# Appendix P Geotechnical Data Report

# GEOTECHNICAL DATA REPORT

## Rehabilitation of Weston Aqueduct Supply Main 3 MWRA Contract No. 6539

Weston, Waltham, Belmont, Arlington, Somerville, and Medford, Massachusetts

Stantec, Inc.

for the

Massachusetts Water Resources Authority

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## **Acronyms**

bgs below ground surface
BCB Boston City Base
bl/ft blows per foot

CP1 Construction Package 1
CP2 Construction Package 2
CP3 Construction Package 3

El. elevation
CTI CorrTech, Inc.
HA hand auger

HSA hollow stem auger I.D. inside diameter

MWRA Massachusetts Water Resources Authority

N-Value standard penetration resistance

O.D. outside diameter

RQD rock quality designation SPT standard penetration test

Stantec Stantec, Inc.

WASM 3 Weston Aqueduct Supply Main 3



## Section 1

## Introduction

#### 1.1 General

This report summarizes CDM Smith's field exploration and laboratory test program for the Rehabilitation of the Weston Aqueduct Supply Main 3 (WASM 3) Project, MWRA Contract No. 6539, in the Town of Weston, City of Waltham, Town of Belmont, Town of Arlington, City of Somerville, and City of Medford, Massachusetts.

The Massachusetts Water Resources Authority (MWRA) Rehabilitation of WASM 3 Project, MWRA Contract No. 6539, consisted of evaluating the condition of the existing WASM 3 water mains, and providing recommendations for the rehabilitation or replacement of the water mains. This report was completed in conjunction with the hazardous materials and corrosion assessments to characterize subsurface conditions to be used in design. Rehabilitation recommendations will be provided by Stantec, Inc (Stantec), of Boston, MA, under separate cover.

The project site and existing WASM 3 main alignment are illustrated on **Figure 1-1** - Project Locus Plan.

Elevations noted are in feet and referenced to North American Vertical Datum 1988 (NAVD88).

### 1.2 Purpose and Scope

The purpose of the subsurface exploration program was to provide the design team with subsurface information along the existing WASM 3 alignments; including soil boring logs, approximate location of bedrock surface, groundwater levels and installation of groundwater monitoring wells, collection of soil and bedrock samples for geotechnical analysis, corrosion analysis, and analytical analysis.

Specifically, CDM Smith's scope of work included:

- Review existing subsurface information;
- Prepare a soil exploration program work plan for Stantec and MWRA's approval;
- Conduct a subsurface exploration program along the existing WASM 3 alignment, that consisted of performing 112 test borings;
- Install 12 groundwater monitoring wells at select test boring locations;
- Collect soil and bedrock samples for geotechnical testing, analytical analysis, and corrosion analysis;
- Coordinate with CorrTech, Inc. (CTI) of Hopkinton, MA for corrosion sample collection;
- Coordinate with Stantec for analytical sample collection;





PROJECT LOCUS PLAN FIGURE 1-1

- Conduct geotechnical laboratory tests on select soil samples to assist with the classification of soils encountered;
- Prepare test boring logs;
- Prepare groundwater monitoring well logs;
- Provide Stantec with subsurface information to prepare geotechnical profile drawings of the existing section alignments; and
- Prepare this memorandum summarizing the geotechnical data collected as part of the recent subsurface exploration program.



## Section 2

## Site and Subsurface Conditions

## 2.1 Existing Site Conditions

The WASM 3 rehabilitation project is separated for bidding purposes into three proposed Construction Packages denoted as CP-1, CP-2 and CP-3. The conditions along each construction package are presented below.

#### **Construction Package 1**

The proposed WASM 3 Construction Package 1 (CP-1) includes the rehabilitation of approximately 13,609 feet of lock-bar steel pipe as follows:

- 5,080 feet of existing 56-inch diameter steel pipe along Section W11 between Sta. 394+70 and Sta. 445+50 in Arlington, MA; and
- 8,529 feet of existing 60-inch diameter steel pipe along Sections W12, W51, and W16 between Sta. 445+50 and Sta. 557+19 in Arlington, Somerville, and Medford, MA.

The alignment is located within the streets of Arlington, Somerville and Medford; including, Pleasant Street, Swan Street, Swan Place, Massachusetts Avenue, Broadway, Palmer Street, Hamlet Street, Coral Street, and the Mystic Valley Parkway in Arlington, Mystic Valley and Alewife Brook Parkway, Capen Street, Irvington Road, and Boston Avenue in Somerville, and Boston Street, and the Mystic Valley Parkway in Medford. The pipe invert ranges from approximately 6.5 feet to 21 feet bgs. The existing water main crosses beneath the Charles River in Medford.

#### **Construction Package 2**

The proposed WASM 3 Construction Package 2 (CP-2) includes the rehabilitation of approximately 10,769 feet of existing 56-inch diameter lock-bar steel pipe along Section W11 between Sta. 288+44 and Sta. 394+34 in Belmont and Arlington, MA.

The alignment begins at Pleasant Street in Belmont, and extends east to Venner Road in Arlington, MA. The alignment is located along Route 60 (Pleasant Street) within Belmont. The pipe invert ranges from approximately 6 feet to 21 feet bgs. The existing water main within the CP-2 limits connects to other MWRA distribution alignments including Section 59 and W118 and crosses beneath the Concord Turnpike/Route 2.

#### **Construction Package 3**

The proposed WASM 3 Construction Package 3 (CP-3) includes the rehabilitation of approximately 28,719 feet of 56-inch or 60-inch diameter lock-bar steel pipe as follows:

• 26,825 feet of existing 60-inch diameter steel pipe along Sections W9 and W10 between Sta. 0+00 and Sta. 269+50 in Weston and Waltham, MA; and



• 1,894 feet of existing 56-inch diameter steel pipe along Section W11 between Sta. 269+50 and Sta. 288+44 in Waltham, and Belmont, MA.

The alignment begins near the intersection of MA Route 30 and River Road in Weston, and extends east where it connects to the CP-2 alignment at Pleasant Street in Belmont. The alignment is located within the streets of Weston, Waltham and Belmont; including, River Road in Weston, and South Street, Charles River Road, Howe Avenue, Hope Avenue, Sun Street, Fern Street, Felton Street, Central Street, Newton Street, Barton Street, Chamberlain Terrace, Linden Street, and Waverly Oaks Road in Waltham, and Trapelo Road in Belmont. The areas along the pipe alignment are generally a mixture of residential and commercial properties; a portion of the alignment is adjacent to the Charles River and Stony Brook Basin. The pipe invert ranges from approximately 6 feet to 17 feet below ground surface (bgs).

Within the CP-3 limits, the existing water main connects to other MWRA distribution alignments; including, Section W1, Section W10B and 10C, and the Watertown Section.

### 2.2 Subsurface Exploration Programs

#### 2.2.1 Existing Subsurface Information

A variety of existing documents were reviewed prior to developing the subsurface exploration program for the proposed Rehabilitation of WASM 3 Project. Documents included: contract plans, record drawings, detail records, existing boring data, and construction drawings for the WASM 3 water mains, as well as for other nearby projects including the following:

#### **Construction Package 1**

- Utility System Record Plans including the following:
  - 1924 and 1926 Section W11,
  - 1925 Section W12, and
  - 1934 Section W16 Distribution
- Parsons Brinkerhoff. "MWRA Weston Aqueduct Supply Main 3 New Shaft 7 Connection Alignment Plan", March 3, 2003.
- One (1) test boring log prepared by CDM Smith conducted for the MWRA Contract 6540 project.
- One (1) test boring log conducted for the MassDOT, Line Borings Arlington, Lexington, and Belmont, 1966 project.
- One (1) test boring log conducted for the MWRA Proposed Distribution Line from Shaft 9, Medford, MA, 1967 project.
- Six (6) test boring logs conducted for the MassDOT, River Street and Harvard Avenue Over the Mystic River, Arlington, MA, 1933 project.



- Eight (8) test boring logs conducted for the MassDOT, Mystic Valley Parkway Over Alewife Brook, Arlington and Somerville, MA, 2010 project.
- Ten (10) test boring logs conducted for the MassDOT, Winthrop Street Bridge Over Mystic River, Medford, MA project.
- Eleven (11) test boring logs conducted for the MWRA WASM 3, 1933 project.
- One (1) test boring log conducted for the MWRA 1937 Contract No. 59, 1937 project.

#### **Construction Package 2**

- Utility System Record Plans of 1926 Section W11 Distribution.
- One (1) test boring log conducted by Capone Construction Co., Belmont, MA, January 1987.
- Twenty-one (21) test boring logs conducted for the MassDOT Pleasant Street (Route 60)
   Belmont, MA 2004 project.
- Two (2) test boring logs conducted fort the MassDOT Route 2 Arlington/Belmont, 1964 project.
- Eleven (11) test boring logs conducted for the MassDOT Route 60 at Route 2
   Belmont/Arlington, MA 1967, project.
- Test boring logs by Raymond Concrete Pile Co. prepared for MassDOT, Belmont, MA, 1967

#### **Construction Package 3**

- Utility System Record Plans including:
  - 1924 Section W9,
  - 1932 Section W10, and
  - 1926 Section W11 Distribution.
- Sixteen (16) test boring logs conducted for the MassDOT Rte. 128 Widening Under River Street, Weston, MA, October, 1960 project.
- Twelve (12) test boring logs conducted for the MassDOT Northern Circumferential Highway Over Norumbega Rd, Weston, MA, March 1950 project.
- Four (4) test boring logs prepared by Hager-Richeter Geoscience, Inc., Weston, MA, January 1997.
- Thirteen (13) test boring logs conducted for the MWRA Contract No. 233,8, Charles Relief Sewer, Waltham, MA, 1956 project.
- One (1) test boring logs conducted for the MWRA 1937 Contract No. 59, 1937 project.



Site plans identifying the approximate location of relevant existing test borings and test boring locations are included in **Figures 2-1**, **2-2** and **2-3**. Relevant existing test boring logs are included in **Appendix A**.

#### 2.2.2 Subsurface Exploration Program

A work plan was prepared for and approved by Stantec and the MWRA, outlining the subsurface exploration program for the MWRA Rehabilitation of the WASM 3 Project (*Final Soil Exploration Program Work Plan*, Stantec/CDM Smith, September 2017).

The subsurface exploration program consisted of performing one hundred and twelve (112) test borings. Seventy-one (71) test borings were drilled from ground surface without utilizing vacuum excavation. The locations of forty-two (42) test borings were advanced using vacuum excavation prior to performing the test borings. Twelve (12) groundwater monitoring wells were installed in completed test borings. A breakdown of the subsurface exploration program by Construction Package is provided below.

All test borings were conducted and completed by GeoLogic-Earth Exploration Inc. of Norfolk, Massachusetts between August 28, 2017 and January 29, 2018. Test borings were conducted using a Acker Soil Scout ATV track-mounted drill rigs. Test borings were drilled using drive and wash techniques with 3 to 4-inch inside diameter (I.D.) steel casing.

Prior to drilling, select test boring locations were cleared using vacuum excavation methods to locate existing utilities that may not have been identified as part of the DigSafe utility clearance. Vacuum excavation was conducted to depths ranging from four (4) feet to six (6) feet bgs unless a subsurface obstruction, such as a utility, boulder or shallow bedrock was encountered. Test borings were then drilled to depths ranging from 5 to 26 feet bgs, approximately.

Split spoon sampling was typically conducted continuously, from the ground surface or bottom of the vacuum excavation depth through the approximate existing pipe depth, and at five-foot intervals thereafter. Split spoon sampling was conducted in accordance with ASTM D1586 (using a 2-inch outside diameter (0.D.) sampler, driven 24 inches by blows from a 140-pound hammer falling freely for 30-inches). The number of blows required to drive the sampler each 6-inch increment was recorded and the Standard Penetration Resistance (N-value) was determined as the sum of the blows over the middle 12 inches of penetration. Samples collected from the test borings were visually logged and classified by a CDM Smith representative at the time of drilling. Representative soil samples from each split spoon were collected and stored in jars for subsequent review and laboratory testing.

Rock coring was conducted at select locations where bedrock was encountered at or near the approximate existing pipe invert depth. Rock coring was conducted using an NX core barrel and in accordance with ASTM D2113. In the field, rock core samples were evaluated for percent recovery and Rock Quality Designation (RQD). The RQD was estimated for each rock core by dividing the total length of the rock segments longer than four inches by the total length of the rock core run. The time to advance each foot of rock core was recorded during the rock coring process. Rock core samples collected from rock coring activities were visually logged and classified by a CDM Smith representative at the time of coring.



Soil samples and rock core samples were transported to and stored at the CDM Smith Geotechnical Testing Laboratory in Somerville, Massachusetts.

Analytical and corrosivity soil samples were collected during the subsurface exploration program; analysis and results are reported by others under separate cover.

Where encountered, groundwater levels at the test boring locations were estimated from the condition of the samples obtained, and by the observed water levels within the borehole at the time of drilling.

Where installed, groundwater monitoring wells were constructed in accordance with ASTM D5092 (Standard Practice for Design and Installation of Groundwater Monitoring Wells). Each groundwater monitoring well was constructed using 2-inch I.D. Schedule 40 PVC riser, and 10-foot-long well screens. Clean No. 2 silica sand was placed in the annular space surrounding the well screens to approximately two feet above the top of the well screen. A bentonite seal, between one (1) and two (2) feet thick, was placed in the annular space above the silica sand pack, and the annular space above the bentonite seal was backfilled with native material to approximately one foot below ground surface. Wells were completed with flush-mount casing with a bolted road box cover and surface seal consisting of approximately one foot of concrete.

Boreholes not completed as monitoring wells were backfilled with cuttings with asphalt patch as required.

Development of monitoring wells will be performed by Stantec. Well development will be performed to remove fine-grained materials from the monitoring well and sand filter pack, to establish hydraulic connections between the well and screened formations, and to improve well yield.

The test boring locations were located in the field through the use of a portable, hand-held Global Positioning System (GPS) receiver. The approximate as-drilled test boring locations are shown on **Figures 3-3A** through **3-3R**.

#### **Construction Package 1**

The CP-1 subsurface exploration program included conducting the following:

- Thirty-two (32) test borings, B-84 through B-116, excluding B-106;
- Six (6) test borings were converted into groundwater monitoring wells upon completion, B-93 (MW), B-100 (MW), B-104 (MW), B-107 (MW), B-110 (MW), and B-113 (MW);
- Forty (40) analytical samples and fifteen (15) corrosion samples were collected;
- Split spoon refusal or split spoon and auger refusal encountered at four (4) test boring locations, B-84, B-87, B-104 (MW), and B-105; and
- Rock coring was conducted at two (2) test boring locations, B-86 and B-107 (MW).

#### **Construction Package 2**

The CP-2 subsurface exploration program included conducting the following:



- Twenty-three (23) test borings, B-60 through B-82A;
- One (1) test boring was converted into a groundwater monitoring well upon completion, B-75A (MW);
- Thirty-two (32) analytical samples and eleven (11) corrosion samples were collected;
- Split spoon refusal or split spoon and auger refusal encountered at eleven (11) test boring locations, B-62 through B-64, B-66, B-67, B-69, B-70, B-72, B-73, B-76, and B-78; and
- Five-foot long rock core samples were collected at four (4) test boring locations, B-60, B-61, B-62, and B-75A (MW).

#### **Construction Package 3**

The CP-3 subsurface exploration program included conducting the following:

- Fifty-seven (57) test borings, B-1 through B-59, with the exception of B-15 and B-23;
- Five (5) test borings were converted into groundwater monitoring wells upon completion, B-9 (MW), B-17 (MW), B-20 (MW), B-25 (MW), and B-53 (MW);
- In addition to geotechnical sampling, seventy (70) analytical samples and twenty-three (23) corrosion samples were collected;
- Split spoon or rollerbit refusal encountered at nine (9) test boring locations, B-3, B-7, B-18, B-20 (MW), B-31, B-51, B-52, B-54, and B-58; and
- Rock coring was conducted at six (6) test boring locations, B-8A, B-19, B-22, B-53 (MW), B-55, and B-57.

#### 2.3 Deviations from the Work Plan

The following deviations were made to the final work plan:

#### **Construction Package 1**

- At test boring locations B-87 and B-90, groundwater monitoring wells were not installed because groundwater was not encountered within the existing pipe invert depth.
- At test boring location B-102, the boring was terminated in very soft clay. Based on previous borings conducted by the Massachusetts DOT in 1933 this location was known to have a 30 to 40 ft thick soft clay layer. Therefore, the boring was terminated at 23 ft bgs, after penetrating approximately 9 ft into the soft clay layer.
- At test boring location B-108, an unmarked and abandoned utility was encountered at approximately 8 ft bgs. The boring was backfilled and offset approximately 10 ft to location B-108A where vacuum excavation was performed to a depth of approximately 6 feet bgs and the boring was drilled to a depth of 16 ft bgs.



 At test boring location B-108A, the planned corrosion sample was not collected due to insufficient volume of soil material recovered in the split spoon.

#### **Construction Package 2**

- At test boring locations B-71 and B-80, the planned second analytical samples were not collected due to insufficient volume of soil material available; very dense materials or numerous cobbles and boulders were encountered within the existing pipe zone depth.
- At test boring location B-82, the test boring was terminated prematurely at approximately 10 ft bgs because the drill crew was informed that the location was too close to an existing utility. The drill crew offset the boring to location B-82A and drilled the boring to 26 ft bgs.

#### **Construction Package 3**

- At test boring locations B-3, B-14, B-40, B-53 (MW) and B-60 the planned second analytical soil samples were not collected due to insufficient volume of soil material available; very dense materials or cobbles and coarse gravel were encountered within the existing pipe zone depth.
- At test boring location B-8, the test boring was terminated prematurely at 5 ft bgs because it was suspected that an unmarked utility was encountered. The test boring location was offset approximately 5 ft south to location B-8A where vacuum excavation was performed and the boring was drilled to a depth of 16 ft bgs.
- At test boring locations B-13, B-35, B-37, and B-59 groundwater monitoring wells were not installed because groundwater was not encountered at the time of drilling.
- At test boring location B-23, the boring was not performed due to the number of utilities in the vicinity of the proposed boring location. A hand auger was attempted at location B-23, but the auger could not be advanced due to frost.
- At test boring location B-52, a soil corrosion sample was not collected due to insufficient volume of soil material available; numerous cobbles and boulders were encountered within the existing pipe zone depth.

## 2.4 Geotechnical Laboratory Testing

Geotechnical laboratory tests were performed on select split spoon soil samples recovered from the subsurface exploration program. Soil geotechnical laboratory tests were performed by CDM Smith at the Geotechnical Testing Laboratory located in Somerville, Massachusetts. A summary of the laboratory testing conducted for each construction package follows. Testing was performed in accordance with the cited ASTM standards on samples selected from various test borings, strata, and depths.

A summary of the geotechnical laboratory test results is presented in **Table 2-1**. The laboratory test results are included in **Appendix C**.



| Contachnical Laboratory Tost   | Test Standard | Quantity of Tests Performed |      |      |  |  |  |  |  |
|--------------------------------|---------------|-----------------------------|------|------|--|--|--|--|--|
| Geotechnical Laboratory Test   | Test Standard | CP-1                        | CP-2 | CP-3 |  |  |  |  |  |
| Soil:                          |               |                             |      |      |  |  |  |  |  |
| Gradation (Sieve)              | ASTM D422     | 38                          | 28   | 67   |  |  |  |  |  |
| Gradation (Sieve & Hydrometer) | ASTM D422     | 11                          | 8    | 10   |  |  |  |  |  |
| Atterberg Limits               | ASTM D4318    | 9                           | 1    | 5    |  |  |  |  |  |
| Organic Content                | ASTM D2974    | 10                          | 3    | 4    |  |  |  |  |  |

#### 2.5 Subsurface Conditions

#### 2.5.1 Regional Geology

Select available regional geology references were reviewed and are included in **Appendix D** including:

- Stone, J.R., "Surficial Geologic Map of the Clinton-Concord-Grafton-Medfield 12-Quadrangle Area in East Central Massachusetts", 2006.
- Nelson, A.E., "Surficial Geologic Map of the Natick Quadrangle, Middlesex and Norfolk Counties, Massachusetts", 1974.
- Goldsmith, R., "Bedrock Geologic Map of Massachusetts", 1983.

Subsurface geology in the area of the project site may be classified as glacial stratified deposits, consisting of a mix of sand and gravel, with cobbles, clay, and silt.

The bedrock geology within the CP-1 alignment consists of Cambridge Argillite, composed of gray argillite and minor quartzite, with rare sandstone and conglomerate. The bedrock geology within the CP-2 and CP-3 alignments consists of diorite and gabbro, and gray granite or granodiorite.

#### 2.5.2 Subsurface Conditions

#### **Construction Package 1**

The subsurface conditions encountered within the CP-1 limits typically consist of Pavement or Topsoil located at ground surface that is underlain by a sequence of Fill, Sand and Gravel, Silty Sand, Sand, Organic Soils, Silty Clay, Weathered Rock, and Bedrock.

#### **Pavement**

Pavement was encountered at 13 of the 32 CP-1 test boring locations, B-84, B-91, B-92, B-94, B-96 through B-100 (MW), and B-105 through B-109. The pavement ranged from approximately 0.2 to 1.2 ft thick, with an average thickness of approximately 0.6 ft. The pavement typically consisted of asphalt with an underlying gravel base.



#### **Topsoil**

Topsoil was encountered at 17 of the 32 CP-1 test boring locations. The topsoil layer ranged from approximately 0.2 to 0.5 ft thick, with an average thickness of approximately 0.3 ft at the test boring locations. The topsoil layer typically consisted of fine to coarse SAND, with varying amounts of fine gravel and silt.

#### Fill

A Fill stratum was encountered underlying the pavement or topsoil at 15 of the 32 CP-1 test boring locations. This stratum generally consists of dry to moist, gray to brown, medium dense to very dense, fine to coarse SAND, some to "and" fine to coarse gravel, trace to little silt.

- The Fill stratum was fully penetrated at all test boring locations where it was encountered, B-91, B-92, B-94, B-95, B-101 through B-105, and B-108A through B-113 (MW). The stratum thickness ranged from approximately 1.3 to 8.5 ft, with an average thickness of approximately 4 ft at the test boring locations.
- Standard Penetration Test (SPT) N-values in the Fill stratum ranged from 5 to greater than 100 blows per foot (bl/ft), with an average value of approximately 52 bl/ft at the test boring locations.

#### Sand and Gravel

A Sand and Gravel stratum was encountered at 23 of the 32 CP-1 test boring locations and typically consists of moist, medium to very dense, brown, fine to coarse SAND, little to "and" amounts fine to coarse gravel, trace to little silt or fine to coarse GRAVEL, little to "and" amounts fine to coarse sand, trace to little silt.

- This stratum was fully penetrated at 9 test boring locations, B-86 through B-88, B-98, B-102, B-107 (MW), B-109 through B-111. At these locations the average stratum thickness was approximately 8.2 ft.
- This stratum was not fully penetrated at the following 14 test boring locations: B-84, B-89 through B-97, B-99, B-101, B-103, and B-104 (MW). At these locations, the average stratum penetration depth was approximately 12.7 ft.
- SPT N-values in the Sand and Gravel stratum ranged from 7 to greater than 100 bl/ft, with an average value of approximately 86 bl/ft at the test boring locations.

#### **Silty Sand**

A Silty Sand stratum was encountered at 12 of the 32 CP-3 test boring locations. This stratum typically consists of moist, medium to very dense, brown, fine to medium SAND, little to "and" amounts of silt, trace to little fine gravel.

This stratum was fully penetrated at 9 test boring locations, B-85, B-90, B-104 (MW), B-109, B-111 through B-113 (MW), B-115, and B-116. At these locations, the average stratum thickness was approximately 5.9 ft.



- This stratum was not fully penetrated at 3 test boring locations: B-104 (MW), B-108A, and B-114. At these locations, the average stratum penetration depth was approximately 7.6 ft.
- SPT N-values in the Silty Sand stratum ranged from 9 to greater than 100 bl/ft, with an average value of approximately 54 bl/ft at the test boring locations.

#### Sand

A Sand stratum was encountered at 4 of the 32 CP-1 test boring locations. This stratum typically consisted of moist, medium to very dense, brown, fine to coarse SAND, trace to little fine gravel, trace to little silt.

- The Sand stratum was fully penetrated at 2 test boring locations, B-95 through B-114. At these locations, the average penetration depth into the stratum was approximately 7.5 ft.
- The Sand stratum was not fully penetrated at 2 test borings locations, B-98 and B-100 (MW). At these locations, the stratum penetration depth was approximately 12.1 ft.
- SPT N-values in the Sand stratum ranged from 8 to greater than 100 bl/ft, with an average value of approximately 42 bl/ft at the test boring locations.

#### **Organic Soils**

An Organic Soils stratum was encountered at 5 of the 32 CP-1 test boring locations: B-88, B-103, and B-111 through B-113. This stratum typically consisted of moist, very stiff to hard, brown, Organic Silty CLAY, trace to "and" amounts of fine to coarse sand, trace to little fine gravel, trace peat.

- The Organic Soils stratum was fully penetrated at all test boring location where encountered. At these locations, the average stratum thickness was approximately 1.5 ft.
- SPT N-values in the Organic Soils stratum ranged from 3 to 39 bl/ft, with an average value of approximately 21 bl/ft at the test boring locations.

#### Silty Clay

A Silty Clay stratum was encountered at 12 of the 32 CP-1 test boring locations. This stratum typically consisted of moist to wet, very stiff to hard, brown, Silty CLAY or CLAY & SILT, trace to "and" amounts of fine to coarse sand, trace to little fine gravel.

- The Silty Clay stratum was fully penetrated at 3 test boring locations, B-84, B-103, and B-109. At these locations, the penetration depth into the stratum was approximately 5.0, 5.5, and 3.5 ft, respectively.
- The Silty Clay stratum was not fully penetrated at 9 test boring locations B-85, B-88, B-102, B-110 (MW) through B-113 (MW), B-115, and B-116. At these locations, the average stratum penetration depth was approximately 6.5 ft.
- SPT N-values in the Silty Clay stratum ranged from 0 to 76 bl/ft, with an average value of approximately 27 bl/ft at the test boring locations.



#### **Weathered Rock**

A Weathered Rock stratum was encountered at 3 of the 32 CP-1 test boring locations. This stratum consisted of moist, very dense, gray-brown, fine to coarse GRAVEL, little to "and" amounts of fine to coarse sand, trace to some silt.

- The Weathered Rock stratum was fully penetrated at test boring locations B-86, and B-107 (MW). The average stratum penetration depth was approximately 3.3 ft.
- The Weathered Rock stratum was not fully penetrated at test boring location B-87. At this location the stratum penetration depth was 2.6 ft.
- SPT N-values in the Weathered Rock stratum were greater than 100 bl/ft.

#### **Bedrock**

Bedrock was encountered at 2 of the 32 CP-1 test boring locations: B-86, and B-107 (MW). At these test boring locations, the depth to top of bedrock was approximately 10.0, and 14.5 ft bgs, respectively. Rock core recovery was approximately 100 and 96 percent, and the RQD was approximately 22 and 8 percent, respectively.

- The Bedrock at test boring B-86 consisted of hard, moderately fractured, very slightly weathered, dark gray, fine grained, GRANITE; primary joint set moderate, very close to close, rough, stepped.
- The Bedrock at test boring location B-107 (MW) consisted of medium hard, sound, slightly weathered, gray, fine grained, ARGILLITE; primary joint set shallow to vertical, very close to close, rough, stepped.

Refusal (drilling and split spoon) was encountered at depths ranging from of approximately 14 to 24.7 ft bgs at 4 of the 32 test boring locations, B-84, B-87, B-104 (MW), and B-105 in the following strata: Sand and Gravel, Silty Sand, and Weathered Rock.

#### Construction Package 2

The subsurface conditions encountered within the CP-2 limits typically consist of Pavement or Topsoil located at ground surface that is underlain by a sequence of Fill, Sand and Gravel, Sandy Silt, Silty Sand, Clay, Weathered Rock, and Bedrock.

#### **Pavement**

Pavement was encountered at 17 of the 23 CP-2 test boring locations, B-60 through B-62, B-66 through B-70, B-72 through B-78, B-80, and B-82A. The pavement ranged from approximately 0.3 to 1.0 ft thick, with an average thickness of approximately 0.5 ft. The pavement typically consisted of asphalt with an underlying gravel base.

#### **Topsoil**

Topsoil was encountered at 4 of the 23 CP-2 test boring locations, B-65, B-71, B-79, and B-81. The topsoil layer ranged from approximately 0.2 to 0.5 ft thick, with an average thickness of approximately 0.3 ft. The topsoil layer typically consisted of fine to coarse SAND, with varying amounts of fine gravel and silt.



#### Fill

A Fill stratum was encountered underlying the pavement or topsoil at 9 of the 23 CP-2 test boring locations. This stratum generally consists of dry to moist, gray to brown, medium dense to very dense, fine to coarse SAND, some to "and" fine to coarse gravel, trace silt.

- The Fill stratum was fully penetrated at all test boring locations where it was encountered, B-62, B-64, B-67 through B-69, B-76, B-80, B-81, and B-82A. The stratum thickness ranged from approximately 1.7 to 6.0 ft, with an average thickness of approximately 3.5 ft.
- Standard Penetration Test (SPT) N-values in the Fill stratum ranged from 10 to greater than 100 blows per foot (bl/ft), with an average value of approximately 60 bl/ft at the test boring locations.

#### Sand and Gravel

A Sand and Gravel stratum was encountered at 20 of the 23 CP-2 test boring locations and typically consists of moist, medium to very dense, brown, fine to coarse SAND, little to "and" amounts fine to coarse gravel, trace to little silt or fine to coarse GRAVEL, little to "and" amounts fine to coarse sand, trace to little silt.

- This stratum was fully penetrated at 6 test boring locations, B-60 through B-62, B-75A (MW), B-79 and B-82A. At these locations the average stratum thickness was approximately 6.9 ft.
- This stratum was not fully penetrated at 14 test boring locations: B-63 through B-66, B-70 through B-74, B-76 through B-78, B-80, and B-81, At these locations, the average stratum penetration depth was approximately 11.3 ft.
- SPT N-values in the Sand and Gravel stratum ranged from 14 to greater than 100 bl/ft, with an average value of greater than 100 bl/ft at the test boring locations.

#### Sandy Silt

A Sandy Silt stratum was encountered at 5 of the 23 CP-2 test boring locations. This stratum typically consists of moist, medium to very dense, brown, SILT, little to "and" amounts fine to coarse sand, trace to "and" fine to coarse gravel.

- This stratum was fully penetrated at all test boring location where encountered, B-66, B-77 through B-79, and B-82A. At these locations, the average stratum thickness was approximately 3.8 ft.
- SPT N-values in the Sandy Silt stratum ranged from 17 to greater than 100 bl/ft, with an average value of approximately 68 bl/ft at the test boring locations.

#### **Silty Sand**

A Silty Sand stratum was encountered at 4 of the 23 CP-2 test boring locations. This stratum typically consists of moist, medium to very dense, brown, fine to medium SAND, little to "and" amounts of silt, trace to little fine gravel.



- This stratum was not fully penetrated at test boring locations, B-67 through B-69, and B-82A. At these locations, the average stratum penetration depth was approximately 12.2 ft.
- SPT N-values in the Silty Sand stratum ranged from 33 to greater than 100 bl/ft, with an average value of approximately greater than 100 bl/ft at the test boring locations.

#### **Silty Clay**

A Silty Clay stratum was encountered at 2 of the 23 CP-2 test boring locations. This stratum typically consisted of moist to wet, very stiff to hard, brown, CLAY or Silty CLAY, little to "and" amounts of silt, trace to some fine to medium sand.

- The Silty Clay stratum was fully penetrated at test boring location B-76. At this location, penetration depth into the stratum was approximately 4 ft.
- The Silty Clay stratum was not fully penetrated at test boring location B-79. At this location, the stratum penetration depth was approximately 4 ft.
- SPT N-values in the Silty Clay stratum ranged from 6 to 38 bl/ft, with an average value of approximately 33 bl/ft at the test boring locations.

#### **Weathered Rock**

A Weathered Rock stratum was encountered at 2 of the 23 CP-2 test boring locations. This stratum consisted of moist, very dense, gray-brown, fine to coarse GRAVEL, with varying amounts of fine to coarse SAND, trace silt.

- The Weathered Rock stratum was fully penetrated at test boring location B-61. The stratum thickness at this location was approximately 3 ft.
- The Weathered Rock stratum was not fully penetrated at test boring location B-62. At this location, the stratum penetration depth was approximately 4.6 ft.
- SPT N-values in the Weathered Rock stratum were greater than 100 bl/ft.

#### **Bedrock**

Bedrock was encountered at the following 3 of the 23 CP-2 test boring locations: B-60, B-61, and B-75A (MW). At these test boring locations, the depth to top of bedrock was approximately 3.5, 9.0, and 8.5 ft bgs, respectively. Rock core recovery was approximately 93, 87, and 50 percent. The RQD was approximately 35, 17, and 24 percent, respectively.

- The bedrock at test boring location B-60 consisted of hard, moderately fractured, slightly weathered, gray, medium grained, GRANITE; primary joint set shallow, very to moderately close, rough, stepped.
- The bedrock at test boring location B-61 consisted of hard, moderately fractured, slightly weathered, gray, medium grained, GRANITE; primary joint set shallow to steep, very close to close, rough, stepped.



• The bedrock at test boring location B-75A (MW) consisted of hard, slightly weathered, fine to medium grained, gray, GRANITE, close jointing.

Refusal (drilling and split spoon) was encountered at depths ranging from of approximately 11 of 22 test boring locations, B-62 through B-64, B-66, B-67, B-69, B-70, B-72, B-73, B-76, and B-78 and in the following strata: Sand and Gravel, Silty Sand, and Silty Clay.

#### **Construction Package 3**

The subsurface conditions encountered within the CP-3 limits typically consist of Pavement or Topsoil located at ground surface that is underlain by a sequence of Fill, Sand and Gravel, Silty Sand, Sand, Sandy Silt, Clay, Weathered Rock, and Bedrock.

#### **Pavement**

Pavement was encountered at 30 of the 58 CP-3 test boring locations, B-9 (MW), B-12, B-18, B-19, B-24 through B-31, B-33 through B-40, B-42, B-48, B-50, B-52 through B-55, and B-57 through B-59. The pavement ranged from approximately 0.2 to 0.7 feet thick, with an average thickness of approximately 0.4 feet. The pavement typically consisted of asphalt with an underlying gravel base.

#### **Topsoil**

Topsoil was encountered at 27 of the 58 CP-3 test boring locations, B-1 through B-8, B-10, B-11, B-13 through B-17 (MW), B-20 (MW) through B-22, B-32, B-41, B-43 through B-47, B-49, B-51, and B-56. The topsoil layer ranged from approximately 0.2 to 4 feet thick, with an average thickness of approximately 1.1 feet. The topsoil layer typically consisted of fine to coarse SAND, with varying amounts of fine gravel and silt.

#### Fill

A Fill stratum was encountered underlying the pavement or topsoil at 23 of the 58 CP-3 test boring locations. This stratum generally consists of dry to moist, gray to brown, medium dense to very dense, fine to coarse SAND, some to "and" fine to coarse gravel, trace to little silt.

- The Fill stratum was fully penetrated at all test boring locations where it was encountered, B-10, B-13, B-16, B-18, B-19, B-21, B-22, B-24 through B-26, B-29, B-30, B-32, B-33, B-36 through B-38, B-40, B-41, B-43, B-49, B-54, and B-59. The stratum thickness ranged from approximately 0.5 to 7.5 feet, with an average thickness of approximately 3.1 feet.
- Standard Penetration Test (SPT) N-values in the Fill stratum ranged from 9 to greater than 100 blows per foot (bl/ft), with an average value of approximately 75 bl/ft at the test boring locations.

#### **Sand and Gravel**

A Sand and Gravel stratum was encountered at 53 of the 58 CP-3 test boring locations and typically consists of moist, medium to very dense, brown, fine to coarse SAND, little to "and" amounts fine to coarse gravel, trace to little silt or fine to coarse GRAVEL, little to "and" amounts fine to coarse sand, trace to little silt.



- This stratum was fully penetrated at 19 test boring locations, B-3, B-6, B-7, B-18, B-20 (MW), B-22, B-38 through B-41, B-42, B-44, B-46, B-48, B-52 through B-55, and B-57. At these locations, the average stratum thickness was approximately 5.8 feet.
- This stratum was not fully penetrated at 34 test boring locations, B-1, B-2, B-4, B-5, B-8A, B-9 (MW), B-10 through B-17 (MW), B-21, B-24 through B-37, B-47, B-49 through B-51, B-56, B-58, and B-59. At these locations, the average stratum penetration depth was approximately 13.4 feet.
- SPT N-values in the Sand and Gravel stratum ranged from 6 to greater than 100 bl/ft, with an average value of greater than 100 bl/ft at the test boring locations.

#### Silty Sand

A Silty Sand stratum was encountered at 10 of the 57 CP-3 test boring locations. This stratum typically consists of moist, medium to very dense, brown, fine to medium SAND, little to "and" amounts of silt, trace to little fine gravel.

- This stratum was fully penetrated at 4 test boring locations, B-11, B-13, B-18, and B-20 (MW). At these locations, the average stratum thickness was approximately 6 feet.
- This stratum was not fully penetrated at 6 test boring locations, B-6, B-7, B-41, B-42, B-43, and B-48. At these locations, the average stratum penetration depth was approximately 9.1 feet.
- SPT N-values in the Silty Sand stratum ranged from 4 to greater than 100 bl/ft, with an average value of approximately 54 bl/ft at the test boring locations.

#### Sand

A Sand stratum was encountered at 4 of the 57 CP-3 test boring locations: B-36 through B-39. This stratum typically consists of moist, medium dense to dense, to dense, brown, fine to coarse SAND, with trace to little silt and fine gravel.

- The Sand stratum was fully penetrated at 4 test boring locations, B-36 through B-39. At these locations, the average stratum thickness was approximately 8.4 feet.
- The Sand stratum was not fully penetrated at test boring location B-44. At this location, the penetration depth into the stratum was approximately 4 ft.
- SPT N-values in the Sand stratum ranged from 9 to 68 bl/ft, with an average value of approximately 33 bl/ft at the test boring locations.

#### Sandy Silt

A Sandy Silt stratum was encountered at 6 of the 57 CP-3 test boring locations. This stratum typically consists of moist, medium to very dense, brown, SILT, little to "and" amounts fine to coarse sand, trace to "and" fine to coarse gravel.

• This stratum was fully penetrated at 3 test boring locations B-44 through B-46. At these locations, the average stratum thickness was approximately 7.1feet.



- This stratum was not fully penetrated at 3 test boring locations, B-38 through B-40. At these locations, the average stratum penetration depth was approximately 6.3 feet.
- SPT N-values in the Sandy Silt stratum ranged from 17 to greater than 100 bl/ft, with an average value of approximately 68 bl/ft at the test boring locations.

#### **Silty Clay**

A Silty Clay stratum was encountered at 4 of the 57 CP-3 test boring locations. This stratum typically consisted of moist to wet, very stiff to hard, gray-brown, CLAY or Silty CLAY, trace to little fine sand.

- The Silty Clay stratum was fully penetrated at test boring location B-43. At this location, the stratum thickness was approximately 4 feet.
- The stratum was not fully penetrated at 3 test boring location B-44 through B-46. At these locations, the average stratum penetration depth was approximately 3.7 feet.
- SPT N-values in the Silty Clay stratum ranged from 21 to 78 bl/ft, with an average value of approximately 44 bl/ft at the test boring locations.

#### **Weathered Rock**

A Weathered Rock stratum was encountered at 10 of the 57 CP-3 test boring locations. This stratum consisted of moist, very dense, gray-brown, fine to coarse GRAVEL, with varying amounts of fine to coarse sand, trace to some silt.

- This stratum was fully penetrated at 4 test boring locations, B-19, B-22, B-53, and B-57. At these locations, the average stratum thickness at these locations was approximately 1.2 feet.
- The stratum was not fully penetrated at 6 test boring locations, B-3, B-18, B-20 (MW), B-52, B-54, and B-55. At these locations, the average stratum penetration depth was approximately 2.9 feet.
- SPT N-values in the Weathered Rock stratum were greater than 100 bl/ft.

#### Bedrock

Bedrock was encountered at the following 4 of the 57 CP-3 test boring locations: B-19, B-22, B-53 (MW), and B-57. At these test boring locations, the depth to top of bedrock was approximately 9.0, 11.5, 6.0, 9.0, and 3.5 feet bgs, respectively. Rock core recovery was approximately 67, 95, 75, and 100 percent. The RQD was approximately 7, 50, 0, and 55 percent, respectively.

- The bedrock at test boring location B-19 consisted of hard, extremely fracture, slightly weathered, gray, fine grained, GABBRO; primary joint set moderately dipping to vertical, very close, rough, stepped.
- The bedrock at test boring location B-22 consisted of hard, slightly weathered, gray, fine grained, FELSITE; primary joint set steep to vertical, very close, rough, stepped.



- The bedrock at test boring location B-53 (MW) consisted of hard, extremely fractured, slightly weathered, gray, fine grained, GRANITE; primary joint set very close.
- The bedrock at test boring location B-57 consisted of hard, moderately fractured, slightly weathered, gray, fine grained, GABBRO; primary joint set moderate to vertical, very close to close, rough, planar.

Refusal (drilling and split spoon) was encountered at depths ranging from of approximately 14 to 24.7 feet bgs at 9 of the 58 CP-3 test boring locations, B-3, B-7, B-18, B-20 (MW), B-31, B-51, B-52, B-54, and B-58 in the following strata: Sand and Gravel, Silty Sand, and Weathered Rock.

A summary of the subsurface conditions encountered at the test boring locations is presented in **Table 2-2**. Test boring logs, groundwater monitoring well installation logs prepared by CDM Smith, are included in **Appendix E**. Rock core photo logs, prepared by CDM Smith, are included in **Appendix F**.

### 2.6 Groundwater Levels

#### 2.6.1 During Drilling and Excavation

Where groundwater was encountered at the time of drilling, the depth to groundwater was recorded prior to backfilling the test boring.

- Along the CP-1 alignment, groundwater was encountered at 24 of the 32 test boring locations. At the time of drilling, the depth to groundwater was recorded between 3.0 and 15.7 feet bgs, approximately.
- Along the CP-2 alignment, groundwater was encountered at 20 of the 23 test boring locations. At the time of drilling, the depth to groundwater ranged from approximately 2.5 to 11.8 feet bgs.
- Along the CP-3 alignment, groundwater was encountered at 38 of the 57 test boring locations. At the time of drilling, the depth to groundwater ranged from approximately 1.5 to 14 feet bgs.

Groundwater levels recorded at the completion of drilling are included in **Table 2-2**.

### 2.6.2 Groundwater Monitoring Well Readings

Groundwater monitoring wells were installed at the following 12 test boring locations at the completion of drilling:

| CP-1: | B-93 (MW)      | B-100 (MW) | B-104 (MW) |
|-------|----------------|------------|------------|
| •     | B-107 (MW)     | B-110 (MW) | B-113 (MW) |
| CP-2: | D 75 A (NA)A/) |            |            |
| CP-Z: | B-75A (MW)     |            |            |
| CP-3: | B-9 (MW)       | B-17 (MW)  | B-20 (MW)  |
| •     | B-25 (MW)      | B-53 (MW)  |            |



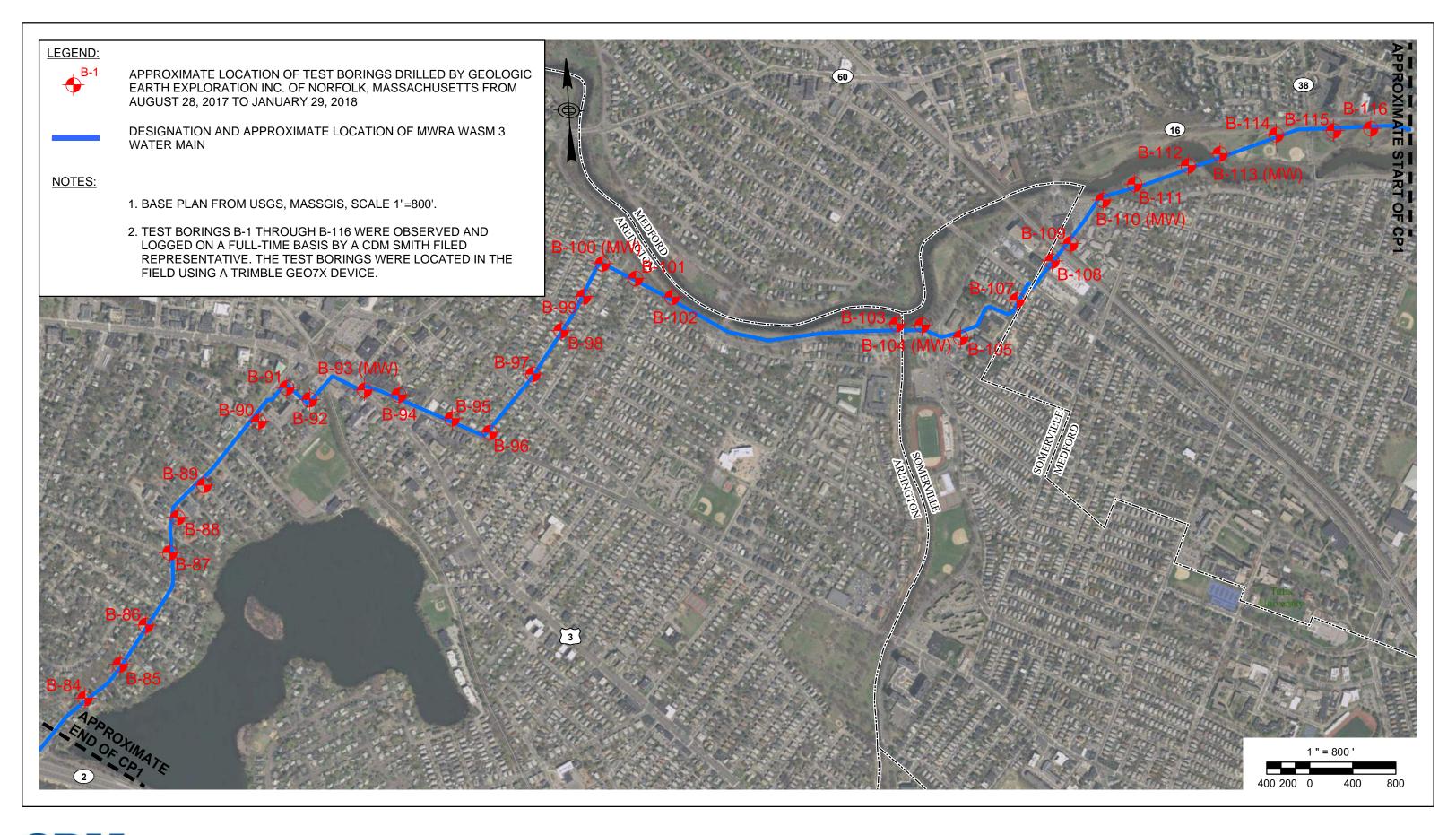
Groundwater levels were collected within the installed monitoring wells between on February 27, 2018. A summary of groundwater monitoring well readings is presented in **Table 2-3**.

### 2.7 Expected Variations in Subsurface Conditions

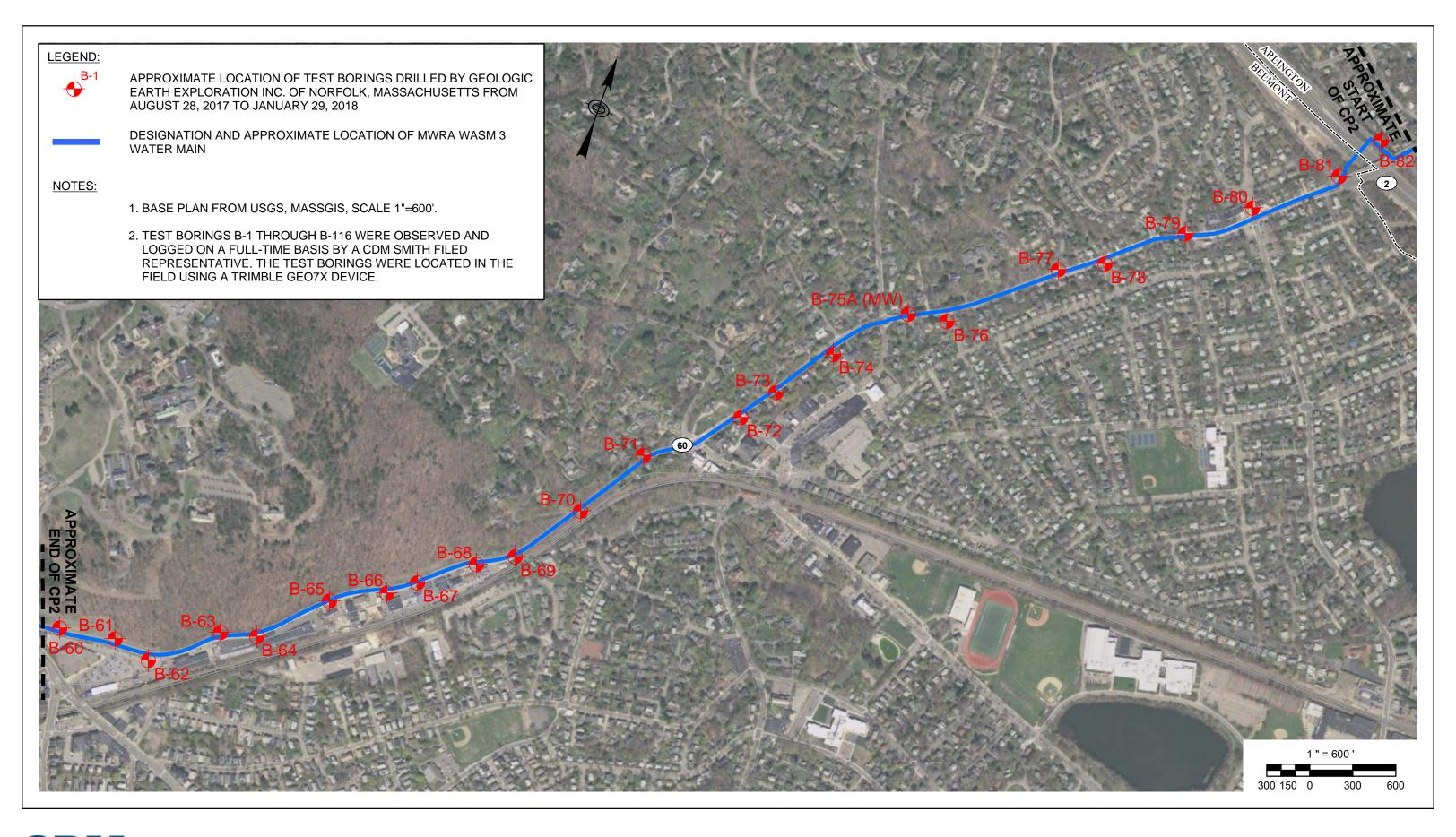
Subsurface conditions presented herein are based on soil, rock and groundwater conditions observed at the test boring locations. However, subsurface conditions may vary at other locations within the site.

Groundwater levels change with time, season, river levels, temperature, and construction activities in the area, as well as with other factors. In addition, stabilized groundwater levels can be difficult to obtain in test borings drilled using drive and wash drilling methods (during rock coring) due to the presence of drilling fluid in the borehole. Therefore, groundwater conditions at the time of construction may be different from those observed at the time of explorations.











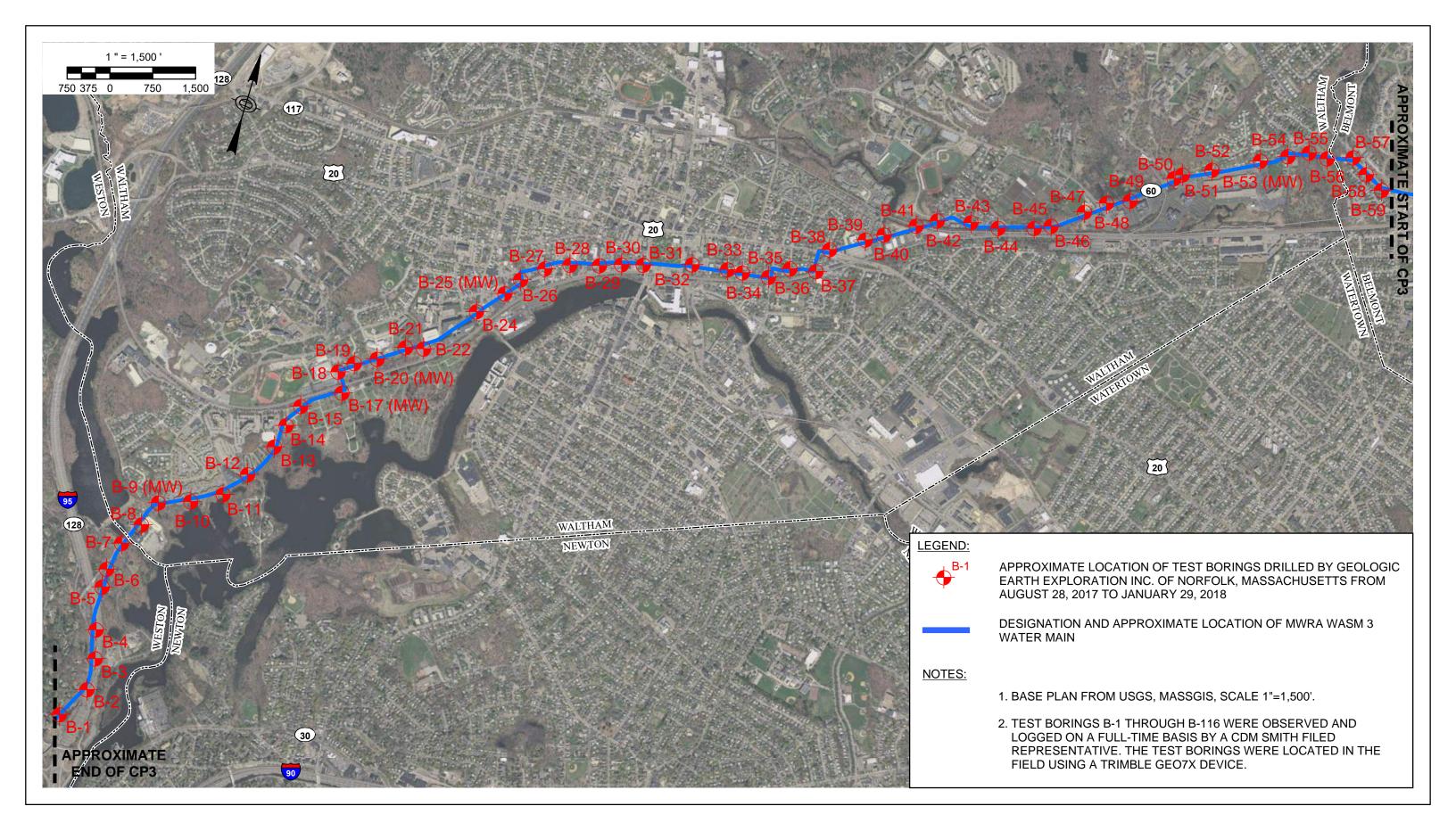




Table 2-1
Summary of Geotechnical Laboratory Test Results

| Exploration | Sample | Sample     |                 | USCS                        |        |         | Grain       | Size Analys | is <sup>2</sup> |           | At       | terberg Lir | nits <sup>3</sup> | Moisture           | Organi             |
|-------------|--------|------------|-----------------|-----------------------------|--------|---------|-------------|-------------|-----------------|-----------|----------|-------------|-------------------|--------------------|--------------------|
| Number      |        |            | Stratum         |                             | Grav   | el (%)  |             | Sand (%)    |                 | Fines (%) | — LL (%) |             | PI (%)            | Content            | Conten             |
| Number      | Number | Depth (ft) |                 | Classification <sup>1</sup> | Coarse | Fine    | Coarse      | Medium      | Fine            | Silt Cla  | y LL (%) | PL (%)      | PI (%)            | (%) <sup>(4)</sup> | (%) <sup>(5)</sup> |
|             |        |            |                 |                             |        | Constru | iction Pack | age 3       |                 |           |          |             |                   |                    |                    |
| B-1         | S-2    | 2-4        | Sand and Gravel | SP-SM                       | 13.2   | 21.9    | 9.8         | 23.3        | 22.9            | 8.9       |          |             |                   | 4.2                |                    |
| B-2         | S-1    | 6-8        | Sand and Gravel | GP-GM                       | 8.0    | 36.8    | 13.0        | 19.1        | 12.5            | 10.6      |          |             |                   |                    |                    |
| B-3         | S-1    | 6-6.8      | Sand and Gravel | SW-SM                       | 7.2    | 34.4    | 17.0        | 21.6        | 10.8            | 9.0       |          |             |                   | 8.3                |                    |
| B-4         | V-1    | 2.5-3      | Sand and Gravel | SM                          | 0.0    | 1.0     | 2.3         | 9.4         | 61.7            | 25.6      |          |             |                   | 10.9               |                    |
| B-5         | S-1    | 6-8        | Sand and Gravel | SM                          | 0.0    | 0.6     | 0.8         | 6.9         | 71.3            | 20.4      |          |             |                   | 14.1               |                    |
| B-6         | S-1    | 6-8        | Sand and Gravel | SW-SM                       | 10.8   | 19.8    | 15.2        | 37.7        | 11.2            | 5.3       |          |             |                   | 12.1               |                    |
| B-7         | S-3    | 4-5.3      | Sand and Gravel | SM                          | 9.6    | 15.2    | 10.7        | 21.8        | 18.2            | 24.5      |          |             |                   | 11.3               |                    |
| B-9 (MW)    | S-1    | 6-8        | Sand and Gravel | SM                          | 0.0    | 26.7    | 11.7        | 13.1        | 13.6            | 34.9      |          |             |                   | 32.1               | 3.1                |
| B-10        | S-2    | 2-4        | Fill            | SP-SM                       | 18.4   | 19.6    | 12.0        | 24.9        | 17.6            | 7.5       |          |             |                   | 5.1                |                    |
| B-10        | S-4    | 6-8        | Sand and Gravel | SP                          | 0.0    | 0.3     | 4.4         | 53.8        | 38.7            | 2.8       |          |             |                   | 21.3               |                    |
| B-11        | S-3    | 4-6        | Sand and Gravel | GW-GM                       | 25.1   | 22.2    | 14.7        | 19.7        | 10.5            | 7.8       |          |             |                   | 10.5               |                    |
| B-11        | S-5    | 8-10       | Silty Sand      | SM                          | 0.0    | 3.2     | 1.6         | 19.2        | 28.9            | 45.4 1.7  | 7 NV     | NP          | NP                | 4.2                |                    |
| B-12        | S-2    | 8-10       | Sand and Gravel | SP-SM                       | 0.0    | 3.9     | 5.3         | 32.6        | 51.6            | 6.6       |          |             |                   | 8.7                |                    |
| B-13        | S-4    | 6-8        | Silty Sand      | SM                          | 0.0    | 23.7    | 9.1         | 19.3        | 26.4            | 21.5      |          |             |                   | 4.0                |                    |
| B-14        | S-2    | 2-2.5      | Sand and Gravel | SM                          | 12.7   | 26.4    | 12.6        | 16.0        | 15.6            | 16.7      |          |             |                   | 7.5                |                    |
| B-16        | S-2    | 2-4        | Sand and Gravel | GM                          | 13.8   | 31.5    | 13.7        | 12.9        | 12.8            | 15.3      |          |             |                   | 9.1                |                    |
| B-17 (MW)   | S-3    | 4-6        | Sand and Gravel | GW-GM                       | 17.8   | 30.7    | 14.6        | 19.5        | 10.5            | 6.9       |          |             |                   | 8.5                |                    |
| B-18        | S-5    | 9-10.5     | Silty Sand      | SM                          | 3.2    | 11.1    | 10.9        | 24.2        | 23.9            | 26.7      |          |             |                   | 11.6               |                    |
| B-19        | S-3    | 4-6        | Fill            | SM                          | 0.0    | 39.8    | 15.1        | 18.5        | 12.8            | 13.8      |          |             |                   | 9.7                |                    |
| B-20 (MW)   | S-2    | 2-4        | Silty Sand      | ML                          | 0.0    | 0.2     | 3.2         | 18.2        | 26.1            | 52.3      |          |             |                   | 22.9               | 3.2                |
| B-21        | S-5    | 8-10       | Fill            | SM                          | 30.0   | 6.4     | 6.8         | 17.6        | 23.9            | 15.3      |          |             |                   | 13.8               |                    |
| B-22        | S-3    | 4-6        | Sand and Gravel | SM                          | 9.5    | 18.6    | 16.6        | 21.9        | 16.3            | 17.1      |          |             |                   | 11.0               |                    |
| B-24        | V-1    | 2-2.5      | Fill            | SM                          | 0.0    | 11.5    | 9.1         | 21.7        | 28.2            | 29.5      |          |             |                   | 13.8               |                    |
| B-24        | V-2    | 4.5-5      | Fill            | SM                          | 0.0    | 19.3    | 13.3        | 22.1        | 25.0            | 20.3      |          |             |                   | 8.3                |                    |
| B-25 (MW)   | V-1    | 2-2.5      | Fill            | GM                          | 18.4   | 26.8    | 10.3        | 18.1        | 13.1            | 13.3      |          |             |                   | 7.2                |                    |
| B-25 (MW)   | S-1    | 6-8        | Sand and Gravel | GP-GM                       | 14.5   | 33.6    | 11.8        | 18.0        | 13.6            | 8.5       |          |             |                   | 11.4               |                    |
| B-26        | V-1    | 2-2.5      | Fill            | SM                          | 0.0    | 36.1    | 14.5        | 22.5        | 12.8            | 14.1      |          |             |                   | 8.6                |                    |
| B-26        | S-2    | 9-9.7      | Sand and Gravel | SM                          | 1.8    | 37.3    | 13.3        | 22.2        | 12.6            | 12.8      |          |             |                   | 7.9                |                    |
| B-27        | S-1    | 0.5-2      | Sand and Gravel | SM                          | 0.0    | 24.8    | 13.5        | 25.3        | 21.1            | 15.3      |          |             |                   | 6.5                |                    |
| B-28        | S-4    | 9-9.8      | Sand and Gravel | SP-SM                       | 21.8   | 18.9    | 13.3        | 23.2        | 11.7            | 11.1      |          |             |                   | 7.2                |                    |



Table 2-1
Summary of Geotechnical Laboratory Test Results

| Exploration | Sample | Sample      |                 | USCS                        |        |        | Grain  | Size Analys | is <sup>2</sup> |          |         | Atterberg Li | mits <sup>3</sup> | Moisture           | Organic            |
|-------------|--------|-------------|-----------------|-----------------------------|--------|--------|--------|-------------|-----------------|----------|---------|--------------|-------------------|--------------------|--------------------|
| Number      | Number |             | Stratum         |                             | Grave  | el (%) |        | Sand (%)    |                 | Fines (% | 5)<br>  | ) DL /0/)    | PI (%)            | Content            | Content            |
| Nullibel    | Number | Deptii (it) |                 | Classification <sup>1</sup> | Coarse | Fine   | Coarse | Medium      | Fine            | Silt C   | Clay    | ) PL (%)     | PI (%)            | (%) <sup>(4)</sup> | (%) <sup>(5)</sup> |
| B-29        | S-5    | 8-10        | Sand and Gravel | GW-GM                       | 22.1   | 29.4   | 12.7   | 18.7        | 9.1             | 8.0      |         |              |                   | 10.8               |                    |
| B-30        | V-2    | 5-5.5       | Sand and Gravel | ML                          | 0.0    | 6.3    | 4.5    | 15.4        | 19.0            | 45.1     | 9.7 20  | 17           | 3                 | 20.2               |                    |
| B-31        | V-1    | 2-2.5       | Sand and Gravel | SM                          | 18.1   | 1.2    | 3.2    | 19.0        | 15.0            | 43.5     |         |              |                   | 20.3               |                    |
| B-31        | S-3    | 14-14.7     | Sand and Gravel | ML                          | 0.0    | 6.2    | 4.1    | 14.7        | 24.9            | 32.5 1   | 7.6     |              |                   | 11.0               |                    |
| B-32        | S-2    | 8-10        | Sand and Gravel | SW-SM                       | 13.8   | 28.5   | 14.9   | 22.8        | 10.8            | 9.2      |         |              |                   | 9.0                |                    |
| B-33        | S-2    | 2-4         | Sand and Gravel | GP-GM                       | 9.5    | 41.1   | 10.6   | 21.0        | 11.0            | 6.8      |         |              |                   | 5.6                |                    |
| B-34        | V-1    | 2-2.5       | Sand and Gravel | SM                          | 12.2   | 21.3   | 9.0    | 19.1        | 14.5            | 23.9     |         |              |                   | 13.1               |                    |
| B-35        | S-2    | 2-3.5       | Sand and Gravel | SP-SM                       | 18.7   | 27.5   | 13.8   | 21.9        | 11.3            | 6.8      |         |              |                   | 6.3                |                    |
| B-36        | S-3    | 4-6         | Sand            | SP                          | 0.0    | 3.5    | 13.5   | 55.5        | 26.0            | 1.5      |         |              |                   | 4.5                |                    |
| B-37        | V-1    | 2-2.5       | Sand            | SP                          | 3.2    | 7.5    | 3.2    | 52.2        | 32.0            | 1.9      |         |              |                   | 5.1                |                    |
| B-38        | V-1    | 3-3.5       | Sand            | SP                          | 5.3    | 4.9    | 4.8    | 51.3        | 31.7            | 2.0      |         |              |                   | 6.3                |                    |
| B-38        | S-3    | 14-16       | Sandy Silt      | ML                          | 0.0    | 0.0    | 0.0    | 0.3         | 2.6             | 87.1 1   | .0.0 NV | NP           | NP                | 28.6               |                    |
| B-39        | S-5    | 8-10        | Sand            | SW-SM                       | 0.0    | 10.5   | 8.5    | 53.6        | 18.8            | 8.6      |         |              |                   | 6.4                |                    |
| B-40        | S-6    | 14-16       | Sandy Silt      | ML                          | 0.0    | 0.0    | 0.0    | 0.6         | 1.6             | 80.7 1   | 7.1     |              |                   | 27.4               |                    |
| B-41        | V-2    | 5.5-6       | Sand and Gravel | SP-SM                       | 0.0    | 4.0    | 3.9    | 52.0        | 29.0            | 11.1     |         |              |                   | 28.8               |                    |
| B-41        | S-2    | 8-10        | Silty Sand      | SM                          | 0.0    | 0.0    | 0.0    | 0.6         | 79.9            | 19.5     |         |              |                   | 28.5               |                    |
| B-42        | S-2    | 8-10        | Silty Sand      | SM                          | 0.0    | 12.4   | 4.2    | 7.8         | 37.7            | 25.3 1   | 2.6     |              |                   | 80.6               | 9.4                |
| B-42        | S-3    | 14-16       | Silty Sand      | ML                          | 0.0    | 0.0    | 0.1    | 0.6         | 7.2             | 92.1     |         |              |                   | 25.1               |                    |
| B-43        | S-5    | 8-10        | Clay            | CL                          | 0.0    | 0.0    | 0.1    | 0.6         | 2.1             | 44.8 5   | 2.4 42  | 21           | 21                | 25.7               |                    |
| B-44        | S-1    | 6-8         | Sand and Gravel | SM                          | 5.6    | 29.2   | 12.0   | 18.4        | 22.0            | 12.8     |         |              |                   | 14.4               |                    |
| B-45        | S-3    | 10-12       | Sandy Silt      | ML                          | 0.0    | 0.7    | 0.3    | 1.1         | 3.6             | 87.9     | 6.4     |              |                   | 24.1               |                    |
| B-45        | S-4    | 14-16       | Clay            | CL                          | 0.0    | 0.0    | 0.0    | 0.1         | 0.4             | 59.3 4   | 0.2 30  | 18           | 12                | 24.8               |                    |
| B-46        | S-2    | 8-10        | Sandy Silt      | ML                          | 0.0    | 0.0    | 0.0    | 0.1         | 29.3            | 66.7     | 3.9     |              |                   | 26.0               |                    |
| B-47        | V-1    | 2-2.5       | Sand and Gravel | GP-GM                       | 13.8   | 32.9   | 12.4   | 21.0        | 12.1            | 7.8      |         |              |                   | 5.4                |                    |
| B-48        | S-4    | 6-8         | Silty Sand      | SM                          | 0.0    | 0.0    | 0.1    | 1.7         | 76.8            | 21.4     |         |              |                   | 9.2                |                    |
| B-50        | S-2    | 2-4         | Sand and Gravel | SM                          | 20.4   | 17.5   | 11.0   | 14.1        | 14.0            | 23.0     |         |              |                   | 11.7               |                    |
| B-51        | S-4    | 6-8         | Sand and Gravel | GW-GM                       | 21.5   | 33.5   | 11.1   | 15.2        | 10.5            | 8.2      |         |              |                   | 6.3                |                    |
| B-52        | S-3    | 4-5         | Sand and Gravel | SM                          | 0.0    | 17.0   | 14.3   | 26.5        | 28.6            | 13.6     |         |              |                   | 13.4               |                    |
| B-53 (MW)   | S-2    | 2-3.3       | Sand and Gravel | SM                          | 9.6    | 24.7   | 10.8   | 13.5        | 14.5            | 26.9     |         |              |                   | 10.3               |                    |
| B-54        | S-3    | 4-6         | Sand and Gravel | GM                          | 10.6   | 33.2   | 12.5   | 15.7        | 10.9            | 17.1     |         |              |                   | 10.3               |                    |
| B-55        | S-1    | 2-3.8       | Sand and Gravel | GW-GM                       | 18.6   | 30.5   | 14.4   | 19.0        | 10.7            | 6.8      |         |              |                   | 9.4                |                    |
| B-56        | S-2    | 2-3.3       | Sand and Gravel | SM                          | 0.0    | 31.4   | 15.2   | 21.7        | 18.0            | 13.7     |         |              |                   | 9.6                | 2.6                |



Table 2-1
Summary of Geotechnical Laboratory Test Results

| Exploration | Sample | Sample     |                 | USCS                        |        |         | Grair       | n Size Analys | is <sup>2</sup> |           | Att      | terberg Lir | nits³  | its <sup>3</sup> Moisture |                    |
|-------------|--------|------------|-----------------|-----------------------------|--------|---------|-------------|---------------|-----------------|-----------|----------|-------------|--------|---------------------------|--------------------|
| Number      |        |            | Stratum         |                             | Grave  | el (%)  |             | Sand (%)      |                 | Fines (%) |          |             |        | Content                   | Content            |
| Number      | Number | Depth (ft) |                 | Classification <sup>1</sup> | Coarse | Fine    | Coarse      | Medium        | Fine            | Silt Clay | - LL (%) | PL (%)      | PI (%) | (%) <sup>(4)</sup>        | (%) <sup>(5)</sup> |
| B-56        | S-3    | 11-13      | Sand and Gravel | SM                          | 11.5   | 24.2    | 12.1        | 22.6          | 16.8            | 12.8      |          |             |        | 10.1                      |                    |
| B-57        | S-3    | 4-5.5      | Sand and Gravel | GM                          | 0.0    | 47.0    | 16.8        | 10.8          | 8.7             | 16.7      |          |             |        | 10.9                      |                    |
| B-58        | V-1    | 2-3        | Sand and Gravel | GW-GM                       | 5.1    | 41.3    | 15.3        | 19.5          | 10.6            | 8.2       |          |             |        | 5.1                       |                    |
| B-59        | V-2    | 5-6        | Fill            | GP-GM                       | 6.6    | 44.3    | 11.4        | 15.8          | 13.5            | 8.4       |          |             |        | 6.1                       |                    |
| B-59        | S-3    | 14-16      | Sand and Gravel | GW-GM                       | 16.6   | 33.2    | 15.2        | 14.7          | 13.0            | 7.3       |          |             |        | 7.8                       |                    |
|             |        |            |                 |                             |        | Constru | ıction Pack | age 2         |                 |           |          |             |        |                           |                    |
| B-60        | S-2    | 2-3.3      | Sand and Gravel | GW-GM                       | 17.5   | 39.5    | 12.1        | 15.9          | 9.6             | 5.4       |          |             |        | 6.8                       |                    |
| B-61        | S-3    | 4-6        | Sand and Gravel | GW                          | 9.0    | 40.9    | 19.2        | 19.5          | 8.0             | 3.4       |          |             |        | 12.4                      |                    |
| B-63        | S-3    | 4-6        | Sand and Gravel | SM                          | 14.3   | 23.2    | 10.5        | 19.1          | 13.0            | 19.9      |          |             |        | 18.4                      |                    |
| B-64        | S-1    | 6-8        | Sand and Gravel | SM                          | 13.6   | 11.0    | 8.0         | 15.1          | 18.1            | 34.2      |          |             |        | 10.7                      |                    |
| B-65        | S-3    | 4-6        | Sand and Gravel | ML                          | 0.0    | 4.8     | 3.0         | 8.2           | 16.5            | 59.4 8.1  |          |             |        | 19.9                      |                    |
| B-65        | S-5    | 8-8.5      | Sand and Gravel | SM                          | 11.1   | 20.4    | 10.1        | 16.1          | 19.7            | 22.6      |          |             |        | 9.7                       |                    |
| B-66        | S-1    | 6-8        | Sandy Silt      | ML                          | 0.0    | 5.9     | 4.0         | 12.5          | 21.1            | 56.5      |          |             |        | 48.2                      | 6.8                |
| B-67        | S-1    | 6-7.1      | Silty Sand      | SM                          | 0.0    | 28.1    | 8.5         | 12.3          | 15.4            | 35.7      |          |             |        | 34.0                      | 5.9                |
| B-68        | S-2    | 8-10       | Silty Sand      | ML                          | 0.0    | 7.0     | 6.3         | 9.5           | 17.4            | 50.5 9.3  |          |             |        | 13.2                      |                    |
| B-69        | S-3    | 4-6        | Silty Sand      | SM                          | 0.0    | 12.2    | 11.8        | 21.2          | 27.1            | 27.7      |          |             |        | 11.5                      |                    |
| B-70        | S-2    | 2-4        | Sand and Gravel | SM                          | 4.7    | 30.5    | 13.2        | 19.7          | 14.8            | 17.1      |          |             |        | 8.0                       |                    |
| B-70        | S-4    | 6-8        | Sand and Gravel | SM                          | 0.0    | 32.3    | 13.4        | 19.6          | 19.3            | 15.4      |          |             |        | 8.8                       |                    |
| B-71        | V-1    | 2-3        | Sand and Gravel | SP-SM                       | 15.5   | 25.8    | 11.6        | 19.7          | 16.1            | 11.3      |          |             |        | 6.8                       |                    |
| B-71        | S-4    | 14-15.5    | Sand and Gravel | SM                          | 0.0    | 22.9    | 21.7        | 24.4          | 14.7            | 16.3      |          |             |        | 15.4                      |                    |
| B-72        | S-2    | 2-4        | Sand and Gravel | ML                          | 0.0    | 16.9    | 8.2         | 11.0          | 13.2            | 40.0 10.7 |          |             |        | 23.9                      |                    |
| B-73        | S-2    | 2-4        | Sand and Gravel | SM                          | 0.0    | 16.3    | 14.6        | 23.3          | 26.7            | 19.1      |          |             |        | 6.2                       |                    |
| B-74        | S-1    | 0.5-1.7    | Sand and Gravel | SM                          | 0.0    | 33.1    | 14.6        | 20.7          | 14.6            | 17.0      |          |             |        | 9.5                       |                    |
| B-74        | S-5    | 8-9.3      | Sand and Gravel | SW                          | 8.6    | 37.9    | 20.7        | 20.5          | 7.8             | 4.5       |          |             |        | 8.3                       |                    |
| B-75A       | S-1    | 6-8        | Sand and Gravel | GM                          | 14.4   | 40.6    | 10.9        | 10.8          | 8.5             | 14.8      |          |             |        | 14.0                      |                    |
| B-76        | S-2    | 2-4        | Clay            | CL                          | 0.0    | 0.0     | 0.8         | 6.3           | 16.3            | 44.3 32.3 |          |             |        | 20.4                      |                    |
| B-77        | S-2    | 2-4        | Sandy Silt      | ML                          | 0.0    | 12.6    | 5.4         | 14.0          | 14.1            | 44.3 9.6  |          |             |        | 40.9                      |                    |
| B-78        | S-2    | 2-4        | Sand and Gravel | SW-SM                       | 6.0    | 21.2    | 19.6        | 28.1          | 15.8            | 9.3       |          |             |        | 13.5                      |                    |
| B-78        | S-5    | 8-10       | Sandy Silt      | ML                          | 0.0    | 0.0     | 0.0         | 0.0           | 12.3            | 70.1 17.6 |          |             |        | 21.8                      |                    |
| B-79        | S-6    | 14-16      | Clay            | CL                          | 0.0    | 0.0     | 0.2         | 3.7           | 24.6            | 71.5      | 32       | 20          | 12     | 28.8                      |                    |
| B-80        | S-2    | 6-8        | Sand and Gravel | SP-SM                       | 11.0   | 25.8    | 11.6        | 23.5          | 19.9            | 8.2       |          |             |        | 8.2                       |                    |



Table 2-1
Summary of Geotechnical Laboratory Test Results

| Exploration | Sample | Sample     |                 | USCS                        |        |         | Grair      | Size Analys   | is <sup>2</sup> |              |           | Att       | erberg Lir | nits³  | Moisture           | Organic            |
|-------------|--------|------------|-----------------|-----------------------------|--------|---------|------------|---------------|-----------------|--------------|-----------|-----------|------------|--------|--------------------|--------------------|
|             |        |            | Stratum         |                             | Grave  | el (%)  |            | Sand (%)      |                 | Fine         | s (%)     |           |            |        | Content            | Content            |
| Number      | Number | Depth (ft) |                 | Classification <sup>1</sup> | Coarse | Fine    | Coarse     | Medium        | Fine            | Silt         | Clay      | - LL (%)  | PL (%)     | PI (%) | (%) <sup>(4)</sup> | (%) <sup>(5)</sup> |
| B-81        | S-4B   | 9.5-10     | Sand and Gravel | ML                          | 0.0    | 1.3     | 3.1        | 6.6           | 25.9            | 34.3         | 28.8      |           |            |        | 18.0               |                    |
| B-82A       | S-1    | 0.5-2      | Fill            | ML                          | 0.0    | 7.9     | 4.6        | 11.2          | 18.9            | 57           | 7.4       |           |            |        | 32.5               | 5.0                |
| B-82A       | S-5A   | 8-8.5      | Sandy Silt      | ML                          | 0.0    | 5.6     | 2.0        | 7.4           | 13.4            | 44.2         | 27.4      |           |            |        | 21.3               |                    |
|             |        |            |                 |                             |        | Constru | ction Pack | age 1         |                 |              |           |           |            |        |                    |                    |
| B-84        | S-5    | 9-11       | Clay            | CL                          | 0.0    | 0.0     | 0.0        | 0.7           | 9.0             | 52.8         | 37.5      | 28        | 16         | 12     | 21.0               |                    |
| B-85        | S-6    | 14-16      | Clay            | CL                          | 0.0    | 0.0     | 0.0        | 0.2           | 1.3             | 47.1         | 51.4      | 39        | 25         | 14     | 31.0               |                    |
| B-86        | S-3    | 4-6        | Sand and Gravel | SM                          | 4.8    | 13.0    | 7.8        | 16.6          | 29.9            | 27           | 7.9       |           |            |        | 30.8               |                    |
| B-87        | S-2    | 2-4        | Sand and Gravel | SP-SM                       | 8.8    | 27.9    | 9.7        | 24.0          | 19.9            | 9            | .7        |           |            |        | 2.4                |                    |
| B-88        | S-1    | 0-2        | Organic Soils   |                             |        |         | Additi     | onal Laborato | ory Testing A   | Assigned and | d Pending | Completio | on         |        | 21.6               | 4.3                |
| B-88        | S-6B   | 14.2-15.1  | Clay            | ML                          | 0.0    | 1.6     | 1.8        | 6.7           | 20.0            | 69           | 9.9       |           |            |        | 29.0               |                    |
| B-89        | S-3    | 9-10.5     | Sand and Gravel | GM                          | 30.7   | 13.6    | 7.4        | 13.3          | 14.3            | 20           | ).7       |           |            |        | 8.9                |                    |
| B-90        | S-1    | 0-2        | Silty Sand      |                             |        |         | Additi     | onal Laborato | ory Testing A   | Assigned and | d Pending | Completio | on         |        | 10.1               | 4.4                |
| B-90        | S-3    | 4-4.8      | Sand and Gravel | SP-SM                       | 4.3    | 33.6    | 14.5       | 24.7          | 14.6            | 8            | .3        |           |            |        | 7.5                |                    |
| B-91        | S-1    | 5-7        | Sand and Gravel | SW-SM                       | 12.0   | 31.9    | 11.8       | 24.2          | 11.8            | 8            | .3        |           |            |        | 8.6                |                    |
| B-92        | S-1    | 5-7        | Sand and Gravel | SW                          | 0.0    | 40.9    | 19.4       | 25.3          | 9.9             | 4            | .5        |           |            |        | 8.2                |                    |
| B-93 (MW)   | S-2    | 2-4        | Sand and Gravel | SP                          | 11.9   | 21.1    | 13.5       | 33.8          | 16.3            | 3            | .4        |           |            |        | 3.9                |                    |
| B-94        | S-3    | 4-5.3      | Fill            | SP-SM                       | 2.5    | 27.4    | 18.4       | 29.1          | 17.0            | 5            | .6        |           |            |        | 12.6               |                    |
| B-95        | S-2    | 2-4        | Fill            | SP-SM                       | 0.0    | 27.0    | 10.3       | 29.5          | 24.6            | 8            | .6        |           |            |        | 4.8                |                    |
| B-96        | S-3    | 4-6        | Sand and Gravel | SP-SM                       | 0.0    | 17.7    | 12.1       | 28.3          | 35.0            | 6            | .9        |           |            |        | 4.2                |                    |
| B-97        | S-1B   | 0.9-2      | Sand and Gravel | SM                          | 0.0    | 0.0     | 0.8        | 13.5          | 36.8            | 47.3         | 1.6       |           |            |        | 25.9               |                    |
| B-97        | S-5    | 8-10       | Sand and Gravel | SP                          | 0.0    | 24.3    | 10.4       | 37.6          | 24.0            | 3            | .7        |           |            |        | 3.8                |                    |
| B-98        | S-1    | 5-7        | Sand and Gravel | SP-SM                       | 3.2    | 12.0    | 7.9        | 48.8          | 22.3            | 5            | .8        |           |            |        | 13.1               |                    |
| B-99        | S-2    | 7-9        | Sand and Gravel | SW                          | 0.0    | 18.1    | 22.0       | 41.9          | 13.4            | 4            | .6        |           |            |        | 9.1                |                    |
| B-100 (MW)  | S-1    | 0.5-2      | Sand            |                             |        |         | Additi     | onal Laborato | ory Testing A   | Assigned and | d Pending | Completio | on         |        | 19.2               | 2.9                |
| B-100 (MW)  | S-3    | 4-6        | Sand            | SP                          | 0.0    | 7.0     | 10.0       | 54.3          | 24.9            | 3            | .8        |           |            |        | 4.2                |                    |
| B-101       | S-4    | 4-6        | Sand and Gravel | SP-SM                       | 13.4   | 30.0    | 13.9       | 21.9          | 10.2            | 10           | 0.6       |           |            |        | 7.2                |                    |
| B-102       | S-4    | 6-8        | Sand and Gravel | GP-GM                       | 22.3   | 25.3    | 12.3       | 20.2          | 12.3            | 7            | .6        |           |            |        | 25.5               | 7.8                |
| B-103       | S-4    | 6-8        | Organic Soils   | ML                          | 0.0    | 0.1     | 4.2        | 10.1          | 19.9            | 65           | 5.7       |           |            |        | 80.2               | 9.4                |
| B-104 (MW)  | S-2    | 8-10       | Sand and Gravel | SM                          | 0.0    | 27.2    | 15.8       | 24.9          | 17.5            | 14           | 1.6       |           |            |        | 28.4               | 4.2                |



Table 2-1
Summary of Geotechnical Laboratory Test Results

| Exploration | Sample | Sample     |                 | USCS                        | Grain Size Analysis <sup>2</sup>                 |        |         |               |               |              |           | Att       | erberg Lir | nits <sup>3</sup> | Moisture           | Organic            |
|-------------|--------|------------|-----------------|-----------------------------|--|--------|---------|---------------|---------------|--------------|-----------|-----------|------------|-------------------|--------------------|--------------------|
| Number      | Number | Depth (ft) | Stratum         | Classification <sup>1</sup> | Grave  | el (%) |         | Sand (%)      |               | Fine         | s (%)     | - LL (%)  | PL (%)     | PI (%)            | Content            | Content            |
| Number      | Number | Depth (It) |                 | Classification              | Coarse   | Fine   | Coarse  | Medium        | Fine          | Silt         | Clay      | - LL (%)  | PL (%)     | PI (%)            | (%) <sup>(4)</sup> | (%) <sup>(5)</sup> |
| B-105       | S-4    | 6-8        | Silty Sand      | SM                          | 0.0  | 13.8   | 8.0     | 20.7          | 25.6          | 33           | 1.9       |           |            |                   | 11.4               |                    |
| B-107 (MW)  | S-1    | 0.5-2      | Sand and Gravel | SM                          | 0.0  | 11.7   | 12.6    | 34.2          | 29.3          | 12           | 2.2       |           |            |                   | 14.6               |                    |
| B-107 (MW)  | S-4    | 6-8        | Sand and Gravel | SM                          | 0.0  | 13.2   | 11.8    | 18.7          | 24.3          | 32           | 2.0       |           |            |                   | 9.6                |                    |
| B-108       | S-2    | 8-10       | Silty Sand      | SM                          | 0.0  | 22.8   | 11.4    | 21.1          | 26.3          | 18           | 3.4       |           |            |                   | 16.2               |                    |
| B-110 (MW)  | S-3    | 4-6        | Organic Soil    | ОН                          | Additional Laboratory Testing Assigned and Pendi |        |         |               |               |              |           | Completio | on         |                   | 62.9               | 7.8                |
| B-110 (MW)  | S-5    | 8-10       | Organic Soil    | ОН                          | 0.0  | 0.0    | 0.6     | 3.0           | 11.1          | 46.5         | 38.8      | 98        | 41         | 57                | 80.0               |                    |
| B-110 (MW)  | S-7    | 19-21      | Clay            | CL                          | 0.0  | 0.0    | 0.0     | 0.5           | 3.3           | 47.9         | 48.3      | 33        | 17         | 16                | 31.8               |                    |
| B-111       | S-3B   | 4.5-6      | Silty Sand      | SM                          | 0.0  | 0.7    | 2.2     | 17.1          | 46.5          | 33           | 3.5       |           |            |                   | 26.2               |                    |
| B-112       | S-2    | 2-4        | Organic Soils   | CL                          | 0.0  | 0.0    | 0.0     | 4.3           | 5.4           | 31.0         | 59.3      |           |            |                   | 55.7               | 5.9                |
| B-112       | S-6    | 14-16      | Clay            | CL                          | 0.0  | 0.0    | 0.0     | 0.2           | 1.6           | 33.2         | 65.0      | 46        | 21         | 25                | 38.7               |                    |
| B-113 (MW)  | S-3A   | 4-5        | Organic Soils   |                             |  |        | Additio | onal Laborato | ory Testing A | Assigned and | d Pending | Completio | on         |                   | 185.9              | 21.1               |
| B-113 (MW)  | S-5    | 9-11       | Clay            | CH/OH                       | 0.0  | 0.0    | 0.0     | 1.1           | 1.9           | 49.6         | 47.4      | 96        | 36         | 60                | 85.5               |                    |
| B-113 (MW)  | S-6B   | 14.5-16    | Clay            | CL                          | 0.0  | 0.0    | 0.0     | 0.8           | 10.1          | 33.6         | 55.5      | 37        | 18         | 19                | 35.3               |                    |
| B-114       | S-1    | 6-8        | Sand            | SP-SM                       | 7.3  | 9.2    | 6.3     | 15.7          | 54.9          | 6            | .6        |           |            |                   | 14.6               |                    |
| B-115       | S-2    | 8-10       | Silty Sand      | SM                          | 0.0  | 12.5   | 7.2     | 21.2          | 15.4          | 43           | 3.7       |           |            |                   | 63.4               | 5.4                |
| B-115       | S-4    | 19-21      | Clay            | CL                          | 0.0  | 0.0    | 0.0     | 0.3           | 11.5          | 44.1         | 44.1      | 38        | 18         | 20                | 32.5               |                    |
| B-116       | S-2    | 8-10       | Silty Sand      | SP-SM                       | 0.0  | 28.5   | 11.5    | 31.9          | 22.4          | 5            | .7        |           |            |                   | 11.0               |                    |
| B-116       | S-3    | 14-16      | Clay            | CL                          | 0.0  | 0.0    | 0.7     | 0.3           | 5.4           | 41.4         | 52.2      | 30        | 16         | 14                | 29.9               |                    |

#### Notes:

- 1. USCS classifications were performed in accordance with ASTM D2487.
- 2. Grain size analysis tests performed in accordance with ASTM D7928 & D6913 and ASTM D1140.
- 3. Atterberg limit tests performed in accordance with ASTM D4318.
- 4. Moisture content analysis performed in accordance with ASTM D2216.
- 5. Organic content analysis performed in accordance with ASTM D2974.

#### **Abbreviations:**

SP-SM: Poorly Graded Sand and Silty Sand GP-GM: Poorly Graded Gravel and Silty Gravel SW-SM: Well Graded Sand and Silty Sand SM: Silty Sand

SP: Poorly Graded Sand GW-GM: Well Graded Gravel

-- Not conducted

ML: Silt

GM: Silty Gravel CL: Lean Clay CH: Fat Clay

OH: Organic Silt



Table 2-2 Summary of Subsurface Conditions

|                       |  |  |                     |      |                    |                 | Stratum | Thickness (      | ft) |                      |                   |         | Approximate                          | Approximate                                    |
|-----------------------|--|--|---------------------|------|--------------------|-----------------|---------|------------------|-----|----------------------|-------------------|---------|--------------------------------------|--|
| Exploration<br>Number | Approximate<br>Ground Surface<br>Elevation (ft) <sup>(1)</sup> | Approximate<br>Exploration<br>Depth (ft) | Pavement or Topsoil | Fill | Sand and<br>Gravel | Silty Sand      | Sand    | Organic<br>Soils |     | Silty Clay           | Weathered<br>Rock | Bedrock | - Depth to Top<br>of Bedrock<br>(ft) | Depth to<br>Groundwater<br>(ft) <sup>(2)</sup> |
| Construction          | Package 1  |  |                     |      |                    |                 |         |                  |     |                      |                   |         |                                      |  |
| B-84                  | Survey Pending   | 15.0                                     | 0.6                 | NE   | 6.9/>2.0           | NE              | NE      | NE               | NE  | 5.5                  | NE                | NE      | NE                                   | NE   |
| B-85                  | Survey Pending   | 16.0                                     | 0.4                 | NE   | NE                 | 8.6             | NE      | NE               | NE  | >7.0                 | NE                | NE      | NE                                   | 6.5  |
| B-86                  | Survey Pending   | 15.0                                     | 0.3                 | NE   | 7.7                | NE              | NE      | NE               | NE  | NE                   | 2.0               | >5.0    | 10.0                                 | 3.0  |
| B-87                  | Survey Pending   | 14.0                                     | 0.3                 | NE   | 11.1               | NE              | NE      | NE               | NE  | NE                   | >2.6              | NE      | NE                                   | 11.5   |
| B-88                  | Survey Pending   | 16.0                                     | 0.5                 | NE   | 11.2               | NE              | NE      | 2.5              | NE  | >1.8                 | NE                | NE      | NE                                   | NE   |
| B-89                  | Survey Pending   | 15.3                                     | 0.5                 | NE   | >14.8              | NE              | NE      | NE               | NE  | NE                   | NE                | NE      | NE                                   | 2.0  |
| B-90                  | Survey Pending   | 16.0                                     | NE                  | NE   | >14.0              | 2.0             | NE      | NE               | NE  | NE                   | NE                | NE      | NE                                   | NE   |
| B-91                  | Survey Pending   | 16.0                                     | 0.9                 | 3.1  | >12.0              | NE              | NE      | NE               | NE  | NE                   | NE                | NE      | NE                                   | NE   |
| B-92                  | Survey Pending   | 16.0                                     | 0.7                 | 4.3  | >11.0              | NE              | NE      | NE               | NE  | NE                   | NE                | NE      | NE                                   | NE   |
| B-93 (MW)             | Survey Pending   | 16.0                                     | 1.0                 | NE   | >15.0              | NE              | NE      | NE               | NE  | NE                   | NE                | NE      | NE                                   | 3.0  |
| B-94                  | Survey Pending   | 16.0                                     | 0.3                 | 4.9  | >10.8              | NE              | NE      | NE               | NE  | NE                   | NE                | NE      | NE                                   | 10.0   |
| B-95                  | Survey Pending   | 16.0                                     | 1.3                 | 3.5  | >8.0               | NE              | 3.2     | NE               | NE  | NE                   | NE                | NE      | NE                                   | NE   |
| B-96                  | Survey Pending   | 16.0                                     | 0.3                 | NE   | >15.7              | NE              | NE      | NE               | NE  | NE                   | NE                | NE      | NE                                   | 14.5   |
| B-97                  | Survey Pending   | 16.0                                     | 0.6                 | NE   | >15.4              | NE              | NE      | NE               | NE  | NE                   | NE                | NE      | NE                                   | 10.0   |
| B-98                  | Survey Pending   | 21.0                                     | 1.0                 | NE   | 11.5               | NE              | >8.5    | NE               | NE  | NE                   | NE                | NE      | NE                                   | 8.0  |
| B-99                  | Survey Pending   | 16.0                                     | 0.9                 | NE   | >15.1              | NE              | NE      | NE               | NE  | NE                   | NE                | NE      | NE                                   | 13.2   |
| B-100 (MW)            | Survey Pending   | 16.0                                     | 0.3                 | NE   | NE                 | NE              | >15.7   | NE               | NE  | NE                   | NE                | NE      | NE                                   | 8.0  |
| B-101                 | Survey Pending   | 16.0                                     | 0.7                 | 3.3  | >12.0              | NE              | NE      | NE               | NE  | NE                   | NE                | NE      | NE                                   | NE   |
| B-102                 | Survey Pending   | 23.0                                     | 0.3                 | 4.0  | 7.7                | NE              | NE      | NE               | NE  | >11.0                | NE                | NE      | NE                                   | 7.5  |
| B-103                 | Survey Pending   | 26.0                                     | 0.5                 | 5.5  | 4.0/>8.5           | NE              | NE      | 2.0              | NE  | 5.5                  | NE                | NE      | NE                                   | 7.2  |
| B-104 (MW)            | Survey Pending   | 24.7                                     | 0.3                 | 5.2  | >12.7              | 6.0             | NE      | NE               | NE  | NE                   | NE                | NE      | NE                                   | 5.3  |
| B-105                 | Survey Pending   | 14.8                                     | 0.3                 | 3.7  | NE                 | >10.8           | NE      | NE               | NE  | NE                   | NE                | NE      | NE                                   | 4.0  |
| B-107 (MW)            | Survey Pending   | 18.5                                     | 0.3                 | NE   | 9.7                | NE              | NE      | NE               | NE  | NE                   | 4.5               | >4.0    | 14.5                                 | 5.0  |
| B-108                 | Survey Pending   | 16.0                                     | 1.2                 | 6.8  | NE                 | >8.0            | NE      | NE               | NE  | NE                   | NE                | NE      | NE                                   | 7.4  |
| B-109                 | Survey Pending   | 21.0                                     | 1.0                 | 8.5  | 5.5                | 2.5             | NE      | NE               | NE  | 3.5                  | NE                | NE      | NE                                   | 6.5  |
| B-110 (MW)            | Survey Pending   | 21.0                                     | NE                  | 2.0  | 5.5                | NE              | NE      | NE               | NE  | 10.0/<br>>3.5        | NE                | NE      | NE                                   | 5.8  |
| B-111                 | Survey Pending   | 16.0                                     | 0.5                 | 1.7  | 4.0                | 4.3             | NE      | 2.0              | NE  | >3.5                 | NE                | NE      | NE                                   | 5.5  |
| B-112                 | Survey Pending   | 26.0                                     | 0.7                 | 1.3  | NE                 | 5.5             | NE      | 2.0              | NE  | >16.5                | NE                | NE      | NE                                   | 5.1  |
| B-113 (MW)            | Survey Pending   | 26.0                                     | 0.3                 | 1.7  | NE                 | 7.5/2.0/<br>5.0 | NE      | 1.0              | NE  | 2.0/7.5/<br>3.0/>3.5 | NE                | NE      | NE                                   | 5.5  |



Table 2-2
Summary of Subsurface Conditions

| Exploration    | Approximate                                     | Approximate               |                        |          |                    |             | Stratum  | Thickness (      | ft)        |              |                   |          | Approximate - Depth to Top | Approximate  Depth to           |
|----------------|---|---------------------------|------------------------|----------|--------------------|-------------|----------|------------------|------------|--------------|-------------------|----------|----------------------------|---------------------------------|
| Number         | Ground Surface<br>Elevation (ft) <sup>(1)</sup> | Exploration<br>Depth (ft) | Pavement<br>or Topsoil | Fill     | Sand and<br>Gravel | Silty Sand  | Sand     | Organic<br>Soils | Sandy Silt | Silty Clay   | Weathered<br>Rock | Bedrock  | of Bedrock<br>(ft)         | Groundwater (ft) <sup>(2)</sup> |
| B-114          | Survey Pending                                  | 16.0                      | 0.3                    | NE       | NE                 | >4.0        | 11.7     | NE               | NE         | NE           | NE                | NE       | NE                         | 4.0                             |
| B-115<br>B-116 | Survey Pending<br>Survey Pending                | 21.0<br>16.0              | 0.2<br>0.2             | NE<br>NE | NE<br>NE           | 11.8<br>9.8 | NE<br>NE | NE<br>NE         | NE<br>NE   | >9.0<br>>6.0 | NE<br>NE          | NE<br>NE | NE<br>NE                   | 4.3<br>3.7                      |

#### Notes:

- 1. Ground surface elevations have not yet been acquired. Survey will be scheduled in the Spring 2018 when conditions are favorable for locating the boreholes.
- 2. Indicated depths are depths below ground surface at the time of drilling.
- 3. Groundwater levels were measured at the completion of drilling and may not represent static groundwater conditions.

#### **Abbreviations:**

NE - Not Encountered

NR - Not Recorded

> - Layer not fully penetrated

/ - Layer encountered twice in test boring



#### Table 2-2 Continued Summary of Subsurface Conditions

| Exploration    | Approximate                                     | Approximate               |                        |      |                    |            | Stratum <sup>-</sup> | Thickness (      | ft)        |            |                   |         | Approximate                     | Approximate  Depth to            |
|----------------|---|---------------------------|------------------------|------|--------------------|------------|----------------------|------------------|------------|------------|-------------------|---------|---------------------------------|----------------------------------|
| Number         | Ground Surface<br>Elevation (ft) <sup>(1)</sup> | Exploration<br>Depth (ft) | Pavement<br>or Topsoil | Fill | Sand and<br>Gravel | Silty Sand | Sand                 | Organic<br>Soils | Sandy Silt | Silty Clay | Weathered<br>Rock | Bedrock | Depth to Top<br>of Bedrock (ft) | Groundwater  (ft) <sup>(2)</sup> |
| Construction F | Package 2                                       |                           |                        |      |                    |            |                      |                  |            |            |                   |         |                                 |                                  |
| B-60           | Survey Pending                                  | 8.5                       | 0.5                    | NE   | 3.0                | NE         | NE                   | NE               | NE         | NE         | NE                | >5.0    | 3.5                             | NE                               |
| B-61           | Survey Pending                                  | 14.0                      | 1.0                    | NE   | 5.0                | NE         | NE                   | NE               | NE         | NE         | 3.0               | >5.0    | 9.0                             | 6.0                              |
| B-62           | Survey Pending                                  | 14.1                      | 0.3                    | 1.7  | 12.1               | NE         | NE                   | NE               | NE         | NE         | >4.6              | NE      | NE                              | 6.0                              |
| B-63           | Survey Pending                                  | 14.3                      | NE                     | NE   | >14.3              | NE         | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 6.2                              |
| B-64           | Survey Pending                                  | 15.3                      | NE                     | 6.0  | >9.3               | NE         | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 11.8                             |
| B-65           | Survey Pending                                  | 15.0                      | 0.3                    | NE   | >14.7              | NE         | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 9.0                              |
| B-66           | Survey Pending                                  | 14.2                      | 0.3                    | NE   | 4.2/>3.2           | NE         | NE                   | NE               | 6.5        | NE         | NE                | NE      | NE                              | 7.0                              |
| B-67           | Survey Pending                                  | 14.8                      | 0.5                    | 4.5  | NE                 | >9.8       | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 2.5                              |
| B-68           | Survey Pending                                  | 15.5                      | 0.3                    | 4.7  | NE                 | >10.5      | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 6.1                              |
| B-69           | Survey Pending                                  | 14.8                      | 0.5                    | 3.5  | NE                 | >10.8      | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 11.5                             |
| B-70           | Survey Pending                                  | 13.5                      | 0.3                    | NE   | >13.2              | NE         | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 3.2                              |
| B-71           | Survey Pending                                  | 15.5                      | 0.5                    | NE   | >15.0              | NE         | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | NE                               |
| B-72           | Survey Pending                                  | 13.5                      | 0.4                    | NE   | >13.1              | NE         | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 3.0                              |
| B-73           | Survey Pending                                  | 14.3                      | 0.5                    | NE   | >13.8              | NE         | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 8.0                              |
| B-74           | Survey Pending                                  | 16.0                      | 0.3                    | NE   | >15.7              | NE         | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 7.0                              |
| B-75A (MW)     | Survey Pending                                  | 14.5                      | 0.8                    | NE   | 7.7                | NE         | NE                   | NE               | NE         | NE         | NE                | >6.0    | 8.5                             | 5.0                              |
| B-76           | Survey Pending                                  | 14.8                      | 0.5                    | 1.5  | >10.8              | NE         | NE                   | NE               | NE         | 4.0        | NE                | NE      | NE                              | NE                               |
| B-77           | Survey Pending                                  | 15.0                      | 0.3                    | NE   | >10.5              | NE         | NE                   | NE               | 4.2        | NE         | NE                | NE      | NE                              | 8.0                              |
| B-78           | Survey Pending                                  | 14.5                      | 0.3                    | NE   | 7.7/>2.5           | NE         | NE                   | NE               | 4.0        | NE         | NE                | NE      | NE                              | 7.5                              |
| B-79           | Survey Pending                                  | 16.0                      | 0.3                    | NE   | 8.4                | NE         | NE                   | NE               | 3.3        | >4.0       | NE                | NE      | NE                              | 9.5                              |
| B-80           | Survey Pending                                  | 16.0                      | 0.5                    | 3.5  | >12.0              | NE         | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 8.5                              |
| B-81           | Survey Pending                                  | 26.0                      | 0.3                    | 4.7  | >21.0              | NE         | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 9.0                              |
| B-82A          | Survey Pending                                  | 26.0                      | 0.3                    | 1.7  | 6.0                | >17.5      | NE                   | NE               | 0.5        | NE         | NE                | NE      | NE                              | 8.5                              |

#### Notes:

- Ground surface elevations have not yet been acquired. Survey will be scheduled in the Spring 2018 when conditions are favorable for locating the boreholes.
- 2. Indicated depths are depths below ground surface at the time of drilling.
- 3. Groundwater levels were measured at the completion of drilling and may not represent static groundwater conditions.

#### Abbreviations:

NE - Not Encountered

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> - Layer not fully penetrated

/ - Layer encountered twice in test boring



#### Table 2-2 Continued Summary of Subsurface Conditions

| Exploration  | Approximate                                     | Approximate               |                        |      |                    |             | Stratum <sup>*</sup> | Thickness (      | ft)        |            |                   |         | Approximate                     | Approximate  Depth to           |
|--------------|---|---------------------------|------------------------|------|--------------------|-------------|----------------------|------------------|------------|------------|-------------------|---------|---------------------------------|---------------------------------|
| Number       | Ground Surface<br>Elevation (ft) <sup>(1)</sup> | Exploration<br>Depth (ft) | Pavement<br>or Topsoil | Fill | Sand and<br>Gravel | Silty Sand  | Sand                 | Organic<br>Soils | Sandy Silt | Silty Clay | Weathered<br>Rock | Bedrock | Depth to Top<br>of Bedrock (ft) | Groundwater (ft) <sup>(2)</sup> |
| Construction | Package 3                                       |                           |                        |      |                    |             |                      |                  |            |            |                   |         |                                 |                                 |
| B-1          | Survey Pending                                  | 16.0                      | 0.5                    | NE   | >15.5              | NE          | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | NE                              |
| B-2          | Survey Pending                                  | 16.0                      | 3.5                    | NE   | >12.5              | NE          | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 10.9                            |
| B-3          | Survey Pending                                  | 14.0                      | 0.2                    | NE   | 11.8               | NE          | NE                   | NE               | NE         | NE         | >2.0              | NE      | NE                              | 5.2                             |
| B-4          | Survey Pending                                  | 16.0                      | 1.0                    | NE   | >15.0              | NE          | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 9.0                             |
| B-5          | Survey Pending                                  | 16.0                      | 0.7                    | NE   | >15.3              | NE          | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | NE                              |
| B-6          | Survey Pending                                  | 16.0                      | 1.5                    | NE   | 10.5               | >4.0        | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | NE                              |
| B-7          | Survey Pending                                  | 24.7                      | 3.0                    | NE   | 14.0               | >7.7        | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 11.1                            |
| B-8A         | Survey Pending                                  | 16.0                      | 0.8                    | NE   | >15.2              | NE          | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 14.0                            |
| B-9 (MW)     | Survey Pending                                  | 21.0                      | 1.0                    | NE   | >20.0              | NE          | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 9.0                             |
| B-10         | Survey Pending                                  | 16.0                      | 0.7                    | 3.3  | >12.0              | NE          | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | NE                              |
| B-11         | Survey Pending                                  | 16.0                      | 0.5                    | NE   | 7.5/>4.0           | 4.0         | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | NE                              |
| B-12         | Survey Pending                                  | 16.0                      | 0.2                    | NE   | >15.8              | NE          | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | NE                              |
| B-13         | Survey Pending                                  | 16.0                      | 1.0                    | 1.0  | >4.0               | 10.0        | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | NE                              |
| B-14         | Survey Pending                                  | 16.0                      | 0.7                    | NE   | >15.3              | NE          | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 12.0                            |
| B-16         | Survey Pending                                  | 16.0                      | 0.5                    | 1.5  | >14.0              | NE          | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | NE                              |
| B-17 (MW)    | Survey Pending                                  | 21.0                      | 0.5                    | NE   | >20.5              | NE          | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 8.4                             |
| B-18         | Survey Pending                                  | 14.0                      | 0.3                    | 1.7  | 5.5                | 4.5         | NE                   | NE               | NE         | NE         | >2.0              | NE      | NE                              | 1.5                             |
| B-19         | Survey Pending                                  | 14.0                      | 0.3                    | 6.2  | NE                 | NE          | NE                   | NE               | NE         | NE         | 2.5               | >5.0    | 9.0                             | 9.3                             |
| B-20 (MW)    | Survey Pending                                  | 14.0                      | 0.5                    | NE   | 6.0                | 5.5         | NE                   | NE               | NE         | NE         | >2.0              | NE      | NE                              | 4.1                             |
| B-21         | Survey Pending                                  | 15.0                      | 4.0                    | 7.5  | >3.5               | NE          | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 12.0                            |
| B-22         | Survey Pending                                  | 16.5                      | 0.3                    | 2.7  | 6.2                | NE          | NE                   | NE               | NE         | NE         | 2.3               | >5.0    | 11.5                            | 7.8                             |
| B-23         |   |                           |                        |      | To                 | Be Conducte | ed In the            | Spring of 2      | 2018       |            |                   |         |                                 |                                 |
| B-24         | Survey Pending                                  | 21.0                      | 1.0                    | 3.8  | >16.2              | NE          | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 14.5                            |
| B-25 (MW)    | Survey Pending                                  | 15.0                      | 0.3                    | 3.2  | >11.5              | NE          | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 8.5                             |
| B-26         | Survey Pending                                  | 15.0                      | 0.3                    | 5.2  | >9.5               | NE          | NE                   | NE               | NE         | NE         | NE                | NE      | NE                              | 8.0                             |



#### Table 2-2 Continued Summary of Subsurface Conditions

| Exploration | Approximate                                     | Approximate               |                     |      |                    |            | Stratum | Thickness (      | ft)        |            |                   |         | Approximate                     | Approximate<br>Depth to            |
|-------------|---|---------------------------|---------------------|------|--------------------|------------|---------|------------------|------------|------------|-------------------|---------|---------------------------------|------------------------------------|
| Number      | Ground Surface<br>Elevation (ft) <sup>(1)</sup> | Exploration<br>Depth (ft) | Pavement or Topsoil | Fill | Sand and<br>Gravel | Silty Sand | Sand    | Organic<br>Soils | Sandy Silt | Silty Clay | Weathered<br>Rock | Bedrock | Depth to Top<br>of Bedrock (ft) | Groundwater<br>(ft) <sup>(2)</sup> |
| B-27        | Survey Pending                                  | 16.0                      | 0.3                 | NE   | >15.7              | NE         | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | 6.5                                |
| B-28        | Survey Pending                                  | 16.0                      | 0.3                 | NE   | >15.7              | NE         | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | 14.5                               |
| B-29        | Survey Pending                                  | 16.0                      | 0.3                 | 1.7  | >14.0              | NE         | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | 6.6                                |
| B-30        | Survey Pending                                  | 16.0                      | 0.4                 | 4.1  | >11.5              | NE         | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | 5.2                                |
| B-31        | Survey Pending                                  | 19.8                      | 1.2                 | NE   | >18.6              | NE         | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | 6.0                                |
| B-32        | Survey Pending                                  | 16.0                      | 3.0                 | 3.0  | >10.0              | NE         | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | NE                                 |
| B-33        | Survey Pending                                  | 16.0                      | 0.3                 | 1.7  | >14.0              | NE         | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | NE                                 |
| B-34        | Survey Pending                                  | 16.0                      | 0.7                 | NE   | >15.3              | NE         | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | NE                                 |
| B-35        | Survey Pending                                  | 16.0                      | 0.5                 | NE   | >15.5              | NE         | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | NE                                 |
| B-36        | Survey Pending                                  | 15.3                      | 0.3                 | 1.7  | >6.8               | NE         | 6.5     | NE               | NE         | NE         | NE                | NE      | NE                              | NE                                 |
| B-37        | Survey Pending                                  | 16.0                      | 0.3                 | 0.7  | >4.0               | NE         | 11.0    | NE               | NE         | NE         | NE                | NE      | NE                              | NE                                 |
| B-38        | Survey Pending                                  | 16.0                      | 0.7                 | 2.3  | 4.0                | NE         | 5.0     | NE               | >4.0       | NE         | NE                | NE      | NE                              | 8.5                                |
| B-39        | Survey Pending                                  | 17.0                      | 0.4                 | NE   | 3.6                | NE         | 11.1    | NE               | >1.9       | NE         | NE                | NE      | NE                              | 11.8                               |
| B-40        | Survey Pending                                  | 21.0                      | 0.2                 | 3.8  | 4.0                | NE         | NE      | NE               | >13.0      | NE         | NE                | NE      | NE                              | 5.2                                |
| B-41        | Survey Pending                                  | 16.0                      | 0.2                 | 3.3  | 4.5                | >8.0       | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | 4.1                                |
| B-42        | Survey Pending                                  | 21.0                      | 0.2                 | NE   | 5.8                | >15.0      | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | 3.2                                |
| B-43        | Survey Pending                                  | 16.0                      | 0.5                 | 1.5  | NE                 | 6.0/>4.0   | NE      | NE               | NE         | 4.0        | NE                | NE      | NE                              | 5.3                                |
| B-44        | Survey Pending                                  | 16.0                      | 1.0                 | NE   | 6.5                | NE         | >4.0    | NE               | 4.5        | >4.0       | NE                | NE      | NE                              | 7.0                                |
| B-45        | Survey Pending                                  | 16.0                      | 0.3                 | NE   | NE                 | NE         | NE      | NE               | 12.7       | >3.0       | NE                | NE      | NE                              | 5.4                                |
| B-46        | Survey Pending                                  | 16.0                      | 1.0                 | NE   | 7.0                | NE         | NE      | NE               | 4.0        | >4.0       | NE                | NE      | NE                              | 6.4                                |
| B-47        | Survey Pending                                  | 16.0                      | 1.0                 | NE   | >15.0              | NE         | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | 12.8                               |
| B-48        | Survey Pending                                  | 16.0                      | 0.5                 | NE   | 5.5                | >10.0      | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | 11.3                               |
| B-49        | Survey Pending                                  | 16.0                      | 0.8                 | 5.2  | >10.0              | NE         | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | 7.2                                |
| B-50        | Survey Pending                                  | 15.0                      | 1.0                 | NE   | >14.0              | NE         | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | NE                                 |
| B-51        | Survey Pending                                  | 14.4                      | 0.3                 | NE   | >14.1              | NE         | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | 7.7                                |
| B-52        | Survey Pending                                  | 14.5                      | 0.3                 | NE   | 8.7                | NE         | NE      | NE               | NE         | NE         | >5.5              | NE      | NE                              | 5.2                                |
| B-53 (MW)   | Survey Pending                                  | 11.0                      | 0.3                 | NE   | 2.6                | NE         | NE      | NE               | NE         | NE         | 3.1               | >5.0    | 6.0                             | 6.0                                |
| B-54        | Survey Pending                                  | 14.1                      | 0.4                 | 1.6  | 11.0               | NE         | NE      | NE               | NE         | NE         | >1.1              | NE      | NE                              | 11.0                               |
| B-55        | Survey Pending                                  | 13.0                      | 1.5                 | NE   | 6.5                | NE         | NE      | NE               | NE         | NE         | >5.0              | NE      | NE                              | 5.8                                |
| B-56        | Survey Pending                                  | 15.0                      | 0.5                 | NE   | >14.5              | NE         | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | 7.2                                |
| B-57        | Survey Pending                                  | 14.0                      | 0.5                 | NE   | 5.5                | NE         | NE      | NE               | NE         | NE         | 3.0               | >5.0    | 9.0                             | 5.8                                |
| B-58        | Survey Pending                                  | 10.0                      | 0.4                 | NE   | >9.6               | NE         | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | NE                                 |



#### Table 2-2 Continued Summary of Subsurface Conditions

| Exploration | Approximate                                     | Approximate               |                        |      |                    |            | Stratum | Thickness (      | ft)        |            |                   |         | Approximate                     | Approximate Depth to |
|-------------|---|---------------------------|------------------------|------|--------------------|------------|---------|------------------|------------|------------|-------------------|---------|---------------------------------|----------------------|
| Number      | Ground Surface<br>Elevation (ft) <sup>(1)</sup> | Exploration<br>Depth (ft) | Pavement<br>or Topsoil | Fill | Sand and<br>Gravel | Silty Sand | Sand    | Organic<br>Soils | Sandy Silt | Silty Clay | Weathered<br>Rock | Bedrock | Depth to Top<br>of Bedrock (ft) | Groundwater          |
| B-59        | Survey Pending                                  | 16.0                      | 0.8                    | 5.2  | >10.0              | NE         | NE      | NE               | NE         | NE         | NE                | NE      | NE                              | NE                   |

#### Notes:

- Ground surface elevations have not yet been acquired. Survey will be scheduled in the Spring 2018 when conditions are favorable for locating the boreholes.
- 2. Indicated depths are depths below ground surface at the time of drilling.
- 3. Groundwater levels were measured at the completion of drilling and may not represent static groundwater conditions.

#### Abbreviations:

NE - Not Encountered

NR - Not Recorded

> - Layer not fully penetrated

/ - Layer encountered twice in test boring



Table 2-3
Summary of Groundwater Monitoring Well Readings

| Monitoring Well<br>Number | Ground Surface  Elevation (1) | Depth to<br>Groundwater (ft) <sup>(2)</sup> |
|---------------------------|-------------------------------|---|
|                           |                               | 2/27/2018                                   |
| B-9 (MW)                  | Survey Pending                | 8.32  |
| B-17 (MW)                 | Survey Pending                | NE  |
| B-20 (MW)                 | Survey Pending                | 3.40  |
| B-25 (MW)                 | Survey Pending                | 8.12  |
| B-53 (MW)                 | Survey Pending                | 6.90  |
| B-75A (MW)                | Survey Pending                | 5.70  |
| B-93 (MW)                 | Survey Pending                | NE  |
| B-100 (MW)                | Survey Pending                | 13.77                                       |
| B-104 (MW)                | Survey Pending                | 8.15  |
| B-107 (MW)                | Survey Pending                | 7.08  |
| B-110 (MW)                | Survey Pending                | 6.55  |
| B-113 (MW)                | Survey Pending                | 2.50  |

#### Notes:

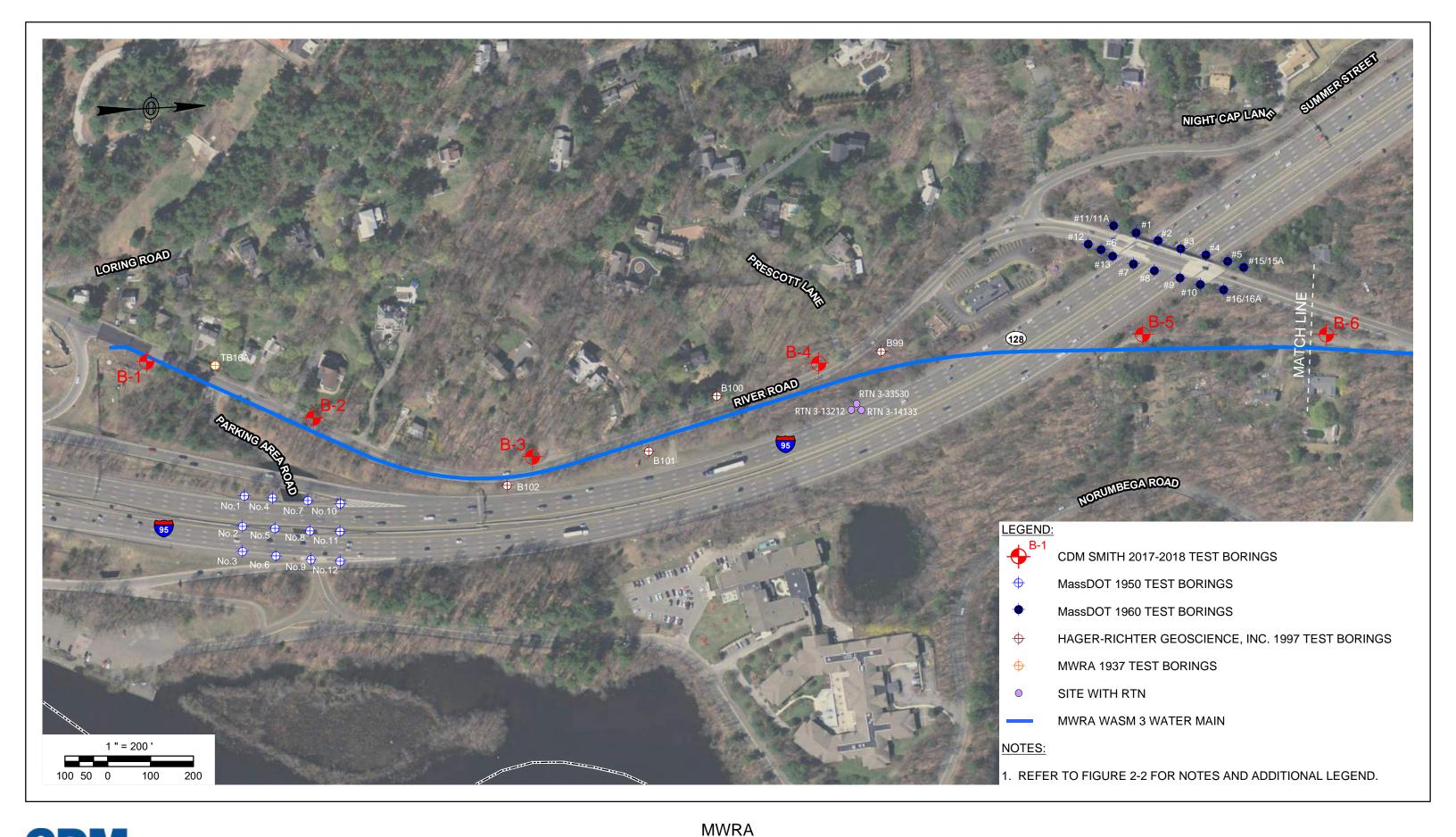
- 1. Ground surface elevations have not yet been acquired. Survey will be scheduled in the Spring 2018 when conditions are favorable for locating the boreholes.
- 2. Indicated depths are depths below ground surface as measured on the date identified.

#### **Abbreviations:**

ft - feet

NE - Not Encountered

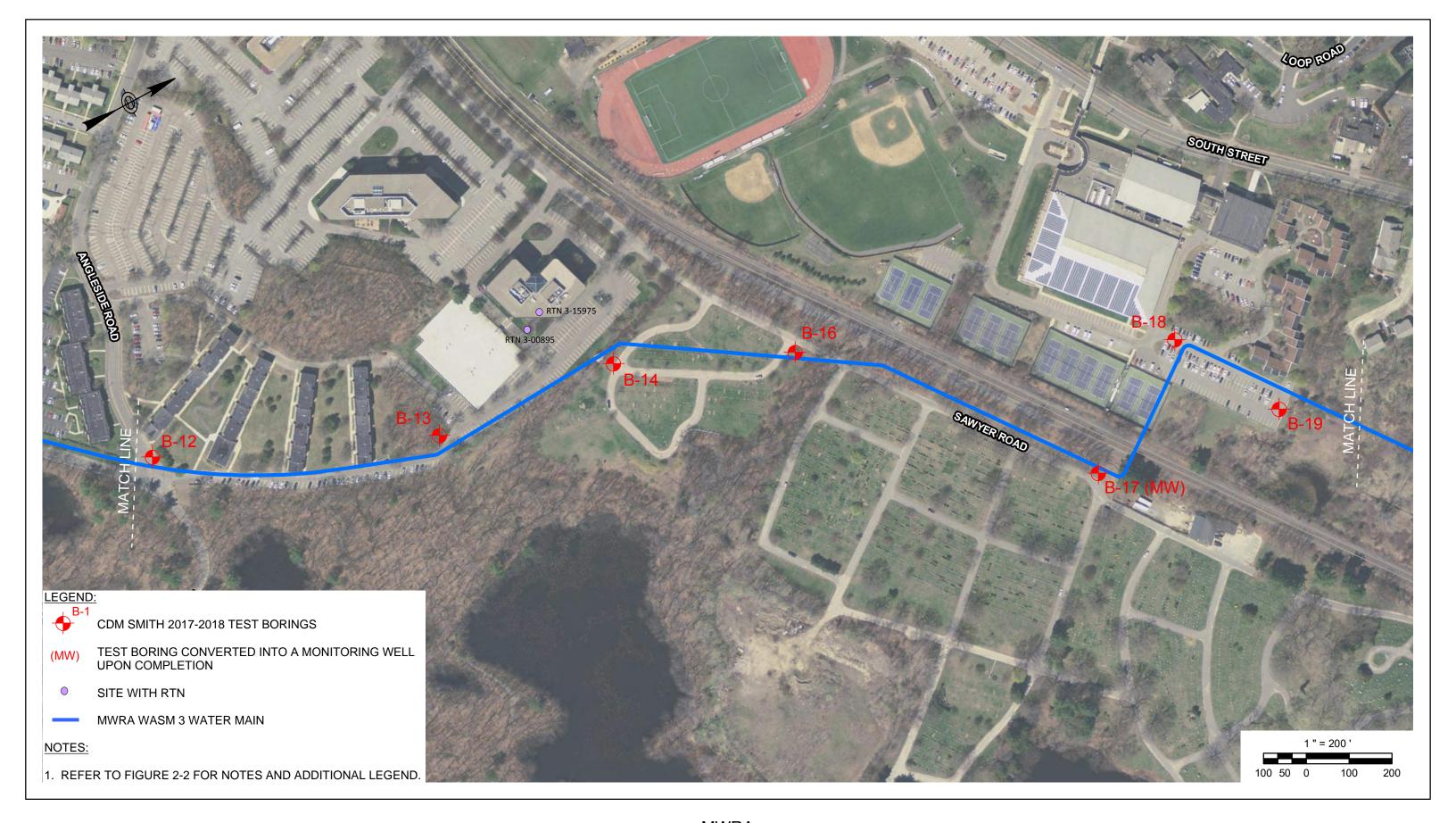




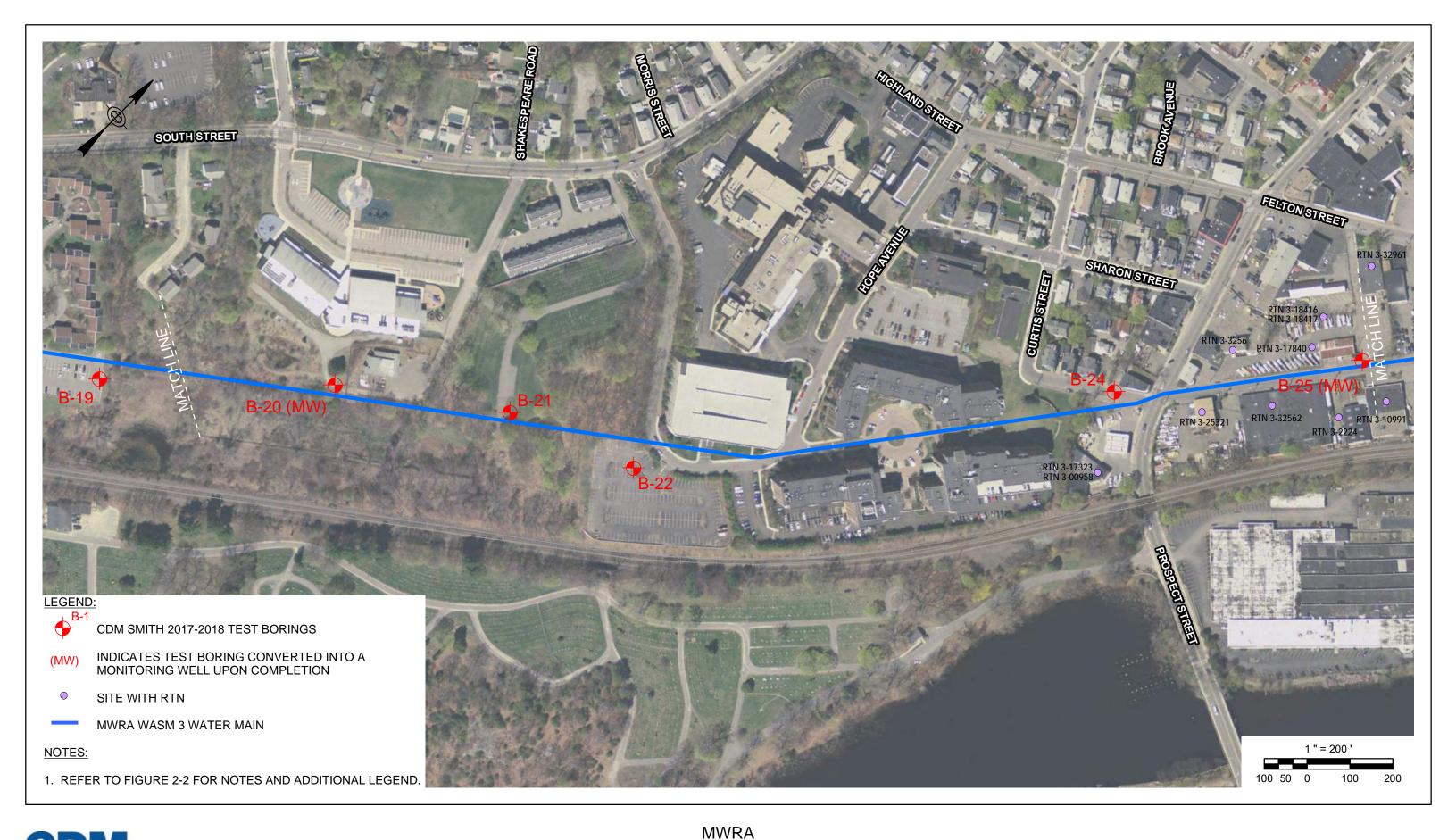




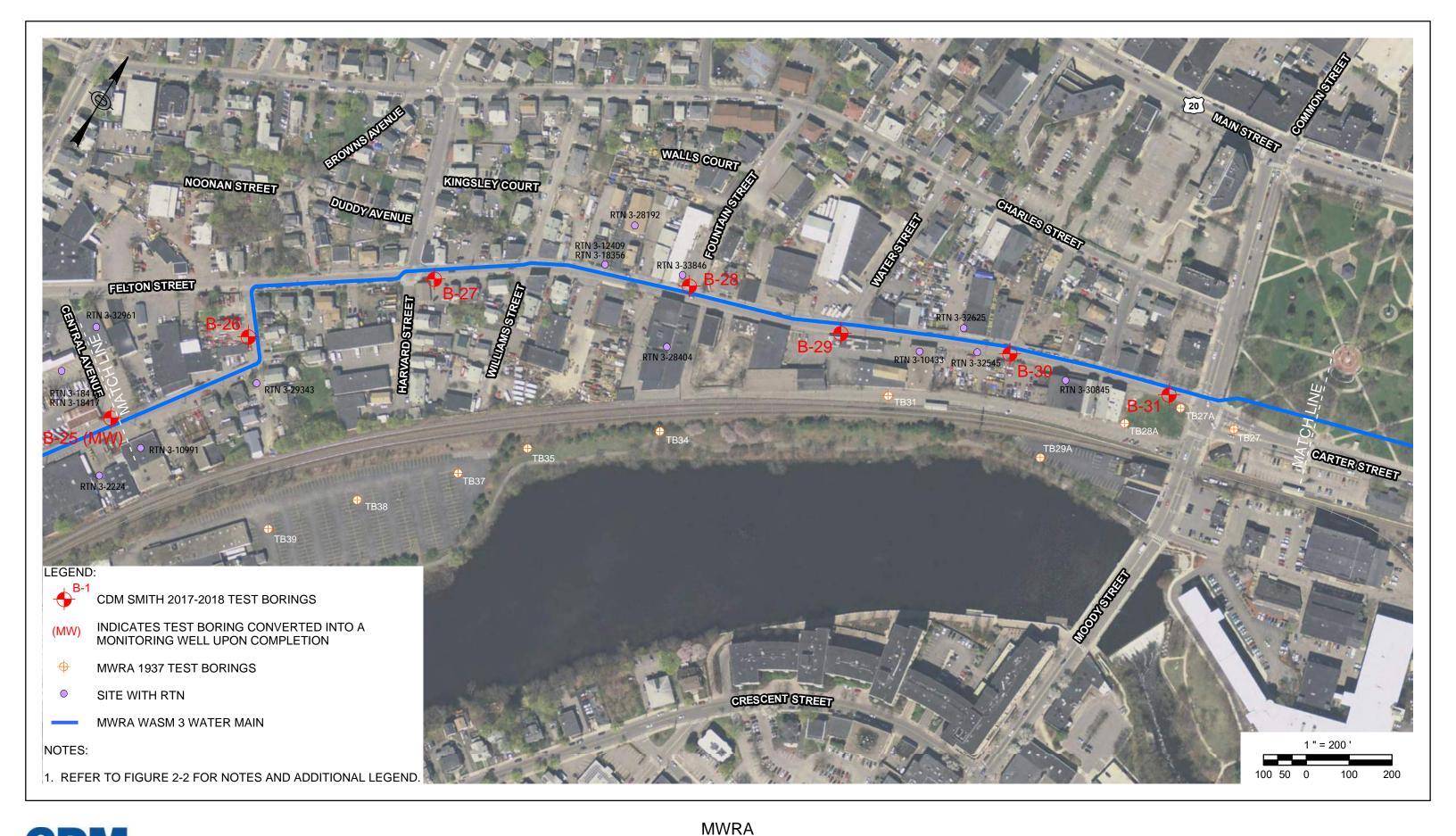












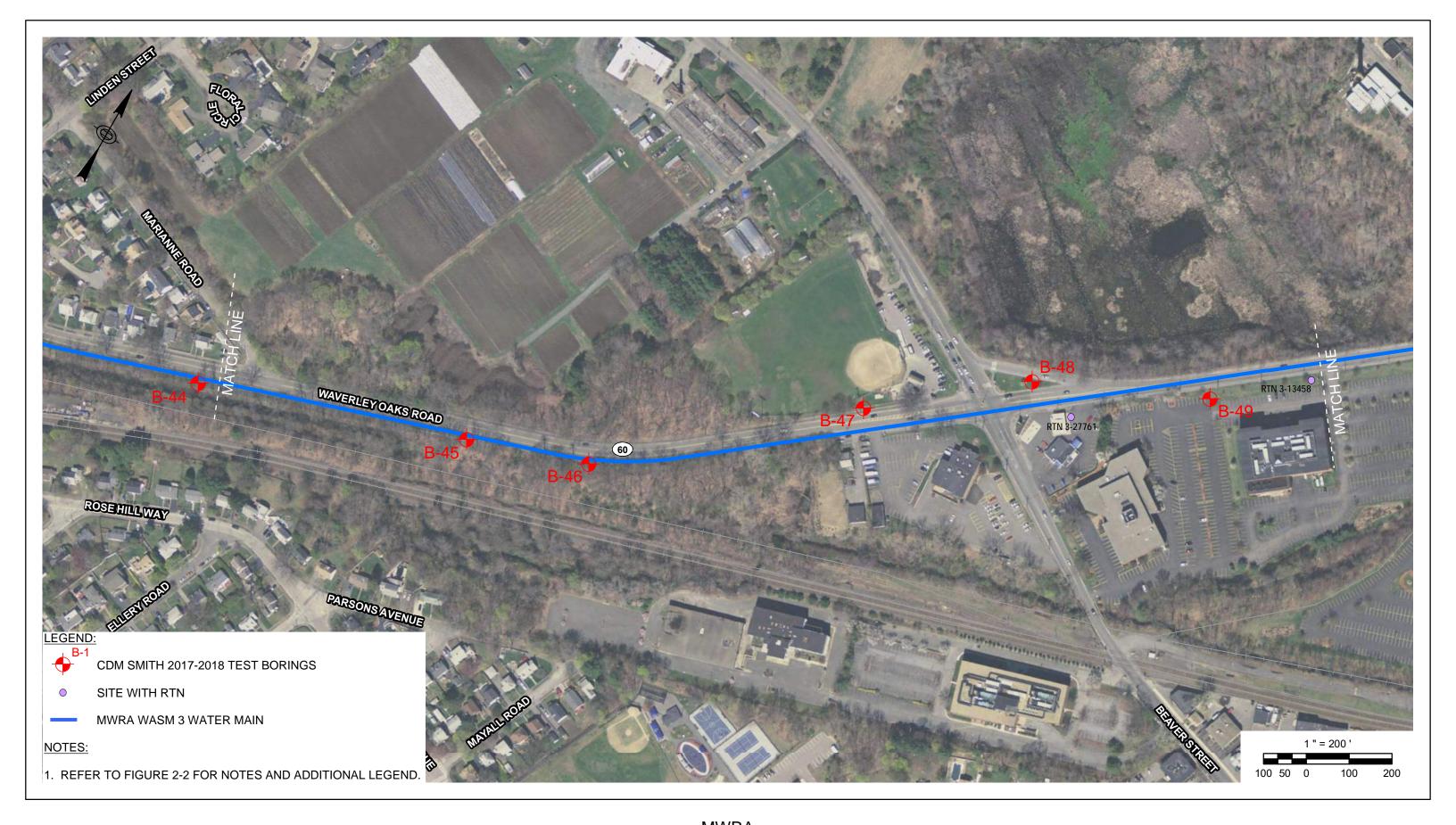








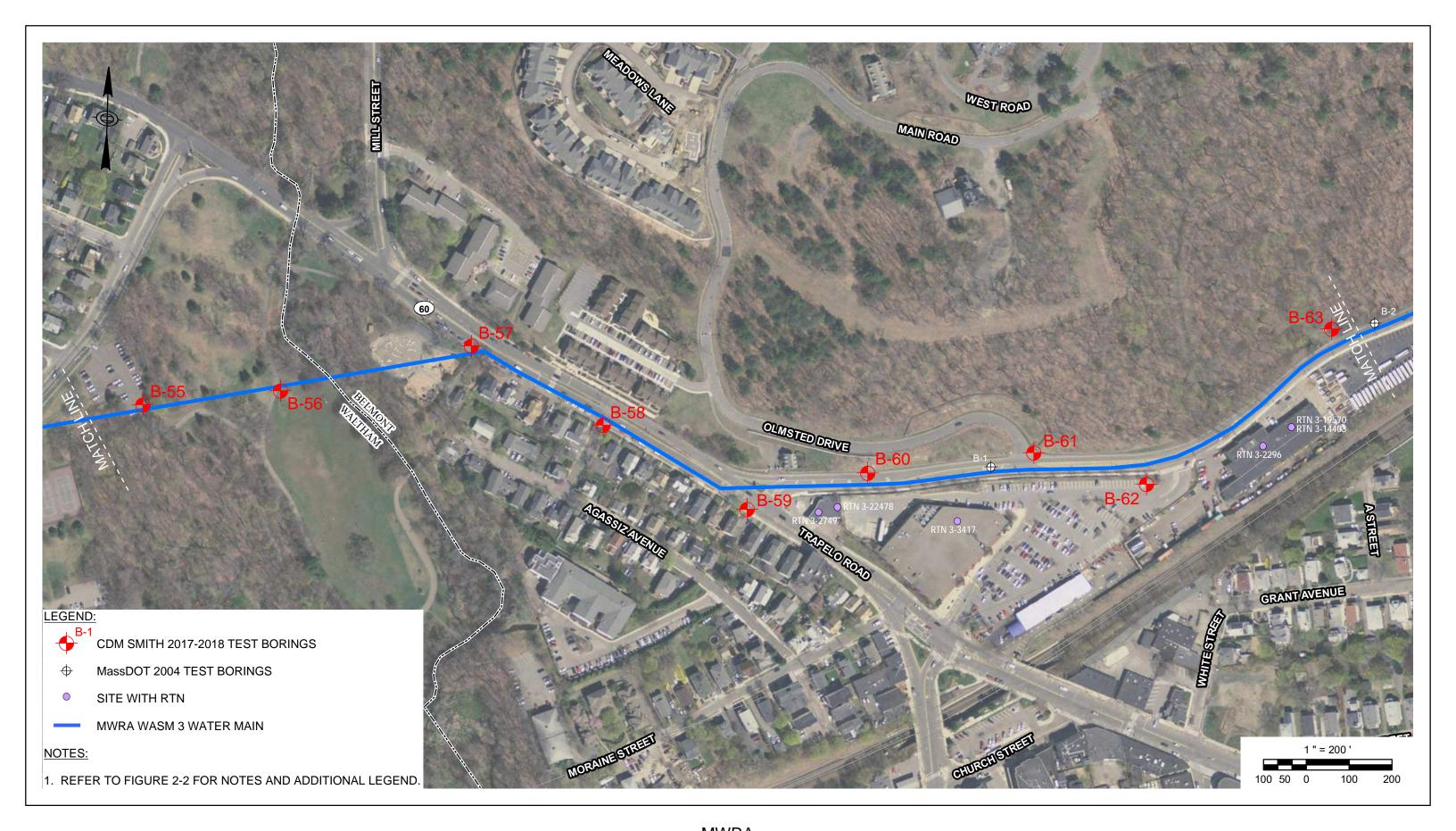
















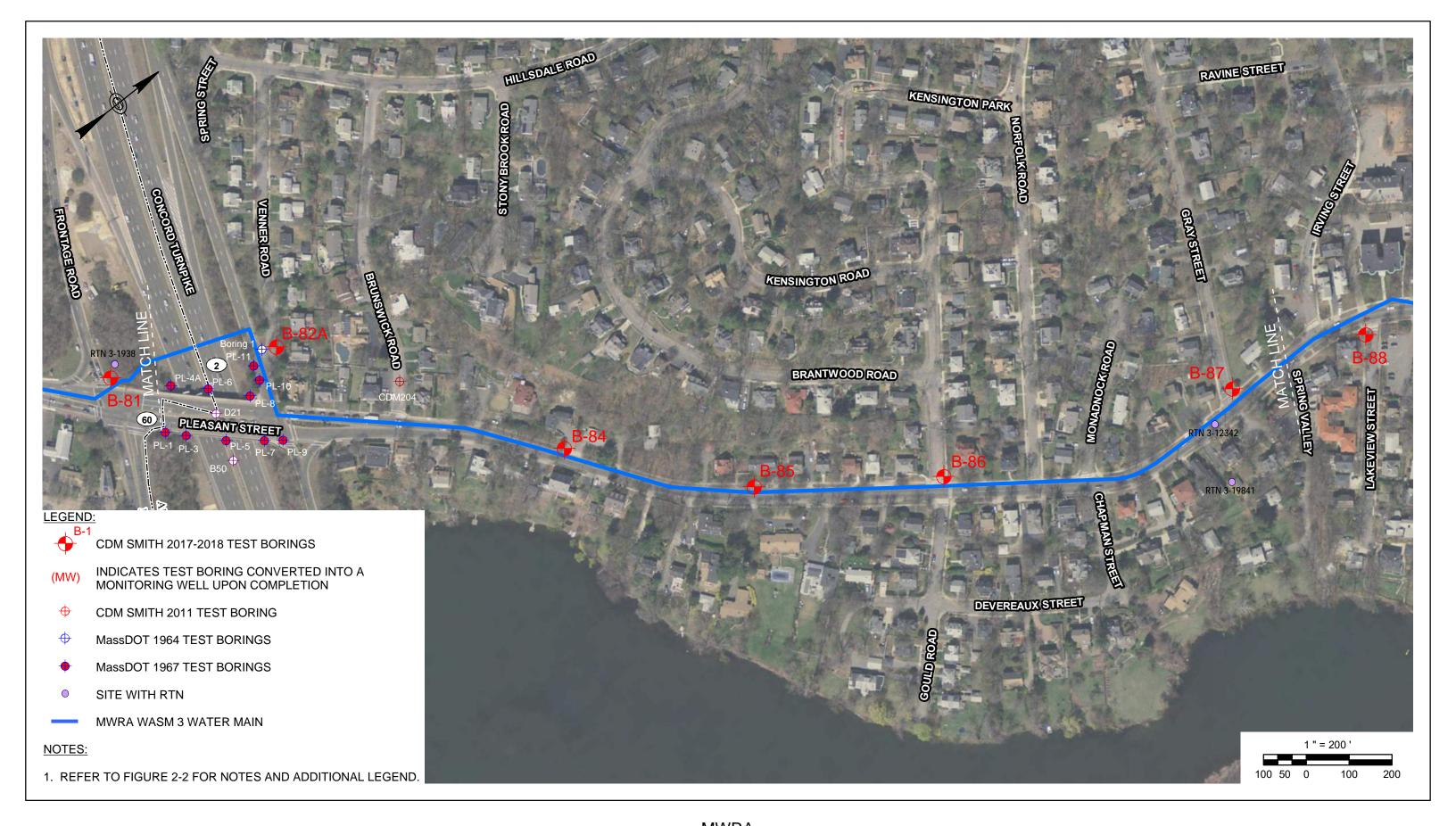








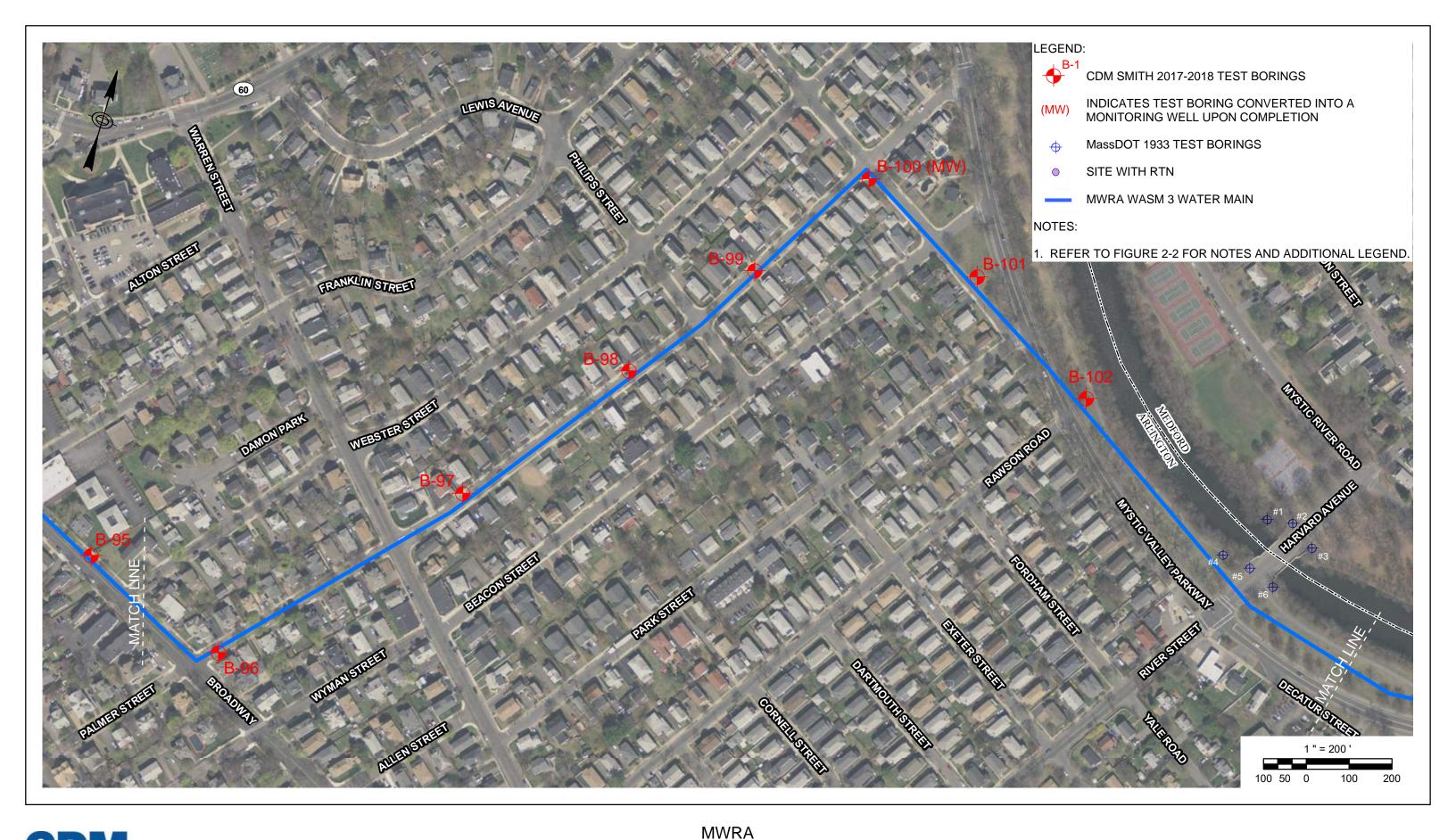




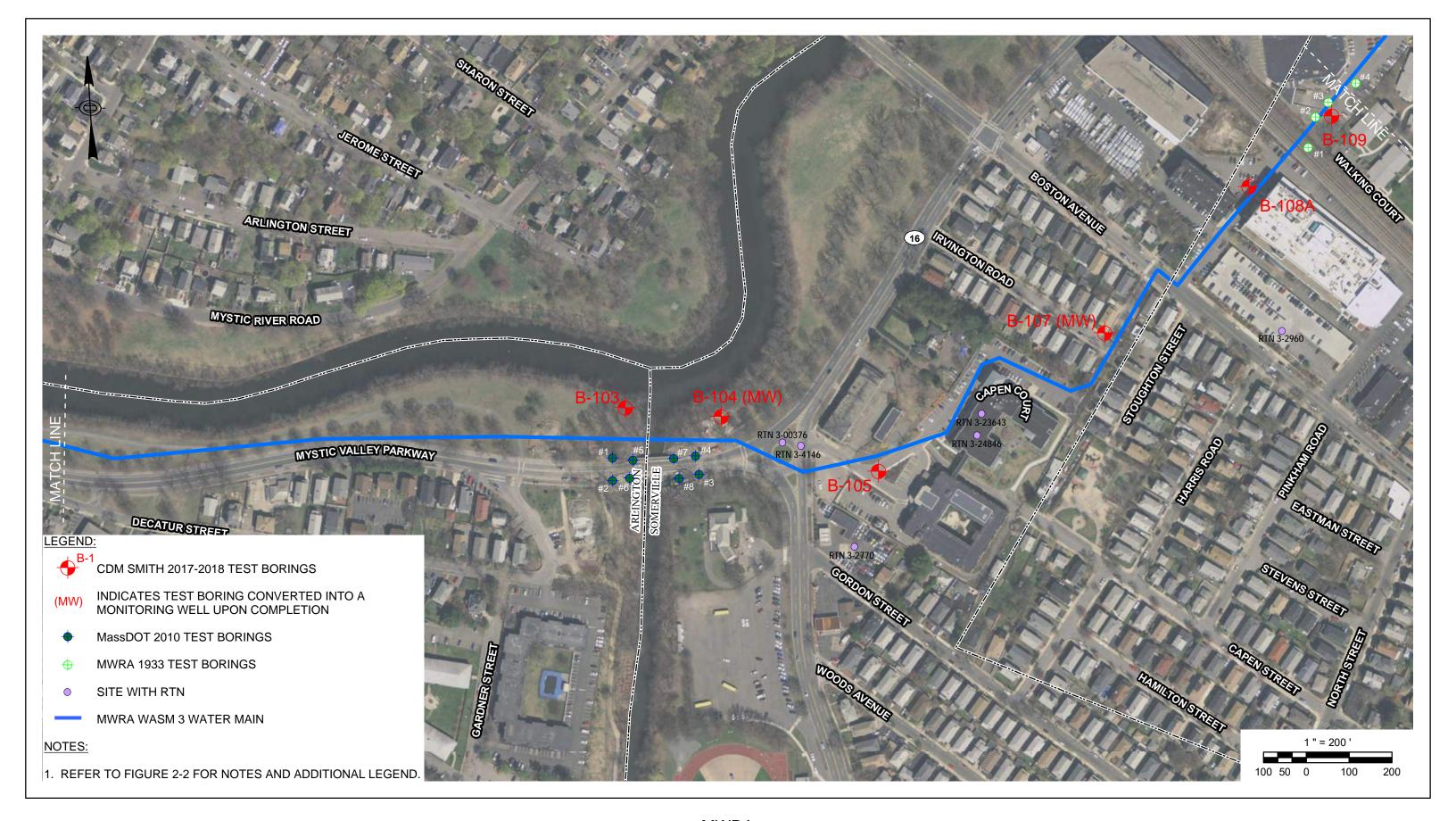


















## Appendix A

Existing Test Boring Logs



# CDM Smith 2011 Test Boring Arlington, MA

Sheet 1 of 1

### **Boring Number:** CDM-204

Client: Green International Affiliates Project Location: Arlington, MA

Project Name: MWRA - Contract 6540

Project Number: 33341-82080

Drilling Contractor/Driller: Soil Exploration / George Guinto

Drilling Method/Casing/Core Barrel Size: Hollow Stem Auger / 4/

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2

Bore Hole Location: Brunswick Ave

N: 2973476 E: 747149

Drilling Date: Start: 6/15/2011 End: 6/15/2011

Surface Elevation (ft.): 54.1

Total Depth (ft.): 15.5

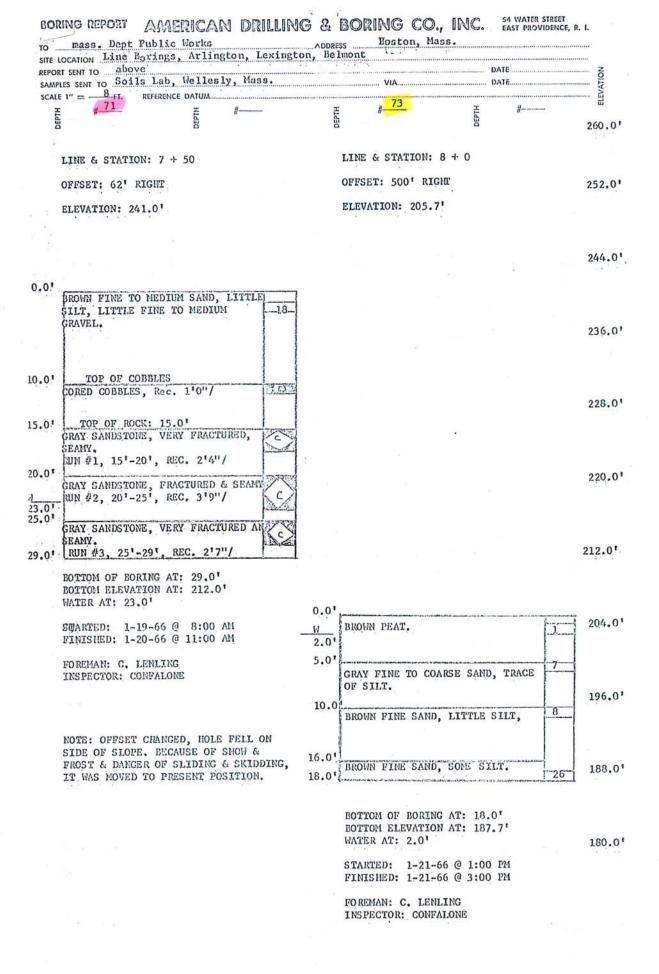
Depth to Initial Water Level (ft): Depth Date

NE

Abandonment Method: Backfill with cuttings, cold patch

| Ele<br>Dej<br>(fi                                 | 1    | Sample | Sample        | Sample                               | Length (in)<br>Blows per | Sample<br>Recovery (in) | Split Spoon<br>Size (0.D.) | Graphic Log    | Strata                 | Materi  | al Description                            | Ģ.                    | Remark                           |
|---|------|--------|---------------|--------------------------------------|--------------------------|-------------------------|----------------------------|----------------|------------------------|---|---|-----------------------|----------------------------------|
| -   | 1    |        |               |                                      |                          |                         |                            | ***            |                        | Asphalt   |   |                       |                                  |
| -   | -    | ss     | S-1           | 24                                   | 4 4 2 6                  | 10                      |                            |                | Ē                      | Moist, loose, brown,<br>and fine to coarse G                                    | medium to coarse<br>RAVEL, trace silt     | SAND                  |                                  |
| -   | +    |        |               |                                      |                          |                         | 8                          | <b>~</b>       |                        |   |   |                       | Hard drilling - ri               |
| 49.1  |      | s      | S-2           | 24                                   | 29<br>46<br>50<br>48     | 22                      | 0.                         | (C)            |                        | Moist, very dense, bro<br>some fine gravel, trace                               | own, fine to coarse<br>e silt             | SAND,                 | chatter                          |
| _   | - 88 | 8      | S-3           | 24                                   | 5<br>50<br>45<br>45      | 17                      | 0.0                        | )<br>()        | avei                   | Moist, very dense, dar<br>SAND, some silt, little                               | k gray, fine to coar<br>fine gravel       | rse                   |                                  |
| 44.1  | SS   |        | S-4           | 24                                   | 56<br>44<br>30<br>30     | 16                      |                            | Sand and Grand |                        | Moist, very dense, brow<br>some fine to coarse gra                              | vn, fine to coarse S<br>avel, little silt | SAND,                 | Rock fragments in<br>op of spoon |
| 39.1<br>15  | SS   | S      | 3-5           | 7                                    | 40 0/1"                  | 5                       |                            |                |                        | Moist, very dense, browr<br>SRAVEL, some fine to c<br>Boring terminated at 15.5 |   | silt                  |                                  |
| 34.1  |      | -      | Types<br>HP-H | vdro F                               | Punch                    |                         |                            |                | Cons                   | istency vs Blowcount/Foo  | at .                                      | Diam's 4              |                                  |
| - Auger/C<br>- Californ<br>- 1.5" Ro<br>- 2" Rock | Core | е      | WS - V        | olit Sp<br>nelby<br>/ash S<br>eoprob | oon<br>Fube<br>Sample    | IIVI IIAn               | Se: 0-                     | ular (         | Sand)<br>ense;<br>Dens | Eine Gr   | ained (Clay): Stiff: 8-15 V. Stiff: 15-30 | and<br>some<br>little | 35-50%<br>20-35%<br>10-20%       |
| eviewe  | a pi | /: G   | eoff B        | . Sc                                 | hwar                     | tz                      | -                          |                | Т                      | Date: 12/8/2011   | Hard: >30                                 | trace<br>moisture     | <10%<br>lensity, color           |

## MassDOT 1966 Project Arlington, MA



## MWRA Proposed Distribution Line from Shaft 9

Medford, MA

#### NEW ENGLAND TEST BORING CORP. TEST BORING REPORT

Contract No. C-348 BOSTON, MASSACHUSETTS

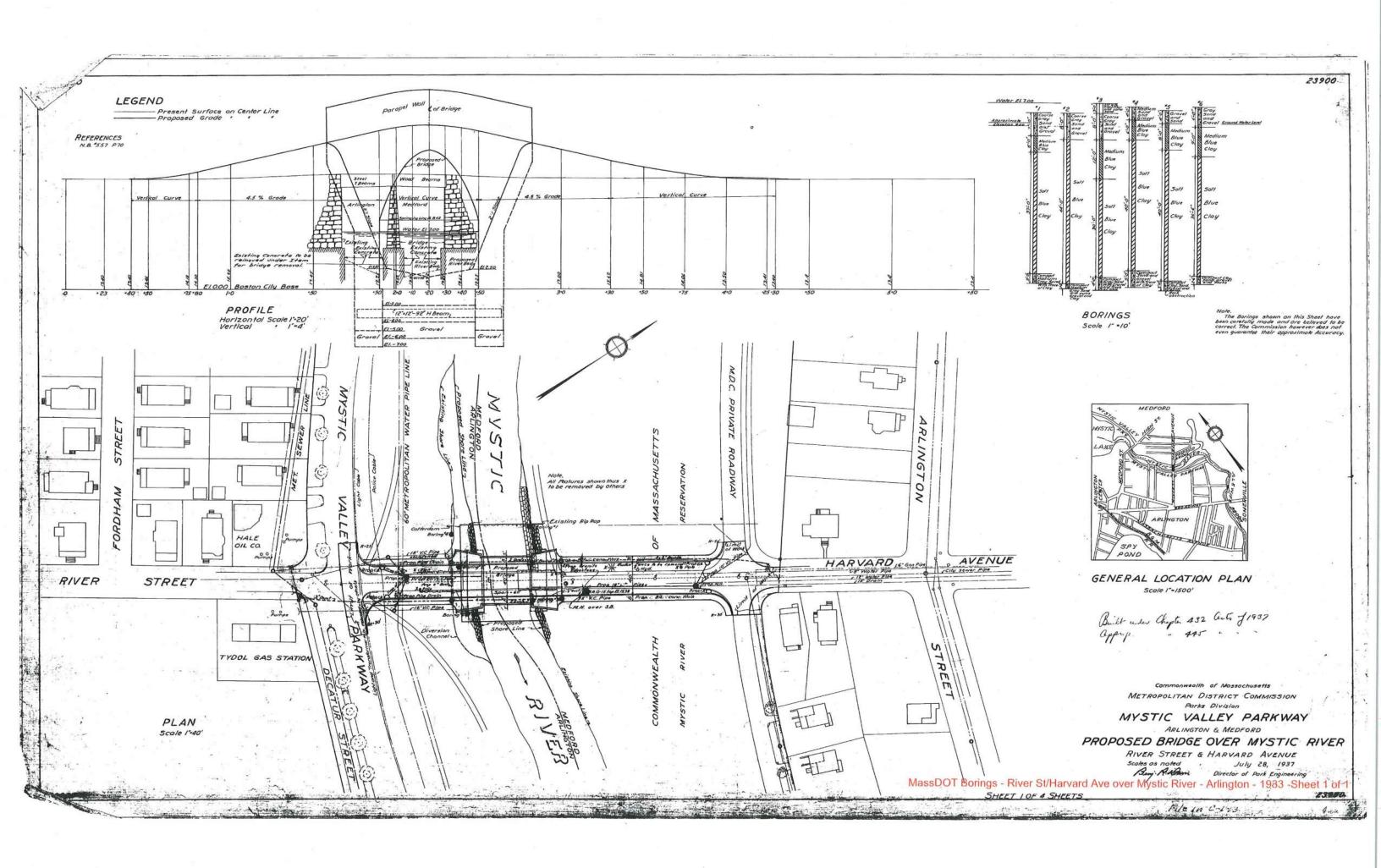
Yelephone Baldesseerskx3694

Comm. of Mass. - Met. Dist. Comm. - Constructionete-

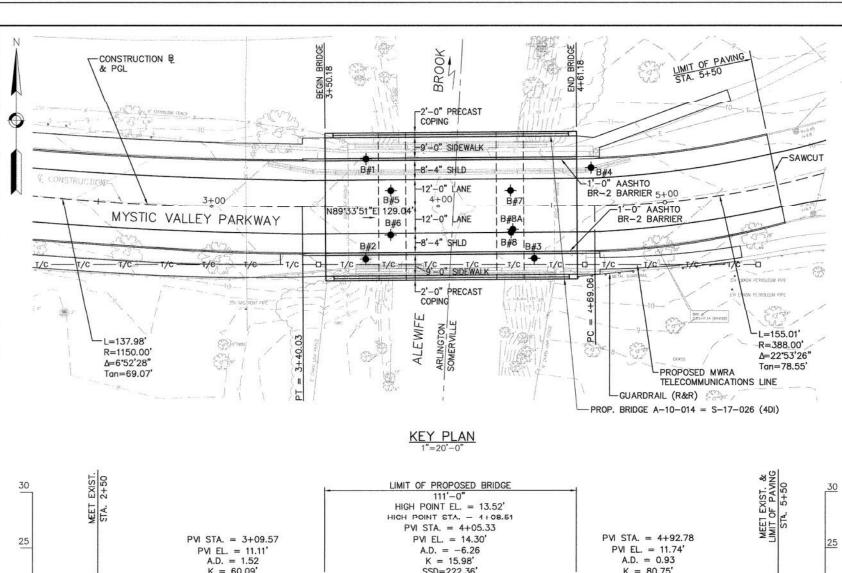
2/23/67 Job No. 3628

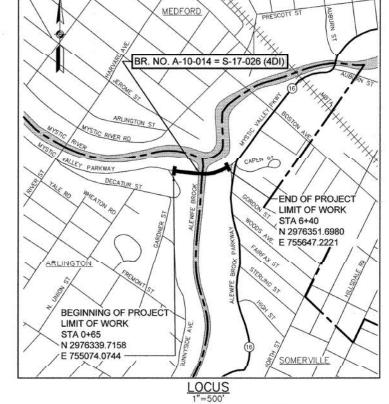
Scale F= 4 Proposed Distribution Line from Shaft 9, Medford, Mass. Figures to right head column tedicate number of blows required to drive 2 tech campling open 1 feet, using 140-th, weight falling 30 tech 106+17 104+84 Sta. 406-10 Sta. 40494 Sta. 103+20 BORING # 28 BORING # 30 BORING # 29 O'O'Elev. 8.77 0'0"Elev. 10.83 O'O'Elev. 8.95 sandy loam, fill sand, loam, fill W.L. SOFT, DARK-BROWN SANDY, SILTY PEAT 2 sand, gravel and loam, fill (no sample) M. La (no sample) 30 OH VERY SOFT, DARK-BROWN SILTY FEAT V.LOOSE, COARSE (wet) TO MEDIUM DK-GRAY MED-DENSE, COARSE TO MEDIUM YELLOW SAND & GRAVEL, son fine sand (wet) 510H W.L. trace of gravel YELLOW SAND, GRAVEL & SILT, FILL (wet) 6 . OH 6.64 MED-DENSE, COARSE DK-GRAY-YELLOW SOFT, DK-GRAY-2 YELLOW PEATY MEDIUM, VERY FINE TO FINE GRAY SAND & ORAVEL, ORGANIC SILT (moint) some medium sand SAND & INORGANIC 910# 10'ou trace fine sand&gilt SILT & CLAY DOOSE, COARSE TO MEDIUM DK-GRAY DENSE, COARSE TO MEDIUM SILTY (some plasticity wet) SAND & GRAVEL, 1200m 12'6" ailt (vat) GRAY SAND AND MED-DENSE, VERY GHAVEL, some fine 13.6" sand, trace olay PINE TO FINE SILTY GRAY SAND, trace 14 SOFT GRAY SANDY, of olay SILTY CLAY MEDIUM, VERY FINE GRAY SAND, INORGANIC (wet) 1600H SILT AND CLAY MEDIUM TO SOFT SANDY, SILTY (moderately to very GRAY CLAY plastic; wet) (slightly plastid; (moderately plastic; moist) wet) 2000L 20 0H Water Level -2'0' 50 0 OH Water Level -500 Water Level -2'6'

## MassDOT River Street and Harvard Avenue Over the Mystic River 1933 Project Arlington, MA



## MassDOT Mystic Valley Parkway Over Alewife Brook 2010 Project Arlington/Somerville, MA





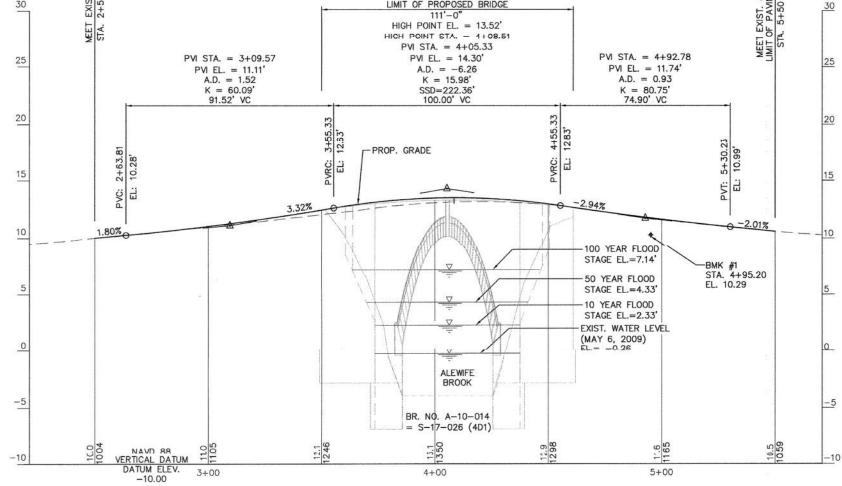
#### ARLINGTON / SOMERVILLE MYSTIC VALLEY PARKWAY

| FED. AID PROJ. NO. | SHEET<br>NO. | SHEETS                 |
|--------------------|--------------|------------------------|
| NFA                | 21           | 40                     |
|                    | 15000        | FED. AID PROJ. NO. NO. |

#### **KEY PLAN & PROFILE**

| BRIDGE<br>SHEET NO. | TITLE                             |
|---------------------|-----------------------------------|
| 1                   | KEY PLAN & PROFILE                |
| 2                   | GENERAL NOTES                     |
| 3                   | BORING LOGS                       |
| 4                   | BORING LOGS                       |
| 5                   | PLAN & SECTION                    |
| 6                   | EXISTING & PROPOSED ELEVATIONS    |
| 7                   | TYPICAL SECTIONS                  |
| 8                   | DEMOLITON PLAN AND SECTION        |
| 9                   | SEQUENCE OF CONSTRUCTION STAGE I  |
| 10                  | SEQUENCE OF CONSTRUCTION STAGE II |
| 11                  | SEQUENCE OF CONSTRUCTION STAGE II |
| 12                  | MISCELLANEOUS DETAILS             |
| 13                  | MISCELLANEOUS DETAILS             |
| 14                  | FOUNDATION LAYOUT DETAILS         |
| 15                  | BRIDGE RAIL DETAILS               |
| 16                  | BRIDGE RAIL DETAILS               |
| 17                  | HISTORIC DRAWINGS                 |
| 18                  | HISTORIC DRAWINGS                 |
| 19                  | HISTORIC DRAWINGS                 |
| 20                  | HISTORIC DRAWINGS                 |

#### ESTIMATED QUANTITIES QUANTITY DEMOLITION OF BRIDGE NO A-10-014=S-17-026 LS CY CY CY CY CY CY BRIDGE EXCAVATION 1,620 160 45 520 BRIDGE EXCAVATION WITHIN COFFERDAM CLASS B ROCK EXCAVATION DREDGING AND DISPOSAL OF MATERIAL 62 140 GRAVEL BORROW GRAVEL BORROW - TYPE C GRAVEL BORROW FOR BRIDGE FOUNDATIONS 860 GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES 1,900 FINE GRADING AND COMPACTING SY LS HR HR 750 HEALTH AND SAFETY PLAN 110 IMPLEMENTATION OF HEALTH AND SAFETY PLAN 430 625 40 PERSONNEL PROTECTION LEVEL 'C' UPGRADE MONITORING/HANDLING AND STOCKPILING OF CONTAMINATED SOILS HR LICENSED SITE PROFESSIONAL (LSP) SERVICES 2 1,100 MISCELLANEOUS SOIL TESTING EA DISPOSAL OF UNREGULATED SOIL DISPOSAL OF REGULATED SOIL: IN-STATE FACILITY DISPOSAL OF REGULATED SOIL: OUT-OF-STATE FACILITY TON TON TON CY TON TON SY SF LS FT 140 70 70 56 113 120 225 550 DISPOSAL OF HAZARDOUS WASTE DENSE GRADED CRUSHED STONE FOR SUBBASE HOT MIX ASPHALT BASE COURSE HOT MIX ASPHALT CEMENT CONCRETE SIDEWALK CEMENTIOUS MORTAR FOR PATCHING TEMPORARY SHORING METAL BRIDGE RAILING 208 CONTROL OF WATER, BRIDGE NO. A-10-014=S-17-026 LS LS BRIDGE STRUCTURE, BRIDGE NO. A-10-014=S-17-026



PROFILE - MYSTIC VALLEY PARKWAY

VERTICAL: 1"=4'
HORIZONTAL: 1"=20'

NOTE: FOR GENERAL NOTES, SEE SHEET 2 OF 20.



Gannett Fleming

199 WELLS AVE.
SUITE 210
NEWTON, MA. 02459

(617) 527-7822

25, 2010 ISSUED FOR CONSTRUCTION **MASSDOT** 

PROPOSED BRIDGE REHABILITATION

#### ARLINGTON/SOMERVILLE

MYSTIC VALLEY PARKWAY OVER ALEWIFE BROOK

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
10 PARK PLAZA BOSTON, MASS

THE DR. BROWN PROTECT DEVIZ. THOMAS P. Gredule DE.

SHEET 1 OF 20 SHEETS BRIDGE NO. A-10-014=S-17-026 (4D1)

TDS:

Technical Drilling Services. Inc.
P.O. Box 10/2 Peter Drive, Sterling, MA 01564

TEL (978) 422-0005 FAX (978) 422-0006

| DRILLER:              |                  | INSPECTOR:   |           |             | The state of the s |
|-----------------------|------------------|--------------|-----------|-------------|--|
| SITE LOCATION         | CLIENT           | START DATE   | HOLE NO.  | TOTAL DEPTH | WATER TABLE  |
| Bridge                | Gotnett Fleming  | 6/8/05       | B-1       | 47"         | 8,-10,   |
| Mystic Valley Parkway | 199 Wells Avenue | FINISH DATE  | WELL TYPE | WELLDEPTH   | HOLE TYPE  |
| Somorville, MA        | Newton, MA       | 6/8/05       | No well   | No well     | 4 % B8A  |
| Sample Hansnur 140 th | Drop 30"         | Drive Hammer | 300 Ib    | Drop 24"    |  |

| le            | Depth of | Caving | Depth | in Feet | Blown Fee 6' up      | Rec. | SOIL DESCRIPTION   |
|---------------|----------|--------|-------|---------|----------------------|------|--|
| er            | Sample   | Blows  | From  | To      | - speed with Hansser | 1    |  |
|               |          | 1000   | 0"    | 5       |                      |      | Concrete   |
|               |          |        | 5"    |         |                      |      |  |
| 1             | 5'-7'    |        | -     | -       | 2-3-4-2              |      | Loose, dry to moist. Sine to med. sand, some coarse sand and silt,               |
| 1             |          |        |       | 8.      |                      |      | trace gravel   |
|               |          |        | 0-    |         |                      |      |  |
| -             | 19:-12:  |        |       | -       | 2-2-2-2              | -    | V. soft, moist to wet silt and first sand, some clay, some organic               |
| _             |          |        |       | 13"     |                      | _    | matter   |
| -             |          |        | 13.   | -       |                      |      |  |
|               | 15517    |        |       |         | 3-9-17-15            |      | Loose to med, dense, wet, fine to med to consus sand, some                       |
| -             |          |        |       | 1       | -                    | -    | inorganic self, some clay, trace cobbles and gravel                              |
| -             |          | _      | -     | 20"     | +                    | 1    | FOOTING AT EL. 0.00 (BOSTON CITY BA  |
| _             |          |        | 201   | 1       | 1                    | -    | EL,-6.46 (NGVD 88)   |
|               | 201-221  |        |       |         | 2-2-3-4              |      | V. soft to soft, moist to wet, clay, some silt                                   |
|               |          |        |       | 24"     |                      |      |  |
|               |          | 9      | 24"   | 1       |                      |      |  |
|               | 25'-27"  |        |       |         | 36-41-29-26          |      | Med. dense, wet, fine to med. to course sand, some silt, some clay.              |
|               | 3032.    |        |       |         | 19-21-28-20          | 1    | Trace gravel   |
| _             |          |        |       | 35"     |                      |      |  |
|               |          |        | 35.   |         |                      |      |  |
|               | 35'-37"  |        |       | -       | 48-58-60-129/2"      |      | Dense to v. dense, wet, fine to med to coarse sand, some clay, some              |
| 1             |          |        |       |         |                      |      | some nilt, some med to course gravel, trace cabbles<br>(possible weathered rock) |
|               |          |        |       | 36.8"   |                      |      |  |
|               |          |        |       | 37.5"   |                      |      | End of B-1/Spoon Refusal/Augur Refusal   |
| $\neg$        |          |        |       |         | 1                    |      | NX Core 37.5'-47.5'  |
| $\neg$        |          |        |       |         |                      |      | No well installed  |
|               |          |        |       |         |                      |      | Water at 3'-10' upon completion  |
| $\neg$        |          |        |       | 1       | 1                    | -    |  |
| _             |          |        |       | 1       |                      |      |  |
| 1             |          |        | -     |         |                      |      |  |
| $\neg$        |          |        |       |         |                      |      |  |
| $\neg$        |          |        | -     |         |                      |      |  |
| 1             |          |        |       | 1       | 1                    | -    |  |
| $\rightarrow$ | 6        |        |       |         | 1                    | 1    |  |
| -             |          |        | 1     | 1       | -                    | -    |  |

| PENETRATIO            | N RESISTANCE                             |                                 |               | PROPOR | TIONS USED               | RE | MARKS  |
|-----------------------|--|---------------------------------|---------------|--------|--------------------------|----|--|
|                       | ling 30" on 2" O.D<br>ensity (Blows/ft.) | Sampler<br>Cobosive Consistence | v (Blooks/fl) | Trace  | D1440 505+               |    | The stratification lines represent the approximate<br>boundary between voil types and the transition may be                              |
| very loose            | 0-4<br>5.9                               | very sell                       | 0-2           | Little | 20% to 20%<br>20% to 35% |    | gradual.   |
| madium dense<br>dense | 10-29                                    | medjum stiff                    | 5-8<br>9-15   | And    | 25% to 50%               |    | Water level readings have been made in the drill holes of<br>times and under conditions stated on the beginn logs.                       |
| yery dense            | 59+                                      | Very stiff<br>Hard              | 16-30<br>31°  |        |                          |    | Fluctuations in the level of the groundwater may occur<br>due to other factors than those present at the time<br>measurements were made. |

BORING B#4 STA. 4+68.00 OFFSET: 16.70 LT ELEV. 11.8±

Technical Drilling Services, Inc. P.O. Box 10/2 Peter Drive, Sterling, MA 01564

TEL (978) 422-0005 FAX (978) 422-0006

| DRH LER:               |                  | INSPECTOR:   |           |             |            |
|------------------------|------------------|--------------|-----------|-------------|------------|
| SITE LOCATION          | CLENT            | START DATE   | HOLENO    | TOTAL DEPTH | WATERTABLE |
| Bridge                 | Gannett Florring | 6/13/05      | B-4       | 25:5'       | 10'-12"    |
| Mystic Valley Parkway  | 199 Wells Avenue | FINISH DATE  | WELL TYPE | WELL DEPTH  | HOLE TYPE  |
| Source - May Edit.     | Stores, SAA      | C03.05       | No well   | Nowall      | 4 14" MR A |
| Sammle Rassumer 140 lb | Drup 30"         | Drive Hammur | 30015     | Drop 24"    |            |

| Sapaple | Depth of | Casing | Depth in Feet |      | Here's Per 6" mp.    | Recovery | SOIL DESCRIPTION   |
|---------|----------|--------|---------------|------|----------------------|----------|--|
| Number  | Sample   | Blows  | From          | 1 To | speen with<br>Hommer |          |  |
|         |          |        | 07            | 4"   |                      |          | Asphilt  |
|         |          |        | 4"            |      |                      |          |  |
| S-1     | 3"-7"    |        |               |      | 18-25-21-15          |          | Med. dense, dry, fine to med, sand, some coarse sand, some               |
| -       |          |        |               | 8.   |                      |          | inorganic silt, truce gravel   |
| -       | -        |        | 8             |      |                      |          |  |
| 8-2     | 10'-12'  |        |               |      | 2-2-2-2              |          | V. soft, moist, fine to silty sund, some clay, organic root matter       |
| -       |          | -      |               | 14"  | 1                    |          |  |
| -       |          |        | 14"           |      |                      |          |  |
| 5-3     | 15'-17'  | -      | -             | 1    | 2-3-16-17            |          | V. loose to med, dense, wet, fine to med, sund, some med, to coarse      |
|         |          |        |               |      |                      |          | sand, some silt, trace gravel and colibles                               |
|         | -        |        |               | 17'  |                      |          | FOOTING AT EL 0.00 (BOSTON CITY BA                                       |
|         |          |        | 47"           |      | 1                    |          | FL. 6.46 (NGVD 88)   |
| S-4     | 20"-22"  |        | -             |      | 18-23-23-21          |          | Stiff to v. stiff to med. dense clay and silty sand, some med. to course |
| 8-5     | 25'-27'  |        |               |      | 120/5"               |          | sand, some fine sand (possible weathered rock)                           |
|         |          |        |               | 25.5 |                      |          |  |
| 1       |          |        |               |      |                      |          | End of B-4/Spoon Return!/Auger Refusal at 25.51                          |
|         |          |        |               |      |                      | 1        | No well installed  |
|         |          |        |               |      |                      |          | Water at 10'-12' upon completion   |
|         |          |        |               |      |                      |          |  |
|         |          |        |               | 1000 |                      |          |  |
|         |          |        |               | 1    |                      |          |  |
|         |          |        |               | 1    |                      |          |  |
|         |          |        |               | 1    |                      |          |  |
|         |          |        |               |      |                      |          |  |
|         |          |        |               |      |                      |          |  |
|         |          |        |               |      |                      |          |  |
| 2       |          |        |               |      |                      |          |  |
|         |          |        |               |      |                      |          |  |
|         |          |        |               | -    | -                    | -        |  |
|         |          |        | -             | -    |                      | -        |  |
|         |          |        |               | -    | -                    | -        |  |
|         |          |        | -             |      | -                    | -        |  |
|         |          |        |               | -    | 1                    | ļ        |  |
|         |          |        |               |      | 1                    |          |  |
|         |          |        |               |      |                      |          |  |

|   |                         |                     | -             |        |            |          |   |
|---|-------------------------|---------------------|---------------|--------|------------|----------|---|
| PENETRATIO  | N RESISTANCE            |                     |               | PROPOS | TIONS USED | REM      | ARKS;   |
| 140 LB, Wt. falling 30" on 2" O.D. Sampfor<br>Collesionless Density (Blows/R) Collesionless Density (Blows/R) |                         |                     |               | Trace: | 19% to 10% |          | The stratification lines represent the approximate<br>boundary between soil types and the transition may be     |
| very loose  | loose 0-4 very soft 0-2 | 100                 | -             |        |            | gradual. |   |
| loone<br>medium dense   | 5-9                     | medium stiff        | 2-4<br>5-8    | Same   | 20% 4x35%  |          | Water level readines have been made in the drill holes of   |
| dense<br>very dense   | 30-49<br>59+            | stiff<br>Very stiff | 9-15<br>16-30 | Ast    | 35% to 50% |          | times and under conditions stated on the boring logs.<br>Fluctuations in the level of the groundwater may occur |

TDS:

BORING B#2 STA. 3+68.20 OFFSET: 22.90 RT ELEV. 12.6±

Technical Drilling Services Inc.

