

# STORMWATER MANAGEMENT REPORT

## MIXED USE DEVELOPMENT MULTIFAMILY BUILDING AT No. 4 COMMUNITY PLACE BLOCK 1501 - LOT 4

BOROUGH OF MADISON, COUNTY OF MORRIS, STATE OF NEW JERSEY

**Owner/Applicant:** Park Valley Madison, LLC  
10 Dundar Road, Suite 210  
Springfield, New Jersey 07081

**Prepared By:** SUBURBAN CONSULTING ENGINEERS, INC.  
2430 Highway 34, Bldg. A, Suite 1R  
Wall, New Jersey 08736

**Submitted To:** Borough of Madison Engineering Department  
Attn: Frank Russo, P.E., P.P.  
50 Kings Road  
Madison, New Jersey 07940

**File No.:** SCE-R11521.011

MAY 2020



DAREN J. PHIL  
NJPE LICENSE #24GE03619100

05-14-2020  
DATE

**SUBURBAN CONSULTING ENGINEERS, INC.**

2430 Highway 34, Bldg. A, Suite 1R, Wall, New Jersey 08736  
732-282-1776; Fax 732-722-7319

## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1</b>
	1.1 Existing Condition .....	1
	1.2 Proposed Condition .....	2
<b>2.0</b>	<b>DESIGN REGULATIONS.....</b>	<b>3</b>
	2.1 New Jersey Stormwater Management Regulations.....	3
	2.2 Borough of Madison Regulations .....	3
	2.3 Soil Erosion and Sediment Control.....	3
<b>3.0</b>	<b>DESIGN METHODOLOGY.....</b>	<b>3</b>
	3.1 Computer Software .....	3
<b>4.0</b>	<b>DESIGN RESULTS.....</b>	<b>4</b>
	4.1 Stormwater Quantity .....	4
	4.1.1 Borough Ordinance §195-37.1B(1) .....	4
	4.1.2 Borough Ordinance §195-37.1B(2) .....	4
	4.1.3 Borough Ordinance §195-37.1D(1) .....	4
	4.2 Groundwater Recharge .....	4
	4.2.1 Borough Ordinance §195-37.1B(4) .....	4
	4.2.2 Borough Ordinance §195-37.1B(6) .....	5
	4.3 Soil Erosion .....	5
	4.4 Stormwater Conveyance System.....	5
<b>5.0</b>	<b>MAINTENANCE .....</b>	<b>5</b>
<b>6.0</b>	<b>CONCLUSION .....</b>	<b>5</b>

## APPENDICES

<b>APPENDIX A</b>	<b>Soils Map</b>
<b>APPENDIX B</b>	<b>Runoff Curve Numbers</b>
<b>APPENDIX C</b>	<b>NJ 24 Hour Rainfall Frequency Data &amp; Water Quality Storm Distribution</b>
<b>APPENDIX D</b>	<b>HydroCAD Hydrograph and Routing Report</b>
<b>APPENDIX E</b>	<b>Groundwater Recharge Calculations</b>
<b>APPENDIX F</b>	<b>Stormwater Conveyance Calculations</b>
<b>APPENDIX G</b>	<b>Drainage Area Maps</b>

**1.0 INTRODUCTION**

This Stormwater Management Report is prepared in conjunction with plans entitled; “Preliminary and Final major Site Plan for Park Valley Development, 4 Community Place, Borough of Madison, County of Morris, State of New Jersey” prepared by **SUBURBAN CONSULTING ENGINEERS, INC.** (SCE) dated May 2020. The stormwater management report has been prepared to address the stormwater management design and soil erosion and sediment control requirements for the proposed site development.

The subject property is an existing lot, approximately 0.403 acres in area within the CDB-2 Zone, identified as Block 1501, Lot 4 on the Official Tax Maps for the Borough of Madison, County of Essex, State of New Jersey. The project site is a corner lot bound by Community Place to the south, Lots 5 & 6 of Block 1501 to the west, Residential Lot 3 of Block 1501 to the north, and Cook Avenue to the east. The site is currently in use with a dwelling and detached garage on the western portion of the site, and a gravel parking area on the eastern section of the property. No wetlands have been identified on the property. The property is outside any delineated flood hazard areas. The property is within State Planning Area 1 (Metropolitan).

**1.1 Existing Condition**

Under existing conditions, the project area contains one (1) two-story frame dwelling with front porch and rear deck. A detached garage is in the northwest corner of the property. An asphalt driveway provides access to the garage from Community Place along the eastern side of the dwelling. The eastern side of the property is mostly occupied by a gravel parking lot area. Various other appurtenances associated with the residential use of the property such as sidewalks, patios and walls are also present. The existing land cover is as summarized in the following table:

**Table 1-1**

<b>Existing Land Cover</b>		
<b>Cover</b>	<b>Area (Sq. Ft.)</b>	<b>Area (Acres)</b>
Roof & Sidewalks	2,418	0.055
Paved	2,251	0.052
Gravel	10,878	0.250
Lawn	2,008	0.046
<b>Total</b>	<b>17,555</b>	<b>0.403</b>

The project area is comprised of one (1) drainage area: E-100, which generates runoff from the existing site and generally flows in a southeastern direction. The generated runoff is ultimately discharged onto the Cook Avenue and Community Place Right-of-Way and collected into the existing system reinforced concrete pipe system under the roads via various inlet points. No above ground or underground detention systems have been identified.

As per the NRCS Soils Map, the underlying soils have been classified as Urban Land-Haledon Complex, 3 to 8 percent slopes (USHALB). Soils map and additional soil data are found in Appendix A of this report. The hydrologic soil group classification for USHALB soils is HSG ‘C’. A listing of various land covers and their associated Curve Number (CN) is included in Appendix B of this report.

The existing time of concentration was determined to be less than 6 minutes; therefore, the minimum time of concentration of six (6) minutes (0.1 hour) will be utilized for hydrograph and runoff generation computations. Existing Drainage Area Map, found in Appendix G of this report, provides a visual representation of the existing drainage area (E-100) and the time of concentration runoff path.

1.2 Proposed Condition

All existing structures including, but not limited to, existing two-story dwelling, detached garage, patios, decks, and gravel parking area will be demolished and removed. Proposed improvements include the construction of a three-story building with parking, lobby, and office use at the ground level. A total of eighteen (18) proposed dwelling units are proposed in the floors above. An underground detention system is proposed near the rear parking area. The detention system is designed to outflow towards the existing ‘E’ inlet on Cook Avenue.

Under proposed conditions, the project area is comprised of two (2) drainage areas: P-100 and B-100. Area P-100 includes area which generates runoff which will be collected and directed toward the proposed underground detention system. Proposed land cover for this area is as summarized in the following table:

**Table 1-2**

<b>Proposed Land Cover: P-100</b>		
<b>Cover</b>	<b>Area (Sq. Ft.)</b>	<b>Area (Acres)</b>
Roof & Sidewalks	11,813	0.271
Paved	2,308	0.053
Lawn	1,403	0.033
<b>Total</b>	<b>15,524</b>	<b>0.357</b>

Area B-100 includes area which generates runoff which will not be collected and directed toward the proposed underground detention system, but rather allowed to flow offsite and collected into the existing stormwater collection system under Cook Avenue and Community Place. Proposed land cover for this area is as summarized in the following table:

**Table 1-3**

<b>Proposed Land Cover: B-100</b>		
<b>Cover</b>	<b>Area (Sq. Ft.)</b>	<b>Area (Acres)</b>
Sidewalks	181	0.004
Lawn	1,850	0.042
<b>Total</b>	<b>2,031</b>	<b>0.046</b>

The proposed time of concentration was determined to be less than 6 minutes; therefore, the minimum time of concentration of six (6) minutes (0.1 hour) will be utilized for hydrograph and runoff generation computations. Proposed Drainage Area Map, found in Appendix G of this report, provides a visual representation of proposed drainage areas (P-100 & B-100) and the time of concentration runoff path.

These proposed improvements represent a total disturbance area of 18,995 square feet (0.436 acres) and an increase in impervious area of 9,633 square feet (0.221 acres).

## 2.0 DESIGN REGULATIONS

### 2.1 New Jersey Stormwater Management Regulations

Applicability of the state requirements are triggered for proposed improvements that meet the criteria for major development. As per N.J.A.C. 7:8-1.2, a major development is any improvement that provides for ultimately disturbing one or more acres of land or increasing impervious surface by one-quarter acre or more. As per the land cover breakdown above, the total proposed disturbance will be less than one acre, and the increase in impervious area is less than one-quarter acre (14,246 sq. ft. – 4,669 sq. ft. = 9,577 sq. ft. or 0.220 acres). Given these conditions, the State standards for stormwater management **are not** applicable to the proposed improvements.

### 2.2 Borough of Madison Regulations

As per Borough Ordinance Section §195-37.1A(2), stormwater control requirements are applicable for **any** application for a building permit, except application for additions or alterations of less than 400 square feet to one or two family residences. The proposed site improvements meet this criterion and shall be subject to the following Borough requirements:

- As per §195-37.1B(1), proposed peak rate of stormwater runoff shall be reduced to 50% of the predevelopment rate for the two-year storm, 75% for the ten-year storm, and 80% for the one-hundred-year storm.
- As per §195-37.1B(2), there shall be no increase in stormwater runoff volume over predevelopment levels of water quality storm (1.25 inches over two hours) or any storm of lesser intensity.
- As per §195-37.1B(4), soil absorption and groundwater recharge capacity of the area shall not decrease below what occurs under existing conditions.
- As per §195-37.1B(6), recharge of the aquifer and associated groundwater must be maintained.
- As per §195-37.1D(1), stormwater detention facilities shall be designed to contain an amount equal to the increase in volume of runoff which results from development of a site.

### 2.3 Soil Erosion and Sediment Control

The project is also required to comply with the Soil Erosion and Sediment Control Standards for New Jersey. These standards outline specific requirements for minimizing soil erosion both during and after construction is complete. The project disturbs more than 5,000 square feet and, therefore, will need to be certified by the Morris County Soil Conservation District (MCSCD). As the project does not disturb more than one (1) acre of land, an NJDEP Request for Authorization (RFA) will not be required.

## 3.0 DESIGN METHODOLOGY

### 3.1 Computer Software

Computer software (HydroCAD Stormwater Modeling) was utilized to model stormwater runoff rates and hydrograph volumes for the 2-year, 10-year, and 100-year storm events. HydroCAD uses the TR-55 method to route stormwater models. Runoff curve number (CN) values were chosen based upon the appropriate land cover as listed in Appendix C of this

report. Rainfall distributions for hydrograph generation are based on New Jersey 24-hour rainfall frequency data provided by Natural Resources Conservation Service (NRCS), dated August 2012. Additionally, Appendix C contains the rainfall distribution for the water quality storm event (1.25 inches over two hours).

**4.0 DESIGN RESULTS**

4.1 Stormwater Quantity

4.1.1 Borough Ordinance §195-37.1B(1)

The proposed underground detention system will provide stormwater quantity reductions to meet the Borough requirements (listed above).

A summary of the existing and proposed peak flows to each design point is provided in the tables below:

**Table 4-1**

Storm Event	Total Existing Discharge (cfs)	Reduction Factor	Allowable Discharge (cfs)
2-year	0.96	50%	0.48
10-year	1.53	25%	1.15
100-year	2.59	20%	2.08

**Table 4-2**

Storm Event	Total Proposed Discharge (cfs)	Allowable Discharge (cfs)	Complies
2-year	0.44	0.48	Yes
10-year	0.89	1.15	Yes
100-year	2.04	2.08	Yes

4.1.2 Borough Ordinance §195-37.1B(2)

The proposed improvements shall result in an increase in runoff volume of 218 cu. ft. for the water quality storm. The proposed underground detention system has 239 cu. ft. of storage available in the stone bed, bellow the proposed perforated HDPE pipes. This volume will be infiltrated into the ground and will offset the increase in runoff volume for the water quality storm. The proposed design meets the Borough requirements.

4.1.3 Borough Ordinance §195-37.1D(1)

The proposed improvements result in an increase of 650 cubic feet of runoff. The proposed underground detention system has a total volume of approximately 2,200 cubic feet. The proposed design complies with the Borough standard.

4.2 Groundwater Recharge

4.2.1 Borough Ordinance §195-37.1B(4)

As per the New Jersey Groundwater Recharge Spreadsheet (NJGRS) (included in Appendix E of this report), the decrease in groundwater recharge capacity for the area based on the change in land cover is 0.0 cubic feet. This is a result of the underlying

soils being classified as urban land. Urban land produces no recharge in the existing or proposed condition.

#### 4.2.2 Borough Ordinance §195-37.1B(6)

As indicated above, the proposed improvements will result in an increase in the recharge of the aquifer and associated groundwater.

#### 4.3 Soil Erosion

Since this project will disturb more than 5,000 square feet, certification from the Morris County Soil Conservation District is required.

The plans accompanying this report depict the location and details for the following erosion controls:

1. Stabilized Construction Entrance to reduce the tracking of sediment onto paved roadway or other impervious surfaces.
2. Sediment barriers to intercept small amounts of sediment from unprotected areas of limited extent.
3. Storm sewer inlet protection to intercept and retain sediment, thus preventing the entrance of sediment into a storm sewer system.
4. Temporary stockpile for the stripping of any topsoil for subsequent use on the project site.

#### 4.4 Stormwater Conveyance System

The Rational Method was used for the design of the drainage conveyance system. All proposed pipes can safely convey the 25-year storm event without surcharge above any grate elevation. Detailed calculations to this regard are included in Appendix F of this report.

### 5.0 MAINTENANCE

A stormwater operation and maintenance manual will be provided under separate cover for Borough review as a condition of approval, after all necessary Borough required revisions are incorporated into the plan set and design.

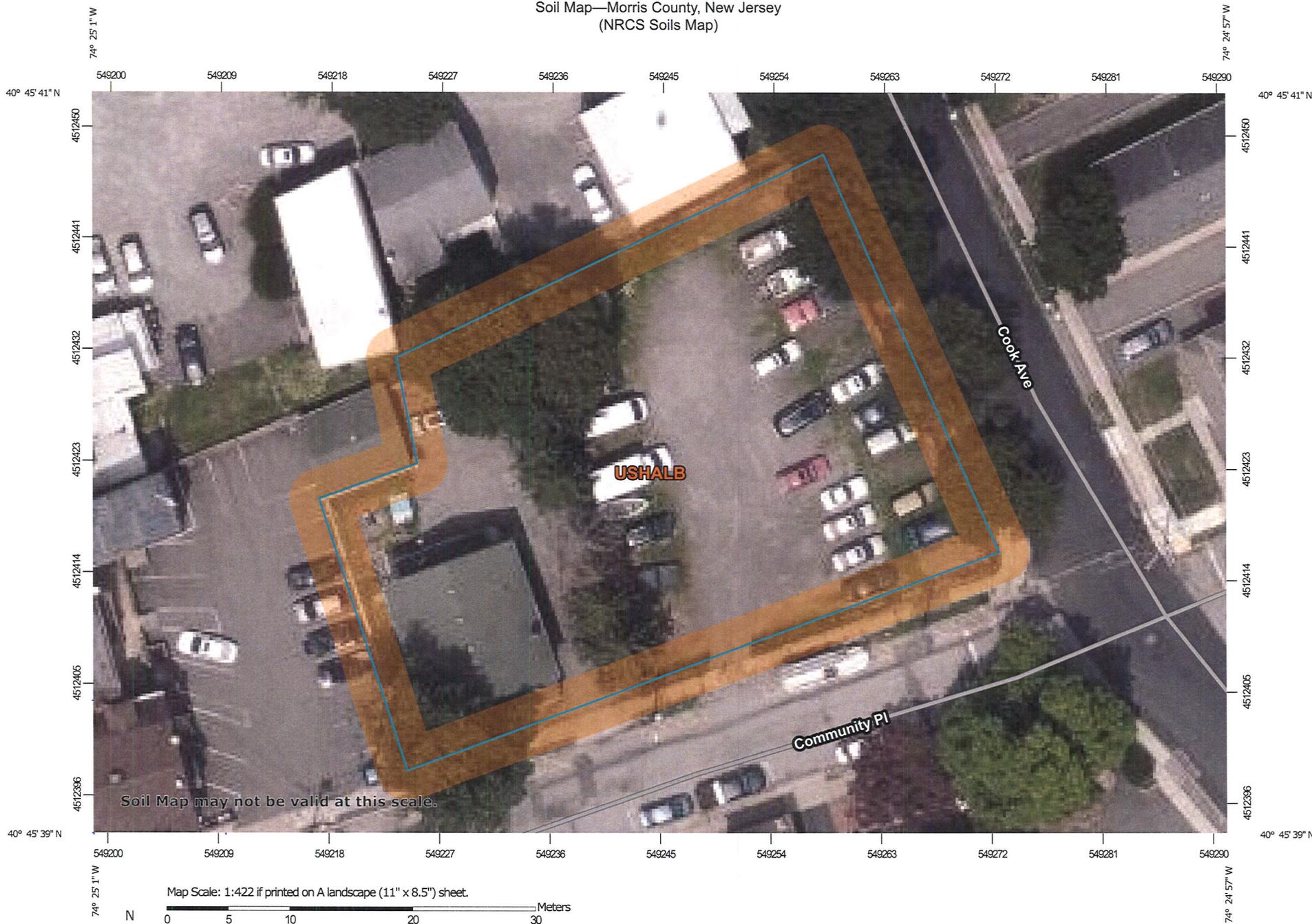
### 6.0 CONCLUSION

The proposed stormwater design utilizes the most current Borough standards and best management practices to support compliance with applicable regulations. The project meets the Borough requirements for each design storm; therefore, the site follows the Borough stormwater quantity requirements. Groundwater recharge requirements have also been met. Lastly, soil erosion and sediment control certifications are being sought from the Morris County Soil Conservation District and will be forwarded to the borough once issued.

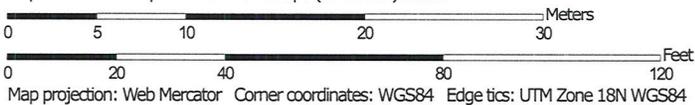
# **Appendix A**

## SOILS MAP

Soil Map—Morris County, New Jersey  
(NRCS Soils Map)



Map Scale: 1:422 if printed on A landscape (11" x 8.5") sheet.



Soil Map—Morris County, New Jersey  
(NRCS Soils Map)

### MAP LEGEND

**Area of Interest (AOI)**

 Area of Interest (AOI)

**Soils**

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

**Special Point Features**

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

**Water Features**

 Streams and Canals

**Transportation**

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

**Background**

 Aerial Photography

### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Morris County, New Jersey

Survey Area Data: Version 14, Sep 16, 2019

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

Date(s) aerial images were photographed: Jul 26, 2019—Jul 31, 2019

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

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
USHALB	Urban land-Haledon complex, 3 to 8 percent slopes	0.4	100.0%
<b>Totals for Area of Interest</b>		<b>0.4</b>	<b>100.0%</b>

# **Appendix B**

## **RUNOFF CURVE NUMBERS**

Table 2-2a Runoff curve numbers for urban areas <sup>1/</sup>

Cover description	Average percent impervious area <sup>2/</sup>	Curve numbers for hydrologic soil group			
		A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.) <sup>3/</sup> :					
Poor condition (grass cover < 50%) .....		68	79	86	89
Fair condition (grass cover 50% to 75%) .....		49	69	79	84
Good condition (grass cover > 75%) .....		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way) .....		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way) .....		98	98	98	98
Paved; open ditches (including right-of-way) .....		83	89	92	93
Gravel (including right-of-way) .....		76	85	89	91
Dirt (including right-of-way) .....		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) <sup>4/</sup> .....		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders) .....		96	96	96	96
Urban districts:					
Commercial and business .....	85	89	92	94	95
Industrial .....	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses) .....	65	77	85	90	92
1/4 acre .....	38	61	75	83	87
1/3 acre .....	30	57	72	81	86
1/2 acre .....	25	54	70	80	85
1 acre .....	20	51	68	79	84
2 acres .....	12	46	65	77	82
<i>Developing urban areas</i>					
Newly graded areas (pervious areas only, no vegetation) <sup>5/</sup> .....					
		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

<sup>1</sup> Average runoff condition, and  $I_a = 0.2S$ .

<sup>2</sup> The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

<sup>3</sup> CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

<sup>4</sup> Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

<sup>5</sup> Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b Runoff curve numbers for cultivated agricultural lands <sup>1/</sup>

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment <sup>2/</sup>	Hydrologic condition <sup>3/</sup>	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T+ CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

<sup>1</sup> Average runoff condition, and  $I_a=0.2S$

<sup>2</sup> Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

<sup>3</sup> Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good  $\geq 20\%$ ), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c Runoff curve numbers for other agricultural lands <sup>1/</sup>

Cover type	Cover description	Hydrologic condition	Curve numbers for hydrologic soil group			
			A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. <sup>2/</sup>		Poor	68	79	86	89
		Fair	49	69	79	84
		Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.		—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. <sup>3/</sup>		Poor	48	67	77	83
		Fair	35	56	70	77
		Good	30 <sup>4/</sup>	48	65	73
Woods—grass combination (orchard or tree farm). <sup>5/</sup>		Poor	57	73	82	86
		Fair	43	65	76	82
		Good	32	58	72	79
Woods. <sup>6/</sup>		Poor	45	66	77	83
		Fair	36	60	73	79
		Good	30 <sup>4/</sup>	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.		—	59	74	82	86

<sup>1</sup> Average runoff condition, and  $I_a = 0.2S$ .

<sup>2</sup> *Poor*: <50% ground cover or heavily grazed with no mulch.

*Fair*: 50 to 75% ground cover and not heavily grazed.

*Good*: > 75% ground cover and lightly or only occasionally grazed.

<sup>3</sup> *Poor*: <50% ground cover.

*Fair*: 50 to 75% ground cover.

*Good*: >75% ground cover.

<sup>4</sup> Actual curve number is less than 30; use CN = 30 for runoff computations.

<sup>5</sup> CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

<sup>6</sup> *Poor*: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.

*Fair*: Woods are grazed but not burned, and some forest litter covers the soil.

*Good*: Woods are protected from grazing, and litter and brush adequately cover the soil.

# **Appendix C**

## **NJ 24 HOUR RAINFALL FREQUENCY DATA & WATER QUALITY STORM DISTRIBUTION**

**NEW JERSEY 24 HOUR RAINFALL FREQUENCY DATA**

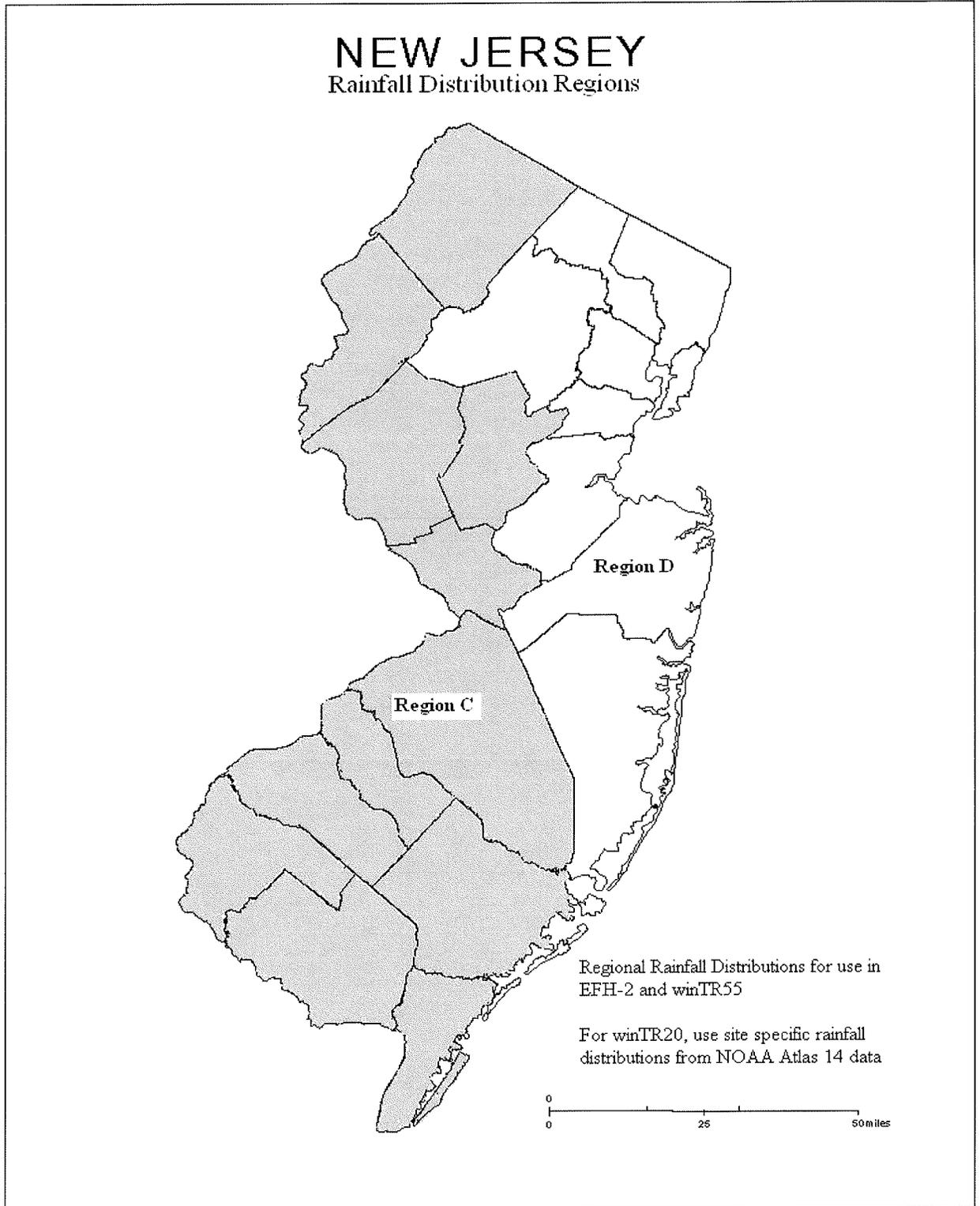
Rainfall amounts in Inches

County	1 year	2 year	5 year	10 year	25 year	50 year	100 year
Atlantic	2.72	3.31	4.30	5.16	6.46	7.61	8.90
Bergen	2.75	3.34	4.27	5.07	6.28	7.32	8.47
Burlington	2.77	3.36	4.34	5.18	6.45	7.56	8.81
Camden	2.73	3.31	4.25	5.06	6.28	7.34	8.52
Cape May	2.67	3.25	4.22	5.07	6.34	7.47	8.73
Cumberland	2.69	3.27	4.25	5.09	6.37	7.49	8.76
Essex	2.85	3.44	4.40	5.22	6.44	7.49	8.66
Gloucester	2.71	3.29	4.24	5.05	6.29	7.36	8.55
Hudson	2.73	3.31	4.23	5.02	6.19	7.20	8.31
Hunterdon	2.80	3.38	4.26	5.00	6.09	7.02	8.03
Mercer	2.74	3.31	4.23	5.01	6.19	7.20	8.33
Middlesex	2.76	3.35	4.30	5.12	6.36	7.43	8.63
Monmouth	2.79	3.38	4.38	5.23	6.53	7.66	8.94
Morris	2.94	3.54	4.47	5.24	6.37	7.32	8.35
Ocean	2.81	3.42	4.45	5.33	6.68	7.87	9.20
Passaic	2.87	3.47	4.42	5.23	6.43	7.47	8.62
Salem	2.69	3.26	4.20	5.00	6.22	7.28	8.45
Somerset	2.76	3.34	4.25	5.01	6.15	7.13	8.21
Sussex	2.68	3.22	4.02	4.70	5.72	6.60	7.58
Union	2.80	3.39	4.35	5.17	6.42	7.49	8.69
Warren	2.78	3.34	4.18	4.89	5.93	6.83	7.82

Notes: The average point rainfall amounts listed above were developed from data contained in NOAA Atlas 14 Volume 2.

