PLANNING BOARD MEETING

Tuesday, February 08, 2022 at 6:00 PM

Town Hall - 41 South Main Street Randolph, MA 02368

AGENDA

In accordance with Governor Baker's Order Suspending Certain Provisions of the Open Meeting Law, G. L. c. 30A, § 20, relating to the 2020 COVID 19 emergency, the Planning Board shall meet remotely to avoid group congregation.

A. Call to Order - Roll Call

B. Chairperson Comments

C. Approval of Minutes

1. Minutes of 1/25/22 meeting

D. Public Speaks

E. Public Hearings

F. Old/Unfinished Business

G. New Business

1. Tier 2 Review- 33 Mazzeo Drive- proposed car wash

H. Staff Report

I. Board Comments

J. Adjournment

Meeting schedule:

February 22
March 8 and 22
April 12 and 26
May 10 and 24

PLANNING BOARD MEETING

Tuesday, January 25, 2022 at 6:00 PM

Town Hall - 41 South Main Street Randolph, MA 02368

MINUTES

In accordance with Governor Baker's Order Suspending Certain Provisions of the Open Meeting Law, G. L. c. 30A, § 20, relating to the 2020 COVID 19 emergency, the Planning Board shall meet remotely to avoid group congregation.

A. Call to Order - Roll Call

PRESENT
Alexandra Alexopoulos
Sarah Bergman
Tony Plizga
Peter Taveira
Steve Monteiro- Member joined at 6:12pm.

B. Chairperson Comments

None made.

C. Approval of Minutes

1. Minutes of 12/21/21 meeting

   A motion was made by Taveira, seconded by Alexopoulos, that the Minutes of 12/21/21 be approved as amended. The motion passed by the following vote:

   Voting Yea: Alexopoulos, Bergman, Plizga, Taveira

   Voting Abstaining: Monteiro

D. Public Speaks

No comments made.

E. Public Hearings

1. Request for in-law apartment request 35 Decota Drive

   Legal ad read into the record by the Planner.

Planner provided an over view of the proposed plan. Planning department rec application and letter of intent from the applicants engineer, Keith Hinzman that was dated December 13, 2021. It is a request to convert an existing finished basement to an in- law apartment.

Harry Harding (applicant) is requesting to construct this in- law apartment for his elderly mother. The plan is to construct a bedroom and add a bathroom with a full shower.

Chairman discuss what would meet the requirements of second egress. The means of second egress could be the stairs going upstairs to the main living room area as long as that door is not locked. Also, there is a door that goes to the garage. As long as the door that goes to the garage and out the garage can be locked or unlocked from the in- law apartment.

A motion was made by Alexopoulos, seconded by Bergman, that the plans for the in-law apartment at 35 Decota Drive dated 11/23/2021, be approved as submitted.

Voting Yea: Alexopoulos, Bergman, Plizga, Taveira, Monteiro

F. Old/Unfinished Business

G. New Business

1. Approval Not Required (ANR) 186 Chestnut Street

Planner gave an overview of the plan. This is a residential single family district with minimum lot sizes of 12,000 square feet with 100 foot frontage.

Chairman comments that a minimum lot with 75 width feet is okay.

Planner comments yes, because it is angled.

Chairman comments the front is 100 foot and the width is still 75 feet which is the requirement. Chairman ask board members if anyone has any questions and comments.

Alexopoulos wants to clarify if the notations Lot 1 with the circle and straight line is a fence.

Chairman confirms it is a chain link fence with a circular post.

A motion was made by Alexopoulous, seconded by Bergman, to endorse the approval not required for 186 Chestnut Street based on plans data 12/17/2021 by Colllins civil engineering their project number 21-251-43.

Voting Yea: Alexopoulos, Bergman, Plizga, Taveira, Monteiro

2. Election of officers for 2022

Chairman ask fellow board members if they have any motion or suggestions for elections of officers for 2022.

A motion was made by Alexopoulos, seconded by Bergman, for Tony Plizga to be Chairman

Voting Yea: Alexopoulos, Bergman, Plizga, Taveira, Monteiro

Tony Plizga nominates Sarah Bergmn to be Vice Chair.

A motion was made by Plizga, seconded by Alexopoulos, for Sarah Bergman to be Vice Chair.

Voting Yea: Alexopoulos, Bergman, Plizga, Taveira, Monteiro

H. Staff Report

1. Correspondence to subdividers

Planner included in the agenda packet copies of correspondence that were sent to incomplete subdivisions or subdivisions that were not signed off by the Planning Board with a request for a status update. Only exceptions are the ones that are known to be actively under construction.

The subdividers are asked to provide information in writing to the clerk, Christine Bui or appear before the Planning Board in February.

Kiley Circle is a subdivision that is presumed a subdivision that has not been recorded. The Planner has reached out to the property owner requesting for information so that we can complete the records and has been unable to make contact. The property owner at one point did have a conversation with the Planning Board Chairman and intended on providing information to the Board, but there is still no information provided at this time. The property owner has a final opportunity to provide information substantiating the subdivision approval and recording at the registry of deeds, if not, the Planning Board will conduct a public hearing in April. The Planning Board has approved this plan over 20 years ago.

Mr. Taveira provided some information to the Planner about Lafayette Estates where vehicles were entering. There are no curb cuts at this project site, vehicles are jumping on the sidewalk and going in and that is violation which the Board had put in their decision for approval. Planner will follow- up with the owner with that issue.

Chairman mentions that Pham Estates had submitted the compaction report for the private way which they thought was a driveway.

Upcoming Projects Anticipated

Perry Estates- modification of a subdivision at 297 Chestnut Street. Sent to Nitsch Engineering for peer review. Scheduled hearing for March.

33 Mazzeo Drive- site plan and review for a car wash.

647 North Main- site plan and review for a daycare.

28 York Ave. (Melville Candy)- withdrawn.

Other updates:

FEMA and FIRM updates- zoning code amendment required. Written and approved by regional rep. Introducing the Town Council to initiate.

MBTA Communities- housing density changes.

I. Board Comments

Alexopoulos requesting for future meeting dates to be at the end of the agenda.

Chariman and Alexopoulos agreed on three months in advance each time.

J. Adjournment

Notification of Upcoming Meeting Dates

Adjourned at 6:50 PM.

PLANNING DEPARTMENT

APPLICATION FOR A SPECIAL PERMIT OR SITE PLAN & DESIGN REVIEW

Project Type	O Tier 1 Review ⊗ Tier 2 Review O Tier 4 Site Plan/Design Review		O In-Law O Two-Family O Special Permit
Assessor Parcel ID *map-block-parcel*	57-B-18..12A	**Norfolk County Registry of Deeds**	*Book/Page or Cert #* 37058/111
Parcel Address	33 Mazzeo Drive, Randolph, MA		
Current use	Garage		
Zoning District	GBHD	**Size of Parcel**	35,945 S.F. (0.825 Acres)
Parcel Attributes	O Wetland O Flood Plain O Wetland Resource		
Project Description	Proposed construction of a 6,000 S.F. Car Wash building with associated site access, parking, utilities, and a stormwater management system.		

Applicant	New England Realty Trust		
Contact person	Christos Kyriakidis		
Applicant Status	O Owner O Tenant O Licensee ⊠ Buyer O Other_____		
Address	611 High Street, No. 190, Dedham, MA		
Phone	617-721-1517	**Email**	newenglandrealtytrust@gmail.com

Surveyor	MBL Land Development & Permitting Corp.		
Contact person	Michael Keegan		
Address	5 Bristol Drive, Suite 3A, South Easton, MA		
Phone	508-297-2746	**Email**	Michael@MBLLandDevelopment.com

Engineer	MBL Land Development & Permitting, Corp.		
Contact person	Brian Dunn		
Address	5 Bristol Drive, Suite 3A, South Easton, MA		
Phone	508-297-2746	**Email**	Brian@MBLLandDevelopment.com

If property owner is not the Applicant, authorization from the owner is required

Property Owner	Carl V. Dahlgren, Trustee of the 306 West Street Nominee Realty Trust		
Address	28 Kendall Court, Raynham, MA 02767		
Phone	6174557686	**Email**	kdahlgren14@gmail.com

I hereby certify, under the pains and penalties of perjury, that the information contained in this application is true, accurate and complete to the best of my knowledge and belief. I agree to abide by the Randolph Zoning Ordinances and complete construction of the project in accordance with said rules and any conditions of the Planning Board.

Carl V Dahlgren (Jan 22, 2022 09:56 EST)

Applicant — Jan 22, 2022 — Date

Agent/Representative — January 27, 2022 — Date

MBL Land Development & Permitting, Corp.

Land Development, Transportation & Environmental Solutions

Office Location
5 Bristol Drive, Suite 3A
South Easton, MA 02375
P.508.297.2746
F.508.617.8543
Email: info@MBLLandDevelopment.com

Remittance Address
P.O. Box 7001
Somerset, MA 02726
P.508.617.8541
F.508.617.8543
Website:www.MBLLandDevelopment.com

January 27, 2022

Randolph Planning Board
Randolph Town Hall
41 South Main Street
Randolph, MA 02368

Re: Development Impact Statement – 33 Mazzeo Drive Car Wash

Dear Members of the Planning Board,

MBL Land Development & Permitting Corp. has prepared this Development Impact Statement on behalf of the applicant New England Realty Trust for the construction of the proposed Car Wash facility at 33 Mazzeo Drive.

Environmental Impact

The project is located at 33 Mazzeo Drive in Randolph, Massachusetts on the north side of the street between Thomas Patten Drive and West Street. This property is referenced as Block B, Lot 18..12A on Assessors Map 57 and contains a total area of 0.825 acres. The existing site is comprised of a single-family house on the north side of the property and a 1-story garage on the south side of the property with broken pavement and concrete areas. The site does not lie within a flood area, as shown on the F.E.M.A. Flood insurance rate map (F.I.R.M.) for Norfolk county, Massachusetts, Map Number 25021C0216E, Community Number 250251, Panel 0216, having an effective date of July 17, 2012. The site is not located within a NHESP Priority Habitat of Rare Species or an Estimated Habitat of Rare Wildlife according to the Massachusetts Natural Heritage Atlas, 14th Edition effective August 2017. This site is located within a Public Watershed Supply Outstanding Resource Water Critical Area.

The Soil Conservation Survey for Norfolk County indicates that the entirety of the site is located within Soil Map Unit 422B – Canton Fine Sandy Loam, 0-8% slopes, extremely stony. This soil type has a Hydrologic Soil Group of B. The site topography ranges from elevation 100 at the high point on the north side of the site to elevation 91 at the south side of the site. The site slopes are generally between 1-15%.

The proposed site development consists of the construction of a 6,000 S.F. car wash building with associated site access, parking, utilities, and a stormwater management system. To mitigate the quality and quantity of stormwater runoff discharging from the site, the stormwater management system has been designed to collect, treat and control flows leaving the site. The proposed stormwater management system will consist of a series of deep sump hooded catch basins, drain manholes, and water quality units that will convey stormwater runoff to the two subsurface

recharge chamber systems located within the site parking lot. The stormwater management system has been designed to reduce peak flows from the existing conditions to the proposed conditions for all storm events. From an environmentally sensitive perspective, the aforementioned measures result in a low impact design that promotes on-site groundwater recharge while preserving the natural hydrologic conditions.

To limit potential impacts to the resource areas, erosion and sedimentation control Best Management Practices (BMPs) consisting of a Filter Mitt erosion control barrier will be installed between the edge of work and the resource areas. The erosion control barrier shall be inspected and maintained throughout construction and not removed until construction is complete and all disturbed areas have been stabilized. In addition, silt sack inlet protection shall be utilized on all proposed catch basins and a stabilized construction exit shall be installed to stop any sediment from being tracked into the roadway.

Community Impact

A community impact assessment was performed to ensure that the proposed project will not result in any negative impacts to the adjacent community.

Zoning

The site is located within the Great Bear Swamp Highway District and is abutted by this district on the East, South, and Southwest; the site is abutted by the Residential Single Family High Density District on the Northwest and North.

Impact to Abutters

The building is set back approximately 34 feet from Mazzeo Drive, and the nearest abutting property line lies approximately 10 feet from the furthermost edge of the building. To ensure that the adjacent residential district is not impacted a 6' tall Vinyl Fence is proposed around the perimeter of the property in this area. Additionally, a 346-foot long retaining wall is proposed around the site perimeter with a max height of 6 feet to ensure that no grading takes place off site and the adjacent sites remain undisturbed. It should be noted that the proposed grade is lower than the existing grade and the retaining wall will be higher on the abutter properties' sides.

Site Parking

The proposed parking lot located on site consists of 18 parking spaces, and an additional 17 cars will be able to queue at the right one-way entrance driveway. This is enough to accommodate customers and to ensure that there will be no backup onto Mazzeo Drive.

Gross floor area is defined in the Randolph Zoning Bylaws as "The sum of the gross horizontal areas of the several floors of a building measured from the exterior face of exterior walls, or from the center line of a wall separating two (2) buildings, but not including interior parking spaces, loading space for motor vehicles, or any space where the floor-to-ceiling height is less than six (6) feet." The interior tunnel of the car wash building can be classified as an interior loading space for motor vehicles; therefore, this tunnel area was excluded from the gross floor area calculations for the parking factor and an gross floor area of 1,950 was used to determine the required amount of parking spaces.

Historical Site Impact

Per the Massachusetts Cultural Resource Information System (MACRIS) this site does not lie in proximity to any historic properties or areas.

Trash Storage and Pickup

The proposed dumpster area will be enclosed by a 6' vinyl fence near the center of the site behind a parking space and is only to be accessed by the dumpster truck after the car wash operational hours when the adjacent parking spaces are empty.

Site Lighting

An outdoor lighting plan has been prepared by SK & Associates. The lighting design made efforts to minimize glare and light spillover to neighboring properties: a maximum of .2 foot candles at the northern and eastern site boundaries and 1.3 foot candles at the southern site boundary are the only areas where light spills off-site. The Please refer to the Photometric Plan on Sheet SL1 of the Site Plans.

Traffic Impact

The project is located on the north side of the Mazzeo Drive between Thomas Patten Drive and West Street. Mazzeo Drive is a public two-lane roadway with a single lane of travel designated for each direction.

In 2019, a two-way traffic spot study was performed by the Massachusetts Department of Transportation along Warren Street between Route 24 and Route 28. The spot count was performed approximately 0.09 miles east of the site. Please refer to Figure 1 below.

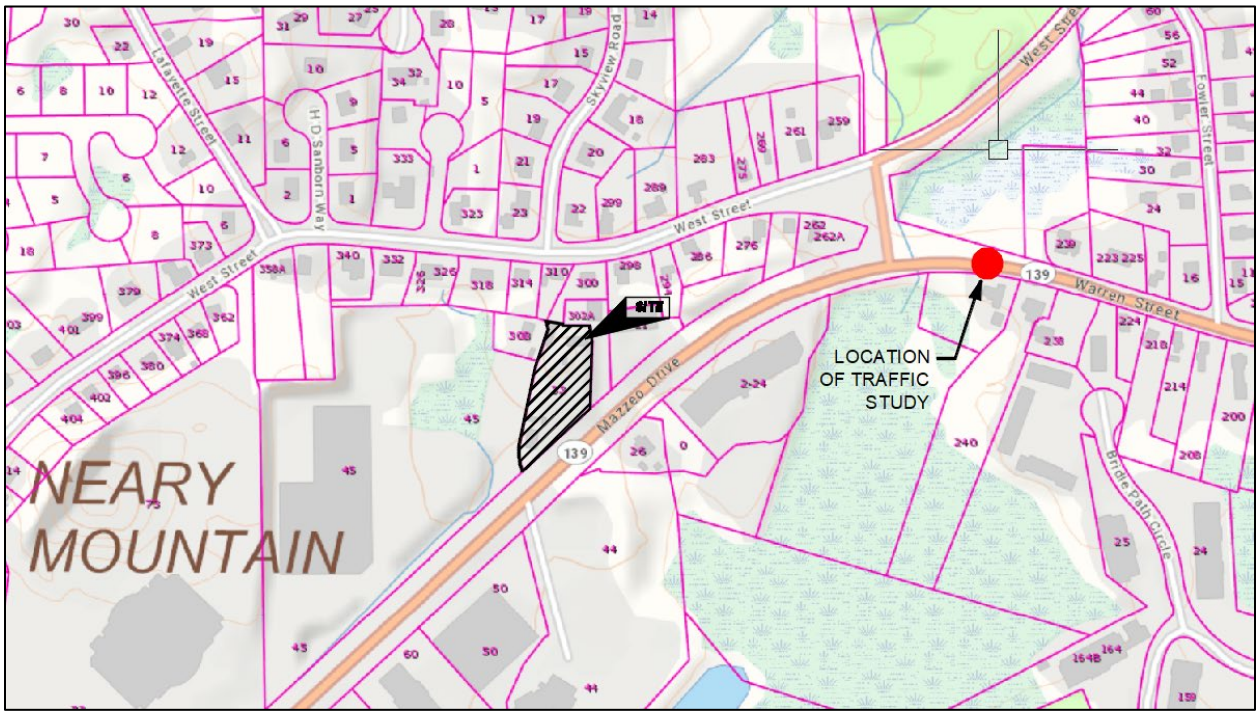
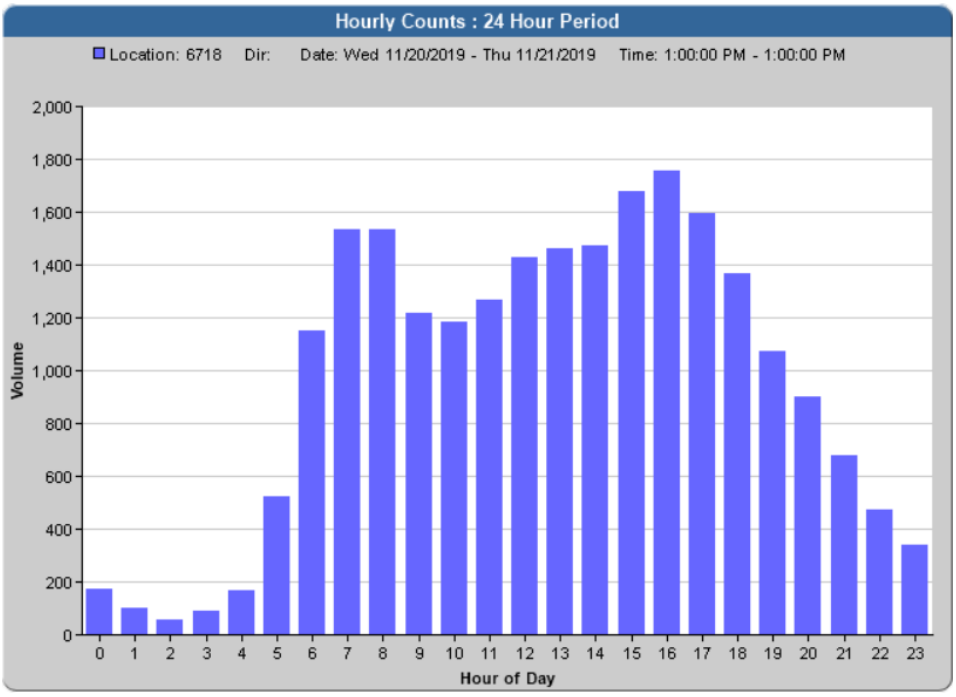


Figure 1: Location of Traffic Study

The length of this spot study was 24 hours and took place from 1 PM on November 20, 2019 to 1 PM on November 21, 2019. The recorded parameters for this study include the Average Annual Daily Traffic (AADT) and Vehicle Volume Count. The results of this study can be found in Figures 2-3.

INTERVAL:15-MIN					
Time	15-min Interval				Hourly Count
	1st	2nd	3rd	4th	
0:00-1:00	64	46	38	25	173
1:00-2:00	28	27	20	26	101
2:00-3:00	14	16	15	13	58
3:00-4:00	21	13	23	32	89
4:00-5:00	22	25	57	62	166
5:00-6:00	94	130	142	157	523
6:00-7:00	195	269	339	347	1,150
7:00-8:00	343	401	435	354	1,533
8:00-9:00	362	418	395	361	1,536
9:00-10:00	347	316	264	290	1,217
10:00-11:00	272	316	272	321	1,181
11:00-12:00	332	302	321	313	1,268
12:00-13:00	361	372	357	340	1,430
13:00-14:00	372	364	362	361	1,459
14:00-15:00	335	400	368	371	1,474
15:00-16:00	392	427	439	418	1,676
16:00-17:00	462	419	439	433	1,753
17:00-18:00	494	397	369	332	1,592
18:00-19:00	331	393	317	327	1,368
19:00-20:00	277	278	273	246	1,074
20:00-21:00	238	214	212	236	900
21:00-22:00	208	182	159	129	678
22:00-23:00	137	133	106	96	472
23:00-24:00	91	101	97	50	339
Total					23,210
AADT					22,604
AM Peak					07:30-08:30 1,569
PM Peak					16:15-17:15 1,785



Figures 2 & 3: 24 Hour Vehicle Volumes
Source: MassDOT TDMS – Location ID 6718

The peak hourly volume for this location was 1,753 vehicles, which was observed between 4 PM and 5 PM. Of these 1,753 vehicles, 923 traveled in the northbound direction and 830 traveled in the southbound direction.

In order to estimate the number of trips that could by generated by the project, statistics published by the Institute of Transportation Engineers (ITE) in Trip Generation for similar land uses were examined. The ITE trip generation statistics represent compilations of data from studies/projects throughout the United States collected over the past 40+ years on trip generation characteristics for different types of land uses. The data has been compiled to provide transportation analysts with guidelines in forecasting 24 hour and peak hour volumes for the specified land use.

Please see Table 1 below for the expected traffic generation of the project based on trip generation rates provided in the ITE Trip Generation Manual, 10th Edition, for Land Use Code 948 – Automated Car Wash. These trip rates were applied to the project to estimate the volume of daily and peak hour traffic likely to be generated by the project.

Table 1: Trip Generation Data

Time Period	Enter %	Exit %	Average Rate (Per 1000 Sq. Ft. GFA)
Weekday – Single Hour PM Peak, Adjacent Street Traffic	50	50	14.20
Weekday – Single Hour PM Peak, Site Generated Traffic	50	50	11.66

The total Gross Floor Area (GFA) of the car wash building is 6,000 square feet, so the average rate per unit listed in the table above was multiplied by a factor of 6 in order to obtain representative volumes. The proposed traffic volume at the project site during the evening peak hour of a typical weekday is expected to reach 70 vehicles. The proposed volume at the PM peak hour after incorporating the additional traffic generated by the project is projected to be 1,823 vehicles. The 70 vehicles generated by the proposed site development are estimated to impact the total traffic volume

by 3.9%. Since the traffic impacts of the project are measured under peak volume conditions and the increase in trips during these time periods is not significant, the project will likely not have a material impact on traffic operations.

Utilities

The existing utilities on site that connect to the garage and house buildings are to be disconnected and removed. The proposed utilities on site consist of electric, water, sewer, and drainage provisions.

Underground electric conduits will run from the proposed building and tie into the existing utility pole at Mazzeo Drive. The existing utility pole number 6 located in front of the site is to be relocated to avoid site access interference.

Water services will run from the proposed building and tie into the existing water main located in the right-of-way in front of the site. The existing fire hydrant at the front of the site is to remain.

The runoff from the car wash operation inside the building will be captured and partially recycled by a water reclaim system comprised of 3 2,000 gallon tanks. As water is used in the wash process it will flow from floor drains to these 3 tanks which will settle out sediment. A portion of this water will then be pumped back into the building through a Velocity VRC100 reclaim system to be reused in the wash process. These tanks then will overflow to a 2,000 gallon oil-water separator to settle out any additional sediment before being routed to the municipal sewer system via the existing stub on-site.

The drainage structures will consist of 7 catch basins and 3 water quality units which will convey storm water runoff to the subsurface recharge chamber systems.

Site Operation

The hours of operation for the car wash and vacuums would be no earlier than 7 AM to not later than 10 PM.

A central vacuum system from Vacutech will be utilized, with sound levels not exceeding 73 decibels. A sound level meter reading report is attached; it should be noted that this study was conducted in open-air conditions.

During normal operation hours the site will only be accessible by the 12' wide entrance to the far east. The center site access will only be utilized as an exit route; a vehicular barrier (model Giotto-30 BT) on a magnetic loop will automatically raise and lower to allow vehicles to exit, and a remote-controlled vehicular barrier (model Giotto-30 BT) will remain lowered to prevent entrance access for customers. This barrier will be raised for dumpster truck and fire truck access as needed during normal hours of operation, and after 8PM these barriers will be raised until the site opens the next morning.

Please don't hesitate to contact us with any questions and concerns or should you need additional information.

Respectfully,

MBL Land Development & Permitting Corp.

Brian M. Dunn
President/Project Director

Tracy L. Duarte, PE
Project Manager

Attachments:

- Site Planset – Dated 1/27/2022 – Provided by MBL Land Development & Permitting Corp.
- Sound Level Meter Readings – Provided by Vacutech
- Giotto-30 BT Vehicular Barrier Spec Sheet

SOUND LEVEL METER READINGS

MODEL: FT-DD-T440HP4 (40hp VACSTAR TURBINE VACUUM PRODUCER)

READING ONE: 73 DB-A, 3 FEET FROM TURBINE @ 45° ANGLE
AND NO BACKGROUND NOISE OR OUTSIDE INTERFERENCE.

READING TWO: 69 DB-A, 10 FEET FROM TURBINE @ 45° ANGLE
AND NO BACKGROUND NOISE OR OUTSIDE INTERFERENCE.

READING THREE: 54 DB-A, 20 FEET FROM TURBINE @ 45° ANGLE
AND NO BACKGROUND NOISE OR OUTSIDE INTERFERENCE.

READING FOUR: 38 DB-A, 30 FEET FROM TURBINE @ 45° ANGLE
AND NO BACKGROUND NOISE OR OUTSIDE INTERFERENCE.

NOTE: THESE READINGS WERE TAKEN OUTSIDE IN THE OPEN ON A CONCRETE SLAB.

SOUND LEVEL METER USED:

SIMPSON MODEL #40003 – MSHA APPROVED.
MEETS OSHA & WALSH-HEALY REQUIREMENTS FOR NOISE CONTROL.
CONFORMS TO ANSI S1.4-1983, IEC 651 SPECS FOR METER TYPE.

Vacutech
1350 Hi-Tech Drive, Sheridan WY, 82801
PHONE: (800) 917-9444 FAX: (303) 675-1988
EMAIL: info@vacutechllc
WEB SITE: vacutechllc.com

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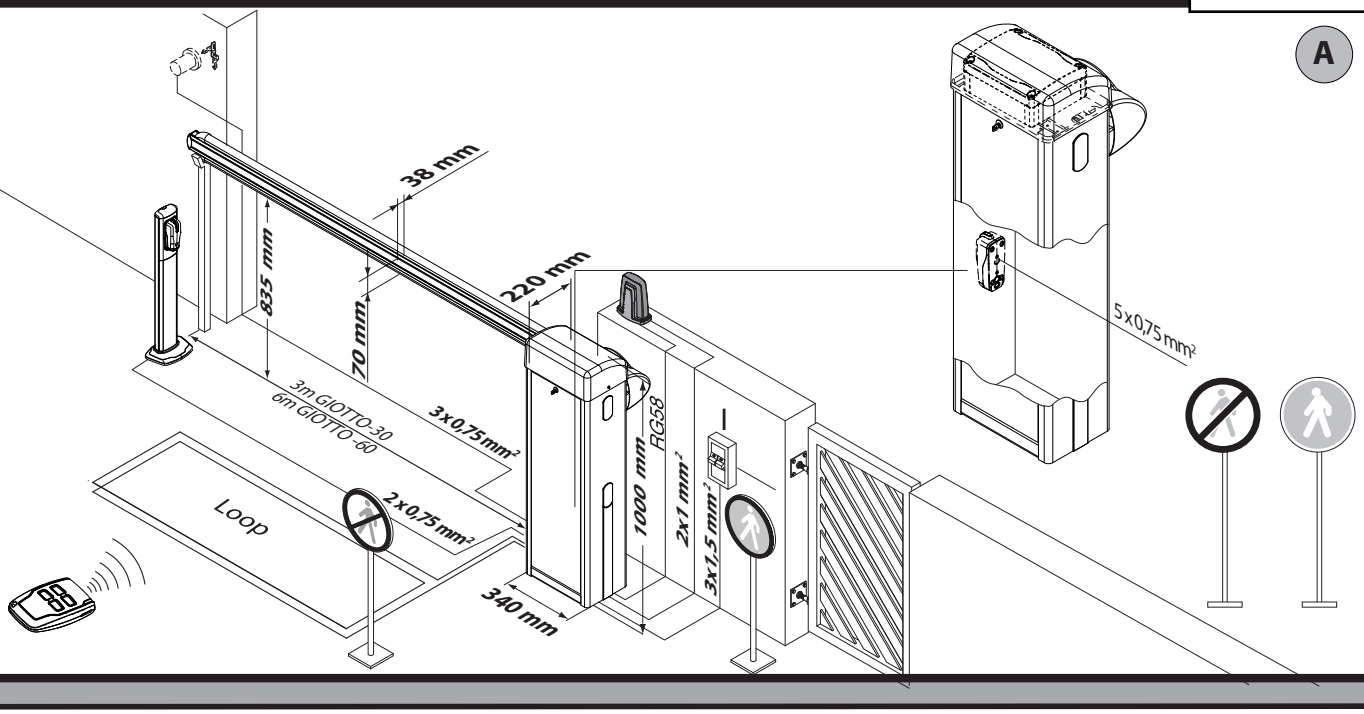

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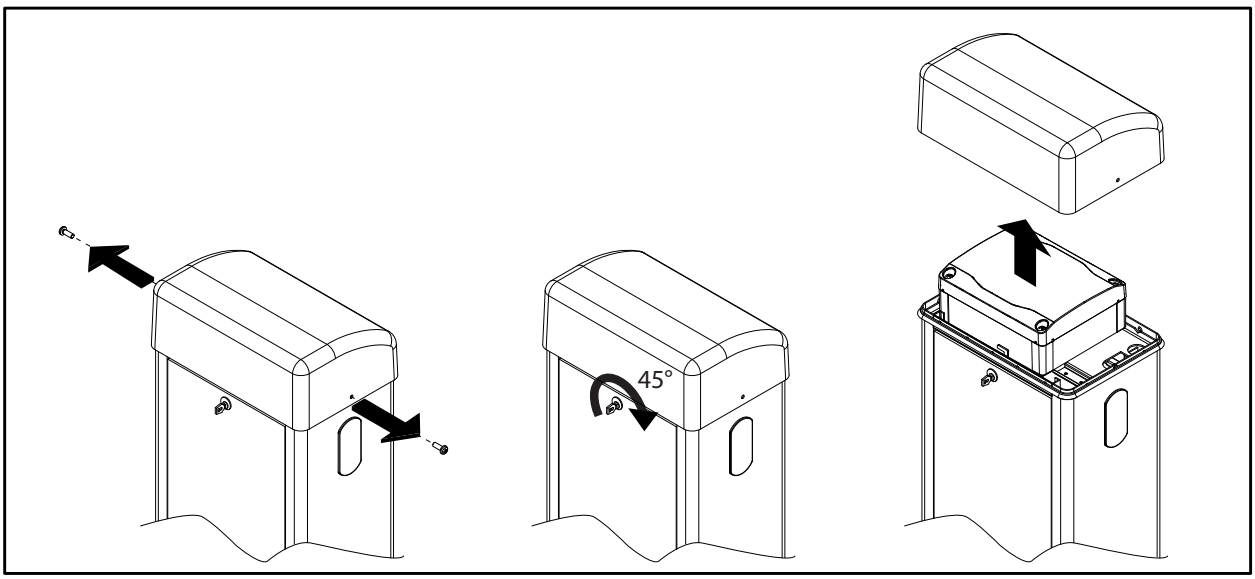

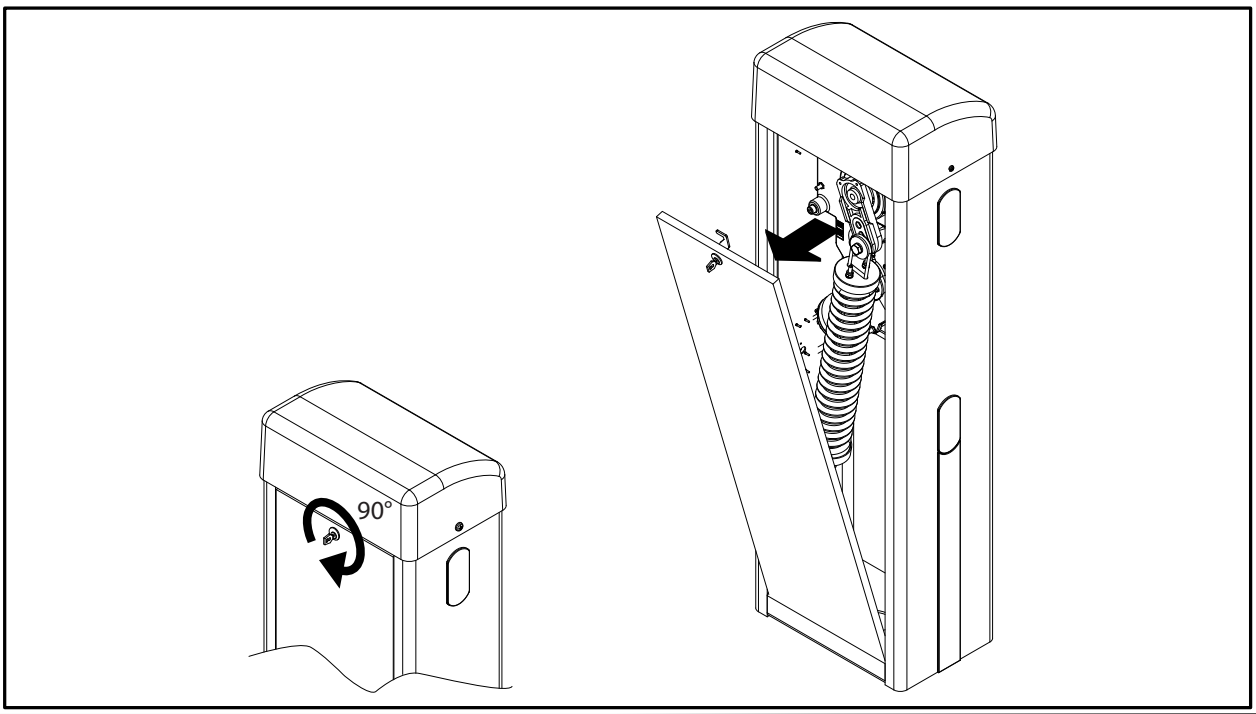

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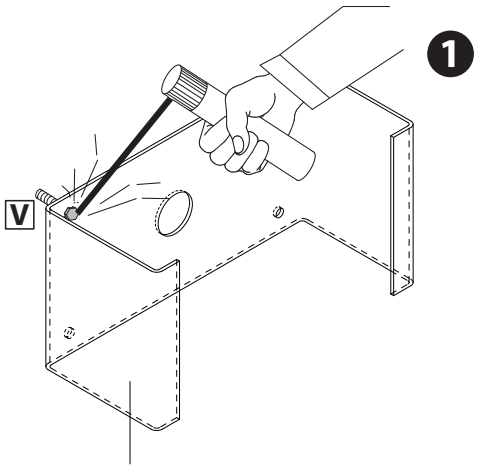

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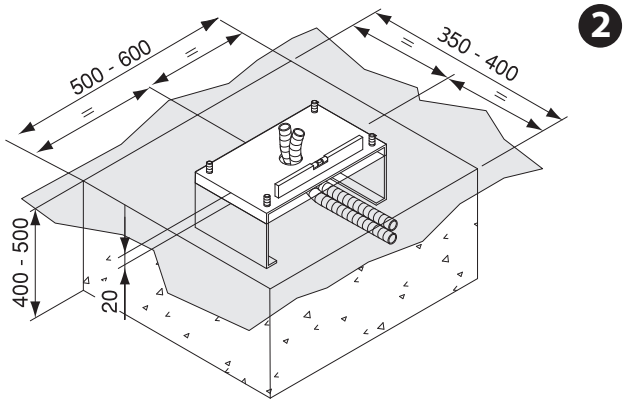

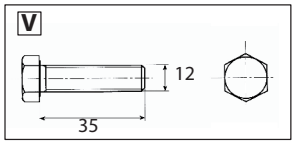

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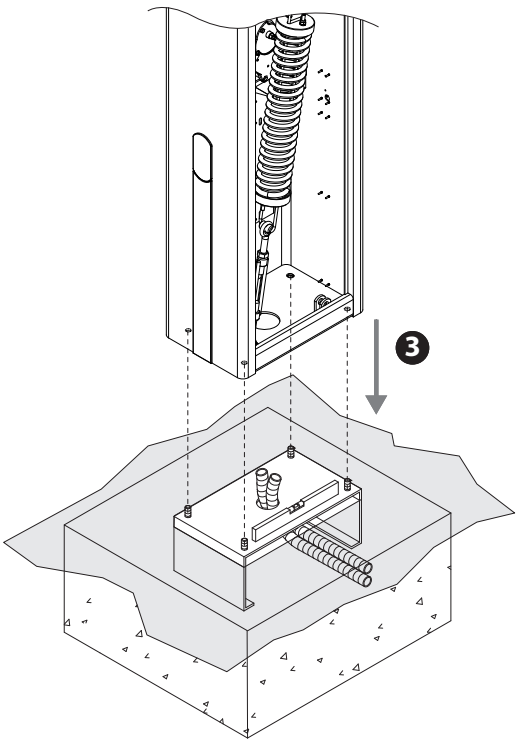

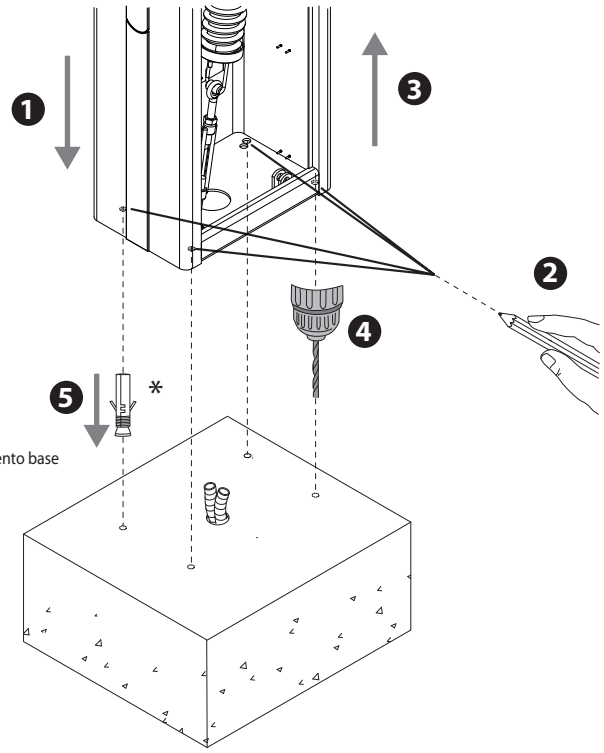

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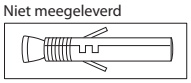


PROPOSED CAR WASH

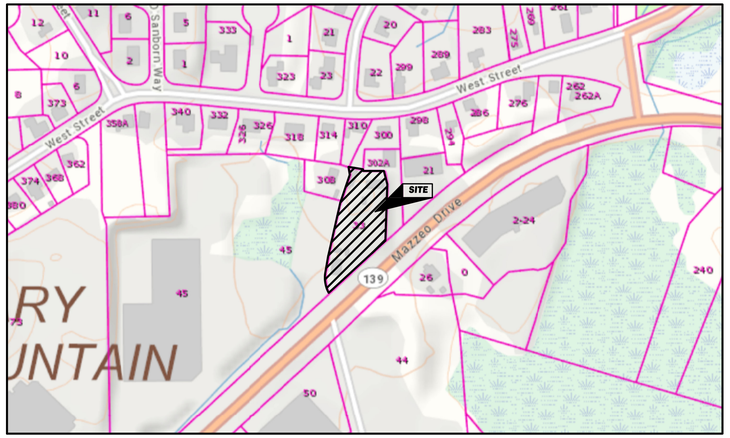
SITE PLANS

33 MAZZEO DRIVE
ASSESSORS MAP 57 BLOCK B LOT 18..12A
RANDOLPH, MASSACHUSETTS

JANUARY 27, 2022

SHEET INDEX: SITE CIVIL

MBL NORTH



LOCUS MAP
SCALE:1"=200'

PLANS PREPARED FOR:

NEW ENGLAND REALTY TRUST
611 HIGH STREET, NO.190
DEDHAM, MASSACHUSETTS

PROJECT CONTACTS:

CIVIL ENGINEER/LAND SURVEYOR

MBL LAND DEVELOPMENT & PERMITTING, CORP.
5 BRISTOL DRIVE, SUITE 3A
SOUTH EASTON, MA 02375
P.508.297.2746
BRIAN M. DUNN PRIMARY CONTACT
brian@mbllanddevelopment.com
website:www.MBLLandDevelopment.com

COMMONWEALTH OF MASSACHUSETTS
TRACY L. DUARTE
CIVIL
NO. 48660
REGISTERED
PROFESSIONAL ENGINEER

PLANS PREPARED BY:

MBL
LAND DEVELOPMENT & PERMITTING, CORP.
LAND DEVELOPMENT, TRANSPORTATION AND ENVIRONMENTAL SOLUTIONS
5 BRISTOL DRIVE, SUITE 3A
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PROJ. No.: 2021-054
DATE: JANUARY 27, 2022

C-1.0

LEGEND

EXIST	PROP	
		PROPERTY LINE/RIGHT-OF-WAY
		BUILDING SETBACK
EOP		EDGE OF PAVEMENT
EOG		EDGE OF GRAVEL
	BCC	BITUMINOUS CONCRETE BERM
	VGC	VERTICAL GRANITE CURB
SGE		SLOPED GRANITE EDGING
PCC		PRECAST CONCRETE CURB
		SAW CUT
		STOP LINE
	20	CONTOUR
	RD	ROOF DRAIN
D	D	DRAIN LINE
12"-S	S	SEWER LINE
OHW		OVERHEAD WIRE
W	W	WATER LINE
E	UGE	UNDERGROUND ELECTRIC
		BUILDING
		SIGN
	10	PARKING COUNT
		ACCESSIBLE PARKING
	x21.25	SPOT ELEVATION
		TEST PIT LOCATION
		CATCH BASIN
		DRAIN MANHOLE
		DRAIN MANHOLE
		WATER GATE
		FIRE HYDRANT
		UTILITY POLE
		EROSION CONTROL BARRIER
		CROSSWALK

ABBREVIATIONS

APPROX	APPROXIMATE
BIT.	BITUMINOUS PAVEMENT
BM	BENCHMARK
CB	CATCH BASIN
CC	CONCRETE CURB
CONC.	CONCRETE
EL/ELEV	ELEVATION
EOG	EDGE OF GRAVEL
EOP	EDGE OF PAVEMENT
EXIST	EXISTING
FFE	FINISHED FLOOR ELEVATION
HDPE	HIGH DENSITY POLYETHYLENE PIPE
HYD	HYDRANT
INV	INVERT ELEVATION
MAX	MAXIMUM
MIN	MINIMUM
MCC	MONOLITHIC CONCRETE CURB
NTS	NOT TO SCALE
PCC	PRE CAST CONCRETE CURB
PROP	PROPOSED
PVC	POLYVINYL CHLORIDE PIPE
RD	ROOF DRAIN
SMH	SEWER MANHOLE
TYP	TYPICAL
UGE	UNDERGROUND ELECTRIC
UP	UTILITY POLE
VGC	VERTICAL GRANITE CURB
WG	WATER GATE
SGE	SLOPED GRANITE EDGING
T.W.	TOP OF WALL
B.W.	BOTTOM OF WALL
HD	HEAVY-DUTY
SWL	SOLID WHITE LINE
DYL	DOUBLE YELLOW LINE

GENERAL NOTES

1. EXISTING CONDITIONS INFORMATION

A.) THE LOCUS PROPERTY IS REFERENCED AS ASSESSORS MAP 57, BLOCK B, LOT 18..12A.

B.) THE LOCUS PROPERTY IS COMPRISED OF 'LOT "A"' ON THE APPROVAL NOT REQUIRED PLAN PREPARED BY MBL LAND DEVELOPMENT & PERMITTING, CORP. ON OCTOBER 31, 2019, APPROVED BY THE RANDOLPH PLANNING BOARD ON NOVEMBER 18, 2019 AND RECORDED IN THE NORFOLK COUNTY REGISTRY OF DEEDS PLAN BOOK 687 PAGE 25.

C.) ZONING INFORMATION COLLECTED FROM THE TOWN OF RANDOLPH GIS, ASSESSOR'S PROPERTY CARDS, AND THE TOWN BUILDING DEPARTMENT. ZONING OF THE LOCUS PROPERTY WAS AMENDED TO THE GREAT BEAR SWAMP HIGHWAY DISTRICT (GBHD) ACCORDING TO COUNCIL ORDER NO. 2016-040 DATED FEBRUARY 6, 2017 AND PROVIDED BY THE BUILDING DEPARTMENT TO MBL LAND DEVELOPMENT & PERMITTING, CORP. ON JANUARY 9, 2018. ZONING OF LOT 19 HAS BEEN DECLARED TO BE IN THE GBHD AS STATED IN A LETTER ADDRESSED TO MR. BRIAN M. DUNN, PRESIDENT OF MBL LAND DEVELOPMENT & PERMITTING, CORP. FROM RONALD LUM, BUILDING COMMISSIONER OF THE TOWN OF RANDOLPH.

D.) BENCHMARK INFORMATION: ELEVATIONS ARE ASSUMED.
BM-1: NAIL IN UTILITY POLE #6 LOCATED ON THE NORTH SIDE OF MAZZEO DRIVE.
EL.=90.98

E.) THE PARCEL SHOWN HEREON DOES NOT LIE WITHIN A FLOOD AREA, AS SHOWN ON THE F.E.M.A. FLOOD INSURANCE RATE MAP (F.I.R.M.) FOR NORFOLK COUNTY, MASSACHUSETTS, MAP NUMBER 25021C0216E, COMMUNITY NUMBER 250251, PANEL 0216, HAVING AN EFFECTIVE DATE OF JULY 17, 2012.

F.) UNDERGROUND UTILITIES SHOWN HEREON ARE APPROXIMATE ONLY AND BASED ON RECORDS AVAILABLE AT THE TIME OF SURVEY AND FIELD LOCATION OF STRUCTURES AND DIGSAFE MARKINGS. ALL UTILITIES SHOULD BE VERIFIED IN THE FIELD BY THE APPROPRIATE UTILITY COMPANY COMPANY PRIOR TO ANY CONSTRUCTION.

G.) THIS DOCUMENT IS AN INSTRUMENT OF SERVICE OF MBL LAND DEVELOPMENT & PERMITTING, CORP. ISSUED TO OUR CLIENT FOR PURPOSES RELATED DIRECTLY AND SOLELY TO MBL LAND DEVELOPMENT & PERMITTING, CORP.'S SCOPE OF SERVICES UNDER CONTRACT TO OUR CLIENT FOR THIS PROJECT. ANY USE OR REUSE OF THIS DOCUMENT FOR ANY REASON BY ANY PARTY FOR PURPOSES UNRELATED DIRECTLY AND SOLELY TO SAID CONTRACT SHALL BE AT THE USER'S SOLE AND EXCLUSIVE RISK AND LIABILITY, INCLUDING LIABILITY FOR VIOLATION OF COPYRIGHT LAWS, UNLESS WRITTEN CONSENT IS PROVIDED BY MBL LAND DEVELOPMENT & PERMITTING, CORP.

H.) THIS PLAN IS BASED ON AVAILABLE RECORD INFORMATION AND PLANS FROM THE NORFOLK COUNTY REGISTRY OF DEEDS AND AN INSTRUMENT SURVEY PERFORMED BY MBL LAND DEVELOPMENT & PERMITTING, CORP. FROM DECEMBER 2017 TO DECEMBER 2021.

2. MATERIALS

A. CURBING:
ALL CURBING WITHIN THE SITE SHALL BE BITUMINOUS CONCRETE CURB, UNLESS OTHERWISE NOTED. ALL CURBING WITHIN THE TOWN RIGHT-OF-WAY SHALL BE VERTICAL GRANITE CURB, UNLESS OTHERWISE NOTED.

B. PARKING AREAS AND ACCESS DRIVE:
BITUMINOUS PAVEMENT SHALL MEET THE REQUIREMENTS OF SECTION 400 OF THE MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, LATEST EDITION, REVISIONS AND ALL CURRENT ADDENDA.
STANDARD:
SURFACE COURSE: 1.5 INCHES BITUMINOUS CONCRETE
BINDER COURSE: 1.5 INCHES BITUMINOUS BINDER
BASE COURSE: 12.0 INCHES COMPACTED GRAVEL: 6" OF GRADED GRAVEL AND 6" OF 3/4" PROCESSED GRAVEL

C. LANDSCAPE AREAS:
ALL SURFACED AREAS OR DISTURBED AREAS NOT SPECIFIED ON THE LANDSCAPE PLAN SHALL RECEIVE FOUR (4) INCHES OF TOPSOIL, SEED, MULCH, AND BE WATERED UNTIL A HEALTHY STAND OF GRASS IS OBTAINED.

3. PARKING STALLS SHALL BE AS FOLLOWS:

STANDARD PARKING: 9' x 18' MINUMUM
ACCESSIBLE PARKING: 9' x 18' MINIMUM

4. SNOW STORAGE:

SNOW SHALL BE PLOWED TO THE AREAS INDICIATED ON THE PLANS.

5. UTILITIES:

A. LOCATION AND ELEVATIONS OF EXISTING UTILITIES:
THE LOCATION AND ELEVATIONS OF ALL EXISTING UTILITIES AS SHOWN ON THESE PLANS ARE BASED ON THE INFORMATION AS REFERENCED IN THE EXISTING CONDITIONS INFORMATION PROVIDED ABOVE, AND SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

B. STORM DRAINAGE:
UNLESS OTHERWISE NOTED, STORM DRAIN PIPING SHALL BE HDPE, HIGH DENSITY POLYETHYLENE PIPE, SMOOTH LINED (n=0.011) WITH LOCK TIGHT JOINTS. THE SIZES OF ALL PIPES ARE NOTED ON THE GRADING & DRAINAGE PLAN.

CATCH BASINS SHALL BE PRECAST CONCRETE, AS SPECIFIED ON THE DETAIL SHEET. ALL CATCH BASINS SHALL BE FOUR (4) FEET IN DIAMETER, HAVE A FOUR (4) FOOT MINIMUM SUMP, AND HAVE HOODS/SNOUTS INSTALLED AT THEIR OUTLETS.

C. WATER/SEWER
PIPE INSTALLATION AND MATERIALS SHALL COMPLY WITH THE STATE PLUMBING CODE WHERE APPLICABLE. CONTRACTOR SHALL COORDINATE WITH LOCAL PLUMBING INSPECTOR PRIOR TO THE PURCHASE OF MATERIALS AND CONSTRUCTION.

GENERAL CONSTRUCTION REQUIREMENTS

1.) THE CONTRACTOR SHALL VERIFY THE PROPOSED LAYOUT WITH ITS RELATIONSHIP TO THE EXISTING SITE SURVEY. THE CONTRACTOR SHALL ALSO VERIFY ALL DIMENSIONS, SITE CONDITIONS, AND MATERIAL SPECIFICATIONS AND SHALL NOTIFY THE OWNER AND ENGINEER OF ANY ERRORS, OMISSIONS OR DISCREPANCIES BEFORE COMMENCING OR PROCEEDING WITH WORK.

2.) THE SITE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS, INSPECTIONS, BONDS, ETC. AND OTHER APPROVAL RELATED ITEMS WITH THE TOWN OF RANDOLPH AND MASSACHUSETTS HIGHWAY DEPARTMENT. NO CONSTRUCTION SHALL COMMENCE UNTIL SUCH PERMITS HAVE BEEN SECURED.

3.) METHODS AND MATERIALS USED IN THE CONSTRUCTION OF IMPROVEMENTS FOR THIS PROJECT SHALL CONFORM TO THE CURRENT CONSTRUCTION STANDARDS AND SPECIFICATIONS OF THE MASSACHUSETTS HIGHWAY DEPARTMENT AND THE TOWN OF RANDOLPH.

4.) DEVIATIONS OR CHANGES FROM THESE PLANS WILL NOT BE ALLOWED UNLESS APPROVED BY THE ENGINEER/OWNER.

GENERAL CONSTRUCTION REQUIREMENTS (CONT.)

5.) CONTRACTOR TO CONFIRM AND VERIFY THE VALIDITY, LOCATION, MATERIAL, AND AVAILABILITY TO USE EXISTING UTILITIES ON OR NEAR THE PROJECT SITE PROPERTY. CONTRACTOR TO LOCATE EXISTING UTILITIES AND CONFIRM SAID UTILITIES WITH ALL APPLICABLE MUNICIPALITIES AND UTILITY COMPANIES PRIOR TO ANY CONSTRUCTION. ONCE UTILITIES HAVE BEEN CONFIRMED IN THE FIELD BY CONTRACTOR AND VERIFIED BY APPLICABLE MUNICIPALITY AND UTILITY COMPANY AND CONNECTION HAS BEEN APPROVED BY ENTITY, ONLY THEN SHALL CONTRACTOR CONSTRUCT AND UTILIZE THESE UTILITIES. CONTRACTOR TO IMMEDIATELY INFORM ENGINEER OF RECORD OF ANY DEVIATIONS TO PLANS.

6.) THE CONTRACTOR SHALL MAKE EXPLORATORY EXCAVATIONS AND LOCATE ANY EXISTING UTILITIES SUFFICIENTLY AHEAD OF CONSTRUCTION TO PERMIT REVISIONS TO PLANS IF NECESSARY. THE EXISTENCE AND/OR LOCATION OF UTILITIES SHOWN ON THESE PLANS MAY BE ONLY APPROXIMATELY CORRECT AND THE CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN HEREON AND ANY OTHER EXISTING UTILITIES NOT OF RECORD OR NOT SHOWN ON THESE PLANS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING, AT HIS EXPENSE, ANY EXISTING UTILITIES DAMAGED DURING CONSTRUCTION.

7.) THE CONTRACTOR SHALL NOTIFY OPERATORS WHO MAINTAIN UNDERGROUND UTILITY LINES IN THE AREA OF PROPOSED EXCAVATION OR BLASTING AT LEAST TWO WORKING DAYS, BUT NOT MORE THAN TEN WORKING DAYS, PRIOR TO COMMENCEMENT OF EXCAVATION OR DEMOLITION. ALL WATER, GAS, SEWER AND OTHER UTILITIES SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION.

8.) RELOCATION OF ANY UTILITIES SHALL BE AT THE OWNERS EXPENSE AND COMPLETED WITH THE UTILITY WORK. THE OWNER SHALL BE NOTIFIED AS TO THE RELOCATION'S REQUIRED PRIOR TO THE START OF CONSTRUCTION.

9.) IF THE PROJECT DISTURBS MORE THAN ONE ACRE OF LAND AND FALLS WITHIN THE NPDES CONSTRUCTION GENERAL PERMIT(COP)AND EPA JURISDICTION. PRIOR TO THE START OF CONSTRUCTION THE CONTRACTOR IS TO FILE A COP NOTICE OF INTENT WITH THE EPA AND PREPARE A STORMWATER POLLUTION PREVENTION PLAN IN ACCORDANCE WITH THE NPDES REGULATIONS. CONTRACTOR SHALL CONFIRM WITH THE OWNER AND MBL THAT THE NOTICE OF INTENT HAS BEEN FILED WITH THE EPA.

10.) CONTRACTOR SHALL COORDINATE WITH ELECTRICAL CONTRACTOR AND SHALL FURNISH EXCAVATION, INSTALLATION AND BACKFILL OF ELECTRICAL FURNISHED SITE WORK RELATED ITEMS SUCH AS PULL BOXES, CONDUITS, DUCT BANKS, LIGHT POLE BASES, AND CONCRETE PADS. SITE CONTRACTOR SHALL FURNISH CONCRETE ENCASEMENT OF DUCT BANKS IF REQUIRED BY THE UTILITY COMPANY AND AS INDICATED ON THE DRAWINGS. THE CONTRACTOR SHALL EXCAVATE AND BACKFILL TRENCHES FOR GAS IN ACCORDANCE WITH GAS COMPANY'S REQUIREMENTS.

11.) THESE PLANS AND CORRESPONDING AUTO CAD FILES AND DOCUMENTS ARE INSTRUMENTS OF PROFESSIONAL SERVICE, AND SHALL NOT BE USED, IN WHOLE OR IN PART, FOR ANY PURPOSE OTHER THAN FOR WHICH IT WAS CREATED WITHOUT THE EXPRESSED WRITTEN CONSENT OF MBL. ANY UNAUTHORIZED USE, REUSE, MODIFICATION OR ALTERATION AND DISTRIBUTION OF ANY KIND, INCLUDING AUTOMATED CONVERSION OF THIS DOCUMENT SHALL BE AT THE USERS SOLE RISK WITHOUT LIABILITY OR LEGAL EXPOSURE TO MBL.

12.) THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING, WITH MATCHING MATERIALS, ANY PAVEMENT, WALKS, CURBS, ETC. THAT MUST BE CUT OR THAT ARE DAMAGED DURING CONSTRUCTION.

13.) AN APPROVED SET OF PLANS AND ALL APPLICABLE PERMITS MUST BE AVAILABLE AT THE CONSTRUCTION SITE AT ALL TIMES.

14.) CONTRACTOR SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL AND ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM "THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER." THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING A PROTECTIVE BARRIER AROUND THE SITE PRIOR TO AND DURING CONSTRUCTION.

15.) WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION OF THE CONFLICT.

16.) THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS WITH THE APPROPRIATE UTILITY COMPANIES FOR POLE RELOCATION, AND FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE, CABLE, FIRE ALARM, WATER, SANITARY SEWER, STORM DRAIN, AND ANY OTHER UTILITIES, BOTH PUBLIC AND PRIVATE, AS REQUIRED.

17.) THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES, PUBLIC AND PRIVATE, INCLUDING THOSE IN CONTROL OF UTILITIES NOT SHOWN ON THIS PLAN, (SEE CHAPTER 370, ACTS OF 1963, MASSACHUSETTS) PRIOR COMMENCING ANY WORK.

18.) MBL LAND DEVELOPMENT & PERMITTING, CORP. ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN.

19.) UPON AWARD OF CONTRACT, CONTRACTOR SHALL MAKE ALL NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN ALL NECESSARY PERMITS, PAY ALL FEES AND POST ALL BONDS ASSOCIATED WITH SAME, AND COORDINATE WITH THE ENGINEER AS REQUIRED.

20.) THE CONTRACTOR SHALL REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR ALL BUILDING DIMENSIONS AND CONSTRUCTION. BUILDING DIMENSIONS ARE SHOWN FOR COORDINATION WITH OTHER SITE WORK ONLY AND SHOULD NOT BE USED TO STAKE OUT BUILDINGS. SITE CONTRACTOR SHALL STAKE OUT THE EXTERIOR BUILDING CORNERS FROM THE LATEST ARCHITECTURAL PLANS. THE CONTRACTOR SHALL NOTIFY MBL LAND DEVELOPMENT & PERMITTING, CORP. OF ANY DISCREPANCIES BETWEEN SITE PLAN DIMENSIONS AND ARCHITECTURAL BUILDING PLANS BEFORE PROCEEDING WITH ANY PORTION OF SITE WORK WHICH MAY BE EFFECTED SO THAT PROPER ADJUSTMENTS TO THE SITE LAYOUT CAN BE MADE IF NECESSARY.

21.) PRIOR TO THE START OF CONSTRUCTION THE CONTRACTOR SHALL SUBMIT A SCHEDULE OF OPERATIONS TO THE OWNER AND ITS REPRESENTATIVE. THE CONTRACTOR SHALL NOTIFY AND COORDINATE WITH THE OWNER, ITS ENGINEER OR REPRESENTATIVE.

22.) CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR JOB SITE SAFETY AND ALL CONSTRUCTION MEANS AND METHODS. MBL LAND DEVELOPMENT & PERMITTING, CORP. DOES NOT ASSUME ANY RESPONSIBILITY IN JOB SITE SAFETY FOR CONSTRUCTION METHODS USED. ALL FEDERAL, STATE, AND LOCAL OSHA REQUIREMENTS AND REGULATIONS SHALL BE FOLLOWED BY ALL PERSONNEL ON THE JOB SITE AT ALL TIMES.

23.) THE CONTRACTOR SHALL REMOVE ALL STUMPS, RUBBISH, UNSUITABLE MATERIAL AND DEBRIS FROM THE SITE PROJECT SITE. STORAGE OF THESE ITEMS WILL NOT BE PERMITTED ON THE PROJECT SITE. THE CONTRACTOR SHALL LEAVE THE SITE IN A SAFE, CLEAN, AND LEVEL CONDITION AT THE COMPLETION OF THE SITE CLEARANCE WORK.

24.) AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS, WITHOUT PRIOR APPROVAL BY THE OWNER OR ITS REPRESENTATIVE, SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.

25.) THE CONTRACTOR SHALL PROTECT ALL UNDERGROUND DRAINAGE, SEWER, AND UTILITY FACILITIES FROM EXCESSIVE VEHICULAR LOADS DURING CONSTRUCTION. ANY FACILITIES DAMAGED BY CONSTRUCTION LOADS SHALL BE REPAIRED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.

26.) JOINTS BETWEEN NEW BITUMINOUS CONCRETE ROADWAY PAVEMENT AND SAWCUT EXISTING PAVEMENT SHALL BE SEALED WITH BITUMEN AND BACKSANDED.

27.) ALL PROPOSED WALKWAYS WILL BE HANDICAPPED ACCESSIBLE. ALL PROPOSED SLOPES ON WALKWAYS TO BE LESS THAN 5% AND ALL CROSS SLOPES TO BE EQUAL TO OR LESS THAN 2%. ALL WORK WILL BE IN ACCORDANCE WITH THE MOST CURRENT REQUIREMENTS OF THE U.S. ACCESS BOARD, AMERICANS WITH DISABILITIES ACT & COMMONWEALTH OF MASSACHUSETTS ARCHITECTURAL ACCESS BOARD.

28.) FINAL LAYOUT AND STAKING OF ALL PROPOSED FEATURES AND GRADING SHALL BE REVIEWED IN THE FIELD AND APPROVED BY THE OWNERS REPRESENTATIVE PRIOR TO ANY SITE PREPARATION OR CONSTRUCTION. THE CONTRACTOR SHALL NOT ADJUST OR MODIFY THE LAYOUT AND STAKING OF ANY PROPOSED FEATURES WITHOUT FINAL APPROVAL FROM THE OWNERS REPRESENTATIVE AND ANY GOVERNMENTAL AGENCY WHICH MAY HAVE JURISDICTION OVER CONTEMPLATED CHANGE.

GENERAL CONSTRUCTION REQUIREMENTS (CONT.)

29) ALL ELECTRICAL, TELEPHONE, DATA/COM AND FIRE DEPARTMENT CONDUITS ARE TO BE INSTALLED BY THE ELECTRICAL CONTRACTOR. TRENCHING, BACKFILLING, CONCRETE WORK AND STREET REPAIR SHALL BE PERFORMED BY THE GENERAL CONTRACTOR.

30.) RIM ELEVATIONS OF DRAINAGE AND SANITARY SEWER MANHOLES ARE APPROXIMATE. FINAL ELEVATIONS ARE TO BE SET FLUSH AND CONSISTENT WITH GRADING PLANS. ADJUST ALL OTHER RIM ELEVATIONS OF MANHOLES, GAS GATES, WATER GATES AND OTHER UTILITIES TO FINISHED GRADE WITHIN THE LIMITS OF THE SITE WORK.

31.) ALL AREAS DISTURBED DURING CONSTRUCTION SHALL BE REPLACED IN KIND. LAWN AREAS SHALL HAVE A MODIFIED LOAM BORROW PLACED AND SEEDED. THE MODIFIED LOAM BORROW SHALL HAVE A MINIMUM DEPTH OF 4" AND SHALL BE PLACED FLUSH WITH THE TOP OF ADJACENT CURB, EDGING, BERM, OR OTHER SURFACE.

32.) THE CONTRACTOR SHALL WATER, MOW, FERTILIZE OR OTHERWISE MAINTAIN LAWN AREAS UNTIL SATISFACTORY GRASS STANDS ARE ACHIEVED TO THE OWNER OR ITS REPRESENTATIVE SATISFACTION.

33.) THE CONTRACTOR SHALL RESET ALL MONUMENTATION DISTURBED DURING CONSTRUCTION AT NO ADDITIONAL COST TO THE OWNER.

34.) THE CONTRACTOR SHALL PROVIDE A SURVEY BY A PLS TO ENSURE THAT THE MONUMENTATION IS RESET TO ITS ORIGINAL LOCATION. MONUMENTS INCLUDE, BUT ARE NOT LIMITED TO, TOWN BOUNDS, MASS HIGHWAY BOUNDS, PROPERTY LINE MONUMENTS, IRON RODS, STAKES, CONCRETE BOUNDS, GRANITE BOUNDS AND STONE WALLS WITH DRILL HOLES.

35.) THE CONTRACTOR SHALL NOTIFY MBL LAND DEVELOPMENT & PERMITTING, CORP. AFTER INSTALLATION OF ANY UTILITIES AND/OR SUBSURFACE STRUCTURES SO THAT AS-BUILT INFORMATION MAY BE OBTAINED PRIOR TO BACKFILLING.

STORM WATER MAINTENANCE PROGRAM

1.) ALL EROSION AND SEDIMENTATION CONTROL DEVICES TO BE USED FOR THIS PROJECT SHALL BE INSTALLED AND MAINTAINED AS SPECIFIED ON THESE PLANS AND IN VOLUME TWO OF THE STATE OF MASSACHUSETTS STORM WATER MANAGEMENT MANUAL.

2.) PROPER EROSION AND SEDIMENT CONTROL PRACTICES MUST BE IMPLEMENTED DURING ALL PHASES OF CONSTRUCTION AND UNTIL THE SITE IS SATISFACTORILY STABILIZED. ALL CONTROL PRACTICES SHOULD BE IN ACCORDANCE WITH VOLUME TWO OF THE STATE OF MASSACHUSETTS STORM WATER MANAGEMENT MANUAL.

3.) THE CONTRACTOR IS RESPONSIBLE FOR THE MAINTENANCE AND/OR REPLACEMENT OF ALL TEMPORARY AND PERMANENT EROSION AND SEDIMENTATION CONTROL DEVICES TO ENSURE PROPER OPERATION THROUGHOUT THE LIFE OF THE PROJECT. THE CONTRACTOR SHALL CONDUCT THE FOLLOWING MAINTENANCE AT NO ADDITIONAL COST TO THE OWNER. THE CONTRACTOR IS RESPONSIBLE FOR THE MAINTENANCE OF PERMANENT MEASURES UNTIL CONSTRUCTION OF THE PROJECT IS COMPLETED OR UNTIL IT IS ACCEPTED BY THE OWNER. THE OWNER IS RESPONSIBLE THEREAFTER.

4.) TEMPORARY VEGETATIVE COVER SHALL BE APPLIED TO ANY DISTURBED AREAS (INCLUDING SOIL STOCKPILE AREAS) THAT HAVE NOT YET REACHED FINISHED GRADE AS SOON AS POSSIBLE, BUT NOT MORE THAN FOURTEEN (14) DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS TEMPORARILY CEASED, UNLESS THE ACTIVITY IS TO RESUME WITHIN TWENTY-ONE (21) DAYS.

5.) PERMANENT VEGETATIVE COVER SHALL BE APPLIED TO ALL DISTURBED AREAS THAT HAVE REACHED FINISHED GRADE AS SOON AS POSSIBLE, BUT NOT MORE THAN FOURTEEN (14) DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS PERMANENTLY CEASED. THE RECOMMENDED PERMANENT SEEDING DATES ARE APRIL 1 TO JUNE 15 AND AUGUST 15 TO OCTOBER 1.

6.) IF SEEDING CANNOT BE COMPLETED IMMEDIATELY OR WITHIN THE RECOMMENDED SEEDING DATES, USE THE TEMPORARY MULCHING MEASURE TO PROTECT THE SITE AND DELAY SEEDING UNTIL THE NEXT RECOMMENDED SEEDING PERIOD.

7.) AREAS WHICH HAVE BEEN TEMPORARILY OR PERMANENTLY SEEDED SHOULD BE MULCHED IMMEDIATELY FOLLOWING SEEDING IN ADDITION TO AREAS WHICH CANNOT BE SEEDED WITHIN THE RECOMMENDED SEEDING DATES AND ANY SOIL STOCKPILE AREAS. TEMPORARY MULCHING SHOULD BE PERFORMED AS SOON AS POSSIBLE, BUT NOT MORE THAN FOURTEEN (14) DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS TEMPORARILY CEASED UNLESS THE ACTIVITY IS TO RESUME WITHIN TWENTY-ONE (21) DAYS.

8.) ALL MULCHES MUST BE INSPECTED PERIODICALLY, IN PARTICULAR AFTER RAINSTORMS, TO CHECK FOR RILL EROSION. WHERE EROSION IS OBSERVED, ADDITIONAL MULCH MUST BE APPLIED. IF NETTING IS USED, THE NET SHOULD BE INSPECTED AFTER RAINSTORMS FOR DISLOCATION OR FAILURE. IF WASHOUTS OR BREAKAGE OCCUR, THE NET MUST BE REINSTALLED AS NECESSARY AFTER REPAIRING DAMAGE TO SLOPE. INSPECTIONS SHOULD TAKE PLACE UNTIL GRASSES ARE FIRMLY ESTABLISHED. GRASS IS CONSIDERED TO BE FIRMLY ESTABLISHED AT A MINIMUM HEIGHT OF THREE (3) INCHES.

9.) IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTROL DUST AND TAKE ALL NECESSARY MEASURES TO ENSURE ALL ROADS ARE MAINTAINED IN A DUST FREE CONDITION AT ALL TIMES THROUGHOUT THE LIFE OF THE CONTRACT. REPETITIVE TREATMENTS SHOULD BE APPLIED AS NECESSARY.

10.) ALL PROPOSED CONSTRUCTION ENTRANCES SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO THE SURROUNDING ROADWAYS. THIS WILL REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR ADDITIONAL LENGTH AS CONDITIONS DEMAND AND REPAIR AND/OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO THE SURROUNDING ROADWAYS MUST BE REMOVED IMMEDIATELY.

11.) INSPECTION OF PERIMETER SEDIMENT BARRIERS (INCLUDING THOSE ENCOMPASSING SOIL STOCKPILE AREAS) SHOULD BE MADE AFTER EACH STORM EVENT AND REPAIR OR REPLACEMENT SHOULD BE MADE PROMPTLY AS NEEDED. CLEAN OUT OF ACCUMULATED SEDIMENT BEHIND THE SILT FENCE IS NECESSARY IF ONE-HALF OF THE ORIGINAL HEIGHT OF THE BALES BECOMES FILLED IN WITH SEDIMENT.

12.) SILT SACKS HAVE BEEN PROPOSED IN ALL ON-SITE CATCH BASINS IN ORDER TO PREVENT SEDIMENT FROM ENTERING THE PROPOSED STORM DRAINAGE SYSTEM PRIOR TO PERMANENT STABILIZATION OF THE DISTURBED SITE. ALL SILT SACKS SHOULD BE INSPECTED AFTER EVERY RAIN STORM AND REPAIRS MADE AS NECESSARY. SEDIMENT SHOULD BE DISPOSED OF IN A SUITABLE AREA AND PROTECTED FROM EROSION BY EITHER STRUCTURAL OR VEGETATIVE MEANS. CATCH BASIN INLET PROTECTION SHOULD BE REMOVED AND THE AREA REPAIRED AS SOON AS THE CONTRIBUTING DRAINAGE AREA TO THE INLET HAS BEEN COMPLETELY STABILIZED.

13.) REPAIRS OR REPLACEMENT OF DRAINAGE STRUCTURES OF THE FACILITY SHOULD BE DONE WITHIN 30 DAYS OF DEFICIENCY REPORTS. IF AN EMERGENCY SITUATION IS IMMINENT THEN REPAIR/REPLACEMENT MUST BE DONE IMMEDIATELY TO AVERT FAILURE OR DANGER TO NEARBY RESIDENTS.

14.) ALL PROPOSED CATCH BASINS SHALL BE CLEANED FOUR (4) TIMES PER YEAR, AT MINIMUM, AND INSPECTED MONTHLY. ALL SEDIMENTS AND HYDROCARBONS SHOULD BE PROPERLY HANDLED AND DISPOSED, IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL GUIDELINES AND REGULATIONS. SEDIMENT SHALL BE REMOVED WHEN 10% OF THE AVAILABLE STORAGE IS DEPLETED.

16.) IMMEDIATELY PRIOR TO THE END OF CONSTRUCTION OR ACCEPTANCE BY THE OWNER, THE CONTRACTOR SHALL INSPECT ALL ON-SITE CATCH BASINS, WATER QUALITY UNITS, AND SUBSURFACE RECHARGE CHAMBERS AND CLEAN AND FLUSH AS NECESSARY.

811 DigSafe MA ME NH RI VT

No.	DATE	DESCRIPTION	BY
		REVISIONS	

PROJ. MANAGER: TLD
CHIEF DESIGNER: DT
REVIEWED BY: DATE

SEAL

COMMONWEALTH OF MASSACHUSETTS — TRACY L. DUARTE — CIVIL — NO. 48660 — REGISTERED PROFESSIONAL ENGINEER

PREPARED FOR
NEW ENGLAND REALTY TRUST
611 HIGH STREET, NO.190
DEDHAM MASSACHUSETTS

SCALE:
HORZ.:
VERT.:
DATUM:
HORZ.:
VERT.:
0
GRAPHIC SCALE

MBL
LAND DEVELOPMENT & PERMITTING, CORP.
LAND DEVELOPMENT, TRANSPORTATION AND ENVIRONMENTAL SOLUTIONS
5 BRISTOL DRIVE, SUITE 3A
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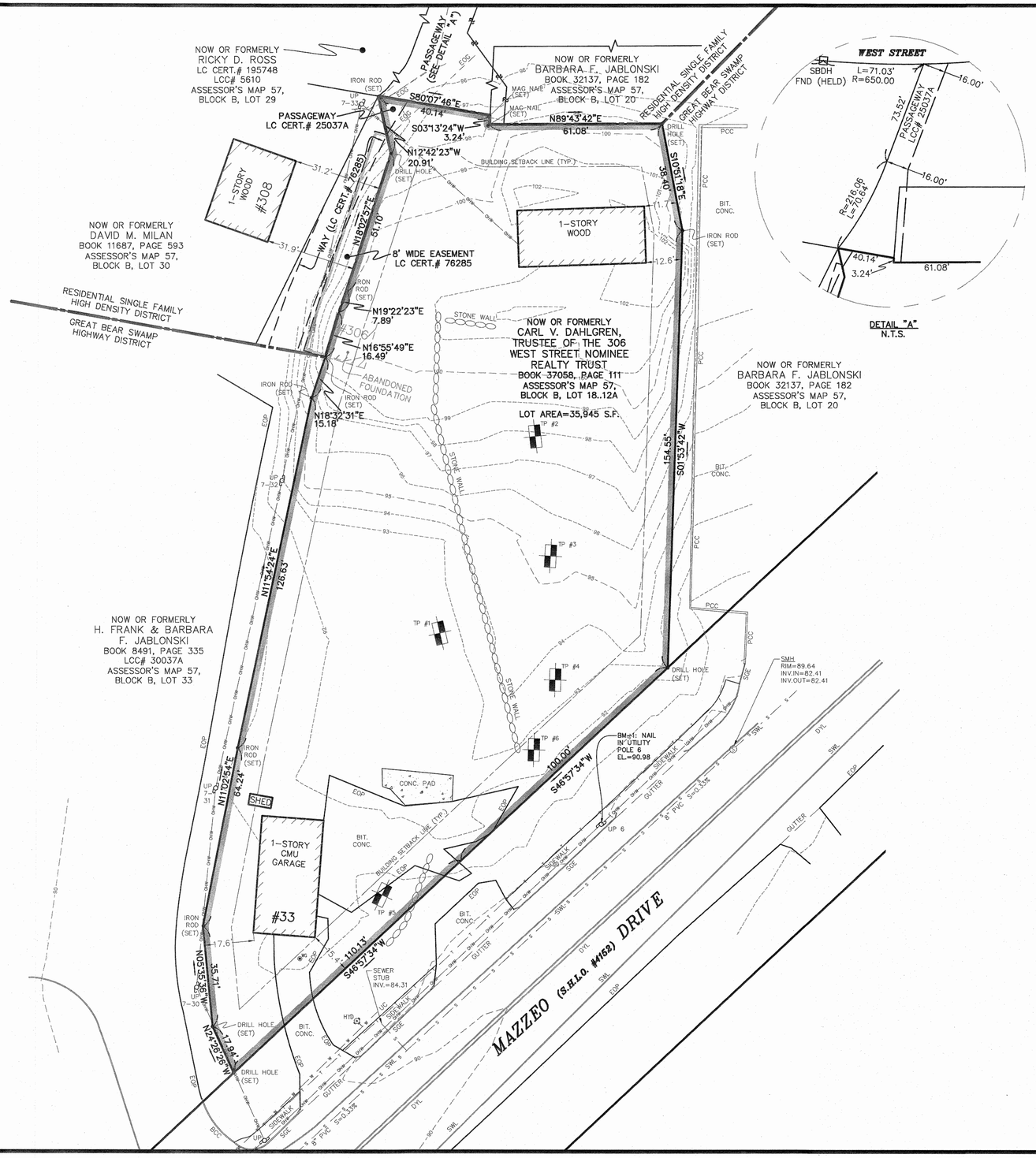
SITE PLANS
GENERAL NOTES & LEGEND
33 MAZZEO DRIVE
ASSESSORS MAP 57 BLOCK B LOT 18..12A
RANDOLPH MASSACHUSETTS

PROJ. No.: 2021-054
DATE: JANUARY 27, 2022

C-2.0

MBL NORTH
LCC# 30037A



GENERAL NOTES :

1) THE LOCUS PROPERTY IS REFERENCED AS ASSESSORS MAP 57, BLOCK B, LOT 18..12A.

2) THE LOCUS PROPERTY IS COMPRISED OF "LOT "A"' ON THE APPROVAL NOT REQUIRED PLAN PREPARED BY MBL LAND DEVELOPMENT & PERMITTING, CORP. ON OCTOBER 31, 2019, APPROVED BY THE RANDOLPH PLANNING BOARD ON NOVEMBER 18, 2019, AND RECORDED IN THE NORFOLK COUNTY REGISTRY OF DEEDS PLAN BOOK 687 PAGE 25.

3) ZONING INFORMATION COLLECTED FROM THE TOWN OF RANDOLPH GIS, ASSESSOR'S PROPERTY CARDS, AND THE TOWN BUILDING DEPARTMENT. ZONING OF THE LOCUS PROPERTY WAS AMENDED TO THE GREAT BEAR SWAMP HIGHWAY DISTRICT (GBHD) ACCORDING TO COUNCIL ORDER No. 2016-040 DATED FEBRUARY 6, 2017 AND PROVIDED BY THE BUILDING DEPARTMENT TO MBL LAND DEVELOPMENT & PERMITTING, CORP ON JANUARY 9, 2018. ZONING OF LOT 19 HAS BEEN DECLARED TO BE IN THE GBHD AS STATED IN A LETTER ADDRESSED TO MR. BRIAN M. DUNN, PRESIDENT OF MBL LAND DEVELOPMENT & PERMITTING, CORP. FROM RONALD LUM, BUILDING COMMISSIONER OF THE TOWN OF RANDOLPH.

4) THE INTENT OF THIS PLAN IS TO SHOW THE EXISTING CONDITIONS OF ASSESSORS MAP 57, BLOCK B, LOT 18..12A.

5) BENCHMARK INFORMATION: ELEVATIONS ARE ASSUMED.
BM=1: NAIL IN UTILITY POLE #6 LOCATED ON THE NORTH SIDE OF MAZZEO DRIVE.
EL.=90.98

6) THE PARCEL SHOWN HEREON DOES NOT LIE WITHIN A FLOOD AREA, AS SHOWN ON THE F.E.M.A. FLOOD INSURANCE RATE MAP (F.I.R.M.) FOR NORFOLK COUNTY, MASSACHUSETTS, MAP NUMBER 25021C0216E, COMMUNITY NUMBER 250251, PANEL 0216, HAVING AN EFFECTIVE DATE OF JULY 17, 2012.

7) UNDERGROUND UTILITIES SHOWN HEREON ARE APPROXIMATE ONLY AND BASED ON RECORDS AVAILABLE AT THE TIME OF SURVEY AND FIELD LOCATION OF STRUCTURES AND DIGSAFE MARKINGS. ALL UTILITIES SHOULD BE VERIFIED IN THE FIELD BY THE APPROPRIATE UTILITY COMPANY COMPANY PRIOR TO ANY CONSTRUCTION.

8) THIS DOCUMENT IS AN INSTRUMENT OF SERVICE OF MBL LAND DEVELOPMENT & PERMITTING, CORP. ISSUED TO OUR CLIENT FOR PURPOSES RELATED DIRECTLY AND SOLELY TO MBL LAND DEVELOPMENT & PERMITTING, CORP.'S SCOPE OF SERVICES UNDER CONTRACT TO OUR CLIENT FOR THIS PROJECT. ANY USE OR REUSE OF THIS DOCUMENT FOR ANY REASON BY ANY PARTY FOR PURPOSES UNRELATED DIRECTLY AND SOLELY TO SAID CONTRACT SHALL BE AT THE USER'S SOLE AND EXCLUSIVE RISK AND LIABILITY, INCLUDING LIABILITY FOR VIOLATION OF COPYRIGHT LAWS, UNLESS WRITTEN CONSENT IS PROVIDED BY MBL LAND DEVELOPMENT & PERMITTING, CORP.

9) THIS PLAN IS BASED ON AVAILABLE RECORD INFORMATION AND PLANS FROM THE NORFOLK COUNTY REGISTRY OF DEEDS AND AN INSTRUMENT SURVEY PERFORMED BY MBL LAND DEVELOPMENT & PERMITTING, CORP. FROM DECEMBER 2017 TO DECEMBER 2021.

