CAPIZZI LAW OFFICES

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MATTHEW G. CAPIZZI, ESQ.
N.J., N.Y., & D.C. Bars

New York Office:
1 Blue Hill Plaza
Lobby Level, Suite 1509
Pearl River, NY 10965
Reply to New Jersey Office

February 16, 2022

Supplement Submittal for Completeness Review

<u>Via Overnight Mail</u>
JoAnna Myung – Secretary
Borough of Alpine Zoning Board of Adjustment
100 Church Street
Alpine, NJ 07620

Re: Church of the Lord– Alpine PB (the "Applicant")
        995 Closter Dock Road: Block 47, Lot 2 and
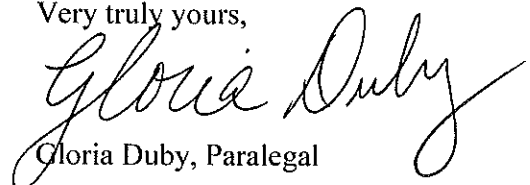   10 Old Dock Road: Block 48, Lot 1.01 (collectively the "Property")

Dear Ms. Myung:

Supplement to our office's filing of January 5, 2022, enclosed please find the following:

1. Application for Soil Moving Permit with Check List for Determining Completeness for Review of Soil Moving Permit Application attached thereto (3 copies);
2. Soil Movement Report prepared by Hubschman Engineering, P.A., dated December 31, 2021 (3 copies);
3. 6 Foot Boulder Wall Calculations prepared by Hubschman Engineering, P.A., dated January 3, 2022 (3 copies);
4. Drainage Report prepared by Hubschman Engineering, P.A., dated December 28, 2021 (3 copies); and
5. Applicant's Check #1073 in the amount of $250.00, which represents the Soil Movement Fee.

Thank you.

Very truly yours,

Gloria Duby

Gloria Duby, Paralegal

MGC/gd
Enclosures

BOROUGH OF ALPINE, 100 CHURCH STREET
201-784-2901 x-22 / 201-784-1407 FAX

CHECK LIST FOR DETERMINATION OF COMPLETENESS
FOR REVIEW OF SOIL MOVING PERMIT APPLICATION

Applicant Name & Address   **CHURCH OF THE LORD, c/o KYUNG HA LEE, 13 MOUNTVIEW AVENUE, ORANGEBURG, NY 10962**

Owner, if not applicant   **CHURCH OF THE LORD, c/o KYUNG HA LEE, 13 MOUNTVIEW AVENUE, ORANGEBURG, NY 10962**

Site Address   **995 CLOSTER DOCK ROAD**   P.O. BOX _____   Block   **47**   Lot **1.01 & 2**

Date of Initial Submission _____   Date of Resubmission _____

One copy will be submitted to the Borough Engineer and two copies will be filed in the Construction Office.

	Yes	No
Have 2 copies of the application been submitted?	X	
Have 2 copies of the plans been submitted?	X	
Have 2 copies of the X-sections & calculations been submitted?	X	
Have 2 copies of the soil certification or tests been submitted?	X	
Have 2 copies of the truck routes been submitted?	X	
Have 2 copies of the truck & equipment to be used been submitted?	X	
Does the title Block on each sheet identify address and block and lot?	X	
Is Topo Map signed and sealed by a surveyor and by an engineer?	X	
Has review fee been submitted? (See attached schedule.)	X	
Has performance bond been submitted? (To be determined by Borough Engineer.)	X	

Is the following information shown on the plans? {Per Ord. 185-3(2)}

	Yes	No
Topographic Map:	X	
Building floor elevation	X	
Existing and proposed contours @ 2 ft. intervals	X	
Spot elevation at building corners.	X	
Top and bottom of wall elevations.	X	
Topography within 25 ft. of lot lines.	X	
Topography for full width of abutting streets	X	
Soil moving quantities.	X	
Storm water management improvements.	X	
Soil Erosion and sediment control provisions.	X	
Location, size and species of trees over 9 inches in diameter	X	
Elevations referenced to USGS datum	X	
Boundary of subject property.	X	
Flood Plains and/or freshwater wetlands.	N/A	
Zoning schedule.	X	
Listing of variances and/or waivers requested	X	

BOROUGH OF ALPINE, 100 CHURCH STREET, ALPINE, NJ 07621
ORDINANCE #541

APPLICATION FOR SOIL MOVING PERMIT

DATE: _____

Exempt Applic.	_____	Yes/No
Applic. Fee	_____	Yes/No
Escrow Fee	_____	Yes/No
Eng'g Escrow Fee	_____	Yes/No

I. **Pre-Approval Data Requirements**

1. Property Description
   Block **47**   Lot **1.01 & 2**
   Street **995 CLOSTER DOCK ROAD**

2. Permittee (Property Owner or Contract Purchaser)
   Name **CHURCH OF THE LORD c/o KYUNG HA LEE**
   Address **13 MOUNTVIEW AVENUE, ORANGEBURG, NEW YORK 10962**
   Telephone No. **203-241-8504**

3. Purpose of Soil Moving
PROPOSED PARKING LOT & SITE IMPROVEMENTS

4. Description of Soil to be Moved:

a. Cut	**13.0**	c.y.	**LOAM & ROCK**	(type)
b. Fill	**1,626.0**	c.y.	**GRAVEL & BANKRUN**	(type)
c. Import	**1,613.0**	c.y.	**GRAVEL & BANKRUN**	(type)
d. Export	**0.0**	c.y.		(type)
e. Max. Height of temporary Stockpile			**6'**	(type)
f. Total Volume of Soil to be Moved			**1,626.0**	c.y

   (cut plus import must equal fill plus export)

5. Wetlands and/or wetland buffer:
- present on the site. _____ **YES** _____ Yes/No
- proposed to be disturbed. _____ **NO** _____ Yes/No/N.A.

6. Bergen County Soil Conservation District approval required. _____ **YES** _____ Yes/No

7. Map(s) submitted in full compliance with Borough Ordinance? _____ **YES** _____ Yes/No
   a. Are slopes steeper than (1) vertical to (4) horizontal? **NO** Yes/No
   b. Are retaining walls higher than (6) feet ? **NO** Yes/No
   c. Are retaining walls less than (6) feet from lot lines? **NO** Yes/No
   d. Are cross sections and end area calculations submitted? **YES** Yes/No
   e. List of all requested waivers from topographic map map requirements.
NO WAIVERS REQUIRED, HEARING REQUIRED TO MOVE MORE THAN 1,000 CY OF SOIL
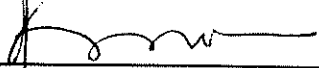
II. Post Approval Data Requirements

1. Proposed Commencement Date

   _____
   (Month/Day/Year)

2. Proposed Completion Date
   (Maximum one (1) year permit)

   _____
   (Month/Day/Year)

3. Location to which Excess Soil will be Exported
   (Street)   **TBD**
   (Mun./State)

4. Location from which Soil will be Imported
   (Street)   **RIVERDALE QUARRY, 125 PATERSON HAMBURG TURNPIKE**
   (Mun./State)   **RIVERDALE, NEW JERSEY 07457**

5. Person in charge of Soil Movement Operations
   Name   **KYUNG HA LEE; CHURCH OF THE LORD**
   Address   **13 MOUNTVIEW AVENUE, ORANGEBURG, NEW YORK**
   Telephone No. **201-241-8504**

6. Route of Travel (within the Borough)

   _____
   _____
   _____
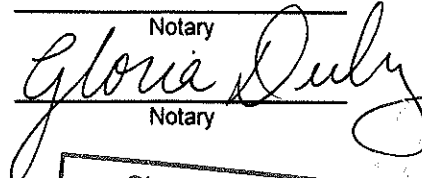
7. Description of Soil Erosion and Control:
   SEDIMENT FILTER FENCE, STABILIZED CONSTRUCTION PAD, INLET PROTECTION

   _____
   _____

8. Liability Insurace Submitted in full compliance with Borough Ordinance   Yes/No

9. Performance Guaranty posted $_____ Yes/No

10. Revegetation Guaranty posted $_____ Yes/No

11. Signature and Notarization

_____
Signature of Owner

_____
Signature of Owner

_____
Notary

_____
Notary

GLORIA M. DUBY
NOTARY PUBLIC OF NEW JERSEY
My Commission Expires Sept. 2024

SOIL MOVING REPORT

PROPOSED PARKING LOT & SITE IMPROVEMENTS
ALPINE COMMUNITY CHURCH
LOT 1.01, BLOCK 48
LOT 2, BLOCK 47
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
(FILE # 3882)

PREPARED ON:

December 31, 2021

PREPARED FOR:

APPLICANT
Alpine M E Church
Closter Dock Road
Alpine, New Jersey 07620

MICHAEL J. HUBSCHMAN, P.C.
MICHAEL J. HUBSCHMAN, P.E., P.P.
PROFESSIONAL ENGINEER AND PLANNER
263A SOUTH WASHINGTON AVENUE
BERGENFIELD, NEW JERSEY 07621
PHONE: 201-384-5666

NJPE No. 29497   NJPP No. 3200

CONCLUSION:

The proposed parking lot and site improvements at Alpine Community Church in the Borough of Alpine, Bergen County, New Jersey will result in a net import of soil during construction. Based on the current site plans and the attached cross sections, an estimated 1,613 cubic yards of soil materials will need to be imported to the project site.

Cut (CY)	
LOT 1.02	2
LOT 2	11
TOTAL	13

Fill (CY)	
LOT 1.02	1,490
LOT 2	136
TOTAL	1,626

Quantity of Soil to Be Imported To Site (CY)
1,613

HUBSCHMAN ENGINEERING
MICHAEL J. HUBSCHMAN, P.E., P.P.
SOIL MOVING CALCULATIONS

ALPINE COMMUNITY CHURCH – LOT 1.01, BLOCK 48
LOT 2, BLOCK 47
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE # 3882

LOT 1.01: SOIL MOVIING CALC'S:

CUT		Cut (SF)	Average (SF)	Distance (FT)	Volume (CF)
0+00	N	0			
			0.00	26	0.00
0+26	S	0			
0+26	N	0			
			0.00	30	0.00
0+56	S	0			
0+56	N	0			
			1.50	29	43.50
0+85	S	3			
0+85	N	0			
			0.00	15	0.00
1+00	S	0			

Total   43.50   ≈   2   CY

FILL		Fill (SF)	Average (SF)	Distance (FT)	Volume (CF)
0+00	N	21			
			284.00	26	7,384.00
0+26	S	547			
0+26	N	646			
			590.50	30	17,715.00
0+56	S	535			
0+56	N	535			
			433.50	29	12,571.50
0+85	S	332			
0+85	N	221			
			171.50	15	2,572.50
1+00	S	122			

Total   40,243.00   ≈   1,490   CY

3

HUBSCHMAN ENGINEERING
MICHAEL J. HUBSCHMAN, P.E., P.P.
SOIL MOVING CALCULATIONS

ALPINE COMMUNITY CHURCH – LOT 1.01, BLOCK 48
LOT 2, BLOCK 47
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE # 3882

LOT 2: SOIL MOVIING CALC'S:

CUT	Cut (SF)	Average (SF)	Distance (FT)	Volume (CF)
0+00 N	0			
		0.00	12	0.00
0+12 S	0			
0+12 N	0			
		5.50	53	291.50
0+65 S	11			

Total 291.50 ≈ 11 CY

FILL	Fill (SF)	Average (SF)	Distance (FT)	Volume (CF)
0+00 N	118			
		99.50	12	1,194.00
0+12 S	81			
0+12 N	81			
		47.00	53	2,491.00
0+65 S	13			

Total 3,685.00 ≈ 136 CY

6 FOOT BOULDER WALL CALCULATIONS

PROPOSED PARKING
ALPINE COMMUNITY CHURCH
LOT 1.01, BLOCK 48
LOT 2, BLOCK 47
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
(Our Job# 3882)

PREPARED ON :

January 3, 2022

PREPARED FOR:

Alpine M.E. Church
Closter Dock Road
Alpine, NJ 07620

MICHAEL J. HUBSCHMAN, P.C.

MICHAEL J. HUBSCHMAN, P.E., P.P.
PROFESSIONAL ENGINEER AND PLANNER
263 A SOUTH WASHINGTON AVE
BERGENFIELD, NJ 07621

NJPE No. 29497   NJPP No. 3200

HUBSCHMAN ENGINEERING, P.A.
MICHAEL J. HUBSCHMAN, P.E., P.P.
6 FT HIGH BOULDER WALLL CALCS

LOT 1.01, BLOCK 48; LOT 2, BLOCK 47
ALPINE, NEW JERSEY
JOB #3882

6 FT HIGH BOULDER RETAINING WALL

$H_1 =$ 8.0 ' TOTAL HEIGHT OF STRUCTURE FROM BASE TO TOP
$H_2 =$ 6.0 ' HIGH STONE WALL (EXPOSED HEIGHT)
$H_3 =$ 2.0 ' EMBEDMENT DEPTH
$l_1 =$ 3.0 ' THICK AT TOP OF WALL
$l_2 =$ 4.5 ' THICK AT BOTTOM OF WALL

DESIGN PARAMETERS

     γ soil $=$ 115 pcf $\phi = 30°$
     γ rock $=$ 135 pcf

       H $=$ 6.0 ' +   2.0 ' $=$ 8.0

Back Slope = 3 Horiz/1 Vert
     $\beta =$ 18 ° max

Assume case 2, $\phi = 30°$, $\beta = 18°$
     $K_h =$ 40 psf/ft   From Figure 26.9 pg 425 Foundation Engineering, Peck
     $K_v =$ 10 psf/ft   From Figure 26.9 pg 425 Foundation Engineering, Peck

HORIZONTAL FORCE P_{AH} ACTING ON SOIL SIDE

P_{AH} $=$ $(0.5)(H^2)(K_h)$ From Figure 26.9 Foundation Engineering, Peck
       $=$ 0.5 x 8.0 ft^2 x   40 psf/ft
       $=$ 1280 plf

VERTICAL FORCE P_{AV} ACTING ON SOIL SIDE

P_{AV} $=$ $(0.5)(H^2)(K_v)$
       $=$ 0.5 x 8.0^2 x   10 psf/ft
       $=$ 320 plf

OVERTURNING MOMENT

M_o $=$ $(P_{AH})(H/3)$
       $=$ 1280 plf x   8.0 ft / 3
       $=$ 3,413 ft-lbs

WEIGHT OF WALL

Rectangular Section:

W_R $=$ THICKNESS X H x γ rock
       $=$ 3.0 x   8.0 ft x   135 pcf
       $=$ 3,240 plf

HUBSCHMAN ENGINEERING, P.A.
MICHAEL J. HUBSCHMAN, P.E., P.P.
6 FT HIGH BOULDER WALLL CALCS

LOT 1.01, BLOCK 48; LOT 2, BLOCK 47
ALPINE, NEW JERSEY
JOB #3882

Triangular Section:

$$W_T = \frac{1}{2} \times \text{THICKNESS} \times H \times \gamma \text{ rock}$$
$$= 0.5 \times \quad 1.5 \text{ ft} \times \quad 8.0 \text{ ft} \times \quad 135 \text{ pcf}$$
$$= 810 \text{ plf}$$

Wall Weight

$$W_W = \text{Rectangular Section} + \text{Triangular Section}$$
$$= 3240 \text{ plf} + \quad 810 \text{ plf}$$
$$= 4,050 \text{ plf}$$

RIGHTING MOMENT   Note: Passive soil force neglected to be conservative

$$M_R = \text{Moment due to Rectangular Section of Wall} + \text{Moment due to Triangular Section of Wall}$$
+ Moment due to vertical component of earth pressure from backslope.
$$= 3,240 \text{ plf} \times \quad 3.0 \text{ ft} + \quad 810 \text{ plf} \times \quad 1.00 \text{ ft} + \quad 320 \text{ plf} \times \quad 4.5 \text{ ft}$$
$$= 11,970 \text{ ft-lbs/ft}$$