Point rainfall estimates for specific locations may be obtained from the Precipitation Frequency Data Server located at <http://www.nws.noaa.gov/ohd/hdsc/>

For most hydrologic design procedures, the rainfall amounts listed above may be rounded to the nearest tenth of an inch.



**Table 5-1: NJDEP 1.25-Inch/2-Hour Stormwater Quality Design Storm  
Cumulative and Incremental Rainfall Distributions**

<b>Time (minutes)</b>	<b>Cumulative Rainfall (inches)</b>	<b>Incremental Rainfall (inches)</b>	<b>Time (minutes)</b>	<b>Cumulative Rainfall (inches)</b>	<b>Incremental Rainfall (inches)</b>
0	0.0000	0.0000	65	0.8917	0.2667
5	0.0083	0.0083	70	0.9917	0.1000
10	0.0166	0.0083	75	1.0500	0.0583
15	0.0250	0.0084	80	1.0840	0.0340
20	0.0500	0.0250	85	1.1170	0.0330
25	0.0750	0.0250	90	1.1500	0.0330
30	0.1000	0.0250	95	1.1750	0.0250
35	0.1330	0.0330	100	1.2000	0.0250
40	0.1660	0.0330	105	1.2250	0.0250
45	0.2000	0.0340	110	1.2334	0.0084
50	0.2583	0.0583	115	1.2417	0.0083
55	0.3583	0.1000	120	1.2500	0.0083
60	0.6250	0.2667			

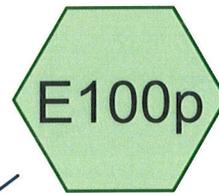
Note: See Figure 5-1 for plot of cumulative rainfall distribution.

# **Appendix D**

## **HYDROCAD HYDROGRAPH AND ROUTING REPORT**



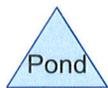
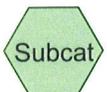
IMPERVIOUS



PERVIOUS



TO COMMUNITY PL



**11521.011 4 Community Place**

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 2

**Area Listing (selected nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
0.046	74	>75% Grass cover, Good, HSG C (E100p)
0.250	89	Gravel roads, HSG C (E100i)
0.052	98	Paved parking, HSG C (E100i)
0.055	98	Roofs, HSG C (E100i)
<b>0.403</b>	<b>90</b>	<b>TOTAL AREA</b>

**11521.011 4 Community Place**

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 3

**Soil Listing (selected nodes)**

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.403	HSG C	E100i, E100p
0.000	HSG D	
0.000	Other	
<b>0.403</b>		<b>TOTAL AREA</b>

**11521.011 4 Community Place**

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 4

**Ground Covers (selected nodes)**

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.046	0.000	0.000	0.046	>75% Grass cover, Good	E100p
0.000	0.000	0.250	0.000	0.000	0.250	Gravel roads	E100i
0.000	0.000	0.052	0.000	0.000	0.052	Paved parking	E100i
0.000	0.000	0.055	0.000	0.000	0.055	Roofs	E100i
<b>0.000</b>	<b>0.000</b>	<b>0.403</b>	<b>0.000</b>	<b>0.000</b>	<b>0.403</b>	<b>TOTAL AREA</b>	

**11521.011 4 Community Place**

NOAA 24-hr D 2-Year Rainfall=3.54"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 5

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

**Subcatchment E100i: IMPERVIOUS**

Runoff Area=0.357 ac 29.97% Impervious Runoff Depth=2.68"  
 Tc=10.0 min CN=92 Runoff=0.91 cfs 0.080 af

**Subcatchment E100p: PERVIOUS**

Runoff Area=0.046 ac 0.00% Impervious Runoff Depth=1.27"  
 Tc=10.0 min CN=74 Runoff=0.06 cfs 0.005 af

**Link EXIST: TO COMMUNITY PL**

Inflow=0.96 cfs 0.084 af  
 Primary=0.96 cfs 0.084 af

**Total Runoff Area = 0.403 ac Runoff Volume = 0.084 af Average Runoff Depth = 2.51"**  
**73.45% Pervious = 0.296 ac 26.55% Impervious = 0.107 ac**

**11521.011 4 Community Place**

NOAA 24-hr D 2-Year Rainfall=3.54"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

**Summary for Subcatchment E100i: IMPERVIOUS**

Runoff = 0.91 cfs @ 12.17 hrs, Volume= 0.080 af, Depth= 2.68"

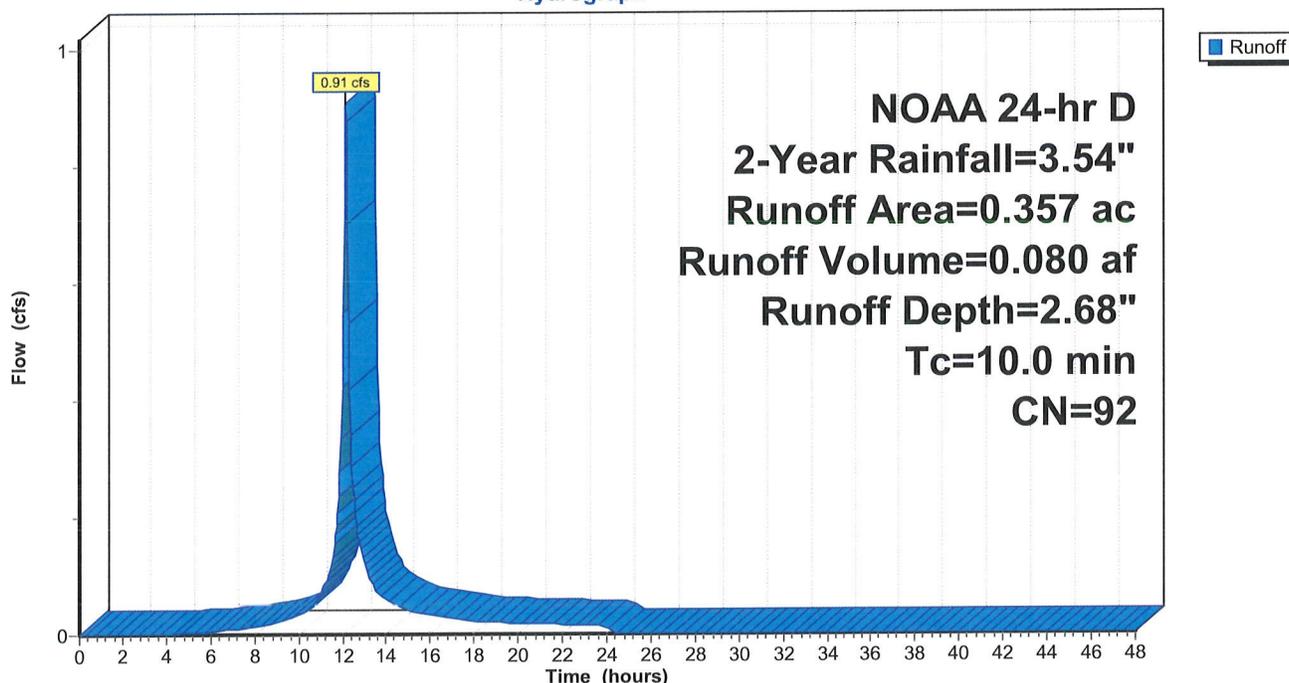
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 2-Year Rainfall=3.54"

Area (ac)	CN	Description
0.055	98	Roofs, HSG C
0.052	98	Paved parking, HSG C
0.250	89	Gravel roads, HSG C
0.357	92	Weighted Average
0.250		70.03% Pervious Area
0.107		29.97% Impervious Area

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

**Subcatchment E100i: IMPERVIOUS**

Hydrograph



**11521.011 4 Community Place**

NOAA 24-hr D 2-Year Rainfall=3.54"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 7

**Summary for Subcatchment E100p: PERVIOUS**

Runoff = 0.06 cfs @ 12.18 hrs, Volume= 0.005 af, Depth= 1.27"

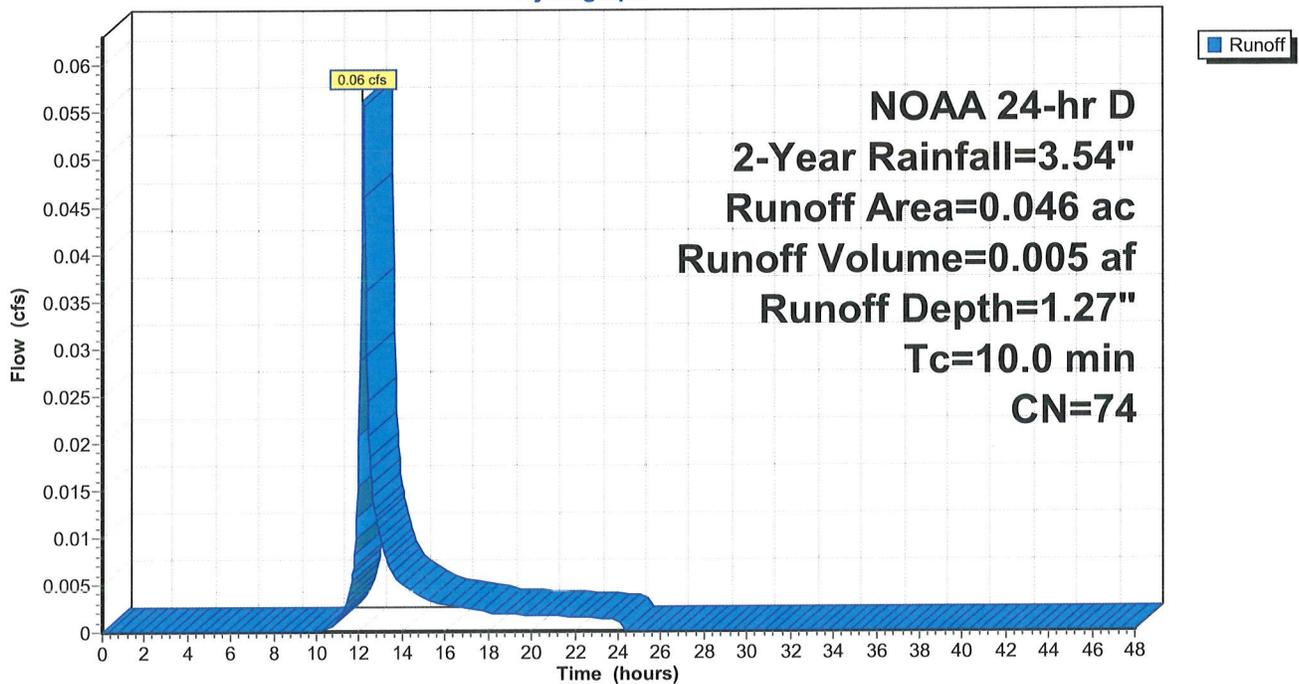
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 2-Year Rainfall=3.54"

Area (ac)	CN	Description
0.046	74	>75% Grass cover, Good, HSG C
0.000	70	Woods, Good, HSG C
0.046	74	Weighted Average
0.046		100.00% Pervious Area

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

**Subcatchment E100p: PERVIOUS**

Hydrograph



# 11521.011 4 Community Place

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

EXISTING  
NOAA 24-hr D 2-Year Rainfall=3.54"

Printed 5/16/2020

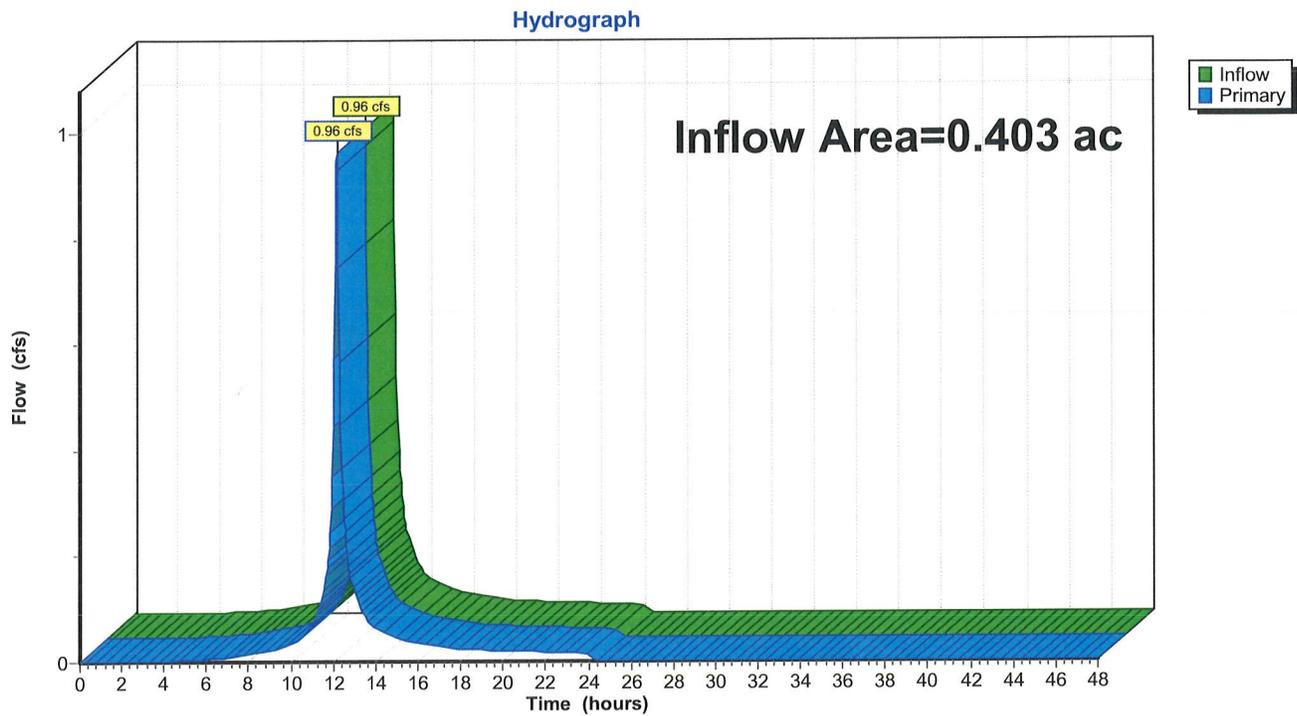
Page 8

## Summary for Link EXIST: TO COMMUNITY PL

Inflow Area = 0.403 ac, 26.55% Impervious, Inflow Depth = 2.51" for 2-Year event  
Inflow = 0.96 cfs @ 12.17 hrs, Volume= 0.084 af  
Primary = 0.96 cfs @ 12.17 hrs, Volume= 0.084 af, Atten= 0%, Lag= 0.0 min

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

## Link EXIST: TO COMMUNITY PL



**11521.011 4 Community Place**

NOAA 24-hr D 10-Year Rainfall=5.24"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 9

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

**Subcatchment E100i: IMPERVIOUS**

Runoff Area=0.357 ac 29.97% Impervious Runoff Depth=4.32"  
 Tc=10.0 min CN=92 Runoff=1.43 cfs 0.129 af

**Subcatchment E100p: PERVIOUS**

Runoff Area=0.046 ac 0.00% Impervious Runoff Depth=2.56"  
 Tc=10.0 min CN=74 Runoff=0.12 cfs 0.010 af

**Link EXIST: TO COMMUNITY PL**

Inflow=1.54 cfs 0.138 af  
 Primary=1.54 cfs 0.138 af

**Total Runoff Area = 0.403 ac Runoff Volume = 0.138 af Average Runoff Depth = 4.12"**  
**73.45% Pervious = 0.296 ac 26.55% Impervious = 0.107 ac**

**11521.011 4 Community Place**

NOAA 24-hr D 10-Year Rainfall=5.24"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

**Summary for Subcatchment E100i: IMPERVIOUS**

Runoff = 1.43 cfs @ 12.17 hrs, Volume= 0.129 af, Depth= 4.32"

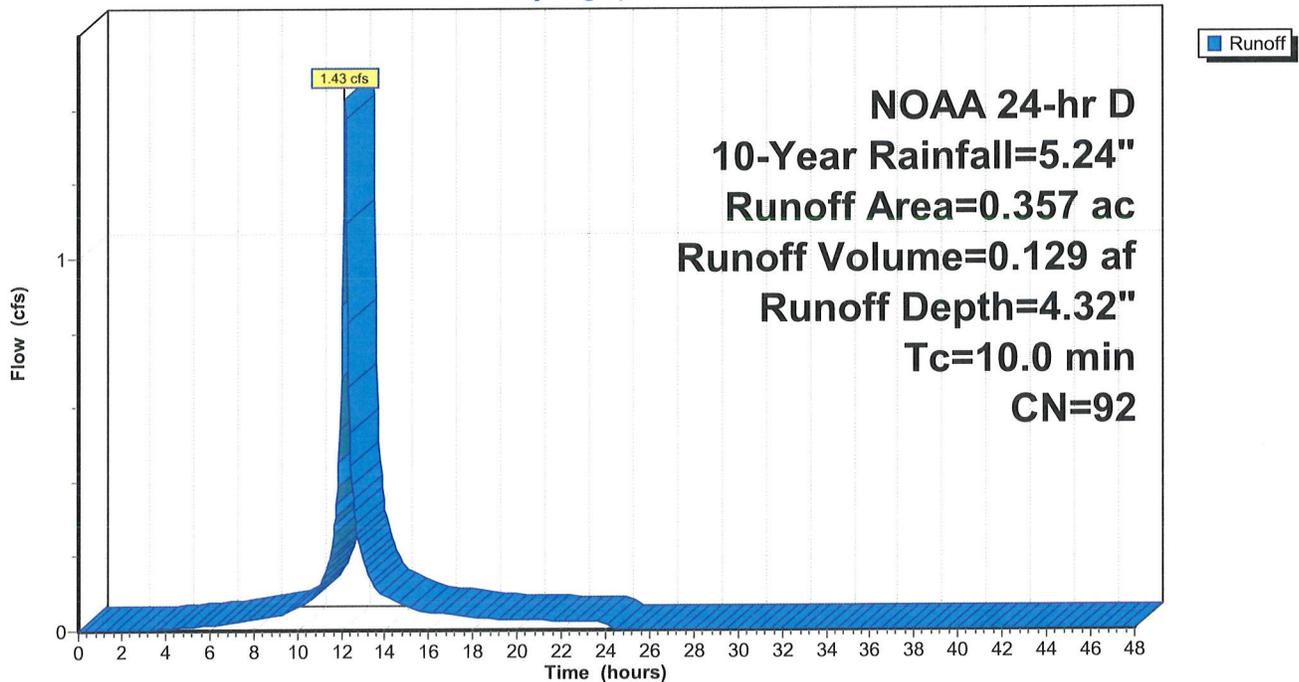
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 10-Year Rainfall=5.24"

Area (ac)	CN	Description
0.055	98	Roofs, HSG C
0.052	98	Paved parking, HSG C
0.250	89	Gravel roads, HSG C
0.357	92	Weighted Average
0.250		70.03% Pervious Area
0.107		29.97% Impervious Area

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

**Subcatchment E100i: IMPERVIOUS**

Hydrograph



**11521.011 4 Community Place**

NOAA 24-hr D 10-Year Rainfall=5.24"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 11

**Summary for Subcatchment E100p: PERVIOUS**

Runoff = 0.12 cfs @ 12.18 hrs, Volume= 0.010 af, Depth= 2.56"

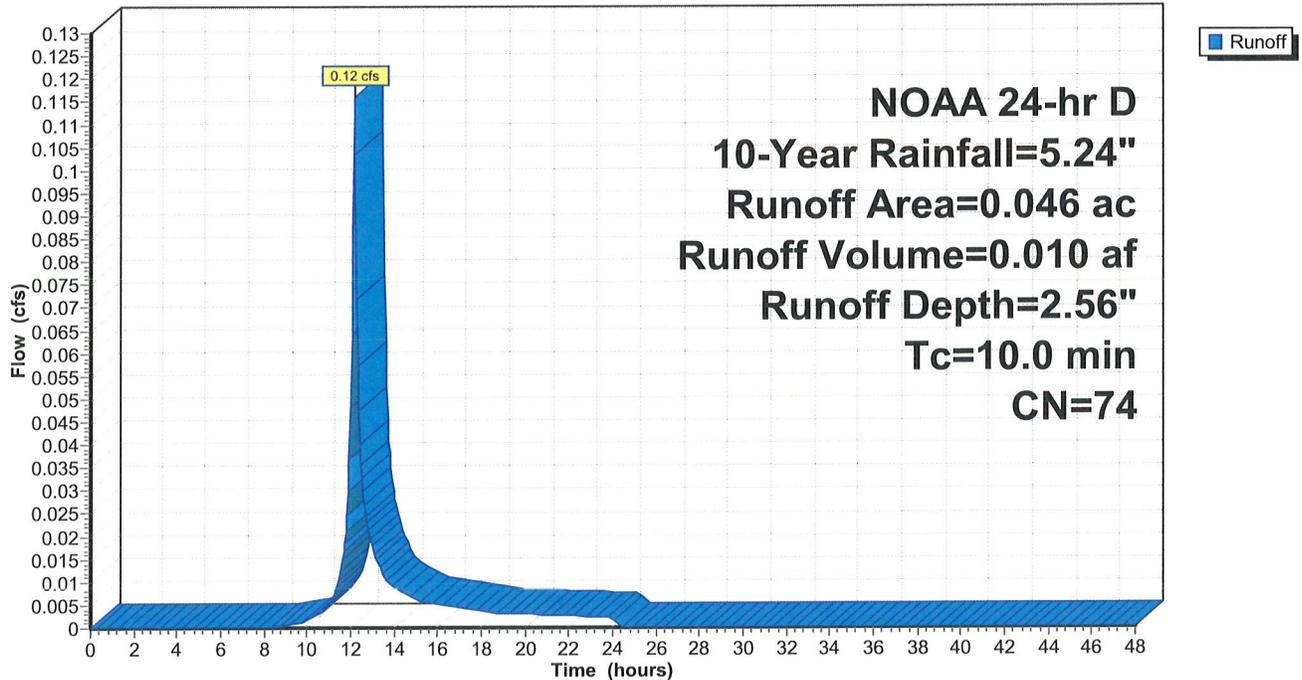
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 10-Year Rainfall=5.24"

Area (ac)	CN	Description
0.046	74	>75% Grass cover, Good, HSG C
0.000	70	Woods, Good, HSG C
0.046	74	Weighted Average
0.046		100.00% Pervious Area

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

**Subcatchment E100p: PERVIOUS**

Hydrograph



# 11521.011 4 Community Place

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

EXISTING

NOAA 24-hr D 10-Year Rainfall=5.24"

