ITEM 151.9 STREAMBED RESTORATION LUMP SUM

DESCRIPTION

This work shall consist of removing, stockpiling, and replacing river bed material within the streambed limits and within the bridge cofferdam. The streambed restoration shall replicate the existing natural channel bed outside the work area in terms of material, roughness, shape, profile, and appearance. The ultimate product will, to the extent possible, replicate the function and appearance of the natural stream channel.

The Contractor shall coordinate with his/her sub-contractors to ensure all required equipment is available on-site to complete the work in this manner. The streambed restoration is required to comply with environmental permits issued for the project.

At least 30 days prior to the commencement of construction, the Contractor shall coordinate with the Engineer. At this meeting, the Engineer will provide an overview of the restoration work. The Contractor should be prepared to discuss the anticipated means, methods, and schedule.

Process Approval:

In lieu of a mockup, the Contractor shall schedule an onsite meeting to discuss the streambed restoration with the Engineer. The Contractor shall provide the Engineer adequate access to observe, direct, and inspect the channel restoration work throughout the duration of the removal, stockpile, and reinstallation of the existing streambed material. If material is being brought to the site for streambed restoration, the Contractor shall provide the Engineer with photographs to see the material.

MATERIAL

The top 2 feet of streambed material excavated from the existing streambed shall be removed and stockpiled to facilitate reinstallation and replication of the natural streambed. The excavated streambed material below the top 2 feet shall be stockpiled and reused to fill the voids in the proposed riprap placed below the top streambed restoration layer.

In the event that the excavated material is not suitable or there is not enough available suitable material, additional streambed restoration material shall be locally sourced that matches the composition of the existing native river bed. The following gradation shall be used as a guide. The median grain size (D50) is approximately 7 mm (fine gravel).

Stream Bed Material Gradation

Particle	**Percent (%) Composition**
Gravel	65
Sand	35

The streambed material shall be approved by the Engineer prior to use.

CONSTRUCTION

Channel

The streambed material shall be reinstalled over dumped riprap, as depicted on the plans, to an average thickness of 2.0 feet, with variations in thickness as necessary to replicate existing channel conditions. The initial placement of streambed material shall fill / choke the voids in the underlying riprap. Fill voids by shaking stone with the teeth of an excavator bucket, hand tamping with metal tamping rods, and by spraying water to settle fines between large stones. Plate compactors shall not be used. The purpose of filling the voids is to prevent subsurface flow where surface water disappears into large voids between the stone fill below the channel bed surface during low flow conditions. The final streambed shape and appearance shall be finalized in the field as directed by the Engineer.

Reinstallation of the stockpiled streambed material shall be placed on top of the riprap to restore streambed habitat and fish passage. The streambed materials shall be installed during normal low water conditions behind cofferdams in accordance with the environmental permits.

Completion

Once all material has been placed in the stream channel and approved by the Engineer, the Contractor shall remove the cofferdams in such a way as to slowly wet the stream to minimize the initial sediment pulse. Every attempt shall be made to minimize the downstream movement of sediment.

