LOT DATA:

	FRONTAGE MAIN STREET (FEET)	FRONTAGE FRANKLIN ST (FEET)	LOT AREA (SF)	UPLAND AREA (SF)
Existing Parcel	369.53'	113.23'	412,887	> 175,000
LOT 1	120.00	–	117,659	30,754
LOT 2	120.01	–	48,747	> 17,000
LOT 3	129.52	113.23'	246,480	> 175,000

ZONING:

DISTRICT: S-20
MIN. LOT SIZE: 20,000 S.F. (12,000 S.F. UPLAND)
MIN. LOT FRONTAGE: 120 FEET

RECORD OWNER:

ASSESSOR'S MAP 51, LOT 75
HJA MA REALTY TRUST
1310 MAIN STREET
READING, MA 01867
– DEED BOOK 70761, PAGE No. 461

GENERAL NOTES:

1. THIS PLAN DOES NOT SHOW ANY UNRECORDED OR UNWRITTEN EASEMENTS WHICH MAY EXIST. A REASONABLE AND DILIGENT ATTEMPT HAS BEEN MADE TO OBSERVE ANY APPARENT, VISIBLE USES OF THE LAND; HOWEVER, THIS DOES NOT CONSTITUTE A GUARANTEE THAT NO SUCH EASEMENTS EXIST.

LEGEND:

SB/DH	STONE BOUND W/ DRILL HOLE
FND	FOUND
S.F.	SQUARE FEET
EOP	EDGE OF PAVEMENT
SGC	SLOPED GRANITE CURB
	WETLAND RESOURCE AREA

FOR REGISTRY OF DEEDS USE ONLY

I DECLARE, TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, INFORMATION, AND BELIEF, THAT THIS PLAN WAS PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

JOHN D. SULLIVAN III, P.E. DATE

READING COMMUNITY PLANNING & DEVELOPMENT COMMISSION APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED

APPROVED _____, 20__

NO DETERMINATION OF COMPLIANCE WITH ZONING REGULATIONS HAS BEEN MADE OR IS INTENDED.

TAX MAP 51 LOT 75
ORIGINAL LOT AREA
412,887 S.F.±/9.479 AC±

LOT 1
117,659 S.F./2.7 AC±
30,754 S.F. UPLAND

LOT 2
48,747 S.F.±
>17,000 S.F. UPLAND

LOT 3
246,480 S.F.±/5.658 AC±
> 175,000 S.F. UPLAND

TAX MAP 51 LOT 63
TOWN OF READING

TAX MAP 51 LOT 62
#26 CHAPEL HILL DR.
N/F ROBERT HOLLAND

TAX MAP 51 LOT 61
#20 CHAPEL HILL DR.
N/F CHARLENE CICCARIELLO

TAX MAP 51 LOT 60
#12 CHAPEL HILL DR.
N/F FRANK COLOMBA

TAX MAP 51 LOT 59
#4 CHAPEL HILL DR.
N/F BENJAMIN HICKOK

TAX MAP 51 LOT 53
#182 FRANKLIN STREET
N/F THOMAS GARDINER

TAX MAP 45 LOT 105
TOWN OF READING

TAX MAP 84
N/F H.J.A. MA REALTY TRUST

TAX MAP 51 LOT 77
0 MAIN STREET
N/F SPENCER HUNT

TAX MAP 51 LOT 78
#170 FRANKLIN STREET
N/F STEPHEN DEBELLIS

TAX MAP 51 LOT 80
#162 FRANKLIN STREET
N/F NESTOR ELIADIS

TAX MAP 51 LOT 79
N/F SOCA MEDICAL LLC

TAX MAP 51 LOT 83
N/F CURA TRUST
#1320 MAIN STREET

TAX MAP 51 LOT 76
#1330 MAIN STREET
N/F MOBIL OIL CORP.

#1310

#1312

FRANKLIN STREET (PUBLIC – 40 FT WIDE)

SAILOR TOM'S WAY

30' WIDE DRAINAGE & SEWERAGE EASEMENT (TOWN OF READING)

EX. 25 FOOT WIDE WATER, SEWER, AND ACCESS EASEMENT

PROP. ACCESS & UTILITY EASEMENT (SEE DETAIL "A")

VERNAL POOL DETERMINATION ON 5/11/22 BY JOINT SITE WALK BY LEC ENVIRONMENTAL & NORSE ENVIRONMENTAL.

WETLAND DELINEATION PERFORMED BY NORSE ENVIRONMENTAL SERVICES IN APRIL OF 2020

25' BVW BUFFER ZONE "NO DISTURBANCE"

35' BVW BUFFER ZONE "NO STRUCTURE"

100' BVW BUFFER

25' ISOLATED WETLAND BUFFER ZONE "NO DISTURBANCE"

35' ISOLATED WETLAND BUFFER ZONE "NO STRUCTURE"

100' ISOLATED WETLAND BUFFER

ISOLATED WETLAND

Flagged by LEC on 10/8/21

FLAGS 1B–10B HUNG BY LEC ENVIRONMENTAL AS PART OF 3RD PARTY REVIEW OF PROJECT AT 1312 MAIN STREET

Driveway

Wire Fence

ZONING DISTRICT: S-20

ZONING DISTRICT: BUS-A

N13°00'18"E 186.20'
N13°29'40"E 89.60'
N14°32'37"E 148.79'
N16°03'49"E 181.83'
N17°42'49"E 42.19'
N25°52'57"E 97.23'
R=947.32' L=11.36'
S84°30'30"E 48.75'
LOT FRONTAGE ON FRANKLIN STREET 113.23'
R=783.96' L=53.12'
S04°52'50"W 140.00'
N85°11'27"E 114.24'
S04°50'30"W 54.04'
S52°00'03"E 476.26'
N07°41'37"E 242.48'
N82°48'40"W 792.40'
N82°48'40"W 409.13'
S82°48'40"E 359.28'
S82°48'40"E 404.00'
S85°15'25"E 217.25'
N89°59'30"E 203.73'
S04°44'35"W 236.11'
S04°44'35"W ((369.53'))
S04°44'35"W 369.96'
S04°44'35"W 120.00'
S04°44'35"W 120.00'
S04°44'35"W 134.17'
S04°44'35"W 135.00'
N04°44'35"E 169.63'
R=27.95' L=46.22'
119.90' N07°11'20"E
65.35'
54.55'
41.8'
20.7'
259.4'
129.52'
120.00'
120.01'
116.11'

10' STRIP OF LAND "TOWN OF READING"

10' STRIP OF LAND "TOWN OF READING"

See Exhibit Plan in Book: 77635 Page: 336 for Driveway and Utility Rights across the 10' Wide Town Strip

MAIN (ROUTE 28) STREET
1903 STATE HIGHWAY LAYOUT (PLAN NO. 847)
(PUBLIC – 66 FEET WIDE)

GRAPHIC SCALE
SCALE: 1"=40'
FEET 40 0 20 40 80 160

DETAIL "A"

84.85' N01°48'29"W
N27°56'01"E 25.96'
N19°39'06"E 80.70'
N46°37'50"E 88.54'
S46°37'50"W 52.33'
S77°17'13"W 72.75'
N80°15'48"E 89.68'
S00°21'00"W 46.23'
S19°39'06"W 95.19'
S57°32'46"E 51.07'
S41°56'54"E 21.71'
N82°48'40"W 104.79'
17.43'
120.00'
25.00'
S04°44'35"W

ZONING BOARD DECISIONS:

THERE ARE NO KNOWN VARIANCES OR SPECIAL PERMITS THAT HAVE BEEN GRANTED BY THE READING ZONING BOARD OF APPEALS FOR THESE PROPERTIES.

1310 MAIN STREET

PLAN OF LAND
LOCATED IN
READING, MASSACHUSETTS
(MIDDLESEX COUNTY)

PREPARED FOR
HJA MA REALTY TRUST
SCALE: 1"= 40' DATE: MAY 29, 2024

PREPARED BY
SULLIVAN ENGINEERING GROUP, LLC
P.O. BOX 2004
WOBURN, MA 01888
(781) 854-8644

SHEET No. 1 OF 1

FOR REGISTRY USE ONLY

SITE PLAN SET

MAJOR SITE PLAN MODIFICATION

GRANDVIEW ROAD SUBDIVISION – PRIVATE WAY

GRANDVIEW ROAD EXTENSION

PROJECT LOCATION:

LOTS 2, 3, and 4
GRANDVIEW ROAD EXTENSION
READING, MA 01867

SHEET INDEX

PROPERTY INFORMATION

ADDRESS
LOTS 2, 3, & 4
GRANDVIEW ROAD EXTENSION
READING, MA 01867

RECORD OWNER
GRANDVIEW, LLC
45 BEACON STREET
READING, MA 01867

LOT SIZE
COMBINED LOTS 2, 3, & 4
45,132 S.F. (1.04 AC.±)

ZONING DISTRICT
SINGLE FAMILY 15 (S-15)

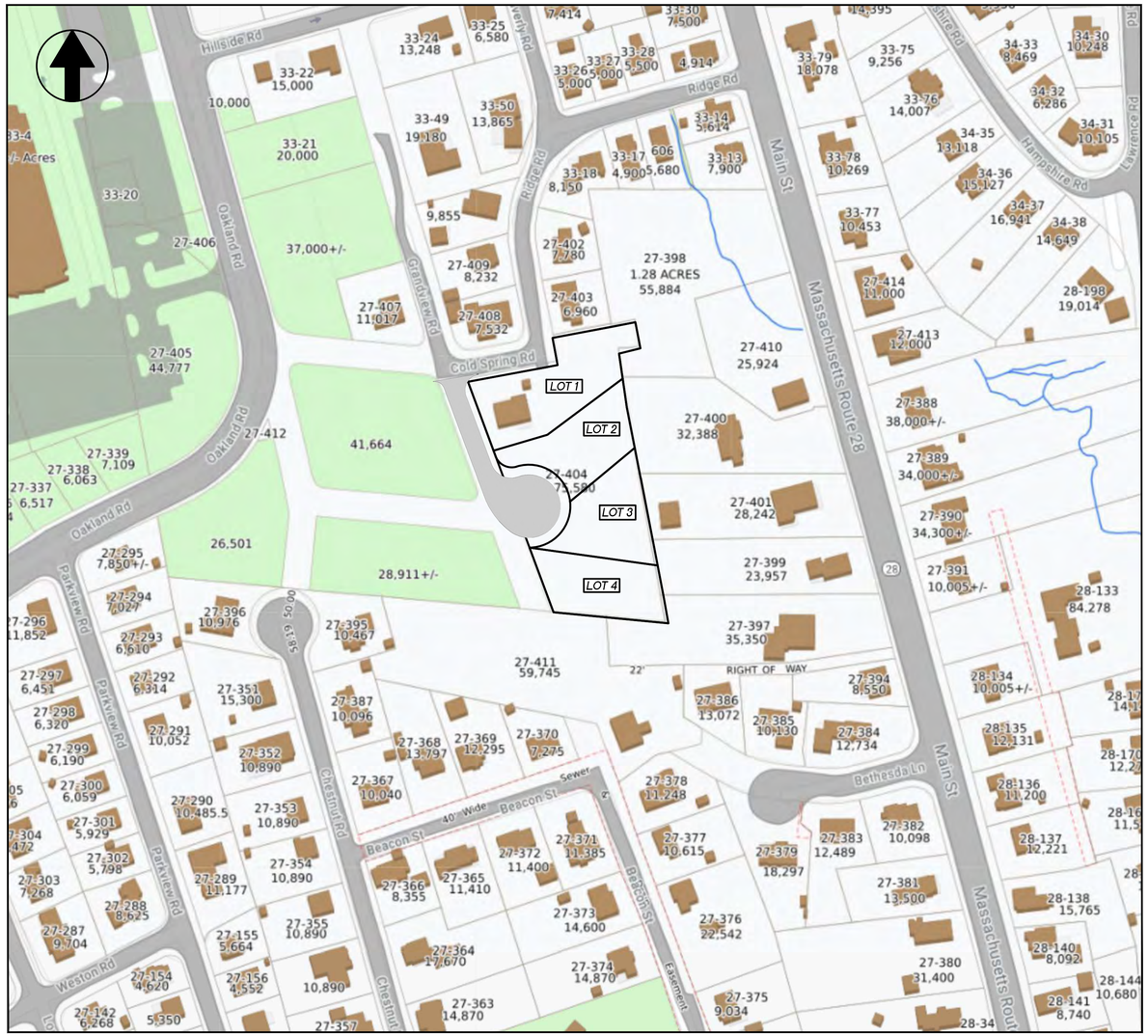
PARCEL ID
PART OF MAP 27, LOT 404

PLAN REFERENCES

1. BOUNDARY, TOPOGRAPHIC, AND PLANIMETRIC INFORMATION WAS OBTAINED FROM AN ON-THE-GROUND SURVEY PERFORMED AND COMPLETED BY PFS LAND SURVEYING, INC., DRAWING NUMBER SV-1, DATED 7/8/2020.
2. MIDDLESEX SOUTH REGISTRY OF DEEDS PLAN 754 OF YEAR 2022.

GENERAL NOTES

1. THE SUBDIVISION OF LAND FOR THIS PROJECT WAS APPROVED AND ENDORSED BY THE READING COMMUNITY PLANNING AND DEVELOPMENT COMMISSION (CPDC), AND THE SUBDIVISION WAS RECORDED WITH THE REGISTRY OF DEEDS AS PLAN 754 OF YEAR 2022.
2. THIS PLAN SET IS FOR THE APPROVAL OF A MAJOR SITE PLAN MODIFICATION. MODIFICATIONS INCLUDE REDESIGNING THE STORMWATER SYSTEM WITH ASSOCIATED SITE GRADING. EASEMENTS HAVE BEEN ADJUSTED AND THEREFORE WILL REQUIRE A NEW ENDORSED SET FOR RECORDING WITH THE REGISTRY.
3. TOPOGRAPHIC DATA IS ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
4. UTILITY INFORMATION OBTAINED FROM THE REFERENCE SURVEY PLAN.
5. SOIL TESTS BY DEEP OBSERVATION HOLES WERE COMPLETED AND REPORTED BY ARMAND J. PORRAZZO (SE#1958) IN JULY 2020. SITE SOILS FROM THE NATURAL RESOURCES CONSERVATION SERVICE (NRCS) ONLINE WEB SOIL SURVEY DETERMINE THE SITE TO CONTAIN TWO (2) SOIL TYPES IDENTIFIED AS CANTON-CHARLTON-URBAN LAND COMPLEX WITH A HYDROLOGIC SOIL GROUP (HSG) "A" AND PAXTON FINE SANDY LOAM WITH A HSG "C".
6. THE SITE DOES NOT CONTAIN AREAS SUBJECT TO 1% ANNUAL CHANCE OF FLOODING AND IS IN ZONE "X" AS DETERMINED BY FEMA FLOOD INSURANCE RATE MAP (FIRM) 25017C0311E WITH AN EFFECTIVE DATE OF 6/4/2010.
7. THE SITE IS INLAND AND NOT LOCATED NEAR OR WITHIN THE FOLLOWING PROTECTED RESOURCE AREAS AS DETERMINED BY THE STATE OF MASSACHUSETTS ONLINE GIS MAPPING SYSTEM "OLIVER".
   - NATURAL HERITAGE OF ENDANGERED SPECIES
   - RIVERFRONT
   - CERTIFIED VERNAL POOLS
   - WELLHEAD PROTECTION ZONES
8. THE SITE DOES CONTAIN A SMALL PORTION OF BORDERING VEGETATED WETLANDS AND WERE DELINEATED BY LEC ENVIRONMENTAL CONSULTANTS, INC. IN JUNE 2020.



LOCUS MAP
SCALE: 1" = 100'

ABUTTER'S LIST (NOW OR FORMERLY)

PARCEL ID	ADDRESS	OWNER
27-367	105 BEACON ST.	L & J FAMILY TRUST BRIAN F DESMOND TRUSTE
27-368	101 BEACON ST.	BEVERE LOREEN M
27-369	99 BEACON ST.	JOHNSON PHILLIP M PHOEBE M JOHNSON
27-370	89 BEACON ST.	DECROTEAU MICHAEL EUGENE
27-371	36 BEACON ST.	CUSOLITO JOHN LINCOLN JR ETA BEACON ST 2012 REALTY TR
27-372	98 BEACON ST.	KELLETT JAY S JOYCE A KELLETT
27-377	33 BEACON ST.	DICLEMENTE MICHAEL C DICLEMENTE JAMIE
27-378	39 BEACON ST.	WILMER CHRISTOPHER K SARA WILMER
27-379	14 BETHESDA	LN. BRETCHKO PAVEL TITOVA ELENA
27-384	882 MAIN ST.	MOREIRA GREGORY C ERIN B MORIERA
27-385	11 BETHESDA LN.	SICILIANO ROBERT L SICILIANO STEPHANIE A
27-386	17 BETHESDA LN.	KOUTOUVIDES DAKIS S KOUTOUVIDES KIMBERLY A
27-387	37 CHESTNUT RD.	GOODHUE MARK J WHITNEY GOODHUE
27-394	884 MAIN ST.	GEORGE JENNIFER L DANIEL F DECARPIS
27-395	43 CHESTNUT RD.	DASILVA JOSEPH A DASILVA ANASTASIA
27-397	890 MAIN ST.	JOYCE MARY ELIZABETH JOHN JOYCE
27-398	MAIN ST.	MILLER KEITH L
27-399	896 MAIN ST.	SANDBERG ELLEN L
27-400	908 MAIN ST.	CHEN I-CHEI
27-401	900 MAIN ST.	READING KOREAN CHURCH OF THE NAZARENE
27-402	26 RIDGE RD.	KERR CHRISTOPHER A LESLIE N KERR
27-403	32 RIDGE RD.	BEAUCHER ROBERT A BARBARA L BEAUCHER
27-404	4 COLDSPRING RD.	JEAN PENNY A
27-405	OAKLAND RD.	TOWN OF READING READING MEMORIAL HIGH
27-407	23 GRANDVIEW RD.	CUSOLITO ROBERT P JOANNE CUSOLITO
27-408	31 RIDGE RD.	CORAM GEOFFREY SUSAN G CORAM
27-409	25 RIDGE RD.	FONG ELAINE
27-410	912 MAIN ST.	HATCH WILLIAM G
27-411	45 BEACON ST.	SALAMONE ANGELO
33-13	930 MAIN ST.	RICCI ANTHONY J JANET K GALLAGHER RICCI
33-14	934 MAIN ST.	CROSBY JO ANN
33-15	RIDGE RD.	TOWN OF READING
33-16	8 RIDGE RD.	YAO RYAN S
33-17	10 RIDGE RD.	ALLEN KATHERINE D
33-18	14 RIDGE RD.	HEGARTY GERALD P ETAL TRS GERALD P HEGARTY REVOC
33-19	OAKLAND RD.	TOWN OF READING SCHOOL DEPT.
33-23	23 RIDGE RD.	MESSINA-PEREZ KAREN E
33-49	10 GRANDVIEW RD.	DRUID DAVID A PATRICIA E DRUID
33-50	2 WAVERLY RD.	HILDRETH JOHN W JUDITH D HILDRETH

UTILITIES AND CONTACTS

CABLE
COMCAST CABLE CORPORATION
5 OMNI WAY
CHELMSFORD, MA 01824
ATTN: TED QUINT
978-848-5163
ted_quint@comcast.com

ELECTRIC
READING MUNICIPAL LIGHT DEPARTMENT
230 ASH ST.
READING, MA 01867
ATTN: PETER PRICE
781-942-6429
pprice@rmld.com

GAS
NATIONAL GRID GAS
40 SYLVAN ROAD
WALTHAM, MA 02451
ATTN: MELISSA OWENS
781-907-2845
melissa.owens@nationalgrid.com

TELEPHONE
VERIZON
385 MYLES STANDISH BLVD.
TAUNTON, MA 02780
ATTN: KAREN MEALEY
774-409-3160
karen.m.mealey@verizon.com

WATER AND SEWER
READING DPW
16 LOWELL ST.
READING, MA 01867
781-942-9077

DEPARTMENT OF PUBLIC WORKS
READING DPW ENGINEERING DIVISION
16 LOWELL ST.
READING, MA 01867
781-942-9082

CONSULTANTS

CIVIL ENGINEER
FODERA ENGINEERING
28 HARBOR ST., SUITE 204
DANVERS, MA 01923
ATTN: GIOVANNI FODERA, P.E.
617-877-3293
gfodera@foderaengineering.com

LAND SURVEYOR
PFS LAND SURVEYING, INC.
20 BALCH AVE.
GROVELAND, MA 01834
ATTN: BRYAN PARMENTER, P.L.S.
508-446-0781
bryan@pfsland.com

DATE:
MAY 10, 2024

PREPARED FOR:
(APPLICANT)
MICHAEL SALAMONE
45 BEACON STREET
READING, MA 01867

PREPARED BY:

FODERA
ENGINEERING
28 HARBOR STREET, SUITE 204
DANVERS, MA 01923
(617) 877-3293

TOWN OF READING COMMUNITY PLANNING AND DEVELOPMENT COMMISSION	
DATE:	

REVISION BLOCK

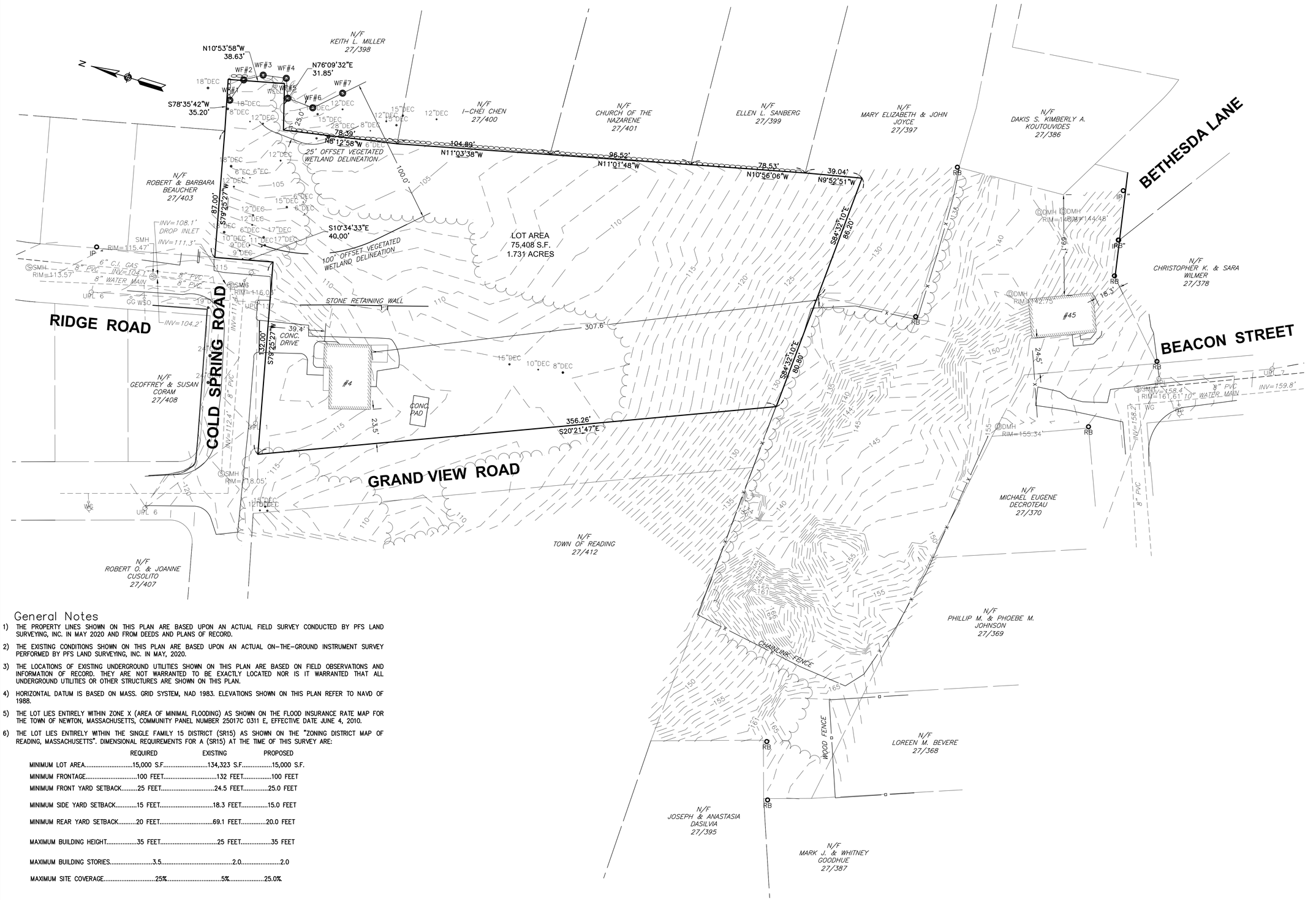
REVISION SET	REVISION DATE	COMPLETED BY
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–

PROFESSIONAL SEAL:
COMMONWEALTH OF MASSACHUSETTS
GIOVANNI GAETANO FODERA
No. 54884
REGISTERED PROFESSIONAL ENGINEER
DATE: 5/10/24

JOB NO.: 20160-149

SHEET TITLE:
COVER SHEET

SHEET NUMBER:
C-0



General Notes

1) THE PROPERTY LINES SHOWN ON THIS PLAN ARE BASED UPON AN ACTUAL FIELD SURVEY CONDUCTED BY PFS LAND SURVEYING, INC. IN MAY 2020 AND FROM DEEDS AND PLANS OF RECORD.

2) THE EXISTING CONDITIONS SHOWN ON THIS PLAN ARE BASED UPON AN ACTUAL ON-THE-GROUND INSTRUMENT SURVEY PERFORMED BY PFS LAND SURVEYING, INC. IN MAY, 2020.

3) THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES SHOWN ON THIS PLAN ARE BASED ON FIELD OBSERVATIONS AND INFORMATION OF RECORD. THEY ARE NOT WARRANTED TO BE EXACTLY LOCATED NOR IS IT WARRANTED THAT ALL UNDERGROUND UTILITIES OR OTHER STRUCTURES ARE SHOWN ON THIS PLAN.

4) HORIZONTAL DATUM IS BASED ON MASS. GRID SYSTEM, NAD 1983. ELEVATIONS SHOWN ON THIS PLAN REFER TO NAVD OF 1988.

5) THE LOT LIES ENTIRELY WITHIN ZONE X (AREA OF MINIMAL FLOODING) AS SHOWN ON THE FLOOD INSURANCE RATE MAP FOR THE TOWN OF NEWTON, MASSACHUSETTS, COMMUNITY PANEL NUMBER 25017C 0311 E, EFFECTIVE DATE JUNE 4, 2010.

6) THE LOT LIES ENTIRELY WITHIN THE SINGLE FAMILY 15 DISTRICT (SR15) AS SHOWN ON THE "ZONING DISTRICT MAP OF READING, MASSACHUSETTS". DIMENSIONAL REQUIREMENTS FOR A (SR15) AT THE TIME OF THIS SURVEY ARE:

	REQUIRED	EXISTING	PROPOSED
MINIMUM LOT AREA	15,000 S.F.	134,323 S.F.	15,000 S.F.
MINIMUM FRONTAGE	100 FEET	132 FEET	100 FEET
MINIMUM FRONT YARD SETBACK	25 FEET	24.5 FEET	25.0 FEET
MINIMUM SIDE YARD SETBACK	15 FEET	18.3 FEET	15.0 FEET
MINIMUM REAR YARD SETBACK	20 FEET	69.1 FEET	20.0 FEET
MAXIMUM BUILDING HEIGHT	35 FEET	25 FEET	35 FEET
MAXIMUM BUILDING STORIES	3.5	2.0	2.0
MAXIMUM SITE COVERAGE	25%	5%	25.0%

7) THE WETLANDS SHOWN HEREON WERE FLAGGED BY LEC ENVIRONMENTAL IN JUNE 2020 AND LOCATED BY PFS LAND SURVEYING INC, IN JUNE 2020.

PFS Land Surveying, Inc.
20 Balch Avenue
Groveland, MA 01834
P 978.891.5203
www.pfsland.com

LEGEND

BM #	BENCHMARK
	BOUND (CONC, STONE, LAND COURT, ETC.)
CB	CATCH BASIN - SQUARE
CB	CATCH BASIN - ROUND
DSK	DISK (CA/T, USC&GS, LAND COURT, ETC.)
DH	DRILL HOLE
D	DRAIN MANHOLE
EHH	ELECTRIC HANDHOLE
E	ELECTRIC MANHOLE
EM	ELECTRIC METER
GG	GAS GATE
GM	GAS METER
	HANDICAP SYMBOL
	GUY WIRE ANCHOR
	FIRE HYDRANT
	LIGHT
OHW	OVERHEAD WIRE
MAG	MAG NAIL
MB	MAIL BOX
	OTHER MANHOLE
PB	PULL BOX
PED	PEDESTRIAN SIGNAL
S	SEWER MANHOLE
T	TELEPHONE MANHOLE
TRFM	TRANSFORMER
12	# OF PARKING SPACES
TS	TRAFFIC SIGNAL
TS	TRAFFIC SIGNAL MAST ARM/SPAN WIRE POLE
	SIGN
ULT#	UTILITY POLE W/ LIGHT
UPL#	UTILITY POLE
WG	WATER GATE
WSO	WATER SHUTOFF
	CHAIN LINK FENCE
	WOOD FENCE

SCALE: 1" = 30'

No.	Revision	Date	Appvd.
2	added tree locations in buffer zone	2-04-2021	BGP
1	updated well location	12-09-2020	BGP

Designed by BGP | Drawn by BGP | Checked by BGP
CAD checked by BGP | Approved by BGP
Scale 1"=30' | Date 7/8/2020

Project Title
Existing Conditions
4 Cold Spring Rd
Reading, MA

Issued for
Review

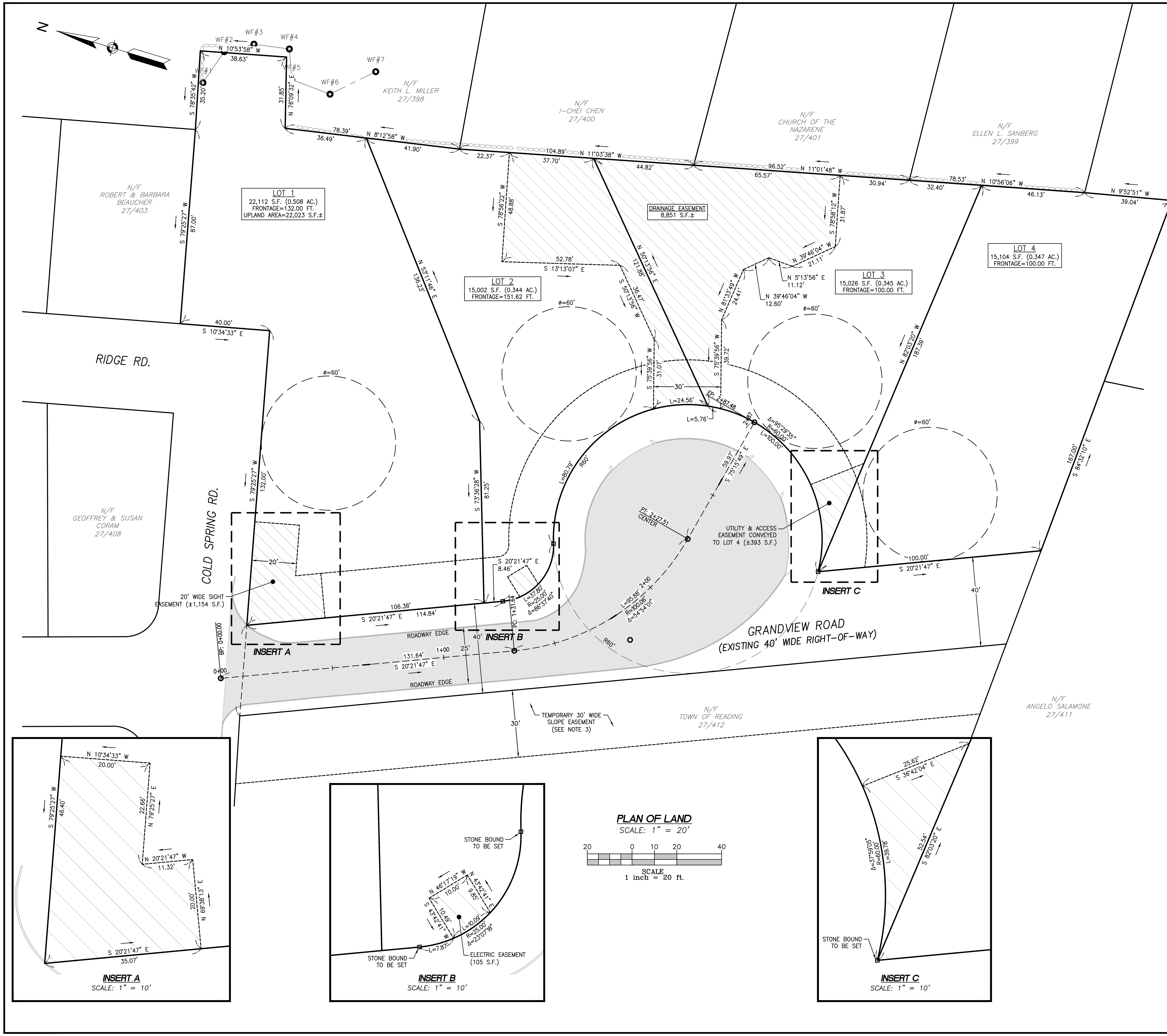
Drawing Title
Existing Conditions
Plan of Land

COMMONWEALTH OF MASSACHUSETTS
BRYAN G. GRUNDEN
NO. 48193
REGISTERED
PROFESSIONAL LAND SURVEYOR

Drawing Number
SV-1

Sheet
1 of 1

Project Number



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1-888-344-7233
MASSACHUSETTS ONE CALL SYSTEM

REVISION	DATE	BY

RIGHT-OF-WAY STATEMENT

THE RIGHT-OF-WAY (ROW), SOUTH OF THE INTERSECTION FROM COLD SPRING ROAD AND GRANDVIEW ROAD, IS AS A PRIVATE WAY FOR ALL LAND OWNERS IN AND ABUTTING THE SUBDIVISION, AND WILL REMAIN NAMED AS GRANDVIEW ROAD.

LEGEND

(solid line)	PROPERTY LINE
(dashed line)	EASEMENT LINE
(dash line)	WETLAND BOUNDARY
RXX'	RADIUS MEASUREMENT
WF#	WETLAND FLAG
▣	STONE BOUND WITH DRILL HOLE

GENERAL NOTES

1. WETLANDS WERE FLAGGED BY LEC ENVIRONMENTAL CONSULTANTS IN JUNE 2020.
2. THE PROJECT IS LOCATED OUTSIDE OF ANY PROTECTED RESOURCE AREAS AND FLOOD ZONES AS DETERMINED BY THE MOST RECENTLY PUBLISHED DATA FROM THE MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION AND FEMA.
3. IN LIEU OF A RETAINING WALL LOCATED IN THE RIGHT-OF-WAY ALONG THE WESTERN BOUNDARY OF GRAND VIEW ROAD, A TEMPORARY THIRTY (30) FOOT WIDE SLOPE EASEMENT IS PROPOSED ON TOWN PROPERTY AND SHALL BE APPROVED BY THE TOWN. SEE SHEET C-4 FOR GRADING.

PLAN REFERENCES

1. BOUNDARY, TOPOGRAPHIC, AND PLANIMETRIC INFORMATION WAS OBTAINED FROM AN ON-THE-GROUND SURVEY PERFORMED AND COMPLETED BY PFS LAND SURVEYING.

PROPERTY INFORMATION

ADDRESS: LOTS 2, 3, & 4
GRANDVIEW ROAD EXTENSION
READING, MA 01867
TAX MAP, LOT: PART OF MAP 27, LOT 404
LOT SIZE: 45,132 S.F. (1.04 AC.)

RECORD OWNERS

LOTS 2, 3, & 4
GRANDVIEW, LLC
45 BEACON STREET
READING, MA 01867

APPLICANT

MICHAEL SALAMONE
45 BEACON ST.
READING, MA 01867

ZONING SUMMARY

ZONING DISTRICT: SINGLE FAMILY 15 (S15)

	REQUIRED	LOT 1	LOT 2	LOT 3	LOT 4
MIN. LOT WIDTH	60'	>60'	>60'	>60'	>60'
MIN. LOT AREA (SF)	15,000	22,112	15,002	15,026	15,104
MIN. FRONTAGE	100'	132.00	151.62	100.00	100.00
RELIEF REQUIRED	–	N	N	N	N

PROJECT LOCATION:
LOTS 2, 3, + 4
GRANDVIEW ROAD
READING, MA 01867
PARCEL ID:
MAP 27, LOT 404

PLAN SET:
MAJOR SITE PLAN MODIFICATION
GRANDVIEW ROAD SUBDIVISION - PRIVATE WAY
(GRANDVIEW ROAD EXTENSION)

MAY 10, 2024

SCALE: 1" = 20'

TOWN OF READING
COMMUNITY PLANNING & DEVELOPMENT COMMISSION

DATE: ______________________

FOR REGISTRY USE ONLY

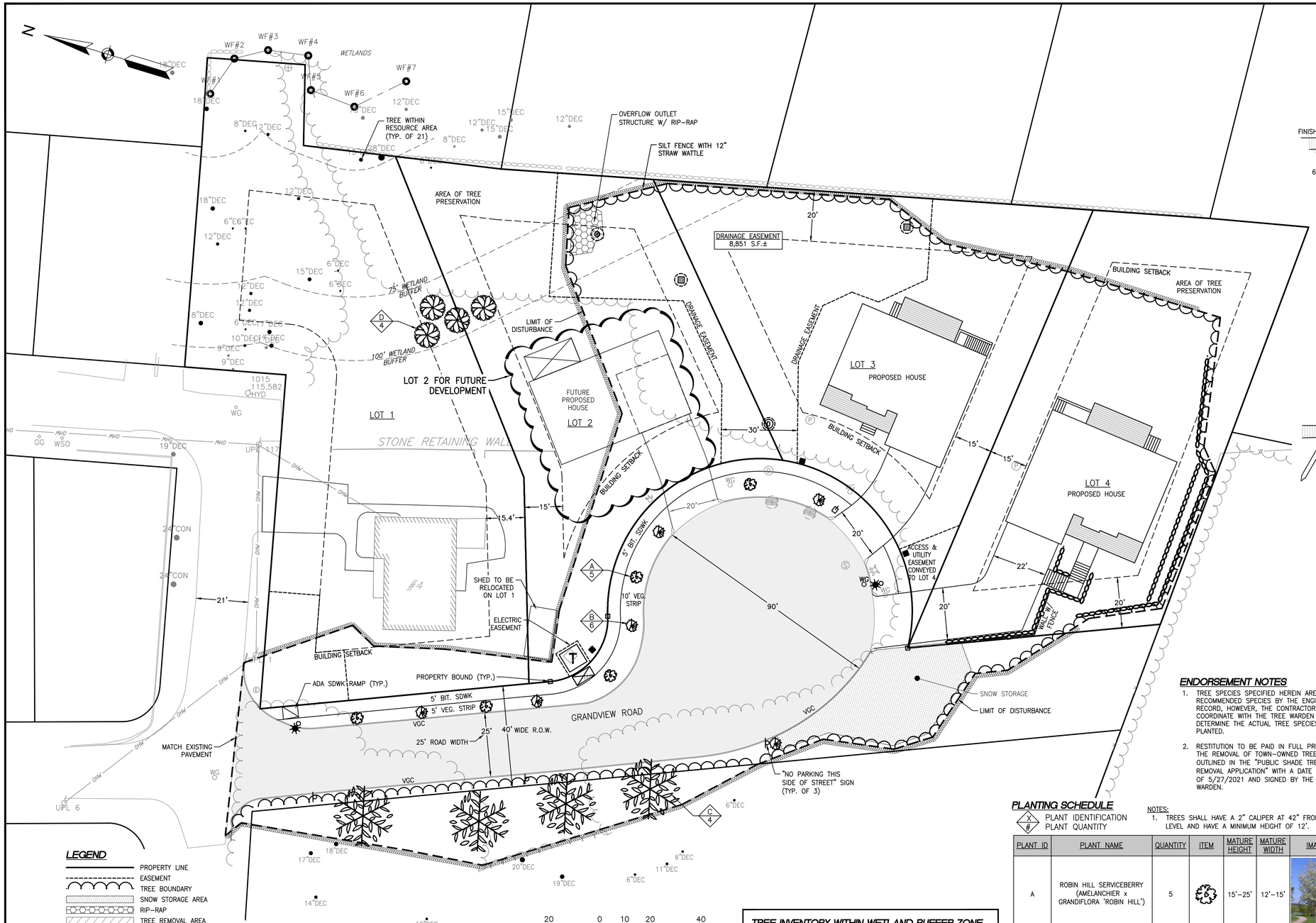
ENGINEER:
FODERA ENGINEERING
(617)877-3293
gfodera@foderaengineering.com
28 Harbor St., Suite 204
Danvers, MA 01923
PROFESSIONAL SEAL
COMMONWEALTH OF MASSACHUSETTS
GIOVANNI GAETANO FODERA
No. 54884
REGISTERED PROFESSIONAL ENGINEER
Job # 20160
DATE: 5/10/24

SURVEYOR:
PFS Land Surveying, Inc.
20 Balch Avenue
Groveland, MA 01834
P 978.891.5203
www.pfsland.com
PROFESSIONAL SEAL
COMMONWEALTH OF MASSACHUSETTS
BRYAN G. PARMENTER
NO. 48193
REGISTERED PROFESSIONAL LAND SURVEYOR
DATE: 5/10/24

JOB NO.: 20160-149

SHEET TITLE:
PLAN OF LAND

SHEET NUMBER:
C-1



SITE AND TREE PRESERVATION PLAN

SCALE: 1" = 20'

LEGEND

- PROPERTY LINE
- EASEMENT
- TREE BOUNDARY
- SNOW STORAGE AREA
- RIP-RAP
- TREE REMOVAL AREA
- RETAINING WALL
- BUILDING SETBACK
- LIMIT OF DISTURBANCE
- WETLAND BOUNDARY
- WETLAND BUFFER
- WF# WETLAND FLAG
- VGC VERTICAL GRANITE CURB
- MAILBOX
- (P) SEWER PUMP
- (S) FORCE MAIN FLUSHING GATE
- FORCE SERVICE BALL VALVE
- CB CATCH BASIN
- (D) DMH DRAIN MANHOLE
- OOS OVERFLOW OUTLET STRUCTURE
- WG WATER VALVE
- GG GAS VALVE
- T ELECTRIC TRANSFORMER & EASEMENT
- ELECTRIC SERVICE PULLBOX
- ELECTRIC MANHOLE

TREE INVENTORY WITHIN WETLAND BUFFER ZONE

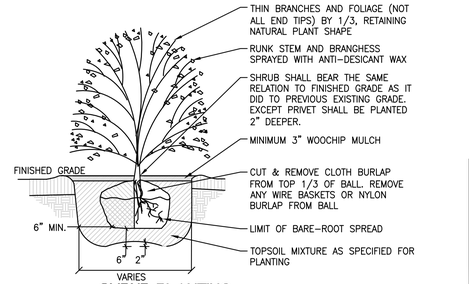
	TREE COUNT
EXISTING TREE COUNT	21
TREES TO BE REMOVED	0
TOTAL TREES TO REMAIN	21

TREE PRESERVATION CALCULATIONS

	LOT 1	LOT 2	LOT 3	LOT 4	Grand View Rd.	TOTALS
LOT AREA, S.F.	22,112	15,002	15,026	15,104	22,164	89,408
NEW IMPERVIOUS, S.F.	0	2,388	2,526	2,998	12,572	23,549
SUM: OPEN SPACE, S.F.	*19,047	12,614	12,500	12,106	9,592	65,859
**REQUIRED # OF TREES	10	7	7	7	N/A	31
AREA OF TREE REMOVAL, S.F.	0	3,605	13,325	11,140	6,217	34,287
AREA OF TREE PRESERVED, S.F.	7,948	3,260	1,590	3,970	2,832	19,600
***ESTIMATED # OF TREES PRESERVED	20	14	7	17	12	70

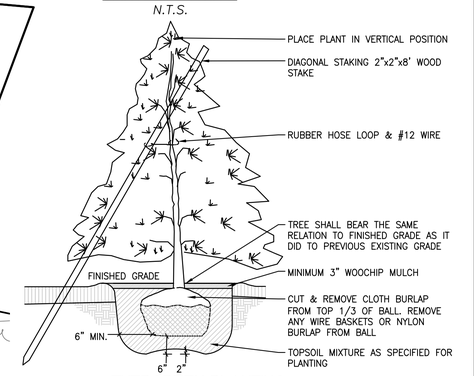
* SUBTRACTED EXISTING IMPERVIOUS AREA OF 3,065 SF.
** BASED ON 1 TREE PER 2,000 S.F. OF OPEN SPACE PER SECTION 7.6.2.2 OF THE TOWN OF READING SUBDIVISION REGULATIONS.
*** ESTIMATED BASED ON 1 TREE PER 225 S.F. (15'X15')

PERMANENT GRASS SEED MIX	SEED, POUNDS PER 1,000 S.F.
LITTLE BLUESTEM OR BROOMSEDGE	0.25
TUMBLE LOVEGRASS	0.10
SWITCHGRASS	0.10
BUSH CLOVER	0.10
RED TOP	0.10



SHRUB PLANTING

N.T.S.



EVERGREEN PLANTING

N.T.S.

GENERAL NOTES

1. ALL PLANT STOCK SHALL CONFORM TO ANSI Z260.1 – NURSERY STOCK, LATEST EDITION (AMERICAN ASSOCIATION OF NURSERYMEN, INC.).
2. NO TREES OR SHRUBS SHALL BE PLANTED AT THE STREET INTERSECTION WHERE THEY COULD BECOME A TRAFFIC HAZARD BY OBSTRUCTING VISION.
3. ALL TREES SHALL BE GUARANTEED BY THE DEVELOPER FOR THEIR ERECTNESS AND GOOD HEALTH FOR TWO (2) YEARS AFTER PLANTING.
4. ALL AREAS DISTURBED DURING CONSTRUCTION SHALL BE LOAMED AND SEEDED. LOAM DEPTH SHALL BE A MINIMUM OF 4 INCHES. ALL LOAM PLACED SHALL BE pH CORRECTED AND FREE OF CLODS, LUMPS, STONES AND OTHER DELETERIOUS MATERIAL.
5. ANY DEAD VEGETATION SHALL BE REMOVED IMMEDIATELY AND REPLACED IN ACCORDANCE WITH THE SPECIFICATION ON PLAN.
6. OWNER SHALL MAINTAIN LANDSCAPE PLANTINGS TO ENSURE THE AESTHETIC APPEARANCE AND OVERALL PLANT HEALTHINESS IS RETAINED. THIS INCLUDES INSPECTING AND REPLACING PLANTINGS AS NECESSARY, WEEKLY MOWING AND MULCHING.
7. AN APPROVED SET OF PLANS AND ALL APPLICABLE PERMITS MUST BE AVAILABLE AT THE CONSTRUCTION SITE.
8. ANY DAMAGE TO PUBLIC OR PRIVATE PROPERTY RESULTING FROM CONSTRUCTION ACTIVITIES SHALL BE REPAIRED BY THE CONTRACTOR AT THEIR EXPENSE.
9. THE CONSTRUCTION SITE SHALL BE SECURED IN A MANNER SO AS TO PREVENT INJURY OR PROPERTY DAMAGE TO THE RESIDENTS OF THE TOWN.
10. AN APPROVED SITE AS-BUILT SHALL BE SUBMITTED TO THE ENGINEERING DIVISION WITHIN 60 DAYS OF CERTIFICATE OF OCCUPANCY. THE AS-BUILT SHALL BE SUBMITTED IN MYLAR AND ELECTRONIC ACAD FORMAT.

ENDORSEMENT NOTES

1. TREE SPECIES SPECIFIED HEREIN ARE SIMPLY RECOMMENDED SPECIES BY THE ENGINEER OF RECORD, HOWEVER, THE CONTRACTOR SHALL COORDINATE WITH THE TREE WARDEN TO DETERMINE THE ACTUAL TREE SPECIES TO BE PLANTED.
2. RESTITUTION TO BE PAID IN FULL PRIOR TO THE REMOVAL OF TOWN-OWNED TREES AS OUTLINED IN THE "PUBLIC SHADE TREE REMOVAL APPLICATION" WITH A DATE OF ACTION OF 5/27/2021 AND SIGNED BY THE TREE WARDEN.

PLANTING SCHEDULE

X = PLANT IDENTIFICATION
# = PLANT QUANTITY

NOTES:
1. TREES SHALL HAVE A 2" CALIPER AT 42" FROM GROUND LEVEL AND HAVE A MINIMUM HEIGHT OF 12'.

PLANT ID	PLANT NAME	QUANTITY	ITEM	MATURE HEIGHT	MATURE WIDTH	IMAGE
A	ROBIN HILL SERVICEBERRY (AMELANCHIER x GRANDIFLORA 'ROBIN HILL')	5	6	15'-25'	12'-15'	
B	GOLDSPIRE GINKGO (GINKGO BILOBA "GOLDSPIRE")	6	B	15'	5'-6'	
*C	SUGAR MAPLE TREE (ACER SACCHARUM)	4	C	60'-75'	40'-50'	
D	HIGHBUSH BLUEBERRY (VACCINIUM CORYMBOSUM)	4	D	6'-12'	8'-12'	

* TREE SPECIES TO BE REPLANTED IN TOWN OWNED PROPERTY SHALL BE APPROVED BY THE TREE WARDEN.

CALL BEFORE YOU DIG
1-888-344-7233
MASSACHUSETTS ONE CALL SYSTEM

REVISION	DATE	BY

PROJECT LOCATION:
LOTS 2, 3, + 4
GRANDVIEW ROAD
READING, MA 01867

PARCEL ID:
MAP 27, LOT 404

PLAN SET:
MAJOR SITE PLAN MODIFICATION
GRANDVIEW ROAD SUBDIVISION - PRIVATE WAY
(GRANDVIEW ROAD EXTENSION)

MAY 10, 2024

SCALE: 1" = 20'

TOWN OF READING
COMMUNITY PLANNING & DEVELOPMENT COMMISSION

DATE: _____

FOR REGISTRY USE ONLY

ENGINEER:
FODERA ENGINEERING
(617)877-3293
gfodera@foderaengineering.com
28 Harbor St., Suite 204
Danvers, MA 01923
PROFESSIONAL SEAL

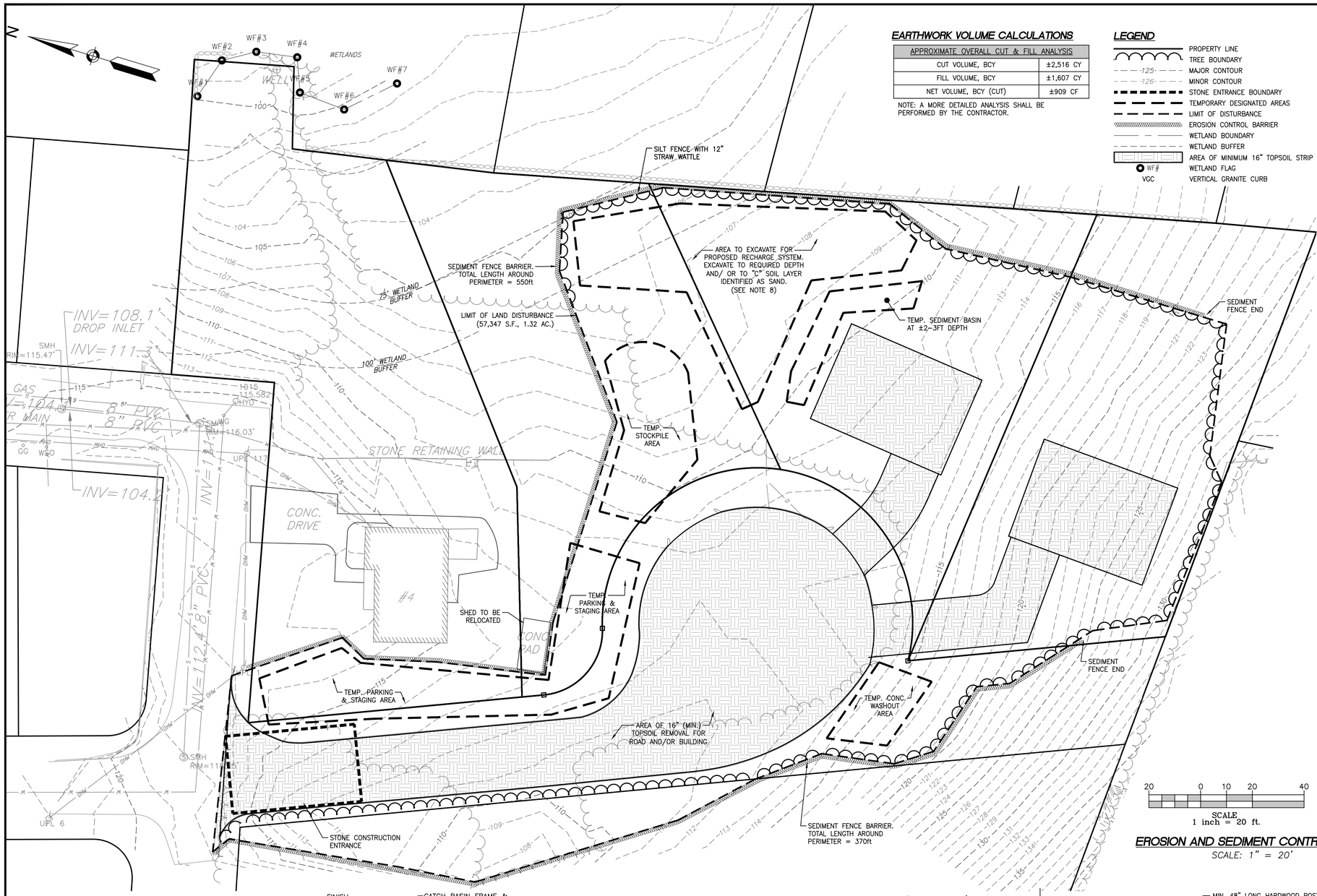
SURVEYOR:
PFS Land Surveying, Inc.
20 Balch Avenue
Groveland, MA 01834
P 978.891.5203
www.pfsland.com
PROFESSIONAL SEAL

COMMONWEALTH OF MASSACHUSETTS — No. 20160 — GIOVANNI GAETANO FODERA — REGISTERED PROFESSIONAL ENGINEER
DATE: 5/10/24

JOB NO.: 20160-149

SHEET TITLE:
SITE AND TREE PRESERVATION

SHEET NUMBER:
C-2



EARTHWORK VOLUME CALCULATIONS

APPROXIMATE OVERALL CUT & FILL ANALYSIS	
CUT VOLUME, BCY	±2,516 CY
FILL VOLUME, BCY	±1,607 CY
NET VOLUME, BCY (CUT)	±909 CF

NOTE: A MORE DETAILED ANALYSIS SHALL BE PERFORMED BY THE CONTRACTOR.