Printed 5/16/2020

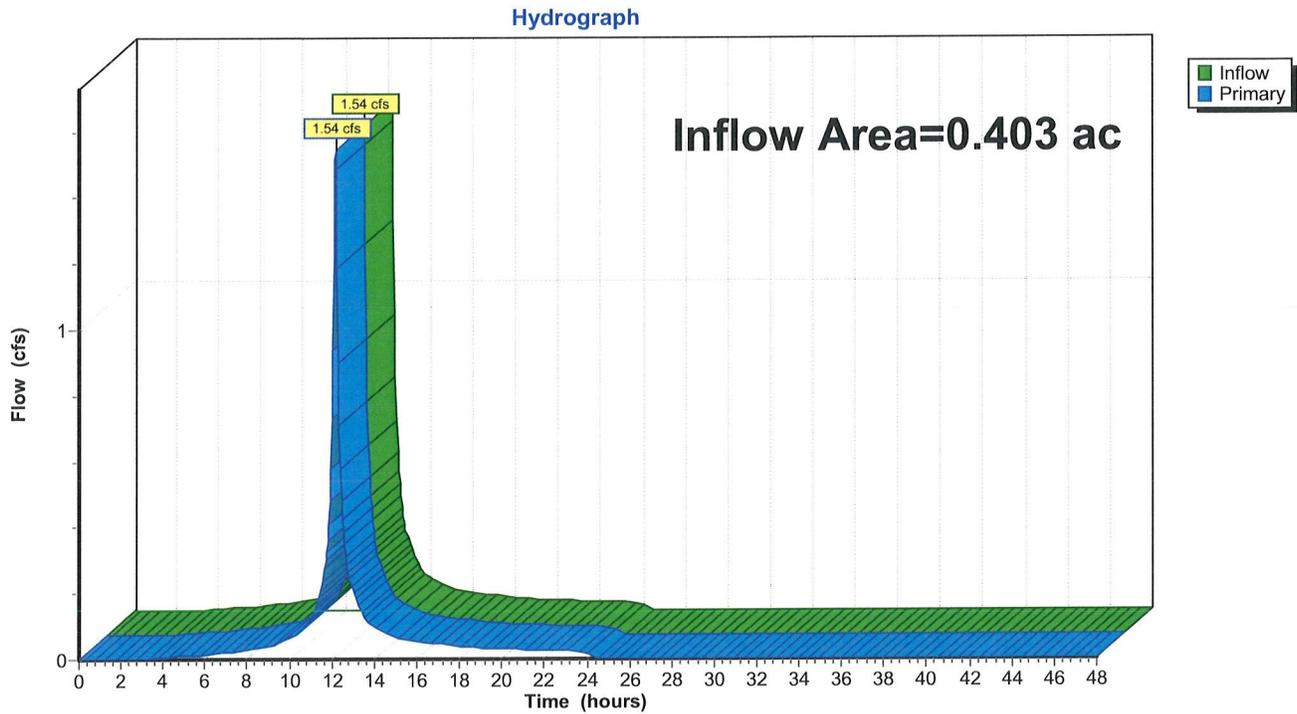
Page 12

## Summary for Link EXIST: TO COMMUNITY PL

Inflow Area = 0.403 ac, 26.55% Impervious, Inflow Depth = 4.12" for 10-Year event  
Inflow = 1.54 cfs @ 12.17 hrs, Volume= 0.138 af  
Primary = 1.54 cfs @ 12.17 hrs, Volume= 0.138 af, Atten= 0%, Lag= 0.0 min

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

## Link EXIST: TO COMMUNITY PL



**11521.011 4 Community Place**

NOAA 24-hr D 100-Year Rainfall=8.35"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 13

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

**Subcatchment E100i: IMPERVIOUS**

Runoff Area=0.357 ac 29.97% Impervious Runoff Depth=7.39"  
 Tc=10.0 min CN=92 Runoff=2.37 cfs 0.220 af

**Subcatchment E100p: PERVIOUS**

Runoff Area=0.046 ac 0.00% Impervious Runoff Depth=5.24"  
 Tc=10.0 min CN=74 Runoff=0.24 cfs 0.020 af

**Link EXIST: TO COMMUNITY PL**

Inflow=2.60 cfs 0.240 af  
 Primary=2.60 cfs 0.240 af

**Total Runoff Area = 0.403 ac Runoff Volume = 0.240 af Average Runoff Depth = 7.14"**  
**73.45% Pervious = 0.296 ac 26.55% Impervious = 0.107 ac**

**11521.011 4 Community Place**

NOAA 24-hr D 100-Year Rainfall=8.35"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

**Summary for Subcatchment E100i: IMPERVIOUS**

Runoff = 2.37 cfs @ 12.17 hrs, Volume= 0.220 af, Depth= 7.39"

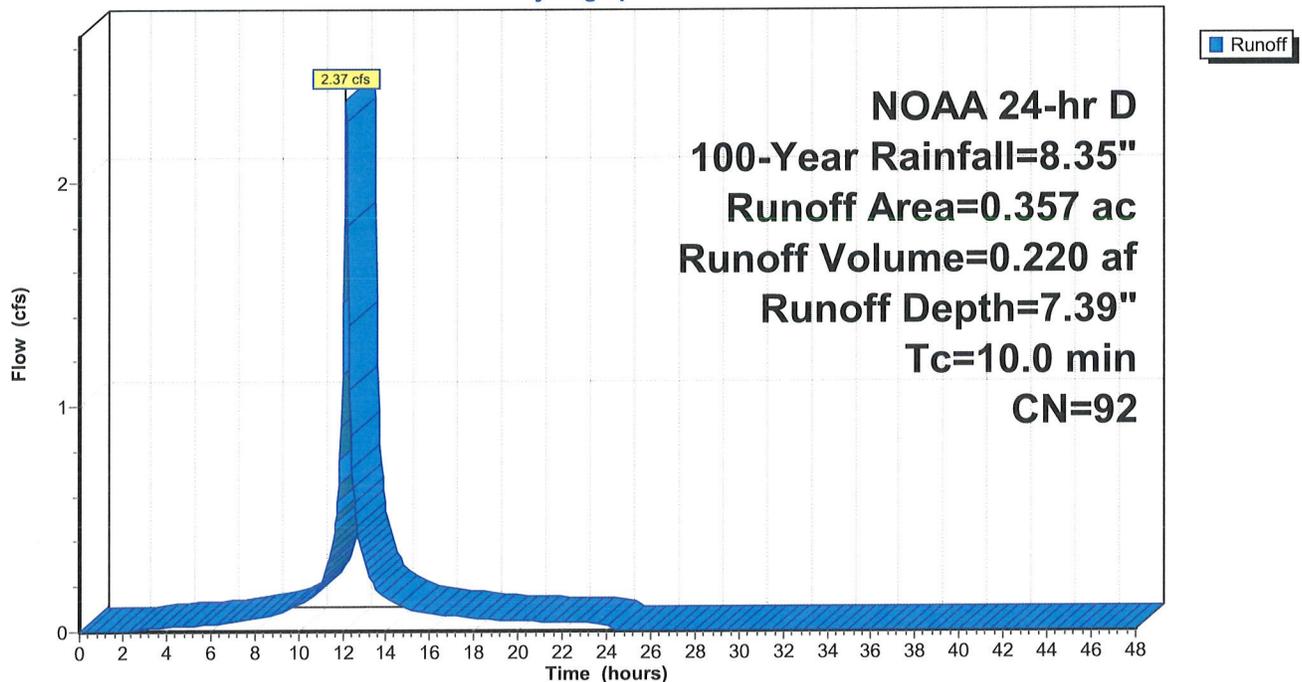
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 100-Year Rainfall=8.35"

Area (ac)	CN	Description
0.055	98	Roofs, HSG C
0.052	98	Paved parking, HSG C
0.250	89	Gravel roads, HSG C
0.357	92	Weighted Average
0.250		70.03% Pervious Area
0.107		29.97% Impervious Area

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

**Subcatchment E100i: IMPERVIOUS**

Hydrograph



# 11521.011 4 Community Place

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

EXISTING

NOAA 24-hr D 100-Year Rainfall=8.35"

Printed 5/16/2020

Page 15

## Summary for Subcatchment E100p: PERVIOUS

Runoff = 0.24 cfs @ 12.17 hrs, Volume= 0.020 af, Depth= 5.24"

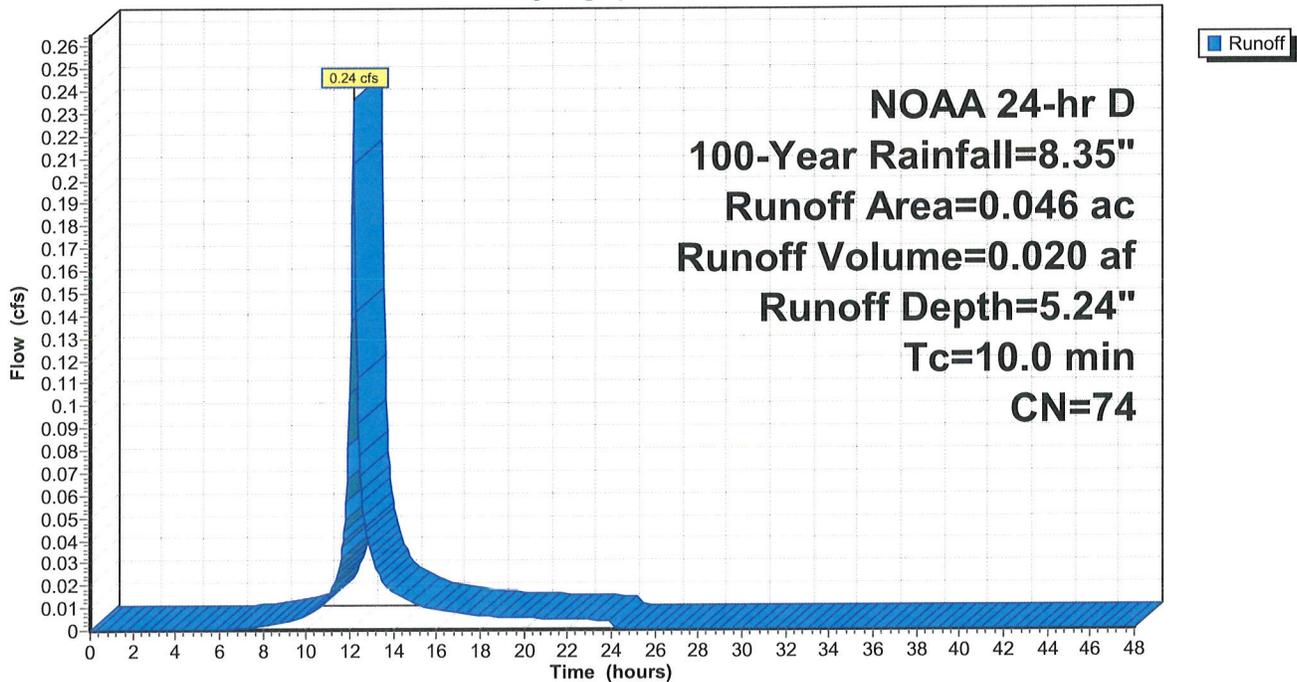
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 100-Year Rainfall=8.35"

Area (ac)	CN	Description
0.046	74	>75% Grass cover, Good, HSG C
0.000	70	Woods, Good, HSG C
0.046	74	Weighted Average
0.046		100.00% Pervious Area

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

## Subcatchment E100p: PERVIOUS

Hydrograph



**11521.011 4 Community Place**

NOAA 24-hr D 100-Year Rainfall=8.35"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 16

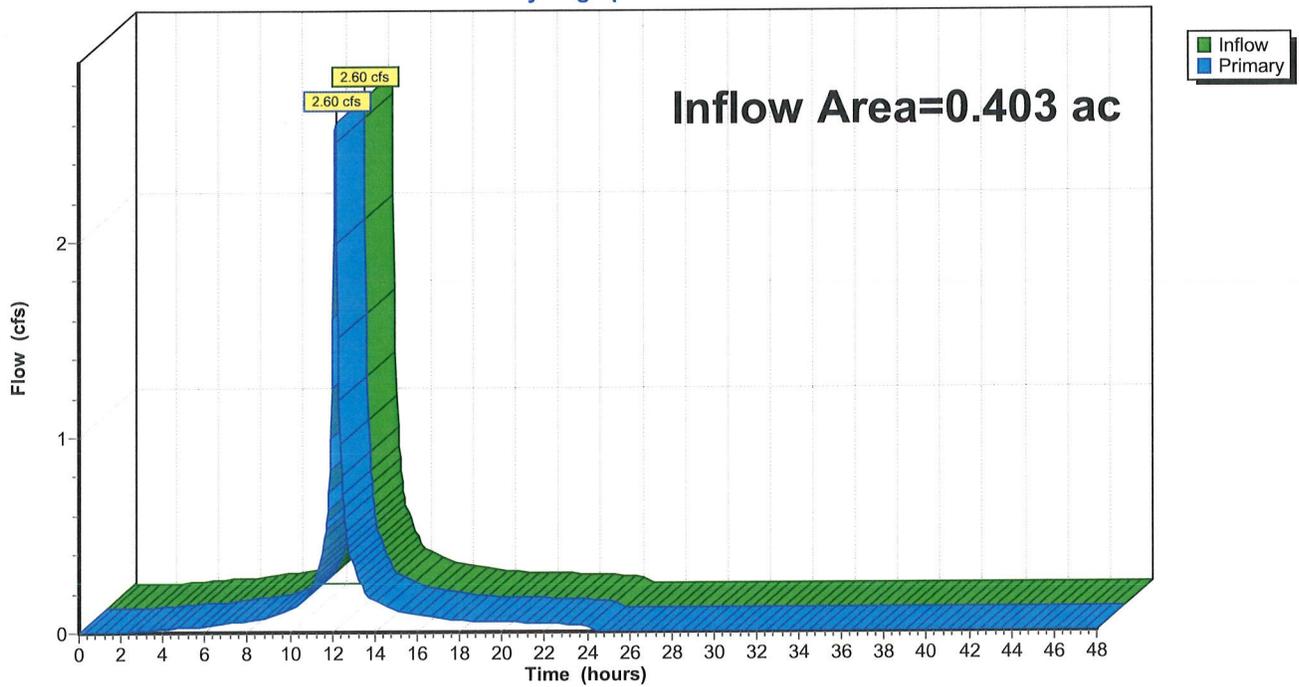
**Summary for Link EXIST: TO COMMUNITY PL**

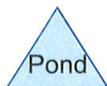
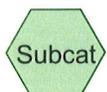
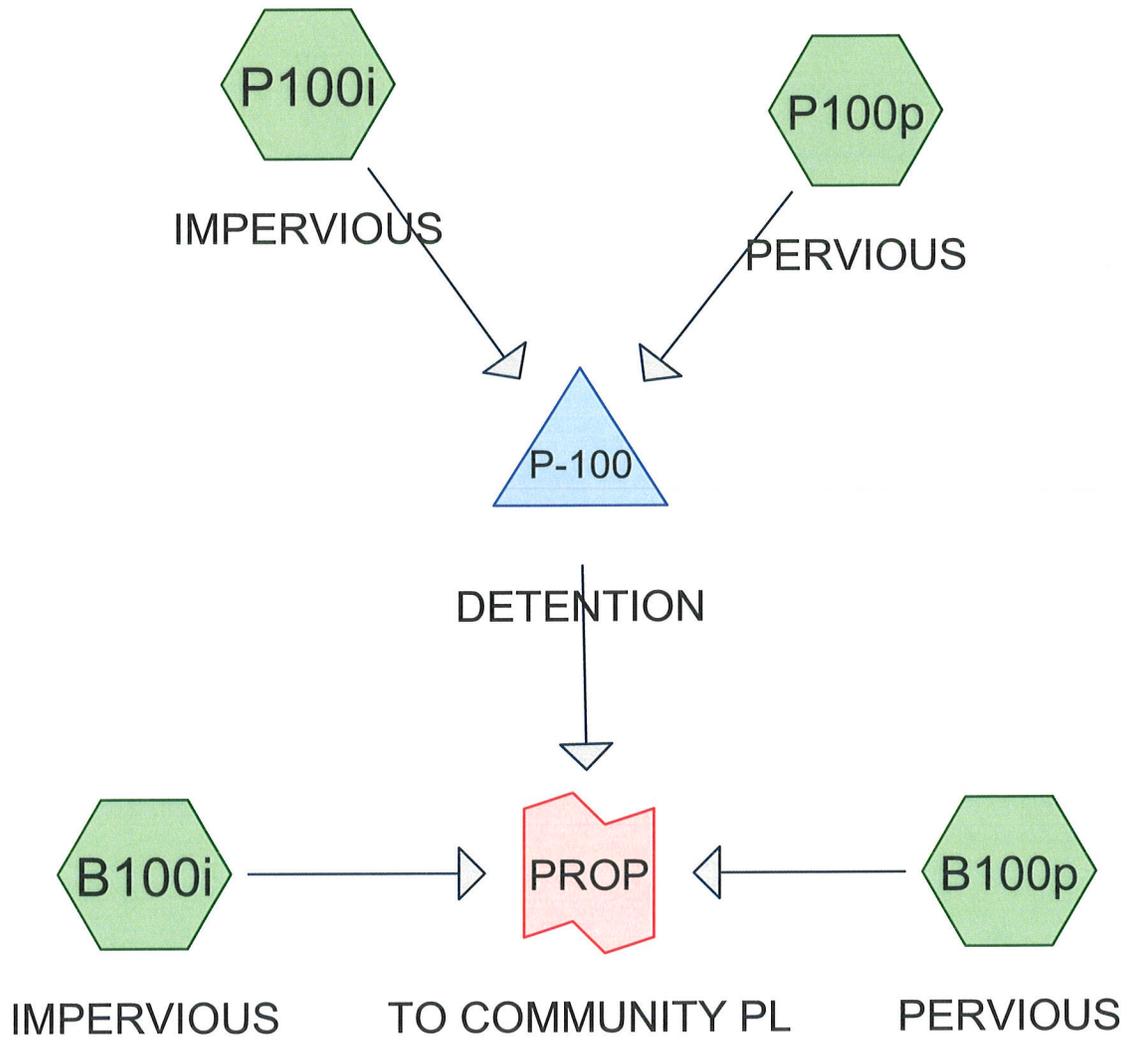
Inflow Area = 0.403 ac, 26.55% Impervious, Inflow Depth = 7.14" for 100-Year event  
Inflow = 2.60 cfs @ 12.17 hrs, Volume= 0.240 af  
Primary = 2.60 cfs @ 12.17 hrs, Volume= 0.240 af, Atten= 0%, Lag= 0.0 min

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

**Link EXIST: TO COMMUNITY PL**

Hydrograph





**11521.011 4 Community Place**

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 2

**Area Listing (selected nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
0.075	74	>75% Grass cover, Good, HSG C (B100p, P100p)
0.053	98	Paved parking, HSG C (P100i)
0.271	98	Roofs, HSG C (P100i)
0.004	98	Walkways, HSG C (B100i)
<b>0.403</b>	<b>94</b>	<b>TOTAL AREA</b>

**11521.011 4 Community Place**

Prepared by {enter your company name here}

**Soil Listing (selected nodes)**

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.403	HSG C	B100i, B100p, P100i, P100p
0.000	HSG D	
0.000	Other	
<b>0.403</b>		<b>TOTAL AREA</b>

**11521.011 4 Community Place**

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 4

**Ground Covers (selected nodes)**

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.075	0.000	0.000	0.075	>75% Grass cover, Good	B100p, P100p
0.000	0.000	0.053	0.000	0.000	0.053	Paved parking	P100i
0.000	0.000	0.271	0.000	0.000	0.271	Roofs	P100i
0.000	0.000	0.004	0.000	0.000	0.004	Walkways	B100i
<b>0.000</b>	<b>0.000</b>	<b>0.403</b>	<b>0.000</b>	<b>0.000</b>	<b>0.403</b>	<b>TOTAL AREA</b>	

**11521.011 4 Community Place**

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 5

**Pipe Listing (selected 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	P-100	241.66	241.50	31.0	0.0052	0.013	15.0	0.0	0.0

**11521.011 4 Community Place**

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

PROPOSED  
NOAA 24-hr D 2-Year Rainfall=3.54"

Printed 5/16/2020

Page 6

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

<b>Subcatchment B100i: IMPERVIOUS</b>	Runoff Area=0.004 ac 100.00% Impervious Runoff Depth=3.31" Tc=10.0 min CN=98 Runoff=0.01 cfs 0.001 af
<b>Subcatchment B100p: PERVIOUS</b>	Runoff Area=0.042 ac 0.00% Impervious Runoff Depth=1.27" Tc=10.0 min CN=74 Runoff=0.05 cfs 0.004 af
<b>Subcatchment P100i: IMPERVIOUS</b>	Runoff Area=0.324 ac 100.00% Impervious Runoff Depth=3.31" Tc=10.0 min CN=98 Runoff=0.93 cfs 0.089 af
<b>Subcatchment P100p: PERVIOUS</b>	Runoff Area=0.033 ac 0.00% Impervious Runoff Depth=1.27" Tc=10.0 min CN=74 Runoff=0.04 cfs 0.003 af
<b>Pond P-100: DETENTION</b>	Peak Elev=242.44' Storage=1,021 cf Inflow=0.97 cfs 0.093 af Outflow=0.41 cfs 0.087 af
<b>Link PROP: TO COMMUNITY PL</b>	Inflow=0.44 cfs 0.093 af Primary=0.44 cfs 0.093 af

**Total Runoff Area = 0.403 ac Runoff Volume = 0.098 af Average Runoff Depth = 2.93"**  
**18.61% Pervious = 0.075 ac 81.39% Impervious = 0.328 ac**

**11521.011 4 Community Place**

NOAA 24-hr D 2-Year Rainfall=3.54"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 7

**Summary for Subcatchment B100i: IMPERVIOUS**

Runoff = 0.01 cfs @ 12.17 hrs, Volume= 0.001 af, Depth= 3.31"

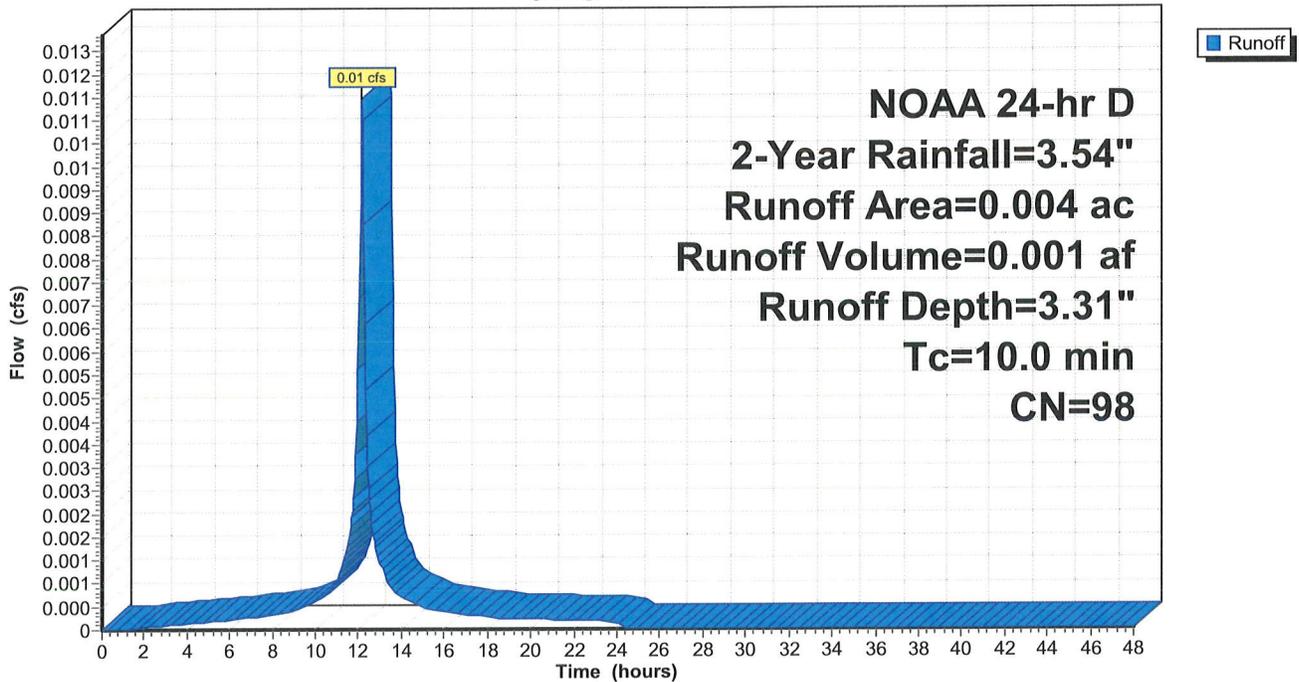
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 2-Year Rainfall=3.54"

Area (ac)	CN	Description
* 0.004	98	Walkways, HSG C
* 0.000	98	Paved parking, HSG C
0.004	98	Weighted Average
0.004		100.00% Impervious Area

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

**Subcatchment B100i: IMPERVIOUS**

Hydrograph



11521.011 4 Community Place

Prepared by {enter your company name here}

Summary for Subcatchment B100p: PERVIOUS

Runoff = 0.05 cfs @ 12.18 hrs, Volume= 0.004 af, Depth= 1.27"

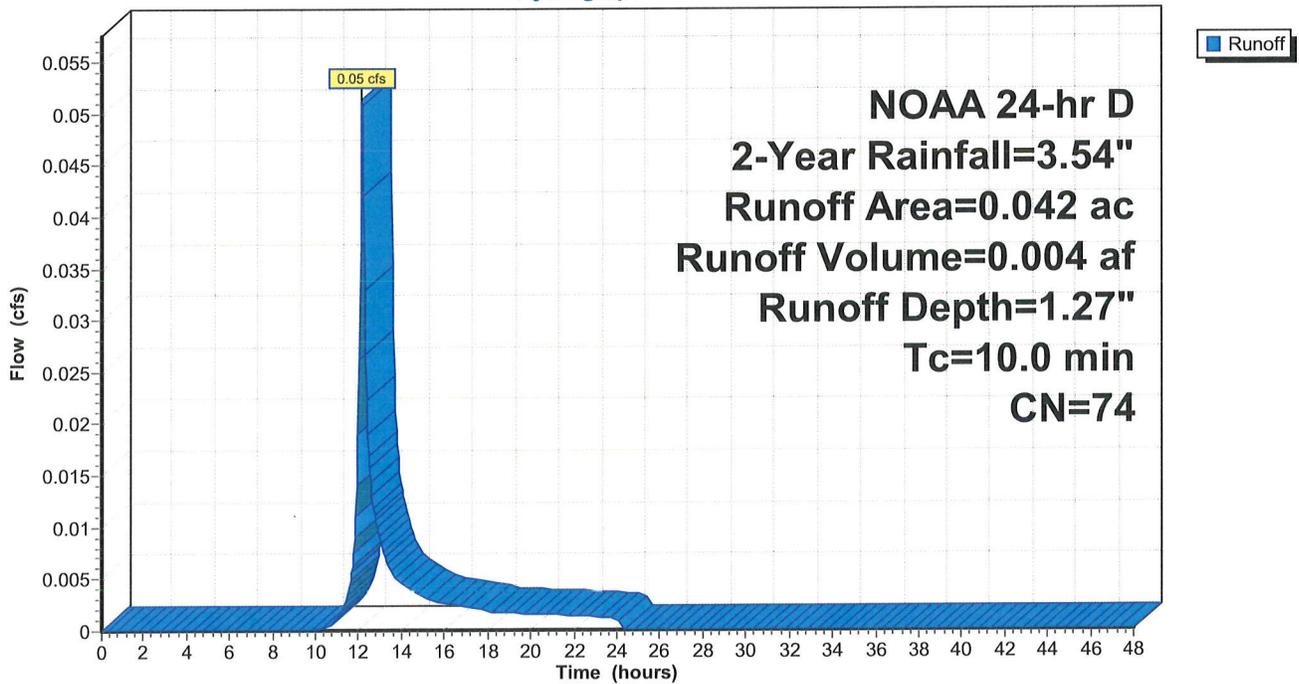
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 2-Year Rainfall=3.54"

