Stamski and McNary, Inc.
1000 Main Street Acton, Massachusetts 01720
Engineering – Planning – Surveying
(978) 263-8585
www.stamskiandmcnary.com

Site Plan Special Permit Application & Special Permit Application Under Zoning Sections 5.4 & 5.5B.2.2

For

7, 9, 19, 29 & 358 Great Road
(Map G-5, Parcels 78, 80, 81& 84)
Acton, Massachusetts

Applicant: AHC, Inc.
342 Great Road
Acton, MA 01720

Date: December 10, 2015

Job No. SM-939B

Table of Contents

- Letter to Acton Town Clerk
- Letter to Acton Board of Selectmen
- Project Narrative

3.1. Application for a Site Plan Special Permit and Transfer of Development Rights/Historic Preservation within the East Acton Village District

3.2. Certified Abutters List

3.3. Use Description

3.4. Other Permits and Variances

3.5. Recorded Plans

3.6. Drainage Calculations

3.7. Water Balance Calculations

3.8. Earth Removal Calculations

3.9. Plans

3.10. Traffic Study

STAMSKI AND MCNARY, INC.
1000 Main Street
Acton, Massachusetts 01720
(978) 263-8585
FAX (978) 263-9883

JOSEPH MARCH, P.E., P.L.S.
GEORGE DIMAKARAKOS, P.E.

December 10, 2015

Acton Town Clerk
472 Main Street
Acton, MA 01720

Re: 7, 9, 19, 29 & 358 Great Road

Dear Town Clerk,

On behalf of our client, AHC, Inc., we hereby submit the enclosed information for a *Site Plan Special Permit* and *Transfer of Development Rights and Historic Preservation Special Permit* pursuant to the Board of Selectmen's *Rules and Regulations for Site Plan Special Permits* and the *Town of Acton Zoning Bylaw* for the referenced site.

Very truly yours,

Stamski and McNary, Inc.

William Hall, E.I.T.

George Dimakarakos, P.E.

STAMSKI AND MCNARY, INC.
1000 Main Street
Acton, Massachusetts 01720
(978) 263-8585
FAX (978) 263-9883

JOSEPH MARCH, P.E., P.L.S.
GEORGE DIMAKARAKOS, P.E.

December 10, 2015

Acton Board of Selectmen
472 Main Street
Acton, MA 01720

Re: 7, 9, 19, 29 & 358 Great Road

Members of the Board,

On behalf of our client, AHC, Inc., we hereby submit the enclosed information for a *Site Plan Special Permit* and *Transfer of Development Rights and Historic Preservation Special Permit* pursuant to the Board of Selectmen's *Rules and Regulations for Site Plan Special Permits* and the *Town of Acton Zoning Bylaw* for the referenced site.

Very truly yours,

Stamski and McNary, Inc.

William Hall, E.I.T.

George Dimakarakos, P.E.

3.1 Application for a Site Plan Special Permit and Transfer of Development Rights/Historic Preservation within the East Acton Village District

Project Narrative:

The site is comprised of four developed parcels of land located at 7, 9, 19-29 and 358 Great Road. Three of the parcels, 7, 9 and 19-29 Great Road, are adjacent to each other. 7, 9, and 19-29 Great Road have commercial and retail properties to the east, south and west and single family dwellings to the north. The fourth parcel, 358 Great Road, is located east of Main Street. A portion of Will's Hole Brook flows through the property at 358 Great Road. 7, 9 and 19-29 Great Road are located within the East Acton Village (EAV) district and 358 Great Road is located in the Limited Business (LB) district, as defined in the Acton Zoning Bylaw.

The EAV district is a flexible zoning district that allows a range of land uses from residential to institutional to business, as well as mixed uses. The applicant has evaluated the list of allowed uses and has concluded that the best alternative for development of these lots is with a mix of single family houses and retail stores. The applicant feels that a Special Permit for the Transfer of Development Rights within the East Acton Village District and Limited Business District and for Historic Preservation, under sections 5.5B.2.2 (a) and (b) of the Acton Zoning Bylaw, would be ideal in order to provide the most compatible development with the surrounding uses.

The proposed site plan shows 14 single family houses and retail with 8,260 sf of net floor area at 7, 9, and 19-29 Great Road and no development at 358 Great Road. The Transfer of Development Rights would allow an increase in Net Floor Area of 12,000 sf at 7, 9, and 19-29 Great Road. The Historic Preservation would allow an increase in Net Floor Area of 10,648 sf and would preserve the historic structures at #7, #19 and #29 Great Road.

This application is consistent with the requirements of the Zoning Bylaw. In terms of Section 5.5B.2.1:

> The increased density on the receiving lot will better distinguish the East Acton Village District through clustering the development, maintaining historic structures, increasing business variety and promoting a pedestrian friendly village environment with the use of pedestrian plazas and sidewalks.

The following is a tabulation of the request transfer of development rights for the two lots:

	358 Great Road (Sending Lot)	7, 9, 19 & 29 Great Road (Receiving Lot)
Developable Site Area (DSA) (sf)	94,930	106,486
Allowable Net Floor Area (NFA) (FAR=0.2) (sf)	18,986	21,297
Proposed NFA to be Transferred (sf)	12,000 (Sending)	12,000 (Receiving)
Proposed NFA from Historic Preservation (0.1 x DSA) (sf)	N/A	10,648
Maximum Allowable NFA (sf)	6,986	43,945
Total Proposed NFA (sf)	4,160 (Existing)	43,835
Proposed Floor Area Ratio	0.04 (Existing)	0.41
Remaining NFA (sf)	2,826	110

The proposed uses at 7, 9, 19 & 29 Great Road are single family dwellings and retail. The site has suitable soils for sewage disposal and town water is available within close proximity. There is no proposed alteration to the site at 358 Great Road.

This Applicant is in the rare position of owning these crucial properties at Acton's eastern gateway. It is also fortuitous that there are transferable rights available from a willing acquaintance of the Applicant. It is important that the Board of Selectmen seize this opportunity to facilitate an existing project while these conditions exist.

Application for a Site Plan Special Permit

Appendix B

TOWN OF ACTON
APPLICATION FOR SITE PLAN SPECIAL PERMIT

For 7, 9, 19 & 29 Great Road
Under Zoning Bylaw Section 10.4

Refer to the "Rules and Regulations for Site Plan Special Permits" available from the Building Department or the Planning Department for details on the information and fees required for this application. Contact the Planning Department at 978-929-6631 or Building Department at 978-929-6633 with any questions concerning the Rules. Incomplete applications may be denied.

Please type or print your application.

1. Location and Street Address of Site 7, 9, 19 & 29 Great Road

2. Applicant's Name AHC, Inc.
   Address 342 Great Road, Acton, MA 01720
   Telephone (917) 446-0774 Email

3. Record Owner's Name AHC, Inc.
   Address 342 Great Road, Acton, MA 01720
   Telephone (917) 446-0774 Email

4. Town Atlas Map(s)/Parcel Number(s) Map G5 Parcels 78, 80, 81 and 84

5. Zoning District (s) of Parcel(s) East Acton Village

If any site plans have been filed previously for this site give file numbers: #05/10/90/-0326

The undersigned hereby apply to the Board of Selectmen for a public hearing and a site plan special permit under Section 10.4 of the Zoning Bylaw approving the attached site plan.

The undersigned hereby certify that the information on this application and plans submitted herewith is correct, and that all applicable provisions of Statutes, Regulations, and Bylaws will be complied with. The above is subscribed to and executed by the undersigned under the penalties of perjury in accordance with Section 1-A of Chapter 268, General Laws of the Commonwealth of Massachusetts.

12/10/15 _____ _____
Date Signature of Petitioner(s) Signature of Petitioner(s)

RECORD OWNER'S KNOWLEDGE AND CONSENT

I hereby assert that I have knowledge of and give my consent to the application presented above.

_____ _____ _____
Date Signature of Record Owner(s) Signature of Record Owner(s)

Application for Transfer of Development Rights/Historic Preservation within the East Acton Village District

Appendix B

TOWN OF ACTON
APPLICATION FOR SPECIAL PERMIT
(ZONING BYLAW)

Indicate the type of Special Permit Requested: Transfer of Development Rights & Historic Preservation

Under Zoning Bylaw Section: 5.4 & 5.5B.2.2

Refer to the "Rules and Regulations for Special Permits" available from the Planning Department for details on the information and fees required for this application. Contact the Planning Department at 978-929-6631 with any questions concerning the Rules. Incomplete applications may be denied.

Please type or print your application.

1. Location and Street Address of proposed SPECIAL PERMIT 7, 9, 19 & 29 Great Road

2. Applicant's Name AHC, Inc.
   Address 342 Great Road, Acton, MA 01720
   Telephone (917) 446-0774 Email

3. Record Owner's Name AHC, Inc.
   Address 342 Great Road, Acton, MA 01720
   Telephone (917) 446-0774 Email

4. Town Atlas Map(s)/Parcel Number(s) Map G5 Parcels 78, 80, 81 and 84

5. Zoning District (s) of Parcel(s) EAV

6. Detailed description of the proposed SPECIAL PERMIT:
   A transfer of 12,000 sf of development rights from 358 Great Road to 7, 9 and 19-29 Great Road. 358 Great Road is located in the Limited Business district and 7, 9 and 19-29 Great Road are located in the East Acton Village district. An increase in Net Floor Area through Historic Preservation is also requested.

7. If applying for a USE SPECIAL PERMIT, declare all hazardous materials or wastes that are expected to be generated, stored, used, or disposed of by the proposed USE. The USE must comply with the TOWN'S Hazardous Materials Control Bylaw:
   The proposed use will not generate hazardous materials or waste.

8. If there was a change in USE, please describe the previous USE on the site: N/A

9. If any SPECIAL PERMITS have been filed previously for this site give file numbers: 29 Great Road, file #05/10/90-0326

10. Please indicate expected number of employees, occupants and/or residents: 6 Employees
35 Residents

11. If a restaurant is proposed, please indicate number of proposed seats: _____

12. Hours of operation: Monday - Saturday: 10 AM - 6 PM

13. Please indicate the following:
Total NET FLOOR AREA (existing): 10,200+/- sf (Approximate from available records)
Total NET FLOOR AREA (proposed): 43,835 sf

14. Describe any proposed modifications to the exterior features or appearances of the STRUCTURE: _____

15. If the proposed SPECIAL PERMIT is located on a developed site, please provide the site conditions for the following characteristics:
LOT size: 106,486 sf
Total LOT coverage (existing): 8% (8,670+/- sf)
Total LOT coverage (proposed): 26% (27,840+/- sf)
Total OPEN SPACE (existing): 62% (66,020+/- sf)
Total OPEN SPACE (proposed): 38% (40,500+/- sf)
Total parking spaces provided on the site: 43
Total parking spaces dedicated to proposed use (existing): N/A
Total parking spaces dedicated to proposed use (proposed): 23

The undersigned hereby apply to the Board of Selectmen for a public hearing and a special permit under Section 10.3 of the Zoning Bylaw approving the attached use form.

The undersigned hereby certify that the information on this application and plans submitted herewith is correct, and that all applicable provisions of Statutes, Regulations, and Bylaws will be complied with. The above is subscribed to and executed by the undersigned under the penalties of perjury in accordance with Section 1-A of Chapter 268, General Laws of the Commonwealth of Massachusetts.

Date	Signature of Petitioner(s)	Signature of Petitioner(s)
	AHC inc.	

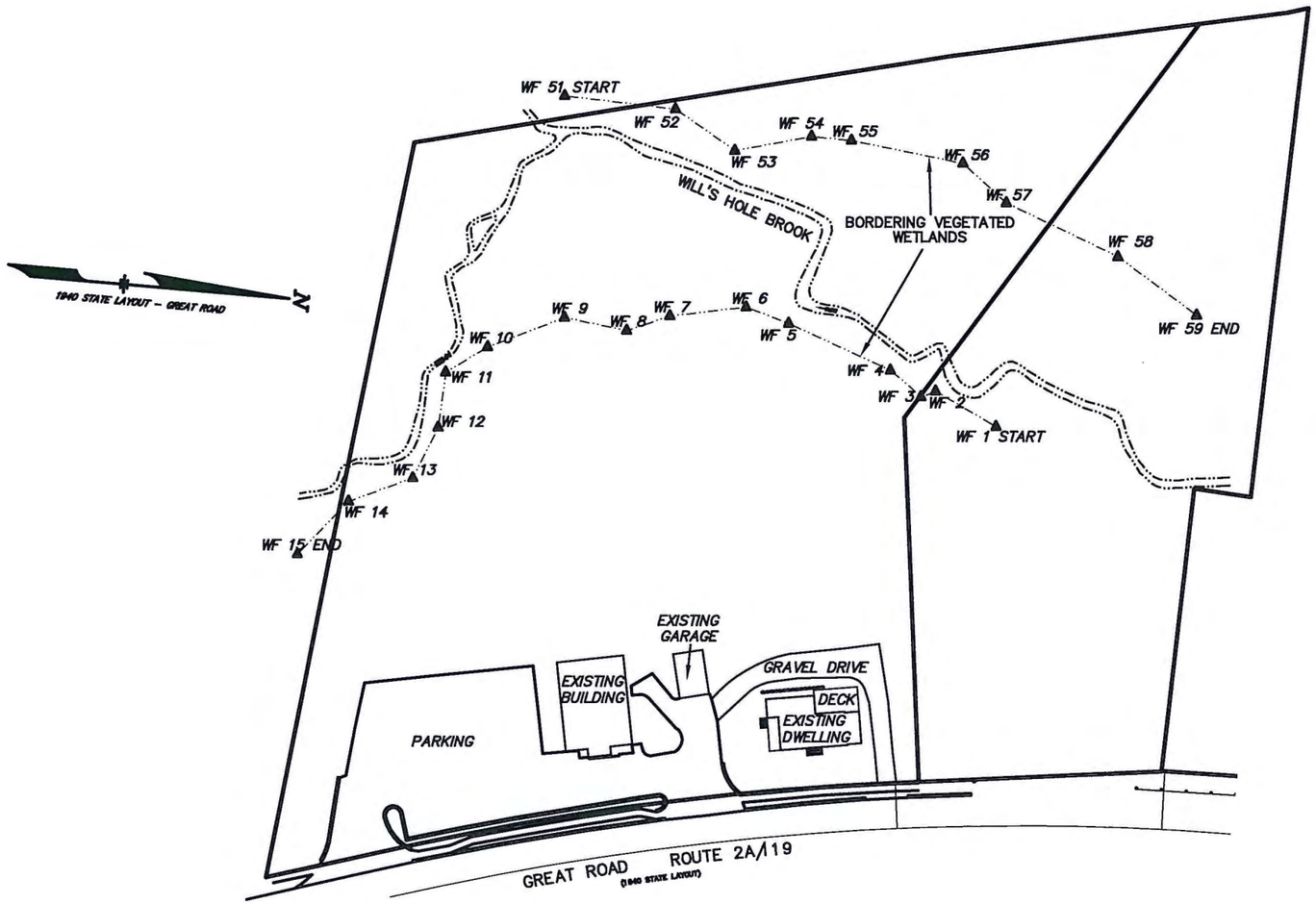
RECORD OWNER'S KNOWLEDGE AND CONSENT

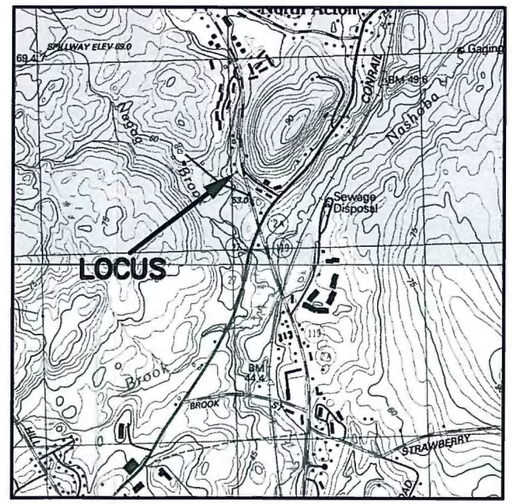
I hereby assert that I have knowledge of and give my consent to the application presented above.

Date	Signature of Record Owner(s)	Signature of Record Owner(s)
Nov. 25th, 2015		

LAND USE DATA 358 GREAT ROAD

FLOOR AREA REQUIREMENTS	
TOTAL SITE AREA	135,228 SF
BORDERING VEGETATED WETLAND AREA	40,298 SF
DEVELOPABLE SITE AREA (DSA) =TOTAL–BVW =	94,930 SF
ALLOWED NET FLOOR AREA (0.2 X 94,930) =	18,986 SF
EXISTING NET FLOOR AREA =	4,160 SF
AVAILABLE NET FLOOR AREA =	14,826 SF
NET FLOOR AREA TO BE TRANSFERRED =	12,000 SF
NET FLOOR AREA AVAILABLE AFTER TRANSFER=	2,826 SF





LOCUS PLAN

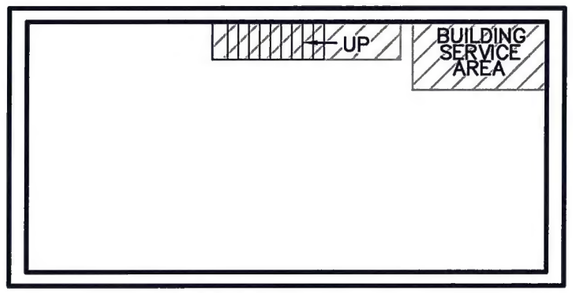
SENDING LOT–358 GREAT ROAD
TDR SPECIAL PERMIT
ACTON, MA
(MIDDLESEX COUNTY)

FOR: KHALEDI
SCALE: 1"=80' JANUARY 14, 2015

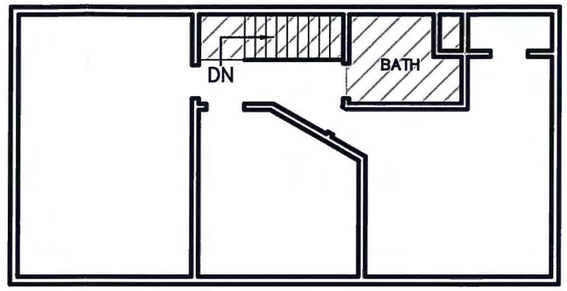
STAMSKI AND McNARY, INC.
1000 MAIN STREET ACTON, MASS.
ENGINEERING – PLANNING – SURVEYING
978–263–8585

SM–939B 358 GREAT ROAD (939B transfer.DWG)

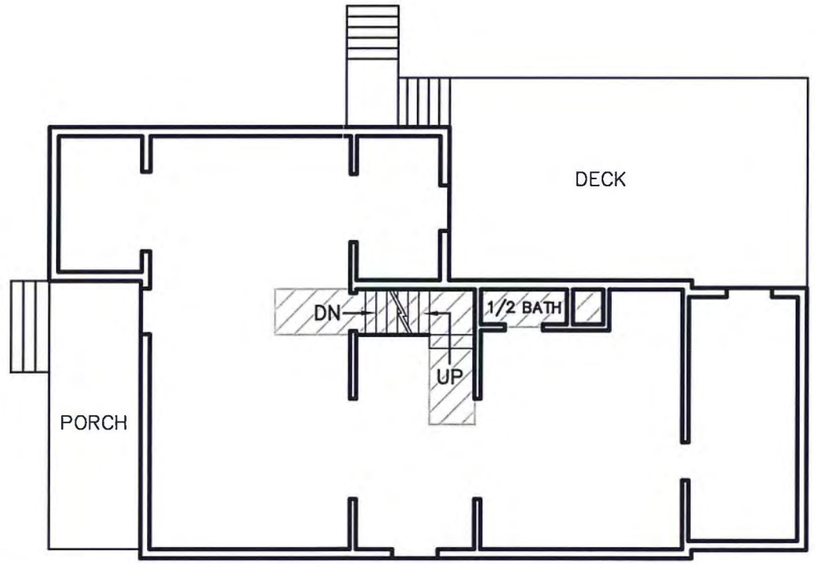
= AREA NOT INCLUDED IN NET FLOOR AREA



FRONT
BASEMENT



FRONT
SECOND FLOOR



FRONT
FIRST FLOOR

358 A GREAT ROAD
CONDO NAME
NET FLOOR AREA

BASEMENT:	490 S.F.±
FIRST FLOOR:	890 S.F.±
SECOND FLOOR:	535 S.F.±
TOTAL:	1915 S.F.±

NOTE
EXTERIOR WALLS NOT INCLUDED IN NET FLOOR AREA.

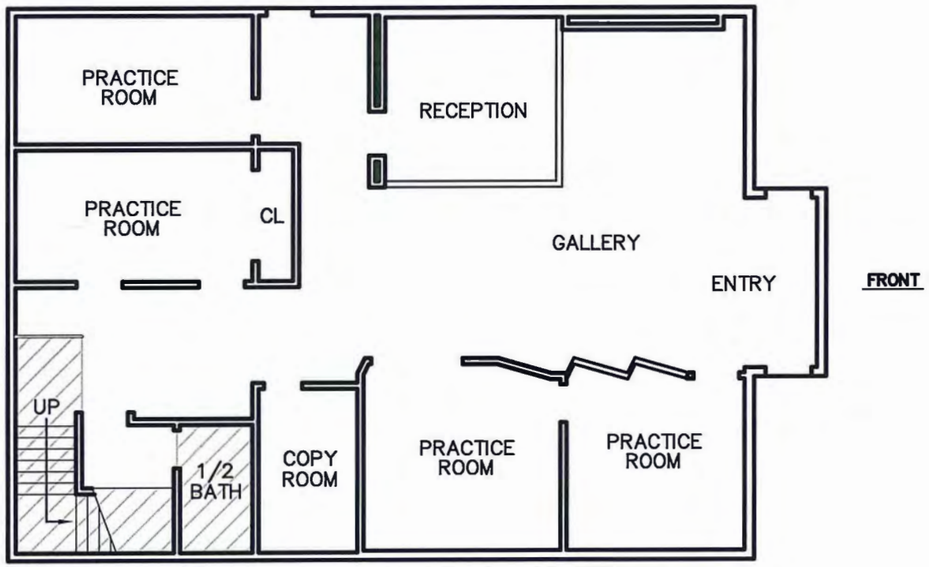
358 A GREAT RD
NET FLOOR AREA PLAN
IN
ACTON, MASSACHUSETTS
(MIDDLESEX COUNTY)

FOR: KHALEDI
SCALE: 1"=10' JANUARY 14, 2015

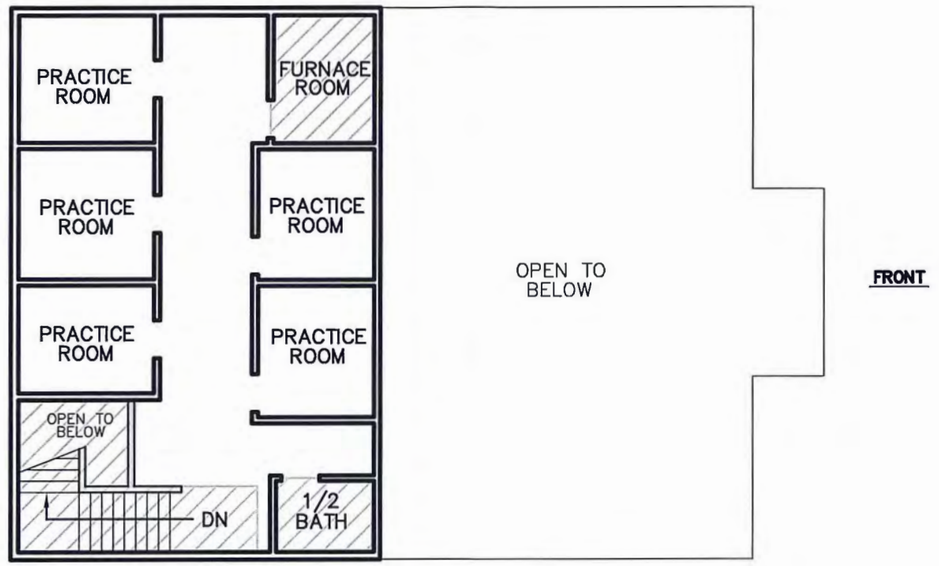
STAMSKI AND MCNARY, INC.
1000 MAIN STREET ACTON, MASSACHUSETTS
ENGINEERING – PLANNING – SURVEYING

0 10 20 30 40 FT

(9398.GREAT RD.work.dwg) 358 GREAT RD SM-9398



FIRST FLOOR



SECOND FLOOR

= AREA NOT INCLUDED IN NET FLOOR AREA

358 B GREAT ROAD
CONDO NAME
NET FLOOR AREA

FIRST FLOOR:	1605 S.F.±
SECOND FLOOR:	640 S.F.±
TOTAL:	2245 S.F.±

NOTE
EXTERIOR WALLS NOT INCLUDED IN NET FLOOR AREA.

358 B GREAT ROAD
NET FLOOR AREA PLAN
IN
ACTON, MASSACHUSETTS
(MIDDLESEX COUNTY)

FOR: KHALEDI
SCALE: 1"=10' JANUARY 14, 2015

STAMSKI AND MCNARY, INC.
1000 MAIN STREET ACTON, MASSACHUSETTS
ENGINEERING – PLANNING – SURVEYING

0 10 20 30 40 FT

(939B.GREAT RD.work.dwg) 358 GREAT RD SM-939B

3.2 Certified Abutters List

Town of Acton
472 Main Street
Acton, MA 0001720
Telephone (978) 929-6621
Fax (978) 929-6340

Brian McMullen
Principal Assessor

Locus: 7,9,19,29 Great Rd
Parcel: G5-84 G5-81 G5-80 G5-78

Parcel ID	LOCATION	Owner	Co-Owner	Mailing Address	City,ST Zip
G5-68	1 GREAT RD BEHIND	ACTON MEDICAL INVESTORS LLC	C/O LIFE CARE SYSTEMS	3001 KEITH STREET	CLEVELAND, TN 37312
G5-68-2	1 GREAT RD BEHIND	ACTON MEDICAL INVESTORS LLC	C/O LIFE CARE CENTERS OF AMERICA	3001 KEITH ST	CLEVELAND, TN 37312
G5-72-1	17 BAYBERRY RD	ACTON MEDICAL INVESTORS LLC	C/O LIFE CARE SYSTEMS	3001 KEITH STREET	CLEVELAND, TN 37312
G5-72-2	21 BAYBERRY RD	GREENWOOD ALFRED TRUSTEE		80 SOMERSET STREET	BELMONT, MA 02478
G5-77	35 GREAT RD	SIMS DONNA M		35 GREAT RD	ACTON, MA 01720
G5-79	38 GREAT RD	LUNG CHIK YAN	LUNG NGA CHEE	270-272 17TH AVENUE	SAN FRANCISCO, CA 94121
G5-82-1	30 GREAT RD	ACTON SPORTS PROPERTY LTD PTNP		30 GREAT RD	ACTON, MA 01720
G5-83	1-13 KEEFE RD	LENOX ASSOCIATES LLC		1 KEEFE ROAD	ACTON, MA 01720
G5-85	1 GREAT RD	ACTON MEDICAL INVESTORS LLC	C/O LIFE CARE SYSTEMS	3001 KEITH STREET	CLEVELAND, TN 37312
G5-87	6 GREAT RD	MORGAN WAYNE L	MORGAN DIANE L	6 GREAT ROAD	ACTON, MA 01720
G5-88	2 GREAT RD	WRENN GEORGE L		2 GREAT RD	ACTON, MA 01720
G5-90	19 KEEFE RD	MORGAN WAYNE L	MORGAN DIANE L	6 GREAT ROAD	ACTON, MA 01720
G5-91	16-24 KEEFE RD	OH CHURL		1323 ELM ST	CONCORD, MA 01742
G5-72	1-5 IRIS CT	IRIS COURT ASSOC LLC	C/O TRIDENT MGT	2 IRIS CT APT 8	ACTON, MA 01720
G5-72-4	14 IRIS CT	IRIS COURT ASSOC LLC	C/O TRIDENT MGT	2 IRIS CT APT 8	ACTON, MA 01720
G5-76	44 GREAT RD	GLOBAL COMPANIES LLC	C/O ALLIANCE ENERGY LLC	15 NORTHEAST INDUSTRIAL RD	BRANFORD, CT 06405
G5-78	29 GREAT RD	AHC INC		29 GREAT RD	ACTON, MA 01720

Abutters and owners of land directly opposite on any public or private street or way and abutters to the abutters within three hundred feet of the property line all as they appear on the most recent applicable tax list.

HEARING NOTICES FOR ALL SPECIAL PERMITS MUST BE SENT TO THE PLANNING BOARD, TOWN HALL IN THE FOLLOWING TOWNS:

Boxborough, MA 01729 Maynard, MA 01754 Concord, MA 01742 Littleton, MA 01460
Carlisle, MA 01741 Stow, MA 01775 Westford, MA 01886 Sudbury, MA 01776

Marty Abbott
Acton Assessors Office

11/19/2015

Town of Concord
Board of Assessors
24 Court Lane
P.O. Box 535
Concord, Massachusetts 01742-0535
Tel: (978) 318-3070
Fax: (978) 369-4760

ABUTTERS LIST

PROPERTY : 134B Elm St.
Concord, MA 01742

MAP: C06

PARCEL: 2000-8-2

As per Massachusetts General Laws Chapter 131, Section 40 whereas the "abutters" included shall be:

> Any person filing a notice of intention with a conservation commission shall at the same time give written notification thereof, by delivery in hand or certified mail, return receipt requested, to all abutters within one hundred feet of the property line of the land where the activity is proposed, at the mailing addresses shown on the most recent applicable tax list of the assessors, including, but not limited to, owners of land directly opposite said proposed activity on any public or private street or way, and in another municipality or across a body of water.

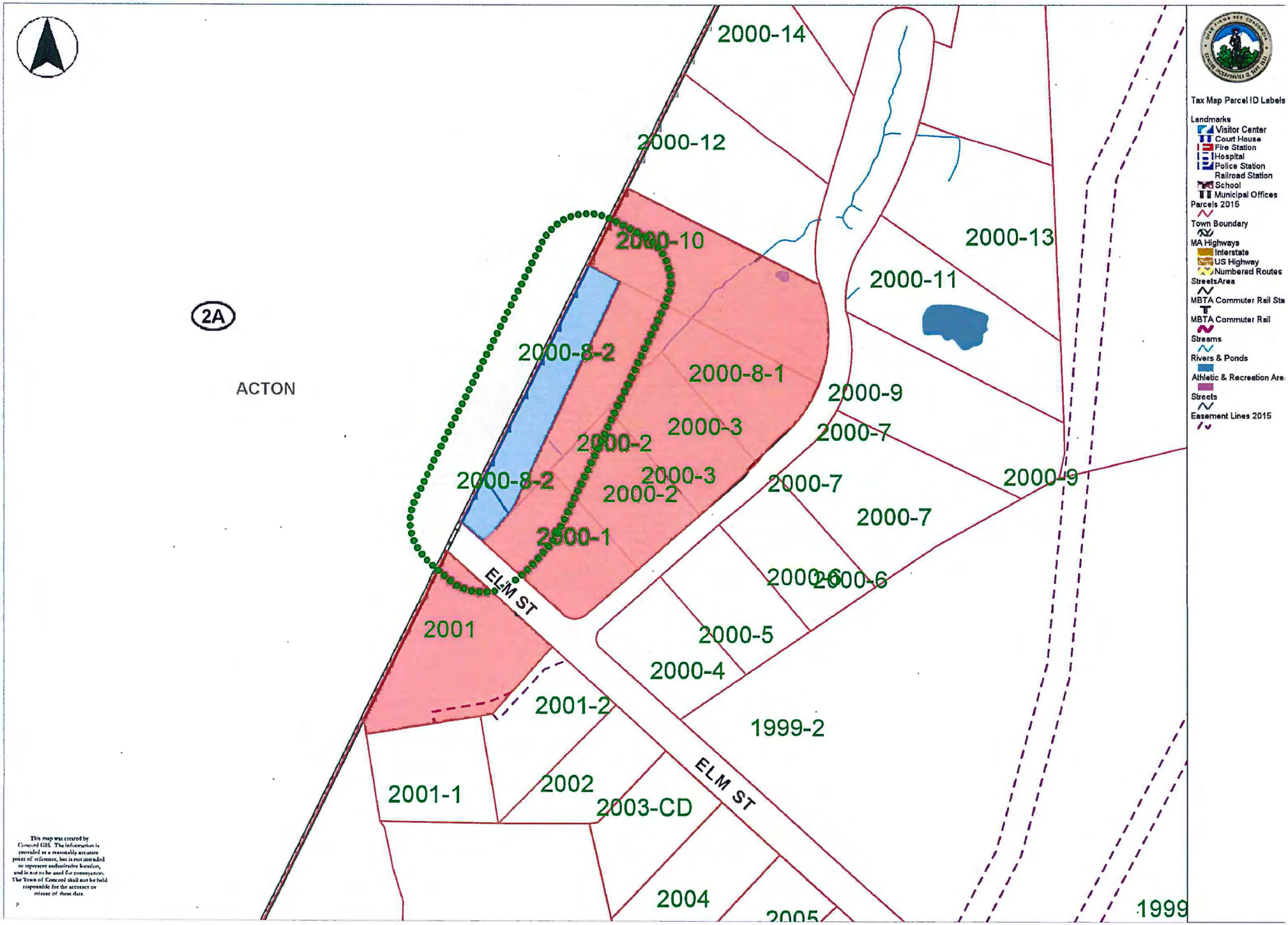
The Board of Assessors hereby certifies that the attached list contains the record owners as of January 1, 2015, and recorded on the current tax rolls. In addition, the Board certifies that the list includes owners, as per recorded deeds as received up to October 31, 2015.

Board of Assessors

11/23/15
Date

Abutters List for Parcel# 2000-8-2, 134B Elm St., using a distance of 100 ft.:

Parcel	Parcel Location	Name & Billing Address as of January 1, 2015	Name & Billing Address as of October 31, 2015
2000-8-2	134B Elm St	Allyn & Margaret K Dimock 79 Commerford Rd Concord, MA 01742	
2000-1	15 Commerford Rd	Vera Taylor 15 Commerford Rd Concord, MA 01742	
2000-2	27 Commerford Rd	Christopher J & Caroline M Mahoney 27 Commerford Rd Concord, MA 01742	
2000-3	43 Commerford Rd	Mansour Zenouzi & Franca Morelli 43 Commerford Rd Concord, MA 01742	
2000-8-1	61 Commerford Rd	Richard S & Debra J Miza 61 Commerford Rd Concord, MA 01742	Michael T Deorsey & Erin R Cusker 61 Commerford Rd Concord, MA 01742
2000-10	79 Commerford Rd	Allyn & Margaret K Dimock 79 Commerford Rd Concord, MA 01742	
2001	1323 Elm St	Churl Oh 1323 Elm St Concord, MA 01742	



Printed on 11/20/2015 at 10:03 AM

134B Elm St

3.3 Use Description

Use Description

Existing Conditions

The existing use of the site is OFFICE and SINGLE FAMILY DWELLING.

Proposed Conditions

The proposed use of the site is for RETAIL, OFFICE, SINGLE FAMILY DWELLING and MULTI-FAMILY DWELLING.

There will be no storage, generation or use of hazardous materials or wastes on the site.

3.4 Other Permits and Variances

Other Permits and Variances

Permitting Body	Required
Acton Board of Health	Disposal Works Construction Permit Aquifer Permit
Acton Board of Selectmen	Transfer of Development Rights/Historic Preservation
Mass Highway	Curb Cut Permit
EPA	NPDES Construction General Permit

3.5 Record Plans

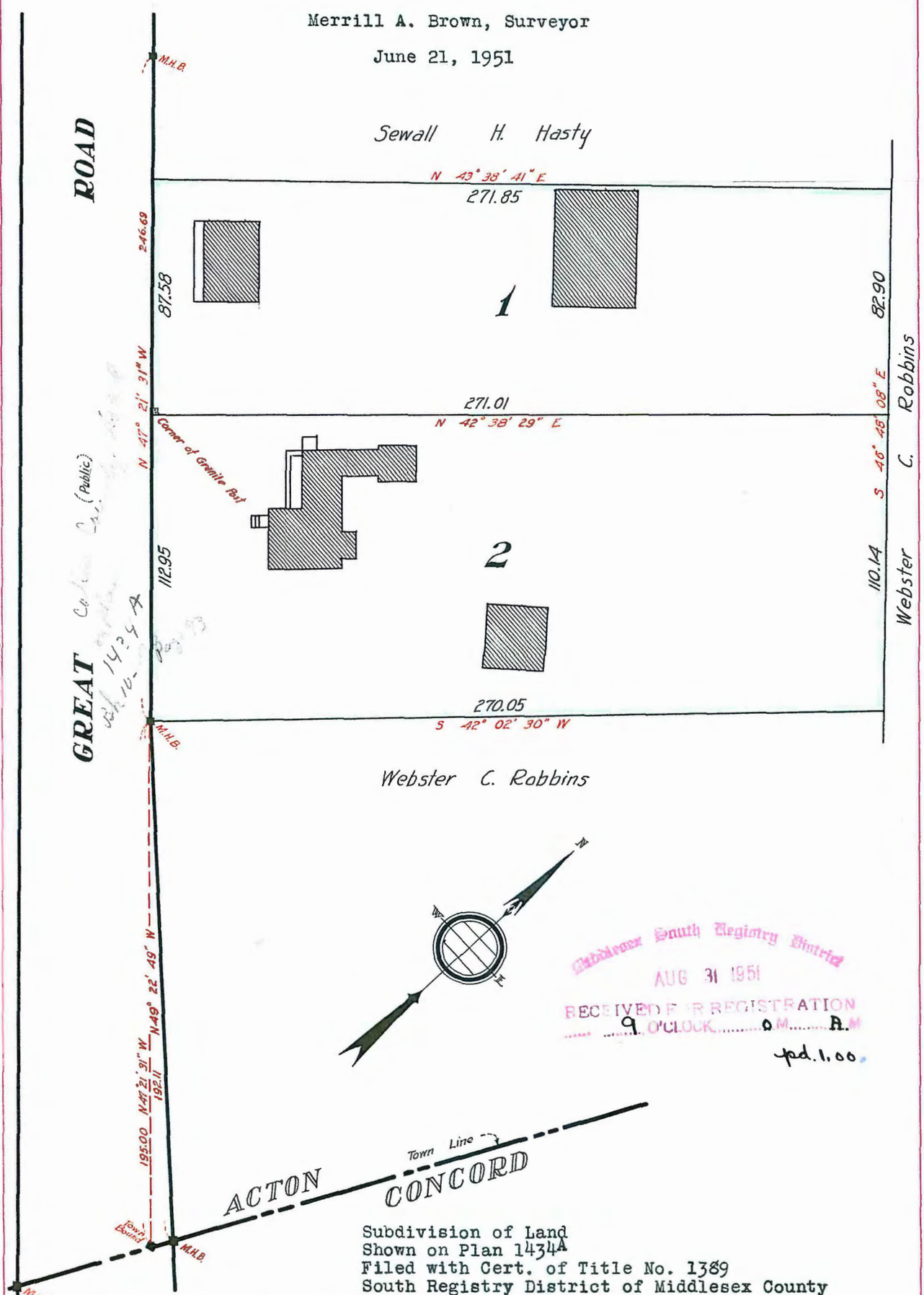
Ctf. 73182 Book 489 Page 157

1434B

SUBDIVISION PLAN OF LAND IN ACTON

Merrill A. Brown, Surveyor

June 21, 1951



Middlesex South Registry District
AUG 31 1951
RECEIVED FOR REGISTRATION
9 O'CLOCK ... A.M.
pd. 1.00

Subdivision of Land
Shown on Plan 1434A
Filed with Cert. of Title No. 1389
South Registry District of Middlesex County

Separate certificates of title may be issued for Lots 1 & 2 as shown hereon
By the Court
Thomas B. Cummings
Deputy Recorder.
JUNE 26, 1951

Copy of part of plan filed in
LAND REGISTRATION OFFICE
JUNE 26, 1951
Scale of this plan 40 feet to an inch
W. T. Fairclough, Engineer for Court

3.6 Drainage Calculations

Table of Contents

Narrative

Pre-Development Hydrology

Post-Development Hydrology

First Flush Volume Calculations

Pipe Sizing Calculations

Soil Evaluation

Drainage Maps

Narrative

Stormwater Management

The proposed project is to redevelop an existing mixed use site located on Great Road.

Pre Development-

The existing site is approximately 2.44 ac and contains an office building, a retail building, three single family dwellings and associated appurtenances. For the stormwater analysis, the existing site conditions from 1990 were used, prior to the conversion of the dwellings on 19 and 29 Great Road to retail space. The site has been divided into 2 subcatchments as shown on the attached drainage map.

Subcatchment 1 is the majority of the site and drains to Great Road uncontrolled. Subcatchment 2 is portion of woods and open space located to the east that flows off-site.

Post Development-

The proposed work is to retain the historical dwellings at 7, 19 and 29 Great Road while adding retail space and 10 single family dwellings. The dwelling at 7 Great Road will be moved and converted to retail space while the retail space at 19 and 29 Great Road will be converted back to single family dwellings. The result will be a total of 14 single family dwellings and approximately 8,000 square feet of retail space. The proposed subcatchments are shown on the attached drainage map.

Subcatchment 1 is located to the north and east of the site and contains 10 single family dwellings and the majority of the driveway. Runoff from subcatchment 1 will be directed to a Contech Vortsentry unit sized to treat the first flush volume. From there it will directed to a subsurface infiltration structure where stormwater will be infiltrated. Subcatchment 2 is located to the south and contains the retail building and associated parking lot. Runoff will be directed to a subsurface infiltration structure with a Contech CDS unit sized to treat the first flush volume. Subcatchment 3 is located to the west and contains an existing retail building, garage and associated pavement. Runoff will be directed to a catch basin and subsurface infiltration structure. Subcatchment 4 is the portion of driveway located to the west. Runoff will flow uncontrolled to the drainage system on Great Road.

In accordance with the Town of Acton Zoning Bylaw, Section 10.4.3.1, the peak rate of stormwater runoff will not exceed the existing rate based on a 10-year storm event. In addition, the system design will not result in a serious flood hazard during the 100-year storm event. The peak runoff rates have been summarized in the following tables.

Discharge Summary Tables

In accordance with the Rules and Regulations for Site Plan Special Permits, water balance calculations have also been performed. Detailed calculations for water balance, inlet grate capacity, and pipe sizing are attached.

Compliance with MA DEP Stormwater Management Standards

Compliance with the Stormwater Management Standards is as follows:

Standard 1: No Untreated Discharges
No untreated discharges to wetlands are proposed. Additional runoff from the site is to be treated with Contech units and infiltrated in subsurface infiltration structures. Roof runoff will be treated by roof drywells.

Standard 2: Peak Rate Attenuation
The Post-Development peak discharge rates must not be increased from pre-development rates for the 2-year, 10-year, and 100-year storm events. Also, offsite flood impact from the 100-year storm must not be increased. With a combination of infiltration and detention, the peak runoff rate and volume have been decreased. The peak runoff rates have been summarized in the following tables.

Discharge Summary Tables

Total Runoff

2-year Storm		10-year Storm		100-year Storm	
Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)
0.071	0.044	0.765	0.153	2.684	0.345

Total Volume

2-year Storm		10-year Storm		100-year Storm	
Pre (cf)	Post (cf)	Pre (cf)	Post (cf)	Pre (cf)	Post (cf)
1,220	199	4,955	513	12,741	1060

Standard 3: Stormwater Recharge
The subsurface infiltration structures have been sized to infiltrate the required recharge volume as specified in the Massachusetts Stormwater Handbook. The "Simple Dynamic" method was used in sizing the required storage volume to infiltrate the recharging runoff. Calculations were performed to insure drawdown within 72 hours to provide storage for the next storm event. Detailed calculations showing compliance with Standard 3 have been attached to this report.

Standard 4: Water Quality
The required water quality volume for this project is 1" of runoff over the impervious area for the subsurface infiltration structures since the infiltration rate is greater than 2.4 inches per hour. This volume will be treated to meet the 80% TSS removal requirement of Standard 4. Also, 44% TSS removal will be provided prior to infiltration. Calculations showing treatment levels are attached.

Standard 5: Land Uses with Higher Potential Pollutant Loads
The site is will not contain "land uses with higher potential pollutant loads."

Standard 6: Critical Areas
The site does not discharge runoff to critical areas.

Standard 7: Redevelopment
The proposed project qualifies as redevelopment but meets all the requirements for new development.

Standard 8: Construction Period Controls
The erosion and sedimentation control measures will be followed in accordance with the Erosion and Sedimentation Control Plan and will be consistent with the requirements of the NPDES Construction General Permit. The project will require coverage under the NPDES Construction General Permit.

Standard 9: Operation and Maintenance Plan
An Operation and Maintenance Plan is included in this report.

Standard 10: Illicit Discharges to Drainage System
An Illicit Discharge Compliance will be provided prior to the discharge of stormwater runoff to the post-construction stormwater BMP's.

Design Basis

1. The United States Department of Agriculture Natural Resource Conservation Service (N.R.C.S.) TR55 methodology was used to determine offsite rates of runoff.
2. The twenty-four hour rainfall, taken from N.R.C.S. publications, is 6.4 inches for the 100-year storm, 4.5 inches for the 10-year storm, and 3.1 inches for the 2-year storm event.
3. The hydrologic calculations were performed using the computer program: "Hydraflow Hydrographs 2007" by Intelisolve.
4. The soil types of the site were taken from the N.R.C.S. Soil Survey Map for Middlesex County.
5. Soil conditions and estimated seasonal high groundwater table were based on on-site soil evaluations.
6. The Natural Resources Conservation Service (N.R.C.S.) soil survey indicated the presences of Windsor Loamy Sand and Merrimac-Urban land complex. These soil groups rate as Hydrologic Group A.