REFERENCES :

NORFOLK COUNTY REGISTRY OF DEEDS

DEED REFERENCES: BOOK 37058 PAGE 111
BOOK 28721 PAGE 324
BOOK 3495 PAGE 175

PLAN REFERENCES: PLAN BOOK 687 No. 25
PLAN BOOK 315 No. 1198
PLAN BOOK 103 No. 637

LAND COURT

PLAN REFERENCES:	DEED REFERENCES:
LCC# 30037	LC CERT.# 195748
LCC# 25037	LC CERT.# 109491 (LOCUS)
LCC# 5610	LC CERT.# 76285

STREET LAYOUTS

S.H.L.O. #4152
C.L.O. #108.5

811 DigSafe MA-ME-NH-RI-VT

No.	DATE	DESCRIPTION	BY
		REVISIONS	

PROJ. MANAGER: TLD
CHIEF DESIGNER: DT
REVIEWED BY: DATE

SEAL
JAN 27 2022
COMMONWEALTH OF MASSACHUSETTS
MICHAEL ROBERT KEEGAN
No. 33939
REGISTERED PROFESSIONAL LAND SURVEYOR
Michael Robert Keegan

SEAL

PREPARED FOR
NEW ENGLAND REALTY TRUST
611 HIGH STREET, NO.190
DEDHAM MASSACHUSETTS

SCALE:
HORZ.: 1"=20'
VERT.:
DATUM:
HORZ.:
VERT.:
20 10 0 20
GRAPHIC SCALE

MBL
LAND DEVELOPMENT & PERMITTING, CORP.
LAND DEVELOPMENT, TRANSPORTATION, AND ENVIRONMENTAL SOLUTIONS
5 BRISTOL DRIVE, SUITE 3A
SOUTH EASTON, MA 02375
P.508.297.2746
EMAIL:info@MBLLandDevelopment.com
WEB: www.MBLLandDevelopment.com

SITE PLANS
EXISTING CONDITIONS PLAN
33 MAZZEO DRIVE
ASSESSORS MAP 57 BLOCK B LOT 18..12A
RANDOLPH MASSACHUSETTS

PROJ. No.: 2021-054
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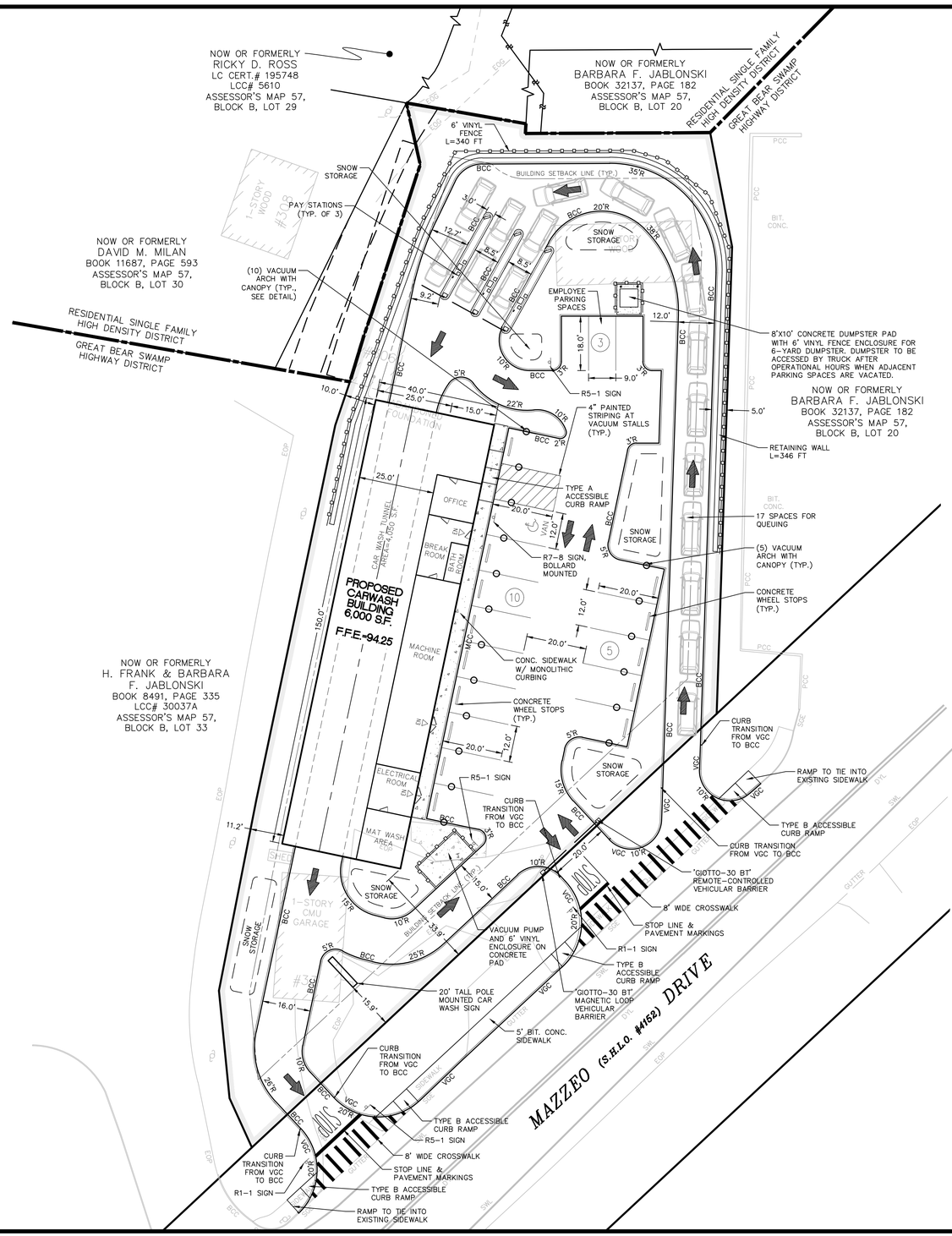
C-3.0

MBL NORTH
LCC# 30037A



ZONING TABLE

ZONE: GREAT BEAR SWAMP HIGHWAY DISTRICT
USE: CAR WASH

	REQUIRED	PROVIDED
MIN. LOT AREA	20,000 S.F.	35,945 S.F.
MIN. FRONTAGE	130 FT	210 FT
MIN. LOT DEPTH	100 Ft	192 FT
MIN. LOT WIDTH	100 Ft	143 FT
FRONT SETBACK (STREET/YARD)	15 FT	33.9 FT
SIDE SETBACK	10 FT	10 FT
REAR SETBACK	15 FT	96.9 FT
BUFFER STRIP TO STREET	5 FT	5 FT
BUFFER STRIP TO RESIDENTIAL	10 FT	10 FT
BUFFER STRIP TO COMMERCIAL	2.50 FT	5 FT
(A) BUILDING LOT COVERAGE	60%	16.7%
(B) IMPERVIOUS LOT COVERAGE	30%	50.7%
(C) OPEN SPACE	10%	32.6%
MAX COVERAGE (A)+(B)	90%	67.4%
MAX. BUILDING HEIGHT (STORIES/FEET)	4/ 50 FT	1/ 25 FT

PARKING CALCULATION TABLE

	CALC. FACTOR	REQUIRED	PROVIDED
COMMERCIAL/BUSINESS	1 SPACE/200 S.F. OF GFA	10 SPACES*	18 SPACES
ACCESSIBLE PARKING	15-25 REG	1 SPACE	1 SPACE

* GROSS FLOOR AREA IS DEFINIED IN THE RANDOLPH ZONING BYLAWS AS "THE SUM OF THE GROSS HORIZONTAL AREAS OF THE SEVERAL FLOORS OF A BUILDING MEASURED FROM THE EXTERIOR FACE OF EXTERIOR WALLS, OR FROM THE CENTER LINE OF A WALL SEPARATING TWO (2) BUILDINGS, BUT NOT INCLUDING INTERIOR PARKING SPACES, LOADING SPACE FOR MOTOR VEHICLES, OR ANY SPACE WHERE THE FLOOR-TO-CEILING HEIGHT IS LESS THAN SIX (6) FEET."

THE INTERIOR TUNNEL OF THE CAR WASH BUILDING CAN BE CLASSIFIED AS AN INTERIOR LOADING SPACE FOR MOTOR VEHICLES; THEREFORE, THIS TUNNEL AREA WAS EXCLUDED FROM THE GROSS FLOOR AREA CALCULATIONS FOR THE PARKING FACTOR AND AN GROSS FLOOR AREA OF 1,950 WAS USED TO DETERMINE THE REQUIRED AMOUNT OF PARKING SPACES.

SIGN SUMMARY TABLE

M.U.T.C.D. NUMBER	TEXT
R1-1	STOP
R5-1	DO NOT ENTER
R7-8	RESERVED PARKING

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COMMONWEALTH OF MASSACHUSETTS
TRACY L. DUARTE
CIVIL
NO. 48660
REGISTERED PROFESSIONAL ENGINEER

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SITE PLANS
LAYOUT & MATERIALS PLAN
33 MAZZEO DRIVE
ASSESSORS MAP 57 BLOCK B LOT 18..12A
RANDOLPH MASSACHUSETTS

PROJ. No.: 2021-054
DATE: JANUARY 27, 2022

C-4.0

MBL NORTH
LCC# 30037A

RESIDENTIAL SINGLE FAMILY HIGH DENSITY DISTRICT
GREAT BEAR SWAMP HIGHWAY DISTRICT

T.W.=98.4
B.W.=96.9

T.W.=100.5
B.W.=97.7

T.W.=100.2
B.W.=95.3

WQU-3
RIM=94.1
INV.IN(ROOF)=90.98
INV.IN(CB-5)=90.98
INV.IN(DMH-2)=90.98
INV.OUT=90.98

DMH-2
RIM=93.9
INV.IN(CB-6)=91.33
INV.IN(CB-7)=91.33
INV.OUT=91.33

T.W.=101.2
B.W.=96.7

T.W.=101.5
B.W.=96.1

8" HDPE
S=1.0%
L=14 FT

8" HDPE
S=1.0%
L=1 FT

CB-7 (SHALLOW GRATE)
RIM=93.8
INV.OUT=90.47

8" HDPE
S=1.0%
L=35 FT

CB-5
(SHALLOW GRATE)
RIM=93.4
INV.OUT=91.25

T.W.=100.3
B.W.=94.3

8" HDPE
S=1.0%
L=27 FT

T.W.=98.6
B.W.=95.2

CB-6 (SHALLOW GRATE)
RIM=93.8
INV.OUT=91.34

RETAINING WALL
L=346 FT
MAX HEIGHT=6 FT

T.W.=95.5
B.W.=94.2

8" HDPE
S=1.0%
L=24 FT

T.W.=96.1
B.W.=94.6

CHAMBER SYSTEM 1
(104) CULTEC R-180
SUBSURFACE
RECHARGE CHAMBERS
INV.=90.74

PROPOSED
CARWASH
BUILDING
6,000 S.F.

F.F.E.=94.25

8" RCP
S=0.5%
L=5 FT

CB-4
RIM=92.4
INV.=89.75

CB-3
(SHALLOW GRATE)
RIM=91.9
INV.OUT=89.86

SLOPE STABILIZATION
BLANKET TO BE
INSTALLED AT 2:1
SLOPE (TYP.)

8" HDPE ROOF
LEADER (TYP.)

8" RCP
S=0.5%
L=17 FT

8" RCP
S=0.5%
L=4 FT

8" RCP
S=0.5%
L=27 FT

INV.=89.37

DMH-1
RIM=91.9
INV.IN(CB-3)=89.72
INV.IN(CB-4)=89.72
INV.OUT=89.72

WQU-2
RIM=92.2
INV.IN(DMH-1)=89.63
INV.IN(CB-2)=89.63
INV.OUT=89.63

8" RCP
S=0.5%
L=50 FT

INSPECTION
PORT
(TYP.)

CB-2 (SHALLOW GRATE)
RIM=91.6
INV.OUT=89.64

8" RCP
S=0.5%, L=3 FT

INV.=89.57

CB-1
(SHALLOW GRATE)
RIM=91.8
INV.OUT=89.61

CHAMBER SYSTEM 2
(20) CULTEC R-330XLHD
SUBSURFACE RECHARGE
CHAMBERS

8" RCP
S=0.5%, L=4 FT

WQU-1
RIM=91.9
INV.IN=89.59
INV.OUT=89.59

MAZZEO (S.H.L.O. #152) DRIVE

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SITE PLANS
GRADING & DRAINAGE PLAN
33 MAZZEO DRIVE
ASSESSORS MAP 57 BLOCK B LOT 18..12A
RANDOLPH MASSACHUSETTS

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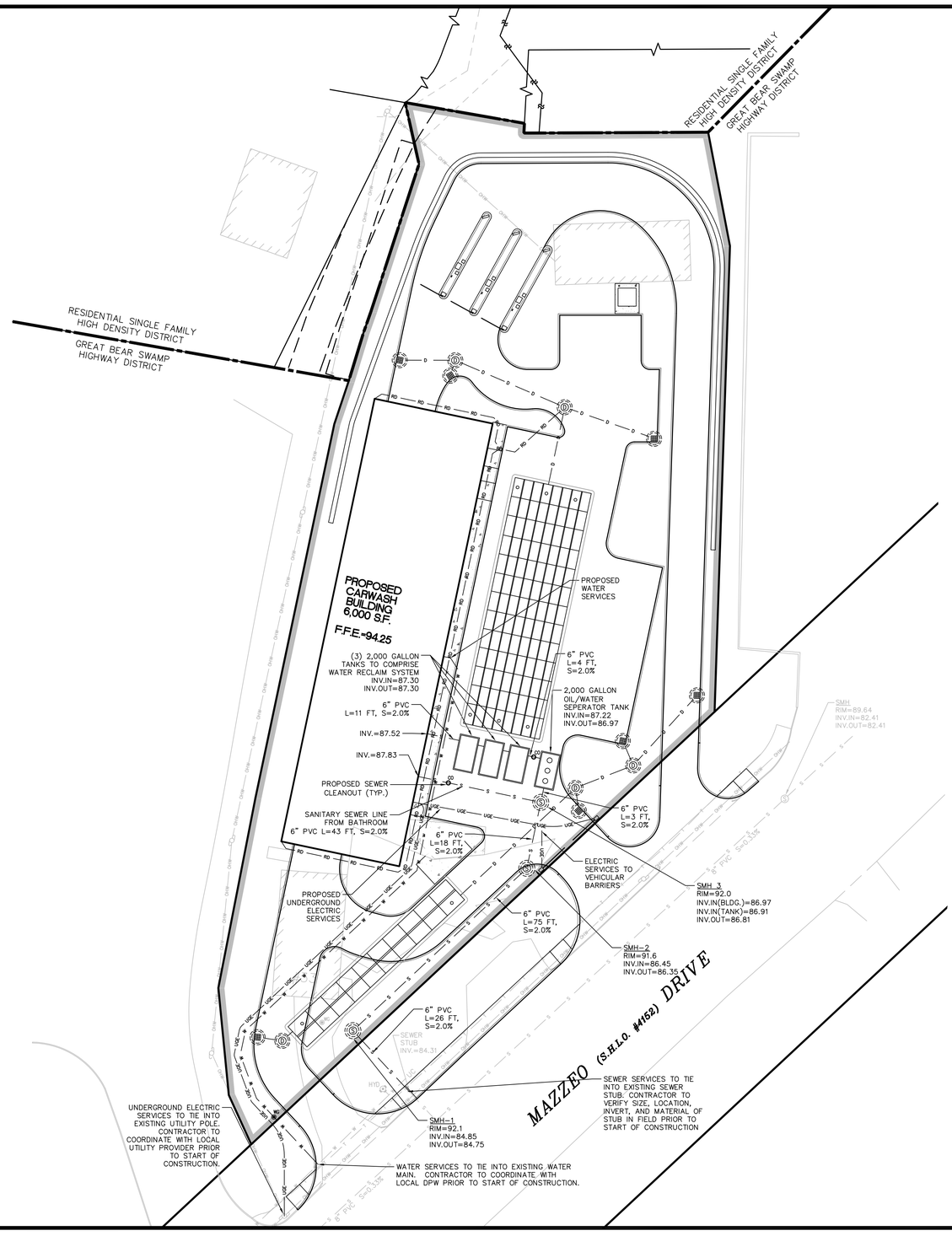
X:\2021\2021-054\CIVIL\Plot\2021-054 Site Plans.dwg, 1/27/2022 1:18:57 PM
CTB:
LMAN:
MS VIEW:
UCS:

MBL NORTH
LCC# 30037A



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UTILITY PLAN
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RANDOLPH MASSACHUSETTS

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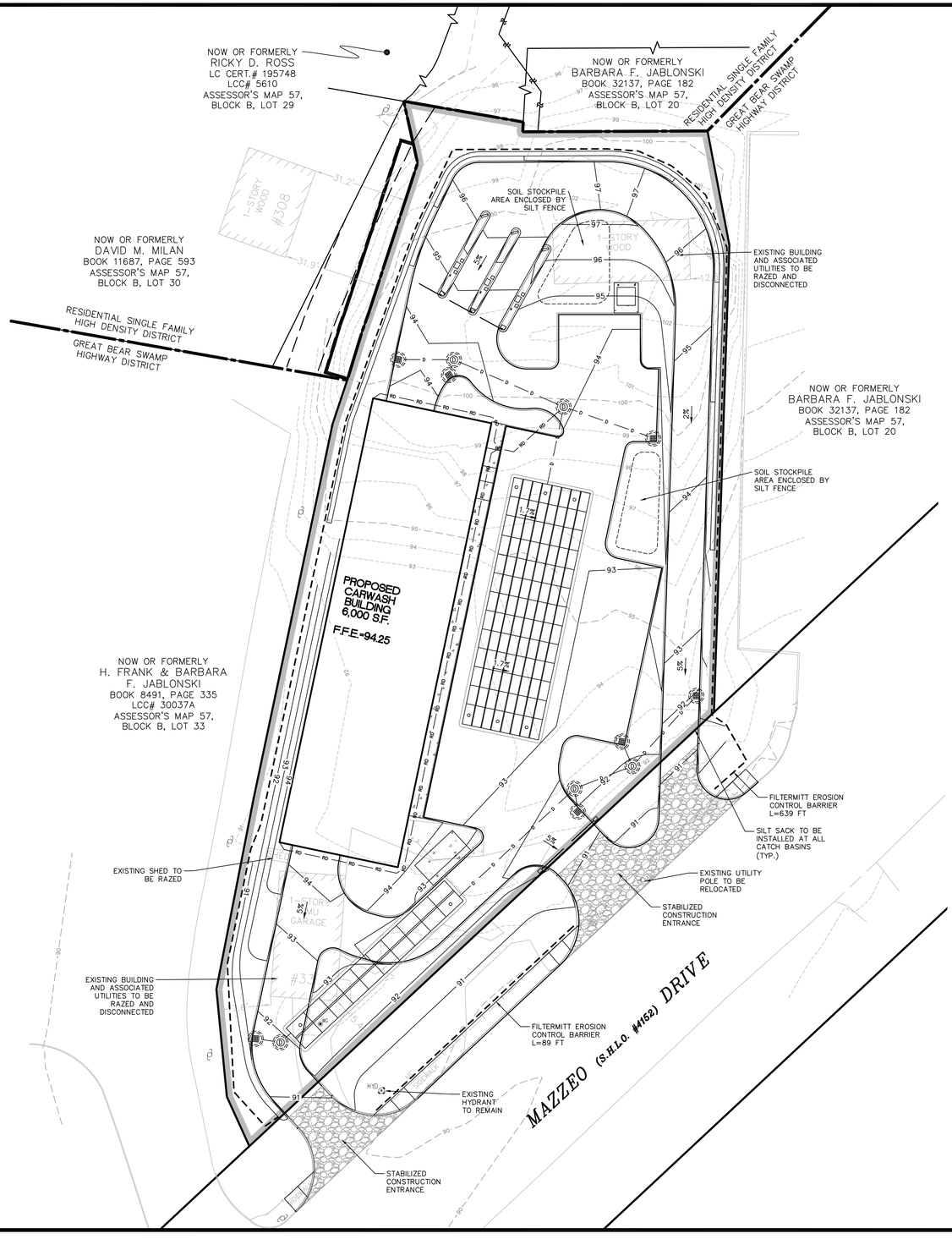

EROSION CONTROL AND GOOD HOUSEKEEPING NOTES

1.) ALL EROSION AND SEDIMENTATION CONTROL DEVICES TO BE USED FOR THIS PROJECT SHALL BE INSTALLED AND MAINTAINED AS SPECIFIED ON THESE PLANS AND IN VOLUME TWO OF THE STATE OF MASSACHUSETTS STORM WATER MANAGEMENT MANUAL, BY THE CONTRACTOR, DURING ALL PHASES OF CONSTRUCTION AND UNTIL THE SITE IS SATISFACTORAILY STABILIZED.

2.) PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL INSTALL ALL EROSION AND SEDIMENT CONTROL DEVICES AS SHOWN ON THE PLAN.

3.) THE CONTRACTOR IS RESPONSIBLE FOR THE TIMELY INSTALLATION, INSPECTION, MAINTENANCE, AND/OR REPLACEMENT OF ALL TEMPORARY AND PERMANENT EROSION CONTROL DEVICES TO ENSURE PROPER OPERATION THROUGHOUT THE LIFE OF THE PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR MAINTENANCE OF PERMANENT MEASURES UNTIL CONSTRUCTION OF THE PROJECT IS COMPLETED OR UNTIL IT IS ACCEPTED BY THE OWNER. THE OWNER IS RESPONSIBLE THEREAFTER.

4.) IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CLEAN ROADS, CONTROL DUST, AND TAKE ALL NECESSARY MEASURES TO ENSURE THAT THE SITE AND ALL ROADS BE MAINTAINED IN A MUD AND DUST-FREE CONDITION AT ALL TIMES THROUGHOUT THE LIFE OF THE CONTRACT. DUST CONTROL SHALL INCLUDE, BUT IS NOT LIMITED TO, WATER, CALCIUM CHLORIDE, AND/OR CRUSHED STONE OR COARSE GRAVEL.

5.) ALL PROPOSED CONSTRUCTION EXITS SHALL BE CONSTRUCTED AS SHOWN ON THE PLANS AND DETAILS. ALL VEHICLE TRAFFIC ENTERING OR EXITING THE PROJECT SITE SHALL PASS OVER THE CONSTRUCTION EXITS TO REDUCE THE TRACKING OR FLOWING OF SEDIMENT ONTO THE SURROUNDING ROADWAYS.

6.) THE PROPOSED CONSTRUCTION EXITS SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO THE SURROUNDING ROADWAYS. THIS WILL REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR ADDITIONAL LENGTH AS CONDITIONS DEMAND AND REPAIR AND/OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO THE SURROUNDING ROADWAYS MUST BE REMOVED IMMEDIATELY.

7.) SILT SACKS HAVE BEEN PROPOSED IN ALL ON-SITE AND ADJACENT CATCH BASINS IN ORDER TO PREVENT SEDIMENT FROM ENTERING THE MUNICIPAL DRAINAGE SYSTEM PRIOR TO PERMANENT STABILIZATION OF THE DISTURBED SITE. ALL SILT SACKS SHOULD BE INSPECTED AFTER EVERY RAIN STORM AND REPAIRS MADE AS NECESSARY. SEDIMENT SHOULD BE DISPOSED OF IN A SUITABLE AREA AND PROTECTED FROM EROSION BY EITHER STRUCTURAL OR VEGETATIVE MEANS. CATCH BASIN INLET PROTECTION SHOULD BE REMOVED AND THE AREA REPAIRED AS SOON AS THE CONTRIBUTING DRAINAGE AREA TO THE INLET HAS BEEN COMPLETELY STABILIZED.

8.) A SILT FENCE SHALL BE INSTALLED AROUND ANY SOIL STOCKPILE AREAS.

9.) INSPECTION OF PERIMETER SEDIMENT BARRIERS (INCLUDING THOSE ENCOMPASSING SOIL STOCKPILE AREAS) SHOULD BE MADE AFTER EACH STORM EVENT AND REPAIR OR REPLACEMENT SHOULD BE MADE PROMPTLY AS NEEDED. CLEAN OUT OF ACCUMULATED SEDIMENT BEHIND FILTERMITT IS NECESSARY IF SEDIMENT REACHES ONE-HALF OF THE ORIGINAL HEIGHT OF THE FILTERMITT.

10.) THE CONTRACTOR SHALL RESTORE DISTURBED AREAS AS CLOSELY AS POSSIBLE. AREAS DAMAGED DURING CONSTRUCTION SHALL BE RESODDED, RESEEDED, OR OTHERWISE RESTORED TO THEIR ORIGINAL STATE. TREES AND OTHER EXISTING VEGETATION SHALL BE RETAINED WHEREVER FEASIBLE.

11.) TEMPORARY VEGETATIVE COVER SHALL BE APPLIED TO ANY DISTURBED AREAS (INCLUDING SOIL STOCKPILE AREAS) THAT HAVE NOT YET REACHED FINISHED GRADE AS SOON AS POSSIBLE, BUT NOT MORE THAN FOURTEEN (14) DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS TEMPORARILY CEASED, UNLESS THE ACTIVITY IS TO RESUME WITHIN TWENTY-ONE (21) DAYS. THE RECOMMENDED TEMPORARY SEEDING DATES ARE MARCH 1 TO JUNE 15 AND AUGUST 15 TO OCTOBER 1.

THIS TEMPORARY VEGETATIVE COVER SHALL MEET THE REQUIREMENTS OF SECTION M6.03.1 OF THE MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGES.

LIMESTONE SHALL CONSIST OF PULVERIZED LIMESTONE OBTAINED BY GRINDING EITHER CALCAREOUS OR DOLOMITIC LIMESTONE SO THAT 95% OF THE MATERIAL WILL PASS A NO. 20 SIEVE AND AT LEAST 50% WILL PASS A NO. 100 SIEVE. THE LIMESTONE SHALL HAVE A NEUTRALIZING VALUE SATISFACTORY TO THE ENGINEER AND SHALL BE ONLY SUCH AS WILL HAVE BEEN MARKETED IN ACCORDANCE WITH THOSE PROVISIONS OF GENERAL LAWS, AS AMENDED, WHICH RELATE TO COMMERCIAL FERTILIZERS.

12.) PERMANENT VEGETATIVE COVER SHALL BE APPLIED TO ALL DISTURBED AREAS THAT HAVE REACHED FINISHED GRADE AS SOON AS POSSIBLE, BUT NOT MORE THAN FOURTEEN (14) DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS PERMANENTLY CEASED. THE RECOMMENDED PERMANENT SEEDING DATES ARE APRIL 1 TO JUNE 15 AND AUGUST 15 TO OCTOBER 1.

THE SEED MIXTURE USED FOR PERMANENT VEGETATIVE COVER OUTSIDE OF IMPERVIOUS OR LANDSCAPED AREAS SHALL RECEIVE THE SEED MIXTURE SPECIFIED IN SECTION M6.03.0 OF THE MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGES. IF SOD IS TO BE USED IN SUCH AREAS, IT SHALL MEET THE REQUIREMENTS OF SECTION M6.05.0 OF THE MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGES.

13.) AREAS WHICH HAVE BEEN TEMPORARILY OR PERMANENTLY SEEDED SHOULD BE MULCHED IMMEDIATELY FOLLOWING SEEDING IN ADDITION TO AREAS WHICH CANNOT BE SEEDED WITHIN THE RECOMMENDED SEEDING DATES AND ANY SOIL STOCKPILE AREAS. TEMPORARY MULCHING SHOULD BE PERFORMED AS SOON AS POSSIBLE, BUT NOT MORE THAN FOURTEEN (14) DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS TEMPORARILY CEASED UNLESS THE ACTIVITY IS TO RESUME WITHIN TWENTY-ONE (21) DAYS.

14.) STRAW OR HAY MULCH, WOOD FIBER MULCH, AND HYDROMULCH ARE RECOMMENDED. THE MATERIALS USED IN MULCHING SHALL CONFORM TO THE REQUIREMENTS LISTED IN SECTION M6.04.0 OF THE MASSACHUSETTS HIGHWAY DEPARTMENT STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGES. ALL MULCHES MUST BE INSPECTED PERIODICALLY, IN PARTICULAR AFTER RAINSTORMS, TO CHECK FOR RILL EROSION. WHERE EROSION IS OBSERVED, ADDITIONAL MULCH MUST BE APPLIED. IF NETTING IS USED, THE NET SHOULD BE INSPECTED AFTER RAINSTORMS FOR DISLOCATION OR FAILURE. IF WASHOUTS OR BREAKAGE OCCUR, THE NET MUST BE REINSTALLED AS NECESSARY AFTER REPAIRING DAMAGE TO SLOPE. INSPECTIONS SHOULD TAKE PLACE UNTIL GRASSES ARE FIRMLY ESTABLISHED. GRASS IS CONSIDERED TO BE FIRMLY ESTABLISHED AT A MINIMUM HEIGHT OF THREE (3) INCHES.

15.) IF SEEDING CANNOT BE COMPLETED IMMEDIATELY OR WITHIN THE RECOMMENDED SEEDING DATES, USE THE TEMPORARY MULCHING MEASURE TO PROTECT THE SITE AND DELAY SEEDING UNTIL THE NEXT RECOMMENDED SEEDING PERIOD.

16.) WASTE DISPOSAL: MATERIALS WHICH COULD BE A POTENTIAL SOURCE OF STORM WATER POLLUTION SUCH AS GASOLINE, DIESEL FUEL, HYDRAULIC OIL, ETC., SHALL BE STORED AT THE END OF EACH DAY IN A STORAGE TRAILER OR COVERED LOCATION AND TAKEN OFF-SITE AND PROPERLY DISPOSED OF. ALL TYPES OF WASTE GENERATED AT THIS SITE SHALL BE DISPOSED OF IN A MANNER CONSISTENT WITH STATE LAW AND/OR REGULATIONS.

17.) GOOD HOUSEKEEPING: THE PROJECT SITE SHALL PROVIDE FOR THE MINIMIZATION OF EXPOSURE OF CONSTRUCTION DEBRIS (INCLUDING, BUT NOT LIMITED TO, INSULATION, WIRING, PAINTS AND PAINT CANS, SOLVENTS, WALL BOARD, ETC.) TO PRECIPITATION BY MEANS OF DISPOSAL AND/OR PROPER SHELTER OR COVER.

18.) IN ADDITION, CONSTRUCTION WASTE MUST BE PROPERLY DISPOSED OF IN ORDER TO AVOID EXPOSURE TO PRECIPITATION AT THE END OF EACH WORKING DAY.

19.) NO DUST WILL BE ALLOWED ON OR OFF WORK SITE. CONTRACTOR MUST CONDUCT CONTINUOUS EFFORT TO CONTROL DUST. LACK OF DUST CONTROL COULD CAUSE THE PROJECT TO BE STOPPED UNTIL ISSUES ARE RESOLVED.

811 DigSafe MA·ME·NH·RI·VT

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TRACY L. DUARTE
CIVIL
NO. 48660
REGISTERED PROFESSIONAL ENGINEER

PREPARED FOR
NEW ENGLAND REALTY TRUST
611 HIGH STREET, NO.190
DEDHAM MASSACHUSETTS

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SITE PLANS
EROSION CONTROL & DEMOLITION PLAN
33 MAZZEO DRIVE
ASSESSORS MAP 57 BLOCK B LOT 18..12A
RANDOLPH MASSACHUSETTS

PROJ. No.: 2021-054
DATE: JANUARY 27, 2022

C-7.0

OBSERVATION HOLE DATA

TEST PIT 1 GRD. EL. 92.11 TEST BY: JUSTIN WILLIAMS, E.I.T.
GW. EL. 87.78 WITNESSED BY:
DATE: 12/7/2021 MOTTLING. EL. 87.78 CERTIFIED BY:

ELEV.	SOIL DEPTH	SOIL HORZ.	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING	OTHER
91.61	0"–6"	A	SANDY LOAM	10YR 3/2		
90.78	6"–16"	B	SANDY LOAM	10YR 5/4		
85.11 ▽	16"–84"	C	SAND	2.5Y 7/2	@ 52"	10% STONES, TIGHT & BONY

WATER WEEPING OBSERVED @ N/A
WATER STANDING OBSERVED @ N/A

TEST PIT 2 GRD. EL. 98.26 TEST BY: JUSTIN WILLIAMS, E.I.T.
GW. EL. 93.26 WITNESSED BY:
DATE: 12/7/2021 MOTTLING. EL. 93.26 CERTIFIED BY:

ELEV.	SOIL DEPTH	SOIL HORZ.	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING	OTHER
95.76	0"–30"	FILL				
95.20	30"–37"	B	LOAMY SAND	10YR 5/4		
92.70 ▽	37"–67"	C	SAND	2.5Y 7/2	@ 60"	10% STONES, TIGHT & BOULDERS

WATER WEEPING OBSERVED @ N/A
WATER STANDING OBSERVED @ N/A

TEST PIT 3 GRD. EL. 95.16 TEST BY: JUSTIN WILLIAMS, E.I.T.
GW. EL. N/A WITNESSED BY:
DATE: 12/7/2021 MOTTLING. EL. N/A CERTIFIED BY:

ELEV.	SOIL DEPTH	SOIL HORZ.	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING	OTHER
92.91	0"–27"	FILL				
91.99	27"–38"	B	LOAMY SAND	10YR 5/6		
90.16	38"–60"	C	SAND	2.5Y 7/2		TIGHT & BONY
						REFUSAL @ 60"

WATER WEEPING OBSERVED @ N/A
WATER STANDING OBSERVED @ N/A

TEST PIT 4 GRD. EL. 93.29 TEST BY: JUSTIN WILLIAMS, E.I.T.
GW. EL. N/A WITNESSED BY:
DATE: 12/7/2021 MOTTLING. EL. N/A CERTIFIED BY:

ELEV.	SOIL DEPTH	SOIL HORZ.	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING	OTHER
92.54	0"–9"	A	SANDY LOAM	10YR 3/2		
91.46	9"–22"	B	SANDY LOAM	10YR 5/6		
88.21	22"–61"	C	SAND	2.5Y 7/2		TIGHT, 10% BOULDERS & COBBLES
						REFUSAL @ 61"

WATER WEEPING OBSERVED @ N/A
WATER STANDING OBSERVED @ N/A

TEST PIT 5 GRD. EL. 90.61 TEST BY: JUSTIN WILLIAMS, E.I.T.
GW. EL. 85.78 WITNESSED BY:
DATE: 12/7/2021 MOTTLING. EL. 85.78 CERTIFIED BY:

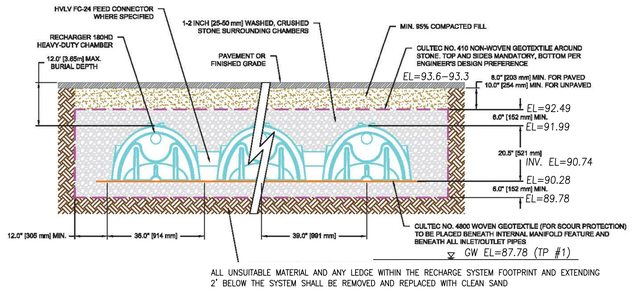
ELEV.	SOIL DEPTH	SOIL HORZ.	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING	OTHER
89.78	0"–10"	FILL				PAVEMENT
89.31	10"–16"	A	LOAMY SAND	10YR 3/2		
88.34	16"–32"	B	LOAMY SAND	10YR 5/6		
84.28 ▽	32"–76"	C	SAND	2.5Y 7/2	@ 58"	TIGHT, 10% BOULDERS & COBBLES

WATER WEEPING OBSERVED @ N/A
WATER STANDING OBSERVED @ N/A

TEST PIT 6 GRD. EL. 91.46 TEST BY: JUSTIN WILLIAMS, E.I.T.
GW. EL. N/A WITNESSED BY:
DATE: 12/7/2021 MOTTLING. EL. N/A CERTIFIED BY:

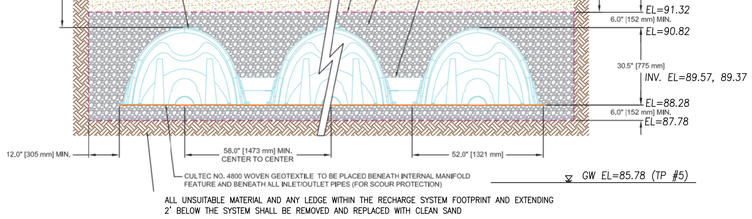
ELEV.	SOIL DEPTH	SOIL HORZ.	SOIL TEXTURE	SOIL COLOR	SOIL MOTTLING	OTHER
90.96	0"–6"	FILL				
90.63	6"–10"	A	LOAMY SAND	10YR 3/2		
89.46	10"–24"	B	LOAMY SAND	10YR 5/6		10% COBBLES & TIGHT
87.54	24"–47"	C	SAND	2.5Y 7/2		REFUSAL @ 47"

WATER WEEPING OBSERVED @ N/A
WATER STANDING OBSERVED @ N/A



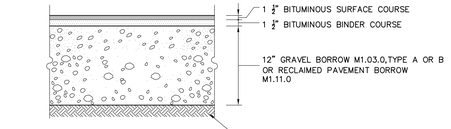
CULTEC 180HD SUBSURFACE RECHARGE CHAMBERS – SYSTEM 1

NOT TO SCALE



CULTEC 330XLHD SUBSURFACE RECHARGE CHAMBERS – SYSTEM 2

NOT TO SCALE



STANDARD DUTY FLEXIBLE PAVEMENT

COMPOSITION AND COMPACTION ACCEPTANCE TESTS

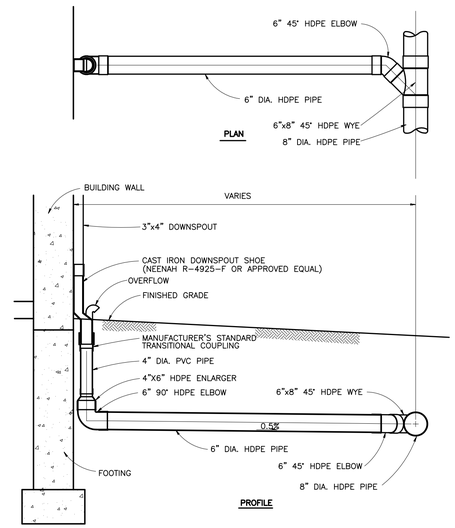
1. OBTAIN SAMPLES FROM PLANT TO INDICATE CONFORMANCE WITH M3.11.09
2. PAVEMENT DENSITY AS OUTLINED IN M3.11.09
3. ALL SAMPLES TO BE TAKEN IN ACCORDANCE WITH AASHTO T230
4. MATERIALS SHALL MEET OR ACCEED THE REQUIREMENTS SPECIFIED INSECTION M3.11.00 DIVISION III, MATERIALS AND THE FOLLOWING SUBSECTIONS

MINERAL AGGREGATE : M3.11.04	BITUMINOUS MATERIALS : M3.11.06
MINERAL FILLER : M3.11.05	COMPOSITION OF BASE COURSE : M3.11.02

5. THE BITUMINOUS CONCRETE BASE COURSE SHALL BE CONSTRUCTED IN ACCORDANCE WITH RELEVANT SECTIONS/PROVISIONS OF SECTION 460 FOR CLASS I BITUMINOUS CONCRETE PAVEMENT, TYPE I–1
6. CLASS I BITUMINOUS PAVEMENT ,TYPE I–1 REQUIRED THE SAME TESTING AS BASE COURSE AND SHALL HAVE A MINIMUM OF 95% COMPACTION. TESTING TO BE COMPLETED BY METHODS OUTLINED IN M3.11.00

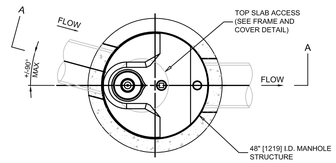
BITUMINOUS CONCRETE PAVEMENT SECTIONS

NOT TO SCALE

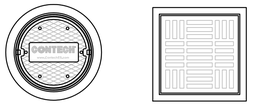


ROOF DRAIN DETAIL

NOT TO SCALE

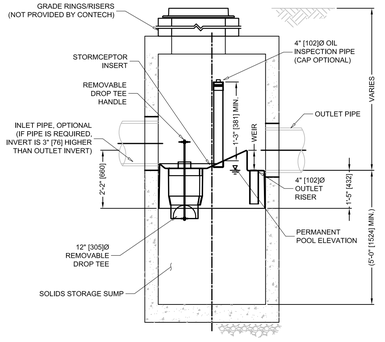


PLAN VIEW
TOP SLAB NOT SHOWN



FRAME AND COVER
(MAY VARY)
NOT TO SCALE

FRAME AND GRATE
(MAY VARY)
NOT TO SCALE



SECTION A-A

GENERAL NOTES:
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. FOR SITE SPECIFIC DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com.
3. STORMCEPTOR WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
4. STORMCEPTOR STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' – 2' [610], AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
5. STORMCEPTOR STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C478 AND AASHTO LOAD FACTOR DESIGN METHOD.
6. ALTERNATE UNITS ARE SHOWN IN MILLIMETERS [mm].

INSTALLATION NOTES
A. ANY SUB–BASE, BACKFILL DEPTH, AND/OR ANTI–FLOTATION PROVISIONS ARE SITE–SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMCEPTOR MANHOLE STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

STORMCEPTOR 450i WATER QUALITY UNITS 1, 2 & 3

NOT TO SCALE

811 DigSafe MA·ME·NH·RI·VT

No.	DATE	DESCRIPTION	BY
		REVISIONS	

PROJ. MANAGER: TLD
CHIEF DESIGNER: DT
REVIEWED BY: DATE

SEAL

COMMONWEALTH OF MASSACHUSETTS
TRACY L. DUARTE
CIVIL
NO. 48660
REGISTERED PROFESSIONAL ENGINEER

PREPARED FOR
NEW ENGLAND REALTY TRUST
611 HIGH STREET, NO.190
DEDHAM MASSACHUSETTS

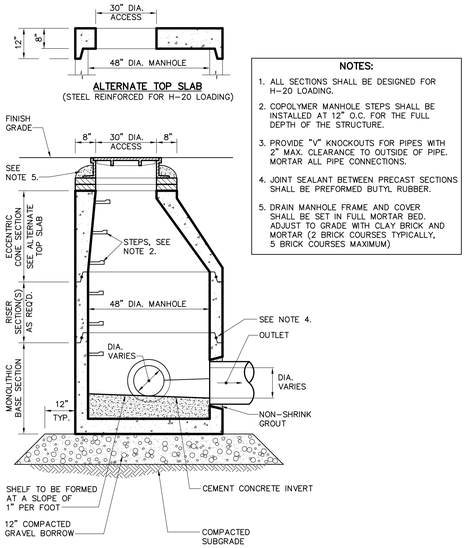
SCALE:
HORZ.:
VERT.:
DATUM:
HORZ.:
VERT.:
0
GRAPHIC SCALE

MBL
LAND DEVELOPMENT & PERMITTING, CORP.
LAND DEVELOPMENT, TRANSPORTATION AND ENVIRONMENTAL SOLUTIONS
5 BRISTOL DRIVE, SUITE 3A
SOUTH EASTON, MA 02375
P.508.297.2746
EMAIL:info@MBLLandDevelopment.com
WEB: www.MBLLandDevelopment.com

SITE PLANS
DETAILS
33 MAZZEO DRIVE
ASSESSORS MAP 57 BLOCK B LOT 18..12A
RANDOLPH MASSACHUSETTS

PROJ. No.: 2021-054
DATE: JANUARY 27, 2022

C-8.0

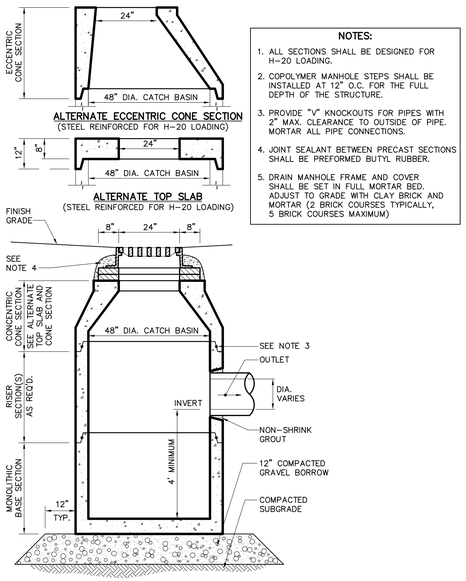


NOTES:

1. ALL SECTIONS SHALL BE DESIGNED FOR H-20 LOADING.
2. COPOLYMER MANHOLE STEPS SHALL BE INSTALLED AT 12" O.C. FOR THE FULL DEPTH OF THE STRUCTURE.
3. PROVIDE "V" KNOCKOUTS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
4. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
5. DRAIN MANHOLE FRAME AND COVER SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH CLAY BRICK AND MORTAR (2 BRICK COURSES TYPICALLY, 5 BRICK COURSES MAXIMUM)

DRAIN MANHOLE (DMH)

NOT TO SCALE



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3. PROVIDE "V" KNOCKOUTS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
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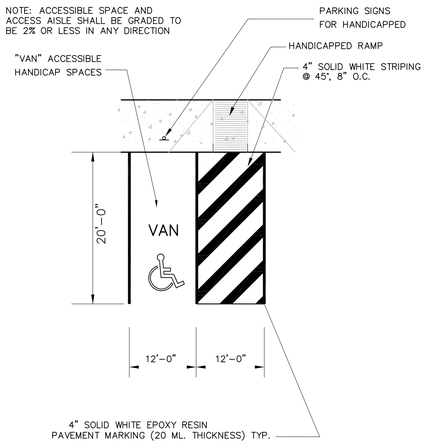
5. DRAIN MANHOLE FRAME AND COVER SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH CLAY BRICK AND MORTAR (2 BRICK COURSES TYPICALLY, 5 BRICK COURSES MAXIMUM)

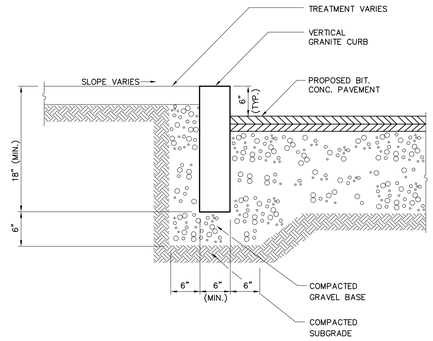
CATCH BASIN (CB)

NOT TO SCALE



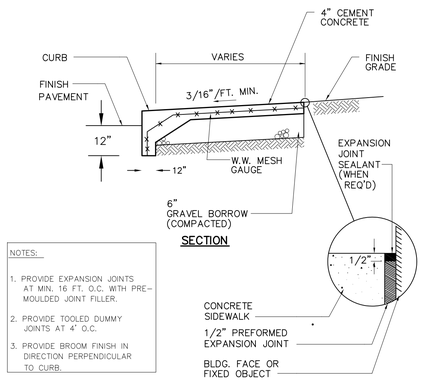
HANDICAP PARKING STALL LAYOUT

NOT TO SCALE



VERTICAL GRANITE CURB (VGC)

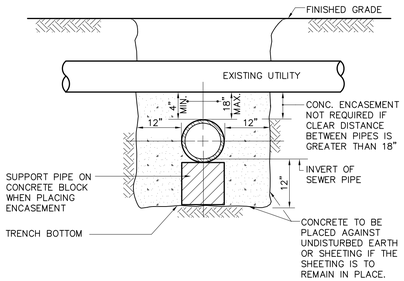
NOT TO SCALE



JOINT DETAIL

MONOLITHIC CONCRETE SIDEWALK AND CURB

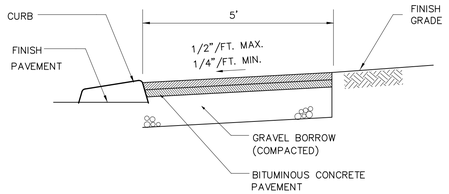
NOT TO SCALE



NOTE: PIPE MUST BE BRACED VERTICALLY & HORIZONTALLY TO PREVENT FLOATATION DURING PLACEMENT OF CONC.

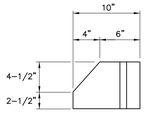
CONCRETE ENCASEMENT AT UTILITY CROSSING

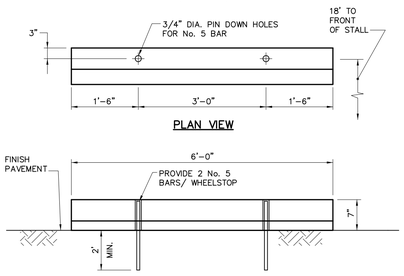
NOT TO SCALE



BITUMINOUS CONCRETE SIDEWALK

NOT TO SCALE



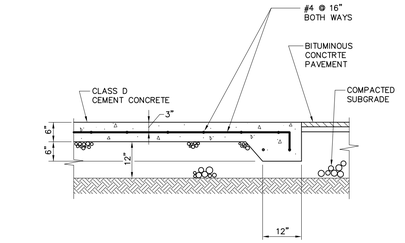


DESIGN DATA

1. CONCRETE STRENGTH F'C 4,000 PSI @ 28 DAYS. DENSITY 150 PCF.
2. CEMENT, PORTLAND TYPE I OR III PER C150-81.
3. ADMIXTURES, AIR & PLASTICIZERS PER ASTM C223-82.
4. AIR ENTRAINMENT 5%-7%.
5. APPROXIMATE WEIGHT: 380 LBS
6. CENTER WHEELSTOP ON PARKING STALL

CONCRETE BUMPER

NOT TO SCALE

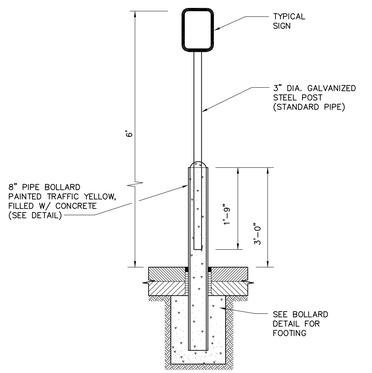


DUMPSTER PAD

NOT TO SCALE

VERTICAL GRANITE CURB TRANSITION PIECE

NOT TO SCALE



HANDICAP PARKING SIGN BASE (IN PAVED AREA)

NOT TO SCALE

811 DigSafe MA.ME.NH.RI.VT

No.	DATE	DESCRIPTION	BY
		REVISIONS	

PROJ. MANAGER:	TLD
CHIEF DESIGNER:	DT
REVIEWED BY:	DATE

SEAL

COMMONWEALTH OF MASSACHUSETTS — TRACY L. DUARTE — CIVIL — NO. 49660 — REGISTERED PROFESSIONAL ENGINEER

PREPARED FOR

NEW ENGLAND REALTY TRUST
611 HIGH STREET, NO.190

DEDHAM MASSACHUSETTS

SCALE:	
HORZ.:	
VERT.:	
DATUM:	
HORZ.:	
VERT.:	

0
GRAPHIC SCALE

MBL
LAND DEVELOPMENT & PERMITTING, CORP.
LAND DEVELOPMENT, TRANSPORTATION AND ENVIRONMENTAL SOLUTIONS
5 BRISTOL DRIVE, SUITE 3A
SOUTH EASTON, MA 02375
P.508.297.2746
EMAIL:info@MBLLandDevelopment.com
WEB: www.MBLLandDevelopment.com

SITE PLANS

DETAILS
33 MAZZEO DRIVE
ASSESSORS MAP 57 BLOCK B LOT 18..12A

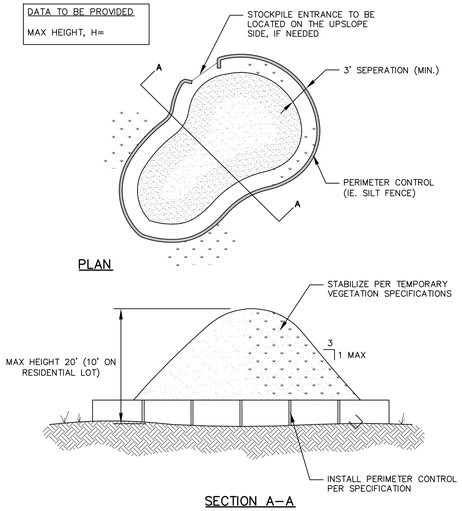
RANDOLPH MASSACHUSETTS

PROJ. No.: 2021-054
DATE: JANUARY 27, 2022

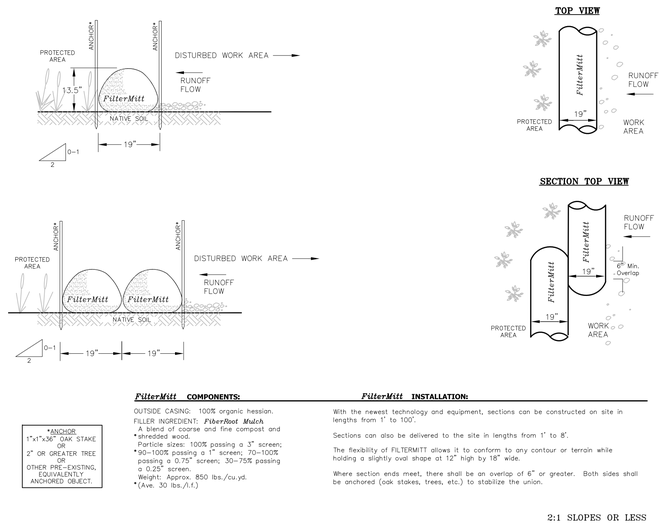
C-8.1

CTB: LMAN: MS VIEW: UCS:

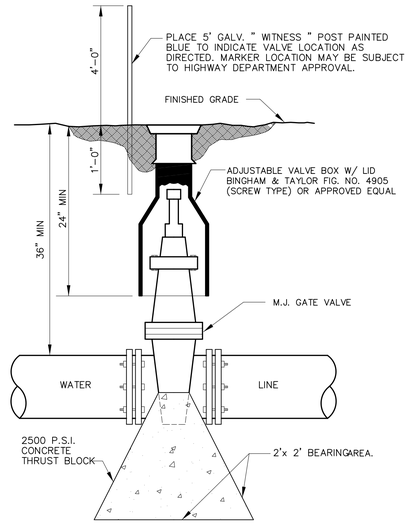
X:\2021\2021-054\CIVIL\Plot\2021-054 Site Plans.dwg, 1/27/2022 12:53:25 PM



SOIL STOCKPILE
NOT TO SCALE

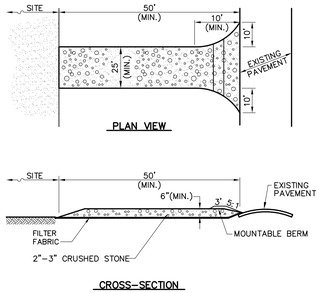


FILTERMITT EROSION CONTROL
NOT TO SCALE



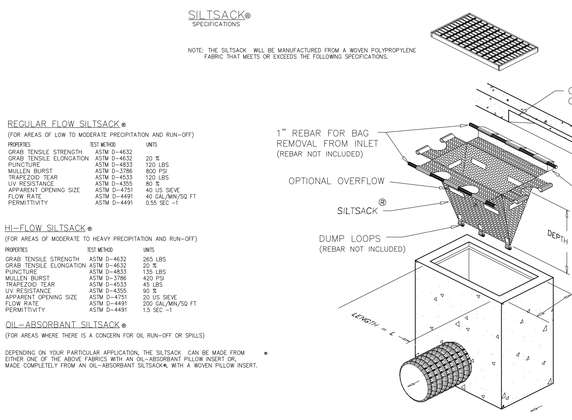
NOTE : IN REMOTE AREAS, VALVE BOXES SHALL EXTEND SIX (6) INCHES ABOVE GRADE.

GATE VALVE
NOT TO SCALE

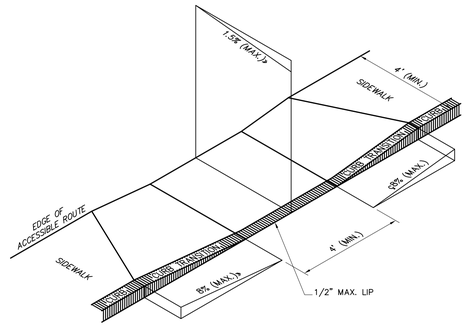


NOTES:
1. ENTRANCE WIDTH SHALL BE A TWENTY-FIVE (25) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
2. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH SHALL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY. BERM SHALL BE PERMITTED. PERIODIC INSPECTION AND MAINTENANCE SHALL BE PROVIDED AS NEEDED.

STABILIZED CONSTRUCTION ENTRANCE
NOT TO SCALE

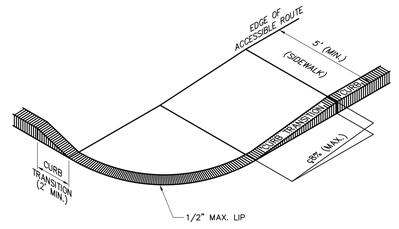


INLET PROTECTION SILT SACK
NOT TO SCALE



NOTES:
1. THE MAXIMUM ALLOWABLE ROUTE (SIDEWALK) AND CURB RAMP CROSS SLOPES SHALL BE 1.5%.
2. THE MAXIMUM ALLOWABLE SLOPE OF ACCESSIBLE ROUTE EXCLUDING CURB RAMPS SHALL BE 5%.
3. THE MAXIMUM ALLOWABLE SLOPE OF ACCESSIBLE ROUTE CURB RAMPS SHALL BE 8%.
4. A MINIMUM OF 4 FEET CLEAR SHALL BE MAINTAINED AT ANY PERMANENT OBSTACLE IN ACCESSIBLE ROUTE (I.E., HYDRANTS, UTILITY POLES, TREE WELLS, SIGNS, ETC.)
5. CURB TREATMENT VARIES, SEE PLANS FOR CURB TYPE.
6. BASE OF RAMP SHALL BE GRADED TO PREVENT PONDING.
7. SEE TYPICAL SIDEWALK SECTION FOR RAMP CONSTRUCTION.

ACCESSIBLE CURB RAMP-TYPE 'A'
NOT TO SCALE



NOTES:
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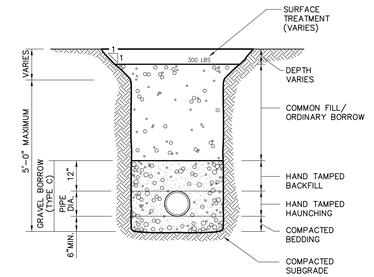
6. BASE OF RAMP SHALL BE GRADED TO PREVENT PONDING.
7. SEE TYPICAL SIDEWALK SECTION FOR RAMP CONSTRUCTION.

ACCESSIBLE CURB RAMP – TYPE 'B'
NOT TO SCALE



UTILITY TRENCH
NOT TO SCALE

No.	DATE	DESCRIPTION	BY
		REVISIONS	

PROJ. MANAGER: TLD
CHIEF DESIGNER: DT
REVIEWED BY: DATE

SEAL

COMMONWEALTH OF MASSACHUSETTS
TRACY L. DUARTE
CIVIL
NO. 48660
REGISTERED PROFESSIONAL ENGINEER

PREPARED FOR
NEW ENGLAND REALTY TRUST
611 HIGH STREET, NO.190
DEDHAM MASSACHUSETTS

SCALE:
HORZ.:
VERT.:
DATUM:
HORZ.:
VERT.:
0
GRAPHIC SCALE

MBL
LAND DEVELOPMENT & PERMITTING, CORP.
LAND DEVELOPMENT, TRANSPORTATION AND ENVIRONMENTAL SOLUTIONS
5 BRISTOL DRIVE, SUITE 3A
SOUTH EASTON, MA 02375
P.508.297.2746
EMAIL:info@MBLLandDevelopment.com
WEB: www.MBLLandDevelopment.com

SITE PLANS
DETAILS
33 MAZZEO DRIVE
ASSESSORS MAP 57 BLOCK B LOT 18..12A
RANDOLPH MASSACHUSETTS

PROJ. No.: 2021-054
DATE: JANUARY 27, 2022
C-8.2

CTB:
LMAN:
MS VIEW:
UCS:
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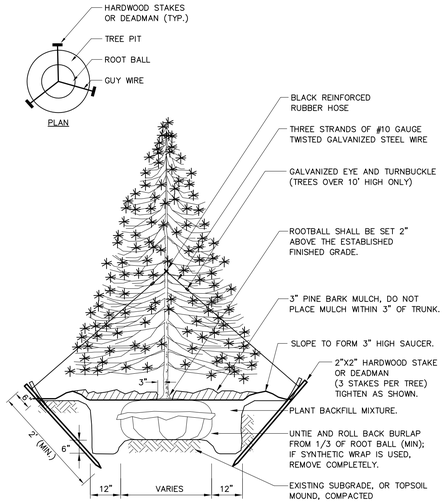
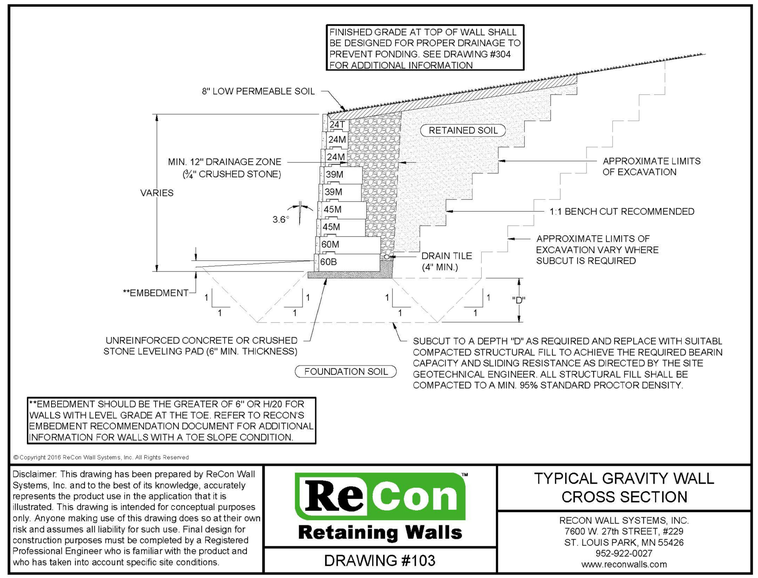


EVERGREEN TREE PLANTING

NOT TO SCALE



**EMBEDMENT SHOULD BE THE GREATER OF 6" OR H/20 FOR WALLS WITH LEVEL GRADE AT THE TOE. REFER TO RECON'S EMBEDMENT RECOMMENDATION DOCUMENT FOR ADDITIONAL INFORMATION FOR WALLS WITH A TOE SLOPE CONDITION.

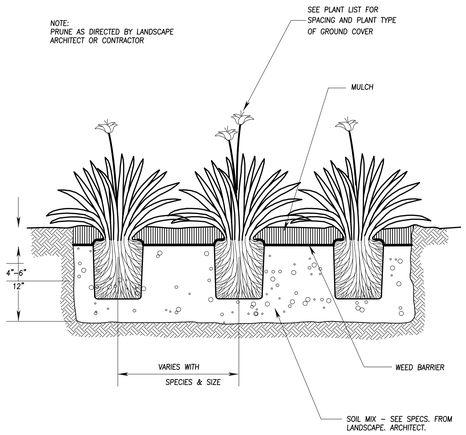
Disclaimer: This drawing has been prepared by ReCon Wall Systems, Inc. and to the best of its knowledge, accurately represents the product use in the application that it is illustrated. This drawing is intended for conceptual purposes only. Anyone making use of this drawing does so at their own risk and assumes all liability for such use. Final design for construction purposes must be completed by a Registered Professional Engineer who is familiar with the product and who has taken into account specific site conditions.

ReCon™ Retaining Walls

DRAWING #103

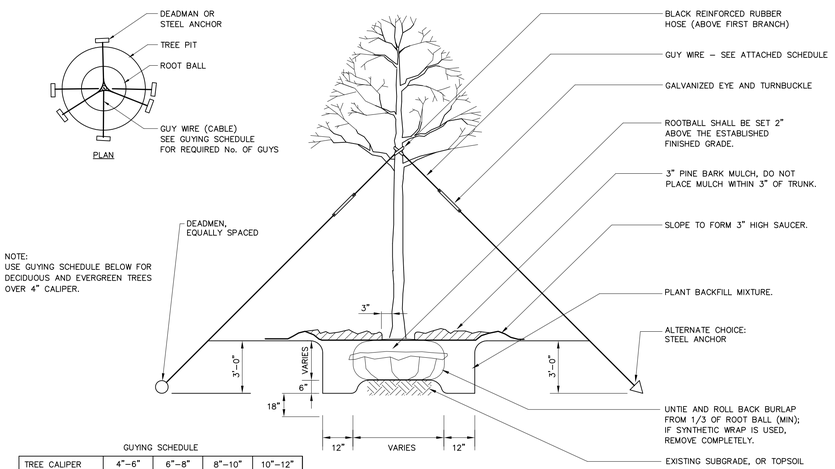
TYPICAL GRAVITY WALL CROSS SECTION

RECON WALL SYSTEMS, INC.
7600 W. 27th STREET, #229
ST. LOUIS PARK, MN 55426
952-922-0027
www.reconwalls.com



GROUND COVER PLANTING

NOT TO SCALE



NOTE:
USE GUYING SCHEDULE BELOW FOR DECIDUOUS AND EVERGREEN TREES OVER 4" CALIPER.

GUYING SCHEDULE

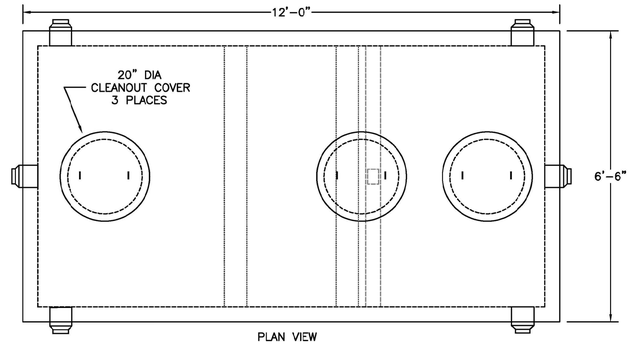
TREE CALIPER	4"–6"	6"–8"	8"–10"	10"–12"
TURNBUCKLE (GALVANIZED)	5/16"x 4–1/2"	5/16"x 4–1/2"	3/8"x6"	1/2"x8"
# GUYS REQ'D.	3	3	4	4
WIRE OR CABLE	1/8"DIA.	3/16"DIA.	1/4"DIA.	5/16"DIA.
DEADMEN SIZE	4" DIA.	6" DIA.	8" DIA.	10" DIA.

TREE PLANTING (FOR TREES OVER 4' CALIPER)

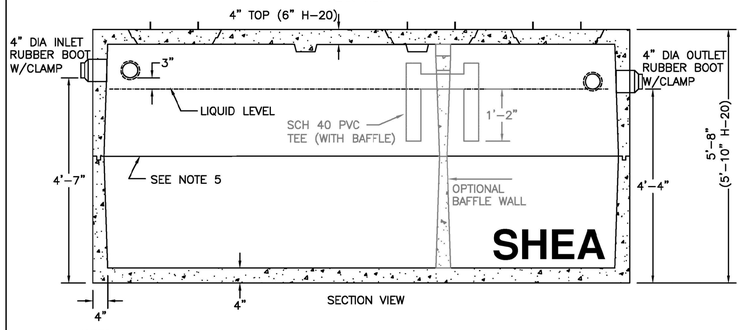
NOT TO SCALE

SHEA CONCRETE PRODUCTS — *New England's Premier Precaster*
800–696–7432 (SHEA)
www.sheaconcrete.com
BILLING ADDRESS: 87 HAVERHILL RD, AMESBURY MA 01913

SEPTIC TANK 2000 GALLON



PLAN VIEW



SECTION VIEW

NOTES:

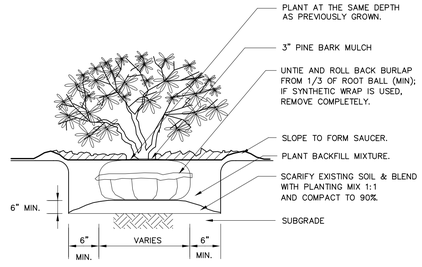
1. CONCRETE: 4,000 PSI MINIMUM AFTER 28 DAYS.
2. CONSTRUCTION OF SEPTIC TANK CONFORMS WITH 310 CMR, SECTION 15.00 DEP TITLE 5 REGS.
3. ALL REINFORCEMENT PER ASTM C1227.
4. BAFFLE WALL OPTIONAL FOR TWO COMPARTMENT TANKS.
5. TEES AND GAS BAFFLE SOLD SEPARATELY.
6. TONGUE & GROOVE JOINT SEALED WITH BUTYL RESIN.
7. IF COVER EXCEEDS 4 FEET, HEAVY DUTY TANK REQUIRED. ALSO AVAILABLE IN AASHTO HS–20 LOADING.

ITEM NO.			WEIGHT
2000	STANDARD		14,245#
2000H	H–20		16,170#
20002C	STANDARD		15,685#
20002CH	H–20		17,610#

SHEA PRODUCT ID: SEE TABLE	PREPARED FOR:		FILE NAME: tk2000.dwg	
WEIGHT (LBS): SEE TABLE	DRAWN BY: ARO	DATE: 06/01/18	PAGE: B1.5	NPCA CERTIFIED PLANT

773 Salem Street–Wilmington, MA | 153 Cranberry Hwy–Rochester, MA | 87 Haverhill Road–Amesbury, MA | 160 Old Turnpike Rd–Nottingham, NH

Specifications subject to change without notice



SHRUB PLANTING

NOT TO SCALE

811 DigSafe MA·ME·NH·RI·VT

No.	DATE	DESCRIPTION	BY
REVISIONS			

PROJ. MANAGER: TLD
CHIEF DESIGNER: DT
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COMMONWEALTH OF MASSACHUSETTS — TRACY L. DUARTE — CIVIL — NO. 48660 — REGISTERED PROFESSIONAL ENGINEER

PREPARED FOR
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611 HIGH STREET, NO.190
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SITE PLANS
DETAILS
33 MAZZEO DRIVE
ASSESSORS MAP 57 BLOCK B LOT 18..12A
RANDOLPH MASSACHUSETTS

PROJ. No.: 2021-054
DATE: JANUARY 27, 2022

C-8.3

VELOCITY WATER WORKS

Elevating the Standard

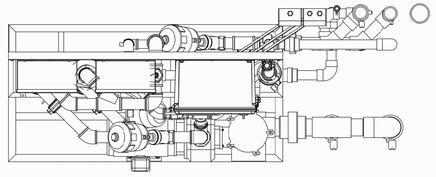
ELECTRICAL SPECIFICATIONS				
MAIN POWER	230-240VAC 5HP/3PHASE 17.5AMPS	460VAC 5HP/3PHASE 7.6AMPS	575VAC 5HP/3PHASE 6.1AMPS	
CONTROL POWER	115-120VAC 20 AMPS			
CONTROL SIGNAL	24V AC or DC/120VAC			CONTROL SIGNAL FROM CARWASH CONTROLLER
LOW LEVEL	24VDC/2WIRE			LOW WATER LEVEL SENSOR LOCATED IN SUCTION TANK

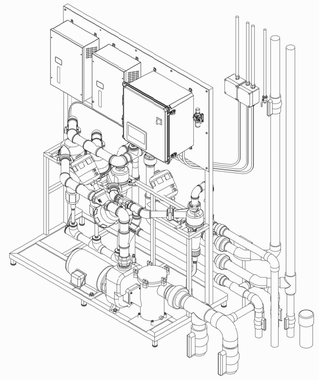
WATER SPECIFICATIONS			
TYPE	CONNECTION	DESCRIPTION	NOTES
FRESH WATER SUPPLY	2" HOSE BARB 72" A.F.F.	100 GPM @ 40PSI (min)	FRESH WATER BYPASS, AUTO PRIME
RECLAIM SUCTION LINE #1	3" SCH 80 PVC OR CPVC	SUCTION LINE	SLOPE TO TANK, FLAPPER CHECK TO BE LOCATED IN TANK. MINIMIZE THE USE OF HARD 90'S IN SUCTION LINES.
RECLAIM SUCTION LINE #2	3" SCH 80 PVC OR CPVC	SUCTION LINE	
RECLAIM WATER OUTPUT	2" SCH 80 PVC OR CPVC	100 GPM @ 60PSI	RECLAIMED WATER TO CARWASH
TRENCH FLUSH	1 1/2" SCH 80 PVC OR CPVC	35 GPM @ 10PSI	CIRCULATION LINE TO TRENCH
TANK FLUSH	1 1/2" SCH 80 PVC OR CPVC	35 GPM @ 10PSI	CIRCULATION LINE TO SECOND TANKING COMPARTMENT
UNDER FLOW LINE	2" SCH 80 PVC OR CPVC	30 GPM @ 10PSI	DIRTY WATER DRAIN TO FIRST COMPARTMENT (GRAVITY DRAIN TO TANK)
OZONE RETURN LINE	1 1/2" SCH 80 PVC OR CPVC	35 GPM @ 10PSI	SANITIZER LINE PER DRAWING

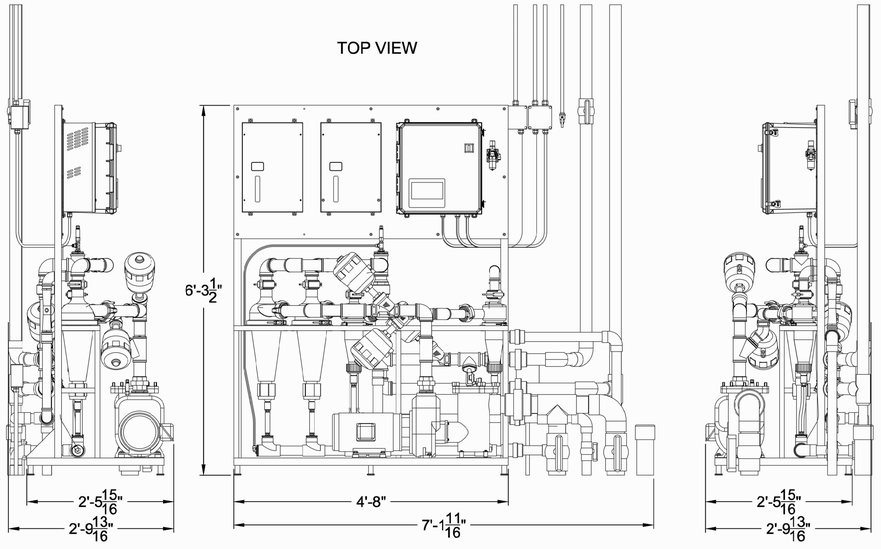
	COMPRESSED AIR SPECIFICATIONS		
TYPE	CONNECTION	DESCRIPTION	NOTES
COMP. AIR SUPPLY	1/4" TUBING 72" A.F.F.	1 CFM @ 80PSI (min)	COMPRESSED AIR USED FOR VALVE ACTUATION.

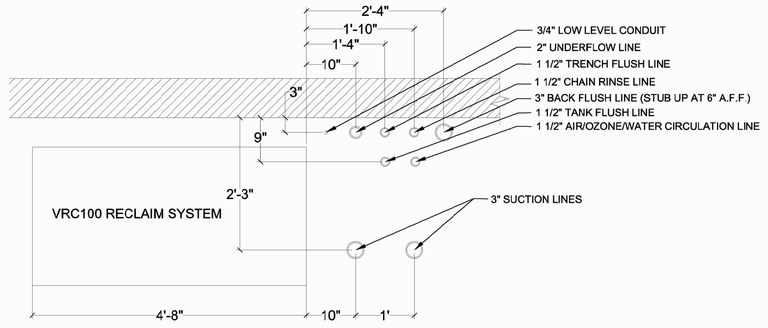
ELECTRICAL NOTES

1. ALL ELECTRICAL MATERIALS USED IN THE INSTALLATION OF THIS EQUIPMENT IS TO BE IN COMPLIANCE WITH UL/CSA STANDARDS. ALL WIRING METHODS AND PROTECTIVE DEVICES TO BE PER THE NATIONAL ELECTRICAL CODE, OR LOCAL ELECTRICAL CODES, WHICH EVER HAS THE HIGHER LEVEL OF ACCEPTABILITY.
2. ALL EXPOSED CONDUITS AND FITTINGS IN THE EQUIPMENT ROOM AND WASH BAY SHALL BE SCHEDULE 40 PVC UNLESS OTHERWISE SPECIFIED BY OWNERS ENGINEER OR LOCAL ELECTRICAL CODE. ALL ENCLOSURES TO BE NON-METALIC WITH A MINIMUM NEMA RATING OF 4X UNLESS OTHERWISE SPECIFIED BY OWNERS ENGINEER OR LOCAL ELECTRICAL CODE. IT IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO VERIFY OWNERS MATERIAL REQUIREMENT AS WELL AS FOLLOW ANY AND ALL LOCAL CODES WHEN PROVIDING THE BID FOR THE PROJECT.
3. PANEL/JUNCTION BOX PENETRATIONS IN WET ENVIRONMENT TO BE ONLY FROM THE BOTTOM. SEAL CONDUIT PENETRATIONS WITH APPROPRIATE BOX CONNECTOR OR SEALING RING TO MAINTAIN NEMA-4X RATING.
4. EACH CONDUIT WITH CURRENT CARRYING CONDUCTORS SHALL HAVE A COPPER EQUIPMENT GROUNDING CONDUCTOR SIZED IN ACCORDANCE WITH NEC250.
5. POWER CABLES, WHEN ALLOWED BY CODE AND CUSTOMER, TO BE USED IN CONJUNCTION WITH A CABLE TRAY SHALL BE APPROPRIATE FOR THE APPLICATION, AND VOLTAGE, WITH A JACKET SUITABLE FOR USE IN A WET ENVIRONMENT THAT MAY ALSO HAVE CHEMICALS AND OILS TYPICAL OF A CARWASH ENVIRONMENT. IT IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO CONFIRM USE OF SUCH IN THIS APPLICATION PER LOCAL ELECTRICAL CODES. IT IS ALSO THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO SUBMIT ALTERNATIVE METHOD TO VELOCITY WATER WORK AND OR OWNER SHOULD ONE BE REQUIRED PER CODE OR OWNERS ENGINEER.
6. ELECTRICAL CONTRACTOR TO PROVIDE AND INSTALL SWITCHABLE DISCONNECTS FOR MOTOR LOADS EVEN THOUGH THEY ARE NOT CALLED OUT IN THE DRAWINGS BUT ARE REQUIRED BY CODE.
7. CURRENT CARRYING CONDUCTORS TO BE SIZED IN ACCORDANCE WITH THE APPLICATION, VOLTAGE, AND CONNECTED LOAD PER THE NATIONAL ELECTRICAL CODE. COLOR CODE FOR CONDUCTORS SHALL BE AS FOLLOWS:









VELOCITY VRC100 RECLAIM SYSTEM

NOT TO SCALE

VELOCITY WATER WORKS
520 RANDOLPH DR. APPLETON, WI 54913

VELOCITY WATER WORKS
VRC100 RECLAIM SYSTEM
100GPM

DRAWN: J.DAYAK DATE: 04/01/21
CHECKED: _____ DATE: _/_/_
APPROVED: _____ DATE: _/_/_
SCALE: NTS PAPER: 24"X36"

LVL	DATE	ENGR. APPR.	DESCRIPTION

HARD COPY IS INTENDED TO BE 24"X36" WHEN PRINTED SCALE(S) ARE NOT ACCURATE FOR ANY OTHER SIZE

PROJECT #: VRC100-01

SHEET #: 01

811 DigSafe MA.ME.NH.RI.VT

CTB: | LMAN: | MS VIEW: | UCS:

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No.	DATE	DESCRIPTION	BY
		REVISIONS	

PROJ. MANAGER: TLD
CHIEF DESIGNER: DT
REVIEWED BY: DATE

SEAL

TRACY L. DUARTE CIVIL NO. 48660 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS

PREPARED FOR
NEW ENGLAND REALTY TRUST
611 HIGH STREET, NO.190
DEDHAM MASSACHUSETTS

SCALE:
HORZ.:
VERT.:
DATUM:
HORZ.:
VERT.:
0
GRAPHIC SCALE

MBL
LAND DEVELOPMENT & PERMITTING, CORP.
LAND DEVELOPMENT, TRANSPORTATION AND ENVIRONMENTAL SOLUTIONS
5 BRISTOL DRIVE, SUITE 3A
SOUTH EASTON, MA 02375
P.508.297.2746
EMAIL:info@MBLLandDevelopment.com
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SITE PLANS
DETAILS
33 MAZZEO DRIVE
ASSESSORS MAP 57 BLOCK B LOT 18..12A
RANDOLPH MASSACHUSETTS

PROJ. No.: 2021-054
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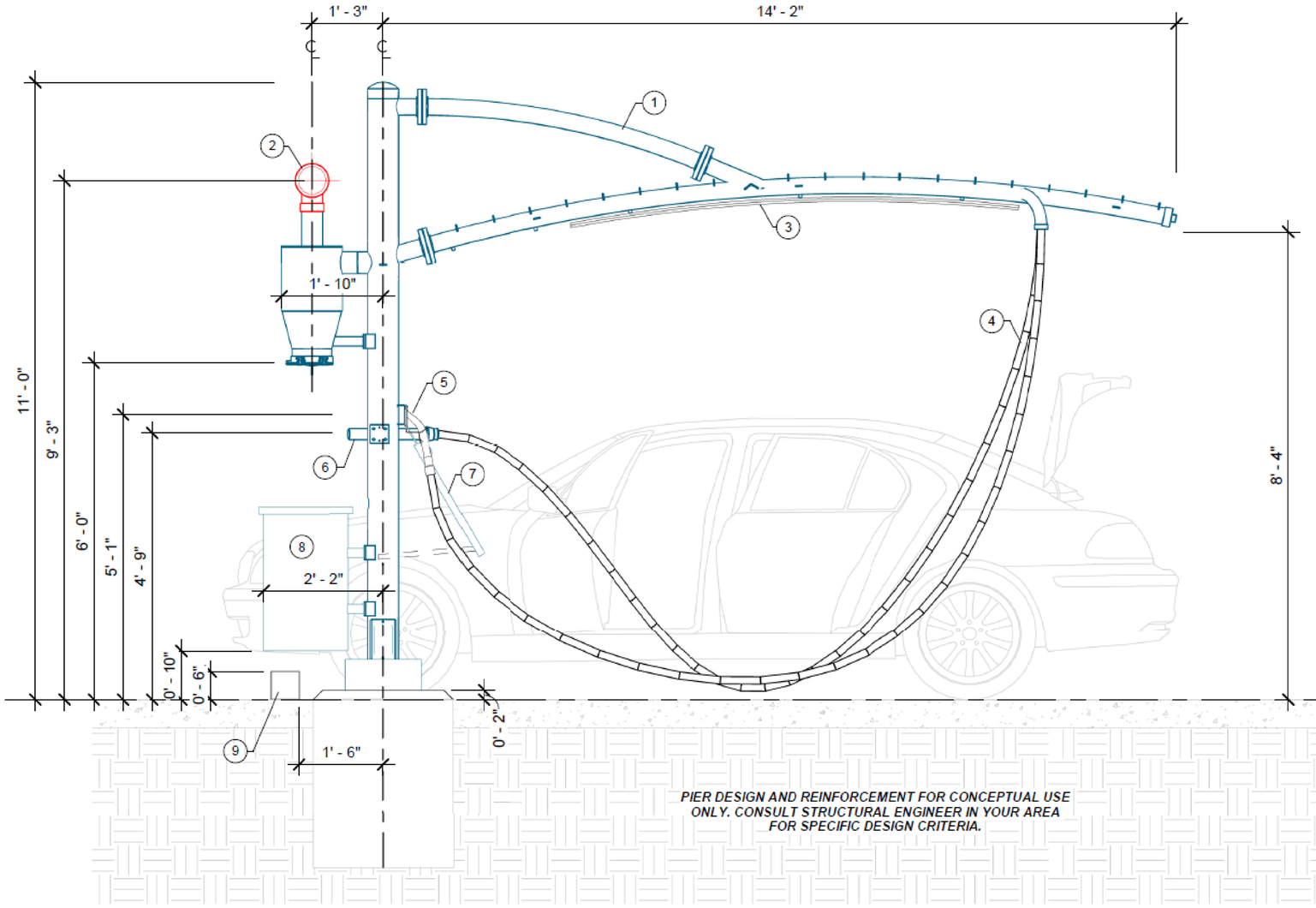
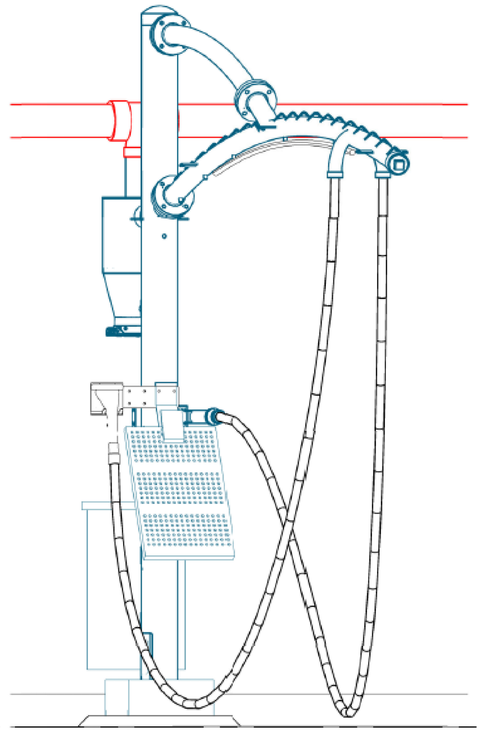
C-8.4





PARKING ELEVATION	
ITEM	DESCRIPTION
1	DUAL USER PALM ARCH
2	6" OVERHEAD ALUMINUM VACUUM TUBE BETWEEN ARCHES
3	8' LED LIGHT
4	1-1/2"x15' VACUUM HOSE
5	CLAW VACUUM TOOL
6	CREVICE VACUUM TOOL
7	17" MAT RACK
8	30 GALLON WASTE RECEPTACLE
9	CURB

PIER DESIGN AND REINFORCEMENT FOR CONCEPTUAL USE ONLY. CONSULT STRUCTURAL ENGINEER IN YOUR AREA FOR SPECIFIC DESIGN CRITERIA.