FACTOR OF SAFETY AGAINST OVERTURNING

$$\text{F.S.} = \frac{M_R}{M_o} \quad \quad \text{Note: Passive soil force neglected to be conservative}$$
$$= \frac{11,970 \text{ ft-lbs/ft}}{3,413 \text{ ft-lbs/ft}}$$
$$= 3.51 \quad > 2.0 \text{ OK}$$

SLIDING

$$F_H = P_{AH}$$
$$= 1,280 \text{ plf}$$
$$F_f = N\mu \quad\quad\quad\quad \mu = 0.48\text{-}0.50 \text{ use } (0.49$$
$$= (W_W + P_{AV}) \times 0.49$$
$$= (\quad 4,050 \text{ plf} + \quad 320 \text{ plf}) \times 0.49$$
$$= 2,141 \text{ plf}$$

FACTOR OF SAFETY AGAINST SLIDING

$$\text{F.S.} = \frac{F_f}{F_H}$$
$$= 2,141 \text{ plf} / \quad 1,280 \text{ plf}$$
$$= 1.67 \quad\quad > 1.5 \text{ OK}$$

BEARING

$$= (W_W + P_{av}) / \text{BASE WIDTH}$$
$$= (\quad 4,050 \text{ plf} + \quad 320 \text{ plf}) / \quad 4.5 \text{ ft}^2$$
$$= 971 \text{ psf} \quad\quad < 2000 \text{ OK}$$

HUBSCHMAN ENGINEERING
MICHAEL J. HUBSCHMAN, P.E., P.P.
6 FT HIGH BOULDER WALL CALCS

LOT 1.01, BLOCK 48; LOT 2, BLOCK 47
ALPINE, NEW JERSEY
JOB # 3882

$$\longleftarrow l_1 \longrightarrow$$

H_2

H_1

H_3

P_{AV}

$W_T \quad W_R$

P_{AH}

$H_1/3$

$$\longleftarrow l_2 \longrightarrow$$
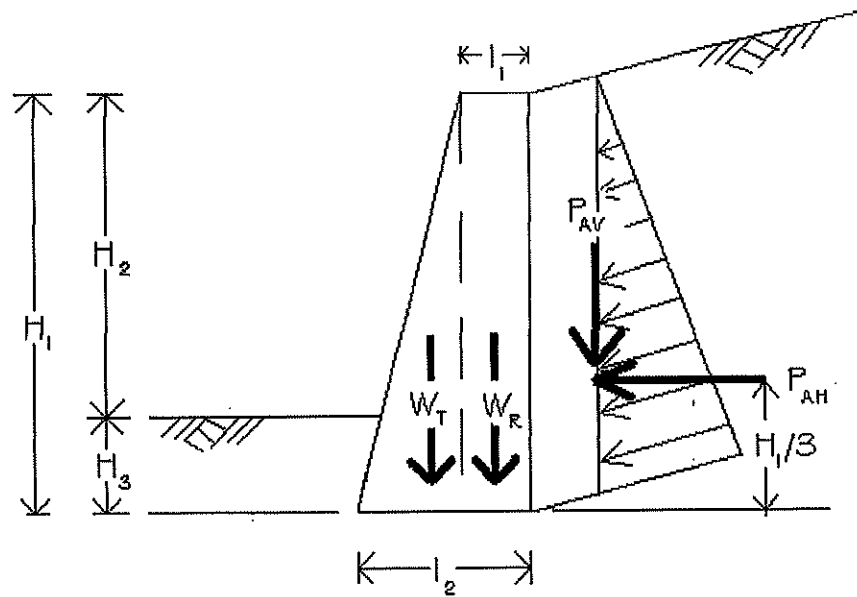
DRAINAGE REPORT

ALPINE COMMUNITY CHURCH
CLOSTER DOCK ROAD
LOT 1.01, BLOCK 48; LOT 2 BLOCK 47
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
(FILE # 3882)

PREPARED ON:

December 28, 2021

PREPARED FOR:

APPLICANT
Alpine M E Church
Closter Dock Road
Alpine, New Jersey 07620

MICHAEL J. HUBSCHMAN, P.C.
MICHAEL J. HUBSCHMAN, P.E., P.P.
PROFESSIONAL ENGINEER AND PLANNER
263 A SOUTH WASHINGTON AVENUE
BERGENFIELD, NEW JERSEY 07621

NJPE No. 29497   NJPP No. 3200

HUBSCHMAN ENGINEERING, P.A.
MICHAEL J. HUBSCHMAN, P.E., P.P.
DRAINAGE REPORT

ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE # 3882

TABLE OF CONTENTS

HUBSCHMAN ENGINEERING, P.A.
MICHAEL J. HUBSCHMAN, P.E., P.P.
DRAINAGE REPORT

ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE # 3882

INTRODUCTION:

This report has been developed to demonstrate compliance of the proposed drainage improvements on the project site with the Borough of Alpine Stormwater Control Ordinance and the NJDEP Stormwater Management Regulations. This project does not qualify as a major project under both of the above listed regulations because it proposes less than one acre of overall land disturbance and less than ¼ acre (10,754 sf) of net new increase of impervious surface coverage for both lots combined.

The project site is a Community Church comprised of 2-lots, consisting of a 124,822 square foot (2.86 acre) lot located along the Old Dock Road in the Borough of Alpine, Bergen County, New Jersey. The applicant proposes site improvements that include two parking lot expansions, 18-parking spaces for 5 Old Dock Road and 25-parking spaces for 995 Old Dock Road.

EVALUATION:

The development areas of both lots were analyzed utilizing HydroCAD computer model based the Modified Rational Method for NJDEP Water Quality design storm, quantity for 2, 10, 25 and 100-year design storms and groundwater recharge.

CONCLUSIONS:

In accordance with the RSIS requirements, the Storage provided for the Water Quality is designed to handle runoff and reduce peak flow discharge for the proposed parking areas of both lots. The proposed stone layers of 12 in thick crushed stone under the previous paving systems meets the water quality volume and minimum groundwater recharge criteria. The stormwater treatment system for the new parking area, consists of a pervious paving system that provide a Total Suspended Solids (TSS) removal rate of 80% and is considered to be a green infrastructure. Except the 100-year for the parking area proposed for the site located at 5 Old Dock Road, the peak runoffs for both parking areas will decrease as a result of construction as shown in the summary tables that follow:

HUBSCHMAN ENGINEERING, P.A.
MICHAEL J. HUBSCHMAN, P.E., P.P.
DRAINAGE REPORT

ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE # 3882

STORMWATER MANAGEMENT SUMMARY (No. 995 Old Dock Road)

Design Storm	Pre development Developed Parking Area Runoff (cfs)	Post Development Parking Area Surface Runoff (cfs)
2 yr.	0.26	0.00
10 yr.	0.35	0.00
25 yr.	0.41	0.00
100 yr.	0.49	0.40

STORMWATER MANAGEMENT SUMMARY (No. 5 Old Dock Road)

Design Storm	Pre development Developed Parking Area Runoff (cfs)	Post Development Parking Area Surface Runoff (cfs) [1]
2 yr.	0.41	0.00
10 yr.	0.57	0.08
25 yr.	0.66	0.52
100 yr.	0.78	0.93

(1) Discharge to Hudson River Watershed.

HUBSCHMAN ENGINEERING, P.A.
MICHAEL J. HUBSCHMAN, P.E., P.P.
DRAINAGE REPORT

ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE # 3882

SECTION 1

EXISTING CONDITIONS

HydroCAD Model Report – Existing Conditions

HUBSCHMAN ENGINEERING, P.A.
MICHAEL J. HUBSCHMAN, P.E., P.P.
DRAINAGE REPORT

ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE #3882

A2

No.995 Parking addition
(to be developed)

A1

No.5 Parking addition
(to be developed)

Subcat Reach Pond Link

Drainage Diagram for 3882 EXISTING CONDITIONS
Prepared by HUBSCHMAN ENGINEERING, P.A.
HydroCAD® 7.00 s/n 002902 © 1986-2003 Applied Microcomputer Systems

HUBSCHMAN ENGINEERING, P.A.
MICHAEL J. HUBSCHMAN, P.E., P.P.
DRAINAGE REPORT

ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE #3882

3882 EXISTING CONDITIONS   *nj-dep 2-Year Duration=10 min, Inten=4.20 in/hr*
Prepared by HUBSCHMAN ENGINEERING, P.A.   Page 2
HydroCAD® 7.00 s/n 002902 © 1986-2003 Applied Microcomputer Systems

Subcatchment A1: No.5 Parking addition (to be developed)

Runoff   =   0.41 cfs @   0.17 hrs, Volume=   0.006 af, Depth= 0.41"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
nj-dep 2-Year Duration=10 min, Inten=4.20 in/hr

Area (sf)	C	Description
7,305	0.59	Wood or Forest Land HSG C

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

Subcatchment A1: No.5 Parking addition (to be developed)

nj-dep 2-Year
Duration=10 min,
Inten=4.20 in/hr
Runoff Area=7,305 sf
Runoff Volume=0.006 af
Runoff Depth=0.41"
Tc=10.0 min
C=0.59

1.2

HUBSCHMAN ENGINEERING, P.A.
MICHAEL J. HUBSCHMAN, P.E., P.P.
DRAINAGE REPORT

ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE #3882

3882 EXISTING CONDITIONS *nj-dep 2-Year Duration=10 min, Inten=4.20 in/hr*
Prepared by HUBSCHMAN ENGINEERING, P.A. Page 3
HydroCAD® 7.00 s/n 002902 © 1986-2003 Applied Microcomputer Systems

Subcatchment A2: No.995 Parking addition (to be developed)

Runoff = 0.26 cfs @ 0.17 hrs, Volume= 0.004 af, Depth= 0.41"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
nj-dep 2-Year Duration=10 min, Inten=4.20 in/hr

Area (sf)	C	Description
4,556	0.59	Wood or Forest Land, HSG C

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

Subcatchment A2: No.995 Parking addition (to be developed)

Hydrograph

nj-dep 2-Year
Duration=10 min,
Inten=4.20 in/hr
Runoff Area=4,556 sf
Runoff Volume=0.004 af
Runoff Depth=0.41"
Tc=10.0 min
C=0.59

1.3

HUBSCHMAN ENGINEERING, P.A.
MICHAEL J. HUBSCHMAN, P.E., P.P.
DRAINAGE REPORT

ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE #3882

3882 EXISTING CONDITIONS *nj-dep 10-Year Duration=10 min, Inten=5.80 in/hr*
Prepared by HUBSCHMAN ENGINEERING, P.A.   Page 4
HydroCAD® 7.00 s/n 002902 © 1986-2003 Applied Microcomputer Systems

Subcatchment A1: No.5 Parking addition (to be developed)

Runoff   =   0.57 cfs @   0.17 hrs, Volume=   0.008 af, Depth= 0.57"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
nj-dep 10-Year Duration=10 min, Inten=5.80 in/hr

Area (sf)	C	Description
7,305	0.59	Wood or Forest Land HSG C

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

Subcatchment A1: No.5 Parking addition (to be developed)

Hydrograph

nj-dep 10-Year
Duration=10 min,
Inten=5.80 in/hr
Runoff Area=7,305 sf
Runoff Volume=0.008 af
Runoff Depth=0.57"
Tc=10.0 min
C=0.59

1.4

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ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE #3882

3882 EXISTING CONDITIONS   *nj-dep 10-Year Duration=10 min, Inten=5.80 in/hr*
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Subcatchment A2: No.995 Parking addition (to be developed)
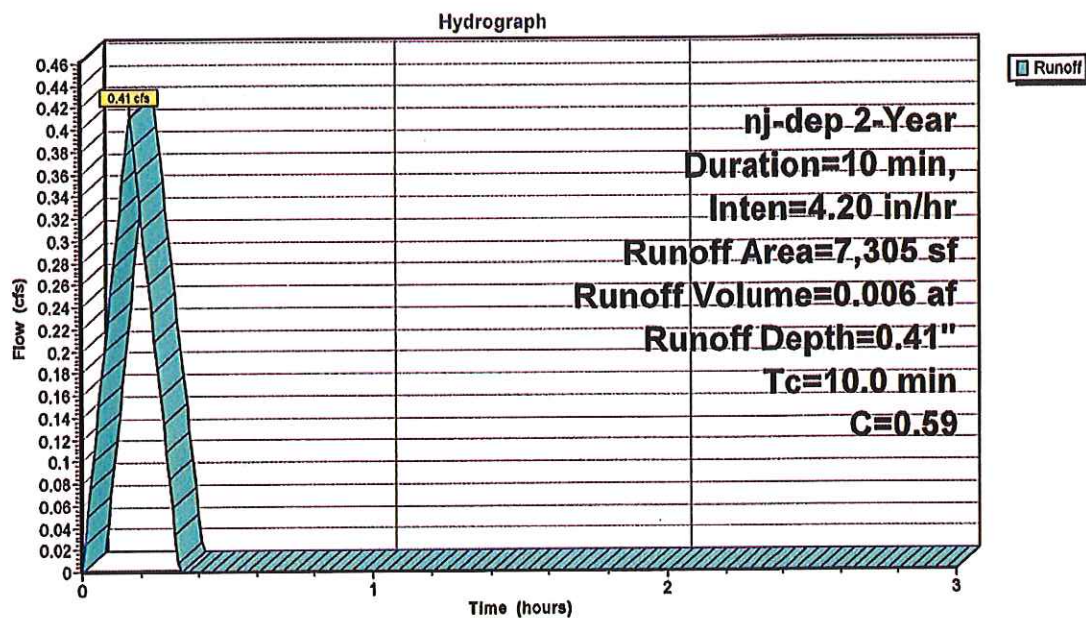
Runoff   =   0.35 cfs @   0.17 hrs, Volume=   0.005 af, Depth= 0.57"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
nj-dep 10-Year Duration=10 min, Inten=5.80 in/hr

Area (sf)	C	Description
4,556	0.59	Wood or Forest Land, HSG C

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

Subcatchment A2: No.995 Parking addition (to be developed)

Hydrograph

nj-dep 10-Year
Duration=10 min,
Inten=5.80 in/hr
Runoff Area=4,556 sf
Runoff Volume=0.005 af
Runoff Depth=0.57"
Tc=10.0 min
C=0.59

1.5

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3882 EXISTING CONDITIONS   *nj-dep 25-Year Duration=10 min, Inten=6.70 in/hr*

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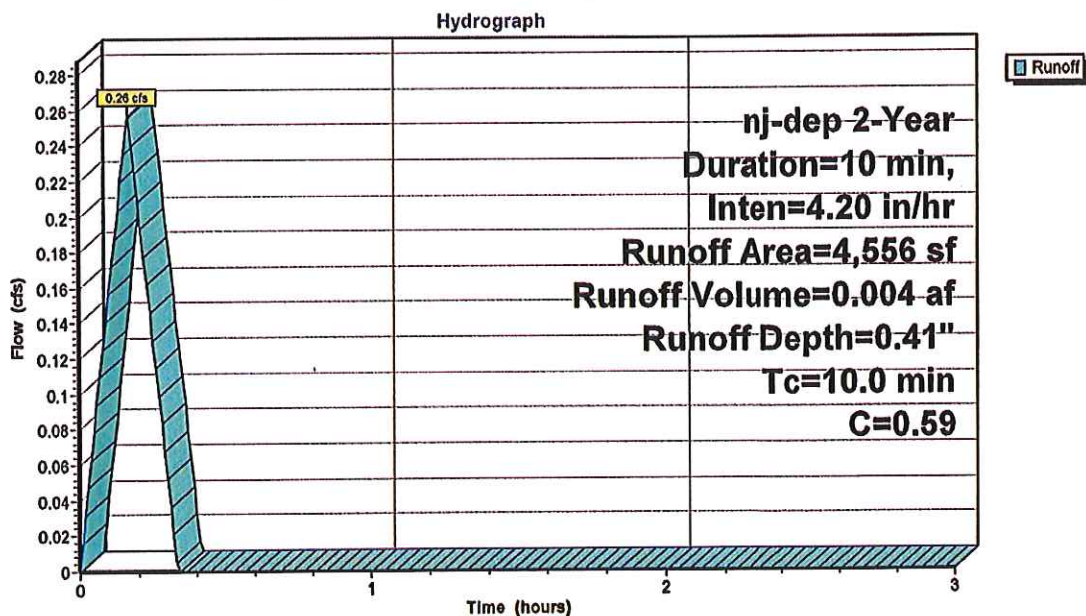### Subcatchment A1: No.5 Parking addition (to be developed)