LEGEND

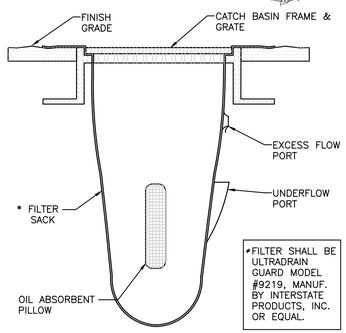
- PROPERTY LINE
- TREE BOUNDARY
- MAJOR CONTOUR
- MINOR CONTOUR
- STONE ENTRANCE BOUNDARY
- TEMPORARY DESIGNATED AREAS
- LIMIT OF DISTURBANCE
- EROSION CONTROL BARRIER
- WETLAND BOUNDARY
- WETLAND BUFFER
- AREA OF MINIMUM 16" TOPSOIL STRIP
- WF# WETLAND FLAG
- VGC VERTICAL GRANITE CURB

EROSION CONTROL NOTES

1. PRIOR TO COMMENCING LAND DISTURBANCE ACTIVITY THE LIMITS OF LAND DISTURBANCE SHALL BE CLEARLY AND ACCURATELY DEMARCATED WITH STAKES, RIBBONS, OR OTHER APPROPRIATE MEANS.
2. INSTALL SEDIMENTATION AND EROSION CONTROL MEASURES PRIOR TO CLEARING GRADING AND DEMOLITION WORK. MAINTAIN ALL SEDIMENT AND EROSION CONTROL, AND TREE PROTECTION MEASURES UNTIL PERMANENT GROUND COVER IS ESTABLISHED.
3. ALL EROSION AND SEDIMENT CONTROL PRACTICES ARE SUBJECT TO FIELD MODIFICATIONS AT THE DIRECTION OF THE TOWN'S DPW ENGINEERING DEPARTMENT.
4. PRIOR TO ANY OTHER CONSTRUCTION, A STABILIZED CONSTRUCTION ENTRANCE SHALL BE CONSTRUCTED AT EACH ENTRY TO OR EXIT FROM THE SITE. CONTRACTOR SHALL MAINTAIN CONSTRUCTION ENTRANCE UNTIL SITE PAVING IS COMPLETE.
5. INLET PROTECTIONS SHALL BE INSTALLED ON ALL EXISTING CATCH BASINS AS INDICATED ON THE PLAN, AND IMMEDIATELY AFTER THE INSTALLATION OF ALL NEWLY INSTALLED INLETS.
6. THE CONSTRUCTION ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD ONTO THE ACCESSING ROADWAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH STONE, AS CONDITIONS DEMAND, AND REPAIR AND/OR CLEAN-OUT OF ANY STRUCTURES USED TO TRAP SEDIMENT. ALL MATERIALS SPILLED, DROPPED, WASHED, OR TRACKED BY VEHICLE OFF-SITE ONTO THE ROADWAY OR INTO STORM DRAINS MUST BE REMOVED.
7. IMMEDIATELY AFTER THE ESTABLISHMENT OF CONSTRUCTION ENTRANCES/EXITS, ALL PERIMETER EROSION CONTROL DEVICES AND STORM WATER MANAGEMENT DEVICES SHALL BE INSTALLED PRIOR TO ANY OTHER CONSTRUCTION.
8. ADD EROSION BARRIER AROUND PERIMETER OF PROPOSED RECHARGE AREA IF THE EXCAVATED PIT WILL REMAIN EXPOSED FOR MORE THAN TWO (2) DAYS, WEATHER PERMITTING. THE EXCAVATED PIT SHALL BE CLEAN OF ALL SEDIMENT.
9. EROSION CONTROL DEVICES SHALL BE INSTALLED BEFORE GROUND DISTURBANCE OCCURS. THE LOCATION OF SOME OF THE EROSION CONTROL DEVICES MAY HAVE TO BE ALTERED FROM THAT SHOWN ON THE APPROVED PLANS IF DRAINAGE PATTERNS DURING CONSTRUCTION ARE DIFFERENT FROM THE FINAL PROPOSED DRAINAGE PATTERNS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ACCOMPLISH EROSION CONTROL FOR ALL DRAINAGE PATTERNS CREATED AT VARIOUS STAGES DURING CONSTRUCTION. ANY DIFFICULTY IN CONTROLLING EROSION DURING ANY PHASE OF CONSTRUCTION SHALL BE REPORTED TO THE ENGINEER IMMEDIATELY.
10. THE CONSTRUCTION OF THE SITE WILL INITIATE WITH THE INSTALLATION OF EROSION CONTROL MEASURES SUFFICIENT TO CONTROL SEDIMENT DEPOSITS AND EROSION. ALL SEDIMENT CONTROL WILL BE MAINTAINED UNTIL ALL UPSTREAM GROUND WITHIN THE CONSTRUCTION AREA HAS BEEN COMPLETELY STABILIZED WITH PERMANENT VEGETATION AND ALL ROADS/DRIVES HAVE BEEN PAVED.
11. THE CONTRACTOR SHALL FURNISH AND MAINTAIN ALL NECESSARY BARRICADES WHILE IMPROVEMENTS ARE BEING MADE. TRAFFIC CONTROL MEASURES TO BE IN ACCORDANCE WITH LOCAL REGULATIONS AND OR MASSDOT.
12. ALL SILT BARRIERS MUST BE PLACED AS ACCESS IS OBTAINED DURING CLEARING. NO GRADING SHALL BE DONE UNTIL SILT BARRIER INSTALLATION AND DETENTION FACILITIES, IF REQUIRED, ARE CONSTRUCTED.
13. CONTRACTOR SHALL PERFORM EROSION CONTROL INSPECTIONS REGULARLY AND IMMEDIATELY FOLLOWING HEAVY RAIN STORMS TO ENSURE MEASURES ARE FUNCTIONING PROPERLY. REPAIR OR REPLACE FAILED SYSTEMS AT THE EARLIEST POSSIBLE DATE.
14. ANY DISTURBED AREA LEFT EXPOSED FOR A PERIOD GREATER THAN 14 DAYS SHALL BE STABILIZED WITH TEMPORARY SEEDING.
15. ALL DISTURBED AREAS, WITH NO SPECIFIED GROUND COVER ARE TO BE RESTORED WITH MINIMUM FOUR (4) INCHES OF TOPSOIL AND SEEDING.
16. PROPERTY MARKERS AND STREET LINE MONUMENTS SHALL BE PROPERLY PROTECTED AT ALL TIMES DURING CONSTRUCTION TO ENSURE INTEGRITY. IF DISTURBED, THEY SHALL BE REPLACED BY A REGISTERED SURVEYOR AT THE CONTRACTOR'S EXPENSE.
17. ALL EXCAVATION SHALL INCLUDE CLEARING, STRIPPING AND STOCKPILING TOPSOIL, REMOVING UNSUITABLE MATERIALS, THE CONSTRUCTION OF EMBANKMENTS, CONSTRUCTION FILLS, AND THE FINAL SHAPING AND TRIMMING TO THE LINES AND GRADES SHOWN ON THE PLANS.
18. ALL TREES, BRUSH, AND ORGANIC TOPSOIL AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED, UNLESS OTHERWISE SPECIFIED, AND DISPOSED OF AT AN OFF-SITE LOCATION, WITH THE EXCEPTION THAT ENOUGH TOPSOIL SHALL BE RETAINED FOR RE-SPREAD AND GENERAL LANDSCAPING. AREAS WHICH ARE TO BE FILLED SHALL BE COMPACTED TO A MINIMUM DENSITY OF 95% AS DETERMINED BY THE MODIFIED PROCTOR (ASTM D1557, METHOD C) COMPACTION TEST IN THE PAVED AREAS AND 90% IN THE OTHER AREAS.
19. SWEEP CLEAN THE BINDER COURSE PRIOR TO THE INSTALLATION OF THE FINAL BITUMINOUS CONCRETE SURFACE COURSE. EXCESSIVE CLEANING OF THE BINDER COURSE THAT MAY BE REQUIRED, AND IS NOT THE FAULT OF THE PAVING CONTRACTOR, SHALL BE PAID FOR ON A TIME AND MATERIAL BASIS BY PRIOR AGREEMENT WITH THE GENERAL CONTRACTOR.
20. THE TOWN'S ENGINEERING DIVISION SHALL BE NOTIFIED SEVENTY-TWO (72) HOURS PRIOR TO ANY EXCAVATION TO MARK OUT TOWN UTILITIES.
21. ALL WATER, SEWER, CURB CUT, STREET OPENING AND JACKIE'S LAW EXCAVATION PERMITS SHALL BE OBTAINED AT THE ENGINEERING DIVISION PRIOR TO ANY EXCAVATIONS.
22. ALL SITE WORK SHALL BE INSPECTED BY THE ENGINEERING DIVISION. THE APPLICANT\OWNER'S CONTRACTOR SHALL SUBMIT A CONSTRUCTION SCHEDULE OF PROPOSED WORK. ALL INSPECTIONS SHALL BE SCHEDULED 48 HOURS IN ADVANCE

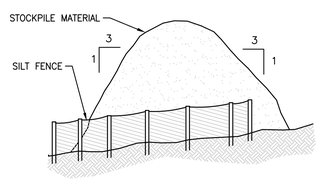
EROSION AND SEDIMENT CONTROL PLAN

SCALE: 1" = 20'



CATCH BASIN INLET PROTECTION

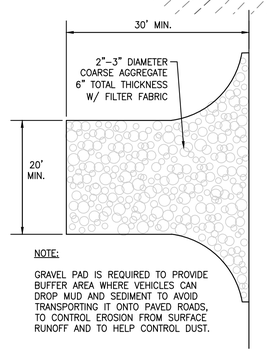
N.T.S.



NOTES
1. STOCKPILE HEIGHTS MUST NOT EXCEED 35 FEET.
2. STOCKPILE SLOPES MUST BE 3:1 OR FLATTER.

STOCKPILE DETAIL

N.T.S.

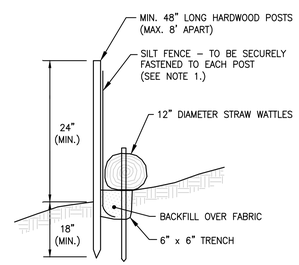


NOTE:

GRAVEL PAD IS REQUIRED TO PROVIDE BUFFER AREA WHERE VEHICLES CAN DROP MUD AND SEDIMENT TO AVOID TRANSPORTING IT ONTO PAVED ROADS, TO CONTROL EROSION FROM SURFACE RUNOFF AND TO HELP CONTROL DUST.

STONE CONSTRUCTION ENTRANCE

N.T.S.



NOTES:
1. WATTLES SHALL BE STAKED A MINIMUM OF 24 INCHES INTO THE GROUND WITH 2 INCHES OR LESS OF STAKE EXPOSED ABOVE WATTLE. STAKE SHALL BE A MAXIMUM OF 4 FEET APART AND WITHIN 2 FEET OF END OF WATTLE SECTIONS.

SILT FENCE/ STRAW WATTLE BARRIER

N.T.S.

CALL BEFORE YOU DIG 1-888-344-7233 MASSACHUSETTS ONE CALL SYSTEM

REVISION	DATE	BY

PROJECT LOCATION:
LOTS 2, 3, + 4
GRANDVIEW ROAD
READING, MA 01867

PARCEL ID:
MAP 27, LOT 404

MAY 10, 2024

PLAN SET:
MAJOR SITE PLAN MODIFICATION
GRANDVIEW ROAD SUBDIVISION - PRIVATE WAY
(GRANDVIEW ROAD EXTENSION)

SCALE: 1" = 20'

TOWN OF READING
COMMUNITY PLANNING & DEVELOPMENT COMMISSION
DATE: _____

FOR REGISTRY USE ONLY

ENGINEER:
FODERA ENGINEERING
(617)877-3293
gfodera@foderaengineering.com
28 Harbor St., Suite 204
Danvers, MA 01923
PROFESSIONAL SEAL

SURVEYOR:
PFS Land Surveying, Inc.
20 Balch Avenue
Groveland, MA 01834
P 978.891.5203
www.pfsland.com
PROFESSIONAL SEAL

COMMONWEALTH OF MASSACHUSETTS GIOVANNI GAETANO FODERA No. 54884 REGISTERED PROFESSIONAL ENGINEER
JOB # 20160
DATE: 5/10/24

JOB NO.: 20160-149

SHEET TITLE:
EROSION + SEDIMENT CONTROL PLAN

SHEET NUMBER:
C-3

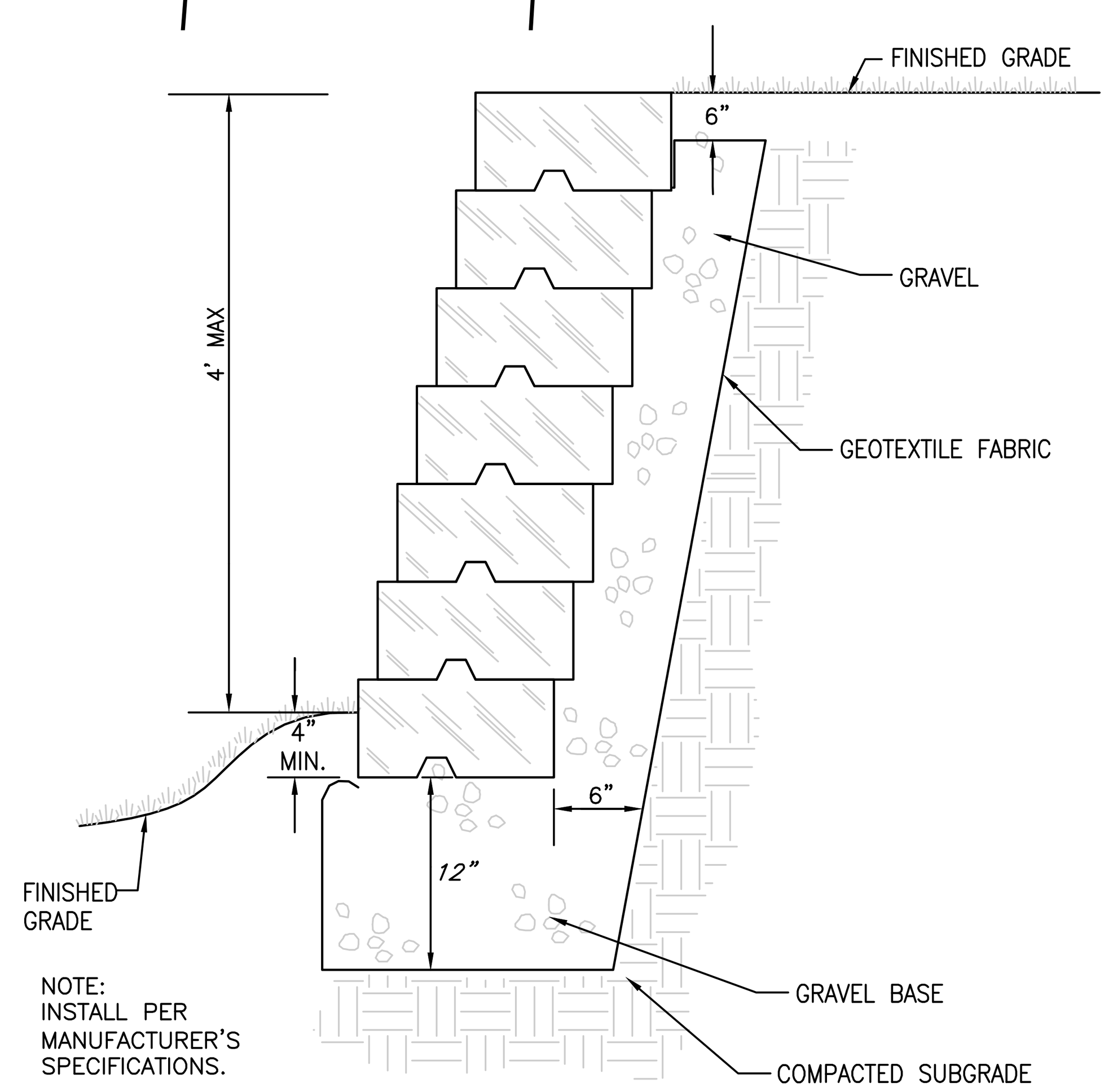
GRADING AND DRAINAGE PLAN

SCALE: 1" = 20'

SCALE
1 inch = 20 ft.

GRADING AND DRAINAGE NOTES

1. ALL CONSTRUCTION MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE TO THE TOWN'S LATEST CONSTRUCTION SPECIFICATIONS AND DETAILS.
2. GRADING IN THE RIGHT-OF-WAY SHALL IN ACCORDANCE WITH LOCAL REGULATIONS, UNLESS OTHERWISE APPROVED BY THE TOWN.
3. THE CONTRACTOR SHALL NOTIFY DIG SAFE AND THE TOWN A MINIMUM OF 72 HOURS PRIOR TO THE START OF ANY EXCAVATIONS.
4. INSTALL ALL APPROPRIATE TREE PROTECTION MEASURES PRIOR TO GRADING AND EXCAVTION.
5. EXACT LOCATIONS OF SAW-CUTTING MAY BE FIELD DETERMINED BASED ON EXISTING PAVEMENT CONDITIONS.
6. THE CONTRACTOR SHALL CAREFULLY PRESERVE BENCHMARKS, REFERENCE POINTS AND STAKES.
7. EROSION CONTROL MEASURES SHALL BE STABILIZED IN PLACE BEFORE BEGINNING SITE WORK. THESE MEASURES SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION.
8. ALL INDICATED ELEVATIONS ARE FINISHED ELEVATIONS.
9. LOCATE AND PROTECT ALL UTILITIES ASSOCIATED WITH THE PROJECT PRIOR TO CONSTRUCTION.
10. ALL EXCAVATION SHALL INCLUDE CLEARING, STRIPPING AND STOCKPILING TOPSOIL, REMOVING UNSUITABLE MATERIALS, THE CONSTRUCTION OF EMBANKMENTS, CONSTRUCTION FILLS, AND THE FINAL SHAPING AND TRIMMING TO THE LINES AND GRADES SHOWN ON THE PLANS.
11. ALL TREES, BRUSH, AND ORGANIC TOPSOIL AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED, UNLESS OTHERWISE SPECIFIED, AND DISPOSED OF AT AN OFF-SITE LOCATION, WITH THE EXCEPTION THAT ENOUGH TOPSOIL SHALL BE RETAINED FOR RE-SPREAD AND GENERAL LANDSCAPING. AREAS WHICH ARE TO BE FILLED SHALL BE COMPACTED TO A MINIMUM DENSITY OF 95% AS DETERMINED BY THE MODIFIED PROCTOR (ASTM D1557, METHOD C) COMPACTION TEST IN THE PAVED AREAS AND 90% IN THE OTHER AREAS.
12. CONTRACTOR SHALL PROVIDE POSITIVE DRAINAGE TO ALL INLETS AND CATCH BASINS. AREAS OF SURFACE PONDING SHALL BE CORRECTED BY CONTRACTOR AT NO ADDITIONAL EXPENSE TO THE OWNER.
13. IF AREAS ARE DISTURBED BEYOND PROPOSED GRADES BY NEGLIGENCE OF THE CONTRACTOR, THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY REGRADING OR REPAIR TO MATCH ORIGINAL EXISTING CONDITIONS.
14. SHORING SHALL BE DONE AS NECESSARY FOR THE PROTECTION OF THE WORK AND FOR THE SAFETY OF PERSONNEL. SHORING SHALL BE IN ACCORDANCE WITH ALL O.S.H.A AND LOCAL REGULATIONS.
15. CONTRACTOR SHALL ADJUST GRADES BY VARYING THE PAVEMENT SECTIONS ACCORDINGLY. EXISTING COMPACTED SUBGRADE TO BE DISTURBED AS LITTLE AS POSSIBLE.
16. ALL PROPOSED SPOT ELEVATIONS SHOWN INDICATE FINISHED GRADED ELEVATIONS AT EDGE OF PAVEMENT AND/OR GRADE BREAKS, UNLESS OTHERWISE NOTED.
17. MAINTAIN PROPER SITE DRAINAGE AT ALL TIMES DURING THE COURSE OF CONSTRUCTION, AND PREVENT STORM WATER FROM RUNNING INTO OR STANDING IN EXCAVATED AREAS.
18. SPREAD AND COMPACT UNIFORMLY TO THE DEGREE SPECIFIED ALL EXCESS TRENCH SPOIL AFTER COMPLETION OF THE UNDERGROUND IMPROVEMENTS (EARTHWORK CONTRACTOR SHALL MAKE APPROPRIATE ADJUSTMENTS IN ROUGH GRADING TO ACCOMMODATE TRENCH SPOIL).
19. PROVIDE WATER TO ADD TO DRY MATERIAL IN ORDER TO ADJUST THE MOISTURE CONTENT FOR THE PURPOSE OF ACHIEVING THE SPECIFIED COMPACTION.
20. UNSUITABLE MATERIAL SHALL BE CONSIDERED AS MATERIAL WHICH IS NOT SUITABLE FOR THE SUPPORT OF PAVEMENT AND BUILDING CONSTRUCTION, AND IS ENCOUNTERED BELOW NORMAL TOPSOIL DEPTHS AND THE PROPOSED SUB-GRADE ELEVATION. THE DECISION TO REMOVE SAID MATERIAL, AND TO WHAT EXTENT, SHALL BE MADE BY A SOILS ENGINEER WITH THE CONCURRENCE OF THE OWNER.
21. REPAIR ANY BASE COURSE AND BINDER COURSE FAILURES PRIOR TO THE INSTALLATION OF THE FINAL BITUMINOUS CONCRETE SURFACE COURSE.
22. SWEEP CLEAN THE BINDER COURSE PRIOR TO THE INSTALLATION OF THE FINAL BITUMINOUS CONCRETE SURFACE COURSE. EXCESSIVE CLEANING OF THE BINDER COURSE THAT MAY BE REQUIRED, AND IS NOT THE FAULT OF THE PAVING CONTRACTOR, SHALL BE PAID FOR ON A TIME AND MATERIAL BASIS BY PRIOR AGREEMENT WITH THE GENERAL CONTRACTOR.
23. CONFIRM INVERTS OF ALL EXISTING STORM INLETS AND SANITARY SEWER MANHOLES BEFORE COMMENCING CONSTRUCTION.
24. A GEOTEXTILE MATTING (LANDLOCK TRM 450 OR EQUIVALENT) SHALL BE USED FOR EROSION CONTROL AN ALL SLOPES GREATER THAN 3H:1V IF NECESSARY.
25. DRAINAGE STRUCTURES AND UNDERGROUND INFILTRATION FACILITIES SHALL BE INSPECTED SEMIANNUALLY TO ENSURE PROPER WORKING ORDER.
26. UNSUITABLE EXISTING SOILS, SILT, AND DEBRIS SHALL BE ADEQUATELY REMOVED FROM THE AREA OF THE PROPOSED INFILTRATION BASIN. REMOVE ALL ORGANICS.
27. IF THE CONTRACTOR IN THE COURSE OF WORK FINDS ANY DISCREPANCIES BETWEEN THE PLANS AND THE PHYSICAL CONDITIONS OF THE LOCALITY, OR ANY ERRORS OR OMISSIONS IN THE PLANS OR IN THE LAYOUT AS GIVEN BY THE ENGINEER, IT SHALL BE HIS DUTY TO IMMEDIATELY INFORM THE ENGINEER, IN WRITING AND THE ENGINEER WILL PROMPTLY VERIFY THE SAME. ANY WORK DONE AFTER SUCH A DISCOVERY, UNTIL AUTHORIZED, WILL BE AT THE CONTRACTOR'S RISK.
28. ANNUAL O&M REPORTS SHALL BE DELIVERED TO THE OFFICE OF THE TOWN ENGINEER BY JANUARY 15 OF EACH YEAR.
29. ANY RETAINING WALL OVER FOUR (4) FEET IN RETAINED HEIGHT SHALL REQUIRE AN ENGINEERED DESIGN FROM A DESIGN PROFESSIONAL.



NOTE:
INSTALL PER MANUFACTURER'S SPECIFICATIONS.

4ft MAX HIGH RETAINING WALL

N.T.S.

LEGEND

(solid line)	PROPERTY LINE
(short dashed line)	EASEMENT
(scalloped line)	TREE BOUNDARY
(hatched band)	RIP-RAP
(chain line)	RETAINING WALL
25	MAJOR CONTOUR
26	MINOR CONTOUR
(long dashed line)	LIMIT OF DISTURBANCE
(dash line)	WETLAND BOUNDARY
(dashed line)	WETLAND BUFFER
WF#	WETLAND FLAG
CB	CATCH BASIN
DMH	DRAIN MANHOLE
TP-3	SOIL TEST PIT
TW	TOP OF WALL
BW	BOTTOM OF WALL
T.O.F.	TOP OF FOUNDATION
FFE	FIRST FLOOR ELEVATION
RIM	RIM ELEVATION
INV	INVERT ELEVATION
O.O.S.	OVERFLOW OUTLET STRUCTURE
F.E.S.	FLARED END SECTION

SOIL TEST RESULTS

TEST DATE: 7/6/2020
WEATHER: 65°F, SUNNY/ DRY
SOIL EVALUATOR: ARMAND PORRAZZO
LICENCE #: 1958

TP-1 (ELV. 106 to 96)

DPT.	Soil Data
0"–9"	Ap (0"–9") Sandy Loam 10YR 3/2
9"–24"	B (9"–24") Sandy Loam 10YR 7/6
24"–108"	C (24"–108") Loamy Sand 2.5Y 4/3

NO REFUSAL
NO WEEPING
REDOX @ 60"
ESHWT = 101.0

TP-2 (ELV. 108 to 98)

DPT.	Soil Data
0"–12"	A (0"–12") Sandy Loam 10YR 3/2
12"–36"	Bw (12"–36") Sandy Loam 10YR 7/6
36"–80"	C1 (36"–80") Loamy Sand 2.5Y 5/2
80"–120"	C2 (80"–120") Sand Gravel 2.5Y 4/3

NO REFUSAL
NO WEEPING
NO REDOX

TP-3 (ELV. 112 to 103)

DPT.	Soil Data
0"–8"	A (0"–8") Sandy Loam 10YR 3/2
8"–27"	Bw (8"–27") Sandy Loam 10YR 7/6
27"–66"	C (27"–66") Loamy Sand 2.5Y 5/2

NO REFUSAL
NO WEEPING
NO REDOX

CALL BEFORE YOU DIG 1-888-344-7233 MASSACHUSETTS ONE CALL SYSTEM

REVISION	DATE	BY

PROJECT LOCATION:
LOTS 2, 3, + 4
GRANDVIEW ROAD
READING, MA 01867

PARCEL ID:
MAP 27, LOT 404

PLAN SET:
MAJOR SITE PLAN MODIFICATION
GRANDVIEW ROAD SUBDIVISION - PRIVATE WAY
(GRANDVIEW ROAD EXTENSION)

MAY 10, 2024

SCALE: 1" = 20'

TOWN OF READING
COMMUNITY PLANNING & DEVELOPMENT COMMISSION

DATE: ____________

FOR REGISTRY USE ONLY

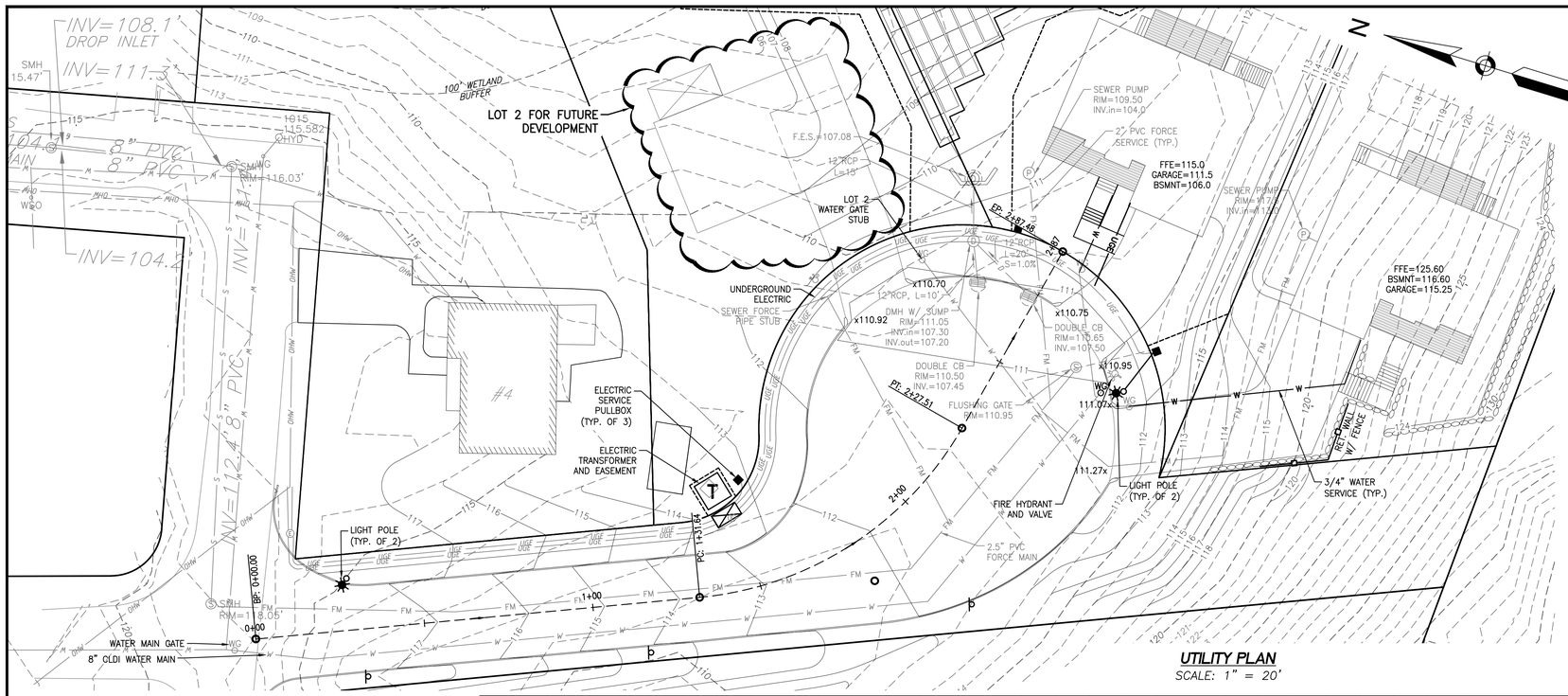
ENGINEER:
FODERA ENGINEERING
(617)877-3293
gfodera@foderaengineering.com
28 Harbor St., Suite 204
Danvers, MA 01923
PROFESSIONAL SEAL
COMMONWEALTH OF MASSACHUSETTS GIOVANNI GAETANO FODERA No. 54884 REGISTERED PROFESSIONAL ENGINEER
Job # 20160
DATE: 8/16/24

SURVEYOR:
PFS Land Surveying, Inc.
20 Balch Avenue
Groveland, MA 01834
P 978.891.5203
www.pfsland.com
PROFESSIONAL SEAL

JOB NO.: 20160-149

SHEET TITLE:
GRADING AND DRAINAGE PLAN

SHEET NUMBER:
C-4



UTILITY PLAN
SCALE: 1" = 20'

LEGEND

- PROPERTY LINE
- RIP-RAP
- RETAINING WALL
- 125 MAJOR CONTOUR
- 126 MINOR CONTOUR
- LIMIT OF DISTURBANCE
- D STORM DRAIN LINE
- G GAS LINE
- OHW OVERHEAD UTILITY WIRE LINE
- S SANITARY SEWER UTILITY LINE
- FM SEWER FORCE MAIN
- UGE UNDERGROUND ELECTRIC LINE
- W WATER UTILITY LINE
- CB CATCH BASIN
- DMH DRAIN MANHOLE
- SEWER PUMP
- SEWER FLUSHING GATE
- FORCE MAIN BALL VALVE
- GAS VALVE
- WATER VALVE
- FIRE HYDRANT
- RIM RIM ELEVATION
- INV INVERT ELEVATION
- STREET LIGHT
- T ELECTRIC TRANSFORMER & EASEMENT
- ELECTRIC SERVICE PULLBOX
- ELECTRIC MANHOLE

SEWAGE CALCULATIONS

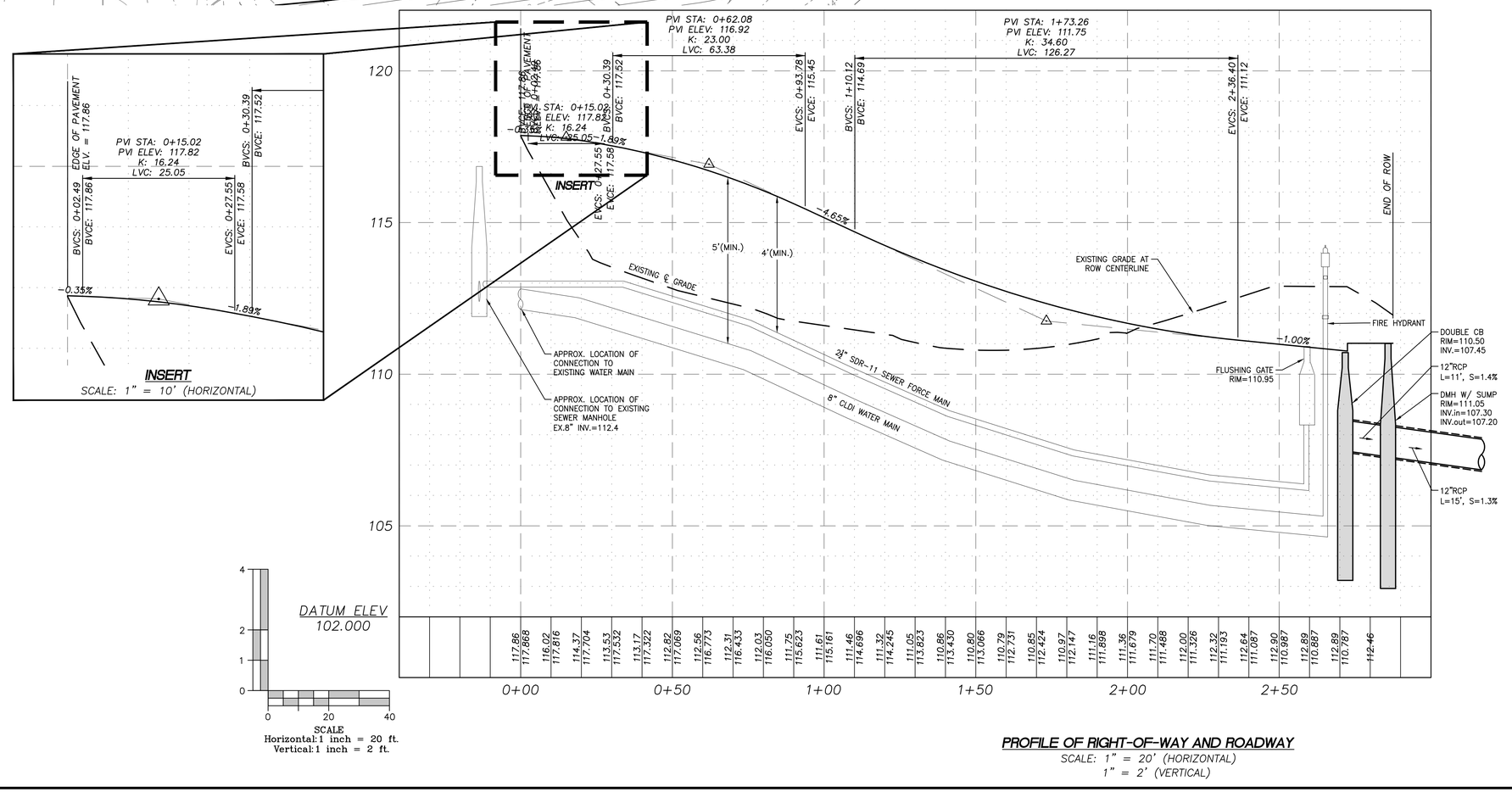
ASSUMPTIONS MADE FOR EACH PROPOSED HOUSE TO CONTAIN FOUR (4) BEDROOMS. CALCULATIONS BELOW ARE IN ACCORDANCE TO 310 CMR 15.00.

3 NEW HOUSES * 4 BEDROOMS PER HOUSE = 12 BEDROOMS ADDED

12 BEDROOMS * 110 GAL/DAY = 1,320 GAL/DAY OF ADDED SEWAGE

UTILITY NOTES

1. CONTRACTOR IS TO VERIFY THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION AND ENSURE NO CONFLICTS EXIST WITH PROPOSED IMPROVEMENTS. NOTIFY ENGINEER IMMEDIATELY IF UTILITIES ARE LOCATED DIFFERENTLY THAN SHOWN. THE CONTRACTOR SHALL COORDINATE WITH EACH RESPECTIVE UTILITY COMPANY IN ORDER TO RELOCATE IF NEEDED IN CONFORMANCE WITH THEIR GUIDELINES.
2. CONTRACTOR SHALL NOTIFY AND COORDINATE WITH THE APPROPRIATE UTILITY COMPANY PRIOR TO THE REMOVAL OF INDICATED UTILITIES ON SITE. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ANY PERMITS REQUIRED FOR DEMOLITION AND HAUL OFF FROM THE APPROPRIATE AUTHORITIES.
3. THE DEPARTMENT OF PUBLIC WORKS OR APPLICABLE GOVERNING DEPARTMENT MUST AUTHORIZE AND PERMIT TO CONSTRUCT, ALTER OR MODIFY A WATER OR SEWER LINE.
4. AT THE COMPLETION OF THE WATER AND/OR SEWER CONSTRUCTION AND PRIOR TO RECORDING THE FINAL PLAT, THE CONTRACTOR WILL FURNISH THE WATER SYSTEM INSPECTOR RECORD DRAWINGS OF THE PROJECT.
5. BUILDING CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE GAS COMPANY FOR THE CONSTRUCTION OF THE GAS LINE BETWEEN METER AND MAIN.
6. BUILDING CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE POWER COMPANY FOR THE CONSTRUCTION OF ELECTRICAL CONDUIT TO PROVIDE SERVICE AND IF A TRANSFORMER IS REQUIRED TO BE INSTALLED.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING, PRIOR TO CONSTRUCTION, ALL EXISTING LOCATIONS AND INVERT ELEVATIONS OF SANITARY SEWERS, STORM DRAINAGE, AND WATER MAINS. IF ANY INVERT ELEVATION VARIES MORE THAN 0.1 FT. FROM RECORD ELEVATIONS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY. WORK SHALL NOT PROCEED UNTIL THE CONTRACTOR IS NOTIFIED BY THE ENGINEER.
8. CONNECT TO EXISTING UTILITIES AND INSTALL UTILITIES IN COMPLIANCE WITH REQUIREMENTS OF APPROPRIATE JURISDICTIONAL AGENCIES.
9. COORDINATE WITH BUILDING PLANS TO ASSURE ACCURACY OF UTILITY CONNECTIONS AND COMPLIANCE WITH LOCAL CODES.
10. ALL SEWERS TO BE MAINTAINED THROUGHOUT CONSTRUCTION, INCLUDING CLEANING OF ANY SILT OR DEBRIS ACCUMULATED IN STRUCTURES.
11. ALL SURPLUS EXCAVATED MATERIAL FROM THE TRENCH SHALL BE DISPOSED OFF THE SITE BY CONTRACTOR.
12. TRENCHING SHOULD BE CONDUCTED IN ACCORDANCE WITH ALL OSHA REGULATIONS.
13. COORDINATE EXACT TRENCHING, ROUTING, AND POINT OF TERMINATION WITH ALL UTILITY COMPANIES.
14. BACKFILL MATERIAL SHALL BE SUITABLE MATERIAL IN COMPLIANCE WITH THE TOWN OF DANVERS AND/OR THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION (MASSDOT).
15. WATER MAIN SHALL HAVE A MINIMUM COVER OF FIVE (5) FEET.
16. THE SANITARY SEWER AND POTABLE WATER LINES ARE TO BE SEPARATED BY AT LEAST 10 FEET HORIZONTALLY, OR THE POTABLE WATER LINE SHALL BE AT LEAST 18 INCHES VERTICALLY ABOVE THE SANITARY SEWER.
17. CONTRACTOR TO RECONFIGURE PROPOSED ELECTRIC/TELEPHONE/CABLE CONDUITS AS NECESSARY TO AVOID CONFLICT WITH TREES/LANDSCAPING.
18. THRUST BLOCKS TO BE PLACED AT ALL BEND LOCATIONS WITHIN THE POTABLE WATER LINES. SEE DETAIL SHEETS.
19. ALL UTILITIES SHALL BE APPROVED MATERIALS AND INSTALLED IN ACCORDANCE WITH THE DEPARTMENT OF PUBLIC WORKS STANDARDS.
20. THE TOWN'S ENGINEERING DIVISION SHALL BE NOTIFIED SEVENTY-TWO (72) HOURS PRIOR TO ANY EXCAVATION TO MARK OUT TOWN UTILITIES.



INSERT
SCALE: 1" = 10' (HORIZONTAL)

PROFILE OF RIGHT-OF-WAY AND ROADWAY
SCALE: 1" = 20' (HORIZONTAL)
1" = 2' (VERTICAL)

UTILITY AND ROADWAY PROFILE PLAN
SCALE: 1" = 20' (HORIZONTAL)

CALL BEFORE YOU DIG 1-888-344-7233 MASSACHUSETTS ONE CALL SYSTEM

REVISION	DATE	BY

PROJECT LOCATION:
LOTS 2, 3, + 4
GRANDVIEW ROAD
READING, MA 01867

PARCEL ID:
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MAJOR SITE PLAN MODIFICATION
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TOWN OF READING
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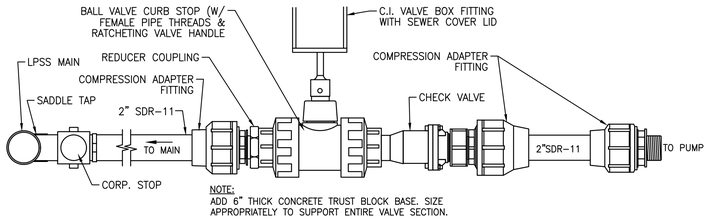
PROFESSIONAL SEAL
COMMONWEALTH OF MASSACHUSETTS 20160 GIOVANNI GAETANO FODERA No. 54894 REGISTERED PROFESSIONAL ENGINEER
DATE: 5/10/24

SURVEYOR:
PFS Land Surveying, Inc.
20 Balch Avenue
Groveland, MA 01834
P 978.891.5203
www.pfsland.com
PROFESSIONAL SEAL

JOB NO.: 20160-149

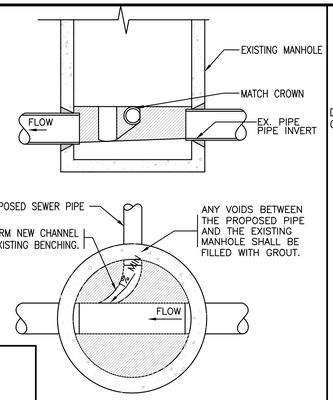
SHEET TITLE:
UTILITY + ROADWAY PROFILE PLAN

SHEET NUMBER:
C-5



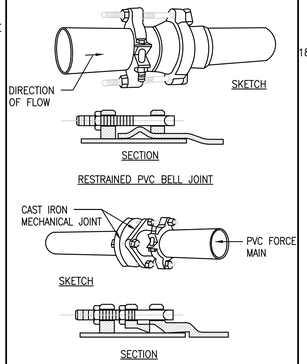
LOW PRESSURE SEWER SERVICE LATERAL VALVE AND CONNECTION

N.T.S.



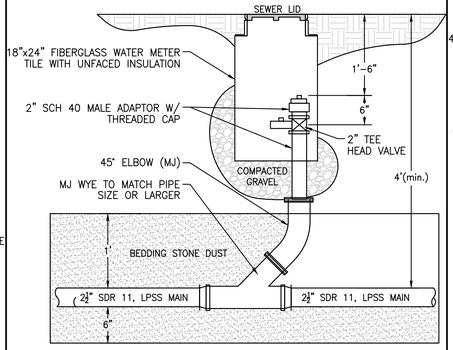
CONNECTION TO EXISTING SEWER MANHOLE

N.T.S.



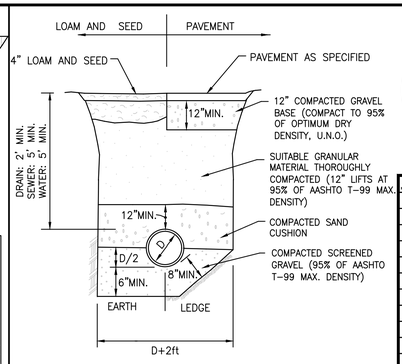
RESTRAINED MECHANICAL JOINT FITTING

N.T.S.



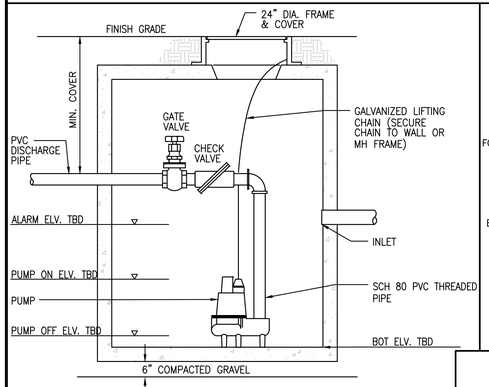
SEWER FORCE MAIN FLUSHING CONNECTION

N.T.S.



DRAIN/ SEWER/ WATER TRENCH AND BACKFILL DETAIL

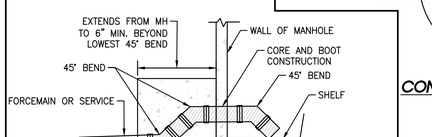
N.T.S.



NOTE:
SEWER PUMP DESIGNS FOR ASSOCIATED LOTS SHALL BE SUBMITTED TO THE ENGINEERING DIVISION FOR REVIEW AND APPROVAL UPON OR BEFORE THE SUBMISSION OF THE APPLICATION FOR THE SEWER PERMIT OF EACH LOT.

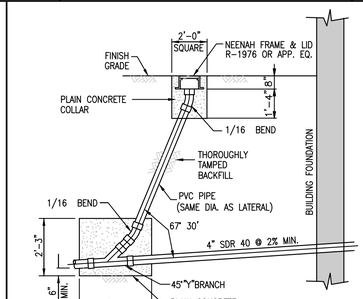
PUMP CHAMBER

N.T.S.



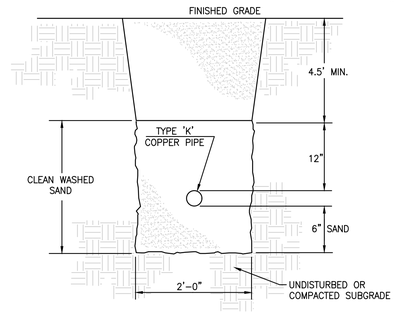
FORCE MAIN CONNECTION TO SEWER MANHOLE

NTS



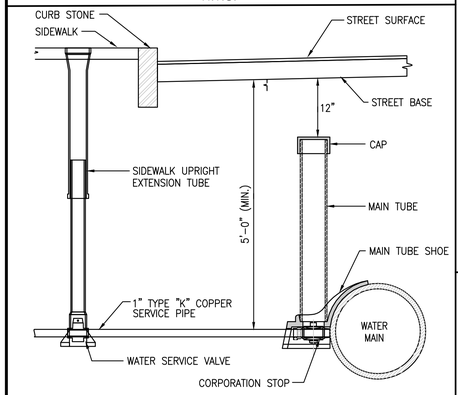
SEWER SERVICE AT BUILDING W/ CLEANOUT

N.T.S.



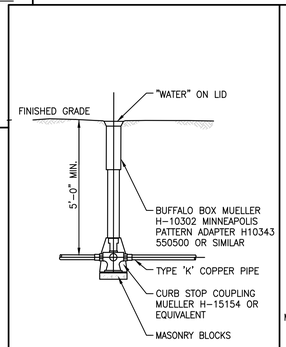
COPPER WATER SERVICE PIPE TRENCH

N.T.S.



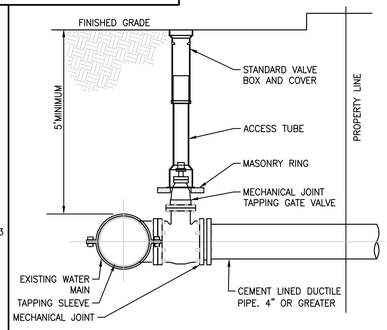
TYPICAL WATER SERVICE CONNECTION

N.T.S.



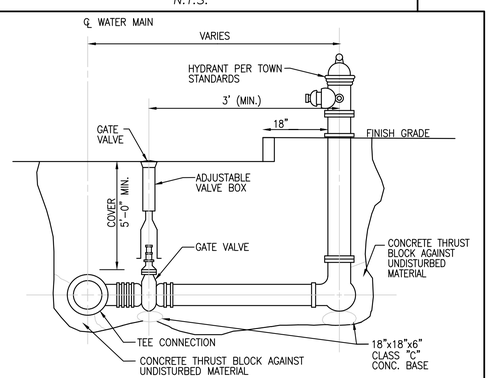
WATER SERVICE VALVE

N.T.S.



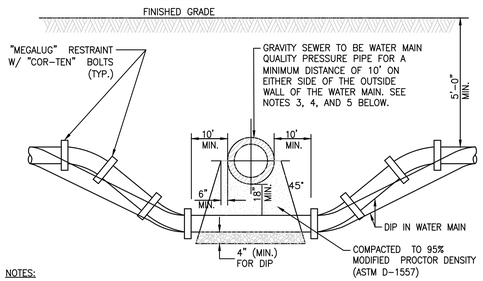
WATER CONNECTION WITH TAPPING SLEEVE AND VALVE

N.T.S.



PROPOSED FIRE HYDRANT

N.T.S.

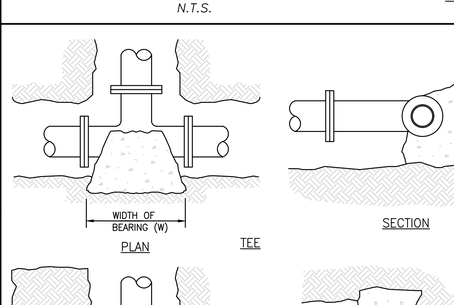


NOTES:

1. HORIZONTAL AND VERTICAL SEPARATION BETWEEN WATERMAINS AND SEWERS SHALL COMPLY WITH APPLICABLE SECTIONS OF LOCAL OR STATE REQUIREMENTS, WHICHEVER IS MORE STRINGENT.
2. CONTRACTOR MAY BEND WATER MAIN PIPE UNIFORMLY UNDER SEWERS WITHOUT USING FITTINGS, PROVIDED THAT JOINT DEFLECTION DOES NOT EXCEED 5 DEGREES PER JOINT FOR PIPE UNDER 14" IN DIAMETER AND 3 DEGREES PER JOINT FOR PIPE 14" AND OVER IN DIAMETER. IF FITTINGS ARE USED, CONTINUOUS STRAPPING WITH RODS, STRAPS, NUTS AND BOLTS BELOW NORMAL WATERMAIN DEPTH ARE REQUIRED, OR RETAINER GLANDS MAY BE USED IN LIEU OF STRAPPING. RETAINER GLANDS TO BE CLOW No. F-1058 OR APPROVED EQUAL.
3. ALL SANITARY SEWER (INCLUDING SERVICE) CROSSINGS WHERE THE WATER MAINS OR WATER SERVICES ARE LESS THAN 18" VERTICALLY ABOVE THE SEWER SHALL BE POLYVINYL CHLORIDE PRESSURE PIPE (SDR 26-160 PSI) AND SHALL CONFORM WITH THE LATEST REVISION OF ASTM D- 2241, JOINTS SHALL CONFORM TO ASTM D-3139 AND ELASTOMERIC GASKETS SHALL CONFORM TO ASTM F-477. THE SAME PIPE AND JOINT MATERIALS SHALL BE USED WHENEVER WATER MAIN CROSSES BELOW THE SEWER.
4. ALL STORM SEWER (INCLUDING SERVICE) CROSSINGS WHERE THE WATER MAINS ARE LESS THAN 18" VERTICALLY ABOVE THE SEWER SHALL BE REINFORCED CONCRETE PIPE, ASTM C-361, CLASS D-25,WITH BELL AND SPIGOT JOINTS AND RUBBER GASKETS, OR PVC SDR 26 AS SPECIFIED IN NOTE 3 ABOVE. THE SAME PIPE AND JOINT MATERIAL SHALL BE USED WHENEVER WATER MAIN CROSSES BELOW THE SEWER.
5. FOR NEW SEWER INSTALLATIONS CROSSING OVER WATER MAINS, THE ENTIRE RUN OF NEW SEWER SHALL BE WATER MAIN QUALITY PIPE, EXTENDING FROM STRUCTURE TO STRUCTURE ON EACH SIDE OF THE CROSSING.

WATER MAIN CROSSING

N.T.S.



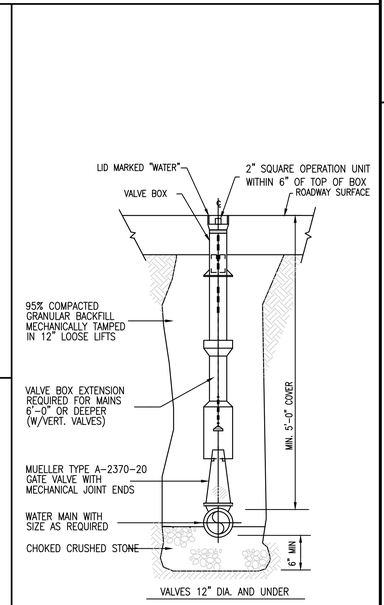
MINIMUM THRUST BLOCK AREA REQUIRED (Y x W)

PIPE SIZE	WATER PIPE	
	TEE, DEAD END, 90° BEND	45° & 22½° BENDS
4" OR LESS	3 SQ. FEET	3 SQ. FEET
6"	4 SQ. FEET	3 SQ. FEET
8"	6 SQ. FEET	3 SQ. FEET
10"	9 SQ. FEET	5 SQ. FEET
12"	13 SQ. FEET	7 SQ. FEET
16"	23 SQ. FEET	12 SQ. FEET

NOTES
1. THRUST BLOCKS TO EXTEND TO UNDISTURBED GROUND.
2. ALL CONCRETE SHALL BE CLASS B.
3. TABLE IS BASED ON 3000 LB./SQ. FT. SOIL. IF SOIL CONDITIONS ARE FOUND TO INDICATE SOIL BEARING LESS, THE AREAS SHALL BE INCREASED ACCORDINGLY.
4. AREAS FOR PIPES GREATER THAN 16" SHALL BE CALCULATED FOR EACH PROJECT.
5. FOR ALL NON BEARING VERTICAL SURFACES.

TRUST BLOCKS FOR WATER SYSTEM

N.T.S.



UNDERGROUND GATE VALVE

N.T.S.

CALL BEFORE YOU DIG 1-888-344-7233 MASSACHUSETTS ONE CALL SYSTEM

REVISION	DATE	BY

PROJECT LOCATION:
LOTS 2, 3, + 4
GRANDVIEW ROAD
READING, MA 01867

PARCEL ID:
MAP 27, LOT 404

MAY 10, 2024

PLAN SET:
MAJOR SITE PLAN MODIFICATION
GRANDVIEW ROAD SUBDIVISION - PRIVATE WAY
(GRANDVIEW ROAD EXTENSION)

SCALE: N.T.S.

TOWN OF READING
COMMUNITY PLANNING & DEVELOPMENT COMMISSION
DATE: _____

FOR REGISTRY USE ONLY

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PROFESSIONAL SEAL

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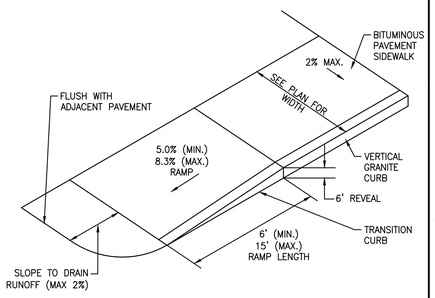
PROFESSIONAL SEAL

COMMONWEALTH OF MASSACHUSETTS
JOB # 20160
GIOVANNI GAETANO FODERA
No. 54884
REGISTERED PROFESSIONAL ENGINEER
DATE: 5/10/24

JOB NO.: 20160-149

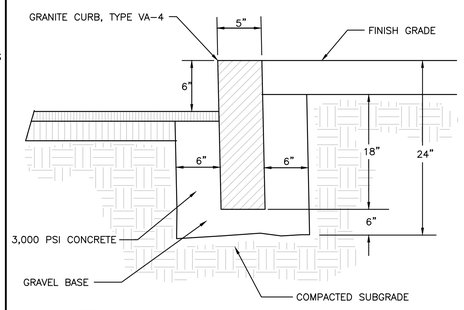
SHEET TITLE:
DETAILS
SHEET 1

SHEET NUMBER:
C-6



ADA ACCESSIBLE SIDEWALK RAMP

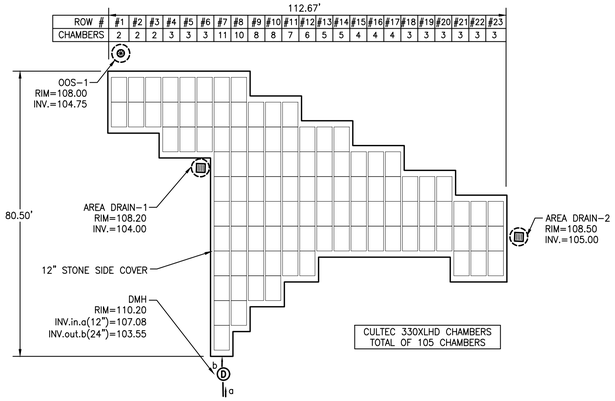
N.T.S.



NOTE:
INSTALL GRANITE CURB INLET AT EACH CATCH BASIN LOCATION

VERTICAL GRANITE CURB

N.T.S.

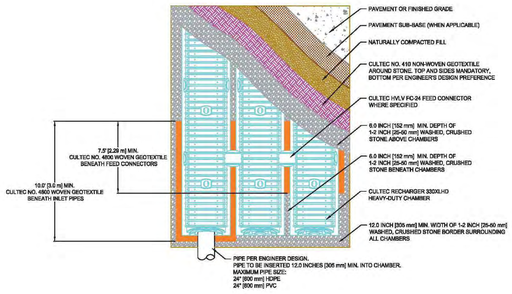


CULTEC RECHARGER

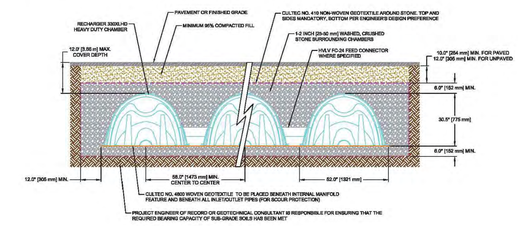
N.T.S.

CULTEC Recharger® 330XLHD Stormwater Chamber

Plan View Drawing

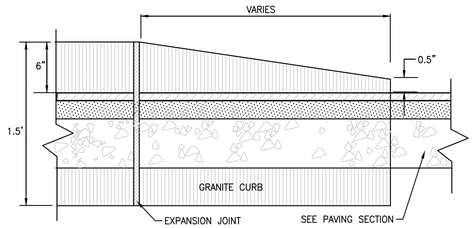


Typical Cross Section for Traffic Application



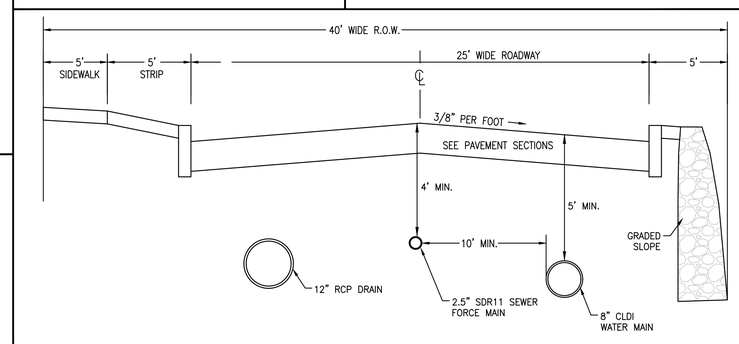
For more information, contact CULTEC at (203) 775-4416 or visit www.cultec.com. 3

NOT USED



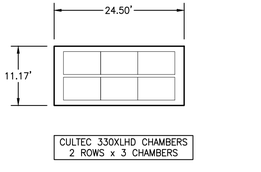
TRANSITION CURB DETAIL

N.T.S.



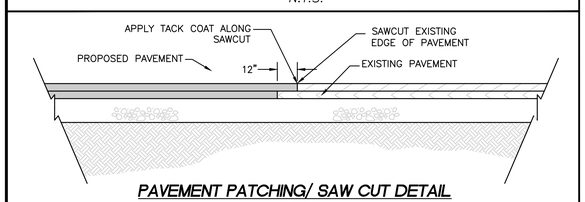
TYPICAL ROADWAY CROSS SECTION

N.T.S.



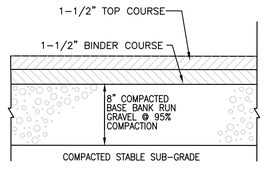
ROOF RECHARGE SYSTEM

N.T.S.

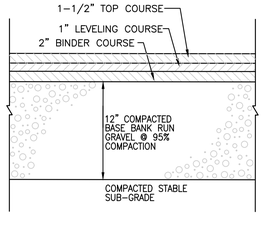


PAVEMENT PATCHING/ SAW CUT DETAIL

N.T.S.



SIDEWALK SECTION

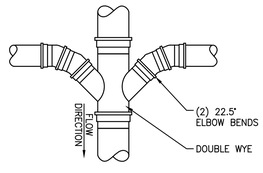


ROADWAY SECTION

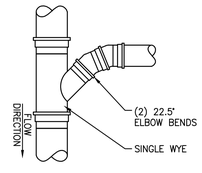
NOTE:
COMPACTED FILL SUBSURFACE BACKFILL SHALL MEET SPECIFICATIONS SET FORTH BY THE ENGINEERING DEPARTMENT AND/OR MASSDOT SPECIFICATIONS.

BITUMINOUS PAVEMENT SECTION

N.T.S.



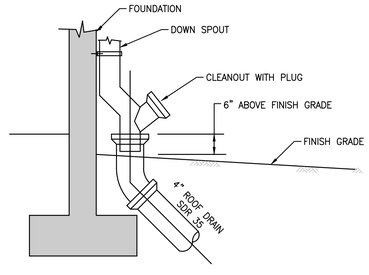
MANIFOLD PLAN VIEW



"WYE" CONNECTION PLAN VIEW

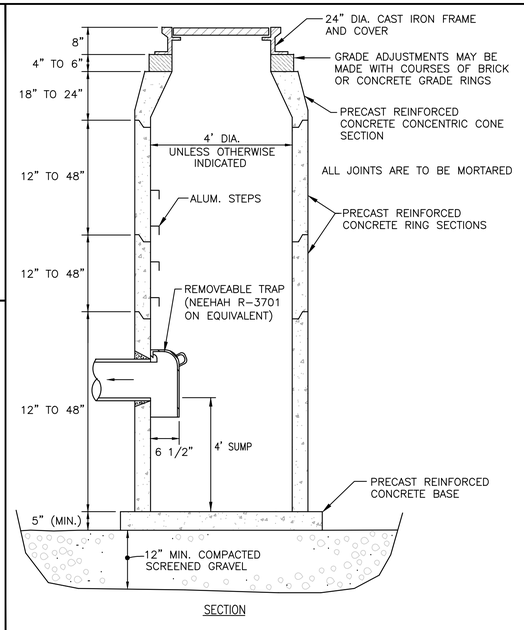
MANIFOLD AND WYE CONNECTIONS

N.T.S.



