

TOWN OF TOPSFIELD



PLANNING BOARD, as Special Permitting Authority

APPLICANT'S CHECKLIST FOR SPECIAL PERMITS

SEE RULES & PROCEDURES FOR DETAILED LIST & REQUIREMENTS:

All Applications for a Special Permit must be made as follows:

- 7 copies of Application Form A + 7 copies SWM applic
- 7 copies of Application Supplement Form B with Assessor's certification
- 7 copies of Assessor's location map (provided by Assessor)
- 7 copies of Plot Plan to scale certified by a registered land surveyor
Stormwater Drainage plan
- 7 copies of Building Inspector's denial, if any
- 2 pre-addressed, stamped envelopes for each lot owner or party of interest set forth in Supplement Form B. (Return Address shall be: Planning Board, Town Hall, Topsfield, MA 01983)
- 2 self-addressed, stamped envelopes with the same return address as above.

Planning Board Application for Special Permit & Site Plan Review

Form A

Before you file this application, it is necessary that you be familiar with the requirements for filing plans and other materials in support of this application as specified in the Topsfield Zoning Bylaws, scenic road Bylaw, Stormwater & Erosion Control Bylaw and the respective Planning Board Rules and Procedures that are available from the Town Clerk and Community development Coordinator as well as the Town website at www.topsfield-ma.gov.

Incomplete applications will not be considered unless waivers are previously obtained from the Planning Board.

SPECIAL PERMIT FEES:

Business Park Use Permits	\$200.00	
Elderly Housing Special Permits	\$1000.00	(New construction EHD see Site Plan Review fees listed below)
Common Drive	\$100.00	
Accessory Apartment	\$100.00	
Groundwater Protection District		
Wind Energy Conversion System – Small Scale	\$200.00	
Ground Mounted Solar Photovoltaic Installations	\$200.00	
Scenic Road		
Stonewall Removal	\$75.00	
Tree Removal	\$75.00	
– Stormwater & Erosion Control	\$100.00	plus $\$0.0030$ times the total square footage of the area to be altered by the project: see exemptions under regulations $\$100 + 18,551 \times .003 = \155.65

SITE PLAN REVIEW:

1). Coverage Fee

\$100/5,000 sq. ft. or any portion thereof of new/alterd lot disturbance (the total square footage of all new/alterd building footprints, plus all paved surfaces, septic installations and stormwater management systems).

_____ sq. ft. + 5,000 sq. ft. x \$100 = _____ area of new/alterd coverage

2). Gross Floor Area Fee

\$200/5,000 square feet or any portion thereof of new/alterd Gross Floor Area (gross floor area – the total square footage of all new floor area on all levels of all new or existing buildings).

_____ sq. ft. + 5,000 sq. ft. x \$200 = _____ area of new/alterd gross floor area

Coverage Fee	\$ _____
Gross Floor Area Fee	\$ _____
Total Site Plan Review Fee	\$ _____

NATURE OF APPLICATION:

- Petition for Special Permit pursuant to Article ____, Section ____ of the Zoning Bylaw.
- Petition for Finding pursuant to Article ____, Section ____ of the Bylaw.
- Petition for Site Plan Review pursuant to Article IX of the Zoning Bylaw (and the Guidelines and Performance Standards for Activities Subject to the Provisions of Article IX of the Topsfield Zoning Bylaw; and Supplement Form C for submitted requirements and formats).
- Petition for a Scenic Road Permit pursuant to Chapter LV.
- Petition for a Stormwater & Erosion Control Permit pursuant Chapter LI.

DESCRIPTION OF APPLICANT:

- a. Name Milk Street Properties, LLC
- b. Address 66 Park St Andover Ma 01810
- c. Phone Number 978 618-1933
- d. Interest in Premises (e.g., owner, tenant, prospective purchaser, etc.) owner
(Attach copy of lease and/or letter of authorization from owner, if applicable)

DESCRIPTION OF PREMISES:

- a. Assessor's Map 32, Lot(s) 136, Zoning District CR
- b. Location of Premises (number and street) 67 Washington St
- c. Name and address of legal owner (if different from Applicant) same
- d. Deed to the Premises recorded at (if known):
 Essex South District Registry of Deeds, Book 31553 Page 25
 Essex South Registry District of the Land Court, Certificate Number _____
- e. Prior zoning decisions affecting the Premises (if any): None
Date of Decision _____ Name of Applicant _____
Nature of Decision _____
- f. Present use of the Premises Vacant (garage used by abutter)
- g. Present structures conform to current Zoning Bylaw. Yes No. If no, in what respect does it not conform. _____

PROPOSAL (attach additional sheets if necessary):

- a. General Description:
Construct Single Family House, Garage,
Septic System, Driveway! Utilities

b. If proposal is for construction or alteration of an existing structure, please state:

	FRONT	REAR	SIDE(S)
1. Setbacks required per bylaw	<u>25'</u>	<u>30'</u>	<u>10'</u>
2. Existing setbacks	<u>-</u>	<u>-</u>	<u>-</u>
3. Setbacks proposed	<u>120'±</u>	<u>84'</u>	<u>20'</u>

	FRONTAGE	AREA
4. Frontage and area required by bylaw	<u>100'</u>	<u>20,000</u>
5. Existing frontage (s) and area	<u>118.41</u>	<u>36,672</u>
6. Frontage (s) and area proposed	<u>118.41</u>	<u>36,672</u>

	FEET	STORIES
7. Existing Height	<u>-</u>	<u>-</u>
8. Height proposed	<u>16±</u>	<u>1</u>

c. Other town, state or federal permits or licenses required, if any:

NECESSARY ACCOMPANYING DATA:

It is required that every application be accompanied by appropriate supporting data. Failure to submit appropriate and complete data could result in delay and/or denial of application for zoning relief. Place a check next to the applicable accompanying supporting data:

Variance of Special Permit Applications:

(See Planning Board Rules and Procedures Section III)

All required supporting data attached Yes No

Site Plan Review Applications:

(See Town of Topsfield Zoning Bylaw, Article IX, Section 9.05. See also Guidelines and Performance Standards for Activities Subject to the Provisions of Article IX of the Topsfield Zoning Bylaw)

All required supporting data attached Yes No

Comprehensive Permit Applications:

(See G.L.c. 40B, Sections 20-23)

All required supporting data attached Yes No

Appeals from decisions of Building Inspector or Others:

(See Planning Board Rules and Procedures, Section III (1) (e))

All required supporting data attached Yes No

If all required supporting data is not attached, why not:

Not Applicable

Date

10-25-12

Kay Webster
Signature of Applicant

TOWN OF TOPSFIELD, MA
PLANNING BOARD

Application Supplement Form B

Attach to this form a copy of the Assessor's map (scale 1" equals 200') showing the property and all other properties and roadways within 300 feet of any portion of the property. Also, show the lot number and lot owner's name on each lot within the 300'.

List below the lot owner names and mailing addresses as shown in the Assessors' records, beginning with the property of the Applicant (locus).

MILK STREET PROPERTIES, LLC
Applicant's Name, Mailing Address: J. MICHAEL DAGGETT
66 PARK STREET ANDOVER, MA 01870
650 E. BROADWAY HAVERHILL MA
Telephone No. 508 633 0989 (978) 618-1933

Locus: 67 Washington St (Parcel 32-136)

Map	Block	Location	Owner	(If different from location) Mailing Address
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SEE ATTACHED LIST

If needed, attach additional sheets.

Assessor's Certification

To the Topsfield Planning Board:

This is to certify that, at the time of the last assessment for taxation made by the Town of Topsfield, the names and mailing addresses of the parties assessed as owners of land within 300' of the parcel of land shown in the attached sketch were as listed.