Runoff   =   0.66 cfs @   0.17 hrs, Volume=   0.009 af, Depth= 0.66"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
nj-dep 25-Year Duration=10 min, Inten=6.70 in/hr

Area (sf)	C	Description
7,305	0.59	Wood or Forest Land HSG C

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

Subcatchment A1: No.5 Parking addition (to be developed)

Hydrograph

nj-dep 25-Year
Duration=10 min,
Inten=6.70 in/hr
Runoff Area=7,305 sf
Runoff Volume=0.009 af
Runoff Depth=0.66"
Tc=10.0 min
C=0.59

1.6

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3882 EXISTING CONDITIONS   *nj-dep 25-Year Duration=10 min, Inten=6.70 in/hr*
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Subcatchment A2: No.995 Parking addition (to be developed)
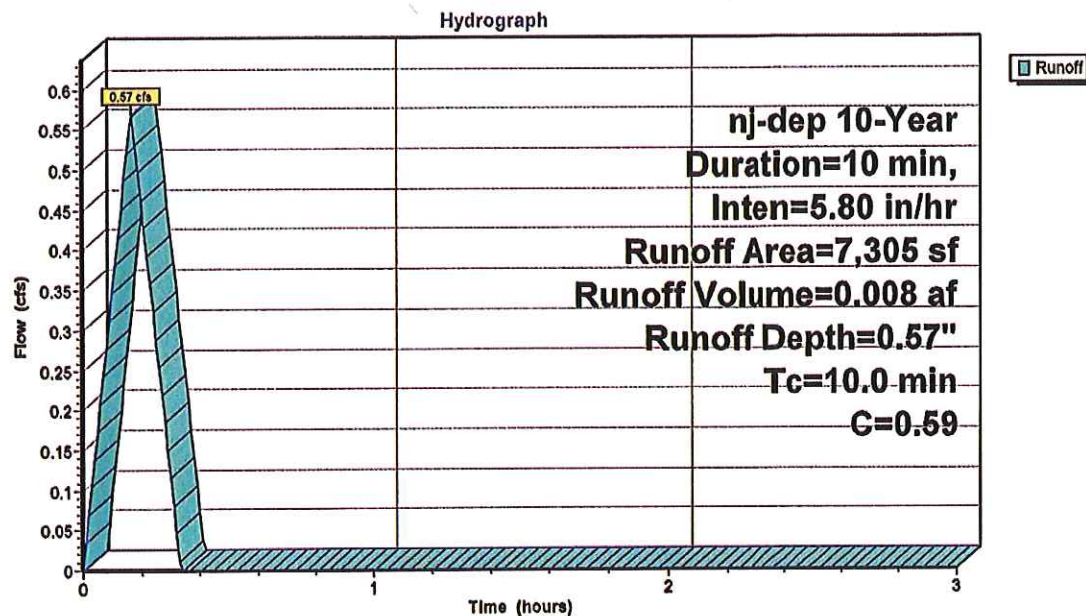
Runoff   =   0.41 cfs @   0.17 hrs, Volume=   0.006 af, Depth= 0.66"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
nj-dep 25-Year Duration=10 min, Inten=6.70 in/hr

Area (sf)	C	Description
4,556	0.59	Wood or Forest Land, HSG C

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

Subcatchment A2: No.995 Parking addition (to be developed)

Hydrograph

nj-dep 25-Year
Duration=10 min,
Inten=6.70 in/hr
Runoff Area=4,556 sf
Runoff Volume=0.006 af
Runoff Depth=0.66"
Tc=10.0 min
C=0.59

1.7

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3882 EXISTING CONDITIONS   *nj-dep 100-Year Duration=10 min, Inten=8.00 in/hr*
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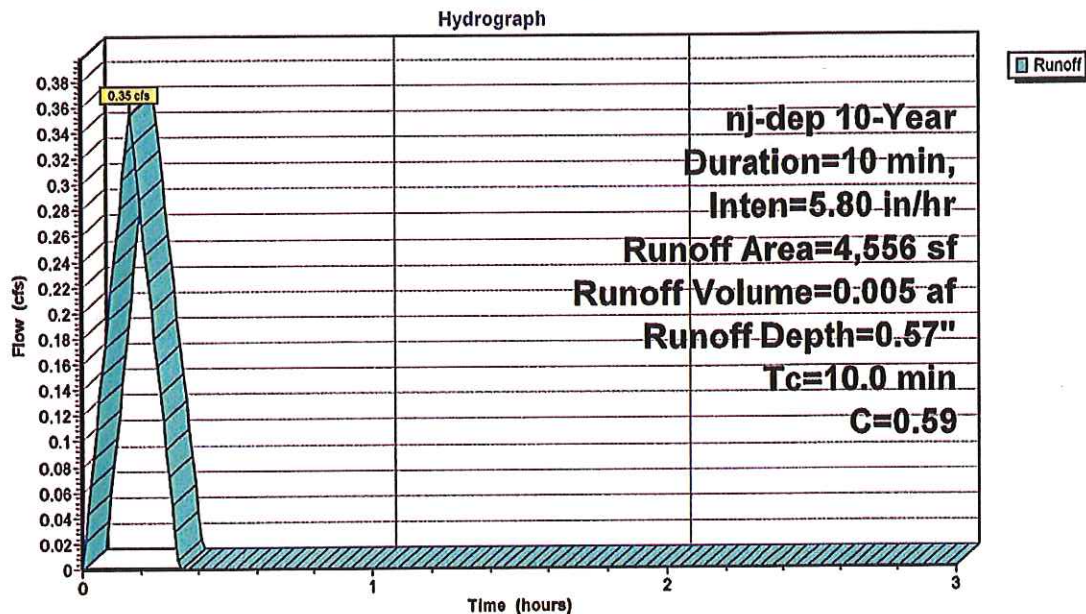### Subcatchment A1: No.5 Parking addition (to be developed)

Runoff   =   0.78 cfs @   0.17 hrs, Volume=   0.011 af, Depth= 0.79"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
nj-dep 100-Year Duration=10 min, Inten=8.00 in/hr

Area (sf)	C	Description
7,305	0.59	Wood or Forest Land HSG C

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

Subcatchment A1: No.5 Parking addition (to be developed)

Hydrograph

nj-dep 100-Year
Duration=10 min,
Inten=8.00 in/hr
Runoff Area=7,305 sf
Runoff Volume=0.011 af
Runoff Depth=0.79"
Tc=10.0 min
C=0.59

1.8

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3882 EXISTING CONDITIONS   *nj-dep 100-Year Duration=10 min, Inten=8.00 in/hr*
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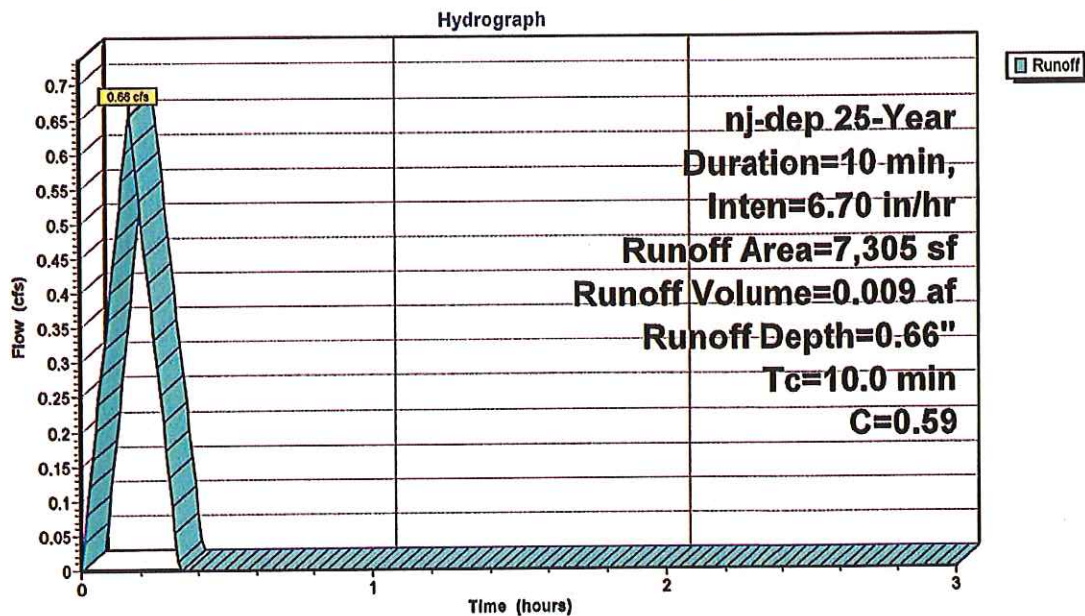### Subcatchment A2: No.995 Parking addition (to be developed)

Runoff   =   0.49 cfs @   0.17 hrs, Volume=   0.007 af, Depth= 0.79"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
nj-dep 100-Year Duration=10 min, Inten=8.00 in/hr

Area (sf)	C	Description
4,556	0.59	Wood or Forest Land, HSG C

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

Subcatchment A2: No.995 Parking addition (to be developed)

Hydrograph

nj-dep 100-Year
Duration=10 min,
Inten=8.00 in/hr
Runoff Area=4,556 sf
Runoff Volume=0.007 af
Runoff Depth=0.79"
Tc=10.0 min
C=0.59

1.9

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ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE # 3882

SECTION 2

PROPOSED CONDITIONS
HydroCAD Model Report – Proposed Conditions

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ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE #3882

A2

No.995 Parking addition
(to be developed)

1P

Pervious Pavement
No.2

A1

No.5 Parking addition
(to be developed)

2P

Pervious Pavement
No.1

Subcat   Reach   Pond   Link

Drainage Diagram for 3882 PROPOSED CONDITIONS
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FILE #3882

3882 PROPOSED CONDITIONS   *nj-dep Quality Duration=14 min, Inten=2.69 in/hr*
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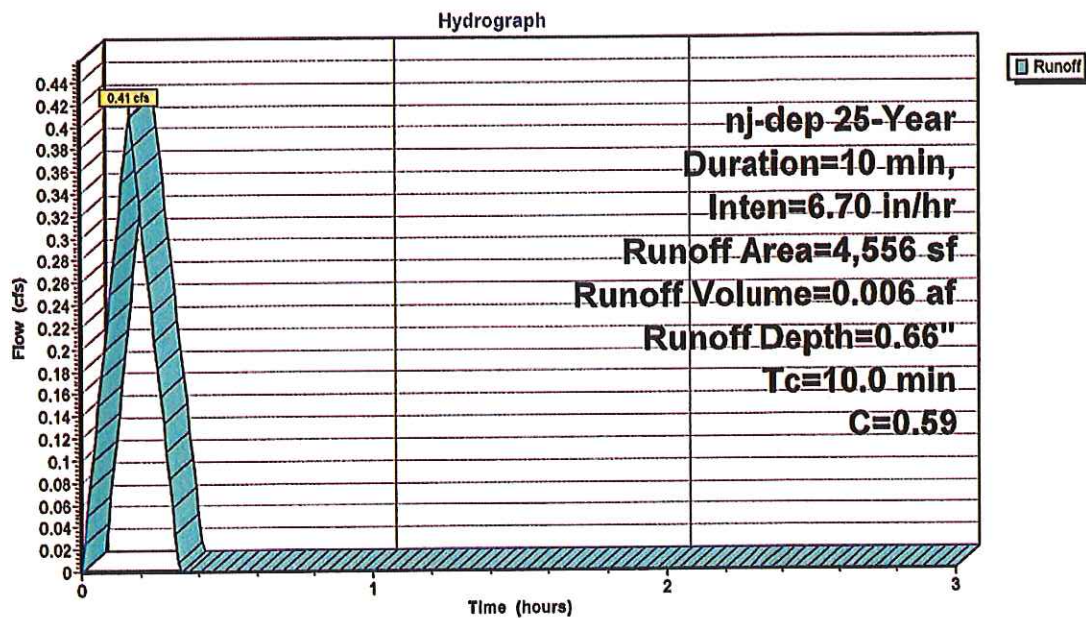
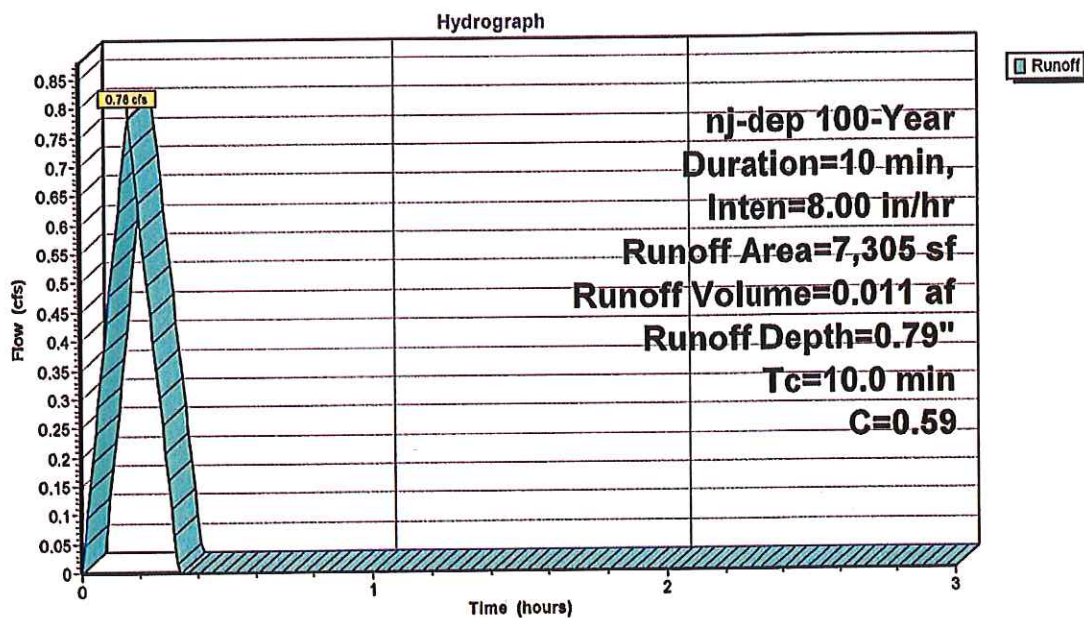### Subcatchment A1: No.5 Parking addition (to be developed)

Runoff   =   0.45 cfs @   0.17 hrs, Volume=   0.009 af, Depth= 0.62"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
nj-dep Quality Duration=14 min, Inten=2.69 in/hr

Area (sf)	C	Description
7,305	0.99	Paved parking & roofs

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

Subcatchment A1: No.5 Parking addition (to be developed)

Hydrograph

nj-dep Quality
Duration=14 min,
Inten=2.69 in/hr
Runoff Area=7,305 sf
Runoff Volume=0.009 af
Runoff Depth=0.62"
Tc=10.0 min
C=0.99

