NBC Phase III CSO Program
Consolidation Conduits
IIIA-4 and IIIA-5

Geotechnical Data Report

Report Status (Final)
Revision No. 4

McMILLEN JACOBS ASSOCIATES

June 2020

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Revision Log

Revision No.	Date	Revision Description
0	11/22/2019	1st Internal Draft
1	03/13/2020	2nd Internal Draft – Incorporation of Supplemental Boring Program
2	04/10/2020	Draft for 30% BODR
3	05/12/2020	Draft
4	06/09/2020	Final

1.0 General

1.1 Introduction

This Geotechnical Data Report (GDR) presents a summary of the subsurface investigation program that was conducted by McMillen Jacobs Associates (McMillen Jacobs) for the Narraganset Bay Commission (NBC) Phase III Combined Sewer Overflow (CSO) Consolidation Conduits IIIA-4 and IIIA-5 Project (the Project) located in Pawtucket, Rhode Island. This work was performed under our Subconsultant Agreement with BETA Group, Inc (BETA), dated 5 March 2019.

The specific objective of the investigatory work was to conduct geotechnical subsurface explorations and a laboratory testing program to acquire data on engineering characteristics and properties of the subsurface materials.

In accordance with the referenced contract, McMillen Jacobs completed the following tasks:

- Prepared a Work Plan describing roles, responsibilities, and field investigations.
- Prepared a Health and Safety Plan (HASP) specific to the anticipated field investigation activities that described the health and site safety procedures to be followed during performance of the work.
- Provided on site supervision during drilling of the subsurface explorations.
- Arranged for and contracted with a geotechnical testing laboratory (GeoTesting Express, of Acton, Massachusetts) to perform geotechnical soil and rock testing on selected samples obtained from the test borings.
- Reviewed information from previous subsurface investigations performed for preliminary design of this Project and other projects located adjacent to the proposed alignment.
- Compiled, prepared, and submitted this GDR that documents the results of the subsurface investigation program.

1.2 Proposed Construction

The Project is one component of the NBC Phase III CSO Program, which began in 2016 and is focused primarily on the Bucklin Point Service Area (BPSA) in the communities of Pawtucket and Central Falls. The overall NBC CSO Program is aimed at lowering annual CSO volumes and reducing annual shellfish bed closures in accordance with a 1992 Consent Agreement with the Rhode Island Department of Environmental Management (RIDEM). Phases I and II of this program, which focused on the Field's Point Service Area (FPSA) in Providence, were completed in 2008 and 2015, respectively. Stantec, along with Pare Corporation as a subconsultant, is under contract with NBC to serve in the role as the Program Manager/Construction Manager (PM/CM) for Phase III CSO Program.

The Project includes the design and construction of consolidation conduits, flow diversions, a gate and screening structure, flow meters, instrumentation panels, sluice gates, and other ancillary facilities necessary to convey flow from outfalls OF-210, OF-211, OF-213, OF-214, and OF-217 to a tunnel via Drop Shaft 213 (DS-213), set to be construction under a separate contract.

1.3 Elevation Datum and Coordinate System

Horizontal coordinates in this document are projected to Rhode Island Mainland State Plane, North American Datum (NAD) 1983 and elevations are referenced to the National Geodetic Vertical Datum (NVGD) 1929, in feet.

The survey base plan was provided to McMillen Jacobs by BETA. Plan locations and elevations of the test borings were determined by Bryant Associates, Inc. of Lincoln, Rhode Island. The Project location is included on Figure 1, Project Locus. The locations of the test borings have been plotted on Figures 2A through 2E, Site and Subsurface Exploration Location Plan.

2.0 Subsurface Explorations

2.1 Exploration Program

Geotechnical test borings were performed to assess soil and bedrock conditions at the site and to acquire data on the engineering characteristics and properties of the subsurface materials. Analytical sample collection and assessment of the environmental subsurface conditions was performed by BETA during the exploration program. Details of the subsurface exploration program are described in the following sections.

2.2 Test Borings

Thirteen (13) geotechnical test borings were performed by Geologic Earth Exploration, Inc. (Geologic), Norwood, MA, during the periods of 27 August to 18 September 2019 and 4 February to 12 February 2020 at the locations shown on Figure 2. Table 1 presents a summary of the subsurface exploration program.

A representative from BETA was onsite to monitor air quality. In addition, soil samples were collected in the initial 10 feet of drilling and were submitted to the analytical laboratory for testing. Refer to the Environmental Data Report (EDR) for details and results of analytical testing.

Test borings were designated B-1 through B-13 and were terminated at depths ranging from 4 to 51 feet below existing ground surface. Vacuum excavation was performed to a depth of 6 feet at test boring locations B-1, B-2, B-3, B-6, and B-8 through B-13 to mitigate the potential for damaging any unidentified existing utilities. A representative photograph taken during vacuum excavation is shown below.

Vacuum Excavation at Test Boring B-3

Test borings were advanced using either a rubber track mounted CME-45A drill rig or a rubber track mounted Acker Scout drill rig using rotary drilling techniques with a 3-7/8 in. diameter tri-cone roller bit.

Test borings B-1, B-2, B-3, and B-9 through B-13 were drilled on the former Tidewater Site owned by National Grid. The Tidewater Site is a former MGP and power plant site and is classified as a superfund site. On behalf of National Grid, a representative from GZA GeoEnvironmental, Inc. (GZA) was onsite to provide access and monitor drilling activities for these test borings. In addition, a representative from BETA was onsite to monitor the air quality as stipulated in the National Grid Access Agreement. No environmental soil sampling was performed at the Tidewater Site.

As required by the National Grid Access Agreement, Geologic was responsible for drumming and leaving on site investigation-derived waste (IDW) that could not be placed back into the completed borehole. After completion of drilling activities on the Tidewater Site, drilling equipment was decontaminated by steam cleaning. Steam cleaning took place on a plastic containment pad allowing the wash water to be drummed as IDW. Management and disposal of the drummed IDW will be conducted by National Grid. Below is a representative photograph of steam cleaning on the Tidewater Site.

Steam Cleaning Set up on the Tidewater Site

Test borings B-4 through B-8 were drilled in the public right-of-way on city streets and required a police detail as well as signage for traffic control. Below is a representative photograph of traffic control set up at test boring B-8.

Drilling Test Boring B-8 at the Intersection of South Main St. and Roosevelt Ave. Ext.

Test borings B-4A, B-4B, B-4C and B-6 encountered obstructions before reaching the planned termination depths. Based on review of historic area photographs at test borings B-4A and B-4B, it was determined that the obstruction was likely an existing foundation from a former building. Completed test boring B-4C was offset approximately three feet from test boring B-4B and advanced through a probable foundation approximately five feet thick.

Test boring B-6 was attempted three times in the vicinity of the entrance to the parking lot south of National Grid's Bridge Mill Power Plant. Vacuum excavation was performed at two of the three locations attempted. At each of the three locations, an unidentified obstruction was encountered at approximately four feet below the existing ground surface. As a result of encountered obstructions, test boring B-6A was relocated about 100 feet to the south of the originally planned location and drilled near the southern end of Roosevelt Avenue Extension.

To prevent the potential for creating future pathways for drilling fluids used during trenchless construction, test borings B-1 through B-3 and B-9 through B-12 were tremie grouted upon completion using a cementitious grout. Test borings B-4 through B-8 and B-13 were backfilled with a mixture of silica sand and soil cuttings generated during the drilling.

Soil samples were obtained using techniques and equipment in general accordance with the American Society for Testing and Materials (ASTM) Standard Specification D1586 Standard Penetration Tests (SPT). SPT tests were performed using a standard 1-3/8-in. I.D. split-spoon sampler. SPT blow counts were recorded for 6-in. intervals, where the SPT "N" value is defined as the number of blows required to drive the split-spoon sampler with a 140-lb. hammer falling freely through a distance of 30 in. for a distance of 12 in. counted from the 6^{th} to the 18^{th} inch that the sampler was driven.

Rock coring was performed using a five-foot long NX (2 in. O.D.) core barrel. The top of bedrock was estimated based on the drilling operations (e.g. excessive rig chatter, difficult drilling penetration) and

practical split-spoon refusal. Rock coring was performed in order to confirm bedrock and to assess its relative quality as indicated by Core Recovery[1] and Rock Quality Designation (RQD)[2].

Soil and rock were classified in the field using visual/manual methods, in accordance with the Unified Soil Classification System (USCS) and the NBC Phase III CSO Program Geotechnical/Environmental Investigation Work Plan Standards as practiced by McMillen Jacobs. Selected soil and rock samples were delivered to GeoTesting Express laboratory in Acton, Massachusetts, for laboratory testing.

Test boring logs are provided in Appendix A and rock coring photographs are provided in Appendix B.

Split-spoon samples were screened in the field for VOCs using a MiniRAE 3000 photoionization detector (PID). Once the soil sample from the split-spoon was collected in a sample jar, the headspace readings were obtained by opening the sample jar and immediately inserting the PID probe into the sample jar headspace to measure the VOCs present within the soil sample. PID results were recorded adjacent to the sample description on the boring logs. In addition to PID readings, any staining, visual and/or olfactory evidence of contamination were also recorded on the boring log within the sample description or as a note beneath the sample descriptions.

Four groundwater observation wells were installed in completed boreholes B-2, B-3, B-4C, and B-7, and two were installed in boreholes adjacent to completed test borings B-9 and B-10. Groundwater observation wells installed in B-2, B-3, B-4C, and B-7 required backfilling to the desired depths of the screened intervals using either grout, bentonite chips, or drill cuttings. The water level observed at the time of drilling is indicated on the test boring logs. Groundwater monitoring was performed between the period 9 September 2019 to 12 February 2020. Groundwater observation well installation and monitoring reports are provided in Appendix C.

[1] The Core Recovery is defined as the ratio (expressed as a percent) of the total length of recovered core to the length cored.
[2] The Rock Quality Designation (RQD) is defined as the sum in inches of all pieces of moderately weathered to less weathered rock core, 4 inches in length or longer, divided by the length in inches of core run (expressed as a percentage). If the core is broken by handling or drilling procedures, the pieces of core are fitted together and counted as one piece, provided they constitute the required 4-inch length.

3.0 Subsurface Investigations by Others

3.1 General

Subsurface explorations have been performed by others in the vicinity of the Project for preliminary design and to construct bridges, roadways, utilities, and conduct environmental assessments. Existing test borings, laboratory testing results, and geophysical data that were judged to be relevant to this Project have been included in this GDR. Brief descriptions of the additional information included is provided below.

Historic data is provided in Appendix D. The locations of the historic test borings are shown on Figure 2.

3.2 Previous Test Borings by Stantec/Pare

Geotechnical subsurface explorations have been performed along the Project alignment by the PM/CM in support of the overall NBC CSO Phase III Program. The following information was provided and reviewed for pertinent information:

- Report entitled "NBC CSO Phase IIIA Contract No. 308.01 C, Request for Proposal, Appendix C, Geotechnical Data Report", prepared by Stantec and Pare Corporation, dated December 23, 2019.

3.3 Tidewater Site

Geotechnical subsurface explorations have been performed across the Tidewater Site by various consultants for National Grid in support of the remediation of the site. The following information was reviewed for pertinent test boring logs:

- Report entitled "Remedial Action Work Plan National Grid Former Tidewater Facility 200 Taft Street Pawtucket, Rhode Island" prepared by GZA GeoEnvironmental, Inc.; dated June 2018.
- Report entitled "Site Investigation Data Report, Former Tidewater MGP and Power Plant Site, Pawtucket, Rhode Island, RIDEM Case No. 95-022" prepared by GZA GeoEnvironmental Inc.; dated January 2011.

3.4 Other Sources of Data

Other subsurface explorations along or adjacent to the project alignment have been performed for various purposes. The following information was reviewed for pertinent test boring logs and data:

- Drawing set entitled "State of Rhode Island and Providence Plantations, Blackstone Valley Sewer District Commission, Taft St. – Pleasant St. Branch Interceptor, Section B, Contract 18", prepared by Metcalf & Eddy Engineers, dated 1950.
- State of Rhode Island, Department of Public Works, Division of Roads and Bridges, Plan, Profile and Sections of Proposed State Highway, Division St. Project, Contract Three, Rhode Island FA Project No.1-01(11), Contract No. 5737, dated 1957.
- State of Rhode Island, Department of Transportation, Plans, Profiles, and Section of Proposed Bridge Replacement, Pawtucket Bridge No. 550, I-95 Over the Seekonk River, Volume 3 Bridge Plans, Rhode Island Contract No. 2010-CB-004, FA Project Nos.BRO-0550(003), IM-0550(004), IMG-0550(005), prepared by Commonwealth Engineers & Consultants Inc., dated April 2010.

4.0 LABORATORY TESTING

4.1 General

A program of geotechnical laboratory testing was performed on selected soil and rock samples collected during the exploration program. Laboratory testing was conducted at the GeoTesting Express geotechnical laboratory, located in Acton, Massachusetts.

A summary of the completed laboratory testing, indicating the number of tests conducted in each exploration, is provided in Table 2. Individual testing results are provided in Appendix E.

4.2 Soil Testing

4.2.1 Grain Size Distribution

A total of nineteen (19) mechanical grain size distribution tests were performed in accordance with ASTM International Standard D421. The results of the grain size analyses were used to confirm field determined soil classifications and material characteristics.

4.3 Rock Testing

4.3.1 Unconfined Compressive Strength

Two unconfined compression strength (UCS) tests were performed on rock core samples in general accordance with ASTM International Standard D7012.

4.3.2 Cerchar Abrasivity Index

Two Cerchar Abrasivity Index (CAI) tests were performed on rock core samples in general accordance with ASTM International Standard D7625. The CAI gives an indication of potential wear of rock excavation equipment.

4.3.3 Brazilian Tensile Strength

Two Brazilian tensile strength (splitting tensile strength) tests were performed on rock core samples in general accordance with ASTM International Standard D3967.

5.0 Limitations

This report has been prepared for specific application to the proposed Consolidation Conduits IIIA-4 and IIIA-5 of the NBC Phase III CSO Program in Pawtucket, Rhode Island, in accordance with generally accepted geotechnical engineering practice.

The data presented herein are based, in part, on information from subsurface explorations that are available to us at this time obtained for design of the proposed facilities. The nature and extent of variations in the subsurface conditions between explorations may vary.

The scope of work undertaken for this GDR does not include a site assessment for the presence of oil or hazardous materials, nor did it include an evaluation of the impact of oil and hazardous materials, if present, to the project, nor any regulatory interaction and remedial activities associated with any contaminated soil, water, or materials that may exist on the site. Observations regarding the presence of oil or hazardous materials were made by McMillen Jacobs on a qualitative basis during drilling of the test borings.

TABLES

TABLE 1
Summary of Subsurface Exploration Program
NBC Phase III CSO Program
Consolidation Conduits IIIA-4 and IIIA-5
Pawtucket, RI

Test Boring Designation	Total Drilled Depth (ft)	Depth Drilled in Soil (ft)	Depth Drilled in Rock (ft)	Observation Well Installed
B-1[1]	22.0	10.0	12.0	
B-2[1]	34.0	29.0	5.0	1
B-3[1]	37.0	27.0	10.0	1
B-4A[2]	8.9	8.9	n/e[3]	
B-4B[2]	10.0	10.0	n/e	
B-4C	35.0	29.5	5.5	1
B-5	35.0	27.0	8.0	
B-6[2]	4.0	4.0	n/e	
B-6A[1]	31.0	26.0	5.0	
B-7	29.2	29.2	n/e	1
B-8[1]	25.0	16.0	9.0	
B-9[1]	39.0	29.0	10.0	1
B-10[1]	31.0	21.0	10.0	1
B-11[1]	39.0	29.0	10.0	
B-12[1]	51.0	29.0	22.0	
B-13[1]	21.0	21.0	n/e	
Totals	**452.1**	**345.6**	**106.5**	**6**

Notes

1. Test borings B-1, B-2, B-3, B-6A, and B-8 through B-13 were vacuum excavated to a depth of about 6 feet below the existing ground surface.

2. Test borings B-4A, B-4B, and B-6 encountered obstructions and were terminated before reaching the planned total depth.

3. "n/e" means not encountered.

TABLE 2
Summary of Laboratory Testing Program
NBC Phase III CSO Program
Consolidation Conduits IIIA-4 and IIIA-5
Pawtucket, RI

Test Boring Designation	Sample ID	Sample Depth (ft)	Soil Testing[1]	Rock Testing[2]		
			Sieve	Cerchar	Brazilian Tensile Strength	Unconfined Compression Strength
B-1	S-1	6-8	1			
B-2	S-3	10-12	1			
B-2	S-7	18-20	1			
B-3	S-2	14-16	1			
B-3	S-5	25-27	1			
B-4C	S-2	14-16	1			
B-4C	S-3b	19-21	1			
B-5	S-4	6-8	1			
B-5	S-8	19-21	1			
B-6A	S-5	19-21	1			
B-7	S-5	8-10	1			
B-7	S-7	14-16	1			
B-8	S-3	10-12	1			
B-9	S-4	17-19	1			
B-9	S-6	21-23	1			
B-9	C-1	29.9-30.3		1	1	1
B-10	S-6	16-18	1			
B-10	C-1	22.3-22.7		1	1	1
B-11	S-7	19-21	1			
B-12	S-7	27-29	1			
B-13	S-2a	8-10	1			
		Totals	**19**	**2**	**2**	**2**

Notes

1. Laboratory soil testing performed in general accordance with ASTM International Standard D421.
2. Laboratory rock testing performed in general accordance with ASTM International Standards D7625, D3967, and D7012C.

FIGURES

PROJECT LOCUS

PROJECT 5980

McMILLEN JACOBS ASSOCIATES

NARRAGANSETT BAY COMMISSION
PHASE III COMBINED SEWER
OVERFLOW PROGRAM

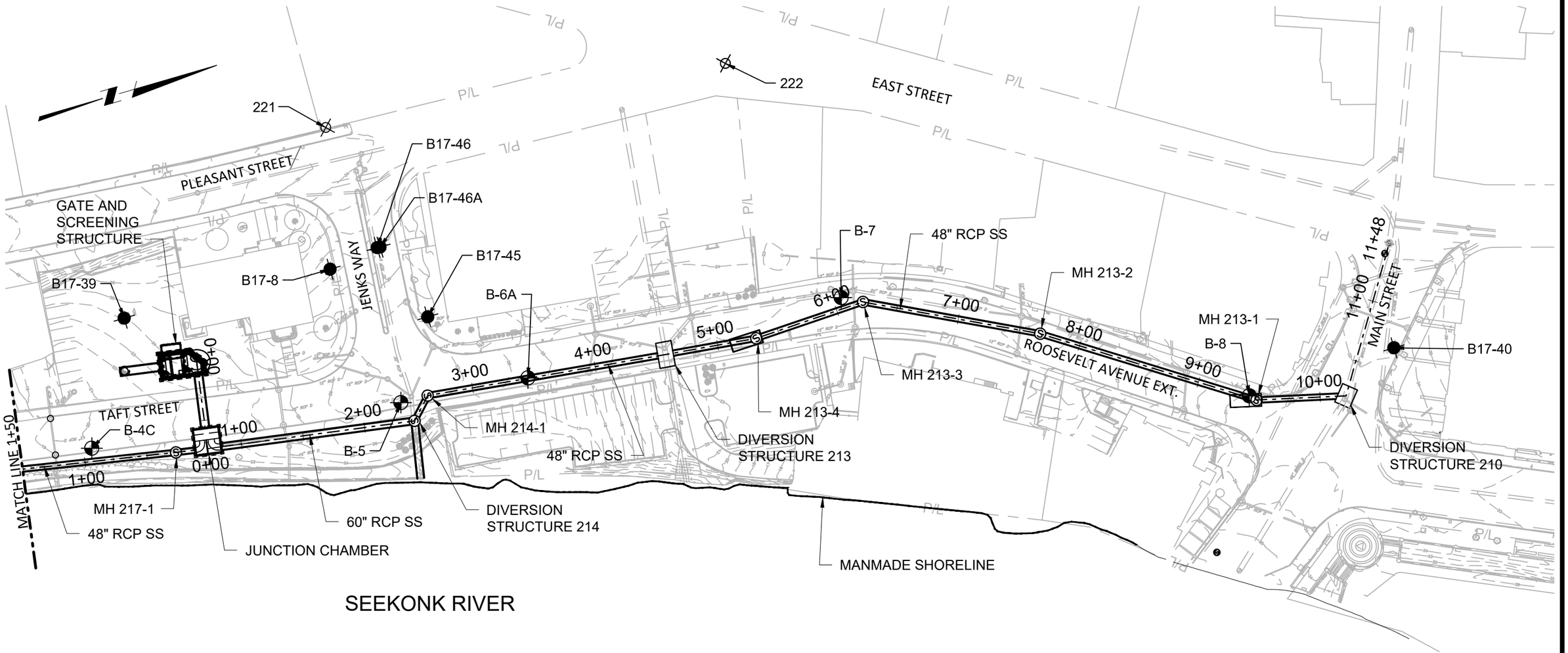
Stantec

PARE

NBC PHASE III CSO PROGRAM
CONSOLIDATION CONDUITS PHASE IIIA-4 AND IIIA-5
PROJECT LOCUS
PAWTUCKET, RHODE ISLAND

DATE
MAY, 2020

FIGURE
1



PLAN

SCALE: 1"=80'

0 80' 160'

NOTE: SEE FIGURE 2E FOR LEGEND AND NOTES.

PROJECT 5980

McMILLEN JACOBS ASSOCIATES

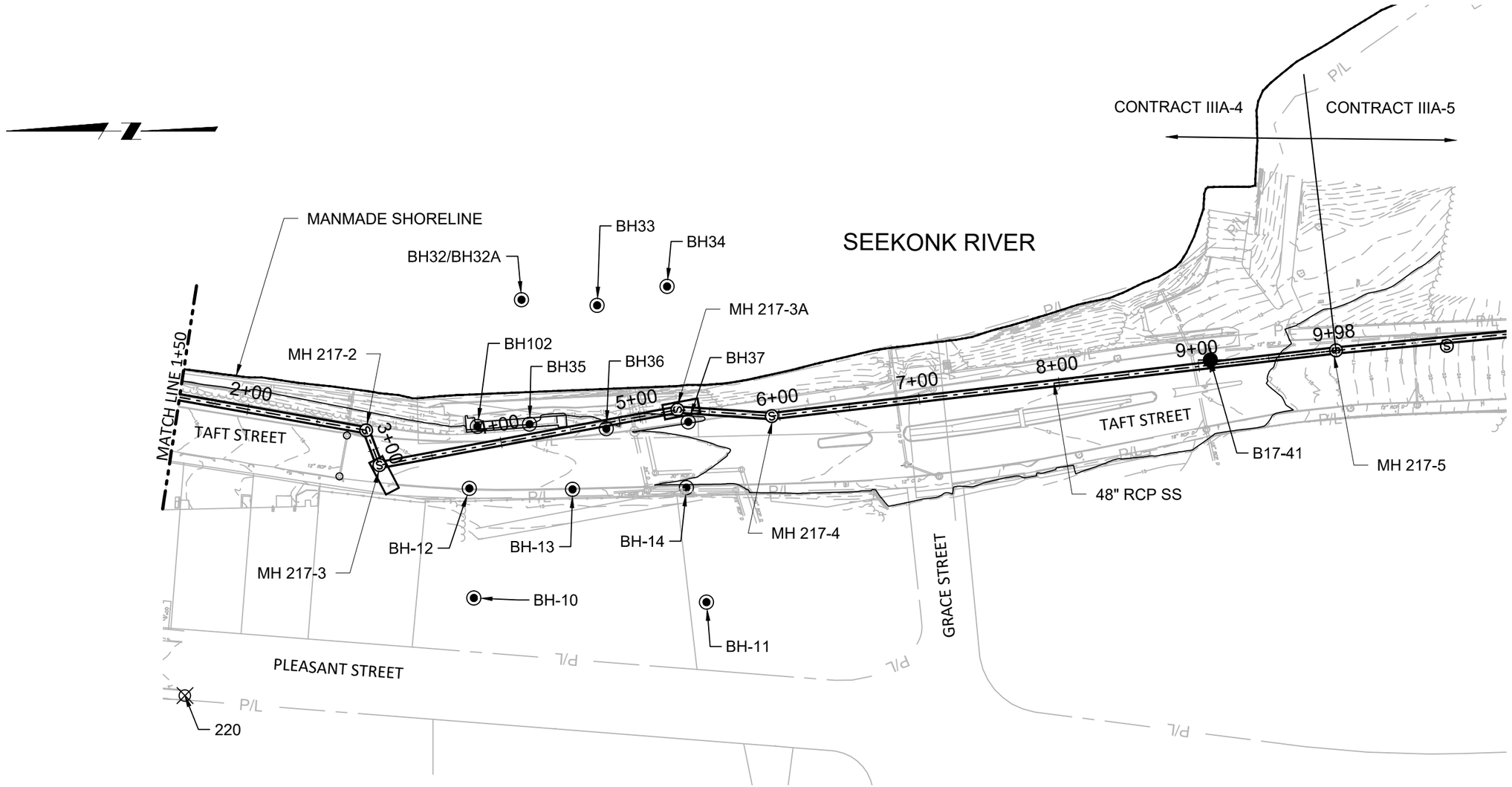
NARRAGANSETT BAY COMMISSION
PHASE III COMBINED SEWER OVERFLOW PROGRAM

Stantec PARE

NBC PHASE III CSO PROGRAM
CONSOLIDATION CONDUITS PHASE IIIA-4 AND IIIA-5
SITE AND SUBSURFACE EXPLORATION PLAN
ALIGNMENT IIIA-4 (SHEET 1 OF 2)

DATE
MAY, 2020

FIGURE
2A



PLAN

SCALE: 1"=80'

0 80' 160'

NOTE: SEE FIGURE 2E FOR LEGEND AND NOTES.

PROJECT 5980

McMILLEN JACOBS ASSOCIATES

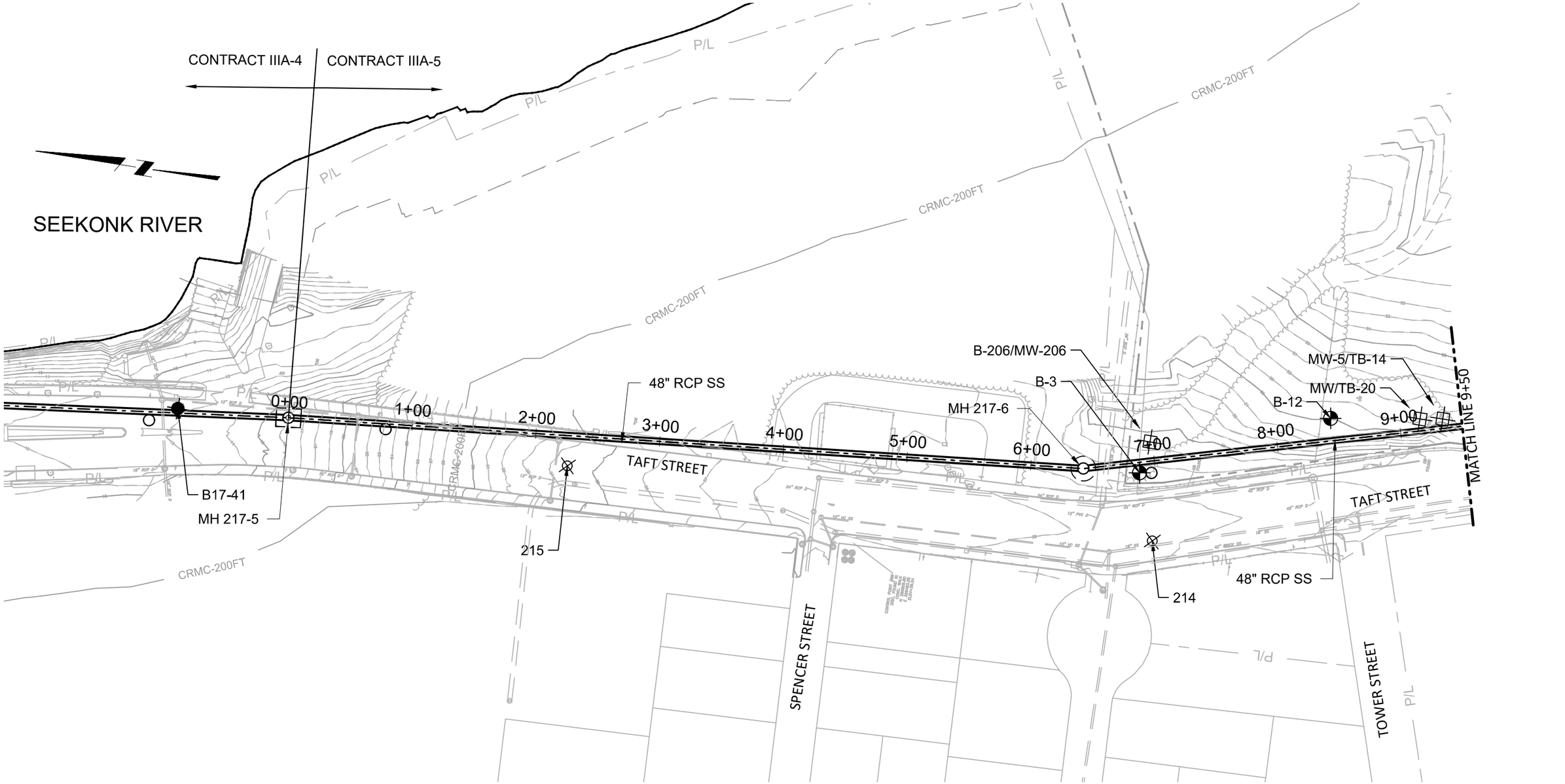
NARRAGANSETT BAY COMMISSION
PHASE III COMBINED SEWER
OVERFLOW PROGRAM

Stantec PARE

NBC PHASE III CSO PROGRAM
CONSOLIDATION CONDUITS PHASE IIIA-4 AND IIIA-5
SITE AND SUBSURFACE EXPLORATION PLAN
ALIGNMENT IIIA-4 (SHEET 2 OF 2)

DATE
MAY, 2020

FIGURE
2B



PLAN

SCALE: 1"=80'

0 80' 160'

NOTE: SEE FIGURE 2E FOR LEGEND AND NOTES.

PROJECT 5980

McMILLEN JACOBS ASSOCIATES

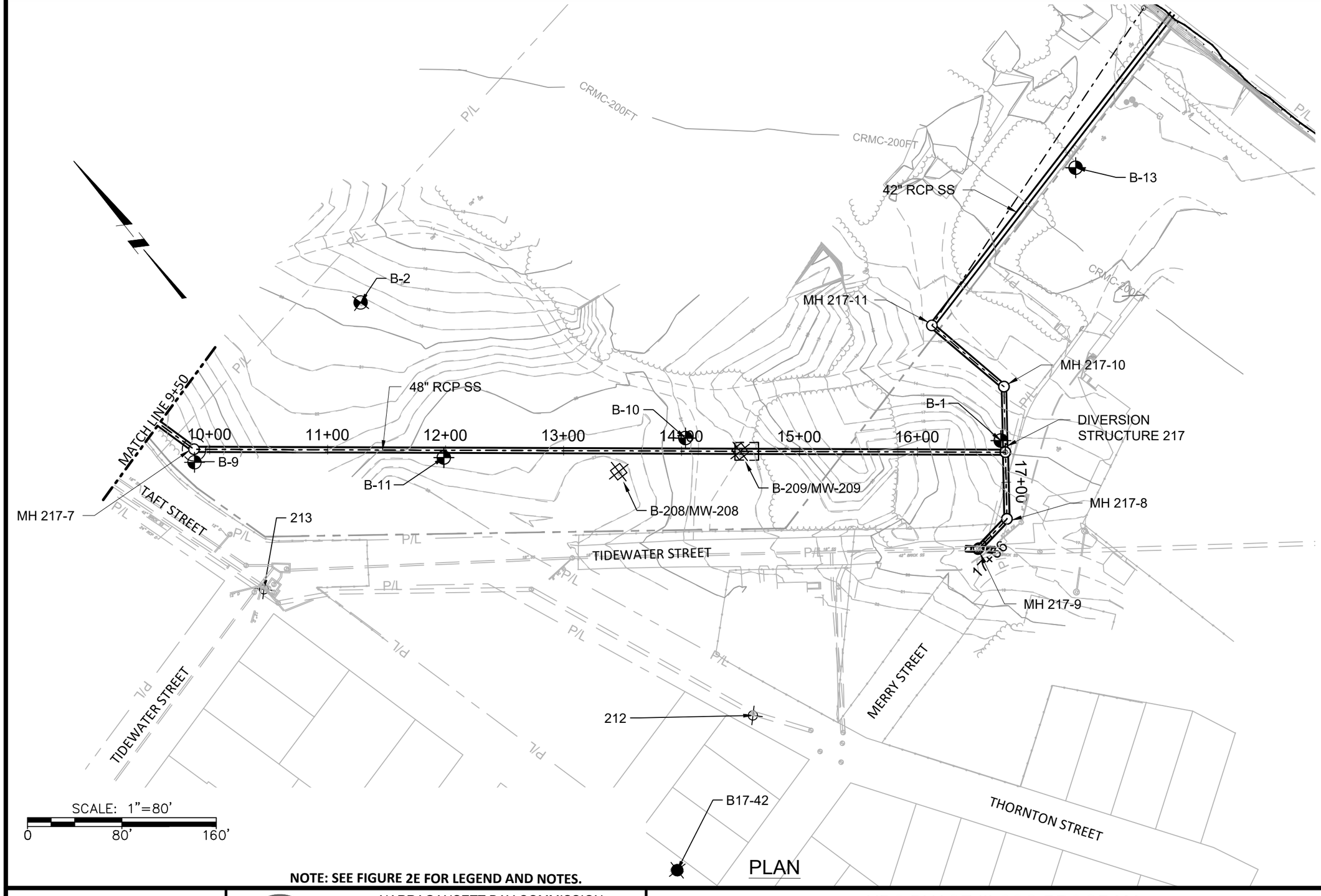
NARRAGANSETT BAY COMMISSION
PHASE III COMBINED SEWER
OVERFLOW PROGRAM

Stantec PARE

NBC PHASE III CSO PROGRAM
CONSOLIDATION CONDUITS PHASE IIIA-4 AND IIIA-5
SITE AND SUBSURFACE EXPLORATION PLAN
ALIGNMENT IIIA-5 (SHEET 1 OF 2)

DATE
MAY, 2020

FIGURE
2C



PLAN

NOTE: SEE FIGURE 2E FOR LEGEND AND NOTES.

PROJECT 5980

McMILLEN JACOBS ASSOCIATES

NARRAGANSETT BAY COMMISSION
PHASE III COMBINED SEWER
OVERFLOW PROGRAM

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NBC PHASE III CSO PROGRAM
CONSOLIDATION CONDUITS PHASE IIIA-4 AND IIIA-5
SITE AND SUBSURFACE EXPLORATION PLAN
ALIGNMENT IIIA-5 (SHEET 2 OF 2)

DATE
MAY, 2020

FIGURE
2D

LEGEND

B-7	DESIGNATION AND LOCATION OF TEST BORING PERFORMED BY GEOLOGIC EARTH EXPLORATION, INC. DURING THE PERIODS 27 AUGUST THROUGH 18 SEPTEMBER AND 04 FEBRUARY THROUGH 12 FEBRUARY UNDER THE SUPERVISION OF MCMILLEN JACOBS ASSOCIATES.
BH-35	DESIGNATION AND LOCATION OF TEST BORING PERFORMED FOR THE PAWTUCKET BRIDGE AND PAWTUCKET BRIDGE REPLACEMENT PERFORMED IN 1955 AND 2010.
B17-39	DESIGNATION AND LOCATION OF TEST BORING PERFORMED BY NEW ENGLAND BORING CONTRACTORS, INC. PERFORMED BETWEEN 04 MAY 2018 AND 08 AUGUST 2019 UNDER THE SUPERVISION OF PARE CORPORATION.
221	DESIGNATION AND LOCATION OF TEST BORING PERFORMED FOR THE TAFT ST. - PLEASANT ST. BRANCH INTERCEPTOR SECTION B DATED 1950.
MW/TB-20	DESIGNATION AND LOCATION OF PREVIOUS TEST BORING CONDUCTED ON THE FORMER TIDEWATER FACILITY.

NOTES

1. BASE PLAN USED FOR FIGURES 2A, 2B AND PART OF 2C WAS A CAD-GENERATED DRAWING TITLED “PAWT_SITE_PLAN_&_PROFILE_IIIA-4” PREPARED BY BETA GROUP, INC. AND OBTAINED ON 2/24/2020 BY MCMILLEN JACOBS ASSOCIATES VIA PROJECTWISE SHAREPOINT.
2. BASE PLAN USED FOR PART OF FIGURE 2C AND 2D WAS A CAD-GENERATED DRAWING TITLED “PAWT_SITE_PLAN_&_PROFILE_IIIA-5_ALT3 ” PREPARED BY BETA GROUP, INC. AND OBTAINED ON 2/24/2020 BY MCMILLEN JACOBS ASSOCIATES VIA PROJECTWISE SHAREPOINT.
3. AS DRILLED LOCATIONS OF THE B-SERIES TEST BORINGS CONDUCTED IN 2019 AND 2020 WERE SURVEYED BY BRYANT AND ASSOCIATES, INC. IN NOVEMBER 2019 AND FEBRUARY 2020 AND PROVIDED TO MCMILLEN JACOBS ASSOCIATES BY BETA GROUP, INC.
4. ALL ELEVATIONS ARE IN FEET AND REFER TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NVGD29).
5. NORTH ARROW ALIGNED WITH GRID NORTH, RHODE ISLAND STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM OF 1983 (NAD83).
6. REFER TO THE APPENDICES OF THIS REPORT FOR TEST BORING LOGS AND GROUNDWATER INSTALLATION AND MONITORING REPORTS.