Authorized Signature Assessors' Office Pauline M. Evans

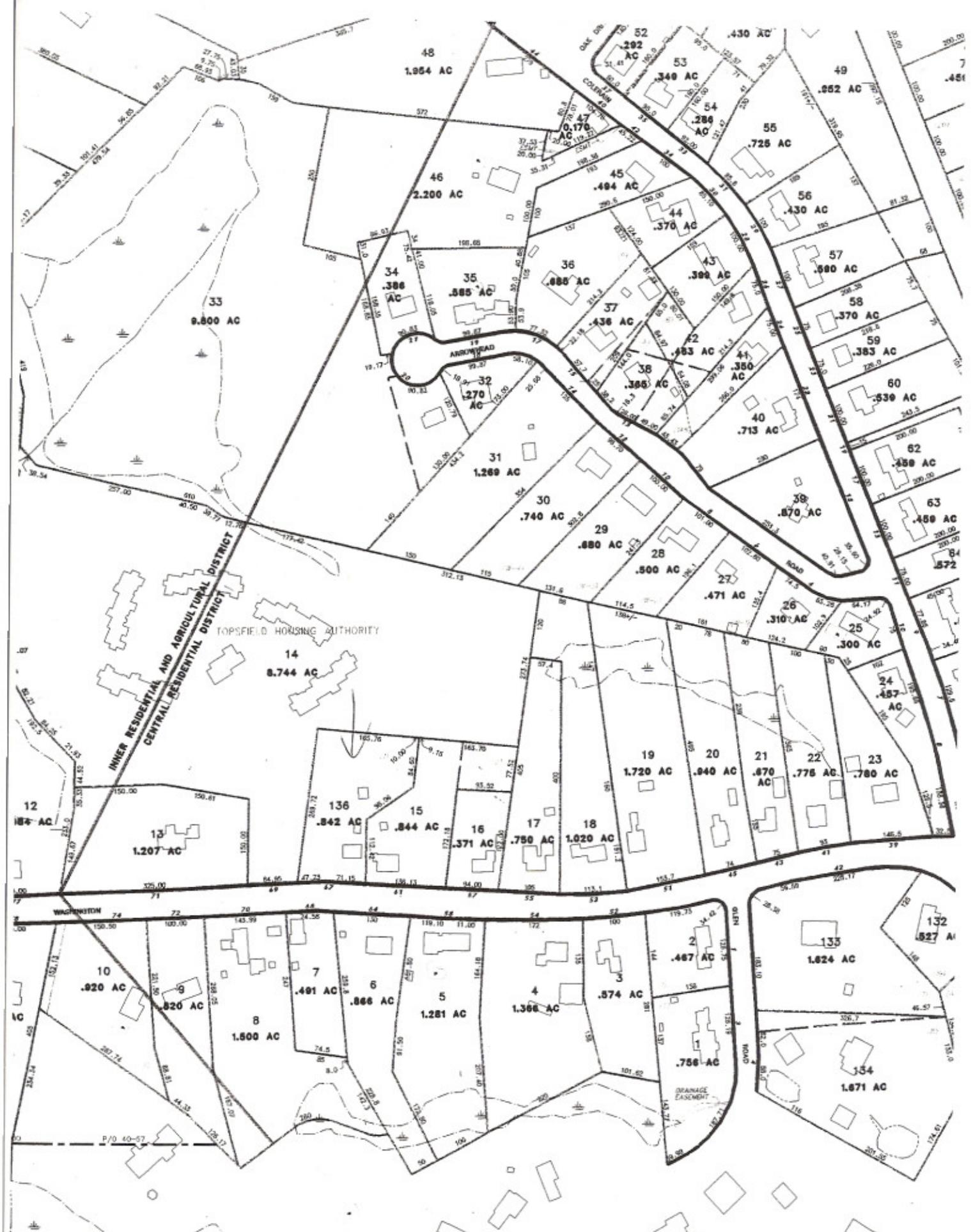
Date of Verification 10/19/2012

Abutters' List 32-136 69 Washington Street within 300' for
Planning Board

MBL	Street No. & Name	Owners Name	Mailing Address & Different
32-14	69 Washington St.	Topsfield Housing Authority	
32-13	71 Washington St.	Perry, Donna A + Reedy, John	
32-10	74 Washington St.	Voss, Guido B. + Leslie A.	
32-9	72 Washington St.	Bridge, John W. + Anne S.	
32-8	70 Washington St.	Demers, Gregg A. + Cathleen M.	
32-7	68 Washington St.	Collins Joseph F. + Elizabeth J.	
32-6	64 Washington St.	Delaney, John F. Jr. + Marian P.	
32-5	58 Washington St.	Heslet, Dennis L. + Phyllis E.	
32-4	54 Washington St.	Stewart, William H. + Marise M.	
32-15	61 Washington St.	Andreas, Niklass	
32-16	57 Washington St.	Makoney, Philip E. + Ellen B.	
32-17	55 Washington St.	Awiszus, David W. + Molly	
32-18	53 Washington St.	Nayden, Edward L. + Mary E.	
32-31	14 Arrowhead Rd	*H. Nigman Jeffrey Tr., Nockory St. Trust,	
32-30	12 Arrowhead Rd	Hernandez, John H.	

→ 900 Cummings Center #412S
Beverly, Ma. 01915

* Subsequent owner



APPLICATION FORM
STORMWATER AND EROSION CONTROL PERMIT

To: The Topsfield Planning Board, Town Hall, Topsfield, MA 01983

The undersigned hereby applies for a Stormwater and Erosion Control Permit and herewith submits six (6) copies of a completed application package for a Stormwater Management Permit (SMP) and an electronic application in PDF format on a CD or DVD disc for approval.

The applicant certifies to the truth of the following facts as part of his application.

1. Name of Applicant: MILK STREET PROPERTIES, LLC
Address: 66 PARK ST
ANDOVER, MA 01810
Telephone Number: 978 618-1933
E-mail Address: MERRENG@AOL.COM
2. Name of Engineer or Surveyor Merrimack Engineering Services
Address 66 Park St
Andover Ma 01810
Telephone Number: 978 475-3555
E-mail Address: MERRENG@AOL.COM
3. Deed to property is dated 6-27-12 and is recorded in Essex South District Registry, Book 31553 Page 25 (recorded 7-25-12)
4. Location of Property for which permit is requested:
Address 67 Washington Street
Topsfield Ma
Zoning District Central Residential (C-R)
5. Attach hereto a copy of the deed.
6. The exact names in which title to the property is held and the present addresses of persons named are: (If married, give spouse's name.)
Milk Street Properties, LLC

7. A complete list of persons with their addresses known to have mortgages, attachments, encumbrances, or liens of any kind upon the property is as follows:

Lowell Five Bank, Merrimack St Lowell Ma

8. If the property is in the name of a trust, the complete and correct name of the trust, date of the trust declaration, book and page where it is recorded and names and addresses of all trustees are as follows:

N/A

9. If the property is in the name of a corporation, the complete and correct name of the corporation, the name and corporate capacity of all officers authorized to sign deeds and other instruments pertaining to real estate are as follows:

... LLC King Wienstein, Manager

10. Description of the project for which a Stormwater and Erosion Control Permit is requested. Include total square footage of land to be altered/cleared.

Vacant, 36,672 Sq Ft of land, located adjacent to
#01 Washington St, except for garage &
driveway that exists (portion of drive to be
removed - garage to remain); Area of
site disturbance = 18,551 Sq. Ft.

