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

Site Plan Special Permit Application

for

267 Great Road
Map E-5, Parcel 13
Acton, MA 01720

Applicant: Acton Management, Inc.
69 Great Road
Acton, MA 01720

Date: June 27, 2014

SM-4860

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3.9.10 LIGHTING PLAN

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.

July 3, 2014

Acton Town Clerk
472 Main Street
Acton, MA 01720

Re: 267 Great Road

Dear Town Clerk,

On behalf of our client, Acton Management, Inc., we hereby submit the enclosed information for a *Site Plan 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.

James Melvin, 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.

July 3, 2014

Acton Board of Selectmen
472 Main Street
Acton, MA 01720

Re: 267 Great Road

Members of the Board,

On behalf of our client, Acton Management, Inc., we hereby submit the enclosed information for a *Site Plan 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.

James Melvin, E.I.T.

George Dimakarakos, P.E.

3.1
APPLICATION
FOR A
SITE PLAN SPECIAL PERMIT

Appendix B

TOWN OF ACTON
APPLICATION FOR SITE PLAN SPECIAL PERMIT

For _____
Under Zoning Bylaw Section _____

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 267 Great Road

2. Applicant's Name Acton Management, Inc.
   Address 69 Great Road, Acton, MA 1720
   Telephone _____ Email _____

3. Record Owner's Name _____
   Address _____
   Telephone _____ Email _____

4. Town Atlas Map(s)/Parcel Number(s) Map E-5, Parcel 13

5. Zoning District (s) of Parcel(s) Limited Business, Groundwater Protection Zone 2 & 3

If any site plans have been filed previously for this site give file numbers: _____

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.

5/9/14 Steph Stub, Mgr.

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)

3.2
CERTIFIED ABUTTERS LIST

Town of Acton
472 Main Street
Acton, MA 01720
Telephone (978) 929-6621
Fax (978) 929-6340

Brian McMullen
Assessor

Locus: **267 GREAT RD**
Parcel I.D.: **E5-13**

Parcel ID	Location	Owner	Co-Owner	Mailing Address	City	ST	Zip
E4-27	254 GREAT RD	NAGOG KNOLL LLC		260 GREAT RD	ACTON, MA 01720		
E5-11	272 GREAT RD	KELMAN JONATHAN L TRUSTEE	THREE SISTERS REALTY TRUS	272 GREAT RD	ACTON, MA 01720		
E5-12	271 GREAT RD	STEINBERG STEPHEN P TRUSTEE	S M K TRUST	PO BOX 2350	ACTON, MA 01720		
E5-14	279 GREAT RD	FRIZZELL ALBERT TRUSTEE	TELLURIDE REALTY TRUST	PO BOX 393	BEDFORD, MA 01730		
E5-18	1 GABRIEL LN	ANDREW BEGGS	KEIKO BEGGS	1 GABRIEL LN	ACTON, MA 01720		
E5-5	289 GREAT RD	CAMPANELLI TRIGATE CHELMSFORD ACTON LLC		289 GREAT RD	ACTON, MA 01720		
E4-15	276 GREAT RD	274 ASSOC REAL ESTATE TRUST	C/O ALPINE PROPERTY MGMT	12 DAMONMILL SQ #EB-2S	CONCORD, MA 01742		
E5-11-1	274 GREAT RD	274 ASSOCIATES ETAL ESTATE TR	C/O ALPINE PROPERTY MGMT	12 DAMONMILL SQ #EB-2S	CONCORD, MA 01742		
E5-14-11	11 LADY SLIPPER LN	STRAWBERRY HILL FARMS	HOMEOWNERS ASSOC.	10 LADY SLIPPER LANE	ACTON, MA 01720		
E5-17	255 GREAT RD	BELLI AR REALTY LLC		271 NEVADA ST	NEWTONVILLE, MA 02460		
E5-8	275 GREAT RD	FRIZZELL ALBERT T TRUSTEE	TELLURIDE REALTY TRUST	PO BOX 393	BEDFORD, MA 01730		

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

Kelly Schorr **4/14/2014**

Acton Assessors Office

3.3 USE DESCRIPTION

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

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

3.4 OTHER PERMITS AND VARIANCES

PERMITTING BODY	REQUIRED
Acton Board of Health	Disposal Works Construction Permit Aquifer Permit
Acton Conservation Commission	Order of Conditions (Acton Wetland Bylaw)
Mass Highway	Curb Cut Permit
EPA	NPDES Construction General Permit

3.5
RECORDED PLANS

Total Pages = 2

Fiduciary Deed

NANCY K. BERNIER, EXECUTOR OF THE WILL OF JOHN A. C KIMBALL, JR., late of Acton, Middlesex County, Massachusetts, Middlesex County Probate Docket No. 11P4951EA, under Power of Sale which power is conferred by the Will of the Deceased Owner, **with *Fiduciary covenants***

for consideration paid and in full consideration of
FOUR HUNDRED FIFTY THOUSAND AND 00/100 ($450,000.00) DOLLARS

grant to **SPS-ACTON, LLC,** a Massachusetts limited liability company with a principal office c/o Acton Management, Inc., 69 Great Road, Acton, Massachusetts 01720

For Registry Use

Property Address: 267 Great Road, Acton, MA 01720

A certain parcel of land, with the building(s) and improvements thereon, situated in Acton, on the Easterly side of the State Highway leading from Concord to Littleton, bounded and described as follows:

BEGINNING at the Northwesterly corner thereof at land now or formerly of E.A. Mayell and said State Highway and running

THENCE by a stone wall by said land now or formerly of said Mayell SOUTH 78° 34' EAST two hundred thirty-seven and 50/100 (237.50) feet and by a stone wall NORTH 11° 56' EAST three hundred and sixteen (316) feet to a corner of stone walls at land of Baxter, hereinafter mentioned;

THENCE by land of said Baxter by a stone wall SOUTH 67° 34' EAST one hundred forty and 5/10 (140.5) feet and SOUTH 11° 56' WEST four hundred eighty-four and 75/100 (484.75) feet to a bound at land now or formerly of Ellice;

THENCE by said State Highway NORTH 4° 44' EAST one hundred seventeen and 8/10 (117.8) feet to the corner first mentioned;

CONTAINING two and 25/100 (2.25) acres, more or less.

See plan of land in Acton surveyed for Alpheus T. Baxter by Horace F. Tuttle, May 20, 1933, recorded with Middlesex South District Registry of Deeds with deed of Alpheus T. Baxter, dated June 15, 1933, recorded with said Deeds in Book 5726, Page 397, these being all of the premises described in said deed.

Subject to easements, rights, restrictions and covenants of record if they affect the locus and are in full force and effect, expressly not intending nor meaning to extend the same in the event that they have expired by operation of law or otherwise.

Meaning and intending to convey the same premises as conveyed by virtue of deed of John A. Kimball and Alice W. Kimball to John A. C. Kimball, Jr. dated May 1, 1968, and recorded with the Middlesex South District Registry of Deeds at Book 11798, Page 633. John A. C. Kimball, Jr. died on August 9, 2011. See Middlesex Probate Docket No. 11P4851EA.

Witness my hand and seal this 5th day of September, 2012.

Nancy K. Bernier

Nancy K. Bernier, Executrix of the
Will of John A. C. Kimball, Jr.

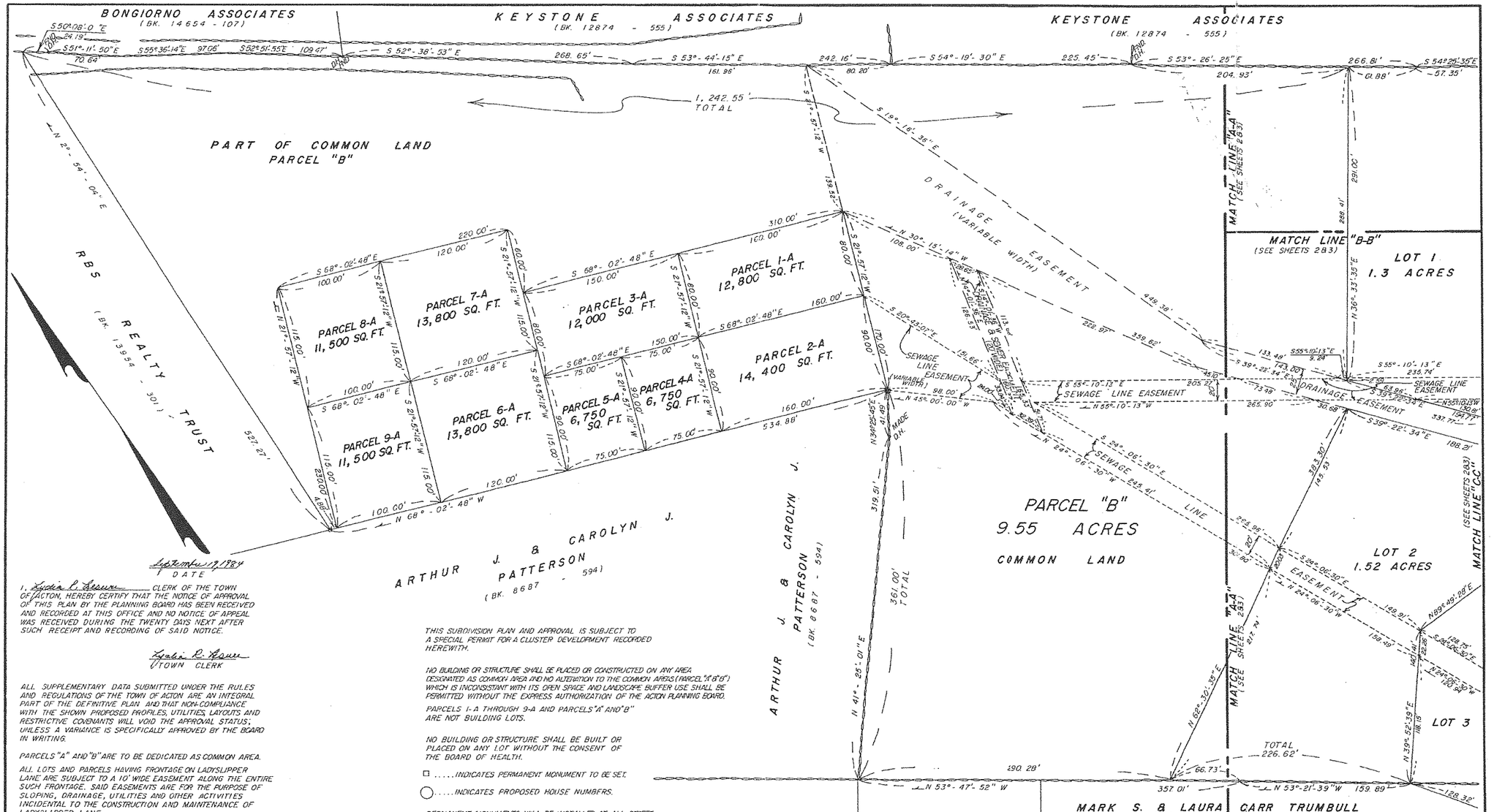
COMMONWEALTH OF MASSACHUSETTS

Middlesex, ss:

On this 5th day of September, 2012, before me, the undersigned notary public, personally appeared Nancy Bernier, as Executrix of the Will of John A. C. Kimball, Jr., proved to me through satisfactory evidence of identification, which was ☑ driver's license, ☐ passport, ☐ employee ID card, ☐ personally known to me, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that she signed it voluntarily for its stated purpose.

Notary public:
My commission expires:

MARK L. SCHEIER
Notary Public
COMMONWEALTH OF MASSACHUSETTS
My Commission Expires
May 06, 2016



September 17, 1984
DATE

I, Lydia R. Hansen CLERK OF THE TOWN OF ACTON, HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO NOTICE OF APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.

Lydia R. Hansen
TOWN CLERK

ALL SUPPLEMENTARY DATA SUBMITTED UNDER THE RULES AND REGULATIONS OF THE TOWN OF ACTON ARE AN INTEGRAL PART OF THE DEFINITIVE PLAN AND THAT NON-COMPLIANCE WITH THE SHOWN PROPOSED PROFILES, UTILITIES, LAYOUTS AND RESTRICTIVE COVENANTS WILL VOID THE APPROVAL STATUS; UNLESS A VARIANCE IS SPECIFICALLY APPROVED BY THE BOARD IN WRITING.

PARCELS "A" AND "B" ARE TO BE DEDICATED AS COMMON AREA.

ALL LOTS AND PARCELS HAVING FRONTAGE ON LADYSLIPPER LANE ARE SUBJECT TO A 10' WIDE EASEMENT ALONG THE ENTIRE SUCH FRONTAGE. SAID EASEMENTS ARE FOR THE PURPOSE OF SLOPING, DRAINAGE, UTILITIES AND OTHER ACTIVITIES INCIDENTAL TO THE CONSTRUCTION AND MAINTENANCE OF LADYSLIPPER LANE.

THIS SUBDIVISION PLAN AND APPROVAL IS SUBJECT TO A SPECIAL PERMIT FOR A CLUSTER DEVELOPMENT RECORDED HEREWITH.

NO BUILDING OR STRUCTURE SHALL BE PLACED OR CONSTRUCTED ON ANY AREA DESIGNATED AS COMMON AREA AND NO ALTERATION TO THE COMMON AREAS (PARCEL "A & B") WHICH IS INCONSISTANT WITH ITS OPEN SPACE AND LANDSCAPE BUFFER USE SHALL BE PERMITTED WITHOUT THE EXPRESS AUTHORIZATION OF THE ACTON PLANNING BOARD.

PARCELS 1-A THROUGH 9-A AND PARCELS "A" AND "B" ARE NOT BUILDING LOTS.

NO BUILDING OR STRUCTURE SHALL BE BUILT OR PLACED ON ANY LOT WITHOUT THE CONSENT OF THE BOARD OF HEALTH.

□ .....INDICATES PERMANENT MONUMENT TO BE SET.

○ .....INDICATES PROPOSED HOUSE NUMBERS.

PERMANENT MONUMENTS WILL BE INSTALLED AT ALL STREET INTERSECTIONS, AT ALL POINTS OF CHANGE IN DIRECTION OF CURVATURE OF STREETS OR ANY OTHER LOCATION AS SHOWN ON THIS PLAN. SUCH MONUMENTS SHALL BE OF GRANITE 6 INCHES SQUARE BY 4 FEET IN LENGTH AND SHALL BE SET FLUSH WITH THE FINISHED GRADE

LOTS SHOWN ON THIS PLAN ARE CREATED PER THE TOWN OF ACTON ZONING BYLAW SECTION 4.2 "CLUSTER DEVELOPMENTS," AND SHALL NOT BE FURTHER SUBDIVIDED TO CREATE ADDITIONAL BUILDING LOTS.

ZONING CLASSIFICATION:
RESIDENCE B.

GENERAL REVISION 7-25-84.
FINAL REVISION 9-4-84.

BK. 15243-506 (BK. 6595-269)

ACTON PLANNING BOARD
DATE OF APPROVAL: 7-30-84
DATE OF ENDORSEMENT: 9-24-84
Duncan W. Wood
Norman
[illegible]
[illegible]

Fee 7.50 By E.J.K.
Middlesex Registry of Deeds
Southern District
Cambridge, Massachusetts
Plan No 1252(A OF 3) of 1984
Rec'd 10/24 1984
at 11 HOT m A.m Doc No 183
Rec'd, Bk. 15844 Pg 195
Attest John F. Zimpelli
Register

SURV: M.M. | CALC: G.D.L. | TRACED: P.J.T. | CK'D: G.D.L. | NB. 559-34 | DEED: BK.12442-68 | REF:

0 20 40 60 80 100 120
FEET
1"=40'
0 5 10 15 20 25 30 35
METERS

I CERTIFY THAT THIS PLAN CONFORMS WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

May 8, 1984
DATE
SURVEYOR

DEFINITIVE SUBDIVISION OF LAND IN
ACTON, MASS.
SURVEYED FOR
B & G CONSTRUCTION CORP.

SCALE: 1"= 40' MAY, 1984

CHARLES A. PERKINS CO., INC.
CIVIL ENGINEERS & SURVEYORS
P.O. BOX 234 - CLINTON, MASS. 01510

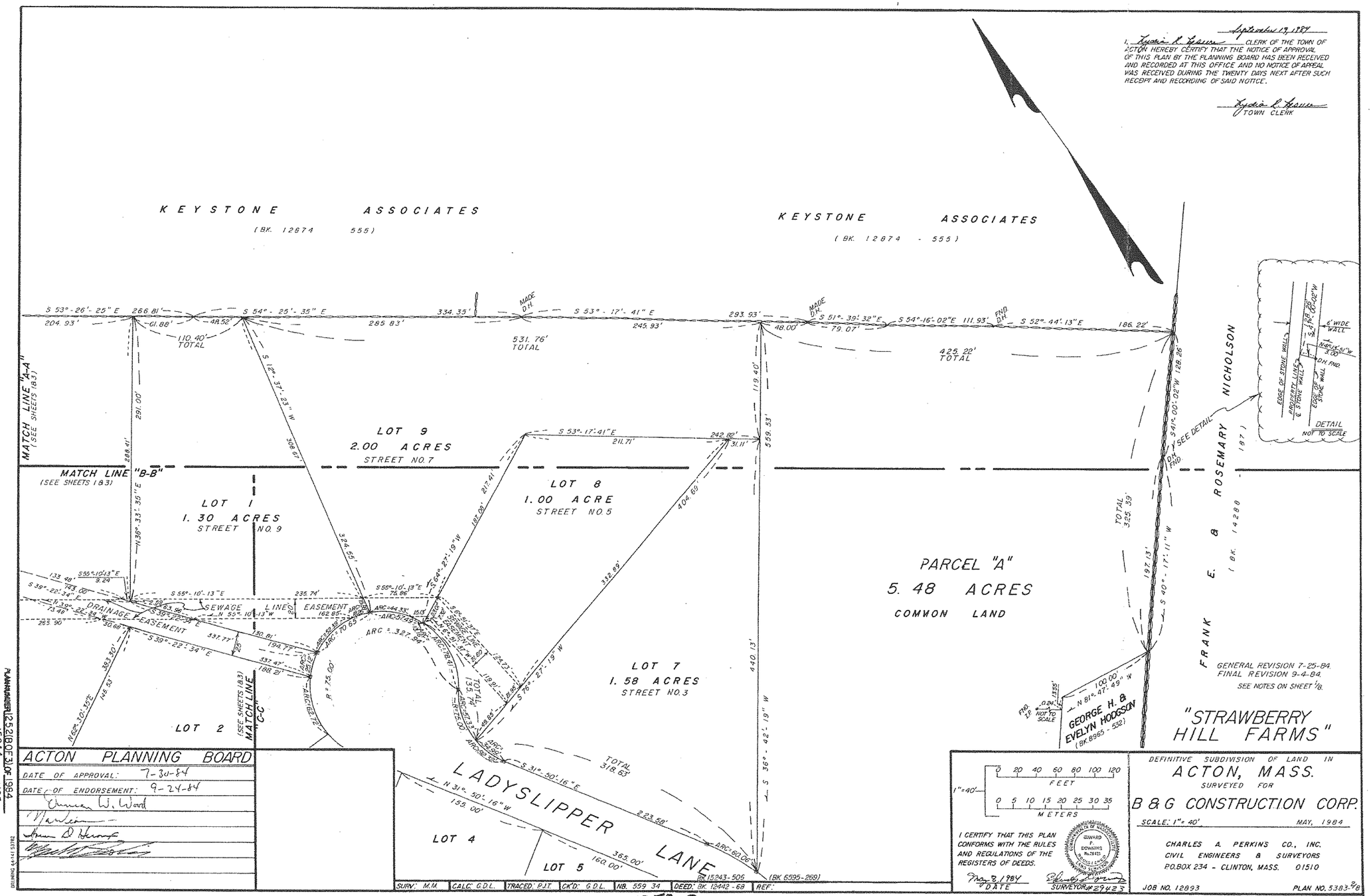
JOB NO. 12893 PLAN NO. 5383-1/8

1252 A-3

1252-1

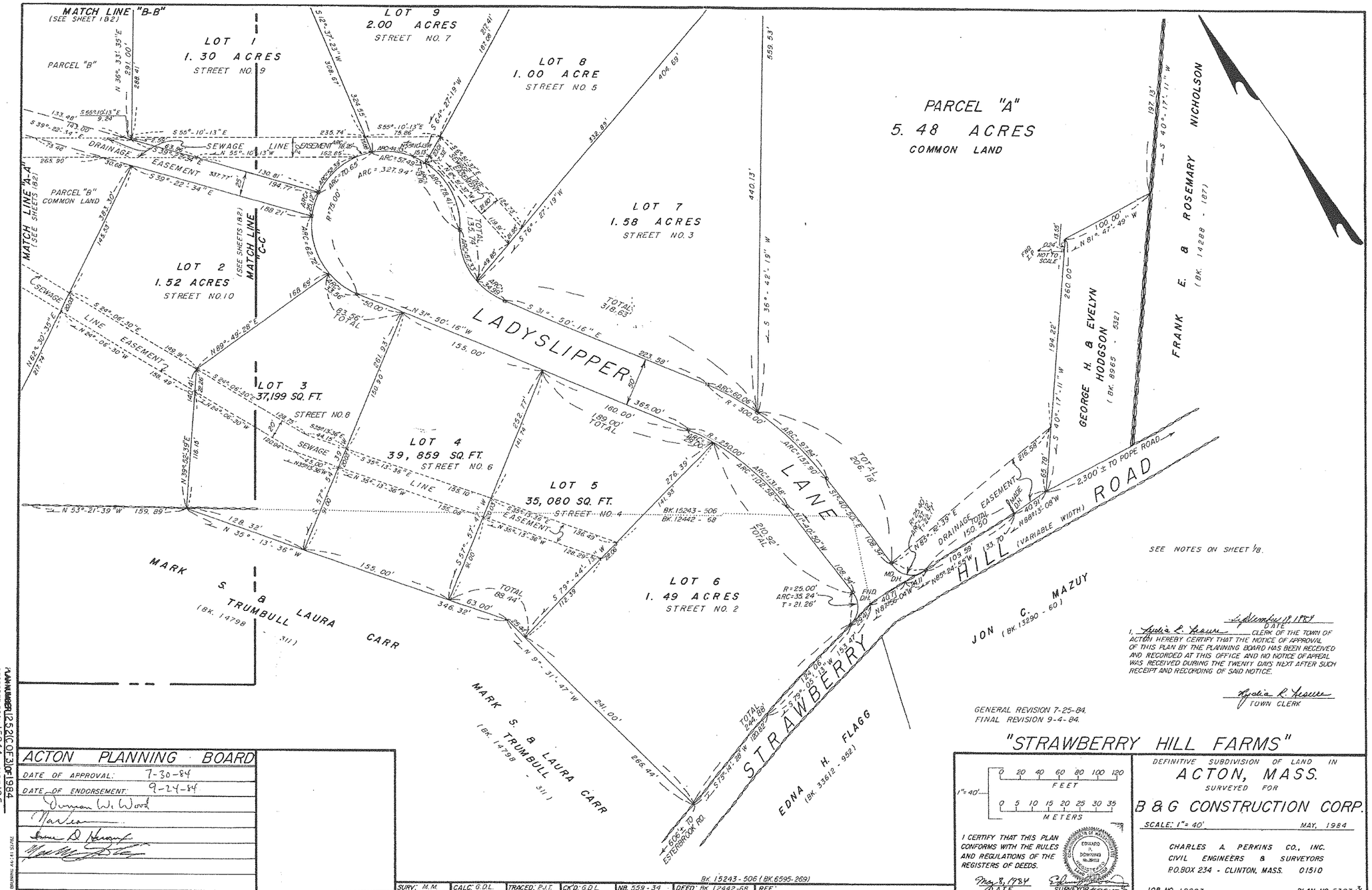
1252-5

1252 OF 1984


September 19, 1984
I, Lydia R. Gauss CLERK OF THE TOWN OF ACTON HEREBY CERTIFY THAT THE NOTICE OF APPROVAL OF THIS PLAN BY THE PLANNING BOARD HAS BEEN RECEIVED AND RECORDED AT THIS OFFICE AND NO NOTICE OF APPEAL WAS RECEIVED DURING THE TWENTY DAYS NEXT AFTER SUCH RECEIPT AND RECORDING OF SAID NOTICE.
Lydia R. Gauss
TOWN CLERK
KEYSTONE ASSOCIATES
(BK. 12874 555)
KEYSTONE ASSOCIATES
(BK. 12874 - 555)
MATCH LINE "A-A"
(SEE SHEETS 1&3)
MATCH LINE "B-B"
(SEE SHEETS 1&3)
MATCH LINE "C-C"
(SEE SHEETS 1&3)
LOT 9
2.00 ACRES
STREET NO. 7
LOT 8
1.00 ACRE
STREET NO. 5
LOT 1
1.30 ACRES
STREET NO. 9
LOT 7
1.58 ACRES
STREET NO. 3
LOT 2
LOT 4
LOT 5
LADYSLIPPER LANE
PARCEL "A"
5.48 ACRES
COMMON LAND
FRANK E. & ROSEMARY NICHOLSON
(BK. 14288 - 187)
GEORGE H. & EVELYN HODGSON
(BK. 8965 - 532)
DRAINAGE EASEMENT
SEWAGE LINE EASEMENT
SEE DETAIL
DETAIL
NOT TO SCALE
GENERAL REVISION 7-25-84.
FINAL REVISION 9-4-84.
SEE NOTES ON SHEET 1/8.
"STRAWBERRY HILL FARMS"
ACTON PLANNING BOARD
DATE OF APPROVAL: 7-30-84
DATE OF ENDORSEMENT: 9-24-84
1"=40'
FEET
METERS
I CERTIFY THAT THIS PLAN CONFORMS WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.
May 8, 1984
DATE
SURVEYOR #29423
DEFINITIVE SUBDIVISION OF LAND IN
ACTON, MASS.
SURVEYED FOR
B & G CONSTRUCTION CORP.
SCALE: 1"= 40'
MAY, 1984
CHARLES A. PERKINS CO., INC.
CIVIL ENGINEERS & SURVEYORS
P.O. BOX 234 - CLINTON, MASS. 01510
JOB NO. 12893
PLAN NO. 5383-2/8
SURV: M.M.
CALC: G.D.L.
TRACED: P.J.T.
CK'D: G.D.L.
NB. 559 34
DEED: BK. 12442-68
REF:
PLANNING BOARD 1252(B OF 3) OF 1984
RECORDED BOOK 15844 PAGE 195

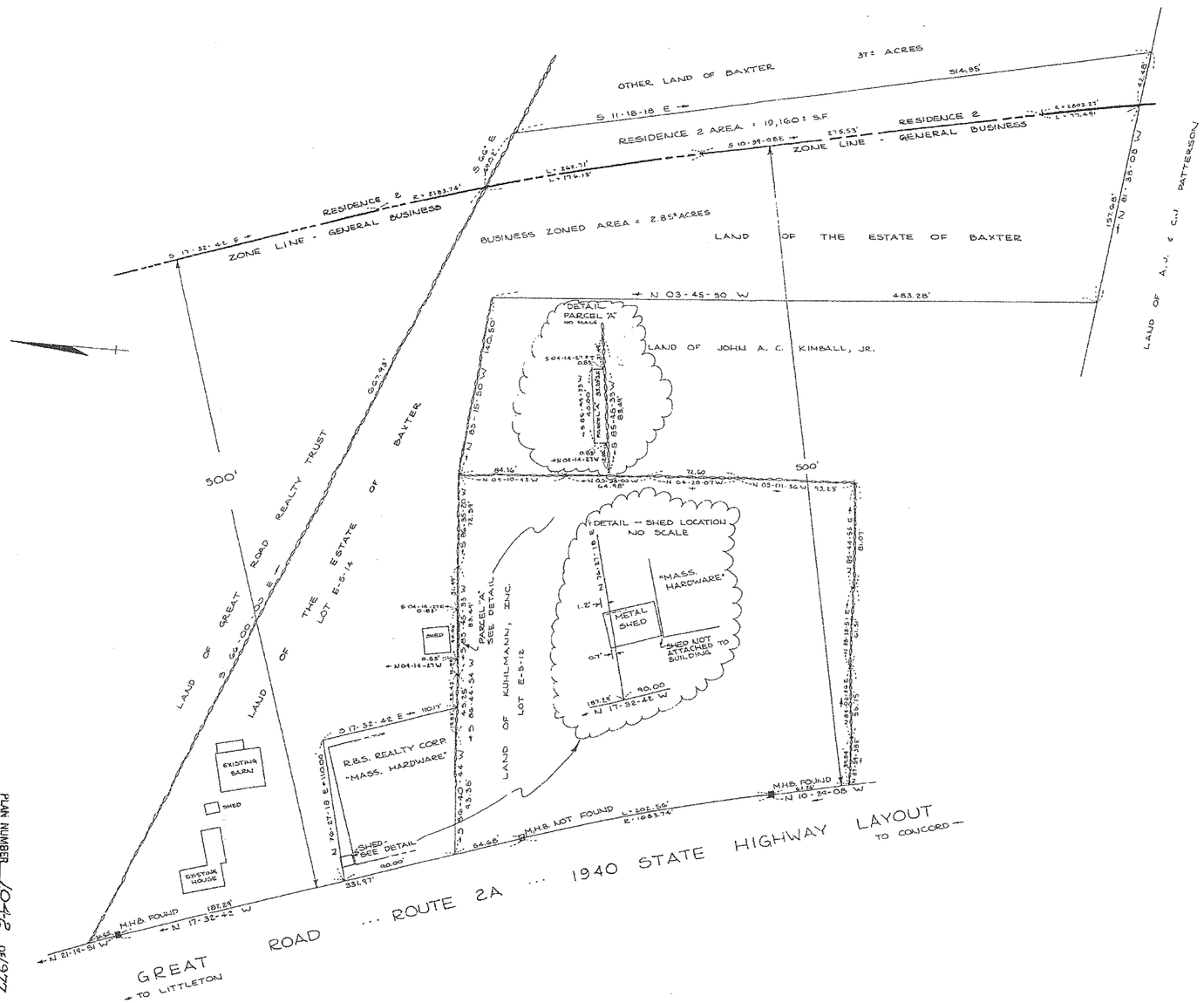
1252 B

1252-2


MATCH LINE "B-B"
(SEE SHEET 1&2)
PARCEL "B"
LOT 1
1.30 ACRES
STREET NO. 9
LOT 9
2.00 ACRES
STREET NO. 7
LOT 8
1.00 ACRE
STREET NO. 5
PARCEL "A"
5.48 ACRES
COMMON LAND
LOT 7
1.58 ACRES
STREET NO. 3
LOT 2
1.52 ACRES
STREET NO. 10
MATCH LINE "A-A"
(SEE SHEETS 1&2)
MATCH LINE "C-C"
(SEE SHEETS 1&2)
PARCEL "B"
COMMON LAND
DRAINAGE EASEMENT
SEWAGE LINE EASEMENT
LADYSLIPPER LANE
LOT 3
37,199 SQ. FT.
STREET NO. 8
LOT 4
39,859 SQ. FT.
STREET NO. 6
LOT 5
35,080 SQ. FT.
STREET NO. 4
LOT 6
1.49 ACRES
STREET NO. 2
MARK S. & LAURA CARR
(BK. 14798 - 311)
MARK S. & LAURA CARR
(BK. 14798 - 311)
STRAWBERRY HILL ROAD
(VARIABLE WIDTH)
2,300' ± TO POPE ROAD
JON C. MAZUY
(BK. 13290 - 60)
EDNA H. FLAGG
(BK. 33612 - 952)
606' ± TO ESTERBROOK RD.
GEORGE H. & EVELYN HODGSON
(BK. 8965 - 532)
FRANK E. & ROSEMARY NICHOLSON
(BK. 14288 - 187)
SEE NOTES ON SHEET 1/8.
GENERAL REVISION 7-25-84.
FINAL REVISION 9-4-84.
"STRAWBERRY HILL FARMS"
DEFINITIVE SUBDIVISION OF LAND IN
ACTON, MASS.
SURVEYED FOR
B & G CONSTRUCTION CORP.
SCALE: 1" = 40'
MAY, 1984
CHARLES A. PERKINS CO., INC.
CIVIL ENGINEERS & SURVEYORS
P.O. BOX 234 - CLINTON, MASS. 01510
JOB NO. 12893
PLAN NO. 5383-3/8
FEET
METERS
1" = 40'
I CERTIFY THAT THIS PLAN CONFORMS WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.
May 8, 1984
DATE
SURVEYOR
BK. 15243 - 506 (BK. 6595 - 269)
SURV: M.M.
CALC: G.D.L.
TRACED: P.J.T.
CK'D: G.D.L.
NB. 559 - 34
DEED: BK. 12442 - 68
REF:
ACTON PLANNING BOARD
DATE OF APPROVAL: 7-30-84
DATE OF ENDORSEMENT: 9-24-84
PLAN NUMBER 1252 (C OF 3) OF 1984
RECORDED BOOK 15844 PAGE 195

1252 C

1252-3



PLAN REFERENCE: SEE PLAN OF LAND IN ACTON, MASSACHUSETTS, OWNED BY: THE ESTATE OF BAXTER, R.H. NELSON CIVIL ENGINEERS, 144 SUDBURY RD., CONCORD, MASS., SCALE 1" = 40', MARCH 24, 1977.

PARCEL "A" TO BE CONVEYED TO THE OWNER OF LOT E-5-12.

APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED
ACTON PLANNING BOARD

Doris V. Sherman

DATE: September 12, 1977

I CERTIFY THAT THE PREPARATION OF THIS PLAN CONFORMS WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS DATED JUNE 19, 1975.

Henry E. Schofield REG. LAND SURVEYOR.

DATE: September 12, 1977

SCALE: 1" = 40'

0 20 40 80 160 FEET
0 5 10 20 40 METERS

HENRY E. SCHOFIELD JR. No. 2832 REGISTERED LAND SURVEYOR

COMPILED PLAN OF LAND IN
ACTON, MASS.
SCALE: 1" = 40' SEPTEMBER 12, 1977
SCHOFIELD BROTHERS, INC.
REGISTERED LAND SURVEYORS
1071 WORCESTER RD., FRAMINGHAM, MASS.

Fee 20.00
By. R.

Middlesex Registry of Deeds, So. Dist.
CAMBRIDGE, MASS.
Plan Number 1042 of 1977
Rec'd Sept. 19, 1977 at 9 hr 2 min. P.M.
With Deed Doc. No. 660
MARTHA ANDREWS EXTRX.
KUHLMANN INC.
Recorded, Book 13217 Page 484
Attest: John F. Zapatelli Register

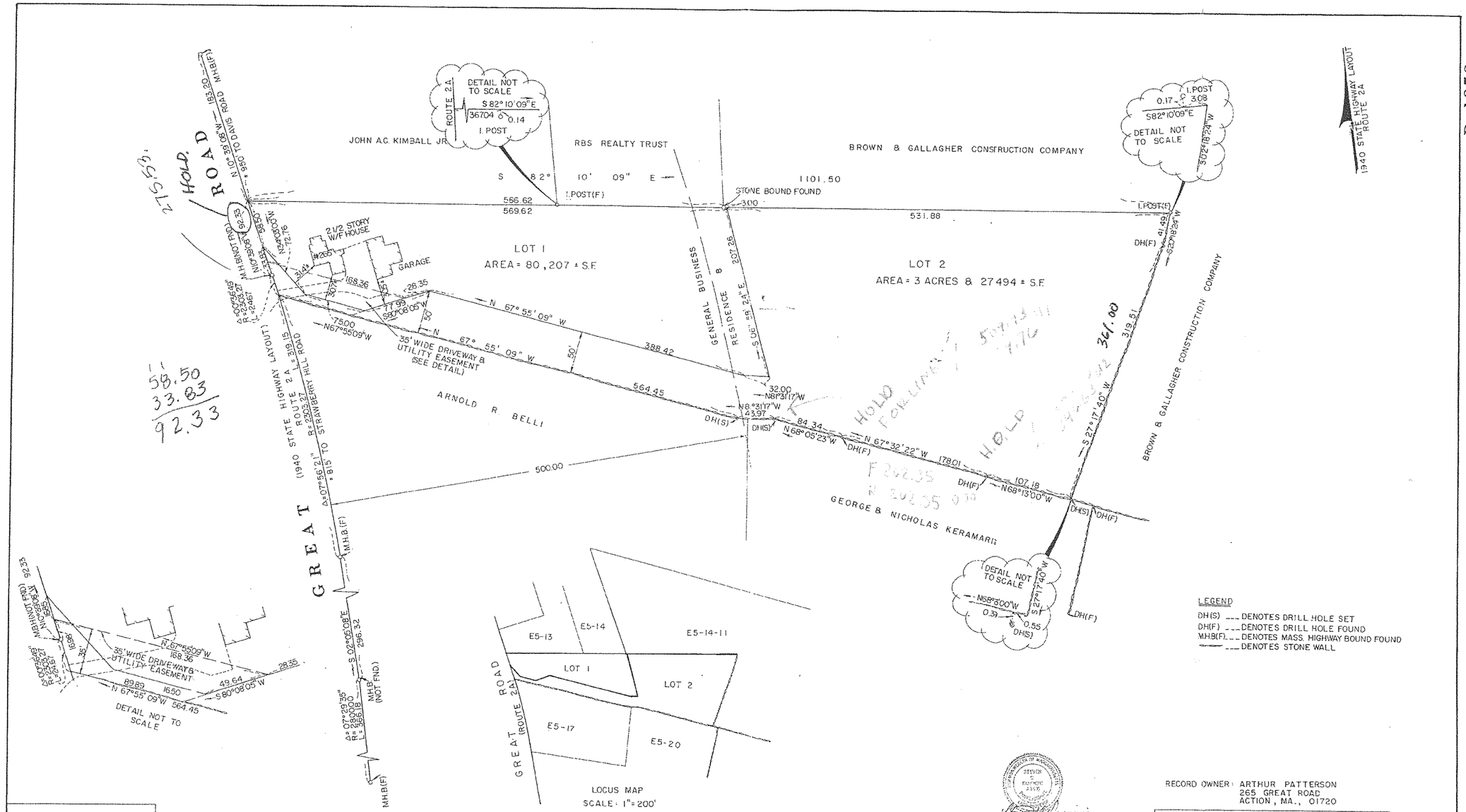
PLAN NUMBER 1042 OF 1977
RECORDED, BOOK 13217 PAGE 484

SEE ASSESSORS SHEET #E-5, LOTS #12 AND #14.

E-1347

E-1347

1042 of 1977



Middlesex Registry of Deeds, Southern District
Cambridge, Massachusetts
Plan No. 1081 of 1988
Rec'd 8-15 1988
at 12h 58m P.m Doc No 467
Rec'd, Bk 19266 Page 363
Attest [signature] Register

RESEARCH BY: RJM
FIELD CHIEF: RJM
COMPUTED BY: SGD
DRAFTED BY: DAE
CHECKED BY: SGD
APPROVED BY: SGD

ASSESSORS MAP: E5 PARCEL: 18
ZONING DISTRICT: GENERAL BUSINESS RESIDENCE 8

Reference: Board of Appeals Decision June 9, 1988.

APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.
ACTON PLANNING BOARD.
Peter C. Gourd
Assistant Town Planner

DATE: June 27, 1988

"I CERTIFY THAT THE PREPARATION OF THIS PLAN RULES AND REGULATIONS OF THE REGISTERS OF DEEDS, DATED JANUARY 1, 1976.
[signature] 1/6/88
PROFESSIONAL LAND SURVEYOR DATE

RECORD OWNER: ARTHUR PATTERSON
265 GREAT ROAD
ACTION, MA., 01720

PLAN OF LAND IN
ACTON, MASS.
PREPARED FOR: ARTHUR PATTERSON
SCALE: 1"=50' JANUARY 6, 1988
SCHOFIELD BROTHERS INC
PROFESSIONAL LAND SURVEYORS & ENGINEERS
626 MAIN STREET — BOLTON, MASS., 01740

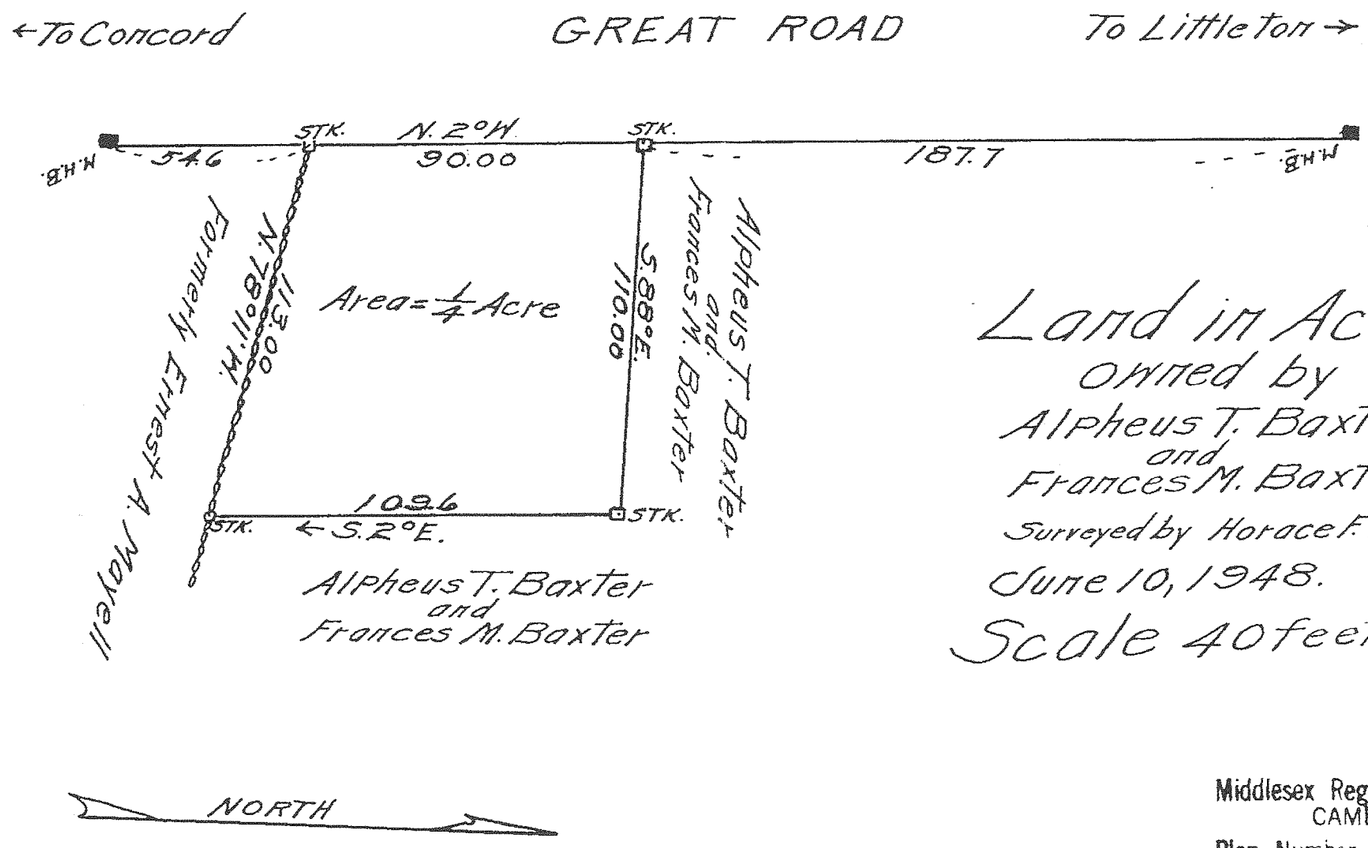
0 25 50 100 200 FEET
0 5 10 20 40 60 METERS

B-1272

TM 1081

1081 of 1988

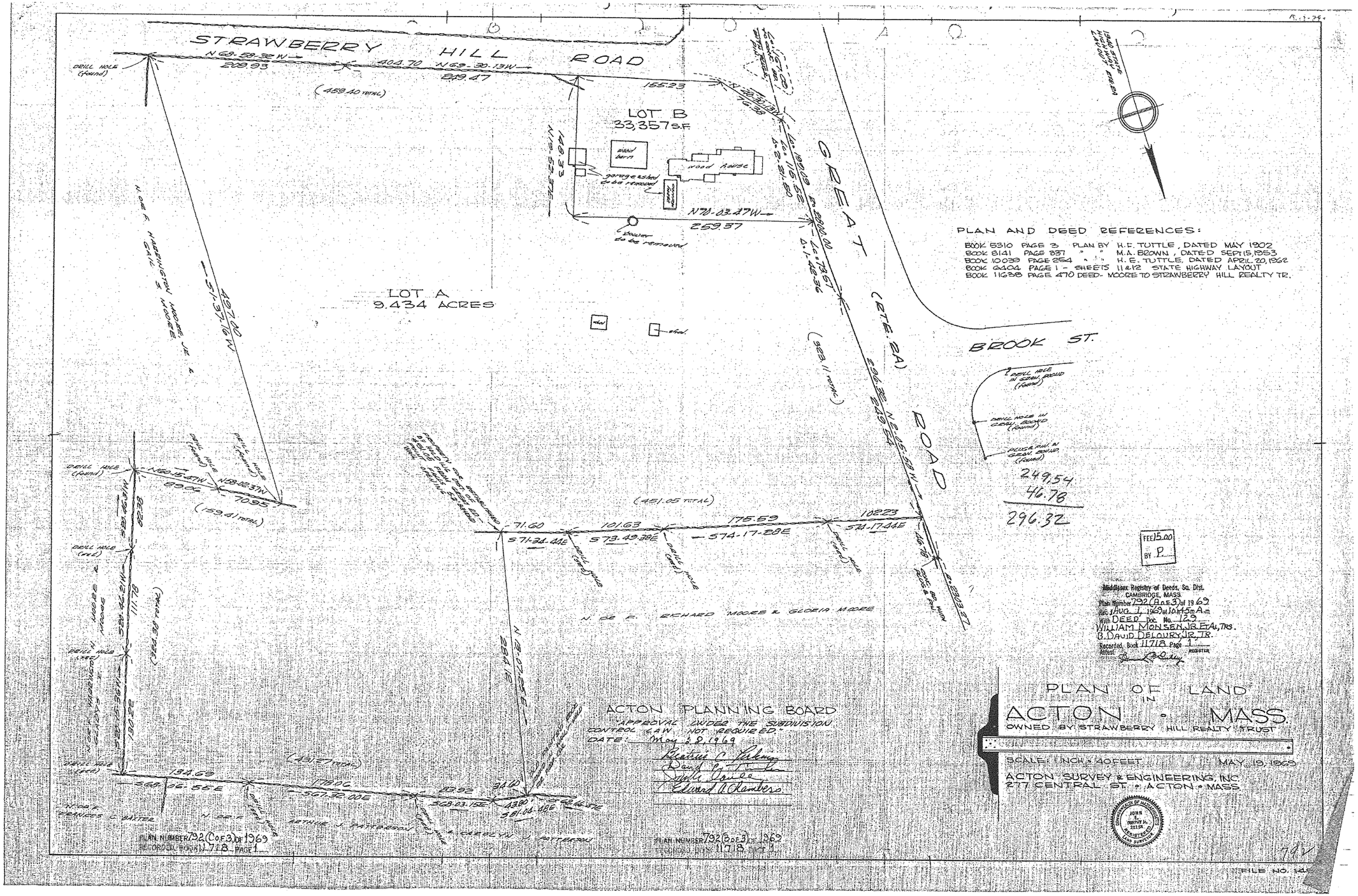
10-41-21 1883 2981

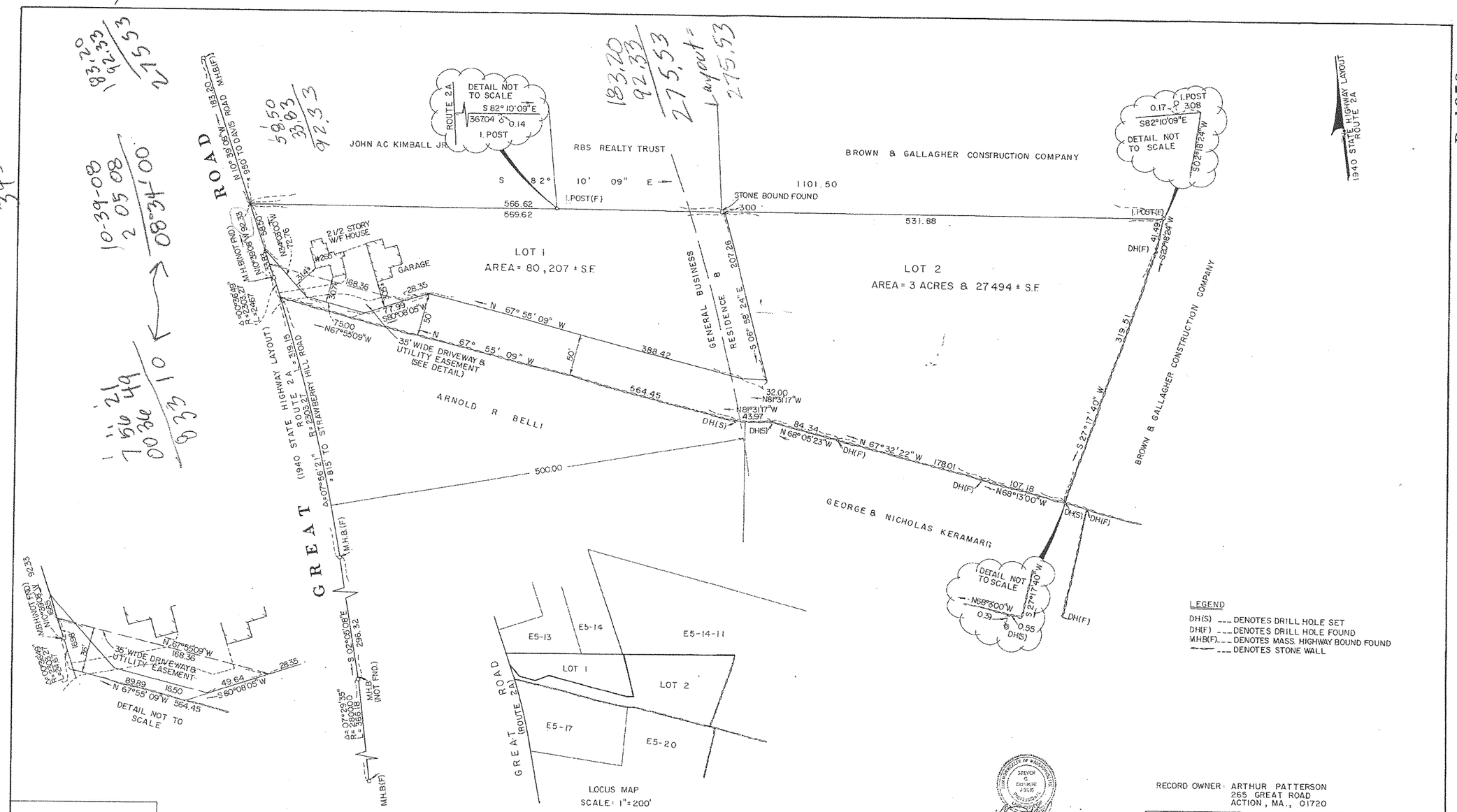


Land in Acton
owned by
Alpheus T. Baxter
and
Frances M. Baxter
Surveyed by Horace F. Tuttle
June 10, 1948.
Scale 40 feet = 1 inch

Middlesex Registry of Deeds, So. Dist.
CAMBRIDGE, MASS.
Plan Number 883 of 1948
Rec'd July 13 1948 at 8 h 30 m A m
With Deed Doc. No. 10
Alpheus T. Baxter & Ux
William W. Bursaw et al
Recorded, Book 7309 Page 337
Attest: Albert T. Guthrie REGISTER

Plan Number 883 of 1948
Recorded, Bk. 7309 Pg. 337


STRAWBERRY HILL ROAD
N 69-59-32 W
209.93
404.70
N 69-30-13 W
819.47
(459.40 TOTAL)
DRILL HOLE (found)
155.23
LOT B
33,357 S.F.
wood barn
wood house
garage & shed to be removed
N 70-03-27 W
259.37
power to be removed
LOT A
9.434 ACRES
GREAT (RTE. 2A)
BROOK ST.
ROAD
PLAN AND DEED REFERENCES:
BOOK 5310 PAGE 3 PLAN BY H.F. TUTTLE, DATED MAY 1902
BOOK 8141 PAGE 337 " " M.A. BROWN, DATED SEPT 15, 1953
BOOK 10039 PAGE 254 " " H.E. TUTTLE, DATED APRIL 20, 1962
BOOK 6404 PAGE 1 - SHEETS 11 & 12 STATE HIGHWAY LAYOUT
BOOK 11638 PAGE 470 DEED- MOORE TO STRAWBERRY HILL REALTY TR.
249.54
46.78
296.32
FEE 15.00
BY P.
Middlesex Registry of Deeds, So. Dist.
CAMBRIDGE, MASS
Plan Number 732 (A of 3) of 1969
Aug. 1 Aug. 1, 1969 at 10:45 A.m.
With DEED Doc. No. 123
WILLIAM MONSEN, JR. ET AL, TRS.
B. DAVID DELOURY, JR. TR.
Recorded, Book 11718 Page 1
Attest: REGISTER
N. OF E. RICHARD MOORE & GLORIA MOORE
N. OF E. HERBERT HOOPER, JR. & CAROL S. HOOPER
N. OF E. ARTHUR J. PATTERSON
N. OF E. CHARLES J. PATTERSON
N. OF E. FRANCIS C. WINTER
ACTON PLANNING BOARD
"APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED"
DATE: May 28, 1969
Beatrice C. Tolkoff
David G. Tuttle
John Gowle
Edward A. Chambers
PLAN NUMBER 732 (C of 3) of 1969
RECORDED BOOK 11718 PAGE 1
PLAN NUMBER 732 (B of 3) of 1969
RECORDED BOOK 11718 PAGE 1
PLAN OF LAND
IN
ACTON • MASS.
OWNED BY: STRAWBERRY HILL REALTY TRUST
SCALE: 1 INCH = 40 FEET
MAY 19, 1969
ACTON SURVEY & ENGINEERING, INC.
277 CENTRAL ST. • ACTON • MASS.
COMMONWEALTH OF MASSACHUSETTS
JOHN E. DOUCETTE
REGISTERED LAND SURVEYOR
FILE NO. 145



Middlesex Registry of Deeds
Southern District
Cambridge, Massachusetts
Plan No. 1081 of 1988
Rec'd 8-15 1988
at 12h 58m P.m Doc No. 467
Rec'd, Bk 19266 Page 363
Attest
Register

RESEARCH BY: RJM
FIELD CHIEF: RJM
COMPUTED BY: SGD
DRAFTED BY: DAE
CHECKED BY: SGD
APPROVED BY: SGD

ASSESSORS MAP: E5 PARCEL: 18
ZONING DISTRICT: GENERAL BUSINESS
RESIDENCE 8

Reference: Board of Appeals Decision June 9, 1988.

APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.
ACTON PLANNING BOARD.
Peter C. Lowell
Assistant Town Planner
DATE: June 27, 1988

"I CERTIFY THAT THE PREPARATION OF THIS PLAN RULES AND REGULATIONS OF THE REGISTERS OF DEEDS, DATED JANUARY 1, 1976.
PROFESSIONAL LAND SURVEYOR — DATE

RECORD OWNER: ARTHUR PATTERSON
265 GREAT ROAD
ACTION, MA., 01720

PLAN OF LAND IN
ACTON, MASS.
PREPARED FOR: ARTHUR PATTERSON
SCALE: 1" = 50' JANUARY 6, 1988
SCHOFIELD BROTHERS INC
PROFESSIONAL LAND SURVEYORS & ENGINEERS
626 MAIN STREET — BOLTON, MASS., 01740

0 25 50 100 200 FEET
0 5 10 20 40 60 METERS

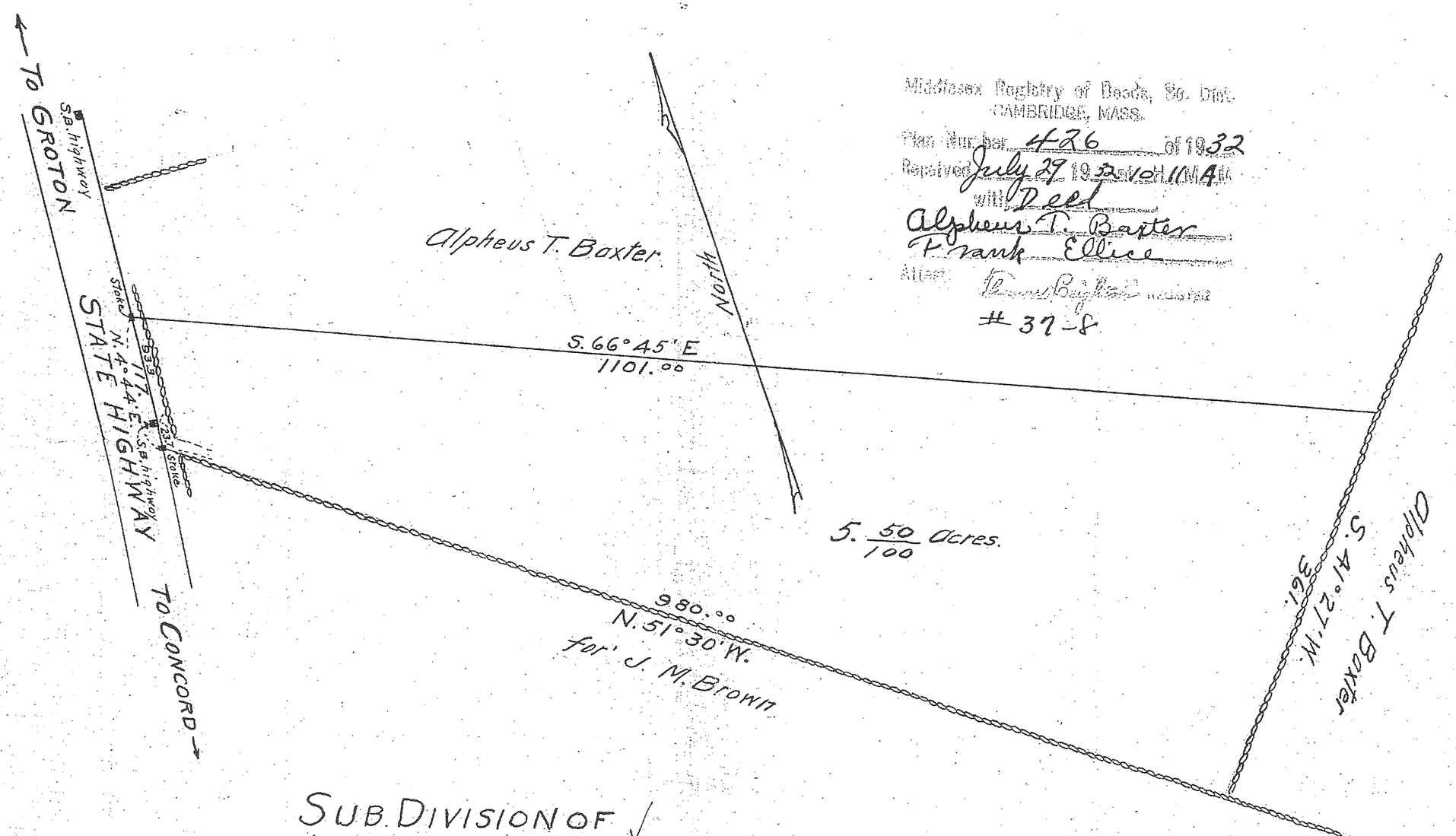
B-1272

1081

B-1272

1081 of 88

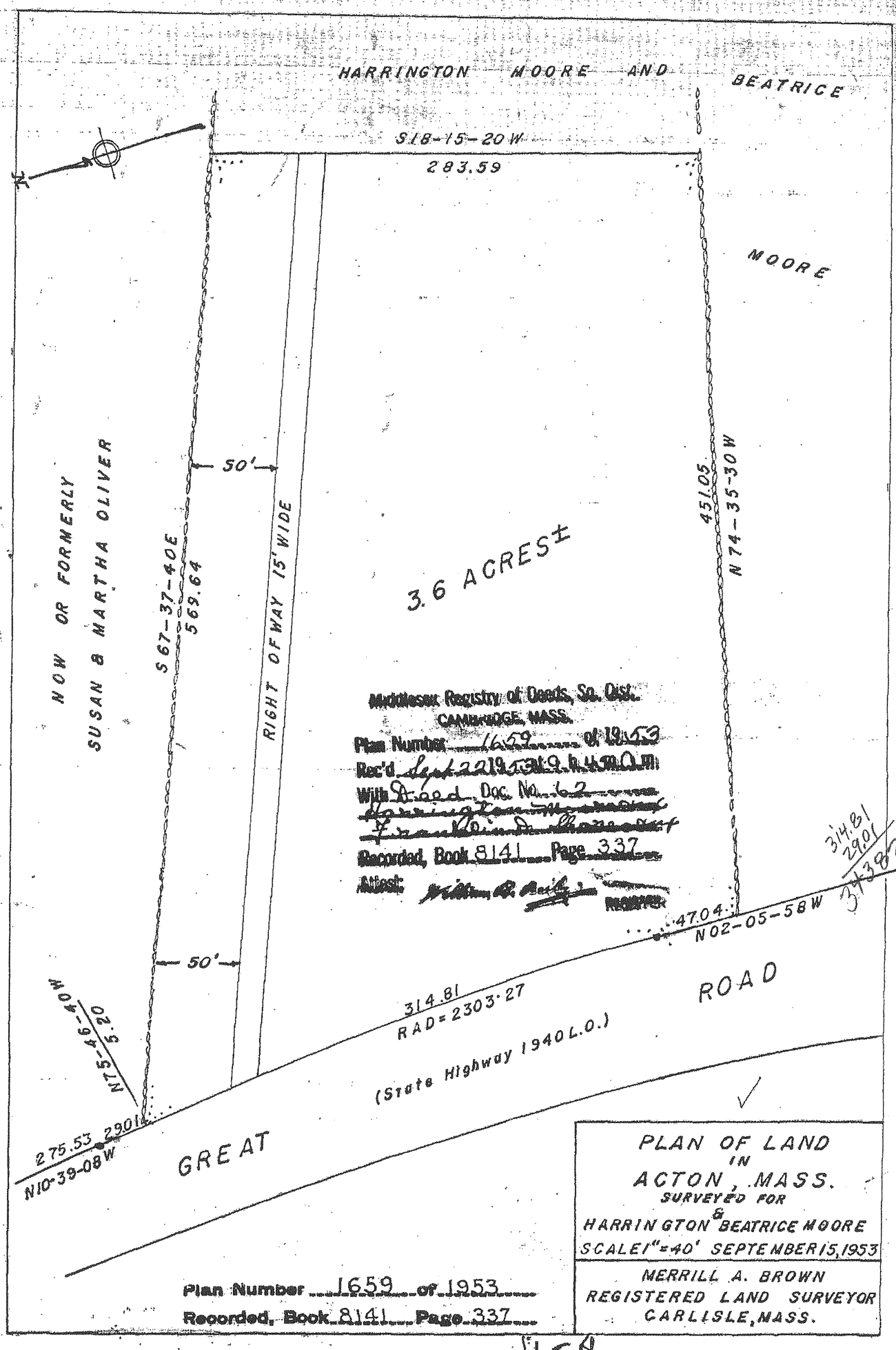
Middlesex Registry of Deeds, So. Dist.
CAMBRIDGE, MASS.
Plan Number 426 of 1932
Received July 27 1932 at 10 H 11 M A.M.
with Deed
Alpheus T. Baxter
Frank Ellice
Attest
#37-8



SUB. DIVISION OF
LAND IN ACTON
Surveyed for
Alpheus T. Baxter
By Horace F. Tuttle
July 16. 1932
Scale 100 feet = 1 inch

426

426 of 32



1659 of 53

1659

RECORD OWNER

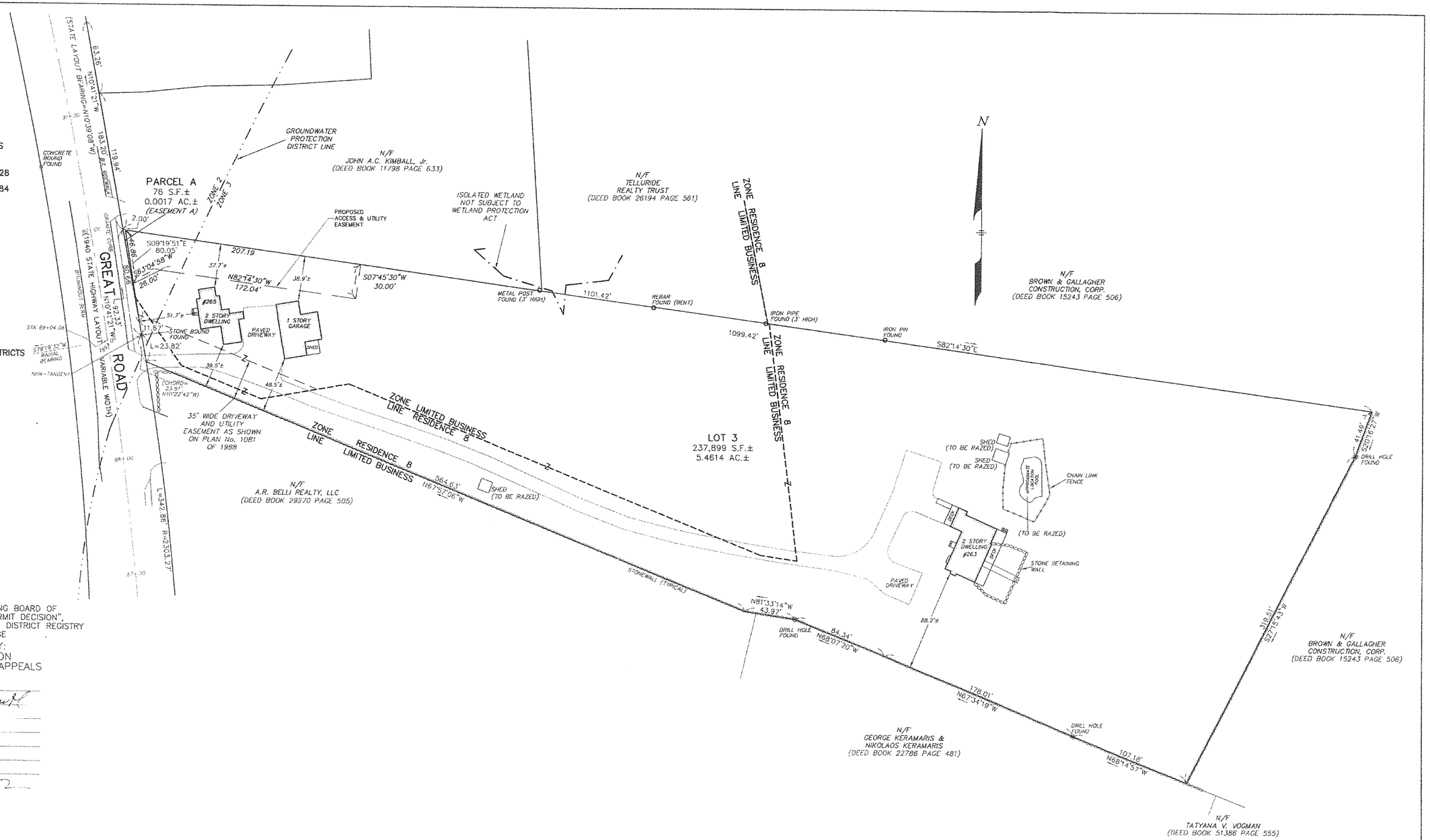
ANTHONY J. RUGGIERO, JR.
263 GREAT ROAD
ACTON, MA

REFERENCE

MIDDLESEX REGISTRY OF DEEDS
SOUTH DISTRICT
TOWN MAP E5 PARCEL 18
DEED BOOK 33151 PAGE 328
TOWN MAP E5 PARCEL 18-1
DEED BOOK 31244 PAGE 284
PLAN No. 426 OF 1932
PLAN No. 269 OF 1933
PLAN No. 521 OF 1940
PLAN No. 80 OF 1948
PLAN No. 883 OF 1948
PLAN No. 1659 OF 1953
PLAN No. 792 OF 1969
PLAN No. 1042 OF 1977
PLAN No. 1252 OF 1984
PLAN No. 1081 OF 1988

ZONING DISTRICT

RESIDENCE 8
LIMITED BUSINESS
GROUNDWATER PROTECTION DISTRICTS
ZONES 2 AND 3



SEE "TOWN OF ACTON ZONING BOARD OF APPEALS COMPREHENSIVE PERMIT DECISION", RECORDED WITH MIDDLESEX SOUTH DISTRICT REGISTRY OF DEEDS IN BOOK , PAGE .

APPROVED BY:
TOWN OF ACTON
ZONING BOARD OF APPEALS

Roland D. Bartl

Nov. 5, 2012
DATE

NOTES:

1.) THIS PLAN IS BASED ON AN ON THE GROUND SURVEY. THE CERTIFICATION HEREON IS INTENDED TO MEET THE REQUIREMENTS OF THE REGISTRY OF DEEDS ONLY, AND IS NOT CERTIFICATION TO THE TITLE OR OWNERSHIP OF THE PROPERTY SHOWN, OR AS TO THE EXISTENCE OF RECORDED OR UNRECORDED EASEMENTS. OWNERSHIP OF ABUTTING PROPERTIES ARE FROM CURRENT ASSESSOR'S RECORDS.

2.) PARCEL A IS NOT A LEGAL BUILDING LOT. IT IS SHOWN FOR CONVEYANCE PURPOSES.

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMITY WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS OF THE COMMONWEALTH OF MASSACHUSETTS.

9/10/12
DATE

REGISTERED PROFESSIONAL LAND SURVEYOR

THE MEADOWS AT ACTON
COMPREHENSIVE PERMIT
ACTON, MASSACHUSETTS
(MIDDLESEX COUNTY)

RECORD PLAN

FOR: 263 GREAT ROAD, LLC.
SCALE: 1"=40' MARCH 29, 2012
REVISED: SEPTEMBER 10, 2012

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

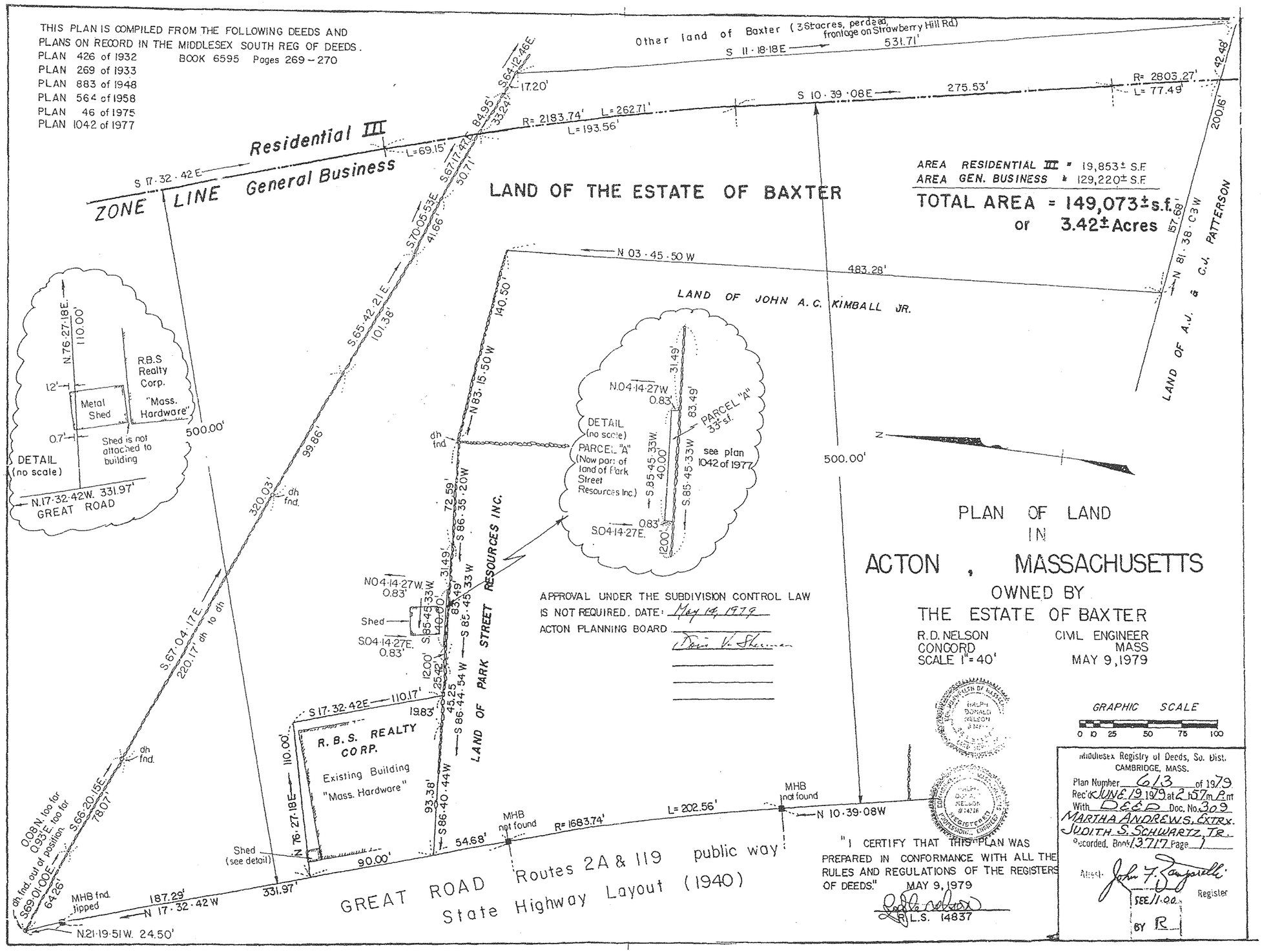
0 10 20 40 60 80 FT

SM-4810 (4810RECORD 1.DWG) SHEET 3 OF 10

COMMONWEALTH OF MASSACHUSETTS
GEORGE DIMAKARAKOS
CIVIL
No. 41281
REGISTERED PROFESSIONAL ENGINEER

COMMONWEALTH OF MASSACHUSETTS
JOSEPH MARCH
35384
PROFESSIONAL LAND SURVEYOR

THIS PLAN IS COMPILED FROM THE FOLLOWING DEEDS AND PLANS ON RECORD IN THE MIDDLESEX SOUTH REG OF DEEDS.
PLAN 426 of 1932 BOOK 6595 Pages 269 – 270
PLAN 269 of 1933
PLAN 883 of 1948
PLAN 564 of 1958
PLAN 46 of 1975
PLAN 1042 of 1977



PLAN NUMBER 613 OF 1979
RECORDED, BOOK 13717 PAGE 1

613 of 79

3.6 DRAINAGE CALCULATIONS
for
267 Great Road
Acton, MA

PREPARED FOR:

Acton Management, Inc.
69 Great Road
Acton, MA 01720

PREPARED BY:

Stamski and McNary, Inc.
1000 Main Street
Acton, MA 01720

Engineering-Planning-Surveying

Table of Contents

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Drainage Maps

Narrative

STORMWATER MANAGEMENT

The site is located at 267 Great Road in Acton, Massachusetts and is approximately 2.26 acres in size and has been previously developed. There is an existing dwelling with a gravel loop driveway, two sheds, and a detached garage located on the site. The Natural Resource Conservation Service (N.R.C.S.) soil survey report for Middlesex County and associated soil map for Acton indicates that soils located on the site are Merrimac-Urban Land Complex and Hinckley Loamy Sand. Merrimac-Urban Land Complex and Hinckley Loamy Sand are in Hydrologic Group A.

Pre-Development

The site is comprised of 4 separate subcatchments. Subcatchment E1 is located to the southeast and contains a portion of the existing dwelling, a shed, and a portion of the existing gravel driveway. This subcatchment drains to the Isolated Wetland on-site. Subcatchment E2 is an entirely wooded area located to the northeast that drains off-site to the east. Subcatchment E3 is located in the northern portion of the site and contains a large area of woods and a portion of the existing dwelling and gravel driveway. This subcatchment drains off-site to the west. Subcatchment E4 contains a portion of the existing dwelling and gravel driveway and lawn and wooded areas. This subcatchment drains to a depression on-site where it is infiltrated. The subcatchments can be seen on the attached drainage maps.

Post-Development

The fully developed site will consist of the proposed office building, paved driveway, paved parking lot, and walkways. The post-development site has been divided into four subcatchments. Subcatchment P1 remains largely unchanged with the exception of the removal of the existing dwelling. The subcatchment drains to the Isolated Wetland located in the southeast corner of the site. Subcatchment P2 relates to subcatchment E2 and remains unchanged. Subcatchment P3 will also remain largely unchanged with the exception of the removal of the existing dwelling. Subcatchment P4 contains the area being developed. The runoff in this subcatchment will flow to 2 deep sump hooded catch basins and a deep sump hooded drop inlet before flowing to Contech CDS2015-4 units for pretreatment. The runoff will then be infiltrated in subsurface infiltration chambers.

This project would qualify as a "Redevelopment Project" as defined by the Stormwater Management Standards but all standards have been met. The following describes the drainage system and the projects compliance with the Stormwater Management Standards.

Standard #1 Untreated direct discharge of Stormwater:

No new direct discharges of untreated stormwater are proposed. The overland discharge to the east, west, and southeast will remain and any additional runoff will be treated and infiltrated.

Standard #2 Post-Development Peak Discharge:

The Stormwater Management Policy requires that peak discharge rates for the 2-year and 10-year storm events not be increased from pre-development conditions. Furthermore, the 100-year storm event will not increase flooding impacts offsite.

Attenuation of peak discharge rates will be accomplished by using infiltration.

The following table summarizes the peak runoff rates to the overland flow discharge points.

Discharge Summary Table

E1 Compared to P1

2-Year Storm		10-year Storm		100-year Storm	
Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)
0.001	0.001	0.018	0.012	0.162	0.130

E2 Compared to P2

2-Year Storm		10-year Storm		100-year Storm	
Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)
0.000	0.000	0.000	0.000	0.003	0.003

E3 Compared to P3

2-Year Storm		10-year Storm		100-year Storm	
Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)
0.000	0.000	0.002	0.000	0.035	0.014

E4 Compared to P4

2-Year Storm		10-year Storm		100-year Storm	
Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)	Pre(cfs)	Post(cfs)
0.000	0.000	0.000	0.000	0.000	0.000

Detailed Calculations are attached.

Standard #3 Recharge to Groundwater:

This standard prescribes the stormwater volume that must be recharged to groundwater based on the existing site soil conditions. The Natural Resources Conservation Service (N.R.C.S.) Middlesex Soil Survey map indicates that the site contains soils in hydrologic group A. The stormwater management Policy requires 0.6 inches of runoff over the total impervious area to be recharged in areas with the respective soil groups. Furthermore the town's regulations require that the annual water budget is balanced to preserve groundwater supply. Detailed "Water Balance Calculations" showing compliance with this standard are attached.

Standard #4 80% TSS Removal:

According to the guidelines provided in the Stormwater Management Standards 80% Total Suspended Solids (TSS) removal is required for the total increase in impervious area associated with the project. This standard requires 1.0 inches of runoff from impervious surfaces to be treated when not in a critical area. Town Standards require 1.0 inch of runoff from impervious areas to be treated. Two proposed catchbasins, Contech CDS2015-4 inserts and subsurface infiltration structures will treat the water quality volume of 1.0 inch over the proposed impervious area. See "Water Quality Volume Calculation" attached. The combination will also remove 92.9% of TSS. See "TSS Removal Calculations".

Standard #5 Higher Potential Pollutant Loads:

The site is not considered to have a "Higher Potential Pollutant Load" as defined in the Stormwater Management Policy.

Standard #6 Protection of Critical Areas:

A portion of the site is located within a Zone II. The proposed BMPs will provide 44% TSS removal and treat the water quality volume prior to infiltration. The proposed BMPs have been determined by MassDEP to be suitable for use within a Zone II per Table CA 3.

Standard #7 Redevelopment Projects:

Although the existing site is developed and has been disturbed, the project has been designed to meet new construction standards. This standard would require that the Stormwater Management Standards be met to the extent practicable. The project has been designed to meet all of the standards.

Standard #8 Erosion/Sediment Control:

Erosion and sediment controls are incorporated into the project design to prevent erosion, control sediment movement, and stabilize exposed and disturbed soils during construction. Temporary erosion and sedimentation controls during construction include minimizing areas of exposed soil, directing and controlling runoff, and rapidly stabilizing exposed areas. Soils left exposed for extended periods will be mulched and seeded for temporary vegetative cover. Following construction, exposed areas will be permanently vegetated with appropriate ground cover. Erosion and sedimentation control measures will be maintained throughout all phases of construction. Inspections will be made regularly and after rainfalls exceeding 0.5 inches in a 24-hour period during construction. The contractor will be required to inspect erosion and sedimentation control measures at the end of each workday, when precipitation is forecasted, and after each rainfall. All measures will be inspected prior to each weekend. The contractor will replace and repair any malfunctioning or damaged control measures including vegetative stabilization.

Long term erosion and sedimentation control will be realized using the Best Management Practices described previously. Areas where soils have been disturbed will be loamed and vegetated with lawn, trees, and shrubs.

Standard #9 Operation and Maintenance Plan:

An Operation and Maintenance plan has been prepared and is shown on the plan set.

Standard #10 Illicit Discharges to Drainage System:

No known illicit discharges exist and none are proposed.

Design Basis

1. The rational method (Q=CIA) was used as a basis for sizing pipes. Runoff Coefficients: C=0.15 for woods, 0.20 for grass/landscaped areas, 0.76 for gravel, and 0.90 for impervious surfaces.
2. The 100-year storm was used for sizing pipes. Rainfall intensity values were taken from the U.S. Weather Bureau Technical Paper 40.
3. The United States Department of Agriculture Natural Resource Conservation Service (N.R.C.S.) TR55 methodology was used to determine offsite rates of runoff.
4. 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.
5. The hydrologic calculations were performed using the computer program: "Hydraflow Hydrographs 2007" by Intelisolve.
6. The soil types of the site were taken from the N.R.C.S. Soil Survey Map from nesoil.com.
7. Soil conditions and estimated seasonal high groundwater table were based on on-site soil evaluations.
8. The Hantoush Method was used for Mounding analysis.

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	0.001	2	1326	15	----	------	------	E1
2	SCS Runoff	0.000	2	n/a	0	----	------	------	E2
3	SCS Runoff	0.000	2	n/a	0	----	------	------	E3
4	SCS Runoff	0.000	2	n/a	0	----	------	------	E4
5	Reservoir	0.000	2	n/a	0	4	156.00	0.000	To Depression
6	Diversion1	0.000	2	n/a	0	5	------	------	Exfiltration
7	Diversion2	0.000	2	n/a	0	5	------	------	Overflow

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	0.018	2	746	255	----	------	------	E1
2	SCS Runoff	0.000	2	n/a	0	----	------	------	E2
3	SCS Runoff	0.002	2	1328	33	----	------	------	E3
4	SCS Runoff	0.012	2	892	322	----	------	------	E4
5	Reservoir	0.011	2	936	319	4	156.01	29.6	To Depression
6	Diversion1	0.011	2	936	319	5	------	------	Exfiltration
7	Diversion2	0.000	2	842	0	5	------	------	Overflow

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	0.058	2	740	501	----	------	------	E1
2	SCS Runoff	0.001	2	1326	10	----	------	------	E2
3	SCS Runoff	0.008	2	924	237	----	------	------	E3
4	SCS Runoff	0.052	2	748	801	----	------	------	E4
5	Reservoir	0.030	2	842	798	4	156.02	80.3	To Depression
6	Diversion1	0.030	2	842	798	5	------	------	Exfiltration
7	Diversion2	0.000	2	850	0	5	------	------	Overflow

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	0.162	2	730	944	----	------	------	E1
2	SCS Runoff	0.003	2	902	74	----	------	------	E2
3	SCS Runoff	0.035	2	754	793	----	------	------	E3
4	SCS Runoff	0.206	2	740	1,750	----	------	------	E4
5	Reservoir	0.088	2	774	1,747	4	156.05	236	To Depression
6	Diversion1	0.088	2	774	1,747	5	------	------	Exfiltration
7	Diversion2	0.000	2	902	0	5	------	------	Overflow

Worksheet 2: Runoff curve number and runoff **SM-4860**

Project: 267 Great Rd By JTM Date 6/27/14

Location: Acton, MA Checked _____ Date _____

Circle one: [Present] Developed E1

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
A	Woods	30			0.13	3.87
A	Open	39			0.14	5.34
	Impervious	98			0.03	2.45
A	Gravel	76			0.02	1.82
				Totals =	0.32	13.49

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{13.49}{0.32} = 42.82$; Use CN = 42.8

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	0.01	0.22	0.81
Runoff, Q.....	cf	15	252	931

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4860

Project: 267 Great Rd By JTM Date 6/27/2014

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed E1

Circle one: Tc Tt through subarea _____

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)			0.4	0.24		
3. Flow length, L (total L <= 300 ft)		ft	9	41		
4. Two-yr 24-hr rainfall, P2		in	3.1	3.1		
5. Land Slope, s		ft/ft	0.027	0.04		
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.05	0.09		0.14

Shallow concentrated Flow		Segment ID	C-D			
7. Surface Description (paved or unpaved)			unpaved			
8. Flow Length, L		ft	25			
9. Watercourse slope, s		ft/ft	0.06			
10. Average Velocity, V (figure 3-1)		ft/s	3.95			
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

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.14

min 8.3

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

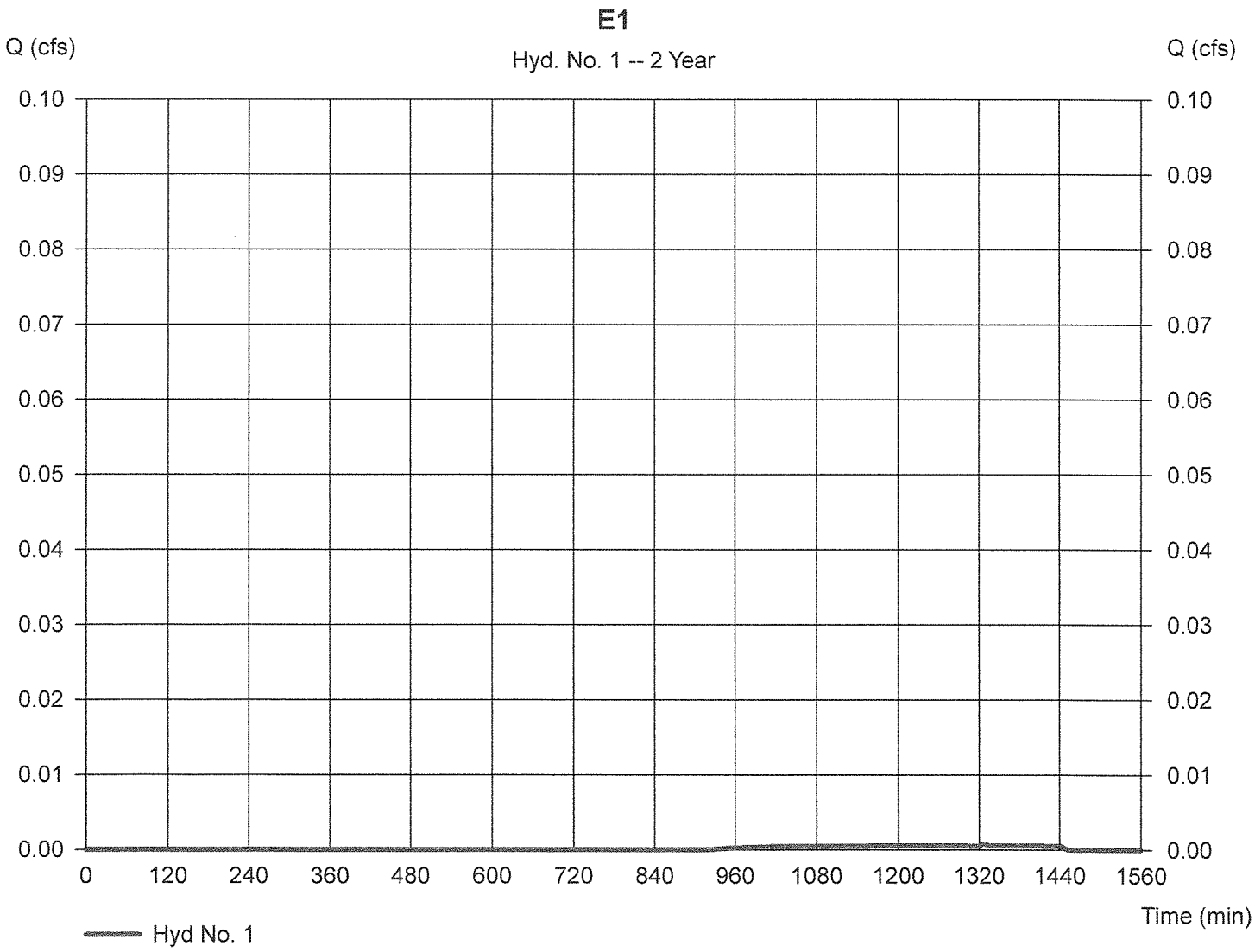
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 1

E1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 2 yrs	Time to peak	= 1326 min
Time interval	= 2 min	Hyd. volume	= 15 cuft
Drainage area	= 0.320 ac	Curve number	= 42.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.30 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



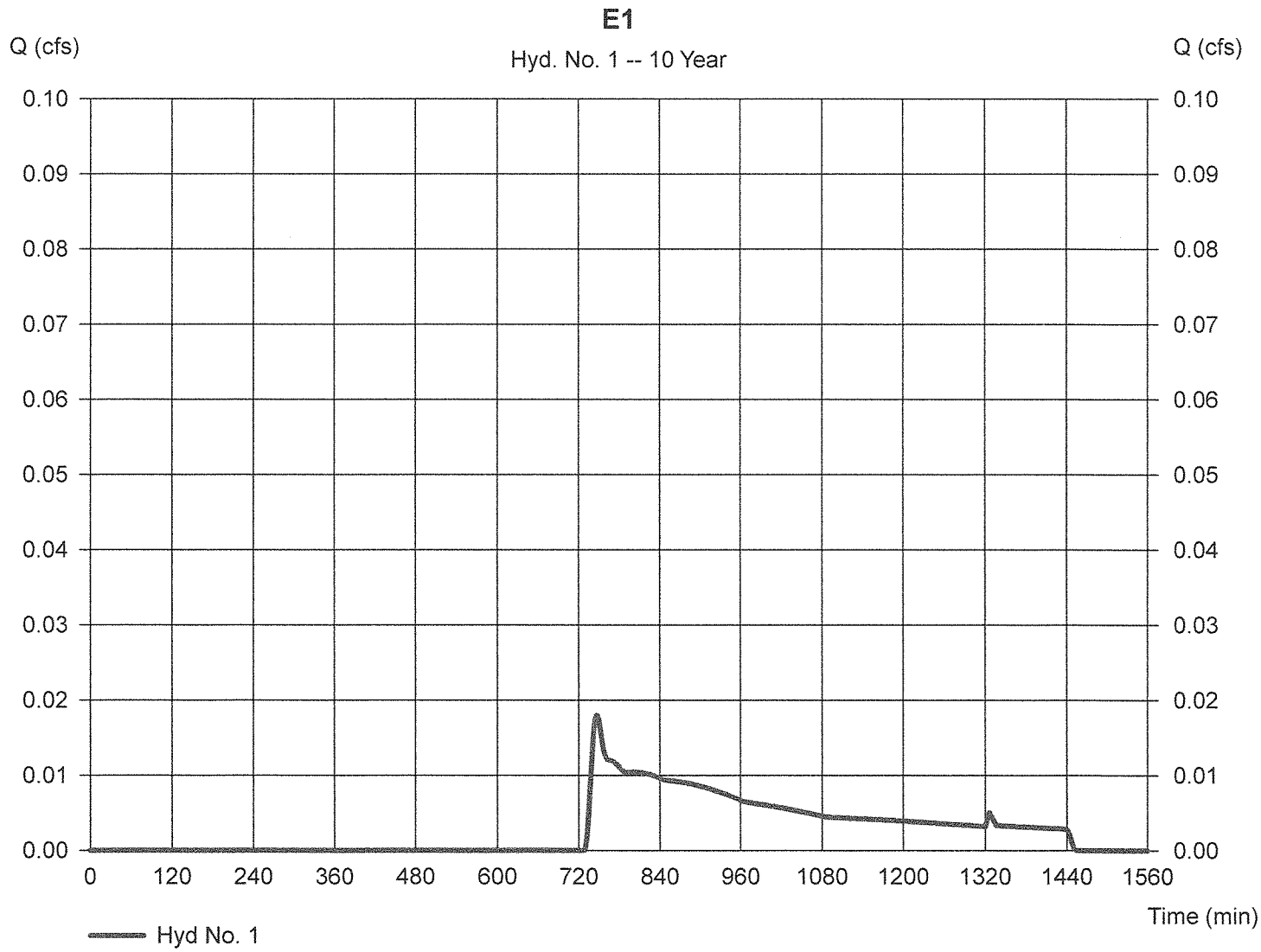
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 1

E1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.018 cfs
Storm frequency	= 10 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 255 cuft
Drainage area	= 0.320 ac	Curve number	= 42.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.30 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



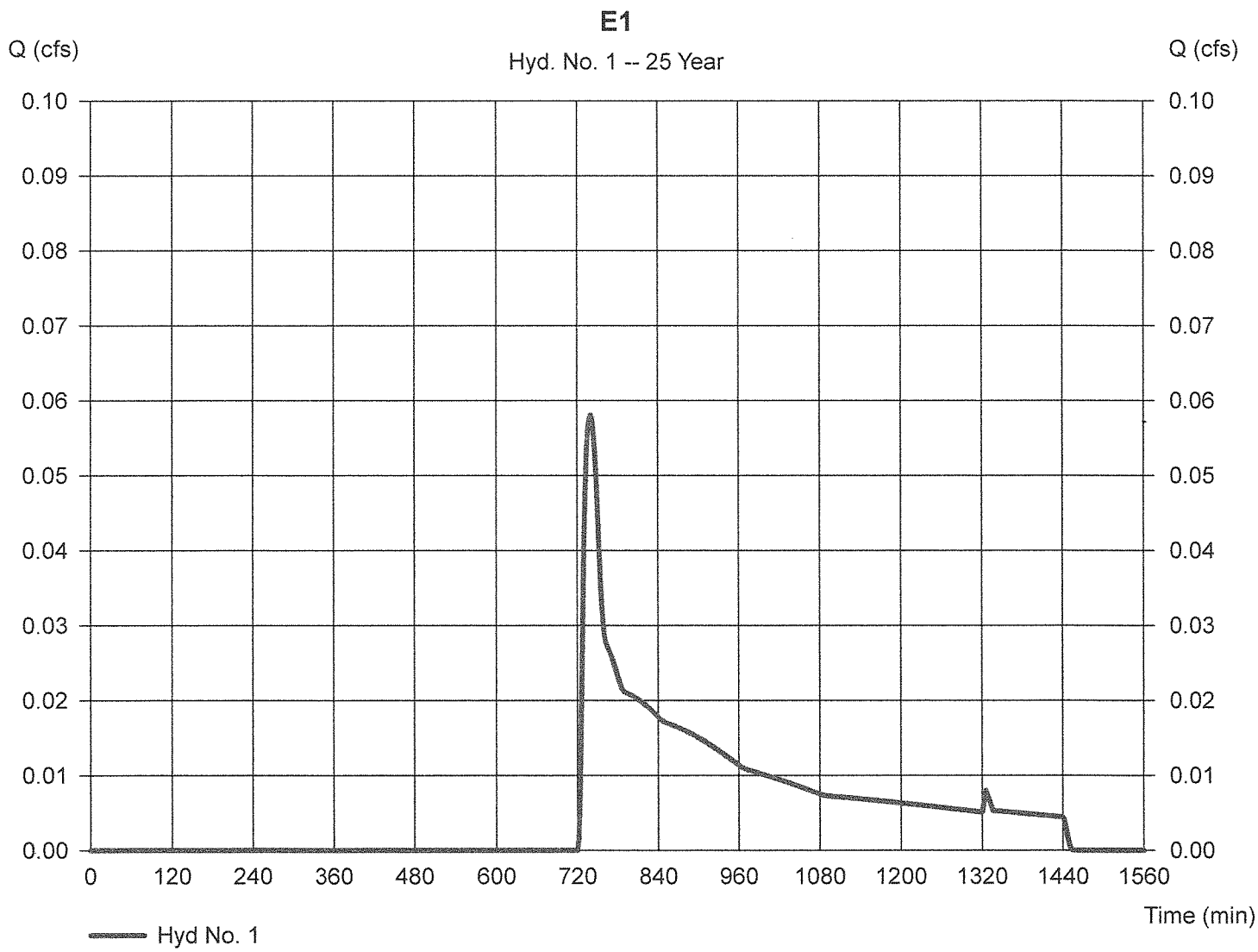
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 1

E1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.058 cfs
Storm frequency	= 25 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 501 cuft
Drainage area	= 0.320 ac	Curve number	= 42.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.30 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



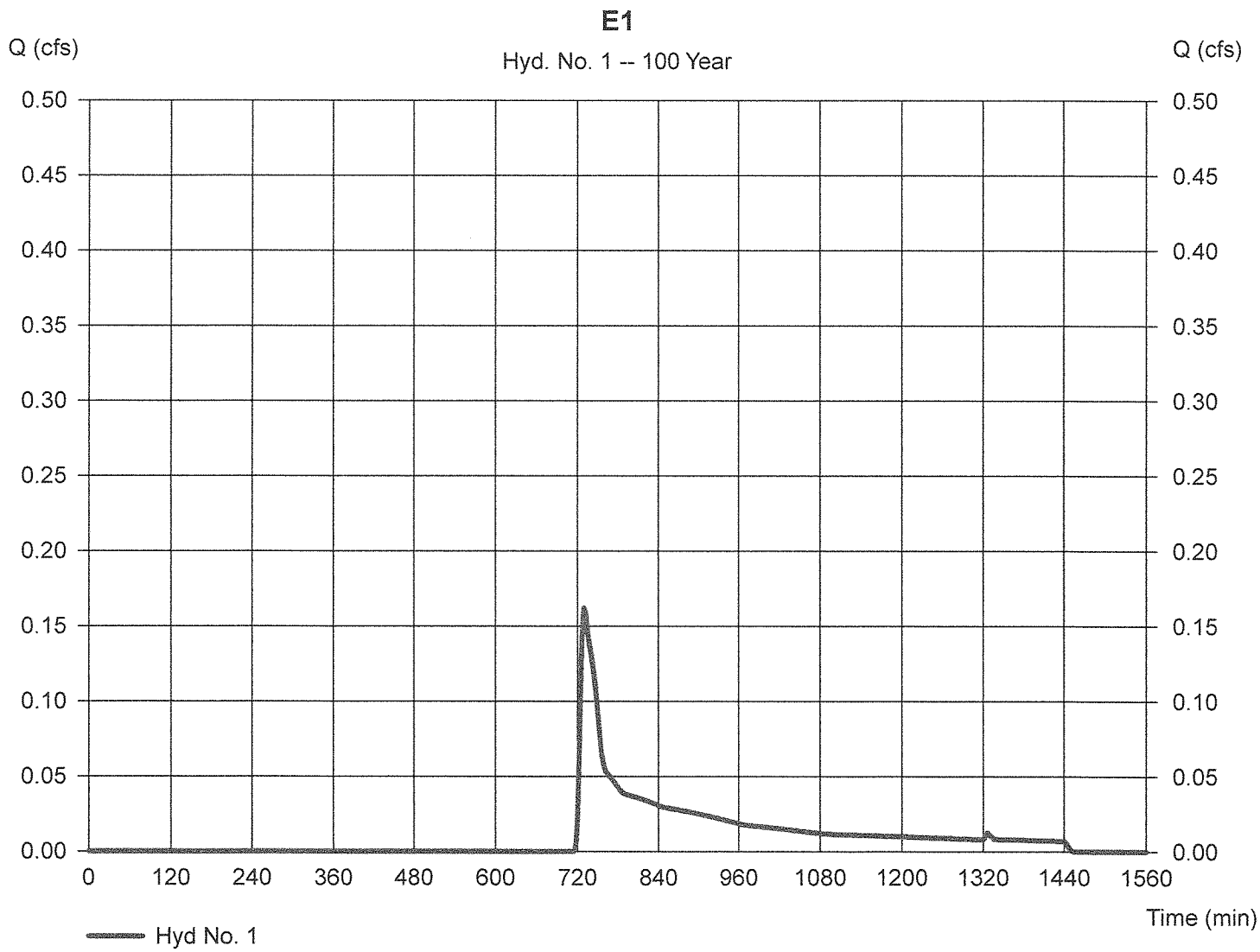
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 1

E1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.162 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 944 cuft
Drainage area	= 0.320 ac	Curve number	= 42.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.30 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Worksheet 2: Runoff curve number and runoff **SM-4860**

Project: 267 Great Rd By JTM Date 6/27/14

Location: Acton, MA Checked _____ Date _____

Circle one: [Present] Developed E2

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
A	Woods	30			0.17	5.01
				Totals =	0.17	5.01

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{5.01}{0.17} = 30.00$; Use CN = 30.0

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	0.11	0.00	0.12
Runoff, Q.....	cf	68	1	73

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4860

Project: 267 Great Rd By JTM Date 6/27/2014

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed E2

Circle one: Tc Tt through subarea _____

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)			0.4			
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	0.055			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.14			0.14
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			unpaved			
8. Flow Length, L		ft	33			
9. Watercourse slope, s		ft/ft	0.068			
10. Average Velocity, V (figure 3-1)		ft/s	4.21			
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