PROJECT 5980

McMILLEN JACOBS ASSOCIATES

NARRAGANSETT BAY COMMISSION
PHASE III COMBINED SEWER
OVERFLOW PROGRAM

Stantec PARE

NBC PHASE III CSO PROGRAM
CONSOLIDATION CONDUITS PHASE IIIA-4 AND IIIA-5
SITE AND SUBSURFACE EXPLORATION PLAN
LEGEND AND NOTES (SHEET 1 OF 1)

DATE
MAY, 2020

FIGURE
2E

APPENDICES

APPENDIX A
Test Boring Logs

SOIL

Soil description on logs of subsurface explorations are based on Standard Penetration Test (SPT) results, visual-manual examination of exposed soil samples, and the results of laboratory tests on selected samples. The criteria, descriptive terms, and definitions are presented herein.
The natural soils are identified and described by visual-manual procedures (ASTM D2488) and in accordance with the United Soil Classification System (USCS) (ASTM D2487) as practiced by McMillen Jacobs Associates. Fill materials may not be classified by USCS criteria.

PENETRATION RESISTANCE

Standard penetration resistance (SPT) (ASTM D1586) - Number of blows required to drive a standard 2 in. O.D. split spoon sampler one foot with a 140 lb. weight falling 30 inches freely downward.

DENSITY / CONSISTENCY

Coarse - Grained Soils	
Apparent Density	SPT Resistance, N (BPF)
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

Fine - Grained Soils	
Apparent Consistency	SPT Resistance, N (BPF)
Very Soft	0 - 2
Soft	2 - 4
Medium Stiff	4 - 8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	>30

Notes: BPF = Blows Per Foot (uncorrected)

WOR = Weight of Rod

COLOR

Basic colors (black, brown, gray, olive, red, and yellow) and combinations (i.e. gray-brown, olive-brown, olive-gray, red-gray, red-brown, yellow-brown, and red-yellow). Modifiers such as light and dark may be used.

SUPPLEMENTAL SOIL DESCRIPTIONS AND STRUCTURE:

Laminating	- 0 to 1/16 in. thick (cohesive)
Parting	- 0 to 1/16 in. thick (granular)
Seam	- 1/16 to 1/2 in. thick
Layer	- 1/2 to 12 in. thick
Stratum	- > 12 in. thick
Pocket	- Small, erratic deposit less than 12 in. size
Lens	- Lenticular deposit larger than a pocket
Occasional	- One or less per 12 in. of thickness
Frequent	- More than one per 12 in. of thickness
Interbedded	- Alternating soil layers of differing composition
Varved	- Alternating thin seams of silt and clay
Mottled	- Variation of color

SAMPLE SYMBOLS

- SPT Sample 2 in. OD
- X SPT Sample 3 in. OD
- Shelby Tube Sample

ADDITIONAL GRAPHIC DESCRIPTIONS

- Asphalt
- Fill

SOIL IDENTIFICATION AND DESCRIPTION

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS Based on ASTM D2488 & D2487)

MAJOR DIVISIONS			GROUP/SYMBOL	TYPICAL DESCRIPTION
COARSE-GRAINED SOILS (50% or more retained on No. 200 sieve)	GRAVELS (more than 50% retained on No. 4 sieve)	CLEAN GRAVELS (less than 5% fines)	GW	WELL-GRADED GRAVEL
			GP	POORLY GRADED GRAVEL
		GRAVELS (with 5 to 12% fines)	GW-GM	WELL-GRADED GRAVEL WITH SILT
			GW-GC	WELL-GRADED GRAVEL WITH CLAY
			GP-GM	POORLY GRADED GRAVEL WITH SILT
			GP-GC	POORLY GRADED GRAVEL WITH CLAY
		GRAVELS WITH FINES (more than 12% fines)	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SANDS (less than 50% retained on No. 4 sieve)	CLEAN SANDS (less than 5% fines)	SW	WELL-GRADED SAND
			SP	POORLY GRADED SAND
		SANDS (with 5 to 12% fines)	SW-SM	WELL-GRADED SAND WITH SILT
			SW-SC	WELL-GRADED SAND WITH CLAY
			SP-SM	POORLY GRADED SAND WITH SILT
			SP-SC	POORLY GRADED SAND WITH CLAY
		SANDS WITH FINES (more than 12% fines)	SM	SILTY SAND
			SC	CLAYEY SAND
FINE-GRAINED SOILS (50% or more passes No. 200 sieve)	SILTS & CLAYS (liquid limit less than 50)	INORGANIC	ML	SILT
			CL	LEAN CLAY
		ORGANIC	OL	LOW PLASTICITY ORGANIC CLAY
	SILTS & CLAYS (liquid limit greater than 50)	INORGANIC	MH	ELASTIC SILT
			CH	FAT CLAY
		ORGANIC	OH	HIGH PLASTICITY ORGANIC CLAY
	SILT/CLAY (liquid limit between 12 and 25)	INORGANIC	CL-ML	CLAYEY SILT / SILTY CLAY
HIGHLY ORGANIC SOILS	PRIMARILY ORGANIC MATTER		PT	PEAT

Notes:

1. Dual symbols (symbols separated by a hyphen, e.g. SP-SM, slightly silty fine SAND) are used for soils between 5% and 12% fines or when liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart.

ROCK

Rock descriptions noted on logs of subsurface explorations are based on visual-manual examination of exposed rock outcrops and core samples. The criteria, descriptive terms and definitions used are as follows:

FIELD HARDNESS / STRENGTH

(after ISRM, 1978; CGS, 1985; Marinos & Hoek, 2001)

Extremely Strong	Cannot be scratched with a knife point or sharp pick; can only be chipped with repeated heavy hammer blows.
Very Strong	Cannot be scratched with a knife point or sharp pick; core breaks with repeated heavy hammer blows.
Strong	Can be scratched with a knife or pick; core breaks with heavy hammer blow.
Moderately Weak	Can be grooved 1/16 in. deep by knife or sharp pick; core breaks with light hammer blow.
Weak	Can be grooved easily with a knife or pick; can be scratched with fingernail; core breaks with light pressure.
Very Weak	Can be readily indented; grooved with fingernail or carved with a knife; core beaks with light pressure.

WEATHERING (after ISRM, 1978)

The action of organic and inorganic chemical and physical processes resulting in alteration of color, texture, and composition

Fresh	No visible sign of alteration, except perhaps slight discoloration on major discontinuity surfaces
Slight	Discoloration of rock material and discontinuity surfaces
Moderate	Less than half the rock material decomposed to soil. Some fresh rock; continuous "framework".
High	More than half the rock material decomposed and/or disintegrated to soil.
Completely	All rock material disintegrated to soil, but mass still intact
Residual Soil	All rock material converted to soil. Material has not been significantly transported.

COLOR:

Basic colors and combinations: gray, light gray, brown, red-brown

TEXTURE

Size, shape and arrangements of constituents

Aphantic	Individual grains invisible
Fine-grained	Grains barely visible to the unaided eye, up to 1/16 in. dia.
Medium Grained	Grains between 1/16 and 3/16 in. dia.
Coarse Grained	Grains between 3/16 and 1/4 in. dia.
Very Coarse Grained	Grains larger than 1/4 in. dia.

LITHOLOGY

Rock Classification and modifiers; accepted formation names

DISCONTINUITIES:

Type	Definition
Joint	A natural fracture along which no displacement has occurred. May occur in parallel groups called sets.
Shear	A natural fracture along which displacement has occurred. Surface may be slickensided or striated.
Fault	A natural fracture along which displacement has occurred. Usually lined with gouge and slickensides.
Shear or Fault Zone	Zone of fractured rock and gouge bordering the displacement plane.

ORIENTATION / ATTITUDE

Term	Angle (degrees)
Horizontal	0-5
Low Angle	6-35
Moderately Dipping	36-55
High Angle	56-85
Vertical	86-100

SPACING

Term	Inches
Extremely Close	<3/4
Very Close	3/4 - 2-1/2
Close	2-1/2 - 8
Moderate	8 - 24
Wide	24 - 80
Very Wide	80- 20 ft.
Extremely Wide	> 20 ft.

ROUGHNESS OF DISCONTINUITY SURFACE

Term	Abbreviation	Description
Very Rough	VR	Near-vertical steps and ridges
Rough	R	Ridges, side-steps, and asperities evident; abrasive to the touch
Slightly Rough	SR	Asperities can be felt.
Smooth	SM	Smooth to the touch
Slickensided	SL	Smooth glossy finish with visible striations

APERTURE/GAP

Term	MM
Very Tight	< .1
Tight	0.1 - 0.25
Partly Open	0.25 - 0.5
Open	0.5 - 2.5
Moderately Wide	2.5 - 10
Wide	> 10
Very Wide	10 - 100
Extremely Wide	100 - 1000
Cavernous	> 1000

INFILLING

Material	Abbreviation
Clay	CL
Silt	SI
Sand	SA
Serpentine	SE
Sulfide	SL
Calcite	CA
Pyrite	PY
Quartz	QZ
Chlorite	CH
Iron Oxide Staining	FE
Could not be determined	X

BEDDING

Term	Inches	Term	Inches
Very Thin	< 2.5	Thick	25-36
Thin	2.5 - 8	Very Thick	< 36
Medium	9 - 24		

GENERAL NOTES:

1. Logs of subsurface exploration depict soil, rock and groundwater conditions only at the boring locations specified on the dates indicated. Subsurface conditions may vary at other locations and at other times.
2. Water levels, where noted on the logs, were measured at the times under the conditions indicated. During test boring drilling, these water levels could have been affected by the introduction of water in to the borehole, extraction of tools or other procedures and thus may not reflect actual groundwater levels at the test boring location. Groundwater level fluctuations may also occur as a results of variations in precipitation, temperature, season, tides, river stage, adjacent construction operations, construction dewatering systems, water supply well pumping, and other conditions.

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SUBSURFACE EXPLORATION KEY

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-1

Date(s) Drilled: **09/05/2019 - 09/06/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **22.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **14.5 ft / NGVD 1929**	
Location: **Southerly end of Tidewater Site**	Coordinates: **360205.11E,285935.78N**	Elevation Source: **Field Survey**	

ELEV. (ft) / WATER LEVEL / DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
10 / 5							Vacuum excavated from about 0 to 6 ft (FILL)	
	6-8	S-1	13/24	18-18-17-20 (N=35)	SM		Moist, dense, brown, fine SAND and gravel, little silt (FILL)	PID=0
5 / 10	8-10	S-2	10/24	14-30-22-19 (N=52)	SP-SM		Moist, very dense, brown, fine SAND, some gravel (FILL)	
0 ▽ / 15							Top of possible boulder/bedrock. See Core Boring Report for rock details.	
	15-16.9	S-3	14/23	16-27-31-50/5" (N=58)	SW-SM		Wet, very dense, gray, SAND, some gravel and silt (Completely Weathered Bedrock)	PID=30
-5							See Core Boring Report for Rock Details	

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▽ - Water Level at Time of Drilling

Boring B-1

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-1

Date(s) Drilled:	09/05/2019 - 09/06/2019	Geotechnical Consultant:	McMillen Jacobs Associates	Logged By:	S. Wilbur	Checked By:	W. Kilker
Drilling Method/ Rig Type:	Mud Rotary/CME 45	Drilling Contractor:	Geologic Earth Exploration, Inc.	Total Depth of Borehole:	22.0 ft		
Borehole Diameter:	4.00 in	Core Barrel Type / Size:	NX / 2 in	Ground Surface Elevation/Datum:	14.5 ft / NGVD 1929		
Location:	Southerly end of Tidewater Site	Coordinates:	360205.11E,285935.78N	Elevation Source	Field Survey		

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DISCONTINUITIES DEPTH (FT)	TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
			4						See Test Boring Report for Overburden Details							
			4													
		10-15	3	2	C-1	24/ 40%	20/ 33%		Strong, gray, moderately weathered, medium-grained CONGLOMERATE. Mechanical breaks at 10.5 ft, 11.3 ft, and 11.8 ft.							
			1													
0			2													
	15								Sample obtained using split spoon sampler. See Test Boring Report for details.							
			2							17.3	J	30	S	1.00	FR	
		17-22	2	2	C-2	45/ 75%	17/ 28%		Strong, gray, moderately weathered, fine-grained SILTSTONE	18.8	J	30	SR	1.00	FR	
										19.1	J	40	SR	1.00	FR	
-5			2							19.8	J	40	SR	1.00	FR	

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Boring B-1

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-1

Date(s) Drilled:	09/05/2019 - 09/06/2019	Geotechnical Consultant:	McMillen Jacobs Associates	Logged By:	S. Wilbur	Checked By:	W. Kilker
Drilling Method/ Rig Type:	Mud Rotary/CME 45	Drilling Contractor:	Geologic Earth Exploration, Inc.	Total Depth of Borehole:	22.0 ft		
Borehole Diameter:	4.00 in	Core Barrel Type / Size:	NX / 2 in	Ground Surface Elevation/Datum:	14.5 ft / NGVD 1929		
Location:	Southerly end of Tidewater Site	Coordinates:	360205.11E,285935.78N	Elevation Source	Field Survey		

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
		17-22	6 5	2	C-2	45/ 75%	17/ 28%		Strong, gray, moderately weathered, fine-grained SILTSTONE	20.0 20.1	J J	30 30	SR R	5.00 5.00	FR FR	
-10	25								Bottom of borehole at 22.0 ft.							
-15																

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Boring B-1

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-2

Date(s) Drilled: **09/03/2019 - 09/05/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **34.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **22.2 ft / NGVD 1929**	
Location: **Tidewater Site**	Coordinates: **359851.53E,286363.91N**	Elevation Source: **Field Survey**	

ELEV. (ft)	WATER LEVEL	DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
18		5							Vacuum excavated from about 0 to 6 ft (FILL)	
			6-8	S-1	24/24	2-1-2-4 (N=3)	CL		Moist, soft, grayish brown, silty CLAY (FILL)	PID=20
13			8-10	S-2	18/24	1-1-0-3 (N=1)	ML		Moist, very soft, gray, SILT (FILL)	PID=32
	▽	10	10-12	S-3	12/24	1-4-1-17 (N=5)	ML		Wet, medium stiff, light gray, SILT, some gravel, little fine sand (FILL)	PID=50
			12-14	S-4	12/24	9-6-7-12 (N=13)	SP		Wet, medium dense, brown, medium SAND some gravel, little silt (FILL)	PID=20
8		15	14-16	S-5	8/24	8-8-5-8 (N=13)	SW-SM		Wet, medium dense, brown, coarse to fine SAND, some gravel, trace fines (ALLUVIUM)	PID=3
			16-18	S-6	20/24	7-3-3-11 (N=6)	ML		Wet, medium stiff, light brown, SILT, some fine sand (ALLUVIUM)	PID=0
3			18-20	S-7	9/24	9-7-6-9 (N=13)			Wet, medium dense, brown, fine to medium SAND, some silt (ALLUVIUM)	PID=0

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▽ - Water Level at Time of Drilling

Boring B-2

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-2

Date(s) Drilled: **09/03/2019 - 09/05/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **34.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **22.2 ft / NGVD 1929**	
Location: **Tidewater Site**	Coordinates: **359851.53E,286363.91N**	Elevation Source: **Field Survey**	

ELEV. (ft) / WATER LEVEL / DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
					SM		Wet, medium dense, brown, fine to medium SAND, some silt (ALLUVIUM)	Occasional rig chatter starting at 21'
-2 / 25	24-26	S-8	6/24	9-8-8-8 (N=16)	SC		Wet, medium dense, gray and brown SAND, some clay, little gravel (GLACIAL TILL)	
-7 / 30	~~29-29~~	~~S-9~~	~~0/0~~	~~50/0"~~			Top of Bedrock at 29.0 ft. See Core Boring Report for rock details.	
-12 / 35								
-17								

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▽ - Water Level at Time of Drilling

Boring B-2

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-2

Date(s) Drilled: **09/03/2019 - 09/05/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **34.0 ft**	
Borehole Diameter: **4.00 in**	Core Barrel Type / Size: **NX / 2 in**	Ground Surface Elevation/Datum: **22.2 ft / NGVD 1929**	
Location: **Tidewater Site**	Coordinates: **359851.53E,286363.91N**	Elevation Source **Field Survey**	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES					
											TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
-2	25								See Test Boring Report for Overburden Details							
-7		29-34	5	1	C-1	56/ 93%	36/ 60%		Strong, fresh, gray, medium-grained SANDSTONE	29.5	J	40	SR	1.00	FR	

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Boring B-2

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-2

Date(s) Drilled:	09/03/2019 - 09/05/2019	Geotechnical Consultant:	McMillen Jacobs Associates	Logged By:	S. Wilbur	Checked By:	W. Kilker
Drilling Method/ Rig Type:	Mud Rotary/CME 45	Drilling Contractor:	Geologic Earth Exploration, Inc.	Total Depth of Borehole:	34.0 ft		
Borehole Diameter:	4.00 in	Core Barrel Type / Size:	NX / 2 in	Ground Surface Elevation/Datum:	22.2 ft / NGVD 1929		
Location:	Tidewater Site	Coordinates:	359851.53E,286363.91N	Elevation Source	Field Survey		

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DISCONTINUITIES DEPTH (FT)	TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
		29-34	4	1	C-1	56/ 93%	36/ 60%		Strong, fresh, gray, medium-grained SANDSTONE	30.7	J	40	SR	5.00	FR	
			4							31.2	J	40	S	1.00	FR	
										31.6	J	20	S	5.00	FR	
										31.8	J	30	S	1.00	FR	
										32.0	J	20	SR	1.00	FR	
			4							32.8	J	20	SR	1.00	SL	
										32.9	J	20	S	1.00	FR	
										33.0	J	20	S	1.00	FR	
										33.2	J	10	S	1.00	FR	
			4							33.3	J	40	SR	5.00	FR	
										33.5	J	20	S	1.00	FR	
										33.7	J	20	R	5.00	SL	
-12									Bottom of borehole at 34.0 ft.							
	35															
-17																

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Boring B-2

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-3

Date(s) Drilled: **09/06/2019 - 09/09/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **37.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **37.4 ft / NGVD 1929**	
Location: **Northwestern corner of Tidewater Site**	Coordinates: **359575.63E,286640.16N**	Elevation Source: **Field Survey**	

ELEV. (ft)	WATER LEVEL	DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
									Vacuum excavated from about 0 to 6 ft (FILL)	
33		5							Drilled from 6 to 8 ft without sampling (FILL)	Rig Chatter/Slow Drilling
			8-10	S-1	19/24	15-35-20-19 (N=55)				PID=0
28		10					SP-SM		Moist, very dense, brown, SAND, little gravel and silt. Fragments of brick. (FILL)	
23	▽	15	14-16	S-2	9/24	14-10-9-8 (N=19)				PID=0
							SM		Wet, medium dense, tan, coarse to fine SAND, trace gravel and fines (ALLUVIUM)	
18									Wet, medium dense, tan, coarse to fine SAND, trace gravel and fines (ALLUVIUM)	

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▽ - Water Level at Time of Drilling

Boring B-3

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-3

Date(s) Drilled: **09/06/2019 - 09/09/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **37.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **37.4 ft / NGVD 1929**	
Location: **Northwestern corner of Tidewater Site**	Coordinates: **359575.63E,286640.16N**	Elevation Source: **Field Survey**	

ELEV. (ft) / WATER LEVEL / DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
	19-21	S-3	9/24	10-9-9-9 (N=18)	SM		Wet, medium dense, tan, coarse to fine SAND, trace gravel and fines (ALLUVIUM)	PID=0
13 / 25	23-25	S-4	10/24	15-21-26-38 (N=47)	CL-GC		Wet, hard, brown, sandy CLAY and coarse to fine gravel (GLACIAL TILL)	PID=0
	25-27	S-5	13/24	16-34-34-28 (N=68)	SM-GM		Wet, very dense, brown, SAND and gravel, little silt (GLACIAL TILL)	PID=0
8 / 30 / 3 / 35 / -2							Top of Bedrock at 27.0 ft. See Core Boring Report for rock details.	

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▽ - Water Level at Time of Drilling

Boring B-3

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-3

Date(s) Drilled: **09/06/2019 - 09/09/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **37.0 ft**	
Borehole Diameter: **4.00 in**	Core Barrel Type / Size: **NX / 2 in**	Ground Surface Elevation/Datum: **37.4 ft / NGVD 1929**	
Location: **Northwestern corner of Tidewater Site**	Coordinates: **359575.63E,286640.16N**	Elevation Source **Field Survey**	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
13	25								See Test Boring Report for Overburden Details							
			3							27.3	J	30	SR	1.00	FR	
										27.4	J	30	SR	1.00	FR	
		27-32	1	2	C-1	22/ 37%	14/ 24%		Recovered material described as follows: Strong, slightly weathered, purple, fine-grained SILTSTONE. No water return while coring run C-1.	28.4	J	20	SR	1.00	FR	
8			2													

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Boring B-3

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-3

Date(s) Drilled: **09/06/2019 - 09/09/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **37.0 ft**	
Borehole Diameter: **4.00 in**	Core Barrel Type / Size: **NX / 2 in**	Ground Surface Elevation/Datum: **37.4 ft / NGVD 1929**	
Location: **Northwestern corner of Tidewater Site**	Coordinates: **359575.63E,286640.16N**	Elevation Source **Field Survey**	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES					
											TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
		27-32	1 2	2	C-1	22/ 37%	14/ 24%		Recovered material described as follows: Strong, slightly weathered, purple, fine-grained SILTSTONE. No water return while coring run C-1.							
3	35	32-37	2 2 2 1 4	2	C-2	16/ 27%	0/ 0%		Recovered material described as follows: Strong, slightly weathered, purple to gray, fine-grained SILTSTONE. No water return while coring run C-2.							
-2									Bottom of borehole at 37.0 ft.							

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Boring B-3

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-4A

Date(s) Drilled: **08/28/2019 - 08/28/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **8.9 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **19.9 ft / NGVD 1929**	
Location: **Taft St north of I-95 bridge**	Coordinates	Elevation Source: **Google Earth**	

ELEV. (ft)	WATER LEVEL	DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
									(ASPHALT)	
			0.5-2	S-1	13/18	23-24-30 (N=54)	SP		Moist, very dense, reddish brown, coarse to fine SAND, little gravel (FILL)	PID=0
			2-4	S-2	10/24	23-26-21-16 (N=47)	SP-SM		Moist, dense, gray, medium to fine SAND, some gravel, little fines (FILL)	PID=0
15	▽	5	4-6	S-3	10/24	19-19-10-5 (N=29)	ML-SM		Wet, very stiff, light brown, medium to fine sandy SILT, little gravel. Fragments of brick and glass. (FILL)	PID=0
			6-8	S-4	6/24	5-5-6-13 (N=11)	SP-SM		Wet, medium dense, dark brown, medium to fine SAND, some gravel, trace fines (FILL)	
			8-8.9	S-5	4/11	71-50/5" (N=50/5")	SP-SM		Wet, very dense, light brown, coarse to fine SAND, some gravel, trace silt. Pieces of concrete. (FILL)	PID=0
10		10							Bottom of borehole at 8.9 ft.	
5		15							Pieces of possible concrete in tip of sampler. Relocated to new location at Boring B-4B.	

McMILLEN JACOBS ASSOCIATES

▽ - Water Level at Time of Drilling

Boring B-4A

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-4B

Date(s) Drilled: **08/28/2019 - 08/28/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **10.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **19.9 ft / NGVD 1929**	
Location: **Taft St north of I-95 bridge**	Coordinates:	Elevation Source: **Google Earth**	

ELEV. (ft) / WATER LEVEL / DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
15 / 5							No sampling from 0 to 8 ft (FILL)	Offset hole about 1 ft from B-4A and continued drilling and sampling from 8 ft below ground surface.
▽	8-10	S-1	14/24	15-12-14-23 (N=26)	SP-SM		Wet, medium dense, light brown, medium to fine SAND, some gravel, trace fines (FILL)	PID=0
10 / 10							Bottom of borehole at 10.0 ft.	
5 / 15							Pieces of possible concrete in tip of sample. Relocated to new location at Boring B-4C.	

McMILLEN JACOBS ASSOCIATES

▽ - Water Level at Time of Drilling

Boring B-4B

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-4C

Date(s) Drilled: **08/29/2019 - 08/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **35.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **19.9 ft / NGVD 1929**	
Location: **Taft St north of I-95 bridge**	Coordinates: **359477.61E,288205.01N**	Elevation Source: **Field Survey**	

ELEV. (ft)	WATER LEVEL	DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
15		5							No sampling from 0 to 9.5 ft (FILL)	Offset hole about 3 ft from B-4B and continued drilling and sampling from 9.5 ft below ground surface. Occasional rig chatter from 0 to 9.5 ft.
10		10	9.5-11.5	S-1	14/24	18-18-29-23 (N=47)	SP		Dry, dense, light brown, coarse to fine SAND, some gravel, trace fines. Possible concrete. (FILL)	PID=0
5		15	14-16	S-2	10/24	15-10-10-15 (N=20)	SP-SM		Moist, dense, light brown, coarse to fine SAND, little gravel, trace fines (FILL)	PID=0
	▽						GP		Wet, dense, dark brown, GRAVEL, little sand, trace fines (FILL)	

McMILLEN JACOBS ASSOCIATES

▽ - Water Level at Time of Drilling

Boring B-4C

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-4C

Date(s) Drilled: **08/29/2019 - 08/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **35.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **19.9 ft / NGVD 1929**	
Location: **Taft St north of I-95 bridge**	Coordinates: **359477.61E,288205.01N**	Elevation Source: **Field Survey**	

ELEV. (ft)	WATER LEVEL	DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
			19-21	S-3	14/24	10-23-18-12 (N=41)	ML-SM		Wet, hard, red, SILT and fine to medium SAND, trace gravel (GLACIOFLUVIAL)	PID=0
-5		25	24-26	S-4	13/24	38-29-20-16 (N=49)	GP-GM		Wet, dense, gray, coarse to fine GRAVEL, little sand (GLACIAL TILL)	PID=0 Rig Chatter
			29-29.5	S-5	6/6	70-50/0"	ML		Wet, very stiff, gray, sandy SILT, little gravel (GLACIAL TILL)	
-10		30							Top of Bedrock at 29.5 ft. See Core Boring Report for rock details.	
-15		35								

McMILLEN JACOBS ASSOCIATES

▽ - Water Level at Time of Drilling

Boring B-4C

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-4C

Date(s) Drilled: **08/29/2019 - 08/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **35.0 ft**	
Borehole Diameter: **4.00 in**	Core Barrel Type / Size: **NX / 2 in**	Ground Surface Elevation/Datum: **19.9 ft / NGVD 1929**	
Location: **Taft St north of I-95 bridge**	Coordinates: **359477.61E,288205.01N**	Elevation Source **Field Survey**	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DISCONTINUITIES DEPTH (FT)	TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
			3						See Test Boring Report for Overburden Details							
			4													
		30-35	4	1	C-1	60/ 100%	26/ 43%		Strong, slightly weathered, purple, fine-grained SILTSTONE							
			4							33.4	J	40	S	1.00	FR	
										33.5	J	40	SR	1.00	FR	
			4							34.2	J	50	SR	1.00	FR	
-15										34.5	J	40	SR	1.00	FR	
										34.6	J	10	S	1.00	FR	
	35								Bottom of borehole at 35.0 ft.							
-20																

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Boring B-4C

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-5

Date(s) Drilled: **08/27/2019 - 08/27/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **35.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **26.8 ft / NGVD 1929**	
Location: **Intersection of Taft St. and Jenks Way**	Coordinates: **359511.82E,288453.92N**	Elevation Source: **Field Survey**	

ELEV. (ft)	WATER LEVEL	DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
									(ASPHALT)	
			0.5-2	S-1	14/18	44-30-30 (N=60)	SM		Dry, very dense, dark gray, coarse to fine SAND, little gravel and silt (FILL)	PID=0
			2-4	S-2	15/24	22-23-19-16 (N=42)	SM		Dry, very dense, light brown, medium to fine SAND, little silt, trace gravel (FILL)	PID=0
22		5	4-6	S-3	6/24	15-8-5-4 (N=13)	GP		Moist, medium dense, gray, coarse GRAVEL (FILL)	
			6-8	S-4	10/24	7-10-12-5 (N=22)	SM		Moist, medium dense, dark gray, coarse to fine SAND and GRAVEL, little silt (FILL)	PID=0
			8-10	S-5	0/24	7-6-6-6 (N=12)			No recovery. Gravel stuck in tip of sampler. (FILL)	PID=0
17		10	10-12	S-6	11/24	5-6-6-7 (N=12)	ML		Moist, stiff, light brown SILT, trace gravel (FILL)	PID=0
	▽									
12		15	14-16	S-7	9/24	5-7-5-3 (N=12)	GW		Wet, medium dense, gray, coarse to fine GRAVEL, little sand, trace fines. Fragments of brick. (FILL)	PID=0 Cobble from 16-17.5 ft
7									Wet, dense, brownish-gray, coarse GRAVEL and sand, little silt (GLACIAL TILL)	

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▽ - Water Level at Time of Drilling

Boring B-5

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-5

Date(s) Drilled: **08/27/2019 - 08/27/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **35.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **26.8 ft / NGVD 1929**	
Location: **Intersection of Taft St. and Jenks Way**	Coordinates: **359511.82E,288453.92N**	Elevation Source: **Field Survey**	

ELEV. (ft)	WATER LEVEL	DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
	▽		19-21	S-8	10/24	10-21-19-29 (N=40)	GM		Wet, dense, brownish-gray, coarse GRAVEL, little sand and silt (GLACIAL TILL)	PID=0
-2		25	24-26	S-9	12/24	13-16-19-29 (N=35)	SM		Wet, dense, brownish-gray, SAND, some gravel, little silt (GLACIAL TILL)	PID=0
									Top of Bedrock at 27.0 ft. See Core Boring Report for rock details.	
-3		30								
-8		35								
-13										

▽ - Water Level at Time of Drilling

Boring B-5

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-5

Date(s) Drilled: **08/27/2019 - 08/27/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **35.0 ft**	
Borehole Diameter: **4.00 in**	Core Barrel Type / Size: **NX / 2 in**	Ground Surface Elevation/Datum: **26.8 ft / NGVD 1929**	
Location: **Intersection of Taft St. and Jenks Way**	Coordinates: **359511.82E,288453.92N**	Elevation Source **Field Survey**	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
2	25								See Test Boring Report for Overburden Details							
		27-32	2 2 2	1	C-1	58/ 97%	47/ 78%		Strong, fresh, gray, medium-grained SANDSTONE	28.9	J	40	SR	5.00	FR	
-3																

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Boring B-5

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-5

Date(s) Drilled:	08/27/2019 - 08/27/2019	Geotechnical Consultant:	McMillen Jacobs Associates	Logged By:	S. Wilbur	Checked By:	W. Kilker
Drilling Method/ Rig Type:	Mud Rotary/CME 45	Drilling Contractor:	Geologic Earth Exploration, Inc.	Total Depth of Borehole:	35.0 ft		
Borehole Diameter:	4.00 in	Core Barrel Type / Size:	NX / 2 in	Ground Surface Elevation/Datum:	26.8 ft / NGVD 1929		
Location:	Intersection of Taft St. and Jenks Way	Coordinates:	359511.82E,288453.92N	Elevation Source	Field Survey		

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DISCONTINUITIES DEPTH (FT)	TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
		27-32	4 5	1	C-1	58/ 97%	47/ 78%		Strong, fresh, gray, medium-grained SANDSTONE	30.5 30.6	J J	40 40	SR SR	5.00 5.00	FR FR	
-8		32-35	3 3	1	C-2	32/ 90%	24/ 67%		Strong, fresh, gray, fine-grained SILTSTONE	32.6 33.7	J J	40 30	SR R	1.00 5.00	FR FR	
	35								Bottom of borehole at 35.0 ft.							
-13																

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Boring B-5

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-6

Date(s) Drilled: **08/29/2019 - 08/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **4.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum:	
Location: **On Roosevelt Ave Ext. north of Jenks Way**	Coordinates:	Elevation Source: **Google Earth**	

ELEV. (ft) / WATER LEVEL / DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
							(ASPHALT)	
	0.5-2	S-1	10/18	9-9-11 (N=20)	SW		Moist, medium dense, brown, coarse to fine SAND with gravel, trace silt (FILL)	
	2-4	S-2	15/24	5-5-6-39 (N=11)	SP		Moist, medium dense, dark brown, medium to fine SAND, little gravel, trace silt. Trace brick fragments. Possible concrete in tip. (FILL)	
-5 5							Bottom of borehole at 4.0 ft.	
							Pieces of possible concrete in tip of sampler. Relocated to new location at Boring B-6A.	
-10 10								
-15 15								

McMILLEN JACOBS ASSOCIATES

▽ - Water Level at Time of Drilling

Boring B-6

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-6A

Date(s) Drilled: **09/18/2019 - 09/18/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **31.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **25.4 ft / NGVD 1929**	
Location: **On Roosevelt Ave Ext. north of Jenks Way**	Coordinates: **359521.28E,288557.54N**	Elevation Source: **Field Survey**	

ELEV. (ft)	WATER LEVEL	DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
									Vacuum excavated from about 0 to 6 ft (FILL)	
21		5	6-8	S-1	8/24	7-4-5-8 (N=9)	SM		Moist, loose, brown, medium to fine SAND, little silt. Black sand in tip of sampler. (FILL)	PID=0
16			8-10	S-2	8/24	10-14-20-15 (N=34)	SP-SM		Moist, dense, brown to black, medium to fine SAND, trace silt (FILL)	PID=0
	▽	10	10-12	S-3	10/24	7-6-4-3 (N=10)	SP-SM		Wet, medium dense, dark brown, medium to fine SAND, little gravel, trace fines (FILL)	Water loss while drilling from 10-14 ft PID=0
11		15	14-16	S-4	8/24	12-5-13-9 (N=18)	SP-SM		Wet, medium dense, gray, SAND, some coarse to fine gravel, little silt. Pieces of glass. (FILL)	PID=0
6									Wet, very dense, gray, SAND and gravel, little silt (GLACIAL TILL)	

McMILLEN JACOBS ASSOCIATES

▽ - Water Level at Time of Drilling

Boring B-6A

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-6A

Date(s) Drilled: **09/18/2019 - 09/18/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **31.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **25.4 ft / NGVD 1929**	
Location: **On Roosevelt Ave Ext. north of Jenks Way**	Coordinates: **359521.28E,288557.54N**	Elevation Source: **Field Survey**	

ELEV. (ft) / WATER LEVEL / DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
	19-21	S-5	15/24	26-35-39-38 (N=74)	SM		Wet, very dense, gray, SAND and GRAVEL, little silt (GLACIAL TILL)	PID=0 Rig Chatter
-1 / 25	24-24.1	S-6	1/1	50/1"	GW		Wet, very dense, gray, coarse to fine GRAVEL, little silt (GLACIAL TILL)	Rig Chatter
-4 / 30							Top of Bedrock at 26.0 ft. See Core Boring Report for rock details.	Rollerbit from 24.1 ft to 26 ft and hit refusal
-9 / 35								
-14								

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▽ - Water Level at Time of Drilling

Boring B-6A

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-6A

Date(s) Drilled: **09/18/2019 - 09/18/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **31.0 ft**	
Borehole Diameter: **4.00 in**	Core Barrel Type / Size: **NX / 2 in**	Ground Surface Elevation/Datum: **25.4 ft / NGVD 1929**	
Location: **On Roosevelt Ave Ext. north of Jenks Way**	Coordinates: **359521.28E,288557.54N**	Elevation Source **Field Survey**	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
1	25								See Test Boring Report for Overburden Details							
		26-31	3	3	C-1	59/ 98%	34/ 57%		Strong, fresh, gray, fine-grained SILTSTONE	26.5	J	40	R	1.00	FR	
										26.7	J	40	SR	1.00	FR	
										26.9	J	30	SR	1.00	SL	
			5							27.6	J	30	SR	1.00	FR	
										27.6	J	20	S	1.00	FR	
										27.9	J	40	S	1.00	SL	
										28.0	J	10	S	1.00	FR	
			4							28.2	J	40	SR	1.00	FR	
										28.7	J	40	S	1.00	FR	
										28.8	J	40	SR	1.00	FR	
										29.0	J	30	SR	1.00	FR	
										29.0	J	20	S	1.00	FR	
-4			6							29.2	J	20	SR	5.00	FR	

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Boring B-6A

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-6A

Date(s) Drilled: **09/18/2019 - 09/18/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **31.0 ft**	
Borehole Diameter: **4.00 in**	Core Barrel Type / Size: **NX / 2 in**	Ground Surface Elevation/Datum: **25.4 ft / NGVD 1929**	
Location: **On Roosevelt Ave Ext. north of Jenks Way**	Coordinates: **359521.28E,288557.54N**	Elevation Source **Field Survey**	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
		26-31	5	3	C-1	59/ 98%	34/ 57%		Strong, fresh, gray, fine-grained SILTSTONE	30.1	J	50	SR	5.00	FR	
										30.2	J	30	S	1.00	FR	
										30.6	J	30	SR	1.00	FR	
										30.7	J	40	SR	5.00	FR	
									Bottom of borehole at 31.0 ft.							
-9	35															
-14																

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Boring B-6A

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-7

Date(s) Drilled: **08/30/2019 - 08/30/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **29.2 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **23.3 ft / NGVD 1929**	
Location: **On Roosevelt Ave Ext. across from National Grid Property**	Coordinates: **359529.70E,288817.39N**	Elevation Source: **Field Survey**	