Signature of Applicant

King Wienstein

Date of Submission

10-25-12

Town Clerk Signature

FILE (2)

TD 14



2012072500387 Bk:31553 Pg:25
07/25/2012 02:09 DEED Pg 1/2

Southern Essex District ROD
Date: 07/25/2012 02:09 PM
ID: 911244 Doc# 20120725003870
Fee: \$1,003.20 Cons: \$220,000.00

67 Washington Street, Topsfield

QUITCLAIM DEED

Lot #1. 61 Washington Street, Topsfield, MA 01983

I, Mark A. DePiero, Trustee of 61 Washington Street Realty Trust, under a Declaration of Trust dated March 4, 2010, of Newburyport, MA 01950, for consideration paid of Two Hundred and Twenty Thousand and NO/100 (\$220,000.00) DOLLARS, grant to Milk Street Properties, LLC, a Massachusetts limited liability company, with a principal office at 66 Park Street, Andover, Massachusetts 01810

with QUITCLAIM COVENANTS:

A parcel of land situated on the Northeasterly side of Washington Street, Topsfield, Essex County, Massachusetts, and being shown as Lot 1 on a plan entitled "Approval Not Required Subdivision Plan of Land, 61 Washington Street, Topsfield, Massachusetts, Prepared for: 61 Washington Street Realty Trust, dated May 18, 2010" which plan is recorded with the Essex South District Registry of Deeds in Plan Book 428, as Plan No. 32 (hereinafter called the "Plan"). Said plan is incorporated herein by referenced for a more particular description of the subject premises.

Containing 0.842 acres, more or less, according to said Plan.

Subject to the Exclusive Driveway & Use Easement for the Benefit of Lot 2 recorded with the Essex South District Registry of Deeds in Book 30334, Page 209.

Subject to the Declaration of Covenants and Restrictions dated April 14, 2011 recorded with the Essex South District Registry of Deeds in Book 30352, Page 398.

Being a portion of the premises conveyed to Grantor by deed of James H. O'Donovan and Tracey C. O'Donovan dated March 26, 2010 and recorded with the Essex South District Registry of Deeds in Book 29355, Page 28

This is not homestead property but by signature below Grantor releases all rights of homestead property he may have acquired in said property.

WITNESS the hand and seal of the Grantor this 27th day of June, 2012.

61 Washington Street Realty Trust

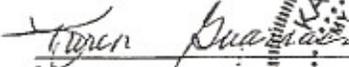
By:


Mark A. DePiero, Trustee

COMMONWEALTH OF MASSACHUSETTS

Essex, ss.

On this 27th day of June, 2012, before me, the undersigned notary public, personally appeared Mark A. DePiero, Trustee of 61 Washington Street Realty Trust, proved to me through satisfactory evidence of identification, which was a driver's license, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he signed it voluntarily for its stated purpose.


Name:
Notary Public
My commission expires



Storm Water Management and Erosion Control Plan
67 Washington Street
Topsfield, Ma
October 25, 2012

The contact information and responsible party is Milk Street Properties, LLC, 66 Park Street, Andover, Ma 01810 tel 978 618-1933. The site is shown on Town of Topsfield Assessors Map 32 Lot 136.

A locus map is shown on the plan

The Zoning District is Central Residence

The proposed land use is a single family house

The existing and proposed (no change) property lines are shown on the plan

The location of the existing and proposed utilities are shown on the plan along with the impervious areas on the site. There is a garage existing on the site and a driveway, a portion of the driveway is to be removed. The garage is to remain as it benefits the abutter.

The existing and proposed topography is shown on the plan

The predevelopment runoff and post development runoff is depicted in the attached calculations. There is no wetland within 100' of the site. The existing slope of the land is about a 5% average with well drained soils.

There are no wetlands on the site, nor streams, impoundments etc. The stormwater will be infiltrated into the ground from the roofs and crushed stone infiltration trenches shown on the plan will provide for groundwater recharge and no increase in peak rate of runoff from the site (actual reduction of flow post development)

There is no 100 year flood plain established for the site.

The seasonal ground water table is 55" to 57" below existing grade

The ground surface cover is moderate woods and grass, shown on the plan. The proposed surface cover is grass where the site is not paved. Those areas and the trees to remain are shown on the site plan.

There are no mapped Habitats, Endangered Species, Vernal Pools, Priority Habitat Areas on the site

The site is 36,672 sq ft and is only one watershed so the drainage map is the site itself

The proposed stormwater management system consists of crushed stone infiltration trench and roof drain infiltration chambers, shown on the plan. The erosion control is loam and seed lawn in areas that are not building or pavement. Silt fence will be installed for erosion control during construction on the site (shown on plan)

The temporary erosion control will be the silt fence, whose purpose is to trap sediment on site, installed after lot clearing and maintained until proposed grass reaches a height of 2" on the site.

The areas of cut and fill are shown on the plan with finish contours and included within the limit of disturbance, shown on the plan.

The project is small enough where all work should be complete in less than 6 months. The first phase is clearing and grubbing, then erosion control installation, excavation for and installation of the foundation, grading of the site, and in parallel with the grading installation of the septic system and utilities. Installation of the binder pavement will occur about 8 weeks from clearing the site. The house will be constructed and the finish pavement and seeding constructed after the house is built about 6 months after clearing. The erosion control shall remain until the grass reaches a height of 2"

During construction the erosion control will be inspected weekly.

The name of the 24 hour contact will be King Wienstein, Milk Street Properties, tel 207-332-7544 and the superintendent will be Michael Daggett tel 508 633-0987 who will also be available 24/7.

The structural details for the drainage system are shown on the plan and consist of infiltration trenches and hancor chambers.

The construction details for the installation of the drainage systems are on the plans along with the stone sizes, specifications, etc. The hydrology calculations are on the attached calculations.

The location of the house and garage (buildings) proposed on the site and the impervious cover not buildings (walks and drives) are shown on the plan.

No other information was requested by the Planning Board and there is no Conservation Commission Jurisdiction for this site.

Hydraulic calculations are attached to this report containing the information required by the Topsfield regulations sec 3.0 along with the Downstream impacts (none as there are not increases in peak rate of runoff from the site) per Section 4.0 of the regulations.

The Soils information from test pits is shown on the plan logged by a Massachusetts Soils Evaluator

The landscaping proposed is lawn where the woods and existing trees will not remain.

The site has no poorly drained soil on it

The calculations contain Hydrocad Model information

The proposed drainage facilities are not connected to off site drainage facilities

Operation and Maintenance Plan
67 Washington Street
Topsfield, Ma
10/25/12

The name and address of the responsible party and owner of the components of the system is Milk Street Properties, LLC, 66 Park St Andover, Ma, attn King Wienstein, tel 978-618-1933 or 207-332-7544

The site plan shown the location of all components of the erosion and drainage systems

The name of the personal responsible for maintenance is the owner of the property (see above)

There is no person responsible for financing inspections.

The maintenance schedule for the system is as follows:

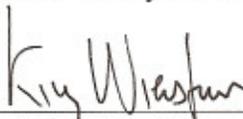
In the spring and fall of the year the systems shall be inspected, leaves removed from them and if there is sediment in them it shall be removed by hand raking the infiltration trenches and using a vacuum truck for the leaching chambers. The owner shall provide an annual report to the Planning Board.

There are no easements required or provided for the stormwater and erosion facilities

During Construction the owner shall inspect the erosion control on a weekly basis and any silt fence disturbed shall be reset. No soil shall be left unseeded or paved for a period longer than 6 months.

During construction the owner shall photograph the installation of the stormwater devices and provide copies of those photos to the Planning Board. The design engineer shall inspect the installation of those devices prior to backfilling and if they are found to be installed in an unacceptable manner they shall be removed and reinstalled by the contractor.