1 PARKING ELEVATION

TYPICAL VACUUM LAYOUT AT PARKING STALL

NOT TO SCALE

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611 HIGH STREET, NO.190
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SITE PLANS
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ASSESSORS MAP 57 BLOCK B LOT 18..12A
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C-8.5

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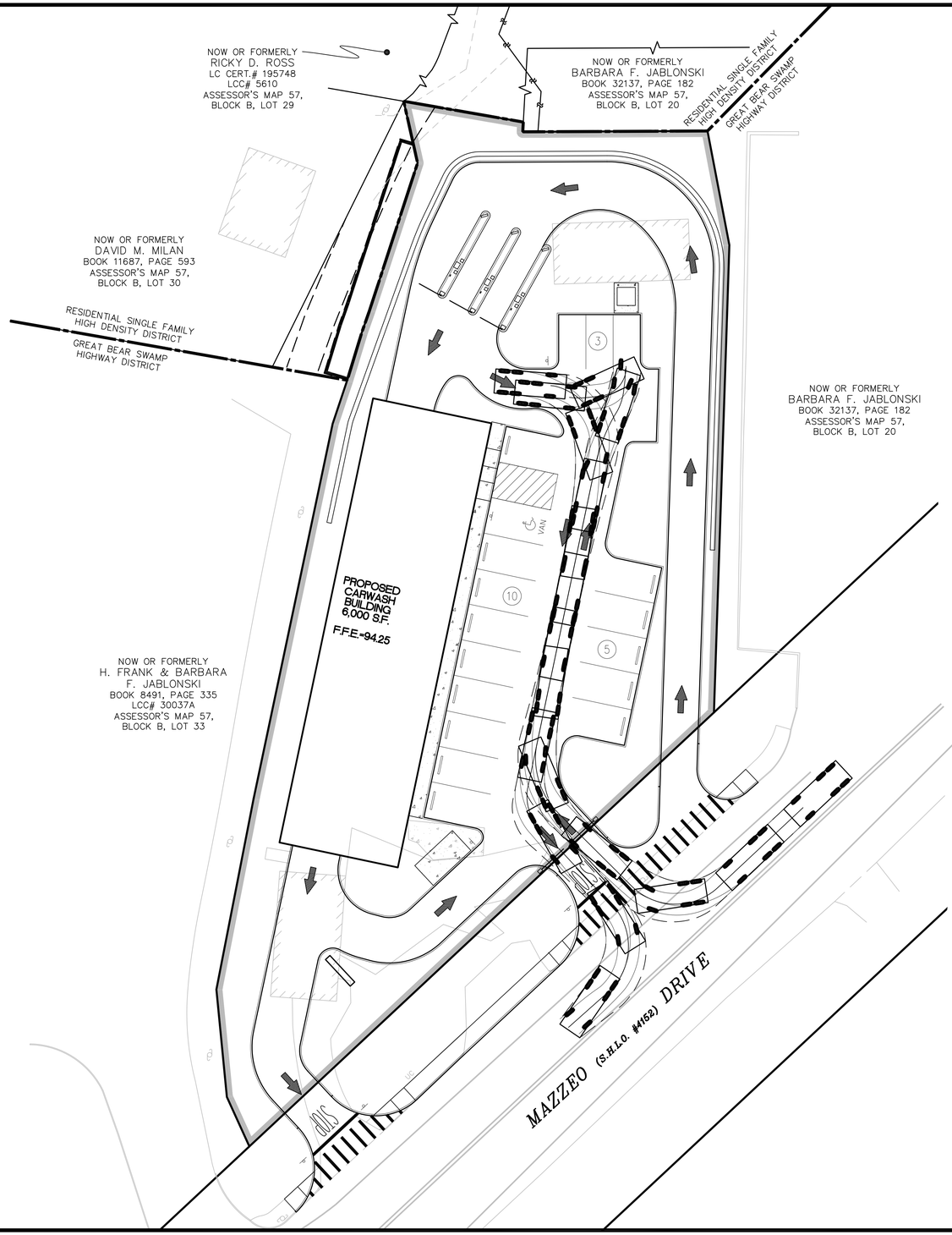
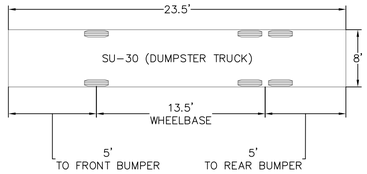


LEGEND

VEHICLE BODY
VEHICLE ENVELOPE
WHEEL PATHS
CENTER LINE OF TRAVEL



AASHTO SU-30 SINGLE UNIT TRUCK
N.T.S.

No.	DATE	DESCRIPTION	BY
REVISIONS			

PROJ. MANAGER: TLD
CHIEF DESIGNER: DT
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SEAL

TRACY L. DUARTE
CIVIL
NO. 48660
REGISTERED PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS

PREPARED FOR
NEW ENGLAND REALTY TRUST
611 HIGH STREET, NO.190
DEDHAM MASSACHUSETTS

SCALE:
HORZ.: 1"=20'
VERT.:
DATUM:
HORZ.:
VERT.:
20 10 0 20
GRAPHIC SCALE

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SITE PLANS
DUMPSTER TRUCK TURNING PLAN
33 MAZZEO DRIVE
ASSESSORS MAP 57 BLOCK B LOT 18..12A
RANDOLPH MASSACHUSETTS

PROJ. No.: 2021-054
DATE: JANUARY 27, 2022

C-9.0

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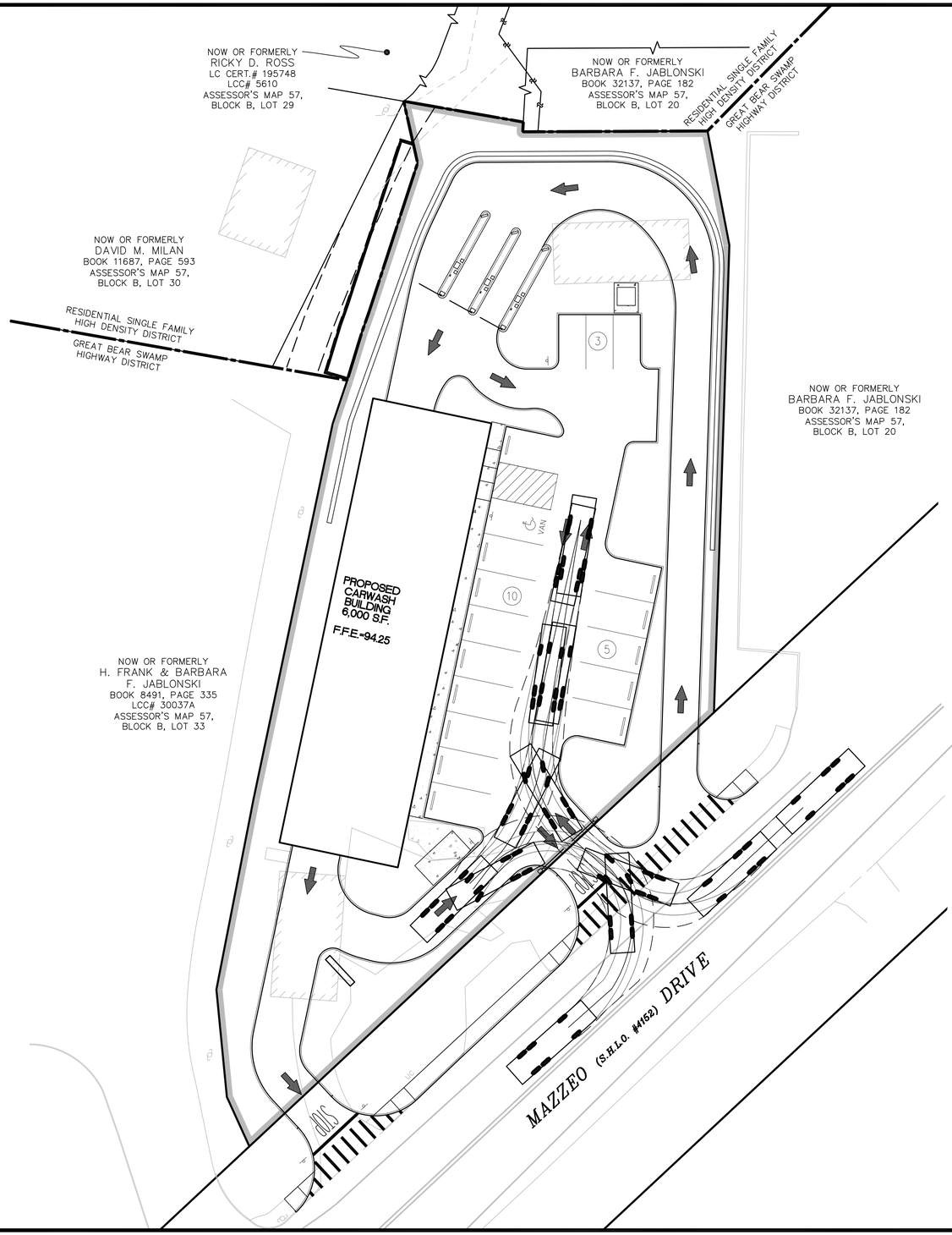
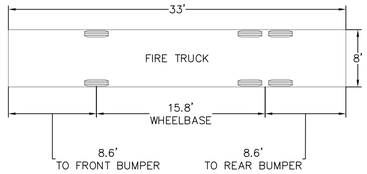


LEGEND

VEHICLE BODY
VEHICLE ENVELOPE
WHEEL PATHS
CENTER LINE OF TRAVEL



AASHTO SU-30 SINGLE UNIT TRUCK
N.T.S.

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TRACY L. DUARTE
CIVIL
NO. 49669
REGISTERED PROFESSIONAL ENGINEER

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NEW ENGLAND REALTY TRUST
611 HIGH STREET, NO.190
DEDHAM MASSACHUSETTS

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20 10 0 20
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SITE PLANS
FIRE TRUCK TURNING PLAN
33 MAZZEO DRIVE
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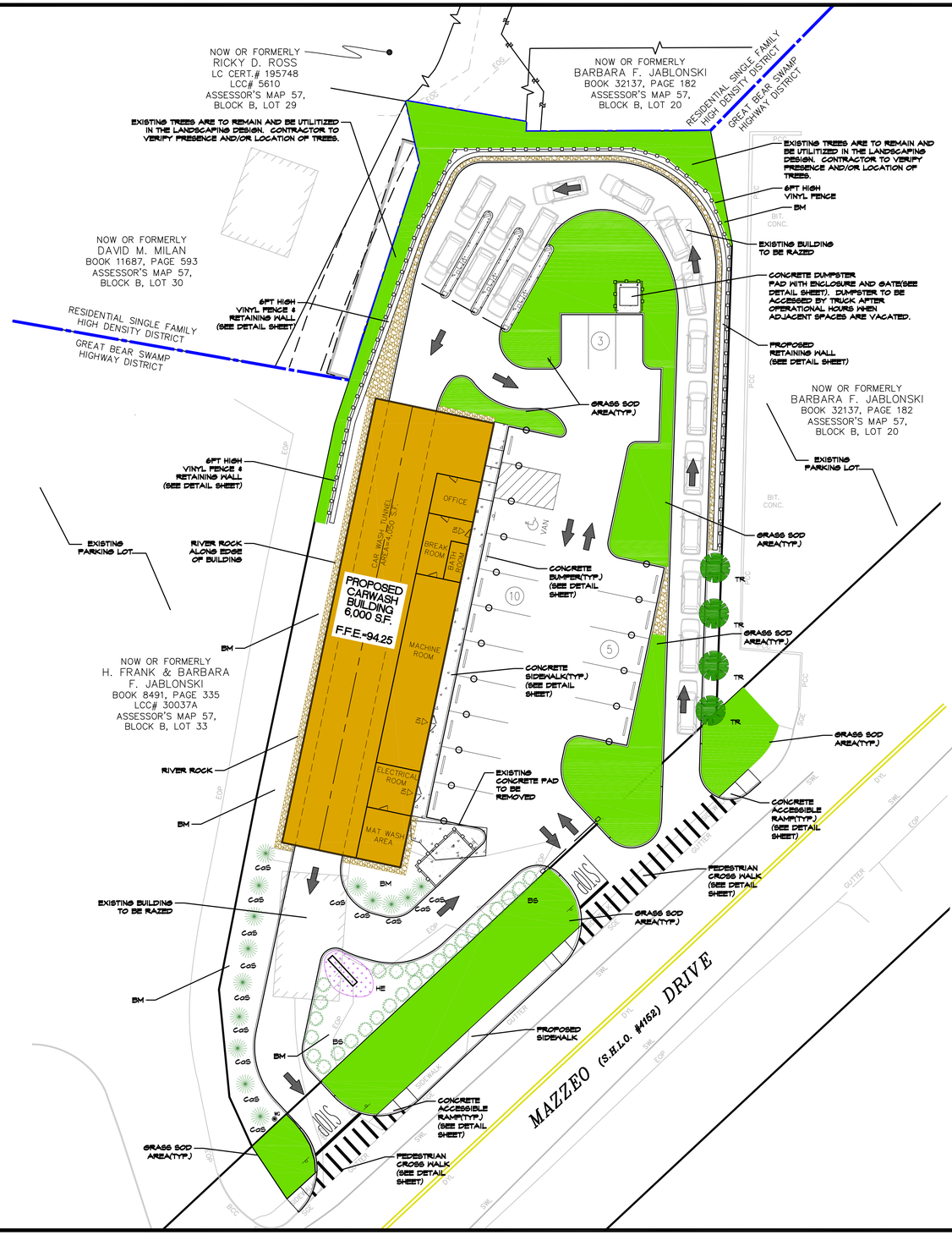
MBL NORTH
LCC# 30037A



IRRIGATION NOTES (WHEN REQUIRED)

CONTRACTOR TO BE RESPONSIBLE FOR PROPER COVERAGE OF AREAS TO BE WATERED I.E. ADJUST HEADS WITH INSUFFICIENT COVERAGE DUE TO BLOCKAGE BY EXISTING OR PROPOSED SITE FEATURES.

CONTRACTOR TO REFER TO LANDSCAPE PLAN TO KEEP SPRINKLER EQUIPMENT AND ACCESSORY MATERIAL FROM INTERFERING WITH PROPER PLANTING, I.E. VERIFY ROOT BALL SIZE FOR PLANTING.

RAINBIRD CONTROL VALVES, COUPLINGS, SPRINKLER HEADS SERIES 1812 AND 1804 SHALL BE USED. USE TORO SUPER 700 LAWN ROTOR WHERE REQUIRED.

MAINLINE AND LATERAL LINE PIPE SHALL BE CLASS 200 PVC IRRIGATION SLEEVE SHALL BE SCHEDULE 40 PVC

INCLUDE BACKFLOW PREVENTER ASSEMBLY AND SPRINKLER CHECK VALVE DEVISES WHERE LOW HEAD DRAINAGE MAY OCCUR.

LANDSCAPING NOTES:

PLANT SOIL SHALL BE 1/3 SPHAGNUM PEAT MOSS AND 2/3 FERTILE FIELD LOAM BY VOLUME.

MULCH SHALL BE HORTICULTURAL QUALITY PINE BARK.

TREE PLANTINGS SHALL BE COMMON VARIETIES CAPABLE OF REACHING A HEIGHT OF 30' @ MATURITY.

SHRUB PLANTINGS SHALL BE COMMON VARIETIES CAPABLE OF A MINIMUM HEIGHT OF 6' @ MATURITY.

UPPER STORY PLANTINGS: 2 1/2 INCH CALIPER
LOWER STORY PLANTINGS: SHRUBS 30-46 INCHES

PLANTS SHALL CONFORM TO MOST RECENT STANDARDS OF THE AMERICAN NURSERYMEN'S ASSOCIATION.

PROVIDE 6" TOPSOIL & FINE GRADE & SEED ALL AREAS NOT OTHERWISE NOTED.

ALL PLANTINGS AT DRIVE WAY ENTRANCES WILL BE MAINTAINED TO A HEIGHT OF 3' OR LESS AS TO NOT OBSCURE TRAFFIC VISIBILITY.

ALL PLANTING BED MASSINGS ARE REQUIRED TO HAVE PVC EDGING AND AND A MINIMUM OF 4" DEEP MULCH COVER OVER FIBERMAT WEED BARRIER.

PLANTING BED WILL HAVE A MINIMUM OF 4-6 PLANT SPECIES.

4-INCH AGED FINE BARK MULCH AND A WEE BARRIER/TY-PAR FABRIC OR APPROVED EQUAL) SHALL BE INSTALLED WHERE SHOWN ON THE PLAN. INSTALL WEED BARRIER PER MANUFACTURERS RECOMMENDATIONS AND SPECIFICATIONS.

RIVER STONE WITH A WEED BARRIER(TY-PAR FABRIC OR APPROVED EQUAL) SHALL BE INSTALLED AS SHOWN ON THE PLAN. INSTALL WEE BARRIER AS INDICATED PER THE MANUFACTURERS RECOMMENDATIONS AND SPECIFICATIONS. RIVER STONE/RIVER RUN TO BE 1"-3" DIA., 6" DEEP WITH WEED BARRIER (TY-PAR OR APPROVED EQUAL)

PLANT PIT BACKFILL SHALL BE MIXED AT A RATE OF 1 PARTS OF TOPSOIL TO 2 PARTS OF DEHYDRATED COW MANURE. SLOW RELEASE FERTILIZER SHALL BE APPLIED AS PER MANUFACTURERS RECOMMENDATIONS AND SPECIFICATIONS. USE EXISTING ON-SITE TOP SOIL(IF AVAILABLE) AS PART OF THE BACK FILL.

ALL LANDSCAPED AREAS NO PLANTED WITH TREES, SHRUBS OR GROUND COVER SHALL BE RESTORED WITH 6" OF LOAM AND HYDROSEED AS INDICATED ON THE PLANS.

ALL SEED, SHRUB,TREE AREAS SHALL RECEIVE 6"PH CORRECTED TOPSOIL. AFTER TOPSOIL IS SPREAD EVENLY OVER THE ENTIRE AREA, ALL CLODS, LUMPS, STONES AND OTHER DELETERIOUS MATERIAL SHALL BE RAKED UP AND REMOVED FROM THE SITE.

APPLICATION OF GRASS SEED, FERTILIZERS AND MULCH SHALL BE ACCOMPLISHED BY BROADCAST SEEDING OR HYDROSEEDING AT THE RATES OUTLINED BELOW:
A/LIME STONE 100 LBS./1,000 SF.
B/FERTILIZER 500 LBS./ACRE OF 10-20-20 OR 1000 LBS./OR 5-10-10
C/MULCH: HAY MULCH APPROXIMATELY 3 TONS PER ACRE.
D/SEE MIX:(SLOPES LESS THAN 4:1) LBS/ACRE

CREEPING RED FESCUE	20
TALL FESCUE	15
PERENNIAL RYE GRASS	5
RED TOP	2

FOR TEMPORARY SEDIMENTATION AND EROSION CONTROL, PLEASE REFER TO THAT SHEET IN THE SET OF PLANS FOR REFERENCE.

ANY CHANGES IN PLANT LOCATIONS OR TYPE OF PLANTS SHALL BE REVIEWED AND APPROVED BY THIS OFFICE AND BURGER KING PRIOR TO THE PURCHASE OF ANY PLANTS AND INSTALLATION OF PLANTS.

ALL TREES AND SHRUBS THAT ARE SHOWN ON THIS PLAN AND INSTALLED BY THE CONTRACTOR SHALL BE GUARANTEED BY THE CONTRACTOR FOR A 1 YEAR PERIOD AFTER INSTALLATION.

THE CONTRACTOR SHALL INSTALL AN IRRIGATION SYSTEM TO PROVIDE COMPLETE COVERAGE OF ALL THE LANDSCAPED AREAS SHOWN ON THIS PLAN. THE SYSTEM SHALL INCLUDE A TIMER AND SHALL BE INSTALLED IN ACCORDANCE WITH STATE AND LOCAL CODES.

Plant Legend

	KEY	DESCRIPTION	MINIMUM INSTALL/SIZE
SHRUBS AND GROUND COVER	BM	BARK MULCH (AGED PINE, UNDYED)	
	BS	BOXWOOD BUXUS SEMPERVIRENS	3-4 FEET, 3 GAL. 4 FT. O.C.
	TR	THUJA OCCIDENTALIS CULTIVAR EMERALD ARBORVITAE	5-6 FT. HT.
	CoS	DWARF REDTWIG DOGWOOD CORNUS SERICEA 'KELSEYI'	20-36 INCHES, 3 GAL. 4 FT. O.C.
		SOD	
	HE	HEMERCALLIS VARIETIES DAYLILY MIXED COLORS-DWARF	1 EVERY 12" SQ.
STONE		RIVER ROCK	1" - 3" DIA. RIVER STONE BED

811 DigSafe MA.ME.NH.RI.VT

No.	DATE	DESCRIPTION	BY
REVISIONS			

PROJ. MANAGER: TLD
CHIEF DESIGNER: DT
REVIEWED BY: DATE

SEAL

SEAL

PREPARED FOR
NEW ENGLAND REALTY TRUST
611 HIGH STREET, NO.190
DEDHAM MASSACHUSETTS

SCALE:
HORZ.: 1"=20'
VERT.:
DATUM:
HORZ.:
VERT.:
20 10 0 20
GRAPHIC SCALE

MBL
LAND DEVELOPMENT & PERMITTING, CORP.
LAND DEVELOPMENT, TRANSPORTATION AND ENVIRONMENTAL SOLUTIONS
5 BRISTOL DRIVE, SUITE 3A
SOUTH EASTON, MA 02375
P.508.297.2746
EMAIL:info@MBLLandDevelopment.com
WEB: www.MBLLandDevelopment.com

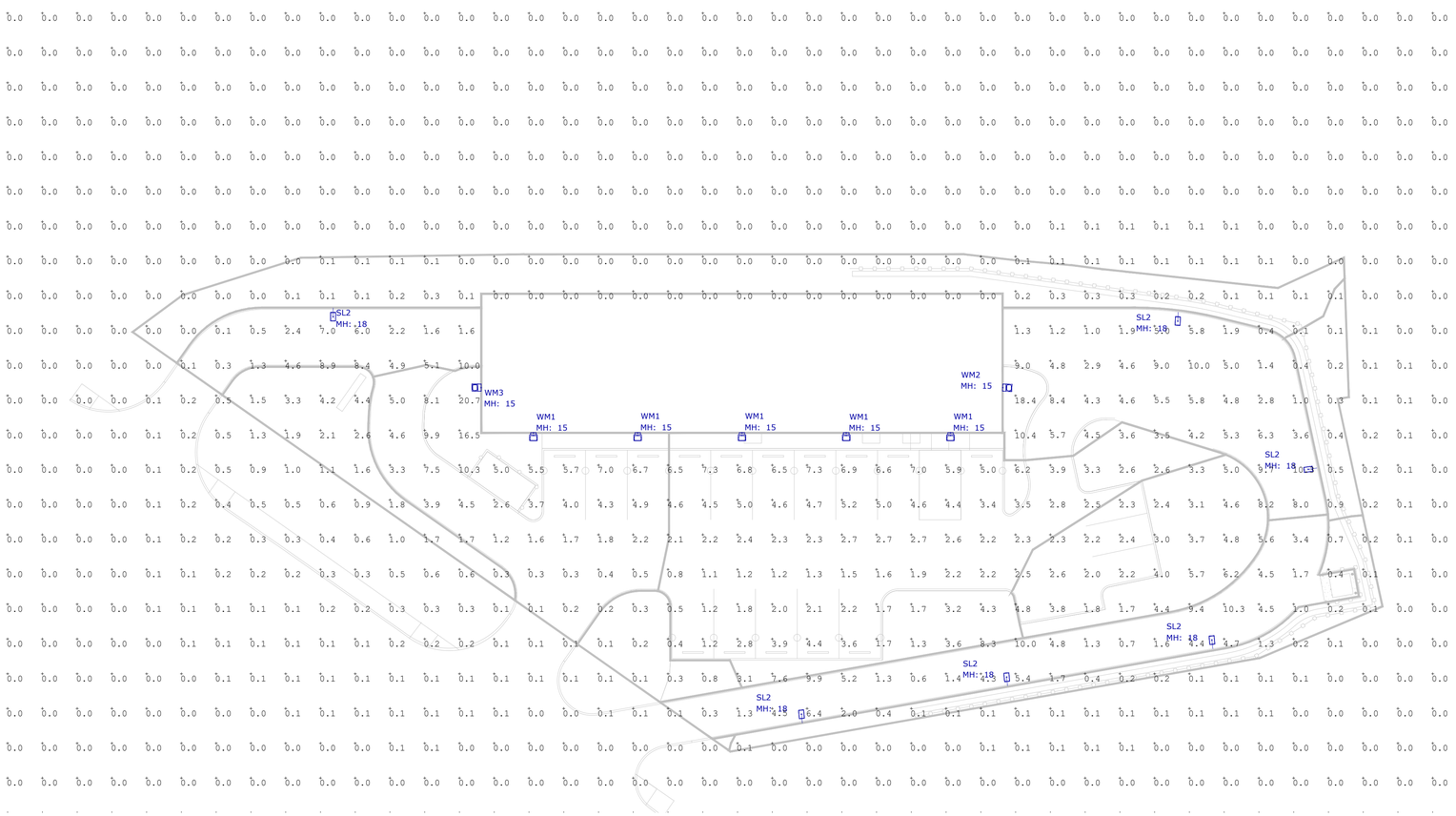
SITE PLANS
LANDSCAPING PLAN
33 MAZZEO DRIVE
ASSESSORS MAP 57 BLOCK B LOT 18..12A
RANDOLPH MASSACHUSETTS

PROJ. No.: 2021-054
DATE: JANUARY 27, 2022

L-1.0

UCS: | MS VIEW: | LMAN: | CTB:

X:\2021\2021-054\CIVIL\Plot\2021-054 LSP.dwg, 1/27/2022 1:01:53 PM



1 Photometric Layout and Calculations

SCALE: 1:20

20' 0 10' 20' 40'

Luminaire Schedule						
Symbol	Label	Qty	Description	LLF	Lum. Watts	Lum. Lumens
	SL2	6	Visionaire # VMX-II-T4-25L-4K-HS	0.900	172	9923
	WM1	5	Visionaire # VMX-II-T3-48LC-5-4K	0.900	52	7624
	WM2	1	Visionaire # VMX-II-T3-25L-4K-LCLS	0.900	172	18056
	WM3	1	Visionaire # VMX-II-T3-25L-4K-RCLS	0.900	172	18056

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
SITE CALCS	Illuminance	Fc	0.94	20.7	0.0	N.A.	N.A.
PARKING AREA	Illuminance	Fc	3.17	7.3	0.2	15.85	36.50
WASH ENTRANCE	Illuminance	Fc	4.11	10.3	0.4	10.28	25.75
WASH EXIT	Illuminance	Fc	4.78	10.0	1.2	3.98	8.33

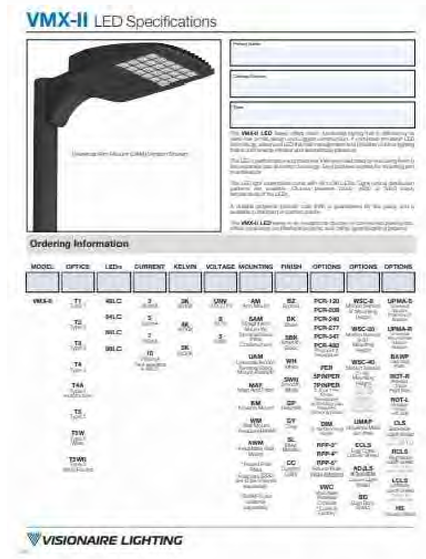
NOTES:

A. A LIGHT LOSS FACTOR OF 0.900 HAS BEEN APPLIED TO FIXTURES UNLESS OTHERWISE NOTED. REFER TO LUMINAIRE SCHEDULE FOR LIGHT LOSS FACTOR AND LUMEN INFORMATION.

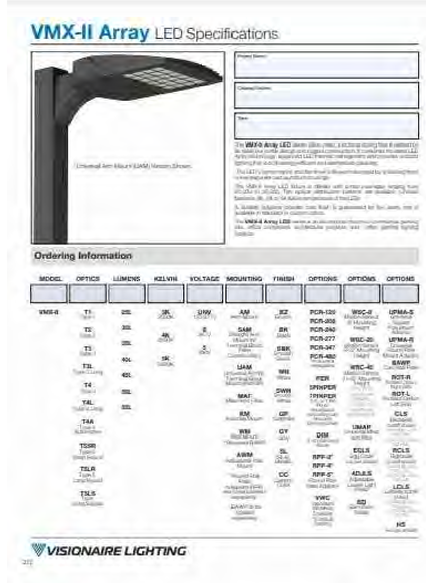
B. SEE "MH" ON LIGHTING FIXTURE TAG LOCATED ON PLAN FOR MOUNTING HEIGHT INFORMATION.

C. CALCULATION POINTS ARE TAKEN AT GRADE.

D. CALCULATION RESULTS ARE BASED ON IES STANDARDS UNLESS OTHERWISE REQUESTED.



2 Visionaire Type VMX-II Specification



3 Visionaire Type VMX-II Array Specification

SK & Associates
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Canton, MA 02021
T - 781-821-1700
www.skandassociates.com

MBL
5 Bristol Drive, Suite 3A
South Easton, MA 02375

33 Mazzeo Dr.

Photometric Layout Calculations Schedules and Specifications

DATE: 1/19/2022	
PROJECT NUMBER: 22004	
DRAWN BY: AM	
CHECKED BY:AD	
APPROVED BY:VM	
SCALE: AS NOTED	

REVISIONS	DESCRIPTION	DATE
1		
2		
3		
4		
5		
6		
7		

SL1

33 MAZZEO DRIVE
RANDOLPH, MA

33 MAZZEO DRIVE
RANDOLPH, MA

33 MAZZEO DRIVE
RANDOLPH, MA

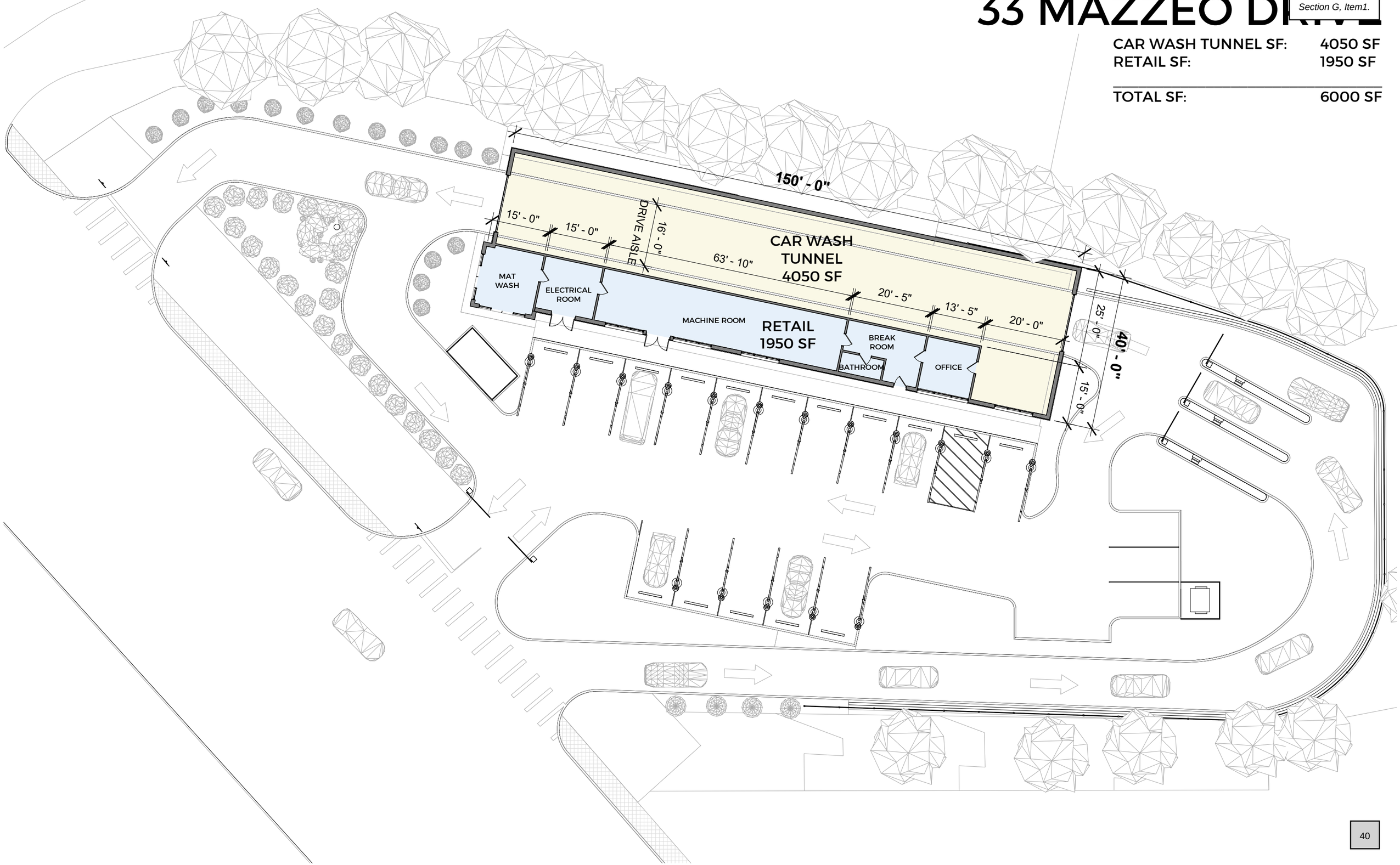

33 MAZZEO DRIVE
RANDOLPH, MA
CAR WASH
Splash
CAR WASH
EXPRESS

33 MAZZEO DRIVE
RANDOLPH, MA

33 MAZZEO DRIVE
RANDOLPH, MA

33 MAZZEO DRIVE

CAR WASH TUNNEL SF:	4050 SF
RETAIL SF:	1950 SF
TOTAL SF:	6000 SF



STAFF REPORT

File		**Reported By**	Michelle Tyler
Project Site	33 Mazzeo Drive	**Application Type**	Tier 2 Site Plan
Site Visit Date	Multiple	**Hearing Date**	February 8, 2022

Project Summary

The applicant proposes to construct a 6,000 square foot automated car wash with associated vacuum services. The project entails demolition of two structures

Zoning District

	Current Zoning	Existing Land Use
Subject	Great Bear Swamp Highway District (GBHD)	Garage and vacant house
North	Residential Single-Family High Density	Single family residence
South	Great Bear Swamp Highway District (GBHD)	Commercial use and single-family residence
East	Great Bear Swamp Highway District (GBHD)	Office building
West	Great Bear Swamp Highway District (GBHD) Residential Single-Family High Density	Multiunit commercial/retail Single family residence

Documents Reviewed

- Application for Tier 2 review dated January 22, 2022
- Site Plan Set prepared by MBL Land Development & Permitting Corp dated January 27, 2022
- Development Impact Statement prepared by MBL Land Development & Permitting Corp dated January 27, 2022
- Drainage Analysis prepared by MBL Land Development & Permitting Corp dated January 27, 2022

Analysis

1. **Summary of Land Use Designation**
   The Blue Hill River Highway District and *Great Bear Swamp Highway District* is intended to provide general retail sales, services, and business space within the Town of Randolph in locations capable of conveniently servicing community-wide and/or regional trade areas, and oriented primarily to automobile access. Businesses are positioned on streets which abut, front on, or have access to a major highway.

2. **Compliance with Regulations**
   a. The use of the parcel conforms with zoning.
   b. The proposed siting of the structure height, setbacks and lot coverage comply with zoning.

3. **Consistency with Plans**
   There are no inconsistencies with the Comprehensive Master Plan updated in 2017.

4. **Compatibility with Surrounding Neighborhood**
   This parcel is within a commercial district and is compatible with surrounding uses. The parcel also abuts conforming residentially zoned parcels to the north and northwest. The layout and design of the structure and site have minimal visual impact to the abutting residences.

Staff Comments

1. **Conservation Commission Review**
   a. The proposal does not lie within a floodplain nor near any known wetlands. A review by Conservation does not appear to be required.

2. **Stormwater**
   a. The project has been submitted to the Department of Public Works for review and approval of stormwater management.

3. **Site Generated Noise**
   a. The decibel levels generated by the vacuum system, as presented in the Development Impact Statement provided by the applicant, seem to exceed the maximum levels permitted in the Town's General Ordinances (section 141).
   b. The potential noise from users of the site may impact residential neighbors. The applicant might consider modification to the hours of operation on weekends (mornings especially) as mitigation.

4. **Access**
   a. The proposed controlled gated entrance/exit should be evaluated for traffic circulation and safety concerns as well as access by emergency services vehicles. The Development Impact Statement indicates the gates will be raised at the end of each operational day however, the applicant should consider an alternate plan should site operators fail to open gates or if the gates experience a failure. At the time of report, the plans have been submitted to the Safety Officer for Randolph Police and Fire Prevention at Randolph Fire for review and comment.

DRAINAGE ANALYSIS

Prepared for New England Realty Trust

Proposed Car Wash

33 Mazzeo Drive
Randolph, Massachusetts 02368

January 27, 2022

MBL Land Development & Permitting Corp.
5 Bristol Drive, Suite 3A
South Easton, MA 02375
Phone 508.297.2746
Fax 508.297.2756
Website: www.MBLLandDevelopment.com

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

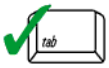
APPENDICES

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

1/27/2022

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☒ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of “country drainage” versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☐ Other (describe): _____

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☒ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☒ is near or to other critical areas
- ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☒ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☒ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☒ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☐ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

1. INTRODUCTION

MBL Land Development and Permitting Corporation (MBL) has prepared this Drainage Analysis for the proposed development of the project site located at 33 Mazzeo Drive, Randolph, Massachusetts. The purpose of the analysis is to quantitatively understand the impacts of the proposed site development on the existing hydrologic conditions and to mitigate these impacts through the implementation of a proposed stormwater management system that utilizes best management practices (BMPs) and is supported by an Operations & Maintenance Plan as well as a Long-Term Pollution Prevention Plan.

2. SITE DESCRIPTION

2.1 EXISTING CONDITIONS

The project is located at 33 Mazzeo Drive in Randolph, Massachusetts on the north side of the street between Thomas Patten Drive and West Street. This property is referenced as Block B, Lot 18..12A on Assessors Map 57 and contains a total area of 0.825 acres. The existing site is comprised of a single-family house on the north side of the property and a 1-story garage on the south side of the property with broken pavement and concrete areas.

The site does not lie within a flood area, as shown on the F.E.M.A. Flood insurance rate map (F.I.R.M.) for Norfolk county, Massachusetts, Map Number 25021C0216E, Community Number 250251, Panel 0216, having an effective date of July 17, 2012.

The site is not located within a NHESP Priority Habitat of Rare Species or an Estimated Habitat of Rare Wildlife according to the Massachusetts Natural Heritage Atlas, 14th Edition effective August 2017. This site is located within a Public Watershed Supply Outstanding Resource Water Critical Area.

2.2 PROPOSED CONDITIONS

The proposed site development consists of the construction of a 6,000 S.F. car wash building with associated site access, parking, utilities, and a stormwater management system.

2.3 SOILS

The Soil Conservation Survey for Norfolk County indicates that the entirety of the site is located within Soil Map Unit 422B – Canton Fine Sandy Loam, 0-8% slopes, extremely stony. This soil type has a Hydrologic Soil Group of B.

2.4 SITE TOPOGRAPHY

The site topography ranges from elevation 100 at the high point on the north side of the site to elevation 91 at the south side of the site. The site slopes are generally between 1-15%.

3. DRAINAGE CALCULATIONS

To mitigate the quality and quantity of stormwater runoff discharging from the site, the stormwater management system has been designed to collect, treat and control flows leaving the site.

The proposed stormwater management system will consist of a series of deep sump hooded catch basins, drain manholes, and water quality units that will convey stormwater runoff to the two subsurface recharge chamber systems located within the site parking lot.

The stormwater management system has been designed to reduce peak flows from the existing conditions to the proposed conditions for all storm events. From an environmentally sensitive perspective, the aforementioned measures result in a low impact design that promotes on-site groundwater recharge while preserving the natural hydrologic conditions.

A detailed hydrologic and hydraulic analysis of the stormwater management system was completed to evaluate its performance and document compliance with the Massachusetts Stormwater Standards for a redevelopment project. MBL has prepared the following drainage system calculations for the proposed site development. These calculations are broken into two main sections; Hydrologic and Hydraulic Analysis.

3.1 HYDROLOGIC ANALYSIS

The Soil Conservation Service (SCS) Unit Hydrograph methodology was utilized to develop a hydrologic model of the site. MBL utilized HydroCAD Version 10.0 software, developed by HydroCAD Software Solutions, LLC to analyze the site hydrology. The program calculates peak rates of runoff and runoff volume based on selected rainfall events. Contributing watershed areas were identified and soils, surface cover, watershed slope, and flow paths were evaluated to develop the necessary HydroCAD model input parameters. A minimum Time of Concentration (Tc) of six (6) minutes was used in the calculations.

Drainage calculations were performed for the Existing and Proposed Conditions for the 24-hour 2, 10, 25 and 100-year Type III storm events. The total rainfall for each of the storm events was based upon data from the NOAA Atlas 14. The total rainfall values used in the hydrologic modeling are shown in the following table:

Table 1: Table Design Rainfall Data

2-year, 24-hour storm	10-year, 24-hour storm	25-year, 24-hour storm	100-year, 24-hour storm
3.22 inches	4.86 inches	6.15 inches	8.80 inches

3.1.1 Design Points

To compare the difference between the existing and proposed peak flow rates, the existing and proposed watershed areas were delineated. The design point for the watershed weas determined by flow paths from the hydraulically most distance point of the watershed. These

parameters were utilized to calculate the times of concentration which were modeled. The same Design Point was analyzed for both the existing and proposed conditions. For this project, four design points were identified, which are as follows:

- Mazzeo Drive
- Offsite North
- Offsite East
- Offsite West

3.1.2 Existing Hydrology

The existing site was analyzed using 4 watershed areas discharging to the design points above. The existing watershed areas are shown on the attached Figure 7 titled, “Existing Conditions Drainage Map”. The hydrographs for the watershed areas were generated to develop the peak discharge rates for the 24-hour, 2, 10, 25, and 100-year storm events for the existing site conditions.

3.1.3 Proposed Hydrology

The proposed site was analyzed using 13 watershed areas discharging to the design points above. The proposed watershed areas are shown on the attached Figure 8 entitled “Proposed Conditions Drainage Map”. The hydrographs for the watershed areas were generated and routed through the proposed BMPs to develop the peak discharge rates for the 24-hour 2, 10, 25 and 100-year storm events for the proposed site conditions.

3.1.4 Peak Discharge Rates

Table 2 below summarizes the existing and proposed peak discharge rates for each Design Point. As depicted in the table, the proposed peak rate of discharge does not increase over existing rate for all storm events analyzed.

Table 2: Pre- and Post-Development Peak Discharge Rates								
Storm Frequency	Existing Peak Runoff (cfs)	Proposed Peak Runoff (cfs)	Existing Peak Runoff (cfs)	Proposed Peak Runoff (cfs)	Existing Peak Runoff (cfs)	Proposed Peak Runoff (cfs)	Existing Peak Runoff (cfs)	Proposed Peak Runoff (cfs)
	Mazzeo Drive	Mazzeo Drive	Offsite North	Offsite North	Offsite East	Offsite East	Offsite West	Offsite West
2	0.10	0.07	0.00	0.00	0.00	0.00	0.02	0.01
10	0.33	0.16	0.04	0.01	0.04	0.01	0.24	0.08
25	0.54	0.24	0.08	0.02	0.09	0.03	0.57	0.16
100	1.04	0.41	0.18	0.05	0.23	0.08	1.47	0.36

3.2 HYDRAULIC ANALYSIS

The stormwater closed (underground piping) drainage system discharging to the BMPs were designed to convey the 25-year storm event. Pipe capacity and peak discharge rates for the closed drainage system were calculated using a Manning's Formula.

The closed drainage system, as designed, is capable of conveying the design flow as calculated. The closed drainage system analysis for the proposed system is depicted in Appendix B.

4. BEST MANAGEMENT PRACTICES

The Massachusetts Stormwater Standards requires 80% removal rate over an average annual basis, for Total Suspended Solids (TSS) contained in stormwater runoff. The water quality volume or "first flush" is defined as the volume obtained by multiplying one-half inch (½") or one inch (1") times the impervious surface area of the contributing drainage area. Water quality volume calculations are provided in Appendix D. When this volume is incorporated into properly designed BMPs an 80% reduction of average annual TSS loading will result. The following Best Management Practices will be employed for the project.

4.1 DEEP SUMP HODDED CATCH BASINS

Deep sump hooded catch basins are proposed for pretreatment. 25% TSS pretreatment credit has been taken for the deep sump hooded catch basins.

4.2 WATER QUALITY UNITS

Stormceptor Water Quality Units are proposed for TSS removal. Please see Appendix D for the manufacturer's TSS removal calculations for the proposed water quality units.

4.3 SUBSURFACE RECHARGE CHAMBERS

Cultec 180HD Subsurface Recharge Chambers and Cultec 330XLHD Subsurface Recharge Chambers are proposed to recharge runoff. Recharge chambers have a TSS removal rate of 80%.

5. STORMWATER MANAGEMENT STANDARDS COMPLIANCE

The proposed best management practices (BMPs) selection and their placement within the treatment train of the stormwater management system has been strategically planned and designed as prescribed by the Massachusetts Stormwater Management Handbook. The following addresses how the project complies with Standards 1-10 as set forth in the Massachusetts Stormwater Handbook:

Standard 1

No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

There are no new untreated discharges to or that will cause erosion in wetlands or waters of the Commonwealth. 95.5% of stormwater runoff from impervious surfaces is designed to be collected, conveyed and treated prior to recharging on-site. The proposed 1,085 s.f. of impervious area discharging directly offsite to the Mazzeo Drive study point is lower than the 2,800 s.f. of existing impervious area discharging offsite to this same study point.

Standard 2

Stormwater management systems shall be designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates.

The stormwater management system has been designed so that the proposed peak discharge rates are less than the existing peak discharge rates for the 2-year, 10-year, 25-year and 100-year 24-hour storm events (see Table 2 of this report). Supporting documentation such as HydroCAD computer model output, required computations, and tables are located in Appendix A.

Standard 3

Loss of annual recharge to groundwater shall be eliminated or minimized with environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance.

The proposed stormwater management system has been designed to collect stormwater runoff and recharge it back into the ground on-site. The soils on-site are conducive to recharge. Supporting documentation such as Required Recharge Volume Calculations can be found in Appendix C.

Standard 4

Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

The required removal of 80% TSS has been achieved by a series of BMP's including deep sump hooded catch basins, water quality units, and subsurface recharge chambers. Computations and documentation are provided in Appendix D.

Standard 5

For land uses with higher potential loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

The site is not a land use with higher potential pollutant load, per the regulations.

Standard 6

Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook.

The site is located within a Public Water Supply Outstanding Resource Water Critical Area. A 1" runoff depth has been utilized to account for this in the Water Quality Volume calculations provided in Appendix D.

Standard 7

A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing Stormwater discharges shall comply with Standard 1 only to the maximum extent practicable.

The project is not considered a redevelopment project per the regulations.

Standard 8

A plan to control construction-related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan is located in Appendix E.

Standard 9

A Long-Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

A Long-Term Operation and Maintenance Plan (O&M Plan) for the site stormwater management facilities can be found in Appendix G and a Long-Term Pollution Prevention Plan (LPPP) is located in Appendix F.

Standard 10

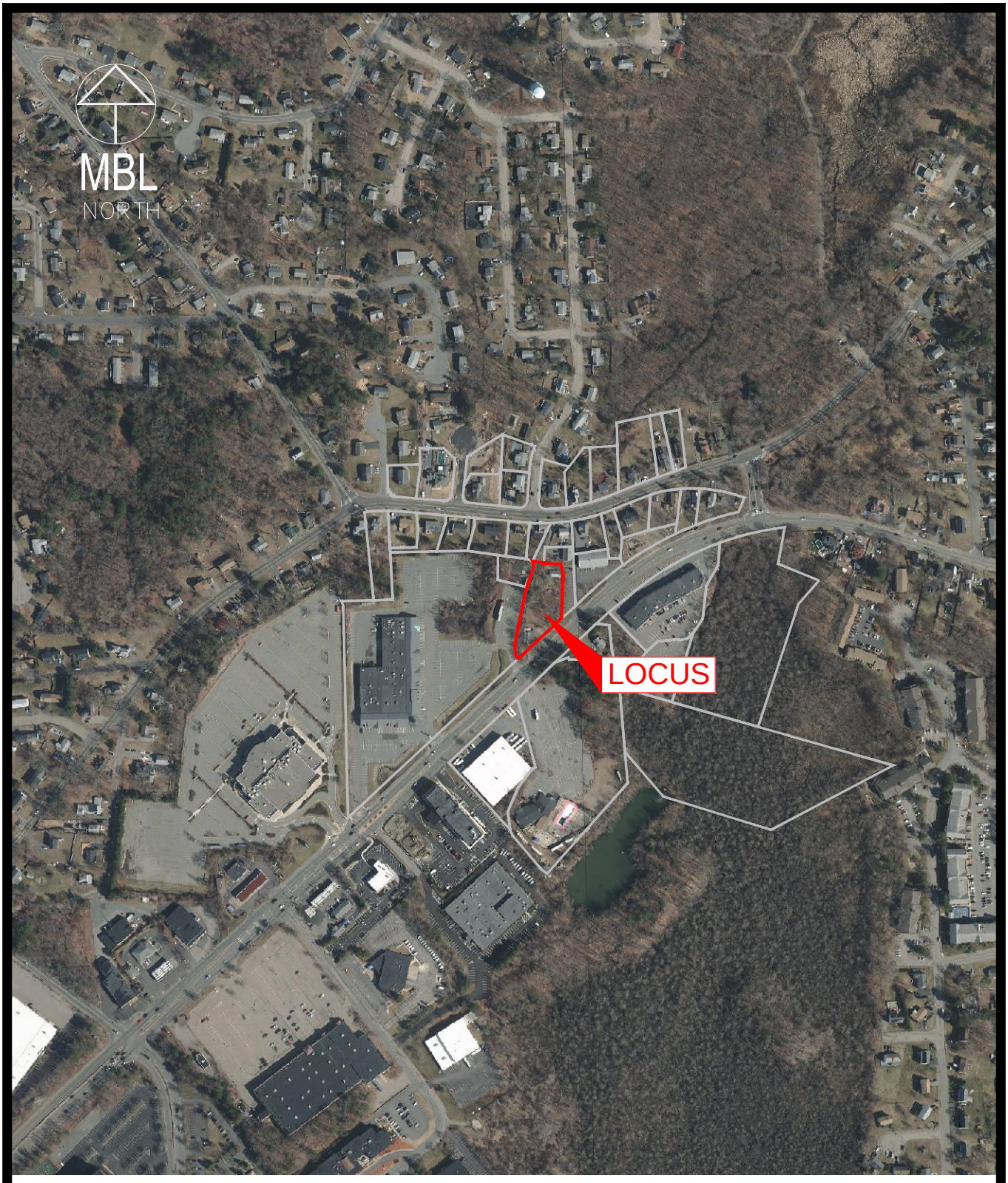
All illicit discharges to the stormwater management system are prohibited.

An Illicit Discharge Compliance Statement has been provided in Appendix H.

6. CONCLUSION

The proposed project will not increase the peak rate of runoff for all modeled storm events for this site over existing conditions. This has been accomplished by implementing BMPs that will enhance the quality of stormwater runoff including deep sump hooded catch basins, water quality units, drain manholes, and subsurface recharge chambers. The proposed stormwater management system has been designed to the meet all 10 of the Massachusetts Stormwater Management System Standards and the Town of Randolph Stormwater Rules & Regulations.

Figure 1: Aerial Map



NOTE: INFORMATION ON THIS PLAN OBTAINED FROM MASSGIS USGS COLOR ORTHO IMAGERY 2019.

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AERIAL MAP

33 MAZZEO DRIVE

MAP 57 LOT BLOCK B LOT 18..12A

RANDOLPH MASSACHUSETTS

PROJ. No:	2021-054
DATE:	01/05/2022
SCALE:	1"=500'

FIGURE 1

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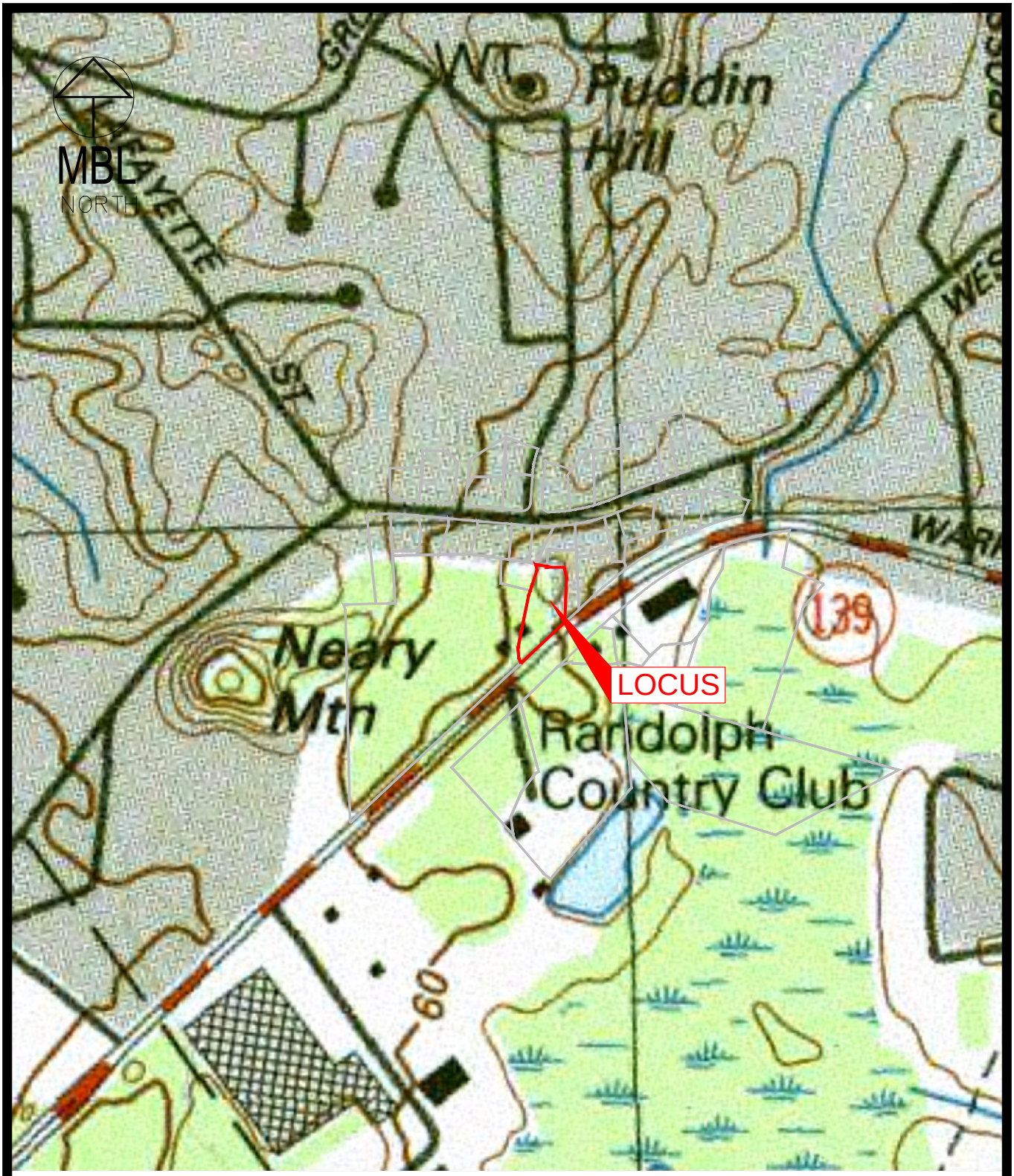
Figure 2: USGS Topographic Map



NOTE: INFORMATION ON THIS PLAN OBTAINED FROM MASSGIS SCANNED 1:25,000 USGS TOPOGRAPHIC QUAD IMAGES, JUNE 2001.

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USGS TOPOGRAPHIC MAP
33 MAZZEO DRIVE
MAP 57 LOT BLOCK B LOT 18..12A
RANDOLPH MASSACHUSETTS

PROJ. No:	2021-054
DATE:	01/05/2022
SCALE:	1"=500'

FIGURE 2

X:\2021\2021-054\ADMIN\REPORTS\NOI\FIGURES\2021-054 FIGURES.DWG

Figure 3: Flood Insurance Rate Map

ZONE X, AREAS BETWEEN THE LIMITS OF THE 100–YEAR AND 500–YEAR FLOODS

ZONE AE, AREAS OF THE 100–YEAR, BASE FLOOD ELEVATION DETERMINED

FLOODWAY AREAS IN ZONE AE

NOTE: FLOOD BOUNDARY INFORMATION SHOWN OBTAINED FROM FEMA FIRM MAP FOR COMMUNITY PANEL NO. 25021C0216E HAVING AN EFFECTIVE DATE OF JULY 17, 2012.

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FLOOD MAP

33 MAZZEO DRIVE

MAP 57 LOT BLOCK B LOT 18..12A

RANDOLPH MASSACHUSETTS

PROJ. No:	2021-054
DATE:	01/05/2022
SCALE:	1"=500'

FIGURE 3

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Figure 4: Natural Heritage Map

ESTIMATED HABITATS OF RARE WILDLIFE

PRIORITY HABITATS OF RARE SPECIES

CERTIFIED VERNAL POOL

NOTE: INFORMATION ON THIS PLAN OBTAINED FROM THE 14TH EDITION OF THE MASSACHUSETTS NATURAL HERITAGE ATLAS DATED AUGUST 1, 2017.

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NATURAL HERITAGE

33 MAZZEO DRIVE

MAP 57 LOT BLOCK B LOT 18..12A

RANDOLPH MASSACHUSETTS

PROJ. No:	2021-054
DATE:	01/05/2022
SCALE:	1"=500'

FIGURE 4

X:\2021\2021-054\ADMIN\REPORTS\NOI\FIGURES\2021-054 FIGURES.DWG

Figure 5: Critical Areas

AREAS OF CRITICAL ENVIRONMENTAL CONCERN

WELLHEAD PROTECTION AREAS

OUTSTANDING RESOURCE WATERS

NOTE: INFORMATION ON THIS PLAN OBTAINED FROM MASS GIS DATABASE ACEC, IPWA, ZONE II AND OUTSTANDING RESOURCE WATERS DATA LAYER. THE LOCUS IS NOT LOCATED WITHIN A CRITICAL AREA.

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CRITICAL AREAS

33 MAZZEO DRIVE

MAP 57 LOT BLOCK B LOT 18..12A

RANDOLPH MASSACHUSETTS

PROJ. No:	2021-054
DATE:	01/05/2022
SCALE:	1"=500'

FIGURE 5

Figure 6: Soils Map

NOTE: INFORMATION ON THIS PLAN OBTAINED FROM MASS GIS NRCS SSURGO–CERTIFIED SOILS DATA LAYER.

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SOILS MAP

33 MAZZEO DRIVE

MAP 57 LOT BLOCK B LOT 18..12A

RANDOLPH MASSACHUSETTS

PROJ. No:	2021-054
DATE:	01/05/2022
SCALE:	1"=100'

FIGURE 6

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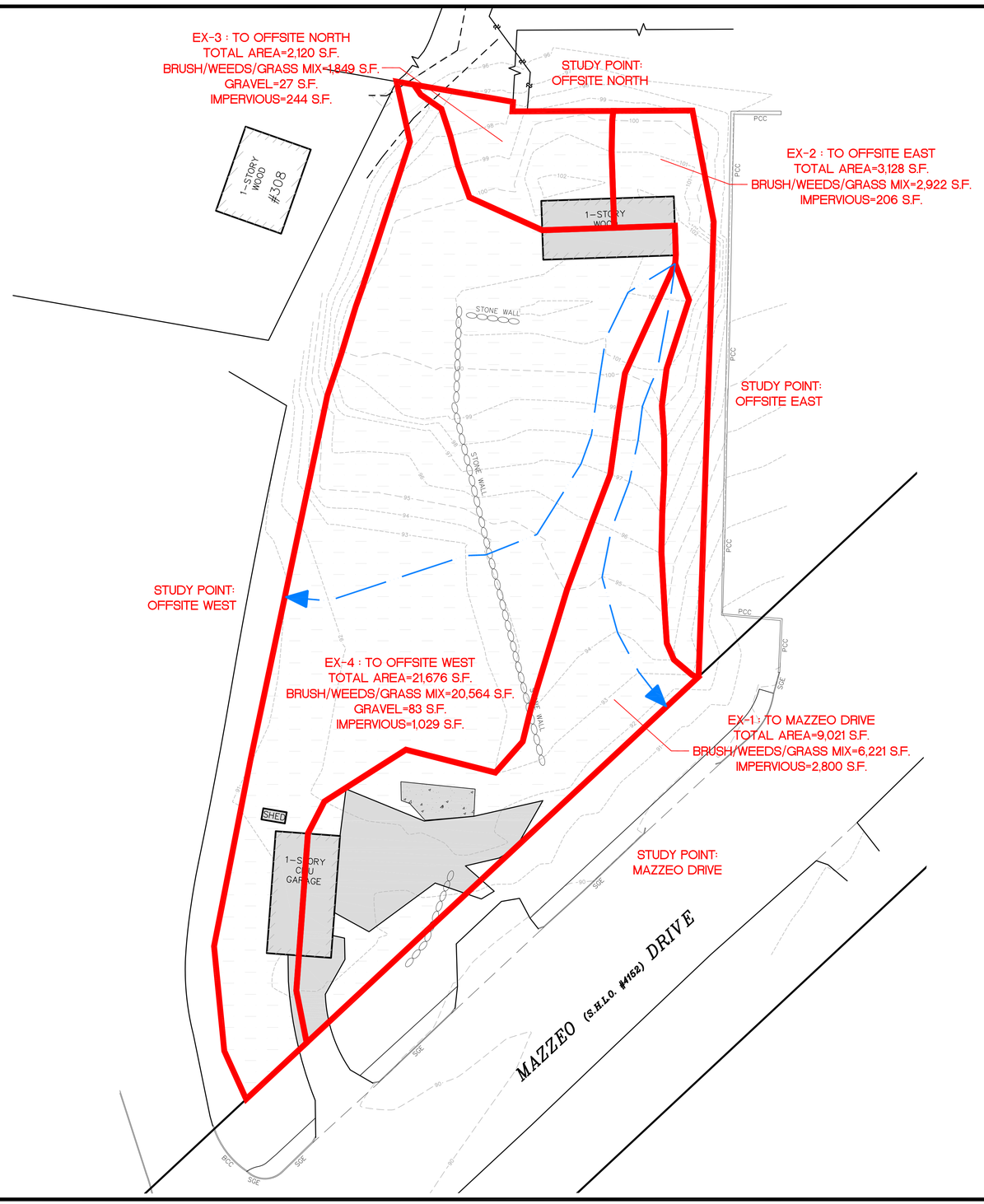
Figure 7: Existing Conditions Drainage Map

MBL NORTH
LCC# 30037A



LEGEND

- WATERSHED BOUNDARY
- DRAINAGE FLOWPATH
- IMPERVIOUS
- GRAVEL
- BRUSH/GRASS/WEEDS MIX

NOTE: WHERE NO FLOWPATH IS SHOWN, A TIME OF CONCENTRATION OF 6 MINUTES WAS USED.

811 DigSafe MA.ME.NH.RI.VT

No.	DATE	DESCRIPTION	BY
REVISIONS			

PROJ. MANAGER: TLD
CHIEF DESIGNER: DT
REVIEWED BY: DATE

SEAL

SEAL

PREPARED FOR
NEW ENGLAND REALTY TRUST
611 HIGH STREET, NO.190
DEDHAM MASSACHUSETTS

SCALE:
HORZ.: 1"=20'
VERT.:
DATUM:
HORZ.:
VERT.:
20 10 0 20
GRAPHIC SCALE

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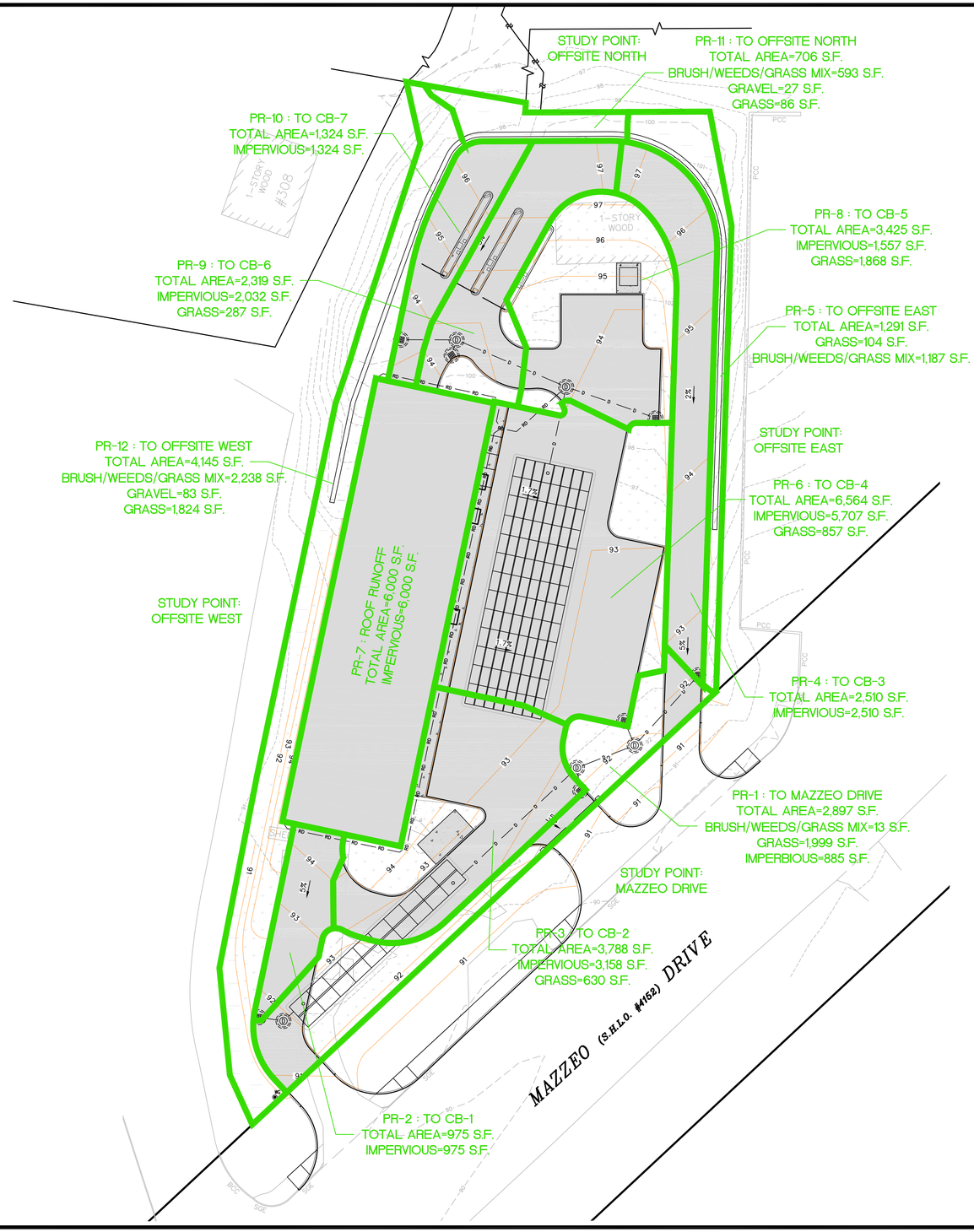
SITE PLANS
EXISTING CONDITIONS DRAINAGE MAP
33 MAZZEO DRIVE
ASSESSORS MAP 57 BLOCK B LOT 18..12A
RANDOLPH MASSACHUSETTS

PROJ. No.: 2021-054
DATE: JANUARY 27, 2022

FIGURE 7

Figure 8: Proposed Conditions Drainage Map

MBL NORTH
LCC# 30037A



LEGEND

- WATERSHED BOUNDARY
- DRAINAGE FLOWPATH
- IMPERVIOUS
- GRAVEL
- GRASS
- BRUSH/GRASS/WEEDS MIX

NOTE: WHERE NO FLOWPATH IS SHOWN, A TIME OF CONCENTRATION OF 6 MINUTES WAS USED.

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No.	DATE	DESCRIPTION	BY
REVISIONS			

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CHIEF DESIGNER: DT
REVIEWED BY: DATE

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SEAL

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NEW ENGLAND REALTY TRUST
611 HIGH STREET, NO.190
DEDHAM MASSACHUSETTS

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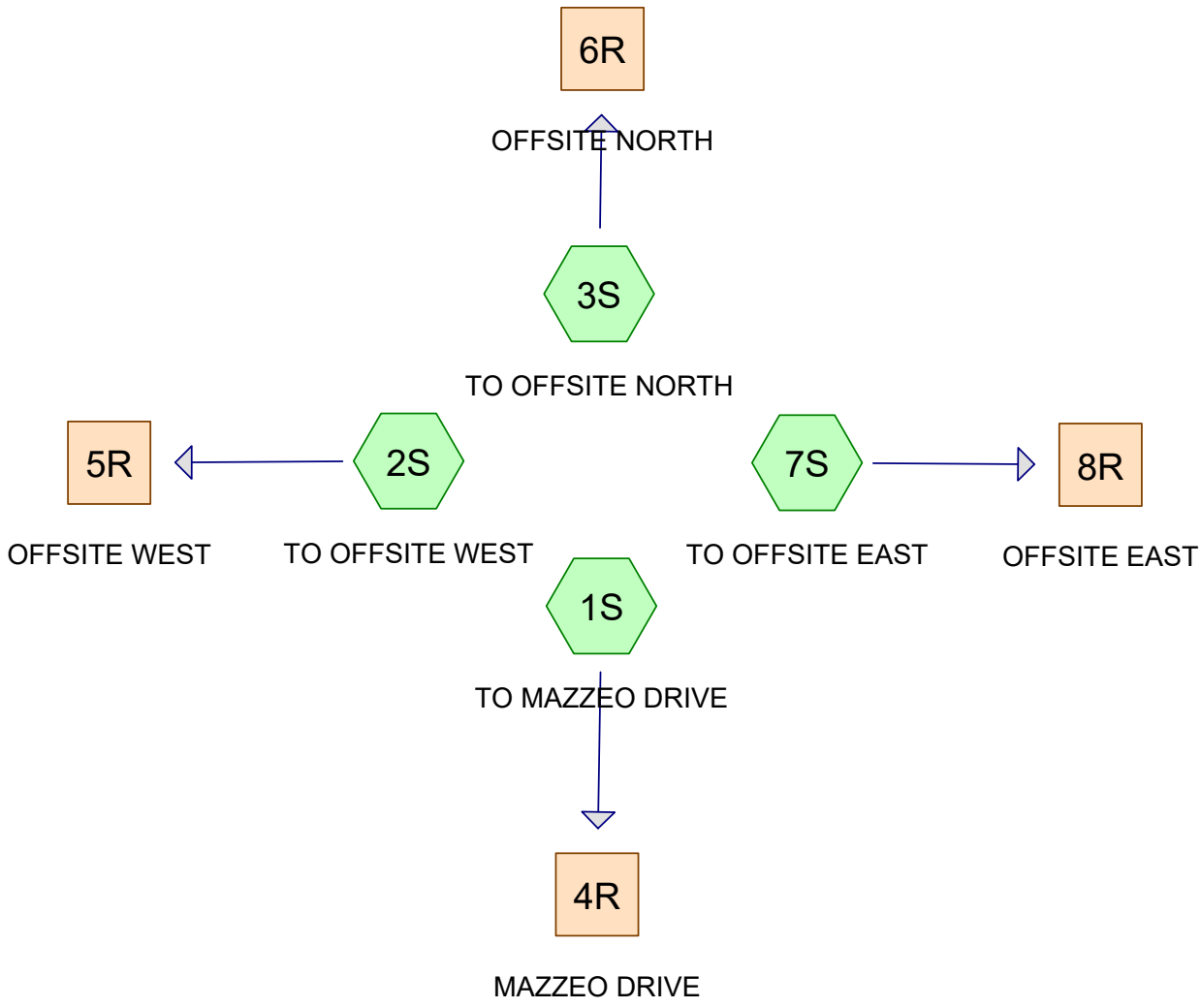
SITE PLANS
PROPOSED CONDITIONS DRAINAGE MAP
33 MAZZEO DRIVE
ASSESSORS MAP 57 BLOCK B LOT 18..12A
RANDOLPH MASSACHUSETTS

PROJ. No.: 2021-054
DATE: JANUARY 27, 2022

FIGURE 8

APPENDIX A: HYDROLOGIC ANALYSIS

Pre-Development HydroCAD Analysis



Subcat Reach Pond Link

Routing Diagram for 2021-054 - EX
Prepared by {enter your company name here}, Printed 1/11/2022
HydroCAD® 10.00-25 s/n 09450 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.724	48	Brush, Good, HSG B (1S, 2S, 3S, 7S)
0.003	96	Gravel surface, HSG B (2S, 3S)
0.098	98	Impervious (1S, 2S, 3S, 7S)
0.825	**54**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.727	HSG B	1S, 2S, 3S, 7S
0.000	HSG C	
0.000	HSG D	
0.098	Other	1S, 2S, 3S, 7S
0.825		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.724	0.000	0.000	0.000	0.724	Brush, Good	1S, 2S, 3S, 7S
0.000	0.003	0.000	0.000	0.000	0.003	Gravel surface	2S, 3S
0.000	0.000	0.000	0.000	0.098	0.098	Impervious	1S, 2S, 3S, 7S
0.000	**0.727**	**0.000**	**0.000**	**0.098**	**0.825**	**TOTAL AREA**	

Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 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 1S: TO MAZZEO DRIVE Runoff Area=9,021 sf 31.04% Impervious Runoff Depth>0.57"
Flow Length=160' Tc=6.5 min CN=64 Runoff=0.10 cfs 0.010 af

Subcatchment 2S: TO OFFSITE WEST Runoff Area=21,676 sf 4.75% Impervious Runoff Depth>0.15"
Flow Length=197' Tc=7.8 min CN=51 Runoff=0.02 cfs 0.006 af

Subcatchment 3S: TO OFFSITE NORTH Runoff Area=2,120 sf 11.51% Impervious Runoff Depth>0.23"
Tc=6.0 min CN=54 Runoff=0.00 cfs 0.001 af

Subcatchment 7S: TO OFFSITE EAST Runoff Area=3,128 sf 6.59% Impervious Runoff Depth>0.15"
Tc=6.0 min CN=51 Runoff=0.00 cfs 0.001 af

Reach 4R: MAZZEO DRIVE Inflow=0.10 cfs 0.010 af
Outflow=0.10 cfs 0.010 af

Reach 5R: OFFSITE WEST Inflow=0.02 cfs 0.006 af
Outflow=0.02 cfs 0.006 af

Reach 6R: OFFSITE NORTH Inflow=0.00 cfs 0.001 af
Outflow=0.00 cfs 0.001 af

Reach 8R: OFFSITE EAST Inflow=0.00 cfs 0.001 af
Outflow=0.00 cfs 0.001 af

Total Runoff Area = 0.825 ac Runoff Volume = 0.018 af Average Runoff Depth = 0.26"
88.10% Pervious = 0.727 ac 11.90% Impervious = 0.098 ac

Summary for Subcatchment 1S: TO MAZZEO DRIVE

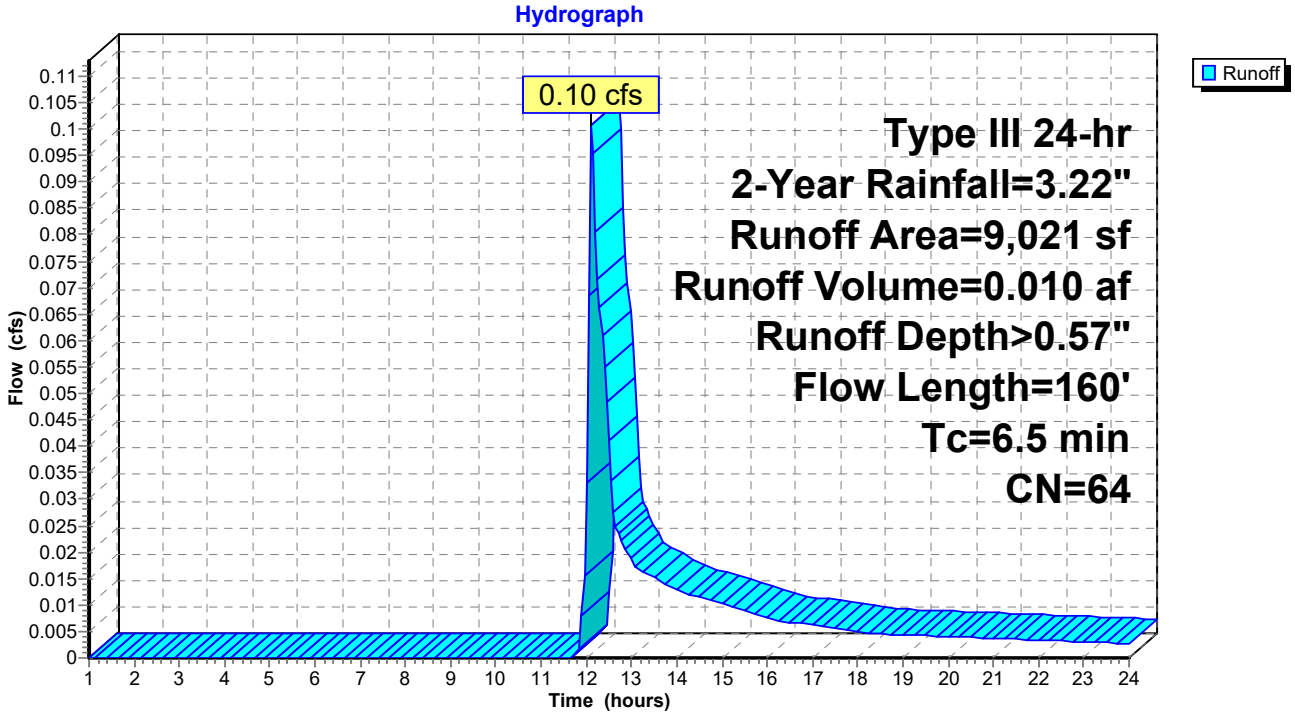
Runoff = 0.10 cfs @ 12.12 hrs, Volume= 0.010 af, Depth> 0.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
	6,221	48	Brush, Good, HSG B
*	2,800	98	Impervious
	9,021	64	Weighted Average
	6,221		68.96% Pervious Area
	2,800		31.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0640	0.16		**Sheet Flow, ab** Grass: Dense n= 0.240 P2= 3.22"
1.4	110	0.0664	1.29		**Shallow Concentrated Flow, bc** Woodland Kv= 5.0 fps
6.5	160	Total			

Subcatchment 1S: TO MAZZEO DRIVE



Summary for Subcatchment 2S: TO OFFSITE WEST

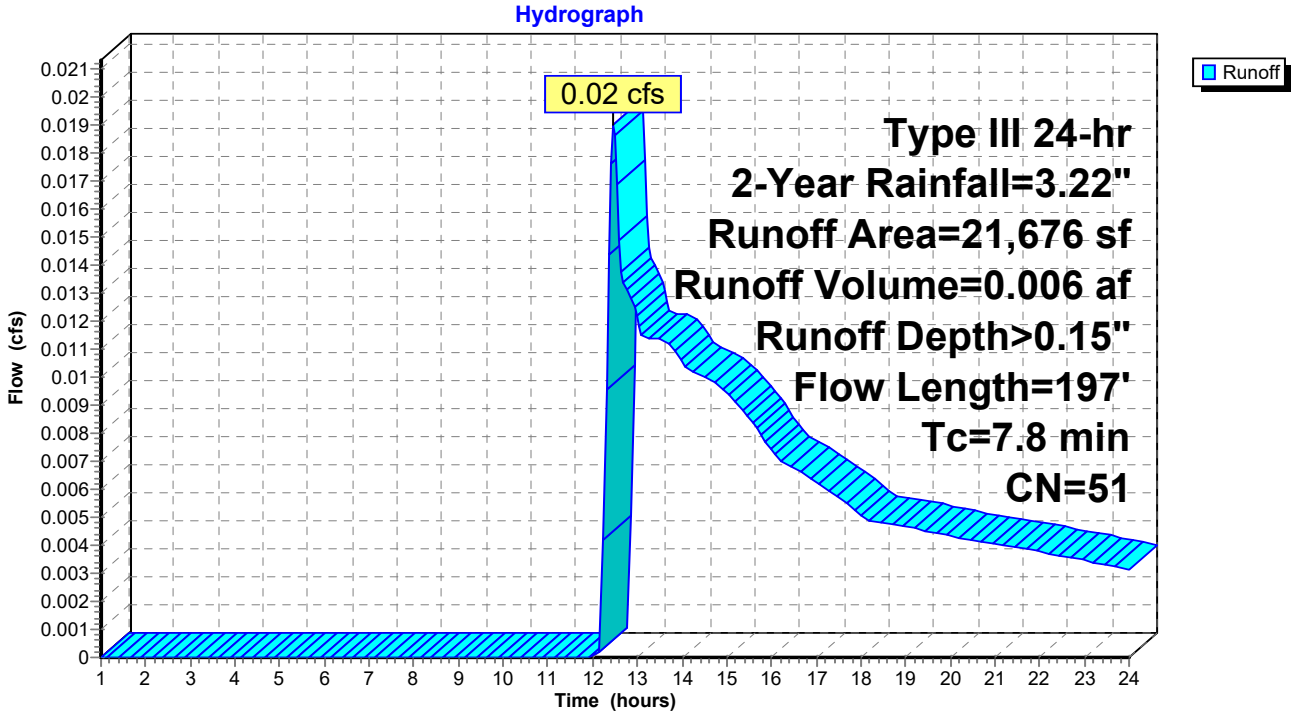
Runoff = 0.02 cfs @ 12.46 hrs, Volume= 0.006 af, Depth> 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
	83	96	Gravel surface, HSG B
	20,564	48	Brush, Good, HSG B
*	1,029	98	Impervious
	21,676	51	Weighted Average
	20,647		95.25% Pervious Area
	1,029		4.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.0480	0.14		**Sheet Flow, ab** Grass: Dense n= 0.240 P2= 3.22"
2.0	147	0.0598	1.22		**Shallow Concentrated Flow, bc** Woodland Kv= 5.0 fps
7.8	197	Total			

Subcatchment 2S: TO OFFSITE WEST



Summary for Subcatchment 3S: TO OFFSITE NORTH

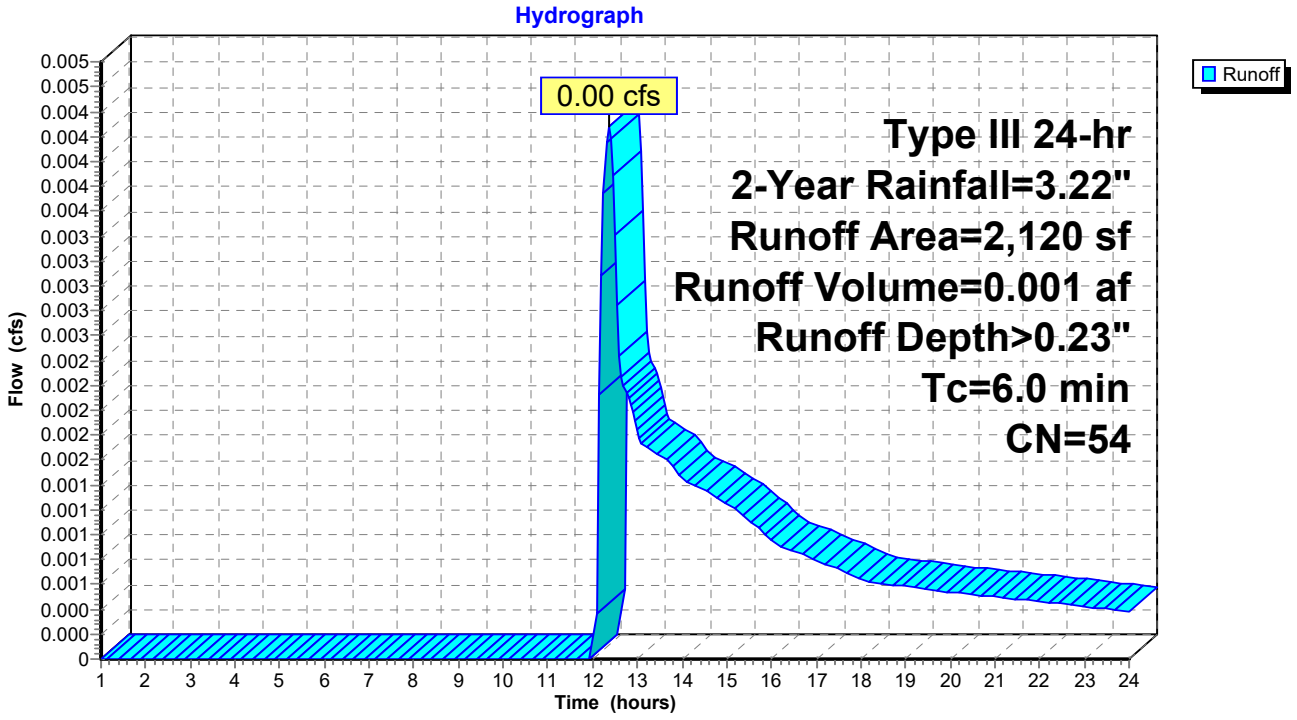
Runoff = 0.00 cfs @ 12.35 hrs, Volume= 0.001 af, Depth> 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
	27	96	Gravel surface, HSG B
	1,849	48	Brush, Good, HSG B
*	244	98	Impervious
	2,120	54	Weighted Average
	1,876		88.49% Pervious Area
	244		11.51% Impervious Area