ELEV. (ft)	WATER LEVEL	DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
									(ASPHALT)	
			0.5-2	S-1	11/18	5-11-17 (N=28)	SP-SM		Moist, medium dense, light brown/red, coarse to fine SAND, some gravel, trace silt (FILL)	PID=0
			2-4	S-2	16/24	11-11-7-6 (N=18)	SP-SM		Moist, medium dense, black, medium to fine SAND, little gravel, trace silt (FILL)	PID=0
19	▽	5	4-6	S-3	4/24	4-2-3-2 (N=5)	SP-SM		Wet, loose, black, medium to fine SAND, little gravel, trace silt (FILL)	
			6-8	S-4	6/24	1-2-1-0 (N=3)	GW		Wet, very loose, black, coarse to fine GRAVEL, little sand (FILL)	PID=0
14		10	8-10	S-5	8/24	1-1-18-6 (N=19)	GW-GM		Wet, medium dense, black, coarse to fine GRAVEL, trace sand and silt (FILL)	PID=0
			10-12	S-6	15/24	10-47-34-18 (N=81)	GW		Wet, very dense, dark brown decomposed wood. Bottom 3": Gray coarse to fine GRAVEL, some silt, little sand (FILL)	3 in split spoon sample. PID=0
9		15	14-16	S-7	13/24	8-9-24-36 (N=33)	SM		Wet, dense, light brown, medium to fine SAND, some gravel, little silt (GLACIOFLUVIAL)	PID=0 Rig Chatter
4			19-20.8	S-8	15/22	21-35-52-50/4" (N=87)			Wet, very dense, light brown, medium to fine SAND, little gravel, trace silt (GLACIOFLUVIAL)	

McMILLEN JACOBS ASSOCIATES

▽ - Water Level at Time of Drilling

Boring B-7

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-7

Date(s) Drilled: **08/30/2019 - 08/30/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **29.2 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **23.3 ft / NGVD 1929**	
Location: **On Roosevelt Ave Ext. across from National Grid Property**	Coordinates: **359529.70E,288817.39N**	Elevation Source: **Field Survey**	

ELEV. (ft) / WATER LEVEL / DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
					SP		Wet, very dense, light brown, medium to fine SAND, little gravel, trace silt (GLACIOFLUVIAL)	PID=0
-1 / 25	24-24.08	S-9	1/1	80/1"				
					SC		Wet, very dense, gray, fine SAND and clay, some fractured rock (GLACIAL TILL)	Rig Chatter
	29-29.13	S-10	0/2	50/2"				
-6 / 30							Bottom of borehole at 29.2 ft.	
-11 / 35								
-16								

McMILLEN JACOBS ASSOCIATES

▽ - Water Level at Time of Drilling

Boring B-7

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-8

Date(s) Drilled: **09/10/2019 - 09/10/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **S. Wilbur**	Checked By: **W. Kilker**
Drilling Method/ Rig Type: **Mud Rotary/CME 45**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **25.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **31.1 ft / NGVD 1929**	
Location: **Intersection of Roosevelt Ave. Ext. and Main St.**	Coordinates: **359697.13E,289110.39N**	Elevation Source: **Field Survey**	

ELEV. (ft)	WATER LEVEL	DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
27		5							Vacuum excavated from about 0 to 6 ft (FILL)	
			6-8	S-1	6/24	14-8-5-8 (N=13)	SM		Moist, stiff, brown, SAND, some silt, little gravel (FILL)	PID=0
22			8-10	S-2	9/24	7-4-4-5 (N=8)	SP		Wet, loose, brown, coarse to fine SAND, little gravel, trace silt (GLACIOFLUVIAL)	PID=0
	▽	10	10-12	S-3	7/24	6-5-2-1 (N=7)	SM		Wet, loose, brown, SAND, some silt, little gravel (GLACIOFLUVIAL)	PID=0
17			~~14-14.08~~	~~S-4~~	~~1/1~~	~~50/1"~~	GW		Wet, very dense, gray, coarse to fine GRAVEL, trace silt (GLACIAL TILL)	No casing advancement
		15							See Core Boring Report for rock details	Sampler refusal at 14.1 ft. Rollerbit from 14.1 ft to 16 ft.
12										

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▽ - Water Level at Time of Drilling

Boring B-8

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-8

Date(s) Drilled:	09/10/2019 - 09/10/2019	Geotechnical Consultant:	McMillen Jacobs Associates	Logged By:	S. Wilbur	Checked By:	W. Kilker
Drilling Method/ Rig Type:	Mud Rotary/CME 45	Drilling Contractor:	Geologic Earth Exploration, Inc.	Total Depth of Borehole:	25.0 ft		
Borehole Diameter:	4.00 in	Core Barrel Type / Size:	NX / 2 in	Ground Surface Elevation/Datum:	31.1 ft / NGVD 1929		
Location:	Intersection of Roosevelt Ave. Ext. and Main St.	Coordinates:	359697.13E,289110.39N	Elevation Source	Field Survey		

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
17	15								See Test Boring Report for Overburden Details							
12		16-21	3 3 2 2	3	C-1	58/ 97%	16/ 27%		Strong, fresh, gray, medium-grained SANDSTONE	16.3 16.4 16.5 16.8 16.8 16.9 17.2 17.3 17.6 17.7 17.8 17.9 18.0 18.7 19.0 19.2 19.3 19.4 19.5	J J J J J J J J J J J J J J J J J J J	30 30 30 40 20 50 30 30 40 40 40 40 50 50 40 30 40 50	SR SR S R SR SR SR SR SR R SR SR R SR SR SR SR SR	5.00 10.0 0 1.00 10.0 0 10.0 0 5.00 5.00 5.00 10.0 0 10.0 0 5.00 5.00	FR FR FR FR FR FR FR FR FR FR FR FR FR FR FR FR FR FR FR	FE FE FE FE FE FE

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Boring B-8

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-8

Date(s) Drilled:	09/10/2019 - 09/10/2019	Geotechnical Consultant:	McMillen Jacobs Associates	Logged By:	S. Wilbur	Checked By:	W. Kilker
Drilling Method/ Rig Type:	Mud Rotary/CME 45	Drilling Contractor:	Geologic Earth Exploration, Inc.	Total Depth of Borehole:	25.0 ft		
Borehole Diameter:	4.00 in	Core Barrel Type / Size:	NX / 2 in	Ground Surface Elevation/Datum:	31.1 ft / NGVD 1929		
Location:	Intersection of Roosevelt Ave. Ext. and Main St.	Coordinates:	359697.13E,289110.39N	Elevation Source	Field Survey		

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DISCONTINUITIES DEPTH (FT)	TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
		16-21	2	3	C-1	58/ 97%	16/ 27%		Strong, fresh, gray, medium-grained SANDSTONE	19.8	J	20	SR	10.0	FR	
										20.0	J	30	SR	0	FR	
											J	30	SR	5.00	FR	
										20.6	J	10	SR	5.00	FR	
										20.7	J	30	SR	1.00	FR	
		21-25	3	3	C-2	42/ 88%	11/ 23%		Strong, fresh, gray, medium-grained SANDSTONE with conglomeratic material between 21-22.2 ft	21.1	J	10	SR	5.00	FR	
										21.2	J	50	SR	10.0	FR	
										21.5	J	40	SR	0	FR	
										21.6	J	40	SR	10.0	FR	
										21.7	J	50	S	0	FR	
										21.9	J	40	SR	10.0	FR	
										22.2	J	40	SR	0	FR	
			2											5.00		
														5.00		
														5.00		
														5.00		
														5.00		
														5.00		
			8							23.7	J	30	R	5.00	SL	
														1.00		
7										24.0	J	30	SR	5.00	FR	
			1											1.00		
														5.00		
	25													1.00		
									Bottom of borehole at 25.0 ft.							
2																

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Boring B-8

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-9

Date(s) Drilled: **02/10/2020 - 02/10/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **39.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Doughnut**	Ground Surface Elevation/Datum: **28.0 ft / NGVD 1929**	
Location: **Across Taft St. from charter school on Tidewater Site**	Coordinates: **359657.08E,286344.74N**	Elevation Source: **Field Survey**	

ELEV. (ft)	WATER LEVEL	DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
24		5							Vacuum excavated from about 0 to 6 ft (FILL)	
			6-8	S-1	6/24	7-16-19-19 (N=35)	SP		Moist, dense, brown, fine SAND little gravel, trace silt (FILL)	PID=0
19		10	8-10	S-2	20/24	13-16-13-9 (N=29)	SP		Top 7": Moist, brown, SAND, some gravel (FILL)	PID=0
							ML		Bottom 13": Moist, very stiff, light brown, SILT, trace sand (ALLUVIUM)	
14		15	14-16	S-3	6/24	15-11-5-5 (N=16)	ML		Moist, very stiff, brown, SILT, trace sand (ALLUVIUM)	PID=0
	▽		17-19	S-4	20/24	6-3-2-3 (N=5)	ML		Wet, medium stiff, dark gray, clayey SILT (ALLUVIUM)	PID=0
9									Wet, medium stiff, dark gray, clayey SILT (ALLUVIUM)	

McMILLEN JACOBS ASSOCIATES

▽ - Water Level at Time of Drilling

Boring B-9

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-9

Date(s) Drilled: **02/10/2020 - 02/10/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **39.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Doughnut**	Ground Surface Elevation/Datum: **28.0 ft / NGVD 1929**	
Location: **Across Taft St. from charter school on Tidewater Site**	Coordinates: **359657.08E,286344.74N**	Elevation Source: **Field Survey**	

ELEV. (ft) / WATER LEVEL / DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
	19-21	S-5	19/24	5-1-6-23 (N=7)	ML		Wet, medium stiff, dark gray, clayey SILT (ALLUVIUM)	PID=0
	21-23	S-6	16/24	19-28-19-26 (N=47)	SW		Moist, dense, orange brown, coarse to medium SAND, little gravel (GLACIAL TILL)	PID=0
-4	23-25	S-7	16/24	42-38-50- 58 (N=88)	GM		Moist, very dense, gray, coarse to fine GRAVEL, some clayey silt, little sand (GLACIAL TILL)	PID=0
25	25-27	S-8	16/24	62-44-37-52 (N=81)	SM		Moist, very dense, gray, medium to fine SAND and coarse to fine GRAVEL, little silt (GLACIAL TILL)	PID=0
	27-28.75	S-9	17/21	38-30-32-100/3" (N=62)	SM		Moist, very dense, gray, medium to fine SAND and coarse to fine GRAVEL, little clayey silt (GLACIAL TILL)	PID=0. Rock fragments in tip of sampler.
-1								
30							Top of Bedrock at 29.0 ft. See Core Boring Report for rock details.	
-6								
35								
-11								

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▽ - Water Level at Time of Drilling

Boring B-9

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-9

Date(s) Drilled: **02/10/2020 - 02/10/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **39.0 ft**	
Borehole Diameter: **4.00 in**	Core Barrel Type / Size: **NX / 2 in**	Ground Surface Elevation/Datum: **28.0 ft / NGVD 1929**	
Location: **Across Taft St. from charter school on Tidewater Site**	Coordinates: **359657.08E,286344.74N**	Elevation Source **Field Survey**	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
4									See Test Boring Report for Overburden Details							
	25															
-1		29-34	6	5	C-1	58/ 97%	41/ 68%		Strong, slightly weathered, dark gray, medium-grained SANDSTONE							

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Boring B-9

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-9

Date(s) Drilled: 02/10/2020 - 02/10/2020	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: M. MacInnis	Checked By: J. Freitas
Drilling Method/ Rig Type: Mud Rotary/Acker Scout	Drilling Contractor: Geologic Earth Exploration, Inc.	Total Depth of Borehole: 39.0 ft	
Borehole Diameter: 4.00 in	Core Barrel Type / Size: NX / 2 in	Ground Surface Elevation/Datum: 28.0 ft / NGVD 1929	
Location: Across Taft St. from charter school on Tidewater Site	Coordinates: 359657.08E,286344.74N	Elevation Source Field Survey	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
			4							30.9	HJ	30				
			3							31.4	J	35	SR	0.50	SW	SL
		29-34		5	C-1	58/ 97%	41/ 68%		Strong, slightly weathered, dark gray, medium-grained SANDSTONE	31.8	J	30	SM	0.50	SW	
										32.0	HJ	40				
			2							32.3	J	40	SM	1.00	SW	SL
										32.3	J	30	SM	0.50	SW	SL
										32.5	J	30	SM	0.50	SW	
										32.7	J	30	SM	0.50	SW	
										32.8	J	30	SM	0.50	SW	SL
			2							32.9	J	30		0.50	SW	
										33.2	J	30	SR	0.50	SW	
										33.3	HJ	30	SM	0.50	SW	
-6										33.6	J	30				
										33.7	HJ	30				
			3							33.8	J	25				
										34.1	HJ	40	SM	0.50	SW	SL
	35									34.3	HJ	70				
										34.5	J	35				
			2							34.6	HJ	20	SR	0.50	SW	
										34.8	HJ	45				
										35.1	J	50				
			2							36.0	J	40	SR	0.50	SW	SL
		34-39		5	C-2	60/ 100%	39/ 65%		Strong, slightly weathered, dark gray, medium-grained SANDSTONE	36.8	J	45	SR	0.50	SW	SL
										37.0	J	40	SR	0.50	SW	
										37.2	J	35	SL	0.50	SW	
			2							37.7	J	65	SL	0.50	SW	
										37.8	J	35	SL	0.50	SW	
										38.0	F/S	40	SL	5.00	MW	CS
			4							38.4	J	40	SM	0.50	SW	SL
										38.5	J	40	SM	0.50	SW	SL
										38.6	J	40	SM	0.50	SW	SL
-11										38.7	J	40	SM	0.50	SW	SL
									Bottom of borehole at 39.0 ft.	38.8	J	35	SR	0.50	SW	

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Boring B-9

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-10

Date(s) Drilled: **02/05/2020 - 02/05/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **31.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Doughnut**	Ground Surface Elevation/Datum: **23.7 ft / NGVD 1929**	
Location: **Southerly end of field on Tidewater Site**	Coordinates: **359996.52E,286103.11N**	Elevation Source: **Field Survey**	

ELEV. (ft) / WATER LEVEL / DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
19 / 5							Vacuum excavated from about 0 to 6 ft (FILL)	
	6-8	S-1	11/24	17-16-18-20 (N=34)	SP		Moist, dense, brown, medium SAND, trace gravel (FILL)	PID=0
	8-10	S-2	21/24	17-15-17-17 (N=32)	SP		Moist, dense, brown, medium SAND (FILL)	PID=0
14 / 10	10-12	S-3	9/24	15-10-12-16 (N=22)	SP		Moist, medium dense, dark brown, medium to fine SAND, little gravel, trace silt (FILL)	PID=0
	12-14	S-4	20/24	14-12-19-18 (N=31)	SP		Moist, dense, dark brown, medium to fine SAND, little gravel, trace silt (FILL)	PID=0
9 / 15	14-16	S-5	9/24	19-13-14-10 (N=27)	SP		Moist, medium dense, dark brown, medium to fine SAND, little gravel, trace silt (FILL)	PID=0
	16-18	S-6	4/24	11-10-12-11 (N=22)	SP		Moist, medium dense, dark brown, medium SAND, trace gravel and silt. Fragments of brick. (FILL)	PID=0. Rock fragments in tip of sampler.
4	18-20	S-7	12/24	19-23-30-46 (N=53)	SP		Moist, very dense, brown, coarse to fine SAND, some gravel, trace silt (FILL)	PID=0

McMILLEN JACOBS ASSOCIATES

▽ - Water Level at Time of Drilling

Boring B-10

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-10

Date(s) Drilled: **02/05/2020 - 02/05/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **31.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Doughnut**	Ground Surface Elevation/Datum: **23.7 ft / NGVD 1929**	
Location: **Southerly end of field on Tidewater Site**	Coordinates: **359996.52E,286103.11N**	Elevation Source: **Field Survey**	

ELEV. (ft) / WATER LEVEL / DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
▽	20-21	S-8	9/12	73-103 (Refusal)	GM		Wet, very dense, dark gray, coarse to fine GRAVEL, little sand and silt (GLACIAL TILL)	PID=3. Petroleum odor, oily appearance, rock fragments in tip of sampler.
-1 / 25							Top of Bedrock at 21.0 ft. See Core Boring Report for rock details.	
-6 / 30								
-11 / 35								
-16								

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▽ - Water Level at Time of Drilling

Boring B-10

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-10

Date(s) Drilled: **02/05/2020 - 02/05/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **31.0 ft**	
Borehole Diameter: **4.00 in**	Core Barrel Type / Size: **NX / 2 in**	Ground Surface Elevation/Datum: **23.7 ft / NGVD 1929**	
Location: **Southerly end of field on Tidewater Site**	Coordinates: **359996.52E,286103.11N**	Elevation Source **Field Survey**	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
									See Test Boring Report for Overburden Details							
		21-26	3	4	C-1	56/ 93%	37/ 62%		Strong, slightly weathered, dark gray, medium-grained SANDSTONE	21.3	J	65	SM	1.00	FR	
										21.7	J	30	R	1.00	SW	SI
			3							22.2	J	25	R		SW	
										22.8	J	45	SM		SW	
			4							23.2	J	60	VR	1.00	SW	PY
										23.4	J	35	R	0.50	SW	
										23.7	J	35	R	0.25	SW	
										23.9	J	40	R	2.00	SW	
			5							24.4	J	40	R	1.00	SW	
-1										24.7	J	40	R	0.50	SW	
	25									24.9	J	45	R	2.00	SW	
			10							25.2	J	20	VR	2.00	SW	
										25.4	J	35	R		SW	
		26-31	2	4	C-2	60/ 100%	52/ 87%		Strong, slightly weathered, dark gray, medium-grained SANDSTONE	27.2	J	50	SR	1.00	SW	CA
			3							27.6	HJ	70	SR	2.00	SW	
										27.7	J	40			SW	
			3							28.9	J	45	SR	1.00	SW	SI
										29.0	J	50	SR	0.25	SW	
										29.1	J	40	SM	1.00	SW	
			2							29.4	J	45	SM	1.00	SW	
-6										29.8	J	35	SM	1.00	SW	

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Boring B-10

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-10

Date(s) Drilled: **02/05/2020 - 02/05/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **31.0 ft**	
Borehole Diameter: **4.00 in**	Core Barrel Type / Size: **NX / 2 in**	Ground Surface Elevation/Datum: **23.7 ft / NGVD 1929**	
Location: **Southerly end of field on Tidewater Site**	Coordinates: **359996.52E,286103.11N**	Elevation Source **Field Survey**	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
		26-31	3	4	C-2	60/ 100%	52/ 87%		Strong, slightly weathered, dark gray, medium-grained SANDSTONE	30.0	J	35	SM	0.50	SW	
										30.5	J	25	SM	0.25	SW	
										30.7	J	40	SM	0.25	SW	
									Bottom of borehole at 31.0 ft.							
-11	35															
-16																

McMILLEN JACOBS ASSOCIATES

Boring B-10

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-11

Date(s) Drilled: **02/07/2020 - 02/10/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **39.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Doughnut**	Ground Surface Elevation/Datum: **25.7 ft / NGVD 1929**	
Location: **Tidewater Site**	Coordinates: **359825.47E,286216.96N**	Elevation Source: **Field Survey**	

ELEV. (ft)	WATER LEVEL	DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
									Vacuum excavated from about 0 to 1 ft: Encountered existing concrete tank foundation (1ft thick from 1-2ft below grade) (FILL)	
			2-4	S-1	24/24	20-23-42-21 (N=65)	SW		Moist, very dense, brown, medium to fine SAND, some gravel (FILL)	PID=0
21		5	4-6	S-2	12/24	20-22-56-36 (N=78)	SW		Moist, very dense, brown, medium to coarse SAND and gravel, trace silt (FILL)	Rig Chatter. PID=0
16		10	9-11	S-3	14/24	14-9-13-10 (N=22)	ML		Moist, very stiff, light brown SILT, trace fine sand, trace clay (ALLUVIUM)	PID=0
			13-15	S-4	17/24	7-3-8-8 (N=11)	ML		Moist, stiff, light brown, clayey SILT, trace sand (ALLUVIUM)	PID=0
11		15	15-17	S-5	7/24	19-22-16-16 (N=38)	GM		Moist, dense, brown, coarse to fine GRAVEL, some coarse to fine sand, little silt (GLACIOFLUVIAL)	PID=0
	▽		17-19	S-6	12/24	15-10-10-12 (N=20)	GM		Moist, medium dense, brown, coarse to fine GRAVEL, some sand, little silt (GLACIOFLUVIAL)	PID=0
6										

McMILLEN JACOBS ASSOCIATES

▽ - Water Level at Time of Drilling

Boring B-11

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-11

Date(s) Drilled: **02/07/2020 - 02/10/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **39.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Doughnut**	Ground Surface Elevation/Datum: **25.7 ft / NGVD 1929**	
Location: **Tidewater Site**	Coordinates: **359825.47E,286216.96N**	Elevation Source: **Field Survey**	

ELEV. (ft) / WATER LEVEL / DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
	19-21	S-7	10/24	14-15-9-10 (N=24)	SP-SM		Moist, medium dense, light brown, coarse to medium SAND, some gravel, trace silt (GLACIOFLUVIAL)	Rig Chatter. PID=0
	21-23	S-8	16/24	9-6-14-20 (N=20)	ML		Moist, very stiff, dark gray, clayey SILT, some sand (GLACIOFLUVIAL)	PID=0. Rock fragments in tip of sampler
	23-25	S-9	8/24	24-22-26-24 (N=48)	GM		Moist, dense, gray, coarse to fine GRAVEL, some sand, little clayey silt (GLACIAL TILL)	PID=0
-1 / 25	25-27	S-10	15/24	26-48-18-52 (N=66)	GM		Moist, very dense, gray, coarse to fine GRAVEL, some sand, little clayey silt (GLACIAL TILL)	PID=0. Rock fragments in tip of sampler
-4 / 30							Top of Bedrock at 29.0 ft. See Core Boring Report for rock details.	
-9 / 35								
-14							Bottom of borehole at 39.0 ft.	

McMILLEN JACOBS ASSOCIATES

▽ - Water Level at Time of Drilling

Boring B-11

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-11

Date(s) Drilled: **02/07/2020 - 02/10/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **39.0 ft**	
Borehole Diameter: **4.00 in**	Core Barrel Type / Size: **NX / 2 in**	Ground Surface Elevation/Datum: **25.7 ft / NGVD 1929**	
Location: **Tidewater Site**	Coordinates: **359825.47E,286216.96N**	Elevation Source **Field Survey**	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES					
											TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
1	25								See Test Boring Report for Overburden Details							
-4		29-33	2	4	C-1	25/ 52%	5/ 10%		Strong, moderately to completely weathered, dark gray, medium-grained SANDSTONE							

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Boring B-11

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-11

Date(s) Drilled:	02/07/2020 - 02/10/2020	Geotechnical Consultant:	McMillen Jacobs Associates	Logged By:	M. MacInnis	Checked By:	J. Freitas
Drilling Method/ Rig Type:	Mud Rotary/Acker Scout	Drilling Contractor:	Geologic Earth Exploration, Inc.	Total Depth of Borehole:	39.0 ft		
Borehole Diameter:	4.00 in	Core Barrel Type / Size:	NX / 2 in	Ground Surface Elevation/Datum:	25.7 ft / NGVD 1929		
Location:	Tidewater Site	Coordinates:	359825.47E,286216.96N	Elevation Source	Field Survey		

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
			1							30.5	J	45	R		MW	FE
										30.8	J	30	R		MW	FE
										31.0	J	15	R	1.00	SW	
			1							31.2	J	50	VR		MW	FE
		29-33		4	C-1	25/ 52%	5/ 10%		Strong, moderately to completely weathered, dark gray, medium-grained SANDSTONE	31.5	J	40	SR		MW	FE
			2													
									Split spoon sample attempted at 34 ft. with blow count of 50/0"							
			3							34.1	J	45	SR	1.00	SW	SI
-9																
	35									34.9	J	45	SM	1.00	SW	
										35.2	J	45	SR	2.00	SW	SI
			3							35.4	J	35	VR	2.00	SW	SI
										35.5	J	40	SR	0.50	SW	SI
										35.7	J	50	VR	0.50	SW	SI
			4							36.2	J	45	SR	1.00	SW	
		34-39		4	C-2	52/ 87%	41/ 68%		Strong, slightly weathered, gray, medium-grained SANDSTONE							
			4							37.0	J	40	SR	1.00	SW	
										37.3	J	50	VR	1.00	SW	
										37.7	J	55	SR	0.50	SW	
			4							38.0	J	40	SR	0.50	SW	
									Bottom of borehole at 39.0 ft.							
-14																

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Boring B-11

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-12

Date(s) Drilled: **02/11/2020 - 02/12/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **51.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Doughnut**	Ground Surface Elevation/Datum: **30.1 ft / NGVD 1929**	
Location: **Across Taft St. from Tower St. on Tidewater Site**	Coordinates: **359643.34E,286494.92N**	Elevation Source: **Field Survey**	

ELEV. (ft) / WATER LEVEL / DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
26 / 5							Vacuum excavated from about 0 to 6 ft (FILL)	
	6-8	S-1	14/24	12-17-14-18 (N=31)	ML		Moist, hard, light brown SILT, little clay (ALLUVIUM)	PID=0
21 / 10	8-10	S-2	19/24	13-8-12-14 (N=20)	ML		Moist, very stiff, dark gray, clayey SILT (ALLUVIUM)	PID=0
16 / 15	14-16	S-3	11/24	4-8-7-7 (N=15)	ML		Moist, stiff, dark gray, clayey SILT (ALLUVIUM)	PID=0
11					ML		Moist, gray SILT (ALLUVIUM)	

McMILLEN JACOBS ASSOCIATES

▽ - Water Level at Time of Drilling

Boring B-12

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-12

Date(s) Drilled: **02/11/2020 - 02/12/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **51.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Doughnut**	Ground Surface Elevation/Datum: **30.1 ft / NGVD 1929**	
Location: **Across Taft St. from Tower St. on Tidewater Site**	Coordinates: **359643.34E,286494.92N**	Elevation Source: **Field Survey**	

ELEV. (ft) / WATER LEVEL / DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
	19-21	S-4	16/24	9-15-18-21 (N=33)	SP		Moist, dense, brown, fine to medium SAND, trace silt (ALLUVIUM)	PID=0
6	23-25	S-5	12/24	24-14-16-20 (N=30)	CL		Moist, hard, light brown CLAY, little silt (GLACIAL TILL)	PID=0
25	25-27	S-6	16/24	34-64-65-54 (N=129)	GC		Moist, very dense, brown, clayey GRAVEL, little sand and silt (GLACIAL TILL)	Sampler would not open. PID=0.
	27-28.75	S-7	4/21	34-69-48-100/3" (N=117)	GC		Moist, very dense, brown, clayey GRAVEL, little sand (GLACIAL TILL)	PID=0. Rock fragments lodged in tip of sampler.
1							Top of Bedrock at 29.0 ft. See Core Boring Report for rock details.	
30								
-4								
35								
-9								

McMILLEN JACOBS ASSOCIATES

▽ - Water Level at Time of Drilling

Boring B-12

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-12

Date(s) Drilled: **02/11/2020 - 02/12/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **51.0 ft**	
Borehole Diameter: **4.00 in**	Core Barrel Type / Size: **NX / 2 in**	Ground Surface Elevation/Datum: **30.1 ft / NGVD 1929**	
Location: **Across Taft St. from Tower St. on Tidewater Site**	Coordinates: **359643.34E,286494.92N**	Elevation Source **Field Survey**	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES					
											TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
6	25								See Test Boring Report for Overburden Details							
1		29-34	3		C-1	9/ 15%	0/ 0%		Weak, highly weathered, gray, medium-grained SANDSTONE							

McMILLEN JACOBS ASSOCIATES

Boring B-12

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-12

Date(s) Drilled:	02/11/2020 - 02/12/2020	Geotechnical Consultant:	McMillen Jacobs Associates	Logged By:	M. MacInnis	Checked By:	J. Freitas
Drilling Method/ Rig Type:	Mud Rotary/Acker Scout	Drilling Contractor:	Geologic Earth Exploration, Inc.	Total Depth of Borehole:	51.0 ft		
Borehole Diameter:	4.00 in	Core Barrel Type / Size:	NX / 2 in	Ground Surface Elevation/Datum:	30.1 ft / NGVD 1929		
Location:	Across Taft St. from Tower St. on Tidewater Site	Coordinates:	359643.34E,286494.92N	Elevation Source	Field Survey		

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DEPTH (FT)	DISCONTINUITIES					
											TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
		29-34	3 4 1 1		C-1	9/ 15%	0/ 0%		Weak, highly weathered, gray, medium-grained SANDSTONE							
-4	35	34-37	2 1 6		C-2	13/ 36%	0/ 0%		Weak, highly weathered, gray, medium-grained SANDSTONE							
-9		37-41	4		C-3	6/ 12%	0/ 0%		Weak, highly weathered, gray, medium-grained SANDSTONE							

McMILLEN JACOBS ASSOCIATES

Boring B-12

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-12

Date(s) Drilled: **02/11/2020 - 02/12/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **51.0 ft**	
Borehole Diameter: **4.00 in**	Core Barrel Type / Size: **NX / 2 in**	Ground Surface Elevation/Datum: **30.1 ft / NGVD 1929**	
Location: **Across Taft St. from Tower St. on Tidewater Site**	Coordinates: **359643.34E,286494.92N**	Elevation Source **Field Survey**	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DISCONTINUITIES DEPTH (FT)	TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
		37-41			C-3	6/ 12%	0/ 0%		Weak, highly weathered, gray, medium-grained SANDSTONE							
		41-46	2	5	C-4	59/ 98%	53/ 88%		Strong, slightly weathered, dark gray, medium-grained SANDSTONE	41.4	J	35	SR	0.50	SW	SI
			3							42.0	J	30	SM	0.50	SW	
										42.8	J	30	SM	0.50	SW	
			2							43.6	J	20	SR	2.00	SW	SI
-14			2							44.2	F/S	30	SL	5.00	MW	CS
	45		2							45.0	J	25	SM	0.50	SW	
										45.4	J	35	SM	0.50	SW	
										45.5	J			0.50	SW	
		46-51	2	5	C-5	59/ 98%	46/ 77%		Strong, slightly weathered, purple, medium-grained SANDSTONE	46.1	J	35	SL	0.50	SW	PY
										46.2	J	30	SL	0.50	SW	
										46.4	J	25	SR	0.50	SW	
			2							47.2	J	40	SR	0.50	SW	
										47.3	J	40	SM	0.50	SW	
										47.7	J	40	SM	0.50	SW	SL
-19			2							49.4	HJ	20	SM	0.50	SW	
										49.4	J	30	SR	0.50	SW	
										49.6	J	40		0.50		

McMILLEN JACOBS ASSOCIATES

Boring B-12

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Core Boring B-12

Date(s) Drilled: **02/11/2020 - 02/12/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **51.0 ft**	
Borehole Diameter: **4.00 in**	Core Barrel Type / Size: **NX / 2 in**	Ground Surface Elevation/Datum: **30.1 ft / NGVD 1929**	
Location: **Across Taft St. from Tower St. on Tidewater Site**	Coordinates: **359643.34E,286494.92N**	Elevation Source **Field Survey**	

ELEV. (FT)	DEPTH (FT)	SAMPLE DEPTH (ft)	DRILL RATE (FT/MIN)	BOX #	RUN #	RECOVERY (in/%)	RQD (in/%)	ROCK TYPE	MATERIAL DESCRIPTION	DISCONTINUITIES DEPTH (FT)	TYPE	DIP	RGH	APT (mm)	WEATHERING	INFILL
		46-51	2	5	C-5	59/ 98%	46/ 77%		Strong, slightly weathered, purple, medium-grained SANDSTONE	50.2 50.2 50.6	HJ J J	35 35 35	SM SR	0.50 0.50 0.50	SW SW	SL
-24									Bottom of borehole at 51.0 ft.							
	55															
-29																

McMILLEN JACOBS ASSOCIATES

Boring B-12

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-13

Date(s) Drilled: **02/06/2020 - 02/06/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **21.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Doughnut**	Ground Surface Elevation/Datum: **9.7 ft / NGVD 1929**	
Location: **Across Seekonk River from Festival Pier on Tidewater Site**	Coordinates: **360398.12E,286078.13N**	Elevation Source: **Field Survey**	

ELEV. (ft) / WATER LEVEL / DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
5 / 5							Vacuum excavated from about 0 to 6 ft (FILL)	
	6-8	S-1	3/24	75-86-54-12 (N=140)	GW		Moist, very dense, dark gray, coarse to fine GRAVEL, some sand, trace silt (FILL)	PID=0
0 / 10	8-10	S-2	20/24	2-5-6-2 (N=11)	SM		Moist, medium dense, dark gray, medium to fine SAND, little silt grading to coarse to fine GRAVEL, little silt. Fragments of brick. (FILL)	PID=0. Strong petroleum odor, oily sheen.
	10-12	S-4	1/24	7-4-5-6 (N=9)	GM		Moist, medium dense, dark gray, sandy GRAVEL, little silt (FILL)	PID=2
								Rig Chatter
-5 ▽ / 15	14-16	S-5	13/24	30-16-17-26 (N=33)	GW		Wet, dense, dark gray, coarse to fine sandy GRAVEL, trace silt (FILL)	PID=0. Rock fragments in tip of sampler, strong petroleum odor.
-10							Wet, hard, grey/brown clayey SILT, trace fine sand (FILL)	PID>100. Very strong petroleum odor, oily sheen.

McMILLEN JACOBS ASSOCIATES

▽ - Water Level at Time of Drilling

Boring B-13

Project: NBC CSO Phase III A-4 and III A-5 Consolidation Conduits
Project Location: Pawtucket, RI
Project Number: 5980.0

Boring B-13

Date(s) Drilled: **02/06/2020 - 02/06/2020**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **M. MacInnis**	Checked By: **J. Freitas**
Drilling Method/ Rig Type: **Mud Rotary/Acker Scout**	Drilling Contractor: **Geologic Earth Exploration, Inc.**	Total Depth of Borehole: **21.0 ft**	
Borehole Diameter/ Sampler Diameter: **4.00 in I.D. / 2 & 3 in I.D.**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Doughnut**	Ground Surface Elevation/Datum: **9.7 ft / NGVD 1929**	
Location: **Across Seekonk River from Festival Pier on Tidewater Site**	Coordinates: **360398.12E,286078.13N**	Elevation Source: **Field Survey**	

ELEV. (ft) / WATER LEVEL / DEPTH (ft)	SAMPLE DEPTH (ft)	SAMPLE NUMBER	REC (in)/ PEN (in)	BLOW COUNTS	USCS	USCS GRAPHIC	MATERIAL DESCRIPTION	REMARKS AND TESTS
	19-21	S-6	11/24	19-19-23-18 (N=42)	ML		Wet, hard, grey/brown clayey SILT, trace fine sand (FILL)	
							Bottom of borehole at 21.0 ft.	