D.O. Box 10/2 Dator Drive Storling, MA 01564 TEL (078) 427-0005 FAV (978) 427-0006

| DRILLER:              |                  | INSPECTOR:    |           |             |             |
|-----------------------|------------------|---------------|-----------|-------------|-------------|
| SITE LOCATION         | CLIENT           | START DATE    | HOLE NO   | TOTAL DEPTH | WATER TABLE |
| Bridge                | Gannett Floming  | 68:05         | B-2       | 46.6        | 10'-12'     |
| Mystic Valley Parkway | 199 Wells Avenue | FINISH DATE   | WELL TYPE | WELL DEPTH  | ROLETYPE    |
| Somerville, MA        | Newton, MA       | 6/8/05        | No well   | No well     | 4%"HSA      |
| Sample Hammer 149     | lb Drop 30"      | Drive Hamoser | 300 lb    | Drop 24"    |             |

| Sample | Depth of | Casing | Depth | in Feet | Depth in Feet  |             | Recovery  | SOIL DESCRIPTION |
|--------|----------|--------|-------|---------|--|-------------|---|------------------|
| Number | Sample   | Blows  | From  | To      | speen with   |             |   |                  |
| S      | 11.      |        | 8"    | 5"      |  | C15-12-7-01 | Concrete  |                  |
|        |          |        | 5-    |         |  |             |   |                  |
| 8-1    | 5"-7"    |        |       |         | 3-3-4-4  |             | Loose, dry, fine to med, course sand, trace silt, trace gravel        |                  |
|        | -        |        |       | 8.      | 1  |             |   |                  |
|        |          |        | 8.    |         |  |             |   |                  |
| 5-2    | 10'-12'  |        |       |         | 2-1-2-2  |             | V. Soft to soft, moist to wet silt and fine sand, trace clay          |                  |
|        |          |        |       | 14"     |  |             |   |                  |
|        |          |        | 14'   |         |  |             |   |                  |
| S-3    | 15'-17'  |        |       |         | 4-6-12-8   |             | V. loose to loose, moist to wet, fine to med, coarse sand, some silt, |                  |
| 300    |          |        |       |         |  |             | some fine to med. gravel  |                  |
|        |          |        |       | 20"     |  |             | OOTING AT EL. 0.00 (BOSTON CITY BA                                    |                  |
|        |          |        | 20"   | 1       |  | 1           | FL-6.46 (NGVD 88)   |                  |
| S-4    | 201-221  |        |       |         | 2-2-2-4  |             | V. soft, wet, silty clay, trace time sands                            |                  |
| -      |          |        |       | 24"     | 1  |             |   |                  |
| -      |          |        | 24"   |         |  |             |   |                  |
| \$-5   | 251-271  |        | -     |         | 20-18-21-19  |             | Med, dense, wet, fine to med, to coarse sand, some incepance salt and |                  |
| S-6    | 30"-34"  | -      | -     |         | 18-21-20-23  | -           | clay (glacial till) trace cobbies                                     |                  |
| 8-7    | 35'-37"  |        |       |         | 13-18-17-18  |             | any agreement and a second  |                  |
| S-8    | 39'-40"  |        |       |         | 37-120/3"  |             |   |                  |
| S-9    | 40'-42'  |        |       |         | 28-120/3"  |             |   |                  |
| -      |          |        |       | ABREM   |  |             |   |                  |
| 0.00   |          |        |       |         |  |             | End of B-2/Auger Refusal/Spoon Refusal                                |                  |
|        |          |        |       |         |  |             | No well installed   |                  |
|        |          |        |       |         |  |             | Water at 10'-12' upon completion                                      |                  |
|        |          |        |       |         |  |             |   |                  |
|        |          |        |       |         |  |             |   |                  |
|        |          |        |       |         |  |             |   |                  |
|        |          |        |       |         |  |             |   |                  |
|        |          |        |       |         |  |             |   |                  |
|        |          |        |       |         | The state of the s | 1           |   |                  |
|        |          |        |       |         |  |             |   |                  |
|        | -        | -      |       | -       |  | 7           |   |                  |
|        |          |        |       | 1       |  |             |   |                  |
| -      |          |        |       |         |  |             |   |                  |
| _      |          | -      | -     | -       |  | -           |   |                  |

| NETRATIO    | N RESISTANCE                               |                                |            | PROPORTIONS LISED |                         |   | REMARKS:  |  |  |
|-------------|--|--------------------------------|------------|-------------------|-------------------------|---|---|--|--|
|             | ling 30" on 2" O.D. S<br>ensity (Blowert.) | iompler<br>Cohesive Consistenc | (Blows ft) | Truse:            | 9% to 10%<br>10% to 20% |   | The stratification lines represent the approximate<br>boundary between soil types and the transition may be |  |  |
| ry loose    | 6-4  | very soft                      | 0-2        | rapte.            | time in time            | 1 | gradual   |  |  |
| 2540        | 5-9  | woff                           | 2-4        | Some.             | 20% 4+35%               | 1 | STANCE OF THE SECOND STANCE OF  |  |  |
| odium dense | 10-29                                      | medium stiff                   | 5-8        | 10000             |                         |   | Water level readings have been made in the drill heder o  |  |  |
| COLC .      | 30-49                                      | State                          | 9-15       | Anti              | 3514 to 5054            | 1 | times and under conditions stated on the berine loss.   |  |  |
| ry dense    | 59~  | Very stiff                     | 16-30      |                   |                         | 1 | Fluctuations in the level of the groundwater may occur  |  |  |

BORING B#3 STA. 4+42.20 OFFSET: 23.10 RT

ELEV. 12.7±

TDS

Technical Drilling Services Inc.

MYSTIC VALLEY PARKWAY FED. AID PROJ. NO. SHEET TOTAL NO. SHEETS NFA 23 40 PROJECT FILE NO. 605520 TEL (978) 422-0005 FAX (978) 422-0006

**BORING LOGS** 

ARLINGTON / SOMERVILLE

| DRILLER:           |              |                  |         |               | INSPECTOR:   |  |             |             |
|--------------------|--------------|------------------|---------|---------------|--------------|--|-------------|-------------|
| SITE LOCATION      | THE PERSON S | CLIENT           | CLIENT  |               |              | HOLE NO.   | TOTAL BEPTH | WATER TABLE |
| Bridee             |              | Gagnett Florning |         |               | 6/19/05      | 8-3  | 40'6"       | 12'-14'     |
| Mostic Valley Park | vav          | 199 Wells Avenue |         |               | FINISH DATE  | WELL TYPE  | WELL BEPTH  | HOLE TYPE   |
| Somerville, MA     |              | Newton, MA       |         |               | 6/10/05      | No well  | No well     | 4 %" HSA    |
| Sample Hammer      | 140 Th       | De               | ip 30"  |               | Drive Hammer | 300 fb   | Drop 24"    |             |
| Sample Depth       | of Casing    | Depth            | in Feet | Blen Per 6" o | n Recovery   | SOIL DESCRIPTION   |             |             |
| Number   Samp      | le Blons     | From             | To      | Hansser       |              |  |             |             |
|                    |              | 0"               | 4"      |               |              | Concrete   |             |             |
|                    | -            | 1.00             | 1       | 1             |              | The state of the s |             |             |

| Sample | Depth of   | Casing |      | Blem Pers" on Recovery | SOIL DESCRIPTION                        |     |  |
|--------|------------|--------|------|------------------------|---|-----|--|
| Number | Sample     | Blons  | From | To                     | Hansser                                 |     |  |
|        |            |        | 0"   | 4"                     |   |     | Concrete   |
|        |            |        | 4"   | 1                      |   |     |  |
| S-1    | 5"-7"      |        |      |                        | 2-2-1-2                                 |     | V. loose, dry, med, course to fine sand, sense gravel, trace still   |
| 8-2    | 10'-12'    |        |      | 1                      | 3-2-5-5                                 |     |  |
|        | -          |        | -    | 13"                    |   |     |  |
|        |            |        | 13"  | 1                      |   |     |  |
| \$-3   | 15'-17'    |        |      |                        | 2-2-6-12                                |     | V. loose to med. dense, moist to wet, fine to med. coarse sand, some |
|        | The second |        |      | 20"                    |   | _   | some inorganic sift, trace clay, trace gravel                        |
|        |            | 20"    |      |                        |   |     |  |
| 8-4    | 20"-22"    | 6      |      |                        | 2-2-2-2                                 | 1   | V, soft, wet, clay, some rilly sand                                  |
| -      |            |        |      | 25"                    | 100000000000000000000000000000000000000 | 1   | FOOTING AT EL. 0.00 (BOSTON CITY BA                                  |
|        |            |        | 25'  |                        |   | -15 | EL6.46 (NGVD 88)   |
| S-5    | 251-271    |        |      |                        | 9-15-15-17                              | - F | Med. dense, wet, (till), fine to med. sand, some silt, some clay and |
| 5-6    | 36'-32'    | -      |      |                        | 120/4"                                  |     | med, to course gravel, trace-cobbles                                 |
| -      | -          |        | 1    | 30.4"                  | 1                                       | 1   |  |
|        |            |        |      |                        |   |     |  |
|        | 1          | -      | 1    | 1                      |   | 1   | End of B-3/Auger Refusal/Spoon Refusal                               |
|        | -          |        |      | 1                      |   |     | NX Core 30'4".40'4"  |
|        |            | 1      | 1    | 1                      |   |     | No well installed  |
|        | -          | 1      |      | 1                      | 1                                       |     | Water at 12'-14' upon completion                                     |
| -      |            | -      | -    | 1                      | 1                                       | 1   |  |
|        | -          |        | 1    |                        | -                                       |     |  |
|        |            |        | 1    |                        |   | -   |  |
|        |            |        |      |                        | 1                                       |     |  |
|        |            |        |      | 1                      |   |     |  |
|        |            |        | 1    |                        |   |     |  |
|        |            | 1      |      |                        |   |     |  |
| _      |            | 1      |      | 1                      |   |     |  |
|        | 1          | 1      |      |                        |   |     |  |
|        | -          | 1      |      |                        |   | 1   |  |
| -      | 1          | 1      | -    | 1                      | 1                                       |     |  |
| -      | -          | 1      | 1    | 1                      |   |     |  |
|        | -          | -      | 1    | 1                      | 1                                       | 1   |  |
| -      | -          | -      | -    | -                      | 1                                       | 1   |  |
| -      | 1          | +      | -    | 1                      | -                                       | -   |  |
|        | 1          | -      |      | -                      | 1                                       | 1   | I  |

10% to 20%

1. BORING LOCATIONS ON PLAN ARE SHOWN THUSLY; P B#2.

2. BORINGS ARE TAKEN FOR THE PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.

WATER LEVELS SHOWN ON THE BORING LOGS WERE OBSERVED AT THE TIME OF BORINGS BEING TAKEN AND DO NOT NECESSARILY SHOW THE TRUE GROUNDWATER LEVEL.

4. FIGURES IN COLUMNS INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE A 1%" ID SPLIT SPOON SAMPLER 6" USING A 140 POUND WEIGHT FALLING 30".

5. BORING SAMPLES ARE STORED AT A STORAGE FACILITY LOCATED ON ROUTE 114 (219 WINTHROP AVE.) IN LAWRENCE, MA. THE CONTRACTOR MAY EXAMINE THE SOIL AND ROCK SAMPLES BY CONTACTING THE MASSDOT CEOTECHNICAL SECTION AT 10 PARK PLAZA ROOM 6500. BOSTON, MA. 02116-3973 AT 617-973-8836.

6. BORINGS B-1, B-2, B-3 & B-4 WERE MADE JUNE 2005.

 BORINGS B-1, B-2, B-3 & B-4 WERE MADE BY TECHNICAL DRILLING SERVICES, INC. P.O. BOX 10/2 PETER DRIVE, STERLING, MA. 01564.

8. BORINGS B-5, B-6, B-7 & B-8+B8A WERE MADE BY GEOLOGIC EARTH EXPLORATION, INC. 7 SHERWOOD DRIVE

9. THE BOSTON CITY BASE VERTICAL DATUM IS USED ON THE BORING LOGS. TO CONVERT FROM BOSTON CITY BASE VERTICAL DATUM TO NAVD 88, SUBTRACT 6.46 FT FROM

10. FOOTING ELEVATIONS ARE BASED ON HISTORIC DRAWINGS.

| SEPT. 25, 2010 | ISSUED FOR CONSTRUCTION    |
|----------------|----------------------------|
| DATE           | DESCRIPTION                |
| USE            | ONLY PRINTS OF LATEST DATE |

SHEET 3 OF 20 SHEETS BRIDGE NO. A-10-014 = S-17-026 (4D1)

STA. 3+79.11 OFFSET: 7.25 LT ELEV. 12.5±

| Geole                | ogic         | - Earth E              | xplora          |         |                                 | The comment | T: Mystic        | ett Fleming,<br>Valley Par<br>ton/Somery | kway over Ales        | wife Brook        | B-5              |
|----------------------|--------------|------------------------|-----------------|---------|---------------------------------|-------------|------------------|--|-----------------------|-------------------|------------------|
| 7 Shervo<br>TEL (508 |              |                        |                 |         | 108; MA 02056<br>(508) 384-4452 | LOCAIR      | UN: Assig        | LAN GOLINCI V                            | ide, wor              |                   | 1 OF             |
| File #:<br>Date Sta  |              | 11016<br>2/9/11        | 0200            |         | TYPE                            | CASING      | SAMPLER          | CORE BAR                                 | REL Surface Ele       | velign:           |                  |
| Date Co              |              |                        |                 |         | SIZE                            | 4"          | 2                | ******                                   |                       |                   |                  |
| Orillar:             | пфин         | D. Sheld               | lon             |         | HAMMER                          | 300#        | 140#             |  | Date                  | er level readings | Depth            |
| Site Rep             |              | Rob Gur                |                 |         | FALL                            | 30*         | 30"              | -  | Date                  |                   |                  |
|                      | -            | -                      | Sample          | -       | IFALL                           | Strata      |                  |  | - I Date              |                   | Depth            |
| Depth                | -            |                        | Pen.            | Rec.    | Y                               | Change      |                  | S  | ample Descript        | tion              |                  |
|                      | No.          | Depth R                | in              | in      | Blows/6*                        | R           |                  |  |                       |                   |                  |
| -                    | S-1          | 0.0-2.0                | 24              | 12      | 14-58-42-31                     |             | S-1 Very de      | ense, brown S                            | AND with trace GF     | SAVEL.            |                  |
| -                    | 1            |                        |                 |         |                                 |             |                  |  |                       |                   |                  |
|                      |              |                        |                 |         |                                 |             |                  |  |                       |                   |                  |
| 5-                   | 346          | 4,0-6,0                | 24              | 0       | 27-19-17-12                     |             | \$-2 M90a;0      | a densa, gray                            | SANU and SILT W       | ITH SOME GRAVES   | 4.               |
| ~ 5                  | 1 1          |                        |                 |         |                                 |             |                  |  |                       |                   |                  |
| -                    | 1            |                        |                 |         |                                 |             |                  |  |                       |                   |                  |
|                      | 5-3          | 9.0-11.0               | 24              | 8       | 40-21-22-24                     |             | C. T. Marchine   | a dance alaski                           | brown SAND with       | town CDANES       |                  |
| 10 -                 | -            | 44-1175                | -               |         | - Transaction                   |             | S-S MINORILI     | Conos, Cax                               | DECEMBER CONTRACT     | Saca Grovett      |                  |
|                      | 1 1          |                        |                 |         |                                 |             |                  |  |                       |                   |                  |
|                      | 1            |                        |                 |         |                                 |             |                  |  |                       |                   |                  |
| -                    |              | 222                    |                 |         |                                 | 14.5        |                  |  |                       |                   |                  |
| 15                   |              | 14.5                   |                 |         |                                 |             |                  |  | , drillied through to |                   |                  |
| -                    | 1            |                        |                 |         |                                 |             | FOOTIN           | G AT EL                                  | . 0.00 (B             | OSTON CI          | Y BASE           |
| -                    |              |                        |                 |         | 1                               |             | _                |  | 6.46 (N               | (GVD 88)          |                  |
| 20 -                 | 84           | 19.5-21.5              | 24              | 24      | 4-6-7-9                         |             | G.d Markins      | stiff, wet, gen                          | CLAV                  |                   |                  |
| 2.0                  |              | 30000000               | 24              | -       |                                 |             | check assertions | organ's story form                       | roller.               |                   |                  |
| -                    | 1 1          |                        |                 |         |                                 |             |                  |  |                       |                   |                  |
|                      |              | 202222                 |                 | 1122    |                                 |             | 2220             |  | 9-102102002           |                   |                  |
| 25 -                 | \$-5         | 24.0-26.0              | 24              | 15      | 72-16-17-21                     | 26.0        | S-5 Very st      | II, gray CLAY,                           | trace fine SAND.      |                   |                  |
|                      |              |                        |                 |         |                                 | 20.0        | Bottom of a      | epioration at 2                          | 6.0"                  |                   |                  |
| - 1                  |              |                        |                 |         |                                 |             |                  |  |                       |                   |                  |
| -                    |              |                        |                 |         |                                 |             |                  |  |                       |                   |                  |
| 30 —                 |              |                        |                 |         |                                 |             |                  |  |                       |                   |                  |
| -                    |              |                        |                 |         |                                 |             |                  |  |                       |                   |                  |
| -                    |              |                        |                 |         |                                 |             |                  |  |                       |                   |                  |
| 35                   |              |                        | 8 1             |         |                                 |             |                  |  |                       |                   |                  |
| 30                   |              |                        | 9               |         |                                 |             |                  |  |                       |                   |                  |
| -                    |              | - 1                    |                 |         |                                 |             |                  |  |                       |                   |                  |
| =                    |              |                        |                 |         |                                 |             |                  |  |                       |                   |                  |
|                      |              |                        |                 |         |                                 |             |                  |  |                       |                   |                  |
| Seaund S             | korface      | b                      | used            |         |                                 |             | then             |  |                       |                   | -                |
| Pr                   | ononio       | ns Used                |                 |         | Cohesive Con<br>Blows/1         |             |                  |  | less Density<br>work  | Sample            | Type             |
| Trace                | and a second | 0 to 10%               |                 |         | lery Soft                       | 9-15 8      | ner ner          | 0-10                                     | Loose                 | UP = Fixed        | Piston           |
| Little               |              | 10 to 20%<br>20 to 35% |                 |         |                                 |             | A-Stiff<br>Hard  | 10-30                                    | M-Dense<br>Dense      | UT = Shelb        |                  |
| And                  |              | 35 to 50%              | 1 '             | J-0 8   | roer 2                          | 197         | 200              | 50+                                      | V-Dense               | CE = Open         | tommer<br>nammer |
| More                 |              | 1. The strafficut      | ion lines       | marener | the approximate                 | boundary    | between soft for | es. The bursts                           | on may be gradual.    |                   |                  |
| Note                 | TO .         | 2. Water level re      | and the law has |         | The second second               |             |                  |  |                       |                   |                  |

# BORING B#8+B#8A

STA. 4+32.06 OFFSET: 11.94 RT

| Geolo  | ogic -               | - Earth E  | xplor                  | ation,                | Inc.                              | CLIENT                      | Gannett                                  | Fleming, Ir                       |   | wife Breck                                      | B-8/B-8/         |
|--|----------------------|--|------------------------|-----------------------|-----------------------------------|-----------------------------|--|-----------------------------------|---|---|------------------|
| 7 Sherwo<br>TEL (508)                        | od Drive<br>) 384-44 |  |                        | Nor<br>FAX            | TUR, MA 02056<br>(508) 384-4452   | LOCATION                    |  | PAGE<br>1 OF 2                    |   |   |                  |
| File in:<br>Date Sta<br>Date Cor<br>Driller: | replated             | 11016<br>2/11/11<br>2/14/11<br>D. Sheld<br>Rob Gur |                        |                       | TYPE -<br>SIZE -<br>HAMMER -      | 4*<br>300#<br>30"           | 2'<br>140#<br>30"                        | CORE BARRE                        | Station:<br>Groundwat<br>Date           | er tevel readings                               | Deprin           |
| Site Rep                                     | -                    | -  |                        | -                     | FALL                              | Strata                      | 30                                       |                                   | Date                                    |   | lepth            |
| Depth  |                      |  | Sample<br>Pen.         | Rec.                  |                                   | Change                      |  | Sar                               | nple Descript                           | tion  |                  |
| R  | No.                  | Depth R  | in<br>24               | in<br>12              | Blows/6*<br>42-64-50-33           | ft                          |  |                                   |   |   |                  |
| 5  | S-2                  | 6.0-8.0  | 24                     | 24                    | 13-12-10-10                       |                             |  |                                   | and GRAVEL, s                           |   |                  |
| 10 —   | 5-3                  | 9.0-11.0   | 24                     | 7                     | 28-10-13-12                       |                             | S-3 Medium d                             | iense, dark bro                   | own, wet SAND                           | and GRAVEL.                                     |                  |
| 15-  |                      | 13.5   |                        |                       |                                   | 13.5                        |  |                                   | 0.00 (B                                 | OSTON CI  | TY BASE          |
| 20-  | 84                   | 20.0-22.0  | 24                     | 24                    | 4-5-7-7                           |                             | S-4 Still, wort,                         | gray SAND or                      | dSET.                                   | ,   |                  |
| 25   | 9-5                  | 24.0-26.0  | 24                     | 10                    | 20-25-39-41                       |                             | S-5 Hard, gray                           | r, wed SAND w                     | ith some SILT.                          |   |                  |
| 30-  | 8-6                  | 29.0-31.0  | 24                     | 12                    | 20-27-39-85                       |                             | S-6 Dense, gr                            | ay, wel SAND                      | with some SILT                          | r.  |                  |
| 35-  | 8-7                  | 34.0-34.5  | 8                      | 15                    | 108-113                           |                             | S-7 Very deno                            | e, gray CLAY                      | and medium S1                           | FONE, ROCK in tip                               | of spoon.        |
| Pround S                                     |                      |  | used                   |                       |                                   | 39,9                        | hen                                      |                                   |   |   |                  |
|  | -                    |  | Diego                  |                       | Cobselve Con                      | sistency                    | 7  | Cohesionies                       | s Density                               | T 6-  | 7                |
| Trace<br>Little<br>Stone<br>And              | уролю                | 0 to 10%<br>10 to 20%<br>20 to 36%<br>35 to 50%    |                        | 3-4 3                 |                                   | 9-15 S<br>16-30 V           | Self<br>(-Self)<br>fond                  | 10-30<br>30-50                    | Loose<br>M-Danse<br>Dense<br>V-Dense    | Sample UP = Fixed UT = Shelt OE = Open * = 300¢ | Platon<br>y Tuba |
| Note   | s:                   | 1, The stratifical<br>2. Weder front of            | ion lines<br>exdings w | regressor<br>min mode | the approximate in the drift hole | boundary i<br>during or est | ketween soil types.<br>The completion of | The transition drilling. The year | may be gradual,<br>ar level irony Aucti | uale over time.                                 |                  |

#### BORING B#6 STA. 3+78.94 OFFSET: 21.70 RT ELEV. 12.5±

| Seolo<br>Shervo                | od Driv | - Earth E                                       | eplon     | Nor      | Inc.               | 100000           | Gannett T: Mystic V ON: Arlingtor |                | vay over Ale                            | wife Brook                                     | B-6                  |
|--------------------------------|---------|---|-----------|----------|--------------------|------------------|-----------------------------------|----------------|---|--|----------------------|
| No.#:                          |         | 11016   | 2,11      |          |                    | CASING           | SAMPLER (                         | ORE BARRE      |   | vation:  |                      |
| lata Ste                       |         |   |           |          | TYPE _             | 40               | -                                 | -              | Station:                                |  |                      |
| lette Cor                      | nplote  |   |           | -        | SIZE _             | 4*               | 2                                 |                | 100000000000000000000000000000000000000 | ar level readings                              |                      |
| dier.                          |         | D. Sheld  |           | -        | HAMMER             | 300#             | 140#                              |                | Date                                    |  | Depth                |
| ite Rep                        | -       | Rob Gur   | ilaw      | _        | FALL               | 30"              | 30*                               | -              | Date                                    | -  | Depth                |
| Depth                          |         |   | Sample    |          |                    | Strata<br>Change |                                   | 0              | mple Descript                           | lieum.   |                      |
| ft                             | No.     | Depth ft  | Pen.      | Rec.     | Blows/6"           | R                |                                   | OBI            | npic Descrip                            | aQ11   |                      |
| 55                             | S-1     | 0.0-2.0   | 24        | 13       | 56-44-18-23        |                  | S-1 Medium to                     | dense, wet S   | SAND, GRAVEL                            | , trace SILT.                                  |                      |
| 5-                             | a-c     | 4.000   | -         | D.       | 66-61-13-19        |                  | GLAY,                             | omnou, wur.    | anno, urvivez                           | , Z. OTONE NIJO                                | ature gray           |
| 10 —                           | 8-3     | 9.0-11.0  | 24        | 7        | 15-6-4-5           |                  | S-3 Loose to r                    | nedium SANE    | to coarse SAN                           | ID above CLAY,                                 |                      |
| 15 —                           |         | 14.0  |           |          |                    | 14.0             | (1.1.1.4 U.S.) A.B.               | AT EL.         | 0.00 (B                                 | OSTON CI                                       | TY BASE              |
| 20-                            | \$4     | 20,0-22.0                                       | 24        | 24       | 7-6-8-8            |                  | S-4 Stiff, gray                   | CLAY,          |   | *  |                      |
| 25-                            | S-6     | 24.0-26.0                                       | 24        | 12       | 24-43-34-41        |                  | S-5 Hard, gray                    | CLAY, some     | STONE.                                  |  |                      |
| 30-                            | 8-0     | 28.0-30.0                                       | 24        | 9        | 10-16-46-64        |                  | S-6 Hard, gray                    | CLAY, some     | trace of SAND.                          |  |                      |
| 35                             | 8-7     | 34.0-36.0                                       | 24        | 11       | 30-37-38-22        |                  | S-7 Hard, gray                    |                |   |  |                      |
| =                              | S-8     | 35.0-37.5                                       | 18        | 8        | 62-72/3*           | 37.5             | S-8 Hard, gray<br>Battom of expl  |                | TONE - mhani<br>5°                      | `  |                      |
| round S                        | artere  | to  | used      |          |                    |                  | hen                               |                | ryen new                                |  |                      |
|                                |         | -   | 1         |          | Cohesive Con       |                  |                                   | Cohesionies    | ss Density                              | 1  |                      |
|                                | oportio | ms Used   | 1         |          | Blows/1            | 1                |                                   | Blow           | s/ft                                    | Sampl<br>UP = Fixe                             | ю Туро               |
| Trace<br>Little<br>Some<br>And |         | 0 to 10%<br>10 to 20%<br>20 to 35%<br>35 to 50% | 1         | 3-4 5    |                    | 16-30 V          | siff<br>r-Saff<br>tend            | 10-30<br>30-50 | Loose<br>M-Derse<br>Dense<br>V-Dense    | UP = Fixe<br>UT = Shal<br>OE = Ope<br>* = 3004 | by Tube<br>n End Rod |
|                                |         | 1. The stratifical                              | ton three | represen | the approximate    | s boundary t     | boleron soil types.               | The transition | may be gradual.                         |  |                      |
| Note                           | s:      | 2. Weter level n                                | adiana v  |          | a la tha dell'hale |                  | April 1                           |                |   | Control of the Control                         |                      |

## BORING B#8+B#8A

STA. 4+32.85 OFFSET: 10.66 RT

| - Lurur L                                       | xpiorai             | ion, l   | nc.  | CLIENT:<br>PROJEC            | 0.00                        | ett Fleming, Inc.<br>c Valley Parkway over Ale   | wife Brook  | B-8/B-8.            |
|---|---------------------|--|--|------------------------------|-----------------------------|--|---|---------------------|
|   |                     |  |  | LOCATIO                      | N: Arlino                   | ton/Somerville, MA   |   | PAGE<br>2 OF 2      |
| 7   | Pen.                |  | Blows/6"   | Strata<br>Unange             |                             | ъатрів цевспр  | pon .   |                     |
|   |                     |  |  |                              | School of                   | regional de Si Si  |   | #1<br>              |
| <u> </u>  | 4                   | _  | charlus Can  | Interven                     |                             | Cohemicalism County  |   |                     |
| 0 to 10%<br>10 to 20%<br>20 to 35%<br>35 to 50% | 3-                  | 4 Sol  | y Soft   | 9-15 S<br>16-30 V            | -Stiff                      | 9-10 Loose<br>10-30 M-Dense<br>30-50 Dense<br>50+ V-Occan  | UP = Fixe<br>UT = Shel<br>OE = Oper                     | d Piston<br>by Tube |
|   | Depth # 8 39.5-30.6 | Sample   S | Sample   S | Sample   PAR (Sole) 394 4492 | Nortick Max 00006   IOCATIC | Nortick MA 00056   LOCATION: Affine   Affine | Nortick_MA 00056   LOCATION:   Artington/Somerville, MA | Salmole             |

# BORING B#7

STA. 4+31.90 OFFSET: 6.90 LT

## ELEV. 12.5± CUENT: Gannett Fleming, Inc. Geologic - Earth Exploration, Inc. B-7 PROJECT: Myslic Valley Parkway over Alewife Brook LOCATION Arlington/Somerville, MA 1 OF 11016 Date Started: 2/7/11 Date Completed: 2/9/11 TYPE 4\* 2' | SIZE 4\* 2' | HAMMER 300# 140# | FALL 30" 30" ---Rob Gunlaw | Depth | Sample | Surata Change | Surata Change | Size | Surata Change | Surata Change | Size | Si 4.0-6.0 3-3 Logse, wet, fine to medium SAND, trace SRLT, trace GRAVEL on STONE. Top of Foundation at 14.2, drilled through to 19'. 14.2 FOOTING AT EL. 0.00 (BOSTON CITY BASE) 5-4 Stiff, gray CLAY S-5 Hard, well, gray CLAY, base small STONE. 50-52-55 -100/2\* 26.0 Bottom of exploration at 26.0' Ground Surface to used then Cohesive Consistency

#### ARLINGTON / SOMERVILLE MYSTIC VALLEY PARKWAY

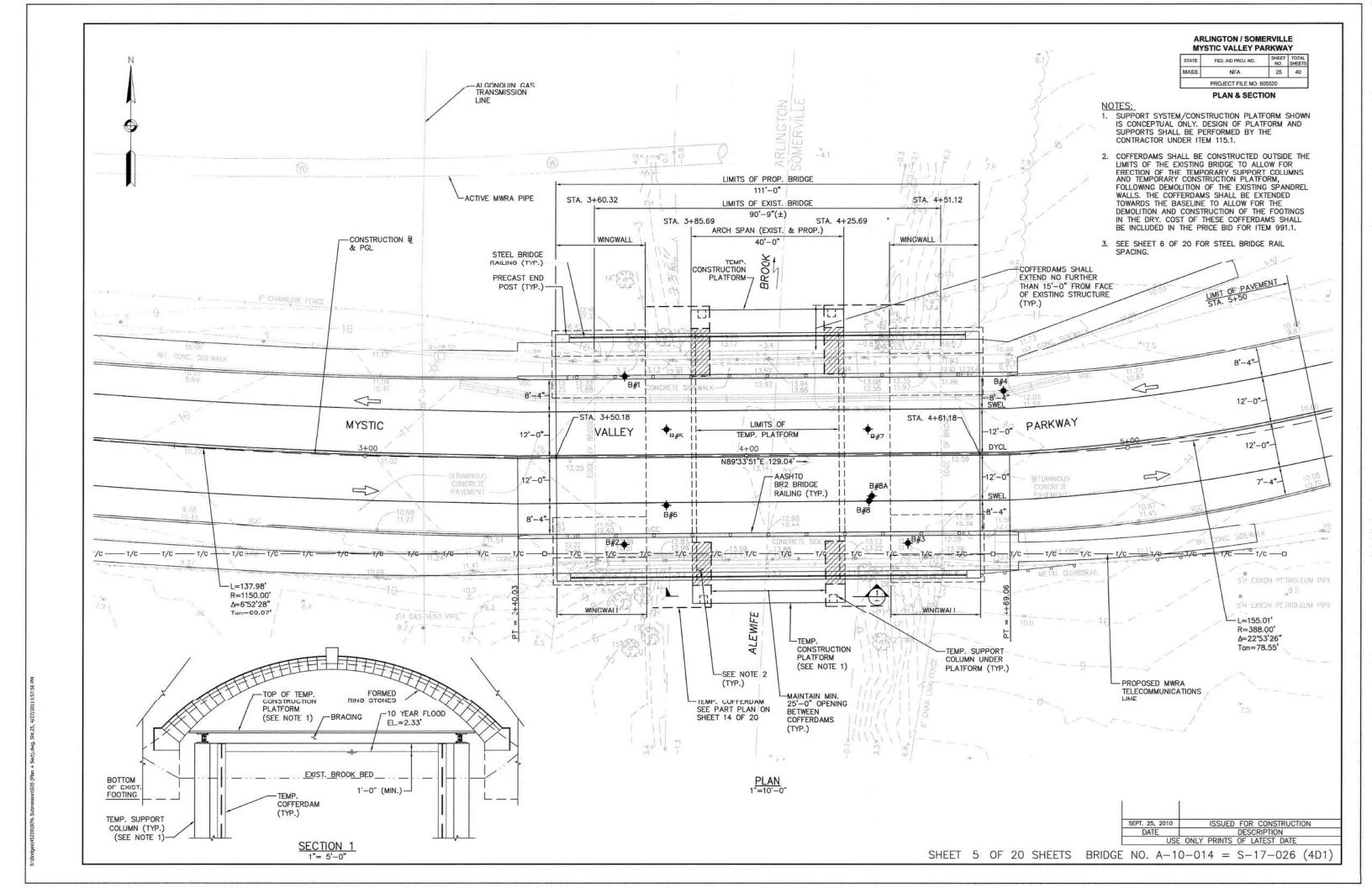
| STATE | FED, AID PROJ. NO. | SHEET<br>NO. | TOTA |
|-------|--------------------|--------------|------|
| MASS. | NFA                | 24           | 40   |

**BORING LOGS** 

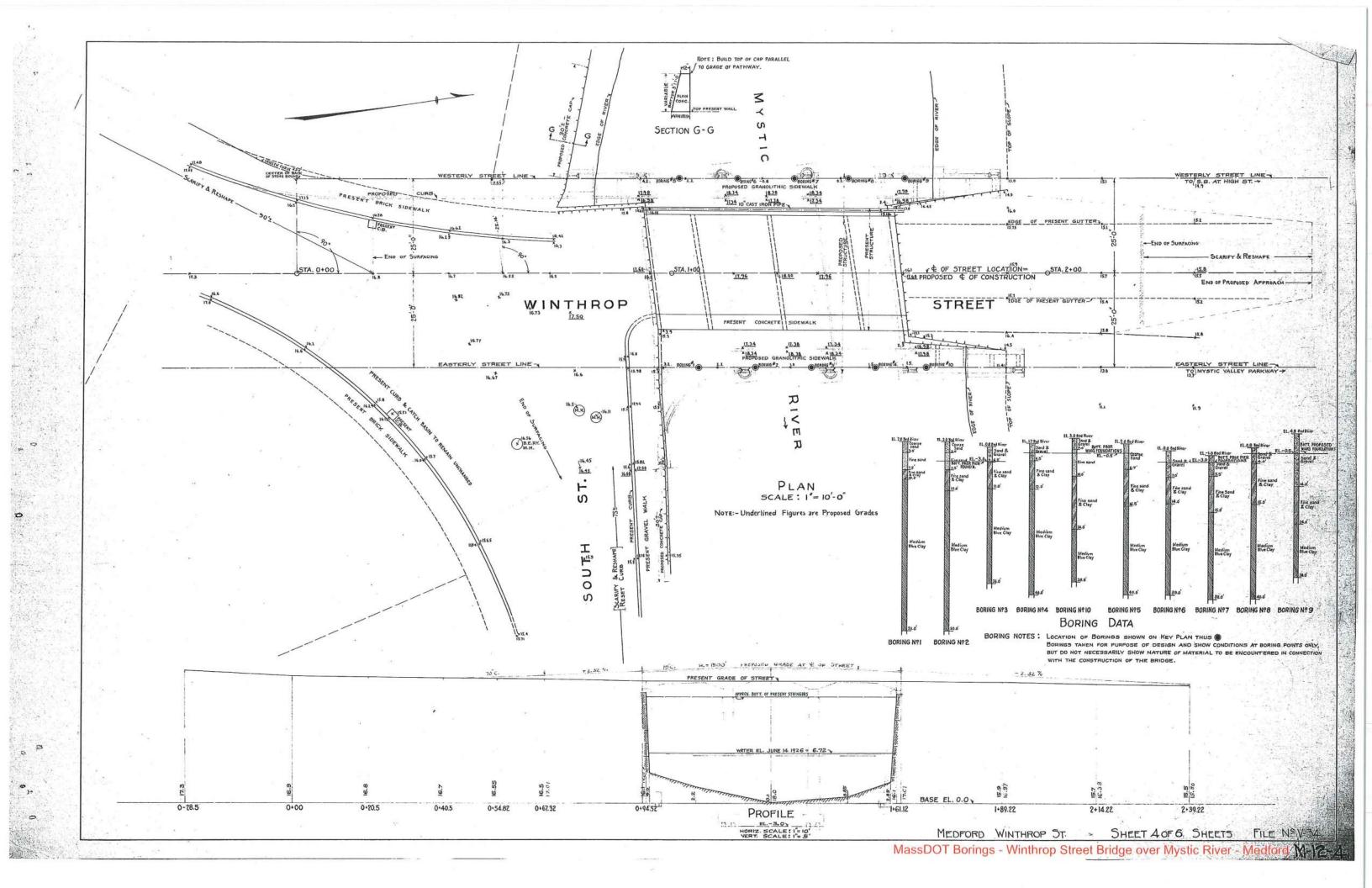
- NOTES:

  1. BORING LOCATIONS ON PLAN ARE SHOWN THUSLY; \$\displays B#5.
- 2. BORINGS ARE TAKEN FOR THE PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.
- 3. FIGURES IN COLUMNS INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE A 1%" ID SPLIT SPOON SAMPLER 6" USING A 140 POUND WEIGHT FALLING 30".
- 4. ALL BORINGS WERE MADE FEBRUARY 2011.
- 5. BORINGS B-5, B-6, B-7, B-8 & B-8A WERE MADE BY GEOLOGIC EARTH EXPLORATION, INC., 7 SHERWOOD DRIVE, NORFOLK, MA 02056.
- 6. THE BOSTON CITY BASE VERTICAL DATUM IS USED ON THE BORING LOGS. TO CONVERT FROM BOSTON CITY BASE VERTICAL DATUM TO NAVD 88, SUBTRACT 6.46 FT FROM THE ELEVATION.
- 7. FOOTING ELEVATIONS ARE BASED ON HISTORIC DRAWINGS.

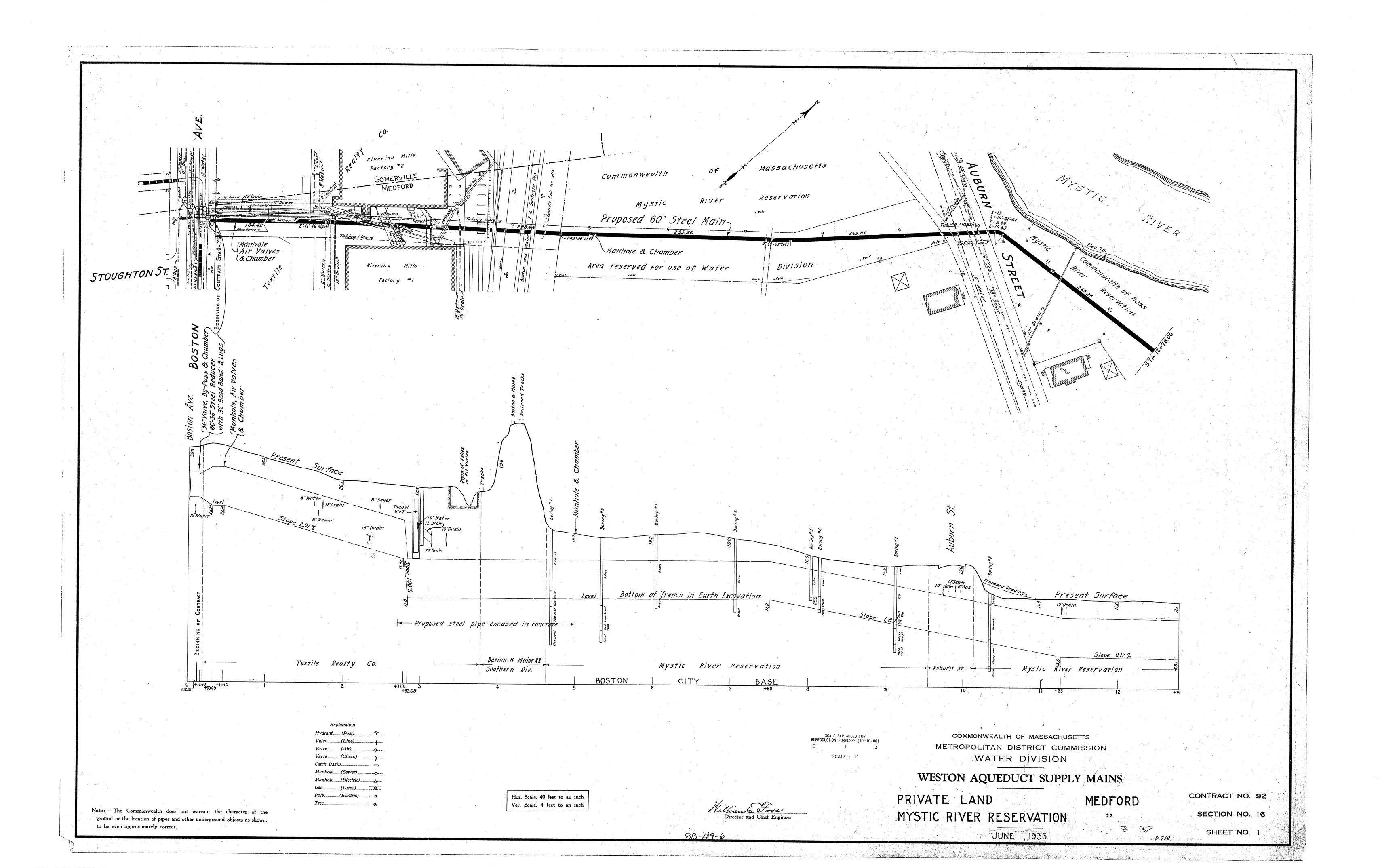
| - 1            |                            |
|----------------|----------------------------|
|                |                            |
| SEPT. 25, 2010 | ISSUED FOR CONSTRUCTION    |
| DATE           | DESCRIPTION                |
| USE            | ONLY PRINTS OF LATEST DATE |

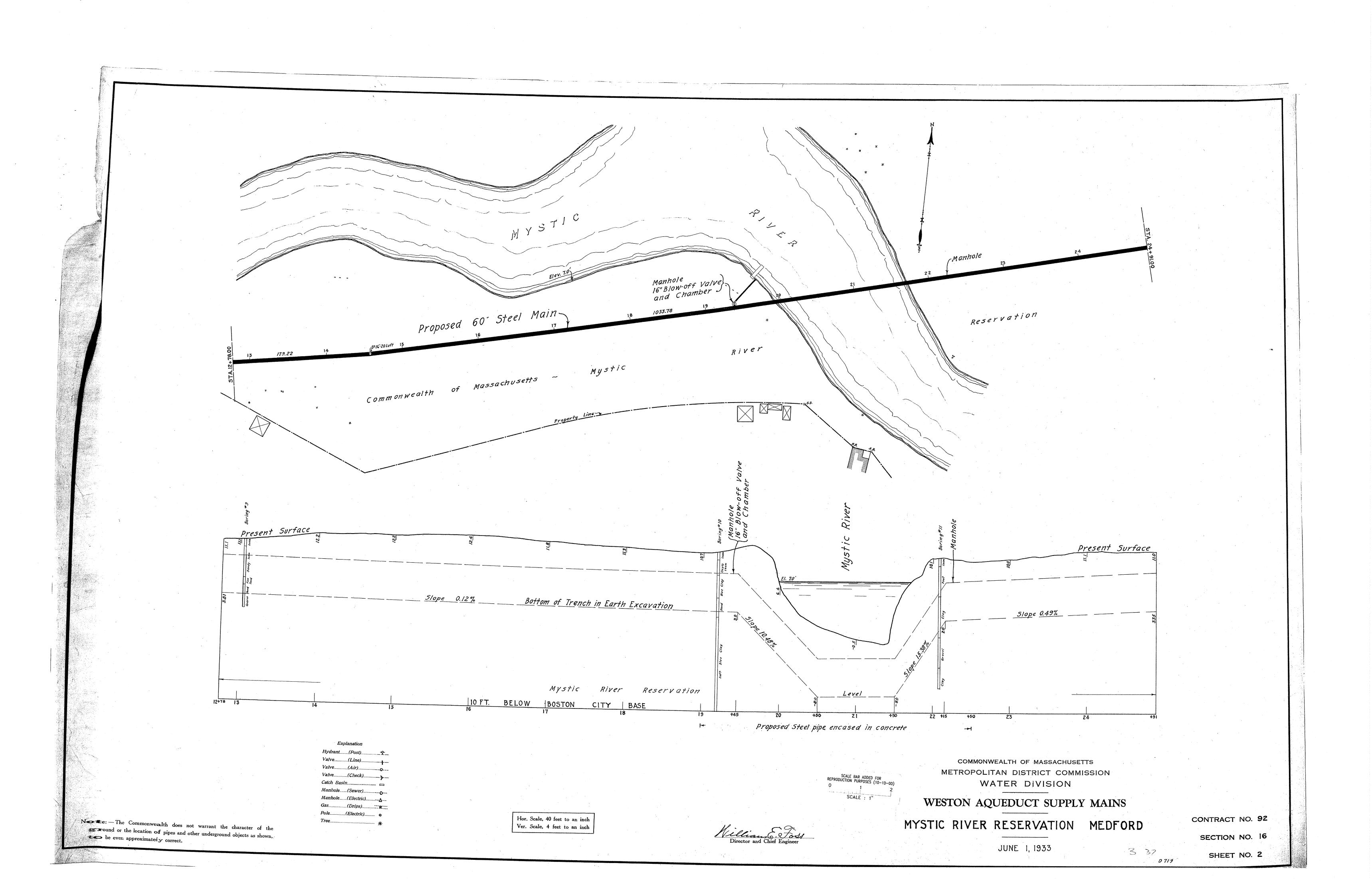


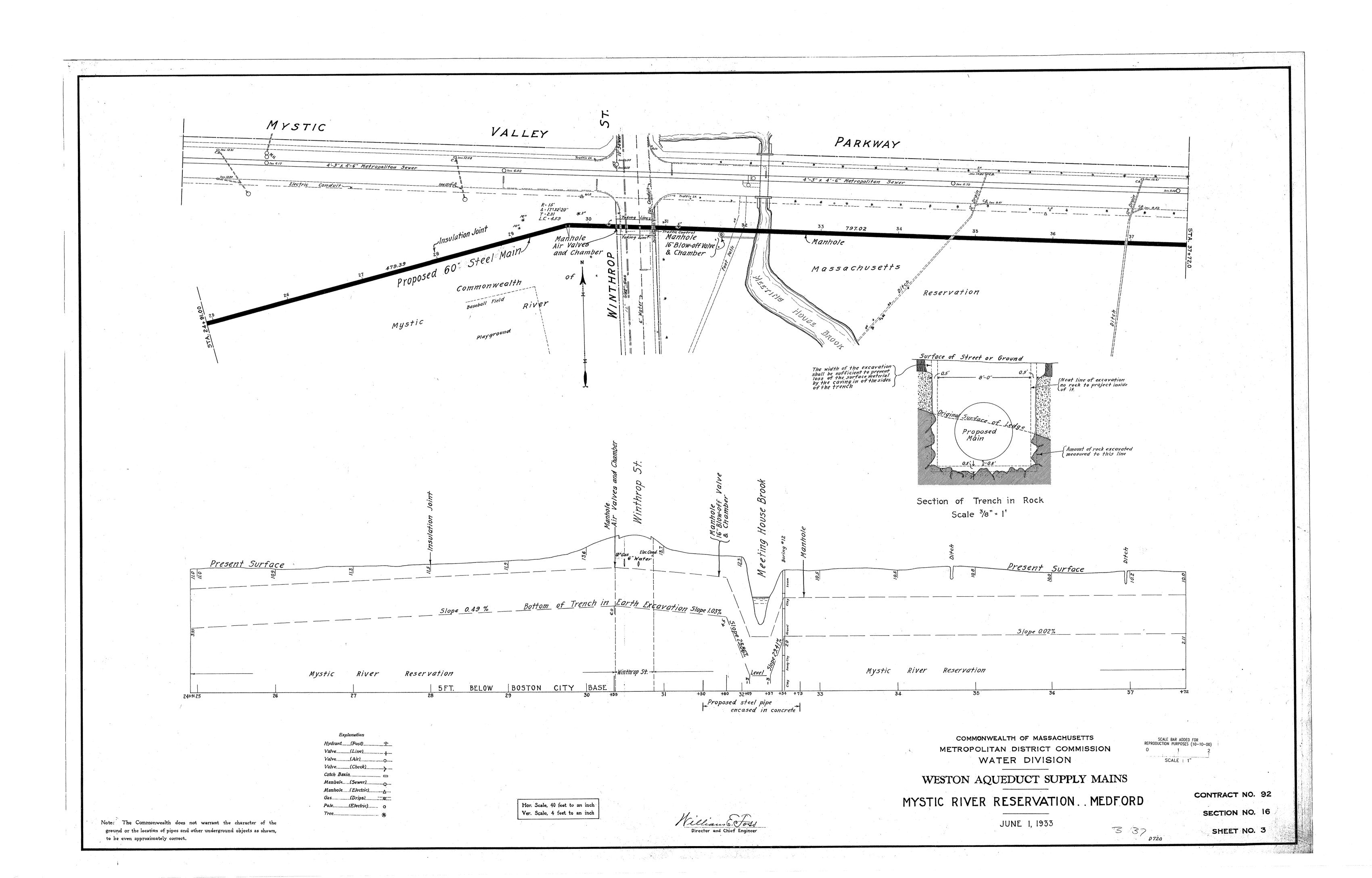
# MassDOT Winthrop Street Bridge Over Mystic River Project Medford, MA

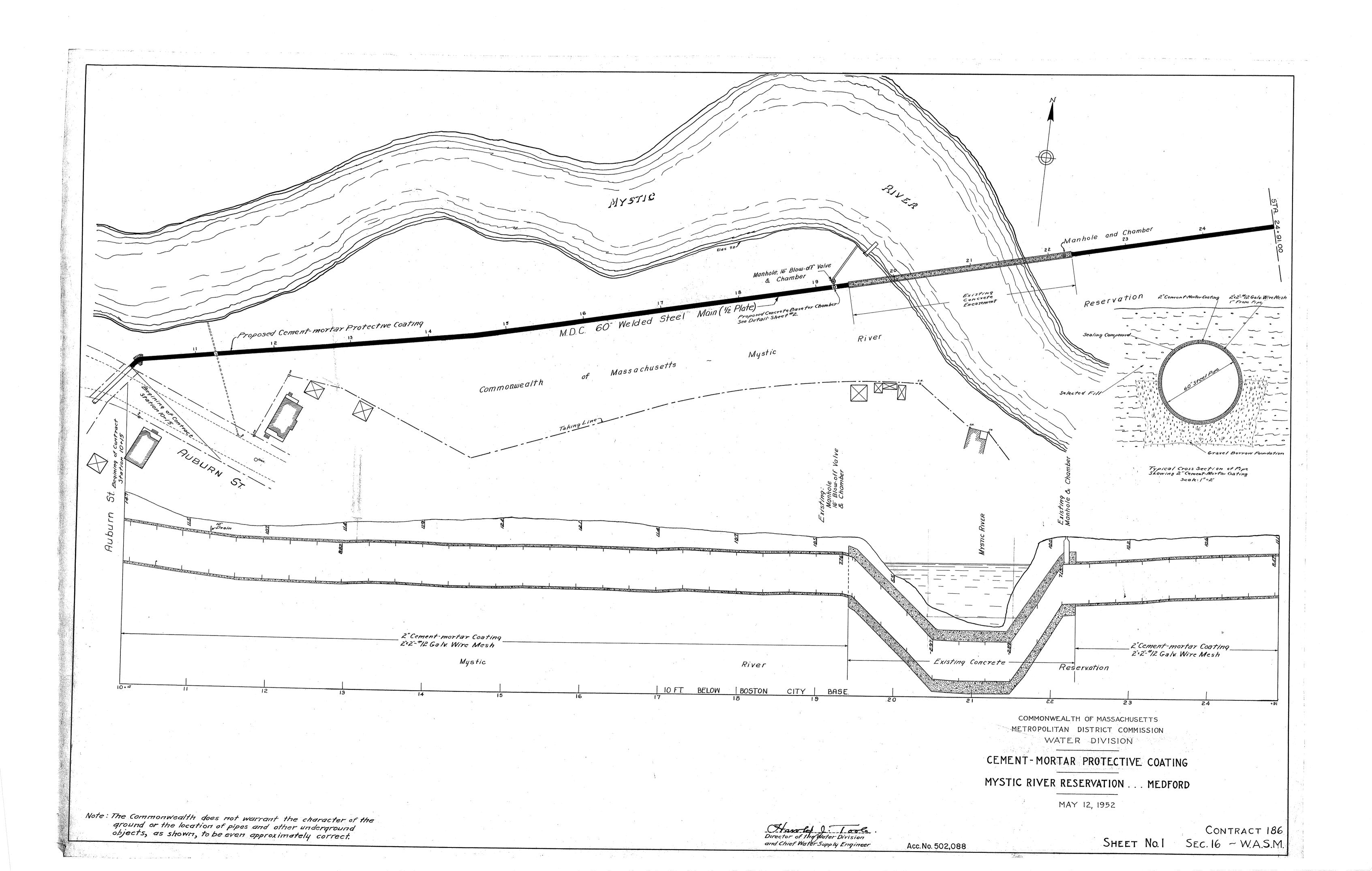


# MWRA WASM 3 Contract Drawings Medford, MA









# Capone Construction Co. 1987 Project Belmont, MA

| DATE S              | TART             | 1-1                            | 6-87                                |                  |                          | TEST BORING LOG  | s                          | HEET 1 of 1          |
|---------------------|------------------|--------------------------------|-------------------------------------|------------------|--------------------------|--|----------------------------|----------------------|
| DATE FI             | NISH             |                                | 6-87                                |                  |                          |  |                            | PROJ. NO.            |
| WEIGHT              | OF HA            | MMER                           | 1                                   | 40               | 300                      | AL SHINER TEST BORING, INC   | LOCATION                   | Belmont L-2          |
| HEIGHT              | OF FAL           | L.                             |                                     | 30''             | 24"                      | BOX 142  | FILE NO.                   | Beimone              |
|                     |                  |                                | R OBSER                             |                  |                          | MELROSE, MASS. 02176<br>(617) 665-0852                                 | OFFSET                     |                      |
|                     | -16_             | 111                            | ME                                  | DEPT<br>noi      | 2000                     | CLIENT   | GROUND ELEV                | VATION               |
|                     |                  |                                |                                     |                  |                          |  | HOLE NO. 5                 | 9&62                 |
| SAMPLE              | R O.D.           | 211                            |                                     | I.D. 7           | -3/8                     | " Capone Construction Co.  | CASII                      | NG SAMPLER CORE BARR |
| TYPE O              |                  |                                | Mobi                                |                  | -3/0                     | 850A Providence Highway  | TYPE Aug                   |                      |
|                     |                  |                                |                                     |                  |                          | Dedham, Mass.  | SIZE I.D.                  | 3" 1-3/8"            |
| SCALE<br>IN<br>FEET | STRATA<br>CHANGE | CASING<br>BLOWS<br>PER<br>FOOT | SAMPLER<br>BLOWS<br>PER<br>6 INCHES | SAMPLE<br>NUMBER | SAMPLE<br>DEPTH<br>RANGE | FIELD CLASSIFICATION   | AND REMARKS                |                      |
|                     |                  |                                |                                     |                  |                          |  |                            |                      |
|                     |                  |                                |                                     |                  |                          |  |                            |                      |
|                     |                  |                                | _                                   |                  | 3'                       |  |                            |                      |
|                     | 4'               |                                | 8                                   | S1               | 3                        | Fine yellow sand, trace of   | silt.                      | -                    |
| 5 <b>'</b>          | 1                |                                | 9                                   |                  | 5'                       | Medium sand and gravel.  |                            |                      |
|                     |                  |                                |                                     |                  |                          | realum band and graver.  |                            |                      |
|                     |                  |                                |                                     |                  |                          |  |                            | ¥.1                  |
|                     |                  |                                |                                     |                  | 8'                       |  |                            |                      |
|                     |                  |                                | 11                                  | S2               | 8                        | Hard medium to coarse sand   | . gravel.                  | and boulders.        |
| 101                 | 10'              |                                | 14                                  | 32               | 10'                      | naru medium eo coarse sand   | , grayer,                  | una zouzuozo         |
| -10-                | 10.              |                                | 1/                                  |                  | 10                       |  |                            |                      |
|                     |                  |                                |                                     |                  |                          |  |                            |                      |
|                     |                  | - 4                            |                                     |                  |                          |  | 1/                         |                      |
|                     |                  |                                |                                     |                  |                          | Depth of borin   | g 10'                      |                      |
| ,                   |                  |                                |                                     | 1                |                          |  |                            |                      |
| _15_                |                  |                                |                                     |                  |                          |  | 27                         | a A                  |
|                     |                  |                                |                                     | 1                |                          |  |                            |                      |
|                     | 1                |                                |                                     |                  |                          |  |                            |                      |
|                     |                  |                                |                                     |                  |                          |  |                            | lel<br>II            |
|                     |                  |                                |                                     |                  |                          |  |                            |                      |
| _20_                |                  |                                |                                     |                  |                          |  |                            |                      |
|                     |                  |                                |                                     |                  |                          |  |                            |                      |
|                     |                  | -                              |                                     |                  |                          |  |                            |                      |
|                     |                  |                                |                                     | 1                |                          |  |                            | *                    |
|                     |                  |                                |                                     | 1                |                          |  |                            |                      |
| <b>-25</b> -        |                  |                                |                                     | 1                |                          |  |                            |                      |
|                     |                  |                                |                                     | 1                |                          |  |                            |                      |
|                     |                  |                                |                                     |                  |                          |  |                            |                      |
|                     |                  |                                |                                     | 1                |                          | - , .  |                            | -                    |
| 30'                 |                  |                                |                                     |                  | -                        |  |                            |                      |
|                     |                  |                                |                                     | Proportio        | ons used: I              |  |                            | TOTAL FOOTAGE        |
| DRILLE              |                  |                                | iner                                |                  | -                        |  | OVE CONSISTENCY  very soft | Earth Boring 10" "   |
| HELPER<br>SOILS E   |                  |                                | y                                   |                  | SS Spli                  | it spoon 4-10 loose 2<br>disturbed piston 4-10-30 medium compact 4     | -4 soft<br>-8 medium stiff | Rock Corings         |
|                     | IG INSP          |                                | 1                                   |                  | TP Tes                   | st Pin 30-50 compact 8-1<br>disturbed thin wall 50 + very compact 15-3 |                            | HOLENO B-59 & 6      |

# MassDOT Pleasant Street (Route 60) 2004 Project Belmont, MA

# THE COMMONWEALTH OF MASSACHUSETTS HIGHWAY DEPARTMENT

Ţ

## PELMONT

PLEASANT STREET (ROUTE 60)

STATE FED.PROJ. AID NO. | PISCAL | SNEET | TOTAL NO. | SHEETS | NO. | STEP-0018(220)X | 2003 | 1 | 241 |

PROJ. FILE NO. 601790

TITLE SHEET AND INDEX

PLAN AND PROFILE OF

# PLEASANT STREET (ROUTE 60)

IN THE TOWN OF

# BELMONT MIDDLESEX COUNTY

FEDERAL AID PROJECT NO. STP-001S(220)X

# CONCORD AVENUE BEGIN PROJECT STA. 09473-777 MET EXIST. MET EXIST

LOCATION MAP 1: 36,800

NOTE
LENGTH OF PROJECT 3,057,115 METERS = 3.057 KILOMETERS

THE 1995 STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, THE DECEMBER 2002 SUPPLEMENTAL SPECIFICATIONS, THE 1996 CONSTRUCTION AND TRAFFIC STANDARD DETAILS, THE APRIL 2003 SUPPLEMENTAL DRAWINGS, "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, MILLENNIUM EDITION", THE 1968 STANDARD DRAWINGS FOR TRAFFIC SIGNALS AND HIGHWAY LIGHTING", THE AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z-60.1-1990), AND THE LATEST EDITIONS OF THE MHD WHEELCHAIR RAMP STANDARDS WILL GOVERN.

### DESIGN DESIGNATION

DESIGN SPEED = 60 K.I ADT (2001) = 15,856 ADT (2021) = 7,550 K = 9% D = 62% T (PEAK HOUR) = 1.5% DHV = 1,580 DDHV = 980





DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION APPROVED

DIVISION ADMINISTRATOR

MASSACHUSETTS
HIGHWAY DEPARTMENT
RECOMMENDED FOR APPROVAL

THE COMMISSIONER

MASSACHUSETTS
HIGHWAY DEPARTMENT
RECOMMENDED FOR APPROVAL

THE COMMISSIONER

DATE

1/7/04

ASSOCIATE COMMISSIONER

DATE

# CONVENTIONAL SIGNS COUNTY, CITY, OR TOWN BOUNDARY COUNTY, CITY, OR TOWN SIDE LINE FENCE LINE BASE LINE OR SURVEY LINE RIGHT OF WAY LINE CULVERT PROPOSED SURFACE SURFACE SURFACE SURFACE SURFACE SURFACE SURFACE SURFACE SURFACE

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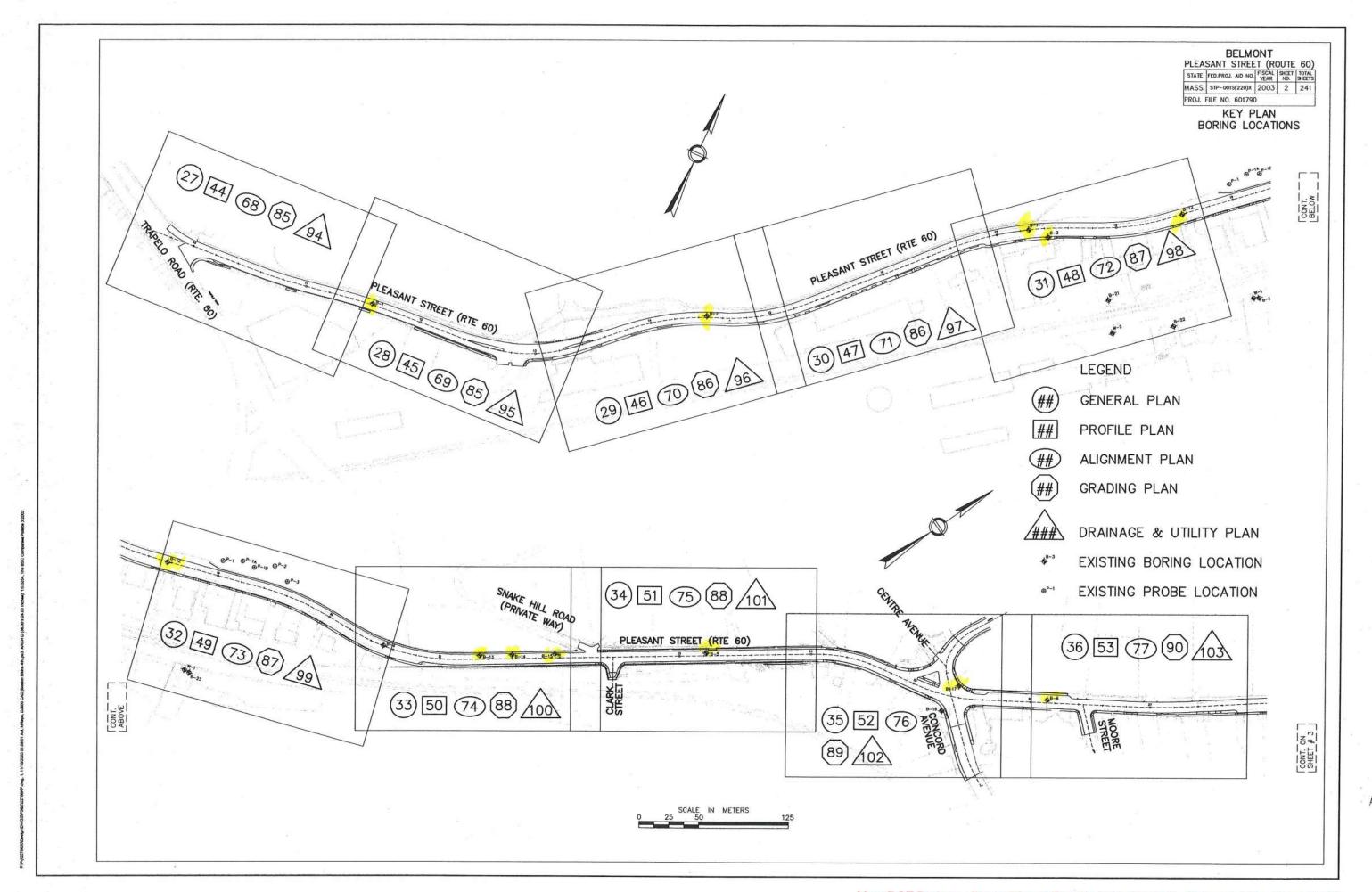
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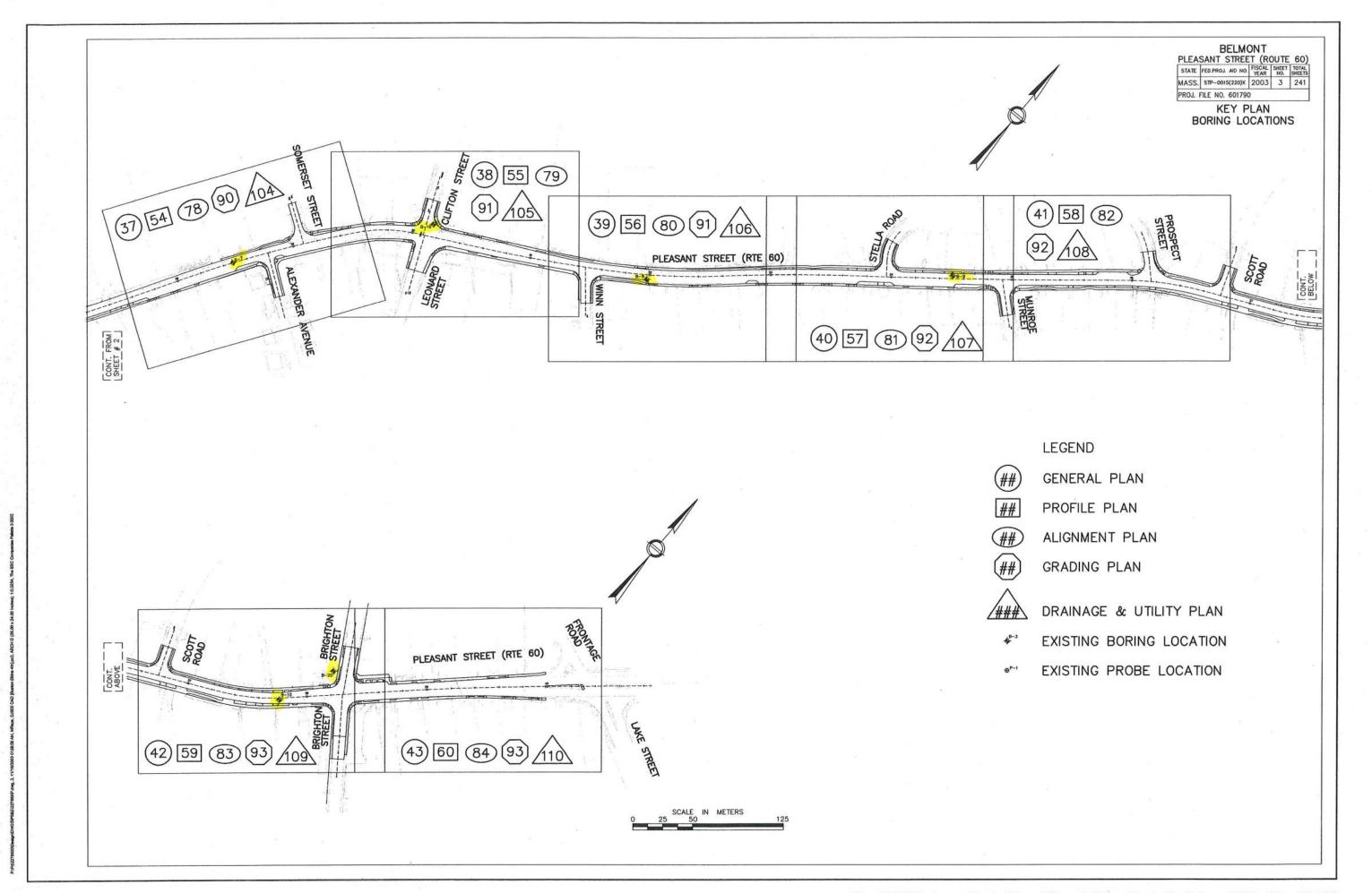
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1.33 - 1.37





# LEGEND

STATE FED.PROJ. AID NO. FISCAL SHEET TOTAL NO. SHEETS **EXISTING EXISTING PROPOSED** DESCRIPTION PROPOSED DESCRIPTION MASS. STP-001S(220)X 2003 4 241 PROJ. FILE NO. 601790 ABBREVIATIONS TRAFFIC, PAVEMENT MARKINGS & SIGNING UTILITIES LEGEND AND GENERAL NOTES св 🗆 CIRCULAR RED CATCH BASIN (OR GUTTER INLET) -----CONDUIT CIRCULAR GREEN СВСІП CATCH BASIN WITH CURB INLET CONTROL CABINET - GROUND MOUNTED FLASHING CIRCULAR RED FLASHING CIRCULAR AMBER Å ⊕-cs CURB STOP CONTROL CABINET - POLE MOUNTED RED VERTICAL ARROW Ø 1 GREEN VERTICAL ARROW CONTROLLER PHASE RED LEFT ARROW AMBER LEFT ARROW ODMH CW DRAINAGE MANHOLE CROSSWALK (SEE PAVEMENT MARKING PLAN FOR DETAIL) GREEN LEFT ARROW RED RIGHT ARROW ELECTRIC DUCT DIRECTION OF FLOW AMBER RIGHT ARROW FLECTRIC MANHOLE EMERGENCY CONFIRMATION BEACON WALK - LUNAR WHITE FLASHING DON'T WALK - PORTLAND ORANGE DON'T WALK - PORTLAND ORANGE ☐ HH ELECTRIC HANDHOLE FLASHING BEACON (ALPHA-NUMERIC DESIGNATION NOTED) **ADJUST** + GG GAS GATE INDUCTIVE LOOP DETECTOR ABAN ABANDON BY OTHERS GAS MAIN LIMIT OF VISIBILITY OF OPTICALLY PROGRAMMED SIGNAL HEAD CIT CHANGE IN TYPE DUCTILE IRON PIPE SEWER MAIN MAST ARM, SHAFT AND BASE (ARM LENGTH AS NOTED) FLARED END FRAME AND COVER OSMH SEWER MANHOLE OPTICAL EMERGENCY DETECTOR MAST ARM NOT IN CONTRACT PAINTED BOTH SIDES TELEPHONE DUCT OVERHEAD CABLE PAVED WATERWAY Отмн 三プ TELEPHONE MANHOLE PAVEMENT ARROW AND LEGEND RCP REINFORCED CONCRETE PIPE RETAIN UTILITY PLUG PEDESTRIAN PUSH BUTTON REMOD REMODEL REMOVE & STACK R&S R&R WATER GATE O WG PEDESTRIAN SIGNAL HEAD (ALPHA-NUMERIC DESIGNATION NOTED) REMOVE & RESET R&T REMOVE & TRANSPORT OWMH WATER MANHOLE PULL BOX 300mm X 300mm BROKEN WHITE LANE LINE, 100 mm (3m MARK - 9m SKIP) BROKEN YELLOW CENTER LINE, 100 mm (3m MARK - 9m SKIP) CROSSWALK (SEE PAVEMENT MARKING PLAN FOR DETAIL) WATER MAIN PB PB PULL BOX 200mm X 575mm, 300mm X 600mm BYCL CW 200mm SD SUBDRAIN SIGN AND POST DOUBLE YELLOW CENTER LINE, 100 mm DYCL SL SWCHL STOP LINE, 300 mm SOLID WHITE CHANNELIZATION LINE, 300 mm R1-1 R1-1 SIGN LEGEND SOLID WHITE EDGE LINE, 100 mm SOLID WHITE GORE LINE, 100 mm SWEL SURFACE DETAILS/TOPO SIGNAL POST AND BASE SWLL SOLID WHITE LANE LINE, 100 mm STOP LINE, 300mm WHITE LINE 1.2m BEHIND CW (TYP.) SOLID YELLOW CHANNELIZATION LINE, 300 mm BASE/SURVEY LINE SYEL SOLID YELLOW EDGE LINE, 100 mm VEHICULAR SIGNAL HEAD (ALPHA-NUMERIC DESIGNATION NOTED) SYGL SOLID YELLOW GORE LINE, 300 mm CITY, TOWN OR COUNTY BOUNDARY VEHICULAR SIGNAL HEAD OPTICALLY PROGRAMMED YCL YELLOW CHEVRON LINE, 300 mm CURB (OR BERM) - TYPE NOTED " X " DUCT (CONCRETE ENCASED) EDGE OF ROAD (MEET CEM. CONC.) EDGE OF ROAD (MEET BIT. CONC.) FENCE (SIZE AND TYPE NOTED) nnn 222 III HIGHWAY GUARD (TYPE NOTED) MHB.SB.CB HIGHWAY/PROPERTY BOUND (TYPE NOTED) R.O.W RIGHT OF WAY LINE GENERAL NOTES STATE BOUNDARY 1. ALL NEW GRANITE CURB SHALL BE TYPE VB UNLESS OTHERWISE NOTED. PRIOR TO THE INSTALLATION OF PROPOSED UTILITIES, THE CONTRACTOR 15. ALL EXISTING TREES TO REMAIN SHALL BE PROTECTED FROM DAMAGE 0 SHALL EXCAVATE TEST PITS AT LOCATIONS OF UTILITY CROSSINGS TO VERIFY DEPTHS OF EXISTING PIPES, CONDUITS OR OTHER FACILITIES, AS DIRECTED BY CAUSED BY CONTRACTORS OPERATIONS TREE (SIZE AND TYPE NOTED) 2. ALL GRANITE CURB SHALL BE SET TO HAVE A 150 mm REVEAL ABOVE NOTIFY UTILITY COMPANY OF SCHEDULE OF REQUIRED POLE RELOCATIONS AS SOON AS YOU RECEIVE THE NOTICE TO PROCEED. FINAL PAVEMENT GRADES (UNLESS OTHERWISE NOTED). WHEEL CHAIR RAMP ALL BASELINE TIES FOR CURB CORNERS AND RADII ARE TO THE P.C.'S THE CONTRACTOR SHALL ENSURE THAT ALL ROADWAY RUNOFF SHALL BE THE TOWN OF BELMONT USES A PLOW WITH A 1.30 m WIDE BLADE TO CLEAR SNOW FROM THE EASTERLY SIDEWALK OF PLEASANT STREET. WHEN OR P.T.'S, UNLESS OTHERWISE NOTED. WHERE PROPOSED CURB MEETS DIRECTED TO CATCH BASINS. **MISCELLANEOUS** EXISTING CURB, BERM, ROADWAY, AND/OR DRIVEWAY PAVEMENT EDGES, MINOR FIELD ADJUSTMENTS TO EITHER THE DESIGNATED RADIUS OR THE THE CONTRACTOR SHALL VERIFY ALL OUTLET GRADES OF DRAINAGE CONSTRUCTION IS COMPLETE, THERE MUST BE A 1.40 m CLEAR WIDTH TO ALLOW FOR THIS TO CONTINUE. THE INSTALLATION OF UTILITY POLES, STRUCTURES PRIOR TO CONSTRUCTING THE DRAINAGE IMPROVEMENTS. **⊕**B-# DESIGNATED STATION OF THE P.C. OR P.T. FOR THE PROPOSED CURB OR BERM MAY BE REQUIRED. THESE ADJUSTMENTS SHALL BE MADE IN THE FIELD BY THE CONTRACTOR AS DIRECTED BY THE RESIDENT HYDRANTS, AND SIGN POLES MUST BE ACCOMPLISHED WITH THIS IN MIND. THE CONTRACTOR SHALL SAWCUT TO THE FULL PAVEMENT DEPTH AT BOUNDARIES BETWEEN FULL DEPTH CONSTRUCTION AND EXISTING PAVEMENT. THE CURB CORNERS SHALL BE TYPE 'A' UNLESS SHOWN OTHERWISE ON THE FIRE ALARM BOX EXCEPT AS NOTED, ALL PAVEMENT MARKINGS SHALL BE THERMOPLASTIC. 4. ALL EXISTING MUNICIPAL UTILITY CASTINGS THAT ARE TO REMAIN WITHIN HYDRANT THE CONTRACTOR SHALL PROVIDE PROTECTION TO ALL TREES SCHEDULED TO AREAS TO BE REPAVED SHALL BE ADJUSTED TO LINE AND GRADE BY THE CONTRACTOR UNLESS OTHERWISE NOTED. ALL PRIVATE 11. BASE MAPPING PREPARED BY THE BSC GROUP, INC. ALL AREAS OUTSIDE OF THE LIMIT OF WORK DISTURBED BY THE M MAIL BOX THE CONTRACTOR IS ADVISED NOT TO MOVE VEHICLE ONTO THE ROOF OF THE CISTERN IN THE ISLAND AT THE CONCORD AVENUE INTERSECTION AS IT TELEPHONE, GAS, AND ELECTRICAL CASTINGS SHALL BE ADJUSTED BY CONTRACTOR'S OPERATIONS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S OWN EXPENSE. STREET LIGHT MAY COLLAPSE THE LOCATIONS OF EXISTING SUBSURFACE UTILITIES SHOWN ON THE ALL WHEELCHAIR RAMPS SHALL BE CONSTRUCTED TO COMPLY WITH THE LATEST M.H.D. STANDARDS. SEE APPENDIX OF SPECIAL PROVISIONS FOR PLANS WERE COMPILED FROM AVAILABLE RECORD DRAWINGS AND ARE NOT WARRANTED TO BE CORRECT. THE LOCATIONS ARE APPROXIMATE ONLY AND IN SOME CASES MAY BE INCOMPLETE. THE CONTRACTOR 21. THE CONTRACTOR IS ADVISED OF THE EXISTENCE OF A FRAGILE MWRA 1.42M STEEL AQUEDUCT CLOSE TO THE SURFACE FOR THE ENTIRE LENGTH OF TEST PIT ADDITIONAL DETAILS. PLEASANT STREET. WOODEN POLE SHALL NOTIFY ALL AGENCIES REQUIRED AND VERIFY THE LOCATIONS OF THE CONTRACTOR SHALL COORDINATE HIS WORK WITH ALL OTHER ONGOING THE CONTRACTOR SHALL TAKE APPROPRIATE MEASURES TO AVOID DISTURBING THE EXISTING STONE WALLS AT THE EDGE OF THE ROADWAY LAYOUT. ALL EXISTING SUBSURFACE UTILITIES PRIOR TO PERFORMING ANY WORK. PROJECTS, INCLUDING BUT NOT LIMITED TO THE MWRA WATER LINE IN ALEXANDER STREET, THE TOWN RECONSTRUCTION OF CONCORD AVENUE, AND THE PROPOSED REDEVELOPMENT OF 790 PLEASANT STREET.

BELMONT

PLEASANT STREET (ROUTE 60)

| BELMONT | PLEASANT STREET (ROUTE 60) | STATE | FED.PROJ. AID NO. | FISCAL | SHEET | TOTAL | SHEETS | MASS. | STP-001S(220)X | 2003 | 5 | 241 | PROJ. FILE NO. 601790 |

BORING LOGS

# BORING # B-1

|               |     |               | SAMPLE               |                                       | And the second s | n       |                |     |        |   |         |             |
|---------------|-----|---------------|----------------------|---------------------------------------|--|---------|----------------|-----|--------|---|---------|-------------|
| Depth<br>(ft) | No. | Depth<br>(ft) | Pen/<br>Rec.<br>(in) | * Blows Per<br>Six Inches/<br>RQD (%) | DESCRIPTION OF SAMPLES<br>(Classification)   | Remarks | Soil<br>Strata | 20  | N VAL  | .UE (topf)<br>60                        | A<br>80 | PID<br>(opm |
|               |     |               |                      |                                       | 6" Asphalt Pavement (2.5" bituminous, 3.5"<br>macadam)   |         | Asphalt        | - 1 |        |   | T       |             |
| 20 -          | S-1 | 0.5           | 24/15                | 18-25-22-22                           | 5-1 Top 4*- Poorly Graded GRAVEL with Sand<br>(GP), ies than 5% fines, gray, molei.<br>Middle 5*- Well Graded SAND with Genvel (SW),<br>fine to medium, 5-10% fines, 35-40% gravel,<br>consps-lowers, molei.<br>Middle 3*- Silpy SAND with Gravel (SM), fine to<br>coarse, 15-20% fines, 15% gravel, gray, molei.<br>Bention 3*- Well Graded SAND with Sitt and  |         | Fill           |     | 4      | *************************************** |         |             |
|               |     | 0.000         |                      |                                       | Gravel (SW-SM), 10-15% fines, 15-20% gravel, gray, moist.  | Λ       |                | 1   |        | 1                                       | 1       |             |
|               |     |               |                      |                                       | Boring Terminated at about 2.5 ft.   | -1      |                | 1   |        | 1                                       | 1       |             |
| 1             |     |               |                      |                                       |  | Ш       |                |     |        |   |         | 1           |
| 4.0 -         |     |               |                      |                                       |  | Ш       |                |     |        | 1                                       | 1       |             |
|               |     |               |                      |                                       |  |         |                |     |        | 1                                       | 1       |             |
| -             |     |               |                      |                                       |  |         |                | 1   |        |   |         |             |
|               |     |               | 1                    |                                       |  | Н       | 8 1            | 1   |        | ı                                       | I       |             |
| 60 -          |     |               |                      |                                       |  |         |                | 1   |        |   |         |             |
| -             |     |               |                      |                                       |  |         |                | 1   |        | 1                                       |         |             |
| -             |     |               |                      |                                       |  |         | 6 1            | -   |        |   |         |             |
| 2             |     |               | 0.7                  | -                                     |  |         |                | 1   |        |   | 1       | 1           |
| 8.0 -         |     |               |                      |                                       |  |         |                | 1   |        |   |         |             |
| -             |     |               |                      |                                       |  |         |                | 1   |        | 1 :                                     |         | 1           |
|               |     |               |                      |                                       |  |         |                |     | 1      | I                                       |         |             |
|               |     |               |                      |                                       |  |         |                | 1   |        |   |         |             |
|               |     |               |                      |                                       |  |         |                | 1   |        |   |         |             |
| temuk         | S.  |               | -                    |                                       |  |         |                |     | - 3377 |   |         |             |

# BORING # B-2

|               |     |               | SAMPLE                |                                       |  | 1.      |                |     |   |   |         |             |
|---------------|-----|---------------|-----------------------|---------------------------------------|--|---------|----------------|-----|---|---|---------|-------------|
| Depth<br>(ft) | No. | Depth<br>(ft) | Pen./<br>Rec.<br>(in) | * Blows Per<br>Six Inches/<br>RQD (%) | DESCRIPTION OF SAMPLES<br>(Classification)   | Romario | Soil<br>Strata | 20  | N VAI                                   | LUE (bpf)<br>60                         | 80      | PIE<br>(ppa |
| - 2           |     | 0.4           |                       |                                       | 5.5" Asphalt Pavement (2.5" bitumicous/3"<br>macedam)  |         | Asphalt        |     | 1                                       | 1                                       | 1       |             |
| - 20 -        | 5-1 |               | 24/10                 | 35-50-37-37                           | S-1 Top 5* - Peorly Graded GRAVEL with Sand<br>(GP), fine, 33-40% stack, 3% fines, gray, slightly<br>moist.<br>Bottom 5* - Well Graded SAND with Siz<br>(SW-SM), 10% fines, 3-10% greed, chunks of<br>black organics, herews, moist. |         |                |     | *************************************** | *************************************** | \$      |             |
| -             | S-2 | 2.4           | 5/4                   | 100/5*                                | 5-2 Top 2" - Peorly Graded GRAVEL with Sand  |         | FiZ            |     |   | I                                       | 100/5** |             |
| -             |     | 2.8           |                       |                                       | (GP), 15-20% sand, 5% fines, gray, moist.<br>Bottom 2" - Silty SAND with Gravel (SM), 20-25%<br>fines, 15% gravel, brown, moist.   |         | Fill           |     |   |   |         |             |
| 40 -          |     |               |                       |                                       |  |         |                |     |   |   |         |             |
| 6.0 -         | S-3 | 5.0           | 24/4                  | 3-4-7-14                              | S-3 SILT with Gravel (ML), 20% gravel, 5-10%<br>and, non-plattic to slightly platfe, light brown,<br>moint (possible natural soil)   |         | ML             | ħ.  |   |   |         |             |
| 0             | -   | 7.0           |                       | -                                     | Boring Terminated at about 7 ft.   | -       | -              |     | 1                                       | 1                                       |         |             |
| -             |     |               |                       |                                       |  |         |                |     |   |   |         |             |
| 8.0 -         |     |               |                       |                                       |  |         |                |     |   |   |         |             |
| -             |     |               |                       |                                       |  |         |                |     |   |   |         |             |
| -             |     |               |                       |                                       |  |         |                |     |   |   |         |             |
| temarks       |     |               |                       |                                       |  | -1-1    | _              | - 1 | -1                                      | 1                                       | 1       | _           |

# BORING # B-3

|               |     |               | SAMPLE               |                                       |  | 1.      |                |          |        |                 |   | Т    |
|---------------|-----|---------------|----------------------|---------------------------------------|--|---------|----------------|----------|--------|-----------------|---|------|
| Depth<br>(ft) | No. | Depth<br>(ft) | Pen/<br>Rec.<br>(in) | * Blows Per<br>Six Inches/<br>RQD (%) | DESCRIPTION OF SAMPLES<br>(Classification)   | Remarks | Soil<br>Strata | 20       | N VAI  | LUB (bpf)<br>60 | A<br>60                                 | (ppu |
|               |     |               |                      |                                       | 7.5° Asphalt Pavement (5.5° bitmuinous/2°<br>macadam)  |         | Asphalt        |          |        | 1               |   |      |
| 2.0 -         | S-I | 0.6           | 240                  | 10-8-5-9                              | S-I No Recovery, See Note 1,   |         |                | ٥        |        |                 | *************************************** | -    |
| 4.0 -         | S-2 | 4.6           | 24/12                | 5-5-9-7                               | S-2 Top 5' Silty SAND with Gravel (SM), trace argunics, 15% fines, 25-30% greet, black, wet Middle 2"-Silly SAND (SM), fine no course, 15% fines, 16-15% gravel, gray-horws, wet. Botton 5"-Silly SAND (SM), fine to medium, 20-25% fines, 5-10% gravel, chanks of organics, hrown with dark troven chanks, moint. |         | Fill           | A        |        |                 |   |      |
| -             | S-3 | 5.0           | 6/6                  | 120%*                                 | S-3 SILT (ML), 5% sand, 5% gravel, moderately<br>plantic, light brown, wet. (Possibly natural, very soft   | 11      | ML             | $\dashv$ | $\top$ | $\top$          | 120%                                    |      |
| 80 -          |     | ,,,           |                      |                                       | silt. Spoon excountered an obstruction remining in the high blow counts)  Boring Terminated at about 5.5 ft.   | 1       |                |          |        |                 |   |      |

# BORING # B-4

|               |     |               | SAMPLE                | 5                                     |   |         |                |     |       |                |         |             |
|---------------|-----|---------------|-----------------------|---------------------------------------|---|---------|----------------|-----|-------|----------------|---------|-------------|
| Depth<br>(ft) | No. | Depth<br>(ft) | Pen./<br>Rec.<br>(in) | * Blows Per<br>Six Inches/<br>RQD (%) | DESCRIPTION OF SAMPLES<br>(Classification)  | Remarks | Soil<br>Strata | 20  | N VAL | UE (bpl)<br>60 | 80      | PII<br>(ppa |
|               |     | 0.2           |                       |                                       | 2" Asphalt Pavement (biteminous)  | _       | Asphalt        | - 1 | - 1   |                | 1       | П           |
| -             | S-1 | 12            | 12/12                 | 29-50%*                               | S-1 Well Graded GRAVEL with Sand (GW),<br>40-45% sand, 55% fines, brown, moint. (Based on<br>bulk sample obtained in the top 2 ft. below<br>pavement, refusal of sampler possibly occurred on   |         | Fill           |     |       |                | 79/12** |             |
| -             |     |               |                       |                                       | large piece of gravel)  |         |                |     |       |                | 1       | ı           |
| 20 -          |     | 1 1           |                       | 1                                     |   | 1.      |                | - 1 | 1     |                | 1       | ı           |
| 20 7          |     |               |                       |                                       |   | 1       | 10             | 1   |       |                |         | l           |
| -             |     |               |                       | 1 1                                   |   |         |                | 1   | 1     |                |         | ı           |
| -             |     | 3.0           | _                     |                                       | S-2 Silty SAND with Gravel (SM), fine to course,  |         |                | 1   |       |                |         |             |
|               |     | 20.00         |                       |                                       | 20% fines, 15% gravel, gray, moist.   |         |                | 1   |       |                |         |             |
| 7             |     |               | 1                     |                                       | CONTRACTOR OF THE STATE OF THE | 1       |                | 1   | 1     |                |         |             |
| 4,0 -         | S-2 | 1             | 24/16                 | 13-19-23-34                           |   |         |                | 1   | 12    | 1              |         | 1           |
| -             |     | 1 3           |                       |                                       |   |         | SM             | 1   |       | 1              |         |             |
|               |     |               |                       |                                       |   |         | 3.00           |     |       | 1              |         |             |
| 7             |     | 5.0           |                       |                                       | S-3 Silty SAND with Gravel (SM), fine to coarse,  |         |                |     |       |                | T       | 1           |
| -             |     | 3             | 9                     |                                       | 15-20% fines, 20% gravel, gray, moist.  |         |                | 1   | 1     |                |         |             |
| 60 -          | S-3 | 0             | 24/12                 | 18-21-28-33                           |   |         |                | 1   | 1.0   |                |         |             |
|               |     |               |                       | 09/20/20/20/20                        |   | 1       |                | 1   | 1 49  |                |         |             |
| 7             |     | 1000          |                       |                                       |   |         |                |     | 1     |                |         |             |
| -             |     | 7.0           | -                     |                                       | Boring Terminated at about 7 ft.  | - 1     |                | 1   |       |                |         |             |
| -             | 9   | 0             |                       |                                       |   |         |                |     | 1     |                |         |             |
| 8.0 -         |     |               |                       | 4                                     |   |         |                |     | 1     |                |         |             |
|               |     |               |                       | 1 1                                   |   |         |                |     | -1    |                |         |             |
| 1             |     | 8 7           |                       |                                       |   |         |                |     | 1     |                |         |             |
| -             |     | ( )           |                       |                                       |   |         |                |     |       |                |         |             |
|               |     | 8 8           |                       |                                       | 100   |         |                |     |       |                |         |             |
|               |     |               |                       |                                       | **  |         |                | 1   |       |                |         |             |

# BORING # B-5

|               |            |               | SAMPLE               | 3                                     |   | 1-        |                |               |       |                   |      |
|---------------|------------|---------------|----------------------|---------------------------------------|---|-----------|----------------|---------------|-------|-------------------|------|
| Depth<br>(fl) | No.        | Depth<br>(ft) | Pen/<br>Rec.<br>(in) | * Blows Per<br>Six Inches/<br>RQD (%) | DESCRIPTION OF SAMPLES<br>(Classification)  | Remeb     | Soil<br>Streta |               |       | E (bpl) A<br>60 B | Coop |
| 550           |            | 0.5           |                      |                                       | 5" Asphalt Paveroeol (3" bituminous/2"<br>macedam)  |           | Asphalt        | I             |       |                   |      |
| - 20 -        | <b>5-i</b> | 2.5           | 24/13                | 42-27-20-20                           | S-1 Top 2 *- Well Graded GRAVEL with Such<br>(SW), 15-20% used, 5% fines, prej. moint<br>Middle 10* - Poorty Graded SAND with Silt and<br>Gravel (SP-SSI), fine to medium, 10% fines,<br>13-20% gravel, known, moint.<br>Bottom 1* - Silty SAND (SM), 20% fines, 5-10%<br>gravel, brown, moint. |           | Fitt           |               | 4     |                   |      |
|               |            | 3.0           |                      |                                       | S-2 Top 3" - Silty SAND (SM), 30-35% fines, trace organics, 5-10% gravel, brown, slightly moist.  |           |                |               |       |                   |      |
| .0 -          | 5-2        |               | 24/12                | 6-5-20-40                             | Bottom 9" - SILT with Sand (ML), non-platfe,<br>15-20% sand, 10-15% gravel, trace organics and<br>roots, light brown, slightly moist, (possible natural<br>soil.)   |           | ML             | A             |       |                   |      |
| 5.0 -         | S-3        | 5.0           | 24/15                | 12-17-15-38                           | 5-3 Top 2" - Well Graded SAND with Silt and<br>Gravel (SW-SSI), 10% fines, 15% gravel, brown,<br>slightly moist. (possible satural seld).<br>Bottom 8" - Well Graded SAND with General (SW),<br>5-10% fines, 10-35% gravel, gray, slightly excist.<br>(possible natural soil.)                  |           | sw             | A             |       |                   |      |
| 1             |            | 7.0           |                      |                                       | Boring Terminated at about 7 ft.  | $\exists$ |                |               |       |                   |      |
| 1.0 -         |            |               |                      |                                       |   |           |                |               |       |                   |      |
| -             |            |               |                      |                                       |   |           |                |               |       |                   |      |
| emarks        |            | rain-size     | analysis             | performed on by                       | alk sample obtained in top one foot below pavement indicat<br>was obtained a few feet from the boring location.   | od a hi   | aher oercentas | se (about 60% | ofeno | el than           |      |

# BORING # B-6

|               | 1    |               | SAMPL                | Б                                     | The second secon | 1       |                |    |       |                 |          |           |
|---------------|------|---------------|----------------------|---------------------------------------|--|---------|----------------|----|-------|-----------------|----------|-----------|
| Depth<br>(fi) | No.  | Depth<br>(ft) | Pen/<br>Rec.<br>(in) | * Blows Per<br>Six Inches/<br>RQD (%) | DESCRIPTION OF SAMPLES<br>(Classification)   | Remarks | Soil<br>Streta | 20 | N VAI | .UE (bpl)<br>60 | A<br>80  | PI<br>(pp |
| 20            |      | 0.4           |                      |                                       | 5" Asphall Pavement (2" bitumisous/ 3"<br>macadam)   |         | Asplalt        |    | T     | 1               | 1        |           |
|               | s-ı  | 12            | 9/8                  | 100-100/3*                            | S-1 Well Graded SAND with Silt and Gravel<br>(SW-SM), 35-40% gravel, 10% fines, gray-brown,<br>moist.  |         |                |    |       |                 | 2005     | ł         |
| - 20 -        |      | 12            |                      |                                       | mots.  |         |                |    |       |                 |          |           |
| -             |      | 2.4           |                      |                                       | S-2 Silty SAND with Gravel (SM), fine to course,<br>15-20% fines, 15-20% gravel, mixed with organic  |         | Fill           |    |       | 1               |          |           |
| ,             | S-2  |               | 24/12                | 7-12-11-30                            | soil, dark brown, slightly moist   |         |                | A  |       |                 |          |           |
| 4.0 -         |      | 4.4           |                      | $\vdash$                              |  |         |                |    |       |                 |          |           |
| -             |      | 5.0           |                      |                                       | S-3 Well Graded SAND with Silt (SW-SM),<br>10-15% fines, 20-30% gravel, brown. (pombly<br>natural soil).   | 1       | 1              | 1  | 1     | $\dagger$       | $\vdash$ |           |
| 6.0 -         | \$-3 |               | 23/14                | 20-40-61-703*                         |  |         | SW-SM          |    |       | -               | 101      |           |
| -             | -    | 6.9           |                      |                                       | Boring Terminated at about 7 ft.   | 1       | $\dashv$       | 1  |       |                 |          |           |
| 8.0 -         |      |               |                      |                                       |  |         |                |    |       |                 |          |           |
| -             |      |               |                      |                                       |  |         |                |    |       |                 | -        |           |
| -             |      |               |                      |                                       |  |         |                | -  |       |                 |          |           |
| temarks       |      |               |                      |                                       |  |         |                |    |       |                 |          |           |

| BELMONT | PLEASANT STREET (ROUTE 60) | STATE | FED.PROJ. AID NO. | FISCAL | SHEET | TOTAL | SHEETS | MASS. | STP-0015(220)X | 2003 | 6 | 241 | PROJ. FILE NO. 601790 |

BORING LOGS

# BORING # B-7

|               |     |               | SAMPLE               |                                       |   | l n     |                |    |       |                |   |      |
|---------------|-----|---------------|----------------------|---------------------------------------|---|---------|----------------|----|-------|----------------|---|------|
| Depth<br>(ft) | No. | Depth<br>(ft) | Pen/<br>Rec.<br>(in) | * Blows Per<br>Six Inches/<br>RQD (%) | DESCRIPTION OF SAMPLES<br>(Classification)  | Remarks | Soil<br>Strata | 20 | N VAL | UE (bpf)<br>60 | 80                                      | (ppn |
|               |     | 0.4           |                      |                                       | 5" Asphalt Pavement (2" bitaminout/3"<br>macadam)   |         | Asphalt        |    | - 1   |                |   |      |
|               | S-I | 1.2           | 9/9                  | 20-75/3"                              | S-1 Top 1" - Well Graded GRAVEL with Sand<br>(GW), gray, moint.<br>Middle 3" - Well Graded SAND with Gravel (SW),   | 1       |                |    |       |                | 959                                     | 1    |
| - 0.1         |     | 55000         |                      |                                       | 55% fines, 15-20% gravel, brown, slightly moint.<br>Bottom 5° - Silry SAND (SM), mostly fine to<br>medium, 155% fines, 5-105% gravel, brown, slightly<br>moist. | 1       | SW/SM          |    |       |                |   |      |
| -             |     |               |                      |                                       | Auges refusal encountered at about 3 ft., boring terminated.  | 1       |                |    |       |                |   |      |
|               |     |               |                      |                                       |   |         |                |    |       |                | *************************************** |      |
| -             |     |               |                      |                                       |   |         |                |    |       |                |   |      |
| 0 -           |     | - 0           |                      |                                       |   |         |                |    |       |                |   |      |
| -             |     |               |                      |                                       |   |         |                |    |       |                |   |      |
|               |     |               |                      |                                       |   |         |                |    |       |                |   |      |
| -             |     |               |                      |                                       |   |         |                |    |       |                |   |      |
| 1             |     |               |                      |                                       |   |         |                |    |       |                |   |      |
| marks         | ID  | villers ad    | vasced a             | ugers through be                      | ulders from about 1 to 3 feet.  |         |                | -  | -     |                | -                                       |      |

# BORING # B-8

| 7             |     | - 1           | SAMPLI                | E                                     |  | Τ.       |                |      |      |               |           | $\neg$ |
|---------------|-----|---------------|-----------------------|---------------------------------------|--|----------|----------------|------|------|---------------|-----------|--------|
| Depth<br>(ft) | No. | Depth<br>(ft) | Pan./<br>Rec.<br>(ia) | * Blows Per<br>Six Inches'<br>RQD (%) | DESCRIPTION OF SAMPLES<br>(Classification)                                     | Romandos | Soil<br>Strata | . 20 | N VA | LUE (bp<br>60 | n ▲<br>80 | (ppn   |
|               |     |               |                       |                                       | 6" Asphali Pavement (4" bituminous/2.5"<br>macadam)                            |          | Asphalt        |      | 1    | -             |           | T      |
|               |     |               |                       | 1 1                                   | Bulk Sample obtained from top 4 inches below                                   | 1        | Fill           |      | 1    |               |           |        |
| -             | 1 8 |               |                       |                                       | pavement. Bulk sample consisted of Poorly Graded<br>GRAVEL (GP), brown, moint. | 1        | 7.11           |      | 1    |               |           | 1      |
|               |     |               |                       |                                       | GRAVEL (GP), STOWN, MOUR.  | 4        |                | 1    | 1    |               |           | 1      |
| 7             |     |               | 8                     |                                       |  |          |                |      | 1    | 1             |           |        |
| 20 -          |     |               |                       |                                       |  |          |                |      | 1    | 1             | 1         |        |
|               |     |               |                       |                                       |  |          |                |      | 1    | 1             | 1         |        |
|               |     |               |                       |                                       |  |          |                |      |      | 1             | 1         | 1      |
| -             |     |               |                       |                                       |  |          |                |      |      | 1             |           |        |
| -             |     |               | 1 1                   |                                       |  |          |                |      |      | 1             | 1         |        |
| - 1           |     |               |                       |                                       |  |          |                | 1    | 1    | 1             |           |        |
| 4.0 -         |     |               |                       |                                       |  |          |                | 1    | 1    |               | 1         | 1      |
| -             |     |               |                       |                                       |  | 11       |                | 1    |      |               |           |        |
|               |     |               | 1                     |                                       |  | П        |                | 1    |      |               | 1         |        |
|               | - 1 |               |                       |                                       |  | П        |                |      |      | 1             | 1         | 1      |
| -             | - 1 |               |                       | 2.                                    |  | П        |                |      |      | 1             |           | 1      |
| 6.0 -         |     | 1             |                       | 1                                     |  | П        |                | 1    | 1    | 1             | 1         |        |
| 0.0           |     |               |                       |                                       |  | 11       | - 1            |      |      | 1             | 1         |        |
| -             | - 1 |               |                       |                                       |  | Ш        |                |      |      | 1             | 1         |        |
| -             |     |               |                       |                                       |  | Ш        |                |      |      | 1             | 1         | 1      |
|               |     |               |                       |                                       |  | Ш        | - 1            |      |      | 1             | 1         |        |
| 7             | 1   |               |                       |                                       |  | П        |                |      |      | 1             | 1         |        |
| 8.0 -         |     | - 1           |                       |                                       |  | 11       | - 1            |      |      | 1             |           | 1      |
|               | - 1 |               |                       | - 1                                   |  | П        | - 1            |      |      |               |           |        |
|               |     |               |                       |                                       |  | П        |                |      |      | 1             |           |        |
| -             |     | - 1           |                       |                                       |  | П        | - 1            |      |      | 1             |           |        |
|               |     |               | 1                     |                                       |  | 11       |                |      |      |               |           |        |
| 7             |     | 1             |                       |                                       |  | 11       | - 1            | 1    |      |               |           | 1      |
| emarks        | _   |               |                       |                                       |  | 1        |                |      |      | 1             | 1         | 1_     |

# BORING # B-9

|               |     |               | SAMPL                | В                                     | Programme and the second second  | 10      |                |     |       |                |   | Т           |
|---------------|-----|---------------|----------------------|---------------------------------------|--|---------|----------------|-----|-------|----------------|---|-------------|
| Depth<br>(ft) | No. | Depth<br>(ft) | Pen/<br>Rec.<br>(ia) | * Blows Per<br>Six Inches/<br>RQD (%) | DESCRIPTION OF SAMPLES<br>(Classification)   | Remarks | Soil<br>Strata | 20  | N VAL | UE (bpf)<br>60 | £0                                      | PED<br>(ppm |
|               |     |               |                      | 00000                                 | 4" Arphalt Pavement (2" biteminous/2" macadam)   | Т       | Asobalt        | - 1 | 1     | 1              | 1                                       | T           |
| - 2.0 -       | S-I | 2.4           | 2417                 | 75-62-50-50                           | S-1 Top 5" - Well Graded GRAVEL, with Stand (GPV), 35-40% sand, gray, moist. Madds 3" - Roody Graded SAND with Sits (SF-SN), face to medium, 10-15% Gens, black, slightly moist. (possibly reclained suphabl, Middle 4" - Well Graded SAND (SW), 3% fines, 5-10% gravel, gray-brown, slightly moist. Botton 5" - Well Graded SAND works. |         | Fill           |     |       |                | 1112                                    |             |
| 40 -          | S-2 | 4.4           | 24/11                | 10-8-8-12                             | Gravel (SW-SSA), 10% fines, 15-20% gravel, brown,<br>shighly mesis.<br>5-7 Top 5°- Sandy Sill T (ML), too-plastic,<br>10-25% sand, mixed with optacie and, dark brown,<br>slightly mois.<br>Bettom 6°- Sill "with Sand (ML), 20-25% sand,<br>non-plastic, slight trace of organics (change), light<br>brown, slightly moist.             | 1       | ML             | 16  |       |                | *************************************** |             |
| -             |     | 5.0           |                      |                                       | S-3 Top 2" - Siley SAND (SM), 35-40% fines,<br>non-plattic, slight trace organics (clumps), light<br>brown, slightly moint.  | $\ $    | -              | -   | -     | +              | -                                       |             |
| 60 -          | S-3 | 7.0           | 24/15                | 25-21-23-26                           | Middle 3" - Well Gruded SAND (SW), moetly fine<br>to medium, 5-10% fines, light brown, slightly moist.<br>Botton 10" - Well Gruded SAND with Gravel<br>(SW), 5-10% fines, 15-20% gravel, gray-brown,<br>slightly moist.  |         | sw             |     | A     |                |   |             |
|               |     | 7.0           |                      |                                       | Boring Terminated at about 7 ft.   | 11      |                |     |       |                |   |             |
| - 0.1         |     |               |                      |                                       |  |         |                |     |       |                |   |             |
| -             |     |               |                      |                                       |  |         |                |     |       |                |   |             |
| essado        | E   | _             |                      |                                       |  | ш       |                | -1_ |       | 1              | 1                                       | _           |

# BORING # B-10

|               |     |               | SAMPLE               | E                                     |   |         |                |   |    |       |                |    |      |
|---------------|-----|---------------|----------------------|---------------------------------------|---|---------|----------------|---|----|-------|----------------|----|------|
| Depth<br>(fl) | No. | Depth<br>(fi) | Pen/<br>Rec.<br>(in) | * Blows Per<br>Six Inches/<br>RQD (%) | DESCRIPTION OF SAMPLES<br>(Classification)  | Romarks | Soil<br>Strata |   | 20 | N VAL | UE (bpf)<br>60 | 80 | (ppe |
|               |     |               |                      |                                       | 6" Asphalt Pavement (3" bituminous/3" macadam)  |         | Asphalt        |   | T  | T     | T              | T  | Т    |
| -             | S-1 | 0.5<br>0.8    | 3/2                  | 703*                                  | S-1 Well Graded SAND with Gravel (SW), mostly<br>medium to course, 40-45% gravel, 5% fines, gray,   | 7"      |                |   | l  |       |                | 70 | 3.4  |
| 2.0 -         | S-2 | 1.0           | 24/15                | 5557                                  | molet. S-T Top 10° - Silty SAND (SM), 25-30% faces. 10-13% gravel, gray-brown, slightly moist. Bottom 3° - Siby SAND (SM), mixed with organics, 23-30% faces, 10-15% gravel, brown, slightly moist. |         | Fill           | đ | -  |       |                |    |      |
| 4.0 -         | S-3 | 3.0           | 24/12                | 7-7-17-66                             | S-3 Well Graded SAND with Gravel (SW), 5% floss, 20-30% gravel, gray, slightly moint. (possible natural soil).  |         |                |   | A  |       |                |    |      |
| -<br>6.0 -    | 5-4 | 5.0           | 24/16                | 35-52-70-95                           | 5-4 Similar to 5-3, less than 5% fines, 30-40% gravel.  |         | SW             |   |    |       |                | ,  | 224  |
| -             | -   | 7.0           |                      |                                       | Boring Terminated at about 7 ft.  | 11      |                |   | l  |       |                |    |      |
| -             |     |               |                      |                                       |   | 11      |                |   | l  |       |                |    |      |
| 8.0 -         |     |               |                      |                                       |   | П       |                |   |    | 1     |                |    |      |
| -             |     |               |                      |                                       |   | П       |                |   |    |       |                |    |      |
| -             |     |               |                      |                                       |   | П       |                |   | l  |       | 1              |    |      |
| -             |     | 1             |                      |                                       |   |         |                |   |    | I     |                |    |      |

# BORING # B-11 (FOPMERLY B-14C)

| Depth | Casing |     |           | Sample     |              |        | Visual Identification   |
|-------|--------|-----|-----------|------------|--------------|--------|---|
| Ft    | bi/n   | No. | In/In     | Depth      | Blows/6"     | Strate | of Soil and / or Rock Sample  |
| ,     |        |     |           |            |              | 0.6.   | Asphalt - 0'6"<br>Gravel - 1'0"   |
|       |        | 1   |           | 1'0'-3'2'  | 27-31-100/2* | 1.0,   | Dry, very dense, fine to coarse sand, some inorganic silt, trace<br>fine gravel, cobbles and boulders                                 |
| 5     |        | 2   |           | 5'0*-5'10* | 44-100/4*    |        |   |
| 10    |        |     |           |            |              | 9.0,   |   |
| 10    |        |     |           |            |              |        | Refusal at 5°10" with split spoon sampler, 100/4"<br>Refusal at 9'0" with hollow stem auger.<br>No water encountered upon completion. |
| 15    |        |     |           |            |              |        | *   |
| 20    |        |     |           |            |              |        |   |
| 15    |        |     |           |            |              |        | e e   |
| 10    |        |     | A.        |            |              |        |   |
| 15    |        |     |           |            |              |        |   |
| 9     |        |     | uger Size |            |              |        |   |

# BORING # B-12 (FORMERLY B-13B)

| Depth<br>Ft. | Cumg |     | the same of | Sample      |            |        | Virual Identification   |
|--------------|------|-----|-------------|-------------|------------|--------|---|
| PL.          | birt | No. | TETE        | Depth       | Blows/6"   | Strate | of Soil and / or Rock Sample  |
| 1            |      |     |             |             |            | 0.6.   | Asphalt 0°6"<br>Gravel 1°0"   |
|              |      | 1   |             | 10.30.      | 7-15-12-15 | 1'0"   | Dry, medium dense to very dense, fine to coarse sand, some inorganic silt, trace fine gravel, cobbles and boulders                      |
| 5            |      | 2   |             | 50*-57*     | 25-100/1*  |        |   |
| 10           |      | 3   |             | 10'0"-10'0" | 100/0*     | 11'0"  |   |
| 15           |      |     |             |             |            |        | Refusal at 10°0" with split spoon sampler, 100.00"<br>Refusal at 11°0" with hollow stem auger.<br>No water encountered upon completion. |
| 20           |      |     |             |             | S=         |        | *   |
| 25           |      |     |             |             |            |        |   |
| 30           |      |     |             |             |            |        |   |
| 95           |      |     |             |             |            |        |   |
| 39           |      |     |             | 76          |            |        |   |

# BORING # B-13 (FORMERLY B-4A)

| Depth | Chaing | 200 |         | Sample  |           | 1000000 | Visual Identification   |
|-------|--------|-----|---------|---------|-----------|---------|---|
| PL.   | H/H    | No. | Pen Rec | Depth   | Hlows/6"  | Strata  | of Soil and / or Rock Sample  |
| 1     |        | 1   |         | 0.00.8. | 22-100/2" | 3'0"    | Dry, very dense, fine to course sand, some fine to course grave<br>and organic silt, trace cobbles.                             |
| 5     |        | 2   |         | 50-50   | 100/0"    | 6.0.    | Dry, very dense, weathered rock   |
| 10    |        |     |         |         |           |         | Refusal at 5'0" with split spoon sampler, 100'0". Refusal at 6'0" with hollow stem auger. No water encountered upon completion. |
| 15    |        |     |         |         |           | 9       | ,   |
| 20    |        |     |         |         |           |         |   |
| 25    |        |     |         |         |           |         |   |
| 90    |        |     |         |         |           |         |   |
| 35    |        |     |         |         |           |         | -   |
| 39    |        |     |         |         |           |         | B 8   |

# BORING # B-14 (FORMERLY B-12A)

| Dopth | Casing | 100 | War Zaki wa | Sample    |          | 1      | Visual Identification  |
|-------|--------|-----|-------------|-----------|----------|--------|--|
| R.    | 1618   | No. | Profes      | Depth     | Blows/6" | Streta | of Soil and / or Rock Sample   |
| 1     |        | 1   |             | 0'0"-0'1" | 100/1*   | 3'0"   | Dry, very dense, fine to coarse sand, some fine to coarse grave organic silt, trace cobbles.  Weathered rock |
| 5     |        |     |             |           |          | 4'0"   | Refusal at 0°1" with split spoon sampler, 100°1". Refusal at 4°0" with hollow stem suger.                    |
| 10    |        |     |             |           |          |        | No water encountered upon completion.  |
| 15    |        |     |             |           |          |        |  |
| 20    |        |     |             |           |          |        |  |
| 25    |        |     |             |           |          |        |  |
| 30    |        |     |             |           |          |        |  |
| 35    |        |     |             | -         |          |        |  |
| 39    |        |     | uger Size   |           |          |        |  |

PROJ. FILE NO. 601790

BORING LOGS

# BORING # B-15 (FORMERLY B-5A)

| Dopth | Craing | 1   | Managar Land | Sample    | y 100 -  |              | Visual Identification   |
|-------|--------|-----|--------------|-----------|----------|--------------|---|
| R.    | 1618   | No. | PayPas       | Dopth     | Blows/6" | Strata       | of Soil and / or Rock Sample  |
| 1     |        | 1   |              | 0'0"-0'1" | 100/1*   |              | Dry, very dense, fine to coarse sand, some fine to coarse gravel, organic silt, trace cobbles.  |
| 5     |        |     |              | 18        |          | 3'0"<br>4'0" | Weathered rock  |
|       |        |     |              |           |          |              | Refusal at 0'1" with split spoon sampler, 100/1".<br>Refusal at 4'0" with hollow stem auger.<br>No water encountered upon completion. |
| 10    |        |     |              |           |          |              |   |
| 15    |        |     |              | 20        |          |              |   |
| 10    |        |     |              |           |          |              |   |
| 5     |        |     |              |           |          |              |   |
| ю     |        |     |              |           |          |              |   |
| 95    |        |     |              |           |          |              |   |
| 9     |        |     |              |           |          |              |   |

# BORING # B-16 (FORMERLY B-6B)

| Depth | Carng |     | 10000 | Sample      |             |        | Visual Identification   |
|-------|-------|-----|-------|-------------|-------------|--------|---|
| Ft.   | b)B   | No. | fmks  | Depth       | Blows/6"    | Strata | of Soul and / or Rock Sample  |
| 1     |       | 1   |       | 02:-2'2'    | 10-10-7-7   | 0.5.   | Asphalt - 0°2°  Dry, medium dense to loose, fine to medium sand, trace organissilt, fine gravel and cobbles Fill                        |
| 6     |       | 2   |       | 50-70       | 4-3-3-4     |        |   |
| 10    |       | 3   |       | 10'0"-12'0" | 21-20-31-27 | 8'0"   | Dry to moist, very dense to medium dense, fine to medium sand<br>some inorganic silt, trace fine gravel.                                |
| 15    |       | 4   |       | 15'0"-17'0" | 7-10-12-18  |        |   |
| 20    |       | 5   |       | 20'0"-20'3" | 100/3*      | 20:3-  | Refusal at 20'3" with split spoon sampler, 100/3". End of boring at 20'3" with hollow stem auger. No water encountered upon completion. |
| 25    |       |     |       |             |             |        | To was seconded upon completed.   |
| 30    |       |     |       |             |             |        |   |
| 35    |       |     |       |             |             |        | 1992  |
| 39    |       |     |       |             |             |        | 62  |

# BORING # B-17 (FORMERLY B-7B)

| Depth | Caring |     | 1      | Sample      |             |                | Visual Identification   |
|-------|--------|-----|--------|-------------|-------------|----------------|---|
| R     | мя     | No. | Pactor | Depth       | Blows/6"    | Strata         | of Soil and / or Rock Sample  |
| 1     |        | 1   |        | 0'6*-2'6*   | 12-22-27-31 | 0.8.           | Asphalt - 0'6"  Day, very dense, fine to medium sand, some organic silt, trace fine gravel and cobbles and boulders.  |
| 5     |        | 2   |        | 5'0"-5'8"   | 27-100/2*   | 60°            | Cored boulders  |
| 10    |        | 3   |        | 10'0"-10'5" | 100/5"      | 80°            | Moist, very dense, fine to coarse sand, some inorganic silt, trace<br>fine gravel, cobbles and boulders.  |
| 15    |        |     |        |             |             | 14'0"          | Corod boulders  |
| 20    |        | 4   |        | 18'0"-20'0" | 22-27-30-30 | 17'0°<br>20'0° | Morx, very dense, fine to course sand, some inorganic sill, trace<br>fine gravel, cobbles and boulders  End of boring at 20'0" with hollow stem auger.  No water encountered upon completion. |
| 25    |        |     |        |             |             |                |   |
| 30    |        |     |        |             |             |                |   |
| 95    |        |     |        |             |             |                |   |
| 39    |        |     |        |             |             |                |   |

# BORING # B-19 (FORMERLY B-9A)

0'0"-0'5"

50'-5'2"

Notes: Hollow Stem Auger Size - 4-1/4"

100/2"

Refusal at 5'2" with split spoon sampler, 100/2". Refusal at 6'0" with hollow stem auger. No water encountered upon completion.

| Depth | Craing |     |       | Sample      |             |       | Visual Identification   |
|-------|--------|-----|-------|-------------|-------------|-------|---|
| Ft.   | ыя     | No. | Parke | Depth       | Blows/6*    | State | of Soil and / or Rock Sample  |
| 1     |        | 1   |       | 0'6*-2'6*   | 10-7-8-15   | 0.6.  | Asphalt - 0'6"  Moist, medium dense to very dense, fine to coarse sand, some organic silt, trace fine gravel, cobbles and boulders.         |
| 5     |        | 2   |       | 5'0*-7'0*   | 14-24-27-14 |       |   |
|       |        |     |       |             | -           | 8.0.  | Cored boulders  |
| 10    |        | 3   |       | 10'0'-10'3' | 100/3*      | 10'0" | Moist, very dense, fine to coarse sand and nested cobbles and<br>boulders, some inorganic silt.   |
| 15    |        | 4   |       | 15'0"-15'1" | 100/1"      | 15'6" | Refusal at 15'1" with split spoon sampler, 100/1".<br>End of boring at 15'6" with hollow stem auger.<br>No water mountered upon completion. |
| 20    |        |     |       |             |             |       | Note: Unable to advance through boulders.   |
| 25    |        |     |       |             |             |       |   |
| 30    |        |     |       |             |             |       | =   |
| 35    |        |     |       |             |             |       |   |
| 39    |        |     |       |             |             |       |   |

| STATE | FED.PROJ. AID NO. | FISCAL | SHEET<br>NO. | TOTAL |
|-------|-------------------|--------|--------------|-------|
| MASS. | STP-001S(220)X    | 2003   | 8            | 241   |

# BORING LOGS

# BORING # B-20 (FORMERLY B-8)

| DEPTH<br>(FEET) | # | TYPE | REC/PEN | PID<br>VALUE<br>(ppm) | BLOW<br>COUNTS<br>6-12-18-24" | DESCRIPTION   | COMMENTS |
|-----------------|---|------|---------|-----------------------|-------------------------------|---|----------|
| 0 -             | 1 | grab | N/A     | 0                     | N/A                           | Asphalt pavement  Dk brown fn(+)-crs  SAND, little gravel  and silt, dry. |          |
| 5 —             | 2 | ss   | 6/24    | 1.                    | 12-14-20-51                   | Brown fn-crs SAND,<br>little gravel, trace<br>silt, dry.                  |          |
|                 | 3 | grab | N/A     | 0                     | N/A                           | Dk brown gravel and fn(+)-crs sand, littl silt, moist.                    | _<br>e   |
| 10 -            | 4 | ss   | 18/24   | 150                   | 27-58-41-43                   | Gray brown fn(+)-crs<br>SAND, little gravel<br>and silt, dry.             | -        |
|                 | 5 | ss   | 3/8     | 170                   | 65-120+                       | Gray brown fn(+)-crs<br>SAND, little gravel<br>and silt, dry.             | -        |
| 15 —            | 6 | grab | N/A     | 250                   | N/A                           | Gray silt and fn(+)-<br>crs sand, trace<br>gravel, moist.                 | -        |

# BORING # B-21

| Depth | Casing | _   |       | Sample      |             |         | Visual Identification   |
|-------|--------|-----|-------|-------------|-------------|---------|---|
| R     | 85°#   | No. | >m916 | Depth       | Blows/6"    | Strata  | of Soil and / or Rock Sample  |
| 1     |        | 1   |       | 0'2"-2'2"   | 7-8-10-8    | 0.5.    | Asphalt = 0°2°  Dry, medium dense to very dense, dry, fine to coarse sand, trac organic silt and fine gravel. |
| 5     |        | 2   |       | 5'0"-5'7"   | 25-100/1"   |         |   |
| 10    |        | 3   |       | 10'0"-12'0" | 14-15-14-15 | 80*     | Dry to wet, medium dense to very dense, fine to coarse sand, some inorganic silt, trace fine gravel, cobbles. |
|       |        | 4   |       | 13'0"-15'0" | 15-37-40-51 | 1000000 |   |
| 15    |        |     |       |             |             | 15'0"   | End of boring at 15'0" with hollow stem auger.<br>Water level at 10'0" upon completion.                       |
| 20    |        |     |       |             |             |         |   |
| 25    |        |     |       |             |             |         |   |
| 30    |        |     |       |             |             |         | ag.   |
| 15    |        |     |       |             |             |         |   |
| 9     |        |     |       |             |             |         |   |

# BORING # B-22

| Depth | Cuing |     |         | Sample      |             |                | Visual Identification   |
|-------|-------|-----|---------|-------------|-------------|----------------|---|
| FL    | 6411  | No. | Preffec | Depth       | Blows 6"    | Streta         | of Sail and / or Rock Sample  |
| 1     |       | 1   |         | 0'2"-2'2"   | 6-5-6-6     | 0.5.           | Asphall = 0'2"  Moist, medium dense, fine to medium sand, some organic silt, trace fine gravel        |
| 5     |       | 2   |         | 5'0"-7'0"   | 8-6-4-4     |                |   |
| 10    |       | 3   |         | 10'0"-12'0" | 15-22-31-27 | 90"            | Moist to wet, very dense to medium dense, fine to coarse sand<br>trace inorganic silt and fine gravel |
| 15    |       | 4   |         | 15'0'-17'0' | 7-10-10-14  |                |   |
| 20    |       | 5   |         | 18'0"-20'0" | 15-15-21-30 | 18°0°<br>20°0° | Wet, dense, very fine to fine sand and inorgenic silt, trace fine<br>gravet.                          |
| 25    |       |     |         |             |             |                | End of boring at 20'0" with hollow stem auger.  Water level at 15'0" upon completion                  |
| 30    |       |     |         |             |             |                |   |
| 35    |       |     |         |             |             |                |   |
| 19    |       |     |         |             |             |                |   |

# BORING # B-23

| Depth | Caring |     |        | Sample      |             |        | Virual Identification  |
|-------|--------|-----|--------|-------------|-------------|--------|--|
| R     | 14/8   | No. | Pm.7ac | Depth       | Blows/6"    | Struta | of Soil and / or Rock Sample   |
| 1     |        | 1   |        | 0'1"-2'1"   | 7-10-10-5   | 0'1"   | Asphalt - 0'1"  Moist, medium dense, dry, fine to medium sand, some organic silt, trace fine gravel.           |
| 5     |        | 2   |        | 5'0"-7'0"   | 14-14-23-27 | 310"   | Moist to wet, medium dense to very dense, fine to coarse sand some inorganic silt, trace fine gravel, cobbles. |
| 10    |        | 3   |        | 10'0"-12'0" | 4-6-15-16   |        |  |
| 15    |        | 4   |        | 13'0'-15'0" | 92-50-38-27 | 15'0"  |  |
| 20    |        |     |        |             |             |        | End of boring at 15°0" with hollow stem auger.<br>Water level at 6°0" upon completion                          |
| 5     |        |     |        |             |             |        |  |
| 0     |        |     |        |             |             |        | = 5  |
| 5     |        |     |        |             |             |        |  |
| 9     |        |     |        |             |             |        |  |

## BORING # W-1

| Depth        | Caring |     |         | Sample      |             |        | Visual Identification   |
|--------------|--------|-----|---------|-------------|-------------|--------|---|
| Depth<br>Ft. | 55.9   | No. | Pet/Rac | Depth       | Blows'6"    | Strata | of Soil and / or Rock Sample  |
|              |        |     |         |             |             | 0.1.   | Asphalt - 0'1"  |
|              |        | 1   |         | 0'1"-2'1"   | 8-10-9-9    |        | Moist, medium dense, dry, fine to medium sand, some organic<br>silt   |
|              |        | 2   |         | 5'0"-7'0"   | 17-19-21-21 | 3.0.   | Moist to wet, dense, fine to coarse sand, some inorganic silt, trace fine gravel.                           |
| 0            |        | 3   |         | 10'0'-12'0" | 21-23-17-37 |        |   |
| 5            |        |     |         |             |             | 15'0"  | End of boring at 15'0" with hollow stem auger. Water level at 60' upon completion. Set well point at 15'0". |
| 0            |        |     |         |             |             |        | set well pount at 13 0 .  |
| 5            |        |     |         |             |             |        |   |
|              |        |     |         |             |             |        | D   |
| 5            |        |     |         |             |             |        |   |
| ١            |        |     |         |             |             |        |   |

# BORING # W-2

| Depth | Castog |     |         | Sample      |             |        | Visual Identification   |
|-------|--------|-----|---------|-------------|-------------|--------|---|
| PL.   | bin.   | No. | Ten 7ac | Depth       | Blows/6"    | Strate | of Soil and / or Rock Sample  |
| ,     |        | 1   |         | 10.30       | 4-5-4-5     | 1'0"   | Bark mulch – 1'0"  Moist, loose, fine to medium sand, some organic silt, trace fine gravel.                   |
| 5     |        | 2   |         | 5'0"-7'0"   | 5-3-2-2     |        | gare.   |
| 10    |        | 3   |         | 10'0"-12'0" | 16-17-22-14 | 90,    | Dry to wet, dense to medium dense, fine to coarse sand, some trace inorganic silt, trace fine gravel          |
| 15    |        | 4   |         | 15'0"-17'0" | 6-9-15-17   |        |   |
| 10    |        | 5   |         | 20'0'-22'0" | 17-18-18-17 |        |   |
| 15    |        | 5   |         | 23'0'-25'0" | 7-10-15-17  | 250°   | End of boring at 25'0" with hollow stem auger. Water level at 15'0" upon completion. Set well point at 20'0". |
| 0     |        |     |         |             |             |        |   |
| 5     |        |     |         |             |             |        |   |
|       |        |     |         |             |             |        |   |

# **PROBES**

| Number | Depth to Refusal |
|--------|------------------|
| Pl     | 4'0"             |
| P1-A   | 6'0"             |
| P1-B   | 4'0"             |
| P-2    | 4'0"             |
| P-3    | 9'0"             |

# MassDOT Route 2 1964 Project Arlington/Belmont, MA

17.5 HRS.

# TEST BORING REPORT RAYMOND

CONCRETE PILE COMPANY

Date JANUARY 8, 1965 UNIVERSAL ENGINEERING CORP+ Location of Borings ROUTE 2. ARLINGTON AND BELMONT, MASSACHUSETTS as a fixed datum. All borings are plotted to a scale of 1"= 4 ft. using Boring No. D 24 Boring No.D 23 Boring No. D 22 Boring No. D 21 45+0 3' RT. FLEV. 287.2' ASPHALT SEE NOTE L 0.0 0.2 1.0 44+0 31 RT. ELEV. 285.51 0.01 CONCRETE ASHPALT SAND CONCRETE 0.51 43+0 6' RT ELEV. 283.0' ASPHALT CONCRETE FIRM 0.07 42+0 31 RT. ELEV. 281.81 MACADAM 1,5 2,5 SAND GRAVEL EILL COMPACT MEDIUM SAND GRAVEL AND BOULDERS DRILLED BOULDER 9' - 10' AND 15' - 20' BOULDER 0.01 SAND 0.21 FIRM
YELLOW
SAND
AND
GRAVEL
AND
BOULDER
FILL 3.01 SAND AND GRAVEL 1.51 5.5 CONCRETE 21 2.5 COMPACT FINE SAND AND GRAVEL 51 LOOSE YELLOW SAND AND GRAVEL FILL 36 8.01 COMPACT GREEN SAND 72 GRAVEL AND BOULDERS 9.0 HARD 6-3 TOP OF ROCK
DRILLED
ROCK FROM
14.0' TO 24.0'
REC-49''
HARD
BROKEN
BROKEN
GRAY
CRYSTALLINE
ROCK 63 COMPACT FINE GREEN 14. TOP OF ROCK
DRILLED
ROCK FROM
12.0' TO 21.0
REC-28:
HARD
BROKEN
GRAY
CRYSTALLINE
ROCK 12,01 SAND GRAVEL AND BOULDERS 13.5 BOULDER TOP OF ROCK

DRILLED
ROCK FROM
22,0' TO 32,0'
REC-3'
HARD
BROKEN
GRAY
CRYSTALLINE
ROCK 22,01 21,01 24 NO WATER NO WATER NOTE I-SAND AND GRAVEL FILL. G. AUGENSTENE START 12/23/64 12.30 PM FINISH 12/23/64 4,30 PM WORKING TIME 4,0 HRS. R. AUGENSTENE START 12/22/64 10.30 AM FINISH 12/22/64 4,30 PM WORKING TIME 5,5 HRS. TOP OF ROCK
DRILLED ROCK
FROM 24'
TO 35.0'
REC-36''
HARD
BROKEN
GRAY
CRYSTALLINE
ROCK 24.01 32.01 NO WATER B RONAN JR, 51ART II/18/64 7,30 AM FINISH II/18/64 4,30 PM WORKING TIME 8,5 HRS. 35.01 NO WATER R AGUENSTENE START II/3I/64 7,00 AM FINISH 12/1/64 4,00 PM WORKING TIME

# TEST BORING REPORT RAYMOND

CONCRETE PILE COMPANY

A DIVISION OF RAYMOND INTERNATIONAL INC.

| ToUNIVE                      | rsal engineering co      | Date.            | JANUARY 21, 1965  |
|------------------------------|--------------------------|------------------|-------------------|
| Location of Borings ROUTE    | 2, ARLLNGTON AND         | BELMONT, MASSACI | HUSETTS           |
| All borings are plotted to a | scale of 1"= 8 ft. using |                  | as a fixed datum. |
| Boring No. 49                | Boring No. 50            | Boring No. 51    | Boring No. 52     |
| 0                            |                          | DATING TWA       | Doring 140.       |

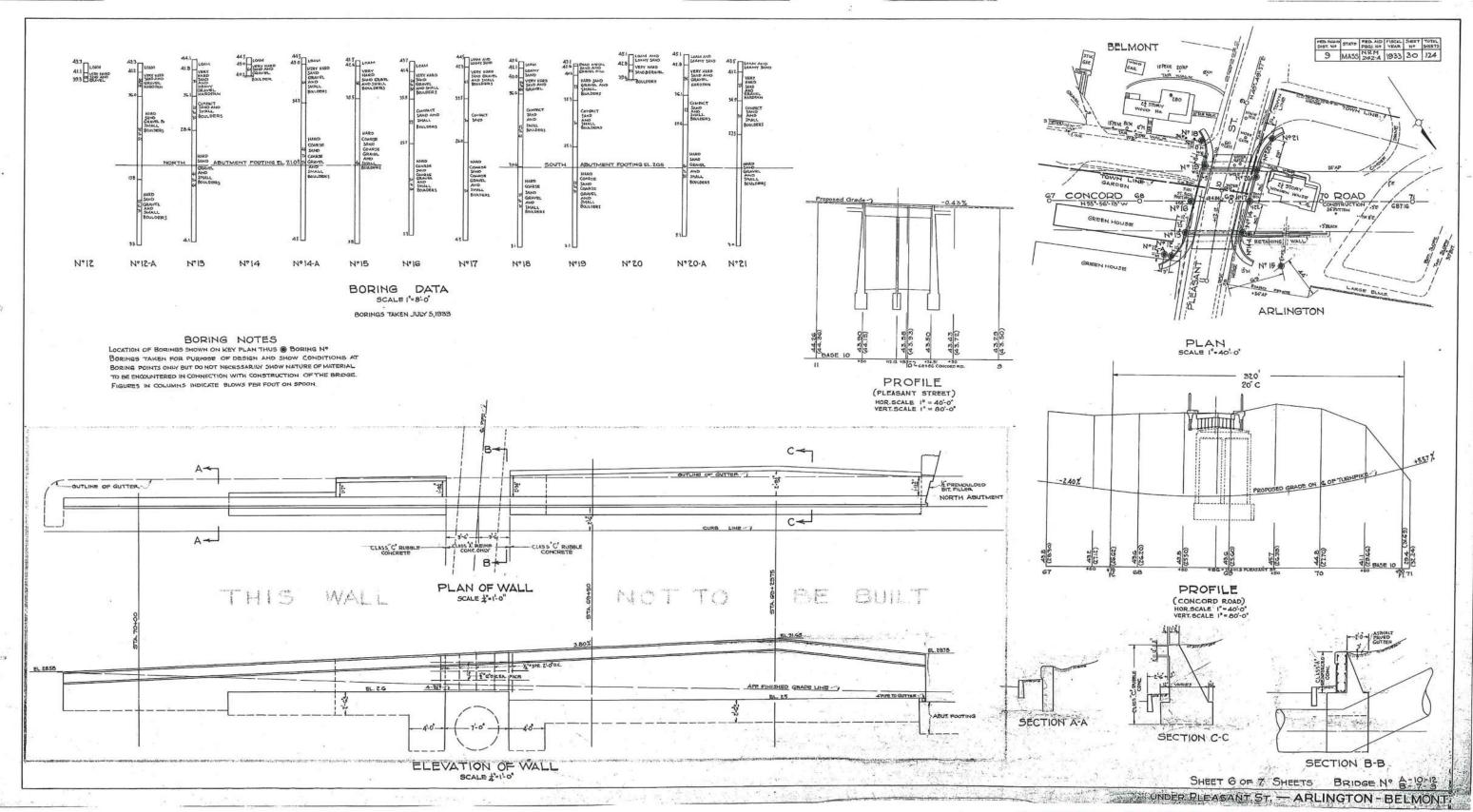
| 0+50 200' LT.<br>ELEV. 47,6' 0.6'<br>BROWN LOAMY<br>SAND GRAVEL<br>& BOULDERS 10 2.5' |   |            |  | ,     |
|---|---|------------|--|-------|
| FINE TO<br>COARSE GRAY70<br>SAND,<br>GRAVEL<br>AND                                    | 72+0 45' LT.                                    |            | 72+0 70' RT。   |       |
| SEE NOTE  | LOAM SAND<br>LOAM SAND<br>AND GRAVEL<br>FINE TO | 2,5'       | ASPHALT<br>CRUSH ROCK<br>FILL<br>FIRM FINE II          | 3.01  |
| NO WATER<br>NOTE NO I-VERY<br>COMPACT LIGHT<br>GRAY FINE TO                           | COARSE<br>COMPACT<br>SAND<br>GRAVEL<br>AND      | 50         | YELLOW<br>SAND<br>HARD MED.<br>YELLOW<br>SAND          | 6,01  |
| COARSE SAND<br>GRAVEL AND<br>BOULDERS.<br>T. HUNT                                     | SMALL<br>BOULDERS                               | 70         | VERY COMPT. YELLOW SAND GRAV.                          | 10,51 |
| START 12/31/64<br>II.30 AM<br>FINISH 12/31/64<br>4.30 PM                              |   | 60         | NO WATER   | 15,01 |
| WORKING TIME<br>4,5 HRS.  | NO WATER T. HUNT                                | 65   20,01 | START 12/10/64<br>10.00 AM                             |       |
|   | START 12/30/<br>9.00 AM<br>FINISH 12/30/        | treestra.  | FINISH 12/10/64<br>2,30 PM<br>WORKING TIME<br>4,0 HRS. | 1     |
|   | 2,30 PM<br>WORKING TIN<br>5,0 HRS.              | ME         |  |       |

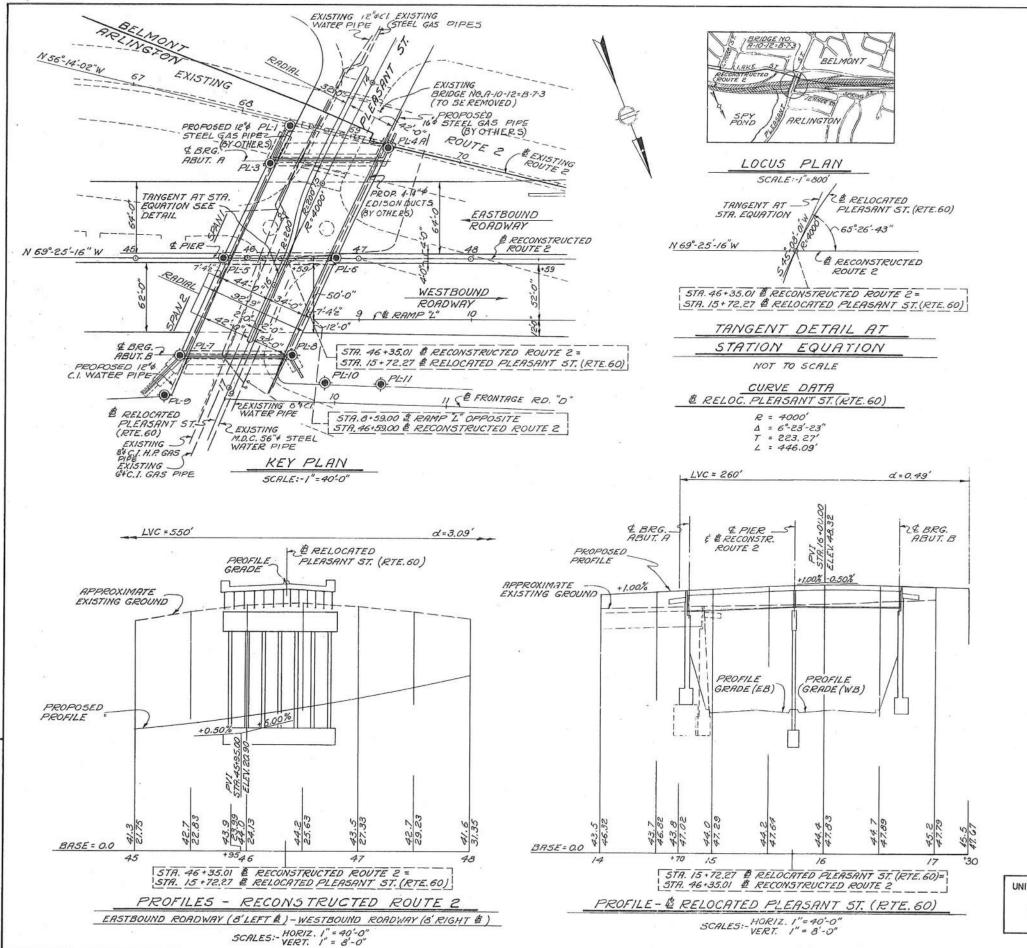
| 63+50 300' R<br>ELEV. 1.2'<br>LOOSE DARK<br>GRAY<br>SILTY<br>SAND     | 10   | 0,01  |
|---|------|-------|
| FINE TO<br>COARSE GRA'<br>SAND AND<br>GRAVEL                          | Y 22 | 5,01  |
| FIRM<br>FINE<br>TO<br>COARSE<br>DARK<br>GRAY<br>SAND<br>AND<br>GRAVEL | 18   | 10.01 |
|   | 16   |       |
| FIRM<br>FINE<br>TO<br>COARSE<br>BROWN<br>SAND                         | 17   | 35.0' |

BORING REPORT AMERICAN DRILLING & BORING CO., INC. EAST PROVIDENCE, R. I. TO COMMONWEALTH OF MASS. DPW ADDRESS BOSTON, MASS.

SITE LOCATION ROUTE 2 - PEDESTRAIN OVERPASS - ARLINGTON, MASS. REPORT SENT TO \_\_\_\_\_ RESEARCH & MATERIALS DIV. \_\_\_\_\_ DATE\_\_\_\_\_ SAMPLES SENT TO VIA DATE. SCALE 1'' = 8REFERENCE DATUM BORING NO. 1 LINE & STATION: 18 + 43 OFFSET: 47' LT ELEVATION: 8.6' 10.0' 0.0' MOIST MEDIUM DENSE, BROWN FINE TO COARSE SAND, TRACE OF FINE GRAVEL, 17 TRACE OF SILT 3.6' W 6.0' MOIST DENSE, BROWN FINE SAND, 50 2.0' SOME SILT 10.0' 26\_\_ WET MEDIUM DENSE, GRAY FINE TO MEDIUM SAND, SOME SIIT 14.0' -6.0' WET VERY STIFF, GRAY CLAY WITH 20 (2 SAMPLES) SOME FINE SAND LAYERS 20.0' 9 -14.0' WET STIFF, GRAY CLAY WITH TRACE · OF FINE SAND LAYERS -22.0' AT 30' BECOMES WET MEDIUM STIFF (NOTE: CHANGED OFFSET BECAUSE OF HIGH PRESSURE CASOLINE LINE BEING DIRECTLY UNDER OTHER OFFSET - A. CONFALONE) -30.0' 40.0' BOTTOM OF BORING: 40.0' BOTTOM ELEVATION: -31.5' WATER: 6.0' -38.0' STARTED: 6/15/72 FINISHED: 6/15/72 DRILLER: A. GOMES INSPECTOR: A. CONFALONE W = WATER SURFACE BELOW STARTING GRADE IN FEET AT COMPLETION OF BORING. 6.0 FT. IN COMP. NIRSK FT. IN HRS. OR FT. IN HRS. CASING DIA BW INCHES, LENGTH FEET. 2" OD SAMPLER DIAL 3/8"ID INCHES, TYPE SPLIT SPOON += MUD LOST IN THIS LAYER OF SOIL. FOOTAGE OF BORING THIS SHEET 40.0' "
SHEET 1 OF 1 FOREMAN A. GOMES CLASSIFICATION BY AG & LLM JOB NO 71-290

# MassDOT Route 60 at Route 2 1967 Project Belmont, MA





PUB RD. OIV. NO. STATE FED.AID PROJ. NO. FISCAL SHEET TOTAL YEAR NO. SHEETS I MASS. U-242(14) 19 182 600

## GENERAL NOTES

BENCH MARK

(B.M. \*A-44) RIGHT OUTER CORNER OF FIRST STEP(BRICK) HOUSE \*17 VENNER ROAD. 240' RT. STA. 48+40 & RECONSTRUCTED ROUTE 2 (ARLINGTON) ELEV. 49.043 (U.S.C.G.S. 1929 DATUM). SURVEY NOTEBOOKS

\$:16918; X-SECTIONS: 25875; DETAIL: 14864, 17018.

FOUNDATIONS

MAY BE ALTERED, IF NECESSARY, TO SUIT CONDITIONS ENCOUNTERED IN CONSTRUCTION.

DATE & SEAL

TO BE PLACED ON THE INSIDE FACE OF THE NORTHWEST AND SOUTHEAST END POSTS A SHEET SHOWING THE SIZE AND CHARACTER OF NUMERALS WILL BE FURNISHED, SEAL WILL BE FURNISHED BY THE COMMONWEALTH AND SET BY THE CONTRACTOR.

IN ACCORDANCE WITH THE 1961 SPECIFICATIONS OF THE AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS AND INTERIM SPECIFICATIONS FOR H20-44 LOADING.

REINFORCEMENT

ALL BARS SHALL HAVE DEFORMATIONS CONFORMING TO A.S.T.M. SPECIFICATION A305. UNLESS OTHERWISE SHOWN ON THE PLANS, REINFORCING BARS SHALL BE LAPPED 20 DIAMETERS TO MAKE A SPLICE, EXCEPT THAT MAIN REINFORCING BARS NEAR THE TOP OF SLABS AND BEAMS HAVING MORE THAN 12 INCHES OF CONCRETE UNDER THE BARS SHALL BE LAPPED 35 DIAMETERS TO MAKE A SPLICE.

BRIDGE RAILINGS

SEE DEPARTMENT STANDARD PLANS, DATED OCT. 1966 FOR DETAILS OF BRIDGE RAILINGS.

UNSUITABLE MATERIAL

ALL UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATIONS OF THE STRUCTURE.

SCALES NOTED ON THE PLANS ARE NOT APPLICABLE TO REDUCED SIZE PRINTS, DIVIDE SCALES BY 2 FOR 4 SIZE PRINTS.

ANCHOR BOLTS

ALL ANCHOR BOLTS SHALL BE SET BY TEMPLATE AND PLACED BEFORE THE CONCRETE IS POURED EXCEPT WHERE NOTED ON SHEET 8.

## ESTIMATED QUANTITIES

(NOT GUARANTEED)

CLASS B ROCK EXCAVATION \_ \_ \_ \_ BRIDGE EXCAVATION \_ \_ \_ \_ BRIDGE EALAVATION GRAVEL BORROW FOR BRIDGE FOUNDATIONS CLASS I BITUMINOUS CONCRETE PAVEMENT TYPE I-I. 119: TOUS
CLASS I BEUSE PROTECTIYE BOTTOM COURSE FOR BRIDGES 115 TOUS
METAL BRIDGE RAILING (3 RAILS) OPTION 480 L.F.
REMOVAL OF PRESENT BRIDGE (BRIDGE NO. AID-12=8-7-3) 1 L.S.
BRIDGE STRUCTURE (BRIDGE NO. A-10-12=8-7-3) 1 L.S. ESTIMATED WEIGHT OF REINFORCING STEEL \_\_\_\_ 239,000 LBSI ESTIMATED WEIGHT OF STRUCTURAL STEEL \_\_\_\_ 815,500 LBS.

THESE QUAUTITIES ARE PART OF ITEM 995,01 BRIDGE STRUCTURE (BRIDGE NO. A-10-12=B-7-3) AND ARE NOT GUARAUTEED.

NOTE: PLANS OF EXISTING BRIDGE MAY BE SEEN AT THE M.D.R.W. 100 NASHUA ST. BOSTON, MASS. ROOM 609



UNIVERSAL ENGINEERING CORPORATION DESIGNING ENGINEERS

38 CHAUNCY BOSTON II, MASS.

ISSUED FOR CONSTRUCTION THE COMMONWEALTH OF MASSACHUSETTS

> PROPOSED BRIDGE ARLINGTON - BELMONT

RECONSTRUCTED ROUTE 2 UNDER

RELOCATED PLEASANT ST. (RTE. 60) SCALES: AS NOTED

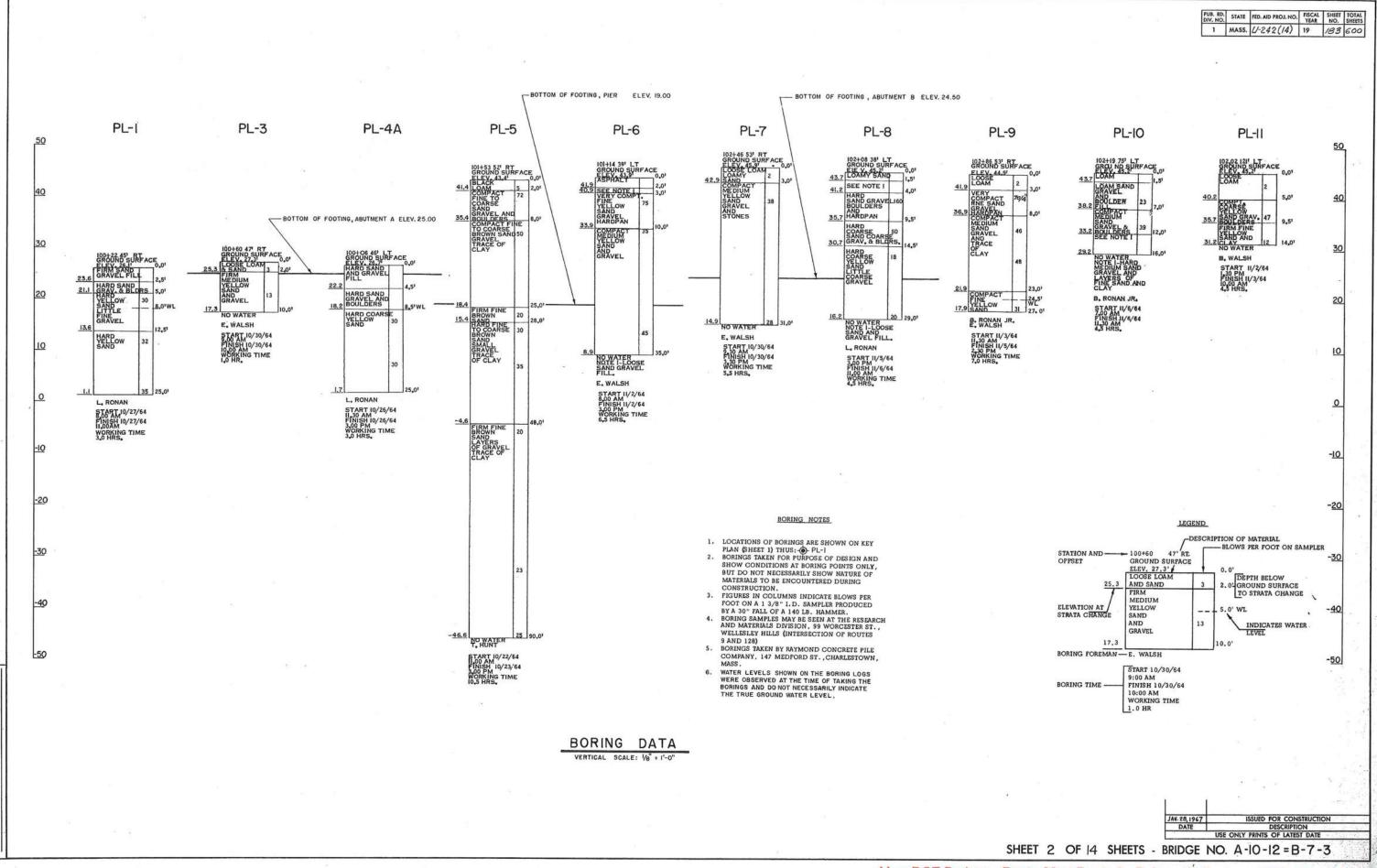
OFFICE OF

DEPARTMENT OF PUBLIC WORKS 100 NASHUA ST., BOSTON 14, MASS.

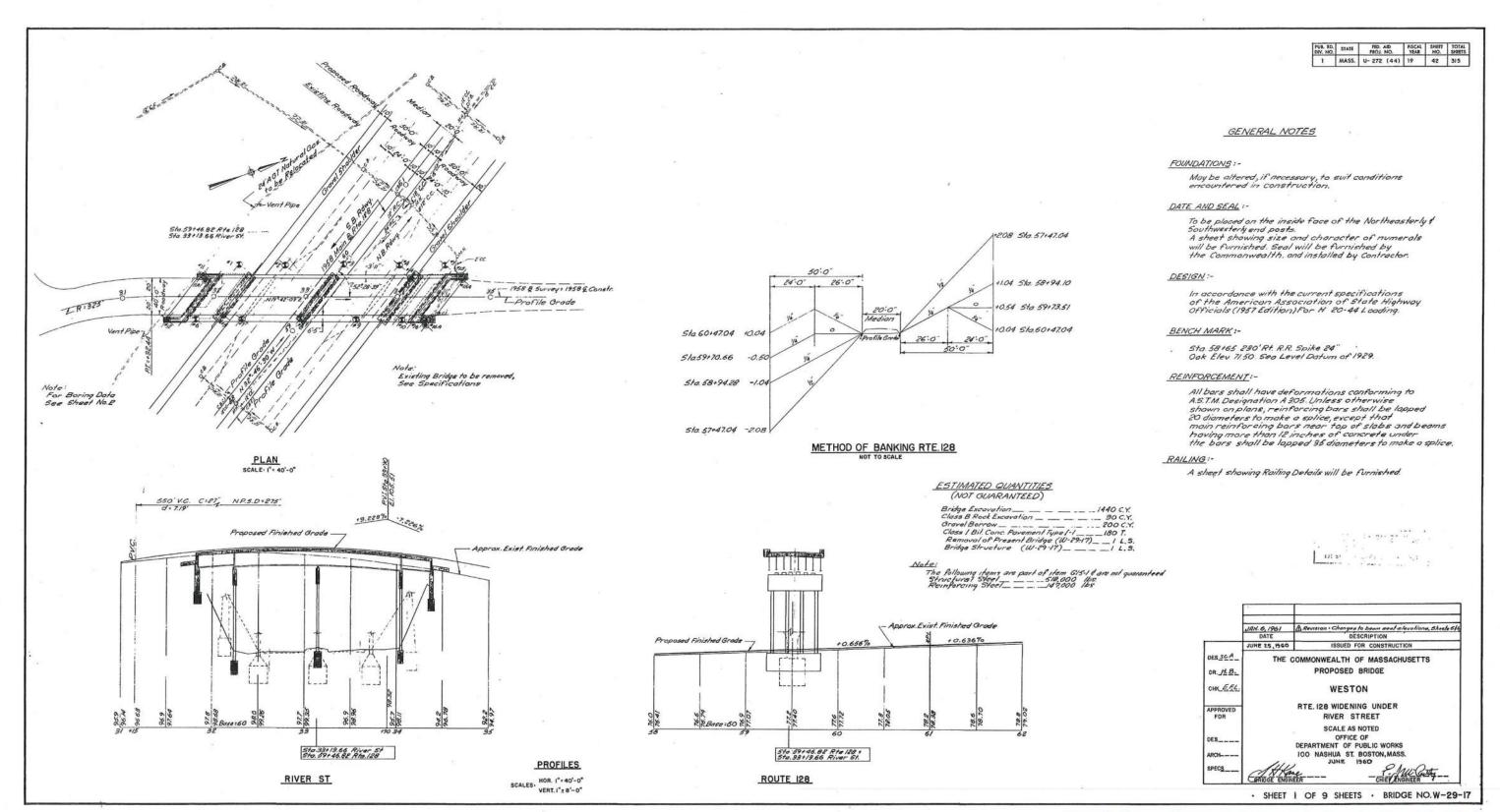


Donuls Boye P.

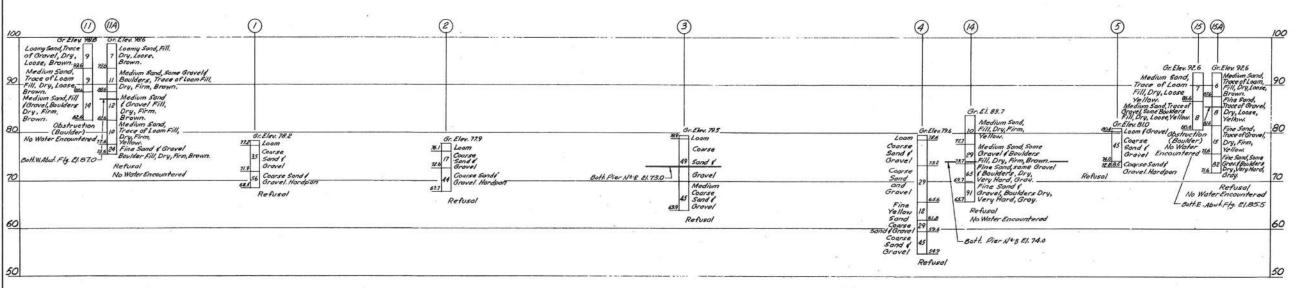
SHEET I OF 14 SHEETS - BRIDGE NO. A-10-12 = B-7-3



# MassDOT Route 128 Widening Under River Street 1960 Project Weston, MA



PUB RD. STATE FED. AID FISCAL SHEET TOTAL DIV. NO. STATE PROJ. NO. FISCAL SHEET TOTAL YEAR NO. SHEETS

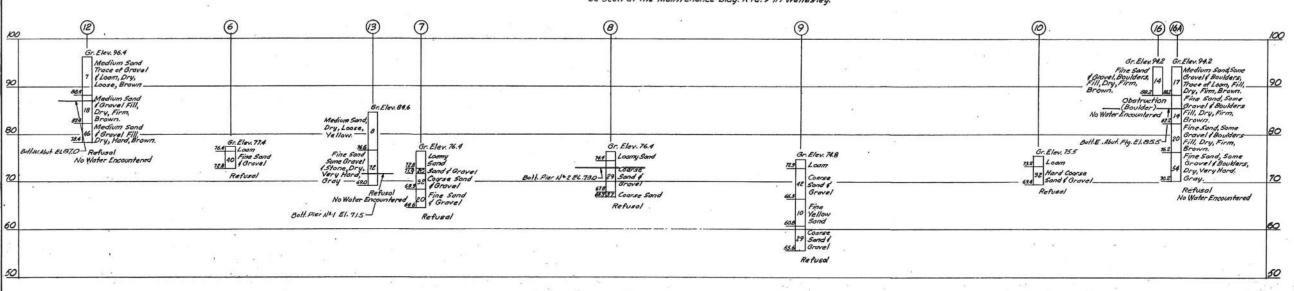


# BORING DATA Scale 18":1'-0"

### NEW BORINGS TAKEN BY CARR-DEE TEST BORING & CONST. CORP. BOSTON, SEPT. 1958

## BORING NOTES

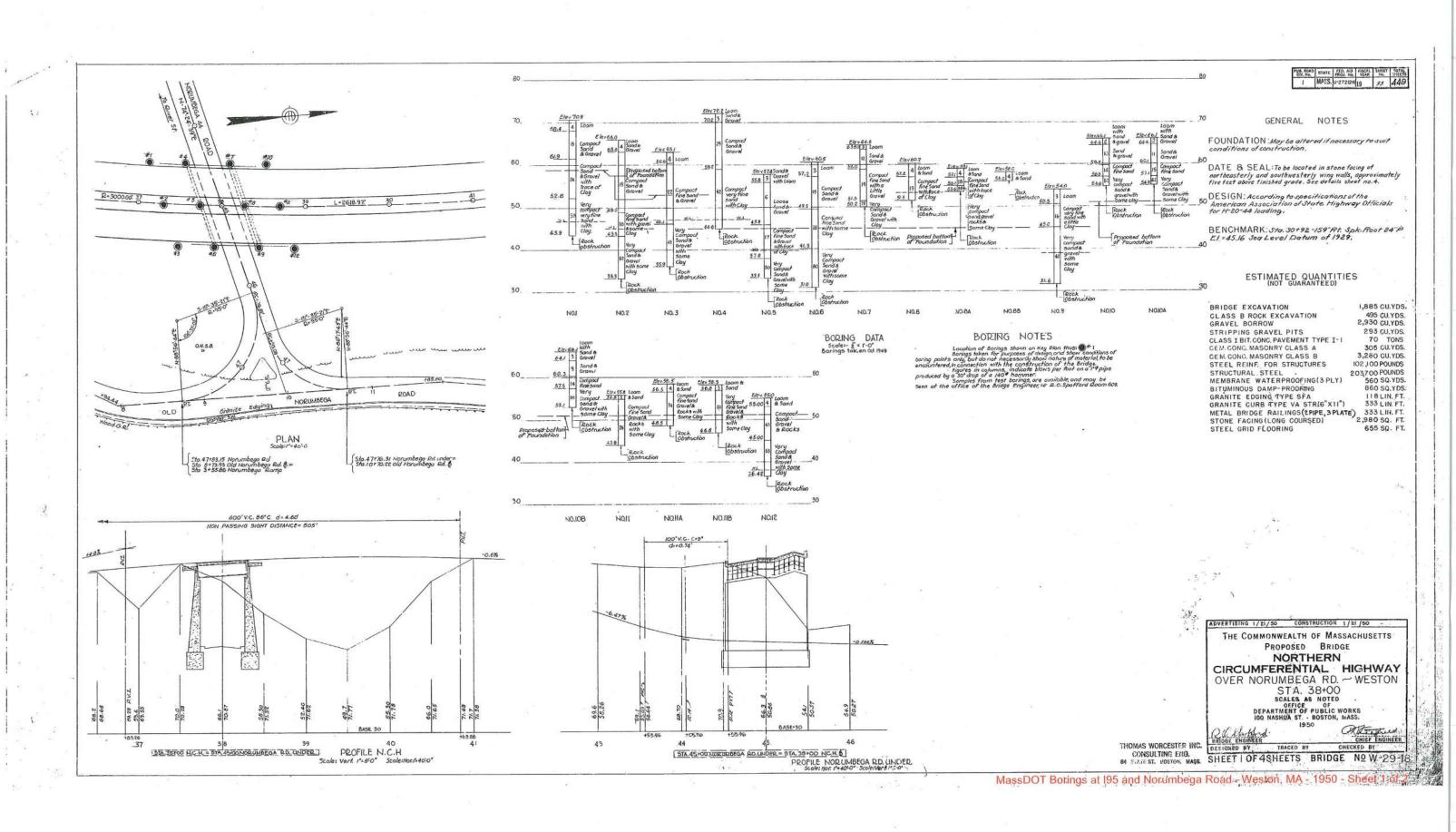
Location of Borings Taken Oct. 1949 Shown on Plan Thus . Location of Borings Taken Sept. 1958 Shown on Plan Thus . Figures in Columns Indicate Blows Per. Ft. on Two Inch & Pipe Produced by 30 "Fall of 140 lb. Hammer, Borings Token For Purpose of Design & Show Conditions at Boring Points Only. But do not Necessarily Show Nature of Materials to be Encountered During Construction, Boring Samples May be Seen at the Maintenance Bldg. Rte. 9 in Wellesley.