TYPICAL DOWNSPOUT LEADER

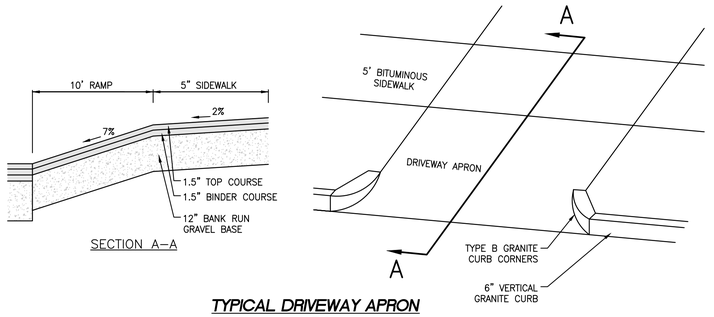
N.T.S.



SECTION

TYPICAL CATCH BASIN

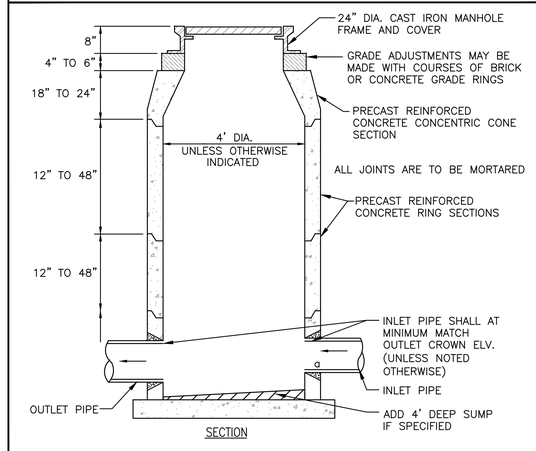
N.T.S.



SECTION A-A

TYPICAL DRIVEWAY APRON

N.T.S.



SECTION

TYPICAL DRAIN MANHOLE

N.T.S.

TOWN OF READING
COMMUNITY PLANNING & DEVELOPMENT COMMISSION

DATE: _____

FOR REGISTRY USE ONLY

REVISION	DATE	BY

PROJECT LOCATION:
LOTS 2, 3, + 4
GRANDVIEW ROAD
READING, MA 01867

PARCEL ID:
MAP 27, LOT 404

PLAN SET:
MAJOR SITE PLAN MODIFICATION
GRANDVIEW ROAD SUBDIVISION - PRIVATE WAY
(GRANDVIEW ROAD EXTENSION)

MAY 10, 2024

SCALE: N.T.S.

ENGINEER:
FODERA ENGINEERING
(617)877-3293
gfodera@foderaengineering.com
28 Harbor St., Suite 204
Danvers, MA 01923
PROFESSIONAL SEAL

SURVEYOR:
PFS Land Surveying, Inc.
20 Balch Avenue
Groveland, MA 01834
P 978.891.5203
www.pfsland.com
PROFESSIONAL SEAL

DATE: 5/10/24

JOB NO.: 20160-149

SHEET TITLE:
DETAILS
SHEET 2

SHEET NUMBER:
C-7

FODERA
ENGINEERING
28 Harbor Street, Suite 204
Danvers, MA 01923
Tel: (617) 992-8492
contact@foderaengineering.com

May 13, 2024

To: Andrew MacNichol, Community Development Director
Town of Reading
Community Planning and Development Commission
16 Lowell Street
Reading, MA 01867

RE: GRANDVIEW ROAD SUBDIVISION
SITE PLAN MODIFICATIONS
4 COLD SPRING ROAD
READING, MA 01867

To Mr. MacNichol,

The project at 4 Cold Spring Road known as Grandview Road Subdivision was originally approved by the Community Planning and Development Commission (CPDC) in 2021. A few years later, the project underwent a design modification to the stormwater system and roadway grading and was re-approved by the CPDC in 2023 as a Major Modification. The project commenced construction and the roadway with associated utilities were constructed along with the infiltration pond. However, the project has come to a halt and the plans have been modified so that the infiltration system matches the design from the 2021 original approved plans. Summaries of plan designs below:

2021 Approved Plans

- 4-Lot subdivision including the existing dwelling at 4 Cold Spring Road. Proposed to construct three (3) new houses along the approved roadway.
- Roadway cul-de-sac was designed at an approximate elevation of 113.
- Stormwater system consisted of multiple catch basins in the cul-de-sac and directed to an underground infiltration system within Lots 2 and 3.

2023 Approved Plans

- Property lines for the 4-lot subdivision remained unchanged. New proposal to keep Lot 2 undeveloped with potential for future development. Lots 3 and 4 will be developed as new single-family dwellings.
- Roadway cul-de-sac was regraded and lowered by two (2) feet to an approximate elevation of 111.
- Stormwater system was redesigned to collect runoff at the end of the cul-de-sac and empty out into an infiltration pond.

2024 Modified Plans

- Property lines remain unchanged, and Lot 2 will remain undeveloped with the potential for future development.
- Grading of roadway and cul-de-sac will remain unchanged and has been constructed according to the plans from 2023.
- Stormwater system will remain with catch basins at the end of the cul-de-sac but the infiltration pond will be modified to an underground infiltration system, similar to the approved plans in 2021.

Additional modifications between 2021 and 2024 plans

- Increased building footprints.
    - Lot 3 will remain to have a separate roof runoff recharge system.
    - Lot 4 roof runoff previously was intended to be directed to the overall infiltration system. This has been modified to have a separate roof runoff recharge system on-site.
- Tree lines for Lots 3 & 4 were shifted back to create more lawn and less wooded surface.
- Although larger building footprints are implemented and the tree line creates more lawn and less wooded surface, there is no substantial change in runoff calculations. This is due to Lot 4 being modified to having its own roof runoff recharge system.
- The as-built roadway and drainage infrastructure are easily incorporated into the new drainage system with the associated elevations making a feasible design.

There are no new design waivers being requested for the modification.

Please accept this submittal as formal request for review. Please do not hesitate to call or email me shall you have any questions, comments, or concerns.

Sincerely yours,

Giovanni Fodera, PE, LSIT
President | Principal Engineer
FODERA Engineering

Attachments:

- Major Site Plan Modification – Grandview Road Subdivision, dated May 10, 2024.
- Post-Development Runoff Summary & Calculations, dated May 10, 2024.

Cc: Michael Salamone
Frank Lanzillo

FODERA
ENGINEERING
28 Harbor Street, Suite 204
Danvers, MA 01923
Tel: (617) 992-8492
contact@foderaengineering.com

May 13, 2024

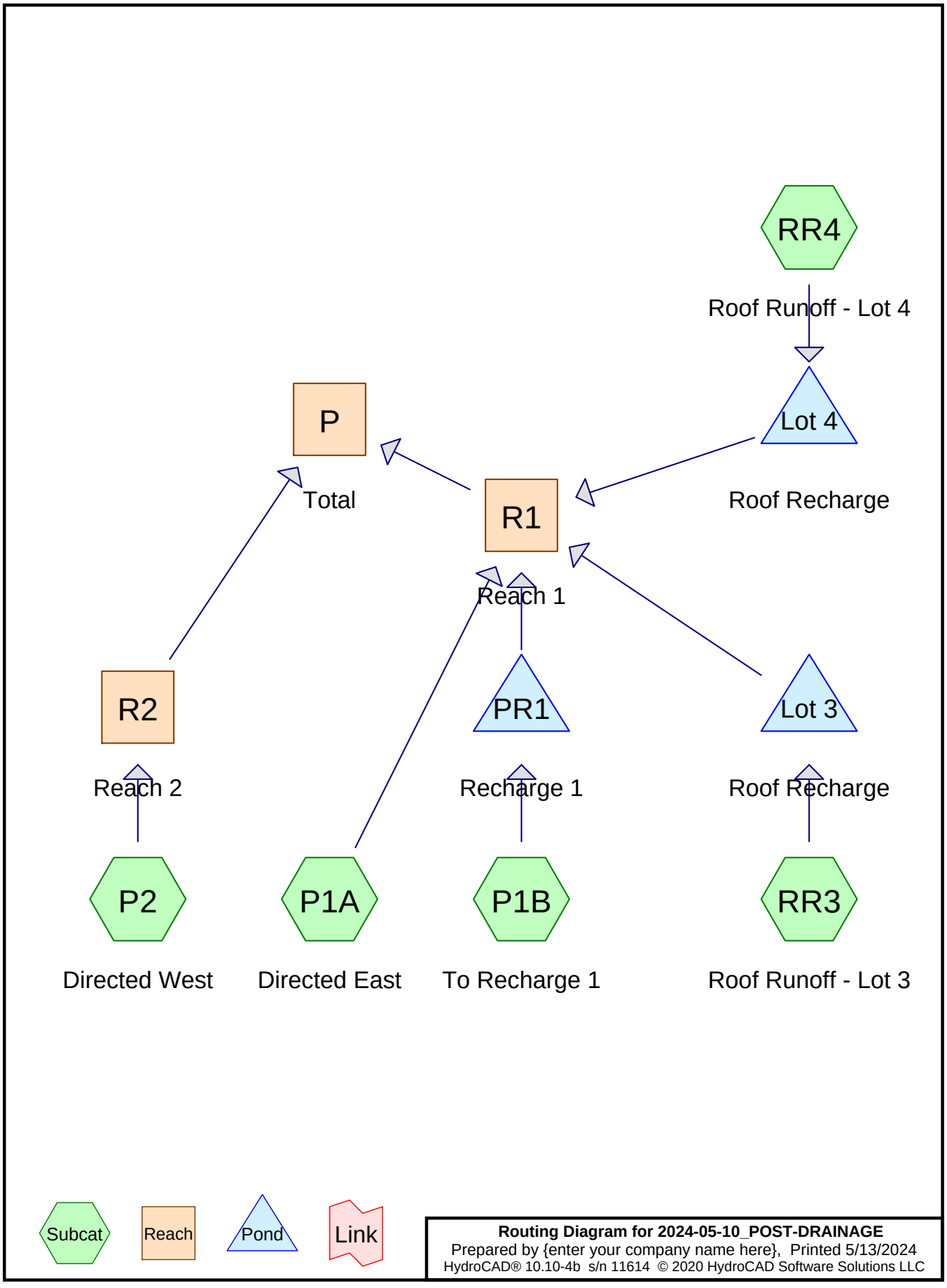
Peak Rate of Discharge Summary

PEAK RATE OF DISCHARGE, cubic-feet per second						
	Reach R1		Reach R2		Σ Reach R1 & R2	
Storm Intensity	Pre-Conditions	Post-Conditions	Pre-Conditions	Post-Conditions	**Pre-Conditions**	**Post-Conditions**
2-year Storm 3.31”	0.24	0.01	0.52	0.03	**0.65**	**0.03**
10-year Storm 5.22”	1.40	0.31	1.29	0.07	**2.57**	**0.34**
25-year Storm 6.41”	2.38	0.73	1.81	0.09	**4.05**	**0.78**
100-year Storm 8.24”	4.12	*4.64	2.65	0.13	**6.57**	**4.68**

* Increase at R1 but sum of the overall site (same watershed area) is less in the post-conditions.

Sincerely yours,

Giovanni Fodera, PE, LSIT
President | Principal Engineer
FODERA Engineering



Routing Diagram for 2024-05-10_POST-DRAINAGE
Prepared by {enter your company name here}, Printed 5/13/2024

Summary for Subcatchment P1A: Directed East

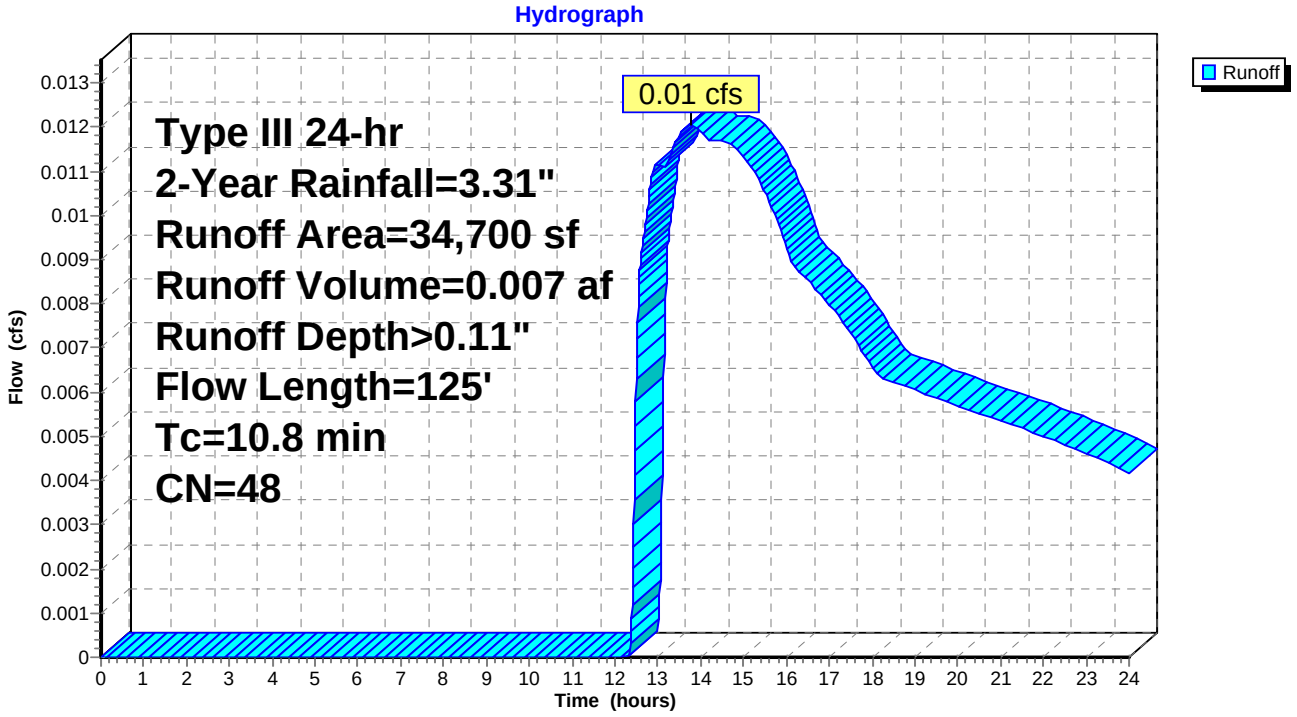
Runoff = 0.01 cfs @ 13.79 hrs, Volume= 0.007 af, Depth> 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.31"

	Area (sf)	CN	Description
*	2,854	98	Impervious
	14,380	39	>75% Grass cover, Good, HSG A
	11,288	30	Woods, Good, HSG A
	3,734	74	>75% Grass cover, Good, HSG C
	111	70	Woods, Good, HSG C
	2,333	80	>75% Grass cover, Good, HSG D
	34,700	48	Weighted Average
	31,846		91.78% Pervious Area
	2,854		8.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	50	0.1400	0.08		**Sheet Flow, Sheet Flow Woods** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.8	75	0.1067	1.63		**Shallow Concentrated Flow, Concentrated Woods** Woodland Kv= 5.0 fps
10.8	125	Total			

Subcatchment P1A: Directed East



Summary for Subcatchment P1B: To Recharge 1

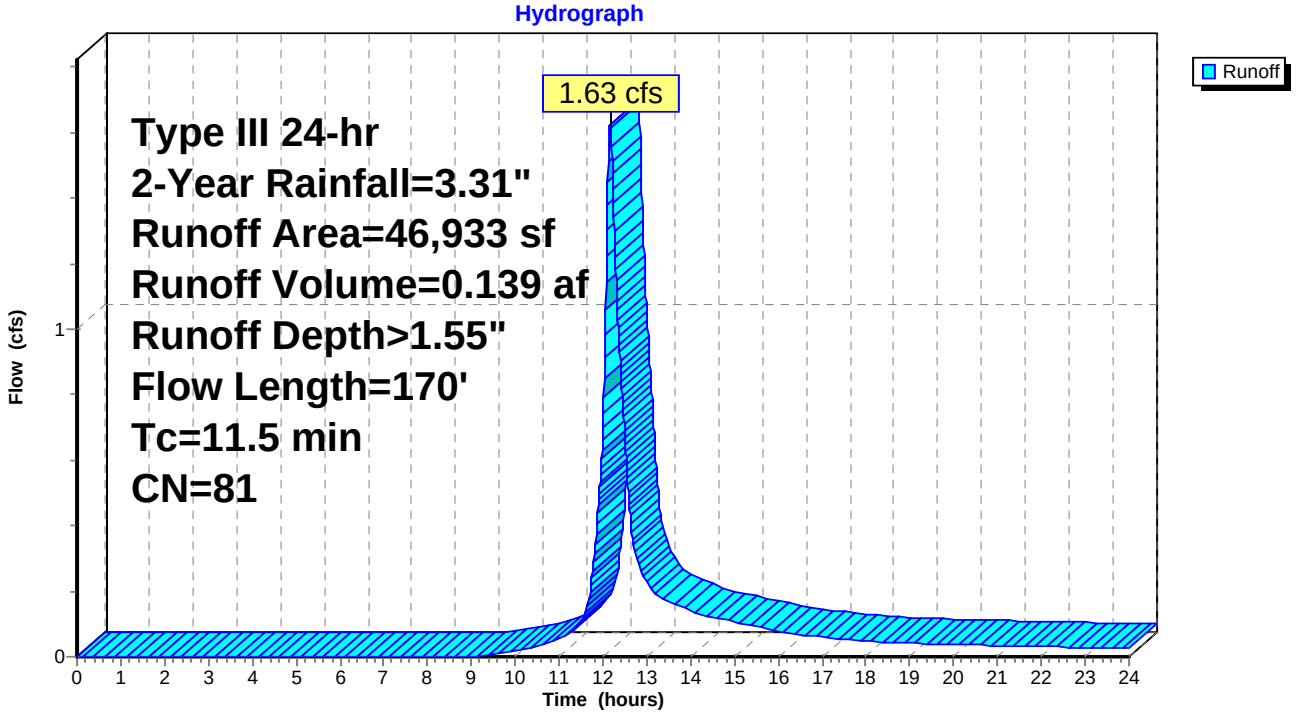
Runoff = 1.63 cfs @ 12.16 hrs, Volume= 0.139 af, Depth> 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.31"

	Area (sf)	CN	Description
*	16,120	98	Impervious
	989	39	>75% Grass cover, Good, HSG A
	21,312	74	>75% Grass cover, Good, HSG C
	8,215	70	Woods, Good, HSG C
	297	80	>75% Grass cover, Good, HSG D
	46,933	81	Weighted Average
	30,813		65.65% Pervious Area
	16,120		34.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	50	0.1400	0.08		**Sheet Flow, Wood Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 3.10"
1.5	120	0.0750	1.37		**Shallow Concentrated Flow, Woods Concentrated Flow** Woodland Kv= 5.0 fps
11.5	170	Total			

Subcatchment P1B: To Recharge 1



Summary for Subcatchment P2: Directed West

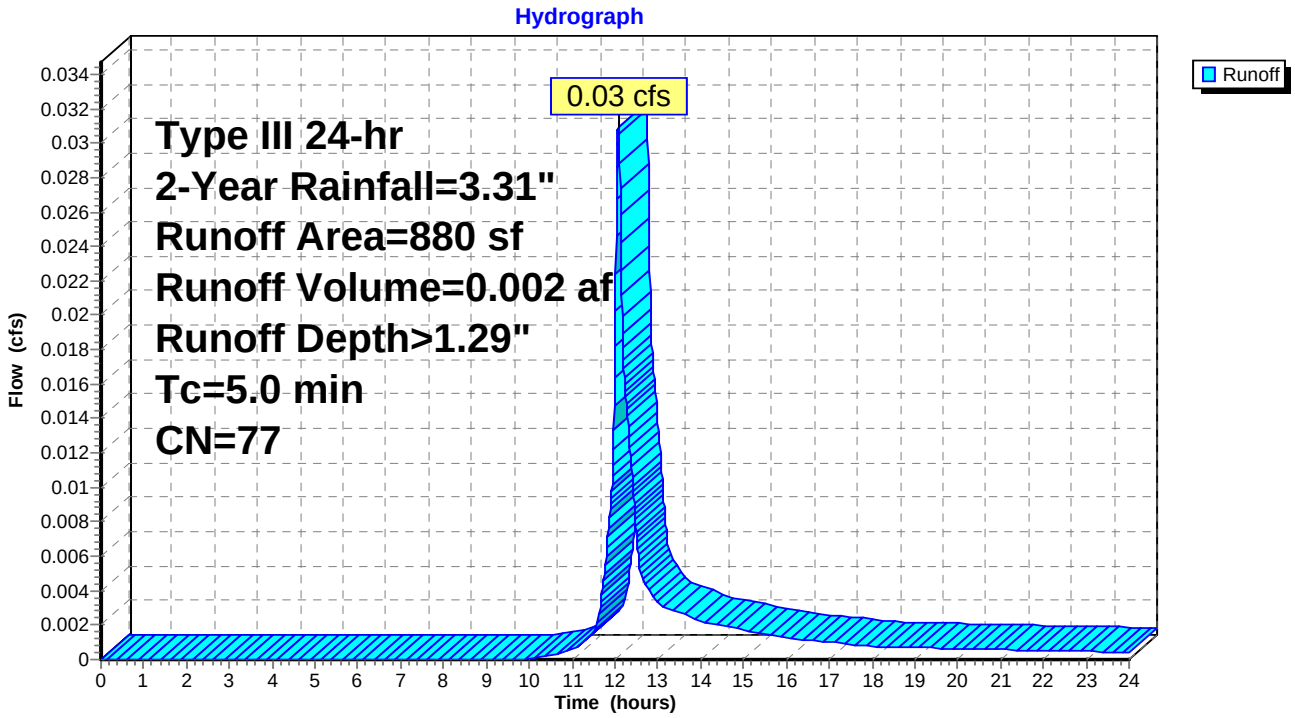
Runoff = 0.03 cfs @ 12.08 hrs, Volume= 0.002 af, Depth> 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.31"

Area (sf)	CN	Description
473	74	>75% Grass cover, Good, HSG C
407	80	>75% Grass cover, Good, HSG D
880	77	Weighted Average
880		100.00% Pervious Area

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

Subcatchment P2: Directed West



Summary for Subcatchment RR3: Roof Runoff - Lot 3

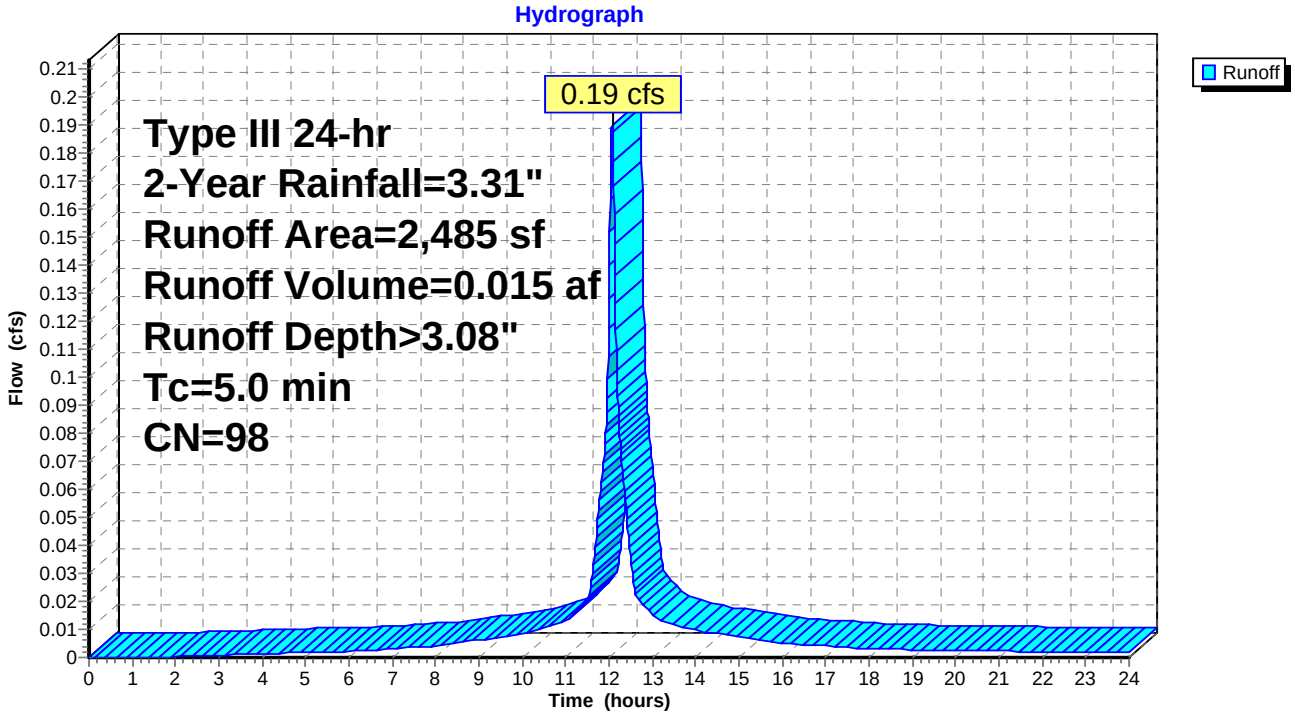
Runoff = 0.19 cfs @ 12.07 hrs, Volume= 0.015 af, Depth> 3.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.31"

	Area (sf)	CN	Description
*	2,485	98	Roof
	2,485		100.00% Impervious Area

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

Subcatchment RR3: Roof Runoff - Lot 3



Summary for Subcatchment RR4: Roof Runoff - Lot 4

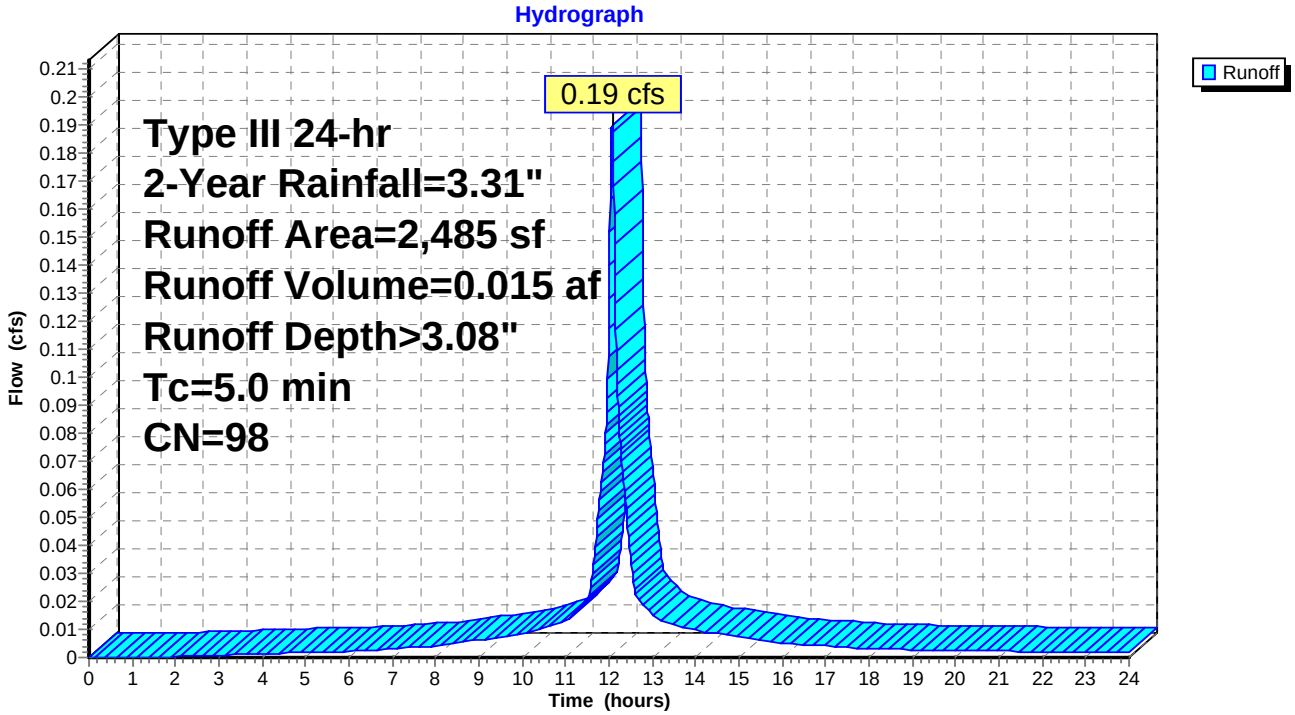
Runoff = 0.19 cfs @ 12.07 hrs, Volume= 0.015 af, Depth> 3.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.31"

	Area (sf)	CN	Description
*	2,485	98	Roof
	2,485		100.00% Impervious Area

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

Subcatchment RR4: Roof Runoff - Lot 4

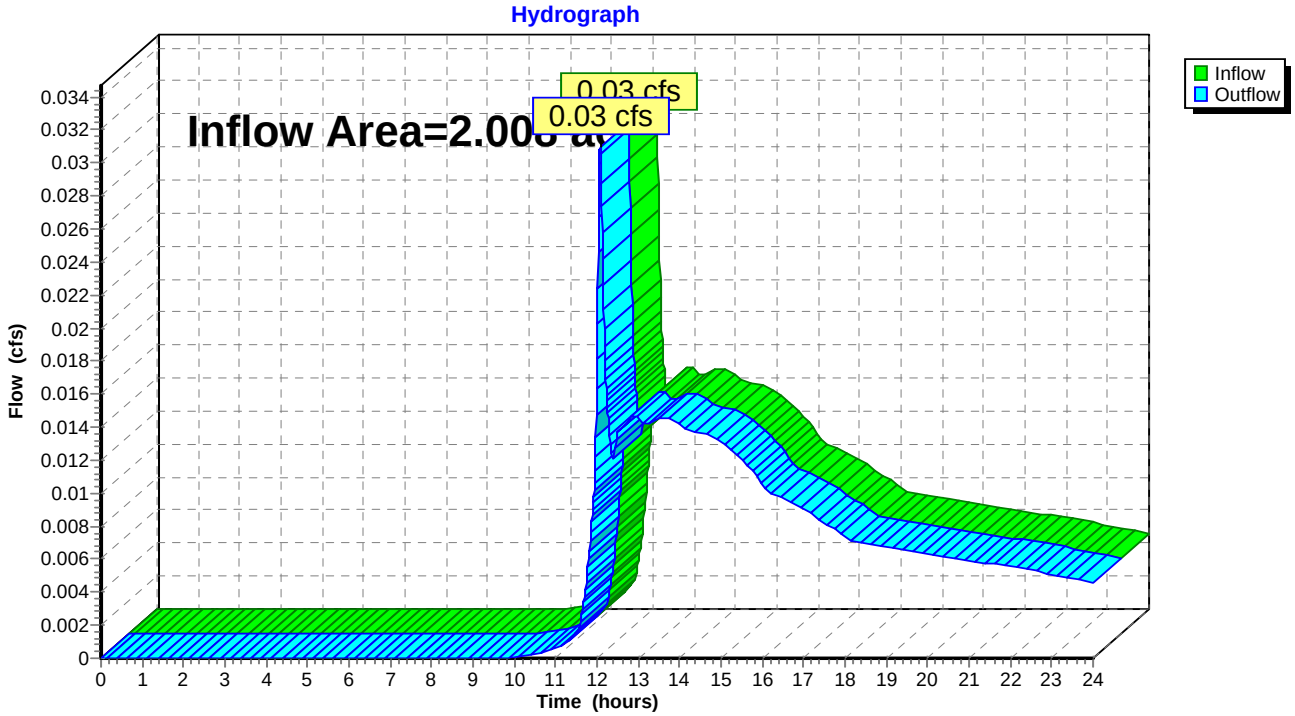


Summary for Reach P: Total

Inflow Area = 2.008 ac, 27.37% Impervious, Inflow Depth > 0.06" for 2-Year event
Inflow = 0.03 cfs @ 12.08 hrs, Volume= 0.009 af
Outflow = 0.03 cfs @ 12.08 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach P: Total

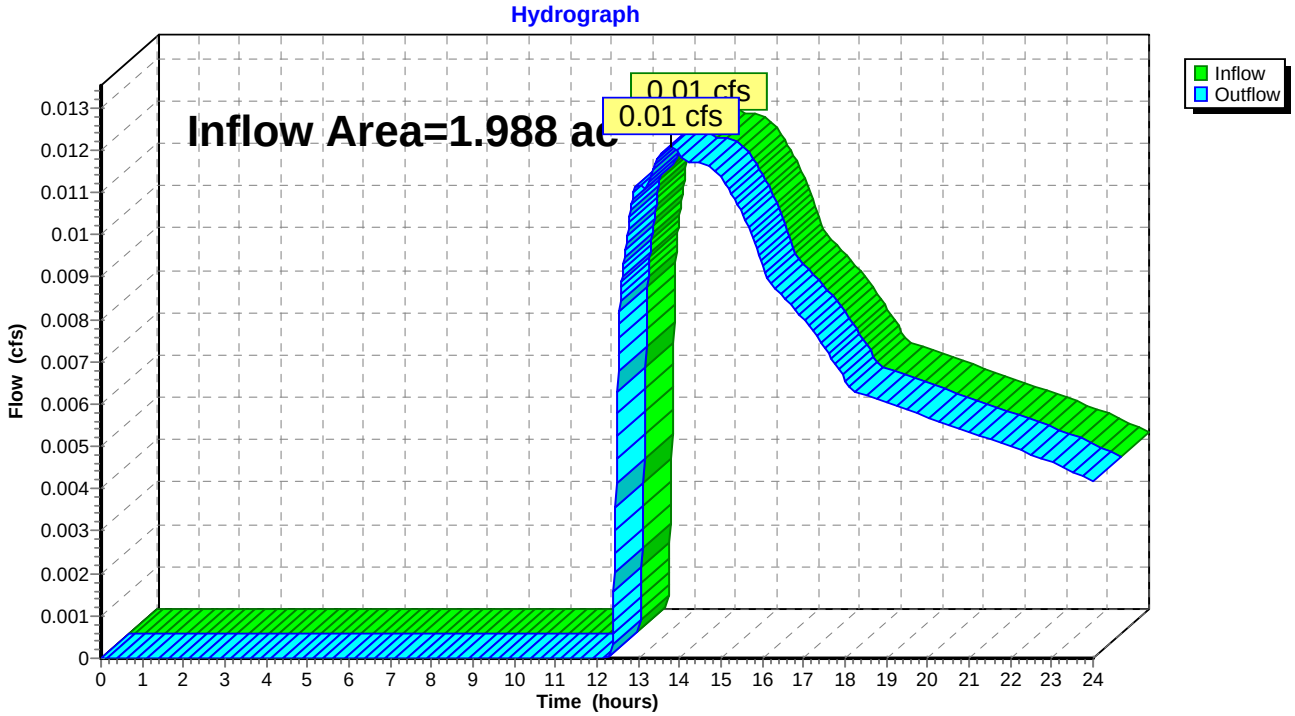


Summary for Reach R1: Reach 1

Inflow Area = 1.988 ac, 27.65% Impervious, Inflow Depth > 0.04" for 2-Year event
Inflow = 0.01 cfs @ 13.79 hrs, Volume= 0.007 af
Outflow = 0.01 cfs @ 13.79 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach R1: Reach 1

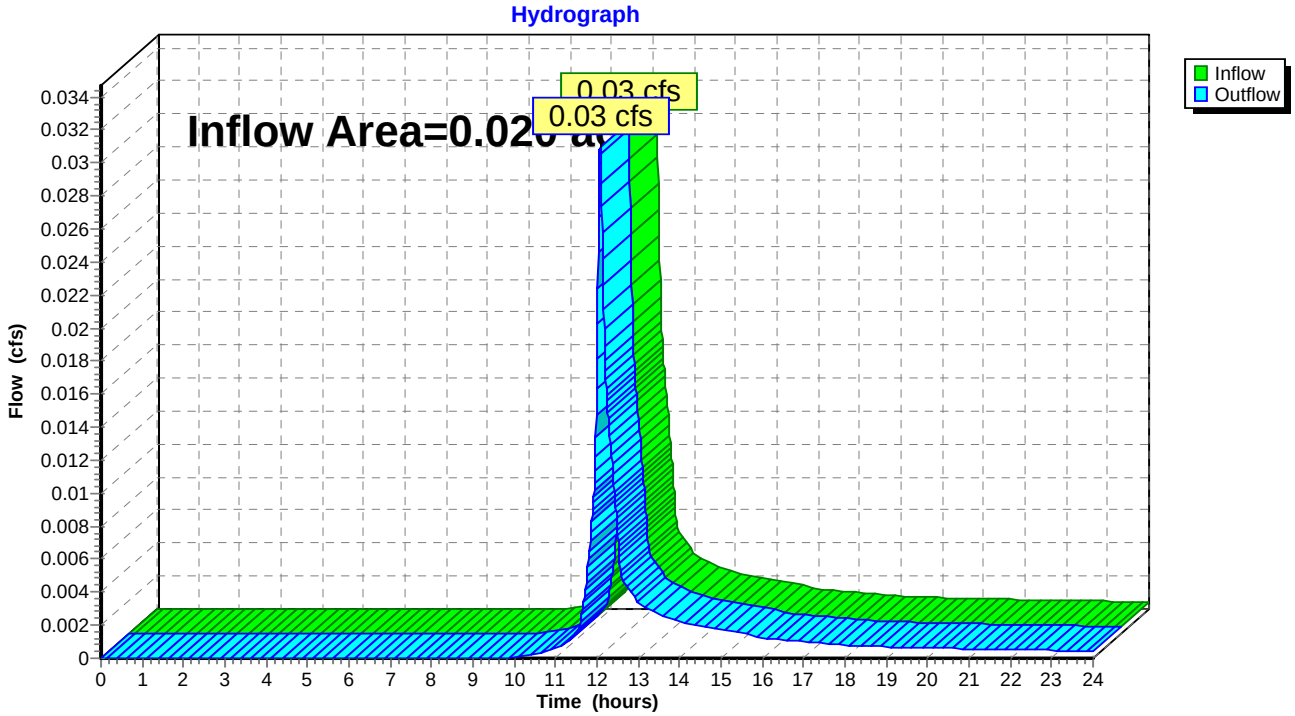


Summary for Reach R2: Reach 2

Inflow Area = 0.020 ac, 0.00% Impervious, Inflow Depth > 1.29" for 2-Year event
Inflow = 0.03 cfs @ 12.08 hrs, Volume= 0.002 af
Outflow = 0.03 cfs @ 12.08 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach R2: Reach 2



Summary for Pond Lot 3: Roof Recharge

Inflow Area = 0.057 ac,100.00% Impervious, Inflow Depth > 3.08" for 2-Year event
Inflow = 0.19 cfs @ 12.07 hrs, Volume= 0.015 af
Outflow = 0.02 cfs @ 11.44 hrs, Volume= 0.015 af, Atten= 91%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.44 hrs, Volume= 0.015 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 104.13' @ 12.84 hrs Surf.Area= 0.007 ac Storage= 0.005 af

Plug-Flow detention time= 85.1 min calculated for 0.015 af (100% of inflow)
Center-of-Mass det. time= 84.4 min (838.7 - 754.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	103.00'	0.007 af	**30.50'W x 10.50'L x 3.54'H Field A** 0.026 af Overall - 0.009 af Embedded = 0.017 af x 40.0% Voids
#2A	103.50'	0.009 af	**Cultec R-330XLHD** x 6 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 6 rows
		0.016 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	108.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 11.44 hrs HW=103.05' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.00' (Free Discharge)
↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond Lot 3: Roof Recharge - 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 6 rows

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

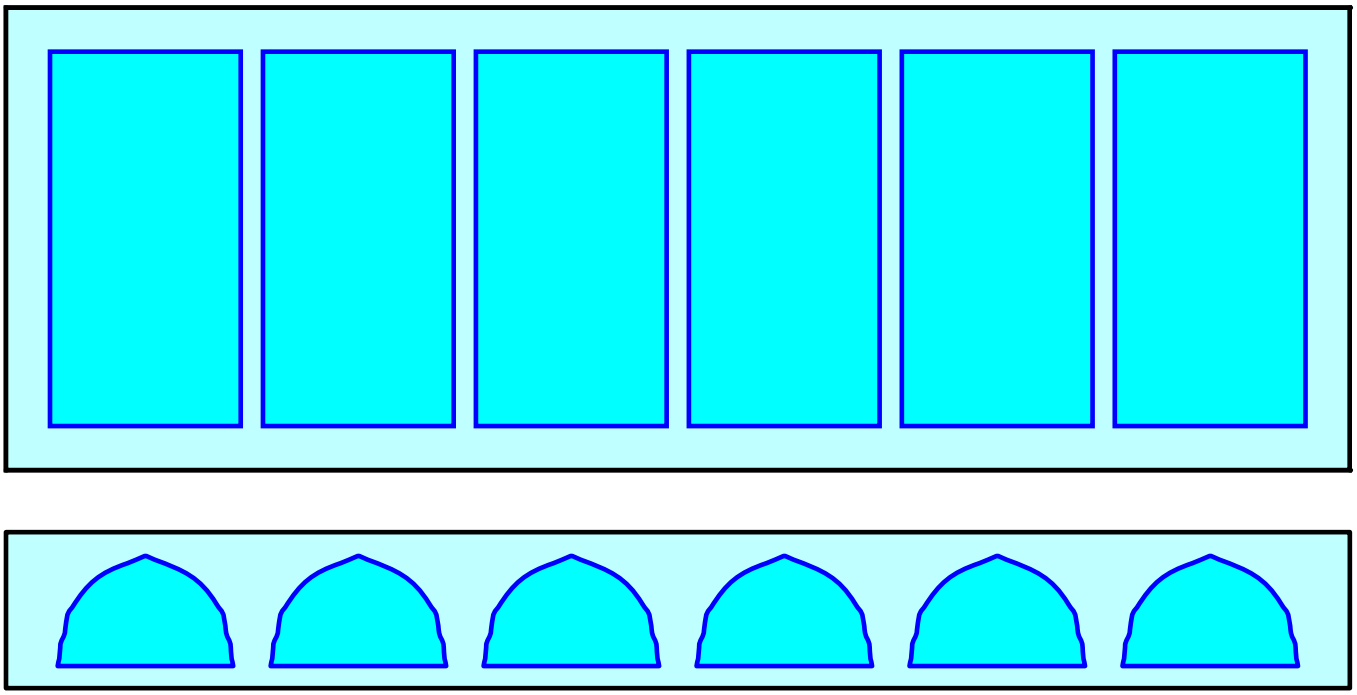
1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +12.0" End Stone x 2 = 10.50' Base Length
6 Rows x 52.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.50' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

6 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 6 Rows = 380.0 cf Chamber Storage

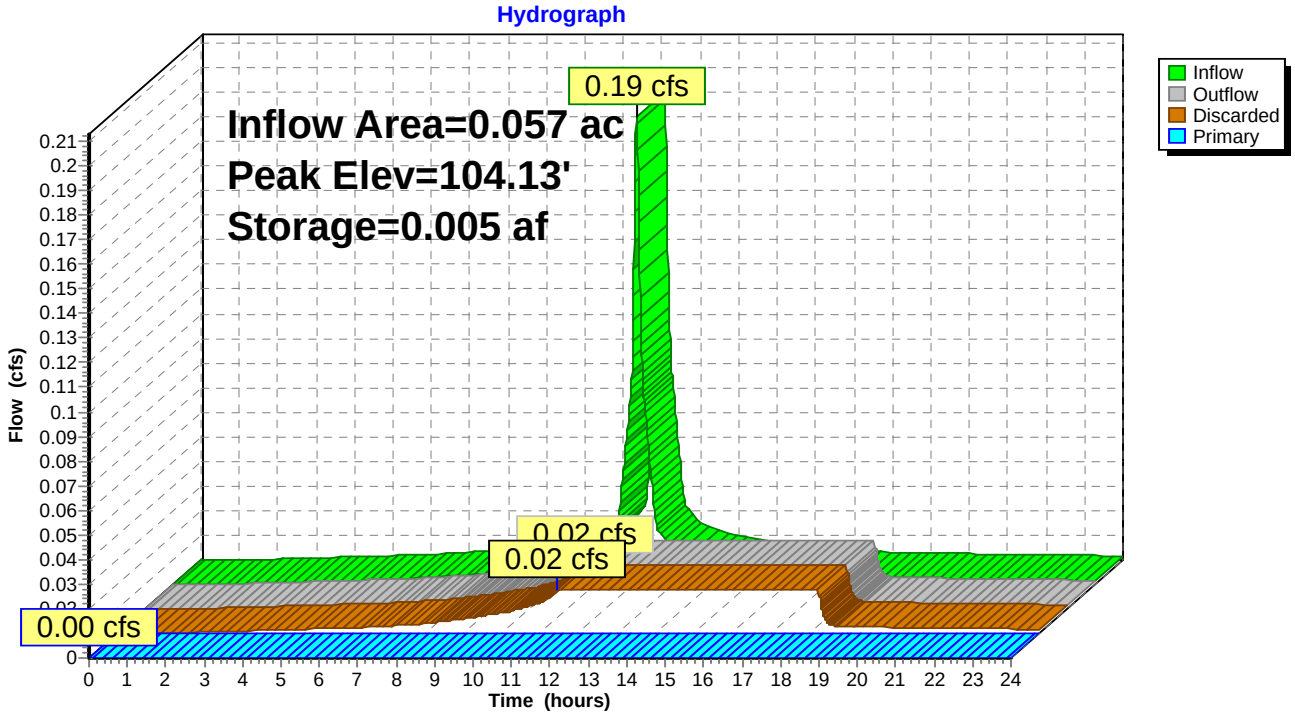
1,134.2 cf Field - 380.0 cf Chambers = 754.2 cf Stone x 40.0% Voids = 301.7 cf Stone Storage

Chamber Storage + Stone Storage = 681.7 cf = 0.016 af
Overall Storage Efficiency = 60.1%
Overall System Size = 10.50' x 30.50' x 3.54'

6 Chambers
42.0 cy Field
27.9 cy Stone



Pond Lot 3: Roof Recharge



Summary for Pond Lot 4: Roof Recharge

Inflow Area = 0.057 ac,100.00% Impervious, Inflow Depth > 3.08" for 2-Year event
Inflow = 0.19 cfs @ 12.07 hrs, Volume= 0.015 af
Outflow = 0.02 cfs @ 11.44 hrs, Volume= 0.015 af, Atten= 91%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.44 hrs, Volume= 0.015 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 104.13' @ 12.84 hrs Surf.Area= 0.007 ac Storage= 0.005 af

Plug-Flow detention time= 85.1 min calculated for 0.015 af (100% of inflow)
Center-of-Mass det. time= 84.4 min (838.7 - 754.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	103.00'	0.007 af	**30.50'W x 10.50'L x 3.54'H Field A** 0.026 af Overall - 0.009 af Embedded = 0.017 af x 40.0% Voids
#2A	103.50'	0.009 af	**Cultec R-330XLHD** x 6 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 6 rows
		0.016 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	108.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 11.44 hrs HW=103.05' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.00' (Free Discharge)
↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond Lot 4: Roof Recharge - 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 6 rows

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

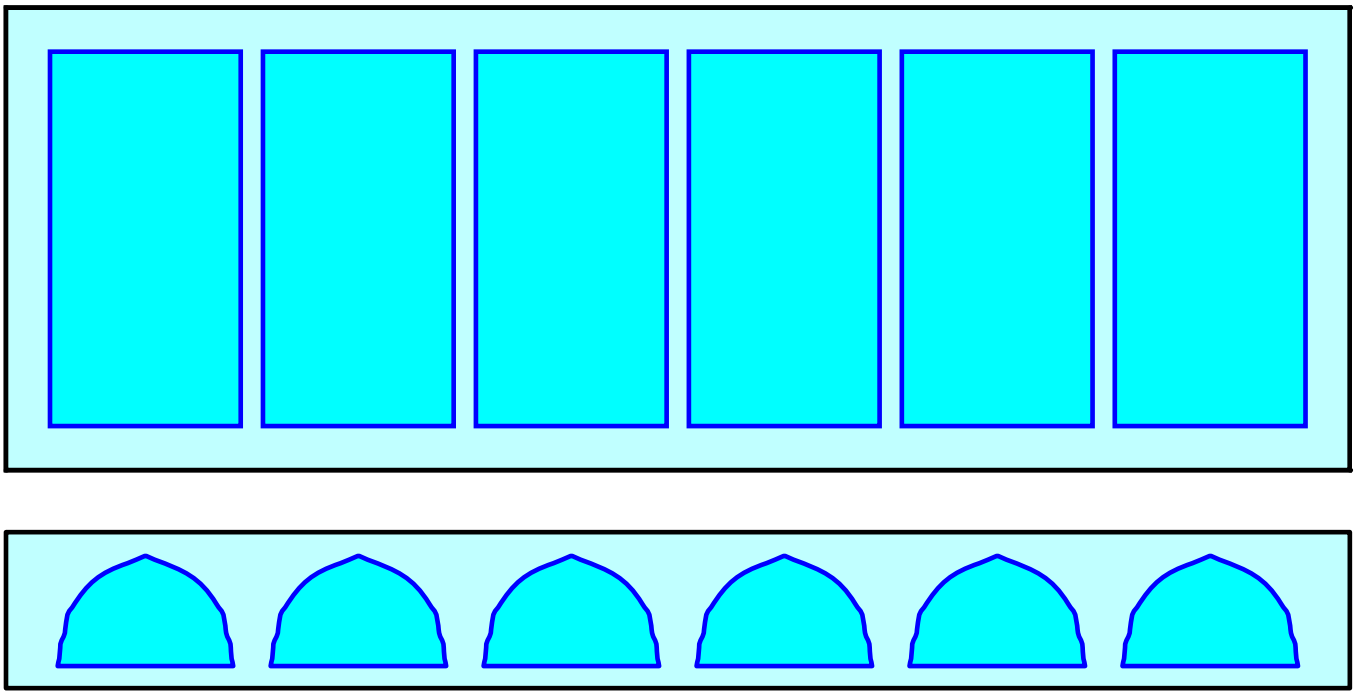
1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +12.0" End Stone x 2 = 10.50' Base Length
6 Rows x 52.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.50' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

6 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 6 Rows = 380.0 cf Chamber Storage

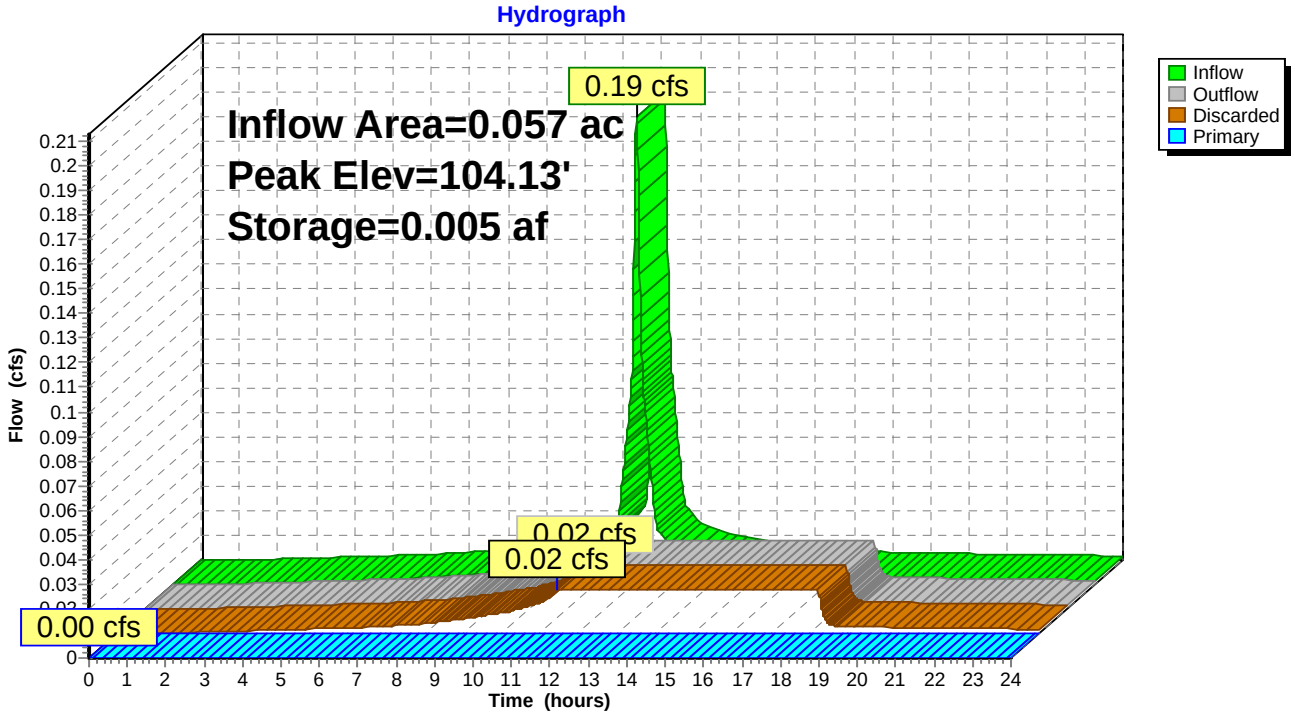
1,134.2 cf Field - 380.0 cf Chambers = 754.2 cf Stone x 40.0% Voids = 301.7 cf Stone Storage

Chamber Storage + Stone Storage = 681.7 cf = 0.016 af
Overall Storage Efficiency = 60.1%
Overall System Size = 10.50' x 30.50' x 3.54'

6 Chambers
42.0 cy Field
27.9 cy Stone



Pond Lot 4: Roof Recharge



Summary for Pond PR1: Recharge 1

Inflow Area = 1.077 ac, 34.35% Impervious, Inflow Depth > 1.55" for 2-Year event
Inflow = 1.63 cfs @ 12.16 hrs, Volume= 0.139 af
Outflow = 0.22 cfs @ 11.81 hrs, Volume= 0.139 af, Atten= 87%, Lag= 0.0 min
Discarded = 0.22 cfs @ 11.81 hrs, Volume= 0.139 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 103.92' @ 13.04 hrs Surf.Area= 0.089 ac Storage= 0.050 af

Plug-Flow detention time= 84.3 min calculated for 0.139 af (100% of inflow)
Center-of-Mass det. time= 83.4 min (924.8 - 841.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	103.00'	0.075 af	**74.00'W x 52.50'L x 3.54'H Field A** 0.316 af Overall - 0.130 af Embedded = 0.186 af x 40.0% Voids
#2A	103.50'	0.130 af	**Cultec R-330XLHD** x 105 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 15 rows
		0.204 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	108.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.22 cfs @ 11.81 hrs HW=103.05' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.00' (Free Discharge)
↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond PR1: Recharge 1 - 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 15 rows

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

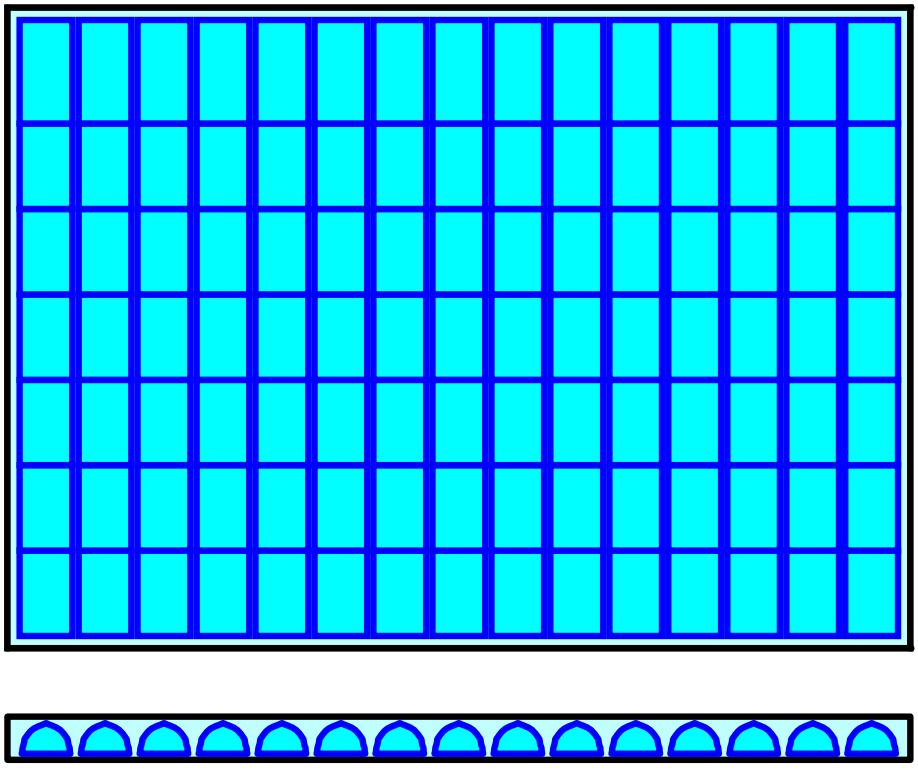
7 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 50.50' Row Length +12.0" End Stone x 2 = 52.50' Base Length
15 Rows x 52.0" Wide + 6.0" Spacing x 14 + 12.0" Side Stone x 2 = 74.00' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

105 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 15 Rows = 5,644.1 cf Chamber Storage

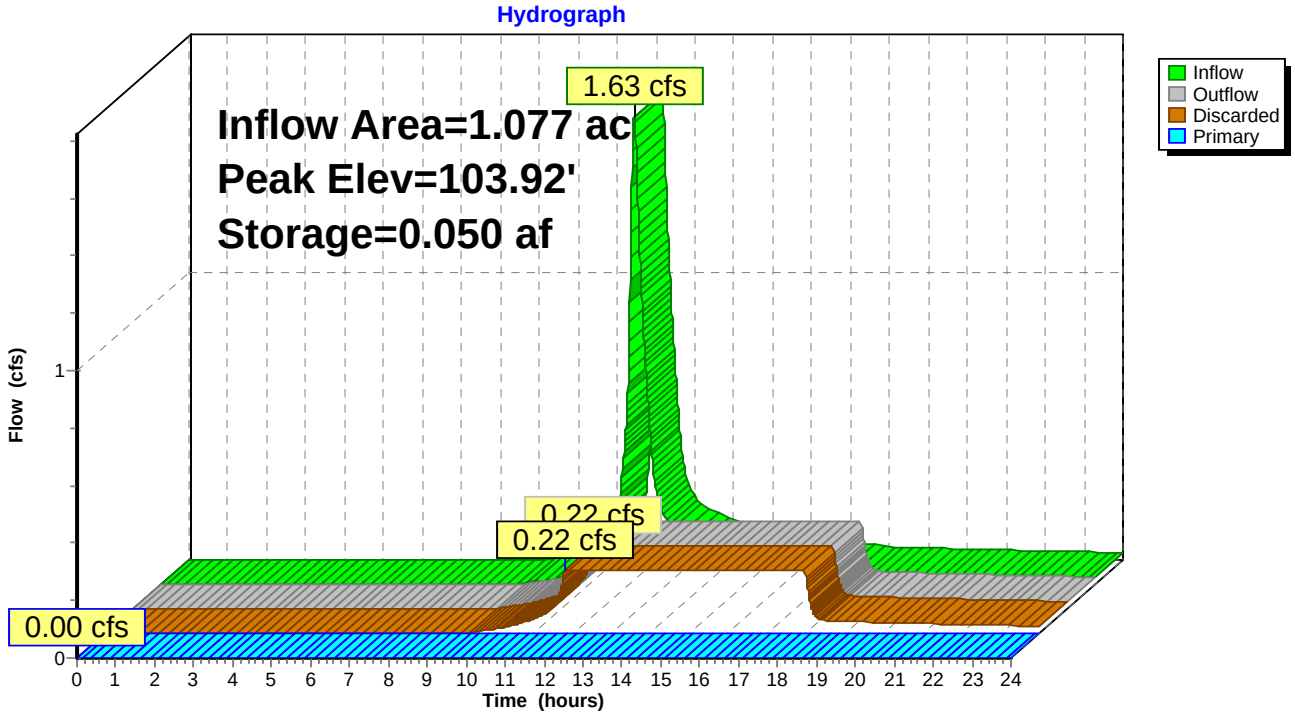
13,759.4 cf Field - 5,644.1 cf Chambers = 8,115.2 cf Stone x 40.0% Voids = 3,246.1 cf Stone Storage