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.14

min 8.5

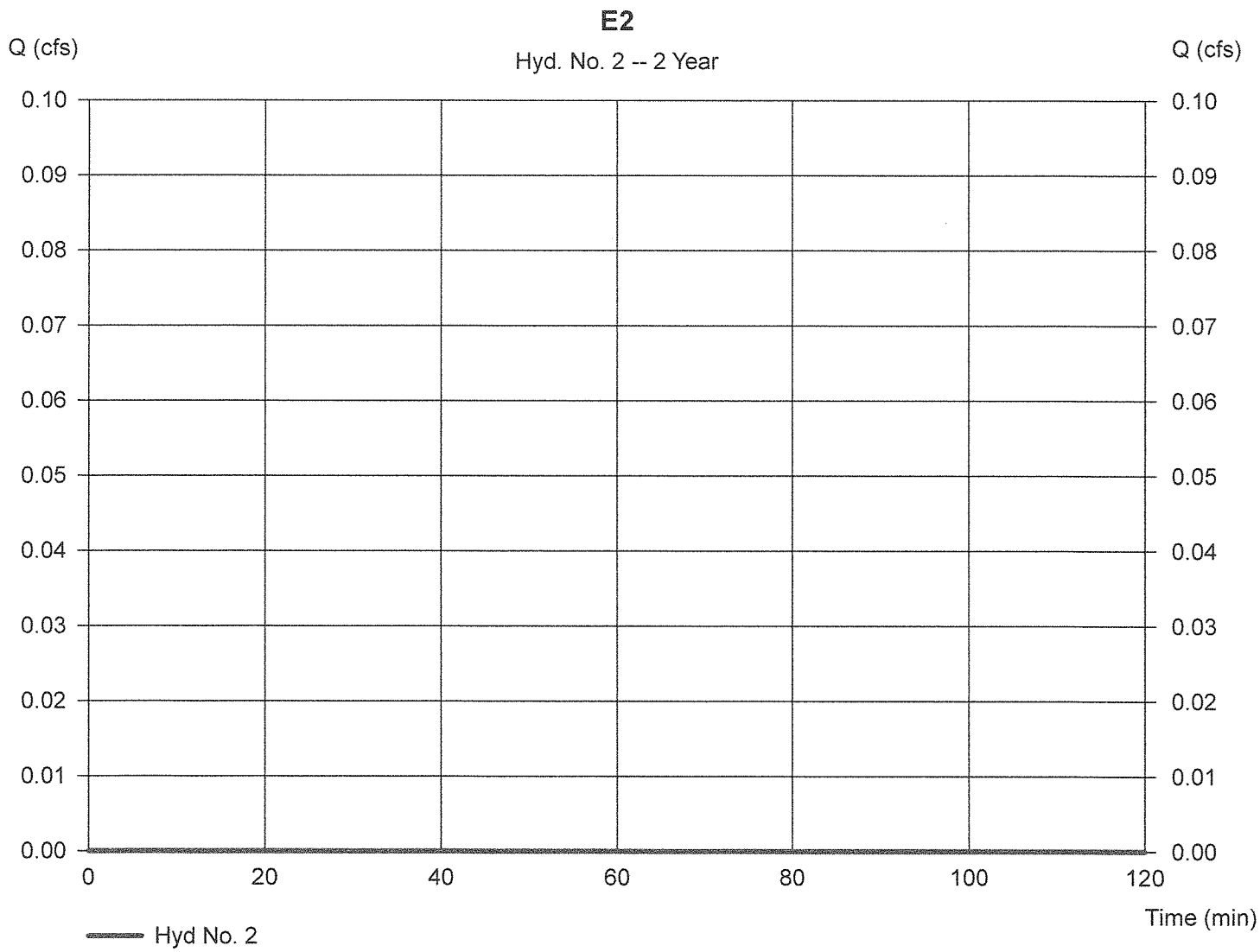
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 2

E2

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	= 0.170 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.50 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



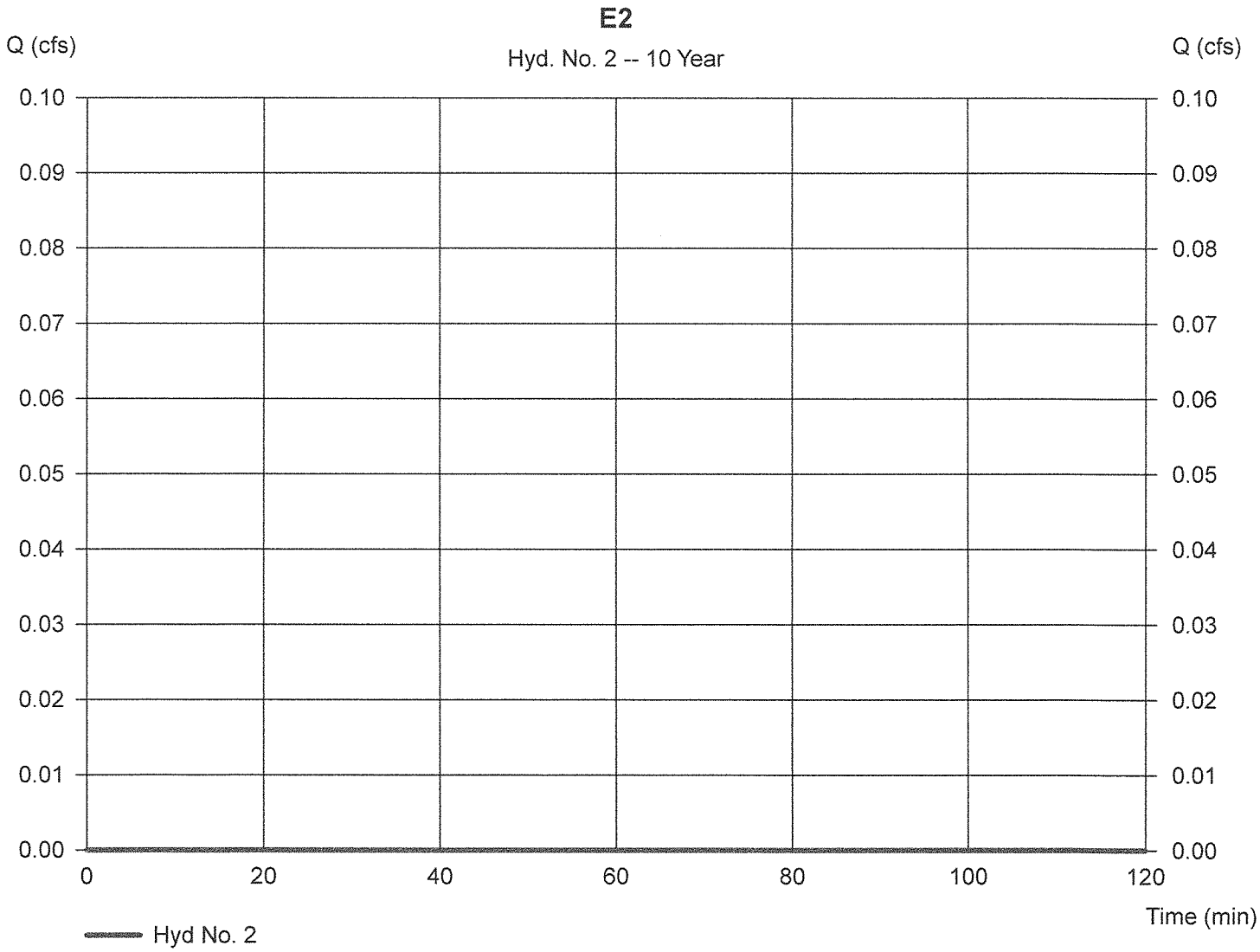
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 2

E2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.170 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.50 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



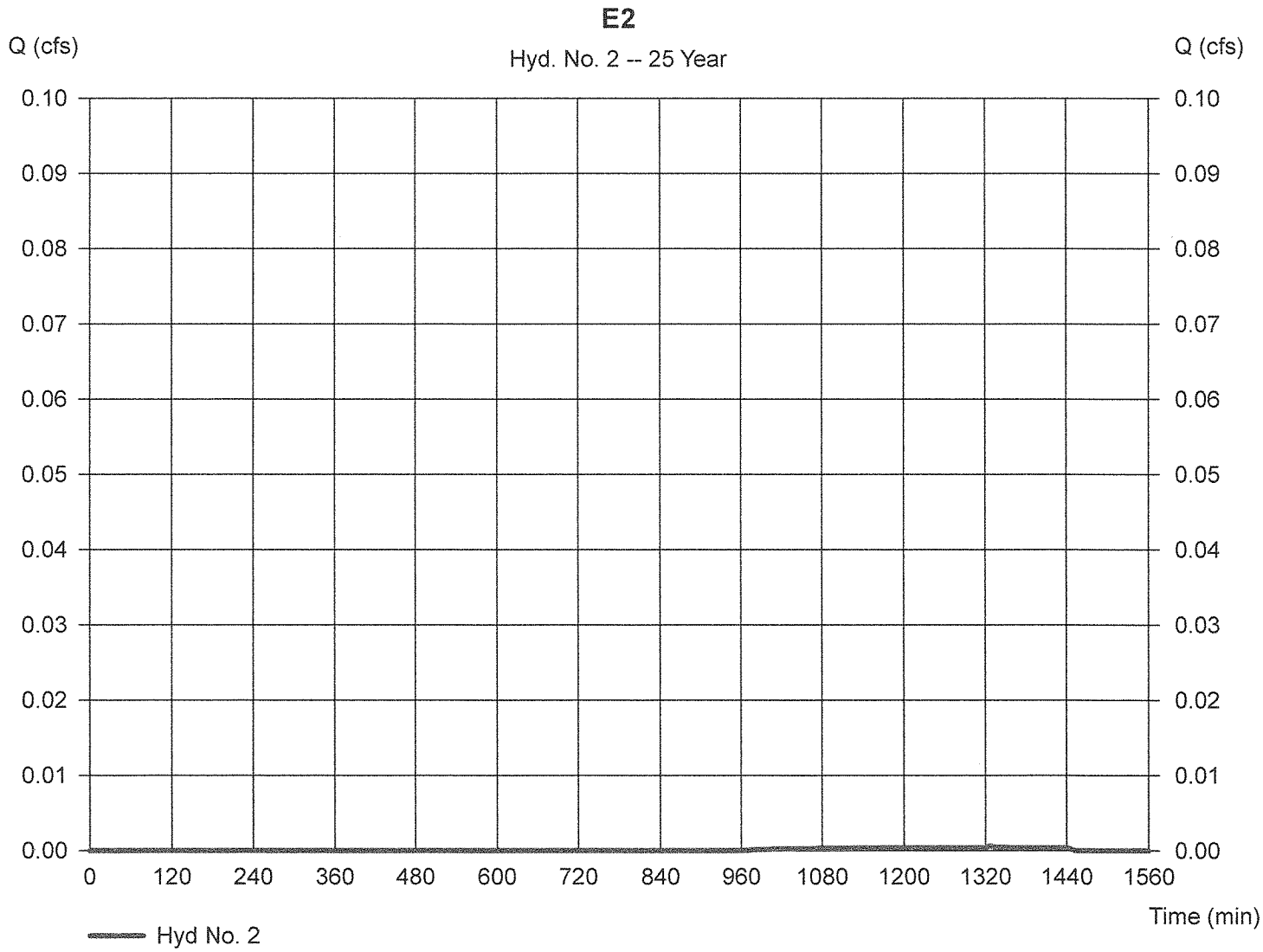
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 2

E2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 25 yrs	Time to peak	= 1326 min
Time interval	= 2 min	Hyd. volume	= 10 cuft
Drainage area	= 0.170 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.50 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



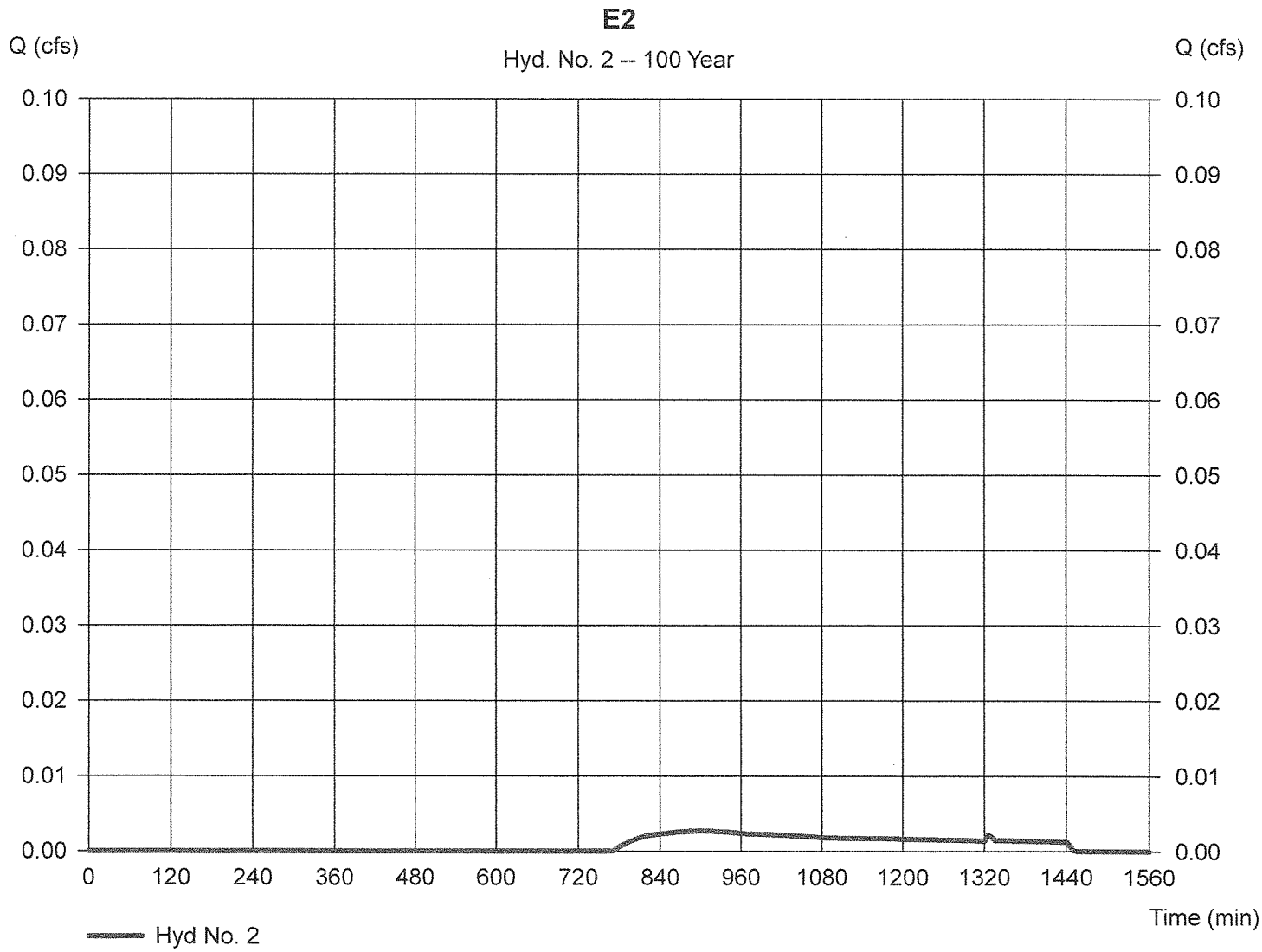
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 2

E2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.003 cfs
Storm frequency	= 100 yrs	Time to peak	= 902 min
Time interval	= 2 min	Hyd. volume	= 74 cuft
Drainage area	= 0.170 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.50 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Worksheet 2: Runoff curve number and runoff **SM-4860**

Project: 267 Great Rd By JTM Date 6/2/14

Location: Acton, MA Checked _____ Date _____

Circle one: Present | Developed E3

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
A	Woods	30			0.77	23.13
A	Open	39			0.05	2.03
	Impervious	98			0.02	1.96
A	Gravel	76			0.02	1.37
					Totals =	0.86	28.49

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{28.49}{0.86} = 33.08$; Use CN = 33.1

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	0.05	0.01	0.25
Runoff, Q.....	cf	145	31	768

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4860

Project: 267 Great Rd By JTM Date 6/2/2014

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed E3

Circle one: Tc Tt through subarea

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)			0.4			
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	0.03			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.18			0.18
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			unpaved			
8. Flow Length, L		ft	81			
9. Watercourse slope, s		ft/ft	0.027			
10. Average Velocity, V (figure 3-1)		ft/s	2.65			
11. Tt = L / 3600V	Compute Tt	hr	0.01			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

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.19

min 11.2

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

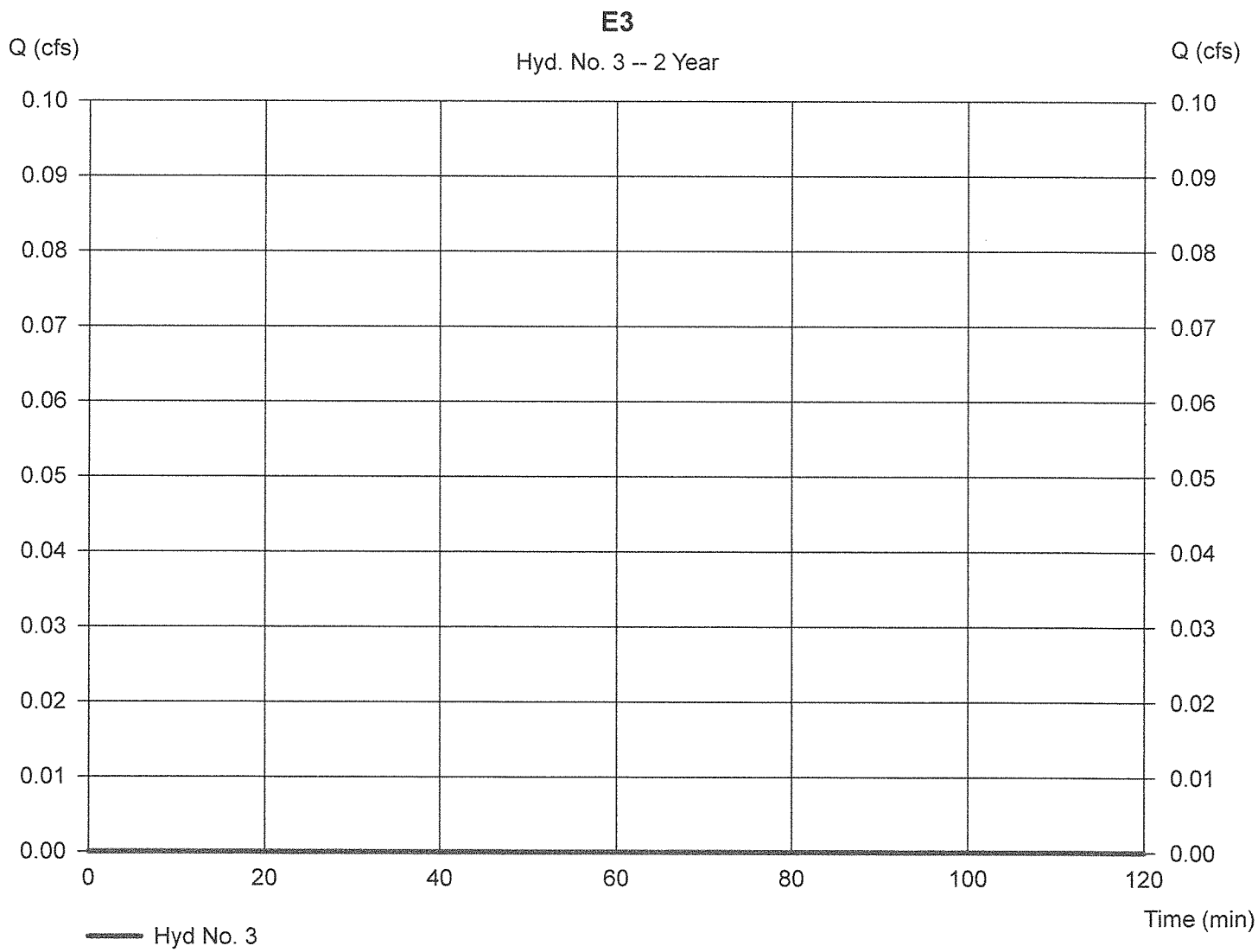
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 3

E3

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	= 0.860 ac	Curve number	= 33.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.20 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



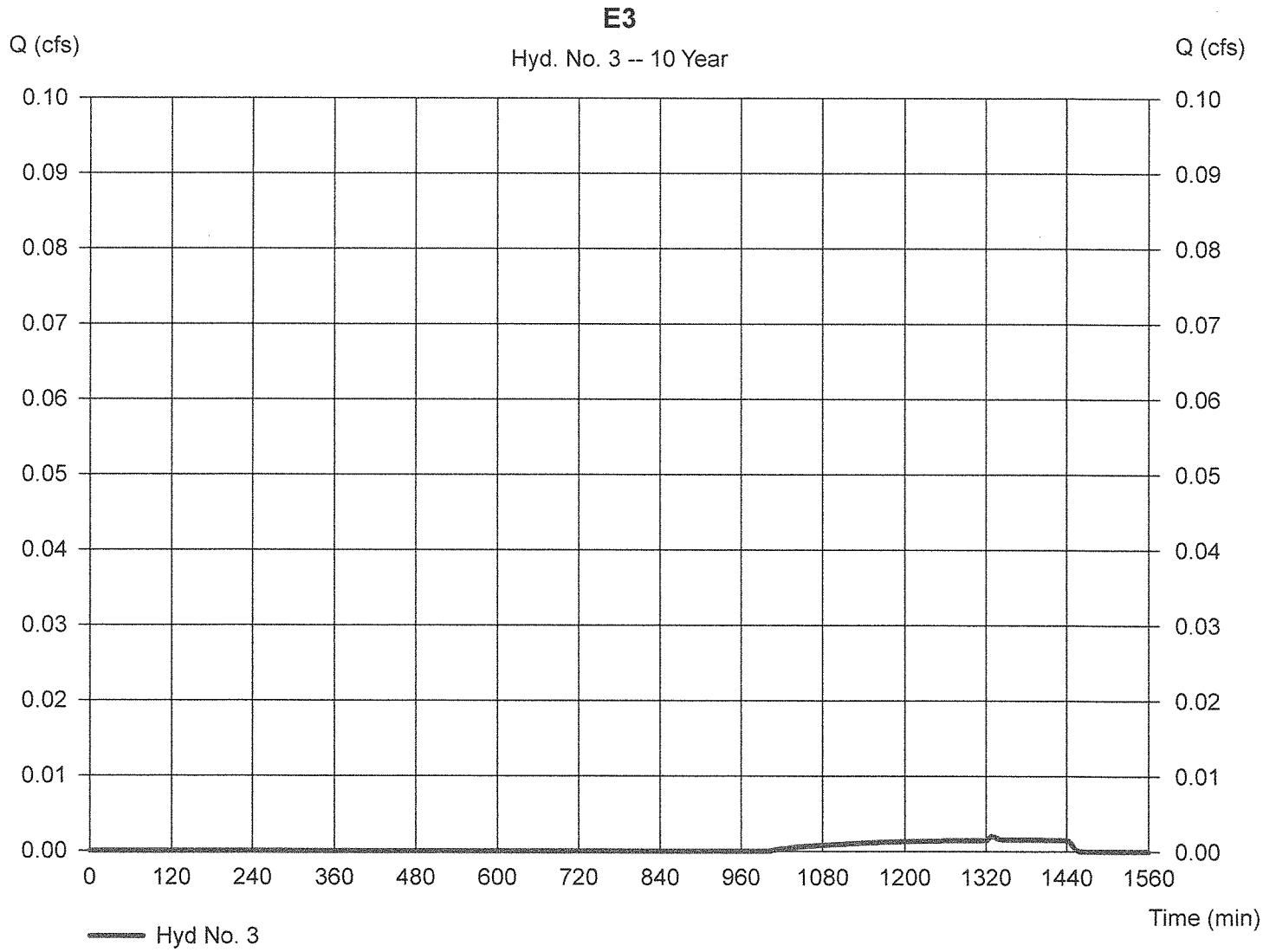
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 3

E3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.002 cfs
Storm frequency	= 10 yrs	Time to peak	= 1328 min
Time interval	= 2 min	Hyd. volume	= 33 cuft
Drainage area	= 0.860 ac	Curve number	= 33.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.20 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



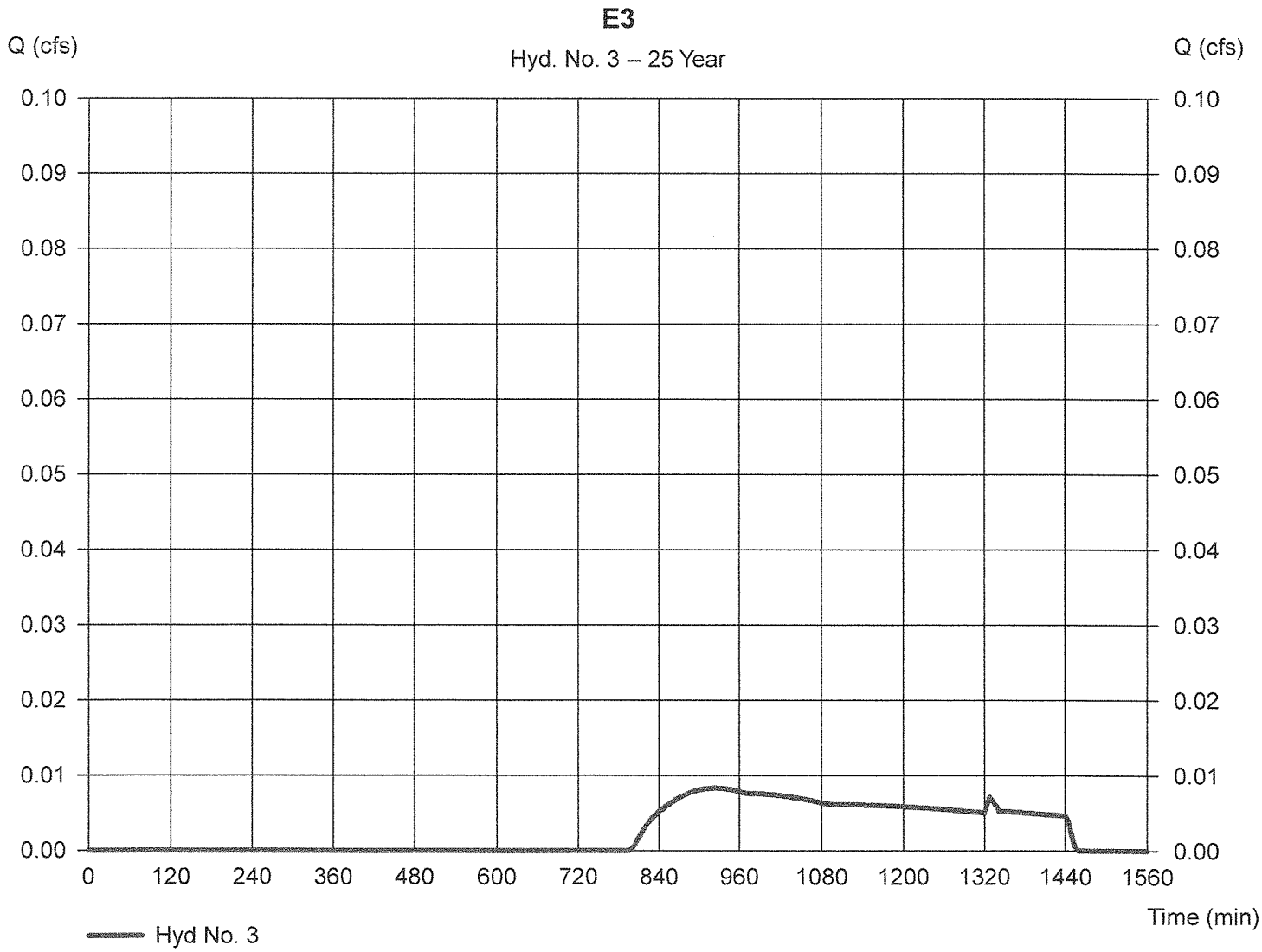
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 3

E3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.008 cfs
Storm frequency	= 25 yrs	Time to peak	= 924 min
Time interval	= 2 min	Hyd. volume	= 237 cuft
Drainage area	= 0.860 ac	Curve number	= 33.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.20 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



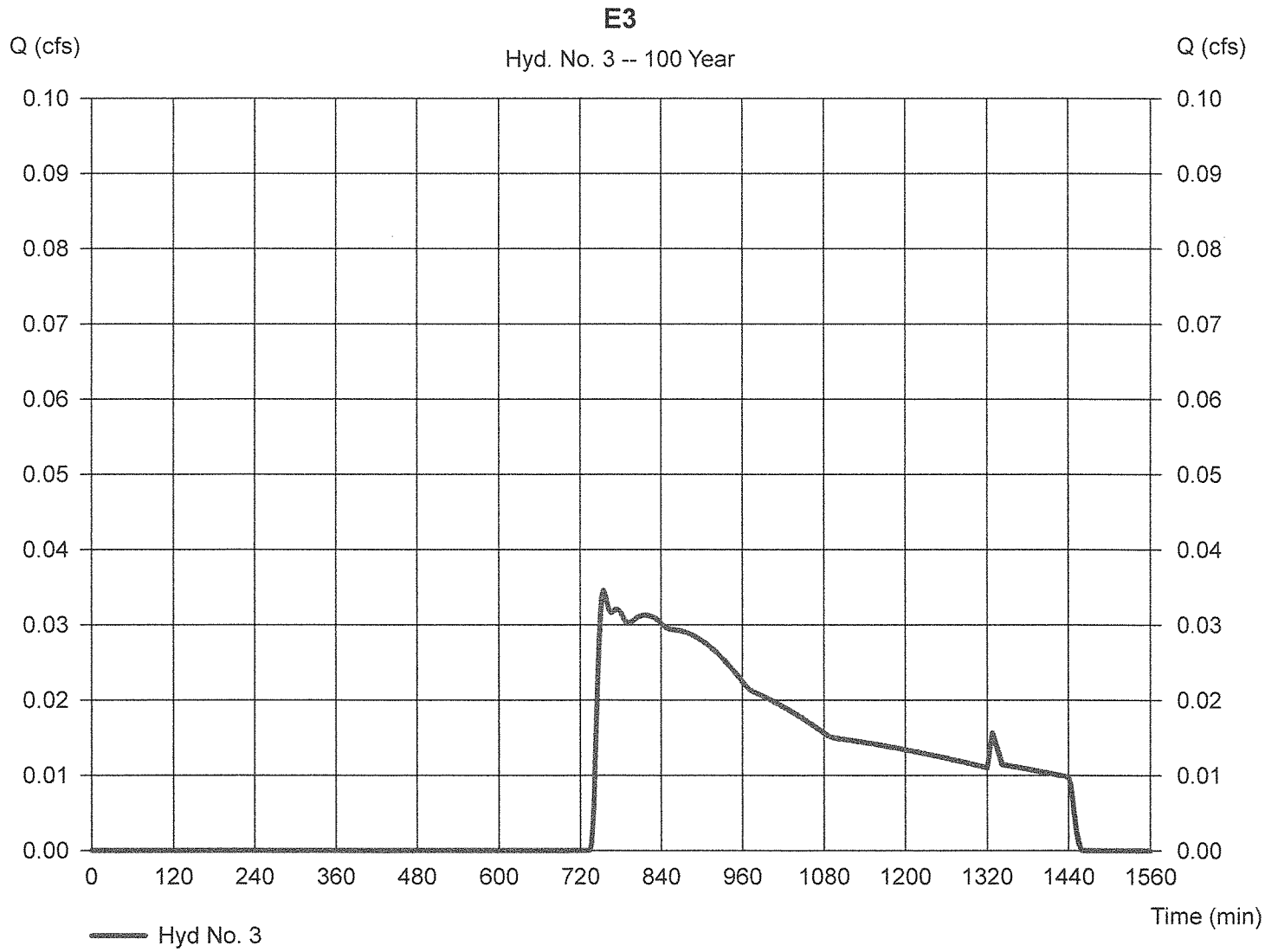
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 3

E3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.035 cfs
Storm frequency	= 100 yrs	Time to peak	= 754 min
Time interval	= 2 min	Hyd. volume	= 793 cuft
Drainage area	= 0.860 ac	Curve number	= 33.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.20 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Worksheet 2: Runoff curve number and runoff **SM-4860**

Project: 267 Great Rd By JTM Date 6/2/14

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed E4

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
A	Woods	30			0.53	15.96
A	Open	39			0.26	10.10
	Impervious	98			0.02	1.96
A	Gravel	76			0.09	6.46
					Totals =	0.90	34.48

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{34.48}{0.90} =$ 38.48 ; Use CN = 38.5

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	0.00	0.10	0.53
Runoff, Q.....	cf	2	319	1739

D-2 (210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4860

Project: 267 Great Rd By JTM Date 6/2/2014

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed E4
Circle one: Tc Tt through subarea

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)			0.4			
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	0.11			0.11
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			unpaved			
8. Flow Length, L		ft	107			
9. Watercourse slope, s		ft/ft	0.037			
10. Average Velocity, V (figure 3-1)		ft/s	3.10			
11. Tt = L / 3600V	Compute Tt	hr	0.01			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

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.12
min 7.4

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

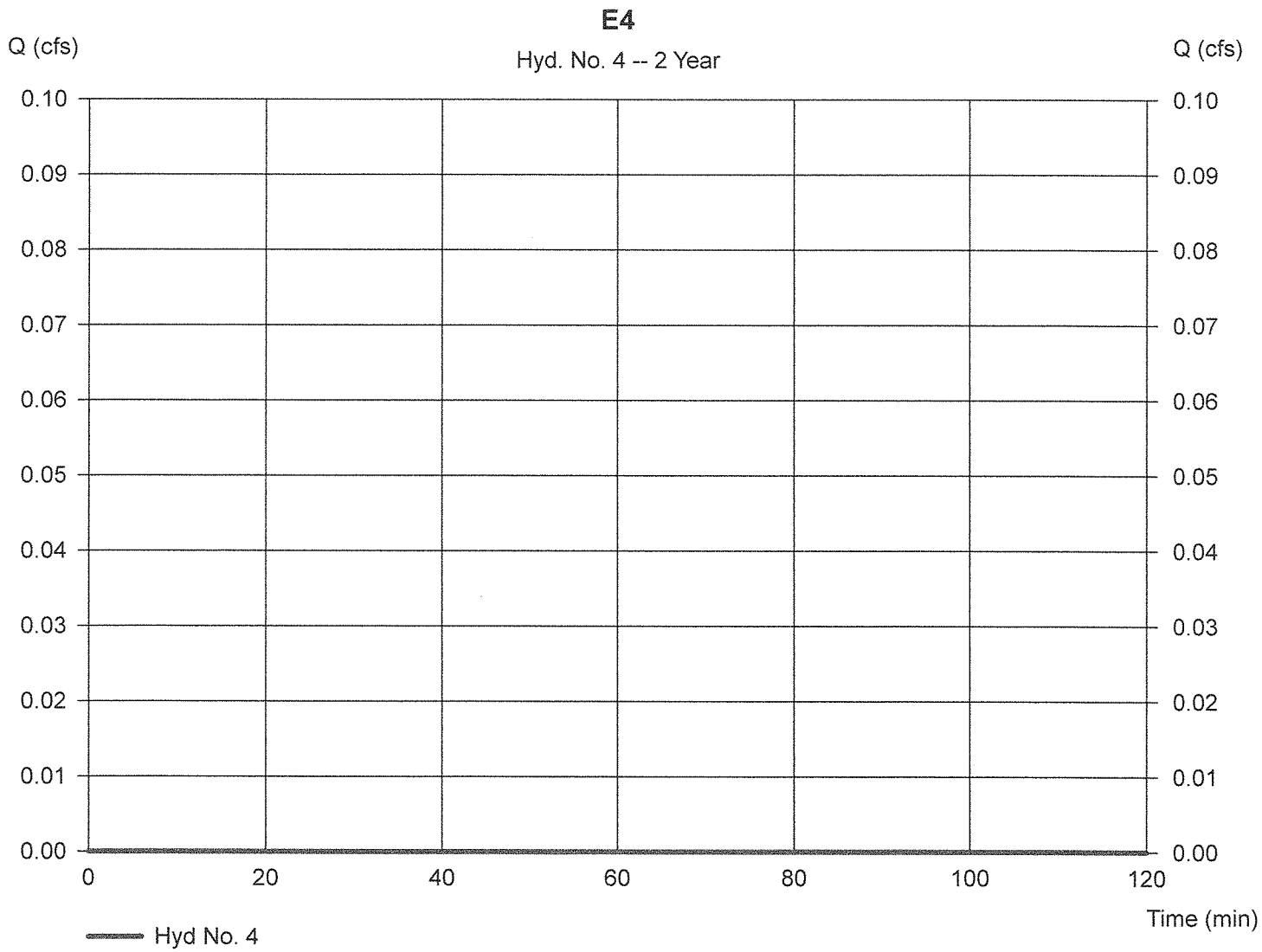
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 4

E4

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	= 0.900 ac	Curve number	= 38.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 7.40 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



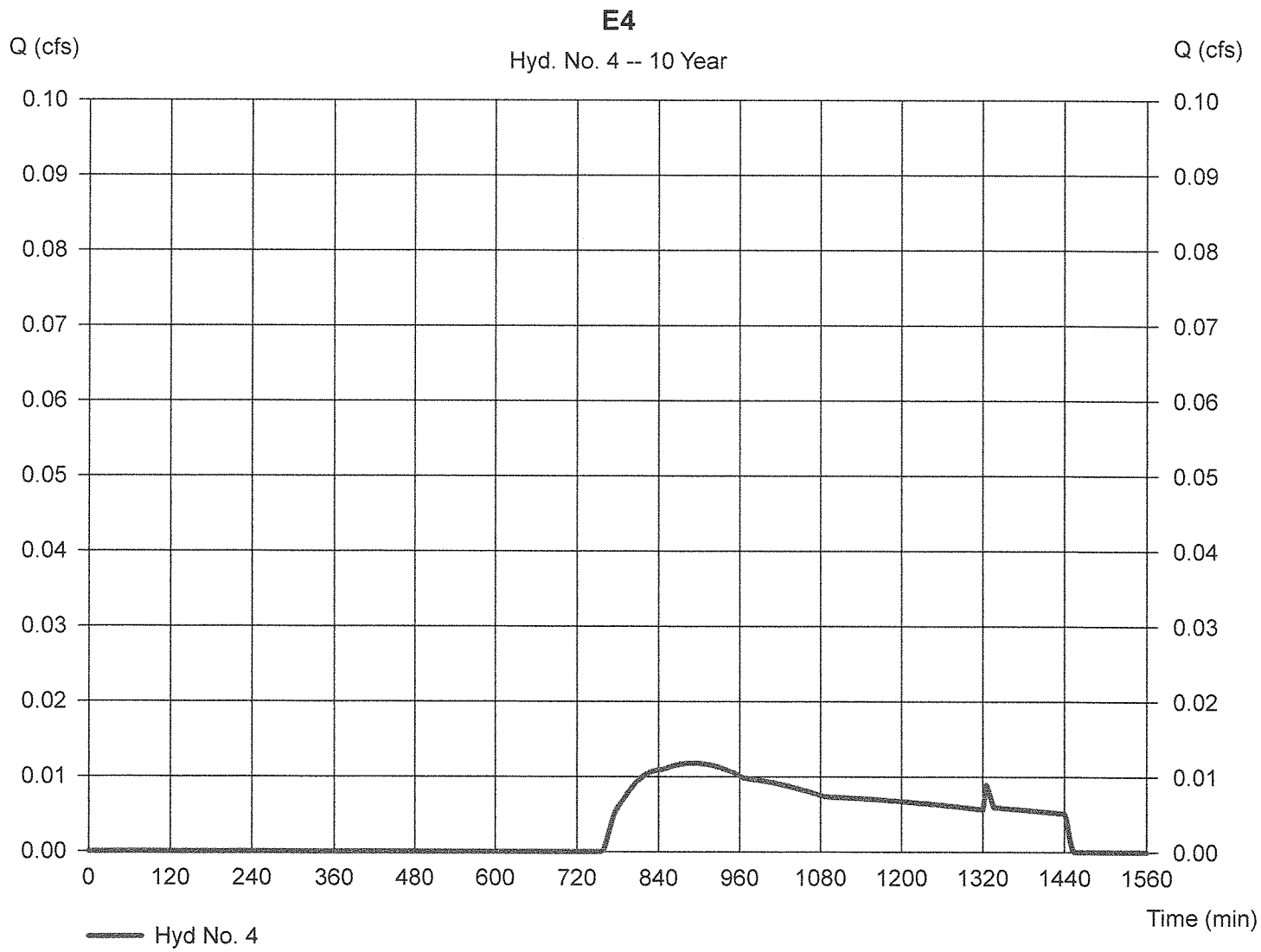
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 4

E4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.012 cfs
Storm frequency	= 10 yrs	Time to peak	= 892 min
Time interval	= 2 min	Hyd. volume	= 322 cuft
Drainage area	= 0.900 ac	Curve number	= 38.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 7.40 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



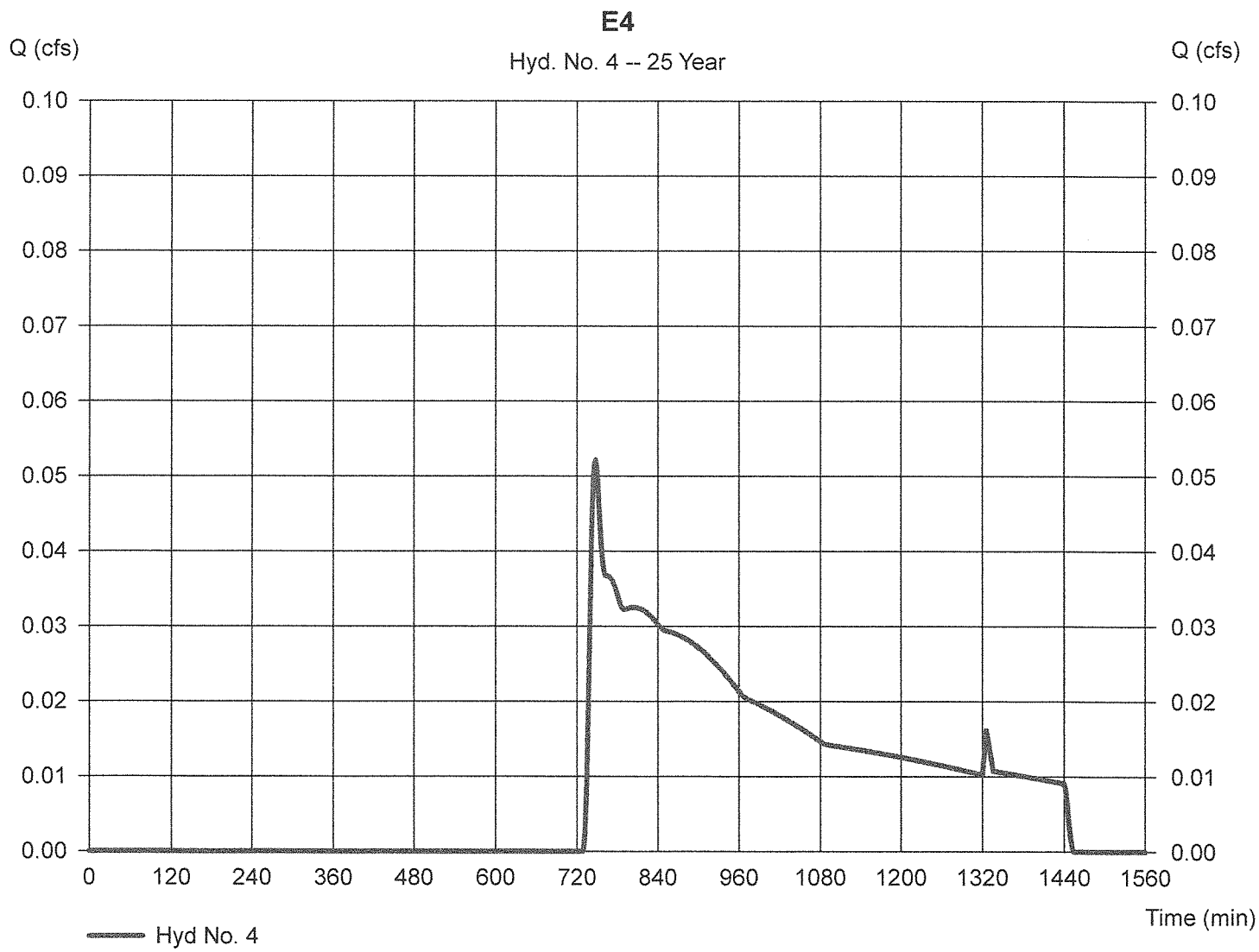
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 4

E4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.052 cfs
Storm frequency	= 25 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 801 cuft
Drainage area	= 0.900 ac	Curve number	= 38.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 7.40 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



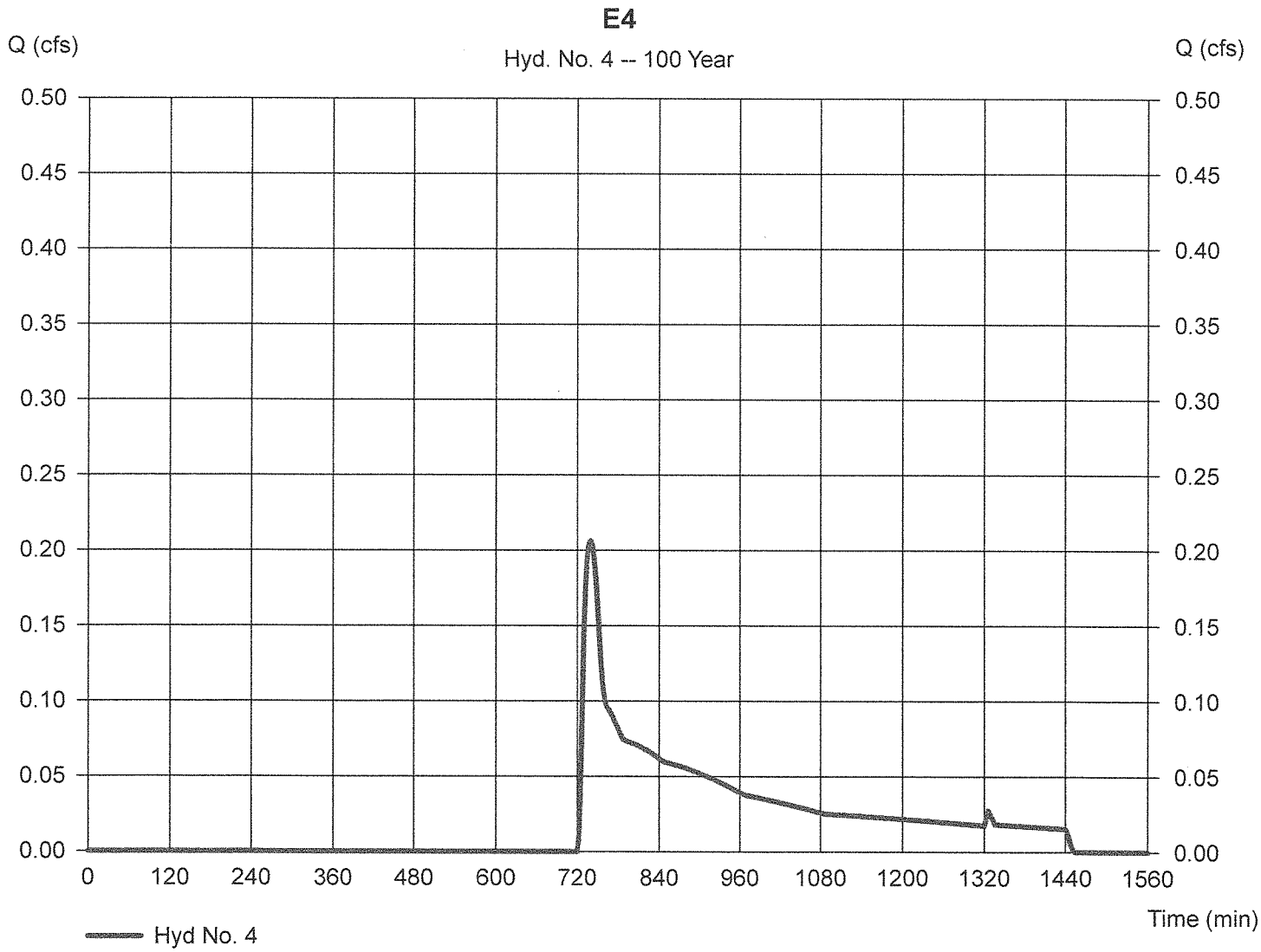
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 4

E4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.206 cfs
Storm frequency	= 100 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 1,750 cuft
Drainage area	= 0.900 ac	Curve number	= 38.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 7.40 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

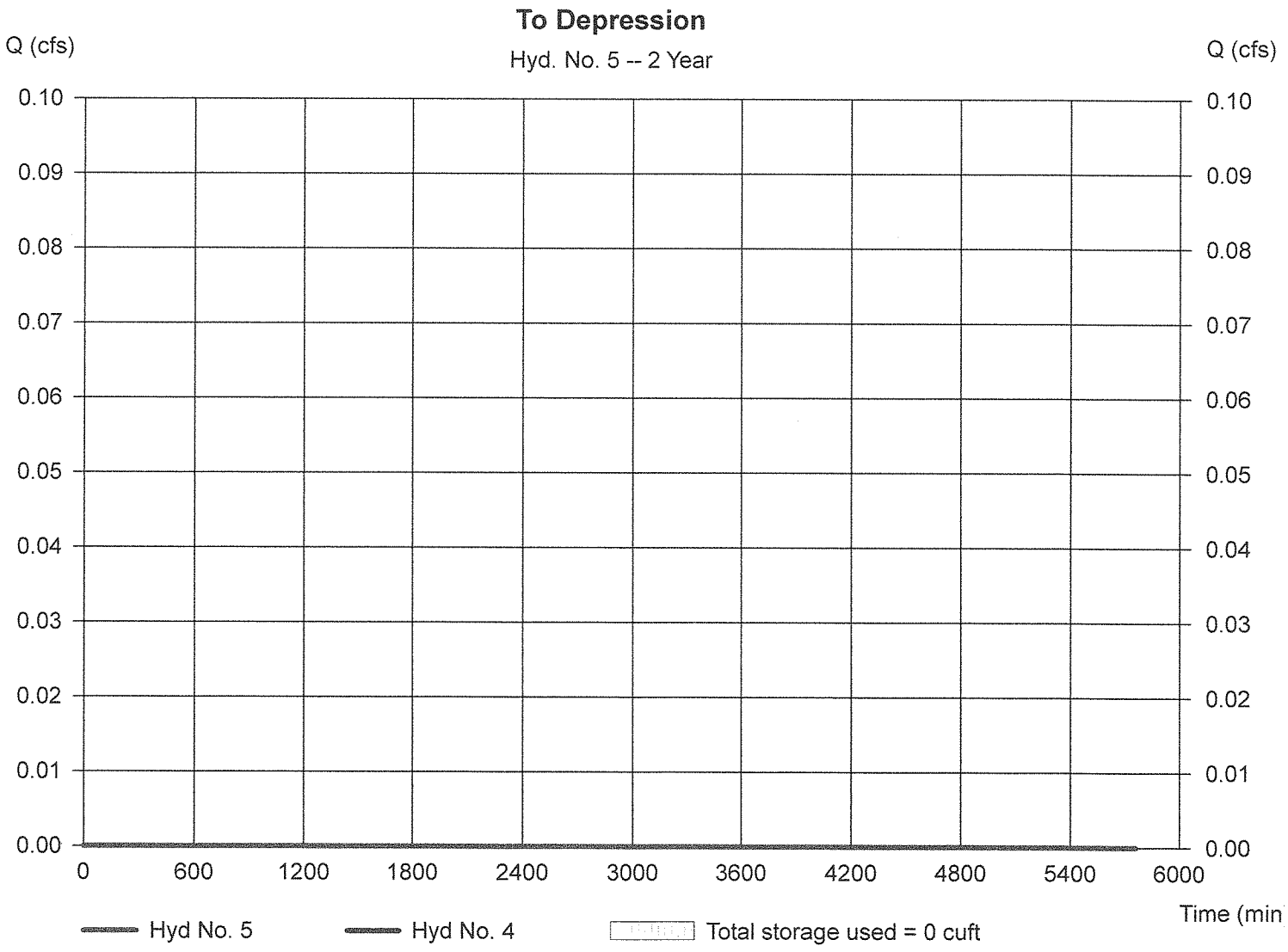
Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 5

To Depression

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - E4	Max. Elevation	= 156.00 ft
Reservoir name	= On-site Depression	Max. Storage	= 0 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