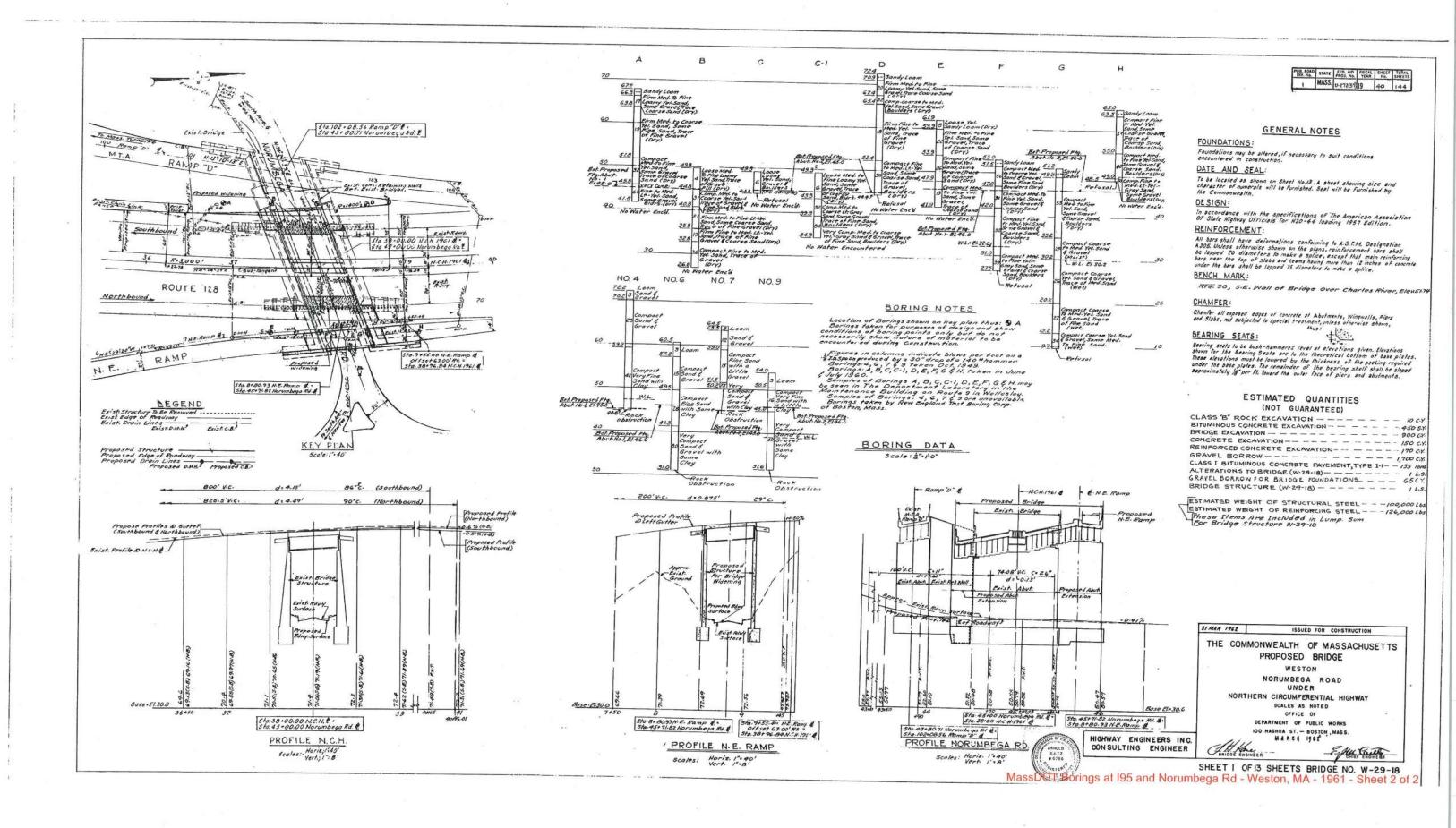


DATE DESCRIPTION USE ONLY PRINTS OF LATEST DATE:

SHEET 2 OF 9 SHEETS BRIDGE NO. W-29-17

# MassDOT Northern Circumgerential Highway Over Norumbega Rd. 1950 Project Weston, MA





# Hager-Richter Geoscience Inc. 1997 Project Weston, MA

| Be ELM STREET - HOPKINTON, MASSACHUSETTS 01748 TEL (508) 435-5543  File #:  Date Started:  Date Completed:  1/6/97  Driller:  R. Eastwood  HAMMER 300#  HAMMER 300#  HAMMER 300#  TYPE HU  Site Rep.:  CASING SAMPLER CORE BARREL  Groundwater level reading:  Date 1/6/97  Date 1/6/97  Size 4" 1-3/8"  Groundwater level reading:  Date 1/6/97  Date 24"  Strata  Change  ft  No. Depth ft  No. Depth ft  Sample  Sample  Sample  Strata  Change  ft  S1 0.5-2.5  24 22 23-41-39-62  S2 4.0-6.0  S2 4.0-6.0  S3 Very dense brown medium to coarse SAND & silt & cobbles  | B Depth _4'2 Depth      |
|--|-------------------------|
| B6 ELM STREET   HOPKINTON, MASSACHUSETTS 01748   TEL (508) 435-5543   FAX (508) 435-5512   LOCATION: River Road, Weston, Mass.   | 1 OF  B Depth 4'2 Depth |
| Factor   F   | 1 OF  B Depth 4'2 Depth |
| Date Started:   1/6/97   | B Depth 4'2 Depth       |
| Date Stairted:   | B Depth _4'2 Depth      |
| Depth   ft   No.   Depth   ft   SI   O.5-2.5   24   22   23-41-39-62   SIZE   4"   1-3/8"   Groundwater level reading   Date   1/6/97   Date   1/6/97   Date   1/6/97   Date   1/6/97   Date   Date   Date   1/6/97   Date   Date   1/6/97   Date      | B Depth 4'2 Depth       |
| Depth   Cas   Sample   Streta   Change   Streta   Streta   Change   Streta   Streta   Change   Streta   Stret   | Depth 4'2 Depth         |
| Depth ft   | Depth                   |
| ft bl/ ft No. Depth ft Pen." Rec." Blows/6" ft Sample Description  Sample Description  6" ASPHALT S1 Very dense brown fine to medium SAND & me |                         |
| 1  |                         |
| S1 Very dense brown fine to medium SAND & me |                         |
| S2 4.0-6.0 24 13 101-21* S2 Very dense brown medium to coarse SAND &   |                         |
| 52 4.0-6.0 24 13 101-21* S2 Very dense brown medium to coarse SAND &   |                         |
| 5   SZ Very dense brown medium to coarse SAND &  |                         |
|  | gravel, some            |
|  |                         |
| 7  |                         |
|  |                         |
| 10 - S3 10.0-11.5 18 12 100-53*-70* S3 Similar to S2   |                         |
| 11,5 Bottom of exploration 11,5'   |                         |
| -  |                         |
|  |                         |
| 15—  |                         |
| 4  |                         |
|  |                         |
| 20 —   |                         |
|  |                         |
|  |                         |
|  |                         |
| 25 —   |                         |
|  |                         |
|  |                         |
|  |                         |
| 30   |                         |
|  |                         |
|  |                         |
| -  |                         |
| ound Surface tousedthen  |                         |
| Cohesive Consistency Cohesionless Density  |                         |
| Proportions Used Blows/Ft. Blows/Ft. Sample  | в Туре                  |
| ittle 10 to 20% 3-4 Soft 16-30 V-Stiff 10-30 M-Dense UT - Shell  | l Piston                |
| Some 20 to 35% 5-8 M-Stiff 31+ Hard 30-50 Dense OE = Open  | End Rod                 |
| 1. The stratification lines represent the approximate boundary between soil turns. The stratification lines represent the approximate boundary between soil turns.   | hammer                  |
| 2. Water level readings were made in the drill hole during or at the completion of drilling. The water level may fluctuate over  |                         |

| Trace<br>Little<br>Some<br>And |            | 10<br>20  | to 10%<br>to 20%<br>to 35%<br>to 50% | 0-2<br>3-4<br>5-8 | Very S<br>Soft<br>M-Stif | Soft  | 9-15<br>16-30<br>31+ | Stiff<br>V-Stiff<br>Hard |             | 0-10<br>10-30<br>30-50    | Loose<br>M-Dense<br>Dense<br>V-Dense | UP = Fixe UT = She OE = Ope | d Piston    |
|--------------------------------|------------|-----------|--------------------------------------|-------------------|--------------------------|-------|----------------------|--------------------------|-------------|---------------------------|--------------------------------------|-----------------------------|-------------|
|                                | oport      | ions U    |                                      |                   |                          | Blows |                      |                          |             | Cohesionles<br>Blows      | /Ft.                                 |                             | Іе Туре     |
| round !                        | Surfac     | e to      | u                                    | eed               | ~~                       |       |                      | then                     |             | <del> </del>              |                                      |                             |             |
| -                              |            |           |                                      |                   |                          |       |                      |                          |             |                           |                                      |                             |             |
| _                              |            |           |                                      |                   |                          |       |                      |                          |             |                           |                                      |                             |             |
| -                              | 1          |           |                                      |                   |                          |       |                      |                          |             |                           |                                      |                             |             |
| 30                             |            |           |                                      |                   |                          |       |                      |                          |             |                           |                                      |                             |             |
| -                              |            |           |                                      |                   |                          |       |                      |                          | 90          |                           |                                      |                             |             |
| _                              |            |           |                                      |                   |                          |       | ļ                    |                          |             |                           |                                      |                             |             |
| 25                             |            |           |                                      |                   | 1                        |       |                      |                          |             |                           |                                      |                             |             |
| -                              |            |           |                                      |                   |                          |       | 9                    |                          | 1820        |                           |                                      |                             |             |
| _                              |            |           |                                      |                   |                          | 1     |                      |                          | 8           |                           |                                      |                             | 2           |
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| <br>20                         |            |           |                                      |                   | 2                        |       |                      |                          |             | æ                         |                                      |                             |             |
| _                              |            |           |                                      |                   |                          |       |                      |                          |             |                           |                                      |                             |             |
| -                              |            |           |                                      |                   | 1                        |       |                      |                          |             |                           |                                      |                             |             |
| 15                             |            |           |                                      |                   |                          |       |                      |                          |             |                           |                                      |                             |             |
| _                              |            |           |                                      |                   |                          |       | 1                    |                          |             |                           | 3                                    |                             |             |
| _                              |            |           |                                      |                   |                          |       | 0.00                 | 12.0                     |             | f exploratio              | n at 12'                             |                             |             |
| 10                             |            | <b>S3</b> | 10.0-12.0                            | 24                | 14                       | 10-14 | -28-37               |                          | S3 Dens     | e brown me<br>k fine sand | dium to coars                        | e SAND & grave              | l, trace    |
| -                              |            |           |                                      |                   | 1                        |       |                      | 9.5                      |             |                           | 1000                                 |                             |             |
| _                              |            |           | E                                    |                   | 1                        |       |                      |                          |             |                           |                                      |                             |             |
| Б —                            |            |           |                                      |                   |                          |       |                      |                          | some cor    | arse gravel &             | 7118                                 |                             |             |
| <u> </u>                       |            | 52        | 4.0-6.0                              | 24                | 20                       | 21-23 | -17-17               |                          |             |                           |                                      | AND & fine to n             | nedium grev |
|                                |            |           |                                      |                   |                          |       |                      |                          |             |                           |                                      |                             |             |
| -                              | 9          | S1        | 0.0-2.0                              | 24                | 19                       | 3-6-1 | 0-29                 |                          |             |                           | rown fine to m<br>o ooarse gravel    | edium SAND &<br>& silt      | fine to     |
| ft                             | bl/<br>ft  | No.       | Depth ft                             |                   | Rec."                    |       | /8/6"                | ft                       |             |                           |                                      |                             | ·           |
| epth                           | Cas        |           |                                      | Sampl             | θ .                      |       |                      | Strata<br>Change         |             |                           | Sample Des                           | orintian                    |             |
| e Rep.                         | 1          |           | . Martin                             |                   | FAL                      |       | 24"                  |                          | 30"         |                           | Date                                 |                             | Depth       |
| ate Cor<br>riller:             | nplete     |           | . Eastwoo                            | d                 | SIZE                     |       | 300#                 |                          | 40#         | •                         | Date                                 | er level readings           | Depth       |
| te Sta                         |            | 10,000    | /3/97<br>/3/97                       |                   | TYP                      | •     | <u>HW</u><br>4"      |                          | SS<br>-3/8" | •                         |                                      |                             |             |
| o#:                            | 1          |           | 6228-EE                              |                   | -                        |       | CASING               | SA SA                    |             | ORE BARRE                 | L Surface Elev                       | vation:                     |             |
| EL (508)                       |            |           | HOPKINTON, M                         |                   | (508) 43                 |       |                      |                          |             |                           |                                      |                             | 1 OF        |
|                                | <b>TOP</b> |           | IODUNITON N                          |                   |                          |       |                      |                          |             |                           | n, Mass.                             |                             | PAGE        |
|                                |            |           |                                      |                   |                          |       | PRO.                 | ECT: L                   | ocal Wa     | ter Main                  | Improvemen                           | nts                         | B10         |

| EA           | RT           | H EX          | (PLORA             | rion,                     | , INC                   | P.               | CLIE            | ит: Ј                     | -lager-Ri   | chter Geo                                 | oscience, In                                | c.                                      | BORING #:               |
|--------------|--------------|---------------|--------------------|---------------------------|-------------------------|------------------|-----------------|---------------------------|-------------|---|---|---|-------------------------|
| Str. Petrico | - Addison to |               |                    |                           |                         |                  | PRO.            | JECT: _                   | ocal Wa     | ater Main                                 | Improveme                                   | nts                                     | B100                    |
| 86 ELM 8     | STREE        | r · +<br>5543 | OPKINTON, M        | ASSACHI<br>FAX (          | USETTS<br>(508) 43      | 01748<br>5-5512  |                 |                           |             |   | on. Mass.                                   |   | PAGE<br>1 OF 1          |
| File #:      |              |               | 6228-EE            |                           | T                       |                  | CASIN           | 0 54                      | MPLER (     | CORE BARR                                 | FI Surface Fla                              | evation:                                |                         |
| Date Sta     | rted:        | 3444          | /6/97              |                           | TYP                     |                  | HW              |                           | SS          |   | Station:                                    | vacion,                                 |                         |
| Date Co      |              | 25,500        |                    |                           | SIZE                    |                  | 4"              |                           | -3/8"       | -   |   | ter level readings                      |                         |
| Driller:     |              |               | . Galvin           | 1                         |                         |                  | 300#            | #1                        | 140#        |   | Date  |   | Depth                   |
| Site Rep     | . <b>:</b>   | 0000          | . Martin           |                           | _ FAL                   |                  | 24"             |                           | 30"         |   | Date  |   | Depth                   |
| Depth        | Cas          |               |                    | Sample                    | - David                 |                  |                 | Strata                    |             |   |   |   |                         |
| ft           | bl/<br>ft    | No.           | Depth ft           | Pen."                     | Rec."                   | Blows            | s/6"            | Change<br>ft              |             |   | Sample De                                   | scription                               |                         |
| -            |              | S1            | 0.3-2.3            | 24                        | 13                      | 49-22-           | 24-18           |                           | S1 Very     | dense bro                                 | wn fine to med                              | lium silty SAND                         | & gravel                |
| -            |              |               |                    |                           |                         |                  |                 | 1                         |             |   |   |   |                         |
| -<br>-       |              | S2            | 4.0-5.3            | 15                        | 0                       | 11-              |                 |                           | S2 No       | recovery                                  |   |   | Ø                       |
| -            |              |               |                    |                           |                         | 100              | 13              | 6.0                       |             |   |   |   |                         |
| -            | ł            |               |                    |                           |                         |                  |                 |                           | Bottom      | of explorati                              | on at b.                                    |   |                         |
|              |              |               |                    |                           |                         |                  |                 |                           |             |   |   |   |                         |
| 10-          | ]            |               |                    |                           |                         |                  |                 |                           |             |   |   | •                                       |                         |
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|              | 1            | 1 1           |                    |                           |                         |                  |                 |                           |             |   |   |   |                         |
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| 15 —         |              |               |                    |                           |                         |                  |                 |                           |             |   |   |   |                         |
|              |              |               |                    |                           |                         |                  |                 |                           |             |   | 3   |   |                         |
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| 20           | ]            |               | 9                  |                           |                         |                  |                 |                           |             |   | 55  | \$                                      |                         |
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| -            | 1            |               | 0/2                |                           |                         |                  |                 | 1                         |             |   |   |   |                         |
| 30           | ]            |               |                    |                           |                         |                  |                 | 1                         |             |   |   |   |                         |
| _            | 4            |               |                    |                           |                         |                  |                 | 1                         |             |   |   |   |                         |
| -            | 1            |               |                    |                           |                         |                  |                 |                           |             |   |   |   |                         |
|              | 1            |               | L                  |                           |                         |                  |                 |                           |             | NO. 11. 11. 11. 11. 11. 11. 11. 11. 11. 1 | 540 SEC. SEC. SEC. SEC. SEC. SEC. SEC. SEC. |   | 9 965000                |
| Ground       | Surfa        | ce to         | U                  | sed                       |                         | pales-are-siz-y- |                 | then                      |             |   |   |   |                         |
|              |              |               | Τ'                 |                           | Cohe                    | sive Con         |                 |                           |             |   | ess Density                                 |   |                         |
| Trace        |              | tions U       | to 10%             | 0-2                       | Very S                  | Blows/           | 9-15            | Stiff                     |             | 0-10                                      | ve/Ft.<br>Loose                             | UP = Fix                                | ole Type<br>ed Piston   |
| Little       |              | 10            | to 20%             | 3-4                       | Soft                    |                  | 16-30           | V-Stif                    | f           | 10-30                                     | M-Dense                                     | UT = She                                | lby Tube                |
| Some<br>And  |              |               | to 35%<br>to 50%   | 5-8                       | M-Stif                  | t                | 31+             | Hard                      |             | 30-50<br>50+                              | Dense<br>V-Dense                            |   | en End Rod<br>O# hammer |
| Not          | es:          | 1. 1          | The stratification | n lines rep<br>lings were | present ti<br>e made is | he approx        | dmate<br>hole d | boundary t<br>uring or at | etween soil | types. The                                | transition may be<br>. The water leve       | građual.<br>Il may fluctuate ove        | er time.                |
| Rer          | nark         | 3:            |                    |                           |                         |                  |                 |                           |             | 65  |   |   |                         |

| _        |            | -      |                      |         |         |                |              |                  | Dec 20 820                               | //SE 2003  | 1                             | BORING #:  |
|----------|------------|--------|----------------------|---------|---------|----------------|--------------|------------------|--|--|-------------------------------|------------|
| EAF      | RTH        | EX     | PLORAT               | ION,    | INC.    |                | LIEN         |                  | ager-Richter Geosc                       |  |                               | B99        |
|          |            |        |                      |         |         |                |              |                  | ocal Water Main In                       |  | s                             | PAGE       |
| ELM ST   | DEET       | , μ    | OPKINTON, MA         | SSACHU  | SETTS O | 1748 L         | OCA          | TION: _B         | iver Road, Weston                        | Mass   |                               | 1 OF       |
| L (608)  | 435-E      |        | OF KINT ON THE       | FAX (5  | 08) 435 | -5512          |              |                  |  |  |                               | 1 OF       |
| e #:     |            | 9      | 8228-EE              |         |         |                | SINC         |                  | APLER CORE BARREL                        | Surface Eleva  | tion:                         |            |
| te Steri |            |        | /6/97                |         | TYPE    | -              | <del>W</del> |                  | SS                                       | Station:   |                               |            |
| te Com   | plete      | d: 1   | /6/97                |         | SIZE    |                | 4"           | _                | 3/8"                                     | NAME AND DESCRIPTION OF THE PARTY OF THE PAR | level readings                |            |
| iller:   |            | B      | . Eastwood           |         |         | MER 3          | 00#          |                  | 40#<br>30"                               | Date   | The second second             | pth        |
| e Rep.:  |            | C      | . Martin             | -       | FALL    |                | 24"          |                  | 30                                       | Date   | U                             | pth        |
| epth (   | Cas<br>bl/ |        |                      | Sample  |         |                |              | Strata<br>Change |  | Sample Desc  | ription                       |            |
| ft       | ft         | No.    | Depth ft             | Pen."   | Rec."   | Blows          | 6"           | ft               |  | <del></del>  | U. CAND 9                     |            |
|          |            | SI     | 0,5-2.5              | 24      | 16      | 52-47-3        | B-61         |                  | S1 Very dense brown                      | tine to mediu  | m siity SAND a                | grave:     |
| -        |            |        |                      | 100,000 | 10,000  |                |              |                  |  |  |                               |            |
| -        |            | - 1    |                      |         |         |                |              | 4.0              |  | fil.   |                               |            |
| _ +      |            | 52     | 4.0-6.0              | 24      | 13      | 94-37*         | 50*          |                  | \$2 Very dense brown<br>fine send & silt | n medium to oc   | erse SAND & gr                | avel, some |
| Б        |            |        |                      |         |         |                |              |                  | Tine sand of site                        |  |                               |            |
| 4        |            |        |                      |         |         |                |              |                  |  |  |                               |            |
| ᅥ        |            |        |                      |         |         |                |              |                  |  |  | Œ                             | ¥75        |
|          |            |        |                      |         |         | ¥ ×            | į.           |                  | S3 Very dense brow                       | - * <del></del>  | im to coorea SA               | ND &       |
| 10       |            | 83     | 10.0-12.0            | 24      | 12      | 37-42-5        | 0-71         |                  | gravel, cobbles & silt                   | n to gray mean   | um to coates sa               | WD W       |
| _        | 8          |        |                      |         |         | 1              |              | 12.0             | Bottom of exploration                    | n at 12'   |                               |            |
| -        |            |        |                      |         |         |                |              |                  |  |  |                               |            |
| 4        |            |        |                      |         |         |                |              |                  | -  |  | 140                           |            |
| 15 -     | *          |        |                      |         |         |                |              |                  |  |  |                               |            |
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| 20 -     |            | 0.0    |                      |         | 1       |                |              |                  |  |  |                               |            |
| 20       |            |        | 1.58                 |         |         | 1              |              |                  |  |  |                               |            |
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| 25       | j          | 1      |                      | 1       | ł       |                |              | Į.               |  |  |                               |            |
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| -        | 1          |        | į                    |         |         | 1              |              |                  |  |  |                               |            |
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| ^^       |            | 1      | 1                    | 1       | 1       |                |              | -                |  |  |                               |            |
| 30       | ]          | 4      |                      |         | 1       |                |              |                  |  | 8  |                               |            |
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|          | 1_         |        |                      |         |         |                |              |                  |  |  |                               |            |
| Ground   | Surf       | noe to |                      | used    |         |                |              | then             |  |  | <del></del>                   |            |
|          |            |        |                      |         | Coh     | esive Cor      |              | noy              | Cohesionle<br>Blow                       |  | . Samp                        | в Туре     |
| Trace    |            | rtions | Used<br>O to 10%     | 0-2     | Very    | Blows/<br>Soft | 9-1          |                  | 0-10                                     | Loose  | UP = Fixe                     | d Piston   |
| Little   |            | 1      | 0 to 20%             | 3-4     | Soft    |                | 16-3<br>31+  |                  |  | M-Dense<br>Dense   | UT = She                      | n End Rod  |
| Some     | )          |        | 0 to 35%<br>5 to 50% | 5-8     | M-St    | ul             | 317          | naic             | 50+                                      | V-Dense  |                               | # hammer   |
| 14.4     |            |        |                      |         | present | the annea      | vimat        | a houndary       | between soil types. The t                | rensition may be   | gradual.<br>may fluctuate ove | 290        |

Remarks:

# MWRA Contract No. 2338 1937 Project Waltham, MA

Form 211-100 Pads-1-55

RAYMOND

CONCRETE PILE COMPANY 304 Park Sq. Building

NEW YORK GOW DIVISION BOSTON 16, Massachusett

To The Commonwealth of Massachusetts Date January 3rd 1956 Job No. 8
ocation of Borings Contract No. 233, S. Charles Relact Sever, WALTHAM, Massachusetts

| No. 36  |                         | No <b>37</b><br>TB37   | ft. using | MILLO LA PERSONA DI LA PERSONA |                  | No. 39<br>TB39             |                                  |
|---|-------------------------|--|-----------|--|------------------|----------------------------|----------------------------------|
|   |                         |  |           |  |                  |                            |                                  |
|   |                         |  |           |  |                  |                            |                                  |
| ELEV. 145,01  | 7                       | ELEY. 146.81   | 7         | ELEY, 146.21   | 7<br>            | ELEV. 146, 21              |                                  |
| HARD BAND,<br>GRAVEL &<br>CINDERS FILL                | or believed T. T. T. T. | VERY COMPACT   | ]         | CAUTH CAUTONIO   | 3.0;<br>98 WAIER | CINDERS BILL               | 95                               |
| VERY COMPACT<br>COARBE BAND,<br>GRAVEL,<br>BOULDERS & | 65                      | GRAVEL,<br>BOULDERS A<br>LITTLE CLAY.                          | WATER     | CLIVELE CLAY.  | 5,51             |                            | Ý                                |
| HARD COARGE   | 7,51                    | BOULDER.   | 98 10.01  | Hard Hoarse<br>Sand, Urayel<br>B. Difaya   | .20<br>          | COMPACT COARS              | 49                               |
| BOULDERS A  |                         | COMPACT COARS  |           | YEBY KOMPACT<br>GOARSE SANC<br>GRAYEL A<br>AUTTHE GUAY.  | <b>.93</b>       | LITTLE GLAY,               | 61                               |
| COMPACT COARS   | 941 1711                | BAND, GRAVEL<br>BOULDERS &<br>LITTLE CHAY.                     |           | LITTLE CLAY.   | 190              | YEAR PURCHE<br>BOOKER ALSO | 100                              |
| LITTLE CLAY   | 28 20.01                |  |           |  |                  | EMPLOYEE STATES            | 13.40<br>13.55<br>13.55<br>13.55 |
|   |                         | WATER ILEVEL   | TAKEN     | WATER LIEVEL T   | AKEN             | WATER JURYEL               | AKE                              |
|   |                         | AFTER COMPLE   | TION.     | WATER LIEVEL T<br>THREE HOURS A<br>COMPLETION.   |                  | AFTER COMPLE               |                                  |
|   |                         | FOREMAN REPA<br>BOULDER DRIVE<br>AHEAD OF SAM<br>FROM 181 TO 1 | PJ-ER     |  |                  |                            |                                  |
|   |                         |  |           |  |                  | ETTERS NEW                 | ROYAL<br>ROYAL                   |
|   |                         |  |           |  |                  |                            | 14(1))<br>14(1))<br>14(1)        |
|   |                         | FR PRYERS DIE  | GATAD AND |  | a a trans        |                            |                                  |
|   | TE SAMP                 |  |           |  | AMP.             |                            |                                  |
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| Figures an e<br>esampling pipe so                     |                         |  |           |  | it. di           | Vito TEXT 1631             |                                  |

# AMOND andivision

o The Commonwest ocation of Borings Co

|          | borings are plo<br>No. 32                                  |           | to a sc       | ale of 1' ≓8_<br>No33                                 |                   | No. 434  |  | Nova 35   |                            |
|----------|--|-----------|---------------|---|-------------------|--|--|---|----------------------------|
| F        | 110.   |           |               |   |                   | <mark>TB34</mark>  | <b>经</b> 10.00000000000000000000000000000000000  | TB35  |                            |
| 1.00     |  |           |               |   |                   |  |  | <u> </u>  |                            |
|          |  |           | 1994          |   |                   |  | TO PERSONAL PROPERTY OF THE PARTY OF THE PAR |   | 102                        |
|          |  |           | , in          |   |                   |  |  |   |                            |
|          | ELEY. 146.9  | 7         |               | ELEV, 147.31  |                   | 146,41   |  | £,, ev, 145, 1                                  |                            |
| 1        | VERY COMPACT   |           | NW.           | HARD BAND,<br>BRAVEL &<br>BOULDERS FIL<br>VERY COMPAC | THE RESERVE       |  |  | FIRM BAND.                                      |                            |
|          | BOULDERS FILL  |           | 6.01          | BAND, GRAVEL  | 6.01              | OINDERS FILL   | 12<br>6.5  | GRAYEL &  | 15                         |
| 1/2      | FIRM COARSE  | <b>海解</b> | 7.01<br>WATER | VERY COMPAC   | WATER             | BAND, BRAYEL,<br>CINDERS FILL,<br>LOGBE COARSE<br>BAND, SRAYEL | 7.87   | LOOSE   |                            |
| 1        | BAND, BRAVEL   | 14        | 11.5          | VERY COMPAC   | 60                |  | 10.8   | BAND<br>Film                                    | 6_                         |
| S. C. C. | LOOSE FINE   | 10        |               | BOULDERS IS   |                   | GOBE FINE  | 8  | YERY  |                            |
|          | LOOSE TINE SAND, TRACE OF CLAY O OLITTLE MICA.  SERNS PARS |           |               | LITTUE GLAY   |                   |  |  |   | N. A.                      |
|          | (VERY SE MY A)   | 56        | 20.0          |   | 198<br>20.0       |  | 10 20.0  | AAND ORAY                                       |                            |
|          | CITTLE CLAY.   |           |               |   |                   |  | Ŧ  |   |                            |
|          | WATER JULYEL<br>THIRTY MINUTE<br>MPIER COMPLE              | TAK       |               | WATER LIVEL   | TAKES             |  | HER<br>S   |   |                            |
|          | APTER COMPLE   | Tier      |               | AT TER COMPLE   | 119tu             |  | LVIII.   |   |                            |
| 1        |  |           |               |   |                   |  |  |   |                            |
|          |  |           |               |   |                   |  | AND THE REAL PROPERTY.   | KEROPETROSIA<br>KINGRESIA                       | <b>加州城</b>                 |
|          |  |           |               |   |                   |  |  | MARKATAN SALA<br>MARKATAN SALA<br>MARKATAN SALA |                            |
|          |  |           |               |   |                   |  |  |   |                            |
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|          |  | 透         | •             | eritari kontantantanta<br>Kilinggan sama dan s        |                   |  |  |   |                            |
|          |  |           | EAME!         |   |                   |  |  | nicest<br>Nacional                              |                            |
|          |  |           |               |   |                   | ANGHESECH<br>Eggs  |  |   |                            |
| 1        |  |           |               |   | SEDOMEST WAS A SE | ON A MARK BUSINESS OF SURE                                     | destructed from 114 a  |   |                            |
| が必       |  |           |               |   |                   |  |  |   | (ATARA)<br>(AT <b>Y</b> SA |

TEST BORING REPORT

RAYMOND

CONCRETE PILE COMPANY 304 PARK SO. Building

TO The Commonwealth of Massachusetts

Location of Borings Contract No. 233, S. Charles Relief Sever. Maintage Massachusetts

|    | porings are plotted to<br>No. <u>29</u>                    | No. 29 A   |                    | No301  |  | 100 31   | V.  |
|----|--|--|--------------------|--|--|--|---|
|    |  | TB29A  |                    |  | <b>建</b> 图 克伊州美国   | TB31   | 15  |
|    |  |  |                    |  |  |  |   |
| 7  |  |  |                    |  | A CONTRACTOR   |  |   |
| 1  |  |  |                    |  |  |  | - N W   |
| 1  |  | TO THE TOTAL PROPERTY.   |                    |  | 44   |  |   |
| Į, | (1) [1] [1] [1] [1] [2] [2] [2] [2] [2] [2] [2] [2] [2] [2 |  |                    | TOOLS WANTED   |  |  |   |
|    | ELEY. 144.91   | ELEV. 144.6 7.   |                    | FLEV. 11431  | 7  | FHEY, 143.5  |   |
|    | GOMPACT BANG   | \f   | 4/30,              | HARD BAND,<br>GRAVEL A<br>BOULDERS FILL  | 2.01   | The second secon |   |
|    | BOULDERS A.  |  |                    | POUL SERVICE   | 3"0"E"   | BLACK LOAMY  | 2   |
| 4  |  | 5' BORING NO   | 5,71               |  | 的位 医神经神经炎  | LOAMY BAND   |   |
|    | CRAVEL, PILT 7.  | FIVE PEET 51 FROM BORING NO 29. THE  | 100                |  |  | LOAMY BAND,<br>SHAYEL FILL.  |   |
| 1  | 103  |  |                    | COMPAGE A  | 76   | CONSTRUCTOR OF THE SERVICE   |   |
|    | WEAT COMPACT<br>COARSE SAND,<br>GRAVEL,                    | BPTHETWO<br>BERINGS IE.  | S MAN THE STATE OF | COMPAND<br>AMA   |  | Property Property and the control of | 37313   |
|    | LITTLE GLAY 92   | )  |                    | e de la company de la comp<br>de la company de la compa  | Track  | DATE TO THE TANK OF THE PARTY O |   |
|    |  |  |                    | ±LAV.  |  | BANG GTAYFL<br>BANALA<br>BOULDERB A  |   |
|    |  | 0  | 18.0               | AND DAY AND  |  | A CHARLES TO A CONTROL   | A VALUE AND AND A   |
|    | SENT CASING  |  | A 13465 K 465      | MANAGARA MANAGARAN   | 20,01  |  | W. SAMAGE   |
|    |  | A STAN OF THE PROPERTY OF THE  |                    | LIKE A REPORT OF A PARTY OF THE | APP  |  |   |
| ÷  |  |  | 21.0               |  | NORTH WAR  |  | 2013  |
|    |  |  |                    | A STATE OF THE STA | <b>计算机模型的</b>  |  | (3).<br>203   |
|    |  |  |                    |  |  |  | UN  |
|    | THE STATE OF THE STATE OF                                  |  | EN)                |  |  |  | OF X  |
|    | (《大成以》 产品的经验 网络金河州 医中枢病 医多种性 医多种 医克里耳氏试验 医乳腺               |  | T ( )              |  |  | THE PROPERTY OF  | 600   |
|    |  | THE STATE OF |                    |  |  |  |   |
|    |  |  |                    |  |  |  | 1773  |
|    |  | 294 CVLLTV L.J 4 EU/AD L.J AD P. C. L.   |                    |  |  |  | 以<br>以<br>以<br>が<br>に<br>に<br>に<br>に<br>に<br>に<br>に<br>に<br>に<br>に<br>に<br>に<br>に |
|    |  |  |                    |  |  |  |   |
|    |  | ETSZAVA CPNKSYAL   |                    |  |  |  |   |
| ** |  |  |                    | All Cardon de la company   | A STATE OF THE STA | WARRY N  |   |
|    | MANUSCRIPTION END  |  |                    |  |  |  | 1481  |

156 1 do 1 do 1 do 1 58 NEW YORK GOW DIVISION BOSTON 16, Massachusette

To The Commonwealth of Massachusetts Date January 3rd 11955 Joh No. B-165174208

Location of Borings Contract No. 233. 8, Charles Relief Sever. WALTHAM, Massachusetts. ft, using All borings are plotted to a scale of 1" \*\*: \_\_\_\_\_\_ 601 **TB27** ELEV. 153.6!# ELEV. 153.61 194V. 152.91-7 PAYEMENT 0.51 2.51 WATER 3.51 HARD SAND & NATER GRAVEL FILL **⊒**50' GRAVEL TILL HARD FINE SAND, ORAYEL LITTLE OLAY, 8 18 6,81 7.5 86 VERY COMPACT BAND, GRAVEL & BOULDERS, 181 12.0 VERY COMPACT BAND, GRAVEL BOULDERS & LITTLE CLAY, 81 Printer of WAT 401 12,51 151 181 15.01 0 BENT OABING AT DEPTHE OF 111 AND 15.01. 19,01 83 VERY COMPACT BAND, GRAVEL BOULDERS & 0 TRACE OF CLAY 01 1 301 PRAVEL 149 VERY COMPACT SAND, GRAVEL POVERERS & I TRACE OF CLAY, 29.01 [0] 30.01 FOREMAN REPORTS LOSE OF WASH WATER WHILE CORING BOULDERS AT THE DEPTH OF SO, OI TAKEN WITH DISE 201 MADE THREE TRIALS AT THIS LOCATION, HIT AN PRETRUCTION IN EACH TRAL AT GEPTHS OF TREE, 6.01, AND 13.05 WATER LEVELS INDICATED ARE THOSE DESERVED AT THE COMPLETION OF EACH BORING, OR AS NOTED, AND TO NOT RECESSARILY REPRESENT PERMANENT GROUND WATER LEVELS. -00!TAKEN WITH TWO INCH SPLIT'S 14-14-05; \$7.4 18-27-955, ROT 1X-8-55, R7, F Figures in right hand column dudicate number of blows required to drive Potental. Raten V. Languages and provided to the contraction by the contract of the co

TEST BORING REPORT

RAYNOND

CONCRETE PILE COMPANY 301 Fark Sq. Building

NEW YORK GOW DIVISION BOSTON 16, Massachusetts

To The Commonwealth of Massachusetts Data January 3rd 10 55 Job No. 8-16517.

Location of Borings Contract No. 233, S. Charles Reliaf Sewer, WALTEAL, Massachusetta.

| AI   | l borings are plot   | ted t       | o a sca        |  | đi,         | ueing.         |   |      |                | ns a fixed dat  | um.        |
|------|--|-------------|----------------|--|-------------|----------------|---|------|----------------|---|------------|
| 1601 | No. 23 A   |             |                | No. 24   |             |                | No <mark>25</mark><br>TB25  |      |                | No. 26<br>TB26  |            |
|      |  |             |                |  |             |                | ELEV. 155.517   | 7    |                | TB20  |            |
|      | ELEV.  52.31   | 2           |                | ELEV. 153,21-<br>SAND &<br>GRAVEL FILL.  | 7           | l              | FIRM COARSE<br>LOAMY BAND,<br>GRAVEL &  |      |                | ELEV. 153.01-   | 7          |
| 1501 | FIRM COARSE<br>SAND, GRAVEL<br>BOULDERS FILL                         | .II         |                | COMPACT  | 38          | 2.01           | BOULDER.  | 33   | 6.01<br>9.01   | BOULDERB<br>FILL.   | 9          |
|      | FIRM COARSE<br>SAND, GRAVEL<br>LITTLE CLAY.                          | 7<br>I5     | .51            | MEDIUM<br>BAND,<br>GRAVEL &<br>BOULDERS,   | 62          |                | HARD COARBE<br>BAND, GRAVEL<br>TRACE OF CLAY  | 20   |                | HARD GAND,<br>GRAVEL &<br>BOULDERS,                           | 16         |
| 1401 |  | 18          | 3.01           |  | 65          | 16,01          | HARD COARDE<br>BAND, LITTLE<br>GRAVEL,  | 18   | 15,01          | VERY COMPACT<br>SAND, PRAVEL<br>LITTLE CLAY.                  | <b>5</b> 1 |
| 1301 | HARD<br>MEDIUM   |             | I.51           | HARD FINE<br>YELLOW SAND,<br>LITTLE FINE<br>GRAVEL S   | and desired | 21.71<br>WATER | HARD FINE<br>BAND, TRADE<br>OF CLAY &<br>LITTLE MICA.   | 220  | 23.01<br>WATER | VERY COMPACT<br>BAND, (BRAVEL<br>(BOULDERS &<br>LITTUE (CLAY) | 137        |
|      | BAND,<br>LITTLE<br>FINE<br>GRAVEL &<br>TRACE OF                      | 22          |                | LITTLE MIOA.   | 19          | 28.01          |   | 20   | 29,31          | LITTUE , CLAY.  |            |
| 1201 | ÇLAY,  | 29          |                | VERY DOMPÁCT<br>MEDIUM<br>BAND GRAVEL<br>A BOULDERS  | 198         |                | HARD COARSE<br>SAND, WHAVEL,<br>BOULDERS<br>A CLAY,   |      | 35 51          | BOULDERS A  |            |
|      | VERY COMPACT   | )18<br>3    | 6 <b>.</b> 01  | (VERY COMPACT<br>) COARSE BAND,<br>'BROYELERS'S  | 210         | 36.01          | VERY COMPACT<br>COARSE SAND<br>WRAYEL<br>SOULDERS A<br>ALITTUE SOLAY  | 68   |                |   |            |
|      | VERY DOMPACT<br>ODARBE BAND,<br>GRAVEL<br>BOULDERS &<br>LITTLE CLAY. | 61 4        | 0,01           | /ERPHEE 186.20<br>   |             | 38,3           |   |      |                |   |            |
| 4101 | WATER LEVEL TA<br>THIRTY MINUTES<br>AFTER COMPLET                    | KEN<br>ION. | y y<br>Y y a   | WATER LEVEL TA<br>THIRTY MINUTER<br>AFTER COMPLET  |             |                | WATER LEVEL TO<br>THIRTY MINUTES<br>WETER COMPLET   | AKEI |                |   | e e        |
| 1001 |  | ,SA         | HERMAN AND THE | S TAKEN W  | Out to the  | A SE MINISTER  | CONTRACTOR SERVICES AND LEAST OF THE PROPERTY |      |                |   |            |
|      | E. J. BOUDREAU   |             |                | The state of the s |             |                |   | AU.  | <b>V</b>       |   | Y.         |

Mass. Dept. of Public Works Research & Materials Section Soils & Foundation Unit. R & M 522

BORING PROFILES:

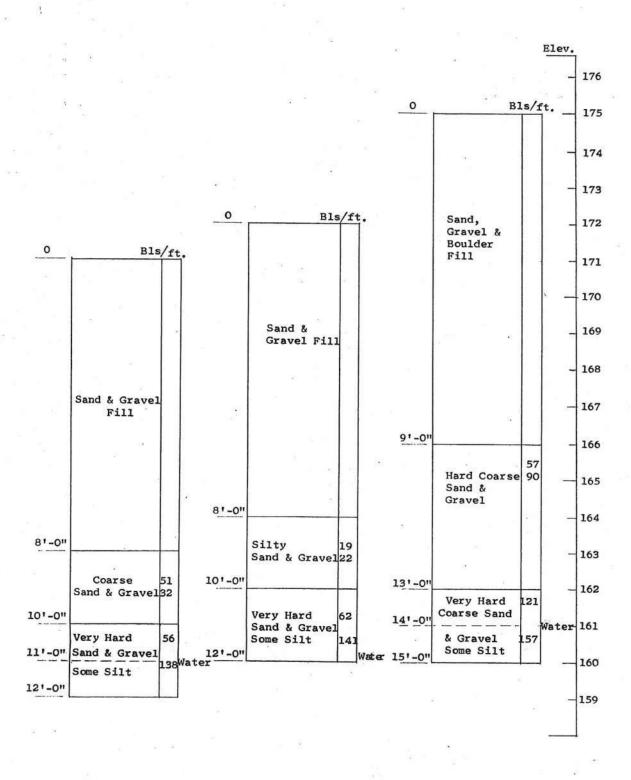
TB<sub>2</sub>

Town: WALTHAM (W-4-23)
Road: WINTER STREET
Dato: June 30, 1966
Vert. Scale: 1"=21-0"

Boring No. 1 Sta. 25+55, 30'Lt. Grnd. Elev. 171.0

Boring No. 2 Sta. 25+92, 26! Lt. Grnd. Elev. 172.0

Boring No. Sta. 26+00 @ R. Grnd. Elev. 175.0



# MWRA Contract No. 59 1937 Project Weston, MA

SHEET I SHEETS

managed and

### COMMONWEALTH OF MASSACHUSETTS METRIDISTR. WATER SUPPLY COMMISSION

RECORD OF BORINGS CONTRACT NO 58 MIDDLESEX, NORFOLK, SUFFOLK AND WORCESTER COUNTIES

|      | Work                     | starte   | d April  | 8 1937 :                                | 1937 to Pen<br>complete  | nsylvanic                             | ber 18               | 1037   | ussburg                                       | P                  | enn.   |   |   |             | -                  | er Foo                        |            |
|------|--------------------------|--|--|---|--|---------------------------------------|----------------------|--|---|--------------------|--|---|---|-------------|--------------------|-------------------------------|------------|
|      | 11011                    | TATION   | LOCA   | TION                                    | SIZE OF<br>CASING  | ELEVAT                                | ION OF               | DEPTH  | LEDGE CO<br>PENE- RE                          | ORE<br>COVD        | NATURE OF  | ITEM                                    | ITEM  | B.E.C.IIII  | COM                | ACTUAL                        | FE         |
|      |                          |  | N<br>20404   | E                                       |  | GROUND                                |                      | LENGE  | TRATION                                       | <b>%</b>           | LEDGE<br>Bietite Schist  | 1                                       | 2   | 19          | 37                 | HRS, MIH.                     | IFR        |
|      |                          | 0+41<br>204+48   | 30483  | 83,405<br>103,749                       | Contract to the party of the last  | 284.88                                |                      |  | 280.93 9                                      |                    | and Grantle  |   | 280,93  | 4/26        |                    | 76.55                         |            |
|      |                          |  |  | manufactured and and a                  | WART OF BUT THE POPULO WILL  | 260.24                                |                      |  | THE RESERVE OF THE PERSON NAMED IN            |                    | Chlorite Schist  | 19.22                                   |   | 7/13        | 7/16               | -                             |            |
| 88   | THE OWNER LAND.          |  |  | 107,118                                 | ***  | 263.92                                | 204.40               |  |   | 0,1                | Granite and<br>Biotite Schiet  | 59,50                                   |   |             | 7/10               |                               |            |
| 8    |                          |  | mich merten de e si nie  | 117011                                  | ANTON MI SE TIMESTO  | 200.25                                | 191.16               |  | 30.04 66                                      |                    | Biotite Dehist   | 9.09                                    | **********  |             | 5/18               | +                             |            |
|      |                          |  |  | 117,747                                 |  | 217.46                                |                      |  | THE RESERVE AND DESCRIPTION OF REAL PROPERTY. | ***                | Biotite Gnelss   | 30,42                                   |   | THE RESERVE | 7/21               | 5-40                          | -          |
| 1    |                          | TAXABLE PARTY  | DESCRIPTION OF THE PERSON OF   | 118,508                                 | NAME AND ADDRESS OF THE OWNER, TH | 206.69                                | 138.33               | 68.36  | 4714  | arte.              | Gneiss   | 68.86                                   | 1. 1.   | B. 100      | 6/22               |                               | -          |
| Y    |                          |  | Manager Street   | ***********                             |  | 209.20                                | 171.58               | -  | an retirement from                            | ACCRECATE VALUE OF | Blotite Gneiss   | 87.62                                   |   | 6/22        | 6/25               | 7-15<br>Not                   | 5.         |
| 0    |                          |  | 31,256   | 125,558                                 | CHAPTER CHAPTER & BRIDE  | 175.82                                | 163.82               |  | 254.0090                                      |                    |  | 12.00                                   | of the last of the last   |             | 5/24               | Noted                         |            |
|      |                          |  | Contractor of  | 131,040                                 |  | 184.19                                | **********           |  | 31.0084                                       | ** * ·             | Mica Schist  | 12.67                                   |   | 4/12        | 4/14               | Total Control of the          | 100        |
| es m |                          |  | The second second  | 133,026                                 |  | 165.80                                | 137.55<br>83.43      | STATE OF THE PERSON NAMED IN   |   | -                  | Greenstone   | 28.25                                   |   | 4/12        |                    |                               | ***        |
| 9    | Marketon Marketon        | THE RESERVE AND ADDRESS.   | The second secon | 134,113                                 |  | 168.55                                | 100                  | 73.57  | 30.33 9                                       | 4                  | Chlorite Schist  | 73.57                                   |   | 4/16        | -                  | 2.35                          |            |
|      |                          |  | Description of the latest Party of the latest  | 135,224                                 | NAME OF TAXABLE PARTY.   | 134.10                                | 87.84                |  | 31.04 99                                      | -                  | Mica Schist  | 80,71                                   | 31.04   | 4/21        | A/27               | -                             | -          |
| 15   | MED                      | THE PERSON NAMED IN  | ************   | 137,061                                 |  | 183.08                                | THE PERSONNELS OF    | 100.73   | RESIDENCE REAL                                | -                  | Muscovite Schist<br>Chlorite Schist  | 21.28                                   | Residence of the last   | 4/16        | ALC: UNKNOWN       | 3.06                          |            |
| 2    |                          |  |  | 138703                                  |  | 162.10                                | 9 (8)(5) T 144       |  | 32.83 67                                      |                    | * * * * * * * * * * * * * * * * * * *  | *** ***                                 | 100000  | 4/20        | 4/24               | 3-40                          |            |
| U.   | ZA I                     | OF REAL PROPERTY.  |  | 139,691                                 | THE RESERVE AND PERSONS ASSESSED.  | 180.5                                 |                      | doned  | DESCRIPTION OF THE PERSON NAMED IN            |                    | Chlorite Schist<br>depth of 171'   | 130.20                                  | The second second   | 1/26        | 5/1                | 3-80                          | _          |
| i    | 12 A·2                   |  | 34,872   | - HERRICAL STREET                       | 24,44,6  | *******                               | -45.50               |  | Name and Address of the Owner, where          |                    | Indiana and Contract of the Co | (EL.9.5                                 |   | 10/28       | *** ******         | -                             | led        |
|      | 1                        | 574+82   |  | 140,197                                 |  | 175.50                                | \$7.00 0 about \$600 |  | THE RESERVE TO STREET                         | ng 24              | Granite  | 218,55                                  |   | 11/15       | 1                  | -                             |            |
|      | Coloredon Inc.           | Carlo de Car | 33,160   | 10.11                                   | 24,4", 44,6  | 152.30                                |                      | doned<br>218.22  | 6/8/37<br>83.29 66                            | 01 (               | depth of 242.2'  |   |   | 4/28        |                    | reach'l                       |            |
| 100  | Personal Line            | -  | 33,076   |   | 40 4 117 W. America and San  | 190.06                                | -49.42               | -  |   | <u> </u>           | and Granite<br>Chloritic Granite   | 218.22                                  | 1 Mar 4 1 mm 14 5 4 1   | 5/12        | 6/1                |                               |            |
|      | STREET, SQUARE,          | Committee of the land  | 33,325   | 142,520                                 | CHILD-ST-THE-ST- | 189.45                                |                      |  |   |                    | Dlabase<br>and Granite<br>Chioritic Granite<br>ond Didbase<br>Diabase and<br>Greenstone<br>Quartitie ond<br>Diabase  | 289.48                                  | we  | 6/5         | 6/17               | ****                          |            |
|      | PORCEASOR STATE          | City and States and Street World   | A committee of the last of the   | 146,152                                 |  | 183.00                                | 157.00               | 114,10   | 407.0079                                      | 7.0                | Orcenstone<br>Quartitle and  | 114.10                                  | + ++ ++ ++  | 5/4         | 5/11               | 5-40                          | 1          |
|      |                          |  | THE PERSON NAMED IN  | 63,486                                  | A-REAL PROPERTY AND ADDRESS OF THE PARTY AND A | 245.00                                | RIA.40               | The state of the s | 519.90 92                                     | 2                  | Granité  | 100000000000000000000000000000000000000 | 407.00  | 5/26        |                    | 111-55                        | 510        |
| 16A  |                          | 95+20  |  | 170945                                  |  | 89,90                                 | 60,40                | THE RESERVE THE PERSON NAMED IN  | 530,4067                                      | -                  | Column States of the Column St | THE R. LEWIS CO., LANSING, MICH.        | 519.90  | 6/17        | 7/15               | Noted                         | _          |
| -    |                          |  |  | 171,528;                                | -  | 51.60                                 | -6.40                | TOTAL PROPERTY.  | 315.0062                                      |                    | Granodiorite<br>Granodiorite   |   | 291.38  | 7/12        | 9/8                | -                             |            |
| i    |                          | ***************************************  |  | 172A48;                                 | THE RESERVE AND ADDRESS OF THE PERSON NAMED IN   | 48.30                                 |                      | STREET, SQUARE, SQUARE,  | 233.50 AD                                     | -                  | Volconic Brecela   | 123,50                                  |   | 5/84        |                    | :                             |            |
|      | beelufulkiida Riin       | 04+70  | MAY THE REAL PROPERTY.   | 171,823                                 | and the same of the same of  | 43.00                                 | -76.35               | A DESCRIPTION OF THE PERSON OF   |   | 0.1                | Granodiorite and   | 119.35                                  | State | 6/17        | 6/15               |                               |            |
|      | PERSONAL PROPERTY SECURE | Autoritation of the Party of th | CELULE PER PER PER PER PER PER PER PER PER PE  |   | 21/2,3", 31/2"   | 56.09                                 | 0.92                 | 55.17  | THE RESERVE NAMED                             | -                  | Volcanic Breccia   | 55.17                                   |   |             | -                  | 10-16                         | tion)      |
|      | 10.00                    | CATALOGUE CONTRACTOR OF  |  | 175,514                                 |  | 104.72                                | 84.62                | The second second  | A0.25 76                                      |                    | Dark Gray Shales   | 20,10                                   |   | 5/13        |                    | 12-58<br>Not                  | 4.0        |
| •    |                          |  |  | 185,213                                 | THE PERSON NAMED IN  | 112,50                                | 87.50                | SHIELDING.   | 502.50 98                                     |                    | Green Shales   |   | THE RESERVE OF THE PERSON NAMED IN  |             |                    | Noted<br>Noted                | .,,        |
|      |                          |  |  | 181,965                                 | STREET, SQUARE, SQUARE | 160.80                                |                      | ACCUPATION AND ADDRESS OF THE PARTY OF THE P | 34.48 56                                      |                    | Greenish Shales  | 120,80                                  | - 100000  | 6/30        | THE REAL PROPERTY. | A STATE OF THE REAL PROPERTY. | 7.4        |
| į    |                          | STREET, SQUARE, SQUARE | NAME AND ADDRESS OF THE OWNER, WHEN  | 189,540                                 | THE PERSON NAMED IN COLUMN 2 IS NOT THE OWNER, THE PERSON NAMED IN COLUM | 161.40                                |                      |  | THE RESERVE AND PERSONS NAMED IN              |                    | Dark Gray Shales   | 124.90                                  | * ****** * *  | 9/7         | 9/4                | 4-50<br>4-05                  | 7.1        |
|      | -                        | Marie  |  | 201,072                                 |  | 116.72                                | 87.72                |  |   |                    | Dark Gray Shales   |   | 392.57  | 4/0         | 9/16               | 4-03                          | 7.3        |
| i    |                          | E-HILE-IX-WIFE   |  | 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | 14, 24, 3%   | 95.70                                 | 15:12                |  |   |                    | Light Brown Shale  | 80.58                                   | THE RESERVE OF THE PERSON NAMED IN  | 6/9         |                    |                               | 6.0        |
| 1    | 25 18                    | 64+91  | 37.469   | 207605                                  | 14.24.36.  | 85.20                                 | -27.60               | 112.80   | 725010  | 16                 |  |   |   | 6/17        | 7/2                | of hole                       | -4.4       |
|      | 26 12                    | 86+69  | 37,423   | 209.783                                 | 24,31.,44  | 47.50                                 | -83.58               | 131.08   | 96.92 37.                                     | 2                  | Conglomerate   | 181.08                                  | 50.75<br>67.84  | 7/17        | 3/59               | Not:                          | 5.0        |
|      |                          |  |  | 212217                                  |  | 18.25                                 | -93.41               | 106.66   | 60.75 54                                      | 0 1                | Gray Shale   | 106.66                                  | 51.03   | 5/10        | 5/10               | Noted                         |            |
|      |                          |  |  |   | 14,24,34   | 81.90                                 | 118.60               | 1 40.50  | 01.87.31                                      | 5.9                | Gray Shale   | 140.50                                  |   | 4/21        | 6/15               | 15-30:                        | 6.0        |
|      | 28A 13                   | 22+92  | 37,414   | 213405                                  | 21/2 31/2"   | 38.61                                 | ~5.60                | 44.21  | 30.18.92                                      | 2                  | Conglomerate   | 44.81                                   |   | 6/10        | 6/25               | 10-30                         | 0.5<br>9 B |
| į    |                          |  |  |   |  |                                       | antiti               |  |   |                    | Forward  | 871 72                                  | 1702 64   | 9 17        | -()                | 10.91                         | 170        |
| ļ    |                          |  |  |   | total k  | by Que                                | ontitie              | AA.KI  | carrie  |                    | Conglomerate<br>Corward  | 4 <b>4.8</b> 1<br>871.72                | 30.18<br>4792.64  | 6/19        | 6/25               | 10-31                         | 2          |
|      | Eleva                    | ntiens   | tes: N   | ton C                                   | ity Bae<br>elt Syst  | 0,                                    |                      | - To   |   |                    |  |   |   |             |                    | i                             |            |
|      | LOCA                     | TION   | OF   | BORI                                    | NGSI   |                                       |                      |  |   |                    | •  |   |   |             |                    |                               |            |
| 100  | :11                      | terno  | tive   | Dress                                   | ine Time   | el Line                               | : Nos                | . 1 to   | 17, 10  | el.                |  | 1 1 1 1                                 |   | W.W.        | AL YER             |                               | ×.         |
|      |                          | oth L  | ine o  | t Pres                                  | seure 7  | nnel L                                | POP! N               | 06. 17   | A to A  | 1-B                | incl, and 58.<br>4 to 60, Incl   | . 1                                     |   |             |                    |                               |            |
|      | AVE                      | wth  | Brone  | ch 77 v                                 | resure il  | mner L                                | D FI                 | OS DE  | A, DR.  | 7, 5               | 4 to 60, Incl  | 1                                       |   |             |                    |                               |            |
|      |                          | plore  | mion.  | in No                                   | rthhoroi   | Intil No                              | 10 . 11              | 1.0  | and a.  | Q 11               |  |   |   |             |                    |                               |            |
|      | A                        | plora  | tion !   | in Fa                                   | st Bost<br>olsea:  | oni No                                | 5, 43                | 43.A   | and 4   | 9-6                | 3,   |   |   |             |                    |                               |            |
|      |                          | plore  | ation  | in Ch                                   | e/sea!   | No. 45,                               |                      |  | j-1., *                                       |                    |  |   |   |             |                    |                               |            |
|      | 5                        | plera  | rion   | at No                                   | rtli, rnd  | of Lake                               | e Goa                | rituai   | ei Nos  | , 12               | A.1, 12.A-2.   |   |   |             |                    |                               |            |
|      | .A.Y                     |  | 9 1/0  | 0500                                    | d: AE, A   | 4, 40,4                               | 1,40                 | الله والا  |   |                    | *  |   | 445 (4)   | #1.         | • " !!!!!          | *                             |            |
|      |                          |  |  |   |  |                                       |                      |  |   |                    |  |   |   |             |                    |                               |            |
|      | Drawi                    | N. E.W   | S. CII   | Ka. Ook                                 | 46   | 2 1                                   | 4.1                  | 1 . K. P   |   | 1                  | A 20 - 1 - 1   |   |   |             | 1 Show             |                               |            |
| -    |                          |  |  | kd, 00,4<br>kd./2/0                     |  | · · · · · · · · · · · · · · · · · · · |                      |  |   |                    | FILE: CON  | r 58 .s                                 | 3.36  |             | 400                | 35.04                         | i          |

#### Appendix B

**Boring and Monitoring Well Installation Logs** 







Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / P. Fisher

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 28 River Rd., Weston, MA Northing: 2950924.3547 Easting: 719979.0651

**Drilling Date: Start:** 11/29/2017 **End:** 11/29/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Reviewed by:

Surface Elevation (ft.): 85.68

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth

Date ΝE 11/29/2017 09:35

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-1** 

| Elev. Depth (ft) 85.7  O SS S-1  24  7  12  13  Strate  Begoneral Description  Material Description  Moist, medium dense, brown, fine to medium SAND, little silt, little fine gravel  Moist, very dense, light brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt   |  |
|--|--|
| SS S-1 24 5 6 Topsoil  Moist, medium dense, brown, fine to medium SAND, little silt, little fine gravel  Moist, very dense, light brown, fine to coarse SAND and fine to coarse GRAVEL trace silt  | Remarks  |
| SAND, little silt, little fine gravel    15  |  |
| 34 SAND and fine to coarse GRAVEL trace silt   |  |
| - SS   S-2   24   42   14   76   5   5   5   5   5   5   5   5   5   |  |
| 80.7 SS S-3 24 16 8 34 SAND, some fine to coarse gravel, trace silt  | Analytical sample (4'-6')  |
| SS S-4 24 24 12 51 Wet, very dense, gray-brown, fine to coarse SAND, little fine gravel, trace silt  |  |
| SS S-5 24 9 10 19 Wet, medium dense, gray-brown, fine to coarse SAND, little fine gravel, trace silt   |  |
| Wet, medium dense, gray-brown, fine to coarse SAND, little fine gravel, trace silt   | Coarse gravel in spoon tip.  |
| Test boring B-1 terminated at 16' bgs and backfilled with soil cuttings.   |  |
| 65.7   |  |
|  | ırmister Classification  |
| AS - Auger/Grab Sample CS - California Sampler SG - 1.5" Rock Core GP - Geoprobe  V - Vac Ex/Grab Sample Sample S - Split Spoon ST - Shelby Tube GP - Geoprobe  V - Vac Ex/Grab Sample S - Split Spoon ST - Shelby Tube GP - Geoprobe  V - Vac Ex/Grab Sample S - Split Spoon ST - Shelby Tube GP - Geoprobe  Granular (Sand): V - Loose: 0-4 Dense: 30-50 Loose: 4-10 V Dense: >50 M. Dense: 10-30  Fine Grained (Clay): V - Soft: <2 Stiff: 8-15 Soft: 2-4 V . Stiff: 15-30 M. Stiff: 4-8 Hard: >30  m | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>noisture, density, color |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / M. Ferreira

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** 44 River Rd., Weston, MA **Northing:** 2951336.9957 **Easting:** 720113.614

**Drilling Date: Start:** 12/11/2017 **End:** 12/11/2017

Surface Elevation (ft.): 80.15

Total Depth (ft.): 16

Depth to Initial Water Level (ft):DepthDateTime10.912/1112:40

Abandonment Method: Backfilled with soil cuttings

| VE   V-1     | J                        |                                  |                         |   |                            |                         |         |  |                            | Logged By: A. Smith  |
|--|--------------------------|----------------------------------|-------------------------|---|----------------------------|-------------------------|---------|--|----------------------------|--|
| 42" Topsol: Moist, brown, fine to coarse SAND and fine to coarse GRAVEL, trace fine gravel, trace of bgs.  SS S-1 24 76 76 14 >100 25 76 76 14 >200 25 76 76 14 >200 25 76 76 14 >200 25 76 76 76 14 >200 25 76 76 76 14 >200 25 76 76 76 14 >200 25 76 76 76 14 >200 25 76 76 76 76 76 76 76 76 76 76 76 76 76  | Depth<br>(ft)            | Sample<br>Type                   | Sample<br>Number        | Sample<br>Length (in)                   | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value | Graphic Log  | Strata                     | Material Description Remarks   |
| Moist, brown, fine to coarse SAND and fine to coarse GRAVEL, trace to little silt    SS  |                          | VE                               | V-1                     |   |                            |                         |         | \(\frac{1}{2}\frac{1}{ | Topsoil                    | SAND, some silt, trace fine gravel, trace boring from the ground surface   |
| SS S-1 24 76 14 >100 SS S-1 24 8 48 12 >100 SS S-1 24 8 8 48 12 >100 SS S-1 24 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8   |                          |                                  |                         |   |                            |                         |         |  |                            |  |
| SS S-2 18 48 12 >100   Top 8": Moist, very dense, brown, fine SAND, little silt   Bottom 4": Moist, very dense, brown, fine to coarse gravel, trace silt   Bottom 4": Moist, very dense, brown, fine to coarse gravel, trace silt   Bottom 4": Moist, very dense, brown, fine to coarse gravel, trace silt   Bottom 4": Moist, very dense, brown, fine to coarse gravel, trace silt   Test boring B-2 terminated at 16' bgs and backfilled with soil cuttings.    Sample Types   | 5 -                      | - SS                             | S-1                     | 24                                      | 76<br>76                   | 14                      | >100    |  |                            | Moist, very dense, brown, fine to coarse GRAVEL and fine to coarse SAND, little silt (6'-8')   |
| Moist, very dense, brown, fine to coarse SAND, some fine gravel, little silt  Test boring B-2 terminated at 16' bgs and backfilled with soil cuttings.  Test boring B-2 terminated at 16' bgs and backfilled with soil cuttings.  Consistency vs Blowcount/Foot  Burmister Classificates and sample Sample Sample Sample SS - California Sample SS - Split Spoon ST - Shelby Tube SD - 1.5' Rock Core NQ - 2' Rock Core  NQ - 2' Rock Core  Moist, very dense, brown, fine to coarse SAND, some fine gravel, little silt  Test boring B-2 terminated at 16' bgs and backfilled with soil cuttings.  Consistency vs Blowcount/Foot  Burmister Classificates Simple SS - Split Spoon Some 20-35% Some 20-35% Ittle 10-20% Trace - 10' No Dense: 30-50 M. Stiff: 4-8 Hard: >30 M. Stiff: 4-8 Hard: >30 Moist, very dense, brown, fine to coarse SAND, some fine gravel, little silt  Test boring B-2 terminated at 16' bgs and backfilled with soil cuttings.   |                          | SS                               | S-2                     | 18                                      | 30<br>48                   | 12                      | >100    |  | and and Gravel             | little silt Bottom 4": Moist, very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt  Rollerbit through boulder from 9.5 |
| backfilled with soil cuttings.  Sample Types  Consistency vs Blowcount/Foot  Sample CS - California Sampler BQ - 1.5" Rock Core NQ - 2" Rock Core NQ - 2" Rock Core  Sample Types  Consistency vs Blowcount/Foot  Scandle (Clay):  V - Vac Ex/Grab Sample Sample Sample Sample Shelby Tube GP - Geoprobe  Consistency vs Blowcount/Foot  Scandle (Clay):  V. Loose: 0-4 Dense: 30-50  V. Loose: 4-10 V. Dense: 30-50  N. Soft: 2-2 Stiff: 8-15 Soft: 2-4 V. Stiff: 15-30 Ittle 10-20% M. Stiff: 4-8 Hard: >30  M | . <u>65.2</u> _          | - SS                             | S-3                     | 24                                      | 56<br>60                   | 10                      | >100    |  | 8                          |  |
| Sample Types  AS - Auger/Grab Sample CS - California Sample BQ - 1.5" Rock Core NQ - 2" Rock Core NQ - Geoprobe  Consistency vs Blowcount/Foot  Consistency vs Blowcount/Foot  Scannel (Clay):  Scannel (Clay):  Sample Sample Sample Sample Sample Sample Shift Spoon ST - Shelby Tube GP - Geoprobe  Consistency vs Blowcount/Foot  Scannel (Clay):  Scome 20-35%  Iittle 10-20%  Iittle 10-20%  Trace <10%  M. Dense: 10-30  M. Stiff: 4-8 Hard: >30  Moisture, density, columnia for the control of t | -<br>-<br>-<br>-         |                                  |                         |   |                            |                         |         | A OLO  |                            | Test boring B-2 terminated at 16' bgs and backfilled with soil cuttings.   |
| AS - Auger/Grab Sample CS - California Sampler BQ - 1.5" Rock Core NQ - 2" Rock Core ROCK CORE CGP - Geoprobe  V - Vac Ex/Grab Sample Sample Sample SS - Split Spoon ST - Shelby Tube GP - Geoprobe  O - 4 Dense: 30-50 V. Soft: <2 Stiff: 8-15 little 10-20% Soft: 2-4 V. Stiff: 15-30 trace <10% moisture, density, column for the control of  | 60.2                     | <u> </u>                         | ample Tv                | nes                                     |                            |                         |         |  |                            | Consistency vs Blowcount/Foot Burmister Classificat  |
|  | CS - Califo<br>BQ - 1.5" | er/Grab S<br>ornia Sa<br>Rock Co | Sample<br>ampler<br>ore | V - Vac<br>San<br>SS - Spli<br>ST - She | nple<br>t Spoor<br>lby Tul | n<br>ne                 | Loose:  | se: (  | anular (<br>)-4 D<br>-10 V | Sand):         Fine Grained (Clay):         and some 20-35%           ense:         30-50         V. Soft:         <2                            |
| Reviewed by: Date: Boring Number: B-2  | Revie                    | wed k                            |                         |   |                            |                         |         |  |                            | Date: Boring Number: B-2   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

 $\textbf{Drilling Contractor/Driller:} \ \ \text{GeoLogic - Earth Exploration, Inc. / P. Fisher}$ 

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** 60 River Rd., Weston, MA **Northing:** 2951934.5782 **Easting:** 720192.6396

**Drilling Date: Start:** 12/6/2017 **End:** 12/6/2017

Surface Elevation (ft.): 81.82

Total Depth (ft.): 14

Depth to Initial Water Level (ft):

**Depth Date Time** 5.2 12/6/2017 13:00

Abandonment Method: Backfilled with soil cuttings

|   |                     |                  |   |                            |                         |                             |             |          |  | Logged                                      | By: A. Smith                            |                 |  |
|---|---------------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|----------|--|---|---|-----------------|--|
| Elev.<br>Depth<br>(ft)                              | Sample<br>Type      | Sample<br>Number | Sample<br>Length (in)                             | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata   |  | Material Desc                               | ription                                 |                 | Remarks  |
| 0   |                     |                  |   |                            |                         |                             | :47: · · ·  |          | 2" Topsoil                               |   |   |                 | Vacuum excavate  |
|   | -                   |                  |   |                            |                         |                             |             |          |  | n, SILT, some                               | e fine sand                             |                 | boring from the ground surface to 6' bgs.  |
|   | VE                  | V-1              |   |                            |                         |                             |             | Gravel   |  | n to gray, fine<br>o coarse sand            | to coarse GRAVE<br>, trace silt         | EL,             | Analytical sample (2'-2.5') 2 to 4' bgs is composed of 20% cobbles. Rollerbit through cobbles and boulders from 4 to 6' bgs. |
|   | SS                  | S-1              | 10  | 15<br>100/4"               | 5                       | >100                        |             | Sand and | Moist, very of SAND and                  | dense, brown<br>fine to coarse              | , fine to coarse<br>GRAVEL, trace si    | lt              | <b>5 1 1 1 1 1 1 1 1 1 1</b>   |
|   |                     |                  |   |                            |                         |                             |             | S        |  |   |   |                 | Rollerbit through cobbles and  |
|   | - SS                | S-2              | 24  | 25<br>24<br>30<br>24       | 10                      | 54                          |             |          |  |   | , fine to coarse<br>GRAVEL, little silt |                 | boulders from 6.9 to 8' bgs.   |
|   | -                   |                  |   |                            |                         |                             |             | WR       |  |   |   |                 | Rollerbit through<br>weathered rock or<br>possible bedrock<br>from 12 to 14'   |
| _ <u>66.8</u>                                       | - \$\$              | <del>\$3</del>   | 0   | 50/0"                      | 0                       | >50                         | -, 1777     |          |  | B-3 terminate ith soil cutting              | d at 14' bgs and<br>s.                  |                 | bgs.   |
| 61.8<br>AS - Auge                                   |                     |                  |   |                            |                         |                             |             |          |  |   |   |                 |  |
| [   | <u>Sa</u>           | mple Ty          |   |                            |                         |                             |             |          | Consistency vs I                         | Blowcount/Foo                               | <u>t</u>                                |                 | ster Classification  |
| AS - Auge<br>CS - Calife<br>BQ - 1.5"<br>NQ - 2" Re | ornia Sa<br>Rock Co | mpler<br>ore S   | V - Vac<br>San<br>S - Spli<br>T - She<br>GP - Ged | nple<br>t Spoor<br>Iby Tul | n<br>ne                 | V. Loos<br>Loose:<br>M. Den | se: 0<br>4- | )-4 E    | (Sand):<br>Dense: 30-50<br>'. Dense: >50 | Fine Gr V. Soft: <2 Soft: 2-4 M. Stiff: 4-8 | V. Stiff: 15-30                         | so<br>lit<br>ti | nd 35-50%<br>ome 20-35%<br>ttle 10-20%<br>race <10%<br>ture, density, color  |
| Revie   | wed b               | y:               |   |                            |                         |                             |             |          | Date:                                    |   | Boring Numb                             | er: B           | -3   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number: 101038-102170** 

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / P. Fisher

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: River Rd./Prescott Ln., Weston, MA Northing: 2952499.7577 Easting: 720002.1819

**Drilling Date: Start:** 12/6/2017 **End:** 12/6/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Reviewed by:

Surface Elevation (ft.): 79.01

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

Depth Date Time 9.0 12/6/2017 10:00

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-4** 

| Dillilling  | j Date.                           | Start: 1.              | 2/0/201   | / []                       | <b>u.</b> 12/           | 0/201                      | ,           |                 | Logged By: A. Smith   | v  |
|---|-----------------------------------|------------------------|---|----------------------------|-------------------------|----------------------------|-------------|-----------------|---|--|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type                    | Sample<br>Number       | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                    | Graphic Log | Strata          | Material Description  | Remarks  |
| 0   |                                   |                        |   |                            |                         |                            | 12 77 12.   |                 | 12" Topsoil   | Vacuum excavate boring from the                                      |
| -   |                                   |                        |   |                            |                         |                            |             |                 |   | ground surface to 6' bgs.  |
| -   | VE                                | V-1                    |   |                            |                         |                            |             |                 | Moist, brown, fine to medium SAND, some silt, trace fine gravel   | Analytical sample (2.5'-3')  |
| 74.0  | -                                 |                        |   |                            |                         |                            |             |                 |   |  |
| <u>74.0</u> 5                                     | VE                                | V-2                    |   |                            |                         |                            |             |                 | Moist, brown, fine SAND, little fine to coarse gravel, trace to little silt                             | Analytical sample (5'-5.5')  |
| -   | - ss                              | S-1                    | 24  | 16<br>30<br>21<br>16       | 12                      | 51                         |             | avel            | Moist, very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt                   |  |
| <b>▼</b> .  | - SS                              | S-2                    | 24  | 20<br>16<br>20<br>23       | 12                      | 36                         |             | Sand and Gravel | Moist, dense, light brown, fine SAND, some silt   |  |
| 10<br>-<br>-                                      | -                                 |                        |   |                            |                         |                            |             |                 |   |  |
| 64.0<br>15  | - ss                              | S-3                    | 24  | 17<br>21<br>19<br>17       | 10                      | 40                         |             |                 | Wet, dense, brown, fine to coarse SAND, trace fine gravel, trace silt                                   |  |
| -   |                                   |                        |   |                            |                         |                            | *****       |                 | Test boring B-4 terminated at 16' bgs and backfilled with soil cuttings.                                |  |
| -   | -                                 |                        |   |                            |                         |                            |             |                 |   |  |
| 59.0  | 92                                | mple Ty                | nes   |                            |                         |                            |             |                 | Consistency vs Blowcount/Foot Burm  | lister Classification  |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | er/Grab S<br>fornia Sa<br>Rock Co | Sample<br>mpler<br>ore | V - Vac<br>Sam<br>SS - Spli<br>ST - She<br>SP - Ged | nple<br>t Spoor<br>lbv Tuk | ו                       | V. Loo<br>Loose:<br>M. Der | se: 0       | nular<br>-4 C   | (Sand): Fine Grained (Clay): Dense: 30-50 V. Soft: <2 Stiff: 8-15 Inches: >50 Soft: 2-4 V. Stiff: 15-30 | and 35-50% some 20-35% ittle 10-20% trace <10% sture, density, color |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / P. Fisher

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 85 Sauyer Rd., Weston, MA Northing: 2953296.8164 Easting: 719957.4358

**Drilling Date: Start:** 12/4/2017 **End:** 12/4/2017

Surface Elevation (ft.): 79.23

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth Date ΝE 12/4/2017 12:30

Abandonment Method: Backfilled with soil cuttings

| VE   V-1     |               |                      |                         |   |                            |                         |         |  |                        | Logged By: A. Smith   |
|--|---------------|----------------------|-------------------------|---|----------------------------|-------------------------|---------|--|------------------------|---|
| VE   V-1   | Depth<br>(ft) | Sample<br>Type       | Sample<br>Number        | Sample<br>Length (in)                   | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value | Graphic Log                                | Strata                 | Material Description Remarks  |
| WE V-1   |               |                      |                         |   |                            |                         |         | 74.18. 74                                  |                        |   |
| Corrosion same same same same same same same same  | -             |                      | V 1                     |   |                            |                         |         | 。<br>。<br>)                                |                        | ground surface<br>6' bgs.   |
| Corrosion same silt, trace silt  SS S-1 24 12 16 8 28 30 30 30 22 10 1000/4" 6 >100 20 20 20 20 5 43 20 5 43 20 5 43 20 20 5 43 20 20 5 43 20 20 5 43 20 20 5 20 20 20 20 20 20 20 20 20 20 20 20 20   | -             | VE                   | V-1                     |   |                            |                         |         | ©<br>0<br>0<br>0                           |                        |   |
| SS S-1 24 16 8 28  | 74.2<br>5     | VE                   | V-2                     |   |                            |                         | -       | );<br>;<br>;<br>;<br>;<br>;<br>;<br>;<br>; |                        | Moist, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt   |
| Moist, very dense, brown, fine to coarse GRAVEL and fine to coarse SAND, little silt  Test boring B-5 terminated at 16' bgs and backfilled with soil cuttings.  SS - Auger/Grab Sample SS - California SS - Califo | -             | - SS                 | S-1                     | 24                                      | 12<br>16                   | 8                       | 28      |  | ravel                  |   |
| Moist, very dense, brown, fine to coarse GRAVEL and fine to coarse SAND, little silt  Test boring B-5 terminated at 16' bgs and backfilled with soil cuttings.  SS - Auger/Grab Sample SS - California SS - Califo | -             | SS                   | S-2                     | 10                                      |                            | 6                       | >100    | );<br>                                     | d and G                | Moist, very dense, brown, fine to coarse<br>GRAVEL and fine to coarse SAND, little silt                                 |
| GRAVEL and fine to coarse SAND, little silt  Test boring B-5 terminated at 16' bgs and backfilled with soil cuttings.  Sample Types  Consistency vs Blowcount/Foot  Sample  V - Vac Ex/Grab Sample CS - California Sample  | 10<br>-<br>-  |                      |                         |   |                            |                         |         |  |                        |   |
| backfilled with soil cuttings.    Sample Types   Consistency vs Blowcount/Foot   Burmister Classification     As - Auger/Grab Sample   V - Vac Ex/Grab Sample   Sample   Sample   Sample   Sample   Sample   V - Vac Ex/Grab   V - Vac Ex/Grab   Sample   V - Vac Ex/Gra | 64.2<br>15    | - SS                 | S-3                     | 24                                      | 23<br>20                   | 5                       | 43      | 0<br>0<br>0<br>0<br>0                      |                        | Moist, very dense, brown, fine to coarse<br>GRAVEL and fine to coarse SAND, little silt                                 |
| Sample Types  Consistency vs Blowcount/Foot  Burmister Classificate  AS - Auger/Grab Sample Sample Sample Source S | -             | -                    |                         |   |                            |                         |         |  |                        | Test boring B-5 terminated at 16' bgs and backfilled with soil cuttings.  |
| AS - Auger/Grab Sample  | 59.2          |                      |                         |   |                            |                         |         |  |                        | Consistence of Blown and Foot   |
| NQ - 2" Rock Core GP - Geoprobe M. Dense: 10-30 M. Stiff: 4-8 Hard: >30 moisture, density, color   | CS - Califo   | r/Grab S<br>ornia Sa | Sample<br>Impler<br>ore | V - Vac<br>San<br>SS - Spli<br>ST - She | nple<br>t Spoor<br>lby Tub | n l                     | _oose:  | se: 0<br>4-                                | nular<br>1-4 [<br>10 \ | (Sand):         Fine Grained (Clay):         and some 20-35%           Dense:         30-50         V. Soft:         <2 |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / P. Fisher

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 139 River Rd., Weston, MA Northing: 2953595.3338 Easting: 719974.3851

**Drilling Date: Start:** 12/1/2017 **End:** 12/1/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 76.21

Total Depth (ft.): 16

NE

Depth to Initial Water Level (ft): Depth Date

12/1/2017 Abandonment Method: Backfilled with soil cuttings

12:40

|   | ,              |                  | _, .,_• .   |                            |                         | .,                          | -  |                 |                             |                        | Logge                           | ed B                     | y: A. Smith                                       |         |   |
|---|----------------|------------------|---|----------------------------|-------------------------|-----------------------------|--|-----------------|-----------------------------|------------------------|---------------------------------|--------------------------|---|---------|---|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log                              | Strata          |                             |                        | Material De                     | escri                    | iption  |         | Remarks   |
| 0 -   |                |                  |   |                            |                         |                             | 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1 |                 | 18                          | 3" Topsoil             |                                 |                          |   |         | Vacuum excavate boring from the ground surface to 6' bgs.                     |
|   | VE             | V-1              |   |                            |                         |                             |  |                 |                             |                        | n, fine to co<br>ravel, trace s |                          | e SAND, some fi                                   | ne      | Analytical sample (2'-2.5')   |
| - <del>71.2</del> -                               | -              |                  |   | 20                         |                         |                             |  | ravel           | M                           | oist verv              | dense brow                      | vn f                     | îne to coarse                                     |         |   |
|   | - ss           | S-1              | 24  | 20<br>54<br>18             | 12                      | 74                          |  | Sand and Gravel | S                           | AND, son               | ne fine to coa                  | arse                     | e gravel, trace silt                              |         |   |
| - <u>66.2</u> -                                   | SS             | S-2              | 24  | 35<br>28<br>26             | 16                      | 63                          |  |                 |                             |                        |                                 |                          | ine to coarse<br>e gravel, trace silt             |         |   |
|   | -              |                  |   |                            |                         |                             |  |                 |                             |                        |                                 |                          |   |         |   |
|   | - SS           | S-3              | 24  | 9<br>12<br>11<br>12        | 12                      | 23                          |  | Silty Sand      |                             | loist, med<br>ome silt | ium dense, t                    | brov                     | vn, fine SAND,                                    |         |   |
|   |                |                  |   |                            |                         |                             | p. 44. 144                               |                 |                             |                        | B-6 termina<br>vith soil cuttir |                          | at 16' bgs and                                    |         |   |
| 56.2  |                |                  |   |                            |                         |                             |  |                 |                             |                        |                                 |                          |   |         |   |
|   | <u>Sa</u>      | ample Ty         | pes   |                            |                         |                             |  |                 | Consi                       | stency vs              | Blowcount/Fo                    | oot                      |   | Burm    | ister Classification  |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | Rock Co        | ampler S         | V - Vac<br>Sam<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lbv Tul | n<br>ne                 | V. Loos<br>Loose:<br>M. Der | se: 0                                    | -4 D            | (Sand)<br>Dense:<br>/. Dens | 30-50                  | V. Soft:                        | Grai<br><2<br>2-4<br>4-8 | ned (Clay): Stiff: 8-15 V. Stiff: 15-30 Hard: >30 | S<br>li | nd 35-50%<br>ome 20-35%<br>ttle 10-20%<br>trace <10%<br>sture, density, color |
| Revie   | wed b          | oy:              |   |                            |                         |                             |  |                 |                             | Date:                  |                                 |                          | Boring Numb                                       | er: B   | i-6   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

 $\textbf{Drilling Contractor/Driller:} \ \ \text{GeoLogic - Earth Exploration, Inc. / M. Ferreira}$ 

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** Gate House Ln., Weston, MA **Northing:** 2954140.7322 **Easting:** 720062.8788

Drilling Date: Start: 11/27/2017 End: 11/28/2017

Surface Elevation (ft.): 60.77

Total Depth (ft.): 24.7

Depth to Initial Water Level (ft):

**Depth Date Time** 11.1 11/28/2017 13:20

Abandonment Method: Backfilled with soil cuttings

|  |                     |                  |   |                              |                         |                             |                    |                 |  |                             | Lo                                    | gged E    | By: A. Smith                   |                     |                       |   |  |  |  |  |
|--|---------------------|------------------|---|------------------------------|-------------------------|-----------------------------|--------------------|-----------------|--|-----------------------------|---------------------------------------|-----------|--------------------------------|---------------------|-----------------------|---|--|--|--|--|
| Elev.<br>Depth<br>(ft)   | Sample<br>Type      | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches        | Sample<br>Recovery (in) | N-Value                     | Graphic Log        | Strata          |  |                             | Material                              | Desci     | ription                        |                     |                       | Remarks   |  |  |  |  |
| 60.8   |                     |                  |   | 2                            |                         |                             | 74 14. ° 18        |                 | 3  | 6" Topso                    | ı                                     |           |                                |                     |                       | Analytical sample   |  |  |  |  |
|  | SS                  | S-1              | 24  | 5<br>7<br>6                  | 15                      | 12                          | <u> </u>           |                 |  | o ropso                     | I                                     |           |                                |                     |                       | (0'-2')   |  |  |  |  |
|  | ss                  | S-2              | 10  | 10<br>100/4"                 | 4                       | >100                        | 11:11              |                 |  |                             |                                       |           |                                |                     |                       |   |  |  |  |  |
|  | SS                  | S-3              | 16  | 22<br>33<br>100/4"           | 10                      | >100                        |                    |                 |  |                             |                                       |           | ne to coars<br>l, some silt    | e SAN               | ID,                   | Rollerbit through<br>boulder from 3 to<br>4' bgs.                           |  |  |  |  |
|  | SS                  | S-4              | 18  | 14<br>28<br>100              | 10                      | >100                        | 。<br>。<br>()<br>() |                 |  |                             |                                       |           | ne to coars<br>I, some silt    | e SAN               | ID,                   | Corrosion sample (6'-7.5')  |  |  |  |  |
| -  | SS                  | S-5              | 6   | 100/6"                       | 3                       |                             |                    |                 | <sub>v</sub>   | Vet verv                    | lense hro                             | wn fi     | ne to coars                    | e SAN               | חו                    |   |  |  |  |  |
|  | 33                  | 3-3              | + 6   | 100/0                        | 3                       | <del> </del>                | ٥. · · · ·         | _               |  |                             |                                       |           | EL, little silt                | COAN                |                       |   |  |  |  |  |
| - <u>50.8</u> -<br>- <u>\\</u>   |                     |                  |   |                              |                         |                             |                    | Sand and Gravel |  |                             |                                       |           |                                |                     |                       |   |  |  |  |  |
| - 45.8<br>15   | SS                  | S-6              | 3   | 100/3"                       | 3                       |                             | ):<br>ø<br>o ()    |                 |  |                             |                                       |           | ne to coars<br>EL, little silt | e SAN               | ID                    |   |  |  |  |  |
| 100200 CTD - 10000 |                     | 0.7              |   | 100/4"                       |                         |                             |                    | Silty Sand      |  | Nat                         |                                       | 5         |                                |                     |                       |   |  |  |  |  |
| 40.8<br>AS - Auge  | SS                  | S-7              | 1   | 100/1"                       | 1                       |                             |                    | S               |  | Vet, very o<br>SAND, little |                                       | own, fi   | ne to mediu                    | ım                  |                       |   |  |  |  |  |
|  | Sa                  | mple Ty          | pes   | -                            |                         | -                           | 10.45 35.5         | 1               |  | istency vs                  |                                       | t/Foot    |                                |                     | Burmi                 | ster Classification   |  |  |  |  |
| AS - Auge<br>CS - Califo<br>BQ - 1.5"<br>NQ - 2" Ro  | ornia Sa<br>Rock Co | mpler<br>ore S   | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>it Spoor<br>elby Tul | n<br>ne                 | V. Loos<br>Loose:<br>M. Den | se: 0<br>4-        | ·10 \           | (Sand<br>Dense:<br>/. Dens   | 30-50                       | Fil<br>V. Soft:<br>Soft:<br>M. Stiff: | <2<br>2-4 | V. Stiff: 1                    | 3-15<br>5-30<br>>30 | aı<br>sc<br>lit<br>tı | nd 35-50%<br>ome 20-35%<br>ttle 10-20%<br>race <10%<br>ture, density, color |  |  |  |  |
| Revie  | wed b               | y:               |   |                              |                         |                             |                    |                 | Reviewed by:    M. Dense: 10-30   M. Stiff: 4-8 Hard: >30   moisture, density, color |                             |                                       |           |                                |                     |                       |   |  |  |  |  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

| Elev.<br>Depth<br>(ft)<br>40.8 | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata     | Material Description  | Remarks |
|--------------------------------|----------------|------------------|-----------------------|-----------------------|-------------------------|---------|-------------|------------|---|---------|
| _ 20<br><br>                   | -              |                  |                       |                       |                         |         |             | Silty Sand |   |         |
|                                | SS             | S-8              | 8                     | 26<br>100/2"          | 8                       | >100    |             |            | Wet, very dense, brown, fine to medium SAND, little silt  Test boring B-7 terminated at 24.7' bgs and |         |
| <br>                           | -              |                  |                       |                       |                         |         |             |            | Test boring B-7 terminated at 24.7' bgs and backfilled with soil cuttings.                            |         |
| <br>                           | _              |                  |                       |                       |                         |         |             |            |   |         |
| 30.8 -                         | -              |                  |                       |                       |                         |         |             |            |   |         |
| <br>                           |                |                  |                       |                       |                         |         |             |            |   |         |
|                                |                |                  |                       |                       |                         |         |             |            |   |         |
| 35                             | -              |                  |                       |                       |                         |         |             |            |   |         |
|                                |                |                  |                       |                       |                         |         |             |            |   |         |
| 20.8<br>40                     |                |                  |                       |                       |                         |         |             |            |   |         |
| <br>                           | -              |                  |                       |                       |                         |         |             |            |   |         |
| -<br>                          | -              |                  |                       |                       |                         |         |             |            |   |         |
| <br><br>- <u>15.8</u> -        | -              |                  |                       |                       |                         |         |             |            |   |         |
| <del></del>                    |                |                  |                       |                       |                         |         |             |            | Boring Number: B  | -7      |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / D. Jacobs

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** 800 South St., Waltham, MA **Northing:** 2954553.6435 **Easting:** 720278.0534

**Drilling Date: Start:** 12/27/2017 **End:** 1/11/2018

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Reviewed by:

Surface Elevation (ft.): 57.99

Total Depth (ft.): 5

Depth to Initial Water Level (ft):

Depth Date Time

NE NE NE

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-8** 

|  | ,                                |                         |   |                            |                         |                            |             |                 | Logged By: D. Abt  |  |
|--|----------------------------------|-------------------------|---|----------------------------|-------------------------|----------------------------|-------------|-----------------|--|--|
| Elev.<br>Depth<br>(ft)                             | Sample<br>Type                   | Sample<br>Number        | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                    | Graphic Log | Strata          | Material Description   | Remarks  |
| 0  | VE                               | V-1                     |   |                            |                         |                            |             | Gravel          | 3" Topsoil: Dry, brown, fine to coarse SAND, some fine gravel, trace silt Dry, brown, fine to coarse SAND, some fine to coarse gravel, little silt | Vacuum excavate test boring from the ground surface to 4.2' bgs.                 |
| <br>- <u>- 53.0</u>                                | VE                               | V-2                     |   |                            |                         |                            |             | Sand and Gravel | Dry, brown, fine to coarse SAND, some fine to coarse gravel, little silt   | Analytical sample (3'-4')  |
| - <u>55.0</u>                                      |                                  |                         |   |                            |                         |                            |             |                 | Rollerbit refusal at 5.1' bgs. The field crew determined that the obstruction could be an unmarked utility and offset to boring location B-8A.     |  |
| - <u>48.0</u> - 10                                 | -                                |                         |   |                            |                         |                            |             |                 |  |  |
| - 43.0<br>15 -                                     | -                                |                         |   |                            |                         |                            |             |                 |  |  |
| 38.0   | Sa                               | ample Ty                | rpes  |                            |                         |                            |             |                 | Consistency vs Blowcount/Foot Burm   | ister Classification   |
| AS - Auge<br>CS - Califo<br>BQ - 1.5"<br>NQ - 2" R | er/Grab S<br>ornia Sa<br>Rock Co | Sample<br>Impler<br>ore | V - Vac<br>San<br>SS - Spli<br>ST - She<br>GP - Geo | nple<br>t Spooi<br>lby Tul | n \                     | V. Loo<br>Loose:<br>M. Der | se: 0       | -4 [<br>10 \    | Dense: 30-50 V. Soft: <2 Stiff: 8-15 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30   | and 35-50%<br>some 20-35%<br>ittle 10-20%<br>trace <10%<br>sture, density, color |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / D. Jacobs Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 800 South St., Waltham, MA Northing: 2954553.6435 Easting: 720278.0534

**Drilling Date: Start:** 1/24/2018 **End:** 1/29/2018

Surface Elevation (ft.): 57.99

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth Date Time 1/29/2018 10:25

Abandonment Method: Backfilled with soil cuttings

|                                       |   |                  |   |                            |                         |                             |             |                 |   | Logged   | By: A. Smith           |   |
|---------------------------------------|---|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|-----------------|---|--|------------------------|---|
| Elev.<br>Depth<br>(ft)                | Sample<br>Type                              | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata          |   | Material Desc  | ription                | Remarks   |
| 0                                     |   |                  |   |                            |                         |                             | 7,1         | Topsoil         | 9" Topsoil                                  |  |                        | Vacuum excavate   |
| -<br>-<br>-<br>53.0<br>5              | VE  | V-1              |   |                            |                         |                             |             | TO              | to coarse g<br>Moist, brow<br>fine to coars | ravel, little silt                                   |                        | throughout  |
| _                                     |   |                  |   |                            |                         |                             |             |                 | 000 0010 10                                 | g for descripti                                      | 511                    |   |
| -<br>-<br>48.0                        | NX  | C-1              | 60  |                            | 28                      |                             | 28282       | Sand and Gravel |   |  |                        |   |
| 48.0<br>10                            | SS  | S-1              | 4   | 100/4"                     | 3                       | >100                        |             |                 | \ <b>\</b> / - <del>\</del>                 | <b>L</b>   | fine to coarse SAN     | ID.   |
| -                                     | -   | 0-1              |   |                            | 3                       | 7100                        |             |                 | and fine to                                 | coarse GRAV  | EL, little silt        |   |
| ▼ -                                   |   |                  |   | 12                         |                         |                             | P           |                 | Wet, dense                                  | e. brown. fine S                                     | SAND, trace silt       |   |
| 43.0<br>15                            | SS  | S-2              | 24  | 15<br>25<br>28             | 16                      | 40                          |             |                 | ,   | , ,  | ,                      |   |
| -<br>-<br>-                           |   |                  |   |                            |                         |                             |             |                 |   | B-8 terminate<br>vith soil cutting                   | d at 16' bgs and<br>s. |   |
| 38.0                                  |   |                  |   |                            | <u> </u>                |                             |             |                 |   |  |                        |   |
|                                       |   | mple Ty          | vpes<br>V - Vac                                     | Fy/Gra                     | h                       |                             | C=-         |                 | Consistency vs                              |  |                        | Burmister Classification and 35-50%                           |
| AS - Auge<br>CS - Califo<br>3Q - 1.5" | r/Grab S<br>ornia Sa<br>Rock Co<br>ock Core | mpler s          | V - Vac<br>Sam<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>Iby Tub | n ,                     | V. Loos<br>Loose:<br>M. Den | se: 0       | 10 V.           | Sand):<br>ense: 30-50<br>Dense: >50         | Fine Gr<br>V. Soft: <2<br>Soft: 2-4<br>M. Stiff: 4-8 | V. Stiff: 15-30        | some 20-35% little 10-20% trace <10% moisture, density, color |
| NQ-2 R                                |   |                  | Ji - OCC  | phone                      |                         |                             |             |                 |   |  |                        | moisture, acrisity, color                                     |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / D. Jacobs

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 800 South St., Waltham, MA Northing: 2954553.6435 Easting: 720278.0534

**Drilling Date: Start:** 1/24/2018 **End:** 1/29/2018

Surface Elevation (ft.): 57.99

Total Depth (ft.): 16

Depth to Initial Water Level (ft): 1/29/2018 10:25

Abandonment Method: Backfilled with soil cuttings

|                            |                |                  |                       |              |            |                        |                      |                |                      |  | 99                            |                          |                     |  |
|----------------------------|----------------|------------------|-----------------------|--------------|------------|------------------------|----------------------|----------------|----------------------|--|-------------------------------|--------------------------|---------------------|--|
| Elevation<br>Depth<br>(ft) | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Recovery (%) | RQD<br>(%) | Drill Rate<br>(min/ft) | Down Press.<br>(psi) | Graphic<br>Log | Strata               | N  | Material Descri               | ption                    |                     | Remarks  |
| 5.0                        | NX             | C-1              | 60                    | 47           | 0          | NR                     | NR                   |                | Cobbles and Boulders | Hard, extremely fra<br>white, coarse grain | ctured, slightl<br>ed, GRAVEL | y weathered<br>and COBBL | , gray to<br>ES     | Core run<br>consists of<br>fractured<br>cobbles and<br>boulders. |
| 10.0<br>- –<br>- –         |                |                  |                       |              |            |                        |                      |                |                      | Continue split spoo                        | n sampling at                 | 10' bgs.                 |                     |  |
| <u>43.0</u> − 15.0 − − −   |                |                  |                       |              |            |                        |                      |                |                      |  |                               |                          |                     |  |
| 38.0 _ 20.0                |                |                  |                       |              |            |                        |                      |                |                      |  |                               |                          |                     |  |
| 33.0<br>Bed                | ding (         | (mm)             |                       | J            | loint S    | Spacir                 | ng (mr               | m)             |                      | Continuity (mm)                            | Attitude                      | Angle                    | Apertu              | ure (mm)   |
| Extremel<br>Very Thir      | y Thin         | <:<br>20         | 20<br>-60             | Ex<br>Ve     | tremely    | y Close<br>se          | 20                   | <20<br>0-60    | E                    | dremely <25                                | Horizontal<br>Shallow         | 0° - 5°<br>5° - 35°      | Very Tight<br>Tight | < 0.1<br>0.1 - 0.25  |

| Bedding (mm)               | Joint Spacing (mm)   | Continuity (mm)  | Attitude Angle  | Aperture (mm)          |
|----------------------------|--|--|---|------------------------|
| Extremely Thin         <20 | Extremely Close <20 Very Close 20-60 Close 60-200 Mod Close 200-600 Wide 600-2000 Very Wide 2000-6000 Extremely Wide >6000 | Extremely <25<br>Moderately 25-100<br>Slightly 100-200<br>Sound >200 | Horizontal 0° - 5°<br>Shallow 5° - 35°<br>Moderate 35° - 55°<br>Steep 55° - 85°<br>Vertical 85° - 90° | Very Tight       < 0.1 |

| -3/8/21              | 33.0   |  |                          |   |              |                                     |   |            |  |                                  |  |  |   |   |
|----------------------|--|--|--------------------------|---|--------------|-------------------------------------|---|------------|--|----------------------------------|--|--|---|---|
| .GPJ                 | Beddi  | ng (mm)                                  |                          | Joint Sp  | oacing       | g (mm                               | <u>1)</u>                                 | <u> </u>   | Continuit                              | <u>y (mm)</u>                    | Attitud  | le Angle   | <u>Apertu</u>   | ure (mm)  |
| A WASM 3 20180220.GP | Extremely Tory Thin Thin Medium Thick Very Thick Extremely | 20-6<br>60-2<br>200-6<br>600-2<br>2000-6 | 60<br>600<br>600<br>6000 | Extremely (<br>Very Close<br>Close<br>Mod Close<br>Wide<br>Very Wide<br>Extremely \ |              | 20-<br>60-<br>200-<br>600-<br>2000- | 20<br>-60<br>200<br>-600<br>2000<br>-6000 | Mo<br>Sli  | tremely<br>oderately<br>ightly<br>ound | <25<br>25-100<br>100-200<br>>200 | Horizontal<br>Shallow<br>Moderate<br>Steep<br>Vertical | 0° - 5°<br>5° - 35°<br>35° - 55°<br>55° - 85°<br>85° - 90° | Very Tight<br>Tight<br>Partly Open<br>Open<br>Mod. Wide<br>Wide | < 0.1<br>0.1 - 0.25<br>0.25 - 0.5<br>0.5 - 2.5<br>2.5 - 10<br>>10 |
| MWRA                 | <u>Field</u>   | <u> Hardness</u>                         | <u> </u>                 | <u> </u>  | Weath        | hering                              | 1   |            |  |                                  |  |  |   |   |
| SDO7.                | Very Hard<br>Hard  | Knife Can't<br>Scratches<br>Difficulty   | Fresh<br>Slight          |   | Discolo      | ible sig<br>oration<br>s fresh      | indica                                    | ted weathe | l weathering<br>ring. All the          | ; slight to no<br>rock materia   | discoloration.<br>Il may be disco                      | oredand may b  | pe weaker externally  |   |
| BIN                  | Med. Hard  | Scratches                                |                          | Moderate  |              |                                     |   |            |  | erial is decom                   |  |  | to a soil. Fre  | sh or discolored rock is  |
|                      | Medium   | Grooves w<br>Difficulty                  |                          | Severe  |              | More th                             | han hali                                  | f of the   | e rock mate                            | erial is decon                   | nposed and/  | or disintegrated   | to a soil. Fres   | sh or discolored rock is  |
| CORE ONLY            | Soft<br>Very Soft  | Grooves R<br>Carves wit                  |                          | Complet<br>Residual   | te<br>I Soil | All rock                            | k mater<br>k mater                        | ial is o   | decompose<br>converted t               | o soil. The n                    | ntegrated to<br>nass structu                           | soil. The origin   |   | ture is largely intact.<br>royed. There is a large                |
| 30CK                 | Review   | ed by:                                   |                          |   |              |                                     |   |            | Date                                   | <b>∋</b> :                       |  | Boring N   | umber: B  | -8A   |

Sheet 1 of 1



## Boring Number: B-9 (MW)

Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / P. Fisher **Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** South St./Charles River Rd., Waltham, MA **Northing:** 2954994.4460 **Easting:** 720460.624

**Drilling Date: Start:** 11/30/2017 **End:** 11/30/2017

Surface Elevation (ft.): 53.56

Total Depth (ft.): 21

Depth to Initial Water Level (ft):

**Depth Date Time** 9.0 11/30/2017 10:00

Abandonment Method: Monitoring well installed

|   |                     |                  |   |                            |                         |                              |             |                 |                             |                             | Logged I                                     | By: A. Smith                          |               |  |
|---|---------------------|------------------|---|----------------------------|-------------------------|------------------------------|-------------|-----------------|-----------------------------|-----------------------------|--|---------------------------------------|---------------|--|
| Elev.<br>Depth<br>(ft)                                | Sample<br>Type      | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                      | Graphic Log | Strata          |                             | ŗ                           | Material Desc                                | ription                               |               | Remarks  |
| 53.6<br>0   |                     |                  |   |                            |                         |                              |             |                 | 5'                          | ' Asphalt                   |  |                                       |               | Vacuum excavate  |
| _   |                     |                  |   |                            |                         |                              | ø. O        |                 |                             |                             |  | n, fine to coarse<br>GRAVEL, trace si | it /          | boring from the ground surface to  |
| _   | VE                  | V-1              |   |                            |                         | -                            | ∘ ()        |                 | ı ~                         |                             |  | ic SILT, trace san                    | <u> </u>      | 6' bgs.  |
| -   |                     |                  |   |                            |                         |                              | ).          |                 | tr                          | ace fine gra                | vel  |                                       |               | Analytical sample (2'-2.5')  |
| _   | VE                  | V-2              |   |                            |                         | -                            | φ. (·)      |                 |                             |                             | vel, some silt                               | se SAND, some fii<br>:                | ne            | (= =)  |
| 48.6<br>5   |                     |                  |   |                            |                         |                              | ): ()       |                 |                             |                             |  |                                       |               |  |
| _   |                     |                  |   | 13                         |                         |                              | .°O         |                 | l v                         | et, medium                  | dense, brov                                  | vn, fine to coarse                    |               | Corrosion sample   |
| _   | SS                  | S-1              | 24  | 21<br>2                    | 6                       | 23                           | · (\)       |                 | S                           | AND, some                   |  | nic silt, some fine                   |               | (6'-8')  |
| _   |                     |                  |   | 5<br>10                    |                         |                              | );<br>.o    |                 | -                           |                             | •  | vn, fine to medium                    | ,             |  |
| <u> </u>  | ss                  |                  |   |                            |                         |                              |             |                 |                             |                             |  |                                       |               |  |
| 43.6<br>10  |                     |                  |   | 16                         |                         |                              | 0.0         | Sand and Gravel |                             | ganic fibers                | •  |                                       |               |  |
| 38.6<br>15  | SS                  | S-3              | 24  | 10<br>13<br>36<br>52       | 10                      | 49                           |             | Š               |                             |                             | brown, fine to<br>GRAVEL, to                 | o coarse SAND ar<br>race silt         | nd            |  |
| 33.6<br>20  | SS                  | S-4              | 24  | 18<br>38<br>33<br>22       | 8                       | 71                           |             |                 | aı                          | nd fine to co               | arse GRAVI                                   | ,                                     |               |  |
| -   |                     |                  |   |                            |                         |                              |             |                 | a                           | est boring B<br>nd converte | 3-9 (MW) terr<br>d into a mon                | ninated at 21' bgs<br>itoring well.   |               |  |
| 28.6  |                     |                  |   |                            |                         |                              |             |                 |                             |                             |  |                                       |               |  |
|   |                     | mple Ty          |   | Ev/Ora                     | h                       |                              |             |                 |                             |                             | owcount/Foot                                 | -                                     |               | ister Classification nd 35-50%   |
| AS - Auge<br>CS - Califo<br>BQ - 1.5" I<br>NQ - 2" Ro | ornia Sa<br>Rock Co | mpler s          | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tul | n l                     | V. Loos<br>Loose:<br>VI. Den | se: 0       | )-4 E<br>-10 V  | (Sand)<br>Dense:<br>/. Dens | 30-50                       | Fine Gra V. Soft: <2 Soft: 2-4 M. Stiff: 4-8 |                                       | so<br>li<br>t | nd 35-50%<br>ome 20-35%<br>ttle 10-20%<br>race <10%<br>tture, density, color |
| Revie   | wed b               | y:               |   |                            |                         |                              |             |                 |                             | Date:                       |  | Boring Numb                           | er: B         | -9 (MW)  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / P. Fisher

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

Bore Hole Location: 52 Charles River Rd., Waltham, MA

**Northing:** 2955208.8030 **Easting:** 720983.944

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Reviewed by:

**Drilling Date: Start:** 11/27/2017 **End:** 11/27/2017

Surface Elevation (ft.): 58.1

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

 Depth
 Date
 Time

 NE
 11/27/2017
 10:35

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-10** 

| Drilling  | Date:          | Start: 1         | 1/2//20                                 | 1/ EI                      | 1a: 11                  | 1/2//2                     | 017         |                 | Logged By: A. Smith  |  |
|---|----------------|------------------|---|----------------------------|-------------------------|----------------------------|-------------|-----------------|--|--|
| Elev.<br>Depth<br>(ft)                          | Sample<br>Type | Sample<br>Number | Sample<br>Length (in)                   | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                    | Graphic Log | Strata          | Material Description   | Remarks  |
| 0   |                |                  |   | 3                          |                         |                            | 74.18. 74   |                 | 8" Topsoil   |  |
| -   | SS             | S-1              | 24                                      | 8<br>13<br>10              | 15                      | 21                         |             |                 | Bottom 7": Moist, medium dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt |  |
| -   | - SS           | S-2              | 24                                      | 6<br>27<br>35<br>100       | 8                       | 62                         |             | ≣               | Moist, very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt              |  |
| 53.1<br>5                                       | SS             | S-3              | 24                                      | 20<br>18<br>17<br>9        | 6                       | 35                         |             |                 | Wet, dense, brown-gray, fine to coarse SAND, some fine gravel, trace silt                          | Analytical sample (4'-6')  |
| -   | SS             | S-4              | 24                                      | 9<br>15<br>14<br>22        | 8                       | 29                         |             |                 | Wet, medium dense, brown, fine to medium SAND, trace silt, trace fine gravel                       |  |
| 48.1<br>10                                      | SS             | S-5              | 24                                      | 22<br>16<br>30<br>31       | 3                       | 46                         |             | d Gravel        | Wet, dense, brown, fine to coarse SAND and fine to coarse GRAVEL, little silt                      |  |
| 10<br>-<br>-                                    | -              |                  |   |                            |                         |                            |             | Sand and Gravel |  |  |
| 43.1  | - SS           | S-6              | 24                                      | 16<br>22<br>20<br>60       | 5                       | 42                         |             |                 | Wet, dense, brown, fine to coarse SAND and fine to coarse GRAVEL, little silt                      |  |
| -<br>-  |                |                  |   |                            |                         |                            | · reate (   |                 | Test boring B-10 terminated at 16' bgs and backfilled with soil cuttings.                          |  |
| =   |                |                  |   |                            |                         |                            |             |                 |  |  |
| 38.1  |                |                  |   |                            |                         |                            |             |                 | Constitution Bloom with the  |  |
|   |                | mple Ty          | <b>pes</b><br>V - Vac                   | Fx/Gra                     | h                       |                            | 0           |                 |  | rmister Classificatio<br>and 35-50%                                    |
| S - Auge<br>S - Califo<br>Q - 1.5"<br>IQ - 2" R | ornia Sa       | mpler<br>ore S   | Sam<br>SS - Splii<br>T - She<br>P - Geo | iple<br>t Spoor<br>lby Tuk | ן פו                    | V. Loo<br>Loose:<br>M. Dei | se: 0       | -4 [<br>10 \    | (Sand):         Fine Grained (Clay):           Dense:         30-50           V. Soft:         <2  | some 20-35%<br>little 10-20%<br>trace <10%<br>loisture, density, color |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / P. Fisher Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 98 Charles River Rd., Waltham, MA Northing: 2955519.2640 Easting: 721477.3143 **Drilling Date: Start:** 11/14/2017 **End:** 11/14/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Reviewed by:

Surface Elevation (ft.): 59.1

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth Date Time ΝE 11/14/2017 13:20

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-11** 

| J9  | , Dute.              | Start: 1                  | 1/ 14/20   | /1/ <b>L</b> I             | iu. 1                   | 1/ 1-1/2                    | 017         |                 | Logged By: A. Smith   |  |
|---|----------------------|---------------------------|--|----------------------------|-------------------------|-----------------------------|-------------|-----------------|---|--|
| Elev.<br>Depth<br>(ft)                              | Sample<br>Type       | Sample<br>Number          | Sample<br>Length (in)                              | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata          | Material Description  | Remarks  |
| 0   |                      |                           |  | 3                          |                         |                             | 74 1× 1/4   |                 | 6" Topsoil  |  |
|   | ss                   | S-1                       | 24   | 7<br>8<br>13               | 12                      | 15                          |             |                 | Bottom 6": Moist, medium dense, brown, fine to coarse SAND, some fine gravel, trace silt        |  |
| -   | SS                   | S-2                       | 24   | 15<br>14<br>8<br>10        | 8                       | 22                          |             | Gravel          | Moist, medium dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt           | Attempted 3 in spoon on samples S-2 and S-3 with little to no                        |
| 54.1<br>5   | SS                   | S-3                       | 24   | 8<br>10<br>9<br>12         | 6                       | 19                          |             | Sand and Gravel | Moist, medium dense, brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt           | recovery.  |
|   | - SS                 | S-4                       | 24   | 19<br>14<br>12<br>12       | 4                       | 26                          |             |                 | Moist, medium dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt           | Corrosion sample (6'-8')   |
| 49.1<br>10  | SS                   | S-5                       | 24   | 8<br>9<br>7<br>8           | 12                      | 16                          |             | Sand            | Moist, medium dense, brown, fine to medium SAND and SILT, trace fine gravel                     | Analytical sample (8'-10')   |
| 10  |                      |                           |  |                            |                         |                             |             | Silty (         |   |  |
| 44.1<br>15  | - SS                 | S-6                       | 24   | 15<br>15<br>16<br>14       | 3                       | 31                          |             | Sand and Gravel | Wet, dense, gray, fine to coarse SAND, some fine to coarse gravel, trace silt                   |  |
| -<br>-<br>-<br>-                                    |                      |                           |  |                            |                         |                             | 0           |                 | Test boring B-11 terminated at 16' bgs and backfilled with soil cuttings.                       |  |
| 39.1  |                      |                           |  |                            |                         |                             |             |                 |   |  |
|   | Sa                   | ample Ty                  | pes  | •                          |                         | •                           | •           |                 | Consistency vs Blowcount/Foot B   | urmister Classification  |
| AS - Auge<br>CS - Califo<br>BQ - 1.5"<br>NQ - 2" Ro | fornia Sa<br>Rock Co | sample<br>impler<br>ore S | V - Vac<br>Sam<br>SS - Spli<br>T - She<br>GP - Ged | nple<br>t Spoor<br>lby Tub | n<br>ne                 | V. Loo:<br>Loose:<br>M. Der | se: 0       | -4 [<br>10 \    | (Sand):         Fine Grained (Clay):           Dense:         30-50         V. Soft:         <2 | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>moisture, density, color |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / P. Fisher

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 110 Angleside Rd., Waltham, MA Northing: 2955956.5908 Easting: 721803.1967

**Drilling Date: Start:** 11/29/2017 **End:** 11/29/2017

Surface Elevation (ft.): 61.1

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

 Depth
 Date
 Time

 NE
 11/29/2017
 13:30

Abandonment Method: Backfilled with soil cuttings

|  |  |                  |                       |                       |                         |         |             |                 |                                    |                            | Logg                                   | jed By                    | <b>/:</b> A. Smith                                |               |  |
|--|--|------------------|-----------------------|-----------------------|-------------------------|---------|-------------|-----------------|------------------------------------|----------------------------|--|---------------------------|---|---------------|--|
| Elev.<br>Depth<br>(ft)                                   | Sample<br>Type   | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata          |                                    |                            | Material D                             | escri                     | ption   |               | Remarks  |
| 0  |  |                  |                       |                       |                         |         | 2,00,0      |                 | 2                                  | " Asphalt                  |  |                           |   |               | Vacuum excavate  |
| -<br>-<br>-<br>-   | VE   | V-1              | 6                     |                       |                         |         |             |                 |                                    | Moist, brow<br>o coarse gr |  |                           | e SAND, some fii                                  | ne            | boring from the ground surface to 6' bgs.  Analytical sample (2'-2.5')       |
| 56.1<br>5 -  | SS   | S-1              | 24                    | 16<br>15<br>14        | 10                      | 29      |             | avel            | N<br>S                             | ∕loist, medi<br>SAND and t | um dense,<br>fine to coa               | brov<br>rse G             | vn, fine to coarse<br>RAVEL, trace si             | e<br>It       |  |
|  |  |                  |                       | 10<br>12              |                         |         |             | D<br>D          | ١,                                 | 1-i-tdi                    |  | ما سام                    | hanne fina to                                     |               |  |
| <u>51.1</u> _  | SS   | S-2              | 24                    | 12<br>12<br>14<br>16  | 16                      | 26      |             | Sand and Gravel |                                    |                            |  |                           | brown, fine to<br>ace fine gravel                 |               |  |
| -<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>-<br>- | · SS   | S-3              | 24                    | 15<br>23<br>21<br>14  | 10                      | 44      |             |                 |                                    | Vet, dense<br>ome fine to  |  |                           | coarse SAND,<br>trace silt                        |               |  |
| -<br>-<br>-  |  |                  |                       |                       |                         |         |             |                 |                                    | est boring<br>ackfilled w  |  |                           | d at 16' bgs and                                  |               |  |
| 41.1   |  |                  |                       |                       |                         |         |             |                 |                                    |                            |  |                           |   |               |  |
|  | <u>Sa</u>  | mple Ty          |                       | F /0                  | .                       |         |             |                 |                                    | istency vs I               |  |                           |   |               | ister Classification   |
| CS - Califo  | AS - Auger/Grab Sample<br>CS - California Sampler<br>3Q - 1.5" Rock Core<br>QC - 2" Rock Core<br>SS - Split Spoon<br>ST - Shelby Tube<br>GP - Geoprobe |                  |                       |                       |                         |         |             |                 | ( <u>Sand</u><br>)ense:<br>/. Dens | 30-50                      | Fine<br>V. Soft:<br>Soft:<br>M. Stiff: | Graii<br><2<br>2-4<br>4-8 | ned (Clay): Stiff: 8-15 V. Stiff: 15-30 Hard: >30 | Si<br>li<br>t | nd 35-50%<br>ome 20-35%<br>ttle 10-20%<br>race <10%<br>tture, density, color |
|  |  | y:               |                       |                       |                         |         |             |                 |                                    |                            |  |                           |   |               |  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 85 Suyer Rd., Waltham, MA Northing: 2956567.2811 Easting: 722088.8573

**Drilling Date: Start:** 12/12/2017 **End:** 12/12/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Reviewed by:

Surface Elevation (ft.): 71.39

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth Date Time ΝE

12/12/2017 Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-13** 

11:55

| 29   | , 24.0.        | Start. 12        | L/ 12/20              |                       | 14. 12                  | -/ 12/20   | , , ,  |                 | Logged By: A. Smith   |   |
|--|----------------|------------------|-----------------------|-----------------------|-------------------------|--|--|-----------------|---|---|
| Elev.<br>Depth<br>(ft)   | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value  | Graphic Log  | Strata          | Material Description  | Remarks   |
| 71.4<br>0  | SS             | S-1              | 24                    | 14<br>100/4"          | 18                      | >100   | <u> </u>   |                 | 12" Topsoil   |   |
|  |                |                  |                       |                       |                         |  |  | Ē               | Moist, very dense, brown, fine to coarse<br>SAND and fine to coarse GRAVEL, little silt     |   |
|  | - SS           | S-2              | 24                    | 32<br>25<br>26<br>26  | 10                      | 51   |  |                 | Dry, very dense, brown, fine to medium SAND and SILT, trace fine gravel                     | Analytical sample (2'-4')   |
| 66.4<br>5  | - SS           | S-3              | 24                    | 45<br>66<br>30<br>23  | 10                      | 96   |  |                 | Dry, very dense, brown, fine to medium SAND and SILT, trace fine gravel                     | Analytical sample (4'-6')   |
|  | - SS           | S-4              | 24                    | 35<br>34<br>18<br>33  | 8                       | 52   |  | Silty Sand      | Dry, very dense, brown, fine to coarse SAND, some fine gravel, some silt                    | Corrosion sample (6'-8')  |
| <br>- <u>61.4</u> _  | SS             | S-5              | 24                    | 25<br>18<br>16<br>18  | 12                      | 34   |  |                 | Dry, dense, brown, fine to medium SAND and SILT, trace fine gravel                          |   |
| 10<br><br>   |                |                  |                       |                       |                         |  |  |                 |   |   |
| <br>- <u>56.4</u><br>15  | - SS           | S-6              | 24                    | 44<br>40<br>66<br>66  | 10                      | >100   |  | Sand and Gravel | Moist, very dense, brown, fine to coarse<br>SAND, some fine to coarse GRAVEL, trace<br>silt | No monitoring well installed due to not encountering water in the |
| <br>   | -              |                  |                       |                       |                         |  |  |                 | Test boring B-13 terminated at 16' bgs and backfilled with soil cuttings.                   | borehole.   |
| 51.4   |                |                  |                       |                       |                         |  |  |                 |   |   |
|  |                | ample Ty         |                       | F.//O:                |                         |  |  |                 |   | ermister Classification   |
| BBQ - 1.5" Rock Core ST - Shelby Tube   Loose: 4-10 V. Dense: >50   So |                |                  |                       |                       |                         | V. Soft: <2 Stiff: 8-15<br>V. Dense: >50 Soft: 2-4 V. Stiff: 15-30 | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>noisture, density, color |                 |   |   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / P. Fisher Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D. Bore Hole Location: Stanley Ave./Lt. L. Duffy Ave., Waltham, MA

Northing: 2957004.6964 Easting: 722143.7997

**Drilling Date: Start:** 11/7/2017 **End:** 11/8/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 73.63

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth Date Time 12.0 11/08/2017 08:30

Abandonment Method: Backfilled with soil cuttings

| Diming  | , Date.        | Start.           | 1/1/201               | , <u>L</u> II         | <b>u.</b> 11/           | 0/201  | •   |                             |                       |                        | Logged                          | By: A. Smith                                 |  |                           |
|---|----------------|------------------|-----------------------|-----------------------|-------------------------|--|---|-----------------------------|-----------------------|------------------------|---------------------------------|--|--|---------------------------|
| Elev.<br>Depth<br>(ft)                              | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value  | Graphic Log                               | Strata                      |                       |                        | Material Des                    | cription                                     |  | Remarks                   |
| 0   |                |                  |                       | 4                     |                         |  | 74 18 - 74                                |                             | 8                     | ' Topsoil              |                                 |  |  |                           |
| -   | SS             | S-1<br>S-2       | 24                    | 8<br>38<br>55<br>100  | 12<br>6                 | 46   | ∘ ()<br>• ()                              |                             | tr                    | oarse SAN<br>ace silt  | ND and fine to                  | gray-brown, fine to<br>coarse GRAVEL,        | )  |                           |
| -   |                | 3-2              | 0                     |                       | 0                       |  | , O<br>. O                                |                             | S                     | loist, very<br>AND and | dense, browr<br>fine to coarse  | n, fine to coarse<br>e GRAVEL, little silt   |  |                           |
| 68.6<br>5   | - ss           | S-3              | 24                    | 24<br>26<br>30<br>32  | 12                      | 56   | )<br>;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;; |                             |                       |                        | ense, brown,<br>o coarse grav   | fine to coarse SAN<br>el, little silt        | ID,  | Analytical sample (4'-6') |
| -   | SS             | S-4              | 6                     | 100                   | 5                       |  | ).<br>O                                   |                             |                       |                        |                                 | n, fine to coarse                            |  |                           |
| -   | -              |                  |                       |                       |                         |  | ў :O:                                     | el                          | 8                     | AND, son               | ne fine to coa                  | rse gravel, little silt                      |  |                           |
| _   |                |                  |                       |                       |                         |  | · ()                                      | Grav                        |                       |                        |                                 |  |  |                           |
| -   | SS             | S-5              | 24                    | 15<br>22<br>26        | 8                       | 48   | )<br>Ø<br>O                               | Sand and Gravel             |                       |                        | e, brown, fine<br>o coarse grav | e to coarse SAND,<br>rel, little silt        |  |                           |
| 63.6<br>10  |                |                  |                       | 19                    |                         |  | . O                                       | S                           |                       |                        |                                 |  |  |                           |
| -   |                |                  |                       |                       |                         |  | D   |                             |                       |                        |                                 |  |  |                           |
| _   |                |                  |                       |                       |                         |  | ٥ · ٠                                     |                             |                       |                        |                                 |  |  |                           |
| ▼ .   | 1              |                  |                       |                       |                         |  | ):<br>):                                  |                             |                       |                        |                                 |  |  |                           |
| -   | -              |                  |                       |                       |                         |  | Ο·  |                             |                       |                        |                                 |  |  |                           |
| _   |                |                  |                       |                       |                         |  | ο. · · · · ·                              |                             |                       |                        |                                 |  |  |                           |
| E0 6  |                |                  |                       | 100<br>52             |                         |  | ب.<br>ا                                   |                             |                       |                        |                                 | n, fine to coarse<br>rse gravel, little silt |  |                           |
| 58.6<br>15  | SS             | S-6              | 24                    | 72                    | 16                      | >100   | O:  |                             |                       | 7 (1 <b>1</b> D, 3011  | 10 11110 10 000                 | oc graver, intic on                          |  |                           |
| -   |                |                  |                       | 100                   |                         |  | i A                                       |                             |                       | eet horing             | R_1/I termina                   | ited at 16' bgs and                          |  |                           |
| _   |                |                  |                       |                       |                         |  |   |                             |                       |                        | rith soil cutting               |  |  |                           |
|   |                |                  |                       |                       |                         |  |   |                             |                       |                        |                                 |  |  |                           |
| -   |                |                  |                       |                       |                         |  |   |                             |                       |                        |                                 |  |  |                           |
| -   |                |                  |                       |                       |                         |  |   |                             |                       |                        |                                 |  |  |                           |
| 53.6  |                |                  |                       |                       |                         |  |   |                             |                       |                        |                                 |  |  |                           |
|   | Sa             | ample Ty         | pes                   |                       |                         |  |   |                             | Consi                 | stency vs              | Blowcount/Fo                    | <u>ot</u>                                    | Burm   | ister Classification      |
| BQ - 1.5" Rock Core ST - Shelby Tube Loose: 4-10 V. |                |                  |                       |                       |                         |  | -4 D                                      | (Sand)<br>Dense:<br>/. Dens | 30-50                 | V. Soft: <<br>Soft: 2- | 4 V. Stiff: 15-30               | S:   | nd 35-50%<br>ome 20-35%<br>ttle 10-20%<br>trace <10% |                           |
| GP - Geoprobe IVI. Dense: 10-30                     |                |                  |                       |                       |                         | M. Stiff: 4-8 Hard: >30 moisture, density, color |   |                             | sture, density, color |                        |                                 |  |  |                           |
| Reviewed by:  |                |                  |                       |                       |                         | Date: Boring Number: B-14                        |   |                             |                       | -14                    |                                 |  |  |                           |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / P. Fisher
 Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA
 Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** Howe Ave./Lt. L. Duffy Ave., Waltham, MA **Northing:** 2957384.4010 **Easting:** 722328.183

**Drilling Date: Start:** 11/21/2017 **End:** 11/21/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Reviewed by:

Surface Elevation (ft.): 77.96

Total Depth (ft.): 16

Depth to Initial Water Level (ft):DepthDateTimeNE11/21/201709:30

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-16** 

| Drilling  | j Date:                | Start: 1               | 1/21/20  | 1/ EI                      | 1a: 11                  | 1/21/2                     | 017         |                       | Logged By: A. Smith   |   |
|---|------------------------|------------------------|--|----------------------------|-------------------------|----------------------------|-------------|-----------------------|---|---|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type         | Sample<br>Number       | Sample<br>Length (in)                              | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                    | Graphic Log | Strata                | Material Description  | Remarks   |
| 0   |                        |                        |  | 3                          |                         |                            | 7,11.       |                       | Top 6": Topsoil   |   |
| -   | SS                     | S-1                    | 24   | 7<br>7<br>12               | 14                      | 14                         |             | Ē                     | Bottom 8": Moist, medium dense, brown, fine<br>to medium SAND, little silt, little fine gravel            |   |
| -   | - SS                   | S-2                    | 24   | 13<br>14<br>16<br>22       | 10                      | 30                         |             |                       | Moist, medium dense, brown, fine to coarse<br>GRAVEL and fine to coarse SAND, little silt                 |   |
| 73.0  | - SS                   | S-3                    | 24   | 12<br>14<br>14<br>8        | 8                       | 28                         |             |                       | Moist, medium dense, brown, fine to coarse SAND, some fine to coarse gravel, little silt                  | Analytical sample (4'-6')   |
| <u>-</u>  | - SS                   | S-4                    | 24   | 9<br>6<br>7<br>100         | 14                      | 13                         |             | -                     | Moist, medium dense, dark brown, fine to medium SAND, trace silt  |   |
| <u>-</u>  | SS                     | S-5                    | 24   | 25<br>19<br>38<br>30       | 10                      | 57                         |             | Sand and Gravel       | Wet, very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, little silt                        |   |
| 10<br>-<br>-                                      | -                      |                        |  | 7                          |                         |                            |             | S                     | Wet, medium dense, brown, fine to coarse  |   |
| 63.0<br>15  | ss                     | S-6                    | 24   | 8<br>11<br>11              | 4                       | 19                         |             |                       | SAND and fine to coarse GRAVEL, little silt   |   |
| -   | -                      |                        |  |                            |                         |                            |             |                       | Test boring B-16 terminated at 16' bgs and backfilled with soil cuttings.                                 |   |
| 50.0  | ]                      |                        |  |                            |                         |                            |             |                       |   |   |
| 58.0  | Sa                     | ımple Ty               | pes  |                            |                         |                            |             |                       | Consistency vs Blowcount/Foot Burn  | │<br>nister Classificatio   |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>IQ - 2" R | er/Grab S<br>fornia Sa | Sample<br>mpler<br>ore | V - Vac<br>Sam<br>SS - Spli<br>T - She<br>GP - Geo | iple<br>t Spoor<br>lby Tuk | ן אַ                    | V. Loo<br>Loose:<br>M. Der | se: 0       | nular<br>-4 [<br>10 \ | (Sand): Fine Grained (Clay): Dense: 30-50 V. Soft: <2 Stiff: 8-15 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30 | and 35-50% some 20-35% little 10-20% trace <10% sture, density, color |

Sheet 1 of 1



## Boring Number: B-17 (MW)

Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / P. Fisher

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: Clark Ave./Howe Ave., Waltham, MA

Northing: 2957827.8270 Easting: 722931.809 Drilling Date: Start: 11/6/2017 End: 11/7/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 75.26

Total Depth (ft.): 21

Depth to Initial Water Level (ft):

**Depth Date Time** 8.4 11/07/2017 07:00

Abandonment Method: Monitoring well installed

|   | ,   |                 |  |                            |     | .,                             |  |          |                            |                          | Logged  | By: A. Smith                              |        |  |
|---|---|-----------------|--|----------------------------|-----|--------------------------------|--|----------|----------------------------|--------------------------|---|---|--------|--|
| Elev.<br>Depth<br>(ft)                            | Samp Samp Numbb Samp Samp Numbb Samp Numbb Samp Recover. Samp Ginch Graphic Graphic Graphic |                 |  |                            |     |                                |  |          |                            |                          | Material Des                                      | cription                                  |        | Remarks  |
| 0   |   |                 |  | 12                         |     |                                | 74 18. 14  |          | Т                          | op 6": Top               | osoil   |   |        |  |
| -   | ss  | S-1             | 24   | 16<br>20<br>33             | 15  | 36                             |  |          | E                          | ottom 9":<br>BRAVEL a    | Dry, dense, b<br>nd fine to coa                   | rown, fine to coars<br>arse SAND, trace s |        |  |
| -   | SS  | S-2             | 8  | 35<br>100/2"               | 4   | >100                           |  |          |                            | ory, very de<br>GRAVEL a | ense, brown, t<br>and fine to coa                 | fine to coarse<br>arse SAND, trace s      | silt   |  |
| 70.3<br>5   | SS  | S-3             | 24   | 10<br>38<br>50<br>60       | 12  | 88                             |  |          |                            |                          |   | fine to coarse<br>arse SAND, trace s      | silt   | Analytical sample (4'-6')  |
| -   | SS  | S-4             | 4  | 100/4"                     | 2   |                                |  |          | a                          | ory, very dender to      | ense, gray, fin<br>coarse SAND                    | ie to coarse GRAV<br>), trace silt        | /EL    |  |
| <b>▼</b> 65.3                                     | - SS  | S-5             | 24   | 8<br>15<br>25<br>14        | 4   | 40                             |  | Gravel   | G                          | )ry, very do<br>GRAVEL a | ense, brown, t<br>and fine to coa                 | fine to coarse<br>arse SAND, trace s      | silt   | Corrosion sample (8'-10')  |
| 60.3<br>15  | - SS  | S-6             | 24   | 13<br>16<br>16<br>18       | 11  | 32                             |  | Sand and |                            |                          | e, brown, fine<br>gravel, trace si                | to coarse SAND,<br>ilt                    |        |  |
| 55.3<br>20  | SS  | S-7             | 24   | 15<br>27<br>39<br>39       | 10  | 66                             |  |          |                            |                          | lense, brown,<br>avel, trace silt                 | fine to coarse SA                         | ND,    |  |
| -<br>-<br>-                                       | -   |                 |  | 03                         |     |                                | <del>  • • • • • • • • • • • • • • • • • • •</del> |          |                            |                          | B-17 (MW) to<br>ted into a mo                     | erminated at 21' b<br>nitoring well.      | gs     |  |
| 50.3  | 1   |                 |  |                            |     |                                |  |          |                            |                          |   |   |        |  |
|   | Sa  | mple Ty         | pes  |                            |     |                                |  |          | Cons                       | istency vs               | Blowcount/Foo                                     | <u>ot</u>                                 | Burm   | ister Classification   |
| AS - Auge<br>CS - Calif<br>3Q - 1.5"<br>NQ - 2" R | ornia Sa<br>Rock Co   | mpler<br>Sore S | V - Vac<br>Sam<br>SS - Spli<br>T - She<br>GP - Geo | nple<br>t Spooi<br>lby Tul | n , | V. Loos<br>Loose:<br>M. Der    | se: 0  | 10 V     | (Sand<br>Dense:<br>/. Dens | 30-50                    | Fine G<br>V. Soft: <2<br>Soft: 2-<br>M. Stiff: 4- | -4 V. Stiff: 15-30                        | S<br>I | and 35-50%<br>some 20-35%<br>ittle 10-20%<br>trace <10%<br>sture, density, color |
| Reviewed by:                                      |   |                 |  |                            |     | Date: Boring Number: B-17 (MW) |  |          |                            |                          |   |   |        |  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / M. Ferreira

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** 415 South St., Waltham, MA **Northing:** 2958168.8310 **Easting:** 722741.199 **Drilling Date: Start:** 12/15/2017 **End:** 12/15/2017

Tatal Bandle (60) 44

Total Depth (ft.): 14

Depth to Initial Water Level (ft):DepthDateTime1.512/15/201712:15

Surface Elevation (ft.): 87.85

Abandonment Method: Backfilled with soil cuttings

|  |                |                  |                       |                       |                         |                             |             |                 | Logged By: A. Smith   |  |
|--|----------------|------------------|-----------------------|-----------------------|-------------------------|-----------------------------|-------------|-----------------|---|--|
| Elev.<br>Depth<br>(ft)   | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata          | Material Description  | Remarks  |
| 87.9<br>0  |                |                  |                       |                       | _                       |                             |             |                 | 4" Asphalt  |  |
| - <u>*</u> -   | SS             | S-1              | 12                    | 56                    | 8                       | >75                         |             | ≣               | Moist, very dense, brown, fine to coarse  |  |
|  | SS             | S-2              | 18                    | 75<br>85<br>48<br>100 | 16                      | >100                        |             | _               | SAND and fine to coarse GRAVEL, little silt  Moist, very dense, brown, fine to coarse SAND, little fine to coarse gravel, trace silt  |  |
| 82.9<br>5  | SS             | S-3              | 9                     | 66<br>100/3"          | 5                       | >100                        |             | Sand and Gravel | Moist, very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt   | Analytical sample (4'-6')  |
|  | SS             | S-4              | 2                     | 100/2"                | 2                       |                             |             | San             | Moist, very dense, brown, fine to coarse<br>SAND and fine to coarse GRAVEL, trace silt  |  |
|  | SS             | S-5              | 18                    | 86<br>48<br>100       | 12                      | >100                        |             | Silty Sand      | Moist, very dense, brown, fine to coarse SAND, some silt, little fine to coarse gravel  |  |
|  | -              |                  |                       |                       |                         |                             |             | Weathered Rock  | Test boring B-18 terminated at 14' bgs and  | Rollerbit from 12<br>to 14' bgs.<br>Possible boulders<br>or bedrock.           |
| - <u>72.9</u>  | -              |                  |                       |                       |                         |                             |             |                 | backfilled with soil cuttings.  |  |
| 67.9<br>AS - Auge  |                |                  |                       |                       |                         |                             |             |                 |   |  |
|  | Sample Types   |                  |                       |                       |                         |                             |             |                 | Consistency vs Blowcount/Foot Burm  | ister Classification   |
| AS - Auger/Grab Sample CS - California Sampler BQ - 1.5" Rock Core NQ - 2" Rock Core QF - Geoprobe |                |                  |                       |                       | n<br>ne                 | V. Loos<br>Loose:<br>M. Den | se: 0<br>4- | -4 E            | ense: 30-50 V. Soft: <2 Stiff: 8-15   Soft: 2-4 V. Stiff: 15-30   Soft: 2-4 V. Stiff: | nd 35-50%<br>ome 20-35%<br>ittle 10-20%<br>trace <10%<br>sture, density, color |
| Reviewed by:   |                |                  |                       |                       |                         |                             |             |                 | Date: Boring Number: B  | -18  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

 $\textbf{Drilling Contractor/Driller:} \ \ \text{GeoLogic - Earth Exploration, Inc. / M. Ferreira}$ 

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 3 in / NX **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

Bore Hole Location: Brandeis University, Waltham, MA Northing: 2958306.2240 Easting: 723000.451

**Drilling Date: Start:** 12/14/2017 **End:** 12/14/2017

Surface Elevation (ft.): 82.01

Total Depth (ft.): 14

Depth to Initial Water Level (ft):

 Depth
 Date
 Time

 9.3
 12/14/2017
 14:20

Abandonment Method: Backfilled with soil cuttings

| Elev.<br>Depth<br>(ft)<br>82.0 | Sample<br>Type   | er<br>er         | <u> </u>              | _                     | Ē                       |                                    | g           |                |                                       |                                |                                    |
|--------------------------------|--|------------------|-----------------------|-----------------------|-------------------------|------------------------------------|-------------|----------------|---------------------------------------|--------------------------------|------------------------------------|
| 0                              | Sa   | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value                            | Graphic Log | Strata         | Material Descrip                      | otion                          | Remarks                            |
|                                |  |                  |                       |                       |                         |                                    |             |                | 3" Asphalt                            |                                |                                    |
|                                |  |                  |                       | 34                    |                         |                                    | XXX         |                | Moist, very dense, brown, fir         | ne to coarse                   |                                    |
| _                              | ss   | S-1              | 18                    | 66                    | 10                      | >100                               | $\ggg$      |                | SAND and fine to coarse Gl            |                                |                                    |
| _                              |  |                  |                       | 60                    |                         |                                    | XXX         |                |                                       |                                |                                    |
|                                |  |                  |                       | 40                    |                         |                                    | XXX         |                | Moist, very dense, brown, fir         | ne to coarse                   | Analytical sample                  |
| -                              | SS   | S-2              | 16                    | 95                    | 10                      | >100                               | XXX         |                | SAND and fine to coarse G             | RAVEL, little silt             | (2'-4')                            |
|                                |  |                  |                       | 100/4"                |                         |                                    | XXX         | Ē              |                                       |                                |                                    |
| _                              |  |                  |                       | 50                    |                         |                                    | XXX         |                | Moist, very dense, brown, fir         | no to coarso                   |                                    |
| 77.0                           |  |                  |                       | 33                    |                         |                                    | XXX         |                | SAND and fine GRAVEL, lit             | ttle silt                      |                                    |
| 77.0<br>5                      | SS   | S-3              | 24                    | 40                    | 8                       | 73                                 | XXX         |                | Critic and into Critical, in          | ttio oiit                      |                                    |
| Ü                              |  |                  |                       | 50                    |                         |                                    | $\ggg$      |                |                                       |                                |                                    |
| _                              | SS   | S-4              | 6                     | 100                   | 4                       |                                    | $\ggg$      |                | Moist, very dense, brown, fir         | ne to coarse                   | Rollerbit from 6.5                 |
|                                |  |                  |                       |                       |                         |                                    |             | 중              | SAND and fine GRAVEL, lit             | ttle silt                      | to 9' bgs. Possibl                 |
|                                |  |                  |                       |                       |                         |                                    |             | Veathered Rock |                                       |                                | boulder or<br>bedrock.             |
| ₹ 72.0<br>10                   |  |                  |                       |                       |                         |                                    |             |                | See core log for description          |                                |                                    |
| 10                             |  |                  |                       |                       |                         |                                    |             |                |                                       |                                |                                    |
| _                              | NX   | C-1              | 60                    |                       | 40                      |                                    |             | Bedrock        |                                       |                                |                                    |
| _                              |  |                  |                       |                       |                         |                                    |             | <b>m</b>       |                                       |                                |                                    |
| _                              |  |                  |                       |                       |                         |                                    |             |                |                                       |                                |                                    |
| 07.0                           |  |                  |                       |                       |                         |                                    |             |                | Boring B-19 terminated at 1           | 4 pgs and                      |                                    |
| 67.0<br>15                     |  |                  |                       |                       |                         |                                    |             |                | backfilled with soil cuttings.        |                                |                                    |
| 13                             |  |                  |                       |                       |                         |                                    |             |                |                                       |                                |                                    |
| _                              | -  |                  |                       |                       |                         |                                    |             |                |                                       |                                |                                    |
|                                |  |                  |                       |                       |                         |                                    |             |                |                                       |                                |                                    |
| _                              |  |                  |                       |                       |                         |                                    |             |                |                                       |                                |                                    |
|                                |  |                  |                       |                       |                         |                                    |             |                |                                       |                                |                                    |
| _                              |  |                  |                       |                       |                         |                                    |             |                |                                       |                                |                                    |
| _                              |  |                  |                       |                       |                         |                                    |             |                |                                       |                                |                                    |
|                                |  |                  |                       |                       |                         |                                    |             |                |                                       |                                |                                    |
| 62.0                           |  | _                |                       |                       | $\longrightarrow$       |                                    |             |                |                                       |                                |                                    |
|                                | <u>Sa</u>  | mple Ty          |                       |                       |                         | Consistency vs Blowcount/Foot Burm |             |                |                                       |                                |                                    |
| AS - Auge                      | r/Grab S   | Sample           | V - Vac               |                       | b                       |                                    | Gra         | nular          | Sand): Fine Grain                     | ed (Clay):                     | and 35-50%<br>some 20-35%          |
| CS - Califo<br>RO - 1 5" !     | S - Auger/Grab Sample<br>S - California Sampler<br>S - California Sampler<br>S - Split Spoon<br>S - 2" Rock Core<br>S - Split Spoon<br>S - Shelby Tube |                  |                       |                       |                         | V. Loos                            |             |                | ense: 30-50 V. Soft: <2               | Stiff: 8-15                    | little 10-20%                      |
| NQ - 2" R                      | ock Core   | , ,              | T - She<br>P - Geo    | lby Tub               | e  L                    | Loose:<br>M. Den                   |             |                | Dense: >50 Soft: 2-4<br>M. Stiff: 4-8 | V. Stiff: 15-30<br>Hard: >30 m | trace <10% oisture, density, color |
|                                | wed b  |                  | GeC                   | hione                 | — I.                    |                                    |             |                |                                       | Boring Number:                 |                                    |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller:GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NX

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: Brandeis University, Waltham, MA Northing: 2958306.2240 Easting: 723000.451

**Drilling Date: Start:** 12/14/2017 **End:** 12/14/2017

ROCK CORE ONLY GINT LOGS MWRA WASM 3 20180220.GPJ - 4/27/23

Surface Elevation (ft.):82.01

Total Depth (ft.): 14

Depth to Initial Water Level (ft):

Depth 9.3 12/14/2017 14:20

Abandonment Method: Backfilled with soil cuttings

| Elevation<br>Depth<br>(ft)  | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Recovery<br>(%) | RQD<br>(%) | Drill Rate<br>(min/ft) | Down Press.<br>(psi) | Graphic<br>Log                        | Strata  | Ma  | aterial Description                     |        | Remarks  |
|-----------------------------|----------------|------------------|-----------------------|-----------------|------------|------------------------|----------------------|---------------------------------------|---------|---|---|--------|----------|
| 72.0<br>10.0                |                |                  |                       |                 |            | 1:00<br>1:00           |                      | ×××<br>×××<br>×××                     | ø.      | Hard, slightly weath<br>GRANITE, very clo | ered, fine grained, gray<br>se jointing | ,      |          |
|                             | NX             | C-1              | 60                    | 67              | 7          | 2:00<br>3:00           |                      | × × × × × × × × × × × × × × × × × × × | Granite |   |   |        |          |
|                             |                |                  |                       |                 |            | 3:00                   |                      | ***                                   |         | Test boring B-19 te                       | rminated at 14' bgs.                    |        |          |
| - 62.0<br>- 20.0 -          |                |                  |                       |                 |            |                        |                      |                                       |         |   |   |        |          |
| - <u>57.0</u> - <u>25.0</u> |                |                  |                       |                 |            |                        |                      |                                       |         |   |   |        |          |
| Bod                         | dina           | (mama)           |                       |                 | - : 4 6    | Snaoi.                 |                      |                                       |         | Continuity (mm)                           | Attitudo Anglo                          | Anarti | uro (mm) |

| Bedding (mm)               | Joint Spacing (mm) | Continuity (mm)  | Attitude Angle  | Aperture (mm)  |  |  |
|----------------------------|--------------------|--|---|--|--|--|
| Extremely Thin         <20 | Extremely Close    | Extremely <25<br>Moderately 25-100<br>Slightly 100-200<br>Sound >200 | Horizontal 0° - 5°<br>Shallow 5° - 35°<br>Moderate 35° - 55°<br>Steep 55° - 85°<br>Vertical 85° - 90° | Very Tight < 0.1<br>Tight 0.1 - 0.25<br>Partly Open 0.25 - 0.5<br>Open 0.5 - 2.5<br>Mod. Wide 2.5 - 10<br>Wide >10 |  |  |

| Field             | Hardness                             | Weat     | thering                  | •  | ·   |
|-------------------|--------------------------------------|----------|--------------------------|--|---|
| Very Hard         | Knife Can't Scratch                  | Fresh    |                          | material weathering; slight to no                                      |   |
| Hard              | Scratches with<br>Difficulty         | Slight   | its fresh condition.     | ŭ  | al may be discoloredand may be weaker externally tha      |
| Med. Hard         | Scratches Readily                    | Moderate |                          |  | or disintergrated to a soil. Fresh or discolored rock is  |
| Medium            | Grooves with Difficulty              | Severe   | More than half of the ro |  | or disintegrated to a soil. Fresh or discolored rock is   |
| Soft<br>Very Soft | Grooves Readily<br>Carves with Knife | Complete |                          | tinuous framework or as coresto<br>composed and/or disintegrated to    | one. soil. The original mass structure is largely intact. |
| Voly con          | Carves warrams                       |          | All rock material is con | verted to soil. The mass structu<br>the soil has not been significantl | re and material fabric are destroyed. There is a large    |
| Reviewe           | ed by:                               |          |                          | Date:  | Boring Number: B-19                                       |





## Boring Number: B-20 (MW)

Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / M. Ferreira

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** 250 South St., Waltham, MA **Northing:** 2958679.1419 **Easting:** 723407.2716 **Drilling Date: Start:** 12/12/2017 **End:** 12/13/2017

lb / 30 in /2 in O.D. Depth to Initial Water Level (ft):

 Depth
 Date
 Time

 4.1
 12/13/2017
 07:45

Surface Elevation (ft.): 76.95

Abandonment Method: Monitoring well installed

Total Depth (ft.): 14

|                                  | ,  |                  | -,,_0                 | –                     |                         | _,                          |             |                            | Logged By: A. Smith   |   |
|----------------------------------|--|------------------|-----------------------|-----------------------|-------------------------|-----------------------------|-------------|----------------------------|---|---|
| Elev.<br>Depth<br>(ft)           | Sample<br>Type   | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata                     | Material Description  | Remarks   |
| 0                                |  |                  |                       | 46                    |                         |                             | 74 1. 1/4   |                            | Top 6": Moist, very dense, gray, fine to coarse   | 9   |
|                                  | ss   | S-1              | 24                    | 55<br>44<br>36        | 18                      | 99                          |             |                            | SAND and fine to coarse GRAVEL, little silt  Bottom 12": Moist, very dense, brown to gray fine SAND, little silt trace organic fibers |   |
|                                  | ss   | S-2              | 24                    | 55<br>40<br>28<br>33  | 24                      | 68                          |             | Silty Sand                 | Moist, very dense, brown to gray, Slightly<br>Organic SILT and fine to medium SAND,<br>trace fine gravel, trace organic fibers        | Analytical sample<br>(2'-4')  |
| - <u>¥</u><br>- <u>72.0</u><br>5 | - ss   | S-3              | 24                    | 20<br>38<br>72<br>50  | 12                      | >100                        |             | ïS                         | Moist, very dense, brown, fine SAND, trace si   | Corrosion sample (4'-6')  |
|                                  | - SS   | S-4              | 24                    | 14<br>80<br>76<br>80  | 12                      | >100                        |             |                            | Moist, very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt   |   |
| -                                | SS   | S-5              | 4                     | 100/4"                | 4                       |                             |             | Gravel                     | Moist, very dense, brown, fine to coarse  |   |
| - <u>67.0</u> 10                 |  |                  |                       |                       |                         |                             |             | Sand and                   | SAND, some fine to coarse gravel, trace silt  |   |
|                                  |  |                  |                       |                       |                         |                             |             | Weathered Rock             |   | Rollerbit from 12<br>to 14' bgs.<br>Possible boulder,<br>weathered rock,<br>or bedrock. |
| 62.0<br>15                       | -  |                  |                       |                       |                         |                             |             | 8                          | Test boring B-20 (MW) terminated at 14' bgs and backfilled with soil cuttings.  |   |
| Z0180Z20.GPJ - 3/8/Z             |  |                  |                       |                       |                         |                             |             |                            |   |   |
| ဂ                                |  |                  |                       |                       |                         |                             |             |                            |   |   |
| 57.0                             | 57.0   |                  |                       |                       |                         |                             |             |                            | Consistency vs Blowcount/Foot   | Burmister Classification  |
| g   CS - Calif<br>BQ - 1.5"      | CS - California Sampler Sample<br>BQ - 1.5" Rock Core SS - Split Spoon V. Loc<br>NO - 2" Rock Core ST - Shelby Tube Lock |                  |                       |                       |                         | V. Loos<br>Loose:<br>M. Den | se: O       | anular (<br>)-4 C<br>-10 V | Sand):   Fine Grained (Clay):   ense: 30-50   V. Soft: <2 Stiff: 8-15   Soft: 2-4 V. Stiff: 15-30   M. Stiff: 4-8   Hard: >30         | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>moisture, density, color    |
| Reviewed by:                     |  |                  |                       |                       |                         |                             |             |                            | Date: Boring Numbe  | r: B-20 (MW)  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Number: 101038-102170 Project Location:** Massachusetts

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 190 South St., Waltham, MA Northing: 2958896.4760 Easting: 723754.5903

**Drilling Date: Start:** 12/15/2017 **End:** 12/15/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Reviewed by:

Surface Elevation (ft.): 82.47

Total Depth (ft.): 15

Depth to Initial Water Level (ft): Depth Date Time 12 12/15/2017

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-21** 

14:40

| Diming  | j Dale.              | Start: 1         | 2/13/20   | 1/ 6                       | 11 <b>u</b> . 12        | 2/13/20                     | ) I <i>I</i>            |                 | Logged By: A. Smith  |
|---|----------------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------------------|-----------------|--|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type       | Sample<br>Number | Sample<br>Length (in)                             | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log             | Strata          | Material Description Remarks   |
| 0   | SS                   | S-1              | 9   | 100<br>100/3"              | 9                       | >100                        | <u>7,17</u> .7 <u>7</u> |                 | 48" Topsoil: Moist, very dense, dark brown,<br>fine to coarse SAND, little fine gravel, little silt, (2'-4')   |
| -   |                      |                  |   |                            |                         |                             |                         | soil            | trace organic fibers   |
| -   | SS                   | S-2              | 24  | 17<br>15<br>12<br>16       | 12                      | 27                          |                         | Topsoi          | Moist, very dense, dark brown, fine to coarse SAND, little fine gravel, little silt, trace organic fibers  |
| 77.5<br>5   | - SS                 | S-3              | 24  | 10<br>85<br>36<br>11       | 6                       | >100                        |                         |                 | Moist, very dense, dark brown, fine to medium SAND and fine to coarse GRAVEL, little silt, trace brick and mortar  |
| -   | - SS                 | S-4              | 24  | 10<br>10<br>11<br>44       | 8                       | 21                          |                         | Ē               | Moist, medium dense, dark brown, fine to medium SAND and fine to coarse GRAVEL, little silt, trace brick and mortar  |
| 72.5<br>10  | - SS                 | S-5              | 24  | 4<br>7<br>16<br>36         | 8                       | 23                          |                         | ш.              | Moist, medium dense, dark brown, fine to coarse SAND and fine to coarse GRAVEL, little silt, trace brick and mortar  |
| . IO .  |                      |                  |   |                            |                         |                             |                         | Gravel          |  |
| 67.5  | - ss                 | S-6              | 24  | 86<br>80<br>56<br>38       | 18                      | >100                        |                         | Sand and Gravel | Wet, very dense, brown, fine to coarse SAND, little fine to coarse gravel, trace silt  |
| 15  |                      |                  |   |                            |                         |                             |                         |                 | Test boring B-21 terminated at 15' bgs and backfilled with soil cuttings.  |
| 62.5  |                      |                  |   |                            |                         |                             |                         |                 |  |
|   | Sa                   | ample Ty         |   | F/O                        |                         |                             |                         |                 | Consistency vs Blowcount/Foot Burmister Classificat  |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>IQ - 2" R | fornia Sa<br>Rock Co | ampler<br>ore    | V - Vac<br>Sam<br>S - Spli<br>T - She<br>GP - Ged | nple<br>t Spoor<br>lby Tub | n<br>ne                 | V. Loos<br>Loose:<br>M. Der | se: 0                   | -4 C            | (Sand):         Fine Grained (Clay):         and 35-50% some 20-35% some |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NX Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 99 Hope Ave., Waltham, MA Northing: 2959021.3215 Easting: 724037.4743

**Drilling Date: Start:** 12/13/2017 **End:** 12/13/2017

Surface Elevation (ft.): 96.12

Total Depth (ft.): 16.5

Depth to Initial Water Level (ft):

Depth Date Time 7.8 12/13/2017 12:50

| Elev.<br>Depth<br>(ft)                            | Sample<br>Type                   | Sample<br>Number        | Sample<br>Length (in)                   | Blows per<br>6 inches    | Sample<br>Recovery (in) | N-Value                     | Graphic Log                            | Strata          | Material Des  | cription                        | Remarks   |
|---|----------------------------------|-------------------------|---|--------------------------|-------------------------|-----------------------------|--|-----------------|---|---------------------------------|---|
| 0   |                                  |                         |   | 26                       |                         |                             | ·, · , · , · , · , · , · , · , · , · , |                 | 4" Topsoil  |                                 |   |
| -   | SS                               | S-1                     | 24                                      | 80<br>82<br>78<br>100/6" |                         | >100                        |  | Ē               | Bottom 4": Moist, very de<br>to medium SAND, some<br>little silt<br>Moist, very dense, gray-b | fine to coarse grav             | rel, (2-4)  |
| -   | SS                               | S-2                     | 6                                       | 100/0                    | 6                       | >100                        | <b>*</b>                               |                 | SAND, some fine to coal   |                                 | uiii  |
| 91.1<br>5   | SS                               | S-3                     | 18                                      | 76<br>80<br>100          | 12                      | >100                        |  | ravel           | Moist, very dense, brown<br>SAND, some fine to coal   |                                 |   |
| -   | SS                               | S-4                     | 3                                       | 100/3"                   | 3                       | >100                        |  | D Dr            | Moist, very dense, browr  | fine to coarse                  |   |
| <b>▼</b> .  | 33                               | <u> </u>                |   |                          | 3                       | 7100                        |  | Sand and Gravel | SAND, some fine to coal   |                                 |   |
| -   | SS                               | S-5                     | 3                                       | 100/3"                   | 1                       | >100                        |  | ×               | No Recovery   |                                 | Fractured piece of  |
| 86.1<br>10  | -                                | -                       |   |                          |                         |                             |  | Weathered Rock  | ,   |                                 | coarse gravel in<br>spoon tip.<br>Rollerbit through<br>boulder or<br>weathered rock |
| 81.1<br>15  | - NX                             | C-1                     | 60                                      |                          | 95                      |                             |  | Bedrock W       | See core log for descript   |                                 | from 9.2 to 11.5' bgs.  |
| -<br>-<br>76.1                                    | -                                |                         |   |                          |                         |                             |  |                 | Test boring B-22 termina backfilled with soil cutting   |                                 | nd  |
| 70.1  | Sa                               | ample Ty                | pes                                     | <u> </u>                 |                         |                             |  |                 | Consistency vs Blowcount/Fo   | <u>ot</u>                       | Burmister Classification  |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | er/Grab S<br>ornia Sa<br>Rock Co | Sample<br>Impler<br>ore | V - Vac<br>San<br>SS - Spli<br>ST - She | nple<br>t Spoor          | n l                     | V. Loos<br>Loose:<br>M. Den | se: 0                                  | -4 [<br>·10 \   | Sand):         Fine G           ense:         30-50         V. Soft:         <;               | rained (Clay):<br>2 Stiff: 8-15 | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%                            |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

 $\textbf{Drilling Method/Casing/Core Barrel Size:} \quad \text{Drive and Wash / 3 in / NX}$ Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 99 Hope Ave., Waltham, MA Northing: 2959021.3215 Easting: 724037.4743

**Drilling Date: Start:** 12/13/2017 **End:** 12/13/2017

Surface Elevation (ft.): 96.12

Total Depth (ft.): 16.5

Depth to Initial Water Level (ft): 7.8 12/13/2017 12:50

Abandonment Method: Backfilled with soil cuttings

| Elevation<br>Depth<br>(ft) | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Recovery (%) | RQD<br>(%) | Drill Rate<br>(min/ft)       | Down Press.<br>(psi) | Graphic<br>Log    | Strata       | Material Description  | Remarks |
|----------------------------|----------------|------------------|-----------------------|--------------|------------|------------------------------|----------------------|-------------------|--------------|---|---------|
| <br><br>- <u>81.1</u> -    | NX             | C-1              | 60                    | 95           | 50         | 1:30<br>1:30<br>1:30<br>1:30 |                      | ######            | Granodiorite | Hard, slightly weathered, fine grained, gray, GRANODIORITE; primary joint set very close, steep |         |
| 15.0<br> -                 |                |                  |                       |              |            | 1:30                         |                      | -#-<br>-#-<br>-#- |              | Test boring B-22 terminated at 16.5' bgs.   |         |
| - <u>76.1</u> - 20.0       |                |                  |                       |              |            |                              |                      |                   |              |   |         |
|                            |                |                  |                       |              |            |                              |                      |                   |              |   |         |
|                            |                |                  |                       |              |            |                              |                      |                   |              |   |         |

| Bedding (mm)               | Joint Spacing (mm)   | Continuity (mm)  | Attitude Angle  | Aperture (mm)  |
|----------------------------|--|--|---|--|
| Extremely Thin         <20 | Extremely Close <20 Very Close 20-60 Close 60-200 Mod Close 200-600 Wide 600-2000 Very Wide 2000-6000 Extremely Wide >6000 | Extremely <25<br>Moderately 25-100<br>Slightly 100-200<br>Sound >200 | Horizontal 0° - 5°<br>Shallow 5° - 35°<br>Moderate 35° - 55°<br>Steep 55° - 85°<br>Vertical 85° - 90° | Very Tight < 0.1<br>Tight 0.1 - 0.25<br>Partly Open 0.25 - 0.5<br>Open 0.5 - 2.5<br>Mod. Wide 2.5 - 10<br>Wide >10 |

| -3/8/21            | 30.0   |              |   |             |  |                 |                               |   |                          |   |                                  |  |  |   |   |
|--------------------|--|--------------|---|-------------|--|-----------------|-------------------------------|---|--------------------------|---|----------------------------------|--|--|---|---|
| .GPJ               | Bedo   | ling (mn     | <u>1)</u>   |             | Joint S  | Spacir          | ng (mi                        | <u>m)</u>   | 2                        | Continuit                               | ty (mm)                          | Attitud  | le Angle   | <u>Aperti</u>   | ure (mm)  |
| A WASM 3 20180220. | Extremely<br>Very Thin<br>Thin<br>Medium<br>Thick<br>Very Thick<br>Extremely | 60<br>20     | <20<br>20-60<br>60-200<br>00-600<br>00-2000<br>00-6000<br>>6000 | N<br>N<br>V | xtremel<br>lery Clos<br>lose<br>lod Clos<br>Vide<br>ery Wid<br>xtremel | se<br>se<br>e   | 20<br>20<br>600<br>200<br>200 | <20<br>0-60<br>0-200<br>0-600<br>0-2000<br>0-6000<br>6000 | M <sub>S</sub>           | ktremely<br>oderately<br>ightly<br>ound | <25<br>25-100<br>100-200<br>>200 | Horizontal<br>Shallow<br>Moderate<br>Steep<br>Vertical | 0° - 5°<br>5° - 35°<br>35° - 55°<br>55° - 85°<br>85° - 90° | Very Tight<br>Tight<br>Partly Open<br>Open<br>Mod. Wide<br>Wide | < 0.1<br>0.1 - 0.25<br>0.25 - 0.5<br>0.5 - 2.5<br>2.5 - 10<br>>10 |
| MWRA               | <u>Fiel</u>  | d Hardn      |   |             | Wea  | therin          | g                             |   |                          |   |                                  |  |  |   |   |
| SDO1.              | Very Hard<br>Hard  |              | Can't Scra<br>hes with  | atch        | Fresh<br>Slight  |                 | Disco                         | sible signoration   | indica                   | ited weath                              | al weathering<br>ering. All the  | ; slight to no<br>rock materia                         | discoloration.<br>Il may be disco                          | loredand may l  | pe weaker externally  |
| GINT               | Med. Hard  | Scrato       | hés Reac  | lily        | Modera   | ate             |                               |   |                          |   |                                  |  |  | d to a soil. Fre  | sh or discolored rock is  |
|                    | Medium   | Crooves with |   |             |  |                 |                               |   | alf of the               | e rock mat                              |                                  | nposed and/  | or disintegrated   | to a soil. Fres   | sh or discolored rock is  |
| CORE ONLY          | Soft<br>Very Soft  | Groov        | es Readil<br>s with Kni   |             | Compl<br>Residu  | ete<br>ıal Soil | All ro                        | ck mate<br>ck mate  | erial is o<br>erial is o | decompose<br>converted t                | o soil. The n                    | integrated to<br>nass structu                          | soil. The origin   |   | ture is largely intact.<br>royed. There is a large                |
| 30CK               | Review   | ed by:       |   |             |  |                 |                               |   |                          | Date                                    | e:                               |  | Boring N   | umber: B  | -22   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / P. Fisher **Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** 11 Bellevue St., Waltham, MA **Northing:** 2959921.0834 **Easting:** 724730.7697 **Drilling Date: Start:** 10/11/2017 **End:** 11/22/2017

Surface Elevation (ft.): 55

Total Depth (ft.): 21

Depth to Initial Water Level (ft):DepthDateTime14.511/22/201711:00

Abandonment Method: Backfilled with soil cuttings

|   |                                  |                         |   |                            |                         |                             |             |                        |                 |  | Log                       | ged B            | sy: D. Abt / A. Smith                              | ı             |   |
|---|----------------------------------|-------------------------|---|----------------------------|-------------------------|-----------------------------|-------------|------------------------|-----------------|--|---------------------------|------------------|--|---------------|---|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type                   | Sample<br>Number        | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata                 |                 |  | Material I                | Descr            | iption   |               | Remarks   |
| 0   |                                  |                         |   |                            |                         |                             |             |                        | 6               | " Asphalt                                  |                           |                  |  |               | Vacuum excavate   |
|   | VE                               | V-1                     | 6   |                            |                         |                             |             | ≣                      | N.              | " Cobble S<br>Noist, brow<br>ttle fine gra | n, fine to                | coars            | e SAND, some s                                     | ilt,          | boring from the<br>ground surface to<br>4.8' bgs.<br>Analytical sample<br>(2'-2.5') |
| 50.0<br>5   | VE                               | V-2                     | 6   |                            |                         |                             |             |                        |                 | /loist, brow<br>ttle fine gra              |                           | coars            | e SAND, some s                                     | ilt,          | Analytical sample<br>(4.5'-5')<br>Rollerbit through<br>boulder or cobbles           |
|   | - SS                             | S-1                     | 24  | 30<br>26<br>36<br>39       | 0                       | 62                          |             | vel                    | 3<br>n          |  | Λoist, very               |                  | se, brown, fine to<br>to coarse gravel,            |               | from 4.8 to 8' bgs.  Corrosion sample (8'-10')                                      |
|   | - SS                             | S-2                     | 24  | 95<br>24<br>27<br>44       | 5                       | 51                          |             | Sand and Grave         |                 |  |                           |                  | fine to coarse<br>GRAVEL, trace si                 | ilt           |   |
|   | - SS                             | S-3                     | 24  | 79<br>72<br>63<br>88       | 6                       | >100                        |             |                        |                 |  |                           |                  | wn, fine to coarse<br>arse sand, trace s           |               |   |
|   | -                                |                         |   |                            |                         |                             | 10.0(.0(.0  |                        | T<br>b          | est boring<br>ackfilled w                  | B-24 tern<br>ith soil cut | ninate<br>ttings | ed at 21' bgs and                                  |               |   |
| 30.0  | <u> </u>                         | ımple Ty                | nes   |                            |                         |                             |             |                        | Cone            | istency vs I                               | Blowcount                 | /Foot            |  | Burm          | ister Classificatio   |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | er/Grab S<br>ornia Sa<br>Rock Co | Sample<br>Impler<br>ore | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Ged | nple<br>t Spoor<br>lby Tul | ן<br>הב                 | V. Loos<br>Loose:<br>M. Den | se: 0       | nular<br>1-4 [<br>10 \ | (Sand<br>Dense: | <u>):</u>                                  |                           |                  | ined (Clay): Stiff: 8-15 V. Stiff: 15-30 Hard: >30 | a<br>si<br>li | and 35-50%<br>ome 20-35%<br>ittle 10-20%<br>trace <10%<br>sture, density, color     |
| Revie   | wed b                            | y:                      |   |                            |                         |                             |             |                        |                 | Date:                                      |                           |                  | Boring Numb  | er: B         | 3-24  |





# Boring Number: B-25 (MW)

Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

 $\textbf{Drilling Contractor/Driller:} \ \ \text{GeoLogic - Earth Exploration, Inc. / M. Ferreira}$ 

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 3 in / NX **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

Bore Hole Location: 45 Sun St., Waltham, MA Northing: 2960373.8970 Easting: 725100.683

Drilling Date: Start: 10/23/2017 End: 10/23/2017

Surface Elevation (ft.): 49.64

Total Depth (ft.): 15

Depth to Initial Water Level (ft):

Depth Date Time

8.5 10/23/2017 10:00

Abandonment Method: Monitoring well installed

|  |                             |                  |  |                       |                         |                   |                           |                          |        |                                    | Log                             | ged B              | By: A. Smith   |            |   |
|--|-----------------------------|------------------|--|-----------------------|-------------------------|-------------------|---------------------------|--------------------------|--------|------------------------------------|---------------------------------|--------------------|--|------------|---|
| Elev.<br>Depth<br>(ft)   | Sample<br>Type              | Sample<br>Number | Sample<br>Length (in)                          | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value           | Graphic Log               | Strata                   |        |                                    | Material                        | Descr              | ription  |            | Remarks   |
| 0  |                             |                  |  |                       |                         |                   | ***                       |                          | 4      | " Asphalt                          |                                 |                    |  |            |   |
| <br><br>   | VE                          | V-1              |  |                       |                         |                   |                           | E.                       |        |                                    | brown, fir<br>coarse S <i>A</i> |                    | coarse GRAVEI<br>little silt   | L          | Analytical sample (2'-2.5')   |
| 44.6   | VE                          | V-2              |  |                       |                         |                   | ₩.(\)<br> <br>  σ<br>  O  |                          |        |                                    | brown, fir<br>o coarse g        |                    | coarse SAND,<br>l, little silt   |            | Analytical sample (4.5'-5')   |
|  | SS                          | S-1              | 24   | 32<br>15<br>8<br>100  | 5                       | 23                | ∘ ()<br>)<br>.ø:<br>• • • |                          | S      | /et, mediu<br>AND and<br>ace orgar | fine to coa                     | brow<br>arse (     | n, fine to coarse<br>GRAVEL, little s                                  | e<br>ilt,  |   |
| 39.6   | SS                          | S-2              | 24   | 19<br>10<br>8<br>20   | 2                       | 18                |                           | Sand and Gravel          | G      | Vet, mediu<br>RAVEL a<br>ace wood  | nd fine to                      | brow<br>coars      | n, fine to coarse<br>se SAND, trace                                    | e<br>silt, |   |
| - 34.6<br>- 15   | SS                          | S-3              | 12   | 95<br>100             | 10                      | >100              |                           |                          | a<br>T | nd fine to est boring              | coarse GF<br>B-25 (MV           | RAVE<br>V) ter     | ne to coarse SA<br>EL, little silt<br>minated at 15' k<br>toring well. |            |   |
| 29.6<br>AS - Auger/0<br>CS - Califor<br>BQ - 1.5" Roc<br>NQ - 2" Roc | Grab S<br>nia Sai<br>ock Co | mpler<br>sre     | pes<br>V - Vac<br>Sam<br>SS - Split<br>T - She | elar                  | n l                     | V. Loos<br>Loose: | se: 0                     | anular<br>)-4 [<br>-10 \ | (Sand  |                                    | V. Soft:<br>Soft:               | e Gra<br><2<br>2-4 | ined (Clay):<br>Stiff: 8-15<br>V. Stiff: 15-30                         |            | nister Classification and 35-50% some 20-35% little 10-20% trace <10% |
| Review   |                             |                  | SP - Geo                                       | probe                 |                         | ivi. Deli         | ise: 10                   | J-3U                     |        | Date:                              | M. Stiff:                       | 4-8                | Hard: >30  Boring Num  |            | B-25 (MW)   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

 $\textbf{Drilling Contractor/Driller:} \ \ \text{GeoLogic - Earth Exploration, Inc. / M. Ferreira}$ 

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** 5 Fern St., Waltham, MA **Northing:** 2960688.6660 **Easting:** 725293.7979

**Drilling Date: Start:** 10/12/2017 **End:** 10/12/2017

Surface Elevation (ft.): 53.01

Total Depth (ft.): 15

 Depth to Initial Water Level (ft):

 Depth
 Date
 Time

 8.0
 10/12/2017
 13:45

Abandonment Method: Backfiled with soil cuttings

|   |                                 |                      |   |                            |                         |                             |             |                            |                |                              | Logi                      | geu 🗅          | sy: A. Smith                                       |          |   |
|---|---------------------------------|----------------------|---|----------------------------|-------------------------|-----------------------------|-------------|----------------------------|----------------|------------------------------|---------------------------|----------------|--|----------|---|
| Elev.<br>Depth<br>(ft)                              | Sample<br>Type                  | Sample<br>Number     | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata                     |                |                              | Material [                | Descr          | iption   |          | Remarks   |
| 0   |                                 |                      |   |                            |                         |                             | XXX         |                            | 3              | " Asphalt                    |                           |                |  |          |   |
| 48.0  | VE                              | V-1                  |   |                            | -1                      |                             |             | Fill                       |                | ∕loist, browi<br>BRAVEL, lit |                           | ND a           | and fine to coarse                                 | e        | Analytical sample (2'-2.5')   |
| 5   | VE                              | V-2                  |   |                            |                         |                             |             |                            | N              | noist, browi                 | n, fine to d              | coars          | e SAND and fine                                    | e        | Analytical sample   |
| -   | SS                              | S-1                  | 9   | 60<br>100/3"               | 9                       | >100                        | : O         |                            | 0              | SRAVEL, tr                   | ace silt                  |                | gray, fine to coar                                 |          | (5.5'-6')   |
| -   |                                 |                      |   | 100/3                      |                         |                             | )<br>.o.    |                            | S              | SAND and f                   | fine to coa               | rse (          | GRAVEL, little sil                                 | se<br>It |   |
| . ▼ -   | -                               |                      |   |                            |                         |                             | φ. · · · ·  |                            |                |                              |                           |                |  |          |   |
| 43.0<br>10  | SS                              | S-2                  | 9   | 90<br>100/3"               | 9                       | >100                        |             | Sand and Gravel            | N<br>S         | Moist, very o                | dense, bro<br>fine to coa | wn-q<br>arse ( | gray, fine to coar<br>GRAVEL, little sil           | se<br>It |   |
| -<br>-<br>38.0                                      | SS                              | S-3                  | 12  | 100/3"<br>50/9"            | 10                      | >100                        |             | Sa                         | N.             | Moist, very o                | dense, bro                | own-ç          | gray, fine to coar<br>GRAVEL, little sil           | se<br>It | 50/9" blow count<br>with 300 lb   |
| 15  |                                 |                      |   |                            |                         |                             |             |                            | Т              | est boring                   | B-26 term                 | inate          | ed at 15' bgs and                                  |          | hammer.   |
| -   |                                 |                      |   |                            |                         |                             |             |                            | , ,            | ackfilled wi                 | ur son cut                | ungs           |  |          |   |
| 33.0  | Sa                              | mple Ty              | pes   |                            |                         |                             |             |                            | Cons           | istency vs E                 | Blowcount/                | <u>Foot</u>    |  | Burn     | ister Classification  |
| AS - Auge<br>CS - Califo<br>BQ - 1.5"<br>NQ - 2" Ro | r/Grab S<br>ornia Sa<br>Rock Co | ample<br>mpler<br>re | V - Vac<br>Sam<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tul | n l                     | V. Loos<br>Loose:<br>M. Den | se: 0       | anular (<br>0-4 D<br>-10 V | (Sand<br>ense: | <u>):</u><br>30-50           |                           |                | ined (Clay): Stiff: 8-15 V. Stiff: 15-30 Hard: >30 |          | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>sture, density, color |
|   | wed b                           |                      |   |                            |                         |                             |             |                            |                | Date:                        |                           |                | Boring Num   | har I    | 2 26  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / M. Ferreira

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 3 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** 146 Felton St., Waltham, MA **Northing:** 2961016.6280 **Easting:** 725613.5234

**Drilling Date: Start:** 10/16/2017 **End:** 10/16/2017

Surface Elevation (ft.): 50.08

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

**Depth Date Time** 6.5 10/16/2017 14:30

Abandonment Method: Backfilled with soil cuttings

| _   |                     |                  |   |                            |                         |                             |                 |                 | Logged By: A. Smith  |
|---|---------------------|------------------|---|----------------------------|-------------------------|-----------------------------|-----------------|-----------------|--|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type      | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log     | Strata          | Material Description Remarks   |
| 50.1<br>0   |                     |                  |   |                            |                         |                             |                 |                 | 4" Asphalt   |
| -   | ss                  | S-1              | 18  | 30<br>22<br>32             | 4                       | 54                          | ∘ ()<br> <br> } |                 | Moist, very dense, brown, fine to coarse SAND, some fine gravel, little silt   |
| -   | - SS                | S-2              | 21  | 18<br>92<br>98<br>100/3"   | 3                       | >100                        |                 |                 | Moist, very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, little silt (2'-4')   |
| 45.1<br>5   | SS                  | S-3              | 10  | 80<br>100/4"               | 10                      | >100                        | ο<br>Ο<br>ο (\) |                 | Moist, very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, little silt (4'-6')   |
| <u> </u>  | SS                  | S-4              | 3   | 100/3"                     | 3                       |                             | )<br>ø<br>o O   | avel            | Moist, very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, little silt cobbles from 6.2 to 8' bgs.   |
| -<br>40.1   | SS                  | S-5              | 4   | 100/4"                     | 4                       |                             |                 | Sand and Gravel | Moist, very dense, brown, fine to coarse<br>SAND and fine to coarse GRAVEL, little silt  |
| 10  | - SS                | S-6              | 24  | 100/6"<br>14<br>14         | 18                      |                             |                 |                 | Wet, very dense, gray, fine to coarse SAND, some fine gravel, little silt  Blows from 14.5 to 16' bgs with 300 lb hammer.  |
| -   | -                   |                  |   | 15                         |                         |                             |                 |                 | Test boring B-27 terminated at 16' bgs and backfilled with soil cuttings.  |
| 30.1  | Sa                  | ample Ty         | pes   |                            |                         |                             |                 |                 | Consistency vs Blowcount/Foot Burmister Classificat  |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | ornia Sa<br>Rock Co | impler<br>ore S  | V - Vac<br>San<br>SS - Spli<br>ST - She<br>GP - Ged | nple<br>t Spoor<br>lby Tub | n<br>ne                 | V. Loos<br>Loose:<br>M. Den | se: 0           | -4 C            | Sand):   Fine Grained (Clay):   and 35-50%   some 20-35%     Dense: 30-50   V. Soft: <2 Stiff: 8-15   little 10-20%     Dense: >50   Soft: 2-4   V. Stiff: 15-30   trace <10%   moisture, density, color |
| Revie   | wed k               | y:               |   |                            |                         |                             |                 |                 | Date: Boring Number: B-27  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / M. Ferreira

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 3 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

Bore Hole Location: 100 Felton St., Waltham, MA
Northing: 2961222.6986 Easting: 726042.7302

**Drilling Date: Start:** 10/16/2017 **End:** 10/16/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 54.8

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

Depth Date Time

14.5 10/16/2017 10:00 **Abandonment Method:** Backfilled with soil cuttings

|   | ,                                |                         |   |                            |                         |                             |   |                            |        | Lo  | ogged I                | By: A. Smith                              |                       |   |
|---|----------------------------------|-------------------------|---|----------------------------|-------------------------|-----------------------------|---|----------------------------|--------|---|------------------------|---|-----------------------|---|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type                   | Sample<br>Number        | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log                             | Strata                     |        | Materia                                     | l Desc                 | ription                                   |                       | Remarks   |
| 0   |                                  |                         |   |                            |                         |                             |   |                            | 3      | .5" Asphalt                                 |                        |   |                       |   |
| -   | SS                               | S-1                     | 15  | 10<br>50<br>100/3"         | 8                       | >100                        | . · · · · · · · · · · · · · · · · · · · |                            | N      | Moist, very dense, be AND and fine to c     |                        |   |                       |   |
| -   | ss                               | S-2                     | 18  | 70<br>82<br>100            | 9                       | >100                        |   |                            | N<br>S | Moist, very dense, b<br>SAND and fine to c  | orown,<br>oarse        | fine to coarse<br>GRAVEL, little silt     |                       | Analytical sample (2'-4')                         |
| 49.8<br>5   | SS                               | S-3                     | 8   | 85<br>100/2"               | 6                       | >100                        | ).<br>Ø<br>O                            |                            | N<br>S | Moist, very dense, b<br>SAND and fine to c  | orown,<br>oarse        | fine to coarse<br>GRAVEL, little silt     |                       | Analytical sample (4'-5')                         |
| -   | -                                |                         |   |                            |                         |                             |   | Sand and Gravel            |        |   |                        |   |                       | Rollerbit through<br>boulder from 5 to<br>8' bgs. |
| 44.8<br>10  | SS                               | S-4                     | 10  | 54<br>100/4"               | 9                       | >100                        |   | Sand                       | V<br>a | Vet, very dense, br<br>nd fine to coarse 0  | own, f<br>GRAVI        | ine to coarse SAN<br>EL, little silt      | ID                    |   |
| 39.8<br>15  | - SS                             | S-5                     | 24  | 56<br>62<br>54<br>60       | 5                       | >100                        |   |                            |        | Vet, very dense, br<br>nd fine to coarse C  |                        |   | ID                    |   |
| -   |                                  |                         |   |                            |                         |                             |   |                            | T<br>b | est boring B-28 te<br>ackfilled with soil c | rminat<br>uttings      | ed at 16' bgs and<br>s.                   |                       |   |
| - 24.0  |                                  |                         |   |                            |                         |                             |   |                            |        |   |                        |   |                       |   |
| 34.8  | Sa                               | ample Ty                | pes   |                            |                         |                             |   |                            | Cons   | istency vs Blowcou                          | nt/Foot                | <u>t</u>                                  | Burmi                 | ster Classification                               |
| AS - Auge<br>CS - Calif<br>3Q - 1.5"<br>NQ - 2" R | er/Grab S<br>ornia Sa<br>Rock Co | Sample<br>ampler<br>ore | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tub | n<br>ne                 | V. Loos<br>Loose:<br>M. Den | se: 0                                   | nular (<br>1-4 D<br>1-10 V |        | ) <u>:</u> <u>F</u><br>30-50 V. Soft        | ine Gra<br>: <2<br>2-4 | ained (Clay): Stiff: 8-15 V. Stiff: 15-30 | ar<br>sc<br>lit<br>tr |   |
| Revie   | wed k                            | oy:                     |   |                            |                         |                             |   |                            |        | Date:                                       |                        | Boring Numb                               | er: B                 | -28   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 62 Felton St., Waltham, MA Northing: 2961354.6919 Easting: 726508.8779

**Drilling Date: Start:** 10/13/2017 **End:** 10/13/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Reviewed by:

Surface Elevation (ft.): 47.8

Total Depth (ft.): 16

6.6

Depth to Initial Water Level (ft): Depth Date Time

10/13/2017 Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-29** 

13:30

| (ft)   |                  |                            | y: A. Smith                      | Logged By:                              |                         |               | SS S-1 18 42 12 64  - SS S-2 24 28 14 73  - SS S-3 15 58 14 >100  - SS S-4 3 100/3" 3  - SS S-5 24 80  - SS S-6 24 90 15 >100 |  |                         |                       |                       |                  |                |               |  |  |  |  |  |  |
|--|------------------|----------------------------|----------------------------------|---|-------------------------|---------------|---|--|-------------------------|-----------------------|-----------------------|------------------|----------------|---------------|--|--|--|--|--|--|
| 3.5" Asphalt    SS   | arks             | Rema                       | ption                            | Material Descrip                        |                         | Strata        | Graphic Log   | N-Value  | Sample<br>Recovery (in) | Blows per<br>6 inches | Sample<br>Length (in) | Sample<br>Number | Sample<br>Type | Depth<br>(ft) |  |  |  |  |  |  |
| SS S-1 18 42 12 64   |                  |                            |                                  | lt                                      | 3.5" Aspha              |               |   |  |                         |                       |                       |                  |                |               |  |  |  |  |  |  |
| SS S-2 24 45 28 14 73 3  |                  | D,                         | e to coarse SAND,<br>little silt | dense, gray, fine<br>o coarse gravel, l | Moist, very some fine t | Ē             |   | 64   | 12                      | 42                    | 18                    | S-1              | SS             | _             |  |  |  |  |  |  |
| SS   S-3   15   58   14   >100   | l sample         |                            |                                  |   |                         |               |   | 73   | 14                      | 45<br>28              | 24                    | S-2              | SS             | _             |  |  |  |  |  |  |
| SAND and fine to coarse GRAVEL, trace silt  Wet, very dense, brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt  Wet, very dense, gray, fine to medium SAND, some fine to coarse gravel, little clay  Test boring B-29 terminated at 16' bgs and   | and .            | Corrosion                  |                                  |   |                         |               |   | >100   | 14                      | 58                    |                       | S-3              | SS             | 42.8<br>5     |  |  |  |  |  |  |
| SAND and fine to coarse GRAVEL, trace slit  Wet, very dense, brown, fine to coarse GRAVEL and fine to coarse GRAVEL, trace slit  Wet, very dense, gray, fine to medium SAND, some fine to coarse gravel, little clay  Test boring B-29 terminated at 16' bgs and   |                  |                            | ine to coarse                    | dense, brown, fir                       | Moist, very             |               |   |  | 3                       | 100/3"                | 3                     | S-4              | SS             | _             |  |  |  |  |  |  |
| Wet, very dense, gray, fine to medium SAND, some fine to coarse gravel, little clay  Test boring B-29 terminated at 16' bgs and  |                  | t                          | RAVEL, trace silt                | fine to coarse GF                       | SAND and                |               |   |  | -                       |                       |                       |                  |                |               |  |  |  |  |  |  |
| Wet, very dense, gray, fine to medium SAND, some fine to coarse gravel, little clay  Test boring B-29 terminated at 16' bgs and  |                  | t                          |                                  |   |                         | ind and Grave |   | - SS S-5 24 80 18 >100 0   |                         |                       |                       |                  |                |               |  |  |  |  |  |  |
| Test boring B-29 terminated at 16' bgs and   |                  | Э,                         |                                  |   |                         |               |   | 32.8   |                         |                       |                       |                  |                |               |  |  |  |  |  |  |
|  |                  |                            |                                  |   |                         |               |   |  |                         |                       |                       |                  |                |               |  |  |  |  |  |  |
| 27.8   |                  |                            |                                  |   |                         |               |   |  |                         |                       |                       |                  |                | 27.8          |  |  |  |  |  |  |
|  |                  | Burmister Class            | <u> </u>                         | Blowcount/Foot                          | Consistency vs          | 9             |   |  |                         |                       | <u>oes</u>            | nple Typ         | <u>Sar</u>     |               |  |  |  |  |  |  |
| AS - Auger/Grab Sample Sample Sample SS - Split Spoon SS - Split Spoon ST - Shelby Tube ST - Shelby Tube ST - Shelby Tube Some ST - Shelby Tube ST - Sh | 35%<br>20%<br>0% | some 20-39<br>little 10-20 | Stiff: 8-15<br>V. Stiff: 15-30   | V. Soft: <2<br>Soft: 2-4                | Dense: 30-50            | -4 D          | se: 0<br>4-   | Auger/Grab Sample California Sampler SS - Split Spoon ST - Shelby Tube |                         |                       |                       |                  |                |               |  |  |  |  |  |  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

 $\textbf{Drilling Contractor/Driller:} \ \ \text{GeoLogic - Earth Exploration, Inc. / M. Ferreira}$ 

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** 42 Felton St., Waltham, MA **Northing:** 2961499.8980 **Easting:** 726877.4759

**Drilling Date: Start:** 10/13/2017 **End:** 10/13/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 44.87

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

Depth Date Time

5.2 10/13/2017 09:30 **Abandonment Method:** Backfilled with soil cuttings

|   |                                  |                         |   |                            |                         |                               |                   |                          |        |                             | Logge                       | ed B         | y: A. Smith                                       |              |  |
|---|----------------------------------|-------------------------|---|----------------------------|-------------------------|-------------------------------|-------------------|--------------------------|--------|-----------------------------|-----------------------------|--------------|---|--------------|--|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type                   | Sample<br>Number        | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                       | Graphic Log       | Strata                   |        |                             | Material De                 | escr         | iption  |              | Remarks  |
| 44.9<br>0   |                                  |                         |   |                            |                         |                               |                   |                          | -      | 5" Asphalt                  |                             |              |   |              | Vacuum excavate  |
| <br>  | -                                |                         |   |                            |                         |                               |                   | E                        |        |                             | 5 044                       |              |   |              | boring from the<br>ground surface to<br>6' bgs.                                |
| <br>30 0  | VE                               | V-1                     |   |                            |                         |                               |                   |                          |        | /ioist, drow                | n, fine SAN                 | ID, t        | race slit   |              | Analytical sample (3'-3.5')  |
| - <del></del> -                                   | VE                               | V-2                     |   |                            |                         |                               | 。<br>):           |                          | 8      | SAND, trac                  | e fine grave                | el           | and fine to coarse                                |              | Analytical sample (5'-5.5')  |
|   | ss                               | S-1                     | 14  | 42<br>80<br>100/2"         | 12                      | >100                          | , O               |                          | y<br>s | Vet, very d<br>ome silt, tr | ense, gray,<br>ace fine gra | tine<br>avel | to medium SAN                                     | D,           |  |
|   | SS                               | S-2                     | 5   | 100/5"                     | 5                       |                               | ):<br>            |                          | V      | Vet. vervid                 | ense, grav-                 | brov         | wn, fine to coarse                                | <u> </u>     |  |
|   | - 50                             | 02                      |   |                            |                         |                               | , O.              | <u>.</u>                 |        |                             |                             |              | GRAVEL, little silt                               |              |  |
| - <u>34.9</u>                                     | -                                |                         |   |                            |                         |                               |                   | Sand and Gravel          |        |                             |                             |              |   |              |  |
| <br>- <u>29.9</u><br>- 15                         | SS                               | S-3                     | 24  | 72<br>38<br>52<br>58       | 9                       | 90                            | )<br>Ø ()<br>Ø () |                          |        |                             | ense, brow<br>coarse GRA    |              | ne to coarse SAN<br>L, little silt                | ND           |  |
| <br><br>24.9                                      |                                  |                         |   |                            |                         |                               |                   |                          |        |                             | B-30 terminivith soil cutti |              | ed at 16' bgs and                                 |              |  |
| 24.5  | Sa                               | ample Ty                | pes   |                            |                         |                               |                   | <u> </u>                 | Cons   | istency vs                  | Blowcount/F                 | oot          |   | Burm         | ister Classification   |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | er/Grab S<br>ornia Sa<br>Rock Co | Sample<br>ampler<br>ore | V - Vac<br>Sam<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tub | ו                       | V. Loose:<br>Loose:<br>M. Den | se: 0             | anular<br>)-4 C<br>-10 V |        | <u>):</u><br>30-50          | Fine V. Soft: Soft:         |              | ned (Clay): Stiff: 8-15 V. Stiff: 15-30 Hard: >30 | a<br>s<br>li | and 35-50%<br>ome 20-35%<br>ttle 10-20%<br>trace <10%<br>sture, density, color |
| Revie   | wed b                            | oy:                     |   |                            |                         |                               |                   |                          |        | Date:                       |                             |              | Boring Numb                                       | er: B        | 3-30   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 8 Felton St., Waltham, MA Northing: 2961592.0985 Easting: 727250.3929

**Drilling Date: Start:** 10/12/2017 **End:** 10/12/2017

Surface Elevation (ft.): 51.73

Total Depth (ft.): 19.8

Depth to Initial Water Level (ft):

Depth Date Time 6.0 10/12/2017 10:20

Abandonment Method: Backfilled with soil cuttings

|   |                     |                  |   |                            |                         |                             |             |                 |                                |                           | Logge                  | d By: A. Smith   | 1                    |                |   |
|---|---------------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|-----------------|--------------------------------|---------------------------|------------------------|--|----------------------|----------------|---|
| Elev.<br>Depth<br>(ft)                                | Sample<br>Type      | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata          |                                | N                         | aterial De             | scription  |                      |                | Remarks   |
| 0   |                     |                  |   |                            |                         |                             |             |                 | 8" As                          | sphalt Pa                 | vement                 |  |                      |                | Vacuum excavate   |
| -   | -                   |                  |   |                            |                         |                             | 0 0000      |                 | 6" Sı                          | ubbase: [                 | ry, browr              | n, fine to coar  |                      |                | boring from the ground surface to   |
|   | \/-                 | 1/4              |   |                            |                         |                             | 0           |                 |                                |                           |                        | arse gravel, li  |                      | _/             | 6' bgs.   |
| · -   | VE                  | V-1              |   |                            |                         |                             |             |                 | SAN                            | t, brown,<br>D, little co | SILT and<br>parse grav | fine to mediu<br>el  | ım                   |                | Analytical sample (2'-2.5')   |
| 46.7<br>5<br>▼  | SS                  | S-1              | 6   | 100/6"                     | 6                       |                             |             |                 | Maia                           | f                         |                        | ··· fina CANE  |                      |                | O   |
| _   | 33                  | <u> </u>         | 0   | 100/6                      | 0                       |                             |             |                 | silt, s                        | i, very de<br>ome fine    | to coarse              | n, fine SANE<br>gravel                                     | ), some              | ,              | Corrosion sample (8'-10')   |
| -   |                     |                  |   | 58<br>62                   |                         | 400                         |             |                 |                                |                           | nse, brow<br>to coarse | n, fine SANE   | ), some              | •              |   |
| 417   | SS                  | S-2              | 24  | 66<br>70                   | 18                      | >100                        |             | ravel           | Siit, 3                        | OTTIC TILLC               | to coarse              | graver   |                      |                |   |
| 41.7 -  | -                   |                  |   |                            |                         |                             |             | Sand and Gravel |                                |                           |                        |  |                      |                |   |
|   |                     |                  |   |                            |                         |                             |             | Ø               |                                |                           |                        |  |                      |                |   |
| <br>36.7  | SS                  | S-3              | 9   | 80<br>100/3"               | 9                       | >100                        |             |                 | Mois                           | t, very de                | nse, brow              | n, SILT and ine gravel                                     | fine to              |                |   |
| 36.7<br>15 -  |                     |                  |   |                            |                         |                             |             |                 | medi                           | um OAN                    | o, ilacci              | nic gravei   |                      |                |   |
|   | -                   |                  |   |                            |                         |                             |             |                 |                                |                           |                        |  |                      |                |   |
| <u>31.7</u> _   | SS                  | S-4              | 10  | 95<br>100/4"               | 10                      | >100                        |             |                 | Mois trace                     | t, very de<br>fine grav   | nse, gray<br>el        | fine SAND,   | some s               | silt,          |   |
| 20  |                     |                  |   |                            |                         |                             |             |                 | Test                           | boring B                  |                        | ated at 19.8'<br>igs.                                      | bgs an               | nd             |   |
| · -   |                     |                  |   |                            |                         |                             |             |                 |                                |                           |                        |  |                      |                |   |
| 26.7  | -                   |                  |   |                            |                         |                             |             |                 |                                |                           |                        |  |                      |                |   |
|   | <u>Sa</u>           | mple Ty          |   |                            |                         |                             |             |                 |                                | ncy vs Blo                | wcount/F               |  |                      | _              | ster Classification   |
| AS - Auge<br>CS - Califo<br>BQ - 1.5" I<br>NQ - 2" Ro | ornia Sa<br>Rock Co | mpler s          | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Ged | nple<br>t Spoor<br>lby Tul | n ,                     | V. Loos<br>Loose:<br>M. Den | se: C       | )-4 E<br>-10 V  | (Sand):<br>Dense:<br>/. Dense: | 30-50<br>>50              | V. Soft:               | Grained (Clay):<br><2 Stiff:<br>2-4 V. Stiff:<br>4-8 Hard: | 8-15<br>15-30<br>>30 | so<br>lit<br>t | nd 35-50%<br>ome 20-35%<br>ttle 10-20%<br>race <10%<br>ture, density, color |
| Dovio   | wed b               | v:               |   |                            |                         |                             |             |                 | Da                             | ite:                      |                        | Boring   | Numb                 | er: B          | -31   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Number: 101038-102170 Project Location:** Massachusetts

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 85 Central St., Waltham, MA Northing: 2961885.9469 Easting: 728253.0253