Pre-Development Hydrology

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.071	2	754	1,220	----	------	------	Subcatchment 1
2	SCS Runoff	0.000	2	n/a	0	----	------	------	Subcatchment 2
4	Combine	0.071	2	754	1,220	1, 2,	------	------	Pre-Total

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.765	2	738	4,954	----	------	------	Subcatchment 1
2	SCS Runoff	0.000	2	1324	2	----	------	------	Subcatchment 2
4	Combine	0.765	2	738	4,955	1, 2,	------	------	Pre-Total

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	2.684	2	732	12,712	----	------	------	Subcatchment 1
2	SCS Runoff	0.002	2	746	29	----	------	------	Subcatchment 2
4	Combine	2.684	2	732	12,741	1, 2,	------	------	Pre-Total

Worksheet 2: Runoff curve number and runoff **SM-939B**

Project: 7, 9, 19-29 Great Road By WJH Date 1/13/2015

Location: Acton, MA Checked _____ Date _____

Circle one: [Present] Developed Subcatchment 1

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
-	Impervious	98			0.49	48.30
626B & 255C A	Woods- Good Condition	30			0.12	3.47
626B & 255C A	Open Space-Good Condition	39			1.76	68.57
626B & 255C A	Gravel-Good Condition	76			0.07	5.45
				Totals =	2.44	125.78

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{125.78}{2.44}$ = 51.59 ; Use CN = 51.6

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.14	0.57	1.47
Runoff, Q.....	cf	1248	5072	13020

(210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-939B

Project: 7, 9, 19-29 Great Road By WJH Date 1/13/2015

Location: Acton, MA Checked _____ Date _____

Circle one: Present / Developed
Circle one: Tc / Tt through subarea Subcatchment 1A

		Segment ID	A-B	B-C		
Sheet flow (Applicable to Tc only)						
1. Surface Description (table 3-1)			Woods	Grass		
2. Mannings roughness coeff., n (table 3-1)			0.6	0.24		
3. Flow length, L (total L <= 300 ft)		ft	28	12		
4. Two-yr 24-hr rainfall, P2		in	3.1	3.1		
5. Land Slope, s		ft/ft	0.02	0.02		
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.18	0.04		0.23
Shallow concentrated Flow		Segment ID	C-D	D-E		
7. Surface Description (paved or unpaved)			UNPAVED	PAVED		
8. Flow Length, L		ft	170	80		
9. Watercourse slope, s		ft/ft	0.08	0.025		
10. Average Velocity, V (figure 3-1)		ft/s	4.56	6.03		
11. Tt = L / 3600V	Compute Tt	hr	0.01	0.00		0.01
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.24
min 14.4

(210-VI-TR-55, Second Ed., June 1986)

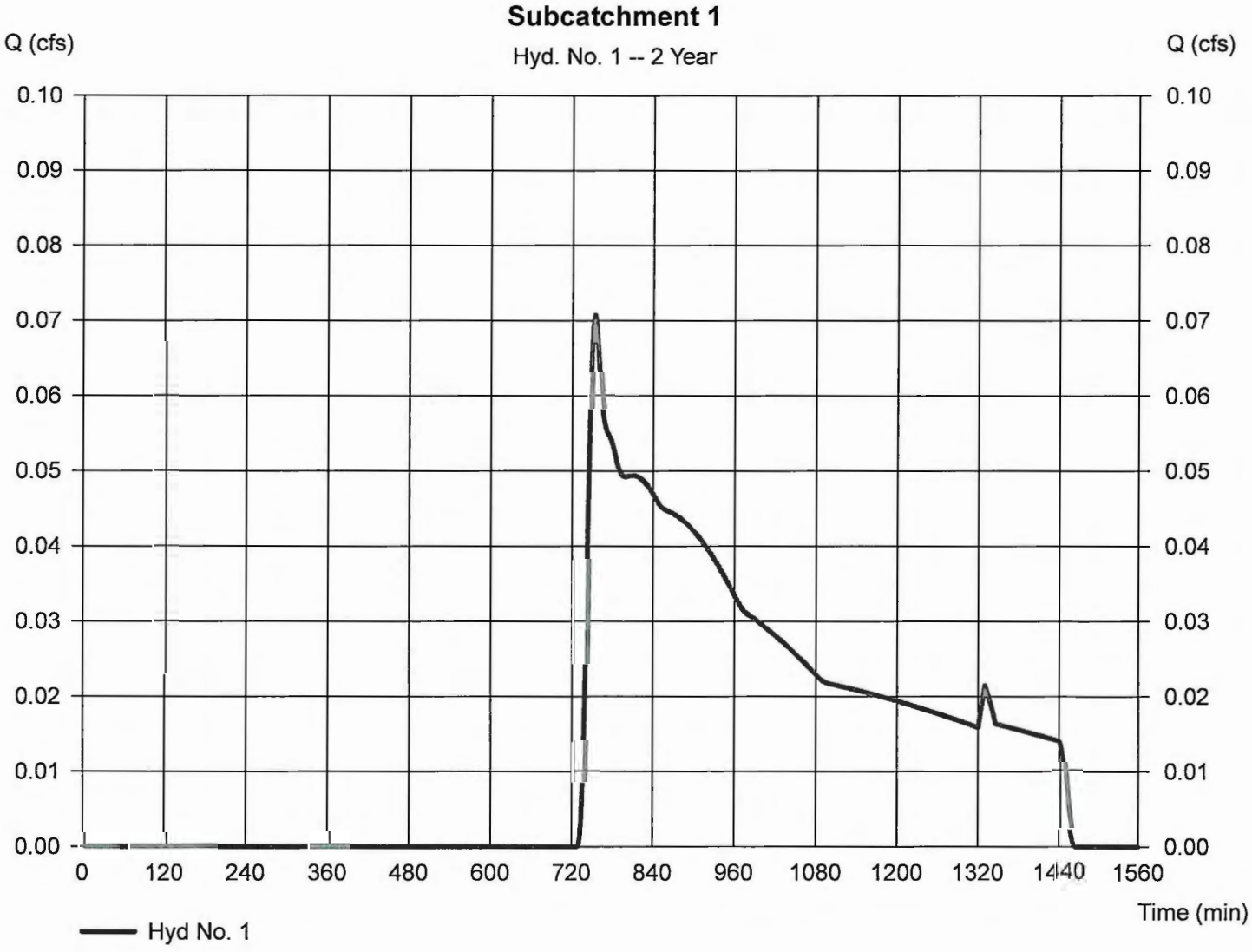
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Feb 5, 2015

Hyd. No. 1

Subcatchment 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.071 cfs
Storm frequency	= 2 yrs	Time to peak	= 754 min
Time interval	= 2 min	Hyd. volume	= 1,220 cuft
Drainage area	= 2.440 ac	Curve number	= 51.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.40 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



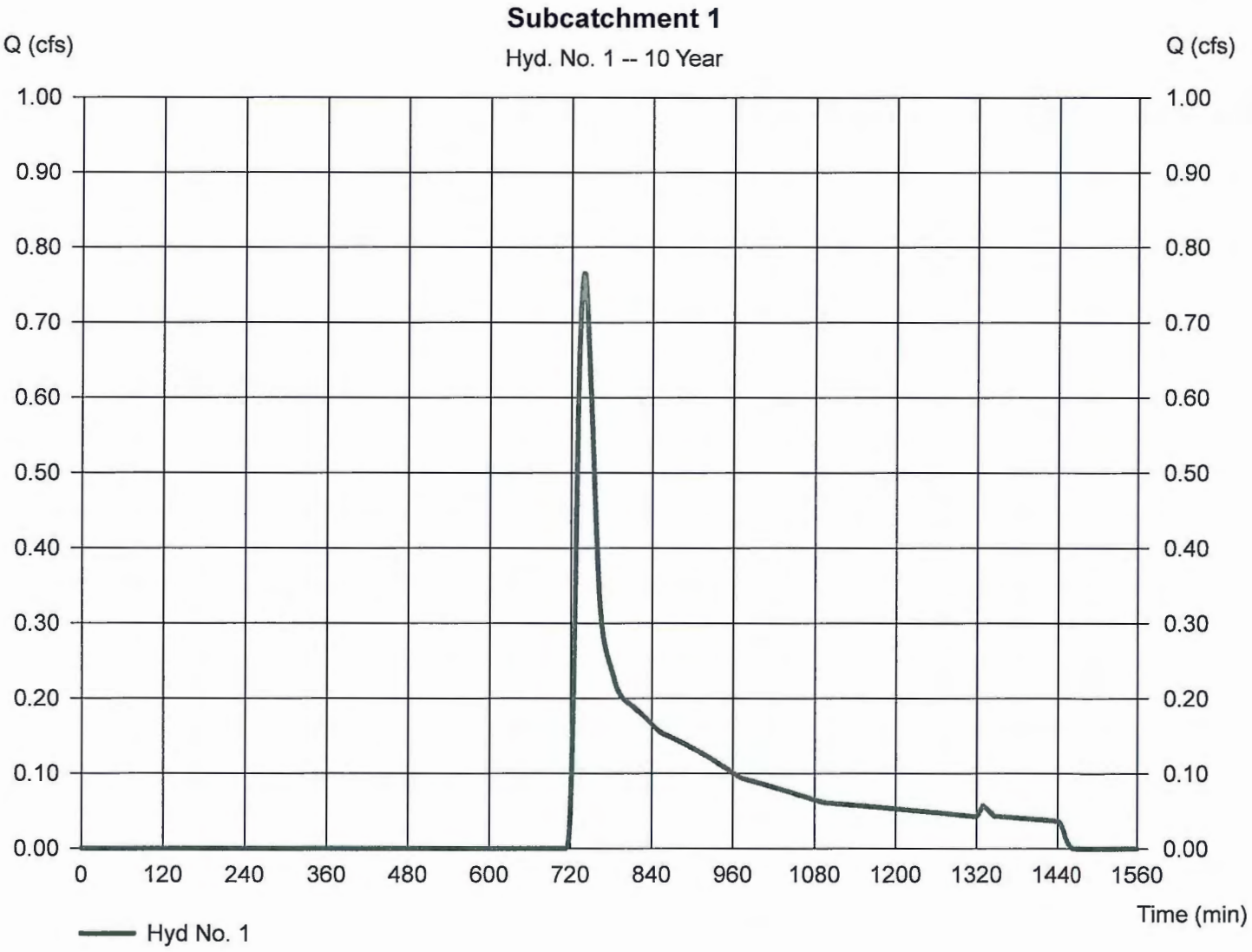
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Feb 5, 2015

Hyd. No. 1

Subcatchment 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.765 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 4,954 cuft
Drainage area	= 2.440 ac	Curve number	= 51.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.40 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



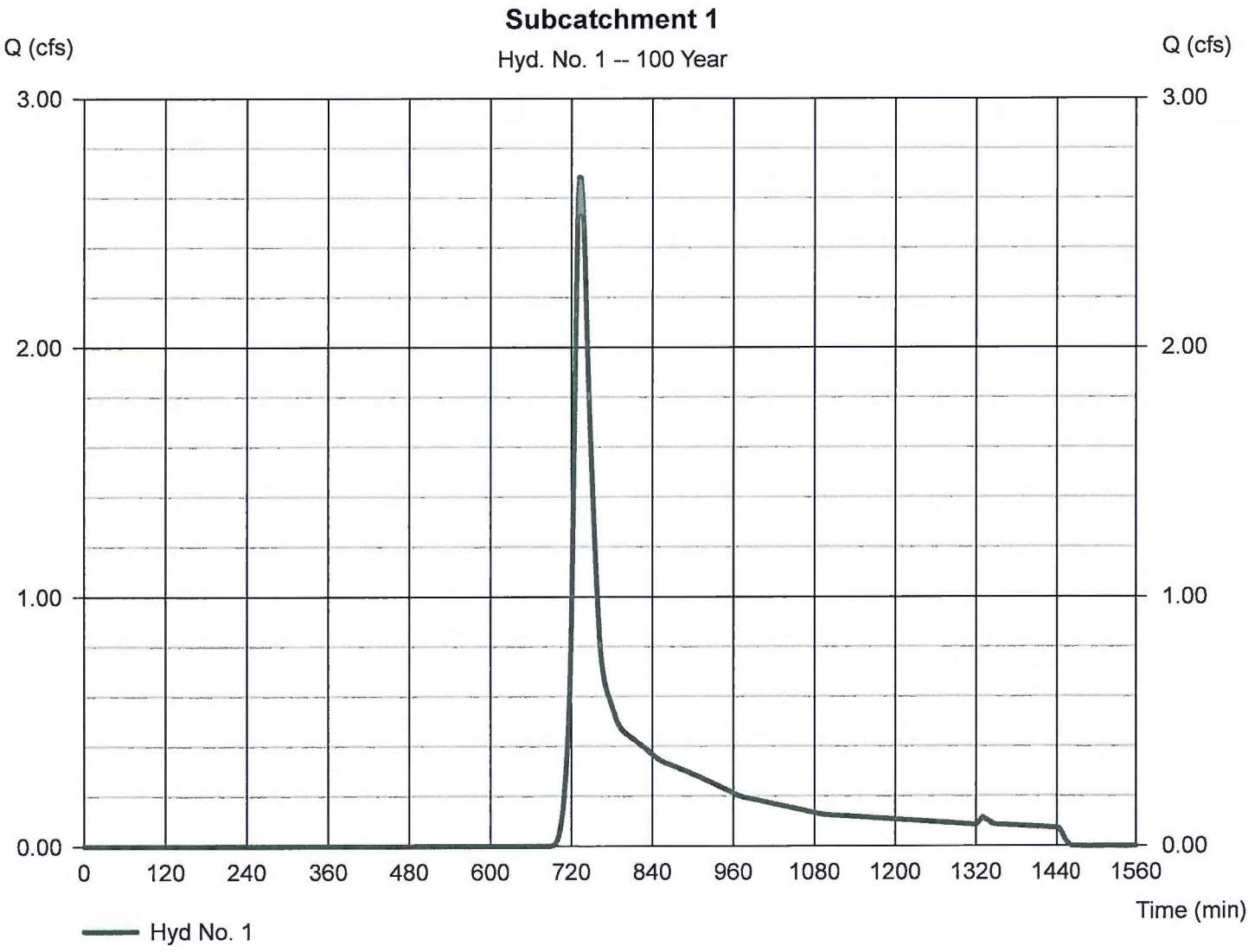
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Feb 5, 2015

Hyd. No. 1

Subcatchment 1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.684 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 12,712 cuft
Drainage area	= 2.440 ac	Curve number	= 51.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 14.40 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Worksheet 2: Runoff curve number and runoff **SM-939B**

Project: 7, 9, 19-29 Great Road By WJH Date 1/13/2015

Location: Acton, MA Checked _____ Date _____

Circle one: [Present] Developed Subcatchment 2

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
-	Impervious	98			0.00	0.00
626B & 255C A	Woods- Good Condition	30			0.02	0.59
626B & 255C A	Open Space-Good Condition	39			0.01	0.55
	Totals =				0.03	1.14

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{1.14}{0.03} = 33.76$; Use CN = 33.8

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.04	0.02	0.28
Runoff, Q.....	cf	4	2	34

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-939B

Project: 7, 9, 19-29 Great Road By WJH Date 1/13/2015

Location: Acton, MA Checked _____ Date _____

Circle one: Present / Developed
Circle one: Tc / Tt through subarea

Subcatchment 2

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Woods			
2. Mannings roughness coeff., n (table 3-1)			0.6			
3. Flow length, L (total L <= 300 ft)		ft	15			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.26			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.04			0.04
Shallow concentrated Flow		Segment ID				
7. Surface Description (paved or unpaved)						
8. Flow Length, L		ft				
9. Watercourse slope, s		ft/ft				
10. Average Velocity, V (figure 3-1)		ft/s				
11. Tt = L / 3600V	Compute Tt	hr				0.00
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.10
min 6.0

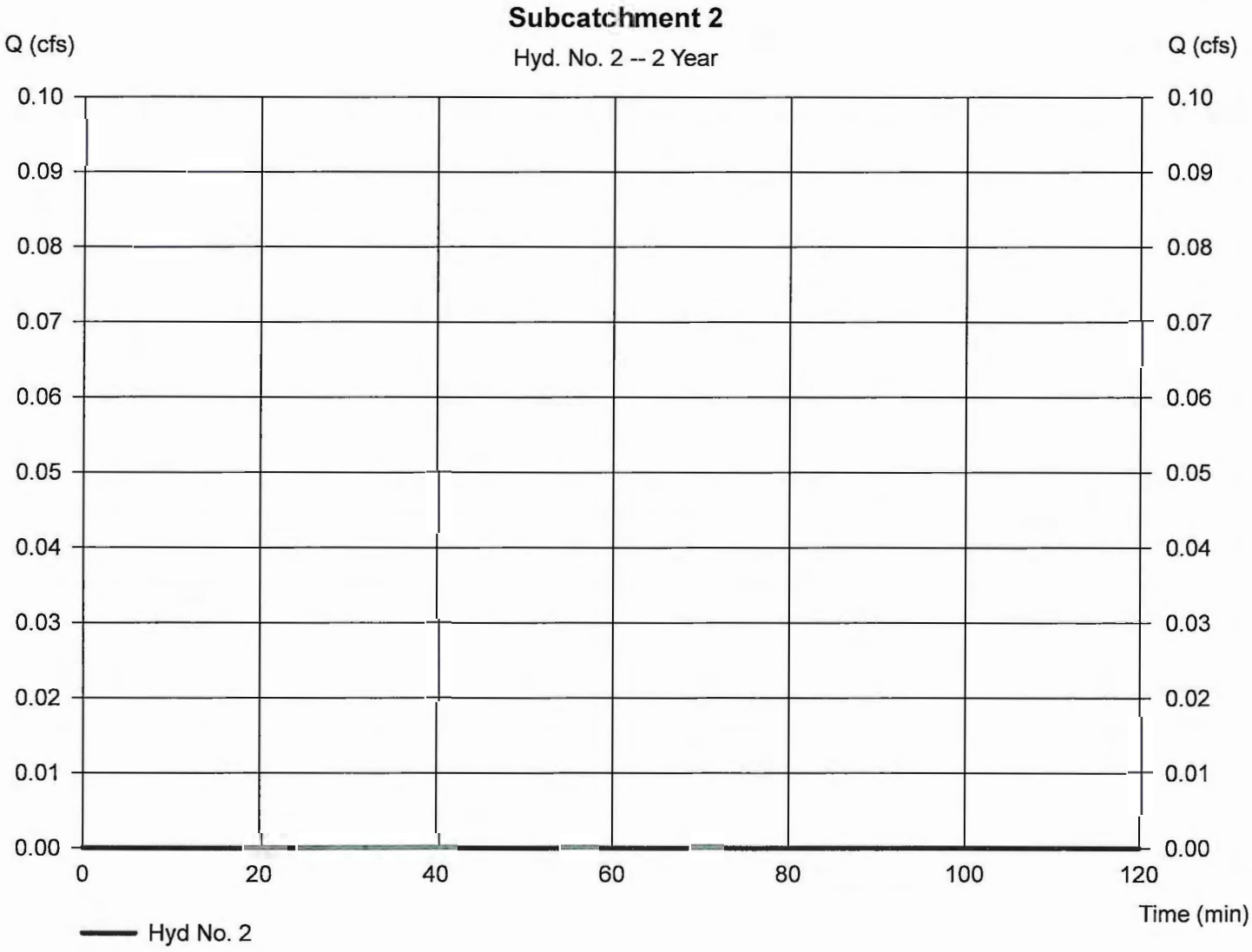
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Feb 5, 2015

Hyd. No. 2

Subcatchment 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.030 ac	Curve number	= 33.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



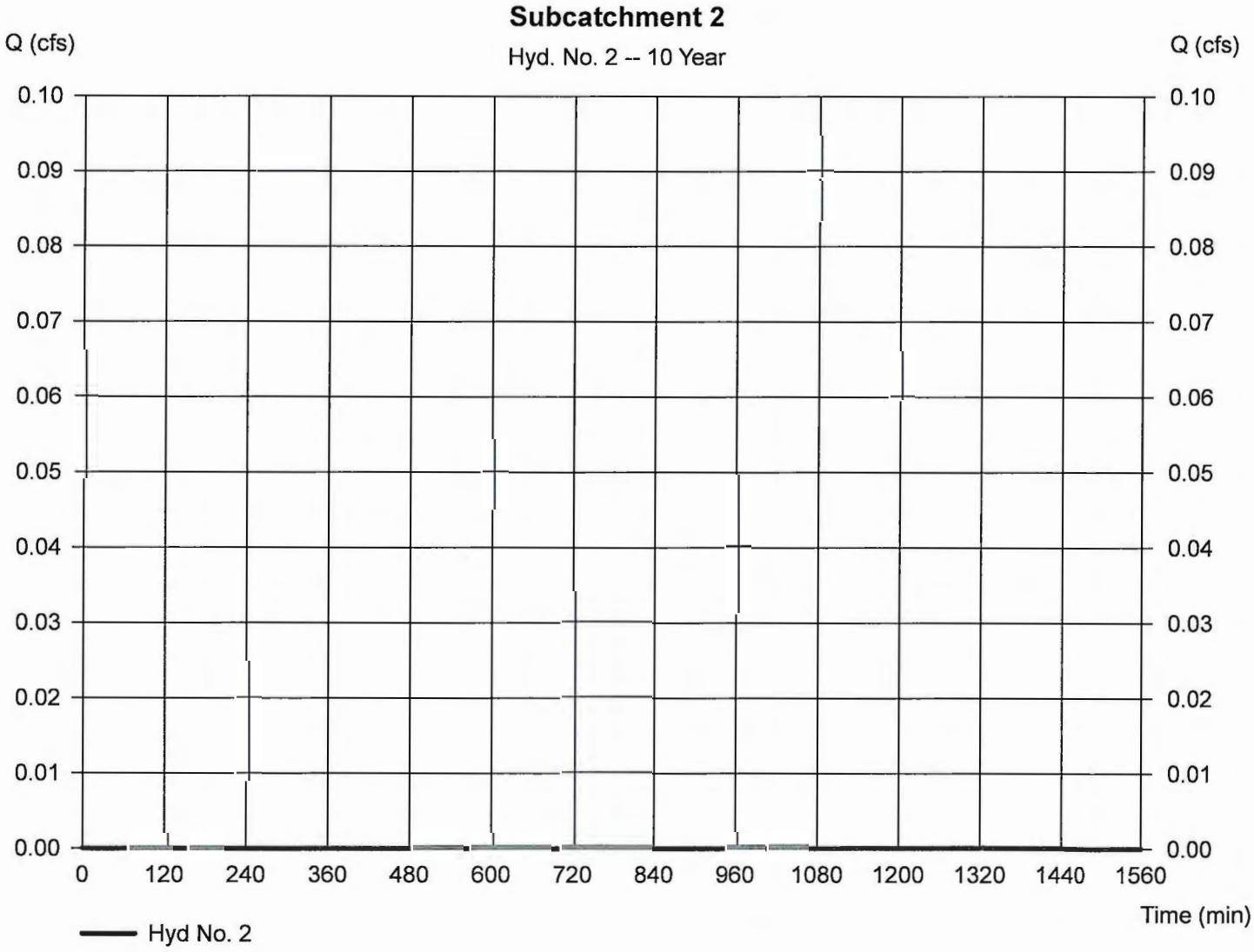
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Feb 5, 2015

Hyd. No. 2

Subcatchment 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 1324 min
Time interval	= 2 min	Hyd. volume	= 2 cuft
Drainage area	= 0.030 ac	Curve number	= 33.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



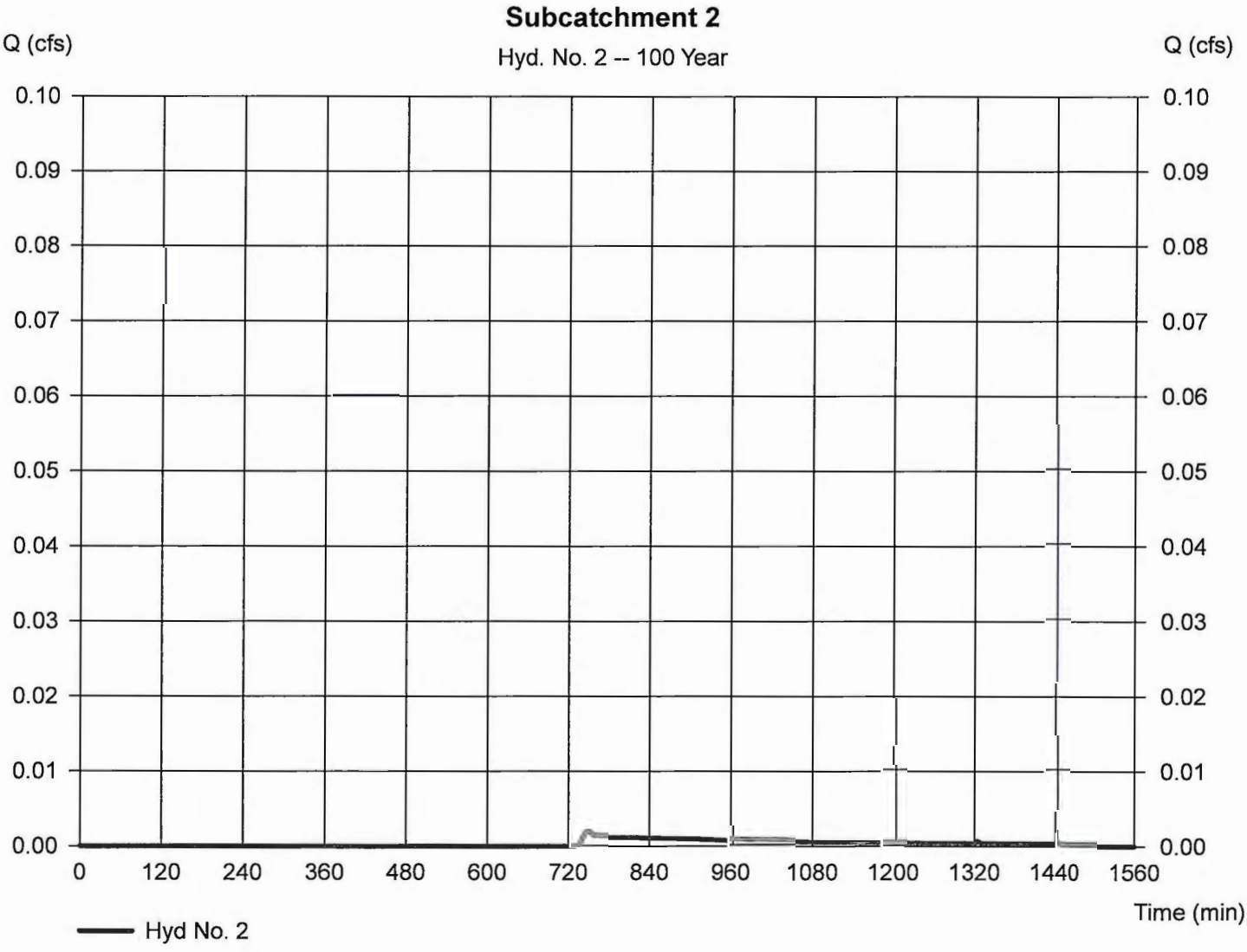
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Feb 5, 2015

Hyd. No. 2

Subcatchment 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.002 cfs
Storm frequency	= 100 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 29 cuft
Drainage area	= 0.030 ac	Curve number	= 33.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



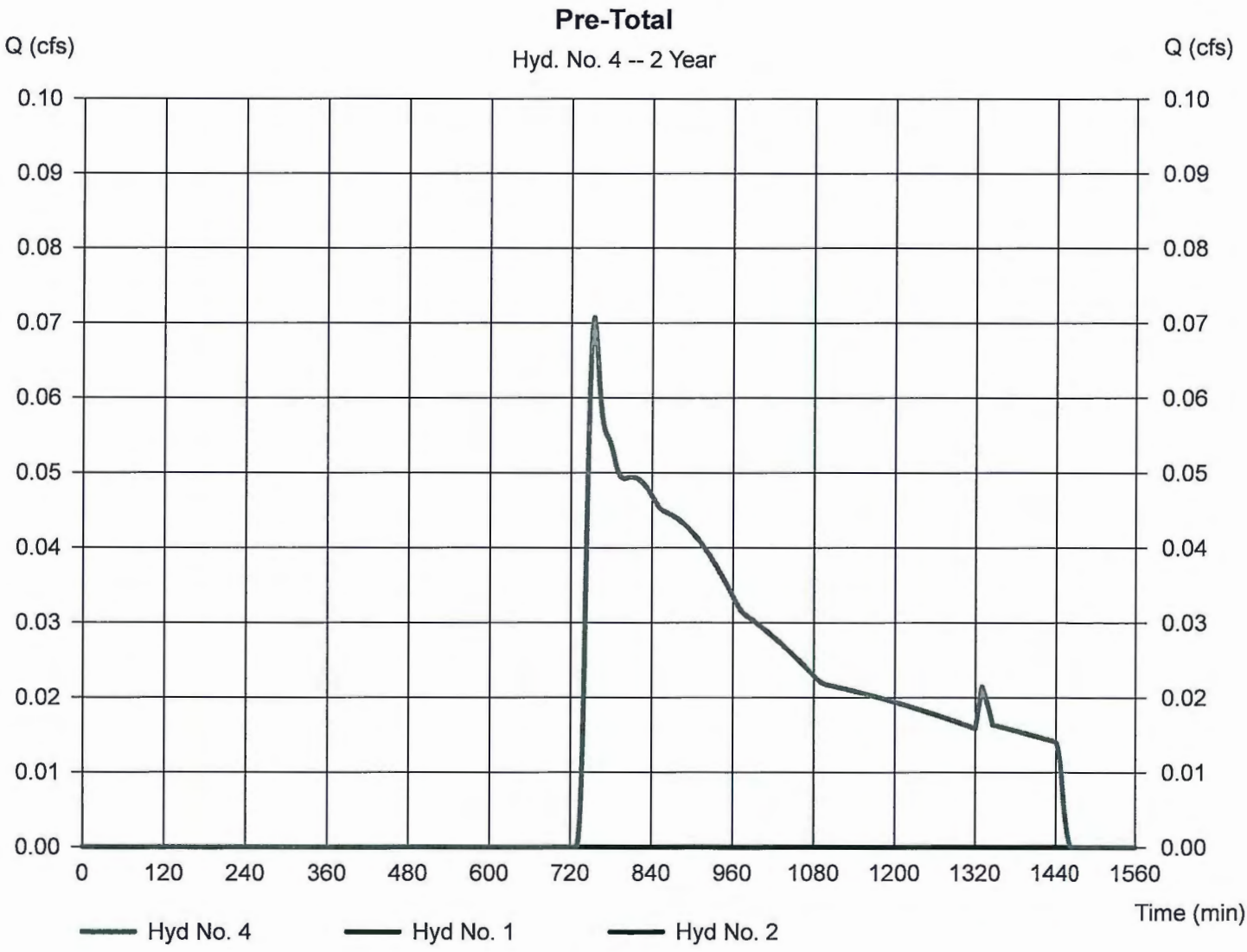
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Feb 5, 2015

Hyd. No. 4

Pre-Total

Hydrograph type	= Combine	Peak discharge	= 0.071 cfs
Storm frequency	= 2 yrs	Time to peak	= 754 min
Time interval	= 2 min	Hyd. volume	= 1,220 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.470 ac



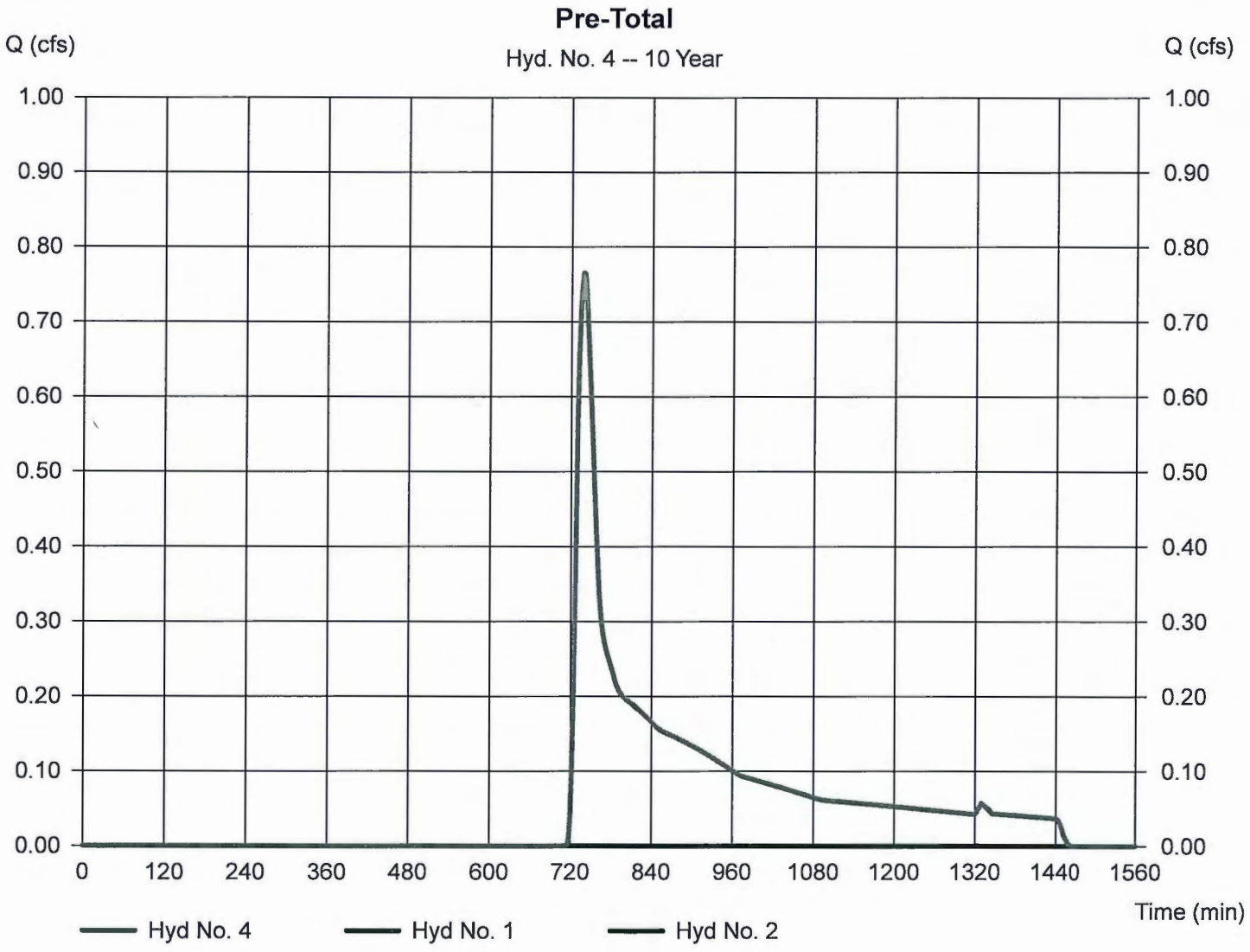
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Feb 5, 2015

Hyd. No. 4

Pre-Total

Hydrograph type	= Combine	Peak discharge	= 0.765 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 4,955 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.470 ac



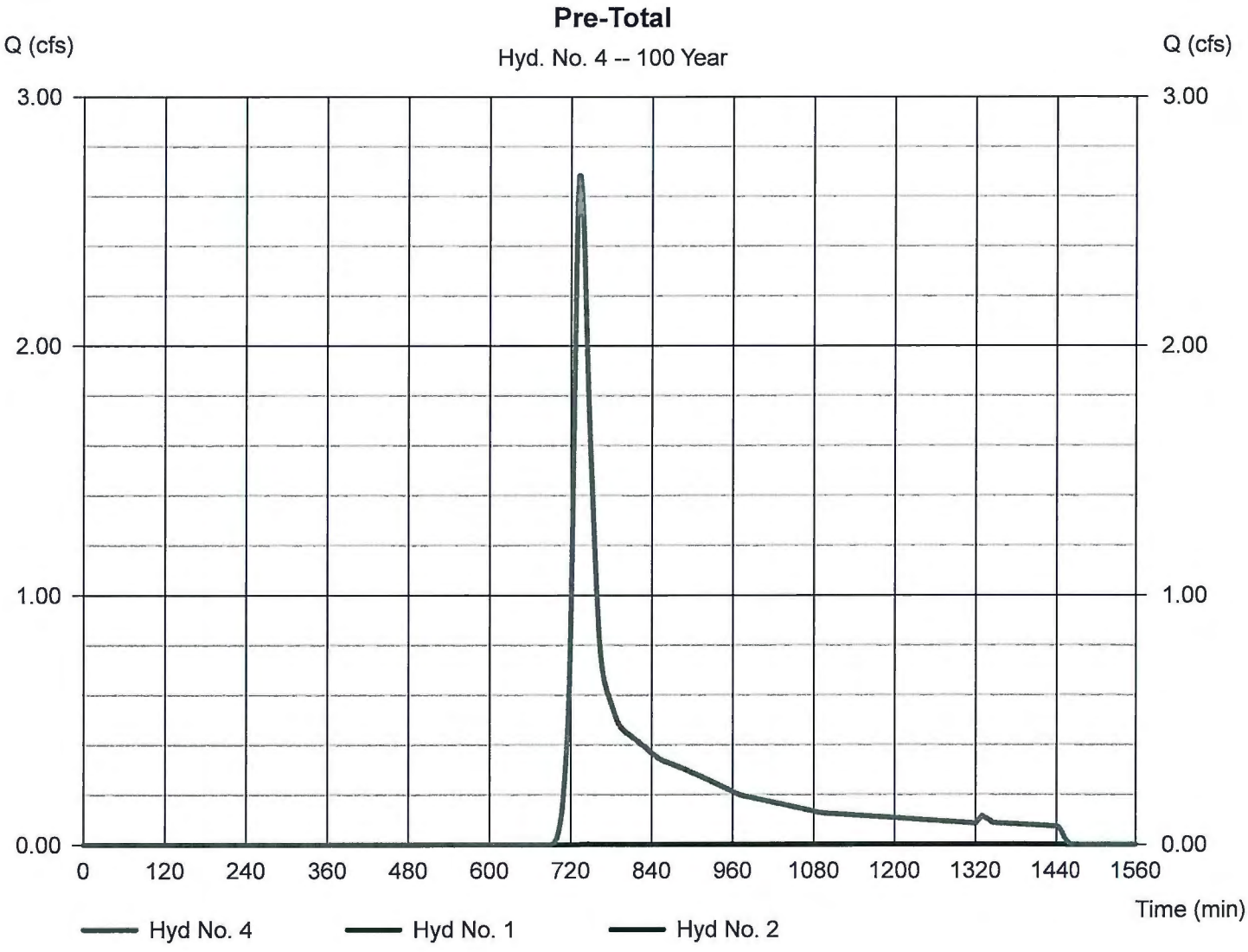
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Feb 5, 2015

Hyd. No. 4

Pre-Total

Hydrograph type	= Combine	Peak discharge	= 2.684 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 12,741 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.470 ac



Post-Development Hydrology

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	0.532	2	730	2,497	----	------	------	Subcatchment 1
2	Reservoir	0.310	2	748	2,497	1	134.91	233	Subsurface Inf. 1
4	SCS Runoff	0.366	2	724	1,218	----	------	------	Subcatchment 2
5	Reservoir	0.148	2	742	1,218	4	128.64	159	Subsurface Inf. 2
7	SCS Runoff	0.116	2	724	436	----	------	------	Subcatchment 3
8	Reservoir	0.053	2	742	436	7	129.48	45.3	Subsurface Inf. 3
10	SCS Runoff	0.044	2	726	199	----	------	------	Subcatchment 4
12	SCS Runoff	1.595	2	724	5,368	----	------	------	Roofs to RD-1
13	Reservoir	0.385	2	746	5,368	12	131.66	1,208	Roof Drywell 1
15	SCS Runoff	0.261	2	724	878	----	------	------	Roofs to RD-2
16	Reservoir	0.070	2	744	878	15	135.89	179	Roof Drywell 2

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	1.423	2	730	5,754	----	------	------	Subcatchment 1
2	Reservoir	0.454	2	756	5,753	1	136.38	1,308	Subsurface Inf. 1
4	SCS Runoff	0.852	2	724	2,604	----	------	------	Subcatchment 2
5	Reservoir	0.196	2	750	2,604	4	129.74	649	Subsurface Inf. 2
7	SCS Runoff	0.321	2	724	1,017	----	------	------	Subcatchment 3
8	Reservoir	0.074	2	750	1,017	7	130.75	246	Subsurface Inf. 3
10	SCS Runoff	0.153	2	724	513	----	------	------	Subcatchment 4
12	SCS Runoff	2.331	2	724	7,981	----	------	------	Roofs to RD-1
13	Reservoir	0.461	2	748	7,981	12	132.54	2,099	Roof Drywell 1
15	SCS Runoff	0.381	2	724	1,306	----	------	------	Roofs to RD-2
16	Reservoir	0.081	2	748	1,306	15	136.60	321	Roof Drywell 2

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	2.866	2	730	11,146	---	-----	-----	Subcatchment 1
2	Reservoir	0.655	2	760	11,146	1	138.42	3,467	Subsurface Inf. 1
4	SCS Runoff	1.609	2	724	4,813	---	-----	-----	Subcatchment 2
5	Reservoir	0.287	2	752	4,813	4	131.84	1,531	Subsurface Inf. 2
7	SCS Runoff	0.658	2	724	1,986	---	-----	-----	Subcatchment 3
8	Reservoir	0.117	2	752	1,986	7	133.40	633	Subsurface Inf. 3
10	SCS Runoff	0.345	2	724	1,060	---	-----	-----	Subcatchment 4
12	SCS Runoff	3.327	2	724	11,532	---	-----	-----	Roofs to RD-1
13	Reservoir	0.624	2	748	11,532	12	134.40	3,346	Roof Drywell 1
15	SCS Runoff	0.544	2	724	1,887	---	-----	-----	Roofs to RD-2
16	Reservoir	0.100	2	750	1,887	15	137.77	525	Roof Drywell 2

Worksheet 2: Runoff curve number and runoff SM-939B

Project: 7, 9, 19 & 29 Great Road By WJH Date 11/18/2015

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] Subcatchment 1

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
-	Impervious	98			0.50	49.27
626B & 255C A	Open Space-Good Condition	39			0.53	20.64
626B & 255C A	Woods- Good Condition	30			0.02	0.61
1/ Use only one CN source per line.				Totals =	1.05	70.52

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{70.52}{1.05} = 67.01$; Use CN = [67.0]

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.64	1.46	2.84
Runoff, Q.....	cf	2429	5594	10836

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-939B

Project: 7, 9, 19 & 29 Great Road By WJH Date 11/18/2015

Location: Acton, MA Checked _____ Date _____

Circle one: Present | Developed
Circle one: Tc | Tt through subarea Subcatchment 1

Sheet flow (Applicable to Tc only)		Segment ID	A-B	B-C		
1. Surface Description (table 3-1)			Woods	Grass		
2. Mannings roughness coeff., n (table 3-1)			0.6	0.24		
3. Flow length, L (total L <= 300 ft)		ft	10	40		
4. Two-yr 24-hr rainfall, P2		in	3.1	3.1		
5. Land Slope, s		ft/ft	0.06	0.02		
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.05	0.12		0.17

Shallow concentrated Flow		Segment ID	C-D	D-E	E-F	
7. Surface Description (paved or unpaved)			UNPAVED	PAVED	PAVED	
8. Flow Length, L		ft	23	238	95	
9. Watercourse slope, s		ft/ft	0.04	0.01	0.09	
10. Average Velocity, V (figure 3-1)		ft/s	3.23	2.03	6.10	
11. Tt = L / 3600V	Compute Tt	hr	0.00	0.03	0.00	0.04

Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.21
min 12.4

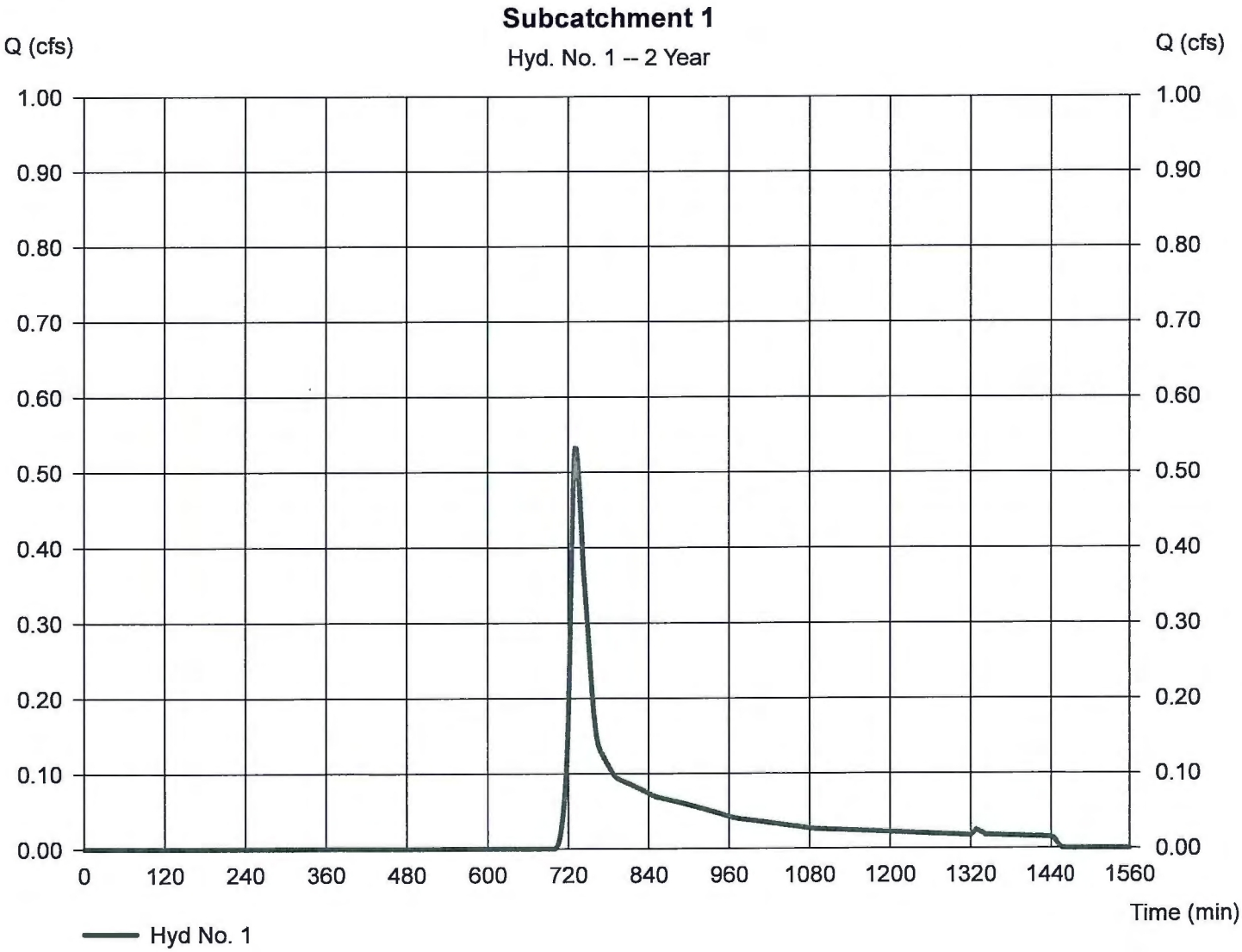
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 1

Subcatchment 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.532 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 2,497 cuft
Drainage area	= 1.050 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 12.40 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



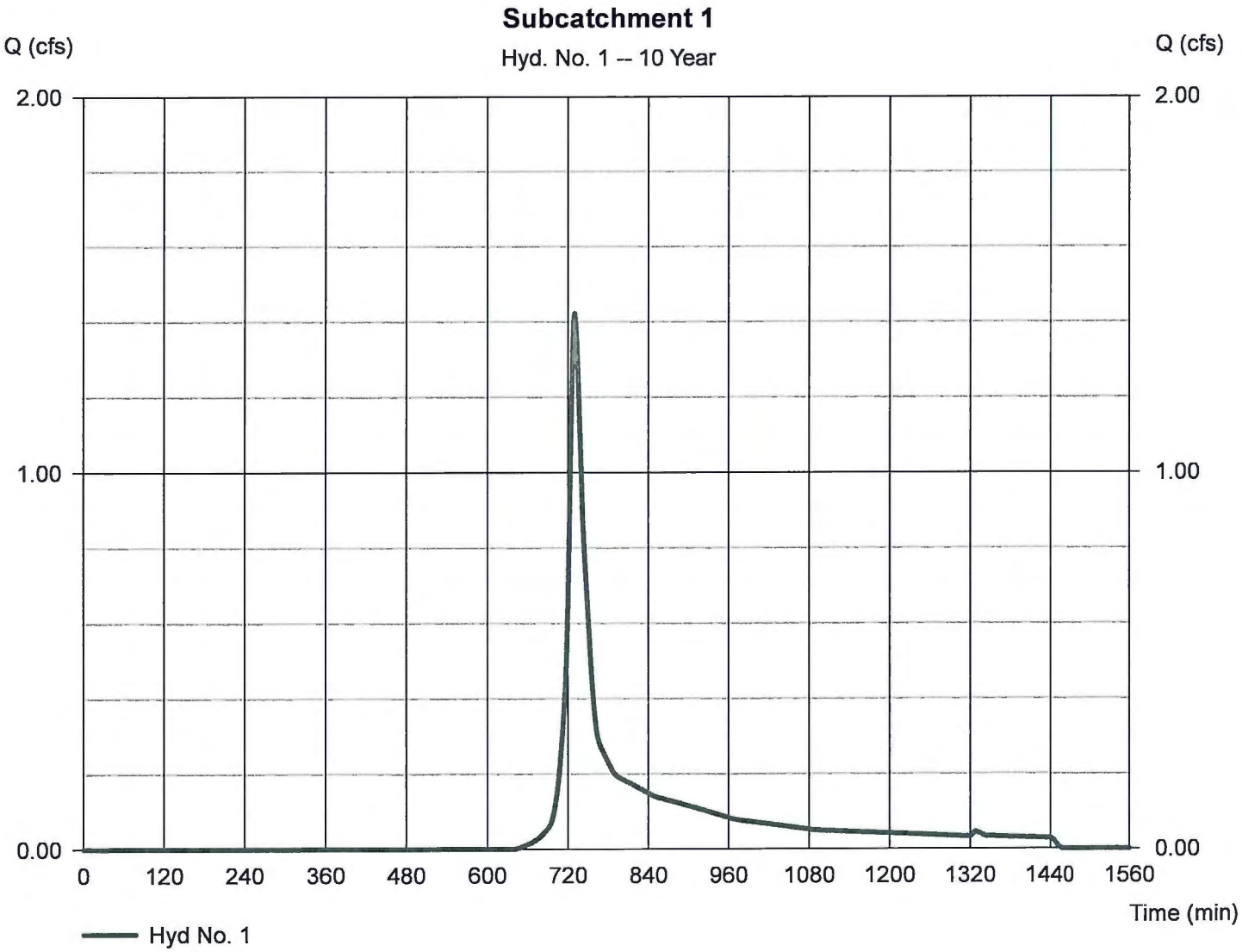
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 1

Subcatchment 1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.423 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 5,754 cuft
Drainage area	= 1.050 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 12.40 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



