

BARRE CITY/BARRE TOWN

QUARRY STREET

MEGC M 6000(11)

Barre City/Barre Town,
Vermont

Prepared for **City of Barre**
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P.O. Box 418
Barre, Vermont 05641

Town of Barre
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Websterville, VT 05678-0116

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November 28, 2017

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1.0 Introduction

On behalf of the Vermont Agency of Transportation (VTrans), VHB has prepared this application package and narrative to describe the regulatory framework and obligations for stormwater management associated with the reconstruction, rehabilitation and widening of an approximately 0.32 mile long section of Quarry Street in Barre City and Barre Town, Vermont (the "Project").

This application is for a State Stormwater Discharge Permit Pursuant to the General Permit 3-9015 due to an expansion and redevelopment of impervious when existing site impervious exceeds one acre. The Project is a Public Transportation Project as defined in the 2017 Vermont Stormwater Management Manual (VSMM) and is classified as Redevelopment with Expansion per Subchapter 6.1.2 as there is a small net increase in impervious in the site area.

2.0 Project Description

This Project Quarry Street, Barre City and Barre Town MEGC M 6000(11)] consists of a minor roadway realignment of Quarry Street , realignment of the intersection with VT 14 (South Main St), widening of the roadway, new pavement at a railroad crossing, new drainage infrastructure, traffic signals, minor reconstruction on VT 14 (South Main St), a stormwater treatment facility and other highway related items, which results in the redevelopment and expansion of impervious in the Project site area. Land use in the Project site area is exclusively transportation and adjacent land uses include residential, commercial, and quarry.

The Project is located at the Barre City/Barre Town line. While the treatment practice is entirely located within Barre City, portions of the work proposed will occur in Barre Town and the treatment practice will receive runoff from both municipalities. As a result, both municipalities have been listed as applicants for this authorization. Of the 3.00 acres of jurisdictional impervious associated with the Project, 2.51 acres is within Barre City and 0.49 acres is within Barre Town. Of the 0.86 acres of total impervious draining to the treatment practice, 0.46 acres is within Barre City and 0.40 is within Barre Town. An impervious areas map has been attached to the end of this narrative depicting these areas. A draft agreement has been prepared between the municipalities and each municipality will continue to own, operate, and maintain the infrastructure within their respective boundaries. Barre City will be billed for the annual operating fees.

3.0 Existing Conditions

Existing Topography, Land Cover, Hydrology, and Soils

The Project is located in a rural area. The land use adjacent to the Quarry St site area is commercial at the intersection of VT 14, transitioning to residential in the direction of Barre Town, and includes a quarry. The western end of the site slopes west towards the intersection of VT 14 and the existing road is crowned in some areas and allowed to sheet flow off into the adjacent grass. Along the south side of the road is an embankment where runoff currently flows to the north. Catch basins collect excess flow at existing intersections along the roadway. There are 2.65 acres of existing impervious within the site area.

The NRCS web soil survey indicates that soils in the Project area can be broken into four primary types. The first is Adams loamy fine sand, 15 to 25 percent slopes, and Hydrologic Soil Group (“HSG”) A. Adams loamy fine sand with 25 to 60 percent slopes and HSG A was also found in the project area. The third soil type located is Salmon very fine sandy loam with 15 – 25 percent slopes and HSG B. The final soil type present is Salmon – Adamant Complex with 8 – 15 percent slopes, very rocky and a HSG B. A soils report and map have been included at the end of this attachment.

Existing Stormwater Systems

Stormwater runoff receives little treatment under existing conditions. Runoff from the site area currently either sheet flows into a grassed area north of Quarry Street or is collected in the catch basin network. The catch basin network continues North out of the site towards Barre and to the eventual discharge point, Stevens Branch. A location map has been included at the end of this attachment with the discharge point indicated.

