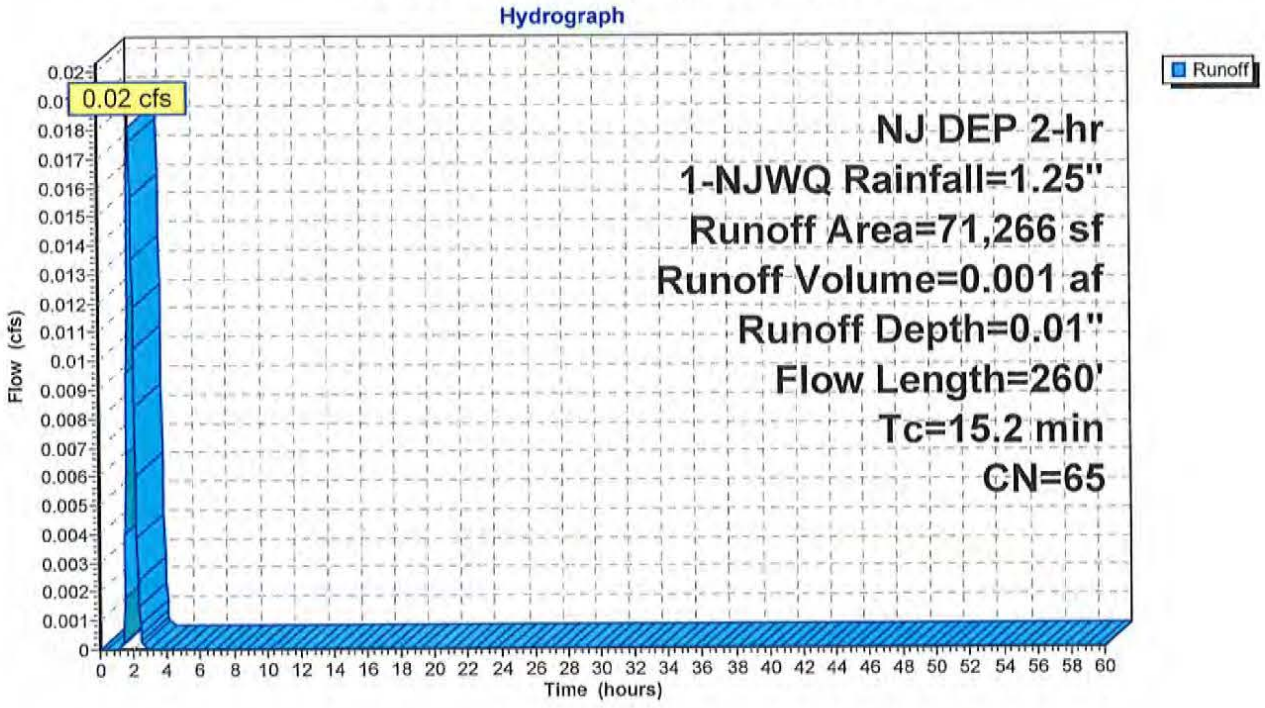
Runoff = 0.02 cfs @ 1.86 hrs, Volume= 0.001 af, Depth= 0.01"
Routed to Reach ST-1 : STONE TRENCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr 1-NJWQ Rainfall=1.25"

	Area (sf)	CN	Description
	55,266	58	Meadow, non-grazed, HSG B
*	2,500	58	Landscape Berm
*	8,400	98	North Half of Tennis Roof HSG B
*	5,100	85	GeoPave Fire Lane HSG B
	71,266	65	Weighted Average
	62,866		88.21% Pervious Area
	8,400		11.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	100	0.0600	0.12		**Sheet Flow, Upslope** Woods: Light underbrush n= 0.400 P2= 3.38"
1.7	160	0.0500	1.57		**Shallow Concentrated Flow, Meadow/Lawn** Short Grass Pasture Kv= 7.0 fps
15.2	260	Total			

Subcatchment TD AREA: ROAD TO TD2



Summary for Reach 1R: DWP

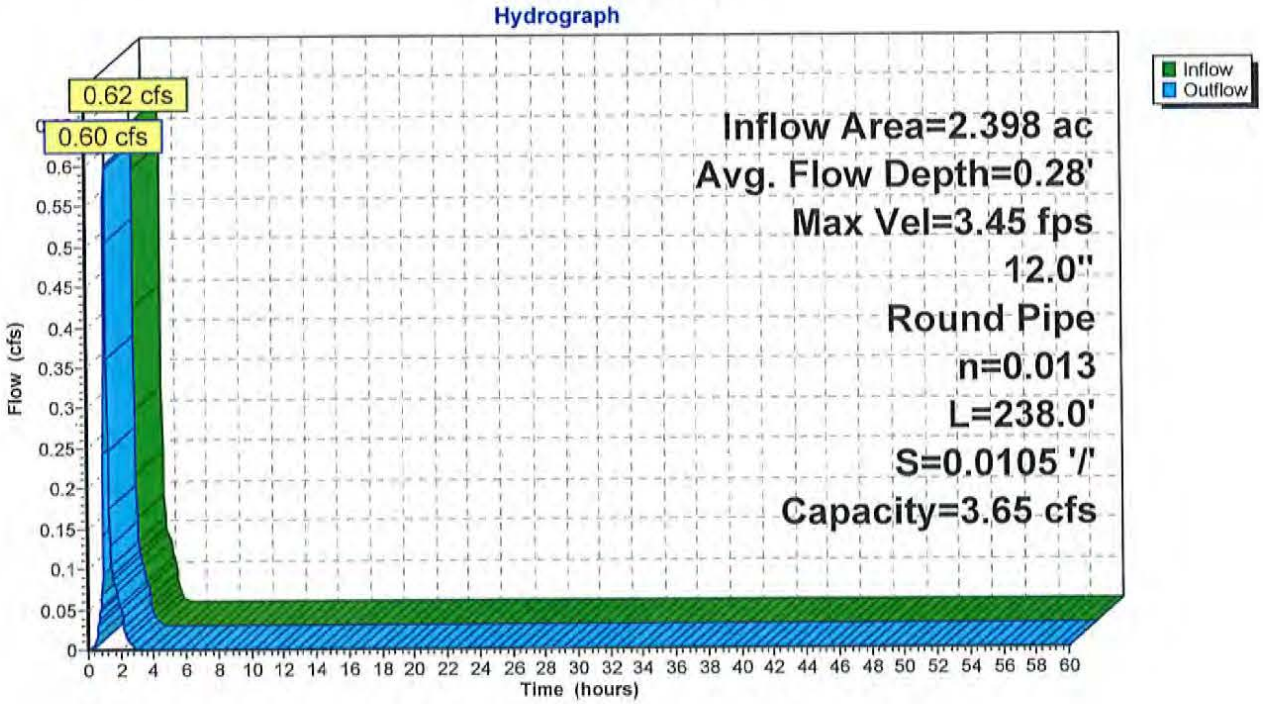
[52] Hint: Inlet/Outlet conditions not evaluated
[79] Warning: Submerged Pond E-1 Primary device # 1 by 0.18'

Inflow Area = 2.398 ac, 17.26% Impervious, Inflow Depth = 0.10" for 1-NJWQ event
Inflow = 0.62 cfs @ 1.11 hrs, Volume= 0.020 af
Outflow = 0.60 cfs @ 1.14 hrs, Volume= 0.020 af, Atten= 4%, Lag= 2.0 min
Routed to Link SCH B : BASIN SCOUR HOLE

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.45 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 1.39 fps, Avg. Travel Time= 2.8 min

Peak Storage= 43 cf @ 1.12 hrs
Average Depth at Peak Storage= 0.28' , Surface Width= 0.90'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.65 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 238.0' Slope= 0.0105 '/'
Inlet Invert= 361.00', Outlet Invert= 358.50'



Summary for Reach DW: Driveway Swale

Existing sweale, no bed no banks, in hedgrow along edge of field

Inflow Area = 3.606 ac, 12.00% Impervious, Inflow Depth = 0.01" for 1-NJWQ event
Inflow = 0.03 cfs @ 2.09 hrs, Volume= 0.002 af
Outflow = 0.03 cfs @ 2.35 hrs, Volume= 0.002 af, Atten= 8%, Lag= 15.3 min
Routed to Reach DWP : Driveway Pipe

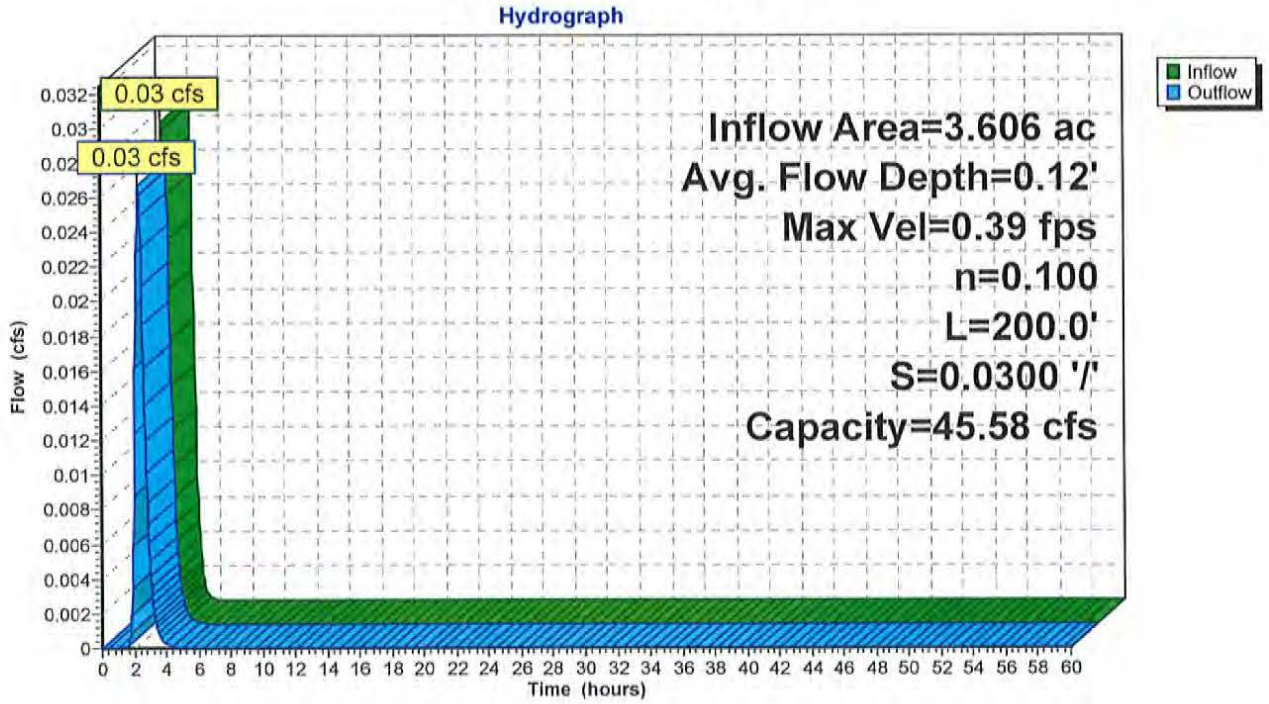
Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.39 fps, Min. Travel Time= 8.4 min
Avg. Velocity = 0.20 fps, Avg. Travel Time= 16.3 min

Peak Storage= 14 cf @ 2.20 hrs
Average Depth at Peak Storage= 0.12' , Surface Width= 1.10'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 45.58 cfs

0.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 4.0 5.0 '/' Top Width= 18.00'
Length= 200.0' Slope= 0.0300 '/'
Inlet Invert= 367.00', Outlet Invert= 361.00'

‡

Reach DW: Driveway Swale



Summary for Reach DWP: Driveway Pipe

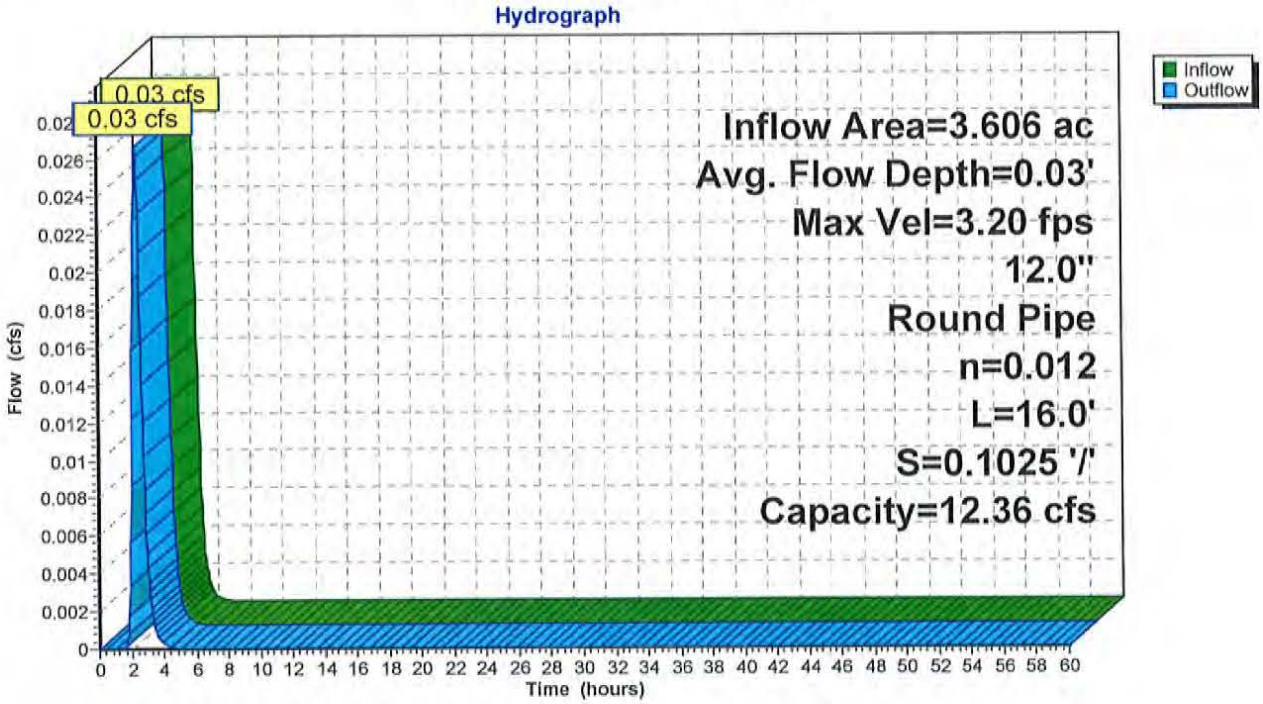
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach DW OUTLET depth by 5.81' @ 0.00 hrs

Inflow Area = 3.606 ac, 12.00% Impervious, Inflow Depth = 0.01" for 1-NJWQ event
Inflow = 0.03 cfs @ 2.35 hrs, Volume= 0.002 af
Outflow = 0.03 cfs @ 2.35 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.1 min
Routed to Reach FS2 : SWALE FOR OFFSITE

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.20 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.02 fps, Avg. Travel Time= 0.1 min

Peak Storage= 0 cf @ 2.35 hrs
Average Depth at Peak Storage= 0.03' , Surface Width= 0.36'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 12.36 cfs

12.0" Round Pipe
n= 0.012 Concrete pipe, finished
Length= 16.0' Slope= 0.1025 '/'
Inlet Invert= 366.81', Outlet Invert= 365.17'



Summary for Reach FS: FIELD SWALE

Existing sweale, no bed no banks, in hedgrow along edge of field

Inflow Area = 5.770 ac, 0.84% Impervious, Inflow Depth = 0.03" for 1-NJWQ event
Inflow = 0.14 cfs @ 1.09 hrs, Volume= 0.012 af
Outflow = 0.09 cfs @ 2.50 hrs, Volume= 0.012 af, Atten= 34%, Lag= 84.2 min
Routed to Pond BASIN : STORM BASIN

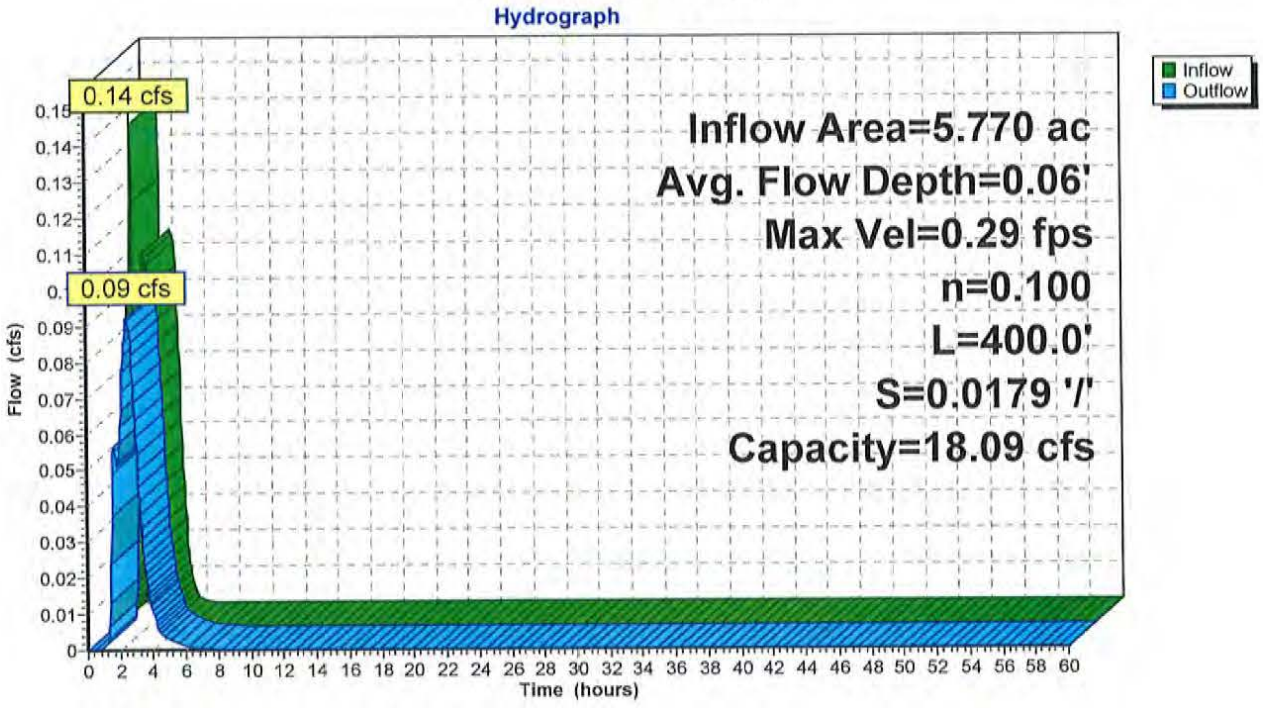
Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.29 fps, Min. Travel Time= 23.2 min
Avg. Velocity = 0.12 fps, Avg. Travel Time= 54.2 min

Peak Storage= 129 cf @ 2.11 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 5.89'
Bank-Full Depth= 1.00' Flow Area= 12.5 sf, Capacity= 18.09 cfs

5.00' x 1.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 10.0 5.0 '/' Top Width= 20.00'
Length= 400.0' Slope= 0.0179 '/'
Inlet Invert= 365.17', Outlet Invert= 358.00'

‡

Reach FS: FIELD SWALE



Summary for Reach FS2: SWALE FOR OFFSITE

Existing sweale, no bed no banks, in hedgrow along edge of field

[62] Hint: Exceeded Reach DWP OUTLET depth by 0.01' @ 3.85 hrs

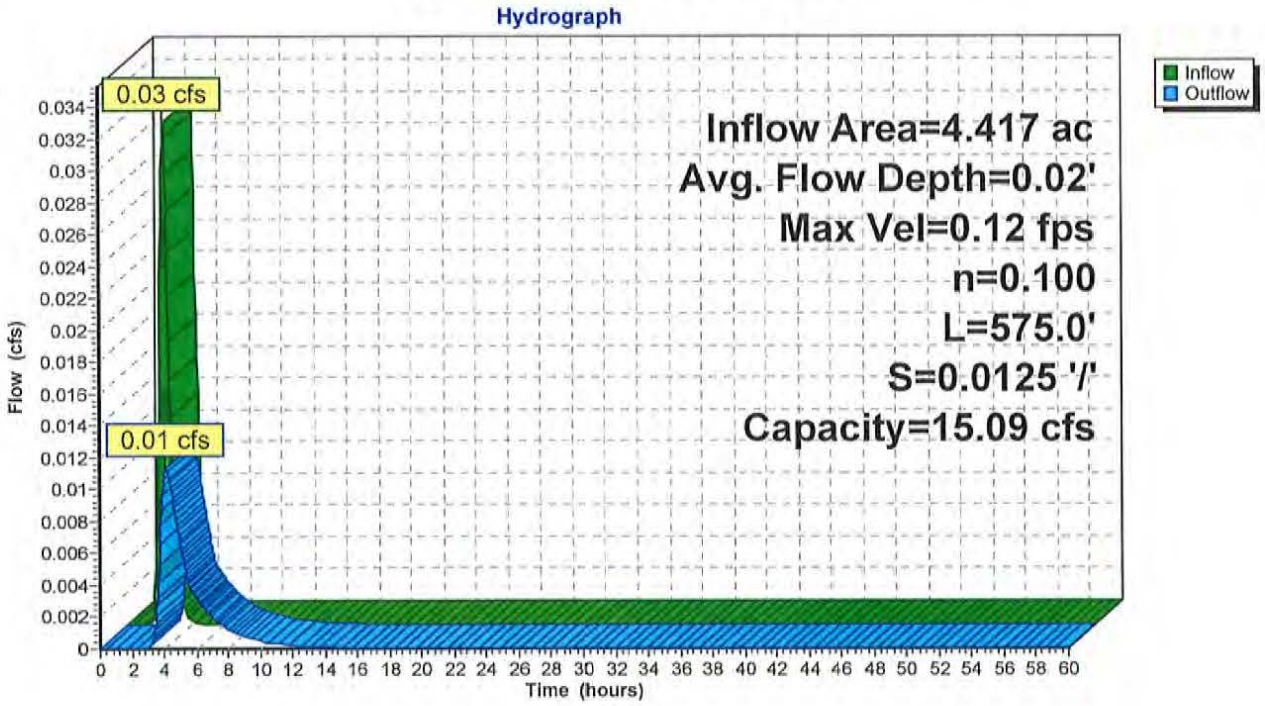
Inflow Area = 4.417 ac, 9.80% Impervious, Inflow Depth = 0.01" for 1-NJWQ event
Inflow = 0.03 cfs @ 2.31 hrs, Volume= 0.002 af
Outflow = 0.01 cfs @ 4.16 hrs, Volume= 0.002 af, Atten= 64%, Lag= 110.7 min
Routed to Link OTHER : TOTAL OFFSITE

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.12 fps, Min. Travel Time= 81.9 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 120.7 min

Peak Storage= 56 cf @ 2.79 hrs
Average Depth at Peak Storage= 0.02' , Surface Width= 5.28'
Bank-Full Depth= 1.00' Flow Area= 12.5 sf, Capacity= 15.09 cfs

5.00' x 1.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 10.0 5.0 '/' Top Width= 20.00'
Length= 575.0' Slope= 0.0125 '/'
Inlet Invert= 365.17', Outlet Invert= 358.00'

‡



Summary for Reach OUT: TD 2 OUTLET

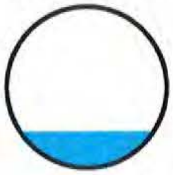
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach TD2 OUTLET depth by 0.16' @ 1.15 hrs

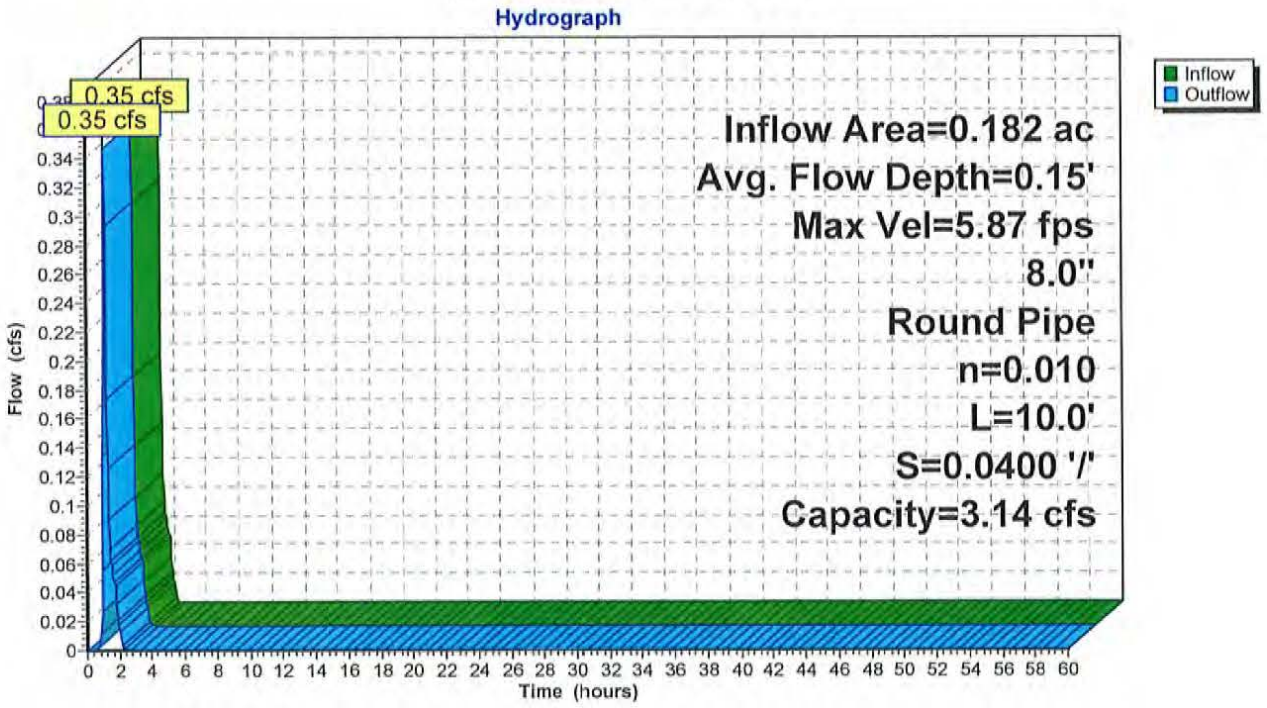
Inflow Area = 0.182 ac, 68.27% Impervious, Inflow Depth = 0.65" for 1-NJWQ event
Inflow = 0.35 cfs @ 1.13 hrs, Volume= 0.010 af
Outflow = 0.35 cfs @ 1.13 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.1 min
Routed to Link SCH B : BASIN SCOUR HOLE

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.87 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.08 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 1.13 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 0.56'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 3.14 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 10.0' Slope= 0.0400 '/'
Inlet Invert= 359.90', Outlet Invert= 359.50'





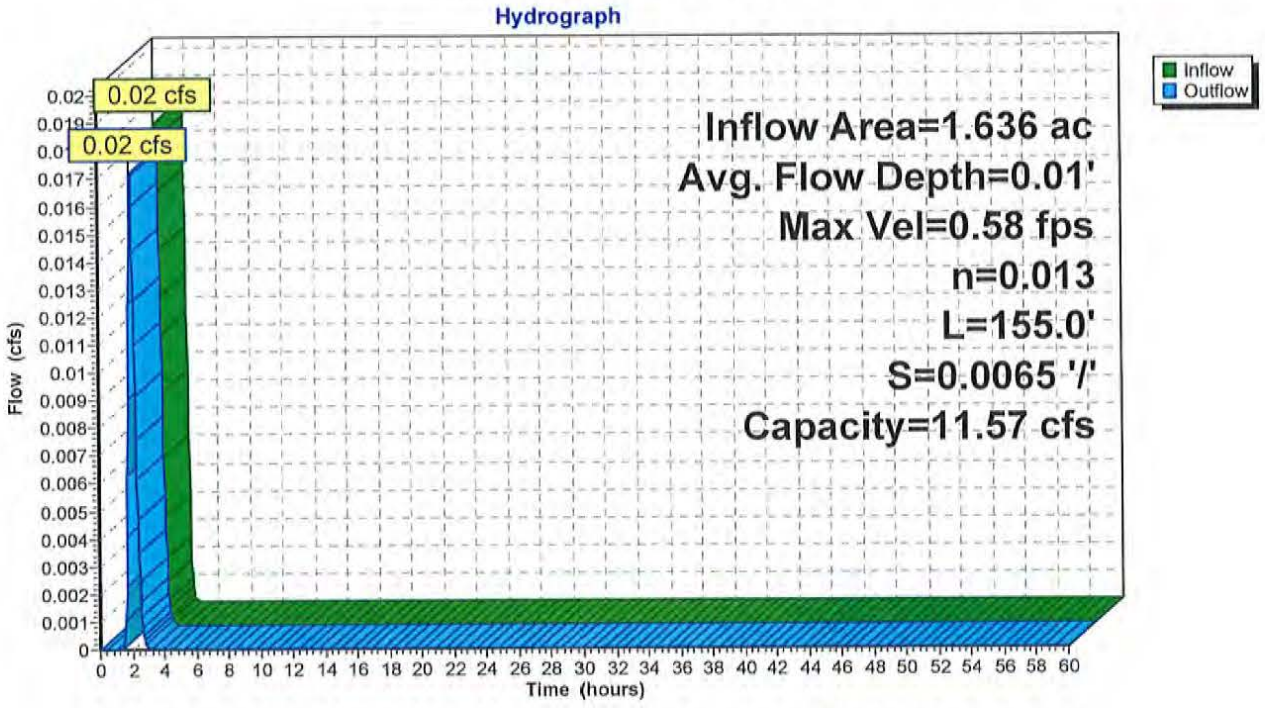
Summary for Reach ST-1: STONE TRENCH

Inflow Area = 1.636 ac, 11.79% Impervious, Inflow Depth = 0.01" for 1-NJWQ event
Inflow = 0.02 cfs @ 1.86 hrs, Volume= 0.001 af
Outflow = 0.02 cfs @ 1.98 hrs, Volume= 0.001 af, Atten= 5%, Lag= 7.3 min
Routed to Reach ST-OUT : DRAIN

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.58 fps, Min. Travel Time= 4.4 min
Avg. Velocity = 0.46 fps, Avg. Travel Time= 5.6 min

Peak Storage= 5 cf @ 1.91 hrs
Average Depth at Peak Storage= 0.01' , Surface Width= 2.00'
Bank-Full Depth= 1.00' Flow Area= 2.0 sf, Capacity= 11.57 cfs

2.00' x 1.00' deep channel, n= 0.013 Concrete, trowel finish
Length= 155.0' Slope= 0.0065 '/'
Inlet Invert= 363.00', Outlet Invert= 362.00'