Chamber Storage + Stone Storage = 8,890.2 cf = 0.204 af
Overall Storage Efficiency = 64.6%
Overall System Size = 52.50' x 74.00' x 3.54'

105 Chambers
509.6 cy Field
300.6 cy Stone



Pond PR1: Recharge 1



Summary for Subcatchment P1A: Directed East

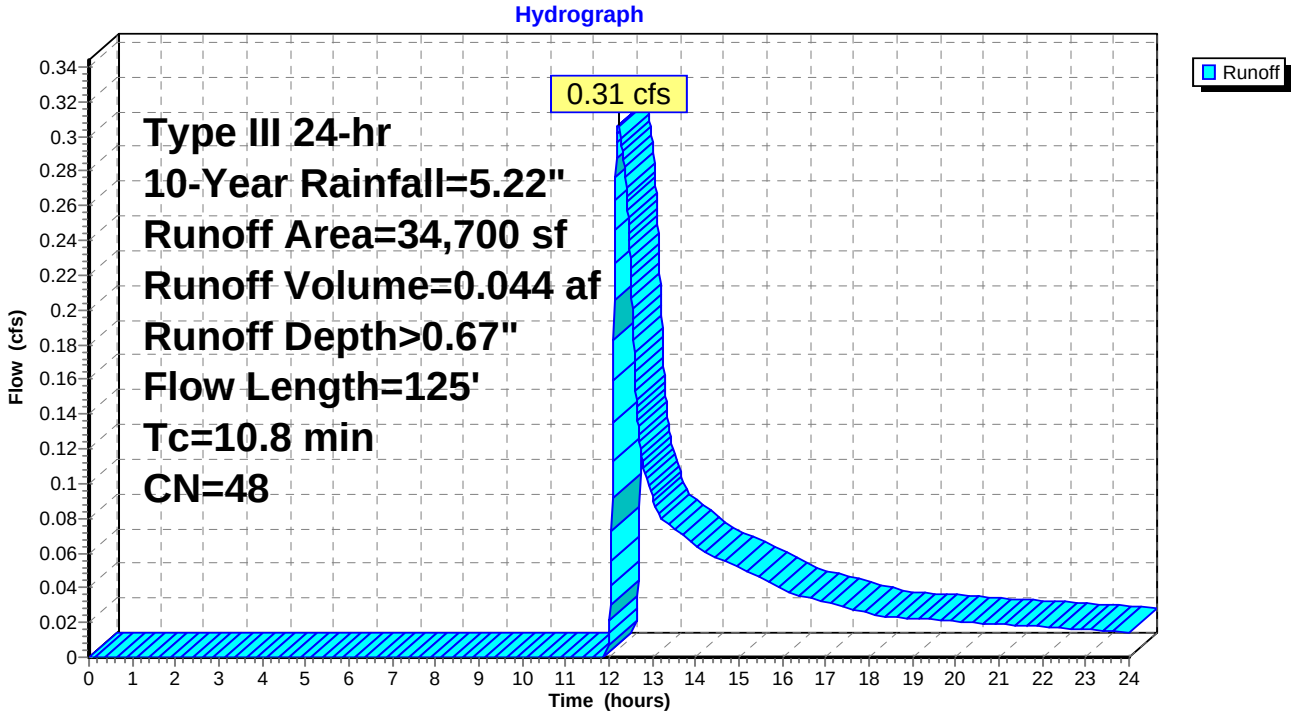
Runoff = 0.31 cfs @ 12.22 hrs, Volume= 0.044 af, Depth> 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.22"

	Area (sf)	CN	Description
*	2,854	98	Impervious
	14,380	39	>75% Grass cover, Good, HSG A
	11,288	30	Woods, Good, HSG A
	3,734	74	>75% Grass cover, Good, HSG C
	111	70	Woods, Good, HSG C
	2,333	80	>75% Grass cover, Good, HSG D
	34,700	48	Weighted Average
	31,846		91.78% Pervious Area
	2,854		8.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	50	0.1400	0.08		**Sheet Flow, Sheet Flow Woods** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.8	75	0.1067	1.63		**Shallow Concentrated Flow, Concentrated Woods** Woodland Kv= 5.0 fps
10.8	125	Total			

Subcatchment P1A: Directed East



Summary for Subcatchment P1B: To Recharge 1

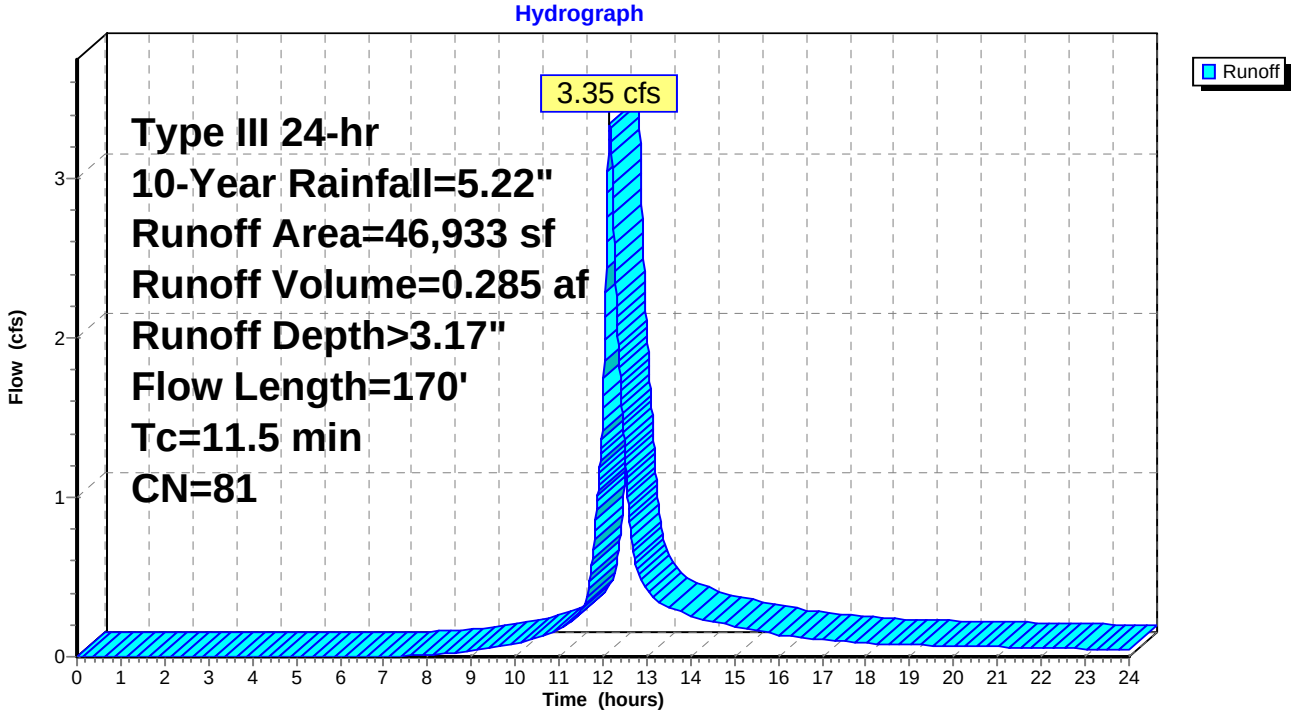
Runoff = 3.35 cfs @ 12.16 hrs, Volume= 0.285 af, Depth> 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.22"

	Area (sf)	CN	Description
*	16,120	98	Impervious
	989	39	>75% Grass cover, Good, HSG A
	21,312	74	>75% Grass cover, Good, HSG C
	8,215	70	Woods, Good, HSG C
	297	80	>75% Grass cover, Good, HSG D
	46,933	81	Weighted Average
	30,813		65.65% Pervious Area
	16,120		34.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	50	0.1400	0.08		**Sheet Flow, Wood Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 3.10"
1.5	120	0.0750	1.37		**Shallow Concentrated Flow, Woods Concentrated Flow** Woodland Kv= 5.0 fps
11.5	170	Total			

Subcatchment P1B: To Recharge 1



Summary for Subcatchment P2: Directed West

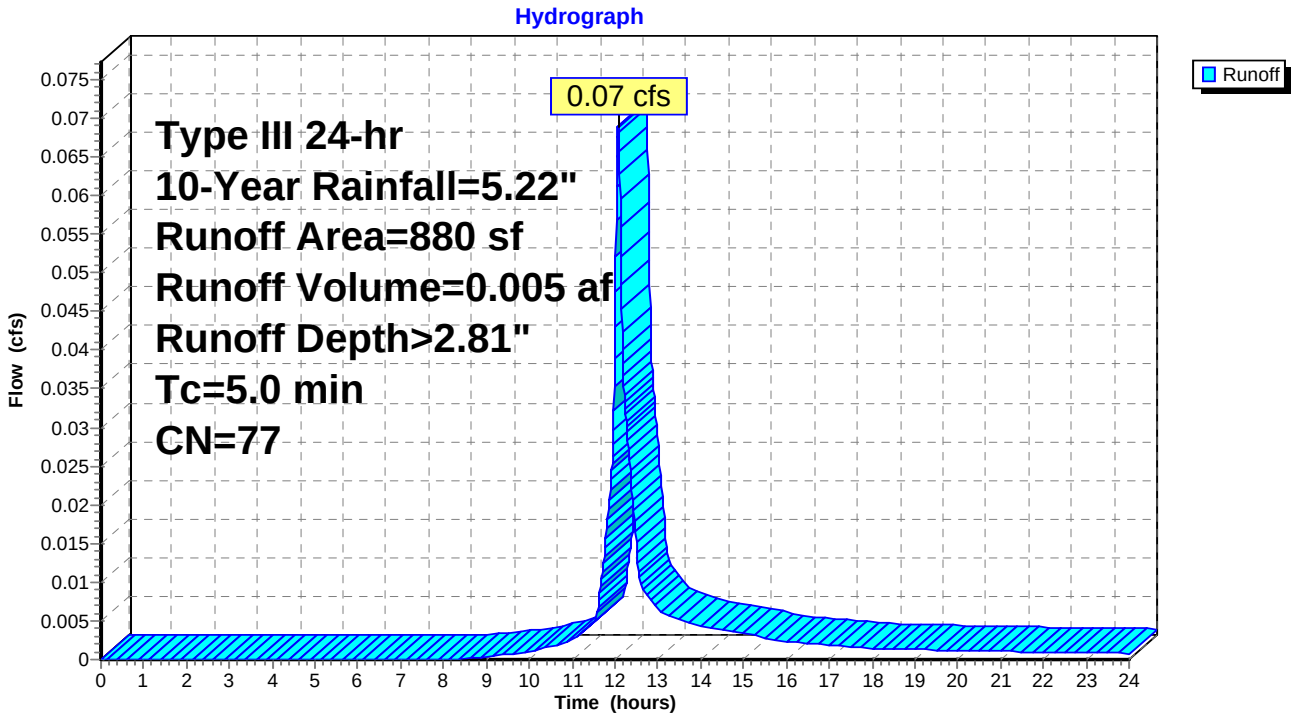
Runoff = 0.07 cfs @ 12.08 hrs, Volume= 0.005 af, Depth> 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.22"

Area (sf)	CN	Description
473	74	>75% Grass cover, Good, HSG C
407	80	>75% Grass cover, Good, HSG D
880	77	Weighted Average
880		100.00% Pervious Area

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

Subcatchment P2: Directed West



Summary for Subcatchment RR3: Roof Runoff - Lot 3

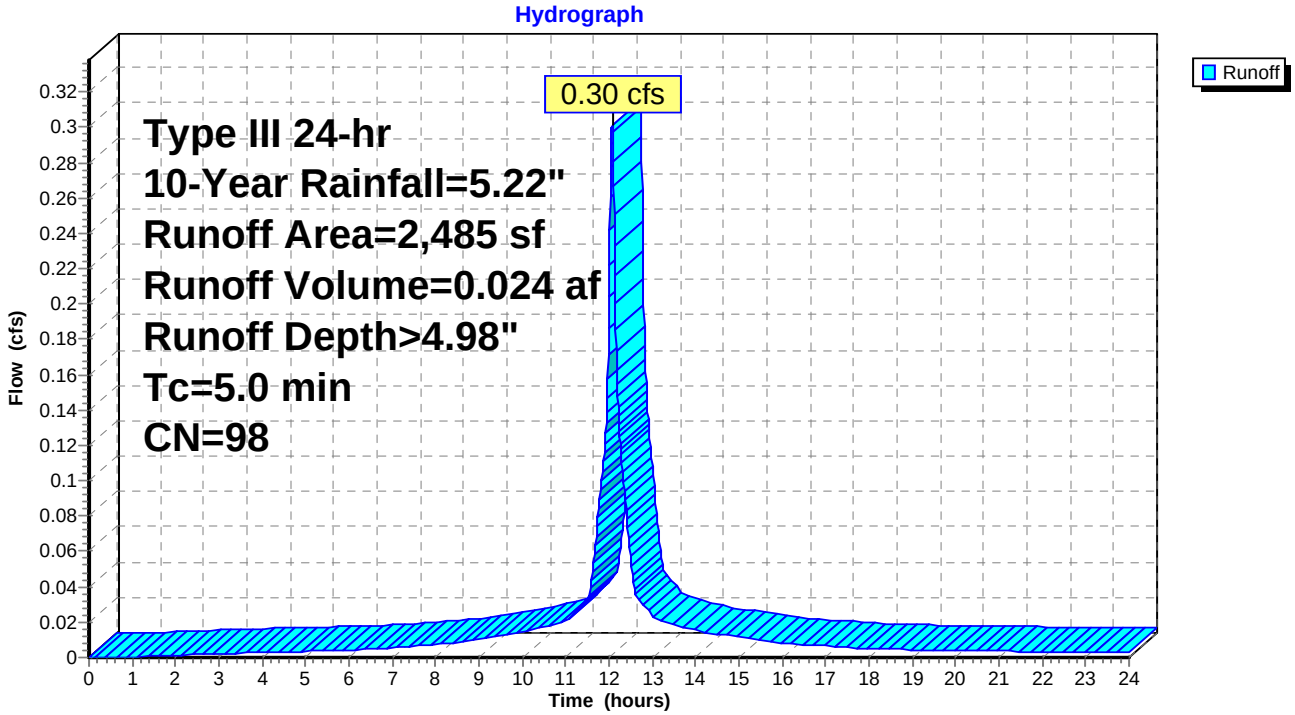
Runoff = 0.30 cfs @ 12.07 hrs, Volume= 0.024 af, Depth> 4.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.22"

	Area (sf)	CN	Description
*	2,485	98	Roof
	2,485		100.00% Impervious Area

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

Subcatchment RR3: Roof Runoff - Lot 3



Summary for Subcatchment RR4: Roof Runoff - Lot 4

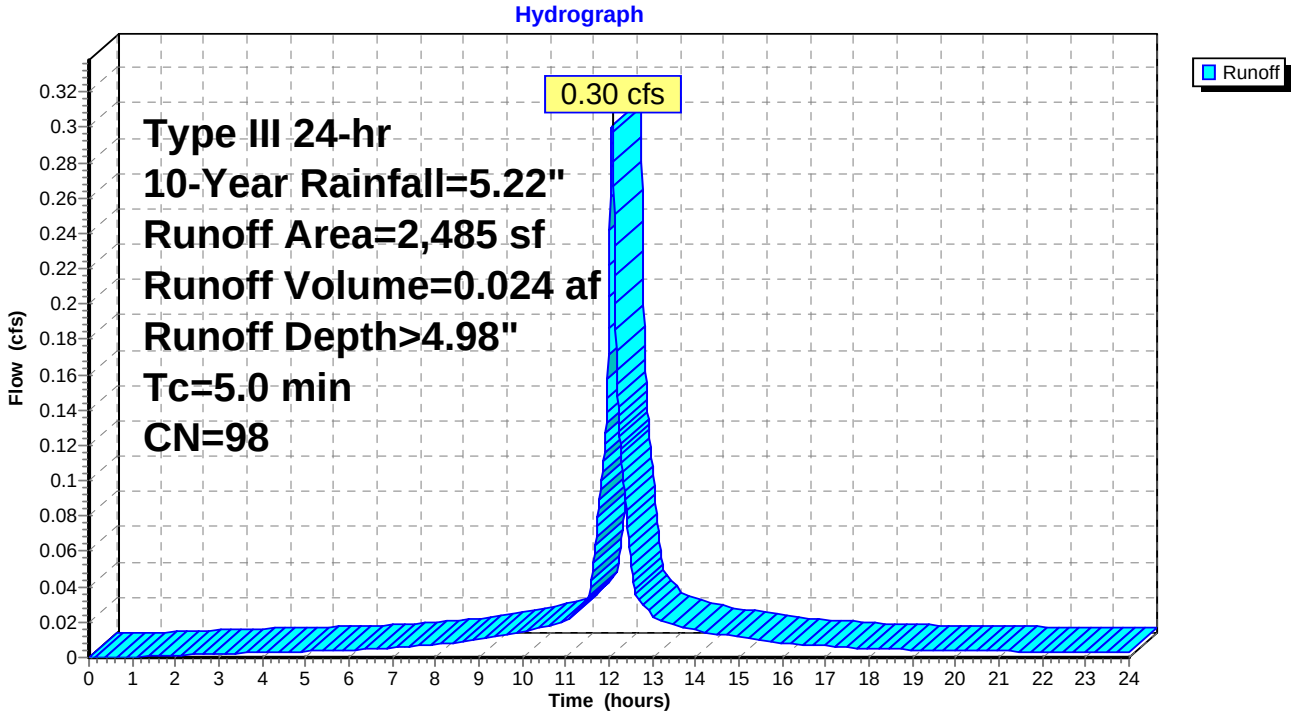
Runoff = 0.30 cfs @ 12.07 hrs, Volume= 0.024 af, Depth> 4.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.22"

	Area (sf)	CN	Description
*	2,485	98	Roof
	2,485		100.00% Impervious Area

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

Subcatchment RR4: Roof Runoff - Lot 4

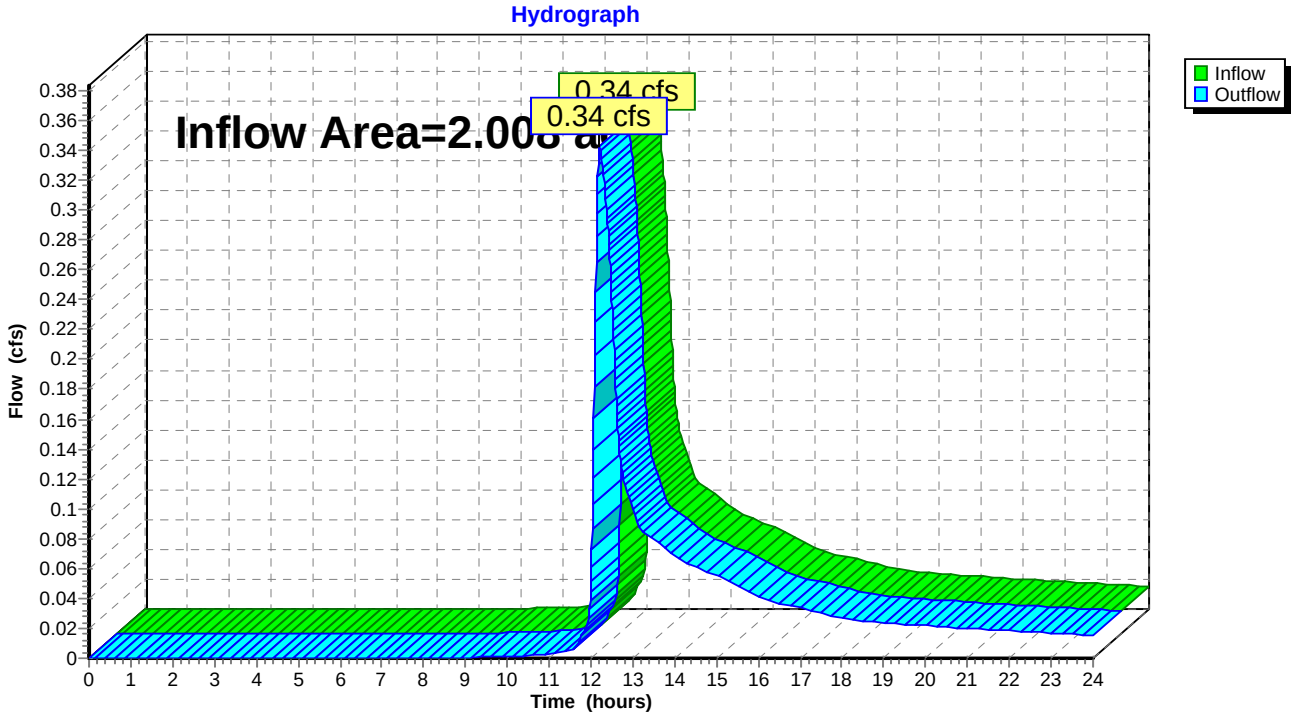


Summary for Reach P: Total

Inflow Area = 2.008 ac, 27.37% Impervious, Inflow Depth > 0.29" for 10-Year event
Inflow = 0.34 cfs @ 12.21 hrs, Volume= 0.049 af
Outflow = 0.34 cfs @ 12.21 hrs, Volume= 0.049 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach P: Total

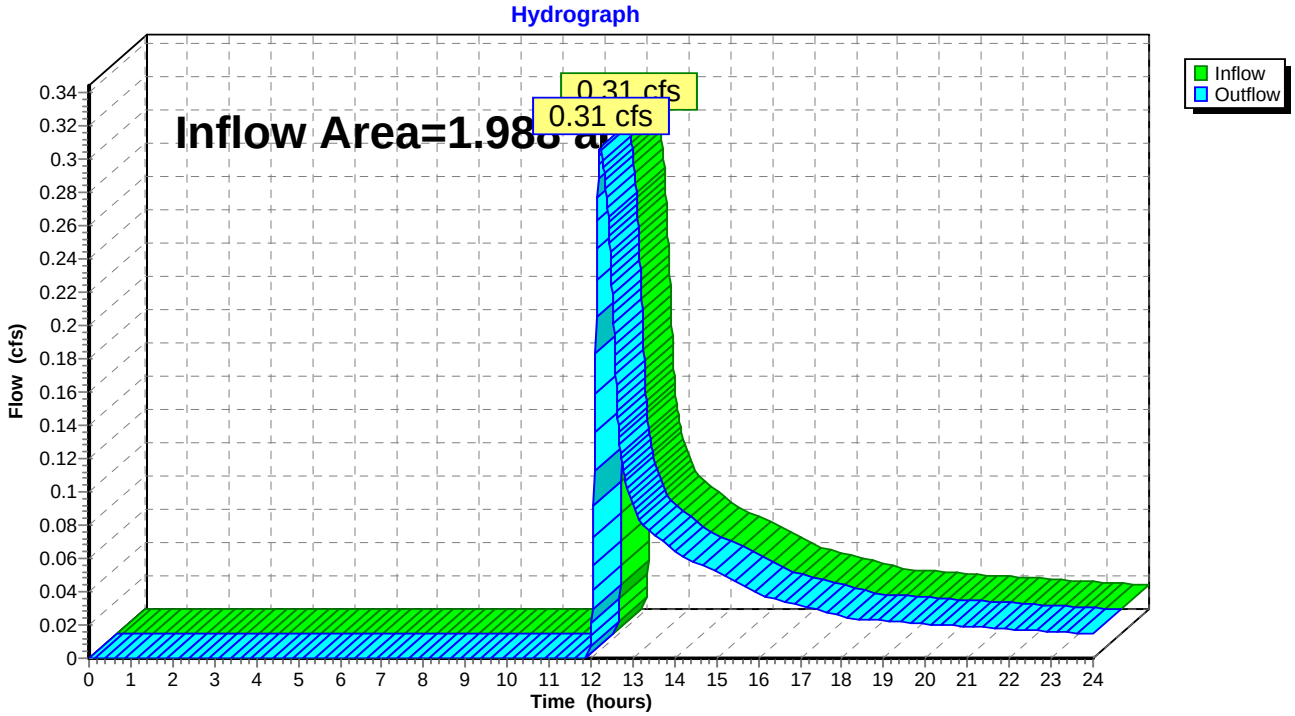


Summary for Reach R1: Reach 1

Inflow Area = 1.988 ac, 27.65% Impervious, Inflow Depth > 0.27" for 10-Year event
Inflow = 0.31 cfs @ 12.22 hrs, Volume= 0.044 af
Outflow = 0.31 cfs @ 12.22 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach R1: Reach 1

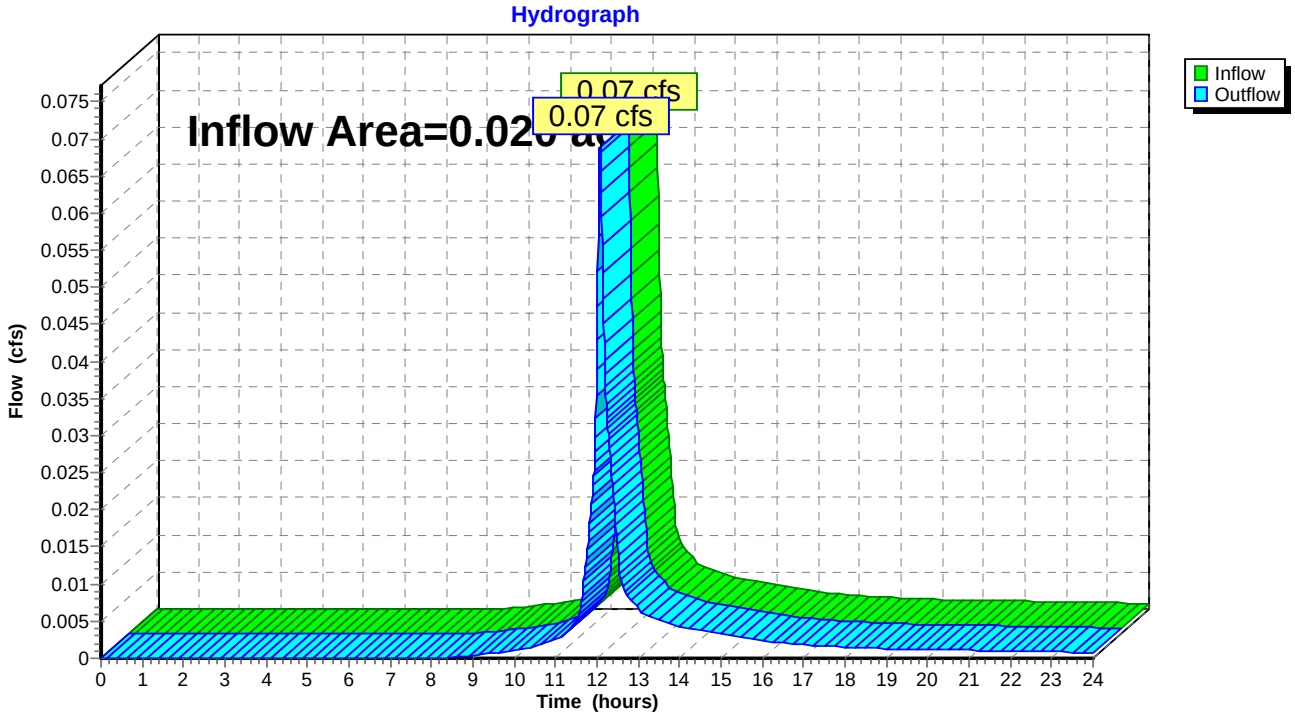


Summary for Reach R2: Reach 2

Inflow Area = 0.020 ac, 0.00% Impervious, Inflow Depth > 2.81" for 10-Year event
Inflow = 0.07 cfs @ 12.08 hrs, Volume= 0.005 af
Outflow = 0.07 cfs @ 12.08 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach R2: Reach 2



Summary for Pond Lot 3: Roof Recharge

Inflow Area = 0.057 ac,100.00% Impervious, Inflow Depth > 4.98" for 10-Year event
Inflow = 0.30 cfs @ 12.07 hrs, Volume= 0.024 af
Outflow = 0.02 cfs @ 10.68 hrs, Volume= 0.024 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.02 cfs @ 10.68 hrs, Volume= 0.024 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 104.99' @ 13.63 hrs Surf.Area= 0.007 ac Storage= 0.010 af

Plug-Flow detention time= 184.2 min calculated for 0.024 af (100% of inflow)
Center-of-Mass det. time= 183.5 min (929.4 - 745.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	103.00'	0.007 af	**30.50'W x 10.50'L x 3.54'H Field A** 0.026 af Overall - 0.009 af Embedded = 0.017 af x 40.0% Voids
#2A	103.50'	0.009 af	**Cultec R-330XLHD** x 6 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 6 rows
		0.016 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	108.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 10.68 hrs HW=103.05' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.00' (Free Discharge)
↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond Lot 3: Roof Recharge - 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 6 rows

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

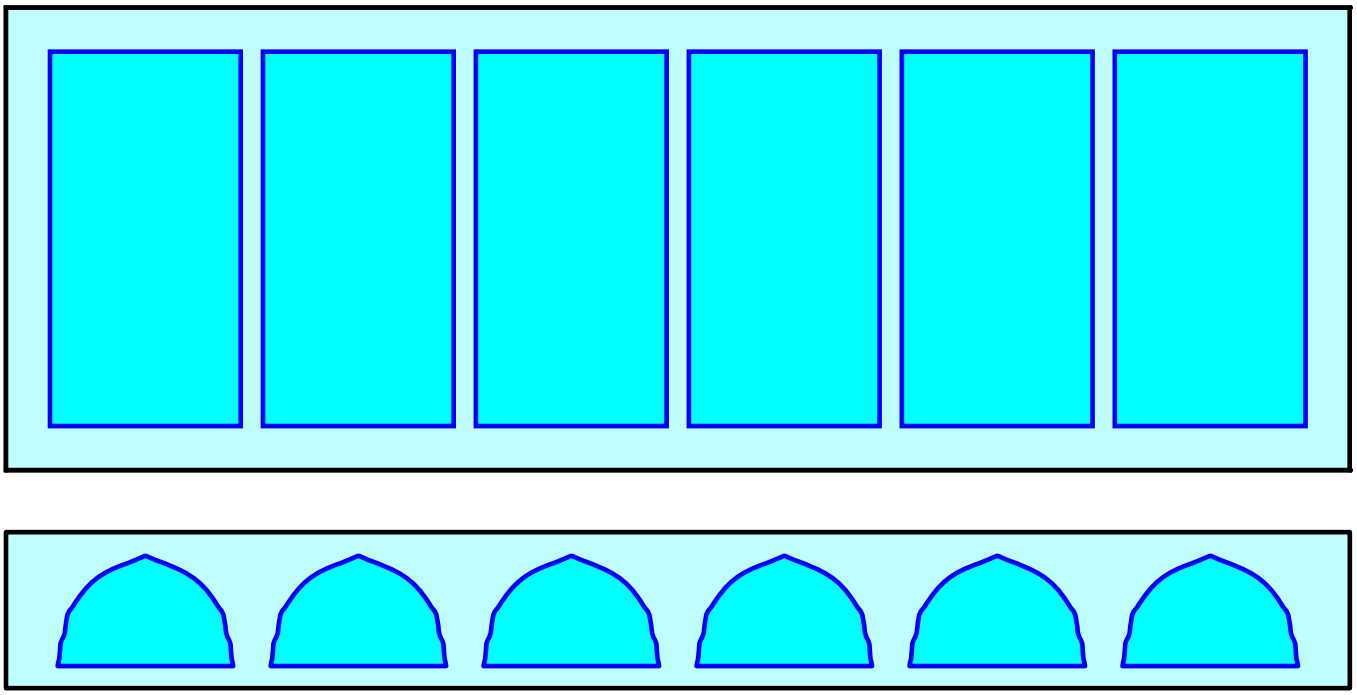
1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +12.0" End Stone x 2 = 10.50' Base Length
6 Rows x 52.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.50' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

6 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 6 Rows = 380.0 cf Chamber Storage

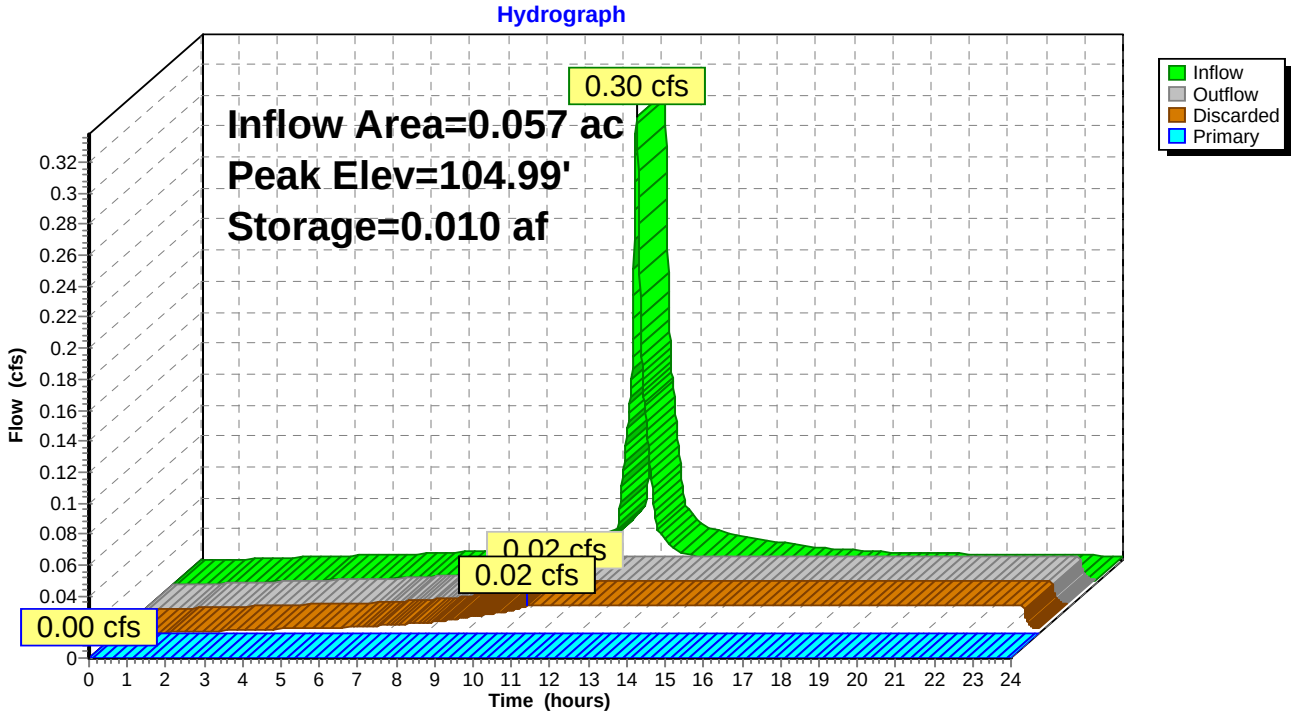
1,134.2 cf Field - 380.0 cf Chambers = 754.2 cf Stone x 40.0% Voids = 301.7 cf Stone Storage

Chamber Storage + Stone Storage = 681.7 cf = 0.016 af
Overall Storage Efficiency = 60.1%
Overall System Size = 10.50' x 30.50' x 3.54'

6 Chambers
42.0 cy Field
27.9 cy Stone



Pond Lot 3: Roof Recharge



Summary for Pond Lot 4: Roof Recharge

Inflow Area = 0.057 ac,100.00% Impervious, Inflow Depth > 4.98" for 10-Year event
Inflow = 0.30 cfs @ 12.07 hrs, Volume= 0.024 af
Outflow = 0.02 cfs @ 10.68 hrs, Volume= 0.024 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.02 cfs @ 10.68 hrs, Volume= 0.024 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 104.99' @ 13.63 hrs Surf.Area= 0.007 ac Storage= 0.010 af

Plug-Flow detention time= 184.2 min calculated for 0.024 af (100% of inflow)
Center-of-Mass det. time= 183.5 min (929.4 - 745.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	103.00'	0.007 af	**30.50'W x 10.50'L x 3.54'H Field A** 0.026 af Overall - 0.009 af Embedded = 0.017 af x 40.0% Voids
#2A	103.50'	0.009 af	**Cultec R-330XLHD** x 6 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 6 rows
		0.016 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	108.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 10.68 hrs HW=103.05' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.00' (Free Discharge)
↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond Lot 4: Roof Recharge - 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 6 rows

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

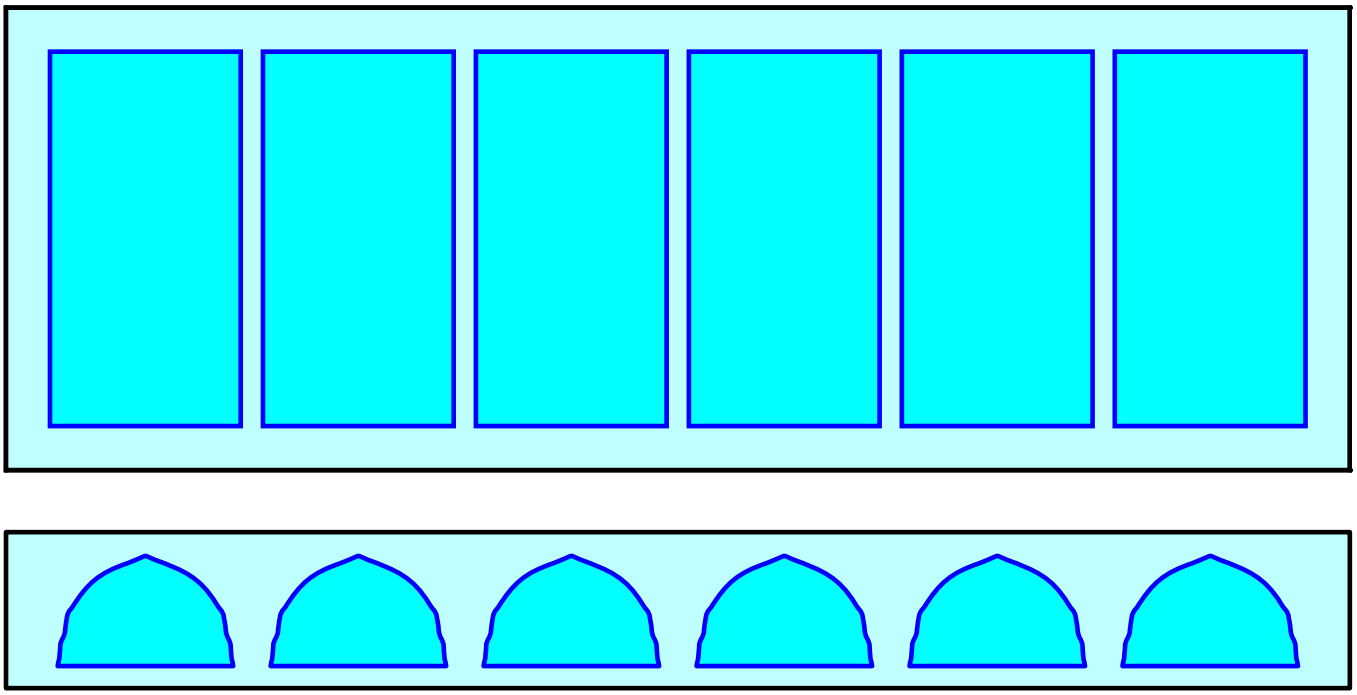
1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +12.0" End Stone x 2 = 10.50' Base Length
6 Rows x 52.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.50' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

6 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 6 Rows = 380.0 cf Chamber Storage

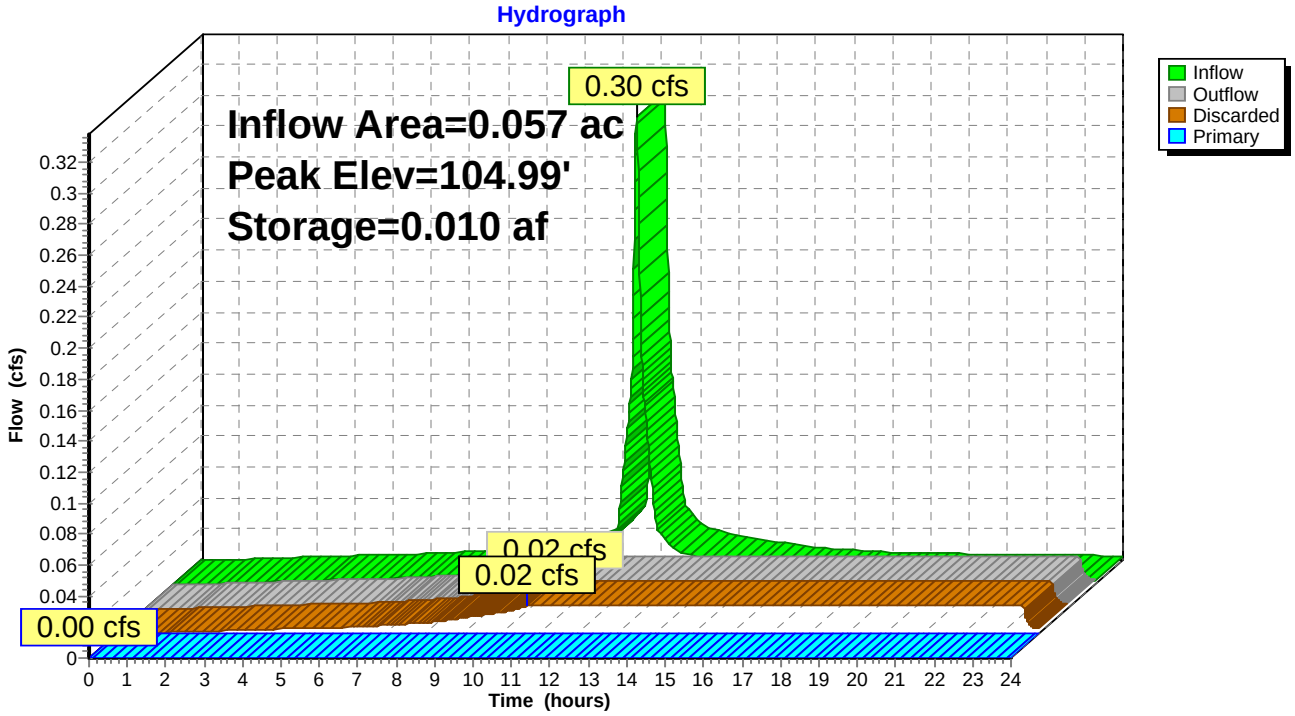
1,134.2 cf Field - 380.0 cf Chambers = 754.2 cf Stone x 40.0% Voids = 301.7 cf Stone Storage

Chamber Storage + Stone Storage = 681.7 cf = 0.016 af
Overall Storage Efficiency = 60.1%
Overall System Size = 10.50' x 30.50' x 3.54'

6 Chambers
42.0 cy Field
27.9 cy Stone



Pond Lot 4: Roof Recharge



Summary for Pond PR1: Recharge 1

Inflow Area = 1.077 ac, 34.35% Impervious, Inflow Depth > 3.17" for 10-Year event
Inflow = 3.35 cfs @ 12.16 hrs, Volume= 0.285 af
Outflow = 0.22 cfs @ 11.36 hrs, Volume= 0.248 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.22 cfs @ 11.36 hrs, Volume= 0.248 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 105.12' @ 14.56 hrs Surf.Area= 0.089 ac Storage= 0.137 af

Plug-Flow detention time= 260.0 min calculated for 0.248 af (87% of inflow)
Center-of-Mass det. time= 202.0 min (1,023.0 - 821.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	103.00'	0.075 af	**74.00'W x 52.50'L x 3.54'H Field A** 0.316 af Overall - 0.130 af Embedded = 0.186 af x 40.0% Voids
#2A	103.50'	0.130 af	**Cultec R-330XLHD** x 105 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 15 rows
		0.204 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	108.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.22 cfs @ 11.36 hrs HW=103.05' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.00' (Free Discharge)
↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond PR1: Recharge 1 - 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 15 rows

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

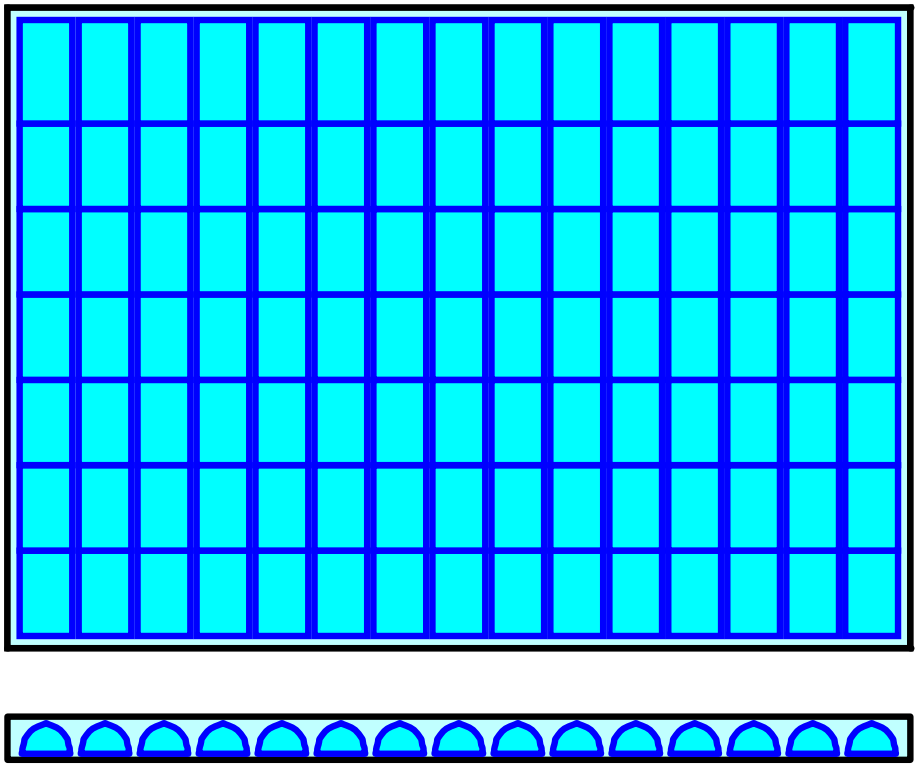
7 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 50.50' Row Length +12.0" End Stone x 2 = 52.50' Base Length
15 Rows x 52.0" Wide + 6.0" Spacing x 14 + 12.0" Side Stone x 2 = 74.00' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

105 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 15 Rows = 5,644.1 cf Chamber Storage

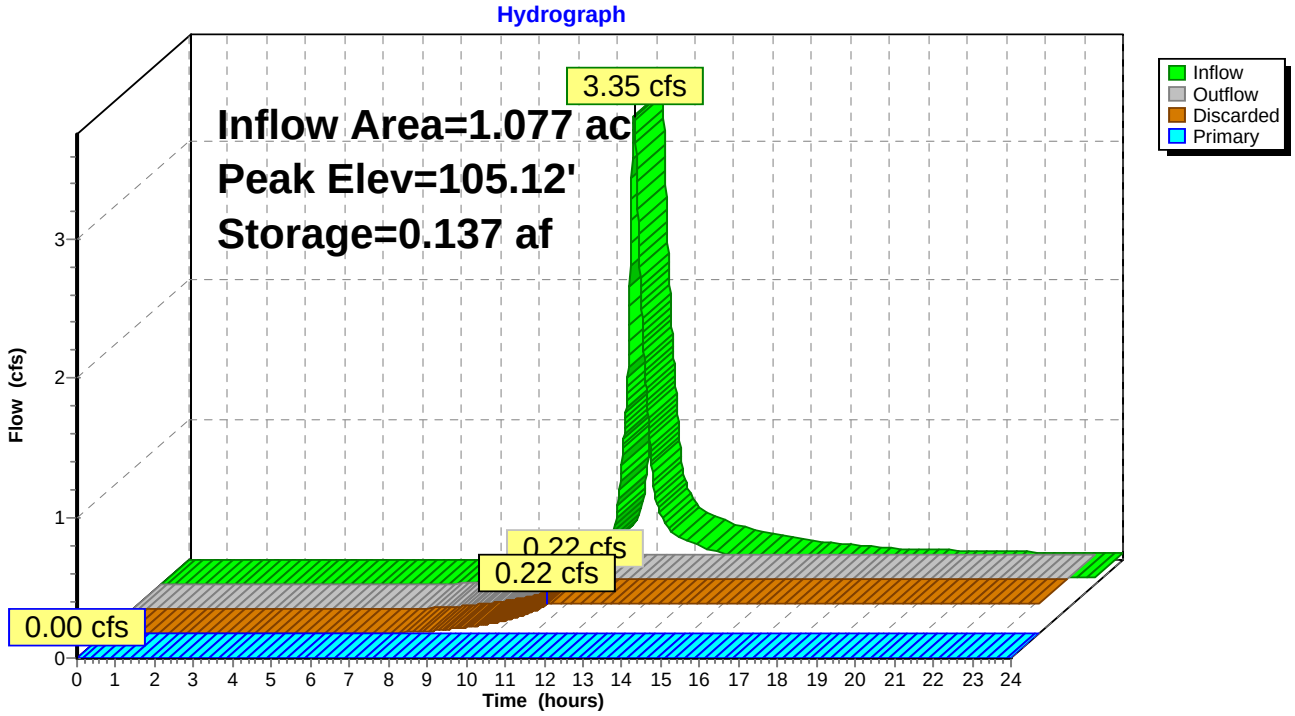
13,759.4 cf Field - 5,644.1 cf Chambers = 8,115.2 cf Stone x 40.0% Voids = 3,246.1 cf Stone Storage

Chamber Storage + Stone Storage = 8,890.2 cf = 0.204 af
Overall Storage Efficiency = 64.6%
Overall System Size = 52.50' x 74.00' x 3.54'

105 Chambers
509.6 cy Field
300.6 cy Stone



Pond PR1: Recharge 1



Summary for Subcatchment P1A: Directed East

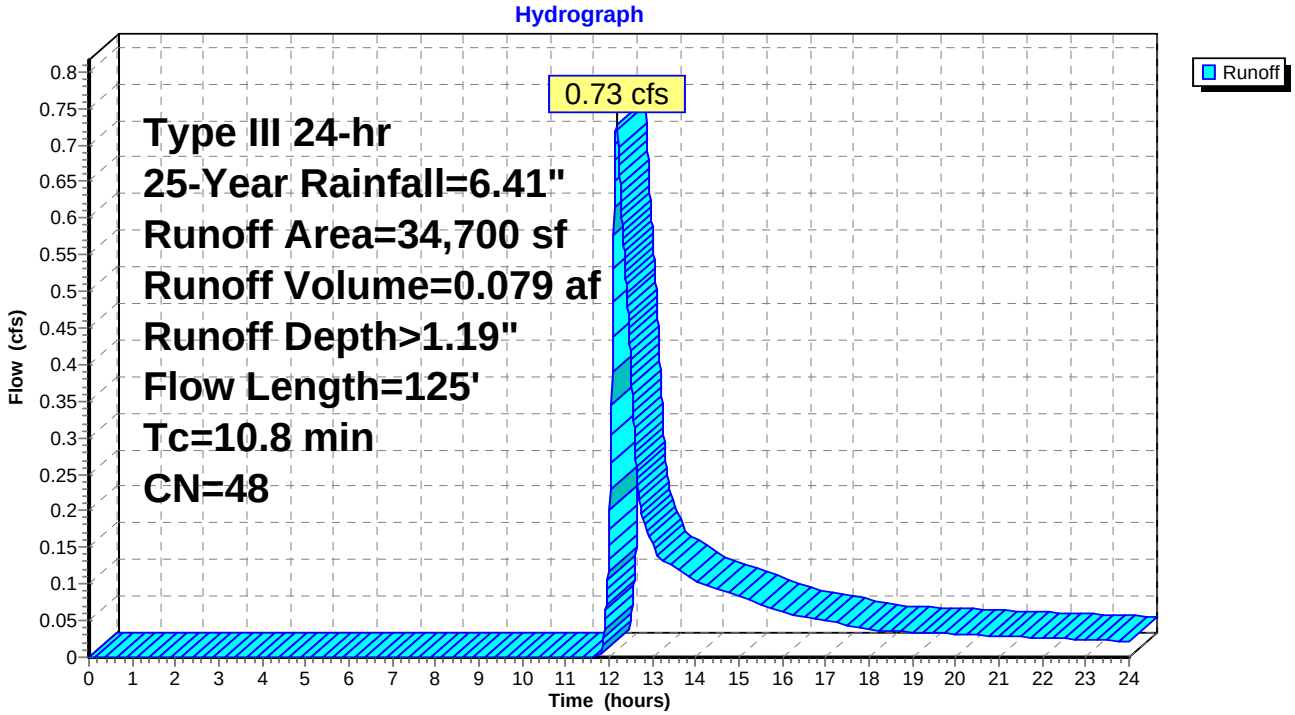
Runoff = 0.73 cfs @ 12.18 hrs, Volume= 0.079 af, Depth> 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.41"

	Area (sf)	CN	Description
*	2,854	98	Impervious
	14,380	39	>75% Grass cover, Good, HSG A
	11,288	30	Woods, Good, HSG A
	3,734	74	>75% Grass cover, Good, HSG C
	111	70	Woods, Good, HSG C
	2,333	80	>75% Grass cover, Good, HSG D
	34,700	48	Weighted Average
	31,846		91.78% Pervious Area
	2,854		8.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	50	0.1400	0.08		**Sheet Flow, Sheet Flow Woods** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.8	75	0.1067	1.63		**Shallow Concentrated Flow, Concentrated Woods** Woodland Kv= 5.0 fps
10.8	125	Total			

Subcatchment P1A: Directed East



Summary for Subcatchment P1B: To Recharge 1

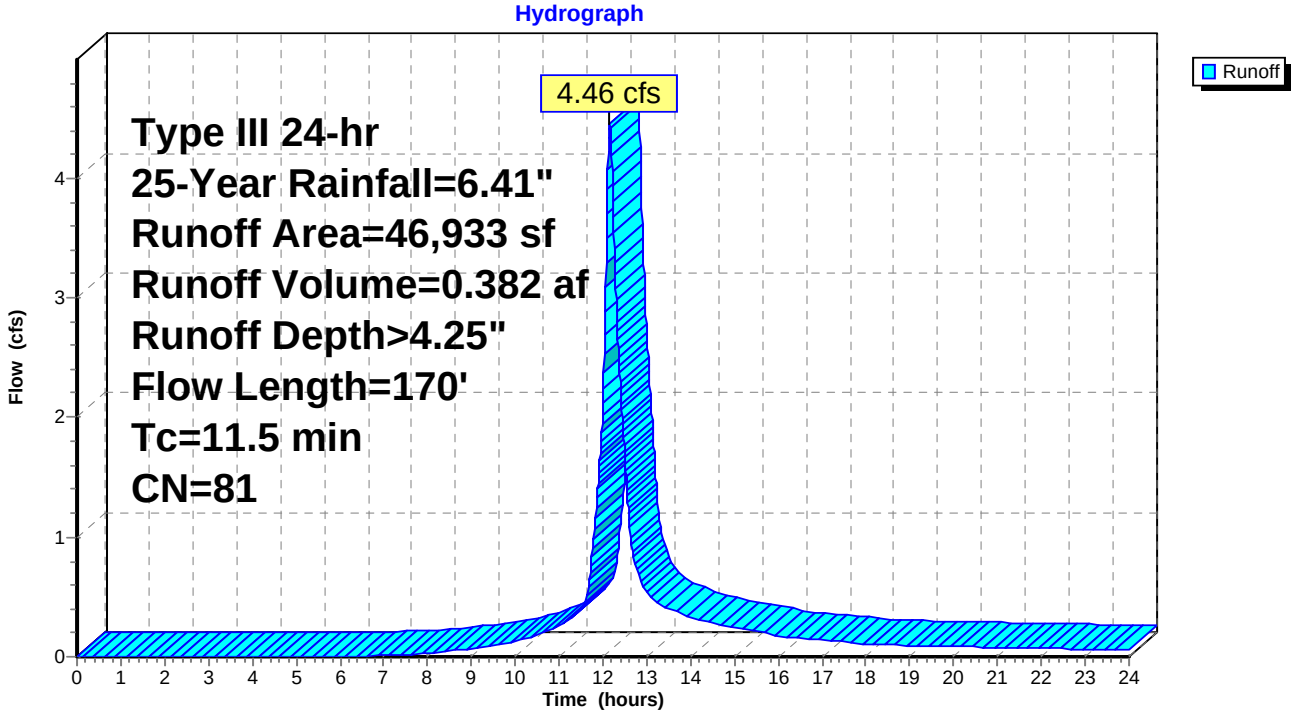
Runoff = 4.46 cfs @ 12.16 hrs, Volume= 0.382 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.41"

	Area (sf)	CN	Description
*	16,120	98	Impervious
	989	39	>75% Grass cover, Good, HSG A
	21,312	74	>75% Grass cover, Good, HSG C
	8,215	70	Woods, Good, HSG C
	297	80	>75% Grass cover, Good, HSG D
	46,933	81	Weighted Average
	30,813		65.65% Pervious Area
	16,120		34.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	50	0.1400	0.08		**Sheet Flow, Wood Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 3.10"
1.5	120	0.0750	1.37		**Shallow Concentrated Flow, Woods Concentrated Flow** Woodland Kv= 5.0 fps
11.5	170	Total			