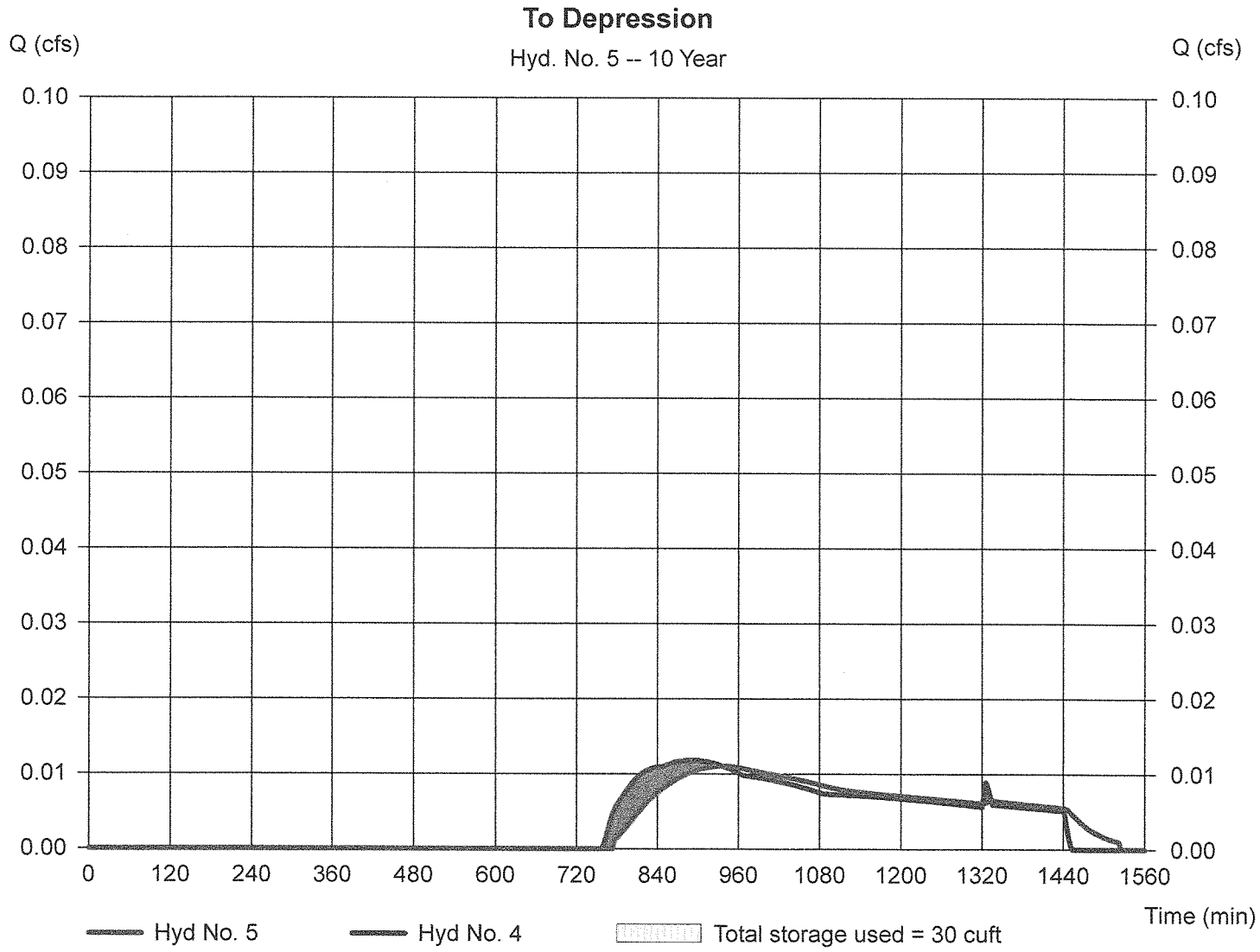
Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 5

To Depression

Hydrograph type	= Reservoir	Peak discharge	= 0.011 cfs
Storm frequency	= 10 yrs	Time to peak	= 936 min
Time interval	= 2 min	Hyd. volume	= 319 cuft
Inflow hyd. No.	= 4 - E4	Max. Elevation	= 156.01 ft
Reservoir name	= On-site Depression	Max. Storage	= 30 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

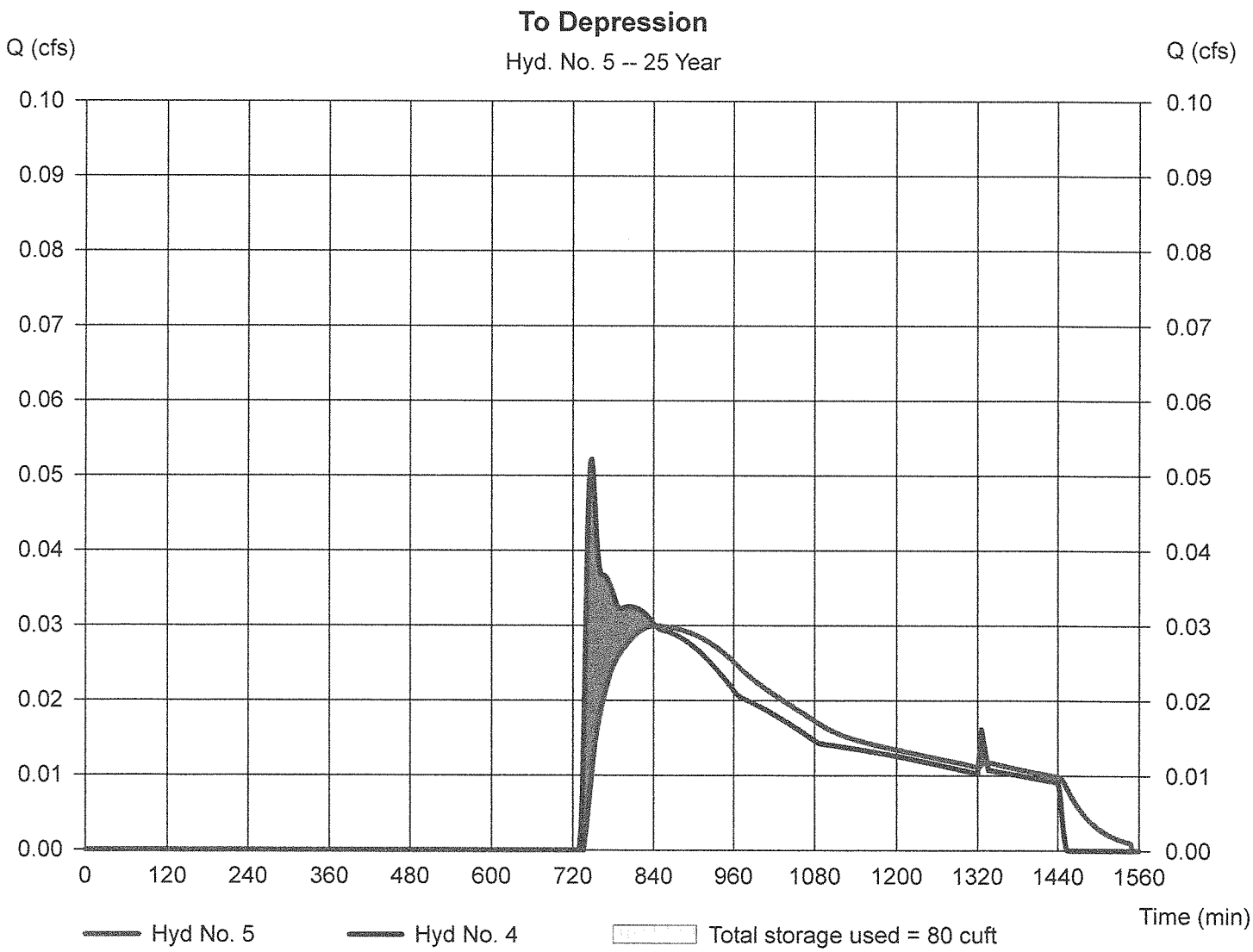
Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 5

To Depression

Hydrograph type	= Reservoir	Peak discharge	= 0.030 cfs
Storm frequency	= 25 yrs	Time to peak	= 842 min
Time interval	= 2 min	Hyd. volume	= 798 cuft
Inflow hyd. No.	= 4 - E4	Max. Elevation	= 156.02 ft
Reservoir name	= On-site Depression	Max. Storage	= 80 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

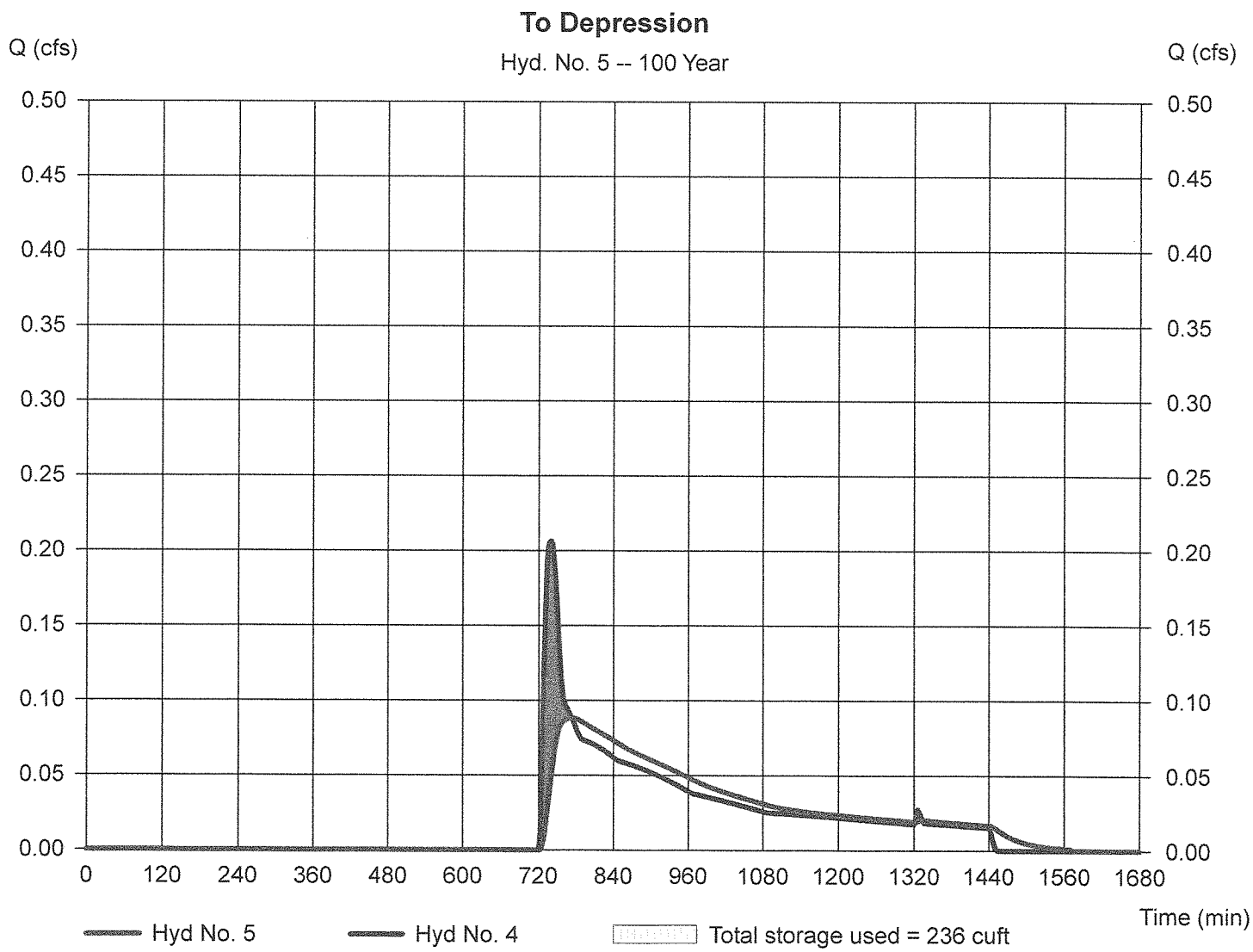
Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 5

To Depression

Hydrograph type	= Reservoir	Peak discharge	= 0.088 cfs
Storm frequency	= 100 yrs	Time to peak	= 774 min
Time interval	= 2 min	Hyd. volume	= 1,747 cuft
Inflow hyd. No.	= 4 - E4	Max. Elevation	= 156.05 ft
Reservoir name	= On-site Depression	Max. Storage	= 236 cuft

Storage Indication method used. Outflow includes exfiltration.



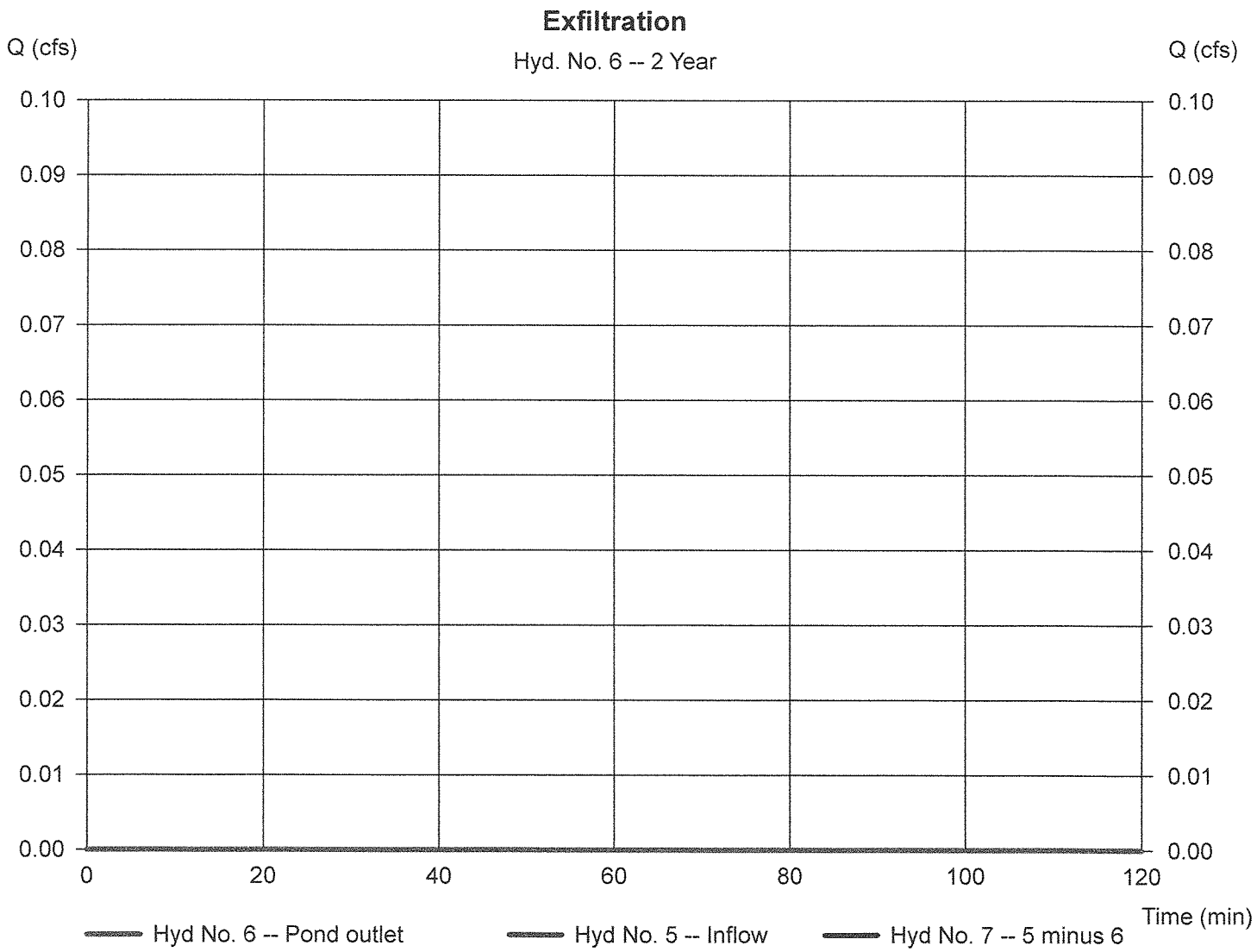
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 6

Exfiltration

Hydrograph type	=	Diversion1	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hydrograph	=	5 - To Depression	2nd diverted hyd.	=	7
Diversion method	=	Pond - On-site Depression	Pond structure	=	Exfiltration



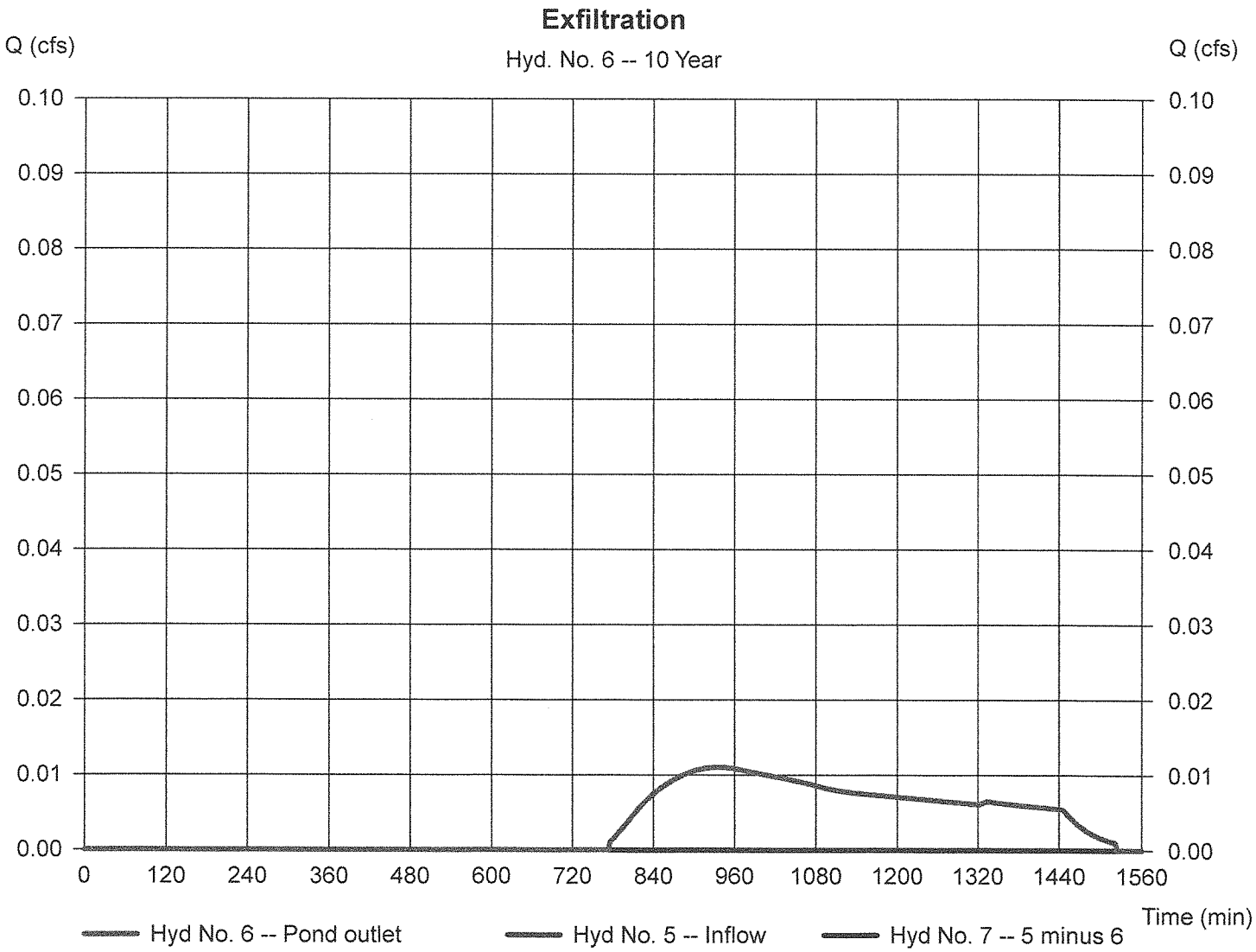
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 6

Exfiltration

Hydrograph type	=	Diversion1	Peak discharge	=	0.011 cfs
Storm frequency	=	10 yrs	Time to peak	=	936 min
Time interval	=	2 min	Hyd. volume	=	319 cuft
Inflow hydrograph	=	5 - To Depression	2nd diverted hyd.	=	7
Diversion method	=	Pond - On-site Depression	Pond structure	=	Exfiltration



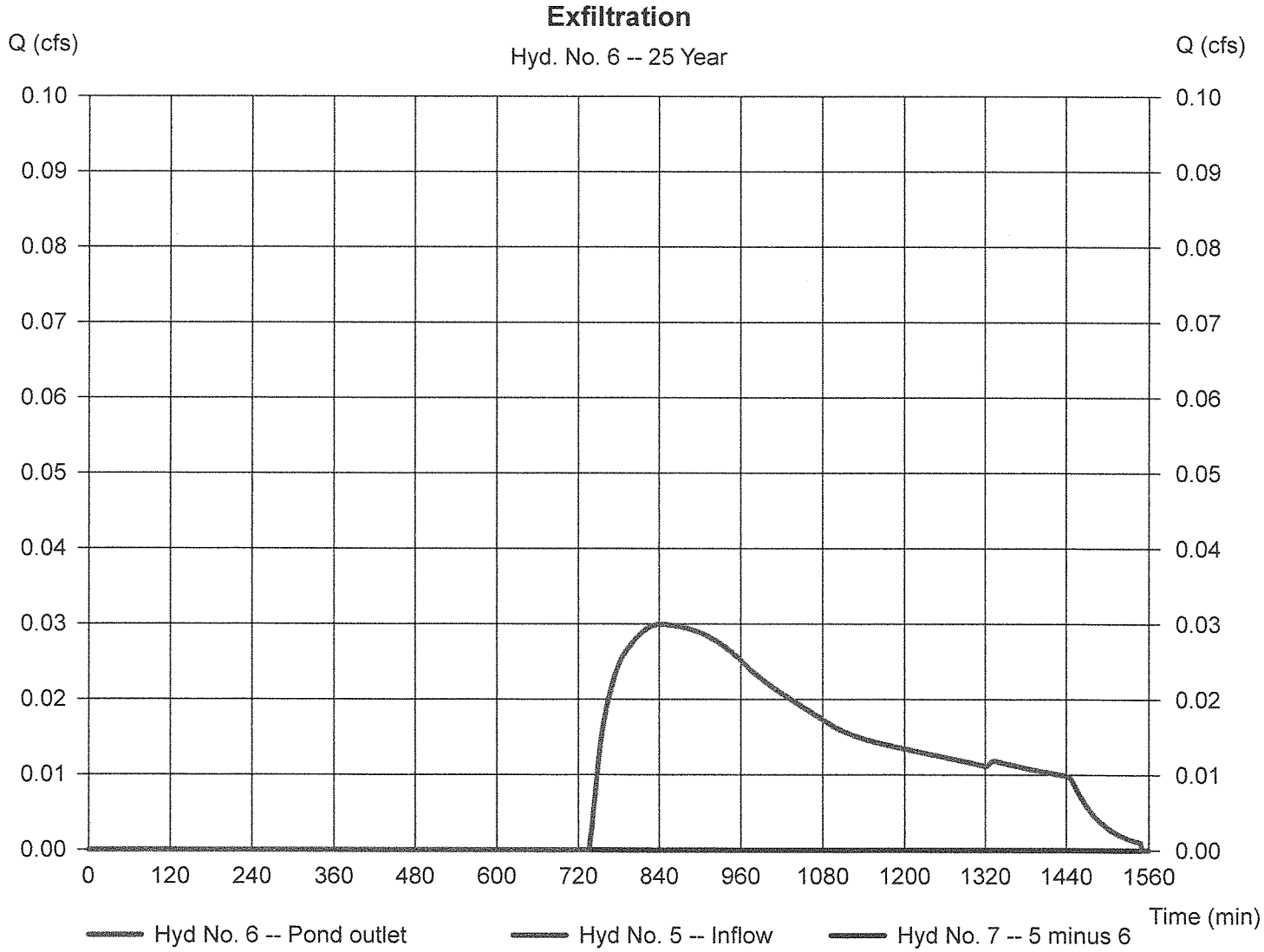
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 6

Exfiltration

Hydrograph type	=	Diversion1	Peak discharge	=	0.030 cfs
Storm frequency	=	25 yrs	Time to peak	=	842 min
Time interval	=	2 min	Hyd. volume	=	798 cuft
Inflow hydrograph	=	5 - To Depression	2nd diverted hyd.	=	7
Diversion method	=	Pond - On-site Depression	Pond structure	=	Exfiltration



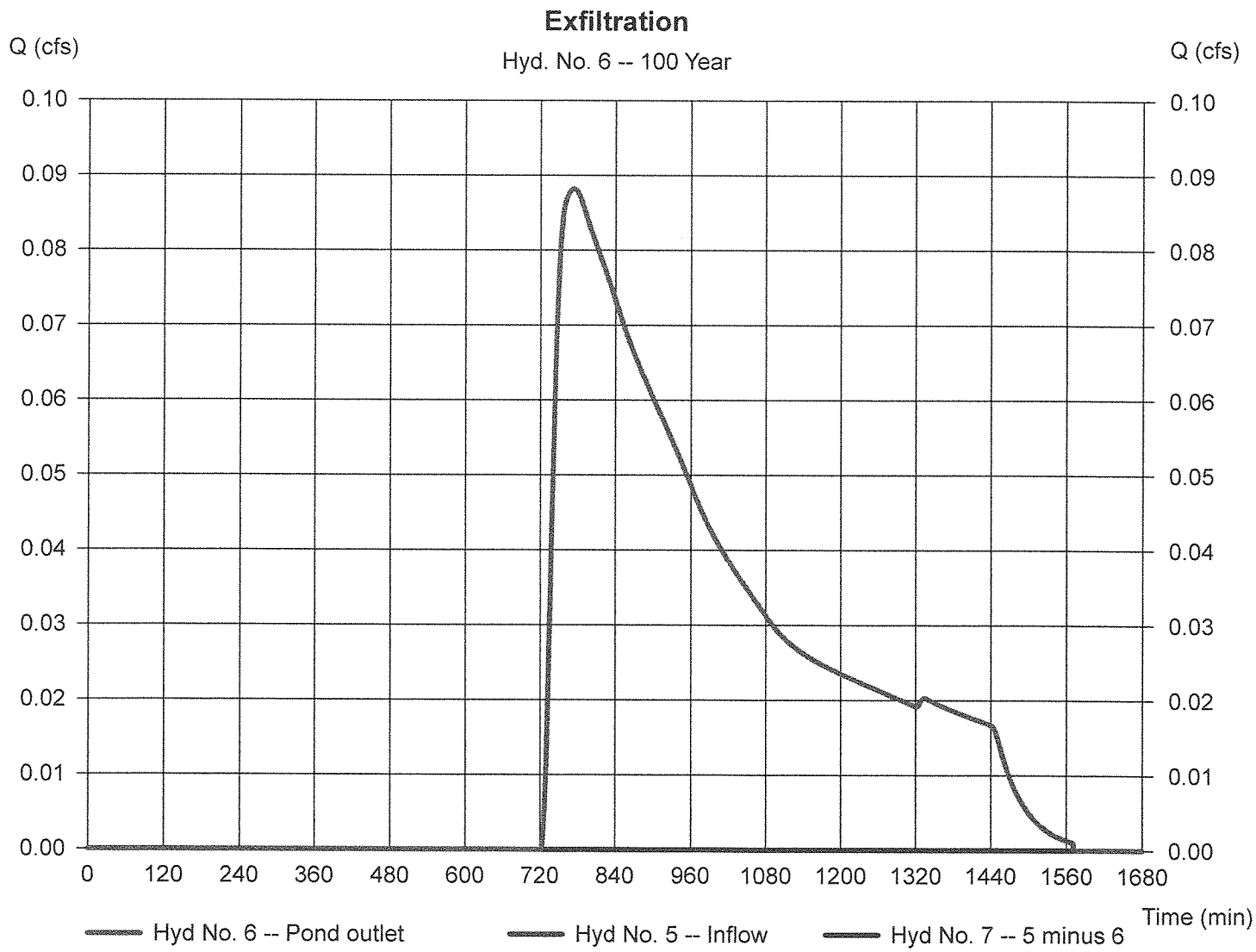
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 6

Exfiltration

Hydrograph type	=	Diversion1	Peak discharge	=	0.088 cfs
Storm frequency	=	100 yrs	Time to peak	=	774 min
Time interval	=	2 min	Hyd. volume	=	1,747 cuft
Inflow hydrograph	=	5 - To Depression	2nd diverted hyd.	=	7
Diversion method	=	Pond - On-site Depression	Pond structure	=	Exfiltration



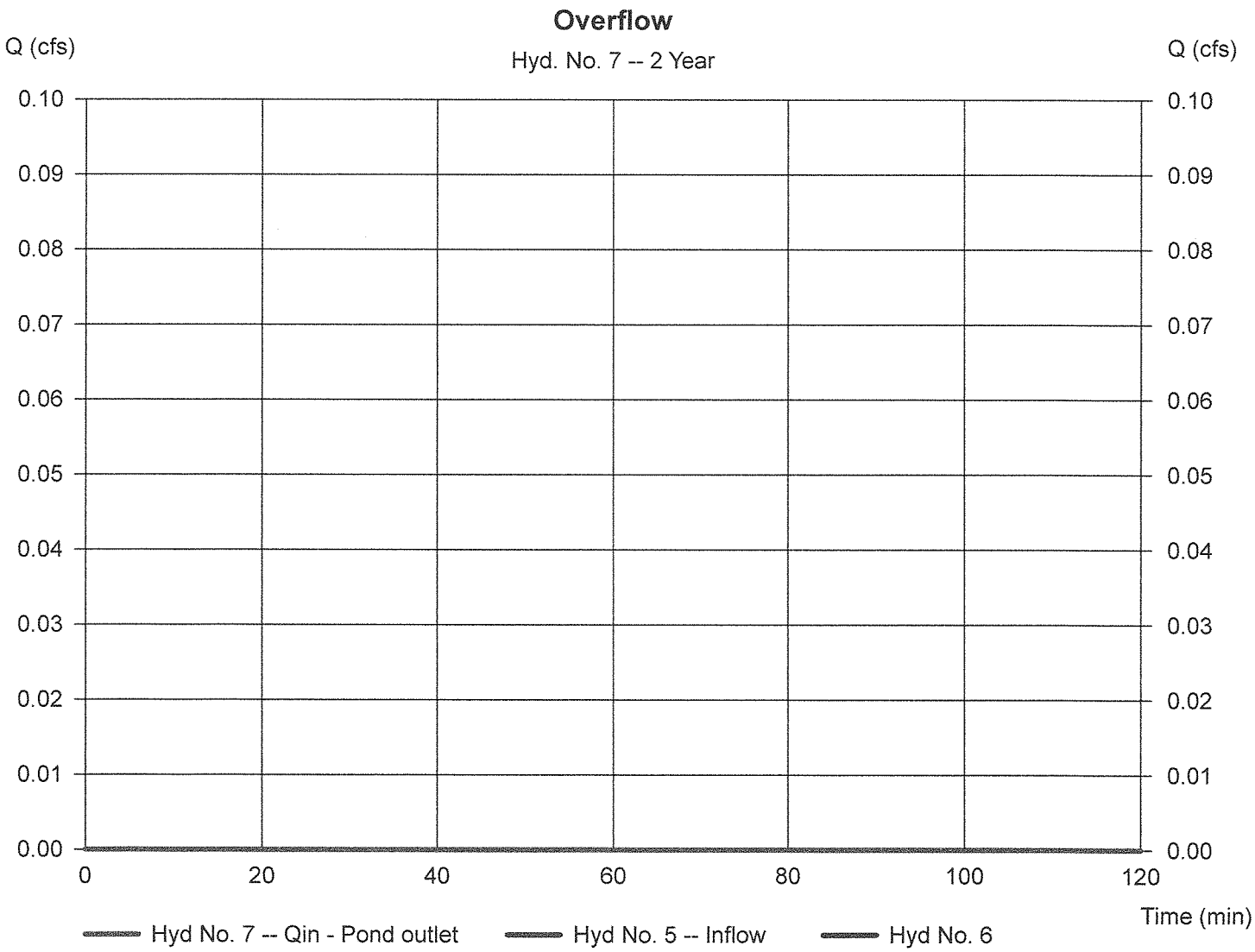
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 7

Overflow

Hydrograph type	=	Diversion2	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hydrograph	=	5 - To Depression	2nd diverted hyd.	=	6
Diversion method	=	Pond - On-site Depression	Pond structure	=	Exfiltration



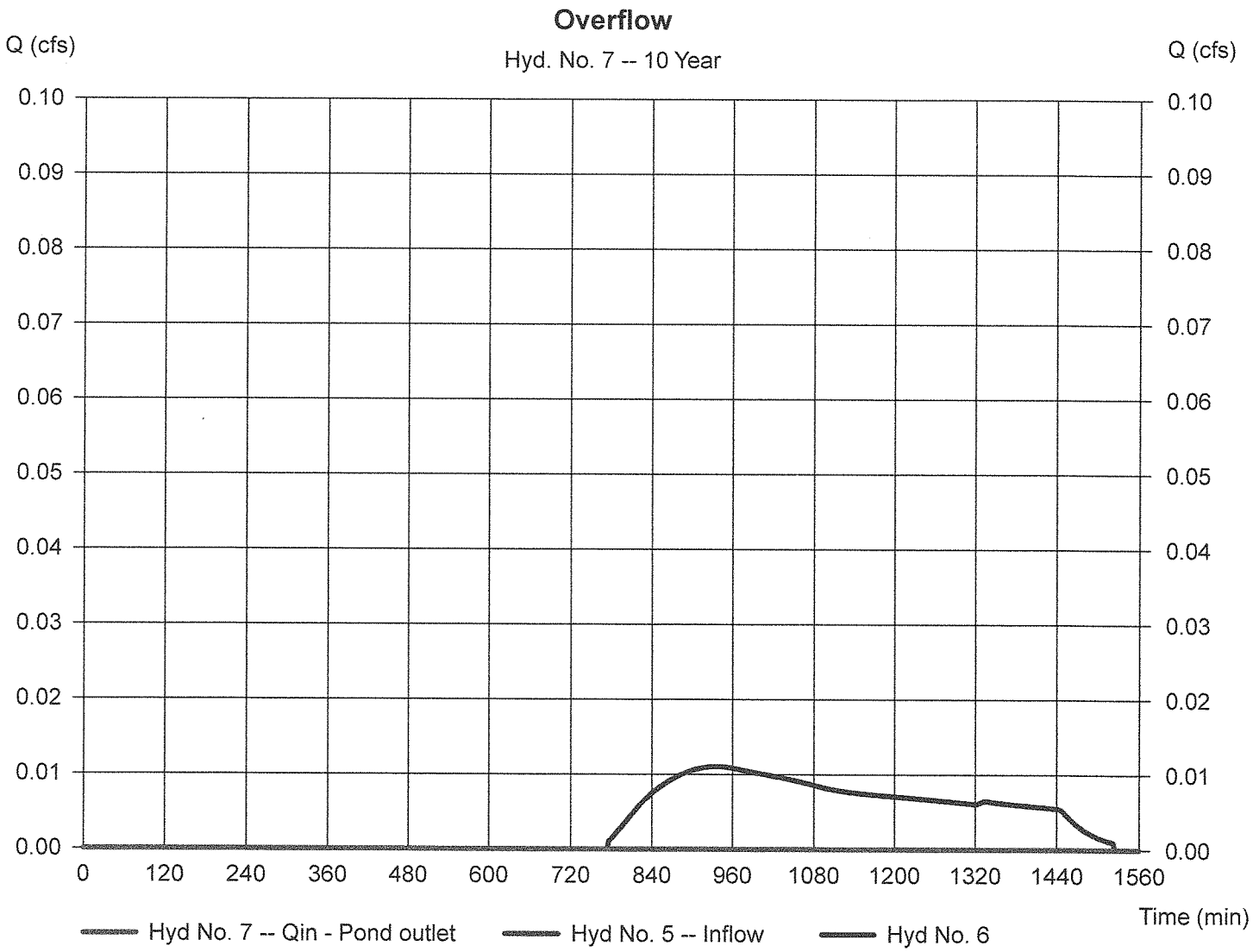
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 7

Overflow

Hydrograph type	=	Diversion2	Peak discharge	=	0.000 cfs
Storm frequency	=	10 yrs	Time to peak	=	842 min
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hydrograph	=	5 - To Depression	2nd diverted hyd.	=	6
Diversion method	=	Pond - On-site Depression	Pond structure	=	Exfiltration



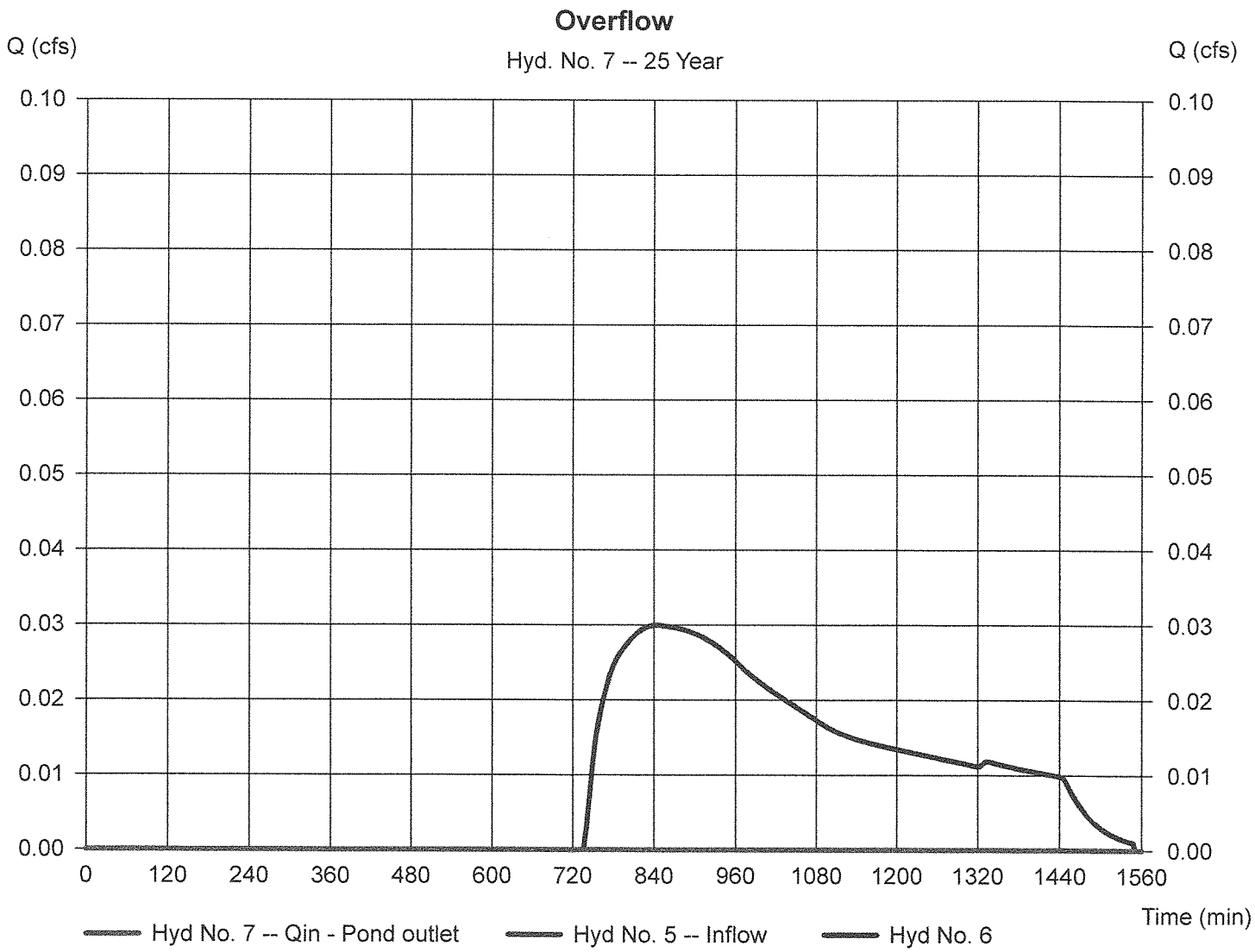
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 7

Overflow

Hydrograph type	=	Diversion2	Peak discharge	=	0.000 cfs
Storm frequency	=	25 yrs	Time to peak	=	850 min
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hydrograph	=	5 - To Depression	2nd diverted hyd.	=	6
Diversion method	=	Pond - On-site Depression	Pond structure	=	Exfiltration



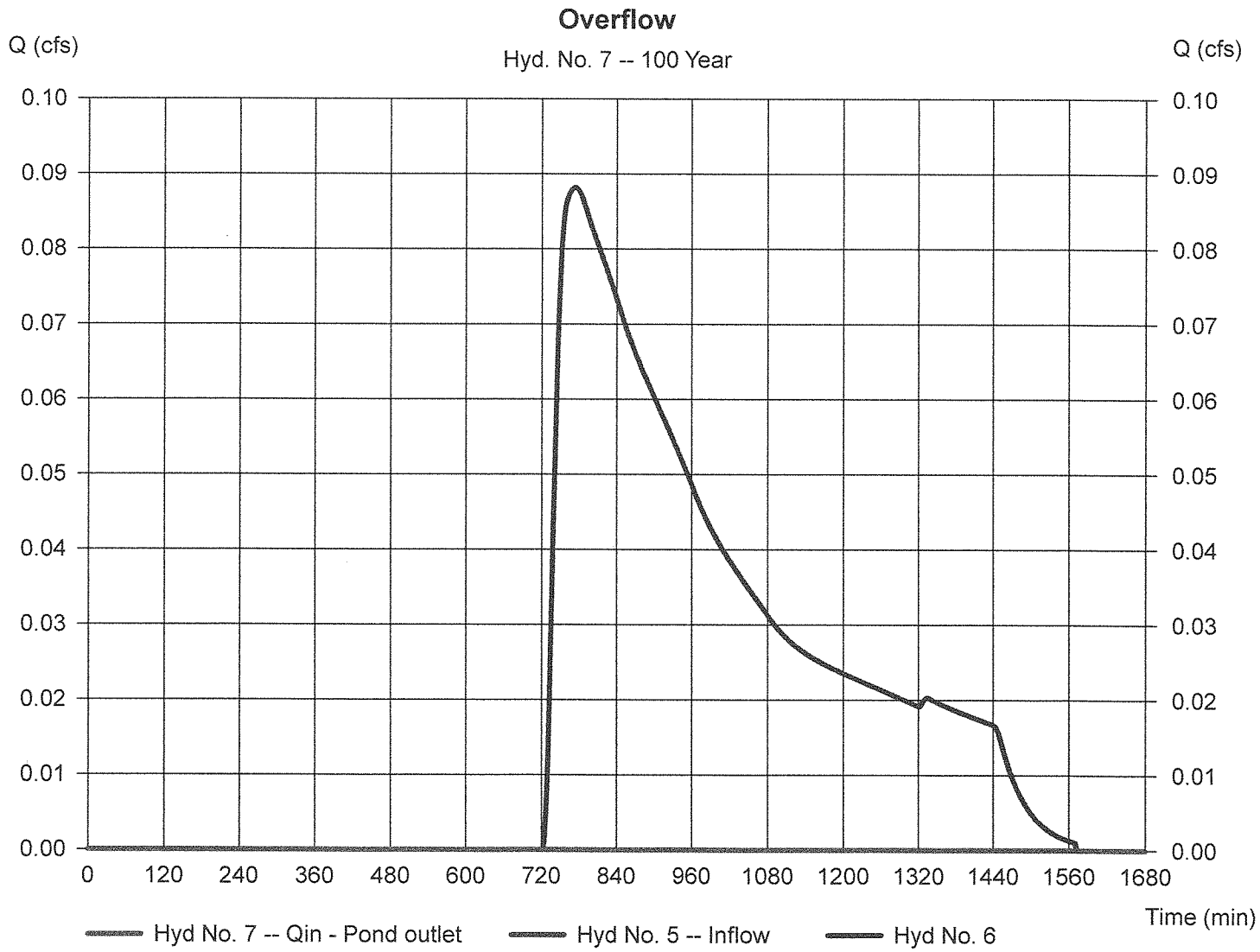
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 7

Overflow

Hydrograph type	=	Diversion2	Peak discharge	=	0.000 cfs
Storm frequency	=	100 yrs	Time to peak	=	902 min
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hydrograph	=	5 - To Depression	2nd diverted hyd.	=	6
Diversion method	=	Pond - On-site Depression	Pond structure	=	Exfiltration



Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Pond No. 1 - On-site Depression

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 156.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	156.00	1,499	0	0
1.00	157.00	9,950	5,103	5,103
2.00	158.00	14,090	11,959	17,062

Culvert / Orifice Structures

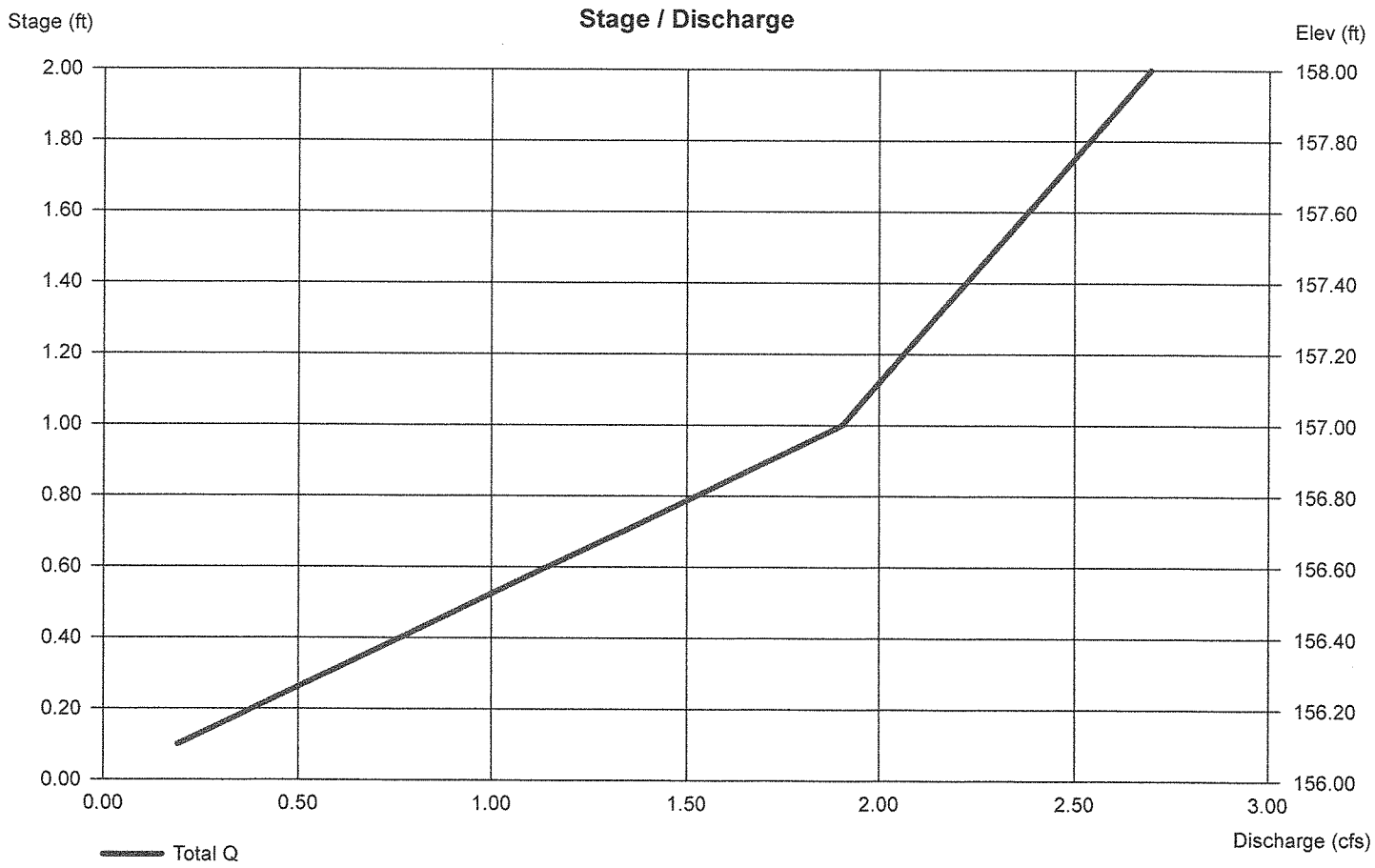
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

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 Contour)
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).