Summary for Reach ST-OUT: DRAIN

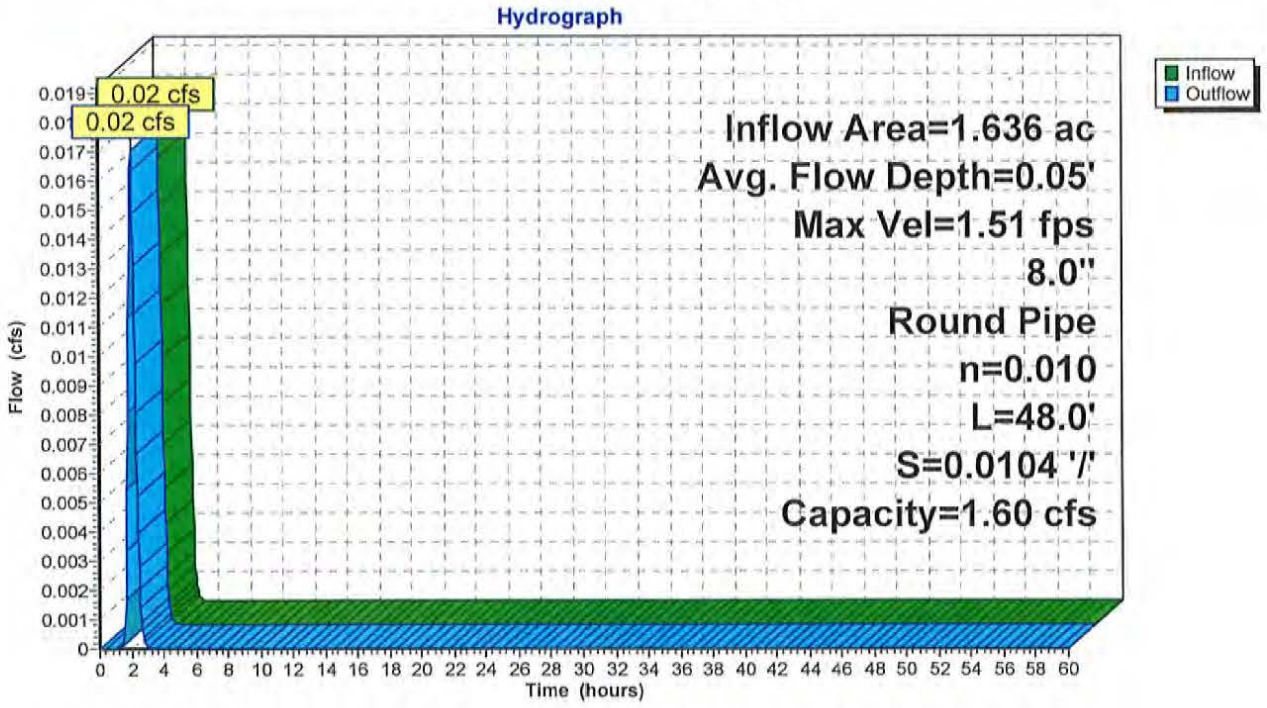
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 1.636 ac, 11.79% Impervious, Inflow Depth = 0.01" for 1-NJWQ event
Inflow = 0.02 cfs @ 1.98 hrs, Volume= 0.001 af
Outflow = 0.02 cfs @ 2.00 hrs, Volume= 0.001 af, Atten= 1%, Lag= 0.9 min
Routed to Pond E-1 : E INLET

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.51 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.94 fps, Avg. Travel Time= 0.9 min

Peak Storage= 1 cf @ 1.99 hrs
Average Depth at Peak Storage= 0.05' , Surface Width= 0.35'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.60 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 48.0' Slope= 0.0104 '/'
Inlet Invert= 361.90', Outlet Invert= 361.40'



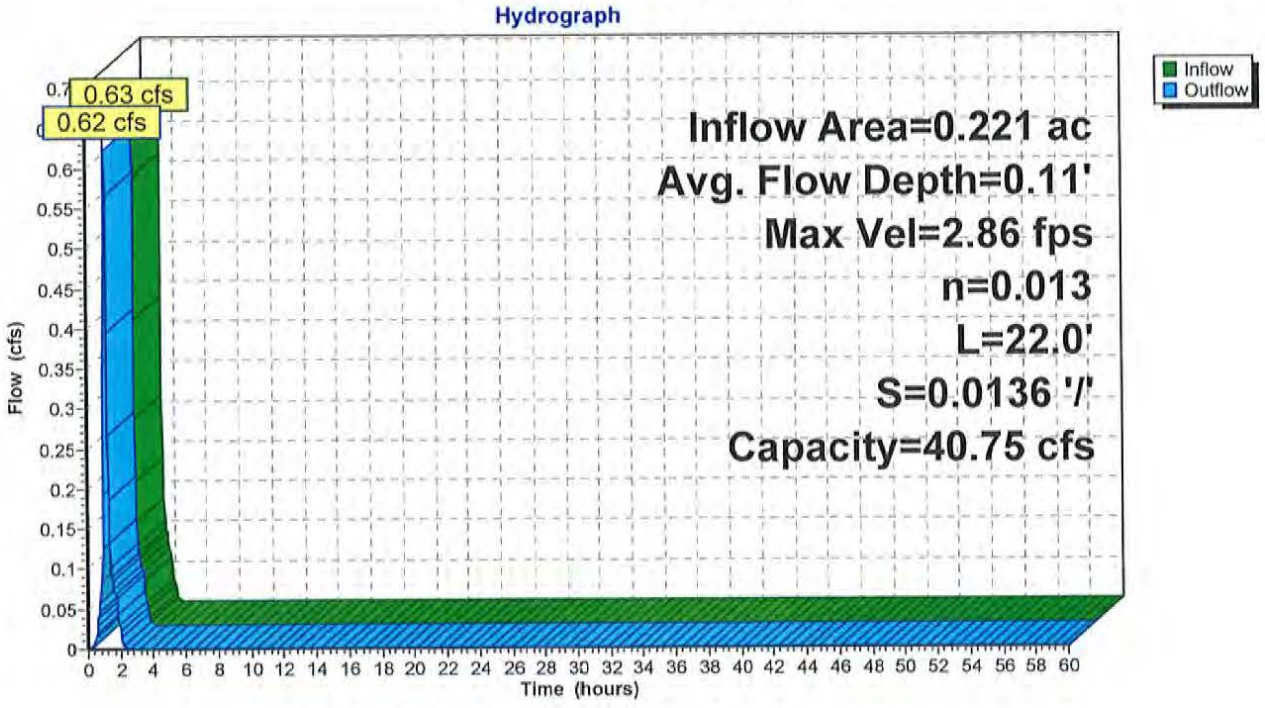
Summary for Reach TD 1: Trench Drain

Inflow Area = 0.221 ac,100.00% Impervious, Inflow Depth = 1.03" for 1-NJWQ event
Inflow = 0.63 cfs @ 1.10 hrs, Volume= 0.019 af
Outflow = 0.62 cfs @ 1.11 hrs, Volume= 0.019 af, Atten= 1%, Lag= 0.2 min
Routed to Pond E-1 : E INLET

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.86 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.38 fps, Avg. Travel Time= 0.3 min

Peak Storage= 5 cf @ 1.10 hrs
Average Depth at Peak Storage= 0.11' , Surface Width= 2.00'
Bank-Full Depth= 2.00' Flow Area= 4.0 sf, Capacity= 40.75 cfs

2.00' x 2.00' deep channel, n= 0.013 Concrete, trowel finish
Length= 22.0' Slope= 0.0136 '/'
Inlet Invert= 361.20', Outlet Invert= 360.90'



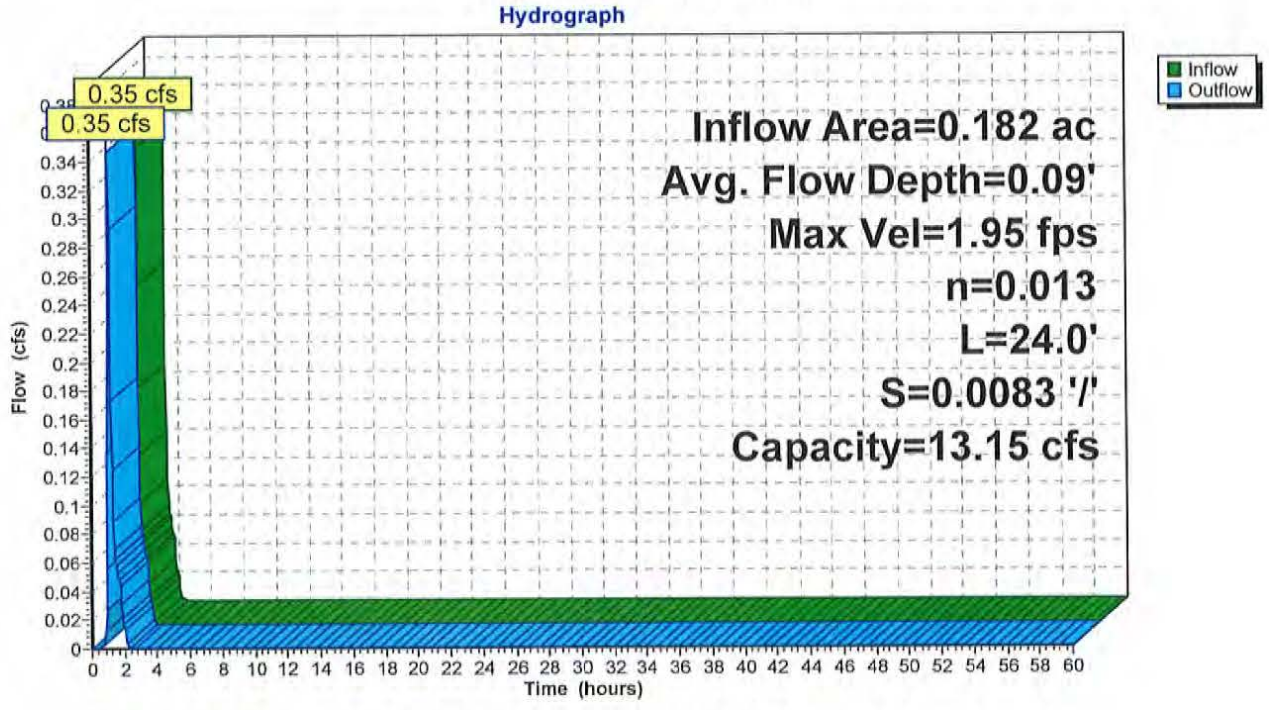
Summary for Reach TD2: Trench Drain

Inflow Area = 0.182 ac, 68.27% Impervious, Inflow Depth = 0.65" for 1-NJWQ event
Inflow = 0.35 cfs @ 1.12 hrs, Volume= 0.010 af
Outflow = 0.35 cfs @ 1.13 hrs, Volume= 0.010 af, Atten= 1%, Lag= 0.4 min
Routed to Reach OUT : TD 2 OUTLET

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.95 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 0.93 fps, Avg. Travel Time= 0.4 min

Peak Storage= 4 cf @ 1.12 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 2.00'
Bank-Full Depth= 1.00' Flow Area= 2.0 sf, Capacity= 13.15 cfs

2.00' x 1.00' deep channel, n= 0.013 Concrete, trowel finish
Length= 24.0' Slope= 0.0083 '/'
Inlet Invert= 360.00', Outlet Invert= 359.80'



Summary for Pond BASIN: STORM BASIN

[62] Hint: Exceeded Reach FS OUTLET depth by 0.01' @ 1.15 hrs

Inflow Area = 8.984 ac, 7.37% Impervious, Inflow Depth = 0.08" for 1-NJWQ event
Inflow = 1.33 cfs @ 1.09 hrs, Volume= 0.057 af
Outflow = 1.00 cfs @ 1.10 hrs, Volume= 0.057 af, Atten= 25%, Lag= 0.6 min
Discarded = 1.00 cfs @ 1.10 hrs, Volume= 0.057 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond SCH OUT : SCH- OUT
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond SCH OUT : SCH- OUT

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Peak Elev= 358.06' @ 1.19 hrs Surf.Area= 16,918 sf Storage= 288 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 3.3 min (97.3 - 94.0)

Volume	Invert	Avail.Storage	Storage Description
#1	358.50'	62,063 cf	**OPEN STORAGE (Prismatic)**Listed below (Recalc)
#2	358.00'	2,621 cf	**CRUSHED STONE FILTER (Prismatic)**Listed below (Recalc) 8,738 cf Overall x 30.0% Voids
		64,684 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
358.50	18,000	0	0
360.00	20,648	28,986	28,986
361.00	22,670	21,659	50,645
361.50	23,000	11,418	62,063

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
358.00	16,753	0	0
358.50	18,200	8,738	8,738

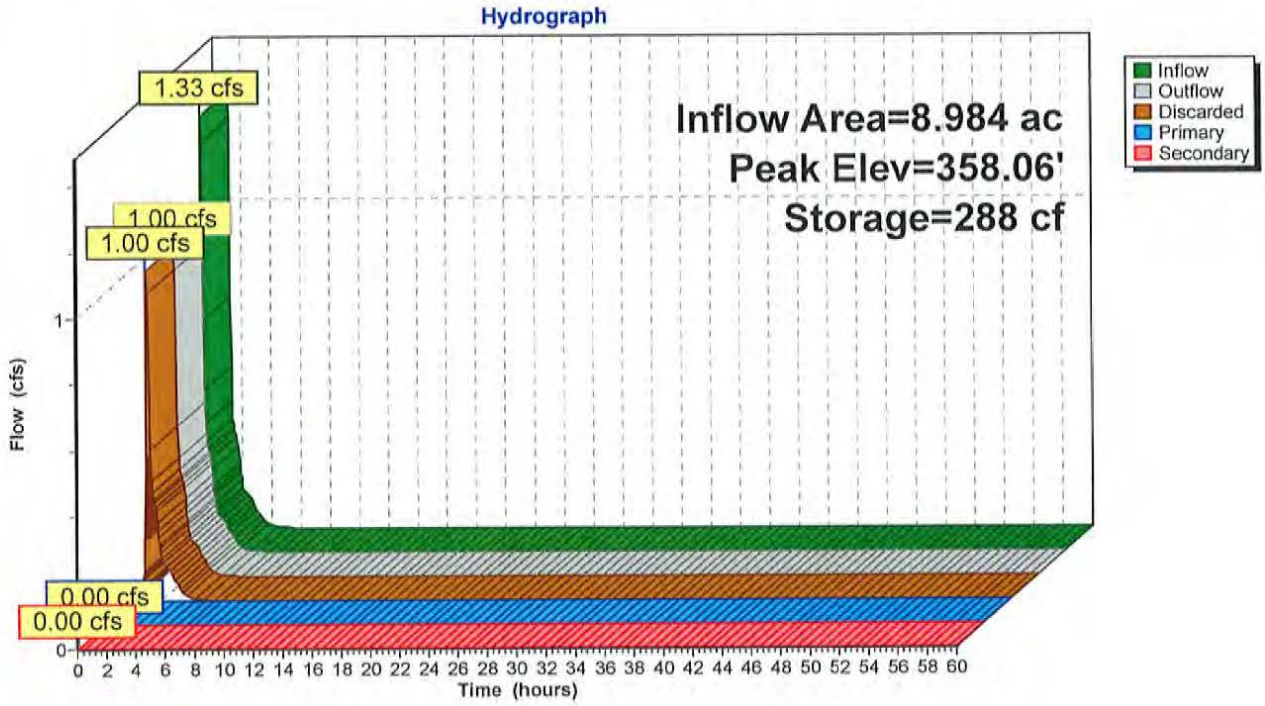
Device	Routing	Invert	Outlet Devices
#1	Primary	358.50'	**6.0" Round Culvert X 3.00** L= 34.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 358.50' / 358.10' S= 0.0118 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 1	358.70'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	359.70'	**1.5" x 20.0" Horiz. Type E Inlet Grate X 8.00 columns**X 15 rows C= 0.600 Limited to weir flow at low heads
#4	Secondary	360.80'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#5	Discarded	358.00'	**1.00 cfs Exfiltration at all elevations**

Discarded OutFlow Max=1.00 cfs @ 1.10 hrs HW=358.04' (Free Discharge)
└**5=Exfiltration** (Exfiltration Controls 1.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=358.00' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)
  └**2=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)
  └**3=Type E Inlet Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=358.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond BASIN: STORM BASIN



Summary for Pond E-1: E INLET

[57] Hint: Peaked at 361.50' (Flood elevation advised)
[62] Hint: Exceeded Reach ST-OUT OUTLET depth by 0.10' @ 1.10 hrs
[63] Warning: Exceeded Reach TD 1 INLET depth by 0.19' @ 1.10 hrs

Inflow Area = 2.398 ac, 17.26% Impervious, Inflow Depth = 0.10" for 1-NJWQ event
Inflow = 0.62 cfs @ 1.11 hrs, Volume= 0.020 af
Outflow = 0.62 cfs @ 1.11 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min
Primary = 0.62 cfs @ 1.11 hrs, Volume= 0.020 af
Routed to Reach 1R : DWP
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1R : DWP

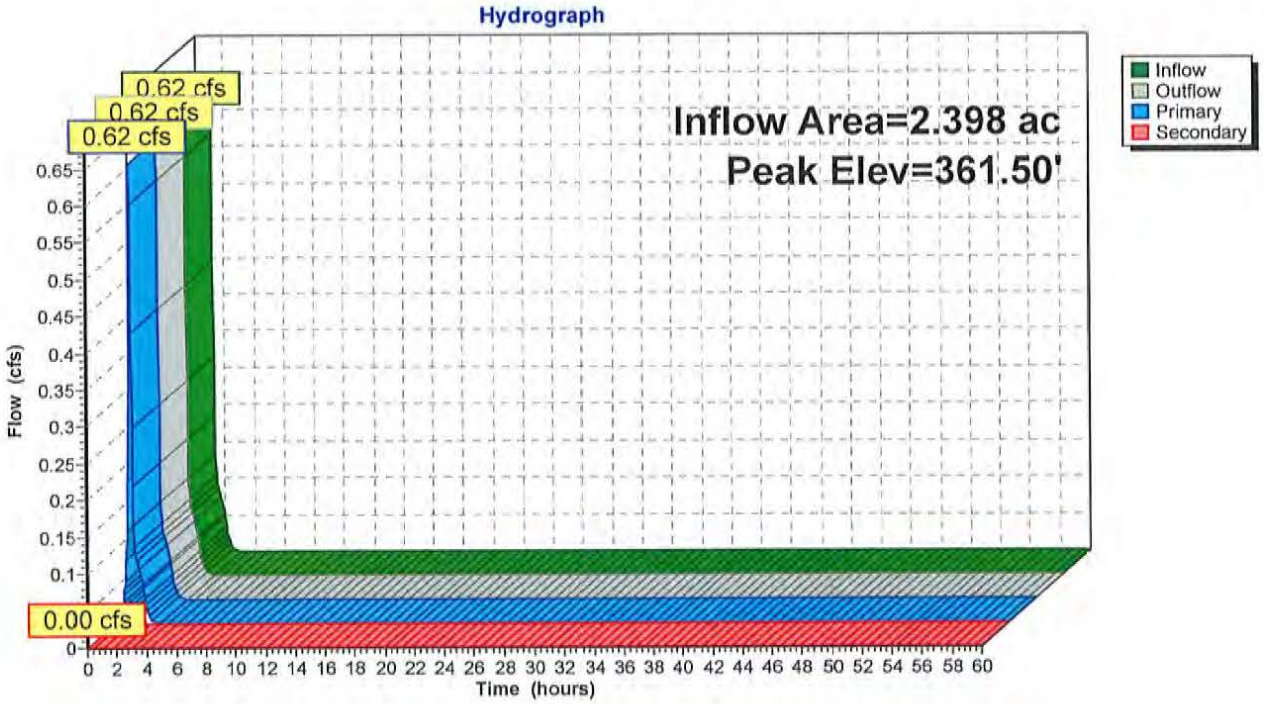
Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Peak Elev= 361.50' @ 1.11 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	361.10'	**12.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Secondary	363.60'	**2.0" x 220.0" Horiz. E-Type Grate X 2.00 columns**X 8 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.62 cfs @ 1.11 hrs HW=361.49' (Free Discharge)
↑—**1=Orifice** (Orifice Controls 0.62 cfs @ 2.14 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=361.10' (Free Discharge)
↑—**2=E-Type Grate** (Controls 0.00 cfs)

Pond E-1: E INLET



Summary for Pond SCH OUT: SCH- OUT

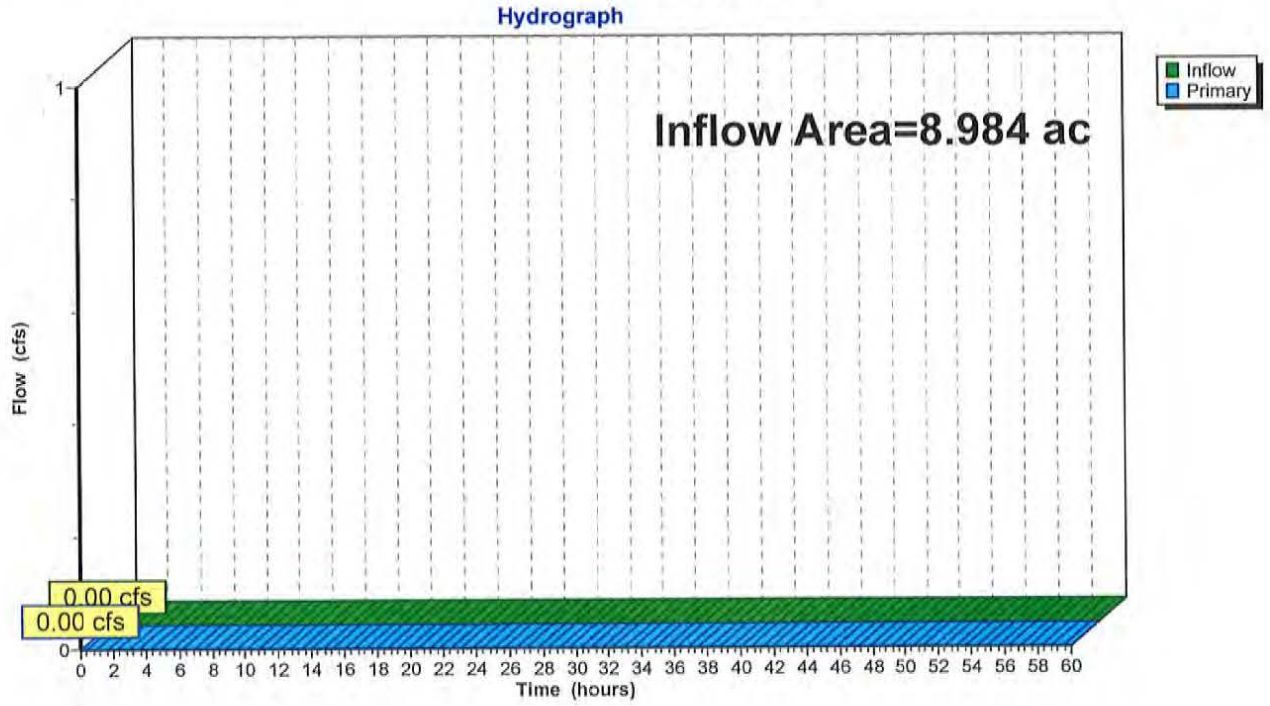
SCOUR HOLE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 8.984 ac, 7.37% Impervious, Inflow Depth = 0.00" for 1-NJWQ event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Routed to Link PROPOSED : TOTAL FOR SP

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Pond SCH OUT: SCH- OUT

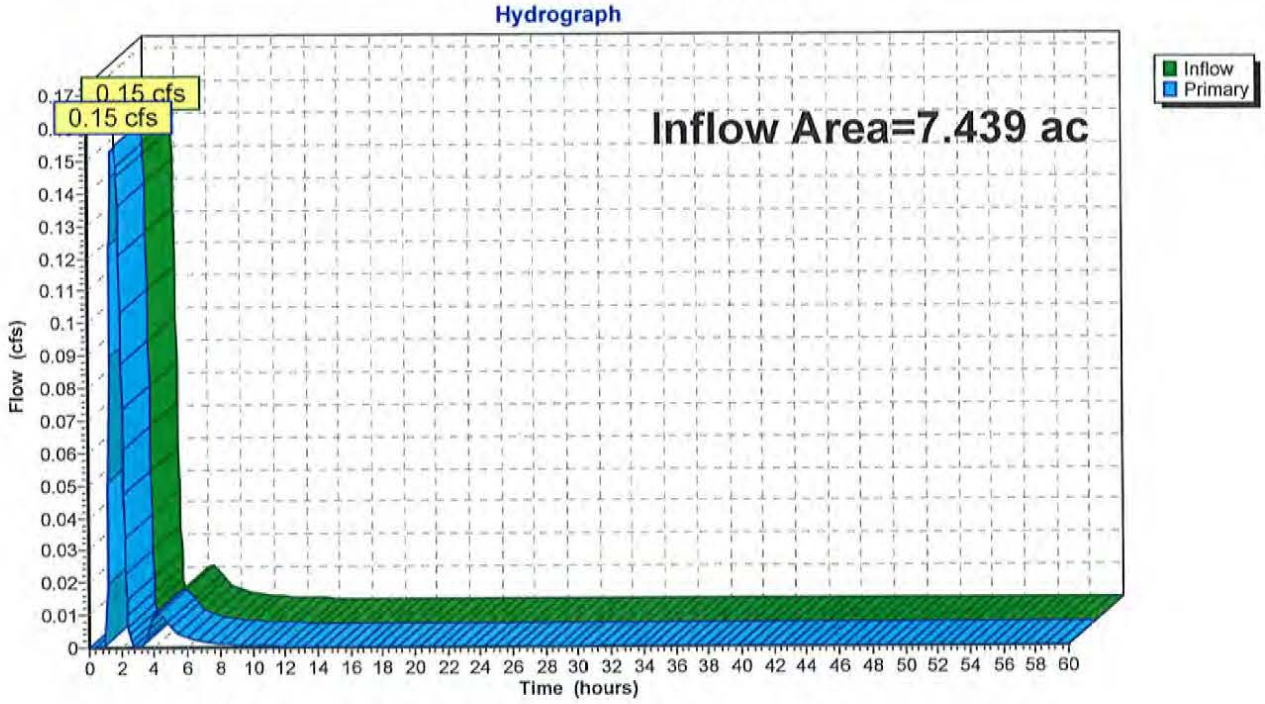


Summary for Link OTHER: TOTAL OFFSITE

Inflow Area = 7.439 ac, 5.82% Impervious, Inflow Depth = 0.02" for 1-NJWQ event
Inflow = 0.15 cfs @ 1.63 hrs, Volume= 0.012 af
Primary = 0.15 cfs @ 1.63 hrs, Volume= 0.012 af, Atten= 0%, Lag= 0.0 min
Routed to Link PROP FLOWS : Onsite Flows

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link OTHER: TOTAL OFFSITE

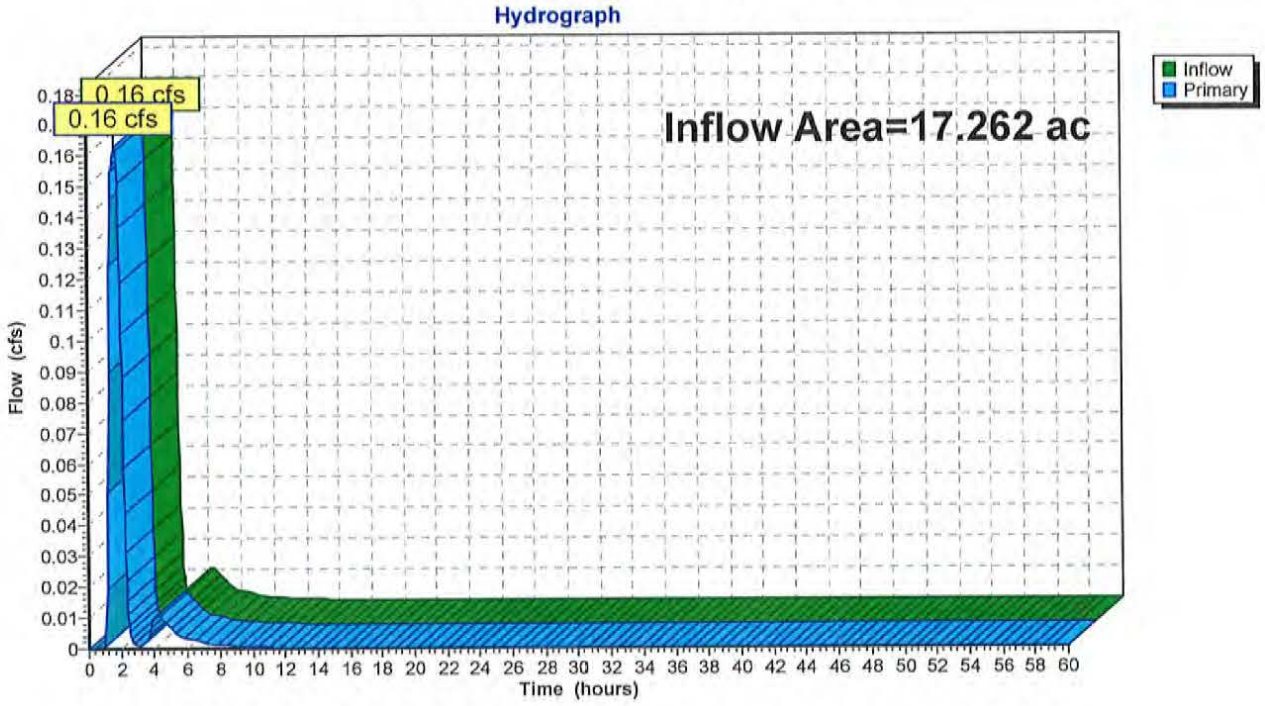


Summary for Link PROP FLOWS: Onsite Flows

Inflow Area = 17.262 ac, 6.34% Impervious, Inflow Depth = 0.01" for 1-NJWQ event
Inflow = 0.16 cfs @ 1.68 hrs, Volume= 0.013 af
Primary = 0.16 cfs @ 1.68 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link PROP FLOWS: Onsite Flows