Subcatchment P1B: To Recharge 1



Summary for Subcatchment P2: Directed West

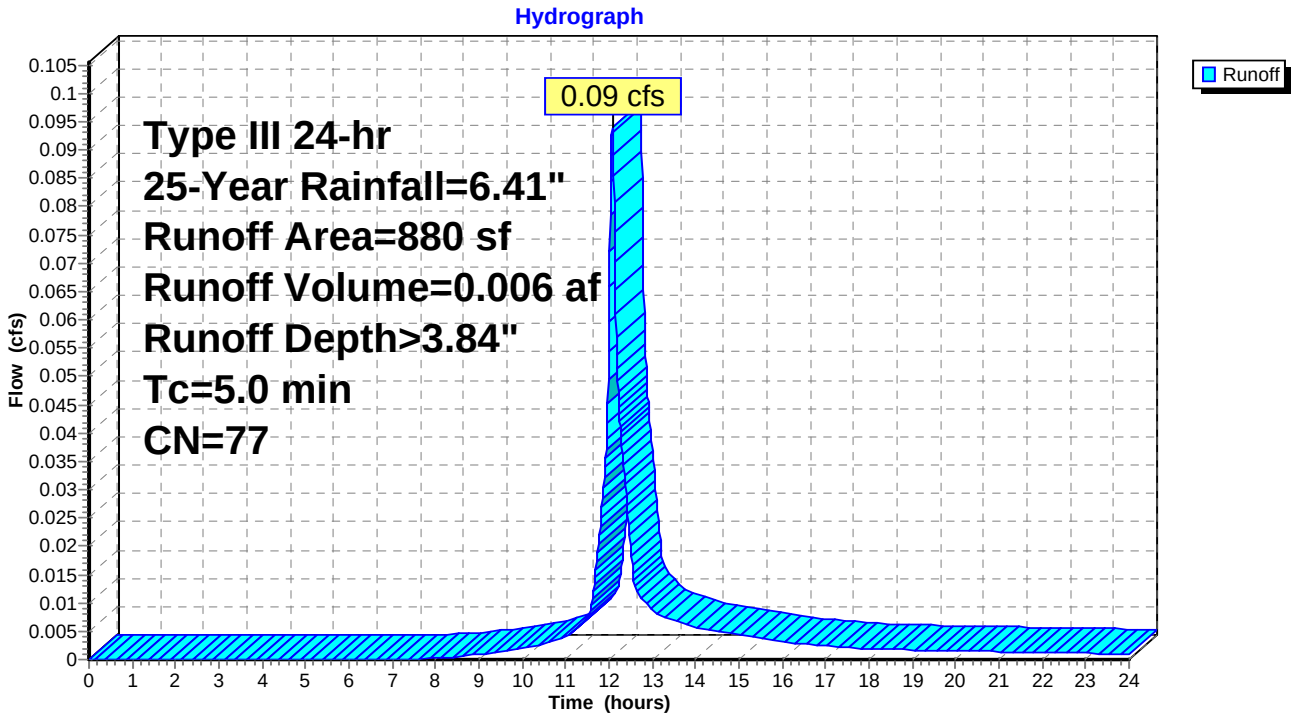
Runoff = 0.09 cfs @ 12.07 hrs, Volume= 0.006 af, Depth> 3.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.41"

Area (sf)	CN	Description
473	74	>75% Grass cover, Good, HSG C
407	80	>75% Grass cover, Good, HSG D
880	77	Weighted Average
880		100.00% Pervious Area

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

Subcatchment P2: Directed West



Summary for Subcatchment RR3: Roof Runoff - Lot 3

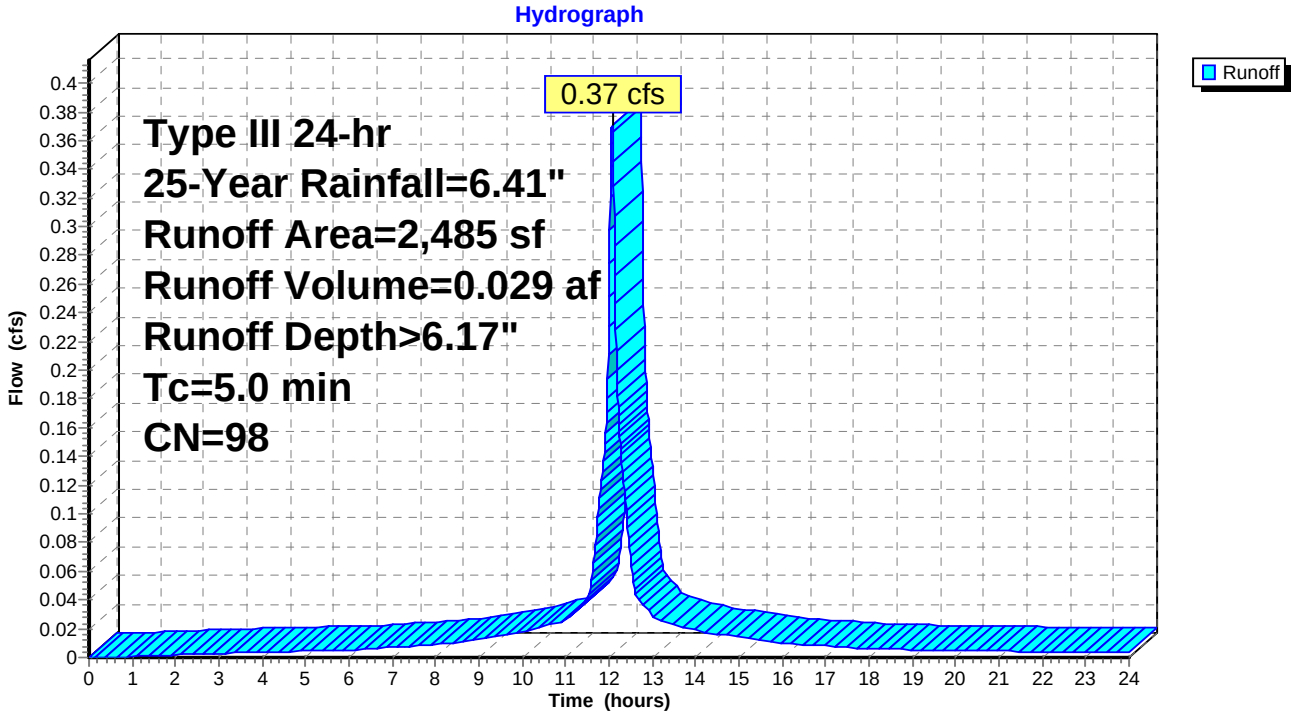
Runoff = 0.37 cfs @ 12.07 hrs, Volume= 0.029 af, Depth> 6.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.41"

	Area (sf)	CN	Description
*	2,485	98	Roof
	2,485		100.00% Impervious Area

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

Subcatchment RR3: Roof Runoff - Lot 3



Summary for Subcatchment RR4: Roof Runoff - Lot 4

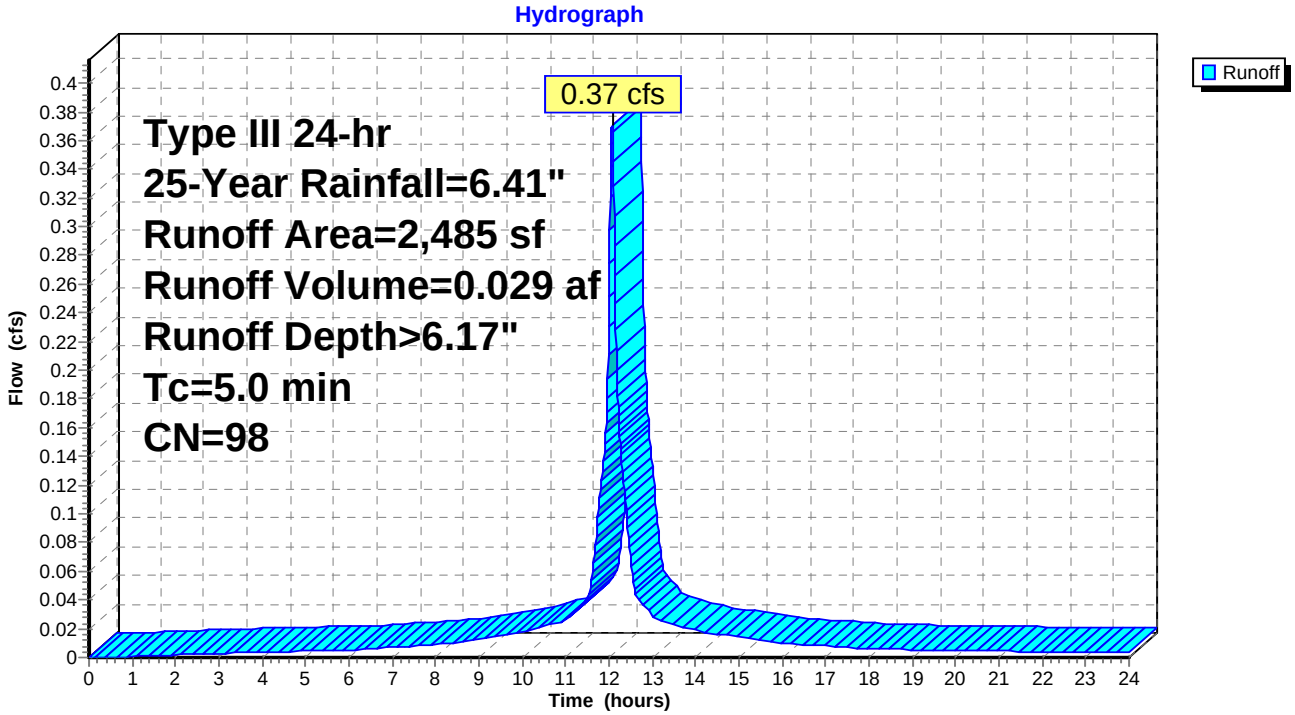
Runoff = 0.37 cfs @ 12.07 hrs, Volume= 0.029 af, Depth> 6.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=6.41"

	Area (sf)	CN	Description
*	2,485	98	Roof
	2,485		100.00% Impervious Area

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

Subcatchment RR4: Roof Runoff - Lot 4

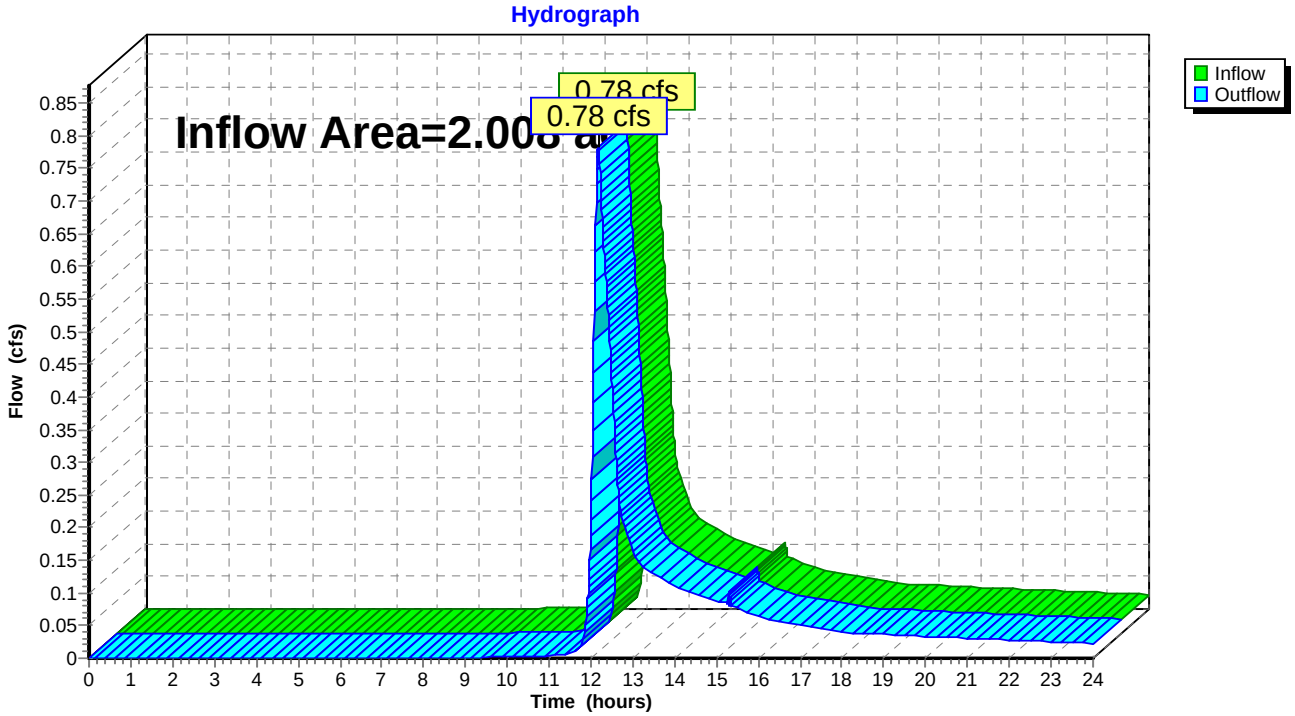


Summary for Reach P: Total

Inflow Area = 2.008 ac, 27.37% Impervious, Inflow Depth > 0.51" for 25-Year event
Inflow = 0.78 cfs @ 12.18 hrs, Volume= 0.086 af
Outflow = 0.78 cfs @ 12.18 hrs, Volume= 0.086 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach P: Total

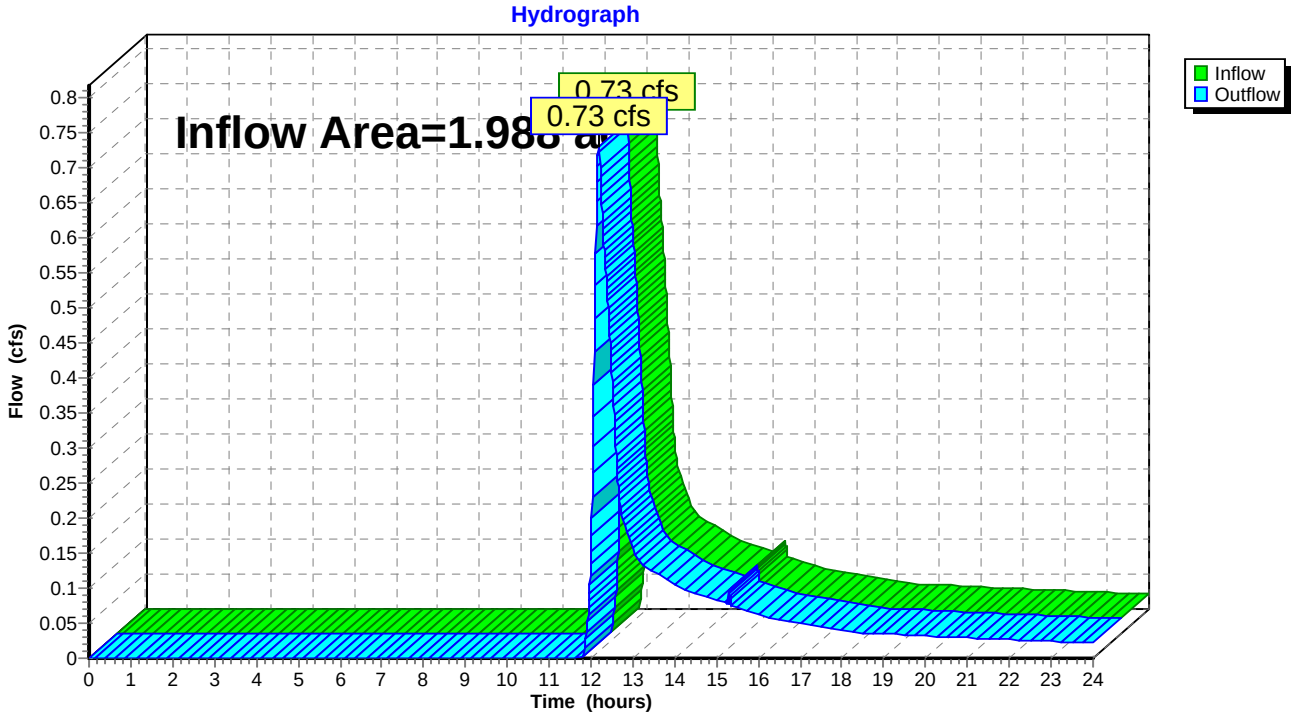


Summary for Reach R1: Reach 1

Inflow Area = 1.988 ac, 27.65% Impervious, Inflow Depth > 0.48" for 25-Year event
Inflow = 0.73 cfs @ 12.18 hrs, Volume= 0.079 af
Outflow = 0.73 cfs @ 12.18 hrs, Volume= 0.079 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach R1: Reach 1

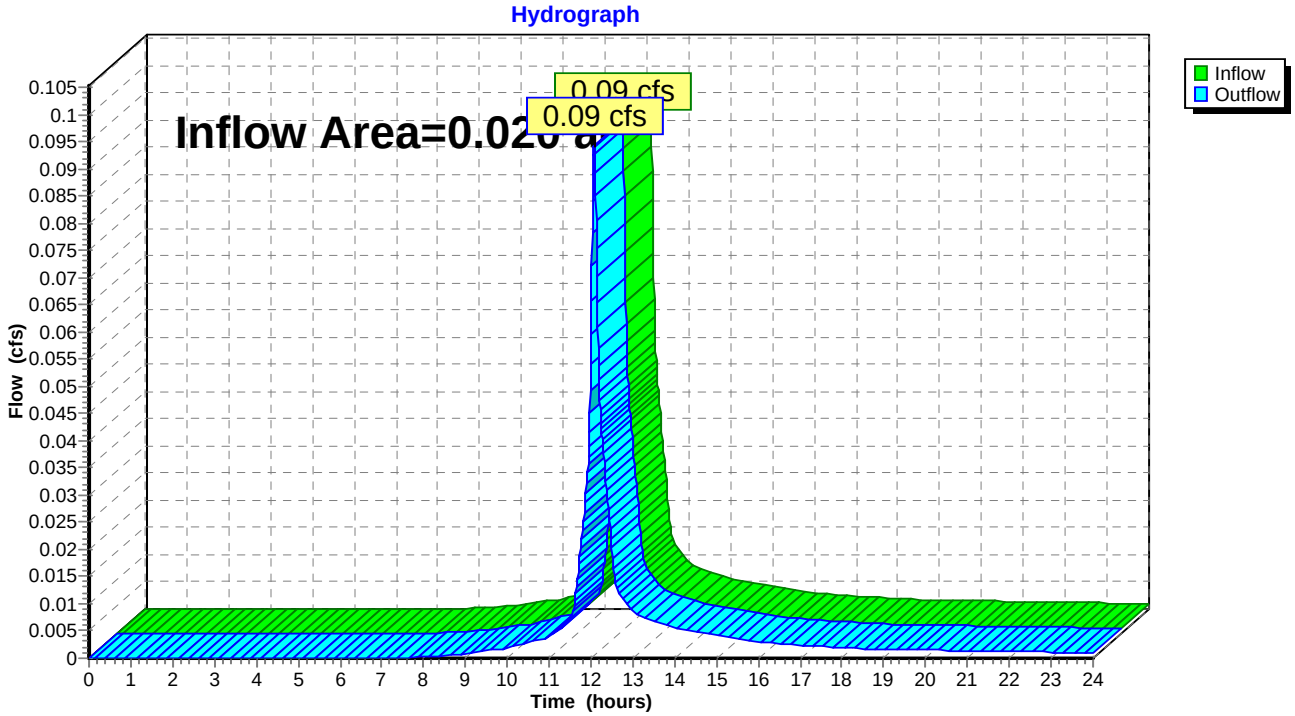


Summary for Reach R2: Reach 2

Inflow Area = 0.020 ac, 0.00% Impervious, Inflow Depth > 3.84" for 25-Year event
Inflow = 0.09 cfs @ 12.07 hrs, Volume= 0.006 af
Outflow = 0.09 cfs @ 12.07 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach R2: Reach 2



Summary for Pond Lot 3: Roof Recharge

Inflow Area = 0.057 ac,100.00% Impervious, Inflow Depth > 6.17" for 25-Year event
Inflow = 0.37 cfs @ 12.07 hrs, Volume= 0.029 af
Outflow = 0.02 cfs @ 10.18 hrs, Volume= 0.025 af, Atten= 95%, Lag= 0.0 min
Discarded = 0.02 cfs @ 10.18 hrs, Volume= 0.025 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 105.72' @ 14.12 hrs Surf.Area= 0.007 ac Storage= 0.013 af

Plug-Flow detention time= 235.3 min calculated for 0.025 af (86% of inflow)
Center-of-Mass det. time= 172.4 min (915.2 - 742.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	103.00'	0.007 af	**30.50'W x 10.50'L x 3.54'H Field A** 0.026 af Overall - 0.009 af Embedded = 0.017 af x 40.0% Voids
#2A	103.50'	0.009 af	**Cultec R-330XLHD** x 6 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 6 rows
		0.016 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	108.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 10.18 hrs HW=103.05' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.00' (Free Discharge)
↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond Lot 3: Roof Recharge - 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 6 rows

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

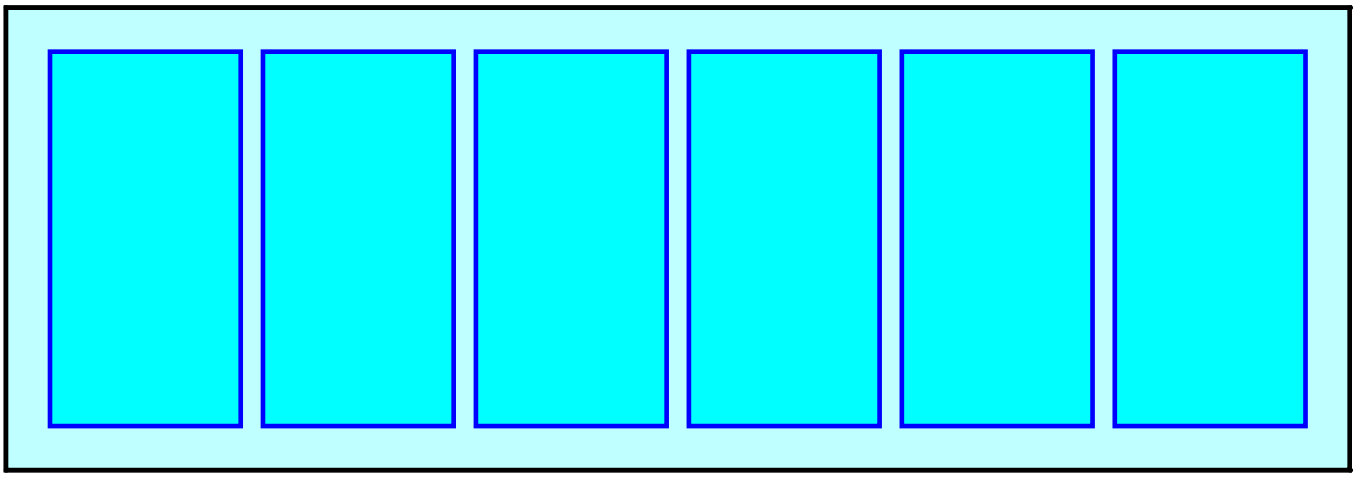
1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +12.0" End Stone x 2 = 10.50' Base Length
6 Rows x 52.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.50' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

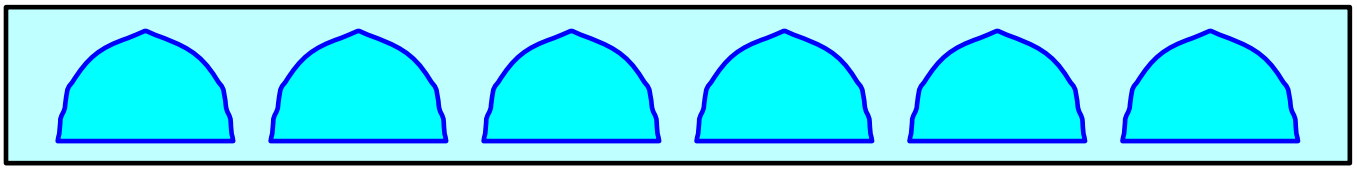
6 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 6 Rows = 380.0 cf Chamber Storage

1,134.2 cf Field - 380.0 cf Chambers = 754.2 cf Stone x 40.0% Voids = 301.7 cf Stone Storage

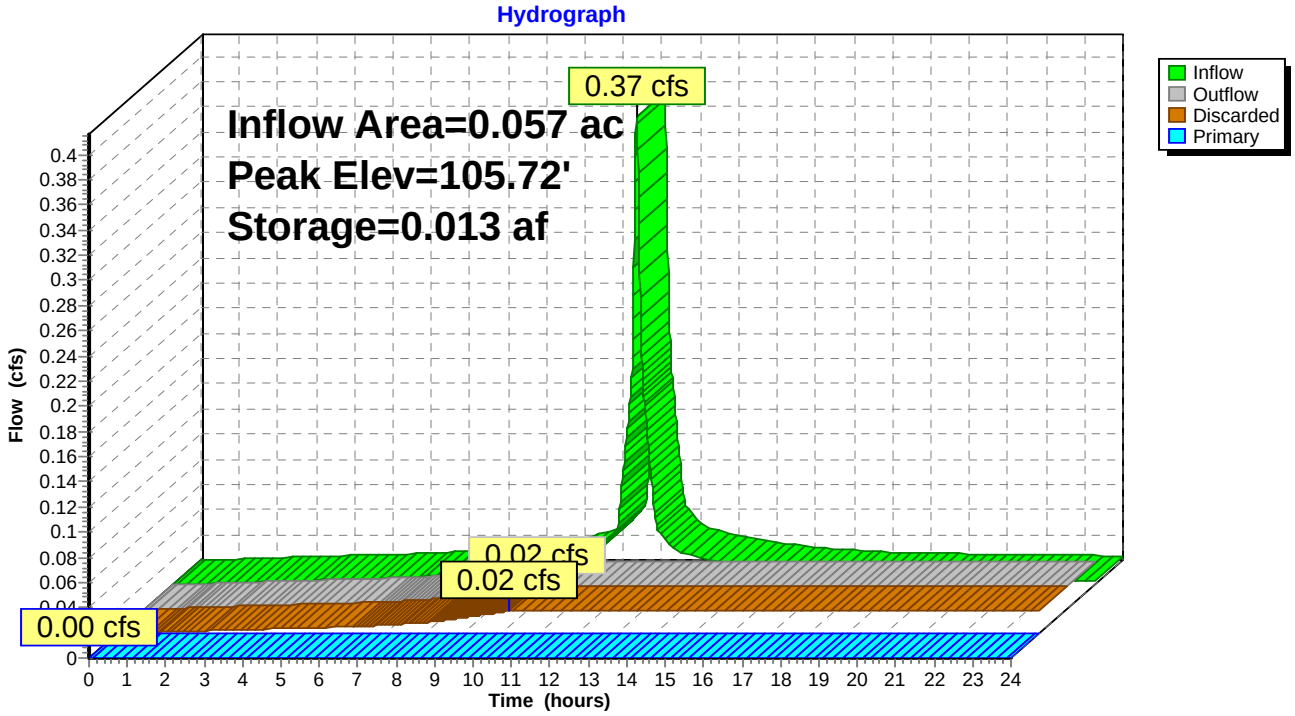
Chamber Storage + Stone Storage = 681.7 cf = 0.016 af
Overall Storage Efficiency = 60.1%
Overall System Size = 10.50' x 30.50' x 3.54'

6 Chambers
42.0 cy Field
27.9 cy Stone





Pond Lot 3: Roof Recharge



Summary for Pond Lot 4: Roof Recharge

Inflow Area = 0.057 ac,100.00% Impervious, Inflow Depth > 6.17" for 25-Year event
Inflow = 0.37 cfs @ 12.07 hrs, Volume= 0.029 af
Outflow = 0.02 cfs @ 10.18 hrs, Volume= 0.025 af, Atten= 95%, Lag= 0.0 min
Discarded = 0.02 cfs @ 10.18 hrs, Volume= 0.025 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 105.72' @ 14.12 hrs Surf.Area= 0.007 ac Storage= 0.013 af

Plug-Flow detention time= 235.3 min calculated for 0.025 af (86% of inflow)
Center-of-Mass det. time= 172.4 min (915.2 - 742.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	103.00'	0.007 af	**30.50'W x 10.50'L x 3.54'H Field A** 0.026 af Overall - 0.009 af Embedded = 0.017 af x 40.0% Voids
#2A	103.50'	0.009 af	**Cultec R-330XLHD** x 6 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 6 rows
		0.016 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	108.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 10.18 hrs HW=103.05' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=103.00' (Free Discharge)
↑**2=Orifice/Grate** (Controls 0.00 cfs)

Pond Lot 4: Roof Recharge - 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 6 rows

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

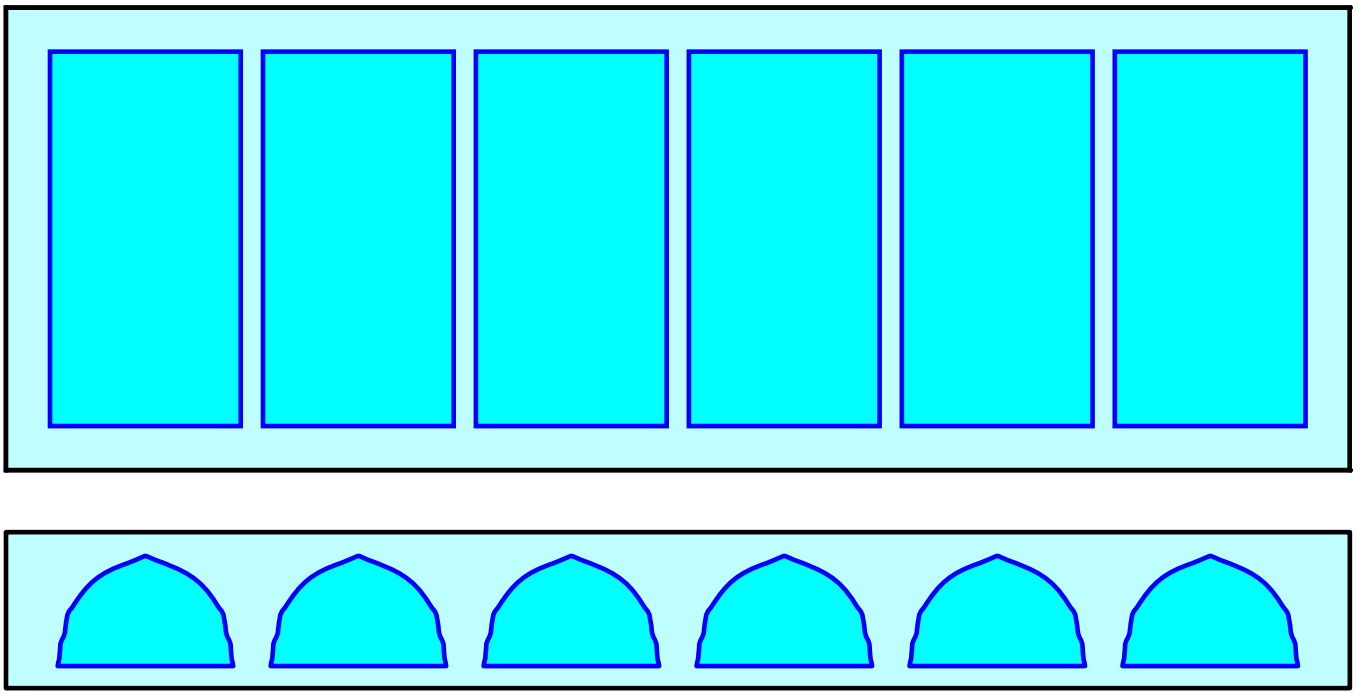
1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +12.0" End Stone x 2 = 10.50' Base Length
6 Rows x 52.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.50' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

6 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 6 Rows = 380.0 cf Chamber Storage

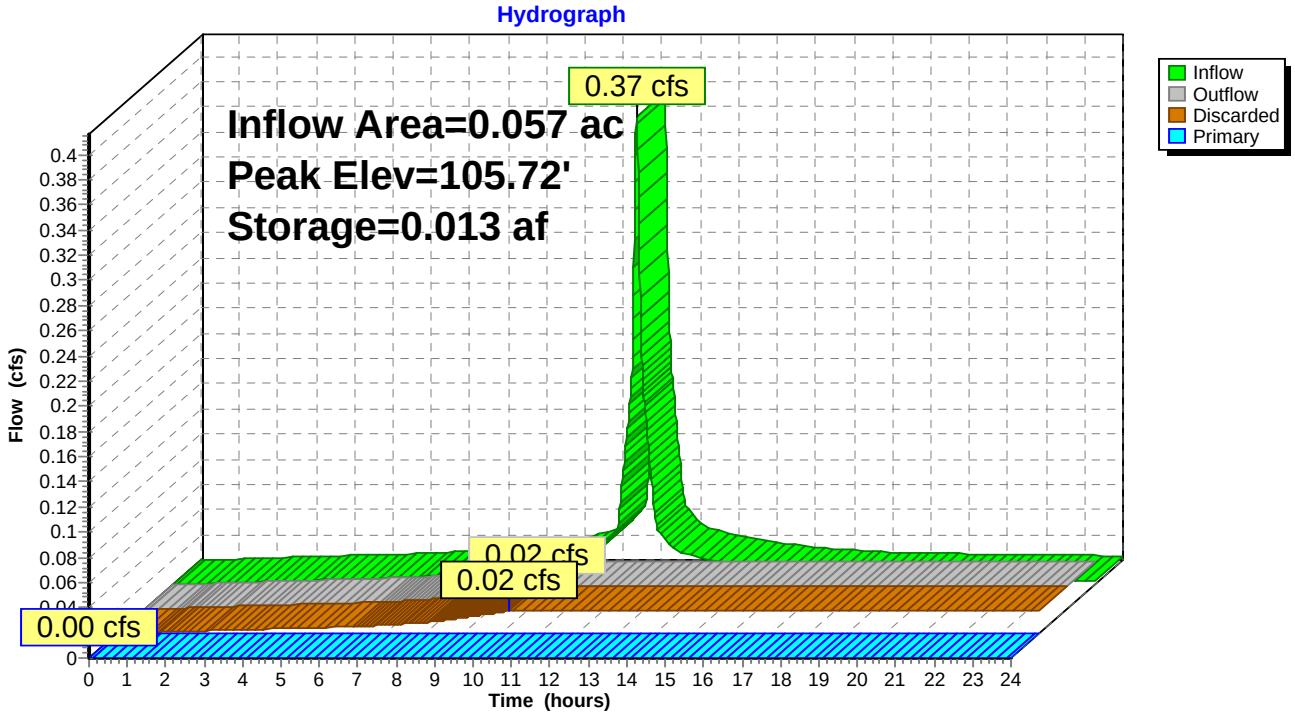
1,134.2 cf Field - 380.0 cf Chambers = 754.2 cf Stone x 40.0% Voids = 301.7 cf Stone Storage

Chamber Storage + Stone Storage = 681.7 cf = 0.016 af
Overall Storage Efficiency = 60.1%
Overall System Size = 10.50' x 30.50' x 3.54'

6 Chambers
42.0 cy Field
27.9 cy Stone



Pond Lot 4: Roof Recharge



Summary for Pond PR1: Recharge 1

Inflow Area = 1.077 ac, 34.35% Impervious, Inflow Depth > 4.25" for 25-Year event
Inflow = 4.46 cfs @ 12.16 hrs, Volume= 0.382 af
Outflow = 0.24 cfs @ 15.26 hrs, Volume= 0.260 af, Atten= 95%, Lag= 186.3 min
Discarded = 0.22 cfs @ 10.86 hrs, Volume= 0.260 af
Primary = 0.02 cfs @ 15.26 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 108.01' @ 15.26 hrs Surf.Area= 0.089 ac Storage= 0.204 af

Plug-Flow detention time= 284.0 min calculated for 0.260 af (68% of inflow)
Center-of-Mass det. time= 189.1 min (1,001.8 - 812.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	103.00'	0.075 af	**74.00'W x 52.50'L x 3.54'H Field A** 0.316 af Overall - 0.130 af Embedded = 0.186 af x 40.0% Voids
#2A	103.50'	0.130 af	**Cultec R-330XLHD** x 105 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 15 rows
		0.204 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	108.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.22 cfs @ 10.86 hrs HW=103.05' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.01 cfs @ 15.26 hrs HW=108.01' (Free Discharge)
↑**2=Orifice/Grate** (Weir Controls 0.01 cfs @ 0.32 fps)

Pond PR1: Recharge 1 - 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 15 rows

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

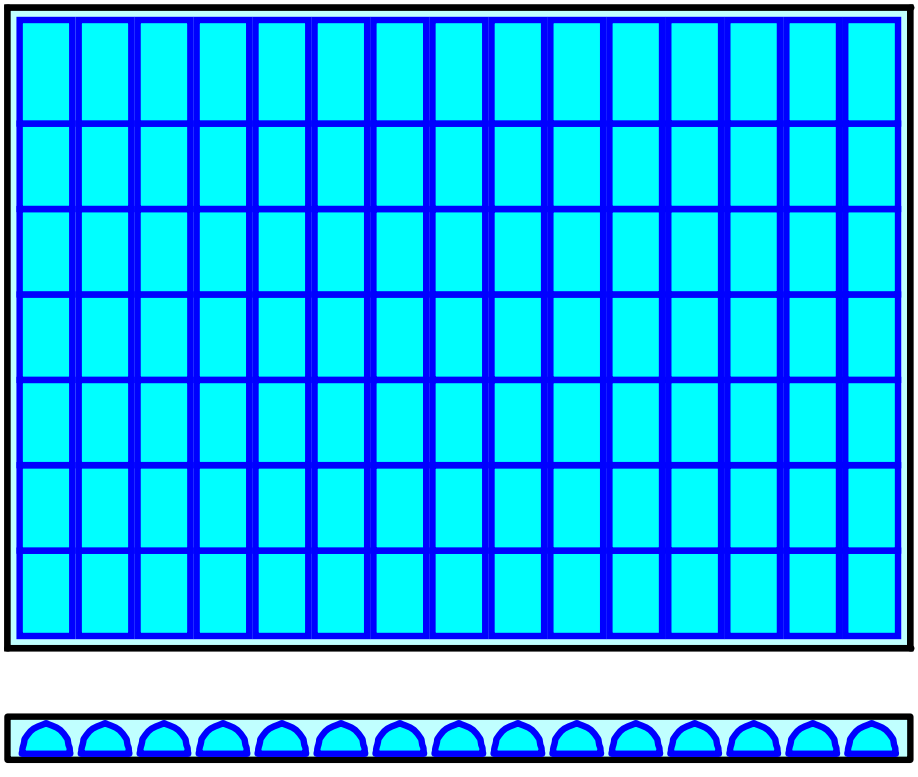
7 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 50.50' Row Length +12.0" End Stone x 2 = 52.50' Base Length
15 Rows x 52.0" Wide + 6.0" Spacing x 14 + 12.0" Side Stone x 2 = 74.00' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

105 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 15 Rows = 5,644.1 cf Chamber Storage

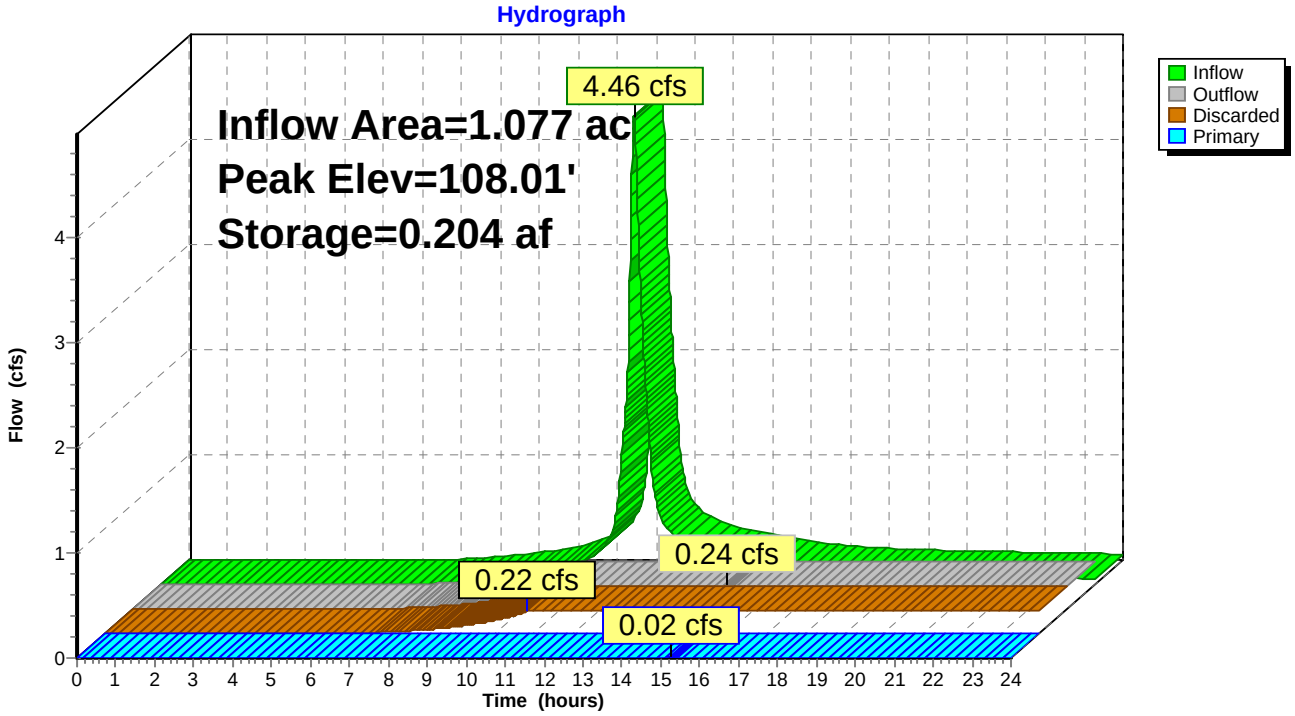
13,759.4 cf Field - 5,644.1 cf Chambers = 8,115.2 cf Stone x 40.0% Voids = 3,246.1 cf Stone Storage

Chamber Storage + Stone Storage = 8,890.2 cf = 0.204 af
Overall Storage Efficiency = 64.6%
Overall System Size = 52.50' x 74.00' x 3.54'

105 Chambers
509.6 cy Field
300.6 cy Stone



Pond PR1: Recharge 1



Summary for Subcatchment P1A: Directed East

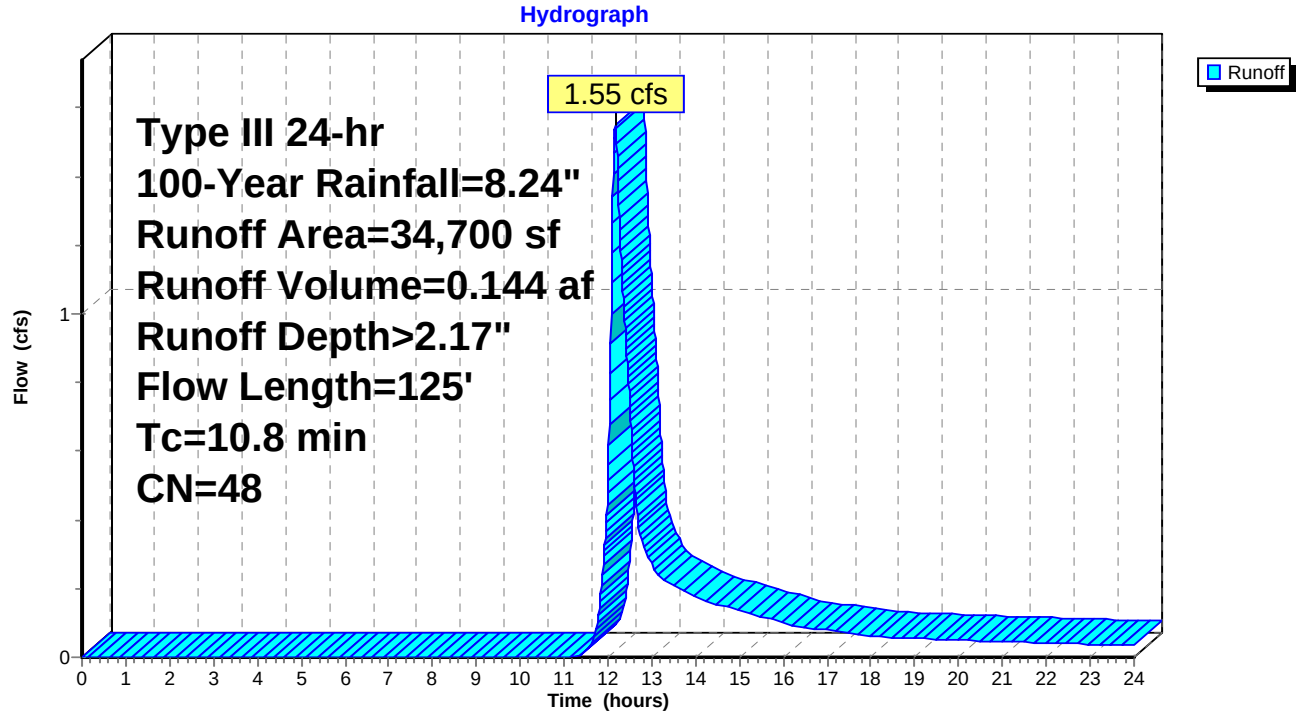
Runoff = 1.55 cfs @ 12.16 hrs, Volume= 0.144 af, Depth> 2.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.24"

	Area (sf)	CN	Description
*	2,854	98	Impervious
	14,380	39	>75% Grass cover, Good, HSG A
	11,288	30	Woods, Good, HSG A
	3,734	74	>75% Grass cover, Good, HSG C
	111	70	Woods, Good, HSG C
	2,333	80	>75% Grass cover, Good, HSG D
	34,700	48	Weighted Average
	31,846		91.78% Pervious Area
	2,854		8.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	50	0.1400	0.08		**Sheet Flow, Sheet Flow Woods** Woods: Dense underbrush n= 0.800 P2= 3.10"
0.8	75	0.1067	1.63		**Shallow Concentrated Flow, Concentrated Woods** Woodland Kv= 5.0 fps
10.8	125	Total			

Subcatchment P1A: Directed East



Summary for Subcatchment P1B: To Recharge 1

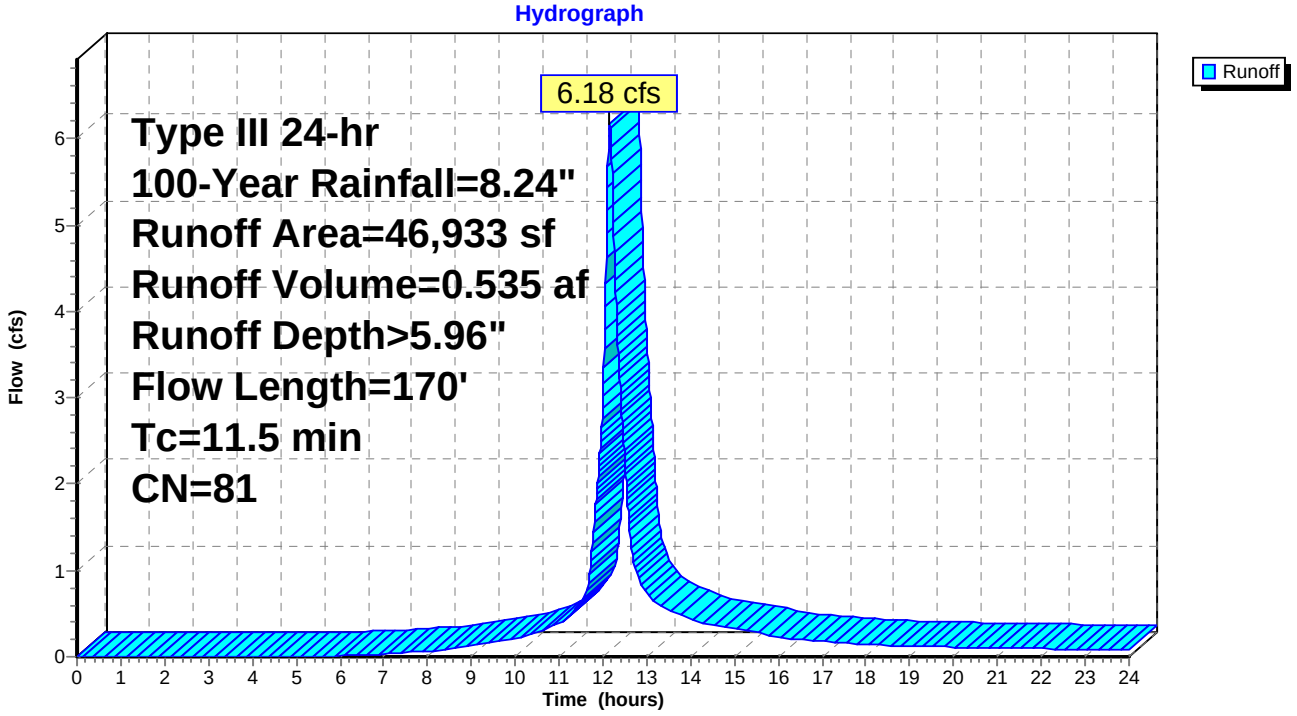
Runoff = 6.18 cfs @ 12.15 hrs, Volume= 0.535 af, Depth> 5.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.24"

	Area (sf)	CN	Description
*	16,120	98	Impervious
	989	39	>75% Grass cover, Good, HSG A
	21,312	74	>75% Grass cover, Good, HSG C
	8,215	70	Woods, Good, HSG C
	297	80	>75% Grass cover, Good, HSG D
	46,933	81	Weighted Average
	30,813		65.65% Pervious Area
	16,120		34.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0	50	0.1400	0.08		**Sheet Flow, Wood Sheet Flow** Woods: Dense underbrush n= 0.800 P2= 3.10"
1.5	120	0.0750	1.37		**Shallow Concentrated Flow, Woods Concentrated Flow** Woodland Kv= 5.0 fps
11.5	170	Total			

Subcatchment P1B: To Recharge 1



Summary for Subcatchment P2: Directed West

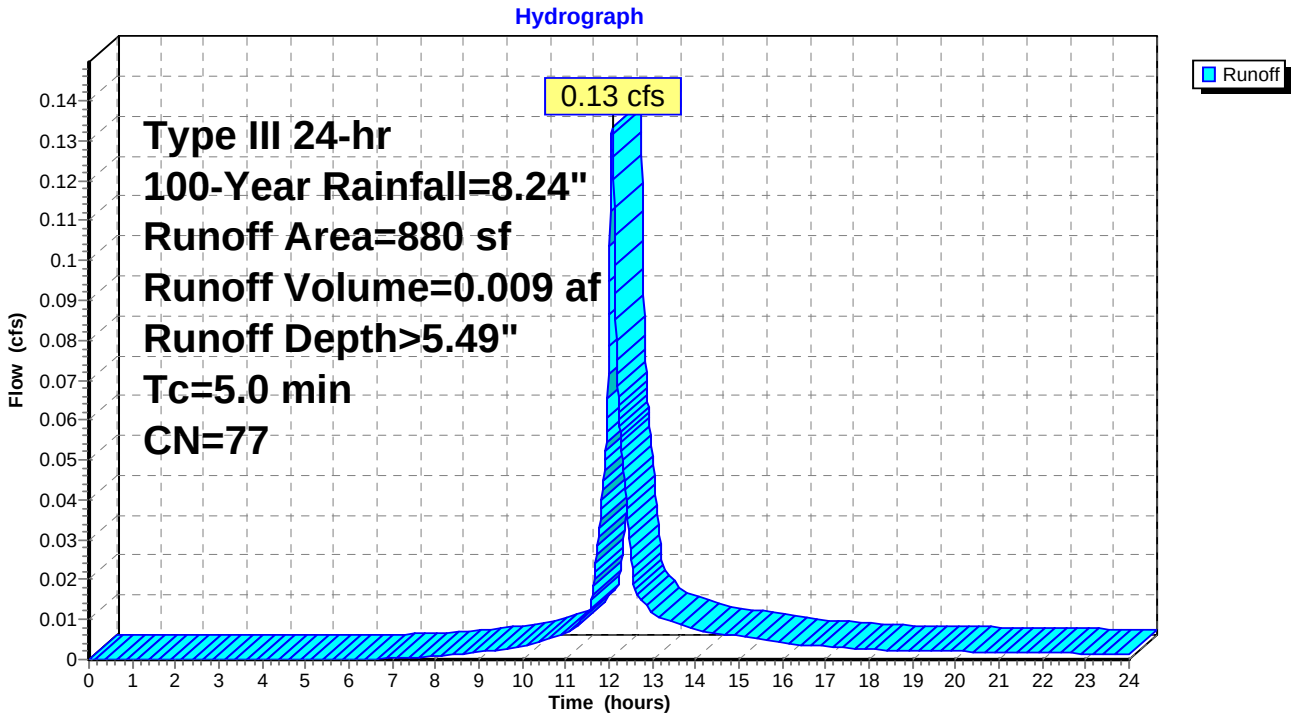
Runoff = 0.13 cfs @ 12.07 hrs, Volume= 0.009 af, Depth> 5.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.24"

Area (sf)	CN	Description
473	74	>75% Grass cover, Good, HSG C
407	80	>75% Grass cover, Good, HSG D
880	77	Weighted Average
880		100.00% Pervious Area

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

Subcatchment P2: Directed West



Summary for Subcatchment RR3: Roof Runoff - Lot 3

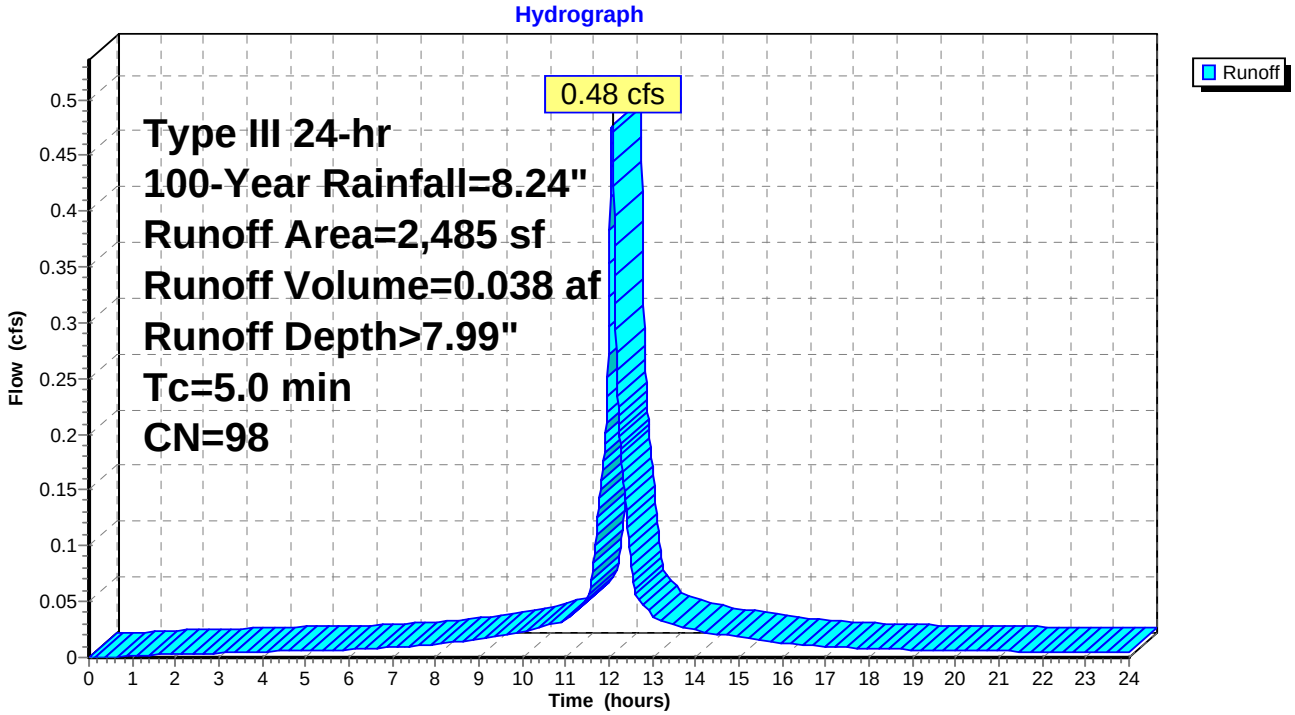
Runoff = 0.48 cfs @ 12.07 hrs, Volume= 0.038 af, Depth> 7.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.24"

	Area (sf)	CN	Description
*	2,485	98	Roof
	2,485		100.00% Impervious Area

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

Subcatchment RR3: Roof Runoff - Lot 3



Summary for Subcatchment RR4: Roof Runoff - Lot 4

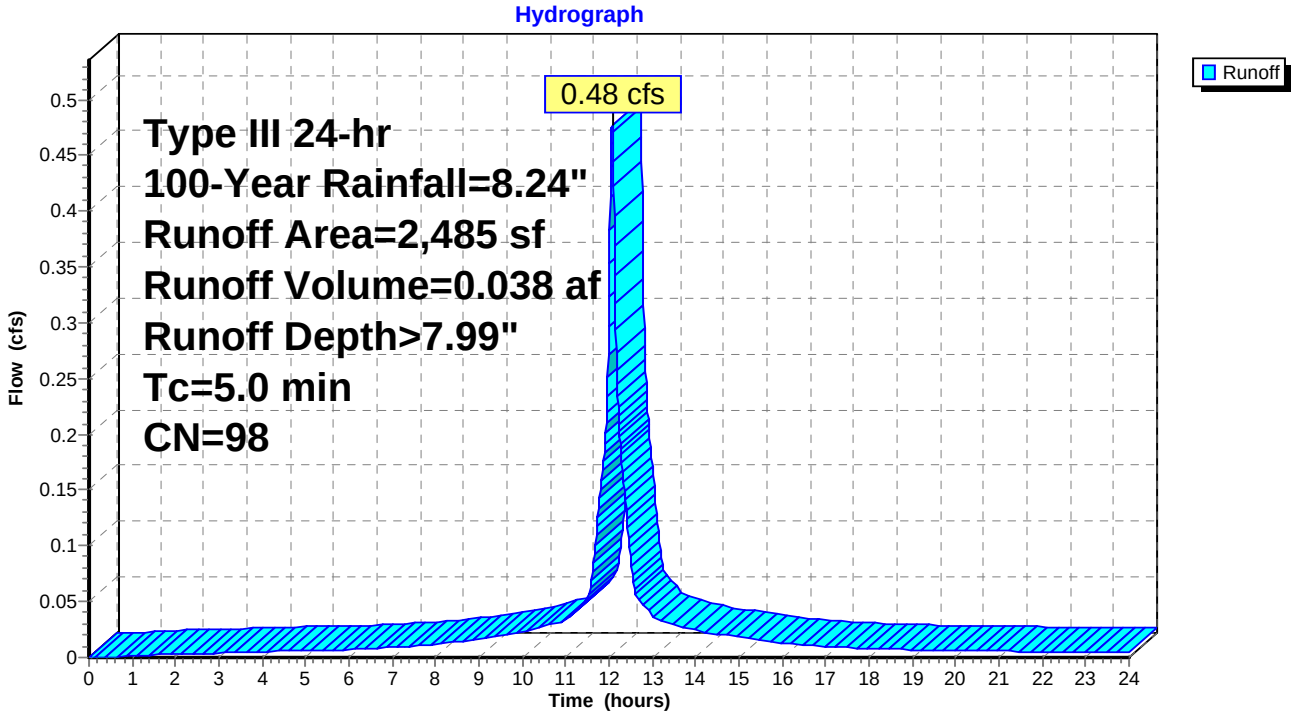
Runoff = 0.48 cfs @ 12.07 hrs, Volume= 0.038 af, Depth> 7.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.24"