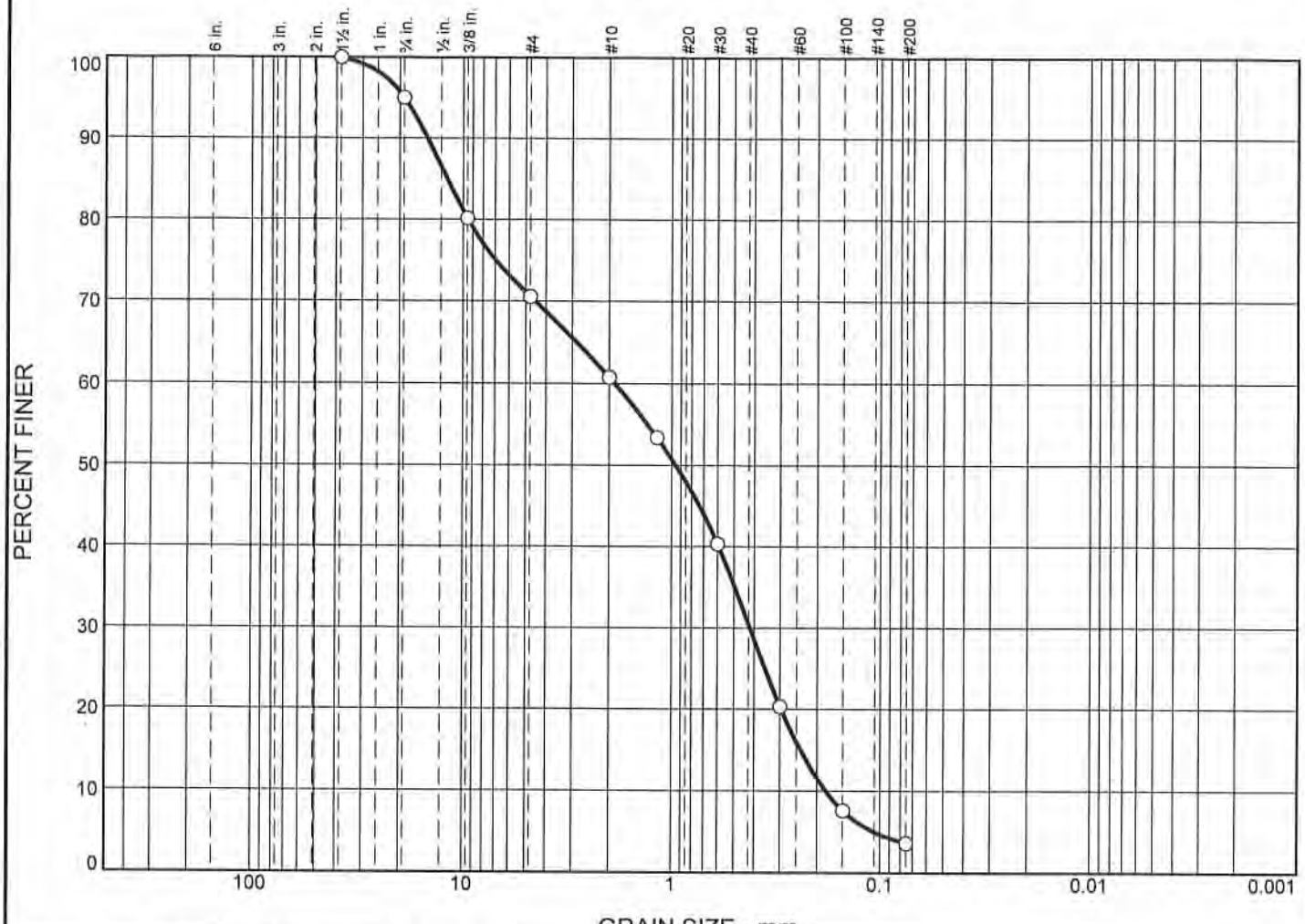
The final streambed shall maintain the general configuration of the existing streambed bedform and there shall be minimal subsurface flow upon final inspection by the Engineer. The project must be passable by fish and other aquatic organisms following construction.

The streambed restoration to be measured for payment will be the complete and accepted work for restoration of the streambed within the limits shown on the Plans as approved by the Engineer.

BASIS OF PAYMENT

The accepted streambed restoration will be paid for on a lump sum basis. Payment will be full compensation for excavating, stockpiling, transporting, and placing the material specified and for furnishing all labor, tools, equipment, testing, and incidentals necessary to complete the work.

Particle Size Distribution Report



	% Boulders	% +3"	% Gravel			% Sand		% Fines
			Coarse	Medium	Fine	Coarse	Fine	
○	0.0	0.0	1.8	18.1	19.3	30.4	26.8	3.6

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	-	-	11.9002	1.8844	0.9540	0.4193	0.2396	0.1814	0.51	10.39

Material Description	USCS	AASHTO
○ FINE TO COARSE SAND, some fine to coarse Gravel, trace Silt	SP	-

Project No. 1801408 **Client:** City of Haverhill

Project: Rosemont Street over the Little River

○ **Source of Sample:** SS1 **Depth:** - **Sample Number:** -

Remarks:

○ As Received WC = 21.3%

GEI Consultants, Inc.
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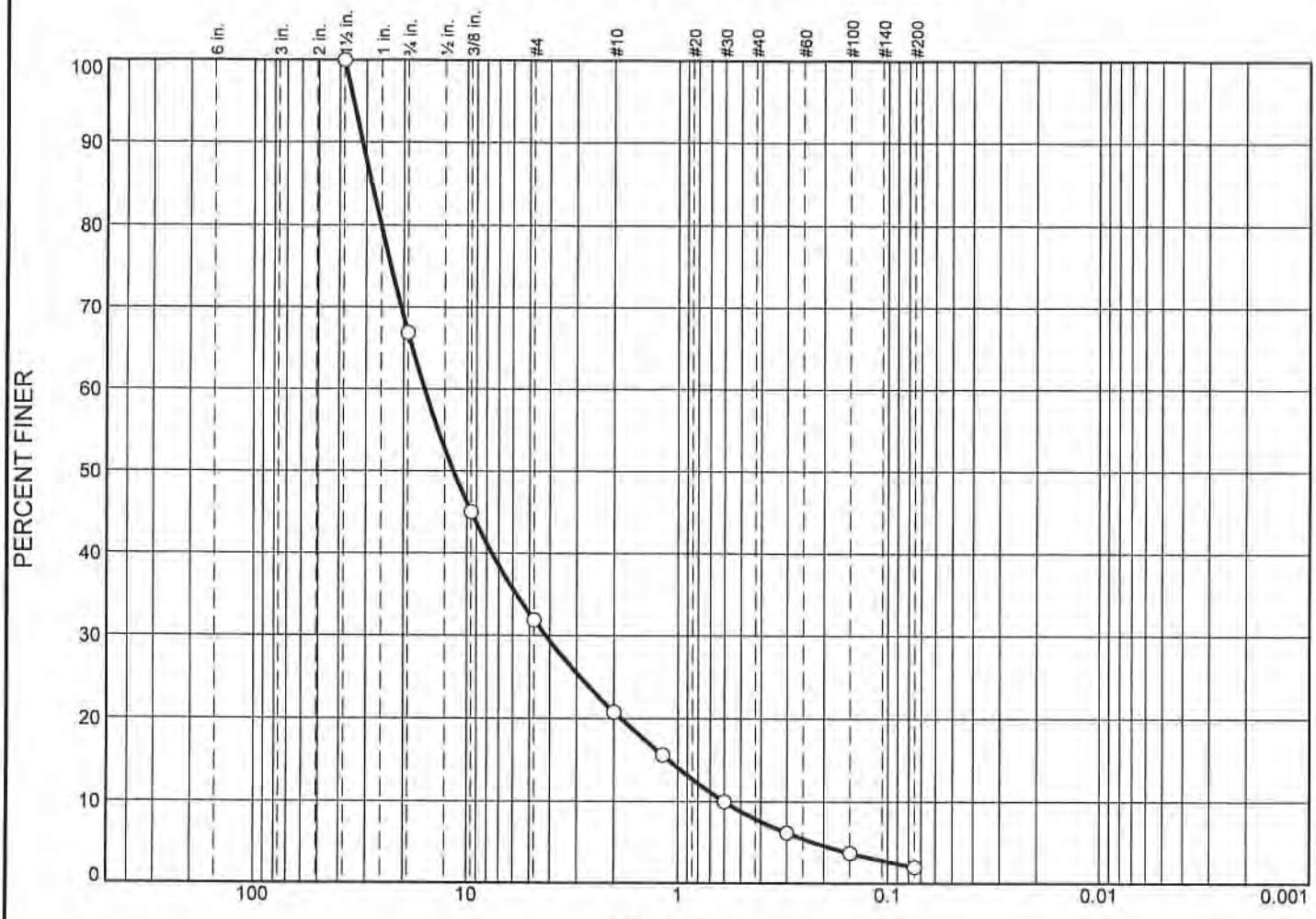
Woburn, MA 01801

GEI Consultants

Figure

Tested By: EF

Particle Size Distribution Report



	% Boulders	% +3"	% Gravel			% Sand		% Fines
			Coarse	Medium	Fine	Coarse	Fine	
○	0.0	0.0	20.3	34.7	24.2	12.9	5.9	2.0

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	-	-	28.3386	15.8985	11.5653	4.1932	1.1043	0.6025	1.84	26.39

Material Description	USCS	AASHTO
○ FINE TO COARSE GRAVEL, some fine to coarse Sand, trace Silt	GW	-

Project No. 1801408 **Client:** City of Haverhill

Project: Rosemont Street over the Little River

○ **Source of Sample:** SS2 **Depth:** - **Sample Number:** -

Remarks:

○ As Received WC = 12.7%

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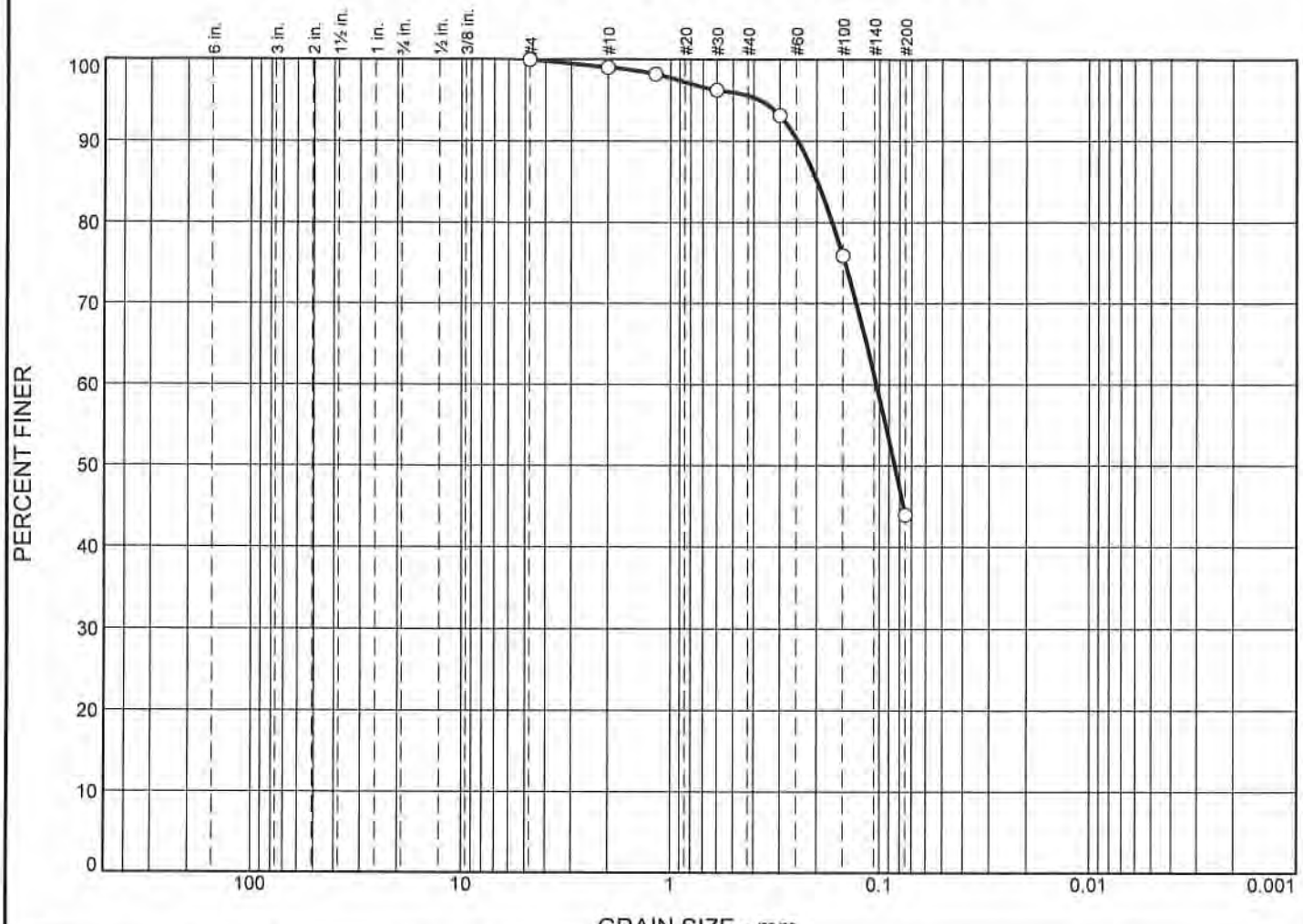
Figure

Tested By: EF

Particle Size Distribution Report



	% Boulders	% +3"	% Gravel			% Sand		% Fines
			Coarse	Medium	Fine	Coarse	Fine	
○	0.0	0.0	0.0	0.0	1.0	3.4	51.6	44.0

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	-	-	0.1985	0.1038	0.0846					

Material Description	USCS	AASHTO
○ FINE SAND, some silt, trace fine gravel	SM	-

Project No. 1801408 **Client:** City of Haverhill

Project: Rosemont Street over the Little River

○ **Source of Sample:** SS3 **Depth:** - **Sample Number:** -

Remarks:

○ As Rec'd WC = 63.9%

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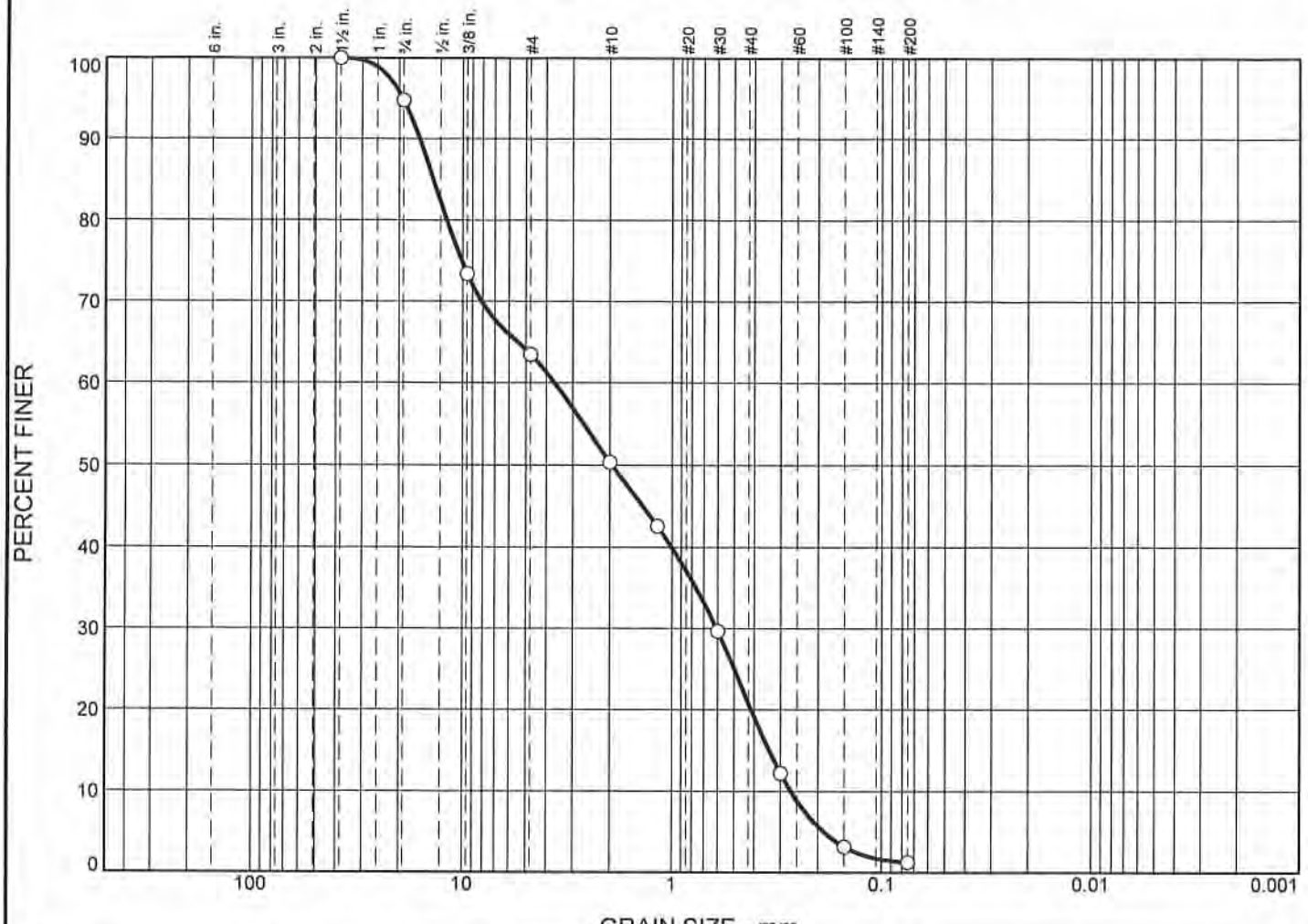
Figure

Tested By: EF

Particle Size Distribution Report



	% Boulders	% +3"	% Gravel			% Sand		% Fines
			Coarse	Medium	Fine	Coarse	Fine	
○	0.0	0.0	1.1	25.5	23.0	29.7	19.5	1.2

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	-	-	13.7484	3.6591	1.9497	0.6081	0.3395	0.2681	0.38	13.65

Material Description	USCS	AASHTO
○ FINE TO COARSE GRAVEL and fine to coarse sand, trace silt	SP	-

Project No. 1801408 **Client:** City of Haverhill

Project: Rosemont Street over the Little River

○ **Source of Sample:** SS4 **Depth:** - **Sample Number:** -

Remarks:

○ As Received WC = 16.6%

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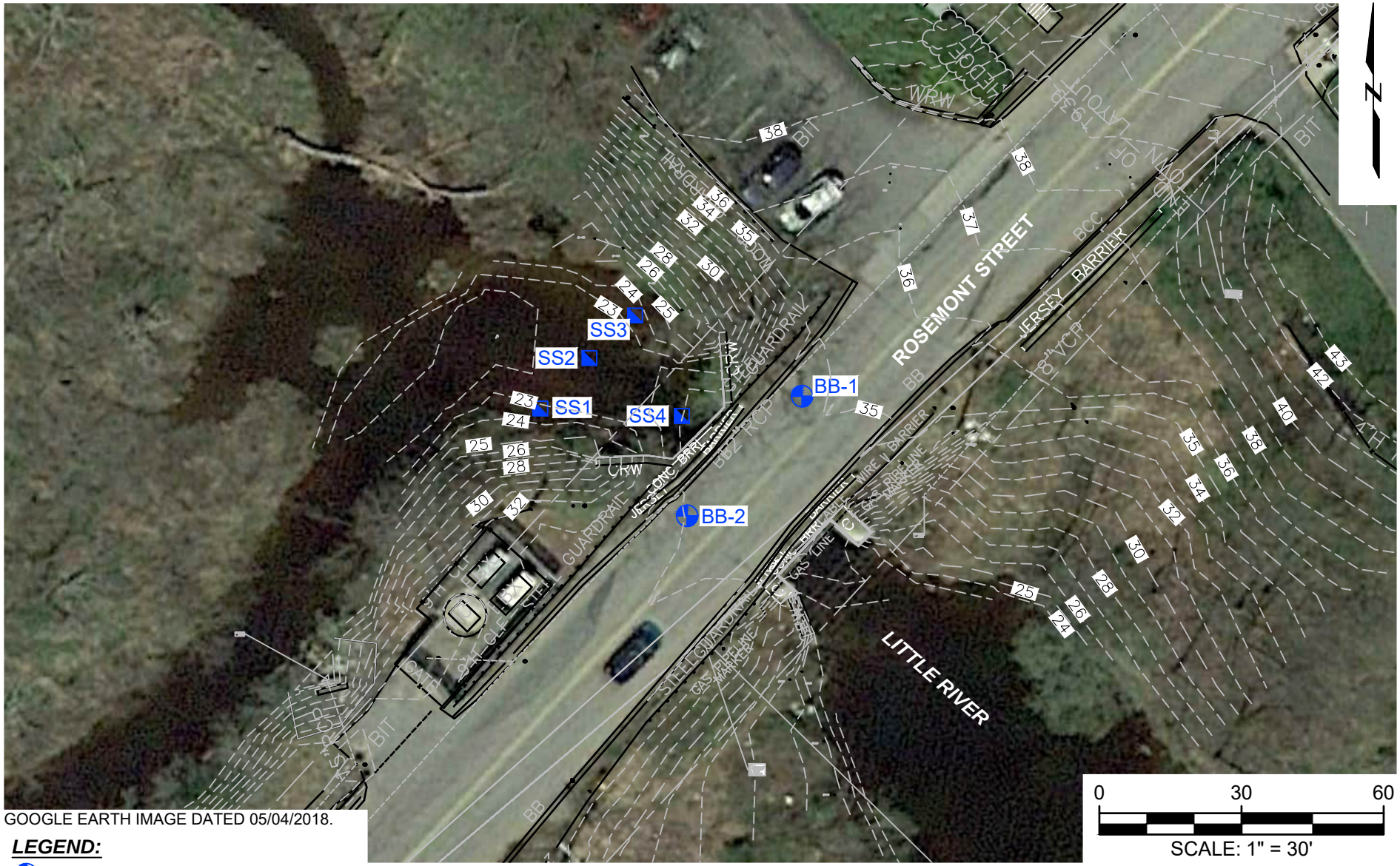
Figure

Tested By: EF



GOOGLE EARTH IMAGE DATED 05/04/2018.

LEGEND:

- BB GEI 2018 SPT BORING
- SS GEI 2019 SEDIMENT SAMPLE

SOURCE:

1. BASE PLAN PROVIDED BY BETA Group on 1/31/2019.

Rosemont Street Bridge Replacement
Rosemont Street Over Little River
Haverhill, Massachusetts

BETA Group, Inc.
Norwood, Massachusetts

GEI Consultants

Project 1801408

EXPLORATION
LOCATION PLAN

February 2019 Fig. 3

\\geiconsulta B:\Working\BETA GROUP\1801408 Rosemont St. Bridge Replacement\00_CAD\Figures\1801408-02 blp.dwg - 2/13/2019