**Drilling Date: Start:** 11/30/2017 **End:** 11/30/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Reviewed by:

Surface Elevation (ft.): 67.25

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth Date NE 11/30/2017

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-32** 

13:30

|   | ,                   |                  |   |                            |                         |                             |  |                 | Logged By: A. Smith  |   |
|---|---------------------|------------------|---|----------------------------|-------------------------|-----------------------------|--|-----------------|--|---|
| Elev.<br>Depth<br>(ft)                              | Sample<br>Type      | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log                              | Strata          | Material Description   | Remarks   |
| 0   |                     |                  |   |                            |                         |                             | 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1 |                 | 36" Topsoil  |   |
|   |                     |                  |   |                            |                         |                             | ·715.7                                   |                 |  |   |
|   | VE                  | V-1              | 6   |                            |                         |                             | <u>1</u> 2. <u>3.12</u> .                |                 |  |   |
| <br>- <u>62.3</u> -                                 | -                   |                  |   |                            |                         |                             |  | Ē               | Moist, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt                | Analytical sample (2'-2.5')   |
|   | SS                  | S-1              | 4   | 100/4"                     | 4                       |                             |  |                 | Moist, very dense, brown, fine to coarse   | Corrosion sample  |
|   |                     |                  |   |                            |                         |                             |  |                 | SAND and fine to coarse GRAVEL, trace silt   | (6'-6.3')   |
| <br>  | SS                  | S-2              | 24  | 18<br>38<br>66<br>60       | 10                      | >100                        |  | Ь               | Moist, very dense, brown, fine to coarse<br>SAND and fine to coarse GRAVEL, trace silt |   |
| - <u>57.3</u>                                       | -                   |                  |   |                            |                         |                             |  | Sand and Gravel |  |   |
| <u>52.3</u><br>15                                   | - SS                | S-3              | 24  | 14<br>90<br>48<br>60       | 9                       | >100                        |  |                 | Moist, very dense, brown, fine to coarse<br>SAND and fine to coarse GRAVEL, trace silt |   |
| <br>  |                     |                  |   |                            |                         |                             |  |                 | Test boring B-32 terminated at 16' bgs and backfilled with soil cuttings.              |   |
| 47.3  | 1                   |                  |   |                            |                         |                             |  |                 |  |   |
| 41.3  | Sa                  | ample Ty         | pes   | l                          |                         |                             |  |                 | Consistency vs Blowcount/Foot Burn   | nister Classification   |
| AS - Auge<br>CS - Califo<br>BQ - 1.5"<br>NQ - 2" Ro | ornia Sa<br>Rock Co | ampler S         | V - Vac<br>Sam<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spooi<br>lby Tul | 1                       | V. Loos<br>Loose:<br>M. Den | se: 0                                    | -4 [<br>10 \    | Dense: 30-50 V. Soft: <2 Stiff: 8-15<br>/ Dense: >50 Soft: 2-4 V. Stiff: 15-30         | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>sture, density, color |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D. Bore Hole Location: 58 Central St./ 40 Appleton St., Waltham, MA

Northing: 2961982.2488 Easting: 728675.3252

**Drilling Date: Start:** 10/17/2017 **End:** 10/17/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 65.84

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth Date Time NE 10/17/2017 13:50

Abandonment Method: Backfilled with soil cuttings

|                         |  |                  |                       |                         |                         |         |             |                 |                    | Lo                                | gged E                 | By: A. Smith                              |                       |   |
|-------------------------|--|------------------|-----------------------|-------------------------|-------------------------|---------|-------------|-----------------|--------------------|-----------------------------------|------------------------|---|-----------------------|---|
| Elev.<br>Depth<br>(ft)  | Sample<br>Type   | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches   | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata          |                    | Materia                           | l Desci                | ription                                   |                       | Remarks   |
| 05.6                    |  |                  |                       |                         |                         |         |             |                 | 4" Asp             | halt                              |                        |   |                       |   |
| -                       | SS   | S-1              | 18                    | 36<br>36<br>52          | 8                       | 88      |             | Fill            | Moist,             | very dense, b                     |                        | fine to coarse<br>se gravel, little silt  |                       |   |
| -                       | SS   | S-2              | 24                    | 38<br>96<br>64<br>70    | 15                      | >100    |             |                 |                    |                                   |                        | fine to coarse<br>se SAND, trace sil      | lt                    | Analytical sample (2'-4')   |
| 60.8                    | ss   | S-3              | 10                    | 79<br>100/4"            | 10                      | >100    |             |                 | Moist,<br>GRAV     | very dense, b<br>EL and fine to   | rown,<br>o coars       | fine to coarse<br>se SAND, trace si       | lt                    |   |
| -                       | SS   | S-4              | 6                     | 100/6"                  | 6                       | >100    |             |                 | Moist,<br>GRAV     | very dense, b<br>EL and fine to   | rown,<br>o coars       | fine to coarse<br>se SAND, trace sil      | lt                    |   |
| 55.8<br>10              | SS   | S-5              | 18                    | 54<br>76<br>100         | 10                      | >100    |             | Sand and Gravel | Moist,<br>GRAV     | very dense, b<br>EL and fine to   | rown,<br>o coars       | fine to coarse<br>se SAND, trace sil      | lt                    |   |
| 50.8<br>15              | - SS   | S-6              | 24                    | 50<br>100<br>100<br>100 | 0                       | >100    |             |                 | GRAV               | EL and fine to                    | o coar                 | fine to coarse<br>se SAND, trace sil      | lt                    |   |
| -<br>-<br>-             | -  |                  |                       |                         |                         |         |             |                 |                    | oring B-33 ter<br>led with soil c |                        | ed at 16' bgs and                         |                       |   |
| 45.8                    |  |                  |                       |                         |                         |         |             |                 |                    |                                   |                        |   |                       |   |
| CS - Calif<br>3Q - 1.5" | S - California Sampler Q - 1.5" Rock Core Q - 2" Rock Core GP - Geoprobe  Sample V. Loose: 0 Loose: 4 M. Dense: 11 |                  |                       |                         |                         |         |             |                 | Sand):<br>ense: 30 | y vs Blowcour                     | ine Gra<br>: <2<br>2-4 | ained (Clay): Stiff: 8-15 V. Stiff: 15-30 | ar<br>sc<br>lit<br>tr | ster Classification and 35-50% ane 20-35% atle 10-20% ace <10% acre, density, color |
| Revie                   | wed b  | oy:              |                       |                         |                         |         |             |                 | Date               | e:                                |                        | Boring Numb                               | er: B                 | -33   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 41 Central St./Cross St., Waltham, MA

Northing: 2962009.9284 Easting: 728929.5735 **Drilling Date: Start:** 10/17/2017 **End:** 10/17/2017 Surface Elevation (ft.): 65.67

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth Date NE 10/17/2017

Abandonment Method: Backfilled with soil cuttings

09:45

|  | ,                                |                        | -,,   |                            |                         |                             |             |                          |        |                           | Log                       | ged B            | sy: A. Smith                                       |               |  |
|--|----------------------------------|------------------------|---|----------------------------|-------------------------|-----------------------------|-------------|--------------------------|--------|---------------------------|---------------------------|------------------|--|---------------|--|
| Elev.<br>Depth<br>(ft)                 | Sample<br>Type                   | Sample<br>Number       | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata                   |        |                           | Material [                | Descr            | iption   |               | Remarks  |
| 0                                      |                                  |                        |   |                            |                         |                             |             |                          | 8      | " Asphalt                 |                           |                  |  |               | Vacuum excavate  |
|  | VE                               | V-1                    |   |                            |                         |                             |             |                          |        |                           | n, fine to o              |                  | e SAND, some fi                                    | ne            | boring from the ground surface to 6' bgs.  Analytical sample (2'-2.5')         |
| 60.7                                   | - VE                             | V-2                    |   |                            |                         |                             |             |                          | , c    | ∕loist, brow<br>oarse GR  | n, fine to o              | coars<br>ce silt | e SAND and fine                                    | to            |  |
|  | SS                               | S-1                    | 18  | 72<br>75<br>100            | 12                      | >100                        |             | avel                     | N<br>S | Moist, very<br>SAND and   | dense, bro<br>fine to coa | own,<br>arse (   | fine to coarse<br>GRAVEL, trace si                 | ilt           | Corrosion sample (6'-7.5')   |
|  | SS                               | S-2                    | 18  | 45<br>66<br>100            | 14                      | >100                        |             | Sand and Gravel          | N<br>S | loist, very<br>SAND and   | dense, bro<br>fine to coa | own, arse (      | fine to coarse<br>GRAVEL, trace s                  | ilt           |  |
| - 55.7<br><br><br>50.7                 | 20                               | 6.2                    | 24  | 80<br>90                   | 12                      | >100                        |             |                          |        |                           |                           |                  | fine to coarse<br>GRAVEL, trace s                  | ilt           |  |
| 50.7                                   | SS                               | S-3                    | 24  | 100                        | 13                      | >100                        |             |                          | T<br>b | est boring<br>ackfilled w | B-34 term                 | ninate<br>tings  | ed at 16' bgs and                                  |               |  |
| 45.7<br>AS - Auge                      | Se                               | ımple Ty               | pes   |                            |                         |                             |             |                          | Cons   | istency vs                | Blowcount                 | /Foot            |  | Burm          | ister Classification   |
| 2 CS - Calif<br>BQ - 1.5"<br>NO - 2" R | er/Grab S<br>ornia Sa<br>Rock Co | Sample<br>mpler<br>ore | V - Vac<br>Sam<br>SS - Spli<br>ST - She<br>SP - Ged | nple<br>t Spoor<br>lby Tub | n<br>ne                 | V. Loos<br>Loose:<br>M. Den | se: 0       | anular<br>)-4 C<br>-10 V |        | <u>):</u><br>30-50        |                           |                  | ined (Clay): Stiff: 8-15 V. Stiff: 15-30 Hard: >30 | a<br>Si<br>li | nd 35-50%<br>ome 20-35%<br>title 10-20%<br>trace <10%<br>sture, density, color |
| Revie                                  | wed b                            | y:                     |   |                            |                         |                             |             |                          |        | Date:                     |                           |                  | Boring Numb  | er: B         | -34  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Number: 101038-102170 Project Location:** Massachusetts

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 4 Central St./Newton St., Waltham, MA

Northing: 2962067.6581 Easting: 729417.6995 **Drilling Date: Start:** 10/19/2017 **End:** 10/19/2017 Surface Elevation (ft.): 66.47

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

Depth Date Time ΝE 10/19/2017 11:45

| Drilling  | Date.                            | Start: 10        | 0/ 19/20  | 17 6                       | iu. it                  | J/ 19/20                    | )   /       |                            | Logged E  | By: A. Smith                                | , and the second |
|---|----------------------------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|----------------------------|---|---|--|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type                   | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata                     | Material Desci  | ription                                     | Remarks  |
| 0   |                                  |                  |   |                            |                         |                             |             |                            | 6" Asphalt  |   |  |
|   | SS                               | S-1              | 18  | 60<br>40<br>34             | 12                      | 74                          |             |                            | Moist, very dense, brown, SAND, some fine to coars  | e gravel, little silt                       |  |
|   | SS                               | S-2              | 18  | 60<br>98<br>100            | 12                      | >100                        |             |                            | Moist, very dense, brown-<br>SAND and fine to coarse  | gray, fine to coars<br>GRAVEL, trace si     | Se Analytical sampl<br>ilt (2'-3.5')   |
| 61.5<br>5   | SS                               | S-3              | 2   | 100/2"                     | 1                       |                             |             |                            | Moist, very dense, brown-<br>SAND and fine to coarse (  | gray, fine to coars<br>GRAVEL, trace si     | se<br>ilt  |
| -<br>   | SS                               | S-4              | 9   | 66<br>100/3"               | 8                       | >100                        |             | ravel                      | Moist, very dense, brown-SAND and fine to coarse  | gray, fine to coars<br>GRAVEL, trace si     | Se Corrosion sample (6'-6.75')   |
| _ <u>56.5</u> _ 10                                | SS                               | S-5              | 4   | 100/4"                     | 4                       |                             |             | Sand and Gravel            | Moist, very dense, brown-<br>SAND and fine to coarse of   | gray, fine to coars<br>GRAVEL, trace si     | se<br>ilt  |
| <br><br>- <u>51.5</u> -<br>15                     | - SS                             | S-6              | 24  | 40<br>45<br>38<br>28       | 18                      | 83                          |             |                            | No Recovery 3 in: Moist, very dense, bro coarse SAND and fine to o  | own-gray, fine to<br>coarse GRAVEL,         | Drove 3" spoon.  |
| <br>  | -                                |                  |   |                            |                         |                             | , •, •[ • ) |                            | Test boring B-35 terminate backfilled with soil cuttings  | ed at 16' bgs and                           |  |
| 46.5  |                                  |                  |   |                            |                         |                             |             |                            |   |   |  |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | er/Grab S<br>ornia Sa<br>Rock Co | mpler<br>ore S   | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tul | n<br>ne                 | V. Loos<br>Loose:<br>M. Den | se: 0       | nular (<br>1-4 D<br>1-10 V | Consistency vs Blowcount/Foot           Sand):         Fine Gra           ense:         30-50         V. Soft:         <2 | stiff: 8-15<br>V. Stiff: 15-30<br>Hard: >30 | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>moisture, density, color   |
| Revie   | wed b                            | y:               |   |                            |                         |                             |             |                            | Date:   | Boring Numb                                 | per: B-35  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Number: 101038-102170 Project Location:** Massachusetts

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 22 Townsend St., Waltham, MA Northing: 2962336.1513 Easting: 729714.3343 **Drilling Date: Start:** 10/19/2017 **End:** 10/19/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 66.06

Total Depth (ft.): 15.3

Depth to Initial Water Level (ft): Depth Date Time

10/19/2017 Abandonment Method: Backfilled with soil cuttings

14:00

ΝE

| Dillilling  | J Date.              | Start: 10        | 0/ 19/20  | 17 6                       | ilu. it                 | J/ 19/20                      | J17         |                |  | Logged E                                    | By: A. Smith                       | , and the second |
|---|----------------------|------------------|---|----------------------------|-------------------------|-------------------------------|-------------|----------------|--|---|------------------------------------|--|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type       | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                       | Graphic Log | Strata         | Ma   | terial Desc                                 | ription                            | Remarks  |
| 0   |                      |                  |   |                            |                         |                               | XXXX        |                | 4" Asphalt                                       |   |                                    |  |
| -   | SS                   | S-1              | 18  | 16<br>16<br>10             | 8                       | 26                            |             | ≣              | Moist, medium<br>SAND, some fir                  | dense, gra<br>ne gravel, t                  | y, fine to coarse<br>race silt     |  |
| -   | - ss                 | S-2              | 24  | 8<br>4<br>5<br>5           | 12                      | 9                             |             |                | Moist, loose, bro<br>trace silt                  | own, fine t                                 | o medium SAND,                     | Analytical sample (2'-4')  |
| 61.1<br>5   | - ss                 | S-3              | 24  | 5<br>3<br>11<br>21         | 14                      | 14                            |             | Sand           | Moist, medium<br>SAND, trace fin                 |   | own, fine to coarse<br>race silt   |  |
| -   | - ss                 | S-4              | 24  | 31<br>34<br>34<br>38       | 16                      | 68                            |             |                | Moist, very dens<br>SAND, trace sil              |   | fine to medium                     |  |
|   |                      |                  |   |                            |                         |                               |             |                |  |   |                                    |  |
| <u>56.1</u><br>10                                 | - SS                 | S-5              | 24  | 54<br>46<br>42<br>46       | 5                       | 88                            |             | ıvel           | Moist, very dens<br>SAND and fine<br>little silt | se, brown,<br>to coarse                     | fine to coarse<br>GRAVEL, trace to | )  |
| -   |                      |                  |   |                            |                         |                               |             | Sand and Grave |  |   |                                    |  |
| <u>51.1</u><br>15                                 | SS                   | S-6              | 15  | 36<br>36<br>100/3"         | 5                       | >100                          |             |                | Moist, very dens<br>SAND and fine<br>little silt |   | fine to coarse<br>GRAVEL, trace to | 1  |
|   |                      |                  |   |                            |                         |                               |             |                | _  | 6 terminate<br>oil cuttings                 | ed at 15.3' bgs and                | d  |
| -   | 1                    |                  |   |                            |                         |                               |             |                |  |   |                                    |  |
| -   | 4                    |                  |   |                            |                         |                               |             |                |  |   |                                    |  |
| 46.1  |                      |                  |   |                            |                         | L                             |             |                |  |   |                                    |  |
|   | Sa                   | ample Ty         |   |                            |                         |                               |             |                | Consistency vs Blow                              | /count/Foot                                 |                                    | Burmister Classification   |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | fornia Sa<br>Rock Co | ampler S         | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Ged | nple<br>t Spooi<br>lby Tul | n<br>ne                 | V. Loose:<br>Loose:<br>M. Der | se: 0       | 1-4 D<br>10 V  | . Dense: >50 S                                   | Fine Gra  . Soft: <2 oft: 2-4 1. Stiff: 4-8 |                                    | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>moisture, density, color   |
| Revie   | wed k                | y:               |   |                            |                         |                               |             |                | Date:  |   | Boring Numb                        | er: B-36   |
|   |                      |                  |   |                            |                         |                               |             |                |  |   |                                    |  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 99 Chamberlain Terrace, Waltham, MA

Northing: 2962447.3562 Easting: 730136.9483 **Drilling Date: Start:** 10/18/2017 **End:** 10/18/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 65.28

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth Date

10/18/2017 Abandonment Method: Backfilled with soil cuttings

14:00

ΝE

|                                      |                |                  |                             |                       |                         |                  |                |                | Logged By: A. Smith  |  |
|--------------------------------------|----------------|------------------|-----------------------------|-----------------------|-------------------------|------------------|----------------|----------------|--|--|
| Elev.<br>Depth<br>(ft)               | Sample<br>Type | Sample<br>Number | Sample<br>Length (in)       | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value          | Graphic Log    | Strata         | Material Description   | Remarks                                |
| 00.0                                 |                |                  |                             |                       |                         |                  | XXXX           |                | 4" Asphalt   | Vacuum excavate                        |
|                                      | ]              |                  |                             |                       |                         |                  | $\bowtie$      | ≣              | Moist, brown, fine to coarse SAND, some fi                                       | ne boring from the ground surface to   |
|                                      |                |                  |                             |                       |                         |                  |                |                | to coarse gravel, little silt  | 6' bgs.                                |
| -                                    | VE             | V-1              |                             |                       |                         |                  |                |                | Moist, brown, fine to medium SAND, little fir                                    | ne Analytical sample                   |
| -                                    |                |                  |                             |                       |                         |                  |                |                | to coarse gravel, trace silt   | (2'-2.5')                              |
| - <del>-</del>                       |                |                  |                             |                       |                         |                  |                |                |  |  |
| 60.3                                 |                |                  |                             |                       |                         |                  |                |                |  |  |
| 5                                    | 1              |                  |                             |                       |                         |                  |                | 1              |  |  |
| -                                    |                |                  |                             | 34                    |                         |                  |                |                | Moist, very dense, gray to brown, fine to  |  |
|                                      |                | 0.4              |                             | 36                    |                         |                  |                | Sand           | medium SAND, little fine gravel, trace silt                                      |  |
| -                                    | SS             | S-1              | 24                          | 32                    | 3                       | 68               |                | , ,            |  |  |
| -                                    |                |                  |                             | 26<br>24              |                         |                  |                |                | Moist, dense, gray to brown, fine to medium                                      | 1                                      |
| _                                    | ss             | S-2              | 24                          | 18                    | 10                      | 40               |                |                | SAND, little fine gravel, trace silt   |  |
| EE 2                                 |                | 0-2              |                             | 22<br>20              | 10                      | 40               |                |                |  |  |
| <u>55.3</u><br>10                    |                |                  |                             |                       |                         |                  |                |                |  |  |
| -                                    | -              |                  |                             |                       |                         |                  |                |                |  |  |
|                                      |                |                  |                             |                       |                         |                  | /              |                |  |  |
| -                                    |                |                  |                             |                       |                         |                  | 4:0            |                |  |  |
| -                                    | 1              |                  |                             |                       |                         |                  |                | avel           |  |  |
| _                                    |                |                  |                             |                       |                         |                  |                | Sand and Grave |  |  |
| E0 2                                 |                |                  |                             | 60<br>60              |                         |                  |                | d an           | Wet, very dense, brown, fine to coarse SAN and fine to coarse GRAVEL, trace silt | ID                                     |
| 50.3<br>15                           | SS             | S-3              | 24                          | 55                    | 8                       | >100             |                | San            | and into to obtained on the LE, trade one  |  |
| -                                    |                |                  |                             | 86                    |                         |                  | <u>;;;;;</u>   |                | Test boring B-37 terminated at 16' bgs and                                       |  |
|                                      |                |                  |                             |                       |                         |                  |                |                | backfilled with soil cuttings.   |  |
| -                                    | 1              |                  |                             |                       |                         |                  |                |                | ·  |  |
| -                                    |                |                  |                             |                       |                         |                  |                |                |  |  |
| _                                    | ]              |                  |                             |                       |                         |                  |                |                |  |  |
| 45.0                                 |                |                  |                             |                       |                         |                  |                |                |  |  |
| 45.3                                 | ⊥ Sa           | ample Ty         | pes                         |                       |                         |                  |                |                | Consistency vs Blowcount/Foot  | Burmister Classification               |
| AS - Auge                            |                |                  | V - Vac                     |                       | ıb                      |                  | Gra            | anular         |  | and 35-50%                             |
| AS - Auge<br>CS - Calif<br>3Q - 1.5" | ornia Sa       | ampler S         | Sam<br>SS - Spli<br>T - She | nple<br>t Spoor       | n                       | V. Loos          | se: 0          | )-4 C          | ense: 30-50 V. Soft: <2 Stiff: 8-15  | some 20-35%<br>little 10-20%           |
| NQ - 2" R                            |                | e S              | ST - She<br>SP - Geo        | lby Tul<br>probe      | ре                      | Loose:<br>M. Der | -4-<br>nse: 10 |                | Dense: >50   Soft: 2-4 V. Stiff: 15-30 M. Stiff: 4-8 Hard: >30                   | trace <10%<br>moisture, density, color |
| Revie                                | wed b          | ov:              |                             |                       |                         |                  |                |                | Date: Boring Numb  | er: B-37                               |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Number: 101038-102170 Project Location:** Massachusetts

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 401 Main St., Waltham, MA Northing: 2962860.4893 Easting: 730274.4037

**Drilling Date: Start:** 10/18/2017 **End:** 10/18/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 57.74

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth Date Time 8.5 10/18/2017 09:55

|   | , Duto.        | Start: 10        | 0/10/20   | '1 <i>'</i>                | iiu. 10                 | 0/ 10/20                    | 017         |                 |  | Logged                                   | By: A. Smith            | <b>.</b>   |
|---|----------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|-----------------|--|--|-------------------------|--|
| Elev.<br>Depth<br>(ft)                              | Sample<br>Type | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata          |  | Material Desc                            | ription                 | Remarks  |
| 0   |                |                  |   |                            |                         |                             |             |                 | 8" Aspha   | lt                                       |                         | Vacuum excavate  |
| -   |                |                  |   |                            |                         |                             |             | Ē               | some fine  | e to coarse sand                         | coarse GRAVEL           | 6' bgs. Boulders and cobbles from 1 to 3' bgs.                                       |
|   | VE             | V-1              |   |                            |                         |                             |             |                 |  | own, fine to med<br>gravel, trace silt   | ium SAND, little fin    | ne Analytical sample (3'-3.5')   |
| <u>52.7</u> -                                       |                |                  |   | 36                         |                         |                             |             | Sand            |  | / dense, brown, 1                        |                         | Analytical sample  |
| -   | SS             | S-1              | 24  | 30<br>26<br>30             | 10                      | 56                          |             |                 | SAND, tr   | ace silt                                 |                         | (6'-8')  |
| <b>▼</b><br>-                                       | SS             | S-2              | 24  | 32<br>40<br>44<br>45       | 8                       | 84                          |             | Gravel          |  | / dense, brown, f<br>e gravel, trace sil | ine to coarse SAN       | ND,  |
| 47.7<br>10  |                |                  |   |                            |                         |                             |             | Sand and Gravel |  |  |                         |  |
| -   |                |                  |   | 22                         |                         |                             |             | Sandy Silt      |  | d, brown, SILT, t                        | race fine to mediu      | m  |
| 42.7<br>15  | SS             | S-3              | 24  | 30<br>34<br>40             | 16                      | 64                          |             | Ø               | sand   |  |                         |  |
| -   |                |                  |   |                            |                         |                             |             |                 |  | ng B-38 terminat<br>I with soil cutting  | ed at 16' bgs and<br>s. |  |
| 37.7  |                |                  |   |                            |                         |                             |             |                 |  |  |                         |  |
|   | <u>Sa</u>      | ample Ty         |   |                            |                         |                             |             |                 |  | vs Blowcount/Foo                         |                         | Burmister Classification   |
| AS - Auge<br>CS - Califo<br>BQ - 1.5"<br>NQ - 2" Ro | Rock Co        | ampler<br>ore    | V - Vac<br>Sam<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tul | n<br>ne                 | V. Loos<br>Loose:<br>M. Der | se: 0       | )-4 E<br>·10 V  | ( <u>Sand):</u><br>Dense: 30-50<br>/. Dense: >50 | 0 V. Soft: <2                            |                         | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>moisture, density, color |
| Revie   | wed b          | oy:              |   |                            |                         |                             |             |                 | Date:  |  | Boring Numb             | er: B-38   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / M. Ferreira

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

Bore Hole Location: 50 Linden St., Waltham, MA Northing: 2963203.1720 Easting: 730823.592

**Drilling Date: Start:** 10/23/2017 **End:** 10/23/2017

Surface Elevation (ft.): 50.99

Total Depth (ft.): 17

Depth to Initial Water Level (ft):

**Depth Date Time** 11.8 10/23/2017 13:45

Abandonment Method: Backfilled with soil cuttings

|   | ,                                |                  |   |                            |                         |                             |  |                        | Logged By: A. Smith   |  |
|---|----------------------------------|------------------|---|----------------------------|-------------------------|-----------------------------|--|------------------------|---|--|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type                   | Sample<br>Number | Sample<br>Length (in)                             | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log                                  | Strata                 | Material Description  | Remarks  |
| 0   |                                  |                  |   |                            |                         |                             |  |                        | 5" Asphalt  |  |
|   | SS                               | S-1              | 18  | 46<br>65<br>54             | 6                       | >100                        |  | sravel                 | Moist, very dense, brown, fine to coarse SAND, some fine gravel, little silt  |  |
|   | SS                               | S-2              | 24  | 32<br>25<br>22<br>14       | 3                       | 47                          |  | Sand and Gravel        | Moist, dense, brown, fine to coarse SAND, some fine gravel, little silt   | Analytical sample (2'-4')  |
| 46.0<br>5   | SS                               | S-3              | 24  | 12<br>6<br>6<br>6          | 14                      | 12                          |  |                        | Moist, medium dense, brown, fine to medium SAND, trace silt   |  |
|   | SS                               | S-4              | 24  | 10<br>10<br>8<br>7         | 14                      | 18                          |  |                        | Moist, medium dense, brown, fine to medium SAND, trace silt   | Corrosion sample (6'-8')   |
| <br>- <u>41.0</u> -                               | - SS                             | S-5              | 24  | 4<br>8<br>5<br>6           | 12                      | 13                          |  | Sand                   | Moist, medium dense, brown, fine to coarse SAND, little fine gravel, trace silt   |  |
| - <u>*</u> -                                      | -                                |                  |   |                            |                         |                             |  |                        |   |  |
| _ <u>36.0</u> -<br>15 -                           | SS                               | S-6              | 24  | 12<br>12<br>15<br>18       | 8                       | 27                          |  | Sandy Silt             | Top 1": Moist, medium dense, brown, fine to medium SAND, trace silt Bottom 7": Wet, very stiff, brown, SILT, trace fine to medium sand            |  |
| <br><br>  |                                  |                  |   |                            |                         |                             | <u>                                     </u> | , 0,                   | Test boring B-39 terminated at 17' bgs and backfilled with soil cuttings.   |  |
| 31.0  |                                  |                  |   |                            |                         |                             |  |                        | Consistant Plants and France  | Dumminton Olera (filare)   |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | er/Grab S<br>ornia Sa<br>Rock Co | impler<br>ore S  | V - Vac<br>San<br>SS - Spli<br>T - She<br>P - Ged | nple<br>t Spoor<br>lby Tul | n<br>ne                 | V. Loos<br>Loose:<br>M. Den | se: 0  | nular<br>1-4 C<br>10 V | Consistency vs Blowcount/Foot         E           (Sand):         Fine Grained (Clay):           Jense:         30-50         V. Soft:         <2 | and 35-50% some 20-35% little 10-20% trace <10% moisture, density, color |
| Revie   | wed b                            | y:               |   |                            |                         |                             |  |                        | Date: Boring Number   | r: B-39  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / D. Jacobs

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 74 Linden St., Waltham, MA Northing: 2963369.1110 Easting: 731109.016

**Drilling Date: Start:** 1/11/2018 **End:** 1/11/2018

Surface Elevation (ft.): 43.17

Total Depth (ft.): 21

Depth to Initial Water Level (ft): Depth Date Time 5.2 1/11/2018 15:00

Abandonment Method: Backfilled with soil cuttings

|   | Dutc.                           | Start. 1/        |   |                            | <b>4.</b> 17.1          |                             | ,           |                            | Logged By: D. Abt   |   |
|---|---------------------------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|----------------------------|---|---|
| Elev.<br>Depth<br>(ft)                              | Sample<br>Type                  | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata                     | Material Description  | Remarks   |
| 43.2<br>0   |                                 |                  |   | 98                         |                         |                             | XXXX        |                            | 2" Asphalt  |   |
| -   | SS                              | S-1              | 24  | 70<br>44<br>13             | 5                       | >100                        |             | _                          | Dry, very dense, brown, fine to coarse SAND, trace silt   |   |
| -   | ss                              | S-2              | 24  | 18<br>14<br>10<br>14       | 4                       | 24                          |             | ∄                          | Moist, medium dense, brown, fine to coarse SAND, trace fine gravel, trace silt                            |   |
| 38.2  | SS                              | S-3              | 24  | 19<br>24<br>27<br>20       | 2                       | 51                          |             | Gravel                     | Moist, very dense, brown, fine to coarse<br>GRAVEL, some fine to coarse sand, little silt                 |   |
| -   | SS                              | S-4              | 24  | 12<br>20<br>18             | 5                       | 38                          |             | Sand and Gravel            | Wet, dense, brown, fine to coarse SAND and fine to coarse GRAVEL, little silt                             |   |
| 33.2<br>10  | SS                              | S-5              | 24  | 13<br>26<br>15<br>11<br>22 | 8                       | 26                          |             |                            | Wet, very stiff, brown, SILT, little fine to medium sand, trace fine gravel                               | Analytical sample (8'-10')  |
| 28.2<br>15  | - SS                            | S-6              | 24  | 23<br>25<br>27<br>22       | 18                      | 52                          |             | Sandy Silt                 | Wet, hard, gray, SILT, trace fine sand  |   |
| 23.2<br>20  | - SS                            | S-7              | 24  | 10<br>15<br>16<br>19       | 20                      | 31                          |             |                            | Moist, hard, gray, SILT, little fine sand   |   |
| -<br>-<br>-   | -                               |                  |   |                            |                         |                             | P 1 1 1 1 · |                            | Test boring B-40 terminated at 21' bgs and backfilled with soil cuttings.                                 |   |
| 18.2  |                                 |                  |   |                            |                         |                             |             |                            |   |   |
| AS - Auge<br>CS - Califo<br>BQ - 1.5"<br>NQ - 2" Ro | r/Grab S<br>ornia Sa<br>Rock Co | mpler S          | V - Vac<br>Sam<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tub | n ,                     | V. Loos<br>Loose:<br>M. Der | se: 0       | anular (<br>)-4 C<br>-10 V | (Sand): Fine Grained (Clay): Dense: 30-50 V. Soft: <2 Stiff: 8-15 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30 | and 35-50% some 20-35% little 10-20% trace <10% obsture, density, color |
| Revie   | wed b                           | y:               |   |                            |                         |                             |             |                            | Date: Boring Number:  | B-40  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / P. Fisher **Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

**Drilling Date: Start:** 11/21/2017 **End:** 11/21/2017

Surface Elevation (ft.): 41.3

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

 Depth
 Date
 Time

 4.1
 11/21/2017
 12:30

Abandonment Method: Backfilled with soil cuttings

| Moist, brown, fine to coarse SAND and fine to coarse GRAVEL, little silt boring from the coarse GRAVEL, little silt boring from the coarse GRAVEL, little silt boring from the ground surface of bgs. Analytical sample (2-2.5)  Wet, brown, fine to medium SAND, little silt, trace fine gravel Wet, dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt  Wet, dense, brown, fine to coarse SAND, little silt, trace fine gravel Wet, dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt  Wet, dense, gray, fine to SAND, little silt  Wet, dense, gray, fine to SAND, little silt  Wet, dense, gray, fine to SAND, little silt  Test boring B-41 terminated at 16' bgs and backfilled with soil cuttings.  As - Auger/Grab Sample Types  As - Auger/Grab Sample Sample Sample Sample Sample GRAVEL, spill Spoon ST. Shelby boring St. Shelby Soon St. Shelby Bornes St. Shelby Soon St. Shelby Bornes | _  |   |                  |                       |                       |                         |         |             |                          | Logged By: A. Smith   |
|--|--|---|------------------|-----------------------|-----------------------|-------------------------|---------|-------------|--------------------------|---|
| VE   V-1   | Depth<br>(ft)                            | Sample<br>Type  | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata                   | Material Description Remarks  |
| ■ SS S-1 24 17 12 34 16 Wet, dense, prown, fine to medium SAND, little silt, trace fine gravel Wet, dense, prown, fine to coarse SAND and fine to coarse GRAVEL, trace silt  ■ SS S-2 24 16 18 33 20 Wet, dense, prown, fine to SAND, little silt  ■ SS S-2 24 16 18 33 31.3 10 Wet, dense, gray, fine to SAND, little silt  ■ Wet, dense, gray, fine to SAND, little silt  ■ Wet, dense, gray, fine to SAND, little silt  ■ Wet, dense, gray, fine to SAND, little silt  ■ Wet, dense, gray, fine to SAND, little silt  ■ Wet, dense, gray, fine to SAND, little silt  ■ Test boring B-41 terminated at 16' bgs and backfilled with soil cuttings.  ■ Test boring B-41 terminated at 16' bgs and backfilled with soil cuttings.  ■ AS-Auger/Grab Sample   | 0  | VE  | V-1              |                       |                       |                         |         |             | iii                      | Moist, brown, fine to coarse SAND and fine to coarse GRAVEL, little silt  boring from the ground surface to 6' bgs. Analytical sample |
| SS   S-2   24   16   |  | -   | •                |                       |                       |                         |         |             |                          | (2-2.3)   |
| SS   S-2   24   16   | - <u>36.3</u> -<br>                      |   |                  |                       |                       |                         |         |             | and and Grave            | trace fine gravel (5.5'-6') Wet dense brown fine to coarse SAND and Corrosion sample  |
| Note   |  |   |                  |                       | 16<br>12<br>17        |                         |         |             | Ö                        | fine to coarse GRAVEL, trace silt   |
| Sample Types   Consistency vs Blowcount/Foot   Burmister Classification  | - <u>31.3</u>                            | -   |                  |                       | 1                     |                         |         |             | Silty Sand               |   |
| 21.3  Sample Types  Consistency vs Blowcount/Foot  AS - Auger/Grab Sample CS - California Sampler BQ - 1.5" Rock Core NQ - 2" Rock Core NQ |  | - SS  | S-3              | 24                    | 8<br>9                | 16                      | 17      |             |                          | silt  |
| CS - California Sampler BQ - 1.5" Rock Core NQ - 2" Rock Core GP - Geoprobe  V. Loose: 0-4 Dense: 30-50 Loose: 4-10 V. Dense: >50 M. Dense: 10-30  V. Soft: <2 Stiff: 8-15 Soft: 2-4 V. Stiff: 15-30 M. Stiff: 4-8 Hard: >30  Iiitle 10-20% M. Stiff: 4-8 Hard: >30  moisture, density, color  | <br>                                     | -   |                  |                       |                       |                         |         |             |                          | Test boring B-41 terminated at 16' bgs and backfilled with soil cuttings.   |
| CS - California Sampler BQ - 1.5" Rock Core NQ - 2" Rock Core GP - Geoprobe V. Loose: 0-4 Dense: 30-50 N. Soft: 2-2 Stiff: 8-15 little 10-20% M. Stiff: 4-8 Hard: >30 little 10-20% moisture, density, color   | 21.3                                     |   |                  |                       |                       | <u> </u>                |         |             |                          |   |
| Paviawad by:  Data:  Raring Number: P 44   | CS - Califo<br>BQ - 1.5" I<br>NQ - 2" Ro | 6 - Auger/Grab Sample<br>5 - California Sampler<br>0 - 1.5" Rock Core<br>1 - 2" Rock Core<br>1 - 2" Rock Core<br>2 - 1.5" Shelby Tube |                  |                       |                       |                         |         | se: 0       | anular<br>)-4 [<br>-10 \ | Sand   Fine Grained (Clay):   and   35-50%   some   20-35%  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / P. Fisher

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA

 $\textbf{Hammer Weight/Drop Height/ Spoon Size:} \quad 140 \text{ lb} \ / \ 30 \text{ in} \ / 2 \text{ in O.D.}$ 

**Bore Hole Location:** 168 Linden St., Waltham, MA **Northing:** 2963916.3760 **Easting:** 731917.682 **Drilling Date: Start:** 11/2/2017 **End:** 11/2/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 42.13

Total Depth (ft.): 21

Depth to Initial Water Level (ft):

Depth Date Time

3.2 11/2/2017 09:25 **Abandonment Method:** Backfilled with soil cuttings

|   |  |                  |   |                            |                         |                               |             |                 | Logged By: A. Smith  |   |
|---|--|------------------|---|----------------------------|-------------------------|-------------------------------|-------------|-----------------|--|---|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type                                 | Sample<br>Number | Sample<br>Length (in)                             | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                       | Graphic Log | Strata          | Material Description   | Remarks   |
| 0 -   | VE   | V-1              |   |                            |                         |                               |             | Sand and Gravel | 2" Asphalt Bottom 6": Moist, gray, fine to coarse SAND and fine GRAVEL, little silt  Moist, gray, fine to coarse SAND and fine | Vacuum excavate<br>boring from the<br>ground surface to<br>6' bgs.<br>Analytical sample |
| 37.1<br>5   |  | VI               |   |                            |                         |                               |             | Sand ar         | GRAVEL, little silt  | (3'-3.5')   |
| -   | ss   | S-1              | 24  | 13<br>2<br>2<br>2          | 3                       | 4                             |             |                 | Wet, soft, dark gray, Organic SILT   | Silty Sand is a potentialy varved deposit.  |
| 32.1<br>10  | ss   | S-2              | 24  | 2<br>10<br>15              | 12                      | 12                            |             |                 | Wet, stiff, dark gray, fine to medium SAND, some organic clayey silt, little fine gravel                                       | Corrosion sample (8'-10')   |
| -<br>-<br>-<br>-<br>27.1<br>15                    | - ss   | S-3              | 24  | 16<br>16<br>18<br>16       | 15                      | 34                            |             | Silty Sand      | Wet, dense, brown, SILT, trace fine sand   |   |
| -<br>-<br>-<br>-<br>-<br>20 -                     | - SS   | S-4              | 24  | 12<br>14<br>18<br>16       | 16                      | 32                            |             |                 | Wet, dense, brown, fine to medium SAND,<br>trace silt  |   |
| -<br>-<br>-                                       |  |                  |   |                            |                         |                               |             |                 | Test boring B-42 terminated at 21' bgs and backfilled with soil cuttings.  |   |
| 17.1  |  |                  |   |                            |                         |                               |             |                 |  |   |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | er/Grab S<br>fornia Sa<br>Rock Co<br>lock Core | impler Sore S    | V - Vac<br>Sam<br>S - Spli<br>T - She<br>GP - Geo | nple<br>t Spoor<br>lby Tub | n<br>ne                 | V. Loose:<br>Loose:<br>M. Der | se: 0       | nular<br>-4 C   | Sand):   Fine Grained (Clay):   ar   so  | me 20-35%<br>tle 10-20%<br>ace <10%<br>ure, density, color                              |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / M. Ferreira

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 3 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** 32 Waverly Oaks Rd., Waltham, MA **Northing:** 2964059.3675 **Easting:** 732508.0332

**Drilling Date: Start:** 10/26/2017 **End:** 10/27/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 43.5

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

Depth Date Time

5.3 10/26 14:10 **Abandonment Method:** Backfilled with soil cuttings

|   | ,              |                         | -,,   |                            |                         |                            |              |            |                             |                            | Logg                            | ed B                     | y: A. Smith                    |                    |         |                     |   |
|---|----------------|-------------------------|---|----------------------------|-------------------------|----------------------------|--------------|------------|-----------------------------|----------------------------|---------------------------------|--------------------------|--------------------------------|--------------------|---------|---------------------|---|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type | Sample<br>Number        | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                    | Graphic Log  | Strata     |                             |                            | Material Do                     | escri                    | iption                         |                    |         | Rei                 | narks   |
| 0   |                |                         |   | 3                          |                         |                            | 74 1/4 - 7/4 |            | Т                           | op 6": To                  | psoil                           |                          |                                |                    |         |                     |   |
|   | SS             | S-1                     | 24  | 4<br>5<br>6                | 12                      | 9                          |              | Fill       |                             |                            | Moist, loose<br>ne fine grav    |                          | own, fine to                   | coars              | se      |                     |   |
|   | SS             | S-2                     | 24  | 5<br>5<br>5<br>5           | 6                       | 10                         |              |            | V si                        | /et, medio<br>lt, trace fi | um dense, g<br>ne gravel        | jray,                    | fine SAND                      | , som              | е       | Analytic<br>(2'-4') | al sample                                     |
| 38.5  | - ss           | S-3                     | 24  | 3<br>3<br>4<br>8           | 4                       | 7                          |              | Silty Sand |                             |                            | , brown, fine<br>rganic fibers  |                          | coarse SAN                     | ID, litt           | le      |                     |   |
| -<br>-  | ss             | S-4                     | 24  | 3<br>23<br>66<br>60        | 12                      | 89                         |              |            | a                           | et, very ond fine to       | lense, brow<br>coarse GRA       | n, fir<br>AVE            | ne to coarse<br>L, little silt | e SAN              | ID      | Corrosio<br>(6'-8') | on sample                                     |
| 33.5<br>10  | SS             | S-5                     | 24  | 24<br>26<br>26<br>43       | 14                      | 52                         |              | Silty Clay |                             | /et, hard,<br>edium sa     | gray, Silty C<br>ınd            | CLAY                     | /, trace fine                  | to                 |         | PP = 2.             | 5 tsf   |
| · · · · · · · · · · · · · · · · · · ·             |                |                         |   |                            |                         |                            |              |            |                             |                            |                                 |                          |                                |                    |         |                     |   |
| 28.5<br>15  |                |                         |   |                            | 16                      | 70                         |              | Silty Sand | V                           | et, very o                 | lense, brow                     | n, fir                   | ne SAND, li                    | ttle sili          | t       |                     |   |
| · -   | -              |                         |   |                            |                         |                            |              |            | T<br>b                      | est borinç<br>ackfilled v  | g B-43 termi<br>vith soil cutti | nate<br>ings.            | d at 16' bgs                   | s and              |         |                     |   |
| 23.5  |                |                         |   |                            |                         |                            |              |            |                             |                            |                                 |                          |                                |                    |         |                     |   |
|   | Sa             | ample Ty                | pes   |                            |                         |                            |              |            | Consi                       | stency vs                  | Blowcount/F                     | oot                      |                                |                    | Burm    | ister Cla           | ssification                                   |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | Rock Co        | sample<br>ampler<br>ore | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tub | n<br>ne                 | V. Loo<br>Loose:<br>M. Der | se: 0        | -4 E       | (Sand)<br>Dense:<br>/. Dens | 30-50                      | V. Soft:<br>Soft:               | Grai<br><2<br>2-4<br>4-8 | V. Stiff: 1                    | -15<br>5-30<br>•30 | S<br>li | ome 20<br>ittle 10  | i-50%<br>)-35%<br>-20%<br>:10%<br>sity, color |
| Revie   | wed I          | oy:                     |   |                            |                         |                            |              |            |                             | Date:                      |                                 |                          | Boring N                       | lumb               | er: B   | 3-43                |   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / P. Fisher

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

Bore Hole Location: 68 Waverly Oaks Rd., Waltham, MA

Northing: 2964126.8030 Easting: 732954.263

Drilling Date: Start: 10/31/2017 End: 10/31/2017

Surface Elevation (ft.): 45.65

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

 Depth
 Date
 Time

 7.0
 10/31/2017
 11:00

| Elev.<br>Depth<br>(ft)                                | Sample<br>Type                  | Sample<br>Number        | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value   | Graphic Log  | Strata          | Material Description  |         | Remarks   |
|---|---------------------------------|-------------------------|---|----------------------------|-------------------------|-----------|--------------|-----------------|---|---------|---|
| 0   |                                 |                         |   |                            |                         |           | 17 · 77 · 17 |                 | 12" Topsoil   |         | Vacuum excavate boring from the                         |
| _   |                                 |                         |   |                            |                         |           |              |                 | Moist, brown, SILT, little fine to mediul little fine to coarse gravel                        | m sand, | ground surface to<br>6' bgs.                            |
| -   | VE                              | V-1                     |   |                            |                         |           |              | Sandy Silt      | ·   |         | Analytic Sample (2'-2.5')                               |
| 40.7<br>5 -   | SS                              | S-1                     | 24  | 12<br>14<br>18<br>30       | 8                       | 37        |              |                 | Wet, dense, brown, fine to coarse SA some fine to coarse gravel, little silt                  | ND,     |   |
| 35.7<br>10  | SS                              | S-2                     | 24  | 14<br>5<br>6<br>5          | 6                       | 11        |              | Sand and Gravel | Wet, medium dense, brown, fine to co<br>SAND and fine to coarse GRAVEL, lit                   |         |   |
| -<br>-<br>-<br>30.7<br>15                             | SS                              | S-3                     | 24  | 7<br>9<br>14<br>13         | 14                      | 23        |              | Silty Clay      | Wet, very stiff, gray, Silty CLAY   |         | PP = 2.0, 2.5, ar<br>3.0 tsf                            |
| -<br>-<br>-   |                                 |                         |   |                            |                         |           | */////       |                 | Test boring B-44 terminated at 16' bgs backfilled with soil cuttings.                         | s and   |   |
| 25.7  | Sa                              | ımple Ty                | pes   |                            |                         |           |              |                 | Consistency vs Blowcount/Foot   | Burm    | nister Classificati                                     |
| AS - Auge<br>CS - Califo<br>BQ - 1.5" I<br>IQ - 2" Ro | r/Grab S<br>ornia Sa<br>Rock Co | Sample<br>Impler<br>ore | V - Vac<br>Sam<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>Iby Tub | n l                     | V. Loose: | se: C        | -10 \           | Sand):         Fine Grained (Clay):           ense:         30-50         V. Soft:         <2 | -15   S | and 35-50%<br>some 20-35%<br>ittle 10-20%<br>trace <10% |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / P. Fisher

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 131 Waverly Oaks Rd., Waltham, MA Northing: 2964321.5588 Easting: 733550.3289

**Drilling Date: Start:** 10/31/2017 **End:** 10/31/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 48.52

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

Depth Date Time 5.4 10/31/2017 13:15

| 29  | , Date.        | Start: 10        | 3/3 1/20   | 17 6                       | iu. i                   | 0/31/20                     | J 1 7       |                |  | Logged E                                     | By: A. Smith                          |  |
|---|----------------|------------------|--|----------------------------|-------------------------|-----------------------------|-------------|----------------|--|--|---------------------------------------|--|
| Elev.<br>Depth<br>(ft)                              | Sample<br>Type | Sample<br>Number | Sample<br>Length (in)                              | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata         |  | Material Desc                                | ription                               | Remarks  |
| 0   |                |                  |  |                            |                         |                             | 1111        |                | 4" Topsoil:                              | Moist, gray, fin                             | e to medium SAN                       |  |
|   | VE             | V-1              |  |                            |                         |                             |             |                | Moist, brow                              | ⁄n, SILT                                     |                                       | boring from the ground surface to 6' bgs.  Analytical sample (2'-2.5')               |
| 43.5<br><u>¥</u>                                    |                |                  |  | 14                         |                         |                             |             | Silt           | No Recove                                | rv   |                                       |  |
|   | SS             | S-1              | 24   | 14<br>6<br>7               | 0                       | 20                          |             | Sandy Silt     | No Recove                                |  |                                       |  |
| - <u>38.5</u> -                                     | SS             | S-2              | 24   | 8<br>4<br>5                | 0                       | 12                          |             |                | 3" split spo<br>fine gravel,             | on- fine to coar<br>trace silt               | se SAND, some                         |  |
| 10<br><br>  | SS             | S-3              | 24   | 13<br>4<br>7<br>11         | 8                       | 11                          |             |                | Wet, stiff, b                            | rown, SILT, tra                              | ice fine to medium                    |  |
| - 33.5<br>15  | - SS           | S-4              | 24   | 13<br>14<br>7              | 16                      | 21                          |             | Silty Clay     | Wet, very s<br>to medium                 | tiff, gray, CLAY<br>sand                     | ′ & SILT, trace fine                  | e  |
|   | -              |                  |  | 16                         |                         |                             |             |                |  | B-45 terminate ith soil cuttings             | ed at 16' bgs and<br>s.               |  |
| 28.5  |                |                  |  |                            |                         |                             |             |                |  |  |                                       |  |
|   | Sa             | ample Ty         | pes  | 1                          |                         | 1                           | 1           |                | Consistency vs                           | Blowcount/Foot                               |                                       | Burmister Classification   |
| AS - Auge<br>CS - Califo<br>BQ - 1.5"<br>NQ - 2" Ro | Rock Co        | ampler<br>ore    | V - Vac<br>Sam<br>SS - Spli<br>T - She<br>GP - Geo | nple<br>t Spoor<br>lbv Tub | n<br>ne                 | V. Loos<br>Loose:<br>M. Der | se: 0       | )-4 D<br>·10 V | (Sand):<br>Dense: 30-50<br>'. Dense: >50 | Fine Gra V. Soft: <2 Soft: 2-4 M. Stiff: 4-8 | stiff: 8-15 V. Stiff: 15-30 Hard: >30 | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>moisture, density, color |
| Revie   | wed b          | oy:              |  |                            |                         |                             |             |                | Date:                                    |  | Boring Numb                           | er: B-45   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / P. Fisher

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 161 Waverly Oaks Rd., Waltham, MA Northing: 2964423.8834 Easting: 733848.2348

**Drilling Date: Start:** 11/14/2017 **End:** 11/16/2017

Surface Elevation (ft.): 56.94

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

Depth Date Time 6.4 11/16/2017 14:05

| Elev.<br>Depth<br>(ft)                                | Sample<br>Type                  | Sample<br>Number | Sample<br>Length (in)                             | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata          |  | Material De                    | escription   | Remarks  |
|---|---------------------------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|-----------------|--|--------------------------------|--|--|
| 0   |                                 |                  |   |                            |                         |                             | 17 31.17    |                 | 12" Topsoil                            |                                |  | Vacuum excava  |
| -   | VE                              | V-1              |   |                            |                         |                             |             | Sand and Gravel | Moist, brow<br>fine to coars           |                                | edium SAND, some<br>tle silt                                     | ground surface<br>6' bgs.  Analytical samp<br>(2.5'-3')  |
| 51.9<br>5 -<br>▼ -                                    | - SS                            | S-1              | 24  | 4<br>3<br>3<br>3           | 6                       | 6                           |             | Sand ar         | Wet, loose,<br>fine to coars           | gray, fine to<br>se gravel, tr | o coarse SAND, som<br>ace silt                                   | ne   |
| 46.9<br>10  | - SS                            | S-2              | 24  | 8<br>12<br>12<br>8         | 8                       | 24                          |             | Sandy Silt      | Wet, very si                           | tiff, brown, \$                | SILT, some fine sand   | d Corrosion samp<br>(8'-10')                             |
| -<br>-<br>41.9<br>15                                  | SS                              | S-3              | 24  | 20<br>34<br>44<br>50       | 16                      | 78                          |             | Silty Clay      | Wet, hard, (                           |                                |  |  |
| -<br>-<br>-<br>36.9                                   |                                 |                  |   |                            |                         |                             |             |                 | Test boring<br>backfilled w            | B-46 terminith soil cutti      | nated at 16' bgs and<br>ngs.                                     |  |
| 30.0  | Sa                              | mple Ty          | pes   |                            |                         |                             |             |                 | Consistency vs                         | Blowcount/F                    | <u>oot</u>   | Burmister Classifica                                     |
| AS - Auge<br>CS - Califo<br>3Q - 1.5"  <br>NQ - 2" Ro | r/Grab S<br>ornia Sa<br>Rock Co | mpler S          | V - Vac<br>Sam<br>S - Spli<br>T - She<br>GP - Geo | iple<br>t Spoor<br>Ibv Tub | n l                     | V. Loos<br>Loose:<br>M. Der | se: 0<br>4- | -4 C<br>-10 V   | Sand):<br>lense: 30-50<br>. Dense: >50 | V. Soft:<br>Soft:              | Grained (Clay): <2 Stiff: 8-15 2-4 V. Stiff: 15-30 4-8 Hard: >30 | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10% |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / P. Fisher

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 191 Waverly Oaks Rd., Waltham, MA Northing: 2964858.9158 Easting: 734327.5545

**Drilling Date: Start:** 11/2/2017 **End:** 11/2/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Reviewed by:

Surface Elevation (ft.): 68.65

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

Depth Date Time 12.8 11/2/2017 14:50

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-47** 

| Diming  | , Date.              | Otart.           | 1/2/201   | , <u>-</u>                 | <b>u.</b> 11/           | 2/201                         | •           |                 | Logged By: A. Smith   |   |
|---|----------------------|------------------|---|----------------------------|-------------------------|-------------------------------|-------------|-----------------|---|---|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type       | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                       | Graphic Log | Strata          | Material Description  | Remarks   |
| 0   |                      |                  |   |                            |                         |                               | 1/ · 1/·/   |                 | 12" Topsoil   | Vacuum excavate boring from the   |
| -   |                      |                  |   |                            |                         |                               |             |                 |   | ground surface to 6' bgs.   |
| -   | VE                   | V-1              |   |                            |                         |                               |             |                 | Moist, brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt                     | Analytical sample (2'-2.5')   |
| 63.7<br>5   |                      |                  |   |                            |                         |                               |             |                 |   |   |
| -   | - SS                 | S-1              | 24  | 46<br>98<br>66<br>56       | 12                      | >100                          |             | avel            | Moist, very dense, brown to gray, fine to coarse SAND and fine to coarse GRAVEL, trace silt |   |
| <u>58.7</u> 10                                    | - SS                 | S-2              | 24  | 32<br>30<br>27<br>20       | 3                       | 57                            |             | Sand and Gravel | Moist, very dense, brown to gray, fine to coarse SAND and fine to coarse GRAVEL, trace silt |   |
|   |                      |                  |   |                            |                         |                               |             |                 |   |   |
| <u>53.7</u><br>15                                 | - SS                 | S-3              | 24  | 21<br>25<br>21<br>20       | 3                       | 46                            |             |                 | Wet, dense, brown to gray, fine to coarse SAND, little fine gravel, trace silt              |   |
| -   |                      |                  |   |                            |                         |                               |             |                 | Test boring B-47 terminated at 16' bgs and backfilled with soil cuttings.                   |   |
| -   |                      |                  |   |                            |                         |                               |             |                 |   |   |
| 48.7  |                      |                  |   |                            | L                       |                               |             |                 |   |   |
|   | Sa                   | mple Ty          |   |                            |                         |                               |             |                 | Consistency vs Blowcount/Foot Burn  | mister Classification   |
| AS - Auge<br>CS - Calif<br>3Q - 1.5"<br>NQ - 2" R | fornia Sa<br>Rock Co | mpler ore        | V - Vac<br>Sam<br>SS - Spli<br>ST - She<br>GP - Geo | iple<br>t Spoor<br>lby Tuk | n<br>ne                 | V. Loose:<br>Loose:<br>M. Der | se: 0       | -4 E            | Dense: 30-50 V. Soft: <2 Stiff: 8-15<br>V. Dense: >50 Soft: 2-4 V. Stiff: 15-30             | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>pisture, density, color |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 3 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** 225 Waverly Oaks Rd., Waltham, MA **Northing:** 2965111.7525 **Easting:** 734637.5415

**Drilling Date: Start:** 10/24/2017 **End:** 10/24/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Reviewed by:

Surface Elevation (ft.): 62.23

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

**Depth Date Time** 11.3 10/24/2017 13:25

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-48** 

| Drilling                | Date:  | Start: 10        | 0/24/20               | 17 Ei                 | <b>1d:</b> 10           | )/24/2  | 017                 |                 | Logged By: A. Smith  | with 30ii cutting3   |
|-------------------------|--|------------------|-----------------------|-----------------------|-------------------------|---------|---------------------|-----------------|--|--|
| Elev.<br>Depth<br>(ft)  | Sample<br>Type   | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log         | Strata          | Material Description   | Remarks  |
| 02.2                    |  |                  |                       | 8                     |                         |         | 74.14. 17           |                 | Top 6": Topsoil  |  |
| -                       | SS   | S-1              | 24                    | 9<br>10<br>12         | 9                       | 19      |                     |                 | Bottom 3": Dry, medium dense, brown, SILT  |  |
| -                       | - SS   | S-2              | 24                    | 46<br>70<br>50<br>82  | 14                      | >100    |                     | Sand and Gravel | Dry, very dense, brown, fine to coarse SAND, little fine to coarse gravel, little silt | Analytical sample (2'-4')  |
| 57.2<br>5               | - ss   | S-3              | 24                    | 36<br>38<br>40<br>33  | 12                      | 78      |                     | Sanc            | Dry, very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt      | Analytical sample (4'-6')  |
| -                       | SS   | S-4              | 24                    | 31<br>20<br>14<br>14  | 16                      | 34      |                     |                 | Moist, dense, brown, fine SAND, some silt  | Corrosion sample (6'-8')   |
| <u>52.2</u><br>10       | SS   | S-5              | 24                    | 28<br>18<br>20<br>28  | 12                      | 38      |                     |                 | Moist, dense, brown, fine SAND, little silt  |  |
| 10<br><u>¥</u> -        | -  |                  |                       |                       |                         |         |                     | Silty Sand      |  |  |
| 47.2<br>15              | - SS   | S-6              | 24                    | 18<br>17<br>19<br>12  | 8                       | 36      |                     |                 | Wet, dense, gray, fine SAND, little silt   |  |
| -<br>-                  |  |                  |                       |                       |                         |         | *• <del>1</del> • • |                 | Test boring B-48 terminated at 16' bgs and backfilled with soil cuttings.              |  |
| -                       |  |                  |                       |                       |                         |         |                     |                 |  |  |
| 42.2                    |  |                  |                       |                       |                         |         |                     |                 |  |  |
|                         | Sa   | mple Ty          | pes                   | 1                     |                         |         | 1                   |                 | Consistency vs Blowcount/Foot Burn   | nister Classification  |
| CS - Calif<br>3Q - 1.5" | Auger/Grab Sample California Sampler 1.5" Rock Core 2" Rock Core GP - Geoprobe  V - Vac Ex/Grab Sample SS - Split Spoon ST - Shelby Tube GP - Geoprobe  V. Loose Loose: M. Dense |                  |                       |                       |                         |         |                     |                 | Dense: 30-50 V. Soft: <2 Stiff: 8-15<br>/ Dense: >50 Soft: 2-4 V. Stiff: 15-30         | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>isture, density, color |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / D. Jacobs Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 271 Waverley Oaks Rd., Waltham, MA

Northing: 2965275.1540 Easting: 735017.5246 **Drilling Date: Start:** 1/24/2018 **End:** 1/26/2018 Surface Elevation (ft.): 59.22

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth Date 7.2 1/26/2018 10:00

Abandonment Method: Backfilled with soil cuttings

|  |                                 |                  |   | -                          |                         |                               |   |                          | Logged By: A. Smith   |
|--|---------------------------------|------------------|---|----------------------------|-------------------------|-------------------------------|---|--------------------------|---|
| Elev.<br>Depth<br>(ft)                             | Sample<br>Type                  | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                       | Graphic Log   | Strata                   | Material Description Remarks  |
| 59.2<br>0  |                                 |                  |   |                            |                         |                               | <u>7, 1, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7,</u> | -                        | 9" Topsoil Vacuum excavate  |
|  | VE                              | V-1              |   |                            |                         |                               |   |                          | Moist, brown, fine to coarse SAND, some fine to coarse gravel, trace silt  Moist, brown, fine to coarse GRAVEL, some fine to coarse sand, trace silt  |
| 5<br>- <u>▼</u> -                                  | SS                              | S-1              | 24  | 32<br>54<br>22<br>20       | 8                       | 76                            |   | avel                     | Wet, very dense, gray, fine to medium SAND, little silt, little fine gravel  Analytical sample (6'-8')  |
| - 49.2<br>10                                       | SS                              | S-2              | 24  | 7<br>9<br>10<br>12         | 18                      | 19                            |   | Sand and Gravel          | Wet, medium dense, brown, fine to medium SAND, trace silt   |
|  | - SS                            | S-3              | 24  | 5<br>6<br>6                | 6                       | 12                            |   |                          | No Recovery:<br>3" Spoon: Wet, medium dense, gray-brown,<br>fine to medium SAND, little fine gravel, little silt  |
| ·  |                                 |                  |   |                            |                         |                               |   |                          | Test boring B-49 terminated at 16' bgs and backfilled with soil cuttings.   |
| 39.2   |                                 |                  |   |                            |                         |                               |   |                          |   |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" Ro | r/Grab S<br>ornia Sa<br>Rock Co | mpler s          | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spooi<br>lby Tul | n ,                     | V. Loose:<br>Loose:<br>M. Der | se: (   | anular<br>)-4 C<br>-10 V | Consistency vs Blowcount/Foot         Burmister Classification           (Sand):         Fine Grained (Clay):         and 35-50% some 20-35%           Jense:         30-50         V. Soft:         <2 |
| Revie  | wed b                           | y:               |   |                            |                         |                               |   |                          | Date: Boring Number: B-49   |





Project Name: Rehabilitation of Weston Aqueduct Supply Main 3 Client: MWRA

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 320 Waverley Oaks Rd., Waltham, MA

Northing: 2965897.0948 Easting: 735637.6863

**Drilling Date: Start:** 10/25/2017 **End:** 10/25/2017

Surface Elevation (ft.): 71.29

Total Depth (ft.): 15

Depth to Initial Water Level (ft):

Depth Date NE 10/25/2017 13:40

Abandonment Method: Backfilled with soil cuttings

|   |   |                  |  |                                |                         |  |   |   | Logged By: A. Smith   |  |
|---|---|------------------|--|--------------------------------|-------------------------|--|---|---|---|--|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type  | Sample<br>Number | Sample<br>Length (in)                            | Blows per<br>6 inches          | Sample<br>Recovery (in) | N-Value  | Graphic Log                             | Strata                                    | Material Description  | Remarks  |
| 0   |   |                  |  |                                |                         |  |   |   | 3" Asphalt Pavement   |  |
|   |   |                  |  | 80                             |                         |  |   |   | 9" Cobble Base  |  |
|   | SS  | S-1              | 9  | 100/3"                         | 4                       | >100   | ο · · · · · · · · · · · · · · · · · · · |   | Wet, very dense, gray, fine to coarse SAND, some fine gravel, trace silt                |  |
|   | SS  | S-2              | 24   | 48<br>26<br>36<br>24           | 4                       | 62   | )<br>Ø<br>O                             | SO CO |   | alytical sample<br>4')                               |
| 66.3<br>5   | - ss  | S-3              | 24   | 18<br>18<br>20<br>24           | 2                       | 38   | ° ∪<br>ø<br>• O                         |   | Moist, dense, brown, fine to coarse SAND and fine to coarse GRAVEL, some silt (4'-      | alytical sample<br>6')                               |
|   | - SS S-4 24 12 5 34 5 7 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 |                  |  | ; ()<br>;<br>;<br>;<br>;<br>() | Gravel                  | Moist, dense, brown, fine to coarse SAND and fine to coarse GRAVEL, little silt (6'- | rosion sample<br>8')                    |   |   |  |
|   | SS  | S-5              | 9  | 15<br>100/3"                   | 4                       | >100   | , ()                                    | and                                       | Moist, very dense, brown, fine to coarse<br>SAND and fine to coarse GRAVEL, little silt |  |
| - <u>61.3</u>                                     | -   |                  |  |                                |                         |  |   |   |   |  |
|   | SS  | S-6              | 12   | 85                             | 8                       | >100   | · ()                                    |   | Wet, very dense, brown, fine to coarse SAND   |  |
| _ <u>56.3</u> -                                   | 33  | <u> </u>         | 12   | 100                            | 0                       | - 100  | ). · · · ·                              |   | and fine to coarse GRAVEL, trace silt  Test boring B-50 terminated at 15' bgs and       |  |
|   | -   |                  |  |                                |                         |  |   |   | backfilled with soil cuttings.  |  |
| 51.3  | ل_ل   |                  |  |                                | L ,                     |  |   |   |   | <u> </u>   |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | er/Grab S<br>fornia Sa<br>Rock Co<br>lock Core              | mpler Sore S     | v - Vac<br>San<br>S - Spli<br>T - She<br>P - Geo | nple<br>t Spoor<br>Iby Tul     | n                       | V. Loos<br>Loose:<br>M. Den  | se: 0<br>4-                             | nular (<br>-4 C<br>10 V                   | Sand):   Fine Grained (Clay):   and   some  | 35-50%<br>20-35%<br>10-20%<br><10%<br>density, color |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira
 Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA
 Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 356 Waverley Oaks Rd., Waltham, MA

Northing: 2965991.6800 Easting: 735756.981

Drilling Date: Start: 10/25/2017 End: 10/25/2017

Surface Elevation (ft.): 77
Total Depth (ft.): 14.4

Depth to Initial Water Level (ft):

**Depth Date Time** 7.7 10/25/2017 10:40

Abandonment Method: Backfilled with soil cuttings

|  | ,   |                  |                       |                       |                         |         |             |                 |      |                         | Logg                           | ged B          | By: A. Smith  |                       |                                  |
|--|---|------------------|-----------------------|-----------------------|-------------------------|---------|-------------|-----------------|------|-------------------------|--------------------------------|----------------|---|-----------------------|----------------------------------|
| Elev.<br>Depth<br>(ft)                   | Sample<br>Type  | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata          |      |                         | Material D                     | )escr          | iption  |                       | Remarks                          |
| 77.0                                     |   |                  |                       | 6                     |                         |         | 74 15. 12   |                 | 3    | " Topsoil               |                                |                |   |                       |                                  |
|  | ss  | S-1              | 24                    | 5<br>4<br>14          | 8                       | 9       |             |                 | N.   | loist, loose            | e, brown, fi<br>gravel, little | ne to<br>silt  | o coarse SAND,  |                       | Analytical sample (0'-2')        |
| _  | SS S-2 3 100/3" 3 >100  |                  |                       |                       |                         |         |             |                 |      |                         |                                |                | ne to coarse<br>arse sand, trace s                            | silt                  |                                  |
| - <u>72.0</u> - 5                        | - SS  | S-3              | 24                    | 36<br>32<br>40<br>62  | 8                       | 72      |             |                 | V    | Vet, very d<br>GRAVEL a | lense, brow<br>nd fine to c    | vn-gr<br>coars | ray, fine to coarse<br>se SAND, trace s                       | e<br>ilt              | Analytical sample (4'-6')        |
| _ <u>*</u>                               | SS  | S-4              | 24                    | 72<br>62<br>90<br>70  | 12                      | >100    |             | Sand and Gravel | (    | GRAVEĹ a                | nd fine to o                   | coars          | ray, fine to coarse<br>se SAND, trace s                       | e<br>ilt              |                                  |
| 67.0<br>10                               | SS  | S-5              | 24                    | 61<br>71<br>45<br>51  | 16                      | >100    |             | Sanc            |      |                         | dense, bro<br>e fine grav      |                | fine to coarse<br>ace silt                                    |                       |                                  |
| <br>                                     | -   |                  |                       | 400/48                | 4                       |         |             |                 |      |                         |                                |                |   |                       |                                  |
| - <u>62.0</u><br>- <u>15</u>             | SS S-6 4 100/4"   |                  |                       |                       |                         |         | 3,000       |                 | S    | AND, son                | ne fine to c                   | oarse<br>inate | fine to coarse<br>e gravel, little silt<br>ed at 14.4' bgs ar | nd                    |                                  |
| 57.0                                     |   |                  |                       |                       |                         |         |             |                 |      |                         |                                |                |   |                       |                                  |
| 57.0                                     | Sa  | ample Ty         | pes                   |                       |                         |         |             | 1               | Cons | istencv vs              | Blowcount/                     | Foot           |   | Burmi                 | ster Classification              |
| CS - Calif<br>  BQ - 1.5"<br>  NO - 2" R | - Auger/Grab Sample<br>- California Sampler<br>- 1.5" Rock Core<br>- 2" Rock Core<br>- 2" Rock Core<br>- 2" Rock Core<br>- 2" Rock Core<br>GP - Geoprobe  V - Vac Ex/Grab<br>Sample<br>SS - Split Spoon<br>ST - Shelby Tube<br>GP - Geoprobe  V. Loose: 0-4<br>Loose: 4-10<br>M. Dense: 10-30 |                  |                       |                       |                         |         |             |                 |      |                         |                                |                | ined (Clay): Stiff: 8-15 V. Stiff: 15-30 Hard: >30            | ar<br>sc<br>lit<br>tr | ace <10%<br>ture, density, color |
| Revie                                    | eviewed by:   |                  |                       |                       |                         |         |             |                 |      | Date:                   |                                |                | Boring Numb   | er: B                 | -51                              |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 390 Waverley Oaks Rd., Waltham, MA

Northing: 2966243.2130 Easting: 736227.419

Drilling Date: Start: 10/26/2017 End: 10/26/2017

Surface Elevation (ft.): 87.91

Total Depth (ft.): 14.5

Depth to Initial Water Level (ft):

**Depth Date Time** 5.2 10/26/2017 13:00

Abandonment Method: Backfilled with soil cuttings

|   | ,   |                  |   |                            |  |   |             |                | Logged By: A. Smith   |  |
|---|---|------------------|---|----------------------------|--|---|-------------|----------------|---|--|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type                                  | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in)  | N-Value   | Graphic Log | Strata         | Material Description  | Remarks  |
| 87.9<br>0   |   |                  |   |                            |  |   |             |                | 4" Asphalt  |  |
| <br>-   | SS  | S-1              | 18  | 26<br>32<br>100            | 11   | >100  |             |                | Moist, very dense, brown, fine to medium SAND, some fine gravel, little silt  |  |
|   | SS  | \$-2             | 2   | 100/2"                     | 2  |   |             | _              | Moist, very dense, brown, fine to coarse SAND, trace silt   | Analytical sample (2'-2.2')  |
| - <u>82.9</u> -                                   | SS S-3 12 42 5 >76 5  SS S-4 9 53 100/3" 8 >100 |                  |   | Sand and Gravel            | Moist, very dense, brown, fine to coarse SAND, little fine gravel, little silt | Analytical sample (4'-5') Corrosion sample not obtained due |             |                |   |  |
|   | SS  | S-4              | 9   | 1                          | 8  | >100  |             | S              | Moist, very dense, brown, fine to coarse SAND, some fine gravel, little silt  | to boulder and low recovery.   |
| <br>  | SS  | S-5              | 6   | 100/6"                     | 5  |   |             |                | Wet, very dense, brown, fine to coarse SANE and fine to coarse GRAVEL, little silt  | Weathered rock encountered at  |
| - <u>77.9</u>                                     | -   |                  |   |                            |  |   |             | Weathered Rock |   | approximately 8.8' bgs.  |
| _ <u>72.9</u> _ 15                                | SS  | S-6              | 6   | 100/6"                     | 5  |   |             |                | Wet, very dense, brown, fine to coarse SANE and fine to coarse GRAVEL, little silt  Test boring B-52 terminated at 14.5' bgs and backfilled with soil cuttings. |  |
| <br><br>67.9                                      |   |                  |   |                            |  |   |             |                |   |  |
|   | Sa  | mple Ty          | pes   |                            |  |   |             |                | Consistency vs Blowcount/Foot   | Burmister Classification   |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | ornia Sa<br>Rock Co                             | impler<br>ore S  | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tub | n<br>ne  | V. Loos<br>Loose:<br>M. Den                                 | se: 0<br>4- | )-4 E          | Sand):         Fine Grained (Clay):           ense:         30-50           V. Soft:         <2   | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>moisture, density, color |
| Revie   | eviewed by:                                     |                  |   |                            |  |   |             |                | Date: Boring Number   | er: B-52   |

Sheet 1 of 1



### **Boring Number: B-53 (MW)**

Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Number: 101038-102170 Project Location:** Massachusetts

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 450 Waverley Oaks Rd., Waltham, MA

Northing: 2966643.9120 Easting: 736978.095 **Drilling Date: Start:** 10/26/2017 **End:** 11/3/2017 Surface Elevation (ft.): 105.91

Total Depth (ft.): 11

Depth to Initial Water Level (ft): Depth Date 6.0 11:00

11/3/2017

|   |                                  |                        | -,,   |                              |                         |                             |             |                          | Logged By: A. Smith   |   |
|---|----------------------------------|------------------------|---|------------------------------|-------------------------|-----------------------------|-------------|--------------------------|---|---|
| Elev.<br>Depth<br>(ft)                                    | Sample<br>Type                   | Sample<br>Number       | Sample<br>Length (in)                               | Blows per<br>6 inches        | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata                   | Material Description  | Remarks   |
| 0   |                                  |                        |   |                              |                         |                             | 0 0 0 0     | _                        | 4" Asphalt Pavement   |   |
|   | SS                               | S-1                    | 18  | 16<br>24<br>20               | 6                       | 44                          |             | Sand and Gravel          | Moist, dense, brown, fine to coarse SAND, trace fine gravel                                     |   |
|   | SS                               | S-2                    | 16  | 26<br>100<br>100/4"          | 16                      | >100                        |             | Sand                     | Top 10": Moist, very dense, brown, fine to coarse SAND, some fine to coarse gravel, some silt   |   |
| ļ -   |                                  |                        |   | 400/0"                       |                         | 100                         |             |                          | Bottom 6": Moist, very dense, gray, fine to coarse SAND and fine to coarse GRAVEL,              |   |
| 400.0   | SS                               | S-3                    | 3   | 100/3"                       | 1                       | >100                        |             | N.                       | little silt   | Analytical sample (2'-3.3')   |
| _ 100.9<br>5<br>_ <b>▼</b> -                              |                                  |                        |   |                              |                         |                             |             |                          | Wet, very dense, gray, fine to coarse SAND, some fine gravel, trace silt                        | (2-3.3)   |
| <br><br>- <u>95.9</u> -                                   | NX                               | C-1                    | 60  |                              | 45                      |                             |             | Bedrock                  | See core log for description  |   |
|   |                                  |                        |   |                              |                         |                             |             |                          | Test boring B-53 (MW) terminated at 11' bgs and converted into a monitoring well.               |   |
| _ <u>90.9</u>   | -                                |                        |   |                              |                         |                             |             |                          |   |   |
| <u> </u>  |                                  |                        |   |                              |                         |                             |             |                          |   |   |
| 95.0  |                                  |                        |   |                              |                         |                             |             |                          |   |   |
| 85.9  | S2                               | mple Ty                | nes   |                              |                         |                             |             |                          | Consistency vs Blowcount/Foot Burn  | ister Classification  |
| 85.9<br>AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | er/Grab S<br>ornia Sa<br>Rock Co | Sample<br>mpler<br>ore | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>it Spoor<br>elby Tub | n<br>ne                 | V. Loos<br>Loose:<br>M. Der | se: O       | anular<br>)-4 C<br>-10 V | Sand):         Fine Grained (Clay):           ense:         30-50           V. Soft:         <2 | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>sture, density, color |
| Revie   | wed b                            | y:                     |   |                              |                         |                             |             |                          | Date: Boring Number: E  | 3-53 (MW)   |

Sheet 1 of 1



### **Boring Number: B-53 (MW)**

Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 450 Waverley Oaks Rd., Waltham, MA

Northing: 2966643.9120 Easting: 736978.095

**Drilling Date: Start:** 10/26/2017 **End:** 11/3/2017

ROCK CORE ONLY GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 105.91

Total Depth (ft.): 11

Depth to Initial Water Level (ft): 6.0 11/3/2017 11:00

Abandonment Method: Backfilled with soil cuttings

Logged By: A. Smith

| Elevation<br>Depth<br>(ft)  | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Recovery (%) | RQD<br>(%) | Drill Rate<br>(min/ft)   | Down Press.<br>(psi) | Graphic<br>Log                        | Strata  | Material Description  | Remarks |
|-----------------------------|----------------|------------------|-----------------------|--------------|------------|--------------------------|----------------------|---------------------------------------|---------|---|---------|
|                             | NX             | C-1              | 60                    | 75           | 0          | 4.0<br>5.0<br>2.5<br>3.5 | NR                   | × × × × × × × × × × × × × × × × × × × | Granite | Hard, slightly weathered, fine grained, gray GRANITE; primary joint set very close, extremely fractured |         |
| <br><br>- 90.9              |                |                  |                       |              |            |                          |                      |                                       |         | Test boring B-53 terminated at 11' bgs and converted into monitoring well.                              |         |
| 90.9<br>15.0                |                |                  |                       |              |            |                          |                      |                                       |         |   |         |
| - <u>85.9</u> - <u>20.0</u> |                |                  |                       |              |            |                          |                      |                                       |         |   |         |
| 80.9                        |                |                  |                       |              |            |                          |                      |                                       |         |   |         |

| Bedding (mm)               | Joint Spacing (mm)   | Continuity (mm)  | Attitude Angle  | Aperture (mm)  |
|----------------------------|--|--|---|--|
| Extremely Thin         <20 | Extremely Close <20 Very Close 20-60 Close 60-200 Mod Close 200-600 Wide 600-2000 Very Wide 2000-6000 Extremely Wide >6000 | Extremely <25<br>Moderately 25-100<br>Slightly 100-200<br>Sound >200 | Horizontal 0° - 5°<br>Shallow 5° - 35°<br>Moderate 35° - 55°<br>Steep 55° - 85°<br>Vertical 85° - 90° | Very Tight < 0.1<br>Tight 0.1 - 0.25<br>Partly Open 0.25 - 0.5<br>Open 0.5 - 2.5<br>Mod. Wide 2.5 - 10<br>Wide >10 |

| ξ              | _                   |   |                     |                  |           |                     |              |                 |   |                |
|----------------|---------------------|---|---------------------|------------------|-----------|---------------------|--------------|-----------------|---|----------------|
| Field Hardness |                     |   | Weat                | thering          |           |                     |              |                 |   |                |
| LOGS           | Very Hard<br>Hard   | Knife Can't Scrat<br>Scratches with<br>Difficulty | tch Fresh<br>Slight |                  | ndicated  |                     |              |                 | oredand may be wea                          | ker externally |
| 5              | Med. Hard<br>Medium | Scratches Readi<br>Grooves with                   | ly Moderate         | present either a | as a con  | tinuous framework o | r as coresto | ones.           | to a soil. Fresh or d                       |                |
|                | Soft                | Difficulty<br>Grooves Readily                     |                     | present either a | as a con  | tinuous framework o | r as coresto | one.            | to a soil. Fresh or di                      |                |
| 2<br>1<br>1    | Very Soft           | Carves with Knife                                 |                     | All rock materia | al is con |                     | nasš structu | re and material | nal mass structure is fabric are destroyed. |                |
| /              |                     |   | •                   |                  |           |                     |              |                 |   |                |

Reviewed by: Date: Boring Number: B-53 (MW)





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

 $\textbf{Drilling Contractor/Driller:} \ \ \text{GeoLogic - Earth Exploration, Inc. / M. Ferreira}$ 

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 3 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

Bore Hole Location: 496 Waverley Oaks Rd., Waltham, MA

Northing: 2966867.4920 Easting: 737411.643

Drilling Date: Start: 10/24/2017 End: 10/24/2017

Surface Elevation (ft.): 96.15

Total Depth (ft.): 14.1

Depth to Initial Water Level (ft):

**Depth Date Time** 11.0 10/24/2017 10:35

Abandonment Method: Backfilled with soil cuttings

|  |                |                  |                       |                       |                         |         |   |                       |  |  |                      | Logged              | d By           | : A. S         | mith                |                 |         |                |   |       |
|--|----------------|------------------|-----------------------|-----------------------|-------------------------|---------|---|-----------------------|--|--|----------------------|---------------------|----------------|----------------|---------------------|-----------------|---------|----------------|---|-------|
| Elev.<br>Depth<br>(ft)   | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log                                       | Strata                |  |  | Mater                | rial Des            | scrip          | otion          |                     |                 |         | F              | Remarks                                     |       |
| 96.2   |                |                  |                       |                       |                         |         |   |                       | 5'   | ' Asphalt  | Pavem                | ent                 |                |                |                     |                 |         |                |   |       |
| -  | SS             | S-1              | 18                    | 40<br>32<br>16        | 6                       | 48      |   | Fil                   | N  | Moist, dense, brown, fine to coarse SAND, trace fine gravel, trace silt  |                      |                     |                |                |                     |                 |         |                |   |       |
|  | - SS           | S-2              | 24                    | 8<br>7<br>10<br>20    | 7                       | 17      | <ul><li>◊</li><li>○</li><li>△</li><li>○</li></ul> |                       | S  | Moist, medium dense, brown, fine to coarse SAND, trace fine gravel, trace silt  Moist, very dense, brown, fine to coarse GRAVEL and fine to coarse SAND, little silt |                      |                     |                |                | Analy<br>(2'-4'     | rtical sam<br>) | ple     |                |   |       |
| 91.2   | - SS           | S-3              | 24                    | 40<br>30<br>90<br>100 | 7                       | >100    | 。○<br>。 ()<br>) <sub>@</sub>                      |                       | G  |  |                      |                     |                |                |                     |                 |         |                |   |       |
|  | SS             | S-4              | 3                     | 100/3"                | 3                       |         |   | Sand and Gravel       | M<br>G   | oist, very<br>RAVEL a  | dense<br>and fine    | , brown<br>to coa   | n, fii<br>arse | ne to (<br>SAN | coarse<br>D, little | e<br>e silt     |         |                |   |       |
| - <u>86.2</u> - <u>10</u> - <u>Ψ</u> -   | SS             | S-5              | 18                    | 65<br>98<br>100       | 6                       | >100    | <b>8</b>  | Se                    |  | oist, very<br>RAVEL a  |                      |                     |                |                |                     |                 |         |                |   |       |
|  | -<br>-<br>     | <del>S-6</del>   | 1                     | 100/1"                | 0                       | >100    |   | Weathered Rock        |  | o recove   |                      | tormine             | otos           | Lat 1/         | 1 1' bo             | 10.00           |         | bould<br>weath | rbit througher or<br>hered roc<br>13 to 14' | _     |
| 81.2 - 15 - 15 - 15 - 15 - 15 - 15 - 15 - 1  |                |                  |                       |                       |                         |         |   | <b>S</b>              | b  | est boring<br>ackfilled v  | y 15-54<br>Vith soil | iermina<br>I cuttin | aleo           | ı at 14        | +. I DG             | is an           | u       | bgs.           |   |       |
| <sup>2</sup> 76.2  |                | mple Ty          | nos                   | <u> </u>              |                         |         |   |                       | Conci  | etonev   | Blower               | nunt/E-             | not            |                |                     |                 | D: :wie | ister C        | laccific                                    | ation |
| AS - Auger/Grab Sample CS - California Sampler DBQ - 1.5" Rock Core NQ - 2" Rock Core NQ - 2" Rock Core GP - Geoprobe  V - Vac Ex/Grab Sample Sample SS - Split Spoon ST - Shelby Tube GP - Geoprobe M. Dens |                |                  |                       |                       |                         |         |   | nular<br>-4 C<br>10 V | 0 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30 trace <10% moisture, density, column and state of the column |  |                      |                     |                |                |                     |                 |         |                |   |       |
| Revie  | wed t          | y:               |                       |                       |                         |         |   |                       |  | Date:  |                      |                     |                | Borii          | ng Ni               | umb             | er: E   | 5-54           |   |       |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D. Bore Hole Location: Beaver Brook Reservation, Waltham, MA

Northing: 2967033.9054 Easting: 737747.5134

**Drilling Date: Start:** 10/27/2017 **End:** 10/27/2017

Surface Elevation (ft.): 99.15

Total Depth (ft.): 13

Depth to Initial Water Level (ft): Depth Date Time

10/27/2017 Abandonment Method: Backfilled with soil cuttings

14:40

5.8

| _   |                                 |                  |                                     |                          |                         |                   |             |                         | Logged By: A. Smith   |
|---|---------------------------------|------------------|-------------------------------------|--------------------------|-------------------------|-------------------|-------------|-------------------------|---|
| Elev.<br>Depth<br>(ft)                          | Sample<br>Type                  | Sample<br>Number | Sample<br>Length (in)               | Blows per<br>6 inches    | Sample<br>Recovery (in) | N-Value           | Graphic Log | Strata                  | Material Description Remarks  |
| 0 -   |                                 |                  |                                     |                          |                         |                   |             |                         | 4" Asphalt<br>14" Cobbles and Coarse Gravel   |
| -   | . ss                            | S-1              | 21                                  | 55<br>76<br>92<br>100/3" | 12                      | >100              |             | ်င်း<br>Sand and Gravel | Moist, very dense, gray, fine to coarse GRAVEL and fine to coarse SAND, trace silt  Analytical sample (2'-3.75')  |
| 94.2  | SS                              | S-2              | 12                                  | 72<br>100                | 6                       | >100              |             |                         | Moist, very dense, gray, fine to coarse GRAVEL and fine to coarse SAND, trace silt  (4'-5') Rollerbit through   |
| 5<br>▼ _  | SS                              | S-3              | 18                                  | 80<br>84<br>110          | 10                      | >100              |             | Sand                    | Moist, very dense, gray, fine to coarse GRAVEL and fine to coarse SAND, trace silt  |
| 89.2<br>10 -                                    | NX                              | C-1              | 60                                  |                          | 24                      |                   |             | Weathered Rock          | See core log for description  |
| 84.2<br>15                                      |                                 |                  |                                     |                          |                         |                   |             |                         | Test boring B-55 terminated at 13' bgs and backfilled with soil cuttings.   |
| 79.2<br>AS - Auge<br>CS - Califo<br>3Q - 1.5" l | r/Grab S<br>ornia Sa<br>Rock Co | mpler or<br>me   | vpes V - Vac Sam SS - Spli ST - She | nnle                     |                         | V. Loos<br>Loose: | se: 0       | nular<br>-4 [           | Consistency vs Blowcount/Foot         Burmister Classificati           (Sand):         Fine Grained (Clay):         and 35-50% some 20-35%           Jense:         30-50         V. Soft:         <2 |
| Revie   |                                 | •                | GP - Geo                            | probe                    |                         | M. Den            | se: 10      | )-30                    | M. Stiff: 4-8 Hard: >30 moisture, density, color  Date: Boring Number: B-55   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:**GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: Beaver Brook Reservation, Waltham, MA

Northing: 2967033.9054 Easting: 737747.5134 **Drilling Date: Start:** 10/27/2017 **End:** 10/27/2017 Surface Elevation (ft.):99.15

Total Depth (ft.): 13

Depth to Initial Water Level (ft):

5.8 10/27/2017 14:40

Abandonment Method: Backfilled with soil cuttings

| Elevation Depth (ft) | levation<br>Depth<br>(ft) | Remarks |
|----------------------|---------------------------|---------|
| 1.5                  | 89.2<br>10.0              |         |
|                      | 84.2<br>15.0              |         |
|                      | 79.2<br>20.0              |         |
| 74.2<br>25.0<br>-    | -<br>74.2<br>25.0<br>-    |         |

| Bedding (mn                                       | <u>n</u> )  | Joint Spacin   | g (mm)  | Continui                                     | ty (mm)                          | Attitude   | Angle  | Aperture (mm)   |   |  |
|---|---|--|---|--|----------------------------------|--|--|---|---|--|
| Thin 6<br>Medium 20<br>Thick 60<br>Very Thick 200 | <20<br>20-60<br>60-200<br>00-600<br>00-2000<br>00-6000<br>>6000 | Extremely Close Very Close Close Mod Close Wide Very Wide Extremely Wide | <20<br>20-60<br>60-200<br>200-600<br>600-2000<br>2000-6000<br>>6000 | Extremely<br>Moderately<br>Slightly<br>Sound | <25<br>25-100<br>100-200<br>>200 | Horizontal<br>Shallow<br>Moderate<br>Steep<br>Vertical | 0° - 5°<br>5° - 35°<br>35° - 55°<br>55° - 85°<br>85° - 90° | Very Tight<br>Tight<br>Partly Open<br>Open<br>Mod. Wide<br>Wide | < 0.1<br>0.1 - 0.25<br>0.25 - 0.5<br>0.5 - 2.5<br>2.5 - 10<br>>10 |  |

| - 5/18/23           |  |   |  |   |   |  |   |  |   |   |  |  |  |
|---------------------|--|---|--|---|---|--|---|--|---|---|--|--|--|
| GPJ                 | <u>Beddi</u>   | ng (mm)   | Joint Spaci  | <u>ng (mm</u> )   | Continui  | <u>ty (mm</u> )  | <u>Attitud</u>  | e Angle  | <u>Apertu</u>   | re (mm)   |  |  |  |
| A WASM 3 20180220   | Extremely T<br>Very Thin<br>Thin<br>Medium<br>Thick<br>Very Thick<br>Extremely T | 20-60<br>60-200<br>200-600<br>600-2000<br>2000-6000   | Extremely Close<br>Very Close<br>Close<br>Mod Close<br>Wide<br>Very Wide<br>Extremely Wide | 20-60<br>60-200<br>200-600<br>600-2000<br>2000-6000   | Extremely<br>Moderately<br>Slightly<br>Sound  | <25<br>25-100<br>100-200<br>>200   | Horizontal<br>Shallow<br>Moderate<br>Steep<br>Vertical  | 0° - 5°<br>5° - 35°<br>35° - 55°<br>55° - 85°<br>85° - 90°                           | Very Tight<br>Tight<br>Partly Open<br>Open<br>Mod. Wide<br>Wide | < 0.1<br>0.1 - 0.25<br>0.25 - 0.5<br>0.5 - 2.5<br>2.5 - 10<br>>10   |  |  |  |
| MWRA                | <u>Field</u>   | <u>Hardness</u>   | Wea  | <u>Weathering</u>   |   |  |   |  |   |   |  |  |  |
| CORE ONLY GINT LOGS | Very Hard<br>Hard<br>Med. Hard<br>Medium<br>Soft<br>Very Soft                    | Knife Can't Scrato<br>Scratches with<br>Difficulty<br>Scratches Readily<br>Grooves with<br>Difficulty<br>Grooves Readily<br>Carves with Knife | Slight  Moderate  Severe   | its fresh conditi<br>Less than half<br>present either a<br>More than half<br>present either a<br>All rock materia | ndicated weather on.  of the rock mate as a continuous of the rock mate as a continuous al is decomposed is converted to the | ering. All the erial is decome framework of the erial is decome framework of the erial is decome framework of the erial is decome erial is dec | rock material  posed and/o  r as coreston  posed and/o  r as coreston  ntegrated to s  nass structure | may be discolor disintergrated es. disintegrated e. soil. The origins and material f | I to a soil. Fresh<br>to a soil. Fresh<br>al mass structur      | weaker externally that<br>or discolored rock is<br>or discolored rock is<br>e is largely intact.<br>yed. There is a large |  |  |  |
| ROCK                | Reviewe  | d by:   |  |   | Dat   | e:   |   | Boring N   | umber: B  | -55   |  |  |  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

 $\textbf{Drilling Contractor/Driller:} \ \ \text{GeoLogic - Earth Exploration, Inc. / M. Ferreira}$ 

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NX Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** Beaver Brook Reservation, Waltham, MA **Northing:** 2967084.8840 **Easting:** 738063.3567

**Drilling Date: Start:** 10/27/2017 **End:** 10/27/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 74.6

Total Depth (ft.): 15

Depth to Initial Water Level (ft):

**Depth Date Time** 7.2 10/27/2017 12:15

Abandonment Method: Backfilled with soil cuttings

|   | ,              |                  |   |                            |                         |                             |             |                 |                             |                           | Logged I                                     | By: A. Smith                                |                |   |
|---|----------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|-----------------|-----------------------------|---------------------------|--|---|----------------|---|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type | Sample<br>Number | Sample<br>Length (in)                             | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata          |                             |                           | Material Desc                                | ription                                     |                | Remarks   |
| 0   |                |                  |   | 16                         |                         |                             | 74.14. 74   |                 | 6                           | " Topsoil                 |  |   |                |   |
| -   | ss             | S-1              | 24  | 50<br>56<br>28             | 6                       | >100                        |             |                 |                             | ,                         |  | <i>c</i>                                    |                |   |
| -   | ss             | S-2              | 15  | 17<br>12<br>100/3"         | 6                       | >100                        |             |                 | S                           | AND, som                  | ne fine gravel, l                            | fine to coarse<br>ittle slightly organic    | c              | Analytical sample (2'-3.75') Rollerbit through boulders and                 |
| 69.6<br>5   |                |                  |   |                            |                         |                             |             |                 |                             |                           |  |   |                | cobbles from 3.3 to 10.8' bgs.  |
| <u> </u>  |                |                  |   |                            |                         |                             |             | Sand and Gravel |                             |                           |  |   |                |   |
| 64.6<br>10  |                |                  |   |                            |                         |                             |             | Sand            |                             |                           |  |   |                |   |
| -   | - SS           | S-3              | 24  | 23<br>42<br>38<br>55       | 8                       | 80                          |             |                 | W<br>a                      | Vet, very d               | ense, gray, fin<br>coarse GRAVI              | e to coarse SAND<br>EL, little silt         |                |   |
| <u>59.6</u>                                       | - SS           | S-4              | 24  | 47<br>34<br>26<br>26       | 12                      | 60                          |             |                 | a                           | Vet, very d               | ense, gray, fin<br>coarse GRAVI              | e to coarse SAND<br>EL, trace to little sil | t              |   |
| 15  | -              |                  |   |                            |                         |                             | V P Y       |                 | T<br>b                      | est boring<br>ackfilled w | B-56 terminat<br>ith soil cuttings           | ed at 15' bgs and<br>s.                     |                |   |
| 54.6  |                |                  |   |                            |                         |                             |             |                 |                             |                           |  |   |                |   |
|   | Sa             | ample Ty         | pes   | '                          |                         | 1                           |             |                 | Consi                       | istency vs                | Blowcount/Foo                                | <u> </u>                                    | Burmi          | ster Classification   |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | Rock Co        | impler<br>ore S  | V - Vac<br>San<br>S - Spli<br>T - She<br>GP - Ged | nple<br>t Spooi<br>lby Tul | ן<br>הפ                 | V. Loos<br>Loose:<br>M. Den | se: 0       | -4 C            | (Sand)<br>Dense:<br>/. Dens | 30-50                     | Fine Gra V. Soft: <2 Soft: 2-4 M. Stiff: 4-8 |   | so<br>lit<br>t | nd 35-50%<br>ome 20-35%<br>ttle 10-20%<br>race <10%<br>ture, density, color |
| Revie   | Reviewed by:   |                  |   |                            |                         |                             |             |                 |                             |                           |  | Boring Numb                                 | er: B          | -56   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NX Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 628 Trapelo Rd., Belmont, MA Northing: 2967193.5570 Easting: 738503.346

**Drilling Date: Start:** 9/20/2017 **End:** 9/20/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 95.47

Total Depth (ft.): 14

Depth to Initial Water Level (ft):

Depth Date Time 5.8 9/20/2017 12:15

Abandonment Method: Backfilled with soil cuttings

| Dillilling  | , Date.        | Start. 9/        | 20/201   | ,                                | u. 5/2                  | .0/2011                     |             |                 |                                     | Logged I                                     | By: A. Smith                            |  |                        |
|---|----------------|------------------|--|----------------------------------|-------------------------|-----------------------------|-------------|-----------------|-------------------------------------|--|---|--|------------------------|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type | Sample<br>Number | Sample<br>Length (in)                              | Blows per<br>6 inches            | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata          |                                     | Material Desc                                | ription                                 | Remarks  |                        |
| 0   | 1              |                  |  |                                  |                         |                             |             |                 | 6" Asphalt                          | Pavement                                     |   |  |                        |
|   | SS             | S-1              | 2  | 100/2"                           | 2                       |                             |             |                 | Moist, very                         |  | ne to coarse SANI<br>l, little silt     | D,   |                        |
|   | - ss           | S-2              | 24   | 5<br>14<br>18<br>20              | 4                       | 32                          |             | Sand and Gravel |                                     | se, brown, fine<br>o coarse grave            | to coarse SAND,<br>Il, little silt      | Analytical samp (2'-4')  | ple                    |
| 90.5<br>5   | SS             | S-3              | 18   | 66<br>72<br>100                  | 14                      | >100                        |             | Sanc            | Wet, very of fine SAND,             |  | ine GRAVEL and                          |  |                        |
| . <del>-</del> .                                  | SS             | S-4              | 3  | 100/3"                           | 3                       |                             |             | Weathered Rock  | Wet, very o                         | lense, brown, f<br>some fine to co           | ine to coarse<br>parse sand, little sil | Attempted rock core starting at 7.5' bgs. Core   |                        |
| . <u>85.5</u>                                     | NX             | C-1              | 60   |                                  | 60                      |                             |             | Bedrock         | See core lo                         | og for descriptio                            | on                                      | barrel jammed<br>and consisted to<br>little recovery of<br>large gravel size<br>fractured rock.<br>Advance to 9' by<br>with the rollerbit<br>and start rock<br>core. | of<br>of<br>ced<br>ogs |
| 80.5<br>15  |                |                  |  |                                  |                         |                             |             |                 |                                     | յ B-57 terminat<br>vith soil cutting։        | ed at 14' bgs and<br>s.                 |  |                        |
| 75.5  |                |                  |  |                                  |                         |                             |             |                 |                                     |  |   |  |                        |
|   | Sa             | mple Ty          | pes  | es Consistency vs Blowcount/Foot |                         |                             |             |                 |                                     |  | Burmister Classificat                   | tion   |                        |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | ornia Sa       | impler<br>ore S  | V - Vac<br>Sam<br>SS - Spli<br>T - She<br>GP - Geo | iple<br>t Spoor<br>Iby Tub       | n<br>ne                 | V. Loos<br>Loose:<br>M. Der | se: 0       | 10 V.           | Sand):<br>ense: 30-50<br>Dense: >50 | Fine Gra V. Soft: <2 Soft: 2-4 M. Stiff: 4-8 |   | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>moisture, density, colo  | or                     |
| Revie   | wed b          | y:               |  |                                  |                         |                             |             |                 | Date:                               |  | Boring Numb                             | er: B-57   |                        |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NX

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 628 Trapelo Rd., Belmont, MA Northing: 2967193.5570 Easting: 738503.346

**Drilling Date: Start:** 9/20/2017 **End:** 9/20/2017

ROCK CORE ONLY GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 95.47

Total Depth (ft.): 14

Depth to Initial Water Level (ft): 5.8 9/20/2017 12:15

Abandonment Method: Backfilled with soil cuttings

Logged By: A. Smith

| Elevation<br>Depth<br>(ft) | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Recovery (%) | RQD<br>(%) | Drill Rate<br>(min/ft) | Down Press.<br>(psi) | Graphic<br>Log                  | Strata | N   | laterial Description               |         | Remarks |
|----------------------------|----------------|------------------|-----------------------|--------------|------------|------------------------|----------------------|---------------------------------|--------|---|------------------------------------|---------|---------|
| <u>85.5</u><br>10.0        |                |                  |                       |              |            | 2.0<br>2.5             |                      | \<br>\<br>\<br>\<br>\<br>\<br>\ |        | Hard, slightly weath<br>primary joint set clo | ered, gray, fine grained G.<br>se. | ABBRO;  |         |
| -                          | NX             | C-1              | 60                    | 60           | 63         | 1.5                    | NR                   | /                               | Gabbro |   |                                    |         |         |
| _                          |                |                  |                       |              |            | 1.5<br>1.5             |                      |                                 |        |   |                                    |         |         |
| 80.5                       |                |                  |                       |              |            | 1.0                    |                      | /                               |        | Test boring B-57 tel                          | rminated at 14' bgs.               |         |         |
|                            |                |                  |                       |              |            |                        |                      |                                 |        |   |                                    |         |         |
| _                          |                |                  |                       |              |            |                        |                      |                                 |        |   |                                    |         |         |
| - <u>75.5</u> - 20.0       |                |                  |                       |              |            |                        |                      |                                 |        |   |                                    |         |         |
| 20.0                       |                |                  |                       |              |            |                        |                      |                                 |        |   |                                    |         |         |
|                            |                |                  |                       |              |            |                        |                      |                                 |        |   |                                    |         |         |
| - <u>70.5</u> - 25.0       |                |                  |                       |              |            |                        |                      |                                 |        |   |                                    |         |         |
| 25.0                       |                |                  |                       |              |            |                        |                      |                                 |        |   |                                    |         |         |
| -                          |                |                  |                       |              |            |                        |                      |                                 |        |   |                                    |         |         |
| Red                        | dina (         | mm)              |                       |              | aint C     | Spacin                 | a / 100 11           | \                               |        | Continuity (mm)                               | Attitude Angle                     | Δnertur | o (mm)  |

| Bedding (mm)  | Joint Spacing (mm)   | Continuity (mm)  | Attitude Angle  | Aperture (mm)  |  |  |
|---|--|--|---|--|--|--|
| Extremely Thin   <20   Very Thin   20-60   Thin   60-200   Medium   200-600   Thick   600-2000   Very Thick   2000-6000   Extremely Thick   >6000 | Extremely Close <20 Very Close 20-60 Close 60-200 Mod Close 200-600 Wide 600-2000 Very Wide 2000-6000 Extremely Wide >6000 | Extremely <25<br>Moderately 25-100<br>Slightly 100-200<br>Sound >200 | Horizontal 0° - 5°<br>Shallow 5° - 35°<br>Moderate 35° - 55°<br>Steep 55° - 85°<br>Vertical 85° - 90° | Very Tight < 0.1<br>Tight 0.1 - 0.25<br>Partly Open 0.25 - 0.5<br>Open 0.5 - 2.5<br>Mod. Wide 2.5 - 10<br>Wide >10 |  |  |

| Field     | <u>Hardness</u>                       | Weat            | thering               |  |             |                  |                |                          |
|-----------|---------------------------------------|-----------------|-----------------------|--|-------------|------------------|----------------|--------------------------|
| Very Hard | Knife Can't Scratch<br>Scratches with | Fresh<br>Slight |                       | ock material weathering;<br>ated weathering. All the r |             |                  | oredand may    | he weaker externally     |
| Hard      | Difficulty                            | "               | than its fresh condit | tion.  |             | ,                | ,              | •                        |
| Med. Hard | Scratches Readily<br>Grooves with     | Moderate        |                       | e rock material is decom<br>continuous framework or    |             |                  | to a soil. Fre | sh or discolored rock is |
| Medium    | Difficulty                            | Severe          | More than half of the | e rock material is decom                               | posed and/o | or disintegrated | to a soil. Fre | sh or discolored rock is |
| Soft      | Grooves Readily                       |                 |                       | continuous framework or                                |             |                  |                |                          |
| Very Soft | Carves with Knife                     | Complete        |                       | decomposed and/or disir                                |             |                  |                |                          |
|           |                                       | Residual Soil   |                       | converted to soil. The m<br>but the soil has not been  |             |                  | abric are des  | troyed. There is a large |
| Dovious   | ad by                                 | •               |                       | Doto   |             | Davina No        | ımbarı B       | . 57                     |

Reviewed by: Date: Boring Number: B-57





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

 $\begin{tabular}{ll} \textbf{Drilling Contractor/Driller:} & \textbf{GeoLogic - Earth Exploration, Inc. / M. Ferreira} \\ \end{tabular}$ 

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D. Bore Hole Location: 602 Trapelo Rd./Agassiz St., Belmont, MA

Northing: 2967013.6930 Easting: 738818.938

Drilling Date: Start: 9/28/2017 End: 9/28/2017

Surface Elevation (ft.): 94.08

Total Depth (ft.): 10

Depth to Initial Water Level (ft):

Depth Date Time

NE 9/28/2017 ---

Abandonment Method: Backfilled with soil cuttings

| ]                                    | ,                                | <b>Cum C C</b>   | _0,_0 .   |                            | 0,_                     | .0,20                       |             |                 | Logged By: A  | a. Smith                                    |  |
|--------------------------------------|----------------------------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|-----------------|---|---|--|
| Elev.<br>Depth<br>(ft)               | Sample<br>Type                   | Sample<br>Number | Sample<br>Length (in)                             | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata          | Material Descriptio   | on  | Remarks  |
| 0                                    |                                  |                  |   |                            |                         |                             |             |                 | 5" Asphalt  |   | Vacuum excavate  |
|                                      |                                  |                  |   |                            |                         |                             |             |                 | Moist, brown, fine to coarse Gl                               | RAVEL and fine                              | boring from the ground surface to 6' bgs.  Analytical sample                 |
| -                                    | VE                               | V-1              |   |                            |                         |                             |             |                 | to coarse SAND, trace silt                                    | TV (V EE and mio                            | (2'-3')  |
| - <u>89.1</u> -                      |                                  |                  |   | 90                         |                         |                             |             | Sand and Gravel | Maint vanudanna kunsun fina                                   | <b>.</b>                                    |  |
|                                      | SS                               | S-1              | 10  | 100/4"                     | 6                       | >100                        |             | Sa              | Moist, very dense, brown, fine<br>SAND and fine to coarse GRA | to coarse<br>.VEL, trace silt               | Corrosion sample (6'-7')   |
| -                                    | SS                               | S-2              | 10  | 58                         | 10                      | >100                        |             |                 | Moist, very dense, brown, fine                                | to coarse                                   |  |
| -                                    | SS                               | S-2<br>S-3       | 0   | 100/4"<br>100/0"           |                         | -100                        |             |                 | SAND and fine to coarse GRA No recovery                       | VEL, trace silt                             | Advance rollerbit  |
| <u>84.1</u><br>10                    |                                  |                  |   |                            |                         |                             |             |                 | •   |   | to 10' bgs.  |
|                                      | -                                |                  |   |                            |                         |                             |             |                 | Test boring B-58 terminated at backfilled with soil cuttings. | . To bys and                                |  |
| ASM 5 20 180 220 . GPD - 5/6/12      | -                                |                  |   |                            |                         |                             |             |                 |   |   |  |
| 74.1<br>AS - Auge                    | Sa                               | ample Ty         |   |                            |                         |                             |             |                 | Consistency vs Blowcount/Foot                                 | Burm  | ister Classification   |
| CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | fornia Sa<br>Rock Co<br>lock Cor | impler<br>ore S  | V - Vac<br>San<br>S - Spli<br>T - She<br>GP - Geo | nple<br>t Spoor<br>lby Tul | n<br>ne                 | V. Loos<br>Loose:<br>M. Der | se: 0       | )-4 C<br>-10 V  | Dense: >50 Soft: 2-4 V.<br>M. Stiff: 4-8 Ha                   | siff: 8-15 li<br>Stiff: 15-30 ard: >30 mois | nd 35-50%<br>ome 20-35%<br>ttle 10-20%<br>race <10%<br>sture, density, color |
| ୍ମ Revie                             | wed b                            | y:               |   |                            |                         |                             |             |                 | Date: Bo  | oring Number: B                             | -58  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 579 Trapelo Rd., Belmont, MA Northing: 2966834.7650 Easting: 739160.765 **Drilling Date: Start:** 9/29/2017 **End:** 9/29/2017

Surface Elevation (ft.): 88.34

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth Date Time ΝE 9/29/2017

Abandonment Method: Backfilled with soil cutttings

| J   |                                 |                         |                       |                            |                         |                             |  |                          | Logged By: A. Smith/J. Wang   |  |  |  |  |
|---|---------------------------------|-------------------------|-----------------------|----------------------------|-------------------------|-----------------------------|--|--------------------------|---|--|--|--|--|
| Elev.<br>Depth<br>(ft)                                | Sample<br>Type                  | Sample<br>Number        | Sample<br>Length (in) | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log                                | Strata                   | Material Description Remarks  |  |  |  |  |
| 0   |                                 |                         |                       |                            |                         |                             |  |                          | 10" Asphalt Vacuum excavat  |  |  |  |  |
|   | -                               |                         |                       |                            |                         |                             |  |                          | boring from the ground surface to 6' bgs.   |  |  |  |  |
|   | VE                              | V-1                     |                       |                            |                         |                             |  | ≡.                       | Moist, dark gray, fine to coarse SAND, some fine to coarse gravel  Analytical sampl (2'-3')   |  |  |  |  |
| 83.3<br>5   | VE                              | V-2                     |                       |                            |                         |                             |  |                          | Moist, dark gray, fine to coarse GRAVEL and fine to coarse SAND, trace silt  Analytical sampl (5'-6')                               |  |  |  |  |
| -   | SS                              | S-1                     | 24                    | 23<br>40<br>64<br>82       | 10                      | >100                        | δ<br>· · · · · · · · · · · · · · · · · · · |                          | Moist, very dense, gray, fine to coarse SAND, some fine to coarse gravel, little silt   |  |  |  |  |
| _   | SS                              | S-2                     | 9                     | 80<br>100/3"               | 8                       | >100                        | 。<br>)                                     |                          | Moist, very dense, gray, fine to coarse SAND, some fine to coarse gravel, little silt   |  |  |  |  |
| 78.3 -  |                                 |                         |                       |                            |                         |                             |  | Sand and Gravel          |   |  |  |  |  |
| 73.3<br>15  | - SS                            | S-3                     | 24                    | 70<br>86<br>70<br>70       | 4                       | >100                        | );<br>Ø<br>O<br>O<br>O                     |                          | Moist, very dense, gray, fine to coarse<br>GRAVEL and fine to coarse SAND, trace silt   |  |  |  |  |
| -<br>-<br>-   |                                 |                         |                       |                            |                         |                             |  |                          | Test boring B-59 terminated at 16' bgs and backfilled with soil cuttings.   |  |  |  |  |
| 68.3  | S                               | ample Ty                | pes                   |                            |                         |                             |  |                          | Consistency vs Blowcount/Foot Burmister Classification  |  |  |  |  |
| AS - Auge<br>CS - Califo<br>BQ - 1.5" I<br>NQ - 2" Ro | r/Grab S<br>ornia Sa<br>Rock Co | Sample<br>Impler<br>ore | V - Vac               | nple<br>t Spoor<br>lby Tub | ן<br>הב                 | V. Loos<br>Loose:<br>M. Den | se: (                                      | anular<br>)-4 [<br>-10 \ | Sand):   Fine Grained (Clay):   and 35-50%   Some 20-35%   Soft:   2-4   V. Stiff:   15-30   trace   10%   moisture, density, color |  |  |  |  |
| Revie   | wed k                           | y:                      |                       |                            |                         | Date: Boring Number: B-59   |  |                          |   |  |  |  |  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / M. Ferreira

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NX **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

Bore Hole Location: 1075 Pleasant St., Belmont, MA Northing: 2966922.9100 Easting: 739437.503

Drilling Date: Start: 9/21/2017 End: 9/21/2017

Surface Elevation (ft.): 96.11

Total Depth (ft.): 8.5

Depth to Initial Water Level (ft):

Depth Date Time

NE 9/21/2017 --

Abandonment Method: Backfilled with soil cuttings

Logged By: J. Wang

|                           |  |                  |                       |                       |                         |                  |             |                 | Logged By: J. Wang   |
|---------------------------|--|------------------|-----------------------|-----------------------|-------------------------|------------------|-------------|-----------------|--|
| Elev.<br>Depth<br>(ft)    | Sample<br>Type                                 | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value          | Graphic Log | Strata          | Material Description Remarks   |
| 96.1                      |  |                  |                       | 38                    |                         |                  |             |                 | 6" Asphalt   |
|                           | SS   | S-1              | 9                     | 100/3"                | 7                       | >100             | ,, o,       | _               | Moist, very dense, dark gray, fine to coarse   |
| -                         |  |                  |                       |                       |                         |                  |             | 3ve             | SAND, some fine to coarse gravel, trace silt   |
|                           |  |                  |                       |                       |                         |                  |             | Sand and Gravel | or true, some time to obdise gravel, trade six   |
| -                         |  |                  |                       | 58                    |                         |                  |             | n d             | Moist, very dense, dark gray, fine to coarse Analytical sample   |
|                           | SS   | S-2              | 15                    | 73                    | 12                      | >100             |             | ا و             | GRAVEL and fine to coarse SAND, trace silt (2'-3.25')  |
| -                         | 1  |                  | '                     | 100/3"                |                         |                  |             | Sar             |  |
|                           |  |                  |                       |                       |                         |                  | N/X         |                 | See core log for description   |
|                           | 1  |                  |                       |                       |                         |                  |             |                 |  |
| 91.1                      |  |                  |                       |                       |                         |                  |             |                 |  |
| 5                         |  |                  |                       |                       |                         |                  |             |                 |  |
| L.                        | NX   | C-1              | 60                    |                       | 56                      |                  |             | Bedrock         |  |
|                           | 1  | 0-1              | 00                    |                       | 50                      |                  |             | ğ               |  |
| ļ .                       | 4  |                  |                       |                       |                         |                  |             |                 |  |
|                           |  |                  |                       |                       |                         |                  |             | 3               |  |
| ļ .                       | - 1  |                  |                       |                       |                         |                  |             | 1               |  |
|                           |  |                  |                       |                       |                         |                  | DXXX.       | -               | Test boring B-60 terminated at 8.5' bgs and  |
| <u> </u>                  | - 1  |                  |                       |                       |                         |                  |             |                 | backfilled with soil cuttings.   |
| 06.4                      |  |                  |                       |                       |                         |                  |             |                 | baokilied with soil outlings.  |
| 86.1<br>10                | 1  |                  |                       |                       |                         |                  |             |                 |  |
|                           |  |                  |                       |                       |                         |                  |             |                 |  |
| F -                       | 1  |                  |                       |                       |                         |                  |             |                 |  |
|                           |  |                  |                       |                       |                         |                  |             |                 |  |
| -                         | 1  |                  |                       |                       |                         |                  |             |                 |  |
|                           |  |                  |                       |                       |                         |                  |             |                 |  |
|                           | 1  |                  |                       |                       |                         |                  |             |                 |  |
| L                         |  |                  |                       |                       |                         |                  |             |                 |  |
|                           |  |                  |                       |                       |                         |                  |             |                 |  |
| 81.1                      |  |                  |                       |                       |                         |                  |             |                 |  |
| 15                        |  |                  |                       |                       |                         |                  |             |                 |  |
| L .                       | 1  |                  |                       |                       |                         |                  |             |                 |  |
| 17/8                      |  |                  |                       |                       |                         |                  |             |                 |  |
| ·                         | 1 1  |                  |                       |                       |                         |                  |             |                 |  |
| 집                         |  |                  |                       |                       |                         |                  |             |                 |  |
| ZO 1802ZU.GPJ - 3/8/ZI    |  |                  |                       |                       |                         |                  |             |                 |  |
| 180                       |  |                  |                       |                       |                         |                  |             |                 |  |
| <u>-</u>                  |  |                  |                       |                       |                         |                  |             |                 |  |
| 20.4                      |  |                  |                       |                       |                         |                  |             |                 |  |
| 76.1                      |  | manla To         |                       |                       |                         |                  |             |                 | Consistency on Planacount/Foot Promise of Classification   |
| 76.1<br>AS - Auge         | Sample Types                                   |                  |                       |                       |                         |                  |             |                 | Consistency vs Blowcount/Foot Burmister Classificatio  |
| ≦ AS - Auge               | AS - Auger/Grab Sample  V - Vac Ex/Grab Sample |                  |                       |                       |                         |                  |             | anular          | Sand): Fine Grained (Clay): and 35-50% some 20-35%   |
| n CS - Calif<br>BQ - 1.5" | ornia Sa<br>Rock Ca                            | ampler S         | SS - Spli<br>ST - She | t Spooi               | n                       | V. Loos          |             |                 | ense: 30-50   V. Soft: <2 Stiff: 8-15   little 10-20%  |
| ∸l NQ - 2" R              |  | e S              | ST - She<br>SP - Geo  | lby Tub               | be                      | Loose:<br>M. Den |             |                 | . Dense: >50   Soft: 2-4 V. Stiff: 15-30   trace <10%   M. Stiff: 4-8   Hard: >30   moisture, density, color |
| Povio                     | א א א ו  |                  |                       | -p. 500               |                         |                  |             |                 | module, denoity, each  |
| ୁ Revie                   | wea t  | υy:              |                       |                       |                         |                  |             |                 | Date: Boring Number: B-60  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NX Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 1075 Pleasant St., Belmont, MA Northing: 2966922.9100 Easting: 739437.503

**Drilling Date: Start:** 9/21/2017 **End:** 9/21/2017

Surface Elevation (ft.): 96.11

Total Depth (ft.): 8.5

Depth to Initial Water Level (ft): ΝE 9/21/2017

Abandonment Method: Backfilled with soil cuttings

Logged By: J. Wang

| Elevation<br>Depth<br>(ft) | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Recovery (%) | RQD<br>(%) | Drill Rate<br>(min/ft)   | Down Press.<br>(psi) | Graphic<br>Log                                | Strata  | N   | laterial Description   |                    | Remarks  |
|----------------------------|----------------|------------------|-----------------------|--------------|------------|--------------------------|----------------------|---|---------|---|--|--------------------|----------|
| 91.1<br>5.0                | NX             | C-1              | 60                    | 93           | 35         | 2.5<br>2.5<br>2.0<br>2.0 | NR                   | ×××<br>×××<br>×××<br>×××<br>×××<br>×××<br>××× | Granite | Hard, slightly weath<br>GRANITE; primary<br>moderately fracture | ered, medium grained, gra<br>joint set shallow, very clos<br>d | ay<br>se to close, |          |
| _ <u>86.1</u>              |                |                  |                       |              |            |                          |                      | ×××   |         | Test boring B-60 ter  | rminated at 8.5' bgs.  |                    |          |
| 81.1<br>- 81.1<br>- 15.0   |                |                  |                       |              |            |                          |                      |   |         |   |  |                    |          |
|                            |                |                  |                       |              |            |                          |                      |   |         |   |  |                    |          |
| ,                          | dina (         | mm)              |                       |              | -:4 0      | anacin                   | (                    |   |         | Continuity (mm)   | Attitude Angle   | Anauti             | ıre (mm) |

| Bedding (mm)               | Joint Spacing (mm)   | Continuity (mm)  | Attitude Angle  | Aperture (mm)  |
|----------------------------|--|--|---|--|
| Extremely Thin         <20 | Extremely Close <20 Very Close 20-60 Close 60-200 Mod Close 200-600 Wide 600-2000 Very Wide 2000-6000 Extremely Wide >6000 | Extremely <25<br>Moderately 25-100<br>Slightly 100-200<br>Sound >200 | Horizontal 0° - 5°<br>Shallow 5° - 35°<br>Moderate 35° - 55°<br>Steep 55° - 85°<br>Vertical 85° - 90° | Very Tight < 0.1<br>Tight 0.1 - 0.25<br>Partly Open 0.25 - 0.5<br>Open 0.5 - 2.5<br>Mod. Wide 2.5 - 10<br>Wide >10 |

| - 3/8/21           | - ]  |         |  |                                     |                           |   |        |                               |   |                          |  |                                 |                                |                                   |                   |  |
|--------------------|--|---------|--|-------------------------------------|---------------------------|---|--------|-------------------------------|---|--------------------------|--|---------------------------------|--------------------------------|-----------------------------------|-------------------|--|
| .GPJ               | Bedo   | ling (n | <u>nm)</u>   |                                     | J                         | oint S  | pacir  | ıg (mı                        | <u>m)</u>   | 2                        | Continui   | ty (mm)                         | Attitud                        | le Angle                          | Apert             | ure (mm)   |
| A WASM 3 20180220. | Extremely<br>Very Thin<br>Thin<br>Medium<br>Thick<br>Very Thicl<br>Extremely | (       | <2<br>20-<br>60-2<br>200-<br>600-2<br>2000-<br>>60 | -60<br>200<br>-600<br>2000<br>-6000 | Ve<br>CI<br>Mo<br>W<br>Ve | tremely<br>ery Clos<br>ose<br>od Clos<br>ide<br>ery Wid | e<br>e | 20<br>20<br>600<br>200<br>200 | <20<br>0-60<br>0-200<br>0-600<br>0-2000<br>0-6000<br>6000 | M <sub>i</sub>           | Extremely   <25   Moderately   25-100   Sound   >200   Sound     Sound     Sound     Sound |                                 |                                |                                   |                   |  |
| MWRA               | <u>Fiel</u>  | d Hard  | dnes   | <u>s</u>                            |                           |   | Wea    | therin                        | <u>nering</u>   |                          |  |                                 |                                |                                   |                   |  |
| SDO7.              | Very Hard<br>Hard  | Scr     | e Can<br>atches<br>culty                           | n't Scrat<br>s with                 |                           | Fresh<br>Slight   |        | Disco                         | sible si<br>loration                                      | indica                   | ited weath   | al weathering<br>ering. All the | ; slight to no<br>rock materia | discoloration.<br>Il may be disco | loredand may l    | pe weaker externally                               |
| BIN                | Med. Hard  | Scr     | atches   | Readi                               | ly                        | Modera  | ate    |                               |   |                          |  | erial is decom                  |                                |                                   | d to a soil. Fre  | sh or discolored rock is                           |
|                    | Medium   | Diffi   | oves v   |                                     |                           | Severe  |        | More                          | than ha   | alf of the               | e rock mat   | erial is decon                  | nposed and/                    | or disintegrated                  | I to a soil. Free | sh or discolored rock is                           |
| CORE ONLY          | Soft<br>Very Soft  |         |  | Readily<br>ith Knife                | e                         | Compl<br>Residu   |        | All ro                        | ck mate<br>ck mate  | erial is o<br>erial is o | decompos<br>converted  | to soil. The n                  | integrated to<br>nass structu  | soil. The origin                  |                   | ture is largely intact.<br>royed. There is a large |
| 30CK               | Reviewed by:   |         |  |                                     |                           |   |        |                               |   |                          | Dat  | e:                              |                                | Boring N                          | umber: B          | -60  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / M. Ferreira **Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: Pleasant St./Olmstead Dr., Belmont, MA

Northing: 2966985.6420 Easting: 739825.182

**Drilling Date: Start:** 9/21/2017 **End:** 9/21/2017

Surface Elevation (ft.): 94.5

Total Depth (ft.): 14

Depth to Initial Water Level (ft):DepthDateTime69/21/201712:00

Abandonment Method: Backfilled with soil cuttings

|  |  |                  |   |                            |                         |                             |               |                          | Logged By: A. Smith  |                     |
|--|--|------------------|---|----------------------------|-------------------------|-----------------------------|---------------|--------------------------|--|---------------------|
| Elev.<br>Depth<br>(ft)                           | Sample<br>Type                               | Sample<br>Number | Sample<br>Length (in)                             | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log   | Strata                   | Material Description Remai   | rks                 |
| 0  |  |                  |   |                            |                         |                             |               |                          | 6" Asphalt   |                     |
| _  |  |                  |   |                            |                         |                             |               |                          | 6" Cobble  |                     |
|  | SS   | S-1              | 12  | 45<br>70                   | 7                       | >70                         |               |                          | Moist, very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt  |                     |
|  | SS   | S-2              | 24  | 22<br>21<br>20<br>20       | 2                       | 41                          |               | Sand and Gravel          | Moist, dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt  Analytical s (2'-4')   | sample              |
| 89.5<br>5  | - SS   | S-3              | 24  | 27<br>26<br>45<br>46       | 8                       | 71                          |               | Sand                     | Moist, very dense, brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt  (4'-6')   | sample              |
| - <del>*</del> -                                 | SS   | S-4              | 7   | 70<br>50/1"                | 7                       | >50                         |               | d Rock                   | Wet, very dense, brown, fine to coarse<br>GRAVEL and fine to coarse SAND, trace silt   |                     |
|  |  |                  |   |                            |                         |                             |               | ere                      |  |                     |
|  | SS   | S-5              | 5   | 100/5"                     | 5                       |                             |               | Weathered                | Wet, very dense, brown, fine to coarse   |                     |
| -  |  |                  |   |                            |                         |                             | <b>V</b> //// | >                        | GRAVEL and fine to coarse SAND, trace silt  See core log for description   |                     |
| - 84.5<br>10                                     | NX   | C-1              | 60  |                            | 52                      |                             |               | Bedrock                  |  |                     |
| - <u>79.5</u>                                    | -  |                  |   |                            |                         |                             |               |                          | Test boring B-61 terminated at 14' bgs and backfilled with soil cuttings.  |                     |
|  | 1  |                  |   |                            |                         |                             |               |                          |  |                     |
| 74.5   | 9-   | mnle Tra         | nos   |                            |                         |                             |               |                          | Consistency vs Blowcount/Foot Burmister Classi   | fication            |
| 74.5  AS - Auge CS - Calife BQ - 1.5" NQ - 2" Re | er/Grab S<br>ornia Sa<br>Rock Co<br>ock Core | mpler Sore S     | V - Vac<br>Sam<br>S - Spli<br>T - She<br>SP - Geo | nple<br>t Spoor<br>lby Tul | n l                     | V. Loos<br>Loose:<br>M. Den | se: 0         | nular (<br>)-4 C<br>10 V | Consistency vs Blowcount/Foot         Burmister Classi           (Sand):         Fine Grained (Clay):         and 35-50 some 20-35 some 20-35 little 10-20 some 20-35 little 10-20 trace < 10 moisture, density,           Date:         Boring Number: B-61 | 0%<br>5%<br>1%<br>% |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA
Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: Pleasant St./Olmstead Dr., Belmont, MA

Northing: 2966985.6420 Easting: 739825.182

**Drilling Date: Start:** 9/21/2017 **End:** 9/21/2017

ROCK CORE ONLY GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 94.5

Total Depth (ft.): 14

Depth to Initial Water Level (ft):

Depth Date Time
6 9/21/2017 12:00

Abandonment Method: Backfilled with soil cuttings

Logged By: A. Smith

| Elevation<br>Depth<br>(ft) | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Recovery (%) | RQD<br>(%) | Drill Rate<br>(min/ft) | Down Press.<br>(psi) | Graphic<br>Log                                       | Strata  | N  | laterial Description                              |       | Remarks  |
|----------------------------|----------------|------------------|-----------------------|--------------|------------|------------------------|----------------------|--|---------|--|---|-------|----------|
| <u>84.5</u><br>10.0        |                |                  |                       |              |            | 2:00<br>2:30           |                      | ×××<br>×××<br>×××<br>×××<br>×××<br>×××<br>×××<br>××× |         | Hard, slightly weath<br>GRANITE; very clos | ered, medium grained, gra<br>se to close jointing | ay,   |          |
|                            | NX             | C-1              | 60                    | 87           | 17         | 2:30                   | NR                   | × × ×<br>× × ×<br>× × ×                              | Granite |  |   |       |          |
| -<br>                      |                |                  |                       |              |            | 1:30<br>2:00           |                      | ×××<br>×××   |         | Total having D Cd to                       | maria aka da ka da la bara                        |       |          |
| <u>79.5</u><br>15.0        |                |                  |                       |              |            |                        |                      |  |         | Test boring B-61 te                        | rminated at 14' bgs.                              |       |          |
|                            |                |                  |                       |              |            |                        |                      |  |         |  |   |       |          |
| -<br>-<br>-                |                |                  |                       |              |            |                        |                      |  |         |  |   |       |          |
| 74.5<br>20.0               |                |                  |                       |              |            |                        |                      |  |         |  |   |       |          |
| <br>                       |                |                  |                       |              |            |                        |                      |  |         |  |   |       |          |
| 69.5                       |                |                  |                       |              |            |                        |                      |  |         |  |   |       |          |
| _ <u>69.5</u> _ 25.0       |                |                  |                       |              |            |                        |                      |  |         |  |   |       |          |
| -<br>                      |                |                  |                       |              |            |                        |                      |  |         |  |   |       |          |
| Bed                        | dina (         | mm)              |                       |              | oint S     | \                      |                      | >  |         | Continuity (mm)                            | Attitude Angle                                    | Anaut | ıre (mm) |

| Bedding (mm)               | Joint Spacing (mm)   | Continuity (mm)  | Attitude Angle  | Aperture (mm)  |  |  |
|----------------------------|--|--|---|--|--|--|
| Extremely Thin         <20 | Extremely Close <20 Very Close 20-60 Close 60-200 Mod Close 200-600 Wide 600-2000 Very Wide 2000-6000 Extremely Wide >6000 | Extremely <25<br>Moderately 25-100<br>Slightly 100-200<br>Sound >200 | Horizontal 0° - 5°<br>Shallow 5° - 35°<br>Moderate 35° - 55°<br>Steep 55° - 85°<br>Vertical 85° - 90° | Very Tight < 0.1<br>Tight 0.1 - 0.25<br>Partly Open 0.25 - 0.5<br>Open 0.5 - 2.5<br>Mod. Wide 2.5 - 10<br>Wide >10 |  |  |

|      | Field I   | Hardness                          | Weat          | hering  |   |
|------|-----------|-----------------------------------|---------------|---|---|
| 3 \  | Very Hard | Knife Can't Scratch               | Fresh         | No Visible sign of rock material weathering; slight to no   |   |
| 3 +  | Hard      | Scratches with<br>Difficulty      | Slight        | Discoloration indicated weathering. All the rock materithan its fresh condition.                                  | ai may be discoloredand may be weaker externally        |
| וכ   | Med. Hard | Scratches Readily<br>Grooves with | Moderate      | Less than half of the rock material is decomposed and/<br>present either as a continuous framework or as coresto  |   |
| ١.   | Medium    | Difficulty                        | Severe        | More than half of the rock material is decomposed and   | or disintegrated to a soil. Fresh or discolored rock is |
|      | Soft      | Grooves Readily                   |               | present either as a continuous framework or as coresto  |   |
| ۱ از | √ery Soft | Carves with Knife                 | Complete      | All rock material is decomposed and/or disintegrated to   |   |
| 5    |           |                                   | Residual Soil | All rock material is converted to soil. The mass structuchange in volume, but the soil has not been significantly |   |
| ŧΓ   | Davilous  | al las es                         |               | Deter   | Danima Number D C4                                      |

Reviewed by: Date: Boring Number: B-61





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / P. Fisher **Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NX

 $\textbf{Hammer Weight/Drop Height/ Spoon Size:} \quad 140 \text{ lb} \text{ / } 30 \text{ in /2 in O.D.}$ 

**Bore Hole Location:** 1010 Pleasant St., Belmont, MA **Northing:** 2966921.5300 **Easting:** 740085.377 **Drilling Date: Start:** 11/9/2017 **End:** 11/13/2017

Surface Elevation (ft.): 85.85

Total Depth (ft.): 14.1

Depth to Initial Water Level (ft):

Depth Date Time

6.0 11/13/2017 09:15

Abandonment Method: Backfilled with soil cuttings

|   | ,                                 |                        |  |                            |                         |                             |             | Logged By: A. Smith        |   |  |  |  |  |
|---|-----------------------------------|------------------------|--|----------------------------|-------------------------|-----------------------------|-------------|----------------------------|---|--|--|--|--|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type                    | Sample<br>Number       | Sample<br>Length (in)                              | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata                     | Material Description  | Remarks  |  |  |  |
| 0   |                                   |                        |  |                            |                         |                             |             |                            | 4" Asphalt  |  |  |  |  |
|   | SS                                | S-1                    | 10   | 17<br>100/4"               | 6                       | >100                        |             | ≣                          | Moist, very dense, brown, fine to medic SAND, little silt                                     | ım   |  |  |  |
|   | - ss                              | S-2                    | 24   | 14<br>28<br>28<br>25       | 8                       | 56                          |             |                            | Moist, very dense, gray-brown, fine to o SAND and fine to coarse GRAVEL, little               | coarse Analytical sample (2'-4')   |  |  |  |
|   | - ss                              | S-3                    | 24   | 14<br>44<br>38<br>56       | 10                      | 82                          |             | Sand and Gravel            | Moist, very dense, gray-brown, fine to o SAND and fine to coarse GRAVEL, little               | e silt (4'-6')   |  |  |  |
|   | ss                                | S-4                    | 18   | 66<br>92<br>100            | 16                      | >100                        |             | Sanda                      | Moist, very dense, gray-brown, fine to o SAND and fine to coarse GRAVEL, little               | coarse Corrosion sample (6-'7.5')  |  |  |  |
| <br>  | SS                                | S-5                    | 16   | 18<br>40<br>100/4"         | 8                       | >100                        |             |                            | Moist, very dense, gray-brown, fine to o SAND and fine to coarse GRAVEL, little               | Advanced rollerbit from 10 to 11' in rock. Cored rock from 11 to 14' and |  |  |  |
| - <u>75.9</u>                                     | NX                                | C-1                    | 36   |                            | 12                      |                             |             | Weathered Rock             | See core log for description  | retrieved 12" of cobbles and coarse gravel.                              |  |  |  |
| - <u>70.9</u> - 15                                | SS                                | S-6                    | 1  | 100/1"                     | 0                       |                             |             |                            | No Recovery Test boring B-62 terminated at 14.1' bo backfilled with soil cuttings.            | gs and   |  |  |  |
| 65.9  | 65.9 Sample Types                 |                        |  |                            |                         |                             |             |                            | Consistency vs Blowcount/Foot   | Burmister Classification   |  |  |  |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | er/Grab S<br>fornia Sa<br>Rock Co | Sample<br>mpler<br>ore | V - Vac<br>San<br>SS - Spli<br>T - She<br>GP - Ged | nple<br>t Spoor<br>lby Tub | n<br>ne                 | V. Loos<br>Loose:<br>M. Den | se: 0<br>4- | anular (<br>)-4 C<br>-10 V | Sand):         Fine Grained (Clay):           ense:         30-50         V. Soft:         <2 | and 35-50%<br>some 20-35%  |  |  |  |
| Revie   | wed b                             | y:                     |  |                            |                         |                             |             |                            | Date: Boring N  | umber: B-62  |  |  |  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / P. Fisher

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NX

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 1010 Pleasant St., Belmont, MA Northing: 2966921.5300 Easting: 740085.377

**Drilling Date: Start:** 11/9/2017 **End:** 11/13/2017

ROCK CORE ONLY GINT LOGS MWRA WASM 3 20180220.GPJ - 5/18/23

Surface Elevation (ft.):85.85

Total Depth (ft.): 14

Depth to Initial Water Level (ft):

6.0 11/13/2017 09:15

Abandonment Method: Backfilled with soil cuttings

| Elevation<br>Depth<br>(ft)     | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Recovery (%) | RQD<br>(%) | Drill Rate<br>(min/ft) | Down Press.<br>(psi) | Graphic<br>Log                  | Strata  | Material Description   | Remarks   |
|--------------------------------|----------------|------------------|-----------------------|--------------|------------|------------------------|----------------------|---------------------------------|---------|--|-----------|
|                                | NX             | C-1              | 36                    | 33           | 0          | 2<br>1<br>2            |                      | ×××<br>×××<br>×××<br>×××<br>××× | GRANITE | Hard, moderately fractured, slightly weathered, gray, medium grained, GRANITE; primary joint set steep to vertical, very close, rough, stepped |           |
| - <u>70.9</u> - <u>15.0</u>    |                |                  |                       |              |            |                        |                      | XXX                             |         | Continue split spoon sampling at 14' bgs.  |           |
| - <u>65.9</u><br>- <u>20.0</u> |                |                  |                       |              |            |                        |                      |                                 |         |  |           |
|                                |                |                  |                       |              |            |                        |                      |                                 |         |  |           |
| <u>55.9</u><br>30.0            | ding           | (mm)             |                       |              | -i4 G      | Snacij                 |                      |                                 |         | Continuity (mm) Attitude Angle Ape   | ture (mm) |

| Bedding (mm)               | Joint Spacing (mm) | Continuity (mm)  | Attitude Angle  | Aperture (mm)  |  |  |
|----------------------------|--------------------|--|---|--|--|--|
| Extremely Thin         <20 | Extremely Close    | Extremely <25<br>Moderately 25-100<br>Slightly 100-200<br>Sound >200 | Horizontal 0° - 5°<br>Shallow 5° - 35°<br>Moderate 35° - 55°<br>Steep 55° - 85°<br>Vertical 85° - 90° | Very Tight < 0.1<br>Tight 0.1 - 0.25<br>Partly Open 0.25 - 0.5<br>Open 0.5 - 2.5<br>Mod. Wide 2.5 - 10<br>Wide >10 |  |  |

| Field             | Hardness                              | Weat            | thering                  |  | ·   |
|-------------------|---------------------------------------|-----------------|--------------------------|--|---|
| Very Hard<br>Hard | Knife Can't Scratch<br>Scratches with | Fresh<br>Slight |                          | material weathering; slight to no weathering. All the rock materia | discoloration.<br>al may be discoloredand may be weaker externally that |
| Med. Hard         | Difficulty<br>Scratches Readily       | Moderate        |                          |  | or disintergrated to a soil. Fresh or discolored rock is                |
| Medium            | Grooves with Difficulty               | Severe          | More than half of the ro |  | or disintegrated to a soil. Fresh or discolored rock is                 |
| Soft<br>Very Soft | Grooves Readily<br>Carves with Knife  | Complete        | All rock material is dec |  | soil. The original mass structure is largely intact.                    |
|                   |                                       | Residual Soil   |                          | the soil has not been significantly                                | re and material fabric are destroyed. There is a large y transported.   |
| Reviewe           | ed by:                                |                 |                          | Date:  | Boring Number: B-62   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 1010 Pleasant St., Belmont, MA Northing: 2967275.6760 Easting: 740503.059 **Drilling Date: Start:** 9/20/2017 **End:** 9/20/2017

Surface Elevation (ft.): 74.79

Total Depth (ft.): 14.3

Depth to Initial Water Level (ft):

Depth Date Time 6.2 9/20/2017 15:35

Abandonment Method: Backfilled with soil cuttings

| Diming  | , Date.             | Start. 3/        | 20/201  | , LI                       | u. 0/2                  | 0/2017                      |             |              |  |                 | Lo                           | gged E    | By: A. Smith                     |                 |         |   |                 |
|---|---------------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|--------------|--|-----------------|------------------------------|-----------|----------------------------------|-----------------|---------|---|-----------------|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type      | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata       |  |                 | Materia                      | l Desci   | ription                          |                 |         | Rema  | arks            |
| 0   | SS                  | S-1              | 24  | 20<br>70<br>70<br>78       |                         | >100                        |             |              |  |                 | dense, g<br>to coarse        |           | ne to coarse<br>I, little silt   | SANI            | D,      |   |                 |
|   | SS                  | S-2              | 6   | 100/6"                     | 6                       |                             |             |              |  |                 | dense, g<br>to coarse        |           | ne to coarse<br>I, little silt   | SANI            | D,      | Analytical<br>(2-2.5')  | sample          |
| - <u>69.8</u> -                                   | SS                  | S-3              | 24  | 21<br>25<br>65<br>100      | 12                      | 90                          |             |              |  |                 |                              |           | ine to coarse<br>EL, little silt | SAN             | ID      | Analytical<br>(4-6')  | sample          |
| - <u>T</u>  | SS                  | S-4              | 10  | 75<br>100/4"               | 10                      | >100                        |             | and Gravel   |  |                 |                              |           | ine to coarse<br>EL, trace silt  | SAN             | ID      |   |                 |
| _ <u>64.8</u> _ 10                                | - SS                | S-5              | 24  | 40<br>80<br>80<br>100      | 16                      | >100                        |             | Sand and     |  |                 |                              |           | ine to coarse<br>EL, trace silt  | SAN             | ID      |   |                 |
|   | -                   |                  |   |                            |                         |                             |             |              |  |                 |                              |           |                                  |                 |         |   |                 |
| <u>59.8</u><br>                                   | SS                  | S-6              | 3   | 100/3"                     | 0                       |                             |             | i            | T  |                 |                              |           | ed at 14.3' bǫ<br>s.             | gs an           | d       |   |                 |
| 54.8  |                     |                  |   |                            |                         |                             |             |              |  |                 |                              |           |                                  | ,               |         |   |                 |
|   | <u>Sa</u>           | mple Ty          |   |                            |                         |                             |             |              | Consistency vs Blowcount/Foot Burmister Classifica |                 |                              |           |                                  |                 |         |   |                 |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | ornia Sa<br>Rock Co | impler<br>ore S  | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tub | n<br>ne                 | V. Loos<br>Loose:<br>M. Den | se: 0       | -4 C<br>10 V | (Sand)<br>Dense:<br>/. Dens                        | 30-50<br>e: >50 | V. Soft<br>Soft:<br>M. Stiff | <2<br>2-4 |                                  | 15<br>-30<br>30 | s<br>li | and 35-5<br>ome 20-3<br>ittle 10-2<br>trace <10<br>sture, density | 35%<br>0%<br>0% |
| Revie   | wed k               | y:               |   |                            |                         |                             |             |              |  | Date:           |                              |           | Boring N                         | umb             | er: B   | -63   |                 |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / P. Fisher **Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

Bore Hole Location: 1000 Pleasant St., Belmont, MA Northing: 2967341.7673 Easting: 740754.7076

Drilling Date: Start: 11/20/2017 End: 11/20/2017

Surface Elevation (ft.): 73
Total Depth (ft.): 15.3

 Depth to Initial Water Level (ft):

 Depth
 Date
 Time

 11.8
 11/20/2017
 10:25

Abandonment Method: Backfilled with soil cuttings

|                        |                      |                  |                                 |                       |                         |                  |             |                 | Logged By: A. Smith   |
|------------------------|----------------------|------------------|---------------------------------|-----------------------|-------------------------|------------------|-------------|-----------------|---|
| Elev.<br>Depth<br>(ft) | Sample<br>Type       | Sample<br>Number | Sample<br>Length (in)           | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value          | Graphic Log | Strata          | Material Description Remarks  |
| 0 -                    |                      |                  |                                 |                       |                         |                  |             |                 | 4" Peastone  Vacuum excavate boring from the ground surface to 6' bgs.  |
|                        | VE                   | V-1              |                                 |                       |                         |                  |             |                 | Moist, brown-gray, fine to medium SAND, some fine to coarse gravel, little silt  Analytical sample (2'-2.5')  |
|                        | SS                   | S-1              | 24                              | 16<br>21<br>20<br>50  | 10                      | 41               |             |                 | Moist, hard, brown, fine to coarse SAND, some silt, some fine to coarse gravel  Analytical sample (6'-8')   |
| - 63.0<br>- 10         | - SS                 | S-2              | 24                              | 54<br>52<br>54<br>100 | 16                      | >100             |             | Sand and Gravel | Moist, hard, brown, SILT, little fine to coarse gravel, trace fine sand  Corrosion sample (8'-10')  |
|                        | SS                   | S-3              | 16                              | 23<br>26<br>100/4"    | 8                       | >100             |             |                 | Wet, very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, little silt  Test boring B-64 terminated at 15.3' bgs and backfilled with soil cuttings.   |
|                        | r/Grab S<br>ornia Sa | malor            | V - Vac<br>Sam                  | nple                  | - 1.                    | V. Loos          |             | anular (        | Consistency vs Blowcount/Foot         Burmister Classification           (Sand):         Fine Grained (Clay):         and 35-50% some 20-35% little 10-20%           Jense:         30-50         V. Soft: <2 |
| Revie                  | ock Core             | · G              | S - Spli<br>T - She<br>SP - Geo | by Tub<br>probe       | pe                      | Loose:<br>M. Den |             |                 | Dense: >50   Soft: 2-4   V. Stiff: 15-30   trace <10%   moisture, density, color  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 800 Pleasant St., Belmont, MA Northing: 2967744.1836 Easting: 741155.4214 **Drilling Date: Start:** 9/19/2017 **End:** 9/19/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 74.4

Total Depth (ft.): 15

Depth to Initial Water Level (ft): Depth

Date Time 9.0 9/19/2017 13:40

Abandonment Method: Backfilled with soil cuttings

| _   |                |                  | 13/201  |                            |                         |                             |             |                 |                                     | Logged E                                     | By: A. Smith   |  |
|---|----------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|-----------------|-------------------------------------|--|--|--|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type | Sample<br>Number | Sample<br>Length (in)                             | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata          |                                     | Material Desc                                | ription  | Remarks  |
| 0   |                |                  |   | 12                         |                         |                             | 74 15 17    |                 | 4" Topsoil                          |  |  |  |
| -   | ss             | S-1              | 24  | 32<br>32<br>30             | 12                      | 64                          |             |                 |                                     |  | nse, brown, fine to<br>coarse gravel, little                     |  |
| -   | SS             | S-2              | 24  | 10<br>14<br>22<br>12       | 5                       | 36                          |             |                 |                                     |  | fine to coarse<br>gravel, little silt                            | Analytical sample (2-4')   |
| 69.4<br>5   | - ss           | S-3              | 24  | 12<br>10<br>12<br>24       | 20                      | 22                          |             |                 |                                     | im dense, bro<br>and, trace fine             | wn, SILT, some fi<br>e sand                                      | ne   |
| -   | ss             | S-4              | 15  | 20<br>70<br>100/3"         | 12                      | >100                        |             | Sand and Gravel |                                     |  | fine to coarse<br>se gravel, trace silt                          |  |
| -   | SS             | S-5              | 6   | 100/6"                     | 6                       |                             |             | lanc            | Wet verv de                         | nse grav-bro                                 | wn, fine to coarse   |  |
| ▼ .   |                | - 0 0            |   |                            |                         |                             |             | Sanc            |                                     |  | e gravel, some silt  |  |
| 64.4<br>10  |                |                  |   |                            |                         |                             |             |                 |                                     |  |  |  |
| <u>59.4</u><br>15                                 | SS             | S-6              | 12  | 28<br>100/6"               | 10                      | >100                        |             |                 | SAND, some                          | e fine to coars                              | wn, fine to coarse<br>e gravel, little silt<br>ed at 15' bgs and |  |
| -<br>-<br>-                                       | -              |                  |   |                            |                         |                             |             |                 |                                     | h soil cuttings                              |  |  |
| 54.4  |                |                  |   |                            | <u> </u>                |                             |             |                 |                                     |  |  |  |
|   | Sa             | mple Ty          |   | - /-                       |                         |                             |             |                 | Consistency vs B                    |  |  | Burmister Classification   |
| AS - Auge<br>CS - Calif<br>3Q - 1.5"<br>NQ - 2" R | ornia Sa       | impler<br>ore S  | V - Vac<br>Sam<br>S - Spli<br>T - She<br>SP - Geo | nple<br>t Spoor<br>lby Tul | n ,                     | V. Loos<br>Loose:<br>M. Den | se: 0       | 10 V            | Sand):<br>ense: 30-50<br>Dense: >50 | Fine Gra V. Soft: <2 Soft: 2-4 M. Stiff: 4-8 | stiff: 8-15 V. Stiff: 15-30 Hard: >30                            | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>moisture, density, color |
| D! -  | wed b          | w.               |   |                            |                         |                             |             |                 | Date:                               |  | <b>Boring Numb</b>   | er: B-65   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira
 Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NX
 Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

 Bore Hole Location:
 790 Pleasant St., Belmont, MA

 Northing:
 2967939.2190 Easting:
 741497.916

 Drilling Date:
 Start:
 9/26/2017 End:
 9/26/2017

Surface Elevation (ft.): 73.6

Total Depth (ft.): 14.2

Depth to Initial Water Level (ft):

**Depth Date Time** 7.0 9/26/2017 13:20

Abandonment Method: Backfilled with soil cuttings

Logged By: J. Wang

|   |                                  |                           |   |                            |                         |                             |             |                          | Logged By: J. Wang   |  |
|---|----------------------------------|---------------------------|---|----------------------------|-------------------------|-----------------------------|-------------|--------------------------|--|--|
| Elev.<br>Depth<br>(ft)                                | Sample<br>Type                   | Sample<br>Number          | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata                   | Material Description   | Remarks  |
| 0   |                                  |                           |   |                            |                         |                             | 0 0 0 0     |                          | 3" Concrete  | Vacuum excavate  |
|   | -                                |                           |   |                            |                         |                             |             | Sand and Gravel          | 1" Gravel Subbase  | boring from the ground surface to 6' bgs.  |
|   | VE                               | V-1                       | 12  |                            |                         |                             |             | Sand                     | Moist, dark gray, fine to coarse SAND, some silt, little fine to coarse gravel                                       | Analytical sample (3-4')   |
| <u>68.6</u> 5   | VE                               | V-2                       | 6   |                            |                         |                             |             |                          | Moist, dark brown, SILT, little clay, trace fine gravel  | Corrosion sample (4'-6')   |
| _ <b>⊼</b> -  | - SS                             | S-1                       | 24  | 17<br>10<br>7<br>14        | 12                      | 17                          |             | Sandy Silt               | Wet, medium dense, black, Organic SILT and fine to coarse SAND, trace fine gravel                                    |  |
| -   | SS                               | S-2                       | 3   | 100/3"                     | 3                       |                             |             | and                      | No Recovery  |  |
| - 63.6<br>- 10  | -                                |                           |   |                            |                         |                             |             |                          |  |  |
| -   | NX                               | C-1                       | 12  |                            |                         |                             |             | Sand and Gravel          |  | Rollerbit from 12 to 13' bgs.  |
|   |                                  |                           |   |                            |                         |                             | \$          | and                      |  |  |
| -   | SS                               | <del>S-3</del>            | 2   | 100/2"                     | 1                       |                             |             | ιχ                       | Wet, very dense, brown, fine to coarse SAND,   |  |
| 53.6  AS - Auge CS - Calife BQ - 1.5" NQ - 2" Ro      |                                  |                           |   | 100/2                      | •                       |                             |             |                          | some silt, little fine to coarse gravel  Test boring B-66 terminated at 14.1' bgs and backfilled with soil cuttings. |  |
| 33.0  | Sa                               | ample Ty                  | pes   | I                          |                         |                             |             | <u> </u>                 | Consistency vs Blowcount/Foot Burn   | nister Classification  |
| AS - Auge<br>CS - Califo<br>BQ - 1.5" I<br>NQ - 2" Ro | er/Grab S<br>ornia Sa<br>Rock Co | Sample<br>Impler<br>ore S | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tuk | n l                     | V. Loos<br>Loose:<br>M. Den | se: 0       | anular<br>)-4 C<br>-10 V | Sand):         Fine Grained (Clay):           ense:         30-50           V. Soft:         <2                      | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>isture, density, color |
| Revie   | wed b                            | y:                        |   |                            |                         |                             |             |                          | Date: Boring Number: I   | 3-66   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts **Project Number: 101038-102170** 

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 782 Pleasant St., Belmont, MA Northing: 2968066.8890 Easting: 741677.9 **Drilling Date: Start:** 10/3/2017 **End:** 10/3/2017

Surface Elevation (ft.): 73.01

Total Depth (ft.): 14.8

Depth to Initial Water Level (ft): Depth Date

10/3/2017 Abandonment Method: Backfilled with soil cuttings

12:15

2.5

|   | , =                             |                  | 0,0,00  |                            |                         | 0,20                        |             |                | Logged By: A. Smith  |   |
|---|---------------------------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|----------------|--|---|
| Elev.<br>Depth<br>(ft)                              | Sample<br>Type                  | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata         | Material Description   | Remarks   |
| 0   |                                 |                  |   |                            |                         |                             |             |                | 3" Concrete 3" Sand Subbase  | Vacuum excavate boring from the   |
| - <u>▼</u>  | VE                              | V-1              |   |                            |                         |                             |             | E              | Moist, dark brown, fine to coarse SAND, some fine to coarse gravel, trace silt   | ground surface to 6' bgs.  Analytical sample (3-4')                                 |
| 5<br><br>   | SS                              | S-1              | 14  | 11<br>18<br>100/2"         | 5                       | >100                        |             |                | Moist, hard, brown, Organic fine to coarse<br>SAND and SILT, some fine gravel  |   |
|   | SS                              | S-2              | 3   | 100/3"                     | 3                       |                             |             |                | Moist, very dense, brown, fine to coarse SAND, some fine to coarse gravel, little silt   |   |
| - <u>63.0</u>                                       | -                               |                  |   |                            |                         |                             |             | Silty Sand     |  |   |
| - 58.0<br>- 15                                      | SS                              | S-3              | 9   | 70<br>100/3"               | 6                       | >100                        |             |                | Moist, very dense, brown, fine to coarse SAND, some fine to coarse gravel, little silt Test boring B-67 terminated at 14.8' bgs and backfilled with soil cuttings. |   |
| <br>53.0  |                                 |                  |   |                            |                         |                             |             |                |  |   |
| 50.0  | Sa                              | mple Ty          | pes   | 1                          |                         |                             |             |                | Consistency vs Blowcount/Foot But  | mister Classification   |
| AS - Auge<br>CS - Califo<br>BQ - 1.5"<br>NQ - 2" Ro | ornia Sa<br>Rock Co<br>ock Core | impler sore      | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tub | n ,                     | V. Loos<br>Loose:<br>M. Den | se: O       | )-4 C<br>·10 V |  | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>oisture, density, color |
| Revie   | wed b                           | y:               |   |                            |                         |                             |             |                | Date: Boring Number:   | B-67  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / M. Ferreira **Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** 762 Pleasant St., Belmont, MA **Northing:** 2968334.4810 **Easting:** 742022.9 **Drilling Date: Start:** 10/2/2017 **End:** 10/2/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 69.93

Total Depth (ft.): 15.5

Depth to Initial Water Level (ft):DepthDateTime6.110/2/201713:15

Abandonment Method: Backfilled with soil cuttings

|   | ,              |                  |   |                            |                         |                             |             |            |                            |                               | Logge                         | d By                             | : A. Sm                                  | ith / J. W   | √ang     |               |                  |  |     |
|---|----------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|------------|----------------------------|-------------------------------|-------------------------------|----------------------------------|--|--------------|----------|---------------|------------------|--|-----|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata     |                            |                               | Material Des                  | scrip                            | otion                                    |              |          |               | R                | emarks   |     |
| 0   |                |                  |   |                            |                         |                             | 5. X.X      |            | 3                          | " Concrete                    | & 1" Sand                     | Sub                              | base                                     |              |          |               |                  | ım excava  |     |
| · -   | VE             | V-1              | 12  |                            |                         |                             |             | Ē          | N<br>s                     | Noist, dark to                | orown, fine t<br>coarse gra   | to co                            | oarse S<br>trace s                       | SAND,<br>ilt |          |               | groun<br>6' bgs  | tical samp   | to  |
| 64.9<br>5   | VE             | V-2              | 12  |                            |                         |                             |             |            |                            |                               | orown, fine t<br>coarse gra   |                                  |  |              |          |               | Analy<br>(3'-4') | tical samp   | le  |
| . <u>T</u> .                                      | ss             | S-1              | 24  | 33<br>28<br>9<br>36        | 8                       | 37                          |             |            | M                          | ∕loist, dense                 | e, brown, fin                 | ne S/                            | AND a                                    | nd SILT      | -        |               |                  |  |     |
| 59.9<br>10  | - SS           | S-2              | 24  | 38<br>84<br>70<br>100      | 14                      | >100                        |             | Silty Sand |                            |                               | lense, brow<br>, trace fine ( |                                  |  | me fine      | to       |               |                  |  |     |
|   | SS             | S-3              | 18  | 44<br>46<br>100/6"         | 12                      | >100                        |             | S          | S                          | SAND, some                    | ense, brown<br>e fine to coa  | arse                             | gravel,                                  | some s       |          |               |                  |  |     |
|   |                |                  |   |                            |                         |                             |             |            | b                          | est boring l<br>ackfilled wit | B-68 termin<br>th soil cuttin | nated<br>ngs.                    | I at 15.                                 | 5' bgs a     | and      |               |                  |  |     |
| 49.9  |                |                  |   |                            |                         |                             |             |            |                            |                               |                               |                                  |  |              |          |               |                  |  |     |
|   |                | ample Ty         |   |                            |                         |                             |             |            |                            |                               | Blowcount/Fo                  | <u>oot</u>                       |  |              | <u> </u> |               |                  | lassificat   | ion |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | Rock Co        | ampler<br>ore    | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tub | n<br>ne                 | V. Loos<br>Loose:<br>M. Den | se: 0<br>4- | -10 V      | (Sand<br>Dense:<br>/. Dens | 30-50                         | V. Soft: <                    | <u>Grain</u><br><2<br>2-4<br>4-8 | ed (Clay<br>Stiff:<br>V. Stiff:<br>Hard: | <br>8-15     |          | litt<br>tr    | me<br>tle<br>ace | 35-50%<br>20-35%<br>10-20%<br><10%<br>ensity, colo | r   |
| Revie   | wed b          | oy:              |   |                            |                         |                             |             |            |                            | Date:                         |                               |                                  | Borin                                    | g Num        | ber      | r: <b>B</b> - | -68              |  |     |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 750 Pleasant St., Belmont, MA Northing: 2968469.5950 Easting: 742257.907

**Drilling Date: Start:** 9/19/2017 **End:** 9/19/2017

Surface Elevation (ft.): 74.66

Total Depth (ft.): 14.8

Depth to Initial Water Level (ft):

Depth Date 11.5 9/19/2017 10:25

Abandonment Method: Backfilled with soil cuttings

|                        |                |                  |                       |                       |                         |                   |                              |            | Logged By: A. Smith   |                             |
|------------------------|----------------|------------------|-----------------------|-----------------------|-------------------------|-------------------|------------------------------|------------|---|-----------------------------|
| Elev.<br>Depth<br>(ft) | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value           | Graphic Log                  | Strata     | Material Description  | Remarks                     |
| 74.7                   |                |                  |                       |                       | _                       |                   |                              |            | 6" Asphalt  |                             |
| · ·                    |                |                  |                       | 7                     |                         |                   | $\times\!\!\times\!\!\times$ |            | Moist, very dense, brown, fine to coarse  | Analytical sample           |
| _                      | SS             | S-1              | 18                    | 44                    | 8                       | 92                | $\bowtie$                    |            | Sand, some fine to coarse gravel, little silt   | (2-4')                      |
| _                      |                |                  |                       | 48                    |                         |                   | $\bowtie$                    |            |   |                             |
|                        |                |                  |                       | 24                    |                         |                   | $\bowtie$                    | ≣          | Moist, dense, brown, fine to coarse Sand,   | Analytical sample           |
| -                      | ss             | S-2              | 24                    | 25<br>13              | 10                      | 38                | $\bowtie$                    |            | some fine to coarse gravel, little silt   | (4-6')                      |
|                        |                |                  |                       | 12                    |                         |                   | $\bowtie$                    |            |   |                             |
| -                      |                |                  |                       | 12                    |                         |                   | $\sim\sim$                   |            | Moist, dense, brown, fine to coarse SAND,   |                             |
| 69.7                   |                |                  |                       | 15                    |                         |                   |                              |            | some silt, little fine gravel   |                             |
| <u>69.7</u> 5          | SS             | S-3              | 24                    | 18                    | 8                       | 33                |                              |            | , 3   |                             |
|                        |                |                  |                       | 18                    |                         |                   |                              |            |   |                             |
| _                      |                |                  |                       | 15                    |                         |                   |                              |            | Moist, dense, brown, fine to medium SAND,   | Corrosion sampl             |
| _                      | ss             | S-4              | 24                    | 12                    | 12                      | 40                |                              |            | some silt, trace fine gravel  | (6'-8')                     |
|                        |                | 0 7              |                       | 28                    | 12                      | 40                |                              |            |   |                             |
| -                      |                |                  |                       | 20<br>12              |                         |                   |                              |            | Maint vary dance grow fine to coorse CAND   |                             |
|                        |                |                  |                       | 45                    |                         |                   |                              | -          | Moist, very dense, gray, fine to coarse SAND, little silt, little fine gravel         |                             |
| -                      | SS             | S-5              | 24                    | 45                    | 16                      | 90                |                              | Silty Sand | inde sin, inde time graver  |                             |
| 64.7                   |                |                  |                       | 70                    |                         |                   |                              | ty S       |   |                             |
| 10                     |                |                  |                       |                       |                         |                   |                              | S          |   |                             |
| <b>▼</b> -             | -              |                  |                       |                       |                         |                   |                              |            |   |                             |
| -                      | SS             | S-6              | 24                    | 85<br>100/4"          | 10                      | >100              |                              |            | Wet, very dense, brown, fine to coarse SAND,  |                             |
| 59.7<br>15             |                |                  |                       | 100/4                 |                         |                   |                              |            | some fine to coarse gravel, little silt  Test boring B-69 terminated at 14.8' bgs and |                             |
| 15                     |                |                  |                       |                       |                         |                   |                              |            | backfilled with soil cuttings.  |                             |
| =                      | 1              |                  |                       |                       |                         |                   |                              |            | basiamed war con catalige.  |                             |
| -                      |                |                  |                       |                       |                         |                   |                              |            |   |                             |
| -                      | -              |                  |                       |                       |                         |                   |                              |            |   |                             |
| -                      |                |                  |                       |                       |                         |                   |                              |            |   |                             |
| 54.7                   |                | ample Ty         | , nos                 |                       |                         |                   |                              |            | Consistency vs Blowcount/Foot B   | urmister Classificati       |
|                        |                |                  |                       | Ev/C=-                | h                       |                   |                              |            |   |                             |
| S - Auge               | r/Grab S       | sample<br>mplor  | V - Vac<br>San        | elar                  | ١.                      | , ,               |                              |            | Sand): Fine Grained (Clay):   | some 20-35%                 |
| Q - 1.5"               | Rock Co        | orė Š            | SS - Spli<br>ST - She | t Spoor               | <u>ا</u> ا              | √. Loos<br>_oose: | 4-                           | ·10 \      | ense: 30-50 V. Soft: <2 Stiff: 8-15<br>. Dense: >50 Soft: 2-4 V. Stiff: 15-30         | little 10-20%<br>trace <10% |
| IQ - 2" R              | ock Core       | e d              | SP - Geo              | pprobe                | ′   i                   |                   | se: 10                       |            | M. Stiff: 4-8 Hard: >30   | moisture, density, color    |
| Povio                  | wed b          | JV.              |                       |                       |                         |                   |                              |            | Date: Boring Number   | · B-69                      |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / P. Fisher, J. Murphy Surface Elevation (ft.): 78.82

Drilling Method/Casing/Core Barrel Size:Drive and Wash / 4 in / NATotal Depth (ft.): 13.5Hammer Weight/Drop Height/ Spoon Size:140 lb / 30 in /2 in O.D.Depth to Initial Water Level (ft):Bore Hole Location:Pleasant St./Snake Hill Rd., Belmont, MADepth DateTime

Northing: 2968930.1200 Easting: 742578.168

Drilling Date: Start: 9/18/2017 End: 9/18/2017

3.2 9/18/2017 15:15 **Abandonment Method:** Backfilled with soil cuttings

|  |                                  |                   |   |                            |                         |                             |             |                        |        | Logged   | By: A. Smith   |                    |   |
|--|----------------------------------|-------------------|---|----------------------------|-------------------------|-----------------------------|-------------|------------------------|--------|--|--|--------------------|---|
| Elev.<br>Depth<br>(ft)                           | Sample<br>Type                   | Sample<br>Number  | Sample<br>Length (in)                             | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata                 |        | Material Desc  | cription   |                    | Remarks   |
| 78.8<br>0  |                                  |                   |   |                            | _                       |                             |             |                        | E      | 5" Asphalt   |  |                    |   |
|  | SS                               | S-1               | 18  | 10<br>26<br>32             | 10                      | 58                          |             |                        | N      | Moist, very dense, brown<br>SAND, some fine to coar                              |  |                    |   |
| <b>— Ā</b> -                                     | - SS                             | S-2               | 24  | 20<br>20<br>15<br>14       | 18                      | 35                          |             |                        |        | Moist, dense, brown, fine and fine to coarse GRAV                                |  |                    | Analytical sample (2'-4')   |
| 73.8   | SS                               | S-3               | 9   | 13<br>100/3"               | 4                       | >100                        |             |                        |        | Moist, very dense, brown SAND, some fine to coar                                 |  |                    |   |
|  | - SS                             | S-4               | 24  | 40<br>48<br>45<br>70       | 18                      | 93                          |             | Sand and Gravel        | N<br>S | Moist, very dense, gray-b<br>SAND, some fine gravel,                             | rown, fine to coars<br>little silt                   | e                  | Analytical sample (6'-8')   |
| - <u>68.8</u> -                                  | - SS                             | S-5               | 24  | 34<br>50<br>62<br>80       | 14                      | >100                        |             | Sai                    |        | Moist, very dense, gray-b<br>SAND, some fine to coar                             |  |                    |   |
|  | SS                               | S-6               | 6   | 100                        | 1                       |                             |             |                        | \\{    | Moist, very dense, gray-b<br>SAND, some fine to coar<br>Test boring B-70 termina | se gravel, trace silt                                |                    |   |
| 63.8 -   | -                                |                   |   |                            |                         |                             |             |                        |        | eackfilled with soil cutting   |  | u                  |   |
| 7808   | -                                |                   |   |                            |                         |                             |             |                        |        |  |  |                    |   |
| \$   | Sa                               | mple Ty           | pes   | •                          |                         | •                           |             |                        | Cons   | istency vs Blowcount/Foo   | <u>ot</u>  | Burmi              | ster Classification   |
| g   CS - Califo<br>  BQ - 1.5"  <br>  NQ - 2" Ro | er/Grab S<br>ornia Sa<br>Rock Co | Sample<br>mpler S | V - Vac<br>San<br>S - Spli<br>T - She<br>GP - Ged | nple<br>t Spoor<br>lby Tuk | n<br>ne                 | V. Loos<br>Loose:<br>M. Den | se: 0<br>4- | nular<br>1-4 C<br>10 V |        | 1): Fine Gi<br>30-50 V. Soft: <2   | rained (Clay):<br>2 Stiff: 8-15<br>4 V. Stiff: 15-30 | a<br>so<br>li<br>t | nd 35-50%<br>ome 20-35%<br>ttle 10-20%<br>race <10%<br>ture, density, color |
| Revie  | wed b                            | y:                |   |                            |                         |                             |             |                        |        | Date:  | Boring Numb  | er: B              | -70   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / M. Ferreira **Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** 710 Pleasant St., Belmont, MA **Northing:** 2969443.2520 **Easting:** 742853.145 **Drilling Date: Start:** 9/25/2017 **End:** 9/25/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 75.15

Total Depth (ft.): 15.5

Depth to Initial Water Level (ft):

Depth Date Time

NE 9/25/2017 13:45

Abandonment Method: Backfilled with soil cuttings

Logged By: J. Wang

|   |                |                  |   |                            |                         |                             |             |                 |                       | Logge   | ed By: J. Wang   |   |   |
|---|----------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|-----------------|-----------------------|---|--|---|---|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata          |                       | Material De   | escription   |   | Remarks   |
| 0   |                |                  |   |                            |                         |                             | 74 15 - 74  |                 | 6                     | " Topsoil   |  | V   | acuum excavate  |
|   |                |                  |   |                            |                         |                             |             |                 | N                     | loist, medium dense, b<br>AND, little silt              | orown, fine to mediu   | ''' g                                     | oring from the round surface to bgs.                        |
|   | VE             | V-1              |   |                            |                         |                             |             |                 |                       | loist, dark brown, fine ne to coarse GRAVEL             |  | (2<br>S                                   | nalytical sample<br>2'-3')<br>ome cobbles in<br>ample VE-1. |
| 70.2  | SS             | S-1              | 8   | 20<br><del>100/2"</del>    | 1                       | >100                        |             |                 | ٨                     | lo Recovery   |  |   | oarse gravel<br>agment in spoon<br>o.                       |
| _   | SS             | S-2              | 4   | 100/4"                     | 2                       | >100                        |             | Gravel          |                       | loist, very dense, dark<br>AND, little fine gravel      | gray, fine to coarse   |   |   |
| -   | SS             | S-3              | 13  | 71<br>60<br>100/1"         | 13                      | >100                        |             | Sand and Gravel |                       | loist, very dense, gray,<br>o coarse gravel, little sil |  | ne  |   |
| - <u>65.2</u><br>10                               | -<br>-<br>-    |                  |   |                            |                         |                             |             |                 |                       |   |  |   |   |
| _ <u>60.2</u><br>_ 15                             | ss             | S-4              | 18  | 28<br>40<br>100/5.5        | . 12                    | >100                        |             |                 | S                     | loist, very dense, dark<br>AND, some fine grave         | el, little silt  |   |   |
|   | _              |                  |   |                            |                         |                             |             |                 | T<br>b                | est boring B-71 termin<br>ackfilled with soil cuttir    | nated at 15.5' bgs an  | d   |   |
| 55.2  | -              |                  |   |                            |                         |                             |             |                 |                       |   |  |   |   |
|   | Sa             | ample Ty         | pes   |                            |                         | •                           | •           | 9               | Cons                  | istency vs Blowcount/Fo                                 | <u>oot</u>   | Burmist                                   | er Classification   |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | fornia Sa      | ampler<br>ore S  | V - Vac<br>Sam<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>Iby Tub | )<br>ne                 | V. Loos<br>Loose:<br>M. Den | se: 0       | 10 V            | Sand<br>ense:<br>Dens | 30-50 V. Soft: 5<br>se: >50 Soft: 2                     | Grained (Clay): <2 Stiff: 8-15 2-4 V. Stiff: 15-30 4-8 Hard: >30 | and<br>some<br>little<br>trace<br>moistur | 10-20%  |
| Revie   | wed k          | oy:              |   |                            |                         |                             |             |                 |                       | Date:   | Boring Numb  | er: B-7                                   | 1   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Number: 101038-102170 Project Location:** Massachusetts

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NX Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: Pleasant St./Moore St., Belmont, MA

Northing: 2969926.0748 Easting: 743401.939

**Drilling Date: Start:** 9/15/2017 **End:** 9/15/2017

Surface Elevation (ft.): 71.72

Total Depth (ft.): 13.5

Depth to Initial Water Level (ft):

Depth Date 3.0 9/15/2017 11:45

Abandonment Method: Backfilled with soil cuttings

|   |                     |                  |   |                            |                         |                             |             |                 |                             |  | Lo                              | ggea B            | sy: A. Sm                                  | ith                     |         |   |      |
|---|---------------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|-----------------|-----------------------------|--|---------------------------------|-------------------|--|-------------------------|---------|---|------|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type      | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata          |                             |  | Material                        | Descr             | iption                                     |                         |         | Remarks   | \$   |
| 0   |                     |                  |   |                            |                         |                             |             |                 | 5'                          | ' Asphalt                                    |                                 |                   |  |                         |         |   |      |
|   | SS                  | S-1              | 18  | 20<br>28<br>28             | 7                       | 56                          |             |                 | IV                          | oist, very                                   | dense, g<br>coarse G            |                   |  |                         | D       |   |      |
| _ 🛂 -   | - SS                | S-2              | 24  | 18<br>30<br>48<br>22       | 8                       | 78                          |             |                 |                             |  | l, brown,<br>fine grave         |                   | some fin                                   | e to coar               | rse     | Analytical sar<br>(2'-4')   | nple |
| - 66.7<br>5                                       | SS                  | S-3              | 12  | 18<br>100                  | 10                      | >100                        |             |                 |                             |  | dense, b<br>I fine to co        |                   |  |                         | t       | Analytical sar<br>(4'-5')   | nple |
|   | SS                  | S-4              | 6   | 100                        | 4                       | >100                        |             | Sand and Gravel | N<br>S                      | oist, very<br>AND and                        | dense, b<br>I fine to co        | rown,<br>oarse (  | fine to co<br>GRAVEL                       | oarse<br>., little silt | t       | Corrosion sar<br>(6'-6.5')  | mple |
|   |                     |                  |   |                            |                         |                             |             | Sa              |                             |  |                                 |                   |  |                         |         | Core through<br>boulder from<br>11.5' bgs.                                    |      |
|   | SS                  | S-5              | 2   | 50/2"                      | 0                       | >50                         |             |                 | 3'                          | o Recove<br>' Spoon:<br>parse SA<br>tle silt | ery:<br>Moist, ver<br>ND and fi | y dens            | se, brow<br>coarse G                       | n, fine to<br>RAVEL,    | /       |   |      |
| - <u>56.7</u><br>- <u>56.7</u><br>                | -                   |                  |   |                            |                         |                             |             |                 | T                           | est boring                                   | g B-72 ter<br>with soil c       | minate<br>uttings | ed at 13.                                  | 5' bgs ar               | nd      |   |      |
|   | -                   |                  |   |                            |                         |                             |             |                 |                             |  |                                 |                   |  |                         |         |   |      |
| 51.7  |                     |                  |   |                            |                         |                             |             |                 |                             |  |                                 |                   |  |                         | 1       |   |      |
|   | <u>Sa</u>           | mple Ty          |   |                            |                         |                             |             |                 | Consi                       | stency vs                                    | Blowcour                        | t/Foot            |  |                         |         | ister Classific   |      |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | ornia Sa<br>Rock Co | mpler<br>ore S   | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tul | n                       | V. Loos<br>Loose:<br>M. Den | se: 0       | -4 E            | (Sand)<br>Dense:<br>/. Dens | 30-50  | V. Soft:<br>Soft:<br>M. Stiff   | <2<br>2-4         | ined (Clay<br>Stiff:<br>V. Stiff:<br>Hard: | <br>8-15                | s<br>li | and 35-50%<br>some 20-35%<br>ittle 10-20%<br>trace <10%<br>sture, density, co |      |
| Revie   | wed b               | y:               |   |                            |                         |                             |             |                 |                             | Date:  |                                 |                   | Borin                                      | g Numb                  | oer: B  | 3-72  |      |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / M. Ferreira **Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 3 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** 624 Pleasant St., Belmont, MA **Northing:** 2970178.3111 **Easting:** 743563.9377 **Drilling Date: Start:** 9/15/2017 **End:** 9/15/2017

Surface Elevation (ft.): 81.67

Total Depth (ft.): 14.3

Depth to Initial Water Level (ft):

**Depth Date Time** 8.0 9/15/2017 14:30

Abandonment Method: Backfilled with soil cuttings

|  |                      |                  |  |                            |                         |                             |             |            |                            |   | Lo                                   | gged E         | <b>3y:</b> A. Sm                          | nith     |               |  |         |
|--|----------------------|------------------|--|----------------------------|-------------------------|-----------------------------|-------------|------------|----------------------------|---|--------------------------------------|----------------|---|----------|---------------|--|---------|
| Elev.<br>Depth<br>(ft)                     | Sample<br>Type       | Sample<br>Number | Sample<br>Length (in)                              | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata     |                            |   | Material                             | Desci          | ription                                   |          |               | Remark   | ks      |
| 81.7                                       |                      |                  |  | 1                          |                         |                             | 74 15. °41  |            | т                          | op 6": To   | ocoil                                |                |   |          |               |  |         |
|  | SS                   | S-1              | 24   | 4<br>10<br>14              | 10                      | 14                          |             |            | S                          | ottom 4":<br>SAND, little   | Moist, me<br>silt, trace             | e fine (       | gravel                                    |          | ne            |  |         |
| -  | SS                   | S-2              | 24   | 25<br>40<br>70<br>45       | 14                      | >100                        |             |            |                            | loist, very<br>AND, little  |                                      |                |   | oarse    |               | Analytical sa<br>(2'-4')   | ample   |
| - <u>76.7</u> -                            | SS                   | S-3              | 9  | 62<br>100/3"               | 9                       | >100                        |             |            |                            | loist, very<br>AND, sor   |                                      |                |   |          |               |  |         |
| _  | SS                   | S-4              | 3  | 100/3"                     | 3                       |                             |             | and Gravel |                            | loist, very<br>AND, sor   |                                      |                |   |          |               |  |         |
| <b>▼</b> -                                 | SS                   | S-5              | 9  | 84<br>100/3"               | 6                       | >100                        |             | Sand and   |                            | Vet, very on the second very detailed the second very detailed to the second very detail to the |                                      |                |   |          | ND            |  |         |
| - <u>71.7</u>                              | -                    |                  |  |                            |                         |                             |             |            |                            |   |                                      |                |   |          |               |  |         |
| 66.7 15 - 15 - 15 - 15 - 15 - 15 - 15 - 15 | SS                   | S-6              | 4  | 100/4"                     | 2                       |                             |             |            | a<br>T                     | Vet, very o<br>nd fine to<br>est boring<br>ackfilled v  | coarse G<br>B-73 ter                 | RAVE<br>minate | EL, little sed at 14.                     | silt     |               |  |         |
| 61.7<br>61.7<br>AS - Auge                  |                      |                  |  |                            |                         |                             |             |            |                            |   |                                      |                |   |          |               |  |         |
| <b>*</b>                                   | Sa                   | mple Ty          | pes  |                            |                         | •                           |             | •          | Cons                       | istency vs  | Blowcoun                             | t/Foot         | <u> </u>                                  |          | Burm          | ister Classif  | ication |
| g CS - Calif<br>BQ - 1.5"<br>NQ - 2" R     | ornia Saı<br>Rock Co | mpler<br>re S    | V - Vac<br>Sam<br>SS - Spli<br>T - She<br>GP - Geo | nple<br>t Spoor<br>lby Tul | n<br>ne                 | V. Loos<br>Loose:<br>M. Den | se: 0<br>4- | ·10 V      | (Sand<br>Dense:<br>/. Dens | 30-50   | Fi<br>V. Soft:<br>Soft:<br>M. Stiff: | <2<br>2-4      | ained (Cla<br>Stiff:<br>V. Stiff<br>Hard: | <br>8-15 | so<br>li<br>t | nd 35-50%<br>ome 20-35%<br>ttle 10-20%<br>race <10%<br>sture, density, o | %<br>%  |
| Revie                                      | wed b                | y:               |  |                            |                         |                             |             |            |                            | Date:   |                                      |                | Borin                                     | g Numl   | ber: B        | -73  |         |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D. Bore Hole Location: Alexander Ave./Pleasant St., Belmont, MA

Northing: 2970563.1560 Easting: 743850.058

**Drilling Date: Start:** 9/14/2017 **End:** 9/14/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Surface Elevation (ft.): 74.86