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	0.001	2	1326	8	----	------	------	P1
2	SCS Runoff	0.000	2	n/a	0	----	------	------	P2
3	SCS Runoff	0.000	2	n/a	0	----	------	------	P3
4	SCS Runoff	0.219	2	726	1,179	----	------	------	P4
5	Reservoir	0.211	2	728	1,179	4	153.04	17.4	Infiltration Area
6	Diversion1	0.211	2	728	1,179	5	------	------	Exfiltration
7	Diversion2	0.000	2	730	0	5	------	------	Overflow
8	SCS Runoff	0.232	2	724	781	----	------	------	Roof Runoff
9	Reservoir	0.056	2	746	781	8	154.27	172	Roof Infiltration
10	Diversion1	0.056	2	746	781	9	------	------	Exfiltration
11	Diversion2	0.000	2	926	0	9	------	------	Overflow

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	0.012	2	748	208	----	------	------	P1
2	SCS Runoff	0.000	2	n/a	0	----	------	------	P2
3	SCS Runoff	0.000	2	n/a	0	----	------	------	P3
4	SCS Runoff	0.923	2	724	3,230	----	------	------	P4
5	Reservoir	0.305	2	748	3,230	4	153.75	530	Infiltration Area
6	Diversion1	0.305	2	748	3,230	5	------	------	Exfiltration
7	Diversion2	0.000	2	824	0	5	------	------	Overflow
8	SCS Runoff	0.339	2	724	1,161	----	------	------	Roof Runoff
9	Reservoir	0.067	2	748	1,161	8	155.06	301	Roof Infiltration
10	Diversion1	0.067	2	748	1,161	9	------	------	Exfiltration
11	Diversion2	0.000	2	598	0	9	------	------	Overflow

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	0.046	2	742	424	----	------	------	P1
2	SCS Runoff	0.001	2	1326	10	----	------	------	P2
3	SCS Runoff	0.003	2	1328	64	----	------	------	P3
4	SCS Runoff	1.436	2	724	4,678	----	------	------	P4
5	Reservoir	0.349	2	750	4,678	4	154.24	1,053	Infiltration Area
6	Diversion1	0.349	2	750	4,678	5	------	------	Exfiltration
7	Diversion2	0.000	2	708	0	5	------	------	Overflow
8	SCS Runoff	0.400	2	724	1,378	----	------	------	Roof Runoff
9	Reservoir	0.075	2	748	1,378	8	155.60	377	Roof Infiltration
10	Diversion1	0.075	2	748	1,378	9	------	------	Exfiltration
11	Diversion2	0.000	2	556	0	9	------	------	Overflow

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	0.130	2	732	819	----	------	------	P1
2	SCS Runoff	0.003	2	902	74	----	------	------	P2
3	SCS Runoff	0.014	2	896	392	----	------	------	P3
4	SCS Runoff	2.219	2	724	6,906	----	------	------	P4
5	Reservoir	0.427	2	752	6,906	4	155.10	1,933	Infiltration Area
6	Diversion1	0.427	2	752	6,906	5	------	------	Exfiltration
7	Diversion2	0.000	2	1080	0	5	------	------	Overflow
8	SCS Runoff	0.484	2	724	1,677	----	------	------	Roof Runoff
9	Reservoir	0.091	2	748	1,677	8	156.73	481	Roof Infiltration
10	Diversion1	0.091	2	748	1,677	9	------	------	Exfiltration
11	Diversion2	0.000	2	640	0	9	------	------	Overflow

Worksheet 2: Runoff curve number and runoff **SM-4860**

Project: 267 Great Rd By JTM Date 6/27/14

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] P1

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
A	Woods	30			0.13	3.87
A	Open	39			0.12	4.80
	Impervious	98			0.02	1.86
A	Gravel	76			0.02	1.82
					Totals =	0.30	12.35

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{12.35}{0.30} = 41.87$; Use CN = 41.9

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	0.01	0.19	0.75
Runoff, Q.....	cf	8	204	803

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4860

Project: 267 Great Rd By JTM Date 6/27/2014

Location: Acton, MA Checked _____ Date _____

Circle one: Present | Developed

Circle one: Tc | Tt through subarea P1

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)			0.4	0.24		
3. Flow length, L (total L <= 300 ft)		ft	9	41		
4. Two-yr 24-hr rainfall, P2		in	3.1	3.1		
5. Land Slope, s		ft/ft	0.027	0.04		
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.05	0.09		0.14

Shallow concentrated Flow		Segment ID	C-D			
7. Surface Description (paved or unpaved)			unpaved			
8. Flow Length, L		ft	25			
9. Watercourse slope, s		ft/ft	0.06			
10. Average Velocity, V (figure 3-1)		ft/s	3.95			
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

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.14

min 8.3

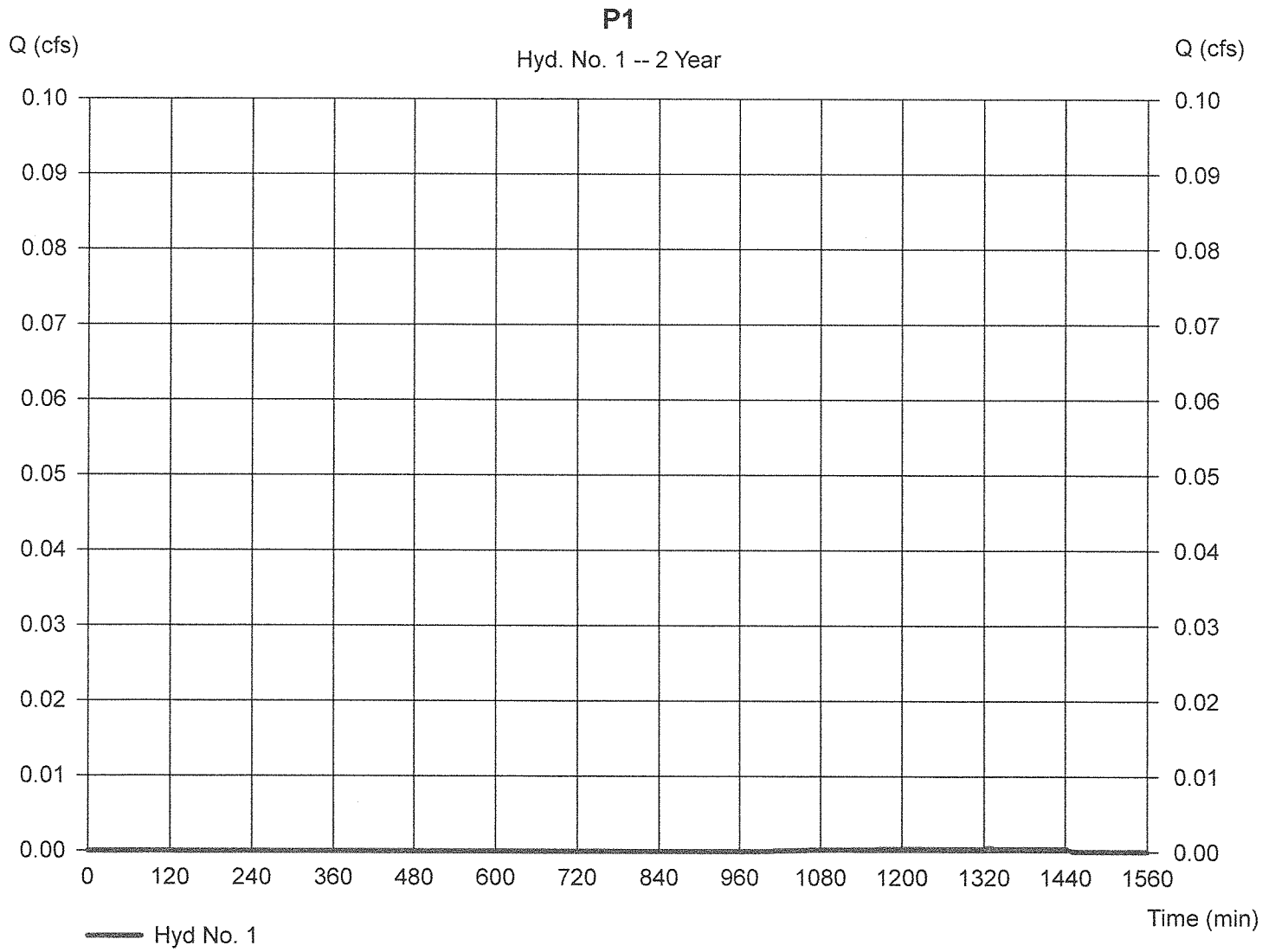
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 1

P1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 2 yrs	Time to peak	= 1326 min
Time interval	= 2 min	Hyd. volume	= 8 cuft
Drainage area	= 0.300 ac	Curve number	= 41.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.30 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



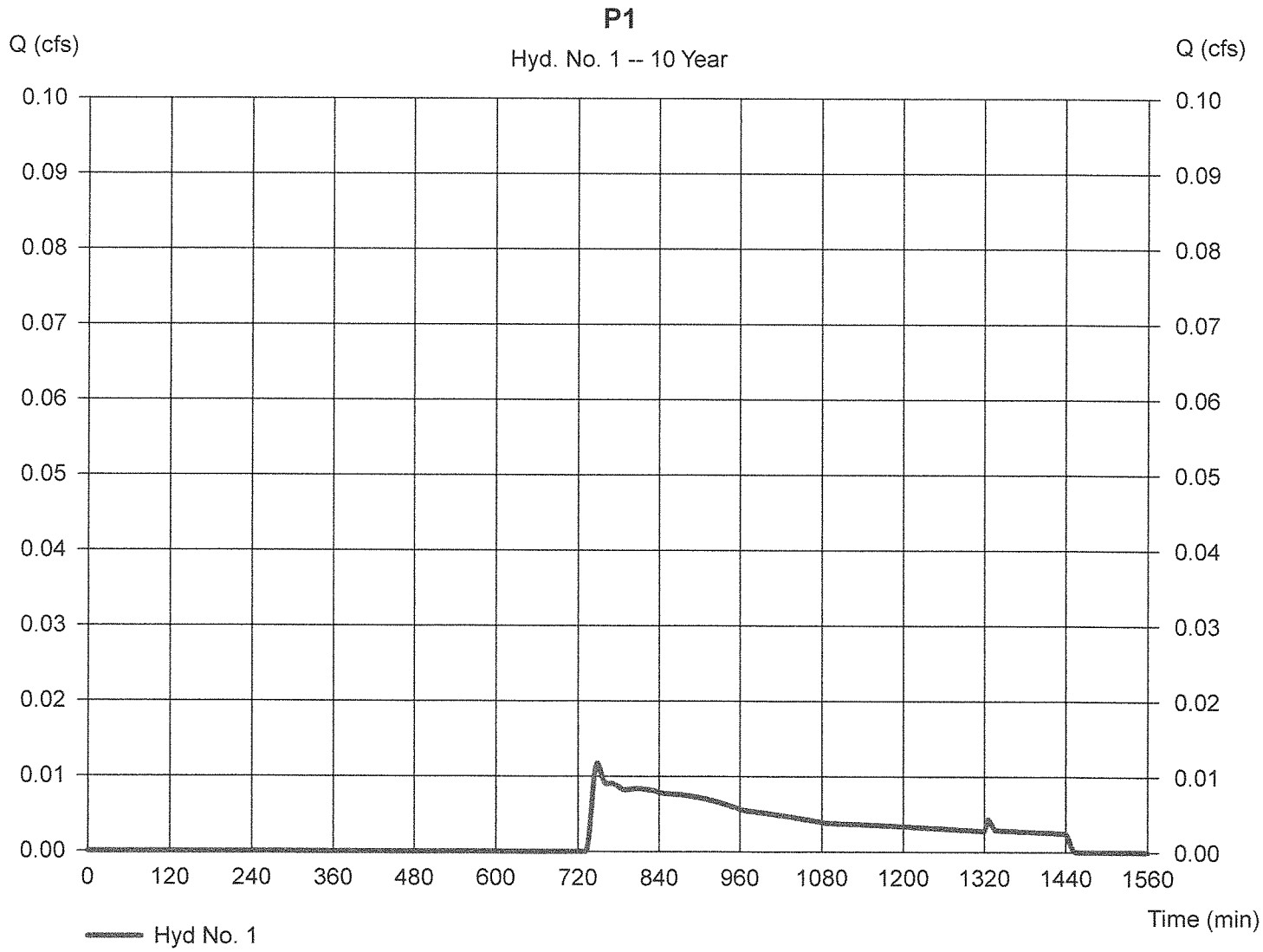
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 1

P1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.012 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 208 cuft
Drainage area	= 0.300 ac	Curve number	= 41.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.30 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



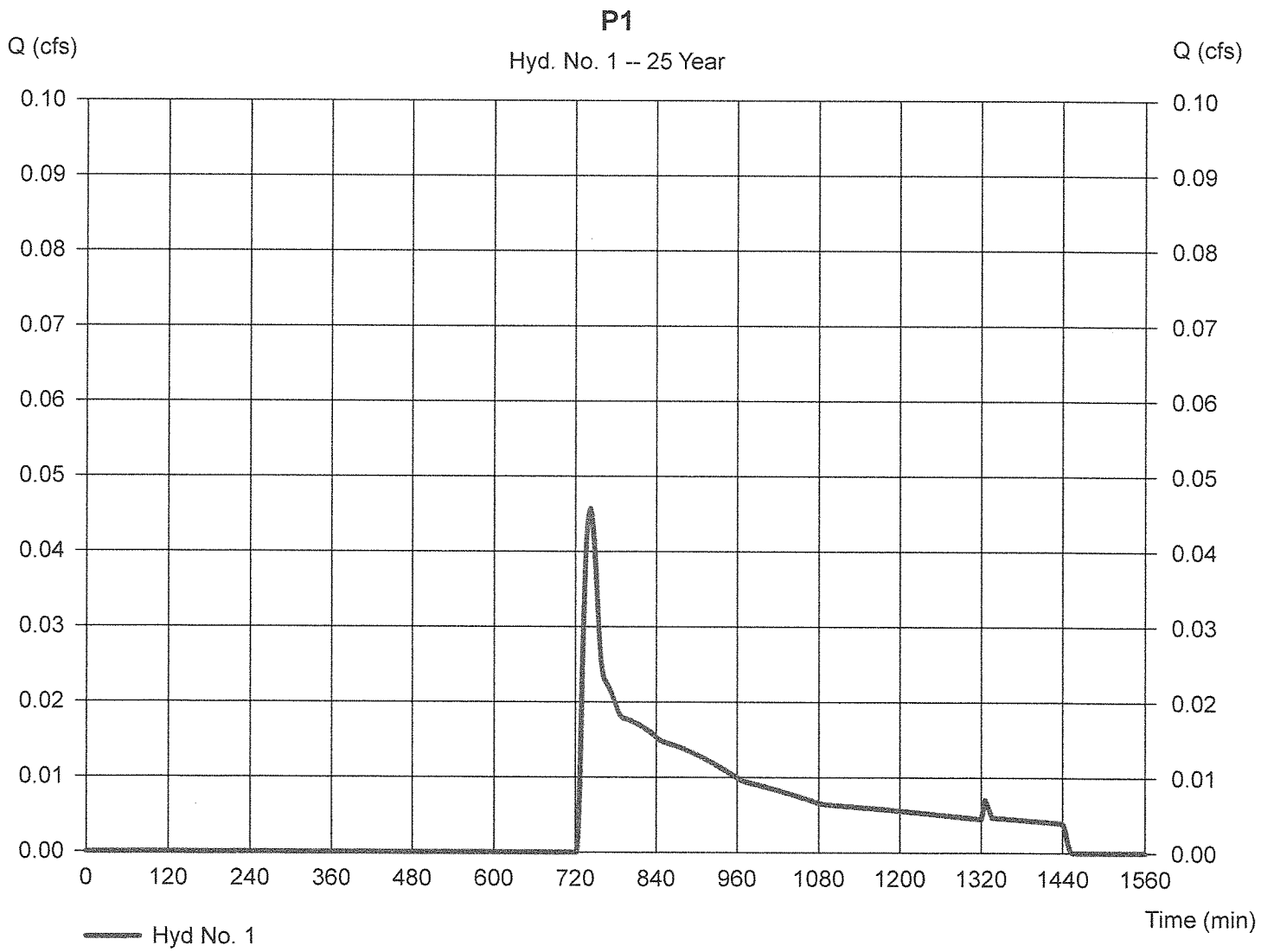
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 1

P1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.046 cfs
Storm frequency	= 25 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 424 cuft
Drainage area	= 0.300 ac	Curve number	= 41.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.30 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



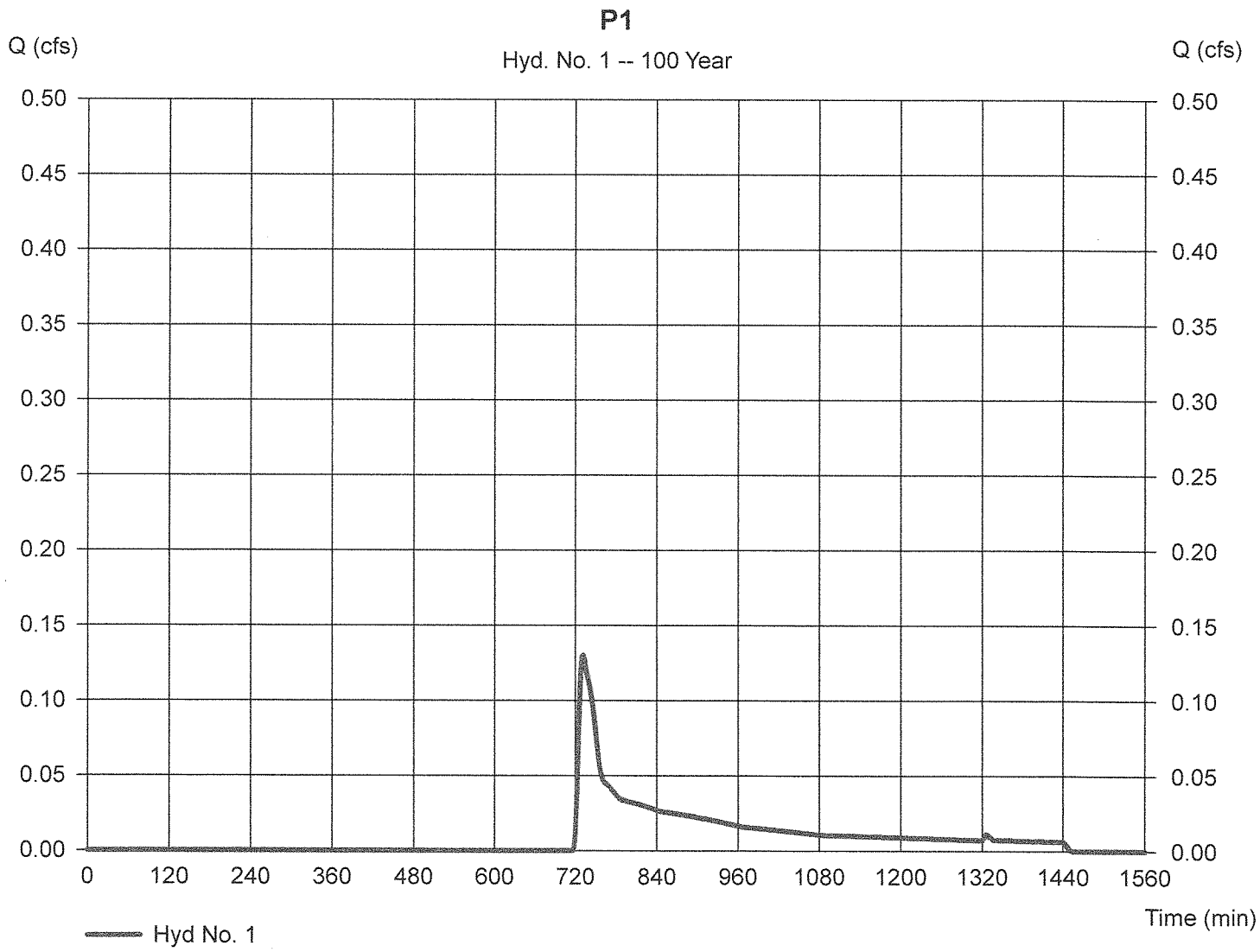
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 1

P1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.130 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 819 cuft
Drainage area	= 0.300 ac	Curve number	= 41.9
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.30 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Worksheet 2: Runoff curve number and runoff SM-4860

Project: 267 Great Rd By JTM Date 6/27/14

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] P2

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
A	Woods	30			0.17	5.01
A	Open	39			0.00	0.00
	Impervious	98			0.00	0.00
A	Gravel	76			0.00	0.00
					Totals =	0.17	5.01

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{5.01}{0.17} = 30.00$; Use CN = 30.0

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	0.11	0.00	0.12
Runoff, Q.....	cf	68	1	73

D-2 (210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4860

Project: 267 Great Rd By JTM Date 6/27/2014

Location: Acton, MA Checked _____ Date _____

Circle one: Present | Developed P2

Circle one: Tc | Tt through subarea _____

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)			0.4			
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	0.055			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.14			0.14
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			unpaved			
8. Flow Length, L		ft	33			
9. Watercourse slope, s		ft/ft	0.068			
10. Average Velocity, V (figure 3-1)		ft/s	4.21			
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

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.14

min 8.5

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

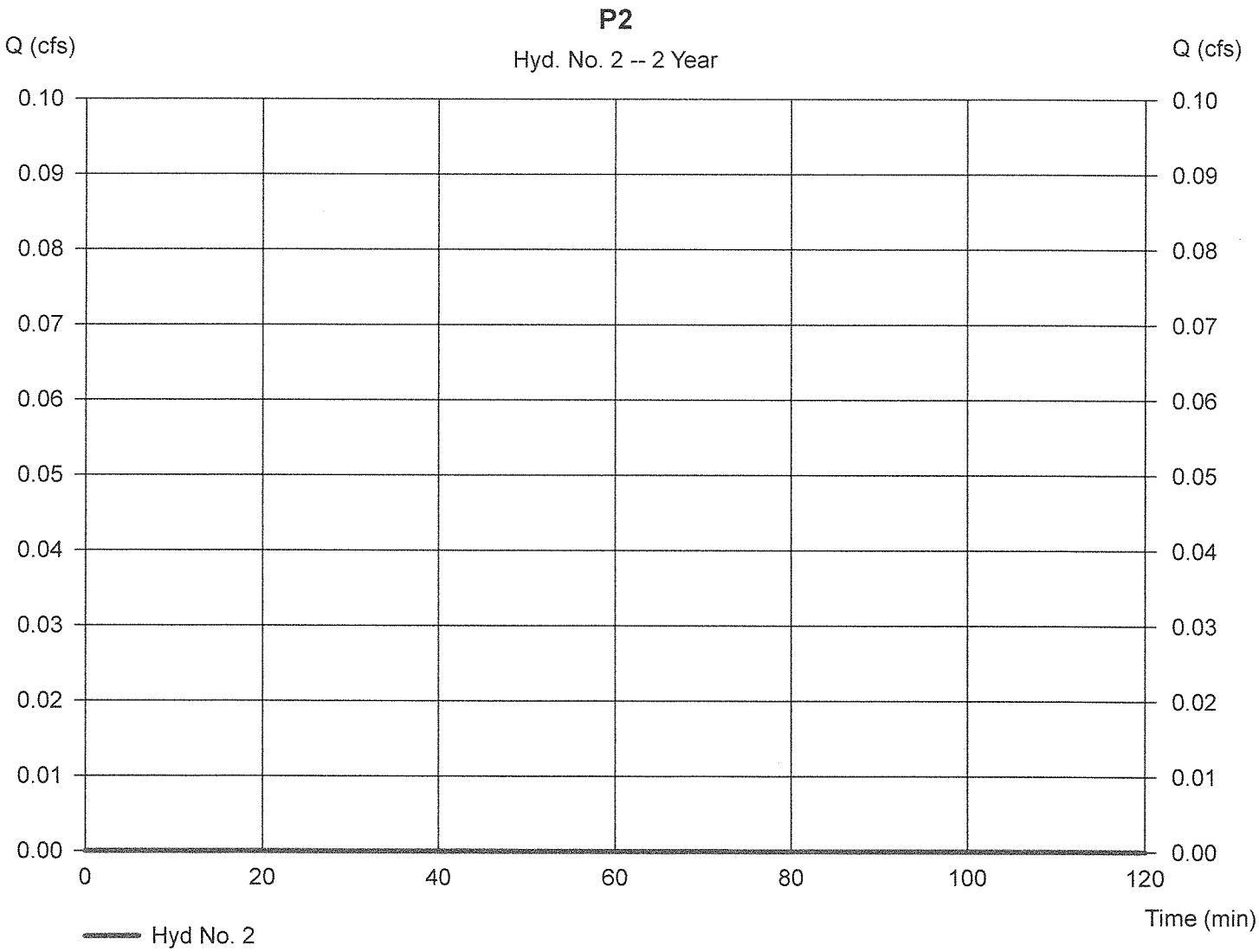
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 2

P2

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	= 0.170 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.50 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



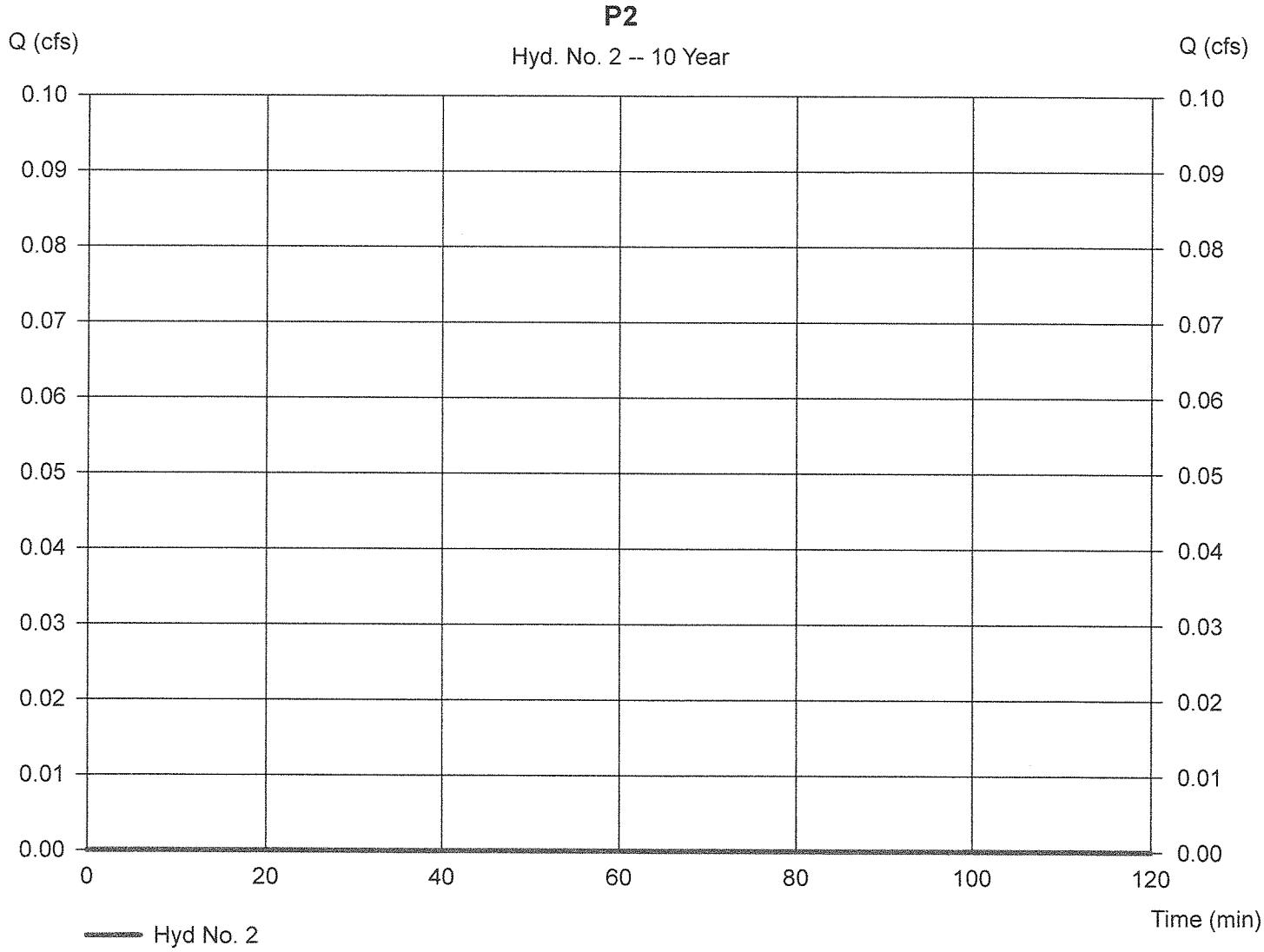
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 2

P2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.170 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.50 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



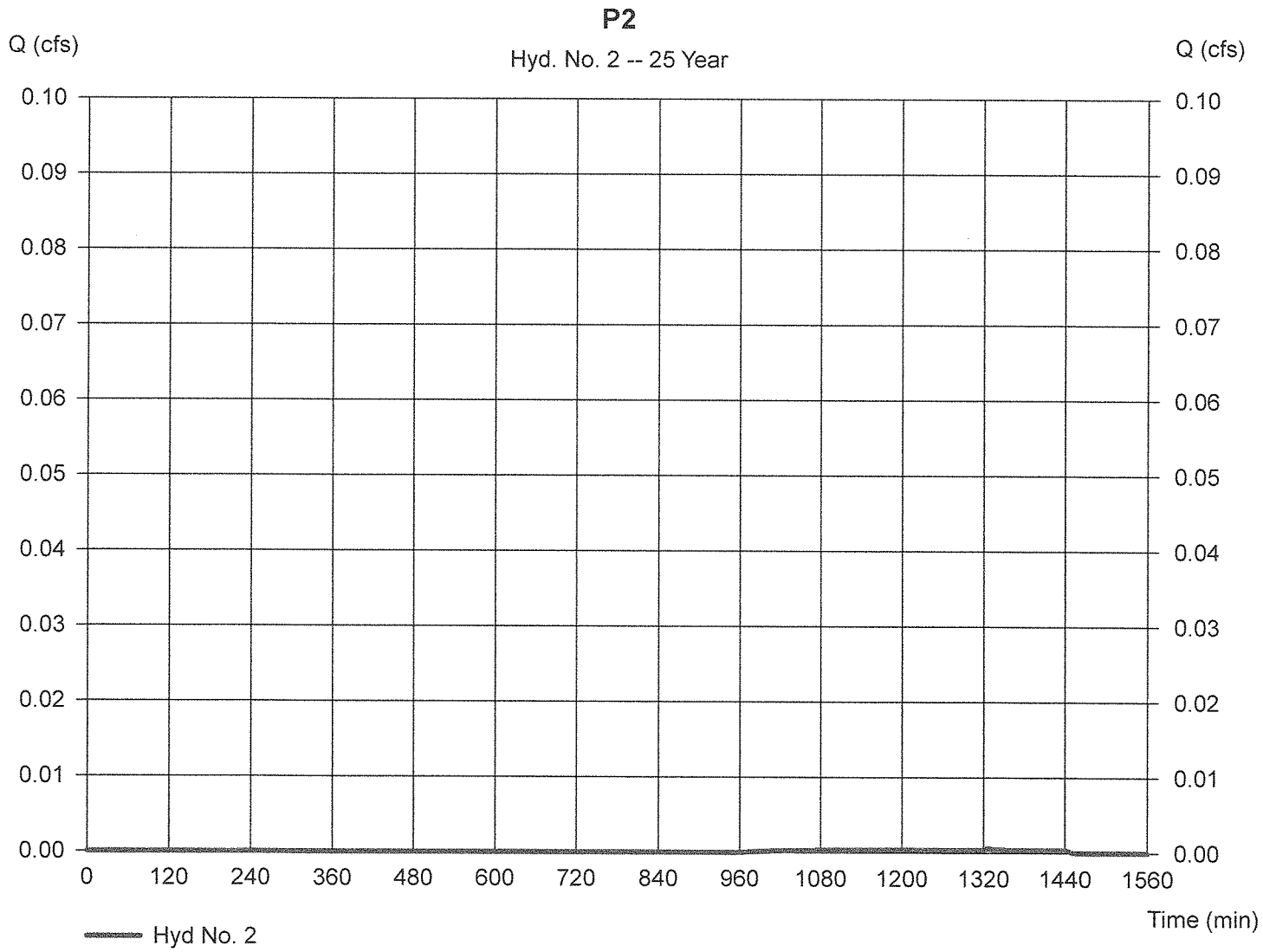
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 2

P2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 25 yrs	Time to peak	= 1326 min
Time interval	= 2 min	Hyd. volume	= 10 cuft
Drainage area	= 0.170 ac	Curve number	= 30
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 8.50 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



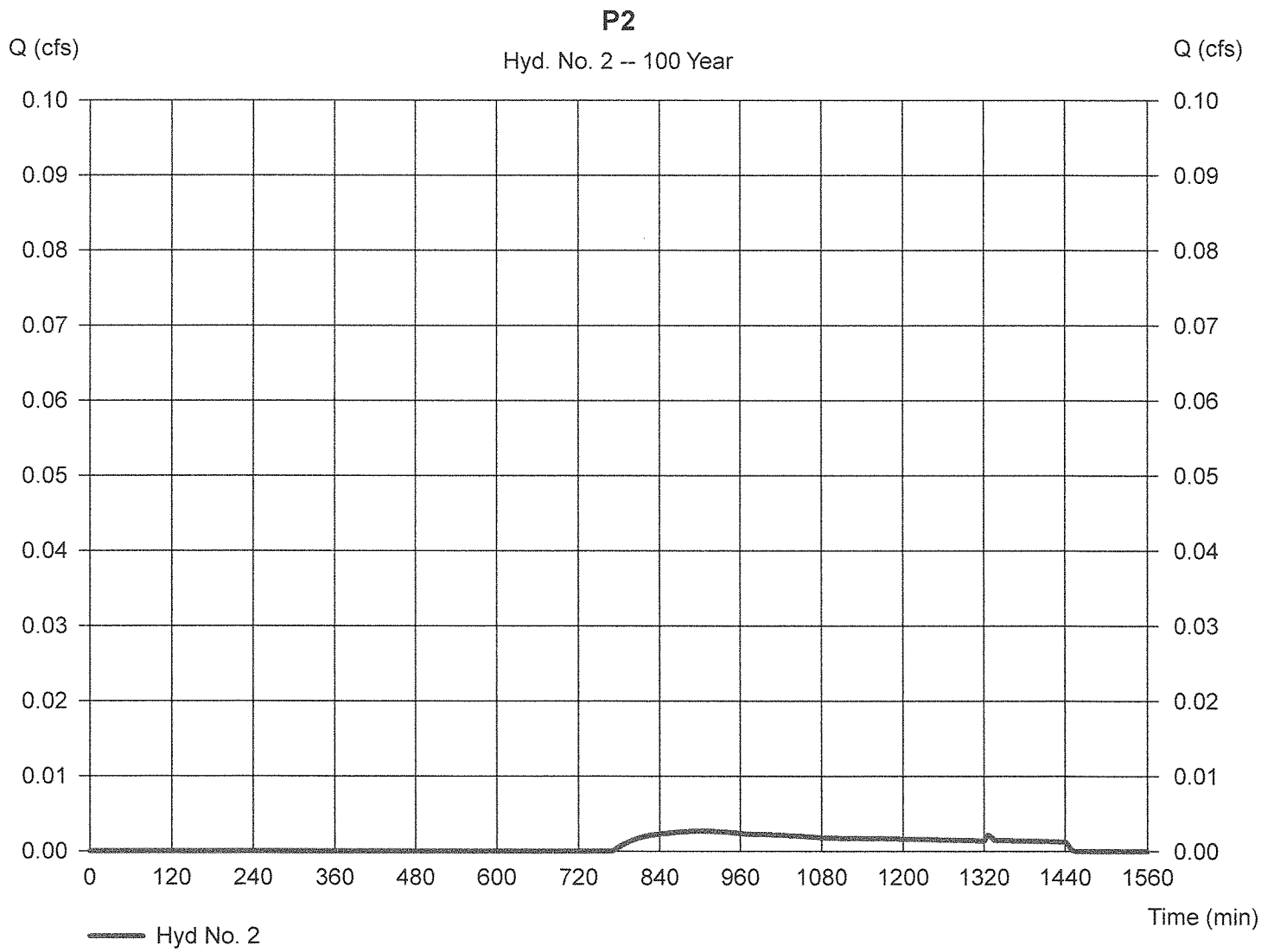
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 2

P2

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.003 cfs
Storm frequency	=	100 yrs	Time to peak	=	902 min
Time interval	=	2 min	Hyd. volume	=	74 cuft
Drainage area	=	0.170 ac	Curve number	=	30
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	8.50 min
Total precip.	=	6.40 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



Worksheet 2: Runoff curve number and runoff **SM-4860**

Project: 267 Great Rd By JTM Date 6/27/14

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] P3

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
A	Woods	30			0.76	22.89
A	Open	39			0.01	0.31
	Impervious	98			0.00	0.39
A	Gravel	76			0.00	0.00
				Totals =	0.78	23.59

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{23.59}{0.78} =$ 30.44 ; Use CN = 30.4

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..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.10	0.00	0.14
Runoff, Q.....	cf	284	1	382

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4860

Project: 267 Great Rd By JTM Date 6/27/2014

Location: Acton, MA Checked _____ Date _____

Circle one: Present | Developed P3

Circle one: Tc | Tt through subarea

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)			0.4			
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	0.03			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.18			0.18
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			unpaved			
8. Flow Length, L		ft	81			
9. Watercourse slope, s		ft/ft	0.027			
10. Average Velocity, V (figure 3-1)		ft/s	2.65			
11. Tt = L / 3600V	Compute Tt	hr	0.01			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

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.19

min 11.2

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

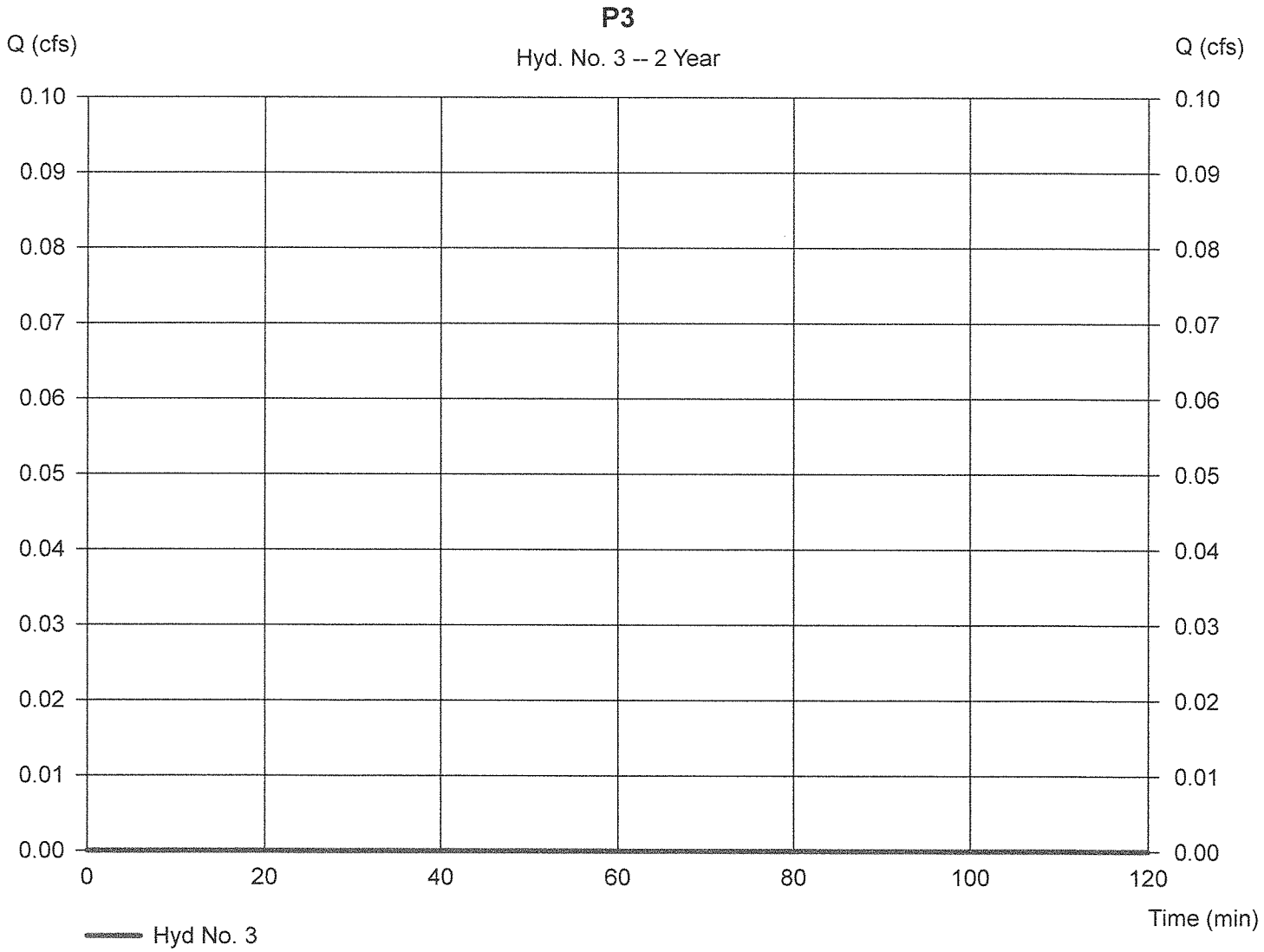
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 3

P3

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	= 0.780 ac	Curve number	= 30.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.20 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



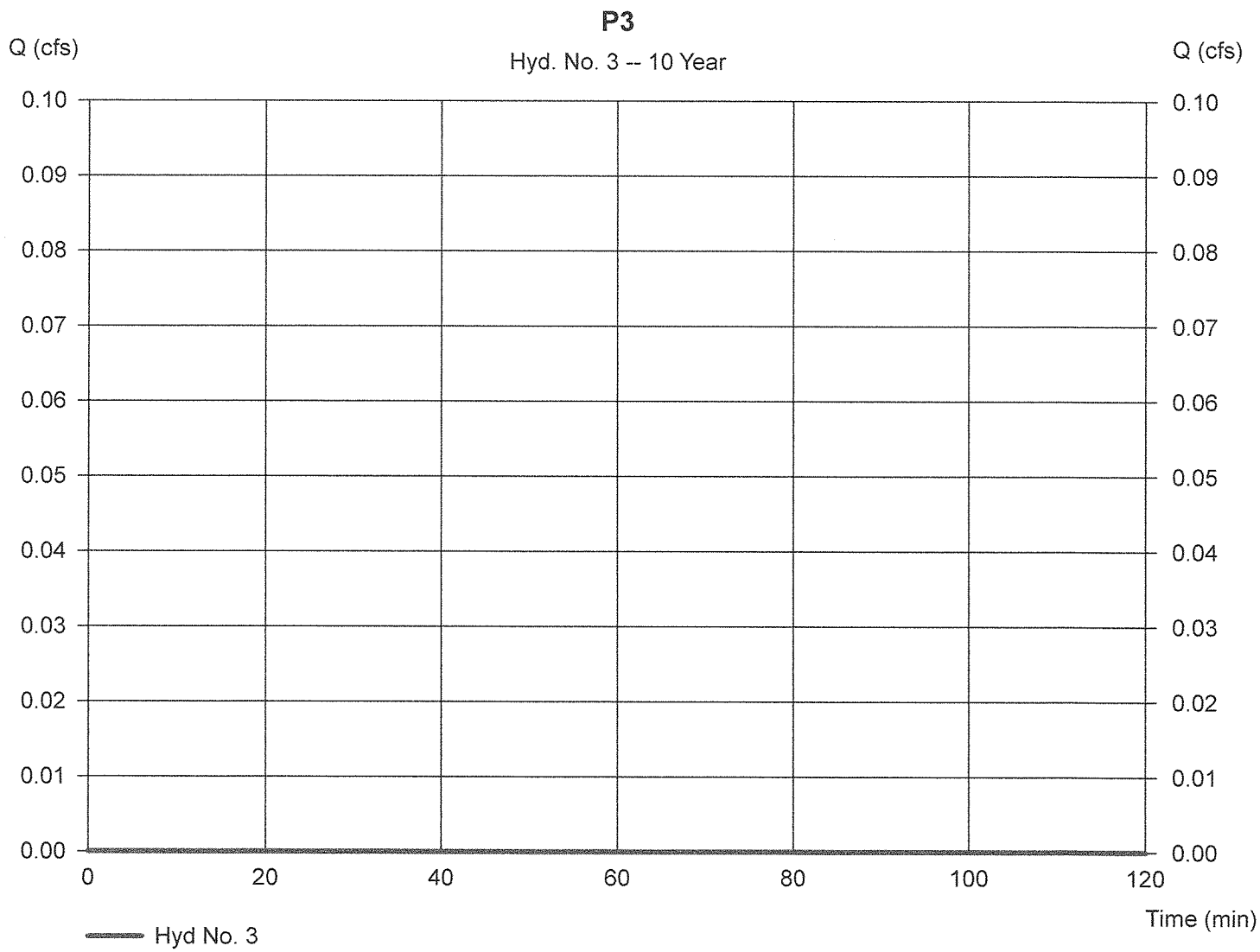
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 3

P3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.780 ac	Curve number	= 30.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 11.20 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



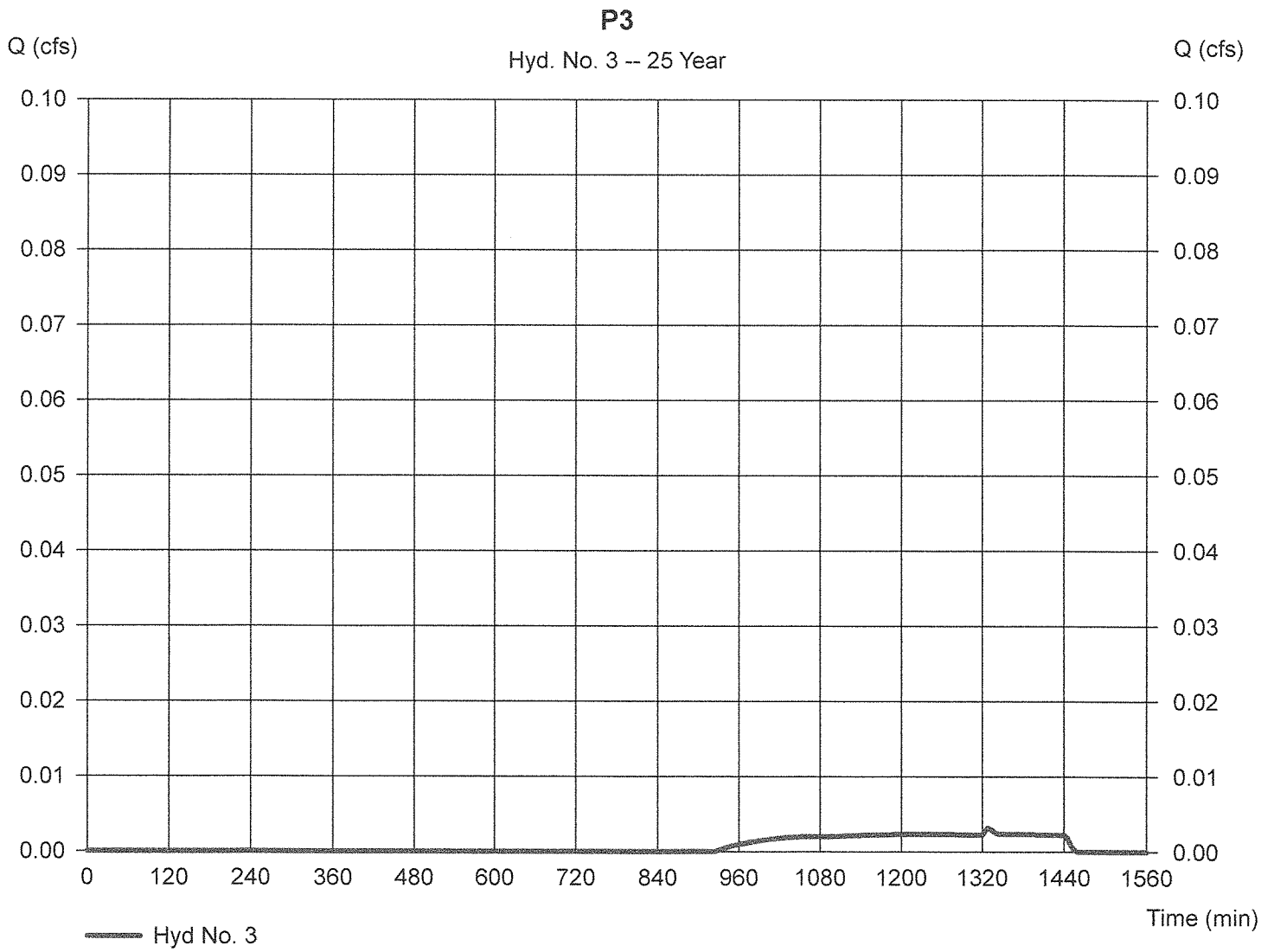
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 3

P3

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.003 cfs
Storm frequency	=	25 yrs	Time to peak	=	1328 min
Time interval	=	2 min	Hyd. volume	=	64 cuft
Drainage area	=	0.780 ac	Curve number	=	30.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	11.20 min
Total precip.	=	5.30 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



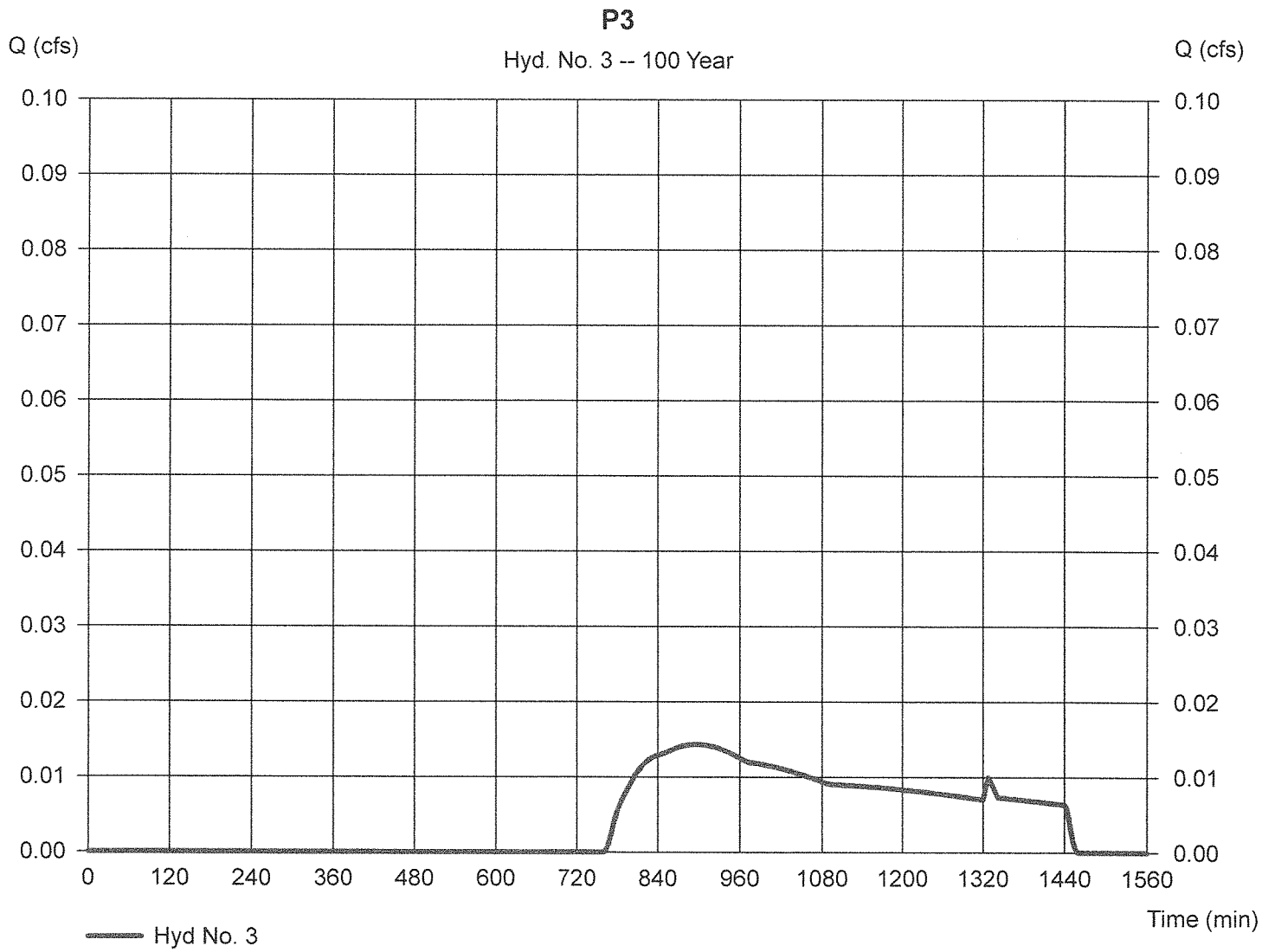
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 3

P3

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.014 cfs
Storm frequency	=	100 yrs	Time to peak	=	896 min
Time interval	=	2 min	Hyd. volume	=	392 cuft
Drainage area	=	0.780 ac	Curve number	=	30.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	11.20 min
Total precip.	=	6.40 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



Worksheet 2: Runoff curve number and runoff **SM-4860**

Project: 267 Great Rd By JTM Date 6/27/14

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] P4

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
A	Woods	30			0.02	0.57
A	Open	39			0.56	21.72
	Impervious	98			0.32	31.07
A	Gravel	76			0.03	1.90
					Totals =	0.92	55.26

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{55.26}{0.92} =$ 60.19 ; Use CN = 60.2

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	0.38	1.03	2.21
Runoff, Q.....	cf	1255	3437	7349

D-2 (210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-4860

Project: 267 Great Rd By JTM Date 6/27/2014

Location: Acton, MA Checked _____ Date _____

Circle one: Present | Developed

Circle one: Tc | Tt through subarea P4

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	0.045			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.10			0.10
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			unpaved			
8. Flow Length, L		ft	54			
9. Watercourse slope, s		ft/ft	0.02			
10. Average Velocity, V (figure 3-1)		ft/s	2.28			
11. Tt = L / 3600V	Compute Tt	hr	0.01			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