2.2

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ALPINE COMMUNITY CHURCH
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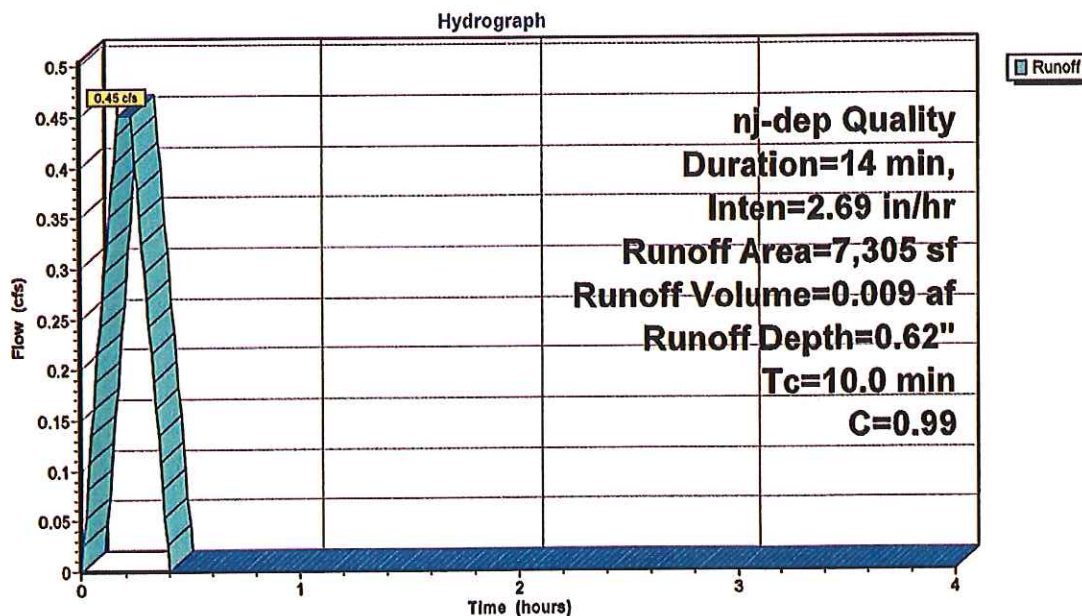
3882 PROPOSED CONDITIONS　　　*nj-dep Quality Duration=14 min, Inten=2.69 in/hr*
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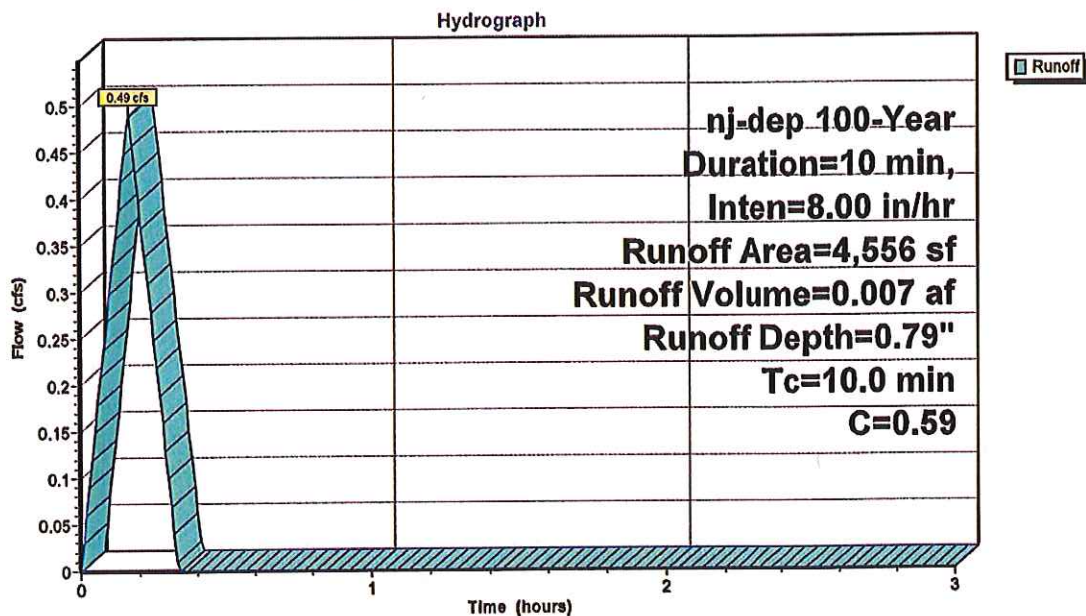## Subcatchment A2: No.995 Parking addition (to be developed)

Runoff　　=　　0.28 cfs @　0.17 hrs, Volume=　　0.005 af, Depth= 0.62"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
nj-dep Quality Duration=14 min, Inten=2.69 in/hr

Area (sf)	C	Description
4,556	0.99	Paved parking & roofs

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

Subcatchment A2: No.995 Parking addition (to be developed)

Hydrograph

nj-dep Quality
Duration=14 min,
Inten=2.69 in/hr
Runoff Area=4,556 sf
Runoff Volume=0.005 af
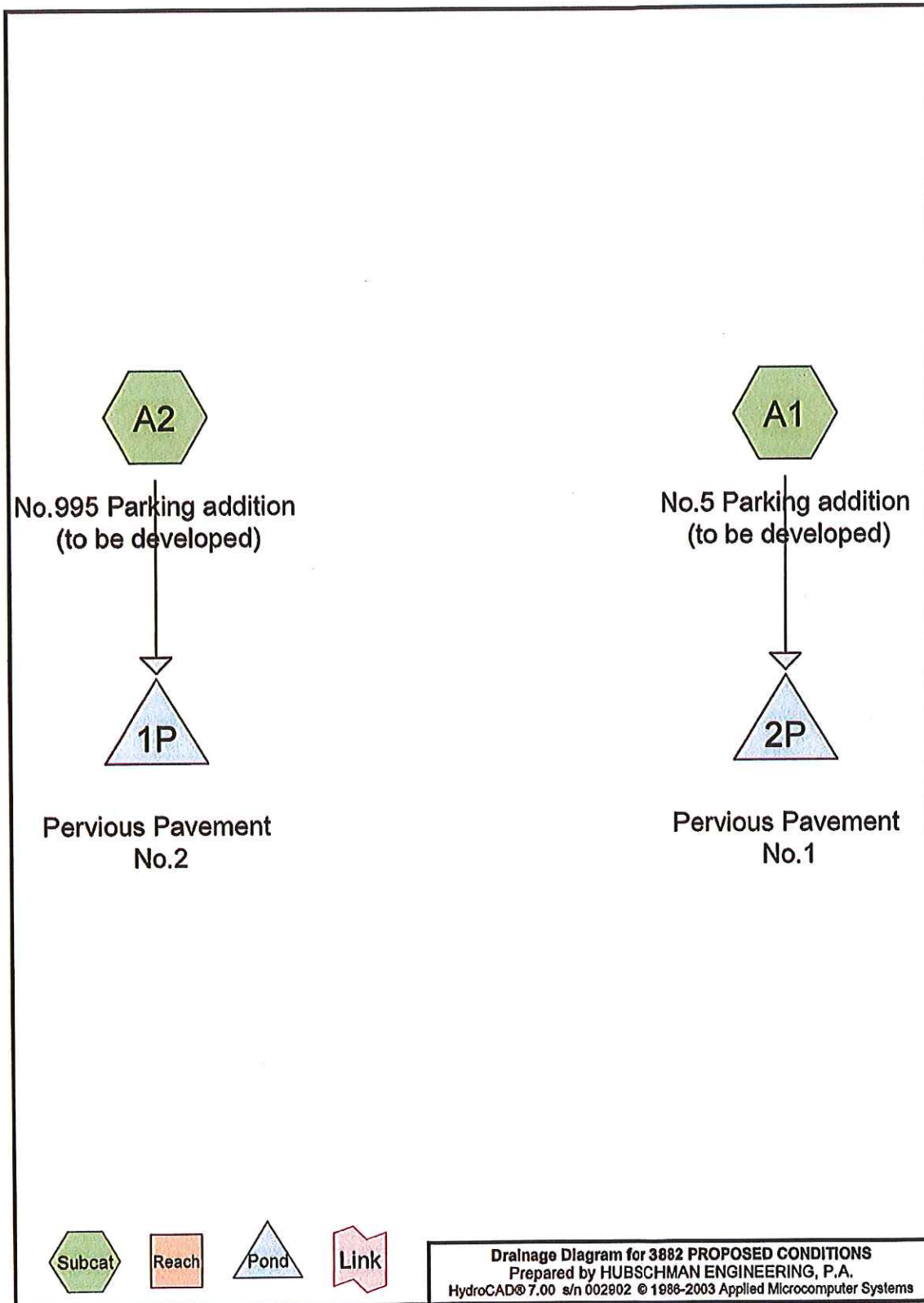Runoff Depth=0.62"
Tc=10.0 min
C=0.99

2.3

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ALPINE COMMUNITY CHURCH
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3882 PROPOSED CONDITIONS   *nj-dep Quality Duration=14 min, Inten=2.69 in/hr*

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Pond 1P: Pervious Pavement No.2

Inflow Area =	0.105 ac,	Inflow Depth =	0.62"	for	Quality event
Inflow =	0.28 cfs @	0.17 hrs,	Volume=	0.005 af	
Outflow =	0.07 cfs @	0.09 hrs,	Volume=	0.005 af,	Atten= 76%, Lag= 0.0 min
Discarded =	0.07 cfs @	0.09 hrs,	Volume=	0.005 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 462.25' @ 0.36 hrs Surf.Area= 1,458 sf Storage= 149 cf
Plug-Flow detention time= 18.3 min calculated for 0.005 af (100% of inflow)
Center-of-Mass det. time= 18.5 min (30.5 - 12.0)

#	Invert	Avail.Storage	Storage Description
1	462.00'	583 cf	**18.00'W x 81.00'L x 1.00'H Prismatoid**
			1,458 cf Overall x 40.0% Voids

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	**0.002778 fpm Exfiltration over entire Surface area**
2	Primary	462.75'	**67.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.07 cfs @ 0.09 hrs HW=462.01' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=462.00' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
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3882 PROPOSED CONDITIONS   *nj-dep Quality Duration=14 min, Inten=2.69 in/hr*
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Pond 1P: Pervious Pavement No.2

Hydrograph

Inflow Area=0.105 ac
Peak Elev=462.25'
Storage=149 cf

Legend: Inflow, Outflow, Discarded, Primary

0.28 cfs
0.07 cfs
0.07 cfs
0.00 cfs

Flow (cfs) vs Time (hours)

2.5

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ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
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3882 PROPOSED CONDITIONS   *nj-dep Quality Duration=14 min, Inten=2.69 in/hr*
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Pond 2P: Pervious Pavement No.1

Inflow Area =	0.168 ac,	Inflow Depth = 0.62"	for Quality event	
Inflow =	0.45 cfs @	0.17 hrs, Volume=	0.009 af	
Outflow =	0.09 cfs @	0.08 hrs, Volume=	0.009 af, Atten= 80%, Lag= 0.0 min	
Discarded =	0.09 cfs @	0.08 hrs, Volume=	0.009 af	
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 456.34' @ 0.37 hrs Surf.Area= 1,920 sf Storage= 261 cf
Plug-Flow detention time= 24.5 min calculated for 0.009 af (100% of inflow)
Center-of-Mass det. time= 24.6 min (36.6 - 12.0)

#	Invert	Avail.Storage	Storage Description
1	456.00'	768 cf	**32.00'W x 60.00'L x 1.00'H Prismatoid** 1,920 cf Overall x 40.0% Voids

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	**0.002778 fpm Exfiltration over entire Surface area**
2	Primary	456.75'	**60.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.09 cfs @ 0.08 hrs HW=456.01' (Free Discharge)
└—**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=456.00' (Free Discharge)
└—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

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3882 PROPOSED CONDITIONS   *nj-dep Quality Duration=14 min, Inten=2.69 in/hr*
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Pond 2P: Pervious Pavement No.1

Hydrograph

Inflow Area=0.168 ac
Peak Elev=456.34'
Storage=261 cf

Legend:
- Inflow
- Outflow
- Discarded
- Primary

0.45 cfs
0.09 cfs
0.09 cfs
0.00 cfs

Flow (cfs) — Time (hours)

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ALPINE COMMUNITY CHURCH
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3882 PROPOSED CONDITIONS   *nj-dep 2-Year Duration=14 min, Inten=3.70 in/hr*
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Subcatchment A1: No.5 Parking addition (to be developed)

Runoff   =   0.62 cfs @   0.17 hrs, Volume=   0.012 af, Depth= 0.85"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
nj-dep 2-Year Duration=14 min, Inten=3.70 in/hr

Area (sf)	C	Description
7,305	0.99	Paved parking & roofs

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

Subcatchment A1: No.5 Parking addition (to be developed)

Hydrograph

nj-dep 2-Year
Duration=14 min,
Inten=3.70 in/hr
Runoff Area=7,305 sf
Runoff Volume=0.012 af
Runoff Depth=0.85"
Tc=10.0 min
C=0.99

2.8

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ALPINE COMMUNITY CHURCH
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FILE #3882
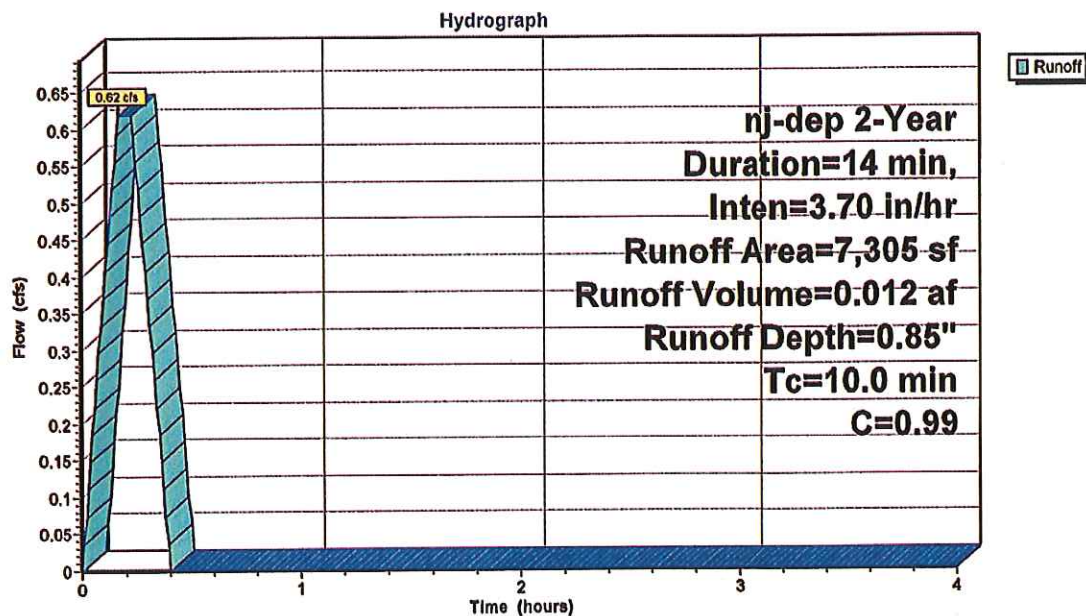
3882 PROPOSED CONDITIONS   *nj-dep 2-Year Duration=14 min, Inten=3.70 in/hr*
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Subcatchment A2: No.995 Parking addition (to be developed)

Runoff   =   0.39 cfs @   0.17 hrs, Volume=   0.007 af, Depth= 0.85"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
nj-dep 2-Year Duration=14 min, Inten=3.70 in/hr

Area (sf)	C	Description
4,556	0.99	Paved parking & roofs

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

Subcatchment A2: No.995 Parking addition (to be developed)

nj-dep 2-Year
Duration=14 min,
Inten=3.70 in/hr
Runoff Area=4,556 sf
Runoff Volume=0.007 af
Runoff Depth=0.85"
Tc=10.0 min
C=0.99

2.9

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FILE #3882
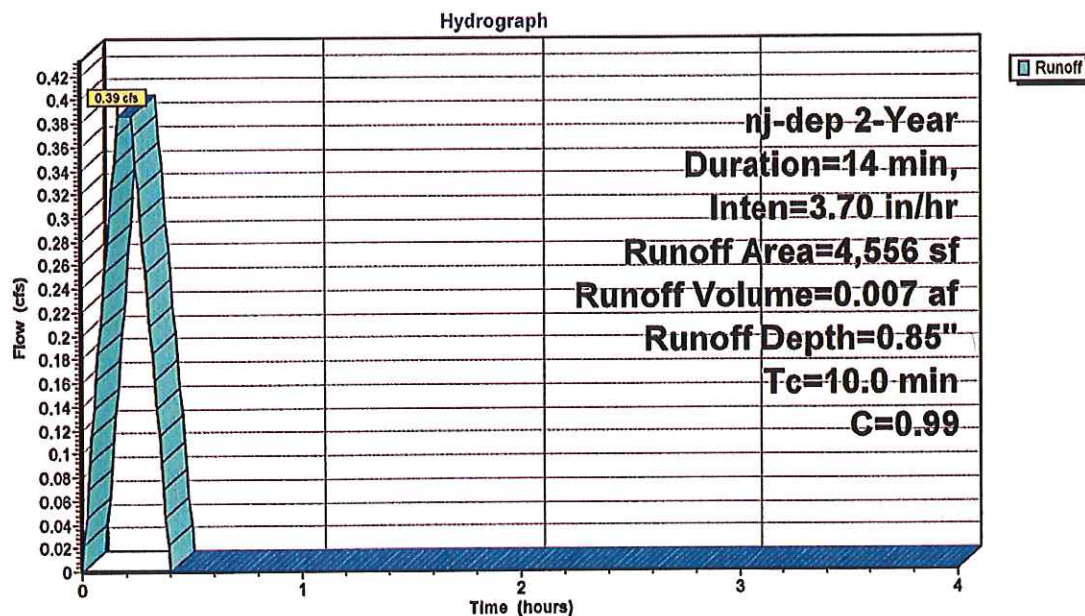
3882 PROPOSED CONDITIONS   *nj-dep 2-Year Duration=14 min, Inten=3.70 in/hr*
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Pond 1P: Pervious Pavement No.2