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

Depth Date Time

7.0 9/14/2017 15:10 **Abandonment Method:** Backfilled with soil cuttings

|   |                                  |                         |  |                               |                         |                             |             |                                |        | Logged  | By: A. Smith    |                    |   |
|---|----------------------------------|-------------------------|--|-------------------------------|-------------------------|-----------------------------|-------------|--------------------------------|--------|---|-----------------|--------------------|---|
| Elev.<br>Depth<br>(ft)                              | Sample<br>Type                   | Sample<br>Number        | Sample<br>Length (in)                              | Blows per<br>6 inches         | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata                         |        | Material Desc   | cription        |                    | Remarks   |
| 74.9<br>0   |                                  |                         |  |                               |                         |                             |             |                                | 4      | " Asphalt   |                 |                    |   |
|   | ss                               | S-1                     | 14   | 44<br>50<br><del>100/2"</del> | 12                      | >100                        |             |                                | Ī.     | Moist, very dense, brown BAND, some fine gravel,        |                 |                    |   |
|   | SS                               | S-2                     | 24   | 12<br>34<br>14<br>35          | 4                       | 48                          |             |                                | s<br>S | Noist, dense, brown, fine ome fine gravel, little silt  | to coarse SAND, |                    | Analytical sample<br>(2'-4')                                      |
| 69.9<br>5   | SS                               | S-3                     | 12   | 38<br>100                     | 12                      | >100                        |             |                                |        | Moist, very dense, brown<br>SAND, some fine gravel,     |                 |                    |   |
| - <b>Ť</b> -  | SS                               | S-4                     | 5  | 100/5"                        | 4                       |                             |             | Gravel                         |        |   |                 |                    | Core through boulder from 6 to 7.5' bgs.                          |
|   | SS                               | S-5                     | 15   | 52<br>70<br><del>100/3"</del> | 10                      | >100                        |             | Sand and Gi                    |        | Vet, very dense, dark graßAND and fine to coarse        |                 | ilt                |   |
| - <u>64.9</u>                                       | -                                |                         |  |                               |                         |                             |             |                                |        |   |                 |                    |   |
| <u>59.9</u><br>15                                   | SS                               | S-6                     | 24   | 40<br>46<br>80<br>100         | 6                       | >100                        |             |                                |        | Vet, very dense, dark gra<br>SAND and fine to coarse    |                 | ilt                |   |
|   | -                                |                         |  |                               |                         |                             |             |                                |        | est boring B-74 termina<br>eackfilled with soil cutting |                 |                    |   |
| 54.9  |                                  | ample Ty                | nes  | I                             |                         |                             |             |                                | Cone   | istency vs Blowcount/Foo                                | ıt.             | Burmi              | ister Classification  |
| AS - Auge<br>CS - Califo<br>BQ - 1.5"<br>NQ - 2" Ro | er/Grab S<br>ornia Sa<br>Rock Co | Sample<br>ampler<br>ore | V - Vac<br>Sam<br>SS - Spli<br>T - She<br>GP - Geo | nple<br>t Spooi<br>lby Tul    | n<br>ne                 | V. Loos<br>Loose:<br>M. Den | se: 0       | <u>nular (</u><br>-4 D<br>10 V |        | ): Fine Gr<br>30-50 V. Soft: <2                         |                 | a<br>so<br>li<br>t | nd 35-50% ome 20-35% tttle 10-20% race <10% sture, density, color |
| Revie   | wed k                            | oy:                     |  |                               |                         |                             |             |                                |        | Date:   | Boring Numb     | er: B              | -74   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / P. Fisher

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NX Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 543 Pleasant St., Belmont, MA Northing: 2971000.5200 Easting: 744248.625

**Drilling Date: Start:** 9/22/2017 **End:** 9/22/2017

Surface Elevation (ft.): 55.69

Total Depth (ft.): 1.8

Depth to Initial Water Level (ft): Depth Date Time ΝE NE NE

Abandonment Method: Backfilled wiht soil cuttings

Longed By: | Wang

|                       | _   |   |                  |   |                            |                         |                             |             |                  | Logged By: J. Wang  |
|-----------------------|---|---|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|------------------|---|
|                       | Elev.<br>Depth<br>(ft)                                | Sample<br>Type                              | Sample<br>Number | Sample<br>Length (in)                             | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata           | Material Description Remarks  |
| t                     | 0   |   |                  |   |                            |                         |                             |             |                  | 6" Asphalt  |
|                       |   | VE  | V-1              |   |                            |                         |                             |             | E                | Moist, brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt   |
|                       |   |   |                  |   |                            |                         |                             |             |                  | Concrete block encountered in vacuum excavated hole. Test boring B-75 backfilled with soil cuttings and offest to B-75A (MW). |
|                       | <u>50.7</u> 5   | _   |                  |   |                            |                         |                             |             |                  |   |
|                       |   |   |                  |   |                            |                         |                             |             |                  |   |
|                       |   | -   |                  |   |                            |                         |                             |             |                  |   |
|                       | - <u>45.7</u> -                                       |   |                  |   |                            |                         |                             |             |                  |   |
|                       |   | -   |                  |   |                            |                         |                             |             |                  |   |
|                       |   |   |                  |   |                            |                         |                             |             |                  |   |
|                       | 40.7  |   |                  |   |                            |                         |                             |             |                  |   |
| 20180220.GPJ - 3/8/21 |   |   |                  |   |                            |                         |                             |             |                  |   |
| M 3 2018022C          |   |   |                  |   |                            |                         |                             |             |                  |   |
| WAS                   | 35.7  | 9-  | mple Tr          | nos   |                            |                         |                             |             |                  | Consistency vs Plansount/Foot Purminter Classification  |
| gg                    | AS - Auge<br>CS - Califo<br>BQ - 1.5" I<br>NQ - 2" Ro | r/Grab S<br>ornia Sa<br>Rock Co<br>ock Core | mpler Sore S     | V - Vac<br>Sam<br>S - Spli<br>T - She<br>SP - Geo | nple<br>t Spoor<br>Iby Tuk | ן ן                     | V. Loos<br>Loose:<br>M. Der | se: 0       | inular (<br>-4 D | Consistency vs Blowcount/Foot   Burmister Classification  |
| اد                    | Revie   | wed b                                       | y:               |   |                            |                         |                             |             |                  | Date: Boring Number: B-75   |





#### **Boring Number: B-75A (MW)**

Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / P. Fisher Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NX

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 543 Pleasant St., Belmont, MA Northing: 2971005.5200 Easting: 744248.625 **Drilling Date: Start:** 11/16/2017 **End:** 11/16/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 4/26/23

Reviewed by:

Surface Elevation (ft.):55.69

Total Depth (ft.): 14.5

Depth to Initial Water Level (ft):

Depth Date Time 5.0 11/16/2017 11:15

Abandonment Method: Monitoring well installed

Boring Number: B-75A (MW)

| Drining                             | , Duto.        | Otart.           | 17 10/20                                |                       |                         | 1/10/2                   | -017        |                | Logged By: A. Smith   |  |
|-------------------------------------|----------------|------------------|---|-----------------------|-------------------------|--------------------------|-------------|----------------|---|--|
| Elev.<br>Depth<br>(ft)              | Sample<br>Type | Sample<br>Number | Sample<br>Length (in)                   | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value                  | Graphic Log | Strata         | Material Description  | Remarks  |
| 0                                   |                |                  |   |                       |                         |                          |             |                | 9" Asphalt  | Vacuum excavate boring   |
| -                                   | VE             | V-1              |   |                       |                         |                          |             |                | Moist, brown, fine to medium SAND, little fine gravel, trace silt                 | from the ground surface to 4' bgs. Vacuum  |
| -                                   | - VE           | V-2              |   |                       |                         |                          |             | d Gravel       | Moist to wet, brown, fine to coarse SAND and fine to coarse GRAVEL, little silt   | excavation could<br>not be conducted<br>past 4' bgs due<br>to cobbles.<br>Cobbles were<br>noted in the |
| <u>5₩.7</u><br>5                    |                |                  |   |                       |                         |                          |             | Sand and Grave |   | vacuum excavated hole.   |
| -                                   | ss             | S-1              | 24                                      | 12<br>13<br>20<br>21  | 8                       | 33                       |             |                | Wet, dense, brown, fine to coarse GRAVEL, some fine to coarse sand, little silt   | Corrosion<br>sample (6'-8')  |
| -                                   | SS             | S-2              | 6                                       | 100/6"                | 0                       | >100                     | ٠٠.٠        |                |   |  |
| 45.7<br>10                          | NX             | C-1              | 60                                      |                       | 30                      |                          |             | Bedrock        | See core log for description  |  |
| 40.7<br>15                          | -              |                  |   |                       |                         |                          |             |                | Test boring B-75A (MW) terminated at 14.5' bgs and backfilled with soil cuttings. |  |
| 35.7                                | <u> </u>       | ımple Ty         | /pes                                    |                       |                         |                          |             |                | Consistency vs Blowcount/Foot Burn  | nister Classificatio   |
| S - Aug                             |                |                  | V - Vac                                 |                       | ab                      |                          | <u>Gr</u> a |                | (Sand): Fine Grained (Clav):  | and 35-50%   |
| CS - Cali<br>BQ - 1.5"<br>NQ - 2" F | fornia Sa      | ampler s         | Sar<br>SS - Spli<br>ST - She<br>SP - Ge | elby Tu               | be                      | V. Loo<br>Loose<br>M. De | : 4         |                | Dense: 30-50 V. Soft: <2 Stiff: 8-15 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30      | ome 20-35%<br>ittle 10-20%<br>trace <10%<br>sture, density, color                                      |

Date:





### **Boring Number: B-75A (MW)**

Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

| Projec  | ct Lo                                    | cation  | n: Ma                       | ssacl                                      | huset               | ts  | Projec   | t Nur  | <b>nber:</b> 101038  | -102170  | )  |   |   |
|---|--|---|-----------------------------|--|---------------------|---|--|--|--|--|--|---|---|
| Elevation<br>Depth<br>(ft)  | Sample<br>Type                           | Sample<br>Number  | Sample<br>Length (in)       | Recovery<br>(%)                            | RQD<br>(%)          | Drill Rate<br>(min/ft)                              | Graphic<br>Log   | Strata   | N  | /laterial Des  | cription   |   | Remarks   |
| 10.0  | NX                                       | C-1   | 60                          | 50   | 24                  | NR  | +++++++++  | DIORITE  | Hard, slightly fractu<br>medium grained, D<br>moderate, close, ro  | IORITE; pri  | mary joint set s   | shallow to  |   |
| 15.0  |  |   |                             |  |                     |   |  |  | Test boring B-75A converted into a mo  | (MW) termi<br>onitoring we   | nated at 14.5'   | bgs and   |   |
|   |  |   |                             |  |                     |   |  |  |  |  |  |   |   |
| Bed   | lding (r                                 | <u>nm)</u>  |                             | <u>Joir</u>                                | nt Spac             | cing (n   | <u>nm)</u>   | <u>c</u>   | ontinuity (mm)   | Attitud  | de Angle   | <u>Apertu</u>   | <u>ire (mm)</u>   |
| Bed  Extremely Very Thir Thin Medium Thick Very Thic Extremely  Fie  Very Hard Hard Med. Hard | ń<br>ck                                  | <20<br>20-6<br>60-20<br>200-6<br>600-20<br>2000-6<br>>600 | 0<br>00<br>00<br>000<br>000 | Very C<br>Close<br>Mod C<br>Wide<br>Very V | Close               | 60<br>20  | <20<br>20-60<br>60-200<br>200-600<br>00-2000<br>000-6000<br>>6000  | Mod  | remely <25<br>derately 25-100<br>jhtly 100-200<br>ind >200   | Horizontal<br>Shallow<br>Moderate<br>Steep<br>Vertical   | 0° - 5°<br>5° - 35°<br>35° - 55°<br>55° - 85°<br>85° - 90°                                 | Very Tight<br>Tight<br>Partly Open<br>Open<br>Mod. Wide<br>Wide     | < 0.1<br>0.1 - 0.25<br>0.25 - 0.5<br>0.5 - 2.5<br>2.5 - 10<br>>10 |
| Fie Very Hard Hard Med. Hard Medium Soft Very Soft  | Scr<br>Diff<br>Scr<br>Gro<br>Diff<br>Gro |   | Readily ith eadily          | Slig<br>Mod<br>Sev<br>Cor                  | sh<br>iht<br>derate | Disc<br>thar<br>Les<br>pres<br>Mor<br>pres<br>All r | Visible signological visible signological visible sites than half sent either than half sent either tock materiock material visible sites visi | indicate condition of the ras a confirm as a confirmation as a confi | rock material is decon<br>ontinuous framework o<br>rock material is decor<br>ontinuous framework o<br>ecomposed and/or dis | rock material rock material rock material rock and/or as coresto rock and/or as coresto integrated to mass structu | al may be discolor disintergrated nes. or disintegrated ne. soil. The origine and material | I to a soil. Fresto a soil. Fresto a soil. Fresto al mass struction | sh or discolored rock is  |
|   |  |   |                             | 1  |                     | ona   | ყ∪ ու ۷∪Ո  | ۰ , <i>ب</i> ال  |  | . organicantly   | , a an openicu.  |   |   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: Winner St./Pleasant St., Belmont, MA

Northing: 2971057.4620 Easting: 744517.272 **Drilling Date: Start:** 9/13/2017 **End:** 9/13/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/8/21

Reviewed by:

Surface Elevation (ft.): 48.09

Total Depth (ft.): 14.8

Depth to Initial Water Level (ft):

Depth Date ΝE 9/18/2017 13:45

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-76** 

|                         | •   | Start: 9/        |                       |                                   |                         |         |             |                         | Logged By: A. Smith  |
|-------------------------|---|------------------|-----------------------|-----------------------------------|-------------------------|---------|-------------|-------------------------|--|
| Elev.<br>Depth<br>(ft)  | Sample<br>Type  | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches             | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata                  | Material Description Remarks   |
| 0                       |   |                  |                       | 3                                 |                         |         | 74 1× 1/4   |                         | Top 6": Topsoil  |
|                         | ss  | S-1              | 24                    | 7<br>8<br>5                       | 10                      | 15      |             | ≣                       | Bottom 4": Moist, medium dense, brown, fine to coarse SAND, some fine gravel, trace silt   |
| -                       | - SS  | S-2              | 24                    | 2<br>2<br>4<br>6                  | 12                      | 6       |             | Clay                    | Moist, medium stiff, brown, CLAY and SILT, some fine to medium sand  Analytical sample (2'-4')                                       |
| 43.1                    | _ ss  | S-3              | 20                    | 8<br>20<br>40<br><del>50/2"</del> | 8                       | 60      |             | Silty Clay              | Moist, hard, brown, CLAY and SILT, some fine to medium sand  |
| -                       | SS  | S-4              | 14                    | 45<br>90<br>50/2"                 | 12                      | >100    |             |                         | Moist, very dense, brown, fine to coarse SAND, some fine gravel, little silt   |
| 38.1                    | SS  | S-5              | 4                     | 100/4"                            | 4                       |         |             | Sand and Gravel         | Moist, very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, little silt   |
| 33.1<br>15              | ss  | S-6              | 9                     | 85<br>100/3"                      | 9                       | >100    |             |                         | Moist, very dense, brown, fine to coarse SAND, some fine to coarse gravel, little silt  Test boring B-76 terminated at 14.8' bgs and |
|                         | -<br>-<br>-   |                  |                       |                                   |                         |         |             |                         | backfilled with soil cuttings.   |
| 28.1                    |   | mple Ty          | nes                   |                                   |                         |         |             |                         | Consistency vs Blowcount/Foot Burmister Classification   |
| CS - Calit<br>BQ - 1.5" | AS - Auger/Grab Sample CS - California Sampler 3Q - 1.5" Rock Core V - Vac Ex/Grab Sample SS - Split Spoon ST - Shelby Tube GP - Geoprobe V. Loose Loose: M. Dens |                  |                       |                                   |                         |         |             | nular (<br>-4 D<br>10 V |  |

Date:





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / M. Ferreira

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

Bore Hole Location: 5 Stella Road, Belmont, MA
Northing: 2971652.8460 Easting: 745125.079
Drilling Date: Start: 9/11/2017 End: 9/11/2017

Surface Elevation (ft.): 51.11

Total Depth (ft.): 15

Depth to Initial Water Level (ft):DepthDateTime8.09/11/201713:20

Abandonment Method: Backfilled with soil cuttings

|   |                     |                  |   |                       |                         |                   |             |                 | L   | ogged By: A. Smith                                     |  |
|---|---------------------|------------------|---|-----------------------|-------------------------|-------------------|-------------|-----------------|---|--|--|
| Elev.<br>Depth<br>(ft)                  | Sample<br>Type      | Sample<br>Number | Sample<br>Length (in)                   | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value           | Graphic Log | Strata          | Materia                                       | al Description   | Remarks  |
| 0                                       |                     |                  |   |                       |                         |                   |             |                 | 4" Asphalt                                    |  |  |
| -                                       | SS                  | S-1              | 9                                       | 48<br>100/3"          | 8                       | >100              |             |                 |   | prown, fine to medium<br>gravel, little silt           | Cobbles from 1.2 to 2' bgs.                              |
| -                                       | SS                  | S-2              | 24                                      | 18<br>25<br>38<br>11  | 10                      | 63                |             | Sandy Silt      | Moist, very dense, coarse sand, little fi     | brown, SILT, some fine t<br>ne gravel                  | to Analytical sample (2'-4')                             |
| 46.1<br>5                               | SS                  | S-3              | 20                                      | 20<br>25<br>70        | 18                      | 95                |             |                 | fine to coarse sand                           |  |  |
| 5                                       |                     |                  |   | 70<br>100/4"          |                         |                   |             |                 | BOTTOM 12": MOIST,                            | very dense, gray, fine to<br>le fine to coarse gravel, |  |
| -                                       |                     |                  |   | 46                    |                         |                   |             |                 | trace silt                                    | ic line to coarse graver,                              |  |
|   |                     | 0.4              | 6.4                                     | 46                    |                         | 7.                |             |                 | Moist, very dense, l                          | orown, fine to coarse                                  |  |
| -                                       | SS                  | S-4              | 24                                      | 25                    | 9                       | 71                |             |                 | SAND, little fine gra                         |  |  |
| <b>T</b> -                              |                     |                  |   | 31                    |                         |                   | $\vdots$    |                 | NA-:-4 !                                      | <b>6 1</b>   |  |
|   | SS                  | S-5              | 6                                       | 100                   | 6                       |                   |             | <u></u>         | Moist, very dense, l<br>SAND, little fine gra | orown, fine to coarse                                  |  |
| 41.1 -                                  |                     |                  |   |                       |                         |                   |             | Sand and Gravel |   |  | Rollerbit through cobbles from 10 to 13' bgs.            |
| -<br>-<br>36.1                          | SS                  | S-6              | 24                                      | 42<br>66<br>44<br>40  | 12                      | >100              |             |                 | Moist, very dense, SAND, little fine gra      | prown, fine to coarse<br>avel, little silt             |  |
| 36.1<br>15                              |                     |                  |   |                       |                         |                   | ***         |                 | Test boring B-77 te<br>backfilled with soil o | erminated at 15' bgs and<br>outtings.                  |  |
| -<br>31.1                               | -                   |                  |   |                       |                         |                   |             |                 |   |  |  |
|   | <u>Sa</u>           | mple Ty          |   |                       |                         |                   |             |                 | Consistency vs Blowcou                        | int/Foot   | Burmister Classification                                 |
| AS - Auge<br>CS - Califo<br>3O - 1.5" I | ornia Sa<br>Rock Co | mpler s          | V - Vac<br>Sam<br>SS - Spli<br>ST - She | nple<br>t Spoor       | n k                     | V. Loos<br>Loose: | se: 0<br>4- | -10 V           | ense: 30-50 V. Soft: 50 Soft:                 | 2-4 V. Stiff: 15-30                                    | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10% |
| NQ - 2" Ro                              | OCK CORE            |                  | SP - Geo                                | probe                 | ין                      | M. Den            | se: 10      | 0-30            | M. Sti  | ff: 4-8 Hard: >30                                      | moisture, density, color                                 |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira
 Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA
 Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 422 Pleasant St., Belmont, MA
Northing: 2971804.7740 Easting: 745417.737

**Drilling Date: Start:** 9/13/2017 **End:** 9/13/2017

Surface Elevation (ft.): 50.47

Total Depth (ft.): 14.5

Depth to Initial Water Level (ft):

 Depth
 Date
 Time

 7.5
 9/13/2017
 10:35

Abandonment Method: Backfilled with soil cuttings

|   |                     |   |                       |                             |                         |              |                                    |                 |                                       |   | Log  | gea E           | sy: A. Sm    | litn  |                  |  |      |
|---|---------------------|---|-----------------------|-----------------------------|-------------------------|--------------|------------------------------------|-----------------|---------------------------------------|---|--|-----------------|--------------|---|------------------|--|------|
| Elev.<br>Depth<br>(ft)                              | Sample<br>Type      | Sample<br>Number                          | Sample<br>Length (in) | Blows per<br>6 inches       | Sample<br>Recovery (in) | N-Value      | Graphic Log                        | Strata          |                                       |   | Material [                                 | Descr           | iption       |   |                  | Remarks  |      |
| 50.5<br>0   |                     |   |                       |                             |                         |              |                                    |                 | 4                                     | " Asphalt                                 |  |                 |              |   |                  |  |      |
|   | ss                  | S-1                                       | 18                    | 7<br>35<br>38               | 9                       | 73           |                                    |                 | N                                     | Moist, very of AND, som                   |  |                 |              |   |                  |  |      |
|   | - SS                | S-2                                       | 24                    | 10<br>10<br>10<br>90        | 6                       | 20           |                                    | Gravel          | V<br>S                                | Vet, mediur<br>SAND, som                  | n dense,<br>e fine gra                     | brow<br>vel, ti | n, fine to   | o coarse  |                  | Analytical sam<br>(2'-4'). Coarse<br>gravel in spoor<br>tip. |      |
| 45.5<br>5   | - SS                | S-3                                       | 21                    | 70<br>95<br>80<br>50/3"     | 0                       | >100         |                                    | Sand and Gravel | N                                     | lo Recover                                | y  |                 |              |   |                  | Coarse gravel spoon tip.                                     | in   |
| <br>- <b>Y</b>                                      | - SS                | S-4                                       | 24                    | 48<br>25<br>23<br>20        | 0                       | 48           |                                    |                 | 3                                     | lo Recover<br>" Spoon: M<br>nedium SA     | loist, den                                 | se, bi<br>silt  | rown, fin    | e to  |                  | Corrosion sam<br>(6'-8')                                     | ıple |
|   | - SS                | S-5                                       | 24                    | 12<br>21<br>23<br>28        | 18                      | 44           |                                    | Sandy Silt      | N.                                    | 1oist, dense                              | e, brown,                                  | SILT            | , little fin | e sand  |                  |  |      |
| 10<br>  | -                   |   |                       |                             |                         |              |                                    | Sand            |                                       |   |  |                 |              |   |                  |  |      |
|   | -                   |   |                       |                             |                         |              |                                    | Sand and Gravel |                                       |   |  |                 |              |   |                  |  |      |
|   | SS                  | S-6                                       | 6                     | 100                         | 6                       | >100         |                                    | San             |                                       | Vet, very de                              |  |                 |              |   | ND,              |  |      |
| _ <u>35.5</u>                                       | -                   |   |                       |                             |                         |              |                                    | •               | Ť                                     | ome fine to<br>est boring<br>ackfilled wi | B-78 term                                  | ninate          | ed at 14.    | 5' bgs aı   | nd               |  |      |
| 30.5  | _                   |   |                       |                             |                         |              |                                    |                 |                                       |   |  |                 |              |   |                  |  |      |
|   | Sa                  | mple Ty                                   |                       |                             |                         |              |                                    | Cons            | istency vs E                          | Blowcount                                 | /Foot                                      |                 |              | Burm  | ister Classifica | <u>ation</u>   |      |
| AS - Auge<br>CS - Califo<br>BQ - 1.5"<br>NQ - 2" Ro | ornia Sa<br>Rock Co | Ex/Granple<br>t Spoor<br>by Tub<br>pprobe | n<br>ne               | V. Loos<br>Loose:<br>M. Den | se: 0                   | -4 [<br>10 \ | ( <u>Sand</u><br>Dense:<br>/. Dens | 30-50           | Fin<br>V. Soft:<br>Soft:<br>M. Stiff: | e <u>Gra</u><br><2<br>2-4<br>4-8          | ined (Clay<br>Stiff:<br>V. Stiff:<br>Hard: | 8-15            | S<br>I       | and 35-50%<br>ome 20-35%<br>ittle 10-20%<br>trace <10%<br>sture, density, col | lor              |  |      |
| Revie   | wed b               | y:  |                       |                             |                         |              |                                    |                 |                                       | Date:                                     |  |                 | Borin        | g Numl  | ber: B           | 3-78   |      |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

 $\textbf{Drilling Contractor/Driller:} \ \ \text{GeoLogic - Earth Exploration, Inc. / M. Ferreira}$ 

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Rere Hole Location: 3 Scott Read Relmont MA

Bore Hole Location: 3 Scott Road, Belmont, MA
Northing: 2972192.9570 Easting: 745884.085
Drilling Date: Start: 9/14/2017 End: 9/14/2017

Surface Elevation (ft.): 48.61

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

Depth Date Time

9.5 9/14/2017 10:00 **Abandonment Method:** Backfilled with soil cuttings

| Elev.<br>Depth<br>(ft)<br>48.6<br>0               | Sample Sample Type   | Sample S-1 | Samble 24   | Blows ber 9 12 20 27 50       | Sample 12 Recovery (in) | N-Value                     | Graphic Log | Strata          | Top 4": -                                       | Material Desc                            | ription                                 |            | Remarks                     |
|---|----------------------|------------|---|-------------------------------|-------------------------|-----------------------------|-------------|-----------------|---|--|---|------------|-----------------------------|
| 0 -   | - SS                 | S-2        |   | 7<br>8<br>9<br>12<br>20<br>27 | 12                      |                             |             |                 |   | Tonsoil                                  |   | -          |                             |
| 43.6  | - SS                 | S-2        |   | 8<br>9<br>12<br>20<br>27      |                         | 15                          |             |                 | Bottom 8  | i opooli                                 |   |            |                             |
| 43.6  |                      |            | 24  | 20<br>27                      | 10                      |                             |             |                 | to mediu  | B": Moist, medium<br>m SAND, trace s     | dense, brown, fin<br>ilt                | ie         |                             |
| 43.6  | - ss                 | S-3        |   |                               |                         | 47                          |             | ravel           |   | ense, brown, fine<br>e to coarse grave   | to coarse SAND,<br>I, little silt       |            | Analytical sample (2'-4')   |
|   |                      |            | 24  | 42<br>30<br>80<br>62          | 12                      | >100                        |             | Sand and Gravel | Moist, ve<br>SAND, s                            | ery dense, brown<br>come fine to coars   | fine to coarse<br>se gravel, trace silt |            | Analytical sample (4'-6')   |
| -   | ss                   | S-4        | 24  | 33<br>36<br>32<br>52          | 12                      | 68                          |             |                 | Moist, ve<br>SAND, s                            | ery dense, brown<br>come fine to coars   | fine to coarse<br>se gravel, trace silt |            | Corrosion sample<br>(6'-8') |
| ₹<br>38.6<br>10                                   | - SS                 | S-5        | 24  | 76<br>65<br>45<br>52          | 14                      | >100                        |             | Sandy Silt      | coarse S<br>trace silt                          | 6": Moist, very de                       |   |            |                             |
| 33.6<br>15  | - ss                 | S-6        | 24  | 11<br>15<br>23<br>24          | 24                      | 38                          |             | Silty Clay      | Wet, har<br>medium                              | d, gray, CLAY &<br>sand                  | SILT, little fine to                    |            |                             |
|   | _                    |            |   |                               |                         |                             |             |                 | Test bor<br>backfilled                          | ing B-79 terminat<br>d with soil cutting | ed at 16' bgs and<br>s.                 |            |                             |
| 28.6  |                      |            |   |                               |                         |                             |             |                 |   |  |   |            |                             |
|   | Sa                   | ample Ty   | pes   |                               |                         |                             |             |                 | Consistency                                     | vs Blowcount/Foo                         | <u>t</u>                                | Burmis     | ster Classification         |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | fornia Sa<br>Rock Co | ampler ore | V - Vac<br>San<br>SS - Spli<br>ST - She<br>GP - Ged | nple<br>t Spoor<br>lby Tub    | n ,                     | V. Loos<br>Loose:<br>M. Den | se: 0       | )-4 E           | ( <u>Sand):</u><br>Dense: 30-5<br>'. Dense: >50 | 0 V. Soft: <2                            |   | litt<br>tr | me 20-35%                   |
| Revie   | wed k                | ov:        |   |                               |                         |                             |             |                 | Date:   |  | Boring Numb                             | _          |                             |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: Pleasant St./Brighton St., Belmont, MA

Northing: 2972521.9200 Easting: 746251.684 **Drilling Date: Start:** 9/22/2017 **End:** 9/22/2017

Reviewed by:

Surface Elevation (ft.): 49.15

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth

Date 8.5 9/25/2017 10:30

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-80** 

| Ū   |                     |                  |   |                            | Logged By: J. Wang      |                             |             |                 |  |   |  |  |  |  |
|---|---------------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|-----------------|--|---|--|--|--|--|
| Elev.<br>Depth<br>(ft)                              | Sample<br>Type      | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata          | Material Description   | Remarks   |  |  |  |  |
| 0   |                     |                  |   |                            |                         |                             |             |                 | 6" Asphalt   | Vacuum excavate   |  |  |  |  |
|   | - VE                | V-1              |   |                            |                         |                             |             | E               | Moist, brown, fine to coarse SAND, some fine to coarse gravel, trace silt                | boring from the ground surface to 4' bgs. Cobbles observed in borehole fro 1 to 5' bgs. |  |  |  |  |
|   | VE                  | V-2              |   |                            |                         |                             |             |                 | Moist, brown, fine to coarse SAND, some fine to coarse gravel, trace silt                |   |  |  |  |  |
| 44.2<br>5   | - SS                | S-1              | 23  | 21<br>27<br>72<br>100/5"   | 6                       | 99                          |             |                 | Wet, very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt      | Analytical sample (3'-4.5')   |  |  |  |  |
|   | - SS                | S-2              | 24  | 40<br>18<br>19<br>15       | 18                      | 37                          |             |                 | Moist, dense, brown to gray, fine to coarse SAND and fine to coarse GRAVEL, trace silt   |   |  |  |  |  |
| <b>.</b><br>  |                     |                  |   | 38                         |                         |                             |             | Vel             | Mat your damas dayle way fine to soone   |   |  |  |  |  |
| <u>39.2</u> -                                       | ss                  | S-3              | 15  | 65<br>100/3"               | 1                       | >100                        |             | Sand and Gravel | Wet, very dense, dark gray, fine to coarse<br>SAND and fine to coarse GRAVEL, trace silt |   |  |  |  |  |
| <br><br>  | -                   |                  |   | 30                         |                         |                             |             | Sand            | Wet, very dense, dark gray, fine to medium   |   |  |  |  |  |
| - <u>34.2</u><br>15                                 | SS                  | S-4              | 24  | 35<br>40<br>35             | 12                      | 75                          |             |                 | SAND, trace silt, trace fine gravel  |   |  |  |  |  |
|   | -                   |                  |   |                            |                         |                             |             |                 | Test boring B-80 terminated at 16' bgs and backfilled with soil cuttings.                |   |  |  |  |  |
| 29.2  |                     |                  |   |                            |                         |                             |             |                 |  |   |  |  |  |  |
|   | <u>Sa</u>           | mple Ty          |   |                            |                         |                             |             |                 | Consistency vs Blowcount/Foot Bu   | rmister Classification  |  |  |  |  |
| AS - Auge<br>CS - Califo<br>BQ - 1.5"<br>NQ - 2" Ro | ornia Sa<br>Rock Co | mpler s          | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tub | n<br>ne                 | V. Loos<br>Loose:<br>M. Der | se: 0       | )-4 E<br>-10 V  | (Sand):     Fine Grained (Clay):       Dense:     30-50     V. Soft:     <2              | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>noisture, density, color    |  |  |  |  |

Date:





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D. Bore Hole Location: Pleasant St./Concord Turnpike, Belmont, MA

Northing: 2972932.4574 Easting: 746740.3706

Drilling Date: Start: 10/4/2017 End: 10/4/2017

Surface Elevation (ft.): 50.22

Total Depth (ft.): 26

Depth to Initial Water Level (ft): Depth Date Time 9.0 10/4/2017 14:30

Abandonment Method: Backfilled with soil cuttings

Logged By: J.Wang

|  |                                   |                  |  |                            |                         |         |   |                |                                     | Logged   | By: J.Wang                          |  |
|--|-----------------------------------|------------------|--|----------------------------|-------------------------|---------|---|----------------|-------------------------------------|--|-------------------------------------|--|
| Elev.<br>Depth<br>(ft)                           | Sample<br>Type                    | Sample<br>Number | Sample<br>Length (in)                            | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value | Graphic Log   | Strata         |                                     | Material Descr   | ription                             | Remarks  |
| 0  | - SS                              | S-1              | 24   | 8<br>19<br>41<br>75        | 24                      | 60      |   |                | 3" Topso<br>Dry, very<br>SILT, trac | dense, light brow  | n, fine SAND and                    | i  |
| 45.2   | SS                                | S-2              | 9  | 60<br>100/3"               | 6                       | >100    |   | Fill           | Dry, very<br>SILT, trad             | dense, light brow<br>ee roots  | n, fine SAND and                    | Analytical sampl<br>(2'-2.9')<br>Asphalt<br>encountered from<br>3 to 3.5' bgs. |
| 5  | - SS                              | S-3              | 24   | 18<br>26<br>35<br>59       | 4                       | 61      |   |                | Wet, very<br>GRAVEL                 | dense, brown, fi<br>, little fine to coar                                      | ne to coarse<br>se sand, trace silt | Analytical sampl<br>(6'-8')  |
| <u>¥</u> 0.2 10                                  | SS                                | S-4              | 24   | 32<br>45<br>30<br>35       | 18                      | 75      |   | avel           | coarse SA<br>Bottom 8               | Moist, very dense<br>AND, trace silt<br>": Moist, very den<br>fine to medium S | se, light brown,                    |  |
| 35.2<br>15                                       | -<br>-<br>-<br>-<br>-             | S-5              | 5  | <del>100/5"</del>          | 2                       | <u></u> |   | Sand and Grave | Wet, very<br>GRAVEL                 | dense, gray, fine  | e to medium                         |  |
| 30.2   | - ss                              | S-6              | 24   | 37<br>42<br>40<br>40       | 18                      | 82      |   |                | Wet, very<br>some silt              | dense, light brov  | wn, fine SAND,                      |  |
| AS - Auge<br>CS - Cali<br>BQ - 1.5"<br>NQ - 2" R | er/Grab S<br>fornia Sa<br>Rock Co | mpler<br>ore S   | v - Vac<br>Sam<br>S - Spli<br>T - She<br>F - Geo | nple<br>t Spoor<br>lby Tub | n l                     | Loose:  | Consistency vs Blowcount/Foot         Burmister Classificate           Granular (Sand):         Fine Grained (Clay):         and 35-50% some 20-35% some 20-35% little 10-20% some 20-35%           Loose:         4-10 V. Dense:         >50         Soft:         <2 Stiff: |                |                                     |  |                                     |  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

| Projec                    | ct Loc         | ation:           | Mass                  | achu                  |                         |         | oject       | Num             | lber: 101038-102170   |         |
|---------------------------|----------------|------------------|-----------------------|-----------------------|-------------------------|---------|-------------|-----------------|---|---------|
| Elev.<br>Depth<br>(ft)    | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata          | Material Description  | Remarks |
| 30.2<br>20<br>            |                |                  |                       |                       |                         |         |             | Sand and Gravel |   |         |
| - <u>25.2</u> - <u>25</u> | - SS           | S-7              | 24                    | 20<br>30<br>23<br>41  | 15                      | 53      |             | Sand            | Wet, very dense, light brown, fine SAND                                   |         |
| <br>                      | -              |                  |                       |                       |                         |         |             |                 | Test boring B-81 terminated at 26' bgs and backfilled with soil cuttings. |         |
| - <u>20.2</u> -           | -              |                  |                       |                       |                         |         |             |                 |   |         |
|                           | -              |                  |                       |                       |                         |         |             |                 |   |         |
| - <u>15.2</u> - <u>35</u> | -              |                  |                       |                       |                         |         |             |                 |   |         |
|                           | -              |                  |                       |                       |                         |         |             |                 |   |         |
| <br>- <u>10.2</u> -       | -              |                  |                       |                       |                         |         |             |                 |   |         |
| 40<br><br>                | -              |                  |                       |                       |                         |         |             |                 |   |         |
|                           | -              |                  |                       |                       |                         |         |             |                 |   |         |
| - <u>5.2</u><br>- 45      | -              |                  |                       |                       |                         |         |             |                 |   |         |
| -                         |                |                  | •                     |                       |                         |         |             |                 | Boring Number: E  | -81     |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:**GeoLogic - Earth Exploration, Inc. / P. Fisher **Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 9 Venner Rd., Arlington, MA Northing: 2973277.1544 Easting: 746927.0222 Drilling Date: Start: 10/3/2017 End: 10/3/2017

Surface Elevation (ft.):51.64

Total Depth (ft.): 10

Depth to Initial Water Level (ft):

Depth Date Time

Abandonment Method: Backfilled with soil cuttings

Logged By: A. Smith

|                        |                |                  |                       |                                  |                         |         |             |            | Logged by. A. Oniill   |
|------------------------|----------------|------------------|-----------------------|----------------------------------|-------------------------|---------|-------------|------------|--|
| Elev.<br>Depth<br>(ft) | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches            | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata     | Material Description Remarks   |
| 51.6<br>0              |                |                  |                       |                                  | _                       |         |             |            | 8" Asphalt   |
|                        | SS<br>- SS     | S-1              | 12                    | 36<br>40<br>30<br>26             | 8                       | <br>50  |             | E          | Moist, very dense, gray, fine to coarse SAND, some fine to coarse gravel, trace silt Moist, very dense, brown, fine to coarse SAND, some fine to coarse gravel, little silt  Analytical sample (2'-4') |
| 46.6<br>5              | - SS           | S-3              | 24                    | 24<br>23<br>10<br>10<br>10<br>10 | 10                      | 20      |             | and Gravel | Moist, very dense, brown, fine to coarse<br>SAND, some fine to coarse gravel, little silt  |
| -                      | - SS           | S-4              | 24                    | 14<br>15<br>16<br>35             | 14                      | 31      |             | Sand and ( | Moist, very dense, brown, fine to coarse SAND, some fine to coarse gravel, little silt   |
| 41.6<br>10             | - SS           | S-5              | 24                    | 20<br>38<br>50<br>72             | 12                      | 88      |             | Silty Clay | Moist, hard, brown, CLAY & SILT, some fine sand  |
| -<br>-<br>-            | -              |                  |                       |                                  |                         |         |             |            | Drill crew notified that test boring location was too close to an existing utility. The boring was backfilled with drill cuttings and offset to boring location B-82A.                                 |
| 36.6<br>15             | -              |                  |                       |                                  |                         |         |             |            |  |
| 31.6                   | Sa             | ample Ty         | /pes                  |                                  |                         |         |             |            | Consistency vs Blowcount/Foot Burmister Classificati   |
| AS - Auae              | er/Grab        | Sample           | V - Vac               | Ex/Gr                            | ab                      |         | <u>Gr</u> a | ınular (   | (Sand): Fine Grained (Clay): and 35-50%  |

MO VALVE ACTIVITY OF THE COLUMN

AS - Auger/Grab Sample CS - California Sampler BQ - 1.5" Rock Core NQ - 2" Rock Core Granular (Sand): Sample some 0-4 Dense: 4-10 V. Dens 10-30 Stiff: V. Stiff: 30-50 SS - Split Spoon ST - Shelby Tube V. Loose: V. Soft: 8-15 10-20% <10% little Loose: M. Dense: Soft: M. Stiff: 15-30 >30 V. Dense: >50 trace Hard: moisture, density, color GP - Geoprobe

Reviewed by: Date: Boring Number: B-82





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / P. Fisher

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 9 Venner Rd., Arlington, MA Northing: 2973277.1544 Easting: 746927.0222

**Drilling Date: Start:** 11/9/2017 **End:** 11/9/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 3/22/21

Reviewed by:

Surface Elevation (ft.): 51.64

Total Depth (ft.): 26

Depth to Initial Water Level (ft):

Depth Date Time 8.5 11/9/2017 11:10

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-82A** 

| Diming                 | , Date.  | otart.           | 11/3/201                                  | , <u>-</u>                 | <b>4.</b> 11/           | 0/2011                      | •           | Logged By: A. Smith |   |  |  |  |  |
|------------------------|--|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|---------------------|---|--|--|--|--|
| Elev.<br>Depth<br>(ft) | Sample<br>Type                                 | Sample<br>Number | Sample<br>Length (in)                     | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata              | Material Description  | Remarks  |  |  |  |
| 0                      |  |                  |   |                            |                         |                             |             |                     | 4" Asphalt  |  |  |  |  |
| -                      | SS   | S-1              | 18  | 8<br>6<br>4                | 10                      | 10                          |             | Ħ                   | Moist, stiff, dark brown, Organic SILT, some fine to coarse sand, trace fine gravel               |  |  |  |  |
| -                      | - SS   | S-2              | 24  | 14<br>18<br>25<br>30       | 14                      | 43                          |             |                     | Moist, dense, brown, fine to coarse SAND, some fine gravel, little silt                           |  |  |  |  |
| 46.6<br>5              | SS   | S-3              | 12  | 30<br>100                  | 4                       | >100                        |             | Sand and Gravel     | Moist, very dense, brown, fine to coarse<br>SAND and fine to coarse GRAVEL, little silt           |  |  |  |  |
| -                      | SS   | S-4              | 24  | 18<br>32<br>50<br>54       | 8                       | 82                          |             | Silt Sand           | Moist, very dense, brown, fine to medium SAND, some fine to coarse gravel, little silt            |  |  |  |  |
| ▼ .                    |  |                  |   | 13                         |                         |                             |             | S ×                 | Top 6": Moist, hard, brown, SILT, some fine to  |  |  |  |  |
| 41.6<br>10             | ss   | S-5              | 24  | 46<br>62<br>56             | 12                      | >100                        |             | Sandy               | medium sand, trace fine gravel  Bottom 6": Moist, very dense, light brown, fine SAND, little silt |  |  |  |  |
| -<br>-<br>-            |  |                  |   | 19                         |                         |                             |             | Silty Sand          | Moist, dense, brown, fine SAND, little silt   |  |  |  |  |
| 36.6<br>15             | SS   | S-6              | 24  | 21<br>21<br>23             | 12                      | 42                          |             | Silty               | ividiot, dorido, provin, mile do trap, maio dia   |  |  |  |  |
| -                      |  |                  |   |                            |                         |                             |             |                     |   |  |  |  |  |
| -                      | SS   | S-7              | 24  | 12<br>21                   | 12                      | 43                          |             |                     | Moist, dense, brown, fine SAND, little silt   |  |  |  |  |
| 31.6                   | 9-   | mple T           | vnos                                      | ۷1                         |                         |                             | 1.1.1       |                     | Consistency vs Blowcount/Foot Burmi   | ster Classification  |  |  |  |
|                        |  |                  | V - Vac                                   | Ev/Cro                     | h                       |                             |             |                     |   | nd 35-50%  |  |  |  |
| S - Calif<br>Q - 1.5"  | er/Grab S<br>fornia Sa<br>Rock Co<br>Rock Core | mpler<br>ore     | Sam<br>SS - Split<br>ST - She<br>GP - Geo | nple<br>t Spoor<br>Iby Tuk | n<br>ne                 | V. Loos<br>Loose:<br>M. Der | se: 0<br>4- | -4 [                | Dense: 30-50 V. Soft: <2 Stiff: 8-15   iii V. Dense: >50   Soft: 2-4 V. Stiff: 15-30   tr         | ome 20-35%<br>ttle 10-20%<br>race <10%<br>ture, density, color |  |  |  |

Date:





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

| Projec                 | JI LUC         | alion.           | iviass                | acriu                 |                         | FIC     | Jeci        | Nulli      | ber: 101038-102170   |         |
|------------------------|----------------|------------------|-----------------------|-----------------------|-------------------------|---------|-------------|------------|--|---------|
| Elev.<br>Depth<br>(ft) | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata     | Material Description   | Remarks |
| 31.6<br>20             | SS             | S-7              | 24                    | 22                    | 12                      | 43      |             |            |  |         |
|                        | -              |                  |                       | 24                    |                         |         |             | Silty Sand |  |         |
| - <u>26.6</u> _ 25     | - SS           | S-8              | 24                    | 22<br>20<br>32<br>22  | 15                      | 52      |             |            | Moist, very dense, brown, fine SAND, little silt                           |         |
| <br>                   |                |                  |                       |                       |                         |         | . 4.51-7    |            | Test boring B-82A terminated at 26' bgs and backfilled with soil cuttings. |         |
|                        | -              |                  |                       |                       |                         |         |             |            |  |         |
| 21.6<br>30             | -              |                  |                       |                       |                         |         |             |            |  |         |
|                        |                |                  |                       |                       |                         |         |             |            |  |         |
|                        | -              |                  |                       |                       |                         |         |             |            |  |         |
| 16.6<br>35             | -              |                  |                       |                       |                         |         |             |            |  |         |
|                        | -              |                  |                       |                       |                         |         |             |            |  |         |
| <br>11 6               | _              |                  |                       |                       |                         |         |             |            |  |         |
| - <u>11.6</u> -        | -              |                  |                       |                       |                         |         |             |            |  |         |
|                        |                |                  |                       |                       |                         |         |             |            |  |         |
|                        |                |                  |                       |                       |                         |         |             |            |  |         |
| - <u>6.6</u><br>- 45   |                |                  |                       |                       |                         |         |             |            |  |         |
| <u> </u>               |                |                  |                       |                       |                         |         |             |            | Boring Number: B   | -82A    |





Project Name: Rehabilitation of Weston Aqueduct Supply Main 3 Client: MWRA

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 235 Pleasant Street, Arlington, MA Northing: 2973644.3219 Easting: 747551.1924 **Drilling Date: Start:** 10/2/2017 **End:** 10/2/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Surface Elevation (ft.): 49.41

Total Depth (ft.): 15

Depth to Initial Water Level (ft): Depth Date Time ΝE 10/2/2017 10:00

Abandonment Method: Backfilled with soil cuttings

| Diming                               | , Duto.                          | Start. I         | 3/2/201                               | ,                               | <b>4.</b> 10/.          | 2/2011                      | •           |                 | Logged  | By: A. Smith                                      |  |
|--------------------------------------|----------------------------------|------------------|---------------------------------------|---------------------------------|-------------------------|-----------------------------|-------------|-----------------|---|---|--|
| Elev.<br>Depth<br>(ft)               | Sample<br>Type                   | Sample<br>Number | Sample<br>Length (in)                 | Blows per<br>6 inches           | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata          | Material Des  | cription  | Remarks  |
| 0                                    |                                  |                  |                                       |                                 |                         |                             | 2 5 4       |                 | 7" Concrete   |   |  |
| -                                    | SS                               | S-1              | 12                                    | 30<br>28                        | 9                       |                             |             |                 | Moist, brown, fine to coa to coarse gravel, trace si  | t   |  |
| -                                    | SS                               | S-2              | 35                                    | 50<br>60<br>50                  | 9                       | >100                        |             | ravel           | Moist, very dense, browr<br>SAND, some fine to coal   |   | Analytical sample (2'-4')  |
| 44.4<br>5                            | SS                               | S-3              | 24                                    | 28<br>30<br>36<br>38            | 12                      | 66                          |             | Sand and Grave  | Moist, very dense, brown SAND, little fine gravel, tr   |   | Corrosion sampl<br>(4'-6')   |
| -                                    | ss                               | S-4              | 18                                    | 32<br>66<br>100                 | 12                      | >100                        |             |                 | Moist, very dense, browr<br>SAND, little fine gravel, tr  |   | Silt in spoon tip.   |
| 39.4<br>10                           | - SS                             | S-5              | 24                                    | 20<br>28<br>48<br>48            | 24                      | 76                          |             | Silty Clay      | Moist, hard, brown, CLA<br>to medium sand   | Y & SILT, trace fine                              | 9  |
| 34.4<br>15                           | SS                               | S-6              | 12                                    | 100/4"                          | 6                       | >100                        |             | Sand and Gravel | Moist, very dense, brown<br>SAND and fine to coarse<br>Test boring B-84 termina<br>backfilled with soil cutting | GRAVEL, little silt ted at 15' bgs and            |  |
| 29.4<br>                             |                                  | ample Ty         | pes<br>V - Vac                        | Ex/Gra                          | b                       |                             | Gra         | nular (         | Consistency vs Blowcount/For  | o <u>t</u><br>rained (Clay):                      | Burmister Classificati   |
| CS - Calif<br>3Q - 1.5"<br>NQ - 2" R | fornia Sa<br>Rock Co<br>Rock Cor | ampler Sore Sore | Sam<br>S - Spli<br>T - She<br>P - Geo | t <sup>·</sup> Spoor<br>Iby Tub | e l                     | V. Loos<br>Loose:<br>M. Der | se: 0       | -4 D            | ense: 30-50 V. Soft:   Dense: >50 Soft: 2-<br>M. Stiff: 4-  | 2 Stiff: 8-15<br>4 V. Stiff: 15-30<br>8 Hard: >30 | some 20-35%<br>little 10-20%<br>trace <10%<br>moisture, density, color |
| Revie                                | wed b                            | oy:              |                                       |                                 |                         |                             |             |                 | Date: Boring Number: B-84   |   |  |





Client: MWRA **Project Name:** Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / D. Jacobs Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 211 Pleasant St., Arlington, MA Northing: 2973919.8504 Easting: 747898.0533 **Drilling Date: Start:** 9/7/2017 **End:** 9/8/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Reviewed by:

Surface Elevation (ft.): 45.35

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth Date 6.5 9/8/2017 09:00

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-85** 

|                                      |                | Start. 3/        | 772011                |                       | 0,0,2                   |                             |             |            | Logged By: A. Smith   |  |
|--------------------------------------|----------------|------------------|-----------------------|-----------------------|-------------------------|-----------------------------|-------------|------------|---|--|
| Elev.<br>Depth<br>(ft)               | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata     | Material Description  | Remarks  |
| 45.4<br>0                            |                |                  |                       | 1                     |                         |                             | 74 14 . 14  |            | 5" Topsoil  |  |
| -                                    | SS             | S-1              | 24                    | 8<br>6<br>6           | 12                      | 14                          |             |            | Moist, medium dense, brown, SILT and fine SAND                                    |  |
| -                                    | - SS           | S-2              | 24                    | 12<br>30<br>32<br>40  | 16                      | 62                          |             |            | Moist, medium dense, brown, fine to medium SAND, little fine gravel, trace silt   | Analytical sample (2'-4')  |
| 40.4<br>5                            | - SS           | S-3              | 24                    | 42<br>60<br>55<br>60  | 12                      | >100                        |             | Silty Sand | Wet, very dense, brown, fine to coarse SAND, little fine gravel, trace silt       |  |
| Ā                                    | SS             | S-4              | 24                    | 44<br>45<br>45<br>60  | 14                      | 90                          |             |            | Wet, very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt | Corrosion sample (6'-8')   |
| -                                    |                |                  |                       | 23                    |                         |                             |             |            | Moist, hard, brown, SILT  |  |
| 35.4<br>10                           | ss             | S-5              | 24                    | 27<br>30<br>35        | 20                      | 57                          |             |            | Moist, hard, brown, CLAY  | PP = 2.5 tsf   |
| -<br>-<br>-                          | -              |                  |                       |                       |                         |                             |             | Silty Clay |   |  |
| 30.4<br>15                           | - SS           | S-6              | 24                    | 20<br>30<br>24<br>25  | 24                      | 54                          |             |            | Moist, hard, brown, CLAY and SILT, trace fine to medium sand                      | PP = 2 tsf   |
| -                                    |                |                  |                       |                       |                         |                             |             |            | Test boring B-85 terminated at 16' bgs and backfilled with soil cuttings.         |  |
| 25.4                                 |                |                  |                       |                       |                         |                             |             |            |   |  |
|                                      | Sa             | mple Ty          | pes                   |                       |                         |                             |             |            | Consistency vs Blowcount/Foot Br  | urmister Classificatio   |
| SQ - 1.5" ROCK Core ST - Shelby Tube |                |                  |                       |                       |                         | V. Loos<br>Loose:<br>M. Den | se: 0       | -4 D       | Sand):   Fine Grained (Clay):   | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>moisture, density, color |





Project Name: Rehabilitation of Weston Aqueduct Supply Main 3 Client: MWRA

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NX Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D. Bore Hole Location: Kensignton Park at Pleasant St., Arlington, MA

Northing: 2974281.9003 Easting: 748160.7361 Drilling Date: Start: 9/6/2017 End: 9/6/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Surface Elevation (ft.): 55.91

Total Depth (ft.): 15

Depth to Initial Water Level (ft): Depth Date Time 3.0 9/6/2017 15:45

Abandonment Method: Backfilled with soil cuttings

| Diming                 | Date.  | Start. 3/        | 0/2017                | Liid                  | . 5/0/2                 | -017    |                 |                 |                           | Logged I                                    | By: A. Smith                               |  |
|------------------------|--|------------------|-----------------------|-----------------------|-------------------------|---------|-----------------|-----------------|---------------------------|---|--|--|
| Elev.<br>Depth<br>(ft) | Sample<br>Type   | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log     | Strata          |                           | Material Desc                               | ription                                    | Remarks  |
| 0                      |  |                  |                       | 8                     |                         |         | -4 1. · · · · · |                 | 3" Topso                  | oil   |  |  |
|                        | SS   | S-1              | 24                    | 13<br>27<br>20        | 11                      | 40      |                 |                 | Moist, de                 |   | to coarse SAND,<br>VEL, little silt        |  |
| . <u>¥</u> .           | - SS   | S-2              | 24                    | 9<br>8<br>7<br>5      | 12                      | 15      |                 | Gravel          |                           |   | own, fine to coarse<br>se GRAVEL, little s |  |
| 50.9<br>5              | - SS   | S-3              | 24                    | 5<br>14<br>10<br>12   | 10                      | 24      |                 | Sand and Gravel |                           | edium dense, brov<br>some silt, little fine | vn, fine to coarse<br>to coarse gravel     |  |
|                        | SS   | S-4              | 24                    | 7<br>9<br>18<br>40    | 10                      | 27      |                 | ¥               | Wet, me<br>GRAVE          | edium dense, gray<br>L, some fine to co     | y, fine to coarse<br>parse SAND, little s  | silt   |
|                        | SS   | S-5              | 4                     | 100/4"                | 0                       | >100    |                 | Rock            | No reco                   | very  |  | Advanced rollerbit   |
| <br>45.9               |  |                  |                       |                       |                         |         |                 | Weathered       |                           |   |  | from 8 to 10' bgs through weathered rock.                                |
| - <u>45.9</u>          | NX   | C-1              | 60                    |                       |                         |         |                 | Bedrock W       | See core                  | e log for descriptio                        | on   |  |
| - <u>40.9</u>          | -  |                  |                       |                       |                         |         |                 |                 | Test bor<br>backfille     | ing B-86 terminat<br>d with soil cutting:   | ed at 15' bgs and<br>s.                    |  |
|                        |  |                  |                       |                       |                         |         |                 |                 |                           |   |  |  |
| 35.9                   | Sa   | ample Ty         | ⊥<br>pes              |                       |                         |         |                 |                 | Consistency               | vs Blowcount/Foo                            | t  | Burmister Classification   |
| CS - Calif             | AS - Auger/Grab Sample CS - California Sampler 3Q - 1.5" Rock Core NQ - 2" Rock Core ST - Shelby Tube GP - Geoprobe  V - Vac Ex/Grab Sample Sample V - Vac Ex/Grab Sample SS - Split Spoon ST - Shelby Tube GP - Geoprobe  M. Dense: 10-30 |                  |                       |                       |                         |         |                 |                 |                           |   | ained (Clay): Stiff: 8-15 V. Stiff: 15-30  | and 35-50% some 20-35% little 10-20% trace <10% moisture, density, color |
| Revie                  | wed b  | oy:              |                       |                       |                         |         |                 |                 | Date: Boring Number: B-86 |   |  |  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

| Projec  |   |  | n: M                                | lassa                     | achu   | setts                  |                                   | -   |  | ı <b>me:</b> Renabilita<br>ı <b>mber:</b> 101038  | tion of Weston Ad<br>-102170   | queduct St                            | uppiy Main 3   |
|---|---|--|-------------------------------------|---------------------------|--|------------------------|-----------------------------------|---|--|---|--|---------------------------------------|--|
| Elevation<br>Depth<br>(ft)                                    | Sample<br>Type  | Sample<br>Number   | Sample<br>Length (in)               | Recovery (%)              | RQD<br>(%)   | Drill Rate<br>(min/ft) | Down Press.<br>(psi)              | Graphic<br>Log  | Strata   | N   | laterial Description   |                                       | Remarks  |
| 10.0<br><br>  | NX  | C-1  | 60                                  | 100                       | 22   | 2<br>4<br>6<br>2       | NR                                | ×××<br>×××<br>×××<br>×××<br>×××<br>×××<br>×××<br>×××  | Bedrock  |   | weathered, moderately fr<br>E, medium dipping with v   |                                       |  |
| <u>40.9</u><br>15.0   |   |  |                                     |                           |  | 2                      |                                   | ×××<br>×××  |  | Test boring B-86 te   | rminated at 15' bgs.   |                                       |  |
| <br><br>  |   |  |                                     |                           |  |                        |                                   |   |  |   |  |                                       |  |
| - <u>35.9</u>   |   |  |                                     |                           |  |                        |                                   |   |  |   |  |                                       |  |
| - 30.9<br>25.0  |   |  |                                     |                           |  |                        |                                   |   |  |   |  |                                       |  |
| 25.9  |   |  |                                     |                           |  |                        |                                   |   |  | Occation it a (com)   |  |                                       |  |
| Extremel  | <b>lding (</b><br>ly Thin   | </td <td>20</td> <td>Ex</td> <td>tremely</td> <td>/ Close</td> <td></td> <td><b>n)</b><br/>&lt;20</td> <td></td> <td>Continuity (mm)  xtremely &lt;25</td> <td>Attitude Angle  Horizontal 0° - 5°</td> <td>Very Tight</td> <td><u>ire (mm)</u><br/>&lt; 0.1</td> | 20                                  | Ex                        | tremely  | / Close                |                                   | <b>n)</b><br><20                                      |  | Continuity (mm)  xtremely <25   | Attitude Angle  Horizontal 0° - 5°   | Very Tight                            | <u>ire (mm)</u><br>< 0.1                                 |
| Very Thin<br>Thin<br>Medium<br>Thick<br>Very Thic<br>Extremel | ck  | 60-<br>200-<br>600-<br>2000-   | -60<br>200<br>-600<br>2000<br>-6000 | Ve<br>Cl<br>Mc<br>W<br>Ve | ery Clos<br>ose<br>od Clos<br>ide<br>ery Wide<br>tremely | e<br>e                 | 20<br>20<br>600<br>200            | 0-60<br>-200<br>0-600<br>-2000<br>0-6000              | M<br>S   | lightly 25-100<br>lightly 100-200<br>ound >200  | Shallow         5° - 35°           Moderate         35° - 55°           Steep         55° - 85°           Vertical         85° - 90° | Tight Partly Open Open Mod. Wide Wide | 0.1 - 0.25<br>0.25 - 0.5<br>0.5 - 2.5<br>2.5 - 10<br>>10 |
|   | ld Ha   |  |                                     | toh                       | Fresh  | Weat                   | herin                             | _   | an of r  | ock material weathering   | elight to no discolaration   |                                       |  |
| Very Hard<br>Hard<br>Med. Hard                                | Sc<br>Di  | ratches  | n't Scra<br>s with<br>s Readi       |                           | Fresh<br>Slight<br>Modera                                | ate                    | Disco<br>than i                   | loration<br>ts fresh<br>than hal                      | indica<br>condi                                    | ated weathering. All the<br>tion.<br>e rock material is decon   | ; slight to no discoloration.<br>rock material may be discon<br>posed and/or disintergrate   | •                                     | •  |
| Medium<br>Soft<br>Very Soft                                   | Medium Grooves with Difficulty Severe Soft Grooves Readily Very Soft Carves with Knife Complete |  |                                     |                           |  |                        | prese<br>More<br>prese<br>All roo | nt eithe<br>than ha<br>nt eithe<br>ck mate<br>ck mate | r as a<br>If of th<br>r as a<br>rial is<br>rial is | continuous framework of the rock material is decord continuous framework of decomposed and/or disconverted to soil. The r | or as corestones.<br>nposed and/or disintegrate  | d to a soil. Fres                     | h or discolored rock is<br>ure is largely intact.        |
| Dovio   | wadl  | h  |                                     |                           |  |                        | J. rui le                         | , 5 111 401   | J.110, 1   | Doto:   |  | lumbarı B                             | 96   |

ROCK CORING LOG GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Reviewed by:

Date:

Boring Number: B-86





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

 $\textbf{Drilling Contractor/Driller:} \ \ \text{GeoLogic - Earth Exploration, Inc. / M. Ferreira}$ 

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

 $\textbf{Hammer Weight/Drop Height/ Spoon Size:} \quad 140 \text{ lb / } 30 \text{ in /2 in O.D.}$ 

Bore Hole Location: Pleasant St./Gray St., Arlington, MA Northing: 2974926.5197 Easting: 748441.0614

Drilling Date: Start: 9/8/2017 End: 9/8/2017

Surface Elevation (ft.): 60.23

Total Depth (ft.): 14

Depth to Initial Water Level (ft):

**Depth Date Time** 11.5 9/8/2017 13:30

Abandonment Method: Backfilled with soil cuttings

|   | , =                 | <b></b>          | 0,20   |                            | . 0,0,2                 |                             |             |                                      | Logged By: A. Smith  |                              |
|---|---------------------|------------------|--|----------------------------|-------------------------|-----------------------------|-------------|--------------------------------------|--|------------------------------|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type      | Sample<br>Number | Sample<br>Length (in)                            | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata                               | Material Description   | Remarks                      |
| 0   |                     |                  |  | 18                         |                         |                             | 74 1        |                                      | 3" Topsoil   |                              |
|   | ss                  | S-1              | 24   | 58<br>12<br>16             | 14                      | 70                          |             |                                      | Dry, very dense, brown, fine to medium SAND, some fine to coarse GRAVEL, little silt |                              |
|   | - ss                | S-2              | 24   | 22<br>40<br>12<br>12       | 12                      | 52                          |             |                                      |  | Analytical sample<br>(2'-4') |
| <u>55.2</u> 5                                     | - ss                | S-3              | 24   | 60<br>52<br>46<br>80       | 17                      | 98                          |             | Sand and Gravel                      |  | Analytical sample<br>(4'-6') |
|   | SS                  | S-4              | 2  | 100/2"                     | 2                       |                             |             | d ar                                 | Moist, very dense, gray, fine to coarse SAND   |                              |
| _   |                     |                  |  |                            |                         |                             |             | San                                  | and fine to coarse GRAVEL, trace silt  |                              |
|   | SS                  | S-5              | 0  | 100/0"                     | 0                       |                             |             |                                      | No recovery  |                              |
| 50.2<br>10  | SS                  | S-6              | 5  | 100/5"                     | 4                       |                             |             |                                      | Wet, very dense, brown, fine to coarse SAND,   |                              |
| <br>  | ss                  | S-7              | 0  | 100/0"                     | 0                       |                             |             | Weathered Rock                       | some fine to coarse GRAVEL, little silt  No Recovery                                 |                              |
| _ <u>45.2</u> _ 15                                | -                   |                  |  | 100,0                      | 0                       |                             |             |                                      | Test boring B-87 terminated at 14' bgs and backfilled with soil cuttings.            |                              |
| 40.2  AS - Auge CS - Calif BQ - 1.5" NQ - 2" R    |                     |                  |  |                            |                         |                             |             |                                      |  |                              |
|   | Sa                  | mple Ty          |  |                            |                         |                             |             | Consistency vs Blowcount/Foot Burmis | ter Classification   |                              |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | ornia Sa<br>Rock Co | impler<br>ore S  | V - Vac<br>San<br>S - Spli<br>T - She<br>P - Geo | nple<br>t Spoor<br>lby Tul | n l                     | V. Loos<br>Loose:<br>M. Der | se: 0       | )-4 E<br>-10 V                       | Sand):   Fine Grained (Clay):   and som  | ne 20-35%<br>e 10-20%        |
| Revie   | wed b               | y:               |  |                            |                         |                             |             |                                      | Date: Boring Number: B-8   | 37                           |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / M. Ferreira **Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 3 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D. Bore Hole Location: Lakeview St./Pleasant St., Arlington, MA

Northing: 2975244.8954 Easting: 748545.6563 Drilling Date: Start: 9/6/2017 End: 9/6/2017 Surface Elevation (ft.): 58.94

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

 Depth
 Date
 Time

 NE
 9/6/2017
 10:40

Abandonment Method: Backfilled with soil cuttings

Logged By: A. Smith

|  |                      |                  |                             |                       |                         |                  |             |                | Logged By: A. Sm  | пит                                   |
|--|----------------------|------------------|-----------------------------|-----------------------|-------------------------|------------------|-------------|----------------|---|---------------------------------------|
| Elev.<br>Depth<br>(ft)                 | Sample<br>Type       | Sample<br>Number | Sample<br>Length (in)       | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value          | Graphic Log | Strata         | Material Description  | Remarks                               |
| 58.9<br>0                              |                      |                  |                             | 4                     | _                       |                  | 74 15. 74   |                | 6" Topsoil  |                                       |
| -                                      | SS                   | S-1              | 24                          | 7<br>6<br>5           | 14                      | 13               |             | Organic Soils  | Moist, medium dense, brown, Slight SILT and fine SAND. 1" fine to me lens at 17' bgs  | edium sand                            |
| -                                      | - SS                 | S-2              | 24                          | 3<br>22<br>50<br>40   | 16                      | 72               |             | Org            | Top 6": Moist, dense, brown, Orga<br>and fine SAND<br>Bottom 10": Moist, very dense, bro<br>coarse SAND and fine to coarse G  | own, fine to                          |
| 53.9<br>5                              | SS                   | S-3              | 15                          | 36<br>85<br>100/3"    | 12                      | >100             |             |                | trace silt  Moist, very dense, brown, fine to co SAND and fine to coarse GRAVEL   | oarse                                 |
| -                                      | SS                   | S-4              | 9                           | 80<br>100/3"          | 9                       | >100             |             | _              | Moist, very dense, brown, fine to co<br>SAND, little fine gravel, trace silt  | oarse Corrosion sample (6-6.75')      |
| -<br>48.9<br>10                        | - SS                 | S-5              | 24                          | 33<br>42<br>40<br>40  | 16                      | 82               |             | Sand and Grave | Moist, very dense, brown, fine to constant SAND, little fine gravel, trace silt   | oarse                                 |
| 43.9<br>15                             | - SS                 | S-6              | 24                          | 10<br>9<br>30<br>34   | 14                      | 39               |             | Silty Clay     | Top 3": Moist, dense, brown, fine t<br>SAND, little fine gravel, trace silt<br>Bottom 11": Wet, hard, brown, CL<br>fine to medium sand, trace fine gra<br>Bottom 1": Wet, dense, brown, fine<br>medium SAND | AY, some avel e to                    |
| 38.9                                   |                      | ımple Ty         | <u>rpes</u>                 |                       |                         |                  |             |                | Test boring B-88 terminated at 16' backfilled with soil cuttings.  Consistency vs Blowcount/Foot  | Burmister Classification              |
| AS - Auge                              | r/Grab S<br>ornia Sa | mpler -          | V - Vac<br>San<br>SS - Spli | nple<br>t Spoor       | ,  ,                    | V. Loos          | se: (       |                | ense: 30-50 V. Soft: <2 Stiff:  | 8-15   some 20-35%<br>  little 10-20% |
| CS - Califo<br>3Q - 1.5"<br>NQ - 2" Ro | Rock Core            | ,,,              | ST - She<br>SP - Geo        | lby Tul               | ne li                   | Loose:<br>M. Der | nse: 10     |                | Dense: >50 Soft: 2-4 V. Stiff: M. Stiff: 4-8 Hard:  | trace <10% moisture, density, color   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / D. Jacobs

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: Hopkins Rd./Pleasant St., Arlington, MA

Northing: 2975525.9291 Easting: 748812.8921 Drilling Date: Start: 9/7/2017 End: 9/7/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Reviewed by:

Surface Elevation (ft.): 62.64

Total Depth (ft.): 15.3

Depth to Initial Water Level (ft):

**Depth Date Time** 2.0 9/7/2017 10:20

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-89** 

| J                          | •  |                  |                       |                       |                         |         |             |  | Logged By: A. Smith   |   |  |  |  |
|----------------------------|--|------------------|-----------------------|-----------------------|-------------------------|---------|-------------|--|---|---|--|--|--|
| Elev.<br>Depth<br>(ft)     | Sample<br>Type   | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata   | Material Description  | Remarks   |  |  |  |
| 02.0                       |  |                  |                       |                       |                         |         | 74.14. 74   |  | 6" Topsoil  | Vacuum excavate   |  |  |  |
| <b>▼</b> -                 | -  |                  |                       |                       |                         |         |             |  | Moist, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt                 | boring from the ground surface to 4' bgs. Analytical sample (0.5'-4.3') |  |  |  |
| _                          | VE   | V-1              |                       |                       |                         |         |             |  |   |   |  |  |  |
| 57.6<br>5                  | SS   | <u>S-1</u>       |                       | 100/3"                | 0                       |         |             |  |   | Rollerbit<br>throughout<br>boulder from 4.5<br>to 5.5'                  |  |  |  |
| -                          | SS   | S-2              | 3                     | 100/3"                | 3                       |         |             | and Gravel   | Wet, very dense, brown, fine to coarse<br>GRAVEL, some fine to coarse SAND, little silt | Rollerbit through cobbles from 6.5 to 8' bgs.                           |  |  |  |
| -                          |  |                  |                       | 50                    |                         |         |             | Sand and   | Wet, very dense, brown, fine to coarse  |   |  |  |  |
| 52.6<br>10                 | SS   | S-3              | 18                    | 72<br>100             | 16                      | >100    |             |  | GRAVEL and fine to coarse SAND, some silt   |   |  |  |  |
| -<br>-<br>47.6<br>15       | SS   | S-4              | 15                    | 40<br>72<br>100/3"    | 12                      | >100    |             |  | Wet, very dense, brown, fine to coarse<br>GRAVEL, some fine to coarse SAND, little silt |   |  |  |  |
| -                          | -  |                  |                       |                       |                         |         |             |  | Test boring B-89 terminated at 15.3' bgs and backfilled with soil cuttings.             |   |  |  |  |
| 42.6                       | -  |                  |                       |                       |                         |         |             |  |   |   |  |  |  |
|                            | <u>Sa</u>  | mple Ty          |                       |                       |                         |         |             | Consistency vs Blowcount/Foot Burmister Classification   |   |   |  |  |  |
| CS - Califo<br>BQ - 1.5" l | S - Auger/Grab Sample S - California Sampler SQ - 1.5" Rock Core IQ - 2" Rock Core GP - Geoprobe |                  |                       |                       |                         |         |             | on Use V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15 Use V. Soft: 15-30 V. Soft: 15-30 V. Soft: 2-4 V. Stiff: 15-30 V. Soft: 2- |   |   |  |  |  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA
Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** Lombard Rd./Pleasant St., Arlington, MA **Northing:** 2976065.1933 **Easting:** 749373.6117

**Drilling Date: Start:** 9/1/2017 **End:** 9/1/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Surface Elevation (ft.): 62.43

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

Depth Date Time

9/1/2017

Abandonment Method: Backfilled with soil cuttings

11:00

Logged By: A. Smith

ΝE

|  |  |                  |                       |                          |                         |         |   |                 |                            | Logged                                      | By: A. Smith                                    |                         |  |
|--|--|------------------|-----------------------|--------------------------|-------------------------|---------|---|-----------------|----------------------------|---|---|-------------------------|--|
| Elev.<br>Depth<br>(ft)                   | Sample<br>Type   | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches    | Sample<br>Recovery (in) | N-Value | Graphic Log   | Strata          |                            | Material Desc                               | cription  |                         | Remarks  |
| 0  | - SS   | S-1              | 24                    | 11<br>12<br>11<br>12     | 18                      | 23      |   | Silty Sand      | Dry, med<br>fine SAN       | dium dense, brov<br>ID and SILT             | vn, Slightly Organio                            | С                       |  |
|  | ss   | S-2              | 21                    | 55<br>80<br>80<br>100/3" | 14                      | >100    |   | -               |                            | dense, brown, f<br>e to coarse GRA          | ine to coarse SAN<br>VEL, trace silt            | D,                      | Analytical sample (2' - 3.75')                                 |
| 57.4<br>5                                | SS   | S-3              | 9                     | 66<br>100/3"             | 9                       | >100    |   |                 |                            | y dense, brown,<br>to coarse GRAV           | fine to coarse SAN<br>EL, trace silt            | ID                      | Analytical sample (4'-4.75')                                   |
|  | - SS   | S-4              | 24                    | 55<br>40<br>82<br>100    | 16                      | >100    |   | -               |                            | ery dense, brown<br>some fine to coar       | , fine to coarse<br>se GRAVEL, trace            |                         |  |
| -  | SS   | S-5              | 2                     | 100/2"                   | 2                       | >100    |   | Grave           |                            |   | d brown, medium<br>coarse GRAVEL                | to                      |  |
| 52.4<br>10                               |  |                  |                       |                          |                         |         |   | Sand and Gravel |                            |   |   |                         |  |
| 47.4                                     | - SS   | S-6              | 24                    | 33<br>75<br>75<br>77     | 10                      | >100    |   |                 |                            | y dense, brown,<br>to coarse GRAV           | fine to coarse SAN<br>EL, trace silt            | ND                      |  |
|  | -  |                  |                       |                          |                         |         |   |                 | Test bor<br>backfilled     | ing B-90 termina<br>d with soil cutting     | ted at 16' bgs and<br>s.                        |                         |  |
| 42.4                                     |  |                  |                       |                          |                         |         |   |                 |                            |   |   |                         |  |
|  |  | ample Ty         | oes<br>V - Vac        | EviCro                   | h                       |         | Consistency vs Blowcount/Foot     Burmister Classification       Granular (Sand):     Fine Grained (Clay):     and 35-50% |                 |                            |   |   |                         |  |
| CS - Calif<br>  BQ - 1.5"<br>  NQ - 2" R | CS - California Sampler BQ - 1.5" Rock Core NQ - 2" Rock Core ST - Shelby Tube GP - Geoprobe  V. Loose: Loose: M. Dense: |                  |                       |                          |                         |         |   |                 | ense: 30-5<br>. Dense: >50 | 0 V. Soft: <2<br>Soft: 2-4<br>M. Stiff: 4-8 | Stiff: 8-15<br>4 V. Stiff: 15-30<br>3 Hard: >30 | so<br>lit<br>tr<br>mois | ome 20-35%<br>ttle 10-20%<br>race <10%<br>ture, density, color |
| Revie                                    | wed k  | oy:              |                       |                          |                         |         |   |                 | Date:                      |   | Boring Numb                                     | er: B                   | -90  |





Client: MWRA **Project Name:** Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D. Bore Hole Location: Swan St./Pleasant St., Arlington, MA

Northing: 2976361.5967 Easting: 749665.2126 **Drilling Date: Start:** 9/1/2017 **End:** 9/1/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Reviewed by:

Surface Elevation (ft.): 51.88

Total Depth (ft.): 16

ΝE

Depth to Initial Water Level (ft): Depth Date Time

9/1/2017

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-91** 

14:00

| 2g  | Date.   | Start: 9                   | / 1/2017              | Liid   | 0/1/2                   | 2017    |             |  | Logged By: A. Smith  |  |  |
|---|---|----------------------------|-----------------------|--|-------------------------|---------|-------------|--|--|--|--|
| Elev.<br>Depth<br>(ft)                              | Sample<br>Type                                      | Sample<br>Number           | Sample<br>Length (in) | Blows per<br>6 inches  | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata   | Material Description   | Remarks  |  |
| 0   |   |                            |                       |  |                         |         |             |  | 3" Asphalt<br>8" Gravel base course  | Vacuum excavate boring from the                              |  |
| -   |   |                            |                       |  |                         |         |             | ≣  | Dry, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt  Dry, brown, fine to coarse SAND and fine to | ground surface to<br>5' bgs.<br>Analytical sample<br>(2'-4') |  |
| _   | VE  | V-1                        |                       |  |                         |         |             | _  | coarse GRAVEL, trace silt, trace brick   |  |  |
| <u>46.9</u> _                                       |   |                            |                       | 9  |                         |         |             |  | Dry, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt  | Rollerbit through boulder from 4 to                          |  |
| -   | ss  | S-1                        | 24                    | 17<br>60<br>60   | 10                      | 77      |             |  | Moist, very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt                                | 5' bgs.  |  |
| -   | SS  | S-2                        | 4                     | 100/4"   | 4                       | >100    |             |  | Moist, very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt                                |  |  |
| <u>41.9</u>   | SS  | S-3                        | 10                    | 55<br>100/4"   | 10                      | >100    |             | Gravel   | Moist, very dense, brown, fine to coarse<br>SAND and fine to coarse GRAVEL, trace silt                             |  |  |
| 10 -  | -   |                            |                       |  |                         |         |             | Sand and   |  |  |  |
| 36.9<br>15  | - ss  | S-4                        | 24                    | 60<br>65<br>72<br>80   | 12                      | 137     |             |  | Moist, very dense, brown, fine to coarse<br>SAND and fine to coarse GRAVEL, trace silt                             |  |  |
| -   | -   |                            |                       |  |                         |         |             |  | Test boring B-91 terminated at 16' bgs and backfilled with soil cuttings.  |  |  |
| 31.9  |   |                            |                       |  |                         |         |             |  |  |  |  |
|   | Sa  | mple Ty                    | pes                   |  |                         |         |             | Consistency vs Blowcount/Foot Burmister Classification |  |  |  |
| AS - Auge<br>CS - Califo<br>BQ - 1.5"<br>NQ - 2" Ro | V - Vac<br>Sam<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tub | n<br>ne               | V. Loose: 0-4 Dense: 30-50 V. Soft: <2 Stiff: 8-15 little 10-20% |                         |         |             |  |  |  |  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

 $\textbf{Drilling Contractor/Driller:} \ \ \textbf{GeoLogic - Earth Exploration, Inc.} \ / \ \textbf{M.} \ \textbf{Ferreira}$ 

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 3 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

Bore Hole Location: Swan St./Swan Pl., Arlington, MA Northing: 2976218.8527 Easting: 749859.8445

Drilling Date: Start: 9/5/2017 End: 9/5/2017

Surface Elevation (ft.): 46.61

Total Depth (ft.): 16

Depth to Initial Water Level (ft):DepthDateTimeNE9/5/201710:15

Abandonment Method: Backfilled with soil cuttings

| Elev.<br>Depth<br>(ft)                            | Sample<br>Type                  | Sample<br>Number | Sample<br>Length (in)                   | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value           | Graphic Log | Strata                     | Material Description  | Remarks   |
|---|---------------------------------|------------------|---|-----------------------|-------------------------|-------------------|-------------|----------------------------|---|---|
| 0   |                                 |                  |   |                       |                         |                   |             |                            | 4" Asphalt  | Vacuum excavate   |
| -   |                                 |                  |   |                       |                         |                   |             |                            | 4" Gravel base course  Dry, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt, trace brick | boring from the<br>ground surface to<br>5' bgs.                 |
| 41.6  | VE                              | V-1              |   |                       |                         |                   |             |                            |   | Analytical sample (4'-6')                                       |
| 41.6<br>5   | - SS                            | S-1              | 24                                      | 50<br>72<br>44<br>50  | 12                      | >100              |             |                            | Moist, very dense, brown, fine to coarse SAND and fine GRAVEL, trace silt                                 |   |
| -   | - SS                            | S-2              | 24                                      | 88<br>76<br>83<br>78  | 12                      | >100              |             |                            | Moist, very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt                       |   |
| 36.6  | SS                              | S-3              | 24                                      | 48<br>50<br>50<br>76  | 12                      | 100               |             | Sand and Gravel            | Moist, very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt                       |   |
| 31.6<br>15  | - SS                            | S-4              | 24                                      | 32<br>22<br>38<br>72  | 8                       | 60                |             |                            | Moist, very dense, brown, fine to coarse<br>SAND and fine to coarse GRAVEL, trace silt                    |   |
| -<br>-<br>-                                       |                                 |                  |   |                       |                         |                   |             |                            | Test boring B-92 terminated at 16' bgs and backfilled with soil cuttings.                                 |   |
| 26.6  |                                 | male T:          | mas.                                    |                       |                         |                   |             |                            | Panaistanay va Playsayınt/East  | niotor Classificati   |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>IQ - 2" R | r/Grab S<br>ornia Sa<br>Rock Co | mpler<br>re      | V - Vac<br>Sam<br>SS - Splii<br>T - She | elar                  | n l                     | V. Loos<br>Loose: | se: C       | anular (<br>)-4 D<br>-10 V | Sand): Fine Grained (Clay): Sense: 30-50 V. Soft: <2 Stiff: 8-15  | nister Classification 35-50% and 35-50% ittle 10-20% trace <10% |

Sheet 1 of 1



## **Boring Number: B-93 (MW)**

Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D. Bore Hole Location: Massachusetts Ave./Broadway, Arlington, MA

Northing: 2976272.7917 Easting: 750377.6421 Drilling Date: Start: 9/5/2017 End: 9/5/2017

Reviewed by:

Surface Elevation (ft.): 44.09

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth Date Time 3.0 9/5/2017 13:00

Abandonment Method: Monitoring well installed

Boring Number: B-93 (MW)

| Dillillig                  | Date.  | Start: 9/        | 3/2017                | Ellu                  | . 9/3/2                 | 2017    |             |  | Logged By: A. Smith   |                           |  |  |
|----------------------------|--|------------------|-----------------------|-----------------------|-------------------------|---------|-------------|--|---|---------------------------|--|--|
| Elev.<br>Depth<br>(ft)     | Sample<br>Type   | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata   | Material Description  | Remarks                   |  |  |
| <u>44.1</u><br>0           |  |                  |                       | 8                     |                         |         | 711. 71     |  | Top 12": Topsoil  |                           |  |  |
| -                          | SS   | S-1              | 24                    | 1 2                   | 16                      | 2       |             |  | Bottom 12": Dry, very loose, brown, fine SAND, some silt                              |                           |  |  |
| <b>▼</b> -                 | - SS   | S-2              | 24                    | 30<br>36<br>36<br>40  | 15                      | 72      |             |  | Moist, very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt | Analytical sample (2'-4') |  |  |
| 39.1<br>5                  | - SS   | S-3              | 24                    | 40<br>46<br>62<br>75  | 12                      | >100    |             |  | Moist, very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt | Analytical sample (4'-6') |  |  |
| -                          | SS   | S-4              | 24                    | 56<br>70<br>70<br>68  | 14                      | >100    |             | avel   | Moist, very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt   | Corrosion sample (6'-8')  |  |  |
| 34.1<br>10                 | - SS   | S-5              | 24                    | 28<br>50<br>62<br>50  | 14                      | >100    |             | Sand and Gravel                                      | Moist, very dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt   |                           |  |  |
| -<br>-<br>-<br>29.1<br>15  | - SS   | S-6              | 24                    | 20<br>15<br>30<br>20  | 10                      | 45      |             |  | Wet, dense, brown, fine to coarse SAND, little fine gravel, trace silt                |                           |  |  |
| -                          |  |                  |                       |                       |                         |         |             |  | Test boring B-93 (MW) terminated at 16' bgs and converted into a monitoring well.     |                           |  |  |
| 24.1                       | 92   | ımple Ty         | nes                   |                       |                         |         |             |  | Consistency vs Blowcount/Foot Bu  | urmister Classification   |  |  |
| CS - Califo<br>3Q - 1.5" l | - Auger/Grab Sample<br>- California Sampler<br>- 1.5" Rock Core  - 2" Rock Core  GP - Geoprobe |                  |                       |                       |                         |         |             | Canular (Sand):   Fine Grained (Clay):   Some 20-35% |   |                           |  |  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / M. Ferreira **Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: Broadway/Alton St., Arlington, MA Northing: 2976203.5501 Easting: 750682.654

Drilling Date: Start: 8/30/2017 End: 8/30/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Surface Elevation (ft.): 39.91

Total Depth (ft.): 16

Depth to Initial Water Level (ft):DepthDateTime10.08/30/201711:30

Abandonment Method: Backfilled with soil cuttings

|   | ,  |                           |   |                            |                         |                             |             |                          | Logged By: A. Smith   |   |
|---|--|---------------------------|---|----------------------------|-------------------------|-----------------------------|-------------|--------------------------|---|---|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type                                 | Sample<br>Number          | Sample<br>Length (in)                             | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata                   | Material Description  | Remarks   |
| 0   |  |                           |   |                            |                         |                             |             |                          | 4" Asphalt  |   |
|   | SS   | S-1                       | 4   | 100/4"                     | 4                       |                             | XXX         |                          |   |   |
| <br>  | - SS   | S-2                       | 24  | 15<br>11<br>8<br>6         | 6                       | 19                          |             | ≣                        | coarse SAND, trace fine gravel, trace brick   | nalytical sample<br>2'-4')                                      |
| 34.9<br>5   | ss   | S-3                       | 15  | 6<br>100/3"                | 10                      | >100                        |             |                          |   | nalytical sample<br>4'-5.2')                                    |
|   | SS   | S-4                       | 24  | 95<br>50<br>60<br>50       | 12                      | >100                        |             |                          |   | Corrosion sample<br>6'-8')                                      |
|   | SS   | S-5                       | 8   | 76                         | 8                       | >100                        |             |                          | Wet, very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt |   |
| 2 <u>79</u> - 10                                  | -  |                           |   |                            |                         |                             |             | Sand and Gravel          |   |   |
| - <u>24.9</u><br>15                               | - SS   | S-6                       | 24  | 30<br>30<br>70<br>40       | 12                      | 100                         |             |                          | Wet, very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt |   |
|   |  |                           |   |                            |                         |                             |             |                          | Test boring B-94 terminated at 16' bgs and backfilled with soil cuttings.           |   |
| 19.9  | 9-   | ımple Ty                  | nas   |                            |                         |                             |             |                          | Consistency vs Blowcount/Foot Burmist   | er Classification   |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | er/Grab S<br>fornia Sa<br>Rock Co<br>lock Core | Sample<br>Impler<br>ore S | V - Vac<br>San<br>SS - Spli<br>T - She<br>P - Geo | nple<br>t Spoor<br>lby Tub | ne                      | V. Loos<br>Loose:<br>M. Der | se: 0       | nular (<br>)-4 C<br>10 V | Sand):   Fine Grained (Clay):   and   som   | 35-50%<br>e 20-35%<br>e 10-20%<br>ce <10%<br>re, density, color |
| Revie   | wed b  | y:                        |   |                            |                         |                             |             |                          | Date: Boring Number: B-9  | 4   |





Client: MWRA **Project Name:** Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: Broadway, Arlington, MA Northing: 2975925.3156 Easting: 751155.8707 **Drilling Date: Start:** 8/28/2017 **End:** 8/28/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Reviewed by:

Surface Elevation (ft.): 36.25

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth Date ΝE 8/28/2017

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-95** 

13:00

|   |                     |                  |   |                            |                         |                             |             |                 | Logged By: A. Smith   |
|---|---------------------|------------------|---|----------------------------|-------------------------|-----------------------------|-------------|-----------------|---|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type      | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata          | Material Description Remarks  |
| 0   |                     |                  |   | 3                          |                         |                             | 74 1. T     |                 | 16" Topsoil   |
| -   | - ss                | S-1              | 24  | 2                          | 12                      | 5                           | /<br>XXX    |                 | Dry, loose, brown, fine to medium SAND,   |
|   | - SS                | S-2              | 24  | 2<br>2<br>1<br>4<br>7      | 12                      | 5                           |             | E               | some SILT, trace fine gravel Dry, loose, brown, fine to coarse SAND, trace fine gravel, trace silt  Analytical sample (2'-4')   |
| 24.2  | SS                  | S-3              | 9   | 11<br>100/3"               | 6                       | >100                        |             |                 | Moist, very dense, brown, fine to medium SAND, some SILT, trace fine gravel   |
| 31.3<br>5   |                     |                  |   | 100/3                      |                         |                             |             |                 | SAND, Some SILT, trace line graver  |
|   | - SS                | S-4              | 24  | 10<br>10<br>14<br>18       | 10                      | 24                          |             | Sand            | Wet, medium dense, brown, fine to coarse<br>SAND, trace silt, trace fine to coarse gravel   |
| <u>26.3</u><br>10                                 | - ss                | S-5              | 24  | 15<br>24<br>28<br>32       | 18                      | 52                          |             |                 | Wet, very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt   |
| 10  | -<br>-<br>- SS      | S-6              | 24  | 12<br>14<br>14             | 7                       | 28                          |             | Sand and Gravel | Wet, medium dense, gray, fine to medium<br>SAND, trace silt, trace fine gravel  |
| 15  |                     |                  |   | 14                         |                         |                             |             |                 | Test boring B-95 terminated at 16' bgs and backfilled with soil cuttings.   |
| 16.3  |                     |                  |   |                            |                         |                             |             |                 |   |
|   | Sa                  | ample Ty         |   | F (0                       | .                       |                             |             |                 | Consistency vs Blowcount/Foot Burmister Classification  |
| AS - Auge<br>CS - Calif<br>3Q - 1.5"<br>NQ - 2" R | fornia Sa<br>Rock C | ampler<br>ore    | V - Vac<br>Sam<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tub | n<br>ne                 | V. Loos<br>Loose:<br>M. Den | se: 0       | -4 C            | (Sand):         Fine Grained (Clay):         and 35-50% some 20-35% some 20-35% some 20-35% little 10-20% trace <10% moisture, density, color           '. Dense:         >50         V. Soft: <2 Stiff: 8-15 little 10-20% trace <10% moisture, density, color |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

 $\textbf{Drilling Contractor/Driller:} \ \ \text{GeoLogic - Earth Exploration, Inc. / M. Ferreira}$ 

Drive and Wash / 3 in / NA

 $\label{lem:lemma$ 

Bore Hole Location: Palmer St./Broadway, Arlington, MA Northing: 2975780.4278 Easting: 751467.8792

**Drilling Date: Start:** 8/29/2017 **End:** 8/29/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Surface Elevation (ft.): 34.71

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

**Depth Date Time** 14.5 8/29/2017 13:30

Abandonment Method: Backfilled with soil cuttings

|                        | ,   |                  |                       |                       |                         |         |                 |          |   | Lo  | gged E            | By: A. Smith                        |                 |  |
|------------------------|---|------------------|-----------------------|-----------------------|-------------------------|---------|-----------------|----------|---|---|-------------------|-------------------------------------|-----------------|--|
| Elev.<br>Depth<br>(ft) | Sample<br>Type  | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log     | Strata   |   | Material                                      | Desc              | ription                             |                 | Remarks  |
| 0                      |   |                  |                       |                       |                         |         |                 |          |   | " Asphalt                                     |                   |                                     |                 |  |
| · -                    | SS  | S-1              | 18                    | 7<br>4<br>3           | 4                       | 7       |                 |          |   | /et, loose, brown, f<br>tle silt              | ine to            | medium SAND,                        |                 |  |
|                        | SS  | S-2              | 24                    | 8<br>14<br>21<br>23   | 18                      | 36      |                 |          | V<br>tr                                       | /et, dense, dark gra<br>ace silt              | ay, fin           | e to medium SAN                     | D,              | Analytical sample (2'-4')  |
| <u>29.7</u><br>5       | SS  | S-3              | 24                    | 17<br>20<br>28<br>27  | 16                      | 48      |                 |          | loist, dense, brown<br>tle fine gravel, trace |   | to coarse SAND,   |                                     |                 |  |
| -<br>-                 | SS  | S-4              | 24                    | 30<br>36<br>36<br>45  | 22                      | 72      |                 | Gravel   | N<br>S  | loist, very dense, b<br>AND and fine to co    | rown,<br>oarse    | fine to coarse<br>GRAVEL, trace sil | lt              |  |
| 24.7<br>10             | SS  | S-5              | 24                    | 16<br>48<br>62<br>62  | 14                      | >100    | Sand and Gravel | Sand and |   | loist, very dense, b<br>AND, some fine to     |                   |                                     |                 |  |
| <u>▼</u> 19.7 15       | - SS  | S-6              | 24                    | 15<br>18<br>23        | 14                      | 41      |                 |          | v   | /et, dense, brown,                            | fine S            | AND, trace silt                     |                 |  |
| -                      | -   |                  |                       | 24                    |                         |         |                 |          | T<br>b  | est boring B-96 ter<br>ackfilled with soil cu | minate<br>uttings | ed at 16' bgs and<br>s.             |                 |  |
| 14.7                   |   |                  |                       |                       |                         |         |                 |          |   |   |                   |                                     |                 |  |
|                        | Sa  | ample Ty         | pes                   |                       |                         | 1       |                 |          | Cons  | stency vs Blowcour                            | t/Foot            |                                     | Burmi           | ster Classification  |
| BQ - 1.5"              | S - Auger/Grab Sample S - California Sampler Q - 1.5" Rock Core Q - 2" Rock Core GP - Geoprobe  V - Vac Ex/Grab Sample S - Split Spoon Loose: 4- M. Dense: 10 |                  |                       |                       |                         |         |                 |          |   | E 30-50 V. Soft: Soft: M. Stiff:              | <2<br>2-4         |                                     | so<br>lit<br>ti | nd 35-50%<br>ome 20-35%<br>title 10-20%<br>race <10%<br>ture, density, color |
| Revie                  | wed k   | y:               |                       |                       |                         |         |                 |          |   | Date:   |                   | Boring Numb                         | er: B           | -96  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

 $\textbf{Drilling Contractor/Driller:} \ \ \text{GeoLogic - Earth Exploration, Inc. / M. Ferreira}$ 

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA
Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** 84-86 Palmer St., Arlington, MA **Northing:** 2976280.7598 **Easting:** 751947.828 **Drilling Date: Start:** 8/30/2017 **End:** 8/30/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Surface Elevation (ft.): 31.85

Total Depth (ft.): 16

Depth to Initial Water Level (ft):DepthDateTime10.08/30/201715:10

Abandonment Method: Backfilled with soil cuttings

|                         | ,  |                  |                       |                         |                         |         |             |                 |        |                            | Logge                                    | d By: A. Smith  |                    |                       |   |
|-------------------------|--|------------------|-----------------------|-------------------------|-------------------------|---------|-------------|-----------------|--------|----------------------------|--|---|--------------------|-----------------------|---|
| Elev.<br>Depth<br>(ft)  | Sample<br>Type   | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches   | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata          |        |                            | Material Des                             | scription   |                    |                       | Remarks   |
| 0                       |  |                  |                       |                         |                         |         |             |                 |        | 3" Asphalt                 |  |   |                    |                       |   |
|                         | SS   | S-1              | 18                    | 5<br>5<br>3             | 10                      | 8       |             |                 | Ī      | Top 4": We<br>GRAVEL, s    | ome fine to                              |   |                    |                       |   |
|                         | - ss   | S-2              | 24                    | 5<br>6<br>6             | 14                      | 11      |             |                 | n<br>T | nedium SA                  | .ND and SIL <sup>*</sup><br>t, medium de | brown, fine to<br>T<br>ense, gray, me                           |                    |                       | Analytical sampl<br>(2'-4')   |
| <u>26.9</u><br>5        | SS   | S-3              | 21                    | 13<br>15<br>23<br>50/3" | 12                      | 38      |             |                 | S      | SAND, som<br>Moist, dens   | ne silt<br>e, brown, fin                 | m dense, brov<br>e to coarse SA<br>vel, trace silt              |                    | е                     |   |
|                         | SS   | S-4              | 24                    | 3<br>27<br>34<br>32     | 12                      | 61      |             | ravel           | l N    | Moist, very                | dense, brow                              | n, fine to coars<br>arse gravel, trad                           |                    |                       | Corrosion sample (6'-8')  |
|                         | - SS   | S-5              | 24                    | 26<br>31<br>22<br>15    | 16                      | 53      |             | Sand and Gravel | N<br>S | Moist, very<br>SAND, som   | dense, brow<br>ne fine grave             | n, fine to coars<br>l, trace silt                               | se                 |                       |   |
| -<br>-<br>-             | -  |                  |                       | 24                      |                         |         |             |                 |        |                            | , brown, fine                            | to medium SA  | AND,               |                       |   |
| 16.9<br>15              | SS   | S-6              | 24                    | 21<br>20<br>22          | 14                      | 41      |             |                 |        | race silt                  |  |   |                    |                       |   |
| -                       | -  |                  |                       |                         |                         |         |             |                 | b b    | est boring<br>packfilled w | B-97 termin<br>ith soil cuttin           | ated at 16' bgs<br>gs.  | s and              |                       |   |
| -                       | 1  |                  |                       |                         |                         |         |             |                 |        |                            |  |   |                    |                       |   |
| 11.9                    | ⊥ S:   | ample Ty         | pes                   | <u> </u>                |                         |         |             |                 | Cons   | istency vs                 | Blowcount/Fo                             | oot   |                    | Burmi                 | ster Classificat  |
| CS - Calif<br>BQ - 1.5" | S - Auger/Grab Sample S - California Sampler Q - 1.5" Rock Core Q - 2" Rock Core GP - Geoprobe  V - Vac Ex/Grab Sample SS - Split Spoon ST - Shelby Tube GP - Geoprobe  V. Loose: Ucose: 4-1 M. Dense: 10- |                  |                       |                         |                         |         |             |                 |        | -                          | Fine C<br>V. Soft: <<br>Soft: 2          | —<br><u>Grained (Clay):</u><br><2 Stiff: 8-<br>!-4 V. Stiff: 15 | -15<br>5-30<br>-30 | ar<br>sc<br>lit<br>tr | nd 35-50%<br>ome 20-35%<br>ttle 10-20%<br>race <10%<br>ture, density, color |
| Revie                   | wed k  | oy:              |                       |                         |                         |         |             |                 |        | Date:                      |  | Boring N  | lumb               | er: B                 | -97   |





Client: MWRA **Project Name:** Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 124-126 Palmer St., Arlington, MA Northing: 2976660.2076 Easting: 752246.5993 **Drilling Date: Start:** 8/31/2017 **End:** 8/31/2017

Surface Elevation (ft.): 27.55

Total Depth (ft.): 21

Depth to Initial Water Level (ft): Depth Date Time

8.0 8/31/2017 13:30 Abandonment Method: Backfilled with soil cuttings

|   |                                  | Start. O         |   |                            |                         |                              |             |                 | Logged By: D. Abt / A. Smith  |  |
|---|----------------------------------|------------------|---|----------------------------|-------------------------|------------------------------|-------------|-----------------|---|--|
| Elev.<br>Depth<br>(ft)                                | Sample<br>Type                   | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                      | Graphic Log | Strata          | Material Description  | Remarks  |
| 0   |                                  |                  |   |                            |                         |                              |             |                 | 10" Asphalt<br>2" Gravel base course  | Vacuum excavate test boring from   |
| -   |                                  |                  |   |                            |                         |                              |             |                 | Moist, brown, fine to coarse SAND, some fine to coarse GRAVEL, trace silt             | the ground<br>surface to 5' bgs.   |
| -   |                                  |                  |   |                            |                         |                              |             |                 |   | Analytical sample (2.5'-5.0')  |
| - 22.6  | VE                               | V-1              |   |                            |                         |                              |             |                 |   | Obstruction encountered. Offset boring 2'  |
| 22.6<br>5   | SS                               | S-1              | 24  | 17<br>32                   | 12                      | 65                           |             | ıvel            | Wet, very dense, brown, fine to coarse SAND, little fine to coarse gravel, trace silt | NW and resume drilling.  |
| _   | 33                               | J-1              | 24  | 33<br>36<br>38             | 12                      | 03                           |             | Sand and Gravel | Wat your dama harry fine to cooke CAND  |  |
| <b>T</b> -  | SS                               | S-2              | 24  | 30<br>38                   | 14                      | 68                           |             | Sand            | Wet, very dense, brown, fine to coarse SAND, some fine to coarse GRAVEL, trace silt   |  |
| -   |                                  |                  |   | 28<br>40                   |                         |                              |             |                 | Wet, very dense, brown, fine to coarse SAND,  |  |
| 17.6<br>10  | SS                               | S-3              | 24  | 35<br>33<br>30             | 10                      | 68                           |             |                 | some fine to coarse GRAVEL, trace silt  |  |
| -   | -                                |                  |   |                            |                         |                              |             |                 |   |  |
| -   | -                                |                  |   |                            |                         |                              | )/<br>      |                 |   |  |
| <u>12.6</u>   | SS                               | S-4              | 24  | 45<br>26                   | 8                       | 55                           |             |                 | Wet, very dense, brown, fine SAND, trace silt   |  |
| 15  | 33                               | 3-4              | 24  | 29<br>32                   | 0                       | 55                           |             | Sand            |   |  |
| -   | _                                |                  |   |                            |                         |                              |             | S               |   |  |
| -   | 60                               | 0.5              | 0.4   | 18                         | 0.4                     | 0.7                          |             |                 | Wet, dense, gray, fine SAND, trace silt   |  |
| 7.6   | SS                               | S-5              | 24  | 15                         | 24                      | 37                           |             | <u> </u>        |   | niotor Classificati  |
| AS - Auge<br>CS - Califo<br>BQ - 1.5"  <br>NQ - 2" Ro | er/Grab S<br>ornia Sa<br>Rock Co | mpler s          | V - Vac<br>Sam<br>SS - Spli<br>ST - She<br>GP - Geo | iple<br>t Spoor<br>Iby Tub | n l                     | V. Loo:<br>_oose:<br>VI. Der | se: (       | )-4 [           | Sand):   Fine Grained (Clay):   | nister Classificati and 35-50% some 20-35% little 10-20% trace <10% isture, density, color |
| Revie   | wed b                            |                  |   | •                          |                         |                              |             |                 | Date: Boring Number: I  |  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

| Elev.<br>Depth<br>(ft)          | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata | Material Description  | Remarks |
|---------------------------------|----------------|------------------|-----------------------|-----------------------|-------------------------|---------|-------------|--------|---|---------|
| 7.6                             | SS             | S-5              | 24                    | 22<br>31              | 24                      | 37      |             | Sand   | Test boring B-98 terminated at 21' bgs and backfilled with soil cuttings. |         |
|                                 |                |                  |                       |                       |                         |         |             |        | backilled with soil cuttings.   |         |
| <u>2.6</u>                      |                |                  |                       |                       |                         |         |             |        |   |         |
|                                 |                |                  |                       |                       |                         |         |             |        |   |         |
| - <u>-2.5</u><br>30             |                |                  |                       |                       |                         |         |             |        |   |         |
|                                 |                |                  |                       |                       |                         |         |             |        |   |         |
| <br><br>-75                     |                |                  |                       |                       |                         |         |             |        |   |         |
| - <del>-7.5</del>               |                |                  |                       |                       |                         |         |             |        |   |         |
|                                 |                |                  |                       |                       |                         |         |             |        |   |         |
| - <u>-12.5</u><br>- 40          |                |                  |                       |                       |                         |         |             |        |   |         |
|                                 |                |                  |                       |                       |                         |         |             |        |   |         |
| <u>17.5</u><br>- <del>4</del> 5 |                |                  |                       |                       |                         |         |             |        |   |         |
|                                 |                |                  |                       |                       |                         |         |             |        | Boring Number: B  | -98     |





Client: MWRA **Project Name:** Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 143-145 Palmer St., Arlington, MA Northing: 2976965.7177 Easting: 752462.7051 **Drilling Date: Start:** 8/31/2017 **End:** 8/31/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Reviewed by:

Surface Elevation (ft.): 25.98

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

Depth Date Time 13.2 8/31/2017 10:25

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-99** 

| J                      |  |                  | 75 1/20 1             |                       | 0,0                     | .,                          |             |                       | Logged By: D. Abt / A. Smith  |  |
|------------------------|--|------------------|-----------------------|-----------------------|-------------------------|-----------------------------|-------------|-----------------------|---|--|
| Elev.<br>Depth<br>(ft) | Sample<br>Type   | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata                | Material Description  | Remarks  |
| 0                      |  |                  |                       |                       |                         |                             |             |                       | 9" Asphalt<br>2" Gravel base course   | Vacuum excavate boring from the  |
| -<br>-<br>-            | VE   | V-1              |                       |                       |                         |                             |             |                       | Dry, brown, fine to coarse SAND, some fine to coarse GRAVEL   | ground surface to<br>5.2' bgs.<br>Analytical sample<br>(2.5'-5.2')       |
| 21.0<br>5              |  |                  |                       | 7                     |                         |                             |             |                       | Moist vany dance brown fine to corre  |  |
| о<br>-                 | SS   | S-1              | 24                    | 17<br>34<br>34        | 10                      | 51                          |             |                       | Moist, very dense, brown, fine to coarse SAND, little fine gravel, trace silt                             |  |
| -                      | - SS   | S-2              | 24                    | 32<br>32<br>40<br>33  | 14                      | 72                          |             | ınd Gravel            | Wet, very dense, brown, fine to coarse SAND, little fine to coarse gravel, trace silt                     |  |
| 16.0<br>10             | SS   | S-3              | 24                    | 30<br>33<br>37<br>48  | 14                      | 70                          |             | Sand and              | Wet, very dense, brown, fine to coarse SAND, some fine to coarse GRAVEL, trace silt                       |  |
| <u>▼</u> - 11.0 15     | - SS   | S-4              | 24                    | 32<br>22<br>22<br>27  | 14                      | 44                          |             |                       | Wet, very dense, brown, fine to coarse SAND, some fine to coarse GRAVEL, trace silt                       |  |
| -<br>-<br>-            |  |                  |                       |                       |                         |                             |             |                       | Test boring B-99 terminated at 16' bgs and backfilled with soil cuttings.                                 |  |
| 6.0                    | , Sa   | ımple Ty         | nes                   |                       |                         |                             |             |                       | Consistency vs Blowcount/Foot Bu  | urmister Classification  |
| S - Califo             | Auger/Grab Sample - California Sampler - 1.5" Rock Core ST - Shelby Tube |                  |                       |                       |                         | V. Loo:<br>Loose:<br>M. Der | se: 0       | nular<br>-4 [<br>10 \ | (Sand): Fine Grained (Clay): Dense: 30-50 V. Soft: <2 Stiff: 8-15 V. Dense: >50 Soft: 2-4 V. Stiff: 15-30 | and 35-50% some 20-35% little 10-20% trace <10% moisture, density, color |





## **Boring Number:** B-100 (MW)

Client: MWRA **Project Name:** Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: Palmer St./Hamlet St., Arlington, MA Northing: 2977246.7851 Easting: 752681.1012

**Drilling Date: Start:** 8/29/2017 **End:** 8/29/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Surface Elevation (ft.): 24.39

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

Time Depth Date

8.0 8/29/2017

Abandonment Method: Backfilled with soil cuttings

| •   | ,                      | Start. 0/                 | 20,20  |                            | u. 0,2                  | .0,20                       |             |                                |                              | Logged E                           | By: A. Smith                                       |                                |  |
|---|------------------------|---------------------------|--|----------------------------|-------------------------|-----------------------------|-------------|--------------------------------|------------------------------|------------------------------------|--|--------------------------------|--|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type         | Sample<br>Number          | Sample<br>Length (in)                              | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata                         |                              | Material Desci                     | ription  |                                | Remarks  |
| 0   |                        |                           |  |                            |                         |                             | p & 4       |                                | 4" Concrete                  |                                    |  |                                |  |
| -   | SS                     | S-1                       | 18   | 4<br>4<br>4                | 10                      | 8                           |             |                                |                              | , brown, Sligh<br>ND, some silt    | tly Organic fine to                                |                                |  |
| -   | - ss                   | S-2                       | 24   | 8<br>11<br>14<br>12        | 12                      | 25                          |             |                                |                              |                                    | wn, fine to coarse<br>e GRAVEL, trace              |                                |  |
| 19.4<br>5   | - SS                   | S-3                       | 24   | 11<br>10<br>12<br>22       | 17                      | 22                          |             |                                |                              | um dense, bro<br>e fine gravel, tr | wn, fine to coarse<br>ace silt                     | Ana<br>(4'-6                   | lytical sample<br>')                                 |
| -<br>-  | SS                     | S-4                       | 24   | 25<br>13<br>12<br>15       | 18                      | 27                          |             |                                | Moist, medii<br>SAND, trace  |                                    | wn, fine to mediur                                 | n Cori<br>(6'-8                | rosion sample<br>'')                                 |
| 14.4<br>10  | SS                     | S-5                       | 24   | 11<br>10<br>11<br>14       | 18                      | 21                          |             | Sand                           | Moist, medii<br>trace silt   | um dense, bro                      | wn, fine SAND,                                     |                                |  |
| -<br>-<br>-<br>9.4<br>15                          | - SS                   | S-6                       | 24   | 9<br>7<br>8<br>6           | 12                      | 15                          |             |                                | Wet, mediu<br>SAND, trace    |                                    | /n, fine to medium                                 |                                |  |
| -<br>-<br>-                                       | -                      |                           |  | 0                          |                         |                             | . (**,*)    |                                | Test boring<br>and backfille | B-100 (MW) t<br>ed with soil cut   | erminated at 16' b<br>tings.                       | gs                             |  |
| 4.4   | ]                      |                           |  |                            |                         |                             |             |                                |                              |                                    |  |                                |  |
| 4.4   | <br>S:                 | ample Ty                  | pes  | <u> </u>                   |                         |                             |             |                                | Consistency vs E             | Blowcount/Foot                     |  | Burmister                      | Classification                                       |
| AS - Auge<br>CS - Calif<br>3Q - 1.5"<br>NQ - 2" R | er/Grab S<br>fornia Sa | Sample<br>ampler<br>ore S | V - Vac<br>Sam<br>SS - Spli<br>T - She<br>GP - Geo | nple<br>t Spoor<br>lby Tul | n<br>ne                 | V. Loos<br>Loose:<br>M. Der | se: 0       | <u>nular (</u><br>-4 D<br>10 V |                              |                                    | ined (Clay): Stiff: 8-15 V. Stiff: 15-30 Hard: >30 | and<br>some<br>little<br>trace | 35-50%<br>20-35%<br>10-20%<br><10%<br>density, color |
| Revie   | wed k                  | oy:                       |  |                            |                         |                             |             |                                | Date:                        |                                    | Boring Numb  | er: B-100                      | (MW)   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 4 Coral St., Arlington, MA Northing: 2977083.4322 Easting: 752971.992

**Drilling Date: Start:** 12/20/2017 **End:** 12/21/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Reviewed by:

Surface Elevation (ft.): 24.21

Total Depth (ft.): 16

Depth to Initial Water Level (ft):

Depth Date Time ΝE 12/21/2017 09:05

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-101** 

| J9                      | , Date.  | Start: 1         | 2120120               | ' I / L               | iu. 12                  | -/2 1/20 | 517         |                       | Logged By: A. Smith  |   |
|-------------------------|--|------------------|-----------------------|-----------------------|-------------------------|----------|-------------|-----------------------|--|---|
| Elev.<br>Depth<br>(ft)  | Sample<br>Type   | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value  | Graphic Log | Strata                | Material Description   | Remarks   |
| 0                       |  |                  |                       | 10                    |                         |          | 71.7        |                       | 8" Topsoil   |   |
| _                       | ss   | S-1              | 24                    | 11<br>18<br>18        | 16                      | 29       |             |                       | Bottom 8": Moist, medium dense, brown, fine to medium SAND, little fine gravel, little silt            |   |
| -                       | SS   | S-2              | 24                    | 14<br>16<br>15<br>42  | 10                      | 31       |             | ₽                     | Moist, dense, brown, fine to coarse SAND and fine to coarse GRAVEL, little silt                        | Analytical sample (2'-4')   |
| 19.2<br>5               | SS   | S-3              | 24                    | 48<br>52<br>40<br>34  | 10                      | 92       |             |                       | Moist, very dense, brown, fine to coarse<br>SAND and fine to coarse GRAVEL, little silt                |   |
| -                       | SS   | S-4              | 24                    | 70<br>58<br>92<br>100 | 12                      | >100     |             |                       | Moist, very dense, gray and brown, fine to coarse SAND and fine to coarse GRAVEL, little silt          |   |
| - <u>14.2</u> - 10      | SS   | S-5              | 24                    | 92<br>88<br>76<br>90  | 10                      | >100     |             | d Gravel              | Moist, very dense, gray and brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt           |   |
| 10                      | -  |                  |                       | 30                    |                         |          |             | Sand and              | Wet, very dense, gray, fine to coarse SAND,  | Rollerbit through<br>boulder from 10 to<br>11.5' bgs.   |
| 9.2                     | ss   | S-6              | 24                    | 24<br>26<br>26        | 10                      | 50       |             |                       | little fine gravel, trace silt   |   |
| -<br>-                  |  |                  |                       |                       |                         |          |             |                       | Test boring B-101 terminated at 16' bgs and backfilled with soil cuttings.                             |   |
| 4.2                     |  |                  |                       |                       |                         |          |             |                       | Someistanaum Blausaumt/Fact  | minton Olo !f!!   |
| CS - Calif<br>BQ - 1.5" | - Auger/Grab Sample - California Sampler - 1.5" Rock Core - 2" Rock Core - 2" Rock Core - Copyright Sample Sample Sample SS - Split Spoon ST - Shelby Tube GP - Geoprobe |                  |                       |                       |                         |          | se: 0       | nular<br>-4 C<br>10 V | (Sand): Fine Grained (Clay): Dense: 30-50 V. Soft: <2 Stiff: 8-15 Dense: >50 Soft: 2-4 V. Stiff: 15-30 | nister Classification and 35-50% some 20-35% little 10-20% trace <10% sisture, density, color |





Client: MWRA **Project Name:** Rehabilitation of Weston Aqueduct Supply Main 3

**Project Number:** 101038-102170 **Project Location:** Massachusetts

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: Mystic Valley Parkway, Arlington, MA Northing: 2976889.6176 Easting: 753296.0274

**Drilling Date: Start:** 12/21/2017 **End:** 12/21/2017

Surface Elevation (ft.): 12.95

Total Depth (ft.): 23

Depth to Initial Water Level (ft):

Depth Date Time 7.5 12/21/2017 13:50

Abandonment Method: Backfilled with soil cuttings

| Elev.<br>Depth<br>(ft)                                     | Sample<br>Type                   | Sample<br>Number | Sample<br>Length (in)                    | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value                       | Graphic Log      | Strata                | Material Description  | Remarks   |
|--|----------------------------------|------------------|--|-----------------------|-------------------------|-------------------------------|------------------|-----------------------|---|---|
| 0  |                                  |                  |  | 52                    |                         |                               | *******<br>***** |                       | 4" Topsoil  | Analytical cample   |
| -  | ss                               | S-1              | 24                                       | 35<br>86<br>80        | 14                      | >100                          |                  |                       | Bottom 10": Moist, very dense, dark brown, fine to medium SAND, little silt, little fine grave  |   |
| -  | - SS                             | S-2              | 24                                       | 65<br>42<br>60<br>48  | 4                       | >100                          |                  | ≣                     | Moist, very dense, dark brown, fine to medium SAND, little silt, little fine gravel   | m   |
| 8.0<br>5   | - SS                             | S-3              | 24                                       | 18<br>12<br>9<br>12   | 10                      | 21                            |                  |                       | Top 6": Wet, medium dense, brown, fine to coarse SAND, trace silt  Bottom 4": Wet, very stiff, dark brown, Organic SILT                 | Analytical sample (4'-6')   |
| ¥ -  | SS                               | S-4              | 24                                       | 14<br>13<br>24<br>32  | 6                       | 37                            |                  | Gravel                | Wet, dense, dark brown, fine to coarse<br>GRAVEL and fine to coarse SAND, trace<br>organic silt   |   |
| 3.0  | - SS                             | S-5              | 24                                       | 14<br>22<br>30<br>8   | 6                       | 52                            |                  | Sand and Grave        | Wet, very dense, gray, fine to coarse SAND, some fine gravel, little silt   |   |
|  | - SS                             | S-6              | 24                                       | 4<br>7<br>12<br>12    | 24                      | 19                            |                  | Silty Clay            | Wet, very stiff, gray, Silty CLAY   | PP = 0.5 tsf  |
| -7.1<br>-8S - Auge<br>CS - Calif<br>CS - 1.5"<br>NQ - 2" R | er/Grab S<br>ornia Sa<br>Rock Co | mpler sore       | V - Vac<br>Sarr<br>SS - Spli<br>ST - She | nple<br>t Spoor       | n l                     | V. Loose:<br>Loose:<br>M. Der | se: 0<br>4-      | nular<br>-4 [<br>10 \ | Consistency vs Blowcount/Foot           Sand):         Fine Grained (Clay):           ense:         30-50           V. Soft:         <2 | Burmister Classification and 35-50% 20-35% little 10-20% trace <10% |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3
Project Location: Massachusetts Project Number: 101038-102170

| Elev.<br>Depth<br>(ft)<br>-7.1 | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata     | Material Description   | Remarks |
|--------------------------------|----------------|------------------|-----------------------|-----------------------|-------------------------|---------|-------------|------------|--|---------|
| _ 20<br>                       | SS             | S-7              | 24                    | WOH<br>WOH<br>WOH     | 12                      | WOH     |             | Silty Clay | Wet, very soft, gray, Silty CLAY   |         |
| 12.1<br>- 25 -                 |                |                  |                       |                       |                         |         |             |            | Test boring B-102 terminated at 23' bgs and backfilled with soil cuttings. |         |
|                                |                |                  |                       |                       |                         |         |             |            |  |         |
|                                |                |                  |                       |                       |                         |         |             |            |  |         |
|                                |                |                  |                       |                       |                         |         |             |            |  |         |
|                                |                |                  |                       |                       |                         |         |             |            |  |         |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

**Bore Hole Location:** Mystic Valley Parkway, Arlington, MA **Northing:** 2976439.0809 **Easting:** 755355.8314

**Drilling Date: Start:** 12/22/2017 **End:** 12/22/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Surface Elevation (ft.): 12.19

Total Depth (ft.): 26

Depth to Initial Water Level (ft):

 Depth
 Date
 Time

 7.2
 12/22/2017
 12:30

Abandonment Method: Backfilled with soil cuttings

|                         | ,   |                  | _,, _ 0               |                       |                         | -,, -   | •                |                 |    |                                       | Logg          | ged B  | sy: A. Smith   |       |                       |  |
|-------------------------|---|------------------|-----------------------|-----------------------|-------------------------|---------|------------------|-----------------|----|---------------------------------------|---------------|--------|--|-------|-----------------------|--|
| Elev.<br>Depth<br>(ft)  | Sample<br>Type  | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log      | Strata          |    |                                       | Material D    | escr)  | iption   |       |                       | Remarks  |
| 0                       |   |                  |                       | 93                    |                         |         | 74 18. 74        |                 | 6  | " Topsoil                             |               |        |  |       |                       |  |
|                         | SS  | S-1              | 24                    | 30<br>33<br>35        | 16                      | 63      |                  |                 | tı | oarse SAN<br>ace silt                 | ND, some f    | ine to | nse, brown, fi<br>o coarse grav                            | el,   |                       |  |
|                         | - ss  | S-2              | 24                    | 17<br>13<br>9<br>8    | 8                       | 22      |                  | ≣               |    | /loist, medi<br>ilt                   | ium dense,    | gray   | y, fine SAND,  | son   | ne                    | Analytical sample (2'-4')  |
| 7.2<br>5                | SS  | S-3              | 24                    | 10<br>9<br>6<br>6     | 12                      | 15      |                  |                 |    | ⁄loist, medi<br>ilt                   | ium dense,    | gray   | y, fine SAND,  | son   | ne                    | Analytical sample (4'-6')  |
| - <u>T</u> -            | SS  | S-4              | 24                    | 6<br>10<br>6<br>8     | 12                      | 16      |                  | Organic Soils   |    |                                       |               |        | n, Organic SIL<br>trace fine gra                           |       |                       | Corrosion sample (6'-8')   |
| - <u>2.2</u><br>- 10    | SS  | S-5              | 24                    | 22<br>36<br>25<br>32  | 10                      | 61      |                  | _               |    |                                       |               |        | to coarse SA<br>race organic t                             |       |                       |  |
| 10                      |   |                  |                       |                       |                         |         |                  | Sand and Gravel |    |                                       |               |        |  |       |                       |  |
|                         |   |                  |                       |                       |                         |         |                  |                 |    |                                       |               |        |  |       |                       |  |
| <u>-2.8</u><br>15       | - SS  | S-6              | 24                    | 8<br>9<br>10<br>12    | 6                       | 19      |                  | Silty Clay      | V  | Vet, very s                           | tiff, gray, S | ilty C | CLAY   |       |                       | PP < 0.5 tsf   |
|                         |   |                  |                       |                       |                         |         | 7.5              |                 |    |                                       |               |        |  |       |                       |  |
|                         | SS  | S-7              | 24                    | 30<br>32              | 12                      | 62      |                  |                 |    | Vet, very d                           |               | , fine | s SAND, some   | e fin | e                     |  |
| -7.8                    | Sa  | ample Ty         | pes                   |                       |                         |         | %.4 <u>.°0°1</u> |                 |    | · · · · · · · · · · · · · · · · · · · | Blowcount/    | Foot   |  |       | Burmi                 | ster Classification  |
| CS - Calif<br>BQ - 1.5" | S - Auger/Grab Sample S - California Sampler Q - 1.5" Rock Core Q - 2" Rock Core GP - Geoprobe  V - Vac Ex/Grab Sample Sample SS - Split Spoon ST - Shelby Tube GP - Geoprobe  V. Loose: Loose: 4 M. Dense: 1 |                  |                       |                       |                         |         |                  |                 |    |                                       |               |        | ined (Clay):<br>Stiff: 8-19<br>V. Stiff: 15-3<br>Hard: >30 | 30    | ar<br>sc<br>lit<br>tr | nd 35-50%<br>ome 20-35%<br>title 10-20%<br>race <10%<br>ture, density, color |
| Revie                   | wed l   | by:              |                       |                       |                         |         |                  |                 |    | Date:                                 |               |        | Boring Nu  | mb    | er: B                 | -103   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

| Elev.<br>Depth<br>(ft)         | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) |                      | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata          | Material Description  | Remarks |
|--------------------------------|----------------|------------------|-----------------------|----------------------|-------------------------|---------|-------------|-----------------|---|---------|
| -7.8<br>20<br>                 | SS             | S-7              | 24                    | 30<br>30             | 12                      | 62      |             | Sand and Gravel |   |         |
| <u>12.8</u> _<br>_ <u>25</u> _ | - SS           | S-8              | 24                    | 58<br>54<br>56<br>52 | 12                      | >100    |             | Sand            | Wet, very dense, gray, fine SAND, some fine gravel, little silt  Test boring B-103 terminated at 26' bgs and backfilled with soil cuttings. |         |
|                                | -              |                  |                       |                      |                         |         |             |                 |   |         |
| 30<br><br>                     | -              |                  |                       |                      |                         |         |             |                 |   |         |
| - <u>-22.8</u> -<br>35 -       | -              |                  |                       |                      |                         |         |             |                 |   |         |
|                                |                |                  |                       |                      |                         |         |             |                 |   |         |
|                                | -              |                  |                       |                      |                         |         |             |                 |   |         |
| <u> </u>                       |                |                  |                       |                      |                         |         |             |                 | Boring Number: B  | -103    |

Sheet 1 of 2



# Boring Number: B-104 (MW)

Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / D. Jacobs **Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: Mystic Valley Parkway, Somerville, MA

Northing: 2976424.5058 Easting: 755588.63

Drilling Date: Start: 12/27/2017 End: 1/8/2018

Surface Elevation (ft.): 14.26

Total Depth (ft.): 24.7

Depth to Initial Water Level (ft):

**Depth Date Time** 5.3 1/8/2018 15:30

Abandonment Method: Monitoring well installed

| J   |   |                        |   |                            |                         |                             |             |                 | Logged By: A. Smith   |  |  |  |  |  |
|---|---|------------------------|---|----------------------------|-------------------------|-----------------------------|-------------|-----------------|---|--|--|--|--|--|
| Elev.<br>Depth<br>(ft)                                | Sample<br>Type                              | Sample<br>Number       | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log | Strata          | Material Description Remarks  |  |  |  |  |  |
| 0 -   | -   |                        |   |                            |                         |                             |             |                 | 3" Topsoil: Dry, brown, fine to coarse SAND, some fine gravel, little silt  Some fine gravel, little silt  Vacuum excavate boring from the ground surface to 6' bgs.                            |  |  |  |  |  |
|   | VE  | V-1                    |   |                            |                         |                             |             | E               | Moist, brown, fine to coarse SAND, some fine to coarse gravel, little silt  Analytical sample (2'-4')   |  |  |  |  |  |
| 9.3   |   |                        |   | 67<br>58                   |                         |                             |             |                 | Wet, very dense, gray, fine to medium SAND, some organic silt, trace fine gravel  |  |  |  |  |  |
|   | SS  | S-1                    | 24  | 70<br>16                   | 2                       | >100                        |             |                 |   |  |  |  |  |  |
| 4.3<br>10   | SS  | S-2                    | 24  | 3<br>9<br>10<br>9          | 6                       | 19                          |             | Silty Sand      | Wet, medium dense, gray, fine to coarse SAND, some fine gravel, trace organic fibers  Analytical sample (8'-10')  |  |  |  |  |  |
|   | · SS  | S-3                    | 24  | 38<br>55<br>46<br>56       | 12                      | >100                        |             | Sand and Gravel | Wet, very dense, gray, fine to medium SAND, some fine to coarse gravel, little silt   |  |  |  |  |  |
| -5.7  | SS<br><u>S</u> a                            | S-4                    | 24<br>pes   | 60<br>65                   | 12                      | >100                        |             |                 | Wet, very dense, gray, fine to coarse SAND and fine to coarse GRAVEL, little silt  Consistency vs Blowcount/Foot Burmister Classification   |  |  |  |  |  |
| AS - Auge<br>CS - Califo<br>BQ - 1.5" I<br>NQ - 2" Ro | r/Grab S<br>ornia Sa<br>Rock Co<br>ock Core | Sample<br>mpler<br>ore | V - Vac<br>San<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spoor<br>lby Tul | n<br>ne                 | V. Loos<br>Loose:<br>M. Der | se: 0       | -4 [<br>·10 \   | (Sand):         Fine Grained (Clay):         and some 20-35% some 20-35% some 20-35% little 10-20% trace <10% moisture, density, color           Dense:         >50         V. Soft:         <2 |  |  |  |  |  |
| Revie   | wed b                                       | y:                     |   |                            |                         |                             |             |                 | Date: Boring Number: B-104 (MW)   |  |  |  |  |  |





# Boring Number: B-104 (MW)

Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

|  | Elev.<br>Depth<br>(ft) | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata          | Material Description   | Remarks   |
|--|------------------------|----------------|------------------|-----------------------|-----------------------|-------------------------|---------|-------------|-----------------|--|-----------|
|  | -5.7<br>20             | SS             | S-4              | 24                    | 60<br>40              |                         | >100    |             |                 |  |           |
|  | <br>                   |                |                  |                       | 44                    |                         |         |             | Sand and Gravel | Wet very dense gray fine to coarse SAND  |           |
|  | <u>-10.7</u><br>25     | SS             | S-5              | 8                     | 100/2"                | 0.5                     | >100    |             |                 | Wet, very dense, gray, fine to coarse SAND and fine to coarse GRAVEL, little silt Test boring B-104 (MW) terminated at 24.7' |           |
|  | <br>                   | -              |                  |                       |                       |                         |         |             |                 | Test boring B-104 (MW) terminated at 24.7' bgs and converted into a monitoring well.   |           |
|  | - \frac{-15.7}{30} -   | -              |                  |                       |                       |                         |         |             |                 |  |           |
|  | <u>20.7</u> - 35       | -              |                  |                       |                       |                         |         |             |                 |  |           |
| GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19 | 25.7<br>- 40           |                |                  |                       |                       |                         |         |             |                 |  |           |
| BL GINT LOGS MWRA                            | - <del>30.7</del> - 45 |                |                  |                       |                       |                         |         |             |                 | Boring Number: B   | -104 (MW) |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: Capen St., Somerville, MA Northing: 2976277.1826 Easting: 755945.5454

Drilling Date: Start: 9/12/2017 End: 9/12/2017

Surface Elevation (ft.): 25.24

Total Depth (ft.): 14.8

Depth to Initial Water Level (ft):

Depth Date 4.0 9/12/2017 10:00

Abandonment Method: Backfilled with soil cuttings

| SS   | Logged By: A. Smith               |  |  |  |  |  |
|--|-----------------------------------|--|--|--|--|--|
| SS S-1 18 55 8 >100  | emarks                            |  |  |  |  |  |
| SS   S-1   18   55   8   >100  |                                   |  |  |  |  |  |
| SS S-2 24 123 10 38  | e gravel in<br>tip.               |  |  |  |  |  |
| SS S-3 5 100/5" 5 >100/5" 5 >100 S S-100 S Some fine to coarse SAND, some fine to coarse SAND, some fine to coarse gravel, some silt  Moist, very dense, brown, fine to coarse SAND, some silt, little fine gravel  Moist, very dense, brown, fine to coarse SAND, some silt, little fine gravel  Moist, very dense, brown, fine to medium SAND, some silt, little fine gravel  SS S-5 24 33 16 63 26 8 9 40 4 >100 S SAND, some silt, little fine gravel  Test boring B-105 terminated at 14.8' bgs and backfilled with soil cuttings.  SS Auger/Grab Sample V-Vac Ex/Grab Sample  Sample Types Consistency vs Blowcount/Foot Burmister Cliented Sample  Granular (Sand): Fine Grained (Clay): and 3 some 3 some 3 some 2 som | ical sampl                        |  |  |  |  |  |
| SS S-4 24 30 18 60  SS S-5 24 30 30 16 63  SS S-6 9 40 4 >100  SS S-6 9 100/3 4 >100  SS S-6 9 100/3 4 >100  SS S-6 S-6 S-6 S-6 S-6 S-6 S-6 S-6 S-6 S  |                                   |  |  |  |  |  |
| SS S-5 24 30 33 16 63 Pg 8 SAND, some silt, little fine gravel    SS S-6 9 40 4 > 100   Moist, very dense, brown, fine to medium SAND and SILT, little fine gravel   |                                   |  |  |  |  |  |
| SAND and SILT, little fine gravel  Test boring B-105 terminated at 14.8' bgs and backfilled with soil cuttings.  Sample Types  Consistency vs Blowcount/Foot  Sample V- Vac Ex/Grab Sample   | sion sampl                        |  |  |  |  |  |
| Sample Types  Consistency vs Blowcount/Foot  S - Auger/Grab Sample S - Colifornia Sample   |                                   |  |  |  |  |  |
|  | 35-50%<br>20-35%<br>0-20%<br><10% |  |  |  |  |  |

Sheet 1 of 1



# Boring Number: B-107 (MW)

Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

**Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NX **Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

Bore Hole Location: 44 Irvington Rd., Somerville, MA Northing: 2976571.8345 Easting: 756490.7311 Drilling Date: Start: 9/12/2017 End: 9/12/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Surface Elevation (ft.): 34.79

Total Depth (ft.): 18.5

Depth to Initial Water Level (ft):

**Depth Date Time** 5.0 9/12/2017 11:30

Abandonment Method: Monitoring well installed

Logged By: A. Smith

|   |                                  |                  |                                       |                            |                         |                               |             |                                |                                       | Logged E                              | <b>3y:</b> A. Smith                       |                 |   |
|---|----------------------------------|------------------|---------------------------------------|----------------------------|-------------------------|-------------------------------|-------------|--------------------------------|---------------------------------------|---------------------------------------|---|-----------------|---|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type                   | Sample<br>Number | Sample<br>Length (in)                 | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                       | Graphic Log | Strata                         |                                       | Material Desc                         | ription                                   |                 | Remarks   |
| 0   |                                  |                  |                                       |                            |                         |                               | اه اه اه    |                                | √ 3" Asphalt                          |                                       |   |                 |   |
|   | SS                               | S-1              | 18                                    | 15<br>12<br>12             | 12                      | 24                            |             |                                | Moist, med                            |                                       | wn, fine to coarse<br>le silt             | !               |   |
|   | - SS                             | S-2              | 24                                    | 16<br>22<br>25<br>50       | 18                      | 47                            |             |                                | Moist, den<br>little fine gr          | se, brown, fine<br>ravel, little silt | to medium SAND                            | ,               | Analytical sample (2'-4')   |
|   | - SS                             | S-3              | 24                                    | 30<br>46<br>56<br>42       | 16                      | >100                          |             |                                | Moist, very<br>SAND, little           | dense, brown,<br>e fine gravel, littl | fine to medium<br>le silt                 |                 |   |
|   | - SS                             | S-4              | 24                                    | 20<br>28<br>28<br>25       | 14                      | 56                            |             | Sand and Gravel                |                                       | dense, brown,<br>me silt, little fine |   |                 |   |
| <br><br>24.8                                      | - SS                             | S-5              | 24                                    | 20<br>35<br>56<br>60       | 14                      | 91                            |             | Sand                           |                                       | dense, brown,<br>me fine to coars     | fine to coarse<br>se gravel, little silt  |                 |   |
| - 24.8 10   |                                  |                  |                                       |                            |                         |                               |             |                                |                                       |                                       |   |                 | Rollerbit through<br>cobbles and<br>boulders from 10<br>to 14.5' bgs.       |
| - <u>19.8</u>                                     | NX                               | C-1              | 48                                    |                            | 46                      |                               |             | Bedrock                        | See core k                            | og for descriptic                     | on  |                 |   |
| <br>14.8  |                                  |                  |                                       |                            |                         |                               | ×//>        |                                | Test boring bgs and co                | g B-107 (MW) t<br>onverted into a i   | erminated at 18.5'<br>monitoring well.    | ,               |   |
|   | Sa                               | ample Typ        | oes                                   | •                          |                         | Consistency vs Blowcount/Foot |             |                                |                                       |                                       |   | Burmi           | ster Classification   |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | er/Grab S<br>ornia Sa<br>Rock Co | Sample Spre S    | V - Vac<br>Sam<br>S - Spli<br>T - She | nple<br>t Spoor<br>lby Tub | n<br>ne                 | V. Loos<br>Loose:<br>M. Den   | se: 0       | <u>nular (</u><br>-4 D<br>10 V | Sand):<br>ense: 30-50<br>. Dense: >50 | 1                                     | hined (Clay): Stiff: 8-15 V. Stiff: 15-30 | so<br>lit<br>ti | nd 35-50%<br>ome 20-35%<br>ttle 10-20%<br>race <10%<br>ture, density, color |
| Revie   | wed b                            | oy:              |                                       |                            | ,                       | Date: Boring Number: B        |             |                                |                                       |                                       |   |                 | -107 (MW)   |





Reviewed by:

## **Boring Number:** B-107 (MW)

Project Name: Rehabilitation of Weston Aqueduct Supply Main 3 Client: MWRA

| Projec   | t Lo           | catio                               | n: M                  | lass                            | achu   | setts                  |                                | rojec   | t Nu   | umber: 101038-   | -102170  |   | ,   |  |  |
|--|----------------|-------------------------------------|-----------------------|---------------------------------|--|------------------------|--------------------------------|---|--|--|--|---|---|--|--|
| Elevation<br>Depth<br>(ft)   | Sample<br>Type | Sample<br>Number                    | Sample<br>Length (in) | Recovery (%)                    | RQD<br>(%)   | Drill Rate<br>(min/ft) | Down Press.<br>(psi)           | Graphic<br>Log  | Strata   | N  | Material Description   |   | Remarks   |  |  |
| 19.8<br>15.0   |                |                                     |                       |                                 |  | 1:00<br>1:00           |                                |   | e  |  | tly weathered, gray, AR0<br>ry close to close, thin be                                     |   |   |  |  |
|  | NX             | C-1                                 | 60                    | 96                              | 8  | 2:00                   | NR                             |   | Argillite  |  |  |   |   |  |  |
|  |                |                                     |                       |                                 |  |                        |                                |   |  | Test boring B-107 t  | erminated at 18.5' bgs.  |   |   |  |  |
| <u> 14.8</u> – 20.0  |                |                                     |                       |                                 |  |                        |                                |   |  |  |  |   |   |  |  |
|  |                |                                     |                       |                                 |  |                        |                                |   |  |  |  |   |   |  |  |
|  |                |                                     |                       |                                 |  |                        |                                |   |  |  |  |   |   |  |  |
| 9.8  |                |                                     |                       |                                 |  |                        |                                |   |  |  |  |   |   |  |  |
| 25.0   |                |                                     |                       |                                 |  |                        |                                |   |  |  |  |   |   |  |  |
|  |                |                                     |                       |                                 |  |                        |                                |   |  |  |  |   |   |  |  |
|  |                |                                     |                       |                                 |  |                        |                                |   |  |  |  |   |   |  |  |
| 4.8 -  |                |                                     |                       |                                 |  |                        |                                |   |  |  |  |   |   |  |  |
|  |                |                                     |                       |                                 |  |                        |                                |   |  |  |  |   |   |  |  |
|  |                |                                     |                       |                                 |  |                        |                                |   |  |  |  |   |   |  |  |
| Bed<br>Extremel<br>Very Thir   | ding (         | <u>mm)</u>                          |                       | <u>J</u>                        | oint S   | pacin                  | ıg (mr                         | <u>n)</u>   |  | Continuity (mm)  | Attitude Angle   | Apertu  | ure (mm)  |  |  |
| Extremel Very Thir Thin Medium Thick Very Thic Extremel  | ń              | 20-<br>60-<br>200-<br>600-<br>2000- | 2000<br>-6000         | Ex<br>Ve<br>Cl<br>Mc<br>W<br>Ve | tremely<br>ery Clos<br>ose<br>od Clos<br>ide<br>ery Wid<br>tremely | / Close<br>se<br>e     | 20<br>60<br>200<br>600<br>2000 | <20<br>)-60<br>-200<br>)-600<br>-2000<br>)-6000<br>6000 | N<br>S   | Axtremely <25<br>Moderately 25-100<br>Sound >200                                       | Horizontal 0° - 5° Shallow 5° - 35° Moderate 35° - 55° Steep 55° - 85° Vertical 85° - 90°  | Very Tight<br>Tight<br>Partly Open<br>Open<br>Mod. Wide<br>Wide | < 0.1<br>0.1 - 0.25<br>0.25 - 0.5<br>0.5 - 2.5<br>2.5 - 10<br>>10 |  |  |
| <u>Fie</u>   | ld Ha          | rdnes                               | <u>s</u>              |                                 |  |                        | hering                         |   |  |  |  |   |   |  |  |
| Hard Scratches with Difficulty  Med. Hard Scratches Readily Medium Difficulty  Medium Difficulty  Soft Grooves Readily  Slight Discolora than its from Moderate Less than present eight More than the Moderate Less than present eight Modera |                |                                     |                       |                                 |  |                        |                                |   | indication indication conding the condition of the condition of the condition indication of the condition of | ated weathering. All the ition.<br>ne rock material is decon<br>continuous framework o | nposed and/or disintegrate   | ed to a soil. Fre   | sh or discolored rock is  |  |  |
| Very Soft  | Ca             | arves w                             | ith Knif              | e                               | Comple<br>Residu   |                        | All roo                        | ck mate   | rial is<br>rial is   | decomposed and/or disiconverted to soil. The n   | integrated to soil. The orig<br>nass structure and materia<br>n significantly transported. |   |   |  |  |

Date:

Boring Number: B-107 (MW)





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

 $\textbf{Drilling Contractor/Driller:} \ \ \text{GeoLogic - Earth Exploration, Inc. / M. Ferreira}$ 

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D. Bore Hole Location: 200 Boston Ave., Medford, MA

Northing: 2976911.0610 Easting: 756850.1348

Drilling Date: Start: 10/5/2017 End: 10/5/2017

Surface Elevation (ft.): 26.21

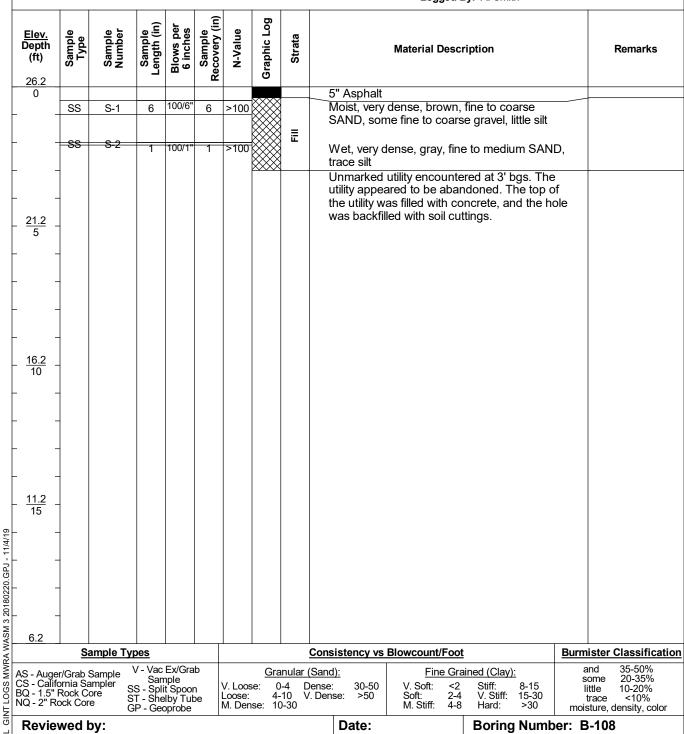
Total Depth (ft.): 3

Depth to Initial Water Level (ft):

Depth Date Time
NE NE NE

Abandonment Method: Backfilled with concrete

Logged By: A. Smith







Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D. Bore Hole Location: Whole Foods Parking Lot, Medford, MA

Northing: 2977044.4331 Easting: 757045.8241 **Drilling Date: Start:** 10/5/2017 **End:** 10/5/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Reviewed by:

Surface Elevation (ft.): 18.3

Total Depth (ft.): 21

Depth to Initial Water Level (ft): Depth Date Time 6.5 10/5/2017 13:25

Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-109** 

| J   |                | Start. IV        | 0,0,20  |                            | <b>u</b> i 10/          | 0,201                         | •           |                 | Logged By: A. Smith  |  |
|---|----------------|------------------|---|----------------------------|-------------------------|-------------------------------|-------------|-----------------|--|--|
| Elev.<br>Depth<br>(ft)                                | Sample<br>Type | Sample<br>Number | Sample<br>Length (in)                               | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                       | Graphic Log | Strata          | Material Description   | Remarks  |
| 0   |                |                  |   |                            |                         |                               |             |                 | 2" Asphalt<br>10" Gravel and Cobbles   |  |
| -   | SS             | S-1              | 12  | 80<br>16                   | 6                       |                               |             |                 | Wet, very dense, gray, fine to medium SAND, trace silt   |  |
| -   | - SS           | S-2              | 24  | 9<br>6<br>6<br>4           | 1                       | 12                            |             |                 | Wet, medium dense, brown, fine to medium SAND, some silt   |  |
| 13.3<br>5   | - SS           | S-3              | 24  | 8<br>5<br>6<br>6           | 0                       | 11                            |             | E               | No Recovery:<br>3" Spoon: Wet, medium dense, brown, fine to<br>medium SAND, some silt, trace glass                             |  |
| <b>T</b> -  | - SS           | S-4              | 24  | 9<br>18<br>23<br>18        | 0                       | 41                            |             |                 | No Recovery: 3" Spoon: Wet, dense, dark brown, fine to coarse SAND and fine to coarse GRAVEL, little organic silt, trace glass |  |
| -   | - SS           | S-5              | 24  | 11<br>8<br>5<br>5          | 2                       | 13                            |             |                 | Top 18": Wet, medium dense, dark brown, fine to coarse SAND and fine to coarse GRAVEL, little organic silt, trace glass        | Analytical and<br>Corrosion sample<br>(8'-10')                       |
| 8.3   | SS             | S-6              | 12  |                            | 12                      |                               | -           | Silty Sand      | Bottom 6": Wet, medium dense, brown, fine SAND, little silt Wet, medium dense, brown, fine SAND, little silt                   | Analytical sample<br>(10'-11')                                       |
| 3.3<br>15   | - SS           | S-7              | 24  | 19<br>25<br>52<br>72       | 14                      | 77                            |             | Sand and Gravel | Wet, very dense, brown, fine to coarse SAND, some fine gravel, little silt   |  |
| -<br>-1.7   | SS             | S-8              | 24  | 7<br>9                     | 20                      | 39                            |             | Silty Clay      | Wet, hard, gray, Silty CLAY  |  |
|   |                | ample Ty         | <b>pes</b><br>V - Vac                               | Ev/Cro                     | h                       |                               |             |                 |  | and 35-50%   |
| AS - Auge<br>CS - Califo<br>BQ - 1.5"  <br>IQ - 2" Ro | ornia Sa       | ampler<br>ore S  | v - vac<br>Sam<br>SS - Spli<br>ST - She<br>SP - Geo | nple<br>t Spooi<br>lby Tul | n l                     | V. Loose:<br>Loose:<br>M. Der | se: 0       | -4 C            | Dense: 30-50 V. Soft: <2 Stiff: 8-15<br>V. Dense: >50 Soft: 2-4 V. Stiff: 15-30  | some 20-35%<br>little 10-20%<br>trace <10%<br>isture, density, color |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

| Elev.<br>Depth<br>(ft) | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata | Material Description   | Remarks |
|------------------------|----------------|------------------|-----------------------|-----------------------|-------------------------|---------|-------------|--------|--|---------|
| -1.7<br>20             | ss             | S-8              | 24                    | 30<br>100             | 20                      | 39      |             |        |  |         |
|                        |                |                  |                       |                       |                         |         |             |        | Test boring B-109 terminated at 21' bgs and backfilled with soil cuttings. |         |
|                        |                |                  |                       |                       |                         |         |             |        |  |         |
| -<br>-6.7              |                |                  |                       |                       |                         |         |             |        |  |         |
| <u>-6.7</u><br>25      |                |                  |                       |                       |                         |         |             |        |  |         |
|                        |                |                  |                       |                       |                         |         |             |        |  |         |
|                        |                |                  |                       |                       |                         |         |             |        |  |         |
| -<br>-11.7             |                |                  |                       |                       |                         |         |             |        |  |         |
| - <del>-11.7</del> -   |                |                  |                       |                       |                         |         |             |        |  |         |
|                        |                |                  |                       |                       |                         |         |             |        |  |         |
|                        |                |                  |                       |                       |                         |         |             |        |  |         |
| <u>16.7</u> -          |                |                  |                       |                       |                         |         |             |        |  |         |
| 35 -                   |                |                  |                       |                       |                         |         |             |        |  |         |
|                        |                |                  |                       |                       |                         |         |             |        |  |         |
| -                      |                |                  |                       |                       |                         |         |             |        |  |         |
| - <u>-21.7</u> -       |                |                  |                       |                       |                         |         |             |        |  |         |
| 40<br>- –              |                |                  |                       |                       |                         |         |             |        |  |         |
|                        |                |                  |                       |                       |                         |         |             |        |  |         |
|                        |                |                  |                       |                       |                         |         |             |        |  |         |
| <u>26.7</u> -<br>45    |                |                  |                       |                       |                         |         |             |        |  |         |
| 45<br>                 |                |                  |                       |                       |                         |         |             |        |  |         |
|                        |                |                  |                       |                       |                         |         |             |        | Boring Number: E   | -109    |





## **Boring Number: B-110 (MW)**

Client: MWRA **Project Name:** Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 105 Auburn St., Medford, MA Northing: 2977428.7695 Easting: 757370.1157 Drilling Date: Start: 12/19/2017 End: 12/19/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Surface Elevation (ft.): 14.53

Total Depth (ft.): 21

Depth to Initial Water Level (ft): Depth Date Time 5.8 12/19/2017

Abandonment Method: Monitoring well installed

12:30

Logged By: A Smith

|   |                |                  |   |                            |                         |                               |             |                 |                           |                                | Logg                          | jed B            | <b>y:</b> A. Sr                        | mith         |        |  |
|---|----------------|------------------|---|----------------------------|-------------------------|-------------------------------|-------------|-----------------|---------------------------|--------------------------------|-------------------------------|------------------|--|--------------|--------|--|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type | Sample<br>Number | Sample<br>Length (in)                             | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                       | Graphic Log | Strata          |                           |                                | Material D                    | escr             | iption                                 |              |        | Remarks  |
| 14.5<br>0   | SS             | S-1              | 24  | 70<br>62<br>52<br>32       | 16                      | >100                          |             | ≣               |                           | oist, very o                   |                               | wn, i            | fine to r                              | nedium       |        |  |
|   | SS             | S-2              | 24  | 19<br>21<br>25<br>20       | 20                      | 46                            |             |                 | N                         | loist, hard,                   | gray, Silty                   | CLA              | ΑΥ                                     |              |        | Analytical sample (2'-4')<br>PP = 2.5 tsf  |
| 9.5<br>5<br><u>¥</u>                              | SS             | S-3              | 24  | 7<br>8<br>12<br>17         | 20                      | 20                            |             |                 | tr                        | Moist, very s<br>ace peat      |                               |                  |  |              |        | Corrosion sample (4'-6')<br>PP = 1.6 tsf   |
|   | SS             | S-4              | 24  | 3<br>3<br>6                | 24                      | 6                             |             | Organic Soils   | tr                        | loist, medio<br>ace peat       |                               |                  |  |              |        | PP = 0.8 tsf   |
| 4.5<br>10   | - SS           | S-5              | 24  | 7<br>7<br>7<br>8           | 24                      | 14                            |             | 0               |                           | /loist, stiff, g<br>nedium sar |                               |                  | CLAY, li                               | ttle fine to | )      | PP = 0.7 tsf   |
| 10  |                |                  |   |                            |                         |                               |             |                 |                           |                                |                               |                  |  |              |        |  |
|   |                |                  |   | 44                         |                         |                               |             | ravel           | V                         | Vet, very de                   | ense brow                     | ın fii           | ne to co                               | narse SA     | ND     |  |
| - <u>-0.5</u><br>15                               | SS             | S-6              | 24  | 53<br>48<br>64             | 12                      | >100                          |             | Sand and Gravel |                           | ome fine to                    |                               |                  |  |              | ,      |  |
|   |                |                  |   |                            |                         |                               |             | Clay            |                           |                                |                               |                  |  |              |        |  |
| -5.5  | SS             | S-7              | 24  | 11<br>9                    | 24                      | 18                            |             | Silty           | to                        | Vet, very st<br>o medium s     | sand                          |                  | & SILT                                 | , trace fir  | ne     | PP = 1.0 tsf   |
|   | <u>Sa</u>      | ample Ty         | pes   |                            |                         |                               |             |                 | Cons                      | istency vs E                   | Blowcount/I                   | Foot             |  |              | Burn   | nister Classificatio   |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | fornia Sa      | ampler S         | V - Vac<br>Sam<br>S - Spli<br>T - She<br>SP - Ged | nple<br>t Spoor<br>lby Tub | n<br>ne                 | V. Loose:<br>Loose:<br>M. Der | se: 0       | 10 V            | (Sand<br>ense:<br>/. Dens | 30-50                          | Fine V. Soft: Soft: M. Stiff: | <2<br>2-4<br>4-8 | ned (Cla<br>Stiff:<br>V. Stif<br>Hard: | 8-15         | :      | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>isture, density, color |
| Revie   | wed l          | by:              |   |                            |                         |                               |             |                 |                           | Date:                          |                               |                  | Borir                                  | ng Num       | ber: I | B-110 (MW)   |





# Boring Number: B-110 (MW)

Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

| Elev.<br>Depth<br>(ft)      | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata | Material Description   | Remarks      |
|-----------------------------|----------------|------------------|-----------------------|-----------------------|-------------------------|---------|-------------|--------|--|--------------|
| -5.5<br>20                  | SS             | S-7              | 24                    | 9                     | 24                      | 18      |             |        |  | PP = 1.0 tsf |
|                             |                |                  |                       |                       |                         |         |             |        | Test boring B-110 (MW) terminated at 21' bgs and converted into a monitoring well. |              |
| - <u>-10.5</u>              |                |                  |                       |                       |                         |         |             |        |  |              |
|                             |                |                  |                       |                       |                         |         |             |        |  |              |
| - <u>15.5</u> _<br>30 -<br> |                |                  |                       |                       |                         |         |             |        |  |              |
| <u>20.5</u> _ 35            |                |                  |                       |                       |                         |         |             |        |  |              |
|                             |                |                  |                       |                       |                         |         |             |        |  |              |
|                             |                |                  |                       |                       |                         |         |             |        |  |              |
|                             |                |                  |                       |                       |                         |         |             |        | Boring Number:   | D 440 (BMA)  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D. Bore Hole Location: 120 Auburn St., DCR Property, Medford, MA Northing: 2977545.8348 Easting: 757673.1903

**Drilling Date: Start:** 12/18/2017 **End:** 12/18/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Reviewed by:

Surface Elevation (ft.): 11.9

Total Depth (ft.): 16

Depth to Initial Water Level (ft): Depth Date 5.5

12/18/2017 Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-111** 

13:50

| Sample Sample Sample Length (in) Number Proceedings Blows per 6 inches Sample Sample Sample Sample Sample Sample Sample Sample Number Number Proceedings Sample Sam | Strata          | Material Description   |   |
|--|-----------------|--|---|
| 0 42   |                 | Material Description   | Remarks   |
|  | ,7.<br>•        | 6" Topsoil   |   |
| - SS S-1 24 30 16 54 42  | ≣               | Bottom 10": Moist, very dense, brown, fine to coarse SAND, some fine gravel, trace silt  |   |
| - SS S-2 24 17 20 8 34   | Organic Soils   | Top 3": Moist, dense, brown, fine to coarse SAND, some fine gravel, trace silt Bottom 5": Moist, hard, dark brown, Organic SILT  | Analytical sample (2'-4')   |
| $\frac{6.9}{\P}$ - SS S-3 24 $\begin{pmatrix} 4 & 4 & 4 & 4 & 4 & 4 & 4 & 4 & 4 & 4 $  |                 | Top 3": Moist, stiff, dark brown, Organic SILT Bottom 9": Moist, loose, brown, fine to medium SAND, some silt, trace fine gravel |   |
| - SS S-4 24 9 8 12 18  | Silty Sand      | Moist, medium dense, brown, fine SAND, some silt   |   |
| 1.9  | Sand and Gravel | Wet, very dense, brown, fine to coarse SAND, some fine to coarse gravel, little silt   |   |
| -3.1   | Silty Clay (    | Wet, very stiff, brown, Silty CLAY   | PP = 2.2 tsf  |
|  |                 | Test boring B-111 terminated at 16' bgs and backfilled with soil cuttings.   |   |
| -8.1   |                 |  |   |
| Sample Types  AC Acceptance V - Vac Ex/Grab Gr   |                 |  | nister Classification<br>and 35-50%   |
| AS - Auger/Grab Sample CS - California Sampler SS - Snit Spoon V. Loose:   | <b>1-10 ∖</b>   | Dense: 30-50 V. Soft: <2 Stiff: 8-15<br>/ Dense: >50 Soft: 2-4 V. Stiff: 15-30   | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>sture, density, color |





Client: MWRA **Project Name:** Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 3 in / NA Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: DCR Property, Medford, MA Northing: 2977680.1306 Easting: 758176.0581

**Drilling Date: Start:** 12/18/2017 **End:** 12/18/2017

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Reviewed by:

Surface Elevation (ft.): 10.08

Total Depth (ft.): 26

5.1

Depth to Initial Water Level (ft): Depth Date

12/18/2017 Abandonment Method: Backfilled with soil cuttings

**Boring Number: B-112** 

10:48

|  | Sample Sample Length (ii) Sample Recovery (iii) Recovery (iii) N-Value Graphic Log |         | 011    |                      | Logged By: A. Smith |        |           |              |   |  |
|--|--|---------|--------|----------------------|---------------------|--------|-----------|--------------|---|--|
|  |  |         | Strata | Material Description | Remarks             |        |           |              |   |  |
| 0  |  |         |        | 15                   | _                   |        | 7, 15, 7, |              | 8" Topsoil  |  |
| -  | SS   | S-1     | 24     | 21<br>25<br>19       | 18                  | 46     |           | ≣            | Bottom 10": Moist, dense, brown, gray, fine SAND, some silt                                       |  |
| -  | ss   | S-2     | 24     | 17<br>19<br>20<br>23 | 20                  | 39     |           | rganic Soils | Moist, hard, dark brown, Organic Silty CLAY, trace fine to medium sand                            | Analytical sample (2'-4')  |
| <u>5</u> 1 -   | - ss   | S-3     | 24     | 10<br>15<br>16<br>26 | 24                  | 31     |           | ō            | Moist, dense, brown, fine to medium SAND, some silt, trace organic fibers                         | Corrosion sample (4'-6')   |
| -  | - SS   | S-4     | 24     | 20<br>25<br>31<br>23 | 24                  | 56     |           | Silty Sand   | Wet, very dense, brown, fine to coarse SAND, little silt, trace fine gravel                       |  |
| <u>0.1</u><br>10   | - SS   | S-5     | 24     | 32<br>22<br>13       | 10                  | 35     |           |              | Top 6": Wet, dense, gray, fine to medium SAND, trace silt Bottom 4": Wet, hard, brown, Silty CLAY |  |
| -<br>-<br>-  |  |         |        | 11                   |                     |        |           |              |   |  |
| <u>-4.9</u><br>15  | - ss   | S-6     | 24     | 6 4 6 7              | 24                  | 10     |           | Silty Clay   | Wet, stiff, gray, Silty CLAY, trace fine to medium sand   | PP = 1.0 tsf   |
| -9.9   | SS   | S-7     | 24     | 7 8                  | 24                  | 22     |           |              | Wet, very stiff, gray, Silty CLAY   | PP = 1.7 tsf   |
|  | Sa   | mple Ty | ypes   | -                    |                     | ·      | <u> </u>  |              | Consistency vs Blowcount/Foot Burn  | nister Classificatio   |
| S - Auger/Grab Sample S - California Sampler SQ - 1.5" Rock Core IQ - 2" Rock Core GP - Geoprobe  V - Vac Ex/Grab Sample SS - Split Spoon Loose: 0- Loose: 4-1 M. Dense: 10- |  |         |        |                      |                     | Loose: | se: 0     | -4 [<br>10 \ | Dense: 30-50 V. Soft: <2 Stiff: 8-15 /. Dense: >50 Soft: 2-4 V. Stiff: 15-30                      | and 35-50%<br>some 20-35%<br>little 10-20%<br>trace <10%<br>isture, density, color |

Date:





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3
Project Location: Massachusetts Project Number: 101038-102170

Sample Recovery (in) **Graphic Log** Blows per 6 inches Sample Length (in) Sample Number N-Value Elev. Depth (ft) Sample Type Strata **Material Description** Remarks **-**9.9 PP = 1.7 tsf S-7 24 22 15 Silty Clay 8 Wet, very stiff, gray, Silty CLAY -<u>14.9</u> 25 SS S-8 24 24 17 9 11 Test boring B-112 terminated at 26' bgs and backfilled with soil cuttings. <u>-19.9</u> 30 -<u>24.9</u> 35 <u>-29.9</u> GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19 -<u>34.9</u> 45 **Boring Number: B-112** 





## Boring Number: B-113 (MW)

Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / M. Ferreira
 Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA
 Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: Veterans Memorial Park, Medford, MA

Northing: 2977766.8067 Easting: 758496.2043

Drilling Date: Start: 12/19/2017 End: 12/20/2017

Surface Elevation (ft.): 11.11

Total Depth (ft.): 26

Depth to Initial Water Level (ft):DepthDateTime5.512/20/201711:00

Abandonment Method: Monitoring well installed

|   |                     |                  |  |                            |                         |                             | Logged By: A. Smith |                       |  |   |  |  |  |
|---|---------------------|------------------|--|----------------------------|-------------------------|-----------------------------|---------------------|-----------------------|--|---|--|--|--|
| Elev.<br>Depth<br>(ft)                              | Sample<br>Type      | Sample<br>Number | Sample<br>Length (in)                              | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                     | Graphic Log         | Strata                | Material Description   | Remarks   |  |  |  |
| 0   |                     |                  |  | 20                         |                         |                             | -, 7, -, 1,<br>×××× |                       | 4" Topsoil   |   |  |  |  |
|   | SS                  | S-1              | 24   | 25<br>36<br>33             | 20                      | 61                          |                     | Ē                     | Bottom 16": Moist, very dense, gray, fine SAND, some clay, trace fine gravel   |   |  |  |  |
|   | SS                  | S-2              | 24   | 9<br>11<br>14<br>10        | 10                      | 25                          |                     | Organic Soils Clay    | Moist, very stiff, brown, Silty CLAY, some fine sand, trace fine gravel  | Analytical sample<br>(2'-4')  |  |  |  |
| - 61  |                     |                  |  | 1 2                        |                         |                             |                     | Jic S                 | Top 12": Wet, soft, brown, PEAT  | Corrosion sample (4'-6')  |  |  |  |
| - <u>6.1</u> -                                      | SS                  | S-3              | 24   | 1<br>1                     | 22                      | 3                           |                     | Orga                  | Bottom 10": Wet, soft, gray, Silty CLAY, trace peat  | PP = 1.0 tsf  |  |  |  |
|   | SS                  | S-4              | 24   | 3<br>2<br>1<br>2           | 20                      | 3                           |                     |                       | Wet, soft, gray, Silty CLAY, trace peat  | PP = 0.8 tsf  |  |  |  |
|   |                     |                  |  |                            |                         |                             |                     | Silty Clay            |  |   |  |  |  |
| - <u>1.1</u> - 10 -                                 | - SS                | S-5              | 24   | 2<br>2<br>3<br>4           | 24                      | 5                           |                     | Silty                 | Wet, medium stiff, gray, CLAY, trace fine to medium sand, trace peat   | PP < 0.5 tsf  |  |  |  |
|   | · SS                | S-6              | 24   | 60<br>38<br>20<br>18       | 10                      | 58                          |                     | Silty Clay Silty Sand | Top 6": Wet, very dense, gray, fine to medium SAND, little fine gravel, trace silt Bottom 4": Wet, hard, brown, Silty CLAY, little fine sand | PP = 2.0 tsf  |  |  |  |
| <br><br>-8.9  | ss                  | S-7              | 24   | 13<br>16                   | 16                      | 36                          |                     | Silty Sand            | Wet, dense, gray, fine SAND, little silt   |   |  |  |  |
|   | Sa                  | mple Ty          | pes  | •                          |                         | •                           |                     |                       | Consistency vs Blowcount/Foot Burm   | ister Classification  |  |  |  |
| AS - Auge<br>CS - Califo<br>BQ - 1.5"<br>NQ - 2" Ro | ornia Sa<br>Rock Co | mpler<br>ore S   | V - Vac<br>Sam<br>SS - Spli<br>T - She<br>GP - Ged | nple<br>t Spoor<br>lby Tub | n ,                     | V. Loo:<br>Loose:<br>M. Der | se: 0               | -4 [<br>10 \          | Dense: 30-50 V. Soft: <2 Stiff: 8-15   ii<br>Dense: >50   Soft: 2-4 V. Stiff: 15-30   t  | nd 35-50%<br>ome 20-35%<br>ttle 10-20%<br>race <10%<br>ture, density, color |  |  |  |
| Revie   | wed b               | y:               |  |                            |                         |                             |                     |                       | Date: Boring Number: B   | -113 (MW)   |  |  |  |





GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

# Boring Number: B-113 (MW)

Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

| i rojec                  | , LOC          | Jation.          | IVIAS                 | Jacri                 |                         |         | ٠ . ٥٫٠     | , , , ,    | umber: 101036-102170   |         |
|--------------------------|----------------|------------------|-----------------------|-----------------------|-------------------------|---------|-------------|------------|--|---------|
| I                        | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata     | Material Description   | Remarks |
| -8.9<br>20<br>-          | SS             | S-7              | 24                    | 20 13                 | 16                      | 36      |             | Silty Sand |  |         |
| - <u>13.9</u><br>25      | SS             | S-8              | 24                    | 2<br>3<br>4<br>5      | 24                      | 7       |             | Silty Clay | Wet, medium stiff, gray, Silty CLAY  |         |
| -                        |                |                  |                       |                       |                         |         |             |            | Test boring B-113 (MW) terminated at 26' bgs and converted into a monitoring well. |         |
| - <u>18.9</u> _          |                |                  |                       |                       |                         |         |             |            |  |         |
| - <u>23.9</u><br>35      |                |                  |                       |                       |                         |         |             |            |  |         |
| - <u>28.9</u><br>40<br>- |                |                  |                       |                       |                         |         |             |            |  |         |
| - <u>33.9</u><br>45      |                |                  |                       |                       |                         |         |             |            | Boring Number: B-  |         |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

**Drilling Contractor/Driller:** GeoLogic - Earth Exploration, Inc. / D. Jacobs **Drilling Method/Casing/Core Barrel Size:** Drive and Wash / 4 in / NA

**Hammer Weight/Drop Height/ Spoon Size:** 140 lb / 30 in /2 in O.D.

Bore Hole Location: Veterans Memorial Park, Medford, MA

Northing: 2977894.5906 Easting: 759032.9731 Drilling Date: Start: 1/9/2018 End: 1/9/2018

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Surface Elevation (ft.): 12.03

Total Depth (ft.): 16

Depth to Initial Water Level (ft):DepthDateTime4.01/9/201811:55

Abandonment Method: Backfilled with soil cuttings

Logged By: A. Smith

| Logged By: A. Smith  |                |                  |                       |                       |                         |                               |             |                              |                            |                    |   |                            |  |               |  |
|--|----------------|------------------|-----------------------|-----------------------|-------------------------|-------------------------------|-------------|------------------------------|----------------------------|--------------------|---|----------------------------|--|---------------|--|
| Elev.<br>Depth<br>(ft)   | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value                       | Graphic Log | Strata                       |                            |                    | Material D                                    | escr                       | iption   |               | Remarks  |
| 0  |                |                  |                       |                       |                         |                               | 71.74.77    |                              |                            |                    |   |                            | e to coarse SAND                                   | ), /          | Vacuum excavate  |
|  | - VE           | V-1              |                       |                       | -                       |                               |             |                              | l ĭ                        | loist, brow        | gravel, trace<br>in, fine to c<br>o coarse gr | oars                       | e SAND, some s                                     | ilt,          | test boring from<br>the ground<br>surface to 6' bgs.<br>Analytical sample<br>(2'-4') |
| 5  | 7.0 5 VE V-2   |                  |                       |                       |                         |                               |             |                              |                            |                    | SAND, some silt                               | t,                         |  |               |  |
|  |                |                  |                       |                       |                         | Sand                          | \ \ \       | Vet, very o                  |                            | /n, fi             | ne to medium<br>gravel, trace silt            |                            |  |               |  |
| <br>- <u>2.0</u> -   | - SS           | S-2              | 24                    | 54<br>65<br>70<br>110 | 14                      | >100                          |             |                              |                            |                    | lense, brow<br>coarse grav                    |                            | ne to coarse SAN<br>race silt                      | ND,           |  |
| <br>   |                |                  |                       | Sand                  |                         |                               |             |                              |                            |                    |   |                            |  |               |  |
| <u>-3.0</u><br>15  | SS             | S-3              | 24                    | 52<br>40<br>36<br>58  | 12                      | 76                            |             | Silty Sand                   |                            |                    |   |                            | ne SAND, little sil                                |               |  |
|  | -8.0           |                  |                       |                       |                         |                               |             | B-114 terr<br>vith soil cutt |                            | ted at 16' bgs and | d   |                            |  |               |  |
| -0.0   | Sample Types   |                  |                       |                       |                         | 1                             |             |                              | Cons                       | istency vs         | Blowcount/l                                   | Foot                       |  | Burm          | ister Classification   |
| AS - Auger/Grab Sample<br>CS - California Sampler<br>BQ - 1.5" Rock Core<br>NQ - 2" Rock Core<br>OF - Geoprobe |                |                  |                       |                       | n<br>ne                 | V. Loose:<br>Loose:<br>M. Der | se: 0       | -10 V                        | (Sand<br>Dense:<br>/. Dens | 30-50              | Fine<br>V. Soft:<br>Soft:<br>M. Stiff:        | e Grai<br><2<br>2-4<br>4-8 | ined (Clay): Stiff: 8-15 V. Stiff: 15-30 Hard: >30 | Si<br>li<br>t | nd 35-50%<br>ome 20-35%<br>ttle 10-20%<br>trace <10%<br>sture, density, color        |
| Revie  | wed l          | by:              |                       |                       |                         | Date: Boring Number: B-114    |             |                              |                            |                    |   |                            |  |               |  |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / D. Jacobs

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 2400 Mystic Valley Parkway, Medford, MA

Northing: 2977890.9394 Easting: 759561.8584

**Drilling Date: Start:** 12/26/2016 **End:** 1/10/2018

Surface Elevation (ft.): 10.34

Total Depth (ft.): 21

Depth to Initial Water Level (ft):DepthDateTime4.31/10/201811:00

Abandonment Method: Backfilled with soil cuttings

Logged By: D. Abt

|  |            |                  |                       |                       |                         |         |                          |                             |                            |                           | Log                 | gea E                                     | sy: D. Abt                     |                       |  |   |
|--|------------|------------------|-----------------------|-----------------------|-------------------------|---------|--------------------------|-----------------------------|----------------------------|---------------------------|---------------------|---|--------------------------------|-----------------------|--|---|
| Elev.<br>Depti<br>(ft)                           | Sai        | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log              | Strata                      |                            |                           | Material            | Descr                                     | iption                         |                       |  | Remarks   |
| 0  |            |                  |                       |                       |                         |         | 7/-1                     |                             |                            |                           |                     |   | e to coarse S                  | SANE                  | ),   | Vacuum excavate   |
|  | VE         | V-1              |                       |                       | -                       |         |                          |                             | N<br>Se                    | ome fine t                | n, fine to coarse ( | coars<br>grave                            |                                |                       |  | test boring from<br>the ground<br>surface to 5.6'<br>bgs. |
| -<br>- <u>▼</u><br>- <u>5.3</u>                  | -<br>VE    | V-2              |                       |                       |                         |         |                          |                             |                            | loist, brow<br>ome fine g |                     | coars                                     | e SAND and                     | d SIL                 | Τ,   | Analytical sample<br>(3'-5')                              |
| 5  |            |                  |                       |                       |                         |         |                          | and                         |                            |                           |                     |   |                                |                       |  |   |
| _  | - SS       | S-1              | 24                    | 26<br>8<br>5<br>6     | 0                       | 13      |                          | Silty Sand                  | N                          | o Recove                  | ry                  |   |                                |                       |  |   |
| -<br>- <u>0.3</u><br>10                          | - SS       | S-2              | 24                    | 7<br>6<br>5<br>8      | 10                      | 11      |                          |                             |                            |                           |                     |   | n, Organic f<br>tle fine grave |                       |  | Corrosion sample (8'-10')                                 |
| 10<br> -<br> -                                   | _          |                  |                       |                       |                         |         |                          |                             |                            |                           |                     |   |                                |                       |  | Rig chatter from  |
| -<br>-<br>- <u>-4.7</u><br>15                    | - ss       | S-3              | 24                    | 15<br>16<br>25<br>21  | 21                      | 41      |                          | Silty Clay                  |                            | /et, hard,<br>ne sand     | brown to            | gray,                                     | CLAY & SIL                     | T, littl              | le   | 12 to 14' bgs.  |
| -9.7<br>AS - Au<br>CS - C2<br>BQ - 1.<br>NQ - 2" |            | S-4              | 24                    | 15                    | 20                      | 20      |                          | Silty                       |                            |                           |                     | to gr                                     | ay, CLAY &                     | SILT                  | ,  |   |
| -9.7   |            | ample Ty         |                       | 9                     |                         |         | <u> </u>                 | 1                           |                            | tle fine sa<br>stency vs  |                     | t/Foot                                    |                                |                       | Burmi  | ster Classification                                       |
| AS - Au<br>CS - Ca<br>BQ - 1.<br>NQ - 2"         | Y Y 5 (2 ) |                  |                       |                       |                         | se: 0   | anular<br>)-4 C<br>-10 V | (Sand)<br>Dense:<br>/. Dens | <u>:</u><br>30-50          |                           |                     | ined (Clay):<br>Stiff: 8-<br>V. Stiff: 15 | 15<br>-30<br>30                | ar<br>sc<br>lit<br>tr | nd 35-50%<br>ome 20-35%<br>ttle 10-20%<br>ace <10%<br>ture, density, color |   |
| Reviewed by:                                     |            |                  |                       |                       |                         |         |                          |                             | Date: Boring Number: B-115 |                           |                     | -115                                      |                                |                       |  |   |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

**Project Location:** Massachusetts **Project Number:** 101038-102170

| Elev.<br>Depth<br>(ft)  | Sample<br>Type | Sample<br>Number | Sample<br>Length (in) | Blows per<br>6 inches | Sample<br>Recovery (in) | N-Value | Graphic Log | Strata | Material Description   | Remarks   |
|-------------------------|----------------|------------------|-----------------------|-----------------------|-------------------------|---------|-------------|--------|--|-----------|
| -9.7<br>20              | SS             | S-4              | 24                    | 11<br>14              | 20                      | 20      |             |        | T. (1  |           |
|                         |                |                  |                       |                       |                         |         |             |        | Test boring B-115 terminated at 21' bgs and backfilled with soil cuttings. |           |
|                         |                |                  |                       |                       |                         |         |             |        |  |           |
| <br>-14.7               |                |                  |                       |                       |                         |         |             |        |  |           |
| - <u>-14.7</u><br>-<br> |                |                  |                       |                       |                         |         |             |        |  |           |
|                         |                |                  |                       |                       |                         |         |             |        |  |           |
|                         |                |                  |                       |                       |                         |         |             |        |  |           |
| <u>19.7</u> -           |                |                  |                       |                       |                         |         |             |        |  |           |
| 30                      |                |                  |                       |                       |                         |         |             |        |  |           |
|                         |                |                  |                       |                       |                         |         |             |        |  |           |
|                         |                |                  |                       |                       |                         |         |             |        |  |           |
| - <u>-24.7</u><br>35    |                |                  |                       |                       |                         |         |             |        |  |           |
| - 35<br>                |                |                  |                       |                       |                         |         |             |        |  |           |
|                         |                |                  |                       |                       |                         |         |             |        |  |           |
|                         |                |                  |                       |                       |                         |         |             |        |  |           |
| - <u>-29.7</u><br>40    |                |                  |                       |                       |                         |         |             |        |  |           |
|                         |                |                  |                       |                       |                         |         |             |        |  |           |
|                         |                |                  |                       |                       |                         |         |             |        |  |           |
|                         |                |                  |                       |                       |                         |         |             |        |  |           |
| - <del>-34.7</del> -    |                |                  |                       |                       |                         |         |             |        |  |           |
|                         |                |                  |                       |                       |                         |         |             |        |  |           |
|                         |                |                  |                       |                       |                         |         |             |        | Boring Number: B   | <br> -115 |





Client: MWRA Project Name: Rehabilitation of Weston Aqueduct Supply Main 3

Project Location: Massachusetts Project Number: 101038-102170

Drilling Contractor/Driller: GeoLogic - Earth Exploration, Inc. / D. Jacobs

Drilling Method/Casing/Core Barrel Size: Drive and Wash / 4 in / NA

Hammer Weight/Drop Height/ Spoon Size: 140 lb / 30 in /2 in O.D.