4.0 Proposed Stormwater Management System

Compliance with the 2017 Vermont Stormwater Management Manual

The Project is categorized as a Public Transportation Project under Chapter 6.0 of the 2017 VSMM and is classified as Redevelopment with Expansion, see Attachment 2 for verification. As indicated above, there are 2.65 acres of existing impervious in the site area. As a result of the Project, there will be 0.68 acres of expanded impervious surface, 1.10 acres of redeveloped impervious surface, and 1.22 acres existing impervious surface to remain, for a total resulting impervious surface of 3.00 acres. This equates to a net increase in impervious surface of 0.35 acres. As the net increase in impervious surface is less than one acre, only the Post-Construction Soil Depth and Quality and Water Quality Treatment Standards are applicable to the Project per Subchapter 6.1.2 of the 2017 VSMM.

The receiving water for the Project is Stevens Branch which is designated as a cold-water fish habitat per Appendix A of the Vermont Water Quality Standards. The Project will include a new drainage collection system with direct discharge to the receiving water via a stabilized outfall.

Post-Construction Soil Depth and Quality Treatment Standard

The Post-Construction Soil Depth and Quality Standard is required for Public Transportation projects and is therefore applicable to this Project. Compliance with this standard is demonstrated by the modification of the sections of the VTrans Standard Specifications as required by subchapter 6.1.3 of the 2017 VSMM and by indicating areas that are subject to the requirement on the plans. In order to facilitate meeting the Soil Depth and Quality Requirements, the various methods of compliance for this standard have been outlined on the plans to allow the Contractor to select their preferred method, in coordination with VTrans.

Water Quality Treatment Standard

Per subchapter 6.1.2 of the 2017 VSMM and the Public Transportation Project Classification Tool workbook, this Project is required to treat 100 percent of the Water Quality Volume (WQv) for the net increase in impervious surface of 0.35 acres. Compliance with this standard is met by a dry swale preceded by a pre-treatment swale with check dams. The dry swale and pre-treatment swale have been sized for 100 percent of the WQv draining to the practice which includes runoff from 0.86 acres of impervious surface.

Channel Protection Standard

Not applicable to the Project per Subchapter 6.1.2 of the 2017 VSMM.

Recharge Standard

Not applicable to the Project per Subchapter 6.1.2 of the 2017 VSMM.

Overbank Flood Protection Standard

Not applicable to the Project per Subchapter 6.1.2 of the 2017 VSMM.

Extreme Flood Protection Standard

Not applicable to the Project per Subchapter 6.1.2 of the 2017 VSMM.

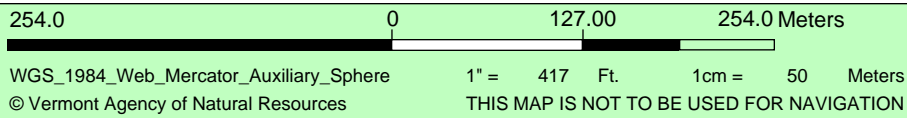


LEGEND

- Town Boundary

1: 5,000
November 29, 2017

NOTES



DISCLAIMER: This map is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. ANR and the State of Vermont make no representations of any kind, including but not limited to, the warranties of merchantability, or fitness for a particular use, nor are any such warranties to be implied with respect to the data on this map.