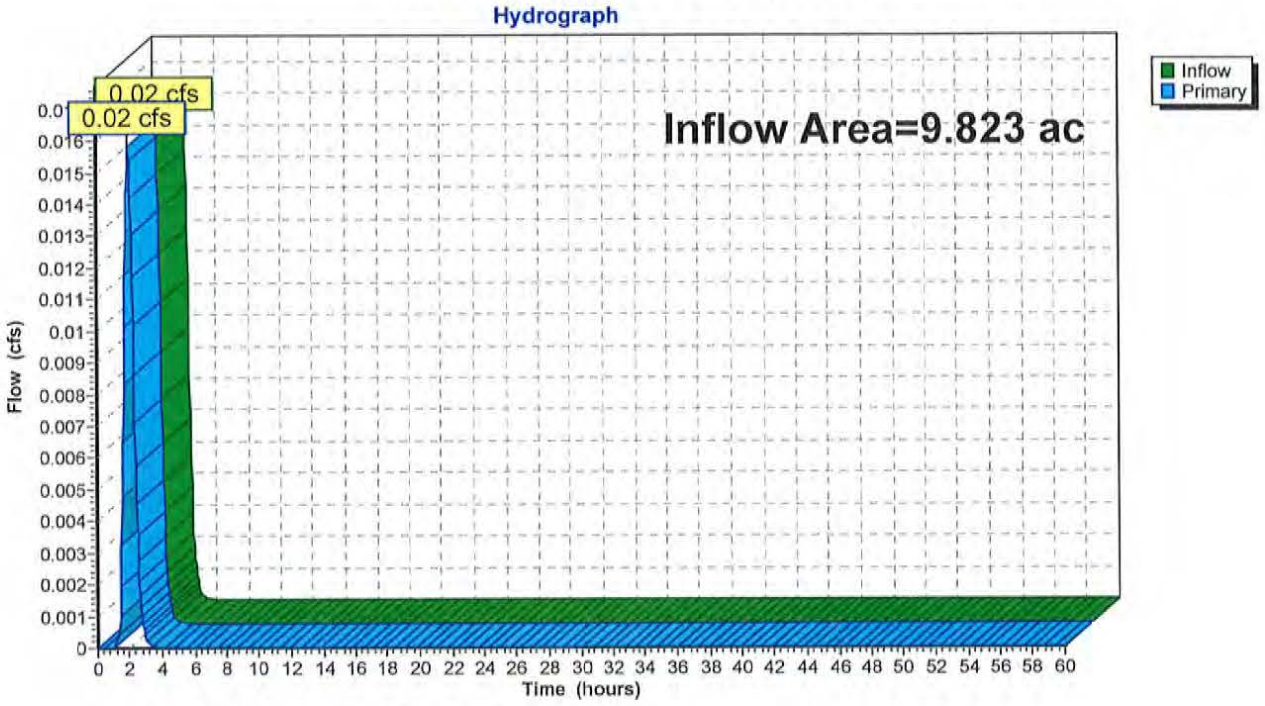


Summary for Link PROPOSED: TOTAL FOR SP

Inflow Area = 9.823 ac, 6.74% Impervious, Inflow Depth = 0.00" for 1-NJWQ event
Inflow = 0.02 cfs @ 1.97 hrs, Volume= 0.001 af
Primary = 0.02 cfs @ 1.97 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min
Routed to Link PROP FLOWS : Onsite Flows

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link PROPOSED: TOTAL FOR SP

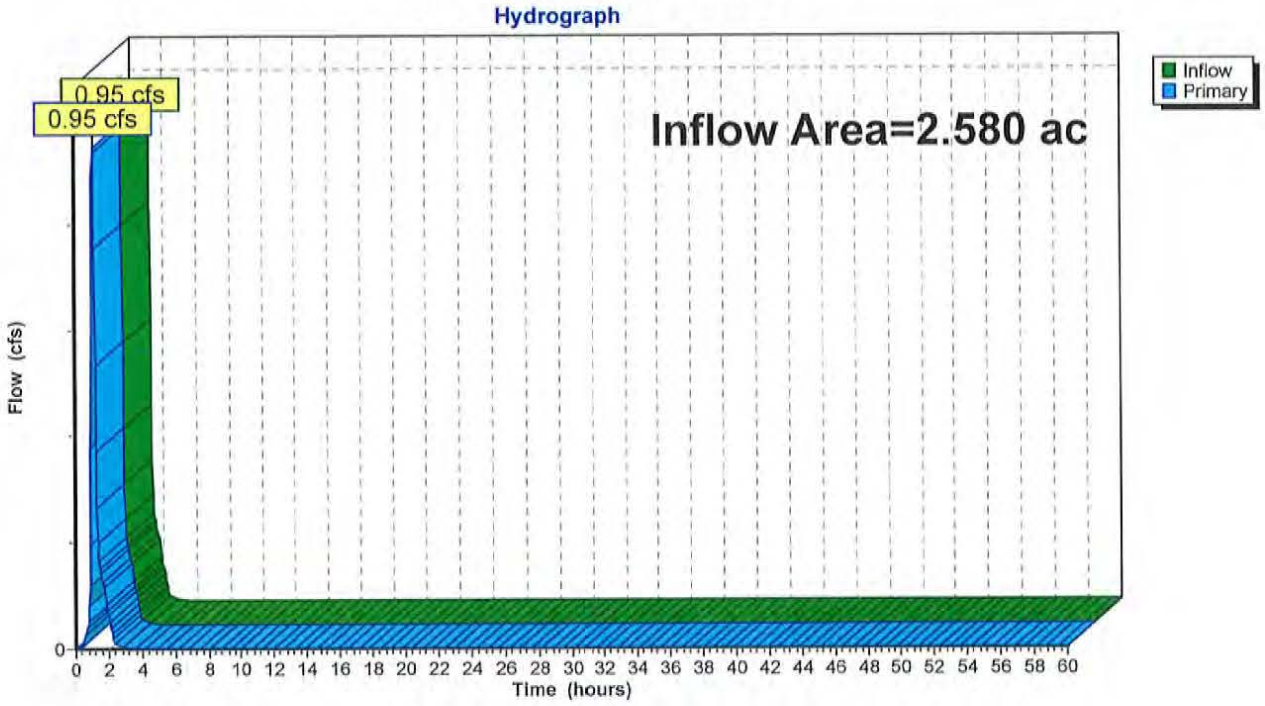


Summary for Link SCH B: BASIN SCOUR HOLE

Inflow Area = 2.580 ac, 20.87% Impervious, Inflow Depth = 0.14" for 1-NJWQ event
Inflow = 0.95 cfs @ 1.13 hrs, Volume= 0.030 af
Primary = 0.95 cfs @ 1.13 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.0 min
Routed to Pond BASIN : STORM BASIN

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link SCH B: BASIN SCOUR HOLE



Summary for Subcatchment 1/4 ROOF: ROOF DRAIN

Roof Drain tied into driveway drain

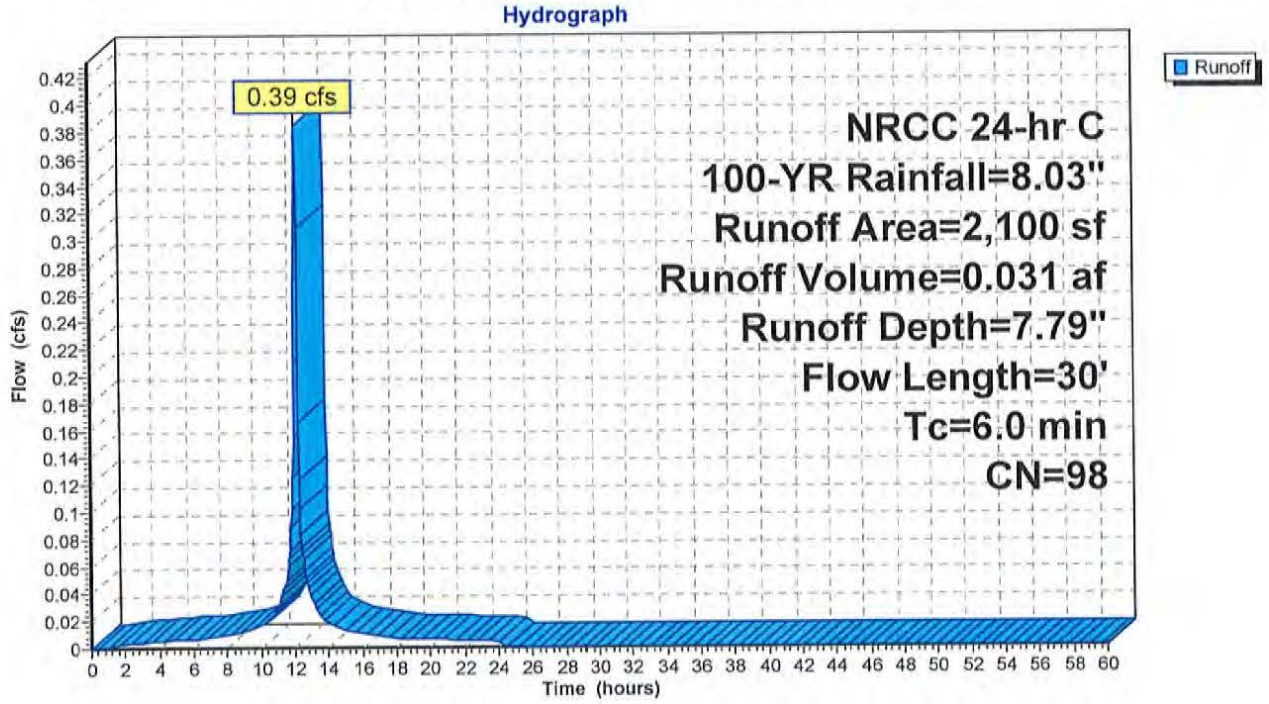
Runoff = 0.39 cfs @ 12.13 hrs, Volume= 0.031 af, Depth= 7.79"
Routed to Reach FS : FIELD SWALE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-YR Rainfall=8.03"

	Area (sf)	CN	Description
*	2,100	98	1/4 Roof, HSG B
	2,100		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	30		0.08		**Direct Entry, Roof Drain**

Subcatchment 1/4 ROOF: ROOF DRAIN



Summary for Subcatchment ACCESS: Driveway

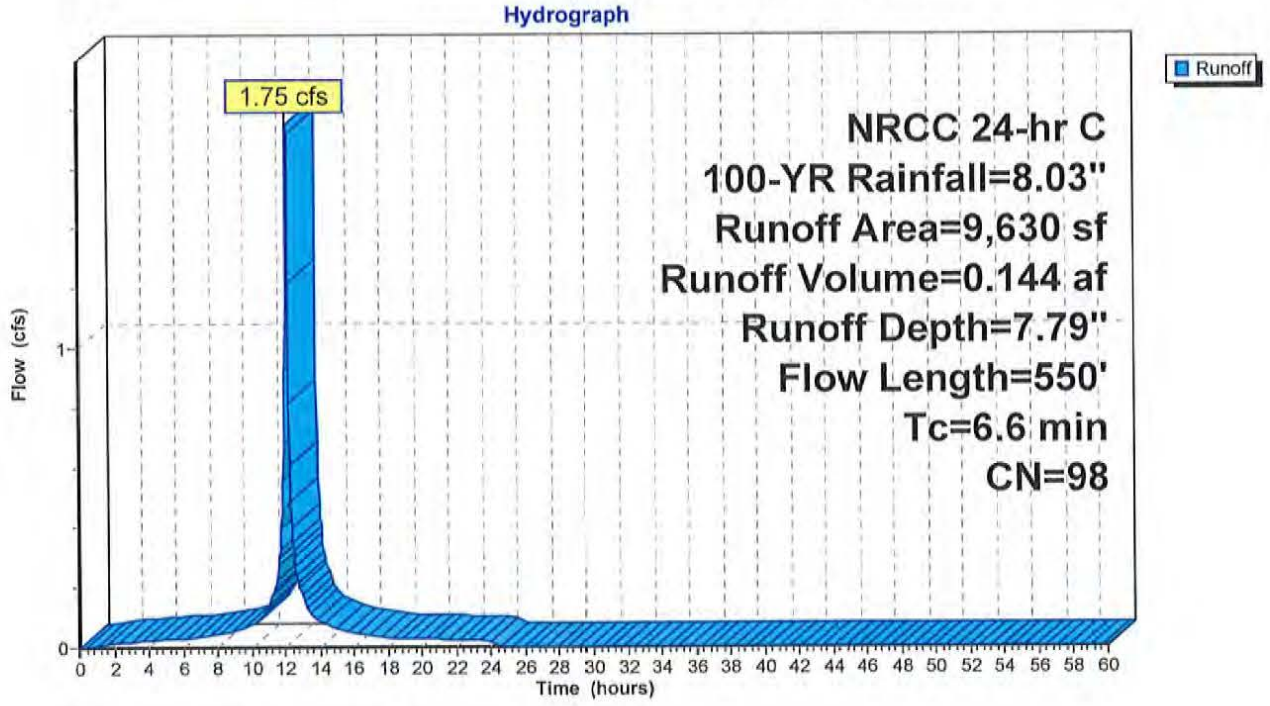
Runoff = 1.75 cfs @ 12.13 hrs, Volume= 0.144 af, Depth= 7.79"
Routed to Reach TD 1 : Trench Drain

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-YR Rainfall=8.03"

Area (sf)	CN	Description
9,630	98	Paved parking, HSG B
9,630		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	100	0.0600	2.19		**Sheet Flow, Paved** Smooth surfaces n= 0.011 P2= 3.38"
5.8	450	0.0040	1.28		**Shallow Concentrated Flow, Paved** Paved Kv= 20.3 fps
6.6	550	Total			

Subcatchment ACCESS: Driveway



Summary for Subcatchment LD: Lower Driveway

Flows across GeoPave to basin

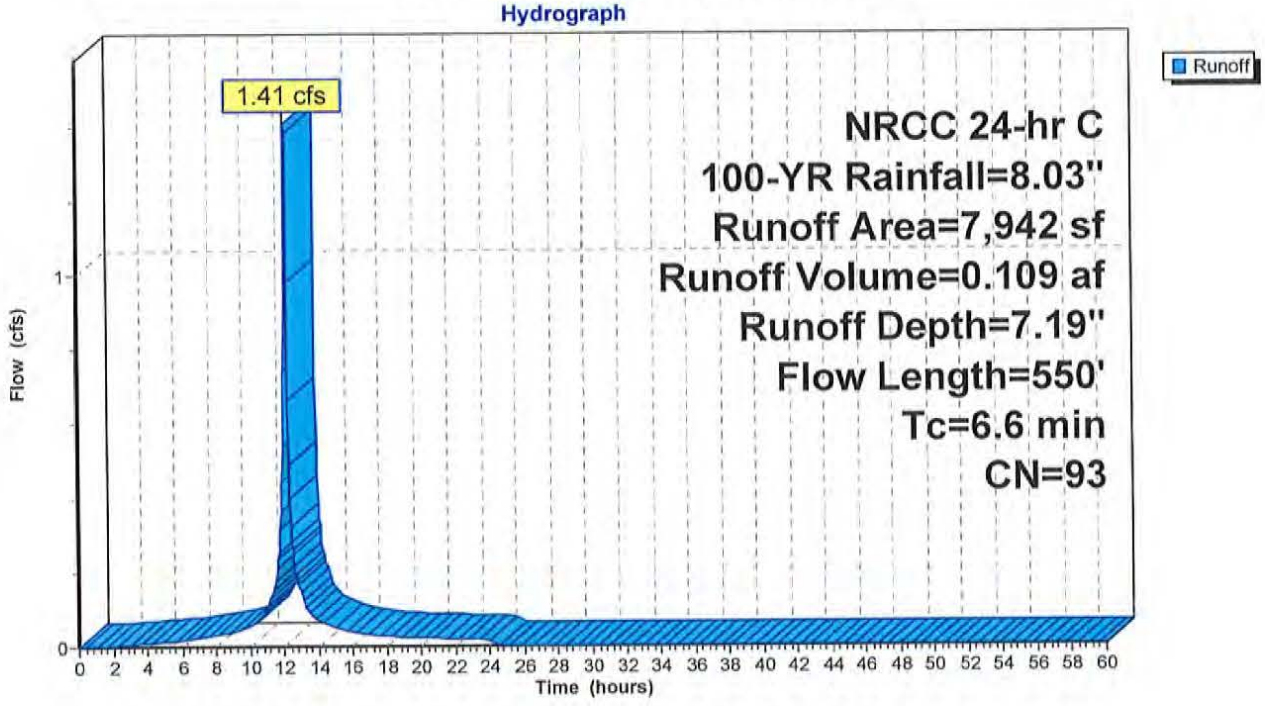
Runoff = 1.41 cfs @ 12.13 hrs, Volume= 0.109 af, Depth= 7.19"
Routed to Reach TD2 : Trench Drain

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-YR Rainfall=8.03"

	Area (sf)	CN	Description
*	5,422	98	Paved driveway, HSG B
*	2,520	82	GeoPave Area
	7,942	93	Weighted Average
	2,520		31.73% Pervious Area
	5,422		68.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	100	0.0600	2.19		**Sheet Flow, Paved** Smooth surfaces n= 0.011 P2= 3.38"
5.8	450	0.0040	1.28		**Shallow Concentrated Flow, Paved** Paved Kv= 20.3 fps
6.6	550	Total			

Subcatchment LD: Lower Driveway



Summary for Subcatchment MAIN: MAIN PORTION

LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B

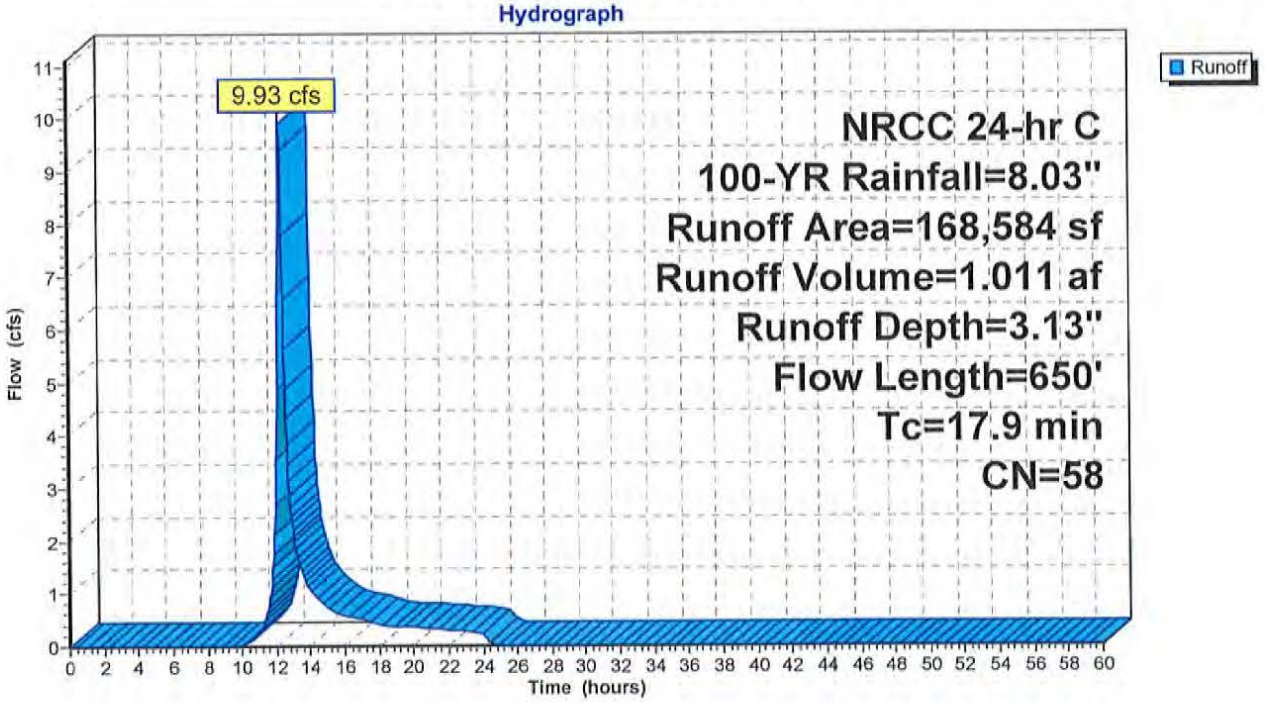
Runoff = 9.93 cfs @ 12.28 hrs, Volume= 1.011 af, Depth= 3.13"
Routed to Reach FS : FIELD SWALE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-YR Rainfall=8.03"

Area (sf)	CN	Description
158,869	58	Meadow, non-grazed, HSG B
9,715	55	Woods, Good, HSG B
168,584	58	Weighted Average
168,584		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6	100	0.0500	0.17		**Sheet Flow, Meadow** Grass: Dense n= 0.240 P2= 3.38"
8.3	550	0.0250	1.11		**Shallow Concentrated Flow, Meadow** Short Grass Pasture Kv= 7.0 fps
17.9	650	Total			

Subcatchment MAIN: MAIN PORTION



Summary for Subcatchment OFF DW: Driveway to PL

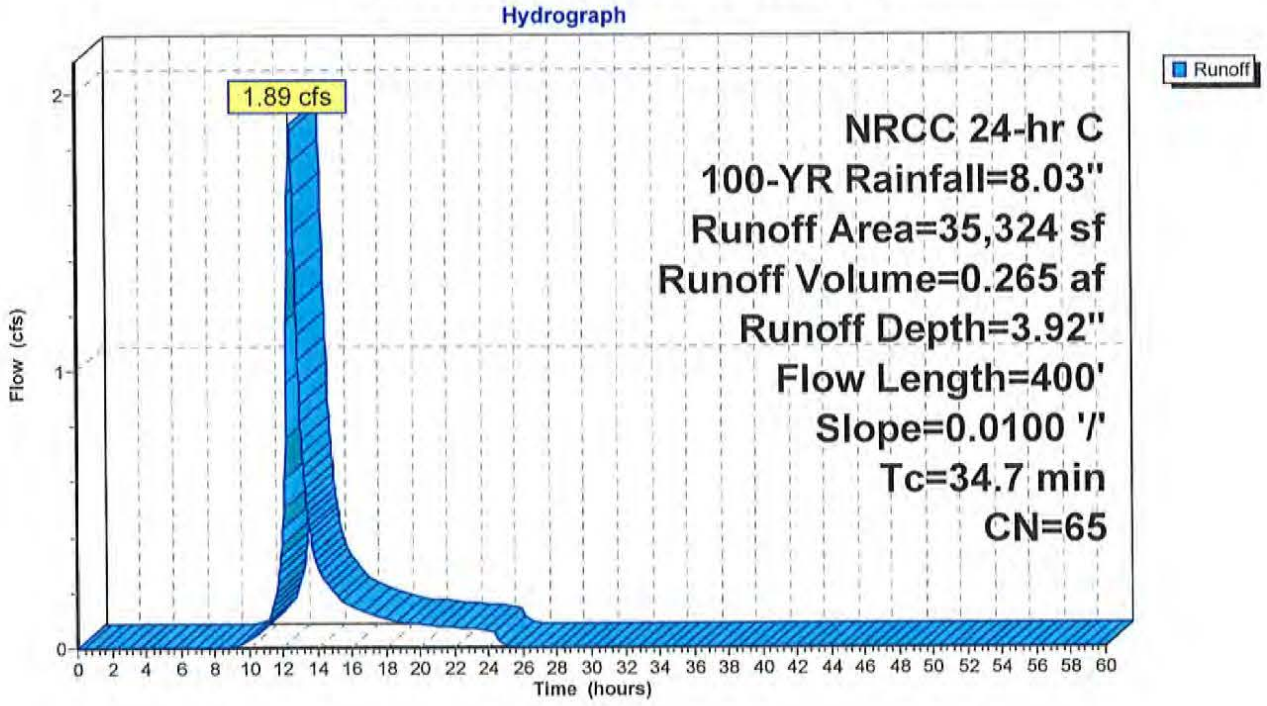
Runoff = 1.89 cfs @ 12.48 hrs, Volume= 0.265 af, Depth= 3.92"
Routed to Reach FS2 : SWALE FOR OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-YR Rainfall=8.03"

Area (sf)	CN	Description
35,324	65	Brush, Good, HSG C
35,324		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	100	0.0100	0.06		**Sheet Flow, SURACE FLOW** Woods: Light underbrush n= 0.400 P2= 3.38"
7.1	300	0.0100	0.70		**Shallow Concentrated Flow, Un defined swale area** Short Grass Pasture Kv= 7.0 fps
34.7	400	Total			

Subcatchment OFF DW: Driveway to PL



Summary for Subcatchment OFFSITE: Exisiting home east

LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B

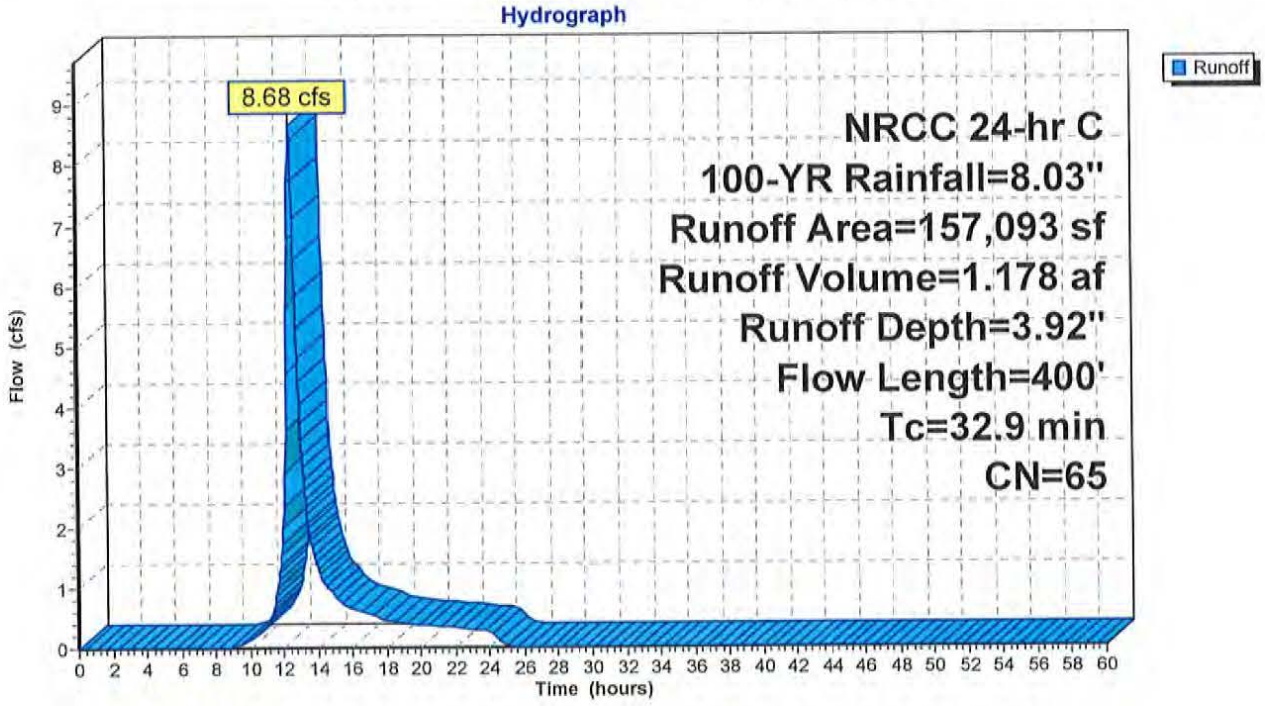
Runoff = 8.68 cfs @ 12.47 hrs, Volume= 1.178 af, Depth= 3.92"
Routed to Reach DW : Driveway Swale

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-YR Rainfall=8.03"

Area (sf)	CN	Description
157,093	65	2 acre lots, 12% imp, HSG B
138,242		88.00% Pervious Area
18,851		12.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.6	100	0.0400	0.06		**Sheet Flow, Woods and Shrubs** Woods: Dense underbrush n= 0.800 P2= 3.38"
5.3	300	0.0350	0.94		**Shallow Concentrated Flow, Woods and Shrubs** Woodland Kv= 5.0 fps
32.9	400	Total			

Subcatchment OFFSITE: Exisiting home east



Summary for Subcatchment PL 1: Easements undisturbed

Undisturbed by Site Plan

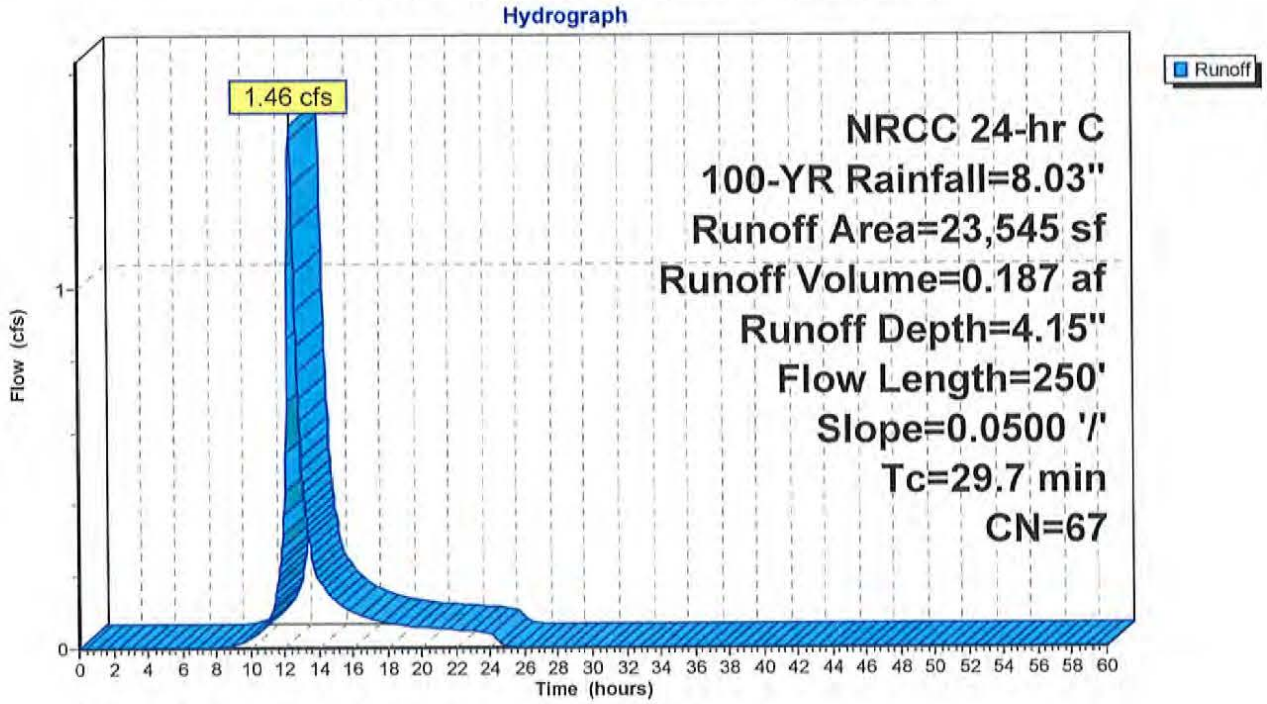
Runoff = 1.46 cfs @ 12.42 hrs, Volume= 0.187 af, Depth= 4.15"
Routed to Pond E-1 : E INLET

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-YR Rainfall=8.03"

Area (sf)	CN	Description
23,545	67	Brush, Poor, HSG B
23,545		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.2	100	0.0500	0.07		**Sheet Flow, Hedgerow/Meadow** Woods: Dense underbrush n= 0.800 P2= 3.38"
4.5	150	0.0500	0.56		**Shallow Concentrated Flow, Hedgerow/Meadow** Forest w/Heavy Litter Kv= 2.5 fps
29.7	250	Total			