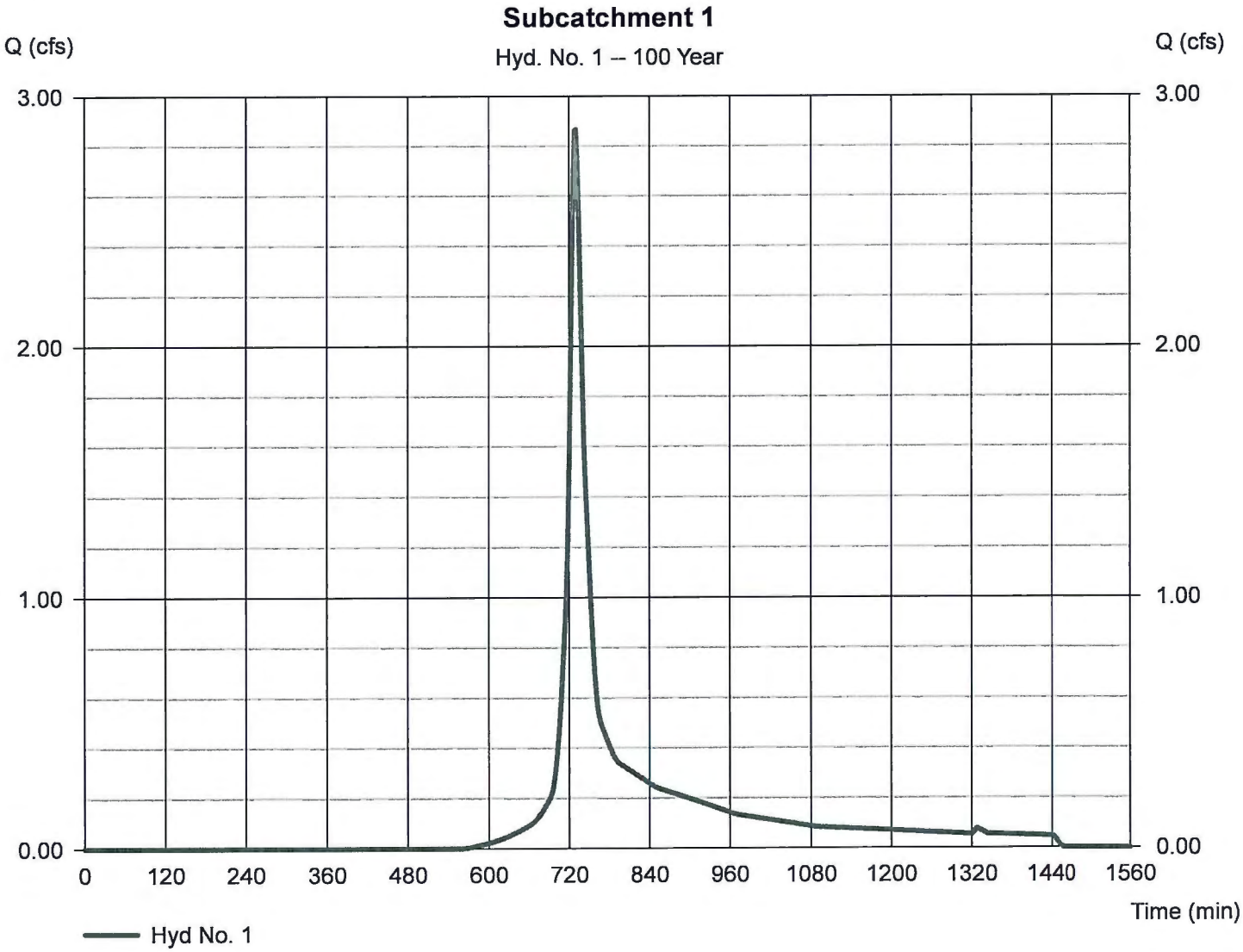
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 1

Subcatchment 1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.866 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 11,146 cuft
Drainage area	= 1.050 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 12.40 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

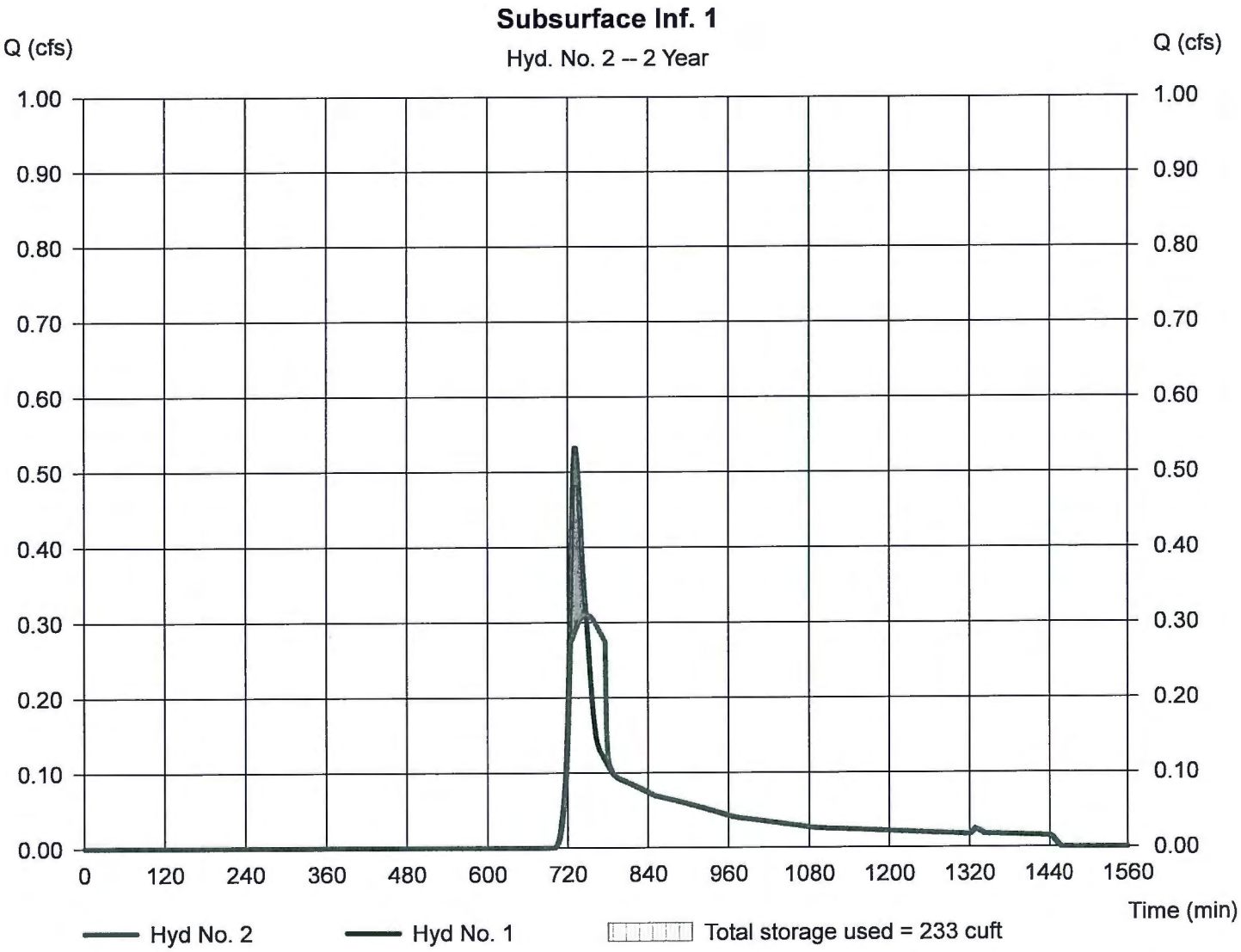
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 2

Subsurface Inf. 1

Hydrograph type	= Reservoir	Peak discharge	= 0.310 cfs
Storm frequency	= 2 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 2,497 cuft
Inflow hyd. No.	= 1 - Subcatchment 1	Max. Elevation	= 134.91 ft
Reservoir name	= Sub 1 Infiltration	Max. Storage	= 233 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

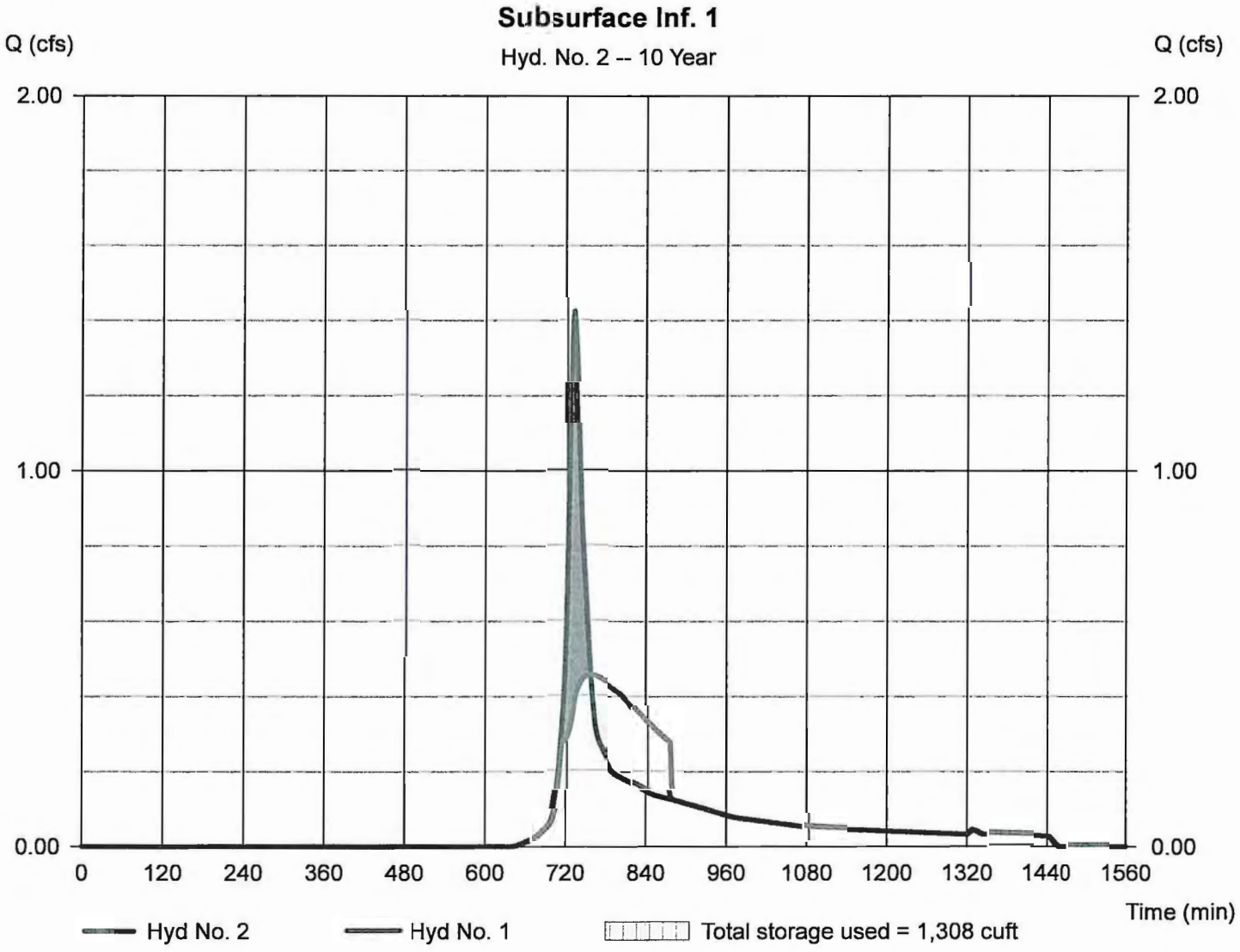
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 2

Subsurface Inf. 1

Hydrograph type	= Reservoir	Peak discharge	= 0.454 cfs
Storm frequency	= 10 yrs	Time to peak	= 756 min
Time interval	= 2 min	Hyd. volume	= 5,753 cuft
Inflow hyd. No.	= 1 - Subcatchment 1	Max. Elevation	= 136.38 ft
Reservoir name	= Sub 1 Infiltration	Max. Storage	= 1,308 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

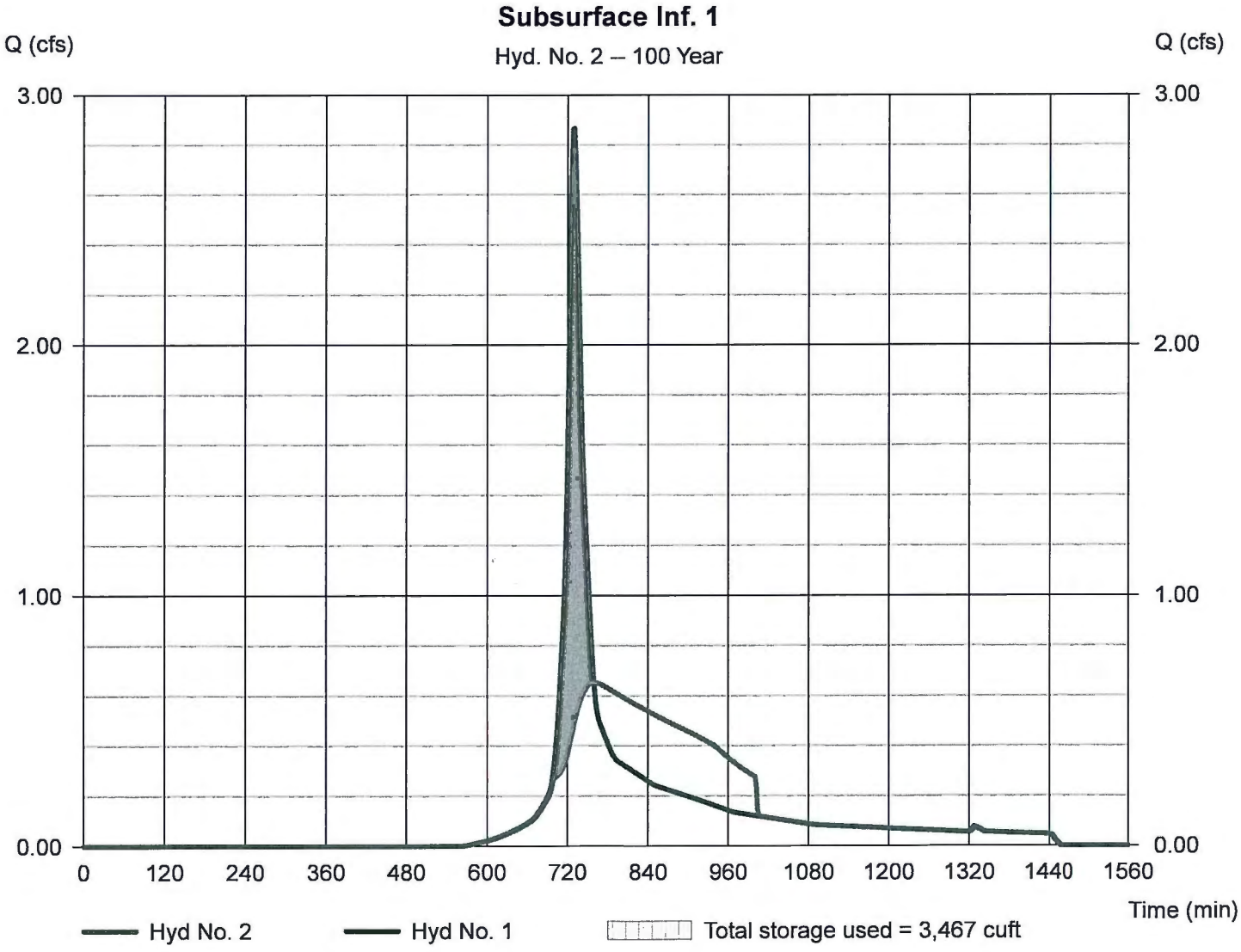
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 2

Subsurface Inf. 1

Hydrograph type	= Reservoir	Peak discharge	= 0.655 cfs
Storm frequency	= 100 yrs	Time to peak	= 760 min
Time interval	= 2 min	Hyd. volume	= 11,146 cuft
Inflow hyd. No.	= 1 - Subcatchment 1	Max. Elevation	= 138.42 ft
Reservoir name	= Sub 1 Infiltration	Max. Storage	= 3,467 cuft

Storage Indication method used. Outflow includes exfiltration.



Worksheet 2: Runoff curve number and runoff **SM-939B**

Project: 7, 9, 19 & 29 Great Road By WJH Date 11/18/2015

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] Subcatchment 2

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
-	Impervious	98			0.24	23.42
626B & 255C A	Open Space-Good Condition	39			0.20	7.90
Totals =					0.44	31.32

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{31.32}{0.44} = 70.94$; Use CN = [70.9]

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.82	1.74	3.22
Runoff, Q.....	cf	1307	2791	5157

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-939B

Project: 7, 9, 19 & 29 Great Road By WJH Date 11/18/2015

Location: Acton, MA Checked Date

Circle one: Present Developed
Circle one: Tc Tt through subarea Subcatchment 2

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Grass			
2. Mannings roughness coeff., n (table 3-1)			0.24			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.09			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.08			0.08
Shallow concentrated Flow		Segment ID	B-C	C-D	D-E	
7. Surface Description (paved or unpaved)			UNPAVED	UNPAVED	UNPAVED	
8. Flow Length, L		ft	22	12	127	
9. Watercourse slope, s		ft/ft	0.14	1	0.016	
10. Average Velocity, V (figure 3-1)		ft/s	6.04	16.13	2.04	
11. Tt = L / 3600V	Compute Tt	hr	0.00	0.00	0.02	0.02
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.10
min 6.0

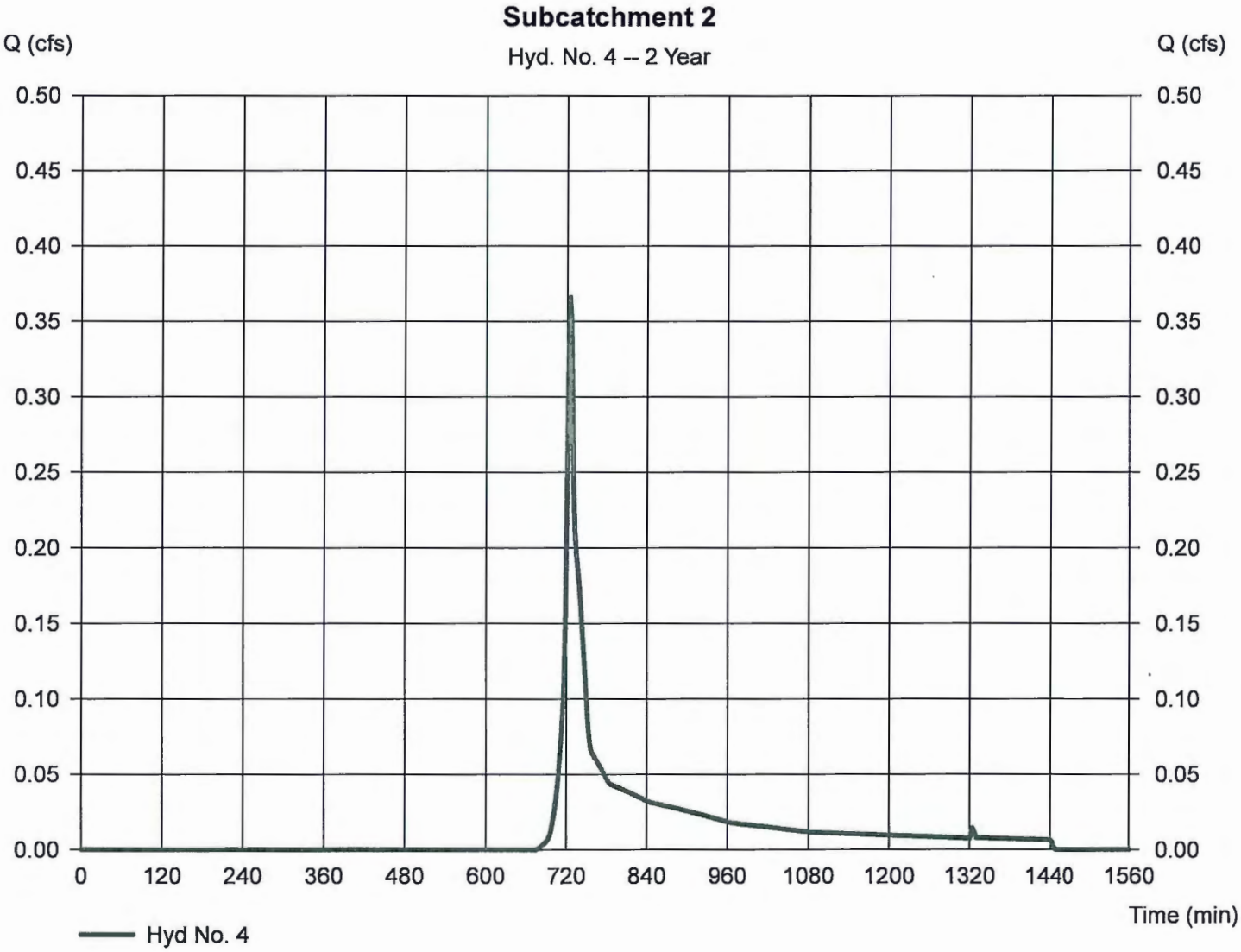
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 4

Subcatchment 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.366 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,218 cuft
Drainage area	= 0.440 ac	Curve number	= 70.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

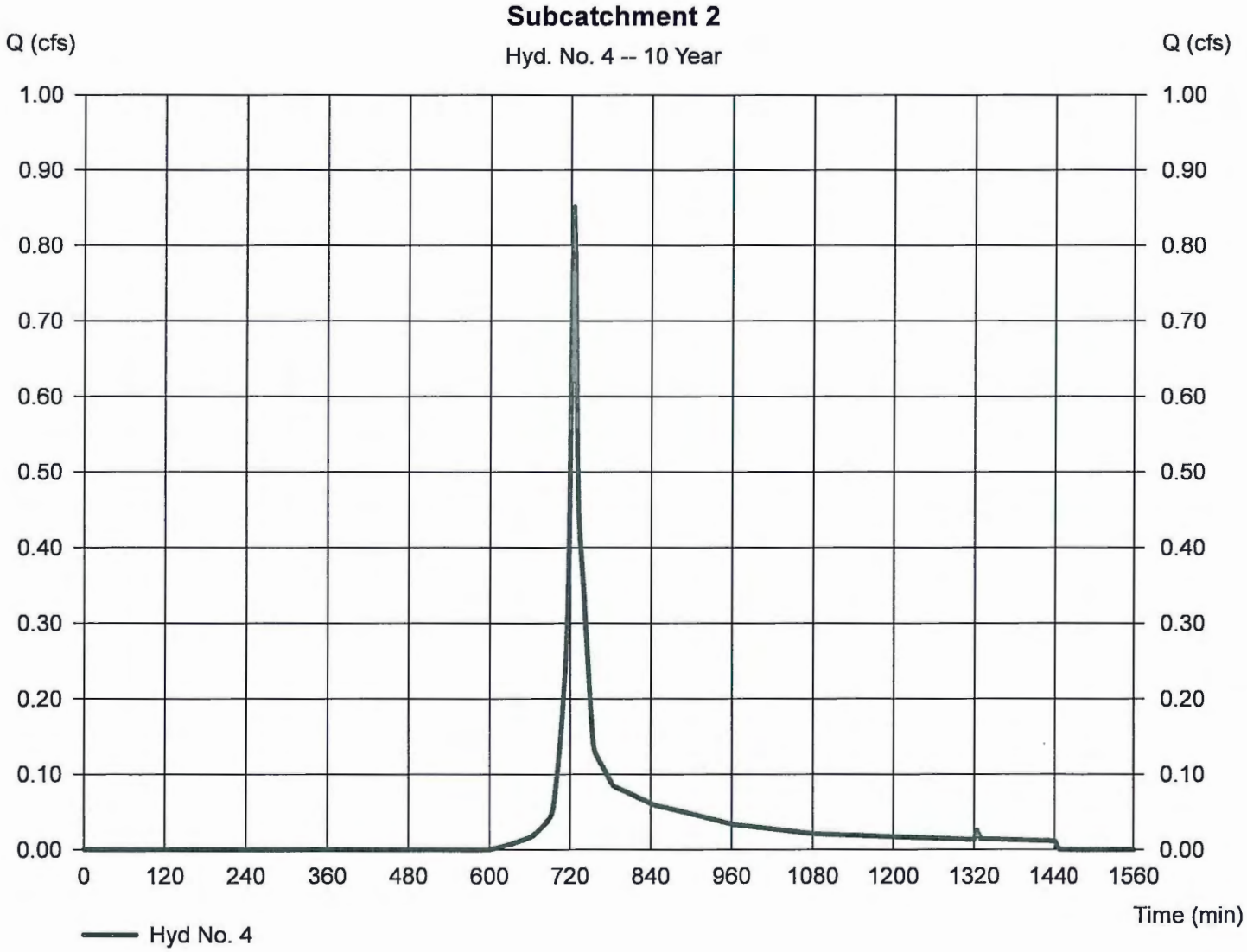


Hydrograph Report

Hyd. No. 4

Subcatchment 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.852 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 2,604 cuft
Drainage area	= 0.440 ac	Curve number	= 70.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



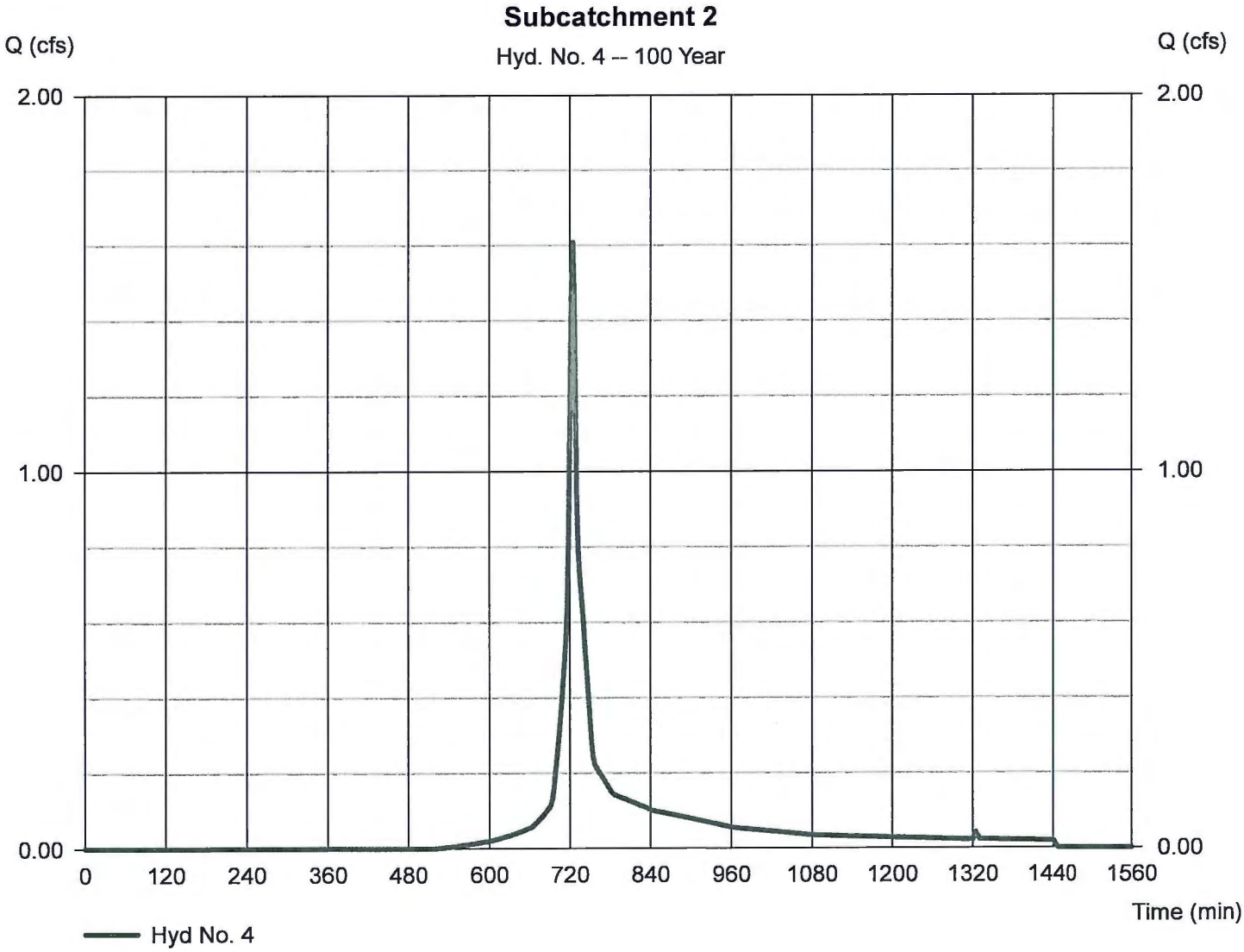
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 4

Subcatchment 2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.609 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 4,813 cuft
Drainage area	= 0.440 ac	Curve number	= 70.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

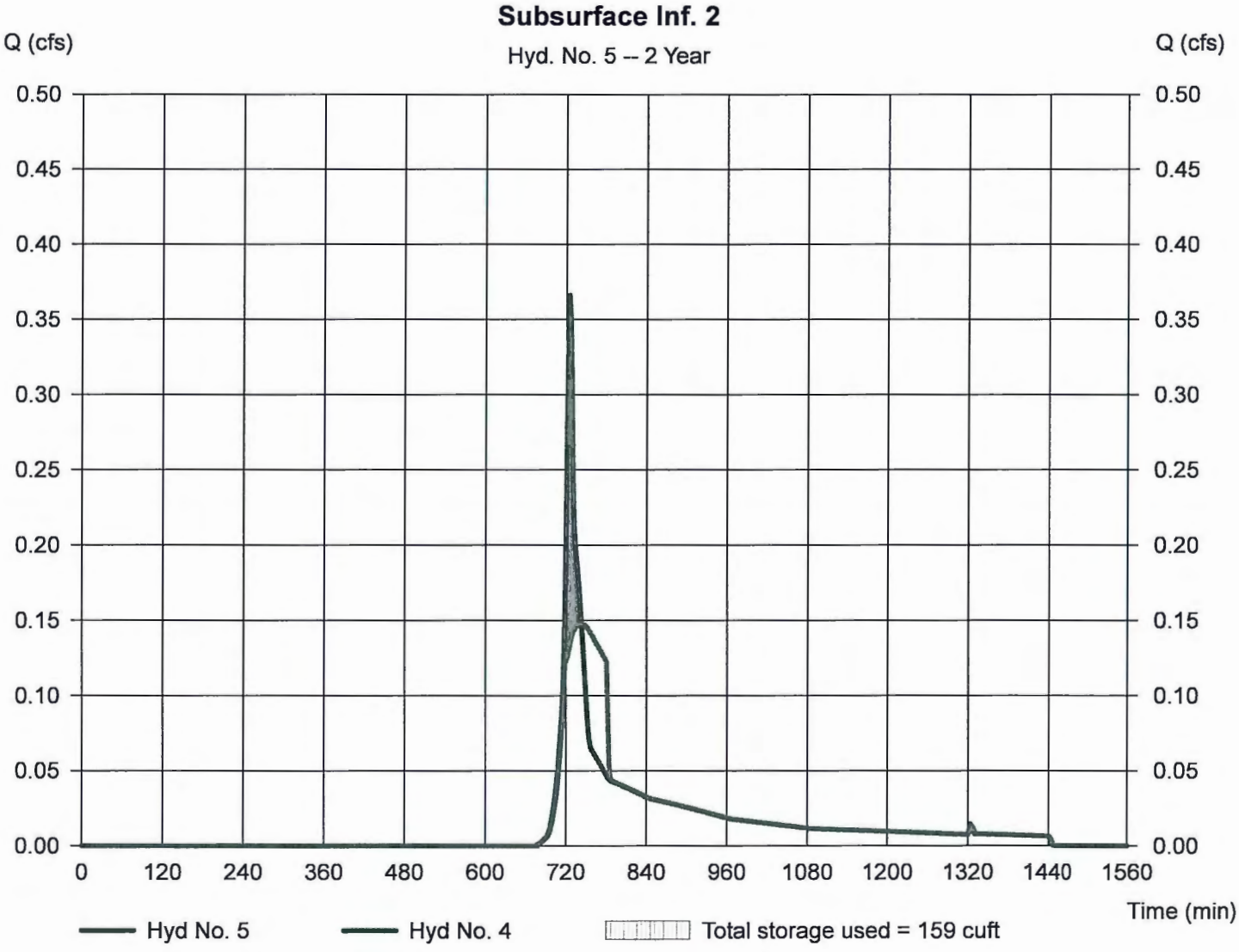
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 5

Subsurface Inf. 2

Hydrograph type	= Reservoir	Peak discharge	= 0.148 cfs
Storm frequency	= 2 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 1,218 cuft
Inflow hyd. No.	= 4 - Subcatchment 2	Max. Elevation	= 128.64 ft
Reservoir name	= Sub 2 Infiltration	Max. Storage	= 159 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

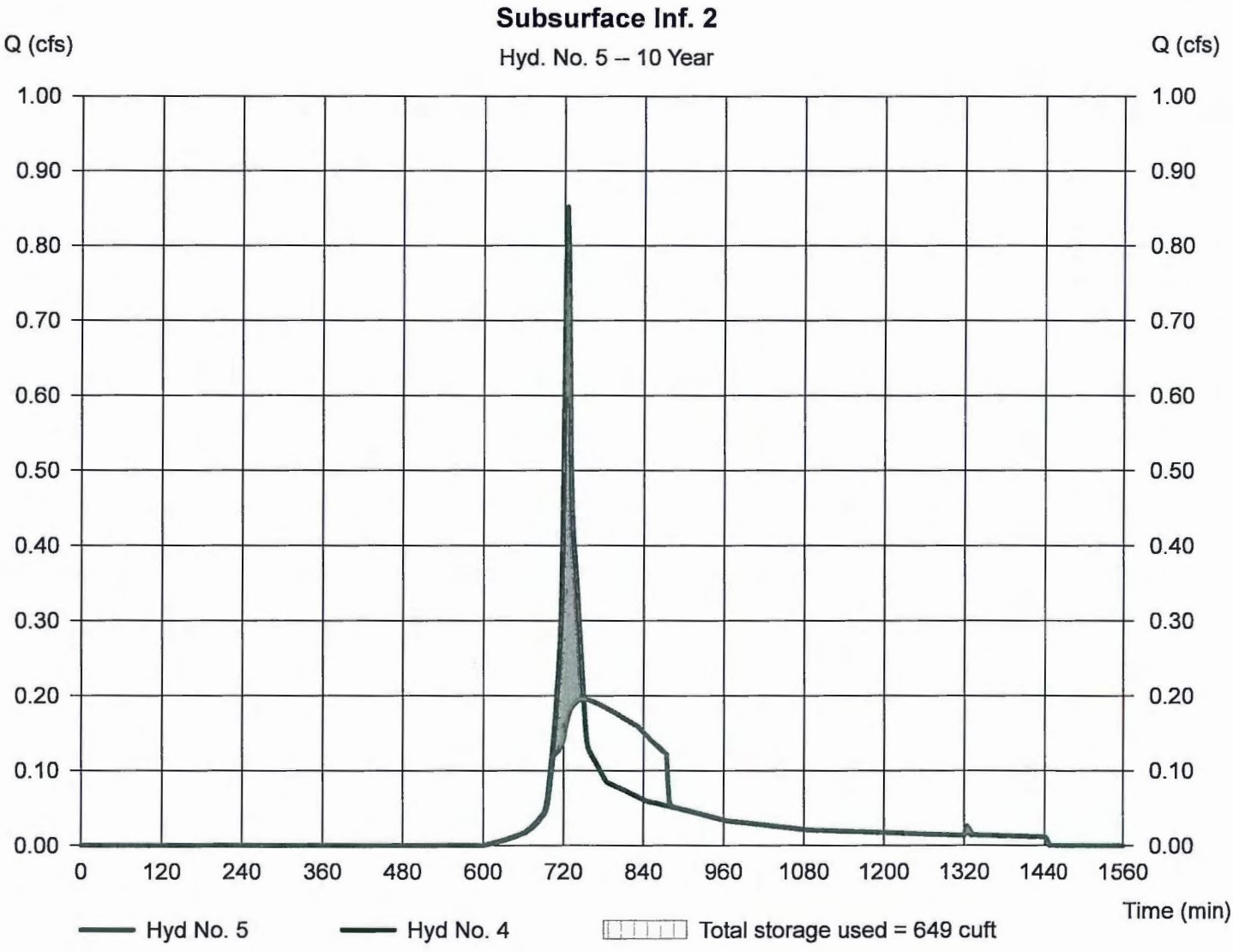
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 5

Subsurface Inf. 2

Hydrograph type	= Reservoir	Peak discharge	= 0.196 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 2 min	Hyd. volume	= 2,604 cuft
Inflow hyd. No.	= 4 - Subcatchment 2	Max. Elevation	= 129.74 ft
Reservoir name	= Sub 2 Infiltration	Max. Storage	= 649 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

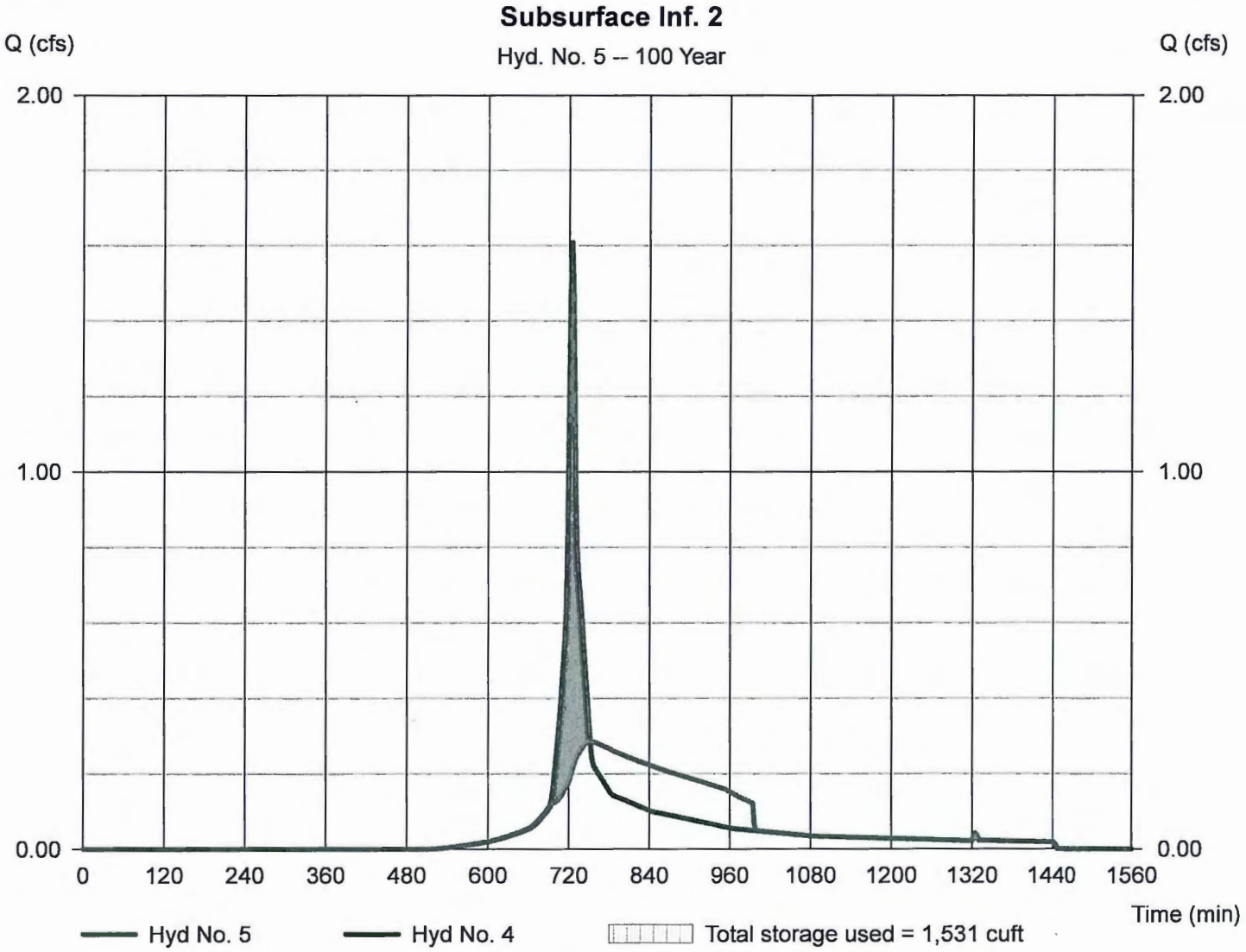
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 5

Subsurface Inf. 2

Hydrograph type	= Reservoir	Peak discharge	= 0.287 cfs
Storm frequency	= 100 yrs	Time to peak	= 752 min
Time interval	= 2 min	Hyd. volume	= 4,813 cuft
Inflow hyd. No.	= 4 - Subcatchment 2	Max. Elevation	= 131.84 ft
Reservoir name	= Sub 2 Infiltration	Max. Storage	= 1,531 cuft

Storage Indication method used. Outflow includes exfiltration.



Worksheet 2: Runoff curve number and runoff **SM-939B**

Project: 7, 9, 19 & 29 Great Road By WJH Date 11/18/2015

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] Subcatchment 3

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
-	Impervious	98			0.10	9.74
626B & 255C A	Open Space-Good Condition	39			0.11	4.47
					Totals =	0.21	14.21

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{14.21}{0.21}$ = 66.39 ; Use CN = [66.4]

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q.....	in	0.61	1.42	2.78
(Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)				
Runoff, Q.....	cf	474	1106	2159

(210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-939B

Project: 7, 9, 19 & 29 Great Road By WJH Date 11/18/2015

Location: Acton, MA Checked Date

Circle one: Present | Developed
Circle one: Tc | Tt through subarea Subcatchment 3

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Pavement			
2. Mannings roughness coeff., n (table 3-1)			0.011			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.02			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.01			0.01
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			PAVED			
8. Flow Length, L		ft	49			
9. Watercourse slope, s		ft/ft	0.02			
10. Average Velocity, V (figure 3-1)		ft/s	2.87			
11. Tt = L / 3600V	Compute Tt	hr	0.00			0.00
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.10
min 6.0

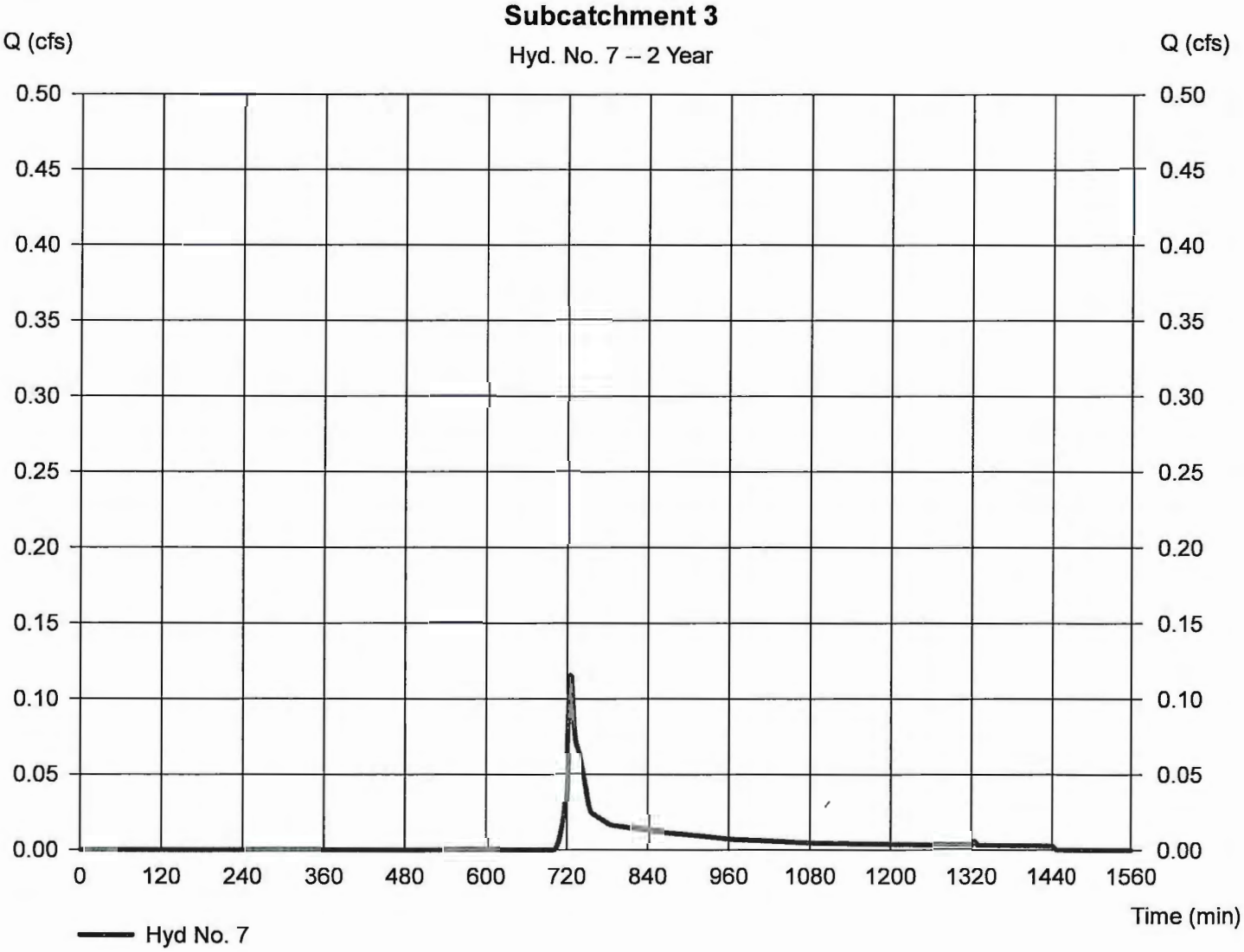
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 7

Subcatchment 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.116 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 436 cuft
Drainage area	= 0.210 ac	Curve number	= 66.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

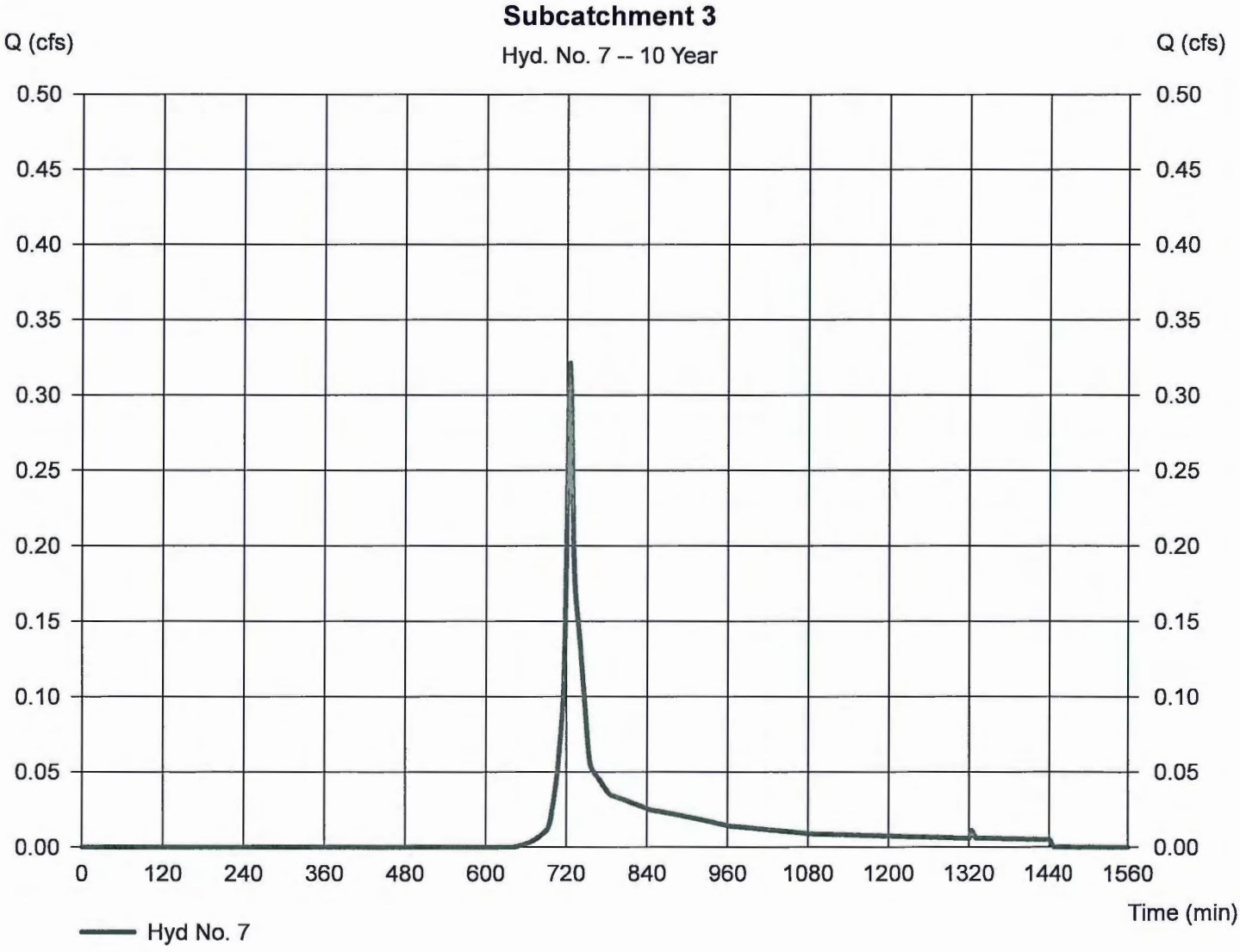


Hydrograph Report

Hyd. No. 7

Subcatchment 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.321 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,017 cuft
Drainage area	= 0.210 ac	Curve number	= 66.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