-15 / 25
-20 / 30
-25 / 35
-30

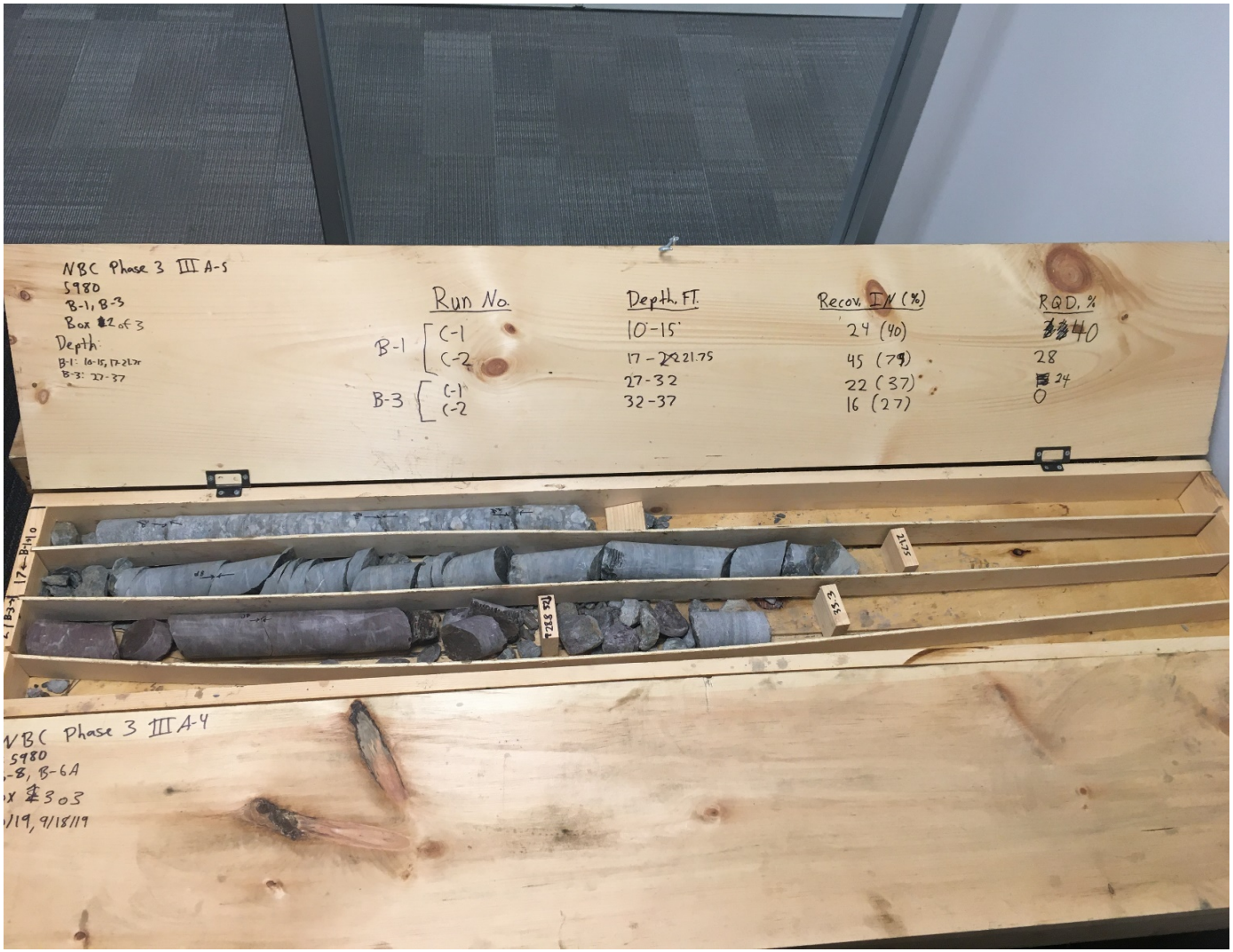
McMILLEN JACOBS ASSOCIATES

▽ - Water Level at Time of Drilling

Boring B-13

APPENDIX B
Rock Core Photographs

CORE PHOTOS



McMILLEN JACOBS ASSOCIATES	**Test Boring B-1, Run C-1 & C-2 (10 ft to 21.75 ft)** **Test Boring B-3, Run C-1 & C-2 (27 ft to 37 ft)**	**Project**	NBC Phase 3 IIIA-4 and IIIA-5 Consolidation Conduits		
		Date	11/20/2019	**Figure**	B.1

CORE PHOTOS

McMILLEN JACOBS ASSOCIATES	**Test Boring B-8, Run C-1 & C-2 (16 ft to 25 ft)** **Test Boring B-6A, Run C-1 (26 ft to 31 ft)**	**Project**	NBC Phase 3 IIIA-4 and IIIA-5 Consolidation Conduits		
		Date	11/20/2019	**Figure**	B.2

CORE PHOTOS

McMILLEN JACOBS ASSOCIATES	**Test Boring B-5, Run C-1 & C-2 (27 ft to 35 ft)** **Test Boring B-4C, Run C-1 (30 ft to 35 ft)** **Test Boring B-2, Run C1 (29 ft to 34 ft)**	**Project**	NBC Phase 3 IIIA-4 and IIIA-5 Consolidation Conduits		
		Date	11/20/2019	**Figure**	B.3

CORE PHOTOS

McMILLEN JACOBS ASSOCIATES	**Test Boring B-10, Run C-1 & C-2 (21 ft to 31 ft)** **Test Boring B-11, Run C-1 & C-2 (29 ft to 39 ft)**	**Project**	NBC Phase 3 IIIA-4 and IIIA-5 Consolidation Conduits		
		Date	2/25/2020	**Figure**	B.4

CORE PHOTOS

McMILLEN JACOBS ASSOCIATES	**Test Boring B-9, Run C-1 & C-2 (29 ft to 39 ft)** **Test Boring B-12, Run C-4 & C-5 (41 ft to 51 ft)**	**Project**	NBC Phase 3 IIIA-4 and IIIA-5 Consolidation Conduits		
		Date	2/25/2020	**Figure**	B.5

CORE PHOTOS

McMILLEN JACOBS ASSOCIATES	**Test Boring B-12, C-1 (29 ft to 34 ft)**	**Project**	NBC Phase 3 IIIA-4 and IIIA-5 Consolidation Conduits		
		Date	2/12/2020	**Figure**	B.6

CORE PHOTOS

McMILLEN JACOBS ASSOCIATES	**Test Boring B-12, C-2 (34 ft to 37 ft)**	**Project**	NBC Phase 3 IIIA-4 and IIIA-5 Consolidation Conduits		
		Date	2/12/2020	**Figure**	B.7

CORE PHOTOS

McMILLEN JACOBS ASSOCIATES	**Test Boring B-12, C-3 (37 ft to 41 ft)**	**Project**	NBC Phase 3 IIIA-4 and IIIA-5 Consolidation Conduits		
		Date	2/12/2020	**Figure**	B.8

APPENDIX C
Groundwater Observation Well Installation and Monitoring Reports

OBSERVATION WELL INSTALLATION REPORT

McMILLEN JACOBS ASSOCIATES

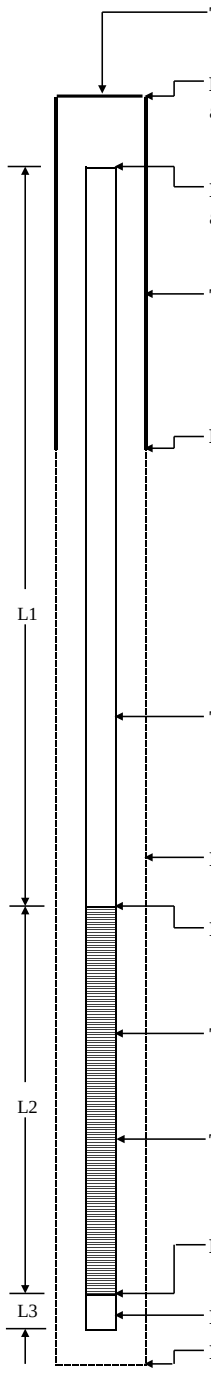
Well No. B-2

Boring No. B-2

PROJECT	NBC Phase III Consolidation Conduits IIIA-4 and IIIA-5	**FILE NO.**	5980
LOCATION	Pawtucket, RI	**PROJECT MGR.**	T. Muindi
CLIENT	NBC	**FIELD REP.**	S. Wilbur
CONTRACTOR	Geologic Earth Exploration, Inc.	**DATE INSTALLED**	9/4/2019-9/5/2019
DRILLER	Paul Fisher	**WATER LEVEL**	8.60

Ground El.	22.22 ft	**Location**	Middle of the field on Tidewater Site	☑	**Guard Pipe**
El. Datum	NVGD 29			☐	**Roadway Box**

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
0-14': Fill - Brown and gray, sands, silts, and gravel	0-2': Grout
14-20': Alluvium - Brown silty sands and silt	2-3': Bentonite Seal
24-29': Till - Sands, silts and gravels.	3-15': Holliston Sand
29-34': Rock	15-34': Grout



(Bottom of Exploration)
(Numbers refer to depth from ground surface in feet)

Type of protective cover/lock	Guard Pipe with Lock	
Height of top of guard pipe above the ground surface	2.5	ft
Height of top of riser pipe above the ground surface	2	ft
Type of protective casing:	Guard Pipe	
Length	5.0	ft
Inside Diameter	4.0	in
Depth of bottom of guard pipe/roadway box	2.5	ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Grout	0.0	2.0
Bentonite	2.0	1.0

Type of riser pipe:	Solid PVC	
Inside diameter of riser pipe	2.0	in
Type of backfill around riser	Holliston Sand	
Diameter of borehole	4.0	in
Depth to top of well screen	5.0	ft
Type of screen	Slotted PVC Schedule 40	
Screen gauge or size of openings	0.01	in
Diameter of screen	2.0	in
Type of backfill around screen	Holliston Sand	
Depth of bottom of well screen	15.0	ft
Bottom of Silt trap	-	ft
Depth of bottom of borehole	34.0	ft

(Not to Scale)

ft	ft	ft	ft
Riser Pay Length (L1)	+ Length of screen (L2)	+ Length of silt trap (L3)	= Pay length

COMMENTS:

GROUNDWATER MONITORING REPORT

Well No. B-02

Boring No. B-02

PROJECT	NBC Phase III Consolidation Conduits IIIA-4 and IIIA-5	**MJA JOB NO.**	5980
LOCATION	Pawtucket, RI	**PROJECT MGR.**	T. Muindi
CLIENT	NBC	**FIELD REP.**	S. Wilbur
CONTRACTOR	Geologic Earth Exploration, Inc.	**DATE INSTALLED**	9/4/2019-9/5/2019

ELEVATION OF REFERENCE POINT 22.2 NGVD 29 **REFERENCE POINT:** **Ground Surface** ☑ **PVC** ☐ **Other**

Date	Time	Elapsed Time (Days)	Depth of Water from Reference Point (ft)	Elevation of Water (ft)	Remarks	Read By
9/9/2019	7:00am	4	11.1	11.1		SW
2/4/2020	12:00pm	152	5	17.2		MM

OBSERVATION WELL INSTALLATION REPORT

McMILLEN JACOBS ASSOCIATES

Well No. B-3

Boring No. B-3

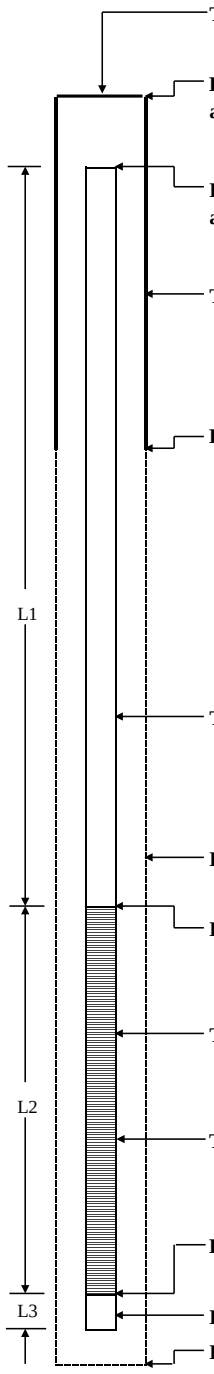
PROJECT	NBC Phase III Consolidation Conduits IIIA-4 and IIIA-5	**FILE NO.**	5980
LOCATION	Pawtucket, RI	**PROJECT MGR.**	T. Muindi
CLIENT	NBC	**FIELD REP.**	S. Wilbur
CONTRACTOR	Geologic Earth Exploration, Inc.	**DATE INSTALLED**	9/9/2019
DRILLER	Ray Eastwood	**WATER LEVEL**	

Ground El. 37.45 ft
El. Datum NVGD 29

Location Northwestern corner of the Tideawter Site

☑ **Guard Pipe**
☐ **Roadway Box**

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
0-14': Fill - Brown, silty sands with gravel	
14-23': Tan, sands with silt and gravel	0-12.5': Grout and Drill Cuttings
	12.5-14.5': Bentonite Seal
23-27': Till - Brown, sands, silts, clays and gravel	
27-37': Rock	14.5-26.5': Holliston Sand
	26.5-37': Bentonite Chips
(Bottom of Exploration) (Numbers refer to depth from ground surface in feet)	



(Not to Scale)

Type of protective cover/lock: Guard Pipe with Lock

Height of top of guard pipe above the ground surface: 2.5 ft

Height of top of riser pipe above the ground surface: 2 ft

Type of protective casing: Guard Pipe
Length: 5.0 ft
Inside Diameter: 4.0 in

Depth of bottom of guard pipe/roadway box: 2.5 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Grout	0.0	12.5
Bentonite	12.5	2.0

Type of riser pipe: Solid PVC
Inside diameter of riser pipe: 2.0 in
Type of backfill around riser: Holliston Sand

Diameter of borehole: 4.0 in

Depth to top of well screen: 16.5 ft

Type of screen: Slotted PVC Schedule 40
Screen gauge or size of openings: 0.01 in
Diameter of screen: 2.0 in
Type of backfill around screen: Holliston Sand

Depth of bottom of well screen: 26.5 ft

Bottom of Silt trap: - ft

Depth of bottom of borehole: 37.0 ft

Riser Pay Length (L1)	+	Length of screen (L2)	+	Length of silt trap (L3)	=	Pay length
ft		ft		ft		ft

COMMENTS:

McMILLEN JACOBS ASSOCIATES

GROUNDWATER MONITORING REPORT

Well No. B-03
Boring No. B-03

PROJECT	NBC Phase III Consolidation Conduits IIIA-4 and IIIA-5	**MJA JOB NO.**	5980
LOCATION	Pawtucket, RI	**PROJECT MGR.**	T. Muindi
CLIENT	NBC	**FIELD REP.**	S. Wilbur
CONTRACTOR	Geologic Earth Exploration, Inc.	**DATE INSTALLED**	9/9/2019

ELEVATION OF REFERENCE POINT 37.45 NGVD 29 **REFERENCE POINT:** **Ground Surface** ☑ **PVC** ☐ **Other**

Date	Time	Elapsed Time (Days)	Depth of Water from Reference Point (ft)	Elevation of Water (ft)	Remarks	Read By
-	-	-	-	-	No groundwater monitoring to date due to access constraints at the Tidewater site.	-
-	-	-	-	-		-
-	-	-	-	-		-
-	-	-	-	-		-

OBSERVATION WELL INSTALLATION REPORT

McMILLEN JACOBS ASSOCIATES

Well No. B-4C

Boring No. B-4C

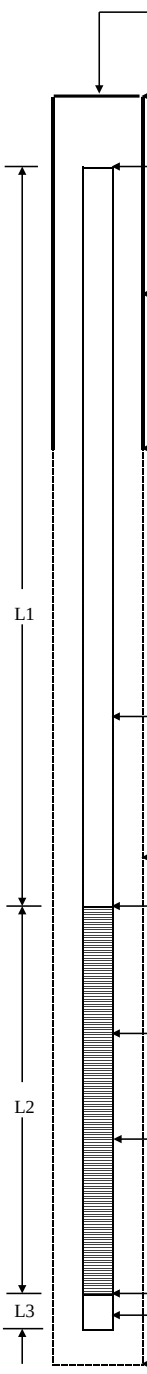
PROJECT	NBC Phase III Consolidation Conduits IIIA-4 and IIIA-5	**FILE NO.**	5980
LOCATION	Pawtucket, RI	**PROJECT MGR.**	T. Muindi
CLIENT	NBC	**FIELD REP.**	S. Wilbur
CONTRACTOR	Geologic Earth Exploration, Inc.	**DATE INSTALLED**	8/29/2019
DRILLER	Paul Fisher	**WATER LEVEL**	18.50

Ground El. 19.87 ft
El. Datum NVGD 29

Location East side of Roosevelt, across from southern property extents of Masonic Temple

☐ **Guard Pipe**
☑ **Roadway Box**

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
	0-10': Drill Cuttings
0-20': Fill - Light brown, sands with silt and gravel	
	10-12': Bentonite Seal
20-24': Glaciofluvial - Red silty sand	
24-29.5': Till - Gray, sands, silts and gravels	14-24': Holliston Sand
29.5 -34': Rock	
	24-34': Drill Cuttings



Type of protective cover/lock: Roadway Box Cover

Depth of roadway box below the ground surface: 0.0 ft

Depth of top of riser pipe below the ground surface: 0.5 ft

Type of protective casing: Roadway Box
Length: 0.5 ft
Inside Diameter: 6 in

Depth of bottom of guard pipe/roadway box: 0.5 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Drill Cuttings	0.0	10.0
Bentonite	10.0	2.0

Type of riser pipe: Solid PVC
Inside diameter of riser pipe: 2.0 in
Type of backfill around riser: Holliston Sand

Diameter of borehole: 4.0 in

Depth to top of well screen: 14.0 ft

Type of screen: Slotted PVC Schedule 40
Screen gauge or size of openings: 0.01 in
Diameter of screen: 2.0 in
Type of backfill around screen: Holliston Sand

Depth of bottom of well screen: 24.0 ft

Bottom of Silt trap: - ft

Depth of bottom of borehole: 35.0 ft

(Bottom of Exploration)
(Numbers refer to depth from ground surface in feet)

(Not to Scale)

Riser Pay Length (L1)	+	Length of screen (L2)	+	Length of silt trap (L3)	=	Pay length
ft		ft		ft		ft

COMMENTS:

GROUNDWATER MONITORING REPORT

McMILLEN JACOBS ASSOCIATES

Well No. B-4C
Boring No. B-4C

PROJECT	NBC Phase III Consolidation Conduits IIIA-4 and IIIA-5	**MJA JOB NO.**	5980
LOCATION	Pawtucket, RI	**PROJECT MGR.**	T. Muindi
CLIENT	NBC	**FIELD REP.**	S. Wilbur
CONTRACTOR	Geologic Earth Exploration, Inc.	**DATE INSTALLED**	8/29/2019

ELEVATION OF REFERENCE POINT 19.87 NGVD 29 **REFERENCE POINT:** **Ground Surface** ☑ **PVC** ☐ **Other**

Date	Time	Elapsed Time (Days)	Depth of Water from Reference Point (ft)	Elevation of Water (ft)	Remarks	Read By
9/12/2019	7:10am	14	18.3	1.57		SW
9/18/2019	7:10am	20	18.5	1.37		SW
2/12/2020	3:00pm	167	18.5	1.37		MM

OBSERVATION WELL INSTALLATION REPORT

McMILLEN JACOBS ASSOCIATES

Well No. B-7

Boring No. B-7

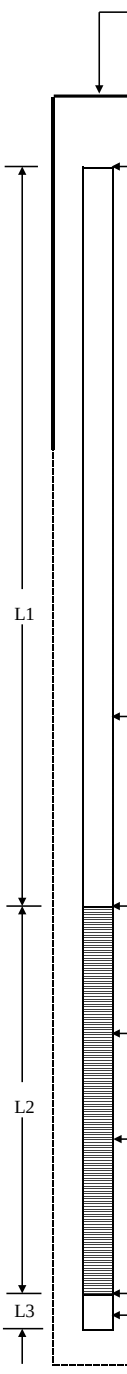
PROJECT	NBC Phase III Consolidation Conduits IIIA-4 and IIIA-5	**FILE NO.**	5980
LOCATION	Pawtucket, RI	**PROJECT MGR.**	T. Muindi
CLIENT	NBC	**FIELD REP.**	S. Wilbur
CONTRACTOR	Geologic Earth Exploration, Inc.	**DATE INSTALLED**	8/30/2019
DRILLER	Paul Fisher	**WATER LEVEL**	8.40

Ground El. 23.28 ft
El. Datum NVGD 29

Location West side Roosevelt Ave, across from National Grid Hydroelectric facility.

☐ **Guard Pipe**
☑ **Roadway Box**

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
0-14': Fill - brown and black, sand with silt; and gravel with silt	0-6': Drill Cuttings
	6-8': Bentonite Seal
14-24': Glaciofluvial - Brown, silty sand with gravel	8-20': Holliston Sand
24-29.2': Till - Gray, sands, clays, and gravel	20-29.2': Drill Cuttings
(Bottom of Exploration) (Numbers refer to depth from ground surface in feet)	



(Not to Scale)

Type of protective cover/lock	Roadway Box Cover
Depth of roadway box below the ground surface	0.0 ft
Depth of top of riser pipe below the ground surface	0.3 ft
Type of protective casing:	Roadway Box
Length	0.5 ft
Inside Diameter	6.0 in
Depth of bottom of guard pipe/roadway box	0.5 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Drill Cuttings	0.0	6.0
Bentonite Seal	6.0	2.0

Type of riser pipe:	Solid PVC
Inside diameter of riser pipe	2.0 in
Type of backfill around riser	Holliston Sand
Diameter of borehole	4.0 in
Depth to top of well screen	10.0 ft
Type of screen	Slotted PVC Schedule 40
Screen gauge or size of openings	0.01 in
Diameter of screen	2.0 in
Type of backfill around screen	Holliston Sand
Depth of bottom of well screen	20.0 ft
Bottom of Silt trap	- ft
Depth of bottom of borehole	29.2 ft

Riser Pay Length (L1)	+	Length of screen (L2)	+	Length of silt trap (L3)	=	Pay length
ft		ft		ft		ft

COMMENTS:

GROUNDWATER MONITORING REPORT

Well No. B-07
Boring No. B-07

PROJECT	NBC Phase III Consolidation Conduits IIIA-4 and IIIA-5	**MJA JOB NO.**	5980
LOCATION	Pawtucket, RI	**PROJECT MGR.**	T. Muindi
CLIENT	NBC	**FIELD REP.**	S. Wilbur
CONTRACTOR	Geologic Earth Exploration, Inc.	**DATE INSTALLED**	8/30/2019

ELEVATION OF REFERENCE POINT 23.28 NGVD 29 **REFERENCE POINT:** Ground Surface ☑ **PVC** ☐ **Other**

Date	Time	Elapsed Time (Days)	Depth of Water from Reference Point (ft)	Elevation of Water (ft)	Remarks	Read By
9/12/2019	7:00am	13	8.4	14.88		SW
9/18/2019	7:00am	19	8.5	14.78		SW
2/10/2020	7:00am	164	8.25	15.03		MM

OBSERVATION WELL INSTALLATION REPORT

McMILLEN JACOBS ASSOCIATES

Well No. B-9 (OW)
Boring No. B-9

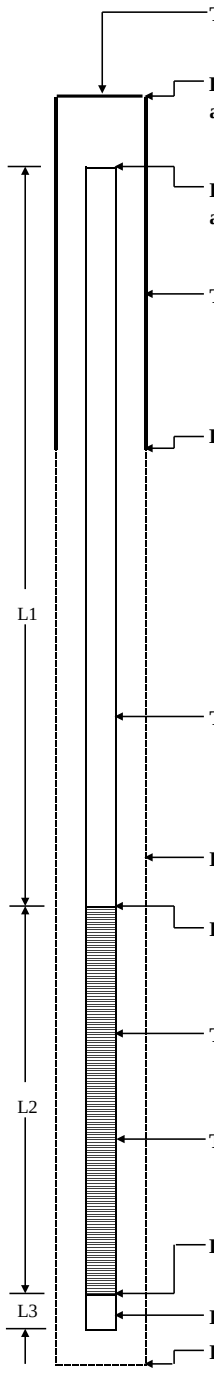
PROJECT	NBC Phase III Consolidation Conduits IIIA-4 and IIIA-5	**FILE NO.**	5980
LOCATION	Pawtucket, RI	**PROJECT MGR.**	T. Muindi
CLIENT	NBC	**FIELD REP.**	M. MacInnis
CONTRACTOR	Geologic Earth Exploration, Inc.	**DATE INSTALLED**	2/10/2020
DRILLER	John Boyd	**WATER LEVEL**	10.67'

Ground El. 28.04 ft
El. Datum NVGD 29

Location Across Taft St. from charter school on Tidewater Site.

☑ **Guard Pipe**
☐ **Roadway Box**

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
0-9': Fill - Brown sands and gravels	0-5': Drill Cuttings
9-20': Alluvium - Brown and gray silts and clays	5-8': Bentonite Seal
	8-20': Holliston Sand



Type of protective cover/lock: Guard Pipe with Lock

Height of top of guard pipe above the ground surface: 2.5 ft

Height of top of riser pipe above the ground surface: 2 ft

Type of protective casing: Guard Pipe
- **Length:** 5.0 ft
- **Inside Diameter:** 4.0 in

Depth of bottom of guard pipe/roadway box: 2.5 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Bentonite	5.0	3.0

Type of riser pipe: Solid PVC
- **Inside diameter of riser pipe:** 2.0 in
- **Type of backfill around riser:** Holiston Sand

Diameter of borehole: 4.0 in

Depth to top of well screen: 10.0 ft

Type of screen: Slotted PVC Schedule 40
- **Screen gauge or size of openings:** 0.01 in
- **Diameter of screen:** 2.0 in

Type of backfill around screen: Holiston Sand

Depth of bottom of well screen: 20.0 ft

Bottom of Silt trap: - ft

Depth of bottom of borehole: 20.0 ft

(Bottom of Exploration)
(Numbers refer to depth from ground surface in feet)

(Not to Scale)

Riser Pay Length (L1)	+	Length of screen (L2)	+	Length of silt trap (L3)	=	Pay length
ft		ft		ft		ft

COMMENTS:

GROUNDWATER MONITORING REPORT

Well No. **B-09 (OW)**
Boring No. **B-09**

PROJECT	NBC Phase III Consolidation Conduits IIIA-4 and IIIA-5	**MJA JOB NO.**	5980
LOCATION	Pawtucket, RI	**PROJECT MGR.**	T. Muindi
CLIENT	NBC	**FIELD REP.**	M. MacInnis
CONTRACTOR	Geologic Earth Exploration, Inc.	**DATE INSTALLED**	2/10/2020

ELEVATION OF REFERENCE POINT 28.04 NGVD 29 **REFERENCE POINT:** **Ground Surface** ☑ **PVC** ☐ **Other**

Date	Time	Elapsed Time (Days)	Depth of Water from Reference Point (ft)	Elevation of Water (ft)	Remarks	Read By
2/10/2020	12:00pm	0	10.66	17.38		MM

OBSERVATION WELL INSTALLATION REPORT

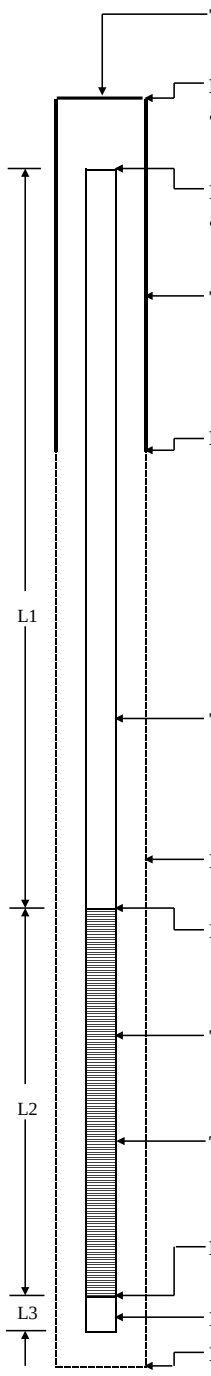
McMILLEN JACOBS ASSOCIATES

Well No. B-10 (OW)
Boring No. B-10

PROJECT	NBC Phase III Consolidation Conduits IIIA-4 and IIIA-5	**FILE NO.**	5980
LOCATION	Pawtucket, RI	**PROJECT MGR.**	T. Muindi
CLIENT	NBC	**FIELD REP.**	M. MacInnis
CONTRACTOR	Geologic Earth Exploration, Inc.	**DATE INSTALLED**	2/6/2020
DRILLER	Dave Sheldon	**WATER LEVEL**	10.42'

Ground El. 23.74 ft
El. Datum NVGD 29
Location Southerly end of field on Tidewater Site.
☑ **Guard Pipe**
☐ **Roadway Box**

SOIL/ROCK CONDITIONS	BOREHOLE BACKFILL
0-16': Fill - Brown sand and gravels	0-2': Drill Cuttings
	2-4': Bentonite Seal
	4-16': Holliston Sand
(Bottom of Exploration) (Numbers refer to depth from ground surface in feet)	



(Not to Scale)

Type of protective cover/lock	Guard Pipe with Lock
Height of top of guard pipe above the ground surface	2.75 ft
Height of top of riser pipe above the ground surface	2.25 ft
Type of protective casing:	Guard Pipe
Length	5.0 ft
Inside Diameter	4.0 in
Depth of bottom of guard pipe/roadway box	2.2 ft

Type of Seals	Top of Seal (ft)	Thickness (ft)
Bentonite Seal	2.0	2.0

Type of riser pipe:	Solid PVC
Inside diameter of riser pipe	2.0 in
Type of backfill around riser	Holiston Sand
Diameter of borehole	4.0 in
Depth to top of well screen	6.0 ft
Type of screen	Slotted PVC Schedule 40
Screen gauge or size of openings	0.01 in
Diameter of screen	2.0 in
Type of backfill around screen	Holliston Sand
Depth of bottom of well screen	16.0 ft
Bottom of Silt trap	- ft
Depth of bottom of borehole	16.0 ft

Riser Pay Length (L1)	+	Length of screen (L2)	+	Length of silt trap (L3)	=	Pay length
ft		ft		ft		ft

COMMENTS:

McMILLEN JACOBS ASSOCIATES

GROUNDWATER MONITORING REPORT

Well No. B-10 (OW)
Boring No. B-10 (OW)

PROJECT NBC Phase III Consolidation Conduits IIIA-4 and IIIA-5 **MJA JOB NO.** 5980
LOCATION Pawtucket, RI **PROJECT MGR.** T. Muindi
CLIENT NBC **FIELD REP.** M. MacInnis
CONTRACTOR Geologic Earth Exploration, Inc. **DATE INSTALLED** 2/6/2020
ELEVATION OF REFERENCE POINT 23.74 NGVD 29 **REFERENCE POINT:** Ground Surface ☑ **PVC** ☐ **Other**

Date	Time	Elapsed Time (Days)	Depth of Water from Reference Point (ft)	Elevation of Water (ft)	Remarks	Read By
2/10/2020	12:15pm	4	10.42	13.32		MM

APPENDIX D

Subsurface Investigations by Others

Table D.1 Summary of Existing Data by Others
NBC Phase III CSO Program - Consolidation Conduit IIIA4

Table D.2 Summary of Existing Data by Others
NBC Phase III CSO Program - Consolidation Conduit IIIA5

Table D.1

Summary of Existing Data By Others[1]
NBC Phase III CSO Program - Consolidation Conduit IIIA4

Project Reference Document	Boring ID	Northing[2]	Easting[2]	Elevation[3] Ground Surface	Total Depth of Boring (ft)	Elevation Bottom of Boring	Rock Core Data Available	Laboratory Data Available (Type)[4]	Groundwater Monitoring Well	Elevation Groundwater Monitoring Well Screen Interval
NBC CSO Phase IIIA Contract No. 308.01C Geotechnical Data Report (Dec 2019)	B17-8	288429	359393	29.9	230.0	-200.1	x	GS, UCS, BTS	x	4.4 to -5.6
	B17-39	288259	359385	24.5	233.7	-209.2	x	GS, UCS, BTS	open hole readings	-
	B17-40	289233	359693	33.3	20.6	12.7	x	GS	-	-
	B17-41	287414	359505	12.8	25.0	-12.2	x	GS	-	-
	B17-45	288494	359452	28	47.4	-19.4	x	GS, PL, UCS	-	-
	B17-46	288470	359387	31.1	17.0	14.1	-	-	-	-
	B17-46A	288473	359387	30.9	43.2	-12.3	x	GS	-	-
Taft St - Pleasant St Branch Interceptor Section B Contract 18 (1950)	220	288143	359266	38.0	25.0	13.0	-	-	-	-
	221	288458	359283	30.0	18.0	12.0	-	-	-	-
	222	288781	359323	27.0	4.0	23.0	-	-	-	-
Bridge Replacement Pawtucket Bridge No. 550 I-95 Over the Seekonk River Volume Three Bridge Plans R.I. Contract 210-CB-004 (2010)	BH-10	287938	359336	40.0	14.4	25.6	-	-	-	-
	BH-11	287772	359333	48.1	20.7	27.4	-	-	drilling readings	-
	BH-12	287941	359413	14.9	31.0	-16.1	x	-	-	-
	BH-13	287868	359413	14.1	25.5	-11.4	x	-	-	-
	BH-14	287787	359414	13.3	29.5	-16.2	x	-	no readings	8.8 to -1.2
Division Street Bridge Project Contract Three R.I. Project No. I-01-(11) (1957)	BH32/BH32A	287904	359547	-12.0	24.0	-36.0	-	-	-	-
	BH33	287850	359543	-12.0	26.5	-38.5	-	-	-	-
	BH34	287800	359557	-12.3	22.0	-34.3	-	-	-	-
	BH35	287898	359459	3.0	24.0	-21.0	-	-	-	-
	BH36	287843	359456	3.0	26.5	-23.5	-	-	-	-
	BH37	287785	359461	3.5	17.0	-13.5	-	-	-	-
	BH72	287902	359355	25.5	22.0	3.5	-	-	-	-
	BH73	287816	359360	28.5	24.5	4.0	-	-	-	-
	BH102	287935	359457	5.0	10.5	-5.5	-	-	-	-

Notes

1. Table D.1 includes a summary of data by others deemed relevant for inclusion into the NBC Phase III CSO Program, Consolidation Conduits IIIA4 and IIIA5, Geotechnical Data Report (GDR).

2. Horizontal coordinates projected to Rhode Island Mainland State Plane, North American Datum (NAD), 1983. Locations of Taft St-Pleasant St and Division St Bridge borings are estimated based on visual review of the project reference documents indicated.

3. Elevations referenced to the National Geodetic Vertical Datum (NGVD) 1929, in feet.

4. Laboratory testing acronyms include GS=Grain Size Distribution, PL=Point Load, UCS=Unconfined Compressive Strength-Rock, BTS=Splitting (Brazilian) Tensile Strength.

5. "x" indicates data available. " -" indicates no data included in project reference document.

Table D.2

Summary of Existing Data By Others[1]
NBC Phase III CSO Program - Consolidation Conduit IIIA5

Project Reference Document	Boring ID	Northing[2]	Easting[2]	Elevation[3] Ground Surface	Total Depth of Boring (ft)	Elevation Bottom of Boring	Rock Core Data Available	Laboratory Data Available (Type)[4]	Groundwater Monitoring Well	Elevation Groundwater Monitoring Well Screen Interval
NBC CSO Phase IIIA Contract No. 308.01C Geotechnical Data Report (Dec 2019)	B17-41	287414	359505	12.8	25.0	-12.2	x	GS	-	-
	B17-42	285820	359764	42.9	30.6	12.3	-	GS	-	-
Taft St - Pleasant St Branch Interceptor Section B Contract 18 (1950)	212	285883	359896	39.0	28.0	11.0	-	-	-	-
	213	286224	359637	31.0	25.0	6.0	-	-	-	-
	214	286621	359523	32.6	21.0	11.6	-	-	-	-
	215	287097	359509	30.0	15.0	15.0	-	-	-	-
Tidewater Facilities (GZA Boring Program)	B-206	286636	359602	35.6	30.0	5.6	-	-	see note 6	15.6 to 26.6
	MW5/TB14	286405	359657	29.4	22.0	7.4	-	-		13.87 to 25.4
	MW7/TB-20	286424	359654	29.2	25.0	4.2	-	-		14.2 to 4.2
	B-208	286116	359934	26.4	20.0	6.4	-	-		16.4 to 6.4
	B-209	286066	360026	22.7	19.0	3.7	-	-		13.7 to 3.7

Notes
1. Table D.2 includes a summary of data by others deemed relevant for inclusion into the NBC Phase III CSO Program, Consolidation Conduits IIIA4 and IIIA5, Geotechnical Data Report (GDR).
2. Horizontal coordinates projected to Rhode Island Mainland State Plane, North American Datum (NAD), 1983. Locations of Taft St-Pleasant St and Tidewater borings B-26. B-208, and B-209 are estimated based on visual review of the project reference documents indicated.

3. Elevations referenced to the National Geodetic Vertical Datum (NGVD) 1929, in feet.
4. Laboratory testing acronyms include GS=Grain Size Distribution.
5. "x" indicates data available. " -" indicates no data included in project reference document.
6. Groundwater wells installed for analytical testing. No groundwater monitoring data available.

Phase IIIA-4 Historic Data

Pawtucket Tunnel RFP GDR

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BORING NUMBER B17-8

TEST BORING REPORT

PROJECT NAME Narragansett Bay Commission Phase III CSO Program
CLIENT NBC/Stantec
CONTRACTOR New England Boring Contractors, Inc.

PROJECT NO. 13:308.00D/14106.02
START 2/23/2018
FINISH 3/9/2018
DRILLER NEBC
LOGGED BY MED/HMS
CHECKED BY SJM
ELEVATION 31.1 **NORTHING** 288425.051
DATUM NGVD 1929 **EASTING** 359394.337
LOCATION Jenks Way/Masonic Temple

	CASING	SAMPLER	BARREL
Type	Steel	Split Spoon	HQ3
Inside Diameter (in.)	4	1 3/8	2 3/8
Hammer Weight (lb.)	140	140	N/A
Hammer Fall (in.)	30	30	N/A

DRILLING EQUIPMENT & PROCEDURES
Rig Make & Model: Mobile Drill B-52
Bit Type: 3 7/8" Tricone
Drill Fluid: Water
Casing: 5" (20') / 4" (23.3')
Hoist/Hammer: Automatic Hammer

DEPTH (ft)	ELEVATION (ft)	CASING BLOWS	SPT	SAMPLE NO.	REC (in) / PEN (in)	SAMPLE DEPTH (ft)	USCS SYMBOL	GRAPHIC LOG	VISUAL-MANUAL IDENTIFICATION & DESCRIPTION (Density/consistency, color, max. particle size, structure, odor, moisture, optional descriptions, geologic interpretation)	DRILLING NOTES
0	31.1									
		4		S-1	/	0 - 2	SW		Moist, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt, trace brick. (FILL)	PID = 0.0 ppm (0'-2') 4" Topsoil. Hand excavated. Several cobbles. Composite environmental sample taken (0'-4'). (1) 8 oz. Amber, (1) VOA at 1'.
		6								
		100+	10-9-10-8 (19)	S-2	18 / 24	2 - 4	SW		Top 6": Moist, medium dense, brown, fine to coarse SAND, trace brick. (FILL) Middle 3": Gray, coarse GRAVEL. (FILL) Bottom 9": Tan, fine SAND, some silt, trace brick. (FILL)	PID = 2.2 ppm (2'-4')
		100+								
5	26.1	10	12-10-8-10 (18)	S-3	15 / 24	4 - 6	SM		Moist, medium dense, tan, fine SAND, some silt, trace medium to coarse sand. (FILL)	PID = 6.4 ppm (4'-6') Composite environmental sample taken (4'-10').
		15								
		20	6-6-5-5 (11)	S-4	8 / 24	6 - 8	SM		Moist, medium dense, light tan, fine SAND, little silt, little medium to coarse sand, trace fine gravel.	PID = 4.2 ppm (6'-8') Red seam at mid recovery. Composite environmental sample taken (4'-11'). (1) 8 oz. Amber, (1) VOA at 5'.
		80								
		50	4-7-7-6 (14)	S-5	9 / 24	8 - 10	SM		Top 4": Moist, medium dense, tan, fine to medium SAND, some silt. (FILL) Middle 2": Gray, fractured coarse GRAVEL. (FILL) Bottom 3": Brown, fine to medium SAND, some silt, trace brick. (FILL)	PID = 0.2 ppm (8'-10')
10	21.1	63								
		50	6-3-4-3 (7)	S-6	0 / 24	10 - 12			No Recovery. Coarse gravel in tip.	Drilling color brown through zone.
		50								
		40	4-6-4-6 (10)	S-7	12 / 24	12 - 14	SP		Top 3": Dark Brown to black, fine to coarse SAND, little gravel, little silt. (Petroleum-like Odor). (FILL) Bottom 9": Brown to tan, fine to medium SAND, little silt. (FILL)	Top 3" PID = 0.4 ppm Bottom 9" PID = 0.8 ppm Environmental sample taken (12'-13'). (1) 8 oz. Amber, (1) VOA.
		40								
15	16.1	20	3-7-3-3 (10)	S-8	4 / 24	14 - 16	SP-SM		Moist, loose, dark brown, fine to medium SAND, little gravel, little silt, trace coarse sand. (FILL)	PID = 4.2 ppm
		20								
		75	60/0"	S-9	0 / 0	16 - 18			No Recovery. Split spoon refusal at 16'.	Driller advanced the roller bit through a boulder at approximately 16.5'.
		125								
		X							No Samples Taken.	
20	11.1	X								
		X								Driller advanced the roller bit through a boulder at approximately 21'.
		X								
		X								
		X	17-121/5"	S-10	9 / 11	22.7 - 23.6	GW		Wet, very dense, tan to gray, fine to coarse GRAVEL, some fine to coarse sand, trace silt.	
									Bottom of borehole at 23.60 feet.	Driller advanced the roller bit to 25'.