Subcatchment PL 1: Easements undisturbed



Summary for Subcatchment PL 2: Easements unditsturbed

Undisturbed by Sie Plan
Flows to Hedgerow by scour hole

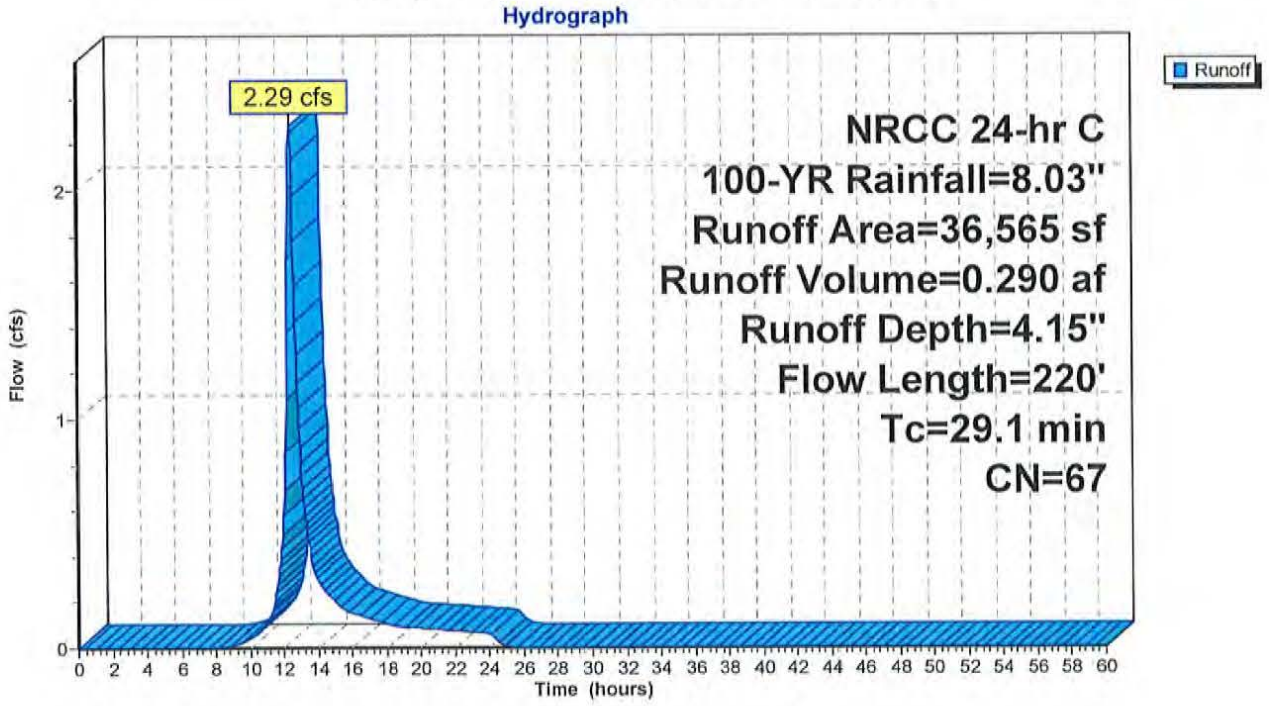
Runoff = 2.29 cfs @ 12.41 hrs, Volume= 0.290 af, Depth= 4.15"
Routed to Link PROPOSED : TOTAL FOR SP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-YR Rainfall=8.03"

	Area (sf)	CN	Description
*	36,565	67	Easements undidsturbed
	36,565		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	100	0.0450	0.06		**Sheet Flow, Hedgerow/Meadow** Woods: Dense underbrush n= 0.800 P2= 3.38"
2.8	120	0.0200	0.71		**Shallow Concentrated Flow, Hegerow/Meadow** Woodland Kv= 5.0 fps
29.1	220	Total			

Subcatchment PL 2: Easements unditsturbed



Summary for Subcatchment SEPTIC ETC: Graded areas

Area outside of site plan and access lanes, includes storm basin area

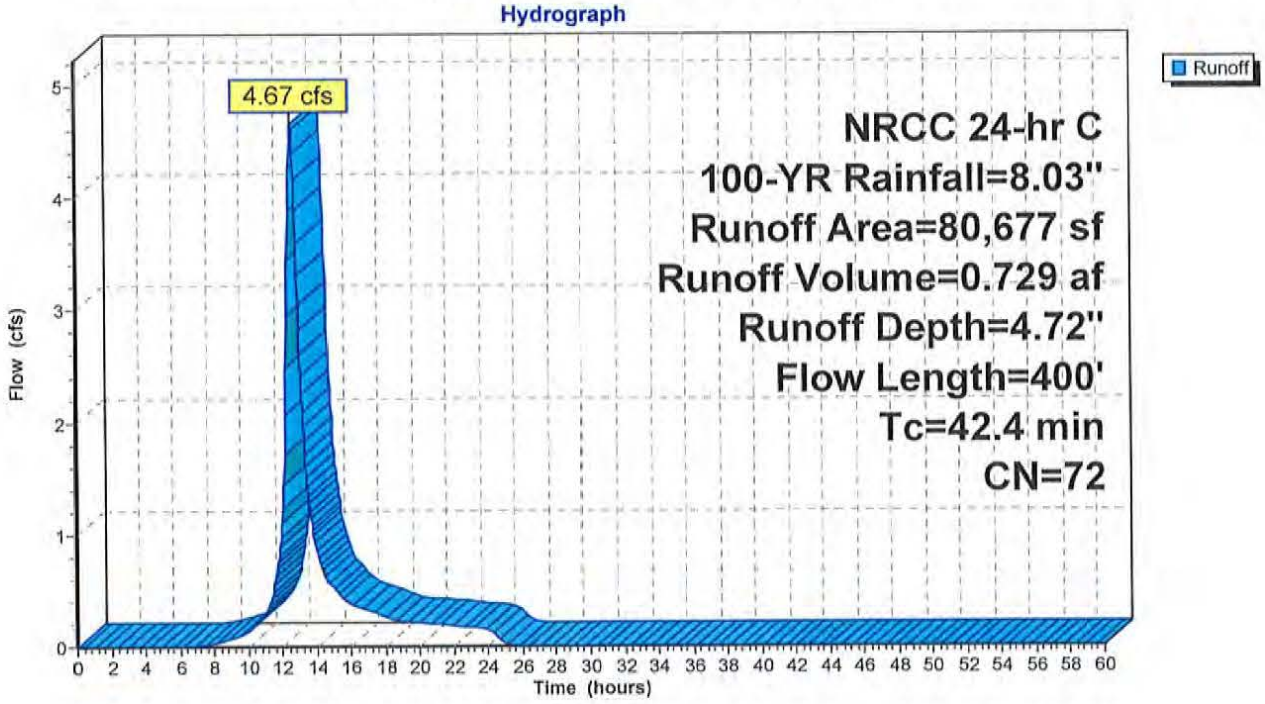
Runoff = 4.67 cfs @ 12.58 hrs, Volume= 0.729 af, Depth= 4.72"
Routed to Reach FS : FIELD SWALE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-YR Rainfall=8.03"

	Area (sf)	CN	Description
	54,407	61	>75% Grass cover, Good, HSG B
	22,670	98	Water Surface, 0% imp, HSG B
*	3,600	85	Geopave units fire lane, HSG B
	80,677	72	Weighted Average
	80,677		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	100	0.0300	0.14		**Sheet Flow, Lawn Area** Grass: Dense n= 0.240 P2= 3.38"
30.6	300	0.0250	0.16		**Sheet Flow, Lawn Areas** Grass: Dense n= 0.240 P2= 3.38"
42.4	400	Total			

Subcatchment SEPTIC ETC: Graded areas



Summary for Subcatchment SOUTH: TO HEDGEROW

AbrB—Abbottstown silt loam, 2 to 6 percent slopes HSG C

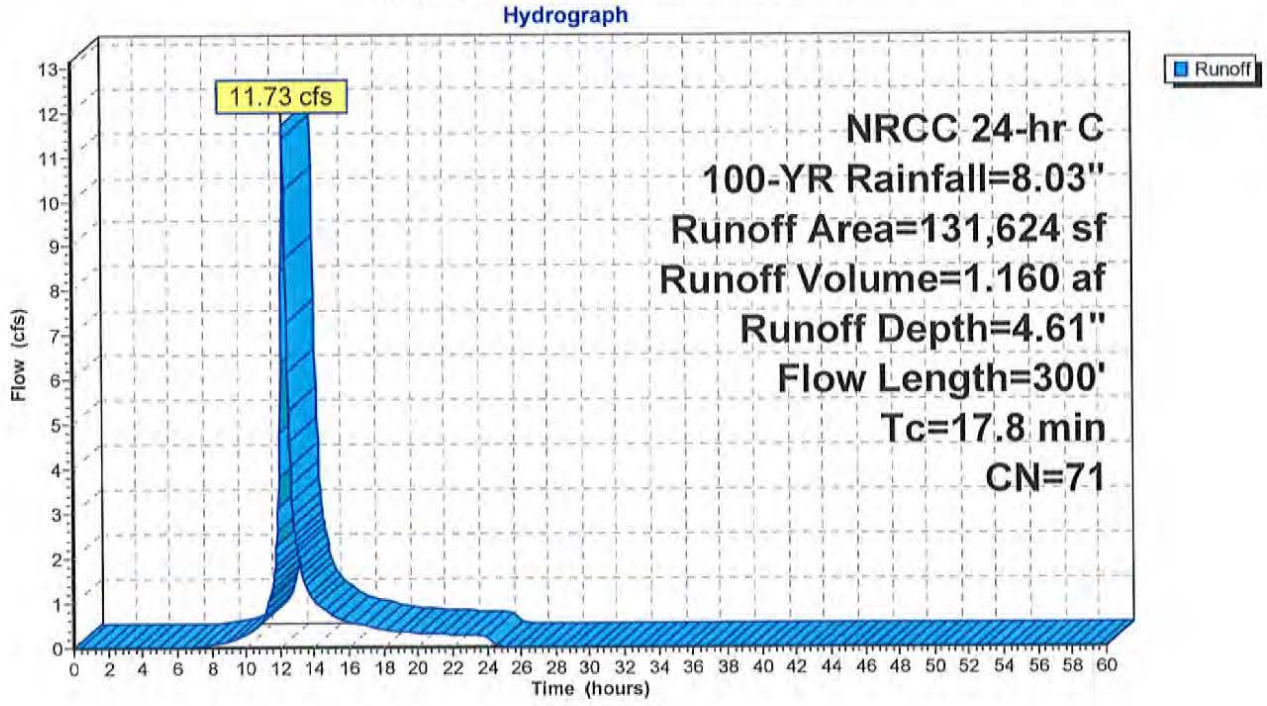
Runoff = 11.73 cfs @ 12.27 hrs, Volume= 1.160 af, Depth= 4.61"
Routed to Link OTHER : TOTAL OFFSITE

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-YR Rainfall=8.03"

Area (sf)	CN	Description
131,624	71	Meadow, non-grazed, HSG C
131,624		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	100	0.0200	0.12		**Sheet Flow, Meadow** Grass: Dense n= 0.240 P2= 3.38"
3.9	200	0.0150	0.86		**Shallow Concentrated Flow, Meadow** Short Grass Pasture Kv= 7.0 fps
17.8	300	Total			

Subcatchment SOUTH: TO HEDGEROW



Summary for Subcatchment SP: SITE PLAN AREA

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

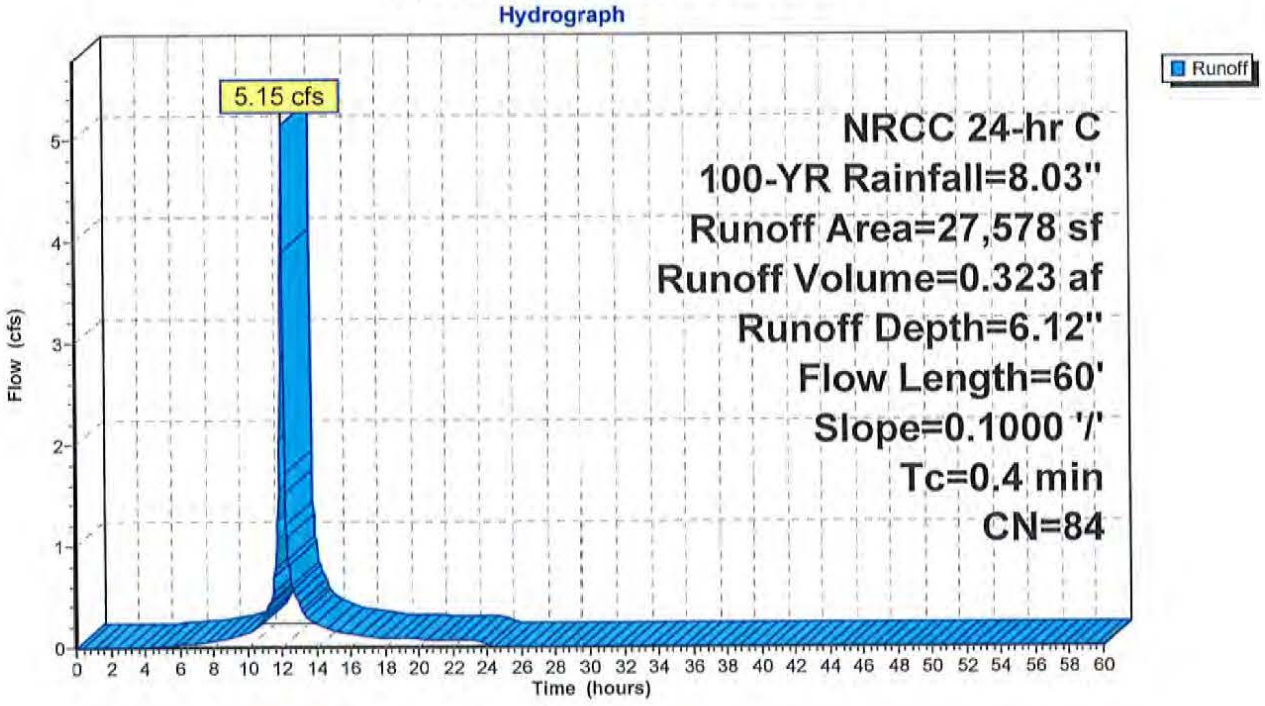
Runoff = 5.15 cfs @ 12.05 hrs, Volume= 0.323 af, Depth= 6.12"
Routed to Pond BASIN : STORM BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-YR Rainfall=8.03"

	Area (sf)	CN	Description
*	1,132	98	Handicapped Locations
*	2,711	61	LANDSCAPE ISLAND Good, HSG B
*	21,127	85	Geopaves, HSG B
*	1,848	98	Sidewalk Unconnected pavement, HSG B
*	324	98	Paved pad Dumpster HSG B
*	436	85	Geopave HSG B
	27,578	84	Weighted Average
	24,274		88.02% Pervious Area
	3,304		11.98% Impervious Area
	1,848		55.93% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	60	0.1000	2.43		**Sheet Flow, Roof** Smooth surfaces n= 0.011 P2= 3.38"

Subcatchment SP: SITE PLAN AREA



Summary for Subcatchment TD AREA: ROAD TO TD2

Roof drain tied into combination drain

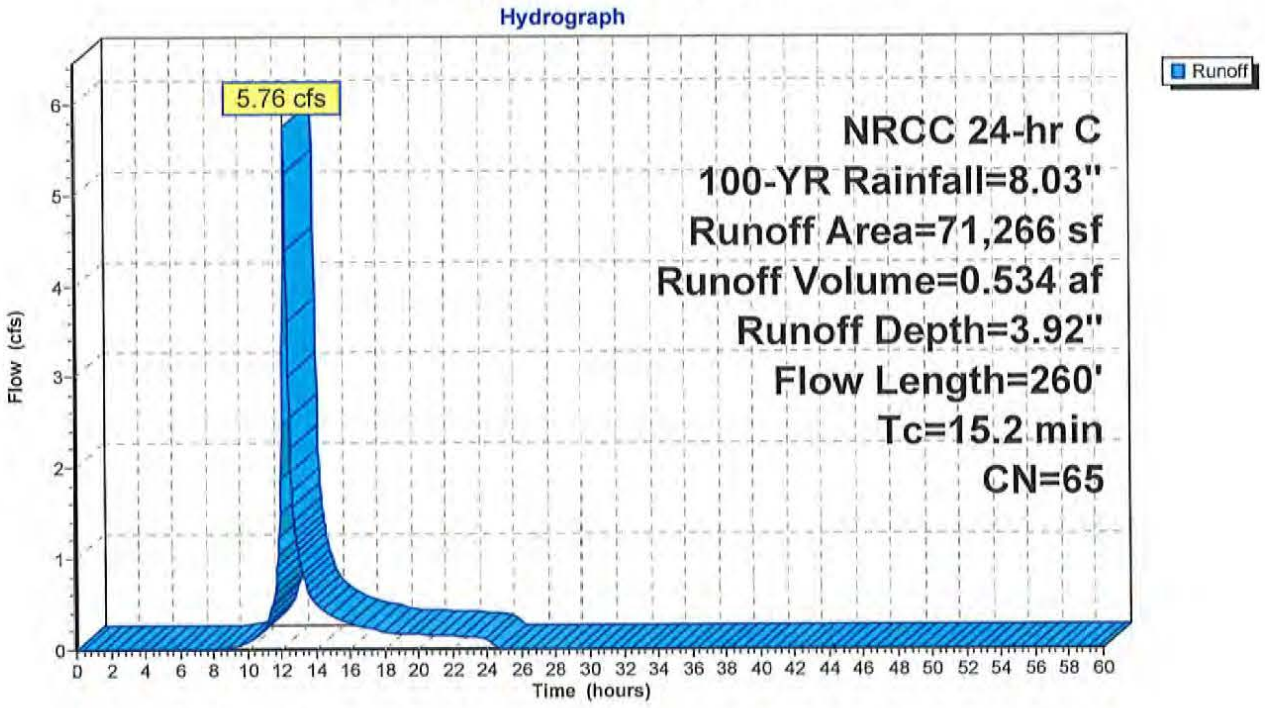
Runoff = 5.76 cfs @ 12.24 hrs, Volume= 0.534 af, Depth= 3.92"
Routed to Reach ST-1 : STONE TRENCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
NRCC 24-hr C 100-YR Rainfall=8.03"

	Area (sf)	CN	Description
	55,266	58	Meadow, non-grazed, HSG B
*	2,500	58	Landscape Berm
*	8,400	98	North Half of Tennis Roof HSG B
*	5,100	85	GeoPave Fire Lane HSG B
	71,266	65	Weighted Average
	62,866		88.21% Pervious Area
	8,400		11.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.5	100	0.0600	0.12		**Sheet Flow, Upslope** Woods: Light underbrush n= 0.400 P2= 3.38"
1.7	160	0.0500	1.57		**Shallow Concentrated Flow, Meadow/Lawn** Short Grass Pasture Kv= 7.0 fps
15.2	260	Total			

Subcatchment TD AREA: ROAD TO TD2



Summary for Reach 1R: DWP

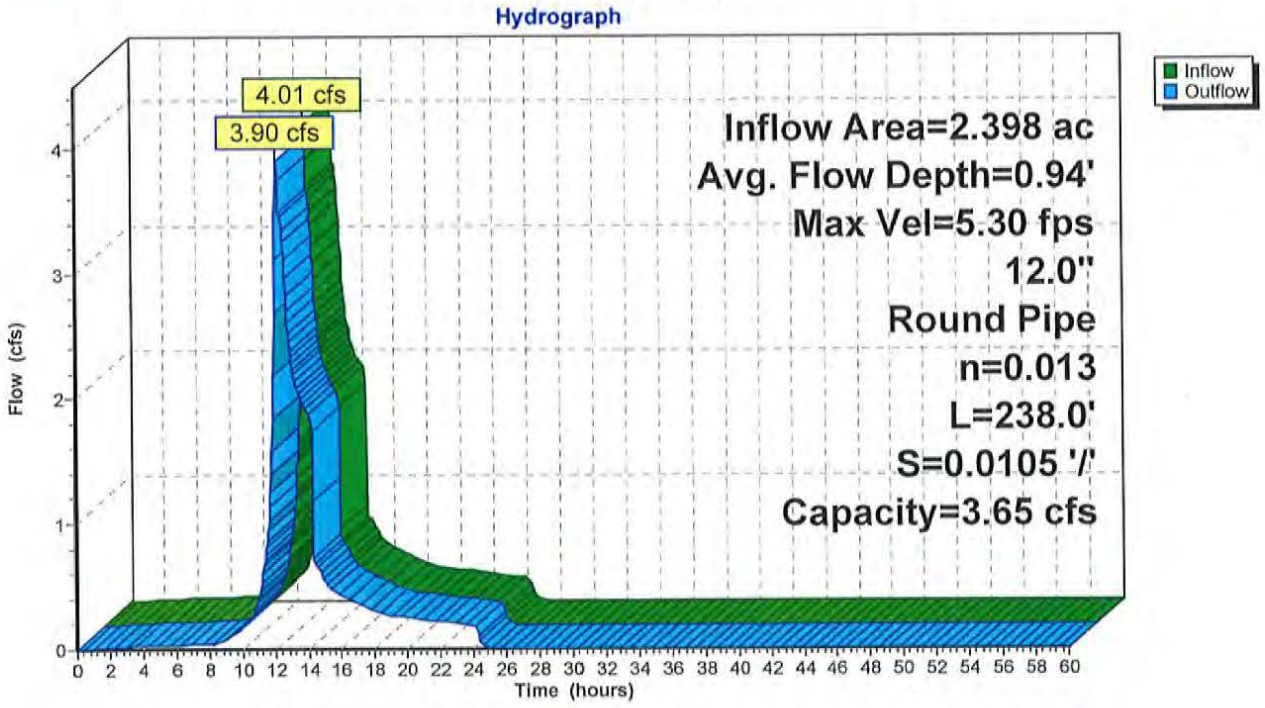
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 110% of Manning's capacity
[79] Warning: Submerged Pond E-1 Primary device # 1 by 0.83'

Inflow Area = 2.398 ac, 17.26% Impervious, Inflow Depth = 4.33" for 100-YR event
Inflow = 4.01 cfs @ 12.15 hrs, Volume= 0.865 af
Outflow = 3.90 cfs @ 12.18 hrs, Volume= 0.865 af, Atten= 3%, Lag= 1.9 min
Routed to Link SCH B : BASIN SCOUR HOLE

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.30 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 2.39 fps, Avg. Travel Time= 1.7 min

Peak Storage= 182 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.94' , Surface Width= 0.48'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 3.65 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 238.0' Slope= 0.0105 '/'
Inlet Invert= 361.00', Outlet Invert= 358.50'



Summary for Reach DW: Driveway Swale

Existing sweale, no bed no banks, in hedgrow along edge of field

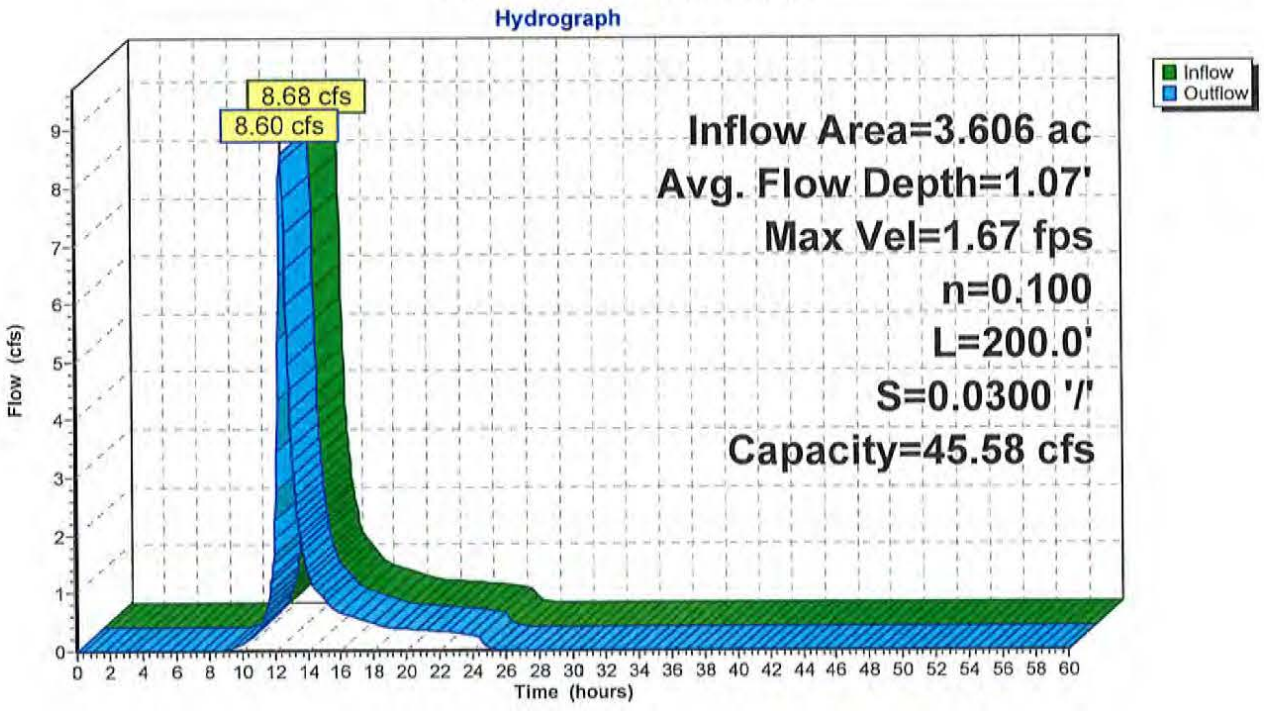
Inflow Area = 3.606 ac, 12.00% Impervious, Inflow Depth = 3.92" for 100-YR event
Inflow = 8.68 cfs @ 12.47 hrs, Volume= 1.178 af
Outflow = 8.60 cfs @ 12.53 hrs, Volume= 1.178 af, Atten= 1%, Lag= 3.7 min
Routed to Reach DWP : Driveway Pipe

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.67 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 0.73 fps, Avg. Travel Time= 4.6 min

Peak Storage= 1,034 cf @ 12.49 hrs
Average Depth at Peak Storage= 1.07' , Surface Width= 9.64'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 45.58 cfs

0.00' x 2.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 4.0 5.0 '/' Top Width= 18.00'
Length= 200.0' Slope= 0.0300 '/'
Inlet Invert= 367.00', Outlet Invert= 361.00'

‡



Summary for Reach DWP: Driveway Pipe

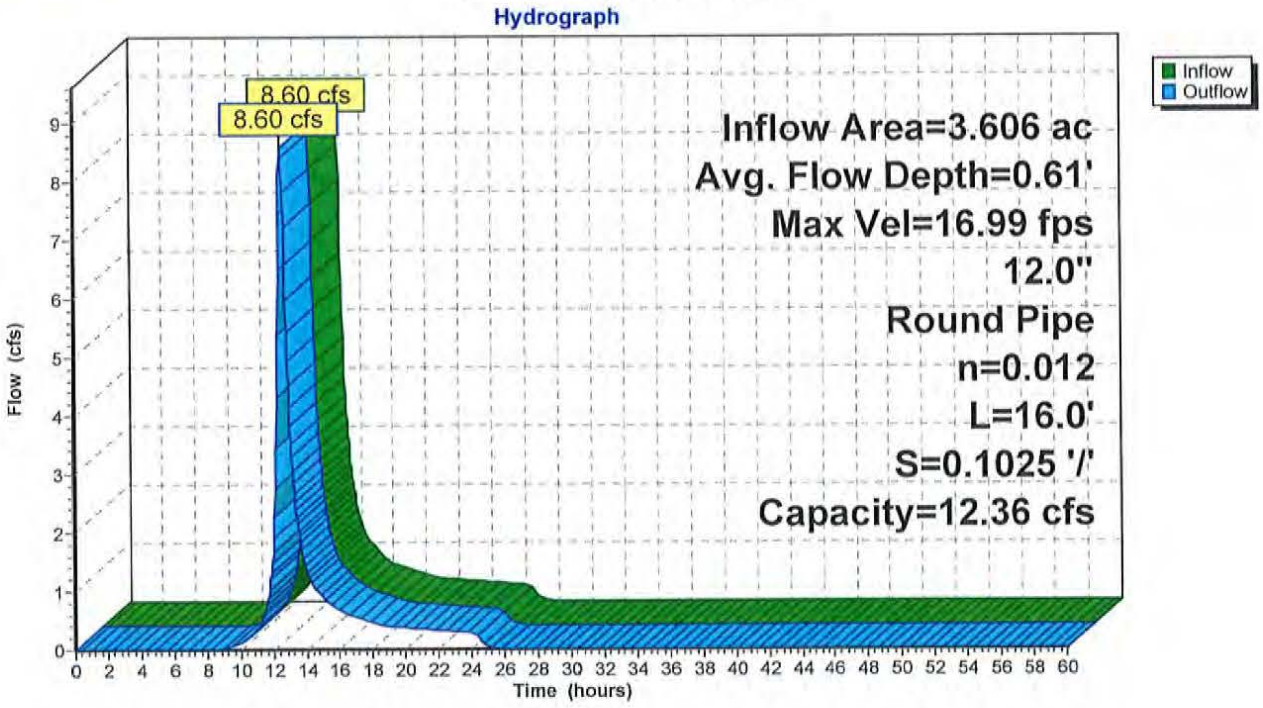
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach DW OUTLET depth by 5.81' @ 0.00 hrs

Inflow Area = 3.606 ac, 12.00% Impervious, Inflow Depth = 3.92" for 100-YR event
Inflow = 8.60 cfs @ 12.53 hrs, Volume= 1.178 af
Outflow = 8.60 cfs @ 12.53 hrs, Volume= 1.178 af, Atten= 0%, Lag= 0.0 min
Routed to Reach FS2 : SWALE FOR OFFSITE

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 16.99 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 7.25 fps, Avg. Travel Time= 0.0 min

Peak Storage= 8 cf @ 12.53 hrs
Average Depth at Peak Storage= 0.61' , Surface Width= 0.97'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 12.36 cfs

12.0" Round Pipe
n= 0.012 Concrete pipe, finished
Length= 16.0' Slope= 0.1025 '/'
Inlet Invert= 366.81', Outlet Invert= 365.17'