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

Subcatchment 3S: TO OFFSITE NORTH



Summary for Subcatchment 7S: TO OFFSITE EAST

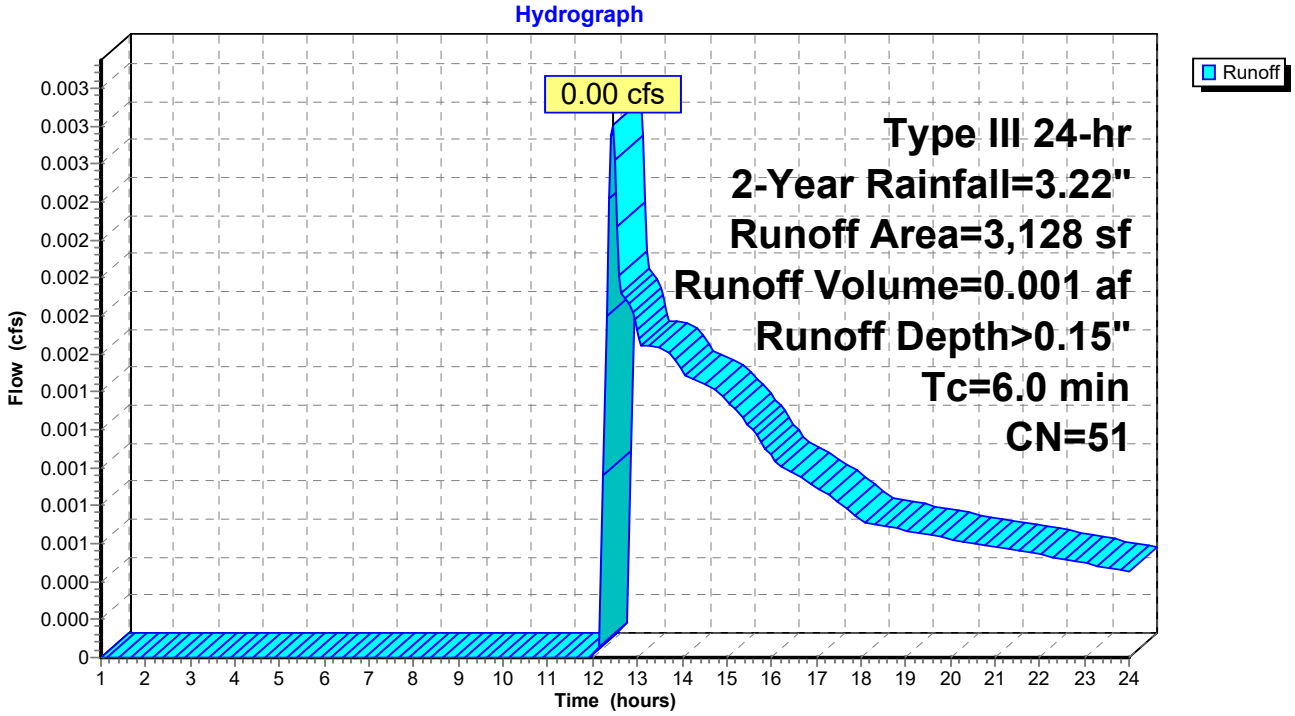
Runoff = 0.00 cfs @ 12.44 hrs, Volume= 0.001 af, Depth> 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
	2,922	48	Brush, Good, HSG B
*	206	98	Impervious
	3,128	51	Weighted Average
	2,922		93.41% Pervious Area
	206		6.59% Impervious Area

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

Subcatchment 7S: TO OFFSITE EAST

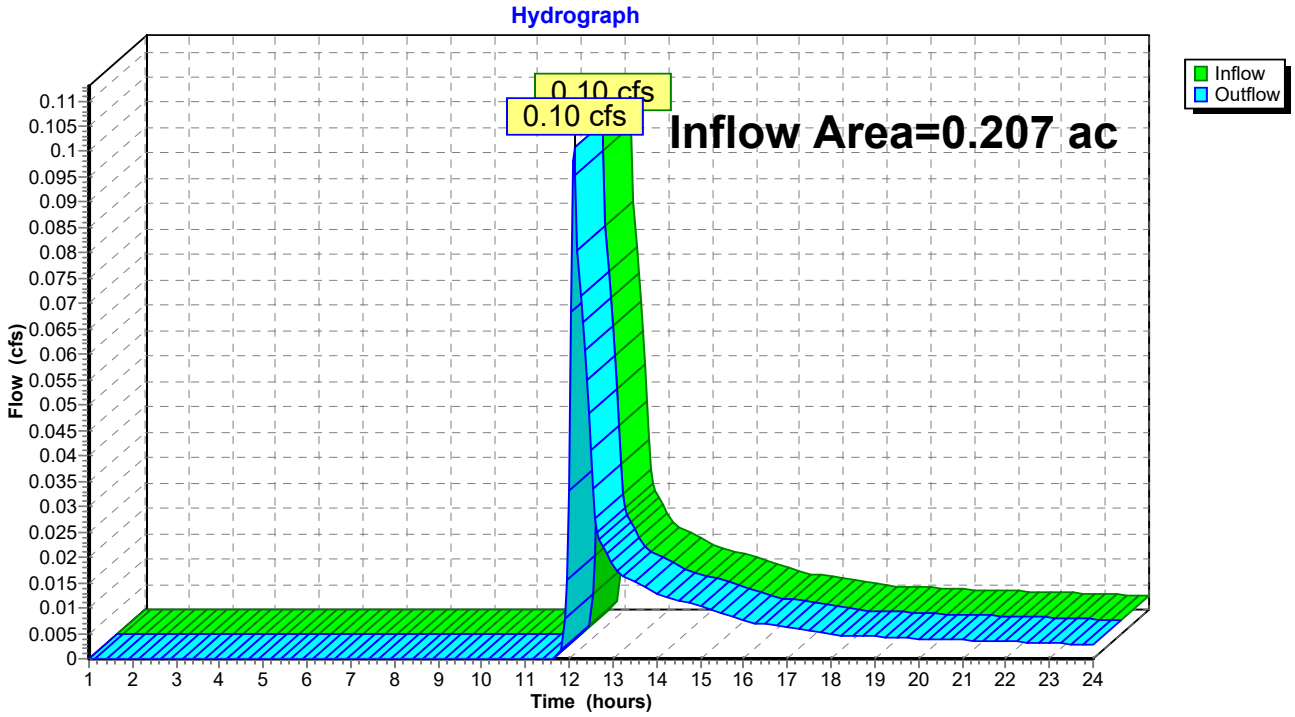


Summary for Reach 4R: MAZZEO DRIVE

Inflow Area = 0.207 ac, 31.04% Impervious, Inflow Depth > 0.57" for 2-Year event
Inflow = 0.10 cfs @ 12.12 hrs, Volume= 0.010 af
Outflow = 0.10 cfs @ 12.12 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 4R: MAZZEO DRIVE

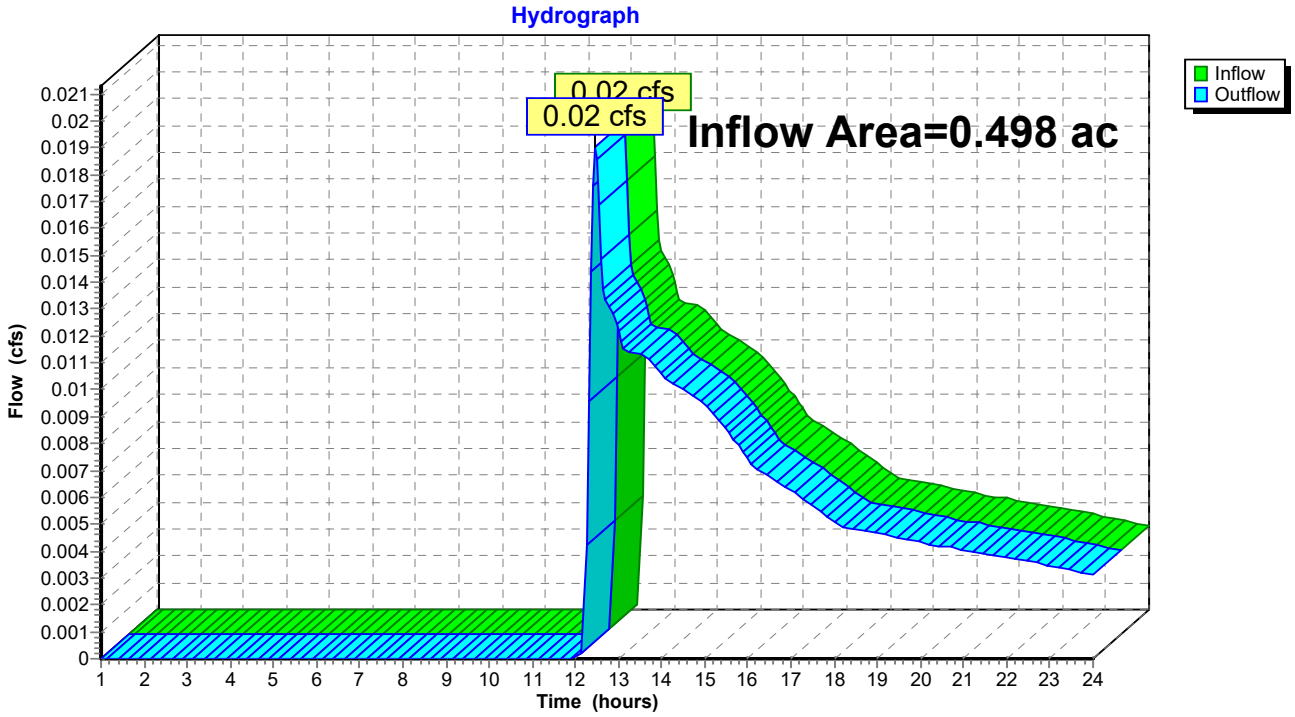


Summary for Reach 5R: OFFSITE WEST

Inflow Area = 0.498 ac, 4.75% Impervious, Inflow Depth > 0.15" for 2-Year event
Inflow = 0.02 cfs @ 12.46 hrs, Volume= 0.006 af
Outflow = 0.02 cfs @ 12.46 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 5R: OFFSITE WEST

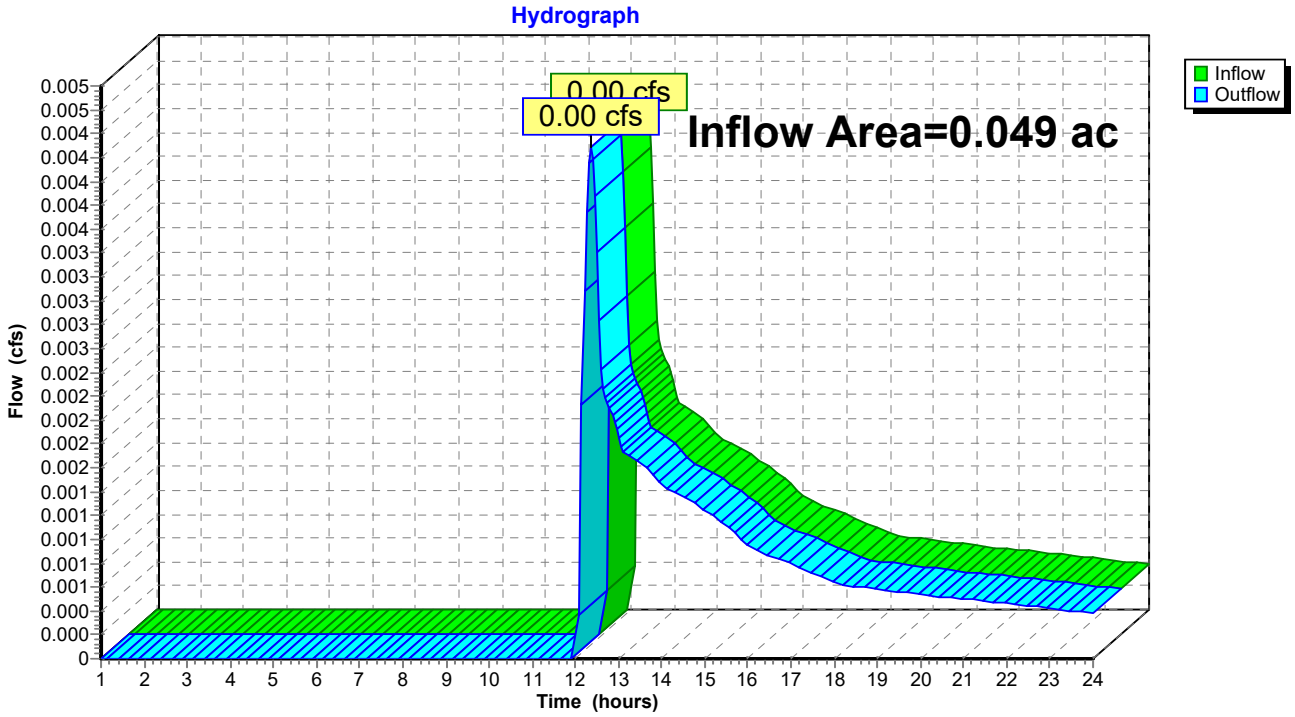


Summary for Reach 6R: OFFSITE NORTH

Inflow Area = 0.049 ac, 11.51% Impervious, Inflow Depth > 0.23" for 2-Year event
Inflow = 0.00 cfs @ 12.35 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 12.35 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 6R: OFFSITE NORTH

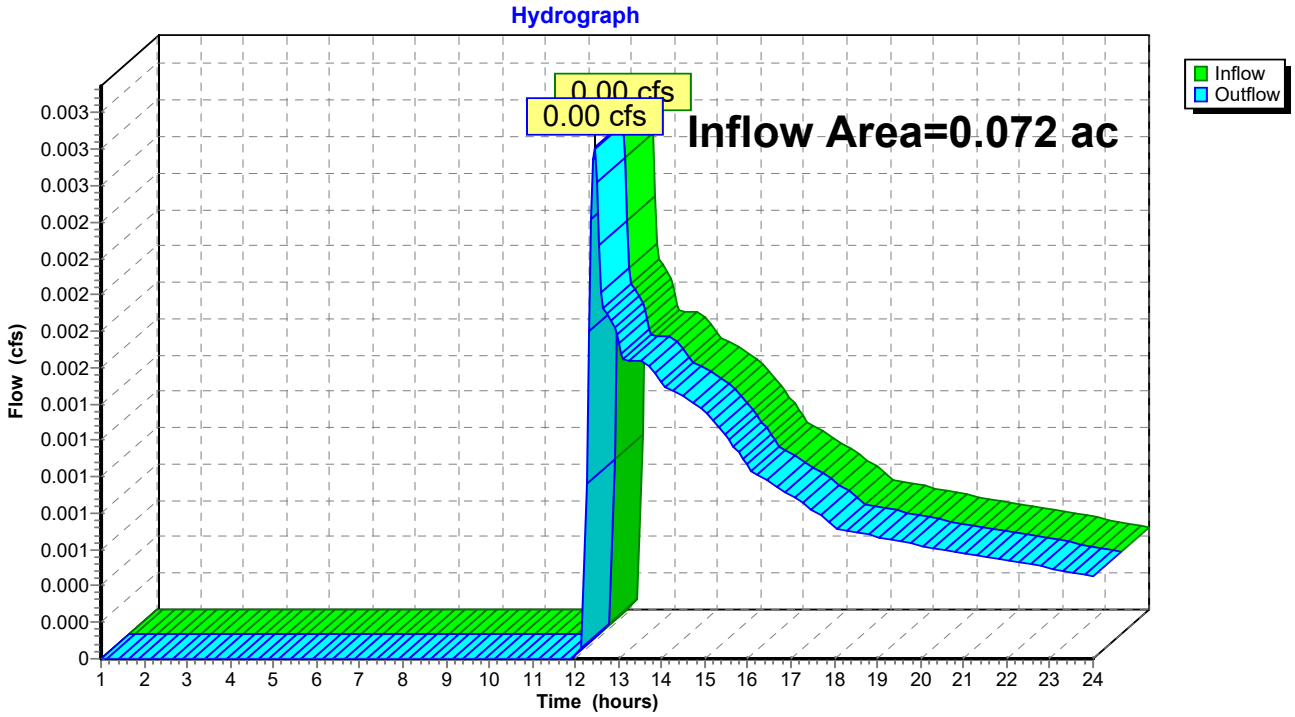


Summary for Reach 8R: OFFSITE EAST

Inflow Area = 0.072 ac, 6.59% Impervious, Inflow Depth > 0.15" for 2-Year event
Inflow = 0.00 cfs @ 12.44 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 12.44 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 8R: OFFSITE EAST



Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 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 1S: TO MAZZEO DRIVE Runoff Area=9,021 sf 31.04% Impervious Runoff Depth>1.49"
Flow Length=160' Tc=6.5 min CN=64 Runoff=0.33 cfs 0.026 af

Subcatchment 2S: TO OFFSITE WEST Runoff Area=21,676 sf 4.75% Impervious Runoff Depth>0.69"
Flow Length=197' Tc=7.8 min CN=51 Runoff=0.24 cfs 0.028 af

Subcatchment 3S: TO OFFSITE NORTH Runoff Area=2,120 sf 11.51% Impervious Runoff Depth>0.85"
Tc=6.0 min CN=54 Runoff=0.04 cfs 0.003 af

Subcatchment 7S: TO OFFSITE EAST Runoff Area=3,128 sf 6.59% Impervious Runoff Depth>0.69"
Tc=6.0 min CN=51 Runoff=0.04 cfs 0.004 af

Reach 4R: MAZZEO DRIVE Inflow=0.33 cfs 0.026 af
Outflow=0.33 cfs 0.026 af

Reach 5R: OFFSITE WEST Inflow=0.24 cfs 0.028 af
Outflow=0.24 cfs 0.028 af

Reach 6R: OFFSITE NORTH Inflow=0.04 cfs 0.003 af
Outflow=0.04 cfs 0.003 af

Reach 8R: OFFSITE EAST Inflow=0.04 cfs 0.004 af
Outflow=0.04 cfs 0.004 af

Total Runoff Area = 0.825 ac Runoff Volume = 0.062 af Average Runoff Depth = 0.90"
88.10% Pervious = 0.727 ac 11.90% Impervious = 0.098 ac

Summary for Subcatchment 1S: TO MAZZEO DRIVE

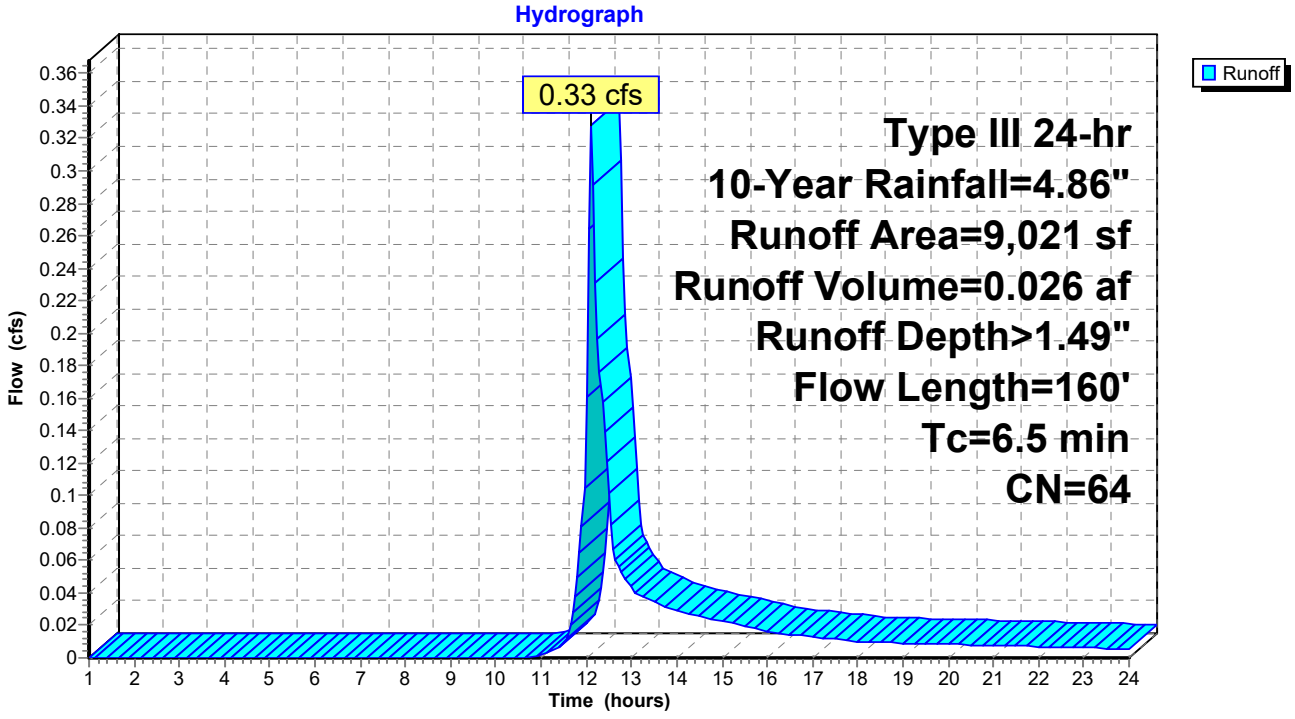
Runoff = 0.33 cfs @ 12.11 hrs, Volume= 0.026 af, Depth> 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
	6,221	48	Brush, Good, HSG B
*	2,800	98	Impervious
	9,021	64	Weighted Average
	6,221		68.96% Pervious Area
	2,800		31.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0640	0.16		**Sheet Flow, ab** Grass: Dense n= 0.240 P2= 3.22"
1.4	110	0.0664	1.29		**Shallow Concentrated Flow, bc** Woodland Kv= 5.0 fps
6.5	160	Total			

Subcatchment 1S: TO MAZZEO DRIVE



Summary for Subcatchment 2S: TO OFFSITE WEST

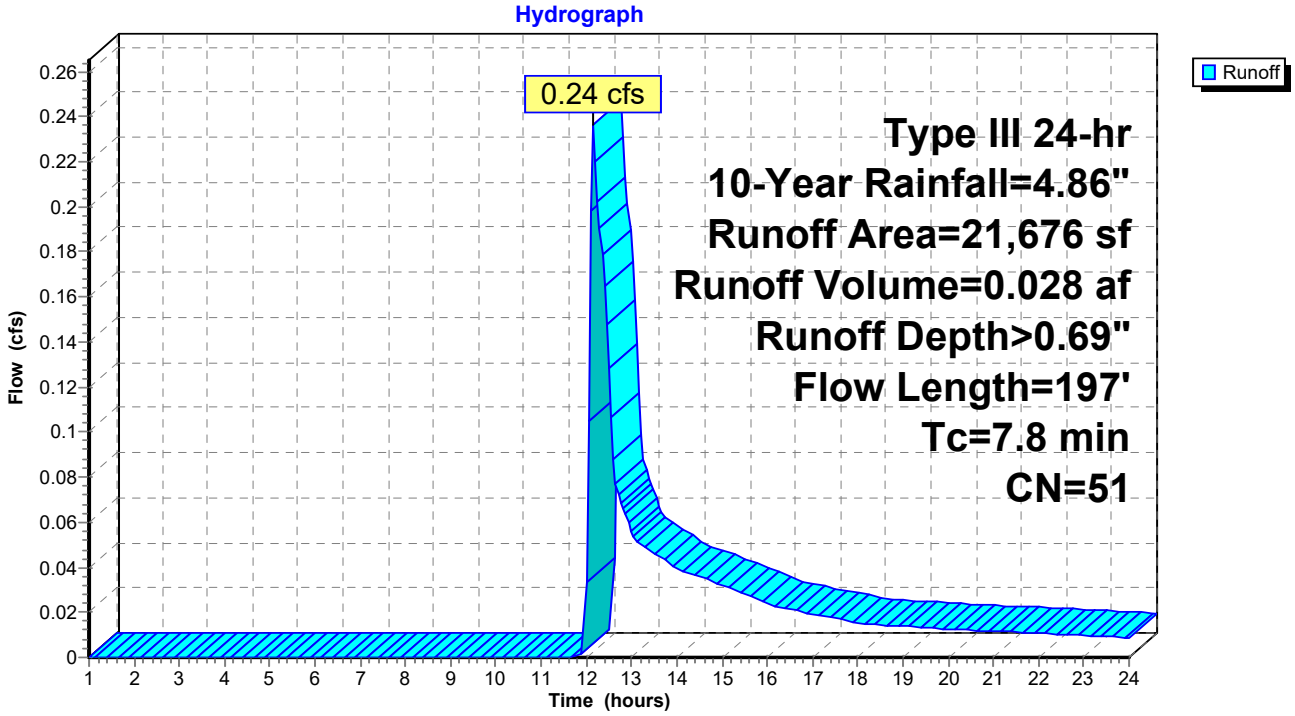
Runoff = 0.24 cfs @ 12.16 hrs, Volume= 0.028 af, Depth> 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
	83	96	Gravel surface, HSG B
	20,564	48	Brush, Good, HSG B
*	1,029	98	Impervious
	21,676	51	Weighted Average
	20,647		95.25% Pervious Area
	1,029		4.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.0480	0.14		**Sheet Flow, ab** Grass: Dense n= 0.240 P2= 3.22"
2.0	147	0.0598	1.22		**Shallow Concentrated Flow, bc** Woodland Kv= 5.0 fps
7.8	197	Total			

Subcatchment 2S: TO OFFSITE WEST



Summary for Subcatchment 3S: TO OFFSITE NORTH

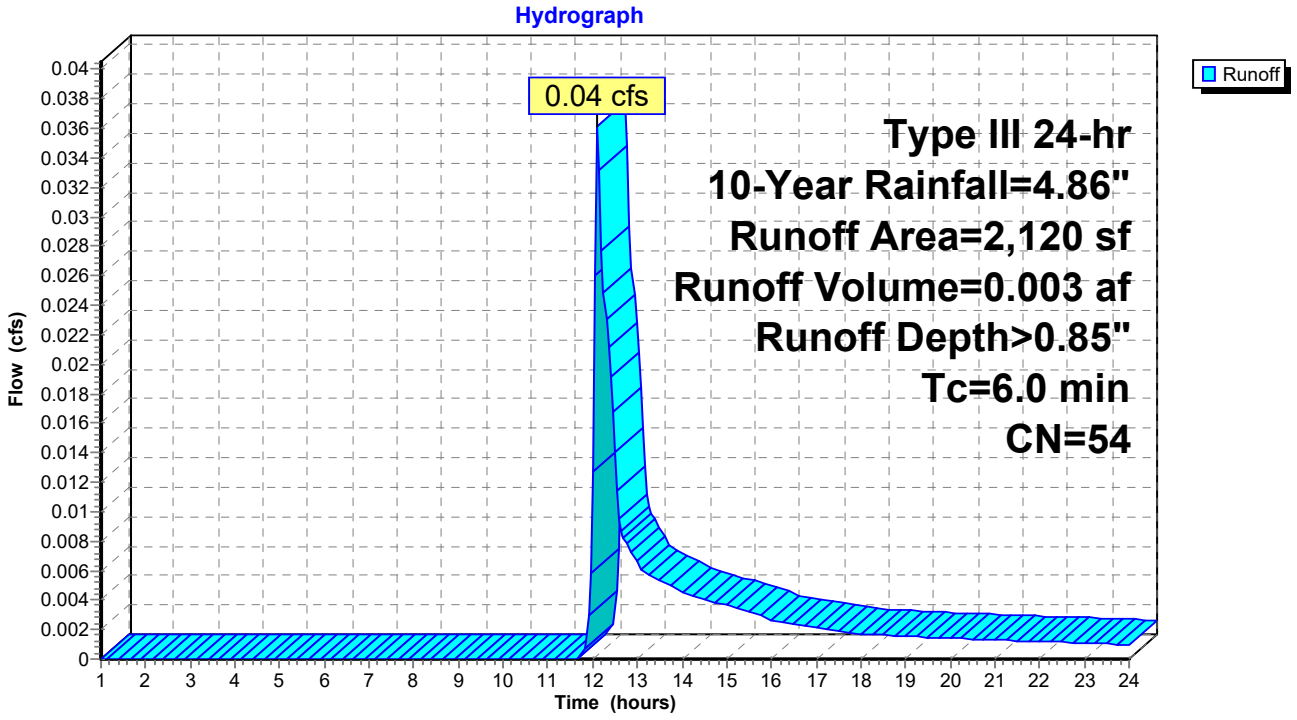
Runoff = 0.04 cfs @ 12.11 hrs, Volume= 0.003 af, Depth> 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
	27	96	Gravel surface, HSG B
	1,849	48	Brush, Good, HSG B
*	244	98	Impervious
	2,120	54	Weighted Average
	1,876		88.49% Pervious Area
	244		11.51% Impervious Area

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

Subcatchment 3S: TO OFFSITE NORTH



Summary for Subcatchment 7S: TO OFFSITE EAST

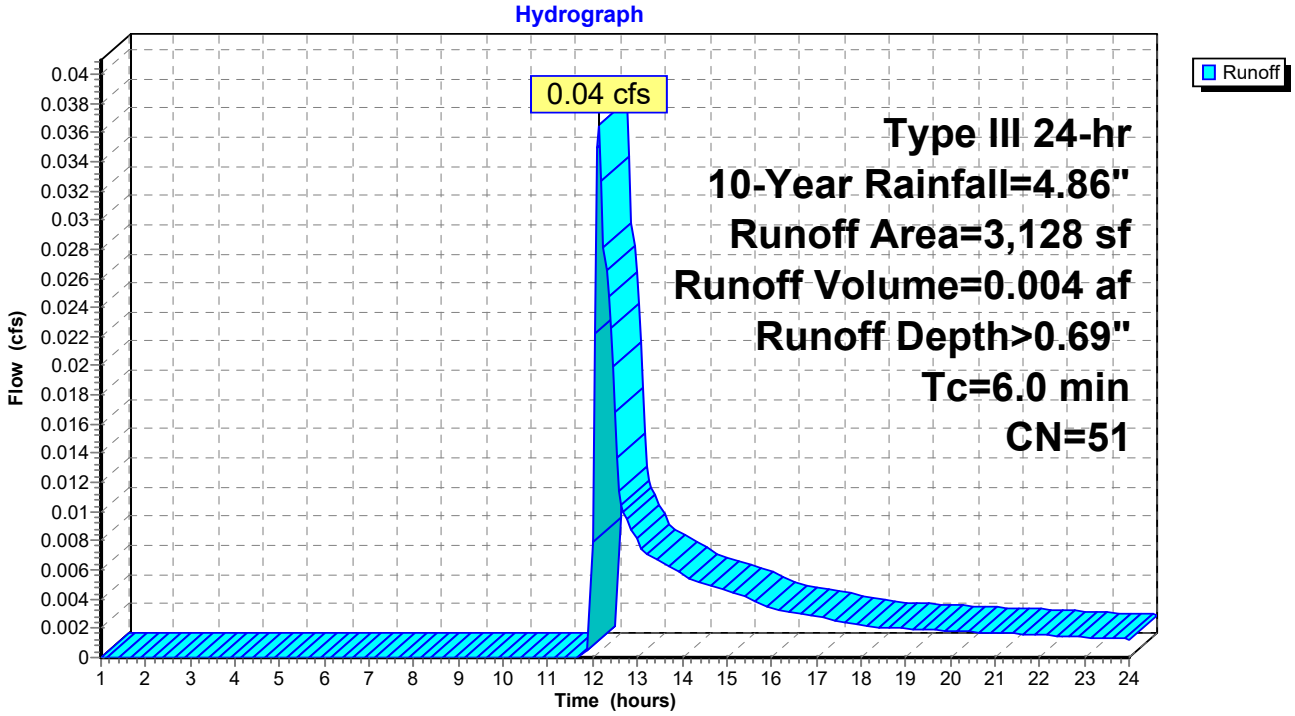
Runoff = 0.04 cfs @ 12.12 hrs, Volume= 0.004 af, Depth> 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
	2,922	48	Brush, Good, HSG B
*	206	98	Impervious
	3,128	51	Weighted Average
	2,922		93.41% Pervious Area
	206		6.59% Impervious Area

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

Subcatchment 7S: TO OFFSITE EAST

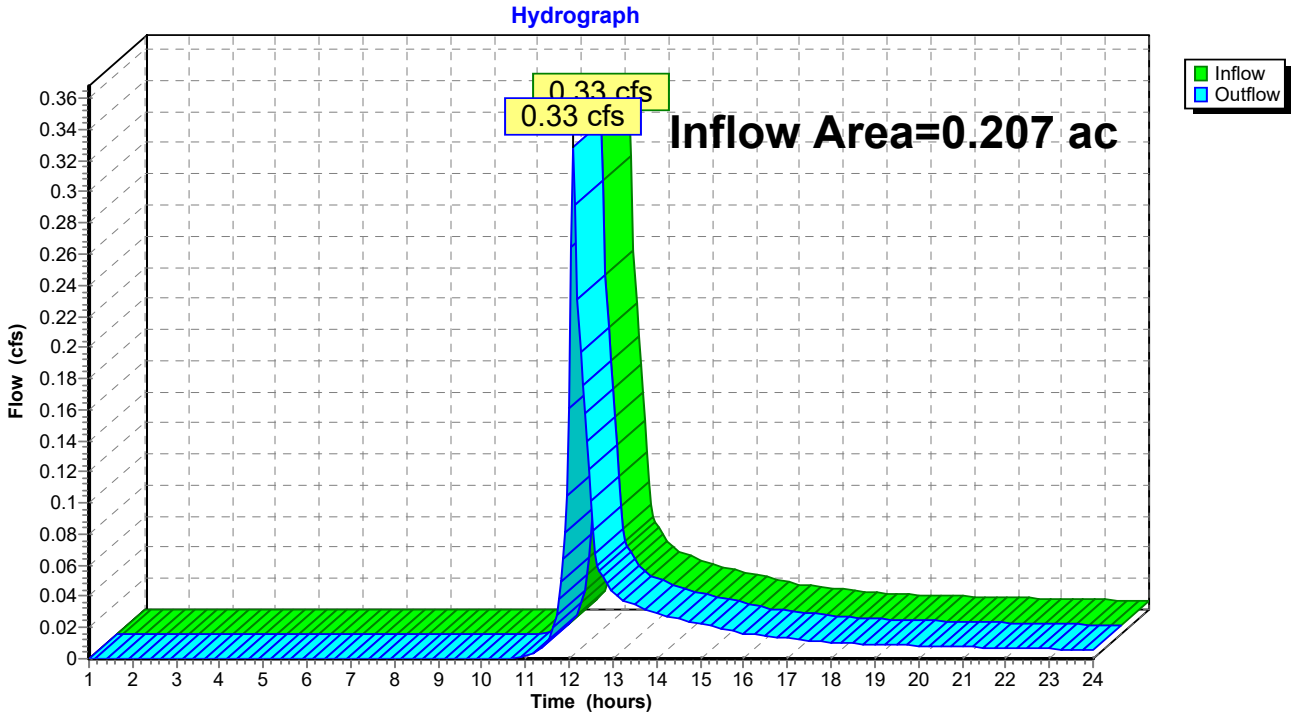


Summary for Reach 4R: MAZZEO DRIVE

Inflow Area = 0.207 ac, 31.04% Impervious, Inflow Depth > 1.49" for 10-Year event
Inflow = 0.33 cfs @ 12.11 hrs, Volume= 0.026 af
Outflow = 0.33 cfs @ 12.11 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 4R: MAZZEO DRIVE

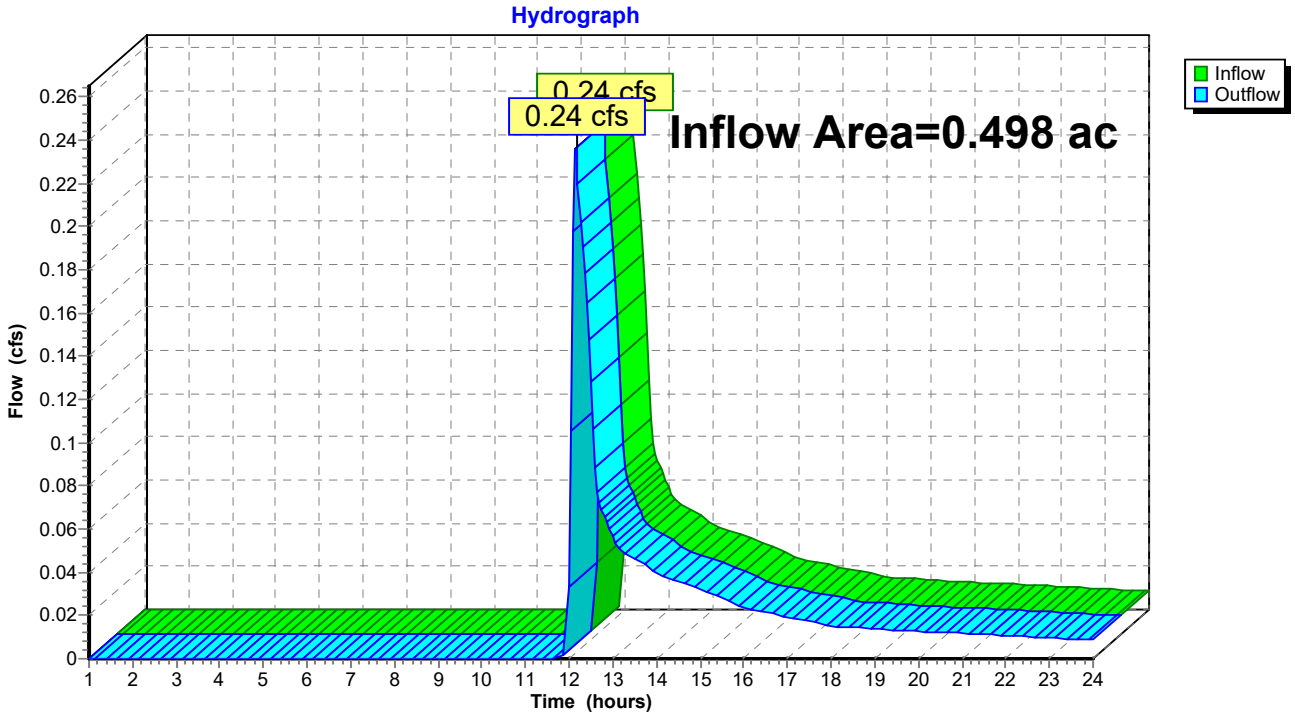


Summary for Reach 5R: OFFSITE WEST

Inflow Area = 0.498 ac, 4.75% Impervious, Inflow Depth > 0.69" for 10-Year event
Inflow = 0.24 cfs @ 12.16 hrs, Volume= 0.028 af
Outflow = 0.24 cfs @ 12.16 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 5R: OFFSITE WEST

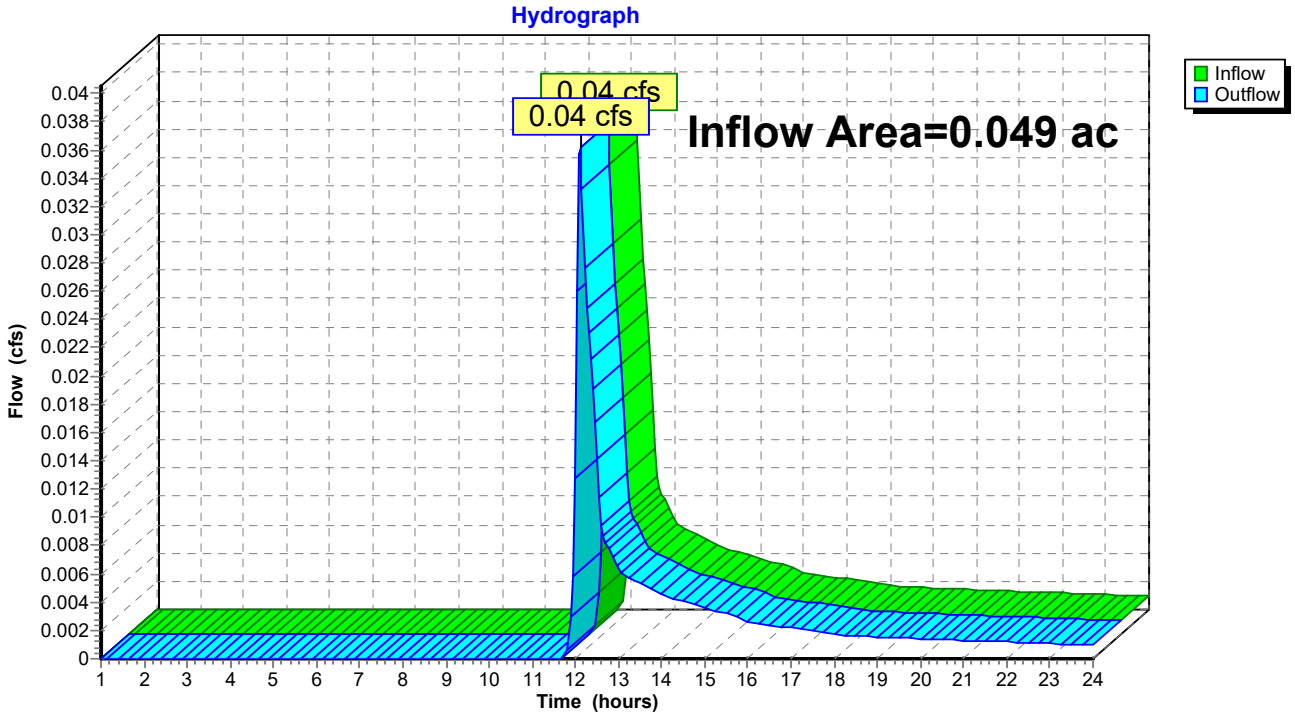


Summary for Reach 6R: OFFSITE NORTH

Inflow Area = 0.049 ac, 11.51% Impervious, Inflow Depth > 0.85" for 10-Year event
Inflow = 0.04 cfs @ 12.11 hrs, Volume= 0.003 af
Outflow = 0.04 cfs @ 12.11 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 6R: OFFSITE NORTH

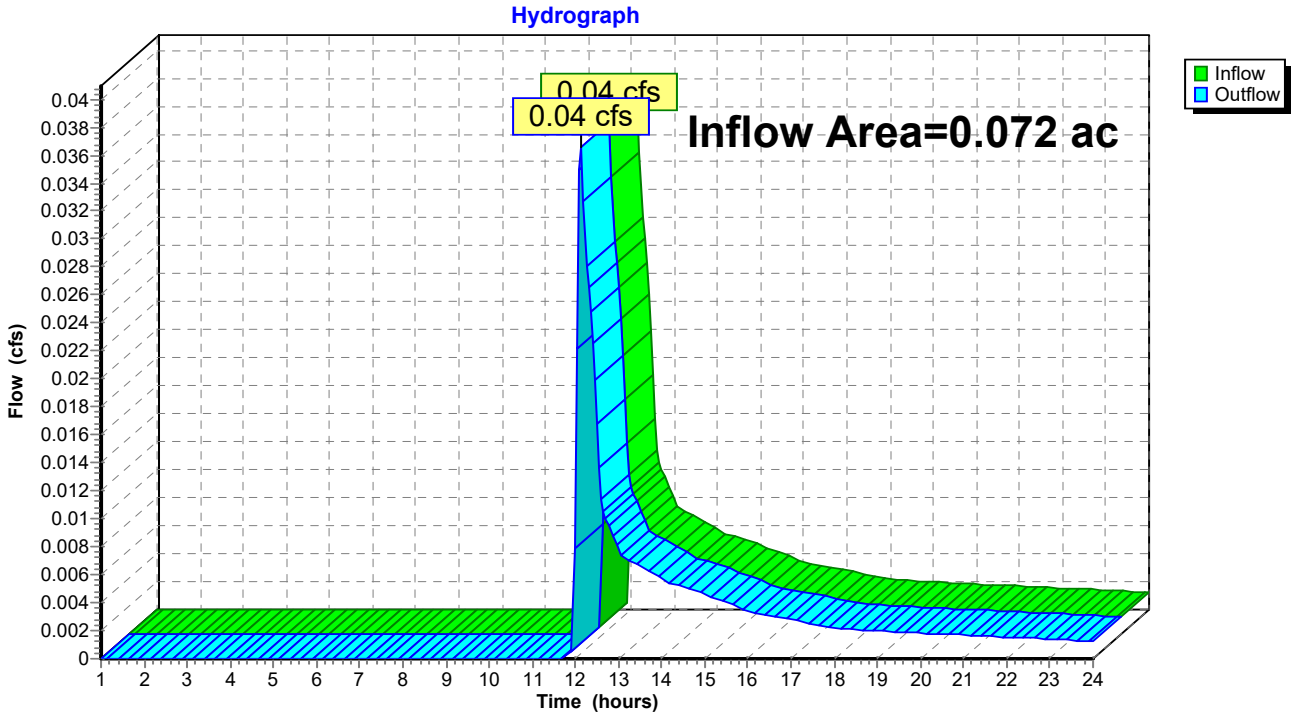


Summary for Reach 8R: OFFSITE EAST

Inflow Area = 0.072 ac, 6.59% Impervious, Inflow Depth > 0.69" for 10-Year event
Inflow = 0.04 cfs @ 12.12 hrs, Volume= 0.004 af
Outflow = 0.04 cfs @ 12.12 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 8R: OFFSITE EAST



Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 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 1S: TO MAZZEO DRIVE Runoff Area=9,021 sf 31.04% Impervious Runoff Depth>2.37"
Flow Length=160' Tc=6.5 min CN=64 Runoff=0.54 cfs 0.041 af

Subcatchment 2S: TO OFFSITE WEST Runoff Area=21,676 sf 4.75% Impervious Runoff Depth>1.29"
Flow Length=197' Tc=7.8 min CN=51 Runoff=0.57 cfs 0.053 af

Subcatchment 3S: TO OFFSITE NORTH Runoff Area=2,120 sf 11.51% Impervious Runoff Depth>1.52"
Tc=6.0 min CN=54 Runoff=0.08 cfs 0.006 af

Subcatchment 7S: TO OFFSITE EAST Runoff Area=3,128 sf 6.59% Impervious Runoff Depth>1.29"
Tc=6.0 min CN=51 Runoff=0.09 cfs 0.008 af

Reach 4R: MAZZEO DRIVE Inflow=0.54 cfs 0.041 af
Outflow=0.54 cfs 0.041 af

Reach 5R: OFFSITE WEST Inflow=0.57 cfs 0.053 af
Outflow=0.57 cfs 0.053 af

Reach 6R: OFFSITE NORTH Inflow=0.08 cfs 0.006 af
Outflow=0.08 cfs 0.006 af

Reach 8R: OFFSITE EAST Inflow=0.09 cfs 0.008 af
Outflow=0.09 cfs 0.008 af

Total Runoff Area = 0.825 ac Runoff Volume = 0.108 af Average Runoff Depth = 1.57"
88.10% Pervious = 0.727 ac 11.90% Impervious = 0.098 ac

Summary for Subcatchment 1S: TO MAZZEO DRIVE

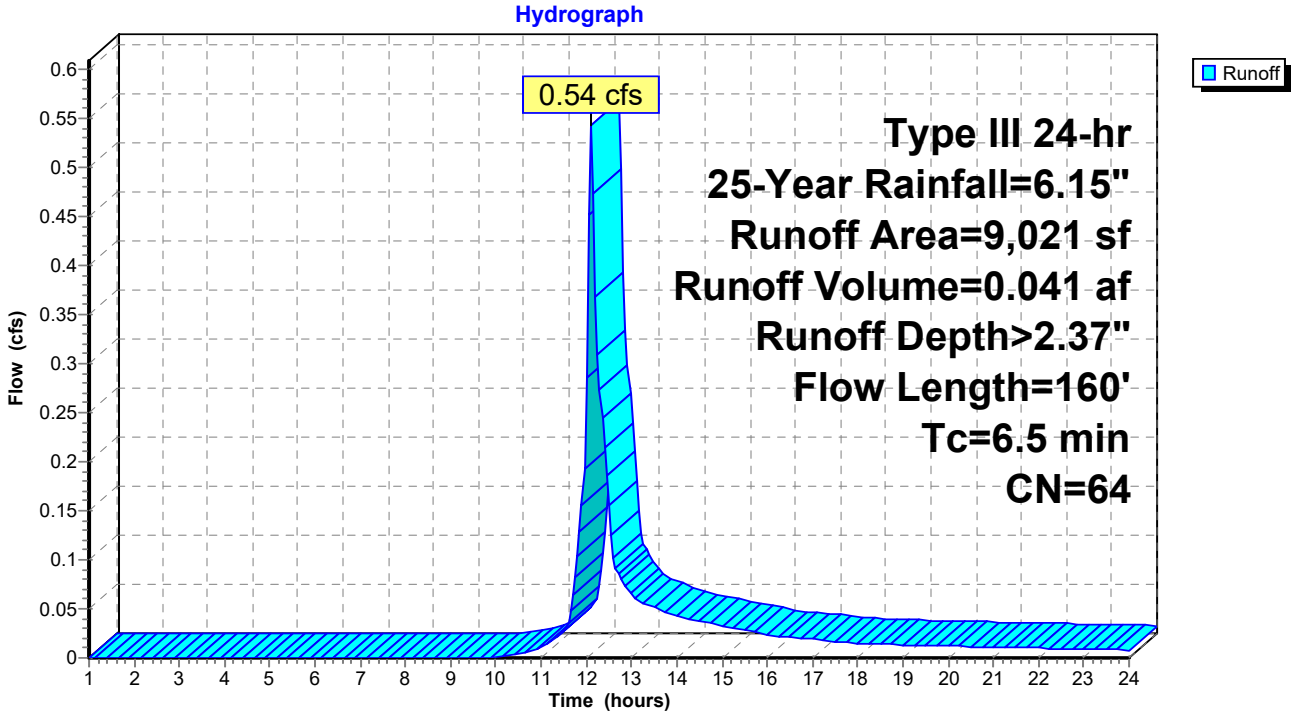
Runoff = 0.54 cfs @ 12.10 hrs, Volume= 0.041 af, Depth> 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
	6,221	48	Brush, Good, HSG B
*	2,800	98	Impervious
	9,021	64	Weighted Average
	6,221		68.96% Pervious Area
	2,800		31.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0640	0.16		**Sheet Flow, ab** Grass: Dense n= 0.240 P2= 3.22"
1.4	110	0.0664	1.29		**Shallow Concentrated Flow, bc** Woodland Kv= 5.0 fps
6.5	160	Total			

Subcatchment 1S: TO MAZZEO DRIVE



Summary for Subcatchment 2S: TO OFFSITE WEST

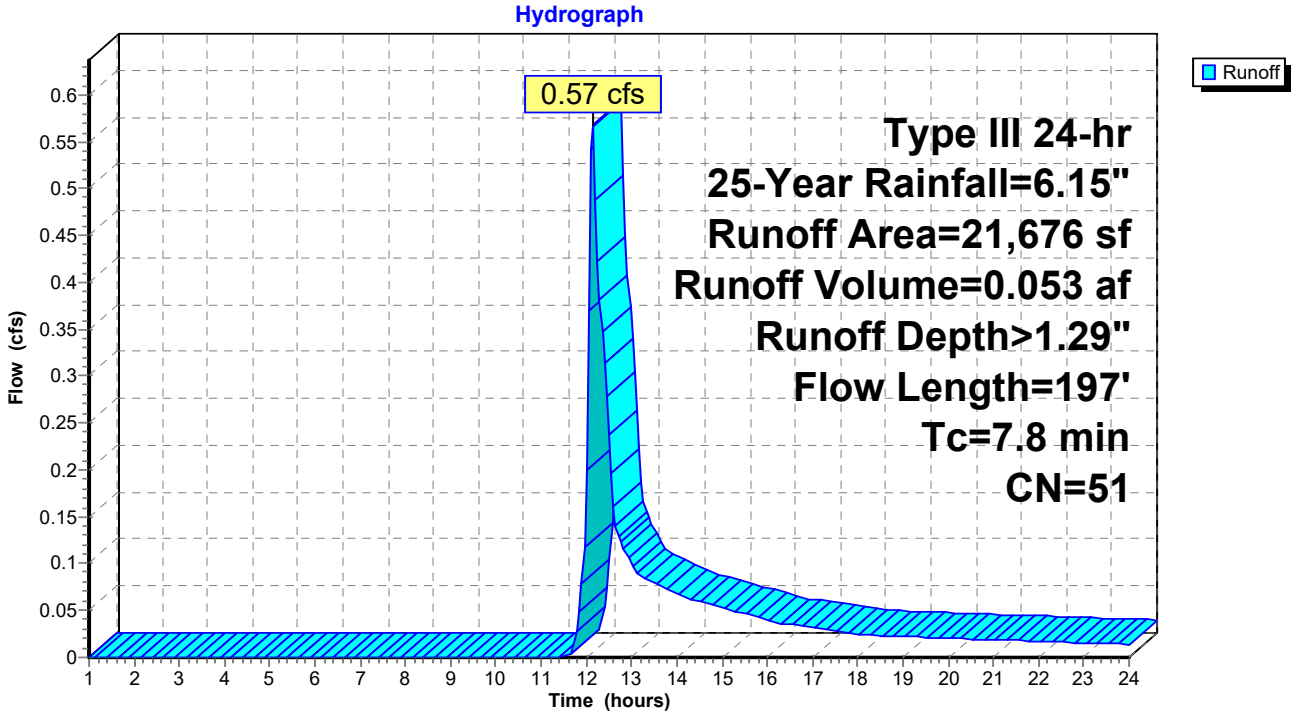
Runoff = 0.57 cfs @ 12.14 hrs, Volume= 0.053 af, Depth> 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
	83	96	Gravel surface, HSG B
	20,564	48	Brush, Good, HSG B
*	1,029	98	Impervious
	21,676	51	Weighted Average
	20,647		95.25% Pervious Area
	1,029		4.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.0480	0.14		**Sheet Flow, ab** Grass: Dense n= 0.240 P2= 3.22"
2.0	147	0.0598	1.22		**Shallow Concentrated Flow, bc** Woodland Kv= 5.0 fps
7.8	197	Total			

Subcatchment 2S: TO OFFSITE WEST



Summary for Subcatchment 3S: TO OFFSITE NORTH

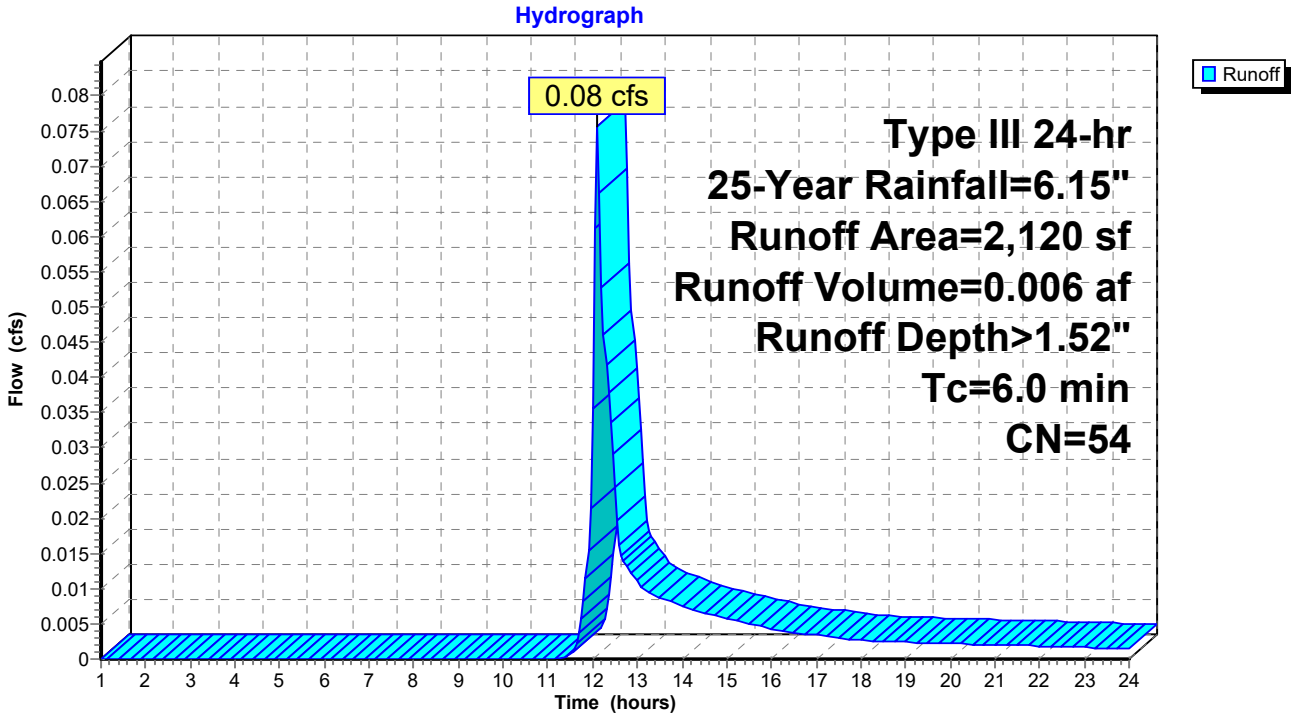
Runoff = 0.08 cfs @ 12.11 hrs, Volume= 0.006 af, Depth> 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
	27	96	Gravel surface, HSG B
	1,849	48	Brush, Good, HSG B
*	244	98	Impervious
	2,120	54	Weighted Average
	1,876		88.49% Pervious Area
	244		11.51% Impervious Area

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

Subcatchment 3S: TO OFFSITE NORTH



Summary for Subcatchment 7S: TO OFFSITE EAST

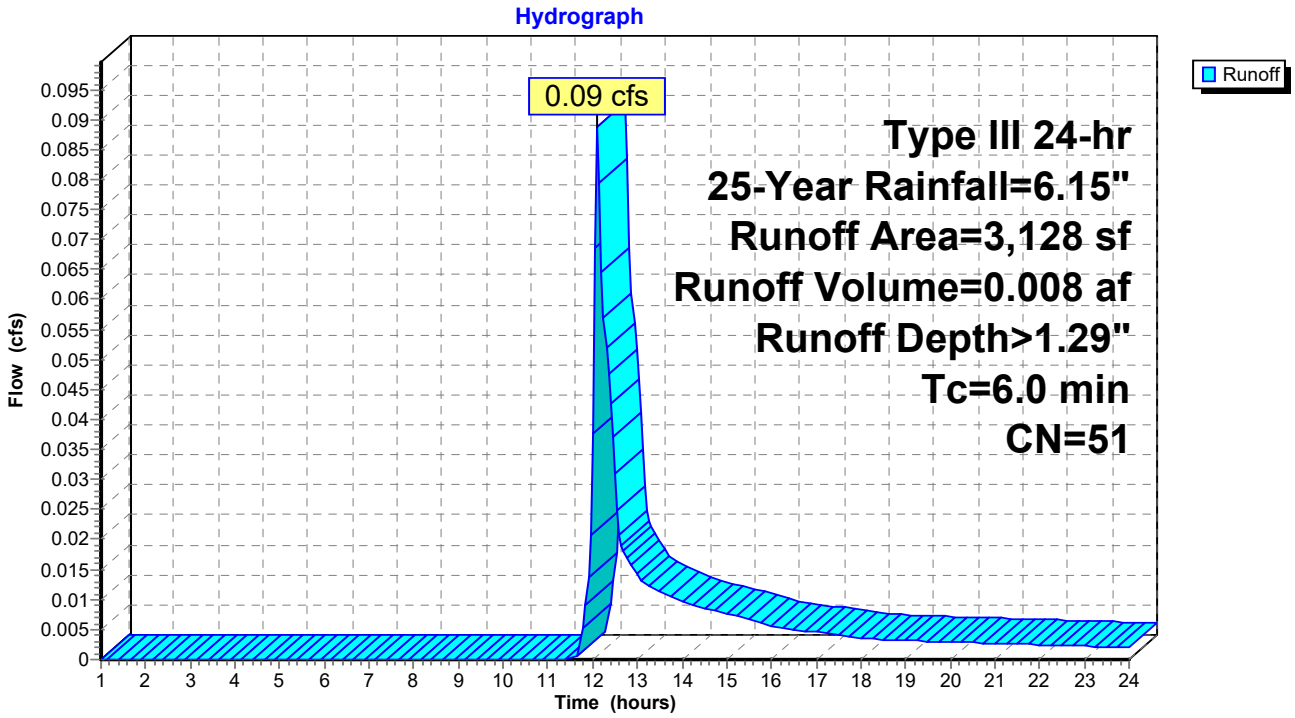
Runoff = 0.09 cfs @ 12.11 hrs, Volume= 0.008 af, Depth> 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
	2,922	48	Brush, Good, HSG B
*	206	98	Impervious
	3,128	51	Weighted Average
	2,922		93.41% Pervious Area
	206		6.59% Impervious Area

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

Subcatchment 7S: TO OFFSITE EAST

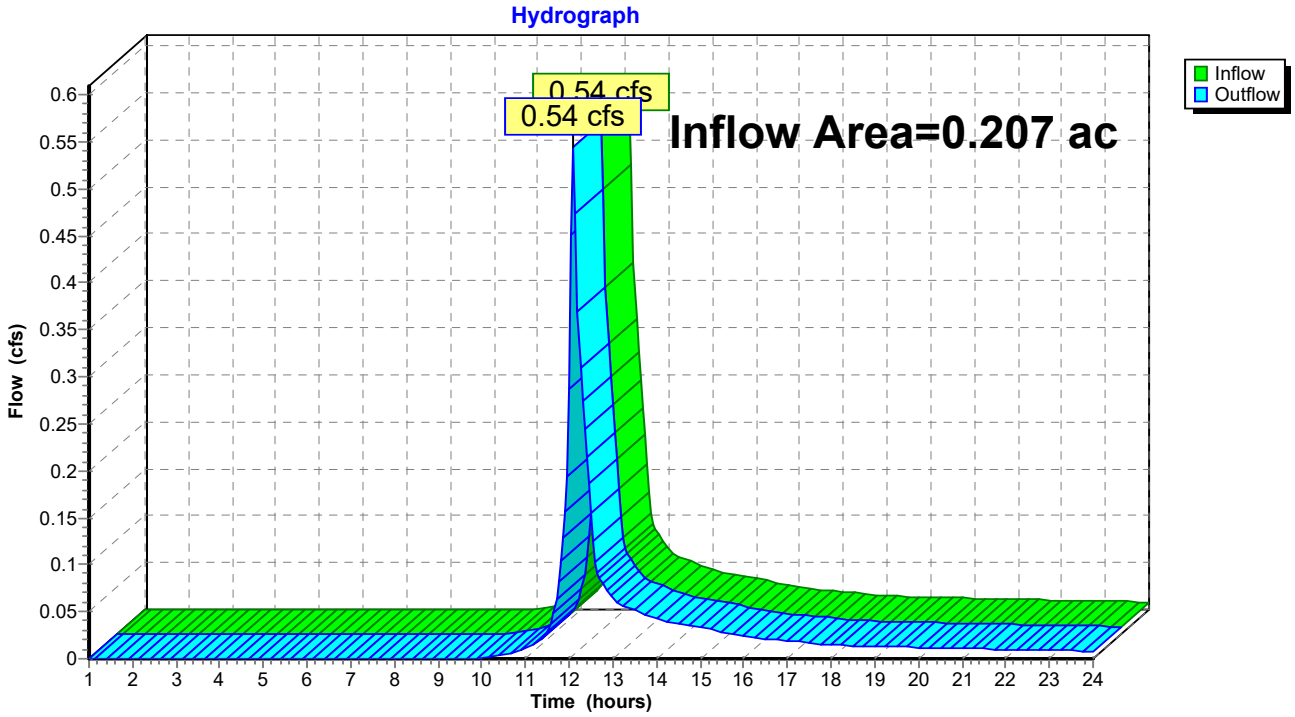


Summary for Reach 4R: MAZZEO DRIVE

Inflow Area = 0.207 ac, 31.04% Impervious, Inflow Depth > 2.37" for 25-Year event
Inflow = 0.54 cfs @ 12.10 hrs, Volume= 0.041 af
Outflow = 0.54 cfs @ 12.10 hrs, Volume= 0.041 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 4R: MAZZEO DRIVE

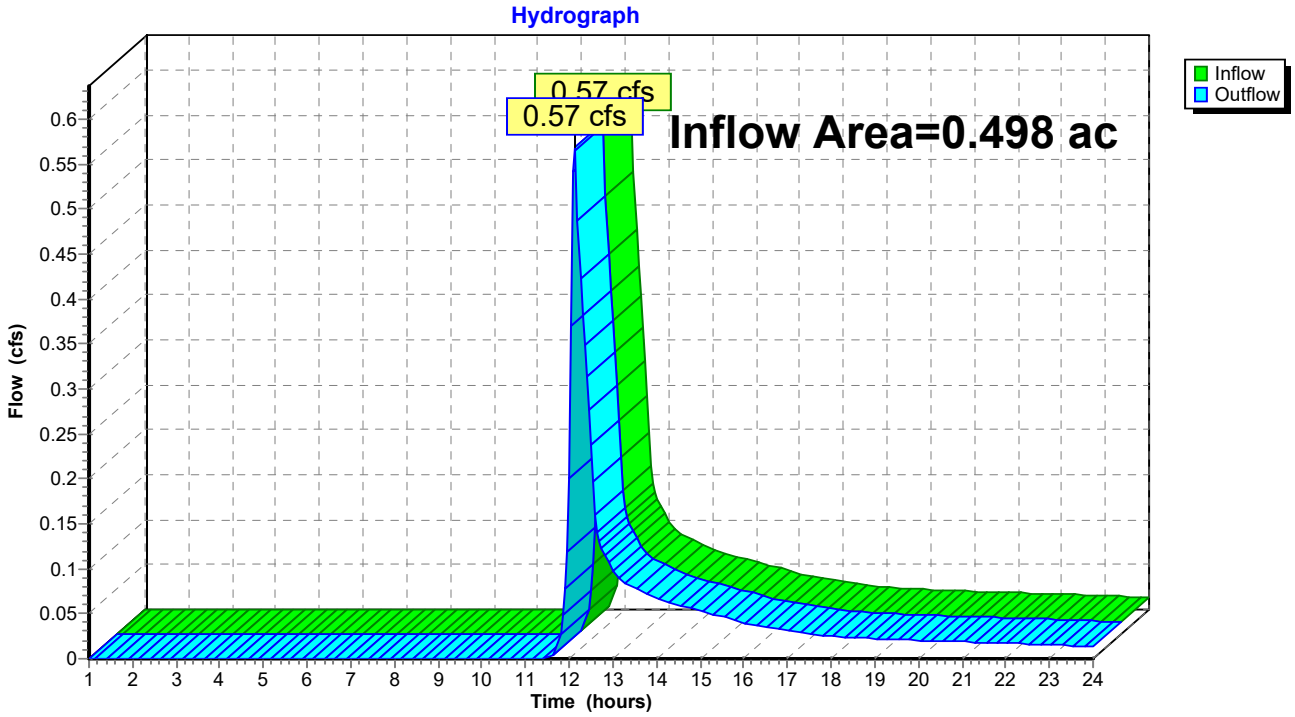


Summary for Reach 5R: OFFSITE WEST

Inflow Area = 0.498 ac, 4.75% Impervious, Inflow Depth > 1.29" for 25-Year event
Inflow = 0.57 cfs @ 12.14 hrs, Volume= 0.053 af
Outflow = 0.57 cfs @ 12.14 hrs, Volume= 0.053 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 5R: OFFSITE WEST

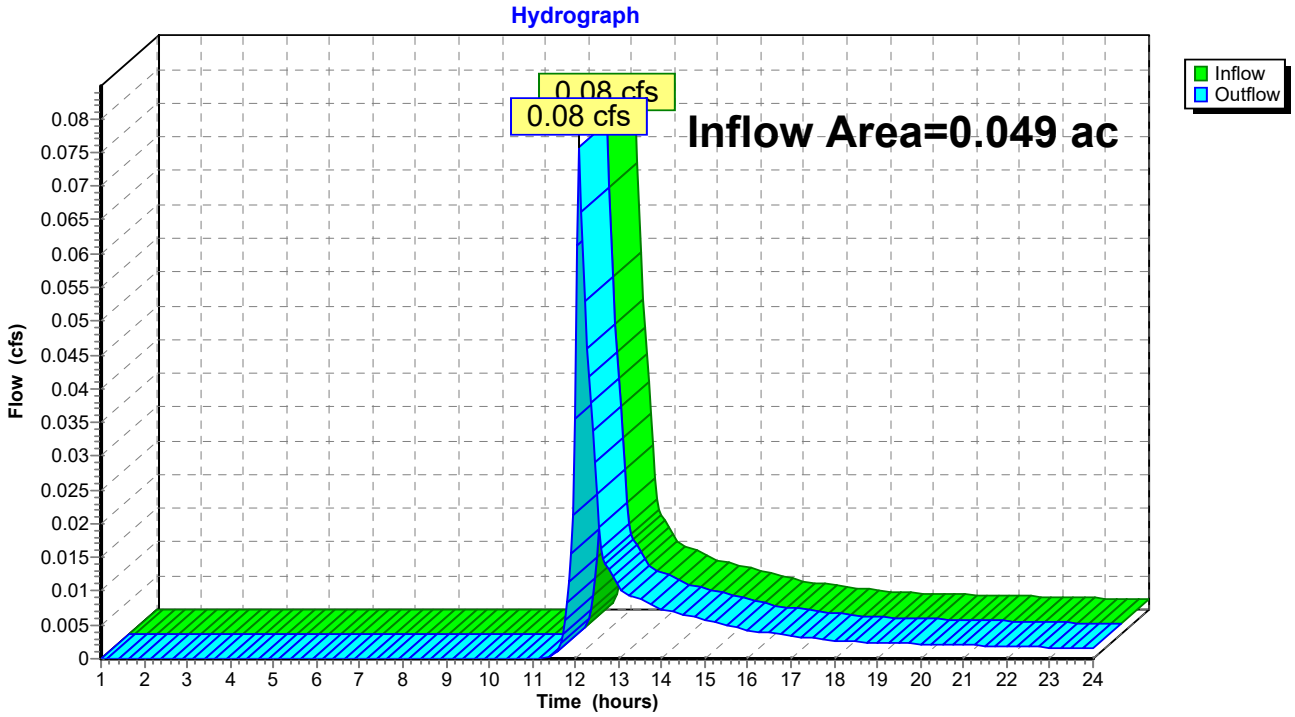


Summary for Reach 6R: OFFSITE NORTH

Inflow Area = 0.049 ac, 11.51% Impervious, Inflow Depth > 1.52" for 25-Year event
Inflow = 0.08 cfs @ 12.11 hrs, Volume= 0.006 af
Outflow = 0.08 cfs @ 12.11 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 6R: OFFSITE NORTH

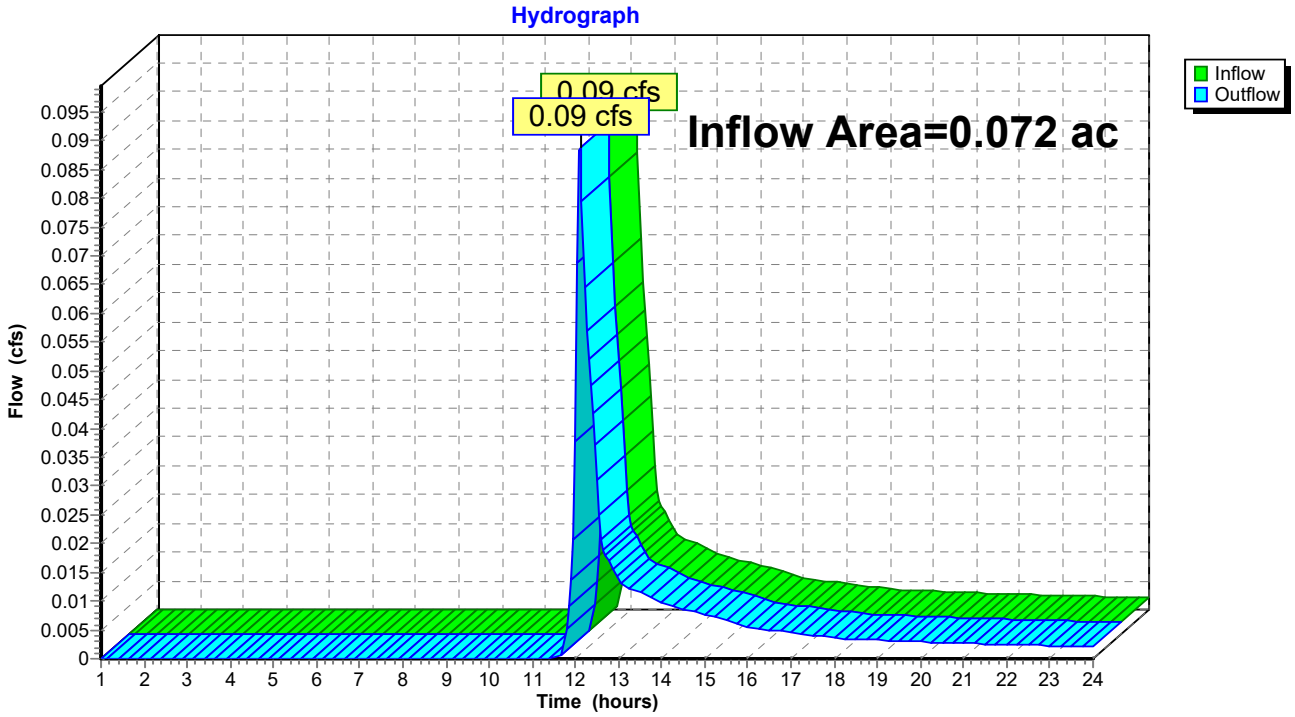


Summary for Reach 8R: OFFSITE EAST

Inflow Area = 0.072 ac, 6.59% Impervious, Inflow Depth > 1.29" for 25-Year event
Inflow = 0.09 cfs @ 12.11 hrs, Volume= 0.008 af
Outflow = 0.09 cfs @ 12.11 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 8R: OFFSITE EAST



Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 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 1S: TO MAZZEO DRIVE Runoff Area=9,021 sf 31.04% Impervious Runoff Depth>4.42"
Flow Length=160' Tc=6.5 min CN=64 Runoff=1.04 cfs 0.076 af

Subcatchment 2S: TO OFFSITE WEST Runoff Area=21,676 sf 4.75% Impervious Runoff Depth>2.87"
Flow Length=197' Tc=7.8 min CN=51 Runoff=1.47 cfs 0.119 af

Subcatchment 3S: TO OFFSITE NORTH Runoff Area=2,120 sf 11.51% Impervious Runoff Depth>3.22"
Tc=6.0 min CN=54 Runoff=0.18 cfs 0.013 af

Subcatchment 7S: TO OFFSITE EAST Runoff Area=3,128 sf 6.59% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=51 Runoff=0.23 cfs 0.017 af

Reach 4R: MAZZEO DRIVE Inflow=1.04 cfs 0.076 af
Outflow=1.04 cfs 0.076 af

Reach 5R: OFFSITE WEST Inflow=1.47 cfs 0.119 af
Outflow=1.47 cfs 0.119 af

Reach 6R: OFFSITE NORTH Inflow=0.18 cfs 0.013 af
Outflow=0.18 cfs 0.013 af

Reach 8R: OFFSITE EAST Inflow=0.23 cfs 0.017 af
Outflow=0.23 cfs 0.017 af

Total Runoff Area = 0.825 ac Runoff Volume = 0.225 af Average Runoff Depth = 3.28"
88.10% Pervious = 0.727 ac 11.90% Impervious = 0.098 ac

Summary for Subcatchment 1S: TO MAZZEO DRIVE

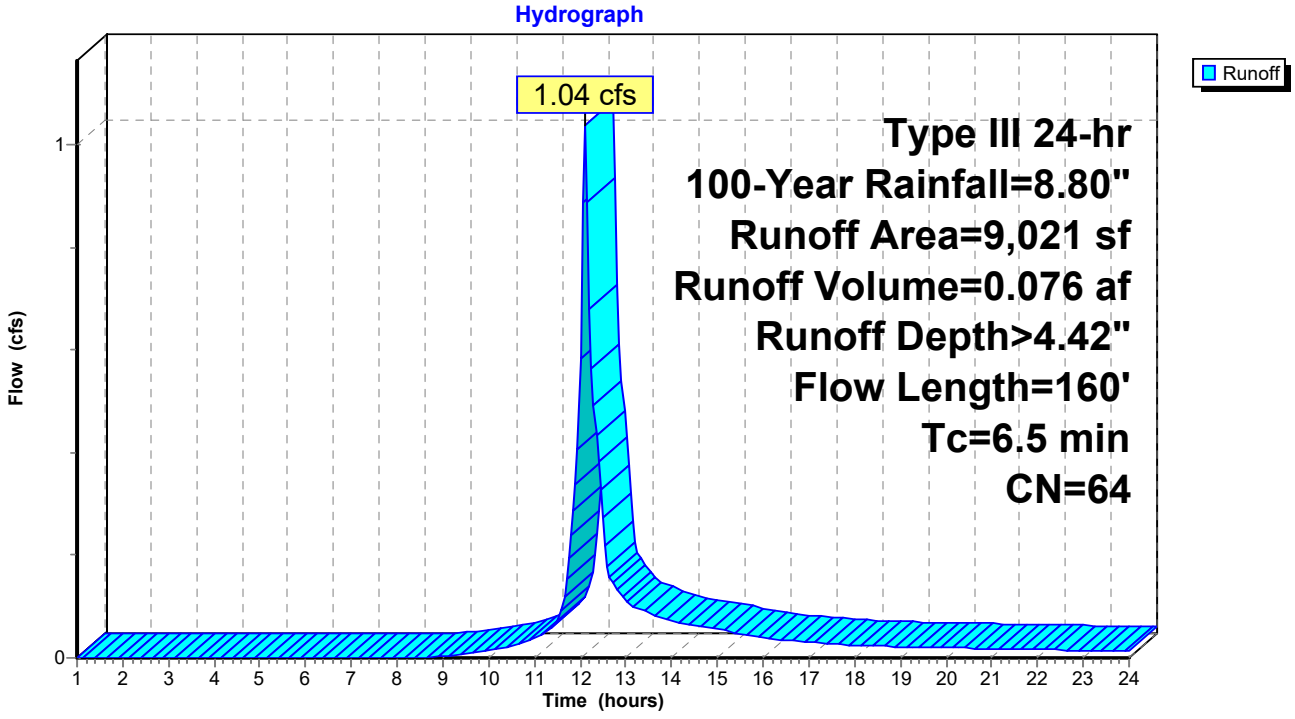
Runoff = 1.04 cfs @ 12.10 hrs, Volume= 0.076 af, Depth> 4.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
	6,221	48	Brush, Good, HSG B
*	2,800	98	Impervious
	9,021	64	Weighted Average
	6,221		68.96% Pervious Area
	2,800		31.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0640	0.16		**Sheet Flow, ab** Grass: Dense n= 0.240 P2= 3.22"
1.4	110	0.0664	1.29		**Shallow Concentrated Flow, bc** Woodland Kv= 5.0 fps
6.5	160	Total			

Subcatchment 1S: TO MAZZEO DRIVE



Summary for Subcatchment 2S: TO OFFSITE WEST

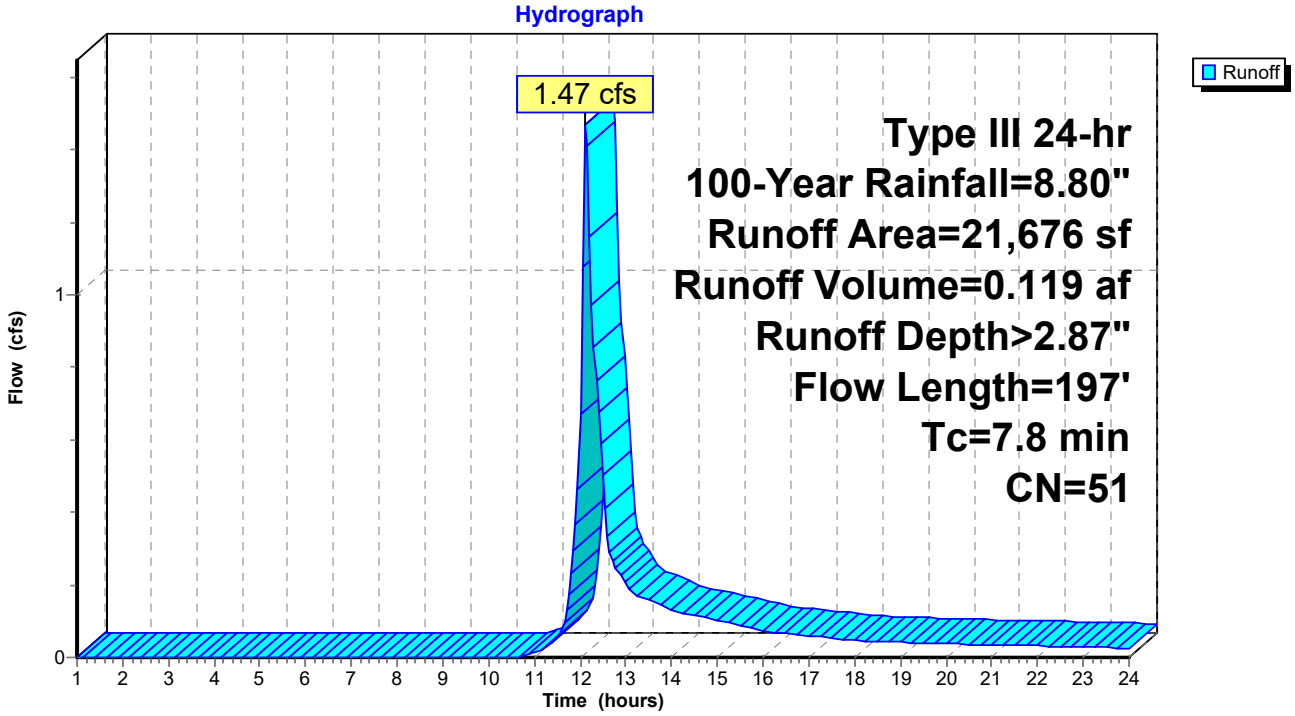
Runoff = 1.47 cfs @ 12.12 hrs, Volume= 0.119 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
	83	96	Gravel surface, HSG B
	20,564	48	Brush, Good, HSG B
*	1,029	98	Impervious
	21,676	51	Weighted Average
	20,647		95.25% Pervious Area
	1,029		4.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.0480	0.14		**Sheet Flow, ab** Grass: Dense n= 0.240 P2= 3.22"
2.0	147	0.0598	1.22		**Shallow Concentrated Flow, bc** Woodland Kv= 5.0 fps
7.8	197	Total			

