STORMWATER DRAINAGE REPORT

KEUKA ROAD

PARCEL 3837
CONCORD, MA

February 6, 2020
Rev. 1 November 2, 2020

Prepared for:
KEUKA TRUST
311 GREAT ROAD
LITTLETON, MASSACHUSETTS 01460

Prepared by:
MARKEY & RUBIN, INC.
PO BOX 957
ACTON, MASSACHUSETTS 01720

Keuka Road, Parcel 3837
Stormwater Drainage Report
November 2, 2020

DRAINAGE REPORT

1.1 Introduction

The purpose of these calculations is to ensure that any increase in runoff caused by the paved driveway for this development within the Keuka Road right of way is collected and infiltrated into the existing soils within this lot. By doing this, then when this driveway is built, there is no increase in runoff in the Hosmer Meadow development.

To accomplish this, all runoff from the paved driveway within the Keuka Road right of way up to a 100-year storm event is collected by a catch basin and drained into a cultec chamber.

See calculations attached. The area of paved driveway used in these calculations is only the area of the paved driveway within Keuka Road right of way. Though additional runoff will be collected by this catch basin, as long as the cultec chambers retain the runoff that is generated by the said paved area, any additional runoff can overflow this system and thereby still meeting the design parameters for the Hosmer Meadow development.

1.2 Site Description

Soils are all A-soils – highly pervious with a high water table. From on-site soil tests done for the septic system, the water table is taken as the same – that being 30 inches below natural grade.

1.3 Methods of Calculations

Calculations are based upon standard methodologies set forth in U.S. Soil Conservation Service TR-55 and TR-20 and performed by *HydroCAD Software*. More specifically, the rainfall is based upon a design storm in 24 hours, and a Type III Rainfall. The size of storm is as follows:

Storm Event	24-hr Precipitation
100-yr	6.6”

1.4 Runoff Results

The calculations show that the cultec chamber will hold more than the equivalent volume of runoff for a 100-year storm event from the paved area of proposed driveway within the Keuka Road right of way.

1.5 Conclusion

This is a conservative calculation to ensure no increase in runoff within the Keuka Road right-of-way when building the driveway to this lot off Keuka Road.

APPENDIX 1
NRCS SOIL MAP

Map Scale: 1:2,180 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 30 60 120 180

Feet
0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

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

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

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

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

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 16, Sep 14, 2016

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

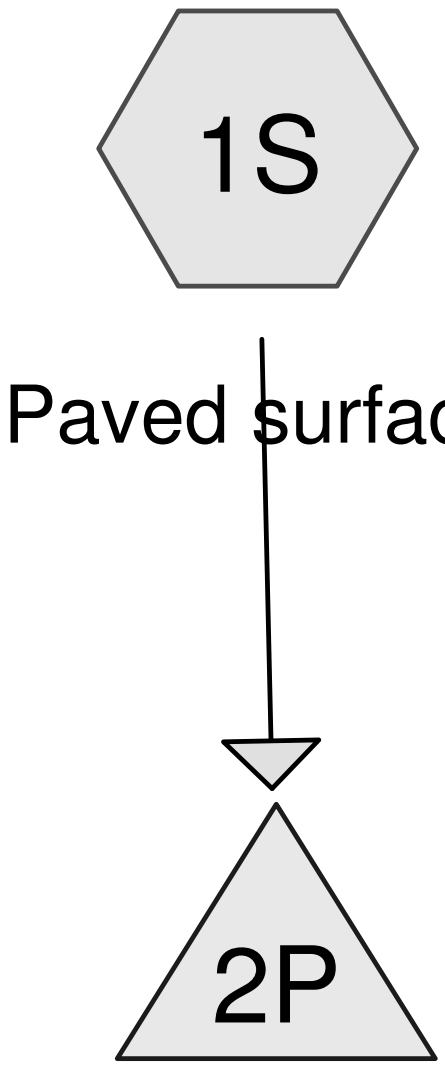
Date(s) aerial images were photographed: Sep 12, 2014—Sep 28, 2014

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

Map Unit Legend

Middlesex County, Massachusetts (MA017)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
51A	Swansea muck, 0 to 1 percent slopes	13.3	57.5%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	9.8	42.5%
Totals for Area of Interest		**23.1**	**100.0%**

APPENDIX 2
DRAINAGE CALCULATIONS



Subcat Reach Pond Link

Routing Diagram for 5004 Drainage
Prepared by Markey & Rubin, Inc., Printed 11/3/2020

Summary for Subcatchment 1S: Paved surface

Runoff = 0.02 cfs @ 12.08 hrs, Volume= 0.002 af, Depth= 6.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=6.60"

	Area (sf)	CN	Description
*	142	98	Paved surface
	142		100.00% Impervious Area

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

Summary for Pond 2P: Cultec Chamber

Inflow Area = 0.003 ac,100.00% Impervious, Inflow Depth = 6.36" for 100 yr event
Inflow = 0.02 cfs @ 12.08 hrs, Volume= 0.002 af
Outflow = 0.01 cfs @ 11.96 hrs, Volume= 0.002 af, Atten= 55%, Lag= 0.0 min
Discarded = 0.01 cfs @ 11.96 hrs, Volume= 0.002 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 131.02' @ 12.25 hrs Surf.Area= 0.001 ac Storage= 0.000 af

Plug-Flow detention time= 2.7 min calculated for 0.002 af (100% of inflow)
Center-of-Mass det. time= 2.7 min (746.5 - 743.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	130.70'	0.001 af	**5.00'W x 10.00'L x 2.04'H Field A** 0.002 af Overall - 0.000 af Embedded = 0.002 af x 40.0% Voids
#2A	131.20'	0.000 af	**Cultec C-100HD** Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 1 rows
		0.001 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	131.34'	**4.0" Round Culvert** L= 10.0' Ke= 0.500 Inlet / Outlet Invert= 131.34' / 131.24' S= 0.0100 '/' Cc= 0.900 n= 0.600, Flow Area= 0.09 sf
#2	Discarded	130.70'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 11.96 hrs HW=130.72' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=130.70' (Free Discharge)
↑—**1=Culvert** (Controls 0.00 cfs)