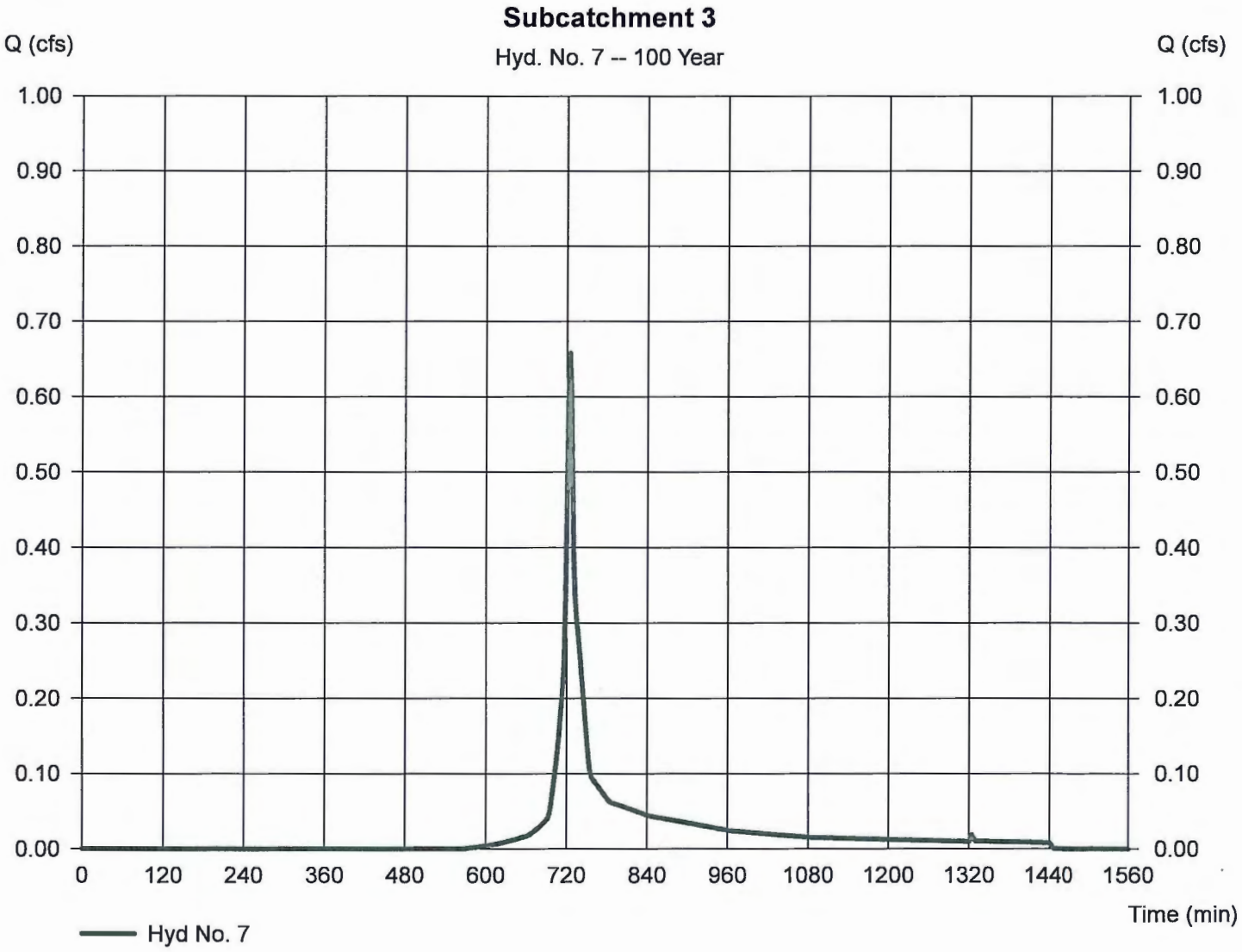
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 7

Subcatchment 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.658 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,986 cuft
Drainage area	= 0.210 ac	Curve number	= 66.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

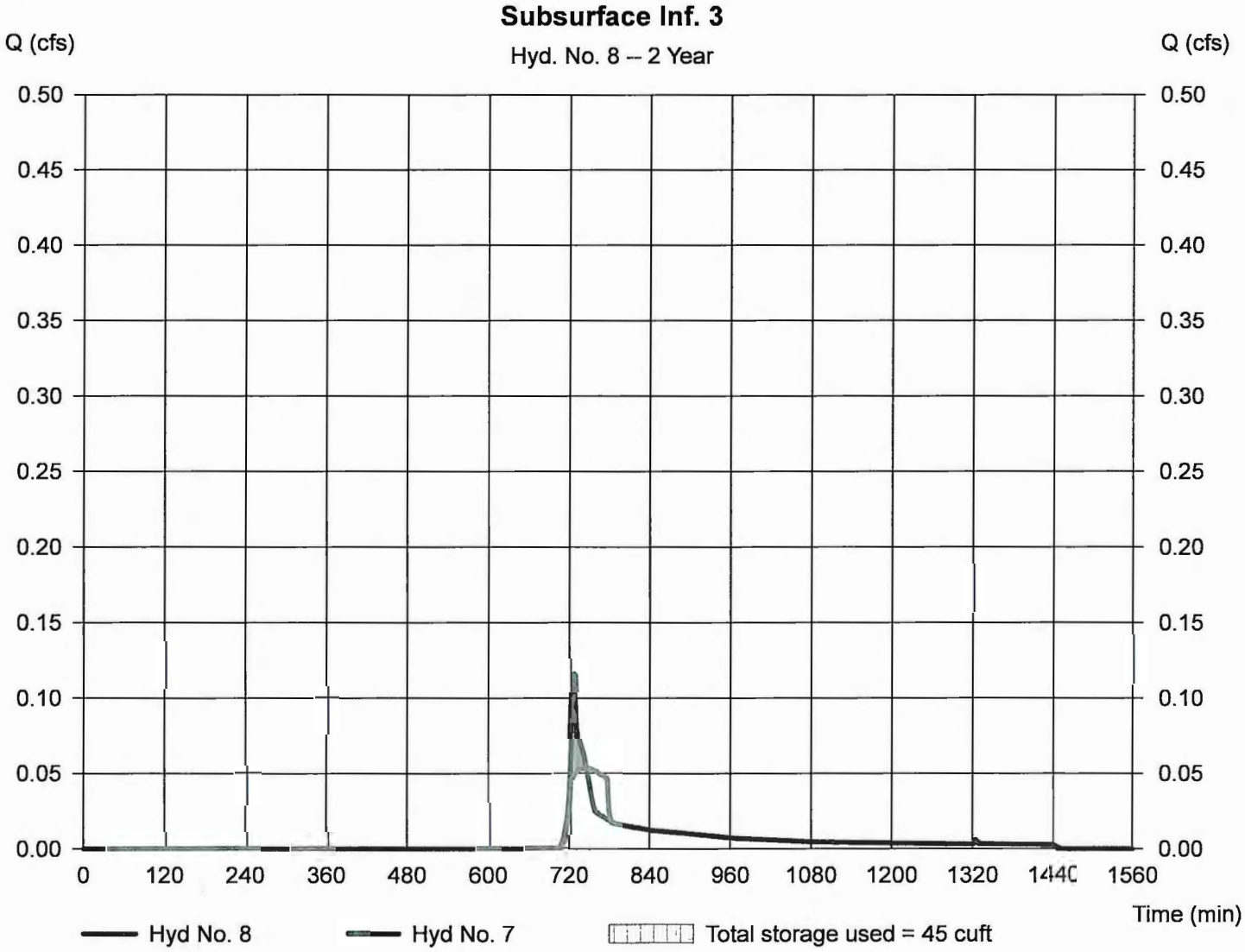
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 8

Subsurface Inf. 3

Hydrograph type	= Reservoir	Peak discharge	= 0.053 cfs
Storm frequency	= 2 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 436 cuft
Inflow hyd. No.	= 7 - Subcatchment 3	Max. Elevation	= 129.48 ft
Reservoir name	= Sub 3 Infiltration	Max. Storage	= 45 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

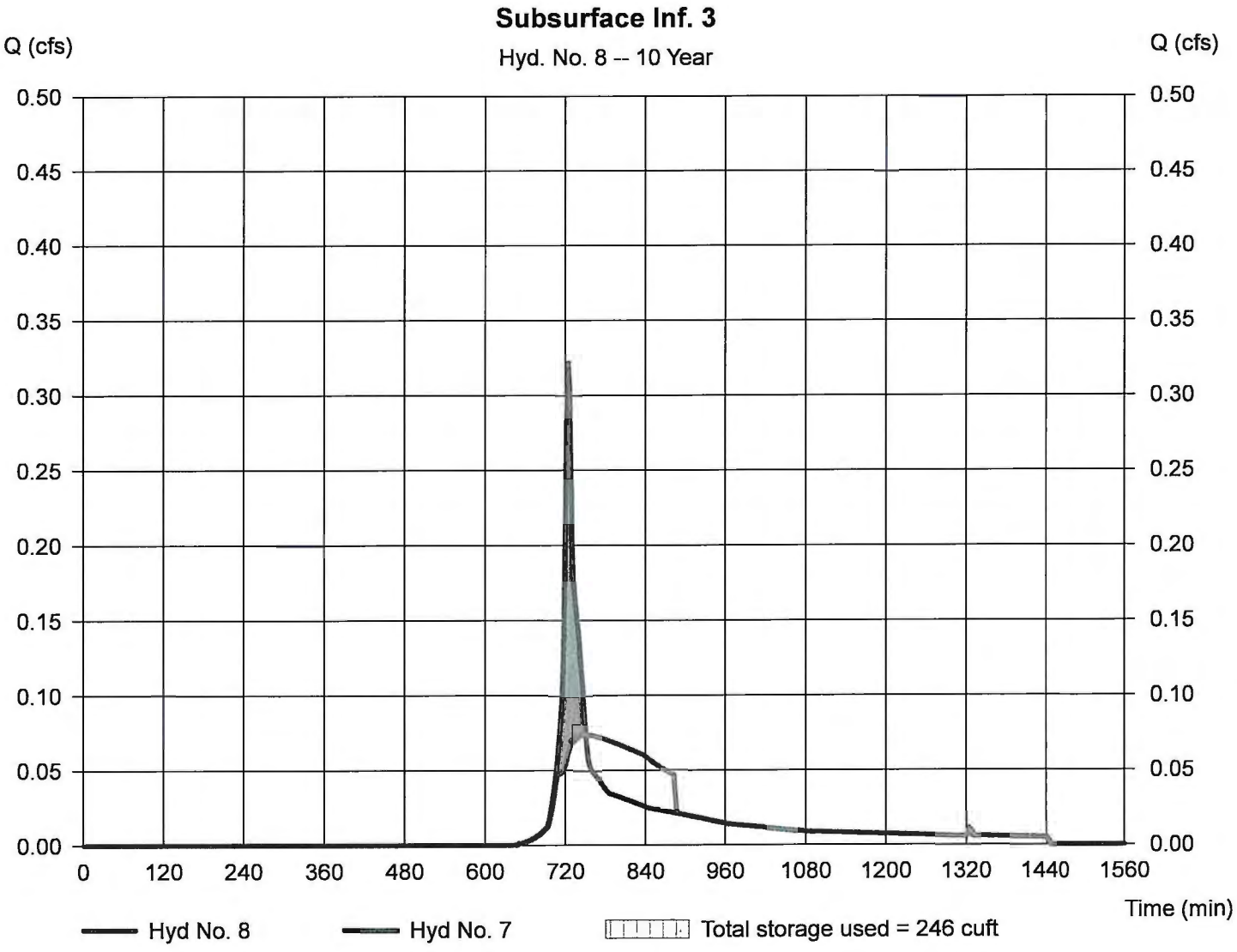
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 8

Subsurface Inf. 3

Hydrograph type	= Reservoir	Peak discharge	= 0.074 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 2 min	Hyd. volume	= 1,017 cuft
Inflow hyd. No.	= 7 - Subcatchment 3	Max. Elevation	= 130.75 ft
Reservoir name	= Sub 3 Infiltration	Max. Storage	= 246 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

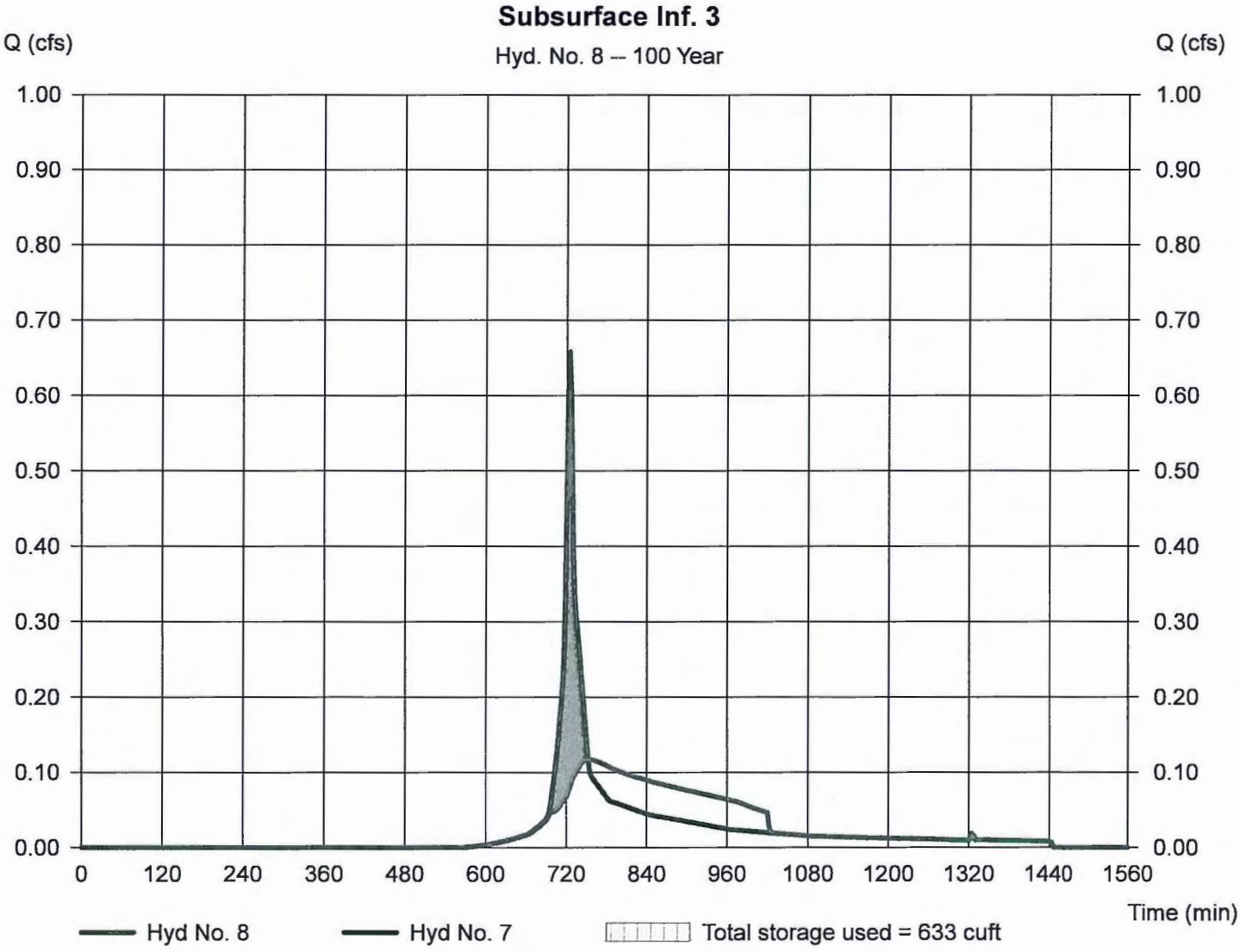
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 8

Subsurface Inf. 3

Hydrograph type	= Reservoir	Peak discharge	= 0.117 cfs
Storm frequency	= 100 yrs	Time to peak	= 752 min
Time interval	= 2 min	Hyd. volume	= 1,986 cuft
Inflow hyd. No.	= 7 - Subcatchment 3	Max. Elevation	= 133.40 ft
Reservoir name	= Sub 3 Infiltration	Max. Storage	= 633 cuft

Storage Indication method used. Outflow includes exfiltration.



Worksheet 2: Runoff curve number and runoff **SM-939B**

Project: 7, 9, 19 & 29 Great Road By WJH Date 11/18/2015

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] Subcatchment 4

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
-	Impervious	98			0.05	4.85
626B & 255C A	Open Space-Good Condition	39			0.08	2.96
1/ Use only one CN source per line.				Totals =	0.13	7.80

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{7.80}{0.13} = 62.28$; Use CN = [62.3]

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.45	1.16	2.39
Runoff, Q.....	cf	204	527	1089

(210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-939B

Project: 7, 9, 19 & 29 Great Road By WJH Date 11/18/2015

Location: Acton, MA Checked _____ Date _____

Circle one: Present | Developed
Circle one: Tc | Tt through subarea

Subcatchment 4

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			Pavement			
2. Mannings roughness coeff., n (table 3-1)			0.011			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.1			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.01			0.01
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			PAVED			
8. Flow Length, L		ft	57			
9. Watercourse slope, s		ft/ft	0.1			
10. Average Velocity, V (figure 3-1)		ft/s	6.43			
11. Tt = L / 3600V	Compute Tt	hr	0.00			0.00
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0.00

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.10
min 6.0

(210-VI-TR-55, Second Ed., June 1986)

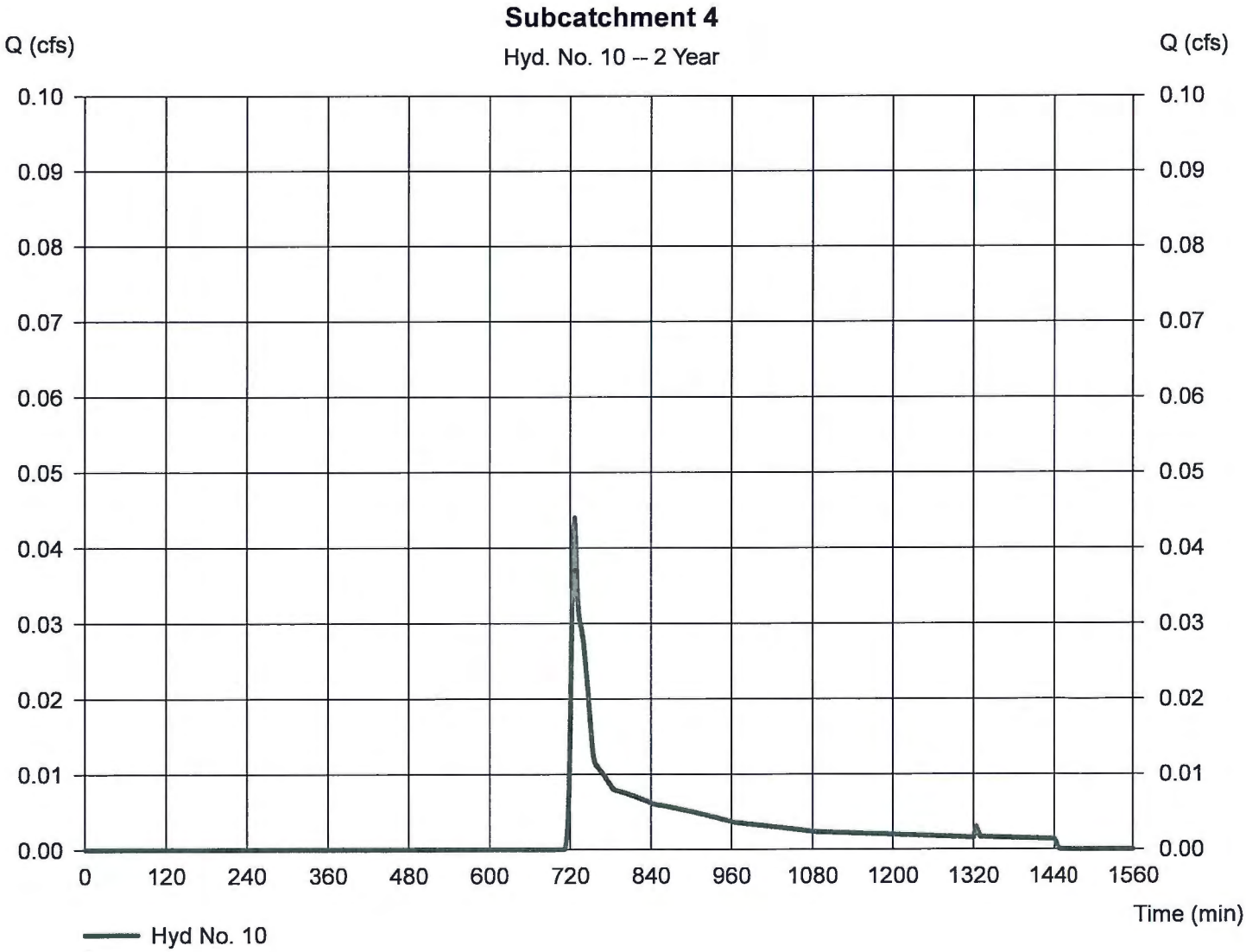
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 10

Subcatchment 4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.044 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 199 cuft
Drainage area	= 0.130 ac	Curve number	= 62.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

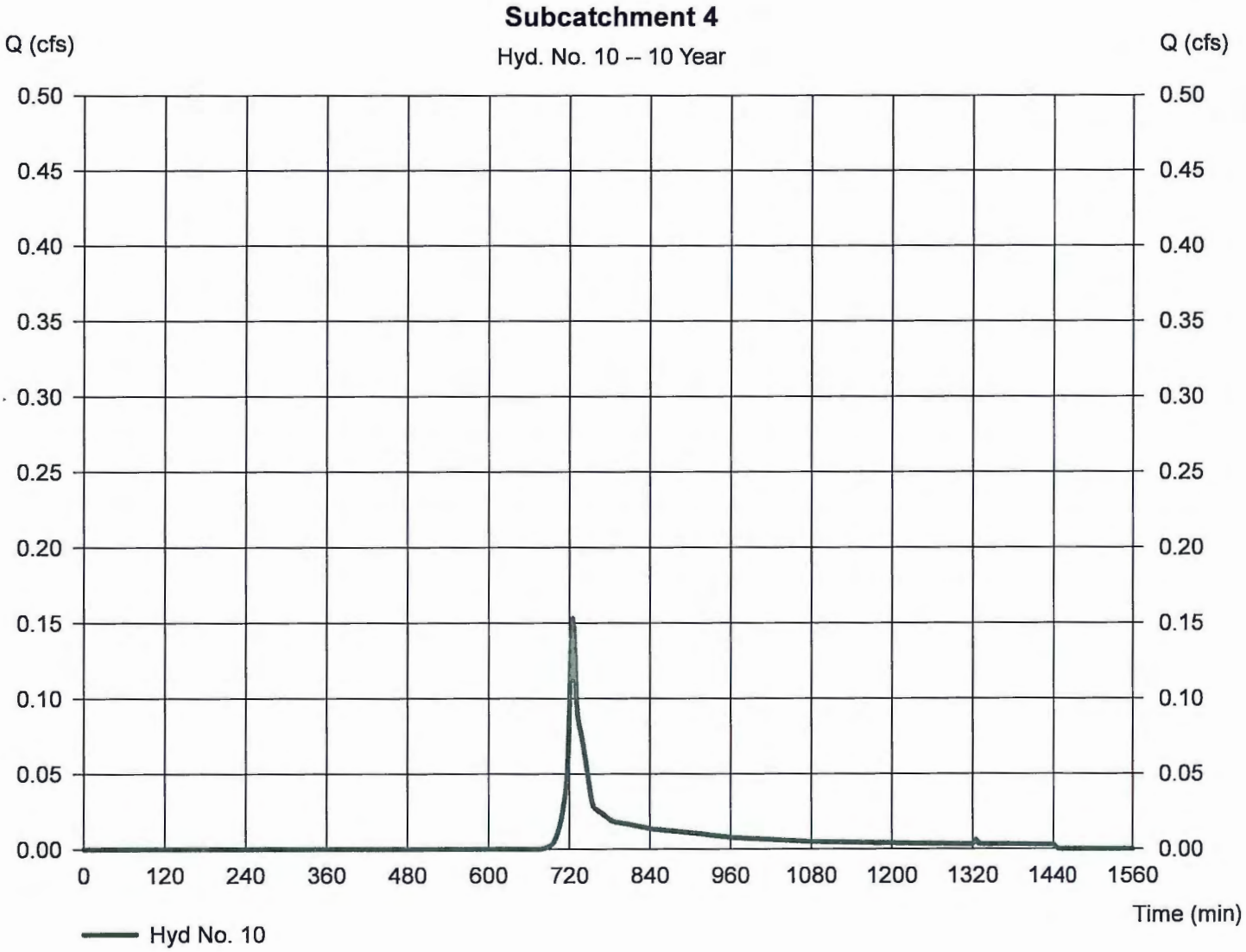


Hydrograph Report

Hyd. No. 10

Subcatchment 4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.153 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 513 cuft
Drainage area	= 0.130 ac	Curve number	= 62.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



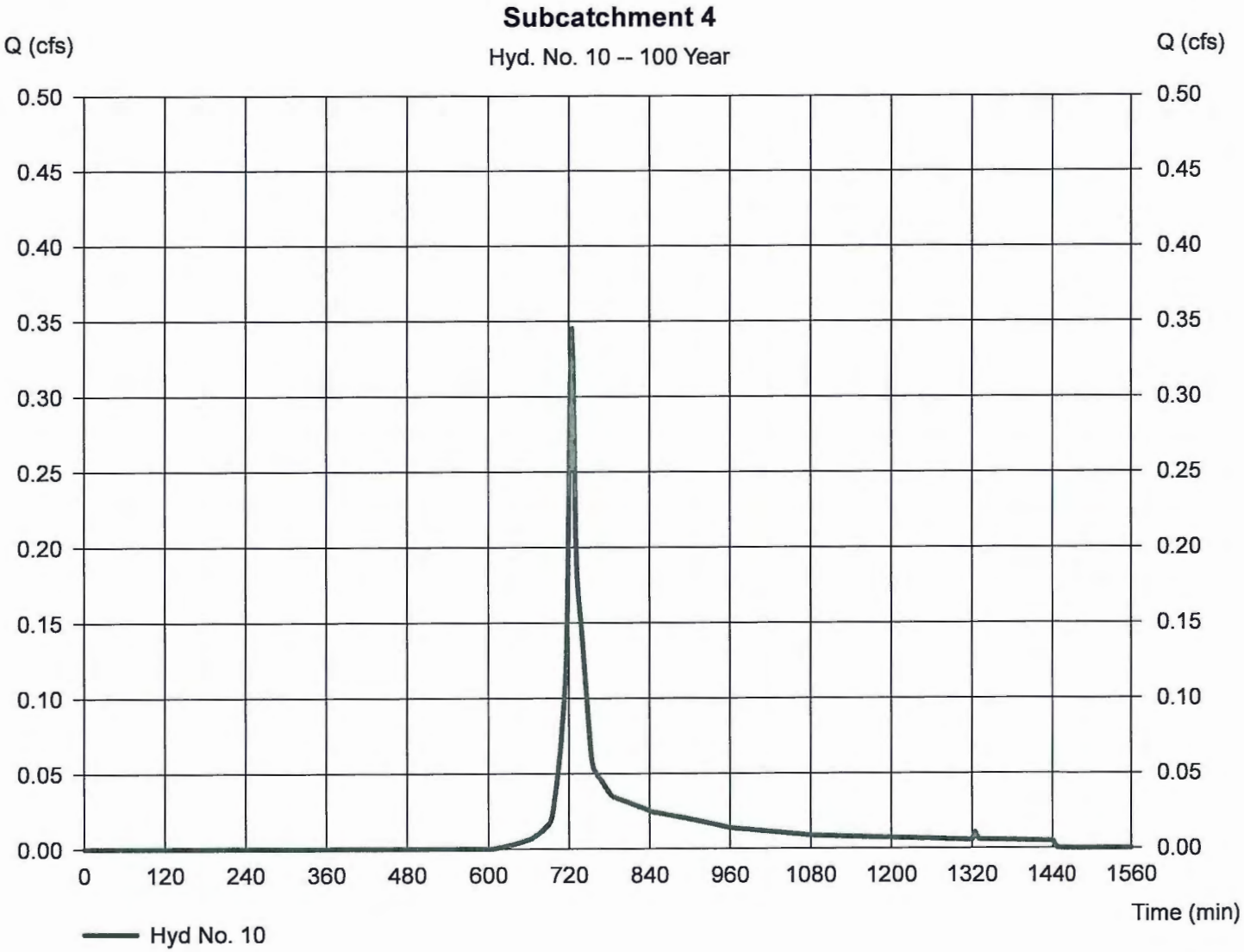
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 10

Subcatchment 4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.345 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,060 cuft
Drainage area	= 0.130 ac	Curve number	= 62.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Worksheet 2: Runoff curve number and runoff **SM-939B**

Project: 7, 9, 19 & 29 Great Road By WJH Date 11/18/2015

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] Roof Drywell 1

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
-	Impervious (Roof)	98			0.55	53.94
	Totals =				0.55	53.94

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{53.94}{0.55} = 98.00$; Use CN = [98.0]

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q.....	in	2.87	4.26	6.16
(Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)				
Runoff, Q.....	cf	5730	8520	12311

(210-VI-TR-55, Second Ed., June 1986)

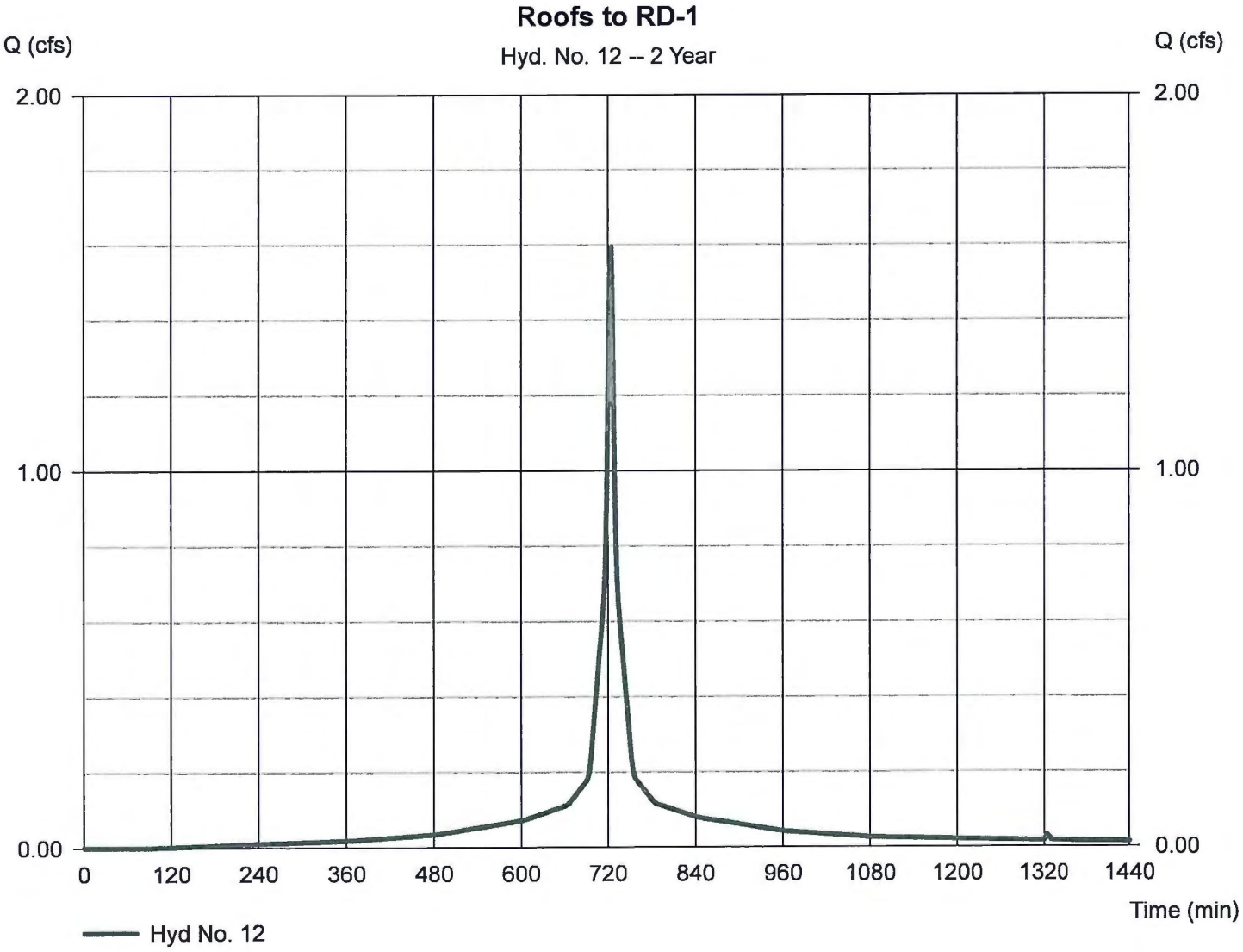
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Thursday, Nov 19, 2015

Hyd. No. 12

Roofs to RD-1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.595 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 5,368 cuft
Drainage area	= 0.550 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



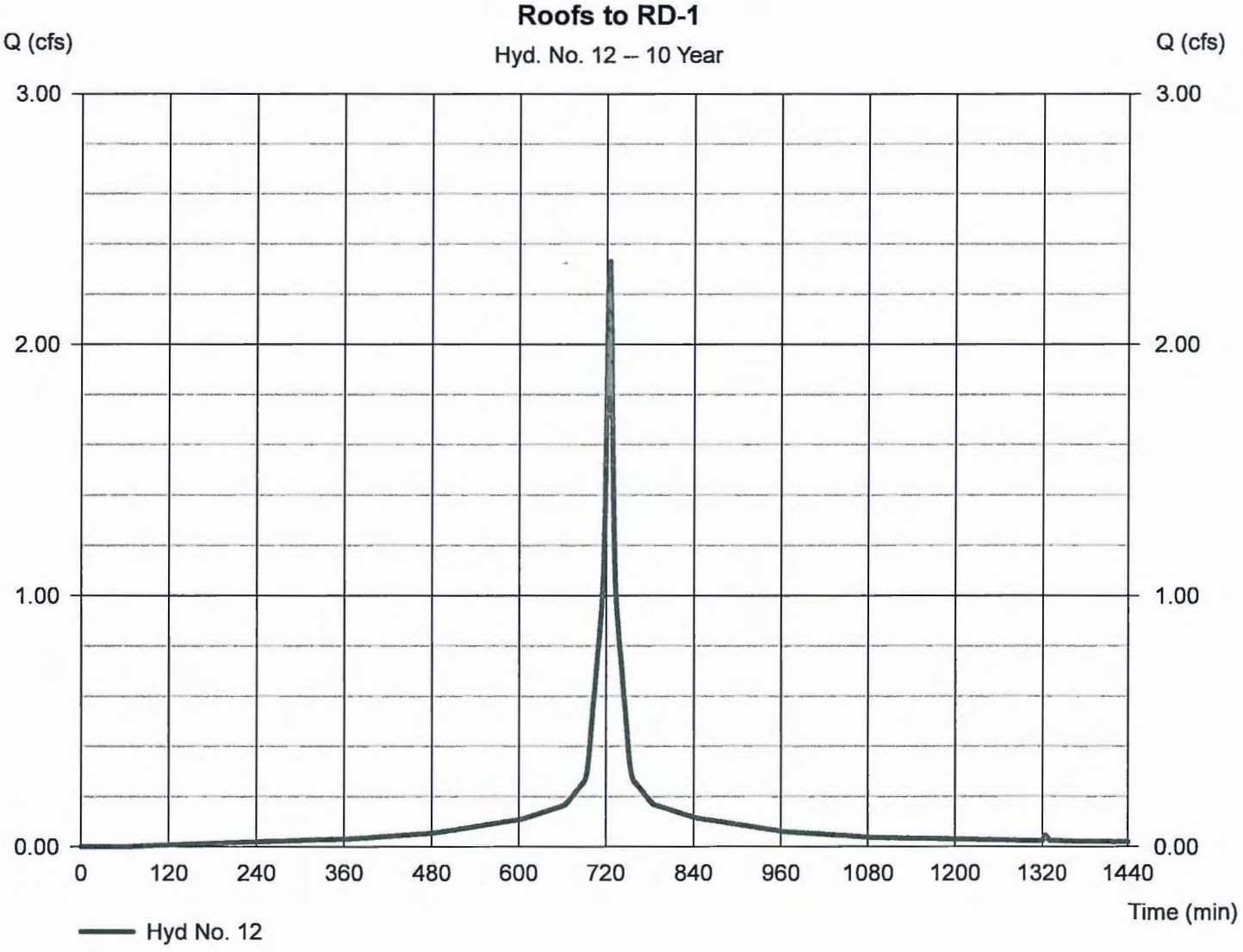
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 12

Roofs to RD-1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.331 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 7,981 cuft
Drainage area	= 0.550 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



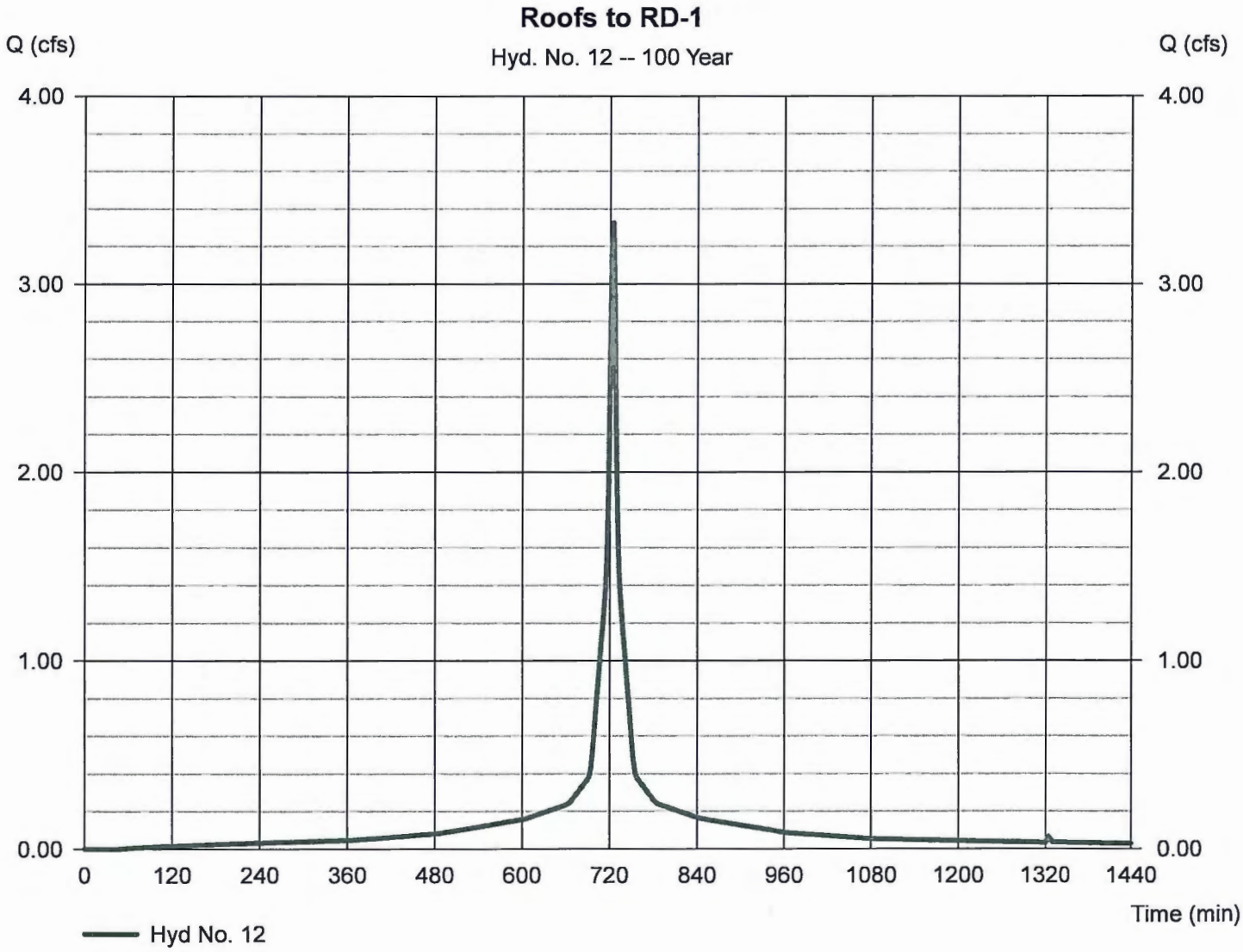
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 12

Roofs to RD-1

Hydrograph type	= SCS Runoff	Peak discharge	= 3.327 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 11,532 cuft
Drainage area	= 0.550 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

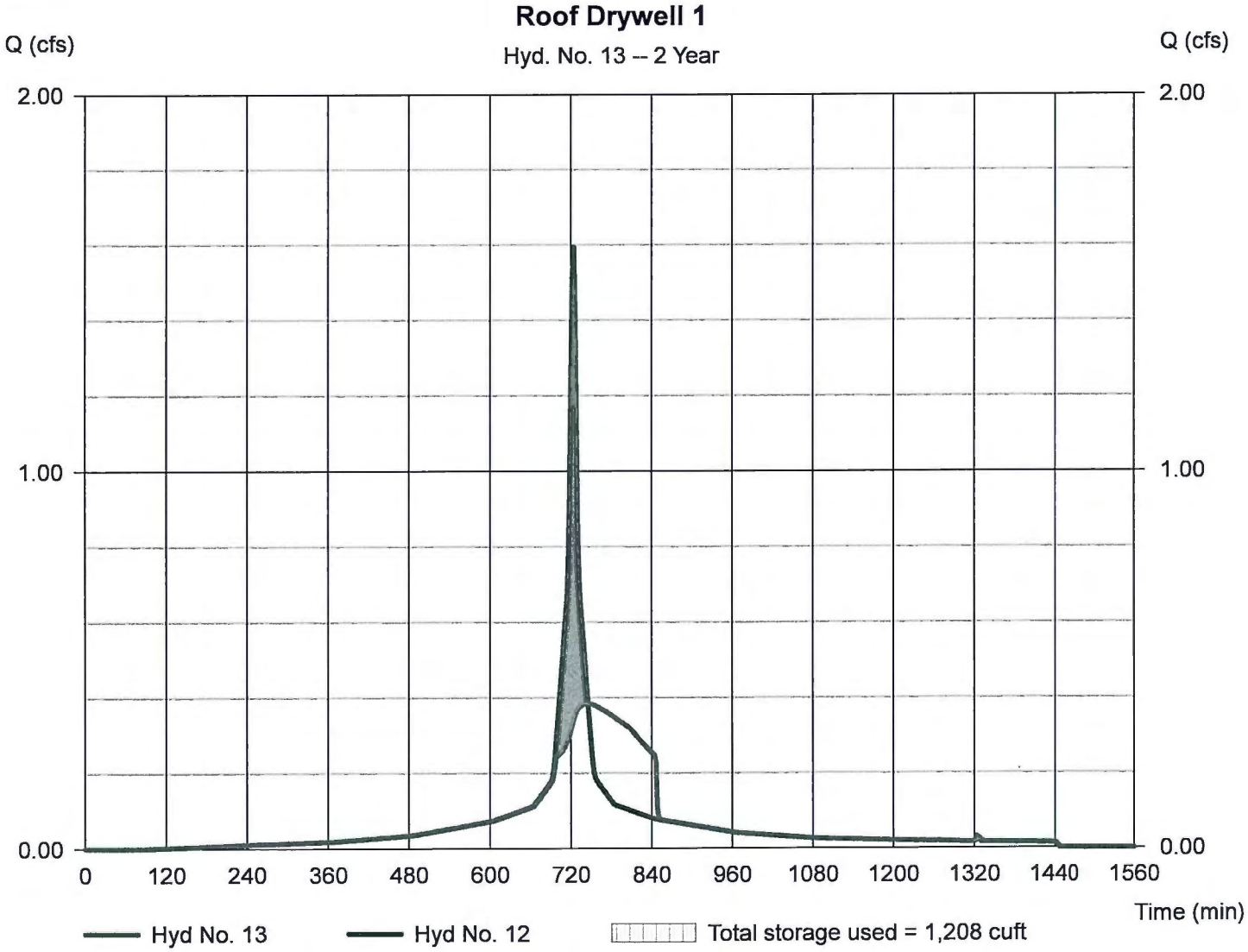
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 13

Roof Drywell 1

Hydrograph type	= Reservoir	Peak discharge	= 0.385 cfs
Storm frequency	= 2 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 5,368 cuft
Inflow hyd. No.	= 12 - Roofs to RD-1	Max. Elevation	= 131.66 ft
Reservoir name	= Roof Drywell 1	Max. Storage	= 1,208 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

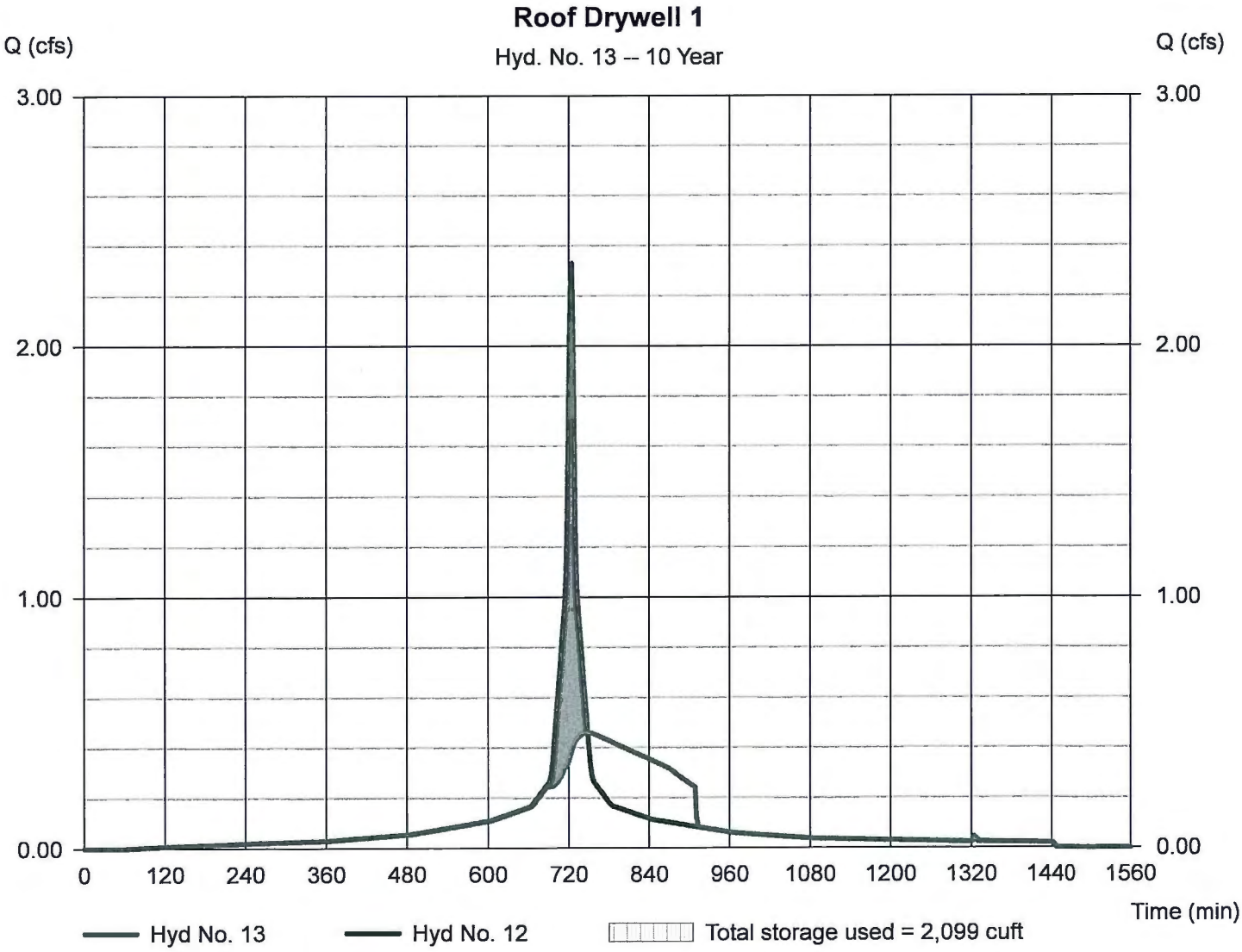
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 13

Roof Drywell 1

Hydrograph type	= Reservoir	Peak discharge	= 0.461 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 7,981 cuft
Inflow hyd. No.	= 12 - Roofs to RD-1	Max. Elevation	= 132.54 ft
Reservoir name	= Roof Drywell 1	Max. Storage	= 2,099 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

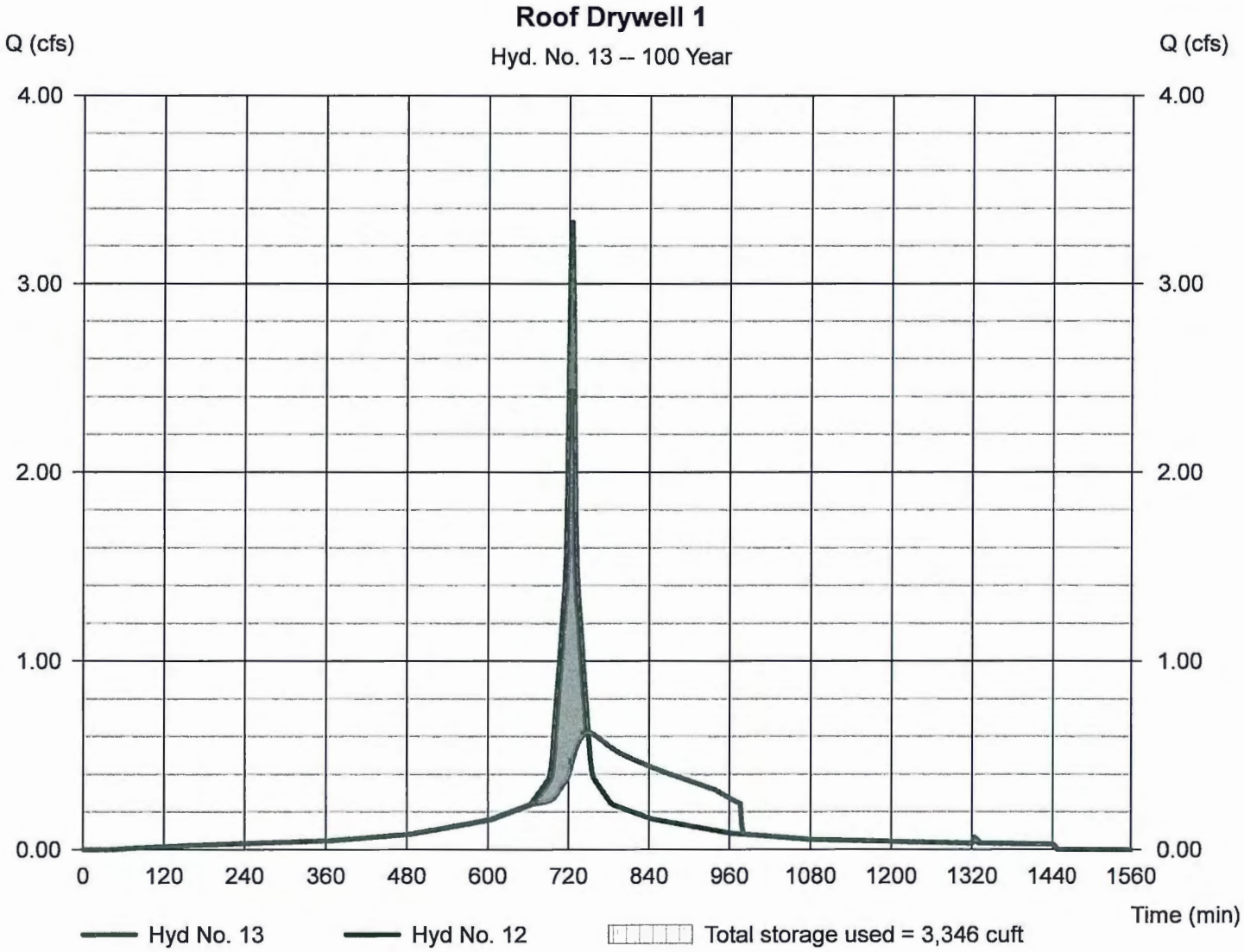
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 13

Roof Drywell 1

Hydrograph type	= Reservoir	Peak discharge	= 0.624 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 11,532 cuft
Inflow hyd. No.	= 12 - Roofs to RD-1	Max. Elevation	= 134.40 ft
Reservoir name	= Roof Drywell 1	Max. Storage	= 3,346 cuft

Storage Indication method used. Outflow includes exfiltration.