Inflow Area =	0.105 ac, Inflow Depth = 0.85"	for 2-Year event	
Inflow =	0.39 cfs @ 0.17 hrs, Volume=	0.007 af	
Outflow =	0.07 cfs @ 0.07 hrs, Volume=	0.007 af, Atten= 83%, Lag= 0.0 min	
Discarded =	0.07 cfs @ 0.07 hrs, Volume=	0.007 af	
Primary =	0.00 cfs @ 0.00 hrs, Volume=	0.000 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 462.40' @ 0.37 hrs Surf.Area= 1,458 sf Storage= 234 cf
Plug-Flow detention time= 28.9 min calculated for 0.007 af (100% of inflow)
Center-of-Mass det. time= 29.0 min (41.0 - 12.0)

#	Invert	Avail.Storage	Storage Description
1	462.00'	583 cf	18.00'W x 81.00'L x 1.00'H Prismatoid
			1,458 cf Overall x 40.0% Voids

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.002778 fpm Exfiltration over entire Surface area
2	Primary	462.75'	67.0' long x 10.0' breadth Broad-Crested Rectangular Weir
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.07 cfs @ 0.07 hrs HW=462.01' (Free Discharge)
└─1=Exfiltration (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=462.00' (Free Discharge)
└─2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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3882 PROPOSED CONDITIONS   *nj-dep 2-Year Duration=14 min, Inten=3.70 in/hr*
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Pond 1P: Pervious Pavement No.2

Hydrograph

Inflow Area=0.105 ac
Peak Elev=462.40'
Storage=234 cf

Legend: Inflow · Outflow · Discarded · Primary

0.39 cfs
0.07 cfs
0.07 cfs
0.00 cfs

Flow (cfs) — Time (hours)

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ALPINE COMMUNITY CHURCH
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FILE #3882
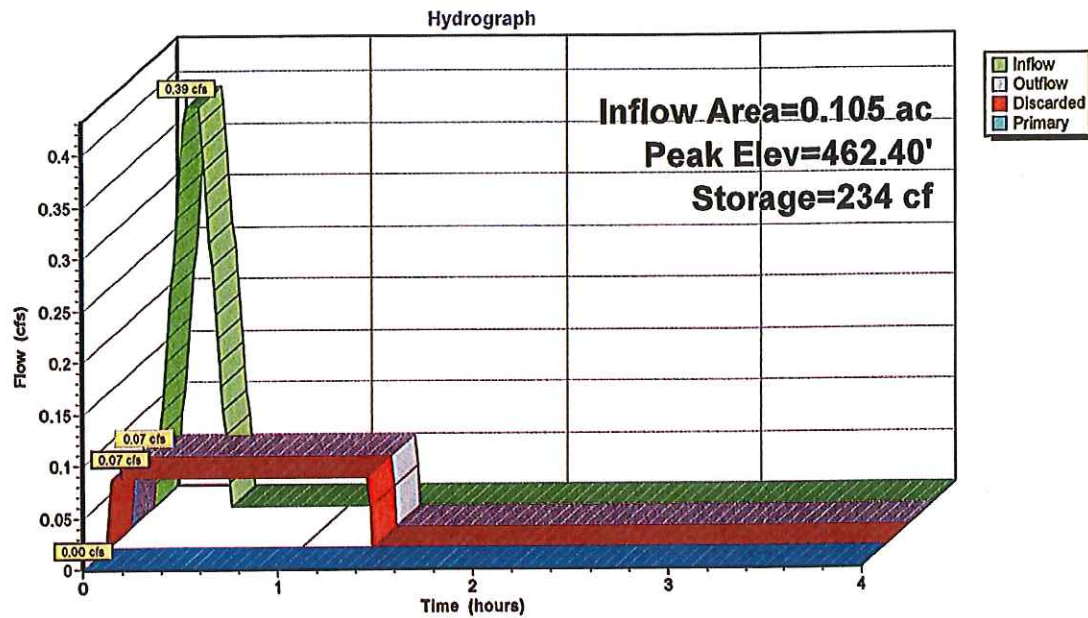
3882 PROPOSED CONDITIONS   *nj-dep 2-Year Duration=14 min, Inten=3.70 in/hr*
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Pond 2P: Pervious Pavement No.1

Inflow Area =	0.168 ac,	Inflow Depth = 0.85" for 2-Year event	
Inflow =	0.62 cfs @	0.17 hrs, Volume=	0.012 af
Outflow =	0.09 cfs @	0.06 hrs, Volume=	0.012 af, Atten= 86%, Lag= 0.0 min
Discarded =	0.09 cfs @	0.06 hrs, Volume=	0.012 af
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 456.52' @ 0.38 hrs   Surf.Area= 1,920 sf Storage= 399 cf
Plug-Flow detention time= 37.4 min calculated for 0.012 af (100% of inflow)
Center-of-Mass det. time= 37.5 min (49.5 - 12.0)

#	Invert	Avail.Storage	Storage Description
1	456.00'	768 cf	32.00'W x 60.00'L x 1.00'H Prismatoid 1,920 cf Overall x 40.0% Voids

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.002778 fpm Exfiltration over entire Surface area
2	Primary	456.75'	60.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.09 cfs @ 0.06 hrs HW=456.01' (Free Discharge)
└─1=Exfiltration (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=456.00' (Free Discharge)
└─2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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Pond 2P: Pervious Pavement No.1

Hydrograph

Inflow Area=0.168 ac
Peak Elev=456.52'
Storage=399 cf

Legend:
- Inflow
- Outflow
- Discarded
- Primary

0.62 cfs
0.09 cfs
0.09 cfs
0.00 cfs

Flow (cfs)

Time (hours)

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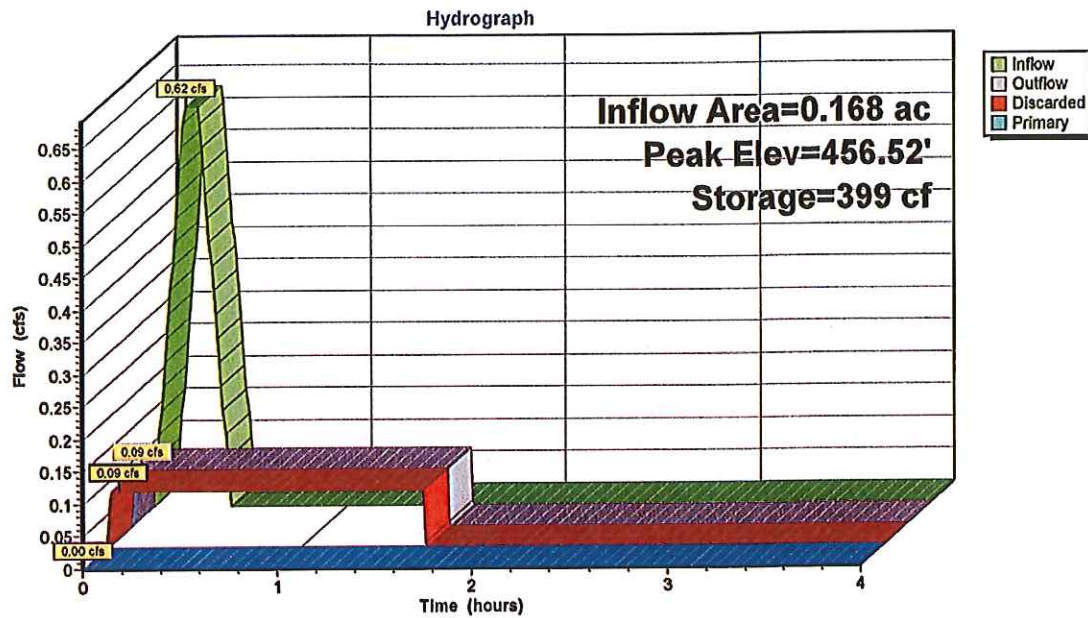
3882 PROPOSED CONDITIONS   *nj-dep 10-Year Duration=14 min, Inten=5.04 in/hr*
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Subcatchment A1: No.5 Parking addition (to be developed)

Runoff   =   0.84 cfs @   0.17 hrs, Volume=   0.016 af, Depth= 1.16"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
nj-dep 10-Year Duration=14 min, Inten=5.04 in/hr

Area (sf)	C	Description
7,305	0.99	Paved parking & roofs

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

Subcatchment A1: No.5 Parking addition (to be developed)

nj-dep 10-Year
Duration=14 min,
Inten=5.04 in/hr
Runoff Area=7,305 sf
Runoff Volume=0.016 af
Runoff Depth=1.16"
Tc=10.0 min
C=0.99

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Subcatchment A2: No.995 Parking addition (to be developed)

Runoff   =   0.53 cfs @   0.17 hrs, Volume=   0.010 af, Depth= 1.16"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
nj-dep 10-Year Duration=14 min, Inten=5.04 in/hr

Area (sf)	C	Description
4,556	0.99	Paved parking & roofs

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

Subcatchment A2: No.995 Parking addition (to be developed)

Hydrograph

nj-dep 10-Year
Duration=14 min,
Inten=5.04 in/hr
Runoff Area=4,556 sf
Runoff Volume=0.010 af
Runoff Depth=1.16"
Tc=10.0 min
C=0.99

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Pond 1P: Pervious Pavement No.2

Inflow Area =	0.105 ac,	Inflow Depth = 1.16"	for 10-Year event
Inflow =	0.53 cfs @	0.17 hrs, Volume=	0.010 af
Outflow =	0.07 cfs @	0.06 hrs, Volume=	0.010 af, Atten= 87%, Lag= 0.0 min
Discarded =	0.07 cfs @	0.06 hrs, Volume=	0.010 af
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 462.60' @ 0.38 hrs Surf.Area= 1,458 sf Storage= 350 cf
Plug-Flow detention time= 43.1 min calculated for 0.010 af (100% of inflow)
Center-of-Mass det. time= 43.4 min (55.4 - 12.0)

#	Invert	Avail.Storage	Storage Description
1	462.00'	583 cf	18.00'W x 81.00'L x 1.00'H Prismatoid 1,458 cf Overall x 40.0% Voids

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.002778 fpm Exfiltration over entire Surface area
2	Primary	462.75'	67.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.07 cfs @ 0.06 hrs HW=462.01' (Free Discharge)
⌐—1=Exfiltration (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=462.00' (Free Discharge)
⌐—2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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Pond 1P: Pervious Pavement No.2

Hydrograph

Inflow Area=0.105 ac
Peak Elev=462.60'
Storage=350 cf

Legend:
- Inflow
- Outflow
- Discarded
- Primary

0.53 cfs
0.07 cfs
0.07 cfs
0.00 cfs

Flow (cfs) — Time (hours)

2.17

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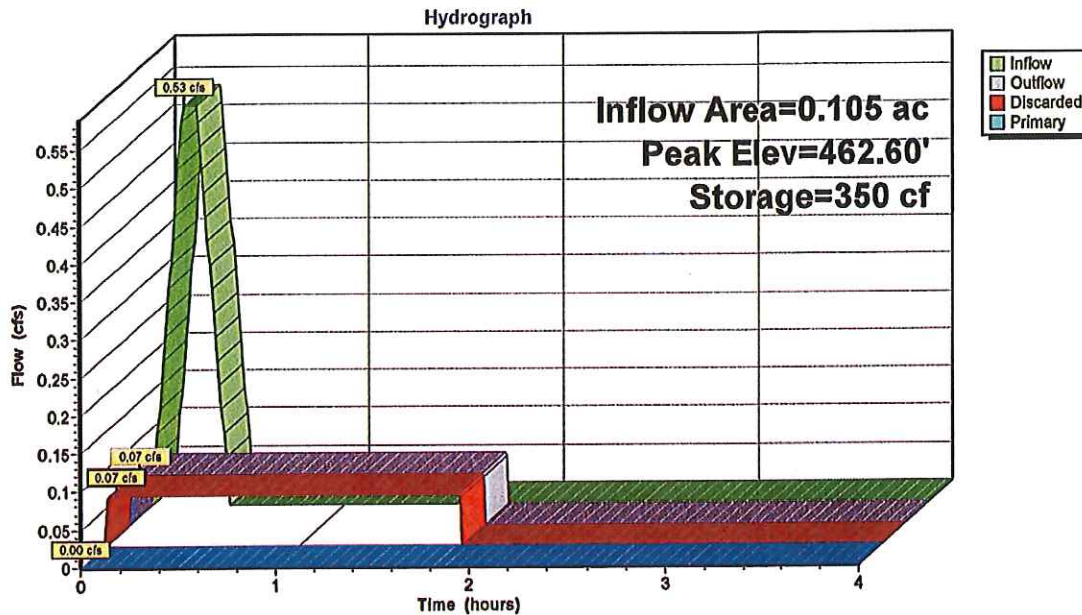
3882 PROPOSED CONDITIONS   *nj-dep 10-Year Duration=14 min, Inten=5.04 In/hr*
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Pond 2P: Pervious Pavement No.1

Inflow Area =   0.168 ac, Inflow Depth = 1.16" for 10-Year event
Inflow   =   0.84 cfs @ 0.17 hrs, Volume=   0.016 af
Outflow   =   0.17 cfs @ 0.37 hrs, Volume=   0.016 af, Atten= 80%, Lag= 11.9 min
Discarded =   0.09 cfs @ 0.05 hrs, Volume=   0.016 af
Primary   =   0.08 cfs @ 0.37 hrs, Volume=   0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 456.76' @ 0.37 hrs Surf.Area= 1,920 sf Storage= 581 cf
Plug-Flow detention time= 53.7 min calculated for 0.016 af (100% of inflow)
Center-of-Mass det. time= 53.8 min (65.8 - 12.0)

#	Invert	Avail.Storage	Storage Description
1	456.00'	768 cf	32.00'W x 60.00'L x 1.00'H Prismatoid 1,920 cf Overall x 40.0% Voids

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.002778 fpm Exfiltration over entire Surface area
2	Primary	456.75'	60.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.09 cfs @ 0.05 hrs HW=456.01' (Free Discharge)
└─1=Exfiltration (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.08 cfs @ 0.37 hrs HW=456.76' (Free Discharge)
└─2=Broad-Crested Rectangular Weir (Weir Controls 0.08 cfs @ 0.2 fps)

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Pond 2P: Pervious Pavement No.1

Hydrograph

Inflow Area=0.168 ac
Peak Elev=456.76'
Storage=581 cf

Legend: Inflow, Outflow, Discarded, Primary

0.84 cfs
0.17 cfs
0.09 cfs
0.08 cfs

Flow (cfs) vs Time (hours)