Accepted by :



King Wienstein, Milk Street Properties, LLC, owner

THIS CHECK IS VOID WITHOUT A GREEN & BLUE BORDER AND BACKGROUND PLUS A NIGHT & FINGERPRINT WATERMARK ON THE BACK - HOLD AT ANGLE TO VIEW

Milk Street Properties LLC
Stephen E. Stapinski
King Weinstein
66 Park Street
Andover, MA 01810

VOID
Date 10/25/12

3
53-7133/21

pay to the order of

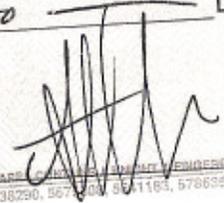
Town of Topsfield

\$ 155.65 -

One Hundred Fifty Five and ⁶⁵/₁₀₀ Dollars

LowellFive
It starts with a conversation

Memo Filing Fee 67 Wakehurst

Signed 

U.S. PATENTS 5,538,290, 5,672,000, 5,811,183, 5,786,353, 5,984,304, 6,030,000

⑆211371337⑆ 39923111 0003

SITE DEVELOPMENT

67 WASHINGTON STREET

TOPSFIELD, MASSACHUSETTS

INFILTRATION SYSTEM DRAINAGE CALCULATIONS

DATE: OCTOBER 22, 2012

PREPARED FOR DEVELOPER:

MILK STREET PROPERTIES, LLC

66 Park Street
Andover, MA 01810



Merrimack Engineering Services, Inc.

66 Park Street
Andover, MA 01810
merreng@aol.com

Phone: (978)-475-3555
Fax: (978)-475-1448

SITE DEVELOPMENT

67 WASHINGTON STREET

TOPSFIELD, MASSACHUSETTS

Introduction

It is proposed to construct a 1-story, 5 bedroom house with 2-car garage and driveway at site improvements on the land, located at 67 Washington Street in Topsfield, MA.

The purpose of this report is to calculate the pre-development runoff rate and to outline mitigation to reduce runoff from the new development of the lot.

The lot size is 36,672 ± S.F., or 0.842 AC. the existing 2-car garage is 704 S.F., and existing impervious area is 1,800 ± S.F. The post development of new development condition will have 3,372± S.F the new house and 4,059± S.F. other impervious areas.

Because this is an increase in impervious area in the post-development condition, mitigation in the form of roof infiltration chambers and crushed stone infiltration trench will be provided.

Soils within the vicinity of the project have been mapped by USDA-NRCS (formerly SCS) and consist of Canton fine sandy loams, 3 to 8 percent slopes, which is classified within the SCS Hydrological Soils Group B.

The purpose of these calculations will be to determine Pre-Development and Post-Development runoff rates using SCS-TR20 Runoff Method, as implemented by HydroCad computer model for proposed site design. A proposed infiltration Chambers and crushed stone infiltration trench have been designed to mitigate any increase in peak runoff rate. The calculation performed for 100-year storm event. As shown in the following calculations, there will be a reduction in peak runoff (100 year storm) to Washington Street.

The following chart is a summary of pre and post- development peak flow rates for 100-year storm events of the Sub-catchment area and accumulation design point – Pre-development and Post-development.

Design Point	Pre-Development	Post - Development	Change
Washington Street	2.08	1.82	-0.26

SITE DEVELOPMENT

67 WASHINGTON STREET

TOPSFIELD, MASSACHUSETTS

Calculations of Drainage System Components

Runoff Guidelines:

100-year storm – Rainfall for Essex County: 6.4" – see Section 6.1 (Rainfall Data Maps)

[Guidelines for Soil and Water Conservation, fig. B-1]

Corresponding runoff over impervious area, for curve number CN=98: 6.11" = 0.5092'

Corresponding runoff over short grass pasture, for curve number CN=74: 3.53" = 0.2942'

[Same, Table B-9, by interpolation]

Infiltration Trench A.

Length: 74 lf;

Width: 2'; Depth: 2'; Void ratio: 0.35

Infiltration: 30 min / inch = 2 inches / hour = 48 inches / day = 4 ft / day (Infiltration Depth)

Dead storage:
2'W x 2'D x 74'L x 0.35 = 104 c.f.

Infiltration Storage:
2'W x 4'D x 74'L = 592 c.f.

Bulk storage = Dead storage + Infiltration Storage = 104 c.f. + 592 c.f. = 696 c.f.

Runoff into Infiltration Trench A:

Contributing area:, 1105 sq. ft. - **Walkway**

Contributing runoff: 1,105 sf. x 0.5092' = 563 c.f.

592 c.f. < 696 c.f, so Infiltration Trench A is adequate and works with full capacity.

Infiltration Trench B.

Length: 146 lf;

Width: 2'; Depth: 2'; Void ratio: 0.35

Infiltration: 30 min / inch = 2 inches / hour = 48 inches / day = 4 ft / day (Infiltration Depth)

Dead storage:
2'W x 2'D x 146'L x 0.35 = 204 c.f.

Infiltration Storage:
2'W x 4'D x 146'L = 1,168 c.f.

Bulk storage = Dead storage + Infiltration Storage = 204 c.f. + 1,168 c.f. = 1,372 c.f.

Runoff into Infiltration Trench B:

Contributing area: 2,478 sf. - **Driveway & Parking Area**

Contributing runoff: 2,478 sf. x 0.5092' = 1,262 c.f.

1,262 c.f. < 1,372 c.f, so Infiltration Trench A is adequate and works with full capacity.

SITE DEVELOPMENT

67 WASHINGTON STREET

TOPSFIELD, MASSACHUSETTS

Calculations of Drainage System Components

Roof Runoff (Building #67 & 2-car Garage)

Contributing Building & Garage Roof Area: 3,372 s.f. + 480 s.f. = 3,852 s.f.

Generated Runoff Volume: 3,852 s.f. x 0.5092' = 1,961 c.f.

Infiltration Facility Capacity.

Chambers & Stone Capacity:

Using Stormtech SC310 Chambers.

Chamber Dimensions:

Length: 7.56' (total)

Length: 7.11' (lay up)

Width: 2.84' (34")

Height: 1.33' (16")

Adjusted Radius: $R_c = (17'' + 16'') : 2 = 16 \frac{1}{2}'' = 1.375'$

Chamber Cross-Section: $A_c = \pi \times R_c^2 / 2 = 2.97$ s.f.

Chamber Capacity: 14.7 c.f. [Cultec Plastic Chamber Systems Manual]

Accept 2 Chamber Groups with 4 Chambers in a Group.

Capacity for 4 Chambers: $V_c = 14.7$ c.f. x 4 = 58.8 c.f.

Stone Width : $S_w = 9.00'$ (Chamber Width + 3'-1" on each Chamber side)

Stone Height: $S_h = 1.84'$ (Chamber Height + 6" Bottom Pad)

Chamber Group Length: $S_l = 29.44'$ (Chamber Group lay up Length + 0.5' on each end Chamber)

Stone Length: $S_{el} = S_l + 5.56' = 35.00'$ (Chamber Group Length + 2'-7" on each Chamber Group bulkhead)

Void Ratio: $\gamma = 0.4$

Stone Bulkhead Cross-Section Area: $S_{ba} = S_w \times S_h = 9.0' \times 1.84' = 16.56$ s.f.

Stone Cross-Section Area around the Chambers: $S_c = S_{ba} - A_c = 16.56$ s.f. - 2.97 s.f. = 13.59 s.f.

Stone Volume around the Chambers: $V_{sc} = S_l \times S_c \times \gamma = 35.00' \times 13.59$ s.f. * 0.4 = 190.3 c.f.