Summary for Reach FS: FIELD SWALE

Existing sweale, no bed no banks, in hedgrow along edge of field

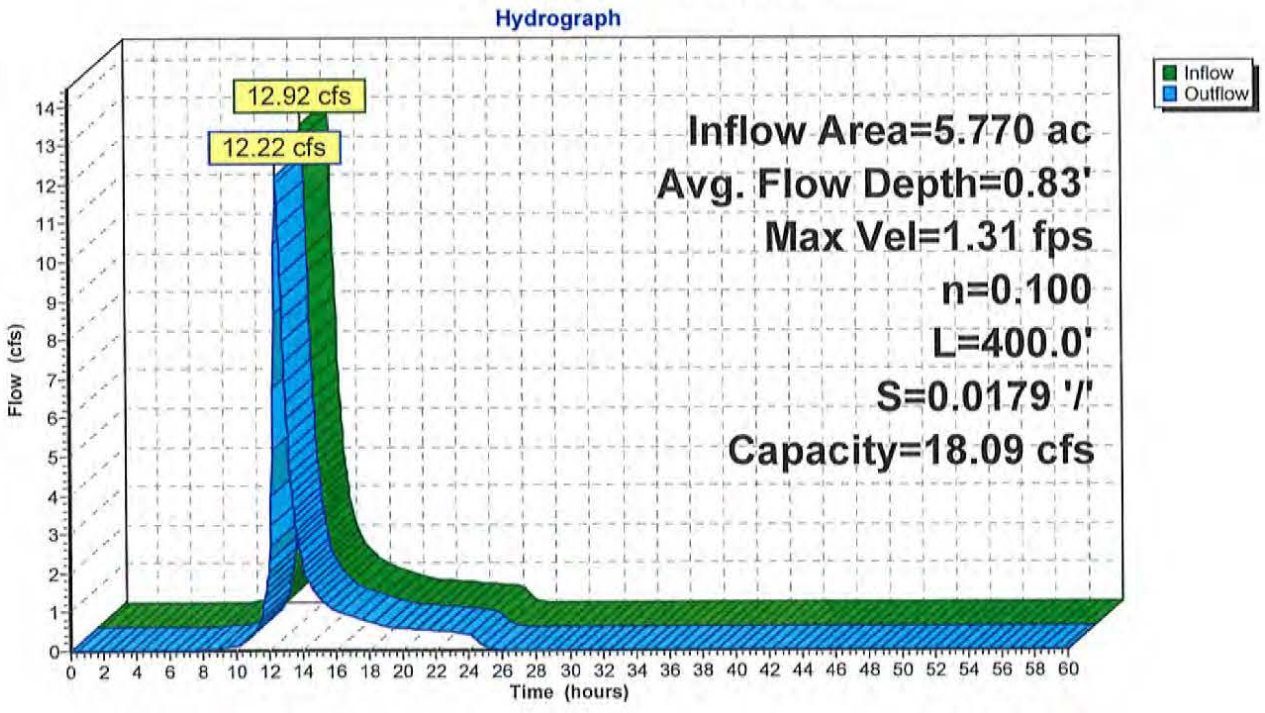
Inflow Area = 5.770 ac, 0.84% Impervious, Inflow Depth = 3.68" for 100-YR event
Inflow = 12.92 cfs @ 12.30 hrs, Volume= 1.771 af
Outflow = 12.22 cfs @ 12.46 hrs, Volume= 1.771 af, Atten= 5%, Lag= 9.6 min
Routed to Pond BASIN : STORM BASIN

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.31 fps, Min. Travel Time= 5.1 min
Avg. Velocity = 0.34 fps, Avg. Travel Time= 19.4 min

Peak Storage= 3,759 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.83' , Surface Width= 17.52'
Bank-Full Depth= 1.00' Flow Area= 12.5 sf, Capacity= 18.09 cfs

5.00' x 1.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 10.0 5.0 '/' Top Width= 20.00'
Length= 400.0' Slope= 0.0179 '/'
Inlet Invert= 365.17', Outlet Invert= 358.00'

‡



Summary for Reach FS2: SWALE FOR OFFSITE

Existing sweale, no bed no banks, in hedgrow along edge of field

[62] Hint: Exceeded Reach DWP OUTLET depth by 0.27' @ 12.85 hrs

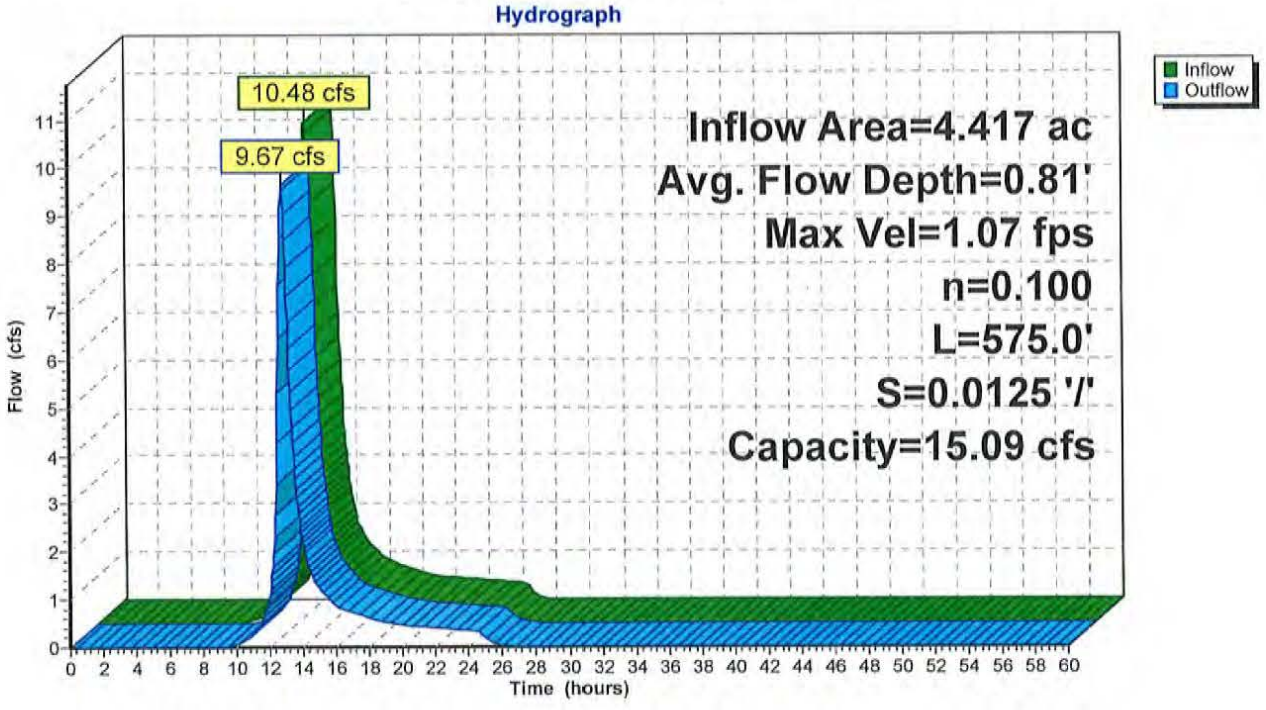
Inflow Area = 4.417 ac, 9.80% Impervious, Inflow Depth = 3.92" for 100-YR event
Inflow = 10.48 cfs @ 12.52 hrs, Volume= 1.442 af
Outflow = 9.67 cfs @ 12.79 hrs, Volume= 1.442 af, Atten= 8%, Lag= 15.8 min
Routed to Link OTHER : TOTAL OFFSITE

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.07 fps, Min. Travel Time= 8.9 min
Avg. Velocity = 0.29 fps, Avg. Travel Time= 33.2 min

Peak Storage= 5,178 cf @ 12.64 hrs
Average Depth at Peak Storage= 0.81' , Surface Width= 17.18'
Bank-Full Depth= 1.00' Flow Area= 12.5 sf, Capacity= 15.09 cfs

5.00' x 1.00' deep channel, n= 0.100 Earth, dense brush, high stage
Side Slope Z-value= 10.0 5.0 '/' Top Width= 20.00'
Length= 575.0' Slope= 0.0125 '/'
Inlet Invert= 365.17', Outlet Invert= 358.00'

‡



Summary for Reach OUT: TD 2 OUTLET

[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach TD2 OUTLET depth by 0.20' @ 12.15 hrs

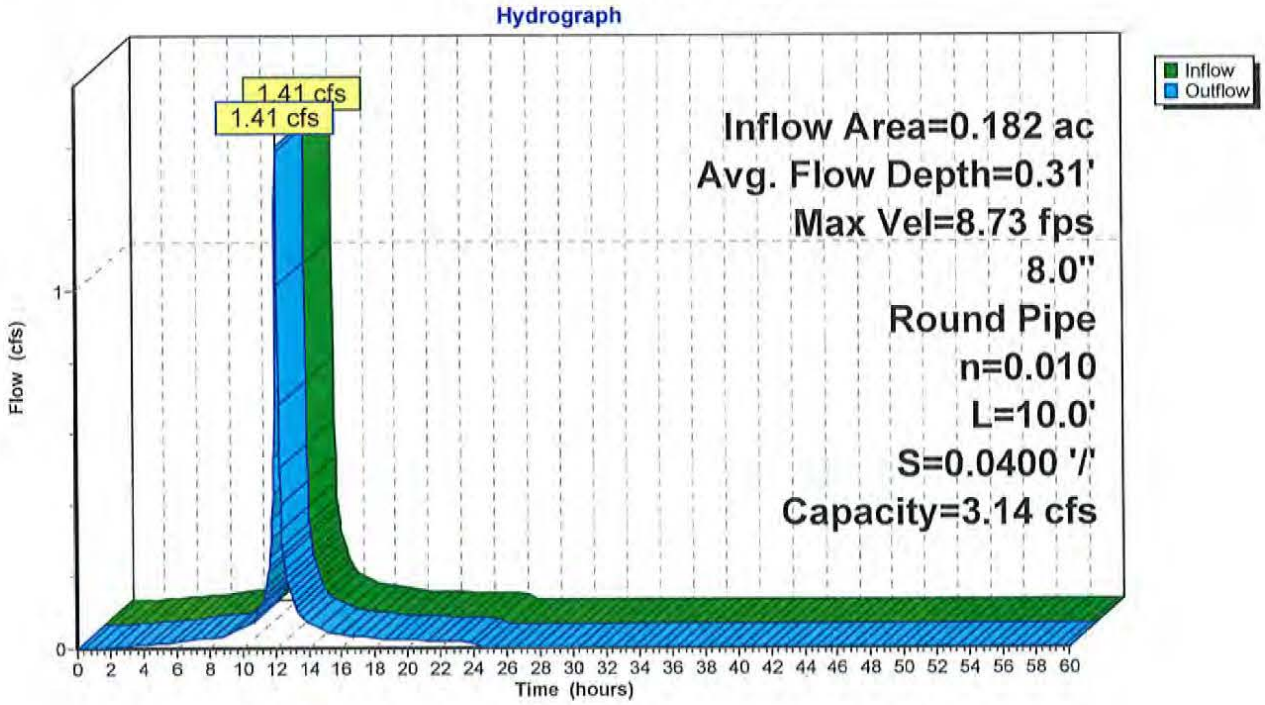
Inflow Area = 0.182 ac, 68.27% Impervious, Inflow Depth = 7.19" for 100-YR event
Inflow = 1.41 cfs @ 12.14 hrs, Volume= 0.109 af
Outflow = 1.41 cfs @ 12.14 hrs, Volume= 0.109 af, Atten= 0%, Lag= 0.0 min
Routed to Link SCH B : BASIN SCOUR HOLE

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.73 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 2.96 fps, Avg. Travel Time= 0.1 min

Peak Storage= 2 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.31' , Surface Width= 0.67'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 3.14 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 10.0' Slope= 0.0400 '/'
Inlet Invert= 359.90', Outlet Invert= 359.50'

Reach OUT: TD 2 OUTLET



Summary for Reach ST-1: STONE TRENCH

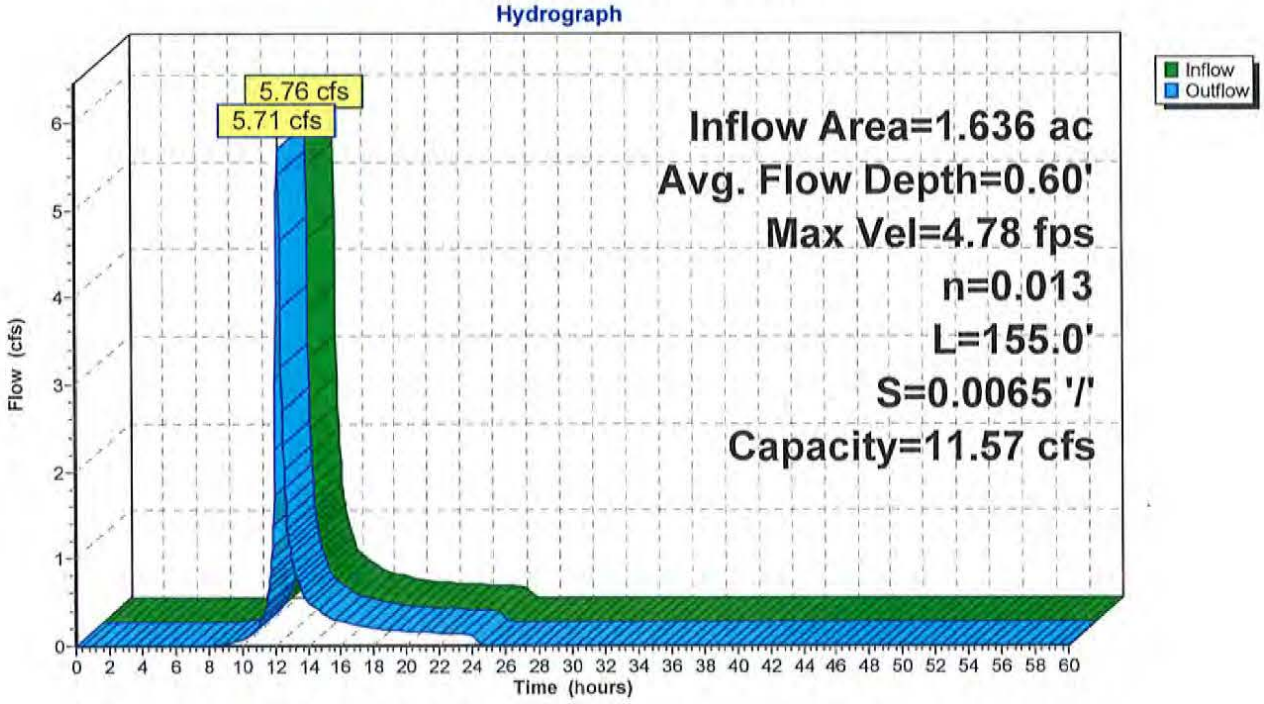
Inflow Area = 1.636 ac, 11.79% Impervious, Inflow Depth = 3.92" for 100-YR event
Inflow = 5.76 cfs @ 12.24 hrs, Volume= 0.534 af
Outflow = 5.71 cfs @ 12.26 hrs, Volume= 0.534 af, Atten= 1%, Lag= 0.9 min
Routed to Reach ST-OUT : DRAIN

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.78 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.55 fps, Avg. Travel Time= 1.7 min

Peak Storage= 187 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.60' , Surface Width= 2.00'
Bank-Full Depth= 1.00' Flow Area= 2.0 sf, Capacity= 11.57 cfs

2.00' x 1.00' deep channel, n= 0.013 Concrete, trowel finish
Length= 155.0' Slope= 0.0065 '/'
Inlet Invert= 363.00', Outlet Invert= 362.00'

Reach ST-1: STONE TRENCH



Summary for Reach ST-OUT: DRAIN

[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 356% of Manning's capacity
[76] Warning: Detained 0.106 af (Pond w/culvert advised)
[62] Hint: Exceeded Reach ST-1 OUTLET depth by 0.45' @ 14.20 hrs

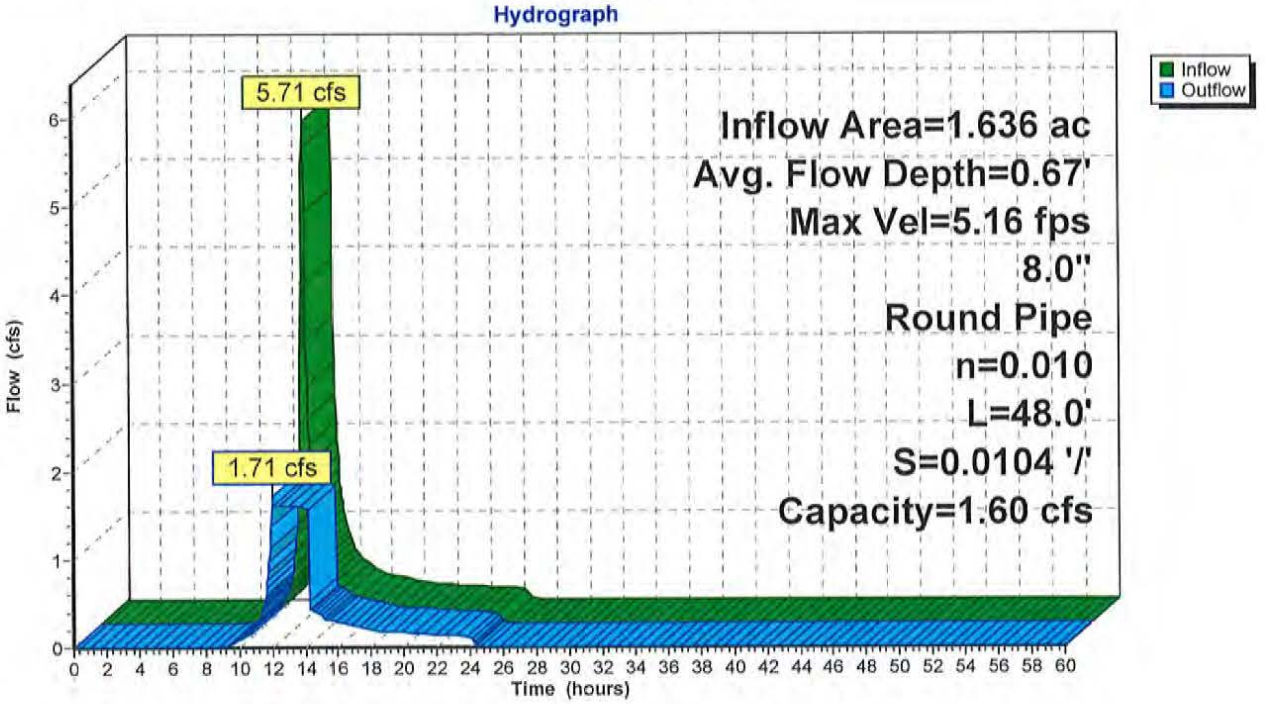
Inflow Area = 1.636 ac, 11.79% Impervious, Inflow Depth = 3.92" for 100-YR event
Inflow = 5.71 cfs @ 12.26 hrs, Volume= 0.534 af
Outflow = 1.71 cfs @ 12.01 hrs, Volume= 0.534 af, Atten= 70%, Lag= 0.0 min
Routed to Pond E-1 : E INLET

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.16 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.08 fps, Avg. Travel Time= 0.3 min

Peak Storage= 17 cf @ 12.05 hrs
Average Depth at Peak Storage= 0.67'
Bank-Full Depth= 0.67' Flow Area= 0.3 sf, Capacity= 1.60 cfs

8.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 48.0' Slope= 0.0104 '/'
Inlet Invert= 361.90', Outlet Invert= 361.40'

Reach ST-OUT: DRAIN



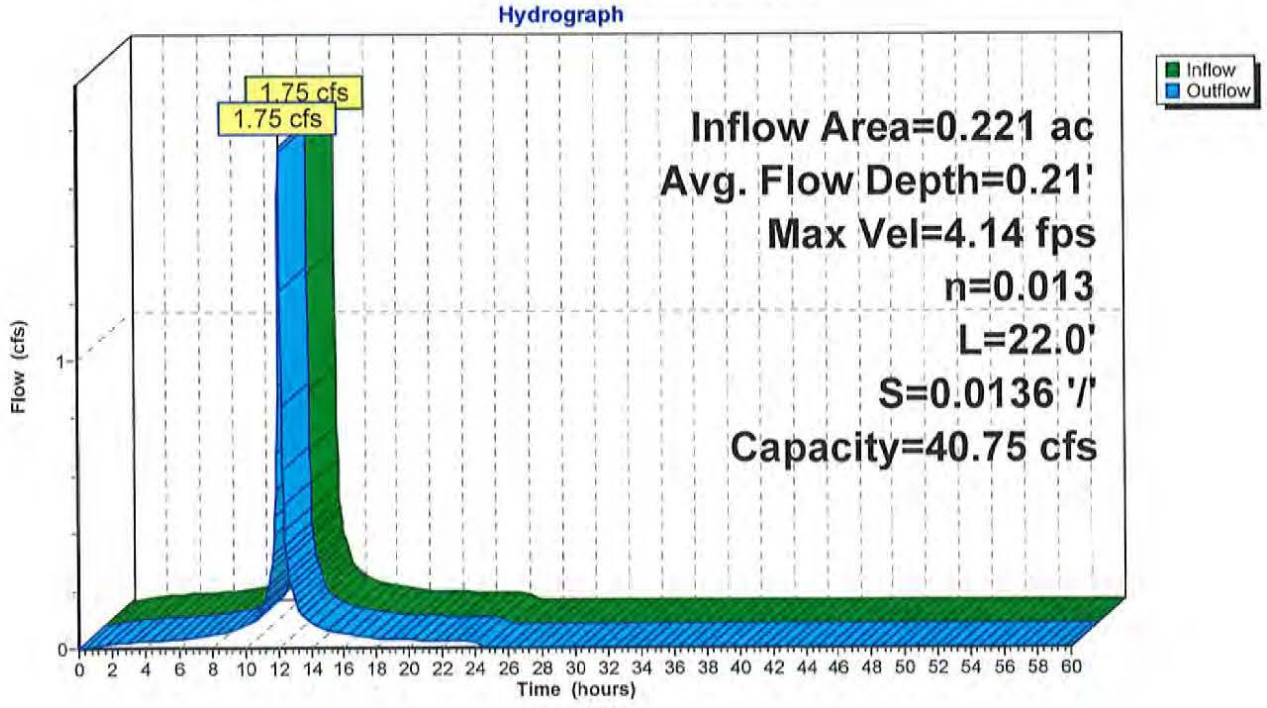
Summary for Reach TD 1: Trench Drain

Inflow Area = 0.221 ac,100.00% Impervious, Inflow Depth = 7.79" for 100-YR event
Inflow = 1.75 cfs @ 12.13 hrs, Volume= 0.144 af
Outflow = 1.75 cfs @ 12.14 hrs, Volume= 0.144 af, Atten= 0%, Lag= 0.1 min
Routed to Pond E-1 : E INLET

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.14 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.17 fps, Avg. Travel Time= 0.3 min

Peak Storage= 9 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 2.00'
Bank-Full Depth= 2.00' Flow Area= 4.0 sf, Capacity= 40.75 cfs

2.00' x 2.00' deep channel, n= 0.013 Concrete, trowel finish
Length= 22.0' Slope= 0.0136 '/'
Inlet Invert= 361.20', Outlet Invert= 360.90'



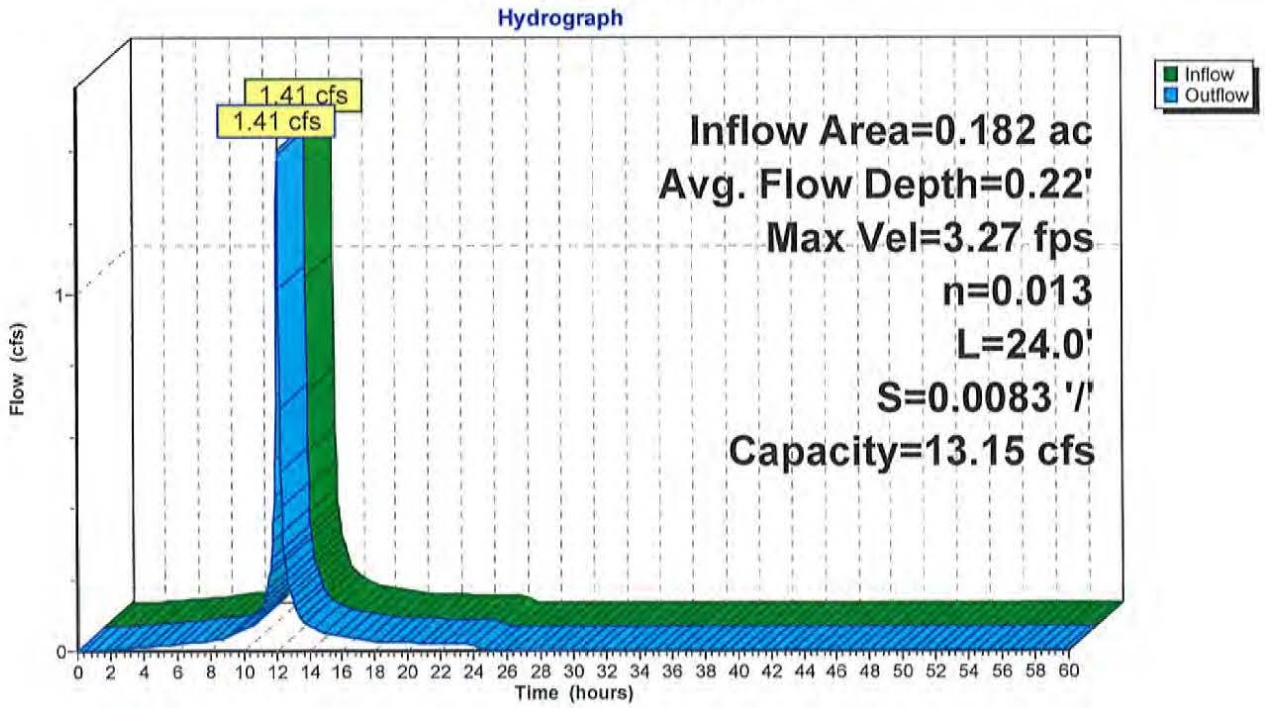
Summary for Reach TD2: Trench Drain

Inflow Area = 0.182 ac, 68.27% Impervious, Inflow Depth = 7.19" for 100-YR event
Inflow = 1.41 cfs @ 12.13 hrs, Volume= 0.109 af
Outflow = 1.41 cfs @ 12.14 hrs, Volume= 0.109 af, Atten= 0%, Lag= 0.2 min
Routed to Reach OUT : TD 2 OUTLET

Routing by Stor-Ind+Trans method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.27 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 0.84 fps, Avg. Travel Time= 0.5 min

Peak Storage= 10 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.22' , Surface Width= 2.00'
Bank-Full Depth= 1.00' Flow Area= 2.0 sf, Capacity= 13.15 cfs

2.00' x 1.00' deep channel, n= 0.013 Concrete, trowel finish
Length= 24.0' Slope= 0.0083 '/'
Inlet Invert= 360.00', Outlet Invert= 359.80'



Summary for Pond BASIN: STORM BASIN

[62] Hint: Exceeded Reach FS OUTLET depth by 2.35' @ 14.05 hrs

Inflow Area = 8.984 ac, 7.37% Impervious, Inflow Depth = 4.10" for 100-YR event
Inflow = 16.74 cfs @ 12.45 hrs, Volume= 3.067 af
Outflow = 4.90 cfs @ 13.77 hrs, Volume= 3.067 af, Atten= 71%, Lag= 79.0 min
Discarded = 1.00 cfs @ 10.85 hrs, Volume= 1.344 af
Primary = 3.90 cfs @ 13.77 hrs, Volume= 1.724 af
Routed to Pond SCH OUT : SCH- OUT
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond SCH OUT : SCH- OUT

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Peak Elev= 360.70' @ 13.77 hrs Surf.Area= 40,270 sf Storage= 46,624 cf

Plug-Flow detention time= 111.1 min calculated for 3.065 af (100% of inflow)
Center-of-Mass det. time= 111.1 min (970.0 - 858.9)

Volume	Invert	Avail.Storage	Storage Description
#1	358.50'	62,063 cf	**OPEN STORAGE (Prismatic)**Listed below (Recalc)
#2	358.00'	2,621 cf	**CRUSHED STONE FILTER (Prismatic)**Listed below (Recalc) 8,738 cf Overall x 30.0% Voids
		64,684 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
358.50	18,000	0	0
360.00	20,648	28,986	28,986
361.00	22,670	21,659	50,645
361.50	23,000	11,418	62,063

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
358.00	16,753	0	0
358.50	18,200	8,738	8,738

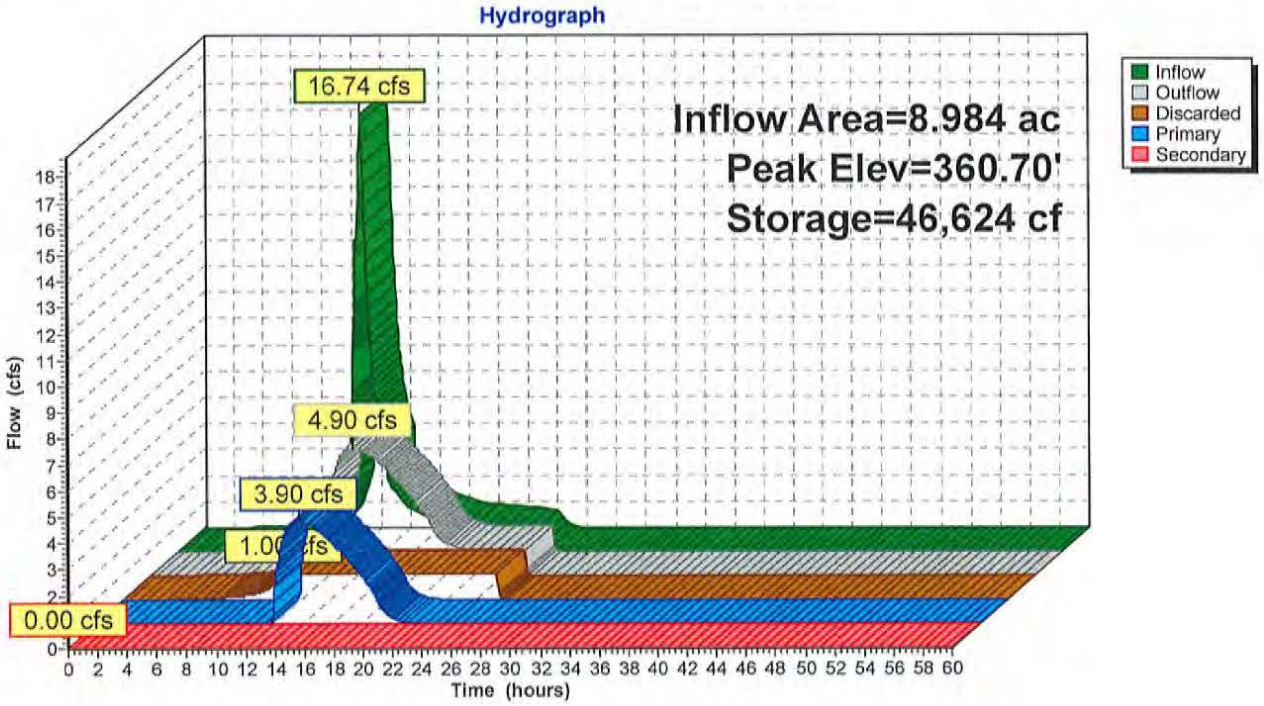
Device	Routing	Invert	Outlet Devices
#1	Primary	358.50'	**6.0" Round Culvert X 3.00** L= 34.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 358.50' / 358.10' S= 0.0118 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 1	358.70'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	359.70'	**1.5" x 20.0" Horiz. Type E Inlet Grate X 8.00 columns**X 15 rows C= 0.600 Limited to weir flow at low heads
#4	Secondary	360.80'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#5	Discarded	358.00'	**1.00 cfs Exfiltration at all elevations**