WATER LEVEL DATA

DATE/TIME	DEPTH (ft.) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER
2/26/2018 8:30:00 AM	16	16	15
2/28/2018 8:00:00 AM	23.3	74.5	14.3
3/5/2018 8:45:00 AM	23.3	134.1	13.8
3/6/2018 8:00:00 AM	23.3	159.2	11.8
3/9/2018 8:00:00 AM	23.3	219.9	9.3

SAMPLE IDENTIFICATION
O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

REMARKS:
1. Hand excavated from 0'-2'.
2. S-7: Top 3" was environmentally sampled. Bottom was taken for geotechnical sample.
3. Coarse gravel in tip of S-8.
4. Spin-shoe on the bottom of the 4" casing from 18 ft - no casing blows counted below this depth.
5. Removed 20' of 5" casing and installed 4' casing down to approximately 23.3'.
6. "X" within casing blows indicates that blows were not counted at that interval.

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CORE BORING REPORT

BORING NUMBER B17-8

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
20.0																	
20.5																	
21.0																	
21.5																	
22.0																	
22.5																	
23.0										See Test Boring report							
23.5									23.6	Weathered Rock - No Sample Taken							
24.0																	
24.5																	
25.0	1.25	C-1	25 - 25.2	6.1 - 5.9	2 100%	0 0%	4		25.0	Strong to very strong, purple SILTSTONE, laminated 1-2 mm, fresh. - Bedding planes 40°-50°. - Orthogonal joint around 25.8'.	25.1 25.6 25.7 25.8-26.0	B B J J	1 1 1 1	40 50 60 60	SM SM SM SM	F F F F	None None None None
25.5	3.25	C-2	25.2 - 29.6	5.9 - 1.5	52.5 100%	38 72%											
26.0	2.25						1		26.7	Strong to very strong, gray, fine SANDSTONE, massive, fresh.	26.5	J	1	35	SM	F	None
26.5									27.1	Moderately strong to strong, purple SILTSTONE, laminated 1-2 mm, fresh. - Orthogonal joint at 27.9'. - Bedding planes 40°-50°.	27.0 27.2-27.4 27.6 27.9 27.9	J J B B J	1 1 1 1 1	35 60 50 55 30	SM SM SM SM SM	SW SW F F F	Fe Fe None None None
27.0	2.75						5										
27.5																	
28.0	2.75						1		28.6	Strong to very strong, purple SILTSTONE interlaminated with gray, fine to medium Sandstone, laminated 1-2 mm, fresh. - Bedding planes 40°-50°. - Quartz vein at 29.2, 5 mm±.	28.7	B	1	50	SM	F	None
28.5																	
29.0	2.75						0		29.3	Strong to very strong, purple and light gray SILTSTONE, massive, fresh. - Quartz vein at 29.5', 1 mm±.	-	-	-	-	-	-	-
29.5	2.75	C-3	29.6 - 34.8	1.5 - -3.7	62 100%	51 82%											
30.0							3		30.9	Strong to very strong, gray, fine SANDSTONE, laminated 1-2 mm, fresh. - Bedding planes 40°-50°.	30.3 30.5 30.4-30.8	J J J	1 1 1	40 30 65	SM SM SM	F F F	None None None
30.5	2.5																
31.0							3		31.7	Strong to very strong, purple SILTSTONE, massive, fresh.	31.3 31.3 31.6	B J B	1 1 1	45 25 45	SM SM SM	F F F	None None None
31.5	3																
32.0							3		32.6	Strong to very strong, purple and gray, fine SANDSTONE, laminated 1-2 mm, fresh. - Bedding planes 40°-50°. - Quartz vein at 33.5', 1 mm±.	32.0-32.4 32.3 32.4	J J J	1 1 1	75 15 30	SR SM SM	F F F	None None None
32.5																	
33.0	3.25						2				33.0 33.5	J B	1 1	45 45	SM SM	F F	None None
33.5																	
34.0	3						1		34.3	Strong to very strong, purple and light gray, fine SANDSTONE interlaminated with Siltstone,	34.1	B	1	40	SM	F	None
34.5																	
35.0	3	C-4	34.8	-3.7	61	53			34.8								

REMARKS:
1. Dip angles are measured from horizontal (i.e., perpendicular to the core axis).

WATER LEVEL DATA

DATE/TIME	BOT. OF SOIL CASING (ft)	BOT. OF HOLE (ft)	WATER
2/26/2018 8:30:00 AM	16	16	15
2/28/2018 8:00:00 AM	23.3	74.5	14.3
3/5/2018 8:45:00 AM	23.3	134.1	13.8
3/6/2018 8:00:00 AM	23.3	159.2	11.8
3/9/2018 8:00:00 AM	23.3	219.9	9.3

GROUND SURFACE EL. 31.1

Note: Refer to the key sheets within the Geotechnical Design Report for the description of rock classification system codes.

(Continued Next Page)

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CORE BORING REPORT

BORING NUMBER B17-8

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
35.0			- 39.9	- -8.8	100%	87%				laminated 1-2 mm, fresh. - Bedding planes 40°-50°.							
35.5							1		35.6	Strong to very strong, light gray, fine SANDSTONE, massive, fresh. *(continued)*	35.7	B	1	45	SM	F	None
36.0	2.5									Strong to very strong, purple and light gray, fine SANDSTONE interlaminated with Siltstone, laminated 1-2 mm, fresh. - Bedding planes 40°-50°.							
36.5							1				36.8	B	1	45	SM	F	None
37.0	2.75																
37.5							4				37.3 37.3-37.7 37.6 37.9	B J J B	1 1 1 1	50 85 40 50	SM SR SR SM	F F F F	None None None None
38.0	2.75																
38.5							1		37.9	Strong to very strong, purple SILTSTONE, massive, fresh.							
39.0	3.25								38.4 38.8	Strong to very strong, purple and gray, coarse SANDSTONE, massive, fresh.	38.8	B	1	40	SM	F	None
39.5							1			Strong to very strong, purple, fine SANDSTONE interlaminated with Siltstone, laminated 1-2 mm, fresh. - Bedding planes 40°-50°.	39.4	B	1	40	SM	F	None
40.0	3.5	C-5	39.9 - 45	-8.8 - -13.9	58.5 96%	39 64%											
40.5							0		39.9	Strong to very strong, purple SILTSTONE, massive, fresh.	-	-	-	-	-	-	-
41.0	2.5								40.6	Strong to very strong, purple, fine SANDSTONE, massive, fresh. - Orthogonal joint at 41.1'.							
41.5							4				41.3 41.3 41.6 41.9	J J B J	1 1 1 1	35 40 50 40	SM SM SM SM	F F F F	None None None None
42.0	2.5								41.4 41.7	Strong to very strong, purple SILTSTONE, laminated 1-2 mm, fresh. - Bedding planes 40°-50°.							
42.5							1				42.6	J	1	35	SM	F	None
43.0	2.25								42.6	Strong to very strong, light gray, fine to medium SANDSTONE, massive, fresh.							
43.5							3			Strong to very strong, light gray, fine SANDSTONE, massive, fresh. - Quartz vein at 42.4', 1 mm±.	43.4	J	1	40	SM	F	None
44.0	2.5																
44.5							1		43.9	Strong to very strong, purple SILTSTONE, laminated 1-2 mm, fresh.	44.1 44.3 44.1-44.8	B B J	1 1 1	45 40 70	SM SM SR	F F F	None None None
45.0	4.75	C-6	45 - 50	-13.9 - -18.9	60 100%	43 72%			44.6	- Bedding planes 40°-50°.							
45.5							4		45.3	Strong to very strong, light gray, fine to medium SANDSTONE, massive, fresh. - Orthogonal joint at 45.0'.	45.0 45.0 45.3 45.6	J J B B	1 1 1-2 1	40 40 45 40	SM SM SM SM	F F F F	None None None None
46.0	2.75									Strong to very strong, purple and light gray SILTSTONE, laminated 1-2 mm, fresh. - Bedding planes 30°-40°. - Quartz vein at 46.0', 4 mm±.							
46.5							1				46.0	B	1-2	40	SM	F	None
47.0	3																
47.5							0				-	-	-	-	-	-	-
48.0	3.5								47.7	Strong to very strong, light gray and purple, fine SANDSTONE, massive, fresh.							
48.5							1				48.8	B	1-2	40	SM	F	None
49.0	3.25								48.5	Strong to very strong, purple and light gray SILTSTONE interlaminated with fine Sandstone, laminated 1-2 mm, fresh. - Bedding planes 40°-50°.							
49.5							3				49.1 49.5 49.6	B B B	1-2 1 1-2	45 45 40	SM SM SM	F F F	None None None
50.0	3.5	C-7	50 - 55	-18.9 - -23.9	59 98%	59 98%											
50.5							1				50.9	B	1-8	45	SM	F	None
51.0	2.75								51.1								

(Continued Next Page)

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CORE BORING REPORT

BORING NUMBER B17-8

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
51.5							0			Strong to very strong, purple and light gray, fine to coarse SANDSTONE, massive, fresh. *(continued)*	-	-	-	-	-	-	-
52.0	3																
52.5							2		52.1	Strong to very strong, purple SILTSTONE interlaminated with fine Sandstone, laminated 1-2 mm, fresh.	52.1 52.8	J J	1 1-10	40 45	SM SM	F F	None None
53.0	2.75								52.8	- Bedding planes 40°-50°.							
53.5							1		53.1 53.2	Strong to very strong, purple and light gray, fine to medium SANDSTONE, massive, fresh.	53.2	J	1	45	SM	F	None
54.0	3									Strong to very strong, purple and light gray, conglomeratic SANDSTONE, massive, fresh.							
54.5							1		54.2	Strong to very strong, purple, fine SANDSTONE, massive, fresh.	54.2	J	1-10	45	SM	F	None
55.0	4.25	C-8	55 - 59.7	-23.9 - -28.6	57 100%	57 100%											
55.5							0		55.5	Strong to very strong, gray, purple and white CONGLOMERATE, massive, fresh.	-	-	-	-	-	-	-
56.0	3									Strong to very strong, gray, purple and white, conglomeratic SANDSTONE, massive, fresh.							
56.5							0				-	-	-	-	-	-	-
57.0	3.25																
57.5							0				-	-	-	-	-	-	-
58.0	3.25																
58.5							1		58.0 58.2	Strong to very strong, gray, purple and white CONGLOMERATE, massive, fresh.	58.2	J	1	55	SM	F	None
59.0	3.25									Strong to very strong, gray, purple and white, conglomeratic SANDSTONE, massive, fresh.							
59.5							0		59.0		-	-	-	-	-	-	-
60.0	3.75	C-9	59.7 - 64.5	-28.6 - -33.4	58 100%	54 93%			59.7	Strong to very strong, gray, fine SANDSTONE, massive, fresh.							
60.5	4						1			Strong to very strong, gray to purple CONGLOMERATE, massive, fresh.	60.2	J	1-3	20	SL/SM	F	None
61.0																	
61.5	4						2		61.4	Strong to very strong, gray, conglomeratic SANDSTONE, massive, fresh.	61.4 61.6	J J	1-3 1	45 30	SM/R SM/R	F F	None None
62.0																	
62.5	4.25						1		62.4	Strong to very strong, gray, fine SANDSTONE, massive, fresh.	62.9	J	1-2	35	SR	F	None
63.0										- Quartz vein with Pyrite near 63.0'.							
63.5	4.5						1		63.1	Strong to very strong, gray, conglomeratic SANDSTONE, massive, fresh.	63.3	J	1-2	40	SM	F	None
64.0									63.9	Strong to very strong, gray, fine to coarse SANDSTONE, massive, fresh.							
64.5	5	C-10	64.5 - 69.5	-33.4 - -38.4	60 100%	60 100%	0		64.6	Strong to very strong, gray CONGLOMERATE, massive, fresh.	-	-	-	-	-	-	-
65.0																	
65.5	4						1		65.2	Strong to very strong, purple, fine SANDSTONE interbedded with SILTSTONE, bedded 10-20mm, fresh.	65.3	B	1-10	50	SM	F	None
66.0									66.2	- Bedding planes 40°-50°.							
66.5	4						1		66.5	Strong to very strong, purple SILTSTONE, laminated 1-2 mm, fresh.	66.5	J	1-3	55	SR	F	None
67.0										- Bedding planes 50°.							
67.5	4.25						0		67.3	Strong to very strong, purple, fine SANDSTONE, massive, fresh.	-	-	-	-	-	-	-

2. Wash color gray/purple at ~56.0'.

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CORE BORING REPORT

BORING NUMBER B17-8

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
68.0									67.9	- Quartz vein 67.1', 1 mm±.							
68.5	3.75						2		68.1	Strong to very strong, purple SILTSTONE, laminated 1-2 mm, fresh. - Bedding planes 50°.	68.2 68.8	J J	1 1	25 40	SM SR	F F	None None
69.0									68.9	Strong to very strong, gray, fine SANDSTONE, massive, fresh. *(continued)*							
69.5	3.5	C-11	69.5 - 74.5	-38.4 - -43.4	60 100%	51 85%	1				69.9	B	1-20	55	SM	SW	SI
70.0									69.8	Strong to very strong, gray to purple CONGLOMERATE, massive, fresh.							
70.5	2.75						1			Strong to very strong, gray to purple, fine to medium SANDSTONE, massive, fresh.	70.5	B	1-10	50	SM	F	None
71.0																	
71.5	3.5						0		71.3	Strong to very strong, purple and gray, fine SANDSTONE, laminated 3-5 mm, fresh. - Bedding planes 50°-60°.	-	-	-	-	-	-	-
72.0																	
72.5	3.75						2			Strong to very strong, gray and purple, fine SANDSTONE, massive, fresh. - Quartz vein 73.1', 5-10 mm±. - Orthogonal joints at 73.2'.	72.7 72.8	J J	1 1-2	30 40	SM SM	F SW	None SI
73.0																	
73.5	3.75						4				73.0-73.3 73.2 73.9 73.9-74.1	J J J J	1 1 1 1-5	65 60 20 60	SM SM SM SR	F F F F	QZ None None None
74.0																	
74.5	4.5	C-12	74.5 - 79.2	-43.4 - -48.1	57 100%	55 96%	1				74.1	J	1-5	55	SM	F	None
75.0									74.6	Strong to very strong, gray, fine to coarse SANDSTONE, massive, fresh.							
75.5	4						0				-	-	-	-	-	-	-
76.0																	
76.5	3						0				-	-	-	-	-	-	-
77.0																	
77.5	3						2		77.2	Strong to very strong, gray, fine SANDSTONE, thickly bedded 10-25 mm± to massive, fresh. - Quartz vein at 78.4', 4 mm±. - Orthogonal joints at 79.1'. - Bedding planes 50°.	77.7 77.8	B J	1 1	50 15	SM SR	F F	None None
78.0																	
78.5	3.5						0				-	-	-	-	-	-	-
79.0																	
79.5	4	C-13	79.2 - 84.3	-48.1 - -53.2	61 100%	51 84%	4				79.1 79.1 79.2 79.8-80.1	J B B B	1 1 2 1-2	55 50 55 55	R SR SM SM	F F SW SW	QZ None None SI
80.0																	
80.5	3.75						3		80.1	Strong to very strong, gray to purple, fine to medium SANDSTONE, massive, fresh. - Quartz marbling 80.1' to 80.3'.	80.0-80.3 80.2 80.4	J J J	1 1 1	55 45 50	SM SM SM	F F F	None None None
81.0																	
81.5	4						0				-	-	-	-	-	-	-
82.0																	
82.5	3.75						2		82.2	Strong to very strong, gray to purple, fine SANDSTONE, thickly bedded 10-25 mm± to massive, fresh. - Bedding planes 40° - 50°.	82.7 82.8	B B	1 1	50 50	SM SM	F SW	None None
83.0																	
83.5	2.25						0				-	-	-	-	-	-	-
84.0																	
	3.25																

3. Barrel blocked at ~84.0'.

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CORE BORING REPORT

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PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
84.5		C-14	84.3 - 89.4	-53.2 - -58.3	59 97%	59 97%	1			Strong to very strong, gray to purple, fine SANDSTONE, thickly bedded 10-25 mm± to massive, fresh. - Bedding planes 40° - 50°. *(continued)*	84.0	B	1	55	SM	F	None
85.0																	
85.5	4.5						1				85.4	B	1-3	50	SM	F	None
86.0																	
86.5	3.5						1		86.3	Strong to very strong, gray, fine to medium SANDSTONE, massive, fresh. - Quartz vein 86.9', 1-10 mm±.	86.2-86.5	J	1-2	55	SM	F	SI
87.0									87.1	Strong to very strong, gray to purple, fine SANDSTONE, laminated 1-2 mm± to bedded 15-20mm±, fresh. - Bedding planes 50°-60°.							
87.5	4						1				87.3	B	1	55	SM	F	None
88.0																	
88.5	4						1				88.7	J	1-5	35	R	F	None
89.0																	
89.5	4	C-15	89.4 - 94.4	-58.3 - -63.3	60 100%	48 80%	0				-	-	-	-	-	-	-
90.0																	
90.5	3.75						2		90.4	Strong to very strong, gray, fine to medium SANDSTONE, bedding 10-20 mm±, fresh. - Bedding planes 45°. - Quartz vein at 91.4', 10 mm±.	90.1 90.3	J B	1 1	30 55	SM SM	F F	Fe None
91.0																	
91.5	4.25						2		91.5	Strong to very strong, gray, fine SANDSTONE, massive, fresh.	91.1-91.7 91.4	J J	10 1	70 0	SM SM	SW F	QZ/CA None
92.0																	
92.5	4						1				92.4	J	1	40	SR	F	None
93.0								× × × ×	92.6	Strong to very strong, gray SILTSTONE, massive, fresh. - Quartz vein at 93.4', 3 mm±.							
93.5	4.25						4	× × × ×			93.1-93.7 93.6 93.5-94.2 93.7-94.0	J J J J	1 - 1 1	75 30 80 65	SM VR SR SM	F F F F	QZ None None None
94.0									93.8	Strong to very strong, gray, fine SANDSTONE, massive, fresh.							
94.5	4	C-16	94.4 - 99.4	-63.3 - -68.3	60 100%	55 92%	3		94.5	Strong to very strong, gray, fine to medium SANDSTONE, massive, fresh.	94.0 94.1 94.2	J J J	1 1 1	40 70 55	SM SM SM	F F F	None None None
95.0									94.9	Strong to very strong, gray, fine to medium SANDSTONE with Siltstone interbedding, laminated 1-2 mm± to bedded 20mm±, fresh. - Quartz vein at 96.0', 1 mm±. - Quartz vein at 96.2', 1-10 mm±.							
95.5	3.25						0				-	-	-	-	-	-	-
96.0																	
96.5	3.5						ECF (1±) 4				96.2 96.6-97.1 96.7 96.9-97.0	J J J ECF	1 - - -	30 65 25 -	SM SM SM SM	F F F F	None QZ QZ QZ
97.0																	
97.5	2.5						ECF (1±) 1		97.0	Strong to very strong, gray CONGLOMERATE, massive, fresh.	97.0-97.1	ECF	-	-	SM	F	QZ
98.0									97.6	Strong to very strong, gray, fine to medium SANDSTONE, massive, fresh. - Quartz vein at 98.2', 2-5 mm±.							
98.5	3.25						0				-	-	-	-	-	-	-
99.0																	
99.5	3.5	C-17	99.4 - 104.5	-68.3 - -73.4	61 100%	61 100%	1				99.1	J	1-10	10	SR	F	None
100.0																	
100.5	3						0				-	-	-	-	-	-	-

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CORE BORING REPORT

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PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES						
											Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
101.0																	
101.5	3.25						0			Strong to very strong, gray, fine to medium SANDSTONE, massive, fresh. - Quartz vein at 98.2', 2-5 mm±. *(continued)*	-	-	-	-	-	-	-
102.0																	
102.5	3.5						0				-	-	-	-	-	-	-
103.0																	
103.5	4						3		103.2	Strong to very strong, gray CONGLOMERATE, massive, fresh. - Orthogonal joints 103.4'. - Orthogonal joints around 104.8'. - Quartz vein 107.0', 5 mm±.	103.4 103.4 103.7-104.1	J J J	1 1 1	35 40 70	R SM VR	F SW F	None None None
104.0																	
104.5	5.5	C-18	104.5 - 109.5	-73.4 - -78.4	60 100%	48 80%	3				104.7 104.7 104.9	J J J	1-5 1 1-10	35 20 30	SR VR R	F F F	None None None
105.0																	
105.5	3.5						0				-	-	-	-	-	-	-
106.0																	
106.5	6						0				-	-	-	-	-	-	-
107.0																	
107.5	2.5						ECF (4±)	× × ×	107.2	Strong, gray SILTSTONE, massive, fresh. - Orthogonal joints around 108.3'.	107.2-107.6 107.6	ECF J	- 1	- 50	SM SM	SW F	None None
108.0							5	× × ×									
108.5	3.25						2	× × ×			108.2 108.3	J J	1 1	60 65	SM SM	F F	None None
109.0								× × ×									
109.5	5						2	× × ×			109.5-109.7 109.7-110.0	J J	1 1	80 70	R SM	F F	None QZ
110.0		C-19	109.5 - 114.3	-78.4 - -83.2	58 100%	52 90%		× × ×		- Quartz vein at 110', 2 mm±. - Orthogonal joints at 110', 113.8'.							
110.5	3						4	× × ×			110.0 110.0 110.1-110.4 110.3	J J J J	1 1 1 1	50 35 65 45	SM SM SM SM	F F F F	QZ None QZ QZ
111.0								× × ×									
111.5	4						0	× × ×			-	-	-	-	-	-	-
112.0								× × ×									
112.5	5						1	× × ×			112.8-113.3	J	1	85	VR	F	None
113.0								× × ×									
113.5	4.25						3	× × ×	113.3	Strong to very strong, dark gray SILTSTONE, laminated 1-2 mm, fresh. - Bedding planes 40°-50°. - Quartz vein at 114.6', 5 mm±. - Quartz vein at 114.9', 20 mm±.	113.2 113.8 113.8	J B J	1 1 1	55 45 40	SM SM SM	SW F F	None None None
114.0								× × ×									
114.5	3.5	C-20	114.3 - 119.3	-83.2 - -88.2	60 100%	48 80%	2	× × ×			114.3 114.8	B J	1 1	50 30	SM SM	F F	None QZ
115.0								× × ×	115.0	Strong to very strong, gray, fine SANDSTONE interlaminated with Siltstone, bedding 1-20 mm, fresh. - Bedding planes 50°. - Orthogonal joints around 115.6', 116.4'.	115.5-115.7 115.6 115.7 115.9-116.2	J B J B	1 1 1 1	60 50 30 50	SM SM SR SM	F SW F F	QZ None None None
115.5	3.75						4										
116.0																	
116.5	3.75						4				116.0-116.4 116.0 116.4 116.5	J J J J	1 1 1 1	75 45 55 55	SR SM SR SM	F F F F	None None None None
117.0									116.5	Strong to very strong, gray, fine to coarse SANDSTONE, massive, fresh.							

4. Core barrel blocked at ~107.2'. Moved casing up and down to unblock.

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PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
117.5	6.25						1		117.5	Very strong, white QUARTZ, massive, fresh with fragments of gray, fine to coarse Sandstone	117.3	J	1	35	SR	F	None
118.0																	
118.5	7.5						0				-	-	-	-	-	-	-
119.0																	
119.5	5	C-21	119.3 - 124.5	-88.2 - -93.4	62 100%	62 100%	ECF (3±)		119.3	Strong, gray, conglomeratic SANDSTONE, massive, fresh. - Quartz vein at 120.0', 10-35 mm±.	119.3-119.4	ECF	-	-	SM	F	QZ
120.0							3										
120.5	5						0				-	-	-	-	-	-	-
121.0																	
121.5	5.75						1				121.0	J	1-2	20	SR	F	None
122.0																	
122.5	4.5						1				122.7	J	1-5	40	SR	F	QZ
123.0									122.7	Strong to very strong, dark gray, fine SANDSTONE, massive, fresh.							
123.5	4.5						0				-	-	-	-	-	-	-
124.0																	
124.5	3.5	C-22	124.5 - 129.4	-93.4 - -98.3	59 100%	54 92%	2				124.0 124.8	J J	1-5 1	40 30	R SR	F F	None None
125.0																	
125.5	4						0		125.3	Strong to very strong, dark gray, fine SANDSTONE, laminated 1-2 mm, fresh.	-	-	-	-	-	-	-
126.0									126.0	- Bedding planes 30°-40°.							
126.5	4						1			Strong to very strong, fine to medium SANDSTONE, massive, fresh.	126.8	J	1	35	SM	F	QZ
127.0									126.6	Strong to very strong, dark gray, fine SANDSTONE, laminated 1-2 mm, fresh. - Bedding planes 40°-50°.							
127.5	3.75						1				127.0	B	1	40	SM	F	None
128.0																	
128.5	5.75						0				-	-	-	-	-	-	-
129.0																	
129.5	4.5	C-23	129.4 - 134.1	-98.3 - -103.0	56 100%	42 75%	0		129.6	Strong to very strong, dark gray, fine to medium SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
130.0																	
130.5	3.75						0				-	-	-	-	-	-	-
131.0									130.9	Strong to very strong, dark gray, fine SANDSTONE, laminated 1-2 mm, fresh.							
131.5	3.5						3		131.4	- Bedding planes 50°. - Quartz vein 131.2', 2 mm±. - Orthogonal joints around 131.1'.	131.0 131.2 131.7-132.0	J B J	1 1 1	40 50 60	SM SM R	F SW F	None QZ QZ
132.0																	
132.5	4						1			Strong to very strong, dark gray, fine to medium SANDSTONE, massive, fresh.	132.6	J	1	45	R	F	None
133.0									132.6								
133.5	4						3			Strong to very strong, dark gray, fine SANDSTONE, massive, fresh.	133.0 133.1-133.4 133.3	J J J	1 1 1	45 75 45	SR SR SR	F F F	None QZ None

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											Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
134.0										Strong to very strong, dark gray, fine SANDSTONE, massive, fresh. *(continued)*							
	5.75	C-24	134.1 - 139.1	-103.0 - -108.0	60 100%	54 90%											
134.5							0				-	-	-	-	-	-	-
135.0									134.9	Strong, dark gray, fine to medium SANDSTONE interlaminated with Siltstone, fresh. - Bedding planes 50°-60°.							
	4.5																
135.5							1				135.3	J	1	30	SM	F	PY
136.0																	
	4.5																
136.5							0				-	-	-	-	-	-	-
137.0																	
	4.75																
137.5							0				-	-	-	-	-	-	-
138.0									138.0	Strong to very strong, dark gray, conglomeratic SANDSTONE, massive, fresh.							
	2.75										138.0	J	1	30	SM	F	None
138.5							5				138.0	J	1	35	SM	F	QZ/PY
139.0									138.6	- Quartz vein at 138.1', 7 mm±. - Orthogonal joints at 138.0'.	138.6	J	1	25	SR	F	None
	3.75	C-25	139.1 - 144.2	-108.0 - -113.1	61 100%	55 90%					138.7	J	1	25	SM	F	None
139.5							ECF (1±)				138.7	J	1	45	SM	SW	QZ
140.0							3			Strong to very strong, gray, fine SANDSTONE, massive, fresh. - Quartz marbling 139.0'-139.1'.	139.0-139.1	ECF	-	-	SM	SW	QZ
	3.5										139.4	J	10	20	VR	SW	None
140.5							0				139.4-139.6	J	1	55	SM	F	None
141.0											-	-	-	-	-	-	-
	6.75																
141.5							1		141.1	Very strong, gray, conglomeratic SANDSTONE, massive, fresh. - Quartz vein at 142.7', 15 mm±.	141.0	J	1	20	SR	F	None
142.0																	
	7																
142.5							1				142.8	J	1	15	SR	F	None
143.0																	
	4.75																
143.5							1		143.2								
144.0									143.5	Strong to very strong, gray, fine to coarse SANDSTONE, massive, fresh.	143.5	J	1	35	SM	F	None
	5.5	C-26	144.2 - 149.1	-113.1 - -118.0	59 100%	59 100%			143.9	Strong, dark gray, fine SANDSTONE, massive, fresh.							
144.5							1			Strong to very strong, gray, fine to coarse SANDSTONE, massive, fresh.	144.9	J	1-2	30	SM	F	QZ
145.0									144.9								
	6.5									Strong, gray, fine to medium SANDSTONE, massive, fresh. - Orthogonal joints 145.0'.							
145.5							1				145.0	J	1	55	SM	SW	QZ
146.0									145.6	Very strong, gray CONGLOMERATE, massive, fresh. - Quartz vein at 146.3', 20 mm±.							
	6																
146.5							0		146.5	Strong to very strong, gray, conglomeratic SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
147.0																	
	7																
147.5							1		147.4	Strong, dark gray SILTSTONE, laminated 1-2 mm, fresh. - Bedding planes 50°.	147.3	J	1	15	SR	F	None
148.0									147.7								
	7.25									Moderately strong, gray, CONGLOMERATE, massive, fresh. - Quartz vein at 147.8', 1-40 mm±.							
148.5							1				148.2	J	1	40	SR	F	None
149.0																	
	6.5	C-27	149.1 - 154.2	-118.0 - -123.1	61 100%	61 100%											
149.5							0				-	-	-	-	-	-	-
150.0																	
	6.75																

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CORE BORING REPORT

BORING NUMBER B17-8

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
150.5																	
							1			Moderately strong, gray, CONGLOMERATE, massive, fresh. - Quartz vein at 147.8', 1-40 mm±. *(continued)*	150.8	J	1-2	50	R	F	None
151.0	6.75																
151.5							1				151.9	J	1	45	SM	F	None
152.0	7.25																
152.5							0		152.2	Very strong, gray, conglomeratic SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
153.0									152.8								
	7.25								153.0	Very strong, gray, CONGLOMERATE, massive, fresh.							
153.5							1		153.5	Very strong, gray, fine to medium SANDSTONE, massive, fresh.	153.5	J	1-2	10	SR	F	None
154.0									153.7								
	4.75	C-28	154.2 - 159.4	-123.1 - -128.3	60 97%	60 97%	0			Strong to very strong, dark gray SILTSTONE, laminated 1-2 mm, fresh. - Bedding planes 30°.	-	-	-	-	-	-	-
154.5									154.7								
155.0										Strong to very strong, gray, fine SANDSTONE, massive, fresh.							
	4.5						3			Very strong, gray, fine to medium SANDSTONE, massive, fresh.	155.5-156.1 155.9 155.9	J J J	1 1 1	70 0 45	SR SR VR	F F F	None None None
155.5																	
156.0																	
	4						1		156.2	Strong to very strong, dark gray, fine SANDSTONE, massive, fresh.	156.9	B	1	35	SM	F	None
156.5									156.7								
157.0										Strong to very strong, dark gray, fine SANDSTONE, laminated 1-2 mm to bedded 5-20 mm, fresh. - Bedding planes 30°-40°.	157.2 157.9	B B	1 1	40 35	SM SM	SW F	None None
157.5	4.25						2										
158.0									157.9								
	5						1			Strong to very strong, dark gray, fine to medium SANDSTONE, bedding 1-20 mm, fresh. - Bedding planes 30°-40°.	158.4	J	1	25	SR	F	None
158.5																	
159.0																	
159.5	5.25	C-29	159.4 - 164.5	-128.3 - -133.4	61 100%	46 75%	0		159.4	Strong to very strong, gray, fine to coarse SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
160.0									160.2								
	5						4		160.3	Strong to very strong, dark gray SILTSTONE, massive, fresh.	160.4 160.7 160.9 160.9	J J B J	1 1 1 1	50 45 40 20	SR SM SM SR	F F F F	None PY None None
160.5									160.4								
161.0										Strong to very strong, gray, fine to coarse SANDSTONE, massive, fresh.							
161.5	4.75						1			Strong to very strong, dark gray SILTSTONE, laminated 1-2 mm, fresh. - Bedding planes at 30°-40°. - Orthogonal joints at 160.4'.	161.0	B	1	40	SM	F	PY
162.0																	
162.5	5.25						0				-	-	-	-	-	-	-
163.0									162.8								
	4.25						2		163.1	Strong to very strong, dark gray, fine to medium SANDSTONE, massive, fresh. - Quartz marbling at 162.9'-163.0'.	163.0 163.3	B J	1 1	45 30	SM SR	F F	QZ QZ
163.5																	
164.0										Strong to very strong, dark gray SILTSTONE, laminated 1-2 mm, fresh. - Orthogonal joints 163.3'. - Bedding planes 40°-50°.	164.1-164.4 164.3	J B	1-30 1	60 45	SR SM	SW F	QZ None
164.5	5.25	C-30	164.5 - 169.6	-133.4 - -138.5	61 100%	54.5 89%	2		164.5								
165.0									165.0								
165.5	3.5						1			Strong to very strong, gray, fine SANDSTONE, bedding 10-50 mm, fresh. - Quartz marbling 164.7' - 164.8'.	165.0	J	4	40	SM	F	QZ
166.0																	
166.5	4.25						0			Strong, dark gray, fine SANDSTONE, massive, fresh.	-	-	-	-	-	-	-

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CORE BORING REPORT

BORING NUMBER B17-8

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES: Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
167.0										Strong, dark gray, fine SANDSTONE, massive, fresh. *(continued)*							
167.5	5.25						1				167.9	J	1	20	VR	F	None
168.0									167.8	Strong to very strong, gray, conglomeratic SANDSTONE, massive, fresh.							
168.5	5.25						3				168.8 168.8 168.9	J B B	1 1 1	25 40 45	VR SM SM	F SW F	QZ/PY PY None
169.0									168.7	Strong to very strong, dark gray SILTSTONE, laminated 1-2 mm, fresh.							
169.5	4.5						1		169.2	- Bedding planes 40°-45°. - Orthogonal joints 168.8'.	169.4	J	1	55	SM	F	None
170.0		C-31	169.6 - 174.7	-138.5 - -143.6	61 100%	61 100%			169.9	Strong to very strong, dark gray SILTSTONE, massive, fresh.							
170.5	3.5						0			Strong to very strong, dark gray, fine SANDSTONE, laminated 1-2 mm, fresh. - Bedding planes 40°-50°. - Quartz vein 171.3', 1-5 mm±.	-	-	-	-	-	-	-
171.0																	
171.5	3.75						4		171.3		171.2 171.2 171.3 171.6	B J B J	1 1 1 1	40 25 45 45	SR SM SR SR	SW F SW F	None None None QZ
172.0										Moderately strong to very strong, gray, conglomeratic SANDSTONE, massive, fresh. - Orthogonal joints around 173.2'.							
172.5	3.75						0				-	-	-	-	-	-	-
173.0																	
173.5	5.5						3				173.2 173.3 173.8	J J J	2 2 1-2	60 35 30	SR SR SR	F F SW	QZ None None
174.0																	
174.5	4.75						0		174.5	Moderately strong to very strong, gray, fine to medium SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
175.0		C-32	174.7 - 179.7	-143.6 - -148.6	60 100%	57.5 96%			175.2	Strong to very strong, gray, conglomeratic SANDSTONE, massive, fresh. - Quartz vein at 175.7', 5 mm±.							
175.5	5.5						0				-	-	-	-	-	-	-
176.0									176.2	Strong to very strong, gray, fine to coarse SANDSTONE, massive, fresh. - Quartz vein at 176.3', 20 mm±.							
176.5	4.75						1				176.9	J	1-2	30	SM	F	QZ
177.0																	
177.5	5.5						1				177.1	J	1-5	25	SM	F	QZ
178.0									178.0	Strong to very strong, gray, fine to coarse SANDSTONE, massive, fresh.							
178.5	5.5						0		178.6	Strong to very strong, gray, conglomeratic SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
179.0									179.2								
179.5	7						1		179.4	Strong to very strong, dark gray SILTSTONE, massive, fresh.	179.3	J	1-30	60	VR	F	None
180.0		C-33	179.7 - 184.9	-148.6 - -153.8	62 100%	50 81%											
180.5	3.75						4		180.2	Strong to very strong, gray, conglomeratic SANDSTONE, massive, fresh.	180.1-180.4 180.2 180.4 180.7	J J J J	1-3 1 1 1-5	60 60 15 50	SR SM SM VR	F F F F	None QZ None None
181.0										Strong to very strong, dark gray, fine SANDSTONE, laminated 1 mm±, fresh. - Orthogonal joints around 180.4'. - Bedding planes 30°-40°.							
181.5	4						1				181.0	S	1	25	SL	F	PY
182.0									182.0	Strong to very strong, gray, fine to medium SANDSTONE, massive, fresh. - Orthogonal joints around 182.3'. - Quartz vein at 182.4', 7 mm±.	182.3 182.3 182.4 182.6	J J J B	1-3 7 1-2 1-2	40 45 50 40	SM SR SM SR	F SW F F	PY QZ PY QZ
182.5	3.75						4		182.6								
183.0																	