Area (ac)	CN	Description
0.042	74	>75% Grass cover, Good, HSG C
0.000	70	Woods, Good, HSG C
0.042	74	Weighted Average
0.042		100.00% Pervious Area

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

Subcatchment B100p: PERVIOUS

Hydrograph



**11521.011 4 Community Place**

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

**Summary for Subcatchment P100i: IMPERVIOUS**

Runoff = 0.93 cfs @ 12.17 hrs, Volume= 0.089 af, Depth= 3.31"

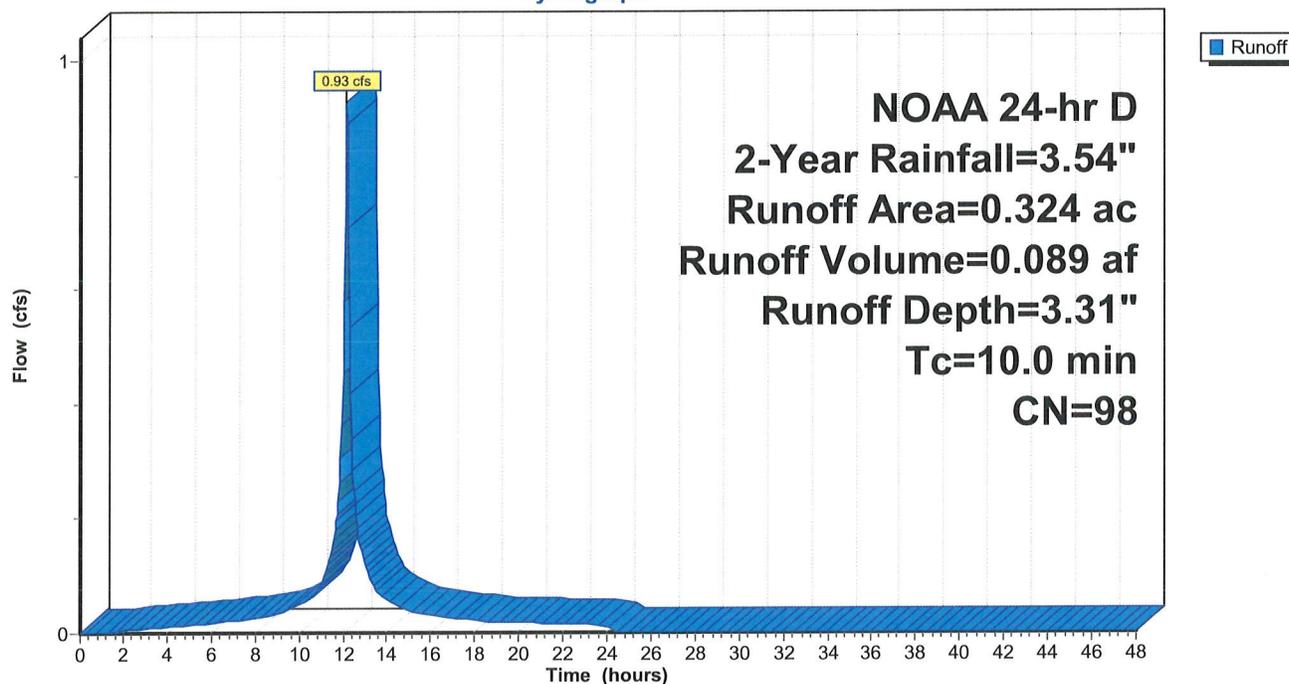
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 2-Year Rainfall=3.54"

Area (ac)	CN	Description
0.271	98	Roofs, HSG C
0.053	98	Paved parking, HSG C
0.324	98	Weighted Average
0.324		100.00% Impervious Area

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

**Subcatchment P100i: IMPERVIOUS**

Hydrograph



**11521.011 4 Community Place**

NOAA 24-hr D 2-Year Rainfall=3.54"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 10

**Summary for Subcatchment P100p: PERVIOUS**

Runoff = 0.04 cfs @ 12.18 hrs, Volume= 0.003 af, Depth= 1.27"

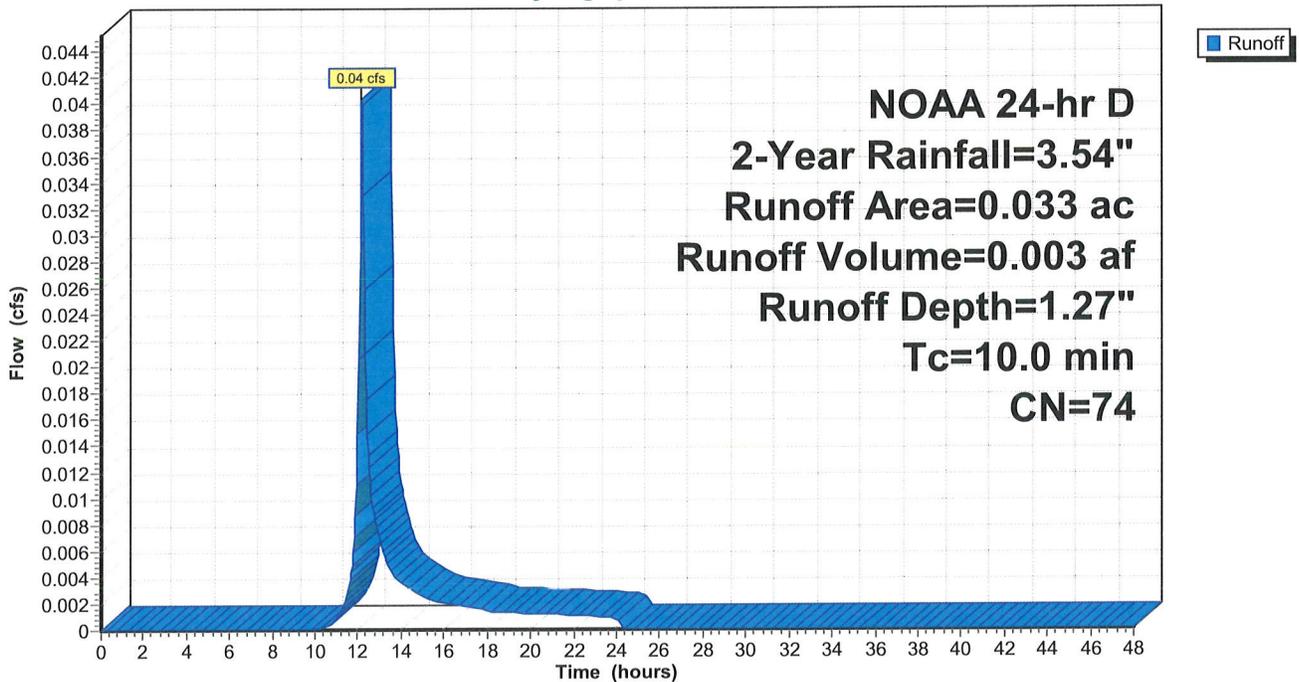
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 2-Year Rainfall=3.54"

Area (ac)	CN	Description
0.033	74	>75% Grass cover, Good, HSG C
0.000	70	Woods, Good, HSG C
0.033	74	Weighted Average
0.033		100.00% Pervious Area

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

**Subcatchment P100p: PERVIOUS**

Hydrograph



**11521.011 4 Community Place**

Prepared by {enter your company name here}

**Summary for Pond P-100: DETENTION**

Inflow Area = 0.357 ac, 90.76% Impervious, Inflow Depth = 3.12" for 2-Year event  
 Inflow = 0.97 cfs @ 12.17 hrs, Volume= 0.093 af  
 Outflow = 0.41 cfs @ 12.37 hrs, Volume= 0.087 af, Atten= 58%, Lag= 12.0 min  
 Primary = 0.41 cfs @ 12.37 hrs, Volume= 0.087 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 242.44' @ 12.37 hrs Surf.Area= 1,795 sf Storage= 1,021 cf

Plug-Flow detention time= 94.8 min calculated for 0.087 af (94% of inflow)  
 Center-of-Mass det. time= 59.8 min ( 823.8 - 764.0 )

Volume	Invert	Avail.Storage	Storage Description
#1A	241.33'	1,202 cf	<b>15.02'W x 119.50'L x 2.42'H Field A</b> 4,339 cf Overall - 1,335 cf Embedded = 3,004 cf x 40.0% Voids
#2A	241.66'	1,079 cf	<b>ADS N-12 18" x 30 Inside #1</b> Inside= 18.2"W x 18.2"H => 1.80 sf x 20.00'L = 36.0 cf Outside= 21.0"W x 21.0"H => 2.23 sf x 20.00'L = 44.5 cf Row Length Adjustment= -5.50' x 1.80 sf x 5 rows 13.52' Header x 1.80 sf x 2 = 48.7 cf Inside
		2,281 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	241.66'	<b>15.0" Round 15" OUTFLOW</b> L= 31.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 241.66' / 241.50' S= 0.0052 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	241.66'	<b>4.5" Vert. 4.5" DIAM. ORIF.</b> C= 0.600
#3	Device 1	242.45'	<b>10.0" Vert. 10" DIA. ORIF</b> C= 0.600
#4	Device 1	243.15'	<b>4.0' long x 2.30' rise 4' WEIR</b> 2 End Contraction(s) 1.6' Crest Height
#5	Primary	243.30'	<b>54.0" x 48.0" Horiz. OUTFLOW GRATE</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow** Max=0.41 cfs @ 12.37 hrs HW=242.44' (Free Discharge)

- 1=15" OUTFLOW (Passes 0.41 cfs of 1.79 cfs potential flow)
- 2=4.5" DIAM. ORIF. (Orifice Controls 0.41 cfs @ 3.71 fps)
- 3=10" DIA. ORIF ( Controls 0.00 cfs)
- 4=4' WEIR ( Controls 0.00 cfs)
- 5=OUTFLOW GRATE ( Controls 0.00 cfs)

**11521.011 4 Community Place**

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

**Pond P-100: DETENTION - Chamber Wizard Field A**

**Chamber Model = ADS N-12 18" (ADS N-12® Pipe)**

Inside= 18.2"W x 18.2"H => 1.80 sf x 20.00'L = 36.0 cf

Outside= 21.0"W x 21.0"H => 2.23 sf x 20.00'L = 44.5 cf

Row Length Adjustment= -5.50' x 1.80 sf x 5 rows

21.0" Wide + 14.3" Spacing = 35.3" C-C Row Spacing

6 Chambers/Row x 20.00' Long -5.50' Row Adjustment +1.75' Header x 2 = 118.00' Row Length +9.0" End Stone x 2 = 119.50' Base Length

5 Rows x 21.0" Wide + 14.3" Spacing x 4 + 9.0" Side Stone x 2 = 15.02' Base Width

4.0" Base + 21.0" Chamber Height + 4.0" Cover = 2.42' Field Height

30 Chambers x 36.0 cf -5.50' Row Adjustment x 1.80 sf x 5 Rows + 13.52' Header x 1.80 sf x 2 = 1,079.2 cf Chamber Storage

30 Chambers x 44.5 cf -5.50' Row Adjustment x 2.23 sf x 5 Rows + 13.52' Header x 2.23 sf x 2 = 1,334.7 cf Displacement

4,338.5 cf Field - 1,334.7 cf Chambers = 3,003.8 cf Stone x 40.0% Voids = 1,201.5 cf Stone Storage

Chamber Storage + Stone Storage = 2,280.7 cf = 0.052 af

Overall Storage Efficiency = 52.6%

Overall System Size = 119.50' x 15.02' x 2.42'

30 Chambers

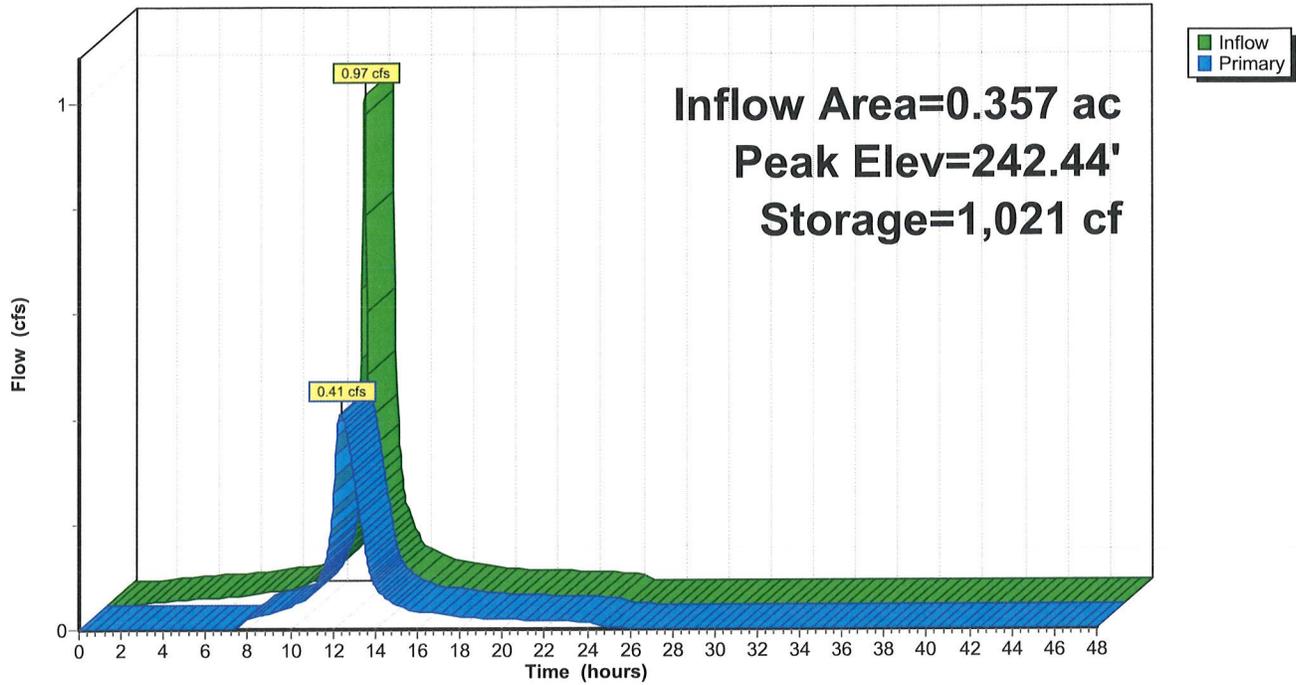
160.7 cy Field

111.3 cy Stone



### Pond P-100: DETENTION

Hydrograph



# 11521.011 4 Community Place

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

PROPOSED  
NOAA 24-hr D 2-Year Rainfall=3.54"

Printed 5/16/2020

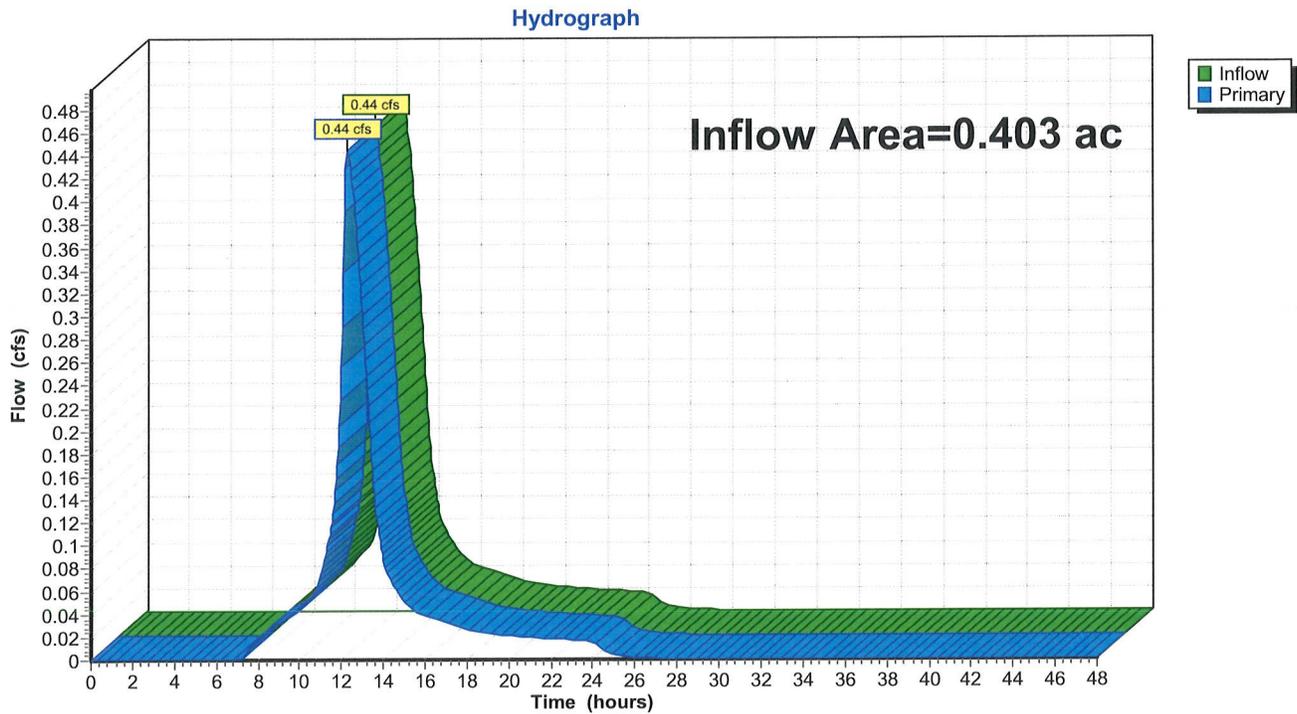
Page 14

## Summary for Link PROP: TO COMMUNITY PL

Inflow Area = 0.403 ac, 81.39% Impervious, Inflow Depth = 2.76" for 2-Year event  
Inflow = 0.44 cfs @ 12.29 hrs, Volume= 0.093 af  
Primary = 0.44 cfs @ 12.29 hrs, Volume= 0.093 af, Atten= 0%, Lag= 0.0 min

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

## Link PROP: TO COMMUNITY PL



**11521.011 4 Community Place**

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

PROPOSED  
NOAA 24-hr D 10-Year Rainfall=5.24"

Printed 5/16/2020

Page 15

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

<b>Subcatchment B100i: IMPERVIOUS</b>	Runoff Area=0.004 ac 100.00% Impervious Runoff Depth=5.00" Tc=10.0 min CN=98 Runoff=0.02 cfs 0.002 af
<b>Subcatchment B100p: PERVIOUS</b>	Runoff Area=0.042 ac 0.00% Impervious Runoff Depth=2.56" Tc=10.0 min CN=74 Runoff=0.11 cfs 0.009 af
<b>Subcatchment P100i: IMPERVIOUS</b>	Runoff Area=0.324 ac 100.00% Impervious Runoff Depth=5.00" Tc=10.0 min CN=98 Runoff=1.38 cfs 0.135 af
<b>Subcatchment P100p: PERVIOUS</b>	Runoff Area=0.033 ac 0.00% Impervious Runoff Depth=2.56" Tc=10.0 min CN=74 Runoff=0.08 cfs 0.007 af
<b>Pond P-100: DETENTION</b>	Peak Elev=242.74' Storage=1,392 cf Inflow=1.47 cfs 0.142 af Outflow=0.82 cfs 0.137 af
<b>Link PROP: TO COMMUNITY PL</b>	Inflow=0.89 cfs 0.147 af Primary=0.89 cfs 0.147 af

**Total Runoff Area = 0.403 ac Runoff Volume = 0.153 af Average Runoff Depth = 4.55"**  
**18.61% Pervious = 0.075 ac 81.39% Impervious = 0.328 ac**

**11521.011 4 Community Place**

NOAA 24-hr D 10-Year Rainfall=5.24"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 16

**Summary for Subcatchment B100i: IMPERVIOUS**

Runoff = 0.02 cfs @ 12.17 hrs, Volume= 0.002 af, Depth= 5.00"

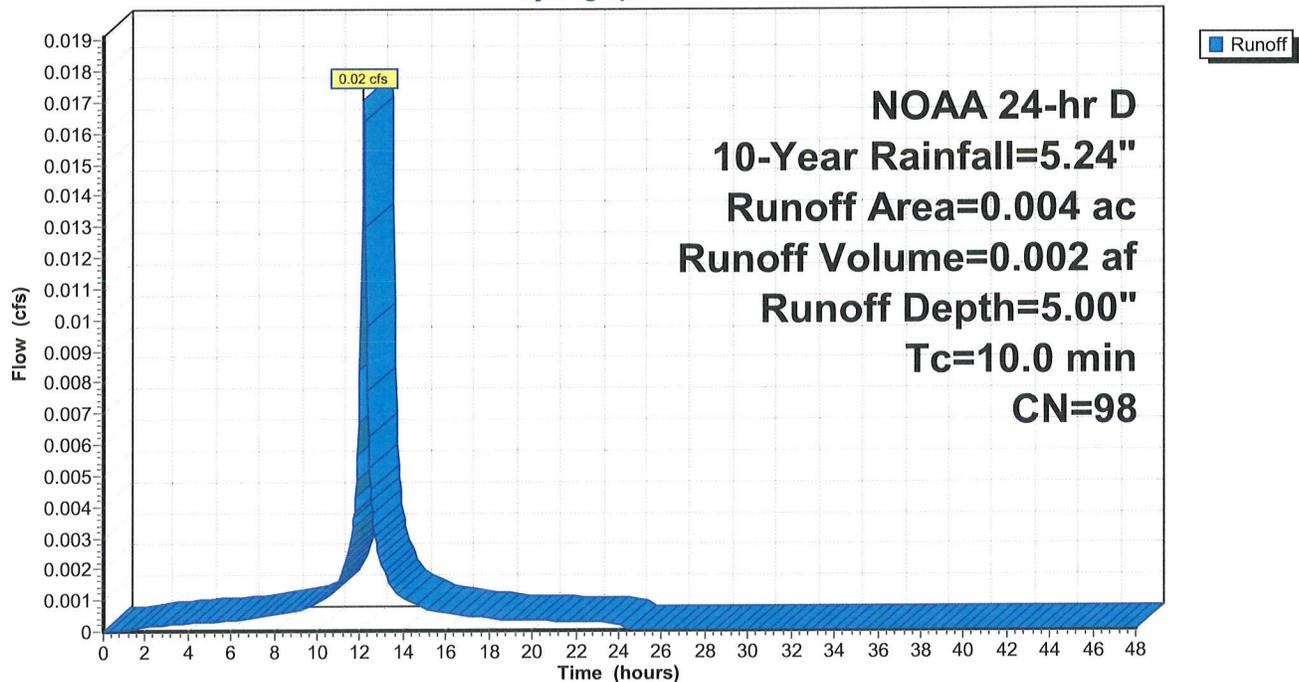
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 10-Year Rainfall=5.24"

Area (ac)	CN	Description
* 0.004	98	Walkways, HSG C
* 0.000	98	Paved parking, HSG C
0.004	98	Weighted Average
0.004		100.00% Impervious Area

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

**Subcatchment B100i: IMPERVIOUS**

Hydrograph



**11521.011 4 Community Place**

NOAA 24-hr D 10-Year Rainfall=5.24"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 17

**Summary for Subcatchment B100p: PERVIOUS**

Runoff = 0.11 cfs @ 12.18 hrs, Volume= 0.009 af, Depth= 2.56"

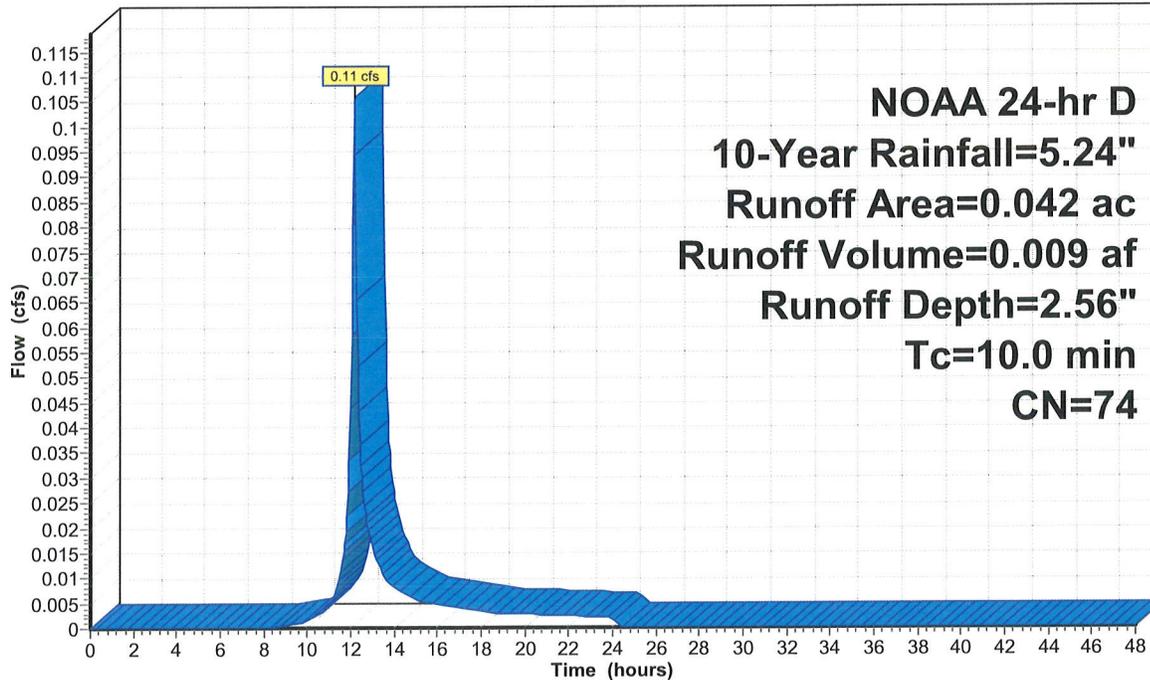
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 10-Year Rainfall=5.24"

