Civil Engineering Associates, Inc.

10 Mansfield View Lane
South Burlington, VT 05403
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E-Mail: dmarshall@cea-vt.com

January 3, 2014

Mr. Winslow Ladue, Selectman
Town of Charlotte
PO Box 119
Charlotte, Vermont 05445

Re: Town Hall/Library Green Drainage Study

Dear Mr. Ladue:

Thank you for taking the time with Lane Morrison and Jenny Cole to review the existing conditions and concerns associated with the lawn area located between the Town Hall and the Library.

Background

This area hosts a number of Town events and has performed poorly during recent heavy precipitation events. The intent of this review is to provide recommendations on how to best improve the existing conditions in order to provide an appropriate level of performance for its future use in hosting events.

Existing Conditions

Much of the area between Route 7 and Greenbush Road is comprised of Livingston soil deposits. The Natural Resources Conservation Service (NRSC) description of the soil indicates that these soils are:

> *"….formed in clayey glaciolacustrine deposits on glacial lake plains. They are very deep to bedrock and very poorly drained. These soils have a water table at depths of 0 to 1.0 feet below the surface from Fall through early Summer. Permeability is moderately slow in the surface layer and slow or very slow in the subsoil and substratum."*

The enclosed existing condition plan (Attachment 1) shows the existing lawn area surrounded by the Town Hall, the access drive shared with the Post Office, Ferry Road and the Library. The mapping shows the following features:

- The topographic contours show that the Library sit s up above the lawn area. Surface drainage flows from the library lawn and roof top westerly toward the lawn area.

- Underground power and communications conduit runs from Ferry Road utility pole to the transformer on the west side of the Town Hall building. Our site

review showed that settlement had occurred in a number of places along this route causing localized ponding further evidenced by the presence of distressed vegetation (See Attachments 2 and 3)

- The west side of the lawn is fairly flat

- The lawn area off of the northeast corner of the Town Hall building is poorly drained due to a lack of available pitch to direct surface water from the area.

The "heavy" nature of the soils and their relatively high water table precludes the ability to vertically drain surface water into the underlying soils. These limitations require that surface and ground water management relay heavily upon proper slope to allow water to flow by gravity from the site. When area and slope are not readily available, more proactive measures are often necessary to achieve proper drainage.

Proposed Improvements

When designing new outdoor grass surfaced activity areas, we traditionally strive to divert water away from the facility and what water does fall from the sky we look to get it off the surface as quickly as possible.

Working off these basic tenets, the recommended improvements to upgrade the performance of the Town Green area are outlined below in order of simplicity (and cost):

- Surface Correction – The localized ponding associated with the settlement of the subsurface power conduit installation should be eliminated through the placement of screened topsoil in a manner that re-establishes the east to west drainage pattern. There is a 50/50 chance that the growing conditions would be suitable to establish a sturdy stand of grass prior to the Town Party in early July. If this work is executed this Sprng, It is still likely that some of these areas will need to be repaired following the event.

  The estimated cost for putting these improvements in place is approximately $1,400 at current commercial rates (See Attachment 8). Volunteer efforts would help reduce this cost.

- Surface Protection – The main lawn area receives runoff from Ferry Road and the Library. To minimize the amount of water getting to the lawn event surface, we would typically recommend that the use of grass lined swales to intercept and direct the surface water to a low point on the property away from the activity area.

  As the existing lawn area is fairly flat in the north-south direction, we are recommending the use of a curtain drain (See Attachment 4).
  - A curtain drain is an excavated trench where a perforated pipe is installed

at the bottom and is backfilled with free draining stone (See Attachment 5).
  - The stone is brought to the surface as a means of providing a continuous linear means of intercepting sheet flows.
  - The term “curtain” is used as it also intercepts ground water from flowing toward the event site.
  - The use of a smooth walled pipe allows water to be conveyed in a much more efficient manner to the point of discharge.
  - The amount of stone exposed at the surface can often be minimized by extending topsoil over the top of the stone trench (not shown on Attachment 5).

The estimated cost for completing this work is $7,600.

- Proper Surface Drainage – As the native soils are “heavy” and preclude ready vertical infiltration of water, the ability to evacuate surface water is critical to minimizing the saturation of the surface.