	Area (sf)	CN	Description
*	2,485	98	Roof
	2,485		100.00% Impervious Area

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

Subcatchment RR4: Roof Runoff - Lot 4

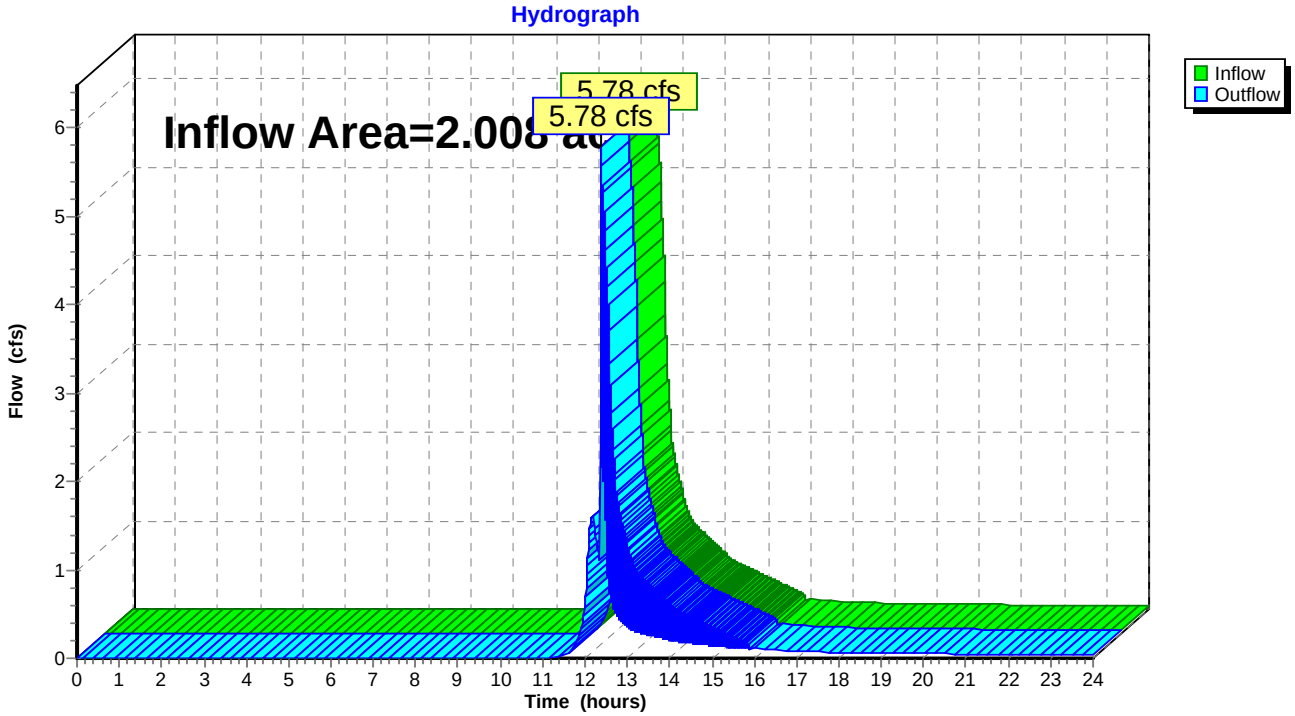


Summary for Reach P: Total

Inflow Area = 2.008 ac, 27.37% Impervious, Inflow Depth > 1.65" for 100-Year event
Inflow = 5.78 cfs @ 12.37 hrs, Volume= 0.276 af
Outflow = 5.78 cfs @ 12.37 hrs, Volume= 0.276 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach P: Total

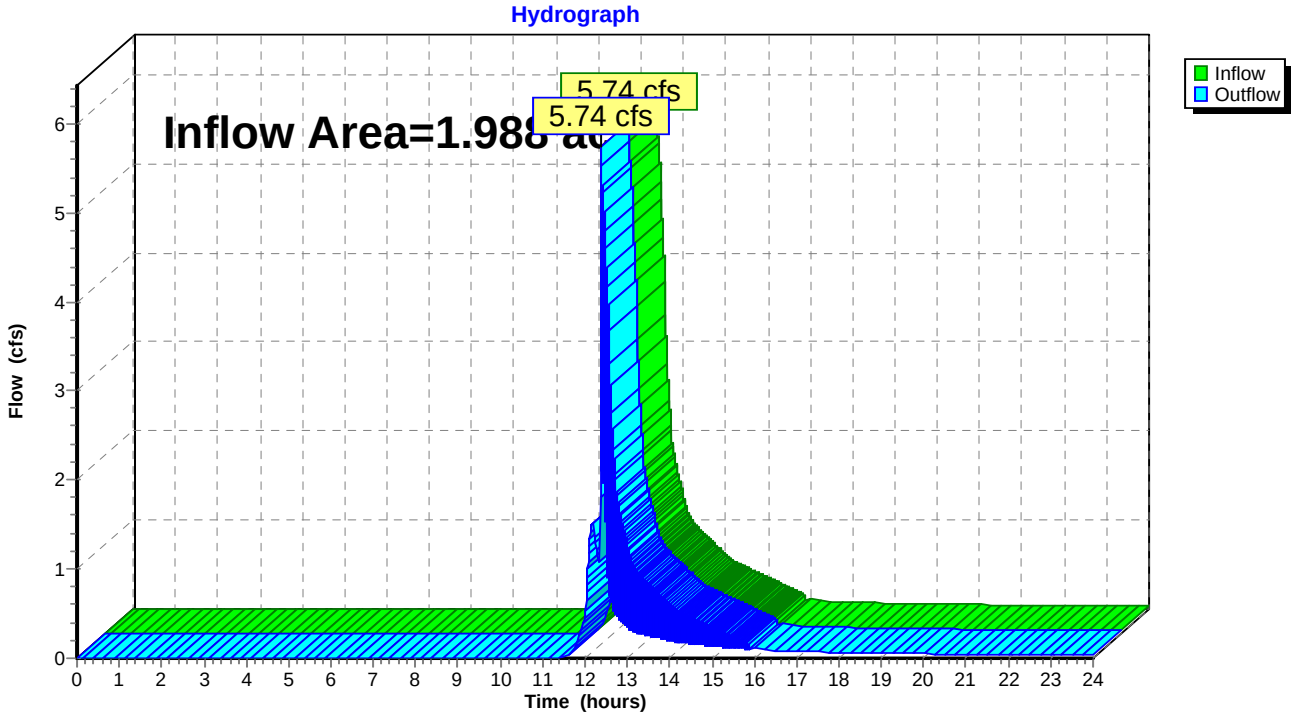


Summary for Reach R1: Reach 1

Inflow Area = 1.988 ac, 27.65% Impervious, Inflow Depth > 1.61" for 100-Year event
Inflow = 5.74 cfs @ 12.37 hrs, Volume= 0.267 af
Outflow = 5.74 cfs @ 12.37 hrs, Volume= 0.267 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach R1: Reach 1

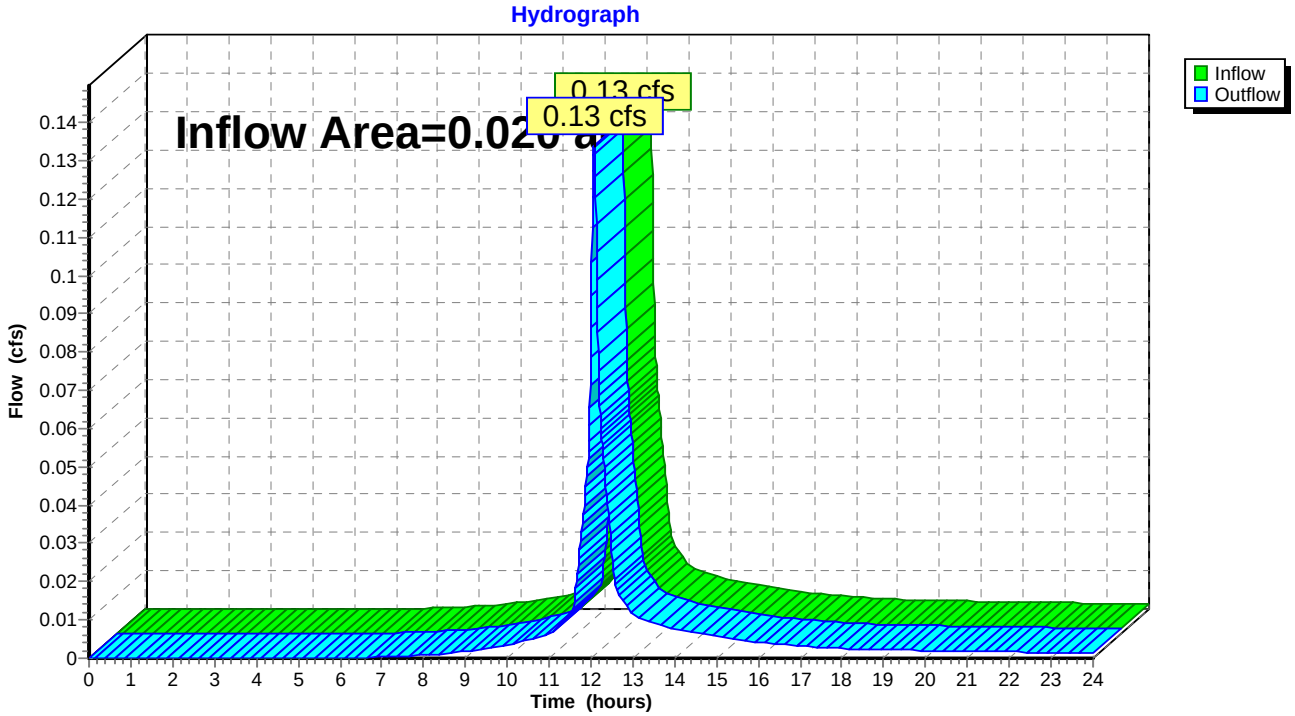


Summary for Reach R2: Reach 2

Inflow Area = 0.020 ac, 0.00% Impervious, Inflow Depth > 5.49" for 100-Year event
Inflow = 0.13 cfs @ 12.07 hrs, Volume= 0.009 af
Outflow = 0.13 cfs @ 12.07 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach R2: Reach 2



Summary for Pond Lot 3: Roof Recharge

Inflow Area = 0.057 ac,100.00% Impervious, Inflow Depth > 7.99" for 100-Year event
Inflow = 0.48 cfs @ 12.07 hrs, Volume= 0.038 af
Outflow = 0.16 cfs @ 12.42 hrs, Volume= 0.030 af, Atten= 67%, Lag= 21.1 min
Discarded = 0.02 cfs @ 9.27 hrs, Volume= 0.027 af
Primary = 0.14 cfs @ 12.42 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 108.06' @ 12.42 hrs Surf.Area= 0.007 ac Storage= 0.016 af

Plug-Flow detention time= 216.4 min calculated for 0.030 af (79% of inflow)
Center-of-Mass det. time= 135.8 min (875.3 - 739.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	103.00'	0.007 af	**30.50'W x 10.50'L x 3.54'H Field A** 0.026 af Overall - 0.009 af Embedded = 0.017 af x 40.0% Voids
#2A	103.50'	0.009 af	**Cultec R-330XLHD** x 6 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 6 rows
		0.016 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	108.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 9.27 hrs HW=103.05' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.12 cfs @ 12.42 hrs HW=108.05' (Free Discharge)
↑**2=Orifice/Grate** (Weir Controls 0.12 cfs @ 0.74 fps)

Pond Lot 3: Roof Recharge - 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 6 rows

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

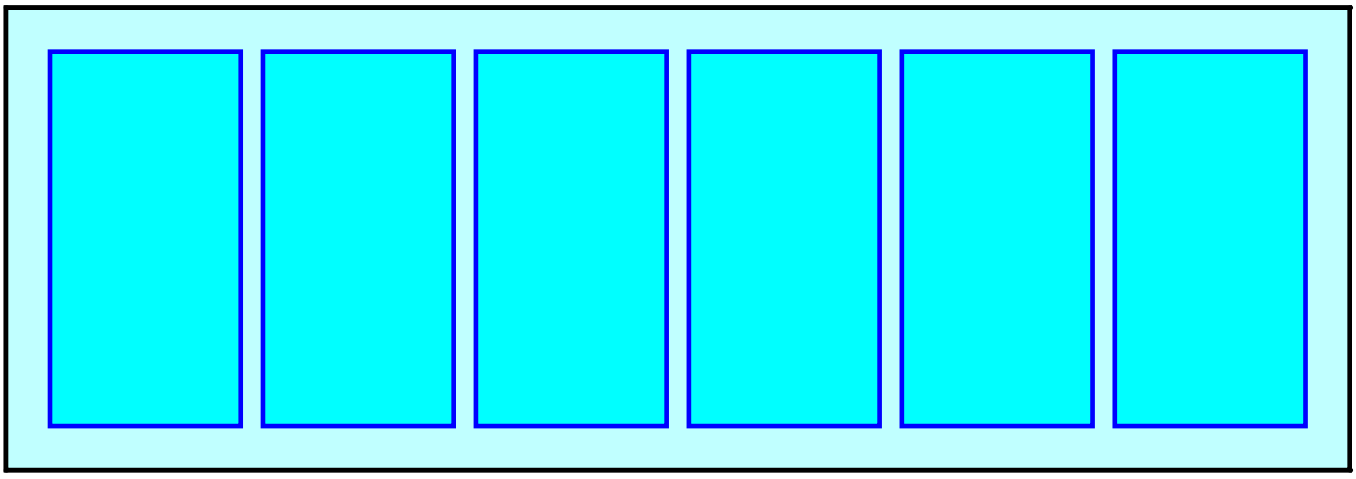
1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +12.0" End Stone x 2 = 10.50' Base Length
6 Rows x 52.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.50' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

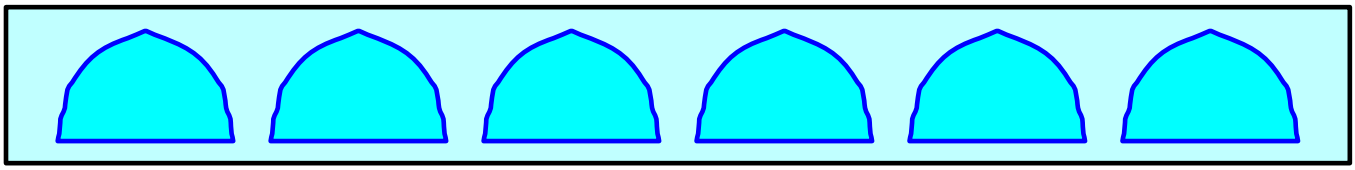
6 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 6 Rows = 380.0 cf Chamber Storage

1,134.2 cf Field - 380.0 cf Chambers = 754.2 cf Stone x 40.0% Voids = 301.7 cf Stone Storage

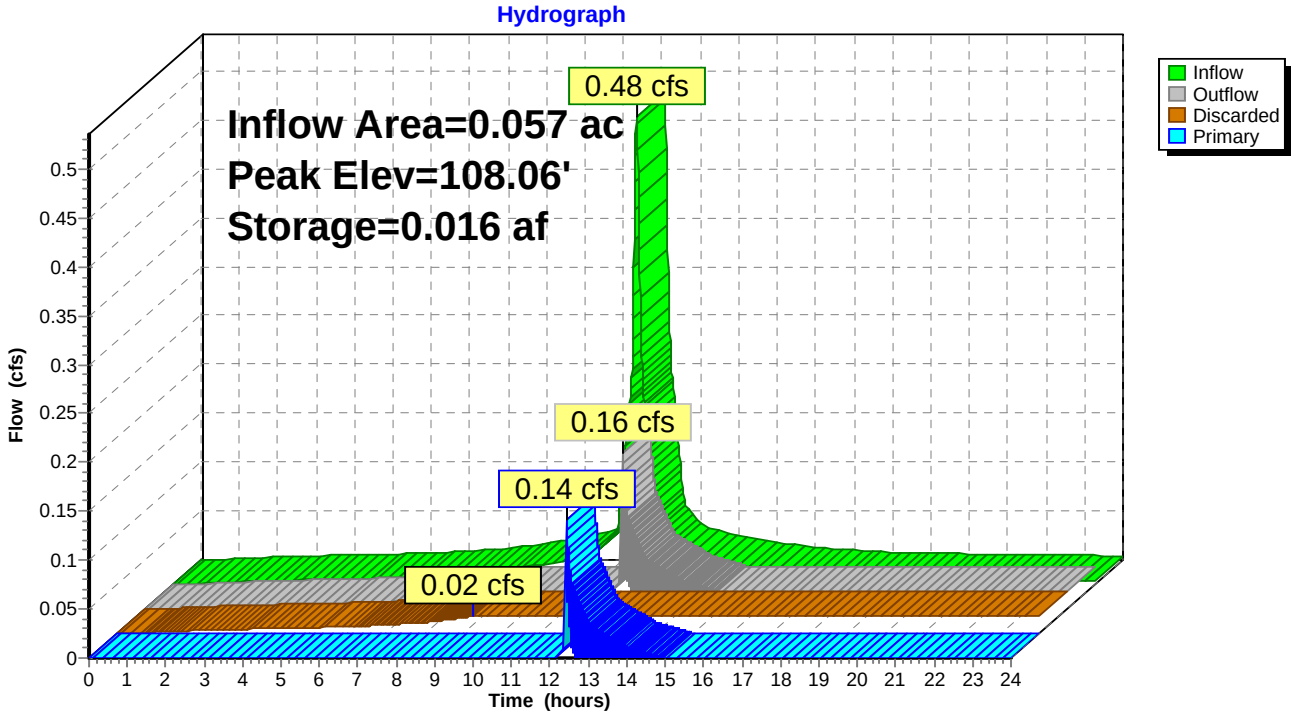
Chamber Storage + Stone Storage = 681.7 cf = 0.016 af
Overall Storage Efficiency = 60.1%
Overall System Size = 10.50' x 30.50' x 3.54'

6 Chambers
42.0 cy Field
27.9 cy Stone





Pond Lot 3: Roof Recharge



Summary for Pond Lot 4: Roof Recharge

Inflow Area = 0.057 ac,100.00% Impervious, Inflow Depth > 7.99" for 100-Year event
Inflow = 0.48 cfs @ 12.07 hrs, Volume= 0.038 af
Outflow = 0.16 cfs @ 12.42 hrs, Volume= 0.030 af, Atten= 67%, Lag= 21.1 min
Discarded = 0.02 cfs @ 9.27 hrs, Volume= 0.027 af
Primary = 0.14 cfs @ 12.42 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 108.06' @ 12.42 hrs Surf.Area= 0.007 ac Storage= 0.016 af

Plug-Flow detention time= 216.4 min calculated for 0.030 af (79% of inflow)
Center-of-Mass det. time= 135.8 min (875.3 - 739.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	103.00'	0.007 af	**30.50'W x 10.50'L x 3.54'H Field A** 0.026 af Overall - 0.009 af Embedded = 0.017 af x 40.0% Voids
#2A	103.50'	0.009 af	**Cultec R-330XLHD** x 6 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 6 rows
		0.016 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	108.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 9.27 hrs HW=103.05' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.12 cfs @ 12.42 hrs HW=108.05' (Free Discharge)
↑**2=Orifice/Grate** (Weir Controls 0.12 cfs @ 0.74 fps)

Pond Lot 4: Roof Recharge - 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 6 rows

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

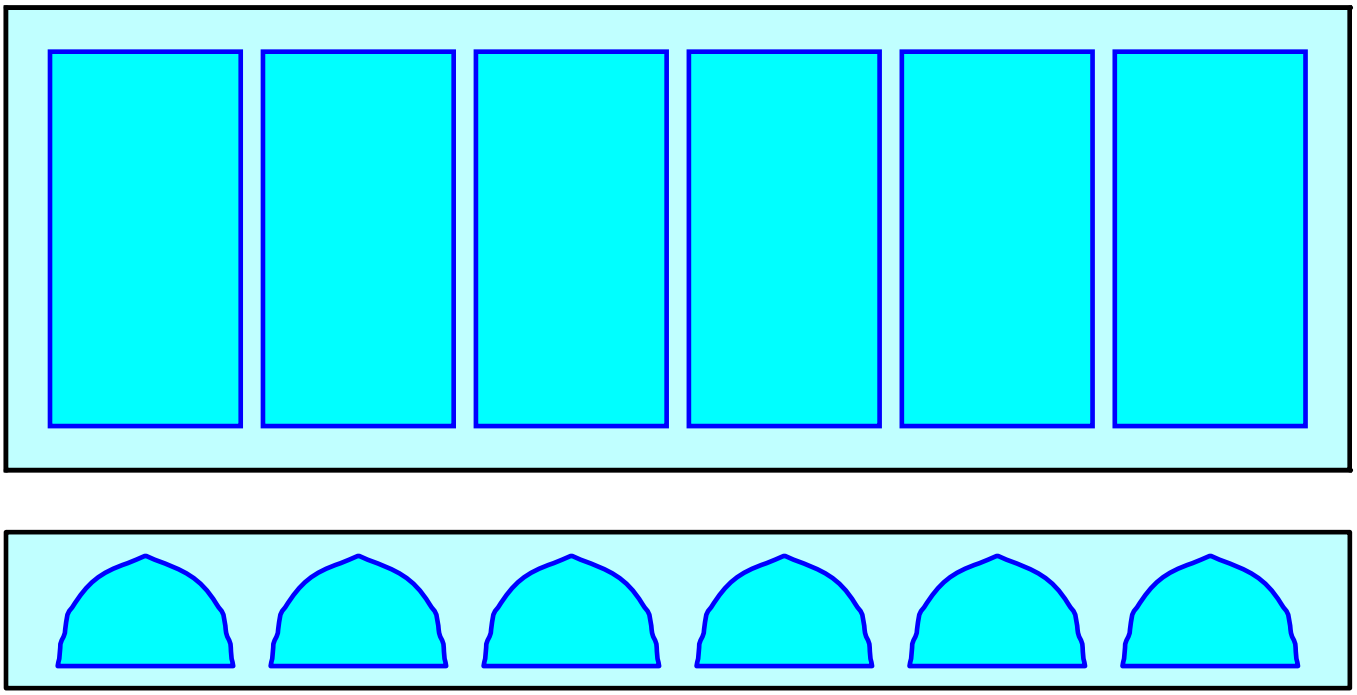
1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +12.0" End Stone x 2 = 10.50' Base Length
6 Rows x 52.0" Wide + 6.0" Spacing x 5 + 12.0" Side Stone x 2 = 30.50' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

6 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 6 Rows = 380.0 cf Chamber Storage

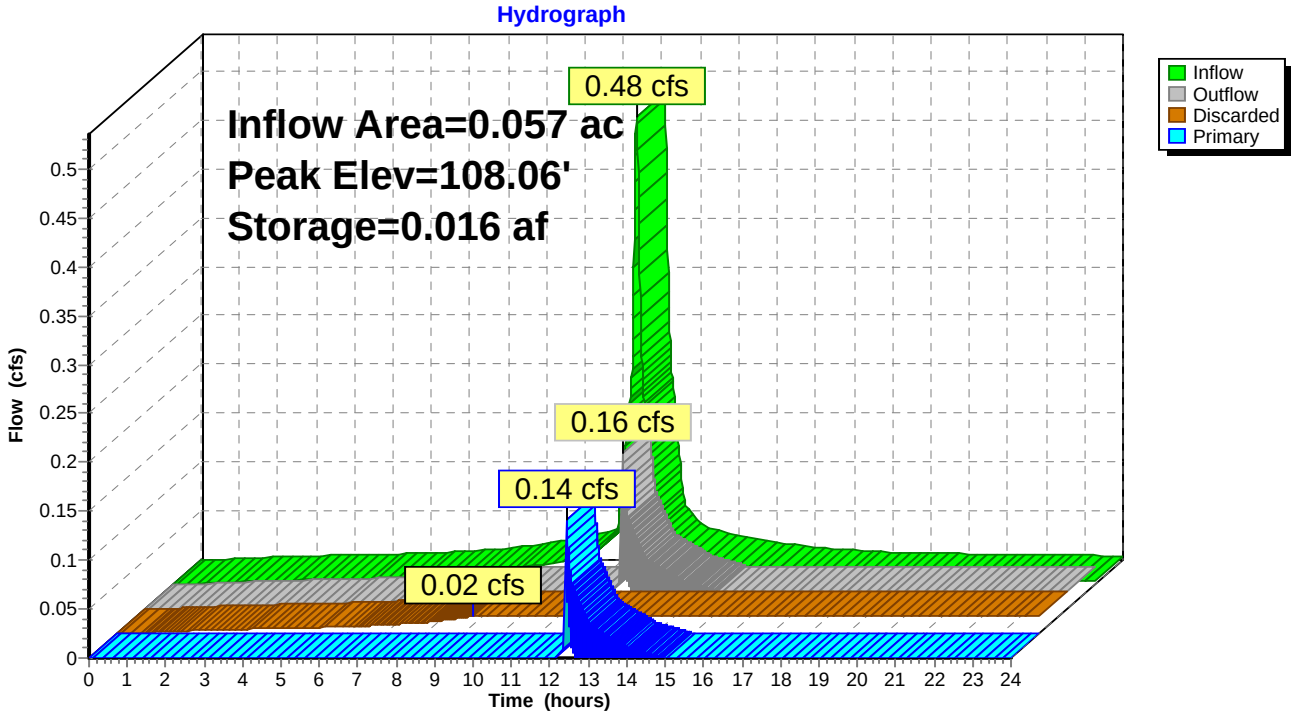
1,134.2 cf Field - 380.0 cf Chambers = 754.2 cf Stone x 40.0% Voids = 301.7 cf Stone Storage

Chamber Storage + Stone Storage = 681.7 cf = 0.016 af
Overall Storage Efficiency = 60.1%
Overall System Size = 10.50' x 30.50' x 3.54'

6 Chambers
42.0 cy Field
27.9 cy Stone



Pond Lot 4: Roof Recharge



Summary for Pond PR1: Recharge 1

Inflow Area = 1.077 ac, 34.35% Impervious, Inflow Depth > 5.96" for 100-Year event
Inflow = 6.18 cfs @ 12.15 hrs, Volume= 0.535 af
Outflow = 4.96 cfs @ 12.37 hrs, Volume= 0.393 af, Atten= 20%, Lag= 13.0 min
Discarded = 0.22 cfs @ 10.11 hrs, Volume= 0.277 af
Primary = 4.74 cfs @ 12.37 hrs, Volume= 0.116 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 109.57' @ 12.37 hrs Surf.Area= 0.089 ac Storage= 0.204 af

Plug-Flow detention time= 202.2 min calculated for 0.393 af (73% of inflow)
Center-of-Mass det. time= 115.6 min (918.9 - 803.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	103.00'	0.075 af	**74.00'W x 52.50'L x 3.54'H Field A** 0.316 af Overall - 0.130 af Embedded = 0.186 af x 40.0% Voids
#2A	103.50'	0.130 af	**Cultec R-330XLHD** x 105 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 15 rows
		0.204 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	103.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	108.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.22 cfs @ 10.11 hrs HW=103.05' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=4.74 cfs @ 12.37 hrs HW=109.57' (Free Discharge)
↑**2=Orifice/Grate** (Orifice Controls 4.74 cfs @ 6.04 fps)

Pond PR1: Recharge 1 - 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 15 rows

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

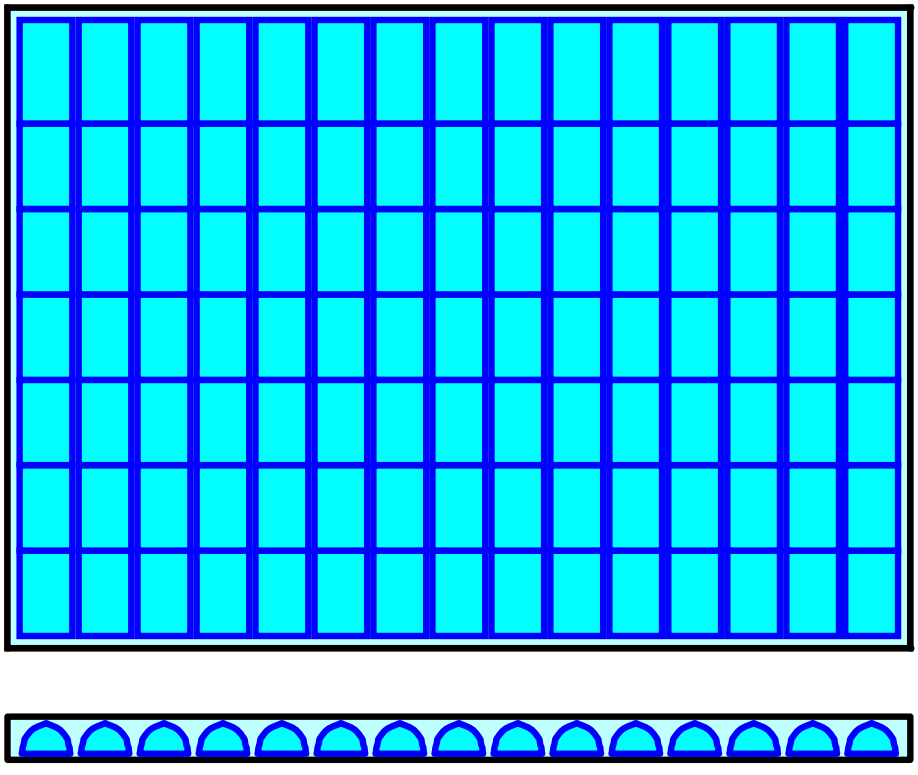
7 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 50.50' Row Length +12.0" End Stone x 2 = 52.50' Base Length
15 Rows x 52.0" Wide + 6.0" Spacing x 14 + 12.0" Side Stone x 2 = 74.00' Base Width
6.0" Stone Base + 30.5" Chamber Height + 6.0" Stone Cover = 3.54' Field Height

105 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 15 Rows = 5,644.1 cf Chamber Storage

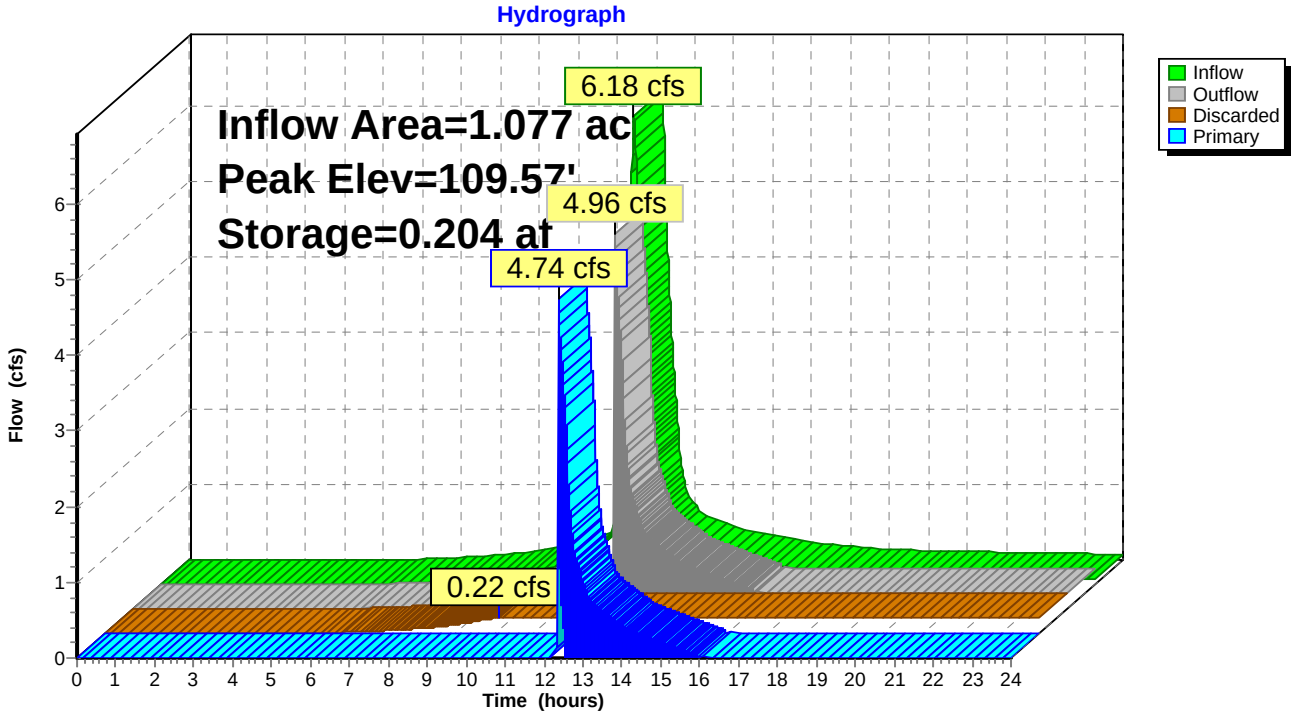
13,759.4 cf Field - 5,644.1 cf Chambers = 8,115.2 cf Stone x 40.0% Voids = 3,246.1 cf Stone Storage

Chamber Storage + Stone Storage = 8,890.2 cf = 0.204 af
Overall Storage Efficiency = 64.6%
Overall System Size = 52.50' x 74.00' x 3.54'

105 Chambers
509.6 cy Field
300.6 cy Stone



Pond PR1: Recharge 1



Town of Reading
Engineering Division

Memo

To: Andrew MacNichol , Community Development Director

From: Ryan A. Percival, P.E., Town Engineer;

CC: Community Planning and Development Commission;

Date: June 4, 2024

Re: Harold Avenue Extension

Materials reviewed:

- Definitive Subdivision Plan entitled; "Harold Avenue Extension", 0 Harold Avenue Reading, Massachusetts; prepared by Sullivan Engineering Group, LLC; dated November 4, 2023
- Drainage Analysis, Harold Avenue Extension; prepared by Sullivan Engineering Group, LLC; dated December 3, 2023

The Engineering Division has reviewed the proposed site application for the proposed project and offers the following comments:

- The subdivision plan appears to not meet proof. The plan does not conform to Section 7.1.2(a), "All angles in street lines shall be eased with curves having a center line radius of one hundred (100) feet minimum. Center lines of opposing streets shall be spaced a minimum of one hundred and fifty (150) feet apart. Reverse curves shall be separated with tangents having a minimum length of seventy-five feet".
- The stormwater design was based on the NOAA Atlas 14 rainfall frequencies. The post development runoff volumes for the 2-, 10-, 25- and 100-year storm have all been reduced. Post development peak discharge rates have been reduced except for the 100-year storm, which saw a slight increase.
- The Storm water design meets TSS removal at 90%
- The applicant shall provide phosphorus removal calculations.
- The size and type of the water and sewer service shall be shown on the plan.
- It is unclear what is happening with the drainage onsite. What is happening from DMH-1 down R1 to the round structure? Is this a catch basin?
- The garage floor elevation is lower than the surrounding area. A trench is proposed and should extend the entire width of the pavement. Was there consideration to raise the home to eliminate potential garage flooding?
- The Driveway width shall be labeled.
- Provide a detail of the retaining wall.
- All utilities shall be approved materials and installed in accordance with the Department of Public Works Standards.
- Engineering Division shall be notified 72 hours in advance to mark out Town utilities.
- All water, sewer, curb cut, street opening and Jackie's Law excavation permits shall be obtained at the Engineering Division prior to any excavations.
- All site work shall be inspected by the Engineering Division. The Applicant/Owner's contractor shall submit a construction schedule of proposed work. All inspections shall be scheduled 48 hours in advance.
- An approved site as-built shall be submitted to the Engineering Division within 60 days of certificate of occupancy. The as-built shall be submitted in mylar and electronic ACAD format

Sullivan Engineering Group, LLC
Civil Engineers & Land Development Consultants

December 4, 2023

Town of Reading
Planning Dept.
16 Lowell Street
Reading, MA 01867

Re: 0 Harold Avenue Extension – Definitive Subdivision
List of Waivers – Subdivision Rules & Regulations

Planning Department;

The following is a list of waivers from the Town of Reading Subdivision Rules and Regulations with supporting justification.

1. A waiver from Section 6.1.1.B.10 requiring existing topography of the tract and of all lands within 100 feet.
   a. The applicant requests relief from this requirement due to limited area on a 4 acre parcel that is being disturbed to construct the house, driveway, utilities, and grading.
2. A waiver from Section 6.1.1.B.17 requiring a profile of existing and proposed grades along the centerline and ROW sidelines for all proposed streets and way.
   a. The applicant requests a waiver from this requirement since no roadway is proposed.
3. A waiver from Section 6.1.1.C requiring a Way and Profile Plan
   a. The applicant requests a waiver from this requirement since no roadway is proposed.
4. A waiver from Section 6.1.1.D(3) requiring a Traffic Study
   a. The applicant requests requests relief from this requirement due to the modest scope of one additional single family home.
5. A waiver from Section 6.1.1.D(5) requiring test boring logs
   a. The applicant requests a waiver from this requirement since no deep utility services are proposed
6. A waiver from Section 7.1.1.B requiring grades of streets
   a. The applicant requests a waiver from this requirement since no roadway is proposed (only a driveway)
7. A waiver from Section 7.1.3 requiring street cross section
   a. The applicant requests a waiver from this requirement since no roadway is proposed.
8. A waiver from Section 7.1.4(B) requiring the intersection of ways having a min. curbline radii of 30 feet.
   a. The applicant requests a waiver from this requirement since the site has insufficient lot frontage to allow 30 foot radii. Since the applicant is only proposing one single family house to be accessed by a driveway a conventional radii rounding is not warranted.
9. A waiver from Section 7.1.5 requiring deadend streets to have a cul-de-sac.
   a. The applicant requests a waiver from this requirement due to the limited scope of this project. In addition, the fire chief stated he would need a cul-de-sac in the case of 2 or more houses for this development. One single family house is being proposed.

P.O. Box 2004 Woburn, MA 01888 (781) 854-8644 e-mail: jacksull53@comcast.net

10. A waiver from Section 7.1.7 requiring the installation of curbing
    a. *The applicant requests a waiver from this requirement since no roadway is being constructed*
11. A waiver from Section 7.1.8 requiring the installation of monuments
    a. *The applicant requests a waiver from this requirement since this development will remain private.*
12. A waiver from Section 7.1.9 requiring the installation of signs
    a. *A waiver from this requirement is requested since no signs are needed for the limited project.*
13. A waiver from Section 7.1.11 requiring the installation of street lighting
    a. *A waiver from this requirement is requested due to the modest scope of work for this project and with one single family house that traditional lighting will suffice for safety.*
14. A waiver from Section 7.2 requiring the installation of sidewalks
    a. *A waiver from this requirement is requested due to the limited scope of this project.*
15. A waiver from Section 7.6 requiring the installation of street trees
    a. *A waiver is requested from this requirement since no roadway is proposed and the applicant has made an effort to save as many mature trees on site as possible*
16. A waiver from Section 8.0 requiring the construction of a way
    a. *A waiver is requested from this requirement since no roadway is proposed.*
17. A waiver from Section 6.1.1.D.4 requiring an Environmental Impact Study to be performed.
    a. *The applicant will be filing with the Reading Conservation Commission for review and approval with conditions for this project.*

Sincerely,

Jack Sullivan, PE

P.O. Box 2004 Woburn, MA 01888 (781) 854-8644 e-mail: jacksull53@comcast.net

Sullivan Engineering Group, LLC
Civil Engineers & Land Development Consultants

December 3, 2023

Town of Reading Engineering Department

Re: Harold Avenue Extension – Reading, MA
Drainage Analysis for CPDC submission

This drainage study was conducted at "Harold Avenue Extension" to evaluate the proposed Site development of the currently vacant lot. The existing site is predominately wooded with a dirt driveway. The proposed condition is for one single family house, paved driveway, and low impact development with attention to site preservation. The applicant is requesting waivers of the Subdivision Rules and Regulations to construct a 14 foot wide driveway in lieu of a conventional roadway/culdesac)

Soil testing was conducted on the site on May 4, 2023 and the soils were found to be suitable for drainage recharge (Loamy sand). The Existing Conditions Plan (Sheet 2) shows the testhole locations and the soil logs. An exfiltration rate of 1.02 in/hr is being used in the drainage analysis based on the Rawl's rate for a SANDY LOAM soil as a conservative approach to the stormwater design. The NRCS soil maps show this property being an "B" series soil. To mitigate the impact of the increase impervious surfaces with this site development a trench drain will be utilized for the driveway runoff with pretreatment of a deep sump manhole and rip-rap spreader prior to discharge to a raingarden. The rain garden is vertically sited 2 feet above the seasonal high groundwater table. The raingarden will have a rip-rap spillway to allow a controlled release of stormwater in larger storm events. The drainage system has been sized utilizing the 2, 10, 25, & 100 year storm numbers provided by NOAA.

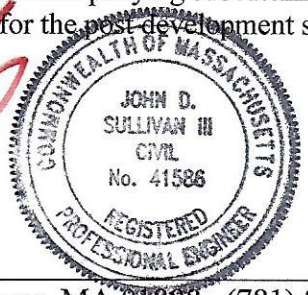
IMPORTANT....this project will require filing with the Conservation Commission for review and approval. This drainage report will be supplemented at that time with the NOI stormwater report, drainage performance standards,

The HydroCAD report models the Predevelopment Condition vs. Postdevelopment Condition for the entire site area. The stormwater design reduces the peak rate of runoff for the 2, 10, 25, and 100 year storm event. The peak rate of stormwater runoff has been reduced for the 2 & 10 year storm event. The volume of stormwater runoff has been reduced in the 2, 10, 25, and 100 year storm. By reducing the stormwater volume in larger storm events will protect against flooding in accordance with the DEP stormwater requirements. The following is summary of the peak rate of runoff for various storm events:

Storm Event	Predevelopment Peak rate (cfs)	Postdevelopment Peak rate (cfs)	Predevelopment Volume (AF)	Postdevelopment Volume (AF)
2 Year	0.43	0.05	0.047	0.007
10 Year	1.55	1.44	0.13	0.087
25 Year	2.81	3.27	0.223	0.181
100 Year	5.12	5.47	0.396	0.356

HydroCAD calculations with the accompanying subcatchment areas are attached to support these calculations. An operation and maintenance plan for the post-development stormwater condition is attached to the end of this report.

Very Truly Yours,



12-3-23

John (Jack) D. Sullivan III, PE

PO Box 2004 Woburn, MA 01888 (781) 854-8644 e-mail: jacksull53@comcast.net

Soil Map—Middlesex County, Massachusetts

Map Scale: 1:2,520 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 23, Sep 12, 2023

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

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
51A	Swansea muck, 0 to 1 percent slopes	4.9	20.8%
52A	Freetown muck, 0 to 1 percent slopes	5.3	22.5%
103B	Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes	0.2	0.8%
104D	Hollis-Rock outcrop-Charlton complex, 15 to 25 percent slopes	0.7	3.1%
422D	Canton fine sandy loam, 15 to 35 percent slopes, extremely stony	0.3	1.4%
424B	Canton fine sandy loam, 3 to 8 percent slopes, extremely bouldery	8.5	36.3%
629C	Canton-Charlton-Urban land complex, 3 to 15 percent slopes	3.5	15.1%
Totals for Area of Interest		**23.4**	**100.0%**

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Harold Avenue Extension

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Rain Garden	**0.90**	**1.00**	**0.90**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**

Total TSS Removal = **90%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project:

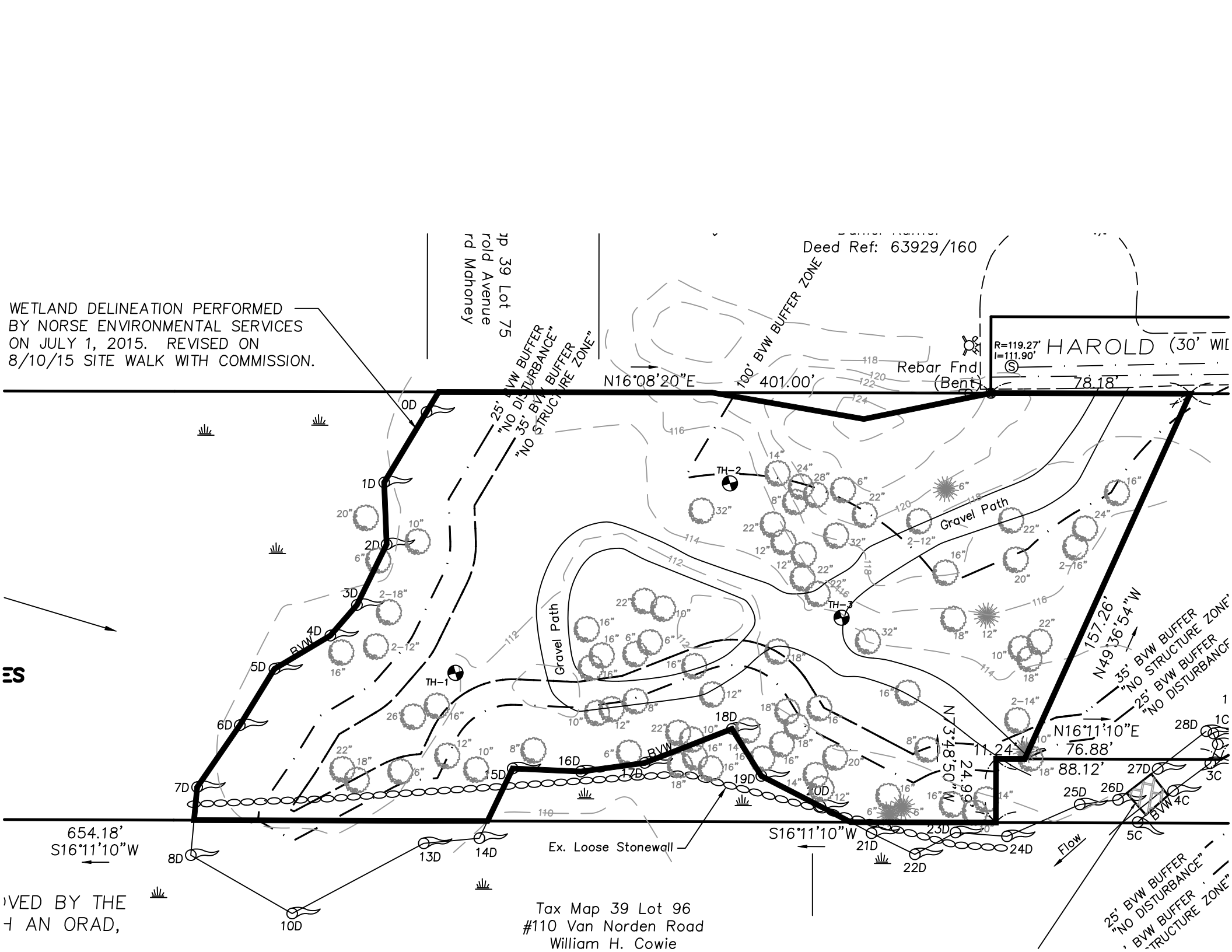
Prepared By: **JDS**

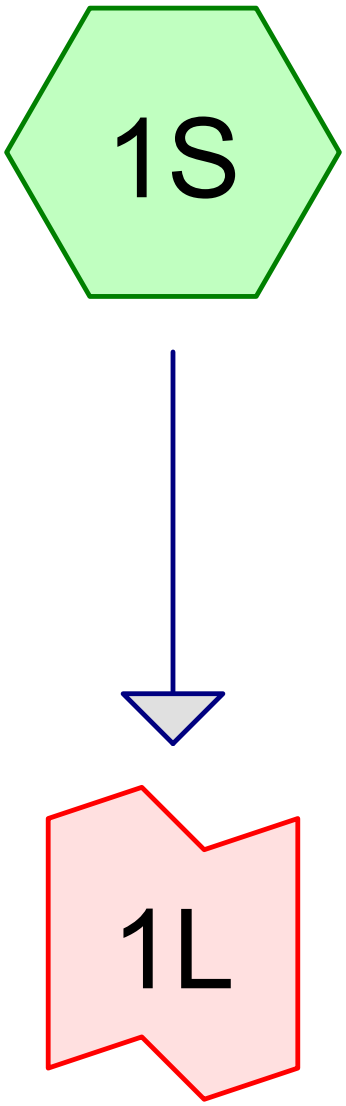
Date: **12/3/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1


WETLAND DELINEATION PERFORMED BY NORSE ENVIRONMENTAL SERVICES ON JULY 1, 2015. REVISED ON 8/10/15 SITE WALK WITH COMMISSION.
Deed Ref: 63929/160
100' BVW BUFFER ZONE
25' BVW BUFFER "NO DISTURBANCE"
35' BVW BUFFER "NO STRUCTURE ZONE"
N16°08'20"E
401.00'
Rebar Fnd (Bent)
R=119.27'
I=111.90'
HAROLD (30' WID
78.18'
Gravel Path
TH-1
TH-2
TH-3
BVW
157.26'
N49°36'54"W
N16°11'10"E
76.88'
11.24'
88.12'
N73°48'50"W
24.99'
654.18'
S16°11'10"W
S16°11'10"W
Ex. Loose Stonewall
Flow
Tax Map 39 Lot 96
#110 Van Norden Road
William H. Cowie



Design Point 1

Subcat Reach Pond Link

Drainage Diagram for Predevelopment
Prepared by Sullivan Engineering Group, LLC 12/3/2023

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Runoff Area=47,217 sf Runoff Depth=0.52"
Flow Length=202' Tc=8.0 min CN=63 Runoff=0.43 cfs 0.047 af

Link 1L: Design Point 1 Inflow=0.43 cfs 0.047 af
Primary=0.43 cfs 0.047 af

Total Runoff Area = 1.084 ac Runoff Volume = 0.047 af Average Runoff Depth = 0.52"

Subcatchment 1S:

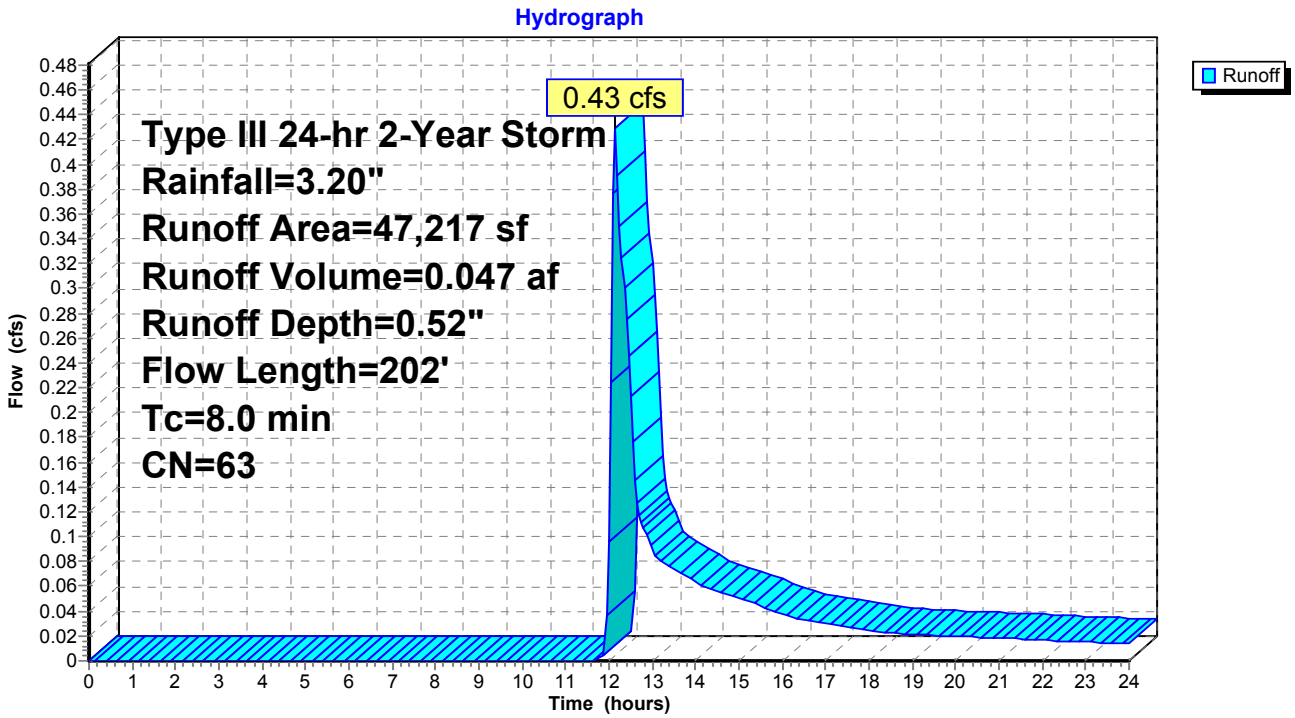
Runoff = 0.43 cfs @ 12.15 hrs, Volume= 0.047 af, Depth= 0.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
5,537	82	Dirt roads, HSG B
41,680	60	Woods, Fair, HSG B
47,217	63	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	50	0.1600	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
2.6	152	0.0390	1.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.0	202	Total			

Subcatchment 1S:

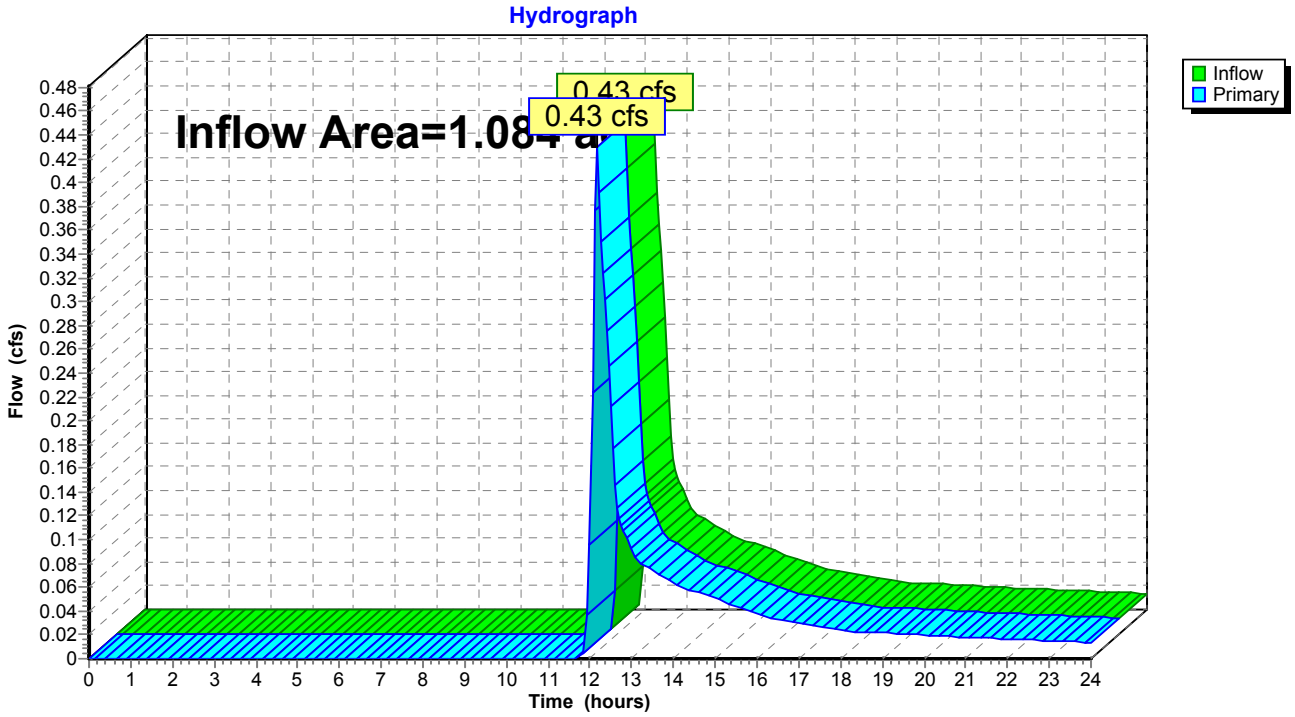


Link 1L: Design Point 1

Inflow Area = 1.084 ac, Inflow Depth = 0.52" for 2-Year Storm event
Inflow = 0.43 cfs @ 12.15 hrs, Volume= 0.047 af
Primary = 0.43 cfs @ 12.15 hrs, Volume= 0.047 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Design Point 1



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Runoff Area=47,217 sf Runoff Depth=1.44"
Flow Length=202' Tc=8.0 min CN=63 Runoff=1.55 cfs 0.130 af

Link 1L: Design Point 1 Inflow=1.55 cfs 0.130 af
Primary=1.55 cfs 0.130 af

Total Runoff Area = 1.084 ac Runoff Volume = 0.130 af Average Runoff Depth = 1.44"

Subcatchment 1S:

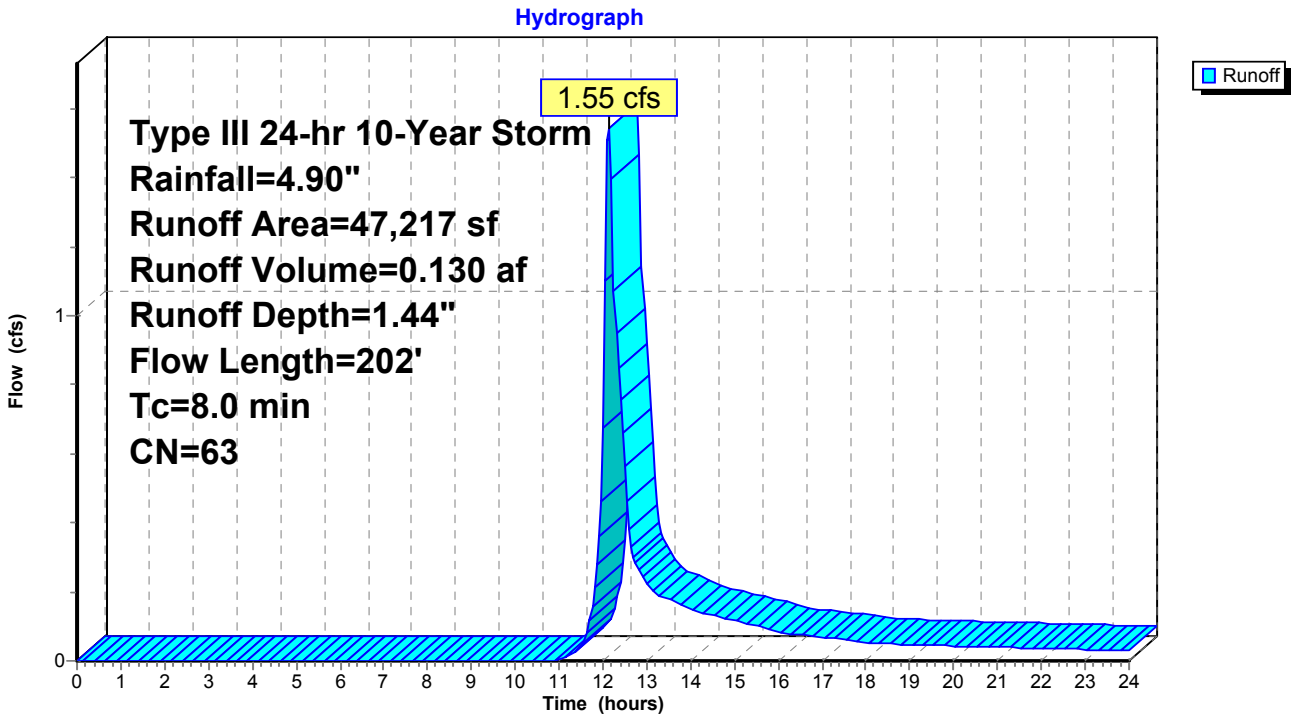
Runoff = 1.55 cfs @ 12.13 hrs, Volume= 0.130 af, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Storm Rainfall=4.90"

Area (sf)	CN	Description
5,537	82	Dirt roads, HSG B
41,680	60	Woods, Fair, HSG B
47,217	63	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	50	0.1600	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
2.6	152	0.0390	1.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.0	202	Total			

Subcatchment 1S:

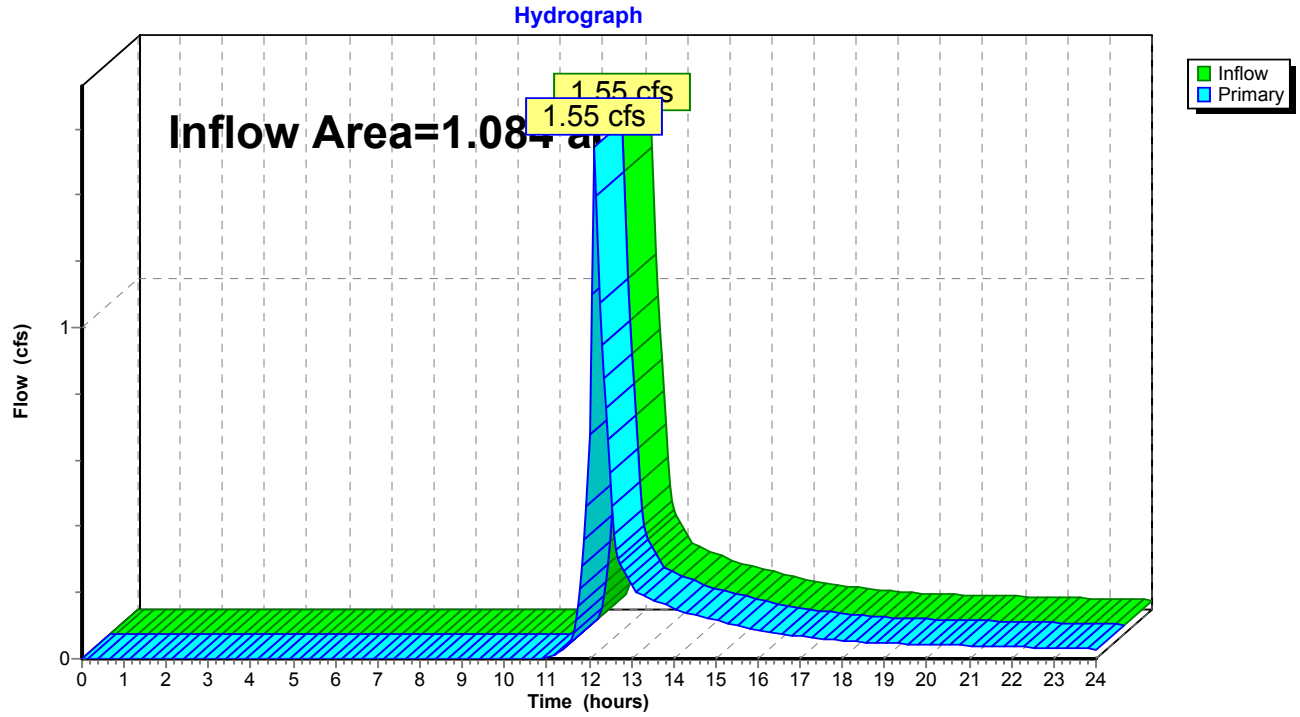


Link 1L: Design Point 1

Inflow Area = 1.084 ac, Inflow Depth = 1.44" for 10-Year Storm event
Inflow = 1.55 cfs @ 12.13 hrs, Volume= 0.130 af
Primary = 1.55 cfs @ 12.13 hrs, Volume= 0.130 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Design Point 1



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Runoff Area=47,217 sf Runoff Depth=2.46"
Flow Length=202' Tc=8.0 min CN=63 Runoff=2.81 cfs 0.223 af

Link 1L: Design Point 1 Inflow=2.81 cfs 0.223 af
Primary=2.81 cfs 0.223 af

Total Runoff Area = 1.084 ac Runoff Volume = 0.223 af Average Runoff Depth = 2.46"

Subcatchment 1S:

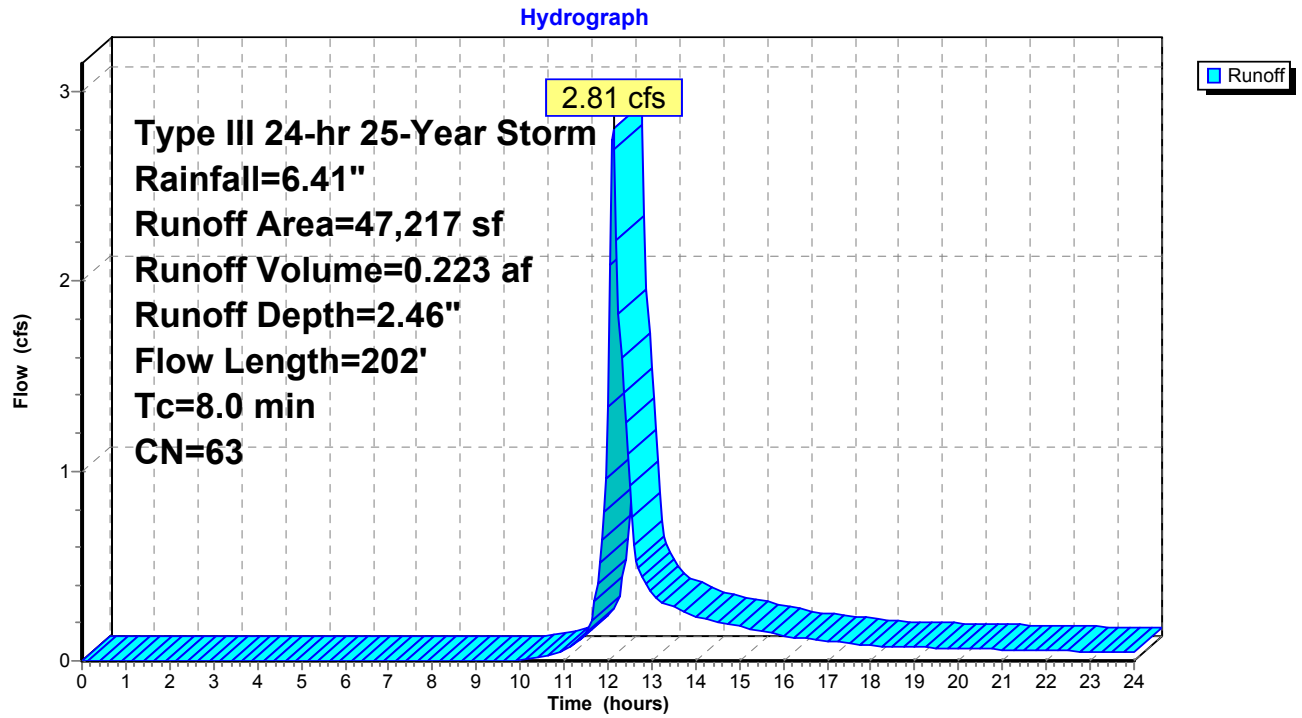
Runoff = 2.81 cfs @ 12.12 hrs, Volume= 0.223 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Storm Rainfall=6.41"

Area (sf)	CN	Description
5,537	82	Dirt roads, HSG B
41,680	60	Woods, Fair, HSG B
47,217	63	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	50	0.1600	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
2.6	152	0.0390	1.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.0	202	Total			

Subcatchment 1S:

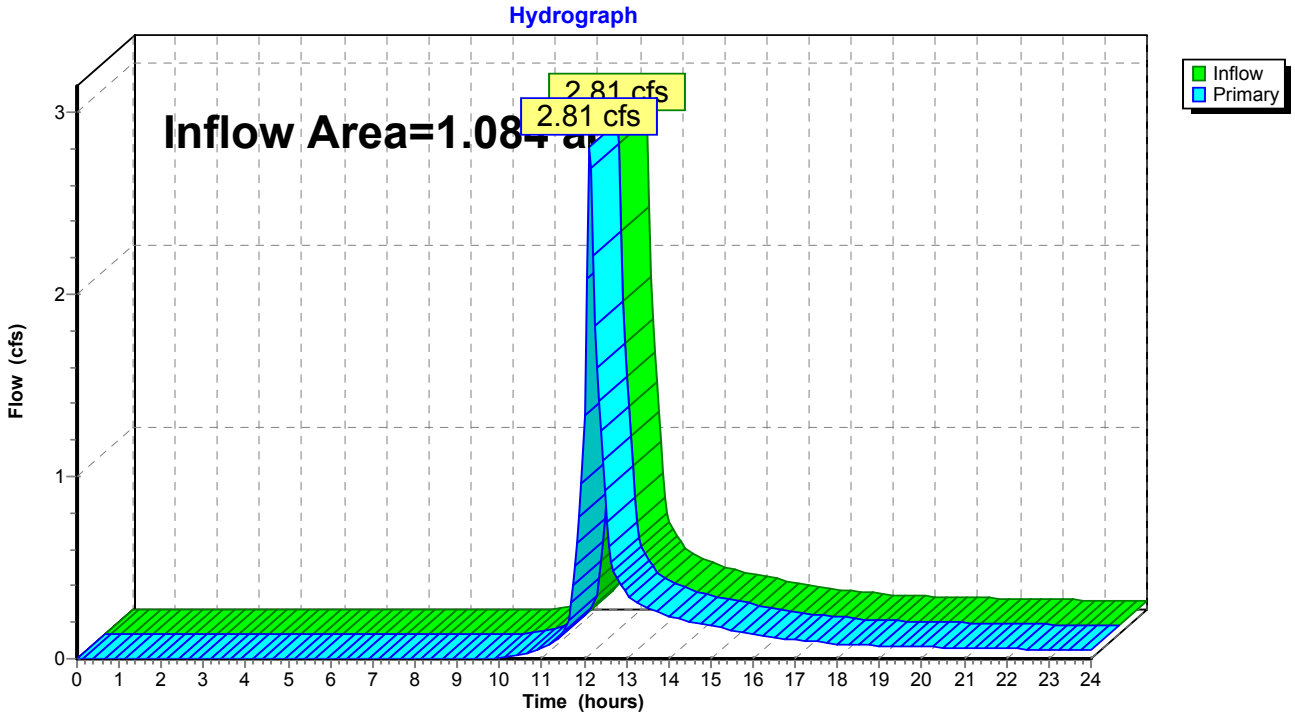


Link 1L: Design Point 1

Inflow Area = 1.084 ac, Inflow Depth = 2.46" for 25-Year Storm event
Inflow = 2.81 cfs @ 12.12 hrs, Volume= 0.223 af
Primary = 2.81 cfs @ 12.12 hrs, Volume= 0.223 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Design Point 1



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Runoff Area=47,217 sf Runoff Depth=4.38"
Flow Length=202' Tc=8.0 min CN=63 Runoff=5.12 cfs 0.396 af

Link 1L: Design Point 1 Inflow=5.12 cfs 0.396 af
Primary=5.12 cfs 0.396 af

Total Runoff Area = 1.084 ac Runoff Volume = 0.396 af Average Runoff Depth = 4.38"

Subcatchment 1S:

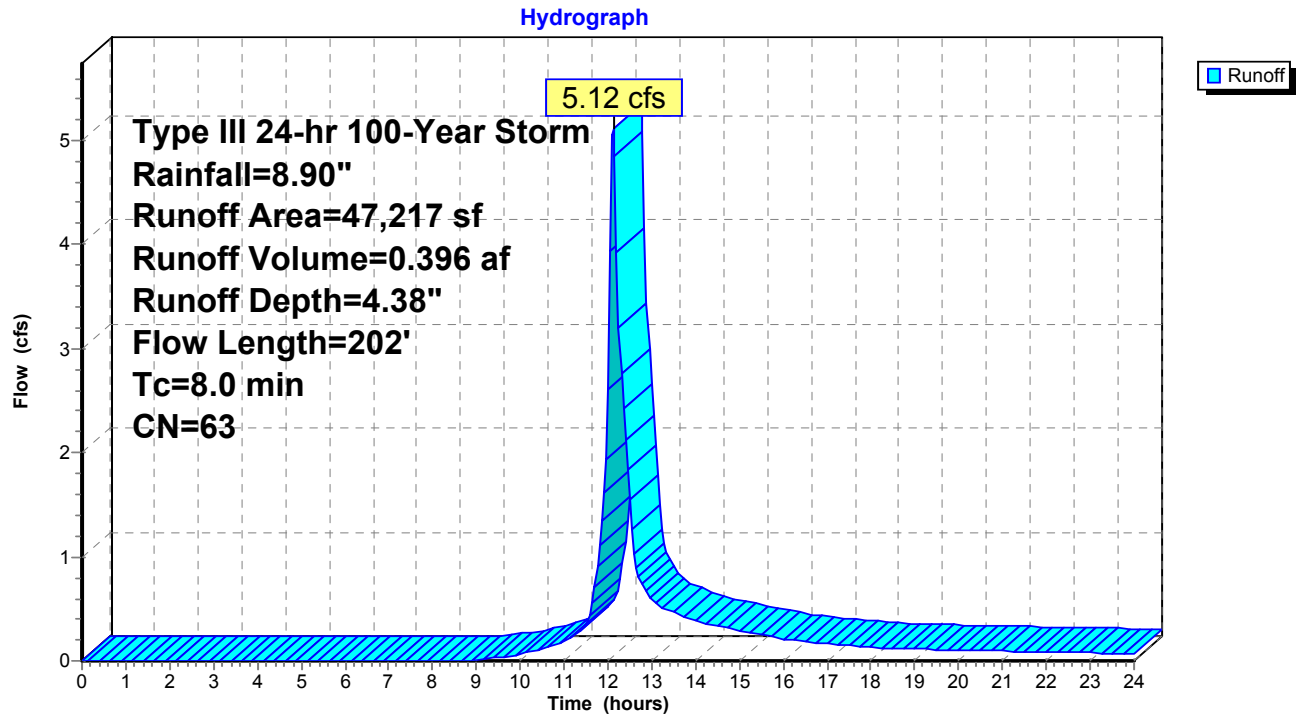
Runoff = 5.12 cfs @ 12.12 hrs, Volume= 0.396 af, Depth= 4.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Storm Rainfall=8.90"

Area (sf)	CN	Description
5,537	82	Dirt roads, HSG B
41,680	60	Woods, Fair, HSG B
47,217	63	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	50	0.1600	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
2.6	152	0.0390	1.0		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
8.0	202	Total			

Subcatchment 1S:

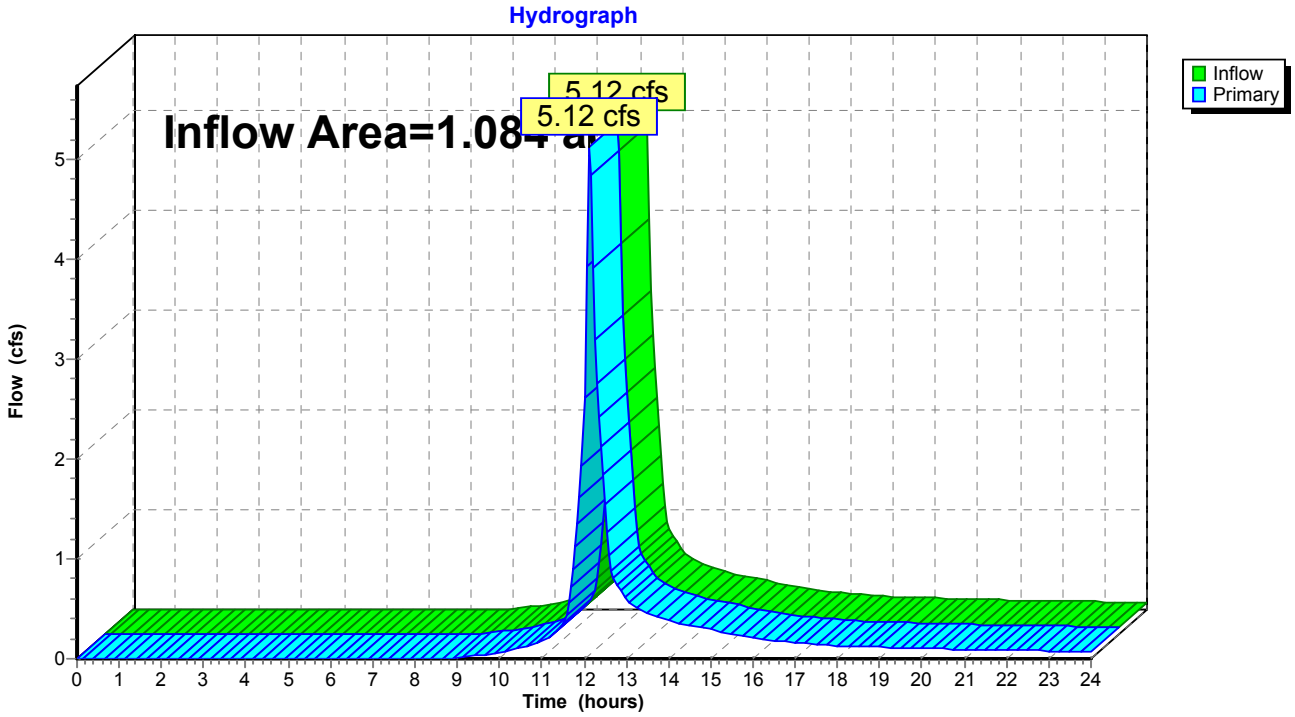


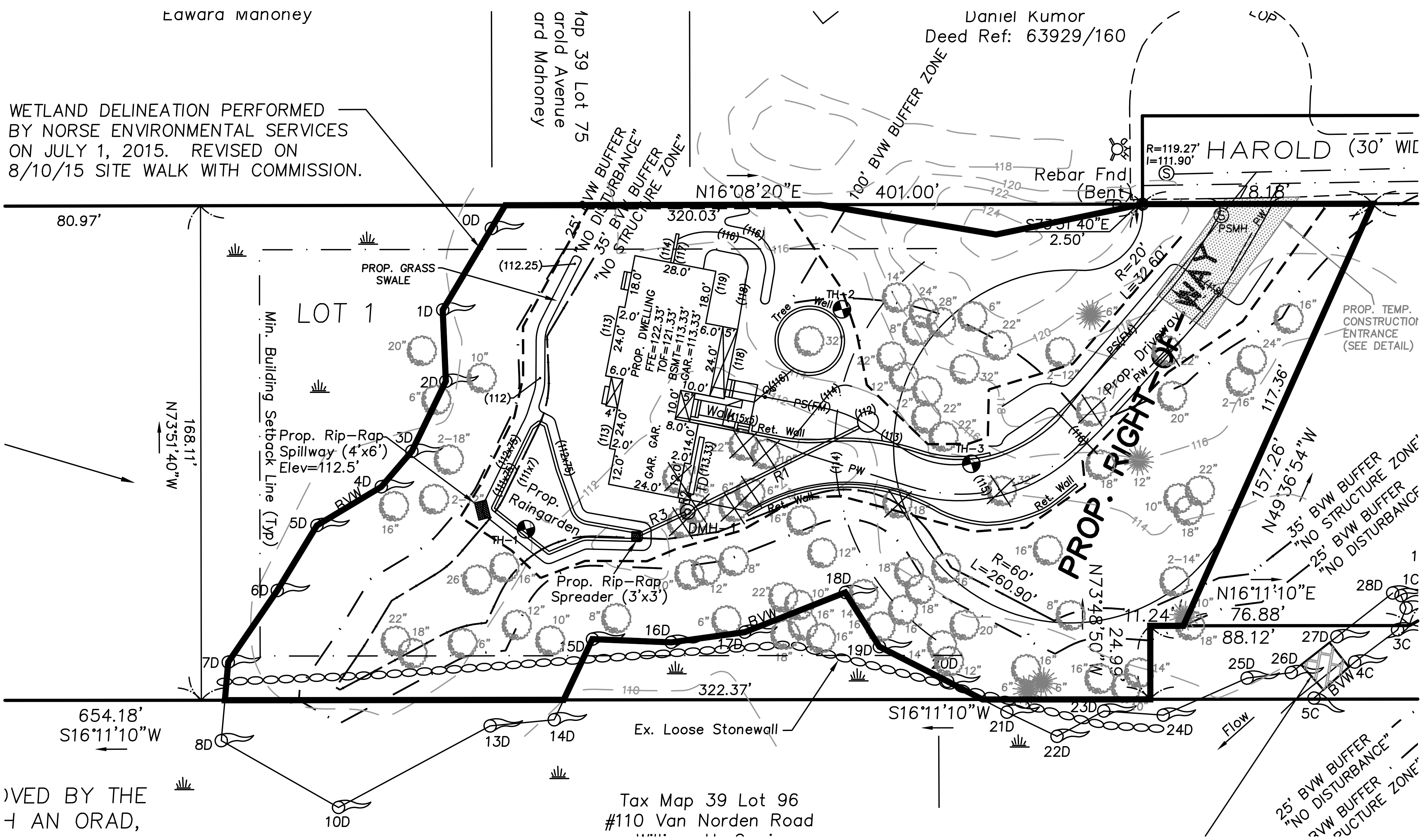
Link 1L: Design Point 1

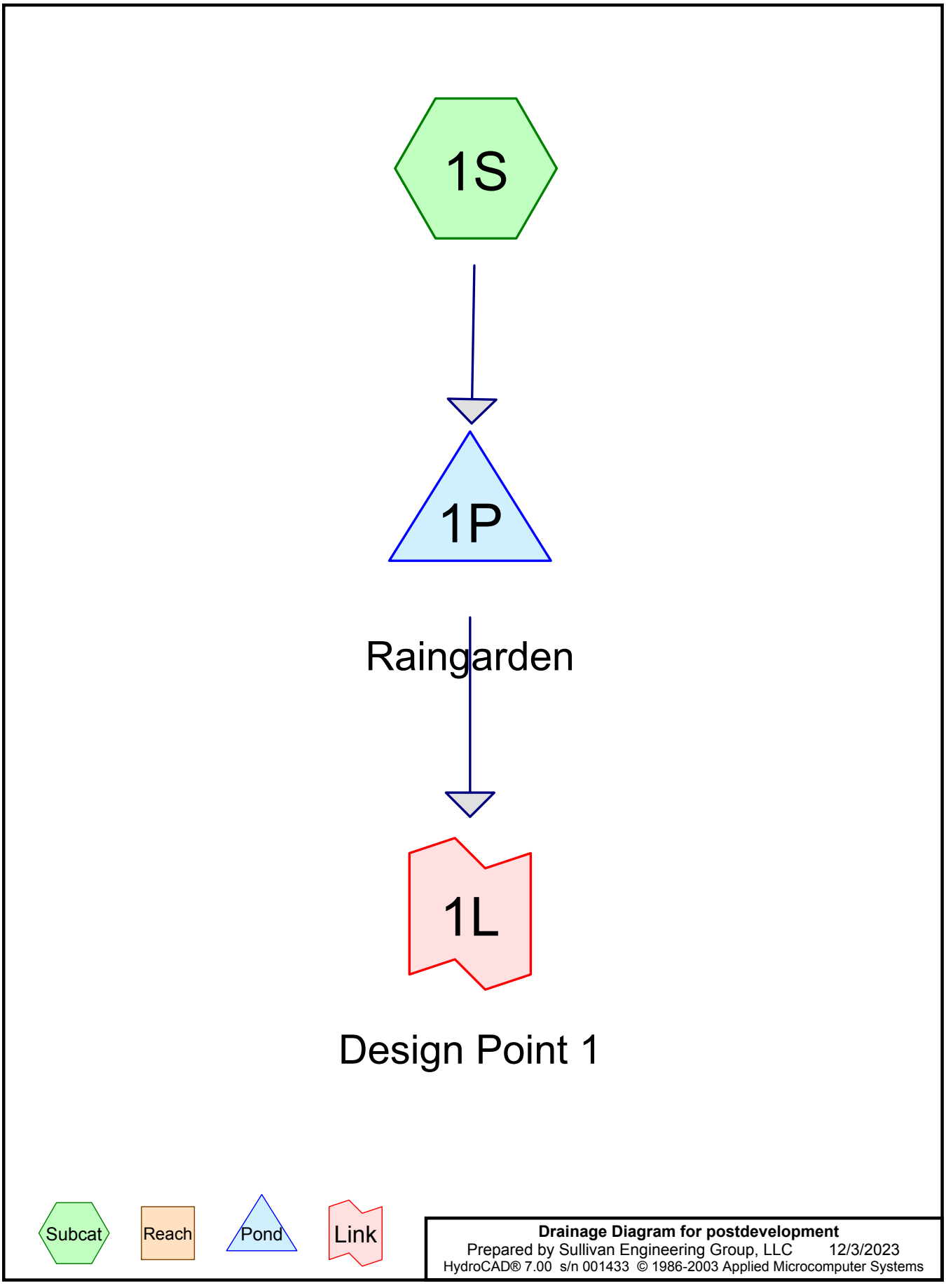
Inflow Area = 1.084 ac, Inflow Depth = 4.38" for 100-Year Storm event
Inflow = 5.12 cfs @ 12.12 hrs, Volume= 0.396 af
Primary = 5.12 cfs @ 12.12 hrs, Volume= 0.396 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Design Point 1




WETLAND DELINEATION PERFORMED BY NORSE ENVIRONMENTAL SERVICES ON JULY 1, 2015. REVISED ON 8/10/15 SITE WALK WITH COMMISSION.
Edward Mahoney
Map 39 Lot 75
Harold Avenue
ard Mahoney
Daniel Kumor
Deed Ref: 63929/160
100' BVW BUFFER ZONE
25' BVW BUFFER "NO DISTURBANCE"
35' BVW BUFFER "NO STRUCTURE ZONE"
HAROLD (30' WID
Rebar Fnd (Bent)
N16°08'20"E 401.00'
320.03'
S73°51'40"E 2.50'
78.18'
R=119.27' l=111.90'
PROP. TEMP. CONSTRUCTION ENTRANCE (SEE DETAIL)
PROP. RIGHT-OF-WAY
Prop. Driveway
R=20' L=32.60'
R=60' L=260.90'
117.36'
157.26' N49°36'54"W
N16°11'10"E 76.88'
88.12'
11.24'
N73°48'50"W 24.99'
LOT 1
Min. Building Setback Line (Typ)
PROP. GRASS SWALE
PROP. DWELLING
FFE=122.33'
TOF=121.33'
BSMT=113.33'
GAR.=113.33'
Prop. Raingarden
Prop. Rip-Rap Spillway (4'x6') Elev=112.5'
Prop. Rip-Rap Spreader (3'x3')
Ret. Wall
Tree Well
TH-1
TH-2
TH-3
DMH
Ex. Loose Stonewall
80.97'
168.11' N73°51'40"W
654.18' S16°11'10"W
322.37'
S16°11'10"W
Flow
Tax Map 39 Lot 96
#110 Van Norden Road
OVED BY THE
H AN ORAD,



Drainage Diagram for postdevelopment
Prepared by Sullivan Engineering Group, LLC 12/3/2023

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Runoff Area=47,217 sf Runoff Depth=0.60"
Flow Length=229' Tc=8.3 min CN=65 Runoff=0.54 cfs 0.054 af

Pond 1P: Raingarden Peak Elev=112.52' Storage=967 cf Inflow=0.54 cfs 0.054 af
Discarded=0.03 cfs 0.031 af Primary=0.05 cfs 0.007 af Outflow=0.08 cfs 0.038 af

Link 1L: Design Point 1 Inflow=0.05 cfs 0.007 af
Primary=0.05 cfs 0.007 af

Total Runoff Area = 1.084 ac Runoff Volume = 0.054 af Average Runoff Depth = 0.60"

Subcatchment 1S:

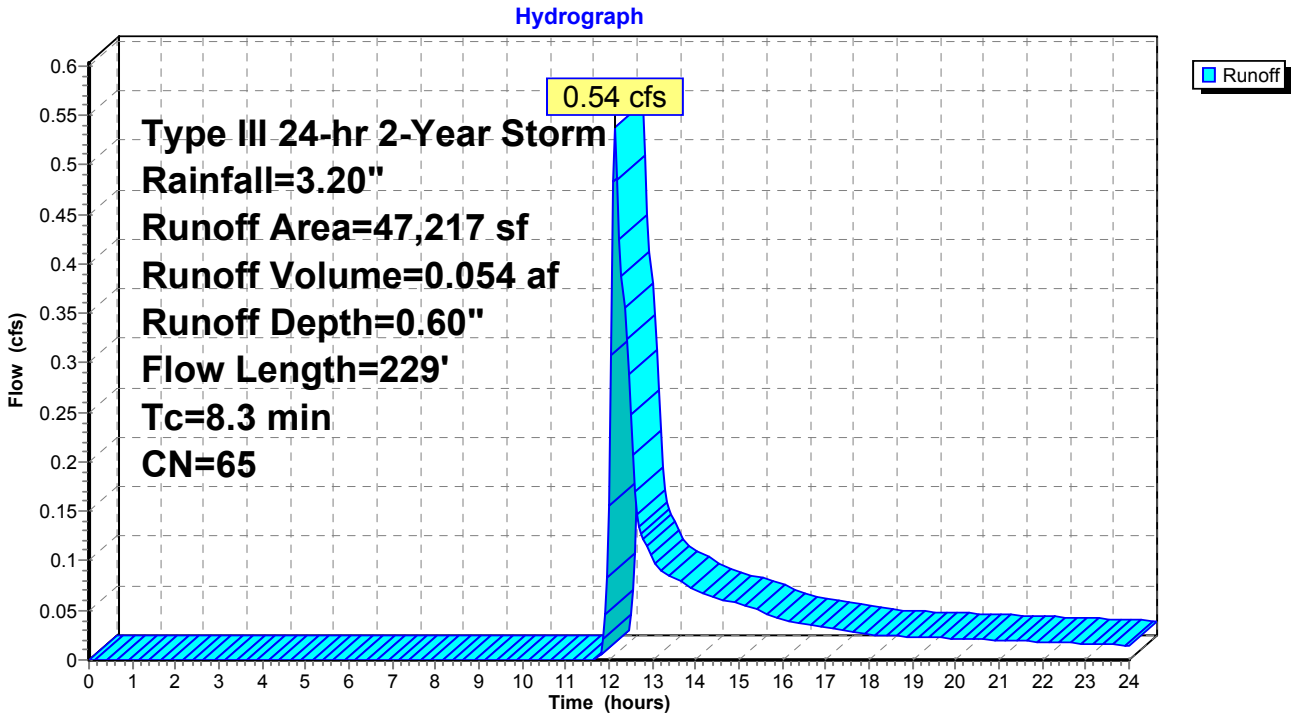
Runoff = 0.54 cfs @ 12.15 hrs, Volume= 0.054 af, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
2,458	98	House/Porch Roofs
170	98	walkway
3,685	98	paved driveway
217	98	ret wall
4,400	61	>75% Grass cover, Good, HSG B
36,287	60	Woods, Fair, HSG B
47,217	65	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	50	0.1600	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
2.9	179	0.0220	1.0		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	229	Total			

Subcatchment 1S:



Pond 1P: Raingarden

Inflow Area = 1.084 ac, Inflow Depth = 0.60" for 2-Year Storm event
Inflow = 0.54 cfs @ 12.15 hrs, Volume= 0.054 af
Outflow = 0.08 cfs @ 13.69 hrs, Volume= 0.038 af, Atten= 85%, Lag= 92.5 min
Discarded = 0.03 cfs @ 13.69 hrs, Volume= 0.031 af
Primary = 0.05 cfs @ 13.69 hrs, Volume= 0.007 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 112.52' @ 13.69 hrs Surf.Area= 1,383 sf Storage= 967 cf
Plug-Flow detention time= 252.5 min calculated for 0.038 af (70% of inflow)
Center-of-Mass det. time= 144.3 min (1,040.5 - 896.2)

#	Invert	Avail.Storage	Storage Description
1	111.70'	1,241 cf	**Custom Stage Data (Prismatic)** Listed below

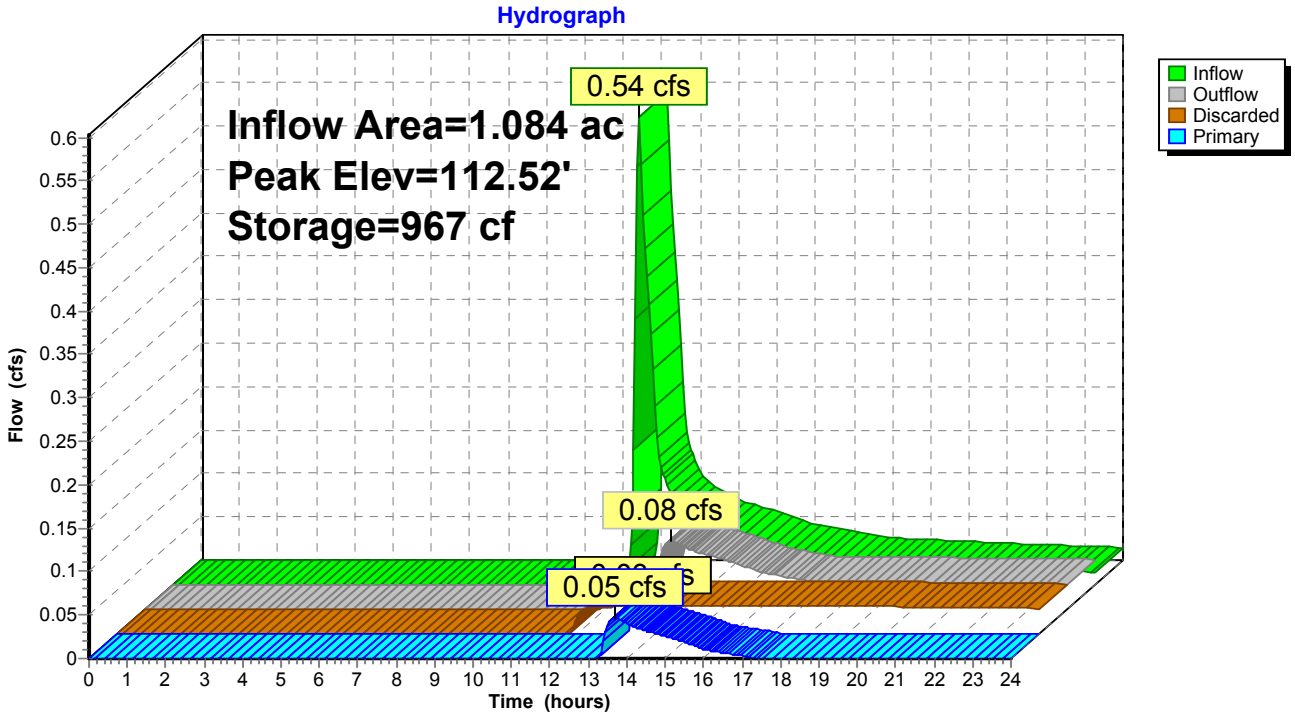
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
111.70	718	0	0
111.75	868	40	40
112.75	1,535	1,202	1,241

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	**0.001416 fpm Exfiltration over entire Surface area**
2	Primary	112.50'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.03 cfs @ 13.69 hrs HW=112.52' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.05 cfs @ 13.69 hrs HW=112.52' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 0.05 cfs @ 0.3 fps)

Pond 1P: Raingarden

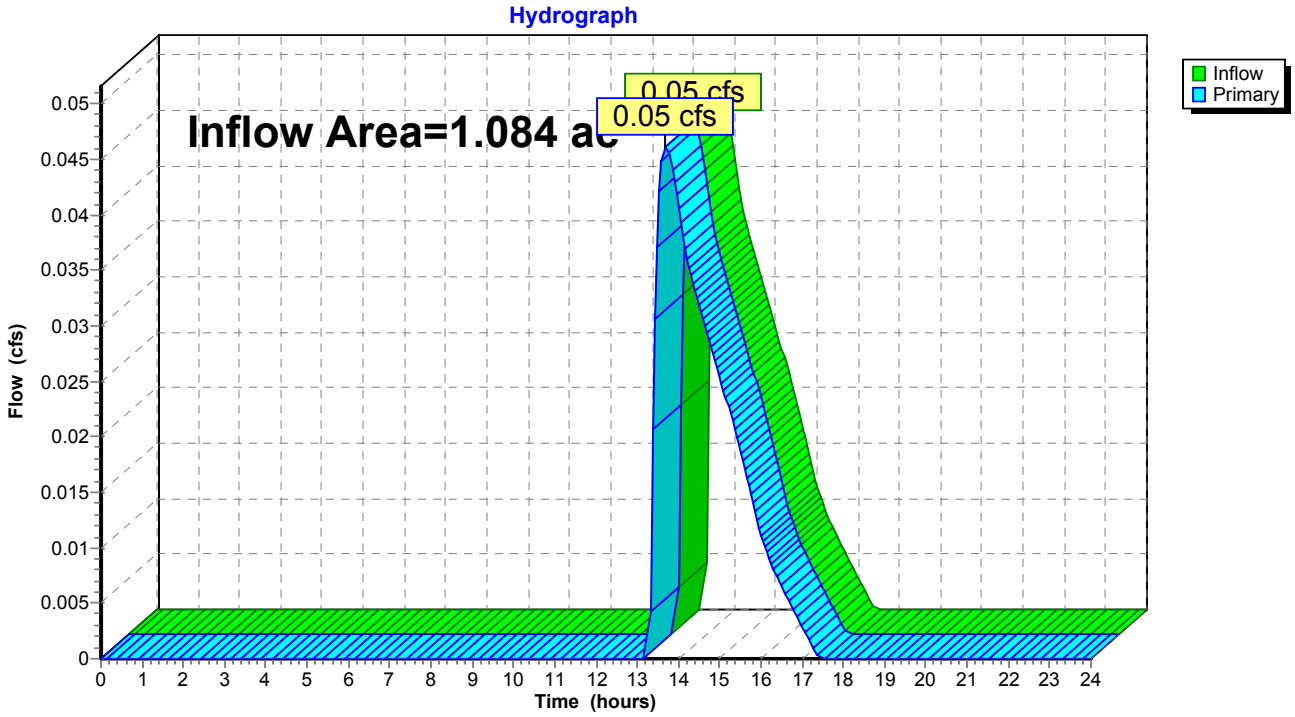


Link 1L: Design Point 1

Inflow Area = 1.084 ac, Inflow Depth = 0.08" for 2-Year Storm event
Inflow = 0.05 cfs @ 13.69 hrs, Volume= 0.007 af
Primary = 0.05 cfs @ 13.69 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Design Point 1



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Runoff Area=47,217 sf Runoff Depth=1.58"
Flow Length=229' Tc=8.3 min CN=65 Runoff=1.72 cfs 0.143 af

Pond 1P: Raingarden Peak Elev=112.72' Storage=1,201 cf Inflow=1.72 cfs 0.143 af
Discarded=0.04 cfs 0.034 af Primary=1.44 cfs 0.087 af Outflow=1.47 cfs 0.122 af

Link 1L: Design Point 1 Inflow=1.44 cfs 0.087 af
Primary=1.44 cfs 0.087 af

Total Runoff Area = 1.084 ac Runoff Volume = 0.143 af Average Runoff Depth = 1.58"

Subcatchment 1S:

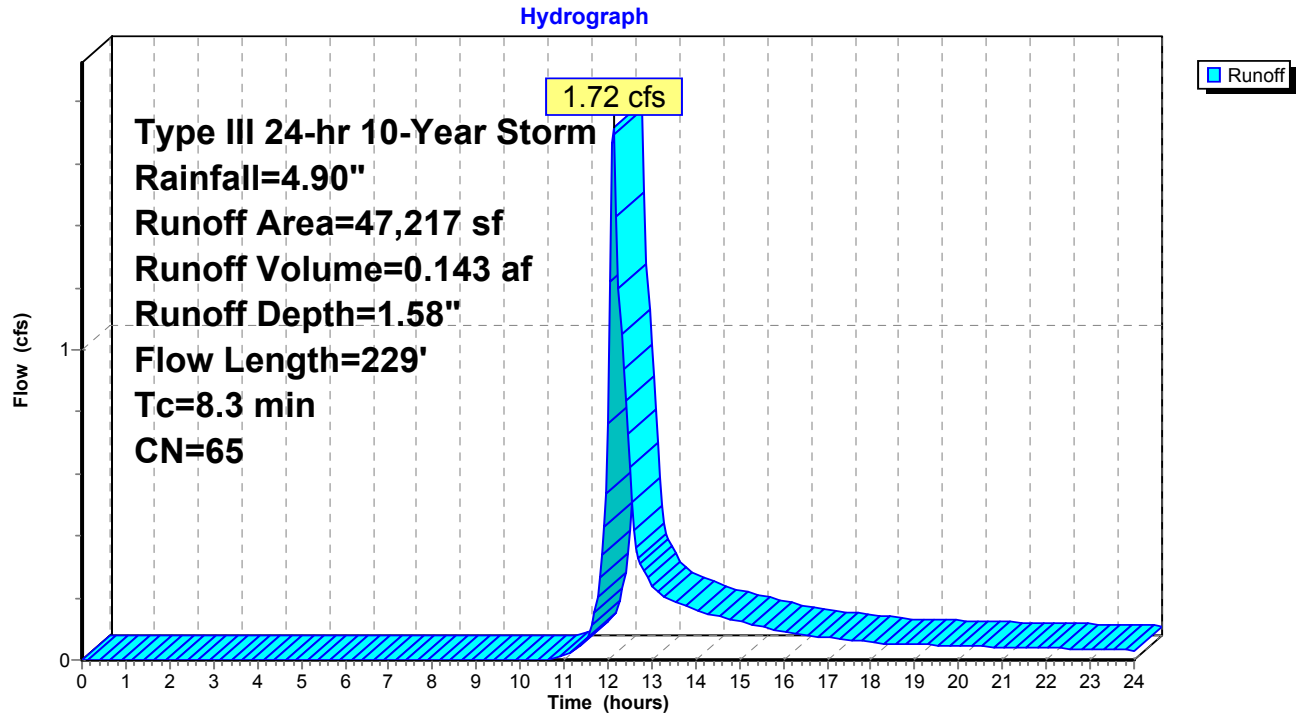
Runoff = 1.72 cfs @ 12.13 hrs, Volume= 0.143 af, Depth= 1.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Storm Rainfall=4.90"

Area (sf)	CN	Description
2,458	98	House/Porch Roofs
170	98	walkway
3,685	98	paved driveway
217	98	ret wall
4,400	61	>75% Grass cover, Good, HSG B
36,287	60	Woods, Fair, HSG B
47,217	65	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	50	0.1600	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
2.9	179	0.0220	1.0		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	229	Total			

Subcatchment 1S:



Pond 1P: Raingarden

Inflow Area = 1.084 ac, Inflow Depth = 1.58" for 10-Year Storm event
Inflow = 1.72 cfs @ 12.13 hrs, Volume= 0.143 af
Outflow = 1.47 cfs @ 12.22 hrs, Volume= 0.122 af, Atten= 14%, Lag= 5.3 min
Discarded = 0.04 cfs @ 12.22 hrs, Volume= 0.034 af
Primary = 1.44 cfs @ 12.22 hrs, Volume= 0.087 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 112.72' @ 12.22 hrs Surf.Area= 1,513 sf Storage= 1,201 cf
Plug-Flow detention time= 96.9 min calculated for 0.122 af (85% of inflow)
Center-of-Mass det. time= 30.4 min (893.7 - 863.2)

#	Invert	Avail.Storage	Storage Description
1	111.70'	1,241 cf	**Custom Stage Data (Prismatic)** Listed below

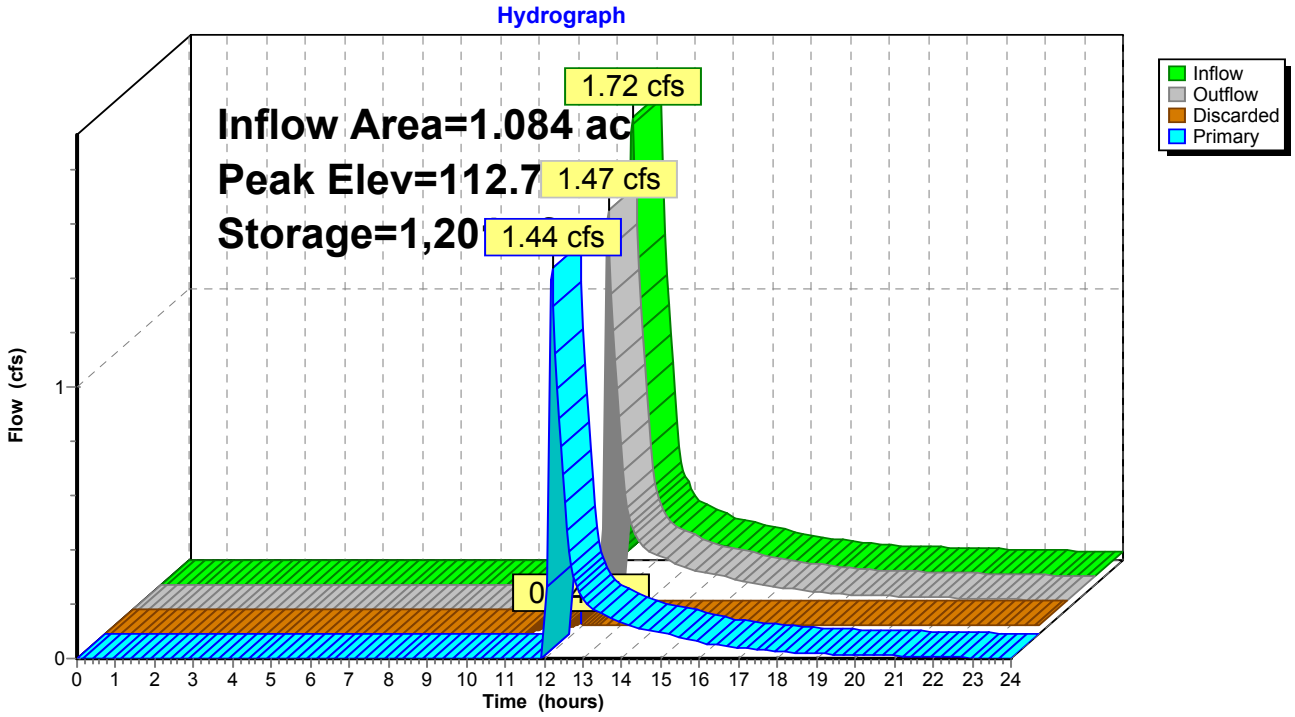
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
111.70	718	0	0
111.75	868	40	40
112.75	1,535	1,202	1,241

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	**0.001416 fpm Exfiltration over entire Surface area**
2	Primary	112.50'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.04 cfs @ 12.22 hrs HW=112.71' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=1.35 cfs @ 12.22 hrs HW=112.71' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.35 cfs @ 1.1 fps)

Pond 1P: Raingarden

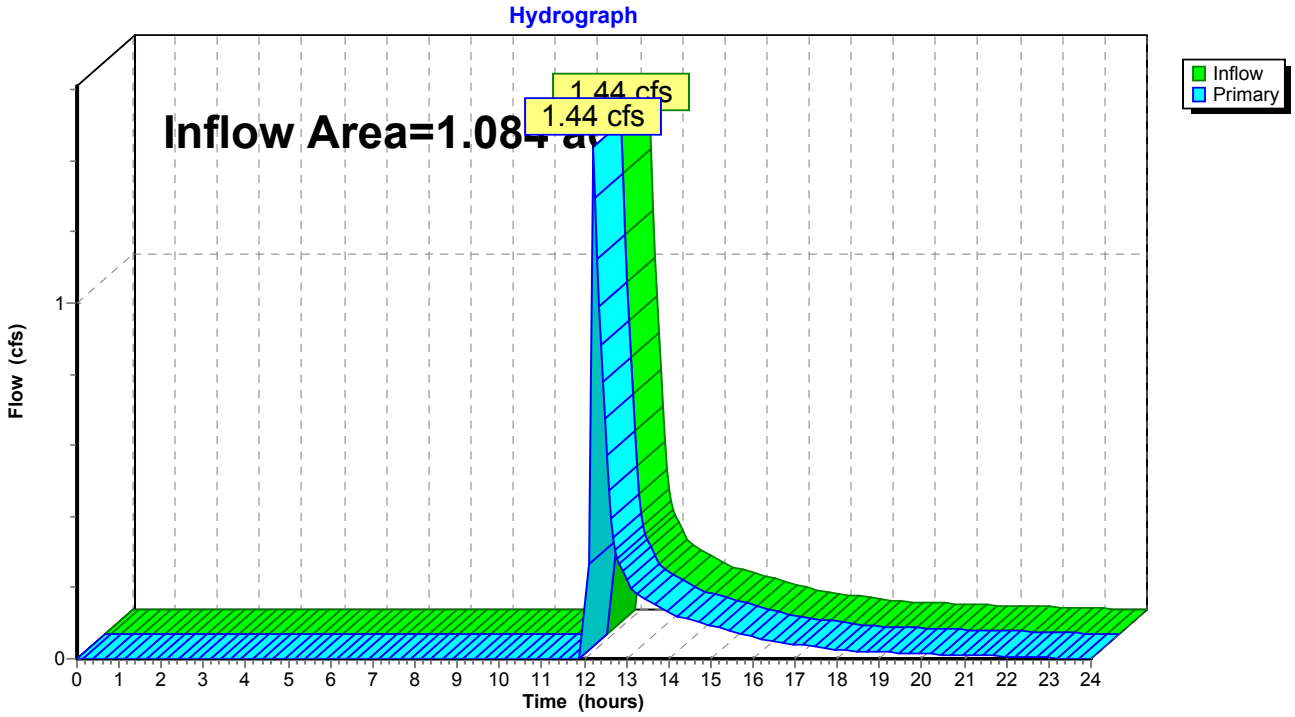


Link 1L: Design Point 1

Inflow Area = 1.084 ac, Inflow Depth = 0.97" for 10-Year Storm event
Inflow = 1.44 cfs @ 12.22 hrs, Volume= 0.087 af
Primary = 1.44 cfs @ 12.22 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Design Point 1



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Runoff Area=47,217 sf Runoff Depth=2.65"
Flow Length=229' Tc=8.3 min CN=65 Runoff=3.02 cfs 0.239 af

Pond 1P: Raingarden Peak Elev=112.86' Storage=1,241 cf Inflow=3.02 cfs 0.239 af
Discarded=0.04 cfs 0.036 af Primary=3.27 cfs 0.181 af Outflow=3.31 cfs 0.217 af

Link 1L: Design Point 1 Inflow=3.27 cfs 0.181 af
Primary=3.27 cfs 0.181 af

Total Runoff Area = 1.084 ac Runoff Volume = 0.239 af Average Runoff Depth = 2.65"

Subcatchment 1S:

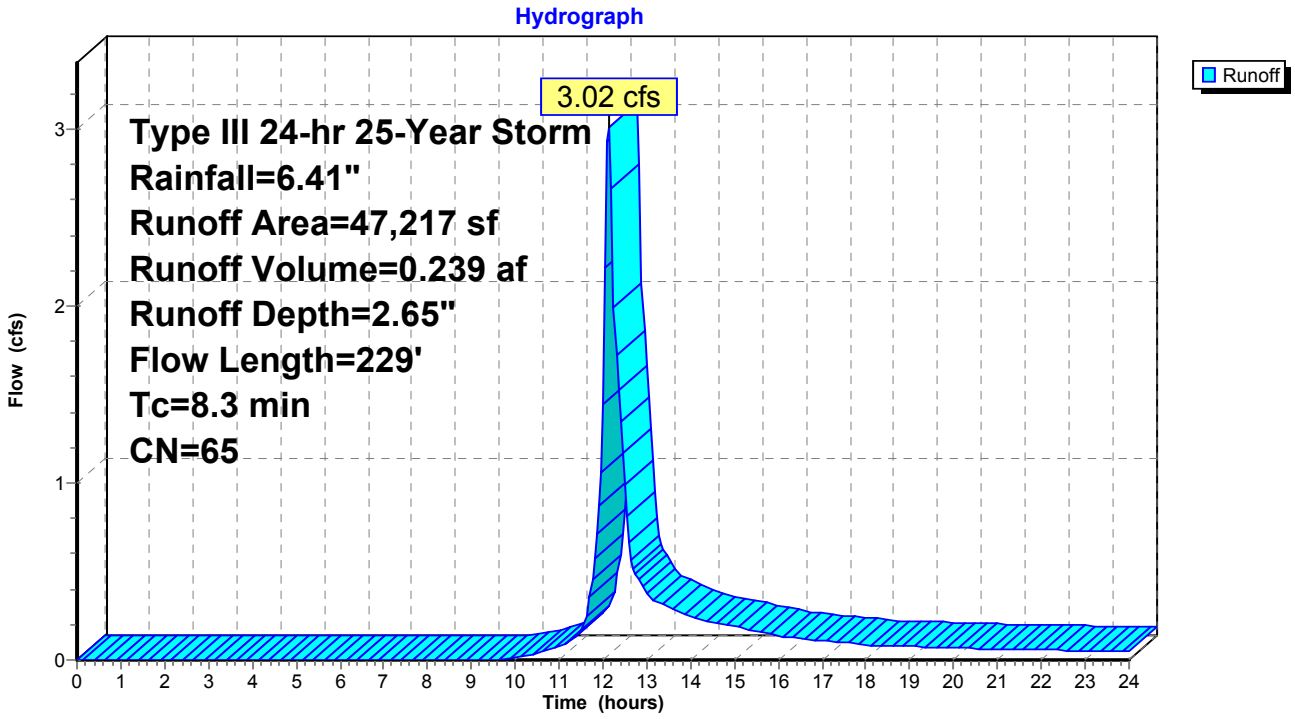
Runoff = 3.02 cfs @ 12.12 hrs, Volume= 0.239 af, Depth= 2.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Storm Rainfall=6.41"

Area (sf)	CN	Description
2,458	98	House/Porch Roofs
170	98	walkway
3,685	98	paved driveway
217	98	ret wall
4,400	61	>75% Grass cover, Good, HSG B
36,287	60	Woods, Fair, HSG B
47,217	65	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	50	0.1600	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
2.9	179	0.0220	1.0		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	229	Total			

Subcatchment 1S:



Pond 1P: Raingarden

Inflow Area = 1.084 ac, Inflow Depth = 2.65" for 25-Year Storm event
Inflow = 3.02 cfs @ 12.12 hrs, Volume= 0.239 af
Outflow = 3.31 cfs @ 12.11 hrs, Volume= 0.217 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.04 cfs @ 12.10 hrs, Volume= 0.036 af
Primary = 3.27 cfs @ 12.11 hrs, Volume= 0.181 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 112.86' @ 12.11 hrs Surf.Area= 1,535 sf Storage= 1,241 cf
Plug-Flow detention time= 63.1 min calculated for 0.217 af (91% of inflow)
Center-of-Mass det. time= 18.2 min (865.9 - 847.7)

#	Invert	Avail.Storage	Storage Description
1	111.70'	1,241 cf	**Custom Stage Data (Prismatic)** Listed below

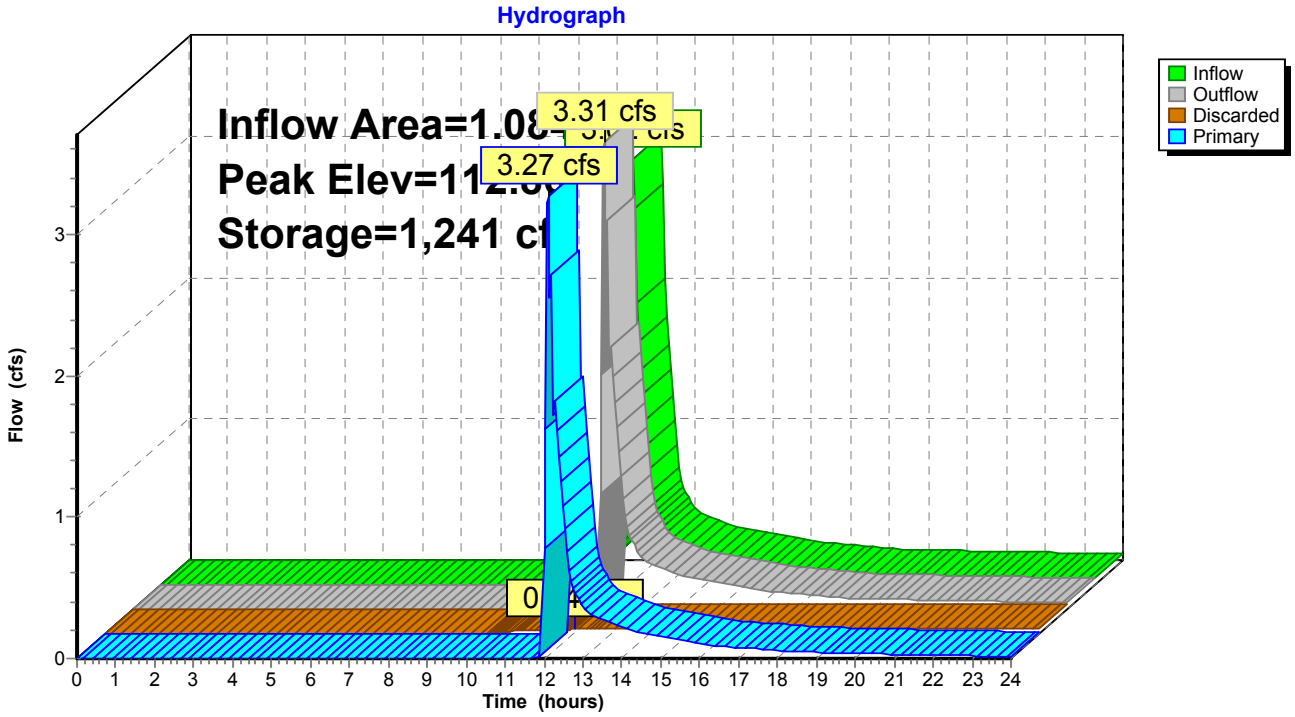
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
111.70	718	0	0
111.75	868	40	40
112.75	1,535	1,202	1,241

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	**0.001416 fpm Exfiltration over entire Surface area**
2	Primary	112.50'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.04 cfs @ 12.10 hrs HW=112.86' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=3.08 cfs @ 12.11 hrs HW=112.85' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 3.08 cfs @ 1.5 fps)