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CORE BORING REPORT

BORING NUMBER B17-8

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
183.5							1			Strong to very strong, dark gray, fine to medium SANDSTONE interlaminated with Siltstone, fresh. - Bedding planes 40°. *(continued)*	183.5	B	1-5	40	SR	F	PY
184.0	5								184.1								
184.5							0			Strong to very strong, dark gray, fine SANDSTONE, laminated 1-2 mm, fresh. - Bedding planes 30°-40°. - Quartz vein at 184.9'-185.5', 1 mm±, 85°. - Quartz vein at 185.4', 1-3 mm±.	-	-	-	-	-	-	-
185.0	4.25	C-34	184.9 - 190	-153.8 - -158.9	59 97%	59 97%											
185.5							1				185.6	J	1	25	SM	SW	QZ
186.0	3.25																
186.5							0				-	-	-	-	-	-	-
187.0	4																
187.5							0		187.1	Strong to very strong, dark gray, fine SANDSTONE, massive, fresh. - Quartz vein at 188.0', 1 mm±.	-	-	-	-	-	-	-
188.0	3.5																
188.5							2				188.0 188.5	J J	1 1	5 5	SM SR	F F	QZ None
189.0	5																
189.5							1		189.0	Strong to very strong, gray, conglomeratic coarse SANDSTONE, massive, fresh - Quartz vein at 189.0', 2 mm±.	189.0	J	1	40	SM	F	QZ
190.0	4.5																
190.5		C-35	190 - 195.1	-158.9 - -164.0	61 100%	57 93%	0		190.0	Strong to very strong, gray, fine to medium SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
191.0	4.25																
191.5							0				-	-	-	-	-	-	-
192.0	4																
192.5							2				192.6-193.3 192.9	J J	1 1	85 0	VR SM	F F	QZ None
193.0	4																
193.5							1				193.4	J	1	20	SM	F	QZ
194.0	4.5								193.7 193.9	Strong to very strong, gray CONGLOMERATE, massive, fresh.							
194.5							3	× × ×	194.3 194.5	Strong to very strong, gray, fine SANDSTONE, massive, fresh. Strong to very strong, dark gray SILTSTONE, laminated 1-2 mm, fresh. - Bedding planes.	194.2 194.5 194.9	J S J	1 1 1	50 15 5	SM SL SM	F F F	QZ QZ None
195.0	4.25	C-36	195.1 - 200.1	-164.0 - -169.0	60 100%	60 100%											
195.5							1				195.4	S	1	20	SL	F	None
196.0	3.5									Strong to very strong, gray, fine SANDSTONE, massive, fresh.							
196.5							1		196.1 196.2	Strong to very strong, dark gray, CONGLOMERATE, massive, fresh.	196.1	J	1	20	SM	F	QZ
197.0	4									Strong to very strong, dark gray, fine SANDSTONE, laminated 1 mm±, fresh.							
197.5							1	× × ×	197.1 197.2	- Bedding planes 20°-30°.	197.5	S	1	20	SL	F	QZ
198.0	4.5							× × ×	197.4 197.5 197.7	Strong to very strong, dark gray, CONGLOMERATE, massive, fresh.							
198.5							0			Strong to very strong, dark gray SILTSTONE, massive, fresh.	-	-	-	-	-	-	-
199.0	5									Strong to very strong, dark gray, fine to medium SANDSTONE, massive, fresh.							
199.5							0		199.5	Strong to very strong, dark gray	-	-	-	-	-	-	-

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PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES: Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
200.0										SILTSTONE, massive, fresh.							
200.5	4.75	C-37	200.1 - 205	-169.0 - -173.9	59 100%	56 95%	0		200.2	Strong to very strong, dark gray, fine to coarse SANDSTONE, bedding 10-20 mm±, fresh.	-	-	-	-	-	-	-
201.0									200.5	- Quartz vein at 198.6', 1-40 mm±.							
201.5	3.25						3		200.9	- Bedding planes 30°.	201.6-202.4	J	1	80	SR	F	QZ
202.0										Strong to very strong, dark gray, conglomeratic SANDSTONE, massive, fresh. *(continued)*	201.8	J	1	10	SR	F	None
202.5	4.5						1		201.9	Strong to very strong, dark gray, fine SANDSTONE, massive, fresh.	201.9	J	1	0	VR	F	None
203.0										Strong to very strong, gray, fine to medium SANDSTONE, massive, fresh	202.7	S	1-2	10	SL	F	QZ
203.5	4.5						1			Strong to very strong, dark gray, fine to coarse SANDSTONE, massive, fresh.	203.3	J	1	20	SM	F	None
204.0										- Quartz vein at 200.3', 2 mm±.							
204.5	4.25						0		204.2	- Quartz vein at 200.6', 3 mm±.							
205.0										- Quartz vein at 201.8', 2 mm±.							
205.5	4.25	C-38	205 - 210	-173.9 - -178.9	60 100%	60 100%	0		205.1	- Quartz vein at 201.7', 1 mm±.							
206.0										Strong to very strong, dark gray, conglomeratic SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
206.5	3.25						1		205.7	- Quartz vein at 202.2'-202.5', 1 mm±, 65°.							
207.0									206.4	- Quartz vein at 203.0', 1 mm±.							
207.5	3.5						1		206.8	- Quartz vein at 203.1', 1 mm±.							
208.0										Strong to very strong, dark gray, fine SANDSTONE, massive, fresh.	206.1	J	1	15	SM	F	QZ
208.5	3.25						1		208.3	Strong to very strong, dark gray to black SILTSTONE, laminated 1-2 mm±, fresh.	207.8-208.6	J	1	80	SM	F	QZ/PY
209.0									208.6	- Bedding planes 30°-40°.							
209.5	3.5						0		209.2	Strong to very strong, dark gray SILTSTONE, massive, fresh.	208.3	J	1	15	SM	F	None
210.0										Strong to very strong, dark gray to black SILTSTONE, laminated 1-2 mm±, fresh.	-	-	-	-	-	-	-
210.5	5.5	C-39	210 - 214.8	-178.9 - -183.7	57 98%	34.5 59%	0			- Bedding planes 30°-40°.							
211.0										Strong to very strong, dark gray, fine SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
211.5	3.25						3		211.7	- Quartz vein at 207.0', 1 mm±.							
212.0	4									Strong to very strong, dark gray to black SILTSTONE, massive, fresh.	-	-	-	-	-	-	-
212.5							5			Strong to very strong, dark gray, fine to medium SANDSTONE, laminated 1-2 mm±, fresh.							
213.0	5.25								212.9	- Bedding planes 30°-40°.	211.0	J	1	15	SR	F	QZ
213.5							1			Strong to very strong, dark gray, fine SANDSTONE, massive, fresh.	211.1-211.9	J	1	80	SM	F	QZ/PY
214.0	5.75									- Quartz vein at 209.4', 3 mm±.	211.6	J	1	30	SR	F	None
214.5							3			Strong to very strong, dark gray SILTSTONE, laminated 1-2 mm±m fresh.	212.0	J	1	15	SR	F	None
215.0	4.75	C-40	214.8 - 219.9	-183.7 - -188.8	61 100%	51.5 94%				- Bedding planes 20°-30°.	212.0-212.2	J	1	60	SR	SW	None
215.5							3		215.3	- Quartz vein at 212.0', 2 mm±.	212.4	J	1	50	SR	SW	None
216.0	4								215.7	- Quartz marbling 212.3'-212.5'.	212.6	J	1	30	VR	F	QZ
										Strong to very strong, dark gray, conglomeratic SANDSTONE, massive, fresh.	212.6-212.9	J	1	60	SM	SW	None
										- Quartz vein at 214.7', 30 mm±.	213.0	S	1	30	SL	SW	PY
										- Orthogonal joints 214.5'.	214.2	J	1	50	SR	SW	None
											214.5	J	1	30	SR	SW	None
											214.5	J	1	50	SR	SW	None
										Strong, dark gray, fine SANDSTONE, massive, fresh.	215.4	J	2	55	SM	SW	None
											215.5	S	1	30	SL	F	None
											215.7	S	1	30	SL	F	None

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CORE BORING REPORT

BORING NUMBER B17-8

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES						
											Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
216.5							1			Strong to very strong, gray CONGLOMERATE, massive, fresh. - Quartz vein at 215.9', 10 mm±. - Quartz vein at 217.9', 5 mm±. *(continued)*	216.7	J	1	55	VR	F	None
217.0	5.5																
217.5							0				-	-	-	-	-	-	-
218.0	5																
218.5							1				218.0	J	1	50	VR	F	None
219.0	3.25																
219.5							1		219.0	Strong, dark gray, fine SANDSTONE, massive, fresh.	219.0	J	1	0	SR	F	None
220.0	6.25	C-41	219.9 - 225.1	-188.8 - -194.0	61 100%	51.5 84%											
220.5							3		220.1	Strong, gray, conglomeratic SANDSTONE, massive, fresh.	220.0 220.0-220.4 220.1	J J J	1 1 1	15 65 0	VR SR VR	SW F F	None None None
221.0	4								220.6	Strong to very strong, gray, fine to coarse SANDSTONE, massive, fresh.							
221.5							2				221.0-221.4 221.4	J J	1 1	70 60	SR R	F F	QZ None
222.0	5																
222.5							2	× × ×	222.4		222.1 222.5	J J	1 1	55 45	SR SM	F SW	None SI
223.0	4.25								222.6	Strong, dark gray SILTSTONE with graphite interlaminations, fresh. - Quartz vein at 222.6', 10 mm±. - Bedding planes 30°-40°.							
223.5							3			Strong to very strong, dark gray, fine SANDSTONE, laminated 1-2 mm, fresh. - Bedding planes 30°-40°. - Quartz vein at 222.8', 5 mm±.	223.3 223.4 223.7	B B B	1 1 1	35 35 35	SM SM SM	SW SW F	SI None QZ
224.0	4.5																
224.5							3				224.1 224.5 224.6	B B B	1 1 1	35 30 30	SR SM SM	F SW SW	None SI None
225.0	3.75																
225.5		C-42	225.1 - 230	-194.0 - -198.9	60 100%	45 75%	2	× × × × × × × ×	225.2 225.4	Strong, gray, fine to medium SANDSTONE, massive, fresh.	225.4 225.7	J B	1 1	35 30	SM SM	F SW	None None
226.0	3								226.0	Strong, dark gray to black SILTSTONE with graphite interlaminations, fresh. - Bedding planes 30°.							
226.5							1				226.1	B	1	25	SR	F	None
227.0	3.5								227.0	Strong to very strong, gray, fine SANDSTONE, laminated 1-2 mm, fresh. - Bedding planes 25°.							
227.5							ECF (3±)	× × × × × × × × × × × ×			227.0-227.1 227.1 227.3	ECF S J	- 1 1	- 20 50	SM SL SM	SW SW F	None QZ QZ
228.0	3.5						5			Strong, dark gray SILTSTONE, laminated 1-2 mm±, fresh. - Bedding planes 30°-40°.	227.8	J	1	45	SR	F	QZ
228.5							1		228.0	Strong to very strong, gray, fine to medium SANDSTONE, bedding 1-50 mm±, fresh. - Bedding planes 35°-40°.	228.0	B	1	40	SM	F	None
229.0	4																
229.5							2				229.1 229.2	S J	1 1	25 30	SL SR	F F	None QZ
230.0										**Bottom of borehole at 230.0 feet.**							
230.5																	
231.0																	
231.5																	
232.0																	
232.5																	

5. Boring was backfilled with cement bentonite grout from 230.0 feet to 38.4 feet. A groundwater monitoring well was installed from 38.4 feet to the ground surface. This wall appeared to not function properly, and was removed in June 2019. The boring was backfilled with cement-bentonite grout to the ground surface. Please see the well installation log for additional details.

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BORING NUMBER B17-39

TEST BORING REPORT

PROJECT NAME Narragansett Bay Commission Phase III CSO Program
CLIENT NBC/Stantec
CONTRACTOR New England Boring Contractors, Inc.

PROJECT NO. 13:308.00D/14106.02
START 8/2/2019
FINISH 8/8/2019
DRILLER NEBC
LOGGED BY MLP
CHECKED BY RKM/SJM

	CASING	SAMPLER	BARREL
Type	Steel	Split Spoon	HQ3
Inside Diameter (in.)	4/5	1 3/8	2 3/8
Hammer Weight (lb.)	140	140	N/A
Hammer Fall (in.)	30	30	N/A

DRILLING EQUIPMENT & PROCEDURES
Rig Make & Model: Mobile B-53
Bit Type: 4 7/8" Tricone / 3 7/8" Tricone
Drill Fluid: Water
Casing: 5" (17.8') / 4" (19.0')
Hoist/Hammer: Automatic Hammer

ELEVATION 24.6 **NORTHING** 2882698.809
DATUM NGVD 1929 **EASTING** 359379.301
LOCATION Masonic Temple Parking Lot

DEPTH (ft)	ELEVATION (ft)	CASING BLOWS	SPT	SAMPLE NO.	REC (in) / PEN (in)	SAMPLE DEPTH (ft)	USCS SYMBOL	GRAPHIC LOG	VISUAL-MANUAL IDENTIFICATION & DESCRIPTION (Density/consistency, color, max. particle size, structure, odor, moisture, optional descriptions, geologic interpretation)	DRILLING NOTES
0	24.6									
		26	17-15-17-9/3"	S-1	13 / 21	0.25 - 2	SP		Moist, dense, brown, fine to medium SAND, some fine to coarse gravel, trace coarse sand, trace silt. (FILL)	ASPHALT PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (1) 2 oz. Amber, (3) VOAs.
		42								
		32	11-6-6-4 (12)	S-2	16 / 24	2 - 4	SP		Moist, medium dense, light brown, fine to medium SAND, trace coarse sand, trace fine gravel, trace silt. (FILL)	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (1) 2 oz. Amber, (3) VOAs.
		35								
5	19.6	29	3-5-4-3 (9)	S-3	17 / 24	4 - 6	SP		Moist, loose, brown, fine to medium SAND, little fine to coarse gravel, trace coarse sand, trace silt, trace brick, trace asphalt. (FILL)	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (1) 2 oz. Amber, (3) VOAs.
		63								
		106	6-6-13-13 (19)	S-4	15 / 24	6 - 8	SW		Moist, medium dense, dark gray, fine to coarse SAND, some fine to coarse gravel, trace coarse sand, trace silt, trace glass, trace organics. (FILL)	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (1) 2 oz. Amber, (3) VOAs.
		X								
		142	16-16-13-8 (29)	S-5	13 / 24	8 - 10	SP		5A: Moist, medium dense, black, fine to medium SAND, some fine to coarse gravel, trace coarse sand, trace silt. (FILL)	A: PID = 4.8 ppm B: PID = 2.2 ppm Environmental sample taken. (1) 8 oz. Amber, (1) 2 oz. Amber, (3) VOAs.
10	14.6	X							5B: Moist, medium dense, tan, fine SAND, little fine to coarse gravel, trace coarse sand, trace silt.	
		40	7-13-5-4 (18)	S-6	7 / 24	10 - 12	SW		Wet, medium dense, brown to tan, fine SAND, some medium to coarse sand, trace fine gravel, trace silt.	PID = 0.0 ppm (10'-12') Composite environmental sample taken. (1) 8 oz. Amber, (1) 2 oz. Amber, (3) VOAs.
		45								
		55	5-4-4-5 (8)	S-7	8 / 24	12 - 14	SM		Wet, loose, brown, fine SAND, some silt, trace fine gravel.	PID = 1.3 ppm (12'-14')
		X								
15	9.6	53	6-3-17-31 (20)	S-8	12 / 24	14 - 16	SM		Wet, medium dense, brown to purple, fine SAND, some silt, some fine to coarse gravel.	PID = 0.2 ppm
		113								
		117	14-15-10-50/3"	S-9	3 / 21	16 - 17.8			Wet, medium dense, gray/purple, weathered SANDSTONE recovered as fine to coarse GRAVEL, some fine to coarse sand, little silt.	PID = 0.8 ppm
		X								

Bottom of borehole at 17.80 feet.

WATER LEVEL DATA

DATE/TIME	DEPTH (ft.) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER

SAMPLE IDENTIFICATION
O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

REMARKS:
1. "X" in the casing blows column indicates that blows were not counted at that interval.

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CORE BORING REPORT

BORING NUMBER B17-39

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
15.0										See Test Boring Report							
17.5							N/A				17.8-18.0	J	-	70	SR	SW	QZ
18.0	3.5	C-1	17.8 - 21.3	6.7 - 3.2	41 98%	17 40%	>10		17.8	Moderately weak to strong, gray to light purple, medium SANDSTONE, massive, moderately weathered to slightly weathered.	18.0 18.2 18.2-18.4 18.4-18.5 18.6-18.8 18.8-18.9	J J ECF J J J	20 10-30 - 1-5 1-2 1-5	15 35 - 70 50 45	SR SR SR SR SM SR	SW SW MW SW SW SW	QZ Fe Fe Fe Fe Fe/SI
19.0	2.4								18.6	Strong, gray to light purple, fine SANDSTONE, laminated (1-2 mm±), slightly weathered. - Bedding planes at 30°-35°.							
19.5	2.2						>10		19.0 19.4	Moderately strong, gray to purple, fine to coarse SANDSTONE, bedded (3-4 cm±), moderately weathered to slightly weathered. - Bedding planes at 35°.	19.0 19.0-19.6 19.5-20.0 19.6-19.8 19.8-20.0	J J J J ECF	1-5 1-5 1-5 1-5 -	15 70 65 45 -	SR SR SR SR SR	SW SW SW SW MW/SW	Fe Fe Fe Fe Fe
20.0									20.0	Weak to moderately strong, gray to purple, fine SANDSTONE interlaminated with Siltstone (1-5 mm±), slightly weathered.	20.0 20.6-20.8	J J	- 1-5	35 40	SR SR	HW/MW SW	Fe Fe
20.5	1.3						2			Strong, light gray to light purple, fine to medium SANDSTONE, laminated (1 mm±), slightly weathered. - Bedding planes at 35°-45°.							
21.0										Lost Core. No Recovery.							
21.5	3.4	C-2	21.3 - 25.8	3.2 - -1.3	29 54%	18 33%	N/A		21.3		-	-	-	-	-	-	-
22.0	2.2						N/A				-	-	-	-	-	-	-
22.5																	
23.0	2.2																
23.5							N/A		23.3	Moderately weak to strong, light gray to light purple, medium SANDSTONE, slightly weathered.	23.3-23.4 23.5 23.5-23.8 23.9-24.0	ECF J J J	- 10-40 1-35 1-10	- 40 45-80 45	SR SR SR SR	MW SW MW/SW SW	Fe Fe None None
24.0	1.9						ECF (5±)										
24.5								× × × × × ×	24.4 24.7	Moderately strong, light gray to light purple SILTSTONE, laminated (1 mm±), slightly weathered. - Minor folds from 24.4'-24.7'. - Pyrite vein near 24.4', 1 mm±.	24.0-24.1 24.1-24.3 24.4-24.7 24.5	J J ECF/S J/S	1-10 1-3 - 1-3	45 40-90 - 40	SR SR SL/SR SL/SR	SW SW MW SW	None None None None
25.0	2.2						8										
25.5							>10			Strong, light gray to light purple, fine to medium SANDSTONE, massive, moderately weathered to fresh. - Moderately strong and moderately weathered from 25.3'-25.5'. - Quartz veins from 25.6'-25.8', 1-2 mm±.	25.3 25.3-25.5 25.4-25.7 25.8-26.0	J ECF J ECF	1 - 2-10 -	35 - 50 -	SR SR SR SR	SW MW SW SW	None None None QZ
26.0	4.5	C-3	25.8 - 28.7	-1.3 - -4.2	34 97%	27 77%			25.9								
26.5							1				26.0	J	-	40	SR	F	None
27.0	3.4								26.8								
27.5							ECF (4±)				27.1 27.3 27.3-27.4 27.4	J J ECF J	1 1-5 - 1-3	20 30 - 25	SR SR SR SR	F F SW SW	None None None None
28.0	2						7			Strong, gray, coarse SANDSTONE, massive, slightly weathered to fresh. - Quartz veins throughout, 1-30 mm±.							
28.5							1			Moderately strong to strong, light gray to light purple, fine SANDSTONE, laminated (1 mm±), slightly weathered to fresh. - Bedding planes at 30°-70°.	28.0	J	1-5	25	SR	F	None
29.0	2.7	C-4	28.7 - 33.1	-4.2 - -8.6	54 100%	44 83%			28.7								
29.5	2						3			Moderately strong to strong, light gray to light purple, medium to coarse SANDSTONE, massive,	29.0-29.6 29.7 29.7-30.0	J J J	1-3 1-3 1-3	50-85 30 85	SR/R SR SR	SW SW SW	Fe/QZ None QZ
30.0																	

REMARKS:
1. Dip angles are measured from horizontal (i.e., perpendicular to core axis).
2. Prior to coring, NEBC installed the 4" casing from the ground surface to approximately 17.8'.
3. Wash color light purple.
4. After the first core run, NEBC advanced the 4" diameter casing from 17.8' to 19.0' in attempt to prevent water loss.
5. Little to no flush return from approximately 18.8'-38.3'. NEBC indicated that water was lost through the annulus between the 5" casing and 4" casing.

WATER LEVEL DATA

DATE/TIME	BOT. OF SOIL CASING (ft)	BOT. OF HOLE (ft)	WATER
8/5/2019 12:15:00 PM	17.8	17.8	3.8
8/6/2019 7:00:00 AM	19.0	38.2	14.8
8/7/2019 7:00:00 AM	19.0	113.6	11.0
8/8/2019 7:00:00 AM	19.0	182.3	16.5

GROUND SURFACE EL. 24.6

Note: Refer to the key sheets within the Geotechnical Design Report for the description of rock classification system codes.

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CORE BORING REPORT

BORING NUMBER B17-39

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
30.0									30.1	slightly weathered to fresh.							
30.5	2						3			Strong, light gray to light purple, fine to medium SANDSTONE, massive, slightly weathered to fresh.	30.0-30.5 30.5 30.6-30.9	J J J	1-3 1-3 1-3	85 30 0-75	SR/R SM/SR R	SW SW SW	QZ Fe Fe
31.0																	
31.5	2.9						2				31.0-31.5 31.5-31.8	J J	1 1	80 65	SM/SR SM/SR	SW SW	Fe QZ/Fe
32.0																	
32.5	1/5"						0				-	-	-	-	-	-	-
33.0																	
33.5	2.7	C-5	33.1 - 38.3	-8.6 - -13.8	62 100%	58 94%	1		33.1	Strong, light gray to light green, conglomeratic SANDSTONE, massive, fresh.	33.6	J	1	40	SR	F	None
34.0																	
34.5	2.6						0				-	-	-	-	-	-	-
35.0																	
35.5	2.3						0				-	-	-	-	-	-	-
36.0																	
36.5	2.5						2		36.2	Strong, light gray to light purple, medium to coarse SANDSTONE, massive, fresh.	36.4-36.6 36.8	J J	1 1	45 30	SR SR	SW SW	QZ/CH Fe
37.0									36.6	Strong, light gray to light purple, fine to medium SANDSTONE, laminated (1 mm±), fresh. - Bedding planes at 45°.	37.4	J	1-10	40	SR	F	None
37.5	3.2						1		37.6								
38.0										Strong, light gray to light purple, coarse SANDSTONE, massive, fresh. - Quartz veins from 38.7'-39.2', 1-5 mm±.	-	-	-	-	-	-	-
38.5	4.2	C-6	38.3 - 42.7	-13.8 - -18.2	55 100%	55 100%	0										
39.0																	
39.5	3.3						1		39.3	Moderately strong to strong, light gray to light purple, fine to medium SANDSTONE, laminated (1 mm±), fresh. - Bedding planes at 30°-35°.	39.3	J	1	40	SM/SR	F	None
40.0									40.1								
40.5	3.2						0			Strong, light gray, coarse SANDSTONE, massive, fresh. - Quartz veins, 1-7 mm±.	-	-	-	-	-	-	-
41.0	3.2																
41.5							1		41.3 41.4	Strong, light purple, fine SANDSTONE, laminated (1 mm±), fresh. - Bedding planes at 35°.	41.3	J	1	40	SR	F	QZ
42.0	2.7																
42.5							2		42.1	Strong, light gray, coarse SANDSTONE, massive, fresh. - Quartz veins from 41.4'-41.7', 1 mm±.	42.3 42.8	J J	1 1-3	40 40	SM SR	SW F	None None
43.0	2.5	C-7	42.7 - 47.9	-18.2 - -23.4	60 97%	56 90%											
43.5							0			Strong, light gray to light purple, fine to medium SANDSTONE, laminated (1-2 mm±), fresh. - Bedding planes at 35°-40°.	-	-	-	-	-	-	-
44.0	2.6																
44.5							1		44.1	Strong to very strong, light gray, medium to coarse SANDSTONE, massive, fresh. - Quartz veins from 44.2'-45.0', 2-10 mm±.	44.0	J	1-5	40	SM	SW	QZ
45.0	2.7																
45.5							0		45.2	Strong, light gray to light purple, fine to medium SANDSTONE, laminated (1-2 mm±), fresh. - Bedding planes at 30°.	-	-	-	-	-	-	-
46.0	2																
									46.3								

6. Flush return blocked at approximately 33.1', the driller stopped the core run.
7. Flush returned at approximately 38.3'. Wash color light purple.
8. Wash color turned to light gray at approximately 38.5'.

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PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
46.5							2			Strong to very strong, light gray, medium to coarse SANDSTONE, massive, fresh. *(continued)*	46.0 46.3	J J	1-3 1-10	35 35	SM/SR SR	SW SW	None None
47.0	2.4									- Quartz veins from 47.0'-47.3', 1 mm±.	-	-	-	-	-	-	-
47.5							0										
48.0	2.5	C-8	47.9 - 53.1	-23.4 - -28.6	62 100%	62 100%			47.9	Moderately strong to strong, light gray, medium SANDSTONE interlaminated with fine Sandstone (1-2 mm±) to massive, fresh.							
48.5							1			- Bedding planes at 30°-40° from 47.9'-48.4'.	48.3	J	1	40	SM	SW	Fe
49.0	2.8									- Bedding planes at 40°-50° from 49.4'-49.9'.							
49.5							1				49.7	J	1	25	SR	F	QZ
50.0	2.6																
50.5							1				50.1	J	1	35	SR	SW	Fe
51.0	3.5																
51.5							1				51.7	J	1	25	SR	F	None
52.0	2.6																
52.5							0				-	-	-	-	-	-	-
53.0	2.5	C-9	53.1 - 57.4	-28.6 - -32.9	51 98%	42 81%											
53.5							0			- Bedding planes at 30°-40° from 53.1'-54.3'.	-	-	-	-	-	-	-
54.0	2.7									- Pyrite pockets from 53.8'-54.2', 1-3 mm±.							
54.5							2				54.4 54.4-54.7	J J	1 1	35 50	SR SR	F F	QZ QZ
55.0	2.5								54.6	Strong to very strong, light gray, medium SANDSTONE, massive, fresh.							
55.5							0			- Pyrite pockets from 54.6'-54.8', 1 mm±.	-	-	-	-	-	-	-
56.0	3.1									- Orthogonal joints near 54.6'.							
56.5							1			- Quartz veins from 55.1'-56.1', 1-5 mm±.	56.5-56.9	J	1-2	65	SR	SW	None
57.0	1.9								56.7	Moderately strong to strong, light gray, fine to medium SANDSTONE, laminated (1-3 mm±) to massive, fresh.							
57.5	3.2						ECF (7±)			- Bedding planes at 50°-60°.	57.0-57.1 57.2-57.4 57.6 57.6-57.8	J ECF J ECF	1-10 - 2-3 -	45 - 40 -	SR SR SR SR	F MW F SW	QZ QZ None QZ
58.0		C-10	57.4 - 62.5	-32.9 - -38.0	60 98%	53 87%	10			- Quartz veins from 57.0'-57.2', 1-7 mm±.	57.8	J	2-5	10	SR	F	None
58.5	2.5						0			- Bedding planes at 50°-70° from 57.8'-58.5'.	-	-	-	-	-	-	-
59.0									58.6								
59.5	3.4						2		58.9	Strong, light gray, conglomeratic SANDSTONE, massive, fresh. - Quartz veins 58.5'-58.9', 60 cm±.	59.6 59.8	J J	1-3 1-5	40 15	SR SR	F F	None None
60.0										Strong, light gray, medium to coarse SANDSTONE interlaminated with fine Sandstone and Siltstone (1-2 mm±) to massive, fresh.							
60.5	2.4						0			- Quartz veins from 59.2'-59.5', 2 mm±.	-	-	-	-	-	-	-
61.0										- Bedding planes at 40°-55° from 60.0'-60.6'.							
61.5	2.1						0			- Quartz veins from 60.8'-61.1', 1 mm±.	-	-	-	-	-	-	-
62.0																	
62.5	3.5	C-11	62.5 - 67.5	-38.0 -	61 100%	61 100%	0				-	-	-	-	-	-	-

9. Flush return blocked at approximately 57.4'. The driller stopped the core run.

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CORE BORING REPORT

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DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
63.0				-43.0						- Quartz veins from 62.5'-62.9', 2-5 mm±.							
63.5	3.2						0			- Bedding planes at 15°-30° from 62.5'-65.5'. *(continued)*	-	-	-	-	-	-	-
64.0										- Quartz vein near 63.4', 7 mm±.							
64.5	2.7						0			- Quartz vein near 64.6', 1 mm±.	-	-	-	-	-	-	-
65.0																	
65.5	3.5						0		65.5	- Quartz veins from 65.0'-65.2', 10 mm±.	-	-	-	-	-	-	-
66.0										Strong, light gray, medium SANDSTONE, massive, fresh.							
66.5	3						0			- Quartz veins from 65.8'-67.0', 1-5 mm±.	-	-	-	-	-	-	-
67.0																	
67.5	3.6	C-12	67.5 - 72.7	-43.0 - -48.2	61 98%	61 98%	0		67.5	Strong, light gray, conglomeratic SANDSTONE with Quartz, massive, fresh.	-	-	-	-	-	-	-
68.0									67.8								
68.5	4.5						0		68.5	Strong, light gray, fine to coarse SANDSTONE, massive, fresh. - Quartz marbling from 67.9'-68.2'.	-	-	-	-	-	-	-
69.0																	
69.5	7.1						1			Moderately strong to strong, light gray, conglomeratic SANDSTONE with Quartz, massive, fresh. - Quartz marbling from 68.5'-72.7'.	69.1	J	1-5	10	SR	F	QZ
70.0																	
70.5	7.5						0				-	-	-	-	-	-	-
71.0																	
71.5	5.4						0				-	-	-	-	-	-	-
72.0																	
72.5	8.2						0				-	-	-	-	-	-	-
73.0		C-13	72.7 - 77.8	-48.2 - -53.3	61 100%	61 100%			72.9	Strong, light gray, medium SANDSTONE, massive, fresh.							
73.5	7.6						1		73.2	- Quartz veins near 73.1', 5-10 mm±.	73.2	J	1-10	20	SR	F	QZ
74.0										Strong to very strong, light gray to white, conglomeratic SANDSTONE with Quartz, massive, fresh.							
74.5	5.6						2			- Quartz marbling from 73.2'-74.1'.	74.0-75.0 74.8	J J	1-5 1-5	80 15	SR SR	F F	QZ/PY QZ
75.0																	
75.5	4.5						0				-	-	-	-	-	-	-
76.0									75.9	Strong, light gray, coarse SANDSTONE with fine Sandstone interbeds (1-5 cm±), fresh.							
76.5	4.2						0			- Bedding planes at 30°-45°. - Quartz veins from 75.9'-77.2', 1-30 mm±.	-	-	-	-	-	-	-
77.0																	
77.5	3.5						1		77.5	Strong, light gray, medium to coarse SANDSTONE, massive, fresh.	77.1	J	1-3	30	SR	F	QZ
78.0		C-14	77.8 - 82.9	-53.3 - -58.4	60 98%	60 98%											
78.5	3.3						0		78.5	Strong to very strong, light gray, fine SANDSTONE interlaminated with Siltstone (1-2 mm±) to massive, slightly weathered to fresh.	-	-	-	-	-	-	-
79.0																	

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DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES						
											Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
79.5							1			- Quartz vein near 78.5', 5 mm±.	79.5	J	1	30	SR	SW	QZ/SI
80.0	3.2									- Bedding planes at 30°-40° from 79.0'-79.6'.							
80.5							0			- Quartz veins from 79.3'-79.4', 1-7 mm±. *(continued)*	-	-	-	-	-	-	-
81.0	3.3																
81.5							0				-	-	-	-	-	-	-
82.0	3.7																
82.5							0			- Bedding planes at 30°-40° from 82.2'-84.0'.	-	-	-	-	-	-	-
83.0	3.4	C-15	82.9 - 88	-58.4 - -63.5	62 100%	62 100%											
83.5							1				83.9-84.0	J	1	45	SR	SW	QZ
84.0	4.2								84.0	Strong to very strong, light gray, medium to coarse SANDSTONE, massive, slightly weathered to fresh.							
84.5							1			- Quartz veins from 84.1'-84.5'.	84.0-84.1	J	1	45	SR	SW	QZ
85.0	3.2									- Quartz vein near 85.0', 5 mm±.							
85.5							0		85.3	Strong, light gray, coarse SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
86.0	3.9								85.9	- Quartz veins from 85.4'-86.0', 1-6 mm±.							
86.5							0		86.2	Strong, light gray, medium SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
87.0	3.7									Strong to very strong, light gray, medium to coarse SANDSTONE, massive, fresh.							
87.5							0			- Quartz veins from 86.5'-88.8', 2-15 mm±.	-	-	-	-	-	-	-
88.0	2.8	C-16	88 - 93.2	-63.5 - -68.7	61 98%	57 92%											
88.5							2			- Quartz veins from 87.7'-88.0', 1-10 mm±.	88.1-88.3	J	1	75	SR	F	PY
89.0	2.7									- Quartz veins from 88.4'-88.9', 1-6 mm±.	88.4	J	1	35	SR	F	PY
89.5							0				-	-	-	-	-	-	-
90.0	2																
90.5							1				90.7	J	1-5	35	SR	SW	QZ
91.0	2.9									- Quartz veins from 90.6'-90.7', 1-2 mm±.							
91.5							0		91.2	Strong to very strong, light gray, medium to coarse SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
92.0	4.2									- Quartz veins from 91.2'-91.9', 1-2 mm±.							
92.5							1				92.7	J	1-5	40	SR	F	QZ
93.0	2.8								93.0	Strong to very strong, light gray, coarse SANDSTONE, massive, fresh.							
93.5		C-17	93.2 - 98.3	-68.7 - -73.8	62 100%	62 100%	1				93.9	J	1-5	30	SR	F	QZ
94.0	3.3								93.7	- Conglomeratic Sandstone lens from 93.1'-93.2', 1 cm±.							
94.5							1			Moderately strong to strong, light gray, conglomeratic SANDSTONE, massive, slightly weathered to fresh.	94.4	J	1-5	40	SR/R	F	QZ
95.0	4.1									- Quartz vein near 94.4', 16 mm±.							
95.5							2			- Quartz veins from 95.1'-95.5', 2-30 mm±.	95.1-95.3	J	1-10	45	SR	F	QZ
											95.5	J	1-10	30	SR	F	QZ

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CORE BORING REPORT

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PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES						
											Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
96.0										- Quartz veins from 95.1'-95.5', 2-30 mm±. *(continued)*							
96.5	4.3						0				-	-	-	-	-	-	-
97.0																	
97.5	5.1						1				97.1	J	1-10	20	SR	SW	QZ
98.0																	
98.5	4.4	C-18	98.3 - 103.3	-73.8 - -78.8	60 100%	60 100%	0				-	-	-	-	-	-	-
99.0																	
99.5	5.2						0				-	-	-	-	-	-	-
100.0																	
100.5	4.9						1				100.9	J	1-5	15	SR	SW	QZ
101.0																	
101.5	4.8						0				-	-	-	-	-	-	-
102.0									101.9	Strong, light gray, medium to coarse SANDSTONE interlaminated (1-5 mm±) and interbedded (5-10 mm±) with fine Sandstone to massive, fresh.							
102.5	4.1						0			- Bedding planes at 40°-60° from 101.9'-102.5'.	-	-	-	-	-	-	-
103.0																	
103.5	4.1	C-19	103.3 - 108.4	-78.8 - -83.9	61 100%	59 97%	0		103.3	- Quartz veins near 101.9', 1-3 mm±.	-	-	-	-	-	-	-
104.0										Strong to very strong, light gray, conglomeratic SANDSTONE, massive, fresh.							
104.5	4.1						1		104.3	Strong, light gray, medium SANDSTONE, massive, fresh	104.3	J	1-10	35	SR	SW	QZ
105.0									104.8	Strong to very strong, light gray, conglomeratic SANDSTONE, massive, slightly weathered to fresh.							
105.5	6						2				105.7 105.9	J J	1 1-5	20 40	SR SR	SW SW	QZ QZ
106.0									105.9	Strong to very strong, light gray, coarse SANDSTONE, massive, fresh.							
106.5	5.6						1				106.8	J	1-5	20	SR	F	QZ
107.0									106.9	Strong to very strong, light gray, conglomeratic SANDSTONE, massive, fresh.							
107.5	5.4						0				-	-	-	-	-	-	-
108.0																	
108.5	5.8	C-20	108.4 - 113.6	-83.9 - -89.1	63 100%	63 100%	0				-	-	-	-	-	-	-
109.0																	
109.5	5.8						1			- Quartz veins near 109.1', 3 mm±.	109.6	J	1	35	SR	F	QZ
110.0									110.2	Strong to very strong, light gray, medium SANDSTONE, massive, fresh.							
110.5	4.3						1			- Quartz veins near 110.4', 2 mm±.	110.6	J	1	30	SR	F	None
111.0																	
111.5	3						1				111.5	J	1-10	25	SR	F	None
112.0																	

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DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES						
											Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
112.5																	
	5						0			- Quartz veins near 110.4', 2 mm±. *(continued)*	-	-	-	-	-	-	-
113.0																	
113.5							0			- Quartz veins near 113.3', 5 mm±.	-	-	-	-	-	-	-
	5.2	C-21	113.6 - 118.6	-89.1 - -94.1	59 98%	55 92%											
114.0									113.9								
114.5							1			Strong, light gray, fine to medium SANDSTONE, laminated (1-2 mm±) to massive, fresh. - Bedding planes at 30°-40° from 113.9'-114.8'.	114.1-114.3	J	1-5	45	SR	F	QZ
	3.7																
115.0																	
115.5							0			- Bedding planes at 40° from 115.5'-116.3'.	-	-	-	-	-	-	-
	4.7																
116.0																	
116.5							4		116.3	Strong, light gray, medium SANDSTONE, massive, fresh.	116.1-116.3 116.2-116.3 116.5-116.7 116.7-117.0	J J J J	1 1 1 1-5	45 45 40 75	SR SR SR SR	F F F F	QZ QZ QZ QZ
	4.2																
117.0																	
117.5							0			- Quartz vein near 117.2', 1 mm±.	-	-	-	-	-	-	-
	6.1								117.5	Strong to very strong, light gray, conglomeratic SANDSTONE, massive, fresh.							
118.0																	
118.5							0			- Quartz vein near 117.7', 20 mm±. - Quartz vein near 118.3', 3 mm±.	-	-	-	-	-	-	-
	7.2	C-22	118.6 - 123.6	-94.1 - -99.1	60 100%	60 100%											
119.0																	
119.5							0				-	-	-	-	-	-	-
	5.3																
120.0																	
120.5							1			- Quartz veins from 120.0'-120.4', 1-10 mm±.							
	4.6								120.4	Strong, light gray, fine to medium SANDSTONE, laminated (1-5 mm±), fresh.	120.2	J	1-20	35	SR	F	QZ
121.0																	
121.5							1		121.1	- Bedding planes at 25°-35°.	121.1	J	1	30	SR	F	QZ
	5.6									Strong, light gray, conglomeratic SANDSTONE, massive, fresh. - Quartz veins from 121.1'-121.6', 5-12 mm±.							
122.0																	
122.5							0				-	-	-	-	-	-	-
	5.3																
123.0																	
123.5							0				-	-	-	-	-	-	-
	6.7	C-23	123.6 - 128.6	-99.1 - -104.1	60 100%	60 100%											
124.0																	
124.5							1		124.2	Strong, light gray, medium SANDSTONE, laminated (1 mm±), fresh.	124.9	J	1	30	SR	F	QZ
	4.5									- Bedding planes at 40°.							
125.0									125.0	- Quartz vein near 124.9', 25 mm±.							
125.5							0			Strong, light gray, medium SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
	3.1																
126.0																	
126.5							0				-	-	-	-	-	-	-
	3.2																
127.0																	
127.5							1			- Quartz veins from 126.8'-127.3', 2-10 mm±.	127.6	J	1	30	SR	F	Fe
	5.2																
128.0																	
128.5							0			- Quartz veins from 128.0'-128.2', 2 mm±.	-	-	-	-	-	-	-
	4	C-24	128.6	-104.1	43	40			128.4 128.6	Strong, light gray, conglomeratic							

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DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES						
											Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
129.0			- 132.4	-	93%	87%				SANDSTONE, massive, fresh.							
129.5	5			-107.9			0		129.2	Strong to very strong, light gray, medium to coarse SANDSTONE, massive, fresh. *(continued)*	-	-	-	-	-	-	-
130.0									130.0	Strong to very strong, light gray, conglomeratic SANDSTONE, massive, fresh.							
130.5	4.1						0				-	-	-	-	-	-	-
131.0									130.9	Strong, light gray, medium to coarse SANDSTONE, massive, fresh.							
131.5	4.6						2			Strong, light gray, medium SANDSTONE interlaminated with fine Sandstone (1-2 mm±), slightly weathered to fresh. - Bedding planes at 40°-50°.	131.5-131.7 131.8-132.0	J J	1 1	50 50	SM SM	F SW	QZ/PY None
132.0																	
132.5	4.4	C-25	132.4 - 137.5	-107.9 - -113.0	61 100%	57 93%	0		132.4	Strong, light gray, conglomeratic SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
133.0																	
133.5	4.4						1				133.0	J	1	40	SR	F	QZ
134.0										- Quartz vein near 134.0', 6 mm±.							
134.5	5.4						0				-	-	-	-	-	-	-
135.0										Strong, light gray, medium SANDSTONE, massive, fresh.							
135.5	5.1						1				135.9	J	1-10	10	SR	F	QZ
136.0										- Quartz veins from 135.7'-136.0', 10-17 mm±.							
136.5	5.2						1		136.3	- Quartz veins near 136.2', 2-7 mm±.	136.3	J	1-5	35	SR	F	QZ
137.0										Strong, light gray, coarse SANDSTONE, massive, fresh.							
137.5	6.1	C-26	137.5 - 142.8	-113.0 - -118.3	63 98%	63 98%	1				137.0-137.2	J	1-5	45	SR	F	QZ
138.0																	
138.5	5.6						1				138.3	J	1-10	20	SR	F	QZ
139.0																	
139.5	6.6						0				-	-	-	-	-	-	-
140.0									139.9	Strong, light gray, conglomeratic SANDSTONE, massive, fresh.							
140.5	8.4						1				140.0	J	1	30	SR	F	QZ
141.0																	
141.5	6.8						0				-	-	-	-	-	-	-
142.0																	
142.5	6.3						0				-	-	-	-	-	-	-
143.0		C-27	142.8 - 147.6	-118.3 - -123.1	54 93%	54 93%											
143.5	3.9						0		143.3	Strong to very strong, light gray, medium to coarse SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
144.0																	
144.5	3.2						1				144.8-145.0	J	1-10	30	SR	F	QZ
145.0										- Quartz marbling from 144.8'-145.4'.							