Subcatchment 2S: TO OFFSITE WEST



Summary for Subcatchment 3S: TO OFFSITE NORTH

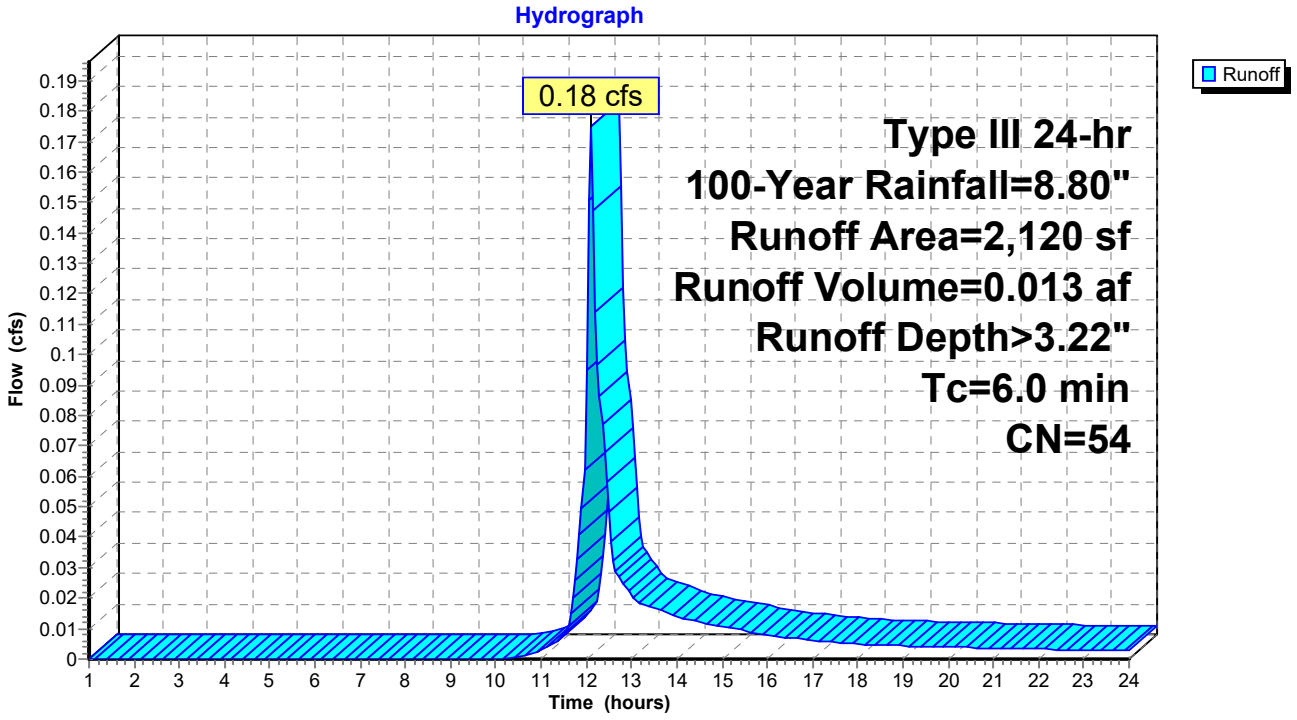
Runoff = 0.18 cfs @ 12.10 hrs, Volume= 0.013 af, Depth> 3.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
	27	96	Gravel surface, HSG B
	1,849	48	Brush, Good, HSG B
*	244	98	Impervious
	2,120	54	Weighted Average
	1,876		88.49% Pervious Area
	244		11.51% Impervious Area

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

Subcatchment 3S: TO OFFSITE NORTH



Summary for Subcatchment 7S: TO OFFSITE EAST

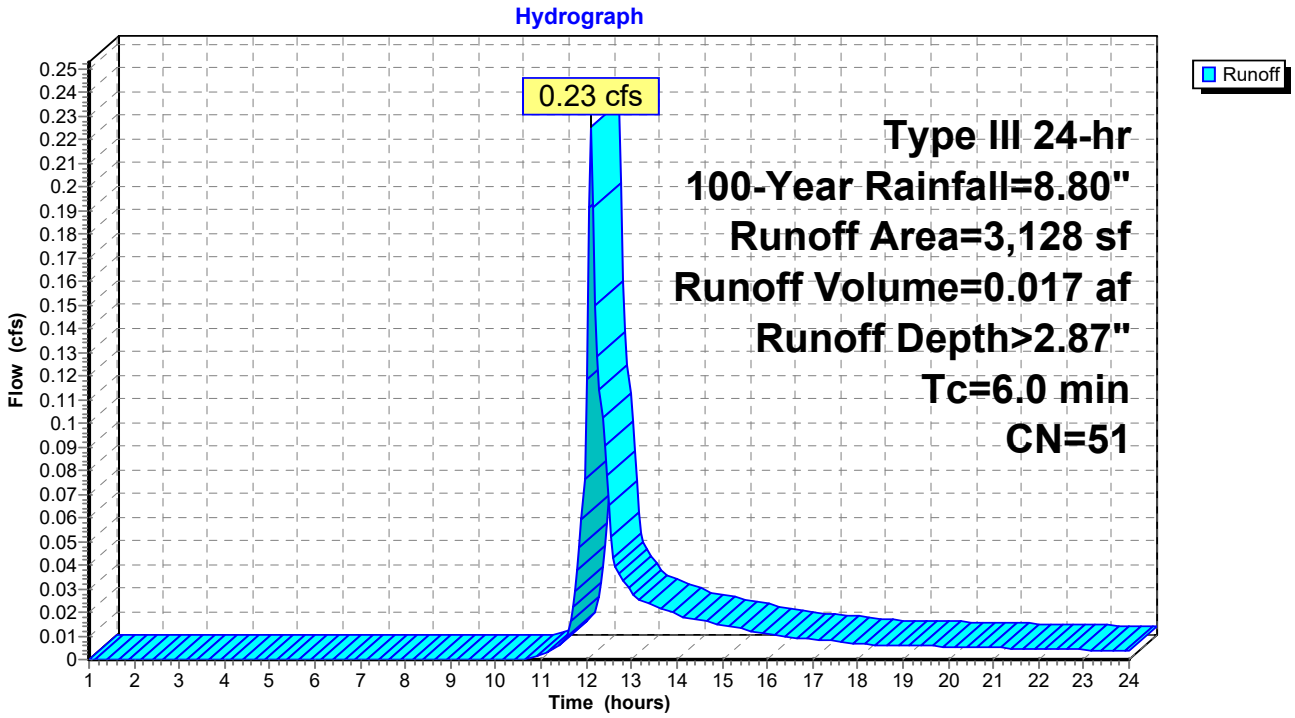
Runoff = 0.23 cfs @ 12.10 hrs, Volume= 0.017 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
	2,922	48	Brush, Good, HSG B
*	206	98	Impervious
	3,128	51	Weighted Average
	2,922		93.41% Pervious Area
	206		6.59% Impervious Area

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

Subcatchment 7S: TO OFFSITE EAST

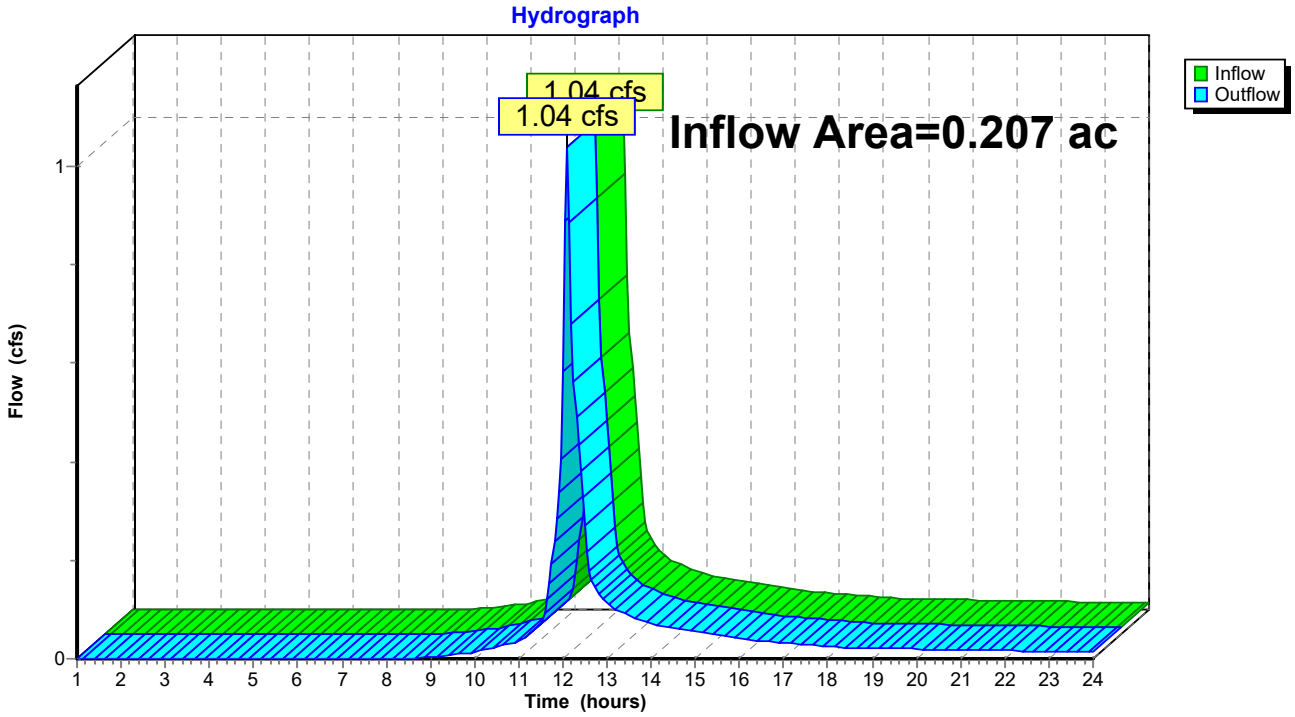


Summary for Reach 4R: MAZZEO DRIVE

Inflow Area = 0.207 ac, 31.04% Impervious, Inflow Depth > 4.42" for 100-Year event
Inflow = 1.04 cfs @ 12.10 hrs, Volume= 0.076 af
Outflow = 1.04 cfs @ 12.10 hrs, Volume= 0.076 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 4R: MAZZEO DRIVE

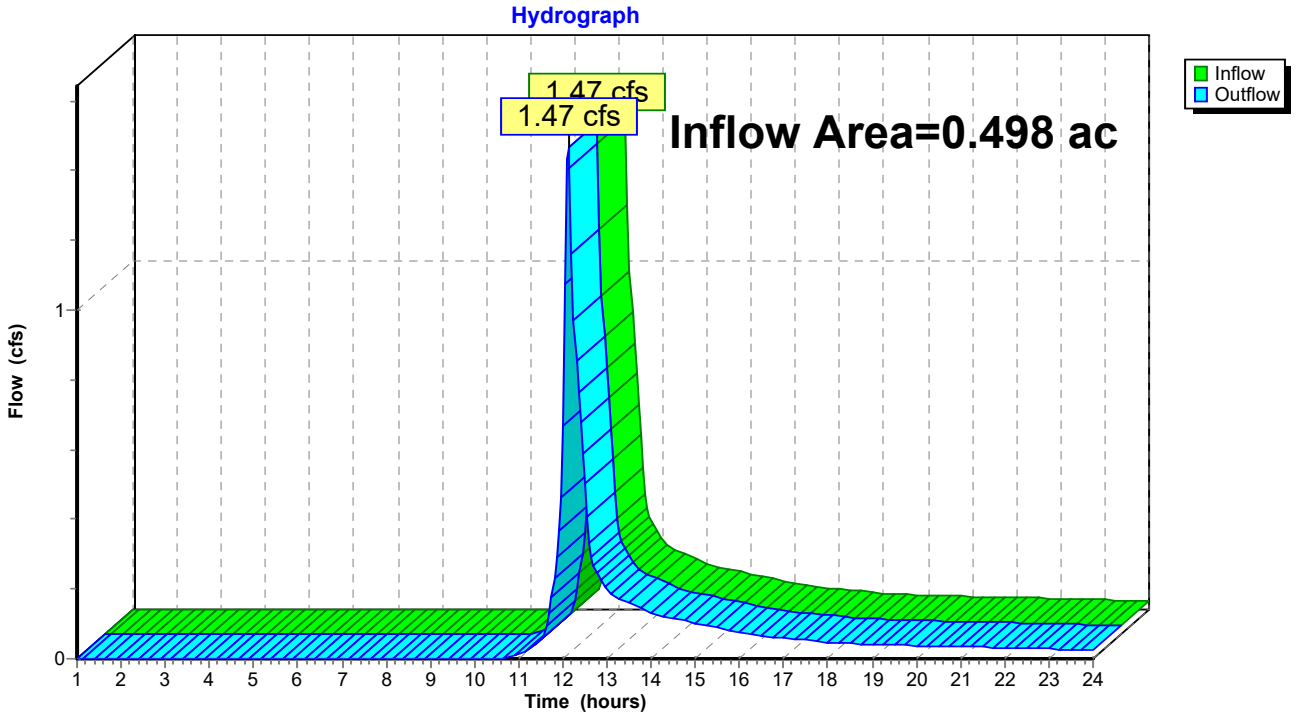


Summary for Reach 5R: OFFSITE WEST

Inflow Area = 0.498 ac, 4.75% Impervious, Inflow Depth > 2.87" for 100-Year event
Inflow = 1.47 cfs @ 12.12 hrs, Volume= 0.119 af
Outflow = 1.47 cfs @ 12.12 hrs, Volume= 0.119 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 5R: OFFSITE WEST

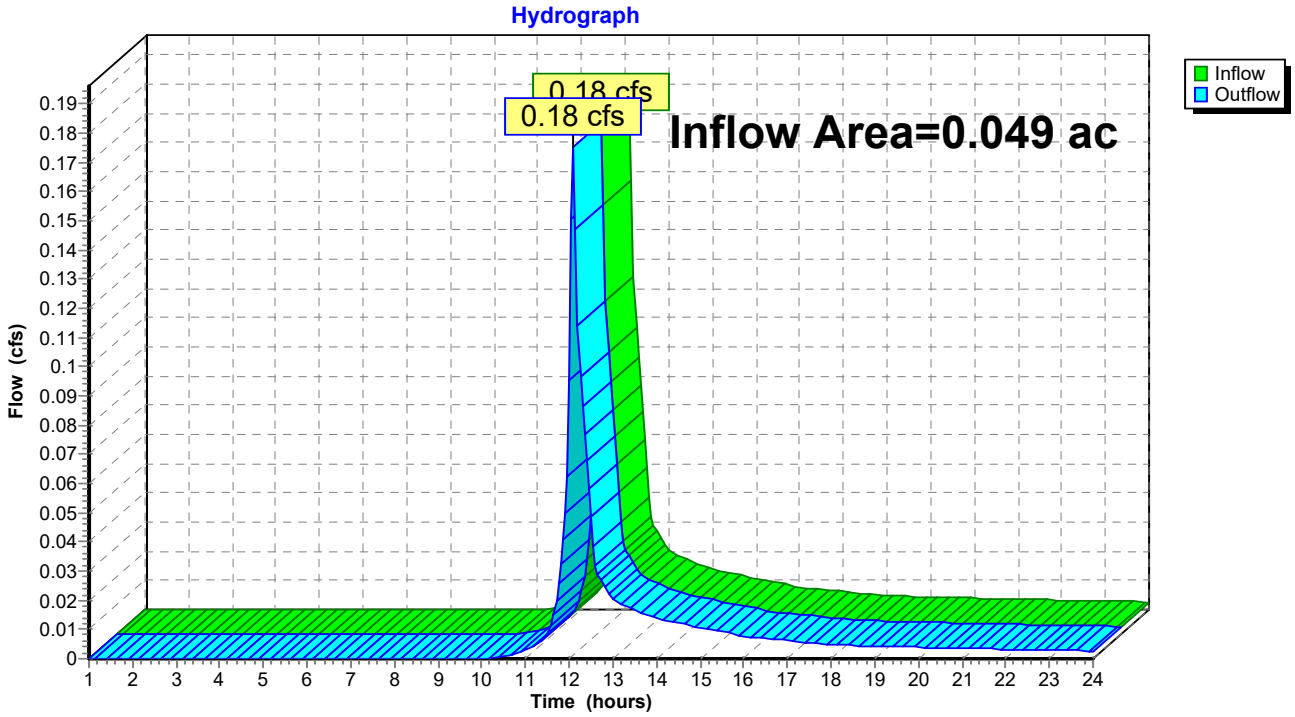


Summary for Reach 6R: OFFSITE NORTH

Inflow Area = 0.049 ac, 11.51% Impervious, Inflow Depth > 3.22" for 100-Year event
Inflow = 0.18 cfs @ 12.10 hrs, Volume= 0.013 af
Outflow = 0.18 cfs @ 12.10 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 6R: OFFSITE NORTH

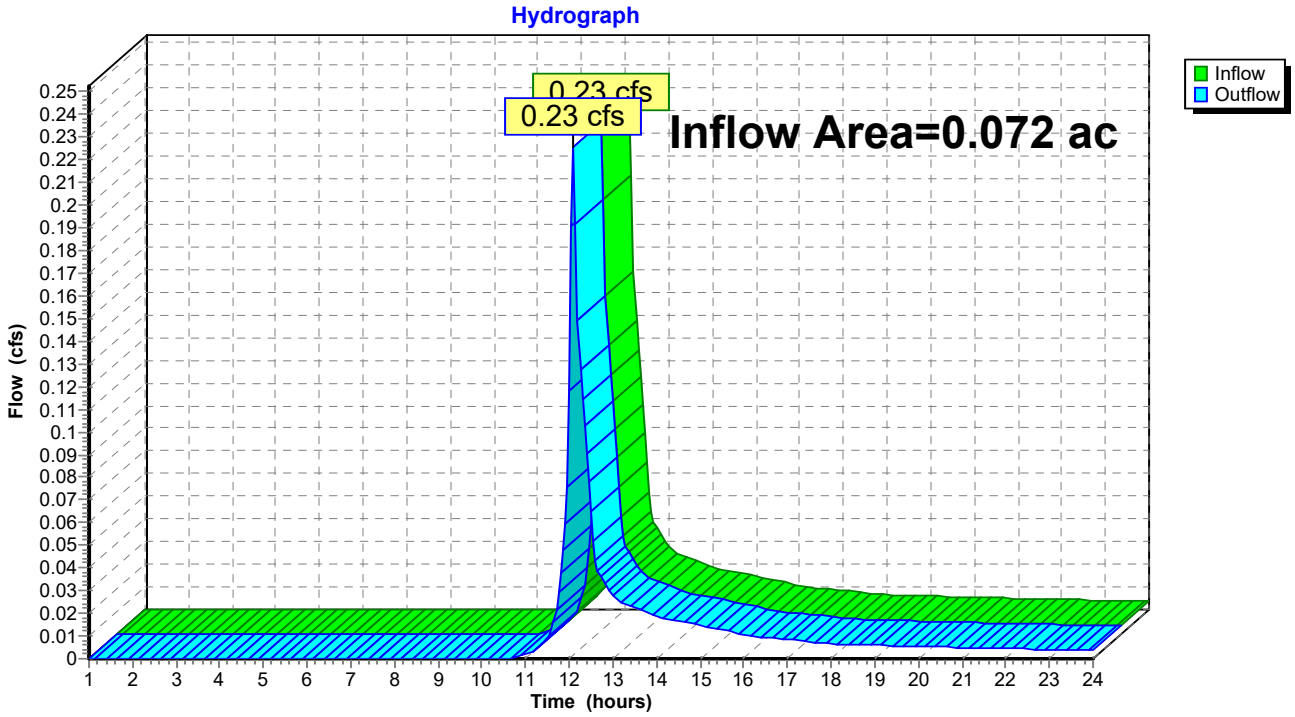


Summary for Reach 8R: OFFSITE EAST

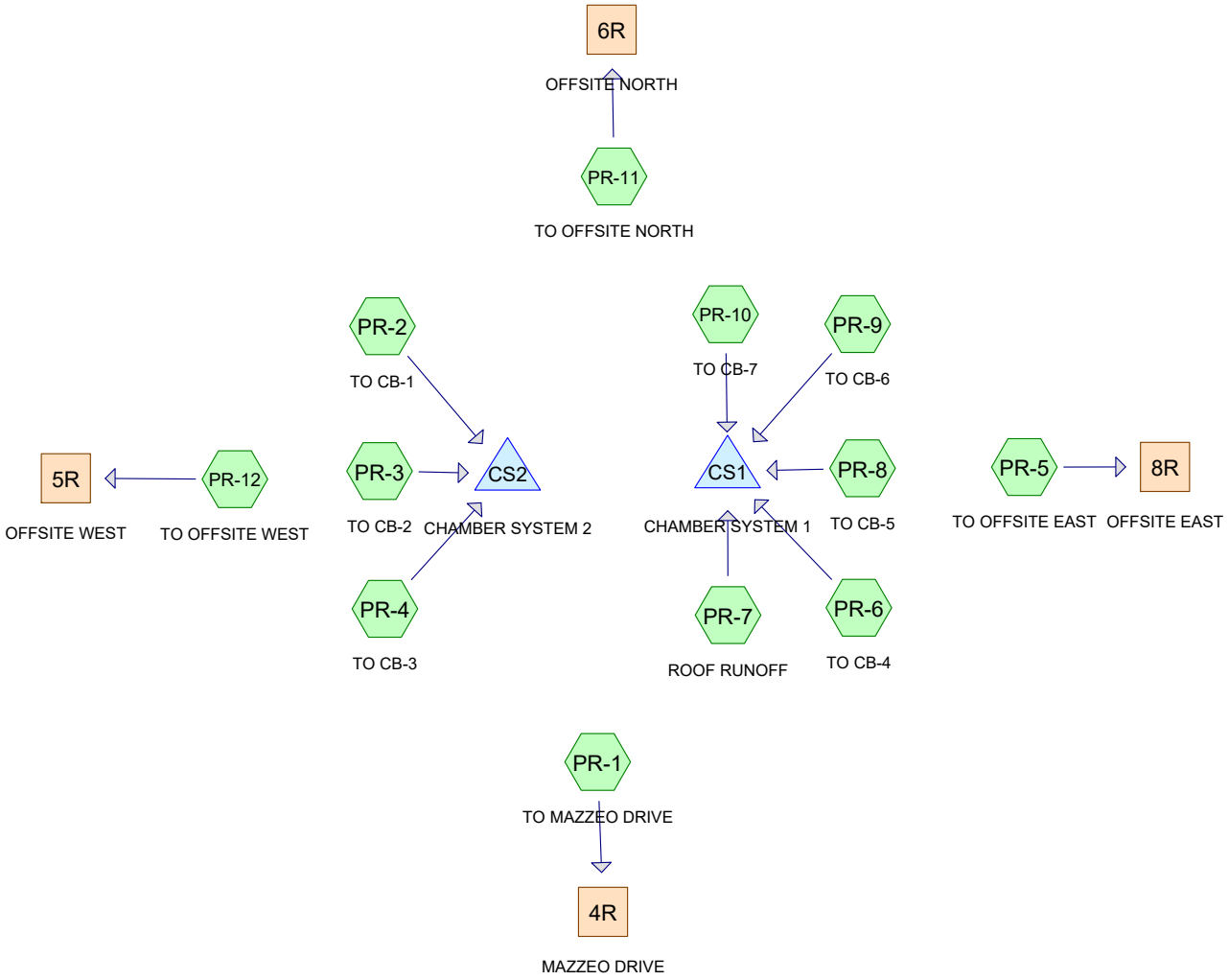
Inflow Area = 0.072 ac, 6.59% Impervious, Inflow Depth > 2.87" for 100-Year event
Inflow = 0.23 cfs @ 12.10 hrs, Volume= 0.017 af
Outflow = 0.23 cfs @ 12.10 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 8R: OFFSITE EAST



Post-Development HydroCAD Analysis



Subcat Reach Pond Link

Routing Diagram for 2021-054 - PR
Prepared by {enter your company name here}, Printed 1/27/2022
HydroCAD® 10.00-25 s/n 09450 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
7,655	61	>75% Grass cover, Good, HSG B (PR-1, PR-11, PR-12, PR-3, PR-5, PR-6, PR-8, PR-9)
4,031	48	Brush, Good, HSG B (PR-1, PR-11, PR-12, PR-5)
110	96	Gravel surface, HSG B (PR-11, PR-12)
24,148	98	Impervious (PR-1, PR-10, PR-2, PR-3, PR-4, PR-6, PR-7, PR-8, PR-9)
35,944	**85**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
11,796	HSG B	PR-1, PR-11, PR-12, PR-3, PR-5, PR-6, PR-8, PR-9
0	HSG C	
0	HSG D	
24,148	Other	PR-1, PR-10, PR-2, PR-3, PR-4, PR-6, PR-7, PR-8, PR-9
35,944		**TOTAL AREA**

2021-054 - PR
Prepared by {enter your company name here}
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Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
0	7,655	0	0	0	7,655	>75% Grass cover, Good	
0	4,031	0	0	0	4,031	Brush, Good	
0	110	0	0	0	110	Gravel surface	
0	0	0	0	24,148	24,148	Impervious	
0	**11,796**	**0**	**0**	**24,148**	**35,944**	**TOTAL AREA**	

Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 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 PR-1: TO MAZZEO DRIVE Runoff Area=2,897 sf 30.55% Impervious Runoff Depth>0.94"
Tc=6.0 min CN=72 Runoff=0.07 cfs 227 cf

Subcatchment PR-10: TO CB-7 Runoff Area=1,324 sf 100.00% Impervious Runoff Depth>2.99"
Tc=6.0 min CN=98 Runoff=0.09 cfs 329 cf

Subcatchment PR-11: TO OFFSITE NORTH Runoff Area=706 sf 0.00% Impervious Runoff Depth>0.15"
Tc=6.0 min CN=51 Runoff=0.00 cfs 9 cf

Subcatchment PR-12: TO OFFSITE WEST Runoff Area=4,145 sf 0.00% Impervious Runoff Depth>0.26"
Tc=6.0 min CN=55 Runoff=0.01 cfs 89 cf

Subcatchment PR-2: TO CB-1 Runoff Area=975 sf 100.00% Impervious Runoff Depth>2.99"
Tc=6.0 min CN=98 Runoff=0.07 cfs 243 cf

Subcatchment PR-3: TO CB-2 Runoff Area=3,788 sf 83.37% Impervious Runoff Depth>2.37"
Tc=6.0 min CN=92 Runoff=0.23 cfs 747 cf

Subcatchment PR-4: TO CB-3 Runoff Area=2,510 sf 100.00% Impervious Runoff Depth>2.99"
Tc=6.0 min CN=98 Runoff=0.18 cfs 624 cf

Subcatchment PR-5: TO OFFSITE EAST Runoff Area=1,291 sf 0.00% Impervious Runoff Depth>0.11"
Tc=6.0 min CN=49 Runoff=0.00 cfs 12 cf

Subcatchment PR-6: TO CB-4 Runoff Area=6,564 sf 86.94% Impervious Runoff Depth>2.46"
Tc=6.0 min CN=93 Runoff=0.41 cfs 1,347 cf

Subcatchment PR-7: ROOF RUNOFF Runoff Area=6,000 sf 100.00% Impervious Runoff Depth>2.99"
Tc=6.0 min CN=98 Runoff=0.42 cfs 1,493 cf

Subcatchment PR-8: TO CB-5 Runoff Area=3,425 sf 45.46% Impervious Runoff Depth>1.29"
Tc=6.0 min CN=78 Runoff=0.11 cfs 367 cf

Subcatchment PR-9: TO CB-6 Runoff Area=2,319 sf 87.62% Impervious Runoff Depth>2.46"
Tc=6.0 min CN=93 Runoff=0.15 cfs 476 cf

Reach 4R: MAZZEO DRIVE Inflow=0.07 cfs 227 cf
Outflow=0.07 cfs 227 cf

Reach 5R: OFFSITE WEST Inflow=0.01 cfs 89 cf
Outflow=0.01 cfs 89 cf

Reach 6R: OFFSITE NORTH Inflow=0.00 cfs 9 cf
Outflow=0.00 cfs 9 cf

Reach 8R: OFFSITE EAST Inflow=0.00 cfs 12 cf
Outflow=0.00 cfs 12 cf

Pond CS1: CHAMBER SYSTEM 1 Peak Elev=90.28' Storage=478 cf Inflow=1.18 cfs 4,013 cf
Outflow=0.47 cfs 4,012 cf

Pond CS2: CHAMBER SYSTEM 2 Peak Elev=89.09' Storage=223 cf Inflow=0.47 cfs 1,615 cf
Outflow=0.18 cfs 1,614 cf

Total Runoff Area = 35,944 sf Runoff Volume = 5,964 cf Average Runoff Depth = 1.99"
32.82% Pervious = 11,796 sf 67.18% Impervious = 24,148 sf

Summary for Subcatchment PR-1: TO MAZZEO DRIVE

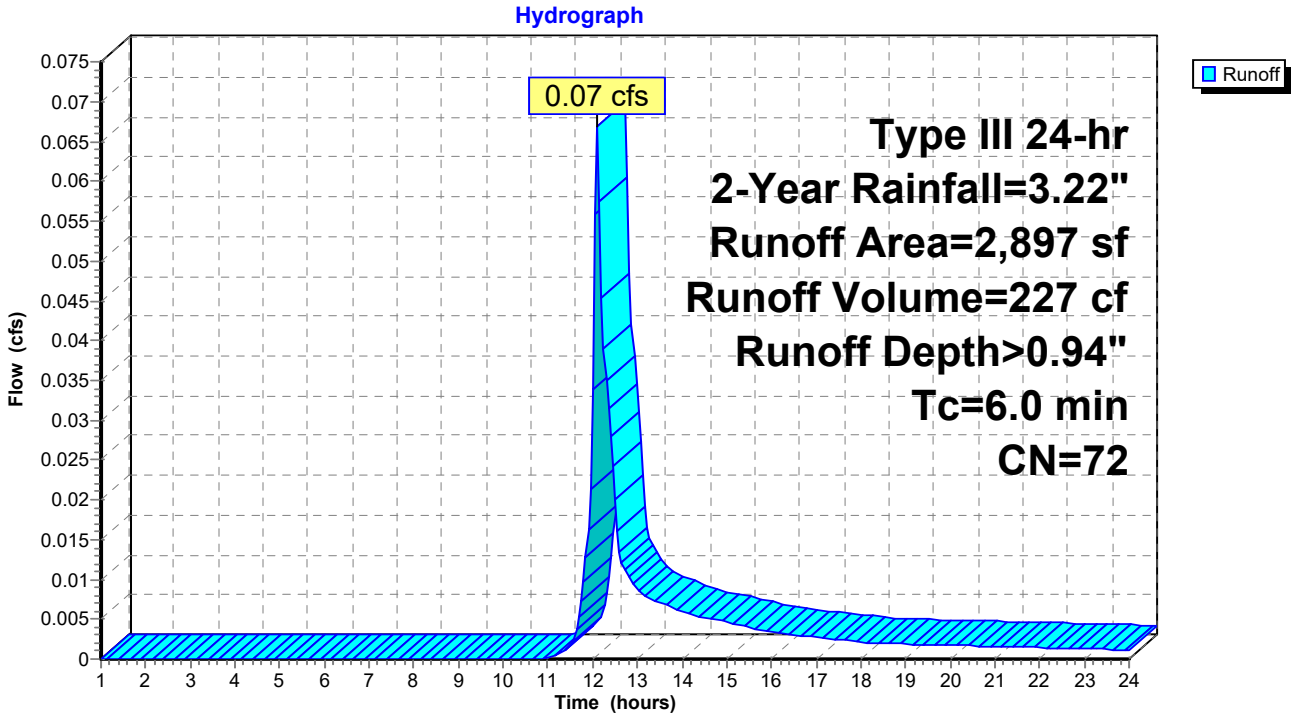
Runoff = 0.07 cfs @ 12.10 hrs, Volume= 227 cf, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
	13	48	Brush, Good, HSG B
	1,999	61	>75% Grass cover, Good, HSG B
*	885	98	Impervious
	2,897	72	Weighted Average
	2,012		69.45% Pervious Area
	885		30.55% Impervious Area

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

Subcatchment PR-1: TO MAZZEO DRIVE



Summary for Subcatchment PR-10: TO CB-7

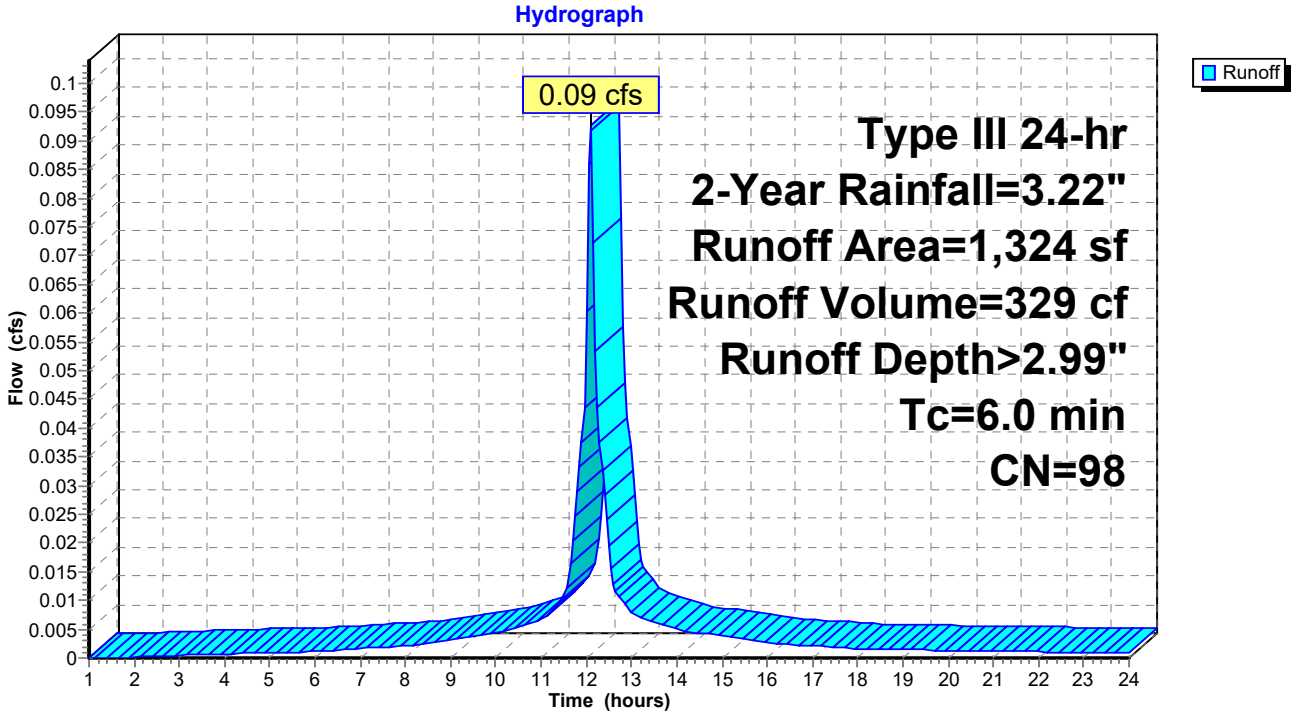
Runoff = 0.09 cfs @ 12.09 hrs, Volume= 329 cf, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
*	1,324	98	Impervious
	1,324		100.00% Impervious Area

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

Subcatchment PR-10: TO CB-7



Summary for Subcatchment PR-11: TO OFFSITE NORTH

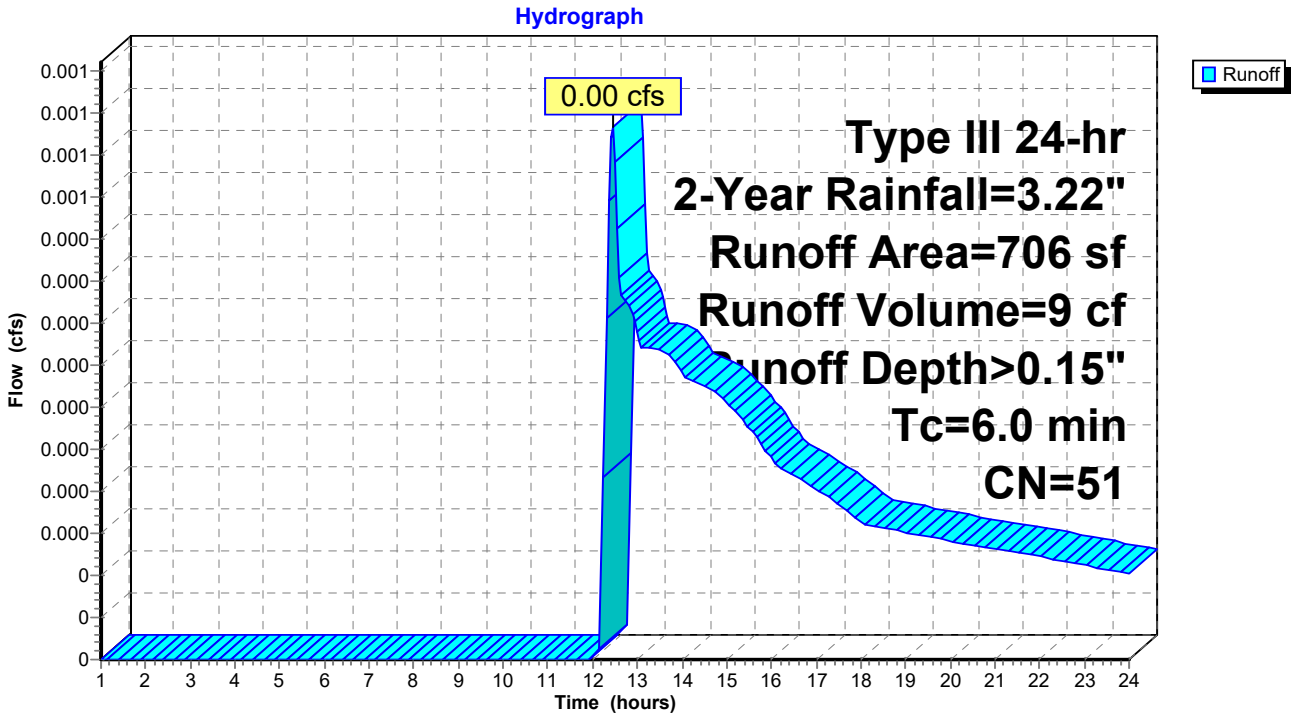
Runoff = 0.00 cfs @ 12.44 hrs, Volume= 9 cf, Depth> 0.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
27	96	Gravel surface, HSG B
593	48	Brush, Good, HSG B
86	61	>75% Grass cover, Good, HSG B
706	51	Weighted Average
706		100.00% Pervious Area

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

Subcatchment PR-11: TO OFFSITE NORTH



Summary for Subcatchment PR-12: TO OFFSITE WEST

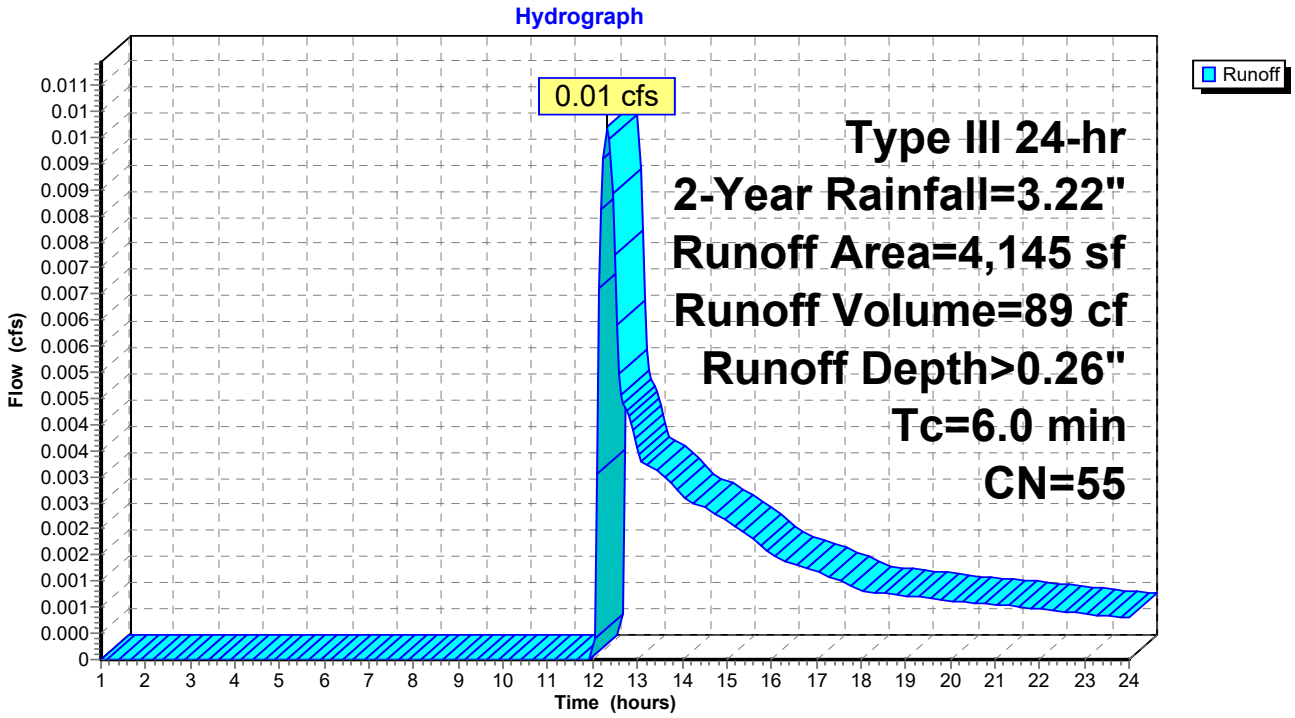
Runoff = 0.01 cfs @ 12.33 hrs, Volume= 89 cf, Depth> 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
83	96	Gravel surface, HSG B
2,238	48	Brush, Good, HSG B
1,824	61	>75% Grass cover, Good, HSG B
4,145	55	Weighted Average
4,145		100.00% Pervious Area

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

Subcatchment PR-12: TO OFFSITE WEST



Summary for Subcatchment PR-2: TO CB-1

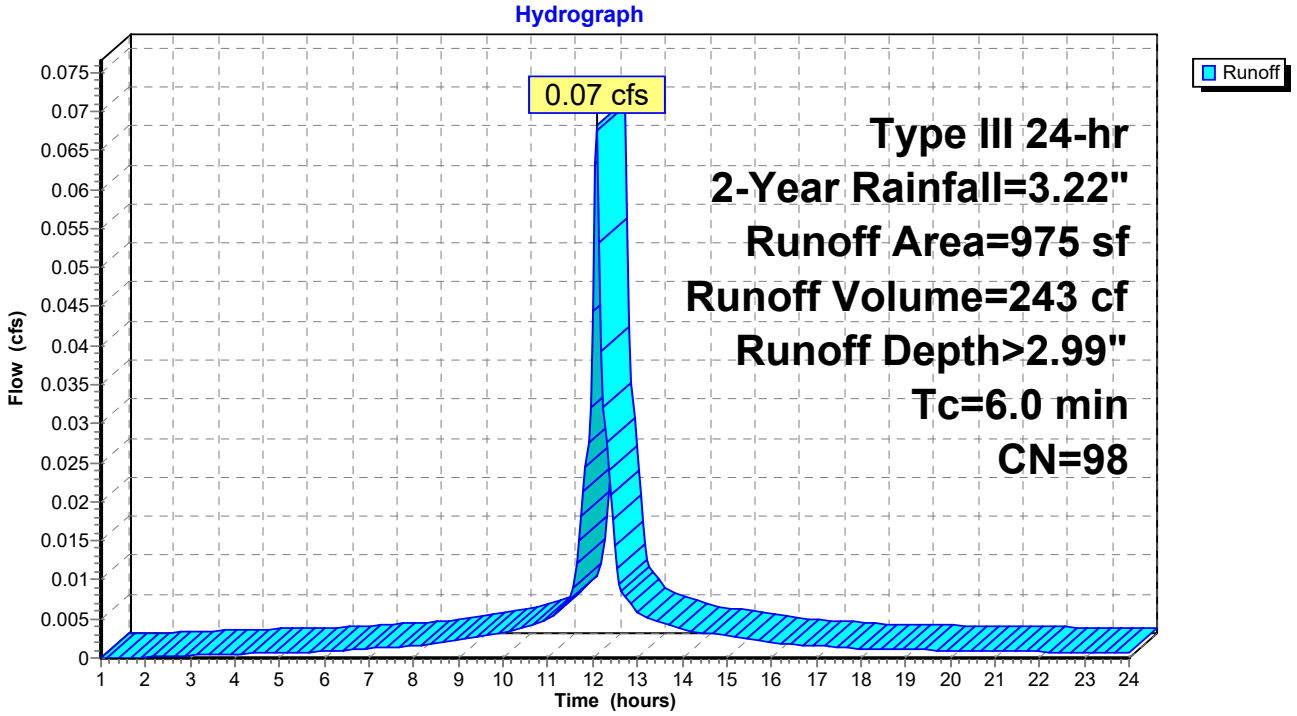
Runoff = 0.07 cfs @ 12.09 hrs, Volume= 243 cf, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
*	975	98	Impervious
	975		100.00% Impervious Area

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

Subcatchment PR-2: TO CB-1



Summary for Subcatchment PR-3: TO CB-2

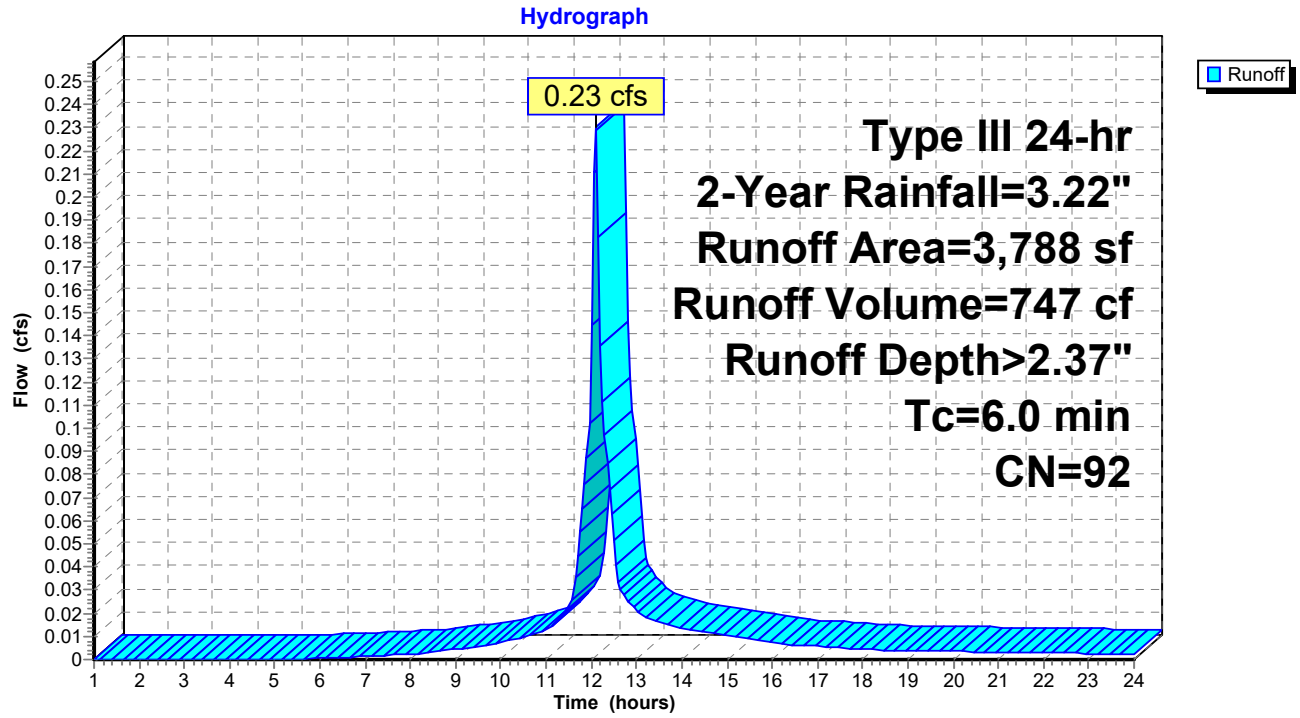
Runoff = 0.23 cfs @ 12.09 hrs, Volume= 747 cf, Depth> 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
*	3,158	98	Impervious
	630	61	>75% Grass cover, Good, HSG B
	3,788	92	Weighted Average
	630		16.63% Pervious Area
	3,158		83.37% Impervious Area

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

Subcatchment PR-3: TO CB-2



Summary for Subcatchment PR-4: TO CB-3

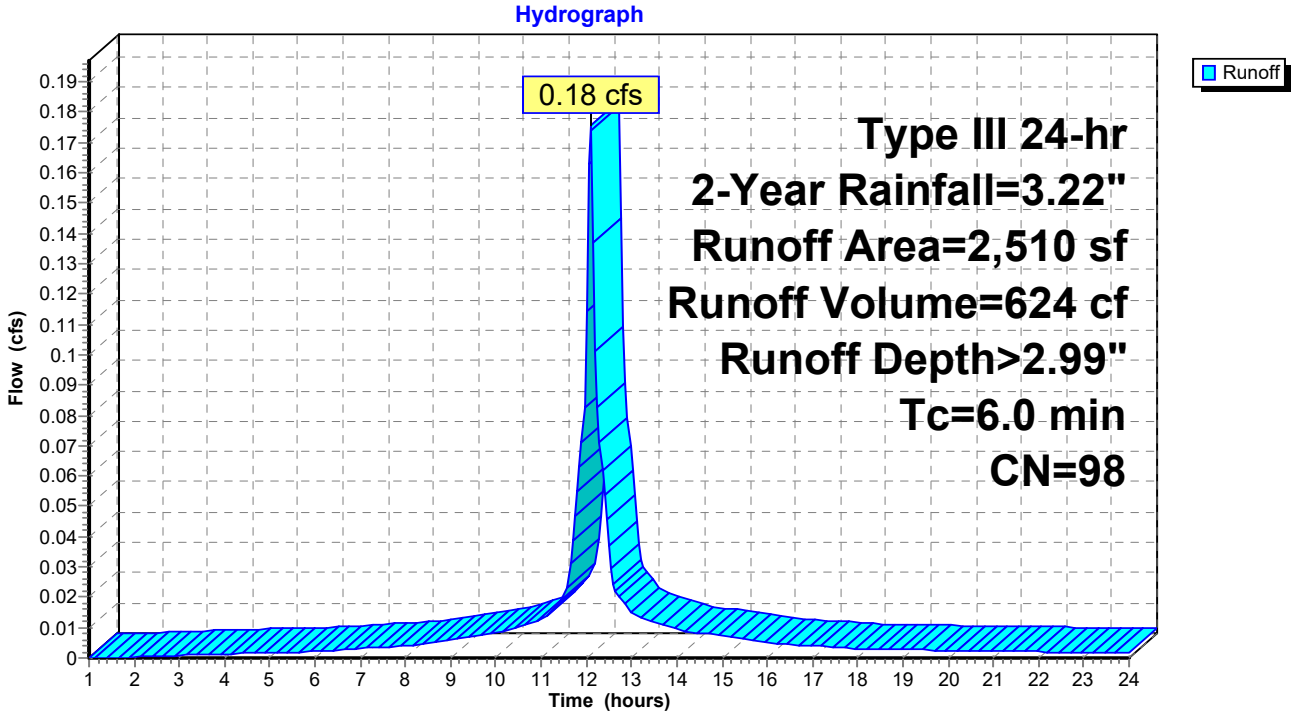
Runoff = 0.18 cfs @ 12.09 hrs, Volume= 624 cf, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
*	2,510	98	Impervious
	2,510		100.00% Impervious Area

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

Subcatchment PR-4: TO CB-3



Summary for Subcatchment PR-5: TO OFFSITE EAST

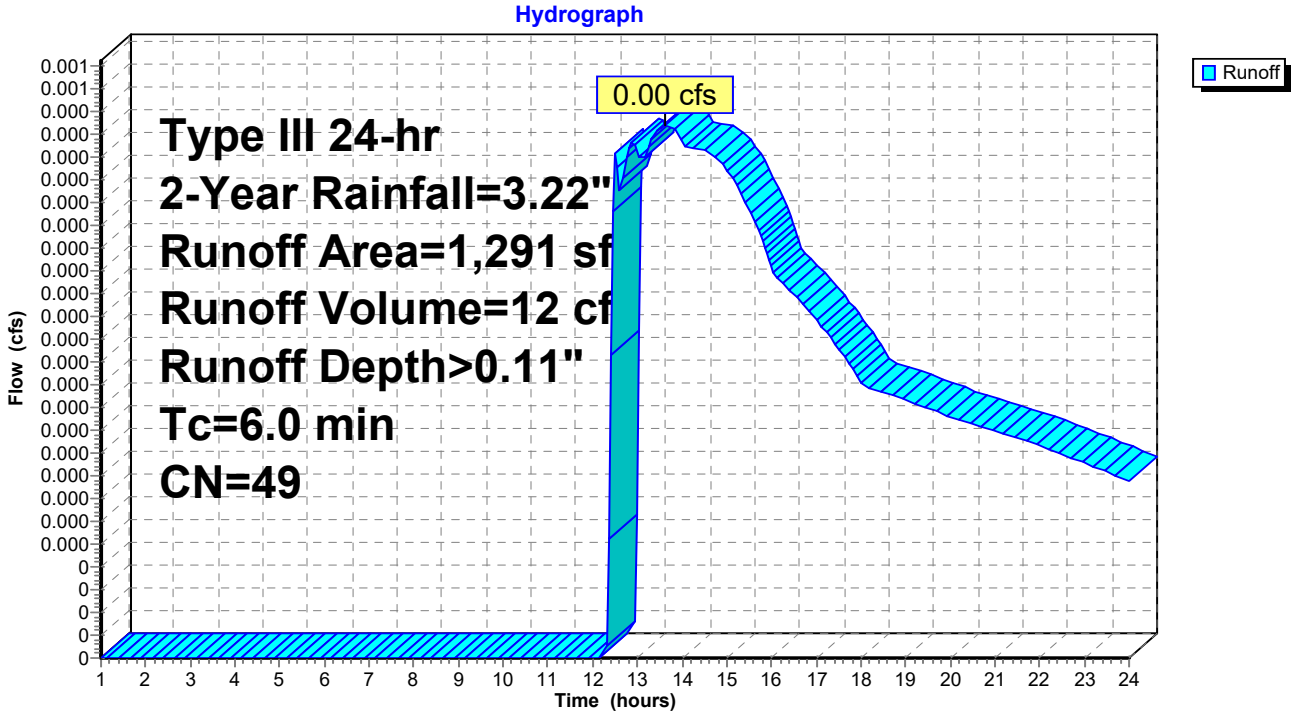
Runoff = 0.00 cfs @ 13.64 hrs, Volume= 12 cf, Depth> 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

Area (sf)	CN	Description
1,187	48	Brush, Good, HSG B
104	61	>75% Grass cover, Good, HSG B
1,291	49	Weighted Average
1,291		100.00% Pervious Area

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

Subcatchment PR-5: TO OFFSITE EAST



Summary for Subcatchment PR-6: TO CB-4

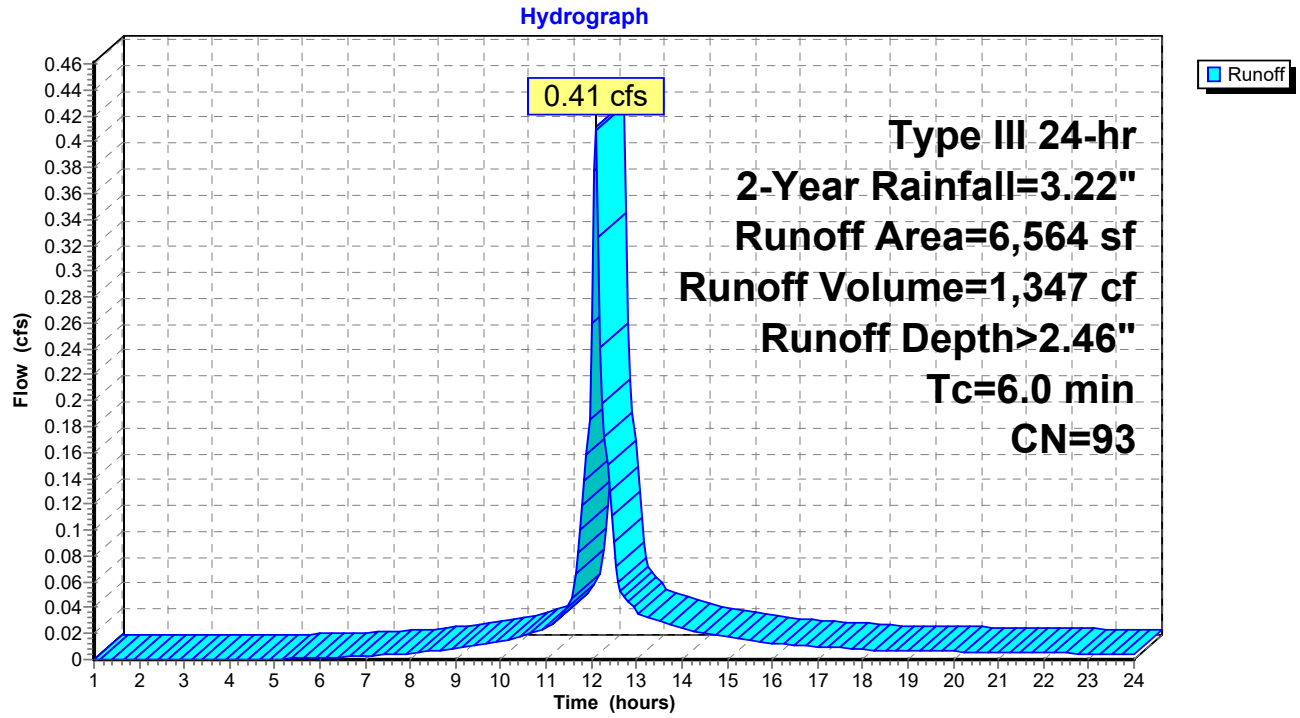
Runoff = 0.41 cfs @ 12.09 hrs, Volume= 1,347 cf, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
*	5,707	98	Impervious
	857	61	>75% Grass cover, Good, HSG B
	6,564	93	Weighted Average
	857		13.06% Pervious Area
	5,707		86.94% Impervious Area

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

Subcatchment PR-6: TO CB-4



Summary for Subcatchment PR-7: ROOF RUNOFF

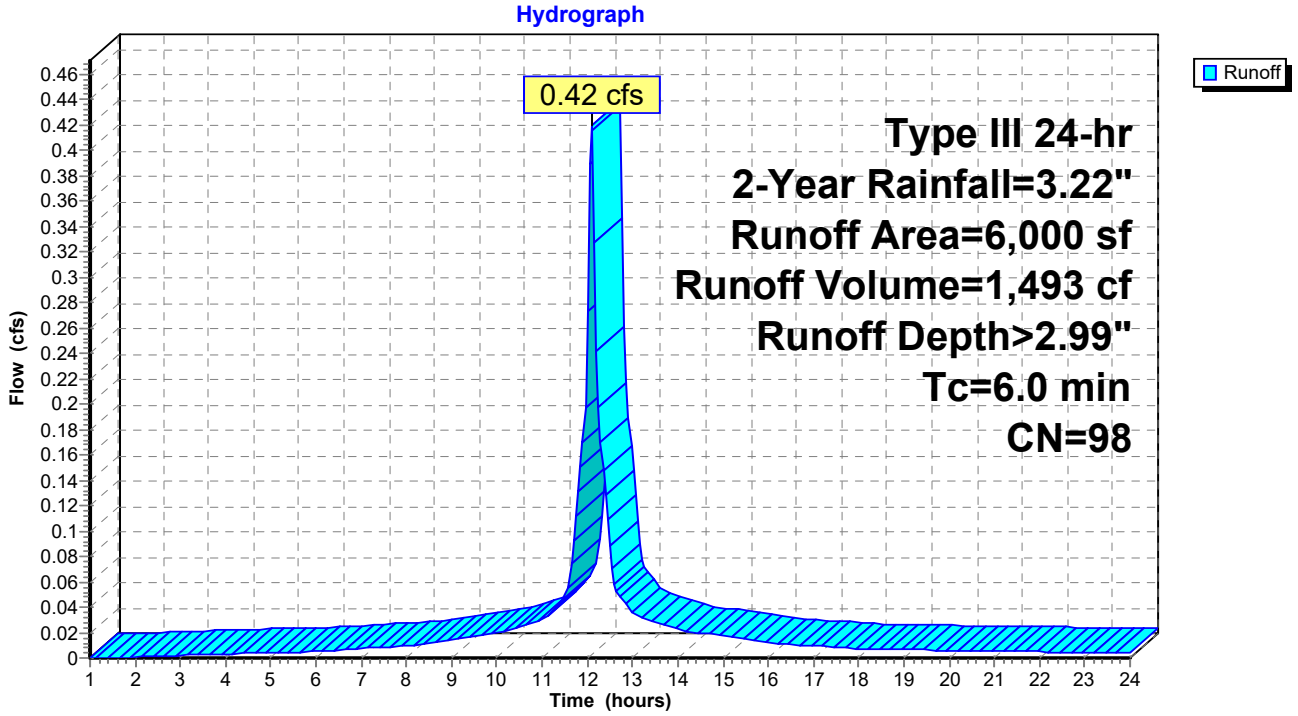
Runoff = 0.42 cfs @ 12.09 hrs, Volume= 1,493 cf, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
*	6,000	98	Impervious
	6,000		100.00% Impervious Area

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

Subcatchment PR-7: ROOF RUNOFF



Summary for Subcatchment PR-8: TO CB-5

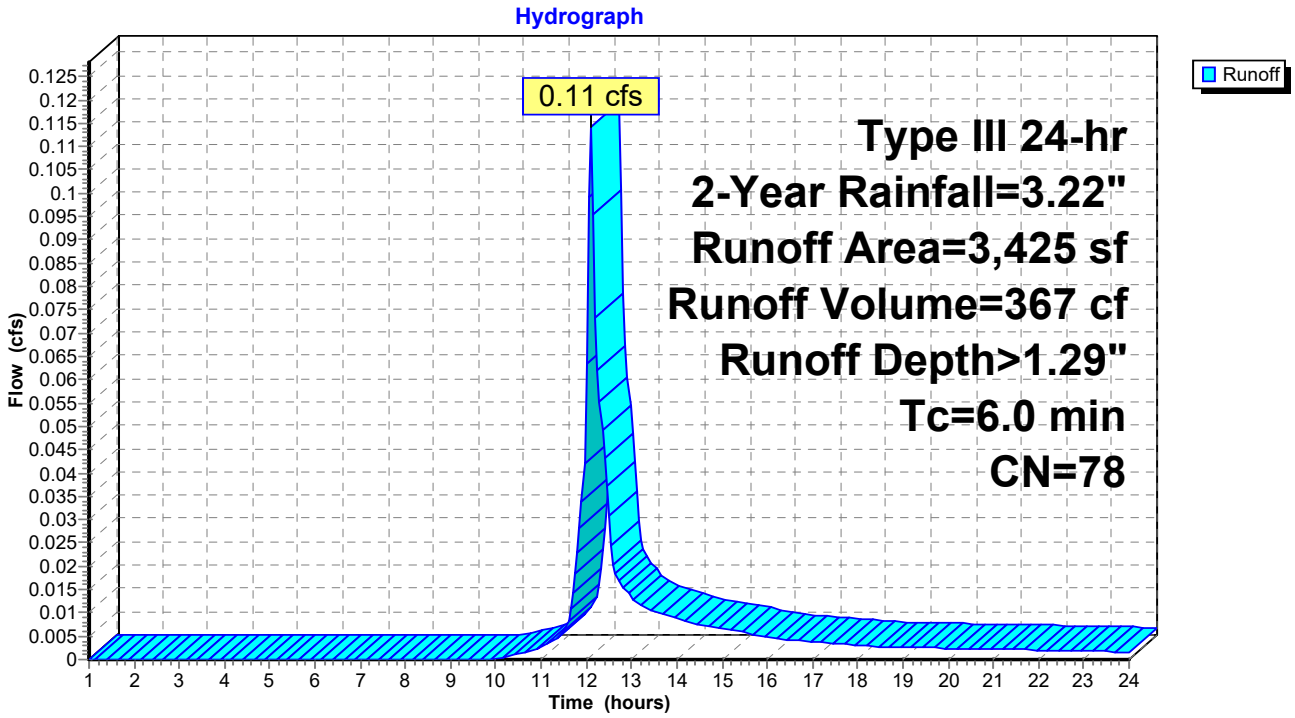
Runoff = 0.11 cfs @ 12.10 hrs, Volume= 367 cf, Depth> 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
*	1,557	98	Impervious
	1,868	61	>75% Grass cover, Good, HSG B
	3,425	78	Weighted Average
	1,868		54.54% Pervious Area
	1,557		45.46% Impervious Area

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

Subcatchment PR-8: TO CB-5



Summary for Subcatchment PR-9: TO CB-6

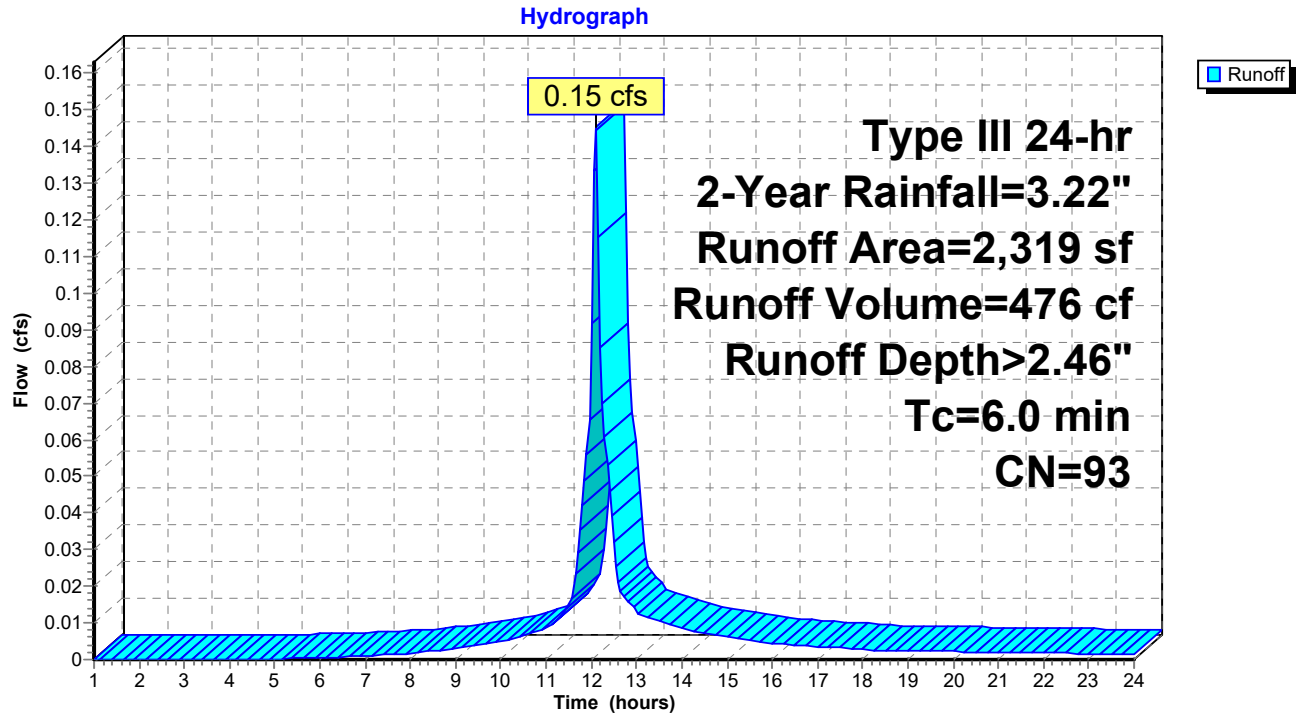
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 476 cf, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.22"

	Area (sf)	CN	Description
*	2,032	98	Impervious
	287	61	>75% Grass cover, Good, HSG B
	2,319	93	Weighted Average
	287		12.38% Pervious Area
	2,032		87.62% Impervious Area

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

Subcatchment PR-9: TO CB-6

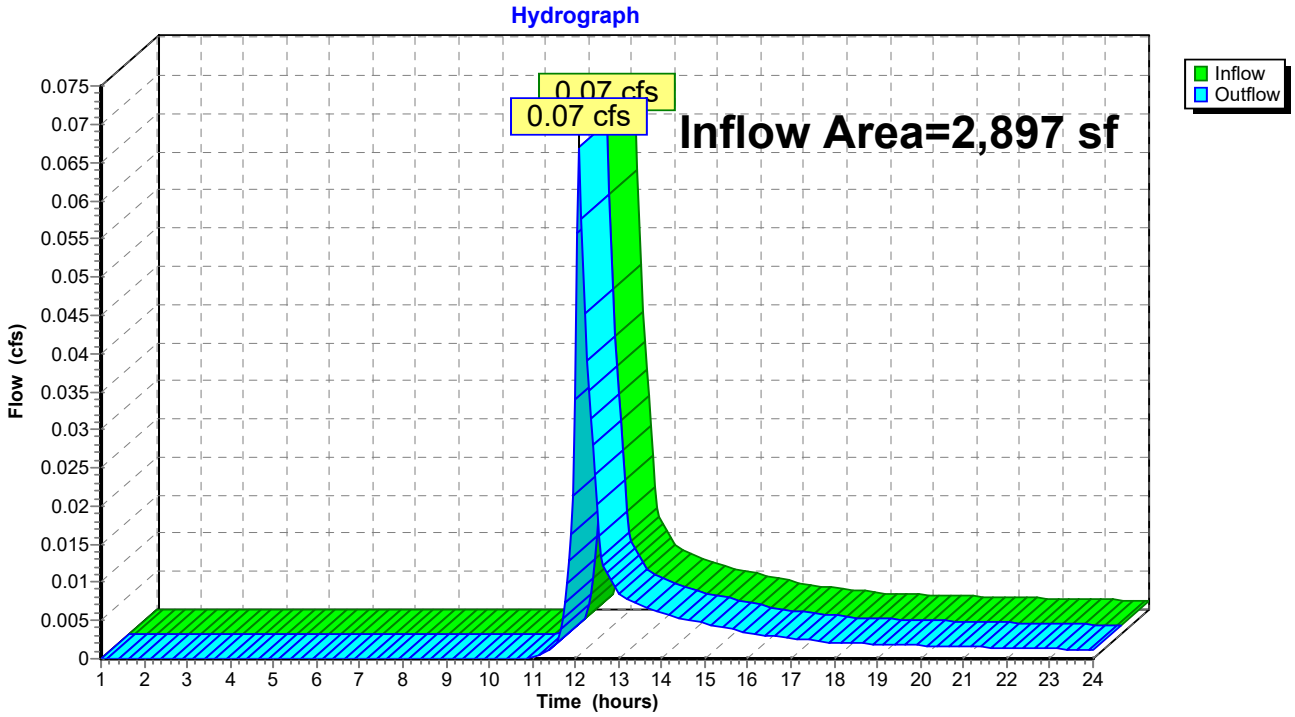


Summary for Reach 4R: MAZZEO DRIVE

Inflow Area = 2,897 sf, 30.55% Impervious, Inflow Depth > 0.94" for 2-Year event
Inflow = 0.07 cfs @ 12.10 hrs, Volume= 227 cf
Outflow = 0.07 cfs @ 12.10 hrs, Volume= 227 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 4R: MAZZEO DRIVE

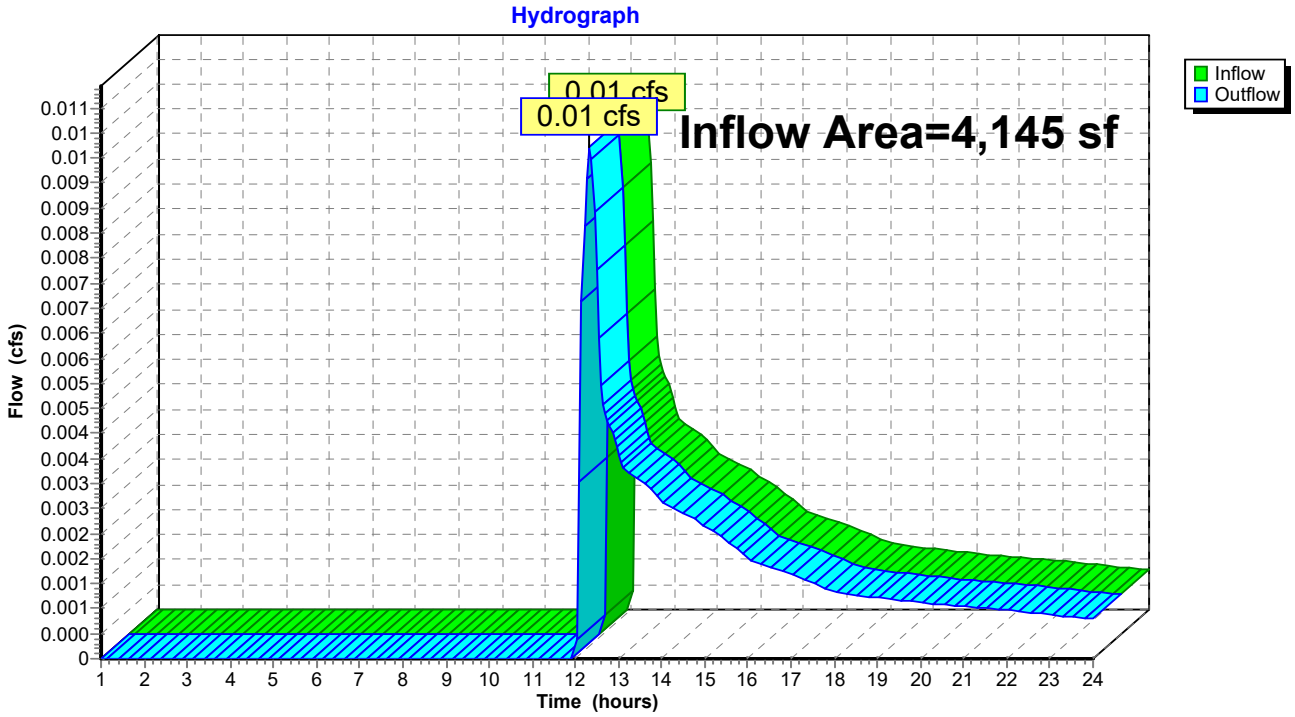


Summary for Reach 5R: OFFSITE WEST

Inflow Area = 4,145 sf, 0.00% Impervious, Inflow Depth > 0.26" for 2-Year event
Inflow = 0.01 cfs @ 12.33 hrs, Volume= 89 cf
Outflow = 0.01 cfs @ 12.33 hrs, Volume= 89 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 5R: OFFSITE WEST

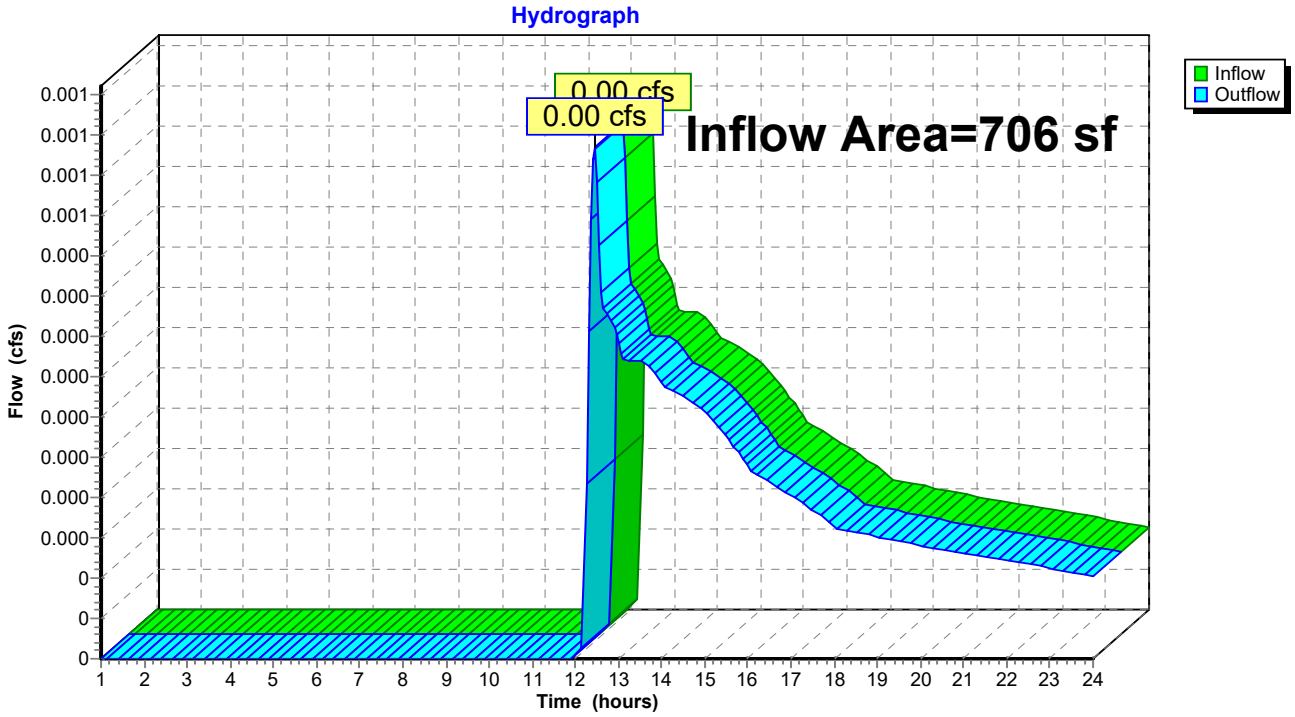


Summary for Reach 6R: OFFSITE NORTH

Inflow Area = 706 sf, 0.00% Impervious, Inflow Depth > 0.15" for 2-Year event
Inflow = 0.00 cfs @ 12.44 hrs, Volume= 9 cf
Outflow = 0.00 cfs @ 12.44 hrs, Volume= 9 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 6R: OFFSITE NORTH

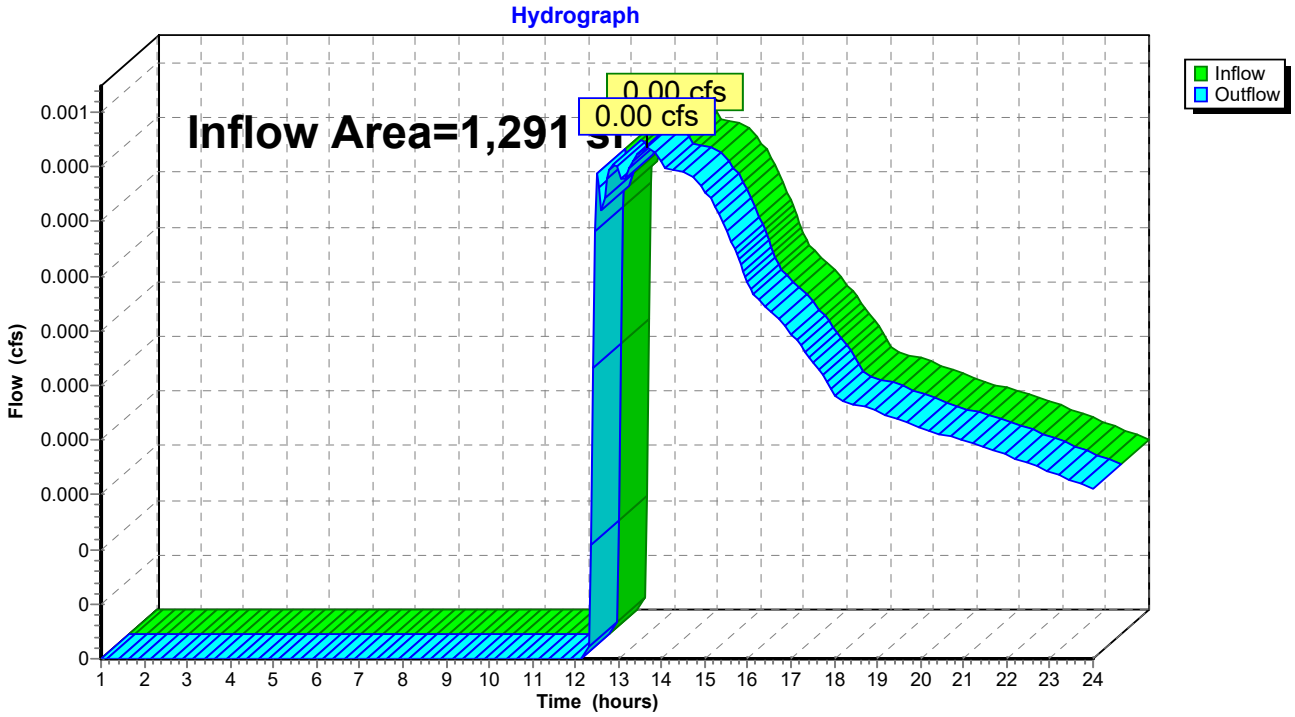


Summary for Reach 8R: OFFSITE EAST

Inflow Area = 1,291 sf, 0.00% Impervious, Inflow Depth > 0.11" for 2-Year event
Inflow = 0.00 cfs @ 13.64 hrs, Volume= 12 cf
Outflow = 0.00 cfs @ 13.64 hrs, Volume= 12 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 8R: OFFSITE EAST



Summary for Pond CS1: CHAMBER SYSTEM 1

Inflow Area = 19,632 sf, 84.66% Impervious, Inflow Depth > 2.45" for 2-Year event
Inflow = 1.18 cfs @ 12.09 hrs, Volume= 4,013 cf
Outflow = 0.47 cfs @ 12.32 hrs, Volume= 4,012 cf, Atten= 60%, Lag= 13.9 min
Discarded = 0.47 cfs @ 12.32 hrs, Volume= 4,012 cf

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 90.28' @ 12.32 hrs Surf.Area= 2,367 sf Storage= 478 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.5 min (785.3 - 780.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	89.78'	1,647 cf	**27.75'W x 85.29'L x 2.71'H Field A** 6,410 cf Overall - 2,292 cf Embedded = 4,118 cf x 40.0% Voids
#2A	90.28'	2,292 cf	**Cultec R-180** x 104 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 8 rows
		3,939 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	89.78'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.47 cfs @ 12.32 hrs HW=90.28' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.47 cfs)

Pond CS1: CHAMBER SYSTEM 1 - Chamber Wizard Field A

Chamber Model = Cultec R-180 (Cultec Recharger® 180HD)
Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf
Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap
Row Length Adjustment= +1.00' x 3.44 sf x 8 rows

36.0" Wide + 3.0" Spacing = 39.0" C-C Row Spacing

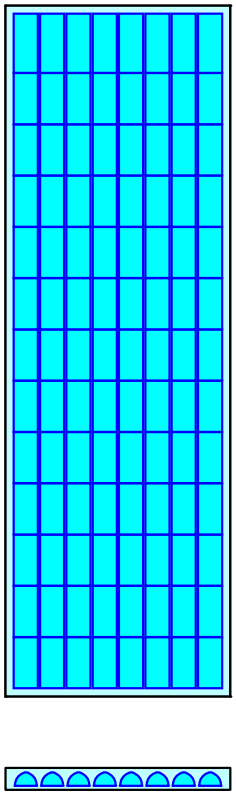
13 Chambers/Row x 6.33' Long +1.00' Row Adjustment = 83.29' Row Length +12.0" End Stone x 2 = 85.29' Base Length
8 Rows x 36.0" Wide + 3.0" Spacing x 7 + 12.0" Side Stone x 2 = 27.75' Base Width
6.0" Base + 20.5" Chamber Height + 6.0" Cover = 2.71' Field Height

104 Chambers x 21.8 cf +1.00' Row Adjustment x 3.44 sf x 8 Rows = 2,291.8 cf Chamber Storage

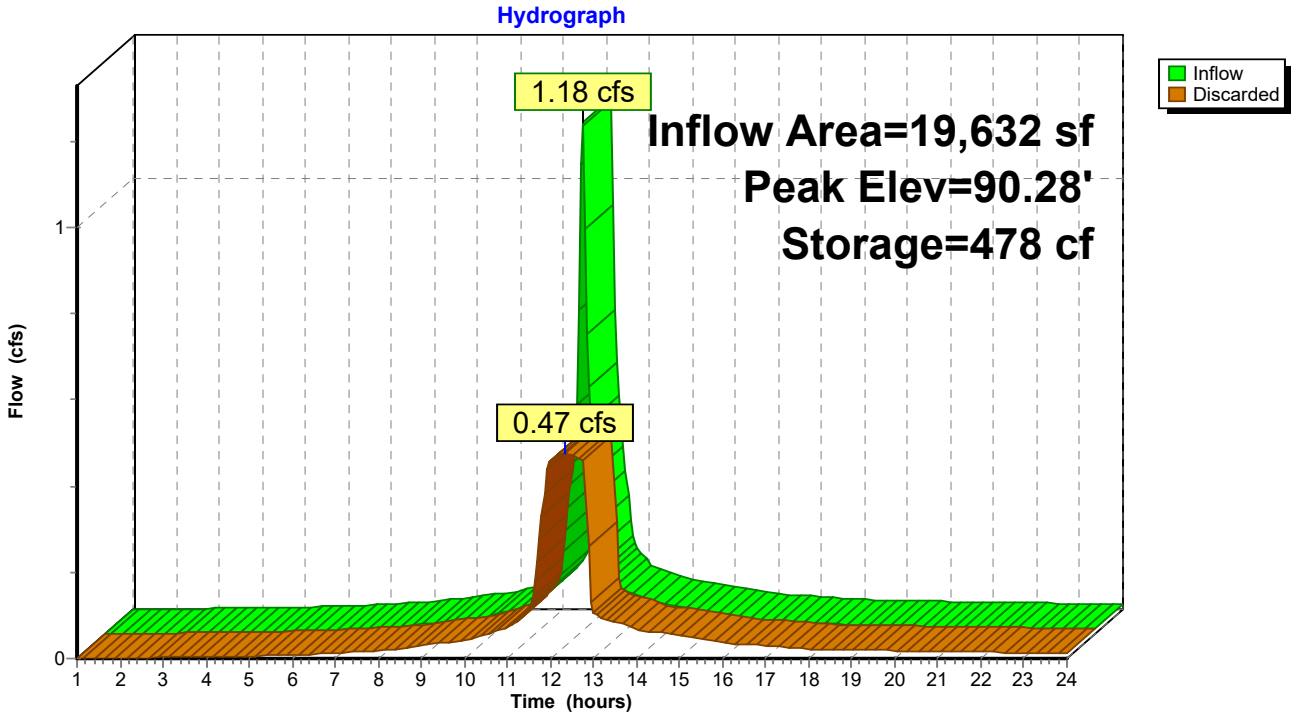
6,410.1 cf Field - 2,291.8 cf Chambers = 4,118.3 cf Stone x 40.0% Voids = 1,647.3 cf Stone Storage