Area (ac)	CN	Description
0.042	74	>75% Grass cover, Good, HSG C
0.000	70	Woods, Good, HSG C
0.042	74	Weighted Average
0.042		100.00% Pervious Area

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

**Subcatchment B100p: PERVIOUS**

Hydrograph



**11521.011 4 Community Place**

NOAA 24-hr D 10-Year Rainfall=5.24"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 18

**Summary for Subcatchment P100i: IMPERVIOUS**

Runoff = 1.38 cfs @ 12.17 hrs, Volume= 0.135 af, Depth= 5.00"

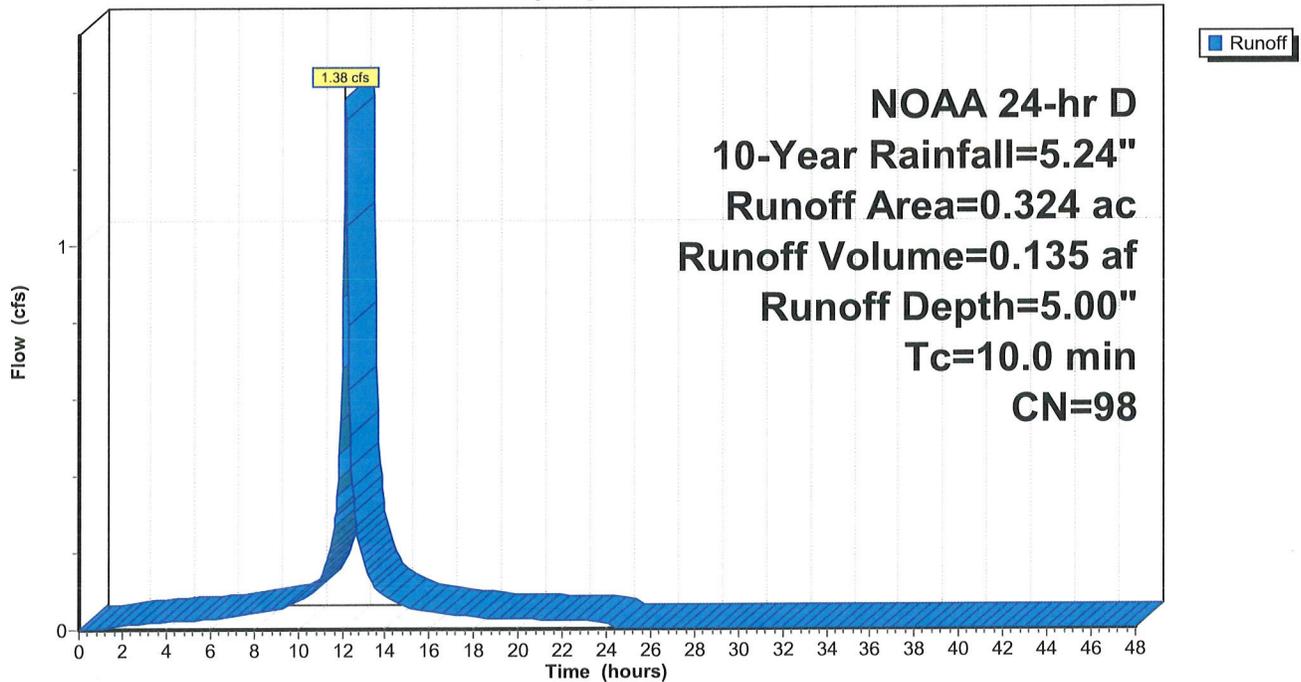
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 10-Year Rainfall=5.24"

Area (ac)	CN	Description
0.271	98	Roofs, HSG C
0.053	98	Paved parking, HSG C
0.324	98	Weighted Average
0.324		100.00% Impervious Area

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

**Subcatchment P100i: IMPERVIOUS**

Hydrograph



11521.011 4 Community Place

Prepared by {enter your company name here}

Summary for Subcatchment P100p: PERVIOUS

Runoff = 0.08 cfs @ 12.18 hrs, Volume= 0.007 af, Depth= 2.56"

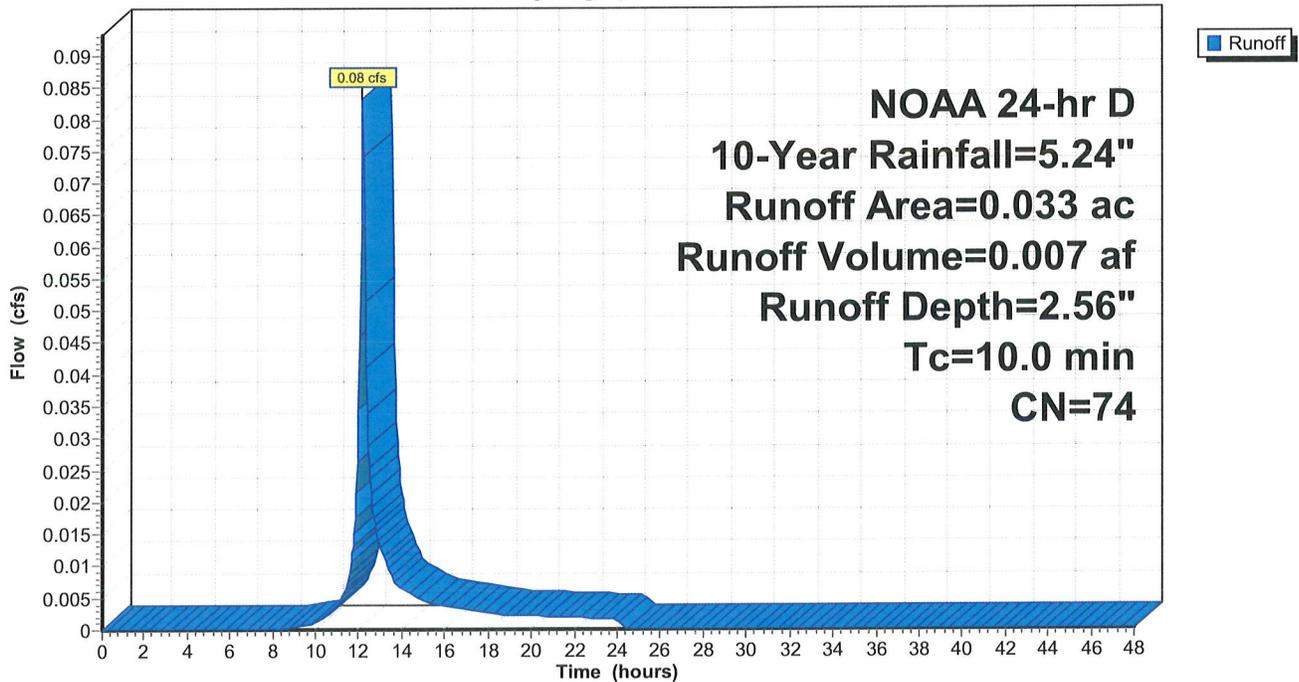
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 10-Year Rainfall=5.24"

Area (ac)	CN	Description
0.033	74	>75% Grass cover, Good, HSG C
0.000	70	Woods, Good, HSG C
0.033	74	Weighted Average
0.033		100.00% Pervious Area

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

Subcatchment P100p: PERVIOUS

Hydrograph



**11521.011 4 Community Place**

NOAA 24-hr D 10-Year Rainfall=5.24"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 20

**Summary for Pond P-100: DETENTION**

Inflow Area = 0.357 ac, 90.76% Impervious, Inflow Depth = 4.78" for 10-Year event  
 Inflow = 1.47 cfs @ 12.17 hrs, Volume= 0.142 af  
 Outflow = 0.82 cfs @ 12.31 hrs, Volume= 0.137 af, Atten= 44%, Lag= 8.7 min  
 Primary = 0.82 cfs @ 12.31 hrs, Volume= 0.137 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 242.74' @ 12.31 hrs Surf.Area= 1,795 sf Storage= 1,392 cf

Plug-Flow detention time= 74.5 min calculated for 0.137 af (96% of inflow)  
 Center-of-Mass det. time= 50.1 min ( 807.1 - 757.0 )

Volume	Invert	Avail.Storage	Storage Description
#1A	241.33'	1,202 cf	<b>15.02'W x 119.50'L x 2.42'H Field A</b> 4,339 cf Overall - 1,335 cf Embedded = 3,004 cf x 40.0% Voids
#2A	241.66'	1,079 cf	<b>ADS N-12 18" x 30</b> Inside #1 Inside= 18.2"W x 18.2"H => 1.80 sf x 20.00'L = 36.0 cf Outside= 21.0"W x 21.0"H => 2.23 sf x 20.00'L = 44.5 cf Row Length Adjustment= -5.50' x 1.80 sf x 5 rows 13.52' Header x 1.80 sf x 2 = 48.7 cf Inside
		2,281 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	241.66'	<b>15.0" Round 15" OUTFLOW</b> L= 31.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 241.66' / 241.50' S= 0.0052 ' /' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	241.66'	<b>4.5" Vert. 4.5" DIAM. ORIF.</b> C= 0.600
#3	Device 1	242.45'	<b>10.0" Vert. 10" DIA. ORIF</b> C= 0.600
#4	Device 1	243.15'	<b>4.0' long x 2.30' rise 4' WEIR</b> 2 End Contraction(s) 1.6' Crest Height
#5	Primary	243.30'	<b>54.0" x 48.0" Horiz. OUTFLOW GRATE</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow** Max=0.81 cfs @ 12.31 hrs HW=242.74' (Free Discharge)

- 1=15" OUTFLOW (Passes 0.81 cfs of 3.05 cfs potential flow)
- 2=4.5" DIAM. ORIF. (Orifice Controls 0.50 cfs @ 4.55 fps)
- 3=10" DIA. ORIF (Orifice Controls 0.31 cfs @ 1.83 fps)
- 4=4' WEIR ( Controls 0.00 cfs)
- 5=OUTFLOW GRATE ( Controls 0.00 cfs)

**11521.011 4 Community Place**

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

**Pond P-100: DETENTION - Chamber Wizard Field A**

**Chamber Model = ADS N-12 18" (ADS N-12® Pipe)**

Inside= 18.2"W x 18.2"H => 1.80 sf x 20.00'L = 36.0 cf

Outside= 21.0"W x 21.0"H => 2.23 sf x 20.00'L = 44.5 cf

Row Length Adjustment= -5.50' x 1.80 sf x 5 rows

21.0" Wide + 14.3" Spacing = 35.3" C-C Row Spacing

6 Chambers/Row x 20.00' Long -5.50' Row Adjustment +1.75' Header x 2 = 118.00' Row Length +9.0" End

Stone x 2 = 119.50' Base Length

5 Rows x 21.0" Wide + 14.3" Spacing x 4 + 9.0" Side Stone x 2 = 15.02' Base Width

4.0" Base + 21.0" Chamber Height + 4.0" Cover = 2.42' Field Height

30 Chambers x 36.0 cf -5.50' Row Adjustment x 1.80 sf x 5 Rows + 13.52' Header x 1.80 sf x 2 = 1,079.2 cf Chamber Storage

30 Chambers x 44.5 cf -5.50' Row Adjustment x 2.23 sf x 5 Rows + 13.52' Header x 2.23 sf x 2 = 1,334.7 cf Displacement

4,338.5 cf Field - 1,334.7 cf Chambers = 3,003.8 cf Stone x 40.0% Voids = 1,201.5 cf Stone Storage

Chamber Storage + Stone Storage = 2,280.7 cf = 0.052 af

Overall Storage Efficiency = 52.6%

Overall System Size = 119.50' x 15.02' x 2.42'

30 Chambers

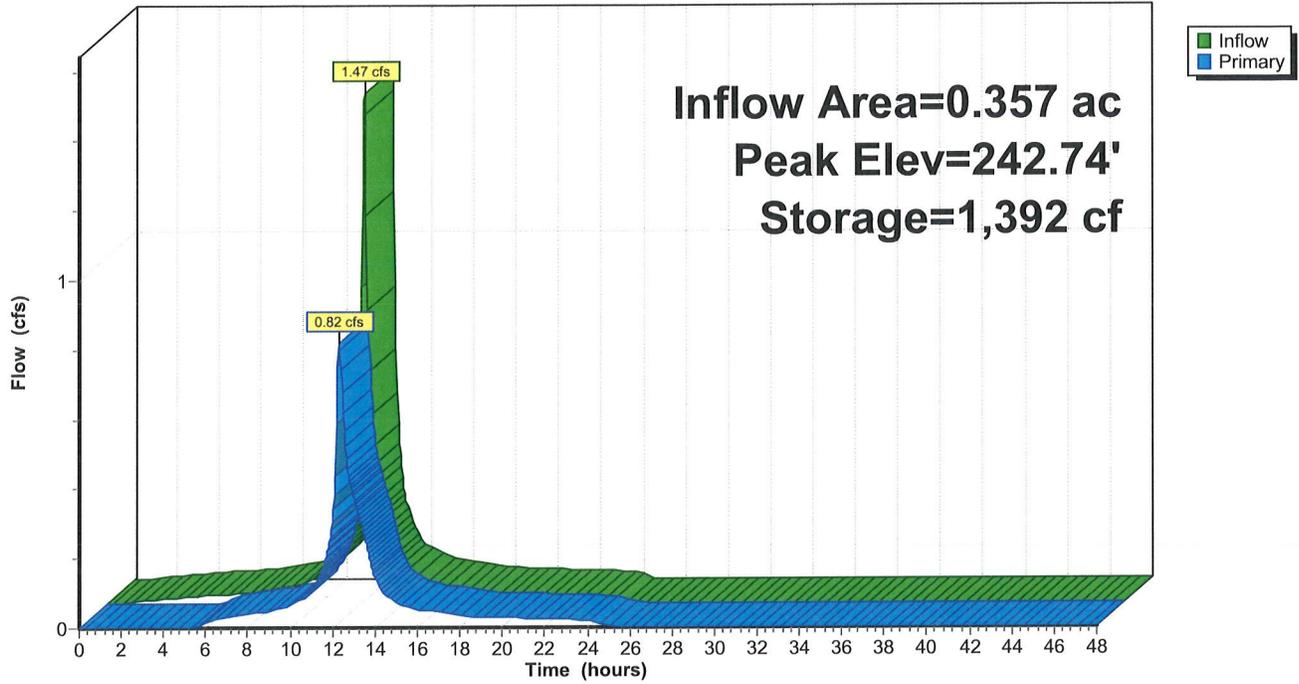
160.7 cy Field

111.3 cy Stone



### Pond P-100: DETENTION

Hydrograph



# 11521.011 4 Community Place

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

PROPOSED  
NOAA 24-hr D 10-Year Rainfall=5.24"

Printed 5/16/2020

Page 23

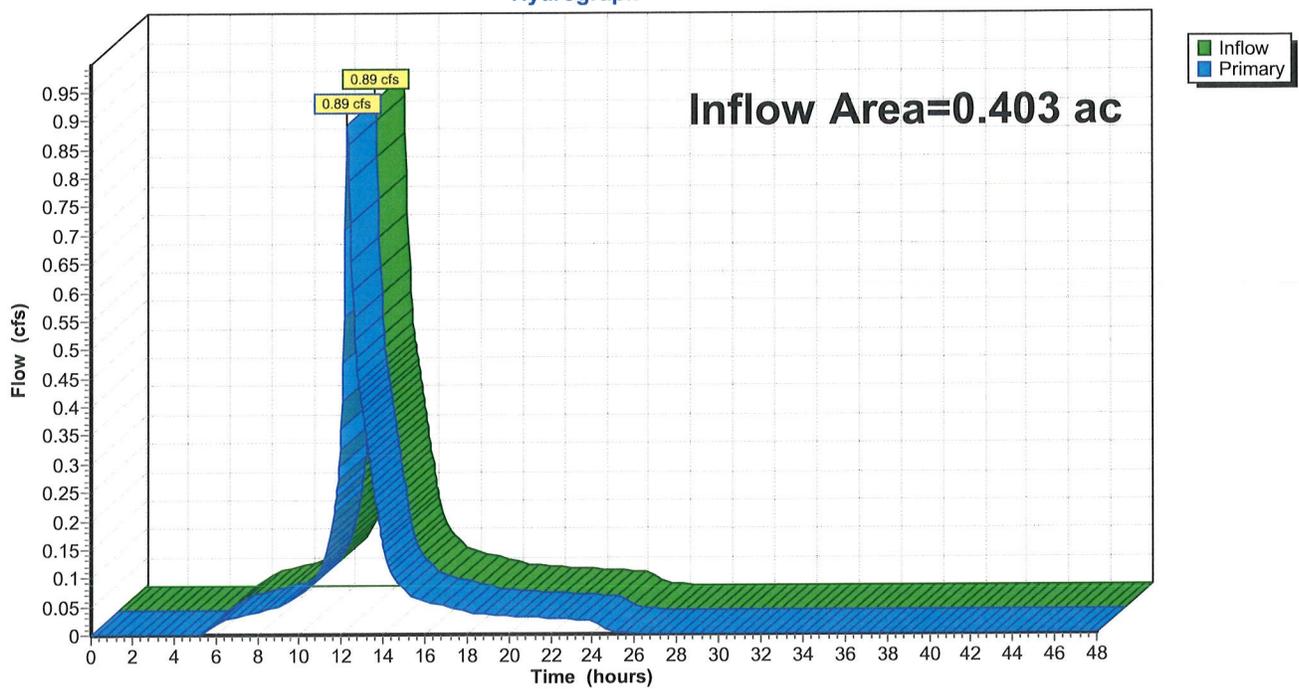
## Summary for Link PROP: TO COMMUNITY PL

Inflow Area = 0.403 ac, 81.39% Impervious, Inflow Depth = 4.38" for 10-Year event  
Inflow = 0.89 cfs @ 12.30 hrs, Volume= 0.147 af  
Primary = 0.89 cfs @ 12.30 hrs, Volume= 0.147 af, Atten= 0%, Lag= 0.0 min

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

## Link PROP: TO COMMUNITY PL

Hydrograph



**11521.011 4 Community Place**

NOAA 24-hr D 100-Year Rainfall=8.35"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 24

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

<b>Subcatchment B100i: IMPERVIOUS</b>	Runoff Area=0.004 ac 100.00% Impervious Runoff Depth=8.11" Tc=10.0 min CN=98 Runoff=0.03 cfs 0.003 af
<b>Subcatchment B100p: PERVIOUS</b>	Runoff Area=0.042 ac 0.00% Impervious Runoff Depth=5.24" Tc=10.0 min CN=74 Runoff=0.22 cfs 0.018 af
<b>Subcatchment P100i: IMPERVIOUS</b>	Runoff Area=0.324 ac 100.00% Impervious Runoff Depth=8.11" Tc=10.0 min CN=98 Runoff=2.21 cfs 0.219 af
<b>Subcatchment P100p: PERVIOUS</b>	Runoff Area=0.033 ac 0.00% Impervious Runoff Depth=5.24" Tc=10.0 min CN=74 Runoff=0.17 cfs 0.014 af
<b>Pond P-100: DETENTION</b>	Peak Elev=243.10' Storage=1,799 cf Inflow=2.38 cfs 0.233 af Outflow=1.85 cfs 0.228 af
<b>Link PROP: TO COMMUNITY PL</b>	Inflow=2.04 cfs 0.249 af Primary=2.04 cfs 0.249 af

**Total Runoff Area = 0.403 ac Runoff Volume = 0.254 af Average Runoff Depth = 7.58"**  
**18.61% Pervious = 0.075 ac 81.39% Impervious = 0.328 ac**

**11521.011 4 Community Place**

Prepared by {enter your company name here}

**Summary for Subcatchment B100i: IMPERVIOUS**

Runoff = 0.03 cfs @ 12.17 hrs, Volume= 0.003 af, Depth= 8.11"

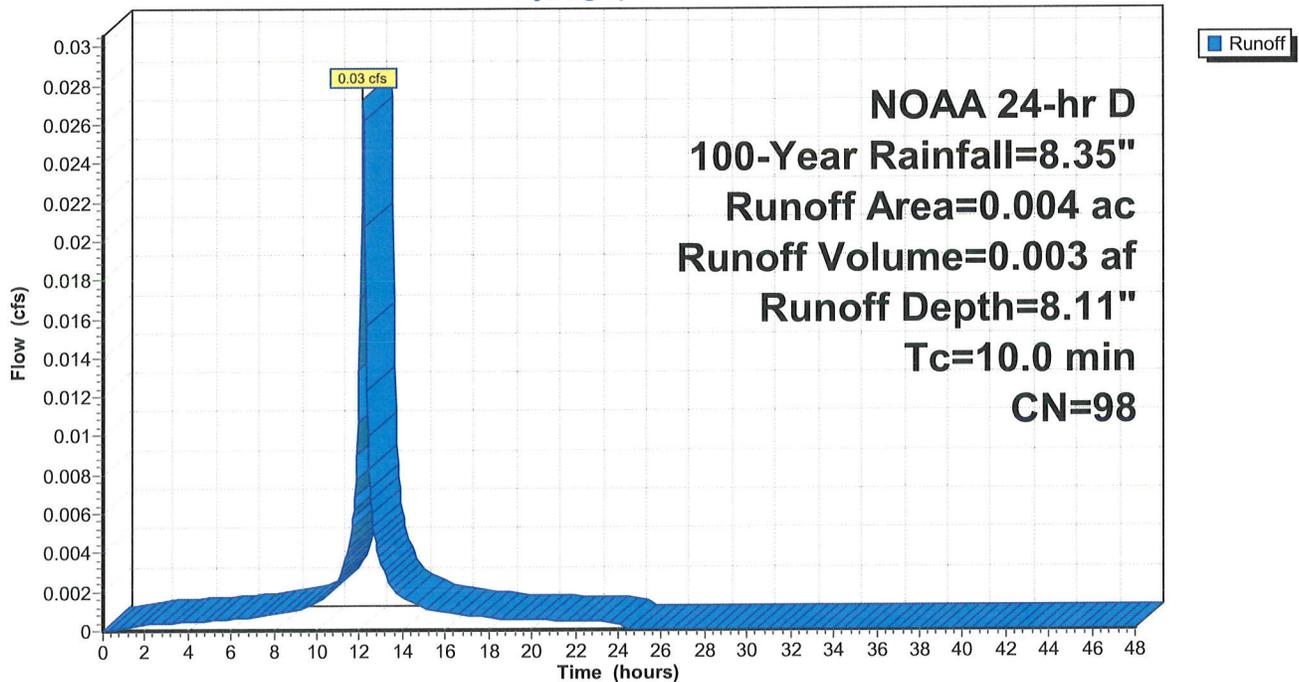
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 100-Year Rainfall=8.35"

Area (ac)	CN	Description
* 0.004	98	Walkways, HSG C
* 0.000	98	Paved parking, HSG C
0.004	98	Weighted Average
0.004		100.00% Impervious Area

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

**Subcatchment B100i: IMPERVIOUS**

Hydrograph



**11521.011 4 Community Place**

NOAA 24-hr D 100-Year Rainfall=8.35"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 26

**Summary for Subcatchment B100p: PERVIOUS**

Runoff = 0.22 cfs @ 12.17 hrs, Volume= 0.018 af, Depth= 5.24"

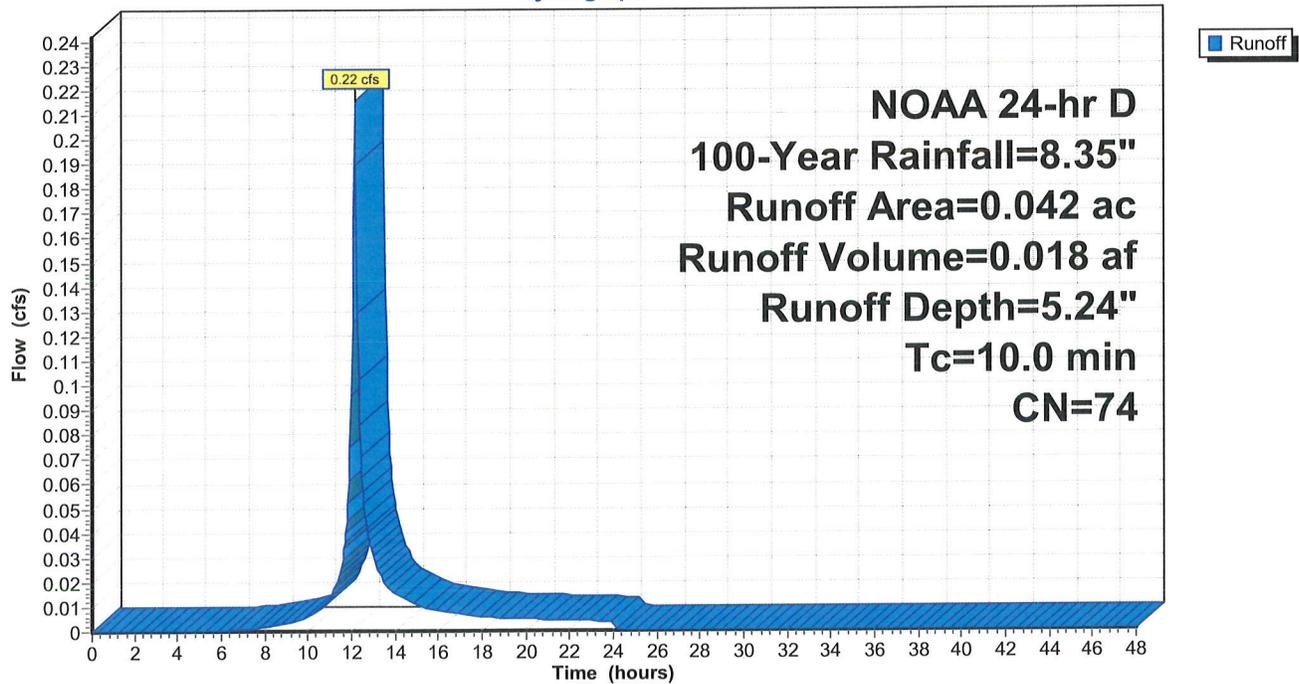
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 100-Year Rainfall=8.35"