10. Flush return blocked at approximately 132.4'. The driller stopped the core run.

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DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES						
											Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
145.5																	
	2						1		145.4	Strong to very strong, light gray, conglomeratic SANDSTONE, massive, fresh.	145.1-145.3	J	1-5	45	SR	F	QZ
146.0																	
146.5	2.1						0				-	-	-	-	-	-	-
147.0									146.6	Strong to very strong, light gray, medium to coarse SANDSTONE, massive, fresh.							
147.5	3.5	C-28	147.6 - 152.6	-123.1 - -128.1	62 100%	62 100%	1			- Quartz veins near 147.2', 13 mm±.	147.1-147.3	J	1-10	45	SR	F	QZ
148.0																	
148.5	3.5						1				148.7	J	1-5	40	SR	F	QZ
149.0																	
149.5	3.2						1				149.7	J	1-5	35	SR	F	QZ
150.0									149.7	Strong, light gray, conglomeratic SANDSTONE, massive, fresh.							
150.5	4						1		150.3	Strong to very strong, light gray, medium to coarse SANDSTONE, massive, fresh.	150.3-150.6	J	1-5	45	SR	F	QZ
151.0																	
151.5	4.3						0		151.1	Strong, light gray, conglomeratic SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
152.0																	
152.5	5.3						0				-	-	-	-	-	-	-
153.0		C-29	152.6 - 157.9	-128.1 - -133.4	62 97%	62 97%											
153.5	3.8						1				153.2-153.9	J	1-5	75	SR	F	PY/QZ
154.0																	
154.5	4.5						1				154.5	J	1	35	SR	F	QZ
155.0																	
155.5	4.2						1				155.2-155.4	J	1	35	SR	F	None
156.0									155.7	Strong to very strong, light gray, medium SANDSTONE, massive, fresh.							
156.5	5						0				-	-	-	-	-	-	-
157.0																	
157.5							0				-	-	-	-	-	-	-
158.0	4.5	C-30	157.9 - 162.9	-133.4 - -138.4	62 100%	62 100%											
158.5							0				-	-	-	-	-	-	-
159.0	4.5																
159.5							0				-	-	-	-	-	-	-
160.0	3.8																
160.5							1		160.5	Strong, light gray, fine SANDSTONE interlaminated with Siltstone (1-2 mm±), slightly weathered to fresh. - Bedding planes at 40°-50°.	160.0	J	1	35	SR	F	None
161.0	3.9																
161.5							1				161.7	J	1	35	SR	SW	None

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DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES						
											Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
162.0	4.6																
162.5							0		162.4	Strong, light gray, medium to coarse SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
163.0	3.4	C-31	162.9 - 168.1	-138.4 - -143.6	61 98%	57 92%											
163.5							0				-	-	-	-	-	-	-
164.0	3.5																
164.5							2				164.4 164.7	J J	1-15 1	30 35	SR SR	F F	QZ None
165.0	3.1																
165.5							0				-	-	-	-	-	-	-
166.0	3.4																
166.5							3				166.3 166.4 166.9	J J J	1 1 1	15 25 30	SR SR SR	F F F	None None None
167.0	3.7																
167.5							0				-	-	-	-	-	-	-
168.0	3.7																
168.5		C-32	168.1 - 172.3	-143.6 - -147.8	50 100%	47 94%	1		168.4	Strong, light gray, fine to medium SANDSTONE interlaminated with Siltstone (1-2 mm±) to massive, slightly weathered to fresh. - Bedding planes at 30°-40° from 168.4'-169.7'.	168.4	J	1-10	20	SR	F	QZ
169.0	4.2																
169.5							1				169.6	J	1-5	30	SR	F	QZ/PY
170.0	3.5																
170.5							0				-	-	-	-	-	-	-
171.0	3.5																
171.5	1.4/3"						0			- Bedding planes at 30°-40° from 171.1'-173.7'.	-	-	-	-	-	-	-
172.0																	
172.5	4	C-33	172.3 - 177.3	-147.8 - -152.8	60 100%	55 92%	0				-	-	-	-	-	-	-
173.0																	
173.5	2.7						2				173.6 173.7-174.0	J J	1 1	30 50	SR SR	F F	None QZ
174.0										- Orthogonal joints near 173.7'.							
174.5	3.4						2				174.0-174.4 174.7	J J	1 1	50 20	SR SR	F F	QZ PY/QZ
175.0										- Quartz veins from 174.8'-175.9', 1-10 mm±.							
175.5	3.1						1			- Bedding planes at 40°-50° from 175.2'-176.9'.	175.8-176.0	J	1	40	SR	F	QZ
176.0																	
176.5	2.5						2				176.1 176.9	J J	1 1	30 30	SR SR	F F	PY None
177.0									176.9	Strong, light gray, fine to medium SANDSTONE interlaminated with Siltstone and Graphite (1-2 mm±), slightly weathered to fresh. - Bedding planes at 30°-45°.							
177.5	4	C-34	177.3 - 182.3	-152.8 - -157.8	60 100%	59 98%	1				177.0	J	1	30	SM	SW	None
178.0																	

11. Flush return blocked at approximately 172.3'. The driller stopped the core run.

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DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES: Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
178.5	2.5						0			- Quartz veins near 177.7', 1-5 mm±. - Quartz veins near 178.1', 1 mm±. *(continued)*	-	-	-	-	-	-	-
179.0										- Quartz veins near 178.3', 1 mm±.							
179.5	2.6						0		179.2	Strong to very strong, light gray, conglomeratic SANDSTONE, massive, slightly weathered to fresh.	-	-	-	-	-	-	-
180.0										- Quartz veins from 179.6'-181.2', 1-3 mm±.							
180.5	2.6						0				-	-	-	-	-	-	-
181.0																	
181.5	4.5						2				181.2-181.5 181.3	J J	1-5 1-5	55 30	SR SR	SW SW	QZ QZ
182.0																	
182.5	3.5	C-35	182.3 - 187.3	-157.8 - -162.8	61 100%	58 97%	0				-	-	-	-	-	-	-
183.0																	
183.5	3						3			- Quartz veins from 183.4-'186.5', 1-10 mm±.	183.3-183.7 183.6 183.8	J J J	1-5 1 1-5	55 30 40	SR SR SR	SW SW SW	QZ QZ QZ
184.0																	
184.5	3.7						1				184.3	J	1-10	35	SR	SW	QZ
185.0																	
185.5	3.6						0				-	-	-	-	-	-	-
186.0																	
186.5	3.3						1				186.0-186.2	J	1-10	60	SR	SW	QZ
187.0																	
187.5	4.3	C-36	187.3 - 189.7	-162.8 - -165.2	28 96.5%	25 86%	2				187.0-187.1 187.9	J J/S	1-5 1	40 30	SR SL/SM	SW SW	QZ QZ
188.0																	
188.5	4						1				188.8-189.0	J/S	1	45	SL/SM	MW/SW	QZ/SA
189.0	2.3/5"								188.9	Moderately strong to strong, light gray, fine SANDSTONE, laminated (1 mm±), slightly weathered to fresh. - Bedding planes at 40°. - Quartz veins, 1-5 mm±.							
189.5	4.2						1				189.1-189.3	J	1	45	SR	SW	QZ
190.0		C-37	189.7 - 193.6	-165.2 - -169.1	47 100%	32 68%											
190.5	4.7						0		190.2	Strong, light gray, medium to coarse SANDSTONE interlaminated with Graphite (1 mm±), slightly weathered to fresh. - Bedding planes at 50°-60°. - Quartz veins, 1-20 mm±.	-	-	-	-	-	-	-
191.0																	
191.5	3.9						4				191.1-191.4 191.3-191.5 191.5-191.7 191.7-192.0	J/S J J/S J	1-10 1-10 1-5 1-5	55 45 45 50	SL/SR SR SR SR	SW SW SW SW	QZ QZ QZ QZ
192.0									191.6	Strong, gray, fine to medium SANDSTONE interlaminated with Graphite (1-2 mm±), slightly weathered to fresh. - Bedding planes at 30°-45°.							
192.5	4.2						4				192.0-192.2 192.0-192.3 192.5 192.8	J J J J	1-5 1-10 1-5 1	50 50 30 40	SR SR SR SR	SW SW F F	QZ QZ QZ QZ
193.0																	
193.5	4.5						3				193.1 193.6-193.7 193.7	J J J	1-4 1-2 1	25 50 30	SR SR SR	SW F F	None QZ QZ
194.0		C-38	193.6 - 196.7	-169.1 - -172.2	36 97%	35 94.5%				- Quartz veins from 193.6'-194.0', 1-6 mm±.							
194.5							0				-	-	-	-	-	-	-

12. Flush return blocked at approximately 189.7', the driller stopped the core run.
13. Flush return blocked at approximately 193.6', the driller stopped the core run.

(Continued Next Page)

Pare Corporation
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CORE BORING REPORT

BORING NUMBER B17-39

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES: Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
195.0	4.1								194.8	Strong, light gray, medium SANDSTONE, massive, fresh.							
195.5	4						0			- Quartz veins from 194.8'-195.9', 1-7 mm±.	-	-	-	-	-	-	-
196.0																	
196.5	4.1						1				196.8	J	1-20	20	SR	SW/F	QZ
197.0		C-39	196.7 - 201.3	-172.2 - -176.8	47 85%	33 60%			196.7	Strong, gray, fine SANDSTONE interlaminated with Graphite (1-2 mm±), slightly weathered to fresh.							
197.5	2.5						0			- Bedding planes at 20°-30°. - Quartz veins from 196.7'-199.3', 1-5 mm±.	-	-	-	-	-	-	-
198.0																	
198.5	2.5						2				198.3 198.6	J J	1-20 1-5	20 25	SR SR	F SW	QZ QZ
199.0																	
199.5	4						2				199.6 199.6-200.0	J J	1-25 1-5	20 75	SR SR	MW/SW F	SA/SI QZ
200.0																	
200.5	2.2						ECF (7±)				200.0 200.0-200.2 200.2-200.3 200.3-200.8	J J J ECF	1 1 1 -	10 80 50 -	SR SR SR SR	F SW SW MW/SW	QZ QZ QZ QZ
201.0							10		200.8	- Moderately strong and moderately to slightly weathered from 200.3'-200.8'.							
201.5	4.5									Lost Core. No Recovery.							
202.0		C-40	201.3 - 204.6	-176.8 - -180.1	39 98%	36 90%	1		201.3	Strong, gray, fine SANDSTONE interlaminated with Graphite (1 mm±), slightly weathered to fresh.	201.3-201.5	J	2-5	60	SR	SW	QZ
202.5	3.7						2			- Bedding planes at 30°-35°. - Quartz veins from 201.3'-204.0', 1-5 mm±.	202.1 202.5-202.7	J J	1 1	35 45	SR SR/R	SW SW	QZ QZ/SA
203.0	3.3																
203.5							0		203.3	Strong, gray, fine to medium SANDSTONE, massive, slightly weathered to fresh.	-	-	-	-	-	-	-
204.0	1.6/4"																
204.5	4.4						2			- Slightly weathered from 204.4'-204.5'.	204.4 204.5	J J	1-5 1-5	30 30	SR SR	SW SW	None None
205.0		C-41	204.6 - 208.6	-180.1 - -184.1	47 98%	31 65%			204.6	Strong, gray, fine SANDSTONE interlaminated with Siltstone and Graphite (1 mm±), fresh.							
205.5	3.3						0			- Bedding planes at - Quartz veins from 204.6'-205.0', 1-5 mm±.	-	-	-	-	-	-	-
206.0											206.0	J	1	35	SR	SW	QZ
206.5	4.2						ECF (4±)		206.3	- Quartz veins from 206.0'-206.2', 5-10 mm±.	206.2 206.3 206.5-206.8 206.7-206.9 206.7-207.0 206.8-207.0	J J J ECF J J	1 1 1-10 - 2-5 1-10	30 30 55 - 50 55	SR SR SR SM/SR SR SR	SW SW SW MW/SW SW SW	QZ QZ PY QZ/SI QZ QZ
207.0							10			Strong, gray SILTSTONE interlaminated with Graphite (1 mm±), moderately weathered to fresh.							
207.5	3.9						1			- Bedding planes at 30°-35°.	207.9	J	1	30	SR	SW	None
208.0										- Moderately to slightly weathered from 206.7'-206.9'.'							
208.5	4.5						3			- Moderately strong from 206.7'-206.9'.	208.1 208.5 208.6	J J J	1-10 1 1	15 15 10	SR SR SR	SW SW SW	QZ None None
209.0		C-42	208.6 - 213.4	-184.1 - -188.9	60 100%	60 100%											
209.5	3.5						0				-	-	-	-	-	-	-
210.0																	
210.5	3.7						0			- Quartz veins from 210.2'-211.1', 1-10 mm±.	-	-	-	-	-	-	-
211.0																	

14. Flush return blocked at approximately 196.7', the driller stopped the core run.
15. Flush return blocked at approximately 201.3', the driller stopped the core run.

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CORE BORING REPORT

BORING NUMBER B17-39

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES: Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
211.5	3.2						0		211.1	Moderately strong to strong, gray, fine to medium SANDSTONE interlaminated with Siltstone and Graphite (1-2 mm±), slightly weathered to fresh.	-	-	-	-	-	-	-
212.0										- Bedding planes at 30°-40°.							
212.5	2.6						1			- Siltstone interlaminations from 211.1'-214.0'. *(continued)*	213.9	J	1	40	SR	F	QZ
213.0																	
213.5	3.2	C-43	213.4 - 218.7	-188.9 - -194.2	63 98%	55 86%	0				-	-	-	-	-	-	-
214.0										- Quartz veins from 213.7'-215.6', 1-15 mm±.							
214.5	3.5						0			- Graphite interlaminations from 214.2'-217.8'.	-	-	-	-	-	-	-
215.0																	
215.5	3.5						0				-	-	-	-	-	-	-
216.0																	
216.5	3.6						2			- Quartz veins from 216.4'-218.0', 1-10 mm±.	217.8 217.9	J J	1-10 1	30 40	SM SR	SW SW	QZ QZ
217.0																	
217.5	3.3						ECF (4±)				218.1 218.1-218.2 218.2-218.4 218.5	J ECF J J	1-20 - 1-5 1-20	30 - 55 15	SR SR SR SR	F SW F F	None QZ QZ QZ
218.0							7				219.0	J	1	15	SR	SW	None
218.5	3.7						>10		218.2	- Moderately strong from 218.1'-218.2'.	219.0-219.2 219.1-219.3 219.3 219.6 219.7 219.8	J ECF J J J J	1 - 5-50 1-10 1-5 2-20	35 - 10 20 15 5	SR SR SR SR SR SR	SW HW/MW MW MW/SW SW SW	None QZ None QZ None QZ
219.0		C-44	218.7 - 221.8	-194.2 - -197.3	18 49%	4 11%			218.9	Strong, gray, fine to coarse SANDSTONE, massive, slightly weathered to fresh.	219.8-220.0	ECF	-	-	SR	HW/MW	QZ
219.5							N/A		219.2	- Quartz veins, 1 mm±.	220.0-220.1 220.1	ECF J	- 2-10	- 35	SR SR	HW/MW SW	QZ QZ
220.0	3.8									Strong, gray, conglomeratic SANDSTONE, massive, slightly weathered.							
220.5							N/A		220.2	Very weak to moderately strong, dark gray, fine SANDSTONE interlaminated with Graphite and Siltstone (1 mm±), highly weathered to slightly weathered.	-	-	-	-	-	-	-
221.0	4.5									- Bedding planes at 0°-20°.							
221.5							0			- Very weak from 219.2'-219.3' and 219.8'-220.1'.	-	-	-	-	-	-	-
222.0	4	C-45	221.8 - 223.7	-197.3 - -199.2	23 100%	18 78%			221.8	- Highly to moderately weathered from 219.2'-219.3' and 219.8'-220.1'.							
222.5							3			Lost Core. No Recovery.	223.2-223.4 223.5-223.7 223.8	J J J	1 1-30 1-5	40 40 25	SR SR SR	SW SW F	QZ QZ QZ
223.0	3.2									Strong, gray, conglomeratic SANDSTONE, massive, slightly weathered to fresh.							
223.5							0			- Quartz veins from 222.5'-223.2', 1-40 mm±.	-	-	-	-	-	-	-
224.0	3.1	C-46	223.7 - 228.8	-199.2 - -204.3	58 95%	54 88.5%				- Quartz veins from 223.7'-225.3', 1-15 mm±.							
224.5							0				-	-	-	-	-	-	-
225.0	3.1																
225.5							0		225.3	Strong, light gray, medium SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
226.0	3.2																
226.5							0				-	-	-	-	-	-	-
227.0	3								226.7								
227.5							2				228.0	J	1-5	15	SR	SW	QZ

16. No recovery between the depths of 220.0'-221.8'. The driller performed shorter core runs in attempt to improve core recovery.

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CORE BORING REPORT

BORING NUMBER B17-39

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS
228.0	3.6									Strong, gray, conglomeratic SANDSTONE, slightly weathered to fresh.
228.5							0		228.1	- Quartz veins from 226.7'-227.8', 1-7 mm±. *(continued)*
229.0	3.3	C-47	228.8 - 233.7	-204.3 - -209.2	59 100%	59 100%				- Quartz vein from 228.0'-228.1', 20-25 mm±.
229.5							0			Moderately strong to strong, gray, fine SANDSTONE interlaminated with Graphite (1-5 mm±), slightly weathered to fresh.
230.0	3.1									- Bedding planes at 30°-40°.
230.5							0			- Quartz veins from 228.9'-231.1', 1-20 mm±.
231.0	3									- Moderately weathered from 229.2'-229.3', near 229.6' and from 230.6'-231.0'.
231.5							0		231.3	- Moderately weathered near 229.6'.
232.0	2.4									- Moderately strong near 229.6'.
232.5							0			- Moderately weathered from 230.6'-231.0'.
233.0	2.5									- Moderately strong from 230.6'-231.0'.
233.5										Strong, gray, medium SANDSTONE interlaminated with Siltstone (1-2 mm±) to massive, fresh.
234.0										- Quartz veins from 231.9'-233.5', 1-10 mm±.
234.5										- Bedding planes at 30°-40° from 232.3'-233.7'.
235.0										**Bottom of borehole at 233.7 feet.**
235.5										
236.0										
236.5										
237.0										
237.5										
238.0										
238.5										
239.0										
239.5										
240.0										
240.5										
241.0										
241.5										
242.0										
242.5										
243.0										
243.5										
244.0										

DISCONTINUITIES						
Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
228.2	J	1-5	40	SM	SW	QZ
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-

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BORING NUMBER B17-40

TEST BORING REPORT

PROJECT NAME Narragansett Bay Commission Phase III CSO Program
CLIENT NBC/Stantec
CONTRACTOR New England Boring Contractors, Inc.

PROJECT NO. 13:308.00D/14106.02
START 5/11/2018
FINISH 5/11/2018
DRILLER NEBC
LOGGED BY HMS
CHECKED BY SJM
ELEVATION 33.3 **NORTHING** 289232.91
DATUM NGVD 1929 **EASTING** 359692.649
LOCATION Main Street at Roosevelt

	CASING	SAMPLER	BARREL	DRILLING EQUIPMENT & PROCEDURES
Type	Steel	Split Spoon	HQ3	**Rig Make & Model:** Mobile B-53
Inside Diameter (in.)	5	1 3/8	2 3/8	**Bit Type:** 4 7/8" Tricone
Hammer Weight (lb.)	140	140	N/A	**Drill Fluid:** Water
Hammer Fall (in.)	30	30	N/A	**Casing:** 5"
				Hoist/Hammer: Automatic Hammer

DEPTH (ft)	ELEVATION (ft)	CASING BLOWS	SPT	SAMPLE NO.	REC (in) / PEN (in)	SAMPLE DEPTH (ft)	USCS SYMBOL	GRAPHIC LOG	VISUAL-MANUAL IDENTIFICATION & DESCRIPTION (Density/consistency, color, max. particle size, structure, odor, moisture, optional descriptions, geologic interpretation)	DRILLING NOTES
0	33.3									
		X							6" Pavement	
		X	43-12-11-7 (23)	S-1	4 / 24	0.5 - 2.5	SM		Moist, medium dense, fine to coarse SAND, some fine gravel, little silt, trace coarse gravel.	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (2) VOAs.
		X								
		X	10-9-10-10 (19)	S-2	10 / 24	2.5 - 4.5	SW		Moist, medium dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt.	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (2) VOAs.
5	28.3	X								
		X	9-8-29 (37)	S-3	17 / 18	4.5 - 6	SW		Moist, dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt.	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (2) VOAs.
		X	33-21-44-31 (65)	S-4	16 / 24	6 - 8	GW-GM		Moist, very dense, brown, fine to coarse GRAVEL, some fine to coarse sand, trace silt.	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (2) VOAs.
		X								
		X	31-17-18-10 (35)	S-5	15 / 24	8 - 10	GW-GM		Moist/wet, dense, brown, fine to coarse GRAVEL, some fine to coarse sand, trace silt.	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (2) VOAs.Water level at approximately 9.5'.
10	23.3	X								
		X	13-17-14-13 (31)	S-6	10 / 24	10 - 12	GW		Wet, dense, brown, coarse GRAVEL, some fine to coarse sand, little fine gravel, trace silt.	
		X	6-5-17-48 (22)	S-7	9 / 24	12 - 14	SM		Wet, medium dense, brown, fine to coarse SAND, some fine gravel, little silt, trace coarse gravel.	PID = 0.0 ppm
			105	S-8	4 / 8	14 - 14.2			Wet, very dense, gray, weathered SANDSTONE recovered as fine to coarse gravel, little fine to coarse sand, trace silt.	PID = 0.0 ppm Obstruction/possible Bedrock at 14'.

Bottom of borehole at 14.20 feet.

WATER LEVEL DATA			
	DEPTH (ft.) TO:		
DATE/TIME	BOTTOM OF CASING	BOTTOM OF HOLE	WATER

SAMPLE IDENTIFICATION
O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

REMARKS:
1. "X" within casing blows indicates blows were not counted at that interval.

Pare Corporation
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BORING NUMBER B17-40

CORE BORING REPORT

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
10.0									14.2	Weathered Rock - No Sample Taken							
15.0	3	C-1	14.6 - 17.4	18.7 - 15.9	34 100%	26.5 78%			14.6	Strong, gray, conglomeratic SANDSTONE, massive, fresh. - Quartz vein at 16.7', 15 mm±. - 'Vuggy'1-3 mm ± diameter at 16.6'-16.7'.							
	4						2				15.4 15.7	J J	1 1	30 50	R R	F SW	None Fe
	3.25						2				16.5 16.9	J J	1-10 1	60 30	SR SR	SW SW	Fe Fe
17.5	5.5	C-2	17.4 - 20.6	15.9 - 12.7	38 100%	23 61%	3		16.7	Strong, gray, fine to coarse SANDSTONE, bedded 10-20 mm± to massive, fresh. - Bedding planes at 30°-40°. - Quartz vein at 18.1', 15 mm±.	17.2 17.6 17.9	B J B	1 5 1	30 40 30	SR VR R	SW F F	Fe/QZ None QZ
	3						1				18.5	B	1	30	SR	F	None
19.5	2.75						4				19.2 19.3 19.7 19.9	B J J B	1 10 1 1	30 25 25 30	SR R R SR	SW SW/RS SW SW	Fe SI Fe Fe
20.6										**Bottom of borehole at 20.6 feet.**							

REMARKS:
1. Dip angles are measured from horizontal (i.e., perpendicular to the core axis).
2. Flush return blocked at ~17.6'. Driller moved casing up and down to unblock.
3. Boring was backfilled with cement bentonite grout from 20.6 feet to the ground surface. No groundwater monitoring well was installed.

WATER LEVEL DATA

DATE/TIME	BOT. OF SOIL CASING (ft)	BOT. OF HOLE (ft)	WATER

GROUND SURFACE EL. 33.3

Note: Refer to the key sheets within the Geotechnical Design Report for the description of rock classification system codes.

Pare Corporation
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BORING NUMBER B17-41

TEST BORING REPORT

PROJECT NAME Narragansett Bay Commission Phase III CSO Program
CLIENT NBC/Stantec
CONTRACTOR New England Boring Contractors, Inc.

PROJECT NO. 13:308.00D/14106.02
START 5/3/2018
FINISH 5/4/2018
DRILLER NEBC
LOGGED BY HMS
CHECKED BY SJM
ELEVATION 12.8 **NORTHING** 287414.433
DATUM NGVD 1929 **EASTING** 359504.663
LOCATION Taft Street near Division Street Bridge

	CASING	SAMPLER	BARREL
Type	Steel	Split Spoon	HQ3
Inside Diameter (in.)	4	1 3/8	2 3/8
Hammer Weight (lb.)	140	140	N/A
Hammer Fall (in.)	30	30	N/A

DRILLING EQUIPMENT & PROCEDURES
Rig Make & Model: Mobile B-53
Bit Type: 3 7/8" Tricone
Drill Fluid: Water
Casing: 4"
Hoist/Hammer: Automatic Hammer

DEPTH (ft)	ELEVATION (ft)	CASING BLOWS	SPT	SAMPLE NO.	REC (in) / PEN (in)	SAMPLE DEPTH (ft)	USCS SYMBOL	GRAPHIC LOG	VISUAL-MANUAL IDENTIFICATION & DESCRIPTION (Density/consistency, color, max. particle size, structure, odor, moisture, optional descriptions, geologic interpretation)	DRILLING NOTES
0	12.8									
		X							Approximately 9" Pavement.	9" PAVEMENT
		10	9-10-12-72 (22)	S-1	15 / 24	0.75 - 2.75	SW-SM		A: Wet, medium dense, brown, fine to coarse SAND and fine to coarse GRAVEL, little silt. B: Wet, very dense, purple/brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt.	1A: PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (2) VOAs.
		18								
		146		S-2	0 / 6	2.75 - 3.25			No Recovery.	1B: PID = 0.0 ppm
		97								
5	7.8	X	28-9-7-3 (16)	S-3	8 / 24	4 - 6	GW		Wet, medium dense, purple/brown, fine to coarse GRAVEL, some fine to coarse sand, trace silt.	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (2) VOAs.
		X								
		X	3-3-4-7 (7)	S-4	5 / 24	6 - 8	GW		Wet, loose, brown, coarse GRAVEL, some fine gravel, little fine to coarse sand, trace silt.	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (2) VOAs.
		X								
		X	3-2-7-17 (9)	S-5	5 / 24	8 - 10	SW-SM		Wet, loose, brown, fine to coarse SAND and fine coarse GRAVEL, little silt.	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (2) VOAs.
10	2.8	X								
		X	6-3-8-19 (11)	S-6	3 / 24	10 - 12	GW		Wet, medium dense, brown, coarse GRAVEL, little fine to coarse sand, trace silt, trace fine gravel.	PID = 0.0 ppm
		X	14-10-16-18 (26)	S-7	13 / 24	12 - 14	GW-GM		Wet, medium dense, brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt.	PID = 0.0 ppm
		X								
15	-2.2	X	22-23-33-39 (56)	S-8	11 / 24	14 - 16	GW		Wet, very dense, tan/gray, fine to coarse GRAVEL, little fine to coarse sand, trace silt, trace clay. (Possible weathered Sandstone)	PID = 0.0 ppm
		X								
			27-56-87-51 (143)	S-9	19 / 24	16 - 18	SW		A: Wet, very dense, gray, fine to coarse SAND, some fine gravel, trace silt, trace coarse gravel. B: Wet, very dense, gray, fine to coarse GRAVEL and fine to coarse SAND, little silt. (Possible weathered Sandstone)	PID = 0.0 ppm
			103/4"	S-10	2 / 4	18 - 18.3			Wet, very dense, gray, weathered SANDSTONE recovered as fine to coarse gravel, trace fine to coarse sand, trace silt.	PID = 0.0 ppm

Bottom of borehole at 18.30 feet.

WATER LEVEL DATA

DATE/TIME	DEPTH (ft.) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER

SAMPLE IDENTIFICATION
O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

REMARKS:
1. No casing blows for the first foot. NEBC set and reset casing to make sure casing was plum.
2. Used 140 lb. hammer for casing blows from 2'-4'.
3. Starting at 4', NEBC used the kelly and weight of the drilling to advance casing.
4. NEBC determined weathered bedrock began at approximately 18.3'. NEBC advanced roller bit to competent rock at approximately 21.1'.
5. "X" within casing blows indicates blows were not counted at that interval.

TEST BORING REPORT - GINT STD US LAB.GDT - 8/6/19 11:11 - Y:\JOBS\14 JOBS\14106.02 NBC PHASE III CSO CER-RI\PHASE III FIELD WORK\BORING LOGS\14106.02 BORING LOGS.GPJ

Pare Corporation
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CORE BORING REPORT

BORING NUMBER B17-41

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
15.0																	
15.5																	
16.0																	
16.5																	
17.0																	
17.5																	
18.0																	
18.5										Weathered Rock - No Sample Taken							
19.0																	
19.5																	
20.0																	
20.5																	
21.0																	
21.5	2.5	C-1	21.1 - 25	-8.3 - -12.2	47 100%	37 79%	1		21.1	Strong, gray, conglomeratic SANDSTONE, massive, fresh. - Quartz vein at 21.5', 5 mm±. - Quartz vein at 22.1', 3 mm±. - Quartz vein at 22.2', 2 mm±.	21.3	J	1	45	SR	F	None
22.0	4.75																
22.5							3				22.0 22.5 22.7	J J J	1 1 1	55 45 45	R SM SM	SW F F	Fe None None
23.0	2.5								23.0								
23.5	2.75						1			Strong, gray/blue, fine to coarse SANDSTONE interlaminated with Siltstone, fresh. - Bedding planes at 40°-50°.	23.3	B	1	45	SM	F	None
24.0																	
24.5	1.5						ECF (4±)				24.0 24.2 24.7 24.8-24.9	B B B ECF	1 1 1 -	45 40 45 -	SR SM SR SR	F SW SW SW	None Fe Sl Fe
25.0							7										
25.5										**Bottom of borehole at 25.0 feet.**							
26.0																	
26.5																	
27.0																	
27.5																	
28.0																	
28.5																	
29.0																	
29.5																	
30.0																	

REMARKS:
1. Dip angles are measured from horizontal (i.e., perpendicular to the core axis).
2. Wash color white.
3. Flush return blocked at approximately 22.8'. Driller moved casing up and down to unblock.
4. Boring was backfilled with cement bentonite grout from 25.0 feet to the ground surface. No groundwater monitoring well was installed.

WATER LEVEL DATA

DATE/TIME	BOT. OF SOIL CASING (ft)	BOT. OF HOLE (ft)	WATER

GROUND SURFACE EL. 12.8

Note: Refer to the key sheets within the Geotechnical Design Report for the description of rock classification system codes.

Pare Corporation
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BORING NUMBER B17-45

TEST BORING REPORT

PROJECT NAME Narragansett Bay Commission Phase III CSO Program
CLIENT NBC/Stantec
CONTRACTOR New England Boring Contractors, Inc.