End Stone Volume: $V_{se} = [S_{el} - S_l] \times S_{ba} \times \gamma = 5.56' \times 16.56$ s.f. * 0.4 = 36.83 c.f.

Total Stone Volume: $V_{ts} = V_{sc} + V_{se} = 190.3$ c.f. + 36.83 c.f. = 227.13 c.f.

Bulk Volume (Chambers and Stone): $V_b = V_c + V_{ts} = 58.8$ c.f. + 227.13 c.f. = 286 c.f.

SITE DEVELOPMENT

67 WASHINGTON STREET

TOPSFIELD, MASSACHUSETTS

Calculations of Drainage System Components

Infiltration Capacity:

Infiltration Area:

Bottom: $Sl * Sw = 35.0' * 9.00' = 315 \text{ s.f.}$

Infiltration rate : $30 \text{ min/inch} = 2 \text{ inches/hour} = 48 \text{ inches/24 hours} = 4 \text{ ft/day}$

Infiltration Capacity: $Ic = 315 \text{ s.f.} * 4 \text{ ft / day} = 1,260 \text{ c.f.}$

So the Total Bulk and Infiltration Capacity per day for the Facility is:

$Tc = Ic + Vb = 286 \text{ c.f.} + 1,260 \text{ c.f.} = 1,546 \text{ c.f.}$

Using 2 Roof Infiltration Facilities on Site: $Vrb = 2 * Tc = 2 * 1,546 \text{ c.f.} = 3,092 \text{ c.f.}$

$3,092 \text{ c.f.} > 1,961 \text{ c.f.}$, so the system of 2 infiltration facilities with 4 chambers in each group will be adequate to accommodate building and 2-car garage roof runoff.

The soils are Hydrologic Soil Group "B" soils – Canton Fine Sandy Loam, according to attached Web Soil Survey Report (see section 6.2). An infiltration structure is proposed to meet Standard 3. The calculated roof runoff from the building is 1,961 c.f., and distributed unequally (1,103 c.f. & 858 c.f.) into 2 infiltration chamber groups, capacity of each group – 1,546 c.f. Required recharge volume (see page 5) is 0.004976 ac.-ft, or $0.004976 \text{ ac.-ft} * 43,560 \text{ s.f./ac.} = 216.75 \text{ c.f.}$ The infiltration area of proposed chamber group is 315 s.f. Determine if the proposed infiltration structure will draw down the 216.75 c.f of water within 72 hours.

Drawdown rate = 1.02 inches per hour (Rawls Rate for Sandy Loam) * 1 ft. / 12 inches * 315 s.f. = 26.25 c.f. / hour (see chart below)

Drawdown time = $216.75 \text{ c.f.} / 26.25 \text{ c.f. / hour} = 8.257 \text{ hours} < 72 \text{ hours}$, so result is satisfactory for design purposes.

1982 Rawls Rates

Texture Class	NRCS Hydrologic Soil Group (HSG)	Infiltration Rate (Inches / Hour)
Sand	A	8.27
Loamy Sand	A	2.41
Sandy Loam	B	1.02
Loam	B	0.52
Silt Loam	C	0.27
Sandy Clay Loam	C	0.17
Clay Loam	D	0.09
Silty Clay Loam	D	0.06
Sandy Clay	D	0.05
Silty Clay	D	0.04
Clay	D	0.02

MILK STREET PROPERTIES

67 WASHINGTON STREET

TOPSFIELD, MASSACHUSETTS

WATER QUALITY VOLUME & STORMWATER RECHARGE

WATER QUALITY VOLUME

WQV – Water Quality Volume

ReV – Recharge Volume

I – Total Impervious Area (Including Rooftops)

Ir – Rooftop Impervious Area

Rr – Rooftop Runoff

Total site area in acres (A): 0.842

Total impervious area including rooftops (I) in acres: 0.0884 (All Buildings) + 0.0821 (Roadways & Drives) = 0.1706

Find Water Quality Volume (WQV) Using 0.5" rule:

$$\text{WQV} = (0.5 \times I) / 12 = (0.5 \times 0.1706) / 12 = 0.0071 \text{ acre-feet}$$

STORMWATER RECHARGE

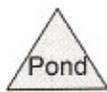
NRCS HYDROLOGIC SOIL TYPE	APPROX. SOIL TEXTURE	TOTAL AREA (ac.)	IMPERVIOUS AREA (I, ac)	TARGET DEPTH FACTOR (F)
A	sand	-	-	0.6-inch
B	loam	0.842	0.1706	0.35-inch
C	silty loam	-	-	0.25-inch
D	clay	-	-	0.1-inch

$$\text{ReV} = (I \times F) / 12 = (0.1706 \times 0.35) / 12 = 0.00497 \text{ acre-feet}$$



(Existing Site)

(Design Point Flow)



Pre-Development

Type III 24-hr 100-yr Rainfall=6.40"

Prepared by Merrimack Engineering Services

Page 2

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10/22/2012

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment ES: (Existing Site)

Runoff Area=36,672 sf Runoff Depth=2.61"

Flow Length=308' Tc=15.1 min CN=67 Runoff=2.08 cfs 0.183 af

Reach DP: (Design Point Flow)

Inflow=2.08 cfs 0.183 af

Outflow=2.08 cfs 0.183 af

Total Runoff Area = 0.842 ac Runoff Volume = 0.183 af Average Runoff Depth = 2.61"

Pre-Development

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Type III 24-hr 100-yr Rainfall=6.40"

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 10/22/2012

Subcatchment ES: (Existing Site)

Runoff = 2.08 cfs @ 12.22 hrs, Volume= 0.183 af, Depth= 2.61"

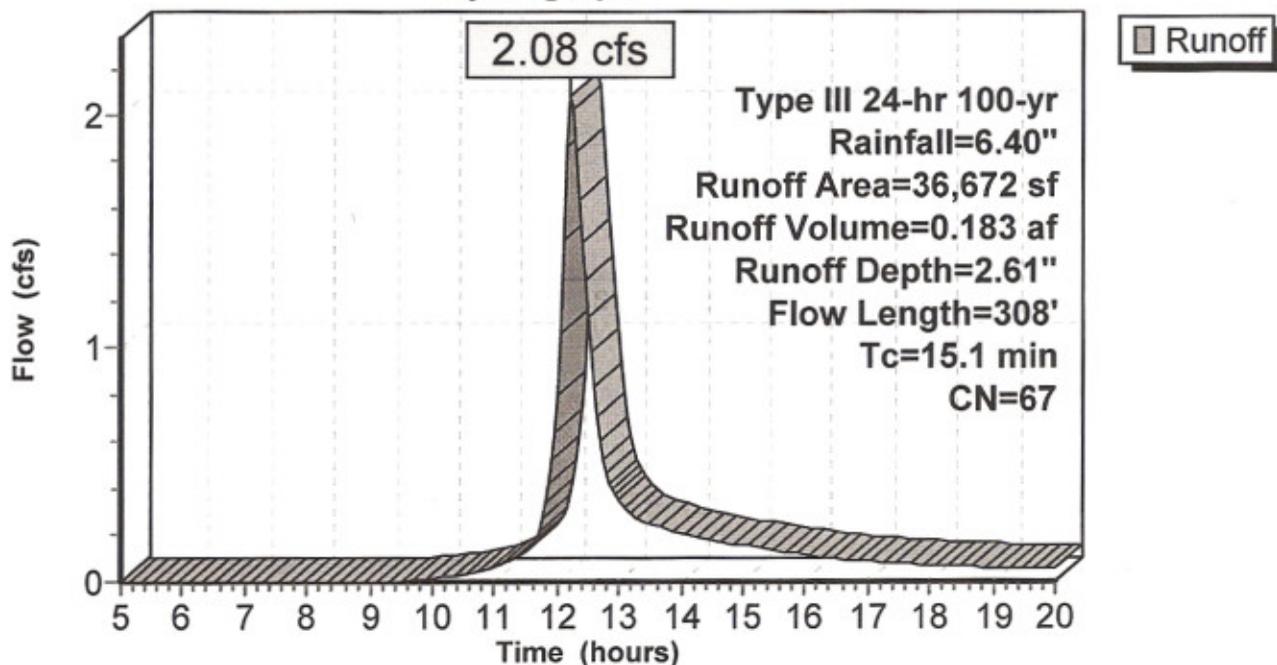
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-yr Rainfall=6.40"