Area (ac)	CN	Description
0.042	74	>75% Grass cover, Good, HSG C
0.000	70	Woods, Good, HSG C
0.042	74	Weighted Average
0.042		100.00% Pervious Area

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

**Subcatchment B100p: PERVIOUS**

Hydrograph



**11521.011 4 Community Place**

NOAA 24-hr D 100-Year Rainfall=8.35"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 27

**Summary for Subcatchment P100i: IMPERVIOUS**

Runoff = 2.21 cfs @ 12.17 hrs, Volume= 0.219 af, Depth= 8.11"

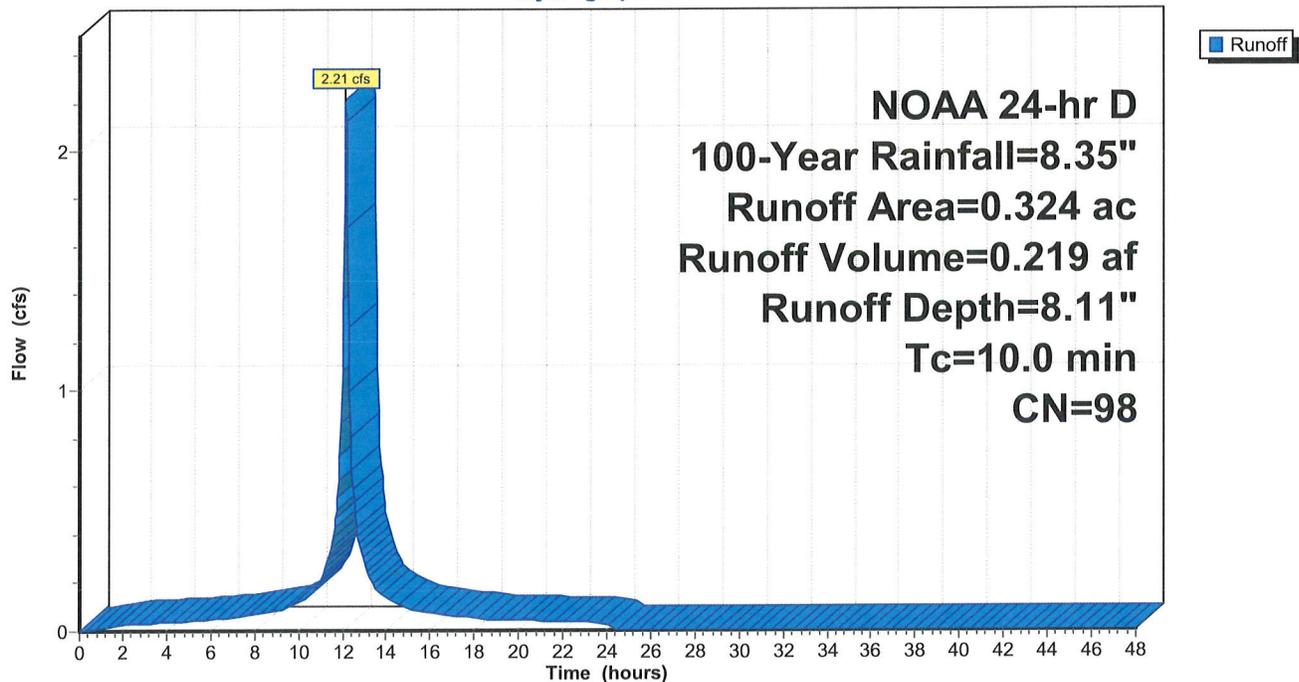
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 100-Year Rainfall=8.35"

Area (ac)	CN	Description
0.271	98	Roofs, HSG C
0.053	98	Paved parking, HSG C
0.324	98	Weighted Average
0.324		100.00% Impervious Area

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

**Subcatchment P100i: IMPERVIOUS**

Hydrograph



11521.011 4 Community Place

Prepared by {enter your company name here}

Summary for Subcatchment P100p: PERVIOUS

Runoff = 0.17 cfs @ 12.17 hrs, Volume= 0.014 af, Depth= 5.24"

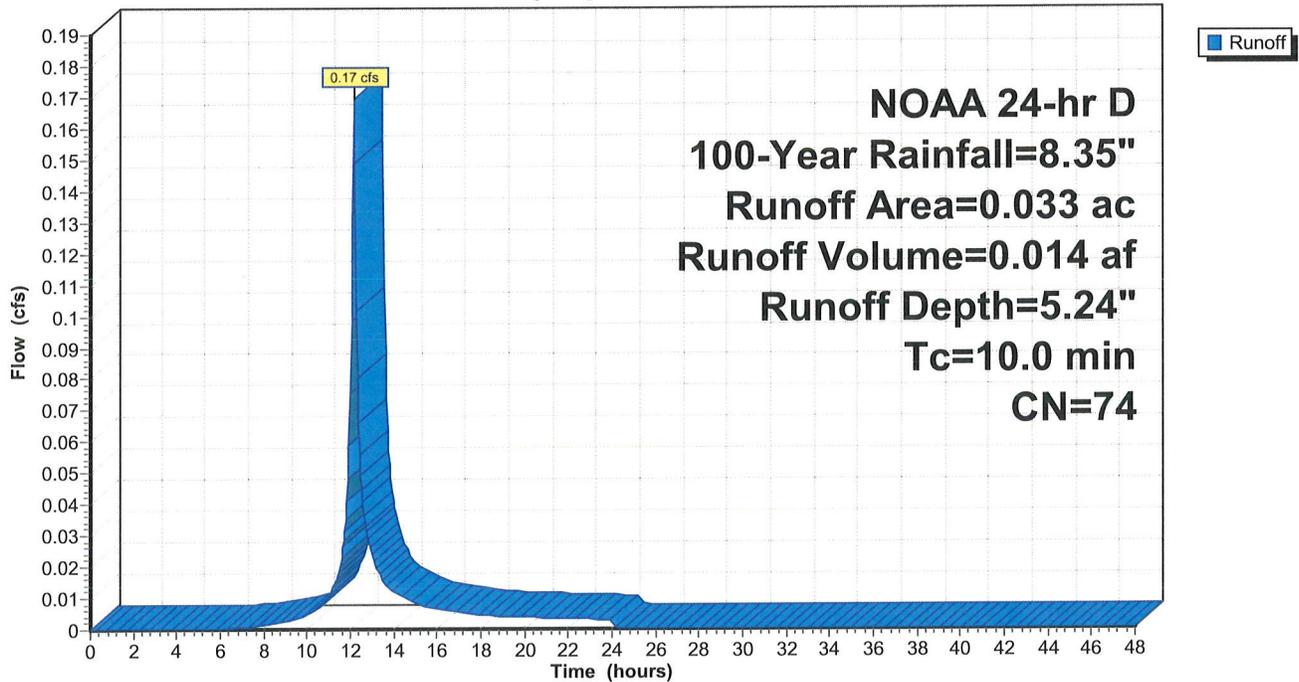
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 100-Year Rainfall=8.35"

Area (ac)	CN	Description
0.033	74	>75% Grass cover, Good, HSG C
0.000	70	Woods, Good, HSG C
0.033	74	Weighted Average
0.033		100.00% Pervious Area

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

Subcatchment P100p: PERVIOUS

Hydrograph



**11521.011 4 Community Place**

NOAA 24-hr D 100-Year Rainfall=8.35"

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 29

**Summary for Pond P-100: DETENTION**

Inflow Area = 0.357 ac, 90.76% Impervious, Inflow Depth = 7.84" for 100-Year event  
 Inflow = 2.38 cfs @ 12.17 hrs, Volume= 0.233 af  
 Outflow = 1.85 cfs @ 12.25 hrs, Volume= 0.228 af, Atten= 22%, Lag= 5.1 min  
 Primary = 1.85 cfs @ 12.25 hrs, Volume= 0.228 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 243.10' @ 12.25 hrs Surf.Area= 1,795 sf Storage= 1,799 cf

Plug-Flow detention time= 55.0 min calculated for 0.228 af (98% of inflow)  
 Center-of-Mass det. time= 39.2 min ( 789.4 - 750.2 )

Volume	Invert	Avail.Storage	Storage Description
#1A	241.33'	1,202 cf	<b>15.02'W x 119.50'L x 2.42'H Field A</b> 4,339 cf Overall - 1,335 cf Embedded = 3,004 cf x 40.0% Voids
#2A	241.66'	1,079 cf	<b>ADS N-12 18" x 30 Inside #1</b> Inside= 18.2"W x 18.2"H => 1.80 sf x 20.00'L = 36.0 cf Outside= 21.0"W x 21.0"H => 2.23 sf x 20.00'L = 44.5 cf Row Length Adjustment= -5.50' x 1.80 sf x 5 rows 13.52' Header x 1.80 sf x 2 = 48.7 cf Inside
		2,281 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	241.66'	<b>15.0" Round 15" OUTFLOW</b> L= 31.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 241.66' / 241.50' S= 0.0052 '/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	241.66'	<b>4.5" Vert. 4.5" DIAM. ORIF.</b> C= 0.600
#3	Device 1	242.45'	<b>10.0" Vert. 10" DIA. ORIF</b> C= 0.600
#4	Device 1	243.15'	<b>4.0' long x 2.30' rise 4' WEIR</b> 2 End Contraction(s) 1.6' Crest Height
#5	Primary	243.30'	<b>54.0" x 48.0" Horiz. OUTFLOW GRATE</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow** Max=1.84 cfs @ 12.25 hrs HW=243.10' (Free Discharge)

- 1=15" OUTFLOW (Passes 1.84 cfs of 4.53 cfs potential flow)
- 2=4.5" DIAM. ORIF. (Orifice Controls 0.59 cfs @ 5.38 fps)
- 3=10" DIA. ORIF (Orifice Controls 1.24 cfs @ 2.74 fps)
- 4=4' WEIR ( Controls 0.00 cfs)
- 5=OUTFLOW GRATE ( Controls 0.00 cfs)

**11521.011 4 Community Place**

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

**Pond P-100: DETENTION - Chamber Wizard Field A**

**Chamber Model = ADS N-12 18" (ADS N-12® Pipe)**

Inside= 18.2"W x 18.2"H => 1.80 sf x 20.00'L = 36.0 cf

Outside= 21.0"W x 21.0"H => 2.23 sf x 20.00'L = 44.5 cf

Row Length Adjustment= -5.50' x 1.80 sf x 5 rows

21.0" Wide + 14.3" Spacing = 35.3" C-C Row Spacing

6 Chambers/Row x 20.00' Long -5.50' Row Adjustment +1.75' Header x 2 = 118.00' Row Length +9.0" End Stone x 2 = 119.50' Base Length

5 Rows x 21.0" Wide + 14.3" Spacing x 4 + 9.0" Side Stone x 2 = 15.02' Base Width

4.0" Base + 21.0" Chamber Height + 4.0" Cover = 2.42' Field Height

30 Chambers x 36.0 cf -5.50' Row Adjustment x 1.80 sf x 5 Rows + 13.52' Header x 1.80 sf x 2 = 1,079.2 cf Chamber Storage

30 Chambers x 44.5 cf -5.50' Row Adjustment x 2.23 sf x 5 Rows + 13.52' Header x 2.23 sf x 2 = 1,334.7 cf Displacement

4,338.5 cf Field - 1,334.7 cf Chambers = 3,003.8 cf Stone x 40.0% Voids = 1,201.5 cf Stone Storage

Chamber Storage + Stone Storage = 2,280.7 cf = 0.052 af

Overall Storage Efficiency = 52.6%

Overall System Size = 119.50' x 15.02' x 2.42'

30 Chambers

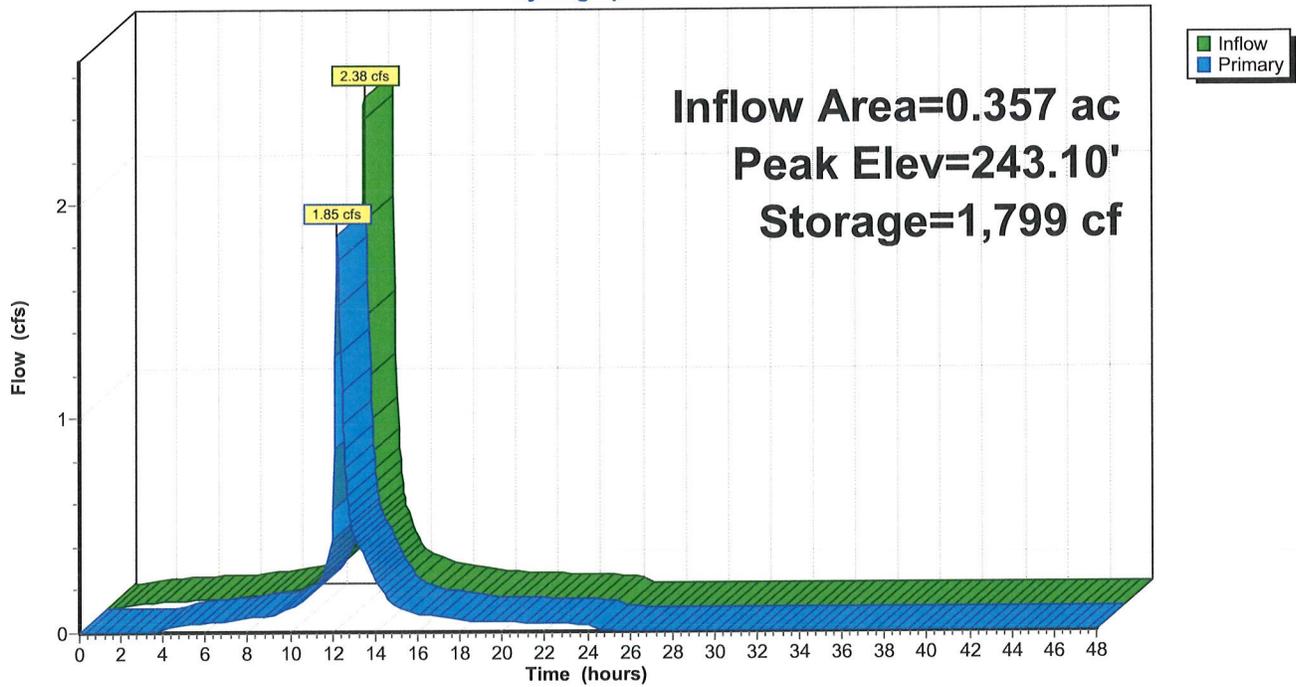
160.7 cy Field

111.3 cy Stone



### Pond P-100: DETENTION

Hydrograph



### 11521.011 4 Community Place

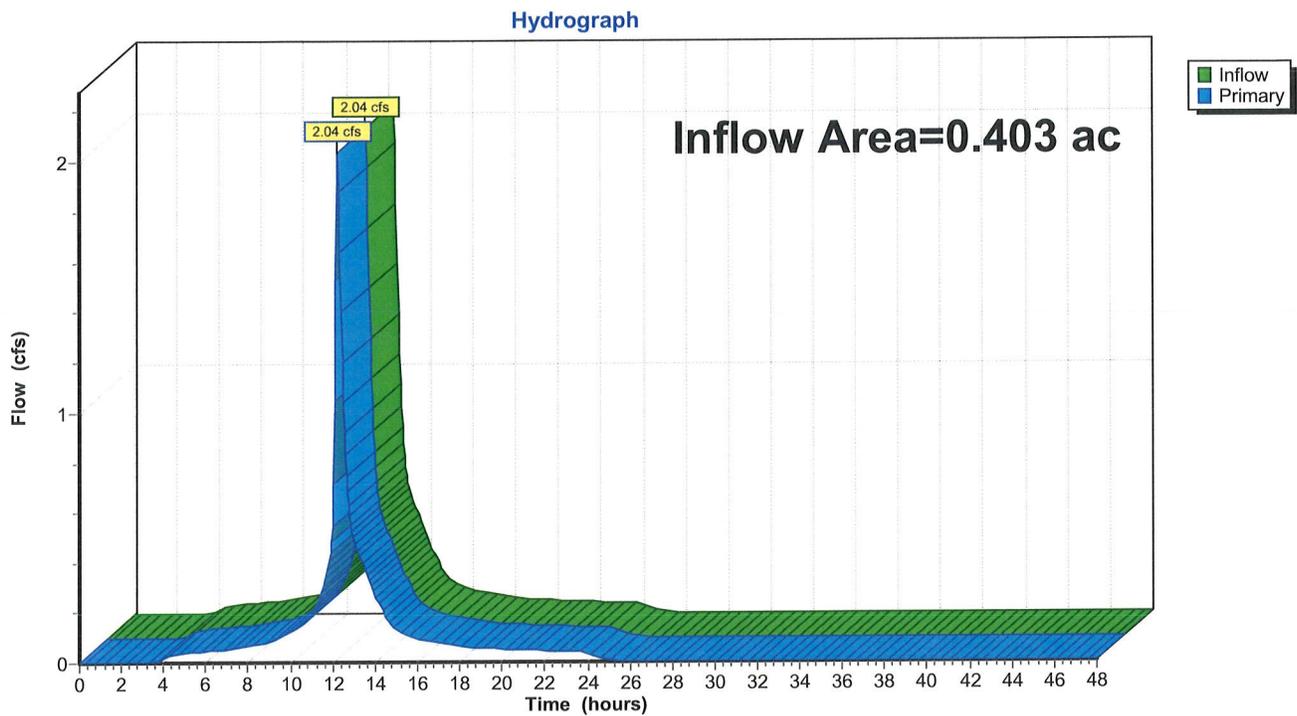
Prepared by {enter your company name here}

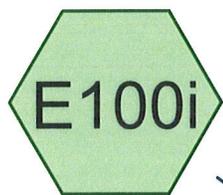
### Summary for Link PROP: TO COMMUNITY PL

Inflow Area = 0.403 ac, 81.39% Impervious, Inflow Depth = 7.41" for 100-Year event  
Inflow = 2.04 cfs @ 12.24 hrs, Volume= 0.249 af  
Primary = 2.04 cfs @ 12.24 hrs, Volume= 0.249 af, Atten= 0%, Lag= 0.0 min

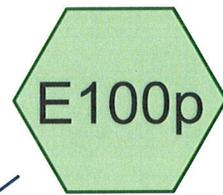
Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

### Link PROP: TO COMMUNITY PL





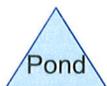
IMPERVIOUS



PERVIOUS



TO COMMUNITY PL



**11521.011 4 Community Place**

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 2

**Area Listing (selected nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
0.046	74	>75% Grass cover, Good, HSG C (E100p)
0.250	89	Gravel roads, HSG C (E100i)
0.052	98	Paved parking, HSG C (E100i)
0.055	98	Roofs, HSG C (E100i)
<b>0.403</b>	<b>90</b>	<b>TOTAL AREA</b>

**11521.011 4 Community Place**

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 3

**Soil Listing (selected nodes)**

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.403	HSG C	E100i, E100p
0.000	HSG D	
0.000	Other	
<b>0.403</b>		<b>TOTAL AREA</b>

**11521.011 4 Community Place**

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 4

**Ground Covers (selected nodes)**

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.046	0.000	0.000	0.046	>75% Grass cover, Good	E100p
0.000	0.000	0.250	0.000	0.000	0.250	Gravel roads	E100i
0.000	0.000	0.052	0.000	0.000	0.052	Paved parking	E100i
0.000	0.000	0.055	0.000	0.000	0.055	Roofs	E100i
<b>0.000</b>	<b>0.000</b>	<b>0.403</b>	<b>0.000</b>	<b>0.000</b>	<b>0.403</b>	<b>TOTAL AREA</b>	

**11521.011 4 Community Place**

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

EXISTING WATER QUALITY  
NJ DEP 2-hr 1yr WQ Rainfall=1.25"

Printed 5/16/2020

Page 5

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

**Subcatchment E100i: IMPERVIOUS**

Runoff Area=0.357 ac 29.97% Impervious Runoff Depth=0.60"  
Tc=10.0 min CN=92 Runoff=0.56 cfs 0.018 af

**Subcatchment E100p: PERVIOUS**

Runoff Area=0.046 ac 0.00% Impervious Runoff Depth=0.07"  
Tc=10.0 min CN=74 Runoff=0.01 cfs 0.000 af

**Link EXIST: TO COMMUNITY PL**

Inflow=0.56 cfs 0.018 af  
Primary=0.56 cfs 0.018 af

**Total Runoff Area = 0.403 ac Runoff Volume = 0.018 af Average Runoff Depth = 0.54"**  
**73.45% Pervious = 0.296 ac 26.55% Impervious = 0.107 ac**

# 11521.011 4 Community Place

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

EXISTING WATER QUALITY  
NJ DEP 2-hr 1yr WQ Rainfall=1.25"

Printed 5/16/2020

Page 6

## Summary for Subcatchment E100i: IMPERVIOUS

Runoff = 0.56 cfs @ 1.16 hrs, Volume= 0.018 af, Depth= 0.60"

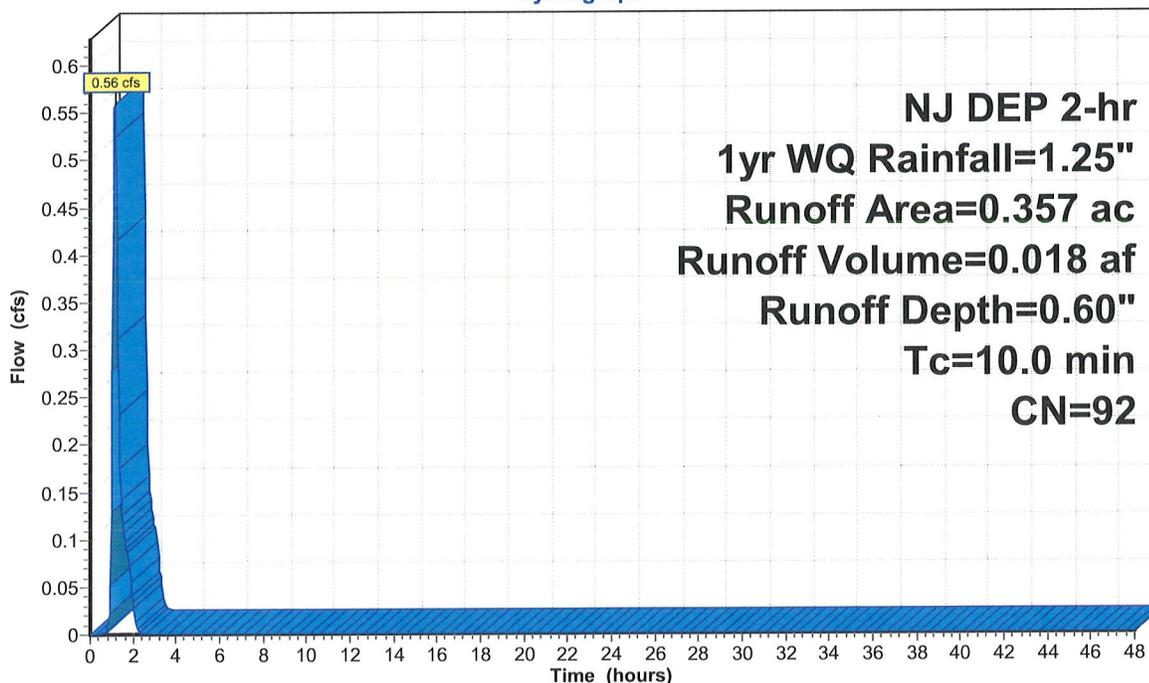
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
NJ DEP 2-hr 1yr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.055	98	Roofs, HSG C
0.052	98	Paved parking, HSG C
0.250	89	Gravel roads, HSG C
0.357	92	Weighted Average
0.250		70.03% Pervious Area
0.107		29.97% Impervious Area

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

## Subcatchment E100i: IMPERVIOUS

Hydrograph



**11521.011 4 Community Place**

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

EXISTING WATER QUALITY  
NJ DEP 2-hr 1yr WQ Rainfall=1.25"

Printed 5/16/2020

Page 7

**Summary for Subcatchment E100p: PERVIOUS**

Runoff = 0.01 cfs @ 1.27 hrs, Volume= 0.000 af, Depth= 0.07"