Discarded OutFlow Max=1.00 cfs @ 10.85 hrs HW=358.04' (Free Discharge)
└**5=Exfiltration** (Exfiltration Controls 1.00 cfs)

Primary OutFlow Max=3.90 cfs @ 13.77 hrs HW=360.70' (Free Discharge)
└**1=Culvert** (Barrel Controls 3.90 cfs @ 6.62 fps)
└**2=Broad-Crested Rectangular Weir**(Passes < 37.64 cfs potential flow)
└**3=Type E Inlet Grate** (Passes < 120.55 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=358.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond BASIN: STORM BASIN



Summary for Pond E-1: E INLET

[57] Hint: Peaked at 362.72' (Flood elevation advised)
[63] Warning: Exceeded Reach ST-OUT INLET depth by 0.16' @ 12.15 hrs
[63] Warning: Exceeded Reach TD 1 INLET depth by 1.32' @ 12.15 hrs

Inflow Area = 2.398 ac, 17.26% Impervious, Inflow Depth = 4.33" for 100-YR event
Inflow = 4.01 cfs @ 12.15 hrs, Volume= 0.865 af
Outflow = 4.01 cfs @ 12.15 hrs, Volume= 0.865 af, Atten= 0%, Lag= 0.0 min
Primary = 4.01 cfs @ 12.15 hrs, Volume= 0.865 af
Routed to Reach 1R : DWP
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 1R : DWP

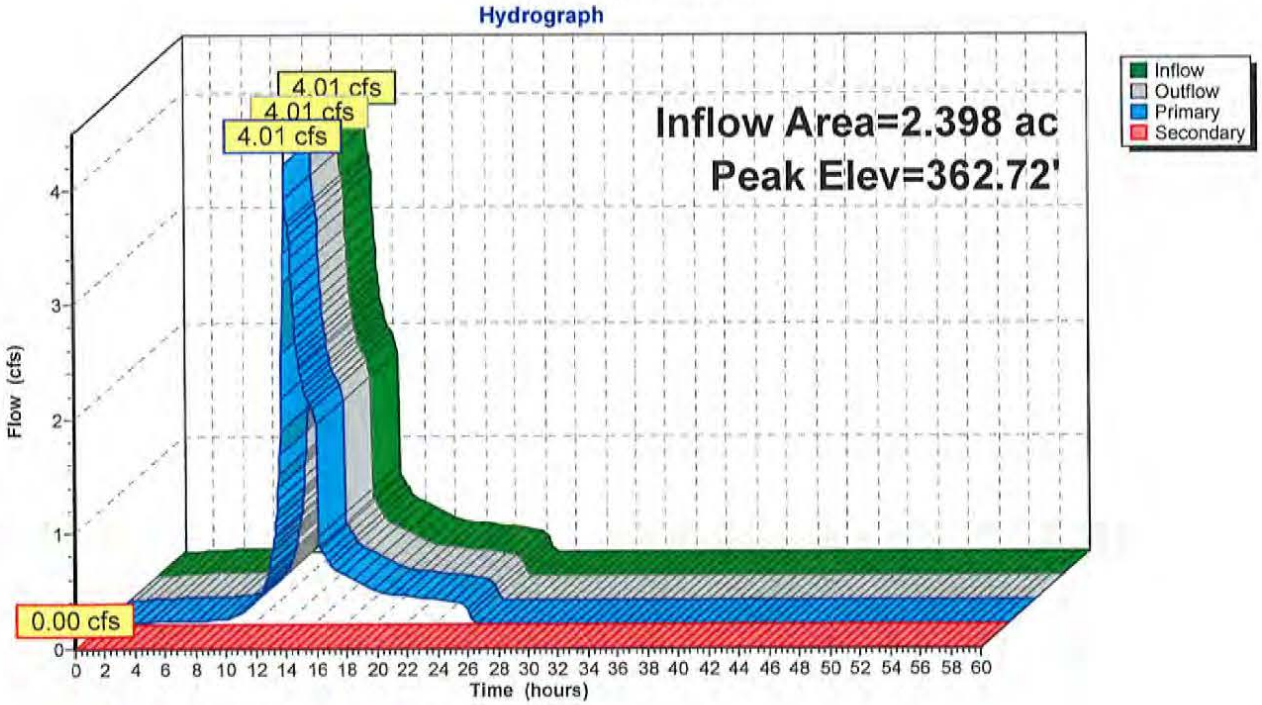
Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Peak Elev= 362.72' @ 12.15 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	361.10'	**12.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#2	Secondary	363.60'	**2.0" x 220.0" Horiz. E-Type Grate X 2.00 columns** X 8 rows C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.01 cfs @ 12.15 hrs HW=362.72' (Free Discharge)
↑—**1=Orifice** (Orifice Controls 4.01 cfs @ 5.10 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=361.10' (Free Discharge)
↑—**2=E-Type Grate** (Controls 0.00 cfs)

Pond E-1: E INLET



Summary for Pond SCH OUT: SCH- OUT

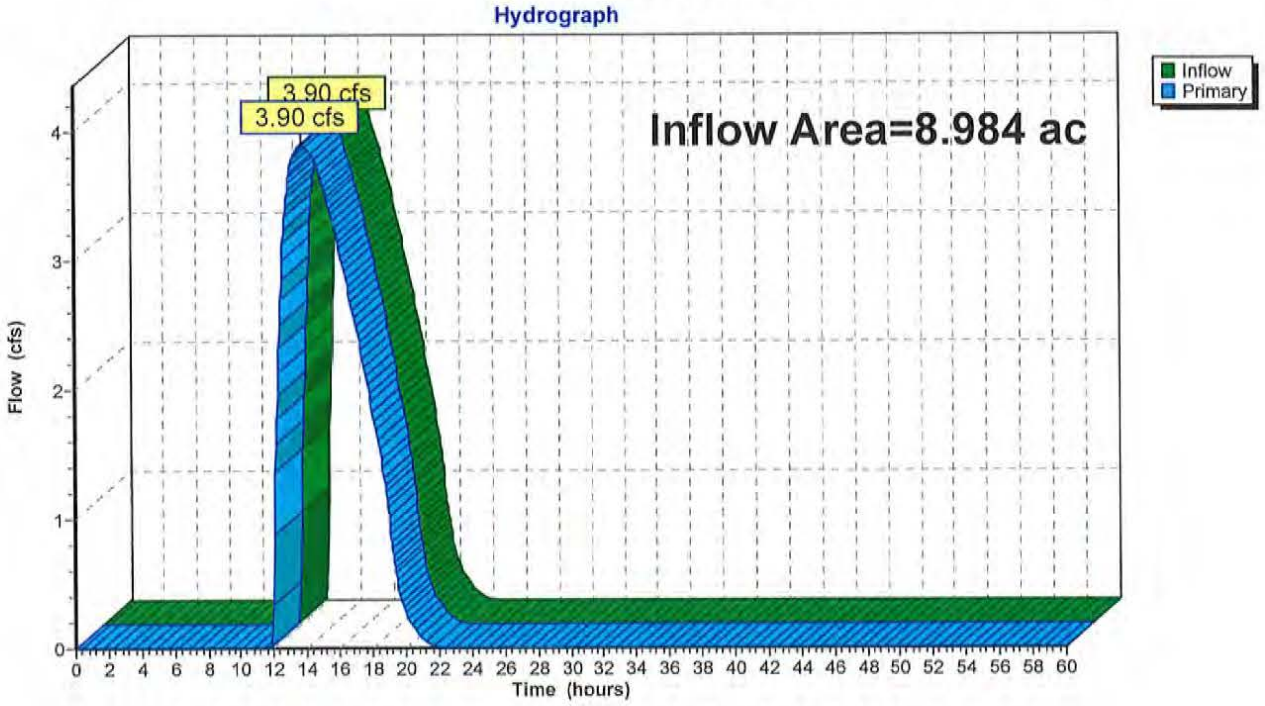
SCOUR HOLE

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 8.984 ac, 7.37% Impervious, Inflow Depth = 2.30" for 100-YR event
Inflow = 3.90 cfs @ 13.77 hrs, Volume= 1.724 af
Primary = 3.90 cfs @ 13.77 hrs, Volume= 1.724 af, Atten= 0%, Lag= 0.0 min
Routed to Link PROPOSED : TOTAL FOR SP

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Pond SCH OUT: SCH- OUT

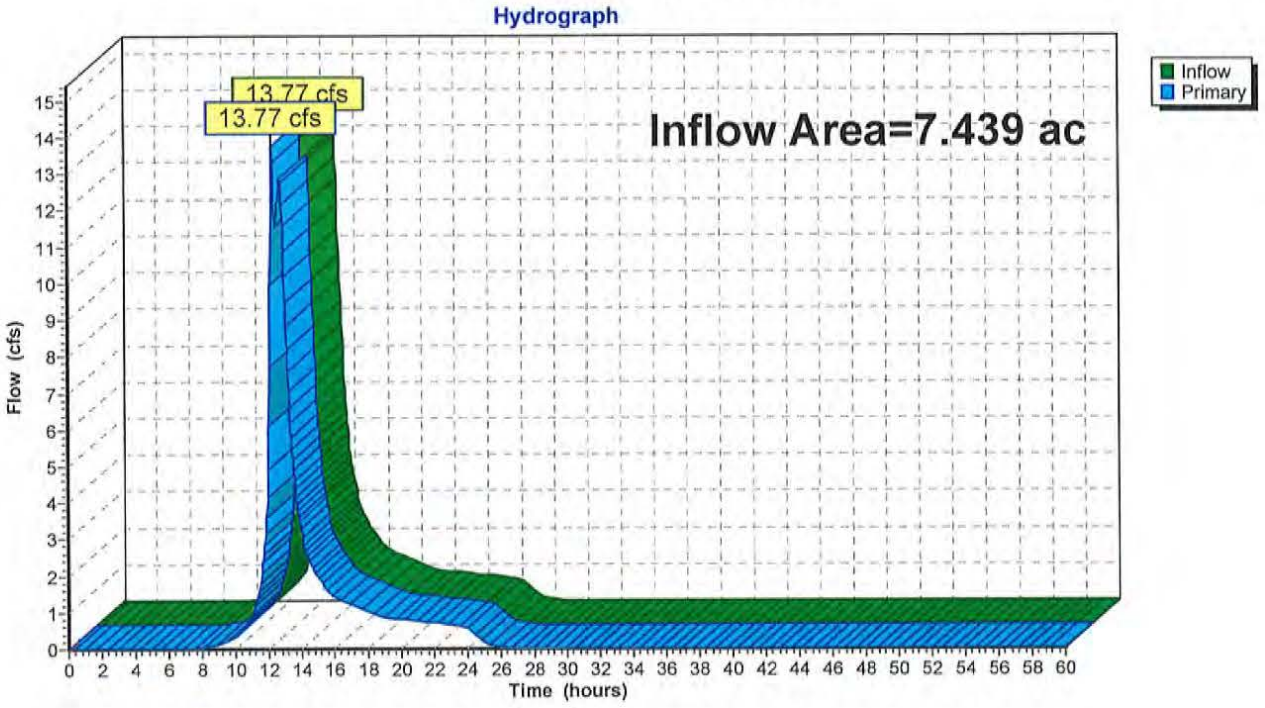


Summary for Link OTHER: TOTAL OFFSITE

Inflow Area = 7.439 ac, 5.82% Impervious, Inflow Depth = 4.20" for 100-YR event
Inflow = 13.77 cfs @ 12.28 hrs, Volume= 2.602 af
Primary = 13.77 cfs @ 12.28 hrs, Volume= 2.602 af, Atten= 0%, Lag= 0.0 min
Routed to Link PROP FLOWS : Onsite Flows

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link OTHER: TOTAL OFFSITE

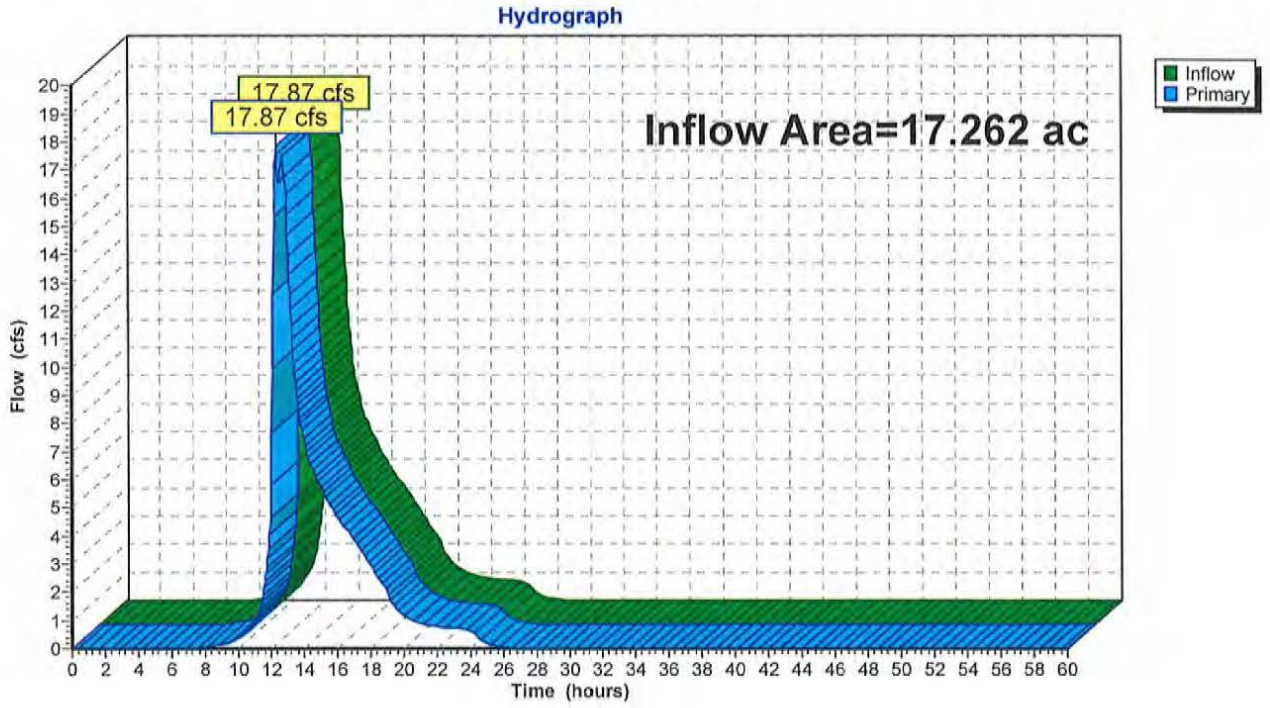


Summary for Link PROP FLOWS: Onsite Flows

Inflow Area = 17.262 ac, 6.34% Impervious, Inflow Depth = 3.21" for 100-YR event
Inflow = 17.87 cfs @ 12.31 hrs, Volume= 4.616 af
Primary = 17.87 cfs @ 12.31 hrs, Volume= 4.616 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link PROP FLOWS: Onsite Flows

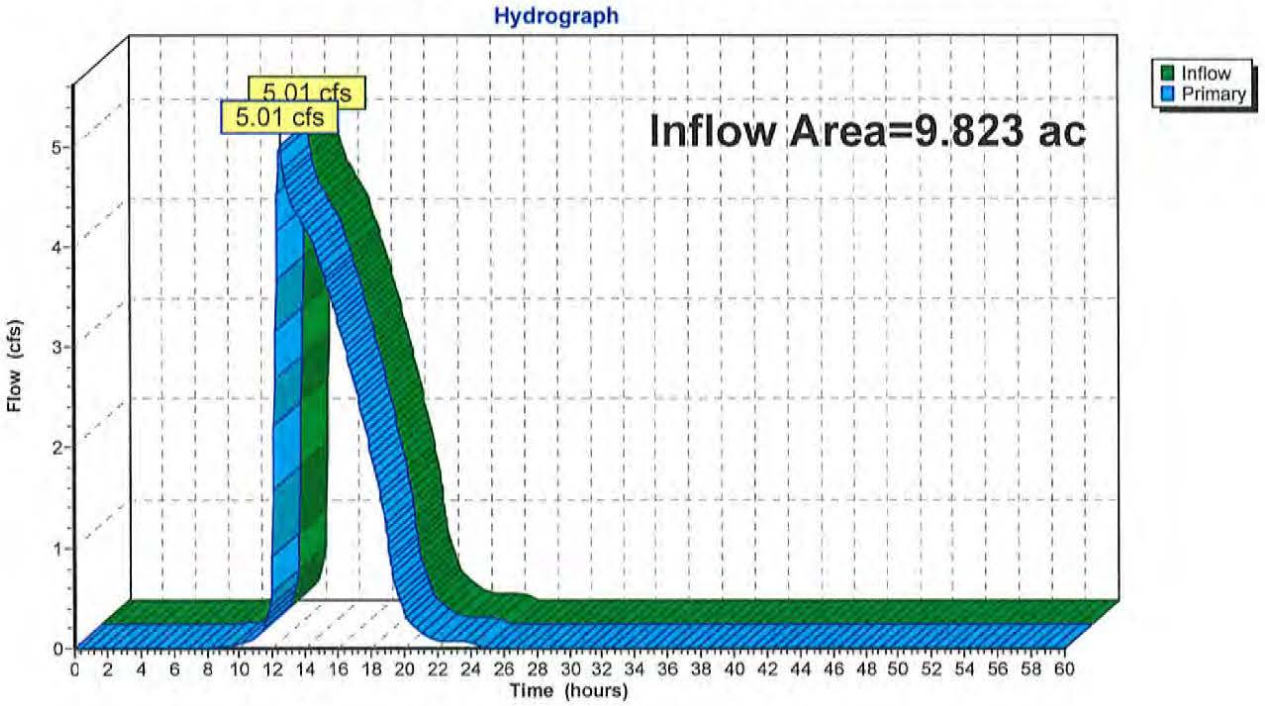


Summary for Link PROPOSED: TOTAL FOR SP

Inflow Area = 9.823 ac, 6.74% Impervious, Inflow Depth = 2.46" for 100-YR event
Inflow = 5.01 cfs @ 12.51 hrs, Volume= 2.014 af
Primary = 5.01 cfs @ 12.51 hrs, Volume= 2.014 af, Atten= 0%, Lag= 0.0 min
Routed to Link PROP FLOWS : Onsite Flows

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link PROPOSED: TOTAL FOR SP

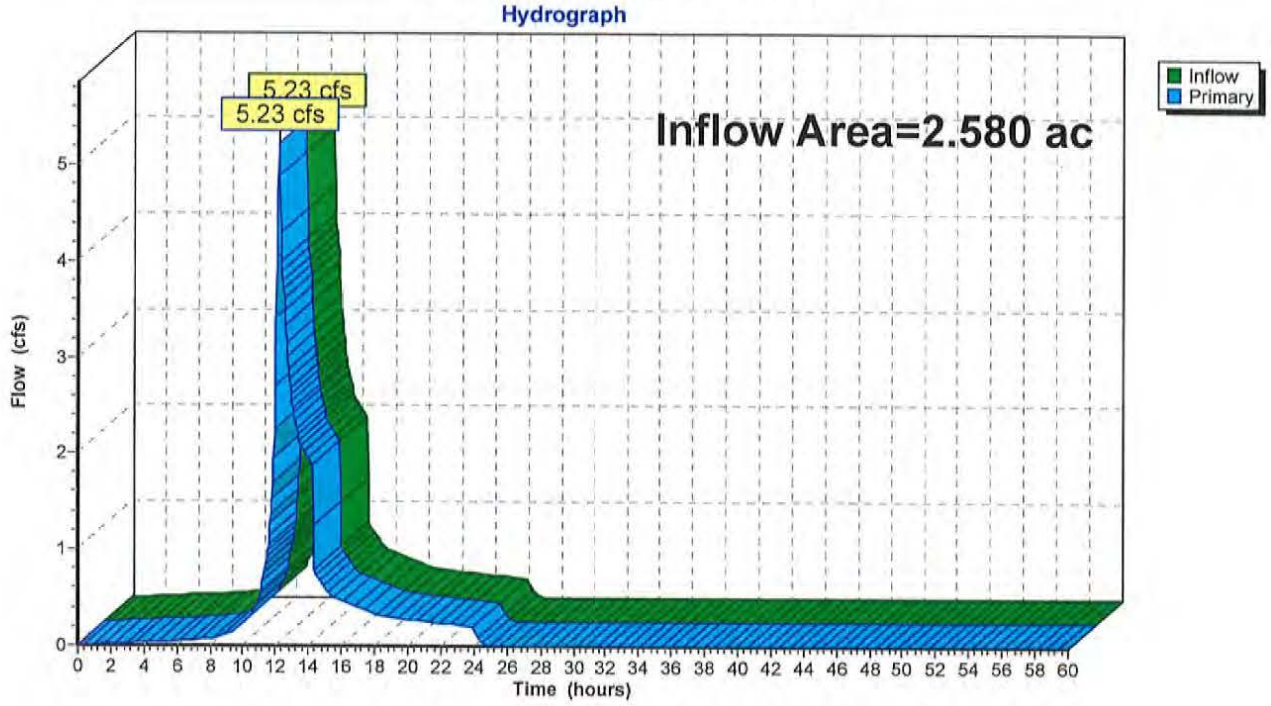


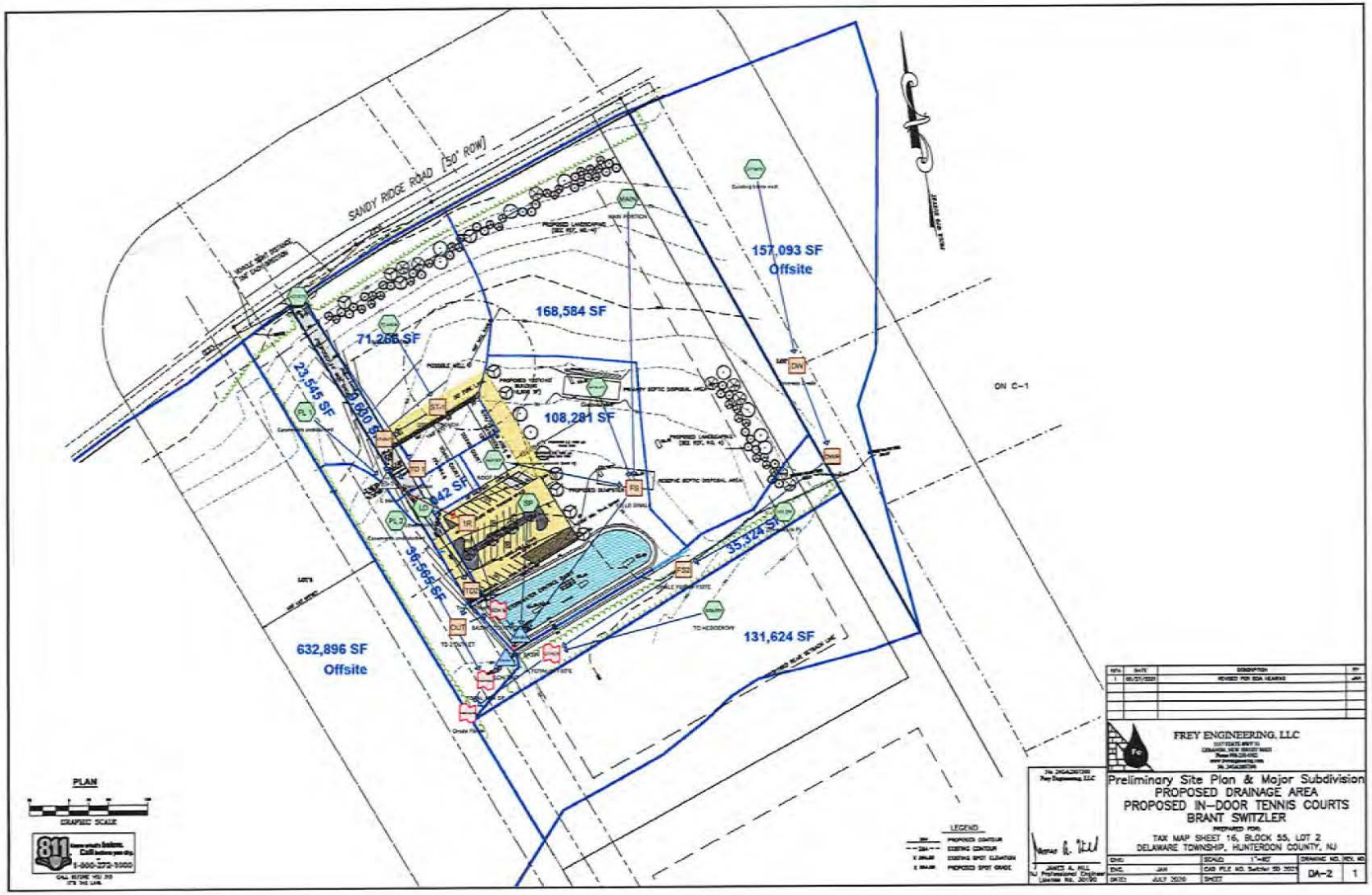
Summary for Link SCH B: BASIN SCOUR HOLE

Inflow Area = 2.580 ac, 20.87% Impervious, Inflow Depth = 4.53" for 100-YR event
Inflow = 5.23 cfs @ 12.15 hrs, Volume= 0.974 af
Primary = 5.23 cfs @ 12.15 hrs, Volume= 0.974 af, Atten= 0%, Lag= 0.0 min
Routed to Pond BASIN : STORM BASIN

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link SCH B: BASIN SCOUR HOLE





Subcat Reach Pond Link

Routing Diagram for 2021-05-28 PROPOSED NO INFIL

Prepared by Frey Engineering, LLC

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2021-05-28 PROPOSED NO INFIL
Prepared by Frey Engineering, LLC

TABLE OF CONTENTS

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	25-YR	NRCC 24-hr	C	Default	24.00	1	6.09	2
2	100-YR	NRCC 24-hr	C	Default	24.00	1	8.03	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.048	98	1/4 Roof, HSG B (1/4 ROOF)
3.606	65	2 acre lots, 12% imp, HSG B (OFFSITE)
1.249	61	>75% Grass cover, Good, HSG B (SEPTIC ETC)
0.811	65	Brush, Good, HSG C (OFF DW)
0.541	67	Brush, Poor, HSG B (PL 1)
0.839	67	Easements undidsturbed (PL 2)
0.058	82	GeoPave Area (LD)
0.117	85	GeoPave Fire Lane HSG B (TD AREA)
0.010	85	Geopave HSG B (SP)
0.083	85	Geopave units fire lane, HSG B (SEPTIC ETC)
0.485	85	Geopaves, HSG B (SP)
0.026	98	Handicapped Locations (SP)
0.062	61	LANDSCAPE ISLAND Good, HSG B (SP)
0.057	58	Landscape Berm (TD AREA)
4.916	58	Meadow, non-grazed, HSG B (MAIN, TD AREA)
3.022	71	Meadow, non-grazed, HSG C (SOUTH)
0.193	98	North Half of Tennis Roof HSG B (TD AREA)
0.124	98	Paved driveway, HSG B (LD)
0.007	98	Paved pad Dumpster HSG B (SP)
0.221	98	Paved parking, HSG B (ACCESS)
0.042	98	Sidewalk Unconnected pavement, HSG B (SP)
0.520	98	Water Surface, 0% imp, HSG B (SEPTIC ETC)
0.223	55	Woods, Good, HSG B (MAIN)
17.262	**67**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
12.449	HSG B	1/4 ROOF, ACCESS, LD, MAIN, OFFSITE, PL 1, SEPTIC ETC, SP, TD AREA
3.833	HSG C	OFF DW, SOUTH
0.000	HSG D	
0.981	Other	LD, PL 2, SP, TD AREA
17.262		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.048	0.000	0.000	0.000	0.048	1/4 Roof	1/4 ROOF
0.000	3.606	0.000	0.000	0.000	3.606	2 acre lots, 12% imp	OFFSITE
0.000	1.249	0.000	0.000	0.000	1.249	>75% Grass cover, Good	SEPTIC ETC
0.000	0.000	0.811	0.000	0.000	0.811	Brush, Good	OFF DW
0.000	0.541	0.000	0.000	0.000	0.541	Brush, Poor	PL 1
0.000	0.000	0.000	0.000	0.839	0.839	Easements undidsturbed	PL 2
0.000	0.000	0.000	0.000	0.058	0.058	GeoPave Area	LD
0.000	0.117	0.000	0.000	0.000	0.117	GeoPave Fire Lane	TD AREA
0.000	0.010	0.000	0.000	0.000	0.010	Geopave	SP
0.000	0.083	0.000	0.000	0.000	0.083	Geopave units fire lane	SEPTIC ETC
0.000	0.485	0.000	0.000	0.000	0.485	Geopaves	SP
0.000	0.000	0.000	0.000	0.026	0.026	Handicapped Locations	SP
0.000	0.062	0.000	0.000	0.000	0.062	LANDSCAPE ISLAND Good	SP
0.000	0.000	0.000	0.000	0.057	0.057	Landscape Berm	TD AREA
0.000	4.916	3.022	0.000	0.000	7.938	Meadow, non-grazed	MAIN, SOUTH, TD AREA
0.000	0.193	0.000	0.000	0.000	0.193	North Half of Tennis Roof	TD AREA
0.000	0.124	0.000	0.000	0.000	0.124	Paved driveway	LD
0.000	0.007	0.000	0.000	0.000	0.007	Paved pad Dumpster	SP
0.000	0.221	0.000	0.000	0.000	0.221	Paved parking	ACCESS
0.000	0.042	0.000	0.000	0.000	0.042	Sidewalk Unconnected pavement	SP
0.000	0.520	0.000	0.000	0.000	0.520	Water Surface, 0% imp	SEPTIC ETC
0.000	0.223	0.000	0.000	0.000	0.223	Woods, Good	MAIN
0.000	**12.449**	**3.833**	**0.000**	**0.981**	**17.262**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	1R	361.00	358.50	238.0	0.0105	0.013	0.0	12.0	0.0
2	DWP	366.81	365.17	16.0	0.1025	0.012	0.0	12.0	0.0
3	OUT	359.90	359.50	10.0	0.0400	0.010	0.0	8.0	0.0
4	ST-OUT	361.90	361.40	48.0	0.0104	0.010	0.0	8.0	0.0
5	BASIN	358.50	358.10	34.0	0.0118	0.010	0.0	6.0	0.0