Pond 1P: Raingarden

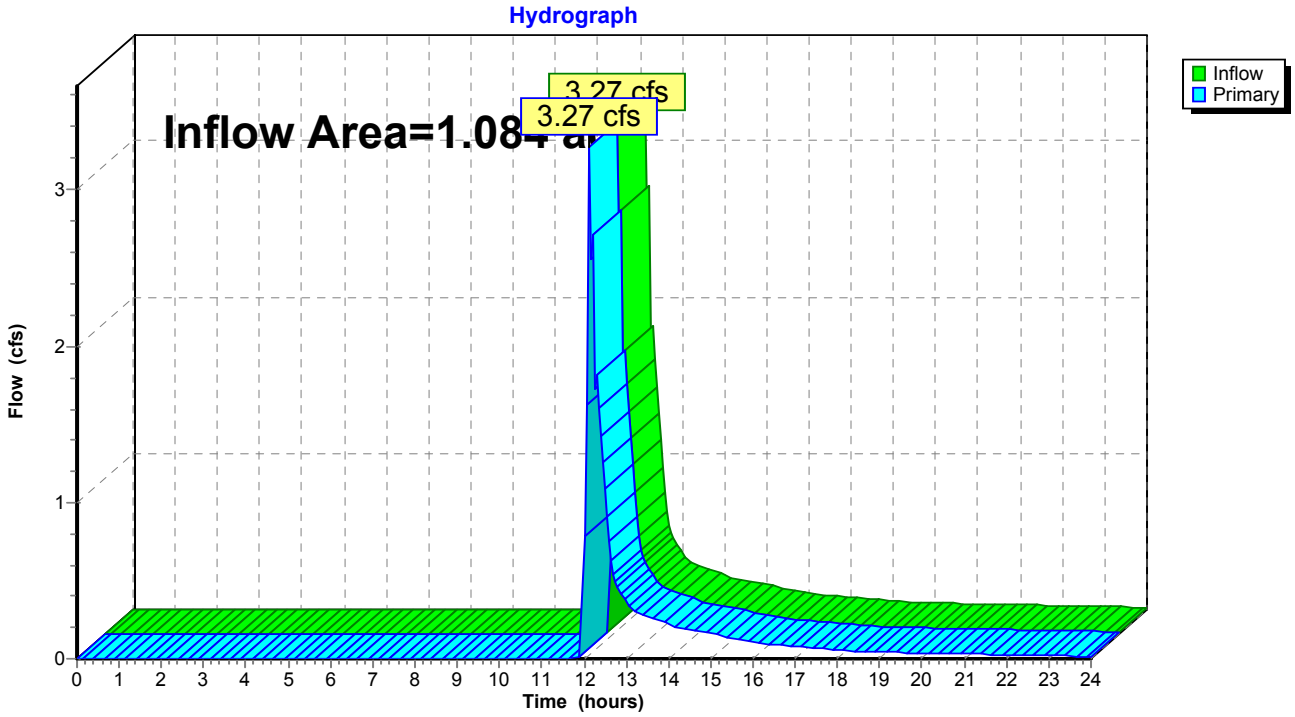


Link 1L: Design Point 1

Inflow Area = 1.084 ac, Inflow Depth = 2.01" for 25-Year Storm event
Inflow = 3.27 cfs @ 12.11 hrs, Volume= 0.181 af
Primary = 3.27 cfs @ 12.11 hrs, Volume= 0.181 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Design Point 1



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Runoff Area=47,217 sf Runoff Depth=4.63"
Flow Length=229' Tc=8.3 min CN=65 Runoff=5.36 cfs 0.418 af

Pond 1P: Raingarden Peak Elev=113.00' Storage=1,241 cf Inflow=5.36 cfs 0.418 af
Discarded=0.04 cfs 0.040 af Primary=5.47 cfs 0.356 af Outflow=5.51 cfs 0.396 af

Link 1L: Design Point 1 Inflow=5.47 cfs 0.356 af
Primary=5.47 cfs 0.356 af

Total Runoff Area = 1.084 ac Runoff Volume = 0.418 af Average Runoff Depth = 4.63"

Subcatchment 1S:

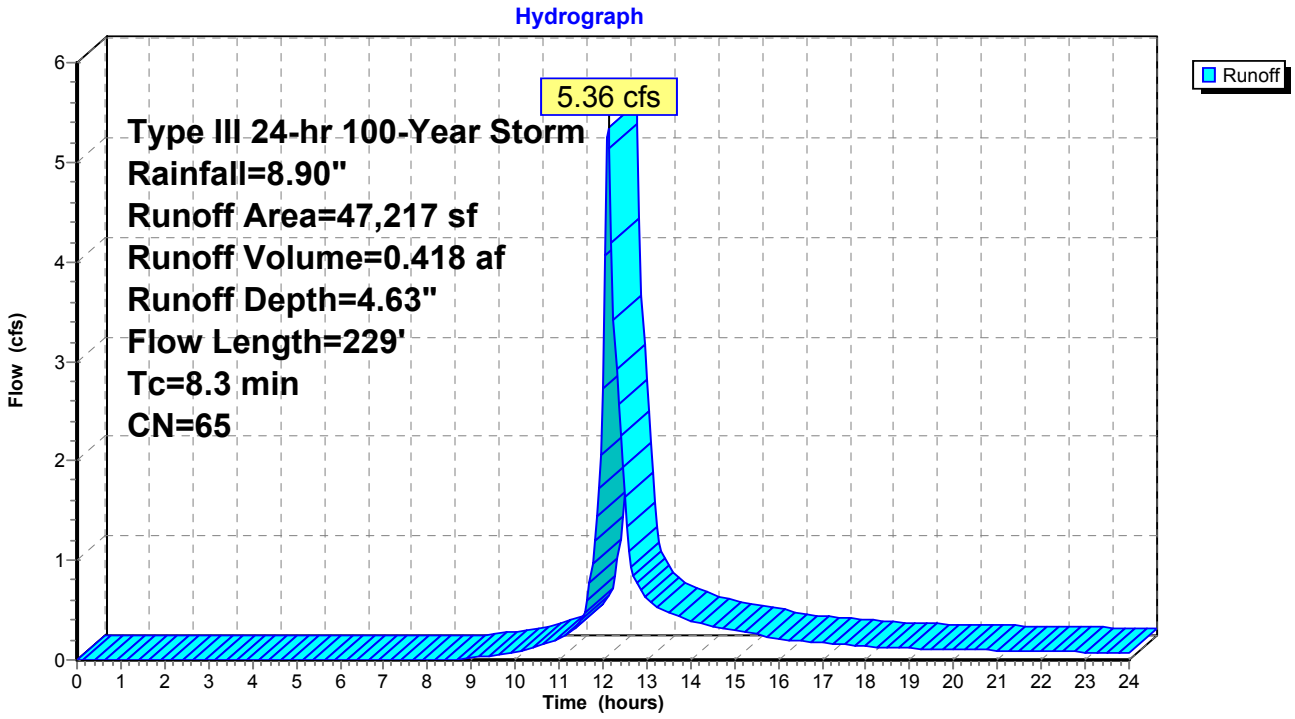
Runoff = 5.36 cfs @ 12.12 hrs, Volume= 0.418 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Storm Rainfall=8.90"

Area (sf)	CN	Description
2,458	98	House/Porch Roofs
170	98	walkway
3,685	98	paved driveway
217	98	ret wall
4,400	61	>75% Grass cover, Good, HSG B
36,287	60	Woods, Fair, HSG B
47,217	65	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	50	0.1600	0.2		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
2.9	179	0.0220	1.0		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.3	229	Total			

Subcatchment 1S:



Pond 1P: Raingarden

Inflow Area = 1.084 ac, Inflow Depth = 4.63" for 100-Year Storm event
Inflow = 5.36 cfs @ 12.12 hrs, Volume= 0.418 af
Outflow = 5.51 cfs @ 12.11 hrs, Volume= 0.396 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.04 cfs @ 11.95 hrs, Volume= 0.040 af
Primary = 5.47 cfs @ 12.11 hrs, Volume= 0.356 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 113.00' @ 12.11 hrs Surf.Area= 1,535 sf Storage= 1,241 cf
Plug-Flow detention time= 40.7 min calculated for 0.395 af (95% of inflow)
Center-of-Mass det. time= 12.6 min (844.1 - 831.6)

#	Invert	Avail.Storage	Storage Description
1	111.70'	1,241 cf	**Custom Stage Data (Prismatic)** Listed below

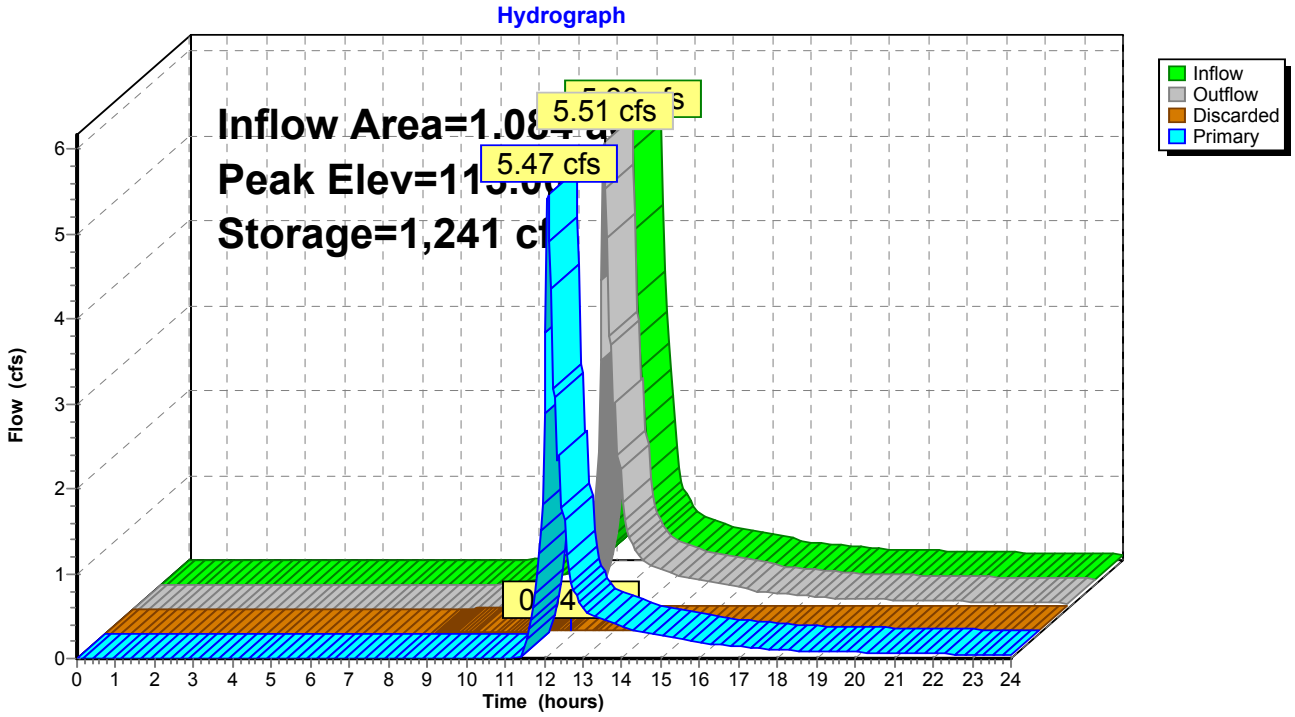
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
111.70	718	0	0
111.75	868	40	40
112.75	1,535	1,202	1,241

#	Routing	Invert	Outlet Devices
1	Discarded	0.00'	**0.001416 fpm Exfiltration over entire Surface area**
2	Primary	112.50'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.04 cfs @ 11.95 hrs HW=112.75' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=5.27 cfs @ 12.11 hrs HW=112.98' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 5.27 cfs @ 1.8 fps)

Pond 1P: Raingarden

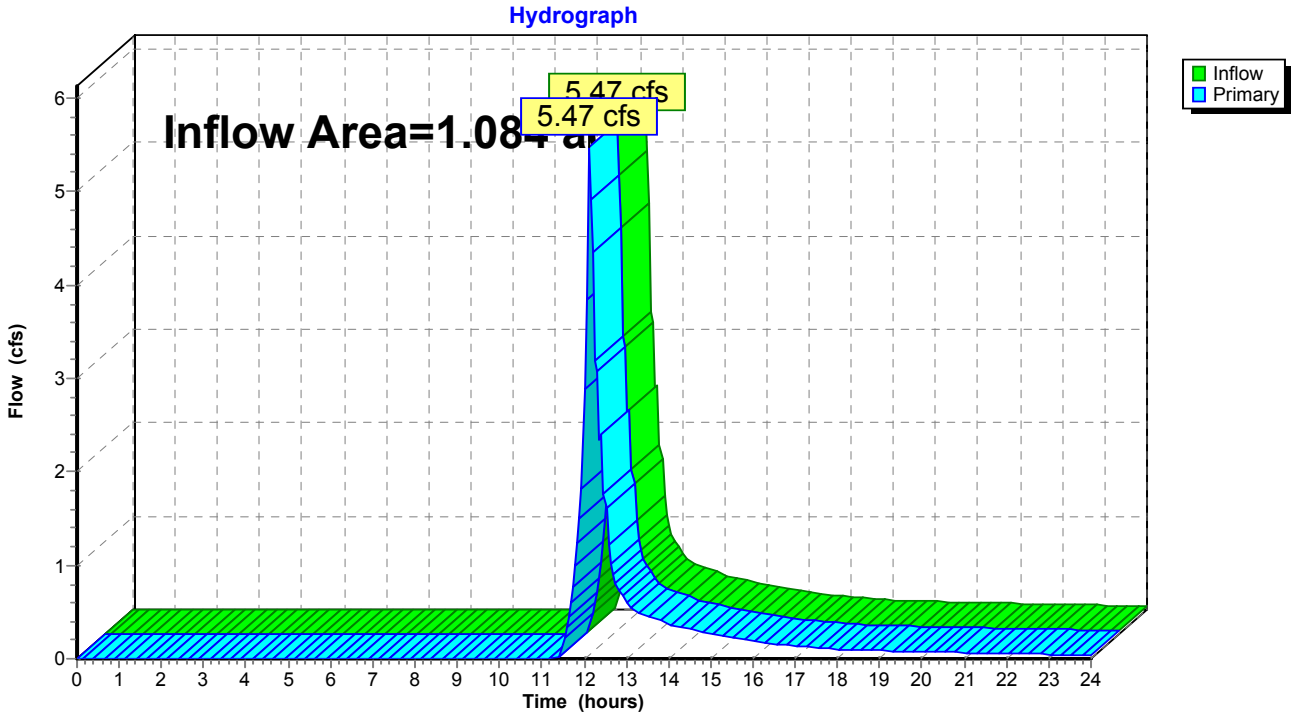


Link 1L: Design Point 1

Inflow Area = 1.084 ac, Inflow Depth = 3.94" for 100-Year Storm event
Inflow = 5.47 cfs @ 12.11 hrs, Volume= 0.356 af
Primary = 5.47 cfs @ 12.11 hrs, Volume= 0.356 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Design Point 1

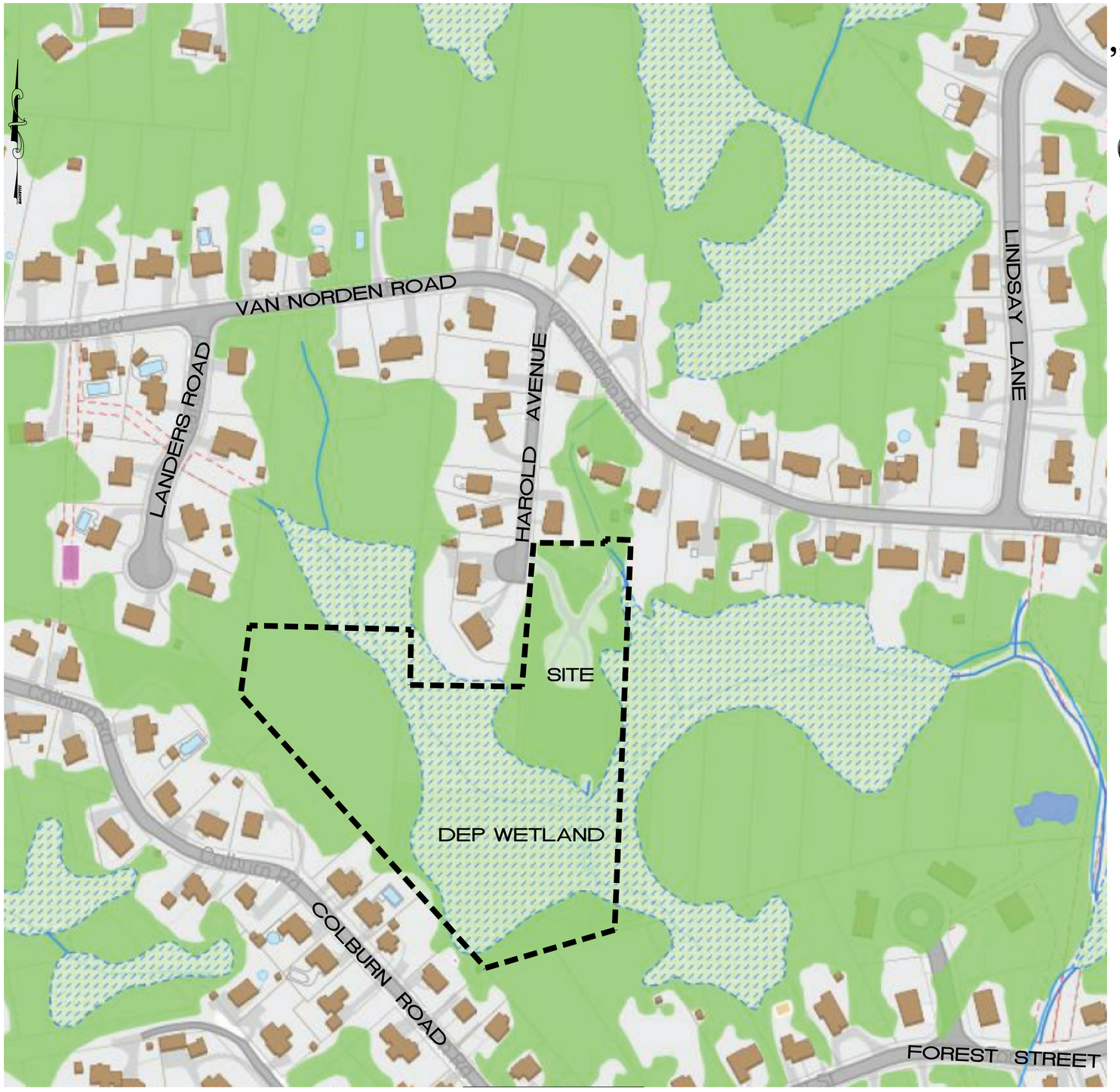


Post-Construction
Stormwater Maintenance Plan

Beginning with the construction of the drainage system, and continuing in perpetuity thereafter, the owner(s) of the site shall maintain in accordance with the following schedule:

a. Driveway sweeping and snow plowing – Pavement and walkways shall be swept in the early spring immediately after snow melt and at least twice other times annually. Snow shall be plowed onto the snow stockpile area shown on the design plans to encourage infiltration during subsequent thawing periods. Sediments shall be removed from snow storage areas in the early spring.
b. Paving – Paving shall be maintained in good condition to channel surface runoff into the stormwater management facilities.
c. Roof drain inlets, downspouts, and roof drain pipes - All components of the roof drain collection system shall be inspected at least 3 times per year. Sediments and debris shall be removed and disposed of in accordance with all applicable federal, state, and local laws. Any components that become damaged shall be repaired or replaced immediately upon discovery to assure proper conveyance of stormwater runoff into the subsurface infiltration system.
d. Rain Gardens – The level of water in the Rain Gardens shall be monitored during and after heavy rain storms at least 3 times per year during the first year of operation and at least twice annually thereafter for evidence of clogging or other problems. The emergency overflow devices (spillway) shall be monitored to insure each is functioning properly and free of any obstructions.
e. Vegetation shall be maintained in healthy condition to prevent erosion and sedimentation in the drainage system and off-site wetland resource areas. The vegetation in the 'Rain Gardens" shall be maintained as native plants and/or shrubs, and shall not be converted to a mowed lawn or other use. Additionally, the post and rail fencing partial surrounding the rain garden shall be inspected 3 times per year to insure the fencing is intact.
f. Rip-Rap Pretreatment Area & Emergency Overflow spillway shall be inspected 3 times per year to insure any debris, trash, accumulated sediment, or leaves is removed and properly disposed of to insure functionality of these areas.

The Annual Stormwater Report (and repair information if performed) shall be submitted to the Town of Reading Engineering Department by January 15th of each calendar year.



GRAPHIC SCALE
SCALE: 1"=100'

FEET 0 100 200 300 400

DEFINITIVE SUBDIVISION PLAN
"HAROLD AVENUE EXTENSION"

0 HAROLD AVENUE
(PORTION OF TAX MAP 39 LOT 230)

LOCATED IN
READING, MASSACHUSETTS
(MIDDLESEX COUNTY)

DATE: NOVEMBER 4, 2023

OWNER/APPLICANT:

ZERO HAROLD AVENUE, LLC
BRICKLEY/SEAR, P.A.
75 FEDERAL STREET, SUITE 1320
BOSTON, MA 02110
(617) 542-0896

ENGINEER:

SULLIVAN ENGINEERING GROUP, LLC
P.O. BOX 2004
WOBURN, MA 01888
(781) 854-8644

ATTORNEY:

JOHN E. SUTHERLAND
BRICKLEY/SEARS, P.A.
75 FEDERAL STREET, SUITE 1320
BOSTON, MA 02110
(617) 542-0896

LIST OF SUBDIVISION WAIVERS:

SECTION 6.1.1.B.10 – EXISTING TOPOGRAPHY OF THE TRACT AND OF ALL LANDS WITHIN 100 FEET
SECTION 6.1.1.B.17– A PROFILE OF EXISTING AND PROPOSED GRADES ALONG THE CENTERLINE AND R.O.W. SIDELINES FOR ALL PROPOSED STREETS AND WAYS.
SECTION 6.1.1.C WAY AND PROFILE PLAN
SECTION 6.1.1.D(3) – TRAFFIC STUDY
SECTION 6.1.1.D(5) – TEST BORING LOGS
SECTION 7.1.1.B – GRADES OF STREETS
SECTION 7.1.3 – STREET CROSS SECTION
SECTION 7.1.4(B) – INTERSECTION OF WAYS – MIN. CURBLINE RADII OF 30 FEET
SECTION 7.1.5 – DEAD END STREETS/CUL-DE-SACS
SECTION 7.1.7 – CURBING
SECTION 7.1.8 – MONUMENTS
SECTION 7.1.9 – SIGNS
SECTION 7.1.11 – STREET LIGHTING
SECTION 7.2 – SIDEWALK
SECTION 7.6 – STREET TREES
SECTION 8.0 – CONSTRUCTION OF WAYS

COMMONWEALTH OF MASSACHUSETTS
John E. Sullivan
CIVIL
No. 41688
REGISTERED
PROFESSIONAL ENGINEER

SHEET INDEX:

FEMA FLOOD MAP DATA:

BASED ON FIRM MAP NO. 25017C0311E, DATED JUNE 4, 2010
NO AREAS ON THIS PROPERTY ARE WITHIN A DESIGNATED 100 YEAR FLOODPLAIN.

AREAS TO THE SOUTHERLY SIDE OF THE WETLAND LINE SHOWN ON PARCEL A ARE DEPICTED AS FLOOD ZONE 'X' WHICH REPRESENT AREAS OF MINIMAL FLOODING (500 YEAR FLOOD)

LEGEND:

	WETLAND FLAG (BY NORSE ENVIRONMENTAL)
BVW	BORDERING VEGETATED WETLAND
248	TWO FOOT CONTOUR
6"	DECIDUOUS TREE (> 6" DIA.)
6"P	EVERGREEN TREE (> 6" DIA.)
	UTILITY POLE
S	SEWER MANHOLE
S	SEWER MAIN
W	COMPILED WATER MAIN
CB	CATCHBASIN
D	DRAIN LINE
BIT.	BITUMINOUS
CONC.	CONCRETE
EOP	EDGE OF PAVEMENT

READING COMMUNITY PLANNING & DEVELOPMENT COMMISSION

_____

_____

_____

_____

_____

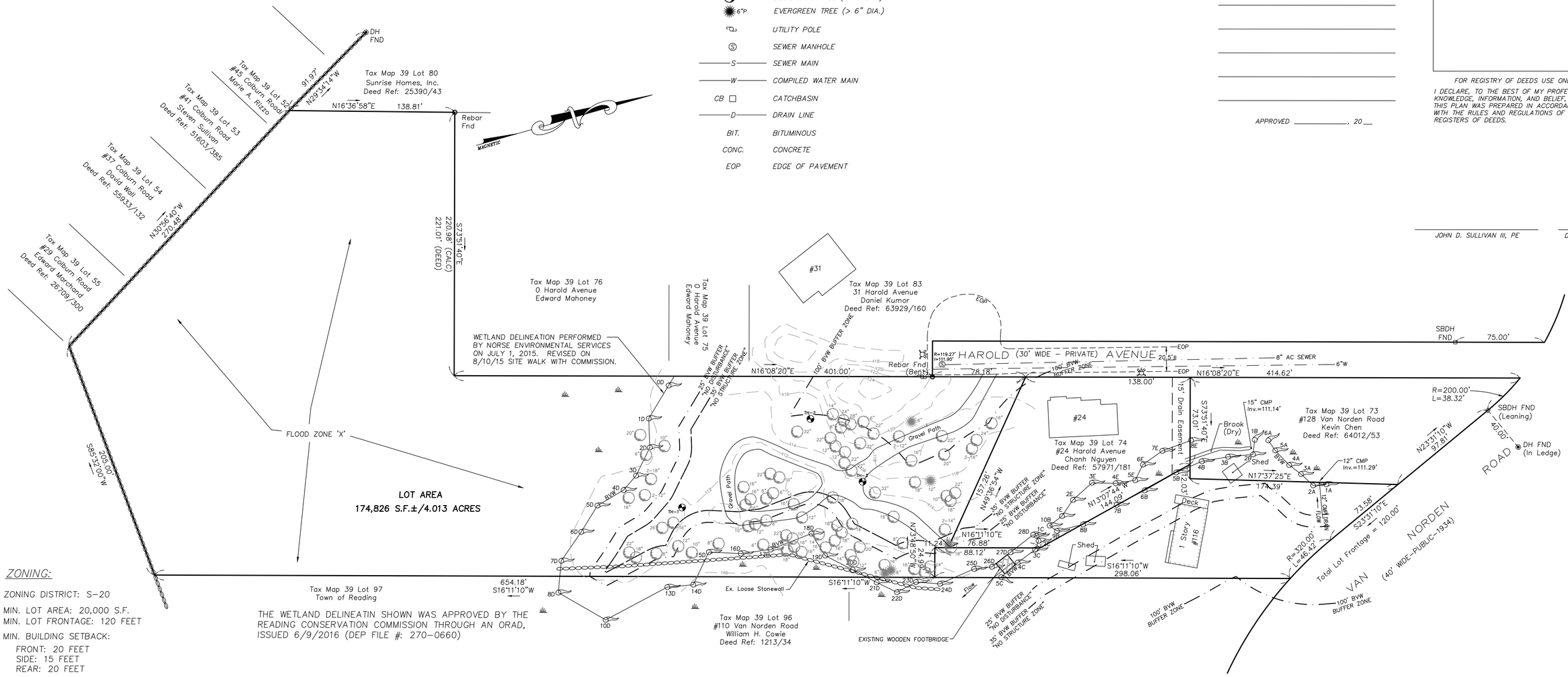
_____

APPROVED _____, 20__

FOR REGISTRY OF DEEDS USE ONLY

I DECLARE, TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, INFORMATION, AND BELIEF, THAT THIS PLAN WAS PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

JOHN D. SULLIVAN III, PE — DATE



ZONING:

ZONING DISTRICT: S-20

MIN. LOT AREA: 20,000 S.F.
MIN. LOT FRONTAGE: 120 FEET

MIN. BUILDING SETBACK:
FRONT: 20 FEET
SIDE: 15 FEET
REAR: 20 FEET

RECORD OWNER/APPLICANT:

ASSESSOR'S MAP 39, LOT 230
ZERO HAROLD AVENUE, LLC
75 FEDERAL STREET, SUITE 1320
BOSTON, MA
– DEED BOOK 79723, PAGE No. 150

REFERENCES:

- PLAN No. 1055 OF 1995
- PLAN No. 456 OF 1996
- PLAN No. 679 OF 1996
- PLAN No. 921 OF 1998
- PLAN No. 71 OF 1999
- PLAN No. 717 OF 2016

THE WETLAND DELINEATIN SHOWN WAS APPROVED BY THE READING CONSERVATION COMMISSION THROUGH AN ORAD, ISSUED 6/9/2016 (DEP FILE #: 270-0660)

GRAPHIC SCALE
SCALE: 1"=40'

FEET 40 0 20 40 80 160

TEST PITS WERE PERFORMED ON MAY 4, 2023
BY JOHN D. SULLIVAN III, P.E., C.S.E. No. 2378
& WITNESSED BY READING ENGINEERING DEPARTMENT

SOILS INFORMATION:

TEST PIT: TH-1
ELEV.= 112.0'

0"-18"	HORIZON A: SANDY LOAM 10 YR 3/3
18"-24"	HORIZON Bw: LOAMY SAND 10 YR 6/8
24"-78"	LAYER C: LOAMY SAND 2.5 Y 6/4

WATER WEEPING @ 30"
DISTINCT MOTTLES @ 28" (ELEV=109.7')
REFUSAL @ NONE

SOILS INFORMATION:

TEST PIT: TH-2
ELEV.=115.2'

0"-16"	HORIZON A: SANDY LOAM 10 YR 3/3
16"-32"	HORIZON Bw: LOAMY SAND 10 YR 6/8
32"-52"	LAYER C: LOAMY SAND 2.5 Y 6/4

WATER WEEPING @ NONE
DISTINCT MOTTLES @ NONE
REFUSAL @ 52" (ELEV=110.9')

SOILS INFORMATION:

TEST PIT: TH-3
ELEV.=114.3'

0"-12"	HORIZON A: SANDY LOAM 10 YR 3/3
12"-26"	HORIZON Bw: LOAMY SAND 10 YR 6/8
26"-78"	LAYER C: LOAMY SAND 2.5 Y 6/4

WATER WEEPING @ NONE
DISTINCT MOTTLES @ NONE

REVISIONS

NO.	DATE	DESCRIPTION	BY	CHK'D

COMMONWEALTH OF MASSACHUSETTS — JOHN D. SULLIVAN III — No. 41886 — REGISTERED PROFESSIONAL ENGINEER

DEFINITIVE SUBDIVISION PLAN
"HAROLD AVENUE EXTENSION"

EXISTING CONDITIONS PLAN OF LAND
LOCATED IN
READING, MASSACHUSETTS
(MIDDLESEX COUNTY)

PREPARED FOR
ZERO HAROLD AVENUE, LLC

SCALE: 1"= 40' DATE: NOV. 4, 2023

PREPARED BY
SULLIVAN ENGINEERING GROUP, LLC
P.O BOX 2004
WOBURN, MA 01888
(781) 854-8644

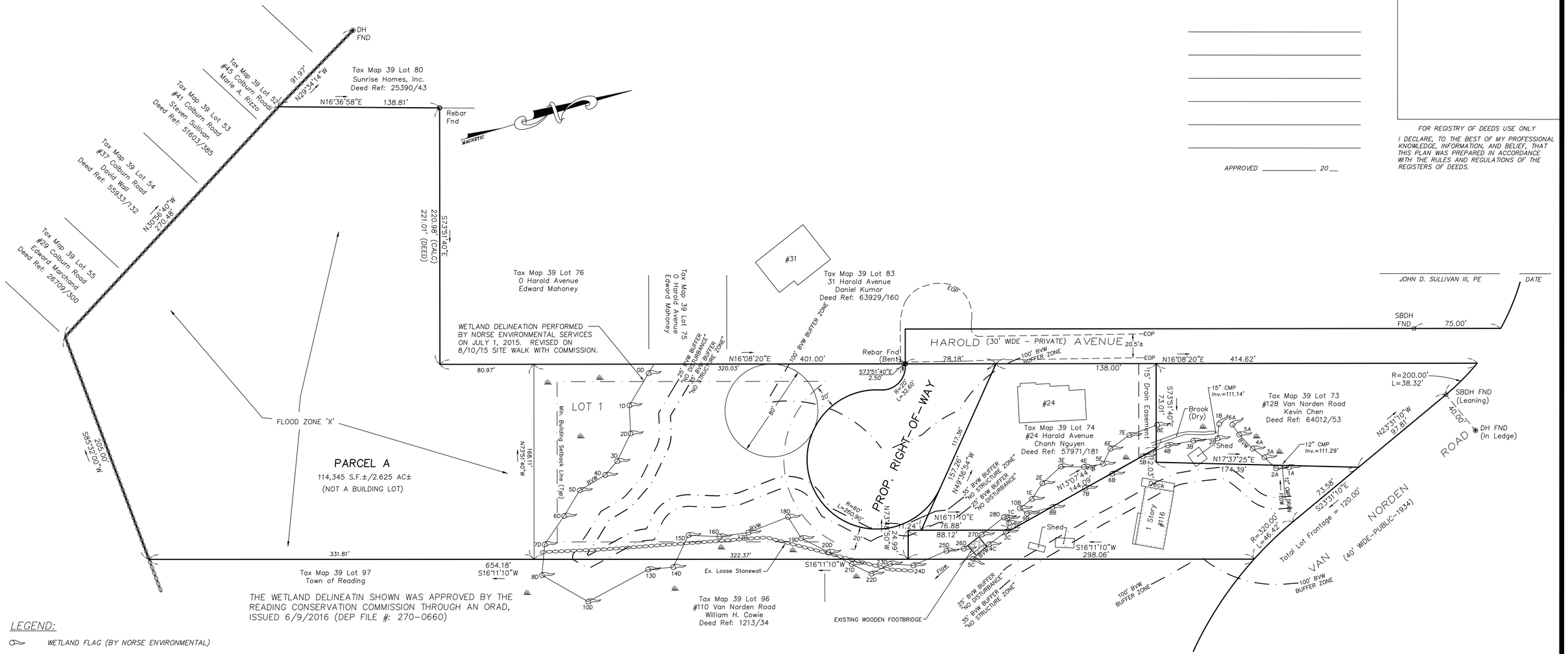
READING COMMUNITY PLANNING & DEVELOPMENT COMMISSION

APPROVED _____, 20__

FOR REGISTRY OF DEEDS USE ONLY

I DECLARE, TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, INFORMATION, AND BELIEF, THAT THIS PLAN WAS PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

JOHN D. SULLIVAN III, PE — DATE



THE WETLAND DELINEATIN SHOWN WAS APPROVED BY THE READING CONSERVATION COMMISSION THROUGH AN ORAD, ISSUED 6/9/2016 (DEP FILE #: 270-0660)

LEGEND:

	WETLAND FLAG (BY NORSE ENVIRONMENTAL)
BVW	BORDERING VEGETATED WETLAND
BIT.	BITUMINOUS
CONC.	CONCRETE
EOP	EDGE OF PAVEMENT

RESIDENTIAL STREET STANDARDS::

WIDTH OF RIGHT-OF-WAY: 60'
MINIMUM PAVEMENT WIDTH: 30'
MIN. CUL-DE-SAC RADIUS: 60'
CENTERLINE RADIUS: 100' MIN.
RADIUS OF RIGHT-OF-WAY ROUNDING: 30'
LENGTH OF DEAD END STREET: 500' MAX.

FEMA FLOOD MAP DATA:

BASED ON FIRM MAP NO. 25017C0311E, DATED JUNE 4, 2010 NO AREAS ON THIS PROPERTY ARE WITHIN A DESIGNATED 100 YEAR FLOODPLAIN.

AREAS TO THE SOUTHERLY SIDE OF THE WETLAND LINE SHOWN ON PARCEL A ARE DEPICTED AS FLOOD ZONE 'X' WHICH REPRESENT AREAS OF MINIMAL FLOODING (500 YEAR FLOOD)

GRAPHIC SCALE
SCALE: 1"=40'

FEET 40 0 20 40 80 160

CONVENTIONAL SINGLE FAMILY LOT:

LOT:	LOT SIZE: (S.F.)	LOT SIZE EXCLUSIVE OF WETLANDS (S.F.)	LOT FRONTAGE: (FEET)
1	45,471	32,765	303.72' *

* ALONG 20 FOOT FRONT SETBACK LINE

ZONING:

ZONING DISTRICT: S-20

MIN. LOT AREA: 20,000 S.F.
MIN. LOT FRONTAGE: 120 FEET

MIN. BUILDING SETBACK:
FRONT: 20 FEET
SIDE: 15 FEET
REAR: 20 FEET

RECORD OWNER/APPLICANT:

ASSESSOR'S MAP 39, LOT 230;
ZERO HAROLD AVENUE, LLC
75 FEDERAL STREET, SUITE 1320
BOSTON, MASS.
- DEED BOOK 79723, PAGE No. 150

REFERENCES:

- PLAN No. 1055 OF 1995
- PLAN No. 456 OF 1996
- PLAN No. 679 OF 1996
- PLAN No. 921 OF 1998
- PLAN No. 71 OF 1999
- PLAN No. 717 OF 2016

REVISIONS

NO.	DATE	DESCRIPTION	BY	CHK'D

DEFINITIVE SUBDIVISION PLAN "HAROLD AVENUE EXTENSION"

COMMONWEALTH OF MASSACHUSETTS — JOHN D. SULLIVAN III — CIVIL — No. 41588 — REGISTERED PROFESSIONAL ENGINEER

COMMONWEALTH OF MASSACHUSETTS — PAUL J. FINOCCHIO — No. 838115 — REGISTERED Land Surveyor

LOTTING PLAN OF PLAN
LOCATED IN
READING, MASSACHUSETTS
(MIDDLESEX COUNTY)

PREPARED FOR
ZERO HAROLD AVENUE, LLC

SCALE: 1"= 40' DATE: NOV. 4, 2023

PREPARED BY
SULLIVAN ENGINEERING GROUP, LLC
P.O BOX 2004
WOBURN, MA 01888
(781) 854-8644

SHEET 3 OF 5

RESIDENTIAL STREET STANDARDS::

WIDTH OF RIGHT-OF-WAY: 60'
MINIMUM PAVEMENT WIDTH: 30'
MIN. CUL-DE-SAC RADIUS: 60'
CENTERLINE RADIUS: 100' MIN.
RADIUS OF RIGHT-OF-WAY ROUNDING: 30'
LENGTH OF DEAD END STREET: 500' MAX.

ZONING:

ZONING DISTRICT: S-20

MIN. LOT AREA: 20,000 S.F.
MIN. LOT FRONTAGE: 120 FEET

MIN. BUILDING SETBACK:
FRONT: 20 FEET
SIDE: 15 FEET
REAR: 20 FEET

RECORD OWNER/APPLICANT:

ASSESSOR'S MAP 39, LOT 230:
ZERO HAROLD AVENUE, LLC
75 FEDERAL STREET, SUITE 1320
BOSTON, MASS.
- DEED BOOK 79723, PAGE No. 150

LEGEND:

- WETLAND FLAG (BY NORSE ENVIRONMENTAL)
- BVW — BORDERING VEGETATED WETLAND
- 248 — TWO FOOT CONTOUR
- 6" — DECIDUOUS TREE (> 6" DIA.)
- 6"P — EVERGREEN TREE (> 6" DIA.)
- UTILITY POLE
- SEWER MANHOLE
- S — SEWER MAIN
- W — COMPILED WATER MAIN
- CB — CATCHBASIN
- D — DRAIN LINE
- BIT. — BITUMINOUS
- CONC. — CONCRETE
- EOP — EDGE OF PAVEMENT
- TREE TO BE REMOVED
- PS — PROP. SEWER SERVICE
- PW — PROP. WATER SERVICE (1" COPPER)
- GP — PROP. E-ONE GRINDER PUMP
- R1 — DRAINAGE REACH

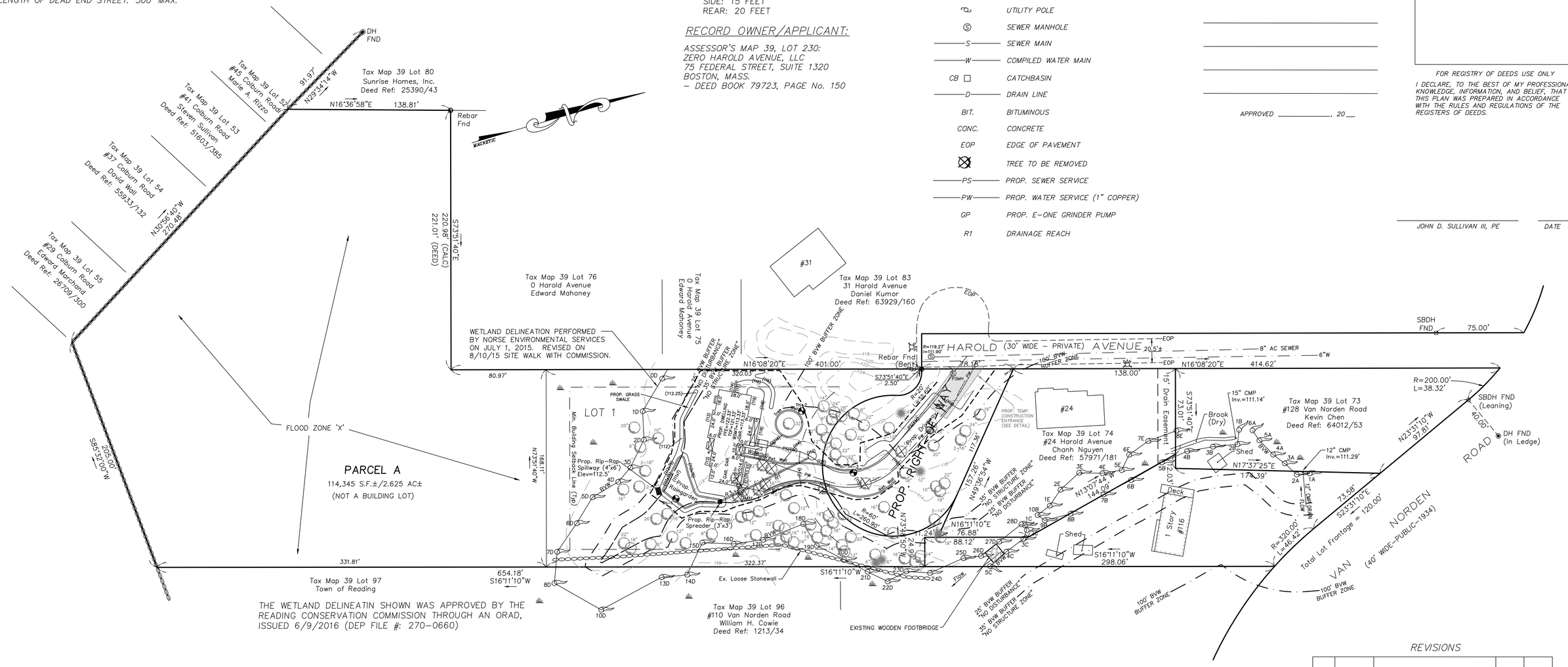
READING COMMUNITY PLANNING & DEVELOPMENT COMMISSION

APPROVED _____, 20__

FOR REGISTRY OF DEEDS USE ONLY

I DECLARE, TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, INFORMATION, AND BELIEF, THAT THIS PLAN WAS PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

JOHN D. SULLIVAN III, PE — DATE



DRAINAGE STRUCTURE CHART:

STRUCTURE	RIM	INV. IN (SIZE/TYPE)		INV. OUT (SIZE/TYPE)	
TD	113.33	N/A		112.00	6" HDPE
DMH-1 *	113.3	111.96	6" HDPE	111.78	12" HDPE

* WITH A 2 FOOT SUMP

REACH CHART:

REACH	LENGTH	SIZE	MATERIAL	SLOPE	BEG INV.	END INV.
R1	62'	6"	HDPE	0.01	112.4	111.78
R2	4'	6"	HDPE	0.01	112.0	111.96
R3	17'	12"	HDPE	0.005	111.78	111.7'

FEMA FLOOD MAP DATA:

BASED ON FIRM MAP NO. 25017C0311E, DATED JUNE 4, 2010
NO AREAS ON THIS PROPERTY ARE WITHIN A DESIGNATED 100 YEAR FLOODPLAIN.

AREAS TO THE SOUTHERLY SIDE OF THE WETLAND LINE SHOWN ON PARCEL A ARE DEPICTED AS FLOOD ZONE 'X' WHICH REPRESENT AREAS OF MINIMAL FLOODING (500 YEAR FLOOD)

GRAPHIC SCALE
SCALE: 1"=40'

FEET 40 0 20 40 80 160

REVISIONS

NO.	DATE	DESCRIPTION	BY	CHK'D

DEFINITIVE SUBDIVISION PLAN "HAROLD AVENUE EXTENSION"

COMMONWEALTH OF MASSACHUSETTS — JOHN D. SULLIVAN III — CIVIL — No. 41988 — REGISTERED PROFESSIONAL ENGINEER

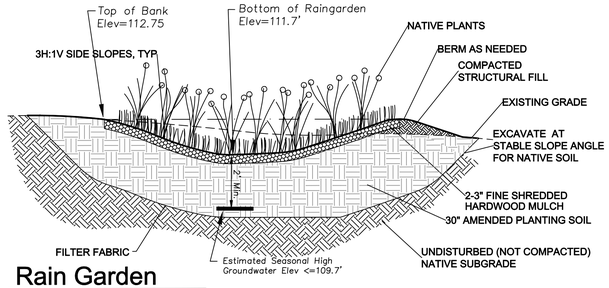
SITE DEVELOPMENT PLAN
LOCATED IN
READING, MASSACHUSETTS
(MIDDLESEX COUNTY)

PREPARED FOR
ZERO HAROLD AVENUE, LLC

SCALE: 1"= 40' DATE: NOV. 4, 2023

PREPARED BY

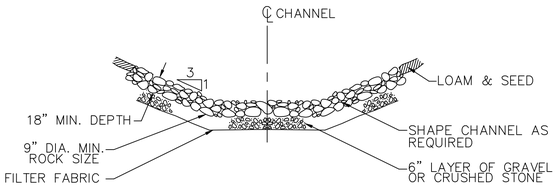
SULLIVAN ENGINEERING GROUP, LLC
P.O BOX 2004
WOBURN, MA 01888
(781) 854-8644



Rain Garden

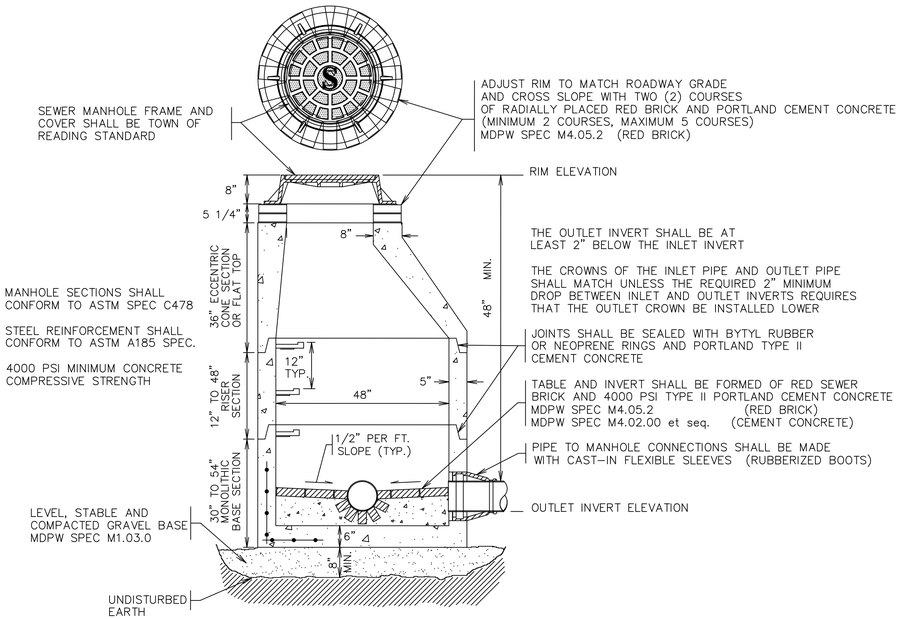
NTS

Note: The Amended Planting Soil shall consist of 40% sand, 20%–30% topsoil, and 30%–40% compost.



RIP–RAP SPREADER

NOT TO SCALE



TYPICAL SEWER MANHOLE DETAIL

(NOT TO SCALE)

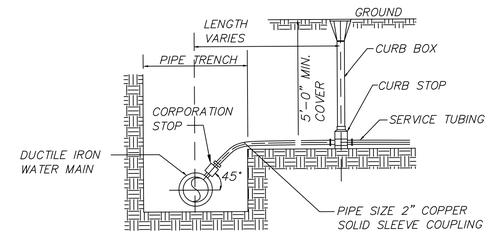
FOR REGISTRY OF DEEDS USE ONLY

I DECLARE, TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, INFORMATION, AND BELIEF, THAT THIS PLAN WAS PREPARED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

JOHN D. SULLIVAN III, PE — DATE

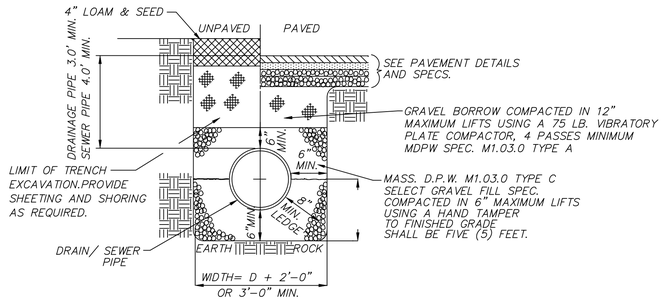
READING COMMUNITY PLANNING & DEVELOPMENT COMMISSION

APPROVED _____, 20__



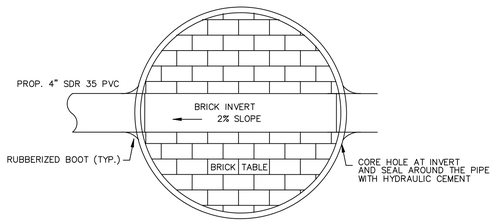
TYPICAL WATER SERVICE

(NOT TO SCALE)



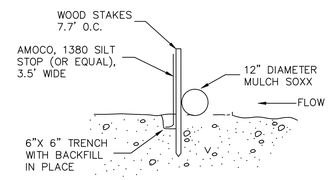
STORM DRAIN/ SEWER TRENCH DETAIL

(NOT TO SCALE)



BRICK TABLE SEWER MANHOLE DETAIL

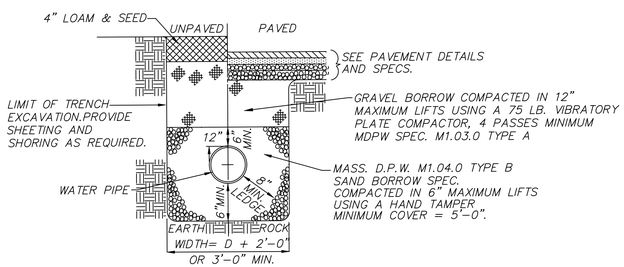
(NOT TO SCALE)



CROSS SECTION

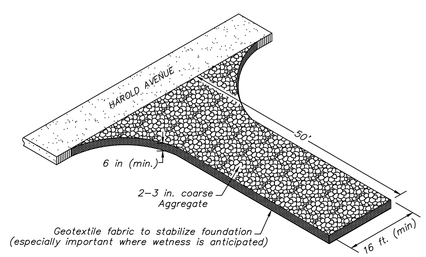
EROSION CONTROL BARRIER

(NOT TO SCALE)



WATER TRENCH

(NOT TO SCALE)



TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT PAD

(NOT TO SCALE)

NOTE:

CONSTRUCT "TEMPORARY CONSTRUCTION ENTRANCE" AS SHOWN ON DETAIL PLAN PRIOR TO THE BEGINNING OF ANY CONSTRUCTION ACTIVITIES. ALL CONSTRUCTION VEHICLES SHALL EXIT THE SITE OVER THIS "TEMPORARY CONSTRUCTION ENTRANCE". THE CONTRACTOR SHALL USE THIS AREA TO REMOVE SOIL FROM THE TIRES OF CONSTRUCTION VEHICLES. "TEMPORARY CONSTRUCTION ENTRANCE" TO CONSIST OF SIX TO TWELVE INCHES OF TWO TO THREE INCH STONE.

REVISIONS

NO.	DATE	DESCRIPTION	BY	CHK'D

DEFINITIVE SUBDIVISION PLAN "HAROLD AVENUE EXTENSION"

COMMONWEALTH OF MASSACHUSETTS
JOHN D. SULLIVAN III
CIVIL
No. 41888
REGISTERED PROFESSIONAL ENGINEER

SITE DEVELOPMENT PLAN
LOCATED IN
READING, MASSACHUSETTS
(MIDDLESEX COUNTY)

PREPARED FOR
ZERO HAROLD AVENUE, LLC

SCALE: N.T.S. *DATE: NOV. 4, 2023*

PREPARED BY

SULLIVAN ENGINEERING GROUP, LLC
P.O BOX 2004
WOBURN, MA 01888
(781) 854–8644

RESIDENTIAL STREET STANDARDS::

WIDTH OF RIGHT-OF-WAY: 60'
MINIMUM PAVEMENT WIDTH: 30'
MIN. CUL-DE-SAC RADIUS: 60'
CENTERLINE RADIUS: 100' MIN.
RADIUS OF RIGHT-OF-WAY ROUNDING: 30'
LENGTH OF DEAD END STREET: 500' MAX.

DEAD END ROADWAY LENGTH:

DEADEND LENGTH MEASURED FROM SIDELINE OF VAN NORDEN ROAD TO CENTER OF CUL-DE-SAC.

TOTAL DEAD END ROADWAY LENGTH = 597 FEET* > 500 FEET

* WAIVER REQUIRED FROM CPDC

ZONING:

ZONING DISTRICT: S-20

MIN. LOT AREA: 20,000 S.F.
MIN. LOT FRONTAGE: 120 FEET

MIN. BUILDING SETBACK:
FRONT: 20 FEET
SIDE: 15 FEET
REAR: 20 FEET

RECORD OWNER/APPLICANT:

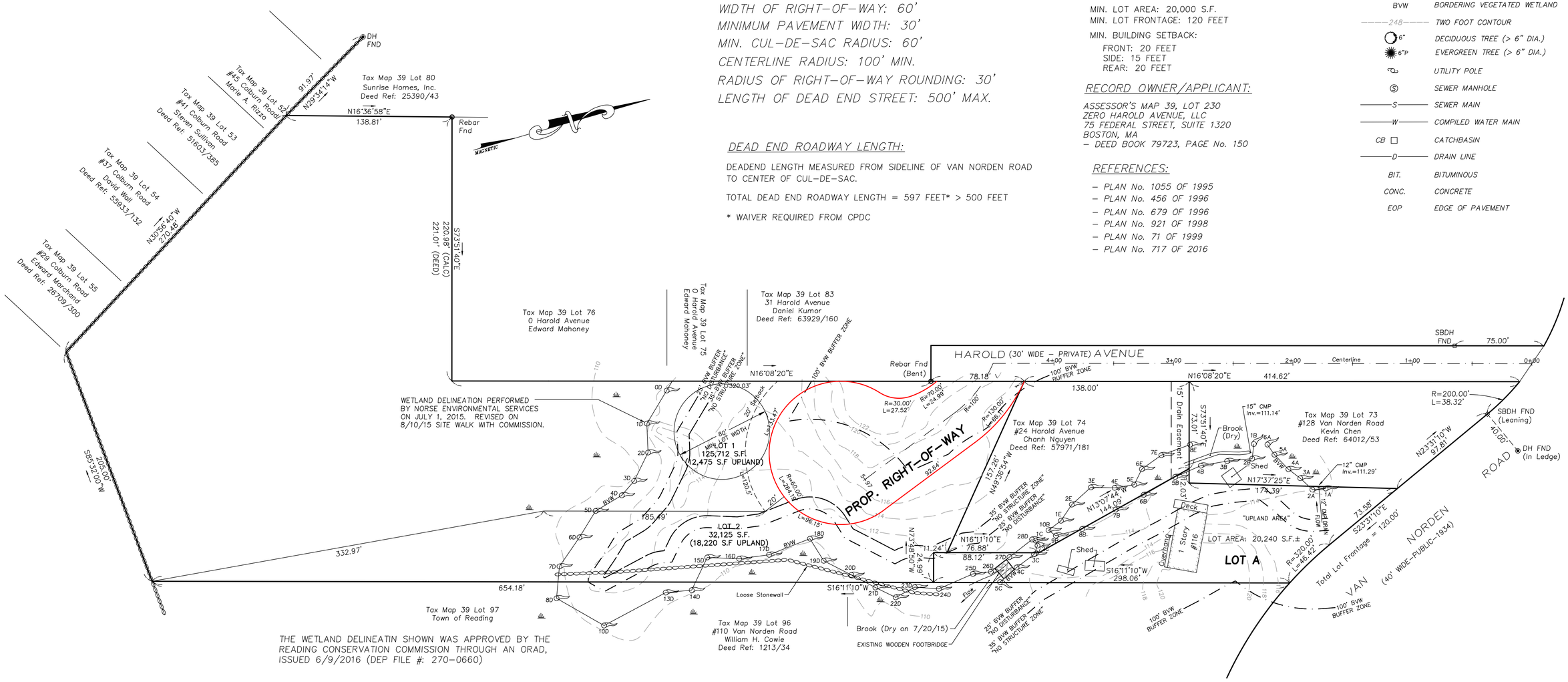
ASSESSOR'S MAP 39, LOT 230
ZERO HAROLD AVENUE, LLC
75 FEDERAL STREET, SUITE 1320
BOSTON, MA
- DEED BOOK 79723, PAGE No. 150

REFERENCES:

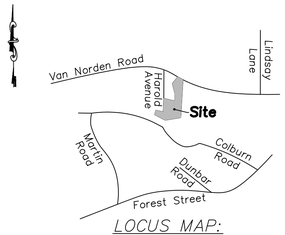
- PLAN No. 1055 OF 1995
- PLAN No. 456 OF 1996
- PLAN No. 679 OF 1996
- PLAN No. 921 OF 1998
- PLAN No. 71 OF 1999
- PLAN No. 717 OF 2016

LEGEND:

	WETLAND FLAG (BY NORSE ENVIRONMENTAL)
BVW	BORDERING VEGETATED WETLAND
248	TWO FOOT CONTOUR
6"	DECIDUOUS TREE (> 6" DIA.)
6"P	EVERGREEN TREE (> 6" DIA.)
	UTILITY POLE
S	SEWER MANHOLE
S	SEWER MAIN
W	COMPILED WATER MAIN
CB	CATCHBASIN
D	DRAIN LINE
BIT.	BITUMINOUS
CONC.	CONCRETE
EOP	EDGE OF PAVEMENT



THE WETLAND DELINEATIN SHOWN WAS APPROVED BY THE READING CONSERVATION COMMISSION THROUGH AN ORAD, ISSUED 6/9/2016 (DEP FILE #: 270-0660)



LOCUS MAP:
NOT TO SCALE:

GRAPHIC SCALE
SCALE: 1"=40'

FEET 40 0 20 40 80 160

FEMA FLOOD MAP DATA:

BASED ON FIRM MAP NO. 25017C0311E, DATED JUNE 4, 2010
NO AREAS ON THIS PROPERTY ARE WITHIN A DESIGNATED 100 YEAR FLOODPLAIN.

AREAS TO THE SOUTHERLY SIDE OF THE WETLAND LINE SHOWN ON PARCEL A ARE DEPICTED AS FLOOD ZONE 'X' WHICH REPRESENT AREAS OF MINIMAL FLOODING (500 YEAR FLOOD)

REVISIONS

NO.	DATE	DESCRIPTION	BY	CHK'D
2	5-6-24	REVISED PROOF	JDS	JDS
1	4-21-24	REVISED PROOF	JDS	JDS

DEFINITIVE SUBDIVISION PLAN "HAROLD AVENUE EXTENSION"

COMMONWEALTH OF MASSACHUSETTS
JOHN D. SULLIVAN III
CIVIL
No. 41686
REGISTERED PROFESSIONAL ENGINEER

PROOF PLAN
LOCATED IN
READING, MASSACHUSETTS
(MIDDLESEX COUNTY)

PREPARED FOR
ZERO HAROLD AVENUE, LLC
SCALE: 1"= 40' DATE: SEPT. 30, 2023

PREPARED BY

SULLIVAN ENGINEERING GROUP, LLC
P.O BOX 2004
WOBURN, MA 01888
(781) 854-8644