Bore Hole Location: 2500 Mystic Valley Parkway, Medford, MA

Northing: 2977872.7539 Easting: 759901.0673

**Drilling Date: Start:** 1/9/2018 **End:** 1/9/2018

GINT LOGS MWRA WASM 3 20180220.GPJ - 11/4/19

Surface Elevation (ft.): 10.61

Total Depth (ft.): 16

Depth to Initial Water Level (ft):DepthDateTime3.71/9/201814:00

Abandonment Method: Backfilled with soil cuttings

Logged By: A. Smith

| Logged By: A. Smith                               |                           |                  |  |                            |                         |                               |                  |              |                              |                            |                                 |              |  |               |   |
|---|---------------------------|------------------|--|----------------------------|-------------------------|-------------------------------|------------------|--------------|------------------------------|----------------------------|---------------------------------|--------------|--|---------------|---|
| Elev.<br>Depth<br>(ft)                            | Sample<br>Type            | Sample<br>Number | Sample<br>Length (in)                              | Blows per<br>6 inches      | Sample<br>Recovery (in) | N-Value                       | Graphic Log      | Strata       |                              |                            | Material D                      | escr         | iption   |               | Remarks   |
| 0   |                           |                  |  |                            |                         |                               |                  |              |                              |                            |                                 |              | e to coarse SAND                                   | ),            | Vacuum excavate test boring from  |
|   | VE                        | V-1              |  |                            |                         |                               |                  |              | D                            | ry, brown                  |                                 | rse          | race grass/roots<br>SAND, some silt,               | _/            | the ground<br>surface to 5.4'<br>bgs.   |
| <u>▼</u>  | VE                        | V-2              |  |                            |                         |                               |                  | Sand         | M<br>sc                      | oist, brow<br>ome fine t   | vn, fine to co<br>to coarse gr  | oars<br>avel | e SAND and SIL <sup>-</sup>                        | Τ,            | Analytical sample<br>(3'-5')  |
|   | - SS S-1 24 44 38 40 6 78 |                  |  |                            | 78                      |                               | Silty Sand       | w            | et, very o                   | et, very dense, gray, SILT |                                 |              |  |               |   |
|   | - SS                      | S-2              | 24   | 23<br>43<br>25<br>23       | 10                      | 68                            |                  |              |                              |                            | dense, brow<br>gravel, trace    |              | ne to coarse SAN                                   | ID,           |   |
| -4.4<br>15  | - 9                       |                  | 38   |                            | Silty Clay              |                               | et, hard,<br>and | gray, CLAY   | ′ and                        | d SILT, trace fine         |                                 |              |  |               |   |
|   | -9.4                      |                  |  |                            |                         |                               |                  |              | Te<br>ba                     | est boring<br>ackfilled v  | g B-116 tern<br>vith soil cutti | nina<br>ings | ted at 16' bgs and                                 | d             |   |
| -9.4  | Sample Types              |                  |  |                            |                         |                               |                  |              | Consi                        | stency vs                  | Blowcount/F                     | oot          |  | Burm          | ister Classification  |
| AS - Auge<br>CS - Calif<br>BQ - 1.5"<br>NQ - 2" R | ornia Sa<br>Rock Co       | impler<br>ore S  | V - Vac<br>Sam<br>SS - Spli<br>T - She<br>GP - Geo | nple<br>t Spoor<br>lby Tul | n<br>ne                 | V. Loose:<br>Loose:<br>M. Der | se: 0            | -4 [<br>10 \ | (Sand)<br>Dense:<br>V. Dense | 30-50                      | 1                               |              | ined (Clay): Stiff: 8-15 V. Stiff: 15-30 Hard: >30 | so<br>li<br>t | nd 35-50%<br>ome 20-35%<br>tttle 10-20%<br>race <10%<br>tture, density, color |
| Reviewed by:                                      |                           |                  |  |                            |                         |                               |                  |              |                              | Date:                      |                                 |              |  |               |   |

### Appendix C

**Rock Core Photo Logs** 



# Rock Core Photographs

MWRA – Rehabilitation of Weston Aqueduct Supply Main 3 Weston, Waltham, Belmont, Arlington, Somerville, and Medford, MA

### B-8A, B-19 and B-22



B-22: <u>11.5'-16.5'</u>

B-19: <u>9.0'-14.0'</u>

B-8A: <u>5.0'-10.0'</u>

### B-53, B-62, and B-75A

B-53: <u>6.0'-11.0'</u>

B-62: <u>11.0'-14.0'</u>

B-75A: <u>9.0'-11.5'</u>



### B-55, B-60, and B-61



B-61: <u>9.0'-14.0'</u>

B-60: <u>3.5'-8.5'</u>

B-55: <u>8.0'-13.0'</u>

### B-57, B-86, and B-107



B-86: <u>10.0'-15.0'</u>

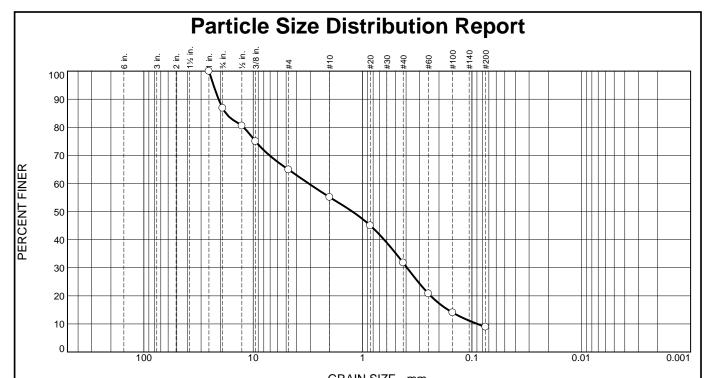
B-107: <u>14.5'-18.5'</u>

B-57: <u>9.0'-14.0'</u>

### Appendix D

**Geotechnical Laboratory Test Results** 





|          |        |       | (      | <u> - RAIN SIZE -</u> | mm.  |         |      |  |
|----------|--------|-------|--------|-----------------------|------|---------|------|--|
| 0/ - 211 | % Gı   | ravel |        | % Sand                |      | % Fines |      |  |
| % +3"    | Coarse | Fine  | Coarse | Medium                | Fine | Silt    | Clay |  |
| 0.0      | 13.2   | 21.9  | 9.8    | 23.3                  | 22.9 | 8.9     |      |  |

| Test R  | esults (ASTM I | D422 & ASTM D1140) |          |  |  |  |  |  |
|---------|----------------|--------------------|----------|--|--|--|--|--|
| Opening | Percent        | Spec.*             | Pass?    |  |  |  |  |  |
| Size    | Finer          | (Percent)          | (X=Fail) |  |  |  |  |  |
| 1"      | 100.0          |                    |          |  |  |  |  |  |
| .75"    | 86.8           |                    |          |  |  |  |  |  |
| .5"     | 80.5           |                    |          |  |  |  |  |  |
| .375"   | 75.0           |                    |          |  |  |  |  |  |
| #4      | 64.9           |                    |          |  |  |  |  |  |
| #10     | 55.1           |                    |          |  |  |  |  |  |
| #20     | 45.0           |                    |          |  |  |  |  |  |
| #40     | 31.8           |                    |          |  |  |  |  |  |
| #60     | 20.8           |                    |          |  |  |  |  |  |
| #100    | 14.0           |                    |          |  |  |  |  |  |
| #200    | 8.9            |                    |          |  |  |  |  |  |
|         |                |                    |          |  |  |  |  |  |
|         |                |                    |          |  |  |  |  |  |
|         |                |                    |          |  |  |  |  |  |
|         |                |                    |          |  |  |  |  |  |
|         |                |                    |          |  |  |  |  |  |
|         |                |                    |          |  |  |  |  |  |
|         |                |                    |          |  |  |  |  |  |
|         |                |                    |          |  |  |  |  |  |
|         |                |                    |          |  |  |  |  |  |
|         |                |                    |          |  |  |  |  |  |
| *       |                | 1                  |          |  |  |  |  |  |

Brown poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)
LL= PI=

PL=

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

 D90=
 20.7450
 D85=
 17.7866
 D60=
 3.1124

 D50=
 1.2385
 D30=
 0.3918
 D15=
 0.1649

 D10=
 0.0892
 Cu=
 34.89
 Cc=
 0.55

Remarks

As received MC = 4.2%

Date Received: 12/8/17

**Date Tested:** 12/13/17

**Date Sampled:** 11/29/17

Tested By: RZ Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

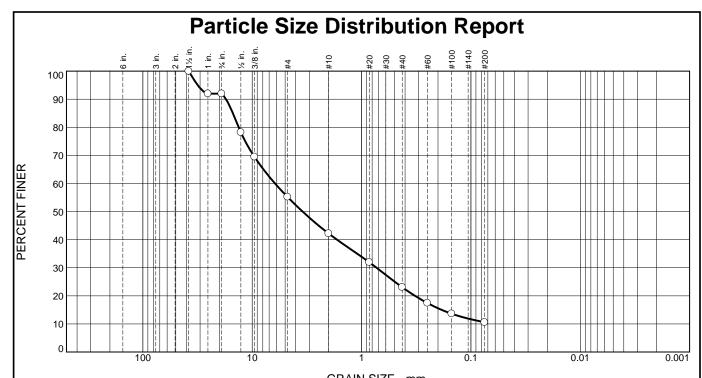
**CDM Smith** 

Source of Sample: B-1 Sample Number: S-2 **Depth:** 2-4'

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA



|          |        |       | (      | <u>GRAIN SIZE -</u> | mm.  |         |      |  |
|----------|--------|-------|--------|---------------------|------|---------|------|--|
| 0/ - 211 | % G    | ravel |        | % Sand              |      | % Fines |      |  |
| % +3"    | Coarse | Fine  | Coarse | Medium              | Fine | Silt    | Clay |  |
| 0.0      | 8.0    | 36.8  | 13.0   | 19.1                | 12.5 | 10.6    |      |  |

PL=

| Opening Size         Finer         Spec.* (Percent)         Pass?           1.5         100.0         (X=Fail)           1.5         92.0         (X=Fail)           .75         92.0         (Sec.*)           .5         78.2         (Sec.*)           .375         69.5         (Sec.*)           #40         42.2         (Sec.*)           #40         23.1         (Sec.*)           #60         17.4         (Sec.*)           #100         13.6         (Sec.*)           #200         10.6         (Sec.*) | Test R  | esults (ASTM D | M D6913 & ASTM D1140) |          |  |  |  |  |  |  |
|--|---------|----------------|-----------------------|----------|--|--|--|--|--|--|
| 1.5  | Opening | Percent        | Spec.*                | Pass?    |  |  |  |  |  |  |
| 1 92.0<br>.75 92.0<br>.5 78.2<br>.375 69.5<br>#4 55.2<br>#10 42.2<br>#20 31.9<br>#40 23.1<br>#60 17.4<br>#100 13.6   | Size    | Finer          | (Percent)             | (X=Fail) |  |  |  |  |  |  |
| .75 92.0<br>.5 78.2<br>.375 69.5<br>#4 55.2<br>#10 42.2<br>#20 31.9<br>#40 23.1<br>#60 17.4<br>#100 13.6   | 1.5     | 100.0          |                       |          |  |  |  |  |  |  |
| .5 78.2<br>.375 69.5<br>#4 55.2<br>#10 42.2<br>#20 31.9<br>#40 23.1<br>#60 17.4<br>#100 13.6   | 1       | 92.0           |                       |          |  |  |  |  |  |  |
| .375   | .75     | 92.0           |                       |          |  |  |  |  |  |  |
| #4 55.2<br>#10 42.2<br>#20 31.9<br>#40 23.1<br>#60 17.4<br>#100 13.6   | .5      | 78.2           |                       |          |  |  |  |  |  |  |
| #10  | .375    | 69.5           |                       |          |  |  |  |  |  |  |
| #20 31.9<br>#40 23.1<br>#60 17.4<br>#100 13.6  | #4      | 55.2           |                       |          |  |  |  |  |  |  |
| #40 23.1<br>#60 17.4<br>#100 13.6  | #10     | 42.2           |                       |          |  |  |  |  |  |  |
| #60 17.4<br>#100 13.6  | #20     | 31.9           |                       |          |  |  |  |  |  |  |
| #100 13.6  | #40     | 23.1           |                       |          |  |  |  |  |  |  |
|  | #60     | 17.4           |                       |          |  |  |  |  |  |  |
| #200 10.6  | #100    | 13.6           |                       |          |  |  |  |  |  |  |
|  | #200    | 10.6           |                       |          |  |  |  |  |  |  |
|  |         |                |                       |          |  |  |  |  |  |  |
|  |         |                |                       |          |  |  |  |  |  |  |
|  |         |                |                       |          |  |  |  |  |  |  |
|  |         |                |                       |          |  |  |  |  |  |  |
|  |         |                |                       |          |  |  |  |  |  |  |
|  |         |                |                       |          |  |  |  |  |  |  |
|  |         |                |                       |          |  |  |  |  |  |  |
|  |         |                |                       |          |  |  |  |  |  |  |
|  |         |                |                       |          |  |  |  |  |  |  |

#### **Material Description**

Gray-brown poorly graded gravel with silt and sand

Atterberg Limits (ASTM D 4318) LL= PI=

Classification USCS (D 2487)= GP-GM **AASHTO** (M 145)= A-1-a

Coefficients

D<sub>85</sub>= 15.0225 D<sub>30</sub>= 0.7295 C<sub>u</sub>= **D<sub>60</sub>=** 6.1897 **D<sub>90</sub>=** 17.3166 D<sub>50</sub>= 3.4602 D<sub>10</sub>= D<sub>15</sub>= 0.1851 C<sub>c</sub>=

Remarks

Date Received: 1/30/18 **Date Tested:** 1/31/18

Tested By: SB Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-2 Sample Number: S-1

**Depth:** 6-8'

**Client:** Massachusetts Water Resources Authority (MWRA)

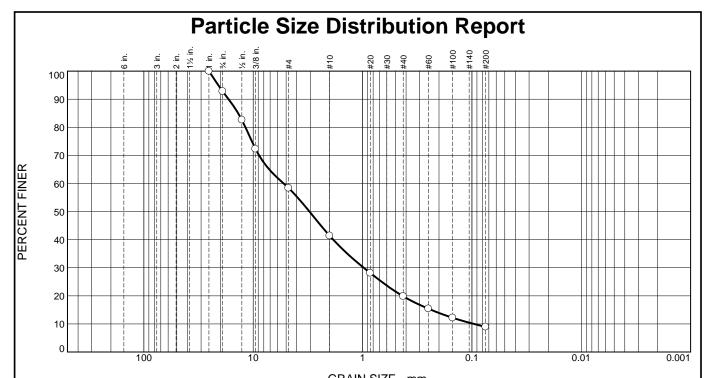
Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 12/11/17

**Boston, Massachusetts Project No:** 101038.102170

#### **CDM Smith**



|         |        |       | (      | <u> JRAIN SIZE -</u> | mm.  |         |      |  |
|---------|--------|-------|--------|----------------------|------|---------|------|--|
| 0/ - 21 | % G    | ravel |        | % Sand               |      | % Fines |      |  |
| % +3"   | Coarse | Fine  | Coarse | Medium               | Fine | Silt    | Clay |  |
| 0.0     | 7.2    | 34.4  | 17.0   | 21.6                 | 10.8 | 9.0     |      |  |

| Test Results (ASTM D6913 & ASTM D1140) |         |           |          |  |  |  |  |  |
|--|---------|-----------|----------|--|--|--|--|--|
| Opening                                | Percent | Spec.*    | Pass?    |  |  |  |  |  |
| Size                                   | Finer   | (Percent) | (X=Fail) |  |  |  |  |  |
| 1                                      | 100.0   |           |          |  |  |  |  |  |
| .75                                    | 92.8    |           |          |  |  |  |  |  |
| .5                                     | 82.6    |           |          |  |  |  |  |  |
| .375                                   | 72.3    |           |          |  |  |  |  |  |
| #4                                     | 58.4    |           |          |  |  |  |  |  |
| #10                                    | 41.4    |           |          |  |  |  |  |  |
| #20                                    | 28.1    |           |          |  |  |  |  |  |
| #40                                    | 19.8    |           |          |  |  |  |  |  |
| #60                                    | 15.4    |           |          |  |  |  |  |  |
| #100                                   | 12.2    |           |          |  |  |  |  |  |
| #200                                   | 9.0     |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |

Gray well-graded sand with silt and gravel

Atterberg Limits (ASTM D 4318) LL= PI=

PL=

Classification
SW-SM AASHTO (M 145)= A-1-a USCS (D 2487)=

Coefficients

**D<sub>90</sub>=** 16.8087 **D<sub>50</sub>=** 3.0592 **D<sub>10</sub>=** 0.0957 **D<sub>60</sub>=** 5.2635 **D<sub>15</sub>=** 0.2355 **C<sub>c</sub>=** 1.89 D<sub>85</sub>= 13.7251 D<sub>30</sub>= 0.9762 C<sub>u</sub>= 54.98

Remarks

As received MC = 8.3%

**Date Tested:** 1/31/18

Date Received: 1/30/18 Tested By: SB

**Date Sampled:** 12/16/17

Checked By: MP

Title: Laboratory Manager

(no specification provided)

Source of Sample: B-3 **Depth:** 6-6.9' Sample Number: S-1

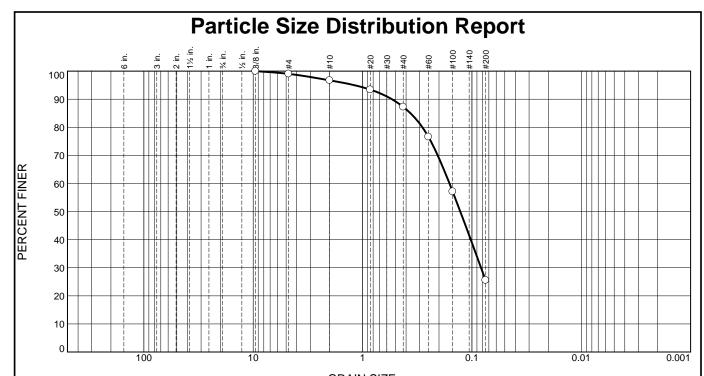
Client: Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts Project No:** 101038.102170

**CDM Smith** 



|        | GRAIN SIZE - mm. |        |       |           |        |         |      |      |
|--------|------------------|--------|-------|-----------|--------|---------|------|------|
| 9/ .3" |                  | % G    | ravel | el % Sand |        | % Fines |      |      |
|        | % +3"            | Coarse | Fine  | Coarse    | Medium | Fine    | Silt | Clay |
|        | 0.0              | 0.0    | 1.0   | 2.3       | 9.4    | 61.7    | 25.6 |      |

| Test Results (ASTM D6913 & ASTM D1140) |         |           |          |  |  |  |  |  |
|--|---------|-----------|----------|--|--|--|--|--|
| Opening                                | Percent | Spec.*    | Pass?    |  |  |  |  |  |
| Size                                   | Finer   | (Percent) | (X=Fail) |  |  |  |  |  |
| .375                                   | 100.0   |           |          |  |  |  |  |  |
| #4                                     | 99.0    |           |          |  |  |  |  |  |
| #10                                    | 96.7    |           |          |  |  |  |  |  |
| #20                                    | 93.4    |           |          |  |  |  |  |  |
| #40                                    | 87.3    |           |          |  |  |  |  |  |
| #60                                    | 76.6    |           |          |  |  |  |  |  |
| #100                                   | 57.1    |           |          |  |  |  |  |  |
| #200                                   | 25.6    |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
| *                                      |         |           |          |  |  |  |  |  |

|   | <b>Material Desc</b>  | <u>ription</u>                                |
|---|---|---|
| Brown silty sand  |   |   |
|   |   |   |
| Atte  | erberg Limits (A  | STM D 4318)                                   |
| PL=   | LĽ=   | PI=   |
| USCS (D 2487)=  | SM Classificat  | <u>:ion</u><br>ITO (M 145)= A-2-4(0)          |
|   | Coefficier  |   |
| <b>D<sub>90</sub>=</b> 0.5391 <b>D<sub>50</sub>=</b> 0.1277 | <b>D<sub>85</sub>=</b> 0.3641 <b>D<sub>30</sub>=</b> 0.0825 | D <sub>60</sub> = 0.1604<br>D <sub>15</sub> = |
| D <sub>10</sub> = 0.1277                                    | C <sub>u</sub> =  | C <sub>C</sub> =                              |
|   | Remarks   | <b>3</b>                                      |
| As recieved MC =  | 10.9%   |   |
|   |   |   |
| Date Received:  | 1/30/18 <b>Da</b>   | ate Tested: 1/31/18                           |
| Tested By:  | SB  |   |
| Checked By:   | MP  |   |
|   |   | er  |

Source of Sample: B-4 Sample Number: S-V-1

**Depth:** 2.5-3'

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

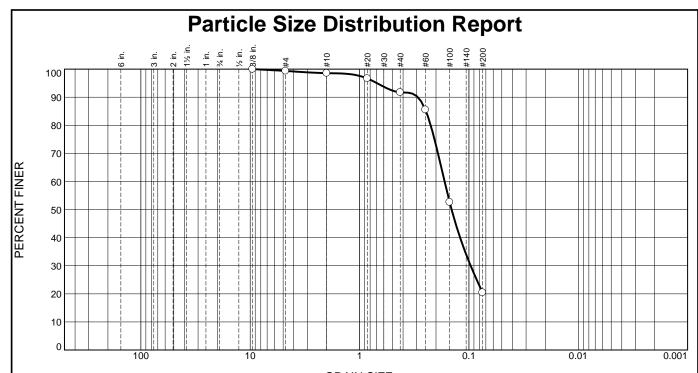
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 12/6/17

Boston, Massachusetts

**Project No:** 101038.102170



|          |       |        |       | (        | <u> GRAIN SIZE -</u> | mm.     |      |      |
|----------|-------|--------|-------|----------|----------------------|---------|------|------|
| 9/ - 211 |       | % Gı   | ravel | l % Sand |                      | % Fines |      |      |
|          | % +3" | Coarse | Fine  | Coarse   | Medium               | Fine    | Silt | Clay |
|          | 0.0   | 0.0    | 0.6   | 0.8      | 6.9                  | 71.3    | 20.4 |      |

| Test Results (ASTM D422 & ASTM D1140) |         |           |          |  |  |  |  |  |
|---------------------------------------|---------|-----------|----------|--|--|--|--|--|
| Opening                               | Percent | Spec.*    | Pass?    |  |  |  |  |  |
| Size                                  | Finer   | (Percent) | (X=Fail) |  |  |  |  |  |
| .375"                                 | 100.0   |           |          |  |  |  |  |  |
| #4                                    | 99.4    |           |          |  |  |  |  |  |
| #10                                   | 98.6    |           |          |  |  |  |  |  |
| #20                                   | 96.7    |           |          |  |  |  |  |  |
| #40                                   | 91.7    |           |          |  |  |  |  |  |
| #60                                   | 85.6    |           |          |  |  |  |  |  |
| #100                                  | 52.6    |           |          |  |  |  |  |  |
| #200                                  | 20.4    |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |

|  | <u> Material Descri</u>  | <u>ption</u>  |
|--|--|---|
| Brown silty sand   |  |   |
| <u>Att</u>   | erberg Limits (AS  | <u>TM D 4318)</u>   |
| PL=  | LL=  | PI=   |
| USCS (D 2487)=   | SM Classification SM AASHT   | on<br>O (M 145)= A-2-4(0)   |
| <b>D<sub>90</sub>=</b> 0.2930 <b>D<sub>50</sub>=</b> 0.1439 <b>D<sub>10</sub>=</b> | Coefficient D <sub>85</sub> = 0.2467 D <sub>30</sub> = 0.0964 C <sub>u</sub> = | <u>S</u><br>D <sub>60</sub> = 0.1668<br>D <sub>15</sub> =<br>C <sub>c</sub> = |
| As received MC =   | Remarks: 14.1%   |   |
| Date Received:<br>Tested By:   |  | e Tested: 12/12/17  |
| Checked By:  | MP   |   |
| Title  | Laboratory Manager   |   |

Source of Sample: B-5 Sample Number: S-1

**Depth:** 6-8'

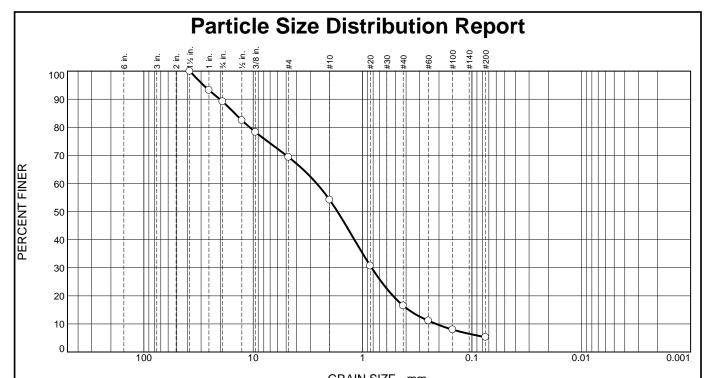
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 12/4/17



|        |       |        |       | (          | <u>GRAIN SIZE -</u> | mm.     |      |      |
|--------|-------|--------|-------|------------|---------------------|---------|------|------|
| 9/ .3" |       | % Gı   | ravel | vel % Sand |                     | % Fines |      |      |
|        | % +3" | Coarse | Fine  | Coarse     | Medium              | Fine    | Silt | Clay |
|        | 0.0   | 10.8   | 19.8  | 15.2       | 37.7                | 11.2    | 5.3  |      |

| Test Results (ASTM D422 & ASTM D1140) |         |           |          |  |  |  |  |  |  |
|---------------------------------------|---------|-----------|----------|--|--|--|--|--|--|
| Opening                               | Percent | Spec.*    | Pass?    |  |  |  |  |  |  |
| Size                                  | Finer   | (Percent) | (X=Fail) |  |  |  |  |  |  |
| 1.5"                                  | 100.0   |           |          |  |  |  |  |  |  |
| 1"                                    | 93.2    |           |          |  |  |  |  |  |  |
| .75"                                  | 89.2    |           |          |  |  |  |  |  |  |
| .5"                                   | 82.5    |           |          |  |  |  |  |  |  |
| .375"                                 | 78.3    |           |          |  |  |  |  |  |  |
| #4                                    | 69.4    |           |          |  |  |  |  |  |  |
| #10                                   | 54.2    |           |          |  |  |  |  |  |  |
| #20                                   | 30.7    |           |          |  |  |  |  |  |  |
| #40                                   | 16.5    |           |          |  |  |  |  |  |  |
| #60                                   | 11.1    |           |          |  |  |  |  |  |  |
| #100                                  | 8.0     |           |          |  |  |  |  |  |  |
| #200                                  | 5.3     |           |          |  |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |  |

Brown well-graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)
PL= LL= Pl=

PL= LL= PI=

 $\begin{array}{ccc} & & & & \\ \textbf{USCS (D 2487)=} & & SW\text{-}SM & \textbf{AASHTO (M 145)=} & A\text{-}1\text{-}b \end{array}$ 

Remarks

As received MC = 12.1%

Date Received: 12/8/17 Date Tested: 12/12/17

Tested By: RZ
Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

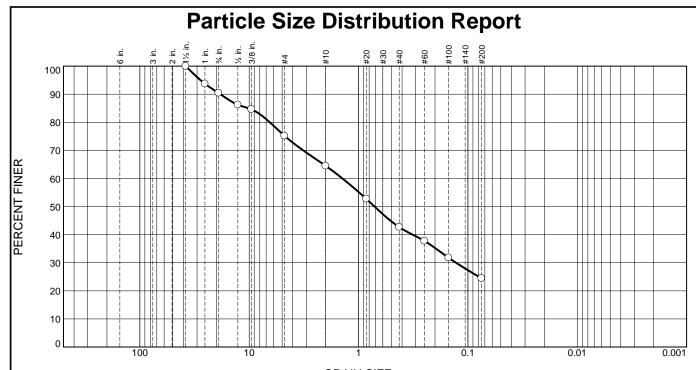
Source of Sample: B-6 Sample Number: S-1

Client: Massachusetts Water Resources Authority (MWRA)

Project: Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 12/1/17



|          | GRAIN SIZE - mm. |        |             |        |         |      |      |      |
|----------|------------------|--------|-------------|--------|---------|------|------|------|
| 0/ - 211 |                  | % G    | avel % Sand |        | % Fines |      |      |      |
|          | % +3"            | Coarse | Fine        | Coarse | Medium  | Fine | Silt | Clay |
|          | 0.0              | 9.6    | 15.2        | 10.7   | 21.8    | 18.2 | 24.5 |      |

| Test Results (ASTM D422 & ASTM D1140) |         |           |          |  |  |  |  |
|---------------------------------------|---------|-----------|----------|--|--|--|--|
| Opening                               | Percent | Spec.*    | Pass?    |  |  |  |  |
| Size                                  | Finer   | (Percent) | (X=Fail) |  |  |  |  |
| 1.5"                                  | 100.0   |           |          |  |  |  |  |
| 1"                                    | 93.7    |           |          |  |  |  |  |
| .75"                                  | 90.4    |           |          |  |  |  |  |
| .5"                                   | 86.2    |           |          |  |  |  |  |
| .375"                                 | 84.6    |           |          |  |  |  |  |
| #4                                    | 75.2    |           |          |  |  |  |  |
| #10                                   | 64.5    |           |          |  |  |  |  |
| #20                                   | 52.7    |           |          |  |  |  |  |
| #40                                   | 42.7    |           |          |  |  |  |  |
| #60                                   | 37.8    |           |          |  |  |  |  |
| #100                                  | 31.8    |           |          |  |  |  |  |
| #200                                  | 24.5    |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |

| Material Description  |  |                        |          |  |  |  |
|---|--|------------------------|----------|--|--|--|
| Brown silty sand v  | vith gravel  |                        |          |  |  |  |
|   |  |                        |          |  |  |  |
| Λ++   | rhora Limite (   | A STM D 4219           | `        |  |  |  |
| PL=   | erberg Limits (A<br>LL=  | PI=                    | 1        |  |  |  |
| USCS (D 2487)=  | SM Classifica  | ation<br>SHTO (M 145)= | A-1-b    |  |  |  |
| <b>D<sub>90</sub>=</b> 18.3462<br><b>D<sub>50</sub>=</b> 0.7141<br><b>D<sub>10</sub>=</b> | Coefficie<br>D <sub>85</sub> = 10.1034<br>D <sub>30</sub> = 0.1285<br>C <sub>u</sub> = |                        | 1.4042   |  |  |  |
|   | Remar  | ks                     |          |  |  |  |
| As received MC =  | 11.3%  |                        |          |  |  |  |
|   |  |                        |          |  |  |  |
| Date Received:  | 12/8/17  | Date Tested:           | 12/12/17 |  |  |  |
| Tested By:  | RZ   |                        |          |  |  |  |
| Checked By:   | MP   |                        |          |  |  |  |
| Title: 1  | Title: Laboratory Manager  |                        |          |  |  |  |
|   |  |                        | -        |  |  |  |

Source of Sample: B-7 Sample Number: S-3

**Depth:** 4-5.3'

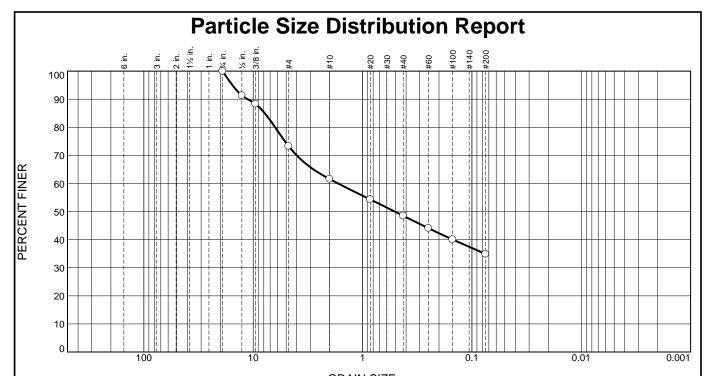
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 11/28/17



|          |        |       | (      | <u>GRAIN SIZE -</u> | mm.  |         |      |
|----------|--------|-------|--------|---------------------|------|---------|------|
| 0/ - 211 | % G    | ravel |        | % Sand              |      | % Fines |      |
| % +3"    | Coarse | Fine  | Coarse | Medium              | Fine | Silt    | Clay |
| 0.0      | 0.0    | 26.7  | 11.7   | 13.1                | 13.6 | 34.9    |      |

| Test R  | esults (ASTM [ | 0422 & ASTM D | 1140)    |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| .75"    | 100.0          |               |          |
| .5"     | 91.3           |               |          |
| .375"   | 88.3           |               |          |
| #4      | 73.3           |               |          |
| #10     | 61.6           |               |          |
| #20     | 54.3           |               |          |
| #40     | 48.5           |               |          |
| #60     | 44.1           |               |          |
| #100    | 40.1           |               |          |
| #200    | 34.9           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |

| Material Description   |  |            |                                       |  |  |  |  |  |
|--|--|------------|---------------------------------------|--|--|--|--|--|
| Dark brown silty s   | and with gra                           | vel        |                                       |  |  |  |  |  |
|  |  |            |                                       |  |  |  |  |  |
| A 44.  |  | :4- /ACTM  | D 4240\                               |  |  |  |  |  |
| PL=  | erberg Lim<br>LL=                      | Its (ASTW  | <u>D 4318)</u><br>Pl=                 |  |  |  |  |  |
|  | Class                                  | sification |                                       |  |  |  |  |  |
| USCS (D 2487)=   |  |            | <b>M 145)=</b> A-2-4(0)               |  |  |  |  |  |
|  | Coe                                    | fficients  |                                       |  |  |  |  |  |
| <b>D<sub>90</sub>=</b> 11.2557 <b>D<sub>50</sub>=</b> 0.5075 | D <sub>85</sub> = 7.8                  | 3409       | <b>D<sub>60</sub>=</b> 1.6733         |  |  |  |  |  |
| D <sub>50</sub> = 0.3073<br>D <sub>10</sub> =                | D <sub>30</sub> =<br>C <sub>11</sub> = |            | D <sub>15</sub> =<br>C <sub>c</sub> = |  |  |  |  |  |
|  | u<br>De                                | marks      | ·                                     |  |  |  |  |  |
| As received MC =   |  | illaiks    |                                       |  |  |  |  |  |
|  |  |            |                                       |  |  |  |  |  |
|  |  |            |                                       |  |  |  |  |  |
| Date Received:   |  | Date To    | ested: 12/12/17                       |  |  |  |  |  |
| Tested By:   | RZ                                     |            |                                       |  |  |  |  |  |
| Checked By:  | MP                                     |            |                                       |  |  |  |  |  |
| Title: 1   | Laboratory N                           | Manager    |                                       |  |  |  |  |  |
|  |  |            |                                       |  |  |  |  |  |

Source of Sample: B-9 Sample Number: S-1

**Depth:** 6-8'

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 11/30/17

#### **CDM Smith**

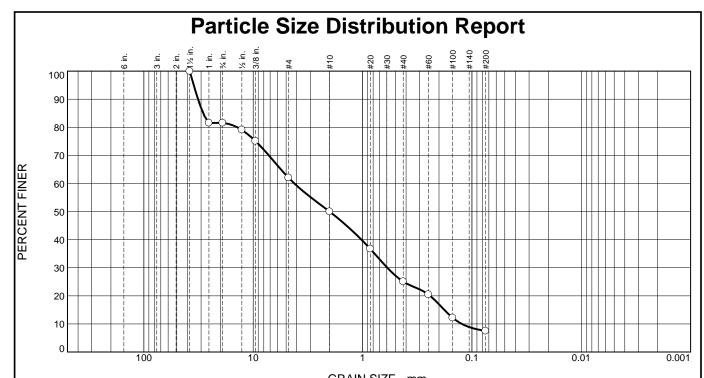
#### **Geotechnical Engineering Laboratory**

### Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

| Client:            | Massachusetts Water Resources Authority |              |            |
|--------------------|---|--------------|------------|
| Project Name:      | Weston Aqueduct Supply Main 3           | Tested By:   | MP         |
| Project Location:  | MWRA line, MA                           | Test Date:   | 12/12/2017 |
| Project Number:    | 101038-102170                           | •            |            |
| Boring Number:     | B-9                                     | Procedure:   | С          |
| Sample Number:     | S-1                                     | Temperature: | 440° C     |
| Sample Depth (ft): | 6-8                                     | •            |            |
| Sample Date:       | 11/30/2017                              |              |            |

| AS RECEIVED MOISTURE CONTEN  | T      |
|------------------------------|--------|
| Tin Mass (g)                 | 126.65 |
| Wet Mass of Sample & Tin (g) | 169.30 |
| Dry Mass of Sample & Tin (g) | 158.94 |
| Mass of Water (g)            | 10.36  |
| Mass of Dry Soil (g)         | 32.29  |
| Moisture Content (%)         | 32.1   |

| ASH CONTENT                          |        |  |  |  |  |
|--------------------------------------|--------|--|--|--|--|
| Porcelain Dish Mass (g)              | 126.65 |  |  |  |  |
| Porcelain Dish + Oven Dried Soil (g) | 158.94 |  |  |  |  |
| Mass of Oven Dried Soil (g)          | 32.29  |  |  |  |  |
| Mass of Dish & Burned Soil (g)       | 157.94 |  |  |  |  |
| Mass of Burned Soil (g)              | 31.29  |  |  |  |  |
| Mass of Organic Material (g)         | 1.00   |  |  |  |  |
| Ash Content (%)                      | 96.9   |  |  |  |  |
|                                      |        |  |  |  |  |
| Organic Content (%)                  | 3.1    |  |  |  |  |



|          |        |       | (      | <u> JRAIN SIZE -</u> | mm.  |         |      |
|----------|--------|-------|--------|----------------------|------|---------|------|
| 0/ - 211 | % Gı   | ravel |        | % Sand               |      | % Fines |      |
| % +3"    | Coarse | Fine  | Coarse | Medium               | Fine | Silt    | Clay |
| 0.0      | 18.4   | 19.6  | 12.0   | 24.9                 | 17.6 | 7.5     |      |

| esuits (ASTIVI L | 0422 & ASTM D   | )1140)  |
|------------------|---|---|
| Percent          | Spec.*  | Pass?   |
| Finer            | (Percent)   | (X=Fail)  |
| 100.0            |   |   |
| 81.6             |   |   |
| 81.6             |   |   |
| 79.1             |   |   |
| 75.1             |   |   |
| 62.0             |   |   |
| 50.0             |   |   |
| 36.7             |   |   |
| 25.1             |   |   |
| 20.5             |   |   |
| 12.2             |   |   |
| 7.5              |   |   |
|                  |   |   |
|                  |   |   |
|                  |   |   |
|                  |   |   |
|                  |   |   |
|                  |   |   |
|                  |   |   |
|                  |   |   |
|                  |   |   |
|                  | Percent Finer 100.0 81.6 81.6 79.1 75.1 62.0 50.0 36.7 25.1 20.5 12.2 | Percent         Spec.*           Finer         (Percent)           100.0         81.6           81.6         79.1           75.1         62.0           50.0         36.7           25.1         20.5           12.2         12.2 |

Brown poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)
PL= LL= Pl=

Classification

USCS (D 2487)= SP-SM **AASHTO** (M 145)= A-1-a

Remarks

As received MC = 5.1%

Date Received: 12/8/17 Date Tested: 12/12/17

Tested By: RZ
Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-10 Depth: 2-4' Sample Number: S-2

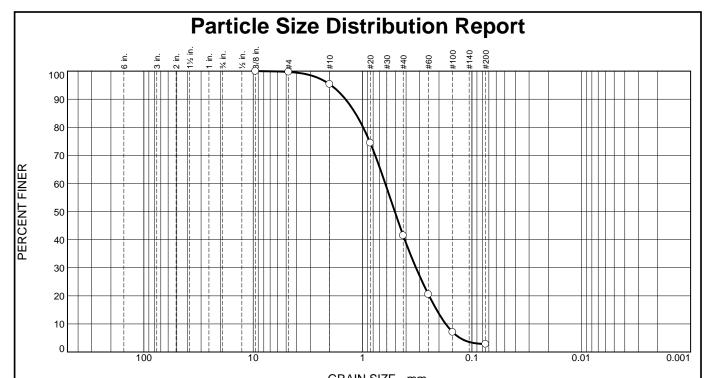
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 11/27/17



|         |        |       | (      | <u>GRAIN SIZE -</u> | mm.  |         |      |
|---------|--------|-------|--------|---------------------|------|---------|------|
| 0/ - 21 | % Gı   | ravel |        | % Sand              |      | % Fines |      |
| % +3"   | Coarse | Fine  | Coarse | Medium              | Fine | Silt    | Clay |
| 0.0     | 0.0    | 0.3   | 4.4    | 53.8                | 38.7 | 2.8     |      |

| Test Results (ASTM D422 & ASTM D1140) |   |  |  |  |  |  |  |  |
|---------------------------------------|---|--|--|--|--|--|--|--|
| Percent                               | Spec.*                                    | Pass?  |  |  |  |  |  |  |
| Finer                                 | (Percent)                                 | (X=Fail)   |  |  |  |  |  |  |
| 100.0                                 |   |  |  |  |  |  |  |  |
| 99.7                                  |   |  |  |  |  |  |  |  |
| 95.3                                  |   |  |  |  |  |  |  |  |
| 74.4                                  |   |  |  |  |  |  |  |  |
|                                       |   |  |  |  |  |  |  |  |
|                                       |   |  |  |  |  |  |  |  |
|                                       |   |  |  |  |  |  |  |  |
| 2.8                                   |   |  |  |  |  |  |  |  |
|                                       |   |  |  |  |  |  |  |  |
|                                       |   |  |  |  |  |  |  |  |
|                                       |   |  |  |  |  |  |  |  |
|                                       |   |  |  |  |  |  |  |  |
|                                       |   |  |  |  |  |  |  |  |
|                                       |   |  |  |  |  |  |  |  |
|                                       |   |  |  |  |  |  |  |  |
|                                       |   |  |  |  |  |  |  |  |
|                                       |   |  |  |  |  |  |  |  |
|                                       |   |  |  |  |  |  |  |  |
|                                       |   |  |  |  |  |  |  |  |
|                                       |   |  |  |  |  |  |  |  |
|                                       | Percent<br>Finer<br>100.0<br>99.7<br>95.3 | Percent Spec.* (Percent)  100.0 99.7 95.3 74.4 41.5 20.5 7.1 |  |  |  |  |  |  |

Gray-brown poorly graded sand

Atterberg Limits (ASTM D 4318)

PL=

Coefficients

 D90=
 1.4319
 D85=
 1.1628
 D60=
 0.6201

 D50=
 0.5072
 D30=
 0.3246
 D15=
 0.2100

 D10=
 0.1737
 Cu=
 3.57
 Cc=
 0.98

Remarks

As received MC = 21.3%

Date Received: 12/8/17 Date Tested: 12/14/17

Tested By:  $\underline{RZ}$ 

Checked By: MP

Title: Laboratory Manager

(no specification provided)

Source of Sample: B-10 Sample Number: S-4

**Depth:** 6-8'

Client: Massachusetts Water Resources Authority (MWRA)

**Date Sampled:** 11/27/17

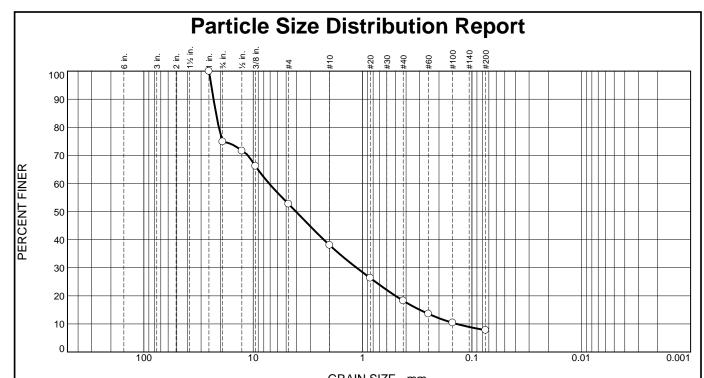
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

acnusetts Project No: 101038.102170 Figure

**CDM Smith** 

**Boston, Massachusetts** 



|         |        |       | (      | <u>GRAIN SIZE -</u> | mm.  |         |      |
|---------|--------|-------|--------|---------------------|------|---------|------|
| 0/ - 21 | % Gı   | ravel |        | % Sand              |      | % Fines |      |
| % +3"   | Coarse | Fine  | Coarse | Medium              | Fine | Silt    | Clay |
| 0.0     | 25.1   | 22.2  | 14.7   | 19.7                | 10.5 | 7.8     |      |

| Test Results (ASTM D422 & ASTM D1140) |         |           |          |  |  |  |  |  |
|---------------------------------------|---------|-----------|----------|--|--|--|--|--|
| Opening                               | Percent | Spec.*    | Pass?    |  |  |  |  |  |
| Size                                  | Finer   | (Percent) | (X=Fail) |  |  |  |  |  |
| 1"                                    | 100.0   |           |          |  |  |  |  |  |
| .75"                                  | 74.9    |           |          |  |  |  |  |  |
| .5"                                   | 71.6    |           |          |  |  |  |  |  |
| .375"                                 | 66.2    |           |          |  |  |  |  |  |
| #4                                    | 52.7    |           |          |  |  |  |  |  |
| #10                                   | 38.0    |           |          |  |  |  |  |  |
| #20                                   | 26.3    |           |          |  |  |  |  |  |
| #40                                   | 18.3    |           |          |  |  |  |  |  |
| #60                                   | 13.6    |           |          |  |  |  |  |  |
| #100                                  | 10.4    |           |          |  |  |  |  |  |
| #200                                  | 7.8     |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |
|                                       |         |           |          |  |  |  |  |  |

Dark brown well-graded gravel with silt and sand

Atterberg Limits (ASTM D 4318) LL= PI=

PL=

Classification

USCS (D 2487)= GW-GM AASHTO (M 145)= A-1-a

Coefficients

 D90=
 23.0722
 D85=
 21.8991
 D60=
 7.1641

 D50=
 4.0649
 D30=
 1.1331
 D15=
 0.2990

 D10=
 0.1378
 Cu=
 52.00
 Cc=
 1.30

Remarks

As received MC = 10.5%

**Date Tested:** 12/12/17

Date Received: 12/8/17 Tested By: RZ

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-11 Sample Number: S-3

**Depth:** 4-6'

**Date Sampled:** 11/14/17

**Figure** 

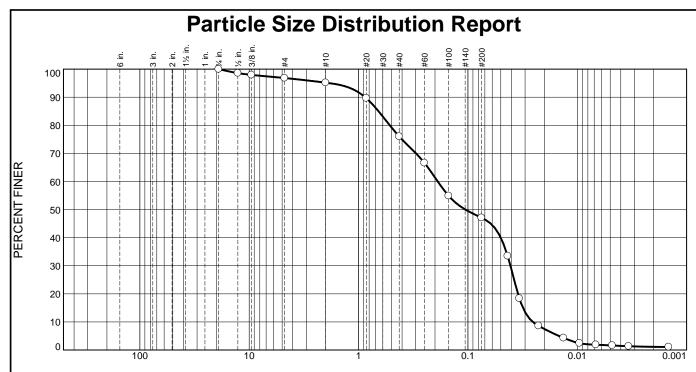
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts Project No: 101038.102170



|          |        |              | (      | <u> GRAIN SIZE -</u> | mm.  |      |      |
|----------|--------|--------------|--------|----------------------|------|------|------|
| 0/ - 211 | % Gr   | ravel % Sand |        | % Fines              |      |      |      |
| % +3"    | Coarse | Fine         | Coarse | Medium               | Fine | Silt | Clay |
| 0.0      | 0.0    | 3.2          | 1.6    | 19.2                 | 28.9 | 45.4 | 1.7  |

| Test R          | esults (ASTM I | 0422 & ASTM D | 1140)    |
|-----------------|----------------|---------------|----------|
| Opening Percent |                | Spec.*        | Pass?    |
| Size            | Finer          | (Percent)     | (X=Fail) |
| .75"            | 100.0          |               |          |
| .5"             | 98.6           |               |          |
| .375"           | 97.9           |               |          |
| #4              | 96.8           |               |          |
| #10             | 95.2           |               |          |
| #20             | 89.7           |               |          |
| #40             | 76.0           |               |          |
| #60             | 66.6           |               |          |
| #100            | 54.9           |               |          |
| #200            | 47.1           |               |          |
| 0.0433 mm.      | 33.5           |               |          |
| 0.0338 mm.      | 18.4           |               |          |
| 0.0226 mm.      | 8.6            |               |          |
| 0.0133 mm.      | 4.3            |               |          |
| 0.0095 mm.      | 2.4            |               |          |
| 0.0068 mm.      | 1.9            |               |          |
| 0.0048 mm.      | 1.6            |               |          |
| 0.0034 mm.      | 1.3            |               |          |
| 0.0015 mm.      | 1.1            |               |          |
|                 |                |               |          |
|                 |                |               |          |

| Brown silty sand   | <u>Material Description</u>  |  |  |  |  |  |
|--|--|--|--|--|--|--|
| PL= NP   | rberg Limits (ASTM D 4318)<br>LL= NV PI= NP  |  |  |  |  |  |
| USCS (D 2487)=   | SM Classification (M 145)= A-4(0)  |  |  |  |  |  |
| D <sub>90</sub> = 0.8694<br>D <sub>50</sub> = 0.1054<br>D <sub>10</sub> = 0.0255 | Coefficients         D85= 0.6567       D60= 0.1887         D30= 0.0408       D15= 0.0314         Cu= 7.40       Cc= 0.35 |  |  |  |  |  |
| Remarks As received MC = $4.2\%$   |  |  |  |  |  |  |
| Date Received:<br>Tested By:   |  |  |  |  |  |  |
| Checked By:  | MP   |  |  |  |  |  |
| Title:   | Laboratory Manager   |  |  |  |  |  |

Source of Sample: B-11 Sample Number: S-5

**Depth:** 8-10'

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

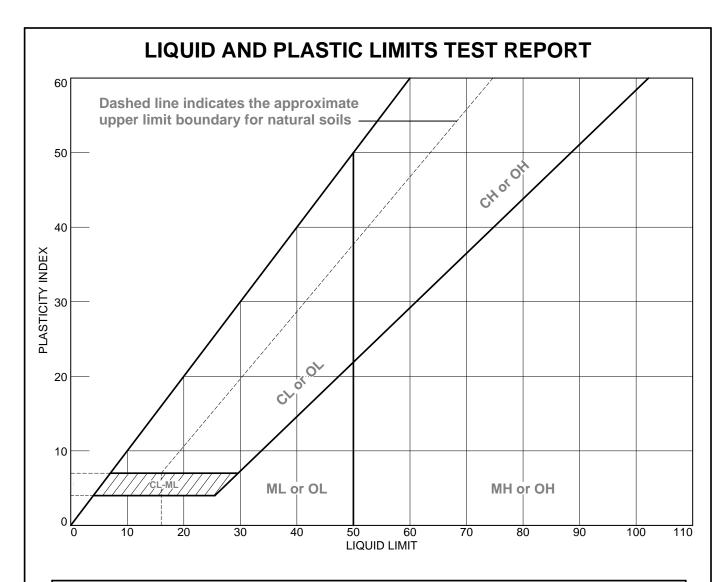
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 11/14/17

**Project No:** 101038.102170 **Figure** 

**Boston, Massachusetts** 



|        | SOIL DATA |               |       |                                    |                         |                        |                            |      |
|--------|-----------|---------------|-------|------------------------------------|-------------------------|------------------------|----------------------------|------|
| SYMBOL | SOURCE    | SAMPLE<br>NO. | DEPTH | NATURAL<br>WATER<br>CONTENT<br>(%) | PLASTIC<br>LIMIT<br>(%) | LIQUID<br>LIMIT<br>(%) | PLASTICITY<br>INDEX<br>(%) | uscs |
| •      | B-11      | S-5           | 8-10' | 4.2                                | NP                      | NV                     | NP                         | SM   |

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

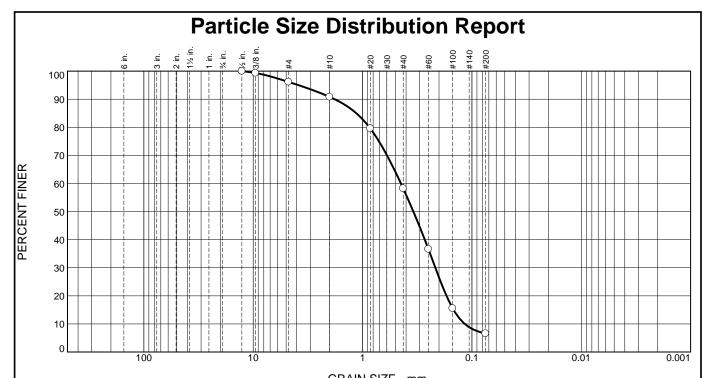
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts** 

**Project No.:** 101038.102170 Figure

Tested By: RZ Checked By: MP



|        |       |        |               |        | <u>GRAIN SIZE -</u> | mm.  |      |      |
|--------|-------|--------|---------------|--------|---------------------|------|------|------|
| 0/ .2" |       | % G    | Gravel % Sand |        | % Fines             |      |      |      |
|        | % +3" | Coarse | Fine          | Coarse | Medium              | Fine | Silt | Clay |
|        | 0.0   | 0.0    | 3.9           | 5.3    | 32.6                | 51.6 | 6.6  |      |

| Test F  | Test Results (ASTM D422 & ASTM D1140) |           |          |  |  |  |  |  |  |
|---------|---------------------------------------|-----------|----------|--|--|--|--|--|--|
| Opening | Percent                               | Spec.*    | Pass?    |  |  |  |  |  |  |
| Size    | Finer                                 | (Percent) | (X=Fail) |  |  |  |  |  |  |
| .5"     | 100.0                                 |           |          |  |  |  |  |  |  |
| .375"   | 99.3                                  |           |          |  |  |  |  |  |  |
| #4      | 96.1                                  |           |          |  |  |  |  |  |  |
| #10     | 90.8                                  |           |          |  |  |  |  |  |  |
| #20     | 79.6                                  |           |          |  |  |  |  |  |  |
| #40     | 58.2                                  |           |          |  |  |  |  |  |  |
| #60     | 36.6                                  |           |          |  |  |  |  |  |  |
| #100    | 15.6                                  |           |          |  |  |  |  |  |  |
| #200    | 6.6                                   |           |          |  |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |  |
| *       | .:6:                                  |           |          |  |  |  |  |  |  |

#### 

**Material Description** 

(no specification provided)

Source of Sample: B-12 Sample Number: S-2

**Depth:** 8-10'

CDM Smith

Client: Massachusetts Water Resources Authority (MWRA)

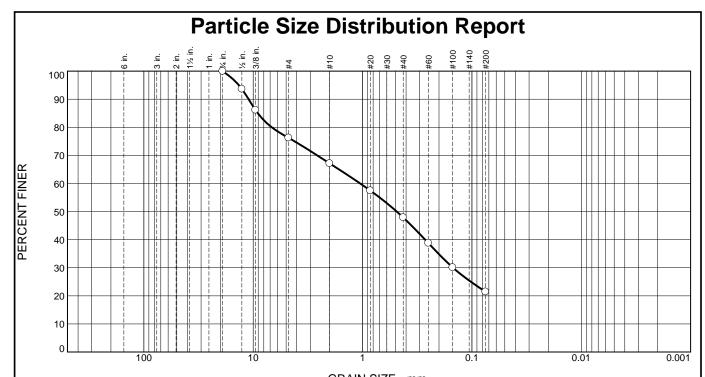
Title: Laboratory Manager

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Checked By: MP

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 11/29/17



|         |       |        |                 | (      | <u> - RAIN SIZE</u> | mm.  |      |      |
|---------|-------|--------|-----------------|--------|---------------------|------|------|------|
| 9/ - 21 |       | % Gı   | % Gravel % Sand |        | % Fines             |      |      |      |
|         | % +3" | Coarse | Fine            | Coarse | Medium              | Fine | Silt | Clay |
|         | 0.0   | 0.0    | 23.7            | 9.1    | 19.3                | 26.4 | 21.5 |      |

| Test Results (ASTM D6913 & ASTM D1140) |         |           |          |  |  |  |  |  |
|--|---------|-----------|----------|--|--|--|--|--|
| Opening                                | Percent | Spec.*    | Pass?    |  |  |  |  |  |
| Size                                   | Finer   | (Percent) | (X=Fail) |  |  |  |  |  |
| .75                                    | 100.0   |           |          |  |  |  |  |  |
| .5                                     | 93.6    |           |          |  |  |  |  |  |
| .375                                   | 86.1    |           |          |  |  |  |  |  |
| #4                                     | 76.3    |           |          |  |  |  |  |  |
| #10                                    | 67.2    |           |          |  |  |  |  |  |
| #20                                    | 57.5    |           |          |  |  |  |  |  |
| #40                                    | 47.9    |           |          |  |  |  |  |  |
| #60                                    | 38.8    |           |          |  |  |  |  |  |
| #100                                   | 30.1    |           |          |  |  |  |  |  |
| #200                                   | 21.5    |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |

| Material Description   |   |   |  |  |  |  |
|--|---|---|--|--|--|--|
| Brown silty sand v   | with gravel   |   |  |  |  |  |
|  |   |   |  |  |  |  |
| Λ 44.  | orbora Limito (A)   | CTM D 4240)   |  |  |  |  |
| PL=  | erberg Limits (A:<br>LL=  | Pl=   |  |  |  |  |
| USCS (D 2487)=   | SM Classificat  | <u>ion</u><br>I <b>TO (M 145)=</b>                                |  |  |  |  |
| D <sub>90</sub> = 11.0216<br>D <sub>50</sub> = 0.4868<br>D <sub>10</sub> = | Coefficier D <sub>85</sub> = 9.0688 D <sub>30</sub> = 0.1488 C <sub>u</sub> = | D <sub>60</sub> = 1.0508<br>D <sub>15</sub> =<br>C <sub>c</sub> = |  |  |  |  |
|  | Remarks   | <b>.</b>  |  |  |  |  |
| As recieved MC =   | 4.0%  |   |  |  |  |  |
|  |   |   |  |  |  |  |
| Date Received:   | 1/30/18 <b>Da</b>   | ate Tested: 1/31/18   |  |  |  |  |
| Tested By:   | SB  |   |  |  |  |  |
| Checked By:  | Checked By: MP  |   |  |  |  |  |
| Title: Laboratory Manager  |   |   |  |  |  |  |
|  |   |   |  |  |  |  |

Source of Sample: B-13 Sample Number: S-4

**Depth:** 6-8'

**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

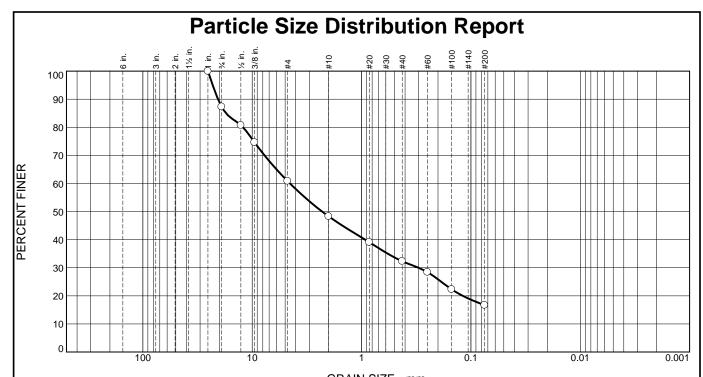
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 12/12/17

**Boston, Massachusetts** 

**Project No:** 101038.102170



|        |       |        |               | (      | <u> - RAIN SIZE</u> | · mm. |      |      |
|--------|-------|--------|---------------|--------|---------------------|-------|------|------|
| 0/ .2" |       | % Gı   | Gravel % Sand |        | % Fines             |       |      |      |
|        | % +3" | Coarse | Fine          | Coarse | Medium              | Fine  | Silt | Clay |
|        | 0.0   | 12.7   | 26.4          | 12.6   | 16.0                | 15.6  | 16.7 |      |

| Test Results (ASTM D422 & ASTM D1140) |         |           |          |  |  |  |  |
|---------------------------------------|---------|-----------|----------|--|--|--|--|
| Opening                               | Percent | Spec.*    | Pass?    |  |  |  |  |
| Size                                  | Finer   | (Percent) | (X=Fail) |  |  |  |  |
| 1"                                    | 100.0   |           |          |  |  |  |  |
| .75"                                  | 87.3    |           |          |  |  |  |  |
| .5"                                   | 80.7    |           |          |  |  |  |  |
| .375"                                 | 74.6    |           |          |  |  |  |  |
| #4                                    | 60.9    |           |          |  |  |  |  |
| #10                                   | 48.3    |           |          |  |  |  |  |
| #20                                   | 39.1    |           |          |  |  |  |  |
| #40                                   | 32.3    |           |          |  |  |  |  |
| #60                                   | 28.4    |           |          |  |  |  |  |
| #100                                  | 22.3    |           |          |  |  |  |  |
| #200                                  | 16.7    |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |

|  | Material Description   |   |  |  |  |  |  |
|--|--|---|--|--|--|--|--|
| Brown silty sand v   | vith gravel  |   |  |  |  |  |  |
|  |  |   |  |  |  |  |  |
| Δ++  | erberg Limits (ASTM  | D 4318)                                       |  |  |  |  |  |
| PL=  | LL=  | PI=   |  |  |  |  |  |
|  | Classification   |   |  |  |  |  |  |
| USCS (D 2487)=   | SM AASHTO (I   | <b>M 145)=</b> A-1-b                          |  |  |  |  |  |
|  | Coefficients   |   |  |  |  |  |  |
| <b>D<sub>90</sub>=</b> 20.5433 <b>D<sub>50</sub>=</b> 2.2920 | <b>D<sub>85</sub>=</b> 17.3554 <b>D<sub>30</sub>=</b> 0.3019 | D <sub>60</sub> = 4.5101<br>D <sub>15</sub> = |  |  |  |  |  |
| D <sub>10</sub> = 2.2720                                     | C <sub>u</sub> =   | C <sub>c</sub> =                              |  |  |  |  |  |
|  | Remarks  |   |  |  |  |  |  |
| As received MC =   | 7.5%   |   |  |  |  |  |  |
|  |  |   |  |  |  |  |  |
|  |  |   |  |  |  |  |  |
| Date Received:   |  | <b>ested:</b> 12/13/17                        |  |  |  |  |  |
| Tested By:   | KZ   |   |  |  |  |  |  |
| Checked By:  | MP   |   |  |  |  |  |  |
| Title:   | Laboratory Manager   |   |  |  |  |  |  |
|  |  |   |  |  |  |  |  |

Source of Sample: B-14 Sample Number: S-2 **Depth:** 2-2.5'

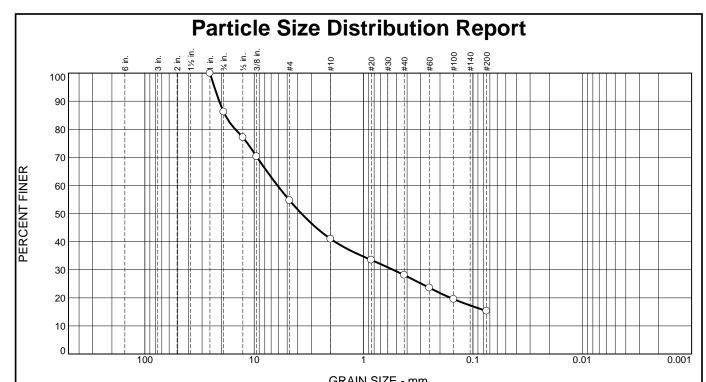
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Date Sampled: 11/7/17



| ı |              | GRAIN SIZE - MM. |      |           |        |      |      |      |
|---|--------------|------------------|------|-----------|--------|------|------|------|
| I | 0/ - 21      | % Gravel % Sand  |      | I % Fines |        |      |      |      |
| ı | <b>% +3"</b> | Coarse           | Fine | Coarse    | Medium | Fine | Silt | Clay |
| ĺ | 0.0          | 13.8             | 31.5 | 13.7      | 12.9   | 12.8 | 15.3 |      |

| Test R  | esults (ASTM I | 0422 & ASTM D | 1140)    |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1"      | 100.0          |               |          |
| .75"    | 86.2           |               |          |
| .5"     | 77.1           |               |          |
| .375"   | 70.3           |               |          |
| #4      | 54.7           |               |          |
| #10     | 41.0           |               |          |
| #20     | 33.5           |               |          |
| #40     | 28.1           |               |          |
| #60     | 23.6           |               |          |
| #100    | 19.5           |               |          |
| #200    | 15.3           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |

|  | Material Descripti   | <u>on</u>   |
|--|--|---|
| Brown silty grave  | l with sand  |   |
|  |  |   |
| Δ++.   | erberg Limits (ASTM  | D 4318)   |
| PL=  | LL=  | PI=   |
| USCS (D 2487)=   | GM Classification AASHTO   | ( <b>M 145)=</b> A-1-a  |
| D <sub>90</sub> = 20.8855<br>D <sub>50</sub> = 3.6958<br>D <sub>10</sub> = | Coefficients D <sub>85</sub> = 18.3864 D <sub>30</sub> = 0.5376 C <sub>u</sub> = | D <sub>60</sub> = 6.1286<br>D <sub>15</sub> =<br>C <sub>c</sub> = |
|  | Remarks  |   |
| As received MC =   | 9.1%   |   |
|  |  |   |
| Date Received:   | 12/8/17 <b>Date T</b>  | ested: 12/12/17   |
| Tested By:   | RZ   |   |
| Checked By:  | MP   |   |
| Title:   | Laboratory Manager   |   |
|  |  |   |

Source of Sample: B-16 Dept Sample Number: S-2

**Depth:** 2-4'

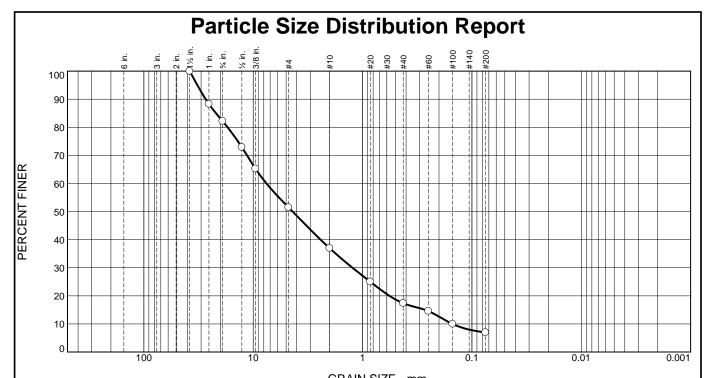
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 11/21/17



|          |                 |      | (       | <u> JRAIN SIZE -</u> | mm.  |      |      |
|----------|-----------------|------|---------|----------------------|------|------|------|
| 0/ - 211 | % Gravel % Sand |      | % Fines |                      |      |      |      |
| % +3"    | Coarse          | Fine | Coarse  | Medium               | Fine | Silt | Clay |
| 0.0      | 17.8            | 30.7 | 14.6    | 19.5                 | 10.5 | 6.9  |      |

| Test R  | esults (ASTM I | 0422 & ASTM D | 1140)    |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1.5"    | 100.0          |               |          |
| 1"      | 88.3           |               |          |
| .75"    | 82.2           |               |          |
| .5"     | 72.9           |               |          |
| .375"   | 65.3           |               |          |
| #4      | 51.5           |               |          |
| #10     | 36.9           |               |          |
| #20     | 25.0           |               |          |
| #40     | 17.4           |               |          |
| #60     | 14.5           |               |          |
| #100    | 10.0           |               |          |
| #200    | 6.9            |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
| * /     |                | 1)            | l        |

Gray-brown well-graded gravel with silt and sand

Atterberg Limits (ASTM D 4318)
LL= PI=

PL=

Classification

USCS (D 2487)= GW-GM AASHTO (M 145)= A-1-a

Coefficients

 D90=
 27.2148
 D85=
 21.9000
 D60=
 7.5619

 D50=
 4.3591
 D30=
 1.2356
 D15=
 0.2684

 D10=
 0.1507
 Cu=
 50.18
 Cc=
 1.34

Remarks

As received MC = 8.5%

Date Received: 12/8/17 Date Tested: 12/12/17

Tested By: RZ
Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

**CDM Smith** 

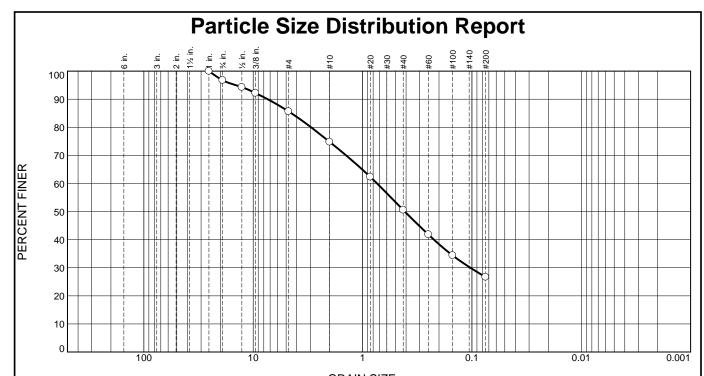
Source of Sample: B-17 Sample Number: S-3 **Depth:** 4-6'

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Date Sampled: 11/7/17



|         |        |                 | (      | <u> JRAIN SIZE -</u> | mm.  |      |      |
|---------|--------|-----------------|--------|----------------------|------|------|------|
| 0/ - 21 | % G    | % Gravel % Sand |        | % Fines              |      |      |      |
| % +3"   | Coarse | Fine            | Coarse | Medium               | Fine | Silt | Clay |
| 0.0     | 3.2    | 11.1            | 10.9   | 24.2                 | 23.9 | 26.7 |      |

| Test F  | Results (ASTM D | 6913 & ASTM I | D1140)   |
|---------|-----------------|---------------|----------|
| Opening | Percent         | Spec.*        | Pass?    |
| Size    | Finer           | (Percent)     | (X=Fail) |
| 1       | 100.0           |               |          |
| .75     | 96.8            |               |          |
| .5      | 94.3            |               |          |
| .375    | 92.2            |               |          |
| #4      | 85.7            |               |          |
| #10     | 74.8            |               |          |
| #20     | 62.3            |               |          |
| #40     | 50.6            |               |          |
| #60     | 41.8            |               |          |
| #100    | 34.4            |               |          |
| #200    | 26.7            |               |          |
|         |                 |               |          |
|         |                 |               |          |
|         |                 |               |          |
|         |                 |               |          |
|         |                 |               |          |
|         |                 |               |          |
|         |                 |               |          |
|         |                 |               |          |
|         |                 |               |          |
| *       |                 |               |          |

|   | <b>Material Desc</b>  | <u>ription</u>  |
|---|---|---|
| Brown silty sand  |   |   |
|   |   |   |
| Atte  | erberg Limits (A  | STM D 4318)   |
| PL=   | LL=   | Pl=   |
| USCS (D 2487)=  | SM Classificat  | i <u>on</u><br>TO (M 145)= A-2-4(0)                               |
| D <sub>90</sub> = 7.3800<br>D <sub>50</sub> = 0.4110<br>D <sub>10</sub> = | Coefficier D <sub>85</sub> = 4.4718 D <sub>30</sub> = 0.1033 C <sub>u</sub> = | D <sub>60</sub> = 0.7369<br>D <sub>15</sub> =<br>C <sub>c</sub> = |
|   | Remarks   | <b>i</b>  |
| As recieved MC =  | 11.6%   |   |
|   |   |   |
| Date Received:  | 1/30/18 <b>Da</b>   | te Tested: 1/31/18  |
| Tested By:  | SB  |   |
| Checked By:   | MP  |   |
|   |   | er  |

**Date Sampled:** 12/15/17

(no specification provided)

Source of Sample: B-18 Sample Number: S-5

**Depth:** 9-10.5'

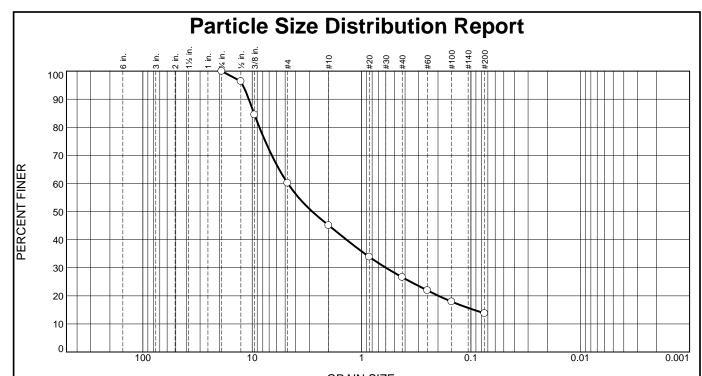
#### **CDM Smith**

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts Project No:** 101038.102170



|          |        |                 | (      | <u>GRAIN SIZE -</u> | mm.  |      |      |
|----------|--------|-----------------|--------|---------------------|------|------|------|
| 0/ - 211 | % G    | % Gravel % Sand |        | % Fines             |      |      |      |
| % +3"    | Coarse | Fine            | Coarse | Medium              | Fine | Silt | Clay |
| 0.0      | 0.0    | 39.8            | 15.1   | 18.5                | 12.8 | 13.8 |      |

| Test R  | esults (ASTM D | 6913 & ASTM [ | D1140)   |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| .75     | 100.0          |               |          |
| .5      | 96.4           |               |          |
| .375    | 84.5           |               |          |
| #4      | 60.2           |               |          |
| #10     | 45.1           |               |          |
| #20     | 33.9           |               |          |
| #40     | 26.6           |               |          |
| #60     | 21.9           |               |          |
| #100    | 17.9           |               |          |
| #200    | 13.8           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
| * ,     | .:c:           |               |          |

|   | Material Desc                                | <u>cription</u>                              |
|---|--|--|
| Brown silty sand v                            | vith gravel                                  |  |
|   |  |  |
| A 44 -  |  | OTM D 4040)                                  |
| PL=   | erberg Limits (A<br>LL=                      | 13   N   D   43   18  <br>Pl=                |
| -   | Classifies                                   | <br>41am                                     |
| USCS (D 2487)=                                | SM AASI                                      | HTO (M 145)= A-1-a                           |
|   | Coefficie                                    | nts  |
| <b>D<sub>90</sub>=</b> 10.7458                | D <sub>85</sub> = 9.6325                     | D <sub>60</sub> = 4.7194                     |
| D <sub>50</sub> = 2.8244<br>D <sub>10</sub> = | D <sub>30</sub> = 0.5985<br>C <sub>u</sub> = | D <sub>15</sub> = 0.0937<br>C <sub>c</sub> = |
| - 10-   | -  | · ·  |
| As recieved MC =                              | Remark                                       | S  |
| As recieved MC =                              | 9.170  |  |
|   |  |  |
| Date Received:                                | 1/30/18 <b>D</b>                             | ate Tested: 1/31/18                          |
| Tested By:                                    | SB   |  |
| Checked By:                                   |  |  |
|   |  |  |
| Title:  | Laboratory Manag                             | ger  |

Source of Sample: B-19 Sample Number: S-3

**Depth:** 4-6'

**CDM Smith** 

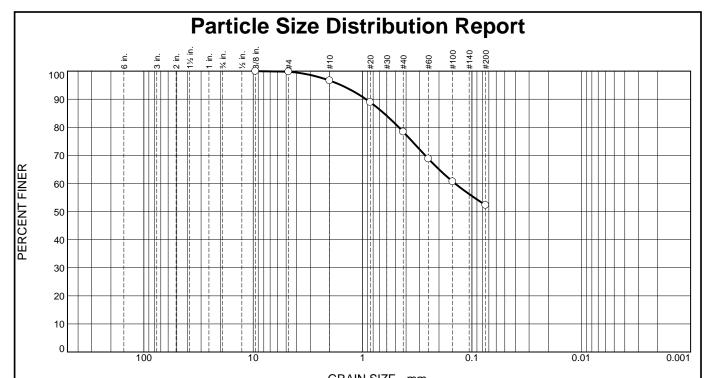
**Client:** Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 12/14/17

Boston, Massachusetts Project No: 101038.102170



|          |        |       | (      | <u> - RAIN SIZE</u> | mm.  |         |      |
|----------|--------|-------|--------|---------------------|------|---------|------|
| 0/ - 211 | % Gı   | ravel |        | % Sand              |      | % Fines |      |
| % +3"    | Coarse | Fine  | Coarse | Medium              | Fine | Silt    | Clay |
| 0.0      | 0.0    | 0.2   | 3.2    | 18.2                | 26.1 | 52.3    |      |

| Test Re | esults (ASTM D | 6913 & ASTM I | D1140)   |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| .375    | 100.0          |               |          |
| #4      | 99.8           |               |          |
| #10     | 96.6           |               |          |
| #20     | 88.9           |               |          |
| #40     | 78.4           |               |          |
| #60     | 68.8           |               |          |
| #100    | 60.7           |               |          |
| #200    | 52.3           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
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|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
| *       |                |               |          |

# Gray-brown sandy silt with organics Atterberg Limits (ASTM D 4318) PL= LL= Pl=

**Material Description** 

 $\begin{array}{ccc} & & \underline{\textbf{Classification}} \\ \textbf{USCS (D 2487)=} & & \text{ML} & & \textbf{AASHTO (M 145)=} & \text{A-4}(0) \end{array}$ 

Coefficients

Remarks

As recieved MC = 22.9%

Date Received: 1/30/18 Date Tested: 1/31/18
Tested By: SB

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-20 Depth: 2-4' Sample Number: S-2

CDM Smith Client: Mass

Client: Massachusetts Water Resources Authority (MWRA)

ct: Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 12/13/17

Boston, Massachusetts Project No: 101038.102170

# **CDM Smith**

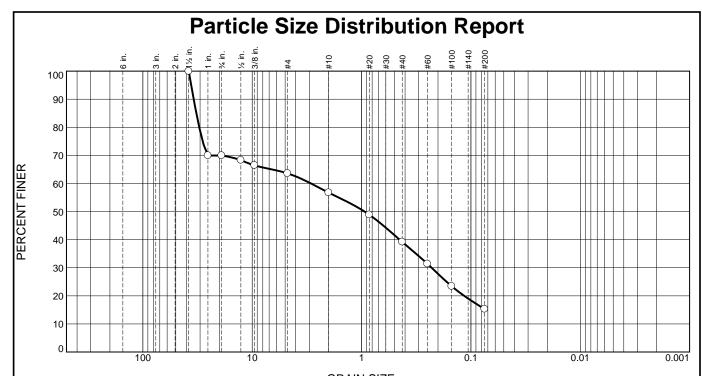
# **Geotechnical Engineering Laboratory**

# Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

Client: Massachusetts Water Resources Authority Weston Aqueduct Supply Main 3 Tested By: Project Name: MWRA line, MA Test Date: 1/31/2017 Project Location: Project Number: 101038-102170 Boring Number: B-20 Procedure: S-2 Temperature: 440° C Sample Number: Sample Depth (ft): 2-4 Sample Date: 12/13/2017

| AS RECEIVED MOISTURE CONTENT |        |
|------------------------------|--------|
| Tin Mass (g)                 | 126.70 |
| Wet Mass of Sample & Tin (g) | 212.00 |
| Dry Mass of Sample & Tin (g) | 196.26 |
| Mass of Water (g)            | 15.74  |
| Mass of Dry Soil (g)         | 69.56  |
| Moisture Content (%)         | 22.6   |

| ASH CONTENT                          |        |
|--------------------------------------|--------|
| Porcelain Dish Mass (g)              | 126.70 |
| Porcelain Dish + Oven Dried Soil (g) | 196.26 |
| Mass of Oven Dried Soil (g)          | 69.56  |
| Mass of Dish & Burned Soil (g)       | 194.00 |
| Mass of Burned Soil (g)              | 67.30  |
| Mass of Organic Material (g)         | 2.26   |
| Ash Content (%)                      | 96.8   |
|                                      |        |
| Organic Content (%)                  | 3.2    |



|               |        |       |        | <u>GRAIN SIZE -</u> | · mm. |         |      |  |
|---------------|--------|-------|--------|---------------------|-------|---------|------|--|
| 0/ - 2        | % Gı   | ravel | % Sand |                     |       | % Fines |      |  |
| % <b>+</b> 3" | Coarse | Fine  | Coarse | Medium              | Fine  | Silt    | Clay |  |
| 0.0           | 30.0   | 6.4   | 6.8    | 17.6                | 23.9  | 15.3    |      |  |

| Test R  | esults (ASTM D | 6913 & ASTM [ | D1140)   |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1.5     | 100.0          |               |          |
| 1       | 70.0           |               |          |
| .75     | 70.0           |               |          |
| .5      | 68.3           |               |          |
| .375    | 66.5           |               |          |
| #4      | 63.6           |               |          |
| #10     | 56.8           |               |          |
| #20     | 48.9           |               |          |
| #40     | 39.2           |               |          |
| #60     | 31.4           |               |          |
| #100    | 23.4           |               |          |
| #200    | 15.3           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
| *       |                |               |          |

Brown silty sand with gravel and brick fragments

Atterberg Limits (ASTM D 4318)

PL=

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-1-b

Coefficients

D<sub>90</sub>= 34.3126 D<sub>85</sub>= 32.4495 D<sub>60</sub>= 2.9007 D<sub>50</sub>= 0.9393 D<sub>30</sub>= 0.2287 D<sub>15</sub>= C<sub>c</sub>=

Remarks

As recieved MC = 13.8%

**Date Tested:** 1/31/18

**Date Sampled:** 12/15/17

Date Received: 1/30/18 Tested By: SB

rested by. 5b

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-21 Sample Number: S-5 **Depth:** 8-10'

Client: Massachusetts Water Resources Authority (MWRA)

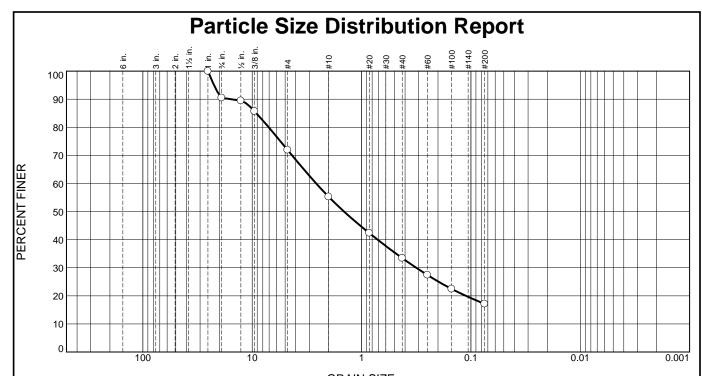
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts

**CDM Smith** 

**Project No:** 101038.102170



|   |       |        |       | (      | <u>GRAIN SIZE -</u> | mm.  |         |      |
|---|-------|--------|-------|--------|---------------------|------|---------|------|
| ſ | % +3" | % G    | ravel |        | % Sand              |      | % Fines |      |
|   |       | Coarse | Fine  | Coarse | Medium              | Fine | Silt    | Clay |
|   | 0.0   | 9.5    | 18.6  | 16.6   | 21.9                | 16.3 | 17.1    |      |

| Test Re | esults (ASTM D | 6913 & ASTM I | D1140)   |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1       | 100.0          |               |          |
| .75     | 90.5           |               |          |
| .5      | 89.5           |               |          |
| .375    | 85.7           |               |          |
| #4      | 71.9           |               |          |
| #10     | 55.3           |               |          |
| #20     | 42.4           |               |          |
| #40     | 33.4           |               |          |
| #60     | 27.4           |               |          |
| #100    | 22.5           |               |          |
| #200    | 17.1           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
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|         |                |               |          |
|         |                |               |          |

|  | <b>Material Desc</b>  | <u>cription</u>                       |  |
|--|---|---------------------------------------|--|
| Brown silty sand v   | vith gravel   |                                       |  |
|  |   |                                       |  |
| Λ++  | rhora Limite (A   | STM D 4219)                           |  |
| PL=  | erberg Limits (A<br>LL=                                     | PI=                                   |  |
|  | Classificat   | tion_                                 |  |
| USCS (D 2487)=   | SM AASH   | HTO (M 145)= A-1-b                    |  |
|  | Coefficier  |                                       |  |
| <b>D<sub>90</sub>=</b> 15.6606 <b>D<sub>50</sub>=</b> 1.4458 | <b>D<sub>85</sub>=</b> 9.1673 <b>D<sub>30</sub>=</b> 0.3161 | D <sub>60</sub> = 2.5985              |  |
| D <sub>10</sub> = 1.4436                                     | C <sub>u</sub> =  | D <sub>15</sub> =<br>C <sub>c</sub> = |  |
|  | Remarks   | s                                     |  |
| As recieved MC =   | 11.0%   | -                                     |  |
|  |   |                                       |  |
|  |   |                                       |  |
| Date Received:   |   | ate Tested: 1/31/18                   |  |
| Tested By:   | SB  |                                       |  |
| Checked By: 1  | MP  |                                       |  |
| Title: 1   | Laboratory Manag  | er                                    |  |
|  |   |                                       |  |

Source of Sample: B-22 Sample Number: S-3 **Depth:** 4-6'

# **CDM Smith**

**Client:** Massachusetts Water Resources Authority (MWRA)

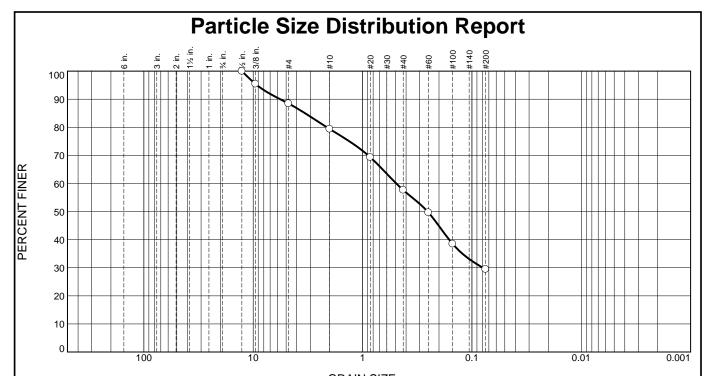
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 12/13/17

Boston, Massachusetts

**Project No:** 101038.102170



|   |       |        |       | (      | <u> JRAIN SIZE -</u> | mm.  |         |      |
|---|-------|--------|-------|--------|----------------------|------|---------|------|
| Ī | % +3" | % Gı   | ravel | % Sand |                      |      | % Fines |      |
|   |       | Coarse | Fine  | Coarse | Medium               | Fine | Silt    | Clay |
|   | 0.0   | 0.0    | 11.5  | 9.1    | 21.7                 | 28.2 | 29.5    |      |

| Test F  | Results (ASTM D | 0422 & ASTM D | 1140)    |
|---------|-----------------|---------------|----------|
| Opening | Percent         | Spec.*        | Pass?    |
| Size    | Finer           | (Percent)     | (X=Fail) |
| .5"     | 100.0           |               |          |
| .375"   | 95.4            |               |          |
| #4      | 88.5            |               |          |
| #10     | 79.4            |               |          |
| #20     | 69.3            |               |          |
| #40     | 57.7            |               |          |
| #60     | 49.7            |               |          |
| #100    | 38.5            |               |          |
| #200    | 29.5            |               |          |
|         |                 |               |          |
|         |                 |               |          |
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|         |                 |               |          |
|         |                 |               |          |

|   | <u>Material</u>  | Descript                   | <u>ion</u>  |
|---|--|----------------------------|---|
| Brown silty sand  |  |                            |   |
| At PL=  | terberg Lim  | its (ASTN                  | <u>/I D 4318)</u><br>Pl=  |
| rL=   |  |                            | • •   |
| USCS (D 2487)=  |  | sification<br>AASHTO       | (M 145)= A-2-4(0)   |
| D <sub>90</sub> = 5.6639<br>D <sub>50</sub> = 0.2543<br>D <sub>10</sub> = | D <sub>85</sub> = 3.0<br>D <sub>30</sub> = 0.0<br>C <sub>u</sub> = | officients<br>3553<br>0792 | D <sub>60</sub> = 0.4919<br>D <sub>15</sub> =<br>C <sub>c</sub> = |
| As received MC  |  | emarks                     |   |
| 715 received ivic   | - 13.070   |                            |   |
| Date Received:  |  | Date '                     | <b>Tested:</b> 12/14/17   |
| Tested By:  |  |                            |   |
| Tested By:<br>Checked By:   | MP   |                            |   |

Source of Sample: B-24 Sample Number: S-V-1 **Depth:** 2-2.5'

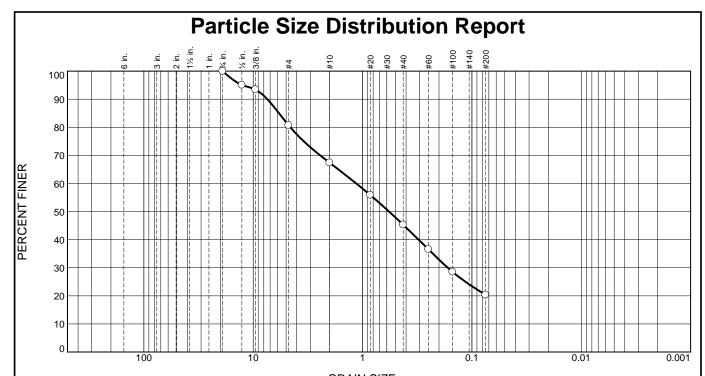
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/11/17



|         |        |                         | (      | <u>GRAIN SIZE -</u> | mm.  |      |      |
|---------|--------|-------------------------|--------|---------------------|------|------|------|
| 0/ - 21 | % G    | % Gravel % Sand % Fines |        |                     |      |      |      |
| % +3"   | Coarse | Fine                    | Coarse | Medium              | Fine | Silt | Clay |
| 0.0     | 0.0    | 19.3                    | 13.3   | 22.1                | 25.0 | 20.3 |      |

| Test R  | esults (ASTM I | 0422 & ASTM D | 1140)    |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| .75"    | 100.0          |               |          |
| .5"     | 95.1           |               |          |
| .375"   | 93.4           |               |          |
| #4      | 80.7           |               |          |
| #10     | 67.4           |               |          |
| #20     | 55.9           |               |          |
| #40     | 45.3           |               |          |
| #60     | 36.6           |               |          |
| #100    | 28.5           |               |          |
| #200    | 20.3           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
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|         |                |               |          |
| *       |                |               |          |

|   | Material De                                   | <u>scription</u>                        |          |
|---|---|---|----------|
| Brown silty sand                              | with gravel                                   |   |          |
|   |   |   |          |
| A.,   |   | /A CTM D 4040                           | ,        |
| PL=   | erberg Limits (<br>LL=                        | ( <u>ASTWLD 4318</u><br>PI=             | )        |
|   | Classifia                                     | ation                                   |          |
| USCS (D 2487)=                                | SM AA   | SHTO (M 145)=                           | A-1-b    |
|   | Coeffic                                       | ients                                   |          |
| <b>D<sub>90</sub>=</b> 7.4288                 | D <sub>85</sub> = 5.8075                      |   | 1.1427   |
| D <sub>50</sub> = 0.5728<br>D <sub>10</sub> = | D <sub>30</sub> = 0.1662<br>C <sub>11</sub> = | 2 D <sub>15</sub> =<br>C <sub>c</sub> = |          |
| 10  | Rema  | •                                       |          |
| As received MC =                              |   | NS .                                    |          |
|   |   |   |          |
|   |   |   |          |
| Date Received:                                | 12/8/17                                       | Date Tested:                            | 12/12/17 |
| Tested By:                                    | RZ  |   |          |
| Checked By:                                   | MP  |   |          |
| Title:  | Laboratory Man                                | ager                                    |          |
|   | •   |   |          |

**Source of Sample:** B-24 **Sample Number:** S-V-2

**Depth:** 4.5-5'

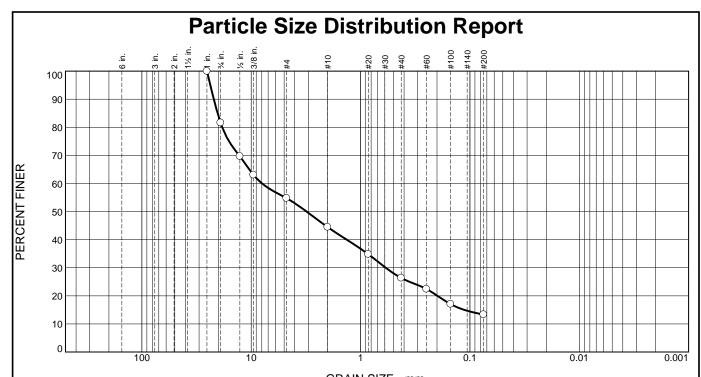
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 11/22/17



|          |                 |      | (      | <u> GRAIN SIZE -</u> | · mm. |      |      |
|----------|-----------------|------|--------|----------------------|-------|------|------|
| 0/ - 211 | % Gravel % Sand |      |        | % Fines              |       |      |      |
| % +3"    | Coarse          | Fine | Coarse | Medium               | Fine  | Silt | Clay |
| 0.0      | 18.4            | 26.8 | 10.3   | 18.1                 | 13.1  | 13.3 |      |

| Test R  | esults (ASTM I | 0422 & ASTM D | 1140)    |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1"      | 100.0          |               |          |
| .75"    | 81.6           |               |          |
| .5"     | 69.7           |               |          |
| .375"   | 63.1           |               |          |
| #4      | 54.8           |               |          |
| #10     | 44.5           |               |          |
| #20     | 34.8           |               |          |
| #40     | 26.4           |               |          |
| #60     | 22.4           |               |          |
| #100    | 17.1           |               |          |
| #200    | 13.3           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
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|         |                |               |          |
|         |                |               |          |

|   | Material Descrip                              | <u>otion</u>                                 |
|---|---|--|
| Dark brown silty g                            | ravel with sand                               |  |
|   |   |  |
|   |   | TM D 4040)                                   |
| <u>Atte</u><br>  PL=                          | erberg Limits (AST<br>LL=                     | NI D 4318)<br>Pl=                            |
| _   | Classificatio                                 | m  |
| USCS (D 2487)=                                | GM AASHT                                      | O (M 145)= A-1-a                             |
|   | Coefficients                                  | <u> </u>                                     |
| <b>D90=</b> 21.9989                           | D <sub>85</sub> = 20.2959                     | D <sub>60</sub> = 7.9574                     |
| D <sub>50</sub> = 3.1169<br>D <sub>10</sub> = | D <sub>30</sub> = 0.5884<br>C <sub>11</sub> = | D <sub>15</sub> = 0.1125<br>C <sub>C</sub> = |
|   | Remarks                                       | ·  |
| As received MC =                              |   |  |
|   |   |  |
|   |   |  |
| Date Received:                                |   | <b>Tested:</b> 12/12/17                      |
| Tested By: 1                                  | RZ  |  |
| Checked By: 1                                 | MP  |  |
| Title: 1                                      | Laboratory Manager                            |  |
| -   |   |  |

Source of Sample: B-25 Sample Number: S-V-1

**Depth: 2-2.5'** 

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

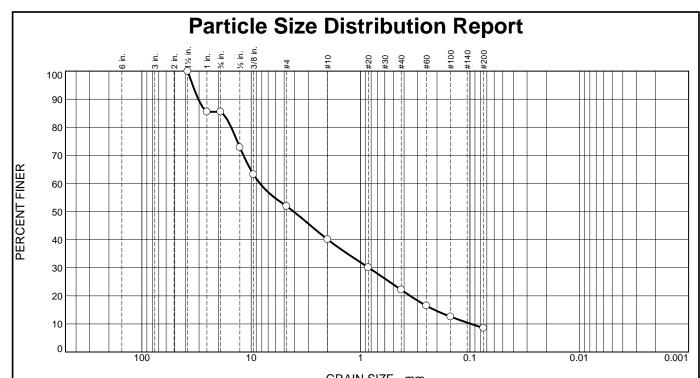
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/23/17

**Project No:** 101038.102170 **Figure** 

**Boston, Massachusetts** 



|          |        |                         | (      | <u>GRAIN SIZE -</u> | mm.  |      |      |
|----------|--------|-------------------------|--------|---------------------|------|------|------|
| 0/ - 211 | % Gı   | % Gravel % Sand % Fines |        |                     |      |      |      |
| % +3"    | Coarse | Fine                    | Coarse | Medium              | Fine | Silt | Clay |
| 0.0      | 14.5   | 33.6                    | 11.8   | 18.0                | 13.6 | 8.5  |      |

| Test R  | esults (ASTM I | 0422 & ASTM D | 1140)    |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1.5"    | 100.0          |               |          |
| 1"      | 85.5           |               |          |
| .75"    | 85.5           |               |          |
| .5"     | 72.8           |               |          |
| .375"   | 63.2           |               |          |
| #4      | 51.9           |               |          |
| #10     | 40.1           |               |          |
| #20     | 30.1           |               |          |
| #40     | 22.1           |               |          |
| #60     | 16.5           |               |          |
| #100    | 12.6           |               |          |
| #200    | 8.5            |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
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|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
| *       |                | 1             |          |

Dark brown poorly graded gravel with silt and sand

Atterberg Limits (ASTM D 4318)
LL= PI=

PL=

Classification

USCS (D 2487)= GP-GM AASHTO (M 145)= A-1-a

Coefficients

 D90=
 30.4787
 D85=
 18.2613
 D60=
 8.3201

 D50=
 4.0955
 D30=
 0.8422
 D15=
 0.2108

 D10=
 0.0975
 Cu=
 85.33
 Cc=
 0.87

Remarks

As received MC = 11.4%

**Date Tested:** 12/12/17

Date Received: 12/8/17 Tested By: RZ

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-25 Sample Number: S-1 **Depth:** 6-8'

**Date Sampled:** 10/23/17

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

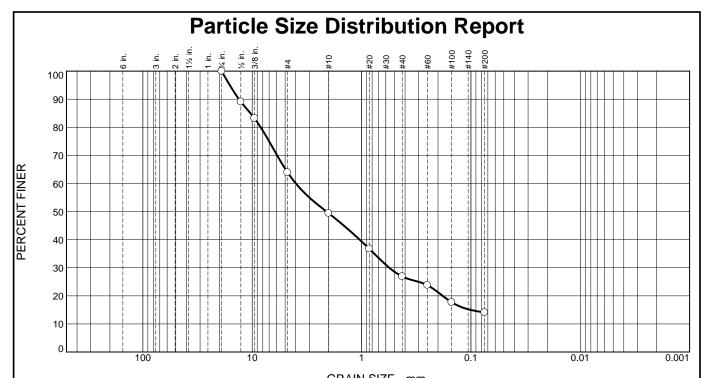
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts** 

**Project No:** 101038.102170

Figure



|          |        |       | (                         | <u> GRAIN SIZE -</u> | · mm. |         |      |
|----------|--------|-------|---------------------------|----------------------|-------|---------|------|
| 0/ - 211 | % G    | ravel | % Sand Coarse Medium Fine |                      | I     | % Fines |      |
| % +3"    | Coarse | Fine  | Coarse                    | Medium               | Fine  | Silt    | Clay |
| 0.0      | 0.0    | 36.1  | 14.5                      | 22.5                 | 12.8  | 14.1    |      |

Brown silty sand with gravel

Date Received: 12/8/17

Tested By: RZ Checked By: MP

| Test R  | esults (ASTM I | 0422 & ASTM D | 1140)    |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| .75"    | 100.0          |               |          |
| .5"     | 89.1           |               |          |
| .375"   | 83.2           |               |          |
| #4      | 63.9           |               |          |
| #10     | 49.4           |               |          |
| #20     | 36.8           |               |          |
| #40     | 26.9           |               |          |
| #60     | 23.8           |               |          |
| #100    | 17.7           |               |          |
| #200    | 14.1           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
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|         |                |               |          |

#### 

**Date Tested:** 12/12/17

**Date Sampled:** 10/12/17

**Material Description** 

\* (no specification provided)

**CDM Smith** 

**Source of Sample:** B-26 **Sample Number:** S-V-1

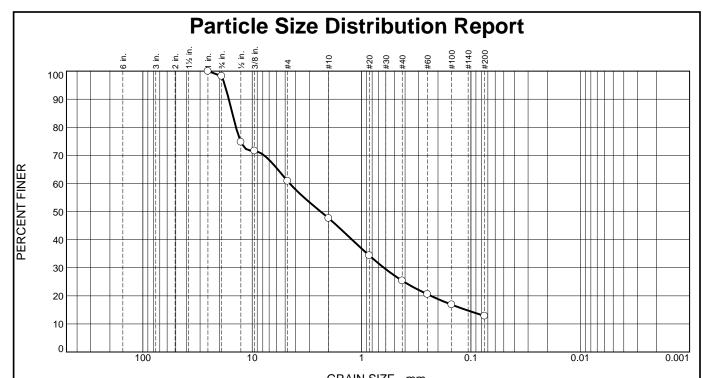
**Depth:** 2-2.5'

Client: Massachusetts Water Resources Authority (MWRA)

Title: Laboratory Manager

**Dject:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA



|          |                         |      | (               | <u> GRAIN SIZE -</u> | · mm. |      |      |
|----------|-------------------------|------|-----------------|----------------------|-------|------|------|
| 0/ - 211 | % Gravel % Sand % Fines |      | % Gravel % Sand |                      |       |      |      |
| % +3"    | Coarse                  | Fine | Coarse          | Medium               | Fine  | Silt | Clay |
| 0.0      | 1.8                     | 37.3 | 13.3            | 22.2                 | 12.6  | 12.8 |      |

| Test R  | esults (ASTM I | 0422 & ASTM D | 1140)    |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1"      | 100.0          |               |          |
| .75"    | 98.2           |               |          |
| .5"     | 74.8           |               |          |
| .375"   | 71.6           |               |          |
| #4      | 60.9           |               |          |
| #10     | 47.6           |               |          |
| #20     | 34.4           |               |          |
| #40     | 25.4           |               |          |
| #60     | 20.6           |               |          |
| #100    | 16.9           |               |          |
| #200    | 12.8           |               |          |
|         |                |               |          |
|         |                |               |          |
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|         |                |               |          |

# **Material Description** Gray-brown silty sand with gravel **Atterberg Limits (ASTM D 4318)** PL= Classification USCS (D 2487)= SM **AASHTO** (M 145)= A-1-a Coefficients D<sub>90</sub>= 16.3695 D<sub>50</sub>= 2.3651 D<sub>10</sub>= D<sub>60</sub>= 4.5366 D<sub>15</sub>= 0.1107 C<sub>c</sub>= **D<sub>85</sub>=** 15.2061 D<sub>30</sub>= 0.6242 C<sub>u</sub>= Remarks As received MC = 7.9%Date Received: 12/8/17 **Date Tested:** 12/13/17 Tested By: RZ Checked By: MP Title: Laboratory Manager

(no specification provided)

**Source of Sample:** B-26 Sample Number: S-2

**Depth:** 9-9.7'

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

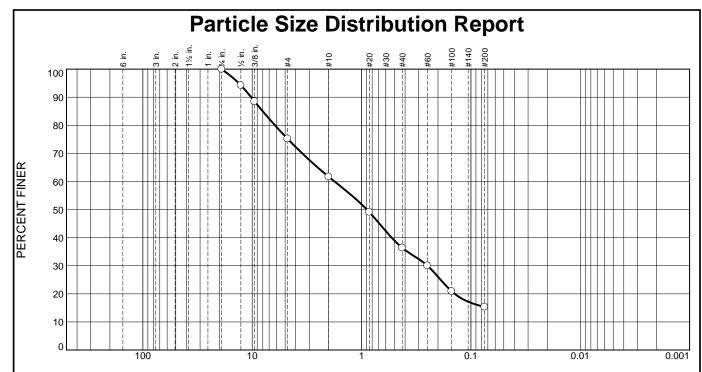
Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/12/17

**Project No:** 101038.102170 **Figure** 

**Boston, Massachusetts** 



|         |          |      | (      | <u> GRAIN SIZE -</u> | mm.  |         |      |
|---------|----------|------|--------|----------------------|------|---------|------|
| 0/ - 21 | % Gravel |      | % Sand |                      |      | % Fines |      |
| % +3"   | Coarse   | Fine | Coarse | Medium               | Fine | Silt    | Clay |
| 0.0     | 0.0      | 24.8 | 13.5   | 25.3                 | 21.1 | 153     |      |

| Test R  | esults (ASTM I | 0422 & ASTM D | 1140)    |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| .75"    | 100.0          |               |          |
| .5"     | 94.3           |               |          |
| .375"   | 88.5           |               |          |
| #4      | 75.2           |               |          |
| #10     | 61.7           |               |          |
| #20     | 49.1           |               |          |
| #40     | 36.4           |               |          |
| #60     | 30.0           |               |          |
| #100    | 20.9           |               |          |
| #200    | 15.3           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
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|         |                |               |          |
|         |                |               |          |
|         |                |               |          |

## Brown silty sand with gravel **Atterberg Limits (ASTM D 4318)** PL= Classification USCS (D 2487)= SM **AASHTO** (M 145)= A-1-b Coefficients **D<sub>90</sub>=** 10.2326 **D<sub>50</sub>=** 0.8945 **D<sub>10</sub>= D<sub>85</sub>=** 8.0192 **D<sub>60</sub>=** 1.7682 D<sub>30</sub>= 0.2496 C<sub>u</sub>= D<sub>15</sub>= C<sub>C</sub>= Remarks As received MC = 6.5%Date Received: 12/8/17 **Date Tested:** 12/13/17 Tested By: RZ Checked By: MP Title: Laboratory Manager

**Material Description** 

(no specification provided)

Source of Sample: B-27 Sample Number: S-1

**Depth:** 0.5-2'

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

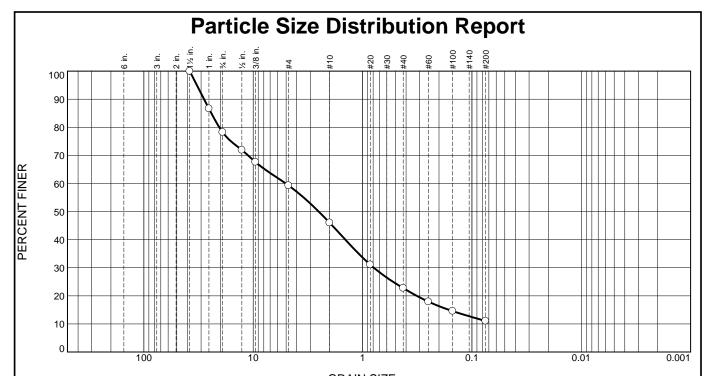
Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/16/17

**Project No:** 101038.102170 **Figure** 

**Boston, Massachusetts** 



|          |                           |       | (      | <u> JRAIN SIZE -</u> | mm.  |         |  |
|----------|---------------------------|-------|--------|----------------------|------|---------|--|
| 0/ - 211 | % G                       | ravel |        | % Sand               |      | % Fines |  |
| % +3"    | Coarse Fine Coarse Medium |       | Medium | Fine                 | Silt | Clay    |  |
| 0.0      | 21.8                      | 18.9  | 13.3   | 23.2                 | 11.7 | 11.1    |  |

| Test R  | esults (ASTM I | 0422 & ASTM D | 1140)    |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1.5"    | 100.0          |               |          |
| 1"      | 86.6           |               |          |
| .75"    | 78.2           |               |          |
| .5"     | 71.9           |               |          |
| .375"   | 67.6           |               |          |
| #4      | 59.3           |               |          |
| #10     | 46.0           |               |          |
| #20     | 31.1           |               |          |
| #40     | 22.8           |               |          |
| #60     | 17.9           |               |          |
| #100    | 14.6           |               |          |
| #200    | 11.1           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |

|   | Material Description   |   |  |  |  |  |  |  |
|---|--|---|--|--|--|--|--|--|
| Gray poorly grade   | Gray poorly graded sand with silt and gravel                 |   |  |  |  |  |  |  |
|   |  |   |  |  |  |  |  |  |
| Λ++   | erberg Limits (ASTM D  | 1318)   |  |  |  |  |  |  |
| PL=   | LL=  | PI=   |  |  |  |  |  |  |
|   | Classification   |   |  |  |  |  |  |  |
| USCS (D 2487)=  | SP-SM AASHTO (M  | <b>145)=</b> A-1-a  |  |  |  |  |  |  |
|   | <b>Coefficients</b>  |   |  |  |  |  |  |  |
| <b>D<sub>90</sub>=</b> 28.1526<br><b>D<sub>50</sub>=</b> 2.5190 | <b>D<sub>85</sub>=</b> 24.1488 <b>D<sub>30</sub>=</b> 0.7887 | <b>D<sub>60</sub>=</b> 5.0381 <b>D<sub>15</sub>=</b> 0.1616 |  |  |  |  |  |  |
| D <sub>10</sub> =   | C <sub>u</sub> =   | C <sub>C</sub> =  |  |  |  |  |  |  |
|   | Remarks  |   |  |  |  |  |  |  |
| As received MC =  | 7.2%   |   |  |  |  |  |  |  |
|   |  |   |  |  |  |  |  |  |
| Date Received:  | 12/8/17 <b>Date Te</b> e                                     | sted: 12/13/17  |  |  |  |  |  |  |
| Tested By:  |  | sieu. 12/13/17  |  |  |  |  |  |  |
|   |  |   |  |  |  |  |  |  |
| Checked By:   |  |   |  |  |  |  |  |  |
| Title:  | Laboratory Manager   |   |  |  |  |  |  |  |
|   |  |   |  |  |  |  |  |  |

Source of Sample: B-28 Sample Number: S-4 **Depth:** 9-9.8'

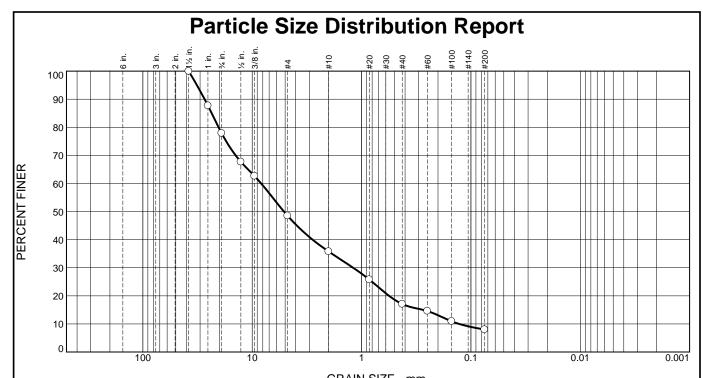
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/16/17



|         |        |       | (      | <u> GRAIN SIZE -</u> | · mm. |         |      |
|---------|--------|-------|--------|----------------------|-------|---------|------|
| 0/ - 21 | % Gı   | ravel |        | % Sand               |       | % Fines |      |
| % +3"   | Coarse | Fine  | Coarse | Medium               | Fine  | Silt    | Clay |
| 0.0     | 22.1   | 29.4  | 12.7   | 18.7                 | 9.1   | 8.0     |      |

| Test R  | esults (ASTM I | 0422 & ASTM D | 1140)    |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1.5"    | 100.0          |               |          |
| 1"      | 87.7           |               |          |
| .75"    | 77.9           |               |          |
| .5"     | 67.7           |               |          |
| .375"   | 62.7           |               |          |
| #4      | 48.5           |               |          |
| #10     | 35.8           |               |          |
| #20     | 25.8           |               |          |
| #40     | 17.1           |               |          |
| #60     | 14.6           |               |          |
| #100    | 10.9           |               |          |
| #200    | 8.0            |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
| *       |                | 15            | l        |

Gray-brown well-graded gravel with silt and sand

Atterberg Limits (ASTM D 4318) LL= PI=

PL=

**Classification** USCS (D 2487)= GW-GM **AASHTO** (M 145)= A-1-a

Coefficients

**D<sub>90</sub>=** 27.2493 **D<sub>50</sub>=** 5.1239 **D<sub>10</sub>=** 0.1280 D<sub>60</sub>= 8.2794 D<sub>15</sub>= 0.2732 C<sub>c</sub>= 1.35 D<sub>85</sub>= 23.4705 D<sub>30</sub>= 1.1943 C<sub>u</sub>= 64.70

Remarks

As received MC = 10.8%

**Date Tested:** 12/13/17

Date Received: 12/8/17 Tested By: RZ

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-29 Sample Number: S-5

**Depth: 8-10'** 

**Date Sampled:** 10/13/17

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

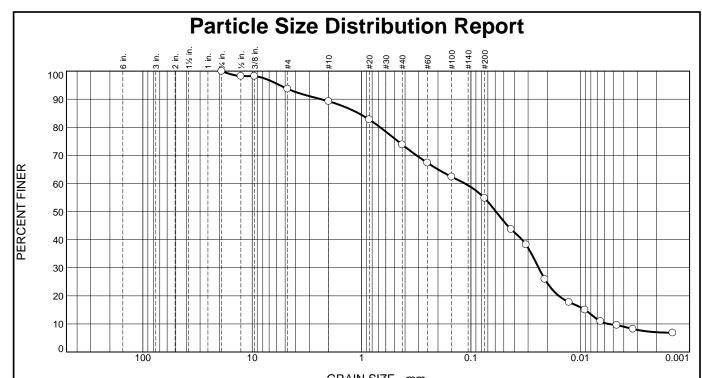
Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts** 

**Project No:** 101038.102170

**Figure** 



|               |          |      |        | <u>GRAIN SIZE -</u> | · mm.    |      |         |  |  |
|---------------|----------|------|--------|---------------------|----------|------|---------|--|--|
| 0/ - 2        | % Gravel |      | % Sand |                     | Sand % f |      | % Fines |  |  |
| % <b>+3</b> " | Coarse   | Fine | Coarse | Medium              | Fine     | Silt | Clay    |  |  |
| 0.0           | 0.0      | 6.3  | 4.5    | 15.4                | 19.0     | 45.1 | 9.7     |  |  |

| Test F     | Results (ASTM D | 422 & ASTM D | 1140)    |
|------------|-----------------|--------------|----------|
| Opening    | Percent         | Spec.*       | Pass?    |
| Size       | Finer           | (Percent)    | (X=Fail) |
| .75"       | 100.0           |              |          |
| .5"        | 98.2            |              |          |
| .375"      | 98.2            |              |          |
| #4         | 93.7            |              |          |
| #10        | 89.2            |              |          |
| #20        | 82.7            |              |          |
| #40        | 73.8            |              |          |
| #60        | 67.3            |              |          |
| #100       | 62.4            |              |          |
| #200       | 54.8            |              |          |
| 0.0429 mm. | 43.7            |              |          |
| 0.0313 mm. | 38.2            |              |          |
| 0.0211 mm. | 25.9            |              |          |
| 0.0127 mm. | 17.8            |              |          |
| 0.0091 mm. | 15.0            |              |          |
| 0.0065 mm. | 10.9            |              |          |
| 0.0046 mm. | 9.6             |              |          |
| 0.0033 mm. | 8.2             |              |          |
| 0.0014 mm. | 6.8             |              |          |
|            |                 |              |          |
|            |                 |              |          |

Gray-brown sandy silt

**Atterberg Limits (ASTM D 4318)** LL= 20

**PL=** 17

Classification

USCS (D 2487)= ML**AASHTO (M 145)=** A-4(0)

Coefficients

**D<sub>90</sub>=** 2.3483 **D<sub>50</sub>=** 0.0590 **D<sub>10</sub>=** 0.0055 D<sub>60</sub>= 0.1136 D<sub>15</sub>= 0.0090 C<sub>c</sub>= 0.92 D<sub>85</sub>= 1.0661 D<sub>30</sub>= 0.0240 C<sub>u</sub>= 20.54

Remarks

As received MC = 20.2%

Date Received: 12/8/17 **Date Tested:** 12/14/17

Tested By: MP/RZ

Checked By: MP

Title: Laboratory Manager

(no specification provided)

Source of Sample: B-30 Sample Number: S-V-2

**Depth:** 5-5.5'

Client: Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

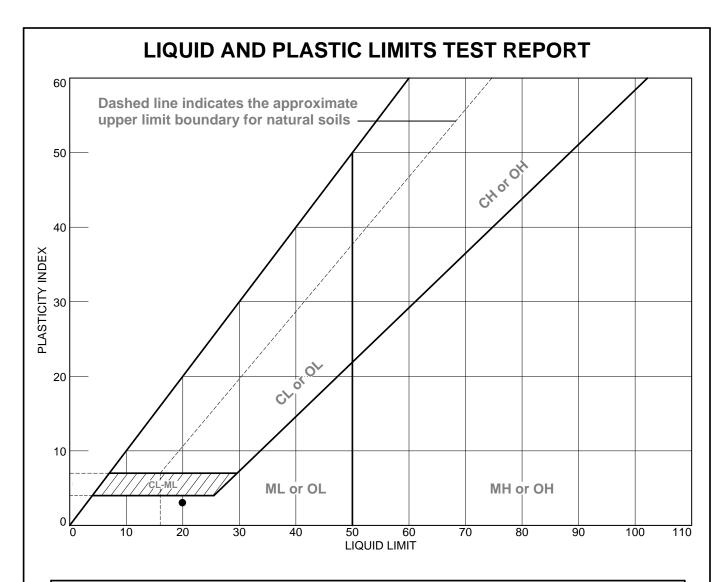
Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts Project No:** 101038.102170

**CDM Smith** 

**Figure** 

**Date Sampled:** 10/13/17



|                         | SOIL DATA |       |        |                                    |                         |                        |                            |      |  |
|-------------------------|-----------|-------|--------|------------------------------------|-------------------------|------------------------|----------------------------|------|--|
| SYMBOL SOURCE SAMPL NO. |           |       | DEPTH  | NATURAL<br>WATER<br>CONTENT<br>(%) | PLASTIC<br>LIMIT<br>(%) | LIQUID<br>LIMIT<br>(%) | PLASTICITY<br>INDEX<br>(%) | uscs |  |
| •                       | B-30      | S-V-2 | 5-5.5' | 20.2                               | 17                      | 20                     | 3                          | ML   |  |

**CDM Smith** 

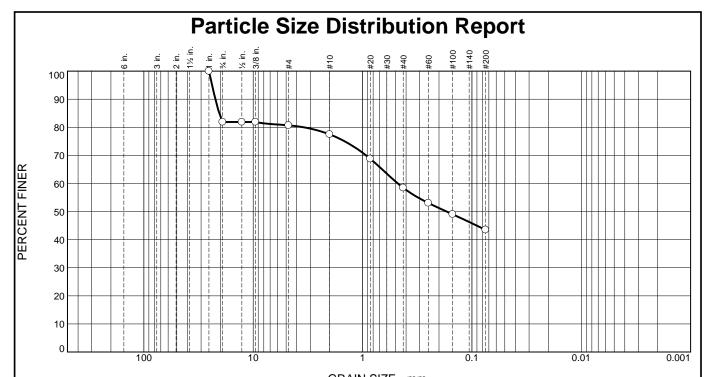
Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts** 

**Project No.:** 101038.102170 Figure



|          |        |       | (      | <u> - RAIN SIZE</u> | mm.  |         |      |
|----------|--------|-------|--------|---------------------|------|---------|------|
| 0/ - 211 | % Gı   | ravel |        | % Sand              |      | % Fines |      |
| % +3"    | Coarse | Fine  | Coarse | Medium              | Fine | Silt    | Clay |
| 0.0      | 18.1   | 1.2   | 3.2    | 19.0                | 15.0 | 43.5    |      |

| Test F  | Test Results (ASTM D422 & ASTM D1140) |           |          |  |  |  |  |  |
|---------|---------------------------------------|-----------|----------|--|--|--|--|--|
| Opening | Percent                               | Spec.*    | Pass?    |  |  |  |  |  |
| Size    | Finer                                 | (Percent) | (X=Fail) |  |  |  |  |  |
| 1"      | 100.0                                 |           |          |  |  |  |  |  |
| .75"    | 81.9                                  |           |          |  |  |  |  |  |
| .5"     | 81.9                                  |           |          |  |  |  |  |  |
| .375"   | 81.9                                  |           |          |  |  |  |  |  |
| #4      | 80.7                                  |           |          |  |  |  |  |  |
| #10     | 77.5                                  |           |          |  |  |  |  |  |
| #20     | 68.8                                  |           |          |  |  |  |  |  |
| #40     | 58.5                                  |           |          |  |  |  |  |  |
| #60     | 53.0                                  |           |          |  |  |  |  |  |
| #100    | 49.0                                  |           |          |  |  |  |  |  |
| #200    | 43.5                                  |           |          |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |
|         |                                       |           |          |  |  |  |  |  |
| *       |                                       |           |          |  |  |  |  |  |

| Material Description                          |  |                                       |          |  |  |
|---|--|---------------------------------------|----------|--|--|
| Brown silty sand v                            | vith gravel                            |                                       |          |  |  |
|   |  |                                       |          |  |  |
| A 44 c  | rhara Limita                           | /ACTM D /210                          | `        |  |  |
| PL=   | LL=                                    | <u>(ASTM D 4318</u><br>PI=            | 1        |  |  |
|   | Classif                                | ication                               |          |  |  |
| USCS (D 2487)=                                |  | ASHTO (M 145)=                        | A-4(0)   |  |  |
|   | Coeffi                                 | cients                                |          |  |  |
| <b>D<sub>90</sub>=</b> 22.1958                | D <sub>85</sub> = 20.44                |                                       | 0.4757   |  |  |
| D <sub>50</sub> = 0.1701<br>D <sub>10</sub> = | D <sub>30</sub> =<br>C <sub>11</sub> = | D <sub>15</sub> =<br>C <sub>c</sub> = |          |  |  |
| 210-  | <b>u</b>                               |                                       |          |  |  |
| As received MC =                              | 20.3% Rem                              | arks                                  |          |  |  |
| 713 received ivic =                           | 20.570                                 |                                       |          |  |  |
|   |  |                                       |          |  |  |
| Date Received:                                | 12/8/17                                | Date Tested:                          | 12/13/17 |  |  |
| Tested By: 1                                  | RZ                                     |                                       |          |  |  |
| Checked By: 1                                 | MP                                     |                                       |          |  |  |
| -   | Laboratory Ma                          | nager                                 |          |  |  |
| Title.  | Laboratory ivia                        | nagei                                 |          |  |  |

Source of Sample: B-31 Sample Number: S-V-1

**Depth:** 2-2.5'

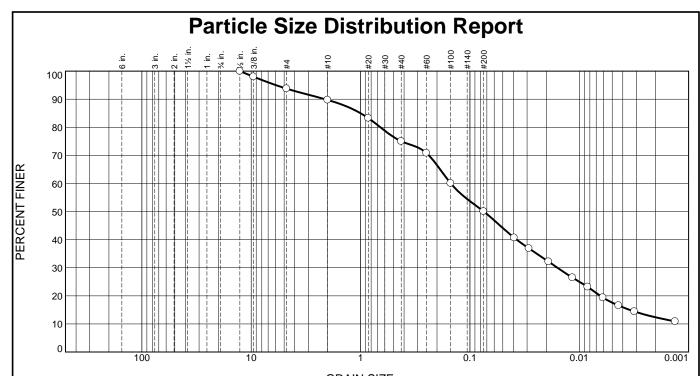
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/12/17



|       |        |          |        |        | <u>GRAIN SIZE -</u> | · mm.   |      |      |
|-------|--------|----------|--------|--------|---------------------|---------|------|------|
|       | 0/ - 2 | % Gravel |        | % Sand |                     | % Fines |      |      |
| % +3" | Coarse | Fine     | Coarse | Medium | Fine                | Silt    | Clay |      |
|       | 0.0    | 0.0      | 6.2    | 4.1    | 14.7                | 24.9    | 32.5 | 17.6 |

| Test Results (ASTM D422 & ASTM D1140) |         |           |          |  |  |  |  |
|---------------------------------------|---------|-----------|----------|--|--|--|--|
| Opening                               | Percent | Spec.*    | Pass?    |  |  |  |  |
| Size                                  | Finer   | (Percent) | (X=Fail) |  |  |  |  |
| .5"                                   | 100.0   |           |          |  |  |  |  |
| .375"                                 | 98.0    |           |          |  |  |  |  |
| #4                                    | 93.8    |           |          |  |  |  |  |
| #10                                   | 89.7    |           |          |  |  |  |  |
| #20                                   | 83.3    |           |          |  |  |  |  |
| #40                                   | 75.0    |           |          |  |  |  |  |
| #60                                   | 70.9    |           |          |  |  |  |  |
| #100                                  | 60.1    |           |          |  |  |  |  |
| #200                                  | 50.1    |           |          |  |  |  |  |
| 0.0394 mm.                            | 40.7    |           |          |  |  |  |  |
| 0.0289 mm.                            | 36.9    |           |          |  |  |  |  |
| 0.0191 mm.                            | 32.2    |           |          |  |  |  |  |
| 0.0116 mm.                            | 26.5    |           |          |  |  |  |  |
| 0.0084 mm.                            | 23.2    |           |          |  |  |  |  |
| 0.0061 mm.                            | 19.4    |           |          |  |  |  |  |
| 0.0044 mm.                            | 16.6    |           |          |  |  |  |  |
| 0.0031 mm.                            | 14.4    |           |          |  |  |  |  |
| 0.0013 mm.                            | 10.9    |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |

|   | <b>Material Descri</b>                        | <u>ption</u>                                 |  |  |  |  |
|---|---|--|--|--|--|--|
| Brown sandy silt  |   |  |  |  |  |  |
|   |   |  |  |  |  |  |
| A 44.   |   | FM D 4040\                                   |  |  |  |  |
| PL=   | erberg Limits (AS<br>LL=                      | PI=  |  |  |  |  |
|   | Classification                                |  |  |  |  |  |
| USCS (D 2487)=  |   | O (M 145)= A-4(0)                            |  |  |  |  |
| . ,   | Coefficient                                   |  |  |  |  |  |
| <b>D<sub>90</sub>=</b> 2.1107                           | D <sub>85</sub> = 0.9990                      | D <sub>60</sub> = 0.1494                     |  |  |  |  |
| <b>D<sub>50</sub>=</b> 0.0746<br><b>D<sub>10</sub>=</b> | D <sub>30</sub> = 0.0158<br>C <sub>11</sub> = | D <sub>15</sub> = 0.0035<br>C <sub>c</sub> = |  |  |  |  |
| D <sub>10</sub> -                                       | u   | о <sub>с</sub> -                             |  |  |  |  |
| As received MC =  | Remarks                                       |  |  |  |  |  |
| As received wic =                                       | 11.070  |  |  |  |  |  |
|   |   |  |  |  |  |  |
| Date Received:  | 12/8/17 <b>Dat</b>                            | e Tested: 12/15/17                           |  |  |  |  |
| Tested By:  | MP/RZ   |  |  |  |  |  |
| Checked By:   | MP  |  |  |  |  |  |
|   | Title: Laboratory Manager                     |  |  |  |  |  |
| i itie.   | Laboratory Wallager                           |  |  |  |  |  |

Source of Sample: B-31 Sample Number: S-3

**Depth:** 14-14.7'

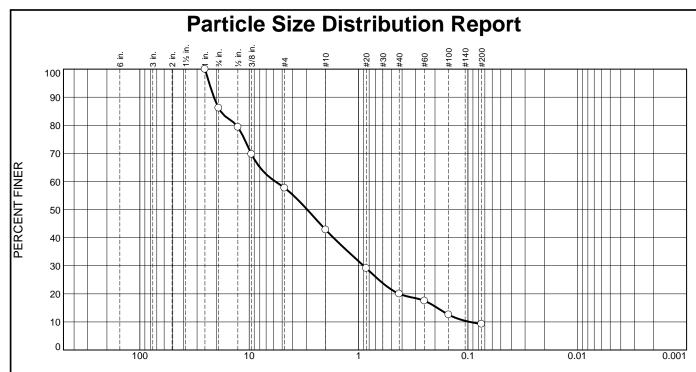
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/12/17



|          |        |             | (      | <u> GRAIN SIZE -</u> | mm.  |      |      |
|----------|--------|-------------|--------|----------------------|------|------|------|
| 0/ - 211 | % Gr   | avel % Sand |        | % Fines              |      |      |      |
| % +3"    | Coarse | Fine        | Coarse | Medium               | Fine | Silt | Clay |
| 0.0      | 13.8   | 28.5        | 14.9   | 22.8                 | 10.8 | 9.2  |      |

| Test Results (ASTM D422 & ASTM D1140) |         |           |          |  |  |  |
|---------------------------------------|---------|-----------|----------|--|--|--|
| Opening                               | Percent | Spec.*    | Pass?    |  |  |  |
| Size                                  | Finer   | (Percent) | (X=Fail) |  |  |  |
| 1"                                    | 100.0   |           |          |  |  |  |
| .75"                                  | 86.2    |           |          |  |  |  |
| .5"                                   | 79.4    |           |          |  |  |  |
| .375"                                 | 69.7    |           |          |  |  |  |
| #4                                    | 57.7    |           |          |  |  |  |
| #10                                   | 42.8    |           |          |  |  |  |
| #20                                   | 29.1    |           |          |  |  |  |
| #40                                   | 20.0    |           |          |  |  |  |
| #60                                   | 17.5    |           |          |  |  |  |
| #100                                  | 12.6    |           |          |  |  |  |
| #200                                  | 9.2     |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |

Brown well-graded sand with silt and gravel

# Atterberg Limits (ASTM D 4318) LL= PI=

PL=

CC- FIE

 $\begin{array}{cc} & \underline{\text{Classification}} \\ \text{USCS (D 2487)=} & \mathrm{SW-SM} & \underline{\text{AASHTO (M 145)=}} & \mathrm{A-1-a} \end{array}$ 

#### Coefficients

 D90=
 21.0220
 D85=
 18.2593
 D60=
 5.7680

 D50=
 2.9506
 D30=
 0.9004
 D15=
 0.1904

 D10=
 0.0961
 Cu=
 60.02
 Cc=
 1.46

## Remarks

As received MC = 9.0%

Date Received: 12/8/17 Date Tested: 12/13/17

Tested By: RZ

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

**CDM Smith** 

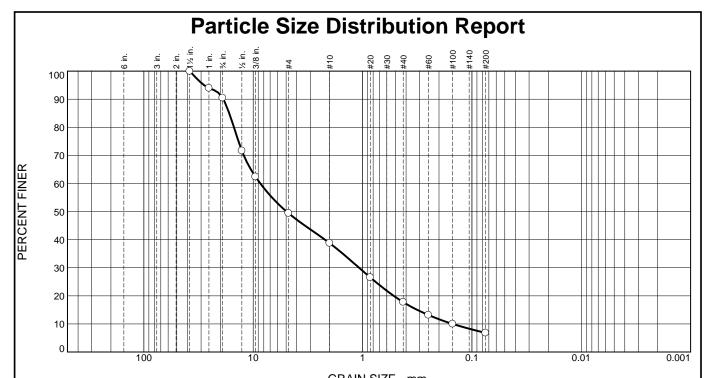
Source of Sample: B-32 Sample Number: S-2 **Depth:** 8-10'

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 11/30/17



|        |        |             | (      | <u> JRAIN SIZE -</u> | mm.  |      |      |
|--------|--------|-------------|--------|----------------------|------|------|------|
| 9/ .2" |        | avel % Sand |        | % Fines              |      |      |      |
| % +3"  | Coarse | Fine        | Coarse | Medium               | Fine | Silt | Clay |
| 0.0    | 9.5    | 41.1        | 10.6   | 21.0                 | 11.0 | 6.8  |      |

| Test Results (ASTM D422 & ASTM D1140) |         |           |          |  |  |  |
|---------------------------------------|---------|-----------|----------|--|--|--|
| Opening                               | Percent | Spec.*    | Pass?    |  |  |  |
| Size                                  | Finer   | (Percent) | (X=Fail) |  |  |  |
| 1.5"                                  | 100.0   |           |          |  |  |  |
| 1"                                    | 94.0    |           |          |  |  |  |
| .75"                                  | 90.5    |           |          |  |  |  |
| .5"                                   | 71.6    |           |          |  |  |  |
| .375"                                 | 62.4    |           |          |  |  |  |
| #4                                    | 49.4    |           |          |  |  |  |
| #10                                   | 38.8    |           |          |  |  |  |
| #20                                   | 26.6    |           |          |  |  |  |
| #40                                   | 17.8    |           |          |  |  |  |
| #60                                   | 13.2    |           |          |  |  |  |
| #100                                  | 10.0    |           |          |  |  |  |
| #200                                  | 6.8     |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |

Gray poorly graded gravel with silt and sand

Atterberg Limits (ASTM D 4318)
LL= PI=

PL=

LL= P|=

Coefficients

 D90=
 18.7522
 D85=
 16.5644
 D60=
 8.6017

 D50=
 4.9512
 D30=
 1.0764
 D15=
 0.3162

 D10=
 0.1503
 Cu=
 57.24
 Cc=
 0.90

Remarks

As received MC = 5.6%

Date Received: 12/8/17 Date Tested: 12/13/17

Tested By: RZ

Checked By: MP

Title: Laboratory Manager

(no specification provided)

**CDM Smith** 

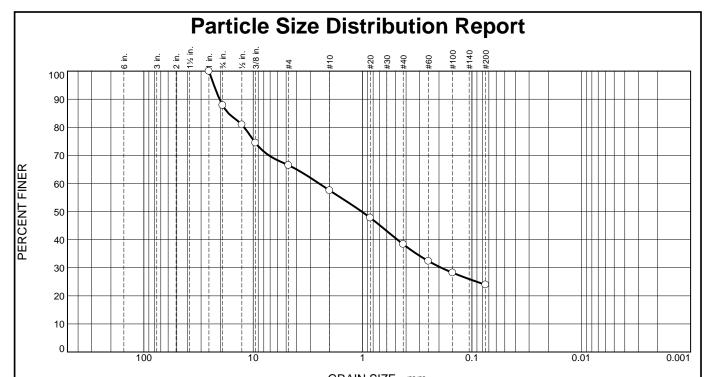
Source of Sample: B-33 Sample Number: S-2 **Depth:** 2-4'

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/17/17



|       |        |       | (         | <u> - RAIN SIZE</u> | · mm. |         |      |
|-------|--------|-------|-----------|---------------------|-------|---------|------|
| % (3" |        | ravel | el % Sand |                     |       | % Fines |      |
| % +3" | Coarse | Fine  | Coarse    | Medium              | Fine  | Silt    | Clay |
| 0.0   | 12.2   | 21.3  | 9.0       | 19.1                | 14.5  | 23.9    |      |

| Test Results (ASTM D422 & ASTM D1140) |         |           |          |  |  |  |
|---------------------------------------|---------|-----------|----------|--|--|--|
| Opening                               | Percent | Spec.*    | Pass?    |  |  |  |
| Size                                  | Finer   | (Percent) | (X=Fail) |  |  |  |
| 1"                                    | 100.0   |           |          |  |  |  |
| .75"                                  | 87.8    |           |          |  |  |  |
| .5"                                   | 80.9    |           |          |  |  |  |
| .375"                                 | 74.4    |           |          |  |  |  |
| #4                                    | 66.5    |           |          |  |  |  |
| #10                                   | 57.5    |           |          |  |  |  |
| #20                                   | 47.8    |           |          |  |  |  |
| #40                                   | 38.4    |           |          |  |  |  |
| #60                                   | 32.4    |           |          |  |  |  |
| #100                                  | 28.2    |           |          |  |  |  |
| #200                                  | 23.9    |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |
|                                       |         |           |          |  |  |  |

|  | <u>iviateriai Descri</u>   | <u> ption</u>   |  |  |  |
|--|--|---|--|--|--|
| Dark brown silty s   | and with gravel  |   |  |  |  |
| Atte   | erberg Limits (AS  | ГМ D 4318)  |  |  |  |
| PL=  | LĽ=  | PI=   |  |  |  |
| USCS (D 2487)=   | SM <b>Classificatio</b>  | on<br>O (M 145)= A-1-b  |  |  |  |
| D <sub>90</sub> = 20.3132<br>D <sub>50</sub> = 1.0173<br>D <sub>10</sub> = | Coefficients D <sub>85</sub> = 16.8408 D <sub>30</sub> = 0.1905 C <sub>u</sub> = | D <sub>60</sub> = 2.4980<br>D <sub>15</sub> =<br>C <sub>c</sub> = |  |  |  |
| As received MC =   | Remarks 13.1%  |   |  |  |  |
| Date Received:<br>Tested By:   |  | e Tested: 12/14/17  |  |  |  |
| Checked By:  | MP   |   |  |  |  |
| Title: Laboratory Manager  |  |   |  |  |  |
|  |  |   |  |  |  |

\* (no specification provided)

Source of Sample: B-34 Sample Number: S-V-1 **Depth:** 2-2.5'

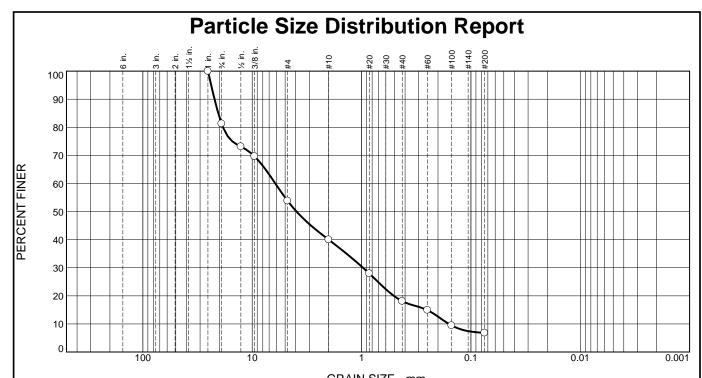
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/6/17



|   | GRAIN SIZE - mm. |          |      |        |        |      |         |      |
|---|------------------|----------|------|--------|--------|------|---------|------|
|   | 0/ - 211         | % Gravel |      | % Sand |        |      | % Fines |      |
| ı | <b>% +3</b> "    | Coarse   | Fine | Coarse | Medium | Fine | Silt    | Clay |
|   | 0.0              | 18.7     | 27.5 | 13.8   | 21.9   | 11.3 | 6.8     |      |

| Test F  | Results (ASTM D | 422 & ASTM D | 1140)    |
|---------|-----------------|--------------|----------|
| Opening | Percent         | Spec.*       | Pass?    |
| Size    | Finer           | (Percent)    | (X=Fail) |
| 1"      | 100.0           |              |          |
| .75"    | 81.3            |              |          |
| .5"     | 73.2            |              |          |
| .375"   | 69.7            |              |          |
| #4      | 53.8            |              |          |
| #10     | 40.0            |              |          |
| #20     | 28.0            |              |          |
| #40     | 18.1            |              |          |
| #60     | 14.9            |              |          |
| #100    | 9.4             |              |          |
| #200    | 6.8             |              |          |
|         |                 |              |          |
|         |                 |              |          |
|         |                 |              |          |
|         |                 |              |          |
|         |                 |              |          |
|         |                 |              |          |
|         |                 |              |          |
|         |                 |              |          |
|         |                 |              |          |
| *       |                 |              |          |

Brown poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)
LL= Pl=

PL=

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-a

Coefficients

 D90=
 22.1212
 D85=
 20.4452
 D60=
 6.1462

 D50=
 3.9328
 D30=
 0.9697
 D15=
 0.2528

 D10=
 0.1589
 Cu=
 38.69
 Cc=
 0.96

Remarks

As received MC = 6.3%

Tested By: RZ
Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-35 Sample Number: S-2 **Depth:** 2-3.5'

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

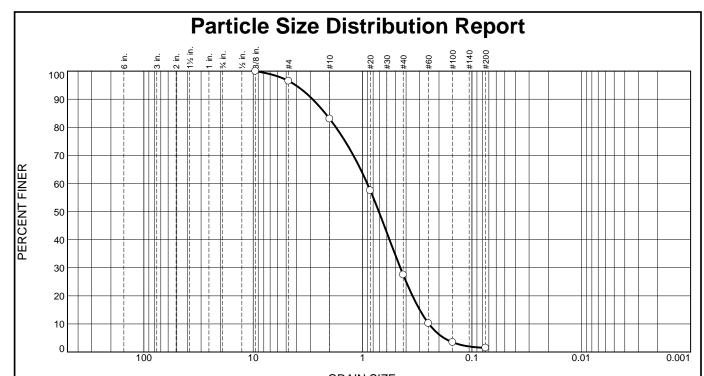
Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts Project No: 101038.102170

Figure

**Date Sampled:** 10/19/17

**CDM Smith** 



|   | GRAIN SIZE - mm. |                        |      |        |        |      |         |      |
|---|------------------|------------------------|------|--------|--------|------|---------|------|
|   | 0/ - 211         | % Gravel               |      | % Sand |        |      | % Fines |      |
| ١ | % +3"            | Coarse                 | Fine | Coarse | Medium | Fine | Silt    | Clay |
|   | 0.0              | 0.0 3.5 13.5 55.5 26.0 |      | 1.5    |        |      |         |      |

| Test Re | esults (ASTM D | 6913 & ASTM I | D1140)   |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| .375    | 100.0          |               |          |
| #4      | 96.5           |               |          |
| #10     | 83.0           |               |          |
| #20     | 57.5           |               |          |
| #40     | 27.5           |               |          |
| #60     | 10.2           |               |          |
| #100    | 3.5            |               |          |
| #200    | 1.5            |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
| *       |                |               |          |

| Brown poorly graded sand  |                         |
|---|-------------------------|
| Atterberg Limits (ASTM D 4318)  PL= LL= Pl=  Classification  USCS (D 2487)= SP AASHTO (M 145)=  |                         |
| Coefficients         D90= 2.8675       D85= 2.1955       D60= 0         D50= 0.7101       D30= 0.4514       D15= 0         D10= 0.2475       Cu= 3.66       Cc= 0 | 0.9062<br>0.2998<br>.91 |
|   |                         |
| Date Received: 1/30/18 Date Tested: Tested By: SB   | 1/31/18                 |
| Checked By: MP  |                         |

(no specification provided)

**Source of Sample:** B-36 **Sample Number:** S-3

**Depth:** 4-6'

**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

Title: Laboratory Manager

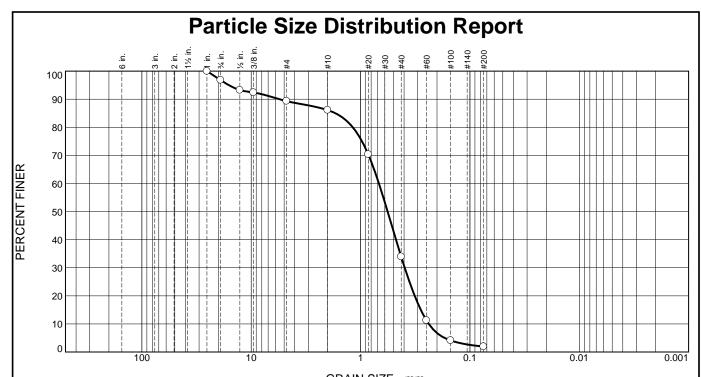
Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/19/17

**Project No:** 101038.102170

**Boston, Massachusetts** 



| GRAIN SIZE - mm. |                       |      |        |        |      |         |      |
|------------------|-----------------------|------|--------|--------|------|---------|------|
| 0/ - 211         | % Gravel              |      | % Sand |        |      | % Fines |      |
| % +3"            | Coarse                | Fine | Coarse | Medium | Fine | Silt    | Clay |
| 0.0              | 3.2 7.5 3.2 52.2 32.0 |      | 1.9    |        |      |         |      |

| Test R  | esults (ASTM D | 6913 & ASTM I | D1140)   |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1       | 100.0          |               |          |
| .75     | 96.8           |               |          |
| .5      | 93.3           |               |          |
| .375    | 92.4           |               |          |
| #4      | 89.3           |               |          |
| #10     | 86.1           |               |          |
| #20     | 70.4           |               |          |
| #40     | 33.9           |               |          |
| #60     | 11.3           |               |          |
| #100    | 4.1            |               |          |
| #200    | 1.9            |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |

|  | <b>Material Descri</b>   | ption  |
|--|--|--|
| Brown poorly gra   | ded sand   |  |
|  |  |  |
| Δ++  | erberg Limits (AS  | TM D 4318)   |
| PL=  | LL=  | PI=  |
| USCS (D 2487)=   | SP Classification SP AASHT   | <u>on</u><br>O (M 145)= A-1-b  |
| D <sub>90</sub> = 5.5138<br>D <sub>50</sub> = 0.5657<br>D <sub>10</sub> = 0.2379 | <b>Coefficient D<sub>85</sub>=</b> 1.6965 <b>D<sub>30</sub>=</b> 0.3946 <b>C<sub>u</sub>=</b> 2.86 | <b>S D<sub>60</sub>=</b> 0.6797 <b>D<sub>15</sub>=</b> 0.2814 <b>C<sub>c</sub>=</b> 0.96 |
| As recieved MC =   | Remarks  |  |
| As recieved MC =   | 5.1%   |  |
|  |  |  |
| Date Received:   | 1/30/18 <b>Dat</b>   | e Tested: 1/31/18  |
| Tested By:   | SB   |  |
| Checked By:  | MP   |  |
| Title:   | Laboratory Manager   |  |
|  |  |  |

Source of Sample: B-37 Sample Number: S-V-1 **Depth:** 2-2.5'

**CDM Smith** 

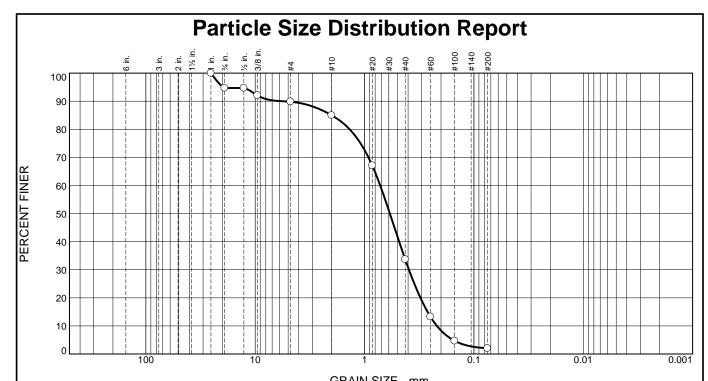
Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/18/17

Boston, Massachusetts Project No: 101038.102170



|       | GRAIN SIZE - IIIIII. |                 |        |        |         |      |      |  |
|-------|----------------------|-----------------|--------|--------|---------|------|------|--|
| % +3" | 0/ - 211             | % Gravel % Sand |        |        | % Fines |      |      |  |
|       | Coarse               | Fine            | Coarse | Medium | Fine    | Silt | Clay |  |
|       | 0.0                  | 5.3             | 4.9    | 4.8    | 51.3    | 31.7 | 2.0  |  |

| Test Re | esults (ASTM D | 6913 & ASTM I | D1140)   |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1       | 100.0          |               |          |
| .75     | 94.7           |               |          |
| .5      | 94.7           |               |          |
| .375    | 92.0           |               |          |
| #4      | 89.8           |               |          |
| #10     | 85.0           |               |          |
| #20     | 67.1           |               |          |
| #40     | 33.7           |               |          |
| #60     | 13.3           |               |          |
| #100    | 4.7            |               |          |
| #200    | 2.0            |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
| *       | ::e::          |               |          |

# **Atterberg Limits (ASTM D 4318)** PL= Classification USCS (D 2487)= SP **AASHTO (M 145)=** A-1-b Coefficients

**Material Description** 

D<sub>60</sub>= 0.7197 D<sub>15</sub>= 0.2656 C<sub>c</sub>= 0.98 **D<sub>90</sub>=** 5.6976 **D<sub>50</sub>=** 0.5868 **D<sub>10</sub>=** 0.2181 D<sub>85</sub>= 2.0000 D<sub>30</sub>= 0.3928 C<sub>u</sub>= 3.30

Remarks

As recieved MC = 6.3%

Brown poorly graded sand

Date Received: 1/30/18 **Date Tested:** 1/31/18 Tested By: SB Checked By: MP

Title: Laboratory Manager

(no specification provided)

Source of Sample: B-38 Sample Number: S-V-1

**Depth:** 3-3.5'

**Client:** Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

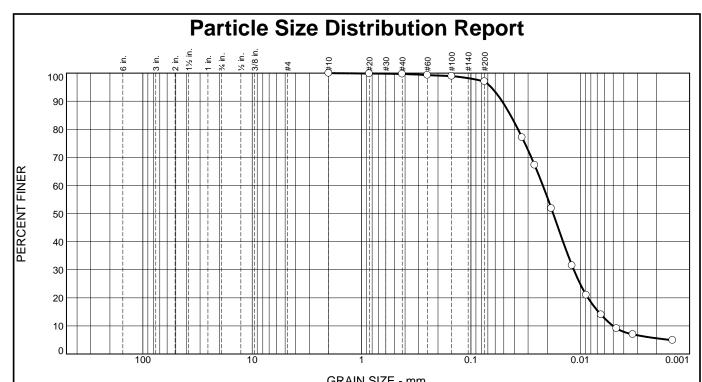
Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/18/17

**Project No:** 101038.102170

**CDM Smith** 

**Boston, Massachusetts** 



| GRAIN SIZE - IIIII. |       |        |               |        |               |      |         |      |
|---------------------|-------|--------|---------------|--------|---------------|------|---------|------|
| 0/ .2"              |       | % G    | Gravel % Sand |        | % Sand % Fine |      | % Fines |      |
| % +3"               | % +3" | Coarse | Fine          | Coarse | Medium        | Fine | Silt    | Clay |
|                     | 0.0   | 0.0    | 0.0           | 0.0    | 0.3           | 2.6  | 87.1    | 10.0 |

| Test Results (ASTM D6913 & D7928 & ASTM D1140) |         |           |          |  |  |  |  |  |
|--|---------|-----------|----------|--|--|--|--|--|
| Opening  | Percent | Spec.*    | Pass?    |  |  |  |  |  |
| Size   | Finer   | (Percent) | (X=Fail) |  |  |  |  |  |
| #10  | 100.0   |           |          |  |  |  |  |  |
| #20  | 99.9    |           |          |  |  |  |  |  |
| #40  | 99.7    |           |          |  |  |  |  |  |
| #60  | 99.3    |           |          |  |  |  |  |  |
| #100   | 98.9    |           |          |  |  |  |  |  |
| #200   | 97.1    |           |          |  |  |  |  |  |
| 0.0341 mm.                                     | 77.1    |           |          |  |  |  |  |  |
| 0.0261 mm.                                     | 67.3    |           |          |  |  |  |  |  |
| 0.0184 mm.                                     | 51.9    |           |          |  |  |  |  |  |
| 0.0119 mm.                                     | 31.5    |           |          |  |  |  |  |  |
| 0.0088 mm.                                     | 21.0    |           |          |  |  |  |  |  |
| 0.0064 mm.                                     | 14.0    |           |          |  |  |  |  |  |
| 0.0047 mm.                                     | 9.1     |           |          |  |  |  |  |  |
| 0.0033 mm.                                     | 7.0     |           |          |  |  |  |  |  |
| 0.0014 mm.                                     | 4.9     |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |

|   | Material Descrip  | <u>otion</u>  |
|---|---|---|
| Gray-brown silt   |   |   |
|   |   |   |
| Δ++   | erberg Limits (AST  | 'M D 4318\  |
| PL= NP  | LL= NV  | <b>PI=</b> NP   |
| USCS (D 2487)=  | Classification ML AASHTO                                    | <u>n</u><br>O (M 145)= A-4(0)                               |
|   | Coefficients  | <u>i</u>  |
| <b>D<sub>90</sub>=</b> 0.0519 <b>D<sub>50</sub>=</b> 0.0177 | <b>D<sub>85</sub></b> = 0.0434                              | <b>D<sub>60</sub>=</b> 0.0220 <b>D<sub>15</sub>=</b> 0.0068 |
| D <sub>10</sub> = 0.0050                                    | <b>D<sub>30</sub>=</b> 0.0115<br><b>C<sub>u</sub>=</b> 4.38 | <b>C<sub>c</sub>=</b> 1.19                                  |
|   | Remarks   |   |
| As recieved MC =  | 28.6%   |   |
|   |   |   |
| Date Received:  | 1/30/18 <b>Date</b>   | <b>Tested:</b> 1/31/18                                      |
| Tested By:  | MP  |   |
| Checked By:   | MP  |   |
| Title:  | Laboratory Manager  |   |
|   | Zacoratory Wanager  |   |

Source of Sample: B-38 Sample Number: S-3

**Depth:** 14-16'

**CDM Smith** 

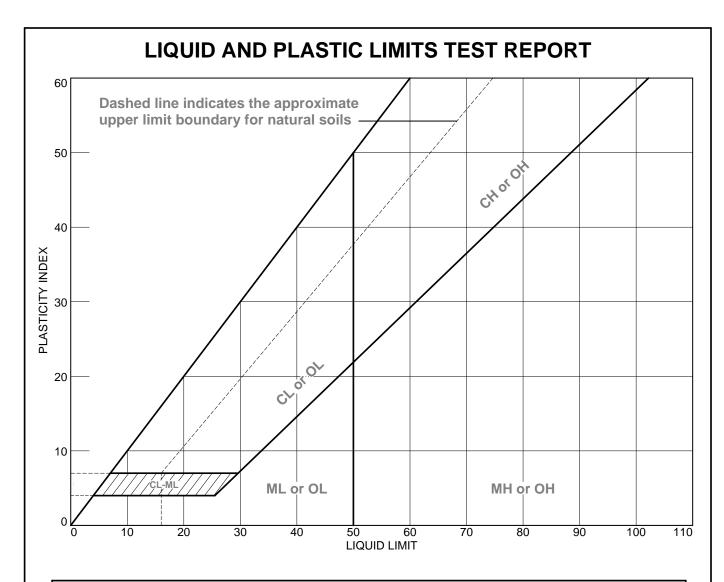
Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/18/17

Boston, Massachusetts Project No: 101038.102170



|   | SOIL DATA |     |        |      |    |                            |      |    |
|---|-----------|-----|--------|------|----|----------------------------|------|----|
| SYMBOL SOURCE SAMPLE DEPTH WATER PLASTIC LIQUID CONTENT LIMIT (%) (%) (%) |           |     |        |      |    | PLASTICITY<br>INDEX<br>(%) | uscs |    |
| •   | B-38      | S-3 | 14-16' | 28.6 | NP | NV                         | NP   | ML |

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

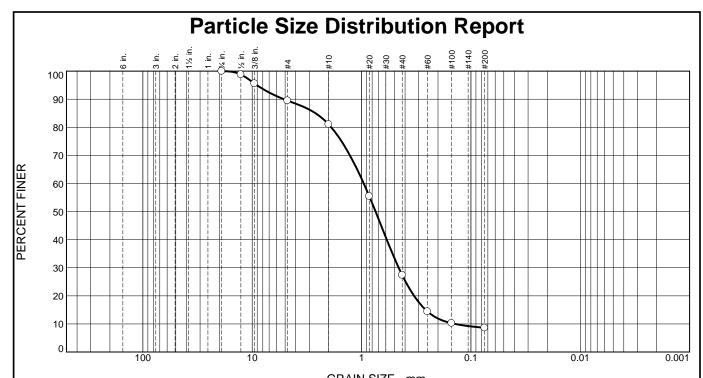
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Project No.: 101038.102170

Boston, Massachusetts

Tested By: MP



| GRAIN SIZE - mm. |        |                 |        |        |         |      |      |
|------------------|--------|-----------------|--------|--------|---------|------|------|
| 0/ - 211         | % Gı   | % Gravel % Sand |        |        | % Fines |      |      |
| % +3"            | Coarse | Fine            | Coarse | Medium | Fine    | Silt | Clay |
| 0.0              | 0.0    | 10.5            | 8.5    | 53.6   | 18.8    | 8.6  |      |

| Test Results (ASTM D6913 & ASTM D1140) |         |           |          |  |  |  |  |  |  |
|--|---------|-----------|----------|--|--|--|--|--|--|
| Opening                                | Percent | Spec.*    | Pass?    |  |  |  |  |  |  |
| Size                                   | Finer   | (Percent) | (X=Fail) |  |  |  |  |  |  |
| .75                                    | 100.0   |           |          |  |  |  |  |  |  |
| .5                                     | 98.8    |           |          |  |  |  |  |  |  |
| .375                                   | 95.6    |           |          |  |  |  |  |  |  |
| #4                                     | 89.5    |           |          |  |  |  |  |  |  |
| #10                                    | 81.0    |           |          |  |  |  |  |  |  |
| #20                                    | 55.5    |           |          |  |  |  |  |  |  |
| #40                                    | 27.4    |           |          |  |  |  |  |  |  |
| #60                                    | 14.4    |           |          |  |  |  |  |  |  |
| #100                                   | 10.3    |           |          |  |  |  |  |  |  |
| #200                                   | 8.6     |           |          |  |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |  |

Brown well-graded sand with silt

Atterberg Limits (ASTM D 4318) LL= PI=

PL=

 $\begin{array}{ccc} & & & & & \\ \text{USCS (D 2487)=} & & \text{SW-SM} & & \text{AASHTO (M 145)=} & & \text{A-1-b} \end{array}$ 

Coefficients

**D<sub>60</sub>=** 0.9549 **D<sub>15</sub>=** 0.2594 **C<sub>c</sub>=** 1.57 **D<sub>90</sub>=** 5.1345 **D<sub>50</sub>=** 0.7444 **D<sub>10</sub>=** 0.1397 D<sub>85</sub>= 2.6338 D<sub>30</sub>= 0.4576 C<sub>u</sub>= 6.83

Remarks

As recieved MC = 6.4%

Date Received: 1/30/18 **Date Tested:** 1/31/18

Tested By: SB Checked By: MP

Title: Laboratory Manager

(no specification provided)

Source of Sample: B-39 Sample Number: S-5

**CDM Smith** 

**Depth: 8-10'** 

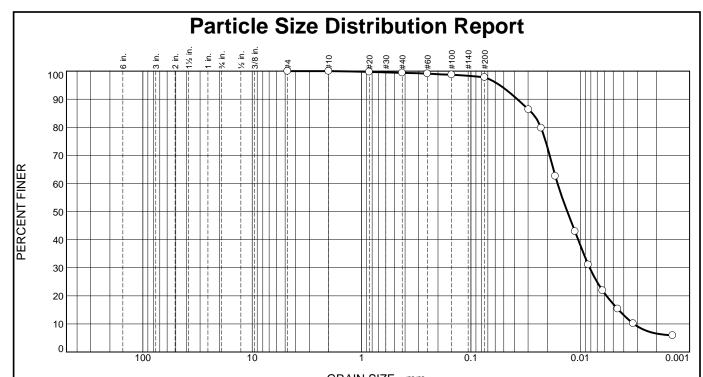
Client: Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/23/17

**Boston, Massachusetts Project No:** 101038.102170



| GRAIN SIZE - mm. |        |                 |        |        |         |      |      |
|------------------|--------|-----------------|--------|--------|---------|------|------|
| 0/ - 211         | % Gı   | % Gravel % Sand |        |        | % Fines |      |      |
| % +3"            | Coarse | Fine            | Coarse | Medium | Fine    | Silt | Clay |
| 0.0              | 0.0    | 0.0             | 0.0    | 0.6    | 1.6     | 80.7 | 17.1 |

| Opening    | Percent | Spec.*    | Pass?    |
|------------|---------|-----------|----------|
| Size       | Finer   | (Percent) | (X=Fail) |
| #4         | 100.0   |           |          |
| #10        | 100.0   |           |          |
| #20        | 99.7    |           |          |
| #40        | 99.4    |           |          |
| #60        | 99.1    |           |          |
| #100       | 98.7    |           |          |
| #200       | 97.8    |           |          |
| 0.0298 mm. | 86.4    |           |          |
| 0.0228 mm. | 79.8    |           |          |
| 0.0169 mm. | 62.6    |           |          |
| 0.0112 mm. | 42.9    |           |          |
| 0.0084 mm. | 31.1    |           |          |
| 0.0063 mm. | 21.9    |           |          |
| 0.0045 mm. | 15.4    |           |          |
| 0.0033 mm. | 10.2    |           |          |
| 0.0014 mm. | 5.9     |           |          |
|            |         |           |          |
|            |         |           |          |
|            |         |           |          |
|            |         |           |          |
|            |         |           |          |

| Material Description  |  |  |  |  |  |  |  |
|---|--|--|--|--|--|--|--|
| Gray silt   |  |  |  |  |  |  |  |
|   |  |  |  |  |  |  |  |
| Att   | erberg Limits (ASTM<br>LL=   | D 4318)<br>PI=   |  |  |  |  |  |
| USCS (D 2487)=  | Classification ML AASHTO (   | <b>M 145)=</b> A-4(0)  |  |  |  |  |  |
| <b>D<sub>90</sub>=</b> 0.0376<br><b>D<sub>50</sub>=</b> 0.0131<br><b>D<sub>10</sub>=</b> 0.0032 | Coefficients D <sub>85</sub> = 0.0274 D <sub>30</sub> = 0.0082 C <sub>u</sub> = 4.98 | <b>D<sub>60</sub>=</b> 0.0161<br><b>D<sub>15</sub>=</b> 0.0045<br><b>C<sub>c</sub>=</b> 1.29 |  |  |  |  |  |
| Remarks As received MC = 27.4%  |  |  |  |  |  |  |  |
| Date Received:<br>Tested By:  |  | 'ested: 2/5/18   |  |  |  |  |  |
| Checked By:   | MP   |  |  |  |  |  |  |
| Title: Laboratory Manager   |  |  |  |  |  |  |  |
|   |  |  |  |  |  |  |  |

Source of Sample: B-40 Sample Number: S-6

**Depth:** 14-16'

**CDM Smith** 

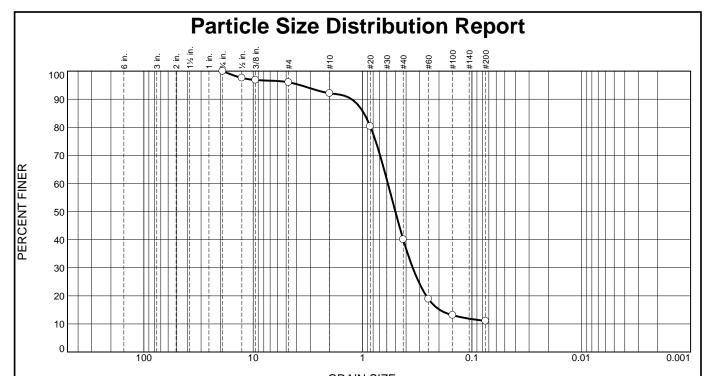
Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 1/11/18

Boston, Massachusetts Project No: 101038.102170



| GRAIN SIZE - mm. |        |                 |        |         |      |      |      |
|------------------|--------|-----------------|--------|---------|------|------|------|
| 0/ - 211         | % G    | % Gravel % Sand |        | % Fines |      |      |      |
| % +3"            | Coarse | Fine            | Coarse | Medium  | Fine | Silt | Clay |
| 0.0              | 0.0    | 4.0             | 3.9    | 52.0    | 29.0 | 11.1 |      |

| Test R  | esults (ASTM I | 0422 & ASTM D | 1140)    |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| .75"    | 100.0          |               |          |
| .5"     | 97.6           |               |          |
| .375"   | 96.8           |               |          |
| #4      | 96.0           |               |          |
| #10     | 92.1           |               |          |
| #20     | 80.4           |               |          |
| #40     | 40.1           |               |          |
| #60     | 18.9           |               |          |
| #100    | 13.1           |               |          |
| #200    | 11.1           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
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|         |                |               |          |
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|         |                |               |          |
|         |                |               |          |
|         |                |               |          |

| Material Description  |  |   |          |  |  |  |  |
|---|--|---|----------|--|--|--|--|
| Brown poorly grad   | Brown poorly graded sand with silt           |   |          |  |  |  |  |
|   |  |   |          |  |  |  |  |
| Λ++   | rhora Limite                                 | /A STM D /219                           | <b>,</b> |  |  |  |  |
| PL=   | LL=  | ( <u>ASTM D 4318)</u><br>PI=            | ,        |  |  |  |  |
| USCS (D 2487)=  | <u>Classific</u><br>SP-SM AA                 |   | A-1-b    |  |  |  |  |
| , ,   | Coeffic                                      | ionte                                   |          |  |  |  |  |
| <b>D<sub>90</sub>=</b> 1.2577 <b>D<sub>50</sub>=</b> 0.5013 | $D_{85} = 0.9711$                            | D <sub>60</sub> =                       | 0.5867   |  |  |  |  |
| D <sub>50</sub> = 0.5013<br>D <sub>10</sub> =               | D <sub>30</sub> = 0.3477<br>C <sub>u</sub> = | 7 D <sub>15</sub> =<br>C <sub>c</sub> = | 0.1970   |  |  |  |  |
| 210-  |  | •                                       |          |  |  |  |  |
| As received MC =  | Rema   | rks                                     |          |  |  |  |  |
| 713 received ivic =   | 20.070                                       |   |          |  |  |  |  |
|   |  |   |          |  |  |  |  |
| Date Received:  | 12/8/17                                      | Date Tested:                            | 12/13/17 |  |  |  |  |
| Tested By:  | RZ   |   |          |  |  |  |  |
| Checked By:   | Checked By: MP                               |   |          |  |  |  |  |
| Title: Laboratory Manager                                   |  |   |          |  |  |  |  |
| - Laboratory Manager  |  |   |          |  |  |  |  |

Source of Sample: B-41 Sample Number: S-V-2 **Depth:** 5.5-6'

# **CDM Smith**

Client: Massachusetts Water Resources Authority (MWRA)

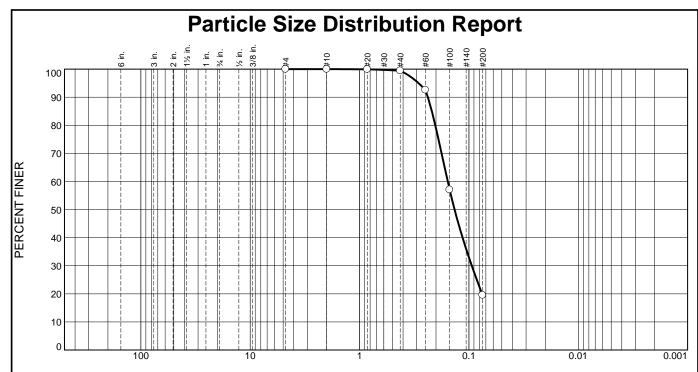
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts Project No: 101038.102170

Figure

**Date Sampled:** 11/21/17



| GRAIN SIZE - mm. |        |               |        |        |         |      |      |  |  |
|------------------|--------|---------------|--------|--------|---------|------|------|--|--|
| 0/ .3"           | % Gı   | Gravel % Sand |        | l      | % Fines |      |      |  |  |
| % +3"            | Coarse | Fine          | Coarse | Medium | Fine    | Silt | Clay |  |  |
| 0.0              | 0.0    | 0.0           | 0.0    | 0.6    | 79 9    | 19.5 |      |  |  |

| Test I  | 422 & ASTM D | 1140)     |          |
|---------|--------------|-----------|----------|
| Opening | Percent      | Spec.*    | Pass?    |
| Size    | Finer        | (Percent) | (X=Fail) |
| #4      | 100.0        |           |          |
| #10     | 100.0        |           |          |
| #20     | 99.9         |           |          |
| #40     | 99.4         |           |          |
| #60     | 92.6         |           |          |
| #100    | 57.1         |           |          |
| #200    | 19.5         |           |          |
|         |              |           |          |
|         |              |           |          |
|         |              |           |          |
|         |              |           |          |
|         |              |           |          |
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|         |              |           |          |
|         |              |           |          |
|         |              |           |          |
|         |              |           |          |
|         |              |           |          |

Gray-brown silty sand

**Atterberg Limits (ASTM D 4318)** PL=

Classification USCS (D 2487)= SM **AASHTO** (M 145)= A-2-4(0)

Coefficients

D<sub>90</sub>= 0.2372 D<sub>50</sub>= 0.1352 D<sub>10</sub>= **D<sub>60</sub>=** 0.1561 **D<sub>85</sub>=** 0.2181 D<sub>30</sub>= 0.0941 C<sub>u</sub>= D<sub>15</sub>= C<sub>C</sub>=

Remarks

As received MC = 28.5%

Date Received: 12/8/17 **Date Tested:** 12/13/17

Tested By: RZ

Checked By: MP

Title: Laboratory Manager

(no specification provided)

**CDM Smith** 

Source of Sample: B-41 Sample Number: S-2

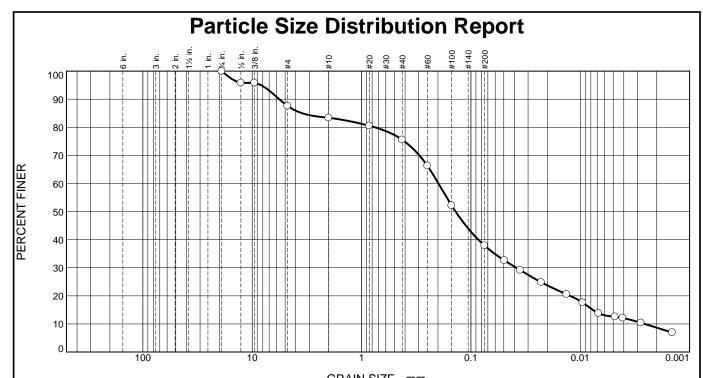
**Depth: 8-10'** 

Client: Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 11/21/17



|        |       |          |      | (      | <u>GRAIN SIZE -</u> | · mm. |         |      |
|--------|-------|----------|------|--------|---------------------|-------|---------|------|
| 0/ .3" |       | % Gravel |      | % Sand |                     |       | % Fines |      |
| % +3"  | % +3" | Coarse   | Fine | Coarse | Medium              | Fine  | Silt    | Clay |
|        | 0.0   | 0.0      | 12.4 | 4.2    | 7.8                 | 37.7  | 25.3    | 12.6 |

| Test Resul | ts (ASTM D6913 | & D7928 & AS | TM D1140) |
|------------|----------------|--------------|-----------|
| Opening    | Percent        | Spec.*       | Pass?     |
| Size       | Finer          | (Percent)    | (X=Fail)  |
| .75"       | 100.0          |              |           |
| .5"        | 95.8           |              |           |
| .375"      | 95.8           |              |           |
| #4         | 87.6           |              |           |
| #10        | 83.4           |              |           |
| #20        | 80.5           |              |           |
| #40        | 75.6           |              |           |
| #60        | 66.3           |              |           |
| #100       | 52.2           |              |           |
| #200       | 37.9           |              |           |
| 0.0494 mm. | 32.6           |              |           |
| 0.0354 mm. | 29.2           |              |           |
| 0.0228 mm. | 24.8           |              |           |
| 0.0133 mm. | 20.6           |              |           |
| 0.0095 mm. | 17.6           |              |           |
| 0.0068 mm. | 13.8           |              |           |
| 0.0048 mm. | 12.6           |              |           |
| 0.0041 mm. | 12.1           |              |           |
| 0.0028 mm. | 10.4           |              |           |
| 0.0014 mm. | 6.9            |              |           |
|            |                |              |           |

Dark brown silty sand with organics

**Atterberg Limits (ASTM D 4318)** 

PL=

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-4(0)

Coefficients

D<sub>90</sub>= 5.6616 D<sub>50</sub>= 0.1380 D<sub>10</sub>= 0.0026 D<sub>85</sub>= 3.4915 D<sub>30</sub>= 0.0385 C<sub>u</sub>= 76.65 **D<sub>60</sub>=** 0.1979 D<sub>15</sub>= 0.0077 C<sub>c</sub>= 2.90

Remarks

As received MC = 80.6%

**Date Tested:** 2/2/18

Date Received: 1/31/18 Tested By: MP/SB

Checked By: MP

Title: Laboratory Manager

(no specification provided)

**Source of Sample:** B-42 Sample Number: S-2

**Depth: 8-10'** 

Date Sampled: 11/2/17

**Client:** Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts** 

**CDM Smith** 

**Project No:** 101038.102170

# **CDM Smith**

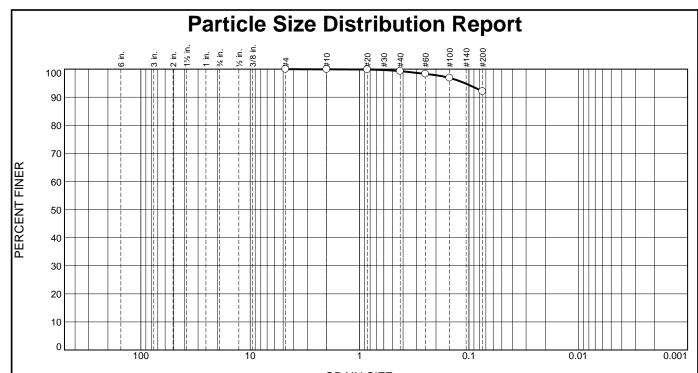
# **Geotechnical Engineering Laboratory**

# Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

Client: Massachusetts Water Resources Authority Weston Aqueduct Supply Main 3 Tested By: Project Name: Test Date: 1/31/2017 MWRA line, MA Project Location: Project Number: 101038-102170 Boring Number: B-42 Procedure: S-2 Temperature: 440° C Sample Number: Sample Depth (ft): 8-10 Sample Date: 11/2/2017

| AS RECEIVED MOISTURE CONTENT |        |
|------------------------------|--------|
| Tin Mass (g)                 | 96.89  |
| Wet Mass of Sample & Tin (g) | 173.07 |
| Dry Mass of Sample & Tin (g) | 139.08 |
| Mass of Water (g)            | 33.99  |
| Mass of Dry Soil (g)         | 42.19  |
| Moisture Content (%)         | 80.6   |

| ASH CONTENT                          |        |  |  |  |  |  |  |
|--------------------------------------|--------|--|--|--|--|--|--|
| Porcelain Dish Mass (g)              | 96.89  |  |  |  |  |  |  |
| Porcelain Dish + Oven Dried Soil (g) | 139.08 |  |  |  |  |  |  |
| Mass of Oven Dried Soil (g)          | 42.19  |  |  |  |  |  |  |
| Mass of Dish & Burned Soil (g)       | 135.11 |  |  |  |  |  |  |
| Mass of Burned Soil (g)              | 38.22  |  |  |  |  |  |  |
| Mass of Organic Material (g)         | 3.97   |  |  |  |  |  |  |
| Ash Content (%)                      | 90.6   |  |  |  |  |  |  |
|                                      |        |  |  |  |  |  |  |
| Organic Content (%)                  | 9.4    |  |  |  |  |  |  |



|        |       |          |      | (      | <u> GRAIN SIZE -</u> | mm.  |         |      |
|--------|-------|----------|------|--------|----------------------|------|---------|------|
| 9/ .3" |       | % Gravel |      | % Sand |                      |      | % Fines |      |
|        | % +3" | Coarse   | Fine | Coarse | Medium               | Fine | Silt    | Clay |
|        | 0.0   | 0.0      | 0.0  | 0.1    | 0.6                  | 7.2  | 92.1    |      |

| Test Re | esults (ASTM D      | 6913 & ASTM I | D1140)   |
|---------|---------------------|---------------|----------|
| Opening | Percent             | Spec.*        | Pass?    |
| Size    | Finer               | (Percent)     | (X=Fail) |
| #4      | 100.0               |               |          |
| #10     | 99.9                |               |          |
| #20     | 99.9                |               |          |
| #40     | 99.3                |               |          |
| #60     | 98.3                |               |          |
| #100    | 96.9                |               |          |
| #200    | 92.1                |               |          |
|         |                     |               |          |
|         |                     |               |          |
|         |                     |               |          |
|         |                     |               |          |
|         |                     |               |          |
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|         |                     |               |          |
|         |                     |               |          |
|         |                     |               |          |
| * /     | cification provided | 1             |          |

|   | <u>Materia</u>  | l Description   |         |
|---|---|---|---------|
| Gray-brown silt   |   |   |         |
| PL= NP  | erberg Lin<br>LL= N   | nits (ASTM D 4318)<br>V Pl= Ni                                  |         |
| USCS (D 2487)=  |   | ssification<br>AASHTO (M 145)=                                  | A-4(0)  |
| D <sub>90</sub> =<br>D <sub>50</sub> =<br>D <sub>10</sub> = | <u>Co</u><br>D <sub>85</sub> =<br>D <sub>30</sub> =<br>C <sub>u</sub> = | efficients D <sub>60</sub> = D <sub>15</sub> = C <sub>c</sub> = |         |
| As recieved MC =  |   | Remarks   |         |
| Date Received:  | 1/30/18   | Date Tested:  | 1/31/18 |
|   |   |   |         |
| Tested By:  | SB  |   |         |
|   |   |   |         |

Source of Sample: B-42 Sample Number: S-3

**Depth:** 14-16'

**CDM Smith** 

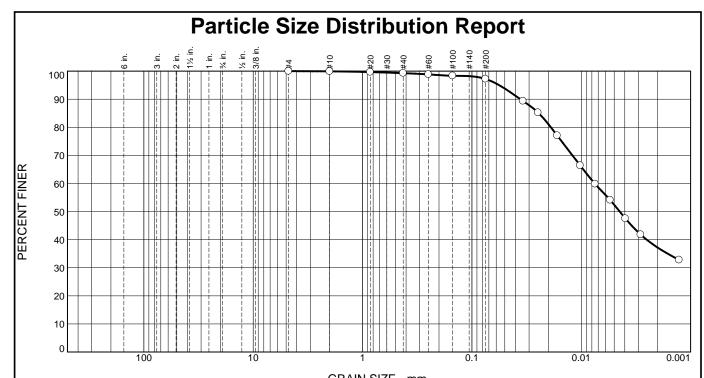
Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Date Sampled: 11/2/17

**Boston, Massachusetts Project No:** 101038.102170



|        |               |          |      |        | <u>GRAIN SIZE -</u> | · mm. |         |      |
|--------|---------------|----------|------|--------|---------------------|-------|---------|------|
| 9/ .3" |               | % Gravel |      | % Sand |                     |       | % Fines |      |
|        | % <b>+3</b> " | Coarse   | Fine | Coarse | Medium              | Fine  | Silt    | Clay |
|        | 0.0           | 0.0      | 0.0  | 0.1    | 0.6                 | 2.1   | 44.8    | 52.4 |

| Opening    | Percent | \$ & D7928 & AS<br>Spec.* | Pass?    |
|------------|---------|---------------------------|----------|
| Size       | Finer   | (Percent)                 | (X=Fail) |
| #4         | 100.0   | ,                         | ,        |
| #10        | 99.9    |                           |          |
| #20        | 99.7    |                           |          |
| #40        | 99.3    |                           |          |
| #60        | 98.8    |                           |          |
| #100       | 98.3    |                           |          |
| #200       | 97.2    |                           |          |
| 0.0341 mm. | 89.4    |                           |          |
| 0.0248 mm. | 85.3    |                           |          |
| 0.0166 mm. | 77.1    |                           |          |
| 0.0102 mm. | 66.4    |                           |          |
| 0.0075 mm. | 59.8    |                           |          |
| 0.0054 mm. | 54.1    |                           |          |
| 0.0039 mm. | 47.5    |                           |          |
| 0.0029 mm. | 41.8    |                           |          |
| 0.0013 mm. | 32.8    |                           |          |
|            |         |                           |          |
|            |         |                           |          |
|            |         |                           |          |
|            |         |                           |          |
|            |         |                           |          |

#### Gray lean clay Atterberg Limits (ASTM D 4318) **PL=** 21 LL= 42 Classification USCS (D 2487)= CL**AASHTO** (M 145)= A-7-6(22) Coefficients D<sub>90</sub>= 0.0360 D<sub>50</sub>= 0.0044 D<sub>10</sub>= **D<sub>60</sub>=** 0.0075 **D<sub>85</sub>=** 0.0245 D<sub>30</sub>= D<sub>15</sub>= C<sub>C</sub>= Remarks As recieved MC = 25.7%Date Received: 1/30/18 **Date Tested:** 1/31/18 Tested By: MP Checked By: MP Title: Laboratory Manager

**Material Description** 

\* (no specification provided)

**Source of Sample:** B-43 **Depth:** 8-10' Sample Number: S-5

**CDM Smith** 

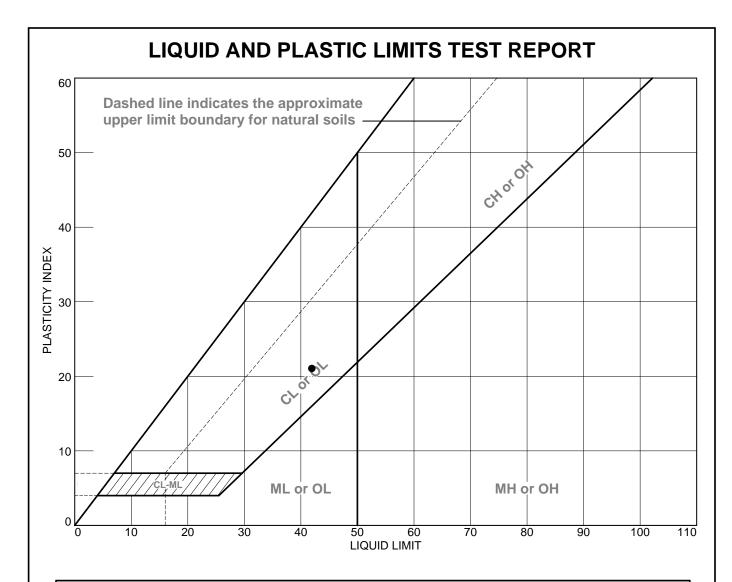
**Client:** Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/26/17

**Boston, Massachusetts Project No:** 101038.102170



|        | SOIL DATA |               |       |                                    |                         |                        |                            |      |  |  |
|--------|-----------|---------------|-------|------------------------------------|-------------------------|------------------------|----------------------------|------|--|--|
| SYMBOL | SOURCE    | SAMPLE<br>NO. | DEPTH | NATURAL<br>WATER<br>CONTENT<br>(%) | PLASTIC<br>LIMIT<br>(%) | LIQUID<br>LIMIT<br>(%) | PLASTICITY<br>INDEX<br>(%) | uscs |  |  |
| •      | B-43      | S-5           | 8-10' | 25.7                               | 21                      | 42                     | 21                         | CL   |  |  |

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

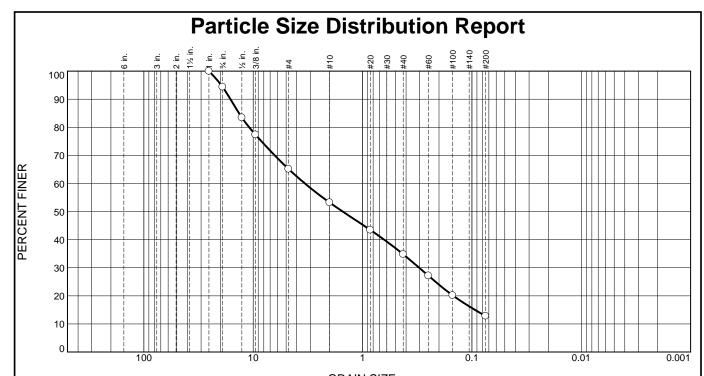
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts Pro

**Project No.:** 101038.102170

Tested By: AS Checked By: MP



|        |       |          |      | (      | <u>GRAIN SIZE -</u> | mm.  |         |      |
|--------|-------|----------|------|--------|---------------------|------|---------|------|
| 0/ .2" |       | % Gravel |      | % Sand |                     |      | % Fines |      |
|        | % +3" | Coarse   | Fine | Coarse | Medium              | Fine | Silt    | Clay |
|        | 0.0   | 5.6      | 29.2 | 12.0   | 18.4                | 22.0 | 12.8    |      |

| Test Re | esults (ASTM D | 6913 & ASTM I | D1140)   |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1       | 100.0          |               |          |
| .75     | 94.4           |               |          |
| .5      | 83.4           |               |          |
| .375    | 77.4           |               |          |
| #4      | 65.2           |               |          |
| #10     | 53.2           |               |          |
| #20     | 43.5           |               |          |
| #40     | 34.8           |               |          |
| #60     | 27.2           |               |          |
| #100    | 20.2           |               |          |
| #200    | 12.8           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |

| Atterberg Limits (ASTM D 4318)   PL   |
|---|
| PL= LL= PI=  Classification USCS(D 2487)= SM AASHTO (M 145)= A-1-b  Coefficients  D90= 16.1416 D85= 13.4888 D60= 3.3678 D50= 1.5183 D30= 0.3036 D15= 0.0936 Cu= Remarks  As recieved MC = 14.4% |
| PL= LL= PI=  USCS(D 2487)= SM   |
| USCS(D 2487)= SM AASHTO (M 145)= A-1-b  Coefficients D90= 16.1416 D85= 13.4888 D60= 3.3678 D50= 1.5183 D30= 0.3036 D15= 0.0936 Cu= Cc=  Remarks As recieved MC = 14.4%                          |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  |
| As recieved MC = 14.4%  |
|   |
| Date Received: 1/30/18 Date Tested: 2/1/18 Tested By: SB  |
| Checked By: MP  |
| Title: Laboratory Manager   |