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

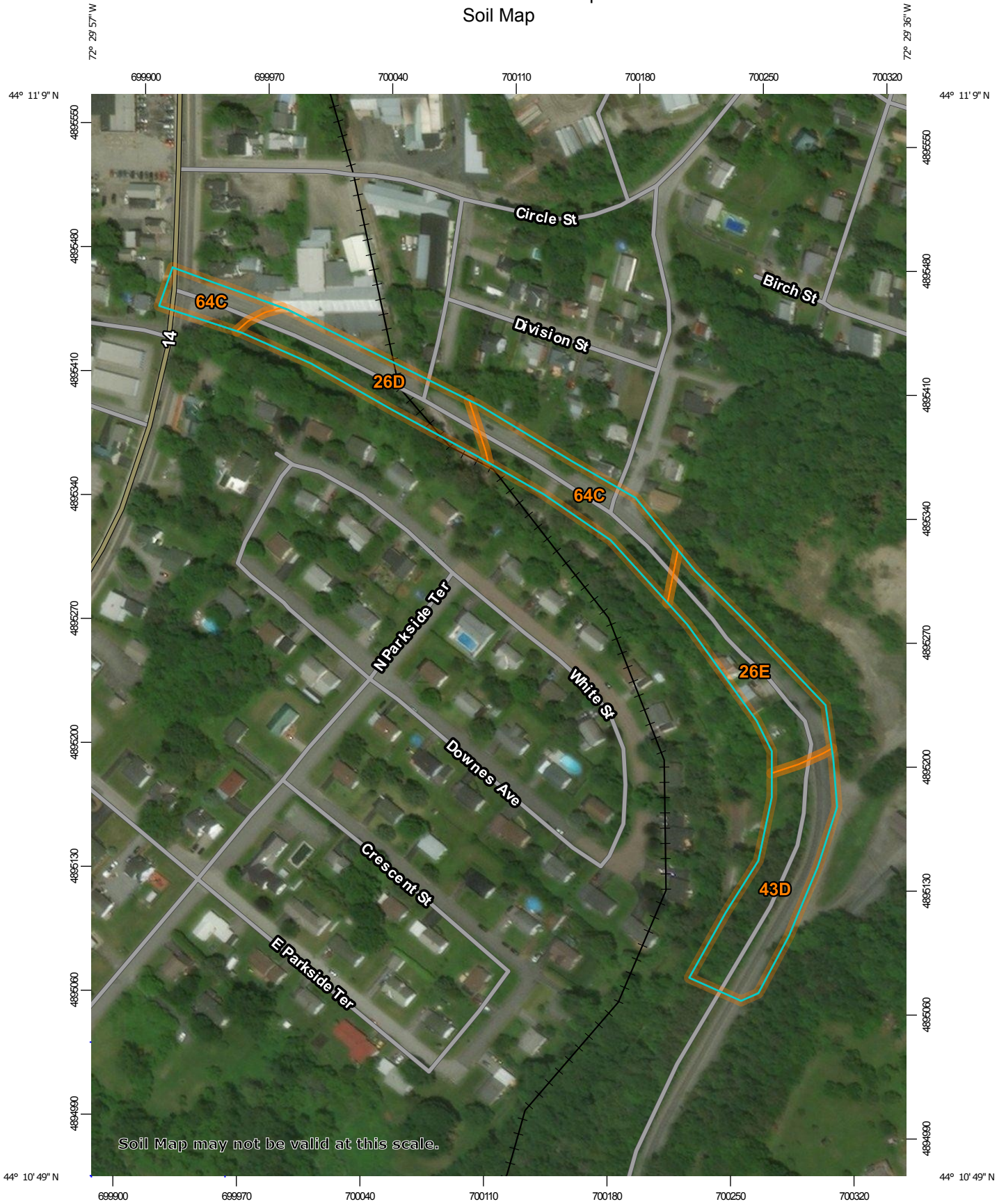
A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Washington County, Vermont**

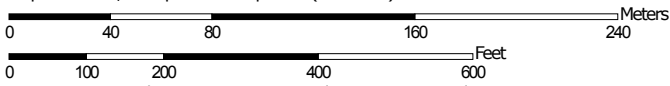
Quarry Street, Barre VT



Custom Soil Resource Report Soil Map



Map Scale: 1:2,980 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N 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 1:20,000.

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: Washington County, Vermont
 Survey Area Data: Version 19, Sep 15, 2016

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

Date(s) aerial images were photographed: Mar 17, 2012—Mar 29, 2017

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

Washington County, Vermont (VT023)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
26D	Adams loamy fine sand, 15 to 25 percent slopes	0.8	19.5%
26E	Adams loamy fine sand, 25 to 60 percent slopes	1.0	23.3%
43D	Salmon very fine sandy loam, 15 to 25 percent slopes	1.3	29.7%
64C	Salmon-Adamant complex, 8 to 15 percent slopes, very rocky	1.2	27.6%
Totals for Area of Interest		4.2	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.