Worksheet 2: Runoff curve number and runoff **SM-939B**

Project: 7, 9, 19 & 29 Great Road By WJH Date 11/18/2015

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] Roof Drywell 2

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
-	Impervious (Roof)	98			0.09	8.70
					Totals =	0.09	8.70

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{8.70}{0.09} = 98.00$; Use CN = [98.0]

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q.....	in	2.87	4.26	6.16
(Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)				
Runoff, Q.....	cf	924	1374	1985

(210-VI-TR-55, Second Ed., June 1986)

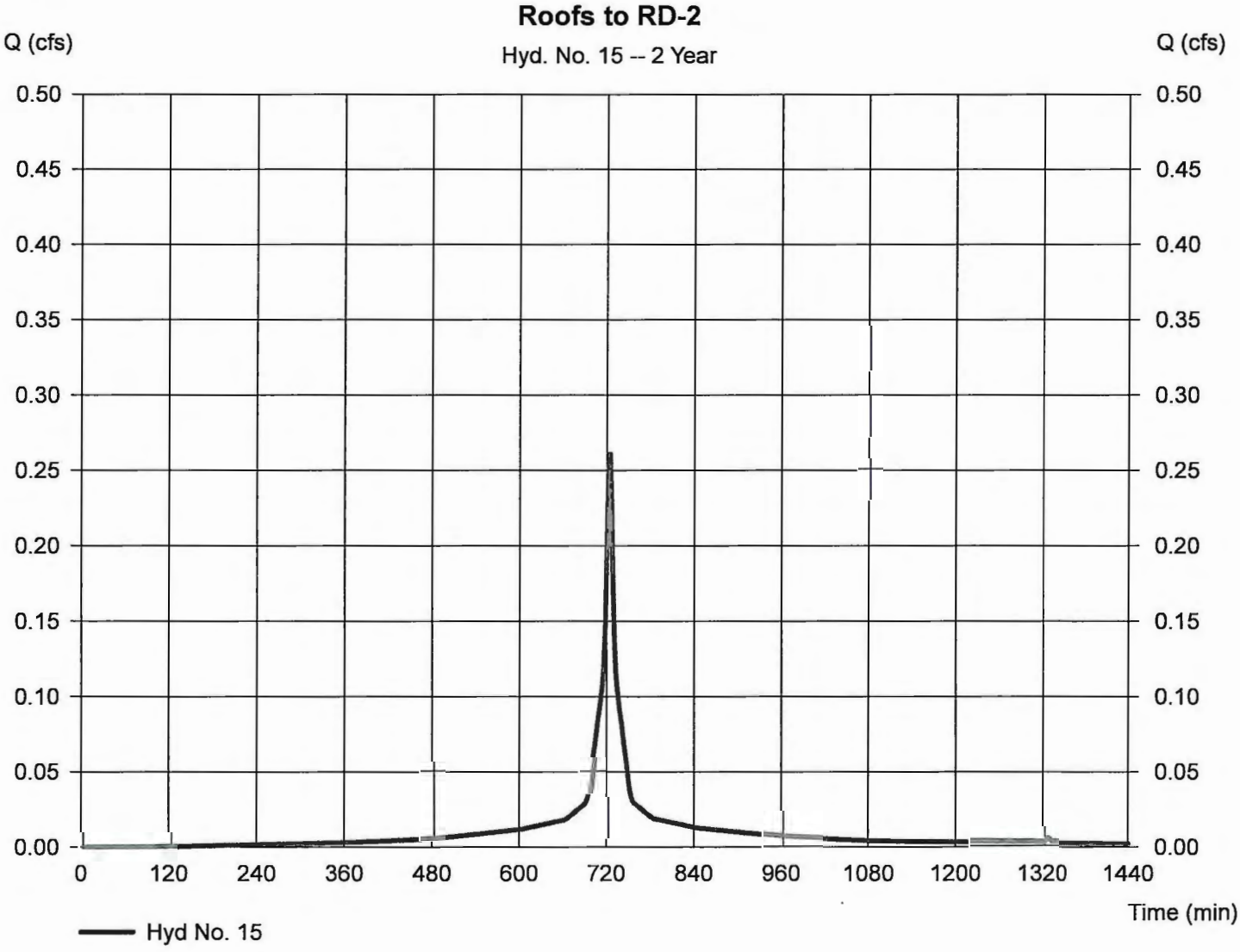
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 15

Roofs to RD-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.261 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 878 cuft
Drainage area	= 0.090 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



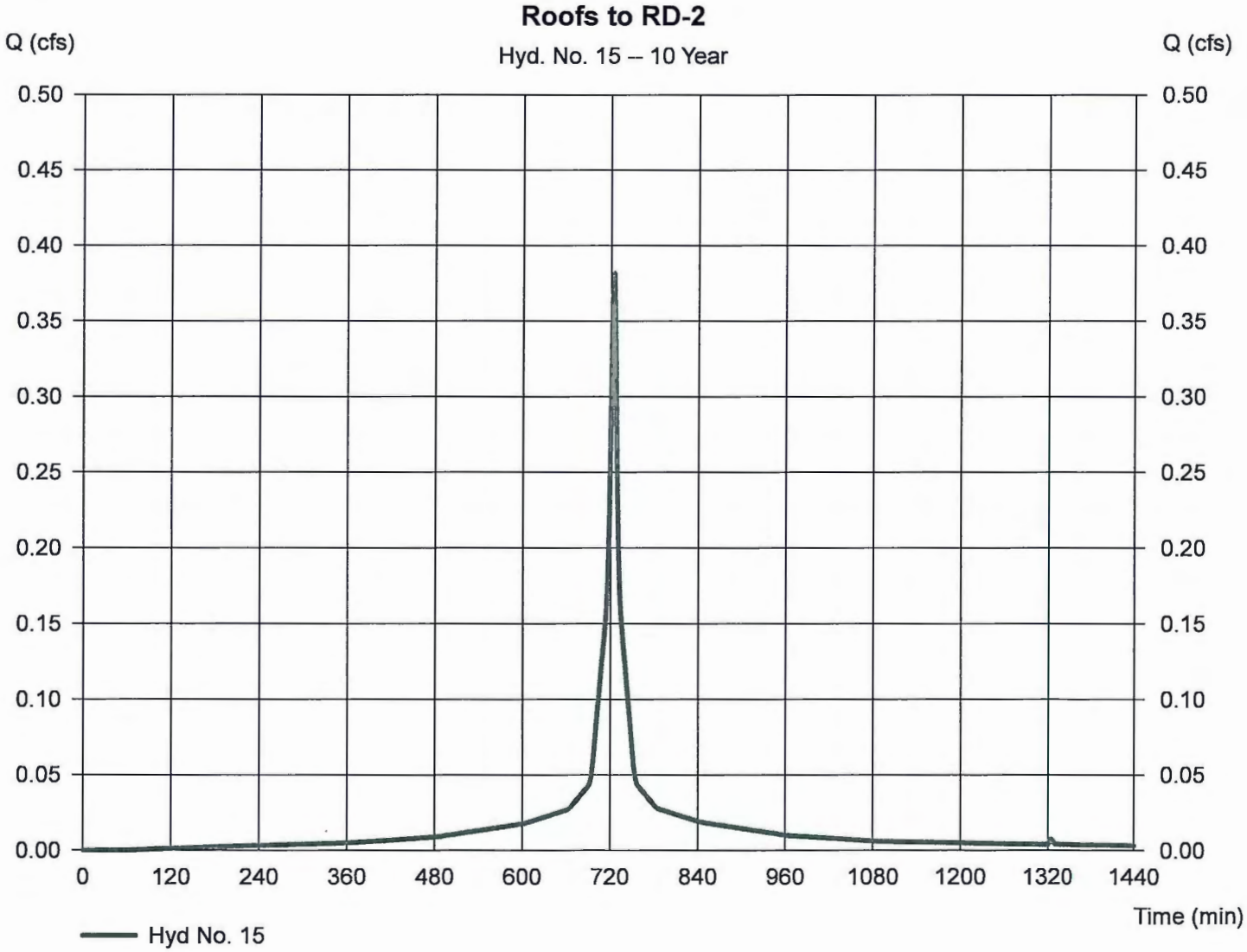
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 15

Roofs to RD-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.381 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,306 cuft
Drainage area	= 0.090 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



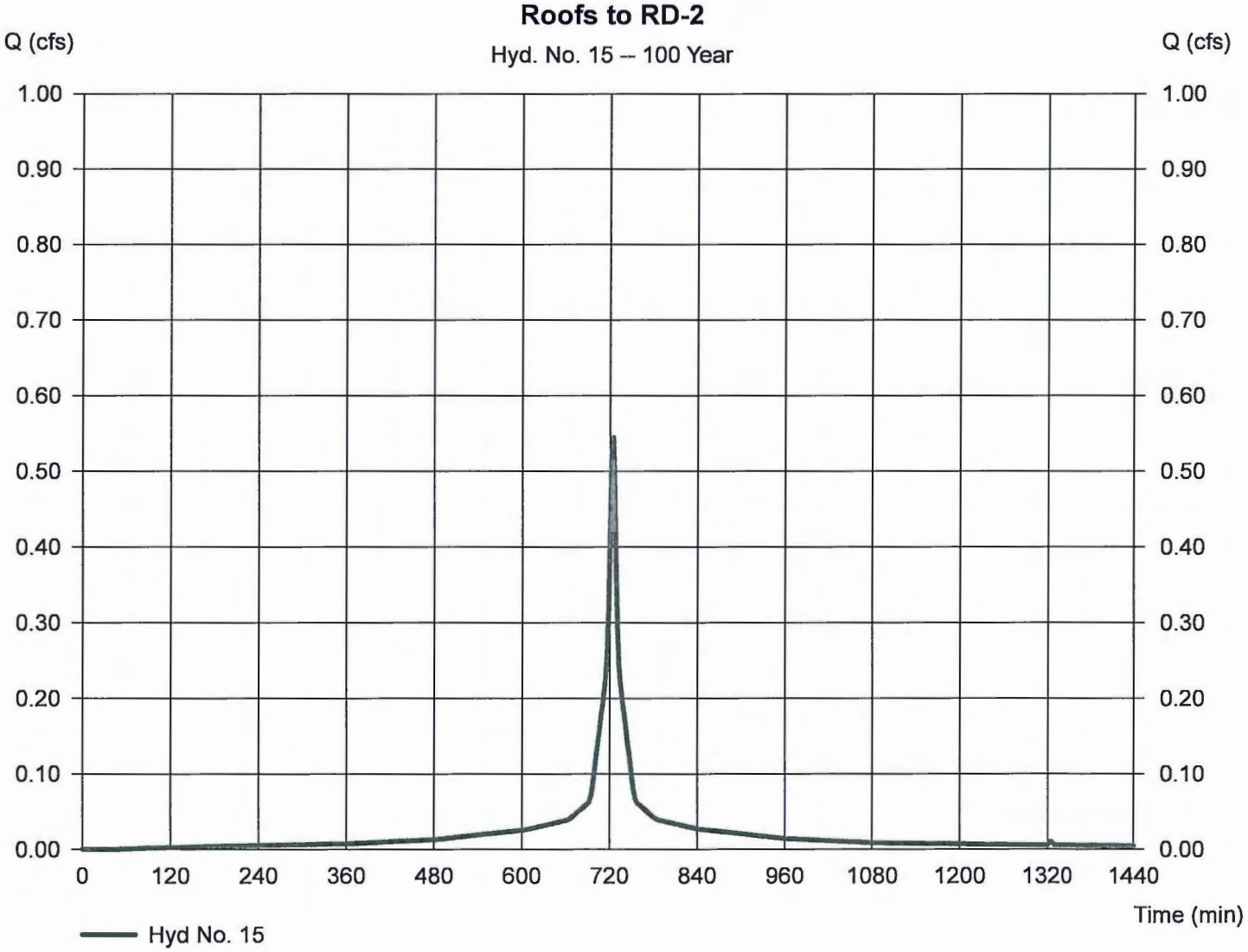
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 15

Roofs to RD-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.544 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,887 cuft
Drainage area	= 0.090 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

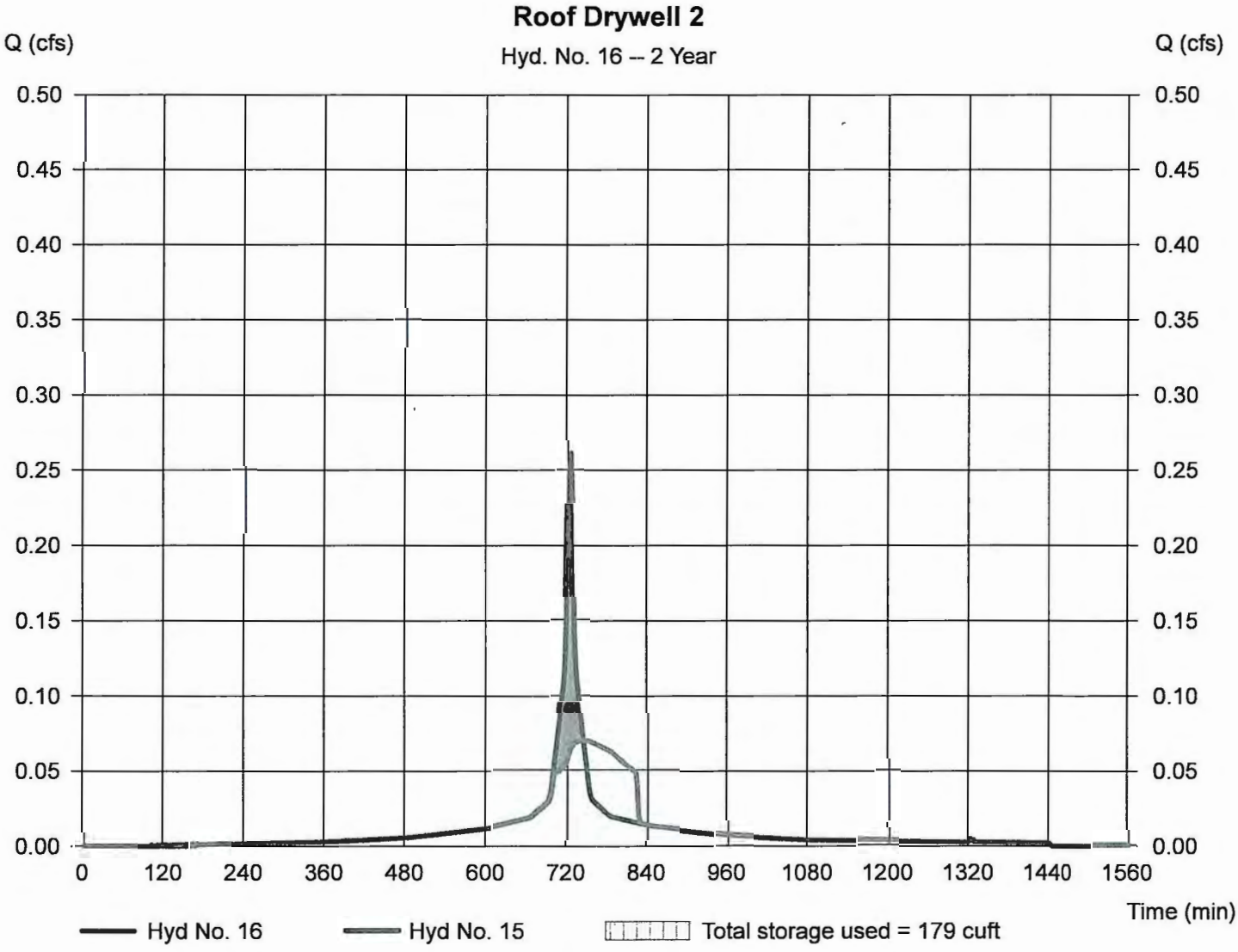
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 16

Roof Drywell 2

Hydrograph type	= Reservoir	Peak discharge	= 0.070 cfs
Storm frequency	= 2 yrs	Time to peak	= 744 min
Time interval	= 2 min	Hyd. volume	= 878 cuft
Inflow hyd. No.	= 15 - Roofs to RD-2	Max. Elevation	= 135.89 ft
Reservoir name	= Roof Drywell 2	Max. Storage	= 179 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

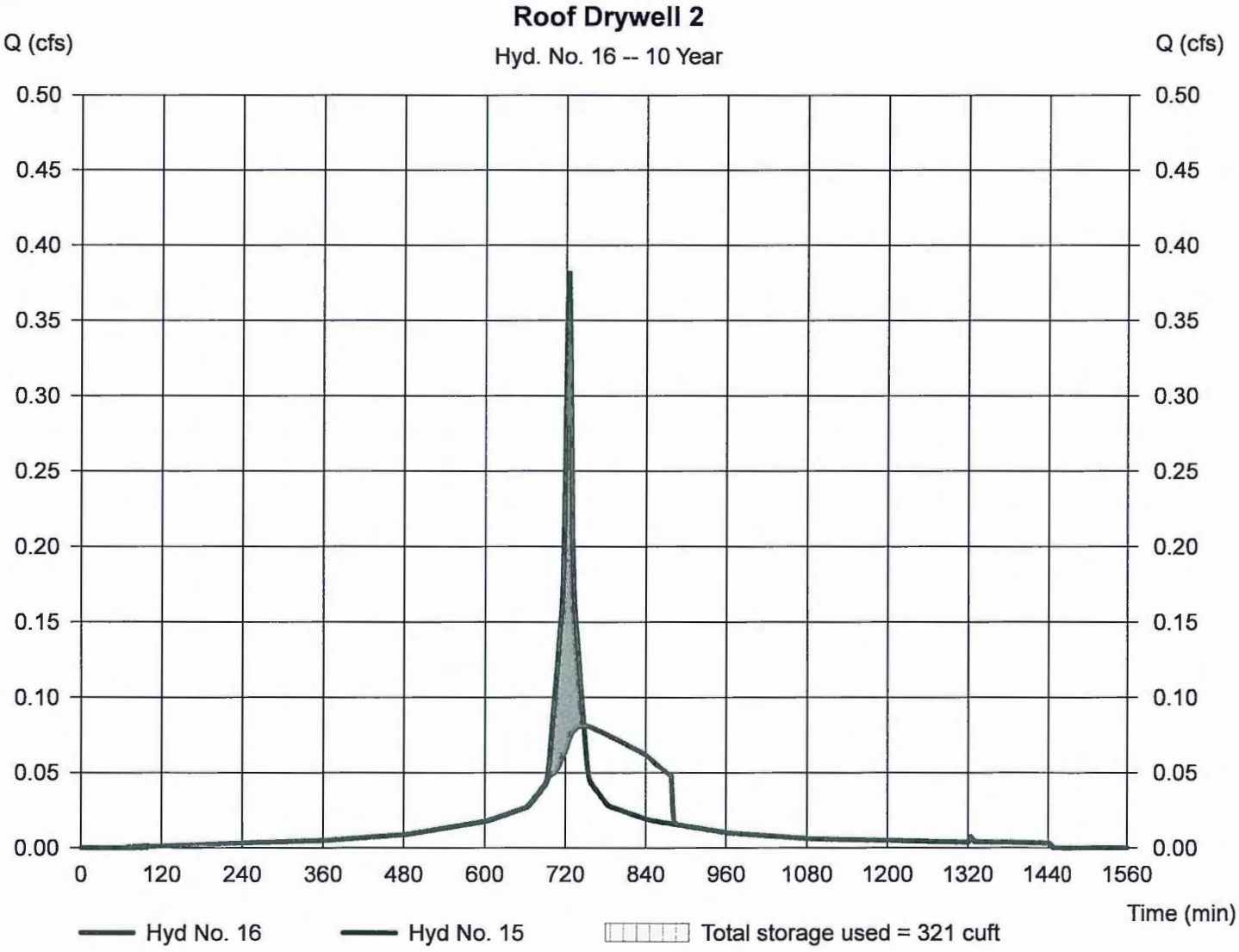
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 16

Roof Drywell 2

Hydrograph type	= Reservoir	Peak discharge	= 0.081 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 1,306 cuft
Inflow hyd. No.	= 15 - Roofs to RD-2	Max. Elevation	= 136.60 ft
Reservoir name	= Roof Drywell 2	Max. Storage	= 321 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

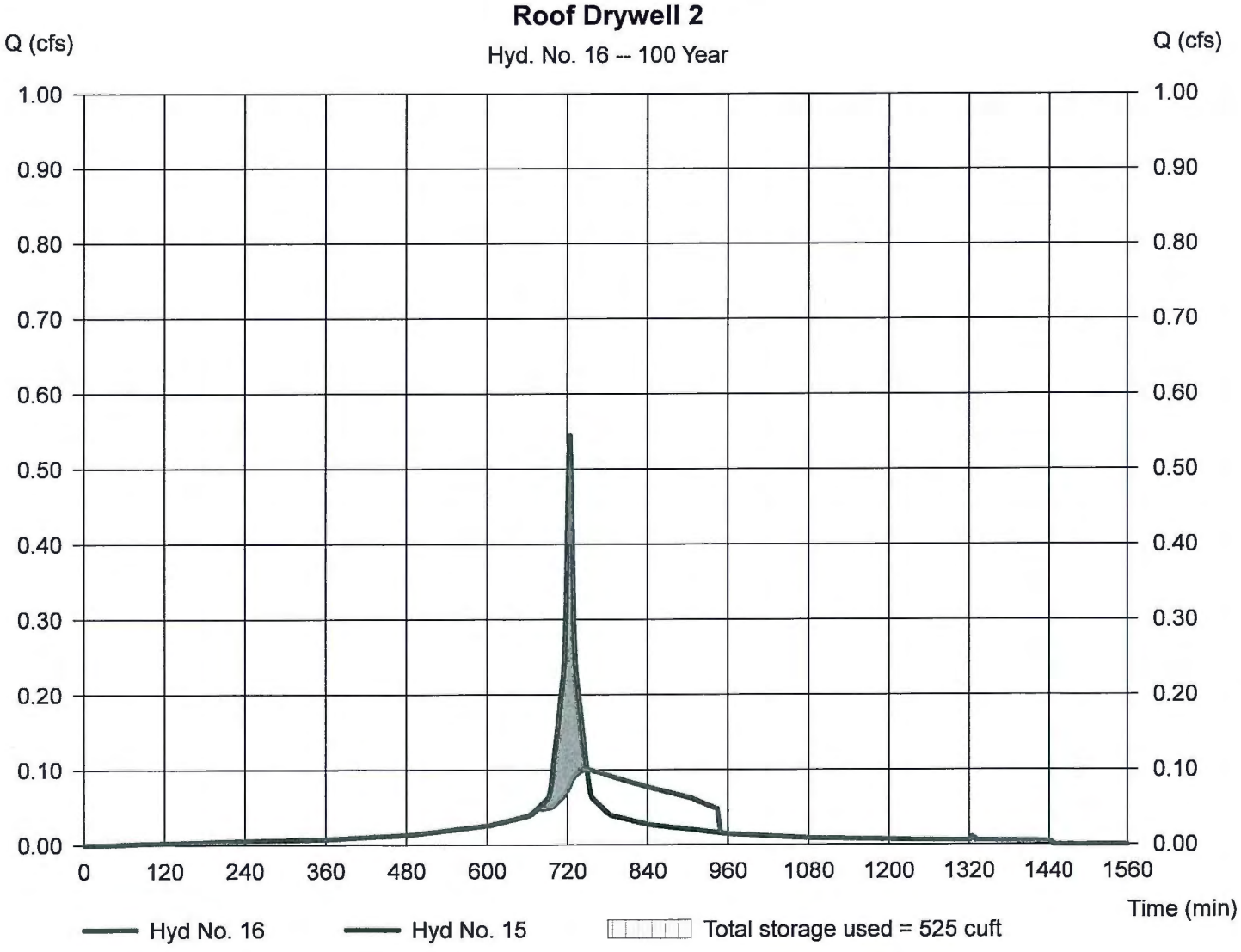
Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Hyd. No. 16

Roof Drywell 2

Hydrograph type	= Reservoir	Peak discharge	= 0.100 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 2 min	Hyd. volume	= 1,887 cuft
Inflow hyd. No.	= 15 - Roofs to RD-2	Max. Elevation	= 137.77 ft
Reservoir name	= Roof Drywell 2	Max. Storage	= 525 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Pond No. 10 - Sub 1 Infiltration

Pond Data

UG Chambers - Invert elev. = 136.00 ft, Rise x Span = 2.50 x 4.25 ft, Barrel Len = 42.72 ft, No. Barrels = 6, Slope = 0.00%, Headers = No
Encasement - Invert elev. = 134.50 ft, Width = 5.50 ft, Height = 4.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	134.50	n/a	0	0
0.45	134.95	n/a	254	254
0.90	135.40	n/a	254	508
1.35	135.85	n/a	254	761
1.80	136.30	n/a	449	1,211
2.25	136.75	n/a	541	1,752
2.70	137.20	n/a	524	2,276
3.15	137.65	n/a	495	2,771
3.60	138.10	n/a	447	3,218
4.05	138.55	n/a	350	3,568
4.50	139.00	n/a	254	3,822

Culvert / Orifice Structures

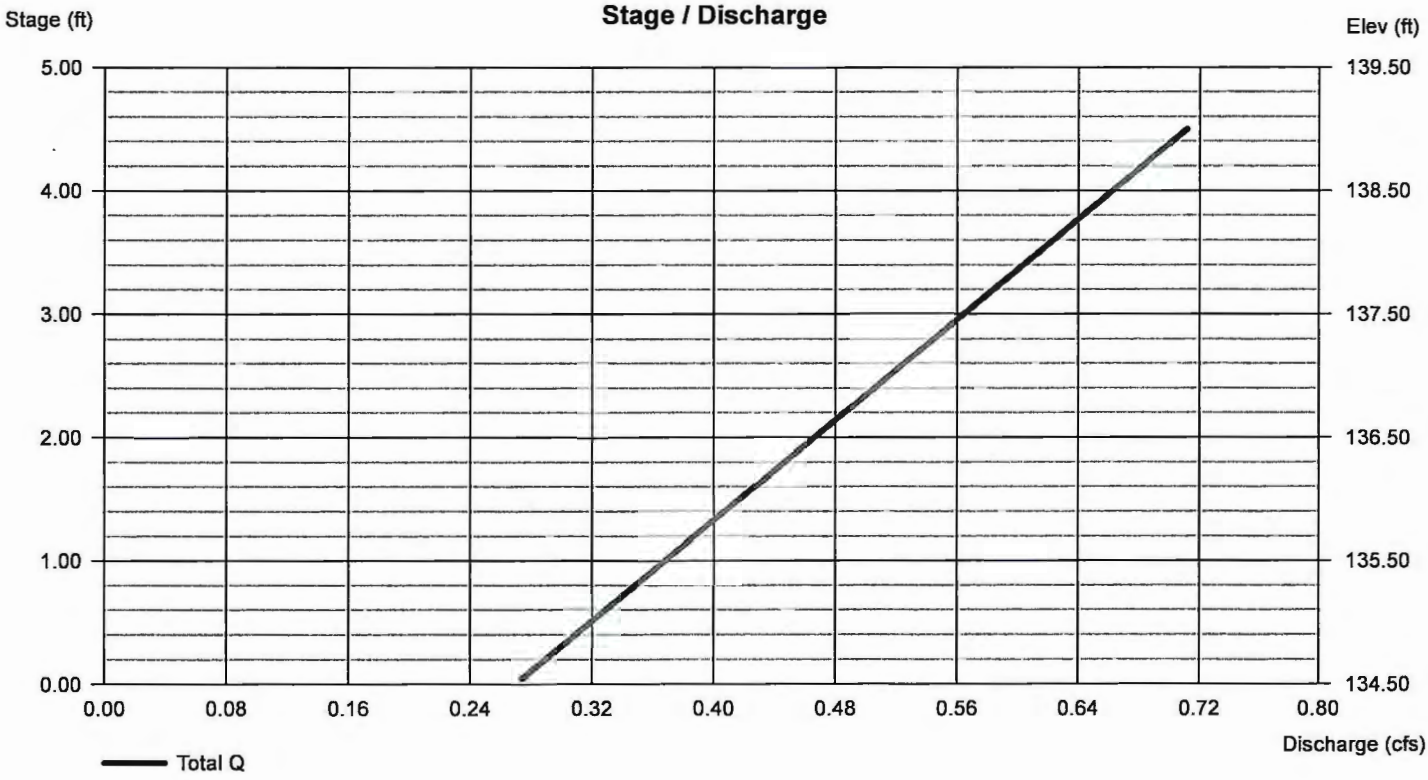
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 8.270 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Pond No. 3 - Sub 2 Infiltration

Pond Data

UG Chambers - Invert elev. = 129.00 ft, Rise x Span = 2.50 x 4.25 ft, Barrel Len = 28.48 ft, No. Barrels = 4, Slope = 0.00%, Headers = No
Encasement - Invert elev. = 128.00 ft, Width = 5.50 ft, Height = 4.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	128.00	n/a	0	0
0.45	128.45	n/a	113	113
0.90	128.90	n/a	113	226
1.35	129.35	n/a	214	440
1.80	129.80	n/a	240	680
2.25	130.25	n/a	232	911
2.70	130.70	n/a	218	1,129
3.15	131.15	n/a	196	1,325
3.60	131.60	n/a	148	1,473
4.05	132.05	n/a	113	1,586
4.50	132.50	n/a	113	1,699

Culvert / Orifice Structures

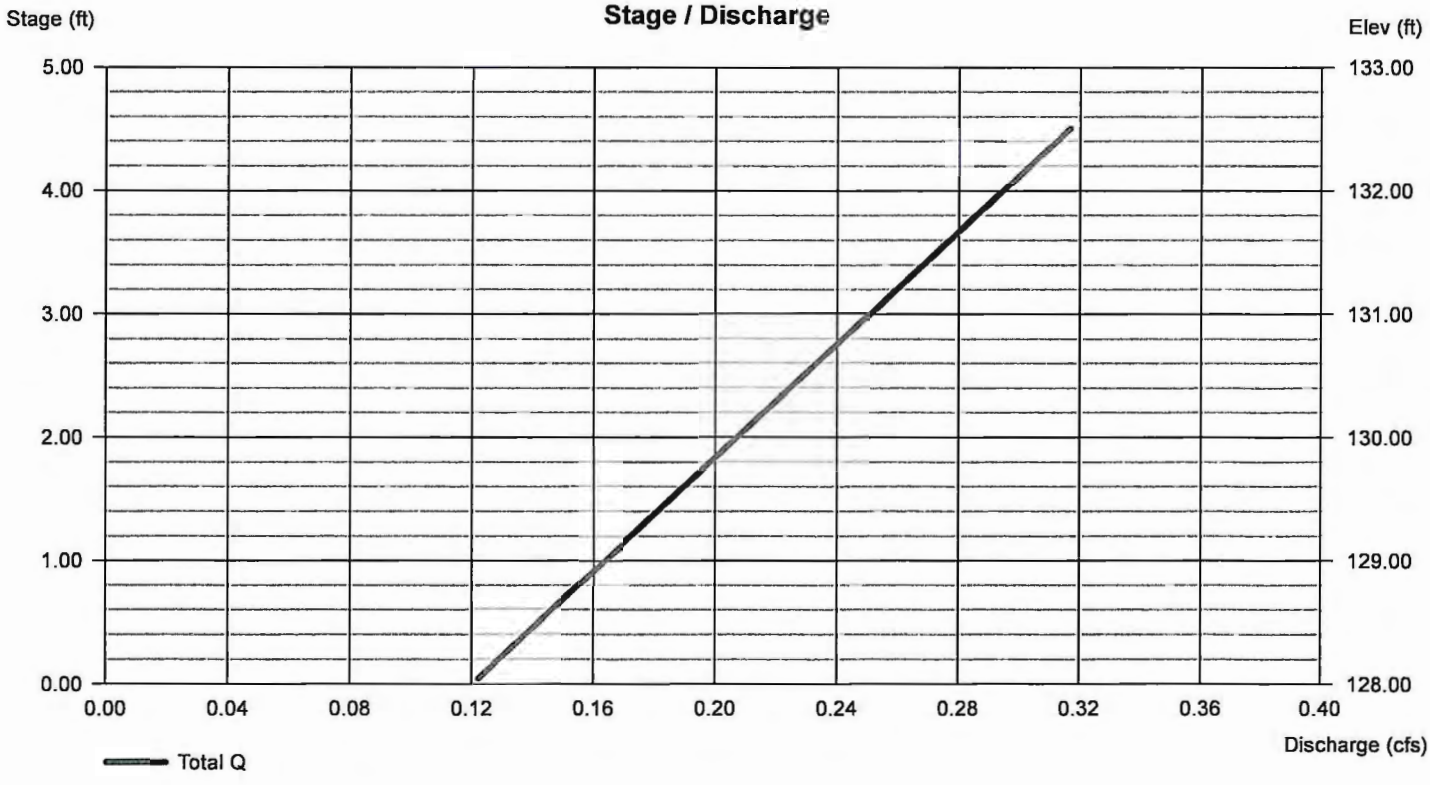
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 8.270 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Pond No. 6 - Sub 3 Infiltration

Pond Data

UG Chambers - Invert elev. = 130.00 ft, Rise x Span = 2.50 x 4.25 ft, Barrel Len = 14.24 ft, No. Barrels = 3, Slope = 0.00%, Headers = No
Encasement - Invert elev. = 129.00 ft, Width = 5.58 ft, Height = 4.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	129.00	n/a	0	0
0.45	129.45	n/a	43	43
0.90	129.90	n/a	43	86
1.35	130.35	n/a	81	167
1.80	130.80	n/a	91	257
2.25	131.25	n/a	88	345
2.70	131.70	n/a	82	427
3.15	132.15	n/a	74	501
3.60	132.60	n/a	56	557
4.05	133.05	n/a	43	600
4.50	133.50	n/a	43	643

Culvert / Orifice Structures

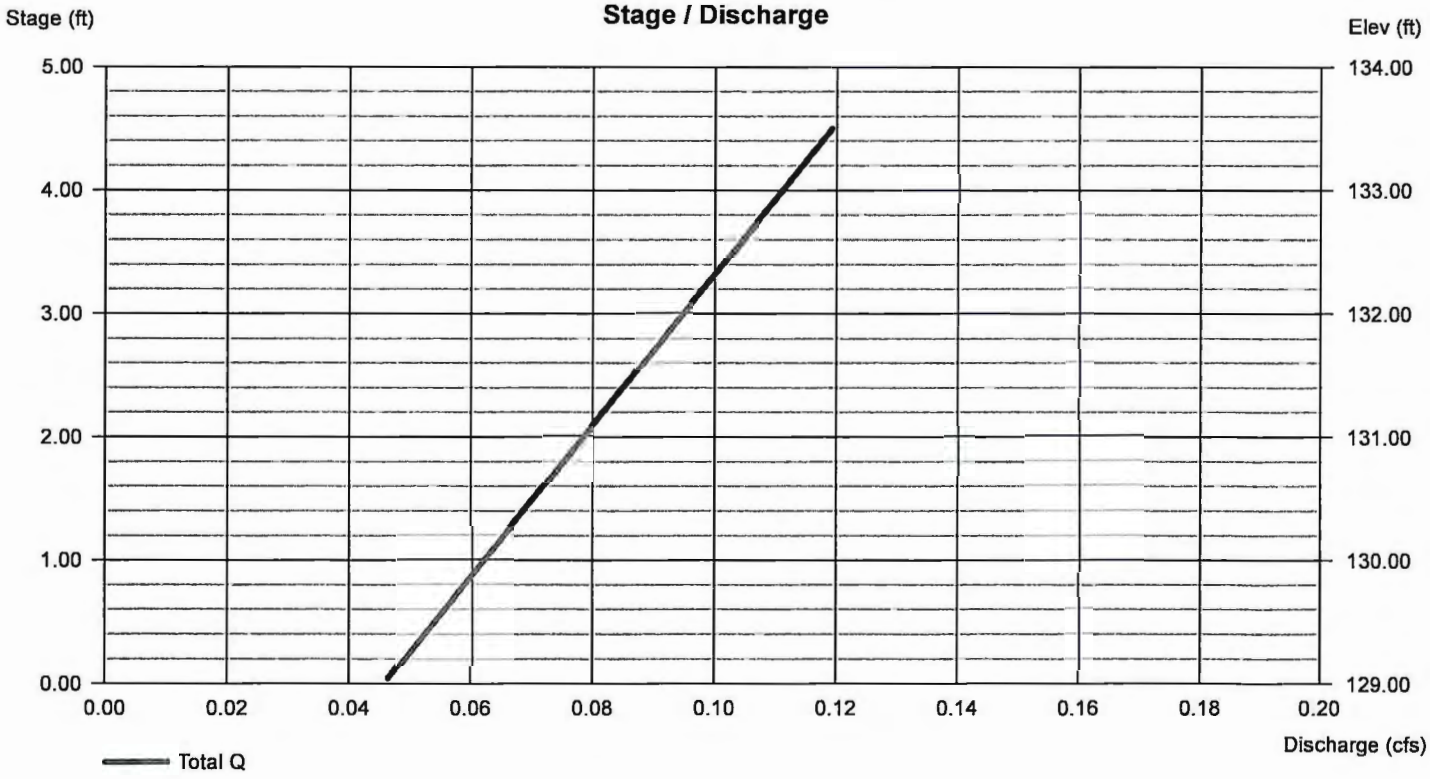
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 8.270 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Pond No. 1 - Roof Drywell 1

Pond Data

UG Chambers - Invert elev. = 131.00 ft, Rise x Span = 2.50 x 4.25 ft, Barrel Len = 56.96 ft, No. Barrels = 4, Slope = 0.00%, Headers = No
Encasement - Invert elev. = 130.00 ft, Width = 5.50 ft, Height = 4.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	130.00	n/a	0	0
0.45	130.45	n/a	226	226
0.90	130.90	n/a	226	451
1.35	131.35	n/a	428	880
1.80	131.80	n/a	480	1,359
2.25	132.25	n/a	464	1,823
2.70	132.70	n/a	436	2,259
3.15	133.15	n/a	391	2,650
3.60	133.60	n/a	296	2,946
4.05	134.05	n/a	226	3,171
4.50	134.50	n/a	226	3,397

Culvert / Orifice Structures

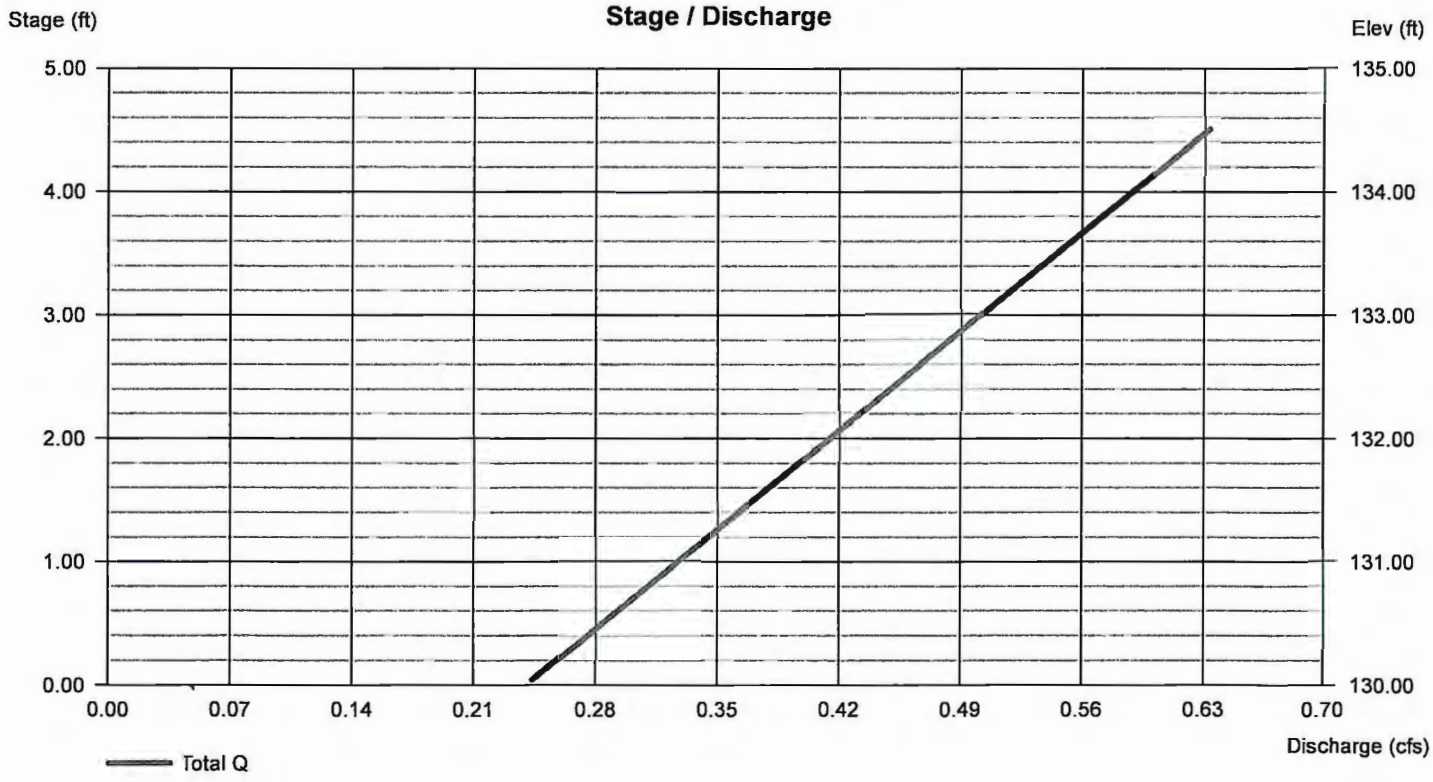
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 8.270 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Thursday, Nov 19, 2015

Pond No. 4 - Roof Drywell 2

Pond Data

UG Chambers - Invert elev. = 135.50 ft, Rise x Span = 2.50 x 4.25 ft, Barrel Len = 21.36 ft, No. Barrels = 2, Slope = 0.00%, Headers = No
Encasement - Invert elev. = 134.50 ft, Width = 5.75 ft, Height = 4.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	134.50	n/a	0	0
0.45	134.95	n/a	44	44
0.90	135.40	n/a	44	88
1.35	135.85	n/a	82	171
1.80	136.30	n/a	92	263
2.25	136.75	n/a	89	351
2.70	137.20	n/a	84	435
3.15	137.65	n/a	75	510
3.60	138.10	n/a	57	568
4.05	138.55	n/a	44	612
4.50	139.00	n/a	44	656

Culvert / Orifice Structures

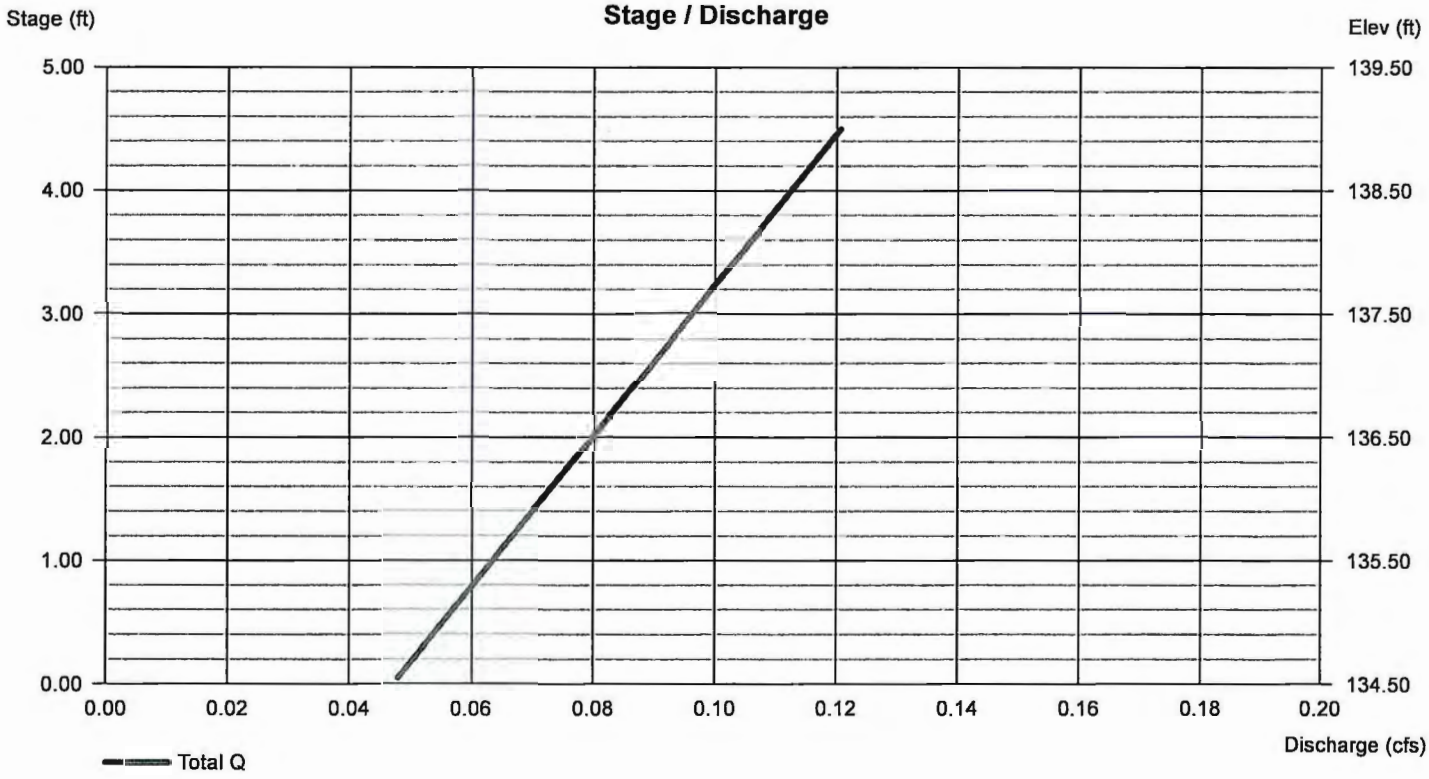
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 8.270 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



First Flush Volume Calculations

Project: First Village
Location: Acton, MA
Prepared For: Bill Hall - Stamski & McNary, Inc.