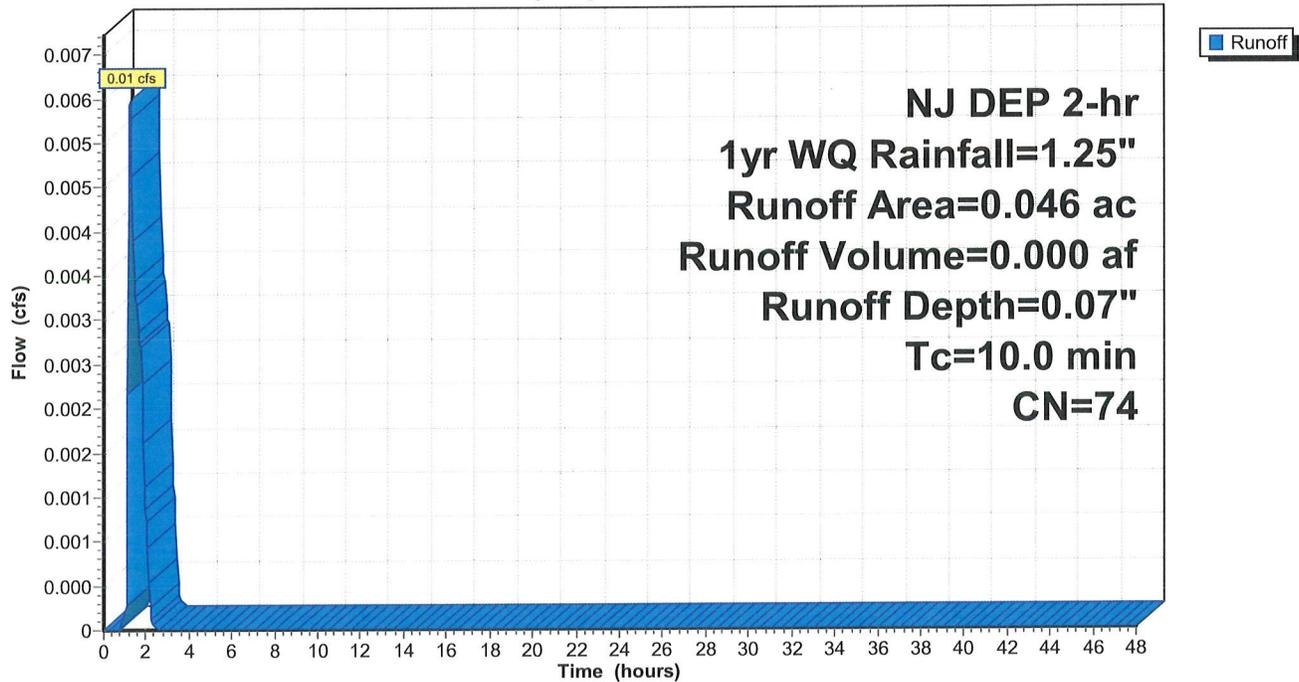
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
NJ DEP 2-hr 1yr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.046	74	>75% Grass cover, Good, HSG C
0.000	70	Woods, Good, HSG C
0.046	74	Weighted Average
0.046		100.00% Pervious Area

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

**Subcatchment E100p: PERVIOUS**

Hydrograph



# 11521.011 4 Community Place

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

EXISTING WATER QUALITY  
NJ DEP 2-hr 1yr WQ Rainfall=1.25"

Printed 5/16/2020

Page 8

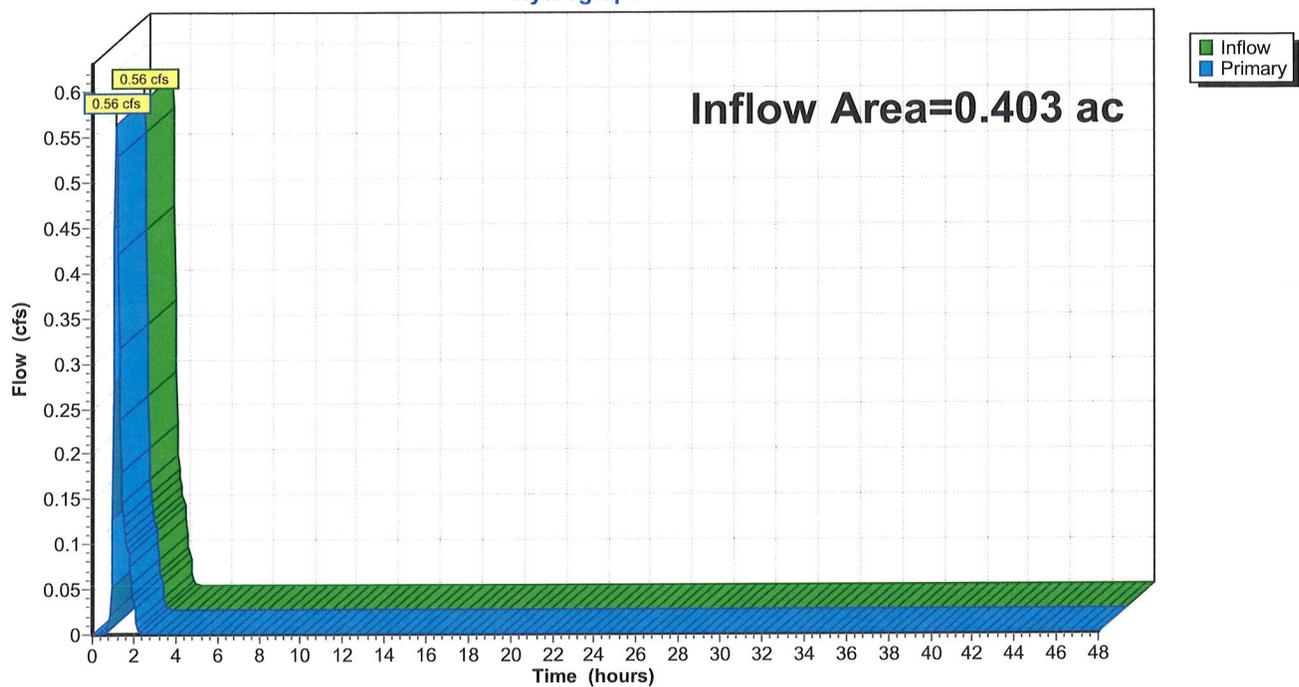
## Summary for Link EXIST: TO COMMUNITY PL

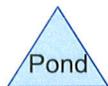
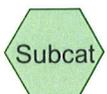
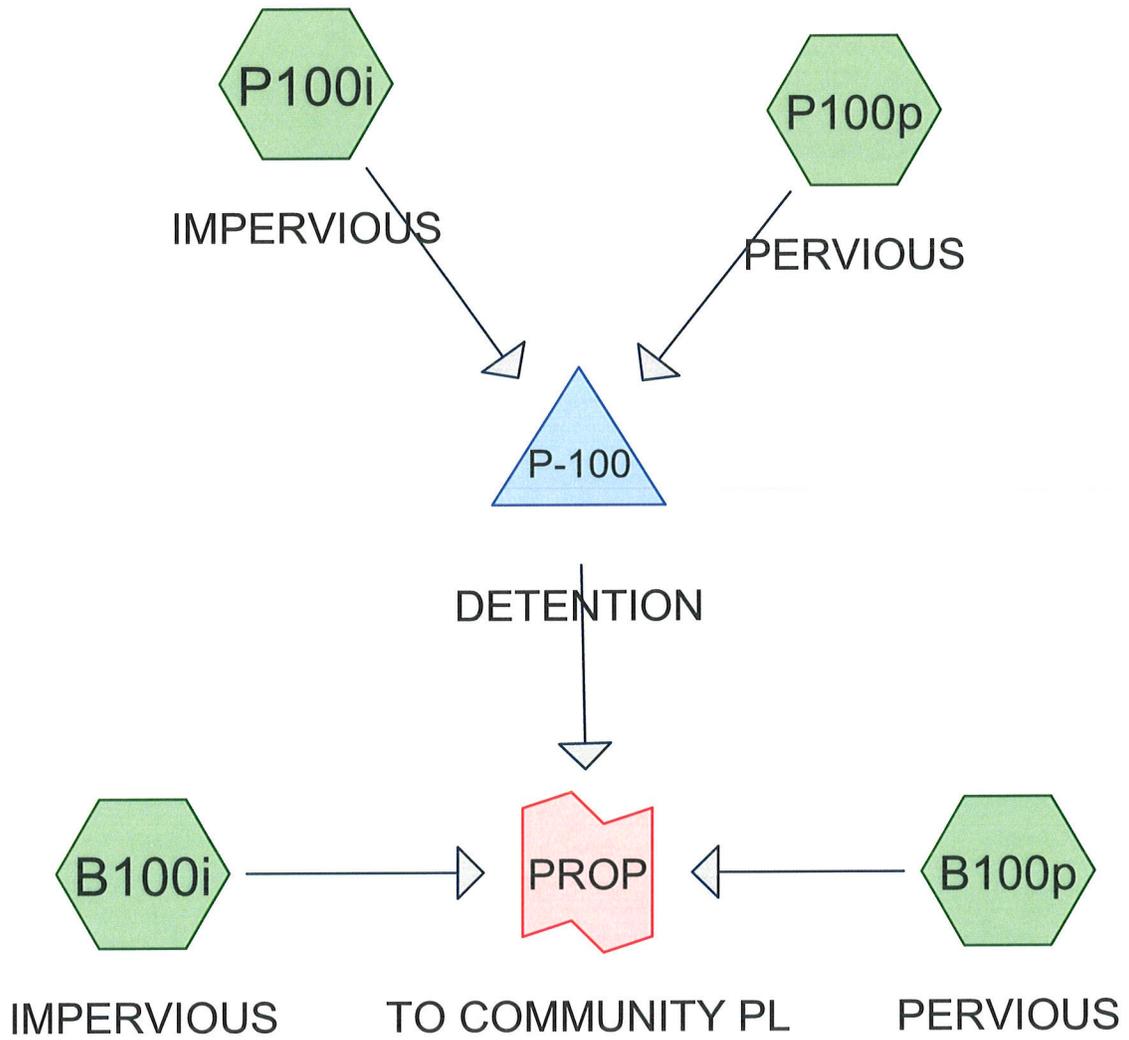
Inflow Area = 0.403 ac, 26.55% Impervious, Inflow Depth = 0.54" for 1yr WQ event  
Inflow = 0.56 cfs @ 1.16 hrs, Volume= 0.018 af  
Primary = 0.56 cfs @ 1.16 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

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

## Link EXIST: TO COMMUNITY PL

Hydrograph





**11521.011 4 Community Place**

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 2

**Area Listing (selected nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
0.075	74	>75% Grass cover, Good, HSG C (B100p, P100p)
0.053	98	Paved parking, HSG C (P100i)
0.271	98	Roofs, HSG C (P100i)
0.004	98	Walkways, HSG C (B100i)
<b>0.403</b>	<b>94</b>	<b>TOTAL AREA</b>

**11521.011 4 Community Place**

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 3

**Soil Listing (selected nodes)**

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.403	HSG C	B100i, B100p, P100i, P100p
0.000	HSG D	
0.000	Other	
<b>0.403</b>		<b>TOTAL AREA</b>

**11521.011 4 Community Place**

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 4

**Ground Covers (selected nodes)**

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.075	0.000	0.000	0.075	>75% Grass cover, Good	B100p, P100p
0.000	0.000	0.053	0.000	0.000	0.053	Paved parking	P100i
0.000	0.000	0.271	0.000	0.000	0.271	Roofs	P100i
0.000	0.000	0.004	0.000	0.000	0.004	Walkways	B100i
<b>0.000</b>	<b>0.000</b>	<b>0.403</b>	<b>0.000</b>	<b>0.000</b>	<b>0.403</b>	<b>TOTAL AREA</b>	

**11521.011 4 Community Place**

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 5

**Pipe Listing (selected 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	P-100	241.66	241.50	31.0	0.0052	0.013	15.0	0.0	0.0

**11521.011 4 Community Place**

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

PROPOSED WATER QUALITY  
NJ DEP 2-hr 1yr WQ Rainfall=1.25"

Printed 5/16/2020

Page 6

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

<b>Subcatchment B100i: IMPERVIOUS</b>	Runoff Area=0.004 ac 100.00% Impervious Runoff Depth=1.03" Tc=10.0 min CN=98 Runoff=0.01 cfs 0.000 af
<b>Subcatchment B100p: PERVIOUS</b>	Runoff Area=0.042 ac 0.00% Impervious Runoff Depth=0.07" Tc=10.0 min CN=74 Runoff=0.01 cfs 0.000 af
<b>Subcatchment P100i: IMPERVIOUS</b>	Runoff Area=0.324 ac 100.00% Impervious Runoff Depth=1.03" Tc=10.0 min CN=98 Runoff=0.83 cfs 0.028 af
<b>Subcatchment P100p: PERVIOUS</b>	Runoff Area=0.033 ac 0.00% Impervious Runoff Depth=0.07" Tc=10.0 min CN=74 Runoff=0.00 cfs 0.000 af
<b>Pond P-100: DETENTION</b>	Peak Elev=242.17' Storage=694 cf Inflow=0.84 cfs 0.028 af Outflow=0.30 cfs 0.023 af
<b>Link PROP: TO COMMUNITY PL</b>	Inflow=0.31 cfs 0.023 af Primary=0.31 cfs 0.023 af

**Total Runoff Area = 0.403 ac Runoff Volume = 0.029 af Average Runoff Depth = 0.86"**  
**18.61% Pervious = 0.075 ac 81.39% Impervious = 0.328 ac**

**11521.011 4 Community Place**

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

**Summary for Subcatchment B100i: IMPERVIOUS**

Runoff = 0.01 cfs @ 1.15 hrs, Volume= 0.000 af, Depth= 1.03"

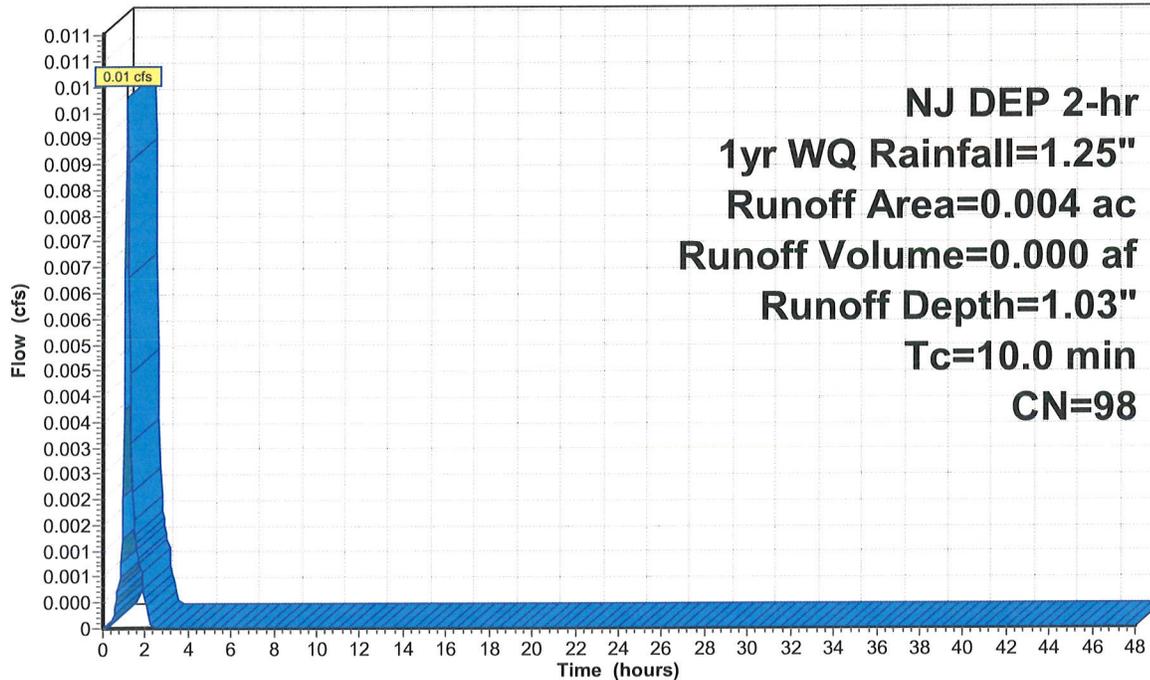
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
NJ DEP 2-hr 1yr WQ Rainfall=1.25"

Area (ac)	CN	Description
* 0.004	98	Walkways, HSG C
* 0.000	98	Paved parking, HSG C
0.004	98	Weighted Average
0.004		100.00% Impervious Area

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

**Subcatchment B100i: IMPERVIOUS**

Hydrograph



**11521.011 4 Community Place**

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

**Summary for Subcatchment B100p: PERVIOUS**

Runoff = 0.01 cfs @ 1.27 hrs, Volume= 0.000 af, Depth= 0.07"

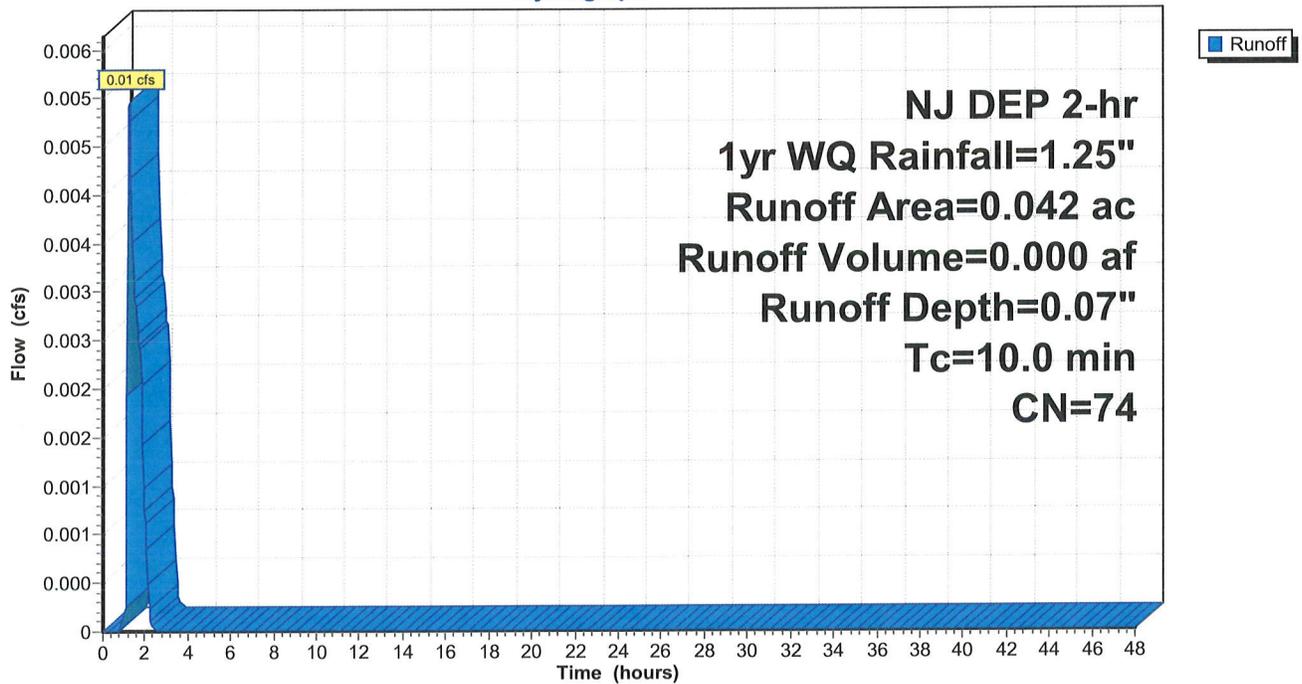
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
NJ DEP 2-hr 1yr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.042	74	>75% Grass cover, Good, HSG C
0.000	70	Woods, Good, HSG C
0.042	74	Weighted Average
0.042		100.00% Pervious Area

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

**Subcatchment B100p: PERVIOUS**

Hydrograph



**11521.011 4 Community Place**

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

PROPOSED WATER QUALITY  
NJ DEP 2-hr 1yr WQ Rainfall=1.25"

Printed 5/16/2020

Page 9

**Summary for Subcatchment P100i: IMPERVIOUS**

Runoff = 0.83 cfs @ 1.15 hrs, Volume= 0.028 af, Depth= 1.03"

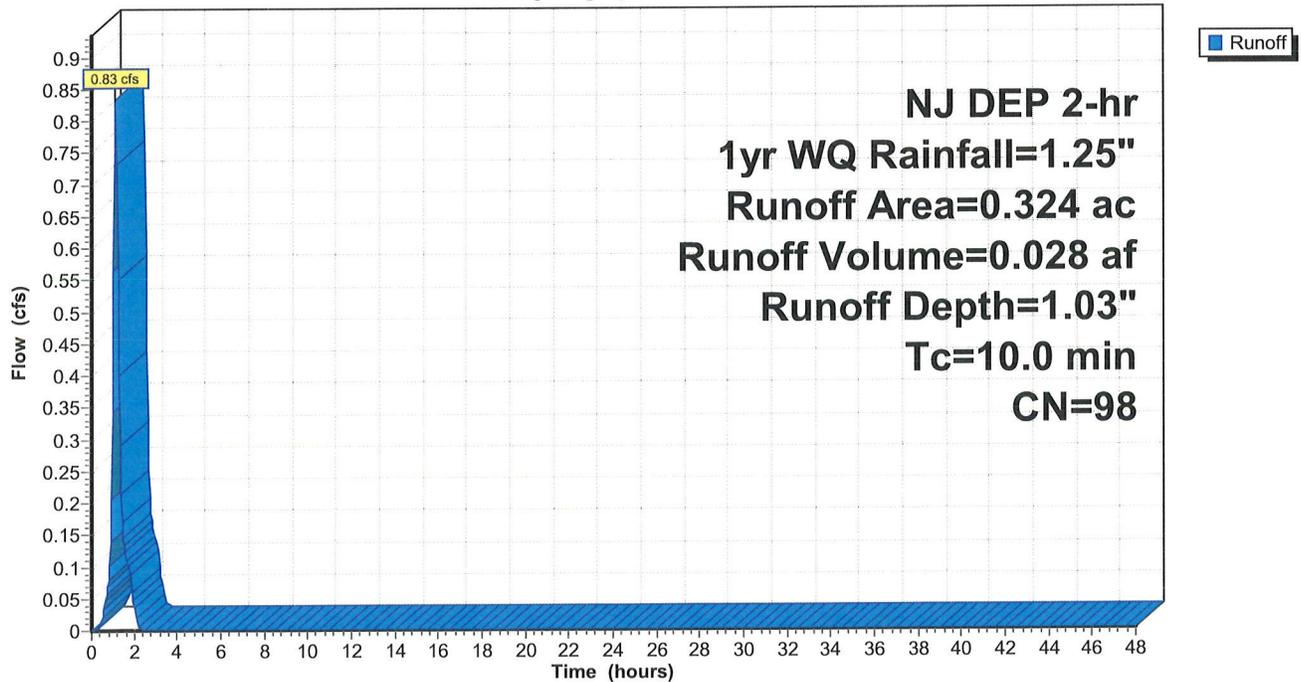
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
NJ DEP 2-hr 1yr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.271	98	Roofs, HSG C
0.053	98	Paved parking, HSG C
0.324	98	Weighted Average
0.324		100.00% Impervious Area

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

**Subcatchment P100i: IMPERVIOUS**

Hydrograph



**11521.011 4 Community Place**

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

**Summary for Subcatchment P100p: PERVIOUS**

Runoff = 0.00 cfs @ 1.27 hrs, Volume= 0.000 af, Depth= 0.07"

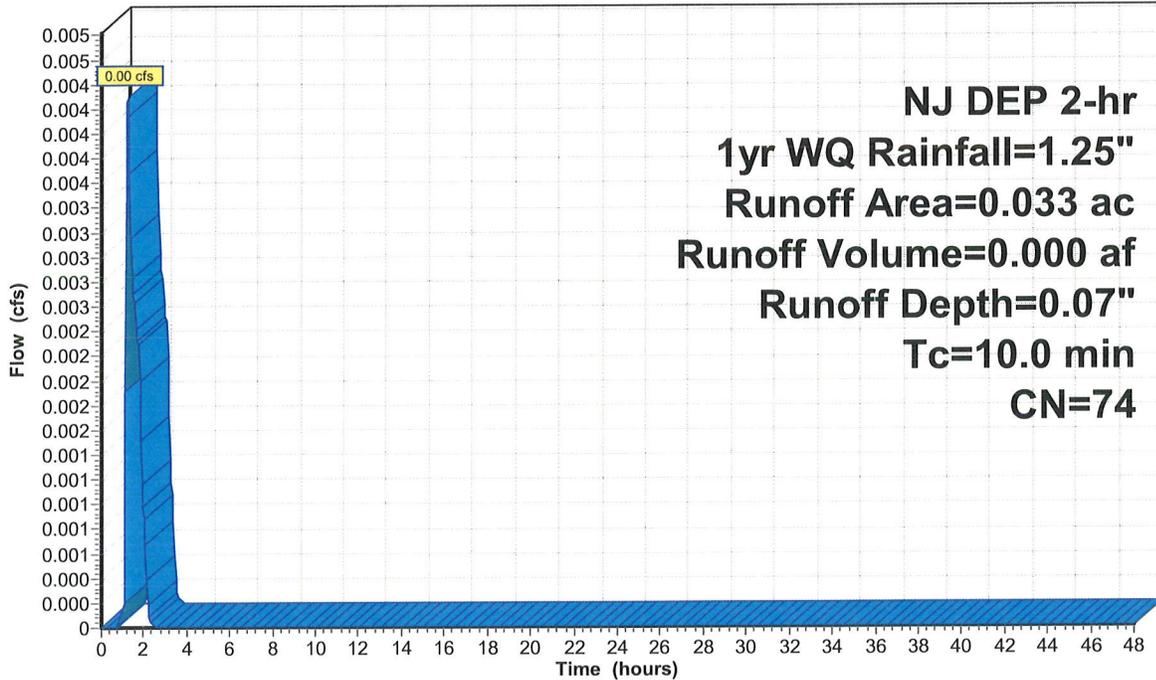
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
NJ DEP 2-hr 1yr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.033	74	>75% Grass cover, Good, HSG C
0.000	70	Woods, Good, HSG C
0.033	74	Weighted Average
0.033		100.00% Pervious Area