Area (sf)	CN	Description
2,504	98	Existing Driveway, 2-car garage, concrete walkways
34,168	65	Woods/grass comb., Fair, HSG B
36,672	67	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	50	0.0324	0.1		Sheet Flow, Flow south
4.8	258	0.0324	0.9		Woods: Light underbrush n= 0.400 P2= 3.10" Shallow Concentrated Flow, Flow south
15.1	308	Total			Woodland Kv= 5.0 fps

Subcatchment ES: (Existing Site)

Hydrograph



Pre-Development

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Type III 24-hr 100-yr Rainfall=6.40"

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Reach DP: (Design Point Flow)

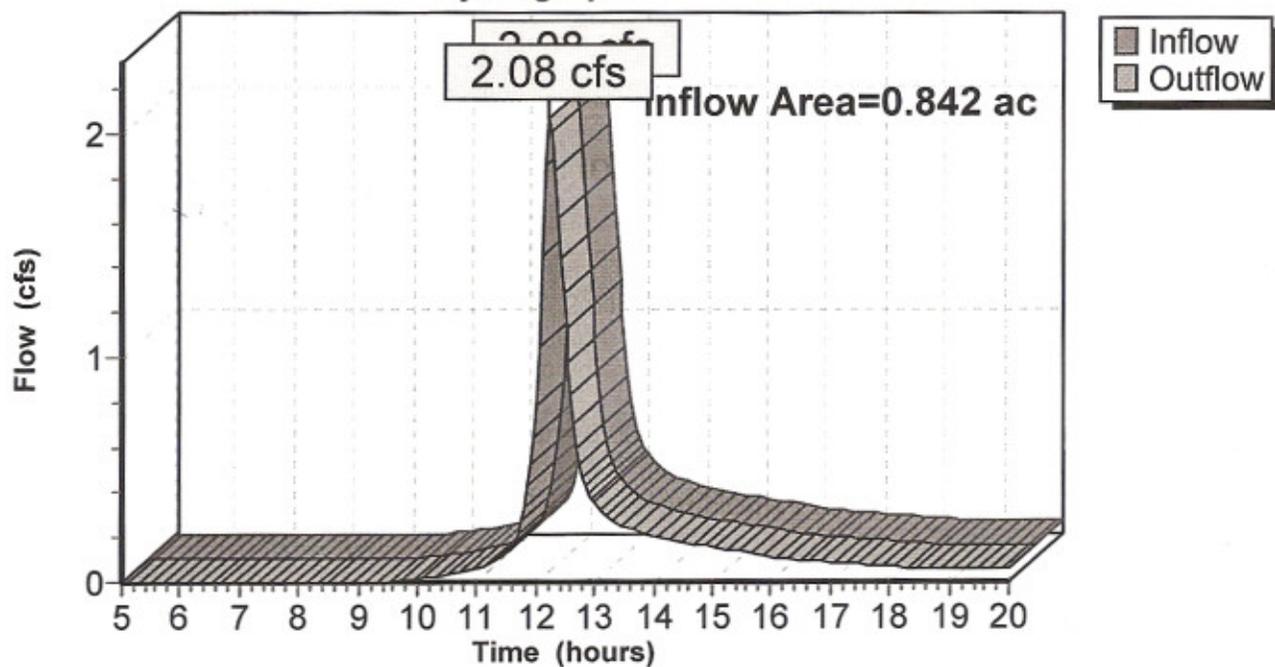
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.842 ac, Inflow Depth = 2.61" for 100-yr event
Inflow = 2.08 cfs @ 12.22 hrs, Volume= 0.183 af
Outflow = 2.08 cfs @ 12.22 hrs, Volume= 0.183 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach DP: (Design Point Flow)

Hydrograph





(Proposed Site) (Design Point Flow)



Drainage Diagram for Post-Development
Prepared by Merrimack Engineering Services 10/22/2012
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Post-Development

Type III 24-hr 100-yr Rainfall=6.40"

Prepared by Merrimack Engineering Services

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10/22/2012

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PS: (Proposed Site)

Runoff Area=29,230 sf Runoff Depth=2.26"

Flow Length=308' Tc=6.7 min CN=63 Runoff=1.82 cfs 0.126 af

Reach DP: (Design Point Flow)

Inflow=1.82 cfs 0.126 af

Outflow=1.82 cfs 0.126 af

Total Runoff Area = 0.671 ac Runoff Volume = 0.126 af Average Runoff Depth = 2.26"

Post-Development

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Type III 24-hr 100-yr Rainfall=6.40"

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Subcatchment PS: (Proposed Site)

Runoff = 1.82 cfs @ 12.11 hrs, Volume= 0.126 af, Depth= 2.26"

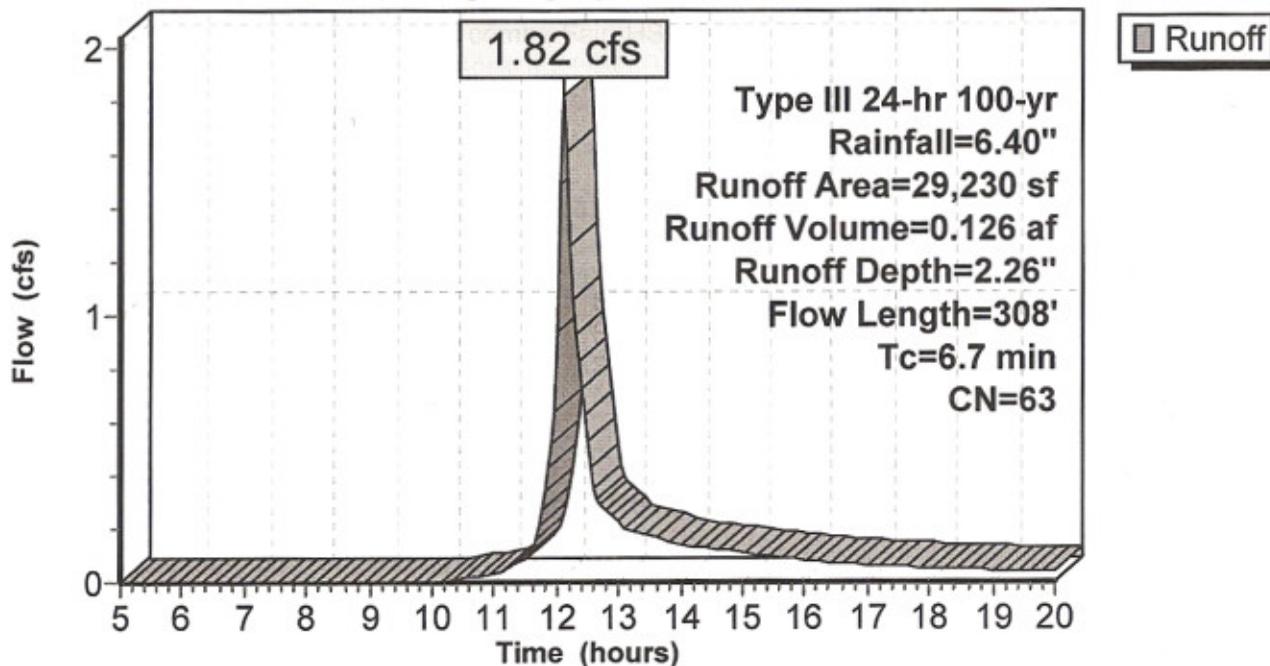
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-yr Rainfall=6.40"