  In addition to the perimeter drainage improvements outlined in the “Surface Protection” section above, we would also implement a regrading of the site to provide a minimum slope of 2% (1/4 inch per foot).

  Rather than regarding through excavating and filling, the most straight forward means of achieving the desired slope would be to bring in new topsoil. We would recommend that a sandy loam topsoil be used as it would provide the benefit of also enabling some vertical drainage to occur.

  The limits of the proposed fill placement for the regrading to achieve the minimum 2% cross slope is depicted on Attachment 7.

  The approximate cost for completing this work is $8,700.

Associated Issues

Flow Length - Typically for grass surface facilities, we prefer to keep the maximum length a drop of water needs to travel to no more than 100 feet. The 2% slope option plan (Attachment 7) shows a travel distance of 120 feet. We did review the opportunity of increasing the slope to introduce a “crown” or high point to reduce the flow length but found that the scope of work nearly doubled. Based on the limited number of times that the facility is used, we did not believe that this ha a suitable return on investment for the limited benefits.

Town Monument – The Town Monument Committee has recommended the placement of the war memorial on the north side of the Town Hall building. We would recommend that the limits of the drainage improvements near the Town Hall building be reviewed

and coordinated in more detail so that the timing and success of the monument placement and enjoyment can be maximized.

Permitting

- WATER QUALITY - The State of Vermont regulates soil disturbance activities that exceed one acre in scope. Even if all three of the recommended improvements were constructed, the limits of disturbance do not exceed this threshold.
- WETLANDS – The ditch along the west side of the lawn is considered to be a significant wetland regulated under the State's Wetlands Rules. Activities related to this facility which are exempt from further regulation include:
    - "The mowing of existing lawns, the placement of barbecue pits, sand boxes, bird houses, and other similar activities incidental to ordinary residential use within a buffer zone".

  Any activity beyond normal use or maintenance, requires the application for and issuance of a Wetland Permit from the State. We have been advised that the State will positively entertain and application that creates limited filling.

This completes our summary of the observations and recommendations at it relates to enhancing the performance of the Town Green under wet conditions. If you should have any questions, please feel free to contact me at 864-2323 x320.

Respectfully,

David S. Marshall

David S,. Marshall, P.E.

Attachments

1 – Existing Conditions Plan of Area
2 – Existing Conditions Photo of Lawn
3 – Existing Conditions Photo of Lawn with Power Trench Highlighted
4 – Proposed Improvements Plan (Items 1 and 2)
5 – Curtain Drain Typical Detail
6 – Photo of Lawn Area with Curtain Drain
7 – Proposed Improvements Plan (Item 3 – Recontouring)
8 – Estimate of Probable Construction Costs