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.11

min 6.4

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

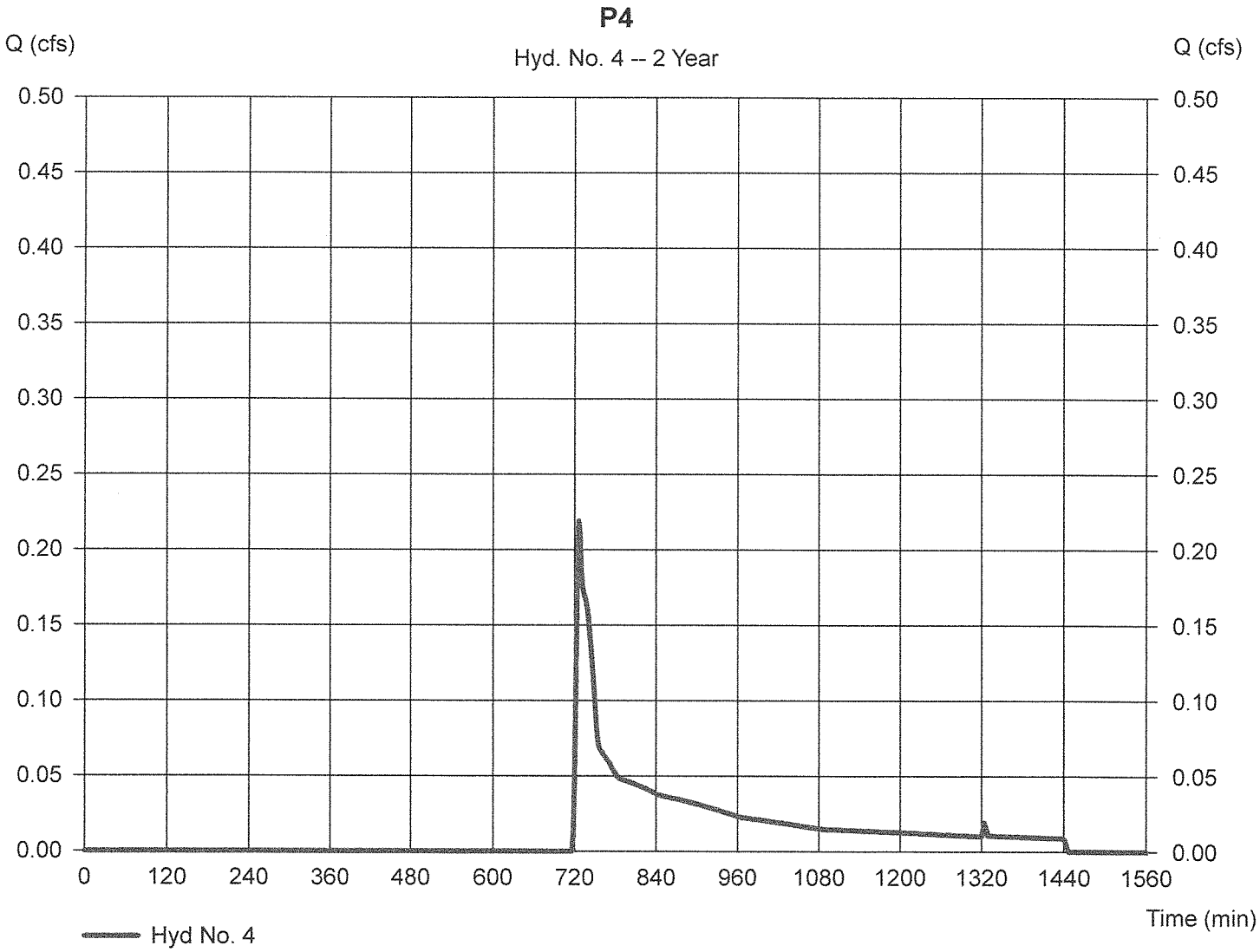
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 4

P4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.219 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 1,179 cuft
Drainage area	= 0.920 ac	Curve number	= 60.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.40 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



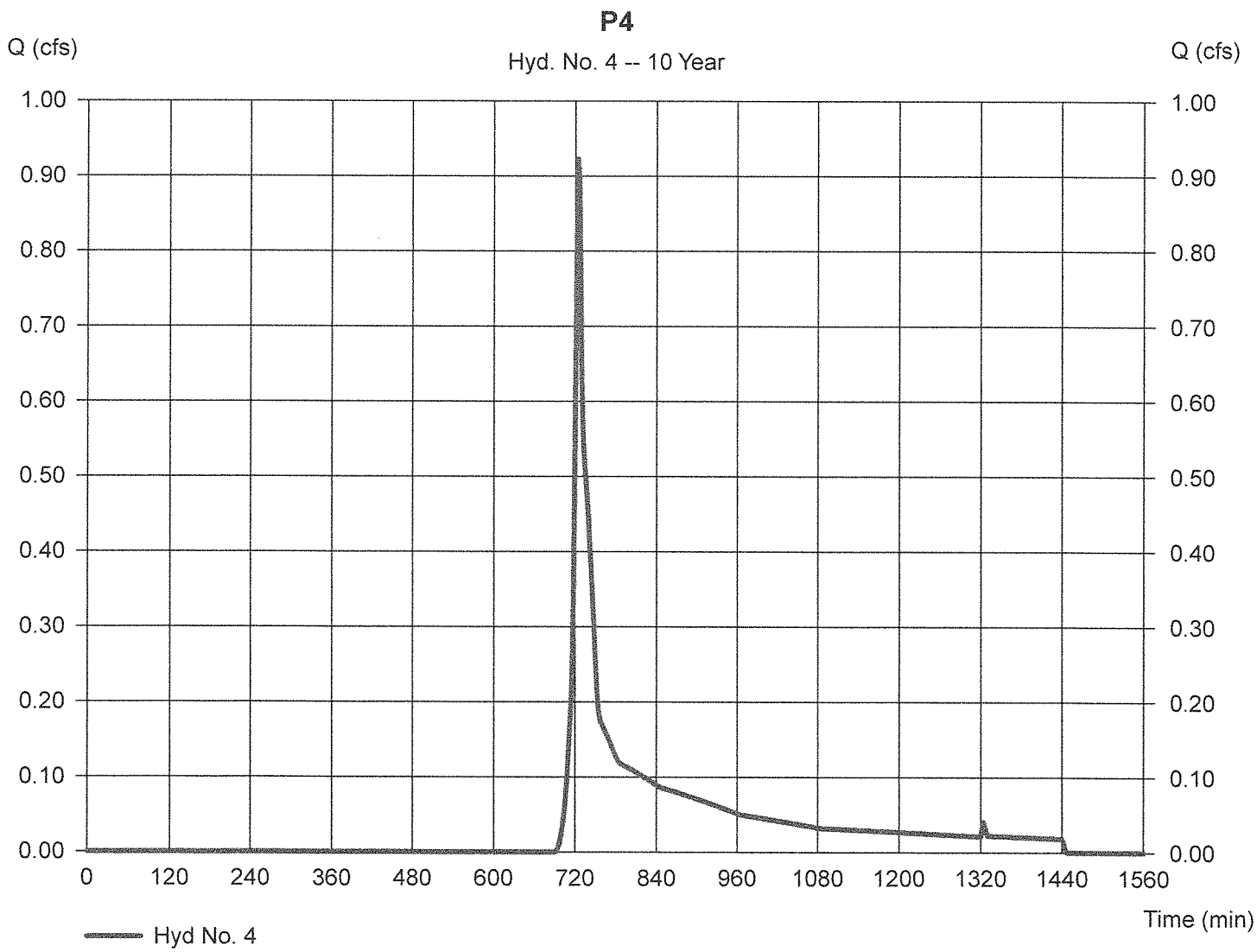
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 4

P4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.923 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 3,230 cuft
Drainage area	= 0.920 ac	Curve number	= 60.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.40 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



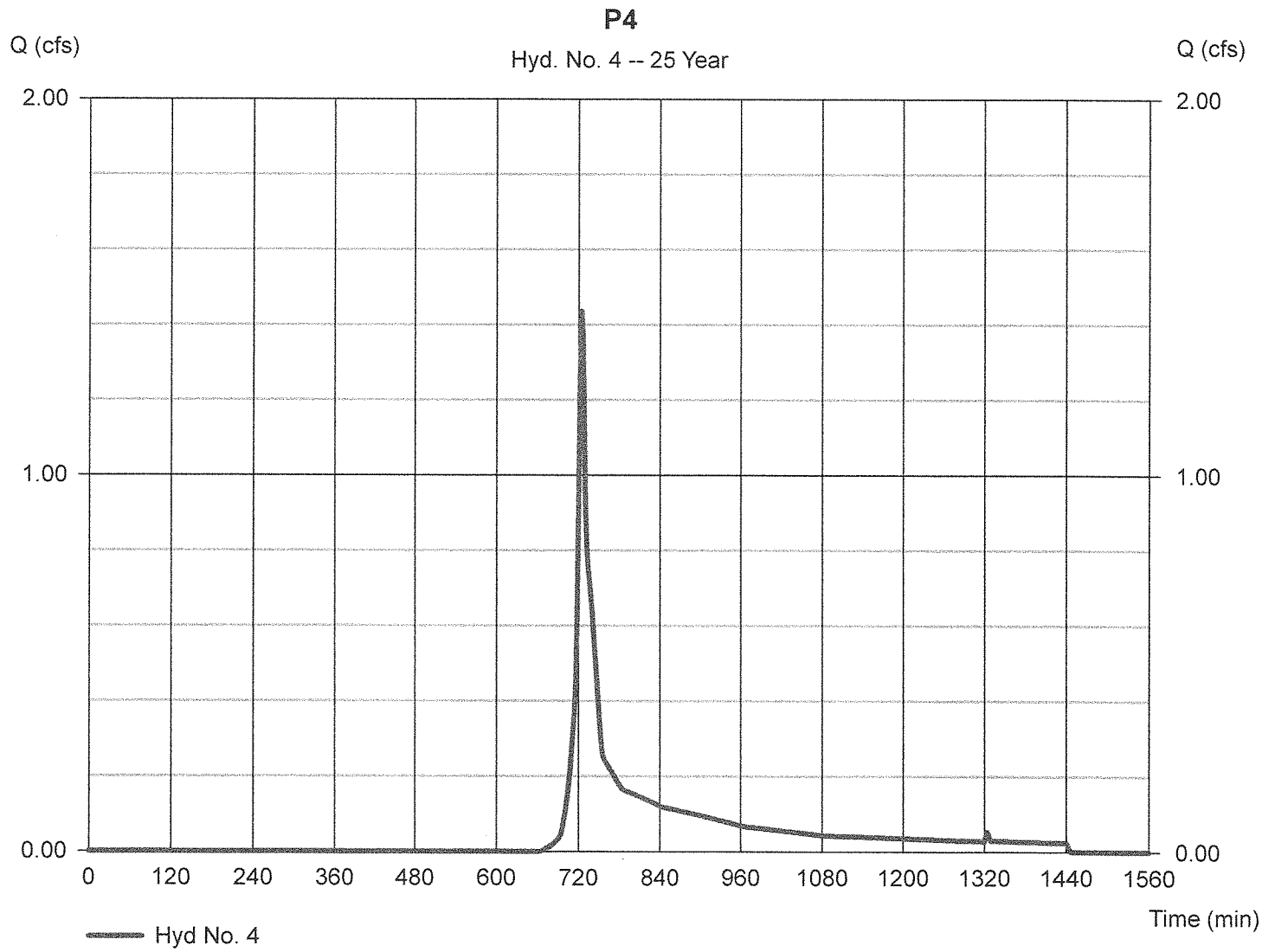
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 4

P4

Hydrograph type	= SCS Runoff	Peak discharge	= 1.436 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 4,678 cuft
Drainage area	= 0.920 ac	Curve number	= 60.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.40 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



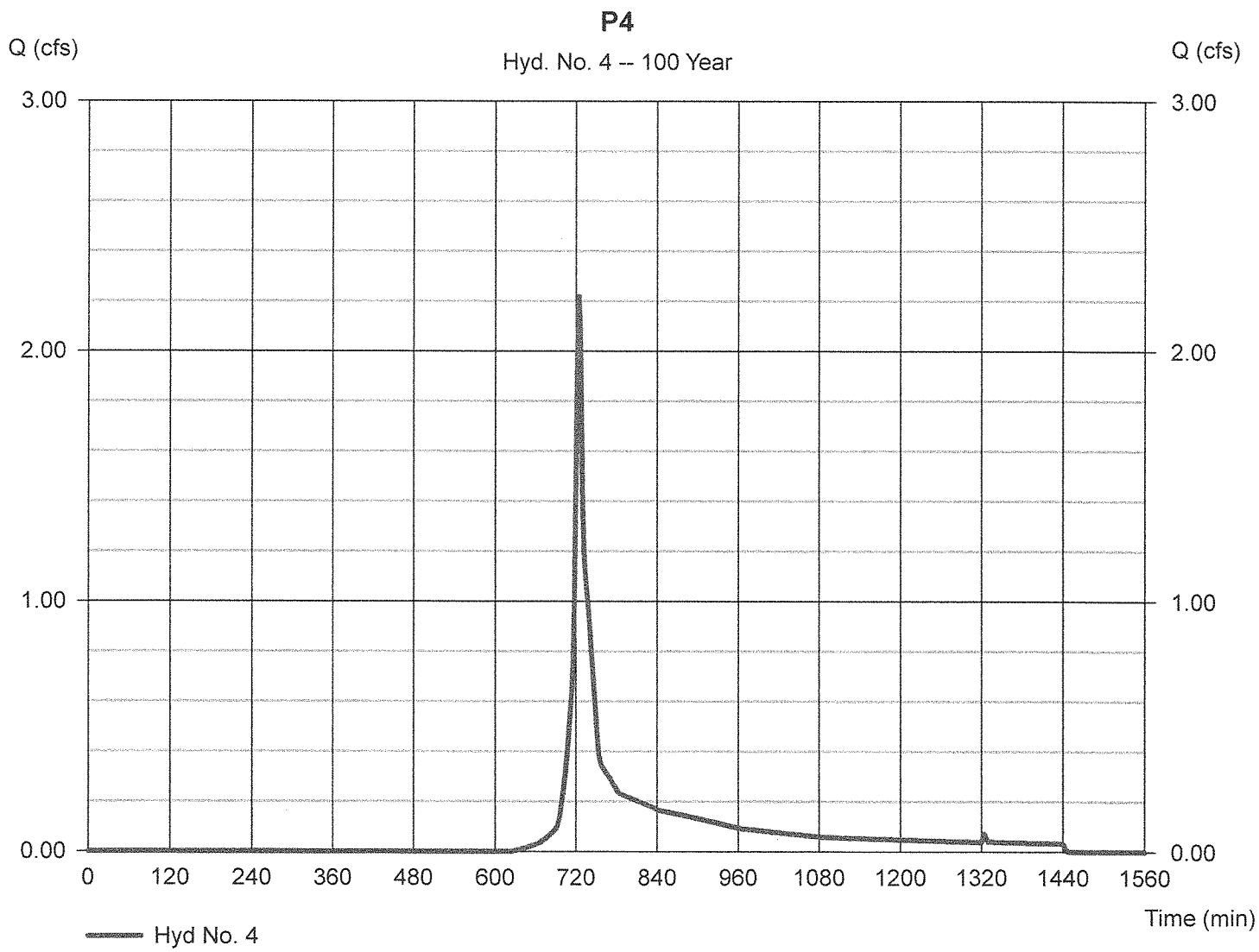
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 4

P4

Hydrograph type	= SCS Runoff	Peak discharge	= 2.219 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 6,906 cuft
Drainage area	= 0.920 ac	Curve number	= 60.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.40 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

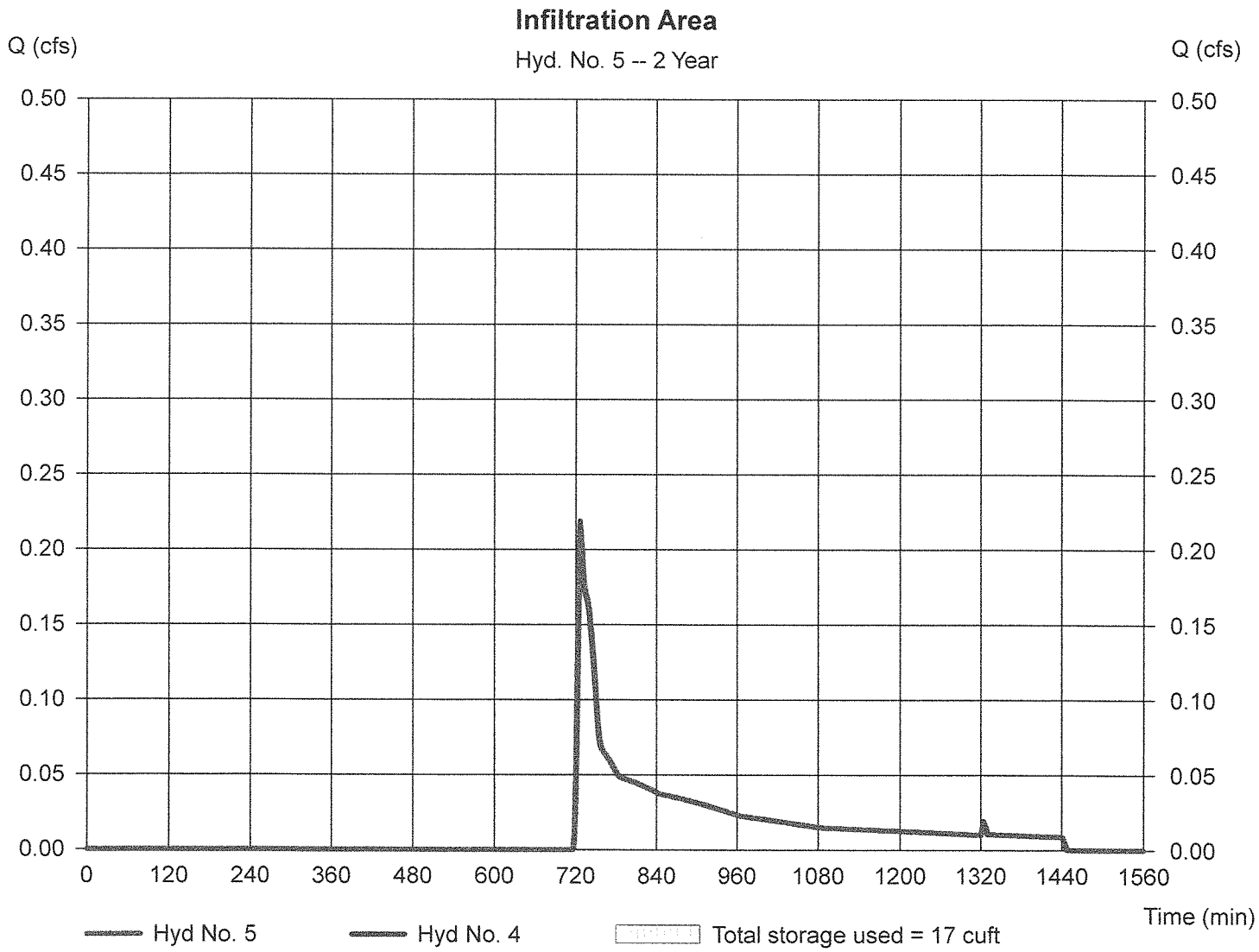
Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 5

Infiltration Area

Hydrograph type	= Reservoir	Peak discharge	= 0.211 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 1,179 cuft
Inflow hyd. No.	= 4 - P4	Max. Elevation	= 153.04 ft
Reservoir name	= Subsurface	Max. Storage	= 17 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

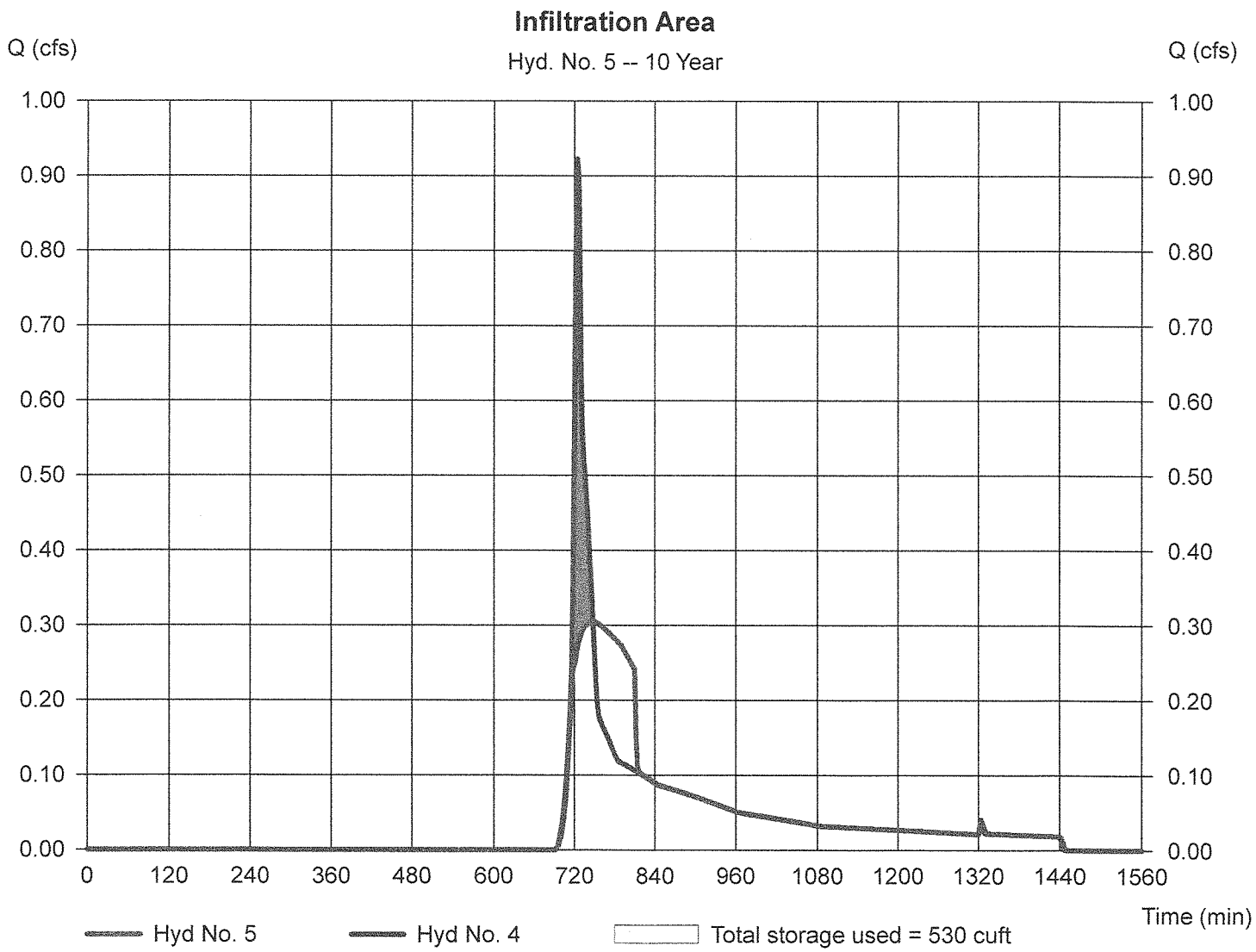
Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 5

Infiltration Area

Hydrograph type	= Reservoir	Peak discharge	= 0.305 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 3,230 cuft
Inflow hyd. No.	= 4 - P4	Max. Elevation	= 153.75 ft
Reservoir name	= Subsurface	Max. Storage	= 530 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

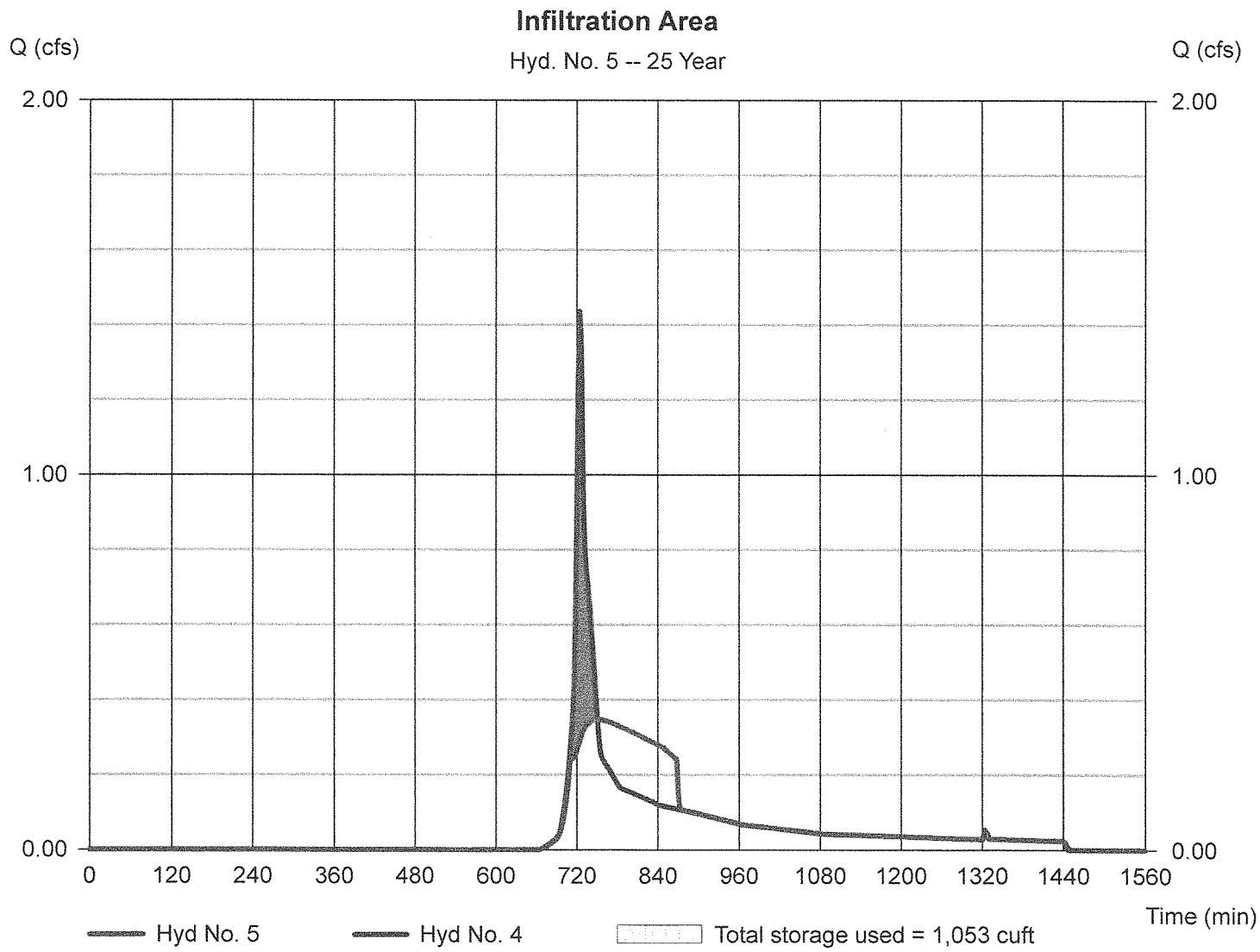
Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 5

Infiltration Area

Hydrograph type	= Reservoir	Peak discharge	= 0.349 cfs
Storm frequency	= 25 yrs	Time to peak	= 750 min
Time interval	= 2 min	Hyd. volume	= 4,678 cuft
Inflow hyd. No.	= 4 - P4	Max. Elevation	= 154.24 ft
Reservoir name	= Subsurface	Max. Storage	= 1,053 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

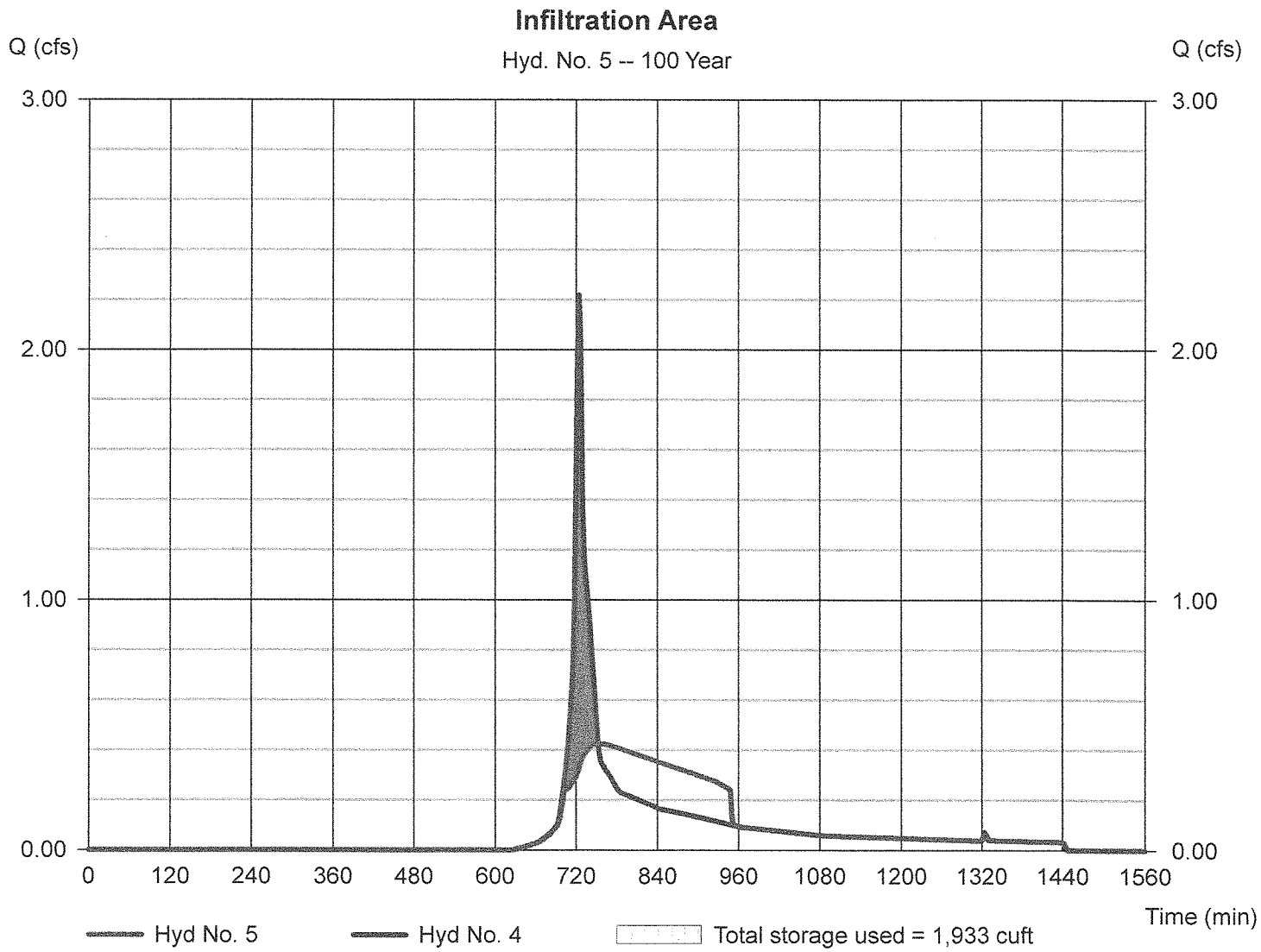
Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 5

Infiltration Area

Hydrograph type	= Reservoir	Peak discharge	= 0.427 cfs
Storm frequency	= 100 yrs	Time to peak	= 752 min
Time interval	= 2 min	Hyd. volume	= 6,906 cuft
Inflow hyd. No.	= 4 - P4	Max. Elevation	= 155.10 ft
Reservoir name	= Subsurface	Max. Storage	= 1,933 cuft

Storage Indication method used. Outflow includes exfiltration.



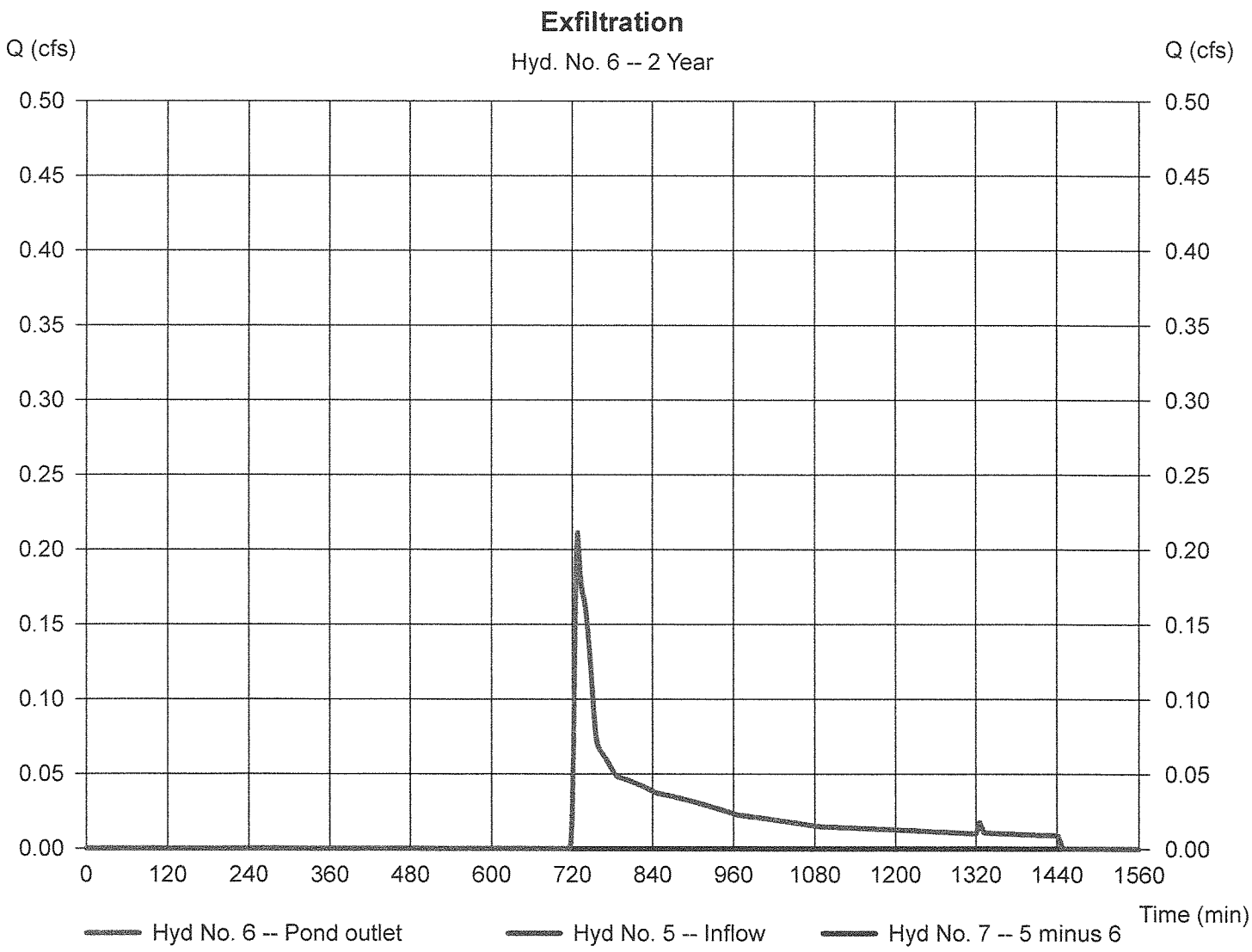
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 6

Exfiltration

Hydrograph type	=	Diversion1	Peak discharge	=	0.211 cfs
Storm frequency	=	2 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	1,179 cuft
Inflow hydrograph	=	5 - Infiltration Area	2nd diverted hyd.	=	7
Diversion method	=	Pond - Subsurface	Pond structure	=	Exfiltration



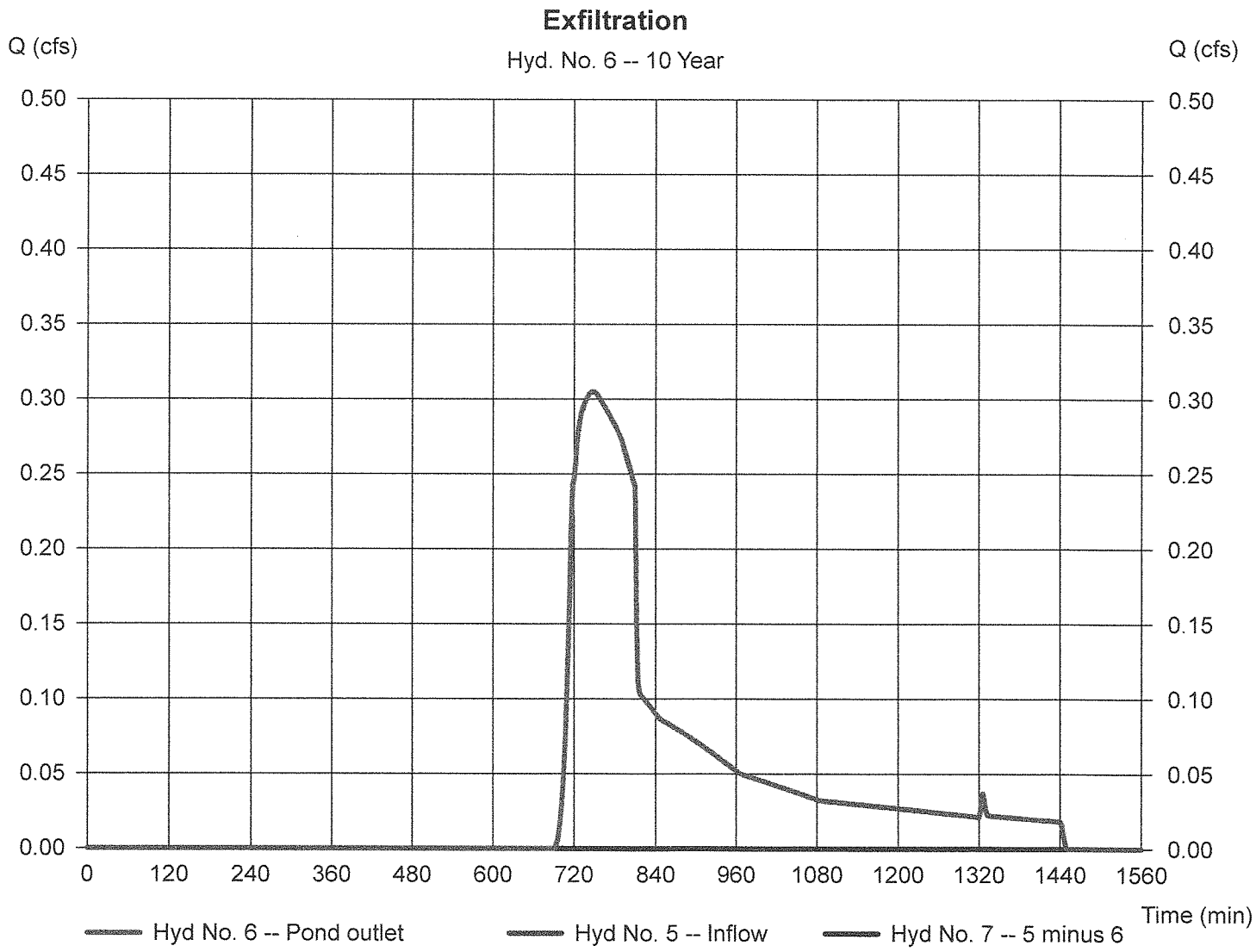
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 6

Exfiltration

Hydrograph type	=	Diversion1	Peak discharge	=	0.305 cfs
Storm frequency	=	10 yrs	Time to peak	=	748 min
Time interval	=	2 min	Hyd. volume	=	3,230 cuft
Inflow hydrograph	=	5 - Infiltration Area	2nd diverted hyd.	=	7
Diversion method	=	Pond - Subsurface	Pond structure	=	Exfiltration



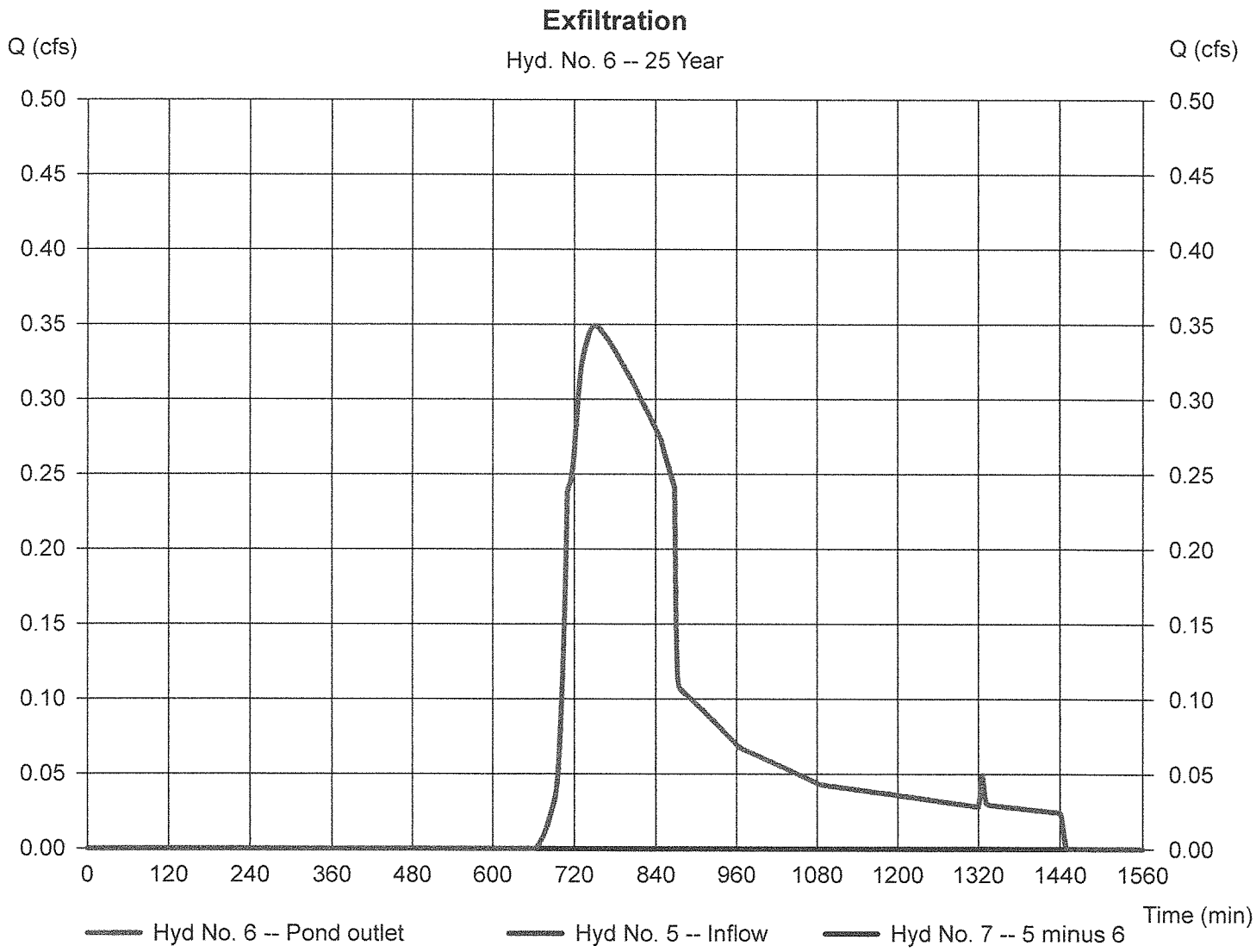
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 6

Exfiltration

Hydrograph type	=	Diversion1	Peak discharge	=	0.349 cfs
Storm frequency	=	25 yrs	Time to peak	=	750 min
Time interval	=	2 min	Hyd. volume	=	4,678 cuft
Inflow hydrograph	=	5 - Infiltration Area	2nd diverted hyd.	=	7
Diversion method	=	Pond - Subsurface	Pond structure	=	Exfiltration



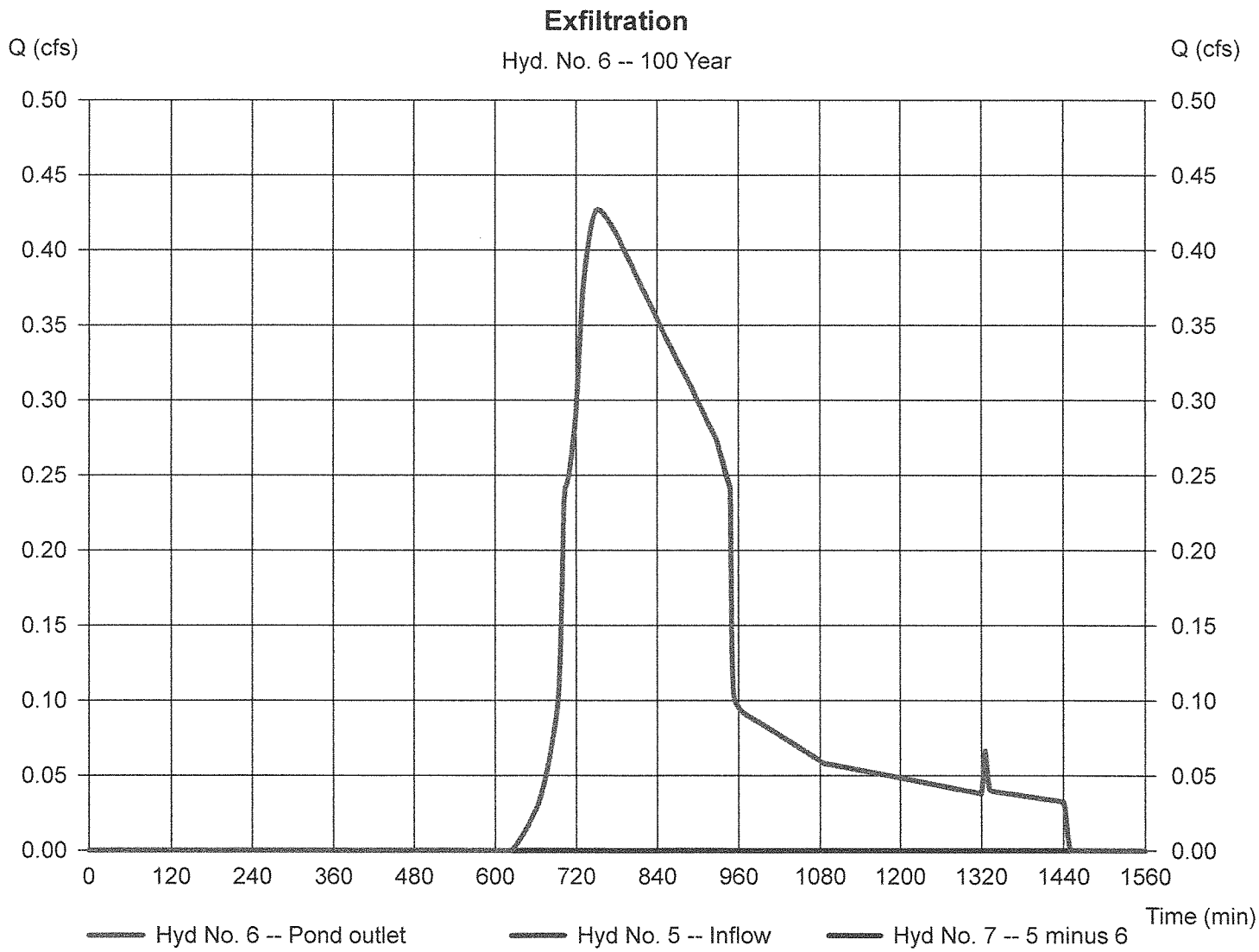
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 6

Exfiltration

Hydrograph type	=	Diversion1	Peak discharge	=	0.427 cfs
Storm frequency	=	100 yrs	Time to peak	=	752 min
Time interval	=	2 min	Hyd. volume	=	6,906 cuft
Inflow hydrograph	=	5 - Infiltration Area	2nd diverted hyd.	=	7
Diversion method	=	Pond - Subsurface	Pond structure	=	Exfiltration



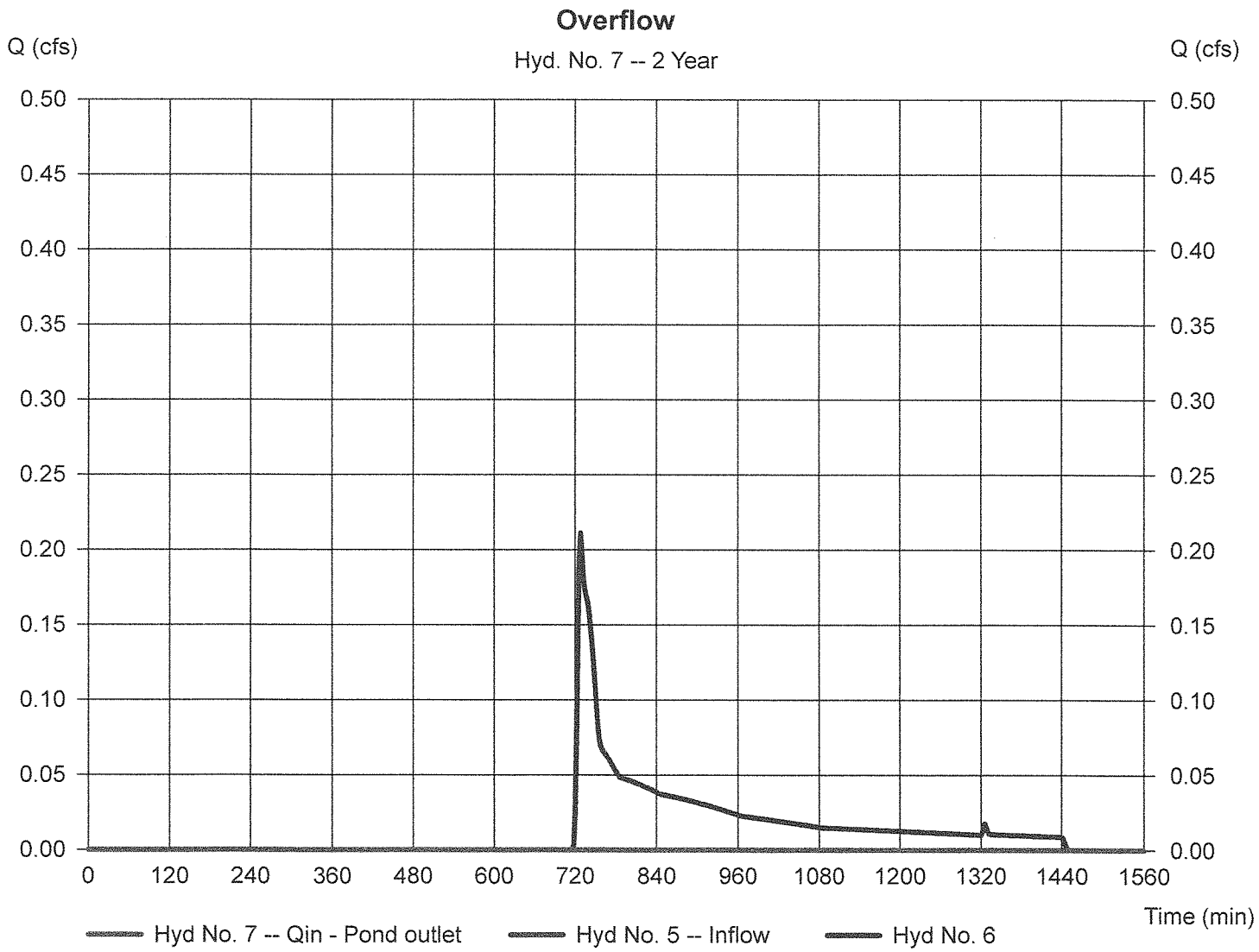
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 7

Overflow

Hydrograph type	=	Diversion2	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	730 min
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hydrograph	=	5 - Infiltration Area	2nd diverted hyd.	=	6
Diversion method	=	Pond - Subsurface	Pond structure	=	Exfiltration