2.19

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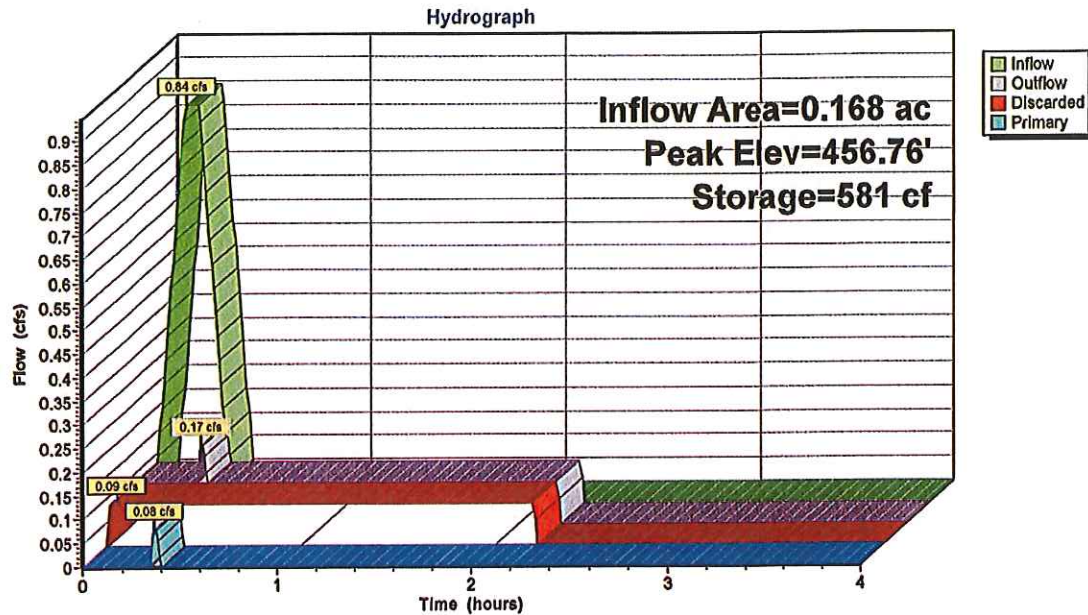
3882 PROPOSED CONDITIONS *nj-dep 25-Year Duration=14 min, Inten=5.86 in/hr*
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Subcatchment A1: No.5 Parking addition (to be developed)

Runoff   =   0.98 cfs @   0.17 hrs, Volume=   0.019 af, Depth= 1.35"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
nj-dep 25-Year Duration=14 min, Inten=5.86 in/hr

Area (sf)	C	Description
7,305	0.99	Paved parking & roofs

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

Subcatchment A1: No.5 Parking addition (to be developed)

Hydrograph

nj-dep 25-Year
Duration=14 min,
Inten=5.86 in/hr
Runoff Area=7,305 sf
Runoff Volume=0.019 af
Runoff Depth=1.35"
Tc=10.0 min
C=0.99

2.20

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3882 PROPOSED CONDITIONS   *nj-dep 25-Year Duration=14 min, Inten=5.86 in/hr*

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Subcatchment A2: No.995 Parking addition (to be developed)
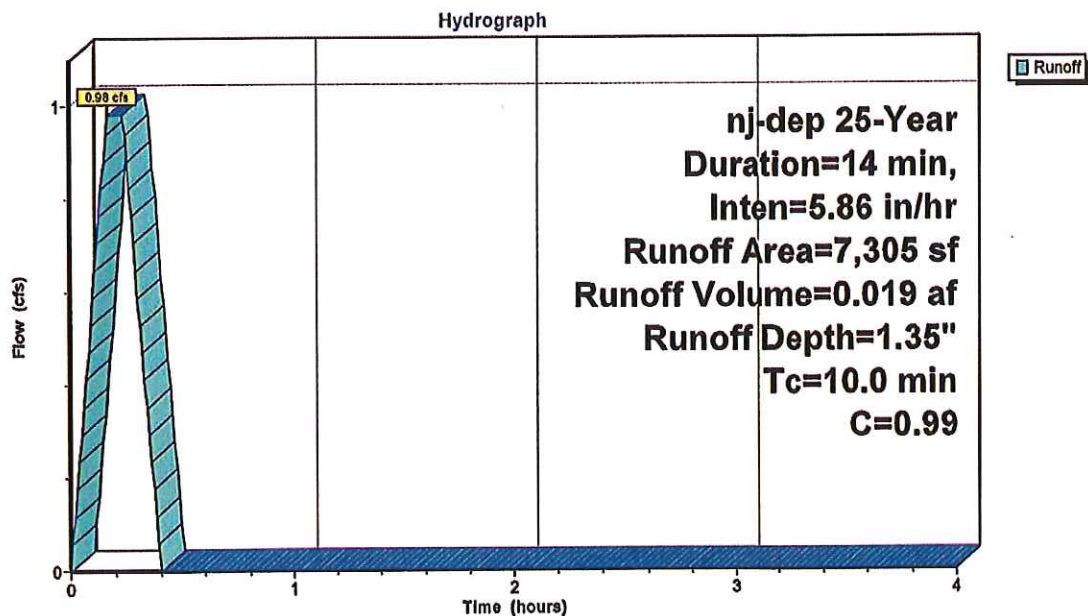
Runoff   =   0.61 cfs @   0.17 hrs, Volume=   0.012 af, Depth= 1.35"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
nj-dep 25-Year Duration=14 min, Inten=5.86 in/hr

Area (sf)	C	Description
4,556	0.99	Paved parking & roofs

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

Subcatchment A2: No.995 Parking addition (to be developed)

Hydrograph

nj-dep 25-Year
Duration=14 min,
Inten=5.86 in/hr
Runoff Area=4,556 sf
Runoff Volume=0.012 af
Runoff Depth=1.35"
Tc=10.0 min
C=0.99

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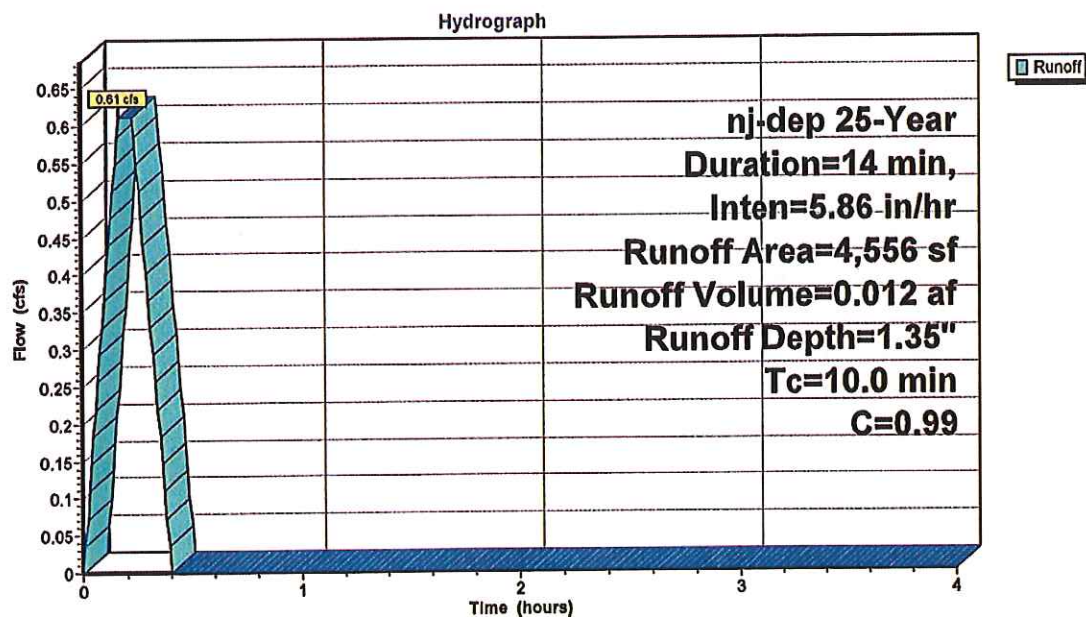
3882 PROPOSED CONDITIONS   *nj-dep 25-Year Duration=14 min, Inten=5.86 in/hr*
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Pond 1P: Pervious Pavement No.2

Inflow Area =	0.105 ac,	Inflow Depth = 1.35"	for 25-Year event
Inflow =	0.61 cfs @	0.17 hrs, Volume=	0.012 af
Outflow =	0.07 cfs @	0.05 hrs, Volume=	0.012 af, Atten= 89%, Lag= 0.0 min
Discarded =	0.07 cfs @	0.05 hrs, Volume=	0.012 af
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 462.72' @ 0.38 hrs Surf.Area= 1,458 sf Storage= 421 cf
Plug-Flow detention time= 51.9 min calculated for 0.012 af (100% of inflow)
Center-of-Mass det. time= 52.0 min (64.0 - 12.0)

#	Invert	Avail.Storage	Storage Description
1	462.00'	583 cf	18.00'W x 81.00'L x 1.00'H Prismatoid
			1,458 cf Overall x 40.0% Voids

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.002778 fpm Exfiltration over entire Surface area
2	Primary	462.75'	67.0' long x 10.0' breadth Broad-Crested Rectangular Weir
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.07 cfs @ 0.05 hrs HW=462.01' (Free Discharge)
└─1=Exfiltration (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=462.00' (Free Discharge)
└─2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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Pond 1P: Pervious Pavement No.2

Hydrograph

Inflow Area=0.105 ac
Peak Elev=462.72'
Storage=421 cf

Legend: Inflow, Outflow, Discarded, Primary

0.61 cfs
0.07 cfs
0.07 cfs
0.00 cfs

Flow (cfs) — Time (hours)

2.23

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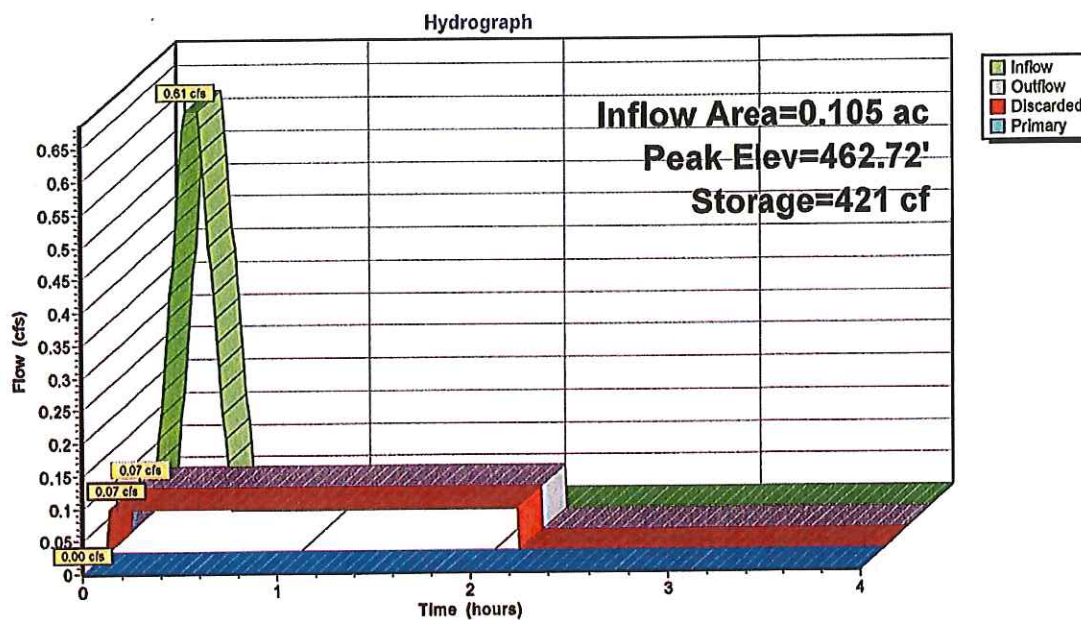
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Pond 2P: Pervious Pavement No.1

Inflow Area =	0.168 ac,	Inflow Depth = 1.35"	for 25-Year event	
Inflow =	0.98 cfs @	0.17 hrs, Volume=	0.019 af	
Outflow =	0.61 cfs @	0.30 hrs, Volume=	0.019 af, Atten= 38%, Lag= 7.8 min	
Discarded =	0.09 cfs @	0.05 hrs, Volume=	0.016 af	
Primary =	0.52 cfs @	0.30 hrs, Volume=	0.003 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 456.77' @ 0.30 hrs Surf.Area= 1,920 sf Storage= 594 cf
Plug-Flow detention time= 47.3 min calculated for 0.019 af (100% of inflow)
Center-of-Mass det. time= 47.4 min (59.4 - 12.0)

#	Invert	Avail.Storage	Storage Description
1	456.00'	768 cf	**32.00'W x 60.00'L x 1.00'H Prismatoid** 1,920 cf Overall x 40.0% Voids

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	**0.002778 fpm Exfiltration over entire Surface area**
2	Primary	456.75'	**60.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.09 cfs @ 0.05 hrs HW=456.02' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.52 cfs @ 0.30 hrs HW=456.77' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.52 cfs @ 0.4 fps)

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Pond 2P: Pervious Pavement No.1

Hydrograph

Inflow Area=0.168 ac
Peak Elev=456.77'
Storage=594 cf

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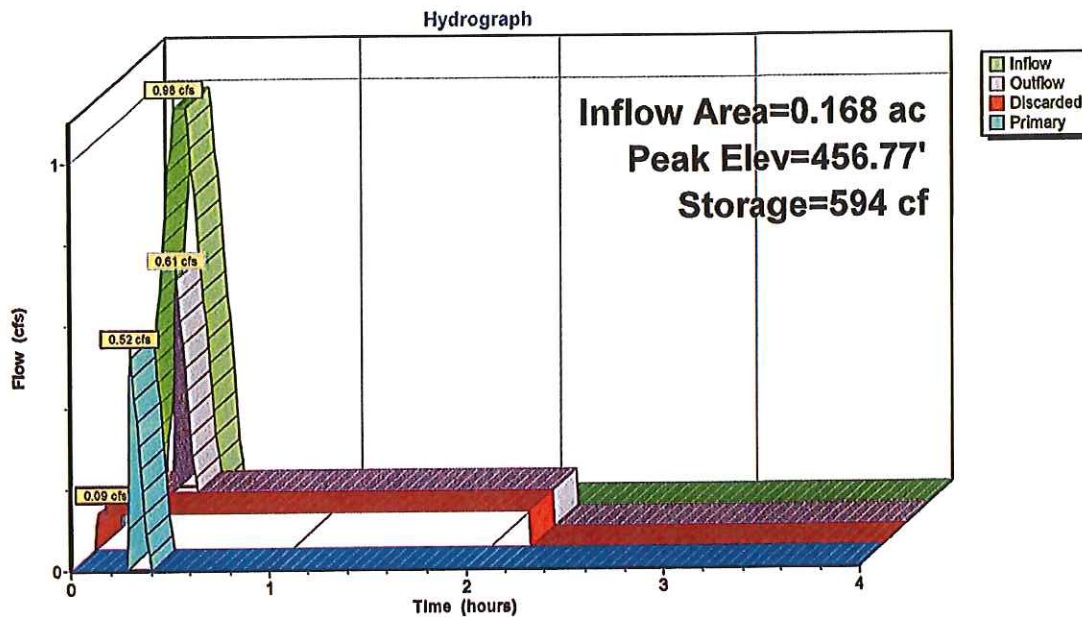
3882 PROPOSED CONDITIONS *nj-dep 100-Year Duration=14 min, Inten=6.99 in/hr*
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Subcatchment A1: No.5 Parking addition (to be developed)

Runoff   =   1.17 cfs @   0.17 hrs, Volume=   0.023 af, Depth= 1.61"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
nj-dep 100-Year Duration=14 min, Inten=6.99 in/hr

Area (sf)	C	Description
7,305	0.99	Paved parking & roofs

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

Subcatchment A1: No.5 Parking addition (to be developed)

Hydrograph

nj-dep 100-Year
Duration=14 min,
Inten=6.99 in/hr
Runoff Area=7,305 sf
Runoff Volume=0.023 af
Runoff Depth=1.61"
Tc=10.0 min
C=0.99