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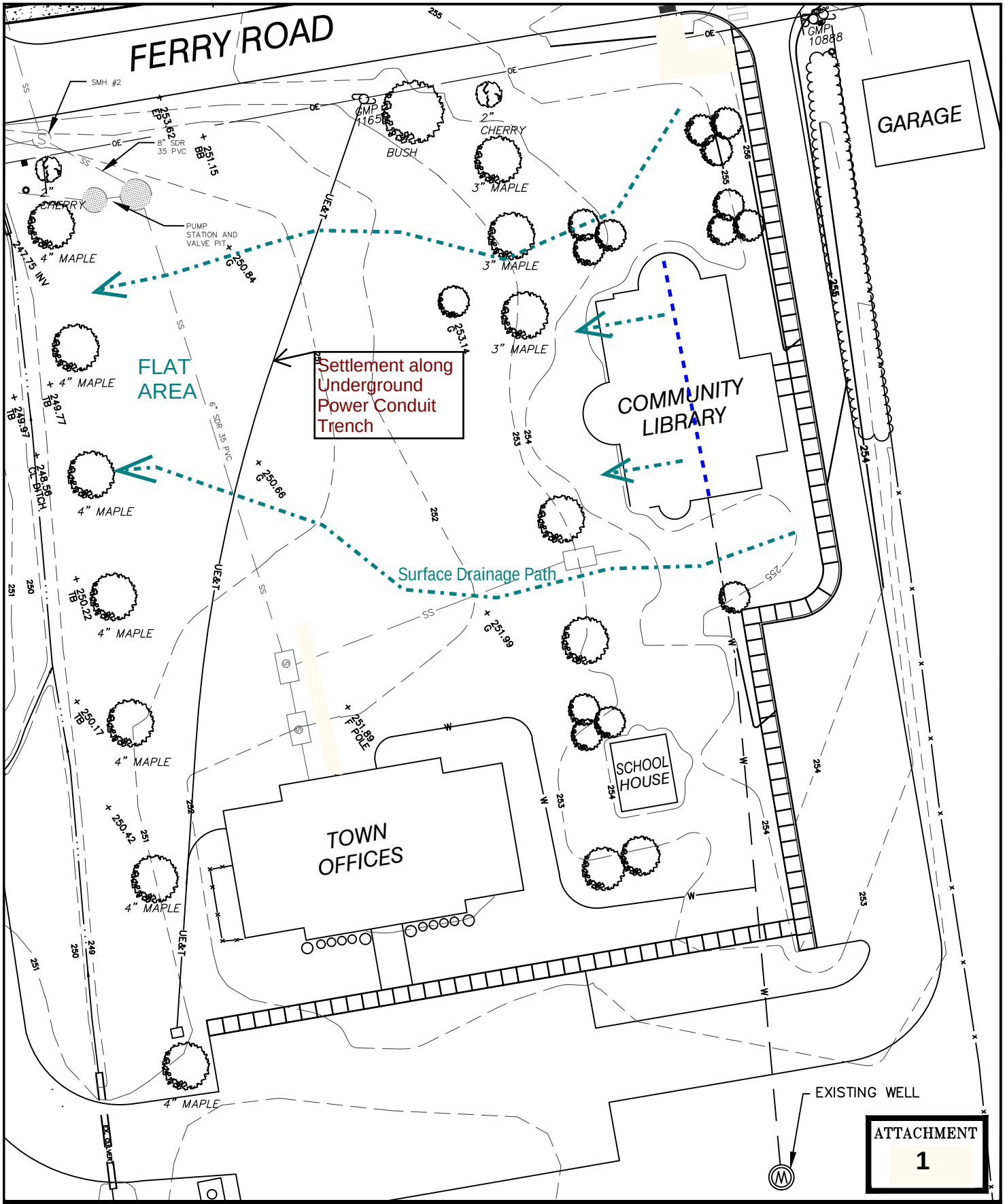
Cc: Jenny Cole (w/enclosures)



ATTACHMENT 1

CIVIL ENGINEERING ASSOCIATES, INC.
10 MANSFIELD VIEW LN., SO. BURLINGTON, VT 05403
802-864-2323 FAX: 802-864-2271

Scale: 1" = 40'
Drawn by ACL
Date Jan 3, 2014
Checked by DSM

EXISTING CONDITIONS AT TOWN OFFICES & LIBRARY

CHARLOTTE VERMONT

Project No. -

DRAWING NUMBER C1


LAWN AREA WITHOUT POWER TRENCH HIGHLIGHTED
ATTACHMENT
2
Google earth
© 2014 Google
Report a problem