Computations

Project: Barre City-Barre Town M EGC M 6000(11) Project #: 51765.01
 Location: Quarry Street Barre, Vermont Sheet: 1 of 2
 Calculated by: TAS Date: 10/5/17
 Checked by: AGM Date: 10/12/17
 Title: Guelph Permeameter Infiltration Test Results

Test Number/Location: 1

Depth of Test: 48.00 in
 Select Test Method: Single Head
 Reservoirs Used: Combined
 Soil Texture Category: 2
 Soil Texture Coefficient, α^* : 0.040 1/cm
 Well Head Height, H: 5 cm
 Radius of Boring, a: 10.48 cm
 Reservoir Area: 35.22 cm²
 Steady State Water Level Change, R: 0.78 cm/min
 Discharge Rate, Q: 27.46 cm³/min
 Value for Finding C, H/a: 0.48
 C Value: 0.37
 Infiltration Rate, K_{fs} : 0.57 cm/min
 = 13.50 in/hour

Test Data

Time	h (cm)	change (cm)
0:00	0.0	0.0
1:53	3.0	3.0
5:12	6.0	3.0
8:27	8.0	2.0
10:32	10.0	2.0
13:02	12.0	2.0
16:13	14.0	2.0
17:31	15.0	1.0

Category	Soil Type	α^*
1	Compacted clays (e.g. clay liners)	0.010
2	Unstructured fine textured soils and fine sands	0.040
3	Most structured soils and medium sands	0.120
4	Coarse sands and highly structured soils	0.360

C Value Calcs	
C0.010	0.3648887
C0.040	0.3712613
C0.120	0.3249867
C0.360	0.3249867



Computations

Project: Barre City-Barre Town M EGC M 6000(11) Project #: 51765.01
 Location: Quarry Street Barre, Vermont Sheet: 2 of 2
 Calculated by: TAS Date: 10/5/17
 Checked by: AGM Date: 10/12/17
 Title: Guelph Permeameter Infiltration Test Results

Test Number/Location: 2

Depth of Test:	60.00 in
Select Test Method:	Single Head
Reservoirs Used:	Combined
Soil Texture Category:	2
Soil Texture Coefficient, α^* :	0.040 1/cm
Well Head Height, H:	5 cm
Radius of Boring, a:	10.48 cm
Reservoir Area:	35.22 cm ²
Steady State Water Level Change, R:	0.67 cm/min
Discharge Rate, Q:	23.72 cm ³ /min
Value for Finding C, H/a:	0.48
C Value:	0.37
Infiltration Rate, K_{fs} :	0.49 cm/min
=	11.66 in/hour

Test Data

Time	h (cm)	change (cm)
0:00	0.0	0.0
1:45	3.0	3.0
3:45	6.0	3.0
6:25	8.0	2.0
9:10	10.0	2.0
12:35	12.0	2.0
15:45	14.0	2.0

Category	Soil Type	α^*
1	Compacted clays (e.g. clay liners)	0.010
2	Unstructured fine textured soils and fine sands	0.040
3	Most structured soils and medium sands	0.120
4	Coarse sands and highly structured soils	0.360

C Value Calcs	
C0.010	0.3648887
C0.040	0.3712613
C0.120	0.3249867
C0.360	0.3249867

Post-Construction Soil Depth and Quality Requirements

These requirements apply to all disturbed areas within the limits of the site which are not covered by an impervious surface, incorporated into a structural stormwater treatment practice, or engineered as structural fill once development is complete. For this project these areas include all areas which are to be vegetated at completion of the project, excluding slopes steeper than 3:1, the dry swale bottom, and dry swale side slopes. A dense and vigorous vegetative cover shall be established over turf areas. Any areas not described above which are disturbed or compacted during construction shall also be subject to these requirements.