CONTECH ENGINEERED SOLUTIONS

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1.0" of runoff.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Given:

Structure Name	Impv. (acres)	A ($miles^2$)	t_c (min)	t_c (hr)	WQV (in)
CDS	0.24	0.0003734	6.0	0.100	1.00
VSHS	0.50	0.0007813	6.0	0.100	1.00

Procedure:

Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Structure Name	qu (csm/in.)
CDS	774.00
VSHS	774.00

1. Compute Q Rate using the following equation:

$$Q_1 = (qu)\ (A)\ (WQV)$$

where:

Q_1 = flow fate associated with first 1.0" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1.0" in this case)

Structure Name	Q_1 (cfs)
CDS	0.29
VSHS	0.60

VortSentry® HS Estimated Net Annual TSS Reduction

CONTECH ENGINEERED SOLUTIONS

FIRST VILLAGE
ACTON, MA
Model VSHS48
System VORTSENTRY

Design Ratio[1] = $\frac{\text{0.12 acres x 0.9}}{\text{63 ft3}}$ **= 0.002**

Rainfall Intensity "/hr	Flow Rate cfs	Operating Rate[2] cfs/ft³	% Total Rainfall Depth[3]	Rmvl. Effcy[4] (%)	Rel. Effcy (%)
0.02	0.00	0.00003	10.2%	98.0%	10.0%
0.04	0.00	0.00007	9.6%	98.0%	9.5%
0.06	0.01	0.00010	9.4%	98.0%	9.3%
0.08	0.01	0.00014	7.7%	98.0%	7.6%
0.10	0.01	0.00017	8.6%	98.0%	8.4%
0.12	0.01	0.00021	6.3%	98.0%	6.2%
0.14	0.02	0.00024	4.7%	98.0%	4.6%
0.16	0.02	0.00028	4.6%	98.0%	4.5%
0.18	0.02	0.00031	3.5%	98.0%	3.5%
0.20	0.02	0.00034	4.3%	98.0%	4.3%
0.25	0.03	0.00043	8.0%	98.0%	7.8%
0.30	0.03	0.00052	5.6%	98.0%	5.5%
0.35	0.04	0.00060	4.4%	98.0%	4.3%
0.40	0.04	0.00069	2.5%	98.0%	2.5%
0.45	0.05	0.00077	2.5%	98.0%	2.5%
0.50	0.05	0.00086	1.4%	98.0%	1.4%
0.75	0.08	0.00129	5.0%	98.0%	4.9%
1.00	0.11	0.00172	1.0%	98.0%	1.0%
1.50	0.16	0.00258	0.0%	98.0%	0.0%
2.00	0.22	0.00344	0.0%	98.0%	0.0%
3.00	0.32	0.00516	0.5%	98.0%	0.5%
					98.0%
				% rain falling at >3"/hr =	0.0%
				Removal Efficiency Adjustment[4] =	6.5%
				Predicted Net Annual Load Removal Efficiency =	**91.5%**

1 - Design Ratio = (Total Drainage Area x Runoff Coefficient) / VortSentry HS Treatment Volume
= The Total Drainage Area and Runoff Coefficient are specified by the site engineer.
2 - Operating Rate (cfs/ft³) = Rainfall Intensity ("/hr) x Design Ratio
3 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
4 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Calculated by: CJA	Date: 11/17/15	Checked by:	Date:

CDS ESTIMATED NET ANNUAL TSS REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

CONTECH ENGINEERED SOLUTIONS

FIRST VILLAGE
ACTON, MA
for SYSTEM: CDS-2015-4

Area	0.75	acres	CDS Model	
Weighted C	0.90		2015-4	
Tc	6	minutes	CDS Treatment Capacity	
			1.4	cfs

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Removal Efficiency (%)	Incremental Removal (%)
0.02	10.2%	10.2%	0.01	0.01	100.0	10.2
0.04	9.6%	19.8%	0.03	0.03	100.0	9.6
0.06	9.4%	29.3%	0.04	0.04	100.0	9.4
0.08	7.7%	37.0%	0.05	0.05	99.5	7.7
0.10	8.6%	45.6%	0.07	0.07	99.1	8.5
0.12	6.3%	51.9%	0.08	0.08	98.6	6.2
0.14	4.7%	56.5%	0.09	0.09	98.2	4.6
0.16	4.6%	61.2%	0.11	0.11	97.7	4.5
0.18	3.5%	64.7%	0.12	0.12	97.3	3.4
0.20	4.3%	69.1%	0.14	0.14	96.8	4.2
0.25	8.0%	77.1%	0.17	0.17	95.7	7.6
0.30	5.6%	82.7%	0.20	0.20	94.5	5.3
0.35	4.4%	87.0%	0.24	0.24	93.4	4.1
0.40	2.5%	89.5%	0.27	0.27	92.2	2.3
0.45	2.5%	92.1%	0.30	0.30	91.1	2.3
0.50	1.4%	93.5%	0.34	0.34	89.9	1.2
0.75	5.0%	98.5%	0.51	0.51	84.2	4.2
1.00	1.0%	99.5%	0.68	0.68	78.5	0.8
1.50	0.0%	99.5%	1.01	1.01	67.0	0.0
2.00	0.0%	99.5%	1.35	1.35	55.6	0.0
3.00	0.5%	100.0%	2.03	1.40	37.2	0.2
						96.5

Removal Efficiency Adjustment[2] =	6.5%
Predicted % Annual Rainfall Treated =	93.4%
Predicted Net Annual Load Removal Efficiency =	**90.1%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Recharge Volume Calculations

Job: SM-939B

Calculated by: WJH
Date: 12/10/2015

Subcatchment 1

Soils: Merrimac-Urban Land Complex
Hydrologic Group: A
Required Recharge Volume
0.6 inches of runoff x impervious area

Impervious area: 0.50 acres
21,899 s.f.

Required Recharge Volume (Rv)

$$Rv = 21{,}899 \text{ s.f.} \times \frac{0.6}{12} = \mathbf{1{,}095 \text{ c.f.}}$$

Simple Dynamic Method
A=Rv / (D+KT)
Rv=A(D+kT)

D (depth of infiltration facility): 4.5 ft
K (saturated hydraulic conductivity): 8.27 inches/hour
0.6891667 feet/hour
T (time): 2 hours
A= 1,453 s.f.
Voids= 0.40
Volume of Chambers= 1,652 c.f.
Rv= **3,577 c.f.** > **1,095 c.f.**

72 Hour Drawdown
Rv/(K x Bottom Area)= 1.09 Hours
1.09 < 72 hours O.K.

Subcatchment 2

Soils: Merrimac-Urban Land Complex

Hydrologic Group: A

Required Recharge Volume

0.6 inches of runoff x impervious area

Impervious area: 0.24 acres

10,410 s.f.

Required Recharge Volume (Rv)

$$Rv = 10{,}410 \text{ s.f.} \times \frac{0.6}{12} = \mathbf{521 \text{ c.f.}}$$

Simple Dynamic Method

A=Rv / (D+KT)

Rv=A(D+kT)

D (depth of infiltration facility):	4.5	ft
K (saturated hydraulic conductivity):	8.27	inches/hour
	0.6891667	feet/hour
T (time):	2	hours
A=	671	s.f.
Voids=	0.40	
Volume of Chambers=	734	c.f.
Rv=	**1,636**	**c.f.** > **521 c.f.**

72 Hour Drawdown

Rv/(K x Bottom Area)= 1.13 Hours

1.13 < 72 hours O.K.

Subcatchment 3

Soils: Merrimac-Urban Land Complex

Hydrologic Group: A

Required Recharge Volume

0.6 inches of runoff x impervious area

Impervious area: 0.10 acres

4,330 s.f.

Required Recharge Volume (Rv)

$$Rv = 4{,}330 \text{ s.f.} \times \frac{0.6}{12} = \mathbf{217 \text{ c.f.}}$$

Simple Dynamic Method

A=Rv / (D+KT)

Rv=A(D+kT)

D (depth of infiltration facility):	4.5	ft
K (saturated hydraulic conductivity):	8.27	inches/hour
	0.6891667	feet/hour
T (time):	2	hours
A=	306	s.f.
Voids=	0.40	
Volume of Chambers=	275	c.f.
Rv=	**711**	**c.f.** **>** **217 c.f.**

72 Hour Drawdown

Rv/(K x Bottom Area)= 1.03 Hours

1.03 < 72 hours O.K.

Pipe Sizing Calculations

DESIGN STORM: 10 YEAR
DATE: 12/10/2015
DONE BY: WJH
FILE: 939B RATIONAL METHOD

STORM SEWER DESIGN

(ADS N-12)"n"= 0.010 4"-10"
(ADS N-12)"n"= 0.012 12"-36"
(ADS N-12)"n"= 0.013 42"-60"
(Cast Iron)"n"= 0.011

PROJECT: SM-939B
LOCATION: Acton, MA

FROM	TO	LENGTH (FT)	TRIBUTARY AREA		TIME OF FLOW		RUNOFF COEFF. "C"	RAINFALL INTENSITY (IN/HR)	"Q" TOTAL RUNOFF (CFS)	SLOPE of PIPE (FT/FT)	DIAM (IN)	MANN. "n"	CAPACITY FULL (CFS)	VELOCITY FULL (FPS)	DESIGN FLOW				FALL IN PIPE (FT)	DRAIN INV. ELEVATION	
			INCR. (ACRES)	TOTAL (ACRES)	TO UPPER END (MIN)	TIME IN SECTION (MIN)									VELOCITY (FPS)	VELOCITY HEAD (FT)	DEPTH OF FLOW (FT)	TOTAL ENERGY HEAD (FT)		UPPER END	LOWER END
PCB-1	DMH-1	35	0.81	0.81	10	0.12	0.54	4.5	1.99	0.010	12	0.012	3.85	4.91	4.93	0.38	0.51	0.88	0.35	137.50	137.15
PCB-2	DMH-1	24	0.12	0.12	10	0.14	0.53	4.5	0.29	0.010	12	0.012	3.85	4.91	2.83	0.12	0.18	0.30	0.24	137.20	136.96
PCB-3	DMH-1	108	0.12	0.12	10	0.66	0.46	4.5	0.25	0.010	12	0.012	3.85	4.91	2.74	0.12	0.17	0.29	1.08	138.04	136.96
DMH-1	Vortsentry	3	0.00	1.05	10	0.01	0.53	5.5	3.09	0.033	12	0.012	7.03	8.96	8.64	1.16	0.46	1.62	0.10	136.86	136.76
PCB-4	Sub. Inf. 3	15	0.21	0.21	10	0.06	0.53	4.5	0.51	0.021	12	0.012	5.63	7.17	4.41	0.30	0.20	0.50	0.32	128.57	128.25
PCB-5	Contech	18	0.38	0.38	10	0.07	0.60	4.5	1.03	0.010	12	0.012	3.85	4.91	4.14	0.27	0.35	0.62	0.18	129.93	129.75
PCB-6	Contech	4	0.06	0.06	10	0.02	0.46	4.5	0.12	0.030	12	0.012	6.67	8.50	3.19	0.16	0.09	0.25	0.12	129.87	129.75
Contech	DMH-4	3	0.44	0.44	10	0.01	0.20	4.5	0.40	0.033	12	0.012	7.03	8.96	4.82	0.36	0.16	0.52	0.10	129.75	129.65
TD-1 & 2	CB-4	70	0.02	0.02	10	0.33	0.49	4.5	0.05	0.064	6	0.012	1.53	7.79	3.50	0.19	0.06	0.25	4.46	133.03	128.57

Closed Drainage System **SM-939B**

Project: 7, 9, 19 & 29 Great Road By WJH Date 11/24/2015

Location: Acton, MA Checked _____ Date _____

Rational Method

Q = peak flow rate, (cfs) i = rainfall intensity inches/hour

C = runoff coefficient, A = area (ac)
C = 0.90 impervious
C = 0.20 landscaped / grass
C = 0.15 woods

PCB-1

Surface Cover	A (ac)	C	Product A x C
impervious	0.40	0.9	0.36
lands/grass	0.39	0.2	0.08
woods	0.02	0.15	0.00
sum =	0.81	sum =	0.44

C = **0.54** = total product / total area

PCB-2

Surface Cover	A (ac)	C	Product A x C
impervious	0.06	0.9	0.05
lands/grass	0.06	0.2	0.01
woods		0.15	0
sum =	0.12	sum =	0.06

C = **0.53** = total product / total area

PCB-3

Surface Cover	A (ac)	C	Product A x C
impervious	0.05	0.9	0.04
lands/grass	0.08	0.2	0.02
woods		0.15	0
sum =	0.12	sum =	0.06

C = 0.46 = total product / total area

DMH-1

Structure Number	A (ac)	C	Product A x C
PCB-1	0.81	0.54	0.44
PCB-2	0.12	0.53	0.06
PCB-3	0.12	0.46	0.06
sum =	1.05	sum =	0.56

C = 0.53 = total product / total area

PCB-4

Surface Cover	A (ac)	C	Product A x C
impervious	0.10	0.9	0.09
lands/grass	0.11	0.2	0.02
woods		0.15	0
sum =	0.21	sum =	0.11

C = 0.53 = total product / total area

PCB-5

Surface Cover	A (ac)	C	Product A x C
impervious	0.22	0.9	0.20
lands/grass	0.17	0.2	0.03
woods		0.15	0
sum =	0.38	sum =	0.23

C = **0.60** = total product / total area

PCB-6

Surface Cover	A (ac)	C	Product A x C
impervious	0.02	0.9	0.02
lands/grass	0.04	0.2	0.01
woods		0.15	0
sum =	0.06	sum =	0.03

C = **0.46** = total product / total area

DMH-4

Structure Number	A (ac)	C	Product A x C
PCB-5	0.38	0.23	0.09
PCB-6	0.06	0.03	0.00
sum =	0.44	sum =	0.09

C = **0.20** = total product / total area

TD-1 & 2

Structure Number	A (ac)	C	Product A x C
impervious	0.01	0.9	0.01
lands/grass	0.01	0.2	0.00
woods		0.15	0
sum =	0.02	sum =	0.01

C = **0.49** = total product / total area

Inlet Grate Capacity Calculations

Job: SM-939B

Calculated by: WJH
Date: 11/24/2015

LeBARON FOUNDRY, INC. LF248 inlet grate pass area A = 217 sq. in.
1.50694 sq. ft.

Q = (C*A* SQRT(2*g*h))*f

C = orifice coefficient
C = 0.6 square edges
A = inlet area
A = 1.51 sq. ft.
g = gravitational constant
g = 32.2 ft/sec^2
h = head on inlet
h = 0.33 ft. (low points)
0.17 ft. (on slope)
f = clogging factor
f = 0.66

Single Grate
Q (MAX)= 2.75 cfs (LP) low points LF248
Q (MAX)= 1.97 cfs (OS) on slope LF248
Double Grate
Q (MAX)= 5.50 cfs low points LF248
Q (MAX)= 3.95 cfs on slope LF248

*DATA USED IN TABLE TAKEN FROM STORM SEWER DESIGN 10YR.

	TRIBUTARY AREA (AC)	TIME OF CONC.	10 YR INTENSITY	C	Q=CiA Q10	POSITION	Q (MAX)	single grate	double grate
PCB-1	0.81	12.4	4.5	0.54	1.99	OS	3.95		yes
PCB-2	0.12	6	4.5	0.53	0.29	OS	3.95		yes
PCB-3	0.12	6	4.5	0.46	0.25	OS	2.75	yes	
PCB-4	0.21	6	4.5	0.53	0.51	OS	2.75	yes	
PCB-5	0.38	6	4.5	0.60	1.03	OS	1.97	yes	
PCB-6	0.06	6	4.5	0.46	0.12	OS	1.97	yes	

Soil Evaluation

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Owner Name: 29 Great Road		Map G5 Parcels 78 & 80 (Map/Lot #)
Street Address: Acton	MA (State)	01720 (Zip Code)
City		

B. Site Information

1. (Check one) ☐ New Construction ☑ Upgrade ☐ Repair

2. Published Soil Survey Available? ☑ Yes ☐ No
   If yes: nesoil.com (Year Published) 1:25,000 (Publication Scale) 626B (Soil Map Unit)
   Merrimac-Urban land complex (Soil Name)
   Filtering Capacity (Soil Limitations)

3. Surficial Geological Report Available? ☑ Yes ☐ No
   If yes: MassGIS (Year Published) 1:25,000 (Publication Scale) (Map Unit)
   Sand and Gravel (Geologic Material)
   (Landform)

4. Flood Rate Insurance Map
   Above the 500-year flood boundary? ☑ Yes ☐ No
   Within the 100-year flood boundary? ☐ Yes ☑ No
   Within the 500-year flood boundary? ☐ Yes ☑ No
   Within a velocity zone? ☐ Yes ☑ No

5. Wetland Area: National Wetland Inventory Map — DEP Wetlands - clear (Map Unit) (Name)
   Wetlands Conservancy Program Map — (Map Unit) (Name)

6. Current Water Resource Conditions (USGS): 11/2013 (Month/Year)
   Range: ☐ Above Normal ☑ Normal ☐ Below Normal

7. Other references reviewed:

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Site Address or Map/Lot Number
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole A: 11/18/13 (Date) 8:20 (Time) RAIN (Weather)

1. Deep Observation Hole Logs

   Deep Hole Number TP-13-1. Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) _____

2. Land Use: PARKING LOT (e.g. woodland, agricultural field, vacant lot, etc.) NONE (Surface Stones) 0-5% (Slope %)

   LANDSCAPE ISLAND (Vegetation) _____ (Landform) ON-SLOPE (Position on landscape (attach sheet))

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Possible Wet Area _____ feet

   Property Line 210' feet Drinking Water Well _____ feet Other _____

4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☒

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

   If Yes: Depth Weeping from Pit _____ Depth Standing Water in Hole _____

   Estimated Depth to High Groundwater: >10'6" inches _____ elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
29 GREAT ROAD
Site Address or Map/Lot Number
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Deep Observation Hole A: Deep Hole Number: TP-13-1

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-3"	A	10YR 3/2	—	—	—	LOAMY SAND	—	—	MASSIVE	FRIABLE	
3"-10"	B	10YR 4/3	—	—	—	LOAMY SAND	2%	—	MASSIVE	FRIABLE	
10"-12"	C	2.5Y 6/4	—	—	—	SAND	5%	1%	SG	LOOSE	

Additional Notes _____

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Site Address or Map/Lot Number
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole A: 11/13/13 (Date) 9:10 (Time) RAIN (Weather)

1. Deep Observation Hole Logs

Deep Hole Number _____ Ground Elevation at Surface of Hole _____

Location (Identify on Plan) _____

2. Land Use: PARKING LOT (e.g. woodland, agricultural field, vacant lot, etc.) — (Surface Stones) 0-5% (Slope %)

PAVEMENT (Vegetation) _____ (Landform) DOWN-SLOPE (Position on landscape (attach sheet))

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Possible Wet Area — feet

Property Line 210' feet Drinking Water Well — feet Other _____

4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit _____ Depth Standing Water in Hole —

Estimated Depth to High Groundwater: 120" (Inches) _____ (elevation)

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

29 GREAT ROAD (Site Address or Map/Lot Number)

Deep Observation Hole A: Deep Hole Number: TP-13-2

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6"	FILL										
6"/26	C	2.5Y 6/4	—	—	—	SAND	5%	—	SG	LOOSE	

Additional Notes _____

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Site Address or Map/Lot Number
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole A: 11/18/13 (Date) 9:15 (Time) RAIN (Weather)

1. Deep Observation Hole Logs

Deep Hole Number _____ Ground Elevation at Surface of Hole _____

Location (Identify on Plan) _____

2. Land Use: PARKING LOT (e.g. woodland, agricultural field, vacant lot, etc.) NONE (Surface Stones) 0-5% (Slope %)

PAVEMENT (Vegetation) _____ (Landform) ON-SLOPE (Position on landscape (attach sheet))

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Possible Wet Area — feet

Property Line 75' feet Drinking Water Well — feet Other _____

4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☐

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit _____ Depth Standing Water in Hole —

Estimated Depth to High Groundwater: 120" inches _____ elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

29 GREAT ROAD Site Address or Map/Lot Number

Deep Observation Hole A: Deep Hole Number: TP-13-3

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6"	FILL										
6"-120"	C	2.5Y 6/4	—	—	—	SAND	5%	—	SG	LOOSE	

Additional Notes _____

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Site Address or Map/Lot Number
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole A: 11/18/13 (Date) 8:40 (Time) CLOUDY (Weather)

1. Deep Observation Hole Logs

Deep Hole Number _____ Ground Elevation at Surface of Hole _____

Location (Identify on Plan) _____

2. Land Use: PARKING LOT (e.g. woodland, agricultural field, vacant lot, etc.) NONE (Surface Stones) 0-5% (Slope %)

PAVEMENT (Vegetation) _____ (Landform) ON-SLOPE (Position on landscape (attach sheet))

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Possible Wet Area — feet

Property Line 210' feet Drinking Water Well — feet Other _____

4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

Estimated Depth to High Groundwater: 72-96" inches _____ elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

29 GRANT ROAD
Site Address or Map/Lot Number

Deep Observation Hole A: Deep Hole Number: TP-13-4

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-6"	FILL										
6"-126"	C	2.5Y 6/4	—	—	—	SAND	5%		SG	LOOSE	

Additional Notes _____

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Site Address or Map/Lot Number

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review

(minimum of two holes required at every proposed disposal area)

Deep Observation Hole A: 11/18/13 (Date) 9:30 (Time) RAIN (Weather)

1. Deep Observation Hole Logs

   Deep Hole Number _____ Ground Elevation at Surface of Hole _____

   Location (Identify on Plan) _____

2. Land Use: PARKING LOT (e.g. woodland, agricultural field, vacant lot, etc.) NONE (Surface Stones) 5-10% (Slope %)

   GRASS/SHRUBS (Vegetation) _____ (Landform) ON-SLOPE (Position on landscape (attach sheet))

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Possible Wet Area _____ feet

   Property Line 710' feet Drinking Water Well — feet Other _____

4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☒

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

   If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

   Estimated Depth to High Groundwater: 120" Inches _____ elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
27 GREAT ROAD
Site Address or Map/Lot Number
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Deep Observation Hole A: Deep Hole Number: TP-13-5

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles) Depth	Color	Percent	Soil Texture (USDA)	Coarse Fragments % by Volume Gravel	Cobbles & Stones	Soil Structure	Soil Consistence (Moist)	Other
0-3"	A	10YR 3/2	—	—	—	LOAMY SAND	—	—	MASSIVE	FRIABLE	
3-10"	B	10YR 4/3	—	—	—	LOAMY SAND	2%	—	MASSIVE	FRIABLE	
10"-120"	C	2.5Y 6/4	—	—	—	SAND	5%	—	SG	LOOSE	

Additional Notes _____

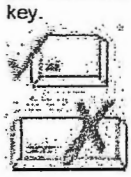
Commonwealth of Massachusetts
City/Town of

Percolation Test

Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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



A. Site Information

Owner Name: 29 GREAT ROAD		
Street Address or Lot #: ACTON	MA	01720
City/Town	State	Zip Code
Contact Person (if different from Owner)	Telephone Number	

B. Test Results

	Date / Time	Date / Time
	11/18/13 9:30	
Observation Hole #	PT-13-A	PT-13-B
Depth of Perc	60"	48"
Start Pre-Soak	9:30	9:35
End Pre-Soak	10:30	10:35
Time at 12"		
Time at 9"		
Time at 6"		
Time (9"-6")		
Rate (Min./Inch)	12 MPI	12 MPI
	Test Passed: ☒ Test Failed: ☐	Test Passed: ☒ Test Failed: ☐

Test Performed By: STAMSKI AND McNARY, INC. (BENJAMIN EWING)

Witnessed By: ACTON BOARD OF HEALTH (SHERYL BALL)

Comments:

Commonwealth of Massachusetts
City/Town of
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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

A. Site Information

Owner Name

29 GREAT ROAD

Street Address or Lot #

ACTON | MA | 01720

City/Town | State | Zip Code

Contact Person (if different from Owner) | Telephone Number

B. Test Results

	Date 11/18/13	Time 9:30	Date	Time
Observation Hole #	PT-13-C		PT-13-D	
Depth of Perc	44"		50"	
Start Pre-Soak	9:40		7:45	
End Pre-Soak	UTS		UTS	
Time at 12"				
Time at 9"				
Time at 6"				
Time (9"-6")				
Rate (Min./Inch)	<2 MIN		<2 MIN	

Test Passed: ☒ Test Failed: ☐ | Test Passed: ☒ Test Failed: ☐

STAMSKI AND McNARY, INC. (BENJAMIN EWING)

Test Performed By:

ACTON BOARD OF HEALTH (SHERYL BALL)

Witnessed By:

Comments:

Commonwealth of Massachusetts
City/Town of

Percolation Test

Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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

A. Site Information

Owner Name: 29 GREAT ROAD

Street Address or Lot #: ACTON

City/Town: MA

State: 01720

Zip Code

Contact Person (if different from Owner)

Telephone Number

B. Test Results

	Date / Time	Date / Time
	11/18/13 / 9:30	/
Observation Hole #	PT-13-E	
Depth of Perc	52"	
Start Pre-Soak	9:50	
End Pre-Soak	UTS	
Time at 12"		
Time at 9"		
Time at 6"		
Time (9"-6")		
Rate (Min./Inch)	42 MI	
	Test Passed: ☒ Test Failed: ☐	Test Passed: ☐ Test Failed: ☐

Test Performed By: STAMSKI AND McNARY, INC. (BENJAMIN EWING)

Witnessed By: ACTON BOARD OF HEALTH (SHERYL BALL)

Comments:

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	A.	B.
☐ Depth observed standing water in observation hole	A. ____ inches	B. ____ inches
☐ Depth weeping from side of observation hole	A. ____ inches	B. ____ inches
☒ Depth to soil redoximorphic features (mottles)	A. SEE ATTACHED inches	B. SOIL LOGS inches
☐ Groundwater adjustment (USGS methodology)	A. ____ inches	B. ____ inches

2. ____ Index Well Number ____ Reading Date ____ Index Well Level

____ Adjustment Factor ____ Adjusted Groundwater Level

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☒ Yes ☐ No

b. If yes, at what depth was it observed? Upper boundary: SEE ATTACHED inches Lower boundary: SOIL LOGS inches

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator — Date: 11/18/13

Typed or Printed Name of Soil Evaluator / License # BENJAMIN FEWING SE2985 — Date of Soil Evaluator Exam: 10/24/05

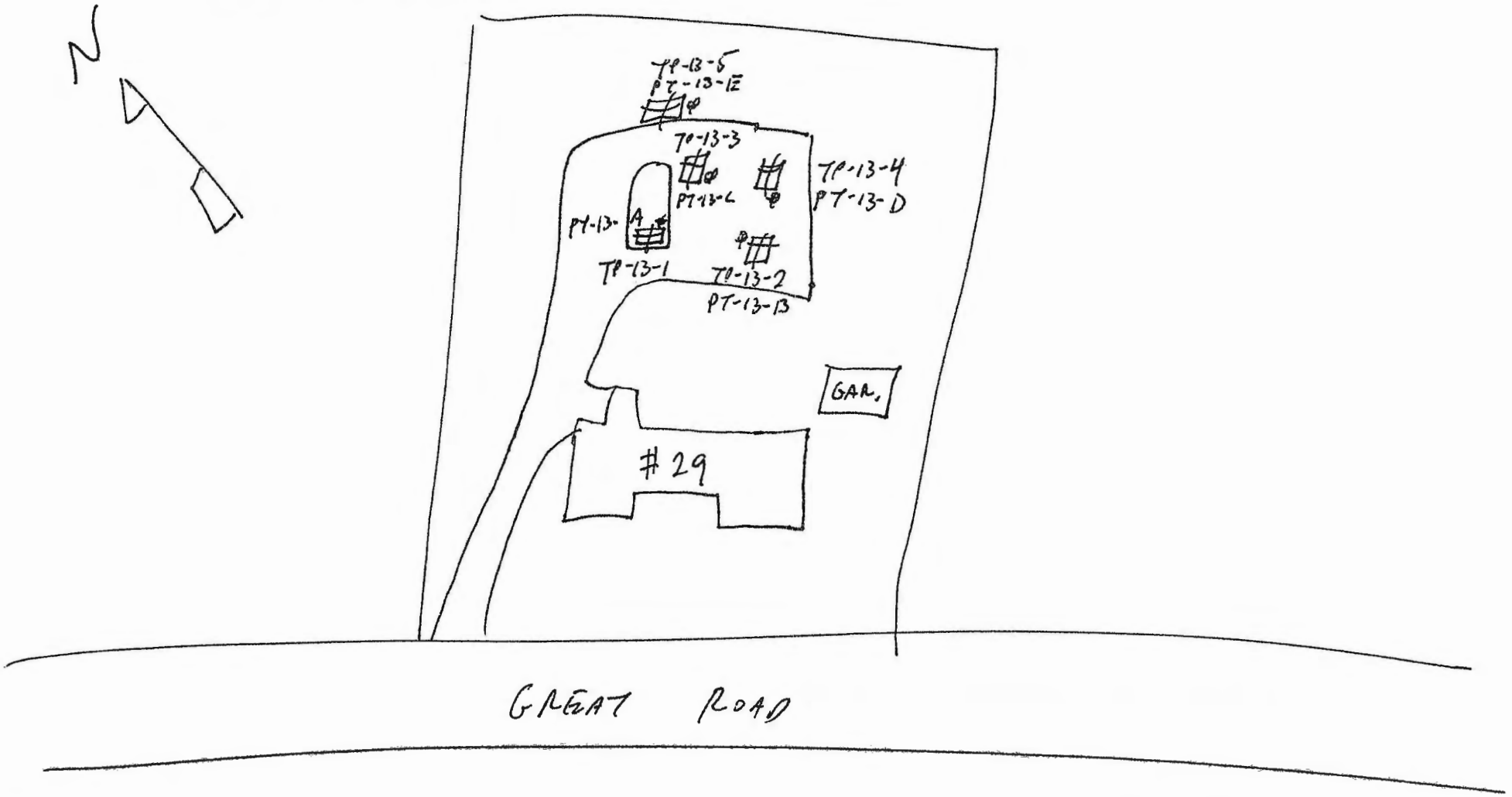
Name of Board of Health Witness: SHERYL BALL — Board of Health: ACTON

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Commonwealth of Massachusetts
City/Town of
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Field Diagrams

Use this sheet for field diagrams:



Commonwealth of Massachusetts
City/Town of ACTON

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

KHALEDE
Owner Name

7-9 GREAT RD
Street Address

Map/Lot #

ACTON
City

MA
State

01720
Zip Code

B. Site Information

1. (Check one) [X] New Construction [ ] Upgrade [ ] Repair

2. Published Soil Survey Available? [X] Yes [ ] No If yes: NESOIL (Year Published) 1:25000 (Publication Scale) 255C / 626B (Soil Map Unit)
WINDSOR LOAMY SAND / MERRIMAC URBAN LAND COMPLEX
Soil Name
Soil Limitations

3. Surficial Geological Report Available? [X] Yes [ ] No If yes: MASS GIS (Year Published) 1:25000 (Publication Scale) (Map Unit)
SAND + GRAVEL
Geologic Material
Landform

4. Flood Rate Insurance Map

Above the 500-year flood boundary? [X] Yes [ ] No Within the 100-year flood boundary? [ ] Yes [X] No

Within the 500-year flood boundary? [ ] Yes [X] No Within a velocity zone? [ ] Yes [X] No

5. Wetland Area: National Wetland Inventory Map — (Map Unit) — (Name)

Wetlands Conservancy Program Map — (Map Unit) — (Name)

6. Current Water Resource Conditions (USGS): 11/14 (Month/Year) Range: [ ] Above Normal [X] Normal [ ] Below Normal

7. Other references reviewed:

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole A: 11-18-14 (Date) ____ (Time) CLEAR (Weather)

1. Deep Observation Hole Logs

Deep Hole Number TP-14-1 Ground Elevation at Surface of Hole —

Location (Identify on Plan) ____

2. Land Use: YARD (e.g. woodland, agricultural field, vacant lot, etc.) NONE (Surface Stones) 0-5 (Slope %)

GRASS (Vegetation) ____ (Landform) ____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body — feet Drainage Way — feet Possible Wet Area — feet

Property Line >10 feet Drinking Water Well >100 feet Other ____

4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

Estimated Depth to High Groundwater: >132 inches — elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

Deep Observation Hole A: Deep Hole Number: TP-14-1

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-66	FILL	—	—	—	—	—	—	—	—	—	
66-132	C	10YR 5/3	—	—	—	SAND	—	—	SG	LOOSE	

Additional Notes WATER LINE ENCOUNTERED IN EAST EDGE OF PIT

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole A: 11-18-14 (Date) _____ (Time) CLEAR (Weather)

1. Deep Observation Hole Logs

Deep Hole Number TP-14-2 Ground Elevation at Surface of Hole —

Location (Identify on Plan) _____

2. Land Use: YARD (e.g. woodland, agricultural field, vacant lot, etc.) NONE (Surface Stones) 0-5 (Slope %)

GRASS (Vegetation) _____ (Landform) _____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body — feet Drainage Way — feet Possible Wet Area — feet

Property Line >10 feet Drinking Water Well >100 feet Other _____

4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

Estimated Depth to High Groundwater: >132 inches — elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

Deep Observation Hole A: Deep Hole Number: TP-14-2

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-11	A	10YR3/2	—	—	—	LS	—	—	M	FR	
11-36	B	10YR4/6	—	—	—	LS	—	—	M	FR	
36-132	C	10YR5/3	—	—	—	SAND	—	—	SG	LOOSE	

Additional Notes _____

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole A: 11-18-14 (Date) _____ (Time) CLEAR (Weather)

1. Deep Observation Hole Logs

Deep Hole Number TP-14-3 Ground Elevation at Surface of Hole —

Location (Identify on Plan) _____

2. Land Use: YARD (e.g. woodland, agricultural field, vacant lot, etc.) NONE (Surface Stones) 0-5 (Slope (%))

GRASS (Vegetation) _____ (Landform) _____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body — feet Drainage Way — feet Possible Wet Area — feet

Property Line 210 feet Drinking Water Well >100 feet Other _____

4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

Estimated Depth to High Groundwater: >120 inches — elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

Deep Observation Hole A: Deep Hole Number: TP-14-3

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-8	A	10YR 3/2				LS	—	—	M	F	
8-24	B	10YR 4/6				LS	—	—	M	F	
24-120	C	10YR 5/3				SAND	—	—	SG	LOOSE	

Additional Notes _____

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole A: 11/18/14 (Date) _____ (Time) CLEAR (Weather)

1. Deep Observation Hole Logs

Deep Hole Number TPH-4. Ground Elevation at Surface of Hole —

Location (Identify on Plan) _____

2. Land Use: YARD (e.g. woodland, agricultural field, vacant lot, etc.) NONE (Surface Stones) 0-5 (Slope %)

GRASS (Vegetation) _____ (Landform) _____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body — feet Drainage Way — feet Possible Wet Area — feet

Property Line >10 feet. Drinking Water Well >100 feet Other _____

4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

Estimated Depth to High Groundwater: >132 inches — elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

Deep Observation Hole A: Deep Hole Number: TP-H-4

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-12	A	10YR 3/2	—	—	—	LS	—	—	M	F	
12-30	B	10YR 4/6	—	—	—	LS	—	—	M	F	
30-132	C	10YR 5/3	—	—	—	SAND	—	—	SG	LOOSE	

Additional Notes _____

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program

7-9 GREAT RD
Site Address or Map/Lot Number

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole A: 11/18/14 (Date) ____ (Time) CLEAR (Weather)

1. Deep Observation Hole Logs

   Deep Hole Number TP-14-5 Ground Elevation at Surface of Hole —

   Location (Identify on Plan) ____

2. Land Use: YARD (e.g. woodland, agricultural field, vacant lot, etc.) NONE (Surface Stones) 0-5 (Slope (%))

   GRASS (Vegetation) ____ (Landform) ____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body — feet Drainage Way — feet Possible Wet Area — feet

   Property Line >10 feet Drinking Water Well >100 feet Other ____

4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☒

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

   If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

   Estimated Depth to High Groundwater: >144 inches — elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

Deep Observation Hole A: Deep Hole Number: TP-14-5

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-24	A	10YR 3/3	—	—	—	LS	—	—	M	F	
0-30	B	10YR 4/6	—	—	—	LS	—	—	M	F	
30-144	C	10YR 5/3	—	—	—	STMS	—	—	SG	LOOSE	

Additional Notes ____

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole A: 11-18-14 (Date) _____ (Time) CLEAR (Weather)

1. Deep Observation Hole Logs

Deep Hole Number TP-14-6 Ground Elevation at Surface of Hole _____

Location (Identify on Plan) _____

2. Land Use: YARD (e.g. woodland, agricultural field, vacant lot, etc.) NONE (Surface Stones) 0-5 (Slope (%))

Vegetation GRASS Landform _____ Position on landscape (attach sheet) _____

3. Distances from: Open Water Body — feet Drainage Way — feet Possible Wet Area — feet

Property Line >10 feet Drinking Water Well >100 feet Other _____

4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

Estimated Depth to High Groundwater: >144 inches — elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

Deep Observation Hole A: Deep Hole Number: TP-14-6

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-12	A	10YR 3/2	—	—	—	LS	—	—	M	F	
12-24	B	10YR 4/6	—	—	—	LS	—	—	M	F	
24-144	C	10YR 5/3	—	—	—	STD	—	—	SG	LOOSE	

Additional Notes _____

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole A: 11-18-14 (Date) _____ (Time) CLEAR (Weather)

1. Deep Observation Hole Logs

Deep Hole Number TP-14-7 Ground Elevation at Surface of Hole –

Location (Identify on Plan) –

2. Land Use: YARD (e.g. woodland, agricultural field, vacant lot, etc.) NONE (Surface Stones) 0-5 (Slope (%))

GRASS (Vegetation) _____ (Landform) _____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body – feet Drainage Way – feet Possible Wet Area – feet

Property Line >10 feet Drinking Water Well >100 feet Other _____

4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit – Depth Standing Water in Hole –

Estimated Depth to High Groundwater: >132 Inches _____ elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

Deep Observation Hole A: Deep Hole Number: TP-14-7

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-12	A	10YR 3/2	–	–	–	LS	–	–	M	FR	
12-24	B	10YR 4/6	–	–	–	LS	–	–	M	FR	
24-132	C	10YR 5/3	–	–	–	SAND	–	–	SG	LOOSE	

Additional Notes _____

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole A: 11-18-14 (Date) _____ (Time) CLEAR (Weather)

1. Deep Observation Hole Logs

Deep Hole Number TP-14-8 Ground Elevation at Surface of Hole _____

Location (Identify on Plan) _____

2. Land Use: YARD (e.g. woodland, agricultural field, vacant lot, etc.) NONE (Surface Stones) 0-5 (Slope %)

GRASS (Vegetation) _____ (Landform) _____ (Position on landscape (attach sheet))

3. Distances from: Open Water Body — feet Drainage Way — feet Possible Wet Area — feet

Property Line >10 feet Drinking Water Well >100 feet Other _____

4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

Estimated Depth to High Groundwater: >132 inches _____ elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

Deep Observation Hole A: Deep Hole Number: TP-14-8

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-12	A	10YR 3/2	—	—	—	LS	—	—	M	FR	
12-24	B	10YR 4/6	—	—	—	LS	—	—	M	FR	
24-132	C	10YR 5/3	—	—	—	SAND		—	SG	LOOSE	

Additional Notes _____

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole A: 11-18-14 (Date) _____ (Time) CLEAR (Weather)

1. Deep Observation Hole Logs
   Deep Hole Number TP-14-9 Ground Elevation at Surface of Hole _____
   Location (Identify on Plan) _____
2. Land Use: YARD (e.g. woodland, agricultural field, vacant lot, etc.) NONE (Surface Stones) 0-5 (Slope (%))
   GRASS (Vegetation) _____ (Landform) _____ (Position on landscape (attach sheet))
3. Distances from: Open Water Body — feet Drainage Way — feet Possible Wet Area — feet
   Property Line >10 feet Drinking Water Well >100 feet Other _____
4. Parent Material: OUTWASH Unsuitable Materials Present: Yes ☐ No ☒
   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐
5. Groundwater Observed: Yes ☐ No ☒
   If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —
   Estimated Depth to High Groundwater: >120 inches _____ elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

7-9 GREAT RD
Site Address or Map/Lot Number

Deep Observation Hole A: Deep Hole Number: TP-14-9

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-12	A	10YR 3/2	-	-	-	LS	-	-	M	FR	
12-30	B	10YR 4/6	-	-	-	LS	-	-	M	FR	
30-120	C	10YR 5/3	-	-	-	SAND	-	-	SG	LOOSE	

Additional Notes _____

Commonwealth of Massachusetts
City/Town of ACTON
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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

A. Site Information

JACK NORTON
Owner Name

7-9 GREAT RD
Street Address or Lot #

ACTON | MA | 01720
City/Town | State | Zip Code

Contact Person (if different from Owner) | Telephone Number

B. Test Results

	Date	Time	Date	Time
	11-18-14	9:15	11-18-14	9:30
Observation Hole #	PT-14-A		PT-14-B	
Depth of Perc	54"		51"	
Start Pre-Soak	24 GALLONS		24 GALLONS	
End Pre-Soak	UNABLE TO		UTS	
Time at 12"	SATURATE			
Time at 9"				
Time at 6"				
Time (9"-6")				
Rate (Min./Inch)	< 2 MPI		< 2 MPI	
	Test Passed: ☒ Test Failed: ☐		Test Passed: ☒ Test Failed: ☐	

STAMSKI AND McNARY, INC - BILL HALL
Test Performed By:

ACTON BOARD OF HEALTH - SHERYL BALL
Witnessed By:

Comments:

Commonwealth of Massachusetts
City/Town of ACTON

Percolation Test

Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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

A. Site Information

STACK ACTON
Owner Name

7-9 GREAT RD
Street Address or Lot #

ACTON | MA | 01720
City/Town | State | Zip Code

Contact Person (if different from Owner) | Telephone Number

B. Test Results

Date	11-18-14	11-18-14
Time	9:40	9:50
Observation Hole #	PT-14-C	PT-14-D
Depth of Perc	86"	55"
Start Pre-Soak	24 GAL	24 GAL
End Pre-Soak	1 FT	1 FT
Time at 12"		
Time at 9"		
Time at 6"		
Time (9"-6")		
Rate (Min./Inch)	< 2 MPI	< 2 MPI
Test Passed:	☒	☒
Test Failed:	☐	☐

STAMSKE AND MCKAY, INC - BILL HALL
Test Performed By:

ACTON BOARD OF HEALTH - SHERYL BALL
Witnessed By:

Comments:

Commonwealth of Massachusetts
City/Town of ACTON

Percolation Test

Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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

A. Site Information

JACK NORTON
Owner Name

7-9 GREAT RD
Street Address or Lot #

ACTON | MA | 01720
City/Town | State | Zip Code

Contact Person (if different from Owner) | Telephone Number

B. Test Results

	Date	Time	Date	Time
	11-18-14	10:05	11-18-14	10:25
Observation Hole #	PT-14-E		PT-14-F	
Depth of Perc	58"		62"	
Start Pre-Soak	24 GAL		24 GAL	
End Pre-Soak	UTS		UTS	
Time at 12"				
Time at 9"				
Time at 6"				
Time (9"-6")				
Rate (Min./Inch)	< 2 MPI		< 2 MPI	
	Test Passed: [X] Test Failed: [ ]		Test Passed: [X] Test Failed: [ ]	

STANSKE AND MCNAMARA, INC - BILL HALL
Test Performed By:

ACTON BOARD OF HEALTH - SHERYL BALL
Witnessed By:

Comments:

Commonwealth of Massachusetts
City/Town of ACTON

Percolation Test

Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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

A. Site Information

JACK NORTON
Owner Name

7-9 GREAT RD
Street Address or Lot #

ACTON | MA | 01720
City/Town | State | Zip Code

Contact Person (if different from Owner) | Telephone Number

B. Test Results

	Date	Time	Date	Time
	11-18-14	10:35	11-18-14	10:45
Observation Hole #	PT-14-G		PT-14-H	
Depth of Perc	50"		52"	
Start Pre-Soak	24 GAL		24 GAL	
End Pre-Soak	UTS		UTS	
Time at 12"				
Time at 9"				
Time at 6"				
Time (9"-6")				
Rate (Min./Inch)	< 2 MPI		< 2 MPI	
	Test Passed: [X] Test Failed: [ ]		Test Passed: [X] Test Failed: [ ]	

STANSKE AND MCKAY, INC - BILL HALL
Test Performed By:

ACTON BOARD OF HEALTH - SHERYL BALL
Witnessed By:

Comments:

Commonwealth of Massachusetts
City/Town of ACTON

Percolation Test

Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

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

A. Site Information

JACK NORTON
Owner Name

7-9 GREAT RD
Street Address or Lot #

ACTON | MA | 01720
City/Town | State | Zip Code

Contact Person (if different from Owner) | Telephone Number

B. Test Results

	Date	Time	Date	Time
	11-18-14	11:00		
Observation Hole #	PT-1-1-I			
Depth of Perc	60"			
Start Pre-Soak	24 GAL			
End Pre-Soak	VTS			
Time at 12"				
Time at 9"				
Time at 6"				
Time (9"-6")				
Rate (Min./Inch)	< 2MPI			
Test Passed:	☒		Test Passed:	☐
Test Failed:	☐		Test Failed:	☐

STANSKE AND MARTIN, INC - BILL HALL
Test Performed By:

ACTON BOARD OF HEALTH - SHERYL BALL
Witnessed By:

Comments:

Commonwealth of Massachusetts
City/Town of ACTON

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	A.	B.
☐ Depth observed standing water in observation hole	SEE inches	SEE inches
☐ Depth weeping from side of observation hole	SOIL inches	SOIL inches
☐ Depth to soil redoximorphic features (mottles)	LOGS inches	LOGS inches
☐ Groundwater adjustment (USGS methodology)	A. inches	B. inches

2. _____ (Index Well Number) _____ (Reading Date) _____ (Index Well Level)

_____ (Adjustment Factor) _____ (Adjusted Groundwater Level)

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☐ No

b. If yes, at what depth was it observed? Upper boundary: SEE SOIL LOGS inches Lower boundary: SEE SOIL LOGS inches

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator — Date: 11/18/14

Typed or Printed Name of Soil Evaluator / License #: BILL HALL SE 13592 — Date of Soil Evaluator Exam: 7/2012