Notes Listing (all nodes)

Line#	Node Number	Notes
1	1/4 ROOF	Roof Drain tied into driveway drain
2	LD	Flows across GeoPave to basin
3	MAIN	LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
4		LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
5		HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B
6	OFFSITE	LbmC2 —Lansdale loam, 6 to 12 percent slopes, eroded HSG B
7		LbmB Lansdale loam, 2 to 6 percent slopes, HSG B
8		HdyC2 Hazleton channery loam, 6 to 12 percent slopes, eroded, HSG B
9	PL 1	Undisturbed by Site Plan
10	PL 2	Undisturbed by Sie Plan
11		Flows to Hedgerow by scour hole
12	SEPTIC ETC	Area outside of site plan and access lanes, includes storm basin area
13	SOUTH	AbrB—Abbottstown silt loam, 2 to 6 percent slopes HSG C
14	TD AREA	Roof drain tied into combination drain
15	DW	Existing sweale, no bed no banks, in hedgrow along edge of field
16	FS	Existing sweale, no bed no banks, in hedgrow along edge of field
17	FS2	Existing sweale, no bed no banks, in hedgrow along edge of field
18	SCH OUT	SCOUR HOLE

Summary for Pond BASIN: STORM BASIN

Inflow Area = 8.984 ac, 7.37% Impervious, Inflow Depth = 2.59" for 25-YR event
Inflow = 10.48 cfs @ 12.48 hrs, Volume= 1.942 af
Outflow = 3.31 cfs @ 13.50 hrs, Volume= 1.798 af, Atten= 68%, Lag= 61.0 min
Primary = 3.31 cfs @ 13.50 hrs, Volume= 1.798 af
Routed to Pond SCH OUT : SCH- OUT
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond SCH OUT : SCH- OUT

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Peak Elev= 360.12' @ 13.50 hrs Surf.Area= 39,089 sf Storage= 34,088 cf

Plug-Flow detention time= 164.5 min calculated for 1.797 af (93% of inflow)
Center-of-Mass det. time= 125.2 min (994.6 - 869.3)

Volume	Invert	Avail.Storage	Storage Description
#1	358.50'	62,063 cf	**OPEN STORAGE (Prismatic)**Listed below (Recalc)
#2	358.00'	2,621 cf	**CRUSHED STONE FILTER (Prismatic)**Listed below (Recalc) 8,738 cf Overall x 30.0% Voids
		64,684 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
358.50	18,000	0	0
360.00	20,648	28,986	28,986
361.00	22,670	21,659	50,645
361.50	23,000	11,418	62,063

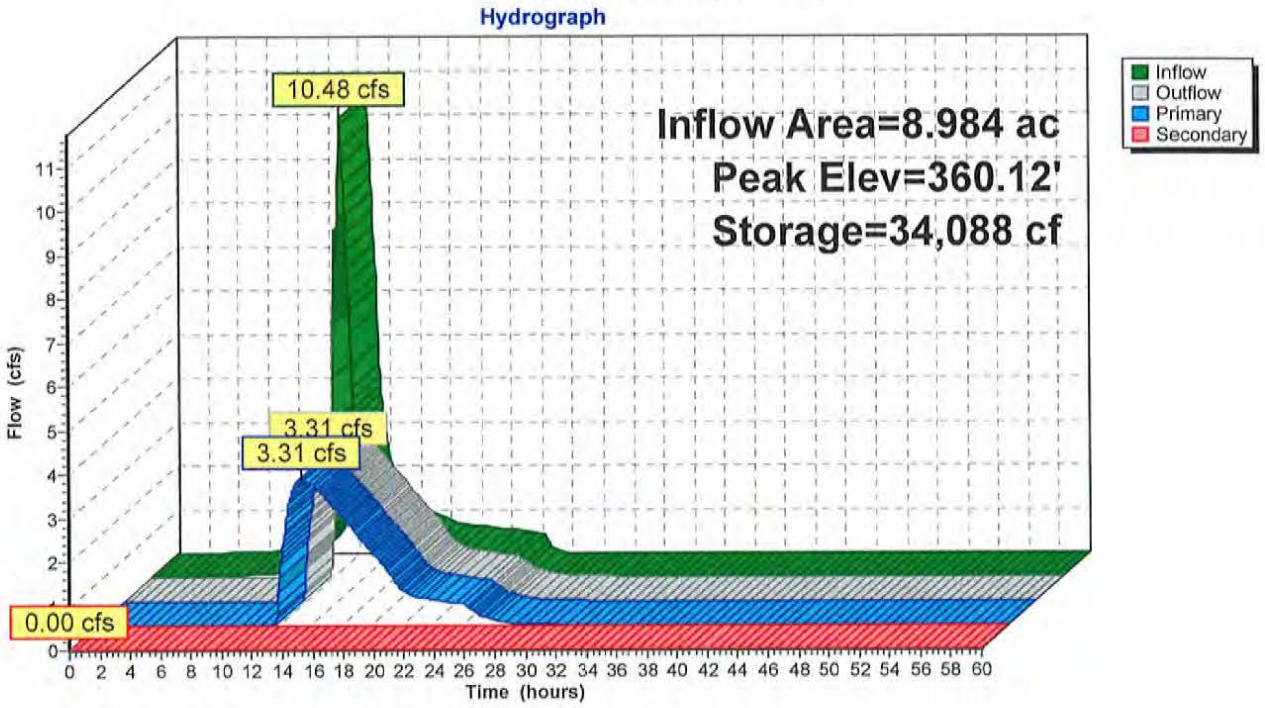
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
358.00	16,753	0	0
358.50	18,200	8,738	8,738

Device	Routing	Invert	Outlet Devices
#1	Primary	358.50'	**6.0" Round Culvert X 3.00** L= 34.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 358.50' / 358.10' S= 0.0118 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 1	358.70'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	359.70'	**1.5" x 20.0" Horiz. Type E Inlet Grate X 8.00 columns**X 15 rows C= 0.600 Limited to weir flow at low heads
#4	Secondary	360.80'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=3.31 cfs @ 13.50 hrs HW=360.12' (Free Discharge)
└**1=Culvert** (Barrel Controls 3.31 cfs @ 5.63 fps)
├**2=Broad-Crested Rectangular Weir**(Passes < 22.46 cfs potential flow)
└**3=Type E Inlet Grate** (Passes < 77.96 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=358.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond BASIN: STORM BASIN



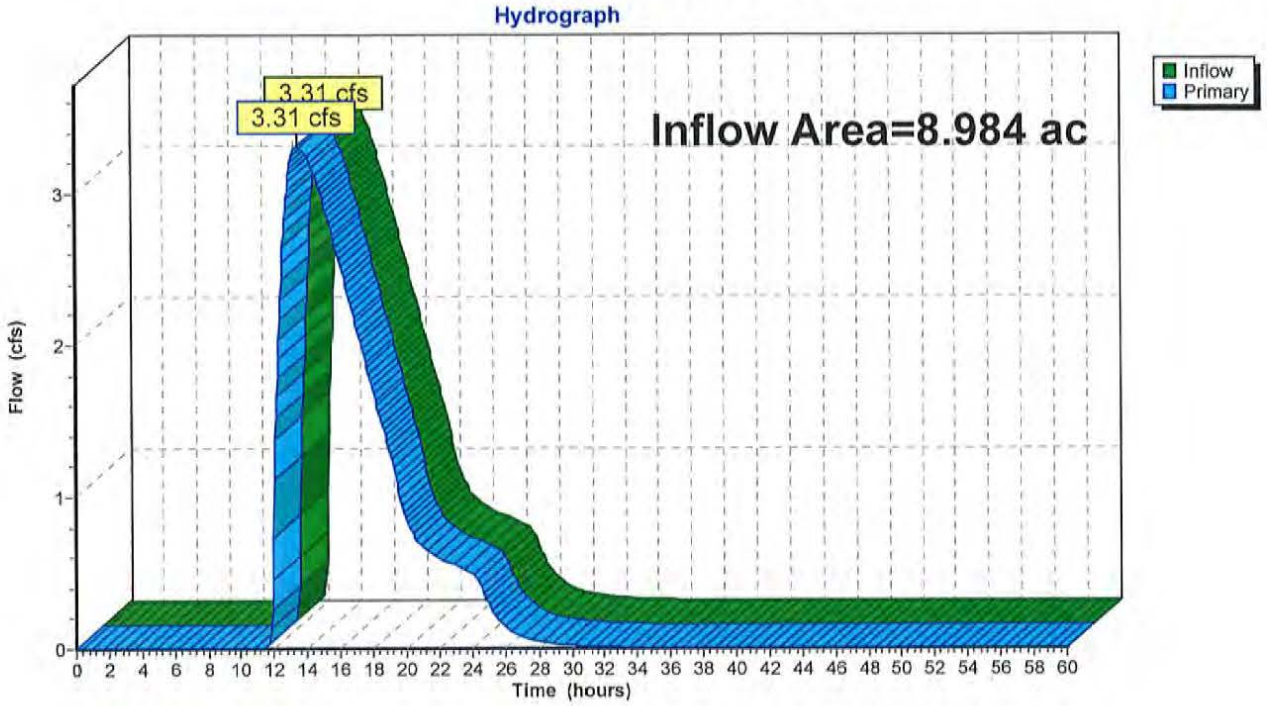
Summary for Pond SCH OUT: SCH- OUT

SCOUR HOLE

Inflow Area = 8.984 ac, 7.37% Impervious, Inflow Depth = 2.40" for 25-YR event
Inflow = 3.31 cfs @ 13.50 hrs, Volume= 1.798 af
Primary = 3.31 cfs @ 13.50 hrs, Volume= 1.798 af, Atten= 0%, Lag= 0.0 min
Routed to Link PROPOSED : TOTAL FOR SP

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Pond SCH OUT: SCH- OUT

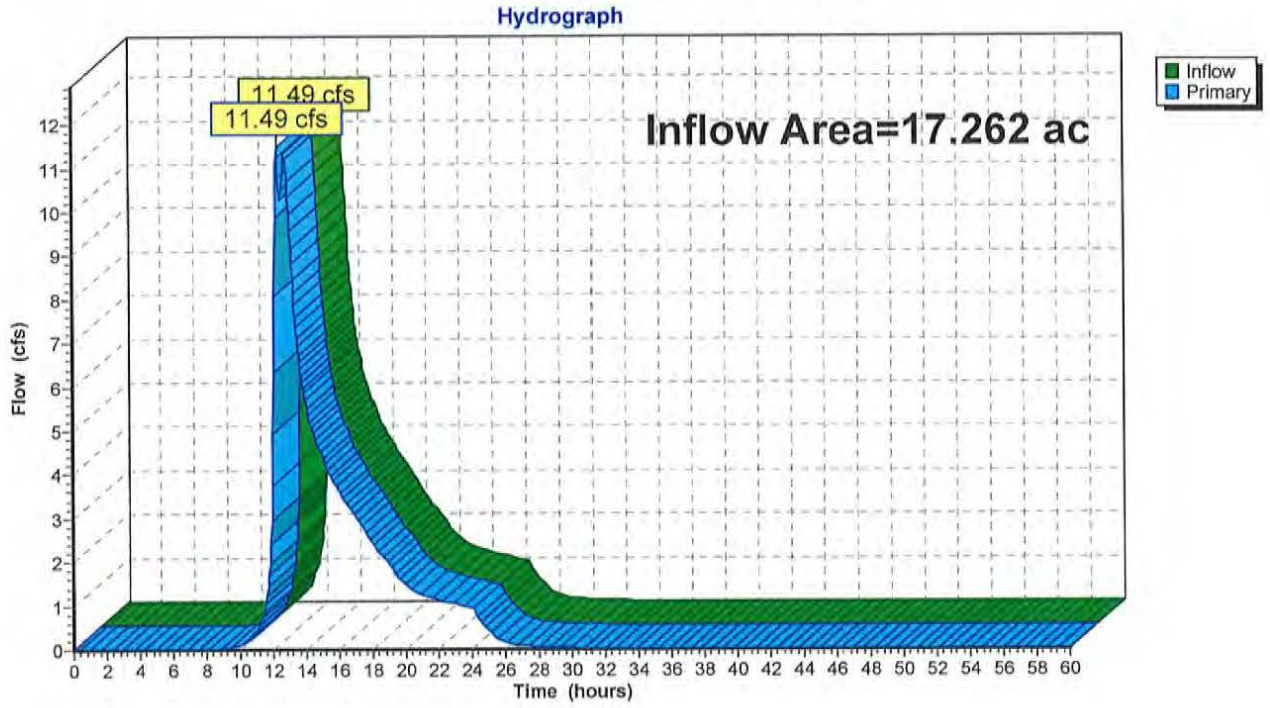


Summary for Link PROP FLOWS: Onsite Flows

Inflow Area = 17.262 ac, 6.34% Impervious, Inflow Depth = 2.52" for 25-YR event
Inflow = 11.49 cfs @ 12.31 hrs, Volume= 3.618 af
Primary = 11.49 cfs @ 12.31 hrs, Volume= 3.618 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link PROP FLOWS: Onsite Flows

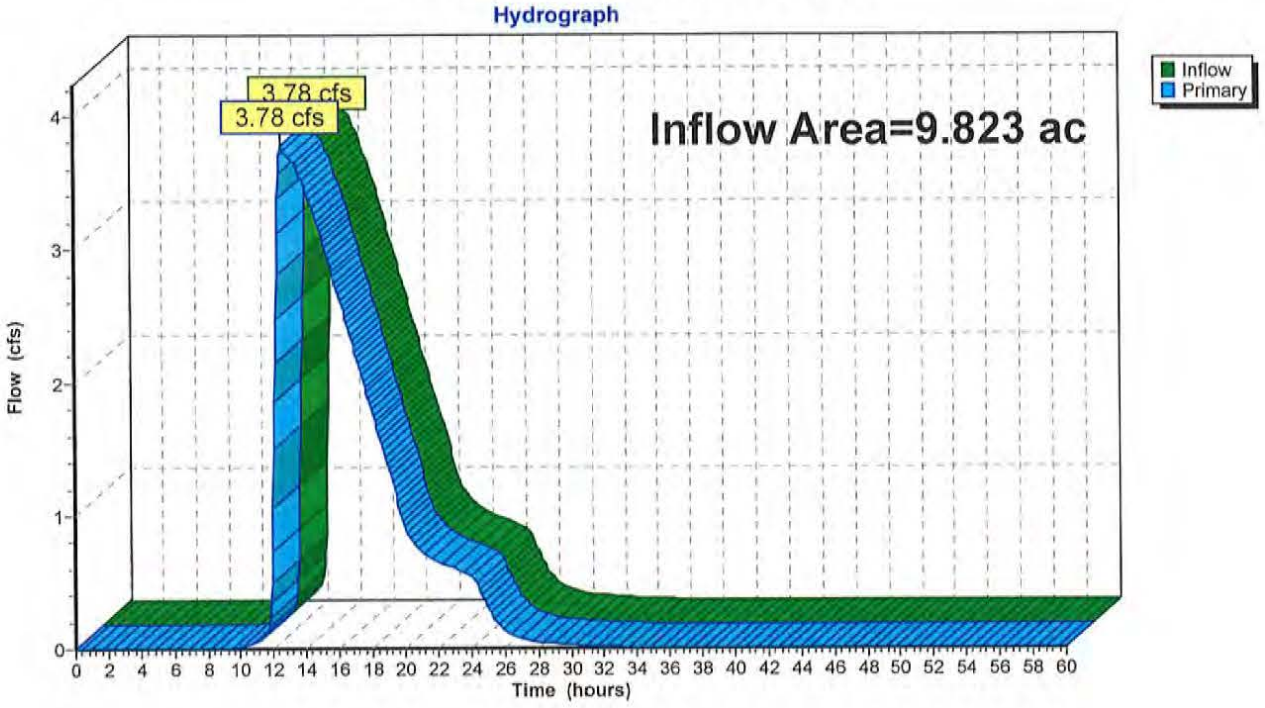


Summary for Link PROPOSED: TOTAL FOR SP

Inflow Area = 9.823 ac, 6.74% Impervious, Inflow Depth = 2.42" for 25-YR event
Inflow = 3.78 cfs @ 12.55 hrs, Volume= 1.980 af
Primary = 3.78 cfs @ 12.55 hrs, Volume= 1.980 af, Atten= 0%, Lag= 0.0 min
Routed to Link PROP FLOWS : Onsite Flows

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link PROPOSED: TOTAL FOR SP



Summary for Pond BASIN: STORM BASIN

Inflow Area = 8.984 ac, 7.37% Impervious, Inflow Depth = 4.10" for 100-YR event
Inflow = 16.74 cfs @ 12.45 hrs, Volume= 3.067 af
Outflow = 6.89 cfs @ 13.30 hrs, Volume= 2.924 af, Atten= 59%, Lag= 50.7 min
Primary = 4.12 cfs @ 13.30 hrs, Volume= 2.735 af
Routed to Pond SCH OUT : SCH- OUT
Secondary = 2.78 cfs @ 13.30 hrs, Volume= 0.189 af
Routed to Pond SCH OUT : SCH- OUT

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Peak Elev= 360.95' @ 13.30 hrs Surf.Area= 40,760 sf Storage= 52,037 cf

Plug-Flow detention time= 166.2 min calculated for 2.924 af (95% of inflow)
Center-of-Mass det. time= 139.2 min (998.1 - 858.9)

Volume	Invert	Avail.Storage	Storage Description
#1	358.50'	62,063 cf	**OPEN STORAGE (Prismatic)**Listed below (Recalc)
#2	358.00'	2,621 cf	**CRUSHED STONE FILTER (Prismatic)**Listed below (Recalc) 8,738 cf Overall x 30.0% Voids
		64,684 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
358.50	18,000	0	0
360.00	20,648	28,986	28,986
361.00	22,670	21,659	50,645
361.50	23,000	11,418	62,063

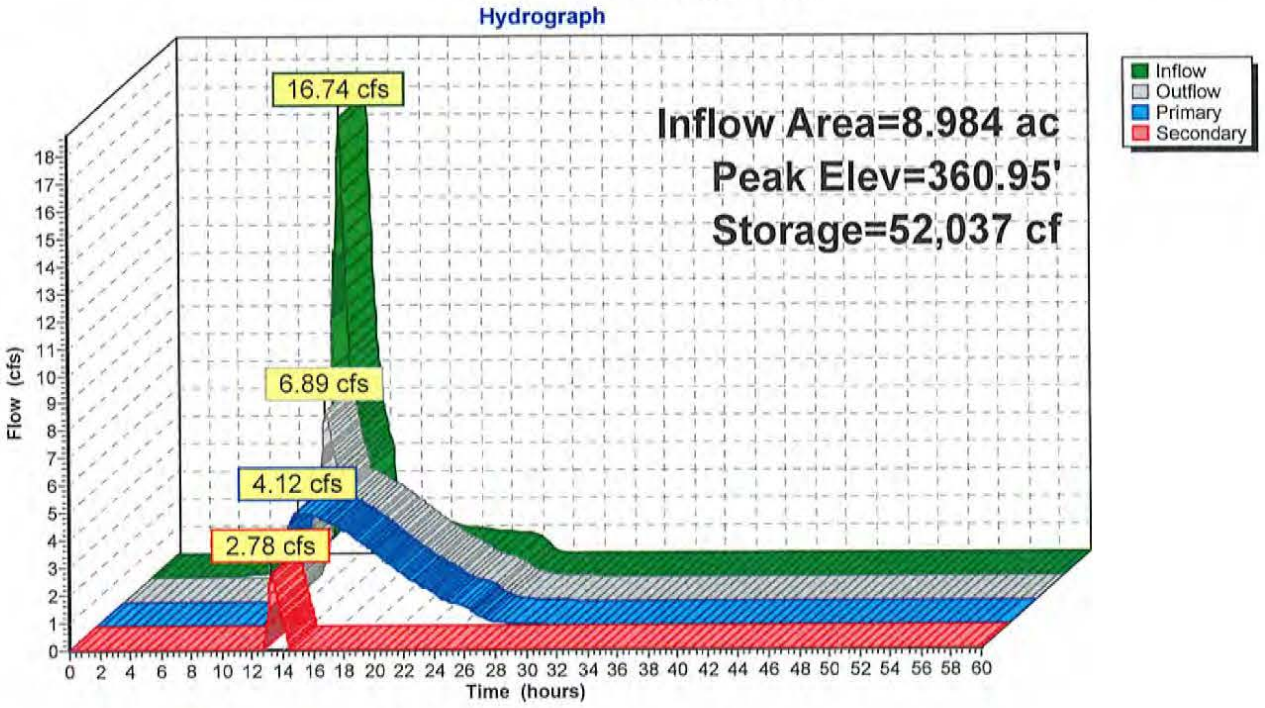
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
358.00	16,753	0	0
358.50	18,200	8,738	8,738

Device	Routing	Invert	Outlet Devices
#1	Primary	358.50'	**6.0" Round Culvert X 3.00** L= 34.0' Box, headwall w/3 square edges, Ke= 0.500 Inlet / Outlet Invert= 358.50' / 358.10' S= 0.0118 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf
#2	Device 1	358.70'	**4.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#3	Device 1	359.70'	**1.5" x 20.0" Horiz. Type E Inlet Grate X 8.00 columns**X 15 rows C= 0.600 Limited to weir flow at low heads
#4	Secondary	360.80'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=4.12 cfs @ 13.30 hrs HW=360.95' (Free Discharge)
└**1=Culvert** (Barrel Controls 4.12 cfs @ 6.99 fps)
└**2=Broad-Crested Rectangular Weir**(Passes < 44.69 cfs potential flow)
└**3=Type E Inlet Grate** (Passes < 134.34 cfs potential flow)

Secondary OutFlow Max=2.76 cfs @ 13.30 hrs HW=360.95' (Free Discharge)
└**4=Broad-Crested Rectangular Weir**(Weir Controls 2.76 cfs @ 0.95 fps)

Pond BASIN: STORM BASIN



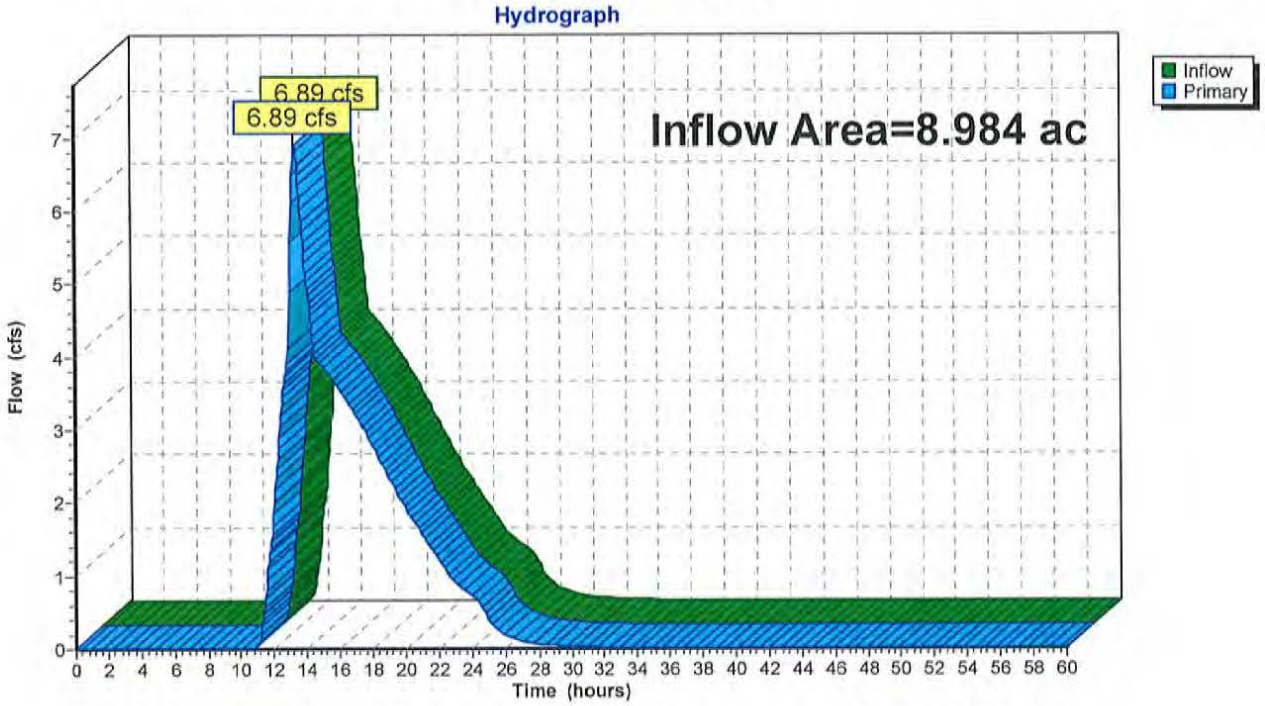
Summary for Pond SCH OUT: SCH- OUT

SCOUR HOLE

Inflow Area = 8.984 ac, 7.37% Impervious, Inflow Depth = 3.91" for 100-YR event
Inflow = 6.89 cfs @ 13.30 hrs, Volume= 2.924 af
Primary = 6.89 cfs @ 13.30 hrs, Volume= 2.924 af, Atten= 0%, Lag= 0.0 min
Routed to Link PROPOSED : TOTAL FOR SP

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Pond SCH OUT: SCH- OUT

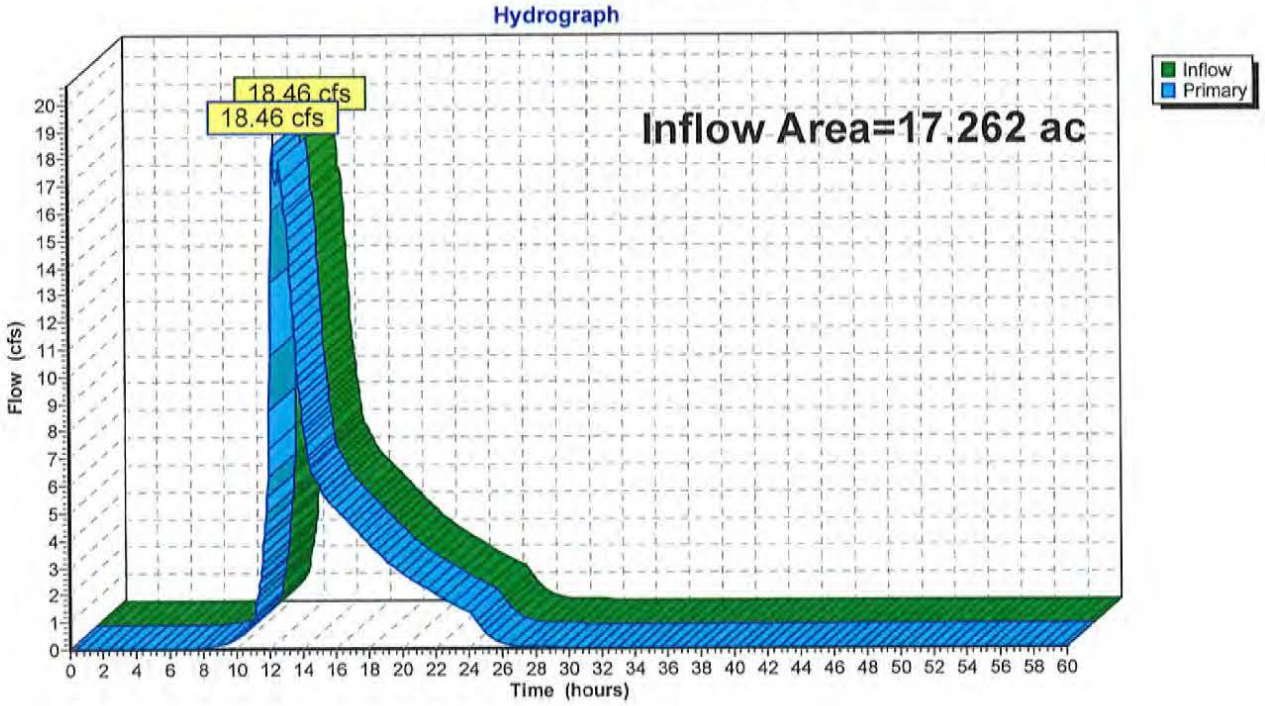


Summary for Link PROP FLOWS: Onsite Flows

Inflow Area = 17.262 ac, 6.34% Impervious, Inflow Depth = 4.04" for 100-YR event
Inflow = 18.46 cfs @ 12.31 hrs, Volume= 5.816 af
Primary = 18.46 cfs @ 12.31 hrs, Volume= 5.816 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link PROP FLOWS: Onsite Flows

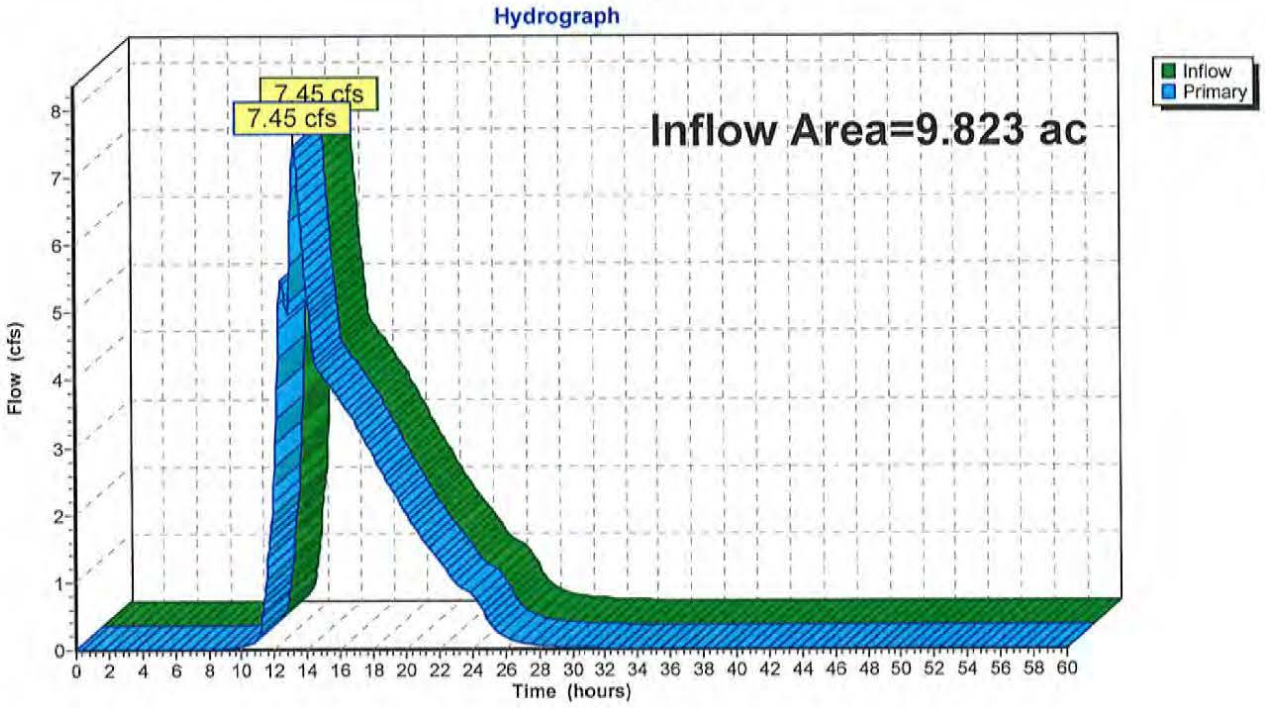


Summary for Link PROPOSED: TOTAL FOR SP

Inflow Area = 9.823 ac, 6.74% Impervious, Inflow Depth = 3.93" for 100-YR event
Inflow = 7.45 cfs @ 13.27 hrs, Volume= 3.214 af
Primary = 7.45 cfs @ 13.27 hrs, Volume= 3.214 af, Atten= 0%, Lag= 0.0 min
Routed to Link PROP FLOWS : Onsite Flows