Alternatively to leaving existing topsoil in place without disturbing or compacting it, there are three methods that may be used to satisfy these requirements.

1. Amend Existing Topsoil in Place

- Scarify or till subsoils to 4 inches of depth or to the depth needed to achieve a total depth of 8 inches of uncompacted soil after a calculated amount of amendment is added.
- Amend the soil to meet the organic content requirements. Organic material may be placed at a pre-approved rate of 1 inch with an organic matter content of 40-65% and rototilled into 3 inches of soil or at a calculated rate rototilled into a depth of soil needed to achieve 4 inches of settled soil at 4% organic content.

2. Remove and Stockpile Existing Topsoil During Grading

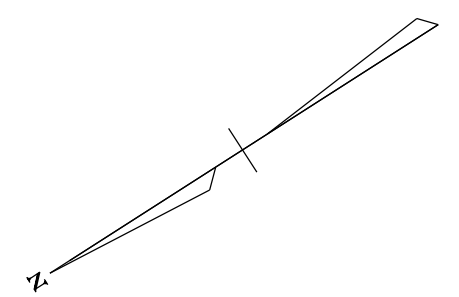
- Topsoil should be stockpiled on site in a controlled area at least 50 feet from surface waters, wetlands, floodplains, or other critical resource areas.
- Scarify or till subgrade to a depth of 4 inches, except for within the drip line of existing trees. The entire surface shall be disturbed by scarification.
- Stockpiled topsoil shall also be amended, if needed, to meet the organic content requirements identified above.
- Replace stockpiled topsoil prior to planting and rake to level, removing any surface rocks larger than 2 inches in diameter.
- Water or roll soils in turf areas to 85% of maximum dry density.

3. Import Topsoil Mix of Sufficient Organic Content and Depth

- Scarify or till subgrade to a depth of 4 inches. Except for within the drip line of existing trees, the entire surface shall be disturbed by scarification.
- Place 4 inches of imported topsoil mix that contains 4% organic matter. Soils used in the mix shall be sand or sandy loam as defined by the USDA.
- Rake to level, removing any surface rocks greater than 2 inches in diameter.
- Water or roll soil in turf areas to 85% of maximum dry density.

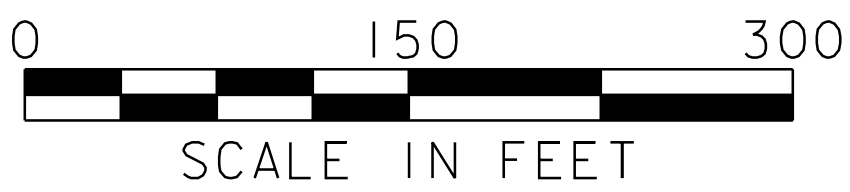
The contractor shall be responsible for preparing and executing a plan for verifying that these areas have met this standard. This plan shall include a minimum of 9 test holes per acre of area subject to this

standard. These test holes shall be excavated to 8 inches using only a shovel driven solely by the weight of the inspector and shall be a minimum of 50 feet apart.



KEY

	SITE PERVIOUS
	EXPANSION OF EXISTING IMPERVIOUS
	REDUCTION OF EXISTING IMPERVIOUS
	REDEVELOPMENT OF IMPERVIOUS
	IMPERVIOUS THAT IS NEITHER EXPANSION OR REDEVELOPMENT



IMPERVIOUS AREAS MAP

PROJECT:	QUARRY STREET	PROJECT NO.:	MEGCM6000(III)>
DESIGN FILE NAME:	Impervious.Areas.AGM.dgn	PLOT DATE:	12/5/2017
SQUAD LEADER:	G. BAKOS	DRAWN BY:	D. PECK
TEXT FILE:		SHEET:	4 OF 4