LAWN AREA WITH POWER TRENCH SHOWN
ATTACHMENT
3
Google earth
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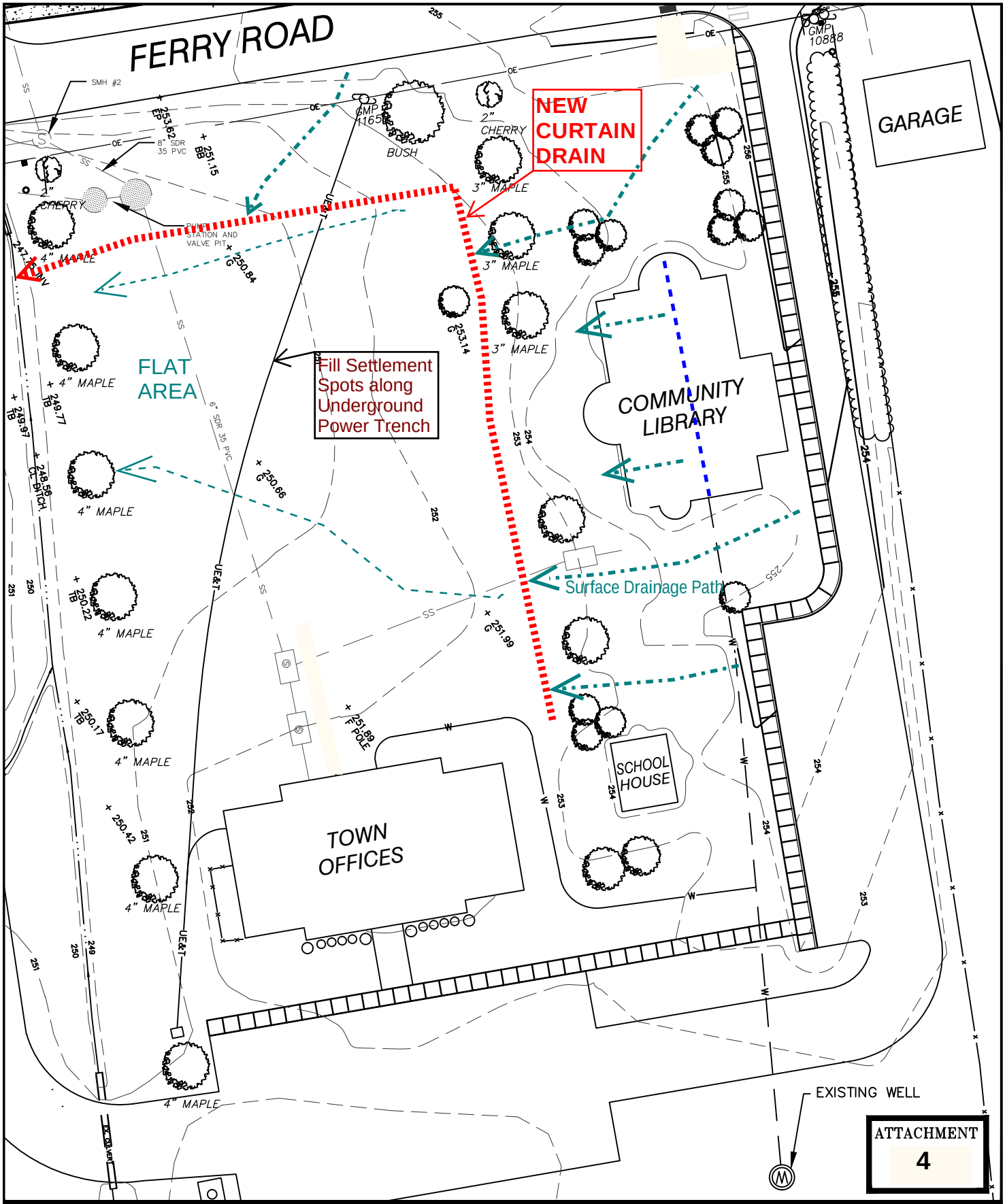
Report a problem



ATTACHMENT 4

CIVIL ENGINEERING ASSOCIATES, INC.
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802-864-2323 FAX: 802-864-2271