Area (sf)	CN	Description
2,504	98	Existing Driveway, 2-car garage, concrete walkways
4,570	65	Woods/grass comb., Fair, HSG B
22,156	58	Meadow, non-grazed, HSG B
29,230	63	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.7	50	0.0324	0.2		Sheet Flow, Flow south Grass: Short n= 0.150 P2= 3.10"
1.3	100	0.0324	1.3		Shallow Concentrated Flow, Flow south Short Grass Pasture Kv= 7.0 fps
0.7	158	0.0324	3.7		Shallow Concentrated Flow, Flow south Paved Kv= 20.3 fps
6.7	308	Total			

Subcatchment PS: (Proposed Site)

Hydrograph



Post-Development

Prepared by Merrimack Engineering Services

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Type III 24-hr 100-yr Rainfall=6.40"

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Reach DP: (Design Point Flow)

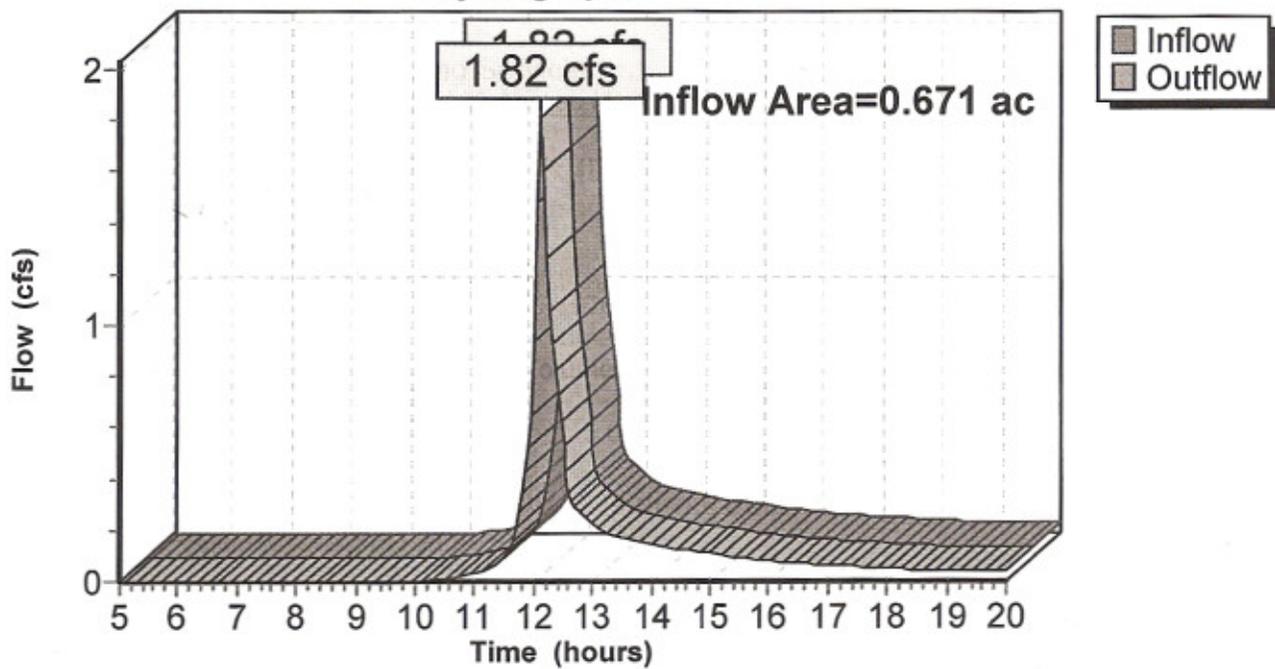
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.671 ac, Inflow Depth = 2.26" for 100-yr event
Inflow = 1.82 cfs @ 12.11 hrs, Volume= 0.126 af
Outflow = 1.82 cfs @ 12.11 hrs, Volume= 0.126 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Reach DP: (Design Point Flow)

Hydrograph



Search

Map Unit Legend

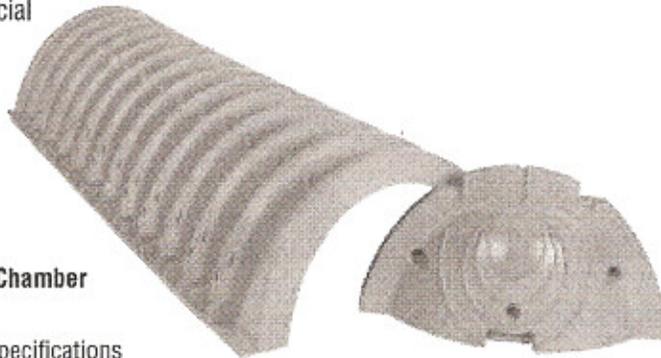
Essex County, Massachusetts, Northern Part (MA605)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
260B	Sudbury fine sandy loam, 3 to 8 percent slopes	0.1	1.8%
420B	Canton fine sandy loam, 3 to 8 percent slopes	2.0	61.6%
421D	Canton fine sandy loam, 15 to 25 percent slopes, very stony	0.7	21.1%
711D	Charlton-Rock outcrop-Hollis complex, 15 to 25 percent slopes	0.5	15.5%
Totals for Area of Interest		3.2	100.0%



StormTech SC-310 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots thus maximizing land usage for commercial and municipal applications.



StormTech SC-310 Chamber

(not to scale)

Nominal Chamber Specifications

Size (L x W x H)

85.4" x 34.0" x 16.0"

(2170 x 864 x 406 mm)

Chamber Storage

14.7 ft³ (0.42 m³)

Minimum Installed Storage*

31.0 ft³ (0.88 m³)

Weight

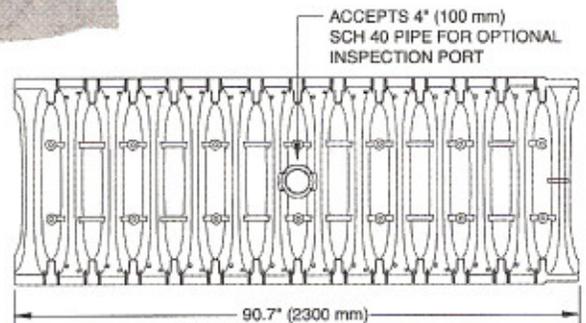
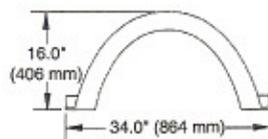
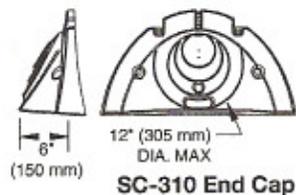
37.0 lbs (16.8 kg)