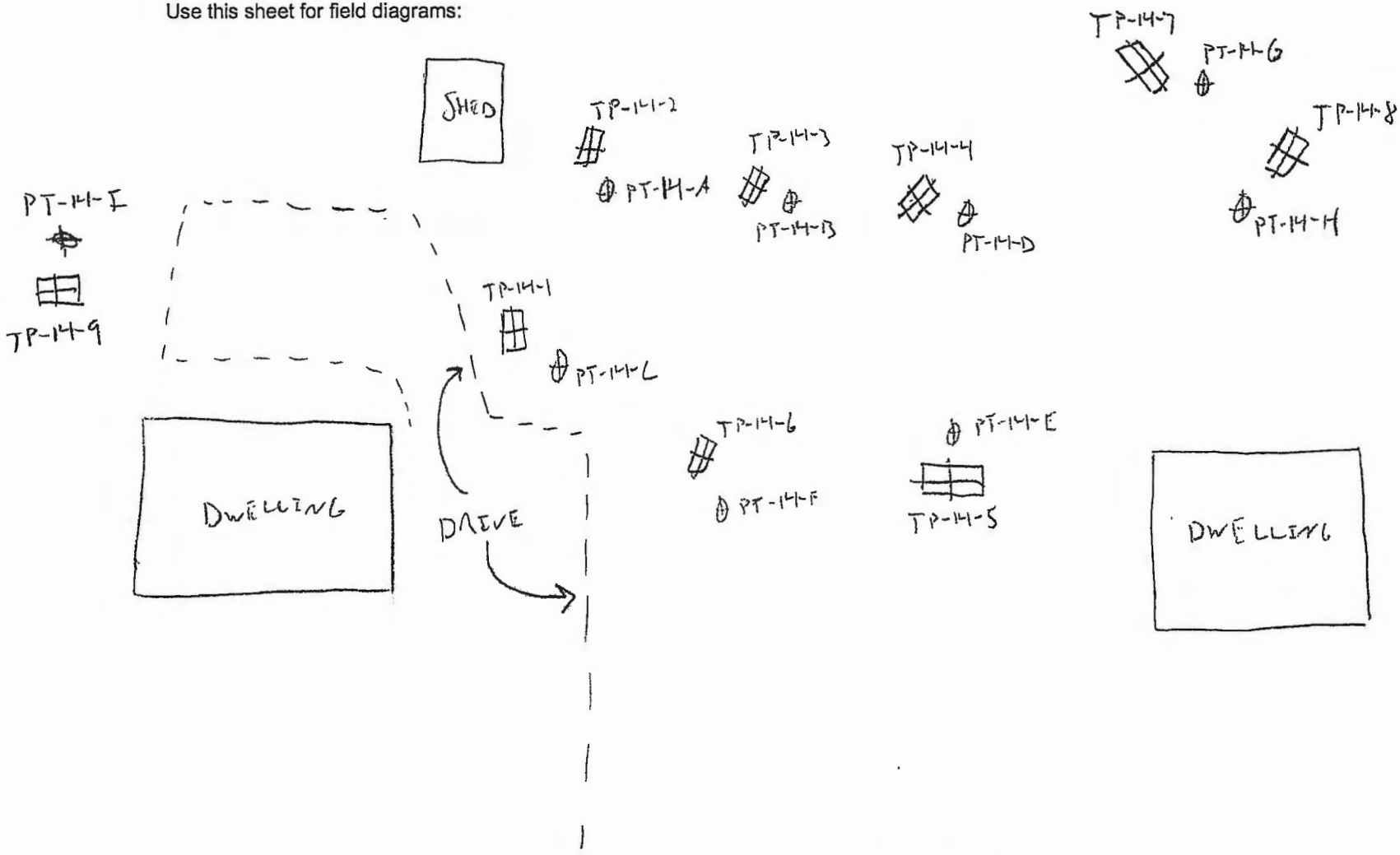
Name of Board of Health Witness: SHERYL BALL — Board of Health: ACTON

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

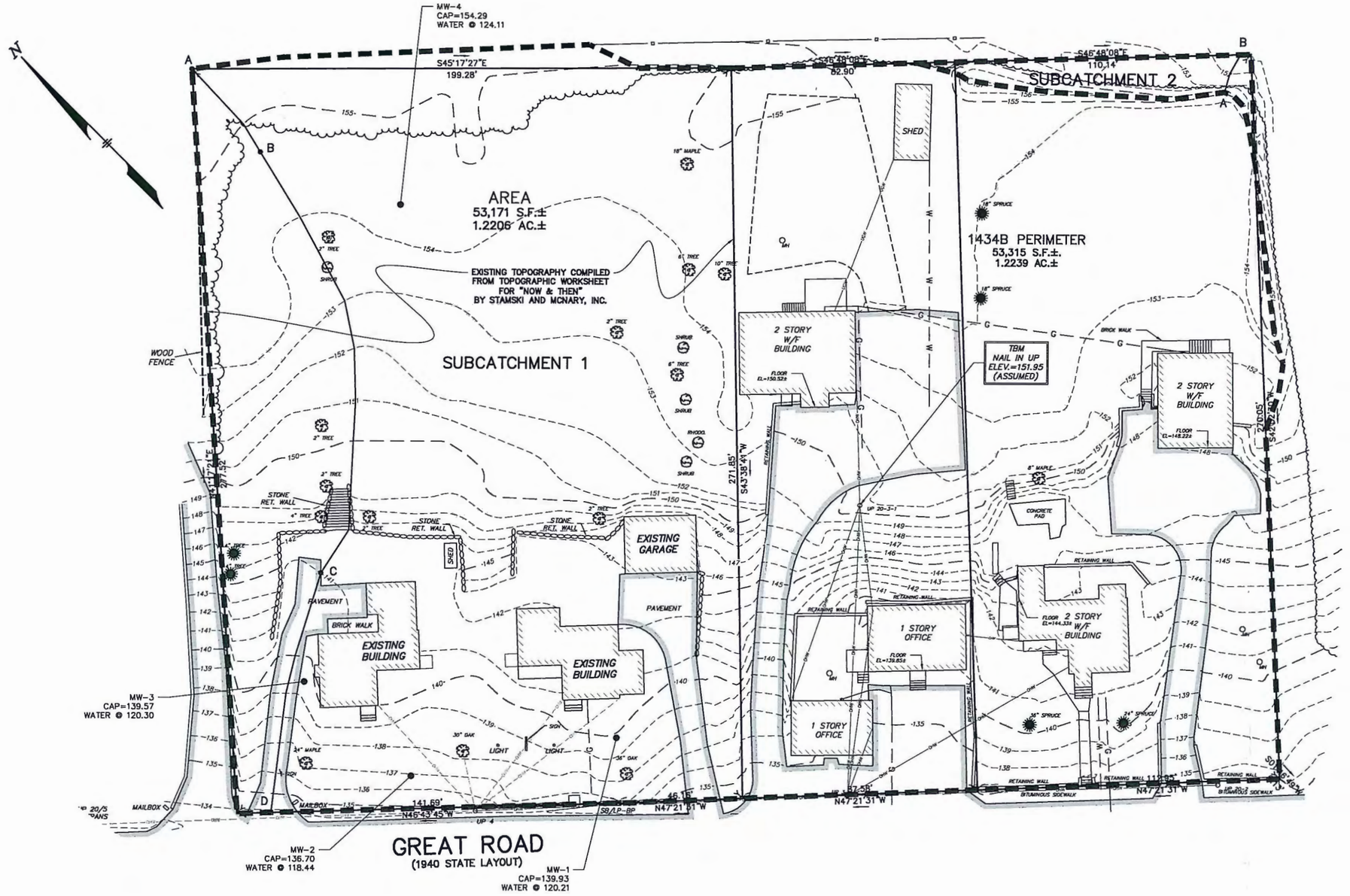
Commonwealth of Massachusetts
City/Town of ACTON
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Field Diagrams

Use this sheet for field diagrams:



Drainage Maps



LEGEND:

- N/F — NOW OR FORMERLY
- OHW — OVERHEAD WIRES
- TREE
- TREE LINE
- UP — UTILITY POLE
- GG — GAS GATE
- G — GAS SERVICE (BURIED)
- WG — WATER GATE
- W — WATER SERVICE (BURIED)
- DMH — DRAIN MANHOLE
- D — SUB-SURFACE DRAIN LINE
- 155 — EXISTING CONTOUR
- 145 — EXISTING CONTOUR
- LIGHTPOLE
- WETLAND FLAG
- 99X9 — SPOT ELEVATION
- STONE WALL
- EDGE OF PAVEMENT

UTILITY NOTE:

ALL UNDERGROUND UTILITIES SHOWN HERE WERE COMPILED ACCORDING TO AVAILABLE RECORD PLANS FROM VARIOUS UTILITY COMPANIES AND PUBLIC AGENCIES AND ARE APPROXIMATE ONLY. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD BEFORE DESIGNING, EXCAVATING, BLASTING, INSTALLING, BACKFILLING, GRADING, PAVEMENT RESTORATION OR REPAIRING. ALL UTILITY COMPANIES, PUBLIC AND PRIVATE, MUST BE CONTACTED INCLUDING THOSE IN CONTROL OF UTILITIES NOT SHOWN ON THIS PLAN. SEE CHAPTER 370, ACTS OF 1963 MASS. WE ASSUME NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN. BEFORE PLANNING FUTURE CONNECTIONS THE APPROPRIATE PUBLIC UTILITY ENGINEERING DEPARTMENT MUST BE CONSULTED. DIG SAFE TELEPHONE No. 1-888-344-7233.

PRE-DEVELOPMENT
DRAINAGE MAP
IN

ACTON, MASSACHUSETTS

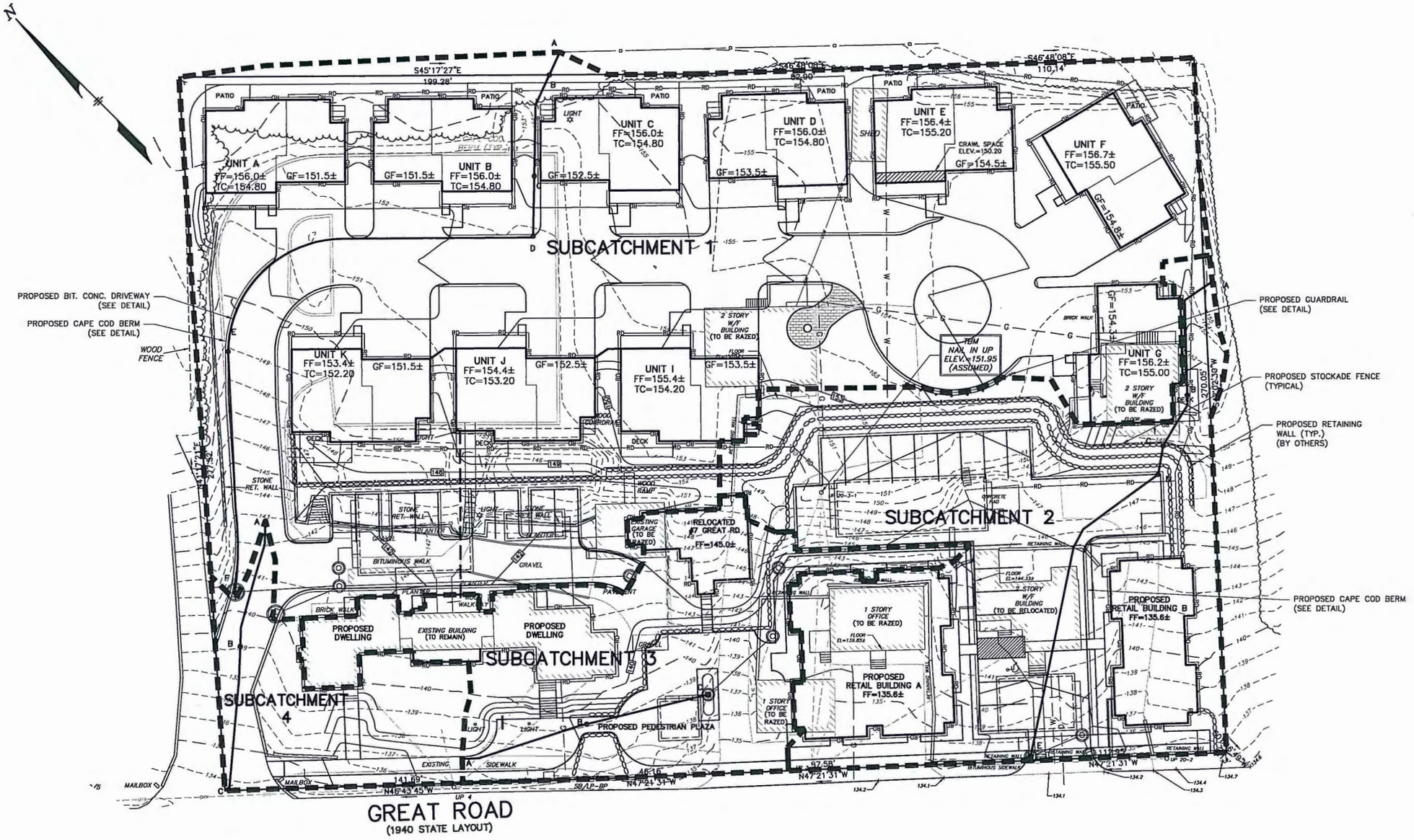
(MIDDLESEX COUNTY)

FOR: KHALEDI
SCALE: 1"=20' DECEMBER 23, 2014

STAMSKI AND MCNARY, INC.
1000 MAIN STREET ACTON, MASSACHUSETTS
ENGINEERING - PLANNING - SURVEYING

0 10 20 40 60 80 FT

(939B EXISTING CONDITIONS.dwg) Great Road SM-939B



LEGEND:

N/F	NOW OR FORMERLY
OHW	OVERHEAD WIRES
	TREE
	TREE LINE
UP	UTILITY POLE
GG•	GAS GATE
G	GAS SERVICE (BURIED)
WG•	WATER GATE
W	WATER SERVICE (BURIED)
DMH	DRAIN MANHOLE
D	SUB-SURFACE DRAIN LINE
	EXISTING CONTOUR
	EXISTING CONTOUR
	LIGHTPOLE
	WETLAND FLAG
99X9	SPOT ELEVATION
	STONE WALL
	EDGE OF PAVEMENT

UTILITY NOTE:

ALL UNDERGROUND UTILITIES SHOWN HERE WERE COMPILED ACCORDING TO AVAILABLE RECORD PLANS FROM VARIOUS UTILITY COMPANIES AND PUBLIC AGENCIES AND ARE APPROXIMATE ONLY. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD BEFORE DESIGNING, EXCAVATING, BLASTING, INSTALLING, BACKFILLING, GRADING, PAVEMENT RESTORATION OR REPAIRING. ALL UTILITY COMPANIES, PUBLIC AND PRIVATE, MUST BE CONTACTED INCLUDING THOSE IN CONTROL OF UTILITIES NOT SHOWN ON THIS PLAN. SEE CHAPTER 370, ACTS OF 1963 MASS. WE ASSUME NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN. BEFORE PLANNING FUTURE CONNECTIONS THE APPROPRIATE PUBLIC UTILITY ENGINEERING DEPARTMENT MUST BE CONSULTED. DIG SAFE TELEPHONE No. 1-888-344-7233.

POST-DEVELOPMENT DRAINAGE MAP IN ACTON, MASSACHUSETTS

(MIDDLESEX COUNTY)

FOR: KHALEDI

SCALE: 1"=20' NOVEMBER 19, 2015

STAMSKI AND MCNARY, INC.
1000 MAIN STREET ACTON, MASSACHUSETTS
ENGINEERING - PLANNING - SURVEYING

0 10 20 40 60 80 FT

(939B SITE-D.dwg) Great Road SM-939B

3.7 Water Balance Calculations

Water Balance Calculations

SM-939B

Project: 7, 9, 19 & 29 Great Road By: WJH Date: 11/19/2015

Location: Acton MA Checked: Date:

Pre-Development Recharge

CN=	36.4						
From Figure 1, infiltration=	20	in/year					
Drainage Area=	107,593	s.f.					
Recharge=	107,593	x	20	/12 in/ft	179,322	c.f./year	

Pre-Development Sewage Flow

7 Great Road:

Total Design Flow=	330	gpd					
330	gpd x	365	days/year x	0.134	s.f./gal =	16,101	c.f./year
					Average(50%)=	8,050	c.f./year

9 Great Road:

Total Design Flow=	440	gpd					
440	gpd x	365	days/year x	0.134	s.f./gal =	21,468	c.f./year
					Average(50%)=	10,734	c.f./year

19 & 29 Great Road:

Total Design Flow=	180	gpd					
180	gpd x	365	days/year x	0.134	s.f./gal =	8,782	c.f./year
					Average(50%)=	4,391	c.f./year

Pre-Development Total

179,322 + 23,175 = 202,497 c.f./year

Post-Development Recharge

CN=	75.4					
From Figure 1, infiltration=	16.2	in/year				
Drainage area=	97,574	s.f.				
Recharge=	97,574	x	16.2	/12 in/ft	131,725	c.f./year

Post-Development Sewage Flow

Total Design Flow=	4,622	gpd					
4,622	gpd x	365	days/year x	0.134	s.f./gal =	225,509	c.f./year
					Average(50%)=	112,754	c.f./year

Post-Development Subsurface Infiltration

From calculations (sheet 2): 87,792 cf

Post-Development Total

131,725 + 200,547 = 332,272 c.f./year

Post-Development	Vs.	Pre-Development
332,272 c.f./year	>	202,497 c.f./year

Overall CN Calculations

SM-939B

Project: 7, 9, 19 & 29 Great Road | By: WJH | Date: 11/19/2015

Location: Acton MA | Checked: | Date:

Total CN

Pre				**Post**			
Subcatchment	Area	CN	Sum		Area	CN	Sum
1	2.44	51.6	125.90	1	1.05	67.0	70.35
2	0.03	33.8	1.01	2	0.44	70.9	31.20
				3	0.21	66.4	13.94
				4	0.13	62.3	8.10
				Drywell 1	0.55	98.0	53.90
				Drywell 2	0.09	98.0	8.82
Total	2.47		126.92	Total	2.47		186.31
	Overall CN:	51.4			Overall CN:	75.4	

Infiltration of Roof Runoff:

Area of roof being infiltrated for 100 year storm:	27,843	sf
Runoff from roofs (CN=98):	30.5	in/year
Total runoff from roofs being infiltrated:	70,768	cf/year

Infiltration BMP'S:

Designed for 100 year storm (6.4 in rain)

	Subcatchment Area (sf)	CN	% of Annual Runoff Infiltrated	From Graph 1 Annual Runoff (in/year)	Annual Infiltration (cf)
Subcatchment 1:	45,842	67.0	100	2.5	9,550
Subcatchment 2:	19,231	70.9	100	3.5	5,609
Subcatchment 3:	9,326	66.4	100	2.4	1,865

Annual Infiltration of Stormwater (including Roofs): 87,792 cf/year

3.8 Earth Removal Calculations

Cut/Fill Report

Generated: 2015-10-30 15:47:42

By user: Bill.Hall

Drawing: Z:\0-1000\0939B\CAD DRAWINGS\CIVIL 3D\Z:\0-1000\0939B\CAD DRAWINGS\CIVIL 3D\939B SITE-C.dwg

Volume Summary

Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
P-CUT FILL SURFACE	full	1.000	1.000	85963.82	9501.46	623.75	8877.71<Cut>

Totals

	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total	85963.82	9501.46	623.75	8877.71<Cut>

* Value adjusted by cut or fill factor other than 1.0

ADJUSTMENT FOR PAVEMENT AND GRAVEL:

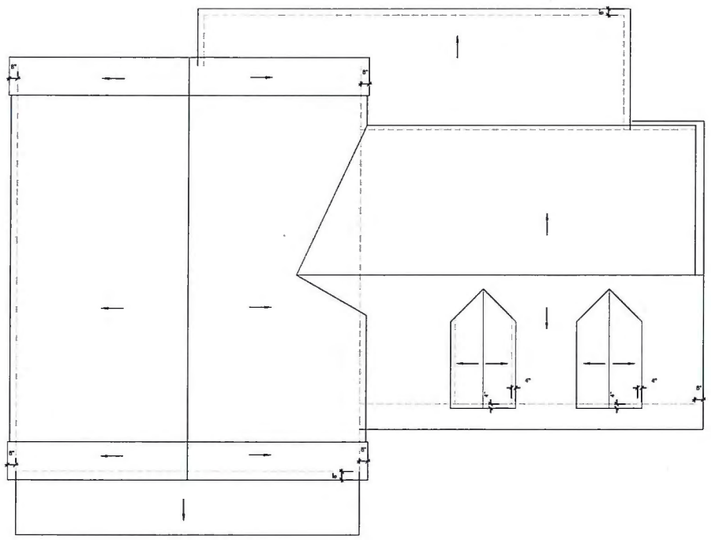
DEPTH = 1.25'

AREA = 38,800 SF

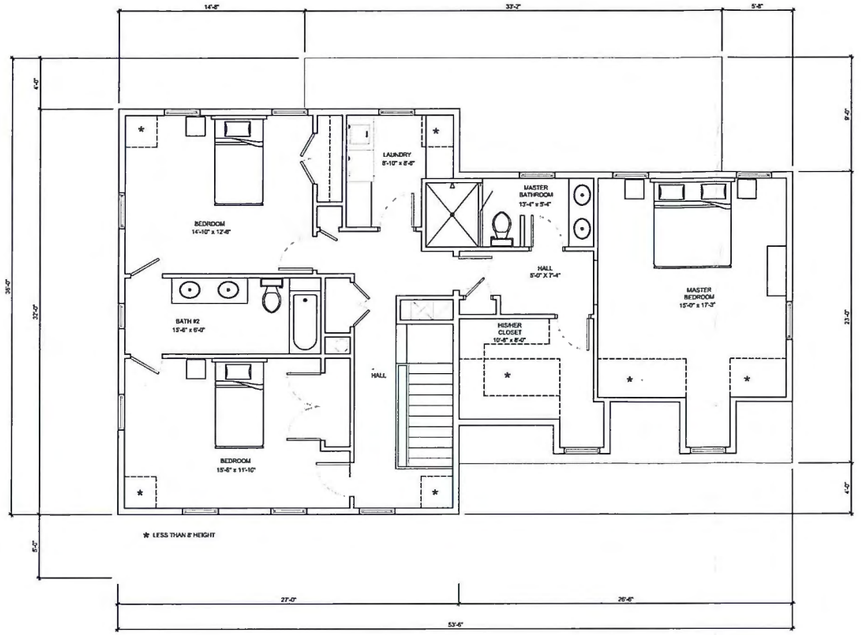
1.25' x 38,800 SF ÷ 27 CF/CY = 1,800 CY OF CUT

TOTAL CUT = 10,678 CY

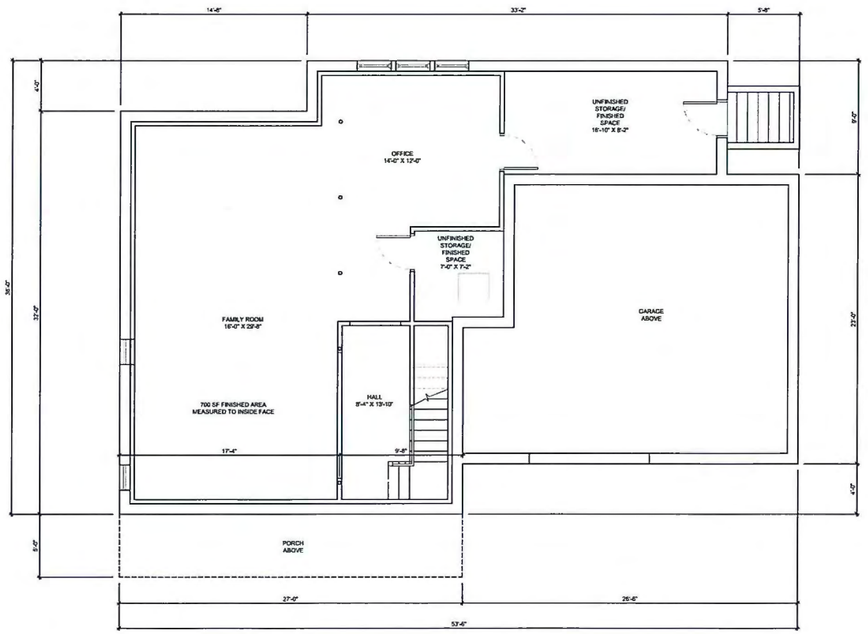
3.9 Plans



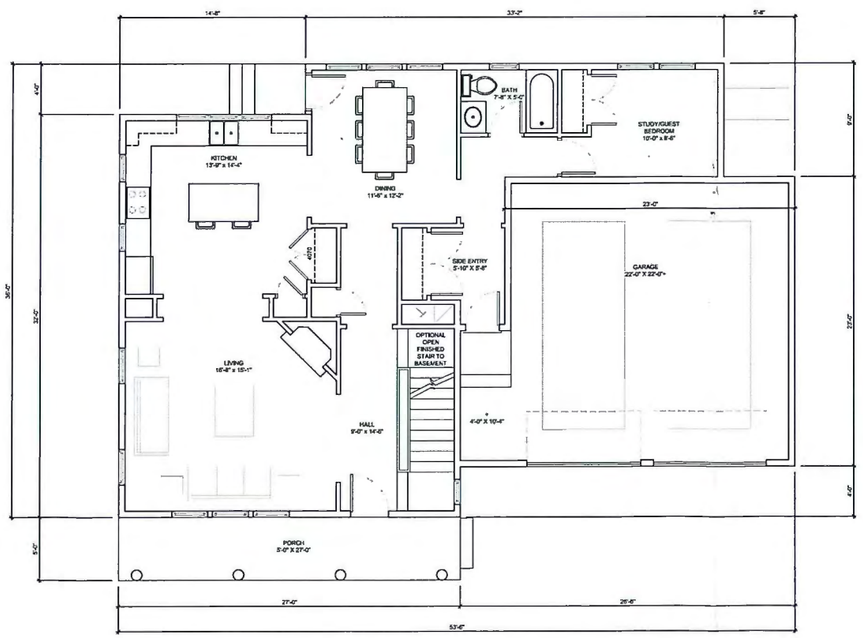
1 ROOF PLAN
SCALE: 3/16"=1'-0"



2 SECOND FLOOR PLAN
SCALE: 3/16"=1'-0"



3 BASEMENT FLOOR PLAN
SCALE: 3/16"=1'-0"



4 FIRST FLOOR PLAN
SCALE: 3/16"=1'-0"

SQUARE FEET (MARKETING)

BASEMENT:	775 SF
1ST FLOOR:	1158 SF
2ND FLOOR:	1395 SF
FINISHED LIVING AREA:	3328 SF
FINISHED LIVING AREA WITHOUT BASEMENT:	2553 SF
GARAGE	573 SF
PORCHES	135 SF

DECK: UNITS H-J; 183 SF, UNIT G; 150SF

NOTE:
1. BASEMENT FINISHED AREA MEASURED TO INSIDE FACE OF WALL
2. ALL OTHER AREAS MEASURED TO OUTSIDE FACE OF WALL.
3. GARAGE, DECKS, AND PORCHES NOT INCLUDED IN FINISHED LIVING AREAS

Design and Documents by
MAHONEY ARCHITECTS
70 Seven Star Lane
Concord, MA
978-287-4223

DRAWING LIST

The use of these plans and specifications is restricted to the original site for which they were prepared and publication thereof is expressly limited to such use. Reuse, reproduction, or publication by any method in whole or part is prohibited without the express written permission of the architect. Title to the plans and specifications and authorization of their reuse remains exclusively with the architect.

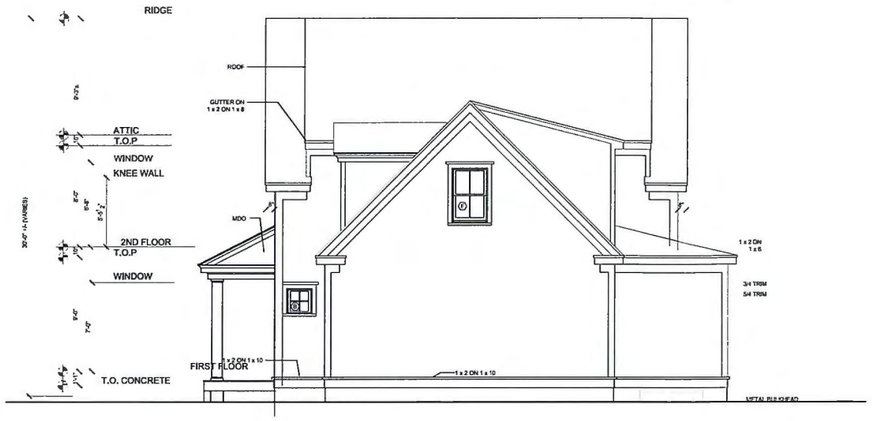
©2013 Mahoney Architects

FIRST VILLAGE
NEW SINGLE FAMILY UNITS
UNITS A - F

DESIGN DEVELOPMENT
SEPTEMBER 17, 2015

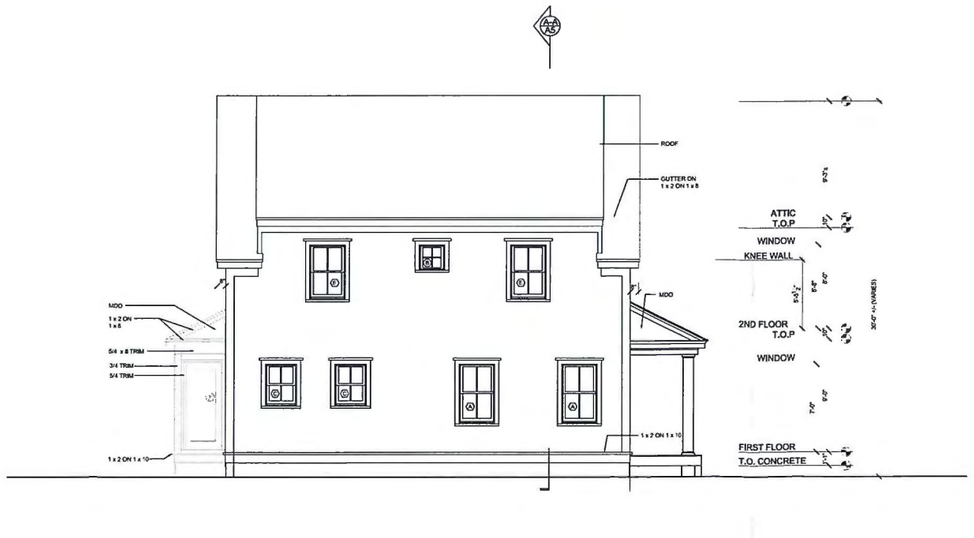
A1
PLANS

1 FRONT ELEVATION
SCALE: 3/16"=1'-0"



2 RIGHT ELEVATION
SCALE: 3/16"=1'-0"

3 REAR ELEVATION
SCALE: 3/16"=1'-0"



4 LEFT ELEVATION
SCALE: 3/16"=1'-0"

Design and Documents by
MAHONEY ARCHITECTS
70 Seven Star Lane
Concord, MA
978-287-4223

DRAWING LIST

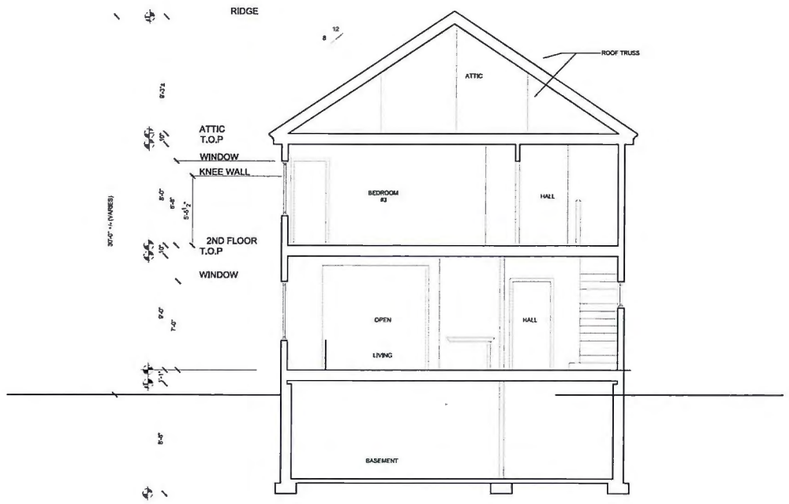
The use of these plans and specifications is restricted to the original site for which they were prepared and publication thereof is expressly limited to such use. Reuse, reproduction, or publication by any method in whole or part is prohibited without the express written permission of the architect. Title to the plans and specifications and authorization of their reuse remains exclusively with the architect.

©2013 Mahoney Architects

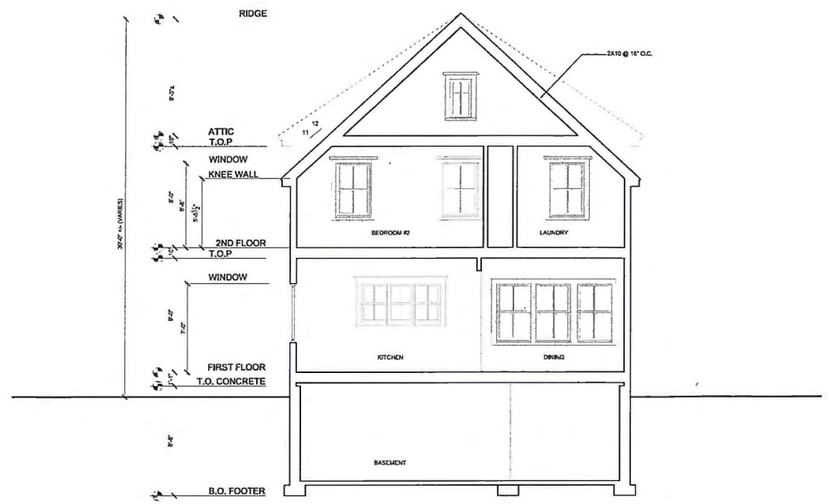
FIRST VILLAGE
NEW SINGLE FAMILY UNITS
UNITS A - F

DESIGN DEVELOPMENT
SEPTEMBER 17, 2015

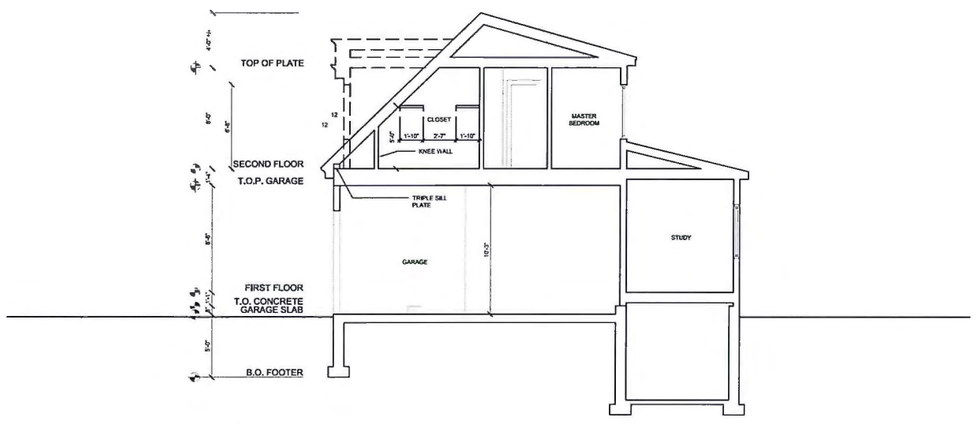
A2
PLANS



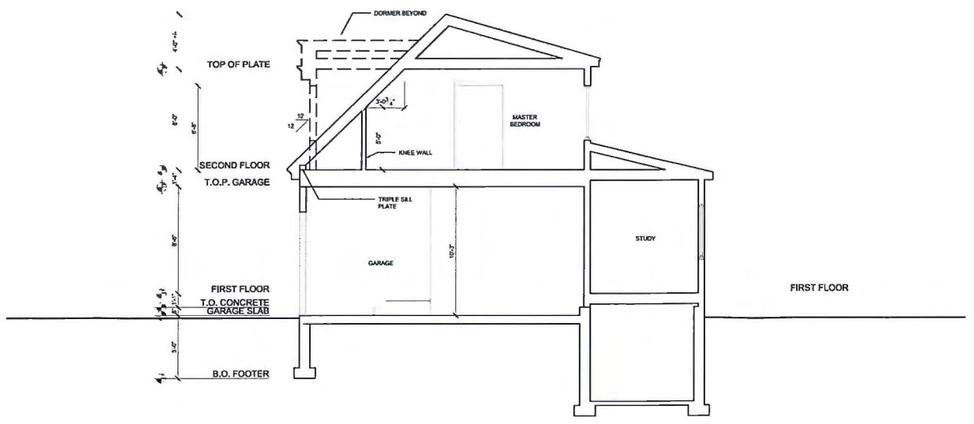
1 MAIN BUILDING SECTION
SCALE: 3/16"=1'-0"



2 SECTON AT DROPPED EAVE
SCALE: 3/16"=1'-0"



3 MASTER BATH / GARAGE SECTION
SCALE: 3/16"=1'-0"



4 MASTER BEDROOM / GARAGE SECTION
SCALE: 3/16"=1'-0"

Design and Documents by
MAHONEY ARCHITECTS
70 Seven Star Lane
Concord, MA
978-287-4223

DRAWING LIST

The use of these plans and specifications is restricted to the original site for which they were prepared and publication thereof is expressly limited to such use. Reuse, reproduction, or publication by any method in whole or part is prohibited without the express written permission of the architect. Title to the plans and specifications and authorization of their reuse remains exclusively with the architect.

©2013 Mahoney Architects

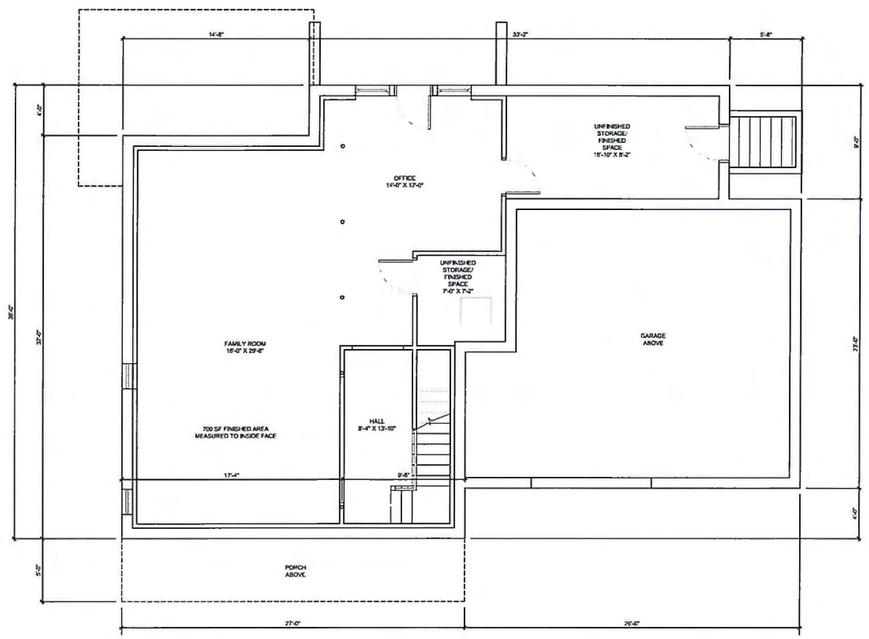
FIRST VILLAGE
NEW SINGLE FAMILY UNITS
UNITS A - F

DESIGN DEVELOPMENT
SEPTEMBER 17, 2015

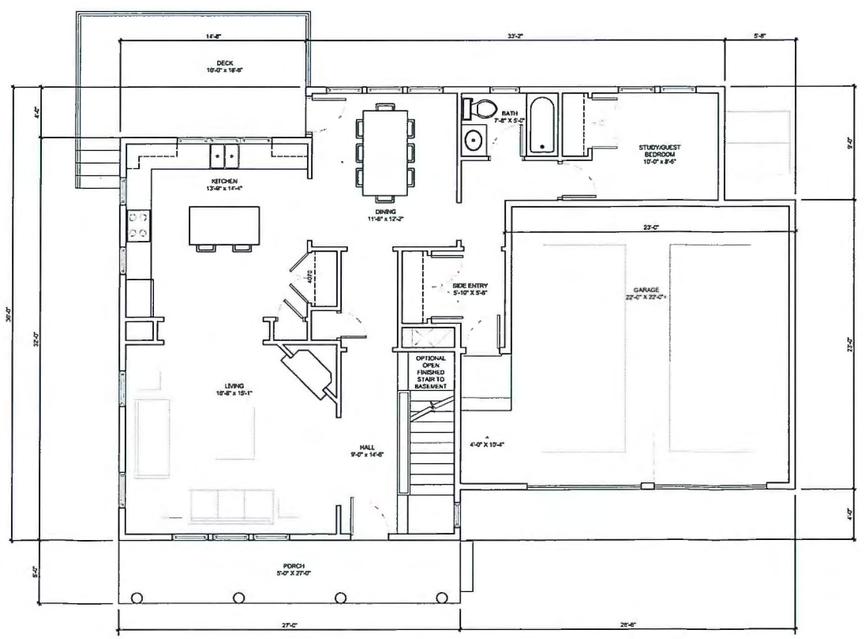
A3
PLANS

1 REAR ELEAVTION WALK OUT / DECK
SCALE: 3/16"=1'-0"

2 REAR ELEVATION BASEMENT WINDOWS/ DECK
SCALE: 3/16"=1'-0"



3 BASEMENT PLAN WALK OUT
SCALE: 3/16"=1'-0"



4 FIRST FLOOR PLAN DECK
SCALE: 3/16"=1'-0"

Design and Documents by
MAHONEY ARCHITECTS
70 Seven Star Lane
Concord, MA
978-287-4223

DRAWING LIST

The use of these plans and specifications is restricted to the original site for which they were prepared and publication thereof is expressly limited to such use. Reuse, reproduction, or publication by any method in whole or part is prohibited without the express written permission of the architect. Title to the plans and specifications and authorization of their reuse remains exclusively with the architect.

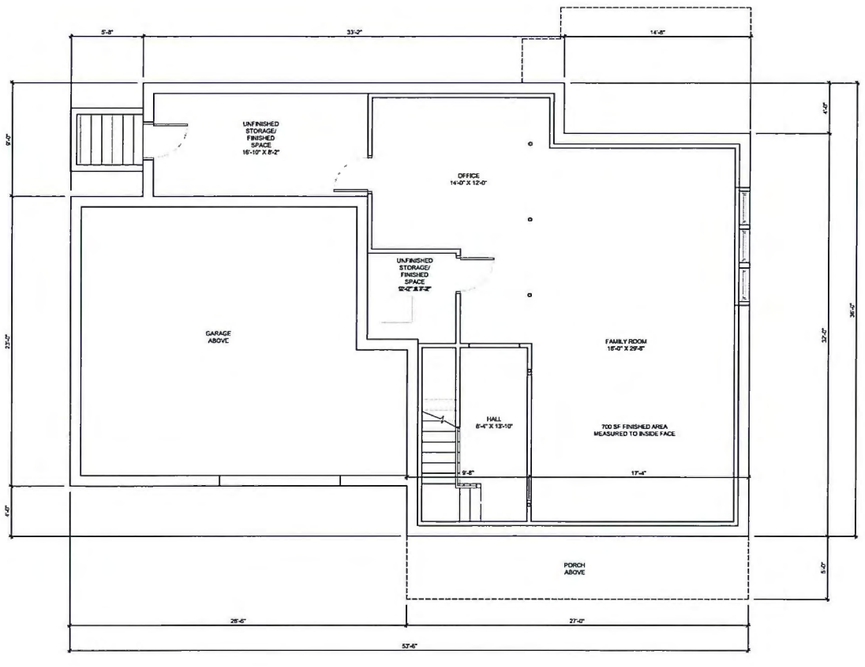
©2013 Mahoney Architects

FIRST VILLAGE
NEW SINGLE FAMILY UNITS
UNITS H, I, J

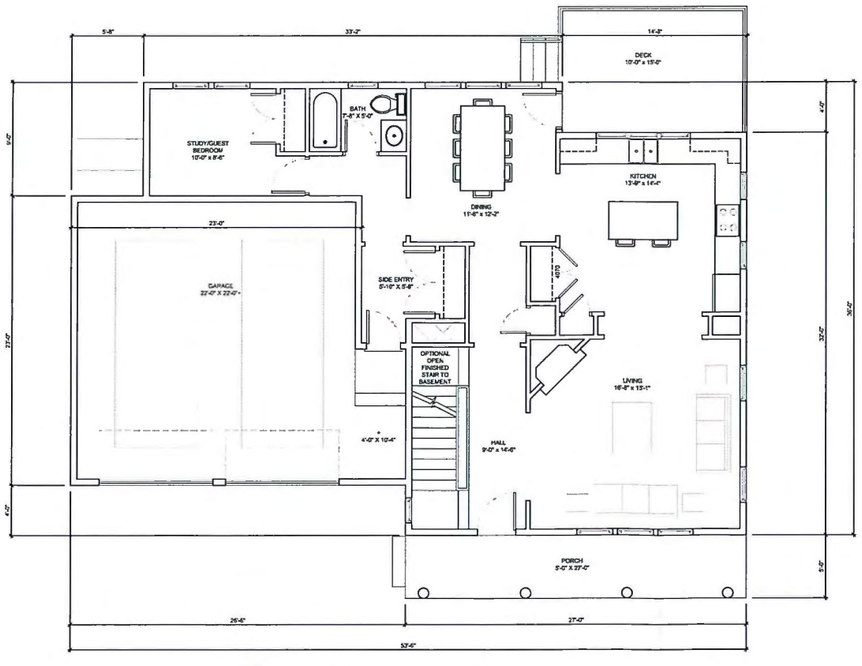
DESIGN DEVELOPMENT
SEPTEMBER 17, 2015

A4
PLANS

2 RIGHT ELEVATION WINDOWS
SCALE: 3/16"=1'-0"



3 BASEMENT PLAN WALK OUT
SCALE: 3/16"=1'-0"



4 FIRST FLOOR PLAN DECK
SCALE: 3/16"=1'-0"

Design and Documents by

MAHONEY ARCHITECTS
70 Seven Star Lane
Concord, MA
978-287-4223

DRAWING LIST

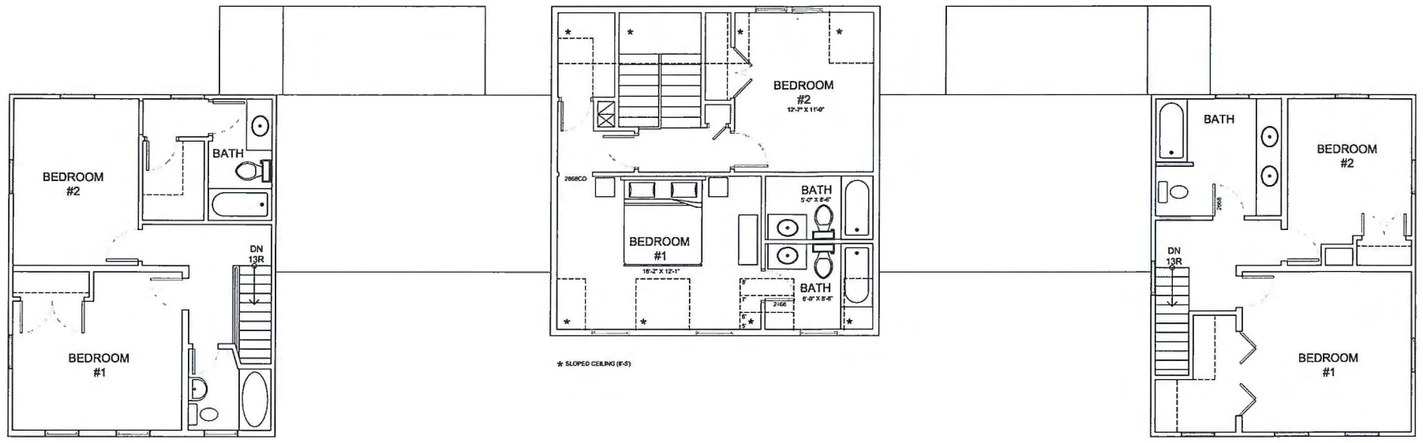
The use of these plans and specifications is restricted to the original site for which they were prepared and publication thereof is expressly limited to such use. Reuse, reproduction, or publication by any method in whole or part is prohibited without the express written permission of the architect. Title to the plans and specifications and authorization of their reuse remains exclusively with the architect.