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link PROPOSED: TOTAL FOR SP



2021-05-28 PROPOSED NO INFIL
Prepared by Frey Engineering, LLC

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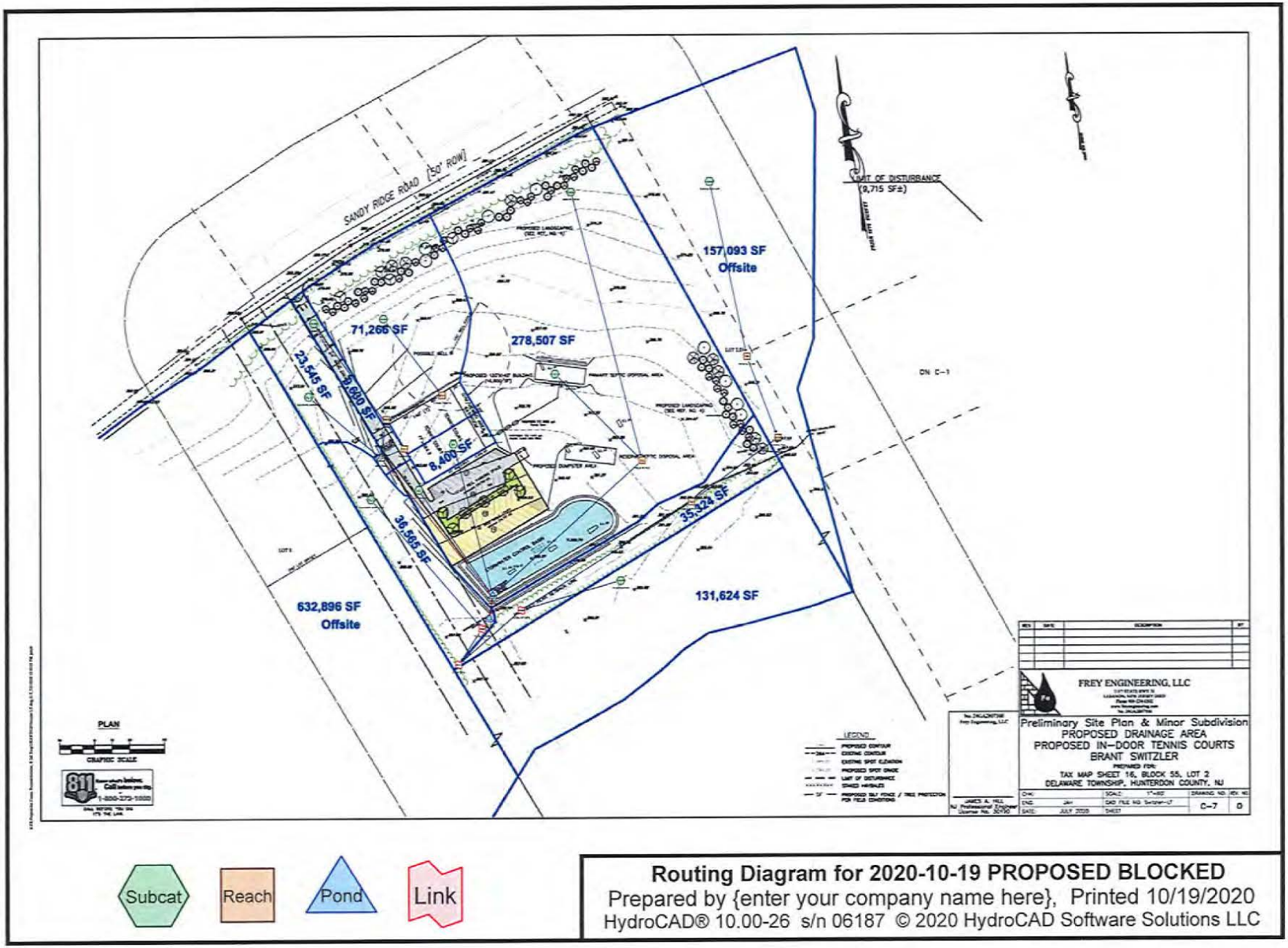


Subcat Reach Pond Link

Routing Diagram for 2020-10-19 PROPOSED BLOCKED

Prepared by {enter your company name here}, Printed 10/19/2020

HydroCAD® 10.00-26 s/n 06187 © 2020 HydroCAD Software Solutions LLC

Summary for Pond BASIN: STORM BASIN

Inflow Area = 8.984 ac, 7.37% Impervious, Inflow Depth = 4.10" for 100-YR event
Inflow = 16.74 cfs @ 12.45 hrs, Volume= 3.067 af
Outflow = 9.42 cfs @ 12.99 hrs, Volume= 1.948 af, Atten= 44%, Lag= 32.6 min
Secondary = 9.42 cfs @ 12.99 hrs, Volume= 1.948 af
Routed to Pond SCH OUT : SCH- OUT

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs
Peak Elev= 361.13' @ 12.99 hrs Surf.Area= 40,953 sf Storage= 56,118 cf

Plug-Flow detention time= 228.5 min calculated for 1.948 af (63% of inflow)
Center-of-Mass det. time= 109.2 min (968.1 - 858.9)

Volume	Invert	Avail.Storage	Storage Description
#1	358.50'	62,063 cf	**OPEN STORAGE (Prismatic)** Listed below (Recalc)
#2	358.00'	2,621 cf	**CRUSHED STONE FILTER (Prismatic)** Listed below (Recalc) 8,738 cf Overall x 30.0% Voids
		64,684 cf	Total Available Storage

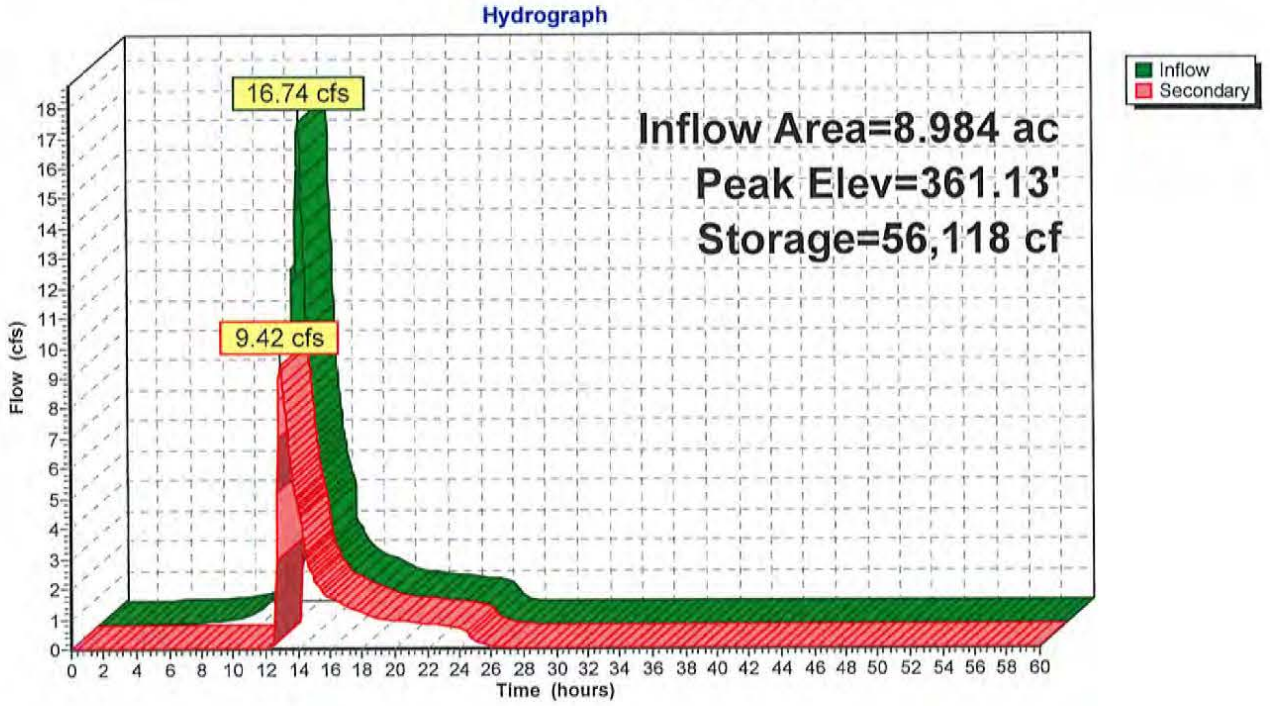
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
358.50	18,000	0	0
360.00	20,648	28,986	28,986
361.00	22,670	21,659	50,645
361.50	23,000	11,418	62,063

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
358.00	16,753	0	0
358.50	18,200	8,738	8,738

Device	Routing	Invert	Outlet Devices
#1	Secondary	360.80'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Secondary OutFlow Max=9.40 cfs @ 12.99 hrs HW=361.13' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 9.40 cfs @ 1.45 fps)

Pond BASIN: STORM BASIN



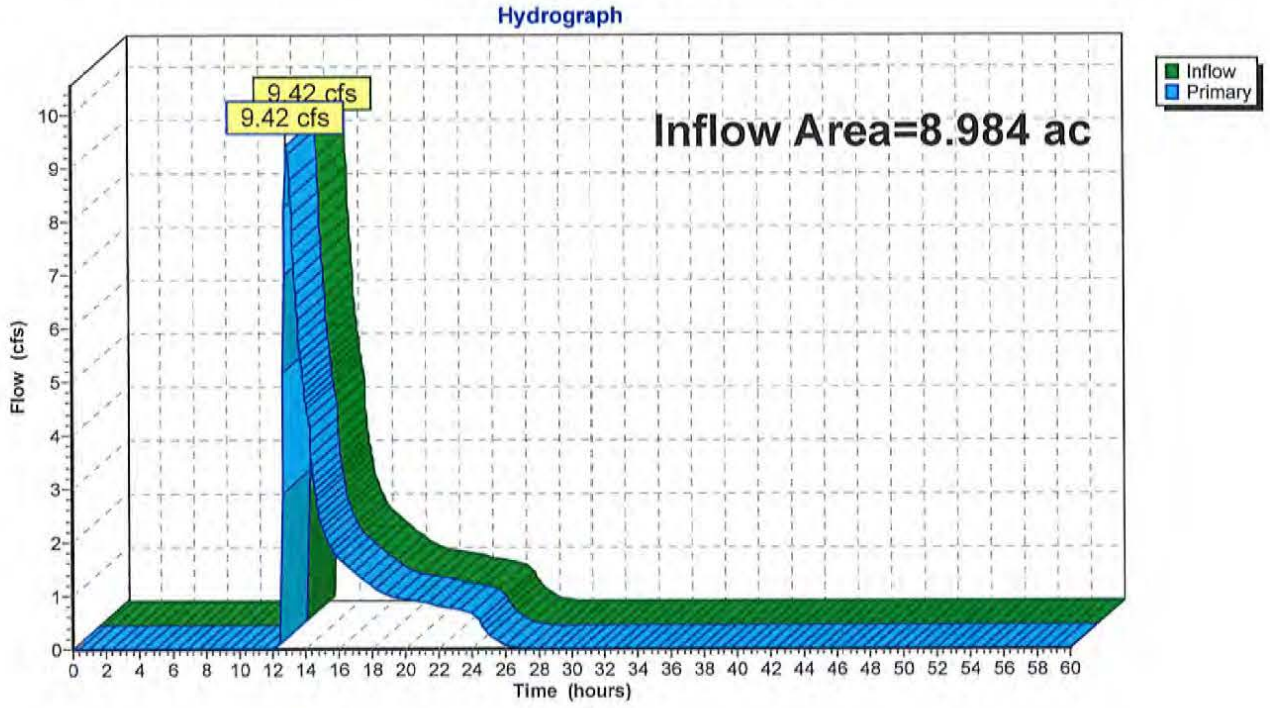
Summary for Pond SCH OUT: SCH- OUT

SCOUR HOLE

Inflow Area = 8.984 ac, 7.37% Impervious, Inflow Depth = 2.60" for 100-YR event
Inflow = 9.42 cfs @ 12.99 hrs, Volume= 1.948 af
Primary = 9.42 cfs @ 12.99 hrs, Volume= 1.948 af, Atten= 0%, Lag= 0.0 min
Routed to Link PROPOSED : TOTAL FOR SP

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Pond SCH OUT: SCH- OUT

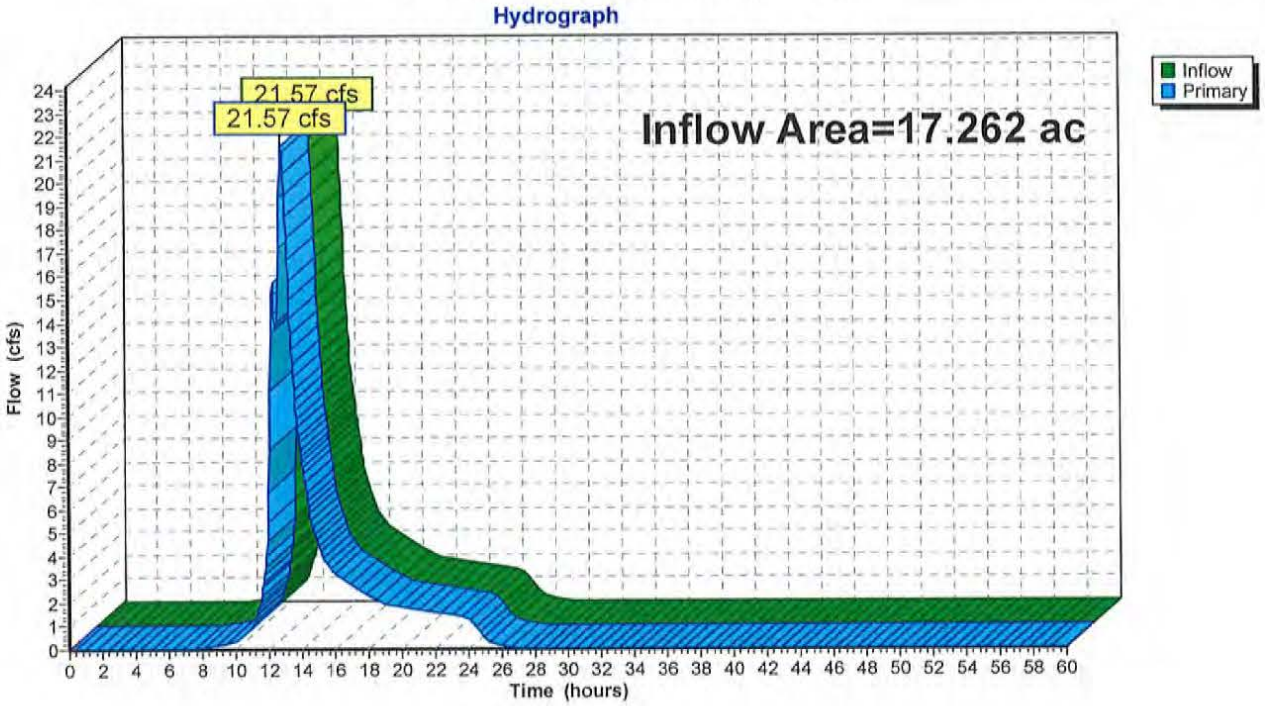


Summary for Link PROP FLOWS: Onsite Flows

Inflow Area = 17.262 ac, 6.34% Impervious, Inflow Depth = 3.36" for 100-YR event
Inflow = 21.57 cfs @ 12.88 hrs, Volume= 4.840 af
Primary = 21.57 cfs @ 12.88 hrs, Volume= 4.840 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link PROP FLOWS: Onsite Flows

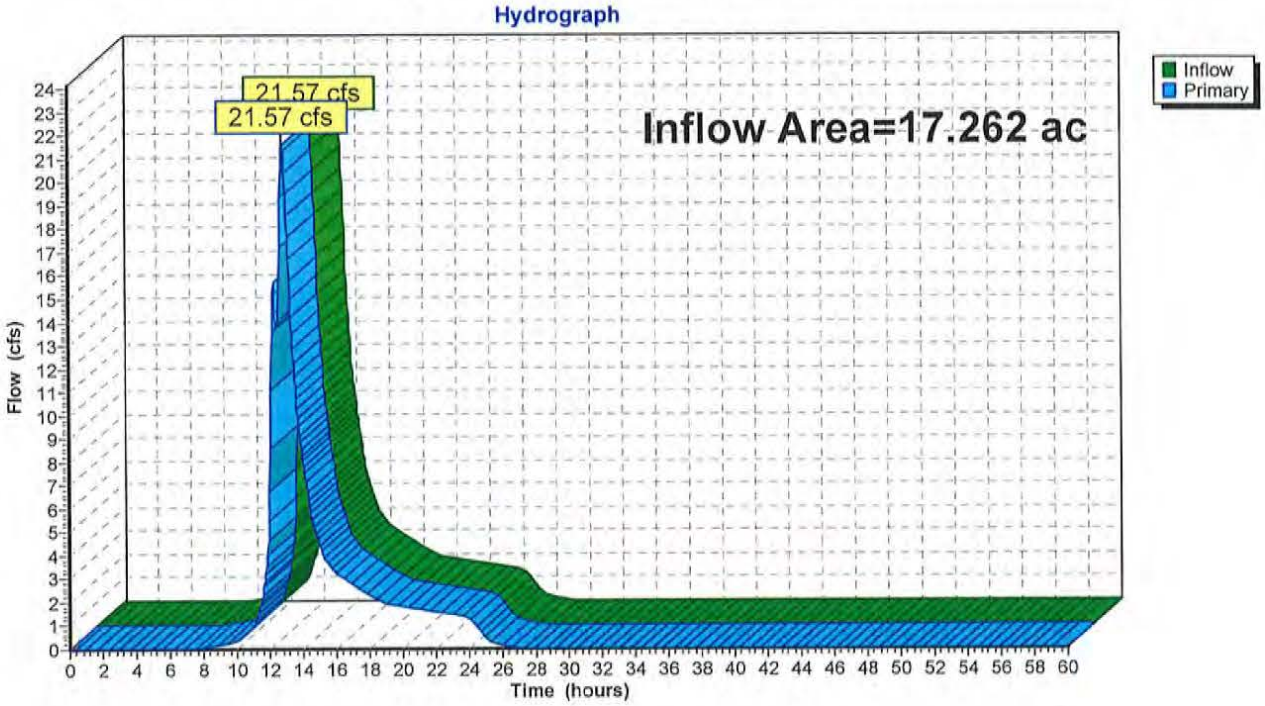


Summary for Link PROPOSED: TOTAL FOR SP

Inflow Area = 17.262 ac, 6.34% Impervious, Inflow Depth = 3.36" for 100-YR event
Inflow = 21.57 cfs @ 12.88 hrs, Volume= 4.840 af
Primary = 21.57 cfs @ 12.88 hrs, Volume= 4.840 af, Atten= 0%, Lag= 0.0 min
Routed to Link PROP FLOWS : Onsite Flows

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.05 hrs

Link PROPOSED: TOTAL FOR SP



APPENDIX C

GROUNDWATER RECHARGE

FIGURE 17 - CONDUIT OUTLET PROTECTION SWITZLER TENNIS FACILITY

SSESC, NJ 2014 CHPTR 12 CONDUIT OUTLET PROTECTION - PREFORMED SCOUR HOLE		
SCOUR HOLE FOR BASIN OUTLET - no infiltration		
Q = 25yr peak flow cfs - USE FLOW FOR NO INFILTRATION SCENARIOS @ 3.31CFS/3 = 1.10		
FOR 0.5D_O	L = 2(0.5*Do*3)+3*Do	W = 2(0.5D0*3)+2Wo
FOR D_O	L = 2Do*3)+3*Do	W = 2D0*3+2Wo
q = Q/W_o sq ft		W_o = ID outlet (ft)
FOR 0.5D_O	d50 = (0.0125/Tw)*q1.33	
FOR D_O	d50 = (0.0082/Tw)*q1.33	
Figure 12-2. For mulitple outlets, same discharge each pipe, design for 1 increase size by 25%		
For areas where T_w cannot be computed use 0.2D_O - therefor 0.2 * 0.50 for 6" opening		

OUTLET STRUCTURE TENNIS CNTR				PREFORMED SCOUR HOLE AT D_O			25% inc
Q25 1.1	cfs	Tw = 0.1	ft	d50 =	0.234	ft	0.31
q= 2.20	sf	$q^{1.33}$ = 2.85		use	4" 1.0 FT THICK		
Do = ft 0.5	3- 6" Round Pipes	ELEV. 358.1		L	4.50	ft	5.75
Wo = ft 0.5	3- 6" Round Pipes			W	4.00	ft	5.00

OUTLET STRUCTURE TENNIS CNTR				PREFORMED SCOUR HOLE AT 0.5D_O			25% inc
Q25 1.1	cfs	Tw = 0.1	ft	d50 =	0.357	ft	0.47
q= 2.20	sf	$q^{1.33}$ = 2.85		use	6" 1.5 FT THICK		
Do = ft 0.5	6" Round Pipes	Do x 0.5 = 0.25		L	3.00	ft	3.75
Wo = ft 0.5	6" Round Pipes	ELEV. 358.1		W	2.50	ft	3.13

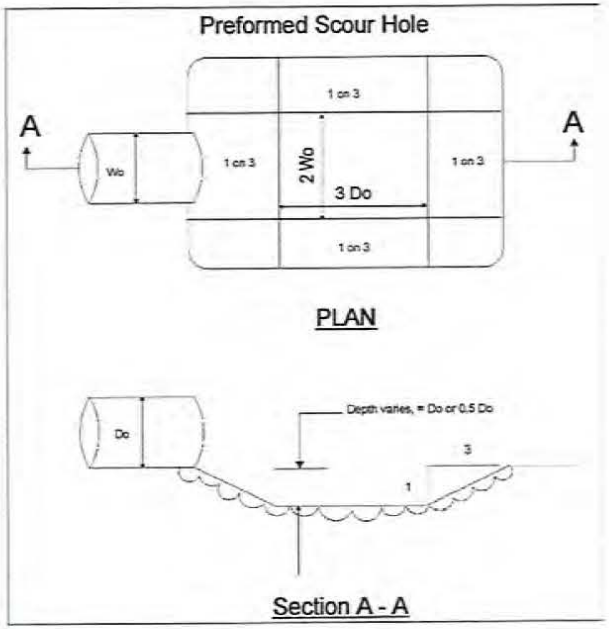
SSESC, NJ 2014 CHPTR 12 CONDUIT OUTLET PROTECTION - PREFORMED SCOUR HOLE		
SCOUR HOLE DRIVEWAY PIPE OUTLET IN BASIN no infiltration		
Q = 25yr peak flow cfs - USE FLOW FOR NO INFILTRATION SCENARIOS @ 4.30CFS		
FOR 0.5D_O	L = 2(0.5*Do*3)+3*Do	W = 2(0.5D0*3)+2Wo
FOR D_O	L = 2Do*3)+3*Do	W = 2D0*3+2Wo
q = Q/W_o sq ft		W_o = ID outlet (ft)
FOR 0.5D_O	d50 = (0.0125/Tw)*q1.33	
FOR D_O	d50 = (0.0082/Tw)*q1.33	
For areas where T_w cannot be computed use 0.2D_O - therefor 0.2 * 0.67' for 8" opening		

OUTLET FOR DRIVEWAY PIPE TO BASIN				PREFORMED SCOUR HOLE AT D_O			
Q25 4.3	cfs	Tw = 0.2	ft	d50 =	0.285	ft	
q= 4.30	sf	$q^{1.33}$ = 6.96		use	4" 1.0 FT THICK		
Do = ft 1	12" Round Pipe	ELEV.	358.6	L	9.00	ft	
Wo = ft 1	12" Round Pipe			W	8.00	ft	

OUTLET FOR DRIVEWAY PIPE TO BASIN				PREFORMED SCOUR HOLE AT 0.5D_O		
Q25 4.3	cfs	Tw = 0.2	ft	d50 =	0.435	ft
q= 4.30	sf	$q^{1.33}$ = 6.96		use	6" 1.5 FT THICK	
Do = ft 1		Do x 0.5 = 0.50		L	6.00	ft
Wo = ft 1	12" Round Pipe	ELEV. 358.1		W	5.00	ft

Standards for Soil Erosion and Sediment Control in New Jersey *January 2014*

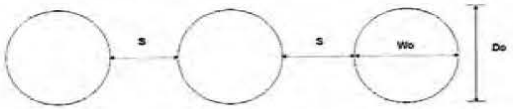
Figure 12-3 Configuration of Preformed Scour Hole



Standards for Soil Erosion and Sediment Control in New Jersey *January 2014*

Figure 12-2 Guidance for Multiple Culvert Outlets

All Culverts Same Diameter
Discharging Same Q



For S < ¼ W_o Size Riprap & Length for 1 pipe. Width shall accommodate all culverts

For S ≥ ¼ W_o Size Riprap & Length for 1 pipe and increase values by 25 %

For culverts of varying diameters or discharge check riprap size and apron length for each. Use the largest values. Increase length and riprap values by 25% if spacing is greater than ¼ W_o. Width shall accommodate all culverts.

References

Fletcher, B. P. and Grace, J. L. Jr., Practical Guidance For Estimating And Controlling Erosion at Culvert Outlets. 1972. Corps of Engineers Research Report H-72-5, Waterways Experimentation Station, Vicksburg, Mississippi

New Jersey Groundwater Recharge Spreadsheet Version 2.0 November 2003

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
HUNTERDON CO., DELAWARE TWP	45.3	1.46

Project Name:	B. Switzler - Tennis Center
Description:	Tennis Training Center
Analysis Date:	05/28/21

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	1.5	Residential 1 acre or 2 acre	Hazleton	11.8	64,142
2	1.5	Residential 1 acre or 2 acre	Lansdale	11.3	61,791
3	0.61	Residential 1 acre or 2 acre	Abbottstown	10.0	22,192
4	0.74	Meadow, Pasture, Grassland or range	Abbottstown	12.3	33,114
5	5.6	Meadow, Pasture, Grassland or range	Lansdale	13.7	278,485
6	3.32	Meadow, Pasture, Grassland or range	Hazleton	14.1	170,465
7	0.95	Meadow, Pasture, Grassland or range	Abbottstown	12.3	42,511
8	3.02	Meadow, Pasture, Grassland or range	Abbottstown	12.3	135,140
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	17.2			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				12.9	807,841

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	1.5	Residential 1 acre or 2 acre	Lansdale	11.3	61,791
2	1.5	Residential 1 acre or 2 acre	Lansdale	11.3	61,791
3	0.61	Residential 1 acre or 2 acre	Abbottstown	10.0	22,192
4	3.2	adow, Pasture, Grassland or ra	Abbottstown	12.3	143,195
5	1.8	adow, Pasture, Grassland or ra	Lansdowne	12.0	78,715
6	1.6	adow, Pasture, Grassland or ra	Hazleton	14.1	82,152
7	0.87	adow, Pasture, Grassland or ra	Abbottstown	12.3	38,931
8	0.54	Woods-grass combination	Lansdale	14.0	27,489
9	0.85	Woods-grass combination	Lansdale	14.0	43,270
10	1.1	Open space	Lansdowne	12.1	48,277
11	0.73	Open space	Abbottstown	12.1	32,016
12	0.95	Open space	Hazleton	14.2	48,944
13	1.11	Impervious areas	Lansdowne	0.0	-
14	0.8	Gravel, dirt	Lansdowne	6.7	19,563
15	0				
Total =	17.2	Warning: make total area equal to Pre-Developed Condition		Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				11.3	708,325

Annual Recharge Requirements Calculation ↓

% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)	48,352
Post-Development Annual Recharge Deficit=	***99,515***	(cubic feet)	

Recharge Efficiency Parameters Calculations (area averages)

RWC=	4.54	(in)	DRWC= 0.94	(in)
ERWC =	1.22	(in)	EDRWC= 0.25	(in)

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Project Name	Description	Analysis Date	BMP or LID Type
B. Switzler - Tennis Center	Tennis Training Center	05/28/21	INFILTRATION BASIN

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	17941.6	sq.ft
BMP Effective Depth, this is the design variable	dBMP	1.5	in
Upper level of the BMP surface (negative if above ground)	dBMPu	18.0	in
Depth of lower surface of BMP, must be>=dBMPu	dEXC	36.0	in
Post-development Land Segment Location of BMP , Input Zero if Location is distributed or undetermined	SegBMP	11	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	1.06	in
ERWC Modified to consider dEXC	EDRWC	0.00	in
Empty Portion of RWC under Infilt. BMP	RERWC	0.00	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	0.57	in
Inches of Rainfall to capture	Pdesign	0.71	in
Recharge Provided Avg. over Imp. Area		24.7	in
Runoff Captured Avg. over imp. Area		24.7	in

BMP Calculated Size Parameters

ABMP/Aimp	Aratio	0.37	unitless
BMP Volume	VBMP	2,258	cu.ft

Parameters from Annual Recharge Worksheet

Post-D Deficit Recharge (or desired recharge volume)	Vdef	99,515	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	48,352	sq.ft
Root Zone Water Capacity	RWC	3.94	in
RWC Modified to consider dEXC	DRWC	0.00	in
Climatic Factor	C-factor	1.46	no units
Average Annual P	Pavg	45.3	in
Recharge Requirement over Imp. Area	dr	24.7	in

System Performance Calculated Parameters

Annual BMP Recharge Volume		99,658	cu.ft
Avg BMP Recharge Efficiency		100.0%	Represents % Infiltration Recharged
%Rainfall became Runoff		77.8%	%
%Runoff Infiltrated		70.2%	%
%Runoff Recharged		70.2%	%
%Rainfall Recharged		54.6%	%

CALCULATION CHECK MESSAGES

Volume Balance-> **Solve Problem to satisfy Annual Recharge**
dBMP Check---> **OK**
dEXC Check---> **OK**
BMP Location---> **OK**

OTHER NOTES

Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensetive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP.
To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration clik the "Default Vdef & Aimp" button.