Chamber Storage + Stone Storage = 3,939.1 cf = 0.090 af
Overall Storage Efficiency = 61.5%
Overall System Size = 85.29' x 27.75' x 2.71'

104 Chambers
237.4 cy Field
152.5 cy Stone



Pond CS1: CHAMBER SYSTEM 1



Summary for Pond CS2: CHAMBER SYSTEM 2

Inflow Area = 7,273 sf, 91.34% Impervious, Inflow Depth > 2.66" for 2-Year event
Inflow = 0.47 cfs @ 12.09 hrs, Volume= 1,615 cf
Outflow = 0.18 cfs @ 12.34 hrs, Volume= 1,614 cf, Atten= 63%, Lag= 15.2 min
Discarded = 0.18 cfs @ 12.34 hrs, Volume= 1,614 cf

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 89.09' @ 12.34 hrs Surf.Area= 821 sf Storage= 223 cf

Plug-Flow detention time= 6.1 min calculated for 1,614 cf (100% of inflow)
Center-of-Mass det. time= 6.0 min (780.9 - 774.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.50'	737 cf	**11.17'W x 73.50'L x 3.54'H Field A** 2,907 cf Overall - 1,065 cf Embedded = 1,841 cf x 40.0% Voids
#2A	89.00'	1,065 cf	**Cultec R-330XLHD** x 20 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,802 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.50'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.18 cfs @ 12.34 hrs HW=89.09' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.18 cfs)

Pond CS2: CHAMBER SYSTEM 2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

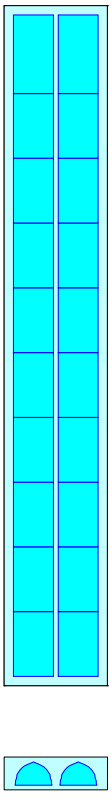
10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +12.0" End Stone x 2 = 73.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

20 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 1,065.5 cf Chamber Storage

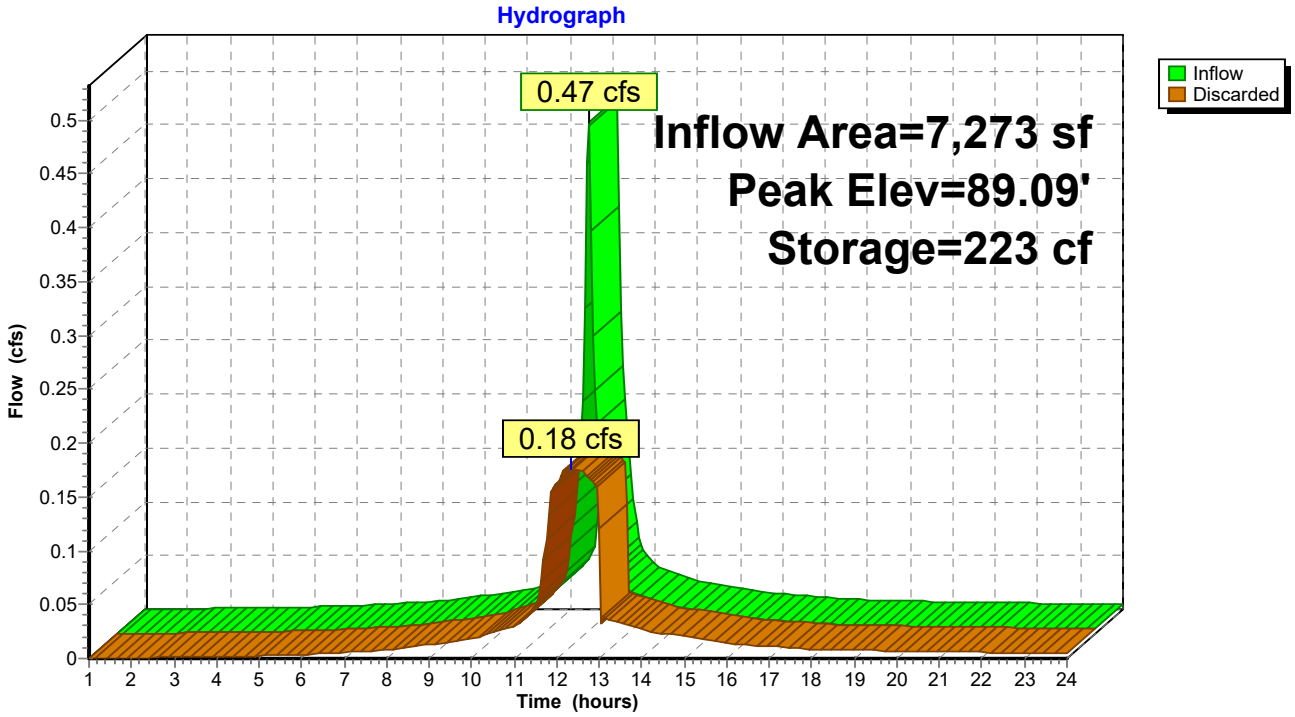
2,906.8 cf Field - 1,065.5 cf Chambers = 1,841.3 cf Stone x 40.0% Voids = 736.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,802.0 cf = 0.041 af
Overall Storage Efficiency = 62.0%
Overall System Size = 73.50' x 11.17' x 3.54'

20 Chambers
107.7 cy Field
68.2 cy Stone



Pond CS2: CHAMBER SYSTEM 2



Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 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 PR-1: TO MAZZEO DRIVE Runoff Area=2,897 sf 30.55% Impervious Runoff Depth>2.09"
Tc=6.0 min CN=72 Runoff=0.16 cfs 504 cf

Subcatchment PR-10: TO CB-7 Runoff Area=1,324 sf 100.00% Impervious Runoff Depth>4.62"
Tc=6.0 min CN=98 Runoff=0.14 cfs 510 cf

Subcatchment PR-11: TO OFFSITE NORTH Runoff Area=706 sf 0.00% Impervious Runoff Depth>0.69"
Tc=6.0 min CN=51 Runoff=0.01 cfs 40 cf

Subcatchment PR-12: TO OFFSITE WEST Runoff Area=4,145 sf 0.00% Impervious Runoff Depth>0.91"
Tc=6.0 min CN=55 Runoff=0.08 cfs 314 cf

Subcatchment PR-2: TO CB-1 Runoff Area=975 sf 100.00% Impervious Runoff Depth>4.62"
Tc=6.0 min CN=98 Runoff=0.10 cfs 375 cf

Subcatchment PR-3: TO CB-2 Runoff Area=3,788 sf 83.37% Impervious Runoff Depth>3.95"
Tc=6.0 min CN=92 Runoff=0.37 cfs 1,247 cf

Subcatchment PR-4: TO CB-3 Runoff Area=2,510 sf 100.00% Impervious Runoff Depth>4.62"
Tc=6.0 min CN=98 Runoff=0.27 cfs 966 cf

Subcatchment PR-5: TO OFFSITE EAST Runoff Area=1,291 sf 0.00% Impervious Runoff Depth>0.58"
Tc=6.0 min CN=49 Runoff=0.01 cfs 63 cf

Subcatchment PR-6: TO CB-4 Runoff Area=6,564 sf 86.94% Impervious Runoff Depth>4.06"
Tc=6.0 min CN=93 Runoff=0.66 cfs 2,220 cf

Subcatchment PR-7: ROOF RUNOFF Runoff Area=6,000 sf 100.00% Impervious Runoff Depth>4.62"
Tc=6.0 min CN=98 Runoff=0.64 cfs 2,310 cf

Subcatchment PR-8: TO CB-5 Runoff Area=3,425 sf 45.46% Impervious Runoff Depth>2.59"
Tc=6.0 min CN=78 Runoff=0.23 cfs 739 cf

Subcatchment PR-9: TO CB-6 Runoff Area=2,319 sf 87.62% Impervious Runoff Depth>4.06"
Tc=6.0 min CN=93 Runoff=0.23 cfs 784 cf

Reach 4R: MAZZEO DRIVE Inflow=0.16 cfs 504 cf
Outflow=0.16 cfs 504 cf

Reach 5R: OFFSITE WEST Inflow=0.08 cfs 314 cf
Outflow=0.08 cfs 314 cf

Reach 6R: OFFSITE NORTH Inflow=0.01 cfs 40 cf
Outflow=0.01 cfs 40 cf

Reach 8R: OFFSITE EAST Inflow=0.01 cfs 63 cf
Outflow=0.01 cfs 63 cf

Pond CS1: CHAMBER SYSTEM 1 Peak Elev=90.69' Storage=1,311 cf Inflow=1.91 cfs 6,563 cf
Outflow=0.49 cfs 6,562 cf

Pond CS2: CHAMBER SYSTEM 2 Peak Elev=89.57' Storage=540 cf Inflow=0.75 cfs 2,589 cf
Outflow=0.19 cfs 2,588 cf

Total Runoff Area = 35,944 sf Runoff Volume = 10,074 cf Average Runoff Depth = 3.36"
32.82% Pervious = 11,796 sf 67.18% Impervious = 24,148 sf

Summary for Subcatchment PR-1: TO MAZZEO DRIVE

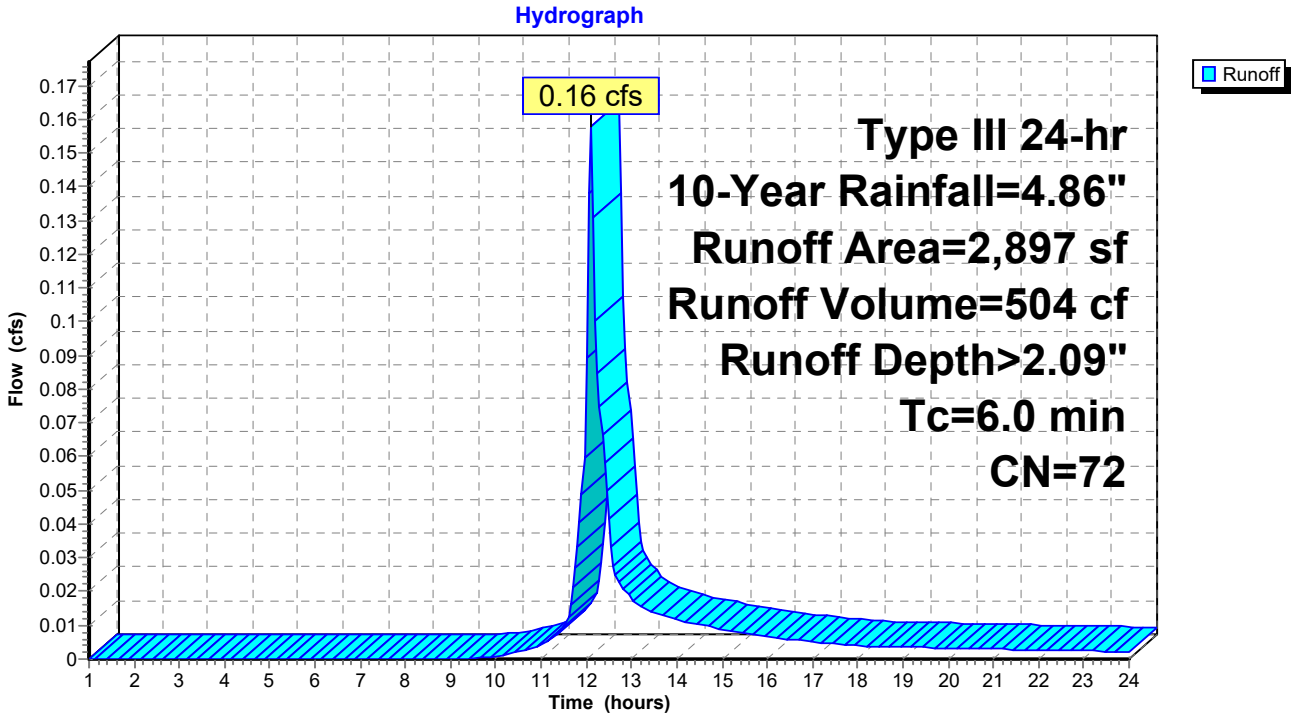
Runoff = 0.16 cfs @ 12.10 hrs, Volume= 504 cf, Depth> 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
	13	48	Brush, Good, HSG B
	1,999	61	>75% Grass cover, Good, HSG B
*	885	98	Impervious
	2,897	72	Weighted Average
	2,012		69.45% Pervious Area
	885		30.55% Impervious Area

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

Subcatchment PR-1: TO MAZZEO DRIVE



Summary for Subcatchment PR-10: TO CB-7

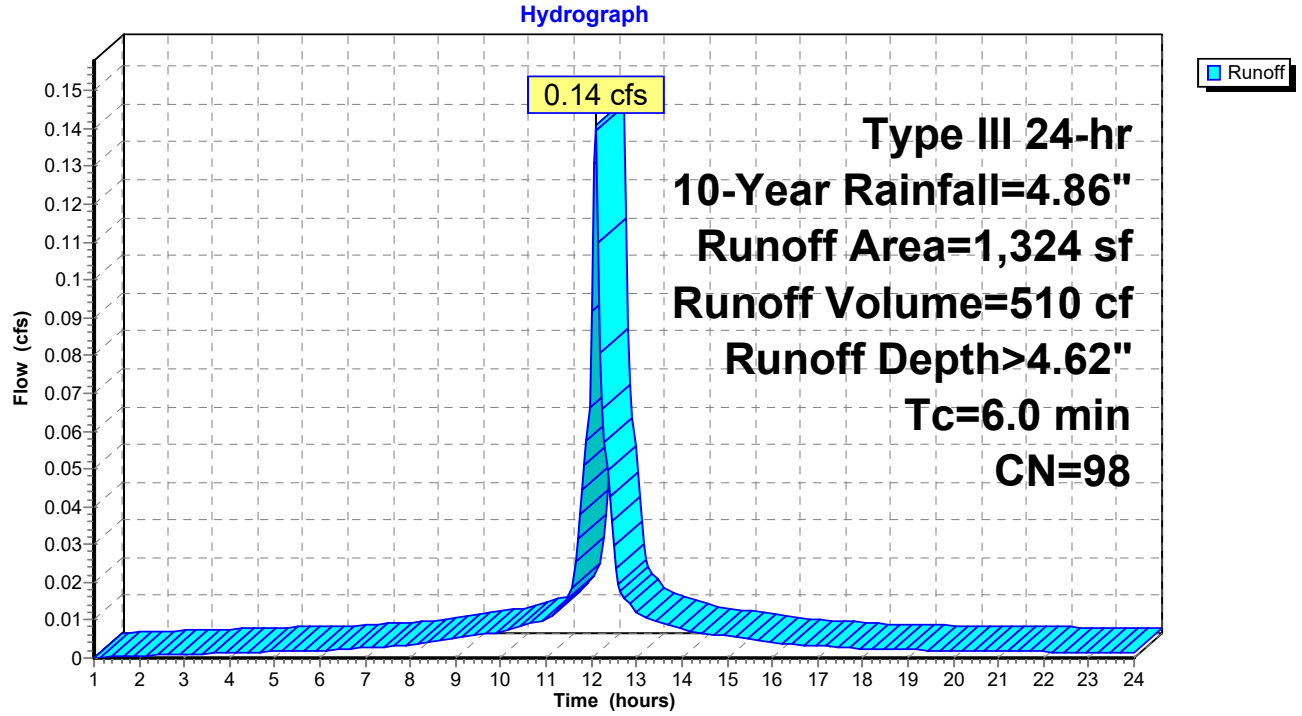
Runoff = 0.14 cfs @ 12.09 hrs, Volume= 510 cf, Depth> 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
*	1,324	98	Impervious
	1,324		100.00% Impervious Area

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

Subcatchment PR-10: TO CB-7



Summary for Subcatchment PR-11: TO OFFSITE NORTH

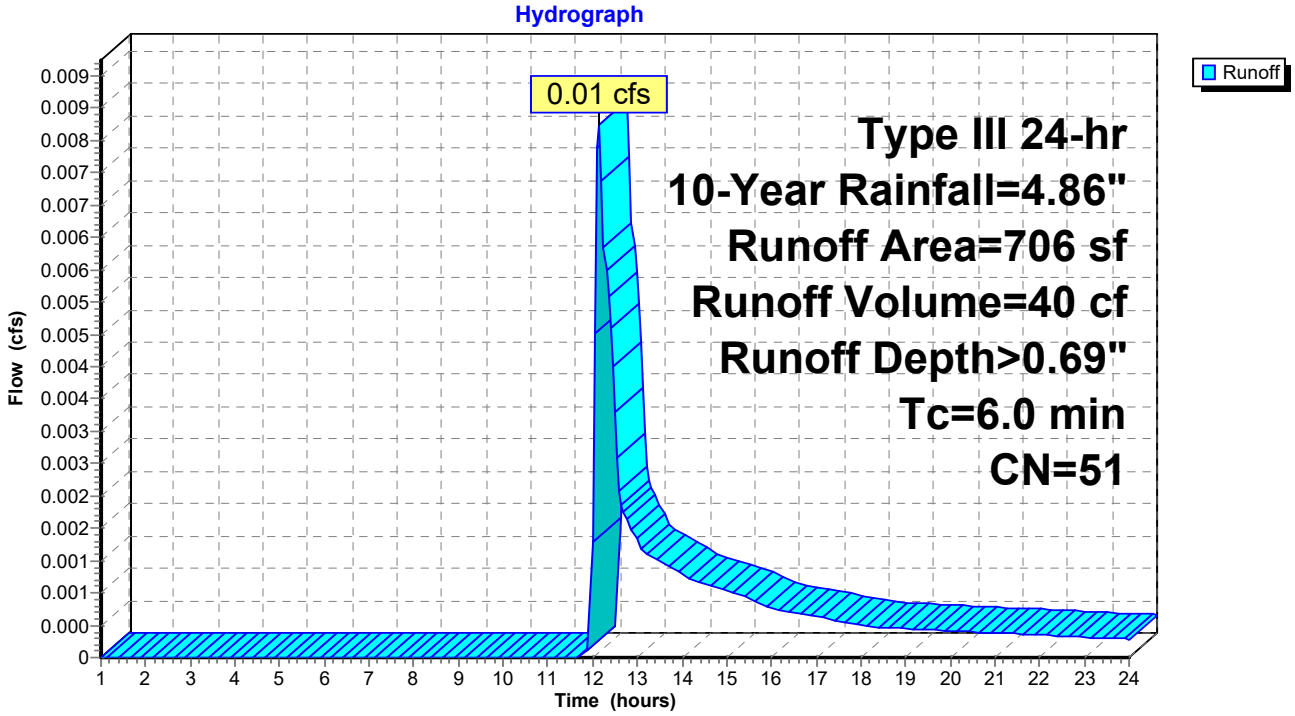
Runoff = 0.01 cfs @ 12.12 hrs, Volume= 40 cf, Depth> 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
27	96	Gravel surface, HSG B
593	48	Brush, Good, HSG B
86	61	>75% Grass cover, Good, HSG B
706	51	Weighted Average
706		100.00% Pervious Area

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

Subcatchment PR-11: TO OFFSITE NORTH



Summary for Subcatchment PR-12: TO OFFSITE WEST

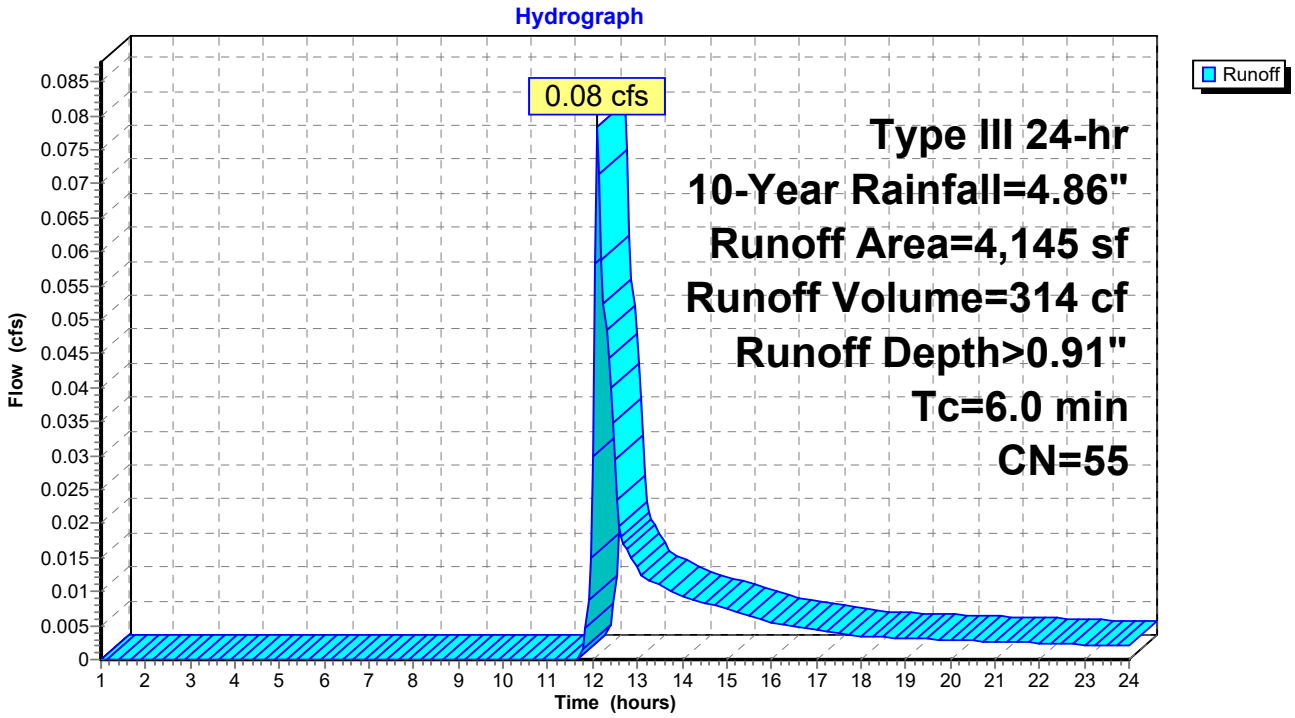
Runoff = 0.08 cfs @ 12.11 hrs, Volume= 314 cf, Depth> 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
83	96	Gravel surface, HSG B
2,238	48	Brush, Good, HSG B
1,824	61	>75% Grass cover, Good, HSG B
4,145	55	Weighted Average
4,145		100.00% Pervious Area

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

Subcatchment PR-12: TO OFFSITE WEST



Summary for Subcatchment PR-2: TO CB-1

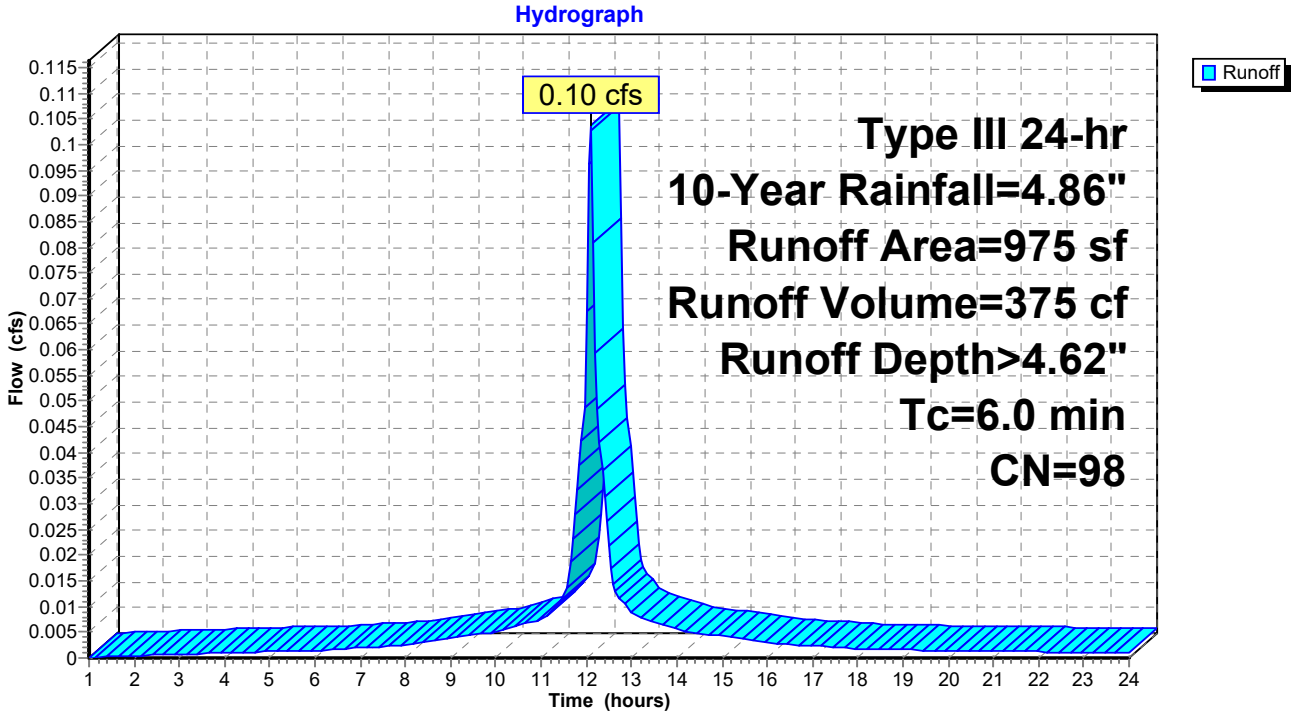
Runoff = 0.10 cfs @ 12.09 hrs, Volume= 375 cf, Depth> 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
*	975	98	Impervious
	975		100.00% Impervious Area

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

Subcatchment PR-2: TO CB-1



Summary for Subcatchment PR-3: TO CB-2

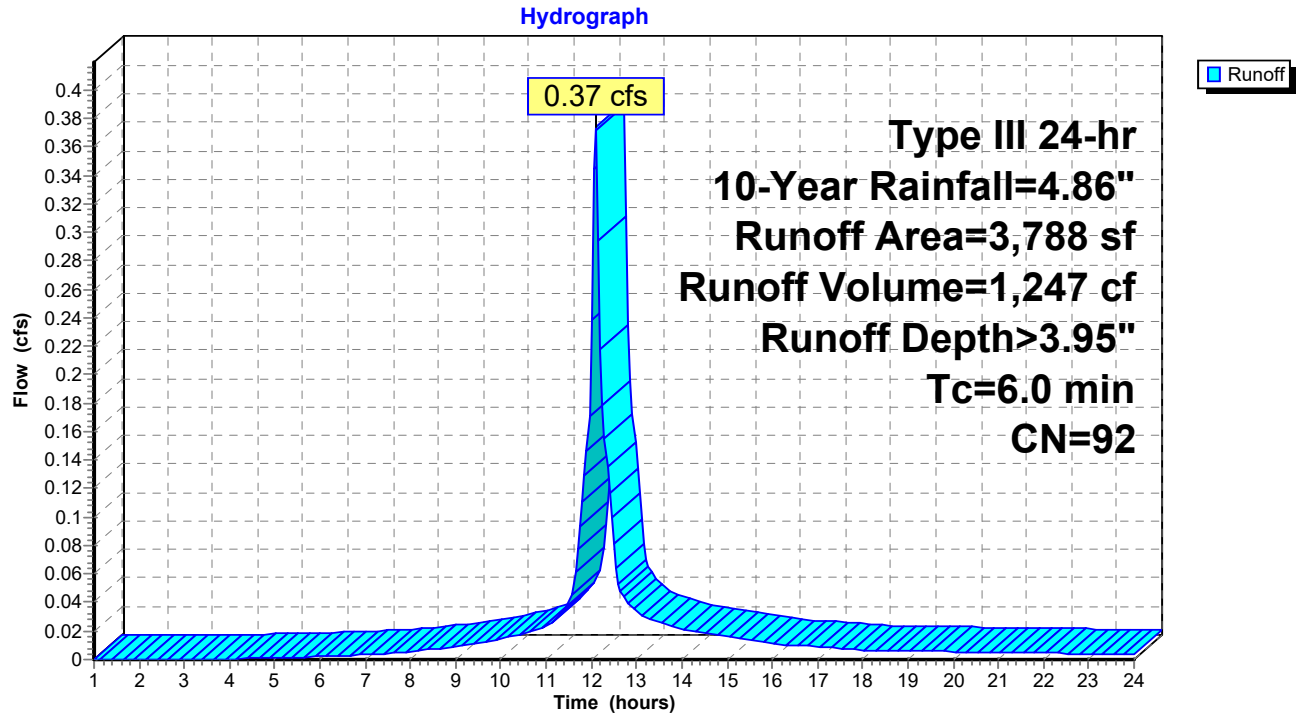
Runoff = 0.37 cfs @ 12.09 hrs, Volume= 1,247 cf, Depth> 3.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
*	3,158	98	Impervious
	630	61	>75% Grass cover, Good, HSG B
	3,788	92	Weighted Average
	630		16.63% Pervious Area
	3,158		83.37% Impervious Area

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

Subcatchment PR-3: TO CB-2



Summary for Subcatchment PR-4: TO CB-3

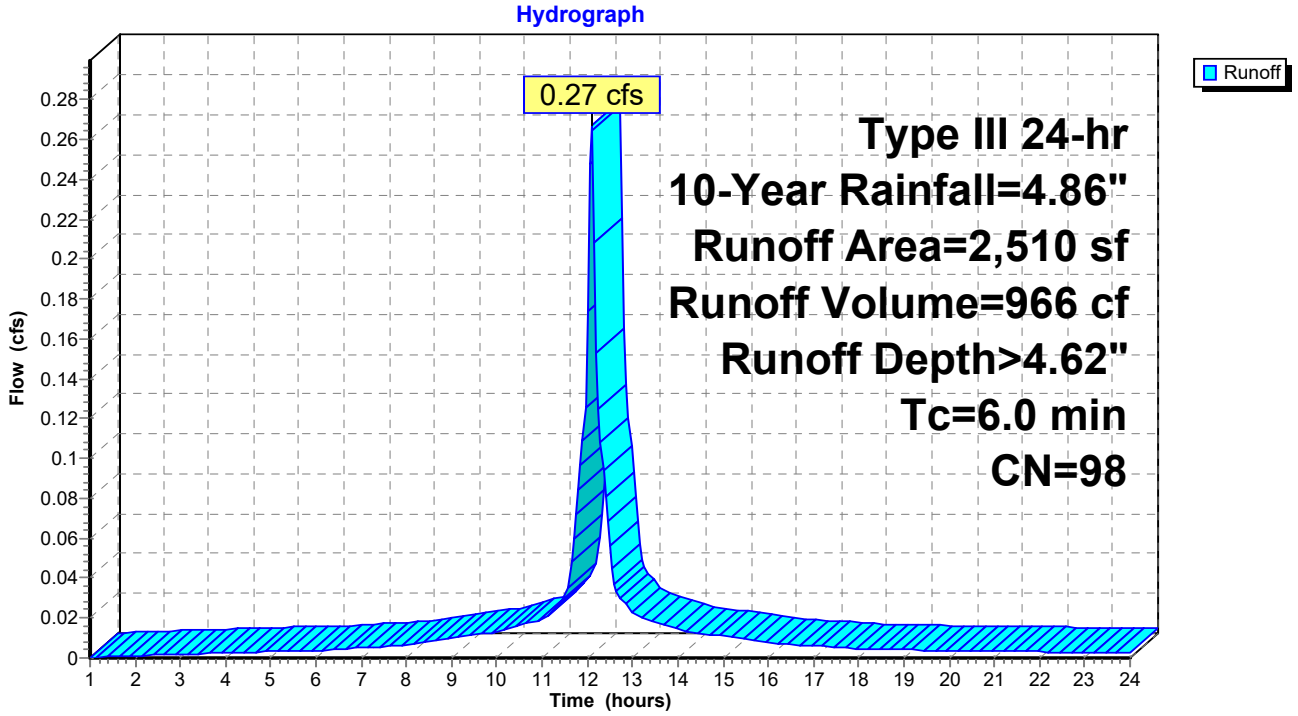
Runoff = 0.27 cfs @ 12.09 hrs, Volume= 966 cf, Depth> 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
*	2,510	98	Impervious
	2,510		100.00% Impervious Area

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

Subcatchment PR-4: TO CB-3



Summary for Subcatchment PR-5: TO OFFSITE EAST

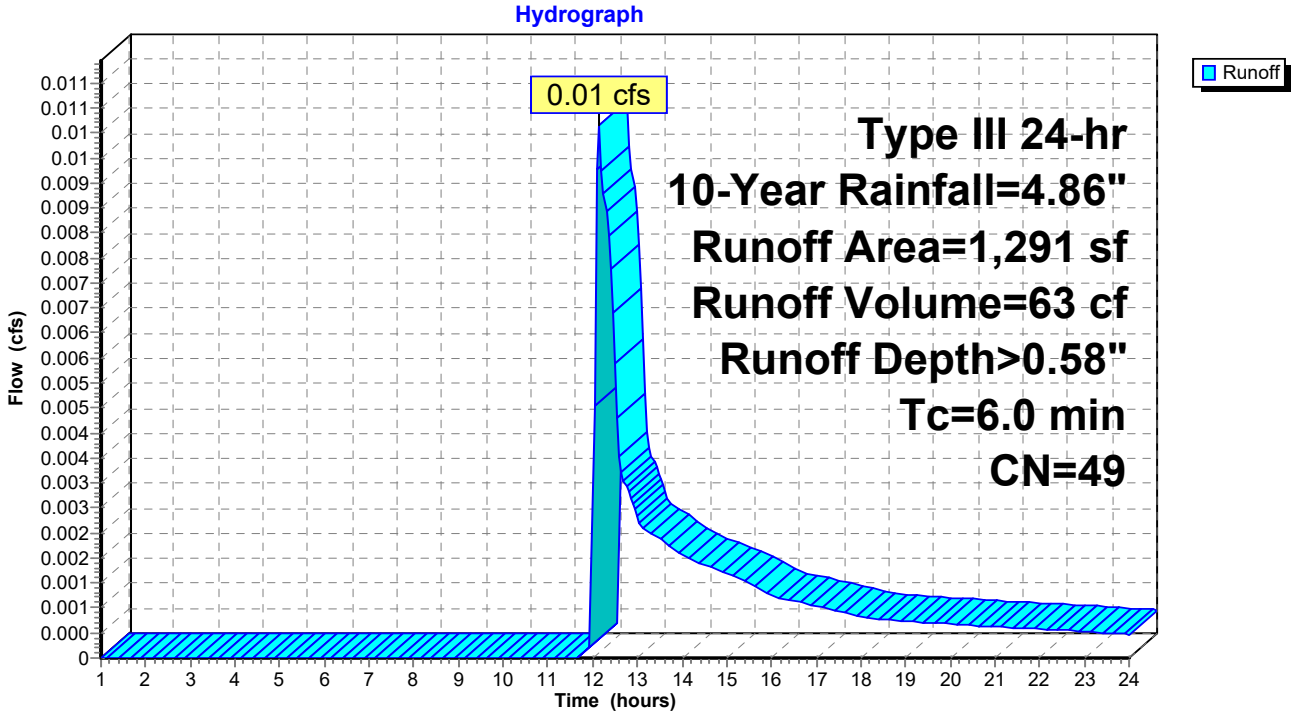
Runoff = 0.01 cfs @ 12.15 hrs, Volume= 63 cf, Depth> 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

Area (sf)	CN	Description
1,187	48	Brush, Good, HSG B
104	61	>75% Grass cover, Good, HSG B
1,291	49	Weighted Average
1,291		100.00% Pervious Area

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

Subcatchment PR-5: TO OFFSITE EAST



Summary for Subcatchment PR-6: TO CB-4

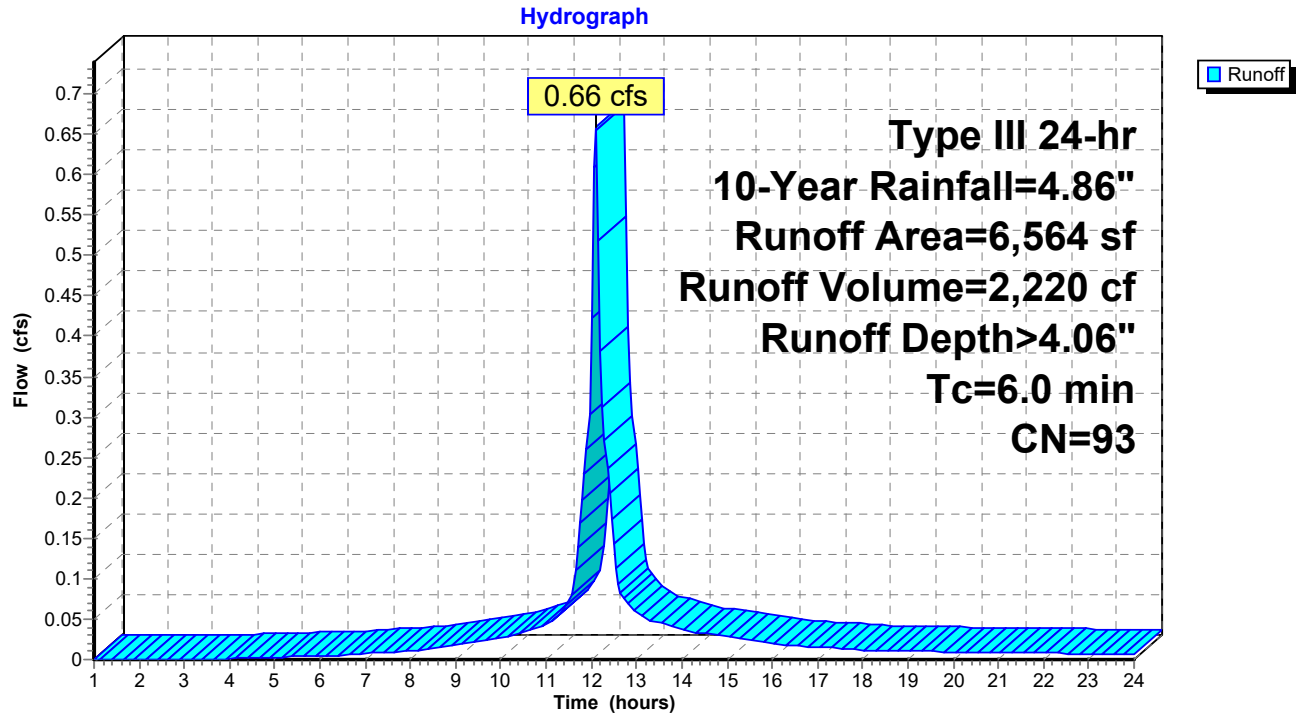
Runoff = 0.66 cfs @ 12.09 hrs, Volume= 2,220 cf, Depth> 4.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
*	5,707	98	Impervious
	857	61	>75% Grass cover, Good, HSG B
	6,564	93	Weighted Average
	857		13.06% Pervious Area
	5,707		86.94% Impervious Area

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

Subcatchment PR-6: TO CB-4



Summary for Subcatchment PR-7: ROOF RUNOFF

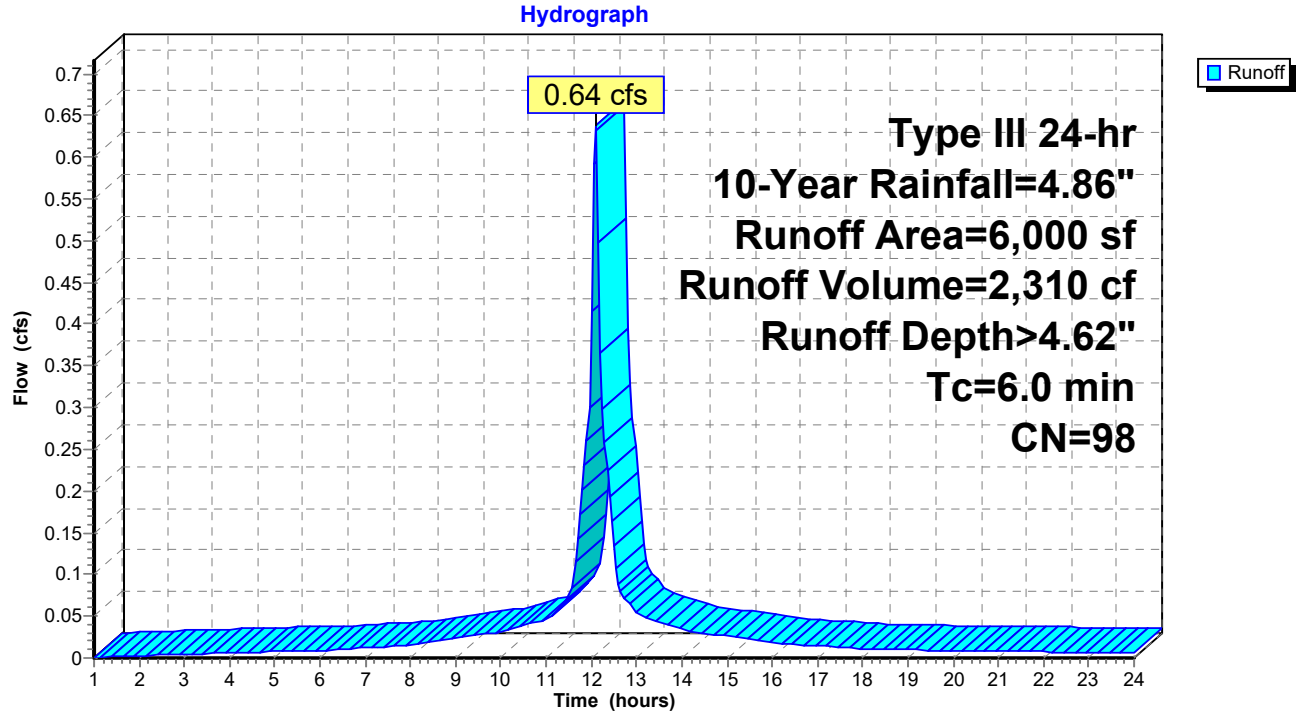
Runoff = 0.64 cfs @ 12.09 hrs, Volume= 2,310 cf, Depth> 4.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
*	6,000	98	Impervious
	6,000		100.00% Impervious Area

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

Subcatchment PR-7: ROOF RUNOFF



Summary for Subcatchment PR-8: TO CB-5

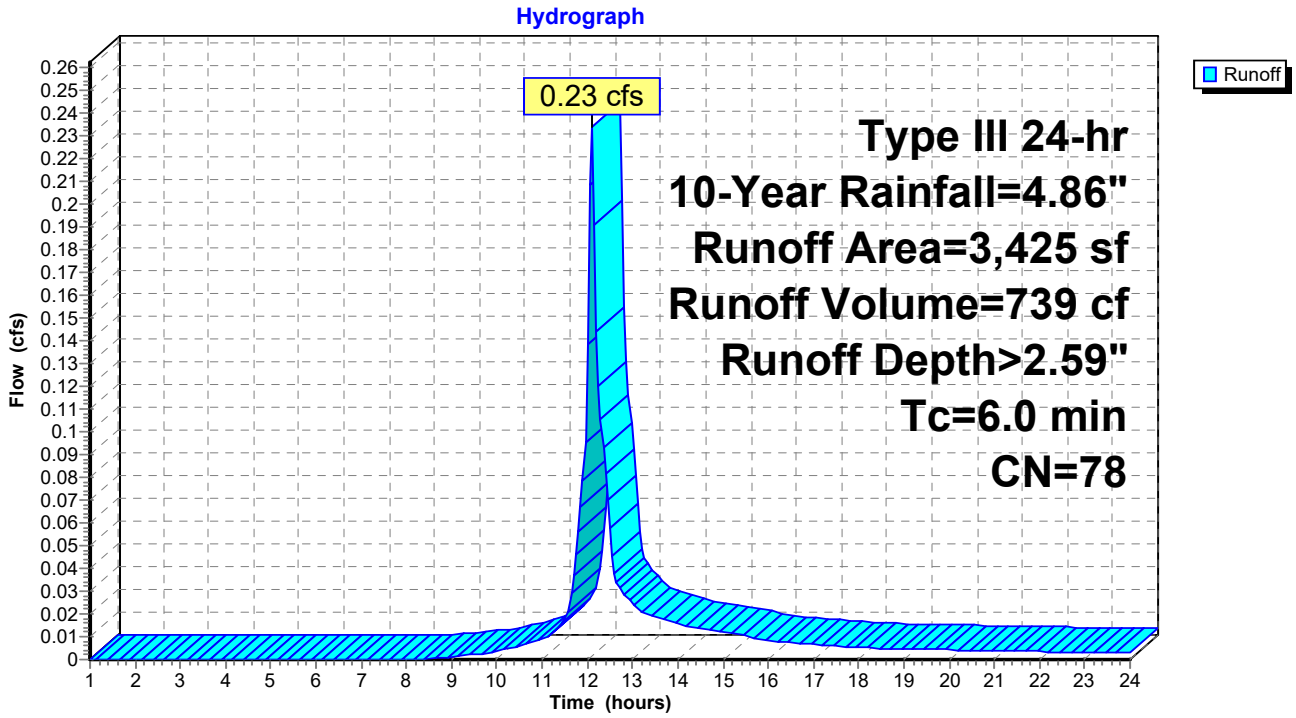
Runoff = 0.23 cfs @ 12.09 hrs, Volume= 739 cf, Depth> 2.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
*	1,557	98	Impervious
	1,868	61	>75% Grass cover, Good, HSG B
	3,425	78	Weighted Average
	1,868		54.54% Pervious Area
	1,557		45.46% Impervious Area

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

Subcatchment PR-8: TO CB-5



Summary for Subcatchment PR-9: TO CB-6

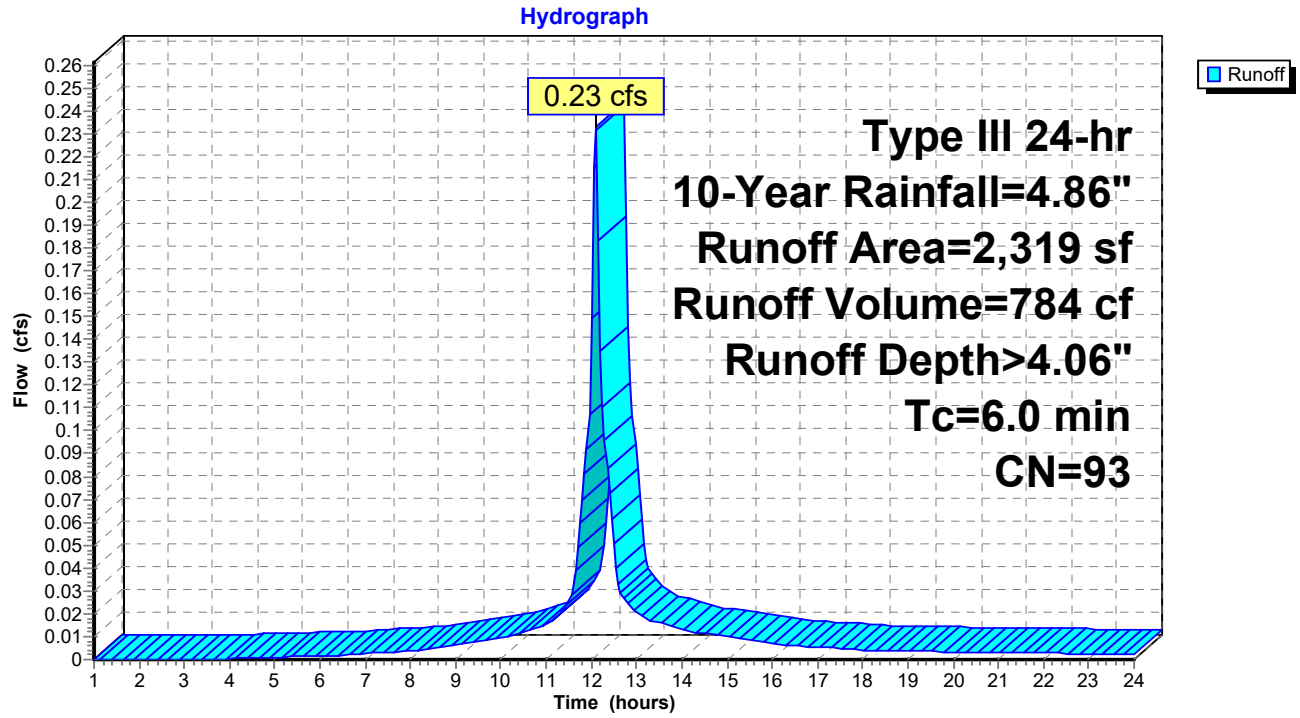
Runoff = 0.23 cfs @ 12.09 hrs, Volume= 784 cf, Depth> 4.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.86"

	Area (sf)	CN	Description
*	2,032	98	Impervious
	287	61	>75% Grass cover, Good, HSG B
	2,319	93	Weighted Average
	287		12.38% Pervious Area
	2,032		87.62% Impervious Area

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

Subcatchment PR-9: TO CB-6

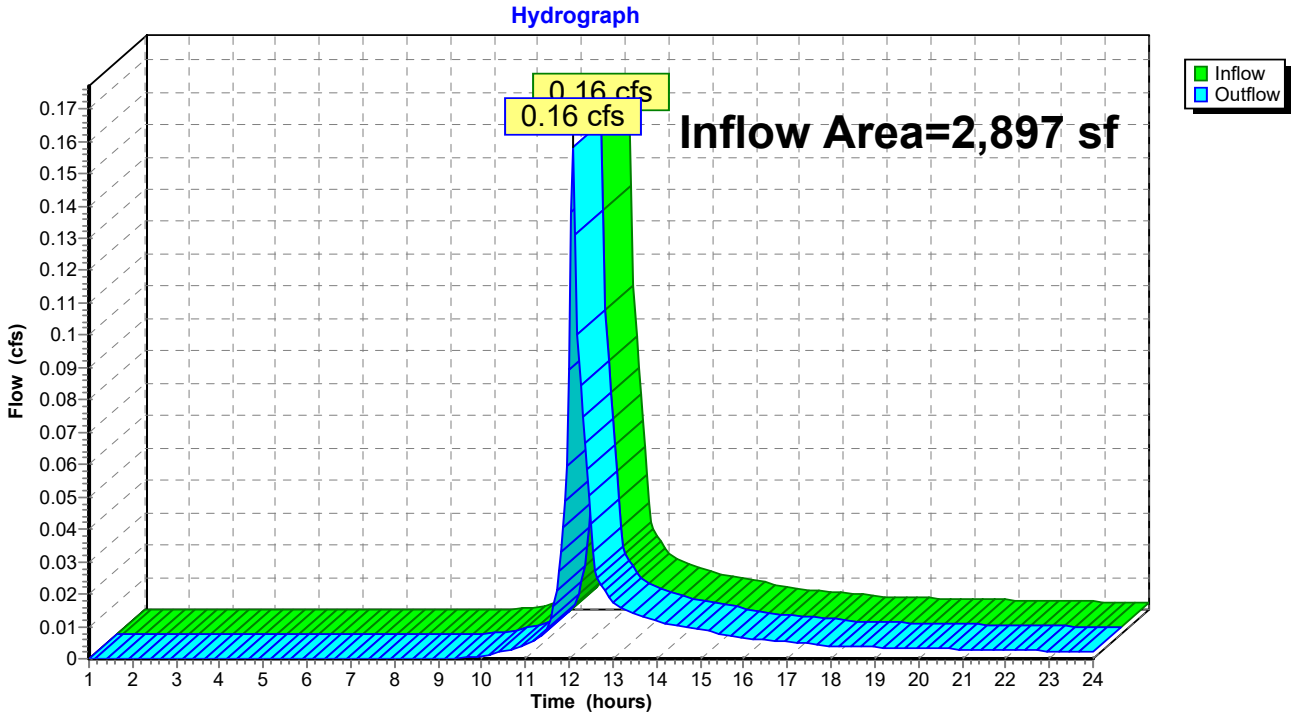


Summary for Reach 4R: MAZZEO DRIVE

Inflow Area = 2,897 sf, 30.55% Impervious, Inflow Depth > 2.09" for 10-Year event
Inflow = 0.16 cfs @ 12.10 hrs, Volume= 504 cf
Outflow = 0.16 cfs @ 12.10 hrs, Volume= 504 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 4R: MAZZEO DRIVE

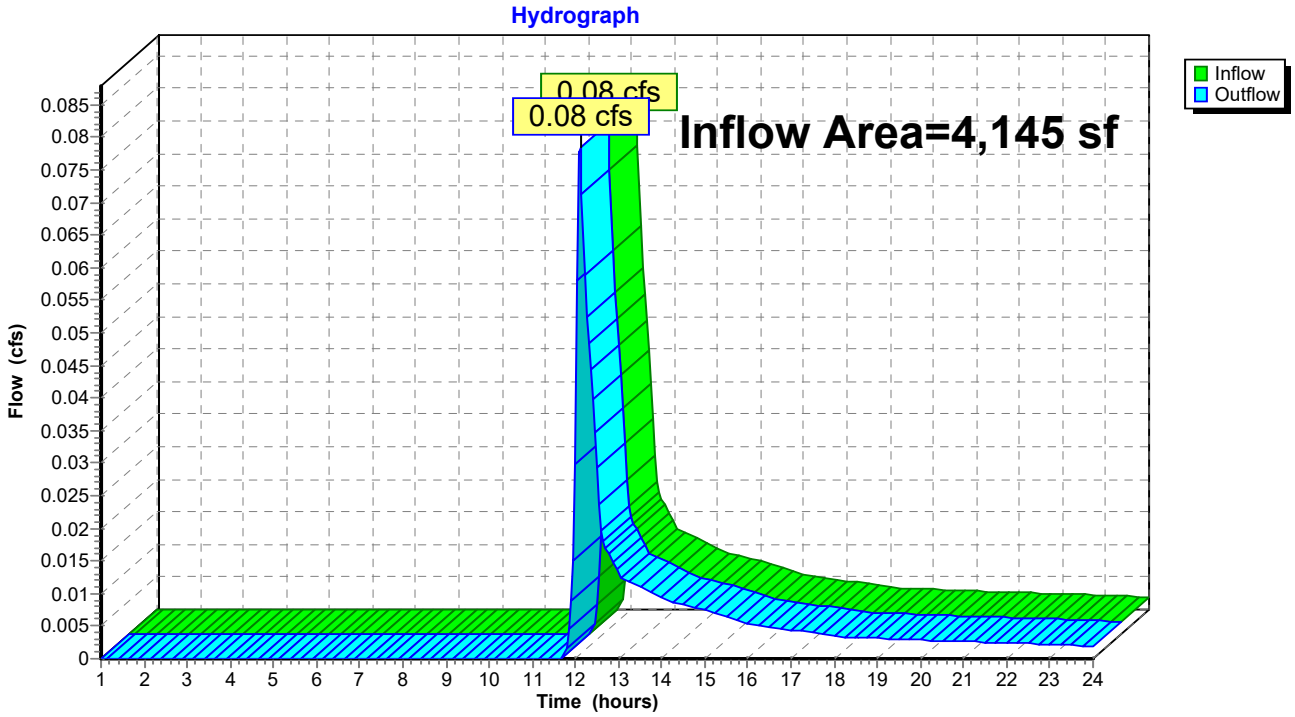


Summary for Reach 5R: OFFSITE WEST

Inflow Area = 4,145 sf, 0.00% Impervious, Inflow Depth > 0.91" for 10-Year event
Inflow = 0.08 cfs @ 12.11 hrs, Volume= 314 cf
Outflow = 0.08 cfs @ 12.11 hrs, Volume= 314 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 5R: OFFSITE WEST

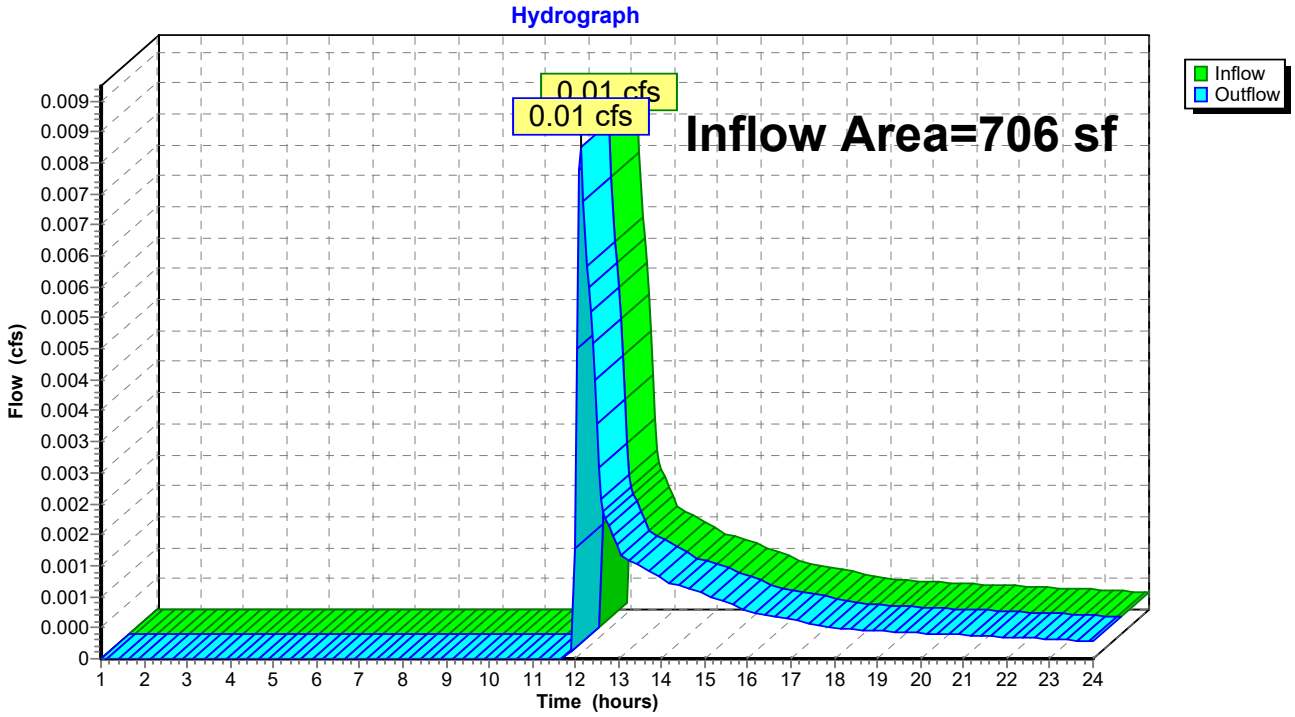


Summary for Reach 6R: OFFSITE NORTH

Inflow Area = 706 sf, 0.00% Impervious, Inflow Depth > 0.69" for 10-Year event
Inflow = 0.01 cfs @ 12.12 hrs, Volume= 40 cf
Outflow = 0.01 cfs @ 12.12 hrs, Volume= 40 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 6R: OFFSITE NORTH

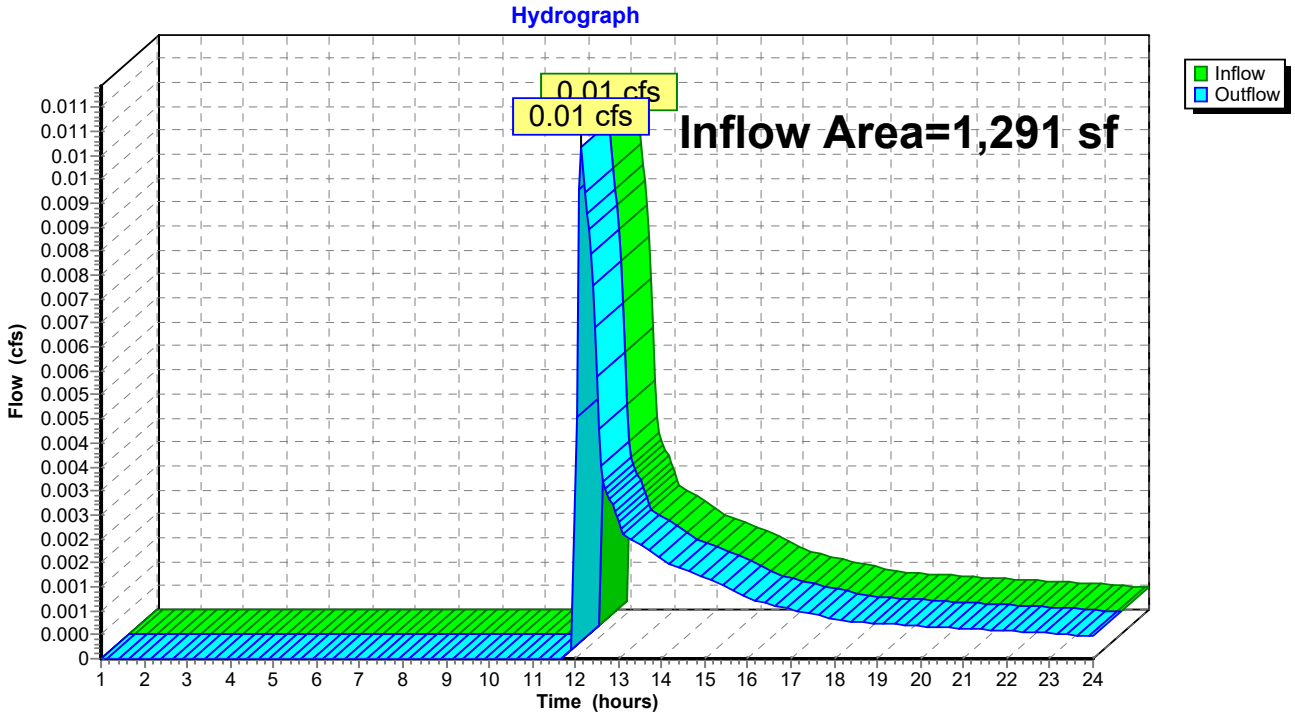


Summary for Reach 8R: OFFSITE EAST

Inflow Area = 1,291 sf, 0.00% Impervious, Inflow Depth > 0.58" for 10-Year event
Inflow = 0.01 cfs @ 12.15 hrs, Volume= 63 cf
Outflow = 0.01 cfs @ 12.15 hrs, Volume= 63 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 8R: OFFSITE EAST



Summary for Pond CS1: CHAMBER SYSTEM 1

Inflow Area = 19,632 sf, 84.66% Impervious, Inflow Depth > 4.01" for 10-Year event
Inflow = 1.91 cfs @ 12.09 hrs, Volume= 6,563 cf
Outflow = 0.49 cfs @ 12.46 hrs, Volume= 6,562 cf, Atten= 74%, Lag= 22.2 min
Discarded = 0.49 cfs @ 12.46 hrs, Volume= 6,562 cf

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 90.69' @ 12.46 hrs Surf.Area= 2,367 sf Storage= 1,311 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 13.1 min (784.2 - 771.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	89.78'	1,647 cf	**27.75'W x 85.29'L x 2.71'H Field A** 6,410 cf Overall - 2,292 cf Embedded = 4,118 cf x 40.0% Voids
#2A	90.28'	2,292 cf	**Cultec R-180** x 104 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 8 rows
		3,939 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	89.78'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.49 cfs @ 12.46 hrs HW=90.69' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.49 cfs)

Pond CS1: CHAMBER SYSTEM 1 - Chamber Wizard Field A

Chamber Model = Cultec R-180 (Cultec Recharger®180HD)
Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf
Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap
Row Length Adjustment= +1.00' x 3.44 sf x 8 rows

36.0" Wide + 3.0" Spacing = 39.0" C-C Row Spacing

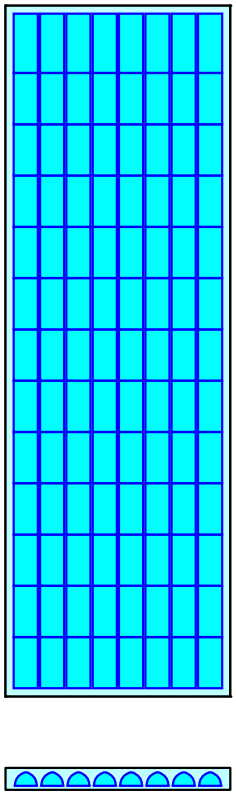
13 Chambers/Row x 6.33' Long +1.00' Row Adjustment = 83.29' Row Length +12.0" End Stone x 2 = 85.29' Base Length
8 Rows x 36.0" Wide + 3.0" Spacing x 7 + 12.0" Side Stone x 2 = 27.75' Base Width
6.0" Base + 20.5" Chamber Height + 6.0" Cover = 2.71' Field Height

104 Chambers x 21.8 cf +1.00' Row Adjustment x 3.44 sf x 8 Rows = 2,291.8 cf Chamber Storage

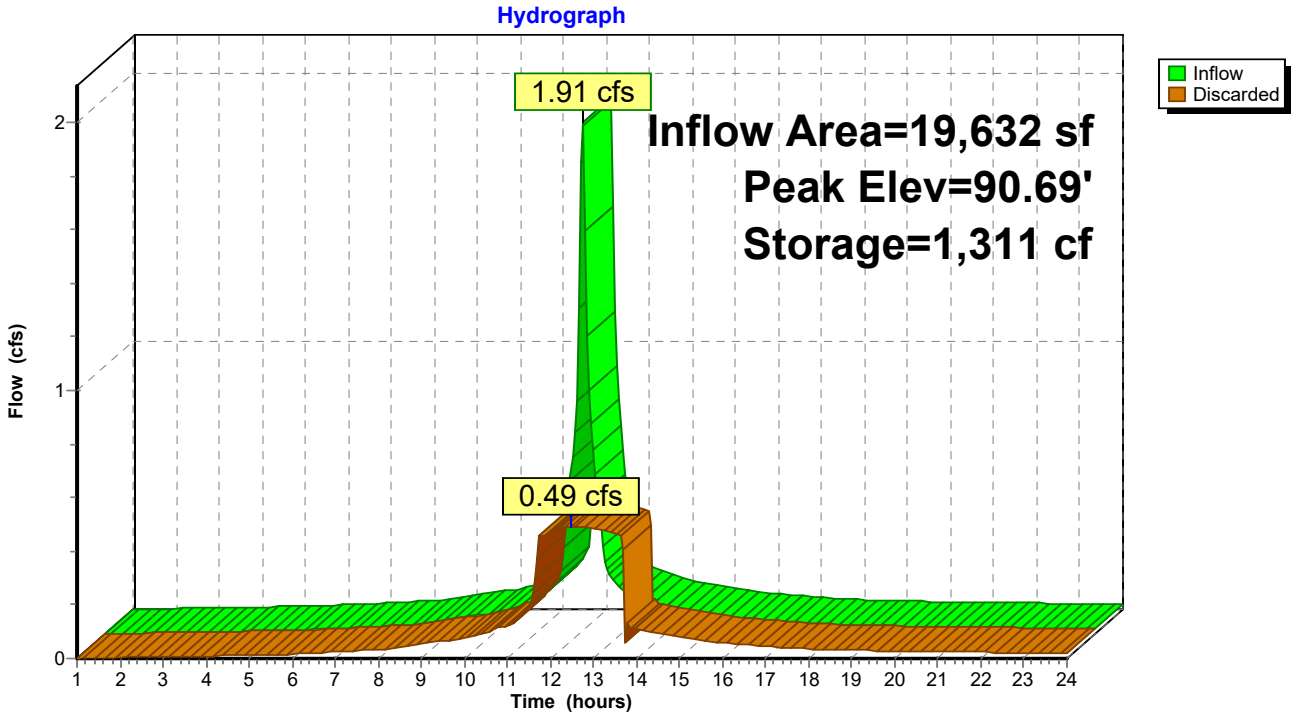
6,410.1 cf Field - 2,291.8 cf Chambers = 4,118.3 cf Stone x 40.0% Voids = 1,647.3 cf Stone Storage

Chamber Storage + Stone Storage = 3,939.1 cf = 0.090 af
Overall Storage Efficiency = 61.5%
Overall System Size = 85.29' x 27.75' x 2.71'

104 Chambers
237.4 cy Field
152.5 cy Stone



Pond CS1: CHAMBER SYSTEM 1



Summary for Pond CS2: CHAMBER SYSTEM 2

Inflow Area = 7,273 sf, 91.34% Impervious, Inflow Depth > 4.27" for 10-Year event
Inflow = 0.75 cfs @ 12.09 hrs, Volume= 2,589 cf
Outflow = 0.19 cfs @ 12.45 hrs, Volume= 2,588 cf, Atten= 74%, Lag= 22.0 min
Discarded = 0.19 cfs @ 12.45 hrs, Volume= 2,588 cf

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 89.57' @ 12.45 hrs Surf.Area= 821 sf Storage= 540 cf

Plug-Flow detention time= 14.8 min calculated for 2,583 cf (100% of inflow)
Center-of-Mass det. time= 14.6 min (779.6 - 765.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.50'	737 cf	**11.17'W x 73.50'L x 3.54'H Field A** 2,907 cf Overall - 1,065 cf Embedded = 1,841 cf x 40.0% Voids
#2A	89.00'	1,065 cf	**Cultec R-330XLHD** x 20 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,802 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.50'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.19 cfs @ 12.45 hrs HW=89.57' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.19 cfs)

Pond CS2: CHAMBER SYSTEM 2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

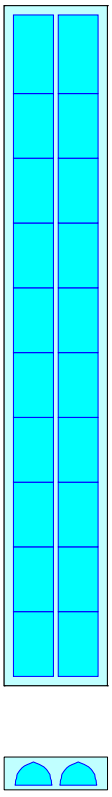
10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +12.0" End Stone x 2 = 73.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

20 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 1,065.5 cf Chamber Storage

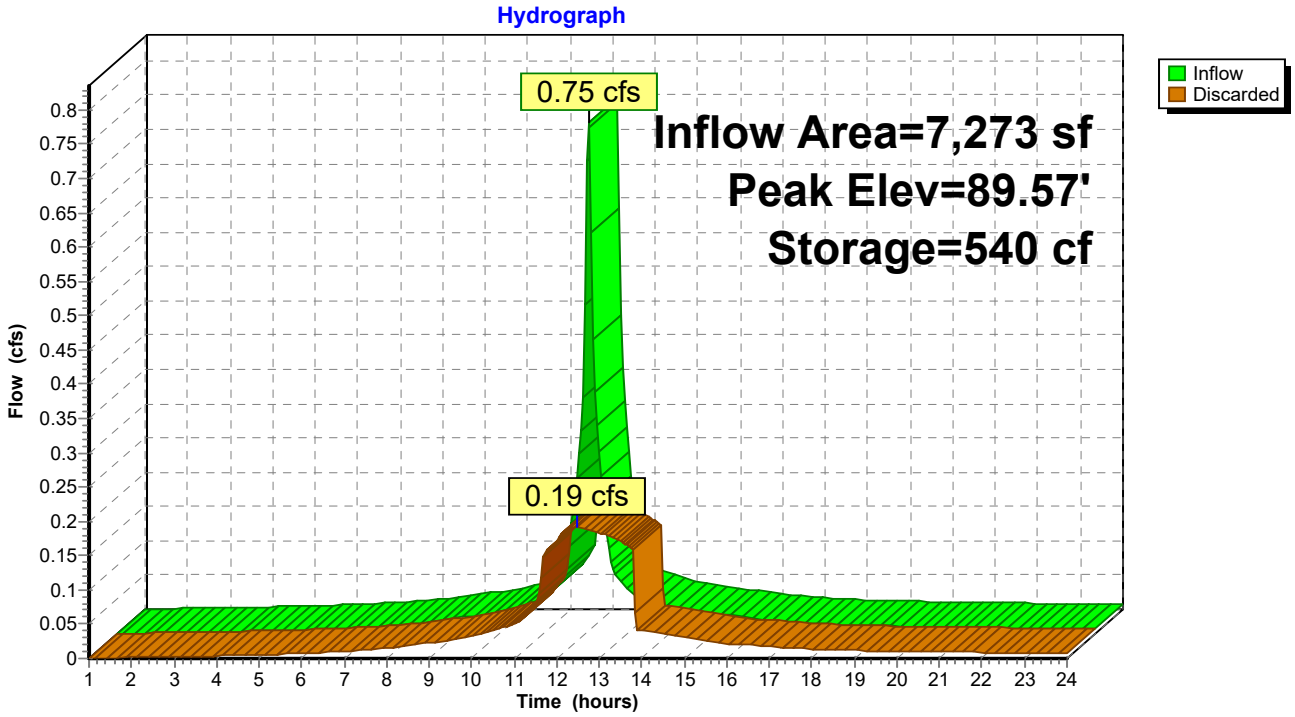
2,906.8 cf Field - 1,065.5 cf Chambers = 1,841.3 cf Stone x 40.0% Voids = 736.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,802.0 cf = 0.041 af
Overall Storage Efficiency = 62.0%
Overall System Size = 73.50' x 11.17' x 3.54'

20 Chambers
107.7 cy Field
68.2 cy Stone



Pond CS2: CHAMBER SYSTEM 2



Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 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 PR-1: TO MAZZEO DRIVE Runoff Area=2,897 sf 30.55% Impervious Runoff Depth>3.11"
Tc=6.0 min CN=72 Runoff=0.24 cfs 752 cf

Subcatchment PR-10: TO CB-7 Runoff Area=1,324 sf 100.00% Impervious Runoff Depth>5.91"
Tc=6.0 min CN=98 Runoff=0.18 cfs 652 cf

Subcatchment PR-11: TO OFFSITE NORTH Runoff Area=706 sf 0.00% Impervious Runoff Depth>1.29"
Tc=6.0 min CN=51 Runoff=0.02 cfs 76 cf

Subcatchment PR-12: TO OFFSITE WEST Runoff Area=4,145 sf 0.00% Impervious Runoff Depth>1.60"
Tc=6.0 min CN=55 Runoff=0.16 cfs 554 cf

Subcatchment PR-2: TO CB-1 Runoff Area=975 sf 100.00% Impervious Runoff Depth>5.91"
Tc=6.0 min CN=98 Runoff=0.13 cfs 480 cf

Subcatchment PR-3: TO CB-2 Runoff Area=3,788 sf 83.37% Impervious Runoff Depth>5.21"
Tc=6.0 min CN=92 Runoff=0.49 cfs 1,646 cf

Subcatchment PR-4: TO CB-3 Runoff Area=2,510 sf 100.00% Impervious Runoff Depth>5.91"
Tc=6.0 min CN=98 Runoff=0.34 cfs 1,236 cf

Subcatchment PR-5: TO OFFSITE EAST Runoff Area=1,291 sf 0.00% Impervious Runoff Depth>1.14"
Tc=6.0 min CN=49 Runoff=0.03 cfs 123 cf

Subcatchment PR-6: TO CB-4 Runoff Area=6,564 sf 86.94% Impervious Runoff Depth>5.33"
Tc=6.0 min CN=93 Runoff=0.85 cfs 2,914 cf

Subcatchment PR-7: ROOF RUNOFF Runoff Area=6,000 sf 100.00% Impervious Runoff Depth>5.91"
Tc=6.0 min CN=98 Runoff=0.81 cfs 2,954 cf

Subcatchment PR-8: TO CB-5 Runoff Area=3,425 sf 45.46% Impervious Runoff Depth>3.71"
Tc=6.0 min CN=78 Runoff=0.33 cfs 1,058 cf

Subcatchment PR-9: TO CB-6 Runoff Area=2,319 sf 87.62% Impervious Runoff Depth>5.33"
Tc=6.0 min CN=93 Runoff=0.30 cfs 1,029 cf

Reach 4R: MAZZEO DRIVE Inflow=0.24 cfs 752 cf
Outflow=0.24 cfs 752 cf

Reach 5R: OFFSITE WEST Inflow=0.16 cfs 554 cf
Outflow=0.16 cfs 554 cf

Reach 6R: OFFSITE NORTH Inflow=0.02 cfs 76 cf
Outflow=0.02 cfs 76 cf

Reach 8R: OFFSITE EAST Inflow=0.03 cfs 123 cf
Outflow=0.03 cfs 123 cf

Pond CS1: CHAMBER SYSTEM 1 Peak Elev=91.09' Storage=2,075 cf Inflow=2.48 cfs 8,607 cf
Outflow=0.51 cfs 8,606 cf

Pond CS2: CHAMBER SYSTEM 2 Peak Elev=89.99' Storage=815 cf Inflow=0.96 cfs 3,361 cf
Outflow=0.21 cfs 3,361 cf

Total Runoff Area = 35,944 sf Runoff Volume = 13,473 cf Average Runoff Depth = 4.50"
32.82% Pervious = 11,796 sf 67.18% Impervious = 24,148 sf

Summary for Subcatchment PR-1: TO MAZZEO DRIVE

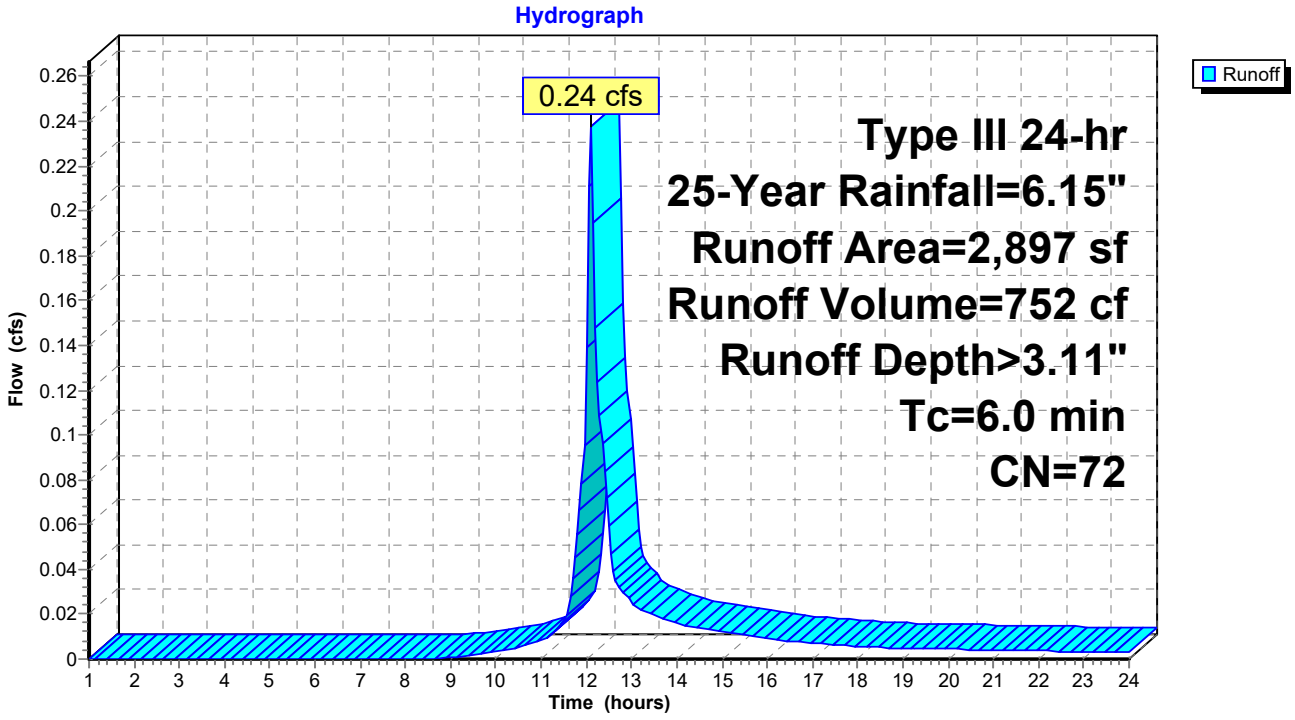
Runoff = 0.24 cfs @ 12.09 hrs, Volume= 752 cf, Depth> 3.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
	13	48	Brush, Good, HSG B
	1,999	61	>75% Grass cover, Good, HSG B
*	885	98	Impervious
	2,897	72	Weighted Average
	2,012		69.45% Pervious Area
	885		30.55% Impervious Area

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

Subcatchment PR-1: TO MAZZEO DRIVE



Summary for Subcatchment PR-10: TO CB-7

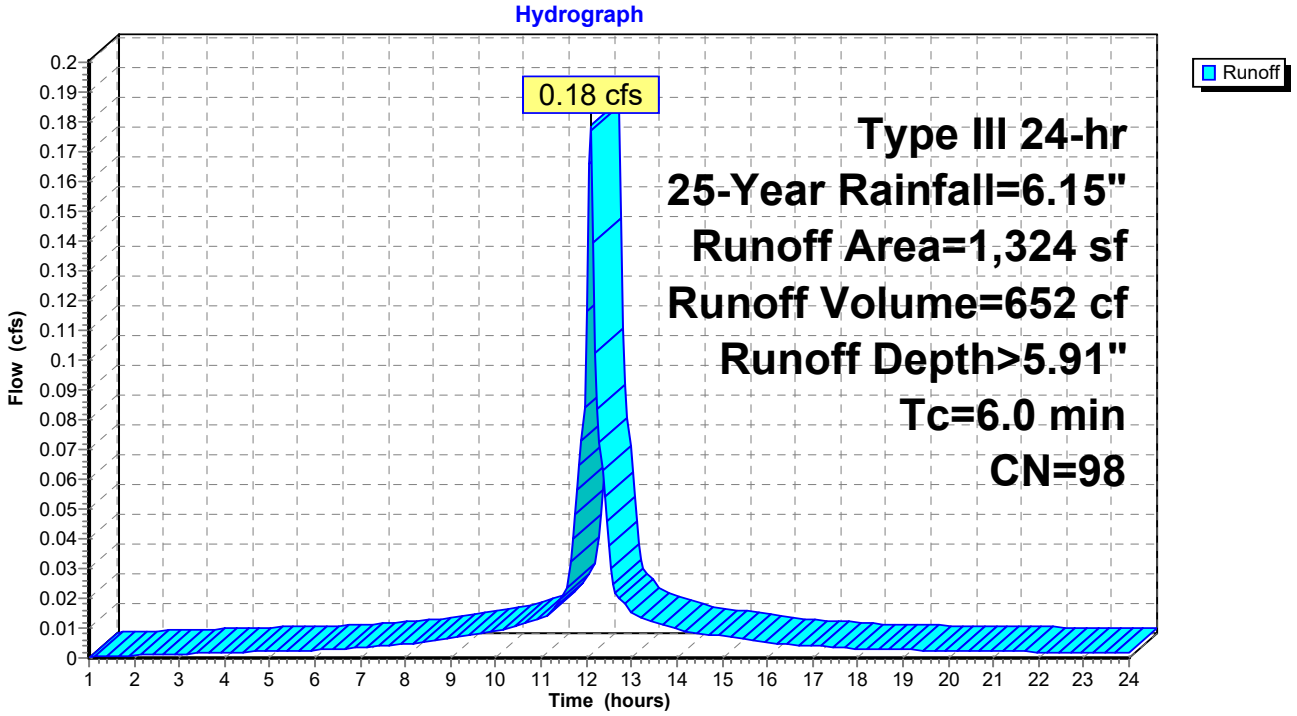
Runoff = 0.18 cfs @ 12.09 hrs, Volume= 652 cf, Depth> 5.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
*	1,324	98	Impervious
	1,324		100.00% Impervious Area