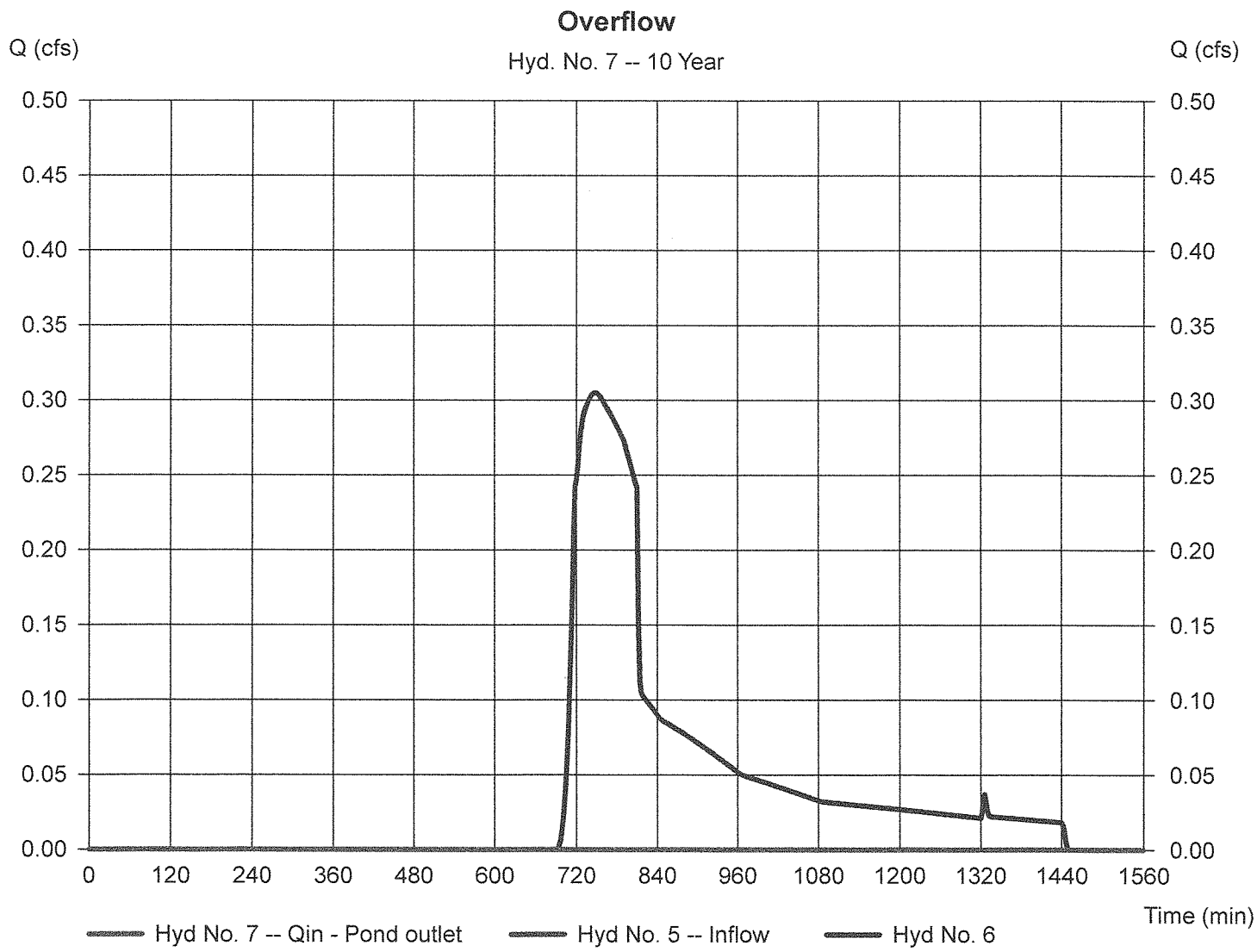
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 7

Overflow

Hydrograph type	=	Diversion2	Peak discharge	=	0.000 cfs
Storm frequency	=	10 yrs	Time to peak	=	824 min
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hydrograph	=	5 - Infiltration Area	2nd diverted hyd.	=	6
Diversion method	=	Pond - Subsurface	Pond structure	=	Exfiltration



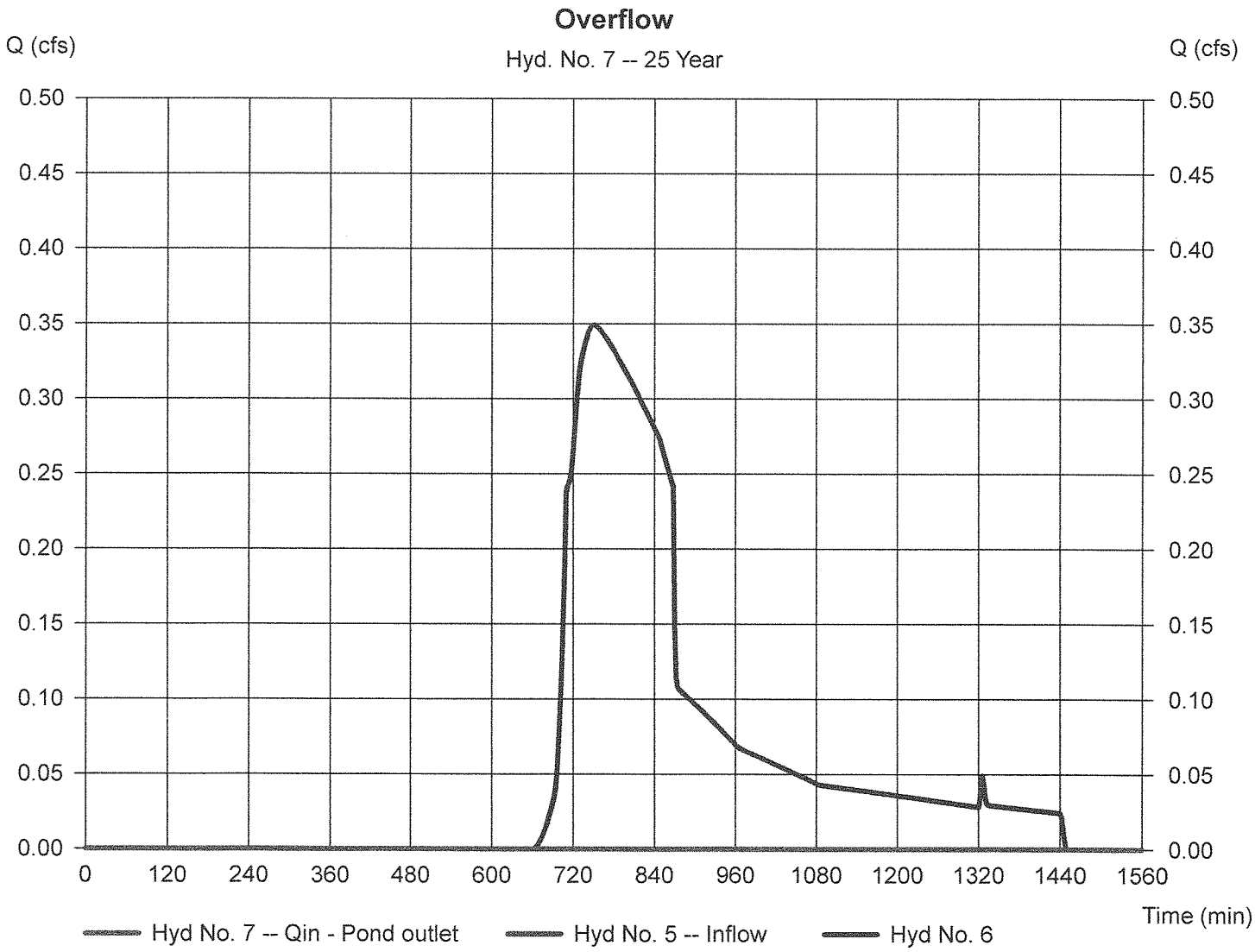
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 7

Overflow

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= 708 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 5 - Infiltration Area	2nd diverted hyd.	= 6
Diversion method	= Pond - Subsurface	Pond structure	= Exfiltration



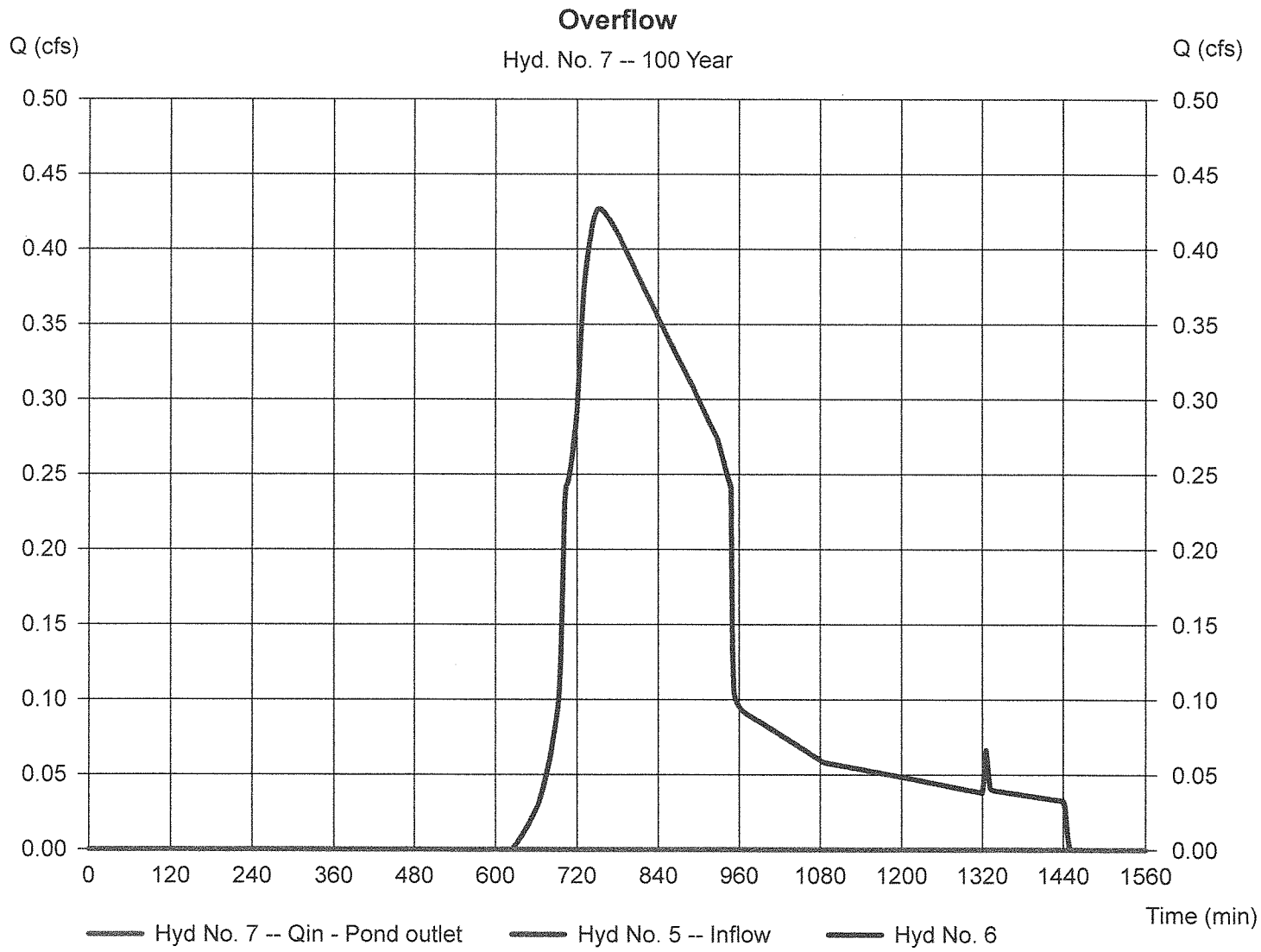
Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 7

Overflow

Hydrograph type	=	Diversion2	Peak discharge	=	0.000 cfs
Storm frequency	=	100 yrs	Time to peak	=	1080 min
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hydrograph	=	5 - Infiltration Area	2nd diverted hyd.	=	6
Diversion method	=	Pond - Subsurface	Pond structure	=	Exfiltration



Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Pond No. 1 - Subsurface

Pond Data

UG Chambers - Invert elev. = 153.50 ft, Rise x Span = 2.50 x 4.25 ft, Barrel Len = 59.00 ft, No. Barrels = 4, Slope = 0.00%, Headers = No
Encasement - Invert elev. = 153.00 ft, Width = 5.25 ft, Height = 4.00 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	153.00	n/a	0	0
0.40	153.40	n/a	198	198
0.80	153.80	n/a	378	577
1.20	154.20	n/a	434	1,011
1.60	154.60	n/a	423	1,433
2.00	155.00	n/a	404	1,837
2.40	155.40	n/a	374	2,211
2.80	155.80	n/a	327	2,538
3.20	156.20	n/a	230	2,768
3.60	156.60	n/a	198	2,966
4.00	157.00	n/a	198	3,165

Culvert / Orifice Structures

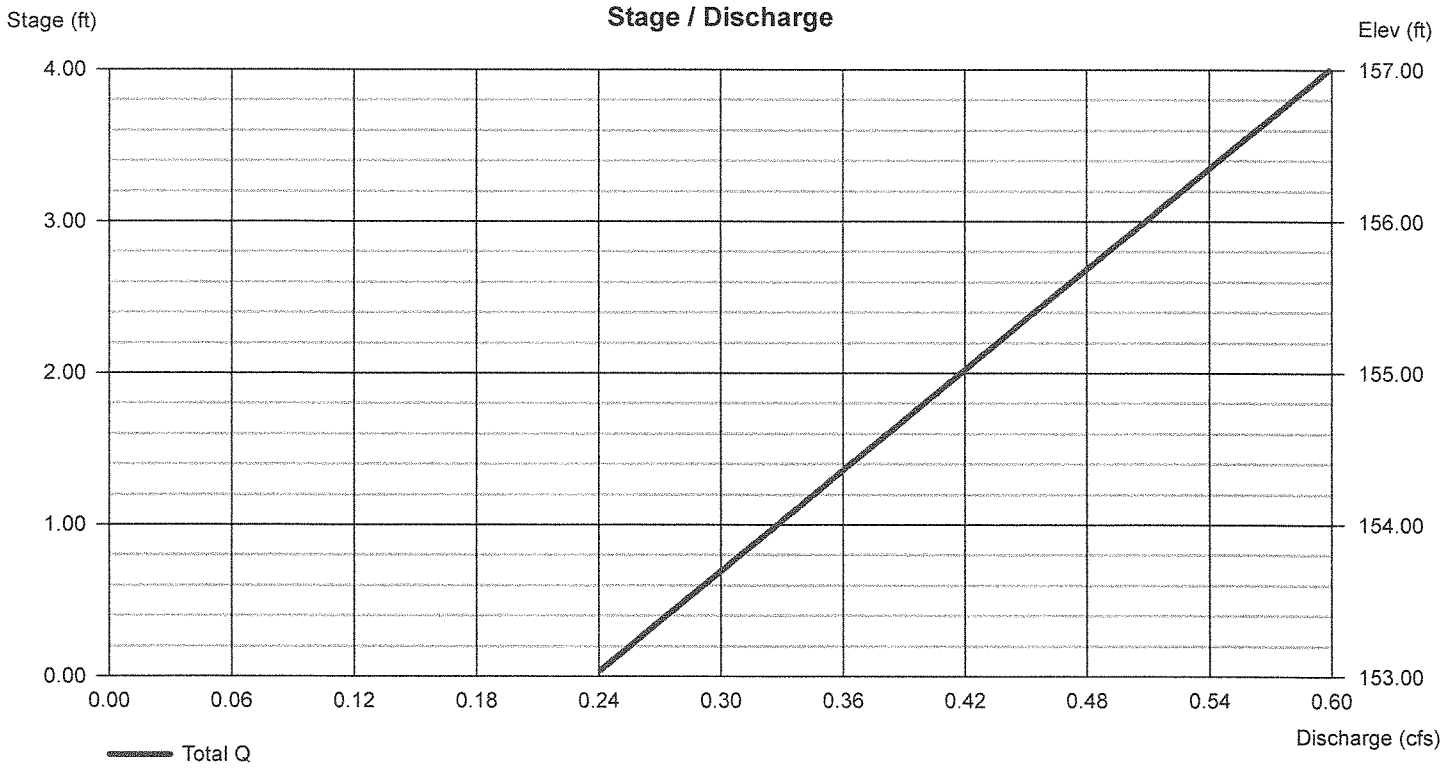
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

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).



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 8

Roof Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 0.232 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Drainage area	= 0.080 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 3.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time -- Outflow (min	cfs)
724	0.232 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 8

Roof Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 0.339 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Drainage area	= 0.080 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 4.50 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time -- Outflow (min	cfs)
724	0.339 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 | Friday, Jun 27, 2014

Hyd. No. 8

Roof Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 0.400 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Drainage area	= 0.080 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 5.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time -- Outflow (min	cfs)
724	0.400 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 8

Roof Runoff

Hydrograph type	= SCS Runoff	Peak discharge	= 0.484 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Drainage area	= 0.080 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 6.0 min
Total precip.	= 6.40 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time -- (min)	Outflow (cfs)
724	0.484 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 9

Roof Infiltration

Hydrograph type	= Reservoir	Peak discharge	= 0.056 cfs
Storm frequency	= 2 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Inflow hyd. No.	= 8 - Roof Runoff	Reservoir name	= Roof Infiltration
Max. Elevation	= 154.27 ft	Max. Storage	= 172 cuft

Storage Indication method used. Outflow includes exfiltration.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
738	0.081	154.24	-----	-----	-----	-----	-----	-----	-----	-----	0.055	0.055
740	0.074	154.25	-----	-----	-----	-----	-----	-----	-----	-----	0.056	0.056
742	0.067	154.26	-----	-----	-----	-----	-----	-----	-----	-----	0.056	0.056
744	0.061	154.27	-----	-----	-----	-----	-----	-----	-----	-----	0.056	0.056
746	0.054	154.27 <<	-----	-----	-----	-----	-----	-----	-----	-----	0.056	0.056 <<
748	0.047	154.27	-----	-----	-----	-----	-----	-----	-----	-----	0.056	0.056
750	0.040	154.26	-----	-----	-----	-----	-----	-----	-----	-----	0.056	0.056
752	0.034	154.24	-----	-----	-----	-----	-----	-----	-----	-----	0.056	0.056

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 9

Roof Infiltration

Hydrograph type	= Reservoir	Peak discharge	= 0.067 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Inflow hyd. No.	= 8 - Roof Runoff	Reservoir name	= Roof Infiltration
Max. Elevation	= 155.06 ft	Max. Storage	= 301 cuft

Storage Indication method used. Outflow includes exfiltration.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
742	0.098	155.02	-----	-----	-----	-----	-----	-----	-----	-----	0.067	0.067
744	0.088	155.05	-----	-----	-----	-----	-----	-----	-----	-----	0.067	0.067
746	0.078	155.06	-----	-----	-----	-----	-----	-----	-----	-----	0.067	0.067
748	0.069	155.06 <<	-----	-----	-----	-----	-----	-----	-----	-----	0.067	0.067 <<
750	0.059	155.06	-----	-----	-----	-----	-----	-----	-----	-----	0.067	0.067
752	0.050	155.05	-----	-----	-----	-----	-----	-----	-----	-----	0.067	0.067
754	0.043	155.03	-----	-----	-----	-----	-----	-----	-----	-----	0.067	0.067

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 9

Roof Infiltration

Hydrograph type	= Reservoir	Peak discharge	= 0.075 cfs
Storm frequency	= 25 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Inflow hyd. No.	= 8 - Roof Runoff	Reservoir name	= Roof Infiltration
Max. Elevation	= 155.60 ft	Max. Storage	= 377 cuft

Storage Indication method used. Outflow includes exfiltration.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
744	0.104	155.57	-----	-----	-----	-----	-----	-----	-----	-----	0.075	0.075
746	0.092	155.59	-----	-----	-----	-----	-----	-----	-----	-----	0.075	0.075
748	0.081	155.60 <<	-----	-----	-----	-----	-----	-----	-----	-----	0.075	0.075 <<
750	0.069	155.60	-----	-----	-----	-----	-----	-----	-----	-----	0.075	0.075
752	0.058	155.59	-----	-----	-----	-----	-----	-----	-----	-----	0.075	0.075
754	0.051	155.57	-----	-----	-----	-----	-----	-----	-----	-----	0.075	0.075

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Hyd. No. 9

Roof Infiltration

Hydrograph type	= Reservoir	Peak discharge	= 0.091 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Inflow hyd. No.	= 8 - Roof Runoff	Reservoir name	= Roof Infiltration
Max. Elevation	= 156.73 ft	Max. Storage	= 481 cuft

Storage Indication method used. Outflow includes exfiltration.

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
746	0.112	156.70	-----	-----	-----	-----	-----	-----	-----	-----	0.091	0.091
748	0.098	156.72 <<	-----	-----	-----	-----	-----	-----	-----	-----	0.091	0.091 <<
750	0.083	156.72	-----	-----	-----	-----	-----	-----	-----	-----	0.091	0.091
752	0.071	156.70	-----	-----	-----	-----	-----	-----	-----	-----	0.091	0.091
754	0.061	156.66	-----	-----	-----	-----	-----	-----	-----	-----	0.090	0.090

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 10

Exfiltration

Hydrograph type	= Diversion1	Peak discharge	= 0.056 cfs
Storm frequency	= 2 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Inflow hydrograph	= 9 - Roof Infiltration	2nd diverted hyd.	= 11
Diversion method	= Pond -	Pond structure	= Exfiltration

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
738	0.055	0.000	0.055
740	0.056	0.000	0.056
742	0.056	0.000	0.056
744	0.056	0.000	0.056
746	0.056 <<	0.000	0.056 <<
748	0.056	0.000	0.056
750	0.056	0.000	0.056
752	0.056	0.000	0.056

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 10

Exfiltration

Hydrograph type	= Diversion1	Peak discharge	= 0.067 cfs
Storm frequency	= 10 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Inflow hydrograph	= 9 - Roof Infiltration	2nd diverted hyd.	= 11
Diversion method	= Pond -	Pond structure	= Exfiltration

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
742	0.067	0.000	0.067
744	0.067	0.000	0.067
746	0.067	0.000	0.067
748	0.067 <<	0.000	0.067 <<
750	0.067	0.000	0.067
752	0.067	0.000	0.067
754	0.067	0.000	0.067

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 10

Exfiltration

Hydrograph type	= Diversion1	Peak discharge	= 0.075 cfs
Storm frequency	= 25 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Inflow hydrograph	= 9 - Roof Infiltration	2nd diverted hyd.	= 11
Diversion method	= Pond -	Pond structure	= Exfiltration

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
744	0.075	0.000	0.075
746	0.075	0.000	0.075
748	0.075 <<	0.000	0.075 <<
750	0.075	0.000	0.075
752	0.075	0.000	0.075
754	0.075	0.000	0.075

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 10

Exfiltration

Hydrograph type	= Diversion1	Peak discharge	= 0.091 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 1,677 cuft
Inflow hydrograph	= 9 - Roof Infiltration	2nd diverted hyd.	= 11
Diversion method	= Pond -	Pond structure	= Exfiltration

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
746	0.091	0.000	0.091
748	0.091 <<	0.000	0.091 <<
750	0.091	0.000	0.091
752	0.091	0.000	0.091
754	0.090	0.000	0.090

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 11

Overflow

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 926 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 9 - Roof Infiltration	2nd diverted hyd.	= 10
Diversion method	= Pond -	Pond structure	= Exfiltration

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
926	0.008	0.008	0.000 <<
928	0.008	0.008	0.000 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 11

Overflow

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 598 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 9 - Roof Infiltration	2nd diverted hyd.	= 10
Diversion method	= Pond -	Pond structure	= Exfiltration

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
598	0.016	0.016	0.000 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 11

Overflow

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= 556 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 9 - Roof Infiltration	2nd diverted hyd.	= 10
Diversion method	= Pond -	Pond structure	= Exfiltration

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
556	0.015	0.015	0.000 <<
560	0.015	0.015	0.000 <<

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2 Friday, Jun 27, 2014

Hyd. No. 11

Overflow

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 640 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 9 - Roof Infiltration	2nd diverted hyd.	= 10
Diversion method	= Pond -	Pond structure	= Exfiltration

Hydrograph Discharge Table

(Printed values >= 99.00% of Qp.)

Time (min)	Inflow cfs	2nd Diverted cfs	Outflow cfs
640	0.030	0.030	0.000 <<
644	0.031	0.031	0.000 <<

...End

Pond Report

Hydraflow Hydrographs by Intelisolve v9.2 — Friday, Jun 27, 2014

Pond No. 2 - Roof Infiltration

Pond Data

UG Chambers - Invert elev. = 153.50 ft, Rise x Span = 2.50 x 4.25 ft, Barrel Len = 37.50 ft, No. Barrels = 1, Slope = 0.00%, Headers = No
Encasement - Invert elev. = 153.00 ft, Width = 5.25 ft, Height = 4.00 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	153.00	n/a	0	0
0.40	153.40	n/a	32	32
0.80	153.80	n/a	60	92
1.20	154.20	n/a	69	161
1.60	154.60	n/a	67	228
2.00	155.00	n/a	64	292
2.40	155.40	n/a	59	351
2.80	155.80	n/a	52	403
3.20	156.20	n/a	37	440
3.60	156.60	n/a	32	471
4.00	157.00	n/a	32	503

Culvert / Orifice Structures

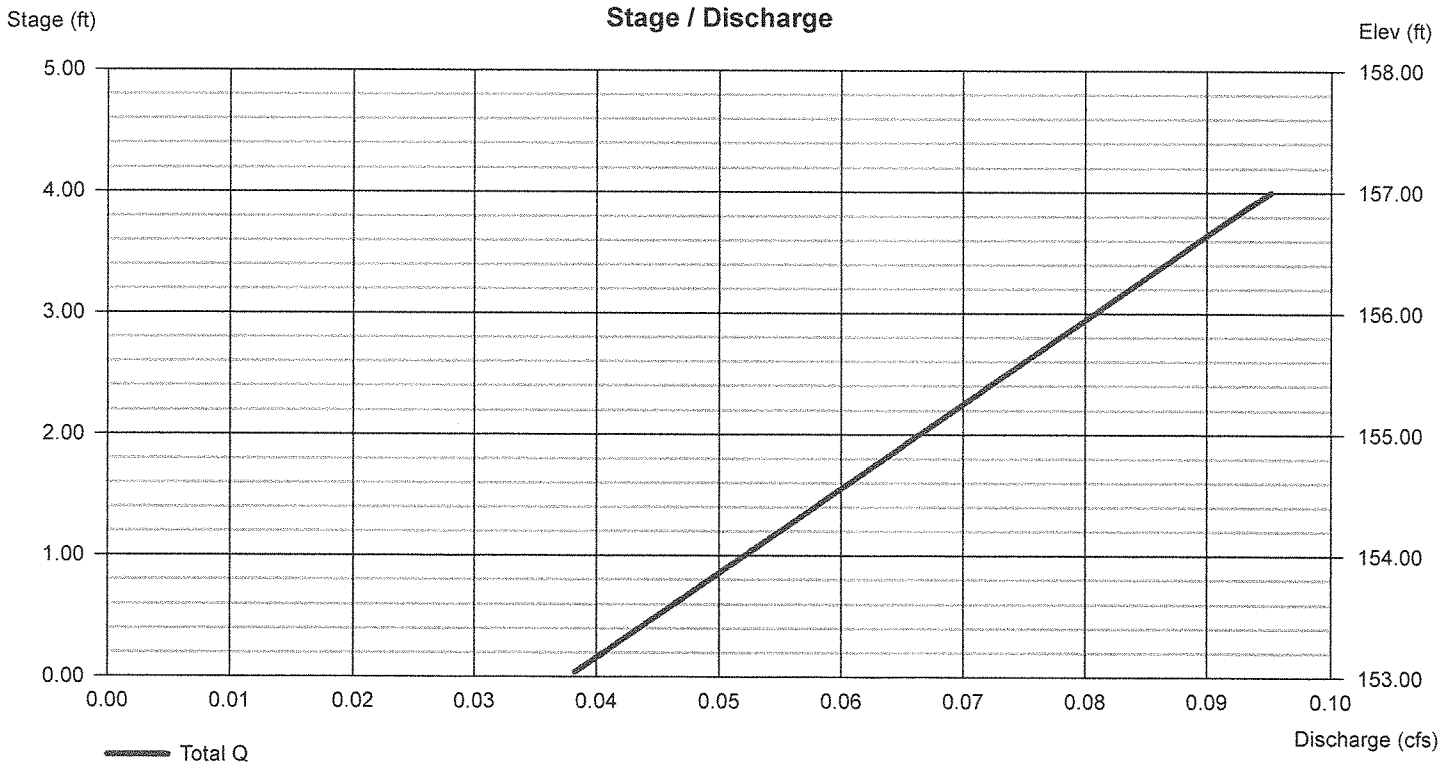
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

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).



Water Quality Volume Calculations

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MASSACHUSETTS 01720
TEL (978) 263-8585
FAX (978) 263-9883

JOB 4860-267 GREAT RD. ACTON
SHEET NO. _____ OF _____
CALCULATED BY WJH DATE 6/27/2014
CHECKED BY _____ DATE _____
SCALE _____

WATER QUALITY VOLUME

$W_{QV} = \frac{1''}{12} \times$ IMPERVIOUS AREA

$W_{QV} = \frac{1''}{12} \times 17{,}348$ SF

$W_{QV} = 1{,}446$ CF

VOLUME TO BE TREATED WITH CONTECH CDS 2015-4 UNITS AND SUBSURFACE INFILTRATION

Project: 267 Great Road
Location: Acton, MA
Prepared For: Benjamin Ewing (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)
DMH-2	0.09	0.0001406	5.0	0.083	1.00
DMH-3	0.24	0.0003750	5.0	0.083	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.)
DMH-2	795.00
DMH-3	795.00

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)
DMH-2	0.11
DMH-3	0.30

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

CONTECH ENGINEERED SOLUTIONS

267 GREAT ROAD
ACTON, MA
for SYSTEM: DMH-3

Area	0.24	acres	CDS Model	
Weighted C	0.90		2015-4	
Tc	5	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%	0.00	0.00	100.0	10.2
0.04	9.6%	19.8%	0.01	0.01	100.0	9.6
0.06	9.4%	29.3%	0.01	0.01	100.0	9.4
0.08	7.7%	37.0%	0.02	0.02	100.0	7.7
0.10	8.6%	45.6%	0.02	0.02	100.0	8.6
0.12	6.3%	51.9%	0.03	0.03	100.0	6.3
0.14	4.7%	56.5%	0.03	0.03	100.0	4.7
0.16	4.6%	61.2%	0.03	0.03	100.0	4.6
0.18	3.5%	64.7%	0.04	0.04	100.0	3.5
0.20	4.3%	69.1%	0.04	0.04	99.9	4.3
0.25	8.0%	77.1%	0.05	0.05	99.5	8.0
0.30	5.6%	82.7%	0.06	0.06	99.2	5.5
0.35	4.4%	87.0%	0.08	0.08	98.8	4.3
0.40	2.5%	89.5%	0.09	0.09	98.4	2.5
0.45	2.5%	92.1%	0.10	0.10	98.1	2.5
0.50	1.4%	93.5%	0.11	0.11	97.7	1.3
0.75	5.0%	98.5%	0.16	0.16	95.9	4.8
1.00	1.0%	99.5%	0.22	0.22	94.0	1.0
1.50	0.0%	99.5%	0.32	0.32	90.4	0.0
2.00	0.0%	99.5%	0.43	0.43	86.7	0.0
3.00	0.5%	100.0%	0.65	0.65	79.4	0.4
						99.4

Removal Efficiency Adjustment[2] =	6.5%
Predicted % Annual Rainfall Treated =	93.5%
Predicted Net Annual Load Removal Efficiency =	**92.9%**

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.

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

CONTECH ENGINEERED SOLUTIONS

267 GREAT ROAD
ACTON, MA
for SYSTEM: DMH-2

Area	0.09	acres	CDS Model	
Weighted C	0.90		2015-4	
Tc	5	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%	0.00	0.00	100.0	10.2
0.04	9.6%	19.8%	0.00	0.00	100.0	9.6
0.06	9.4%	29.3%	0.00	0.00	100.0	9.4
0.08	7.7%	37.0%	0.01	0.01	100.0	7.7
0.10	8.6%	45.6%	0.01	0.01	100.0	8.6
0.12	6.3%	51.9%	0.01	0.01	100.0	6.3
0.14	4.7%	56.5%	0.01	0.01	100.0	4.7
0.16	4.6%	61.2%	0.01	0.01	100.0	4.6
0.18	3.5%	64.7%	0.01	0.01	100.0	3.5
0.20	4.3%	69.1%	0.02	0.02	100.0	4.3
0.25	8.0%	77.1%	0.02	0.02	100.0	8.0
0.30	5.6%	82.7%	0.02	0.02	100.0	5.6
0.35	4.4%	87.0%	0.03	0.03	100.0	4.4
0.40	2.5%	89.5%	0.03	0.03	100.0	2.5
0.45	2.5%	92.1%	0.04	0.04	100.0	2.5
0.50	1.4%	93.5%	0.04	0.04	100.0	1.4
0.75	5.0%	98.5%	0.06	0.06	99.3	5.0
1.00	1.0%	99.5%	0.08	0.08	98.6	1.0
1.50	0.0%	99.5%	0.12	0.12	97.3	0.0
2.00	0.0%	99.5%	0.16	0.16	95.9	0.0
3.00	0.5%	100.0%	0.24	0.24	93.1	0.5
						99.9

Removal Efficiency Adjustment[2] =	6.5%
Predicted % Annual Rainfall Treated =	93.5%
Predicted Net Annual Load Removal Efficiency =	**93.5%**

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.

Groundwater Recharge Calculations

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MASSACHUSETTS 01720
TEL (978) 263-8585
FAX (978) 263-9883

JOB 4860 - 267 GREAT RD. - ACTON
SHEET NO. _____ OF _____
CALCULATED BY WJH DATE 6/27/14
CHECKED BY _____ DATE _____
SCALE _____

REQUIRED RECHARGE VOLUME

$R_V = F \times$ IMP. AREA

F = 0.6" OVER IMPERVIOUS
AREA = 17,348 SF

$R_V = \frac{0.6''}{12} \times 17{,}348$ SF

$R_V = 868$ CF

SIZING STORAGE VOLUME (SIMPLE DYNAMIC METHOD)

$A = \frac{R_V}{D + KT}$ $D = 4'$ $K = 8.27$ IN/HR $T = 2$ HR

$A = \frac{868 \text{ CF}}{4' + \left(\frac{8.27''}{12}\right) 2 \text{ HR}}$

A = 161.4 SF < 1,150.5 SF PROVIDED O.K.

V = A x D

V = 161.4 SF x 4'

V = 645.6 CF < 3,165 CF PROVIDED O.K.

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MASSACHUSETTS 01720
TEL (978) 263-8585
FAX (978) 263-9883

JOB 4860-267 GREAT RD - ACTON
SHEET NO. _____ OF _____
CALCULATED BY WJH DATE 6/27/14
CHECKED BY _____ DATE _____
SCALE _____

72 HOUR DRAWDOWN

$$\text{TIME} = \frac{R_V}{K \times \text{BOTTOM AREA}}$$

$K = 8.27$ IN/HR AREA = 1,150.5 SF $R_V = 868$ CF

$$\text{TIME} = \frac{868 \text{ CF}}{\frac{8.27''}{12} \times 1{,}150.5 \text{ SF}}$$

TIME = 1.09 HOURS < 72 HOURS O.K.

TSS Removal Calculations

INSTRUCTIONS:

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Non-automated: Mar. 4, 2008

Location: Subcatchment P-4

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Contech CDS2015-4	92.9%	1.00	0.929	0.071

Total TSS Removal = 92.9%

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

Project: 4860
Prepared By: WJH
Date: 6/27/14

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Subcatchment P-4

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Contech CDS2015-4	92.9%	1.00	0.929	0.071
Subsurface Infiltration Structure	80%	0.071	0.057	0.014

Total TSS Removal = 98.6%

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

Project: 4860
Prepared By: WJH
Date: 6/27/14

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

Project: 267 Great Road
Location: Acton, MA
Prepared For: Benjamin Ewing (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)
DMH-2	0.09	0.0001406	5.0	0.083	1.00
DMH-3	0.24	0.0003750	5.0	0.083	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.)
DMH-2	795.00
DMH-3	795.00

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)
DMH-2	0.11
DMH-3	0.30

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

CONTECH ENGINEERED SOLUTIONS

267 GREAT ROAD
ACTON, MA
for SYSTEM: DMH-3

Area	0.24	acres	CDS Model	
Weighted C	0.90		2015-4	
Tc	5	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%	0.00	0.00	100.0	10.2
0.04	9.6%	19.8%	0.01	0.01	100.0	9.6
0.06	9.4%	29.3%	0.01	0.01	100.0	9.4
0.08	7.7%	37.0%	0.02	0.02	100.0	7.7
0.10	8.6%	45.6%	0.02	0.02	100.0	8.6
0.12	6.3%	51.9%	0.03	0.03	100.0	6.3
0.14	4.7%	56.5%	0.03	0.03	100.0	4.7
0.16	4.6%	61.2%	0.03	0.03	100.0	4.6
0.18	3.5%	64.7%	0.04	0.04	100.0	3.5
0.20	4.3%	69.1%	0.04	0.04	99.9	4.3
0.25	8.0%	77.1%	0.05	0.05	99.5	8.0
0.30	5.6%	82.7%	0.06	0.06	99.2	5.5
0.35	4.4%	87.0%	0.08	0.08	98.8	4.3
0.40	2.5%	89.5%	0.09	0.09	98.4	2.5
0.45	2.5%	92.1%	0.10	0.10	98.1	2.5
0.50	1.4%	93.5%	0.11	0.11	97.7	1.3
0.75	5.0%	98.5%	0.16	0.16	95.9	4.8
1.00	1.0%	99.5%	0.22	0.22	94.0	1.0
1.50	0.0%	99.5%	0.32	0.32	90.4	0.0
2.00	0.0%	99.5%	0.43	0.43	86.7	0.0
3.00	0.5%	100.0%	0.65	0.65	79.4	0.4
						99.4

Removal Efficiency Adjustment[2] =	6.5%
Predicted % Annual Rainfall Treated =	93.5%
Predicted Net Annual Load Removal Efficiency =	**92.9%**

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.

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

CONTECH ENGINEERED SOLUTIONS

CDS

267 GREAT ROAD
ACTON, MA
for SYSTEM: DMH-2

Area	0.09	acres	CDS Model	
Weighted C	0.90		2015-4	
Tc	5	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%	0.00	0.00	100.0	10.2
0.04	9.6%	19.8%	0.00	0.00	100.0	9.6
0.06	9.4%	29.3%	0.00	0.00	100.0	9.4
0.08	7.7%	37.0%	0.01	0.01	100.0	7.7
0.10	8.6%	45.6%	0.01	0.01	100.0	8.6
0.12	6.3%	51.9%	0.01	0.01	100.0	6.3
0.14	4.7%	56.5%	0.01	0.01	100.0	4.7
0.16	4.6%	61.2%	0.01	0.01	100.0	4.6
0.18	3.5%	64.7%	0.01	0.01	100.0	3.5
0.20	4.3%	69.1%	0.02	0.02	100.0	4.3
0.25	8.0%	77.1%	0.02	0.02	100.0	8.0
0.30	5.6%	82.7%	0.02	0.02	100.0	5.6
0.35	4.4%	87.0%	0.03	0.03	100.0	4.4
0.40	2.5%	89.5%	0.03	0.03	100.0	2.5
0.45	2.5%	92.1%	0.04	0.04	100.0	2.5
0.50	1.4%	93.5%	0.04	0.04	100.0	1.4
0.75	5.0%	98.5%	0.06	0.06	99.3	5.0
1.00	1.0%	99.5%	0.08	0.08	98.6	1.0
1.50	0.0%	99.5%	0.12	0.12	97.3	0.0
2.00	0.0%	99.5%	0.16	0.16	95.9	0.0
3.00	0.5%	100.0%	0.24	0.24	93.1	0.5
						99.9

Removal Efficiency Adjustment[2] =	6.5%
Predicted % Annual Rainfall Treated =	93.5%
Predicted Net Annual Load Removal Efficiency =	**93.5%**

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.

Storm Sewer Design

DESIGN STORM: 100 YEAR
DATE: 6/30/2014
DONE BY: BRE
FILE: 4860 RATIONAL METHOD.wb3

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
(RCP)"n"=0.013

PROJECT: SM-4860
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				MANHOLE INVERT DROP (FT)	FALL IN PIPE (FT)	DRAIN INV. ELEVATION		GROUND SURFACE	
			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	UPPER END	LOWER END
CB-1	DMH-2	50		0.099	10	0.19	0.75	7.6	0.57	0.019	12	0.012	5.37	6.84	4.39	0.30	0.22	0.51		0.97	155.4	154.43	159.4	160.4
DI-1	DMH-1	43		0.35	10	0.20	0.23	7.6	0.60	0.010	12	0.012	3.85	4.91	3.55	0.20	0.27	0.46		0.43	155.77	155.34	158.3	159.6
DMH-1	DMH-2	81		0.35	10	0.38	0.23	7.6	0.60	0.010	12	0.012	3.85	4.91	3.55	0.20	0.27	0.46		0.81	155.24	154.43	159.6	160.4
DMH-2	INF	53		0.449	10	0.20	0.21	7.6	0.71	0.016	12	0.012	4.82	6.14	4.40	0.30	0.26	0.56		0.83	154.33	153.5	160.4	160.1
CB-2	DMH-3	6		0.398	10	0.01	0.64	7.6	1.94	0.083	12	0.012	11.12	14.17	10.58	1.74	0.28	2.02		0.50	154.3	153.8	159.3	159.4
DMH-3	INF	8		0.398	10	0.02	0.64	7.6	1.94	0.025	12	0.012	6.09	7.76	6.87	0.73	0.39	1.12		0.20	153.7	153.5	159.4	159.5

CB - CATCH BASIN
DI - DROP INLET
DMH- DRAIN MANHOLE
INF - INFILTRATION AREA

Inlet Grate Capacity Calculations

Job: SM-4860
Project: 267 Great Road

Calculated by: JTM
Date: 6/27/2014

LeBARON FOUNDRY, INC. LF246 inlet grate pass area A = 225 sq. in.
1.56 sq. ft.

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

C = orifice coefficient
C = 0.6 square edges
A = inlet area
A = 1.56 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)= 2.85 cfs (LP) low points LF246
Q (MAX)= 2.04 cfs (OS) on slope LF246
Double Grate
Q (MAX)= 5.70 cfs (LP) low points LF246
Q (MAX)= 4.09 cfs (OS) on slope LF246

	TRIBUTARY AREA (AC)	TIME OF CONC.	100 YR INTENSITY	C	Q=CiA Q100	POSITION	Q (MAX)	single grate	double grate
CB1	0.10	10	7.6	0.75	0.59	LP	2.85	yes	
CB2	0.40	10	7.6	0.64	1.81	LP	2.85	yes	

Soil Evaluation

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

Site Address or Map/Lot Number

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

Deep Observation Hole A: Date 3/27/12 Time 8:30 Weather CLEAR

1. Deep Observation Hole Logs

Deep Hole Number _____ Ground Elevation at Surface of Hole _____

Location (Identify on Plan) _____

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

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

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Possible Wet Area 100 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 103" Depth Standing Water in Hole 103"

Estimated Depth to High Groundwater: 78" inches _____ elevation

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

267 GREAT ROAD
Site Address or Map/Lot Number

Deep Observation Hole A: Deep Hole Number: TP-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			
0-16"	A	10YR 2/2	—	—	—	LOAMY SAND	—	—	MASSIVE	FRIABLE	
16"-30"	B	10YR 5/6	—	—	—	LOAMY SAND	—	—	MASSIVE	FRIABLE	
30"-11'	C	2.5Y 6/4	78"	7.5YR 6/2	5%	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

Site Address or Map/Lot Number

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

Deep Observation Hole A: 3/27/12 (Date) 8:45 (Time) SUNNY (Weather)

1. Deep Observation Hole Logs

Deep Hole Number TP-3 Ground Elevation at Surface of Hole _____

Location (Identify on Plan) _____

2. Land Use: YARD (e.g. woodland, agricultural field, vacant lot, etc.) — (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 100 feet

Property Line >10 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 77" Depth Standing Water in Hole 84"

Estimated Depth to High Groundwater: 72" (inches) _____ (elevation)

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

267 GREAT ROAD
Site Address or Map/Lot Number

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

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
0-12"	A	10YR 2/2	—	—	—	LOAMY SAND	—	—	MASSIVE	FRIABLE	
12"-28"	B	10YR 5/6	—	—	—	LOAMY SAND	—	—	MASSIVE	FRIABLE	
28"-10'	C	2.5Y 6/4	72"	7.5YR 6/8	5%	SAND	5%	—	SG	LOOSE	

Additional Notes GRAVEL STARTS @ 8'

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

Site Address or Map/Lot Number

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

Deep Observation Hole A: 3/27/12 (Date) 9:15 (Time) CLEAR (Weather)

1. Deep Observation Hole Logs

Deep Hole Number _____ Ground Elevation at Surface of Hole _____

Location (Identify on Plan) _____

2. Land Use: YARD (e.g. woodland, agricultural field, vacant lot, etc.) — (Surface Stones) 5-10% (Slope (%))

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

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Possible Wet Area >100 feet

Property Line >100' 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: 108" (Inches) _____ (elevation)

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

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

Deep Observation Hole A: Deep Hole Number: TP-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
0-12"	A	10YR 2/2	—	—	—	LOAMY SAND	—	—	MASSIVE	FRIABLE	
12"-30"	B	10YR 5/6	—	—	—	LOAMY SAND	—	—	MASSIVE	FRIABLE	
30"-10'	C	2.5Y 6/4	108"	7.5YR 5/2	5%	COARSE SAND	10%	2%	SG	LOOSE	

Additional Notes: CAVING IN @ 8'

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

267 GREAT ROAD
Street Address or Lot #

ACTON
City/Town

MA
State

01920
Zip Code

Contact Person (if different from Owner)

Telephone Number

B. Test Results

	3/27/12 Date	Time	3/27/12 Date	Time
Observation Hole #	PT-A		PT-P	
Depth of Perc	52"		54"	
Start Pre-Soak				
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: ☒ Test Failed: ☐ Test Passed: ☒ Test Failed: ☐

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

ACTON BOARD OF HEALTH (JUSTIN SNAIR)
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

Street Address or Lot #: 267 GREAT ROAD

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

Contact Person (if different from Owner) | Telephone Number

B. Test Results

	Date / Time	Date / Time
	3/27/12 9:30	3/27/12
Observation Hole #	PT-C	PT-D
Depth of Perc	48"	56"
Start Pre-Soak	9:30	9:45
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: ☒ Test Failed: ☐	Test Passed: ☒ Test Failed: ☐

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

Witnessed By: ACTON BOARD OF HEALTH (JUSTIN SNAIR

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

267 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

	3/27/12 (Date) 10:00 (Time)	3/27/12 (Date) 10:15 (Time)
Observation Hole #	PT-E	PT-F
Depth of Perc	52"	50"
Start Pre-Soak	10:00	10:15
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: ☒ Test Failed: ☐	Test Passed: ☒ Test Failed: ☐

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

ACTON BOARD OF HEALTH (JUSTIN SNAIR)
Witnessed By:

Comments:

t5form12.doc• 06/03

Drainage Maps

3.7 WATER BALANCE CALCULATIONS
for
267 Great Road
Acton, MA

PREPARED FOR:

Acton Management, Inc.
69 Great Road
Acton, MA 01720

PREPARED BY:

Stamski and McNary, Inc.
1000 Main Street
Acton, MA 01720

Engineering-Planning-Surveying

Water Balance Calculations

SM-4860

Project: 267 Great Road | By: JTM | Date: 6/27/2014

Location: Acton MA | Checked: | Date:

Pre-Development Recharge

CN=	36.4	
From Figure 1, infiltration=	20	in/year
Drainage Area=	97,574	s.f.

Recharge= 97,574 x 20 /12 in/ft 162,624 c.f./year

Pre-Development Sewage Flow

Leaching Area=	330	gpd
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

Post-Development Recharge

CN=	46.6	
From Figure 1, infiltration=	19.7	in/year
Drainage area=	97,574	s.f.

Recharge= 97,574 x 19.7 /12 in/ft 160,185 c.f./year

Post-Development Sewage Flow

Leaching Area=	270	gpd
Total Design Flow=	270	gpd

270 gpd x 365 days/year x 0.134 s.f./gal = 13,173 c.f./year

Average(50%)= 6,587 c.f./year

Post-Development Subsurface Infiltration

CN=	98	
From Figure 1, runoff=	30.6	in/year (directed to drywells)
Impervious Area	17,424	s.f.

Recharge= 17,424 x 30.6 /12 in/ft 44,431 c.f./year

Post-Development	Vs.	Pre-Development
211,203	>	170,674
c.f./year		c.f./year

Worksheet 2: Runoff curve number and runoff **SM-4860**

Project: 267 Great Rd By JTM Date 6/2/14

Location: Acton, MA Checked _____ Date _____

Circle one: Present Developed PRE

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
A	Woods	30			1.60	47.97
A	Open	39			0.45	17.47
	Impervious	98			0.07	6.37
A	Gravel	76			0.13	9.65
					Totals =	2.24	81.46

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{81.46}{2.24} = 36.38$; Use CN = 36.4

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..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.01	0.05	0.41
Runoff, Q.....	cf	75	442	3360

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

Worksheet 2: Runoff curve number and runoff **SM-4860**

Project: 267 Great Rd By JTM Date 6/3/14

Location: Acton, MA Checked _____ Date _____

Circle one: Present [Developed] POST

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
A	Woods	30			1.08	32.34
A	Open	39			0.69	26.83
	Impervious	98			0.34	33.32
A	Gravel	76			0.05	3.72
	Roof	98			0.08	7.84
				Totals =	2.24	104.06

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{104.06}{2.24} = 46.56$; Use CN = 46.6

2. Runoff

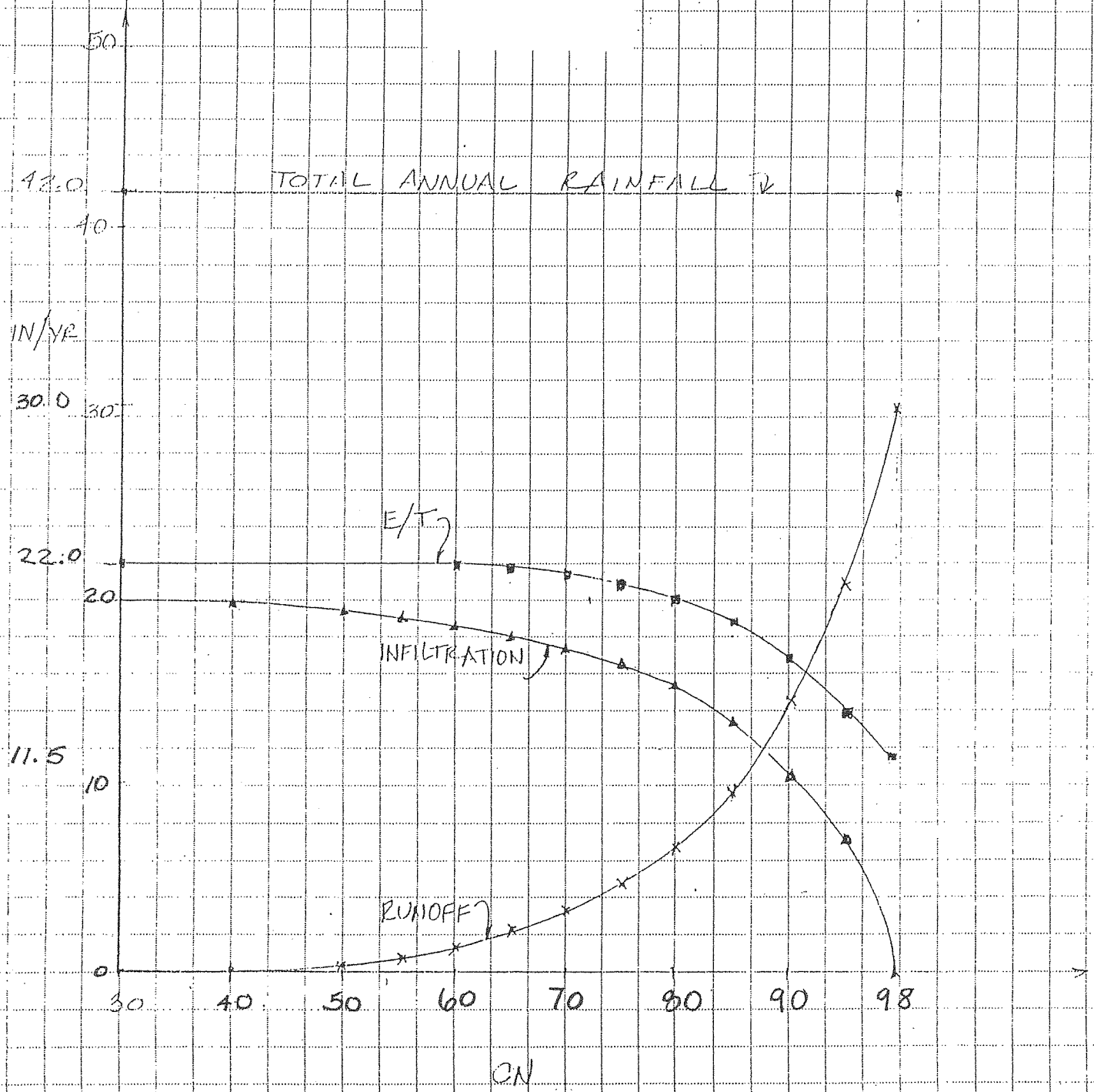
		Storm #1	Storm #2	Storm #3
Frequency.....	yr	2	10	100
Rainfall, P (24-hour).....	in	3.1	4.5	6.4
Runoff, Q..... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.05	0.36	1.08
Runoff, Q.....	cf	427	2881	8770

D-2 (210-VI-TR-55, Second Ed., June 1986)

STAMSKI AND McNARY, INC.
80 Harris Street
ACTON, MASSACHUSETTS 01720
TEL (978) 263-8585
FAX (978) 263-9883

JOB _____
SHEET NO. _____ OF _____
CALCULATED BY _____ DATE _____
CHECKED BY _____ DATE _____
SCALE _____

Figure 1



NOTE: GRAPH COMPILED FROM DATA PUBLISHED BY NOAA (1984 - 1988)
(SEE REPORT FROM STAMSKI & MCNARY INC. SUBMITTED W/ TOWN OF ACTON ENG. DEPT.)