\* (no specification provided)

Source of Sample: B-44 Sample Number: S-1

**Depth:** 6-8'

CDM Smith

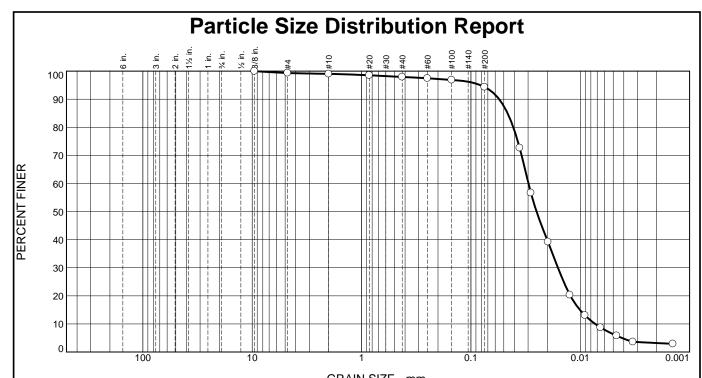
Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/31/17

Boston, Massachusetts Project No: 101038.102170



| GRAIN SIZE - mm. |          |      |        |        |      |         |      |
|------------------|----------|------|--------|--------|------|---------|------|
| % +3"            | % Gravel |      |        | % Sand |      | % Fines |      |
|                  | Coarse   | Fine | Coarse | Medium | Fine | Silt    | Clay |
| 0.0              | 0.0      | 0.7  | 0.3    | 1.1    | 3.6  | 87.9    | 6.4  |

| Opening    | Percent | Spec.*    | Pass?    |
|------------|---------|-----------|----------|
| Size       | Finer   | (Percent) | (X=Fail) |
| .375       | 100.0   |           |          |
| #4         | 99.3    |           |          |
| #10        | 99.0    |           |          |
| #20        | 98.5    |           |          |
| #40        | 97.9    |           |          |
| #60        | 97.5    |           |          |
| #100       | 96.8    |           |          |
| #200       | 94.3    |           |          |
| 0.0358 mm. | 72.7    |           |          |
| 0.0283 mm. | 56.7    |           |          |
| 0.0197 mm. | 39.2    |           |          |
| 0.0124 mm. | 20.3    |           |          |
| 0.0091 mm. | 13.1    |           |          |
| 0.0065 mm. | 8.7     |           |          |
| 0.0046 mm. | 5.8     |           |          |
| 0.0033 mm. | 3.6     |           |          |
| 0.0014 mm. | 2.9     |           |          |
|            |         |           |          |
|            |         |           |          |
|            |         |           |          |
|            |         |           |          |

Gray-brown silt

**Atterberg Limits (ASTM D 4318)** 

PL=

Classification

USCS (D 2487)= ML

**AASHTO** (M 145)= A-4(0)

Coefficients

**D<sub>60</sub>=** 0.0298 **D<sub>15</sub>=** 0.0101 **C<sub>c</sub>=** 1.18 **D<sub>90</sub>=** 0.0551 **D<sub>50</sub>=** 0.0251 **D<sub>10</sub>=** 0.0073 D<sub>85</sub>= 0.0462 D<sub>30</sub>= 0.0160 C<sub>u</sub>= 4.08

Remarks

As recieved MC = 24.1%

**Date Tested:** 1/31/18

Date Received: 1/30/18 Tested By: MP

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

**Source of Sample:** B-45 Sample Number: S-3

**Depth:** 10-12'

**Date Sampled:** 10/31/17

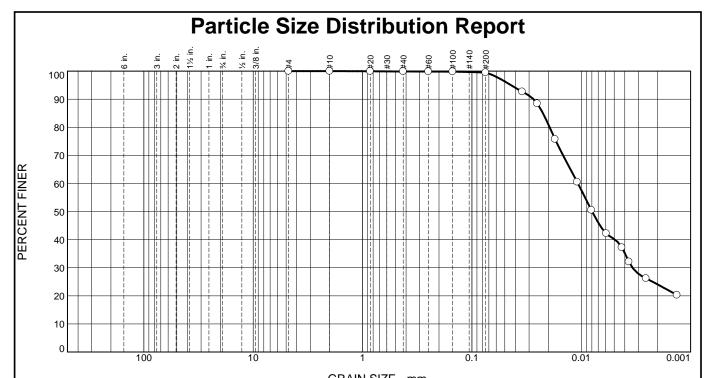
**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts** 



| GRAIN SIZE - mm. |          |      |        |        |      |         |         |  |
|------------------|----------|------|--------|--------|------|---------|---------|--|
| % +3"            | % Gravel |      |        | % Sand | I    | % Fines | % Fines |  |
|                  | Coarse   | Fine | Coarse | Medium | Fine | Silt    | Clay    |  |
| 0.0              | 0.0      | 0.0  | 0.0    | 0.1    | 0.4  | 59.3    | 40.2    |  |

| Opening    | Percent | Spec.*    | Pass?    |  |
|------------|---------|-----------|----------|--|
| Size       | Finer   | (Percent) | (X=Fail) |  |
| #4         | 100.0   |           |          |  |
| #10        | 100.0   |           |          |  |
| #20        | 99.9    |           |          |  |
| #40        | 99.9    |           |          |  |
| #60        | 99.8    |           |          |  |
| #100       | 99.8    |           |          |  |
| #200       | 99.5    |           |          |  |
| 0.0347 mm. | 92.7    |           |          |  |
| 0.0253 mm. | 88.5    |           |          |  |
| 0.0174 mm. | 75.8    |           |          |  |
| 0.0109 mm. | 60.5    |           |          |  |
| 0.0081 mm. | 50.5    |           |          |  |
| 0.0059 mm. | 42.2    |           |          |  |
| 0.0043 mm. | 37.2    |           |          |  |
| 0.0037 mm. | 32.1    |           |          |  |
| 0.0026 mm. | 26.2    |           |          |  |
| 0.0013 mm. | 20.3    |           |          |  |
|            |         |           |          |  |
|            |         |           |          |  |
|            |         |           |          |  |
|            |         |           |          |  |

#### Gray lean clay Atterberg Limits (ASTM D 4318) **PL=** 18 LL= 30 Classification USCS (D 2487)= CL**AASHTO** (M 145)= A-6(11) Coefficients D<sub>90</sub>= 0.0273 D<sub>50</sub>= 0.0079 D<sub>10</sub>= **D<sub>60</sub>=** 0.0107 **D<sub>85</sub>=** 0.0224 D<sub>30</sub>= 0.0034 C<sub>u</sub>= D<sub>15</sub>= C<sub>C</sub>= Remarks As recieved MC = 24.8%Date Received: 1/30/18 **Date Tested:** 2/1/18 Tested By: MP

**Material Description** 

\* (no specification provided)

Source of Sample: B-45 Sample Number: S-4

**Depth:** 14-16'

**Client:** Massachusetts Water Resources Authority (MWRA)

Title: Laboratory Manager

Checked By: MP

Weston Aqueduct Supply Main 3 (WASM3)

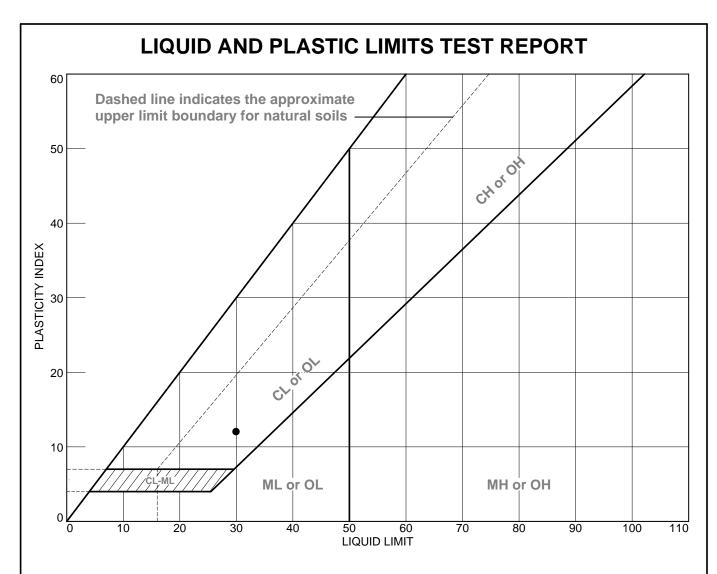
Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/31/17

**Project No:** 101038.102170

**CDM Smith** 

**Boston, Massachusetts** 



| SOIL DATA |        |               |        |                                    |                         |                        |                            |      |  |
|-----------|--------|---------------|--------|------------------------------------|-------------------------|------------------------|----------------------------|------|--|
| SYMBOL    | SOURCE | SAMPLE<br>NO. | DEPTH  | NATURAL<br>WATER<br>CONTENT<br>(%) | PLASTIC<br>LIMIT<br>(%) | LIQUID<br>LIMIT<br>(%) | PLASTICITY<br>INDEX<br>(%) | uscs |  |
| •         | B-45   | S-4           | 14-16' | 24.8                               | 18                      | 30                     | 12                         | CL   |  |

**CDM Smith** 

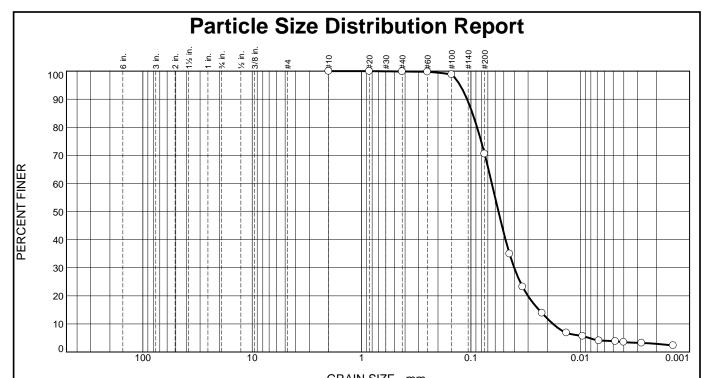
Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts Project No.: 101038.102170

Tested By: AS Checked By: MP



| GRAIN SIZE - mm. |          |      |        |        |      |         |      |
|------------------|----------|------|--------|--------|------|---------|------|
| % +3"            | % Gravel |      |        | % Sand | i    | % Fines |      |
|                  | Coarse   | Fine | Coarse | Medium | Fine | Silt    | Clay |
| 0.0              | 0.0      | 0.0  | 0.0    | 0.1    | 29.3 | 66.7    | 3.9  |

| Test Result | s (ASTM D6913 | & D7928 & ASTM D1140) |          |  |  |  |  |
|-------------|---------------|-----------------------|----------|--|--|--|--|
| Opening     | Percent       | Spec.*                | Pass?    |  |  |  |  |
| Size        | Finer         | (Percent)             | (X=Fail) |  |  |  |  |
| #10         | 100.0         |                       |          |  |  |  |  |
| #20         | 100.0         |                       |          |  |  |  |  |
| #40         | 99.9          |                       |          |  |  |  |  |
| #60         | 99.8          |                       |          |  |  |  |  |
| #100        | 98.8          |                       |          |  |  |  |  |
| #200        | 70.6          |                       |          |  |  |  |  |
| 0.0443 mm.  | 35.0          |                       |          |  |  |  |  |
| 0.0337 mm.  | 23.2          |                       |          |  |  |  |  |
| 0.0224 mm.  | 13.9          |                       |          |  |  |  |  |
| 0.0134 mm.  | 6.8           |                       |          |  |  |  |  |
| 0.0095 mm.  | 5.7           |                       |          |  |  |  |  |
| 0.0068 mm.  | 4.1           |                       |          |  |  |  |  |
| 0.0048 mm.  | 3.8           |                       |          |  |  |  |  |
| 0.0040 mm.  | 3.5           |                       |          |  |  |  |  |
| 0.0027 mm.  | 3.2           |                       |          |  |  |  |  |
| 0.0014 mm.  | 2.3           |                       |          |  |  |  |  |
|             |               |                       |          |  |  |  |  |
|             |               |                       |          |  |  |  |  |
|             |               |                       |          |  |  |  |  |
|             |               |                       |          |  |  |  |  |
|             |               |                       |          |  |  |  |  |

Brown silt with sand

**Atterberg Limits (ASTM D 4318)** 

PL=

Classification

USCS (D 2487)= ML

**AASHTO (M 145)=** A-4(0)

Coefficients

**D<sub>60</sub>=** 0.0644 **D<sub>15</sub>=** 0.0238 **C<sub>c</sub>=** 1.41 D<sub>90</sub>= 0.1084 D<sub>50</sub>= 0.0560 D<sub>10</sub>= 0.0177 D<sub>85</sub>= 0.0967 D<sub>30</sub>= 0.0402 C<sub>u</sub>= 3.63

Remarks

As received MC = 26.0%

**Date Tested:** 2/2/18

Date Received: 1/31/18 Tested By: MP/SB

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-46 Sample Number: S-2

**Depth:** 8-10'

**Date Sampled:** 11/16/18

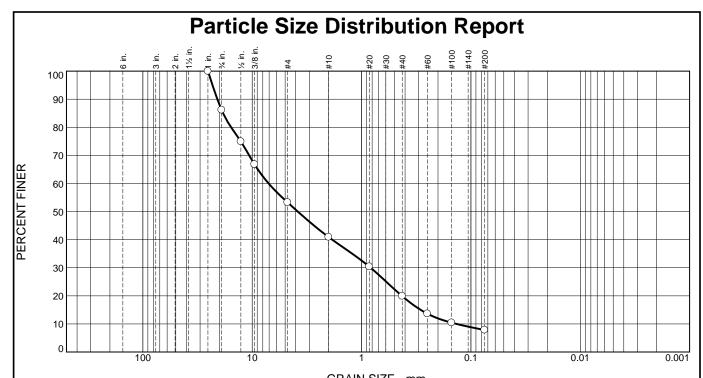
**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts** 



| GRAIN SIZE - mm. |        |                 |        |        |      |         |      |  |
|------------------|--------|-----------------|--------|--------|------|---------|------|--|
| % +3"            | % G    | % Gravel % Sand |        |        |      | % Fines |      |  |
|                  | Coarse | Fine            | Coarse | Medium | Fine | Silt    | Clay |  |
| 0.0              | 13.8   |                 | 12.4   | 21.0   | 12.1 | 7.8     |      |  |

| Test Re | esults (ASTM D | 6913 & ASTM I | D1140)   |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1       | 100.0          |               |          |
| .75     | 86.2           |               |          |
| .5      | 74.9           |               |          |
| .375    | 66.8           |               |          |
| #4      | 53.3           |               |          |
| #10     | 40.9           |               |          |
| #20     | 30.4           |               |          |
| #40     | 19.9           |               |          |
| #60     | 13.6           |               |          |
| #100    | 10.4           |               |          |
| #200    | 7.8            |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |

Brown poorly graded gravel with silt and sand

Atterberg Limits (ASTM D 4318) LL= PI=

PL=

Coefficients

 D90=
 20.8441
 D85=
 18.4565
 D60=
 7.0810

 D50=
 3.8326
 D30=
 0.8261
 D15=
 0.2880

 D10=
 0.1355
 Cu=
 52.24
 Cc=
 0.71

Remarks

As recieved MC = 5.4%

Date Received: 1/30/18

Date Tested: 2/1/18

Tested By: SB

Checked By: MP

Title: Laboratory Manager

(no specification provided)

Source of Sample: B-47 Sample Number: S-V-1

**Depth:** 2-2.5'

Date Sampled: 11/2/17

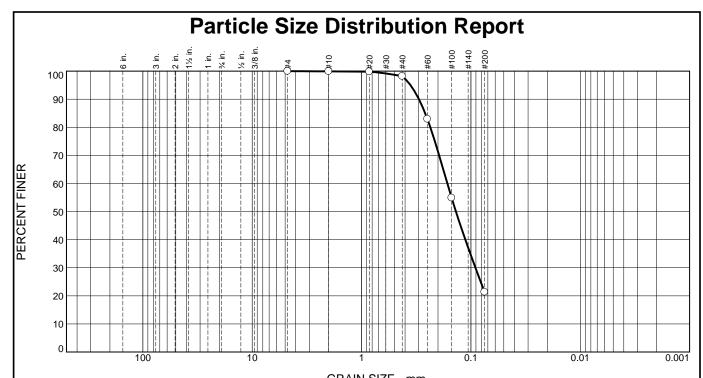
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts Project No:



|  | GRAIN SIZE - mm. |        |       |        |        |      |         |      |  |
|--|------------------|--------|-------|--------|--------|------|---------|------|--|
|  | % +3"            | % Gı   | ravel |        | % Sand | i    | % Fines |      |  |
|  |                  | Coarse | Fine  | Coarse | Medium | Fine | Silt    | Clay |  |
|  | 0.0              | 0.0    | 0.0   | 0.1    | 1.7    | 76.8 | 21.4    |      |  |

| Test R  | esults (ASTM De | 6913 & ASTM I | D1140)   |  |  |
|---------|-----------------|---------------|----------|--|--|
| Opening | Percent         | Spec.*        | Pass?    |  |  |
| Size    | Finer           | (Percent)     | (X=Fail) |  |  |
| #4      | 100.0           |               |          |  |  |
| #10     | 99.9            |               |          |  |  |
| #20     | 99.8            |               |          |  |  |
| #40     | 98.2            |               |          |  |  |
| #60     | 82.9            |               |          |  |  |
| #100    | 54.9            |               |          |  |  |
| #200    | 21.4            |               |          |  |  |
|         |                 |               |          |  |  |
|         |                 |               |          |  |  |
|         |                 |               |          |  |  |
|         |                 |               |          |  |  |
|         |                 |               |          |  |  |
|         |                 |               |          |  |  |
|         |                 |               |          |  |  |
|         |                 |               |          |  |  |
|         |                 |               |          |  |  |
|         |                 |               |          |  |  |
|         |                 |               |          |  |  |
|         |                 |               |          |  |  |
|         |                 |               |          |  |  |
|         |                 |               |          |  |  |

Gray/red brown silty sand

**Atterberg Limits (ASTM D 4318)** 

PL=

USCS (D 2487)=

Classification SM **AASHTO** (M 145)= A-2-4(0)

Coefficients

D<sub>90</sub>= 0.2988 D<sub>50</sub>= 0.1371 D<sub>10</sub>= **D<sub>85</sub>=** 0.2620

**D<sub>60</sub>=** 0.1641

D<sub>30</sub>= 0.0908 C<sub>u</sub>=

D<sub>15</sub>= C<sub>C</sub>=

Remarks

As recieved MC = 9.2%

**Date Tested:** 2/1/18

Date Received: 1/30/18 Tested By: SB

Checked By: MP

Title: Laboratory Manager

(no specification provided)

**Source of Sample:** B-48 Sample Number: S-4

**Depth:** 6-8'

**Date Sampled:** 10/24/17

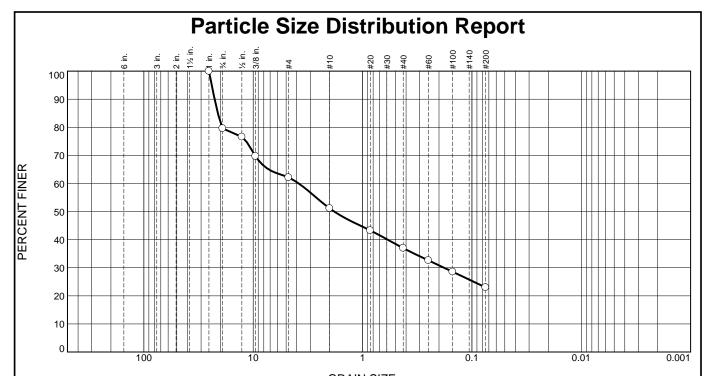
**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts** 



| GRAIN SIZE - mm. |          |      |        |        |      |         |      |  |
|------------------|----------|------|--------|--------|------|---------|------|--|
| % +3"            | % Gravel |      |        | % Sand |      | % Fines |      |  |
|                  | Coarse   | Fine | Coarse | Medium | Fine | Silt    | Clay |  |
| 0.0              | 20.4     | 17.5 | 11.0   | 14.1   | 14.0 | 23.0    |      |  |

| Test R  | esults (ASTM I | 0422 & ASTM D | 1140)    |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1"      | 100.0          |               |          |
| .75"    | 79.6           |               |          |
| .5"     | 76.6           |               |          |
| .375"   | 69.7           |               |          |
| #4      | 62.1           |               |          |
| #10     | 51.1           |               |          |
| #20     | 43.3           |               |          |
| #40     | 37.0           |               |          |
| #60     | 32.6           |               |          |
| #100    | 28.6           |               |          |
| #200    | 23.0           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |

|   | <b>Material Descri</b>                        | <u>ption</u>                          |
|---|---|---------------------------------------|
| Brown silty sand v                            | vith gravel                                   |                                       |
|   |   |                                       |
| A 44.   | uhaua Limita (AC                              | TM D 4240)                            |
| PL=   | erberg Limits (AS<br>LL=                      | PI=                                   |
|   | Classification                                | nn.                                   |
| USCS (D 2487)=                                |   | O (M 145)= A-1-b                      |
|   | Coefficient                                   | s                                     |
| <b>D<sub>90</sub>=</b> 22.5460                | D <sub>85</sub> = 21.0526                     | D <sub>60</sub> = 3.8366              |
| D <sub>50</sub> = 1.8161<br>D <sub>10</sub> = | D <sub>30</sub> = 0.1798<br>C <sub>11</sub> = | D <sub>15</sub> =<br>C <sub>c</sub> = |
| D <sub>10</sub> -                             | <b>u</b>                                      | OC-                                   |
| As received MC =                              | Remarks                                       |                                       |
| As received ivic =                            | 11.770  |                                       |
|   |   |                                       |
| Date Received:                                | 12/8/17 <b>Dat</b>                            | e Tested: 12/13/17                    |
| Tested By:                                    | RZ  |                                       |
| Checked By:                                   |   |                                       |
|   |   |                                       |
| ı itle:                                       | Laboratory Manager                            |                                       |

\* (no specification provided)

Source of Sample: B-50 Sample Number: S-2

**Depth:** 2-4'

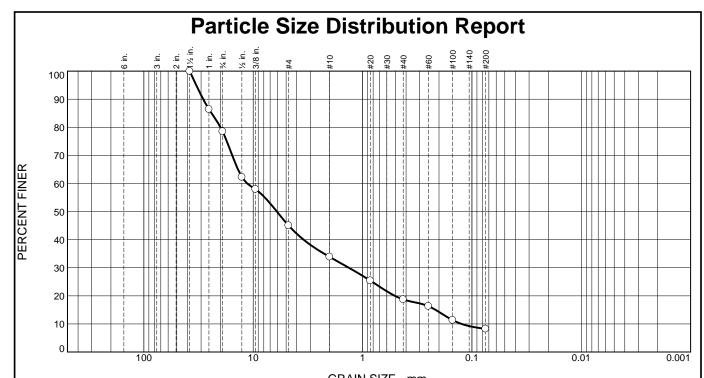
**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/25/17



|         | GRAIN SIZE - mm. |          |      |        |        |         |      |      |
|---------|------------------|----------|------|--------|--------|---------|------|------|
| 0/. 13" |                  | % Gravel |      | % Sand |        | % Fines |      |      |
|         | % +3"            | Coarse   | Fine | Coarse | Medium | Fine    | Silt | Clay |
|         | 0.0              | 21.5     | 33.5 | 11.1   | 15.2   | 10.5    | 8.2  |      |

|   | Test Results (ASTM D422 & ASTM D1140) |         |           |          |  |  |  |  |
|---|---------------------------------------|---------|-----------|----------|--|--|--|--|
|   | Opening                               | Percent | Spec.*    | Pass?    |  |  |  |  |
|   | Size                                  | Finer   | (Percent) | (X=Fail) |  |  |  |  |
| ſ | 1.5"                                  | 100.0   |           |          |  |  |  |  |
|   | 1"                                    | 86.4    |           |          |  |  |  |  |
|   | .75"                                  | 78.5    |           |          |  |  |  |  |
|   | .5"                                   | 62.3    |           |          |  |  |  |  |
|   | .375"                                 | 57.9    |           |          |  |  |  |  |
|   | #4                                    | 45.0    |           |          |  |  |  |  |
|   | #10                                   | 33.9    |           |          |  |  |  |  |
|   | #20                                   | 25.4    |           |          |  |  |  |  |
|   | #40                                   | 18.7    |           |          |  |  |  |  |
|   | #60                                   | 16.3    |           |          |  |  |  |  |
|   | #100                                  | 11.3    |           |          |  |  |  |  |
|   | #200                                  | 8.2     |           |          |  |  |  |  |
|   |                                       |         |           |          |  |  |  |  |
|   |                                       |         |           |          |  |  |  |  |
|   |                                       |         |           |          |  |  |  |  |
|   |                                       |         |           |          |  |  |  |  |
|   |                                       |         |           |          |  |  |  |  |
|   |                                       |         |           |          |  |  |  |  |
| l |                                       |         |           |          |  |  |  |  |
| l |                                       |         |           |          |  |  |  |  |
|   | *                                     |         |           |          |  |  |  |  |

Gray well-graded gravel with silt and sand

Atterberg Limits (ASTM D 4318) LL= PI=

PL=

LL- FI=

Coefficients

 D<sub>90</sub>=
 28.6676
 D<sub>85</sub>=
 24.0368
 D<sub>60</sub>=
 11.3650

 D<sub>50</sub>=
 6.0736
 D<sub>30</sub>=
 1.3364
 D<sub>15</sub>=
 0.2147

 D<sub>10</sub>=
 0.1242
 C<sub>u</sub>=
 91.51
 C<sub>c</sub>=
 1.27

Remarks

As received MC = 6.3%

Date Received: 12/8/17 Date Tested: 12/12/17

Tested By: RZ

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-51 Sample Number: S-4 **Depth:** 6-8'

**Date Sampled:** 10/25/17

**CDM Smith** 

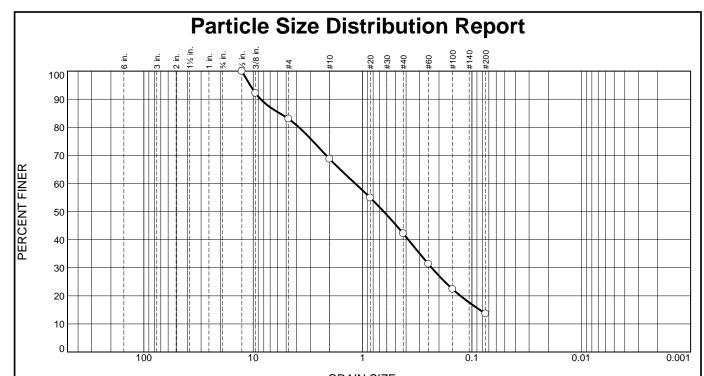
Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts Project No: 101038.102170

Figure



|        |       | GRAIN SIZE - mm. |                 |        |         |      |      |      |
|--------|-------|------------------|-----------------|--------|---------|------|------|------|
| 9/ .3" |       | % G              | % Gravel % Sand |        | % Fines |      |      |      |
|        | % +3" | Coarse           | Fine            | Coarse | Medium  | Fine | Silt | Clay |
|        | 0.0   | 0.0              | 17.0            | 14.3   | 26.5    | 28.6 | 13.6 |      |

| Test Results (ASTM D422 & ASTM D1140) |                   |           |          |  |  |  |  |  |
|---------------------------------------|-------------------|-----------|----------|--|--|--|--|--|
| Opening                               | Percent Spec.* Pa |           |          |  |  |  |  |  |
| Size                                  | Finer             | (Percent) | (X=Fail) |  |  |  |  |  |
| .5"                                   | 100.0             |           |          |  |  |  |  |  |
| .375"                                 | 92.2              |           |          |  |  |  |  |  |
| #4                                    | 83.0              |           |          |  |  |  |  |  |
| #10                                   | 68.7              |           |          |  |  |  |  |  |
| #20                                   | 54.9              |           |          |  |  |  |  |  |
| #40                                   | 42.2              |           |          |  |  |  |  |  |
| #60                                   | 31.3              |           |          |  |  |  |  |  |
| #100                                  | 22.4              |           |          |  |  |  |  |  |
| #200                                  | 13.6              |           |          |  |  |  |  |  |
|                                       |                   |           |          |  |  |  |  |  |
|                                       |                   |           |          |  |  |  |  |  |
|                                       |                   |           |          |  |  |  |  |  |
|                                       |                   |           |          |  |  |  |  |  |
|                                       |                   |           |          |  |  |  |  |  |
|                                       |                   |           |          |  |  |  |  |  |
|                                       |                   |           |          |  |  |  |  |  |
|                                       |                   |           |          |  |  |  |  |  |
|                                       |                   |           |          |  |  |  |  |  |
|                                       |                   |           |          |  |  |  |  |  |
|                                       |                   |           |          |  |  |  |  |  |
| *                                     |                   |           |          |  |  |  |  |  |

|                               | Material D                  | <u> Descriptio</u>           | <u>n</u>                      |
|-------------------------------|-----------------------------|------------------------------|-------------------------------|
| Brown silty sand v            | vith gravel                 |                              |                               |
|                               |                             |                              |                               |
| A 44 -                        |                             | - /A OTNA I                  | D 4040\                       |
| PL=                           | erberg Limit<br>LL=         | S (ASTIVIT                   | <u>ט 4318)</u><br>Pl=         |
|                               | Classi                      | fication                     |                               |
| USCS (D 2487)=                |                             | <u>fication</u><br>NASHTO (N | <b>// 145)=</b> A-1-b         |
|                               | Coeff                       | icients                      |                               |
| <b>D<sub>90</sub>=</b> 8.5434 | $D_{85} = 5.72$             | 48                           | <b>D<sub>60</sub>=</b> 1.1682 |
| <b>D<sub>50</sub>=</b> 0.6405 | <b>D<sub>30</sub>=</b> 0.23 | 34                           | <b>D<sub>15</sub>=</b> 0.0846 |
| D <sub>10</sub> =             | c <sub>u</sub> =            |                              | C <sub>C</sub> =              |
|                               |                             | narks                        |                               |
| As received MC =              | 13.4%                       |                              |                               |
|                               |                             |                              |                               |
| Date Received:                | 12/8/17                     | Date Te                      | ested: 12/14/17               |
| Tested By:                    |                             | Date 10                      | 12/14/17                      |
| -                             |                             |                              |                               |
| Checked By:                   | MP                          |                              |                               |
| Title: 1                      | Laboratory M                | anager                       |                               |
|                               |                             |                              |                               |

(no specification provided)

**Source of Sample:** B-52 **Sample Number:** S-3

**Depth:** 4-5'

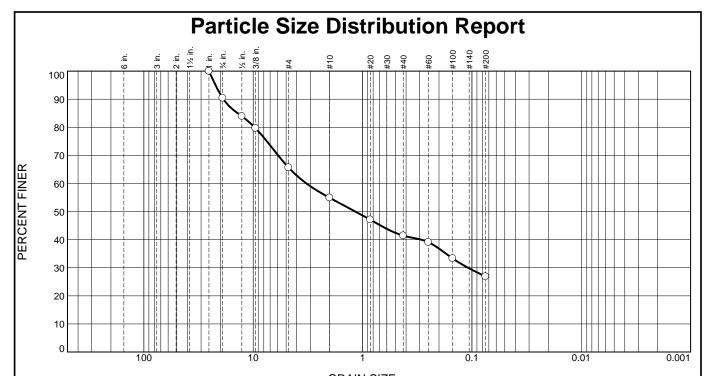
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/26/17



|        |        | GRAIN SIZE - mm. |              |        |         |      |      |  |
|--------|--------|------------------|--------------|--------|---------|------|------|--|
| 9/ .2" |        | % G              | ravel % Sand |        | % Fines |      |      |  |
| % +3"  | Coarse | Fine             | Coarse       | Medium | Fine    | Silt | Clay |  |
|        | 0.0    | 9.6              | 24.7         | 10.8   | 13.5    | 14.5 | 26.9 |  |

| Test R  | esults (ASTM I | 0422 & ASTM D | 1140)    |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1"      | 100.0          |               |          |
| .75"    | 90.4           |               |          |
| .5"     | 83.9           |               |          |
| .375"   | 79.7           |               |          |
| #4      | 65.7           |               |          |
| #10     | 54.9           |               |          |
| #20     | 47.1           |               |          |
| #40     | 41.4           |               |          |
| #60     | 39.1           |               |          |
| #100    | 33.3           |               |          |
| #200    | 26.9           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |

| Gray-brown silty   | Material Description sand with gravel  | <u>n</u>  |
|--|--|---|
| •  |  |   |
| PL=  | erberg Limits (ASTM [<br>LL=   | <u>PI=</u>  |
| USCS (D 2487)=   | SM <b>Classification</b> AASHTO (M   | I <b>145)=</b> A-2-4(0)   |
| D <sub>90</sub> = 18.7379<br>D <sub>50</sub> = 1.1635<br>D <sub>10</sub> = | Coefficients D <sub>85</sub> = 13.8487 D <sub>30</sub> = 0.1086 C <sub>u</sub> = | D <sub>60</sub> = 3.2574<br>D <sub>15</sub> =<br>C <sub>c</sub> = |
| As received MC =   | <b>Remarks</b> = 10.3%   |   |
| Date Received:<br>Tested By:   |  | <b>sted:</b> 12/14/17   |
| Checked By:  | MP   |   |
| Title:   | Laboratory Manager   |   |
|  |  |   |

(no specification provided)

Source of Sample: B-53 Sample Number: S-2

**Depth: 2-2.9'** 

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

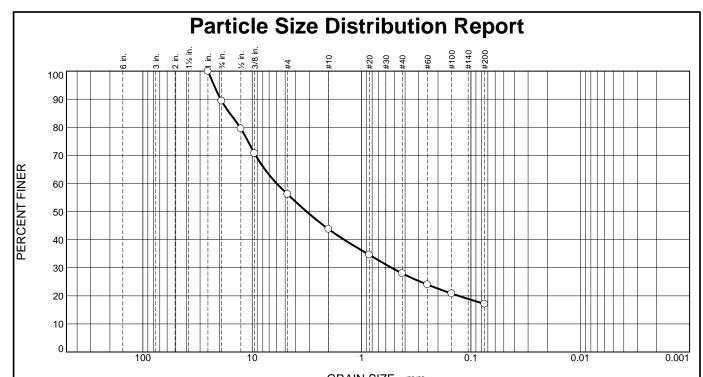
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Date Sampled: 11/3/17

**Project No:** 101038.102170 **Figure** 

**Boston, Massachusetts** 



|        |       | GRAIN SIZE - mm. |              |        |         |      |      |      |
|--------|-------|------------------|--------------|--------|---------|------|------|------|
| 9/ .2" |       | % Gı             | ravel % Sand |        | % Fines |      |      |      |
|        | % +3" | Coarse           | Fine         | Coarse | Medium  | Fine | Silt | Clay |
|        | 0.0   | 10.6             | 33.2         | 12.5   | 15.7    | 10.9 | 17.1 |      |

| Test R  | esults (ASTM I | 0422 & ASTM D | 1140)    |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1"      | 100.0          |               |          |
| .75"    | 89.4           |               |          |
| .5"     | 79.5           |               |          |
| .375"   | 70.7           |               |          |
| #4      | 56.2           |               |          |
| #10     | 43.7           |               |          |
| #20     | 34.6           |               |          |
| #40     | 28.0           |               |          |
| #60     | 24.0           |               |          |
| #100    | 20.8           |               |          |
| #200    | 17.1           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
| *       |                |               |          |

|  | <b>Material Description</b>  |                     |
|--|--|---------------------|
| Brown silty grave  | l with sand  |                     |
|  |  |                     |
| Δ++  | erberg Limits (ASTM D 43   | R18)                |
| PL=  | LL= Pl   |                     |
| USCS (D 2487)=   | Classification GM AASHTO (M 14   | <b>5)=</b> A-1-b    |
|  | Coefficients   |                     |
| <b>D<sub>90</sub>=</b> 19.4225 <b>D<sub>50</sub>=</b> 3.1787 |  | <b>0=</b> 5.9678    |
| D <sub>50</sub> = 3.1787<br>D <sub>10</sub> =                | D <sub>30</sub> = 0.5313 D <sub>1</sub><br>C <sub>u</sub> = C <sub>c</sub> |                     |
|  | Remarks  |                     |
| As received MC =   | = 10.3%  |                     |
|  |  |                     |
| Date Received:   | 12/8/17 <b>Date Teste</b>  | <b>d</b> : 12/14/17 |
| Tested By:   | RZ   |                     |
| Checked By:  | MP   |                     |
| Title:   | Laboratory Manager   |                     |
|  | -  |                     |

\* (no specification provided)

Source of Sample: B-54 Sample Number: S-3 **Depth:** 4-6'

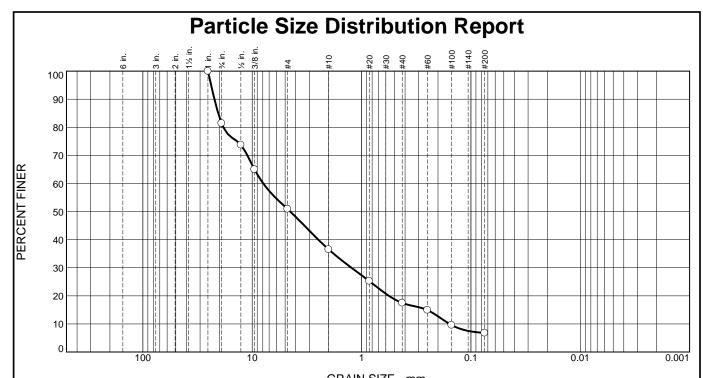
**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/24/17



|                       | GRAIN SIZE - mm. |      |        |         |      |      |      |  |
|-----------------------|------------------|------|--------|---------|------|------|------|--|
| % +3" % Gravel % Sand |                  |      |        | % Fines |      |      |      |  |
| % +3"                 | Coarse           | Fine | Coarse | Medium  | Fine | Silt | Clay |  |
| 0.0                   | 18.6             | 30.5 | 14.4   | 19.0    | 10.7 | 6.8  |      |  |

| Test Results (ASTM D422 & ASTM D1140) |         |           |          |  |  |  |  |
|---------------------------------------|---------|-----------|----------|--|--|--|--|
| Opening                               | Percent | Spec.*    | Pass?    |  |  |  |  |
| Size                                  | Finer   | (Percent) | (X=Fail) |  |  |  |  |
| 1"                                    | 100.0   |           |          |  |  |  |  |
| .75"                                  | 81.4    |           |          |  |  |  |  |
| .5"                                   | 73.7    |           |          |  |  |  |  |
| .375"                                 | 65.0    |           |          |  |  |  |  |
| #4                                    | 50.9    |           |          |  |  |  |  |
| #10                                   | 36.5    |           |          |  |  |  |  |
| #20                                   | 25.2    |           |          |  |  |  |  |
| #40                                   | 17.5    |           |          |  |  |  |  |
| #60                                   | 14.9    |           |          |  |  |  |  |
| #100                                  | 9.6     |           |          |  |  |  |  |
| #200                                  | 6.8     |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
|                                       |         |           |          |  |  |  |  |
| *                                     |         |           |          |  |  |  |  |

Gray-brown well-graded gravel with silt and sand

Atterberg Limits (ASTM D 4318) LL= PI=

PL=

**Classification** USCS (D 2487)= GW-GM **AASHTO** (M 145)= A-1-a

Coefficients

**D<sub>90</sub>=** 22.1623 **D<sub>50</sub>=** 4.4857 **D<sub>10</sub>=** 0.1568 D<sub>60</sub>= 7.9258 D<sub>15</sub>= 0.2524 C<sub>c</sub>= 1.23 D<sub>85</sub>= 20.4709 D<sub>30</sub>= 1.2377 C<sub>u</sub>= 50.55

Remarks

As received MC = 9.4%

Date Received: 12/8/17 **Date Tested:** 12/14/17

Tested By: RZ Checked By: MP

Title: Laboratory Manager

(no specification provided)

Source of Sample: B-55 **Depth: 2-4'** Sample Number: S-1

**Date Sampled:** 10/27/17

# **CDM Smith**

Client: Massachusetts Water Resources Authority (MWRA)

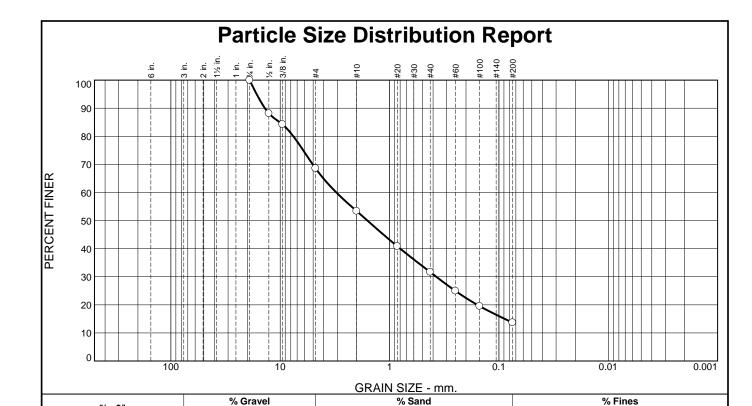
Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts** 

**Project No:** 101038.102170

**Figure** 



| 0.0       |                 | 0.0         | 31.4    | 4 1      | 5.2 |
|-----------|-----------------|-------------|---------|----------|-----|
| Test F    | Results (ASTI   | M D422 & AS | TM D114 | 40)      | 7   |
| Opening   | Percent         | Spec.       | *       | Pass?    | 1   |
| Size      | Finer           | (Perce      | nt) (   | (X=Fail) |     |
| .75"      | 100.0           |             |         |          | 7   |
| .5"       | 88.1            |             |         |          |     |
| .375"     | 84.2            |             |         |          |     |
| #4        | 68.6            |             |         |          |     |
| #10       | 53.4            |             |         |          |     |
| #20       | 40.8            |             |         |          |     |
| #40       | 31.7            |             |         |          |     |
| #60       | 25.0            |             |         |          |     |
| #100      | 19.5            |             |         |          |     |
| #200      | 13.7            |             |         |          |     |
|           |                 |             |         |          |     |
|           |                 |             |         |          |     |
|           |                 |             |         |          |     |
|           |                 |             |         |          |     |
|           |                 |             |         |          |     |
|           |                 |             |         |          |     |
|           |                 |             |         |          |     |
|           |                 |             |         |          |     |
|           |                 |             |         |          |     |
|           |                 |             |         |          |     |
| * (no spe | cification prov | ided)       |         |          | _   |

Coarse

Fine

Coarse

Medium

21.7

Fine

18.0

| Dark brown silty sand with gravel  Atterberg Limits (ASTM D 4318)  |
|--|
| Atterhera Limits (ASTM D 4318)   |
|  |
| PL= LL= PI=  |
| USCS (D 2487)= SM Classification AASHTO (M 145)= A-1-b   |
| Coefficients       D <sub>90</sub> = 13.8305     D <sub>85</sub> = 10.0865     D <sub>60</sub> = 3.0679       D <sub>50</sub> = 1.5945     D <sub>30</sub> = 0.3739     D <sub>15</sub> = 0.0885       D <sub>10</sub> =     C <sub>u</sub> =     C <sub>c</sub> = |
| Remarks As received $MC = 9.6\%$   |
| Date Received: 12/8/17 Date Tested: 12/14/17 Tested By: RZ   |
| Checked By: MP   |
| Title: Laboratory Manager  |

Material Description

Silt

13.7

**Date Sampled:** 10/27/17

Clay

Source of Sample: B-56 Sample Number: S-2

% +3"

**Depth:** 2-3.3'

**CDM Smith** 

**Boston, Massachusetts** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Project No:** 101038.102170 **Figure** 

## **CDM Smith**

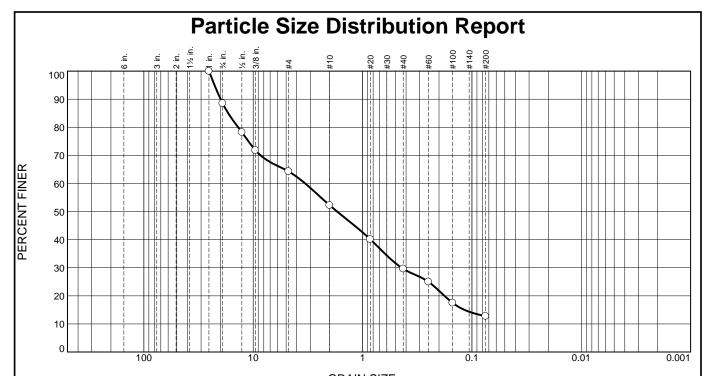
#### **Geotechnical Engineering Laboratory**

# Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

Client: Massachusetts Water Resources Authority Weston Aqueduct Supply Main 3 Project Name: Tested By: MP MWRA line, MA Test Date: 12/14/2017 Project Location: Project Number: 101038-102170 Boring Number: B-56 Procedure: S-2 Temperature: 440° C Sample Number: Sample Depth (ft): 2-3.3 Sample Date: 10/27/2017

| AS RECEIVED MOISTURE CONTENT |        |
|------------------------------|--------|
| Tin Mass (g)                 | 126.66 |
| Wet Mass of Sample & Tin (g) | 215.45 |
| Dry Mass of Sample & Tin (g) | 208.00 |
| Mass of Water (g)            | 7.45   |
| Mass of Dry Soil (g)         | 81.34  |
| Moisture Content (%)         | 9.2    |

| ASH CONTENT                          |        |  |  |  |  |  |
|--------------------------------------|--------|--|--|--|--|--|
| Porcelain Dish Mass (g)              | 126.66 |  |  |  |  |  |
| Porcelain Dish + Oven Dried Soil (g) | 208.00 |  |  |  |  |  |
| Mass of Oven Dried Soil (g)          | 81.34  |  |  |  |  |  |
| Mass of Dish & Burned Soil (g)       | 205.85 |  |  |  |  |  |
| Mass of Burned Soil (g)              | 79.19  |  |  |  |  |  |
| Mass of Organic Material (g)         | 2.15   |  |  |  |  |  |
| Ash Content (%)                      | 97.4   |  |  |  |  |  |
|                                      |        |  |  |  |  |  |
| Organic Content (%)                  | 2.6    |  |  |  |  |  |



|          | GRAIN SIZE - mm. |      |        |        |      |         |      |  |
|----------|------------------|------|--------|--------|------|---------|------|--|
| 0/ - 211 | % Gravel % Sand  |      |        |        |      | % Fines |      |  |
| % +3"    | Coarse           | Fine | Coarse | Medium | Fine | Silt    | Clay |  |
| 0.0      | 11.5             | 24.2 | 12.1   | 22.6   | 16.8 | 12.8    |      |  |

| Test R  | esults (ASTM I     | 0422 & ASTM D | 1140)    |
|---------|--------------------|---------------|----------|
| Opening | pening Percent Spe |               | Pass?    |
| Size    | Finer              | (Percent)     | (X=Fail) |
| 1"      | 100.0              |               |          |
| .75"    | 88.5               |               |          |
| .5"     | 78.2               |               |          |
| .375"   | 71.8               |               |          |
| #4      | 64.3               |               |          |
| #10     | 52.2               |               |          |
| #20     | 40.1               |               |          |
| #40     | 29.6               |               |          |
| #60     | 25.0               |               |          |
| #100    | 17.5               |               |          |
| #200    | 12.8               |               |          |
|         |                    |               |          |
|         |                    |               |          |
|         |                    |               |          |
|         |                    |               |          |
|         |                    |               |          |
|         |                    |               |          |
|         |                    |               |          |
|         |                    |               |          |
|         |                    |               |          |
|         |                    |               |          |

|  | <u>iviateriai Descrip</u>  | <u> Mion</u>   |  |  |  |  |
|--|--|--|--|--|--|--|
| Gray silty sand wit  | th gravel  |  |  |  |  |  |
| Δttc   | erberg Limits (AST   | 'M D 4318)   |  |  |  |  |
| PL=  | LL=  | Pl=  |  |  |  |  |
| USCS (D 2487)=   | SM Classificatio   | <u>n</u><br>O (M 145)=   |  |  |  |  |
| D <sub>90</sub> = 19.8714<br>D <sub>50</sub> = 1.7080<br>D <sub>10</sub> = | Coefficients D <sub>85</sub> = 16.9275 D <sub>30</sub> = 0.4404 C <sub>u</sub> = | D <sub>60</sub> = 3.3467<br>D <sub>15</sub> = 0.1170<br>C <sub>c</sub> = |  |  |  |  |
| As received MC =   | Remarks 10.1%  |  |  |  |  |  |
| Date Received: 1   |  | P Tested: 12/14/17   |  |  |  |  |
| Checked By: 1  | MP   |  |  |  |  |  |
| Title: 1   | Title: Laboratory Manager  |  |  |  |  |  |
|  |  |  |  |  |  |  |

(no specification provided)

**Source of Sample:** B-56 **Sample Number:** S-3

**Depth:** 11-13'

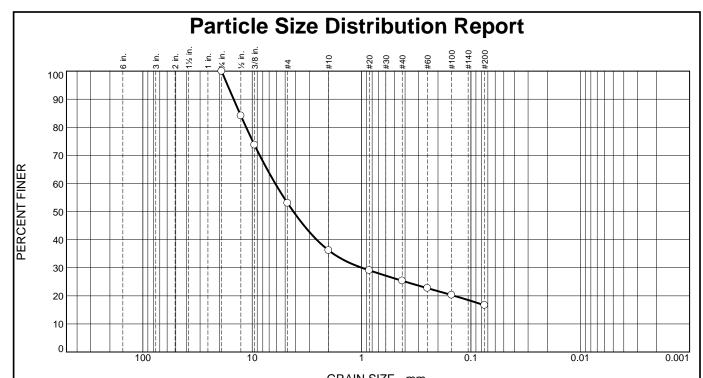
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/27/17



|                 | GRAIN SIZE - mm. |      |        |        |         |      |      |  |
|-----------------|------------------|------|--------|--------|---------|------|------|--|
| % Gravel % Sand |                  |      |        |        | % Fines |      |      |  |
| % +3"           | Coarse           | Fine | Coarse | Medium | Fine    | Silt | Clay |  |
| 0.0             | 0.0              | 47.0 | 16.8   | 10.8   | 8.7     | 16.7 |      |  |

PL=

| Test Re | esults (ASTM D | 422 & ASTM D | 1140)    |  |  |
|---------|----------------|--------------|----------|--|--|
| Opening | Percent        | Spec.*       | Pass?    |  |  |
| Size    | Finer          | (Percent)    | (X=Fail) |  |  |
| 3/4"    | 100.0          |              |          |  |  |
| 1/2"    | 84.1           |              |          |  |  |
| 3/8"    | 73.7           |              |          |  |  |
| #4      | 53.0           |              |          |  |  |
| #10     | 36.2           |              |          |  |  |
| #20     | 29.1           |              |          |  |  |
| #40     | 25.4           |              |          |  |  |
| #60     | 22.7           |              |          |  |  |
| #100    | 20.3           |              |          |  |  |
| #200    | 16.7           |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |

# Material Description

Dark-brown silty gravel with sand

Atterberg Limits (ASTM D 4318)

<u>Classification</u>

USCS (D 2487)= GM AASHTO (M 145)= A-1-b

Coefficients

Remarks

As received MC = 10.9%

Tested By: GW Checked By: MP

Title: Laboratory Manager

(no specification provided)

**CDM Smith** 

Source of Sample: B-57 Sample Number: S-3

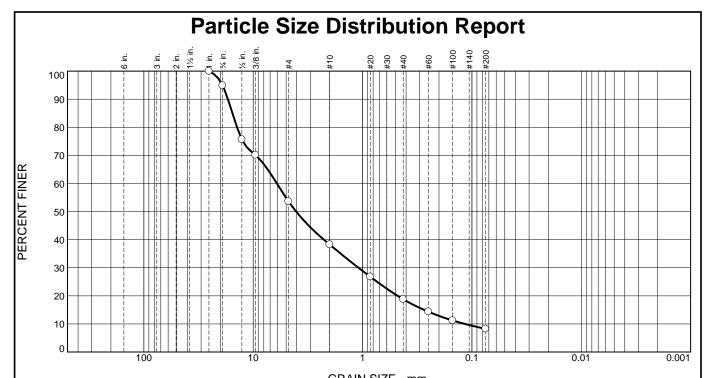
**Depth:** 5-5.5

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/20/2017



| GRAIN SIZE - mm. |       |        |        |        |         |      |      |      |
|------------------|-------|--------|--------|--------|---------|------|------|------|
| % Gravel         |       |        | % Sand |        | % Fines |      |      |      |
|                  | % +3" | Coarse | Fine   | Coarse | Medium  | Fine | Silt | Clay |
|                  | 0.0   | 5.1    | 41.3   | 15.3   | 19.5    | 10.6 | 8.2  |      |

| Test R  | esults (ASTM [ | 0422 & ASTM D | 1140)    |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| 1"      | 100.0          |               |          |
| .75"    | 94.9           |               |          |
| .5"     | 75.7           |               |          |
| .375"   | 70.1           |               |          |
| #4      | 53.6           |               |          |
| #10     | 38.3           |               |          |
| #20     | 26.8           |               |          |
| #40     | 18.8           |               |          |
| #60     | 14.3           |               |          |
| #100    | 11.2           |               |          |
| #200    | 8.2            |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
| *       |                |               |          |

Brown well-graded gravel with silt and sand

# Atterberg Limits (ASTM D 4318) LL= Pl=

PL=

Classification

USCS (D 2487)= GW-GM AASHTO (M 145)= A-1-a

Coefficients

 D90=
 17.0273
 D85=
 15.4805
 D60=
 6.0706

 D50=
 4.0469
 D30=
 1.0899
 D15=
 0.2736

 D10=
 0.1159
 Cu=
 52.37
 Cc=
 1.69

Remarks

As received MC = 5.1%

Date Received: 12/8/17 Date Tested: 12/14/17

Tested By: RZ
Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-58 Sample Number: S-V-1

**Depth:** 2-3'

Date Sampled: 9/28/17

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

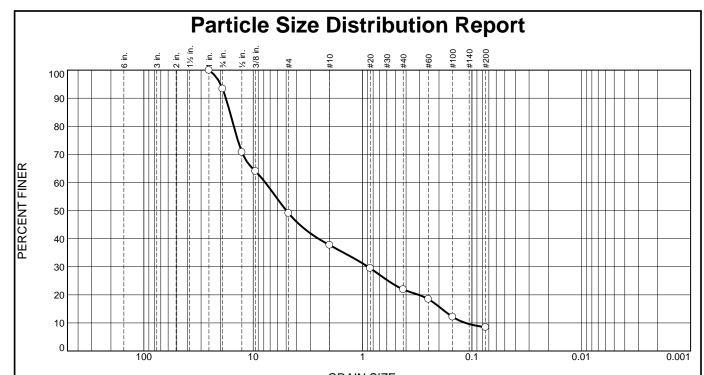
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts** 

**Project No:** 101038.102170

<u>Figure</u>



| GRAIN SIZE - mm. |         |        |       |        |        |      |         |      |
|------------------|---------|--------|-------|--------|--------|------|---------|------|
|                  | 0/ - 21 | % G    | ravel |        | % Sand |      | % Fines |      |
|                  | % +3"   | Coarse | Fine  | Coarse | Medium | Fine | Silt    | Clay |
|                  | 0.0     | 6.6    | 44.3  | 11.4   | 15.8   | 13.5 | 8.4     |      |

PL=

| Test F  | Results (ASTM D | 422 & ASTM D | 1140)    |  |  |
|---------|-----------------|--------------|----------|--|--|
| Opening | Percent         | Spec.*       | Pass?    |  |  |
| Size    | Finer           | (Percent)    | (X=Fail) |  |  |
| 1"      | 100.0           |              |          |  |  |
| .75"    | 93.4            |              |          |  |  |
| .5"     | 70.8            |              |          |  |  |
| .375"   | 64.0            |              |          |  |  |
| #4      | 49.1            |              |          |  |  |
| #10     | 37.7            |              |          |  |  |
| #20     | 29.4            |              |          |  |  |
| #40     | 21.9            |              |          |  |  |
| #60     | 18.5            |              |          |  |  |
| #100    | 12.2            |              |          |  |  |
| #200    | 8.4             |              |          |  |  |
|         |                 |              |          |  |  |
|         |                 |              |          |  |  |
|         |                 |              |          |  |  |
|         |                 |              |          |  |  |
|         |                 |              |          |  |  |
|         |                 |              |          |  |  |
|         |                 |              |          |  |  |
|         |                 |              |          |  |  |
|         |                 |              |          |  |  |
|         |                 |              |          |  |  |

### Material Description

Dark brown poorly graded gravel with silt and sand

Atterberg Limits (ASTM D 4318)

LL= PI=

Classification

USCS (D 2487)= GP-GM AASHTO (M 145)= A-1-a

Coefficients

 D90=
 17.7748
 D85=
 16.3113
 D60=
 7.7587

 D50=
 4.9744
 D30=
 0.8940
 D15=
 0.1885

 D10=
 0.1145
 Cu=
 67.74
 Cc=
 0.90

Remarks

As received MC = 6.1%

Date Received: 12/8/17 Date Tested: 12/14/17

Tested By: RZ

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

**CDM Smith** 

Source of Sample: B-59 Sample Number: S-V-2

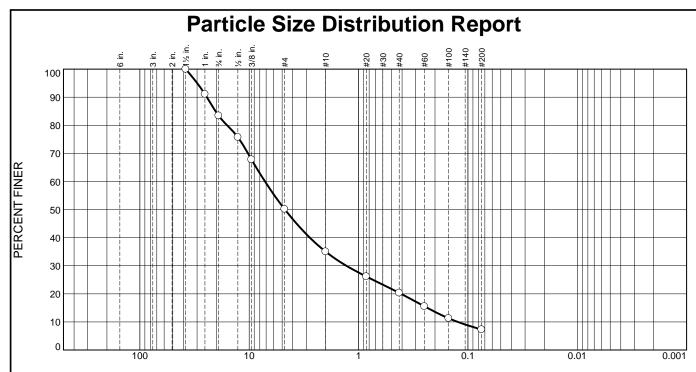
**Depth:** 5-6'

Client: Massachusetts Water Resources Authority (MWRA)

roject: Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 9/27/17



|        |       |          |      | (      | <u> GRAIN SIZE -</u> | mm.  |         |      |
|--------|-------|----------|------|--------|----------------------|------|---------|------|
| 9/ .3" |       | % Gravel |      | % Sand |                      |      | % Fines |      |
|        | % +3" | Coarse   | Fine | Coarse | Medium               | Fine | Silt    | Clay |
|        | 0.0   | 16.6     | 33.2 | 15.2   | 14 7                 | 13.0 | 7.3     |      |

| Test F  | Results (ASTM D | 422 & ASTM D | 1140)    |
|---------|-----------------|--------------|----------|
| Opening | Percent         | Spec.*       | Pass?    |
| Size    | Finer           | (Percent)    | (X=Fail) |
| 1.5"    | 100.0           |              |          |
| 1"      | 91.1            |              |          |
| .75"    | 83.4            |              |          |
| .5"     | 75.8            |              |          |
| .375"   | 67.8            |              |          |
| #4      | 50.2            |              |          |
| #10     | 35.0            |              |          |
| #20     | 26.2            |              |          |
| #40     | 20.3            |              |          |
| #60     | 15.6            |              |          |
| #100    | 11.3            |              |          |
| #200    | 7.3             |              |          |
|         |                 |              |          |
|         |                 |              |          |
|         |                 |              |          |
|         |                 |              |          |
|         |                 |              |          |
|         |                 |              |          |
|         |                 |              |          |
|         |                 |              |          |
|         |                 |              |          |

Gray well-graded gravel with silt and sand

Atterberg Limits (ASTM D 4318)
LL= PI=

PL=

**Classification** 

USCS (D 2487)= GW-GM **AASHTO** (M 145)= A-1-a

Coefficients

**D<sub>90</sub>=** 24.3942 **D<sub>50</sub>=** 4.7120 **D<sub>10</sub>=** 0.1238 D<sub>60</sub>= 7.1742 D<sub>15</sub>= 0.2351 C<sub>c</sub>= 1.88 D<sub>85</sub>= 20.3218 D<sub>30</sub>= 1.2935 C<sub>u</sub>= 57.96

Remarks

Date Sampled: 9/27/17

As received MC = 7.8%

Date Received: 12/8/17 **Date Tested:** 12/14/17

Tested By: RZ Checked By: MP

Title: Laboratory Manager

**Source of Sample:** B-59 Sample Number: S-3

(no specification provided)

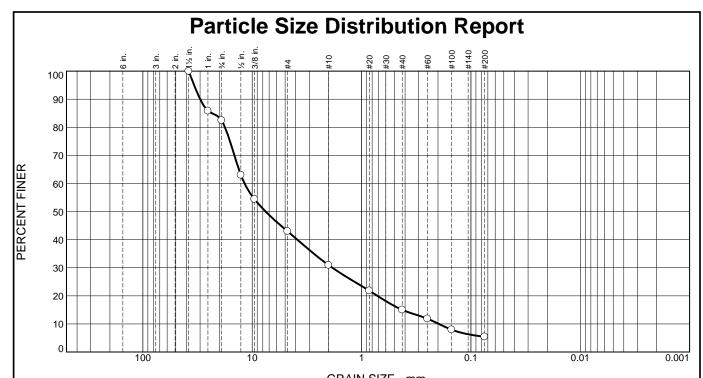
**CDM Smith** Client: Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA **Figure** 

**Boston, Massachusetts Project No:** 101038.102170

**Depth:** 14-16'



|        |       |          |      | (      | <u> - RAIN SIZE</u> | · mm. |         |      |
|--------|-------|----------|------|--------|---------------------|-------|---------|------|
| 9/ .3" |       | % Gravel |      |        | % Sand              |       | % Fines |      |
|        | % +3" | Coarse   | Fine | Coarse | Medium              | Fine  | Silt    | Clay |
|        | 0.0   | 17.5     | 39.5 | 12.1   | 15.9                | 9.6   | 5.4     |      |

| Test R  | esults (ASTM D | 422 & ASTM D | 1140)    |  |  |
|---------|----------------|--------------|----------|--|--|
| Opening | Percent        | Spec.*       | Pass?    |  |  |
| Size    | Finer          | (Percent)    | (X=Fail) |  |  |
| 1.5"    | 100.0          |              |          |  |  |
| 1"      | 85.8           |              |          |  |  |
| 3/4"    | 82.5           |              |          |  |  |
| 1/2"    | 63.0           |              |          |  |  |
| 3/8"    | 54.4           |              |          |  |  |
| #4      | 43.0           |              |          |  |  |
| #10     | 30.9           |              |          |  |  |
| #20     | 21.8           |              |          |  |  |
| #40     | 15.0           |              |          |  |  |
| #60     | 11.9           |              |          |  |  |
| #100    | 8.0            |              |          |  |  |
| #200    | 5.4            |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |

Dark gray well-graded gravel with silt and sand

Atterberg Limits (ASTM D 4318)
LL= PI=

PL=

<u>Classification</u>

USCS (D 2487)= GW-GM AASHTO (M 145)= A-1-a

Coefficients

 D90=
 29.9204
 D85=
 23.4335
 D60=
 11.7627

 D50=
 7.5401
 D30=
 1.8491
 D15=
 0.4234

 D10=
 0.1965
 Cu=
 59.86
 Cc=
 1.48

Remarks

As received MC = 6.8%

**Date Received:** 10/5/2017 **Date Tested:** 10/6/2017

Tested By: **GW** 

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

**CDM Smith** 

**Source of Sample:** B-60 **Sample Number:** S-2

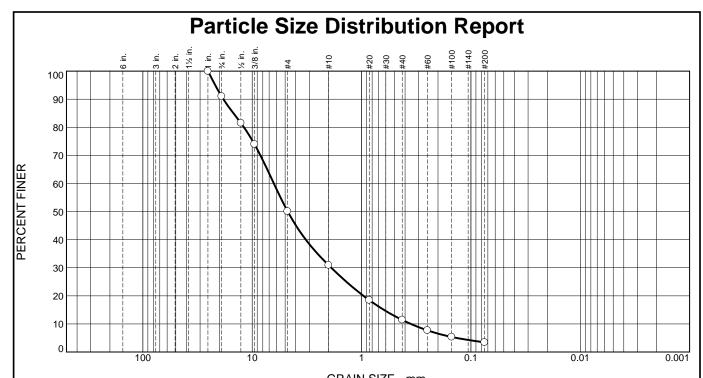
**Depth:** 2-3.3

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/21/2017



| GRAIN SIZE - mm. |       |          |      |        |        |      |         |      |
|------------------|-------|----------|------|--------|--------|------|---------|------|
| 9/ .3"           |       | % Gravel |      |        | % Sand |      | % Fines |      |
|                  | % +3" | Coarse   | Fine | Coarse | Medium | Fine | Silt    | Clay |
|                  | 0.0   | 9.0      | 40.9 | 19.2   | 19.5   | 8.0  | 3.4     |      |

| Test R  | esults (ASTM D |           | 1140)    |
|---------|----------------|-----------|----------|
| Opening | Percent        | Spec.*    | Pass?    |
| Size    | Finer          | (Percent) | (X=Fail) |
| 1"      | 100.0          |           |          |
| 3/4"    | 91.0           |           |          |
| 1/2"    | 81.5           |           |          |
| 3/8"    | 74.0           |           |          |
| #4      | 50.1           |           |          |
| #10     | 30.9           |           |          |
| #20     | 18.5           |           |          |
| #40     | 11.4           |           |          |
| #60     | 7.7            |           |          |
| #100    | 5.4            |           |          |
| #200    | 3.4            |           |          |
|         |                |           |          |
|         |                |           |          |
|         |                |           |          |
|         |                |           |          |
|         |                |           |          |
|         |                |           |          |
|         |                |           |          |
|         |                |           |          |
|         |                |           |          |
|         |                |           |          |

Dark gray well-graded gravel with sand

**Atterberg Limits (ASTM D 4318)** 

PL=

GW Classification USCS (D 2487)= **AASHTO (M 145)=** A-1-a

Coefficients

**D<sub>90</sub>=** 18.3483 **D<sub>50</sub>=** 4.7336 **D<sub>10</sub>=** 0.3542 **D<sub>60</sub>=** 6.3401 **D<sub>15</sub>=** 0.6243 **C<sub>c</sub>=** 1.60 **D<sub>85</sub>=** 14.8403 D<sub>30</sub>= 1.8930 C<sub>u</sub>= 17.90

Remarks

As received MC = 12.4%

**Date Received:** 10/5/2017 **Date Tested:** 10/6/2017

Tested By: GW Checked By: MP

Title: Laboratory Manager

(no specification provided)

**CDM Smith** 

Source of Sample: B-61 Sample Number: S-3

**Depth:** 4-6

Client: Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

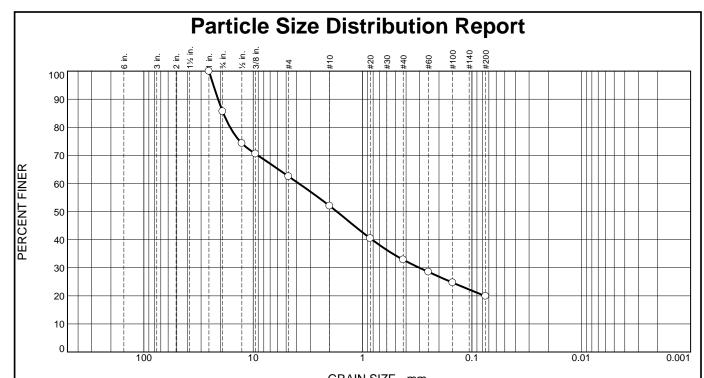
Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Boston, Massachusetts** 

**Project No:** 101038.102170

**Figure** 

**Date Sampled:** 9/21/2017



| GRAIN SIZE - mm. |       |        |        |        |         |      |      |      |
|------------------|-------|--------|--------|--------|---------|------|------|------|
| % +3" % Gravel   |       |        | % Sand |        | % Fines |      |      |      |
|                  | % +3" | Coarse | Fine   | Coarse | Medium  | Fine | Silt | Clay |
|                  | 0.0   | 14.3   | 23.2   | 10.5   | 19.1    | 13.0 | 19.9 |      |

| Test Re | esults (ASTM D | 422 & ASTM D | 1140)    |
|---------|----------------|--------------|----------|
| Opening | Percent        | Spec.*       | Pass?    |
| Size    | Finer          | (Percent)    | (X=Fail) |
| 1"      | 100.0          |              |          |
| 3/4"    | 85.7           |              |          |
| 1/2"    | 74.3           |              |          |
| 3/8"    | 70.6           |              |          |
| #4      | 62.5           |              |          |
| #10     | 52.0           |              |          |
| #20     | 40.5           |              |          |
| #40     | 32.9           |              |          |
| #60     | 28.5           |              |          |
| #100    | 24.7           |              |          |
| #200    | 19.9           |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |

#### **Atterberg Limits (ASTM D 4318)** PL= Classification USCS (D 2487)= SM **AASHTO** (M 145)= A-1-b Coefficients **D<sub>90</sub>=** 20.9614 **D<sub>50</sub>=** 1.7201 **D<sub>10</sub>= D<sub>85</sub>=** 18.7504 **D<sub>60</sub>=** 3.8309 D<sub>30</sub>= 0.3024 C<sub>u</sub>= D<sub>15</sub>= C<sub>C</sub>= Remarks As received MC = 18.4%**Date Received:** 10/5/2017 **Date Tested:** 10/6/2017 Tested By: GW

**Material Description** 

(no specification provided)

Source of Sample: B-63 Sample Number: S-3

**Depth:** 4-6

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

Title: Laboratory Manager

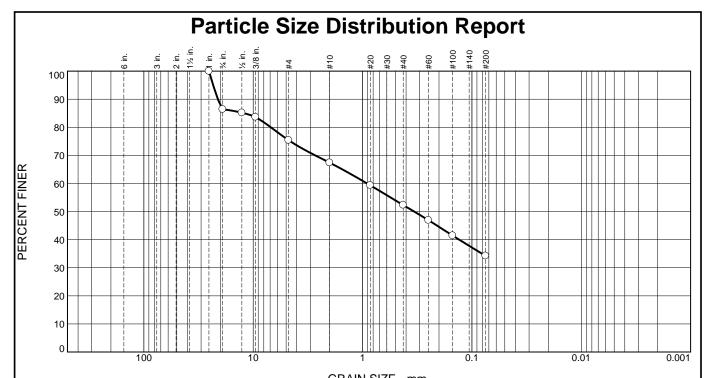
Weston Aqueduct Supply Main 3 (WASM3)

Checked By: MP

Dark brown silty sand with gravel

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/20/2017



| GRAIN SIZE - mm. |          |      |        |        |      |         |      |
|------------------|----------|------|--------|--------|------|---------|------|
| 0/ - 211         | % Gravel |      |        | % Sand |      | % Fines |      |
| <b>% +3</b> "    | Coarse   | Fine | Coarse | Medium | Fine | Silt    | Clay |
| 0.0              | 13.6     | 11.0 | 8.0    | 15.1   | 18.1 | 34.2    |      |

| Test R  | esults (ASTM D | 6913 & ASTM D1140) |          |  |  |
|---------|----------------|--------------------|----------|--|--|
| Opening | Percent        | Spec.*             | Pass?    |  |  |
| Size    | Finer          | (Percent)          | (X=Fail) |  |  |
| 1       | 100.0          |                    |          |  |  |
| .75     | 86.4           |                    |          |  |  |
| .5      | 85.2           |                    |          |  |  |
| .375    | 83.7           |                    |          |  |  |
| #4      | 75.4           |                    |          |  |  |
| #10     | 67.4           |                    |          |  |  |
| #20     | 59.3           |                    |          |  |  |
| #40     | 52.3           |                    |          |  |  |
| #60     | 46.9           |                    |          |  |  |
| #100    | 41.5           |                    |          |  |  |
| #200    | 34.2           |                    |          |  |  |
|         |                |                    |          |  |  |
|         |                |                    |          |  |  |
|         |                |                    |          |  |  |
|         |                |                    |          |  |  |
|         |                |                    |          |  |  |
|         |                |                    |          |  |  |
|         |                |                    |          |  |  |
|         |                |                    |          |  |  |
|         |                |                    |          |  |  |
| *       |                |                    |          |  |  |

Gray-brown silty sand with gravel

**Atterberg Limits (ASTM D 4318)** 

PL=

Classification

USCS (D 2487)= SM

**AASHTO** (M 145)= A-2-4(0)

Coefficients

D<sub>90</sub>= 21.0374 D<sub>50</sub>= 0.3373 D<sub>10</sub>= **D<sub>85</sub>=** 12.1285 **D<sub>60</sub>=** 0.9079 D<sub>30</sub>= D<sub>15</sub>= C<sub>C</sub>=

Remarks

As recieved MC = 10.7%

**Date Tested:** 2/1/18

Date Received: 1/30/18 Tested By: SB

**Date Sampled:** 11/20/17

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-64 Sample Number: S-1

**Client:** Massachusetts Water Resources Authority (MWRA)

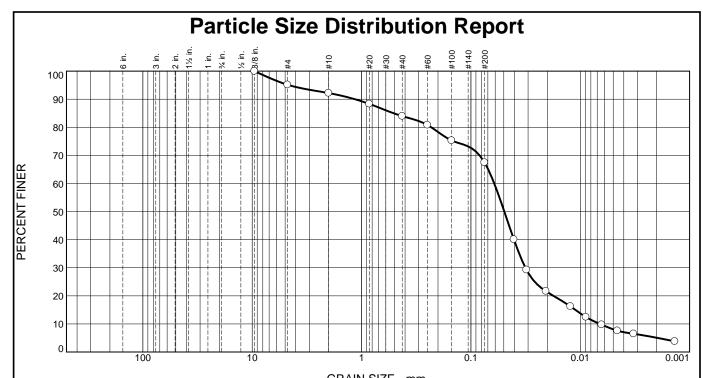
Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts Project No:** 101038.102170

**CDM Smith** 

**Depth:** 6-8'



| GRAIN SIZE - mm. |        |          |        |        |      |         |      |
|------------------|--------|----------|--------|--------|------|---------|------|
| % +3"            | % G    | % Gravel |        |        | I    | % Fines |      |
|                  | Coarse | Fine     | Coarse | Medium | Fine | Silt    | Clay |
| 0.0              | 0.0    | 4.8      | 3.0    | 8.2    | 16.5 | 59.4    | 8.1  |

Brown sandy silt

| Test R     | esults (ASTM D | 422 & ASTM D 1140) |          |  |  |  |
|------------|----------------|--------------------|----------|--|--|--|
| Opening    | Percent        | Spec.*             | Pass?    |  |  |  |
| Size       | Finer          | (Percent)          | (X=Fail) |  |  |  |
| 3/8"       | 100.0          |                    |          |  |  |  |
| #4         | 95.2           |                    |          |  |  |  |
| #10        | 92.2           |                    |          |  |  |  |
| #20        | 88.3           |                    |          |  |  |  |
| #40        | 84.0           |                    |          |  |  |  |
| #60        | 80.8           |                    |          |  |  |  |
| #100       | 75.3           |                    |          |  |  |  |
| #200       | 67.5           |                    |          |  |  |  |
| 0.0404 mm. | 40.1           |                    |          |  |  |  |
| 0.0310 mm. | 29.3           |                    |          |  |  |  |
| 0.0206 mm. | 21.7           |                    |          |  |  |  |
| 0.0123 mm. | 16.3           |                    |          |  |  |  |
| 0.0089 mm. | 12.5           |                    |          |  |  |  |
| 0.0064 mm. | 9.8            |                    |          |  |  |  |
| 0.0046 mm. | 7.6            |                    |          |  |  |  |
| 0.0033 mm. | 6.5            |                    |          |  |  |  |
| 0.0014 mm. | 3.8            |                    |          |  |  |  |
|            |                |                    |          |  |  |  |
|            |                |                    |          |  |  |  |
|            |                |                    |          |  |  |  |
|            |                |                    |          |  |  |  |

### 

**Date Tested:** 10/10/2017

**Date Sampled:** 9/19/2017

**Material Description** 

\* (no specification provided)

Source of Sample: B-65 Sample Number: S-3

**Depth:** 4-6'

Client: Massachusetts Water Pascurges Authority (MWPA)

CDM Smith

Client: Massachusetts Water Resources Authority (MWRA)

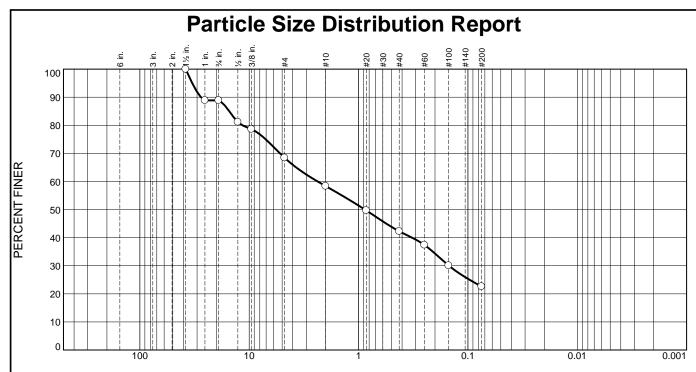
Project: Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Received:** 10/5/2017

Title: Laboratory Manager

Tested By: RZ Checked By: MP



| GRAIN SIZE - mm. |          |      |        |        |      |         |      |  |
|------------------|----------|------|--------|--------|------|---------|------|--|
| 0/ - 21          | % Gravel |      |        | % Sand |      | % Fines |      |  |
| <b>% +3"</b>     | Coarse   | Fine | Coarse | Medium | Fine | Silt    | Clay |  |
| 0.0              | 11.1     | 20.4 | 10.1   | 16.1   | 19.7 | 22.6    |      |  |

| Test Re | esults (ASTM D | 422 & ASTM D | 1140)    |
|---------|----------------|--------------|----------|
| Opening | Percent        | Spec.*       | Pass?    |
| Size    | Finer          | (Percent)    | (X=Fail) |
| 1.5"    | 100.0          |              |          |
| 1"      | 88.9           |              |          |
| 3/4"    | 88.9           |              |          |
| 1/2"    | 81.2           |              |          |
| 3/8"    | 78.6           |              |          |
| #4      | 68.5           |              |          |
| #10     | 58.4           |              |          |
| #20     | 49.7           |              |          |
| #40     | 42.3           |              |          |
| #60     | 37.4           |              |          |
| #100    | 30.1           |              |          |
| #200    | 22.6           |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |

| Material Description   |   |   |  |  |  |  |  |
|--|---|---|--|--|--|--|--|
| Dark brown silty sand with gravel  |   |   |  |  |  |  |  |
|  |   |   |  |  |  |  |  |
| Λ++  | erberg Limits (AS   | TM D 4318)  |  |  |  |  |  |
| PL=  | LL=   | PI=   |  |  |  |  |  |
| USCS (D 2487)=   | SM <b>Classification</b>  | <u>on</u><br>FO (M 145)= A-1-b                                    |  |  |  |  |  |
| D <sub>90</sub> = 27.6426<br>D <sub>50</sub> = 0.8741<br>D <sub>10</sub> = | Coefficient D <sub>85</sub> = 15.2143 D <sub>30</sub> = 0.1489 C <sub>u</sub> = | D <sub>60</sub> = 2.3665<br>D <sub>15</sub> =<br>C <sub>c</sub> = |  |  |  |  |  |
|  | Remarks   |   |  |  |  |  |  |
| As received MC =   | = 9.7%  |   |  |  |  |  |  |
|  |   |   |  |  |  |  |  |
| Date Received:   | 10/5/2017 <b>Dat</b>  | te Tested: 10/6/2017  |  |  |  |  |  |
| Tested By:   | GW  |   |  |  |  |  |  |
| Checked By:  | MP  |   |  |  |  |  |  |
| Title:   | Laboratory Manager  | <u> </u>  |  |  |  |  |  |
|  |   |   |  |  |  |  |  |

(no specification provided)

Source of Sample: B-65 Sample Number: S-5

**Depth:** 8-8.5'

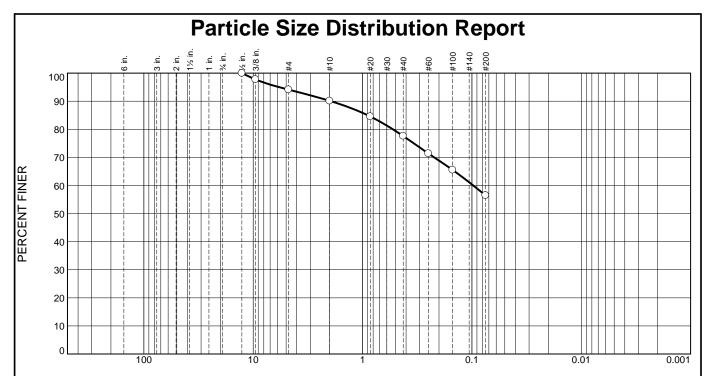
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/19/2017



|   | GRAIN SIZE - mm. |        |       |        |        |      |         |      |
|---|------------------|--------|-------|--------|--------|------|---------|------|
| Γ | 0/ - 21          | % Gr   | ravel | % Sand |        |      | % Fines |      |
|   | % +3"            | Coarse | Fine  | Coarse | Medium | Fine | Silt    | Clay |
|   | 0.0              | 0.0    | 5.9   | 4.0    | 12.5   | 21.1 | 56.5    |      |

| Test R  | esults (ASTM D    | 6913 & ASTM I | D1140)   |
|---------|-------------------|---------------|----------|
| Opening | Percent           | Spec.*        | Pass?    |
| Size    | Finer             | (Percent)     | (X=Fail) |
| .5      | 100.0             |               |          |
| .375    | 97.8              |               |          |
| #4      | 94.1              |               |          |
| #10     | 90.1              |               |          |
| #20     | 84.6              |               |          |
| #40     | 77.6              |               |          |
| #60     | 71.4              |               |          |
| #100    | 65.5              |               |          |
| #200    | 56.5              |               |          |
|         |                   |               |          |
|         |                   |               |          |
|         |                   |               |          |
|         |                   |               |          |
|         |                   |               |          |
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|         |                   |               |          |
|         |                   |               |          |
|         |                   |               |          |
|         |                   |               |          |
|         |                   |               |          |
| *       | -: <i>C</i> :: 1- |               |          |

#### **Atterberg Limits (ASTM D 4318)** PL= Classification USCS (D 2487)= ML**AASHTO** (M 145)= A-4(0)Coefficients **D<sub>90</sub>=** 1.9510 **D<sub>60</sub>=** 0.0973 **D<sub>85</sub>=** 0.8966 D<sub>50</sub>= D<sub>10</sub>= D<sub>30</sub>= D<sub>15</sub>= C<sub>C</sub>= Remarks As recieved MC = 48.2%

**Date Tested:** 2/1/18

**Date Sampled:** 9/26/17

**Material Description** 

Dark brown sandy silt with organics

(no specification provided)

**Source of Sample:** B-66 **Depth:** 6-8' Sample Number: S-1

**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

Title: Laboratory Manager

Weston Aqueduct Supply Main 3 (WASM3)

Date Received: 1/30/18

Tested By: SB Checked By: MP

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Project No:** 101038.102170

**Boston, Massachusetts** 

## **CDM Smith**

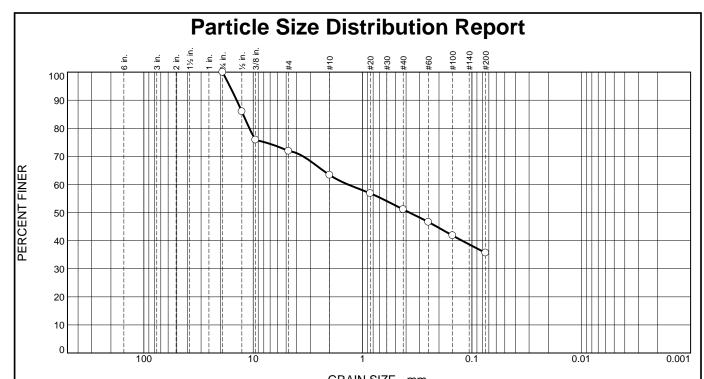
#### **Geotechnical Engineering Laboratory**

# Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

Client: Massachusetts Water Resources Authority Weston Aqueduct Supply Main 3 Tested By: Project Name: MWRA line, MA Test Date: 1/31/2017 Project Location: Project Number: 101038-102170 Boring Number: B-66 Procedure: Temperature: 440° C S-1 Sample Number: Sample Depth (ft): 6-8 Sample Date: 9/26/2017

| AS RECEIVED MOISTURE CONTENT |        |
|------------------------------|--------|
| Tin Mass (g)                 | 105.32 |
| Wet Mass of Sample & Tin (g) | 165.77 |
| Dry Mass of Sample & Tin (g) | 146.93 |
| Mass of Water (g)            | 18.84  |
| Mass of Dry Soil (g)         | 41.61  |
| Moisture Content (%)         | 45.3   |

| ASH CONTENT                          |        |
|--------------------------------------|--------|
| Porcelain Dish Mass (g)              | 105.32 |
| Porcelain Dish + Oven Dried Soil (g) | 146.93 |
| Mass of Oven Dried Soil (g)          | 41.61  |
| Mass of Dish & Burned Soil (g)       | 144.11 |
| Mass of Burned Soil (g)              | 38.79  |
| Mass of Organic Material (g)         | 2.82   |
| Ash Content (%)                      | 93.2   |
|                                      |        |
| Organic Content (%)                  | 6.8    |



|  |       |        |            |        | <u> - RAIN SIZE</u> | mm.            |      |      |
|--|-------|--------|------------|--------|---------------------|----------------|------|------|
|  | % +3" | % G    | % Gravel % |        |                     | % Sand % Fines |      |      |
|  |       | Coarse | Fine       | Coarse | Medium              | Fine           | Silt | Clay |
|  | 0.0   | 0.0    | 28.1       | 8.5    | 12.3                | 15.4           | 35.7 |      |

| Test Results (ASTM D6913 & ASTM D1140) |         |           |          |  |  |  |  |  |
|--|---------|-----------|----------|--|--|--|--|--|
| Opening                                | Percent | Spec.*    | Pass?    |  |  |  |  |  |
| Size                                   | Finer   | (Percent) | (X=Fail) |  |  |  |  |  |
| .75                                    | 100.0   |           |          |  |  |  |  |  |
| .5                                     | 86.0    |           |          |  |  |  |  |  |
| .375                                   | 75.9    |           |          |  |  |  |  |  |
| #4                                     | 71.9    |           |          |  |  |  |  |  |
| #10                                    | 63.4    |           |          |  |  |  |  |  |
| #20                                    | 56.8    |           |          |  |  |  |  |  |
| #40                                    | 51.1    |           |          |  |  |  |  |  |
| #60                                    | 46.6    |           |          |  |  |  |  |  |
| #100                                   | 41.8    |           |          |  |  |  |  |  |
| #200                                   | 35.7    |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
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|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |

#### **Atterberg Limits (ASTM D 4318)** PL= Classification USCS (D 2487)= SM **AASHTO** (M 145)= A-4(0)Coefficients **D<sub>90</sub>=** 14.1715 **D<sub>50</sub>=** 0.3720 **D<sub>10</sub>= D<sub>85</sub>=** 12.3775 **D<sub>60</sub>=** 1.3602 D<sub>30</sub>= D<sub>15</sub>= C<sub>C</sub>= Remarks As recieved MC = 34.0%

**Material Description** 

Brown silty sand with gravel and organics

Date Received: 1/30/18 **Date Tested:** 2/1/18 Tested By: SB Checked By: MP Title: Laboratory Manager

(no specification provided)

Source of Sample: B-67 Sample Number: S-1

**Depth:** 6-7.1

**Client:** Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/3/17

**Project No:** 101038.102170

**CDM Smith** 

**Boston, Massachusetts** 

## **CDM Smith**

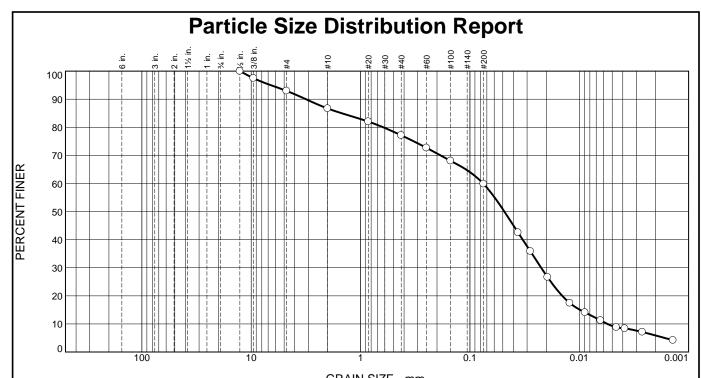
### **Geotechnical Engineering Laboratory**

# Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

Client: Massachusetts Water Resources Authority Tested By: Project Name: Weston Aqueduct Supply Main 3 MWRA line, MA Test Date: 1/31/2017 Project Location: Project Number: 101038-102170 Boring Number: B-67 Procedure: S-1 Temperature: 440° C Sample Number: 6-7.1 Sample Depth (ft): Sample Date: 10/3/2017

| AS RECEIVED MOISTURE CONTENT |        |
|------------------------------|--------|
| Tin Mass (g)                 | 90.33  |
| Wet Mass of Sample & Tin (g) | 154.16 |
| Dry Mass of Sample & Tin (g) | 137.96 |
| Mass of Water (g)            | 16.20  |
| Mass of Dry Soil (g)         | 47.63  |
| Moisture Content (%)         | 34.0   |

| ASH CONTENT                          |        |  |  |  |  |
|--------------------------------------|--------|--|--|--|--|
| Porcelain Dish Mass (g)              | 90.33  |  |  |  |  |
| Porcelain Dish + Oven Dried Soil (g) | 137.96 |  |  |  |  |
| Mass of Oven Dried Soil (g)          | 47.63  |  |  |  |  |
| Mass of Dish & Burned Soil (g)       | 135.14 |  |  |  |  |
| Mass of Burned Soil (g)              | 44.81  |  |  |  |  |
| Mass of Organic Material (g)         | 2.82   |  |  |  |  |
| Ash Content (%)                      | 94.1   |  |  |  |  |
|                                      |        |  |  |  |  |
| Organic Content (%)                  | 5.9    |  |  |  |  |



|        |        |      |        | (          | <u>GRAIN SIZE -</u> | · mm. |         |     |
|--------|--------|------|--------|------------|---------------------|-------|---------|-----|
| 0/ 13" |        | % G  | ravel  | vel % Sand |                     |       | % Fines |     |
| % +3"  | Coarse | Fine | Coarse | Medium     | Fine                | Silt  | Clay    |     |
|        | 0.0    | 0.0  | 7.0    | 6.3        | 9.5                 | 17.4  | 50.5    | 9.3 |

Brown sandy silt

| Opening    | Percent | Spec.*    | Pass?    |
|------------|---------|-----------|----------|
| Size       | Finer   | (Percent) | (X=Fail) |
| .5"        | 100.0   |           |          |
| .375"      | 97.5    |           |          |
| #4         | 93.0    |           |          |
| #10        | 86.7    |           |          |
| #20        | 82.0    |           |          |
| #40        | 77.2    |           |          |
| #60        | 72.7    |           |          |
| #100       | 68.1    |           |          |
| #200       | 59.8    |           |          |
| 0.0363 mm. | 42.5    |           |          |
| 0.0280 mm. | 35.9    |           |          |
| 0.0195 mm. | 26.6    |           |          |
| 0.0122 mm. | 17.4    |           |          |
| 0.0089 mm. | 14.1    |           |          |
| 0.0064 mm. | 11.3    |           |          |
| 0.0046 mm. | 8.8     |           |          |
| 0.0038 mm. | 8.4     |           |          |
| 0.0027 mm. | 7.1     |           |          |
| 0.0014 mm. | 4.2     |           |          |

### **Atterberg Limits (ASTM D 4318)** PL= Classification USCS (D 2487)= ML**AASHTO** (M 145)= A-4(0)Coefficients **D<sub>60</sub>=** 0.0756 **D<sub>15</sub>=** 0.0098 **C<sub>c</sub>=** 1.19 **D<sub>90</sub>=** 3.1621 **D<sub>50</sub>=** 0.0484 **D<sub>10</sub>=** 0.0055 D<sub>85</sub>= 1.4866 D<sub>30</sub>= 0.0223 C<sub>u</sub>= 13.69 Remarks As received MC = 13.2%Date Received: 1/31/18 **Date Tested:** 2/2/18 Tested By: MP/SB Checked By: MP

**Material Description** 

(no specification provided)

**Source of Sample:** B-68 Sample Number: S-2

**Depth: 8-10'** 

**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

Title: Laboratory Manager

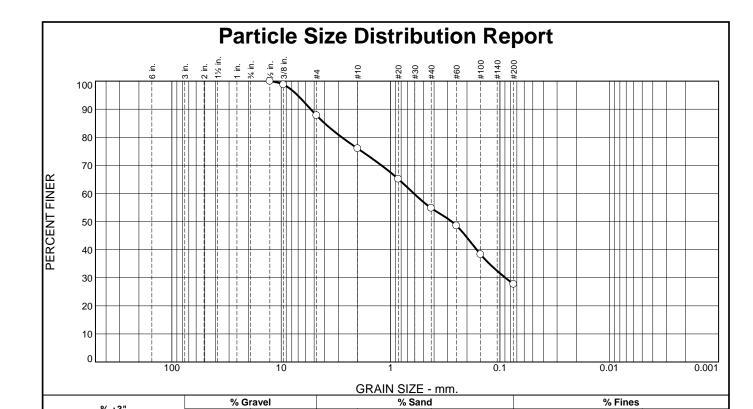
Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/2/17

**Project No:** 101038.102170

**Boston, Massachusetts** 



|         |               | Coarse        | Fine       | Coarse | Medium                 | Fine              | Silt                             | Cla      |
|---------|---------------|---------------|------------|--------|------------------------|-------------------|----------------------------------|----------|
| 0.0     | ı             | 0.0           | 12.2       | 11.8   | 21.2                   | 27.1              | 27.7                             |          |
| Test R  | Results (ASTI | /I D 422 & AS | TM D 1140) |        |                        | Mater             | ial Description                  |          |
| Opening | Percent       | Spec.         | * Pass     | ?      | Brown silty            |                   | <del></del>                      |          |
| Size    | Finer         | (Percei       | nt) (X=Fa  | ail)   |                        |                   |                                  |          |
| 1/2"    | 100.0         |               |            |        |                        |                   |                                  |          |
| 3/8"    | 98.8          |               |            |        |                        | Atterbera L       | imits (ASTM D 4318)              |          |
| #4      | 87.8          |               |            |        | PL=                    | LL=               | PI=                              |          |
| #10     | 76.0          |               |            |        |                        |                   |                                  |          |
| #20     | 65.1          |               |            |        |                        |                   | assification                     | 1 2 1(0) |
| #40     | 54.8          |               |            |        | USCS (D 2              | 2 <b>487)=</b> SM | AASHTO (M 145)=                  | A-2-4(0) |
| #60     | 48.5          |               |            |        |                        | C                 | oefficients                      |          |
| #100    | 38.3          |               |            |        | D <sub>90</sub> = 5.37 |                   | 4.0079 <b>D<sub>60</sub>=</b> 0. | .6123    |
| #200    | 27.7          |               |            |        | D <sub>50</sub> = 0.27 | 62 <b>D</b> 30=   | 0.0891 <b>D<sub>15</sub>=</b>    |          |
|         |               |               |            |        |                        |                   |                                  |          |

D<sub>50</sub>= 0.2762 D<sub>10</sub>= **D<sub>30</sub>=** 0.0891 Remarks

Clay

As received MC = 11.5%

**Date Received:** 10/5/2017 **Date Tested:** 10/6/2017 Tested By: GW

Checked By: MP

Title: Laboratory Manager

(no specification provided)

% +3"

Source of Sample: B-69 Sample Number: S-3

**Depth:** 4-6

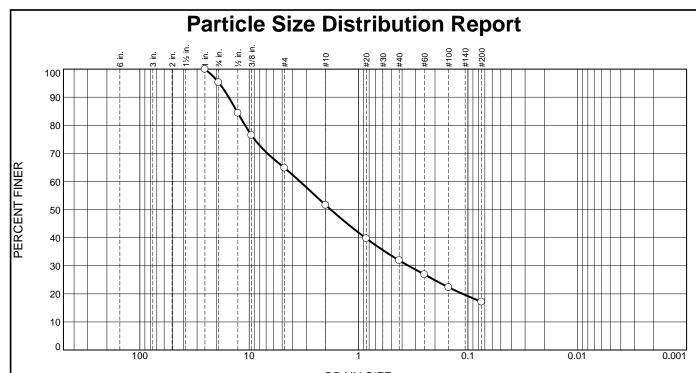
**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/19/2017



|          |                 |      | (      | <u>GRAIN SIZE -</u> | mm.     |      |      |
|----------|-----------------|------|--------|---------------------|---------|------|------|
| 0/ - 211 | % Gravel % Sand |      |        |                     | % Fines |      |      |
| % +3"    | Coarse          | Fine | Coarse | Medium              | Fine    | Silt | Clay |
| 0.0      | 47              | 30.5 | 13.2   | 19.7                | 14.8    | 17.1 |      |

| Test Results (ASTM D 422 & ASTM D 1140) |        |           |          |  |  |  |  |  |
|---|--------|-----------|----------|--|--|--|--|--|
| Opening                                 | Spec.* | Pass?     |          |  |  |  |  |  |
| Size                                    | Finer  | (Percent) | (X=Fail) |  |  |  |  |  |
| 1"                                      | 100.0  |           |          |  |  |  |  |  |
| 3/4"                                    | 95.3   |           |          |  |  |  |  |  |
| 1/2"                                    | 84.4   |           |          |  |  |  |  |  |
| 3/8"                                    | 76.5   |           |          |  |  |  |  |  |
| #4                                      | 64.8   |           |          |  |  |  |  |  |
| #10                                     | 51.6   |           |          |  |  |  |  |  |
| #20                                     | 39.7   |           |          |  |  |  |  |  |
| #40                                     | 31.9   |           |          |  |  |  |  |  |
| #60                                     | 26.9   |           |          |  |  |  |  |  |
| #100                                    | 22.3   |           |          |  |  |  |  |  |
| #200                                    | 17.1   |           |          |  |  |  |  |  |
|   |        |           |          |  |  |  |  |  |
|   |        |           |          |  |  |  |  |  |
|   |        |           |          |  |  |  |  |  |
|   |        |           |          |  |  |  |  |  |
|   |        |           |          |  |  |  |  |  |
|   |        |           |          |  |  |  |  |  |
|   |        |           |          |  |  |  |  |  |
|   |        |           |          |  |  |  |  |  |
|   |        |           |          |  |  |  |  |  |
| *                                       |        |           |          |  |  |  |  |  |

#### Redish brown silty sand with gravel **Atterberg Limits (ASTM D 4318)** PL= Classification USCS (D 2487)= SM **AASHTO** (M 145)= A-1-b Coefficients **D<sub>90</sub>=** 15.4074 **D<sub>50</sub>=** 1.7983 **D<sub>10</sub>= D<sub>85</sub>=** 12.9788 **D<sub>60</sub>=** 3.4332 D<sub>30</sub>= 0.3496 C<sub>u</sub>= D<sub>15</sub>= C<sub>C</sub>= Remarks As received MC = 8.0%**Date Received:** 10/5/2017 **Date Tested:** 10/6/2017 Tested By: GW Checked By: MP Title: Laboratory Manager

**Material Description** 

\* (no specification provided)

Source of Sample: B-70 Sample Number: S-2 **Depth:** 2-4

CDM Smith

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

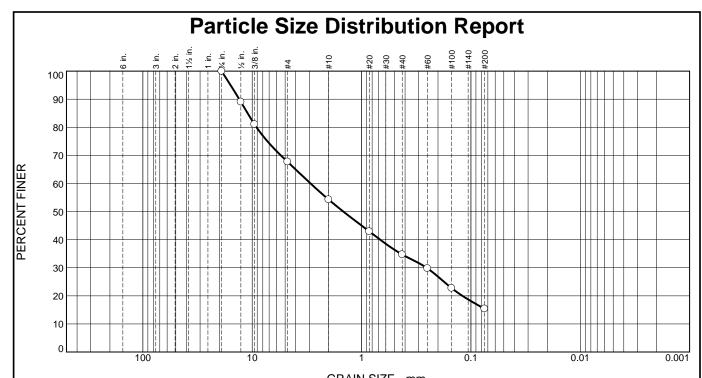
Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

Boston, Massachusetts

Project No: 101038.102170

Figure

**Date Sampled:** 9/18/2017



|        | %+3" Coarse Fine Coarse Medium Fine Silt |       |        |        |      |         |      |
|--------|--|-------|--------|--------|------|---------|------|
| 0/ - 2 | % G                                      | ravel |        | % Sand | i    | % Fines |      |
| % +3"  | Coarse                                   | Fine  | Coarse | Medium | Fine | Silt    | Clay |
| 0.0    | 0.0                                      | 32.3  | 13.4   | 19.6   | 19.3 | 15.4    |      |

| Test R  | esults (ASTM D | 422 & ASTM D | 1140)    |
|---------|----------------|--------------|----------|
| Opening | Percent        | Spec.*       | Pass?    |
| Size    | Finer          | (Percent)    | (X=Fail) |
| 3/4"    | 100.0          |              |          |
| 1/2"    | 89.0           |              |          |
| 3/8"    | 81.1           |              |          |
| #4      | 67.7           |              |          |
| #10     | 54.3           |              |          |
| #20     | 42.9           |              |          |
| #40     | 34.7           |              |          |
| #60     | 29.8           |              |          |
| #100    | 22.7           |              |          |
| #200    | 15.4           |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
| *       |                |              |          |

Dark gray silty sand with gravel

Atterberg Limits (ASTM D 4318)

PL=

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-1-b

Coefficients

Remarks

As received MC = 8.8%

Tested By: **GW** 

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

**CDM Smith** 

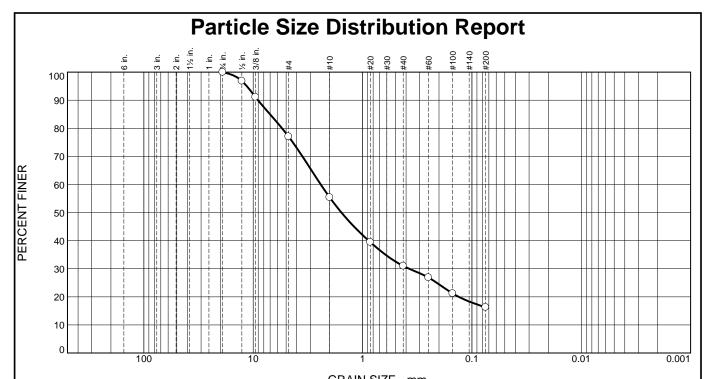
Source of Sample: B-70 Sample Number: S-4 Depth: 6-8

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/18/2017



|        | GRAIN SIZE - mm. |               |        |         |      |      |      |  |
|--------|------------------|---------------|--------|---------|------|------|------|--|
| 0/ .2" | % G              | Gravel % Sand |        | % Fines |      |      |      |  |
| % +3"  | Coarse           | Fine          | Coarse | Medium  | Fine | Silt | Clay |  |
| 0.0    | 0.0              | 22.9          | 21.7   | 24.4    | 14.7 | 16.3 |      |  |

| Test Results (ASTM D 422 & ASTM D 1140) |       |           |          |  |  |  |  |  |  |
|---|-------|-----------|----------|--|--|--|--|--|--|
| Opening Percent Spec.* P                |       |           |          |  |  |  |  |  |  |
| Size                                    | Finer | (Percent) | (X=Fail) |  |  |  |  |  |  |
| 3/4"                                    | 100.0 |           |          |  |  |  |  |  |  |
| 1/2"                                    | 96.9  |           |          |  |  |  |  |  |  |
| 3/8"                                    | 91.1  |           |          |  |  |  |  |  |  |
| #4                                      | 77.1  |           |          |  |  |  |  |  |  |
| #10                                     | 55.4  |           |          |  |  |  |  |  |  |
| #20                                     | 39.5  |           |          |  |  |  |  |  |  |
| #40                                     | 31.0  |           |          |  |  |  |  |  |  |
| #60                                     | 26.9  |           |          |  |  |  |  |  |  |
| #100                                    | 21.2  |           |          |  |  |  |  |  |  |
| #200                                    | 16.3  |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |

Dark brown silty sand with gravel

**Atterberg Limits (ASTM D 4318)** PL=

Classification USCS (D 2487)= SM **AASHTO** (M 145)= A-1-b

Coefficients

D<sub>85</sub>= 7.0232 D<sub>30</sub>= 0.3747 C<sub>u</sub>= **D<sub>90</sub>=** 9.0409 **D<sub>60</sub>=** 2.4129 D<sub>50</sub>= 1.5604 D<sub>10</sub>= D<sub>15</sub>= C<sub>C</sub>=

Remarks

As received MC = 15.4%

**Date Received:** 10/5/2017 **Date Tested:** 10/6/2017

Tested By: GW Checked By: MP

Title: Laboratory Manager

(no specification provided)

**Depth:** 14-15.5

Source of Sample: B-71 Sample Number: S-4

**Client:** Massachusetts Water Resources Authority (MWRA)

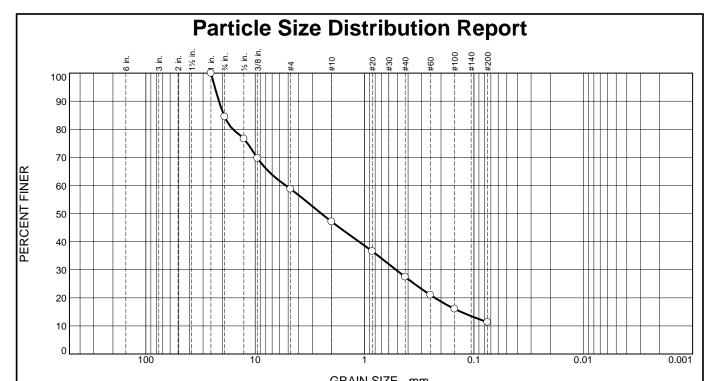
Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/25/2017

**Boston, Massachusetts Project No:** 101038.102170 **Figure** 

**CDM Smith** 



| GRAIN SIZE - IIIII. |          |      |        |        |      |         |      |
|---------------------|----------|------|--------|--------|------|---------|------|
| % +3"               | % Gravel |      | % Sand |        |      | % Fines |      |
|                     | Coarse   | Fine | Coarse | Medium | Fine | Silt    | Clay |
| 0.0                 | 15.5     | 25.8 | 11.6   | 19.7   | 16.1 | 11.3    |      |

| Test Results (ASTM D 422 & ASTM D 1140) |       |           |          |  |  |
|---|-------|-----------|----------|--|--|
| Opening Percent                         |       | Spec.*    | Pass?    |  |  |
| Size                                    | Finer | (Percent) | (X=Fail) |  |  |
| 1"                                      | 100.0 |           |          |  |  |
| 3/4"                                    | 84.5  |           |          |  |  |
| 1/2"                                    | 76.6  |           |          |  |  |
| 3/8"                                    | 69.7  |           |          |  |  |
| #4                                      | 58.7  |           |          |  |  |
| #10                                     | 47.1  |           |          |  |  |
| #20                                     | 36.6  |           |          |  |  |
| #40                                     | 27.4  |           |          |  |  |
| #60                                     | 21.0  |           |          |  |  |
| #100                                    | 16.1  |           |          |  |  |
| #200                                    | 11.3  |           |          |  |  |
|   |       |           |          |  |  |
|   |       |           |          |  |  |
|   |       |           |          |  |  |
|   |       |           |          |  |  |
|   |       |           |          |  |  |
|   |       |           |          |  |  |
|   |       |           |          |  |  |
|   |       |           |          |  |  |
|   |       |           |          |  |  |
|   |       |           |          |  |  |

Brown gray poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)
LL= PI=

PL=

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-a

Coefficients

D<sub>90</sub>= 21.4646 D<sub>85</sub>= 19.3109 D<sub>60</sub>= 5.2564 D<sub>50</sub>= 2.4840 D<sub>30</sub>= 0.5161 D<sub>15</sub>= 0.1312 C<sub>u</sub>= C<sub>c</sub>=

Remarks

As received MC = 6.8%

**Date Received:** 10/5/2017 **Date Tested:** 10/6/2017

Tested By:  $\underline{\mathrm{GW}}$  Checked By:  $\underline{\mathrm{MP}}$ 

Title: Laboratory Manager

\* (no specification provided)

**CDM Smith** 

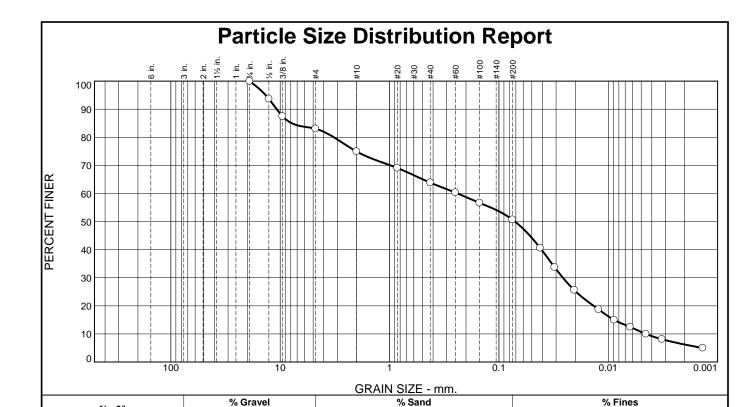
Source of Sample: B-71 Sample Number: V-1 **Depth:** 1-5

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/22/2017



| Test R     |         |           |          |   |
|------------|---------|-----------|----------|---|
| Opening    | Percent | Spec.*    | Pass?    | Brown sand  |
| Size       | Finer   | (Percent) | (X=Fail) |   |
| 3/4"       | 100.0   |           |          |   |
| 1/2"       | 93.7    |           |          |   |
| 3/8"       | 87.4    |           |          | PL=   |
| #4         | 83.1    |           |          |   |
| #10        | 74.9    |           |          |   |
| #20        | 69.1    |           |          | USCS (D 24  |
| #40        | 63.9    |           |          |   |
| #60        | 60.3    |           |          | Don= 10.77  |
| #100       | 56.6    |           |          | <b>D<sub>90</sub>=</b> 10.77 <b>D<sub>50</sub>=</b> 0.071 |
| #200       | 50.7    |           |          | D <sub>10</sub> = 0.004                                   |
| 0.0419 mm. | 40.6    |           |          |   |
| 0.0309 mm. | 33.7    |           |          | , , ,   |
| 0.0205 mm. | 25.6    |           |          | As received   |
| 0.0123 mm. | 18.7    |           |          |   |
| 0.0088 mm. | 15.0    |           |          |   |
| 0.0063 mm. | 12.5    |           |          | Date Recei  |
| 0.0045 mm. | 10.0    |           |          | Date Necei  |

Coarse

0.0

Fine

16.9

Coarse

8.2

| <u>Materi</u> | al D | escr | ip | <u>tion</u> |  |
|---------------|------|------|----|-------------|--|
|               |      |      | •  |             |  |

dy silt with gravel

Fine

13.2

**Atterberg Limits (ASTM D 4318)** 

Medium

11.0

Classification

Silt

40.0

Clay

10.7

487)= ML**AASHTO** (M 145)= A-4(0)

Coefficients

**D<sub>60</sub>=** 0.2387 **D<sub>15</sub>=** 0.0088 **C<sub>c</sub>=** 0.62 D<sub>85</sub>= 7.8514 D<sub>30</sub>= 0.0260 C<sub>u</sub>= 52.67 7774 112 145

Remarks

d MC = 23.9%

eived: 10/5/2017 **Date Tested:** 10/10/2017

Tested By: RZ

Checked By: MP

Title: Laboratory Manager

(no specification provided)

8.1

5.0

Source of Sample: B-72 Sample Number: S-2

0.0032 mm.

0.0014 mm.

% +3"

0.0

**Depth: 2-4'** 

**Date Sampled:** 9/15/2017 Client: Massachusetts Water Resources Authority (MWRA)

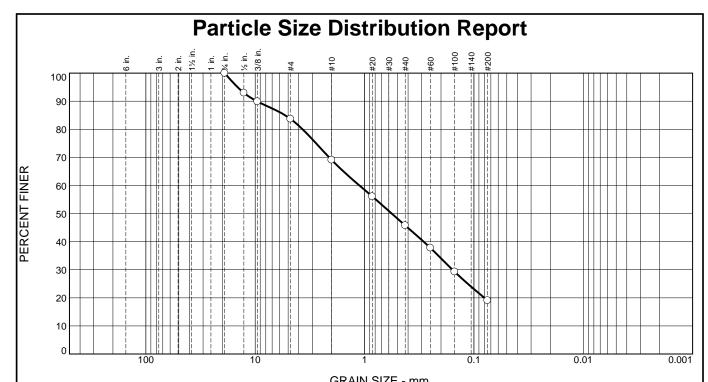
Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Boston, Massachusetts Project No:** 101038.102170

**Figure** 

**CDM Smith** 



| GRAIN SIZE - IIIII. |                         |      |        |        |      |      |      |  |
|---------------------|-------------------------|------|--------|--------|------|------|------|--|
| 0/ - 211            | % Gravel % Sand % Fines |      | % Sand |        |      |      |      |  |
| % +3"               | Coarse                  | Fine | Coarse | Medium | Fine | Silt | Clay |  |
| 0.0                 | 0.0                     | 16.3 | 14.6   | 23.3   | 26.7 | 19.1 |      |  |

| Test Re | esults (ASTM D | 422 & ASTM D | 1140)    |
|---------|----------------|--------------|----------|
| Opening | Percent        | Spec.*       | Pass?    |
| Size    | Finer          | (Percent)    | (X=Fail) |
| 3/4"    | 100.0          |              |          |
| 1/2"    | 93.0           |              |          |
| 3/8"    | 89.9           |              |          |
| #4      | 83.7           |              |          |
| #10     | 69.1           |              |          |
| #20     | 56.1           |              |          |
| #40     | 45.8           |              |          |
| #60     | 37.8           |              |          |
| #100    | 29.3           |              |          |
| #200    | 19.1           |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |

| Brown silty sand w                            |                            | <u>Descriptio</u>             |                                       |  |  |  |  |  |  |
|---|----------------------------|-------------------------------|---------------------------------------|--|--|--|--|--|--|
| Drown sinty saint w                           | ith gravel                 | Brown silty sand with gravel  |                                       |  |  |  |  |  |  |
|   |                            |                               |                                       |  |  |  |  |  |  |
|   |                            |                               |                                       |  |  |  |  |  |  |
| Atte<br>PL=                                   | rberg Limi                 | ts (ASTM I                    | <u>) 4318)</u><br>Pl=                 |  |  |  |  |  |  |
| ·   |                            |                               | · -                                   |  |  |  |  |  |  |
| USCS (D 2487)=                                |                            | <u>ification</u><br>AASHTO (N | <b>1 145)=</b> A-1-b                  |  |  |  |  |  |  |
|   | Coef                       | ficients                      |                                       |  |  |  |  |  |  |
| <b>D<sub>90</sub>=</b> 9.6599                 | <b>D<sub>85</sub>=</b> 5.3 | 292                           | <b>D<sub>60</sub>=</b> 1.1139         |  |  |  |  |  |  |
| D <sub>50</sub> = 0.5643<br>D <sub>10</sub> = | D <sub>30</sub> = 0.1      | 800                           | D <sub>15</sub> =<br>C <sub>c</sub> = |  |  |  |  |  |  |
| 10  | 4                          |                               | -0                                    |  |  |  |  |  |  |
| As received MC =                              |                            | marks                         |                                       |  |  |  |  |  |  |
| As received ivic =                            | 0.270                      |                               |                                       |  |  |  |  |  |  |
|   |                            |                               |                                       |  |  |  |  |  |  |
| Date Received: 1                              | 0/5/2017                   | Date Te                       | sted: 10/6/2017                       |  |  |  |  |  |  |
| Tested By: (                                  | GW                         |                               |                                       |  |  |  |  |  |  |
| Checked By: N                                 |                            |                               |                                       |  |  |  |  |  |  |
| -   |                            |                               |                                       |  |  |  |  |  |  |
| Title: Laboratory Manager                     |                            |                               |                                       |  |  |  |  |  |  |

(no specification provided)

Source of Sample: B-73 Sample Number: S-2 **Depth: 2-4** 

#### **CDM Smith**

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

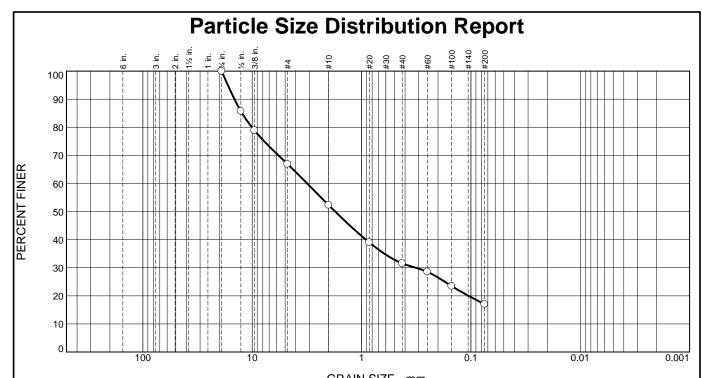
Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Boston, Massachusetts** 

**Project No:** 101038.102170

**Figure** 

**Date Sampled:** 9/15/2017



| %+3" Coarse Fine Coarse Medium Fine Silt |        |        |       |        |        |      |         |      |
|--|--------|--------|-------|--------|--------|------|---------|------|
|  | 0/ - 2 | % G    | ravel |        | % Sand | i    | % Fines |      |
|  | % +3"  | Coarse | Fine  | Coarse | Medium | Fine | Silt    | Clay |
|  | 0.0    | 0.0    | 33.1  | 14.6   | 20.7   | 14.6 | 17.0    |      |

| Test R  | Test Results (ASTM D 422 & ASTM D 1140) |        |          |  |  |  |  |  |  |  |
|---------|---|--------|----------|--|--|--|--|--|--|--|
| Opening | Percent                                 | Spec.* | Pass?    |  |  |  |  |  |  |  |
| Size    | Size Finer                              |        | (X=Fail) |  |  |  |  |  |  |  |
| 3/4"    | 100.0                                   |        |          |  |  |  |  |  |  |  |
| 1/2"    | 85.7                                    |        |          |  |  |  |  |  |  |  |
| 3/8"    | 78.9                                    |        |          |  |  |  |  |  |  |  |
| #4      | 66.9                                    |        |          |  |  |  |  |  |  |  |
| #10     | 52.3                                    |        |          |  |  |  |  |  |  |  |
| #20     | 39.0                                    |        |          |  |  |  |  |  |  |  |
| #40     | 31.6                                    |        |          |  |  |  |  |  |  |  |
| #60     | 28.5                                    |        |          |  |  |  |  |  |  |  |
| #100    | 23.5                                    |        |          |  |  |  |  |  |  |  |
| #200    | 17.0                                    |        |          |  |  |  |  |  |  |  |
|         |   |        |          |  |  |  |  |  |  |  |
|         |   |        |          |  |  |  |  |  |  |  |
|         |   |        |          |  |  |  |  |  |  |  |
|         |   |        |          |  |  |  |  |  |  |  |
|         |   |        |          |  |  |  |  |  |  |  |
|         |   |        |          |  |  |  |  |  |  |  |
|         |   |        |          |  |  |  |  |  |  |  |
|         |   |        |          |  |  |  |  |  |  |  |
|         |   |        |          |  |  |  |  |  |  |  |
|         |   |        |          |  |  |  |  |  |  |  |
| *       |   |        |          |  |  |  |  |  |  |  |

#### Brown gray silty sand with gravel **Atterberg Limits (ASTM D 4318)** PL= Classification USCS (D 2487)= SM **AASHTO (M 145)=** A-1-b Coefficients D<sub>90</sub>= 14.5261 D<sub>50</sub>= 1.7423 D<sub>10</sub>= **D<sub>85</sub>=** 12.3723 **D<sub>60</sub>=** 3.1422 D<sub>30</sub>= 0.3200 C<sub>u</sub>= D<sub>15</sub>= C<sub>C</sub>= Remarks As received MC = 9.5%**Date Received:** 10/5/2017 **Date Tested:** 10/6/2017 Tested By: GW Checked By: MP Title: Laboratory Manager

**Material Description** 

\* (no specification provided)

Source of Sample: B-74 Sample Number: S-1 **Depth:** 0.5-1.7

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

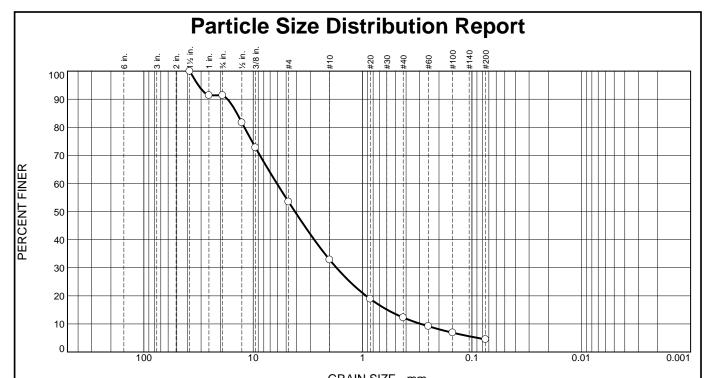
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

Boston, Massachusetts Project No: 101038.102170

Figure

**Date Sampled:** 9/14/2017



| GRAIN SIZE - mm. |        |            |        |        |                |      |      |  |
|------------------|--------|------------|--------|--------|----------------|------|------|--|
| 0/ - 211         | % Gı   | avel % San |        |        | % Sand % Fines |      |      |  |
| % +3"            | Coarse | Fine       | Coarse | Medium | Fine           | Silt | Clay |  |
| 0.0              | 8.6    | 37.9       | 20.7   | 20.5   | 7.8            | 4.5  |      |  |

| Test Results (ASTM D 422 & ASTM D 1140) |         |           |          |  |  |  |  |  |  |
|---|---------|-----------|----------|--|--|--|--|--|--|
| Opening                                 | Percent | Spec.*    | Pass?    |  |  |  |  |  |  |
| Size                                    | Finer   | (Percent) | (X=Fail) |  |  |  |  |  |  |
| 1.5"                                    | 100.0   |           |          |  |  |  |  |  |  |
| 1"                                      | 91.4    |           |          |  |  |  |  |  |  |
| 3/4"                                    | 91.4    |           |          |  |  |  |  |  |  |
| 1/2"                                    | 81.7    |           |          |  |  |  |  |  |  |
| 3/8"                                    | 72.8    |           |          |  |  |  |  |  |  |
| #4                                      | 53.5    |           |          |  |  |  |  |  |  |
| #10                                     | 32.8    |           |          |  |  |  |  |  |  |
| #20                                     | 18.9    |           |          |  |  |  |  |  |  |
| #40                                     | 12.3    |           |          |  |  |  |  |  |  |
| #60                                     | 9.2     |           |          |  |  |  |  |  |  |
| #100                                    | 6.9     |           |          |  |  |  |  |  |  |
| #200                                    | 4.5     |           |          |  |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |  |

# Atterberg Limits (ASTM D 4318) PL= LL= Pl= Classification USCS (D 2487)= SW AASHTO (M 145)= A-1-a Coefficients D90= 17.1353 D85= 14.1094 D60= 6.0734 D50= 4.1535 D30= 1.7322 D15= 0.5927 D10= 0.2936 Cu= 20.69 Cc= 1.68 Remarks As received MC = 8.3% Date Received: 10/5/2017 Date Tested: 10/6/2017

**Material Description** 

Dark-gray well-graded sand with gravel

(no specification provided)

Source of Sample: B-74 Sample Number: S-5 **Depth:** 8-9.3

Client: Massachusetts Water Resources Authority (MWRA)

Tested By: GW Checked By: MP

ect: Weston Aqueduct Supply Main 3 (WASM3)

Title: Laboratory Manager

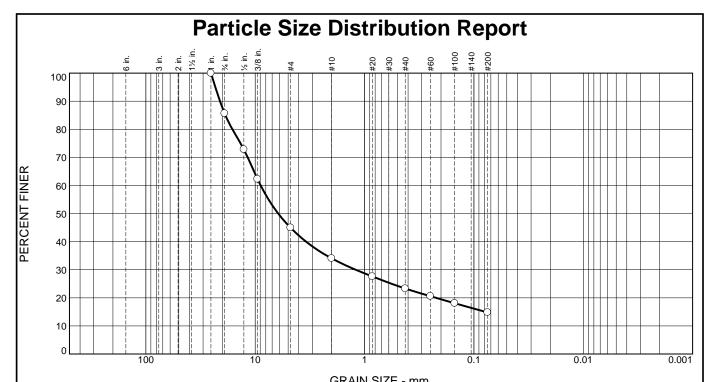
Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/14/2017

Project No: 101038.102170 Figure

**CDM Smith** 

**Boston, Massachusetts** 



|       | GRAIN SIZE - IIIII. |                 |        |        |      |         |      |  |
|-------|---------------------|-----------------|--------|--------|------|---------|------|--|
| % +3" | % G                 | % Gravel % Sand |        | % Sand |      | % Fines |      |  |
|       | Coarse              | Fine            | Coarse | Medium | Fine | Silt    | Clay |  |
| 0.0   | 14.4                | 40.6            | 10.9   | 10.8   | 8.5  | 14.8    |      |  |

| Test Re         | esults (ASTM D | 6913 & ASTM I | D1140)   |
|-----------------|----------------|---------------|----------|
| Opening Percent |                | Spec.*        | Pass?    |
| Size            | Finer          | (Percent)     | (X=Fail) |
| 1"              | 100.0          |               |          |
| .75"            | 85.6           |               |          |
| .5"             | 72.8           |               |          |
| .375"           | 62.3           |               |          |
| #4              | 45.0           |               |          |
| #10             | 34.1           |               |          |
| #20             | 27.6           |               |          |
| #40             | 23.3           |               |          |
| #60             | 20.6           |               |          |
| #100            | 18.1           |               |          |
| #200            | 14.8           |               |          |
|                 |                |               |          |
|                 |                |               |          |
|                 |                |               |          |
|                 |                |               |          |
|                 |                |               |          |
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|                 |                |               |          |
|                 |                |               |          |

|  | Material Description   |                        |                   |  |  |  |  |  |
|--|--|------------------------|-------------------|--|--|--|--|--|
| Brown silty gravel   | Brown silty gravel with sand   |                        |                   |  |  |  |  |  |
|  |  |                        |                   |  |  |  |  |  |
| Λ++  | erberg Limits (A   | A STM D /318)          |                   |  |  |  |  |  |
| PL=  | LL=  | PI=                    |                   |  |  |  |  |  |
| USCS (D 2487)=   | Classifica   | ation<br>SHTO (M 145)= | Δ <sub>-1-a</sub> |  |  |  |  |  |
| 0000 (D 2401)=   |  | ` '                    | 1-1-4             |  |  |  |  |  |
| D <sub>90</sub> = 20.9938<br>D <sub>50</sub> = 6.1619<br>D <sub>10</sub> = | Coefficie<br>D <sub>85</sub> = 18.7445<br>D <sub>30</sub> = 1.2043<br>C <sub>u</sub> = |                        | 130<br>779        |  |  |  |  |  |
|  | Remark   | ks                     |                   |  |  |  |  |  |
| As received MC =   | 14.0%  |                        |                   |  |  |  |  |  |
|  |  |                        |                   |  |  |  |  |  |
| Date Received:   | 1/31/18  | Date Tested: 2/        | /5/18             |  |  |  |  |  |
| Tested By:   | MP/SB  |                        |                   |  |  |  |  |  |
| Checked By:  | MP   |                        |                   |  |  |  |  |  |
| Title: ]   | Title: Laboratory Manager  |                        |                   |  |  |  |  |  |
|  |  |                        |                   |  |  |  |  |  |

(no specification provided)

Source of Sample: B-75A Sample Number: S-1

**Depth:** 6-8'

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

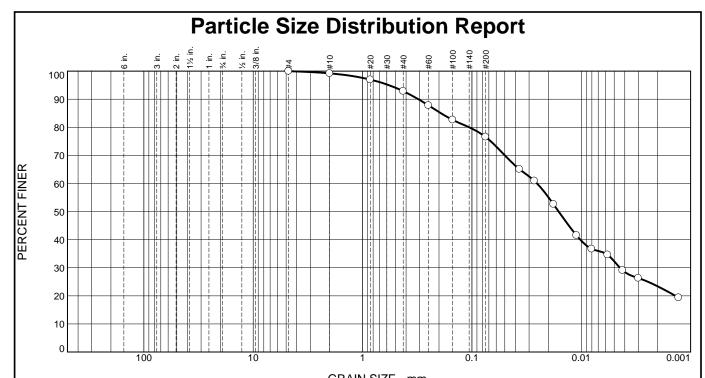
Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 11/15/18

**Boston, Massachusetts** 

**Project No:** 101038.102170



|        | GRAIN SIZE - mm. |        |               |        |        |         |      |      |  |
|--------|------------------|--------|---------------|--------|--------|---------|------|------|--|
| 9/ .3" | 0/ - 211         | % G    | Gravel % Sand |        | I      | % Fines |      |      |  |
|        | <b>% +3</b> "    | Coarse | Fine          | Coarse | Medium | Fine    | Silt | Clay |  |
|        | 0.0              | 0.0    | 0.0           | 0.8    | 6.3    | 16.3    | 44.3 | 32.3 |  |

| Test R     | esults (ASTM D | 422 & ASTM D | 1140)    |
|------------|----------------|--------------|----------|
| Opening    | Percent        | Spec.*       | Pass?    |
| Size       | Finer          | (Percent)    | (X=Fail) |
| #4         | 100.0          |              |          |
| #10        | 99.2           |              |          |
| #20        | 97.0           |              |          |
| #40        | 92.9           |              |          |
| #60        | 87.8           |              |          |
| #100       | 82.7           |              |          |
| #200       | 76.6           |              |          |
| 0.0368 mm. | 65.1           |              |          |
| 0.0269 mm. | 61.0           |              |          |
| 0.0180 mm. | 52.6           |              |          |
| 0.0111 mm. | 41.6           |              |          |
| 0.0080 mm. | 36.7           |              |          |
| 0.0057 mm. | 34.6           |              |          |
| 0.0042 mm. | 29.1           |              |          |
| 0.0030 mm. | 26.3           |              |          |
| 0.0013 mm. | 19.4           |              |          |
|            |                |              |          |
|            |                |              |          |
|            |                |              |          |
|            |                |              |          |
|            |                |              |          |

Brown lean clay with sand

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Coefficients

D<sub>90</sub>= 0.3091 D<sub>85</sub>= 0.1917 D<sub>60</sub>= 0.0254
D<sub>50</sub>= 0.0161 D<sub>30</sub>= 0.0044 D<sub>15</sub>=
D<sub>10</sub>= C<sub>u</sub>= C<sub>c</sub>=

Remarks

As received MC = 20.4%

Tested By: RZ

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-76 Sample Number: S-2 Depth: 2-4'

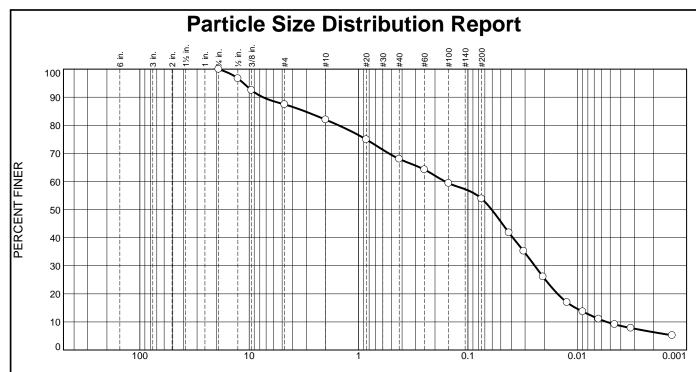
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/13/2017



|          |        |       | (      | <u> GRAIN SIZE -</u> | mm.  |         |      |
|----------|--------|-------|--------|----------------------|------|---------|------|
| 0/ - 211 | % Gı   | ravel |        | % Sand               |      | % Fines |      |
| % +3"    | Coarse | Fine  | Coarse | Medium               | Fine | Silt    | Clay |
| 0.0      | 0.0    | 12.6  | 5.4    | 14 0                 | 14 1 | 44.3    | 9.6  |

Dark brown sandy silt

| Test R     | esults (ASTM D | 422 & ASTM D | 1140)    |
|------------|----------------|--------------|----------|
| Opening    | Percent        | Spec.*       | Pass?    |
| Size       | Finer          | (Percent)    | (X=Fail) |
| 3/4"       | 100.0          |              |          |
| 1/2"       | 96.7           |              |          |
| 3/8"       | 92.5           |              |          |
| #4         | 87.4           |              |          |
| #10        | 82.0           |              |          |
| #20        | 75.0           |              |          |
| #40        | 68.0           |              |          |
| #60        | 64.2           |              |          |
| #100       | 59.4           |              |          |
| #200       | 53.9           |              |          |
| 0.0421 mm. | 41.8           |              |          |
| 0.0310 mm. | 35.2           |              |          |
| 0.0206 mm. | 26.1           |              |          |
| 0.0124 mm. | 17.0           |              |          |
| 0.0089 mm. | 13.7           |              |          |
| 0.0064 mm. | 11.1           |              |          |
| 0.0046 mm. | 9.1            |              |          |
| 0.0032 mm. | 7.8            |              |          |
| 0.0014 mm. | 5.2            |              |          |
|            |                |              |          |
|            |                |              |          |

#### **Atterberg Limits (ASTM D 4318)** PL= Classification USCS (D 2487)= ML**AASHTO** (M 145)= A-4(0)Coefficients **D<sub>90</sub>=** 7.5058 **D<sub>50</sub>=** 0.0607 **D<sub>10</sub>=** 0.0054 D<sub>85</sub>= 3.1003 D<sub>30</sub>= 0.0245 C<sub>u</sub>= 30.12 **D<sub>60</sub>=** 0.1618 D<sub>15</sub>= 0.0104 C<sub>c</sub>= 0.69 Remarks As received MC = 40.9%**Date Received:** 10/5/2017 **Date Tested:** 10/10/2017 Tested By: RZ Checked By: MP

**Material Description** 

(no specification provided)

Source of Sample: B-77

**Depth:** 2-4'

Sample Number: S-2

**CDM Smith** 

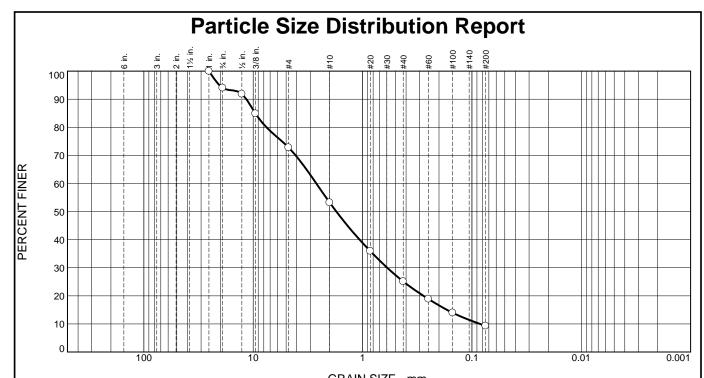
Client: Massachusetts Water Resources Authority (MWRA)

Title: Laboratory Manager

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/11/2017



|         |        |       | (      | <u>GRAIN SIZE -</u> | mm.  |         |      |
|---------|--------|-------|--------|---------------------|------|---------|------|
| 0/ - 21 | % G    | ravel |        | % Sand              |      | % Fines |      |
| % +3"   | Coarse | Fine  | Coarse | Medium              | Fine | Silt    | Clay |
| 0.0     | 6.0    | 21.2  | 19.6   | 28.1                | 15.8 | 9.3     |      |

| Test Re | esults (ASTM D | 422 & ASTM D | 1140)    |
|---------|----------------|--------------|----------|
| Opening | Percent        | Spec.*       | Pass?    |
| Size    | Finer          | (Percent)    | (X=Fail) |
| 1"      | 100.0          |              |          |
| 3/4"    | 94.0           |              |          |
| 1/2"    | 91.9           |              |          |
| 3/8"    | 84.9           |              |          |
| #4      | 72.8           |              |          |
| #10     | 53.2           |              |          |
| #20     | 35.9           |              |          |
| #40     | 25.1           |              |          |
| #60     | 18.9           |              |          |
| #100    | 14.0           |              |          |
| #200    | 9.3            |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |

Dark brown well-graded sand with silt and gravel

Atterberg Limits (ASTM D 4318) LL= PI=

PL=

 $\begin{array}{ccc} & & & & & \\ \text{USCS (D 2487)=} & & \text{SW-SM} & & \text{AASHTO (M 145)=} & & \text{A-1-b} \end{array}$ 

Coefficients

**D<sub>90</sub>=** 11.5533 **D<sub>50</sub>=** 1.7374 **D<sub>10</sub>=** 0.0843 **D<sub>60</sub>=** 2.6478 **D<sub>15</sub>=** 0.1690 **C<sub>c</sub>=** 1.59 D<sub>85</sub>= 9.5728 D<sub>30</sub>= 0.5951 C<sub>u</sub>= 31.41

Remarks

**Date Tested:** 10/9/2017

**Date Sampled:** 9/13/2017

As received MC = 13.5%

**Date Received:** 10/5/2017 Tested By: RZ

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

**CDM Smith** 

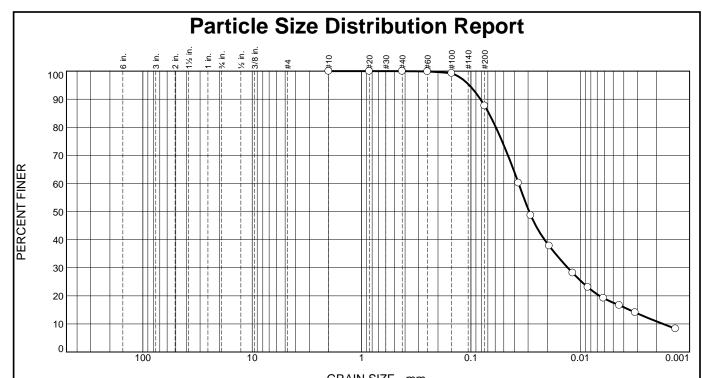
Source of Sample: B-78 Sample Number: S-2

**Depth: 2-4** 

Client: Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA



|        |        |       |        | <u>GRAIN SIZE :</u> | · mm. |         |      |
|--------|--------|-------|--------|---------------------|-------|---------|------|
| 0/ - 2 | % G    | ravel |        | % Sand              | i     | % Fines |      |
| % +3"  | Coarse | Fine  | Coarse | Medium              | Fine  | Silt    | Clay |
| 0.0    | 0.0    | 0.0   | 0.0    | 0.0                 | 12.3  | 70.1    | 17.6 |

| Opening    | Percent | Spec.*    | Pass?    |
|------------|---------|-----------|----------|
| Size       | Finer   | (Percent) | (X=Fail) |
| #10        | 100.0   |           |          |
| #20        | 100.0   |           |          |
| #40        | 100.0   |           |          |
| #60        | 99.9    |           |          |
| #100       | 99.3    |           |          |
| #200       | 87.7    |           |          |
| 0.0368 mm. | 60.2    |           |          |
| 0.0284 mm. | 48.7    |           |          |
| 0.0193 mm. | 37.8    |           |          |
| 0.0117 mm. | 28.2    |           |          |
| 0.0085 mm. | 23.1    |           |          |
| 0.0061 mm. | 19.2    |           |          |
| 0.0044 mm. | 16.7    |           |          |
| 0.0032 mm. | 14.1    |           |          |
| 0.0013 mm. | 8.3     |           |          |
|            |         |           |          |
|            |         |           |          |
|            |         |           |          |
|            |         |           |          |
|            |         |           |          |
|            |         |           |          |

#### **Material Description** Brown silt **Atterberg Limits (ASTM D 4318)** PL= Classification USCS (D 2487)= ML**AASHTO (M 145)=** A-4(0) Coefficients D<sub>60</sub>= 0.0366 D<sub>15</sub>= 0.0035 C<sub>c</sub>= 2.64 D<sub>90</sub>= 0.0818 D<sub>50</sub>= 0.0293 D<sub>10</sub>= 0.0017 D<sub>85</sub>= 0.0686 D<sub>30</sub>= 0.0130 C<sub>u</sub>= 20.94 Remarks As received MC = 21.8%**Date Received:** 10/5/2017 **Date Tested:** 10/10/2017 Tested By: RZ Checked By: MP Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-78 Sample Number: S-5 **Depth:** 8-10'

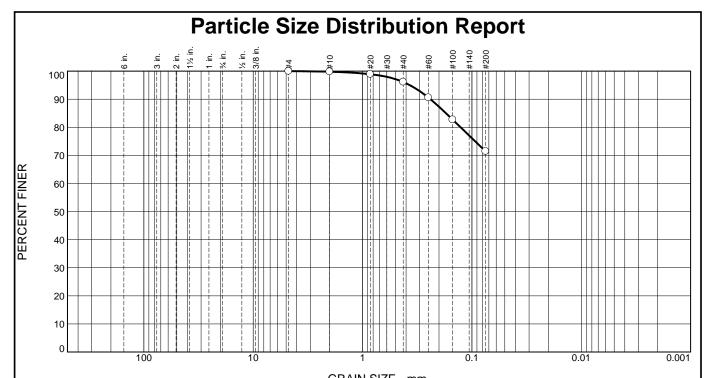
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/13/2017



|        |        |       |        | <u>GRAIN SIZE -</u> | · mm. |         |      |
|--------|--------|-------|--------|---------------------|-------|---------|------|
| 0/ - 2 | % G    | ravel |        | % Sand              | I     | % Fines |      |
| % +3"  | Coarse | Fine  | Coarse | Medium              | Fine  | Silt    | Clay |
| 0.0    | 0.0    | 0.0   | 0.2    | 3.7                 | 24.6  | 71.5    |      |

| Test Re | esults (ASTM D | 422 & ASTM D | 1140)    |
|---------|----------------|--------------|----------|
| Opening | Percent        | Spec.*       | Pass?    |
| Size    | Finer          | (Percent)    | (X=Fail) |
| #4      | 100.0          |              |          |
| #10     | 99.8           |              |          |
| #20     | 98.9           |              |          |
| #40     | 96.1           |              |          |
| #60     | 90.6           |              |          |
| #100    | 82.7           |              |          |
| #200    | 71.5           |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
| *       |                |              |          |

#### **Material Description** Gray lean clay with sand **Atterberg Limits (ASTM D 4318) PL=** 20 LL= 32 Classification USCS (D 2487)= CL**AASHTO** (M 145)= A-6(7)Coefficients **D<sub>90</sub>=** 0.2397 **D<sub>85</sub>=** 0.1725 $D_{60}=$ D<sub>50</sub>= D<sub>10</sub>= D<sub>30</sub>= D<sub>15</sub>= C<sub>C</sub>= Remarks As received MC = 28.8%**Date Received:** 10/5/2017 **Date Tested:** 10/9/2017 Tested By: RZ Checked By: MP Title: Laboratory Manager

\* (no specification provided)

**Source of Sample:** B-79 **Sample Number:** S-6

**Depth:** 14-16

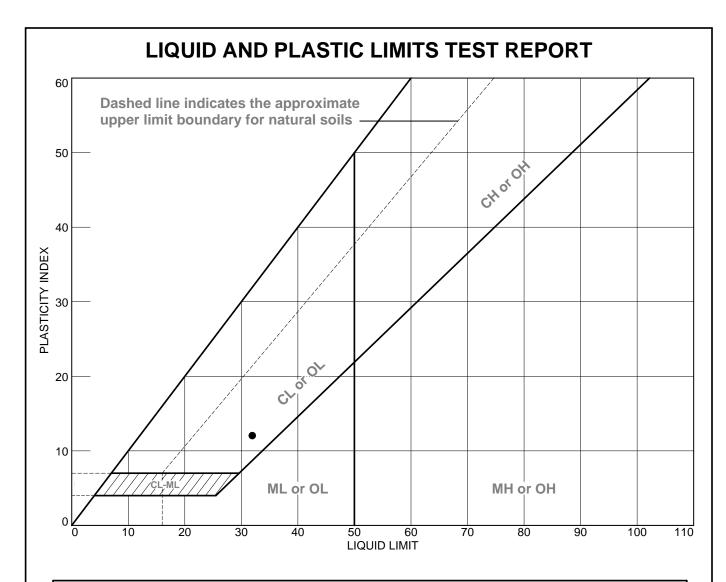
CDM Smith

**Client:** Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/14/2017



|        |        |               |       | <b>SOIL DATA</b>                   | 1                       |                        |                            |      |
|--------|--------|---------------|-------|------------------------------------|-------------------------|------------------------|----------------------------|------|
| SYMBOL | SOURCE | SAMPLE<br>NO. | DEPTH | NATURAL<br>WATER<br>CONTENT<br>(%) | PLASTIC<br>LIMIT<br>(%) | LIQUID<br>LIMIT<br>(%) | PLASTICITY<br>INDEX<br>(%) | USCS |
| •      | B-79   | S-6           | 14-16 | 28.8                               | 20                      | 32                     | 12                         | CL   |

**CDM Smith** 

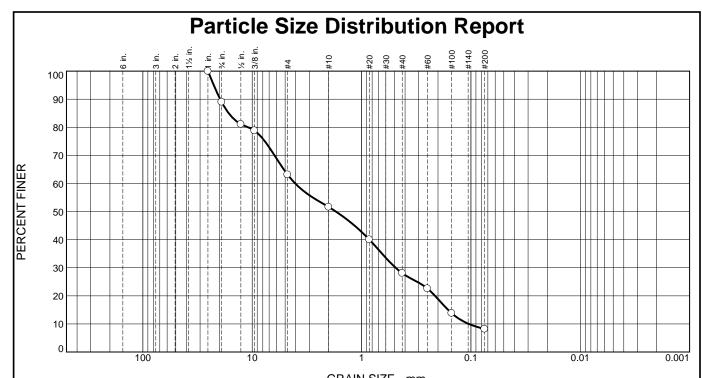
Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Boston, Massachusetts** 

| Tested By: RZ Checked By: MP |
|------------------------------|
|------------------------------|



|         |        |       | (      | <u> JRAIN SIZE -</u> | mm.  |         |      |
|---------|--------|-------|--------|----------------------|------|---------|------|
| 0/ - 21 | % Gı   | ravel |        | % Sand               |      | % Fines |      |
| % +3"   | Coarse | Fine  | Coarse | Medium               | Fine | Silt    | Clay |
| 0.0     | 11.0   | 25.8  | 11.6   | 23.5                 | 19.9 | 8.2     |      |

| Test Re | esults (ASTM D | 422 & ASTM D | 1140)    |
|---------|----------------|--------------|----------|
| Opening | Percent        | Spec.*       | Pass?    |
| Size    | Finer          | (Percent)    | (X=Fail) |
| 1"      | 100.0          |              |          |
| 3/4"    | 89.0           |              |          |
| 1/2"    | 81.1           |              |          |
| 3/8"    | 78.8           |              |          |
| #4      | 63.2           |              |          |
| #10     | 51.6           |              |          |
| #20     | 40.0           |              |          |
| #40     | 28.1           |              |          |
| #60     | 22.6           |              |          |
| #100    | 13.8           |              |          |
| #200    | 8.2            |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |

Dark brown poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)
LL= PI=

PL=

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

 D90=
 19.6392
 D85=
 16.4008
 D60=
 4.0410

 D50=
 1.7172
 D30=
 0.4882
 D15=
 0.1615

 D10=
 0.1046
 Cu=
 38.63
 Cc=
 0.56

Remarks

As received MC = 8.2%

Tested By: RZ Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

**CDM Smith** 

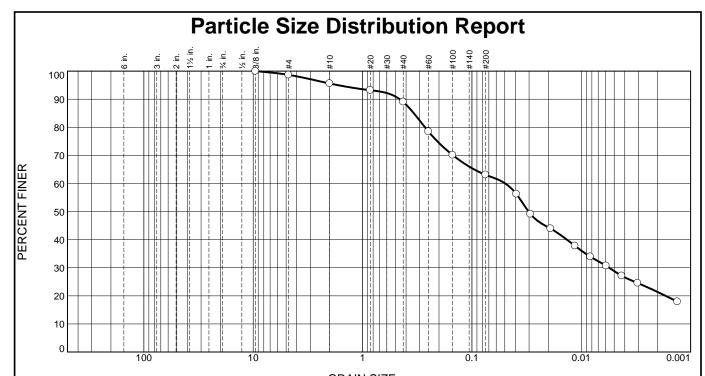
Source of Sample: B-80 Sample Number: S-2 Depth: 6-8

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/25/2017



|          |                 |      | (       | <u>GRAIN SIZE -</u> | mm.  |      |      |
|----------|-----------------|------|---------|---------------------|------|------|------|
| 0/ - 211 | % Gravel % Sand |      | % Fines |                     |      |      |      |
| % +3"    | Coarse          | Fine | Coarse  | Medium              | Fine | Silt | Clay |
| 0.0      | 0.0             | 1.3  | 3.1     | 6.6                 | 25.9 | 34.3 | 28.8 |

| Test Results (ASTM D6913 & D7928 & ASTM D1140) |         |           |          |  |  |  |  |
|--|---------|-----------|----------|--|--|--|--|
| Opening  | Percent | Spec.*    | Pass?    |  |  |  |  |
| Size   | Finer   | (Percent) | (X=Fail) |  |  |  |  |
| .375"  | 100.0   |           |          |  |  |  |  |
| #4   | 98.7    |           |          |  |  |  |  |
| #10  | 95.6    |           |          |  |  |  |  |
| #20  | 93.2    |           |          |  |  |  |  |
| #40  | 89.0    |           |          |  |  |  |  |
| #60  | 78.5    |           |          |  |  |  |  |
| #100   | 70.1    |           |          |  |  |  |  |
| #200   | 63.1    |           |          |  |  |  |  |
| 0.0392 mm.                                     | 56.2    |           |          |  |  |  |  |
| 0.0292 mm.                                     | 49.1    |           |          |  |  |  |  |
| 0.0191 mm.                                     | 44.0    |           |          |  |  |  |  |
| 0.0114 mm.                                     | 37.8    |           |          |  |  |  |  |
| 0.0083 mm.                                     | 33.9    |           |          |  |  |  |  |
| 0.0059 mm.                                     | 30.7    |           |          |  |  |  |  |
| 0.0043 mm.                                     | 27.2    |           |          |  |  |  |  |
| 0.0031 mm.                                     | 24.6    |           |          |  |  |  |  |
| 0.0013 mm.                                     | 17.9    |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |

|  | <b>Material Desci</b>                        | <u>ription</u>                        |
|--|--|---------------------------------------|
| Brown sandy silt                                       |  |                                       |
|  |  |                                       |
| <b>A</b> 44  |  | TIA D 4040)                           |
| PL=  | erberg Limits (AS                            | 91M D 4318)<br>Pl=                    |
| . =-   |  | · ·-                                  |
| USCS (D 2487)=   | Classificati<br>ML AASH                      | TO (M 145)= A-4(0)                    |
|  | Coefficien                                   |                                       |
| <b>D<sub>90</sub>=</b> 0.4567                          | <b>D<sub>85</sub>=</b> 0.3396                | <b>D<sub>60</sub>=</b> 0.0495         |
| <b>D<sub>50</sub></b> = 0.0303 <b>D<sub>10</sub></b> = | D <sub>30</sub> = 0.0056<br>C <sub>u</sub> = | D <sub>15</sub> =<br>C <sub>c</sub> = |
|  | Remarks                                      | · ·                                   |
| As received MC =                                       |  |                                       |
|  |  |                                       |
|  |  |                                       |
| Date Received:   | 1/31/18 <b>Da</b>                            | te Tested: 2/5/18                     |
| Tested By:   | MP/SB  |                                       |
| Checked By: ]  | MP   |                                       |
| Title:   | Laboratory Manage                            | er                                    |
|  |  |                                       |

\* (no specification provided)

Source of Sample: B-81 Sample Number: S-4B

**Depth:** 9.5-10'

**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

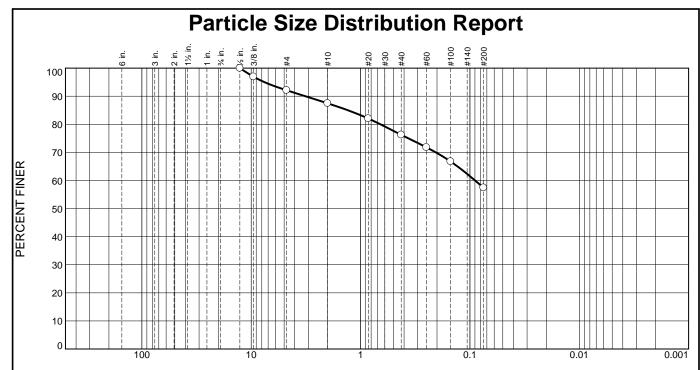
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 12/21/17

Boston, Massachusetts

**Project No:** 101038.102170



|          |        |       | (      | <u> GRAIN SIZE -</u> | mm.  |         |      |
|----------|--------|-------|--------|----------------------|------|---------|------|
| 0/ - 211 | % Gı   | ravel |        | % Sand               |      | % Fines |      |
| % +3"    | Coarse | Fine  | Coarse | Medium               | Fine | Silt    | Clay |
| 0.0      | 0.0    | 7.0   | 1.0    | 11.2                 | 10.0 | 57.4    |      |

| Test Results (ASTM D6913 & ASTM D1140) |         |           |          |  |  |  |  |  |
|--|---------|-----------|----------|--|--|--|--|--|
| Opening                                | Percent | Spec.*    | Pass?    |  |  |  |  |  |
| Size                                   | Finer   | (Percent) | (X=Fail) |  |  |  |  |  |
| .5"                                    | 100.0   |           |          |  |  |  |  |  |
| .375"                                  | 97.0    |           |          |  |  |  |  |  |
| #4                                     | 92.1    |           |          |  |  |  |  |  |
| #10                                    | 87.5    |           |          |  |  |  |  |  |
| #20                                    | 82.1    |           |          |  |  |  |  |  |
| #40                                    | 76.3    |           |          |  |  |  |  |  |
| #60                                    | 71.8    |           |          |  |  |  |  |  |
| #100                                   | 66.8    |           |          |  |  |  |  |  |
| #200                                   | 57.4    |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
| *                                      |         |           |          |  |  |  |  |  |

Dark brown sandy silt with organics

**Atterberg Limits (ASTM D 4318)** 

PL=

Classification

USCS (D 2487)= ML

**AASHTO** (M 145)= A-4(0)

Coefficients

**D<sub>90</sub>=** 3.2019 **D<sub>60</sub>=** 0.0897 **D<sub>85</sub>=** 1.3049

D<sub>50</sub>= D<sub>10</sub>= D<sub>30</sub>= D<sub>15</sub>= C<sub>C</sub>=

Remarks

As received MC = 32.5%

Date Received: 1/31/18 **Date Tested:** 2/5/18

Tested By: MP/SB

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-82A Sample Number: S-1

**Depth:** 0.3-2'

Date Sampled: 11/9/18

**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts** 

**Project No:** 101038.102170

## CDM Smith

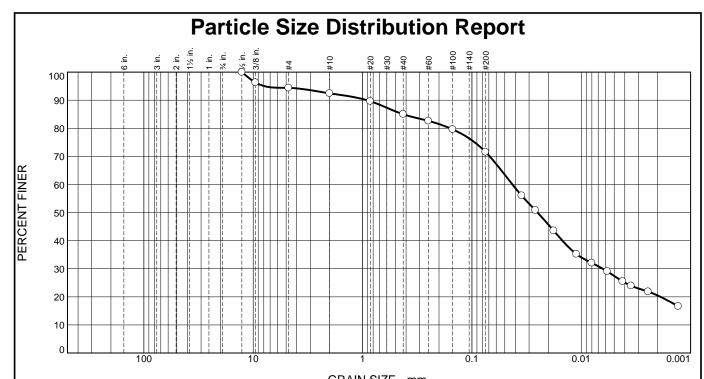
#### **Geotechnical Engineering Laboratory**

# Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

| Client:            | Massachusetts Water Resources Authority |              |          |
|--------------------|---|--------------|----------|
| Project Name:      | Weston Aqueduct Supply Main 3           | Tested By:   | MP       |
| Project Location:  | MWRA line, MA                           | Test Date:   | 2/1/2018 |
| Project Number:    | 101038-102170                           | _            |          |
| Boring Number:     | B-82A                                   | Procedure:   | С        |
| Sample Number:     | S-1                                     | Temperature: | 440° C   |
| Sample Depth (ft): | 0.3-2                                   | _            |          |
| Sample Date:       | 11/9/2017                               |              |          |

| AS RECEIVED MOISTURE CONTENT |        |
|------------------------------|--------|
| Tin Mass (g)                 | 126.65 |
| Wet Mass of Sample & Tin (g) | 206.12 |
| Dry Mass of Sample & Tin (g) | 186.48 |
| Mass of Water (g)            | 19.64  |
| Mass of Dry Soil (g)         | 59.83  |
| Moisture Content (%)         | 32.8   |

| ASH CONTENT                          |        |  |  |  |
|--------------------------------------|--------|--|--|--|
| Porcelain Dish Mass (g)              | 126.65 |  |  |  |
| Porcelain Dish + Oven Dried Soil (g) | 186.48 |  |  |  |
| Mass of Oven Dried Soil (g)          | 59.83  |  |  |  |
| Mass of Dish & Burned Soil (g)       | 183.50 |  |  |  |
| Mass of Burned Soil (g)              | 56.85  |  |  |  |
| Mass of Organic Material (g)         | 2.98   |  |  |  |
| Ash Content (%)                      | 95.0   |  |  |  |
|                                      |        |  |  |  |
| Organic Content (%)                  | 5.0    |  |  |  |



|          |        |       |        | <u>GRAIN SIZE -</u> | · mm. |         |      |
|----------|--------|-------|--------|---------------------|-------|---------|------|
| 0/ - 211 | % G    | ravel |        | % Sand              | I     | % Fines |      |
| % +3"    | Coarse | Fine  | Coarse | Medium              | Fine  | Silt    | Clay |
| 0.0      | 0.0    | 5.6   | 2.0    | 7.4                 | 13.4  | 44.2    | 27.4 |

Brown silt with sand

| Opening    | Percent | Spec.*    | Pass?    |
|------------|---------|-----------|----------|
| Size       | Finer   | (Percent) | (X=Fail) |
| .5"        | 100.0   |           |          |
| .375"      | 96.3    |           |          |
| #4         | 94.4    |           |          |
| #10        | 92.4    |           |          |
| #20        | 89.6    |           |          |
| #40        | 85.0    |           |          |
| #60        | 82.6    |           |          |
| #100       | 79.6    |           |          |
| #200       | 71.6    |           |          |
| 0.0351 mm. | 56.0    |           |          |
| 0.0263 mm. | 50.8    |           |          |
| 0.0179 mm. | 43.5    |           |          |
| 0.0111 mm. | 35.2    |           |          |
| 0.0080 mm. | 32.1    |           |          |
| 0.0058 mm. | 29.1    |           |          |
| 0.0042 mm. | 25.5    |           |          |
| 0.0035 mm. | 23.9    |           |          |
| 0.0024 mm. | 21.9    |           |          |
| 0.0013 mm. | 16.7    |           |          |

#### **Atterberg Limits (ASTM D 4318)** PL= Classification USCS (D 2487)= **AASHTO** (M 145)= A-4(0)MLCoefficients D<sub>90</sub>= 0.9103 D<sub>50</sub>= 0.0251 D<sub>10</sub>= **D<sub>60</sub>=** 0.0426 **D<sub>85</sub>=** 0.4245 D<sub>30</sub>= 0.0064 C<sub>u</sub>= D<sub>15</sub>= C<sub>C</sub>= Remarks As received MC = 21.3%Date Received: 1/31/18 **Date Tested:** 2/2/18 Tested By: MP/SB Checked By: MP

**Material Description** 

(no specification provided)

Source of Sample: B-82A Sample Number: S-5A

**Depth:** 8-8.5'

**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

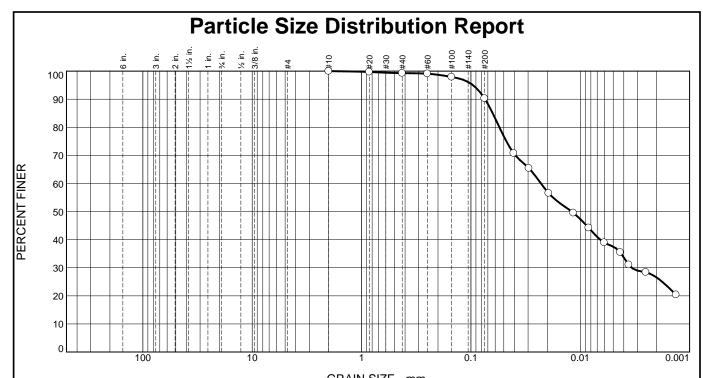
Title: Laboratory Manager

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Date Sampled: 11/9/18

**Boston, Massachusetts Project No:** 101038.102170



|          |        |       | (      | <u>GRAIN SIZE -</u> | · mm. |         |      |
|----------|--------|-------|--------|---------------------|-------|---------|------|
| 0/ - 211 | % G    | ravel |        | % Sand              | I     | % Fines |      |
| % +3"    | Coarse | Fine  | Coarse | Medium              | Fine  | Silt    | Clay |
| 0.0      | 0.0    | 0.0   | 0.0    | 0.7                 | 9.0   | 52.8    | 37.5 |

| Opening    | s (ASTM D6913<br>Percent | Spec.*    | Pass?    |
|------------|--------------------------|-----------|----------|
| Size       | Finer                    | (Percent) | (X=Fail) |
| #10        | 100.0                    |           |          |
| #20        | 99.7                     |           |          |
| #40        | 99.3                     |           |          |
| #60        | 99.1                     |           |          |
| #100       | 97.9                     |           |          |
| #200       | 90.3                     |           |          |
| 0.0406 mm. | 70.8                     |           |          |
| 0.0295 mm. | 65.4                     |           |          |
| 0.0195 mm. | 56.6                     |           |          |
| 0.0116 mm. | 49.5                     |           |          |
| 0.0084 mm. | 44.2                     |           |          |
| 0.0060 mm. | 39.0                     |           |          |
| 0.0043 mm. | 35.5                     |           |          |
| 0.0036 mm. | 31.1                     |           |          |
| 0.0025 mm. | 28.4                     |           |          |
| 0.0013 mm. | 20.4                     |           |          |
|            |                          |           |          |
|            |                          |           |          |
|            |                          |           |          |
|            |                          |           |          |
|            |                          |           |          |

Gray-brown lean clay

Atterberg Limits (ASTM D 4318)

Coefficients

D<sub>90</sub>= 0.0742 D<sub>85</sub>= 0.0632 D<sub>60</sub>= 0.0229 D<sub>50</sub>= 0.0120 D<sub>30</sub>= 0.0034 D<sub>15</sub>= C<sub>c</sub>=

Remarks

As received MC = 21.0%

Date Received: 1/31/18 Date Tested: 2/2/18

Tested By: MP/SB

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

**CDM Smith** 

Source of Sample: B-84 Sample Number: S-5 **Depth:** 9-11'

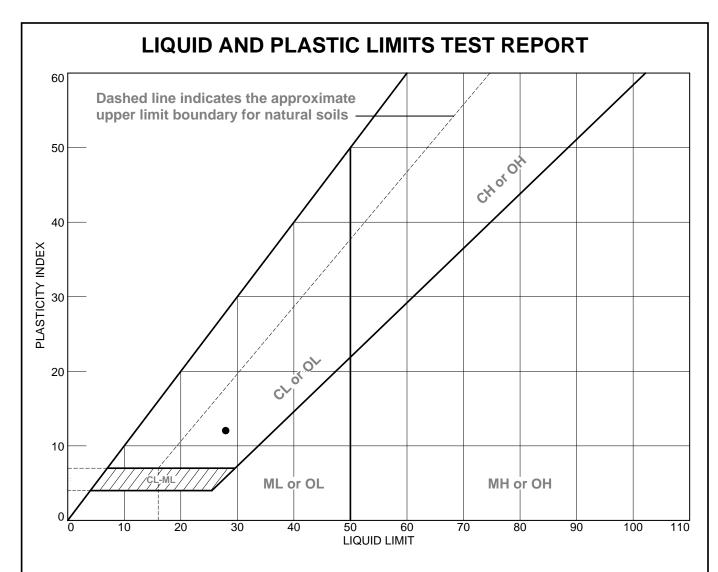
Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 10/2/18

Boston, Massachusetts Project No: 101038.102170



|        | SOIL DATA |               |       |                                    |                         |                        |                            |      |  |  |
|--------|-----------|---------------|-------|------------------------------------|-------------------------|------------------------|----------------------------|------|--|--|
| SYMBOL | SOURCE    | SAMPLE<br>NO. | DEPTH | NATURAL<br>WATER<br>CONTENT<br>(%) | PLASTIC<br>LIMIT<br>(%) | LIQUID<br>LIMIT<br>(%) | PLASTICITY<br>INDEX<br>(%) | uscs |  |  |
| •      | B-84      | S-5           | 9-11' | 21.0                               | 16                      | 28                     | 12                         | CL   |  |  |

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

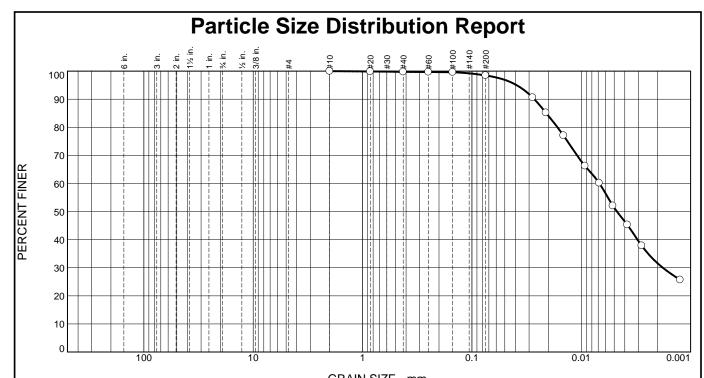
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts

**Project No.:** 101038.102170

| Tested By: AS | Checked Bv: MP |
|---------------|----------------|
|               |                |



|        | GRAIN SIZE - mm. |        |                 |        |        |         |      |      |  |  |
|--------|------------------|--------|-----------------|--------|--------|---------|------|------|--|--|
| 9/ .3" |                  | % Gı   | % Gravel % Sand |        |        | % Fines |      |      |  |  |
|        | % +3"            | Coarse | Fine            | Coarse | Medium | Fine    | Silt | Clay |  |  |
|        | 0.0              | 0.0    | 0.0             | 0.0    | 0.2    | 1.3     | 47.1 | 51.4 |  |  |

| Test Results (ASTM D 422 & ASTM D 1140)  Opening Percent Spec.* Pass? |       |           |          |  |  |  |  |  |  |  |
|---|-------|-----------|----------|--|--|--|--|--|--|--|
| Size  | Finer | (Percent) | (X=Fail) |  |  |  |  |  |  |  |
| #10   | 100.0 | ,         | , ,      |  |  |  |  |  |  |  |
| #20   | 99.9  |           |          |  |  |  |  |  |  |  |
| #40   | 99.8  |           |          |  |  |  |  |  |  |  |
| #60   | 99.7  |           |          |  |  |  |  |  |  |  |
| #100  | 99.6  |           |          |  |  |  |  |  |  |  |
| #200  | 98.5  |           |          |  |  |  |  |  |  |  |
| 0.0278 mm.  | 90.6  |           |          |  |  |  |  |  |  |  |
| 0.0211 mm.  | 85.2  |           |          |  |  |  |  |  |  |  |
| 0.0145 mm.  | 77.1  |           |          |  |  |  |  |  |  |  |
| 0.0093 mm.  | 66.3  |           |          |  |  |  |  |  |  |  |
| 0.0069 mm.  | 60.2  |           |          |  |  |  |  |  |  |  |
| 0.0051 mm.  | 52.1  |           |          |  |  |  |  |  |  |  |
| 0.0038 mm.  | 45.3  |           |          |  |  |  |  |  |  |  |
| 0.0028 mm.  | 37.9  |           |          |  |  |  |  |  |  |  |
| 0.0012 mm.  | 25.7  |           |          |  |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |  |

#### **Material Description** Gray lean clay Atterberg Limits (ASTM D 4318) **PL=** 25 LL= 39 Classification USCS (D 2487)= CL**AASHTO** (M 145)= A-6(16) Coefficients D<sub>90</sub>= 0.0269 D<sub>50</sub>= 0.0047 D<sub>10</sub>= **D<sub>60</sub>=** 0.0068 **D<sub>85</sub>=** 0.0209 D<sub>30</sub>= 0.0018 C<sub>u</sub>= D<sub>15</sub>= C<sub>C</sub>= Remarks As received MC = 31.0%**Date Received:** 10/10/2017 **Date Tested:** 10/10/2017 Tested By: RZ Checked By: MP Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-85 Sample Number: S-6

**Depth:** 14-16'

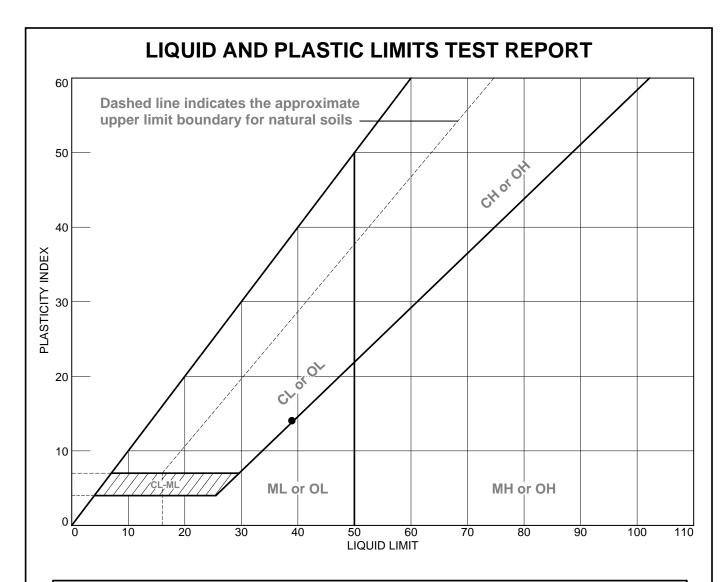
**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/8/2017



|        | SOIL DATA |               |        |                                    |                         |                        |                            |      |  |
|--------|-----------|---------------|--------|------------------------------------|-------------------------|------------------------|----------------------------|------|--|
| SYMBOL | SOURCE    | SAMPLE<br>NO. | DEPTH  | NATURAL<br>WATER<br>CONTENT<br>(%) | PLASTIC<br>LIMIT<br>(%) | LIQUID<br>LIMIT<br>(%) | PLASTICITY<br>INDEX<br>(%) | USCS |  |
| •      | B-85      | S-6           | 14-16' | 31.0                               | 25                      | 39                     | 14                         | CL   |  |

**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

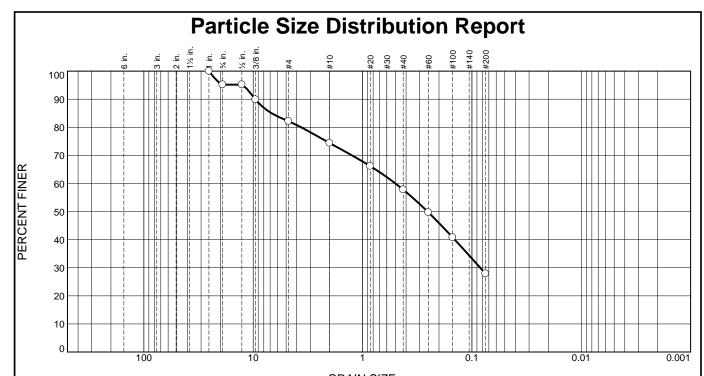
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Boston, Massachusetts** 

**Project No.:** 101038.102170 Figure

| Tested By: RZ  | Checked Bv: MP |
|----------------|----------------|
| rested by. 1\Z | Checked Dy.  v |



|       | GRAIN SIZE - mm. |        |      |         |        |      |      |      |  |  |
|-------|------------------|--------|------|---------|--------|------|------|------|--|--|
| % +3" | % Gravel % Sand  |        |      | % Fines |        |      |      |      |  |  |
|       | % +3"            | Coarse | Fine | Coarse  | Medium | Fine | Silt | Clay |  |  |
|       | 0.0              | 4.8    | 13.0 | 7.8     | 16.6   | 29.9 | 27.9 |      |  |  |

| Test Results (ASTM D 422 & ASTM D 1140) |                     |           |          |  |  |  |  |  |  |  |
|---|---------------------|-----------|----------|--|--|--|--|--|--|--|
| Opening                                 | g Percent Spec.* Pa |           |          |  |  |  |  |  |  |  |
| Size                                    | Finer               | (Percent) | (X=Fail) |  |  |  |  |  |  |  |
| 1"                                      | 100.0               |           |          |  |  |  |  |  |  |  |
| 3/4"                                    | 95.2                |           |          |  |  |  |  |  |  |  |
| 1/2"                                    | 95.2                |           |          |  |  |  |  |  |  |  |
| 3/8"                                    | 89.9                |           |          |  |  |  |  |  |  |  |
| #4                                      | 82.2                |           |          |  |  |  |  |  |  |  |
| #10                                     | 74.4                |           |          |  |  |  |  |  |  |  |
| #20                                     | 66.2                |           |          |  |  |  |  |  |  |  |
| #40                                     | 57.8                |           |          |  |  |  |  |  |  |  |
| #60                                     | 49.7                |           |          |  |  |  |  |  |  |  |
| #100                                    | 40.8                |           |          |  |  |  |  |  |  |  |
| #200                                    | 27.9                |           |          |  |  |  |  |  |  |  |
|   |                     |           |          |  |  |  |  |  |  |  |
|   |                     |           |          |  |  |  |  |  |  |  |
|   |                     |           |          |  |  |  |  |  |  |  |
|   |                     |           |          |  |  |  |  |  |  |  |
|   |                     |           |          |  |  |  |  |  |  |  |
|   |                     |           |          |  |  |  |  |  |  |  |
|   |                     |           |          |  |  |  |  |  |  |  |
|   |                     |           |          |  |  |  |  |  |  |  |
|   |                     |           |          |  |  |  |  |  |  |  |
|   |                     |           |          |  |  |  |  |  |  |  |

| Atte  | erberg Limit                               | s (ASTM D 431                       | 8)         |  |  |  |
|---|--|-------------------------------------|------------|--|--|--|
| PL=   | LL=  | PI=                                 |            |  |  |  |
| USCS (D 2487)=  |  | fication<br>ASHTO (M 145)           | = A-2-4(0) |  |  |  |
|   |  | <u>icients</u>                      |            |  |  |  |
| <b>D<sub>90</sub>=</b> 9.5815                                 | <b>D<sub>85</sub>=</b> 6.78                | 06 <b>D</b> 60                      | = 0.5005   |  |  |  |
| D <sub>50</sub> = 0.2545<br>D <sub>10</sub> =                 | D <sub>30</sub> = 0.08<br>C <sub>u</sub> = | 39 <b>D</b> 15:<br>C <sub>c</sub> = | =          |  |  |  |
|   | Ren  | narks                               |            |  |  |  |
| As received MC =  | 30.8%                                      |                                     |            |  |  |  |
|   |  |                                     |            |  |  |  |
| Date Received: 10/5/2017 Date Tested: 10/9/2017 Tested By: RZ |  |                                     |            |  |  |  |

(no specification provided)

**Source of Sample:** B-86 **Sample Number:** S-3

**Depth:** 4-6

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

Title: Laboratory Manager

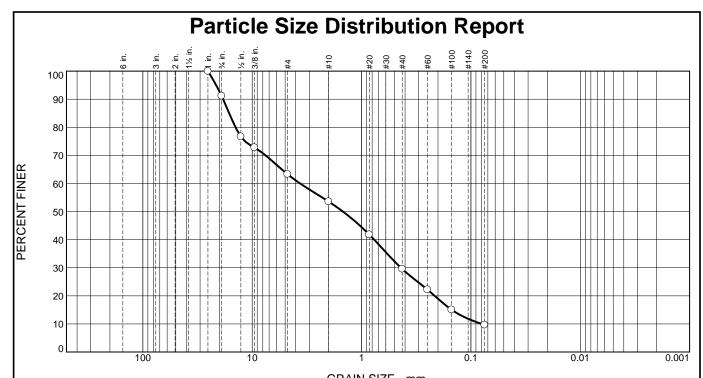
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Checked By: MP

Dark brown silty sand with gravel

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/6/2017



|       | GRAIN SIZE - mm. |                 |      |        |        |         |      |      |  |  |
|-------|------------------|-----------------|------|--------|--------|---------|------|------|--|--|
| % +3" | % G              | % Gravel % Sand |      |        | i      | % Fines |      |      |  |  |
|       | % +3"            | Coarse          | Fine | Coarse | Medium | Fine    | Silt | Clay |  |  |
|       | 0.0              | 8.8             | 27.9 | 9.7    | 24.0   | 19.9    | 9.7  |      |  |  |

| Test Results (ASTM D 422 & ASTM D 1140) |       |           |          |  |  |  |  |  |  |
|---|-------|-----------|----------|--|--|--|--|--|--|
| Opening Percent Spec.* Pass             |       |           |          |  |  |  |  |  |  |
| Size                                    | Finer | (Percent) | (X=Fail) |  |  |  |  |  |  |
| 1"                                      | 100.0 |           |          |  |  |  |  |  |  |
| 3/4"                                    | 91.2  |           |          |  |  |  |  |  |  |
| 1/2"                                    | 76.7  |           |          |  |  |  |  |  |  |
| 3/8"                                    | 72.8  |           |          |  |  |  |  |  |  |
| #4                                      | 63.3  |           |          |  |  |  |  |  |  |
| #10                                     | 53.6  |           |          |  |  |  |  |  |  |
| #20                                     | 41.8  |           |          |  |  |  |  |  |  |
| #40                                     | 29.6  |           |          |  |  |  |  |  |  |
| #60                                     | 22.2  |           |          |  |  |  |  |  |  |
| #100                                    | 15.1  |           |          |  |  |  |  |  |  |
| #200                                    | 9.7   |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
|   |       |           |          |  |  |  |  |  |  |
| *                                       |       |           |          |  |  |  |  |  |  |

Brown poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318) LL= PI=

PL=

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

 D90=
 18.4570
 D85=
 16.2434
 D60=
 3.6465

 D50=
 1.4814
 D30=
 0.4368
 D15=
 0.1493

 D10=
 0.0796
 Cu=
 45.81
 Cc=
 0.66

Remarks

As received MC = 2.4%

Tested By: RZ

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-87 Sample Number: S-2

**Depth:** 2-4

Client: Massachusetts Water Resources Authority (MWRA)