1.17 cfs

2.26

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Subcatchment A2: No.995 Parking addition (to be developed)
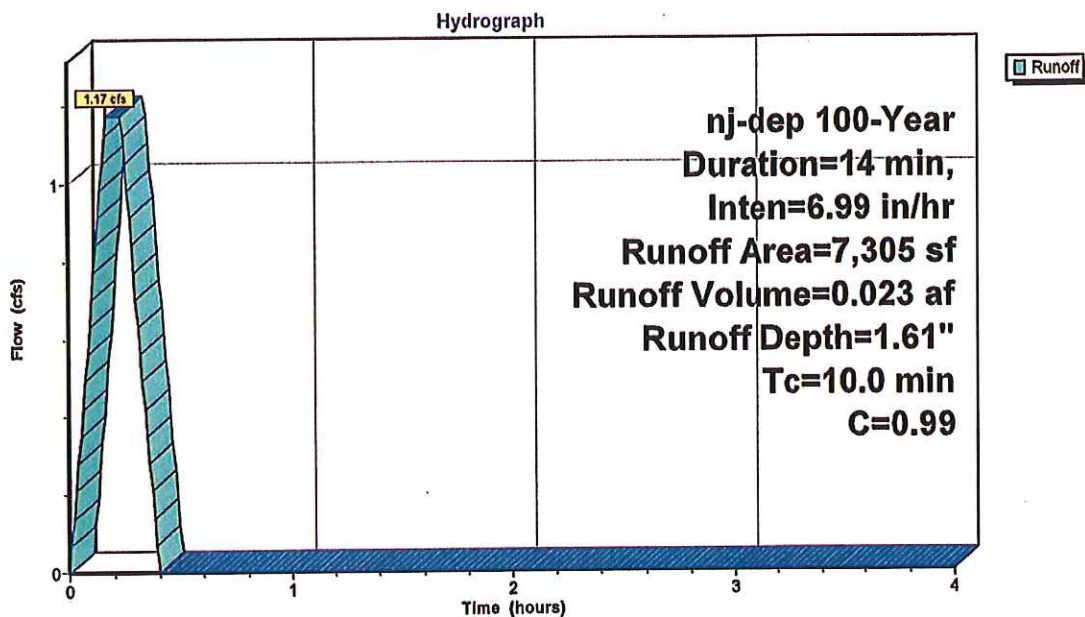
Runoff   =   0.73 cfs @   0.17 hrs, Volume=   0.014 af, Depth= 1.61"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs
nj-dep 100-Year Duration=14 min, Inten=6.99 in/hr

Area (sf)	C	Description
4,556	0.99	Paved parking & roofs

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

Subcatchment A2: No.995 Parking addition (to be developed)

Hydrograph

nj-dep 100-Year
Duration=14 min,
Inten=6.99 in/hr
Runoff Area=4,556 sf
Runoff Volume=0.014 af
Runoff Depth=1.61"
Tc=10.0 min
C=0.99

2.27

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BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE #3882
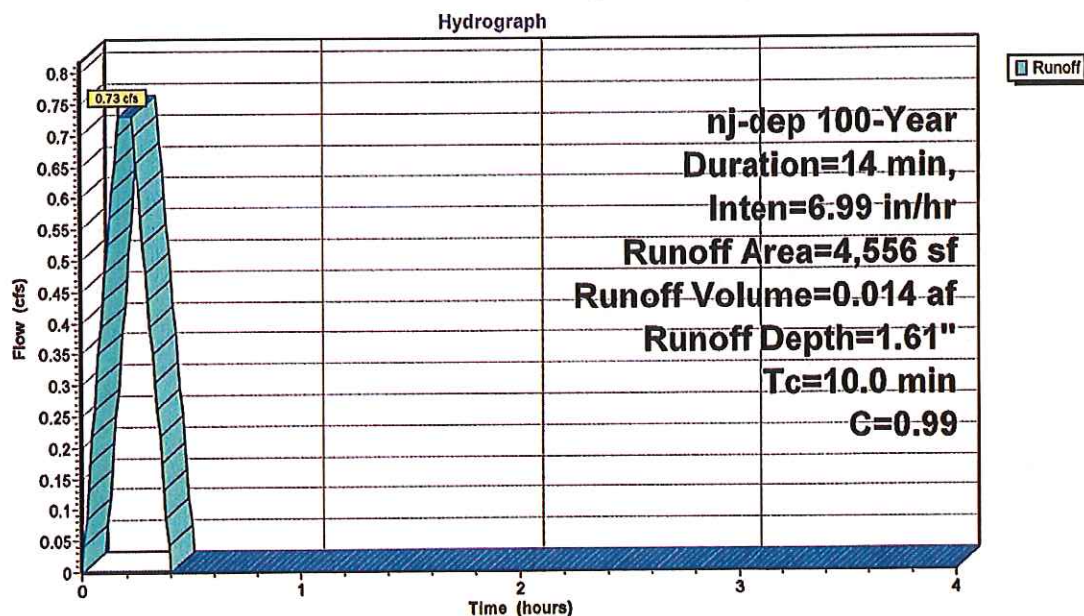
3882 PROPOSED CONDITIONS   *nj-dep 100-Year Duration=14 min, Inten=6.99 in/hr*
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Pond 1P: Pervious Pavement No.2

Inflow Area =		0.105 ac,	Inflow Depth =	1.61"	for 100-Year event	
Inflow	=	0.73 cfs @	0.17 hrs,	Volume=	0.014 af	
Outflow	=	0.46 cfs @	0.30 hrs,	Volume=	0.014 af, Atten= 36%, Lag= 8.0 min
Discarded =		0.07 cfs @	0.05 hrs,	Volume=	0.012 af	
Primary	=	0.40 cfs @	0.30 hrs,	Volume=	0.002 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 462.77' @ 0.30 hrs   Surf.Area= 1,458 sf   Storage= 448 cf
Plug-Flow detention time= 47.9 min calculated for 0.014 af (100% of inflow)
Center-of-Mass det. time= 48.1 min (60.1 - 12.0)

#	Invert	Avail.Storage	Storage Description
1	462.00'	583 cf	18.00'W x 81.00'L x 1.00'H Prismatoid 1,458 cf Overall x 40.0% Voids

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	0.002778 fpm Exfiltration over entire Surface area
2	Primary	462.75'	67.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.07 cfs @ 0.05 hrs HW=462.02'   (Free Discharge)
└─1=Exfiltration (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.38 cfs @ 0.30 hrs HW=462.77'   (Free Discharge)
└─2=Broad-Crested Rectangular Weir (Weir Controls 0.38 cfs @ 0.3 fps)

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Pond 1P: Pervious Pavement No.2

Hydrograph

Inflow Area=0.105 ac
Peak Elev=462.77'
Storage=448 cf

Legend: Inflow, Outflow, Discarded, Primary

0.73 cfs
0.46 cfs
0.40 cfs
0.07 cfs

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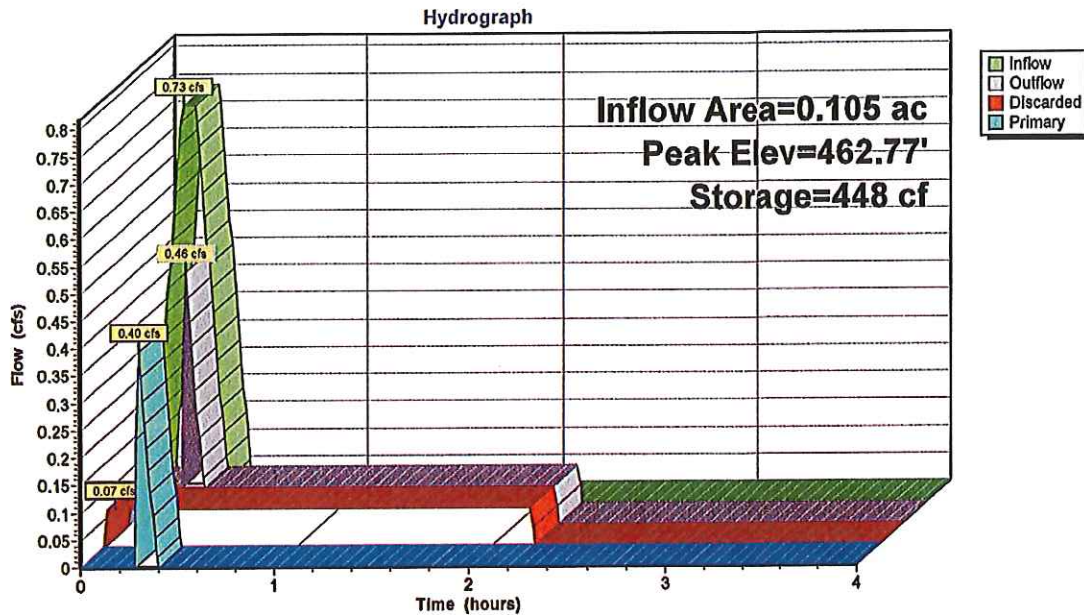
3882 PROPOSED CONDITIONS   *nj-dep 100-Year Duration=14 min, Inten=6.99 in/hr*
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Pond 2P: Pervious Pavement No.1

Inflow Area =	0.168 ac,	Inflow Depth =	1.61"	for 100-Year event	
Inflow =	1.17 cfs @	0.17 hrs,	Volume=	0.023 af	
Outflow =	1.02 cfs @	0.26 hrs,	Volume=	0.023 af,	Atten= 13%, Lag= 5.4 min
Discarded =	0.09 cfs @	0.04 hrs,	Volume=	0.016 af	
Primary =	0.93 cfs @	0.26 hrs,	Volume=	0.006 af	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-4.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 456.78' @ 0.26 hrs Surf.Area= 1,920 sf Storage= 602 cf
Plug-Flow detention time= 40.3 min calculated for 0.023 af (100% of inflow)
Center-of-Mass det. time= 40.5 min (52.5 - 12.0)

#	Invert	Avail.Storage	Storage Description
1	456.00'	768 cf	**32.00'W x 60.00'L x 1.00'H Prismatoid**
			1,920 cf Overall x 40.0% Voids

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	**0.002778 fpm Exfiltration over entire Surface area**
2	Primary	456.75'	**60.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.09 cfs @ 0.04 hrs HW=456.01' (Free Discharge)
 └—1=Exfiltration (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.93 cfs @ 0.26 hrs HW=456.78' (Free Discharge)
 └—2=Broad-Crested Rectangular Weir (Weir Controls 0.93 cfs @ 0.5 fps)

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Pond 2P: Pervious Pavement No.1

Hydrograph

Inflow Area=0.168 ac
Peak Elev=456.78'
Storage=602 cf

Legend:
- Inflow
- Outflow
- Discarded
- Primary

1.17 cfs
1.02 cfs
0.93 cfs
0.09 cf

Flow (cfs)

Time (hours)
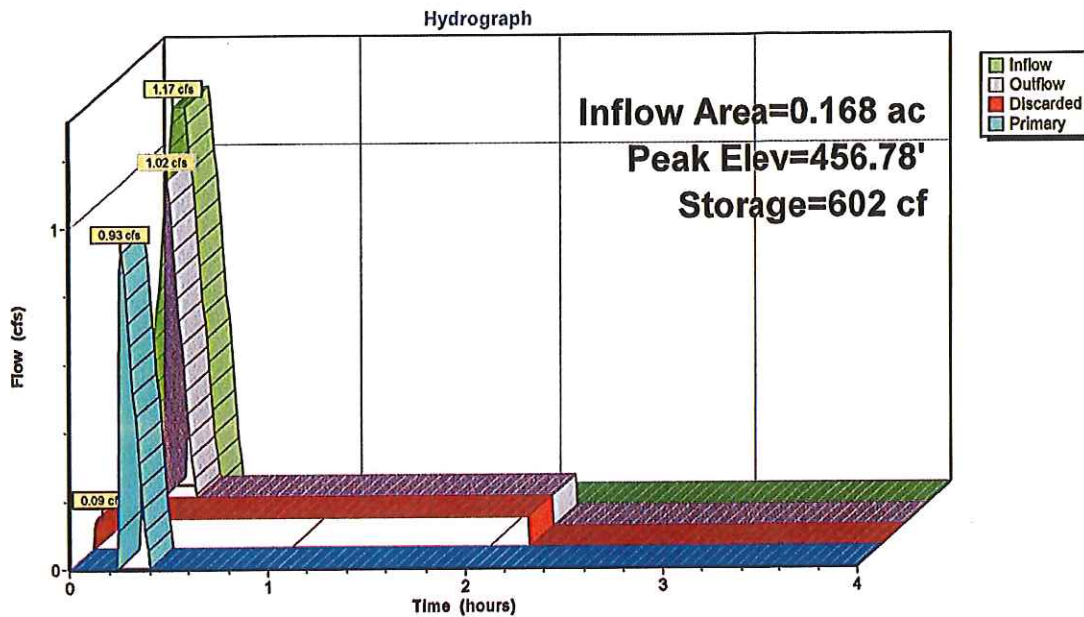
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SECTION 3
WATER QUALITY STORM
Pervious Paving

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STORMWATER QUALITY

The NJDEP Stormwater Rules require that stormwater quality be addressed over all impervious surfaces when ¼ acre or more of new impervious surface coverage is proposed. This project is a redevelopment of a previously disturbed site and has no current means of water quality treatment, therefore; a treatment level of 80% Total Suspended Solids (TSS) removal is required in accordance with Section 4.2 of the New Jersey Stormwater Frequently Asked Questions (FAQ).

Bioretention System:

The Pervious Paving System(s) provided are designed in accordance with the New Jersey Stormwater Best Management Practices (BMP) Manual to provide an 80% TSS removal rate.

Water Quality Summary

Proposed Parking Development Area Location	Development Parking Area Surface Area (sf)	Required Water Quality Volume (cf)	Pervious Area Required based on 12" storage Bed, (40% voids)(sf)	Proposed Pervious Pavement Area		
				Width (ft.)	Length (ft.)	Area (sf.)
995 Old Dock Road	4,556	474.58	1186.5	18	81	1458
5 Old Dock Road	7,305	760.94	1902.3	32	60	1920

See Section 2 for the Maximum Water Quality depth.

The treated water infiltrates into ground for recharge. Requisite details are provided on the site plan.

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SECTION 4
Groundwater Recharge Analysis

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BOROUGH OF ALPINE
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BMP AREA

Groundwater recharge BMP area corresponds to the Pervious Paving footprints of 1,448 sf for 995 Old Dock Road site and 1,920 sf for 5 Old Dock Road Site as a layer of 12 in thick crushed stones is proposed below the Pervious Paving Systems.

Groundwater Recharge Conclusion:

As calculated in the groundwater Annual Recharge Analysis (GSR-32 spreadsheet), the proposed parking expansion creates a groundwater volume deficit of 4,846 cf for 995 Old Dock Road Site and 7,443 cf for 5 Old Dock Road site which must be recharged back to groundwater in order to meet the criteria set forth in the NJ BMP Manual. Groundwater recharging target area of 4,556 sf corresponds to the proposed parking area at 995 Old Dock Road site and 7,305 sf for 5 Old Dock Road site.

Groundwater Recharge Analysis - Supporting Calculations (995 Old Dock Road):

The Groundwater Recharge is solved for the required *BMP Effective Area (ABMP)* of 187.9 in which is calculated based on following inputs:

Aimp	= 4,556 sf (target area, proposed parking)
ABMP	= 1,458 sf (pervious pavement, see engineering drawings)
dBMPu	= 12 in*0.4 =4.8 in
eEXC	= 24 in

Groundwater Recharge Analysis - Supporting Calculations (5 Old Dock Road):

The Groundwater Recharge is solved for the required *BMP Effective Area (ABMP)* of 284.6 in which is calculated based on following inputs:

Aimp	= 7,305 sf (target area, proposed parking)
ABMP	= 1,920 sf (pervious pavement, see engineering drawings)
dBMPu	= 12 in * 0.4 = 4.8 in.
eEXC	= 24 in

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ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE # 3882

Annual Groundwater Recharge Analysis (based on GSR-32)

Project Name:	995 OLD DOCK ROAD
Description:	ALPINE COMMUNITY CHURCH
Analysis Date:	12/30/21

New Jersey Groundwater Recharge Spreadsheet Version 2.0 November 2003

Select Township ↓	Average Annual P (in)	Climatic Factor
BERGEN CO., ALPINE BORO	46.0	1.49

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.10459	Woods-grass combination	Wethersfield	12.8	4,846
2	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 =	0.1			Total Annual Recharge (in) 12.8	Total Annual Recharge (cu.ft) 4,846

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.10459	Impervious areas	Dunellen	0.0	-
2					
3					
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 =	0.1			Total Annual Recharge (in) 0.0	Total Annual Recharge (cu.ft) 4,556

Annual Recharge Requirements Calculation ↓

% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)	0.0

Post-Development Annual Recharge Deficit= 4,846 (cubic feet)

Recharge Efficiency Parameters Calculations (area averages)

RWC=	2.97	(in)	DRWC=	0.30	(in)
ERWC =	0.76	(in)	EDRWC=	0.08	(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.