Shipping

41 chambers/pallet

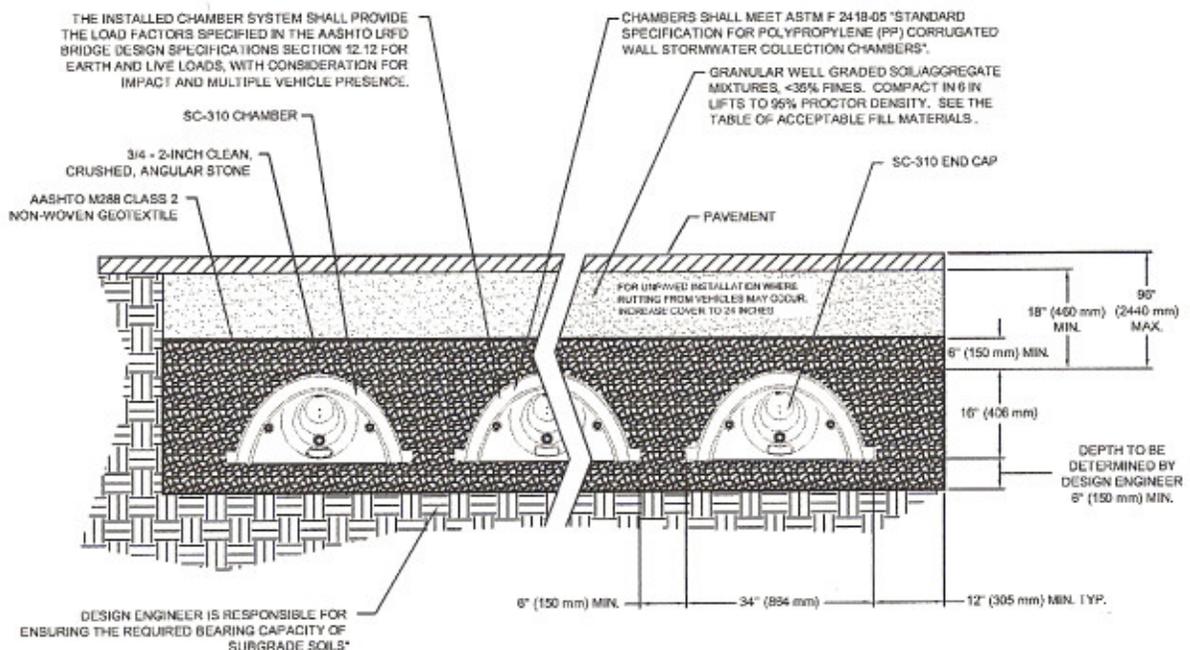
108 end caps/pallet

18 pallets/truck



Typical Cross Section Detail

(not to scale)



THIS CROSS SECTION DETAILS THE REQUIREMENTS NECESSARY TO SATISFY THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12 FOR EARTH AND LIVE LOADS USING STORMTECH CHAMBERS



SC-310 Cumulative Storage Volumes Per Chamber

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (152 mm) Stone Base Under the Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
28 (711)	↑ 14.70 (0.416)	31.00 (0.878)
27 (686)	14.70 (0.416)	30.21 (0.855)
26 (680)	Stone 14.70 (0.416)	29.42 (0.833)
25 (610)	Cover 14.70 (0.416)	28.63 (0.811)
24 (609)	↓ 14.70 (0.416)	27.84 (0.788)
23 (584)	14.70 (0.416)	27.05 (0.766)
22 (559)	14.70 (0.416)	26.26 (0.748)
21 (533)	14.64 (0.415)	25.43 (0.720)
20 (508)	14.49 (0.410)	24.54 (0.695)
19 (483)	14.22 (0.403)	23.58 (0.668)
18 (457)	13.68 (0.387)	22.47 (0.636)
17 (432)	12.99 (0.368)	21.25 (0.602)
16 (406)	12.17 (0.345)	19.97 (0.566)
15 (381)	11.25 (0.319)	18.62 (0.528)
14 (356)	10.23 (0.290)	17.22 (0.488)
13 (330)	9.15 (0.260)	15.78 (0.447)
12 (305)	7.99 (0.227)	14.29 (0.425)
11 (279)	6.78 (0.192)	12.77 (0.362)
10 (254)	5.51 (0.156)	11.22 (0.318)
9 (229)	4.19 (0.119)	9.64 (0.278)
8 (203)	2.83 (0.081)	8.03 (0.227)
7 (178)	1.43 (0.041)	6.40 (0.181)
6 (152)	↑ 0	4.74 (0.134)
5 (127)	0	3.95 (0.112)
4 (102)	Stone Foundation 0	3.16 (0.090)
3 (76)	0	2.37 (0.067)
2 (51)	↓ 0	1.58 (0.046)
1 (25)	0	0.79 (0.022)

Note: Add 0.79 cu. ft. (0.022 m³) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume Per Chamber

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Foundation Depth in. (mm)		
		6 (150)	12 (305)	18 (460)
StormTech SC-310	14.7 (0.4)	31.0 (0.9)	35.7 (1.0)	40.4 (1.1)

Note: Storage volumes are in cubic feet per chamber. Assumes 40% porosity for the stone plus the chamber volume.

Amount of Stone Per Chamber

ENGLISH TONS (CUBIC YARDS)	Stone Foundation Depth		
	6"	12"	18"
StormTech SC-310	2.1 (1.5 yd³)	2.7 (1.9 yd³)	3.4 (2.4 yd³)
METRIC KILOGRAMS (METER³)	150 mm	305 mm	460 mm
StormTech SC-310	1830 (1.1 m³)	2490 (1.5 m³)	2990 (1.8 m³)

Note: Assumes 6" (150 mm) of stone above, and between chambers.

Volume of Excavation Per Chamber

	Stone Foundation Depth		
	6" (150 mm)	12" (305 mm)	18" (460 mm)
StormTech SC-310	2.9 (2.2)	3.4 (2.6)	3.8 (2.9)

Note: Volumes are in cubic yards (cubic meters) per chamber. Assumes 6" (150 mm) of separation between chamber rows and 18" (460 mm) of cover. The volume of excavation will vary as the depth of the cover increases.

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- (A) This Limited Warranty applies solely to the StormTech chambers and endplates manufactured by StormTech and sold to the original purchaser (the "Purchaser"). The chambers and endplates are collectively referred to as the "Products."
- (B) The structural integrity of the Products, when installed strictly in accordance with StormTech's written installation instructions at the time of installation, are warranted to the Purchaser against defective materials and workmanship for one (1) year from the date of purchase. Should a defect appear in the Limited Warranty period, the Purchaser shall provide StormTech with written notice of the alleged defect at StormTech's corporate headquarters within ten (10) days of the discovery of the defect. The notice shall describe the alleged defect in reasonable detail. StormTech agrees to supply replacements for those Products determined by StormTech to be defective and covered by this Limited Warranty. The supply of replacement products is the sole remedy of the Purchaser for breaches of this Limited Warranty. StormTech's liability specifically excludes the cost of removal and/or installation of the Products.
- (C) **THIS LIMITED WARRANTY IS EXCLUSIVE. THERE ARE NO OTHER WARRANTIES WITH RESPECT TO THE PRODUCTS, INCLUDING NO IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.**
- (D) This Limited Warranty only applies to the Products when the Products are installed in a single layer. **UNDER NO CIRCUMSTANCES, SHALL THE PRODUCTS BE INSTALLED IN A MULTI-LAYER CONFIGURATION.**
- (E) No representative of StormTech has the authority to change this Limited Warranty in any manner or to extend this Limited Warranty. This Limited Warranty does not apply to any person other than to the Purchaser.
- (F) Under no circumstances shall StormTech be liable to the Purchaser or to any third party for product liability claims; claims arising from the design, shipment, or installation of the Products, or the cost of other goods or services related to the purchase and installation of the Products. For this Limited Warranty to apply, the Products must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and StormTech's written installation instructions.
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