**oject:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

Boston, Massachusetts

**CDM Smith** 

**Project No:** 101038.102170

Figure

**Date Sampled:** 9/8/2017

#### **CDM Smith**

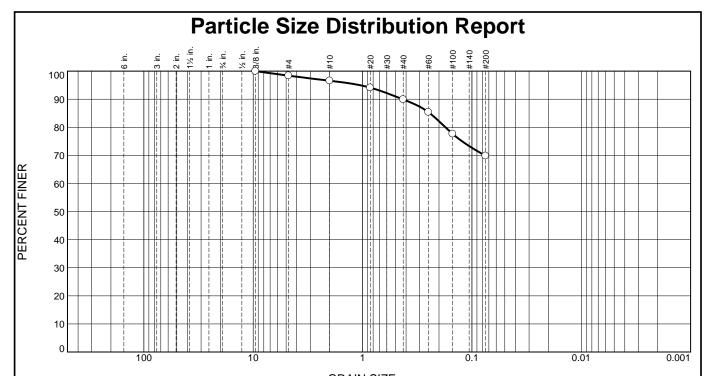
#### **Geotechnical Engineering Laboratory**

# Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

Client: Massachusetts Water Resources Authority Weston Aqueduct Supply Main 3 Project Name: Tested By: MP MWRA line, MA Test Date: 10/9/2017 Project Location: Project Number: 101038-102170 Boring Number: B-88 Procedure: S-1 Temperature: 440° C Sample Number: Sample Depth (ft): 0-2 Sample Date: 9/6/2017

| AS RECEIVED MOISTURE CONTENT |        |
|------------------------------|--------|
| Tin Mass (g)                 | 90.29  |
| Wet Mass of Sample & Tin (g) | 133.38 |
| Dry Mass of Sample & Tin (g) | 125.72 |
| Mass of Water (g)            | 7.66   |
| Mass of Dry Soil (g)         | 35.43  |
| Moisture Content (%)         | 21.6   |

| ASH CONTENT                          |        |  |  |  |
|--------------------------------------|--------|--|--|--|
| Porcelain Dish Mass (g)              | 90.29  |  |  |  |
| Porcelain Dish + Oven Dried Soil (g) | 125.72 |  |  |  |
| Mass of Oven Dried Soil (g)          | 35.43  |  |  |  |
| Mass of Dish & Burned Soil (g)       | 124.20 |  |  |  |
| Mass of Burned Soil (g)              | 33.91  |  |  |  |
| Mass of Organic Material (g)         | 1.52   |  |  |  |
| Ash Content (%)                      | 95.7   |  |  |  |
|                                      |        |  |  |  |
| Organic Content (%)                  | 4.3    |  |  |  |



|          | GRAIN SIZE - mm. |       |           |        |      |         |      |  |
|----------|------------------|-------|-----------|--------|------|---------|------|--|
| 0/ - 211 | % Gı             | ravel | el % Sand |        |      | % Fines |      |  |
| % +3"    | Coarse           | Fine  | Coarse    | Medium | Fine | Silt    | Clay |  |
| 0.0      | 0.0              | 1.6   | 1.8       | 6.7    | 20.0 | 69.9    |      |  |

| Test Ro | esults (ASTM D     | 422 & ASTM D | 1140)    |
|---------|--------------------|--------------|----------|
| Opening | Percent            | Spec.*       | Pass?    |
| Size    | Finer              | (Percent)    | (X=Fail) |
| 3/8"    | 100.0              |              |          |
| #4      | 98.4               |              |          |
| #10     | 96.6               |              |          |
| #20     | 94.1               |              |          |
| #40     | 89.9               |              |          |
| #60     | 85.4               |              |          |
| #100    | 77.7               |              |          |
| #200    | 69.9               |              |          |
|         |                    |              |          |
|         |                    |              |          |
|         |                    |              |          |
|         |                    |              |          |
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|         |                    |              |          |
| *       | aifiantian provide |              |          |

|  | <u>Material</u>  | Description             | 1  |           |  |  |  |
|--|--|-------------------------|--|-----------|--|--|--|
| Brown sandy lean clay  |  |                         |  |           |  |  |  |
|  |  |                         |  |           |  |  |  |
| Λ++  | rhora Limi   | te (ASTM D              | 1210\  |           |  |  |  |
| PL=  | LL=  | ts (ASTM D              | PI=  |           |  |  |  |
| USCS (D 2487)=   |  | sification<br>AASHTO (M | 145)=  | A-4(0)    |  |  |  |
| D <sub>90</sub> = 0.4304<br>D <sub>50</sub> =<br>D <sub>10</sub> = | Coef<br>D <sub>85</sub> = 0.2<br>D <sub>30</sub> =<br>C <sub>u</sub> = |                         | D <sub>60</sub> =<br>D <sub>15</sub> =<br>C <sub>c</sub> = |           |  |  |  |
|  | Re   | marks                   |  |           |  |  |  |
| As received MC =   | 29.0%  |                         |  |           |  |  |  |
|  |  |                         |  |           |  |  |  |
| Date Received:   | 10/5/2017  | Date Tes                | sted:  | 10/9/2017 |  |  |  |
| Tested By:   | RZ   |                         |  |           |  |  |  |
| Checked By:  | Checked By: MP   |                         |  |           |  |  |  |
| Title: Laboratory Manager  |  |                         |  |           |  |  |  |
|  |  |                         |  |           |  |  |  |

\* (no specification provided)

Source of Sample: B-88 Sample Number: S-6 **Depth:** 14-16'

CDM Smith

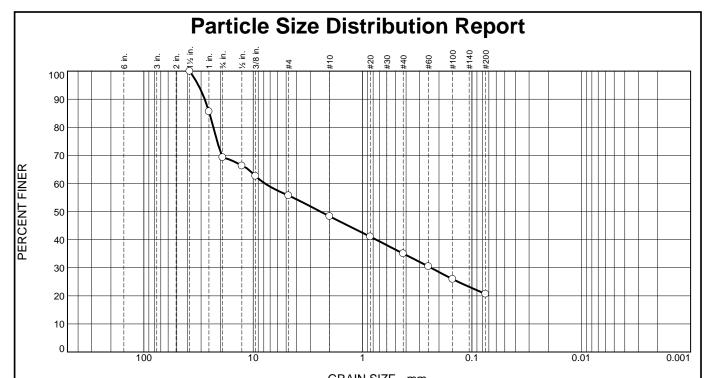
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/6/2017



| GRAIN SIZE - mm. |        |       |        |        |      |         |      |  |
|------------------|--------|-------|--------|--------|------|---------|------|--|
| 0/ - 211         | % Gı   | ravel | % Sand |        |      | % Fines |      |  |
| % <b>+3</b> "    | Coarse | Fine  | Coarse | Medium | Fine | Silt    | Clay |  |
| 0.0              | 30.7   | 13.6  | 7.4    | 13.3   | 14.3 | 20.7    |      |  |

| Test Results (ASTM D 422 & ASTM D 1140) |         |           |          |  |  |  |
|---|---------|-----------|----------|--|--|--|
| Opening                                 | Percent | Spec.*    | Pass?    |  |  |  |
| Size                                    | Finer   | (Percent) | (X=Fail) |  |  |  |
| 1.5"                                    | 100.0   |           |          |  |  |  |
| 1"                                      | 85.6    |           |          |  |  |  |
| 3/4"                                    | 69.3    |           |          |  |  |  |
| 1/2"                                    | 66.3    |           |          |  |  |  |
| 3/8"                                    | 62.6    |           |          |  |  |  |
| #4                                      | 55.7    |           |          |  |  |  |
| #10                                     | 48.3    |           |          |  |  |  |
| #20                                     | 41.1    |           |          |  |  |  |
| #40                                     | 35.0    |           |          |  |  |  |
| #60                                     | 30.5    |           |          |  |  |  |
| #100                                    | 25.9    |           |          |  |  |  |
| #200                                    | 20.7    |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
| * (                                     | -:¢:4:  |           |          |  |  |  |

#### Light brown silty gravel with sand **Atterberg Limits (ASTM D 4318)** PL= Classification USCS (D 2487)= GM **AASHTO (M 145)=** A-1-b Coefficients D<sub>90</sub>= 27.7408 D<sub>50</sub>= 2.4277 D<sub>10</sub>= D<sub>85</sub>= 25.1189 D<sub>30</sub>= 0.2374 C<sub>u</sub>= **D<sub>60</sub>=** 7.8166 D<sub>15</sub>= C<sub>c</sub>= Remarks As received MC = 8.9%**Date Received:** 10/5/2017 **Date Tested:** 10/9/2017 Tested By: RZ Checked By: MP Title: Laboratory Manager

**Material Description** 

\* (no specification provided)

Source of Sample: B-89 Sample Number: S-3 **Depth:** 9-10.5

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/7/2017

#### **CDM Smith**

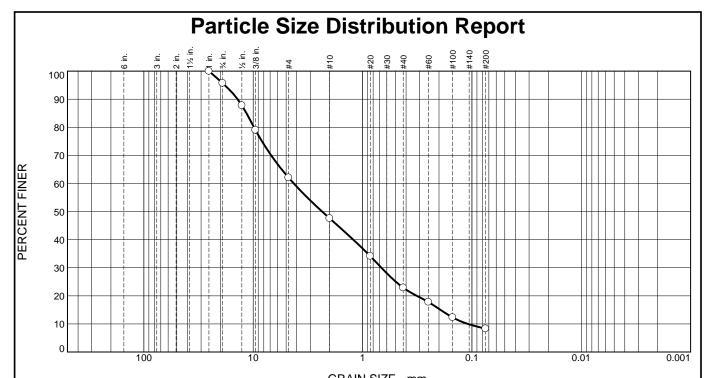
#### **Geotechnical Engineering Laboratory**

# Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

Client: Massachusetts Water Resources Authority Weston Aqueduct Supply Main 3 Project Name: Tested By: MP MWRA line, MA Test Date: 10/9/2017 Project Location: Project Number: 101038-102170 Boring Number: B-90 Procedure: S-1 Temperature: 440° C Sample Number: Sample Depth (ft): 0-2 Sample Date: 9/6/2017

| AS RECEIVED MOISTURE CONTENT |        |
|------------------------------|--------|
| Tin Mass (g)                 | 126.60 |
| Wet Mass of Sample & Tin (g) | 176.13 |
| Dry Mass of Sample & Tin (g) | 171.58 |
| Mass of Water (g)            | 4.55   |
| Mass of Dry Soil (g)         | 44.98  |
| Moisture Content (%)         | 10.1   |

| ASH CONTENT                          |        |  |  |  |
|--------------------------------------|--------|--|--|--|
| Porcelain Dish Mass (g)              | 126.60 |  |  |  |
| Porcelain Dish + Oven Dried Soil (g) | 171.58 |  |  |  |
| Mass of Oven Dried Soil (g)          | 44.98  |  |  |  |
| Mass of Dish & Burned Soil (g)       | 169.60 |  |  |  |
| Mass of Burned Soil (g)              | 43.00  |  |  |  |
| Mass of Organic Material (g)         | 1.98   |  |  |  |
| Ash Content (%)                      | 95.6   |  |  |  |
|                                      |        |  |  |  |
| Organic Content (%)                  | 4.4    |  |  |  |



|          | GRAIN SIZE - mm. |       |        |        |      |         |      |  |
|----------|------------------|-------|--------|--------|------|---------|------|--|
| 0/ - 211 | % G              | ravel | % Sand |        |      | % Fines |      |  |
| % +3"    | Coarse           | Fine  | Coarse | Medium | Fine | Silt    | Clay |  |
| 0.0      | 4.3              | 33.6  | 14.5   | 24.7   | 14.6 | 8.3     |      |  |

| Test Results (ASTM D 422 & ASTM D 1140) |         |           |          |  |  |  |
|---|---------|-----------|----------|--|--|--|
| Opening                                 | Percent | Spec.*    | Pass?    |  |  |  |
| Size                                    | Finer   | (Percent) | (X=Fail) |  |  |  |
| 1"                                      | 100.0   |           |          |  |  |  |
| 3/4"                                    | 95.7    |           |          |  |  |  |
| 1/2"                                    | 87.8    |           |          |  |  |  |
| 3/8"                                    | 79.0    |           |          |  |  |  |
| #4                                      | 62.1    |           |          |  |  |  |
| #10                                     | 47.6    |           |          |  |  |  |
| #20                                     | 34.1    |           |          |  |  |  |
| #40                                     | 22.9    |           |          |  |  |  |
| #60                                     | 17.8    |           |          |  |  |  |
| #100                                    | 12.3    |           |          |  |  |  |
| #200                                    | 8.3     |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |

Brown gray poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)
LL= PI=

PL=

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-a

Coefficients

 D90=
 13.8932
 D85=
 11.5293
 D60=
 4.2564

 D50=
 2.3420
 D30=
 0.6720
 D15=
 0.1936

 D10=
 0.1088
 Cu=
 39.12
 Cc=
 0.97

Remarks

As received MC = 7.5%

**Date Received:** 10/5/2017 **Date Tested:** 10/9/2017

Tested By: RZ

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

**CDM Smith** 

Source of Sample: B-90 Sample Number: S-3

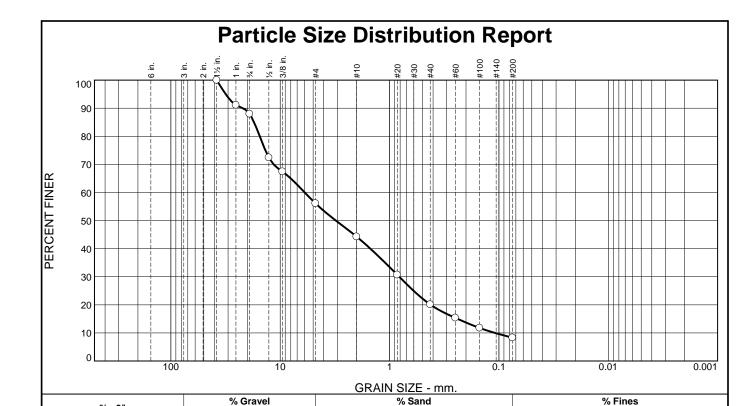
**Depth:** 4-4.8'

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/1/2017



| 1.5"<br>1" | Finer | (Percent) | /V F-:IV |
|------------|-------|-----------|----------|
| 1"         | 100.0 | 1         | (X=Fail) |
| -          | 100.0 |           |          |
|            | 91.1  |           |          |
| 3/4"       | 88.0  |           |          |
| 1/2"       | 72.4  |           |          |
| 3/8"       | 67.4  |           |          |
| #4         | 56.1  |           |          |
| #10        | 44.3  |           |          |
| #20        | 30.7  |           |          |
| #40        | 20.1  |           |          |
| #60        | 15.4  |           |          |
| #100       | 11.8  |           |          |
| #200       | 8.3   |           |          |
|            |       |           |          |
|            |       |           |          |
|            |       |           |          |
|            |       |           |          |
|            |       |           |          |
|            |       |           |          |
|            |       |           |          |
|            |       |           |          |

Coarse

12.0

Fine

31.9

Coarse

11.8

#### **Material Description**

Brown well-graded sand with silt and gravel

Fine

11.8

Atterberg Limits (ASTM D 4318) LL= PI=

PL=

Medium

24.2

Silt

8.3

Clay

 $\begin{array}{cc} & \underline{\text{Classification}} \\ \text{USCS (D 2487)=} & \mathrm{SW-SM} & \underline{\text{AASHTO (M 145)=}} & \mathrm{A-1-a} \end{array}$ 

Coefficients

 D90=
 21.9441
 D85=
 17.3383
 D60=
 5.9677

 D50=
 3.0977
 D30=
 0.8160
 D15=
 0.2385

 D10=
 0.1086
 Cu=
 54.94
 Cc=
 1.03

Remarks

As received MC = 8.6%

**Date Received:** 10/5/2017 **Date Tested:** 10/9/2017

Tested By: RZ

Checked By: MP

Title: Laboratory Manager

Source of Sample: B-91 Sample Number: S-1

% +3"

0.0

**Depth:** 5-7'

**Date Sampled:** 9/1/2017

Client: Massachusetts Water Resources Authority (MWRA)

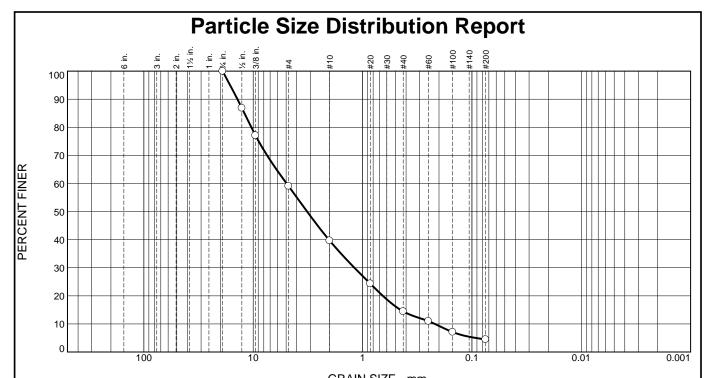
roject: Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

S | Project No: 101038.102170 | Figure

Boston, Massachusetts

**CDM Smith** 



|          | GRAIN SIZE - mm. |      |            |        |         |      |      |
|----------|------------------|------|------------|--------|---------|------|------|
| 0/ - 211 | % Gr             |      | vel % Sand |        | % Fines |      |      |
| % +3"    | Coarse           | Fine | Coarse     | Medium | Fine    | Silt | Clay |
| 0.0      | 0.0              | 40.9 | 19.4       | 25.3   | 9.9     | 4.5  |      |

| Test Re | sults (ASTM D | 422 & ASTM D | 1140)    |
|---------|---------------|--------------|----------|
| Opening | Percent       | Spec.*       | Pass?    |
| Size    | Finer         | (Percent)    | (X=Fail) |
| 3/4"    | 100.0         |              |          |
| 1/2"    | 86.9          |              |          |
| 3/8"    | 77.1          |              |          |
| #4      | 59.1          |              |          |
| #10     | 39.7          |              |          |
| #20     | 24.3          |              |          |
| #40     | 14.4          |              |          |
| #60     | 11.0          |              |          |
| #100    | 7.1           |              |          |
| #200    | 4.5           |              |          |
|         |               |              |          |
|         |               |              |          |
|         |               |              |          |
|         |               |              |          |
|         |               |              |          |
|         |               |              |          |
|         |               |              |          |
|         |               |              |          |
|         |               |              |          |
|         |               |              |          |
| *       |               |              |          |

Brown gray well-graded sand with gravel

**Atterberg Limits (ASTM D 4318)** 

PL=

Classification

SW USCS (D 2487)= **AASHTO (M 145)=** A-1-a

Coefficients

**D<sub>90</sub>=** 13.9461 **D<sub>50</sub>=** 3.2134 **D<sub>10</sub>=** 0.2186 D<sub>60</sub>= 4.9471 D<sub>15</sub>= 0.4499 C<sub>c</sub>= 1.30 D<sub>85</sub>= 12.0306 D<sub>30</sub>= 1.1875 C<sub>u</sub>= 22.63

Remarks

As received MC = 8.2%

**Date Received:** 10/5/2017

**Date Tested:** 10/9/2017

Tested By: RZ

Checked By: MP

Title: Laboratory Manager

(no specification provided)

Source of Sample: B-92 Sample Number: S-1

**Depth:** 5-7'

**Date Sampled:** 9/5/2017

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

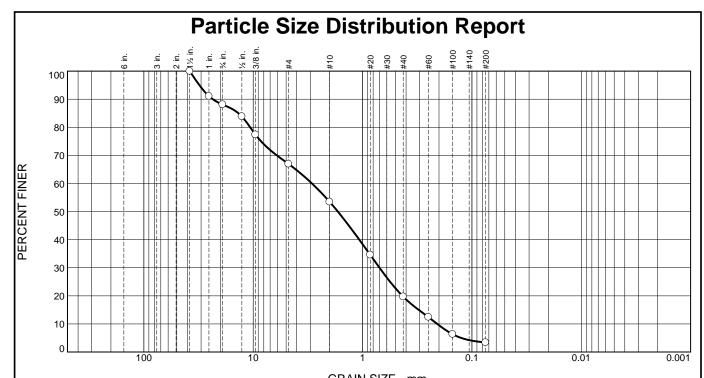
Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Boston, Massachusetts** 

**Project No:** 101038.102170

**Figure** 



| GRAIN SIZE - mm. |          |        |       |        |        |      |         |      |
|------------------|----------|--------|-------|--------|--------|------|---------|------|
|                  | 0/ - 211 | % Gı   | ravel |        | % Sand |      | % Fines |      |
|                  | % +3"    | Coarse | Fine  | Coarse | Medium | Fine | Silt    | Clay |
|                  | 0.0      | 11.9   | 21.1  | 13.5   | 33.8   | 16.3 | 3.4     |      |

| Test R  | esults (ASTM D | 422 & ASTM D | 1140)    |  |  |
|---------|----------------|--------------|----------|--|--|
| Opening | Percent        | Spec.*       | Pass?    |  |  |
| Size    | Finer          | (Percent)    | (X=Fail) |  |  |
| 1.5"    | 100.0          |              |          |  |  |
| 1"      | 91.1           |              |          |  |  |
| 3/4"    | 88.1           |              |          |  |  |
| 1/2"    | 83.8           |              |          |  |  |
| 3/8"    | 77.4           |              |          |  |  |
| #4      | 67.0           |              |          |  |  |
| #10     | 53.5           |              |          |  |  |
| #20     | 34.6           |              |          |  |  |
| #40     | 19.7           |              |          |  |  |
| #60     | 12.4           |              |          |  |  |
| #100    | 6.3            |              |          |  |  |
| #200    | 3.4            |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
|         |                |              |          |  |  |
| *       |                |              |          |  |  |

## Material Description Brown poorly graded sand with gravel

Brown poorty graded sand with graves

PL= Atterberg Limits (ASTM D 4318)
LL= PI=

Coefficients

 D<sub>90</sub>=
 23.4655
 D<sub>85</sub>=
 13.6386
 D<sub>60</sub>=
 2.9040

 D<sub>50</sub>=
 1.6834
 D<sub>30</sub>=
 0.6999
 D<sub>15</sub>=
 0.3065

 D<sub>10</sub>=
 0.2075
 C<sub>u</sub>=
 14.00
 C<sub>c</sub>=
 0.81

Remarks

As received MC = 3.9%

**Date Received:** 10/5/2017 **Date Tested:** 10/9/2017

Tested By: RZ
Checked By: MP

Title: Laboratory Manager

(no specification provided)

**CDM Smith** 

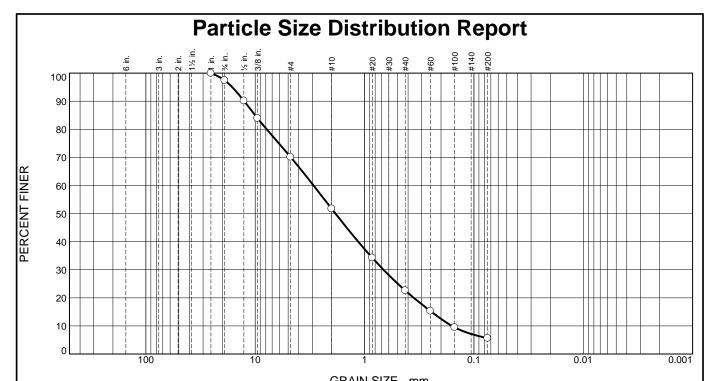
Source of Sample: B-93 Sample Number: S-2 **Depth:** 2-4'

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 9/5/2017



| GRAIN SIZE - IIIIII. |        |       |        |        |      |         |      |
|----------------------|--------|-------|--------|--------|------|---------|------|
| 0/ - 211             | % G    | ravel |        | % Sand |      | % Fines |      |
| % +3"                | Coarse | Fine  | Coarse | Medium | Fine | Silt    | Clay |
| 0.0                  | 2.5    | 27.4  | 18.4   | 29.1   | 17.0 | 5.6     |      |

| Test Re | sults (ASTM D | 422 & ASTM D | 1140)    |
|---------|---------------|--------------|----------|
| Opening | Percent       | Spec.*       | Pass?    |
| Size    | Finer         | (Percent)    | (X=Fail) |
| 1"      | 100.0         |              |          |
| 3/4"    | 97.5          |              |          |
| 1/2"    | 90.2          |              |          |
| 3/8"    | 84.0          |              |          |
| #4      | 70.1          |              |          |
| #10     | 51.7          |              |          |
| #20     | 34.3          |              |          |
| #40     | 22.6          |              |          |
| #60     | 15.3          |              |          |
| #100    | 9.5           |              |          |
| #200    | 5.6           |              |          |
|         |               |              |          |
|         |               |              |          |
|         |               |              |          |
|         |               |              |          |
|         |               |              |          |
|         |               |              |          |
|         |               |              |          |
|         |               |              |          |
|         |               |              |          |
| *       |               |              |          |

Brown gray poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)
LL= PI=

PL=

Coefficients

 D90=
 12.6098
 D85=
 10.0041
 D60=
 2.9292

 D50=
 1.8454
 D30=
 0.6710
 D15=
 0.2439

 D10=
 0.1585
 Cu=
 18.48
 Cc=
 0.97

Remarks

As received MC = 12.6%

**Date Received:** 10/5/2017 **Date Tested:** 10/9/2017

Tested By: RZ Checked By: MP

Title: Laboratory Manager

(no specification provided)

**CDM Smith** 

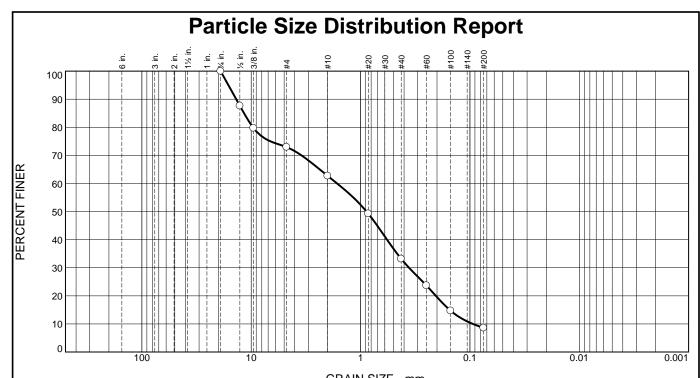
Source of Sample: B-94 Sample Number: S-3 **Depth:** 4-5.3'

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 8/30/2017



| GRAIN SIZE - mm. |          |        |       |        |        |      |         |      |
|------------------|----------|--------|-------|--------|--------|------|---------|------|
|                  | 0/ - 211 | % Gı   | ravel |        | % Sand |      | % Fines |      |
| ı                | % +3"    | Coarse | Fine  | Coarse | Medium | Fine | Silt    | Clay |
|                  | 0.0      | 0.0    | 27.0  | 10.3   | 29.5   | 24.6 | 8.6     |      |

| Test Re | esults (ASTM D | 422 & ASTM D | 1140)    |  |
|---------|----------------|--------------|----------|--|
| Opening | Percent        | Spec.*       | Pass?    |  |
| Size    | Finer          | (Percent)    | (X=Fail) |  |
| 3/4"    | 100.0          |              |          |  |
| 1/2"    | 87.6           |              |          |  |
| 3/8"    | 79.7           |              |          |  |
| #4      | 73.0           |              |          |  |
| #10     | 62.7           |              |          |  |
| #20     | 49.3           |              |          |  |
| #40     | 33.2           |              |          |  |
| #60     | 23.7           |              |          |  |
| #100    | 14.7           |              |          |  |
| #200    | 8.6            |              |          |  |
|         |                |              |          |  |
|         |                |              |          |  |
|         |                |              |          |  |
|         |                |              |          |  |
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|         |                |              |          |  |
|         |                |              |          |  |
|         |                |              |          |  |
|         |                |              |          |  |

Brown poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)
LL= PI=

PL=

**Classification** 

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

 D90=
 13.7196
 D85=
 11.6339
 D60=
 1.6396

 D50=
 0.8814
 D30=
 0.3605
 D15=
 0.1532

 D10=
 0.0939
 Cu=
 17.47
 Cc=
 0.84

Remarks

As received MC = 4.8%

Date Received: 10/5/2017

**Date Tested:** 10/9/2017

Tested By: RZ

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

**CDM Smith** 

Source of Sample: B-95 Sample Number: S-2 **Depth:** 2-4'

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

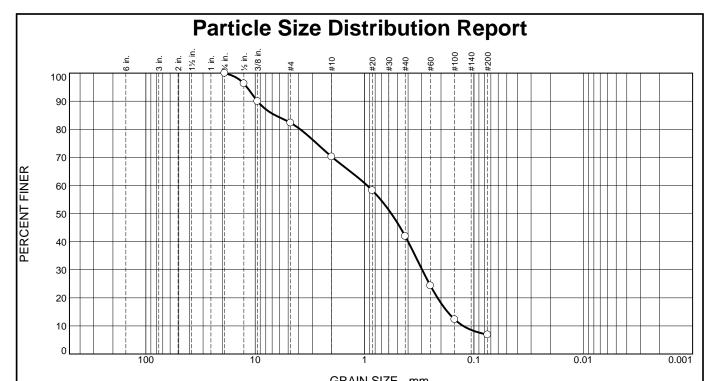
Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

Boston, Massachusetts Project No.

Project No: 101038.102170

Figure

**Date Sampled:** 8/28/2017



| GRAIN SIZE - IIIII. |        |       |        |        |      |         |      |
|---------------------|--------|-------|--------|--------|------|---------|------|
| 0/ - 2              | % G    | ravel |        | % Sand |      | % Fines |      |
| % +3"               | Coarse | Fine  | Coarse | Medium | Fine | Silt    | Clay |
| 0.0                 | 0.0    | 17.7  | 12.1   | 28.3   | 35.0 | 6.9     |      |

| Test R    | esults (ASTM D       | 422 & ASTM D | 1140)    |  |
|-----------|----------------------|--------------|----------|--|
| Opening   | Percent              | Spec.*       | Pass?    |  |
| Size      | Finer                | (Percent)    | (X=Fail) |  |
| 3/4"      | 100.0                |              |          |  |
| 1/2"      | 96.3                 |              |          |  |
| 3/8"      | 90.0                 |              |          |  |
| #4        | 82.3                 |              |          |  |
| #10       | 70.2                 |              |          |  |
| #20       | 58.2                 |              |          |  |
| #40       | 41.9                 |              |          |  |
| #60       | 24.3                 |              |          |  |
| #100      | 12.3                 |              |          |  |
| #200      | 6.9                  |              |          |  |
|           |                      |              |          |  |
|           |                      |              |          |  |
|           |                      |              |          |  |
|           |                      |              |          |  |
|           |                      |              |          |  |
|           |                      |              |          |  |
|           |                      |              |          |  |
|           |                      |              |          |  |
|           |                      |              |          |  |
|           |                      |              |          |  |
|           |                      |              |          |  |
| * (no spe | ecification provided | d)           |          |  |

Light brown poorly graded sand with silt and gravel

## Atterberg Limits (ASTM D 4318) LL= PI=

PL=

**Classification** 

USCS (D 2487)= SP-SM **AASHTO** (M 145)= A-1-b

Coefficients

**D<sub>60</sub>=** 0.9469 **D<sub>15</sub>=** 0.1741 **C<sub>c</sub>=** 0.75 **D<sub>90</sub>=** 9.5364 **D<sub>50</sub>=** 0.5693 **D<sub>10</sub>=** 0.1254 D<sub>85</sub>= 6.5604 D<sub>30</sub>= 0.2974 C<sub>u</sub>= 7.55

Remarks

As received MC = 4.2%

**Date Received:** 10/5/2017 **Date Tested:** 10/9/2017

**Date Sampled:** 8/29/2017

Tested By: RZ Checked By: MP

Title: Laboratory Manager

**Depth:** 4-6'

Source of Sample: B-96 Sample Number: S-3

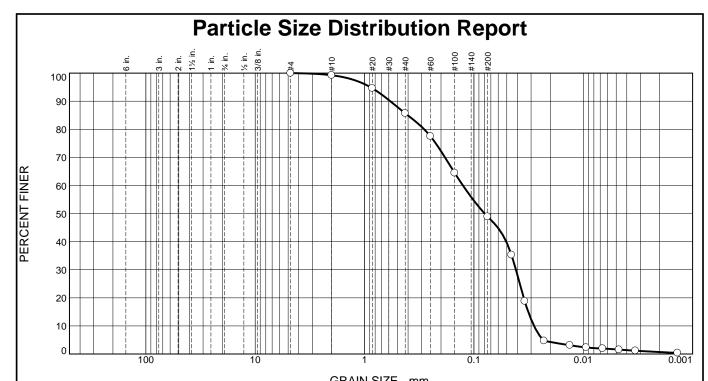
**CDM Smith** Client: Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA **Figure** 

**Boston, Massachusetts** 

**Project No:** 101038.102170



| GRAIN SIZE - IIIII. |               |        |          |        |        |      |         |      |
|---------------------|---------------|--------|----------|--------|--------|------|---------|------|
|                     | 0/ - 211      | % G    | % Gravel |        | % Sand |      | % Fines |      |
|                     | % <b>+3</b> " | Coarse | Fine     | Coarse | Medium | Fine | Silt    | Clay |
|                     | 0.0           | 0.0    | 0.0      | 0.8    | 13.5   | 36.8 | 47.3    | 1.6  |

Red-brown silty sand

| Test R     | esults (ASTM D | 422 & ASTM D | 1140)    |
|------------|----------------|--------------|----------|
| Opening    | Percent        | Spec.*       | Pass?    |
| Size       | Finer          | (Percent)    | (X=Fail) |
| #4         | 100.0          |              |          |
| #10        | 99.2           |              |          |
| #20        | 94.6           |              |          |
| #40        | 85.7           |              |          |
| #60        | 77.5           |              |          |
| #100       | 64.5           |              |          |
| #200       | 48.9           |              |          |
| 0.0453 mm. | 35.3           |              |          |
| 0.0343 mm. | 18.8           |              |          |
| 0.0229 mm. | 4.7            |              |          |
| 0.0133 mm. | 3.1            |              |          |
| 0.0094 mm. | 2.4            |              |          |
| 0.0067 mm. | 2.0            |              |          |
| 0.0047 mm. | 1.6            |              |          |
| 0.0033 mm. | 1.2            |              |          |
| 0.0014 mm. | 0.4            |              |          |
|            |                |              |          |
|            |                |              |          |
|            |                |              |          |
|            |                |              |          |
|            |                |              |          |

#### 

**Date Tested:** 10/10/2017

**Date Sampled:** 8/30/2017

**Material Description** 

\* (no specification provided)

Source of Sample: B-97 Depth: 0.5-2' Sample Number: S-1 (Bottom 6')

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

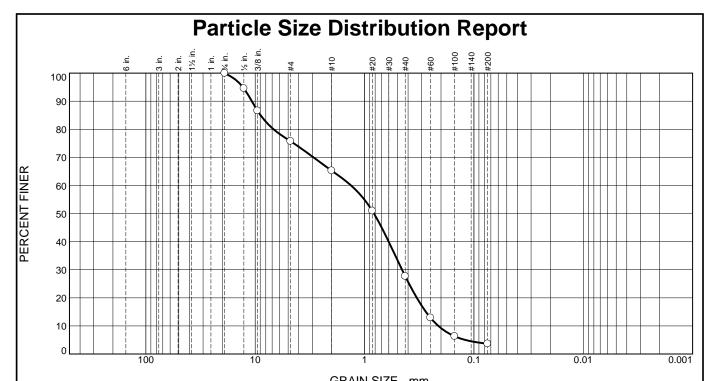
Title: Laboratory Manager

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

**Date Received:** 10/5/2017

Tested By: RZ Checked By: MP

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA



| GRAIN SIZE - IIIII. |        |       |        |        |      |         |      |
|---------------------|--------|-------|--------|--------|------|---------|------|
| 0/ - 2              | % G    | ravel |        | % Sand |      | % Fines |      |
| % +3"               | Coarse | Fine  | Coarse | Medium | Fine | Silt    | Clay |
| 0.0                 | 0.0    | 24.3  | 10.4   | 37.6   | 24.0 | 3.7     |      |

| Test Results (ASTM D 422 & ASTM D 1140) |         |           |          |  |  |  |
|---|---------|-----------|----------|--|--|--|
| Opening                                 | Percent | Spec.*    | Pass?    |  |  |  |
| Size                                    | Finer   | (Percent) | (X=Fail) |  |  |  |
| 3/4"                                    | 100.0   |           |          |  |  |  |
| 1/2"                                    | 94.6    |           |          |  |  |  |
| 3/8"                                    | 86.6    |           |          |  |  |  |
| #4                                      | 75.7    |           |          |  |  |  |
| #10                                     | 65.3    |           |          |  |  |  |
| #20                                     | 51.0    |           |          |  |  |  |
| #40                                     | 27.7    |           |          |  |  |  |
| #60                                     | 12.9    |           |          |  |  |  |
| #100                                    | 6.3     |           |          |  |  |  |
| #200                                    | 3.7     |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
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|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
|   |         |           |          |  |  |  |
| *                                       |         |           |          |  |  |  |

Light brown poorly graded sand with gravel

#### **Atterberg Limits (ASTM D 4318)**

PL=

Classification

USCS (D 2487)= SP **AASHTO** (M 145)= A-1-b

Coefficients

**D<sub>90</sub>=** 10.7328 **D<sub>50</sub>=** 0.8203 **D<sub>10</sub>=** 0.2114  $\begin{array}{l} \textbf{D_{60}=} \ 1.3283 \\ \textbf{D_{15}=} \ 0.2750 \\ \textbf{C_{c}=} \ 0.73 \end{array}$ D<sub>85</sub>= 8.9223 D<sub>30</sub>= 0.4541 C<sub>u</sub>= 6.28

Remarks

As received MC = 3.8%

**Date Tested:** 10/9/2017

**Date Received:** 10/5/2017 Tested By: RZ

Checked By: MP

Title: Laboratory Manager

(no specification provided)

Source of Sample: B-97 Sample Number: S-5

**Depth: 8-10'** 

**Date Sampled:** 8/30/2017

**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

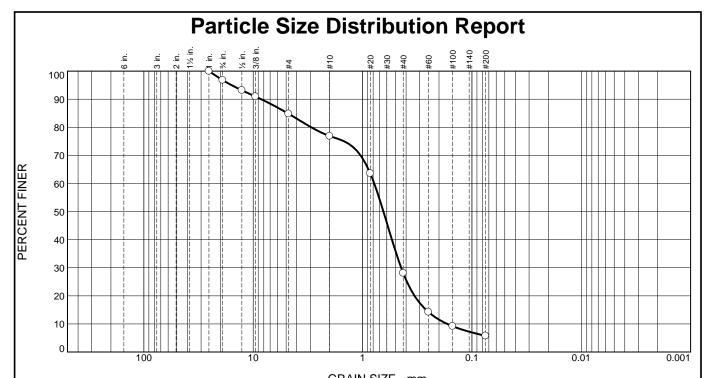
Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Boston, Massachusetts** 

**Project No:** 101038.102170

**Figure** 



| GRAIN SIZE - mm. |          |      |        |               |         |         |      |
|------------------|----------|------|--------|---------------|---------|---------|------|
| 0/ 0             | % Gravel |      | % Sand |               | % Fines | % Fines |      |
| % +3"            | Coarse   | Fine | Coarse | rse Medium Fi | Fine    | Silt    | Clay |
| 0.0              | 3.2      | 12.0 | 7.9    | 48.8          | 22.3    | 5.8     |      |

| Test Results (ASTM D 422 & ASTM D 1140) |         |           |          |  |  |  |  |
|---|---------|-----------|----------|--|--|--|--|
| Opening                                 | Percent | Spec.*    | Pass?    |  |  |  |  |
| Size                                    | Finer   | (Percent) | (X=Fail) |  |  |  |  |
| 1"                                      | 100.0   |           |          |  |  |  |  |
| 3/4"                                    | 96.8    |           |          |  |  |  |  |
| 1/2"                                    | 93.2    |           |          |  |  |  |  |
| 3/8"                                    | 90.9    |           |          |  |  |  |  |
| #4                                      | 84.8    |           |          |  |  |  |  |
| #10                                     | 76.9    |           |          |  |  |  |  |
| #20                                     | 63.6    |           |          |  |  |  |  |
| #40                                     | 28.1    |           |          |  |  |  |  |
| #60                                     | 14.3    |           |          |  |  |  |  |
| #100                                    | 9.2     |           |          |  |  |  |  |
| #200                                    | 5.8     |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |

Brown poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318)
LL= PI=

PL=

 Classification

 USCS (D 2487)=
 SP-SM
 AASHTO (M 145)=
 A-1-b

Coefficients

 D90=
 8.4630
 D85=
 4.8376
 D60=
 0.7820

 D50=
 0.6444
 D30=
 0.4436
 D15=
 0.2624

 D10=
 0.1682
 Cu=
 4.65
 Cc=
 1.50

Remarks

As received MC = 13.1%

**Date Received:** 10/5/2017 **Date Tested:** 10/9/2017

Tested By: RZ

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

**CDM Smith** 

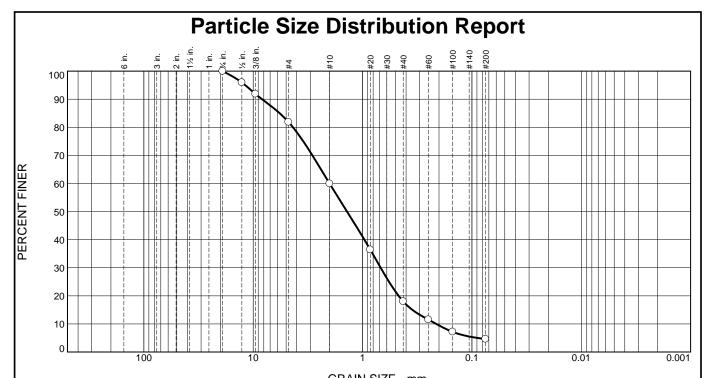
Source of Sample: B-98 Sample Number: S-1 **Depth:** 5-7'

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 8/31/2017



| GRAIN SIZE - mm. |          |      |               |      |         |         |  |
|------------------|----------|------|---------------|------|---------|---------|--|
| 0/ - 211         | % Gravel |      | % Sand        |      | % Fines | % Fines |  |
| % +3"            | Coarse   | Fine | Coarse Medium | Fine | Silt    | Clay    |  |
| 0.0              | 0.0      | 18.1 | 22.0          | 41.9 | 13.4    | 4.6     |  |

| Test Results (ASTM D 422 & ASTM D 1140) |         |           |          |  |  |  |  |
|---|---------|-----------|----------|--|--|--|--|
| Opening                                 | Percent | Spec.*    | Pass?    |  |  |  |  |
| Size                                    | Finer   | (Percent) | (X=Fail) |  |  |  |  |
| 3/4"                                    | 100.0   |           |          |  |  |  |  |
| 1/2"                                    | 95.9    |           |          |  |  |  |  |
| 3/8"                                    | 91.9    |           |          |  |  |  |  |
| #4                                      | 81.9    |           |          |  |  |  |  |
| #10                                     | 59.9    |           |          |  |  |  |  |
| #20                                     | 36.4    |           |          |  |  |  |  |
| #40                                     | 18.0    |           |          |  |  |  |  |
| #60                                     | 11.5    |           |          |  |  |  |  |
| #100                                    | 7.2     |           |          |  |  |  |  |
| #200                                    | 4.6     |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
|   |         |           |          |  |  |  |  |
| *                                       |         |           |          |  |  |  |  |

Brown well-graded sand with gravel

PL= Atterberg Limits (ASTM D 4318)
LL= PI=

- --

Coefficients

 D90=
 8.2995
 D85=
 5.7264
 D60=
 2.0050

 D50=
 1.3867
 D30=
 0.6832
 D15=
 0.3500

 D10=
 0.2121
 Cu=
 9.46
 Cc=
 1.10

Remarks

As received MC = 9.1%

**Date Received:** 10/5/2017 **Date Tested:** 10/9/2017

Tested By: RZ

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-99 Depth: 7-9' Sample Number: S-2

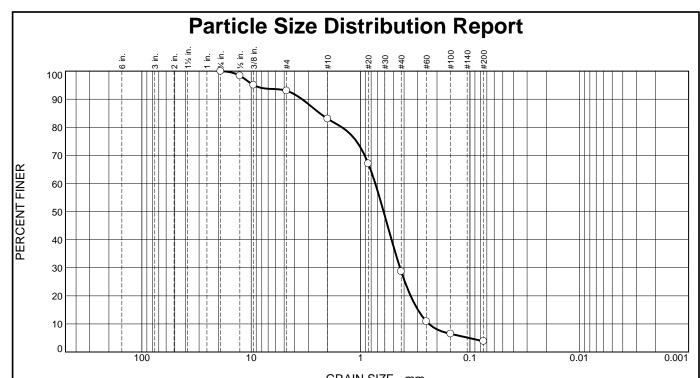
**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Date Sampled:** 8/31/2017



|       | GRAIN SIZE - mm. |       |        |        |      |         |      |
|-------|------------------|-------|--------|--------|------|---------|------|
| % +3" | % G              | ravel | % Sand |        |      | % Fines |      |
|       | Coarse           | Fine  | Coarse | Medium | Fine | Silt    | Clay |
| 0.0   | 0.0              | 7.0   | 10.0   | 54.3   | 24.9 | 3.8     |      |

| Test Re | esults (ASTM D | 422 & ASTM D | 1140)    |
|---------|----------------|--------------|----------|
| Opening | Percent        | Spec.*       | Pass?    |
| Size    | Finer          | (Percent)    | (X=Fail) |
| 3/4"    | 100.0          |              |          |
| 1/2"    | 98.4           |              |          |
| 3/8"    | 95.1           |              |          |
| #4      | 93.0           |              |          |
| #10     | 83.0           |              |          |
| #20     | 67.1           |              |          |
| #40     | 28.7           |              |          |
| #60     | 10.9           |              |          |
| #100    | 6.5            |              |          |
| #200    | 3.8            |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |

#### **Material Description** Light brown poorly graded sand

**Atterberg Limits (ASTM D 4318)** 

PL=

Classification

USCS (D 2487)= SP

**AASHTO (M 145)=** A-1-b

Coefficients

**D<sub>60</sub>=** 0.7334 **D<sub>15</sub>=** 0.2989 **C<sub>c</sub>=** 1.09 **D<sub>90</sub>=** 3.4285 **D<sub>50</sub>=** 0.6152 **D<sub>10</sub>=** 0.2367 D<sub>85</sub>= 2.3575 D<sub>30</sub>= 0.4359 C<sub>u</sub>= 3.10

Remarks

As received MC = 4.2%

**Date Tested:** 10/9/2017

**Date Received:** 10/5/2017 Tested By: RZ

Checked By: MP

Title: Laboratory Manager

(no specification provided)

Source of Sample: B-100 Sample Number: S-3

**Depth:** 4-6'

**Date Sampled:** 8/29/2017

**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Boston, Massachusetts** 

**Project No:** 101038.102170

**Figure** 

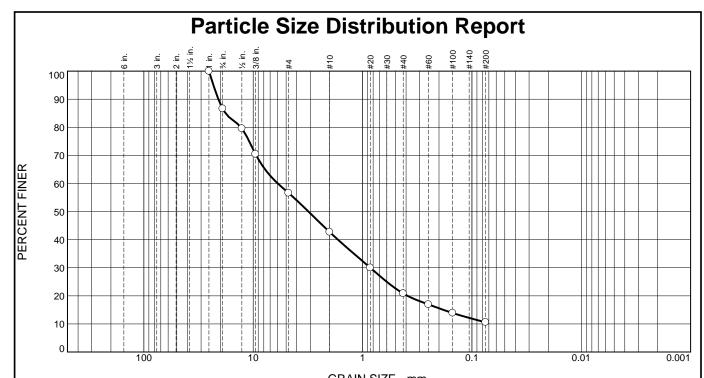
## **Geotechnical Engineering Laboratory**

# Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

| Client:            | Massachusetts Water Resources Authority |              |           |
|--------------------|---|--------------|-----------|
| Project Name:      | Weston Aqueduct Supply Main 3           | Tested By:   | MP        |
| Project Location:  | MWRA line, MA                           | Test Date:   | 10/9/2017 |
| Project Number:    | 101038-102170                           | ·            |           |
| Boring Number:     | B-100                                   | Procedure:   | С         |
| Sample Number:     | S-1                                     | Temperature: | 440° C    |
| Sample Depth (ft): | 0.5-2'                                  | -            |           |
| Sample Date:       | 8/29/2017                               |              |           |

| AS RECEIVED MOISTURE CONTENT |        |
|------------------------------|--------|
| Tin Mass (g)                 | 96.87  |
| Wet Mass of Sample & Tin (g) | 197.98 |
| Dry Mass of Sample & Tin (g) | 181.72 |
| Mass of Water (g)            | 16.26  |
| Mass of Dry Soil (g)         | 84.85  |
| Moisture Content (%)         | 19.2   |

| ASH CONTENT                          |        |  |  |  |  |
|--------------------------------------|--------|--|--|--|--|
| Porcelain Dish Mass (g)              | 96.87  |  |  |  |  |
| Porcelain Dish + Oven Dried Soil (g) | 181.72 |  |  |  |  |
| Mass of Oven Dried Soil (g)          | 84.85  |  |  |  |  |
| Mass of Dish & Burned Soil (g)       | 179.30 |  |  |  |  |
| Mass of Burned Soil (g)              | 82.43  |  |  |  |  |
| Mass of Organic Material (g)         | 2.42   |  |  |  |  |
| Ash Content (%)                      | 97.1   |  |  |  |  |
|                                      |        |  |  |  |  |
| Organic Content (%)                  | 2.9    |  |  |  |  |



|       | GRAIN SIZE - mm. |       |           |        |      |         |      |  |
|-------|------------------|-------|-----------|--------|------|---------|------|--|
| % +3" | % Gı             | ravel | el % Sand |        |      | % Fines |      |  |
|       | Coarse           | Fine  | Coarse    | Medium | Fine | Silt    | Clay |  |
| 0.0   | 13.4             | 30.0  | 13.9      | 21.9   | 10.2 | 10.6    |      |  |

| Test Results (ASTM D6913 & ASTM D1140) |         |           |          |  |  |  |  |  |
|--|---------|-----------|----------|--|--|--|--|--|
| Opening                                | Percent | Spec.*    | Pass?    |  |  |  |  |  |
| Size                                   | Finer   | (Percent) | (X=Fail) |  |  |  |  |  |
| 1"                                     | 100.0   |           |          |  |  |  |  |  |
| .75"                                   | 86.6    |           |          |  |  |  |  |  |
| .5"                                    | 79.6    |           |          |  |  |  |  |  |
| .375"                                  | 70.5    |           |          |  |  |  |  |  |
| #4                                     | 56.6    |           |          |  |  |  |  |  |
| #10                                    | 42.7    |           |          |  |  |  |  |  |
| #20                                    | 30.0    |           |          |  |  |  |  |  |
| #40                                    | 20.8    |           |          |  |  |  |  |  |
| #60                                    | 16.9    |           |          |  |  |  |  |  |
| #100                                   | 13.9    |           |          |  |  |  |  |  |
| #200                                   | 10.6    |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |
|  |         |           |          |  |  |  |  |  |

### **Material Description** Gray-brown poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318) LL= PI= PL=

**Classification** USCS (D 2487)= SP-SM **AASHTO** (M 145)= A-1-a

Coefficients D<sub>90</sub>= 20.8388 D<sub>50</sub>= 3.1244 D<sub>10</sub>= **D<sub>60</sub>=** 5.9565 **D<sub>85</sub>=** 17.9076 D<sub>30</sub>= 0.8506 C<sub>u</sub>= D<sub>15</sub>= 0.1818 C<sub>c</sub>=

Remarks

As received MC = 7.2%

Date Received: 1/31/18 **Date Tested:** 2/5/18

Tested By: MP/SB Checked By: MP

Title: Laboratory Manager

(no specification provided)

Source of Sample: B-101 Sample Number: S-4

**Depth:** 4-6'

Client: Massachusetts Water Resources Authority (MWRA)

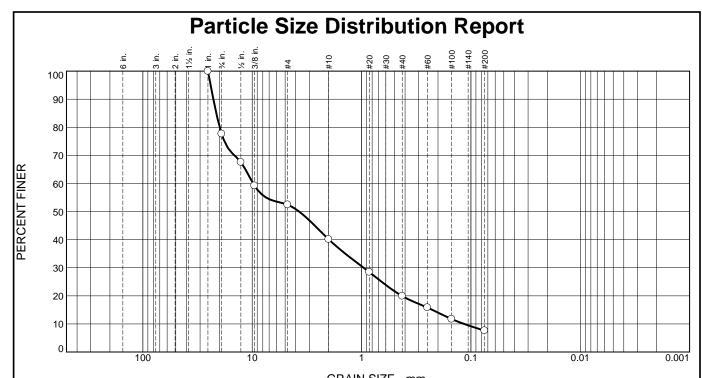
Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 12/21/18

**Boston, Massachusetts Project No:** 101038.102170

**CDM Smith** 



|  |               | GRAIN SIZE - mm. |       |            |        |      |         |      |  |
|--|---------------|------------------|-------|------------|--------|------|---------|------|--|
|  | 0/ - 2        | % Gı             | ravel | vel % Sand |        |      | % Fines |      |  |
|  | <b>% +3</b> " | Coarse           | Fine  | Coarse     | Medium | Fine | Silt    | Clay |  |
|  | 0.0           | 22.3             | 25.3  | 12.3       | 20.2   | 12.3 | 7.6     |      |  |

| Test    | Results (ASTM D | 6913 & ASTM I | D1140)   |  |
|---------|-----------------|---------------|----------|--|
| Opening | Percent         | Spec.*        | Pass?    |  |
| Size    | Finer           | (Percent)     | (X=Fail) |  |
| 1"      | 100.0           |               |          |  |
| .75"    | 77.7            |               |          |  |
| .5"     | 67.6            |               |          |  |
| .375"   | 59.2            |               |          |  |
| #4      | 52.4            |               |          |  |
| #10     | 40.1            |               |          |  |
| #20     | 28.5            |               |          |  |
| #40     | 19.9            |               |          |  |
| #60     | 15.8            |               |          |  |
| #100    | 11.7            |               |          |  |
| #200    | 7.6             |               |          |  |
|         |                 |               |          |  |
|         |                 |               |          |  |
|         |                 |               |          |  |
|         |                 |               |          |  |
|         |                 |               |          |  |
|         |                 |               |          |  |
|         |                 |               |          |  |
|         |                 |               |          |  |
|         |                 |               |          |  |
|         |                 |               |          |  |

Gray-brown poorly graded gravel with silt and sand with organics

Atterberg Limits (ASTM D 4318)
LL= PI=

PL=

Coefficients

 D90=
 22.6755
 D85=
 21.3092
 D60=
 9.8051

 D50=
 3.7232
 D30=
 0.9576
 D15=
 0.2253

 D10=
 0.1156
 Cu=
 84.83
 Cc=
 0.81

Remarks

As received MC = 25.5%

Date Received: 1/31/18

Date Tested: 2/5/18

Tested By: MP/SB

Checked By: MP

Title: Laboratory Manager

(no specification provided)

Source of Sample: B-102 Sample Number: S-4

**Depth:** 6-8'

Date Sampled: 10/4/18

**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts Project 1

**Project No:** 101038.102170

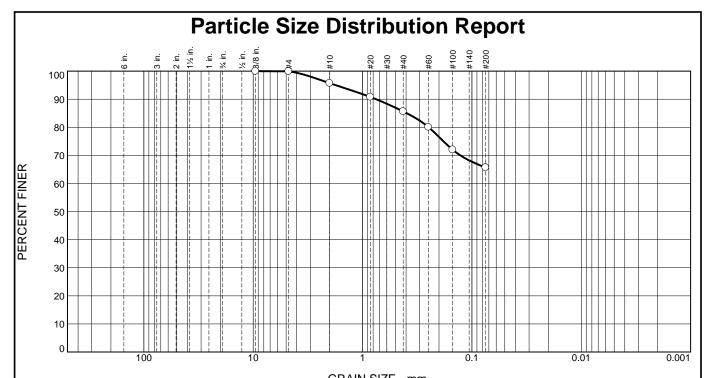
### **Geotechnical Engineering Laboratory**

# Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

Client: Massachusetts Water Resources Authority Weston Aqueduct Supply Main 3 Project Name: Tested By: MWRA line, MA Test Date: 2/2/2018 Project Location: 101038-102170 Project Number: Boring Number: B-102 Procedure: 440° C S-4 Sample Number: Temperature: Sample Depth (ft): 6-8 Sample Date: 12/21/2017

| AS RECEIVED MOISTURE CONTENT |        |
|------------------------------|--------|
| Tin Mass (g)                 | 64.50  |
| Wet Mass of Sample & Tin (g) | 115.81 |
| Dry Mass of Sample & Tin (g) | 98.28  |
| Mass of Water (g)            | 17.53  |
| Mass of Dry Soil (g)         | 33.78  |
| Moisture Content (%)         | 51.9   |

| ASH CONTENT                          |       |  |  |  |  |
|--------------------------------------|-------|--|--|--|--|
| Porcelain Dish Mass (g)              | 64.50 |  |  |  |  |
| Porcelain Dish + Oven Dried Soil (g) | 98.28 |  |  |  |  |
| Mass of Oven Dried Soil (g)          | 33.78 |  |  |  |  |
| Mass of Dish & Burned Soil (g)       | 95.64 |  |  |  |  |
| Mass of Burned Soil (g)              | 31.14 |  |  |  |  |
| Mass of Organic Material (g)         | 2.64  |  |  |  |  |
| Ash Content (%)                      | 92.2  |  |  |  |  |
|                                      |       |  |  |  |  |
| Organic Content (%)                  | 7.8   |  |  |  |  |



|  | GRAIN SIZE - mm. |        |       |        |        |      |         |      |  |
|--|------------------|--------|-------|--------|--------|------|---------|------|--|
|  | 0/ - 21          | % Gı   | ravel | % Sand |        |      | % Fines |      |  |
|  | % +3"            | Coarse | Fine  | Coarse | Medium | Fine | Silt    | Clay |  |
|  | 0.0              | 0.0    | 0.1   | 4.2    | 10.1   | 19.9 | 65.7    |      |  |

| Test Re | esults (ASTM D | 6913 & ASTM [ | D1140)   |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| .375"   | 100.0          |               |          |
| #4      | 99.9           |               |          |
| #10     | 95.7           |               |          |
| #20     | 90.8           |               |          |
| #40     | 85.6           |               |          |
| #60     | 80.1           |               |          |
| #100    | 72.0           |               |          |
| #200    | 65.7           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
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|         |                |               |          |
|         |                |               |          |
|         |                |               |          |

#### Gray-brown sandy organic silt **Atterberg Limits (ASTM D 4318)** PL= Classification USCS (D 2487)= MLAASHTO (M 145)= A-4(0)Coefficients **D<sub>90</sub>=** 0.7536 **D<sub>85</sub>=** 0.3936 $D_{60} =$ D<sub>50</sub>= D<sub>10</sub>= D<sub>30</sub>= D<sub>15</sub>= C<sub>C</sub>= Remarks As received MC = 80.2%Date Received: 1/31/18 **Date Tested:** 2/5/18 Tested By: MP/SB Checked By: MP

**Material Description** 

(no specification provided)

Source of Sample: B-103 Sample Number: S-4

**Depth:** 6-8'

**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

Title: Laboratory Manager

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 12/22/18

**Project No:** 101038.102170

**Boston, Massachusetts** 

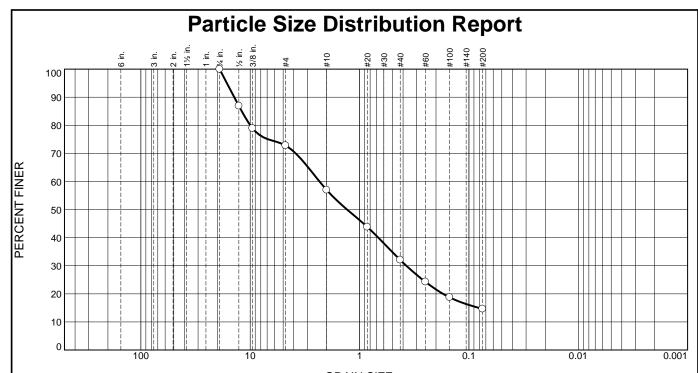
## **Geotechnical Engineering Laboratory**

# Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

| Client:            | Massachusetts Water Resources Authority |              |          |
|--------------------|---|--------------|----------|
| Project Name:      | Weston Aqueduct Supply Main 3           | Tested By:   | MP       |
| Project Location:  | MWRA line, MA                           | Test Date:   | 2/1/2018 |
| Project Number:    | 101038-102170                           | _            |          |
| Boring Number:     | B-103                                   | Procedure:   | С        |
| Sample Number:     | S-4                                     | Temperature: | 440° C   |
| Sample Depth (ft): | 6-8                                     | _            |          |
| Sample Date:       | 12/22/2017                              |              |          |

| AS RECEIVED MOISTURE CONTENT |        |
|------------------------------|--------|
| Tin Mass (g)                 | 105.29 |
| Wet Mass of Sample & Tin (g) | 153.41 |
| Dry Mass of Sample & Tin (g) | 131.89 |
| Mass of Water (g)            | 21.52  |
| Mass of Dry Soil (g)         | 26.60  |
| Moisture Content (%)         | 80.9   |

| ASH CONTENT                          |        |  |  |  |
|--------------------------------------|--------|--|--|--|
| Porcelain Dish Mass (g)              | 105.29 |  |  |  |
| Porcelain Dish + Oven Dried Soil (g) | 131.89 |  |  |  |
| Mass of Oven Dried Soil (g)          | 26.60  |  |  |  |
| Mass of Dish & Burned Soil (g)       | 129.40 |  |  |  |
| Mass of Burned Soil (g)              | 24.11  |  |  |  |
| Mass of Organic Material (g)         | 2.49   |  |  |  |
| Ash Content (%)                      | 90.6   |  |  |  |
|                                      |        |  |  |  |
| Organic Content (%)                  | 9.4    |  |  |  |



|          | GRAIN SIZE - mm. |          |      |        |        |      |         |      |
|----------|------------------|----------|------|--------|--------|------|---------|------|
| 0/ - 211 |                  | % Gravel |      |        | % Sand |      | % Fines |      |
| ı        | <b>% +3"</b>     | Coarse   | Fine | Coarse | Medium | Fine | Silt    | Clay |
|          | 0.0              | 0.0      | 27.2 | 15.8   | 24.9   | 17.5 | 14.6    |      |

| Test R    | esults (ASTM De     | 6913 & ASTM [ | D1140)   |
|-----------|---------------------|---------------|----------|
| Opening   | Percent             | Spec.*        | Pass?    |
| Size      | Finer               | (Percent)     | (X=Fail) |
| .75       | 100.0               |               |          |
| .5        | 86.9                |               |          |
| .375      | 78.9                |               |          |
| #4        | 72.8                |               |          |
| #10       | 57.0                |               |          |
| #20       | 43.8                |               |          |
| #40       | 32.1                |               |          |
| #60       | 24.3                |               |          |
| #100      | 18.7                |               |          |
| #200      | 14.6                |               |          |
|           |                     |               |          |
|           |                     |               |          |
|           |                     |               |          |
|           |                     |               |          |
|           |                     |               |          |
|           |                     |               |          |
|           |                     |               |          |
|           |                     |               |          |
|           |                     |               |          |
|           |                     |               |          |
|           |                     |               |          |
| * (no spe | cification provided | D             |          |

Gray silty sand with gravel and organics

**Atterberg Limits (ASTM D 4318)** 

PL=

Classification

USCS (D 2487)= SM **AASHTO** (M 145)= A-1-b

Coefficients

D<sub>90</sub>= 13.9927 D<sub>50</sub>= 1.3001 D<sub>10</sub>= D<sub>60</sub>= 2.3250 D<sub>15</sub>= 0.0810 C<sub>c</sub>= **D<sub>85</sub>=** 11.9466 D<sub>30</sub>= 0.3734 C<sub>u</sub>=

Remarks

As recieved MC = 28.4%

**Date Tested:** 2/1/18

Date Received: 1/30/18 Tested By: SB

Checked By: MP

Title: Laboratory Manager

(no specification provided)

Source of Sample: B-104 Sample Number: S-2

**Depth:** 8-10'

**Date Sampled:** 1/8/18

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts** 

**Project No:** 101038.102170

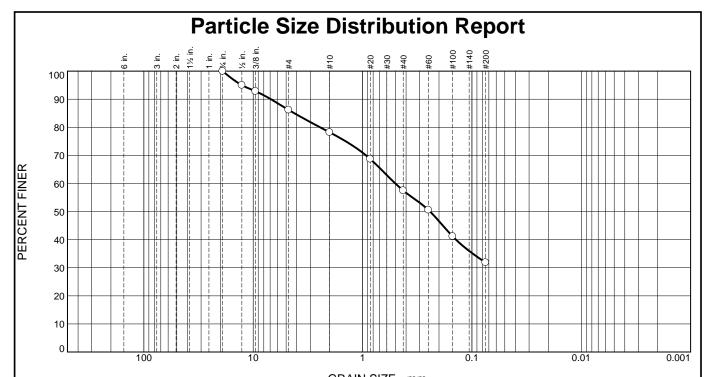
### **Geotechnical Engineering Laboratory**

# Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

Client: Massachusetts Water Resources Authority Weston Aqueduct Supply Main 3 Project Name: Tested By: MWRA line, MA Test Date: 2/1/2018 Project Location: 101038-102170 Project Number: Boring Number: B-104 Procedure: S-2 Temperature: 440° C Sample Number: Sample Depth (ft): 8-10 Sample Date: 1/8/2018

| AS RECEIVED MOISTURE CONTENT |        |
|------------------------------|--------|
| Tin Mass (g)                 | 90.31  |
| Wet Mass of Sample & Tin (g) | 150.87 |
| Dry Mass of Sample & Tin (g) | 137.48 |
| Mass of Water (g)            | 13.39  |
| Mass of Dry Soil (g)         | 47.17  |
| Moisture Content (%)         | 28.4   |

| ASH CONTENT                          |        |  |  |  |
|--------------------------------------|--------|--|--|--|
| Porcelain Dish Mass (g)              | 90.31  |  |  |  |
| Porcelain Dish + Oven Dried Soil (g) | 137.48 |  |  |  |
| Mass of Oven Dried Soil (g)          | 47.17  |  |  |  |
| Mass of Dish & Burned Soil (g)       | 135.48 |  |  |  |
| Mass of Burned Soil (g)              | 45.17  |  |  |  |
| Mass of Organic Material (g)         | 2.00   |  |  |  |
| Ash Content (%)                      | 95.8   |  |  |  |
|                                      |        |  |  |  |
| Organic Content (%)                  | 4.2    |  |  |  |



|         | GRAIN SIZE - mm. |        |                 |        |         |      |      |      |
|---------|------------------|--------|-----------------|--------|---------|------|------|------|
| 0/ . 21 |                  | % G    | % Gravel % Sand |        | % Fines |      |      |      |
| ı       | <b>% +3"</b>     | Coarse | Fine            | Coarse | Medium  | Fine | Silt | Clay |
|         | 0.0              | 0.0    | 13.8            | 8.0    | 20.7    | 25.6 | 31.9 |      |

| Test Re | esults (ASTM D | 422 & ASTM D | 1140)    |
|---------|----------------|--------------|----------|
| Opening | Percent        | Spec.*       | Pass?    |
| Size    | Finer          | (Percent)    | (X=Fail) |
| 3/4"    | 100.0          |              |          |
| 1/2"    | 95.0           |              |          |
| 3/8"    | 92.8           |              |          |
| #4      | 86.2           |              |          |
| #10     | 78.2           |              |          |
| #20     | 68.7           |              |          |
| #40     | 57.5           |              |          |
| #60     | 50.6           |              |          |
| #100    | 41.2           |              |          |
| #200    | 31.9           |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
|         |                |              |          |
| *       |                |              |          |

|                               | <u>Material</u>       | Descripti    | <u>on</u>           |           |
|-------------------------------|-----------------------|--------------|---------------------|-----------|
| Brown silty sand              |                       |              |                     |           |
|                               |                       |              |                     |           |
| Λ.44                          | arbara Lim            | ito /ACTM    | D 4240\             |           |
| PL=                           | erberg Lim<br>LL=     | IIIS (ASTIVI | PI=                 |           |
|                               | Class                 | sification   |                     |           |
| USCS (D 2487)=                | SM Class              | AASHTO (     | (M 145)=            | A-2-4(0)  |
|                               | Coe                   | fficients    |                     |           |
| <b>D<sub>90</sub>=</b> 6.8986 | D <sub>85</sub> = 4.2 |              | D <sub>60</sub> = 0 | 0.5018    |
| <b>D<sub>50</sub>=</b> 0.2414 | $D_{30} =$            |              | D <sub>15</sub> =   |           |
| D <sub>10</sub> =             | c <sub>u</sub> =      |              | cc=                 |           |
|                               |                       | emarks       |                     |           |
| As received MC =              | = 11.4%               |              |                     |           |
|                               |                       |              |                     |           |
| Date Received:                | 10/5/2017             | Doto T       | Tootod:             | 10/0/2017 |
|                               |                       | Date 1       | estea:              | 10/9/2017 |
| Tested By:                    |                       |              |                     |           |
| Checked By:                   | MP                    |              |                     |           |
| Title:                        | Laboratory 1          | Manager      |                     |           |
|                               |                       |              |                     |           |

(no specification provided)

Source of Sample: B-105 Sample Number: S-4 **Depth:** 6-8'

CDM Smith

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

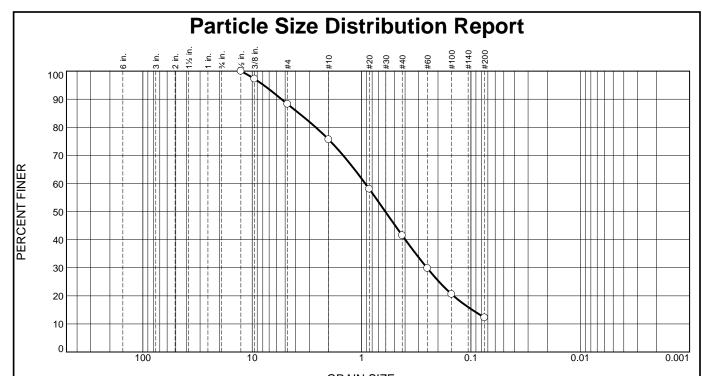
Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Boston, Massachusetts** 

**Project No:** 101038.102170

Figure

**Date Sampled:** 9/12/2017



| GRAIN SIZE - mm. |               |        |                 |        |         |      |      |      |
|------------------|---------------|--------|-----------------|--------|---------|------|------|------|
| 0/ . 21          |               | % G    | % Gravel % Sand |        | % Fines |      |      |      |
| ı                | % <b>+</b> 3" | Coarse | Fine            | Coarse | Medium  | Fine | Silt | Clay |
|                  | 0.0           | 0.0    | 11.7            | 12.6   | 34.2    | 29.3 | 12.2 |      |

| Test Results (ASTM D 422 & ASTM D 1140) |                    |           |          |  |  |  |  |  |
|---|--------------------|-----------|----------|--|--|--|--|--|
| Opening                                 | Percent            | Spec.*    | Pass?    |  |  |  |  |  |
| Size                                    | Finer              | (Percent) | (X=Fail) |  |  |  |  |  |
| 1/2"                                    | 100.0              |           |          |  |  |  |  |  |
| 3/8"                                    | 97.2               |           |          |  |  |  |  |  |
| #4                                      | 88.3               |           |          |  |  |  |  |  |
| #10                                     | 75.7               |           |          |  |  |  |  |  |
| #20                                     | 58.0               |           |          |  |  |  |  |  |
| #40                                     | 41.5               |           |          |  |  |  |  |  |
| #60                                     | 29.8               |           |          |  |  |  |  |  |
| #100                                    | 20.6               |           |          |  |  |  |  |  |
| #200                                    | 12.2               |           |          |  |  |  |  |  |
|   |                    |           |          |  |  |  |  |  |
|   |                    |           |          |  |  |  |  |  |
|   |                    |           |          |  |  |  |  |  |
|   |                    |           |          |  |  |  |  |  |
|   |                    |           |          |  |  |  |  |  |
|   |                    |           |          |  |  |  |  |  |
|   |                    |           |          |  |  |  |  |  |
|   |                    |           |          |  |  |  |  |  |
|   |                    |           |          |  |  |  |  |  |
|   |                    |           |          |  |  |  |  |  |
|   |                    |           |          |  |  |  |  |  |
| *                                       | rification provide |           |          |  |  |  |  |  |

|                               | <u>Material</u>            | Description | <u>on</u>                                    |
|-------------------------------|----------------------------|-------------|--|
| Dark brown silty              | sand                       |             |  |
|                               |                            |             |  |
| A44                           | arhara Limi                | to /ACTM    | D 4240)                                      |
| PL=                           | erberg Limi<br>LL=         | IS (ASTIVI  | <u>D 43 (6)</u><br>Pl=                       |
|                               | Class                      | ification   |  |
| USCS (D 2487)=                |                            |             | <b>M 145)=</b> A-1-b                         |
|                               | Coef                       | ficients    | •  |
| <b>D<sub>90</sub>=</b> 5.3927 | $D_{85} = 3.7$             | 382         | <b>D<sub>60</sub>=</b> 0.9261                |
| <b>D<sub>50</sub>=</b> 0.6064 | <b>D<sub>30</sub>=</b> 0.2 | 525         | D <sub>15</sub> = 0.0971<br>C <sub>c</sub> = |
| D <sub>10</sub> =             | c <sub>u</sub> =           |             | oc=  |
| A                             |                            | marks       |  |
| As received MC =              | = 14.0%                    |             |  |
|                               |                            |             |  |
| Date Received:                | 10/5/2017                  | Date Te     | ested: 10/9/2017                             |
| Tested By:                    |                            | Duto I      | 10/5/2017                                    |
| _                             |                            |             |  |
| Checked By:                   |                            |             |  |
|                               | Laboratory N               | Innagar     |  |

\* (no specification provided)

Source of Sample: B-107 Sample Number: S-1

**Depth:** 0.5-2'

CDM Smith

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

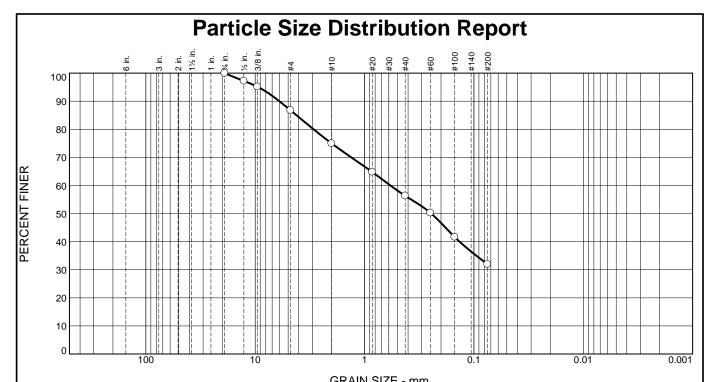
Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Boston, Massachusetts** 

**Project No:** 101038.102170

Figure

**Date Sampled:** 9/12/2017



|          | GRAIN SIZE - IIIII. |                      |        |        |      |      |      |  |
|----------|---------------------|----------------------|--------|--------|------|------|------|--|
| 0/ - 211 | % G                 | ravel % Sand % Fines |        |        |      |      |      |  |
| % +3"    | Coarse              | Fine                 | Coarse | Medium | Fine | Silt | Clay |  |
| 0.0      | 0.0                 | 13.2                 | 11.8   | 18.7   | 24.3 | 32.0 |      |  |

| Test Results (ASTM D 422 & ASTM D 1140) |         |           |          |  |  |  |  |  |
|---|---------|-----------|----------|--|--|--|--|--|
| Opening                                 | Percent | Spec.*    | Pass?    |  |  |  |  |  |
| Size                                    | Finer   | (Percent) | (X=Fail) |  |  |  |  |  |
| 3/4"                                    | 100.0   |           |          |  |  |  |  |  |
| 1/2"                                    | 97.2    |           |          |  |  |  |  |  |
| 3/8"                                    | 95.2    |           |          |  |  |  |  |  |
| #4                                      | 86.8    |           |          |  |  |  |  |  |
| #10                                     | 75.0    |           |          |  |  |  |  |  |
| #20                                     | 64.8    |           |          |  |  |  |  |  |
| #40                                     | 56.3    |           |          |  |  |  |  |  |
| #60                                     | 50.3    |           |          |  |  |  |  |  |
| #100                                    | 41.7    |           |          |  |  |  |  |  |
| #200                                    | 32.0    |           |          |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |
|   |         |           |          |  |  |  |  |  |
| *                                       |         |           |          |  |  |  |  |  |

|   | <u>Material</u>   | Description             | <u>on</u>  |           |
|---|---|-------------------------|--|-----------|
| Brown silty sand  |   |                         |  |           |
|   |   |                         |  |           |
| Λ++   | erberg Lim  | ite (ASTM               | D 4318)  |           |
| PL=   | LL=   | ILS (ASTIVI             | PI=  |           |
| USCS (D 2487)=  |   | sification<br>AASHTO (I | VI 145)=   | A-2-4(0)  |
| D <sub>90</sub> = 6.0126<br>D <sub>50</sub> = 0.2454<br>D <sub>10</sub> = | Coe<br>D <sub>85</sub> = 4.1<br>D <sub>30</sub> =<br>C <sub>u</sub> = | fficients<br>881        | D <sub>60</sub> = (<br>D <sub>15</sub> =<br>C <sub>c</sub> = | 0.5801    |
|   | Re  | marks                   |  |           |
| As received MC =  | 9.6%  |                         |  |           |
|   |   |                         |  |           |
| Date Received:<br>Tested By:  |   | Date Te                 | ested:   | 10/9/2017 |
| Checked By:   | MP  |                         |  |           |
| Title:  | Laboratory N  | Manager                 |  |           |
|   |   |                         |  |           |

(no specification provided)

Source of Sample: B-107 Sample Number: S-4 **Depth:** 6-8'

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

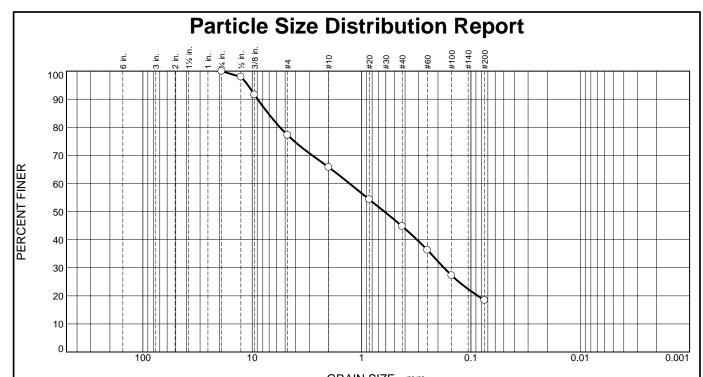
Medford, Somerville, Arlington, Belmont, Waltham and Weston, MA

**Boston, Massachusetts** 

**Project No:** 101038.102170

Figure

**Date Sampled:** 9/12/2017



| GRAIN SIZE - mm. |        |      |        |        |         |      |      |
|------------------|--------|------|--------|--------|---------|------|------|
| 0/ - 21          | % +3"  |      |        |        | % Fines |      |      |
| % +3"            | Coarse | Fine | Coarse | Medium | Fine    | Silt | Clay |
| 0.0              | 0.0    | 22.8 | 11.4   | 21.1   | 26.3    | 18.4 |      |

| Test Results (ASTM D6913 & ASTM D1140) |         |           |          |  |  |  |  |
|--|---------|-----------|----------|--|--|--|--|
| Opening                                | Percent | Spec.*    | Pass?    |  |  |  |  |
| Size                                   | Finer   | (Percent) | (X=Fail) |  |  |  |  |
| .75"                                   | 100.0   |           |          |  |  |  |  |
| .5"                                    | 97.9    |           |          |  |  |  |  |
| .375"                                  | 91.6    |           |          |  |  |  |  |
| #4                                     | 77.2    |           |          |  |  |  |  |
| #10                                    | 65.8    |           |          |  |  |  |  |
| #20                                    | 54.3    |           |          |  |  |  |  |
| #40                                    | 44.7    |           |          |  |  |  |  |
| #60                                    | 36.3    |           |          |  |  |  |  |
| #100                                   | 27.2    |           |          |  |  |  |  |
| #200                                   | 18.4    |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |

|  | Material Descri                               | <u>ption</u>                          |
|--|---|---------------------------------------|
| Brown silty sand v                                   | vith gravel                                   |                                       |
|  |   |                                       |
| Λ44,   | orbora Limita (AC                             | TM D 4240)                            |
| PL=  | erberg Limits (AS<br>LL=                      | PI=                                   |
|  | Classification                                | nn.                                   |
| USCS (D 2487)=                                       |   | O (M 145)= A-1-b                      |
| -  | Coefficient                                   | <b>s</b>                              |
| <b>D<sub>90</sub>=</b> 8.9183                        | D <sub>85</sub> = 7.1542                      | D <sub>60</sub> = 1.2889              |
| <b>D<sub>50</sub>=</b> 0.6190 <b>D<sub>10</sub>=</b> | D <sub>30</sub> = 0.1765<br>C <sub>11</sub> = | D <sub>15</sub> =<br>C <sub>c</sub> = |
| D <sub>10</sub> -                                    | u   | O <sub>C</sub> -                      |
| As received MC =                                     | Remarks                                       |                                       |
| As received wic =                                    | 10.270  |                                       |
|  |   |                                       |
| Date Received:                                       | 1/31/18 <b>Dat</b>                            | e Tested: 2/5/18                      |
| Tested By:   | MP/SB   |                                       |
| Checked By:  |   |                                       |
|  |   |                                       |
| litie:   | Laboratory Manager                            |                                       |

\* (no specification provided)

Source of Sample: B-108 Sample Number: S-2

**Depth:** 8-10'

**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 1/8/18

Boston, Massachusetts Project No: 101038.102170

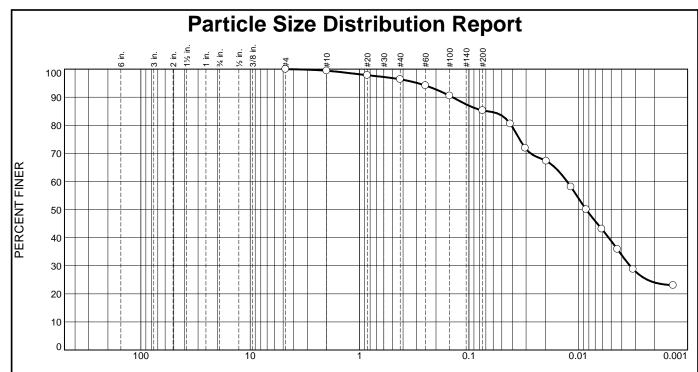
### **Geotechnical Engineering Laboratory**

# Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

Client: Massachusetts Water Resources Authority Weston Aqueduct Supply Main 3 Project Name: Tested By: MWRA line, MA Test Date: 2/1/2018 Project Location: 101038-102170 Project Number: Boring Number: B-110 Procedure: S-3 Temperature: 440° C Sample Number: Sample Depth (ft): 4-6 Sample Date: 12/19/2017

| AS RECEIVED MOISTURE CONTENT |        |
|------------------------------|--------|
| Tin Mass (g)                 | 96.87  |
| Wet Mass of Sample & Tin (g) | 188.25 |
| Dry Mass of Sample & Tin (g) | 152.97 |
| Mass of Water (g)            | 35.28  |
| Mass of Dry Soil (g)         | 56.10  |
| Moisture Content (%)         | 62.9   |

| ASH CONTENT                          |        |  |  |  |  |
|--------------------------------------|--------|--|--|--|--|
| Porcelain Dish Mass (g)              | 96.87  |  |  |  |  |
| Porcelain Dish + Oven Dried Soil (g) | 152.97 |  |  |  |  |
| Mass of Oven Dried Soil (g)          | 56.10  |  |  |  |  |
| Mass of Dish & Burned Soil (g)       | 148.57 |  |  |  |  |
| Mass of Burned Soil (g)              | 51.70  |  |  |  |  |
| Mass of Organic Material (g)         | 4.40   |  |  |  |  |
| Ash Content (%)                      | 92.2   |  |  |  |  |
|                                      |        |  |  |  |  |
| Organic Content (%)                  | 7.8    |  |  |  |  |



|        |        |       | (      | <u> GRAIN SIZE -</u> | · mm. |         |      |
|--------|--------|-------|--------|----------------------|-------|---------|------|
| 0/ .3" | % Gr   | ravel |        | % Sand               | I     | % Fines |      |
| % +3"  | Coarse | Fine  | Coarse | Medium               | Fine  | Silt    | Clay |
| 0.0    | 0.0    | 0.0   | 0.6    | 3.0                  | 11.1  | 46.5    | 38.8 |

| Opening    | Percent | Spec.*    | Pass?    |
|------------|---------|-----------|----------|
| Size       | Finer   | (Percent) | (X=Fail) |
| #4         | 100.0   |           |          |
| #10        | 99.4    |           |          |
| #20        | 97.8    |           |          |
| #40        | 96.4    |           |          |
| #60        | 94.2    |           |          |
| #100       | 90.5    |           |          |
| #200       | 85.3    |           |          |
| 0.0419 mm. | 80.6    |           |          |
| 0.0306 mm. | 71.9    |           |          |
| 0.0196 mm. | 67.3    |           |          |
| 0.0117 mm. | 58.1    |           |          |
| 0.0085 mm. | 50.0    |           |          |
| 0.0061 mm. | 43.1    |           |          |
| 0.0044 mm. | 35.9    |           |          |
| 0.0032 mm. | 28.8    |           |          |
| 0.0014 mm. | 23.0    |           |          |
|            |         |           |          |
|            |         |           |          |
|            |         |           |          |
|            |         |           |          |
|            |         |           |          |

Dark brown organic clay with sand

Atterberg Limits (ASTM D 4318)

Coefficients

D<sub>90</sub>= 0.1415 D<sub>85</sub>= 0.0672 D<sub>60</sub>= 0.0127 D<sub>50</sub>= 0.0085 D<sub>30</sub>= 0.0034 D<sub>15</sub>= C<sub>c</sub>=

Remarks

As received MC = 80.0%

Date Received: 1/31/18 Date Tested: 2/6/18

Tested By: MP/SB

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-110 Sample Number: S-5 **Depth:** 8-10'

**Date Sampled:** 12/19/18

**CDM Smith** 

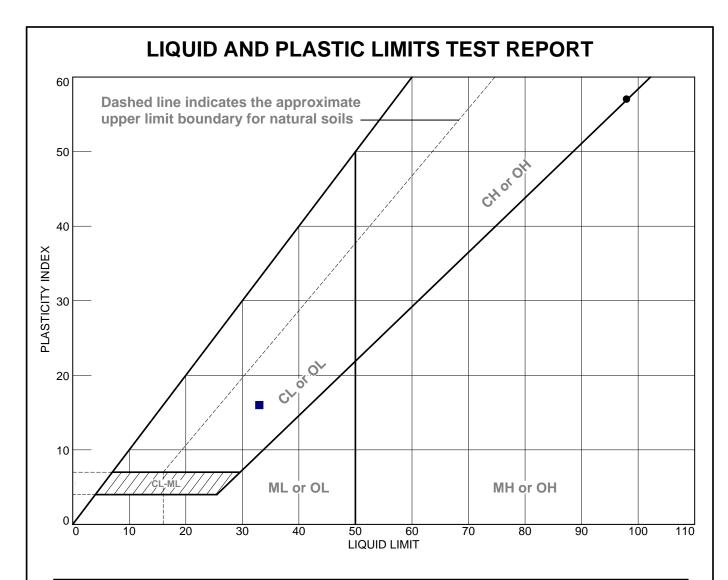
Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts

**Project No:** 101038.102170



|                          | SOIL DATA |                                 |        |                                    |    |                            |      |    |  |  |
|--------------------------|-----------|---------------------------------|--------|------------------------------------|----|----------------------------|------|----|--|--|
| SYMBOL SOURCE SAMPLE NO. |           | NATURAL DEPTH WATER CONTENT (%) |        | PLASTIC LIQUID LIMIT LIMIT (%) (%) |    | PLASTICITY<br>INDEX<br>(%) | uscs |    |  |  |
| •                        | B-110     | S-5                             | 8-10'  | 80.0                               | 41 | 98                         | 57   | ОН |  |  |
| •                        | B-110     | S-7                             | 19-21' | 31.8                               | 17 | 33                         | 16   | CL |  |  |

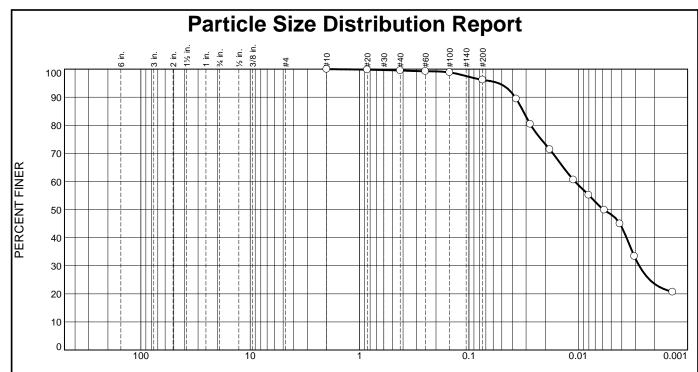
**Client:** Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts Project No.: 101038.102170

| Tested By: AS | Checked Bv: MP |
|---------------|----------------|
|---------------|----------------|



|   |        |        |       | (      | <u> GRAIN SIZE -</u> | · mm. |         |      |  |
|---|--------|--------|-------|--------|----------------------|-------|---------|------|--|
| ľ | 0/ .2" | % Gr   | ravel | % Sand |                      |       | % Fines |      |  |
|   | % +3"  | Coarse | Fine  | Coarse | Medium               | Fine  | Silt    | Clay |  |
|   | 0.0    | 0.0    | 0.0   | 0.0    | 0.5                  | 3 3   | 47.9    | 48 3 |  |

|            | ts (ASTM D6913 |           |          |
|------------|----------------|-----------|----------|
| Opening    | Percent        | Spec.*    | Pass?    |
| Size       | Finer          | (Percent) | (X=Fail) |
| #10        | 100.0          |           |          |
| #20        | 99.8           |           |          |
| #40        | 99.5           |           |          |
| #60        | 99.2           |           |          |
| #100       | 98.8           |           |          |
| #200       | 96.2           |           |          |
| 0.0369 mm. | 89.4           |           |          |
| 0.0275 mm. | 80.4           |           |          |
| 0.0182 mm. | 71.4           |           |          |
| 0.0111 mm. | 60.6           |           |          |
| 0.0080 mm. | 55.2           |           |          |
| 0.0058 mm. | 49.9           |           |          |
| 0.0042 mm. | 45.0           |           |          |
| 0.0031 mm. | 33.4           |           |          |
| 0.0014 mm. | 20.7           |           |          |
|            |                |           |          |
|            |                |           |          |
|            |                |           |          |
|            |                |           |          |
|            |                |           |          |
|            |                |           |          |

Gray lean clay

Atterberg Limits (ASTM D 4318)

LL= 33 PI= 16

**PL=** 17

USCS (D 2487)=

CL CL AASHTO (M 145)= A-6(15)

Coefficients

D<sub>90</sub>= 0.0377 D<sub>85</sub>= 0.0318 D<sub>60</sub>= 0.0107 D<sub>50</sub>= 0.0059 D<sub>30</sub>= 0.0028 D<sub>15</sub>= C<sub>c</sub>=

Remarks

As received MC = 31.8%

Date Received: 1/31/18 Date Tested: 2/5/18

Tested By: MP/SB

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-110 Sample Number: S-7

**Depth:** 19-21'

**Date Sampled:** 12/19/18

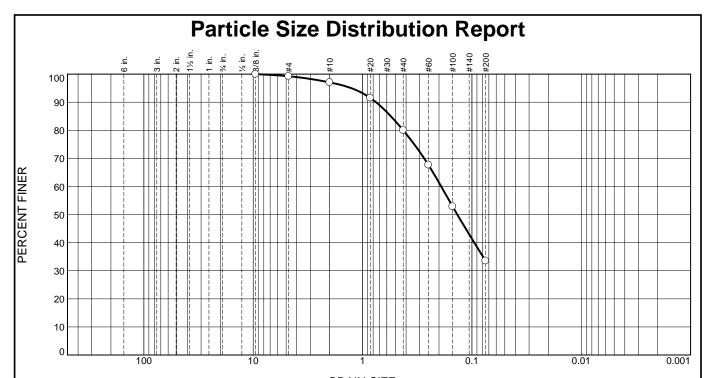
**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts Project No: 101038.102170



|  | GRAIN SIZE - mm. |        |       |        |        |      |         |      |  |
|--|------------------|--------|-------|--------|--------|------|---------|------|--|
|  | 0/ - 211         | % Gr   | ravel |        | % Sand |      | % Fines |      |  |
|  | % +3"            | Coarse | Fine  | Coarse | Medium | Fine | Silt    | Clay |  |
|  | 0.0              | 0.0    | 0.7   | 22     | 17.1   | 46.5 | 33.5    |      |  |

| Test Re | esults (ASTM D | 6913 & ASTM I | D1140)   |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| .375"   | 100.0          |               |          |
| #4      | 99.3           |               |          |
| #10     | 97.1           |               |          |
| #20     | 91.5           |               |          |
| #40     | 80.0           |               |          |
| #60     | 67.7           |               |          |
| #100    | 52.9           |               |          |
| #200    | 33.5           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |

|   | <u>Material</u>                       | <u>Description</u>                    |            |
|---|---------------------------------------|---------------------------------------|------------|
| Brown silty sand  |                                       |                                       |            |
|   |                                       |                                       |            |
| Δ++   | erhera Limi                           | ts (ASTM D 431                        | 8)         |
| PL=   | LL=                                   | PI=                                   | <u>o,</u>  |
| USCS (D 2487)=  |                                       | sification<br>AASHTO (M 145)          | = A-2-4(0) |
|   |                                       | ficients                              |            |
| <b>D<sub>90</sub>=</b> 0.7540 <b>D<sub>50</sub>=</b> 0.1360 | D <sub>85</sub> = 0.5                 |                                       | 0.1909     |
| D <sub>10</sub> = 0.1300                                    | D <sub>30</sub> =<br>C <sub>u</sub> = | D <sub>15</sub> =<br>C <sub>c</sub> = |            |
|   | Re                                    | marks                                 |            |
| As received MC =  | 26.2%                                 |                                       |            |
|   |                                       |                                       |            |
| Date Received:  | 1/31/18                               | Date Tested:                          | 2/5/18     |
| Tested By:  | MP/SB                                 |                                       |            |
| Checked By:   | MP                                    |                                       |            |
| Title:  | Laboratory N                          | <b>1</b> anager                       |            |

\* (no specification provided)

Source of Sample: B-111 Sample Number: S-3B **Depth:** 5.5-6'

CDM Smith

Client: Massachusetts Water Resources Authority (MWRA)

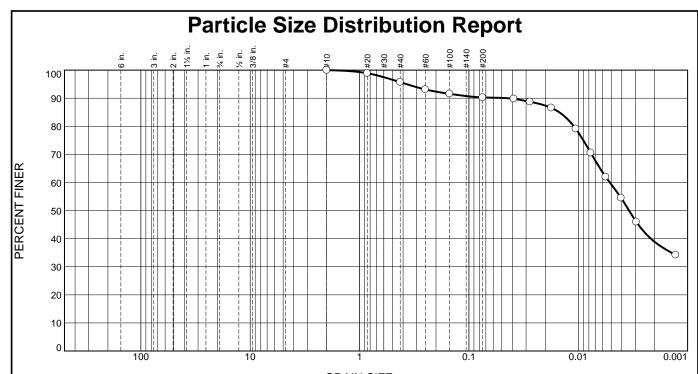
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 12/18/17

**Boston, Massachusetts** 

**Project No:** 101038.102170



| GRAIN SIZE - mm. |        |          |        |        |      |         |      |  |
|------------------|--------|----------|--------|--------|------|---------|------|--|
| 0/ .2"           | % G    | % Gravel |        | % Sand |      | % Fines |      |  |
| % +3"            | Coarse | Fine     | Coarse | Medium | Fine | Silt    | Clay |  |
| 0.0              | 0.0    | 0.0      | 0.0    | 43     | 5.4  | 31.0    | 59.3 |  |

| Test Resul | ts (ASTM D6913 | & D7928 & ASTM D1140) |          |  |  |  |
|------------|----------------|-----------------------|----------|--|--|--|
| Opening    | Percent        | Spec.*                | Pass?    |  |  |  |
| Size       | Finer          | (Percent)             | (X=Fail) |  |  |  |
| #10        | 100.0          |                       |          |  |  |  |
| #20        | 98.9           |                       |          |  |  |  |
| #40        | 95.7           |                       |          |  |  |  |
| #60        | 93.1           |                       |          |  |  |  |
| #100       | 91.6           |                       |          |  |  |  |
| #200       | 90.3           |                       |          |  |  |  |
| 0.0389 mm. | 89.8           |                       |          |  |  |  |
| 0.0276 mm. | 88.7           |                       |          |  |  |  |
| 0.0176 mm. | 86.6           |                       |          |  |  |  |
| 0.0105 mm. | 79.1           |                       |          |  |  |  |
| 0.0077 mm. | 70.6           |                       |          |  |  |  |
| 0.0056 mm. | 62.0           |                       |          |  |  |  |
| 0.0041 mm. | 54.5           |                       |          |  |  |  |
| 0.0029 mm. | 46.0           |                       |          |  |  |  |
| 0.0013 mm. | 34.2           |                       |          |  |  |  |
|            |                |                       |          |  |  |  |
|            |                |                       |          |  |  |  |
|            |                |                       |          |  |  |  |
|            |                |                       |          |  |  |  |
|            |                |                       |          |  |  |  |
|            |                |                       |          |  |  |  |

Dark gray lean clay with organics

**Atterberg Limits (ASTM D 4318)** PL=

**Classification** 

USCS (D 2487)= CL**AASHTO** (M 145)= A-7-6

Coefficients D<sub>90</sub>= 0.0440 D<sub>50</sub>= 0.0034 D<sub>10</sub>= **D<sub>85</sub>=** 0.0149 **D<sub>60</sub>=** 0.0051

D<sub>30</sub>= D<sub>15</sub>= C<sub>C</sub>=

Remarks

As received MC = 55.7%

Date Received: 1/31/18 **Date Tested:** 2/6/18

Tested By: MP/SB Checked By: MP

Title: Laboratory Manager

(no specification provided)

Source of Sample: B-112 **Depth: 2-4' Date Sampled:** 12/18/17 Sample Number: S-2

**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts Project No:** 101038.102170

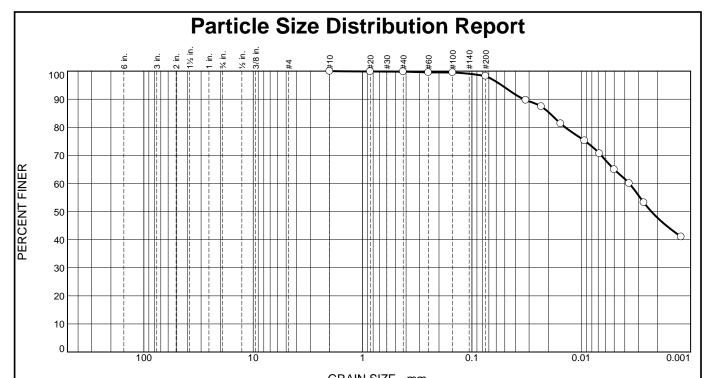
### **Geotechnical Engineering Laboratory**

# Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

Client: Massachusetts Water Resources Authority Weston Aqueduct Supply Main 3 Project Name: Tested By: MWRA line, MA Test Date: 2/5/2018 Project Location: 101038-102170 Project Number: Boring Number: B-112 Procedure: S-2 440° C Sample Number: Temperature: Sample Depth (ft): 2-4 Sample Date: 12/18/2017

| AS RECEIVED MOISTURE CONTENT |        |
|------------------------------|--------|
| Tin Mass (g)                 | 126.67 |
| Wet Mass of Sample & Tin (g) | 187.92 |
| Dry Mass of Sample & Tin (g) | 166.01 |
| Mass of Water (g)            | 21.91  |
| Mass of Dry Soil (g)         | 39.34  |
| Moisture Content (%)         | 55.7   |

| ASH CONTENT                          |        |
|--------------------------------------|--------|
| Porcelain Dish Mass (g)              | 126.67 |
| Porcelain Dish + Oven Dried Soil (g) | 166.01 |
| Mass of Oven Dried Soil (g)          | 39.34  |
| Mass of Dish & Burned Soil (g)       | 163.68 |
| Mass of Burned Soil (g)              | 37.01  |
| Mass of Organic Material (g)         | 2.33   |
| Ash Content (%)                      | 94.1   |
|                                      |        |
| Organic Content (%)                  | 5.9    |



|       | GRAIN SIZE - mm. |      |        |        |      |         |      |  |
|-------|------------------|------|--------|--------|------|---------|------|--|
| % +3" | % Gravel         |      |        | % Sand |      | % Fines |      |  |
|       | Coarse           | Fine | Coarse | Medium | Fine | Silt    | Clay |  |
| 0.0   | 0.0              | 0.0  | 0.0    | 0.2    | 1.6  | 33.2    | 65.0 |  |

| Opening    | Percent | Spec.*    | Pass?    |  |  |
|------------|---------|-----------|----------|--|--|
| Size       | Finer   | (Percent) | (X=Fail) |  |  |
| #10        | 100.0   |           |          |  |  |
| #20        | 99.9    |           |          |  |  |
| #40        | 99.8    |           |          |  |  |
| #60        | 99.6    |           |          |  |  |
| #100       | 99.5    |           |          |  |  |
| #200       | 98.2    |           |          |  |  |
| 0.0322 mm. | 89.7    |           |          |  |  |
| 0.0232 mm. | 87.4    |           |          |  |  |
| 0.0154 mm. | 81.3    |           |          |  |  |
| 0.0093 mm. | 75.2    |           |          |  |  |
| 0.0068 mm. | 70.7    |           |          |  |  |
| 0.0050 mm. | 65.0    |           |          |  |  |
| 0.0036 mm. | 60.0    |           |          |  |  |
| 0.0027 mm. | 53.2    |           |          |  |  |
| 0.0012 mm. | 41.0    |           |          |  |  |
|            |         |           |          |  |  |
|            |         |           |          |  |  |
|            |         |           |          |  |  |
|            |         |           |          |  |  |
|            |         |           |          |  |  |
|            |         |           |          |  |  |

#### Gray lean clay Atterberg Limits (ASTM D 4318) **PL=** 21 LL= 46 Classification USCS (D 2487)= CL**AASHTO** (M 145)= A-7-6(27) Coefficients D<sub>90</sub>= 0.0335 D<sub>50</sub>= 0.0023 D<sub>10</sub>= **D<sub>60</sub>=** 0.0036 **D<sub>85</sub>=** 0.0194 D<sub>30</sub>= D<sub>15</sub>= C<sub>C</sub>= Remarks As recieved MC = 38.7%Date Received: 1/30/18 **Date Tested:** 2/2/18 Tested By: SB Checked By: MP

**Material Description** 

\* (no specification provided)

Source of Sample: B-112 Sample Number: S-6

**Depth:** 14-16'

**CDM Smith** 

**Client:** Massachusetts Water Resources Authority (MWRA)

Title: Laboratory Manager

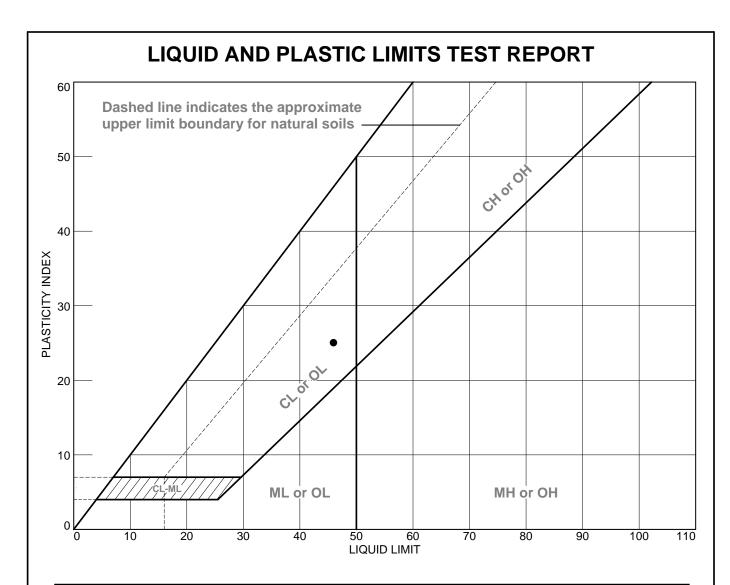
Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 12/18/17

**Project No:** 101038.102170

**Boston, Massachusetts** 



|        | SOIL DATA |               |        |                                    |                         |                        |                            |      |  |
|--------|-----------|---------------|--------|------------------------------------|-------------------------|------------------------|----------------------------|------|--|
| SYMBOL | SOURCE    | SAMPLE<br>NO. | DEPTH  | NATURAL<br>WATER<br>CONTENT<br>(%) | PLASTIC<br>LIMIT<br>(%) | LIQUID<br>LIMIT<br>(%) | PLASTICITY<br>INDEX<br>(%) | USCS |  |
| •      | B-112     | S-6           | 14-16' | 38.7                               | 21                      | 46                     | 25                         | CL   |  |

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts Project No.: 101038.102170

| Tested By: AS | Checked Bv: MP |
|---------------|----------------|
|---------------|----------------|

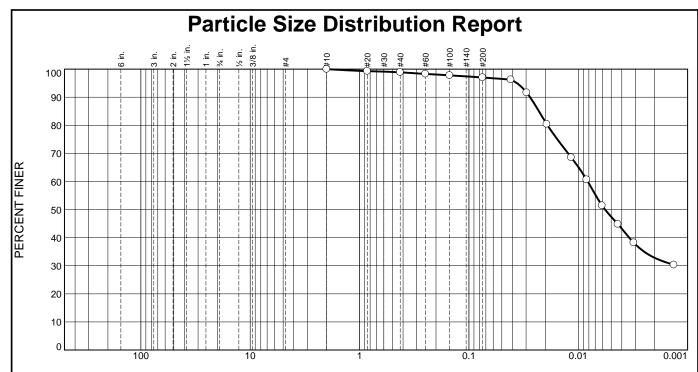
### **Geotechnical Engineering Laboratory**

# Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

Client: Massachusetts Water Resources Authority Weston Aqueduct Supply Main 3 Project Name: Tested By: MWRA line, MA Test Date: 2/2/2018 Project Location: 101038-102170 Project Number: Boring Number: B-113 Procedure: S-3A Temperature: 440° C Sample Number: Sample Depth (ft): 4-5 Sample Date: 12/20/2017

| AS RECEIVED MOISTURE CONTENT |        |
|------------------------------|--------|
| Tin Mass (g)                 | 96.89  |
| Wet Mass of Sample & Tin (g) | 166.50 |
| Dry Mass of Sample & Tin (g) | 121.24 |
| Mass of Water (g)            | 45.26  |
| Mass of Dry Soil (g)         | 24.35  |
| Moisture Content (%)         | 185.9  |

| ASH CONTENT                          |        |  |  |  |  |
|--------------------------------------|--------|--|--|--|--|
| Porcelain Dish Mass (g)              | 96.89  |  |  |  |  |
| Porcelain Dish + Oven Dried Soil (g) | 121.24 |  |  |  |  |
| Mass of Oven Dried Soil (g)          | 24.35  |  |  |  |  |
| Mass of Dish & Burned Soil (g)       | 116.10 |  |  |  |  |
| Mass of Burned Soil (g)              | 19.21  |  |  |  |  |
| Mass of Organic Material (g)         | 5.14   |  |  |  |  |
| Ash Content (%)                      | 78.9   |  |  |  |  |
|                                      |        |  |  |  |  |
| Organic Content (%)                  | 21.1   |  |  |  |  |



| GRAIN SIZE - mm. |          |      |        |        |         |      |      |
|------------------|----------|------|--------|--------|---------|------|------|
| 0/ - 211         | % Gravel |      | % Sand |        | % Fines |      |      |
| % +3"            | Coarse   | Fine | Coarse | Medium | Fine    | Silt | Clay |
| 0.0              | 0.0      | 0.0  | 0.0    | 1.1    | 1 9     | 49.6 | 47.4 |

| Test Results (ASTM D6913 & D7928 & ASTM D1140) |         |           |          |  |  |  |  |
|--|---------|-----------|----------|--|--|--|--|
| Opening  | Percent | Spec.*    | Pass?    |  |  |  |  |
| Size   | Finer   | (Percent) | (X=Fail) |  |  |  |  |
| #10  | 100.0   |           |          |  |  |  |  |
| #20  | 99.3    |           |          |  |  |  |  |
| #40  | 98.9    |           |          |  |  |  |  |
| #60  | 98.3    |           |          |  |  |  |  |
| #100   | 97.8    |           |          |  |  |  |  |
| #200   | 97.0    |           |          |  |  |  |  |
| 0.0413 mm.                                     | 96.3    |           |          |  |  |  |  |
| 0.0296 mm.                                     | 91.6    |           |          |  |  |  |  |
| 0.0194 mm.                                     | 80.4    |           |          |  |  |  |  |
| 0.0116 mm.                                     | 68.6    |           |          |  |  |  |  |
| 0.0084 mm.                                     | 60.7    |           |          |  |  |  |  |
| 0.0061 mm.                                     | 51.4    |           |          |  |  |  |  |
| 0.0043 mm.                                     | 44.8    |           |          |  |  |  |  |
| 0.0031 mm.                                     | 38.2    |           |          |  |  |  |  |
| 0.0013 mm.                                     | 30.3    |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |

Dark gray fat clay with organics

Atterberg Limits (ASTM D 4318)

LL= 96 PI= 60

Coefficients

D<sub>90</sub>= 0.0276 D<sub>85</sub>= 0.0229 D<sub>60</sub>= 0.0082 D<sub>50</sub>= 0.0057 D<sub>30</sub>= D<sub>15</sub>= C<sub>c</sub>=

Remarks

As received MC = 85.5%

Date Received: 1/31/18 Date Tested: 2/6/18

Tested By: MP/SB

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-113 Sample Number: S-5 **Depth:** 9-11'

**Date Sampled:** 12/20/17

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

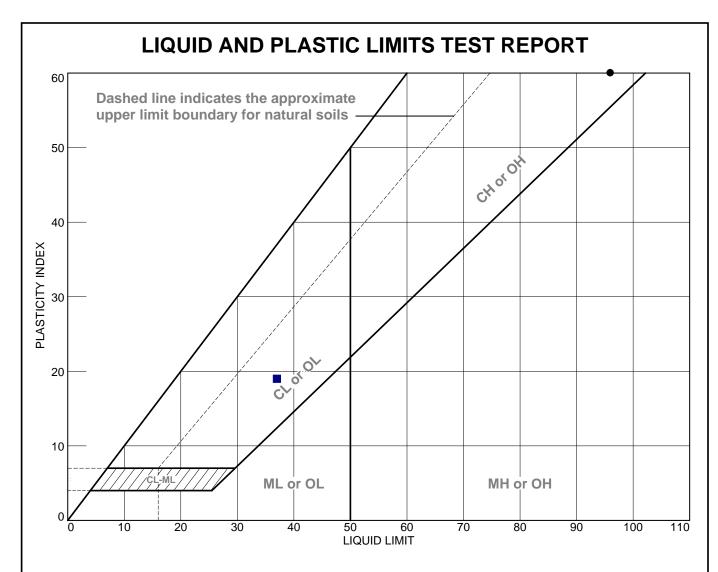
**Client:** Massachusetts Water Resources Authority (MWRA)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Project No:** 101038.102170

**CDM Smith** 

**Boston, Massachusetts** 



| SOIL DATA |        |               |          |                                    |                         |                        |                            |       |  |
|-----------|--------|---------------|----------|------------------------------------|-------------------------|------------------------|----------------------------|-------|--|
| SYMBOL    | SOURCE | SAMPLE<br>NO. | DEPTH    | NATURAL<br>WATER<br>CONTENT<br>(%) | PLASTIC<br>LIMIT<br>(%) | LIQUID<br>LIMIT<br>(%) | PLASTICITY<br>INDEX<br>(%) | uscs  |  |
| •         | B-113  | S-5           | 9-11'    | 85.5                               | 36                      | 96                     | 60                         | CH/OH |  |
| •         | B-113  | S-6B          | 14.5-16' | 35.3                               | 18                      | 37                     | 19                         | CL    |  |

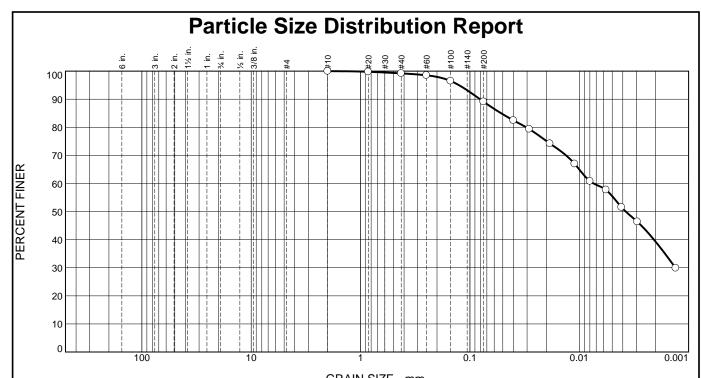
Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts Project No.: 101038.102170

| Tested By: AS | Checked Bv: MP |
|---------------|----------------|
|               |                |



| GRAIN SIZE - mm. |        |                 |        |        |         |      |      |
|------------------|--------|-----------------|--------|--------|---------|------|------|
| % +3"            | % G    | % Gravel % Sand |        |        | % Fines |      |      |
|                  | Coarse | Fine            | Coarse | Medium | Fine    | Silt | Clay |
| 0.0              | 0.0    | 0.0             | 0.0    | 0.8    | 10.1    | 33.6 | 55.5 |

| Test Results (ASTM D6913 & D7928 & ASTM D1140) |         |           |          |  |  |  |  |
|--|---------|-----------|----------|--|--|--|--|
| Opening  | Percent | Spec.*    | Pass?    |  |  |  |  |
| Size   | Finer   | (Percent) | (X=Fail) |  |  |  |  |
| #10  | 100.0   |           |          |  |  |  |  |
| #20  | 99.8    |           |          |  |  |  |  |
| #40  | 99.2    |           |          |  |  |  |  |
| #60  | 98.5    |           |          |  |  |  |  |
| #100   | 96.5    |           |          |  |  |  |  |
| #200   | 89.1    |           |          |  |  |  |  |
| 0.0400 mm.                                     | 82.5    |           |          |  |  |  |  |
| 0.0287 mm.                                     | 79.4    |           |          |  |  |  |  |
| 0.0185 mm.                                     | 74.2    |           |          |  |  |  |  |
| 0.0110 mm.                                     | 67.0    |           |          |  |  |  |  |
| 0.0080 mm.                                     | 60.8    |           |          |  |  |  |  |
| 0.0057 mm.                                     | 57.7    |           |          |  |  |  |  |
| 0.0041 mm.                                     | 51.5    |           |          |  |  |  |  |
| 0.0029 mm.                                     | 46.4    |           |          |  |  |  |  |
| 0.0013 mm.                                     | 29.9    |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |
|  |         |           |          |  |  |  |  |

Gray lean clay

Atterberg Limits (ASTM D 4318) LL= 37

**PL=** 18

USCS (D 2487)= CL

Classification **AASHTO (M 145)=** A-6(17)

Coefficients

D<sub>90</sub>= 0.0808 D<sub>50</sub>= 0.0038 D<sub>10</sub>= **D<sub>60</sub>=** 0.0074 **D<sub>85</sub>=** 0.0518 D<sub>30</sub>= 0.0013 C<sub>u</sub>= D<sub>15</sub>= C<sub>C</sub>=

Remarks

As received MC = 35.3%

**Date Tested:** 2/6/18

Date Received: 1/31/18 Tested By: MP/SB

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-113 Sample Number: S-6B

**Depth:** 14.5-16'

**Date Sampled:** 12/20/17

**CDM Smith** 

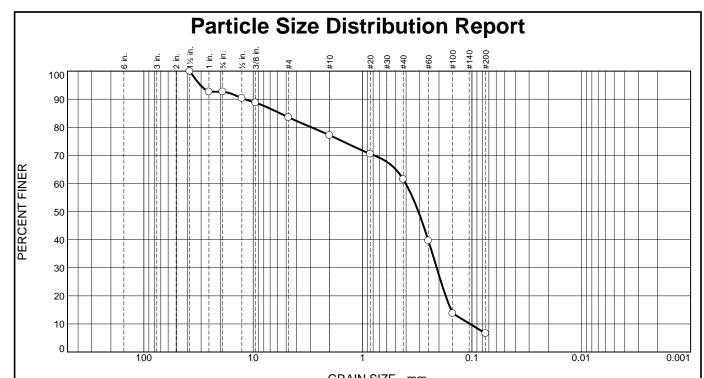
**Client:** Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts** 

**Project No:** 101038.102170



| GRAIN SIZE - mm. |        |       |        |        |      |         |      |  |
|------------------|--------|-------|--------|--------|------|---------|------|--|
| 0/ - 2"          | % G    | ravel | % Sand |        |      | % Fines |      |  |
| % +3"            | Coarse | Fine  | Coarse | Medium | Fine | Silt    | Clay |  |
| 0.0              | 7.3    | 9.2   | 6.3    | 15.7   | 54.9 | 6.6     |      |  |

PL=

|   | Test R    | esults (ASTM De      | 6913 & ASTM [ | D1140)   |  |  |
|---|-----------|----------------------|---------------|----------|--|--|
|   | Opening   | Percent              | Spec.*        | Pass?    |  |  |
|   | Size      | Finer                | (Percent)     | (X=Fail) |  |  |
|   | 1.5       | 100.0                |               |          |  |  |
|   | 1         | 92.7                 |               |          |  |  |
|   | .75       | 92.7                 |               |          |  |  |
|   | .5        | 90.4                 |               |          |  |  |
|   | .375      | 88.8                 |               |          |  |  |
|   | #4        | 83.5                 |               |          |  |  |
|   | #10       | 77.2                 |               |          |  |  |
|   | #20       | 70.5                 |               |          |  |  |
|   | #40       | 61.5                 |               |          |  |  |
|   | #60       | 39.7                 |               |          |  |  |
|   | #100      | 13.8                 |               |          |  |  |
|   | #200      | 6.6                  |               |          |  |  |
|   |           |                      |               |          |  |  |
|   |           |                      |               |          |  |  |
|   |           |                      |               |          |  |  |
|   |           |                      |               |          |  |  |
|   |           |                      |               |          |  |  |
|   |           |                      |               |          |  |  |
|   |           |                      |               |          |  |  |
|   |           |                      |               |          |  |  |
|   |           |                      |               |          |  |  |
| _ | * (no spe | ecification provided | )             |          |  |  |

# **Material Description**

Brown poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318) LL= PI=

**Classification** USCS (D 2487)= SP-SM **AASHTO** (M 145)= A-3

Coefficients

**D<sub>60</sub>=** 0.4030 **D<sub>15</sub>=** 0.1550 **C<sub>c</sub>=** 1.05 **D<sub>90</sub>=** 11.9549 **D<sub>50</sub>=** 0.3086 **D<sub>10</sub>=** 0.1042 D<sub>85</sub>= 5.6922 D<sub>30</sub>= 0.2099 C<sub>u</sub>= 3.87

Remarks

As recieved MC = 14.6%

Date Received: 1/30/18 **Date Tested:** 2/5/18

Tested By: SB Checked By: MP

Title: Laboratory Manager

Source of Sample: B-114 Sample Number: S-1

**Client:** Massachusetts Water Resources Authority (MWRA)

Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

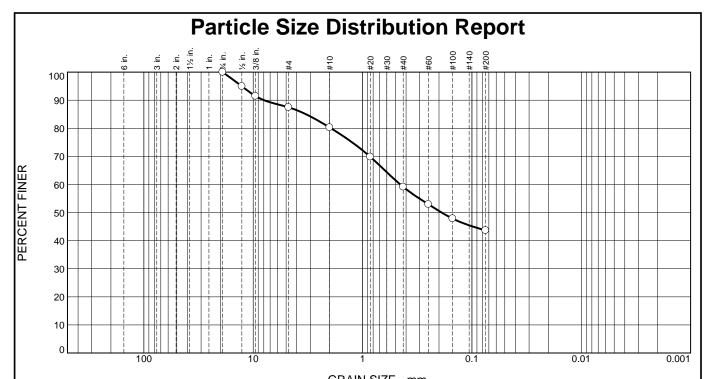
**Date Sampled:** 1/9/18

**Project No:** 101038.102170

**Depth:** 6-8'

**CDM Smith** 

**Boston, Massachusetts** 



|  | GRAIN SIZE - mm. |        |       |          |        |      |         |      |  |
|--|------------------|--------|-------|----------|--------|------|---------|------|--|
|  | 0/ - 211         | % Gı   | ravel | I % Sand |        |      | % Fines |      |  |
|  | % +3"            | Coarse | Fine  | Coarse   | Medium | Fine | Silt    | Clay |  |
|  | 0.0              | 0.0    | 12.5  | 7.2      | 21.2   | 15.4 | 43.7    |      |  |

| Test R  | esults (ASTM D | 6913 & ASTM [ | D1140)   |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| .75     | 100.0          |               |          |
| .5      | 95.0           |               |          |
| .375    | 91.5           |               |          |
| #4      | 87.5           |               |          |
| #10     | 80.3           |               |          |
| #20     | 69.8           |               |          |
| #40     | 59.1           |               |          |
| #60     | 53.0           |               |          |
| #100    | 47.9           |               |          |
| #200    | 43.7           |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |

| Dark gray silty san  | nd with organ  | ics                 |  |        |
|--|--|---------------------|--|--------|
| PL=  | erberg Limi<br>LL=   | ts (ASTN            | <u>/I D 4318)</u><br>PI=                                     |        |
| USCS (D 2487)=   |  | ification<br>AASHTO | (M 145)=   | A-4(0) |
| <b>D<sub>90</sub>=</b> 7.9661<br><b>D<sub>50</sub>=</b> 0.1889<br><b>D<sub>10</sub>=</b> | Coef<br>D <sub>85</sub> = 3.2<br>D <sub>30</sub> =<br>C <sub>u</sub> = | ficients<br>948     | D <sub>60</sub> = (<br>D <sub>15</sub> =<br>C <sub>c</sub> = | ).4517 |
| As recieved MC =   |  | marks               |  |        |
| Date Received:<br>Tested By:   |  | Date <sup>-</sup>   | Tested:  | 2/5/18 |
| Checked By:  | MP   |                     |  |        |
| Title:   | Laboratory N   | lanager             |  |        |

\* (no specification provided)

Source of Sample: B-115 Sample Number: S-2 **Depth:** 8-10'

**CDM Smith** 

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 1/10/18

Boston, Massachusetts Project No: 101038.102170

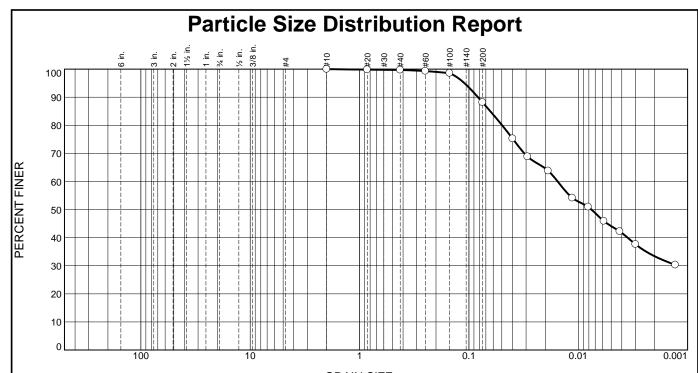
### **Geotechnical Engineering Laboratory**

# Standard Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils(ASTM D2974)

Client: Massachusetts Water Resources Authority Weston Aqueduct Supply Main 3 Project Name: Tested By: MWRA line, MA Test Date: 2/5/2018 Project Location: 101038-102170 Project Number: Boring Number: B-115 Procedure: S-2 Temperature: 440° C Sample Number: Sample Depth (ft): 8-10 Sample Date: 1/10/2018

| AS RECEIVED MOISTURE CONTENT |        |
|------------------------------|--------|
| Tin Mass (g)                 | 96.88  |
| Wet Mass of Sample & Tin (g) | 158.98 |
| Dry Mass of Sample & Tin (g) | 134.88 |
| Mass of Water (g)            | 24.10  |
| Mass of Dry Soil (g)         | 38.00  |
| Moisture Content (%)         | 63.4   |

| ASH CONTENT                          |        |
|--------------------------------------|--------|
| Porcelain Dish Mass (g)              | 96.88  |
| Porcelain Dish + Oven Dried Soil (g) | 134.88 |
| Mass of Oven Dried Soil (g)          | 38.00  |
| Mass of Dish & Burned Soil (g)       | 132.82 |
| Mass of Burned Soil (g)              | 35.94  |
| Mass of Organic Material (g)         | 2.06   |
| Ash Content (%)                      | 94.6   |
| _                                    |        |
| Organic Content (%)                  | 5.4    |



|        | GRAIN SIZE - mm. |        |      |        |        |         |      |      |
|--------|------------------|--------|------|--------|--------|---------|------|------|
| 0/ .2" | % Gravel         |        |      | % Sand | I      | % Fines |      |      |
|        | % +3"            | Coarse | Fine | Coarse | Medium | Fine    | Silt | Clay |
|        | 0.0              | 0.0    | 0.0  | 0.0    | 0.3    | 11.5    | 44 1 | 44 1 |

| Opening    | Percent | Spec.*    | Pass?    |
|------------|---------|-----------|----------|
| Size       | Finer   | (Percent) | (X=Fail) |
| #10        | 100.0   |           |          |
| #20        | 99.8    |           |          |
| #40        | 99.7    |           |          |
| #60        | 99.3    |           |          |
| #100       | 98.6    |           |          |
| #200       | 88.2    |           |          |
| 0.0398 mm. | 75.3    |           |          |
| 0.0291 mm. | 68.8    |           |          |
| 0.0188 mm. | 63.8    |           |          |
| 0.0113 mm. | 54.2    |           |          |
| 0.0081 mm. | 50.9    |           |          |
| 0.0058 mm. | 45.9    |           |          |
| 0.0042 mm. | 42.2    |           |          |
| 0.0030 mm. | 37.6    |           |          |
| 0.0013 mm. | 30.3    |           |          |
|            |         |           |          |
|            |         |           |          |
|            |         |           |          |
|            |         |           |          |
|            |         |           |          |
|            |         |           |          |

#### **Material Description** Gray lean clay Atterberg Limits (ASTM D 4318) **PL=** 18 LL= 38 Classification USCS (D 2487)= CL**AASHTO (M 145)=** A-6(17) Coefficients D<sub>90</sub>= 0.0826 D<sub>50</sub>= 0.0076 D<sub>10</sub>= **D<sub>60</sub>=** 0.0154 **D<sub>85</sub>=** 0.0637 D<sub>30</sub>= D<sub>15</sub>= C<sub>C</sub>= Remarks As received MC = 32.5%Date Received: 1/31/18 **Date Tested:** 2/6/18Tested By: MP/SB Checked By: MP Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-115

Sample Number: S-4

**Depth:** 19-21'

CDM Smith

Client: Massachusetts Water Resources Authority (MWRA)

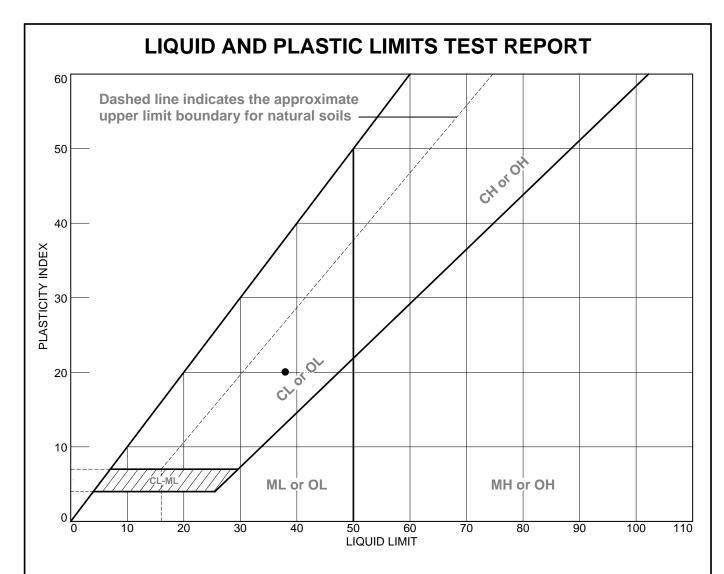
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Date Sampled: 1/10/18

Boston, Massachusetts

**Project No:** 101038.102170



|        | SOIL DATA |               |        |                                    |                         |                        |                            |      |  |  |  |
|--------|-----------|---------------|--------|------------------------------------|-------------------------|------------------------|----------------------------|------|--|--|--|
| SYMBOL | SOURCE    | SAMPLE<br>NO. | DEPTH  | NATURAL<br>WATER<br>CONTENT<br>(%) | PLASTIC<br>LIMIT<br>(%) | LIQUID<br>LIMIT<br>(%) | PLASTICITY<br>INDEX<br>(%) | uscs |  |  |  |
| •      | B-115     | S-4           | 19-21' | 32.5                               | 18                      | 38                     | 20                         | CL   |  |  |  |

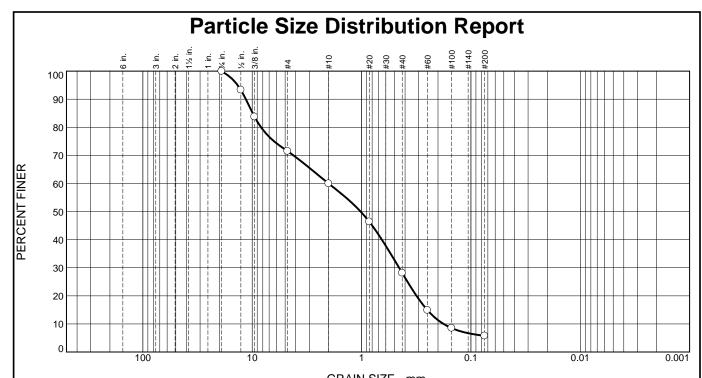
Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts Project No.: 101038.102170

Tested By: AS Checked By: MP



| GRAIN SIZE - mm. |          |      |        |        |      |         |      |  |
|------------------|----------|------|--------|--------|------|---------|------|--|
| 0/ - 211         | % Gravel |      |        | % Sand |      | % Fines |      |  |
| % +3"            | Coarse   | Fine | Coarse | Medium | Fine | Silt    | Clay |  |
| 0.0              | 0.0      | 28.5 | 11.5   | 31.9   | 22.4 | 5.7     |      |  |

| Test Ro | esults (ASTM D | 6913 & ASTM I | D1140)   |
|---------|----------------|---------------|----------|
| Opening | Percent        | Spec.*        | Pass?    |
| Size    | Finer          | (Percent)     | (X=Fail) |
| .75     | 100.0          |               |          |
| .5      | 93.3           |               |          |
| .375    | 83.8           |               |          |
| #4      | 71.5           |               |          |
| #10     | 60.0           |               |          |
| #20     | 46.4           |               |          |
| #40     | 28.1           |               |          |
| #60     | 14.9           |               |          |
| #100    | 8.5            |               |          |
| #200    | 5.7            |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |
|         |                |               |          |

Dark gray poorly graded sand with silt and gravel

Atterberg Limits (ASTM D 4318) LL= PI=

PL=

 Classification

 USCS (D 2487)=
 SP-SM
 AASHTO (M 145)=
 A-1-b

Coefficients

 D90=
 11.4343
 D85=
 9.8979
 D60=
 2.0042

 D50=
 1.0198
 D30=
 0.4538
 D15=
 0.2513

 D10=
 0.1778
 Cu=
 11.27
 Cc=
 0.58

Remarks

As recieved MC = 11.0%

Date Tested: 2/5/18

Date Received: 1/30/18 Tested By: SB

Checked By: MP

Title: Laboratory Manager

\* (no specification provided)

Source of Sample: B-116 Sample Number: S-2

**Depth:** 8-10'

Date Sampled: 1/9/18

**CDM Smith** 

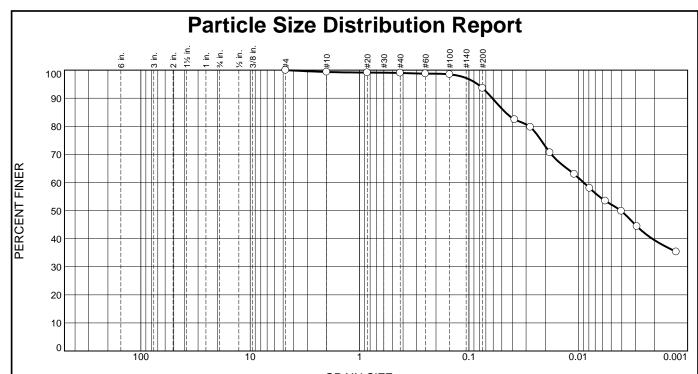
**Client:** Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Boston, Massachusetts** 

**Project No:** 101038.102170



|          | GRAIN SIZE - mm. |          |      |        |        |      |         |      |  |
|----------|------------------|----------|------|--------|--------|------|---------|------|--|
| 0/ - 211 | 0/ .3"           | % Gravel |      |        | % Sand | I    | % Fines |      |  |
|          | % +3"            | Coarse   | Fine | Coarse | Medium | Fine | Silt    | Clay |  |
|          | 0.0              | 0.0      | 0.0  | 0.7    | 0.3    | 5.4  | 41.4    | 52.2 |  |

| Opening    | Percent | Spec.*    | Pass?    |  |
|------------|---------|-----------|----------|--|
| Size       | Finer   | (Percent) | (X=Fail) |  |
| #4         | 100.0   |           |          |  |
| #10        | 99.3    |           |          |  |
| #20        | 99.1    |           |          |  |
| #40        | 99.0    |           |          |  |
| #60        | 98.8    |           |          |  |
| #100       | 98.5    |           |          |  |
| #200       | 93.6    |           |          |  |
| 0.0382 mm. | 82.4    |           |          |  |
| 0.0274 mm. | 79.7    |           |          |  |
| 0.0182 mm. | 70.7    |           |          |  |
| 0.0109 mm. | 63.0    |           |          |  |
| 0.0079 mm. | 58.0    |           |          |  |
| 0.0057 mm. | 53.4    |           |          |  |
| 0.0040 mm. | 49.8    |           |          |  |
| 0.0029 mm. | 44.4    |           |          |  |
| 0.0013 mm. | 35.3    |           |          |  |
|            |         |           |          |  |
|            |         |           |          |  |
|            |         |           |          |  |
|            |         |           |          |  |

| <u> Material Description</u>                                 |  |  |  |  |  |  |
|--|--|--|--|--|--|--|
| Gray lean clay   |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| Atterberg Limits (ASTM D 4318)                               |  |  |  |  |  |  |
| PL= 16   |  |  |  |  |  |  |
| Classification   |  |  |  |  |  |  |
| USCS (D 2487)= CL AASHTO (M 145)= A-6(12)                    |  |  |  |  |  |  |
| Coefficients   |  |  |  |  |  |  |
| $D_{90} = 0.0610$ $D_{85} = 0.0465$ $D_{60} = 0.0089$        |  |  |  |  |  |  |
| D <sub>50</sub> = 0.0041 D <sub>30</sub> = D <sub>15</sub> = |  |  |  |  |  |  |
| $C_{0}$ $C_{0}$ $C_{0}$                                      |  |  |  |  |  |  |
| Remarks  |  |  |  |  |  |  |
| As received $MC = 29.9\%$                                    |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| Date Received: 1/31/18 Date Tested: 2/6/18                   |  |  |  |  |  |  |
| Tested By: MP/SB   |  |  |  |  |  |  |
| Checked By: MP   |  |  |  |  |  |  |
| Title: Laboratory Manager                                    |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

\* (no specification provided)

Source of Sample: B-116 Sample Number: S-3 **Depth:** 14-16'

CDM Smith

Client: Massachusetts Water Resources Authority (MWRA)

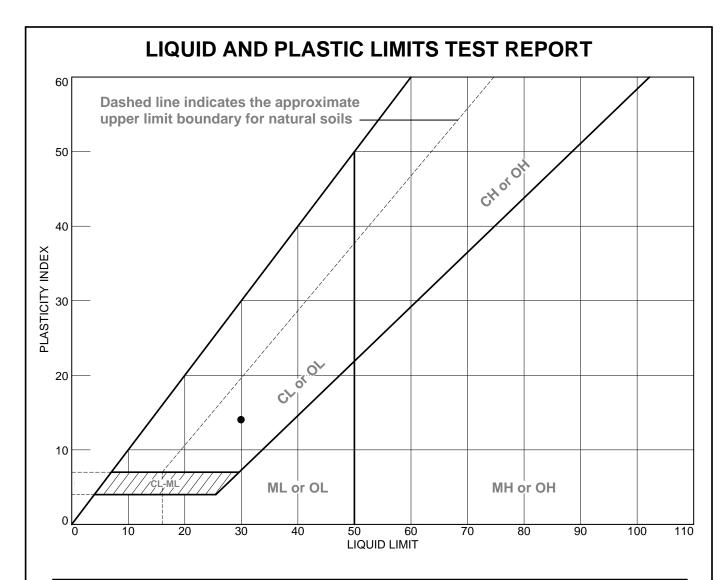
**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

**Date Sampled:** 1/9/18

**Boston, Massachusetts** 

**Project No:** 101038.102170



|        | SOIL DATA |               |        |                                    |                         |                        |                            |      |
|--------|-----------|---------------|--------|------------------------------------|-------------------------|------------------------|----------------------------|------|
| SYMBOL | SOURCE    | SAMPLE<br>NO. | DEPTH  | NATURAL<br>WATER<br>CONTENT<br>(%) | PLASTIC<br>LIMIT<br>(%) | LIQUID<br>LIMIT<br>(%) | PLASTICITY<br>INDEX<br>(%) | USCS |
| •      | B-116     | S-3           | 14-16' | 29.9                               | 16                      | 30                     | 14                         | CL   |

Client: Massachusetts Water Resources Authority (MWRA)

**Project:** Weston Aqueduct Supply Main 3 (WASM3)

Medford, Somerville, Arlington, Belmont, Waltham & Weston, MA

Boston, Massachusetts Project No.: 101038.102170

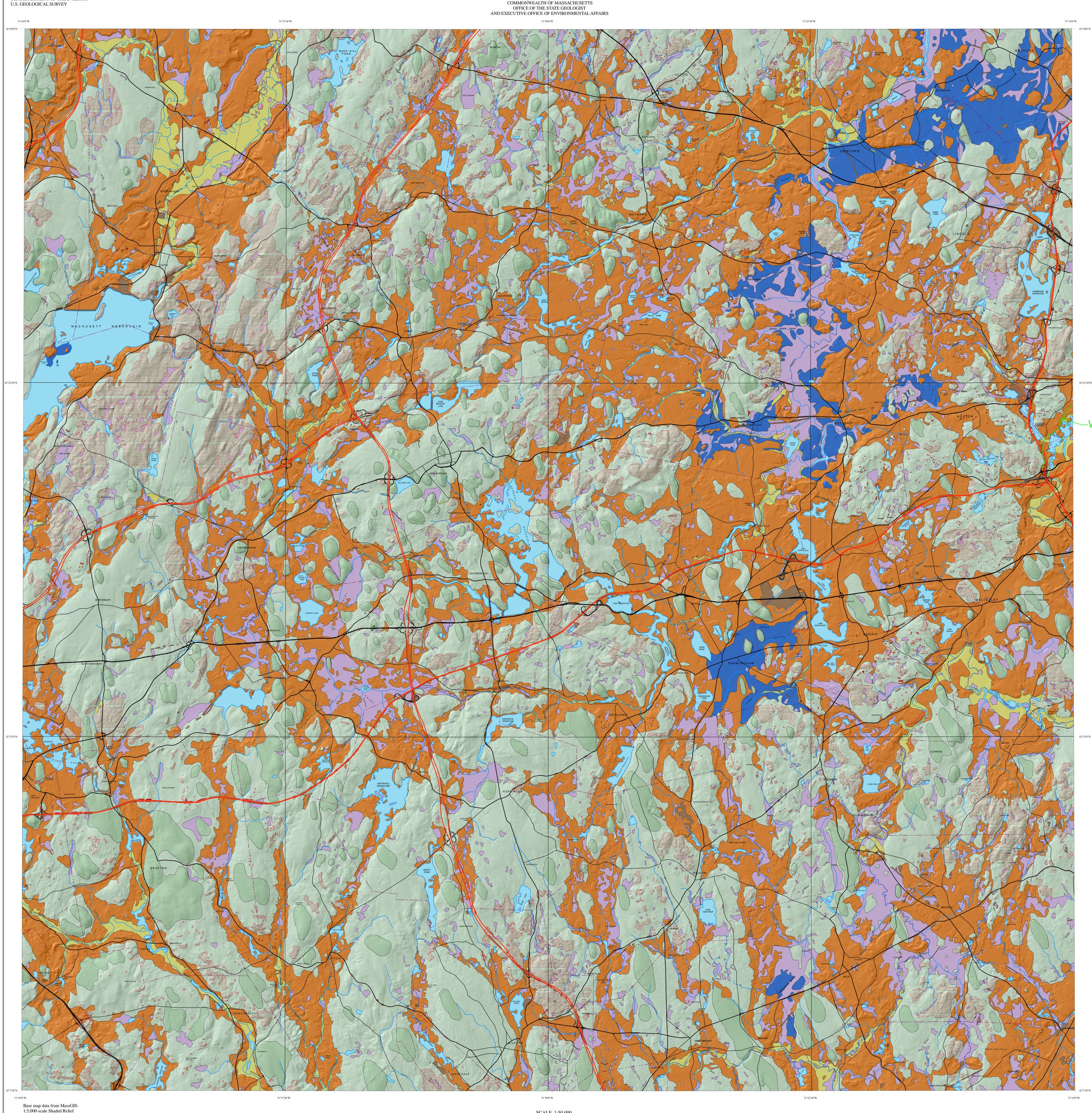
| Tested By: AS | Checked Bv: MP |
|---------------|----------------|
|               |                |

# Appendix E

Regional Geology Maps



Surficial Geologic Map of the Clinton-Concord-Grafton-Medfield 12-Quadrangle Area in East Central Massachusetts, 2006



# SURFICIAL GEOLOGIC MAP OF THE CLINTON-CONCORD-GRAFTON-MEDFIELD 12-QUADRANGLE AREA IN EAST CENTRAL MASSACHUSETTS Compiled by Janet R. Stone and Byron D. Stone

**DESCRIPTION OF MAP UNITS** POSTGLACIAL DEPOSITS

Artificial fill—Earth materials and manmade materials that have been artificially emplaced, primarily in highway and railroad embankments, and in dams; may also include landfills, urban development areas, and filled

Floodplain alluvium—Sand, gravel, silt, and some organic material, stratified and well sorted to poorly sorted, beneath the floodplains of modern streams. The texture of alluvium commonly varies over short distances both laterally and vertically, and generally is similar to the texture of adjacent glacial deposits. Along smaller streams, alluvium is commonly less than 5 ft thick. The most extensive deposit of alluvium on the map is along the Charles, Assabet, and Concord Rivers where the texture is predominantly sand, fine gravel, and silt, and total thickness is as much as 25 ft. Alluvium typically overlies thicker glacial stratified

Swamp deposits—Organic muck and peat that contain minor amounts of sand, silt, and clay, stratified and poorly sorted, in kettle depressions or poorly drained areas. Most swamp deposits are less than about 10 ft thick. Swamp deposits overlie glacial deposits or bedrock. They locally overlie glacial till even where they occur within thin glacial meltwater deposits.

GLACIAL STRATIFIED DEPOSITS

Sorted and stratified sediments composed of gravel, sand, silt, and clay (as defined in particle size diagram) deposited in layers by glacial meltwater. These sediments occur as four basic textural units—gravel deposits, sand and gravel deposits, sand deposits, and fine deposits. On this interim map, gravel, sand and gravel, and sand deposits are not differentiated and are shown as Coarse Deposits where they occur at land surface. Fine Deposits also are shown where they occur at land surface. Textural changes occur both areally and vertically (fig. 2), however subsurface textural variations are not shown on this interim map.

Coarse deposits include: Gravel deposits composed mainly of gravelsized clasts; cobbles and boulders predominate; minor amounts of sand within gravel beds, and sand comprises few separate layers. Gravel layers generally are poorly sorted and bedding commonly is distorted and faulted due to postdepositional collapse related to melting of ice. Sand and gravel deposits composed of mixtures of gravel and sand within individual layers and as alternating layers. Sand and gravel layers generally range from 25 to 50 percent gravel particles and from 50 to 75 percent sand particles. Layers are well to poorly sorted; bedding may be distorted and faulted due to postdepositional collapse. Sand deposits composed mainly of very coarse to fine sand, commonly in well-sorted layers. Coarser layers may contain up to 25 percent gravel particles, generally granules and pebbles; finer layers may contain some very fine sand, silt, and clay.

Fine deposits include very fine sand, silt, and clay that occurs as wellsorted, thin layers of alternating silt and clay, or thicker layers of very fine sand and silt. Very fine sand commonly occurs at the surface and grades downward into rhythmically bedded silt and clay varves. Locally, this map unit may include areas underlain by fine sand.

Thin till—Nonsorted, nonstratified matrix of sand, some silt, and little

crystalline rocks. Fine-grained bedrock sources include the red Mesozoic sedimentary rocks of the Connecticut River lowland, marble in the western

GLACIAL TILL DEPOSITS

clay containing scattered gravel clasts and few large boulders; in areas where till is generally less than 10-15 ft thick and including areas of bedrock outcrop where till is absent. Predominantly upper till of the last glaciation; loose to moderately compact, generally sandy, commonly stony. Two facies are present in some places; a looser, coarser-grained ablation facies, melted out from supraglacial position; and an underlying more compact, finer-grained lodgement facies deposited subglacially. In general, both ablation and lodgement facies of upper till derived from finegrained bedrock are finer grained, more compact, less stony and have fewer surface boulders than upper till derived from coarser grained

river valleys, and fine-grained schists in upland areas.

stained with iron and manganese oxides.

Thick till— Nonsorted, nonstratified matrix of sand, some silt, and little clay containing scattered gravel clasts and few large boulders at the surface; in the shallow subsurface, compact, nonsorted matrix of silt, very fine sand, and some clay containing scattered small gravel clasts in areas where till is greater than 10-15 ft thick, chiefly in drumlin landforms in which till thickness commonly exceeds 100 ft (maximum recorded thickness is 230 ft). Although upper till is the surface deposit, the lower till constitutes the bulk of the material in these areas. Lower till is moderately to very compact, and is commonly finer-grained and less stony than upper till. An oxidized zone, the lower part of a soil profile formed during a period of interglacial weathering, is generally present in the upper part of

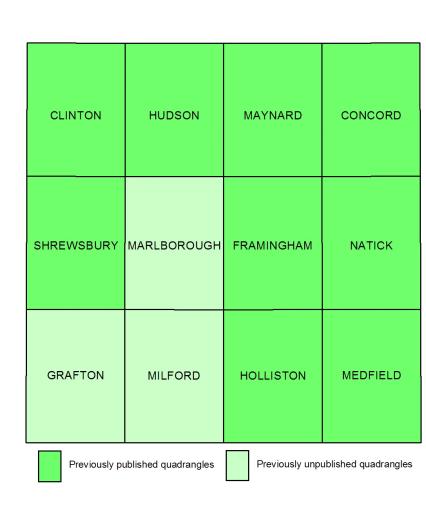
the lower till. This zone commonly shows closely spaced joints that are

BEDROCK AREAS

Bedrock outcrops and areas of abundant outcrop or shallow **bedrock**— Solid color shows extent of individual bedrock outcrops; line pattern indicates areas of shallow bedrock or areas where small outcrops are too numerous to map individually; in areas of shallow bedrock, surficial materials are less than 5 ft thick.

PARTICLE DIAMETER **GRAVEL PARTICLES** SAND PARTICLES FINE PARTICLES

Grain-size classification used in this report, modified from Wentworth (1922)



7.5-minute quadrangles in this compilation

**SOURCES OF DATA** 

See explanatory pamphlet for references **Clinton Quadrangle** Map units were reproduced from Koteff, 1966. Glacial Stratified Deposits in this quadrangle include deposits of glacial Lakes Nashua, Assabet, and Leominster, and other smaller valley deposits. Fine-grained glacial stratified deposits at land surface include glacial Lake Nashua lake-bottom deposits (unit Qnbb of Koteff, 1966). Areas of thick till shown on this map were inferred from photographic image and topographic analysis and drumlin symbols shown by Koteff (1966).

**Hudson and Maynard Quadrangles** Map units were reproduced from Hansen (1956). Glacial Stratified Deposits in this quadrangle include various glacial lake and stream deposits. Fine-grained glacial stratified deposits at land surface include lake-bottom deposits of glacial Lake Sudbury (parts of unit Qsg of Hansen, 1956); this unit has been extended beneath adjacent water bodies and postglacial deposits on this map. Drumlin till unit was reproduced from the published map; other areas of thick till were inferred from photographic image and

**Concord Quadrangle** Map units were reproduced from Koteff (1964). Glacial Stratified Deposits in this

topographic analysis.

quadrangle include deposits of glacial lakes Sudbury and Concord, and other smaller valley deposits. Fine-grained glacial stratified deposits at land surface include lake-bottom deposits of glacial Lakes Sudbury and Concord (unit Qlsb and Qlcb of Koteff, 1964); these units have been extended beneath adjacent water bodies and postglacial deposits on this map. Thick till areas shown on this map were inferred from photographic image and topographic analysis and drumlin symbols shown by Koteff (1964).

**Shrewsbury Quadrangle** Map units were reproduced from Shaw (1969). Glacial Stratified Deposits in this quadrangle include deposits of glacial Lakes Assabet and Nashua, and other smaller valley deposits. Thick till areas shown on this map were inferred from photographic image and topographic analysis and drumlin symbols shown by Shaw (1969).

Marlborough Quadrangle Stone, B.D., 1982, Unpublished field maps

Hildreth, C.T., and Stone, B.D., 2004, Surficial geologic map of the Marlborough Quadrangle, unpublished data.

Framingham Quadrangle Map units were reproduced from Nelson (1974). Glacial Stratified Deposits in this

quadrangle include deposits of glacial Lakes Charles and Sudbury, and other smaller valley deposits. Fine-grained glacial stratified deposits at land surface include lakebottom deposits of glacial Lakes Sudbury and Charles (unit Qlsb and Qlcb of Nelson, 1974); these units have been extended beneath adjacent water bodies and postglacial deposits on this map. Some contacts between till and glacial stratified deposits have been modified from Nelson (1974). Thick till areas shown on this map were inferred from photographic image and topographic analysis and drumlin symbols shown by Nelson

**Natick Quadrangle** Map units were reproduced from Nelson (1974). Glacial Stratified Deposits in this

**Grafton Quadrangle** 

quadrangle include deposits of glacial Lakes Charles and Sudbury, and other smaller valley deposits. Fine-grained glacial stratified deposits at land surface include lakebottom deposits of glacial lake Sudbury (unit Qlsb of Nelson, 1974); this unit has been extended beneath adjacent water bodies and postglacial deposits on this map. Thick till areas shown on this map were inferred from photographic image and topographic analysis and drumlin symbols shown by Nelson (1974).

Haselton, G.M., and Fontaine, E., 1982, Unpublished field maps Distribution of bedrock outcrops from Walsh, G.W., 2005, Bedrock Geologic Map of the Grafton quadrangle, unpublished data.

Milford Quadrangle Haselton, G.M., and Fontaine, E., 1982, Unpublished field map

**Holliston Quadrangle** 

Map units were reproduced from Volckman (1975). Glacial Stratified Deposits in this quadrangle include deposits of glacial Lake Medfield, and other smaller valley deposits. Fine-grained glacial stratified deposits at land surface include lake-bottom deposits of glacial Lake Medfield (unit Qm2 of Volckman, 1975); this unit has been extended beneath adjacent water bodies and postglacial deposits on this map. Thick till areas shown on this map were inferred from photographic image and topographic analysis and drumlin symbols shown by Volckman (1975).

Medfield Quadrangle

Map units were reproduced from Volckman (1975). Glacial Stratified Deposits in this quadrangle include deposits of glacial Lake Medfield, and other smaller valley deposits. Thick till areas shown on this map were inferred from photographic image and topographic analysis and drumlin symbols shown by Volckman (1975).

1:100,000-scale Hydrography

Geographic names from USGS

1:5,000-scale EOT Major Roads

1:25,000-scale Digital Quadrangle Template

Surficial Geologic Map of the Natick Quadrangle, Middlesex and Norfolk Counties, Massachusetts, 1974 INTRODUCTION

The Natick quadrangle is an area of about 55 square miles

in eastern Massachusetts centered about 12 miles west of

Boston. Although much of the topography is controlled by

lithology and structure of the bedrock, a considerable part of

the topography has been modified by glaciation. Bedrock,

most of which is concealed by a cover of surficial deposits, is

principally exposed in the northern half of the quadrangle.

Glacial features include drumlins, eskers or ice-channel fillings,

kames, kame terraces, gently sloping kame deltas, and flat-

lying lake-bottom deposits. A thin veneer of till covers a large

part of the hills in the quadrangle, and most of the younger

stratified glacial deposits lie at the lower levels, having been

Most of the quadrangle is drained by the Charles River,

which flows northeastward and empties into Boston Harbor.

A smaller area in the northwestern and western parts is

drained by the Sudbury River, which flows northward into the

Concord River, hence to the Merrimack River, and finally to

SURFICIAL DEPOSITS

Poorly sorted and mostly nonstratified loose to well-com-

pacted till is widely dispersed throughout the quadrangle. It

is most prevalent in the northern, central, and eastern parts,

where it forms a thin veneer of variable thickness over much

of the bedrock. A large part of the till is concealed by over-

Glacial-lake and glacial-stream deposits

down in or graded to the various stages of glacial Lake Charles (Clapp, 1904, p. 198) and Sudbury (Goldthwait, 1905, p. 274).

These deposits, which are widespread, particularly in the

southern half and western part of the map area, have been

grouped chronologically; the deposits are successively younger

northward. The older deposits were laid down in Lake Charles,

which formed as the glacial meltwaters were dammed by

earlier deposits and ice. With time, as the ice front retreated

northward and successively lower outlets were utilized,

younger stages of Lake Charles and Sudbury. The idea of

mapping groups of glacial deposits according to their chrono-

The distribution of materials is somewhat heterogeneous

throughout the area underlain by lake deposits, because of the

coalescing and overlapping of deltas and the many ice-front

positions from which the sand and gravel originated. Sorting

and degree of stratification of the deposits, as well as the

textures, vary widely. The deltaic deposits most commonly

have south-dipping foreset beds of silt, sand, and pebbly sand

with minor gravelly beds: these are overlain by gently south-

dipping topset beds of coarse pebbly to cobbly gravel. The

gravel has large clasts (boulders and cobbles) which are mostly

granitic in composition, ranging from granite to granodiorite.

Lesser amounts of siliceous gneiss, quartzite, metamorphosed

volcanic rock of intermediate to mafic composition, and gabbro

Lake-bottom deposits of well-sorted and thin stratified beds

of fine-grained silt and sand are present in the northwestern

part of the quadrangle. Clay may be present below the beds

of sand and silt but was not seen in the Natick quadrangle.

bottom deposits in the adjoining Concord quadrangle to the

Glacial-stream deposits

are not clearly graded to any lake level are present in the

north-central and northeastern parts of the quadrangle. In

part, these deposits form kames and kame terraces deposited

GLACIAL AND POSTGLACIAL HISTORY

Glacial ice moved across the Natick quadrangle in a generally

south to southeast direction. This direction is recorded in

the alinement of drumlins, together with grooves and striae

bearing. The effects of glacial erosion are small. The sur-

ficial deposits in the area between Cochituate and Wellesley

are at least 165 feet thick, and it is possible that a preglacial

valley in this area (Clapp, 1904, p. 201) was slightly overdeep-

ened by ice movements and later filled up with glacial ma-

terial. This valley is outlined on the map by bedrock contours.

These contours are based on well depths and show the altitude

of the bedrock surface under the thick cover of glacial de-

posits. The valley trends southeast from near Cochituate

toward Wellesley; near Lake Waban it turns northeast. The

northeast part of the valley follows the trend of and is obvi-

ously controlled by a major fault in the bedrock (Nelson,

unpub. data) which divides pre- from post-Devonian rock. This

covered valley probably represents the preglacial drainage

Till (Qt), deposited directly by the ice, is the oldest glacial

deposit, and, although relatively thin, it is widespread over

much of the quadrangle. Hansen (1956, p. 61) and Koteff

(1964) both report that till of two ages is present in adjoining

quadrangles to the northwest and north, respectively. Only

one till has been observed in the Natick quadrangle, and it

matches the description of the younger one discussed by Koteff

(1964); if the older till is present, it is buried by younger de-

posits. The till mapped in the Natick quadrangle probably

correlates with youngest till of Wisconsin age that Koteff

During retreat of the ice from the Natick and adjacent

quadrangles, melt waters were dammed by hills to the west,

south, and east and by the ice front to the north, and glacial

Lakes Charles and Sudbury were formed. Cols in drainage

divides to the south and east served as spillways and control-

led the lake levels. As the ice retreated farther north, lower

spillways were uncovered and the lakes were successively

lowered to the altitudes of the new spillways. Each succes-

sive level represents a lake stage, and gravel and sand were

Commonly, sand and gravel were deposited in contact with

the stagnant ice front, as well as around and over isolated

stagnant ice blocks that became separated from the main ice

sheet. When sand and gravel were deposited directly into

the lakes, deltas were formed. Relatively level sand and

gravel plains formed in places where deltas coalesced and

Both Lakes Charles and Sudbury occupied parts of the

Natick quadrangle. Lake Charles, the older of the two lakes,

has a complex history that is represented by five stages in the

Natick quadrangle. During each successively lower stage,

glacial deposits were laid down. Although the spillways that

controlled the stage levels of the lakes are located outside the

map area, the lake stage levels can be determined within the

quadrangle by the altitudes of the tops of foreset beds in delta

deposits. Four such altitudes have been obtained within the map area and one altitude from a nearby delta in the adjoin-

ing Framingham quadrangle. The locations of the deltas and

the altitudes of the tops of foreset beds are: just north of Sher-

born in the southwest part of the quadrangle, altitude 178

feet; near East Natick in the west-central part of map, alti-

tude 179 feet; near Cochituate close to the west edge of map,

altitude 178 feet; just west of Happy Hollow in the Framing-

ham quadrangle, altitude 179 feet; and just east of Morses

Because the delta positions are widespread throughout the

quadrangle, it is necessary to know what the postglacial tilt

of the land has been, before the altitude differences between

the various lake stages can be determined. Koteff (1963)

found that postglacial tilt in the adjoining Concord quadran-

gle was between 5 and 6 feet per mile; therefore, using Koteff's

tilt value and projecting the known lake levels, the relative levels of the different stages can be found. The lake stages,

named after geographic locations near the deltas and listed

in order of decreasing altitude, are the Sherborn, East Natick,

Cochituate, Happy Hollow, and Morses Pond stages.

Pond in the center of the map area, altitude 150 feet.

elsewhere where groups of deltas are closely spaced.

for the Sudbury River (Clapp, 1904, p. 201).

(1964) described in the Concord quadrangle.

deposited in or graded to each level.

Glacial-stream deposits (or outwash) forming valley fill that

Koteff (1964) reports that some silty clay is present in lake-

logic relationships was proposed by Jahns (1941, 1953).

younger deposits were laid down in or graded to successively

Most of the stratified deposits in the quadrangle were laid

lying stratified surficial material.

are also present.

in contact with stagnant ice.

the Atlantic Ocean at the northeast corner of the state.

deposited in or graded to glacial lakes formed during deglacia-

tion, when melt waters were temporarily dammed by ice.

The oldest lake deposits (Qlc1)and associated ice-contact deposits (Qc1) were formed during the Sherborn stage. These

eposits are present in the southwestern part of the quadran-

gle and were laid down during the highest known level that

Lake Charles attained in the Natick quadrangle. The next

younger lake deposits (Qlc2) were formed during the East

Natick stage when the lake level was lowered about 12 feet.

These deposits occupy a large part of the Dug Pond-Lake

Cochituate-Natick area. Later, during the Cochituate stage

after the lake level was lowered about 10 feet more, the lake

deposits (Qlc3) formed. Extensive ice-contact deposits (Qc2)

were formed during the following Happy Hollow stage, when

the lake level was about 5 feet lower than that of the preced-

ing Cochituate stage. During this stage, the stagnant ice

The youngest lake deposits (Qlc4) were formed during the

Morses Pond stage, when the lake level was about 14 feet

lower than that of the Happy Hollow stage. These deposits

are exposed over a large area in the Wellesley Fells-Wellesley

Deposition in front of stagnant ice created a sandy and

gravelly kame complex (Qc3) of considerable extent in the eastern part of the quadrangle; some of the topographic fea-

tures include eskers, kame terraces, kame deltas, and kettles. Deposits associated with these features were probably laid down during the Morses Pond stage just after or perhaps, in

part, contemporaneously with the ice-contact deposits (Qc2)

just north of Dudley Pond and with the deposits of outwash

The distribution of the deposits of Lake Charles, especially

those of the Morses Pond stage, suggests that the ice front

retreated at a faster rate in the western part of the Natick

quadrangle then elsewhere in the quadrangle. The area from

Dug Pond to Cochituate in the western part of the map is part

of a broad lowland that extends westward well into the Fram-

ingham quadrangle. This lowland is bordered on the east by

the somewhat higher terrain in the central part of the quad

ing lowland centered around East Natick.

graded to the Morses Pond stage.

earlier than Qo2.

ously with QIs1 and QIs2.

ity of Wayland.

rangle. These highlands are broken by a southeasterly trend-

As the ice melted in the lowlands to the west, ice probably

remained in parts of the East Natick lowlands. Deposits of

the East Natick stage are present on the west side of Morses

Pond, whereas deposits of the Morses Pond stage (29 feet

lower lake altitude) are present on the east side. This, to-

gether with the fact that numerous ice-contact slopes are present in the lowlands from Pickerel Pond to Lake Waban,

strongly suggests that the ice front or large blocks of ice oc-

cupied the lowlands from the East Natick stage through

at least parts of the Morses Pond stage. It is believed that

ice in this area and possibly in the adjacent highlands formed

a southward-extending lobe in the central part of the quad-

rangle. By the time the spillway that controlled the altitude

of the Morses Pond stage was uncovered, the ice lobe had largely melted, and sand and gravel were deposited in or

With continued wastage of the ice after deposition of the

Morses Pond stage lake deposits, a lower spillway for Lake

Charles was uncovered to the east of the quadrangle near the

Blue Hills. The lake was then greatly lowered or completely

of sand and pebbly gravel with some cobbles were deposited

along broad stretches of the Charles River. Deposits of sand

and gravel of uncertain origin (Qsg) also occupy a part of the Charles River in the vicinity of Newton, in the northeastern

part of the quadrangle, and in a small area near Weston Sta-

deposited in a broad valley (Qo1) in the north-central part of

the quadrangle and along the western side of Reeves Hill

(Qo2) in the northwestern part. Deposition of Qo2 was, in

part, contemporaneous with Qo1, which began and ended

Sand and gravel were laid down during five stages of Lake

Sudbury in the northern part of the Natick quadrangle. The

earliest deposits (Qls1) were those that were laid down in or

graded to a small irregular relatively high-level lake approxi-

mately 2 miles southeast of Wayland; the lake developed be-

tween the ice front to the north and hills to the south and is

herein called the Wayland stage of Lake Sudbury. This lake

east that was at a lower level, and which is here called the

high level of the Weston stage. These lakes were at first

separated from each other by uplands and ice, but, with con-

tinued ice retreat, the Wayland stage eventually dropped to

the level of the Weston stage. A spillway about 195 feet in

altitude, located southeast of Weston Reservoir, was the prin-

cipal outlet for the high level of the Weston stage; gravel and

sand deposited during this stage are shown as QIs2 on the

map. Ice-contact deposits Qc4 were formed contemporane-

The spillway controlling the low level of the Weston stage is located southeast of Weston at an altitude of 177 feet. When

this outlet was uncovered, the high level of the Weston stage

The next lower outlet for Lake Sudbury is about 0.6 mile

north of the previous spillway, just north of Weston Station

in the Concord quadrangle at an altitude of about 160 feet.

This outlet controlled the first part or upper level of the

Cherry Brook stage (Koteff, 1963). Deposits of sand and

gravel (Qls4) associated with the upper-level Cherry Brook

stage (Koteff, 1963) are present in the area west of Cherry

the north edge of the map between Wayland and Weston.

This spillway controlled the lower level of the Cherry Brook

stage. The deposits (QIs5) of the lower level are in the vicin-

Cherry Brook stage. The sand and gravel (Qo3) in the val-

leys draining into Stony Brook and a part of the Charles River

near Waltham are the youngest glacial stream deposits in the

Late- and postglacial surficial deposits include wind-blown

silt and fine sand, stream-terrace deposits, alluvium, and

swamp deposits. The wind-blown sand, which probably was

deposited prior to the extensive development of soils after

glaciation, is widely dispersed throughout the map area. The

than 2 feet; hence, they are too thin to show on the map.

thickness seldom exceeds 3 feet and is most commonly less

The stream-terrace deposits (Qrt) are not extensive; they

are shown along the Charles River at several places where the

river valley is fairly broad. Stream-terrace deposits are mostly

derived from upstream glacial-stream and glacial-lake de-

posits. Alluvium (Qal) is present as thin patches in many

small streams and along the broader flood plains of the Charles

in the quadrangle. They were formed during postglacial

APPLIED GEOLOGY

Gravel and sand are the most important surficial resources

in the quadrangle. Much gravel and sand has been extracted

from ice-contact deposits, from glacial-lake and glacial-stream

deposits, and, to a lesser extent, from lake-bottom deposits.

The most extensive gravel and sand deposits are those laid

down during the various stages of Lake Charles in the south-

ern half of the quadrangle. Gravel and sand are extracted

sporadically from several pits shown on the map; for example,

in 1971, gravel and sand were extracted from a large pit com-

plex west of Morses Pond. Because much of the area under-

lain by the thick sand and gravel deposits is presently occupied

by business complexes, schools, housing developments, estates. or parks, exploitation of these deposits is not feasable at the

Organic material in the numerous swamps, plus the deposits

of wind-blown silt, when thick enough, could be used as a soil-

enriching material. Most of the till could be used as subgrade

system, mainland zone

zone 19, shown in blue

Base from U.S. Geological Survey, 1958

10,000-foot grid based on Massachusetts coordinate

1000-meter Universal Transverse Mercator grid ticks,

periods in poorly drained areas.

material for highways.

Relatively thin swamp deposits (Qs) are widely dispersed

Lake-bottom deposits (QIsb) were laid down during the

The next lower outlet at about 155 feet in altitude is near

was lowered about 20 feet; the surficial materials deposited

during the low-level stage are shown as QIs3 on the map.

As the ice front retreated, outwash sand and gravel were

After Lake Charles was drained, deposits consisting chiefly

drained, thus ending its history in the Natick quadrangle.

front was just north of Happy Hollow

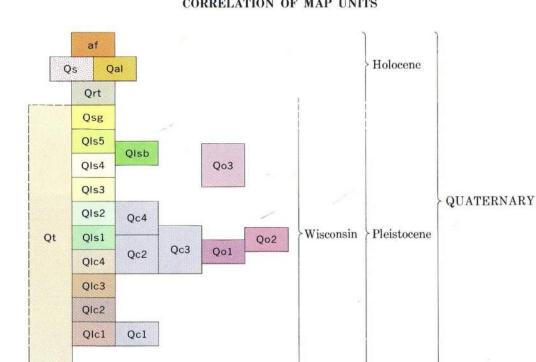
Hills vicinity

(Qo1 and Qo2).

MATERTOWN 3.8 MI. \$71°15'

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GQ-1151



# DESCRIPTION OF MAP UNITS

Yellowish-orange wind-blown silt and sand, generally less than 2 ft. thick, is irregularly spread over surficial deposits but has not been mapped separately

ARTIFICIAL FILL AND GRADED AREAS - Partly cut and partly filled.

sand. Overlies alluvium, river-terrace deposits, till, lacustrine, and ice-contact deposits

mostly derived from older glacial deposits. Occupies flood plain of the Charles RIVER TERRACE DEPOSITS (HOLOCENE) — Pale-brown, light-tan, yel-

relationship to nearby surficial deposits is unclear. Two unrelated deposits, one near Weston Station and the other along the Charles River near Newton GLACIAL-STREAM DEPOSITS (WISCONSIN)—Light-yellowish-brown mod-

erately well sorted and stratified gravel, coarse pebbly sand, and medium sand. Forms broad flat areas or terraces adjacent to streams. Locally mantled by swamp deposits; locally merges with ice-contact deposits. Distribution of collapse structures erratic. Oldest is Qo1

Outwash on west side of Reeves Hill

High-level outwash in north-central part of quadrangle

GLACIAL-LAKE AND GLACIAL-STREAM DEPOSITS (WISCONSIN) -

Deposits of Lake Sudbury Low level of Cherry Brook stage

Qls2 High level of Weston stage QIs1 Wayland stage

Deposits of Lake Charles Morses Pond stage

Cochituate stage East Natick stage

> locally associated with ice-channel fillings; e, esker. Deposited by melt-water streams that flowed from adjacent stagnant ice fronts; gradational with glacial-lake deposits to south. Oldest is Qc1

Qc4 Formed when stagnant ice mass was in eastern part of map

Formed when stagnant ice mass was in vicinity of Dudley Pond

Formed when stagnant ice mass was near Sherborn

LAKE-BOTTOM DEPOSITS (WISCONSIN) - Yellowish-brown to grayishorange well-sorted and stratified fine sand and silt; clay probably present at

depth but has not been observed in surface exposures. Deposits exposed in northwestern part of quadrangle but thicknesses are unknown; shown only

silt; some clay-sized materials. Clay content variable; texture ranges from compact to loose and sandy; forms a veneer over much of bedrock. Thicknesses are not known, but the till is thickest in the drumlins; elsewhere the thickness is estimated to be less than 20 ft. Derived from bedrock and sur-

ficial material; deposited directly by glacial ice

- Contact — Approximately located

Drumlin or drumlinoid hill—Line indicates inferred direction of ice flow

→ Glacial striation — Arrow indicates inferred direction of ice flow. Tip of arrow at point of observation

Sand and gravel pits

Well — Data from U.S. Geological Survey; depth given in feet

Material classification - Number indicates thickness, in feet; g, gravel; s, sand; sl, silt; p, pebbles; c, cobbles; b, boulders; f, fine sand; m, medium sand; letter symbols indicate size distribution in order of decreasing abundance

Delta — Number indicates altitude of top of foreset beds Generalized sand and gravel distribution within stratified deposits - In most exposures exceeding 8 ft. in thickness, sand and gravel are present; therefore,

Mostly sand

\_\_\_\_\_\_ Contours — Showing altitude of the bedrock surface where bedrock is concealed by surficial deposits. Datum is mean sea level; contour interval 25 ft.

### CORRELATION OF MAP UNITS

Geology concealed in places by construction

SWAMP DEPOSITS (HOLOCENE) — Brownish-black muck, peat, silt, and

ALLUVIUM (HOLOCENE) — Pale-brown, light-brown, pale-yellowish-brown, and grayish-orange poorly stratified sand, silt, and gravel with minor clay;

lowish-brown gravel, sand, and silt along the Charles River. Deposits are moderately well sorted and stratified, but stratification is not always distinct SAND AND GRAVEL UNDIFFERENTIATED (HOLOCENE AND PLEIS-TOCENE) — Yellowish-brown stratified sand and gravel of varied texture;

Outwash associated with Stony Brook drainage and Charles River near Wal-

Light-yellowish-brown to gray gravel, sand, and silt laid down in or graded to the various lake levels of Lakes Charles and Sudbury; includes ice-contact fillings, kame terraces, deltas, and some undivided outwash; e, esker. Collapse structures, knobs, and kettles locally abundant. Gravel commonly overlies pebbly sand and sand; sorting and stratification are less well developed in the gravel than in sand and silt; large clasts in gravel are subrounded to rounded; textures are variable. Topset beds of delta deposits are poorly to moderately sorted and stratified; both topsets and foresets dip south; bottomset beds have not been observed. Large flat-topped deltas and associated deposits were derived from melt-water streams issuing from various stagnant ice fronts as the glacier receded north. As much as 165 ft. of mixed sand and gravel and possibly some till present in parts of area formerly covered by

QIs4 High level of Cherry Brook stage Qls3 Low level of Weston stage

Qlc3 Qlc2

Sherborn stage ICE-CONTACT DEPOSITS (WISCONSIN) - Light-yellowish-brown generally poorly sorted and stratified gravel and sand of varying sizes; deposits characterized by collapse structures, kettles, and knobs, very irregular in thickness;

Formed when stagnant ice mass was southeast of Wayland

Qc3 Qc2

Qc1

for the Cherry Brook stage of glacial Lake Sudbury TILL (WISCONSIN) - Light-gray to greenish-gray poorly stratified and poorly sorted heterogeneous mixture of gravel, boulders, cobbles, pebbles, sand, and

BEDROCK EXPOSURES — Solid color represents individual outcrops; ruled pattern indicates closely spaced outcrops where surficial deposits are thin

Melt-water channel — Glacial melt-water channel or spillway cut in bedrock or

surficial materials. Arrow indicates inferred direction of flow

the distribution of surficial material is highly generalized

Very fine sand

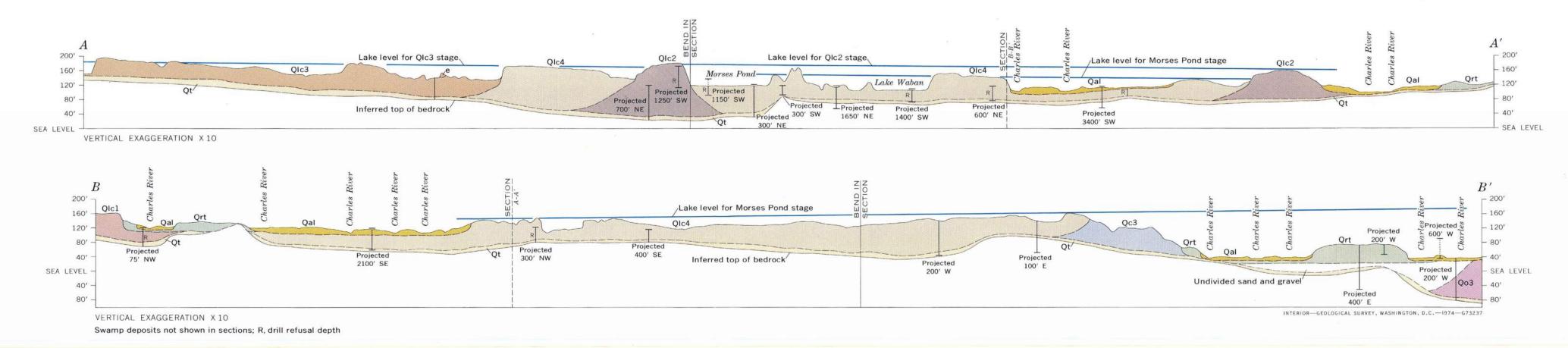
Mixed sand and gravel

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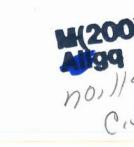
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DEPARTMENT OF PUBLIC WORKS

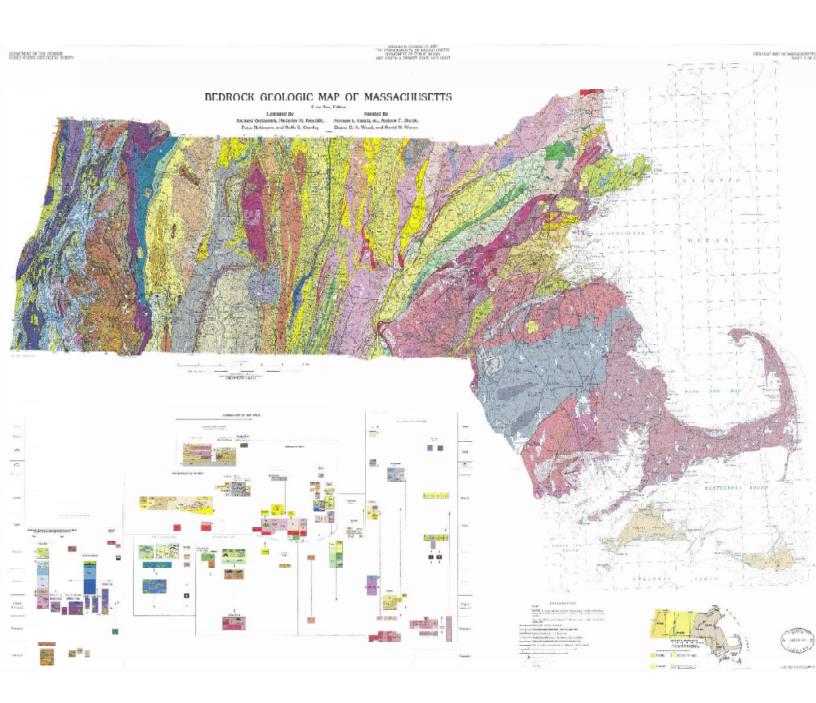
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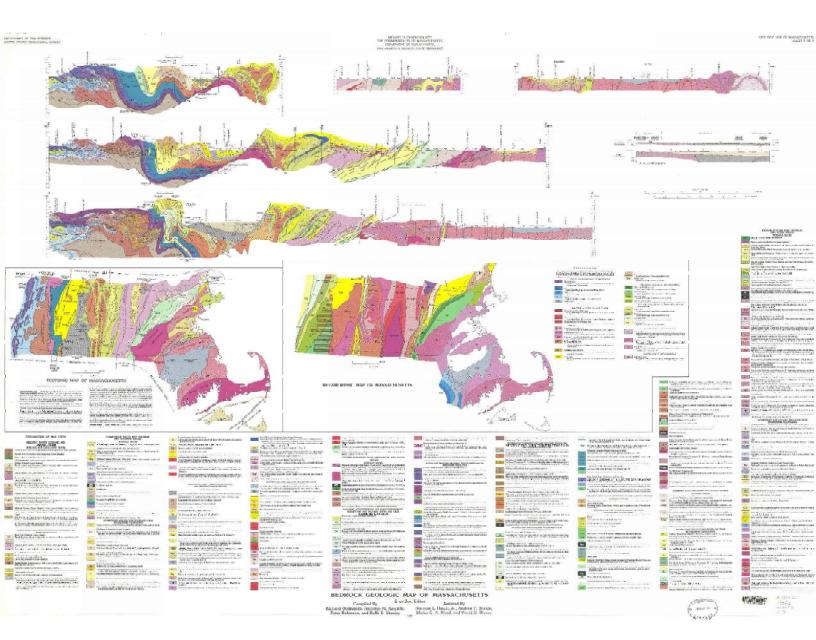


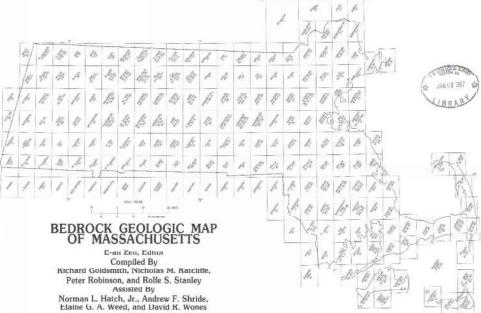


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# Bedrock Geologic Map of Massachusetts, 1983







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