4.2

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ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE # 3882

Project Name			Description		Analysis Date	BMP or LID Type
995 OLD DOCK ROAD			ALPINE COMMUNITY CHURCH		12/30/21	BMP POROUS PAVEMENT

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	187.9	sq.ft
BMP Effective Depth, this is the design variable	dBMP	4.8	in
Upper level of the BMP surface (negative if above ground)	dBMPu	12.0	in
Depth of lower surface of BMP, must be>=dBMPu	dEXC	24.0	in
Post-development Land Segment Zero or Location of BMP - input Zero if Location is destroyed or undetermined	SegBMP	1	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.76	in
ERWC Modified to consider dEXC	EDRWC	0.08	in
Empty Portion of RWC under Infilt. BMP	RERWC	0.06	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	0.20	in
Inches of Rainfall to capture	Pdesign	0.28	in
Recharge Provided Avg. over Imp. Area		12.8	
Runoff Captured Avg. over Imp. Area		13.0	in

BMP Calculated Size Parameters

Parameter	Symbol	Value	Unit
ABMP/Aimp	Aratio	0.04	unitless
BMP Volume	VBMP	75	cu.ft

System Performance Calculated Parameters

Parameter	Symbol	Value	Unit
Annual BMP Recharge Volume		4,846	cu.ft
Avg BMP Recharge Efficiency		98.5%	Represents % Infiltration Recharged
%Rainfall became Runoff		78.0%	%
%Runoff Infiltrated		36.1%	%
%Runoff Recharged		35.6%	%
%Rainfall Recharged		27.7%	%

Parameters from Annual Recharge Worksheet

Parameter	Symbol	Value	Unit
Post-D Deficit Recharge (or desired recharge volume)	Vdef	4,846	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	4,556	sq.ft
Root Zone Water Capacity	RWC	2.97	in
RWC Modified to consider dEXC	DRWC	0.30	in
Climatic Factor	C-factor	1.49	no units
Average Annual P	Pavg	46.0	in
Recharge Requirement over Imp. Area	dr	12.8	in

CALCULATION CHECK MESSAGES

Volume Balance--> OK
dBMP Check--> OK
dEXC Check--> OK

BMP Location--> OK

OTHER NOTES

Pdesign is accurate only after BMP dimensions are updated to make each volume-deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For the Segment Location of BMP if you select 'impervious area,' RWC will be minimal but not zero as determined by the soil type and a scatter root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve on this page for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP. To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.

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ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE # 3882

Project Name:	5 OLD DOCK ROAD
Description:	ALPINE COMMUNITY CHURCH
Analysis Date:	12/30/21

Annual Groundwater Recharge Analysis (based on GSR-32)

New Jersey Groundwater Recharge Spreadsheet Version 2.0 November 2003

Select Township ↓ BERGEN CO., ALPINE BORO

Average Annual P (in)	Climatic Factor
46.0	1.45

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.1577	Woods	Wethersfield	12.2	7,443
2	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 =	0.2			**Total Annual Recharge (in)** 12.2	**Total Annual Recharge (cu.ft)** 7,443

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.1577	Impervious areas	Dunellen	0.0	-
2	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 =	0.2			**Total Annual Recharge (in)** 0.0	**Total Annual Recharge (cu.ft)** 7,305

Annual Recharge Requirements Calculation :

% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (s.f.)

| Post-Development Annual Recharge Deficit= | 7,443 | (cubic feet) |

Recharge Efficiency Parameters Calculations (area averages)

| RWC = | 2.57 | (in) | DRWC= | 0.30 | (in) |
| ERWC = | 0.76 | (in) | EDRWC= | 0.06 | (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 care blank rows, which AM-Dsin between your segment entries. Rows which AM-Dwill not be displayed or used in calculations. For impervious areas outside of standard lot, 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.

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ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE # 3882

Project Name: 5 OLD DOCK ROAD

Description: ALPINE COMMUNITY CHURCH

Analysis Date: 12/30/21

BMP or LID Type: BMP POROUS PAVEMENT _A-5 PAVEMENT AREA

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	343.2	sq.ft
BMP Effective Depth, this is the design variable	dBMP	4.8	in
Upper level of the BMP surface (negative if above ground)	dBMPu	12.0	in
Depth of lower surface of BMP. must be>=dBMPu	dEXC	24.0	in
Post-development Land Segment Location of BMP. Input ZerO if Location is distrubed or undetermined	SegBMP	1	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.61	in
ERWC Modified to consider dEXC	EDRWC	0.06	in
Empty Portion of RWC under Infilt. BMP	RERWC	0.05	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	0.23	in
Inches of Rainfall to capture	Pdesign	0.31	in
Recharge Provided Avg. over Imp. Area		14.4	in
Runoff Captured Avg. over imp. Area		14.6	in

Parameters from Annual Recharge Worksheet

Parameter	Symbol	Value	Unit
Post-D Deficit Recharge (or desired recharge volume)	Vdef	8,782	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	7,305	sq.ft
Root Zone Water Capacity	RWC	2.97	in
RWC Modified to consider dEXC	DRWC	0.30	in
Climatic Factor	C-factor	1.59	no units
Average Annual P	Pavg	49.2	in
Recharge Requirement over Imp. Area	dr	14.4	in

BMP Calculated Size Parameters

Parameter	Symbol	Value	Unit
ABMP/Aimp	Aratio	0.05	unitless
BMP Volume	VBMP	137	cu.ft

System Performance Calculated Parameters

Parameter	Value	Unit	
Annual BMP Recharge Volume	8,782	cu.ft	Represents % Infiltration Recharged
Avg BMP Recharge Efficiency	98.8%	%	
%Rainfall became Runoff	78.5%	%	
%Runoff Infiltrated	37.8%	%	
%Runoff Recharged	37.3%	%	
%Rainfall Recharged	29.3%	%	

CALCULATION CHECK MESSAGES

Volume Balance--> OK
dBMP Check--> OK
dEXC Check--> OK

BMP Location--> OK

OTHER NOTES

Design is accurate only after BMP dimensions are updated to make each volume=deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "Impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other bases

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP. To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.

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ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
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APPENDIX 1

- Location Data
- Site Location and Soil Type Map
- Typical Runoff Coefficients Table
- Time of Concentration (Tc) Nomograph
- IDF Curves and Tabulation

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Soils (SSURGO)

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
WeuB	Wethersfield-Urban land complex, 3 to 8 percent slopes	2.3	39.5%
WeuC	Wethersfield-Urban land complex, 8 to 15 percent slopes	1.4	22.8%
WeuD	Wethersfield-Urban land complex, 15 to 25 percent slopes	2.2	37.7%
Totals for Area of Interest		5.9	100.0%

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BERGEN COUNTY, NEW JERSEY
FILE # 3882

Recommended Coefficient of Runoff Values
for Various Selected Land Uses

| Land Use	Description	Hydrologic Soils Group			
		A	B	C	D
Cultivated Land	without conservation treatment	0.49	0.67	0.81	0.88
	with conservation treatment	0.27	0.43	0.67	0.67
Pasture or Range Land Meadow	poor condition	0.38	0.63	0.78	0.84
	good condition	---	0.25	0.51	0.65
	good condition	---	---	0.41	0.61
Wood or Forest Land	thin stand, poor cover, no mulch	---	0.34	0.59	0.70
	good cover	---	---	0.45	0.59
Open Spaces, Lawns, Parks, Golf Courses, Cemeteries					
Good Condition	grass cover on 75% or more	---	0.25	0.51	0.65
Fair Condition	grass cover on 50% to 75%	---	0.45	0.63	0.74
Commercial and Business Area	85% impervious	0.84	0.90	0.93	0.96
Industrial Districts	72% impervious	0.67	0.81	0.88	0.92
Residential	average % impervious				
Average Lot Size (acres)					
1/8	65	0.59	0.76	0.86	0.90
1/4	38	0.29	0.55	0.70	0.80
1/3	30	---	0.49	0.67	0.78
1/2	25	---	0.45	0.65	0.76
1	20	---	0.41	0.63	0.74
Paved Areas	parking lots, roofs, driveways, etc.	0.99	0.99	0.99	0.99
Streets and Roads	paved with curbs & storm sewers	0.99	0.99	0.99	0.99
	gravel	0.57	0.76	0.84	0.88
	dirt	0.49	0.69	0.80	0.84

NOTE: Values are based on NRCS (formerly the SCS) definitions and are average values.

Source: Technical Manual for Land Use Regulation Program, Bureau of Inland and Coastal
Regulations, Stream Encroachment Permits, New Jersey Department of Environmental
Protection

HUBSCHMAN ENGINEERING, P.A.
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DRAINAGE REPORT

ALPINE COMMUNITY CHURCH
BOROUGH OF ALPINE
BERGEN COUNTY, NEW JERSEY
FILE # 3882

Figure 7.1

TIME OF CONCENTRATION

Example
Height = 100 ft.
Length = 3000 ft.
Time of Concentration = 14 Min.
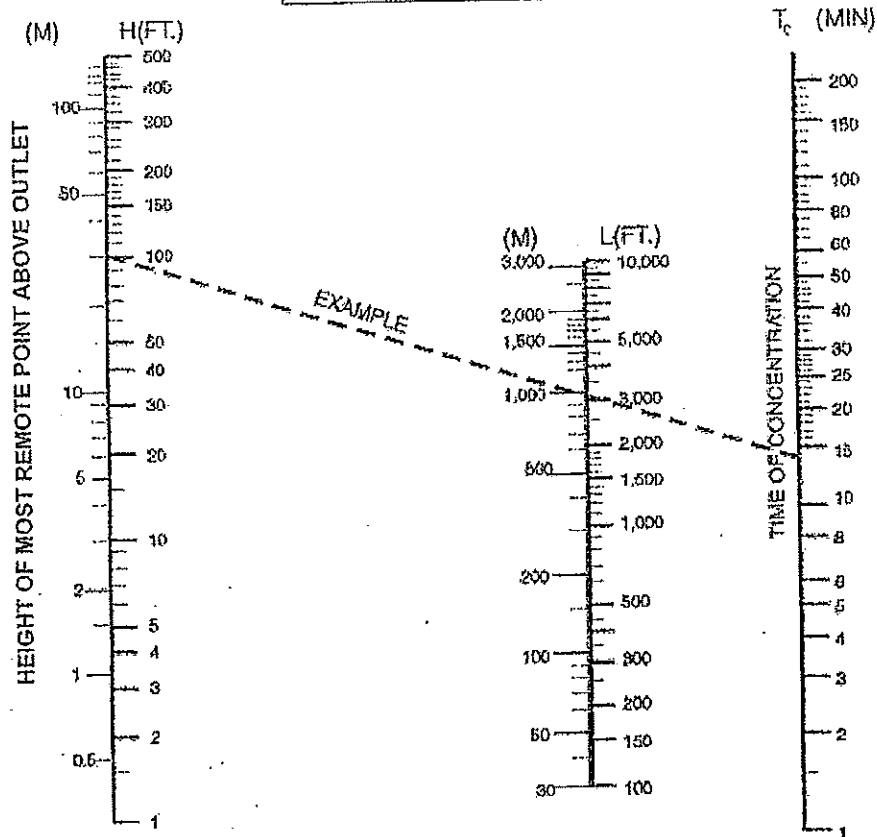
Notes:

Use Nomograph T_c for natural basins with well-defined channels, for overland or bare earth, and for mowed grass roadside channels.

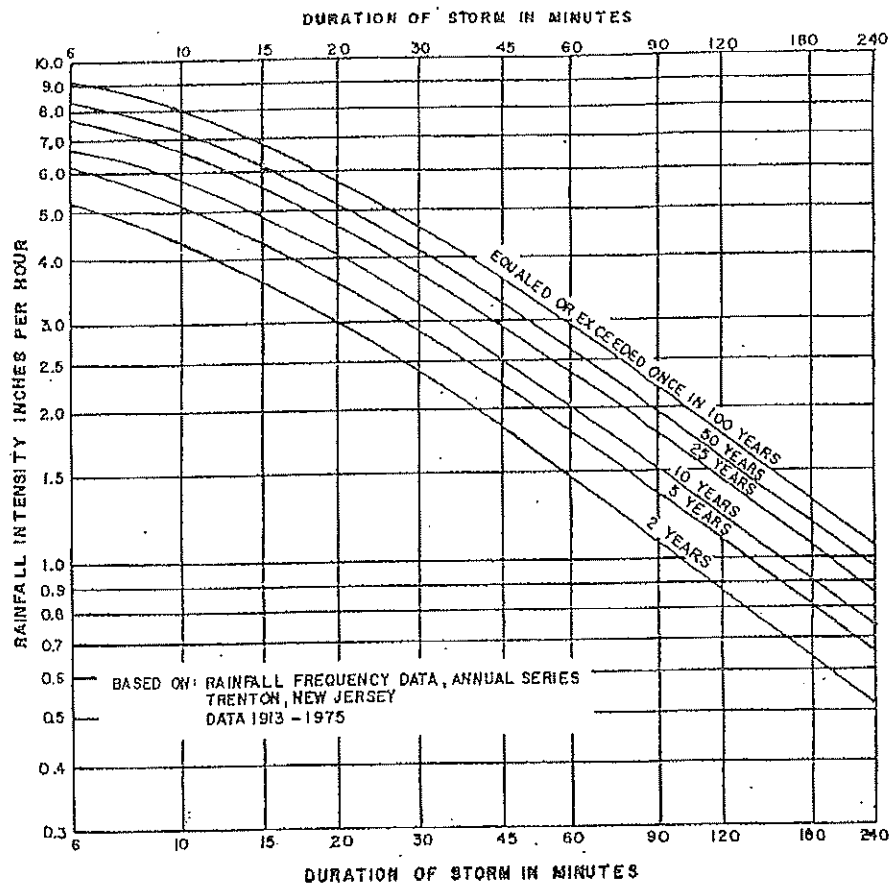For overland flow, grassed surfaces, multiply T_c by 2.

For overland flow, concrete or asphalt surfaces, multiply T_c by 0.4.

For concrete channels, multiply T_c by 0.2 overland flow.

Based on a study by P.Z. Kirpich, *Civil Engineering*, Vol.10, No.6, June 1940, p. 362.

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N.J.A.C. 5:21-7.2

FIGURE 7.2 RAINFALL INTENSITY CURVES

Note: Adapted from Figure 2.1-2 in the NJDEP *Technical Manual for Stream Encroachment Permits.*

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Northern New Jersey
One Year Storm

Recurrence Frequency = 1

DURATION (Minutes)	INTENSITY (inches/hour)
6	3.7
10	3.59
15	2.95
20	2.13
30	1.98
45	1.42
60	1.22
90	0.79
120	0.76

NJDEP Curve
2 Year Storm

Recurrence Frequency = 2

DURATION (Minutes)	INTENSITY (inches/hour)
6	5.2
10	4.3
15	3.55
20	3
30	2.4
45	1.8
60	1.49
90	1.1
120	0.92

NJDEP Curve
10 Year Storm

Recurrence Frequency = 10

DURATION (Minutes)	INTENSITY (inches/hour)
6	6.8
10	5.71
15	4.74
20	4
30	3.35
45	2.5
60	2
90	1.5
120	1.34

NJDEP Curve
25 Year Storm

Recurrence Frequency = 25

DURATION (Minutes)	INTENSITY (inches/hour)
6	7.7
10	6.47
15	5.38
20	4.6
30	3.88
45	3
60	2.54
90	1.8
120	1.6

NJDEP Curve
100 Year Storm

Recurrence Frequency = 100

DURATION (Minutes)	INTENSITY (inches/hour)
6	9
10	7.6
15	6.33
20	5.8
30	4.68
45	3.8
60	3.17
90	2.3
120	2.02