©2013 Mahoney Architects

FIRST VILLAGE
NEW SINGLE FAMILY UNITS
UNIT G

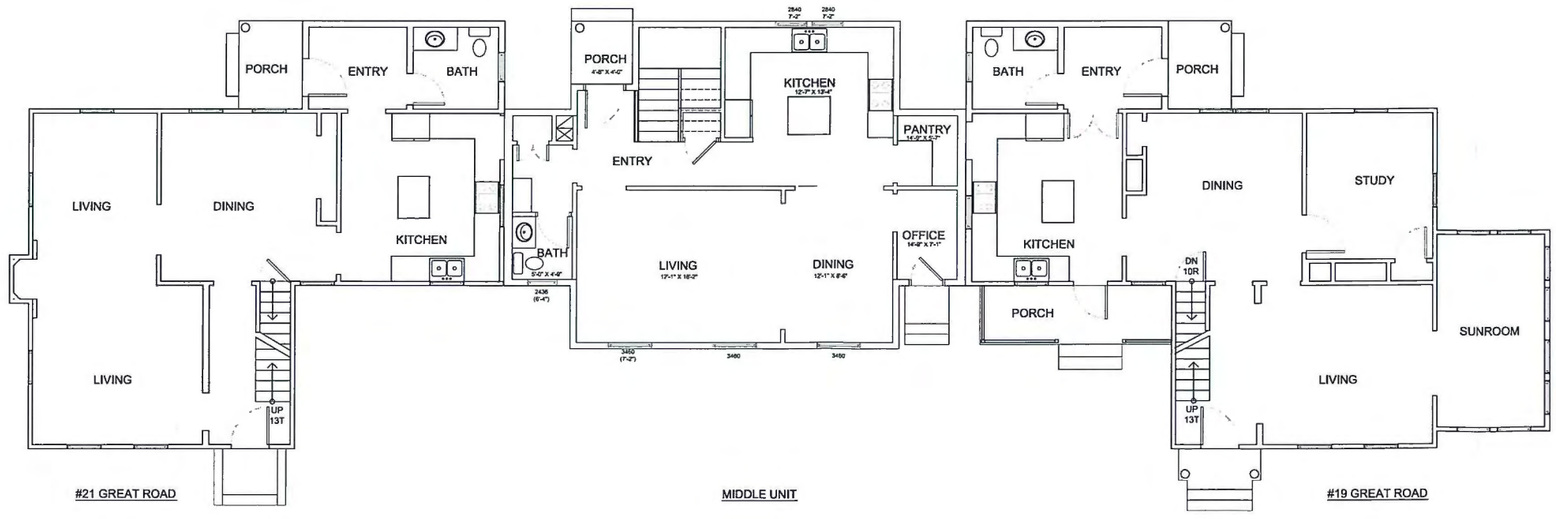
DESIGN DEVELOPMENT
SEPTEMBER 17, 2015

A5
PLANS



#21 GREAT ROAD | MIDDLE UNIT | #19 GREAT ROAD

1 SECOND FLOOR PLAN
SCALE: 3/16"=1'-0"



#21 GREAT ROAD | MIDDLE UNIT | #19 GREAT ROAD

2 FIRST FLOOR PLAN
SCALE: 3/16"=1'-0"

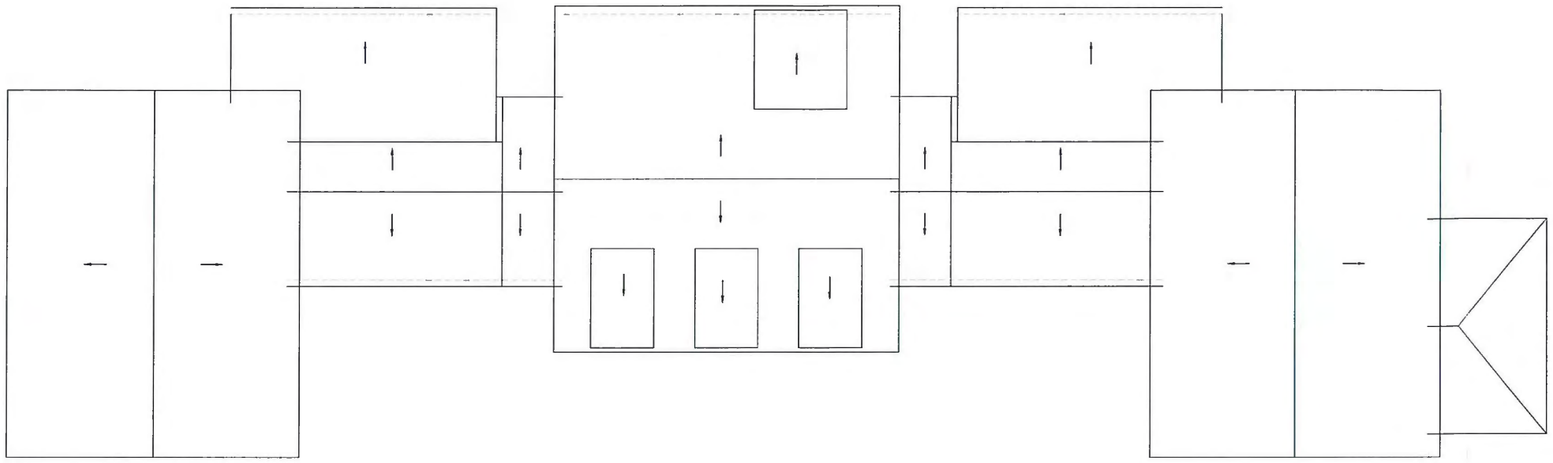
Design and Documents by
MAHONEY ARCHITECTS
70 Seven Star Lane
Concord, MA
978-287-4223

DRAWING LIST
A1 PLANS

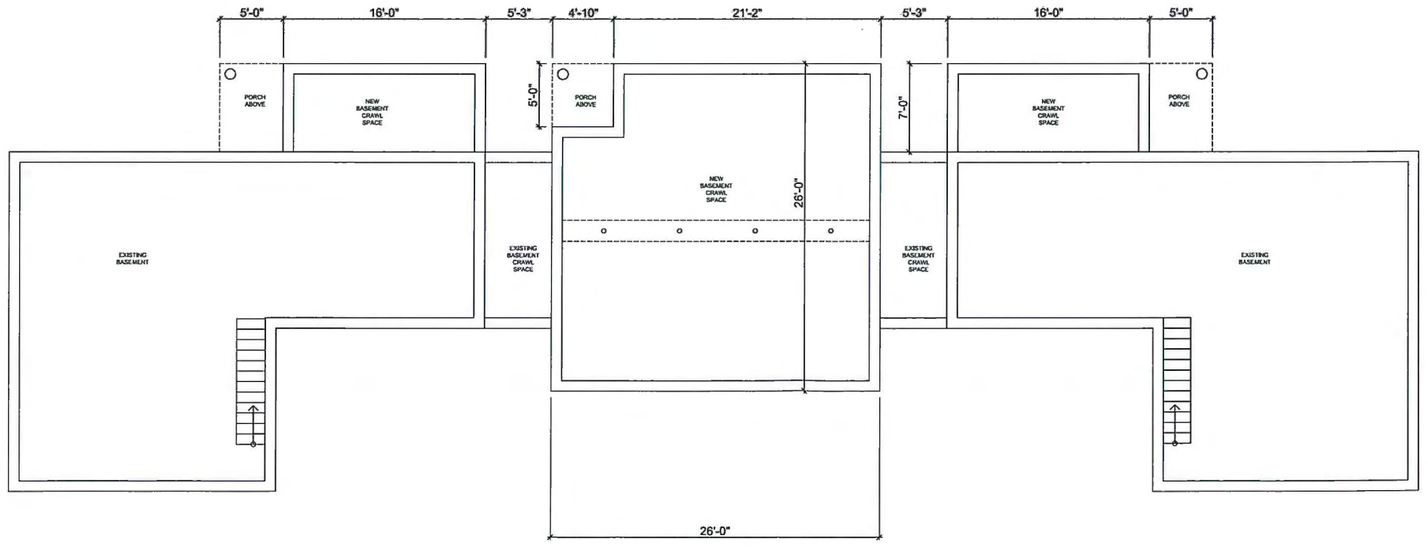
FIRST VILLAGE
Coral House

DESIGN DEVELOPMENT
September 29, 2015

A1
PLANS



1 ROOF PLAN
SCALE: 3/16"=1'-0"



2 FOUNDATION PLAN
SCALE: 3/16"=1'-0"

Design and Documents by
MAHONEY ARCHITECTS
70 Seven Star Lane
Concord, MA
978-287-4223

DRAWING LIST
A1 PLANS

FIRST VILLAGE
Coral House

DESIGN DEVELOPMENT
September 29, 2015

A2
PLANS

1 FRONT ELEVATION
SCALE: 3/16"=1'-0"

2 REAR ELEVATION
SCALE: 3/16"=1'-0"

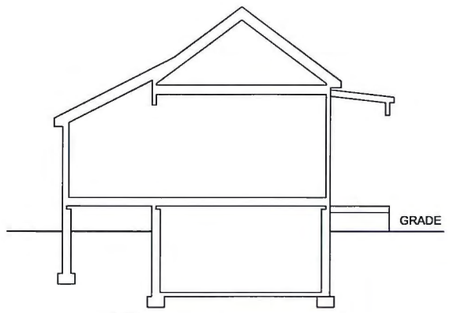
Design and Documents by
MAHONEY ARCHITECTS
70 Seven Star Lane
Concord, MA
978-287-4223

DRAWING LIST
A1 PLANS

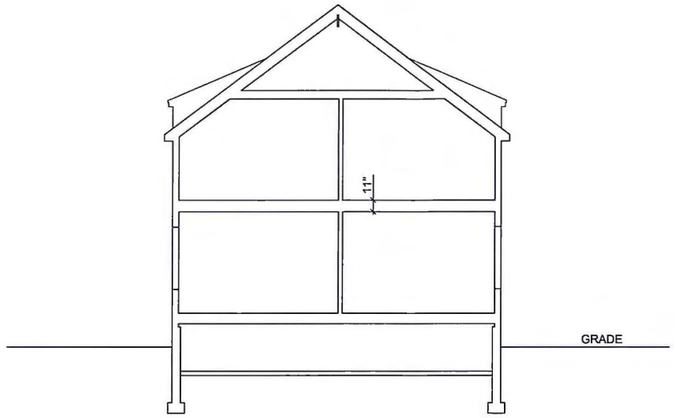
FIRST VILLAGE
Coral House

DESIGN DEVELOPMENT
September 29, 2015

A3
PLANS

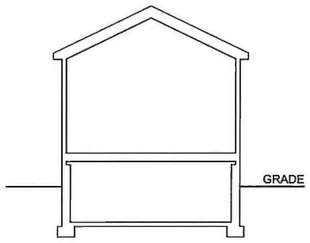


1 REAR ENTRY SECTION, END UNITS
SCALE: 3/16"=1'-0"

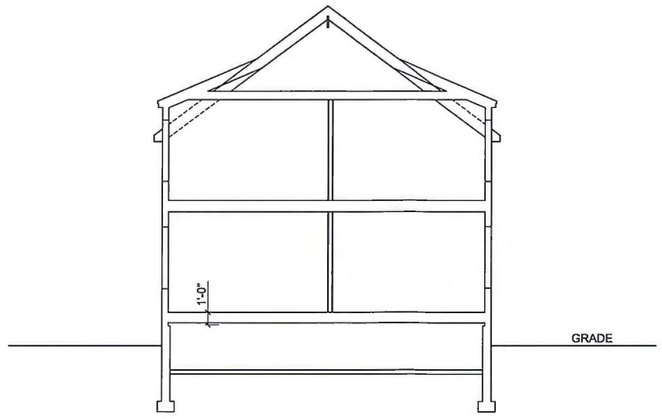


2 MAIN ROOF SECTION
SCALE: 3/16"=1'-0"

3 RIGHT ELEVATION
SCALE: 3/16"=1'-0"



4 BATH/PANTRY SECTION MIDDLE UNIT
SCALE: 3/16"=1'-0"



5 DORMER SECTION
SCALE: 3/16"=1'-0"

6 LEFT ELEVATION
SCALE: 3/16"=1'-0"

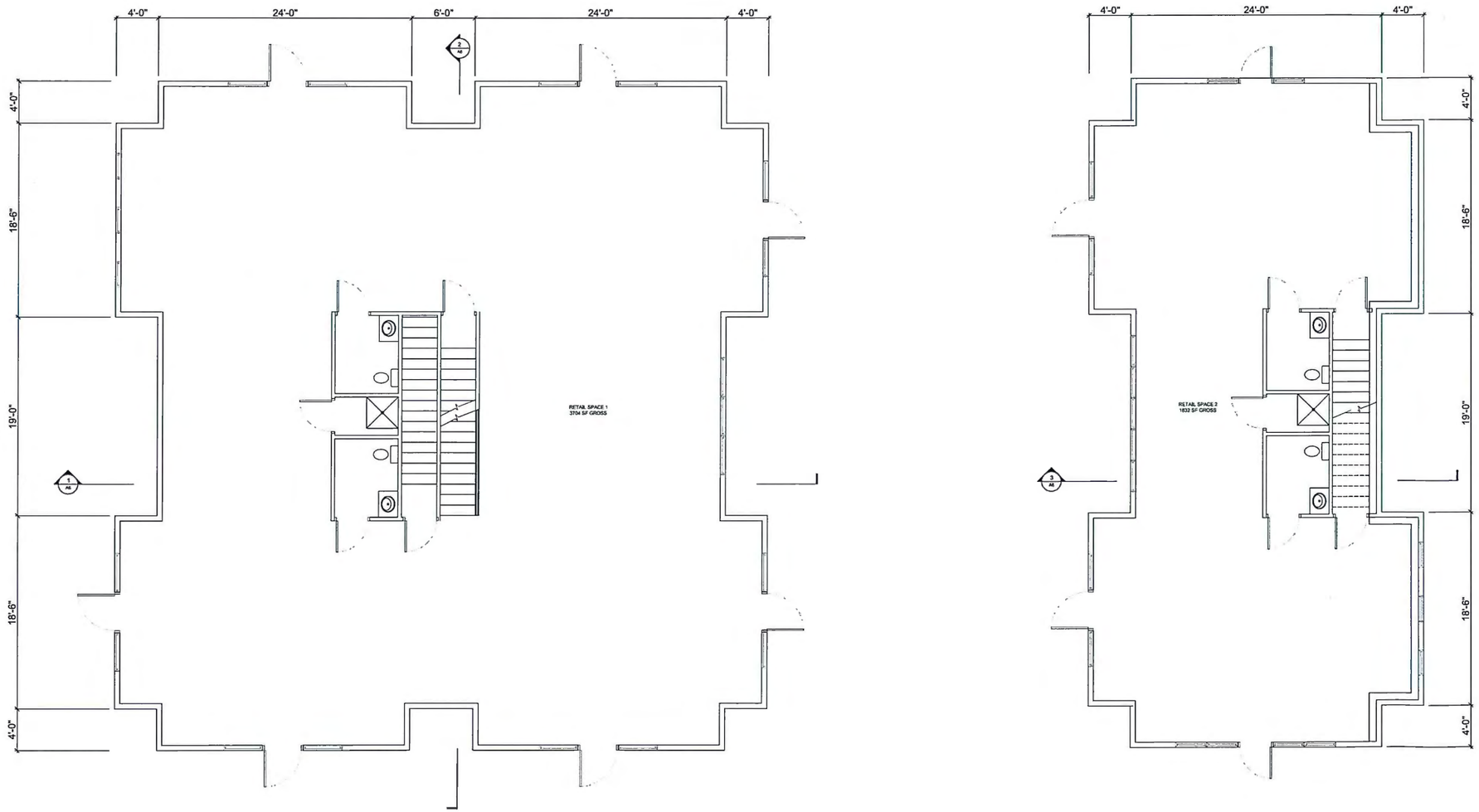
Design and Documents by
MAHONEY ARCHITECTS
78 Seven Star Lane
Concord, MA
978-287-4223

DRAWING LIST
A1 PLANS

FIRST VILLAGE
Coral House

DESIGN DEVELOPMENT
September 29, 2015

A4
PLANS



1 FIRST FLOOR PLAN
SCALE: 3/16"=1'-0"

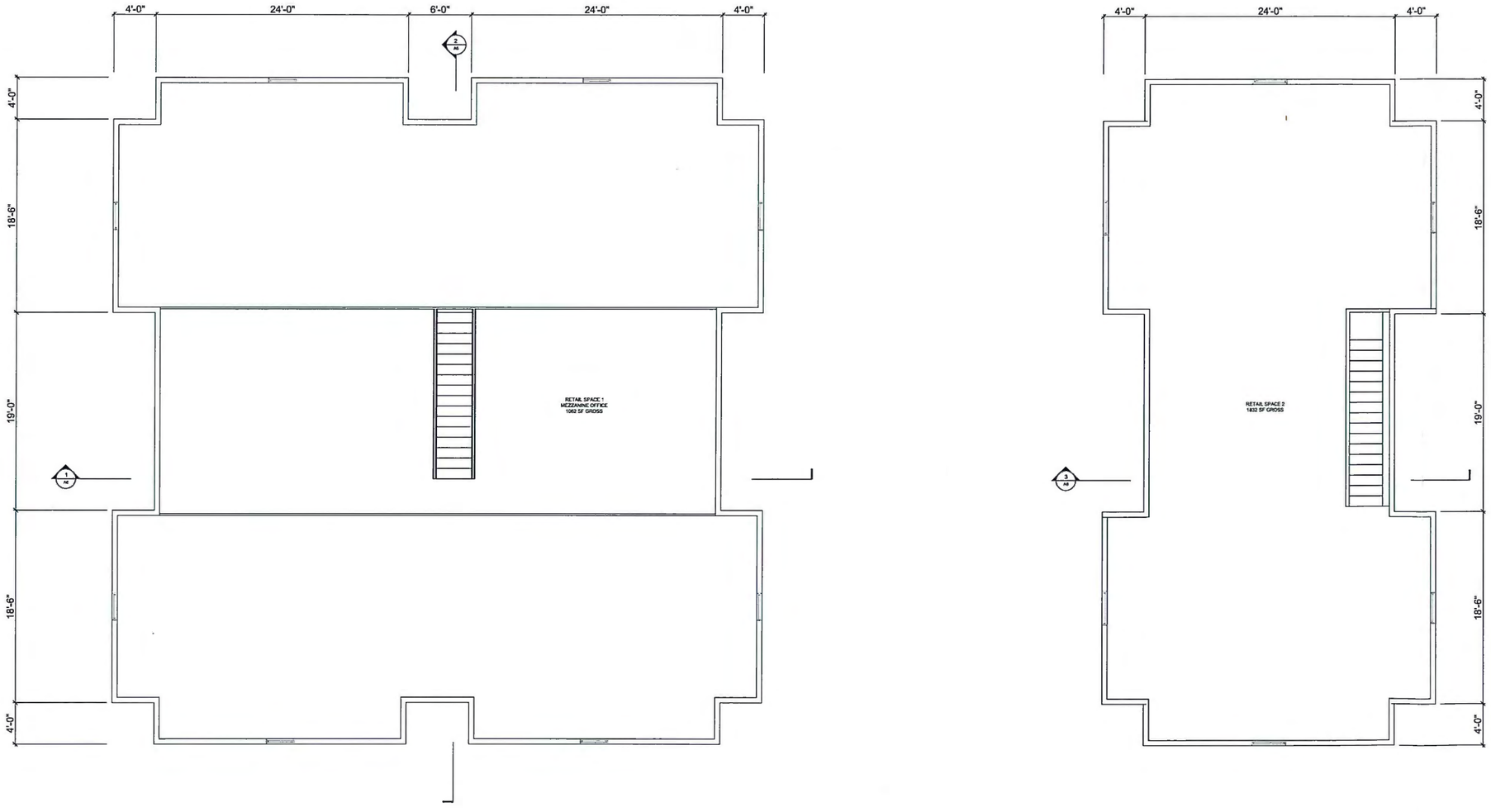
Design and Documents by
MAHONEY ARCHITECTS
70 Seven Star Lane
Concord, MA
978-287-4223

DRAWING LIST
A1 PLANS

FIRST VILLAGE
RETAIL BUILDINGS

DESIGN DEVELOPMENT
OCTOBER 28, 2015

A1
PLANS



1 UPPER FLOOR PLAN
SCALE: 3/16"=1'-0"

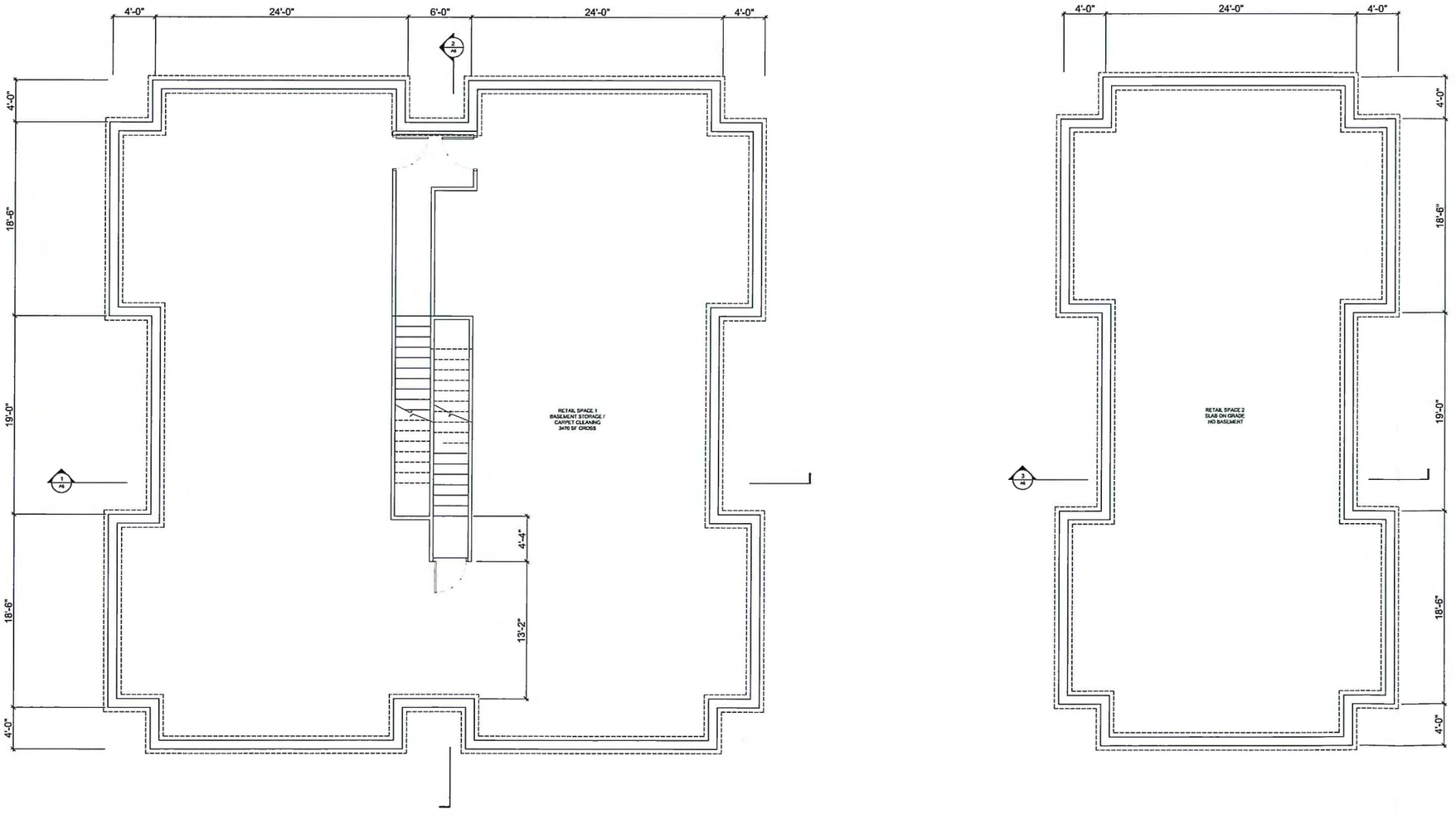
Design and Documents by
MAHONEY ARCHITECTS
70 Seven Star Lane
Concord, MA
978-287-4223

DRAWING LIST
A1 PLANS

FIRST VILLAGE
RETAIL BUILDINGS

DESIGN DEVELOPMENT
OCTOBER 28, 2015

A2
PLANS



1 BASEMENT FLOOR PLAN
SCALE: 3/16"=1'-0"

Design and Documents by
MAHONEY ARCHITECTS
70 Seven Star Lane
Concord, MA
978-287-4223

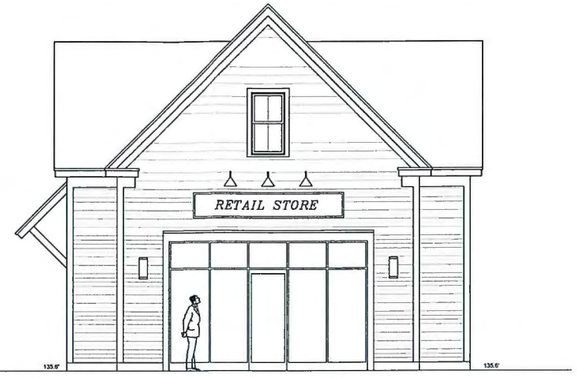
DRAWING LIST
A1 PLANS

FIRST VILLAGE
RETAIL BUILDINGS

DESIGN DEVELOPMENT
OCTOBER 28, 2015

A3
PLANS

1 FIRST RUGS GREAT ROAD ELEVATION
SCALE: 3/16"=1'-0"



2 RETAIL STORE GREAT ROAD ELEVATION
SCALE: 3/16"=1'-0"

3 RETAIL STORE REAR ELEVATION
SCALE: 3/16"=1'-0"

4 FIRST RUGS REAR ELEVATION
SCALE: 3/16"=1'-0"

Design and Documents by
MAHONEY ARCHITECTS
70 Seven Star Lane
Concord, MA
978-287-4223

DRAWING LIST
A1 PLANS

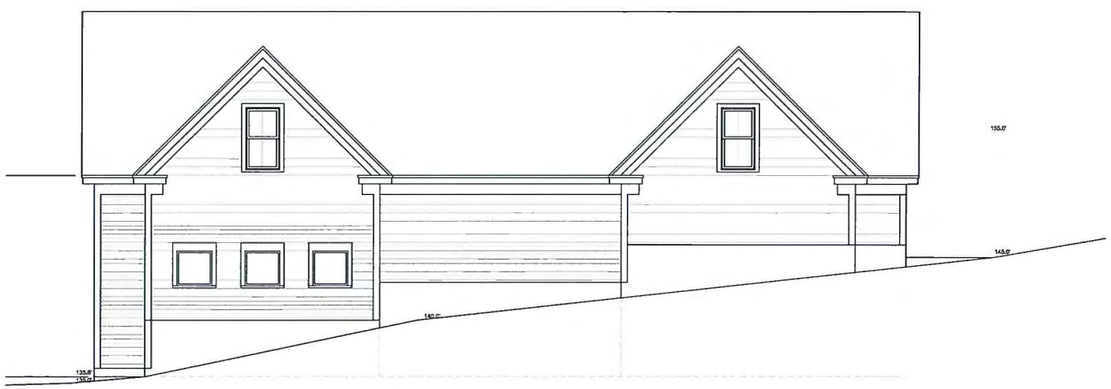
FIRST VILLAGE
RETAIL BUILDINGS

DESIGN DEVELOPMENT
OCTOBER 28, 2015

A4
ELEVATIONS

3 FIRST RUGS LEFT ELEVATION, FACING PLAZA
SCALE: 3/16"=1'-0"

3 FIRST RUGS RIGHT ELEVATION, FACING INTERIOR ROAD
SCALE: 3/16"=1'-0"



3 RETAIL STORE RIGHT ELEVATION, FACING EAST
SCALE: 3/16"=1'-0"

3 RETAIL STORE LEFT ELEVATION, FACING INTERIOR ROAD
SCALE: 3/16"=1'-0"

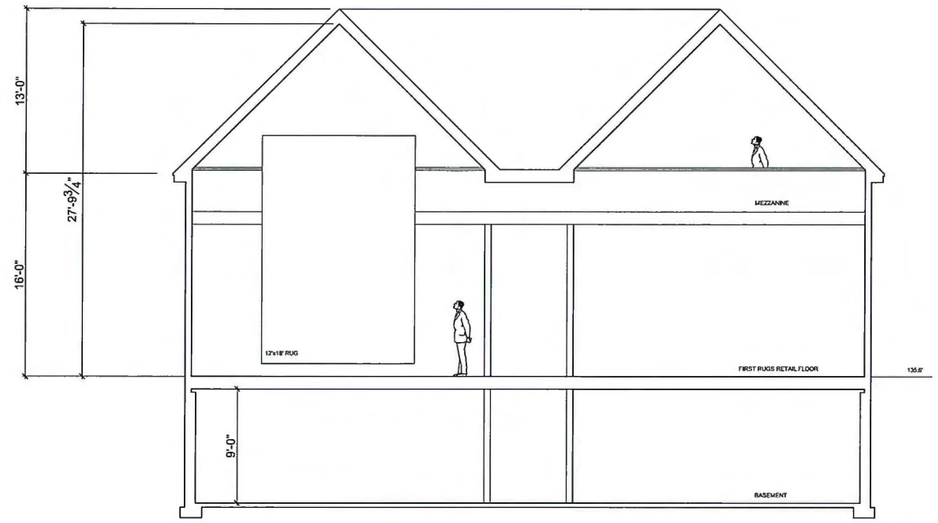
Design and Documents by
MAHONEY ARCHITECTS
70 Seven Star Lane
Concord, MA
978-287-4223

DRAWING LIST
A1 PLANS

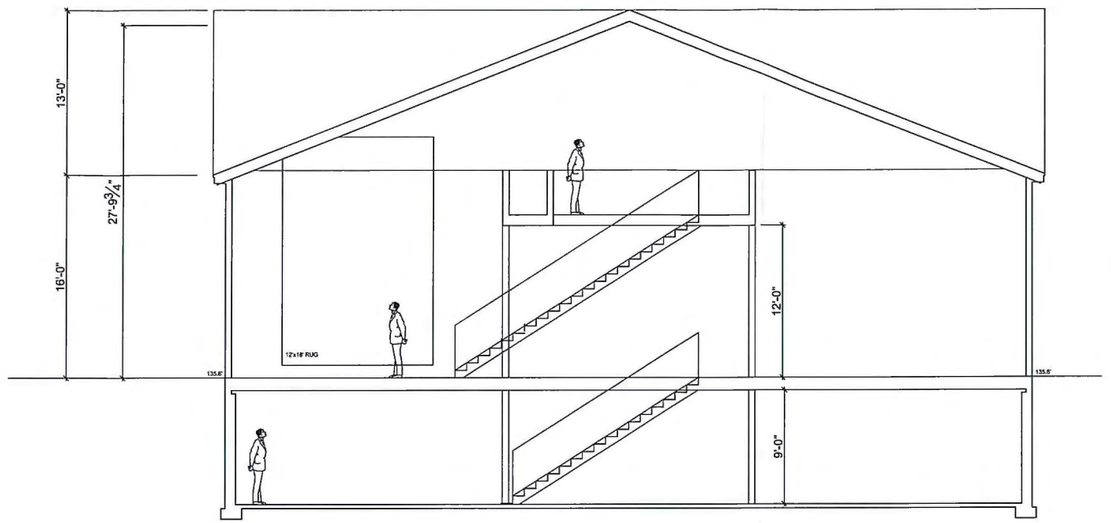
FIRST VILLAGE
RETAIL BUILDINGS

DESIGN DEVELOPMENT
OCTOBER 28, 2015

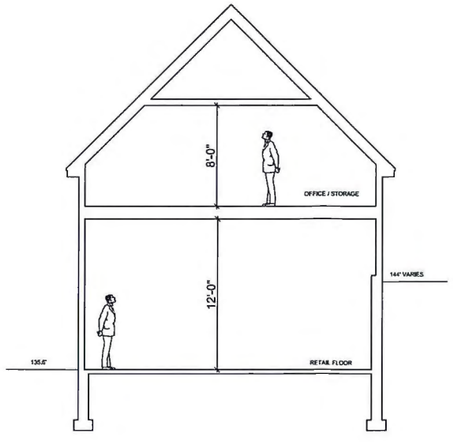
A5
ELEVATIONS



1 FIRST RUGS SECTION
SCALE: 3/16"=1'-0"



2 FIRST RUGS SECTION
SCALE: 3/16"=1'-0"



3 RETAIL BUILDING SECTION
SCALE: 3/16"=1'-0"

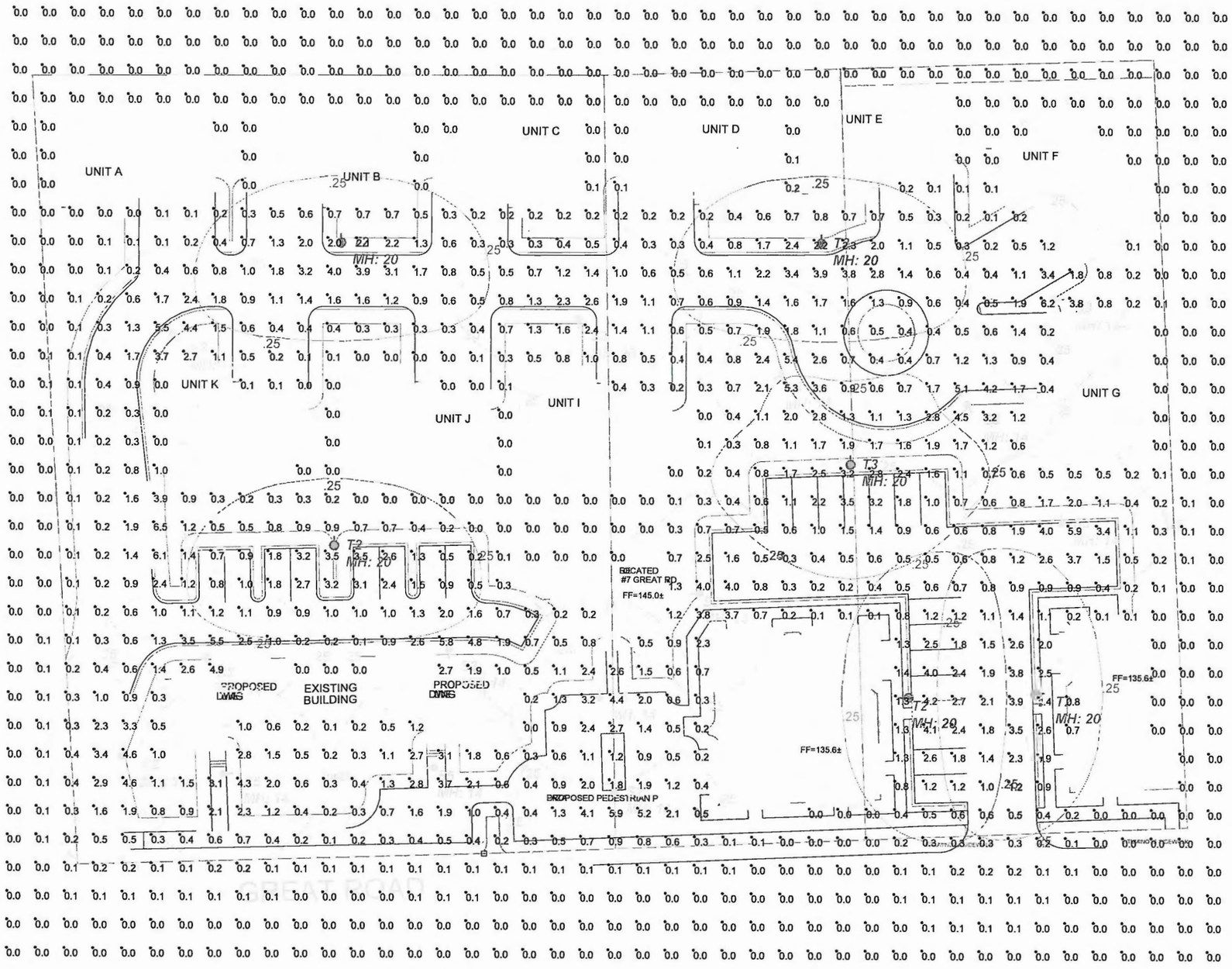
Design and Documents by
MAHONEY ARCHITECTS
70 Seven Star Lane
Concord, MA
978-287-4223

DRAWING LIST
A1 PLANS

FIRST VILLAGE
RETAIL BUILDINGS

DESIGN DEVELOPMENT
OCTOBER 28, 2015

A6
SECTIONS



Outdoor Luminaire Schedule							
Symbol	Qty	Label	Description	Arrangement	Arm	Lum. Lumens	LLF	Filename
	3	S2	1521RLED-SV1-4ARC45T2	SINGLE	1.5	4095	0.900	1521RLED-SV1-4ARC45T2.ies
	9	S3	1521RLED-SV1-4ARC45T3	SINGLE	1.5	4366	0.900	1521RLED-SV1-4ARC45T3.ies
	3	S5	1521RLED-SV1-4ARC45T5	SINGLE	1.5	4265	0.900	1521RLED-SV1-4ARC45T5.ies
	5	T2	1527RLED-SV1-6ARC45T2	SINGLE	1.5	6486	0.900	1527RLED-SV1-6ARC45T2.ies
	1	T3	1527RLED-SV1-6ARC45T3	SINGLE	1.5	6270	0.900	1527RLED-SV1-6ARC45T3.ies

Luminaire Location Summary						
LumNo	Label	X	Y	Z	Orient	Tilt
1	T2	497.75	324	20	269.112	0
2	T2	329.75	323.5	20	271.432	0
3	S3	583	301.75	14	180	0
4	S3	413	291	20	90	0
5	S3	273.5	286.25	14	132.138	0
6	S3	481.5	273.5	14	32.152	0
7	S3	551	262.25	14	121.88	0
8	T3	508.5	246.5	20	271.219	0
9	S3	583	226	14	273.576	0
10	S2	270.75	220.25	14	185.477	0
11	T2	328.25	217.25	20	270	0
12	S3	453.25	197.75	14	0	0
13	S3	368.5	174.75	14	90	0
14	S3	283.75	172	14	90	0
15	S5	421.5	164	14	270	0
16	T2	577.25	163.25	20	181.225	0
17	T2	526.75	161.5	20	0.564	0
18	S2	257.75	139.75	14	180	0
19	S5	360.75	136	14	1.193	0
20	S5	293.25	133.75	14	181.432	0
21	S2	427	130.75	14	270	0

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
CalcPts_1	Illuminance	Fc	0.67	6.5	0.0	N.A.	N.A.

0 10 20 40
SCALE FEET

OMNI-LITE, INC.
263 WINN STREET BURLINGTON, MA. 01803
PH # 781-272-2300, FAX # 781-272-0759 www.omnilight.com

PROJECT: *Acton MA Site*

CLIENT: *XXX*

SCALE: FEET | FILE: omni action ma site 00.adm

DATE: 11/05/2015 | SALES PERSON: Paul Abdella

THESE DRAWINGS ARE FOR CONCEPTUAL USE ONLY AND ARE NOT INTENDED FOR CONSTRUCTION. VALUES REPRESENTED ARE AN APPROXIMATON GENERATED FORM DATA SUPPLIED BY LAMP MFG. AND TESTING LABS.

SternbergLighting

ESTABLISHED 1923 / EMPLOYEE OWNED

GENESIS 3D Product Configurator

Catalog Number:	Type:
1A-1527LED-R-SV1-6ARC35T3-MDL03-EZ/ODPT/550P520/BKT	

Customer Approval:

Conceptual assembly drawing, subject to Engineering verification by factory.

Signature _____ Date _____

NUMBER OF ARMS: 1

ARM ARM MOUNTED FIXTURE: 1527LED

1527 Omega decorative downlight fixture features a spun aluminum bell styled shade with a flared or rounded edge. An aluminum casting is attached to the upper portion of the bell shade to allow coupling to mulitple arms. Fixture features sealed and rotatable optics. Available with flat, sag, clear, or frosted glass.

ARM LIGHT SOURCE: -6ARC35T3-MDL03

Array:	6ARC (84 LEDS, 96 Watts) (6ARC)
Color Temp:	3500K (35)
Distribution:	Type 3 (T3)
Driver:	Multi-Volt Dimmable Low-Range Driver,120-277V (MDL03)

OPTIONS: -EZ

Hangstraight:	EZ Vertical (EZ)

ARM: ODPT

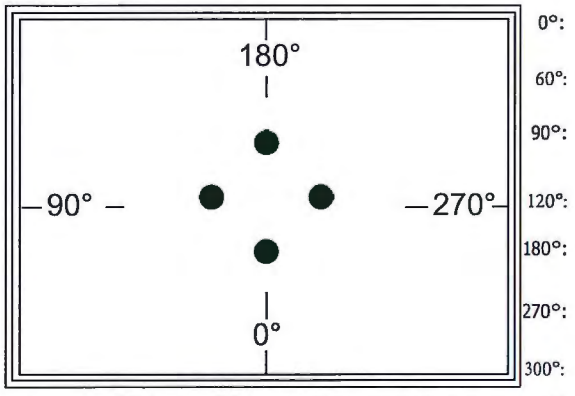
POLE: 550P520/

The 12" diameter cast 356 aluminum alloy base and aluminum shaft shall be a one-piece construction. For fixtures using remote ballasts or drivers, the servicing of these components requires pulling the pole. The pole shall be U.L. or E.T.L. listed in U.S. and Canada.

Model:	550
Shaft Type:	Smooth Straight 5 inch, 6061-T6 Aluminum Alloy (P5)
Height:	20 Ft (20/)

FINISH: BKT

Assembly shall be powder coated to Black Textured finish. Prior to coating, the assembly shall be chemically cleaned and etched in a 5-stage washing system which includes alkaline cleaning, rinsing, phosphoric etching, reverse osmosis water rinsing, and non-chrome sealing to ensure corrosion resistance.



Bolt Info: (4) 3/4" x 18" Anchor Bolts, 8-5/16" Bolt Circle, Diamond Pattern

Access Door Orientation: 0°
Street Side Otientation: 180°

Rev	Description	By	Date
A			
B			
C			
D			
E			

Job Name:			
Job Location:			Drawing No. 6391
Drawn By:	Drawn Date:	Checked By:	Checked Date:

SternbergLighting

ESTABLISHED 1923 / EMPLOYEE OWNED

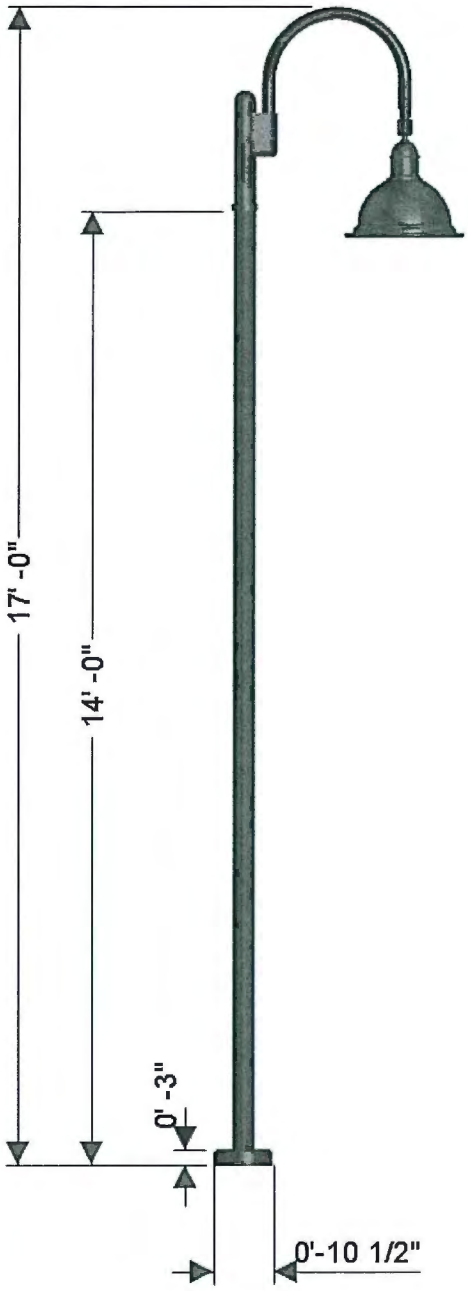
GENESIS 3D Product Configurator

Catalog Number:	Type:
1A-1521LED-R-SV1-4ARC35T3-MDL03-EZ/ODPT/450P414/BKT	

Customer Approval:

Conceptual assembly drawing, subject to Engineering verification by factory.

Signature _____ Date _____



NUMBER OF ARMS: 1

ARM ARM MOUNTED FIXTURE: 1521LED

1521 Omega decorative downlight fixture features a spun aluminum bell styled shade with a flared or rounded edge. An aluminum casting is attached to the upper portion of the bell shade to allow coupling to mulitple arms. Fixture features sealed and rotatable optics. Available with flat, sag, clear or frosted glass.

ARM LIGHT SOURCE: -4ARC35T3-MDL03

Array:	4ARC (56 LEDS, 66 Watts) (4ARC)
Color Temp:	3500K (35)
Distribution:	Type 3 (T3)
Driver:	Multi-Volt Dimmable Low-Range Driver,120-277V (MDL03)

OPTIONS: -EZ

Hangstraight:	EZ Vertical (EZ)

ARM: ODPT

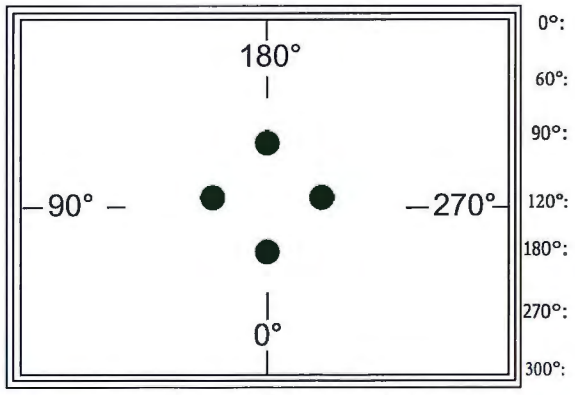
POLE: 450P414/

The 10-1/2" diameter cast 356 aluminum alloy base and aluminum shaft shall be a one-piece construction. For fixtures using remote ballasts or drivers, the servicing of these components requires pulling the pole. The pole shall be U.L. or E.T.L. listed in U.S. and Canada.

Model:	450
Shaft Type:	Smooth Straight 4 Inch, 6061-T6 Aluminum Alloy (P4)
Height:	14 Ft (14/)

FINISH: BKT

Assembly shall be powder coated to Black Textured finish. Prior to coating, the assembly shall be chemically cleaned and etched in a 5-stage washing system which includes alkaline cleaning, rinsing, phosphoric etching, reverse osmosis water rinsing, and non-chrome sealing to ensure corrosion resistance.



Bolt Info: (4) 1/2" x 18" Anchor Bolts, 8" Bolt Circle, Diamond pattern

Access Door Orientation: 0°

Street Side Otientation: 180°

Rev	Description	By	Date
A			
B			
C			
D			
E			

Job Name:			
Job Location:			Drawing No. 6388
Drawn By:	Drawn Date:	Checked By:	Checked Date:

3.10 Traffic Study

Traffic Narrative

The existing uses on the site consist of 3 residential houses, retail and office space. The proposed uses on the site consist of 14 residential units, retail and office space. The proposed uses will generate an additional 12.4 AM Peak Hour trips, 14.4 PM Peak Hour trips and 140.3 Weekday trips. This is under the 30 Peak Hour trips or 400 Weekday trips allowed per Section 3.10 of the Rules and Regulations for Site Plan Special Permits. Trip generation numbers are based on the 9th Edition of the ITE Trip Generation Manual. Therefore, no traffic impact study is required. Detailed calculations are attached.

Traffic Study

Stamski and McNary, Inc.
Location: 7-9 Great Road, Acton
Date: 12/10/2015

Existing Conditions

Residential (3 Units) (LUC 210)

A.M. Peak Hour	P.M. Peak Hour	Weekday
(0.77 Trips/unit)	(1.02 Trips/unit)	(9.52 Trips/unit)
2.31	3.06	28.56

Retail (2,147 SF) (LUC 826)

A.M. Peak Hour	P.M. Peak Hour	Weekday
(6.84 Trips/1000 SF)	(5.02 Trips/1000 SF)	(44.32 Trips/1000 SF)
14.69	10.78	95.16

Office (2,500 SF) (LUC 826)

A.M. Peak Hour	P.M. Peak Hour	Weekday
(1.56 Trips/1000 SF)	(1.49 Trips/1000 SF)	(11.03 Trips/1000 SF)
3.90	3.73	27.58

Proposed Conditions

Retail (6,681 SF) (LUC 890)

A.M. Peak Hour	P.M. Peak Hour	Weekday
(0.40 Trips/1000 SF)	(0.53 Trips/1000 SF)	(5.06 Trips/1000 SF)
2	2.65	25.3

Residential (14 Units) (LUC 210)

A.M. Peak Hour	P.M. Peak Hour	Weekday
(0.77 Trips/unit)	(1.02 Trips/unit)	(9.52 Trips/unit)
10.78	14.28	133.28

Office (1,438 SF) (LUC 826)

A.M. Peak Hour	P.M. Peak Hour	Weekday
(6.84 Trips/1000 SF)	(5.02 Trips/1000 SF)	(44.32 Trips/1000 SF)
20.52	15.06	132.96

	A.M. Peak Hour	P.M. Peak Hour	Weekday
Total Change:	12.40	14.43	140.25