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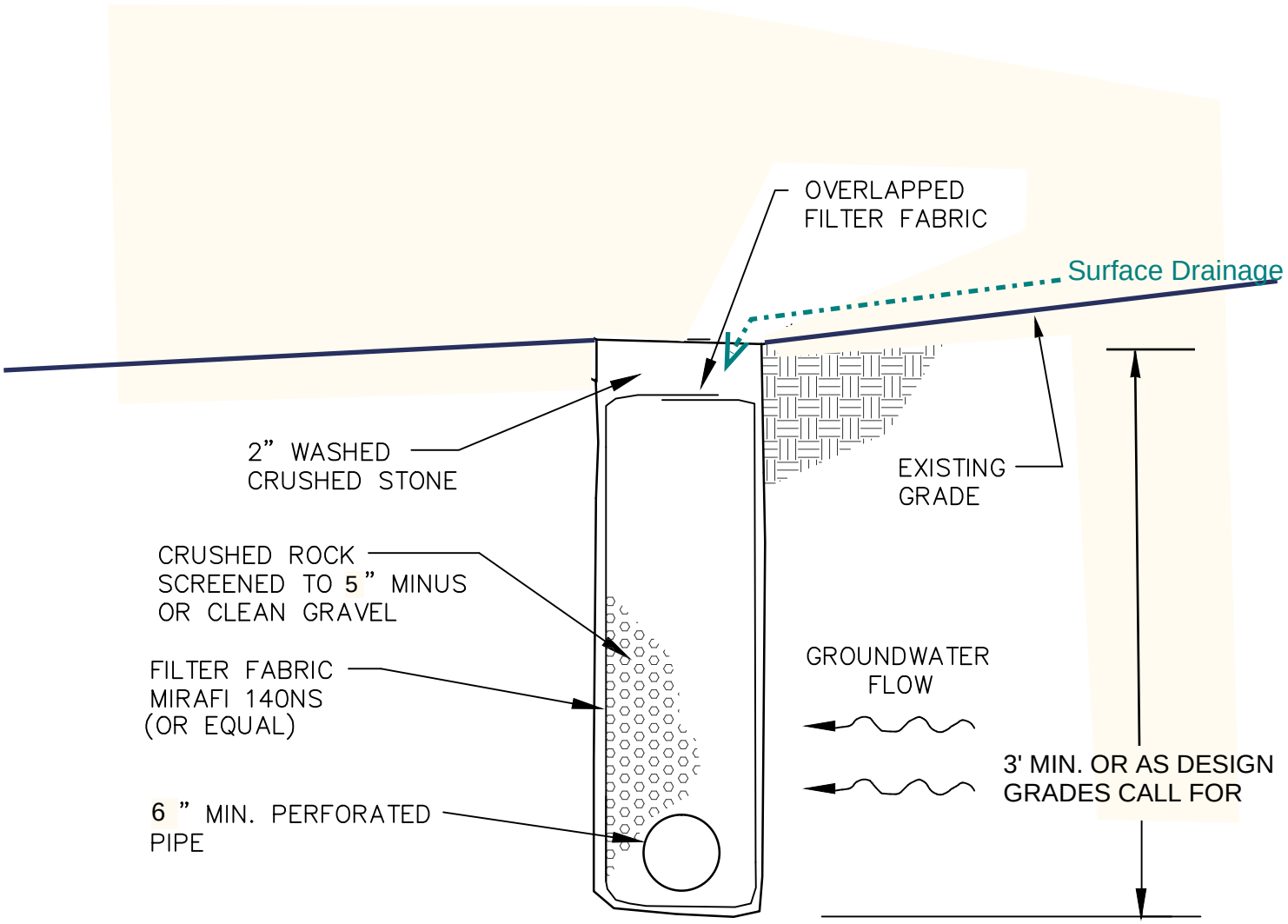
PHASE I DRAINAGE IMPROVEMENTS