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

Subcatchment PR-10: TO CB-7



Summary for Subcatchment PR-11: TO OFFSITE NORTH

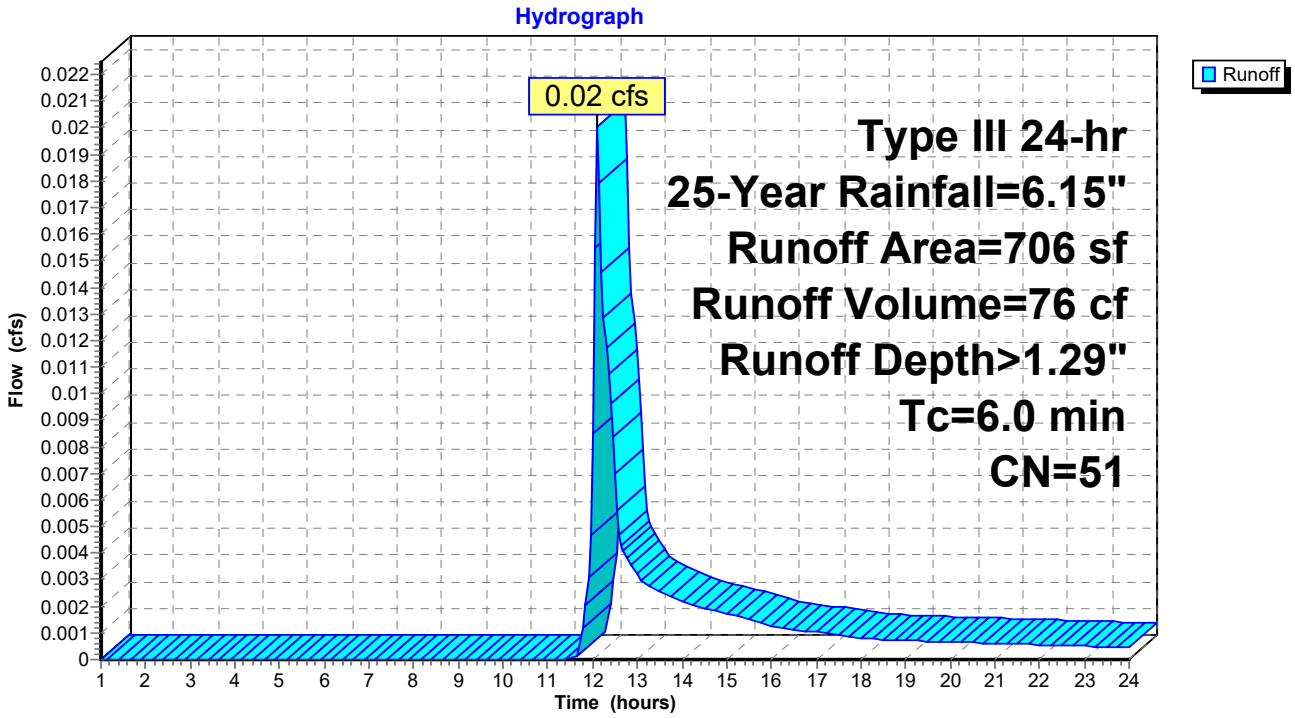
Runoff = 0.02 cfs @ 12.11 hrs, Volume= 76 cf, Depth> 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

Area (sf)	CN	Description
27	96	Gravel surface, HSG B
593	48	Brush, Good, HSG B
86	61	>75% Grass cover, Good, HSG B
706	51	Weighted Average
706		100.00% Pervious Area

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

Subcatchment PR-11: TO OFFSITE NORTH



Summary for Subcatchment PR-12: TO OFFSITE WEST

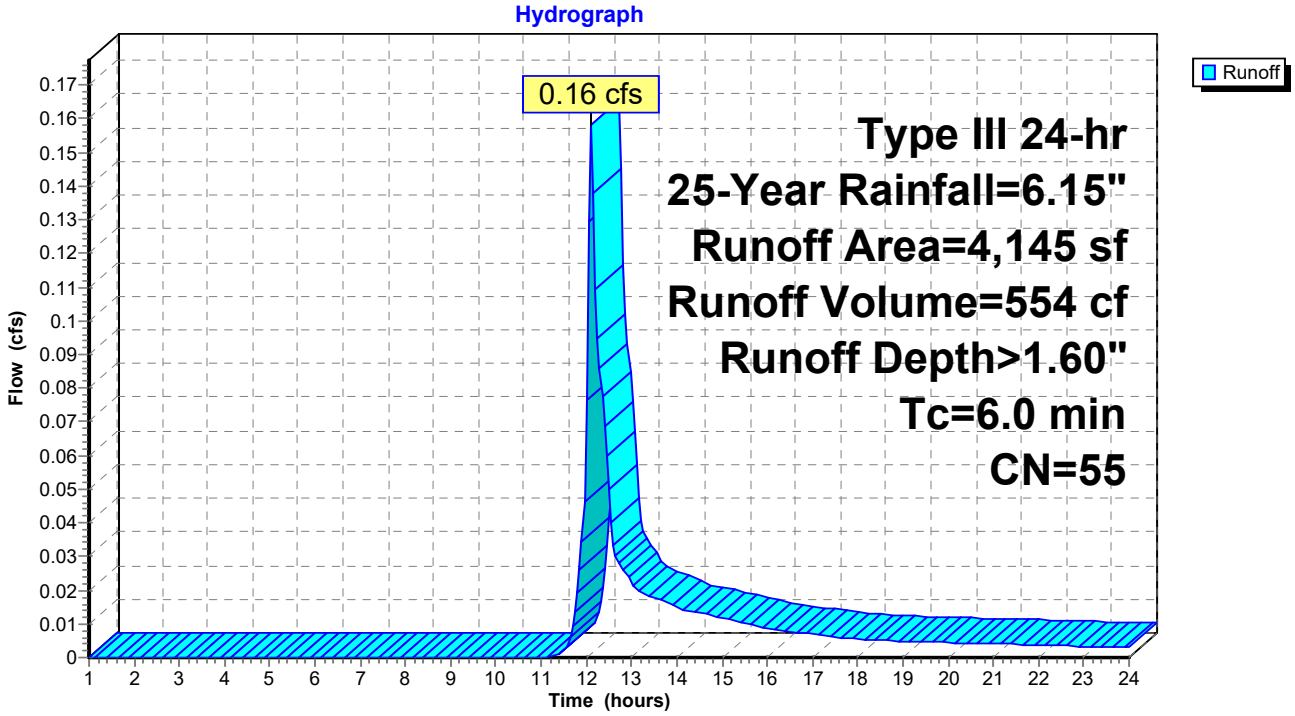
Runoff = 0.16 cfs @ 12.10 hrs, Volume= 554 cf, Depth> 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

Area (sf)	CN	Description
83	96	Gravel surface, HSG B
2,238	48	Brush, Good, HSG B
1,824	61	>75% Grass cover, Good, HSG B
4,145	55	Weighted Average
4,145		100.00% Pervious Area

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

Subcatchment PR-12: TO OFFSITE WEST



Summary for Subcatchment PR-2: TO CB-1

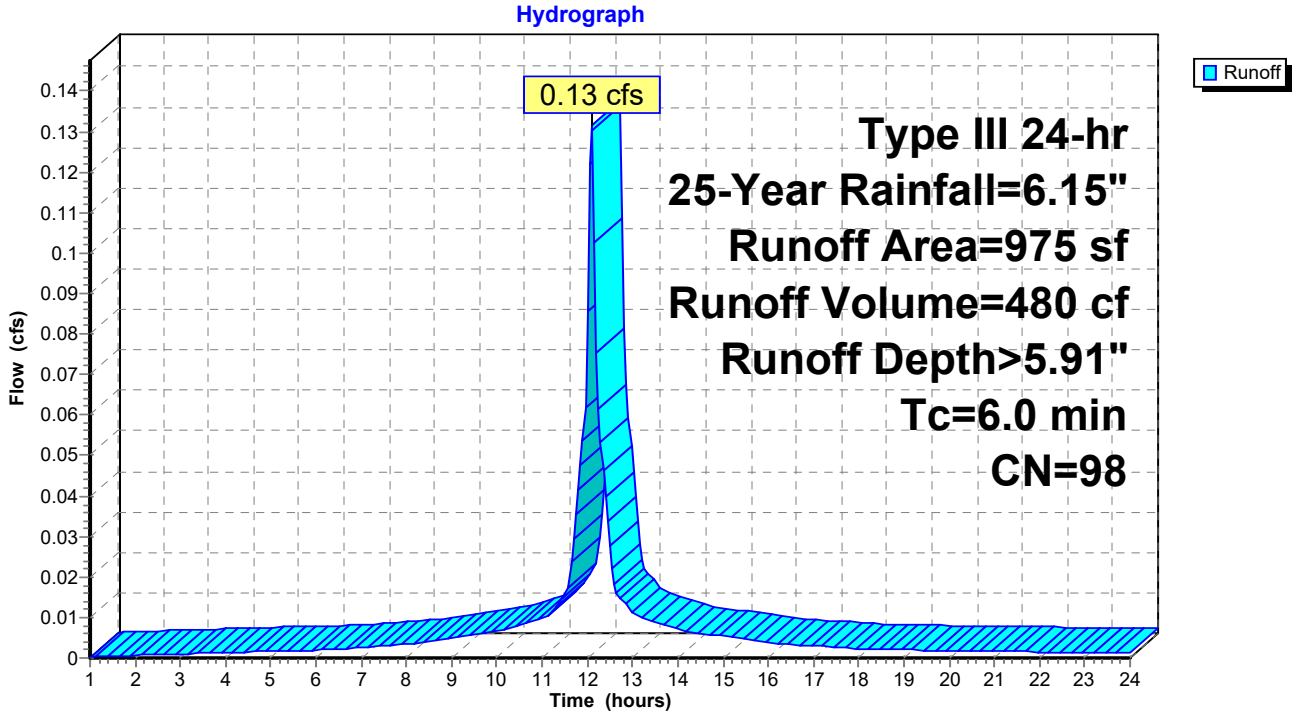
Runoff = 0.13 cfs @ 12.09 hrs, Volume= 480 cf, Depth> 5.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
*	975	98	Impervious
	975		100.00% Impervious Area

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

Subcatchment PR-2: TO CB-1



Summary for Subcatchment PR-3: TO CB-2

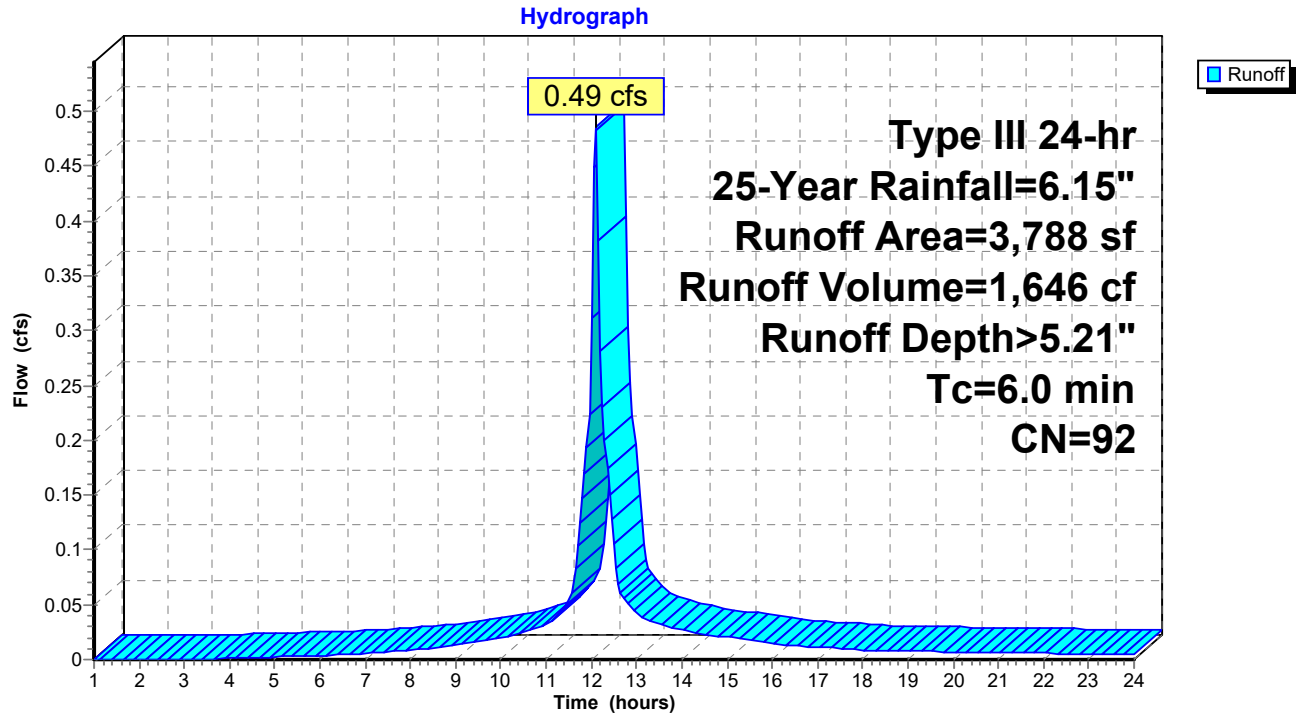
Runoff = 0.49 cfs @ 12.09 hrs, Volume= 1,646 cf, Depth> 5.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
*	3,158	98	Impervious
	630	61	>75% Grass cover, Good, HSG B
	3,788	92	Weighted Average
	630		16.63% Pervious Area
	3,158		83.37% Impervious Area

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

Subcatchment PR-3: TO CB-2



Summary for Subcatchment PR-4: TO CB-3

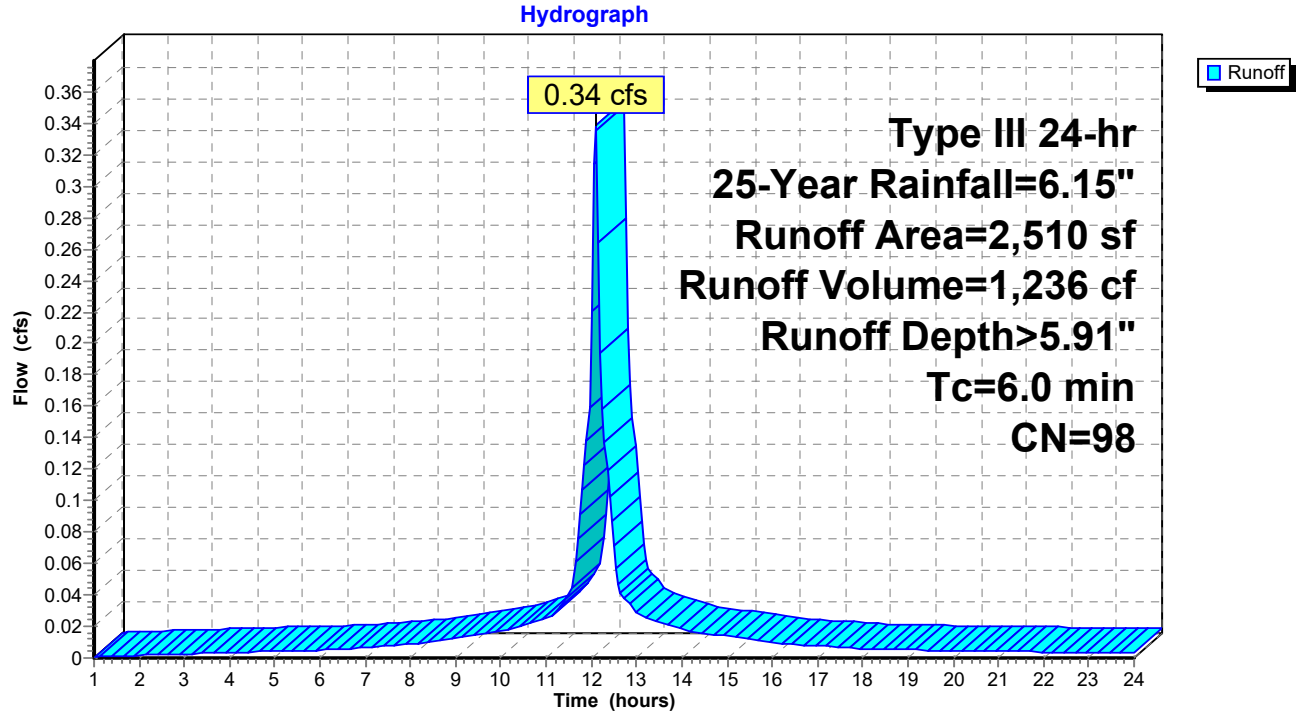
Runoff = 0.34 cfs @ 12.09 hrs, Volume= 1,236 cf, Depth> 5.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
*	2,510	98	Impervious
	2,510		100.00% Impervious Area

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

Subcatchment PR-4: TO CB-3



Summary for Subcatchment PR-5: TO OFFSITE EAST

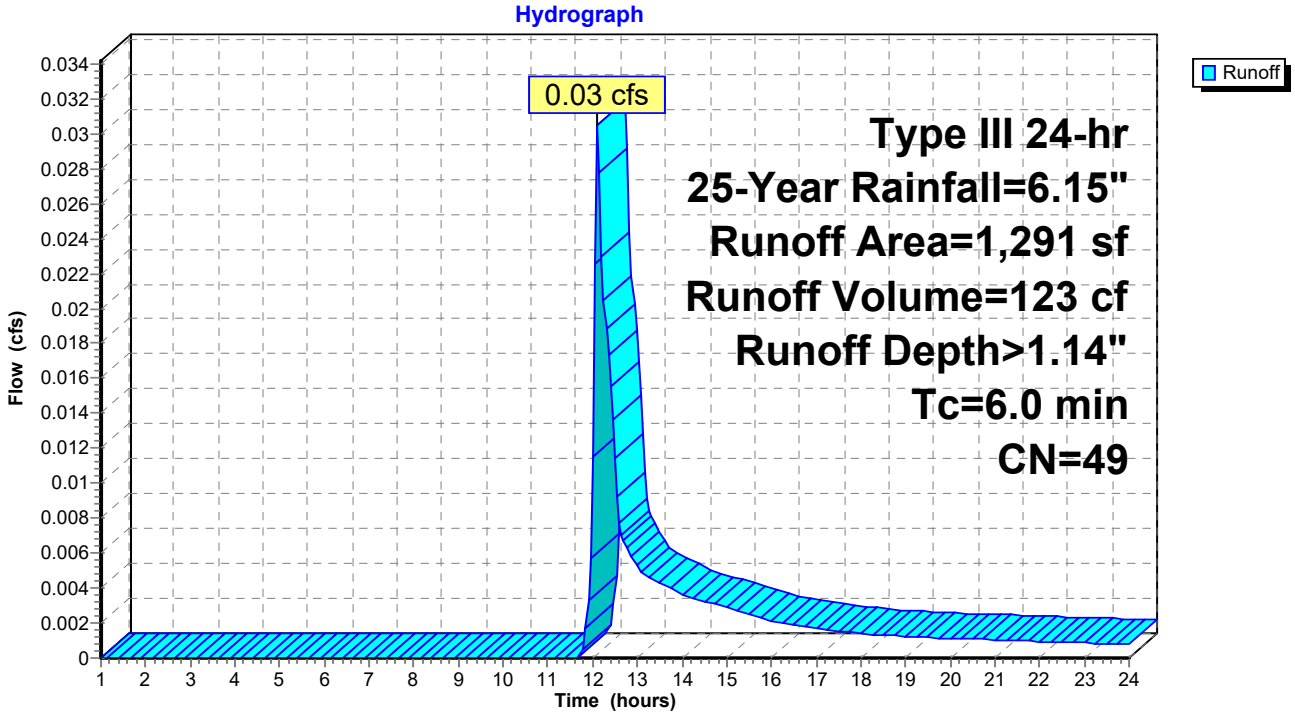
Runoff = 0.03 cfs @ 12.11 hrs, Volume= 123 cf, Depth> 1.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

Area (sf)	CN	Description
1,187	48	Brush, Good, HSG B
104	61	>75% Grass cover, Good, HSG B
1,291	49	Weighted Average
1,291		100.00% Pervious Area

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

Subcatchment PR-5: TO OFFSITE EAST



Summary for Subcatchment PR-6: TO CB-4

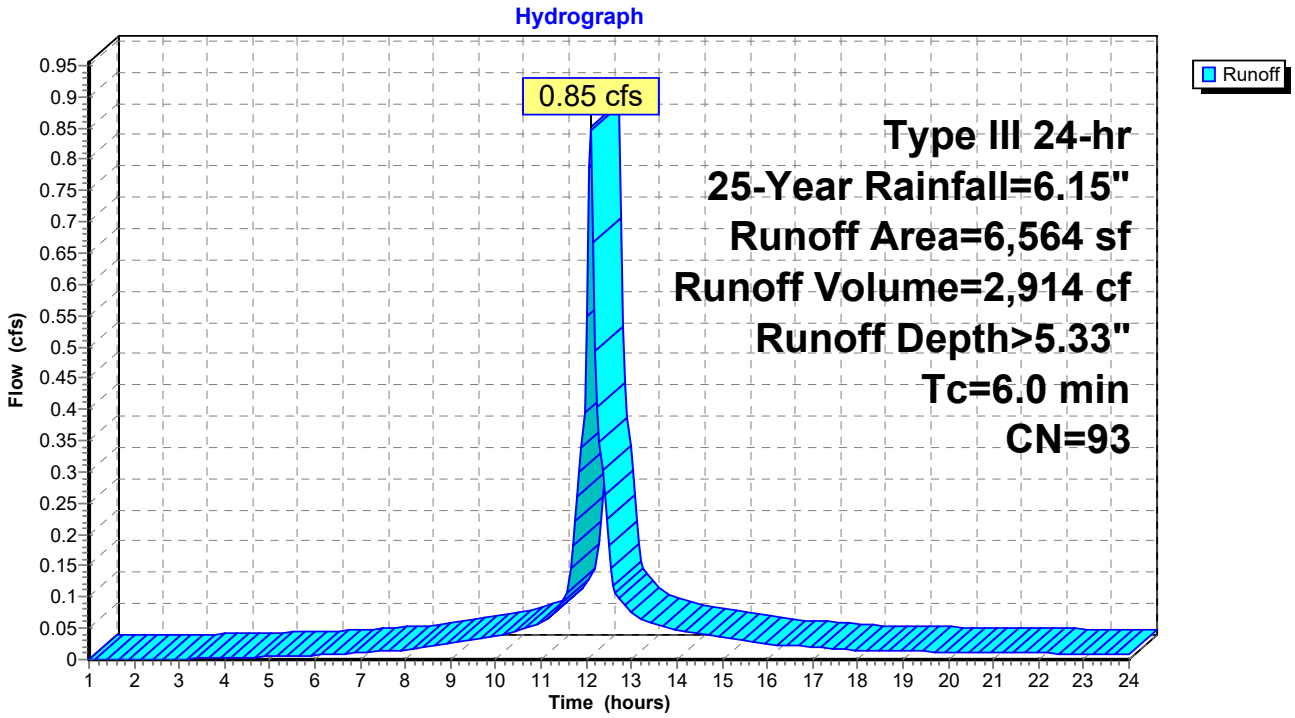
Runoff = 0.85 cfs @ 12.09 hrs, Volume= 2,914 cf, Depth> 5.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
*	5,707	98	Impervious
	857	61	>75% Grass cover, Good, HSG B
	6,564	93	Weighted Average
	857		13.06% Pervious Area
	5,707		86.94% Impervious Area

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

Subcatchment PR-6: TO CB-4



Summary for Subcatchment PR-7: ROOF RUNOFF

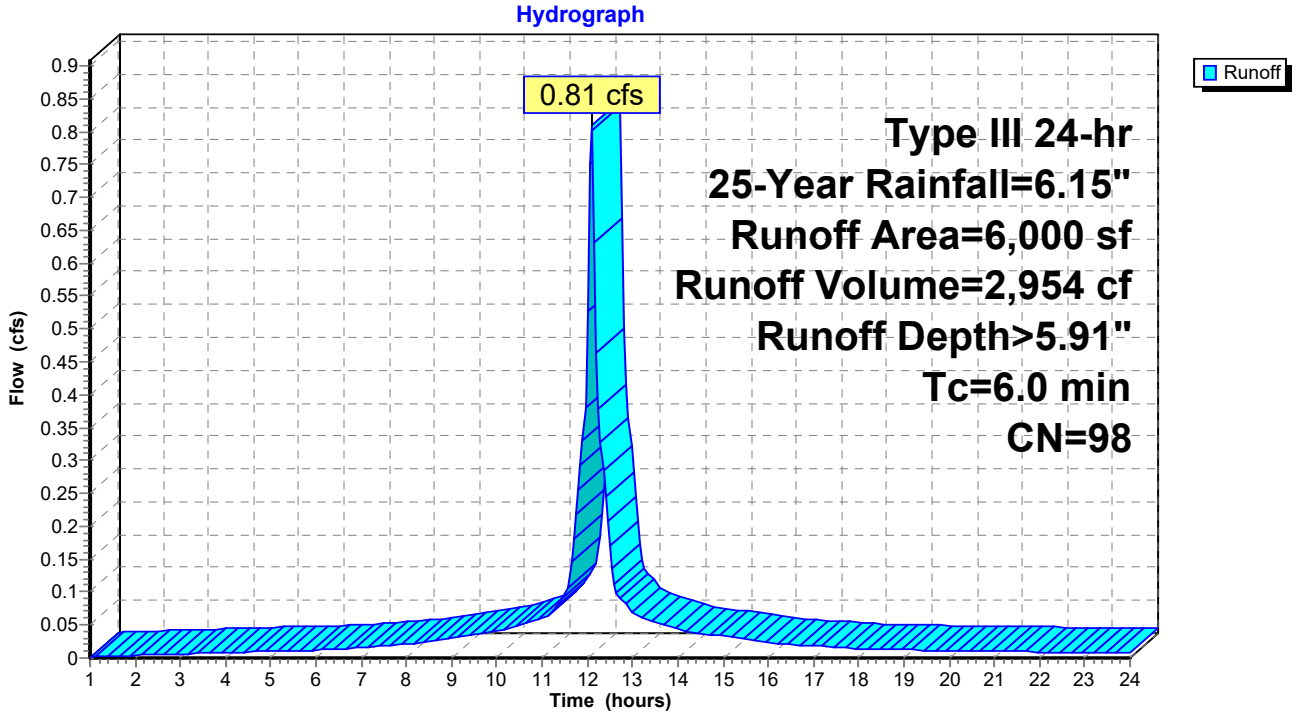
Runoff = 0.81 cfs @ 12.09 hrs, Volume= 2,954 cf, Depth> 5.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
*	6,000	98	Impervious
	6,000		100.00% Impervious Area

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

Subcatchment PR-7: ROOF RUNOFF



Summary for Subcatchment PR-8: TO CB-5

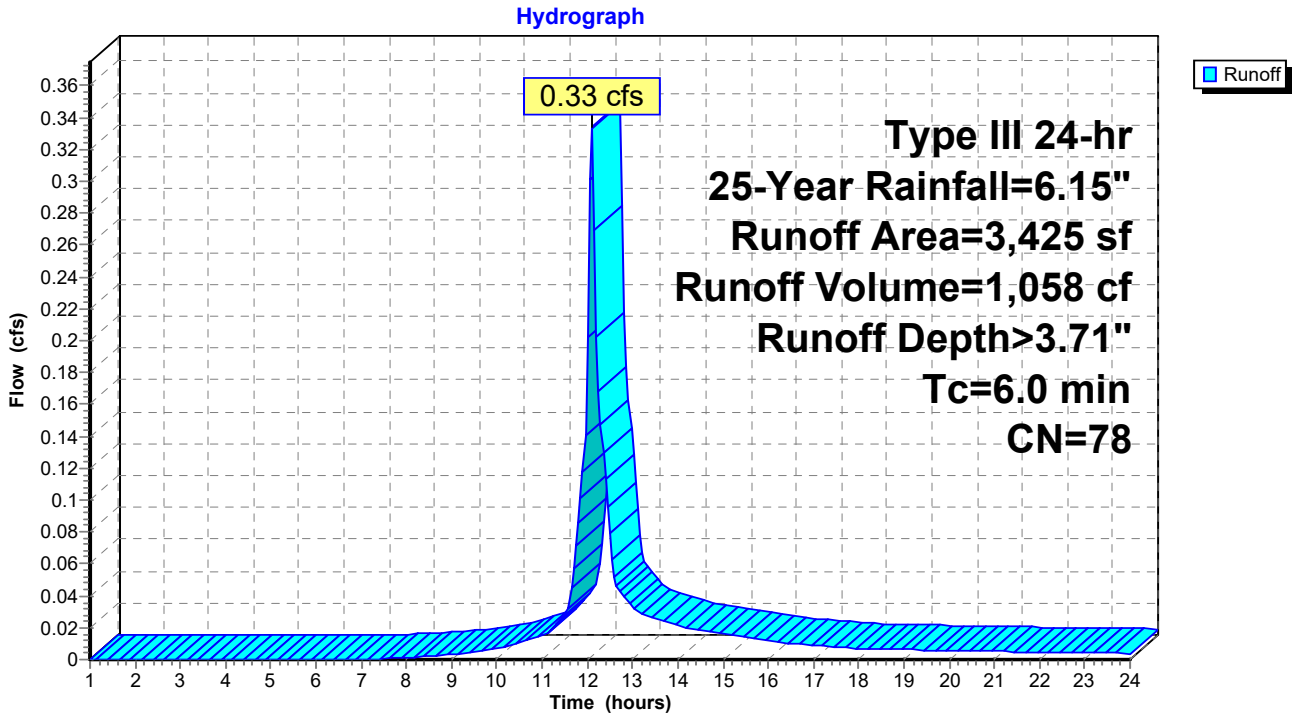
Runoff = 0.33 cfs @ 12.09 hrs, Volume= 1,058 cf, Depth> 3.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
*	1,557	98	Impervious
	1,868	61	>75% Grass cover, Good, HSG B
	3,425	78	Weighted Average
	1,868		54.54% Pervious Area
	1,557		45.46% Impervious Area

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

Subcatchment PR-8: TO CB-5



Summary for Subcatchment PR-9: TO CB-6

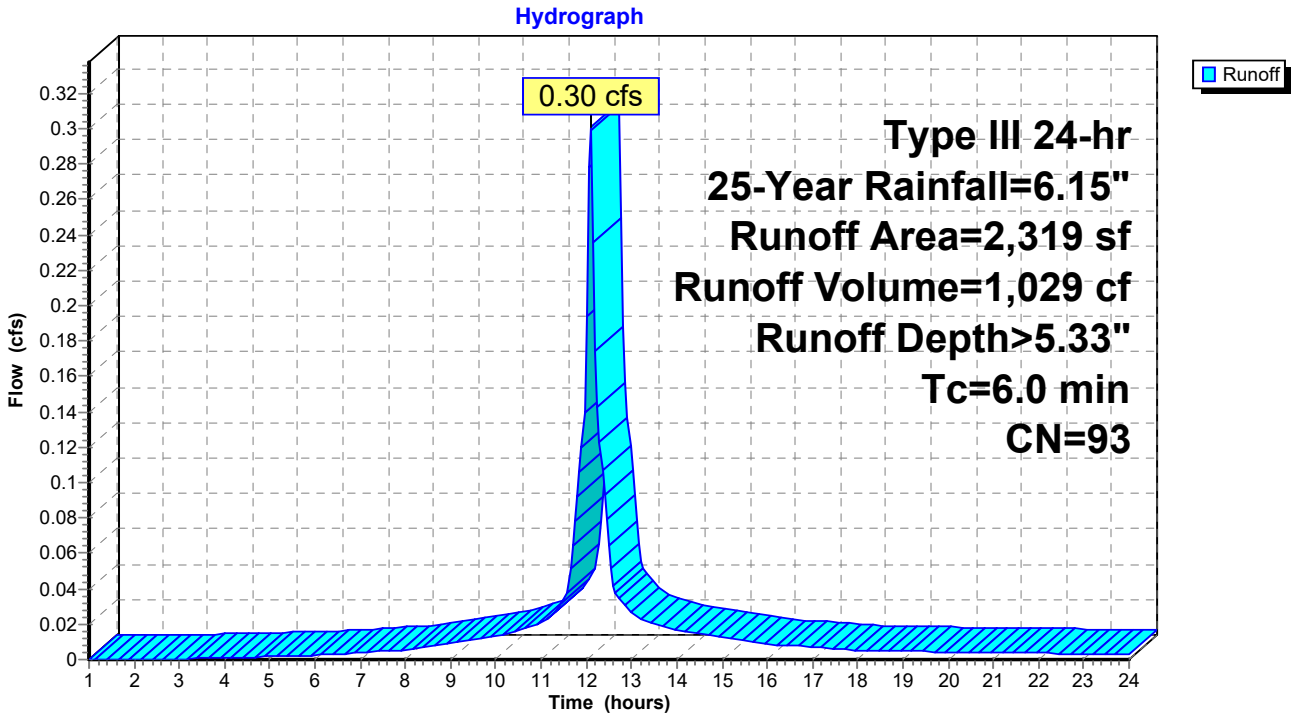
Runoff = 0.30 cfs @ 12.09 hrs, Volume= 1,029 cf, Depth> 5.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.15"

	Area (sf)	CN	Description
*	2,032	98	Impervious
	287	61	>75% Grass cover, Good, HSG B
	2,319	93	Weighted Average
	287		12.38% Pervious Area
	2,032		87.62% Impervious Area

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

Subcatchment PR-9: TO CB-6

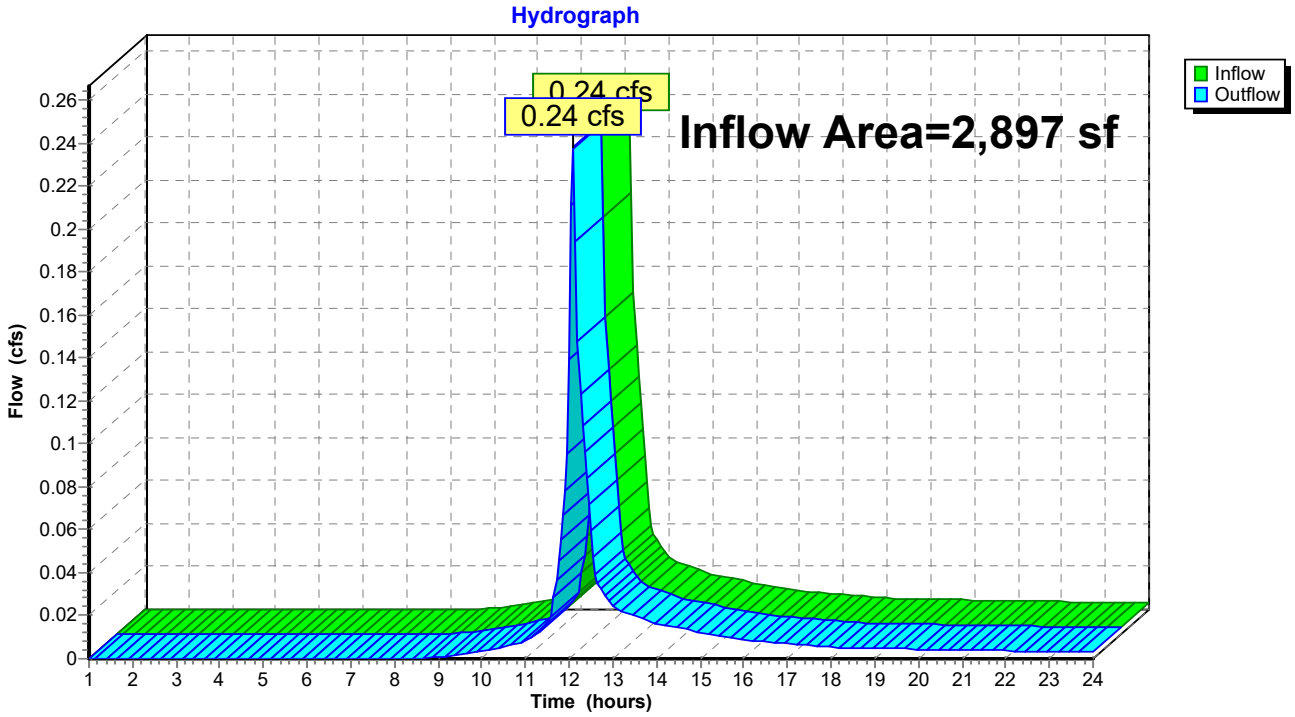


Summary for Reach 4R: MAZZEO DRIVE

Inflow Area = 2,897 sf, 30.55% Impervious, Inflow Depth > 3.11" for 25-Year event
Inflow = 0.24 cfs @ 12.09 hrs, Volume= 752 cf
Outflow = 0.24 cfs @ 12.09 hrs, Volume= 752 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 4R: MAZZEO DRIVE

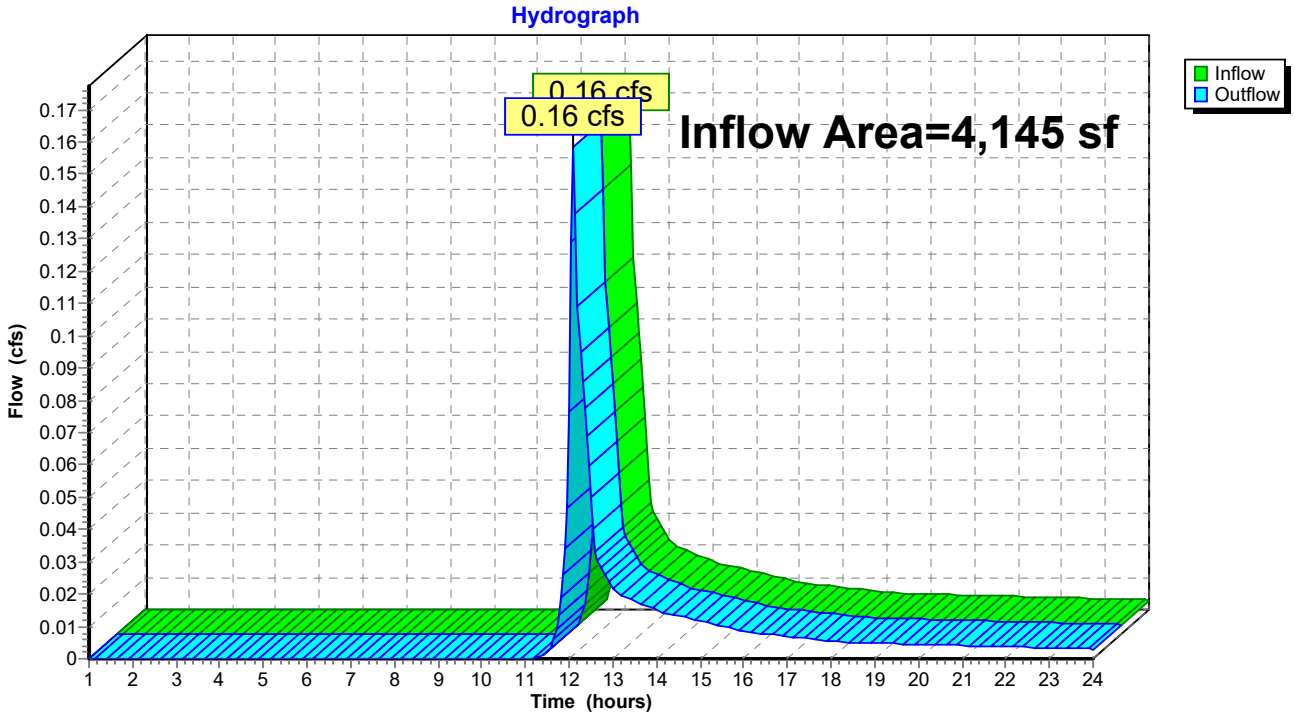


Summary for Reach 5R: OFFSITE WEST

Inflow Area = 4,145 sf, 0.00% Impervious, Inflow Depth > 1.60" for 25-Year event
Inflow = 0.16 cfs @ 12.10 hrs, Volume= 554 cf
Outflow = 0.16 cfs @ 12.10 hrs, Volume= 554 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 5R: OFFSITE WEST

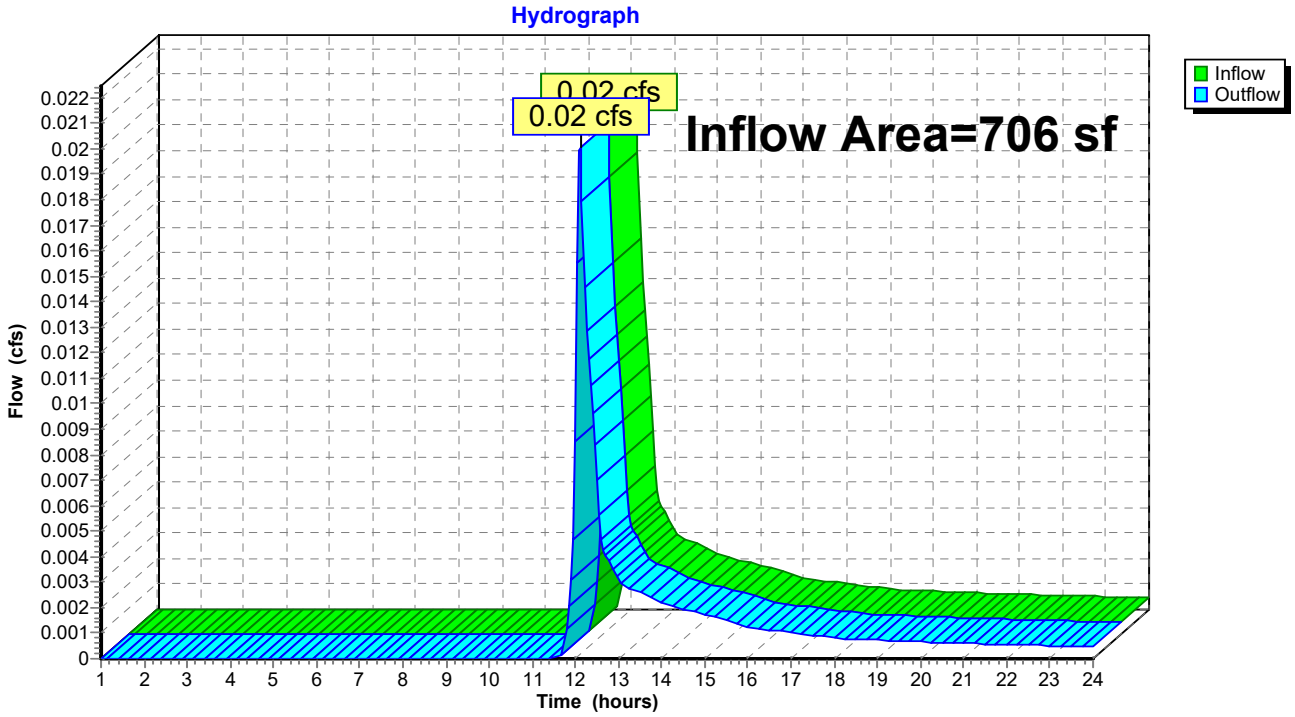


Summary for Reach 6R: OFFSITE NORTH

Inflow Area = 706 sf, 0.00% Impervious, Inflow Depth > 1.29" for 25-Year event
Inflow = 0.02 cfs @ 12.11 hrs, Volume= 76 cf
Outflow = 0.02 cfs @ 12.11 hrs, Volume= 76 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 6R: OFFSITE NORTH

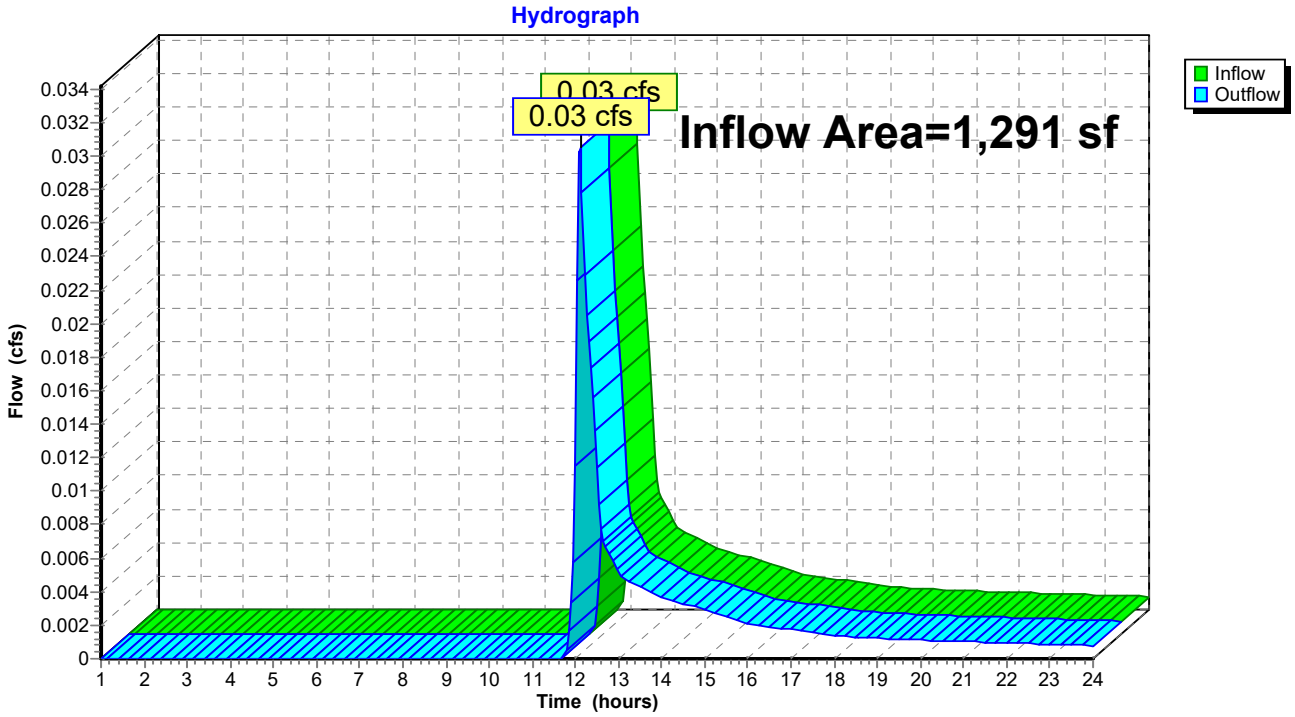


Summary for Reach 8R: OFFSITE EAST

Inflow Area = 1,291 sf, 0.00% Impervious, Inflow Depth > 1.14" for 25-Year event
Inflow = 0.03 cfs @ 12.11 hrs, Volume= 123 cf
Outflow = 0.03 cfs @ 12.11 hrs, Volume= 123 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 8R: OFFSITE EAST



Summary for Pond CS1: CHAMBER SYSTEM 1

Inflow Area = 19,632 sf, 84.66% Impervious, Inflow Depth > 5.26" for 25-Year event
Inflow = 2.48 cfs @ 12.09 hrs, Volume= 8,607 cf
Outflow = 0.51 cfs @ 12.51 hrs, Volume= 8,606 cf, Atten= 79%, Lag= 25.5 min
Discarded = 0.51 cfs @ 12.51 hrs, Volume= 8,606 cf

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 91.09' @ 12.51 hrs Surf.Area= 2,367 sf Storage= 2,075 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 21.9 min (787.9 - 766.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	89.78'	1,647 cf	**27.75'W x 85.29'L x 2.71'H Field A** 6,410 cf Overall - 2,292 cf Embedded = 4,118 cf x 40.0% Voids
#2A	90.28'	2,292 cf	**Cultec R-180** x 104 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 8 rows
		3,939 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	89.78'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.51 cfs @ 12.51 hrs HW=91.09' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.51 cfs)

Pond CS1: CHAMBER SYSTEM 1 - Chamber Wizard Field A

Chamber Model = Cultec R-180 (Cultec Recharger® 180HD)
Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf
Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap
Row Length Adjustment= +1.00' x 3.44 sf x 8 rows

36.0" Wide + 3.0" Spacing = 39.0" C-C Row Spacing

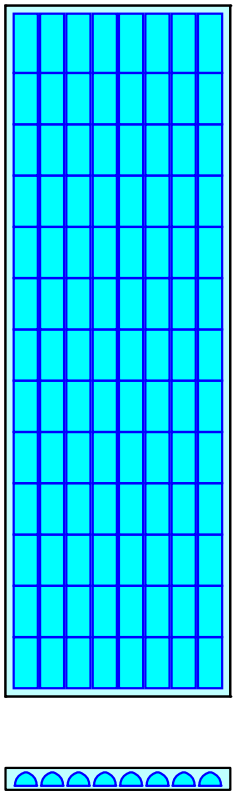
13 Chambers/Row x 6.33' Long +1.00' Row Adjustment = 83.29' Row Length +12.0" End Stone x 2 = 85.29' Base Length
8 Rows x 36.0" Wide + 3.0" Spacing x 7 + 12.0" Side Stone x 2 = 27.75' Base Width
6.0" Base + 20.5" Chamber Height + 6.0" Cover = 2.71' Field Height

104 Chambers x 21.8 cf +1.00' Row Adjustment x 3.44 sf x 8 Rows = 2,291.8 cf Chamber Storage

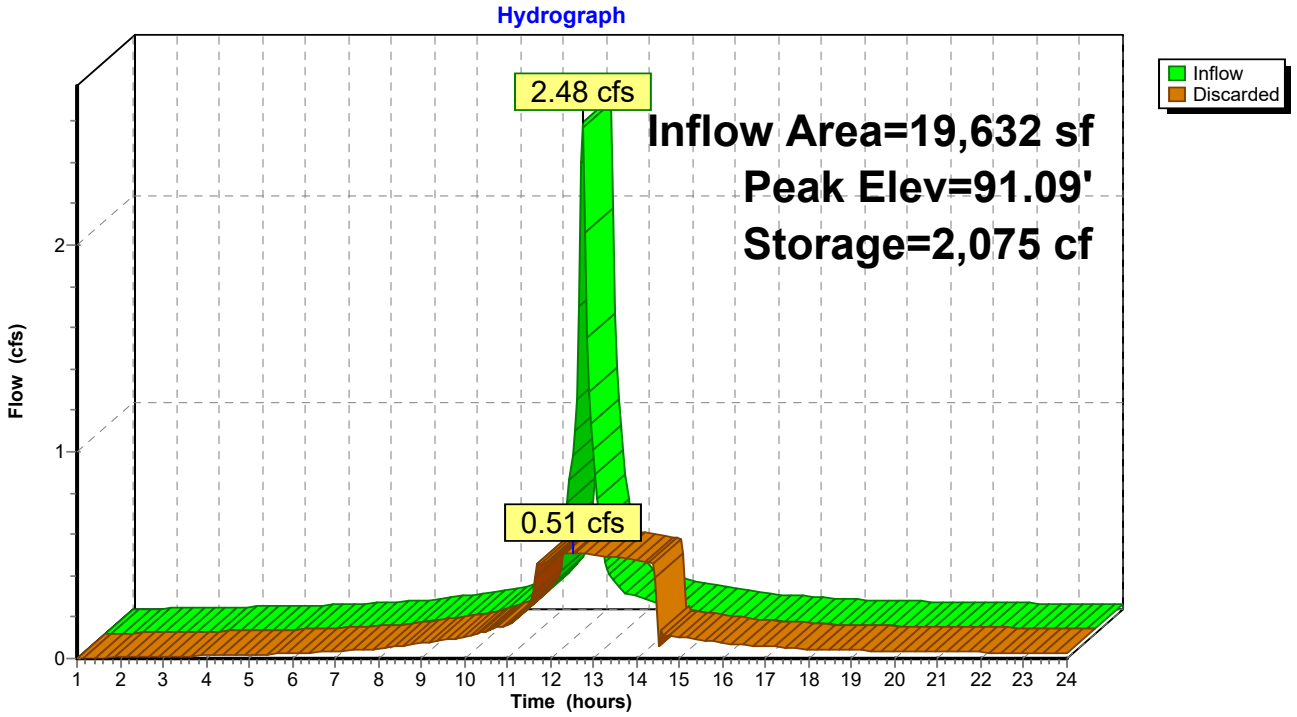
6,410.1 cf Field - 2,291.8 cf Chambers = 4,118.3 cf Stone x 40.0% Voids = 1,647.3 cf Stone Storage

Chamber Storage + Stone Storage = 3,939.1 cf = 0.090 af
Overall Storage Efficiency = 61.5%
Overall System Size = 85.29' x 27.75' x 2.71'

104 Chambers
237.4 cy Field
152.5 cy Stone



Pond CS1: CHAMBER SYSTEM 1



Summary for Pond CS2: CHAMBER SYSTEM 2

Inflow Area = 7,273 sf, 91.34% Impervious, Inflow Depth > 5.55" for 25-Year event
Inflow = 0.96 cfs @ 12.09 hrs, Volume= 3,361 cf
Outflow = 0.21 cfs @ 12.50 hrs, Volume= 3,361 cf, Atten= 79%, Lag= 24.7 min
Discarded = 0.21 cfs @ 12.50 hrs, Volume= 3,361 cf

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 89.99' @ 12.50 hrs Surf.Area= 821 sf Storage= 815 cf

Plug-Flow detention time= 22.3 min calculated for 3,353 cf (100% of inflow)
Center-of-Mass det. time= 22.1 min (782.0 - 759.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.50'	737 cf	**11.17'W x 73.50'L x 3.54'H Field A** 2,907 cf Overall - 1,065 cf Embedded = 1,841 cf x 40.0% Voids
#2A	89.00'	1,065 cf	**Cultec R-330XLHD** x 20 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,802 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.50'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.21 cfs @ 12.50 hrs HW=89.99' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.21 cfs)

Pond CS2: CHAMBER SYSTEM 2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

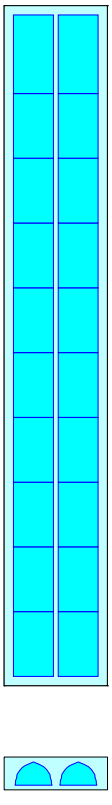
10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +12.0" End Stone x 2 = 73.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

20 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 1,065.5 cf Chamber Storage

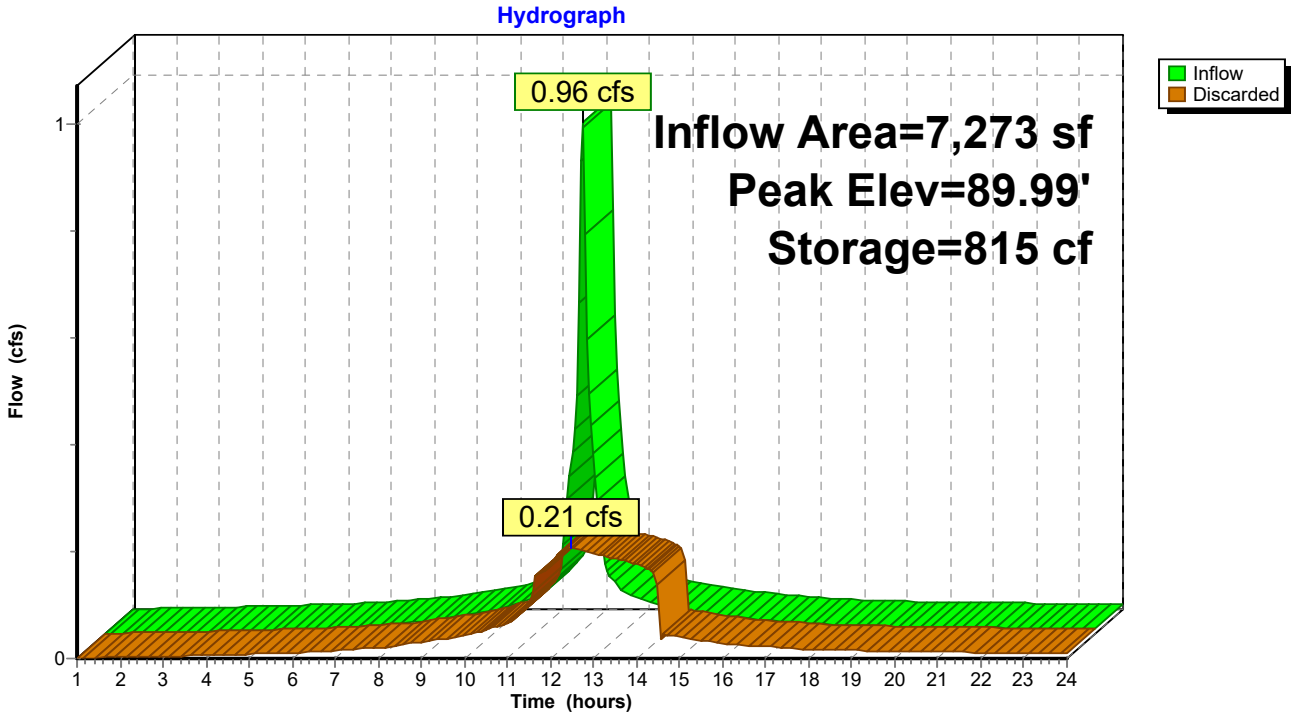
2,906.8 cf Field - 1,065.5 cf Chambers = 1,841.3 cf Stone x 40.0% Voids = 736.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,802.0 cf = 0.041 af
Overall Storage Efficiency = 62.0%
Overall System Size = 73.50' x 11.17' x 3.54'

20 Chambers
107.7 cy Field
68.2 cy Stone



Pond CS2: CHAMBER SYSTEM 2



Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 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 PR-1: TO MAZZEO DRIVE Runoff Area=2,897 sf 30.55% Impervious Runoff Depth>5.40"
Tc=6.0 min CN=72 Runoff=0.41 cfs 1,303 cf

Subcatchment PR-10: TO CB-7 Runoff Area=1,324 sf 100.00% Impervious Runoff Depth>8.55"
Tc=6.0 min CN=98 Runoff=0.26 cfs 943 cf

Subcatchment PR-11: TO OFFSITE NORTH Runoff Area=706 sf 0.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=51 Runoff=0.05 cfs 169 cf

Subcatchment PR-12: TO OFFSITE WEST Runoff Area=4,145 sf 0.00% Impervious Runoff Depth>3.34"
Tc=6.0 min CN=55 Runoff=0.36 cfs 1,154 cf

Subcatchment PR-2: TO CB-1 Runoff Area=975 sf 100.00% Impervious Runoff Depth>8.55"
Tc=6.0 min CN=98 Runoff=0.19 cfs 695 cf

Subcatchment PR-3: TO CB-2 Runoff Area=3,788 sf 83.37% Impervious Runoff Depth>7.83"
Tc=6.0 min CN=92 Runoff=0.71 cfs 2,472 cf

Subcatchment PR-4: TO CB-3 Runoff Area=2,510 sf 100.00% Impervious Runoff Depth>8.55"
Tc=6.0 min CN=98 Runoff=0.49 cfs 1,788 cf

Subcatchment PR-5: TO OFFSITE EAST Runoff Area=1,291 sf 0.00% Impervious Runoff Depth>2.63"
Tc=6.0 min CN=49 Runoff=0.08 cfs 283 cf

Subcatchment PR-6: TO CB-4 Runoff Area=6,564 sf 86.94% Impervious Runoff Depth>7.95"
Tc=6.0 min CN=93 Runoff=1.25 cfs 4,350 cf

Subcatchment PR-7: ROOF RUNOFF Runoff Area=6,000 sf 100.00% Impervious Runoff Depth>8.55"
Tc=6.0 min CN=98 Runoff=1.16 cfs 4,274 cf

Subcatchment PR-8: TO CB-5 Runoff Area=3,425 sf 45.46% Impervious Runoff Depth>6.13"
Tc=6.0 min CN=78 Runoff=0.55 cfs 1,750 cf

Subcatchment PR-9: TO CB-6 Runoff Area=2,319 sf 87.62% Impervious Runoff Depth>7.95"
Tc=6.0 min CN=93 Runoff=0.44 cfs 1,537 cf

Reach 4R: MAZZEO DRIVE Inflow=0.41 cfs 1,303 cf
Outflow=0.41 cfs 1,303 cf

Reach 5R: OFFSITE WEST Inflow=0.36 cfs 1,154 cf
Outflow=0.36 cfs 1,154 cf

Reach 6R: OFFSITE NORTH Inflow=0.05 cfs 169 cf
Outflow=0.05 cfs 169 cf

Reach 8R: OFFSITE EAST Inflow=0.08 cfs 283 cf
Outflow=0.08 cfs 283 cf

Pond CS1: CHAMBER SYSTEM 1 Peak Elev=92.27' Storage=3,730 cf Inflow=3.65 cfs 12,854 cf
Outflow=0.56 cfs 12,852 cf

Pond CS2: CHAMBER SYSTEM 2 Peak Elev=90.99' Storage=1,403 cf Inflow=1.39 cfs 4,955 cf
Outflow=0.24 cfs 4,954 cf

Total Runoff Area = 35,944 sf Runoff Volume = 20,718 cf Average Runoff Depth = 6.92"
32.82% Pervious = 11,796 sf 67.18% Impervious = 24,148 sf

Summary for Subcatchment PR-1: TO MAZZEO DRIVE

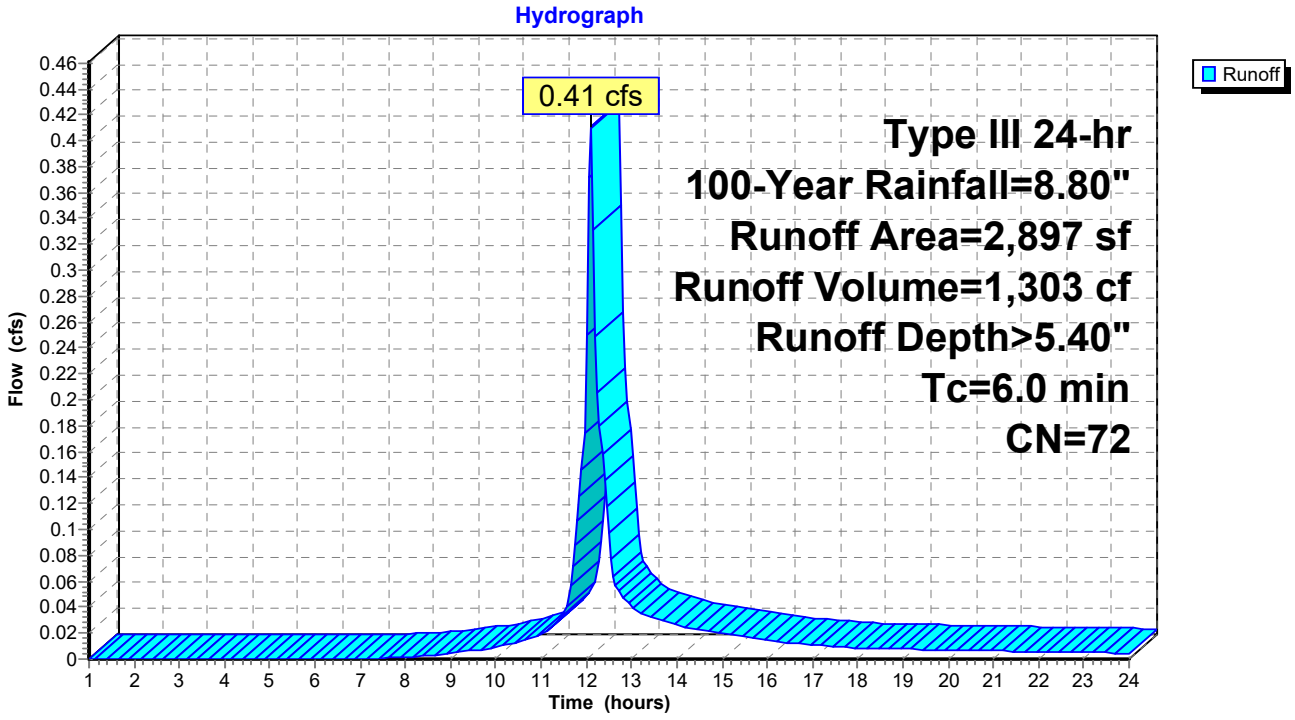
Runoff = 0.41 cfs @ 12.09 hrs, Volume= 1,303 cf, Depth> 5.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
	13	48	Brush, Good, HSG B
	1,999	61	>75% Grass cover, Good, HSG B
*	885	98	Impervious
	2,897	72	Weighted Average
	2,012		69.45% Pervious Area
	885		30.55% Impervious Area

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

Subcatchment PR-1: TO MAZZEO DRIVE



Summary for Subcatchment PR-10: TO CB-7

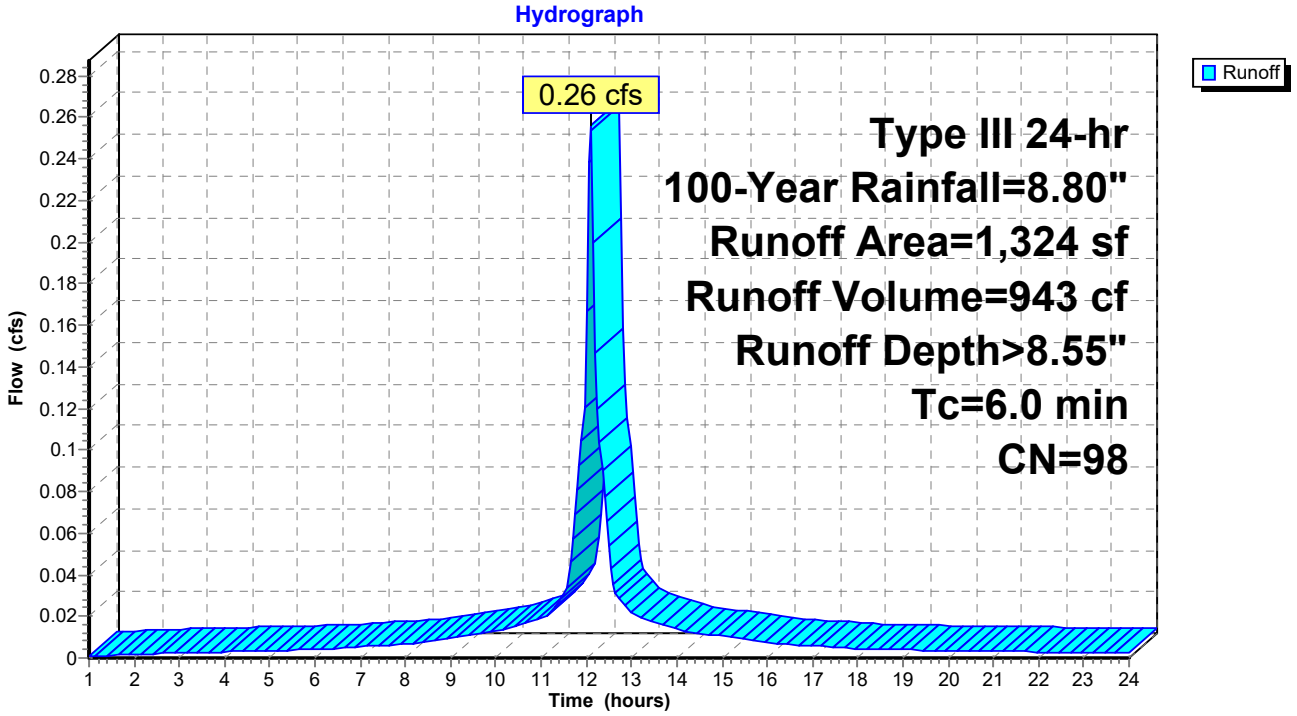
Runoff = 0.26 cfs @ 12.09 hrs, Volume= 943 cf, Depth> 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
*	1,324	98	Impervious
	1,324		100.00% Impervious Area

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

Subcatchment PR-10: TO CB-7



Summary for Subcatchment PR-11: TO OFFSITE NORTH

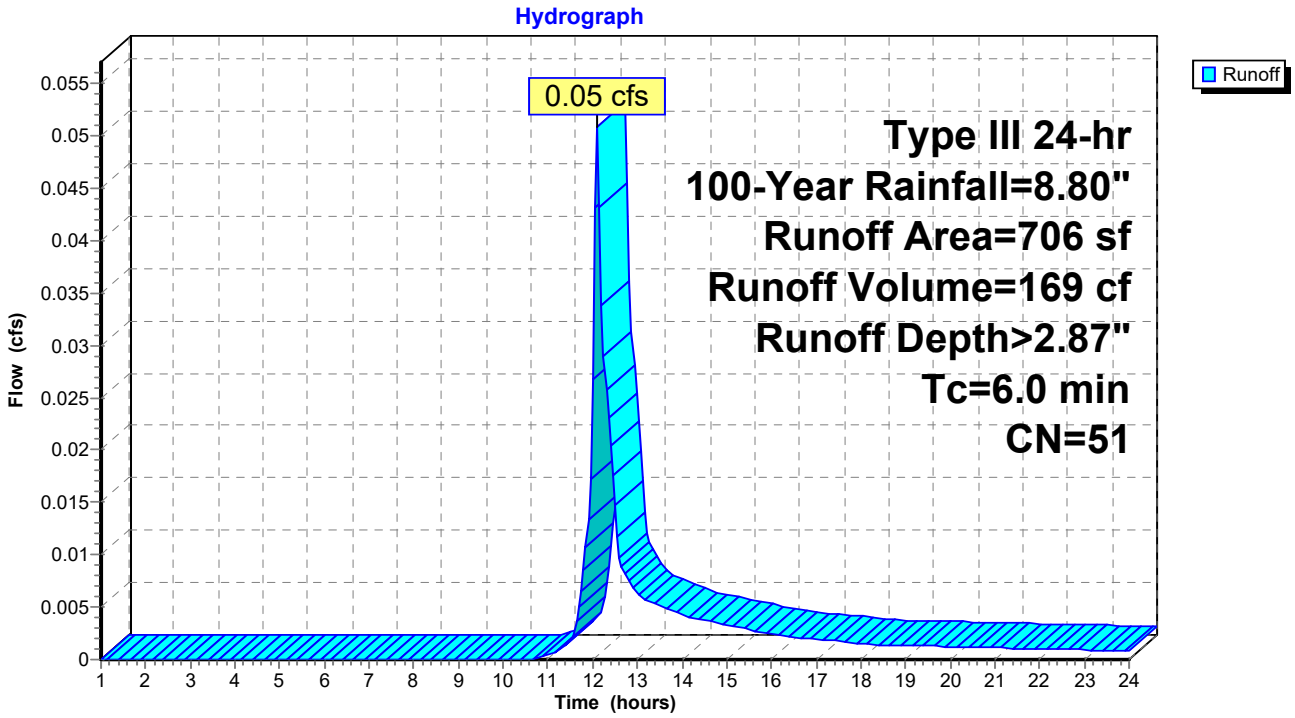
Runoff = 0.05 cfs @ 12.10 hrs, Volume= 169 cf, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
27	96	Gravel surface, HSG B
593	48	Brush, Good, HSG B
86	61	>75% Grass cover, Good, HSG B
706	51	Weighted Average
706		100.00% Pervious Area

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

Subcatchment PR-11: TO OFFSITE NORTH



Summary for Subcatchment PR-12: TO OFFSITE WEST

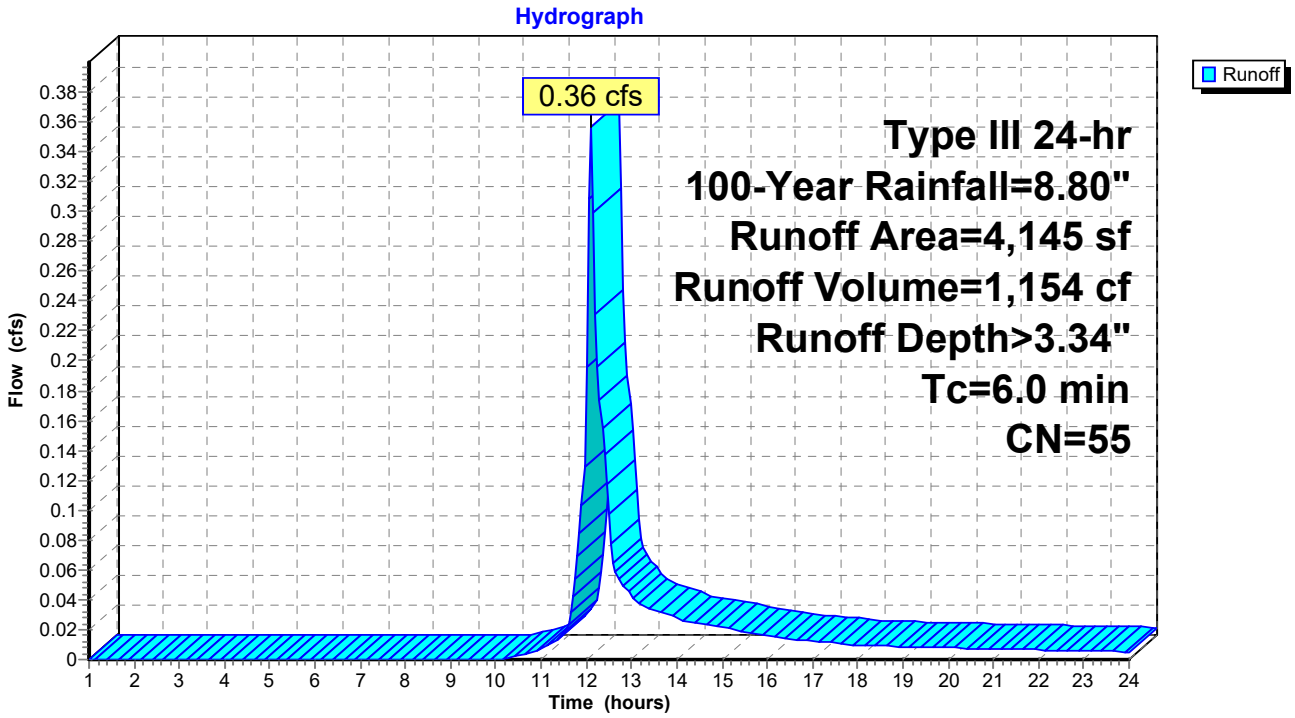
Runoff = 0.36 cfs @ 12.10 hrs, Volume= 1,154 cf, Depth> 3.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
83	96	Gravel surface, HSG B
2,238	48	Brush, Good, HSG B
1,824	61	>75% Grass cover, Good, HSG B
4,145	55	Weighted Average
4,145		100.00% Pervious Area

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

Subcatchment PR-12: TO OFFSITE WEST



Summary for Subcatchment PR-2: TO CB-1

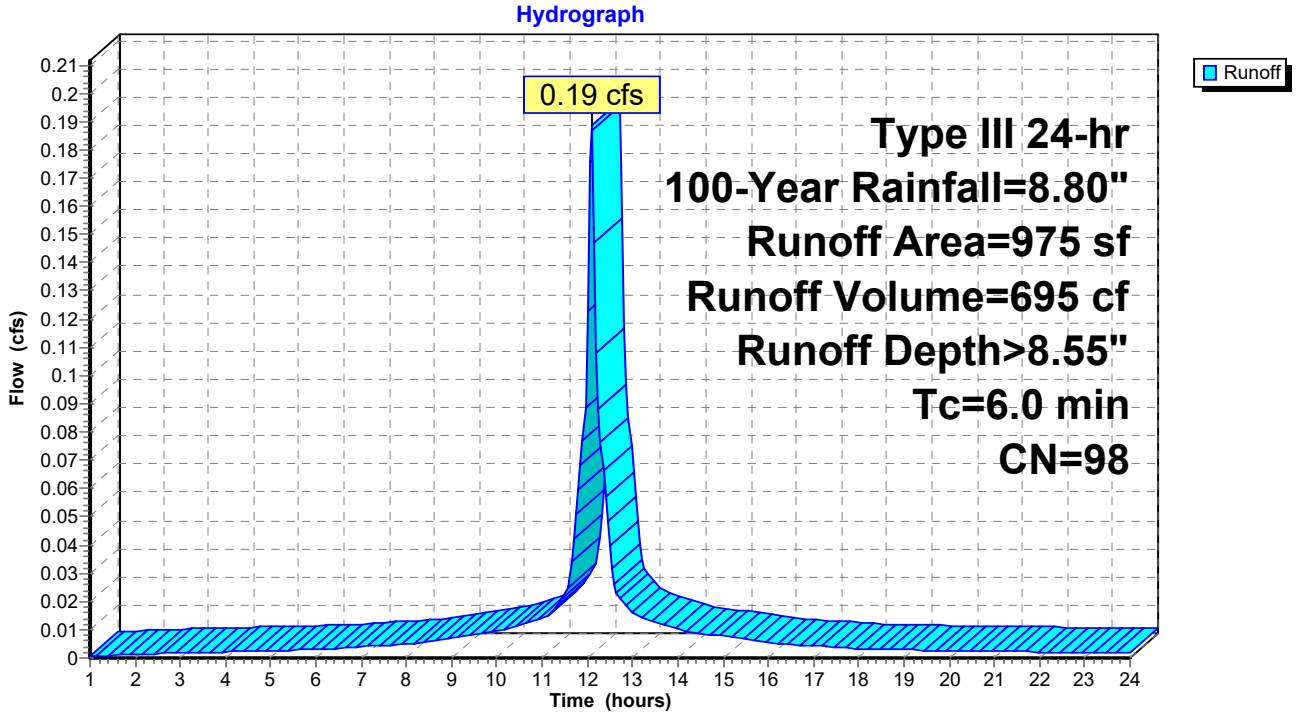
Runoff = 0.19 cfs @ 12.09 hrs, Volume= 695 cf, Depth> 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
*	975	98	Impervious
	975		100.00% Impervious Area

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

Subcatchment PR-2: TO CB-1



Summary for Subcatchment PR-3: TO CB-2

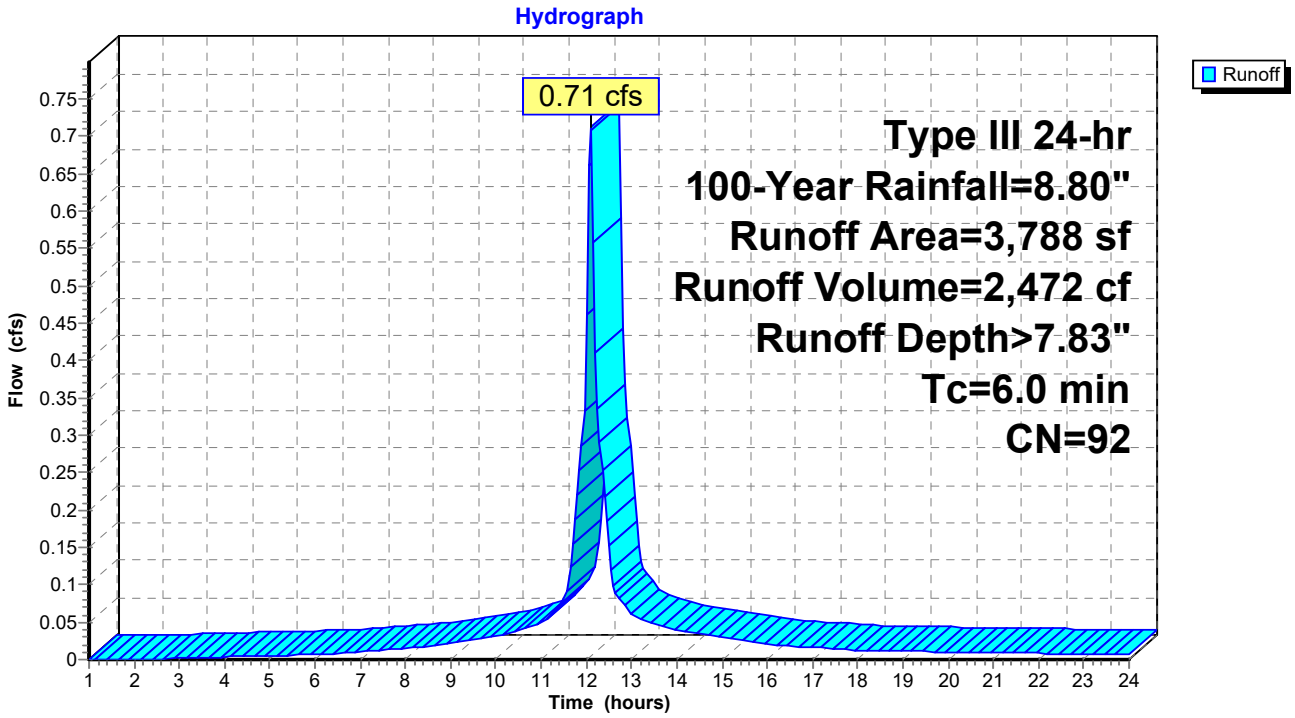
Runoff = 0.71 cfs @ 12.09 hrs, Volume= 2,472 cf, Depth> 7.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
*	3,158	98	Impervious
	630	61	>75% Grass cover, Good, HSG B
	3,788	92	Weighted Average
	630		16.63% Pervious Area
	3,158		83.37% Impervious Area

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

Subcatchment PR-3: TO CB-2



Summary for Subcatchment PR-4: TO CB-3

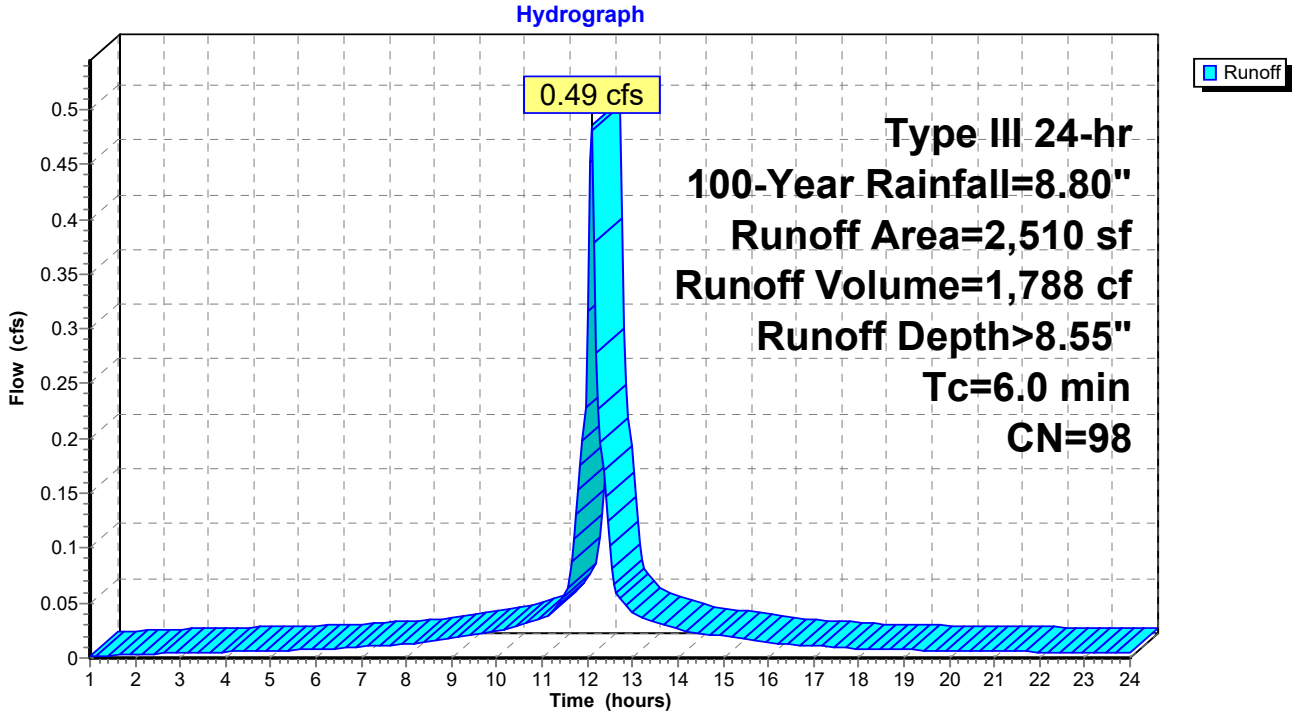
Runoff = 0.49 cfs @ 12.09 hrs, Volume= 1,788 cf, Depth> 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
*	2,510	98	Impervious
	2,510		100.00% Impervious Area