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

**Subcatchment P100p: PERVIOUS**

Hydrograph



**11521.011 4 Community Place**

Prepared by {enter your company name here}

Printed 5/16/2020

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

Page 11

**Summary for Pond P-100: DETENTION**

Inflow Area = 0.357 ac, 90.76% Impervious, Inflow Depth = 0.95" for 1yr WQ event  
 Inflow = 0.84 cfs @ 1.15 hrs, Volume= 0.028 af  
 Outflow = 0.30 cfs @ 1.35 hrs, Volume= 0.023 af, Atten= 64%, Lag= 12.3 min  
 Primary = 0.30 cfs @ 1.35 hrs, Volume= 0.023 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 242.17' @ 1.35 hrs Surf.Area= 1,795 sf Storage= 694 cf

Plug-Flow detention time= 39.6 min calculated for 0.023 af (81% of inflow)  
 Center-of-Mass det. time= 34.9 min ( 109.0 - 74.1 )

Volume	Invert	Avail.Storage	Storage Description
#1A	241.33'	1,202 cf	<b>15.02'W x 119.50'L x 2.42'H Field A</b> 4,339 cf Overall - 1,335 cf Embedded = 3,004 cf x 40.0% Voids
#2A	241.66'	1,079 cf	<b>ADS N-12 18" x 30 Inside #1</b> Inside= 18.2"W x 18.2"H => 1.80 sf x 20.00'L = 36.0 cf Outside= 21.0"W x 21.0"H => 2.23 sf x 20.00'L = 44.5 cf Row Length Adjustment= -5.50' x 1.80 sf x 5 rows 13.52' Header x 1.80 sf x 2 = 48.7 cf Inside
		2,281 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	241.66'	<b>15.0" Round 15" OUTFLOW</b> L= 31.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 241.66' / 241.50' S= 0.0052 ' / Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 1.23 sf
#2	Device 1	241.66'	<b>4.5" Vert. 4.5" DIAM. ORIF.</b> C= 0.600
#3	Device 1	242.45'	<b>10.0" Vert. 10" DIA. ORIF</b> C= 0.600
#4	Device 1	243.15'	<b>4.0' long x 2.30' rise 4' WEIR</b> 2 End Contraction(s) 1.6' Crest Height
#5	Primary	243.30'	<b>54.0" x 48.0" Horiz. OUTFLOW GRATE</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow** Max=0.30 cfs @ 1.35 hrs HW=242.17' (Free Discharge)

- 1=15" OUTFLOW (Passes 0.30 cfs of 0.84 cfs potential flow)
- 2=4.5" DIAM. ORIF. (Orifice Controls 0.30 cfs @ 2.74 fps)
- 3=10" DIA. ORIF ( Controls 0.00 cfs)
- 4=4' WEIR ( Controls 0.00 cfs)
- 5=OUTFLOW GRATE ( Controls 0.00 cfs)

**11521.011 4 Community Place**

Prepared by {enter your company name here}  
HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

**Pond P-100: DETENTION - Chamber Wizard Field A**

**Chamber Model = ADS N-12 18" (ADS N-12® Pipe)**

Inside= 18.2"W x 18.2"H => 1.80 sf x 20.00'L = 36.0 cf  
Outside= 21.0"W x 21.0"H => 2.23 sf x 20.00'L = 44.5 cf  
Row Length Adjustment= -5.50' x 1.80 sf x 5 rows

21.0" Wide + 14.3" Spacing = 35.3" C-C Row Spacing

6 Chambers/Row x 20.00' Long -5.50' Row Adjustment +1.75' Header x 2 = 118.00' Row Length +9.0" End Stone x 2 = 119.50' Base Length  
5 Rows x 21.0" Wide + 14.3" Spacing x 4 + 9.0" Side Stone x 2 = 15.02' Base Width  
4.0" Base + 21.0" Chamber Height + 4.0" Cover = 2.42' Field Height

30 Chambers x 36.0 cf -5.50' Row Adjustment x 1.80 sf x 5 Rows + 13.52' Header x 1.80 sf x 2 = 1,079.2 cf Chamber Storage  
30 Chambers x 44.5 cf -5.50' Row Adjustment x 2.23 sf x 5 Rows + 13.52' Header x 2.23 sf x 2 = 1,334.7 cf Displacement

4,338.5 cf Field - 1,334.7 cf Chambers = 3,003.8 cf Stone x 40.0% Voids = 1,201.5 cf Stone Storage

Chamber Storage + Stone Storage = 2,280.7 cf = 0.052 af  
Overall Storage Efficiency = 52.6%  
Overall System Size = 119.50' x 15.02' x 2.42'

30 Chambers  
160.7 cy Field  
111.3 cy Stone



**11521.011 4 Community Place**

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

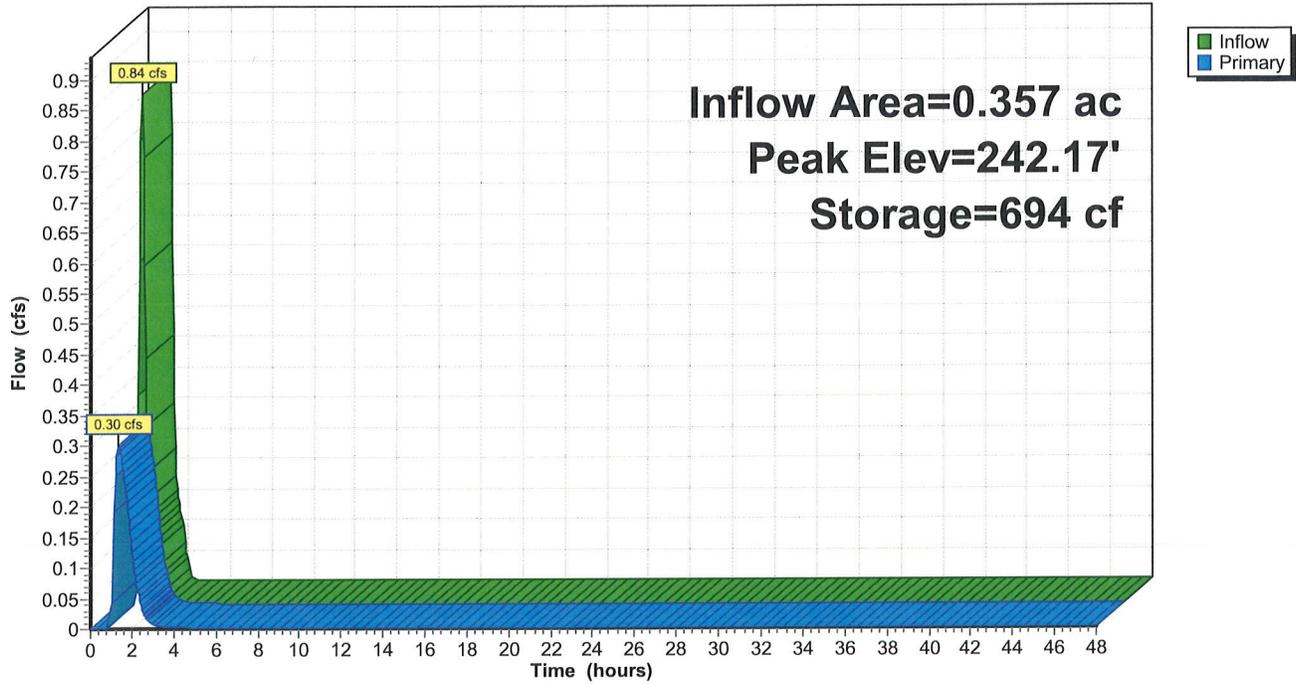
PROPOSED WATER QUALITY  
NJ DEP 2-hr 1yr WQ Rainfall=1.25"

Printed 5/16/2020

Page 13

**Pond P-100: DETENTION**

Hydrograph



# 11521.011 4 Community Place

Prepared by {enter your company name here}

HydroCAD® 10.00-24 s/n 06523 © 2018 HydroCAD Software Solutions LLC

PROPOSED WATER QUALITY  
NJ DEP 2-hr 1yr WQ Rainfall=1.25"

Printed 5/16/2020

Page 14

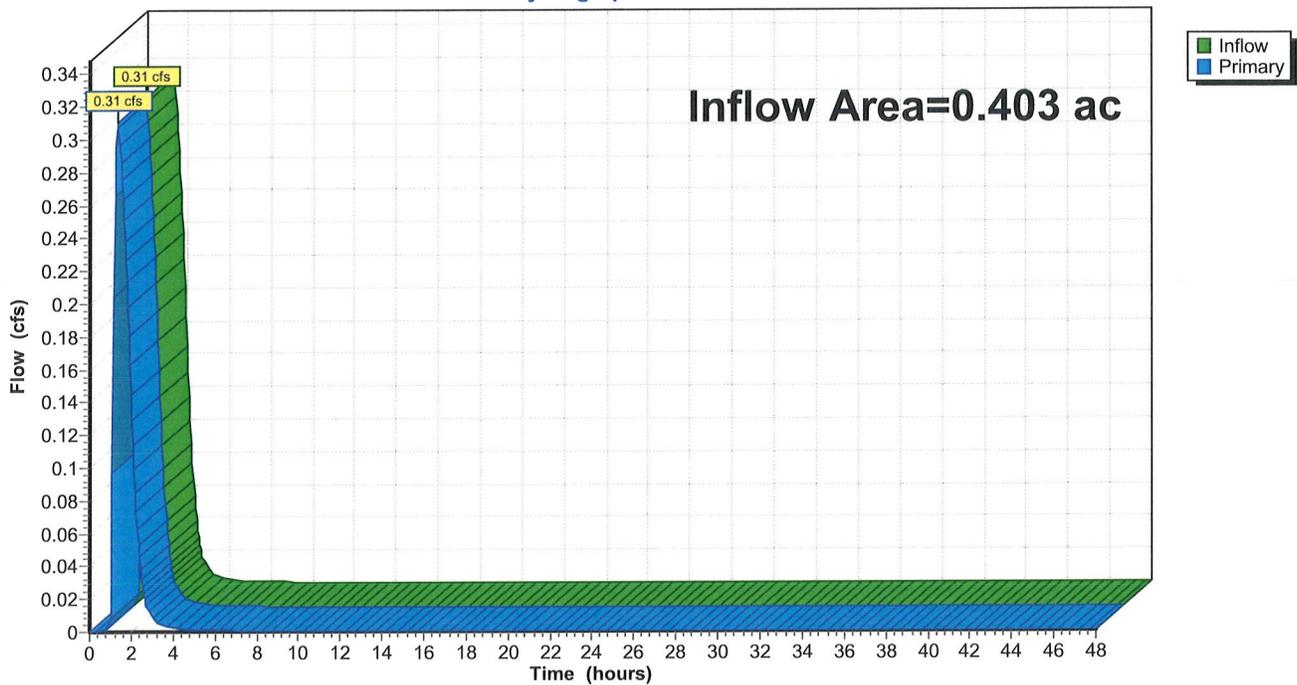
## Summary for Link PROP: TO COMMUNITY PL

Inflow Area = 0.403 ac, 81.39% Impervious, Inflow Depth = 0.69" for 1yr WQ event  
Inflow = 0.31 cfs @ 1.34 hrs, Volume= 0.023 af  
Primary = 0.31 cfs @ 1.34 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

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

## Link PROP: TO COMMUNITY PL

Hydrograph



# **Appendix E**

## **GROUNDWATER RECHARGE CALCULATIONS**

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
MORRIS CO., MADISON BORO	49.2	1.69

Project Name:	4 CommunityPlace
Description:	Multi-Family Project
Analysis Date:	05/14/20

Pre-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.046	Open space	Urban Land*	0.0	-
2	0.25	Gravel, dirt	Urban Land*	0.0	-
3	0.107	Impervious areas	Urban Land*	0.0	-
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	0.4			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				0.0	-

Post-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.328	Impervious areas	Urban Land*	0.0	-
2	0.075	Open space	Urban Land*	0.0	-
3	0				
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	0.4			Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				0.0	-

<b>Annual Recharge Requirements Calculation ↓</b>		0.0	-
% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)	14,288
<b>Post-Development Annual Recharge Deficit=</b>	0	(cubic feet)	
<b>Recharge Efficiency Parameters Calculations (area averages)</b>			
RWC= 0.00	(in)	DRWC= 0.00	(in)
ERWC = 0.00	(in)	EDRWC= 0.00	(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.

# **Appendix F**

## **STORMWATER CONVEYANCE CALCULATIONS**

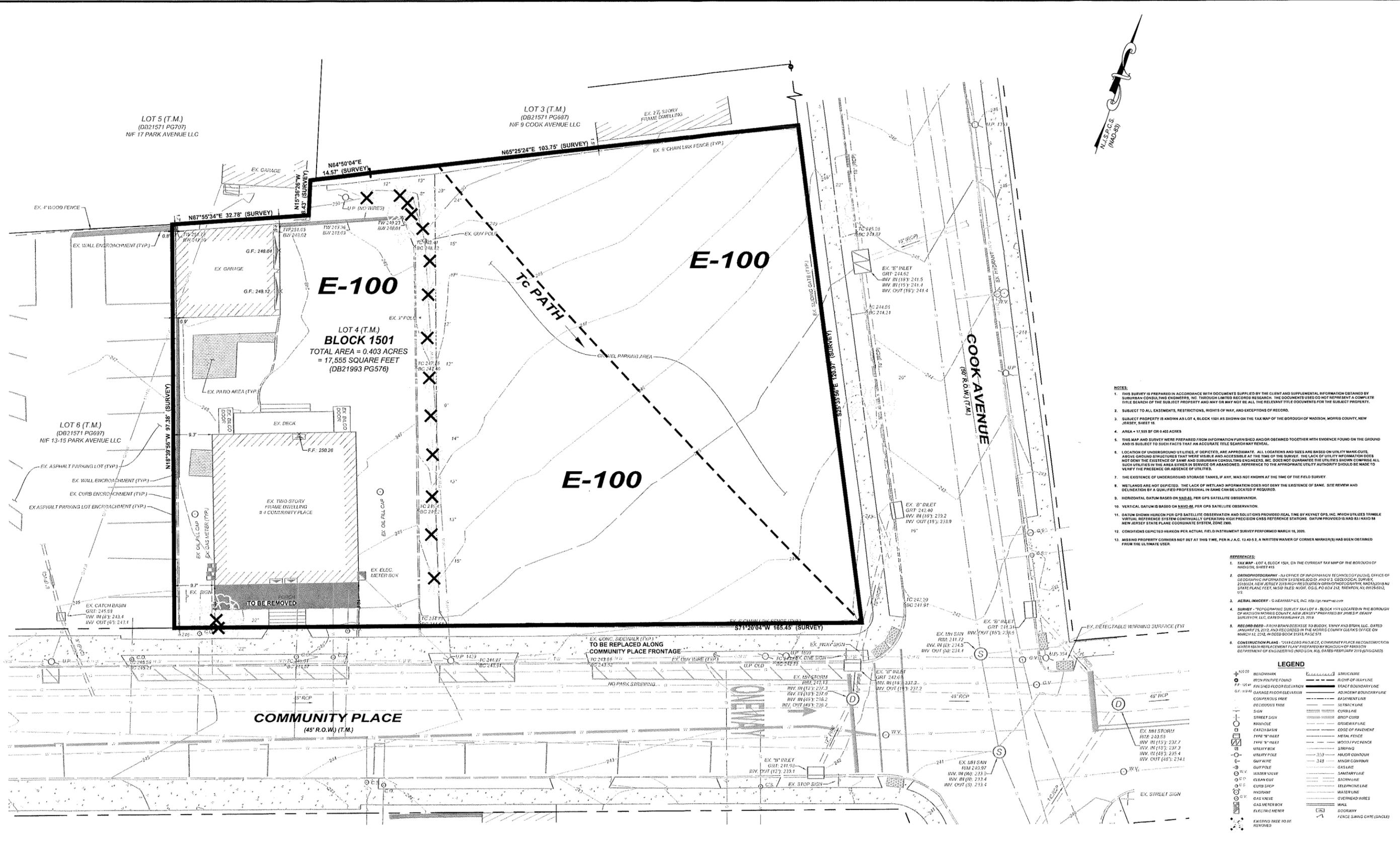
## PIPE FLOW CALCULATIONS

from structure	to structure	C x A	Tc min	storm frequency years	rainfall intensity in/hr	required flow cfs	full flow capacity cfs	% of full flow capacity used	pipe diameter inches	pipe slope % grade	Mannings N - value	pipe material type
PROP E INLET	UG DETENTION	0.32	10	25	6.70	2.14	4.57	47.0%	15	0.50%	0.013	RCP
	BASIN OUTFLOW - 100-YR PEAK FLOW					1.85	4.57	40.5%	15	0.50%	0.013	RCP

# **Appendix G**

## **DRAINAGE AREA MAPS**

E:\SCE\Madison\11521.011 4 Community Place\Exhibit\11521.011 G1 Existing Drainage Area Map.dwg - FH, May 15, 2020 - 11:34pm - d\ames SUBURBAN CONSULTING ENGINEERS, INC.

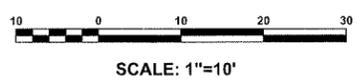


- NOTES:**
- THIS SURVEY IS PREPARED IN ACCORDANCE WITH DOCUMENTS SUPPLIED BY THE CLIENT AND SUPPLEMENTAL INFORMATION OBTAINED BY SUBURBAN CONSULTING ENGINEERS, INC. THROUGH LIMITED RECORDS RESEARCH. THE DOCUMENTS USED DO NOT REPRESENT A COMPLETE TITLE SEARCH OF THE SUBJECT PROPERTY AND MAY OR MAY NOT BE ALL THE RELEVANT TITLE DOCUMENTS FOR THE SUBJECT PROPERTY.
  - SUBJECT TO ALL EASEMENTS, RESTRICTIONS, RIGHTS OF WAY, AND EXCEPTIONS OF RECORD.
  - SUBJECT PROPERTY IS KNOWN AS LOT 4, BLOCK 1501 AS SHOWN ON THE TAX MAP OF THE BOROUGH OF MADISON, MORRIS COUNTY, NEW JERSEY, SHEET 15.
  - AREA = 17,555 SF OR 0.403 ACRES
  - THIS MAP AND SURVEY WERE PREPARED FROM INFORMATION FURNISHED AND/OR OBTAINED TOGETHER WITH EVIDENCE FOUND ON THE GROUND AND IS SUBJECT TO SUCH FACTS THAT AN ACCURATE TITLE SEARCH MAY REVEAL.
  - LOCATION OF UNDERGROUND UTILITIES, IF DEPICTED, ARE APPROXIMATE. ALL LOCATIONS AND SIZES ARE BASED ON UTILITY MARKETS, ABOVE GROUND STRUCTURES THAT WERE VISIBLE AND ACCESSIBLE AT THE TIME OF THE SURVEY. THE LACK OF UTILITY INFORMATION DOES NOT DENY THE EXISTENCE OF SAME AND SUBURBAN CONSULTING ENGINEERS, INC. DOES NOT GUARANTEE THE UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA EITHER IN SERVICE OR ABANDONED. REFERENCE TO THE APPROPRIATE UTILITY AUTHORITY SHOULD BE MADE TO VERIFY THE PRESENCE OR ABSENCE OF UTILITIES.
  - THE EXISTENCE OF UNDERGROUND STORAGE TANKS, IF ANY, WAS NOT KNOWN AT THE TIME OF THE FIELD SURVEY.
  - WETLANDS ARE NOT DEPICTED. THE LACK OF WETLAND INFORMATION DOES NOT DENY THE EXISTENCE OF SAME. SITE REVIEW AND DELINEATION BY A QUALIFIED PROFESSIONAL IN SAME CAN BE LOCATED IF REQUIRED.
  - HORIZONTAL DATUM BASED ON NAD83, PER GPS SATELLITE OBSERVATION.
  - VERTICAL DATUM IS BASED ON NAD83, PER GPS SATELLITE OBSERVATION.
  - DATUM SHOWN HEREON PER GPS SATELLITE OBSERVATION AND SOLUTIONS PROVIDED REAL TIME BY KEYNET GPS, INC. WHICH UTILIZES TRIMBLE VIRTUAL REFERENCE SYSTEM CONTINUALLY OPERATING HIGH PRECISION GROUND REFERENCE STATIONS. DATUM PROVIDED IS NAD 83/NAVD 83 NEW JERSEY STATE PLANE COORDINATE SYSTEM, ZONE 200.
  - CONDITIONS DEPICTED HEREON PER ACTUAL FIELD INSTRUMENT SURVEY PERFORMED MARCH 16, 2020.
  - MISSING PROPERTY CORNERS NOT SET AT THIS TIME, PER N.J.A.C. 17:40-5.2. A WRITTEN WAIVER OF CORNER MARKER(S) HAS BEEN OBTAINED FROM THE ULTIMATE USER.

- REFERENCES:**
- TAX MAP - LOT 4, BLOCK 1501, ON THE CURRENT TAX MAP OF THE BOROUGH OF MADISON, SHEET 15
  - ORTHOPHOTOGRAPHY - (A) OFFICE OF INFORMATION TECHNOLOGY (POLICE), OFFICE OF GEOGRAPHIC INFORMATION SYSTEMS (GIS) AND (B) GEOLOGICAL SURVEY, 2010/2014 NEW JERSEY 2015 HIGH RESOLUTION ORTHOPHOTOGRAPHY, MADISON NJ STATE PLANE FEET, NAD 83 FEET, MOSE, COG, PO BOX 112, TRENTON, NJ, 08646-0112, US
  - AERIAL IMAGERY - © AERIALMAPS US, INC. <http://aerialmaps.com>
  - SURVEY - "TOPOGRAPHIC SURVEY OF LOT 4, BLOCK 1501 LOCATED IN THE BOROUGH OF MADISON MORRIS COUNTY, NEW JERSEY" PREPARED BY JAMES P. DEWOLF SURVEYOR, L.L.C. DATED FEBRUARY 25, 2018
  - RECORD DRAWING FROM BROWN BRASS TO BIDDY, TONY AND BRIAN, L.L.C. DATED JANUARY 25, 2018 AND RECORDED IN THE MORRIS COUNTY CLERK'S OFFICE ON MARCH 12, 2018, IN DEED BOOK 21953, PAGE 578
  - CONSTRUCTION PLANS - "2018 COB PROJECT, COMMUNITY PLACE RECONSTRUCTION WATER MAIN REPLACEMENT PLAN" PREPARED BY BOROUGHS OF MADISON DEPARTMENT OF ENGINEERING (MADISON, NJ), DATED FEBRUARY 2019 (UNRECORDED)

**LEGEND**

3+00.00	BENCHMARK	STRUCTURE
○	RICH PIPES FOUND	RIGHT-OF-WAY LINE
○	FINISHED FLOOR ELEVATION	TRACT BOUNDARY LINE
G.F. 112.8	GARAGE FLOOR ELEVATION	ADJACENT BOUNDARY LINE
○	CONDENSING FREE	EASEMENT LINE
○	RECIPROCATING FREE	SE FENCE LINE
○	SOB	CURB LINE
○	STREET SIGN	DROP CURB
○	MANHOLE	DRIVEWAY LINE
○	CATCH BASIN	EDGE OF PAVEMENT
○	TYPE "W" HOLE	METAL FENCE
○	TYPE "H" HOLE	WOOD/FENCE
○	UTILITY BOX	STRIPING
○	UTILITY POLE	MAJOR CONTOUR
○	GUY WIRE	MINOR CONTOUR
○	WATER VALVE	GUY POLE
○	CLEAN OUT	SANITARY LINE
○	COB SIGN	TELEPHONE LINE
○	HIDDEN	WALKER LINE
○	GAS VALVE	OVERHEAD WIRES
○	GAS METER BOX	WALL
○	ELECTRIC METER	DOORWAY
○	EXISTING TREE TO BE REMOVED	FENCE SAVING GATE (SINGLE)



**NOTICE**  
 THIS DRAWING AND ALL INFORMATION CONTAINED HEREIN IS AUTHORIZED FOR USE ONLY BY THE PARTY FOR WHOM THE WORK WAS CONTRACTED OR TO WHOM IT IS CERTIFIED.  
 THIS DRAWING MAY NOT BE COPIED, REPRODUCED, REPRODUCED, DISTRIBUTED, OR BE USED FOR ANY OTHER PURPOSE WITHOUT THE WRITTEN CONSENT OF SUBURBAN CONSULTING ENGINEERS, INC.  
 PER N.J.A.C. ELECTRONIC SIGNATURES NOT CONTAINING A MANUAL OR DIGITAL SEAL OR PAPER COPIES NOT CONTAINING A HANDED SEAL ARE NOT ORIGINALS AND MAY HAVE BEEN ALTERED.  
 © COPYRIGHT 2020 SUBURBAN CONSULTING ENGINEERS, INC.™  
 ALL RIGHTS RESERVED

DESCRIPTION	NO.	DATE	BY	CHK
REVISIONS				

DRAWN BY:  
CVF  
05/14/2020  
 CHECKED BY:  
CJS  
05/14/2020  
 CHECKED BY:

**DAREN J. PHIL, PE**  
 NJ PROFESSIONAL ENGINEER  
 LICENSE NO. 2469369100  
 DATE: 05/14/2020

**SE SUBURBAN CONSULTING ENGINEERS, INC.**  
 Civil Engineers - Municipal Engineers  
 Landscape Architects  
 Planners - Environmentalists - Land Surveyors  
 76 US Highway 206, Suite 101  
 Flinders, NJ 07836 - 973.398.1776  
 2430 Highway 34, Bldg. A, Suite 1R  
 Wall, NJ 08736 - 732.282.1776  
 EXCELLENCE ♦ ECONOMY ♦ ENVIRONMENT

**PRELIMINARY AND FINAL MAJOR SITE PLAN FOR PARK VALLEY DEVELOPMENT**  
**No. 4 COMMUNITY PLACE, BLOCK 1501 LOT 4**  
 BOROUGH OF MADISON, COUNTY OF MORRIS, STATE OF NEW JERSEY

PROJECT NUMBER:  
SCE-11521.011  
 SCALE:  
1"=10'  
 SHEET **G1** OF **2**  
 REVISION