TOWN OFFICES & LIBRARY

CHARLOTTE VERMONT

Project No. -

DRAWING NUMBER C1



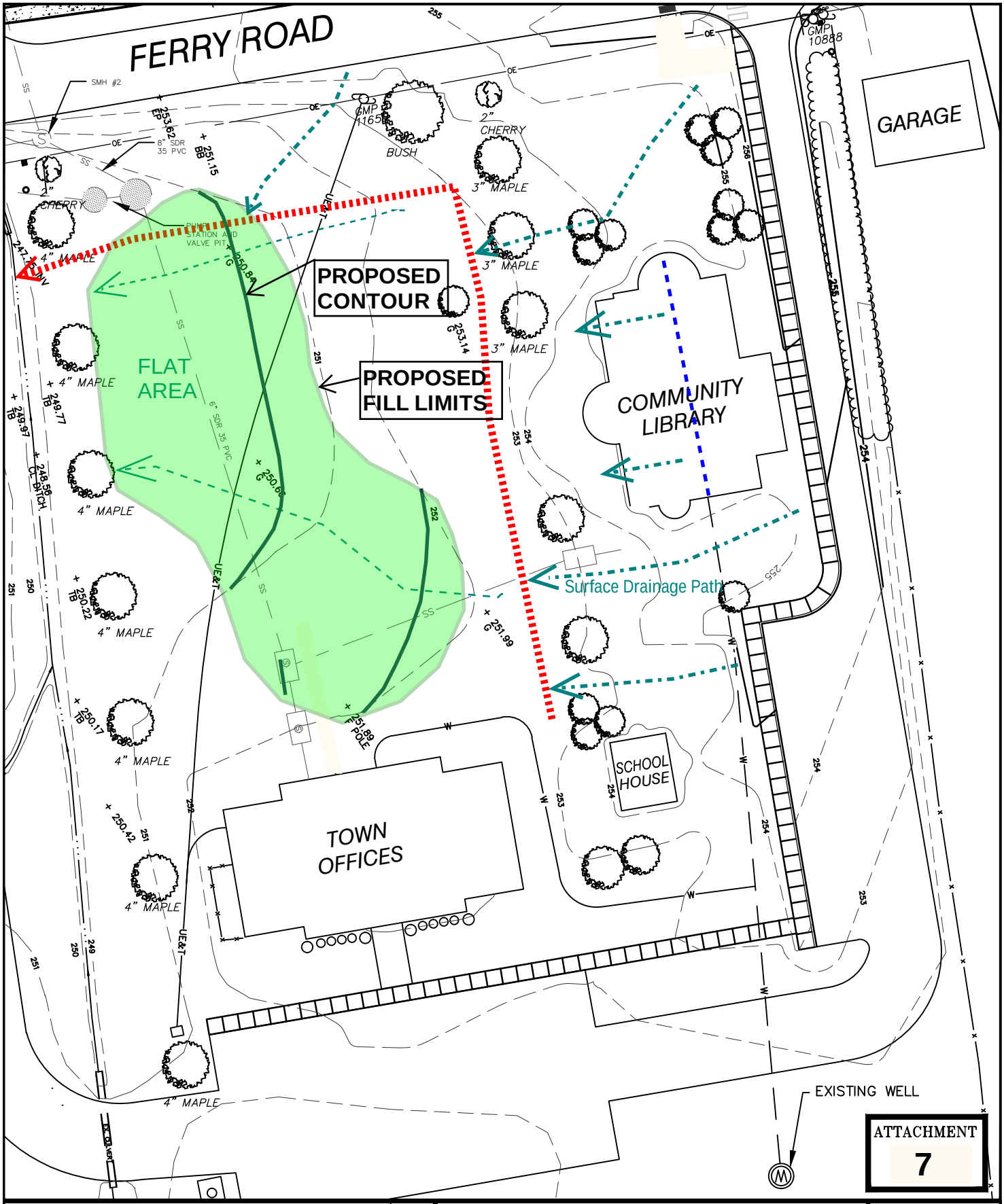
CURTAIN DRAIN INTERCEPTOR

N.T.S.

ATTACHMENT

5


PROPOSED CURTAIN DRAIN INSTALLATION
ATTACHMENT
6
Google earth
© 2014 Google
Report a problem



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MINIMUM 2%SLOPE IMPROVEMENTS

TOWN OFFICES & LIBRARY

CHARLOTTE VERMONT

Project No. -

DRAWING NUMBER C1

CHARLOTTE TOWN LAWN

DRAINAGE IMPROVEMENTS

ESTIMATE OF PROBABLE CONSTRUCTION COST

January 3, 2014

No.	Description	Qty	Unit		Unit Cost		Cost
Fill Low Points							
1	Screened Topsoil	9	CY	x	$30.00	=	$278
2	Place, Seed & Mulch	111	SY	x	$10.00	=	$1,111
							$1,389
Curtian Drain Installation							
3	Install Curtain Drain	305	LF	x	$15.00	=	$4,575
4	Haul Away Excav Material	113	CY	x	$8.00	=	$904
5	Restore Disturbed Areas	847	SY	x	$2.50	=	$2,118
							$7,597
Recontour Lawn Area							
6	Screened Topsoil	103	CY	x	$30.00	=	$3,100
7	Place, Seed & Mulch	1240	SY	x	$4.50	=	$5,580
							$8,680
					Subtotal		$17,666
10%	Contingency						*$1,767*
					Rounded Total		$19,400

ATTACHMENT

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