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

Subcatchment PR-4: TO CB-3



Summary for Subcatchment PR-5: TO OFFSITE EAST

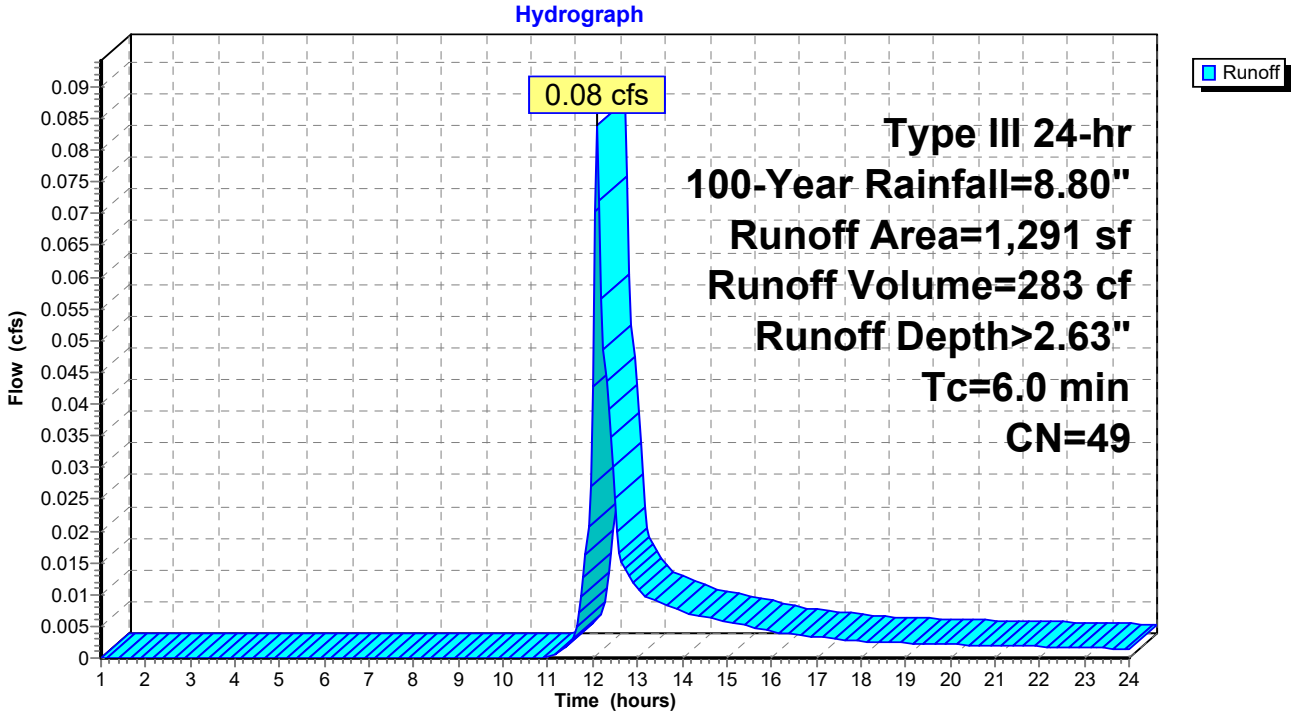
Runoff = 0.08 cfs @ 12.10 hrs, Volume= 283 cf, Depth> 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

Area (sf)	CN	Description
1,187	48	Brush, Good, HSG B
104	61	>75% Grass cover, Good, HSG B
1,291	49	Weighted Average
1,291		100.00% Pervious Area

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

Subcatchment PR-5: TO OFFSITE EAST



Summary for Subcatchment PR-6: TO CB-4

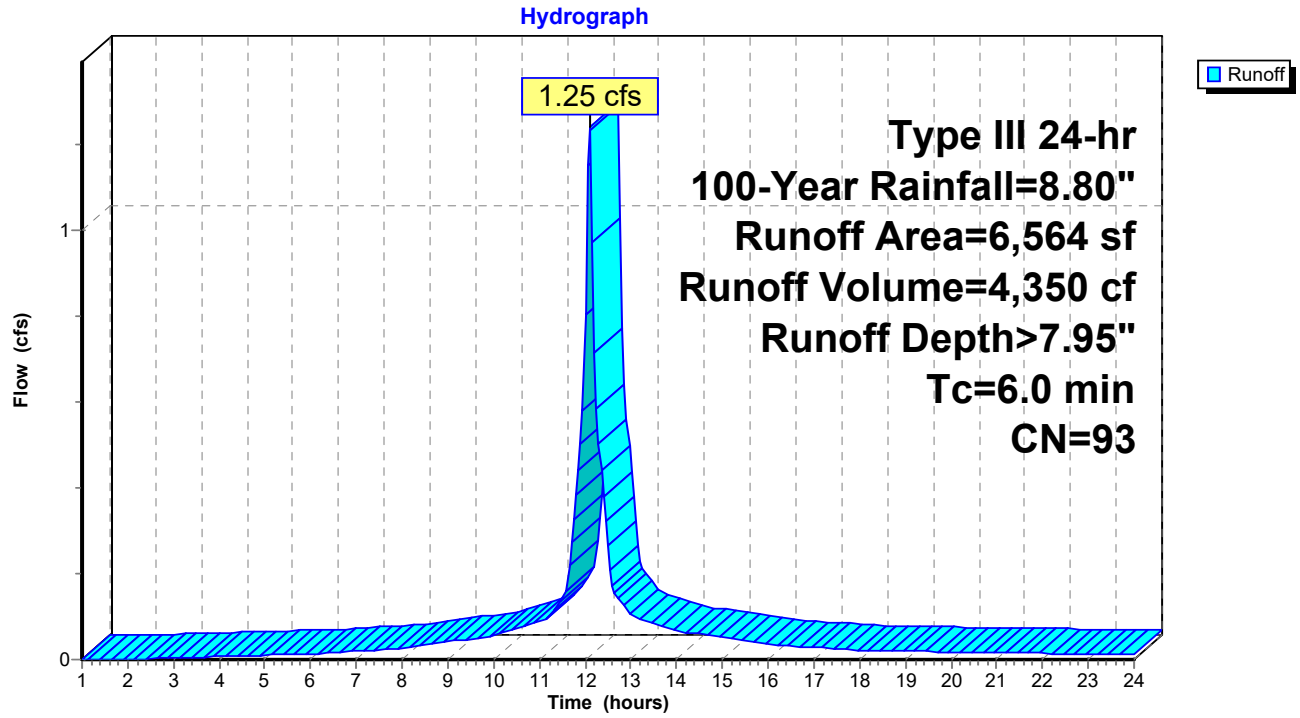
Runoff = 1.25 cfs @ 12.09 hrs, Volume= 4,350 cf, Depth> 7.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
*	5,707	98	Impervious
	857	61	>75% Grass cover, Good, HSG B
	6,564	93	Weighted Average
	857		13.06% Pervious Area
	5,707		86.94% Impervious Area

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

Subcatchment PR-6: TO CB-4



Summary for Subcatchment PR-7: ROOF RUNOFF

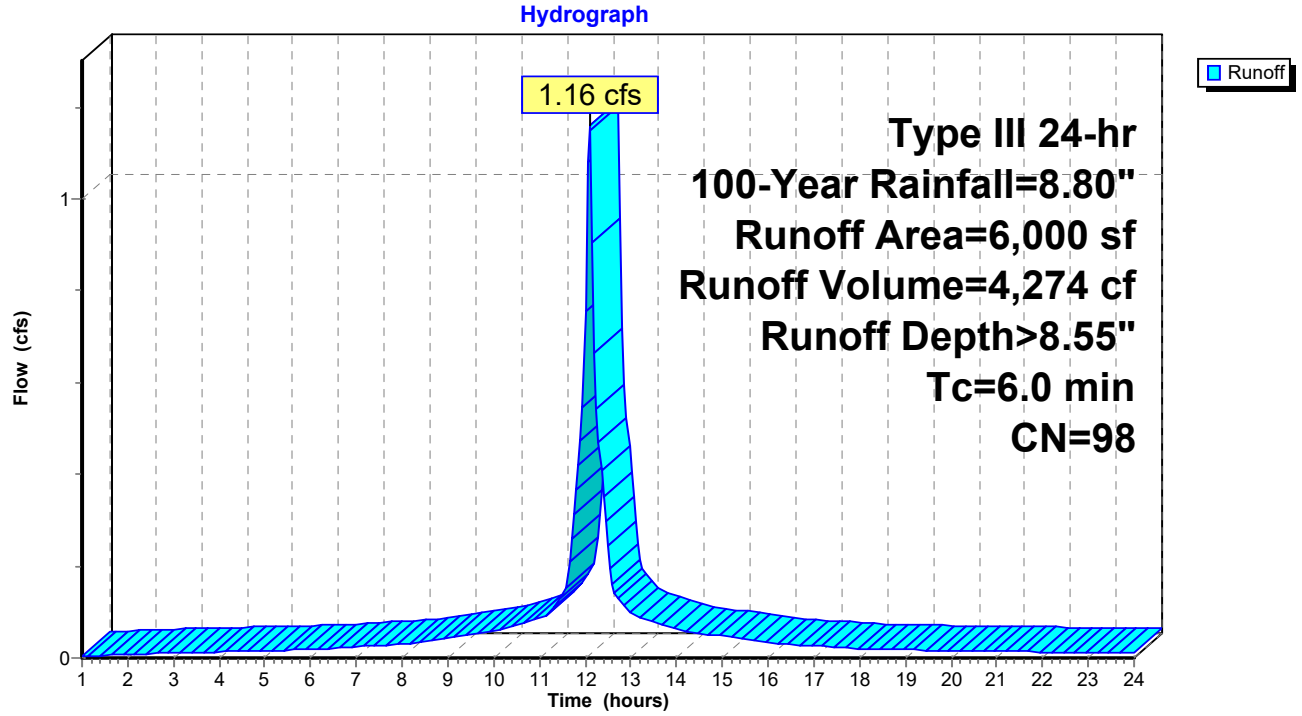
Runoff = 1.16 cfs @ 12.09 hrs, Volume= 4,274 cf, Depth> 8.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
*	6,000	98	Impervious
	6,000		100.00% Impervious Area

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

Subcatchment PR-7: ROOF RUNOFF



Summary for Subcatchment PR-8: TO CB-5

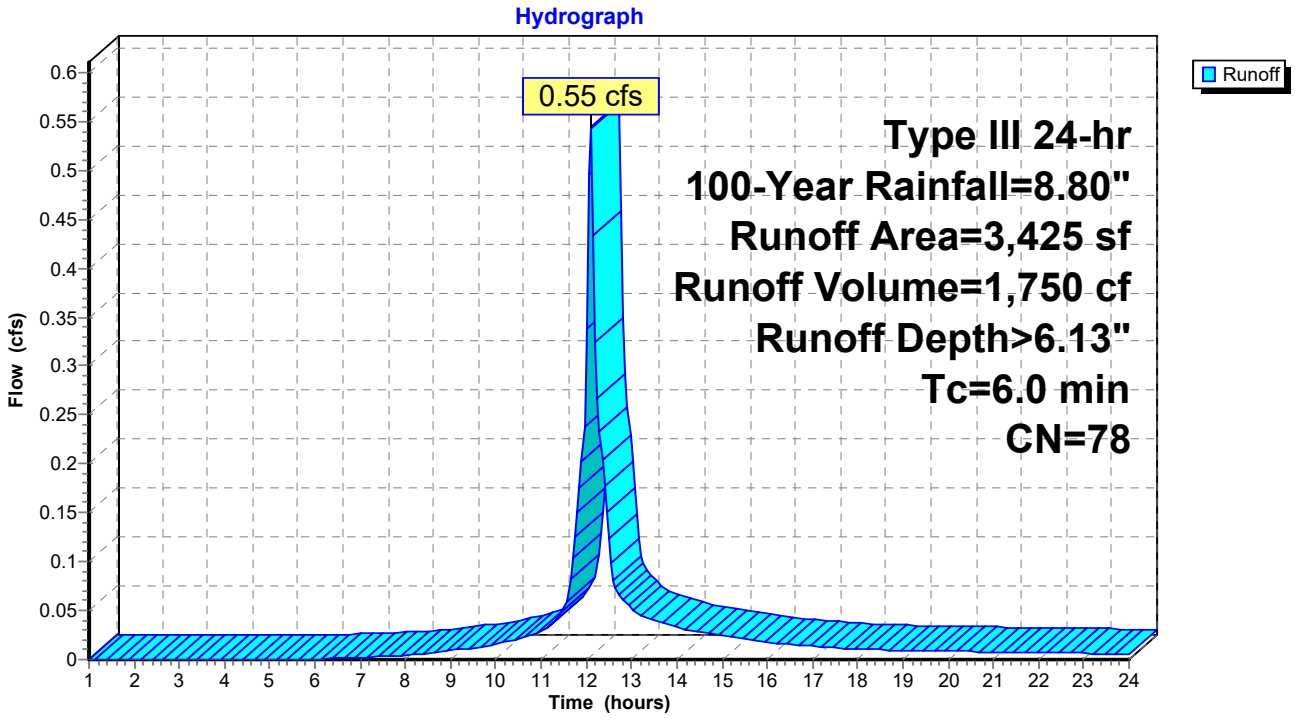
Runoff = 0.55 cfs @ 12.09 hrs, Volume= 1,750 cf, Depth> 6.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
*	1,557	98	Impervious
	1,868	61	>75% Grass cover, Good, HSG B
	3,425	78	Weighted Average
	1,868		54.54% Pervious Area
	1,557		45.46% Impervious Area

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

Subcatchment PR-8: TO CB-5



Summary for Subcatchment PR-9: TO CB-6

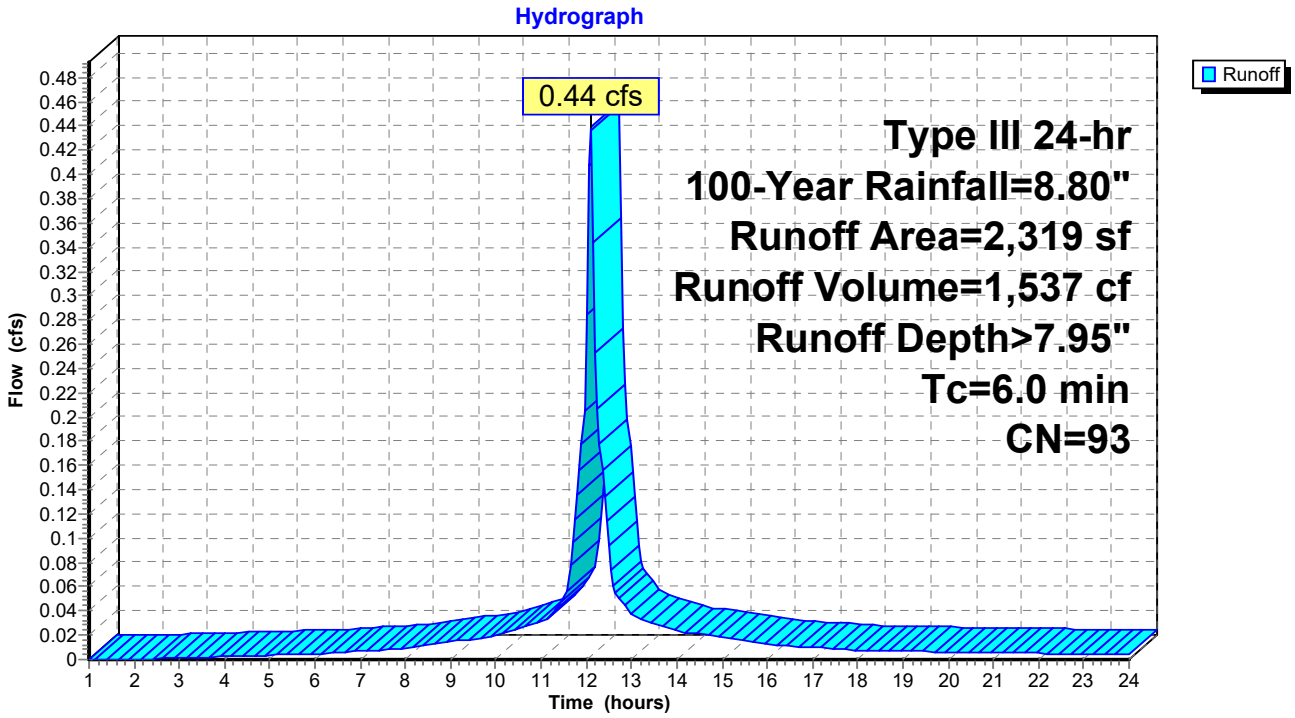
Runoff = 0.44 cfs @ 12.09 hrs, Volume= 1,537 cf, Depth> 7.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.80"

	Area (sf)	CN	Description
*	2,032	98	Impervious
	287	61	>75% Grass cover, Good, HSG B
	2,319	93	Weighted Average
	287		12.38% Pervious Area
	2,032		87.62% Impervious Area

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

Subcatchment PR-9: TO CB-6

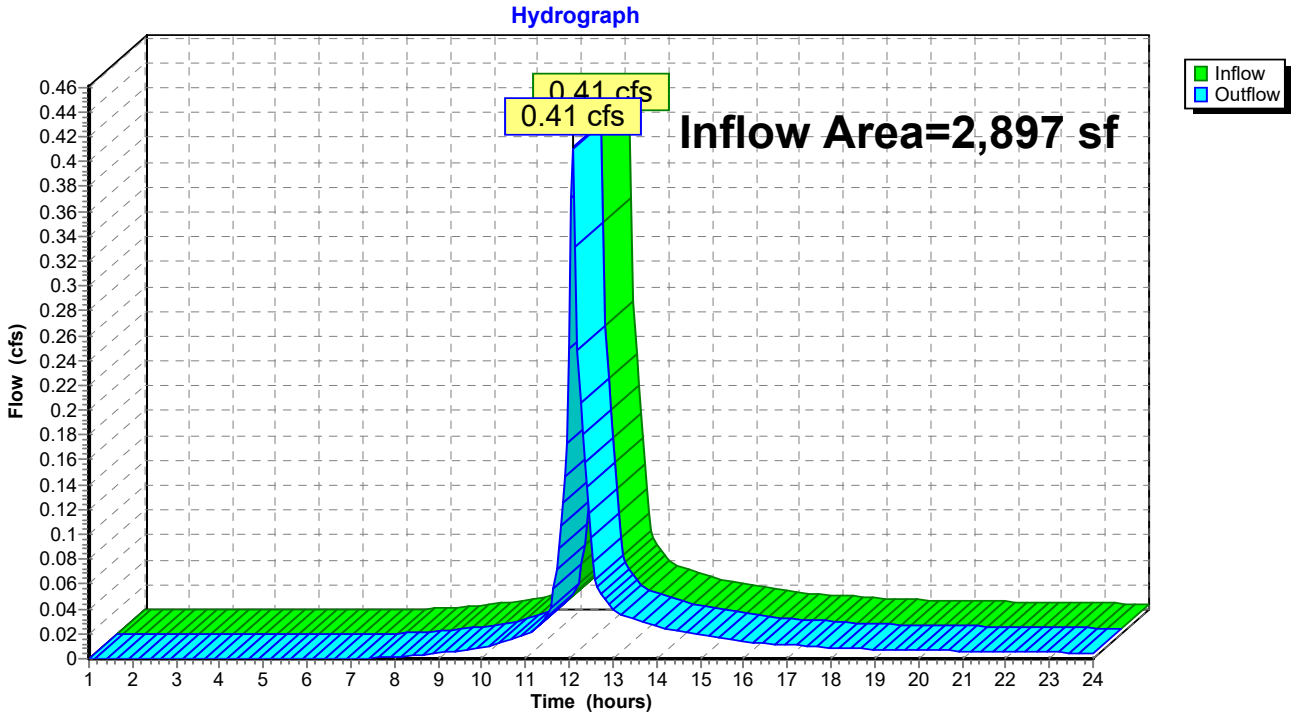


Summary for Reach 4R: MAZZEO DRIVE

Inflow Area = 2,897 sf, 30.55% Impervious, Inflow Depth > 5.40" for 100-Year event
Inflow = 0.41 cfs @ 12.09 hrs, Volume= 1,303 cf
Outflow = 0.41 cfs @ 12.09 hrs, Volume= 1,303 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 4R: MAZZEO DRIVE

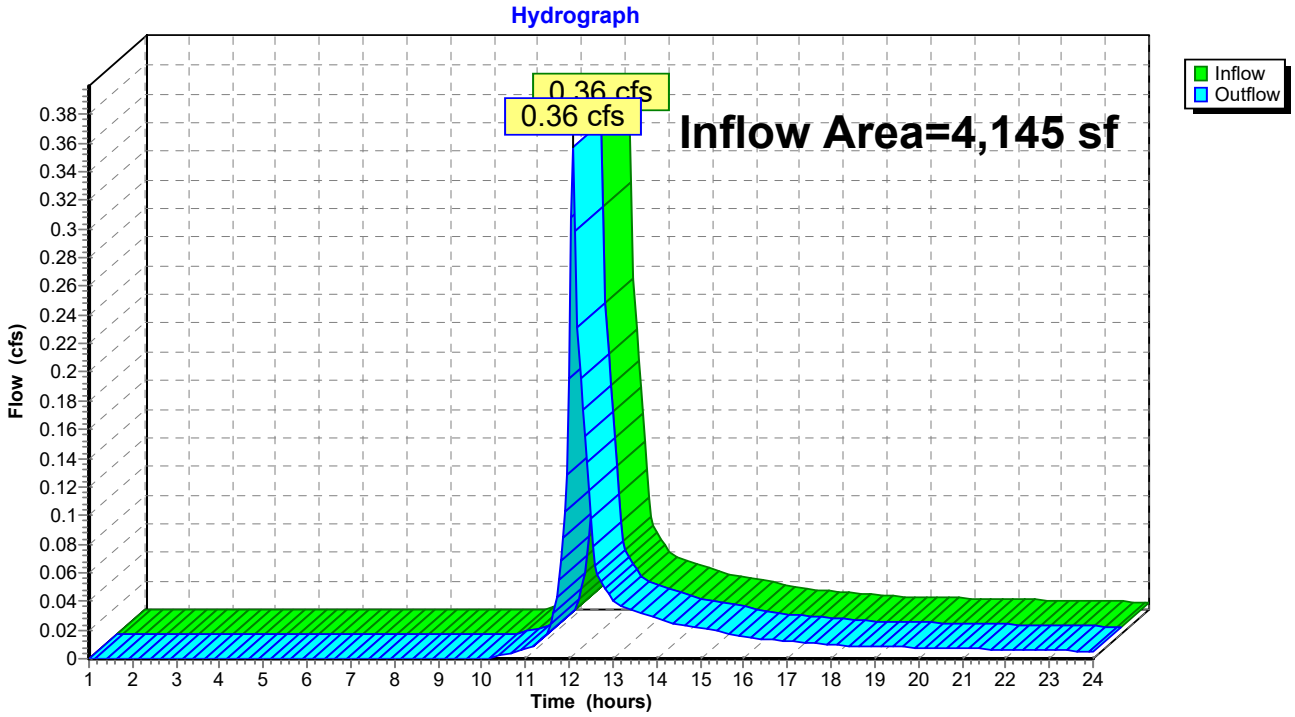


Summary for Reach 5R: OFFSITE WEST

Inflow Area = 4,145 sf, 0.00% Impervious, Inflow Depth > 3.34" for 100-Year event
Inflow = 0.36 cfs @ 12.10 hrs, Volume= 1,154 cf
Outflow = 0.36 cfs @ 12.10 hrs, Volume= 1,154 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 5R: OFFSITE WEST

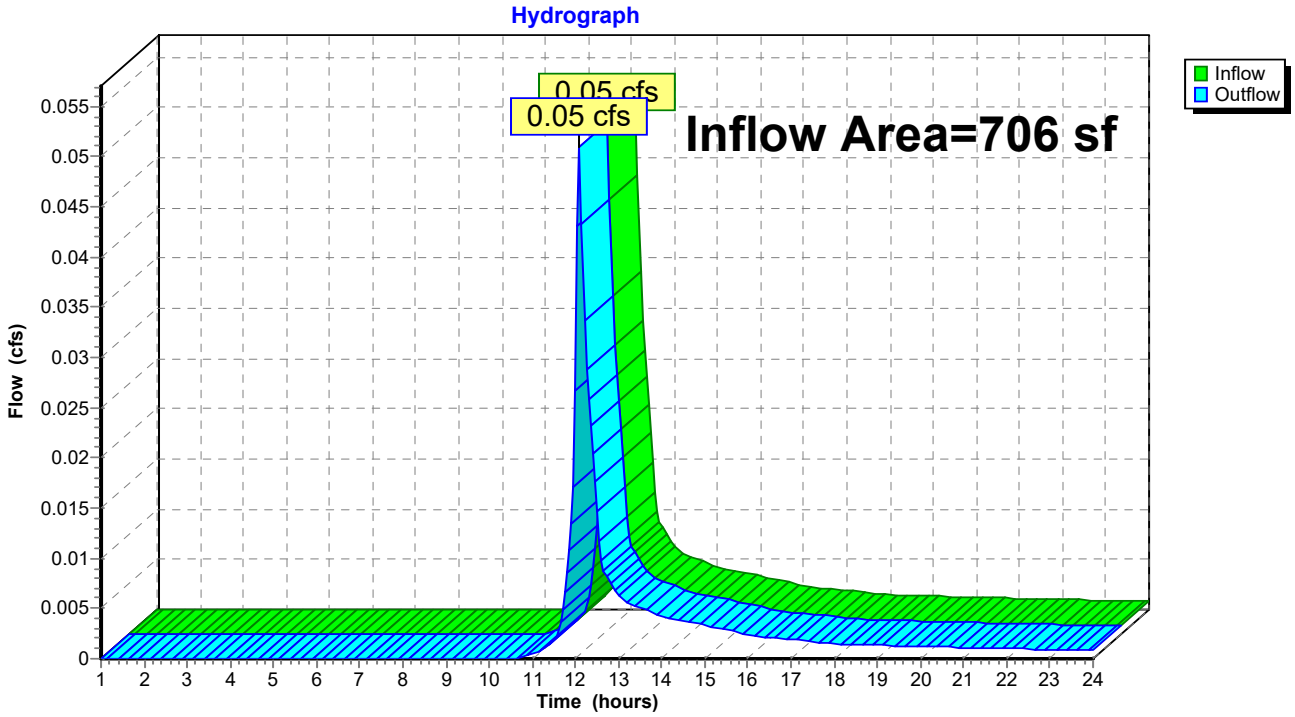


Summary for Reach 6R: OFFSITE NORTH

Inflow Area = 706 sf, 0.00% Impervious, Inflow Depth > 2.87" for 100-Year event
Inflow = 0.05 cfs @ 12.10 hrs, Volume= 169 cf
Outflow = 0.05 cfs @ 12.10 hrs, Volume= 169 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 6R: OFFSITE NORTH

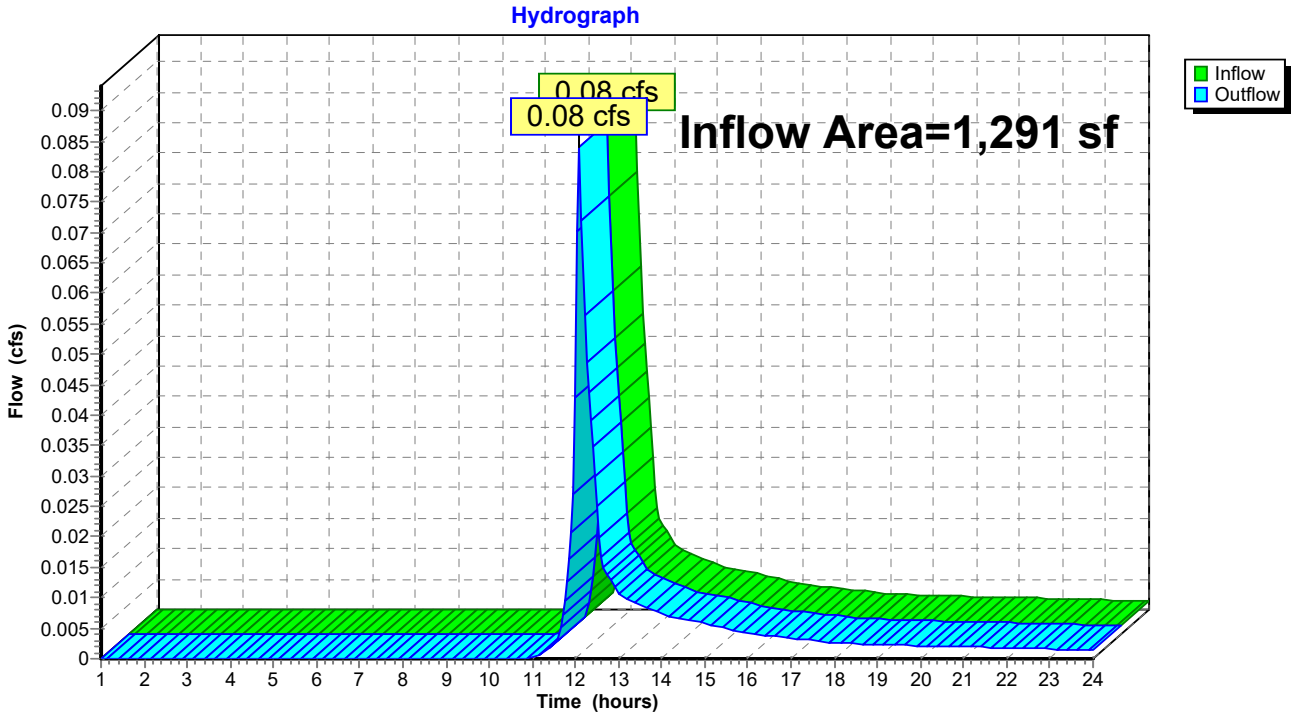


Summary for Reach 8R: OFFSITE EAST

Inflow Area = 1,291 sf, 0.00% Impervious, Inflow Depth > 2.63" for 100-Year event
Inflow = 0.08 cfs @ 12.10 hrs, Volume= 283 cf
Outflow = 0.08 cfs @ 12.10 hrs, Volume= 283 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Reach 8R: OFFSITE EAST



Summary for Pond CS1: CHAMBER SYSTEM 1

Inflow Area = 19,632 sf, 84.66% Impervious, Inflow Depth > 7.86" for 100-Year event
Inflow = 3.65 cfs @ 12.09 hrs, Volume= 12,854 cf
Outflow = 0.56 cfs @ 12.58 hrs, Volume= 12,852 cf, Atten= 85%, Lag= 29.3 min
Discarded = 0.56 cfs @ 12.58 hrs, Volume= 12,852 cf

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 92.27' @ 12.58 hrs Surf.Area= 2,367 sf Storage= 3,730 cf

Plug-Flow detention time= 42.0 min calculated for 12,852 cf (100% of inflow)
Center-of-Mass det. time= 41.9 min (800.9 - 759.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	89.78'	1,647 cf	**27.75'W x 85.29'L x 2.71'H Field A** 6,410 cf Overall - 2,292 cf Embedded = 4,118 cf x 40.0% Voids
#2A	90.28'	2,292 cf	**Cultec R-180** x 104 Inside #1 Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap Row Length Adjustment= +1.00' x 3.44 sf x 8 rows
		3,939 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	89.78'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.56 cfs @ 12.58 hrs HW=92.27' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.56 cfs)

Pond CS1: CHAMBER SYSTEM 1 - Chamber Wizard Field A

Chamber Model = Cultec R-180 (Cultec Recharger® 180HD)
Effective Size= 33.6"W x 20.0"H => 3.44 sf x 6.33'L = 21.8 cf
Overall Size= 36.0"W x 20.5"H x 7.33'L with 1.00' Overlap
Row Length Adjustment= +1.00' x 3.44 sf x 8 rows

36.0" Wide + 3.0" Spacing = 39.0" C-C Row Spacing

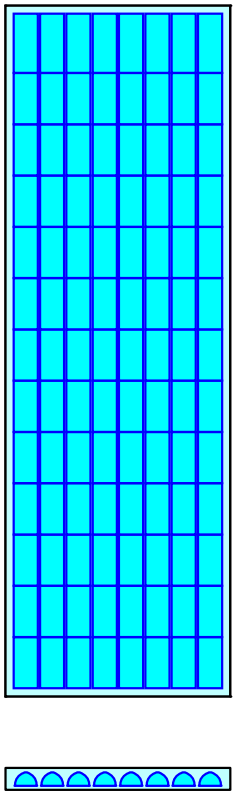
13 Chambers/Row x 6.33' Long +1.00' Row Adjustment = 83.29' Row Length +12.0" End Stone x 2 = 85.29' Base Length
8 Rows x 36.0" Wide + 3.0" Spacing x 7 + 12.0" Side Stone x 2 = 27.75' Base Width
6.0" Base + 20.5" Chamber Height + 6.0" Cover = 2.71' Field Height

104 Chambers x 21.8 cf +1.00' Row Adjustment x 3.44 sf x 8 Rows = 2,291.8 cf Chamber Storage

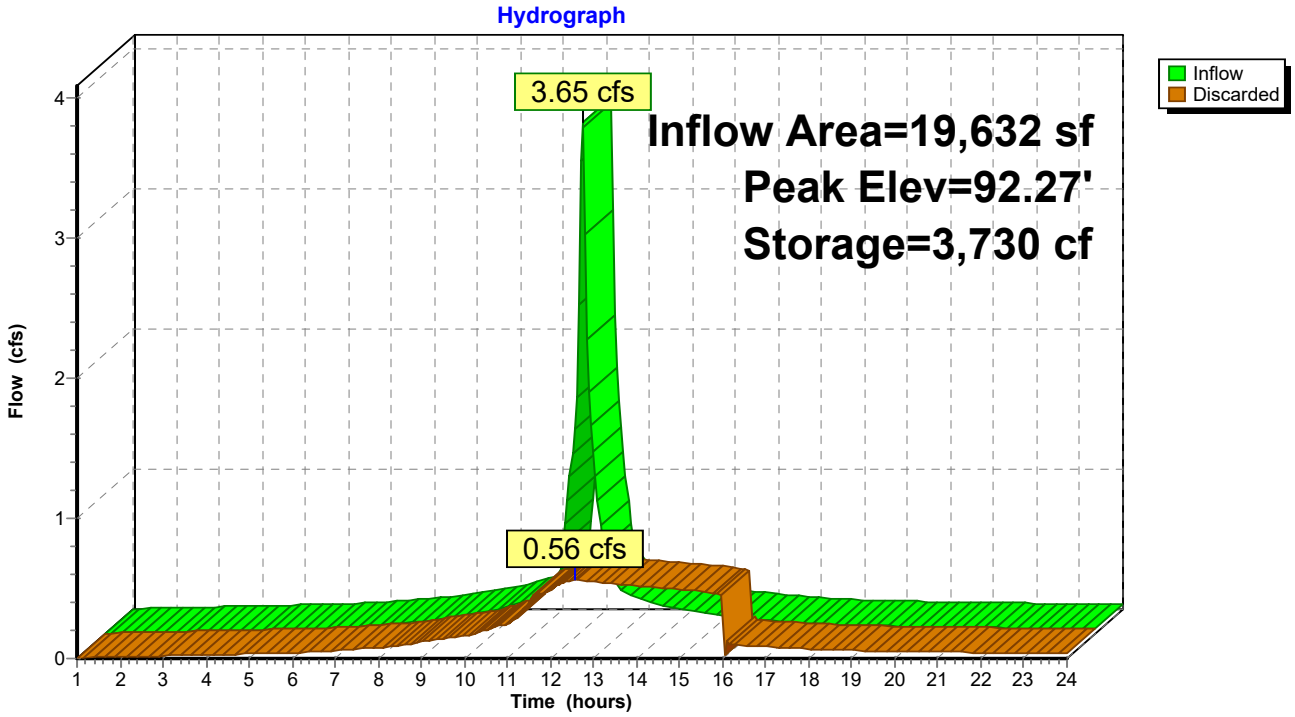
6,410.1 cf Field - 2,291.8 cf Chambers = 4,118.3 cf Stone x 40.0% Voids = 1,647.3 cf Stone Storage

Chamber Storage + Stone Storage = 3,939.1 cf = 0.090 af
Overall Storage Efficiency = 61.5%
Overall System Size = 85.29' x 27.75' x 2.71'

104 Chambers
237.4 cy Field
152.5 cy Stone



Pond CS1: CHAMBER SYSTEM 1



Summary for Pond CS2: CHAMBER SYSTEM 2

Inflow Area = 7,273 sf, 91.34% Impervious, Inflow Depth > 8.18" for 100-Year event
Inflow = 1.39 cfs @ 12.09 hrs, Volume= 4,955 cf
Outflow = 0.24 cfs @ 12.55 hrs, Volume= 4,954 cf, Atten= 83%, Lag= 27.8 min
Discarded = 0.24 cfs @ 12.55 hrs, Volume= 4,954 cf

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 90.99' @ 12.55 hrs Surf.Area= 821 sf Storage= 1,403 cf

Plug-Flow detention time= 37.7 min calculated for 4,954 cf (100% of inflow)
Center-of-Mass det. time= 37.6 min (790.7 - 753.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	88.50'	737 cf	**11.17'W x 73.50'L x 3.54'H Field A** 2,907 cf Overall - 1,065 cf Embedded = 1,841 cf x 40.0% Voids
#2A	89.00'	1,065 cf	**Cultec R-330XLHD** x 20 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 2 rows
		1,802 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	88.50'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=0.24 cfs @ 12.55 hrs HW=90.99' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.24 cfs)

Pond CS2: CHAMBER SYSTEM 2 - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

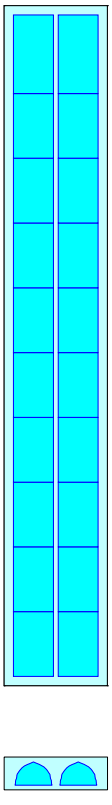
10 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 71.50' Row Length +12.0" End Stone x 2 = 73.50' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.17' Base Width
6.0" Base + 30.5" Chamber Height + 6.0" Cover = 3.54' Field Height

20 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 1,065.5 cf Chamber Storage

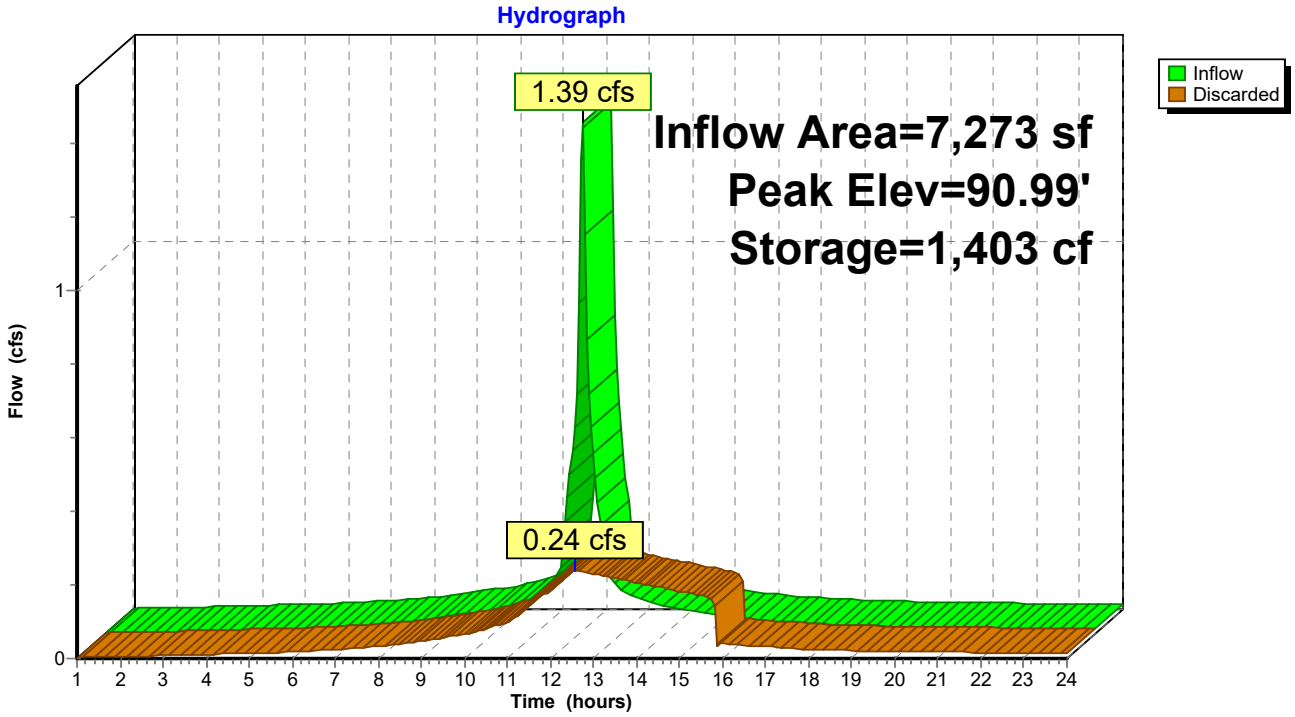
2,906.8 cf Field - 1,065.5 cf Chambers = 1,841.3 cf Stone x 40.0% Voids = 736.5 cf Stone Storage

Chamber Storage + Stone Storage = 1,802.0 cf = 0.041 af
Overall Storage Efficiency = 62.0%
Overall System Size = 73.50' x 11.17' x 3.54'

20 Chambers
107.7 cy Field
68.2 cy Stone



Pond CS2: CHAMBER SYSTEM 2



APPENDIX B: HYDRAULIC ANALYSIS

PIPE SIZING CALCULATIONS

MBL Land Development & Permitting, Corp.
Land Development, Transportation & Environmental Solutions

Project No.: 2021-054
Location: 33 Mazzeo Drive, Randolph
Calculated By: DT
Calculated On: January 27, 2022

25 YEAR STORM

WATERSHED CHARACTERISTICS												PIPE CHARACTERISTICS											FLOW CHARACTERISTICS			
LOCATION				LAND USE			FLOW TIME			FLOW		R = hydraulic radius = area/wetted perimeter														
Description	Cover	Increm. (ACRE)	Total_A (ACRE)	C	CA	Total CA	To Inlet (MIN)	In Pipe (MIN)	Tc (MIN)	I (IPH)	Q (CFS)	Structure	Invert	Pipe	Size (IN)	Length (FT)	Area (SF)	R (FT)	Slope	n	Qf (CFS)	Vf (FT/S)	Q/Qf	V/Vf	V (FT/S)	Tc L/V (MIN)
WS CB-1	LANDSCAPED	0.000		0.350																						
	IMPERVIOUS	0.022		0.850								From: CB-1	Out:													
	GRAVEL DRIVE	0.000		0.700										RCP	8	4	0.35	0.167	0.005	0.011	**1.01**	**2.89**	0.00	0.15	0.45	0.15
			0.022	0.019	0.000		6.00	NONE	6.00	6.39	**0.00**	To: WQU-1	In:													
												From: WQU-1	Out:													
WQU-1 TO CHAMBERS 2						0.000	6.00	0.15	6.15	6.36	**0.00**			RCP	8	3	0.35	0.167	0.005	0.011	**1.01**	**2.89**	**0.00**	**0.19**	**0.54**	**0.09**
												To: CHAMBERS 2	In:													
WS CB-3	LANDSCAPED	0.000		0.350																						
	IMPERVIOUS	0.058		0.850								From: CB-3	Out:													
	GRAVEL DRIVE	0.000		0.700										RCP	8	27	0.35	0.167	0.005	0.011	**1.01**	**2.89**	0.01	0.27	0.77	0.58
			0.058	0.049	0.003		6.00	NONE	6.00	6.39	**0.02**	To: DMH-1	In:													
WS CB-4	LANDSCAPED	0.020		0.350																						
	IMPERVIOUS	0.131		0.850								From: CB-4	Out:													
	GRAVEL DRIVE	0.000		0.000										RCP	8	5	0.35	0.167	0.005	0.011	**1.01**	**2.89**	0.06	0.45	1.32	0.06
			0.151	0.118	0.018		6.00	NONE	6.00	6.39	**0.11**	To: DMH-1	In:													
												From: DMH-1	Out:													
DMH-1 TO WQU-2						0.021	6.00	0.58	6.58	6.29	**0.13**			RCP	8	17	0.35	0.167	0.005	0.011	**1.01**	**2.89**	**0.13**	**0.58**	**1.67**	**0.17**
												To: WQU-2	In:													
WS CB-2	LANDSCAPED	0.014		0.350																						
	IMPERVIOUS	0.072		0.850								From: CB-2	Out:													
	GRAVEL DRIVE	0.000		0.000										RCP	8	4	0.35	0.167	0.005	0.011	**1.01**	**2.89**	0.02	0.33	0.95	0.07
			0.087	0.067	0.006		6.00	NONE	6.00	6.39	**0.04**	To: WQU-2	In:													
												From: WQU-2	Out:													
WQU-2 TO CHAMBERS 2						0.026	6.00	0.07	6.65	6.27	**0.17**			RCP	8	50	0.35	0.167	0.005	0.011	**1.01**	**2.89**	**0.16**	**0.62**	**1.79**	**0.46**
												To: CHAMBERS 2	In:													
WS CB-6	LANDSCAPED	0.007		0.350																						
	IMPERVIOUS	0.047		0.850								From: CB-6	Out:													
	GRAVEL DRIVE	0.000		0.000										HDPE	8	1	0.35	0.167	0.010	0.013	**1.21**	**3.46**	0.01	0.24	0.82	0.02
			0.053	0.042	0.002		6.00	NONE	6.00	6.39	**0.01**	To: DMH-2	In:													
WS CB-7	LANDSCAPED	0.000		0.350																						
	IMPERVIOUS	0.030		0.850								From: CB-7	Out:													
	GRAVEL DRIVE	0.000		0.349										HDPE	8	14	0.35	0.167	0.010	0.013	**1.21**	**3.46**	0.00	0.17	0.60	0.39
			0.030	0.026	0.001		6.00	NONE	6.00	6.39	**0.01**	To: DMH-2	In:													
												From: DMH-2	Out:													
DMH-2 TO WQU-3						0.003	6.00	0.39	6.39	6.32	**0.02**			HDPE	8	35	0.35	0.167	0.010	0.013	**1.21**	**3.46**	**0.02**	**0.31**	**1.09**	**0.54**
												To: WQU-3	In:													
WS CB-5	LANDSCAPED	0.045		0.350																						
	IMPERVIOUS	0.033		0.850								From: CB-5	Out:													
	GRAVEL DRIVE	0.000		0.000										HDPE	8	27	0.35	0.167	0.010	0.013	**1.21**	**3.46**	0.01	0.27	0.93	0.48
			0.079	0.044	0.003		6.00	NONE	6.00	6.39	**0.02**	To: DMH-2	In:													
												From: DMH-2	Out:													
DMH-2 TO WQU-3						0.144	6.00	0.48	6.87	6.24	**0.90**			HDPE	8	24	0.35	0.167	0.010	0.013	**1.21**	**3.46**	**0.75**	**0.96**	**3.33**	**0.12**
												To: WQU-3	In:													

APPENDIX C: GROUNDWATER RECHARGE CALCULATIONS & 72-HR DRAWDOWN CALCULATIONS

Groundwater Recharge Calculations (Chamber System 1)

Project No. 2021-054
Project: Proposed Car Wash
Location: 33 Mazzeo Drive, Randolph, MA
Date: January 27, 2022

Calculate the Required Recharge Volume (Chamber System 1):

NRCS Hydrologic Soil Group	Volume to Recharge (inches)	Impervious Area (square feet)	Required Recharge Volume (cubic feet)
A	0.60	0	0
B	0.35	16620	485
C	0.25	0	0
D	0.10	0	0
		Total Required Recharge Volume	485

Capture Area Adjustment

A minimum of 65% of the total site impervious area must be directed to a recharge BMP:

Impervious Area Directed to Recharge BMP (square feet)	Total Site Impervious Area (square feet)	% of Total Site Directed to Recharge BMP
16620	16620	100%

Calculate the Adjustment Factor:

Impervious Area Directed to Recharge BMP (square feet)	Total Site Impervious Area (square feet)	Ratio of Total Impervious Area to Impervious Area Directed to BMP
16620	16620	1.00

Calculate the Adjusted Required Recharge Volume:

Required Recharge Volume (cubic feet)	Ratio of Total Impervious Area to Impervious Area Directed to BMP	Adjusted Required Recharge Volume (cubic feet)
485	1.00	485
	Total Required Recharge Volume	485
	Provided Recharge Volume = (elev. 90.30 in Chambers)	510

Groundwater Recharge Calculations (Chamber System 2)

Project No. 2021-054
Project: Proposed Car Wash
Location: 33 Mazzeo Drive, Randolph, MA
Date: January 27, 2022

Calculate the Required Recharge Volume (Chamber System 2):

NRCS Hydrologic Soil Group	Volume to Recharge (inches)	Impervious Area (square feet)	Required Recharge Volume (cubic feet)
A	0.60	0	0
B	0.35	7528	220
C	0.25	0	0
D	0.10	0	0
		Total Required Recharge Volume	220

Capture Area Adjustment

A minimum of 65% of the total site impervious area must be directed to a recharge BMP:

Impervious Area Directed to Recharge BMP (square feet)	Total Site Impervious Area (square feet)	% of Total Site Directed to Recharge BMP
6443	7528	86%

Calculate the Adjustment Factor:

Impervious Area Directed to Recharge BMP (square feet)	Total Site Impervious Area (square feet)	Ratio of Total Impervious Area to Impervious Area Directed to BMP
6443	7528	1.17

Calculate the Adjusted Required Recharge Volume:

Required Recharge Volume (cubic feet)	Ratio of Total Impervious Area to Impervious Area Directed to BMP	Adjusted Required Recharge Volume (cubic feet)
220	1.17	257
	Total Required Recharge Volume	257
	Provided Recharge Volume = (elev. 89.19 in Chambers)	290

72 Hour Drawdown Calculations

Project No. 2021-054
Project: Proposed Car Wash
Location: 33 Mazzeo Drive, Randolph, MA
Date: January 27, 2022

According to the Massachusetts Stormwater Management Handbook, recharge BMP's must be designed to drain within 72 hours. Below is the drawdown calculation used:

$Time_{(Drawdown)} = R_v / (K*A)$

Where:

R_v: Recharge Volume (ft^3)

K: Recharge Rate (Rawl's Rate) used to size the infiltration BMP (in/hour)

A: Bottom Area of the Infiltration Facility (ft^2)

Location	R_v	K (in/hour)	K (ft/hr)	A	Drawdown Time (hrs)	Drawdown Time Less than 72 Hours?
Chamber System 1	510	8.27	0.69	2367	0.31	YES
Chamber System 2	290	8.27	0.69	821	0.51	YES

Drawdown Conforms to the Stormwater Management Standards

APPENDIX D: REQUIRED WATER QUALITY VOLUME & TSS REMOVAL CALCULATIONS

TSS Removal Spreadsheet

Project No. 2021-054
Project: Proposed Car Wash
Location: 33 Mazzeo Drive, Randolph, MA
Date: January 27, 2022

Treatment Train: **To Chamber System 1**

Pre-Treatment					
BMP	**TSS Removal Rate**	**Starting TSS Load**	**Amount Removed**	**Remaining Load**	**TSS Removed**
Deep Sump Hooded Catch Basins	**25.0%**	**100.0%**	**25.0%**	**75.0%**	**25.0%**
Water Quality Unit	**89.0%**	**75.0%**	**66.8%**	**8.3%**	**91.8%**

Since this site is located within a Critical Area, 44% pretreatment is required. Based on the calculations above, 92% of TSS is removed prior to the Recharge Chamber System.

Total TSS Removal					
BMP	**TSS Removal Rate**	**Starting TSS Load**	**Amount Removed**	**Remaining Load**	**TSS Removed**
Chamber System 1	**80.0%**	**8.3%**	**6.6%**	**1.7%**	**98.4%**

Per the MA Stormwater Handbook, 80% of TSS is required to be removed prior to discharging. Therefore, the project complies with the Stormwater Standards.

Treatment Train: **To Chamber System 2**

Pre-Treatment					
BMP	**TSS Removal Rate**	**Starting TSS Load**	**Amount Removed**	**Remaining Load**	**TSS Removed**
Deep Sump Hooded Catch Basins	**25.0%**	**100.0%**	**25.0%**	**75.0%**	**25.0%**
Water Quality Unit	**87.0%**	**75.0%**	**65.3%**	**9.8%**	**90.3%**

Since this site is located within a Critical Area, 44% pretreatment is required. Based on the calculations above, 90% of TSS is removed prior to the Recharge Chamber System.

Total TSS Removal					
BMP	**TSS Removal Rate**	**Starting TSS Load**	**Amount Removed**	**Remaining Load**	**TSS Removed**
Chamber System 2	**80.0%**	**9.8%**	**7.8%**	**2.0%**	**98.1%**

Per the MA Stormwater Handbook, 80% of TSS is required to be removed prior to discharging. Therefore, the

Water Quality Calculations (Chamber System 1)

Project No. 2021-054
Project: Proposed Car Wash
Location: 33 Mazzeo Drive, Randolph, MA
Date: January 27, 2022

Calculate the Required Water Quality Volume (Chamber System 1)

Depth of Runoff (inches)	Discharge To:	Total Impervious Area (square feet)	Required Water Quality Volume (cubic feet)
0.5	Not Discharging to a Critical Area		0
1	Discharging to a Critical Area	16620	1385
1	Soils with Rapid Infiltration Rate >2.41 "/hr		0
		Required Water Quality Volume	1385
		Provided Water Quality Volume (EL. 90.77 in Chambers)	1450

Water Quality Calculations (Chamber System 2)

Project No. 2021-054
Project: Proposed Car Wash
Location: 33 Mazzeo Drive, Randolph, MA
Date: January 27, 2022

Calculate the Required Water Quality Volume (Chamber System 2)

Depth of Runoff (inches)	Discharge To:	Total Impervious Area (square feet)	Required Water Quality Volume (cubic feet)
0.5	Not Discharging to a Critical Area		0
1	Discharging to a Critical Area	6443	537
1	Soils with Rapid Infiltration Rate >2.41 "/hr		0
		Required Water Quality Volume	537
		Provided Water Quality Volume (EL. 89.56 in Chambers)	538

WATER QUALITY UNIT SIZING

Brief Stormceptor Sizing Report - WQU-1

Project Information & Location			
Project Name	Car Wash	**Project Number**	2021-054
City	Randolph	**State/ Province**	Massachusetts
Country	United States of America	**Date**	1/12/2022
Designer Information		**EOR Information (optional)**	
Name	JUSTIN WILLIAMS	**Name**	
Company	MBL Land Development & Permitting Corp.	**Company**	
Phone #	781-706-7433	**Phone #**	
Email	Justin@MBLLandDevelopment.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQU-1
Target TSS Removal (%)	80
TSS Removal (%) Provided	97
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	97
STC 900	99
STC 1200	99
STC 1800	99
STC 2400	99
STC 3600	99
STC 4800	100
STC 6000	100
STC 7200	100
STC 11000	100
STC 13000	100
STC 16000	100

Sizing Details

Drainage Area	
Total Area (acres)	0.03
Imperviousness %	100.0

Rainfall	
Station Name	BLUE HILL
State/Province	Massachusetts
Station ID #	0736
Years of Records	58
Latitude	42°12'44"N
Longitude	71°6'53"W

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

Brief Stormceptor Sizing Report - WQU-2

Project Information & Location			
Project Name	Car Wash	**Project Number**	2021-054
City	Randolph	**State/ Province**	Massachusetts
Country	United States of America	**Date**	1/12/2022
Designer Information		**EOR Information (optional)**	
Name	JUSTIN WILLIAMS	**Name**	
Company	MBL Land Development & Permitting Corp.	**Company**	
Phone #	781-706-7433	**Phone #**	
Email	Justin@MBLLandDevelopment.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQU-2
Target TSS Removal (%)	80
TSS Removal (%) Provided	89
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	89
STC 900	93
STC 1200	94
STC 1800	94
STC 2400	95
STC 3600	96
STC 4800	97
STC 6000	97
STC 7200	98
STC 11000	98
STC 13000	98
STC 16000	99

Sizing Details

Drainage Area	
Total Area (acres)	0.28
Imperviousness %	88.0

Rainfall	
Station Name	BLUE HILL
State/Province	Massachusetts
Station ID #	0736
Years of Records	58
Latitude	42°12'44"N
Longitude	71°6'53"W

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

Brief Stormceptor Sizing Report - WQU-3

Project Information & Location			
Project Name	Car Wash	**Project Number**	2021-054
City	Randolph	**State/ Province**	Massachusetts
Country	United States of America	**Date**	1/12/2022
Designer Information		**EOR Information (optional)**	
Name	JUSTIN WILLIAMS	**Name**	
Company	MBL Land Development & Permitting Corp.	**Company**	
Phone #	781-706-7433	**Phone #**	
Email	Justin@MBLLandDevelopment.com	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	WQU-3
Target TSS Removal (%)	80
TSS Removal (%) Provided	88
Recommended Stormceptor Model	STC 450i

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	88
STC 900	92
STC 1200	92
STC 1800	93
STC 2400	94
STC 3600	95
STC 4800	96
STC 6000	96
STC 7200	97
STC 11000	98
STC 13000	98
STC 16000	98

Sizing Details

Drainage Area	
Total Area (acres)	0.18
Imperviousness %	72.0

Rainfall	
Station Name	BLUE HILL
State/Province	Massachusetts
Station ID #	0736
Years of Records	58
Latitude	42°12'44"N
Longitude	71°6'53"W

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage	
Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

APPENDIX E: CONSTRUCTION PERIOD POLLUTION PREVENTION PLAN

This construction period pollution prevention plan has been prepared in accordance with the Stormwater Management Policy issued by the Department of Environmental Protection (DEP), for the proposed site development at:

33 Mazzeo Drive, Randolph, Massachusetts

SECTION I: POTENTIAL SOURCES OF POLLUTION

The following potential sources of pollution should be monitored during construction.

WASTE MATERIALS

All waste materials will be collected and stored in a securely lidded dumpster located more than 100 feet from any resource area as is reasonably practical. The dumpster will meet all local and State solid waste management regulations. All trash and construction debris from the site will be deposited in the dumpster. No construction waste materials will be buried onsite. All personnel will be instructed regarding the correct procedure for waste disposal. Notices stating these practices will be posted in the office trailer, and the individual who manages day-to-day site operations will be responsible for seeing that these practices are followed.

HAZARDOUS WASTE

All hazardous waste materials will be disposed of in the manner specified by local or State regulation or by the manufacturer. Site personnel will be instructed in these practices and the individual, whom manages day-to-day site operations, will be responsible for seeing that these practices are followed.

SANITARY WASTE

All sanitary waste will be collected from the portable units a minimum of once per week by a licensed sanitary waste management contractor, as required by the local or State regulation.

NON-STORM WATER DISCHARGES

During construction activities at the site, some water from the site will be suitable for discharge. Uncontaminated groundwater from de-watering activities will be directed to recharge groundwater on-site. The construction de-watering and all non-stormwater discharges will be directed through a silt bag, dewatering or sedimentation basin prior to discharge to the wetlands. The general contractor will comply with the EPA.'s Final General Permit for Construction De-watering Discharges and the Stormwater Pollution Prevention Plan.

CONCRETE TRUCK WASHOUT AREAS

Concrete trucks will be directed to a washout area located outside of the 100-foot Wetland Buffer. Washout areas shall consist of a layer of polyurethane sheeting draped over a rectangular area built out of straw bales.

PROPER EQUIPMENT/ VEHICLE FUELING AND MAINTENANCE PRACTICES

Petroleum products related to the operation of said equipment will be stored and tightly sealed containers, which will be clearly labeled. Spray guns will be cleaned on a disposable tarp. Vehicles will not be allowed to refuel on-site.

SPILL PREVENTION AND CONTROL PLAN

Materials and equipment necessary for spill cleanup will be kept on-site. Equipment will include but not be limited to brooms, dustpans, mops, rags, gloves, goggles, kitty litter, sand, saw dust and plastic and metal trash containers. All spills will be cleaned up immediately upon discovery. Spills large enough to reach the stormwater management system shall be reported to the Massachusetts DEP or National Response Center at 1-800-424-8802.

SECTION II: BEST MANAGEMENT PRACTICES

An Erosion Control and Sedimentation Control program will be implemented to prevent indirect impact to the existing wetland, existing roadways, and surrounding sites during the construction. The program incorporates Best Management Practices (BMP's) as specified in the guidelines developed by DEP and the Environmental Protection Agency and complies with the requirements of the NPDES General Permit for Storm Water Discharges for Construction Activities. These measures include the installation of temporary erosion and sedimentation controls and construction sequencing. Areas of exposed soil will be kept to a minimum and/or phased during construction and a permanent vegetative cover or other forms of stabilization will be established as soon as practicable.

Proper implementation of the erosion and sedimentation control program will:

- Minimize exposed soils through temporary mulching or seeding or by sequencing so that the amount of exposed soil is kept to a minimum.
- Place erosion controls structures to manage erosion and site runoff.
- Managing the control structures through the life of the construction activities and repairing all damaged structures as well as removing trapped silt as soon as recommended.
- Establish a permanent vegetative cover or other forms of stabilization as soon as practicable.

The following erosion and sedimentation control BMP's are presented in the sequence to which they will be implemented at the site. The measures will be inspected on a weekly basis or immediately before and or after storm event greater than 0.5”. The controls will be routinely maintained throughout the duration of the project. Any damaged controls will be repaired and or replaced immediately. The locations of the specified sedimentation and erosion control measures are depicted on the proposed design drawings.

EROSION CONTROL BARRIERS

Erosion control barriers will be installed and inspected by the appropriate authority at the down gradient limit of work prior to construction. The barriers will consist of staked silt fence and will be entrenched into the ground to prevent under flow. When necessary, additional erosion controls will be installed immediately down gradient of the erosion prone areas, such as the base of steep exposed slopes, around material stockpile areas, throughout the construction phase of the project. A sufficient supply of material shall be kept on site to facilitate the repair or replacement of the proposed barriers.

STABILIZED CONSTRUCTION ENTRANCE

The stabilized construction entrance shall be installed after site clearing but before any earth moving activities. The entrance should be maintained in a condition that will prevent tracking or flowing of sediment onto public rights-of-way. This may require periodic topdressing with additional stone. Remove mud and sediment tracked or washed onto public road immediately. Reshape pad as needed for drainage and runoff control. Repair any broken road pavement immediately. All temporary erosion and sediment control measures shall be removed within 30 days after final site stabilization is achieved or after the temporary practices are no longer needed. Trapped sediment shall be removed or stabilized on site. Inspect the pad and sediment disposal area weekly and after heavy rains or heavy use.

TEMPORARY SURFACE AND SLOPE STABILIZATION

Any area of exposed soil that will remain unstabilized for a period of more than fourteen days will be covered with a layer of straw or mulch until the time of final loam and seeding.

TEMPORARY SEEDING

A temporary vegetative cover of fast-growing indigenous grasses will be established on areas of exposed soils that remain unstable for a period of fourteen days. Depending on the slope, the seeded surfaces will be covered with a layer of mulch.

PERMANENT SEEDING

Upon completion of the final grading, any area not covered by pavement, other forms of stabilization, or other landscaped methods will be loamed and seeded with New England Erosion Control/Restoration Mix (for dry sites) produced by New England Wetland Plants, Inc. (or approved equivalent). This mix includes grasses and broad leaf herbaceous plants that are indigenous to the northeastern Massachusetts. Depending on slope the seeded area will be covered with mulch or erosion control blanket. The seed mix will be applied at a rate of 25lbs/acre.

INFILTRATION PROTECTION

The following practices should be implemented by the contractor to protect the in-situ soils in the location of the infiltration chambers:

- Never allow heavy construction equipment to drive across areas;
- Limit smearing and compacting of soils in infiltration areas;
- Rotary till or disc harrow to a depth of 12” to restore infiltration rates after final grading.

SECTION III: INSPECTIONS

Construction Inspections: Construction inspections shall be performed by personnel from the site contractor and/or the Engineer of Record, as appointed by the owner. Inspection forms shall be executed for each corresponding inspection.

- Perimeter Sediment Controls: Silt fence will be laid and staked into the ground in advance of construction along the perimeter of the project site in locations shown on the Erosion & Sedimentation Control Plan. Such barriers shall be inspected within 12 hours

of a storm event in excess of 0.5" and weekly. Sediment deposits must be removed when the level of deposition reaches approximately one-half the height of the barrier.

- Construction Entrance: The temporary construction entrance should be maintained in a condition that will prevent tracking or flowing of sediment into the street. This may require periodic topdressing with additional stone.

  The entrance should be inspected weekly and within 12 hours of a storm event in excess of 0.5". Mud and soil particles will eventually clog the voids in the gravel and the effectiveness of the gravel pad. When this occurs, the pad should be top dressed with new stone. Complete replacement of the pad may be necessary when the pad becomes completely clogged.

- Catch Basin Inlet Protection: Silt sacks have been proposed in all catch basins to prevent sediment from entering the municipal drainage system prior to permanent stabilization. Silt sacks should be inspected after rainstorm in excess of 0.5" and weekly. Sediment should be disposed of in a suitable area and protected from erosion by either structural or vegetative means. Catch basin inlet protection should be removed and the area repaired as soon as the contributing drainage area to the inlet has been completely stabilized.

APPENDIX F: LONG TERM POLLUTION PREVENTION PLAN

To keep the stormwater management system functioning properly, a Long-Term Pollution Prevention Plan is required. Adherence to this Long-Term Pollution Prevention Plan will be the responsibility of the following:

New England Realty Trust
611 High Street, No. 190
Dedham, Massachusetts

LONG TERM POLLUTION PREVENTION PLAN TRAINING

Annual stormwater pollution prevention plan training shall be conducted. Training records shall be kept on file.

GOOD HOUSEKEEPING PRACTICES
Employees shall be trained in the importance of not spilling fluids and chemicals such as oil, antifreeze, etc. onto the bare ground. All areas exposed to the weather shall be kept clean.

SOLID WASTE MANAGMENT
Solid waste shall be kept in the covered dumpster and collected at a minimum of once per week and disposed of in a legal manner, at a state licensed recycling center or landfill.

REQUIREMENTS FOR STORAGE AND USE OF FERTILIZERS, HERBICIDES AND PESTICIDES
Excess fertilizers shall be swept up from all impervious surfaces and not be allowed to run into the stormwater management system.

All fertilizers, herbicides and pesticides shall be kept in a wrapped or sealed container and under cover.

SNOW DISPOSAL AND PLOWING PLANS
Snow shall be plowed to the area indicated on the permitting plans. If not possible to store the snow on-site, it shall be trucked away and disposed of in the same manner described above.

WINTER ROAD SALT/ SAND USE AND STORAGE RESTRICTIONS
Road salt shall not be used on the site. Sand is an acceptable alternative.

STREET SWEEPING SCHEDULE
Street sweeping shall be performed on paved surfaces no less than four times per year.

APPENDIX G: OPERATION & MAINTENANCE PLAN

To keep the stormwater management system functioning properly and to ensure that the Total Suspended Solids (TSS) are reduced, periodic inspections and maintenance of the system is required. The operation and maintenance of all components of the proposed stormwater management system will be the responsibility of the following:

New England Realty Trust
611 High Street, No. 190
Dedham, Massachusetts

The following is a guideline of the specific maintenance schedules and tasks on a component-by-component basis that is required to keep the stormwater management system functioning properly.

DEEP SUMP CATCH BASINS

Unscheduled Maintenance: At the end of foliage and snow-removal seasons, inspect or clean the basin. Remove any branches, trash or other large debris that could interfere with the proper operation of the stormwater management system. Whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin, remove any accumulated sediment with clamshell buckets or vacuum trucks.

Quarterly Maintenance: Inspect or clean the basin. Remove any branches, trash or other large debris that could interfere with the proper operation of the stormwater management system. Remove any accumulated sediment with clamshell buckets or vacuum trucks.

WATER QUALITY UNITS

See attached on the following pages, the operation and maintenance requirements and owner's manual for the Stormceptor Water Quality Units.

Quarterly Annual Maintenance: Check inlets, separation screens and outlets for clogging and remove any debris that could interfere with the proper operation of the system. Remove any accumulated sediment with vacuum trucks when it reaches 75% of the capacity in the sump.

CULTEC SUBSURFACE RECHARGE CHAMBERS

The subsurface recharge chambers shall be maintained per the manufacturer's recommendations (See full O&M requirements attached on following pages).

Monthly Maintenance (first year only): Check inlets and outlets for clogging and remove any debris that could interfere with the proper operation of the system. Check for depressions in areas over and surrounding the recharge system.

Semi-Annual Maintenance (Spring and Fall): Check inlets and outlets for clogging and remove any debris that could interfere with the proper

operation of the system. Check for depressions in areas over and surrounding the recharge system.

Annual Maintenance: Confirm that no unauthorized modifications have been made to the system.

1 Year After Commissioning and Every 3rd Year Following: Clean the inlets and outlets with vacuum trucks.

2 Years After Commissioning: Inspect the interior of the chambers through inspection port for deficiencies using CCTV or comparable technique. Clean the chambers and feed connectors of any debris with vacuum trucks.

9 Years After Commissioning and every 9 Years Following: Inspect the interior of the chambers through inspection port for deficiencies using CCTV or comparable technique.

ROOF LEADER AND GUTTERS

Unscheduled Maintenance: Maintain the gutters and downspouts in clean condition free of debris so they are able to quickly drain water from the roof and the building.

PAVED AREAS

Quarterly Maintenance: Sweep, vacuum, or clean paved areas to reduce the amount of sediment entering the stormwater management system.

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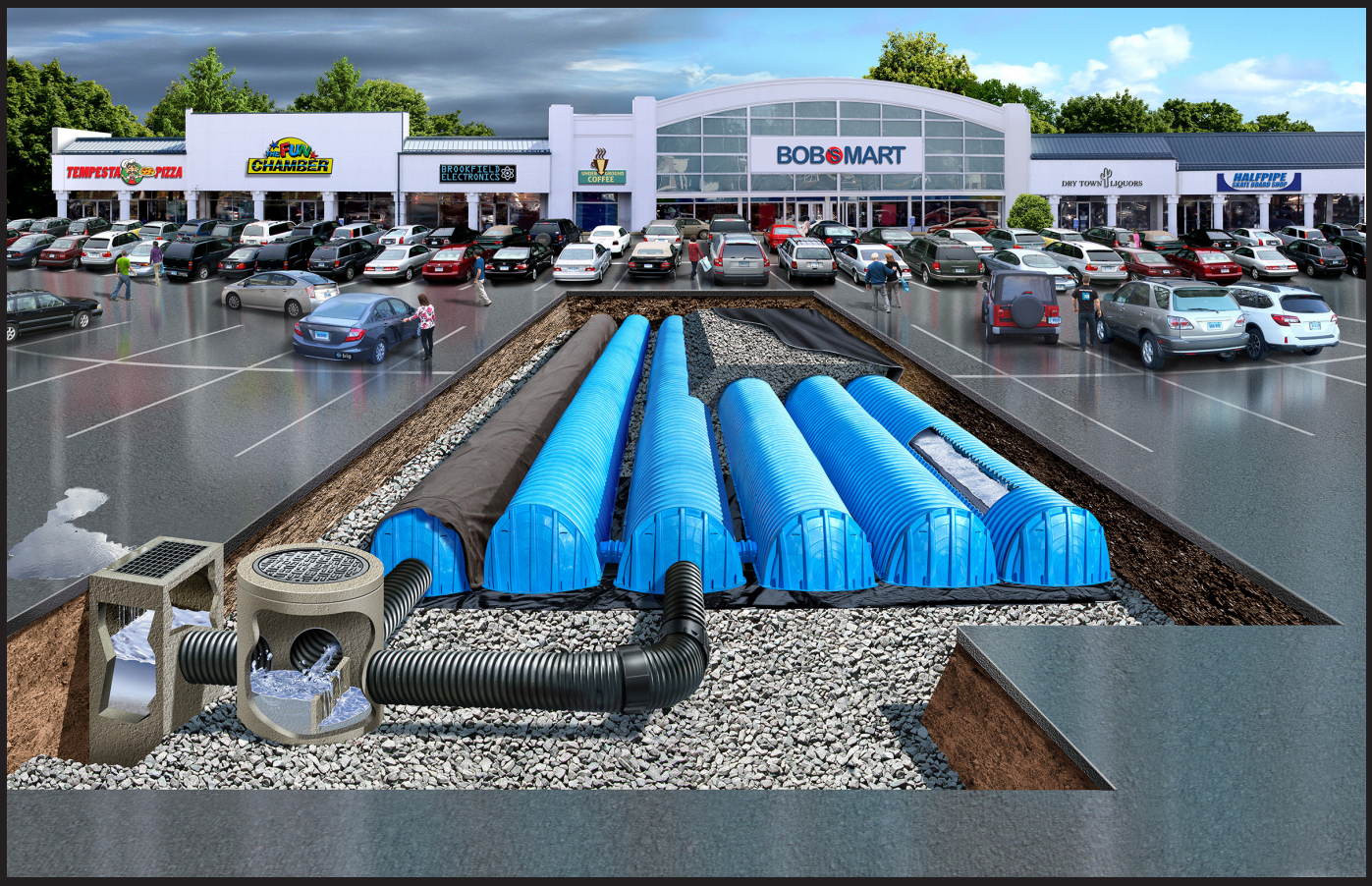

OPERATION & MAINTENANCE GUIDELINES

FOR CULTEC STORMWATER MANAGEMENT SYSTEMS

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Contact Information:
For general information on our other products and services, please contact our offices within the United States at (800)428-5832, (203)775-4416 ext. 202, or e-mail us at custservice@cultec.com.

For technical support, please call (203)775-4416 ext. 203 or e-mail tech@cultec.com.

Visit www.cultec.com/downloads.html for Product Downloads and CAD details.

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January 2020

These instructions are for single-layer traffic applications only. For multi-layer applications, contact CULTEC.
All illustrations and photos shown herein are examples of typical situations. Be sure to follow the engineer's drawings.
Actual designs may vary.

This manual contains guidelines recommended by CULTEC, Inc. and may be used in conjunction with, but not to supersede, local regulations or regulatory authorities. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Introduction

The CULTEC Subsurface Stormwater Management System is a high-density polyethylene (HDPE) chamber system arranged in parallel rows surrounded by washed stone. The CULTEC chambers create arch-shaped voids within the washed stone to provide stormwater detention, retention, infiltration, and reclamation. Filter fabric is placed between the native soil and stone interface to prevent the intrusion of fines into the system. In order to minimize the amount of sediment which may enter the CULTEC system, a sediment collection device (stormwater pretreatment device) is recommended upstream from the CULTEC chamber system. Examples of pretreatment devices include, but are not limited to, an appropriately sized catch basin with sump, pretreatment catchment device, oil grit separator, or baffled distribution box. Manufactured pretreatment devices may also be used in accordance with CULTEC chambers. Installation, operation, and maintenance of these devices shall be in accordance with manufacturer's recommendations. Almost all of the sediment entering the stormwater management system will be collected within the pretreatment device.

Best Management Practices allow for the maintenance of the preliminary collection systems prior to feeding the CULTEC chambers. The pretreatment structures shall be inspected for any debris that will restrict inlet flow rates. Outfall structures, if any, such as outlet control must also be inspected for any obstructions that would restrict outlet flow rates. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Operation and Maintenance Requirements

I. Operation

CULTEC stormwater management systems shall be operated to receive only stormwater run-off in accordance with applicable local regulations. CULTEC subsurface stormwater management chambers operate at peak performance when installed in series with pretreatment. Pretreatment of suspended solids is superior to treatment of solids once they have been introduced into the system. The use of pretreatment is adequate as long as the structure is maintained and the site remains stable with finished impervious surfaces such as parking lots, walkways, and pervious areas are properly maintained. If there is to be an unstable condition, such as improvements to buildings or parking areas, all proper silt control measures shall be implemented according to local regulations.

II. Inspection and Maintenance Options

A. The CULTEC system may be equipped with an inspection port located on the inlet row. The inspection port is a circular cast box placed in a rectangular concrete collar. When the lid is removed, a 6-inch (150 mm) pipe with a screw-in plug will be exposed. Remove the plug. This will provide access to the CULTEC Chamber row below. From the surface, through this access, the sediment may be measured at this location. A stadia rod may be used to measure the depth of sediment if any in this row. If the depth of sediment is in excess of 3 inches (76 mm), then this row should be cleaned with high pressure water through a culvert cleaning nozzle. This would be carried out through an upstream manhole or through the CULTEC StormFilter Unit (or other pretreatment device). CCTV inspection of this row can be deployed through this access port to determine if any sediment has accumulated in the inlet row.

B. If the CULTEC bed is not equipped with an inspection port, then access to the inlet row will be through an upstream manhole or the CULTEC StormFilter.

1. Manhole Access
This inspection should only be carried out by persons trained in confined space entry and sewer inspection services. After the manhole cover has been removed a gas detector must be lowered into the manhole to ensure that there are not high concentrations of toxic gases present. The inspector should be lowered into the manhole with the proper safety equipment as per OSHA requirements. The inspector may be able to observe sediment from this location. If this is not possible, the inspector will need to deploy a CCTV robot to permit viewing of the sediment.

2. StormFilter Access
Remove the manhole cover to allow access to the unit. Typically a 30-inch (750 mm) pipe is used as a riser from the StormFilter to the surface. As in the case with manhole access, this access point requires a technician trained in confined space entry with proper gas detection equipment. This individual must be equipped with the proper safety equipment for entry into the StormFilter. The technician will be lowered onto the StormFilter unit. The hatch on the unit must be removed. Inside the unit are two filters which may be removed according to StormFilter maintenance guidelines. Once these filters are removed the inspector can enter the StormFilter unit to launch the CCTV camera robot.

C. The inlet row of the CULTEC system is placed on a polyethylene liner to prevent scouring of the washed stone beneath this row. This also facilitates the flushing of this row with high pressure water through a culvert cleaning nozzle. The nozzle is deployed through a manhole or the StormFilter and extended to the end of the row. The water is turned on and the inlet row is back-flushed into the manhole or StormFilter. This water is to be removed from the manhole or StormFilter using a vacuum truck.

III. Maintenance Guidelines

The following guidelines shall be adhered to for the operation and maintenance of the CULTEC stormwater management system:

A. The owner shall keep a maintenance log which shall include details of any events which would have an effect on the system's operational capacity.

B. The operation and maintenance procedure shall be reviewed periodically and changed to meet site conditions.

C. Maintenance of the stormwater management system shall be performed by qualified workers and shall follow applicable occupational health and safety requirements.

D. Debris removed from the stormwater management system shall be disposed of in accordance with applicable laws and regulations.

IV. Suggested Maintenance Schedules

A. Minor Maintenance
The following suggested schedule shall be followed for routine maintenance during the regular operation of the stormwater system:

Frequency	Action
Monthly in first year	Check inlets and outlets for clogging and remove any debris, as required.
Spring and Fall	Check inlets and outlets for clogging and remove any debris, as required.
One year after commissioning and every third year following	Check inlets and outlets for clogging and remove any debris, as required.

B. Major Maintenance
The following suggested maintenance schedule shall be followed to maintain the performance of the CULTEC stormwater management chambers. Additional work may be necessary due to insufficient performance and other issues that might be found during the inspection of the stormwater management chambers. (See table on next page)

	Frequency	Action
Inlets and Outlets	Every 3 years	• Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
	Spring and Fall	• Check inlet and outlets for clogging and remove any debris as required.
CULTEC Stormwater Chambers	2 years after commissioning	• Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. • Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
	9 years after commissioning every 9 years following	• Clean stormwater management chambers and feed connectors of any debris. • Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. • Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
	45 years after commissioning	• Clean stormwater management chambers and feed connectors of any debris. • Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. • Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. • Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. • Attain the appropriate approvals as required. • Establish a new operation and maintenance schedule.
Surrounding Site	Monthly in 1st year	• Check for depressions in areas over and surrounding the stormwater management system.
	Spring and Fall	• Check for depressions in areas over and surrounding the stormwater management system.
	Yearly	• Confirm that no unauthorized modifications have been performed to the site.

For additional information concerning the maintenance of CULTEC Subsurface Stormwater Management Chambers, please contact CULTEC, Inc. at 1-800-428-5832.

WQMP
Operation & Maintenance (O&M) Plan

Project Name:_____

Prepared for:

Project Name: _____

Address:_____

City, State Zip:_____

Prepared on:

Date:_____

This O&M Plan describes the designated responsible party for implementation of this WQMP, including: operation and maintenance of all the structural BMP(s), conducting the training/educational program and duties, and any other necessary activities. The O&M Plan includes detailed inspection and maintenance requirements for all structural BMPs, including copies of any maintenance contract agreements, manufacturer's maintenance requirements, permits, etc.

8.1.1 Project Information

Project name	
Address	
City, State Zip	
Site size	
List of structural BMPs, number of each	
Other notes	

8.1.2 Responsible Party

The responsible party for implementation of this WQMP is:

Name of Person or HOA Property Manager	
Address	
City, State Zip	
Phone number	
24-Hour Emergency Contact number	
Email	

8.1.3 Record Keeping

Parties responsible for the O&M plan shall retain records for at least 5 years.

All training and educational activities and BMP operation and maintenance shall be documented to verify compliance with this O&M Plan. A sample Training Log and Inspection and Maintenance Log are included in this document.

8.1.4 Electronic Data Submittal

This document along with the Site Plan and Attachments shall be provided in PDF format. AutoCAD files and/or GIS coordinates of BMPs shall also be submitted to the City.

Appendix ____

BMP SITE PLAN

Site plan is preferred on minimum 11” by 17” colored sheets, as long as legible.

BMP OPERATION & MAINTENANCE LOG

Project Name: _____

Today's Date:_____

Name of Person Performing Activity (Printed):_____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

Minor Maintenance

Frequency		Action
Monthly in first year		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Month 1	Date:	
□ Month 2	Date:	
□ Month 3	Date:	
□ Month 4	Date	
□ Month 5	Date:	
□ Month 6	Date:	
□ Month 7	Date:	
□ Month 8	Date:	
□ Month 9	Date:	
□ Month 10	Date:	
□ Month 11	Date:	
□ Month 12	Date:	
Spring and Fall		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
One year after commissioning and every third year following		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Year 1	Date:	
□ Year 4	Date:	
□ Year 7	Date:	
□ Year 10	Date:	
□ Year 13	Date:	
□ Year 16	Date:	
□ Year 19	Date:	
□ Year 22	Date:	

Major Maintenance

	Frequency		Action
Inlets and Outlets	**Every 3 years**		Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
			Notes
	□ Year 1	Date:	
	□ Year 4	Date:	
	□ Year 7	Date:	
	□ Year 10	Date:	
	□ Year 13	Date:	
	□ Year 16	Date:	
	□ Year 19	Date:	
	□ Year 22	Date:	
	Spring and Fall		Check inlet and outlets for clogging and remove any debris, as required.
			Notes
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
CULTEC Stormwater Chambers	**2 years after commissioning**		□ Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. □ Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
			Notes
	□ Year 2	Date:	

Major Maintenance

	Frequency		Action
CULTEC Stormwater Chambers	**9 years after commissioning every 9 years following**		□ Clean stormwater management chambers and feed connectors of any debris. □ Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. □ Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
			Notes
	□ Year 9	Date:	
	□ Year 18	Date:	
	□ Year 27	Date:	
	□ Year 36	Date:	
	45 years after commissioning		□ Clean stormwater management chambers and feed connectors of any debris. □ Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. □ Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. □ Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. □ Attain the appropriate approvals as required. □ Establish a new operation and maintenance schedule.
			Notes
	□ Year 45	Date:	

Major Maintenance

	Frequency		Action
Surrounding Site	**Monthly in 1st year**		□ Check for depressions in areas over and surrounding the stormwater management system.
			Notes
	□ Month 1	Date:	
	□ Month 2	Date:	
	□ Month 3	Date:	
	□ Month 4	Date:	
	□ Month 5	Date:	
	□ Month 6	Date:	
	□ Month 7	Date:	
	□ Month 8	Date:	
	□ Month 9	Date:	
	□ Month 10	Date:	
	□ Month 11	Date:	
	□ Month 12	Date:	
	Spring and Fall		□ Check for depressions in areas over and surrounding the stormwater management system.
			Notes
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	Yearly		□ Confirm that no unauthorized modifications have been performed to the site.
			Notes
	□ Year 1	Date:	
	□ Year 2	Date:	
	□ Year 3	Date:	
	□ Year 4	Date:	
	□ Year 5	Date:	
	□ Year 6	Date:	
	□ Year 7	Date:	

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CDS® Inspection and Maintenance Guide – New Jersey

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump. Refer to Table 1 for depth from water surface to top of sediment pile for each r indicating that maintenance is required.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile[1]		Sediment Storage Capacity	
	ft	m	ft	m	yd^3	m^3
CDS-4	4	1.2	3.0	0.9	0.9	0.7
CDS-5	5	1.5	3.7	1.1	1.5	1.1
CDS-6	6	1.8	4.7	1.4	2.1	1.6
CDS-8	8	2.4	5.8	1.8	3.7	2.8
CDS-10	10	3.0	7.4	2.3	5.8	4.4
CDS-12	12	3.4	8.0	2.4	8.4	6.4

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

[1] Distances from water surface to top of sediment pile are based on 75% of sump capacity being occupied.

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treament products. For information, visit www.ContechES.com or call 800.338.1122

CDS Inspection & Maintenance Log

CDS Model: _____ Location: _____

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

APPENDIX H: ILLICIT DISCHARGE COMPLIANCE STATEMENT

An illicit discharge is any discharge to a municipal separate storm sewer that is not comprised entirely of stormwater, discharges from fire-fighting activities, and certain non-designated non-stormwater discharges.

To the best of my knowledge, no detectable illicit discharges exist on-site. The site plans included with this report detail the stormwater management system that manages stormwater on the site and demonstrate that the system does not include the entry of an illicit discharge. As the owner, I will ultimately be responsible for implementing the Long-Term Pollution Prevention Plan which includes measures to prevent illicit discharges.

Signature: Carl V. Dahlgren (Jan 23, 2022 22:57 EST)

Owner