3.8 EARTH REMOVAL CALCULATIONS
for
267 Great Road
Acton, MA

PREPARED FOR:

Acton Management, Inc.
69 Great Road
Acton, MA 01720

PREPARED BY:

Stamski and McNary, Inc.
1000 Main Street
Acton, MA 01720

Engineering-Planning-Surveying

Cut/Fill Calculations

Location: 267 Great Road
Acton
Job: SM-4860

Calculated by: BRE
Date: 6/5/2014

Method:	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Grid	838	1591	753
Composite	880	1690	810
Average End	906	1672	766

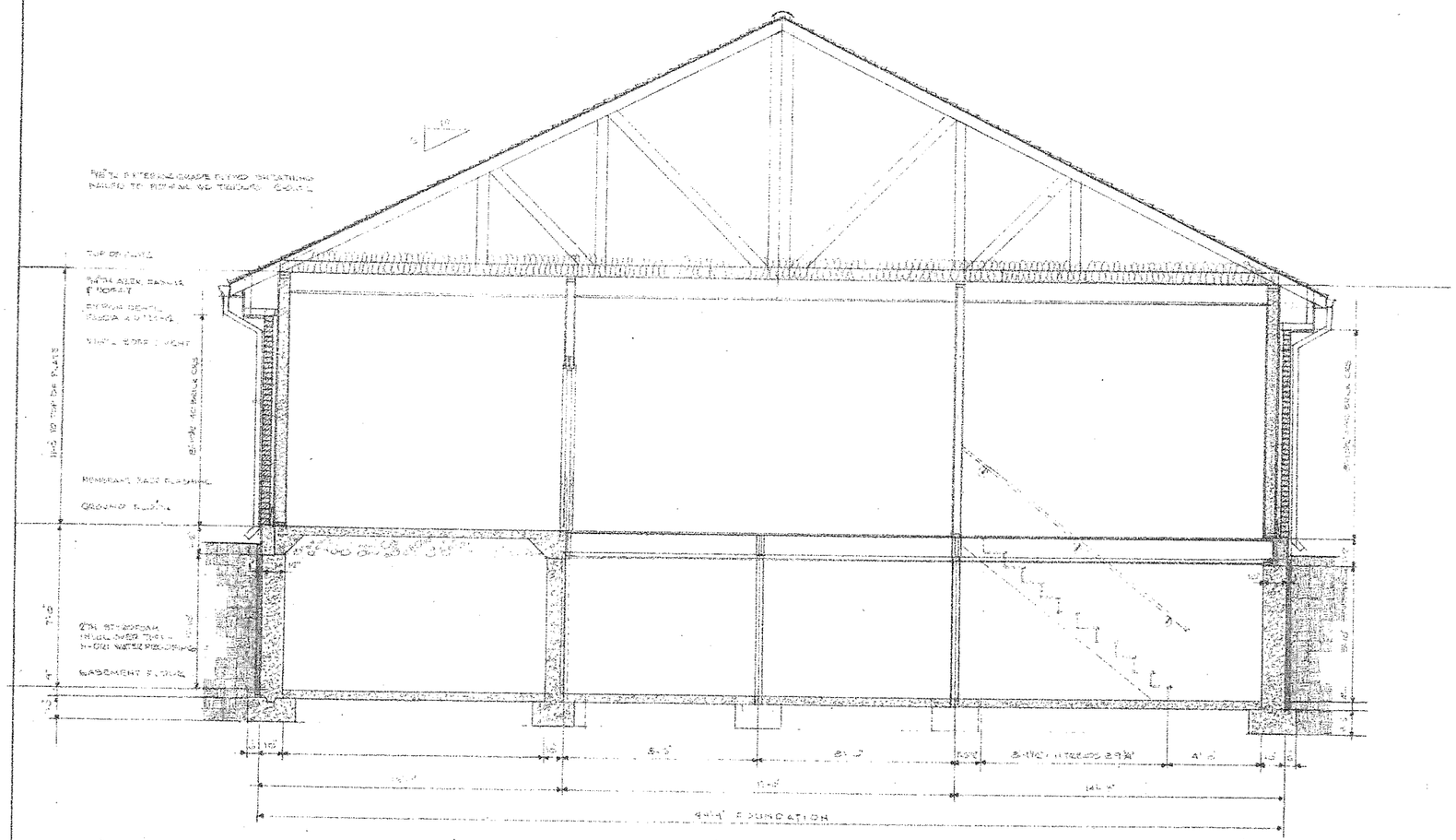
Average: 776 cubic yard of Fill

3.9 PLANS

Attached plans include: Title Sheet, Existing Conditions Plan, Layout Plan, Grading plan, Drainage & Utilities Plan, Detail Sheet - By: Stamski & McNary, Inc.

Landscape Plan – By: Kim Ahern Landscape Architects

FLOOR PLANS



CROSS SECTION A–A

SCALE: 3/8" = 1'-0"

REVISIONS		
No	DATE	LOCATION

E.J. REMPELAKIS ASSOCIATES ARCHITECTS

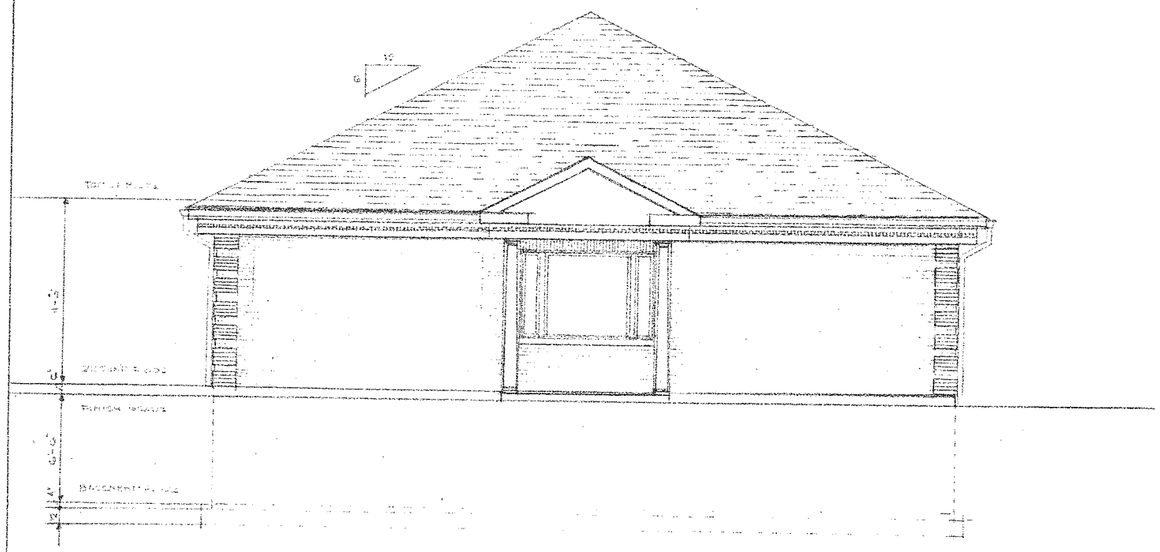
SUITE 201 175 GREAT ROAD ACTON MASSACHUSETTS 01720

SCALE:

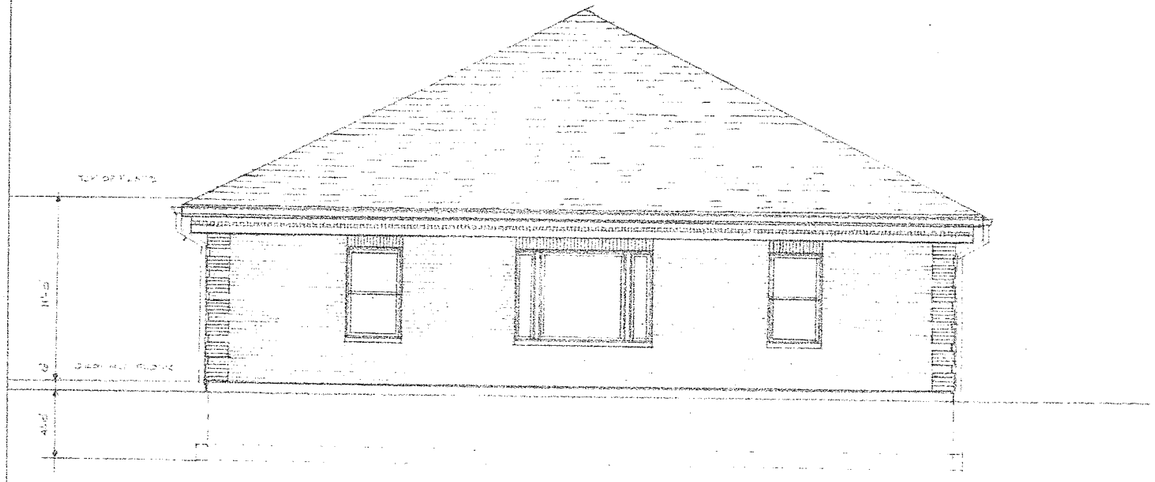
DATE:

DR: CH.

PROJ. NO.



FRONT ELEVATION SCALE: 1/4" = 1'-0"



REAR ELEVATION SCALE: 1/4" = 1'-0"

REVISIONS		
NO	DATE	LOCATION

E.J. REMPELAKIS ASSOCIATES ARCHITECTS

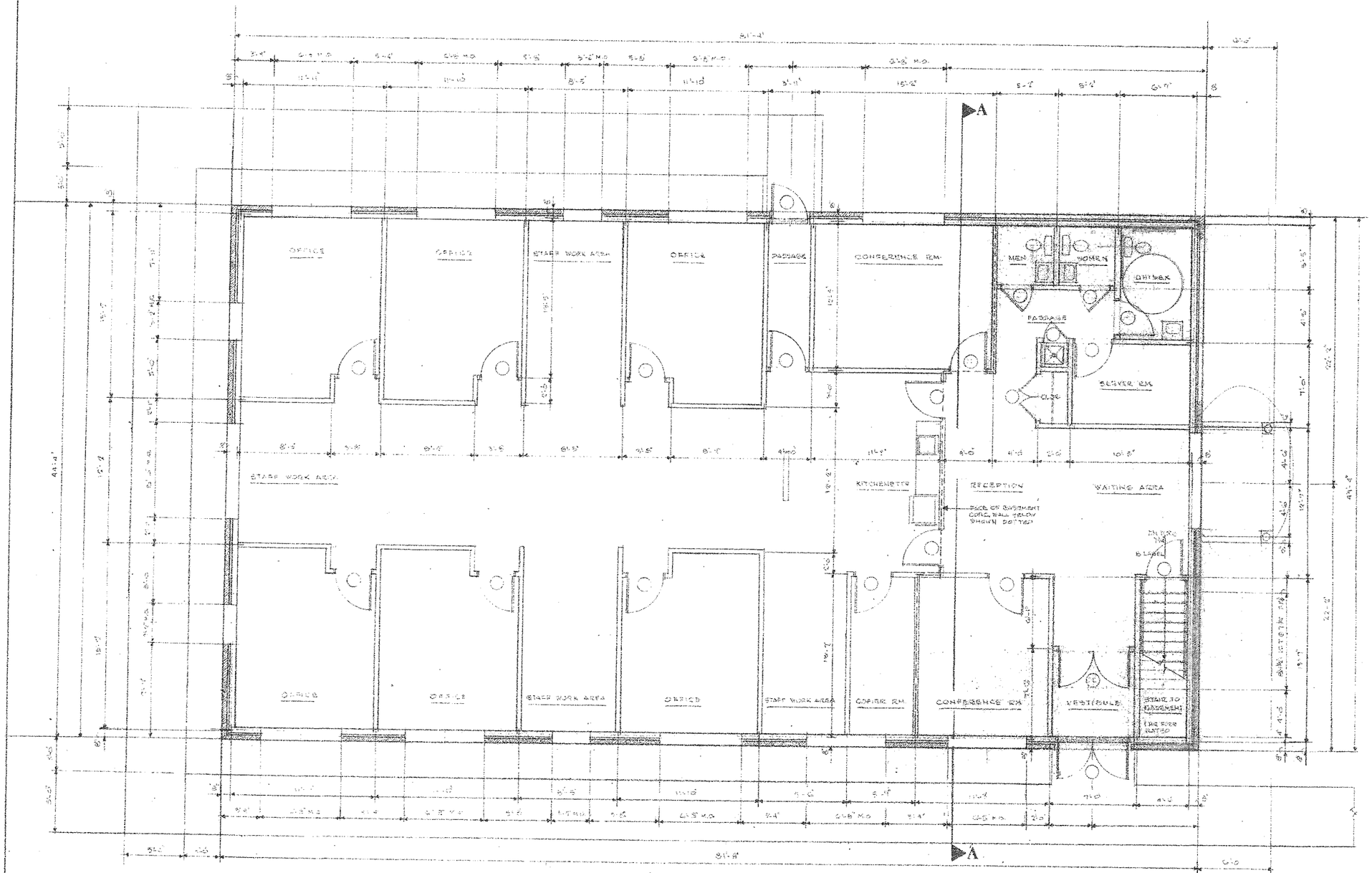
SUITE 291 179 GREAT ROAD ACTON MASSACHUSETTS 01720

SCALE:

DATE:

DR: CH.

PROJ. NO. 80[4-7



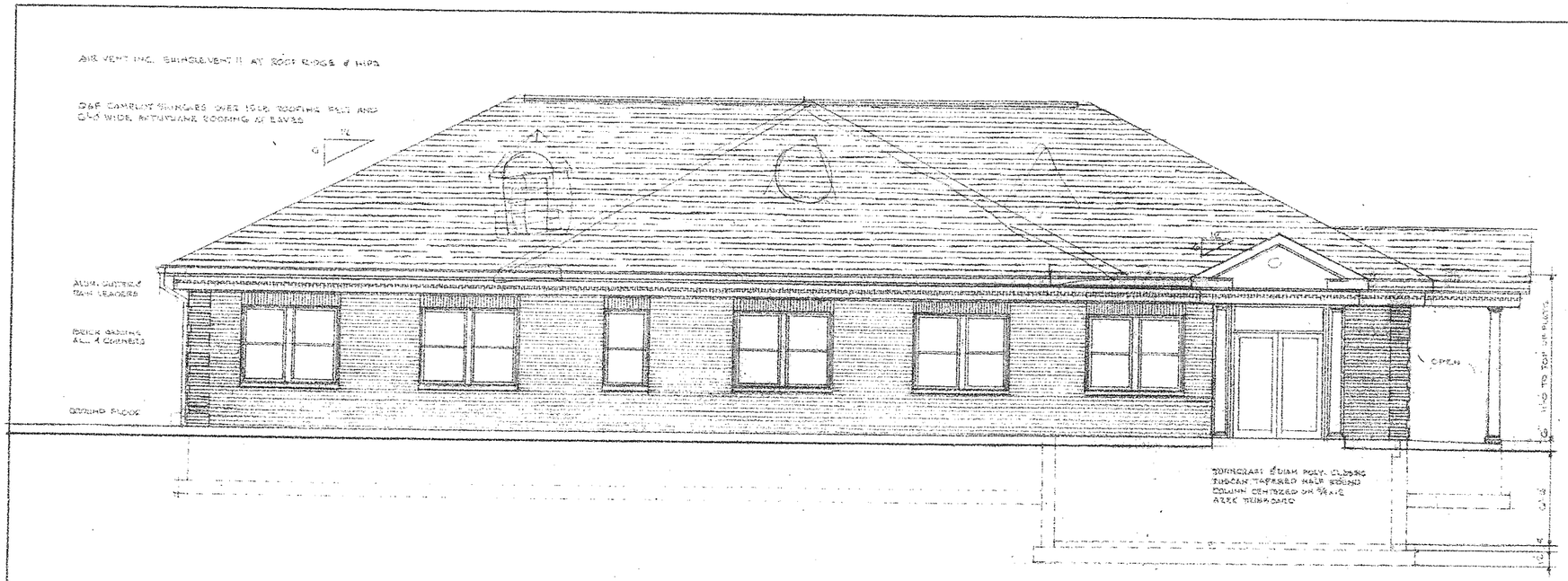
GROUND FLOOR PLAN

SCALE:

REVISIONS		
No	DATE	LOCATION

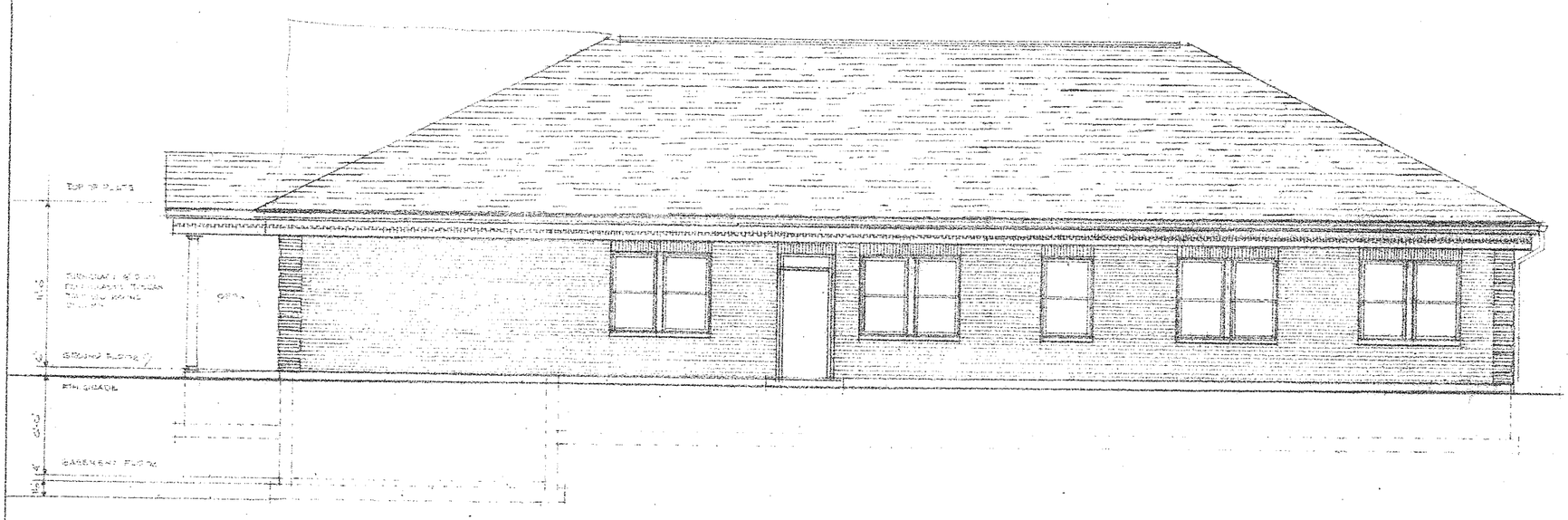
E.J. REMPELAKIS ASSOCIATES ARCHITECTS
SUITE 201 179 GREAT ROAD ACTON MASSACHUSETTS 01720

SCALE:
DATE:
DR. CH.
PROJ. NO.



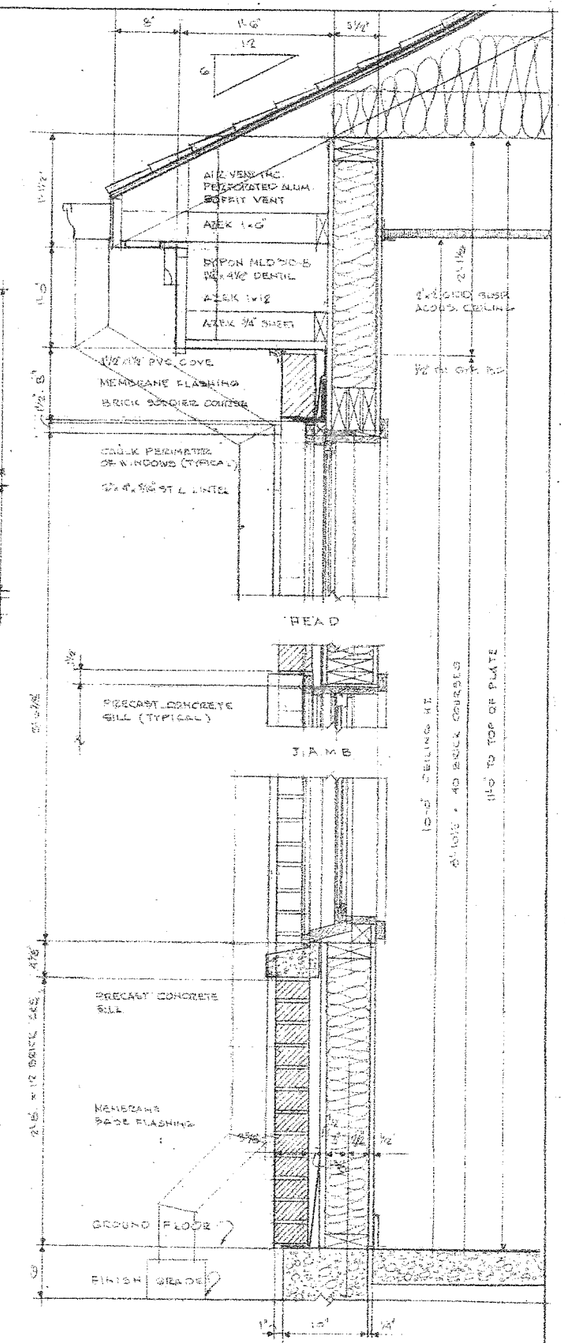
L E F T S I D E E L E V A T I O N

SCALE: 1/4" = 1'-0"



R I G H T S I D E E L E V A T I O N

SCALE: 1/4" = 1'-0"



WALL SECTION

SCALE: 1/2" = 1'-0"

REVISIONS		
NO	DATE	LOCATION

E.J. REMPELAKIS ASSOCIATES ARCHITECTS
SUITE 291 179 GREAT ROAD ACTON MASSACHUSETTS 01720

SCALE:
DATE:
DR: CK:
PROJ. NO. 2014-7

REDUCED PLANS

3.9.10
Lighting Plan

INDEPEN[illegible] LIGHTING [illegible] SULTING [illegible]
51 chemin [illegible] ovey Hill,
Hemming[illegible], Quebec
Canada, J[illegible] 1[illegible]0
Tel: 450-2[illegible] -2[illegible]02
techno@e[illegible]techno.com
www.ecla[illegible]techno.com

dals

Lighting Calculation Study

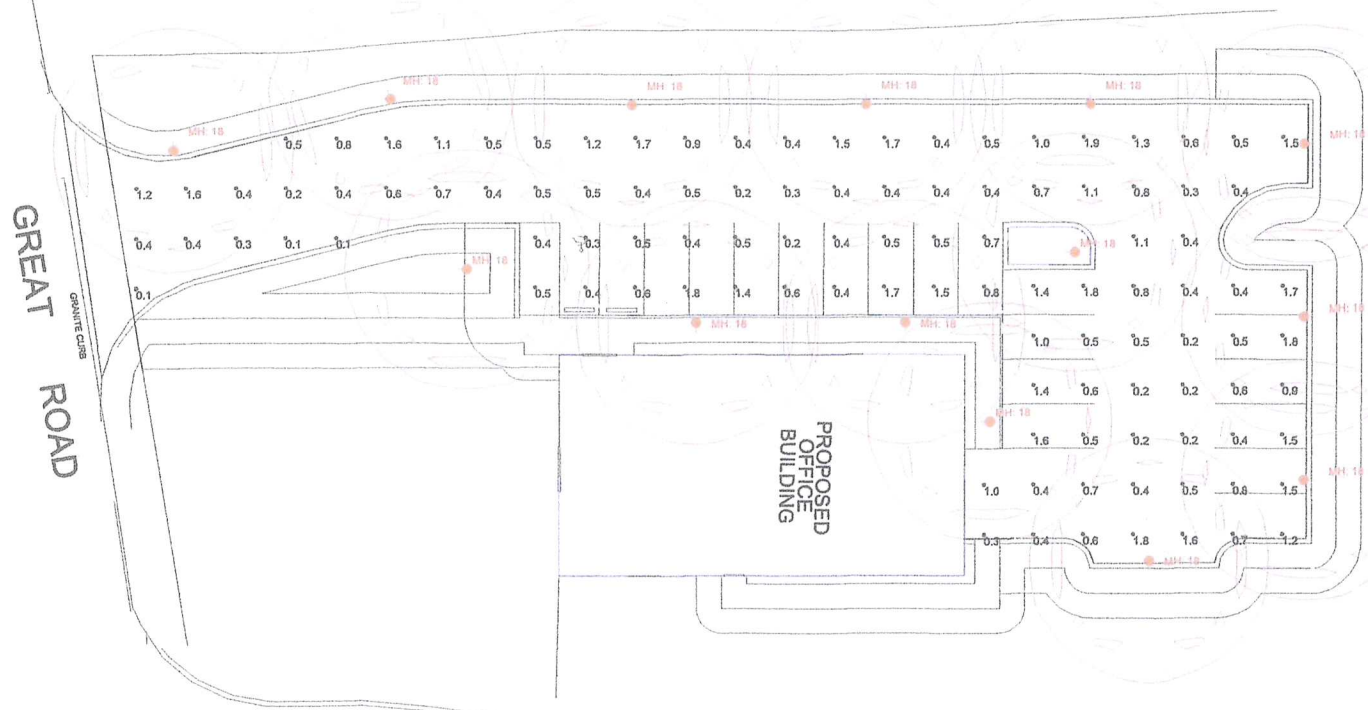
Dals Li[illegible] Inc., 30 Roll[illegible] Brière, Suit[illegible] 10[illegible]
Blainvil[illegible], [illegible]bec, J7C 5[illegible]

DISCLAIMER: [illegible] performa[illegible] [illegible] & CIE stand[illegible] [illegible] Some diff[illegible] [illegible] measured value[illegible] [illegible] results may occur [illegible] to tolerance [illegible] methods, testing [illegible] [illegible] techniques on [illegible] [illegible] such as voltage [illegible] [illegible] variations. [illegible] put data used [illegible] [illegible] calculat[illegible] [illegible] dimensions, [illegible] [illegible] and architect [illegible] [illegible] significantly affect [illegible] [illegible] [illegible], if the [illegible] environmen[illegible] [illegible] match the [illegible] [illegible] will occur bet[illegible] [illegible] and calcul[illegible] [illegible].

Project name : 11187 Acton Parking Lot		Date:6/16/2014
Prepared for: Juan Ernesto Quintana		AGI32 Version 15.1.13
Filename: Acton Parking lot.AGI		Total Time (Hrs.): 1.18
By : Cynthia Primeau Laplante	Units:	Page 1 of 8

dals

Luminaire Schedule								
Symbol	Qty	Label	Description	Lum. Lumens	Lum. Watts	LLF	Filename	Arrangement
	14	G994C[1](1)	G994C[1](1)	1612	27.09	0.900	G994C[1](1).IES	SINGLE



Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
CalcPts	Illuminance	Fc	0.74	1.9	0.1	7.40	19.00

Dals Lighting, Inc., 30 Rolland-Brière, Suite 104
Blainville, Quebec, J7C 5R8

DISCLAIMER: Calculations have been performed according to IESNA & CIE standards and goodpractice. Some differences between measured values and calculated results may occur due to tolerances in calculation methods, testing procedures, component performance, measurement techniques and field conditions such as voltage and temperature variations. Input data used to generate the attached calculations such as room dimensions, reflectances, furniture and architectural elements significantly affect the lightingcalculations. If the real environment conditions do not match the input data, differences will occur between measured values and calculated values.

Project name : 11187 Acton Parking Lot

Prepared for: Juan Ernesto Quintana

Filename: Acton Parking lot.AGI

By : Cynthia Primeau Laplante

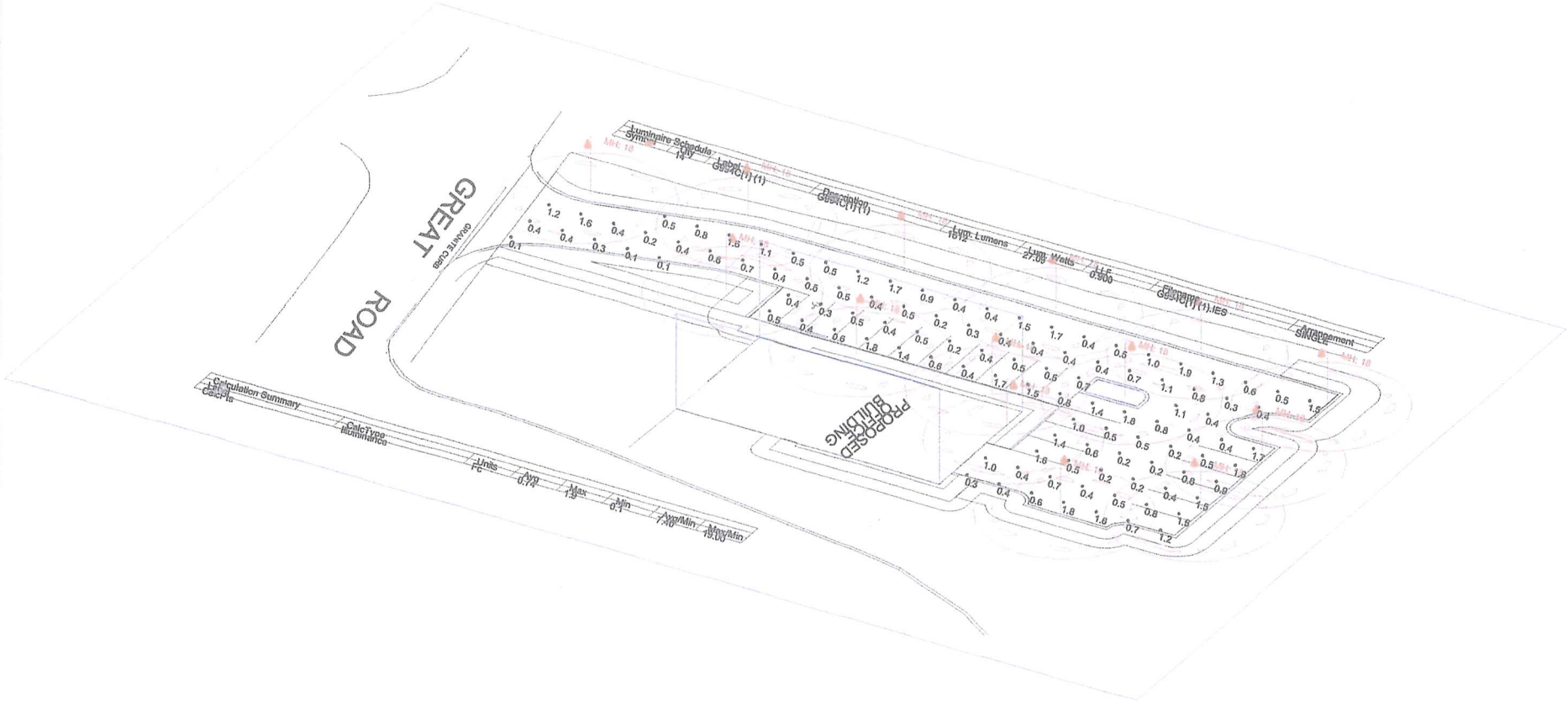
Units:

Date:6/16/2014

AGi32 Version 15.1.13

Total Time (Hrs.): 1.18

dals



Dals Lighting, Inc., 30 Rolland-Brière, Suite 104
Blainville, Quebec, J7C 5R8

DISCLAIMER: Calculations have been performed according to IESNA & CIE standards and goodpractice. Some differences between measured values and calculated results may occur due to tolerances in calculation methods, testing procedures, component performance, measurement techniques and field conditions such as voltage and temperature variations. Input data used to generate the attached calculations such as room dimensions, reflectances, furniture and architectural elements significantly affect the lightingcalculations. If the real environment conditions do not match the input data, differences will occur between measured values and calculated values.

Project name : 11187 Acton Parking Lot		Date:6/16/2014
Prepared for: Juan Ernesto Quintana		AGi32 Version 15.1.13
Filename: Acton Parking lot.AGI		Total Time (Hrs.): 1.18
By : Cynthia Primeau Laplante	Units:	Page 3 of 8

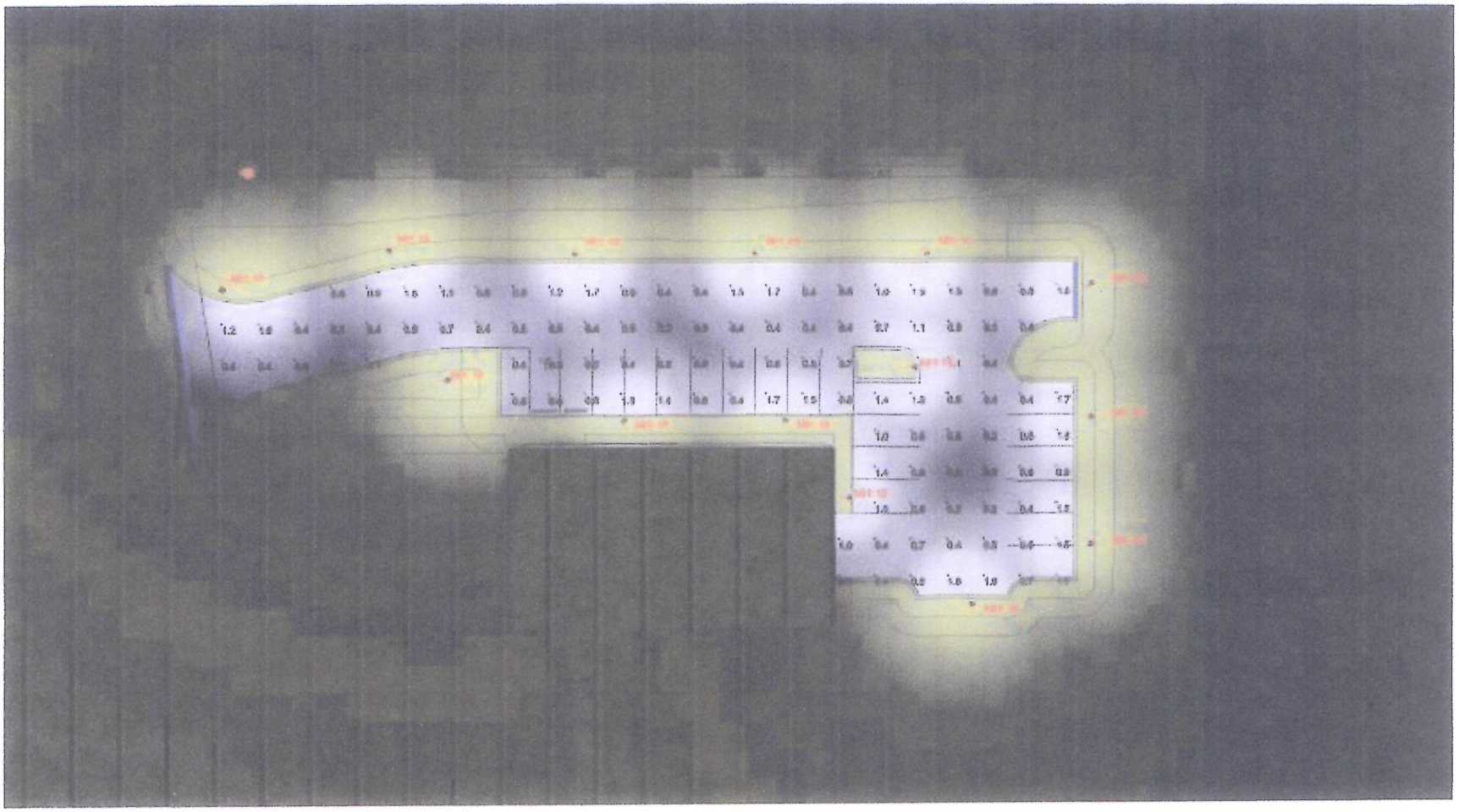
dals

Results Summary

Luminaire Schedule							
Symbol	Qty	Label	Description	Lum. Watts	Lum. Lumens	LLF	Filename
	14	G994C[1] (1)	G994C[1] (1)	27.09	1612	0.900	G994C[1] (1).IES

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
CalcPts	Illuminance	Fc	0.74	1.9	0.1	7.40	19.00

dals

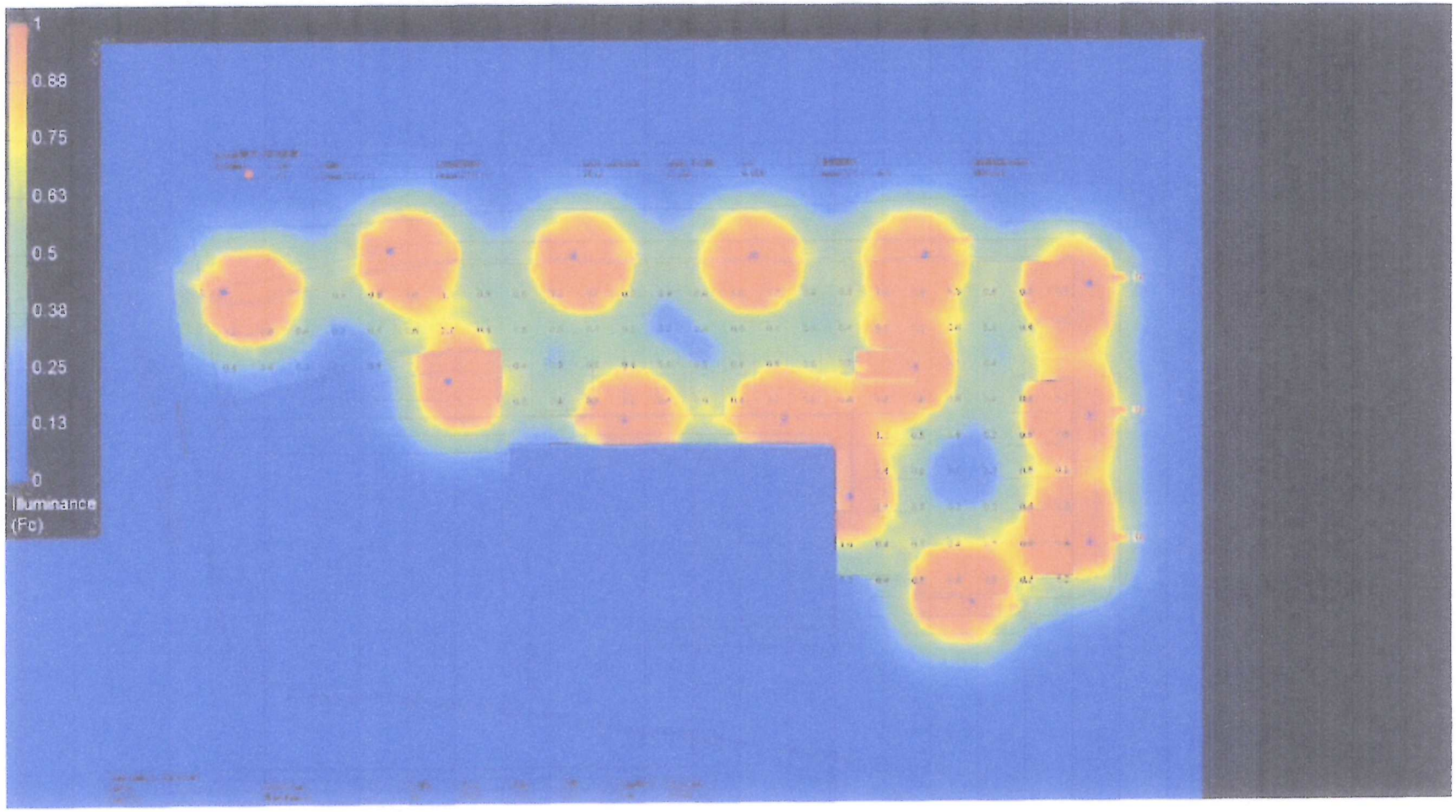


Dals Lighting, Inc., 30 Rolland-Brière, Suite 104
Blainville, Quebec, J7C 5R8

DISCLAIMER: Calculations have been performed according to IESNA & CIE standards and goodpractice. Some differences between measured values and calculated results may occur due to tolerances in calculation methods, testing procedures, component performance, measurement techniques and field conditions such as voltage and temperature variations. Input data used to generate the attached calculations such as room dimensions, reflectances, furniture and architectural elements significantly affect the lightingcalculations. If the real environment conditions do not match the input data, differences will occur between measured values and calculated values.

Project name : 11187 Acton Parking Lot		Date:6/16/2014
Prepared for: Juan Ernesto Quintana		AGi32 Version 15.1.13
Filename: Acton Parking lot.AGI		Total Time (Hrs.): 1.18
By : Cynthia Primeau Laplante	Units:	Page 5 of 8

dals

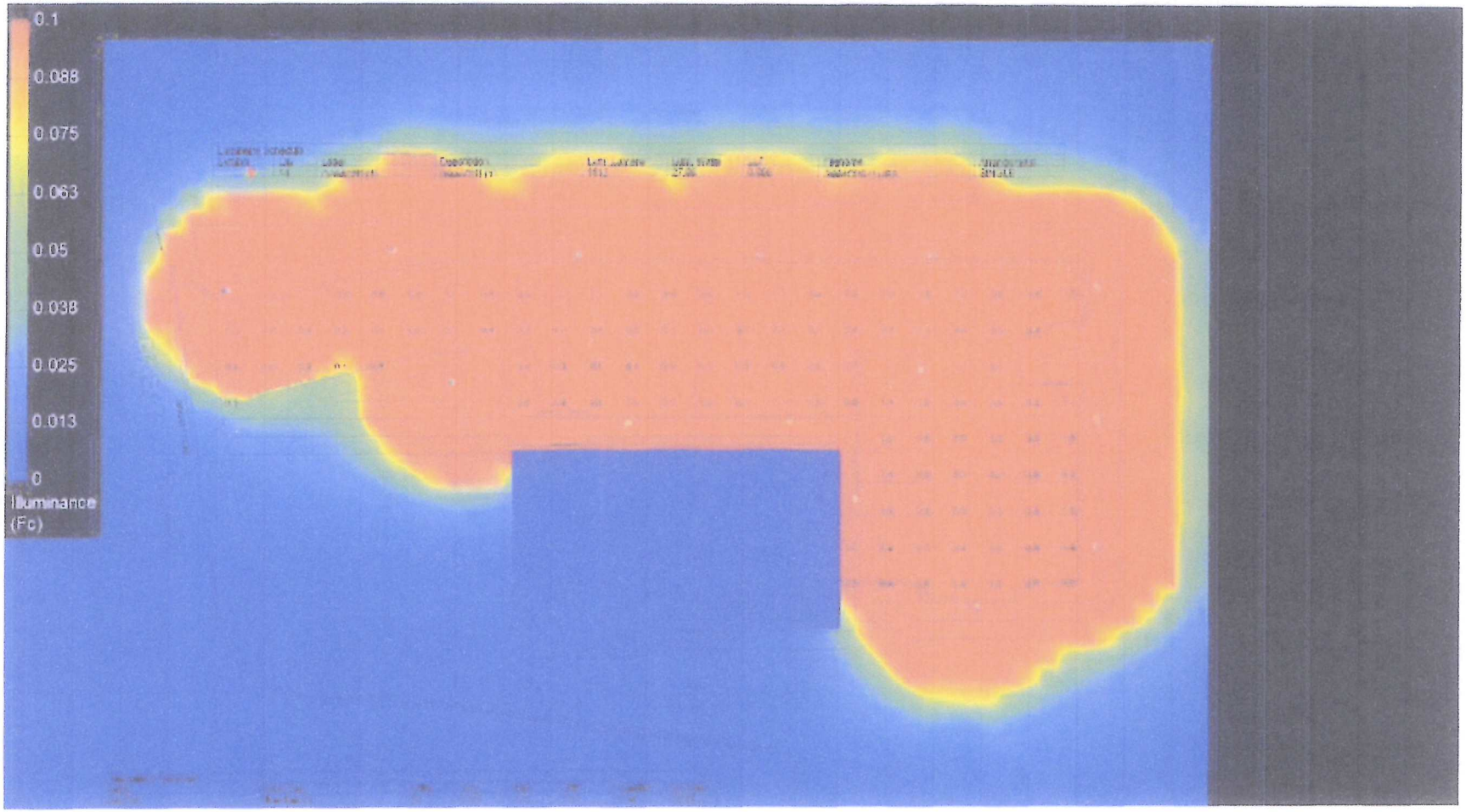


Dals Lighting, Inc., 30 Rolland-Brière, Suite 104
Blainville, Quebec, J7C 5R8

DISCLAIMER: Calculations have been performed according to IESNA & CIE standards and goodpractice. Some differences between measured values and calculated results may occur due to tolerances in calculation methods, testing procedures, component performance, measurement techniques and field conditions such as voltage and temperature variations. Input data used to generate the attached calculations such as room dimensions, reflectances, furniture and architectural elements significantly affect the lightingcalculations. If the real environment conditions do not match the input data, differences will occur between measured values and calculated values.

Project name : 11187 Acton Parking Lot		Date:6/16/2014
Prepared for: Juan Ernesto Quintana		AGi32 Version 15.1.13
Filename: Acton Parking lot.AGI		Total Time (Hrs.): 1.18
By : Cynthia Primeau Laplante	Units:	Page 6 of 8

dals



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Prepared for: Juan Ernesto Quintana

Filename: Acton Parking lot.AGI

By : Cynthia Primeau Laplante

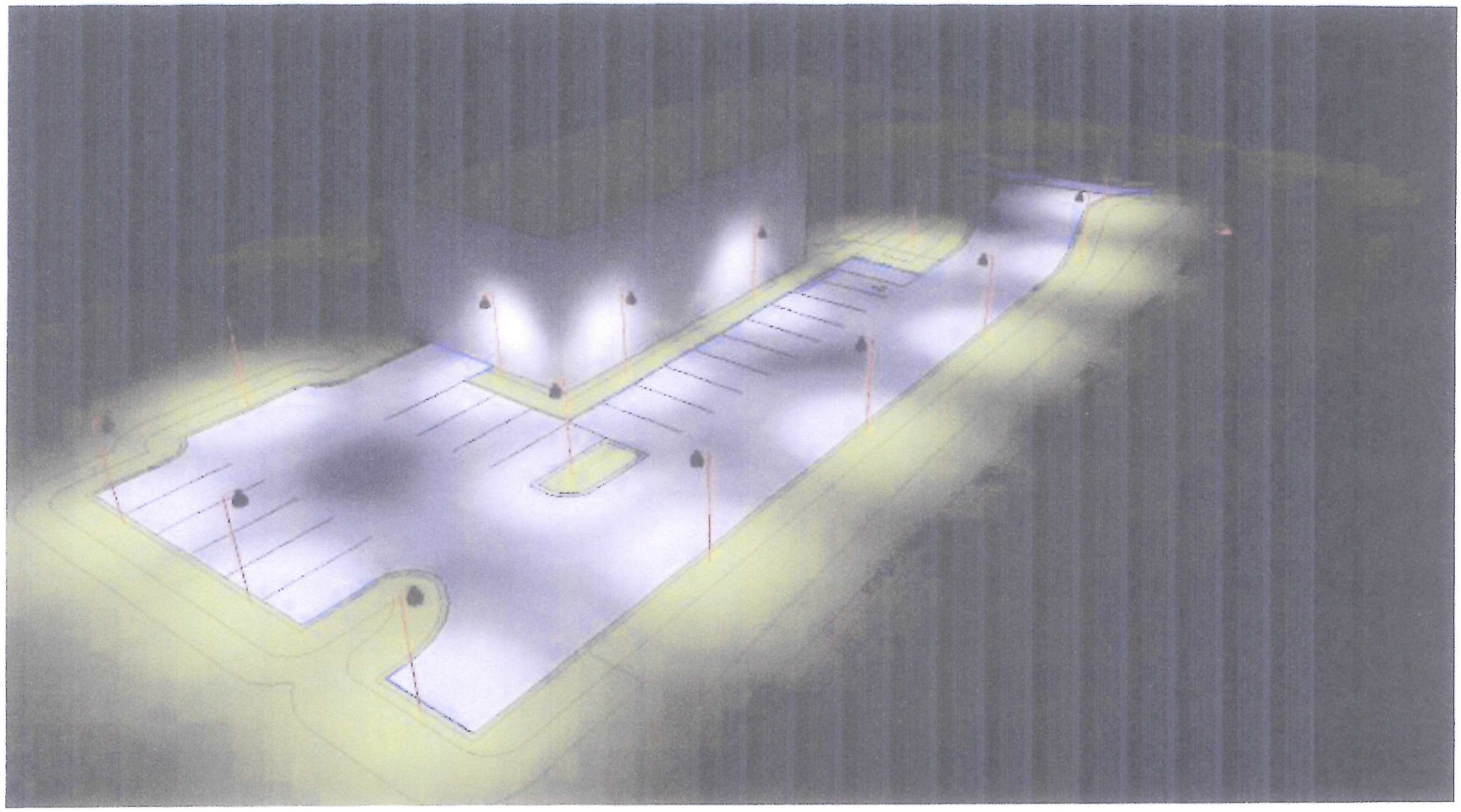
Units:

Date:6/16/2014

AGI32 Version 15.1.13

Total Time (Hrs.): 1.18

dals



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By : Cynthia Primeau Lapiante	Units:	Page 8 of 8

3.10
Traffic Study

Traffic Study

The proposed office building will produce a maximum of 6.5 trips during a peak hour and 41.67 trips during a weekday. Since the proposed office building will produce less than 30 trips in a peak hour and less than 400 trips on a weekday, this project is not subject to a traffic impact study.

STAMSKI AND McNARY, INC.
1000 Main Street
ACTON, MASSACHUSETTS 01720
TEL (978) 263-8585
FAX (978) 263-9883

JOB 267 Great Rd
SHEET NO. _____ OF _____
CALCULATED BY JTM DATE _____
CHECKED BY _____ DATE _____
SCALE _____

TRAFFIC STUDY

A.M. Peak hour
Average rate / 1000 S.F = 1.8
3605/1000 = 3.6
3.6 x 1.8 = 6.5 Trips

P.M. Peak hour
Average rate / 1000 S.F = 1.73
3605 / 1000 = 3.6
3.6 x 1.73 = 6.23 Trips

Weekday
Average rate / 1000 S.F. = 11.57
3605/1000 = 3.6
3.6 x 11.57 = 41.67

☆ AVERAGE RATES FROM INSTITUTE OF TRANSPORTATION ENGINEERS, TRIP GENERATION 7th EDITION VOLUME 3 of 3.