PROJECT NO. 13:308.00D/14106.02
START 4/2/2019
FINISH 4/2/2019
DRILLER NEBC
LOGGED BY JPN
CHECKED BY RKM/SJM

	CASING	SAMPLER	BARREL
Type	Steel	Split Spoon	NX
Inside Diameter (in.)	4	1 3/8	1 7/8
Hammer Weight (lb.)	300	140	N/A
Hammer Fall (in.)	30	30	N/A

DRILLING EQUIPMENT & PROCEDURES
Rig Make & Model: Diedrich D-120
Bit Type: 3 7/8" Tricone
Drill Fluid: Water
Casing: 4"
Hoist/Hammer: Automatic/Safety Hammer

ELEVATION 28.4 **NORTHING** 288479.475
DATUM NGVD 1929 **EASTING** 359446.389
LOCATION Jenks Way

DEPTH (ft)	ELEVATION (ft)	CASING BLOWS	SPT	SAMPLE NO.	REC (in) / PEN (in)	SAMPLE DEPTH (ft)	USCS SYMBOL	GRAPHIC LOG	VISUAL-MANUAL IDENTIFICATION & DESCRIPTION (Density/consistency, color, max. particle size, structure, odor, moisture, optional descriptions, geologic interpretation)	DRILLING NOTES
0	28.4									
		X							9" Asphalt.	9" ASPHALT
		35	16-11-6/3"	S-1	10 / 15	0.75 - 2	SW		Moist, medium dense, brown, fine to coarse SAND, trace fine gravel, trace silt. (FILL)	PID = 0 ppm Environmental sample taken. (1) 8 oz. Amber, (1) 2 oz. Amber, (3) VOAs.
		25	10-21-11-6 (32)	S-2	13.5 / 24	2 - 4	SP-SM		Moist, dense, brown, fine to medium SAND, little coarse sand, little silt, little fine gravel. (FILL)	PID = 0 ppm Environmental sample taken. (1) 8 oz. Amber, (1) 2 oz. Amber, (3) VOAs.
		31								
5	23.4	20	5-5-3-5 (8)	S-3	4 / 24	4 - 6	SW-SM		Wet, loose, brown, fine to coarse SAND, some silt, little fine gravel. (FILL)	PID = 0 ppm (4'-6') Driller pushed sample 1'±. Composite environmental sample taken (4'-8'). (1) 8 oz. Amber, (1) 2 oz. Amber, (3) VOAs.
		11								
		11	20-10-5-3 (15)	S-4	5 / 24	6 - 8	SP-SM		Wet, medium dense, brown to gray, fine SAND and SILT, trace medium to coarse sand, little fine to coarse gravel. (FILL)	PID = 0.3 ppm (6'-8') Casing sunk with spoon blows.
		X								
		100	2-3-4-2 (7)	S-5	9 / 24	8 - 10	SW-SM		Wet, loose, brown to gray, fine to coarse SAND, little silt, some fine to coarse gravel, trace glass. (FILL)	PID = 0 ppm (8'-10') Composite environmental sample taken (8'-12'). (1) 8 oz. Amber, (1) 2 oz. Amber, (3) VOAs.
10	18.4	4								
		7	3-2-6-40 (8)	S-6	7 / 24	10 - 12	GP		Wet, loose, brown to gray, fine to coarse GRAVEL and fine to coarse SAND, trace ceramic, trace silt. (FILL)	PID = 0 ppm (10'-12')
		11								
		X	14-11-7-7 (18)	S-7	12 / 24	12 - 14	GW-GM		Wet, medium dense, brown to gray, fine to coarse GRAVEL and fine to coarse SAND, trace silt.	PID = 0 ppm Environmental sample taken. (1) 8 oz. Amber, (1) 2 oz. Amber, (3) VOAs.
		X								
15	13.4	11	0-2-3-9 (5)	S-8	9 / 24	14 - 16	SW-SM		Wet, loose, brown to gray SAND, some silt, little fine to coarse gravel.	PID = 0 ppm
		80								
		95	6-6-7-4 (13)	S-9	16 / 24	16 - 18	SP-SM SP		9A: Bottom 8": Wet, medium dense, brown, fine to coarse SAND, little silt, trace fine to coarse gravel. 9B: Top 8": Wet, medium dense, brown to gray, fine to coarse SAND, some silt, some fine to coarse gravel.	PID = 0 ppm
		83								
		108	23-35-28-18 (63)	S-10	12 / 24	18 - 20	GW-GM		Moist, very dense, brown to gray, fine to coarse GRAVEL, some fine to coarse sand, little silt.	PID = 0 ppm
20	8.4	70								
		70	22-21-18-17 (39)	S-11	19 / 24	20 - 22	SW-SM		11A: Top 7": Wet, dense, brown to gray, fine to coarse SAND, little fine to coarse gravel, trace silt. 11B: Bottom 12": Wet, dense, brown to gray, fine to coarse SAND, some silt, little fine to coarse gravel.	PID = 0 ppm
		84								
		96	25-49-79-105 (128)	S-12	24 / 24	22 - 24	SM		Wet, very dense, reddish brown/gray, fine to coarse SAND, some fine gravel, little silt.	PID = 0 ppm
		99								
25	3.4	76	60-57-		15	24			Wet, very dense, reddish brown/gray, fine to coarse SAND and SILT, little fine to coarse gravel.	

WATER LEVEL DATA

DATE/TIME	DEPTH (ft.) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER

SAMPLE IDENTIFICATION
O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

REMARKS:
1. Boring was backfilled with cement bentonite grout from the bottom of the borehole to a depth of 4'. The borehole was backfilled to the surface with 3 bags of bentonite chips, one 50 lb. bag of dry concrete mix, and 10"± of asphalt patch.

(Continued Next Page)

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BORING NUMBER B17-45

TEST BORING REPORT

DEPTH (ft)	ELEVATION (ft)	CASING BLOWS	SPT	SAMPLE NO.	REC (in) / PEN (in)	SAMPLE DEPTH (ft)	USCS SYMBOL	GRAPHIC LOG	VISUAL-MANUAL IDENTIFICATION & DESCRIPTION (Density/consistency, color, max. particle size, structure, odor, moisture, optional descriptions, geologic interpretation)	DRILLING NOTES
25	3.4									
		136	44-36 (101)	S-13	/ 24	- 26	SM			PID = 0 ppm
			200/1"	S-14	4 / 1	26 - 26.1	SW-SM		Wet, very dense, gray to brown, medium to coarse SAND, some silt, little fine sand, trace fine gravel.	PID = 0 ppm
				S-15	/	26.1 - 28.3			Rollerbit refusal.	

Bottom of borehole at 28.30 feet.

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CORE BORING REPORT

BORING NUMBER B17-45

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES: Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
25.0																	
25.5																	
26.0																	
26.5																	
27.0																	
27.5										See Test Boring Report	-	-	-	-	-	-	-
28.0											28.4-28.6	J	1-2	60	SM	F	None
28.5	5.3	C-1	28.3 - 32.8	0.1 - -4.4	54 100%	27 50%	N/A		28.3	Strong, purple, fine to medium SANDSTONE, massive, slightly weathered to fresh.	28.5	J	1-2	25	SM/SR	F	None
29.0											28.7	J	3-7	33	SR	SW	None
29.5	6.5						2			- Quartz vein near 28.6'. - Orthogonal joints near 28.7' and 28.9'.	28.7	J	3-7	30	SR	SW	None
30.0											28.9	J	1-3	20	SR/R	F	None
30.5	6.6						3				28.9	J	1-3	45	SM	F	None
31.0	5.2								30.5	Strong, purple/gray, conglomeratic SANDSTONE, laminated (1-5 mm±), slightly weathered to fresh. - Bedding planes at 40°. - Orthogonal joints near 31.1'.	29.4-29.5	J	1-3	45	SR	F	None
31.5							6				29.9	J	1-3	40	SM	F	None
32.0	5.6										30.1	J	1-3	40	SM	F	None
32.5							3		32.0	Strong, purple, fine to medium SANDSTONE, laminated (<1 mm±), slightly weathered to fresh. - Bedding planes at 30°.	30.2	J	1-4	30	SM/SR	F	None
33.0	7.5	C-2	32.8 - 37.5	-4.4 - -9.1	57 100%	51 91%					30.7	B	1-3	35	SM/SR	SW/F	None
33.5							4				31.1	J	1-5	20	SR	F	None
34.0	5.3										31.1	J	1-3	40	SM	F	None
34.5							0			- Orthogonal joints near 33.9'. - Quartz veins from 33.9'-34.1', 4 mm±.	31.3	J	1-10	45	SM	F	QZ
35.0	4.6										31.6	B	1-5	40	SM/SR	SW	QZ
35.5	5						1				31.7	B	1-3	30	SM/SR	SW	QZ
36.0											31.9	J	1-5	20	SR	SW	QZ
36.5	5						2				32.1	B	1-2	40	SM/SR	SW/F	None
37.0									36.7		32.2	B	1-2	40	SM	SW	None
37.5	5.75	C-3	37.5 - 42.4	-9.1 - -14.0	59 100%	53 94%	3		36.8	Strong, purple/gray, conglomeratic SANDSTONE, massive, fresh. Strong, purple/gray, medium SANDSTONE, massive, slightly weathered to fresh.	32.6	J	1-3	21	SM	F	None
38.0											33.0	B	1	30	SM	F	None
38.5	5.6						2				33.5	B	1-3	30	SM	F	None
39.0											33.9	J	1-5	25	SR	SW	None
39.5	5						2				33.9	B	1-10	30	SR	SW/F	QZ
40.0									39.7		35.3-35.4	J	1-5	45	SM	SW	None
											36.0	B	1-3	30	SM	SW	None
											36.7	B	1-4	30	SM	F	None
											37.4	J	1	20	SM	F	None
											37.7-37.9	J	1-6	60	SM/SR	F	QZ
											37.8-37.9	J/S	1-5	50	SL/SR	SW	QZ
											38.6	J	1-3	40	SM	F	Fe
											38.6-38.8	J	1-3	50	SM	SW	None
											39.7	J	1-2	20	SR	SW	None
											39.7-39.9	J	1	50	SR/R	F	None

REMARKS:
1. Dip angles are measured from horizontal (i.e., perpendicular to the core axis).

WATER LEVEL DATA

DATE/TIME	BOT. OF SOIL CASING (ft)	BOT. OF HOLE (ft)	WATER

GROUND SURFACE EL. 28.4

Note: Refer to the key sheets within the Geotechnical Design Report for the description of rock classification system codes.

(Continued Next Page)

Pare Corporation
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CORE BORING REPORT

BORING NUMBER B17-45

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
40.0																	
40.5	5.5						0			Strong, purple, fine SANDSTONE, laminated to massive, slightly weathered to fresh. -Bedding planes at 30° from 41.3'-41.7'. *(continued)*	-	-	-	-	-	-	-
41.0																	
41.5	5.2						ECF (7±)			- Laminated from 41.3'-41.7', 1-2 mm±.	41.7 41.7-42.0 41.9-42.0 41.95-42.0	J ECF J J	1-5 - 1-3 1-3	15 - 60 65	SR SR SR SR	SW SW SW SW	None QZ None None
42.0							10										
42.5	3	C-4	42.4 - 47.4	-14.0 - -19.0	60 100%	48 80%	1		42.0	Transitioning to strong, purple/gray, conglomeratic SANDSTONE, massive, fresh.	42.0-42.2	J	1-3	65	SR	SW	None
43.0																	
43.5	3						2				43.3 43.9	J J	1 1	30 30	SR/R SM	SW/F SW	None None
44.0																	
44.5	2.9						0				-	-	-	-	-	-	-
45.0										- Orthogonal joints near 45.1'.							
45.5	3						3		45.4	Strong, purple to purple/gray, medium SANDSTONE interlaminated with fine Sandstone (1 mm±), slightly weathered to fresh. - Bedding planes at 30°-50°.	45.0 45.1-45.2 45.6	J J B	1-2 1-2 1	30 50 40	SR SR SR	SW/F SW/F SW	None QZ None
46.0																	
46.5	3						5				46.2 46.4-46.6 46.7-46.9 46.8-47.0 46.9-47.0	J B J J J	1-10 1-5 1-2 1 1-5	40 50 60 60 80	SM SM SM SM SR/R	SW SW SW/F F SW/F	None QZ None None None
47.0																	
47.5							ECF (6±)			- Orthogonal joints near 47.0'.	47.0-47.4 47.1 47.2 47.2-47.4	J J J ECF	1-5 1 1 -	80 20 30 -	SR/R SM SM SM	SW/F F SW SW	None None None QZ
48.0							9			**Bottom of borehole at 47.4 feet.**							
48.5																	
49.0																	
49.5																	
50.0																	
50.5																	
51.0																	
51.5																	
52.0																	
52.5																	
53.0																	
53.5																	
54.0																	
54.5																	
55.0																	
55.5																	
56.0																	

2. Boring was backfilled with cement-bentonite grout from the bottom of the boring to the ground surface. No groundwater monitoring well was installed.

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BORING NUMBER B17-46

TEST BORING REPORT

PROJECT NAME Narragansett Bay Commission Phase III CSO Program
CLIENT NBC/Stantec
CONTRACTOR New England Boring Contractors, Inc.

PROJECT NO. 13:308.00D/14106.02
START 4/3/2019
FINISH 4/4/2019
DRILLER NEBC
LOGGED BY JPN
CHECKED BY RKM/SJM
ELEVATION 31.1 **NORTHING** 288470.367
DATUM NGVD 1929 **EASTING** 359386.873
LOCATION Jenks Way

	CASING	SAMPLER	BARREL	DRILLING EQUIPMENT & PROCEDURES
Type	Steel	Split Spoon	NX	**Rig Make & Model:** Diedrich D-120
Inside Diameter (in.)	4	1 3/8	1 7/8	**Bit Type:** 3 7/8" Tricone Bit
Hammer Weight (lb.)	300	140	N/A	**Drill Fluid:** Water
Hammer Fall (in.)	30	30	N/A	**Casing:** 4"
				Hoist/Hammer: Automatic/Safety Hammer

DEPTH (ft)	ELEVATION (ft)	CASING BLOWS	SPT	SAMPLE NO.	REC (in) / PEN (in)	SAMPLE DEPTH (ft)	USCS SYMBOL	GRAPHIC LOG	VISUAL-MANUAL IDENTIFICATION & DESCRIPTION (Density/consistency, color, max. particle size, structure, odor, moisture, optional descriptions, geologic interpretation)	DRILLING NOTES
0	31.1									
		X							10" Asphalt. (FILL)	10" ASPHALT
		24	14-25	S-1	10 / 12	1 - 2	SW		Wet, medium dense, brown, medium to coarse SAND, some fine to coarse gravel, little fine sand. (FILL)	PID = 0.1 ppm (1'-2') Composite environmental sample taken 1'-4'. (1) 8 oz. Amber, (1) 4 oz. Amber, VOAs.
		54	12-24-24-25 (48)	S-2	15 / 24	2 - 4	SW		Wet, dense, brown, medium to coarse SAND, some fine to coarse gravel, little fine sand, trace silt. (FILL)	PID = 0.1 ppm (2'-4')
		36								
5	26.1	23	10-7-7-6 (14)	S-3	15 / 24	4 - 6	SP-SM		Wet, medium dense, brown, fine to medium SAND and SILT, trace fine gravel. (FILL)	PID = 0 ppm Environmental sample taken. (1) 8 oz. Amber, (1) 4 oz. Amber, VOAs.
		15								
		43	3-2-3-23 (5)	S-4	9 / 24	6 - 8	SW		Wet, loose, brown, fine to coarse SAND, some fine to coarse gravel, trace silt. (FILL)	PID = 0 ppm Environmental sample taken. (1) 8 oz. Amber, (1) 4 oz. Amber, VOAs.
		28								
		29	6-3-2-3 (5)	S-5	12 / 24	8 - 10	SP-SM		Wet, loose, brown, fine to coarse SAND, some silt, little fine to coarse gravel, trace ceramic pieces, trace brick. (FILL)	PID = 0 ppm Environmental sample taken. (1) 8 oz. Amber, (1) 4 oz. Amber, VOAs.
10	21.1	27								
		X	3-3-5-100/5"	S-6	18 / 23	10 - 11.9	SW		Wet, loose, brown, fine to coarse SAND and fine GRAVEL. (FILL)	PID = 0 ppm Environmental sample taken. (1) 8 oz. Amber, (1) 4 oz. Amber, VOAs.
		46/0"								
		N/A							OBSTRUCTION	Unmarked 30" sewer (RCP).
		N/A								
15	16.1	N/A								
		N/A	18-28-28-21/5"	S-7	5 / 23	15.1 - 17	SP		Wet, very dense, brown, fine to medium SAND, trace fine gravel, trace coarse sand.	PID = 0 ppm
		N/A								

Bottom of borehole at 17.00 feet.

WATER LEVEL DATA			
	DEPTH (ft.) TO:		
DATE/TIME	BOTTOM OF CASING	BOTTOM OF HOLE	WATER

SAMPLE IDENTIFICATION
O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

REMARKS:
1. Spoon refusal at approximately 11.9'.
2. Bottom of casing was at approximately 11.9' at the end of day 4/3/19.
3. Driller cored from 11.9'-12.1' in 2.5 minutes.
4. Depth to the inside bottom of the obstruction is approximately 14.9'. Driller cored from 14.9'-15.1' in 5 minutes.
5. "X" within casing blows indicates blows were not counted at that interval.
6. NEBC backfilled the boring with two 50 lb. bags of bentonite chips from 11'± to near the ground surface. Approximately 2 gallons of cement grout were added at the surface.

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BORING NUMBER B17-46A

TEST BORING REPORT

PROJECT NAME Narragansett Bay Commission Phase III CSO Program
CLIENT NBC/Stantec
CONTRACTOR New England Boring Contractors, Inc.

PROJECT NO. 13:308.00D/14106.02
START 5/17/2019
FINISH 5/18/2019
DRILLER NEBC
LOGGED BY MLP
CHECKED BY SJM
ELEVATION 30.9 **NORTHING** 288472.737
DATUM NGVD 1929 **EASTING** 359387.178
LOCATION Jenks Way (2.5' north of B17-46)

	CASING	SAMPLER	BARREL
Type	Steel	Split Spoon	HQ3
Inside Diameter (in.)	4	1 3/8	2 3/8
Hammer Weight (lb.)	140	140	N/A
Hammer Fall (in.)	30	30	N/A

DRILLING EQUIPMENT & PROCEDURES
Rig Make & Model: Mobile B-53
Bit Type: 3 7/8" Tricone
Drill Fluid: Water
Casing: 4"
Hoist/Hammer: Automatic Hammer

DEPTH (ft)	ELEVATION (ft)	CASING BLOWS	SPT	SAMPLE NO.	REC (in) / PEN (in)	SAMPLE DEPTH (ft)	USCS SYMBOL	GRAPHIC LOG	VISUAL-MANUAL IDENTIFICATION & DESCRIPTION (Density/consistency, color, max. particle size, structure, odor, moisture, optional descriptions, geologic interpretation)	DRILLING NOTES
0	30.9									
		X							Hand excavated for the first 5' due to concerns over underground utilities. No soil samples were taken.	PID = 0.3 ppm Environmental sample was taken from the sidewall between 0'-1.5'. (1) 8 oz. Amber, (1) 2 oz. Amber, (3) VOAs.
		X								
		X								
		X								PID = 0.2 ppm Environmental sample was taken from the sidewall between 1.5'-3'. (1) 8 oz. Amber, (1) 2 oz. Amber, (3) VOAs.
5	25.9	X								
		X	4-4-3-5 (7)	S-1	13 / 24	5 - 7	SW		Moist, loose, brown, fine to coarse SAND, trace fine to coarse gravel, little silt. (FILL)	PID = 0.3 ppm Environmental sample taken. (1) 8 oz. Amber, (1) 2 oz. Amber, (3) VOAs.
		X								
		13	4-5-3-5 (8)	S-2	5 / 24	7 - 9	SP		Wet, loose, light brown, fine to medium SAND, trace coarse sand, trace fine gravel, trace silt. (FILL)	PID = 0.3 ppm (7'-9') Composite environmental sample taken (7'-13'). (1) 8 oz. Amber, (1) 2 oz. Amber, (3) VOAs.
		11								
10	20.9	X	6-4-2-2 (6)	S-3	1 / 24	9 - 11	SP		Wet, loose, light brown, fine to coarse SAND, trace coarse sand, trace fine gravel, trace silt. (FILL)	PID = 0.3 ppm (9'-11)
		20								
		21	2-2-3-2 (5)	S-4	7 / 24	11 - 13	SP-SM		Wet, loose, light brown, fine to coarse SAND and fine to coarse GRAVEL, little silt, trace brick. (FILL)	PID = 0.3 ppm (11'-13')
		36								
		X	3-2-5-5 (7)	S-5	13 / 24	13 - 15	ML		Wet, medium, dark brown/black SILT, some fine to coarse sand, some fine to coarse gravel, trace glass, trace plastic. (FILL)	PID = 0.4 ppm Environmental sample taken. (1) 8 oz. Amber, (1) 2 oz. Amber, (3) VOAs.
15	15.9	X								
		X	19-14-28-19 (42)	S-6	12 / 24	15 - 17	SW		Wet, dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt.	PID = 0.7 ppm
		151								
		33*	12-10-21-23 (31)	S-7	14 / 24	17 - 19	GM		Wet, dense, brown/orange, fine to coarse GRAVEL, some fine to coarse sand, some silt.	PID = 0.5 ppm
		40*								
20	10.9	X	26-18-21-16 (39)	S-8	7 / 24	19 - 21	GW		Wet, dense, brown, fine to coarse GRAVEL, little fine to coarse sand, trace silt.	PID = 0.1 ppm
		X								
		62*	18-24-17-13 (41)	S-9	10 / 24	21 - 23	GW		Wet, dense, brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt.	PID = 0.0 ppm
		X								
		59/3"		S-10	3 / 3	23 - 23.3	GP		Weathered SANDSTONE recovered as wet, very dense, brown, fine to medium SAND and coarse GRAVEL, little silt, sandstone in tip.	SPT Refusal at 23.3'.

Bottom of borehole at 23.30 feet.

WATER LEVEL DATA

DATE/TIME	DEPTH (ft.) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER

SAMPLE IDENTIFICATION
O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

REMARKS:
1. Elevation is based on milled pavement.
2. "X" within casing blows indicates blows were not counted at that interval.
3. Driller spun casing from 5'-7', 13'-16', and 19'-21'.
4. *Driller advanced the rollerbit ahead of the casing.
5. Boring was backfilled on 5/18/19 with cement bentonite grout from the bottom of the borehole to the ground surface.

TEST BORING REPORT - GINT STD US LAB.GDT - 8/6/19 11:11 - Y:\JOBS\14 JOBS\14106.02 NBC PHASE III CSO CER-RI\PHASE III FIELD WORK\BORING LOGS\14106.02 BORING LOGS.GPJ

Pare Corporation
10 Lincoln Road, Suite 210
Foxboro, MA 02035
T: 508-543-1755
F: 508-543-1881

BORING NUMBER B17-46A

CORE BORING REPORT

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES						
											Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
20.0																	
20.5										See Test Boring Report							
21.0																	
21.5																	
22.0																	
22.5																	
23.0																	
23.5	3.2	C-1	23.3 - 26.4	7.6 - 4.5	29.5 80%	21.5 58%	N/A		23.3	Strong, gray, conglomeratic SANDSTONE, massive, slightly weathered to fresh.	23.8	J	1-3	15	SR	SW	Fe
24.0									23.8	Lost Core. No Recovery.							
24.5	4						N/A		24.4	Strong, gray to light purple, fine to medium SANDSTONE, laminated (1-5 mm±) and massive, slightly weathered to fresh.	24.4-24.5 24.5 24.6 24.8	ECF J J J	- 1-3 0-1 1	- 30 40 30	SR SM SM/SL SR	SW SW SW SW	Fe Fe Fe Fe
25.0																	
25.5	3						0			- Bedding planes at 40°-50°.	-	-	-	-	-	-	-
26.0										- Orthogonal joints near 24.7'.							
26.5	3.5	C-2	26.4 - 31.4	4.5 - -0.5	60 100%	60 100%	1			- Conglomeratic Sandstone interbedded near 24.9', 2-4 cm±.	26.1	J	1-2	25	SR	SW	None
27.0																	
27.5	3.5						1		27.3	Very strong, gray, conglomeratic SANDSTONE, massive, fresh.	27.0	J	1	40	SM/SR	SW	Fe
28.0																	
28.5	4.7						0				-	-	-	-	-	-	-
29.0																	
29.5	3.7						0				-	-	-	-	-	-	-
30.0																	
30.5	3.1						0				-	-	-	-	-	-	-
31.0																	
31.5	5.2	C-3	31.4 - 36	-0.5 - -5.1	55 100%	55 100%	0		31.1	Very strong, gray, medium to coarse SANDSTONE, massive, fresh.	-	-	-	-	-	-	-
32.0									31.5	Very strong, gray, conglomeratic SANDSTONE, massive, fresh.							
32.5	5.7						0				-	-	-	-	-	-	-
33.0																	
33.5	6.2						1				33.8	J	1	40	SR	F	None
34.0																	
34.5	5.7						0				-	-	-	-	-	-	-
35.0																	

REMARKS:
1.*The water level was influenced by the soil casing being sealed into bedrock.

WATER LEVEL DATA

DATE/TIME	BOT. OF SOIL CASING (ft)	BOT. OF HOLE (ft)	WATER
5/18/2019 8:10:00 AM	23.3	28.3	3.4*

GROUND SURFACE EL. 30.9

Note: Refer to the key sheets within the Geotechnical Design Report for the description of rock classification system codes.

(Continued Next Page)

Pare Corporation
10 Lincoln Road, Suite 210
Foxboro, MA 02035
T: 508-543-1755
F: 508-543-1881

BORING NUMBER B17-46A

CORE BORING REPORT

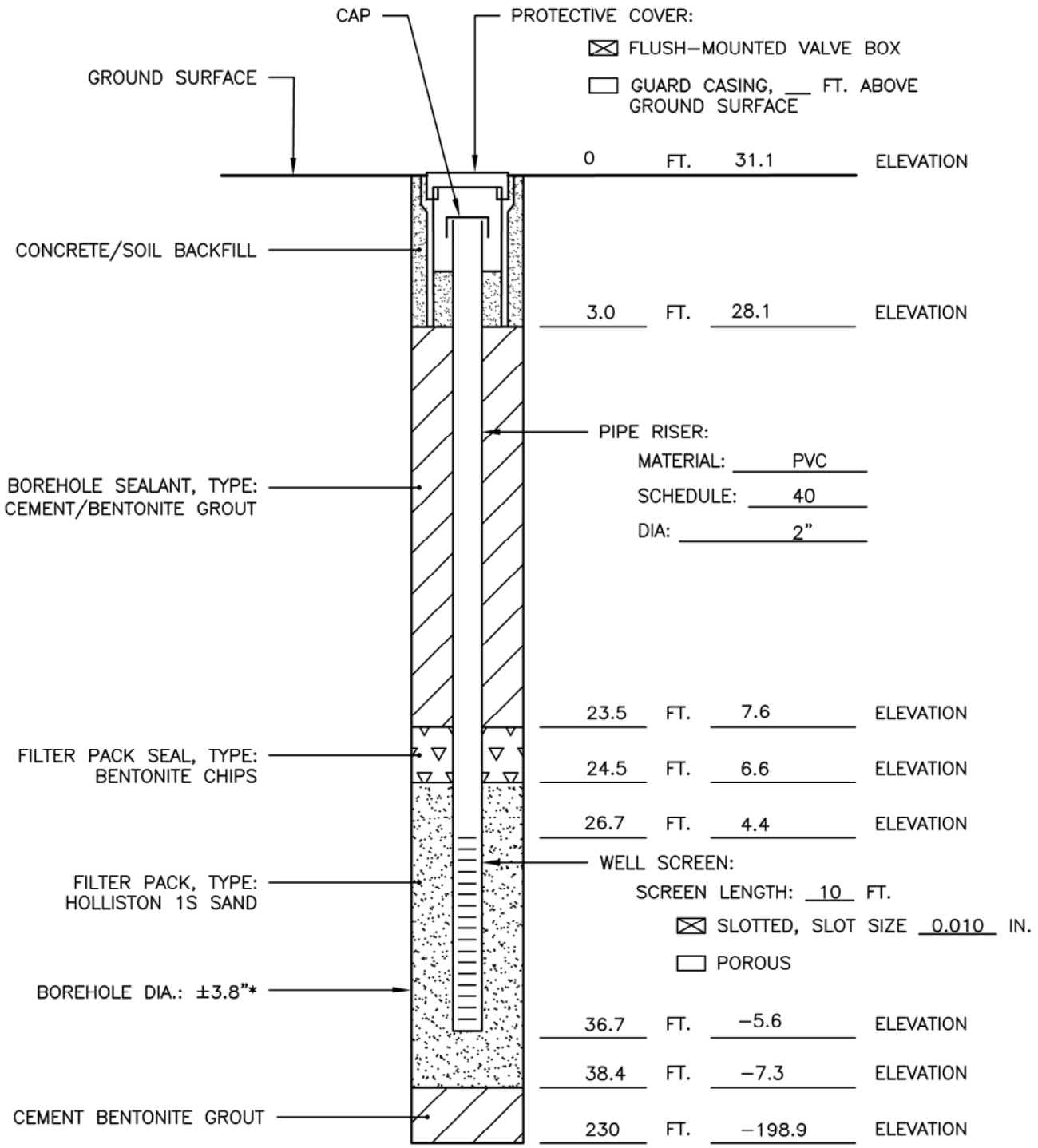
PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
35.0																	
35.5	5						0			Very strong, gray, conglomeratic SANDSTONE, massive, fresh. *(continued)*	-	-	-	-	-	-	-
36.0	4	C-4	36 - 41.2	-5.1 - -10.3	61 98%	57 92%	1		35.6	Very strong, gray, medium to coarse SANDSTONE, massive, fresh.	36.0-36.6	J	1-3	75	SR	F	QZ/Fe
36.5									36.4	Strong, gray to purple, fine SANDSTONE, laminated (1 mm±), slightly weathered to fresh. - Bedding planes at 20°-30°.							
37.0	4						1				37.5	J	1-10	35	SM/SR	SW	None
37.5																	
38.0	2.8						2				38.0 38.7	J J	1-5 1	30 20	SR SR	SW SW	Fe Fe/QZ
38.5																	
39.0	3.9						0				-	-	-	-	-	-	-
39.5																	
40.0	5						0				-	-	-	-	-	-	-
40.5																	
41.0	4.4	C-5	41.2 - 43.2	-10.3 - -12.3	24 100%	18.5 77%	1				41.7	J	1	30	SM	SW	Fe
41.5																	
42.0	4						2			- Quartz veins from 42.2'-42.6', 1 mm±.	42.0 42.2	J J	1-2 1	40 40	SR SM/SR	SW SW	Fe Fe
42.5																	
43.0										**Bottom of borehole at 43.2 feet.**							
43.5																	
44.0																	
44.5																	
45.0																	
45.5																	
46.0																	
46.5																	
47.0																	
47.5																	
48.0																	
48.5																	
49.0																	
49.5																	
50.0																	
50.5																	
51.0																	

2.Boring was backfilled with cement-bentonite grout from the bottom of the boring to the ground surface. No groundwater monitoring well was installed.

WELL/PIEZOMETER INSTALLATION SKETCH

Project Name: NBC CSO PHASE III
WELL/PIEZO NO.: B17-8
Pare Project Number: 14106.02
Sheet: 1 of 1
Field Engineer: H. Shanks/R. Muganga
Date: 1-30-19, 2-4-19, and 2-5-19



Remarks:
*At the beginning of the day on 2/4/19, grout was measured at approximately 30.7 feet below ground. New England Boring Contractors advanced a 5-inch diameter roller bit to approximately 38.4 feet.

WELL/PIEZOMETER WATER LEVEL RECORD

Project Name NBC CSO Phase III **WELL/PIEZO. NO.** B17-8

Project Number 14106.02 **Sheet** 1 **of** 1

Reference(1) Ground Surface **Ref. Elev.** 31.1 NGVD 29

Foundation Sensed Rock Elevation minus +/- 10 feet

Location Description(2) Masonic Temple

Date	Time	Read By	Depth to Water (ft)	Elevation of Water (ft)	Remarks
03-19-18	-	SMA	14.6	16.5	Open Boring (Packer Testing)
03-22-18	-	JMC	12.2	18.9	Open Boring (Packer Testing)
04-05-18	10:45	JMC	13.0	18.1	Open Boring
05-01-18	1:10	HMS	12.6	18.5	Open Boring
05-18-18	4:00	HMS	13.2	17.9	Open Boring
05-29-18	9:10	HMS	13.1	18.0	Open Boring
06-12-18	9:30	HMS	13.2	17.9	Open Boring
07-25-18	8:40	JMC	13.3	17.8	Open Boring
11-02-18	-	MM	13.6	17.5	Open Boring
11-28-18	3:10	MM	13.9	17.2	Open Boring
12-26-18	9:55	HMS	13.7	17.4	Open Boring
01-23-19	2:15	JMC	13.9	17.2	Open Boring
02-07-19	10:20	HMS	17.8	13.3	Groundwater Well
03-18-19	10:30	RKM	17.6	13.5	Groundwater Well
04-09-19	11:45	JMC	17.9	13.2	Groundwater Well
04-23-19	2:45	HP	17.5	13.6	Groundwater Well; measured before well development.
04-24-19	9:50	HP	17.8	13.3	Groundwater Well; measured before well development.

(1) Normally, the top of protective casing.

(2) Street intersection, address, etc.

WELL/PIEZOMETER WATER LEVEL RECORD

Project Name NBC CSO Phase III **WELL/PIEZO. NO.** B17-8

Project Number 14106.02 **Sheet** 1 **of** 1

Date	Time	Read By	Depth to Water (ft)	Elevation of Water (ft)	Remarks
04-25-19	9:00	HP	19.8	11.3	Groundwater Well; measured before well development.
04-26-19	9:50	HP	19.65	11.45	Groundwater Well; measured before well development.
05-09-19	12:15	JPN	17.3	13.8	Groundwater Well
05-15-19	9:10	HP	17.4	13.7	Groundwater Well

(1) Normally, the top of protective casing. (2) Street intersection, address, etc.

WELL/PIEZOMETER INSTALLATION SKETCH

Project Name NBC CSO PHASE III

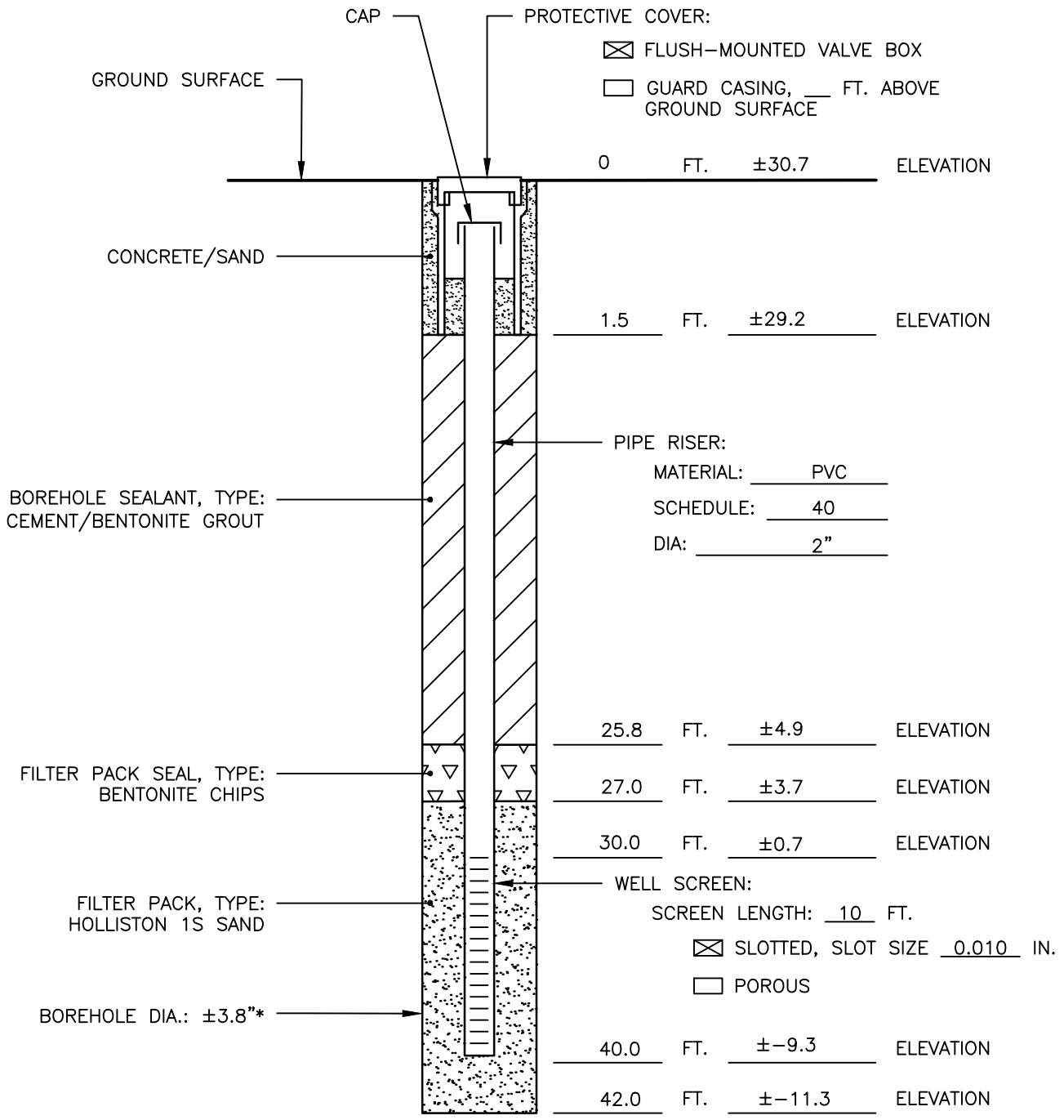
WELL/PIEZO NO. B17-8A

Pare Project Number 14106.02

Sheet 1 of 1

Field Engineer R. Lozinski

Date 6-11-19



Remarks:
The original well (B17-8) has been removed and a new well (B17-8A) installed.

WELL/PIEZOMETER WATER LEVEL RECORD

Project Name NBC CSO Phase III **WELL/PIEZO. NO.** B17- 8A

Project Number 14106.02 **Sheet** 1 **of** 1

Reference(1) Ground Surface **Ref. Elev.** 30.7 NGVD 29

Foundation Sensed Rock Elevation +/- 10 feet.

Location Description(2) Masonic Temple

Date	Time	Read By	Depth to Water (ft)	Elevation of Water (ft)	Remarks
07-01-19	12:40	RAL	18.0	12.7	Groundwater Well; ¼-inch diameter vent installed.
07-19-19	12:50	JPN	16.4	14.3	Vented Groundwater Well; measured before well development.
08-01-19	9:20	MLP	17	13.7	Vented Groundwater Well; measured before well development.
08-01-19	12:05	MLP	16.3	14.4	Vented Groundwater Well; measured before well development.
08-02-19	11:50	JPN	18.2	12.5	Vented Groundwater Well; measured before well development.
08-05-19	7:30	JPN	18.0	12.7	Vented Groundwater Well; measured before well development.
08-06-19	7:30	HMS	18.7	12.0	Vented Groundwater Well; measured before well development.
08-09-19	7:15	MLP	17.9	12.8	Vented Groundwater Well; measured before well development.
08-14-19	2:30	JPN	17.5	13.2	Vented Groundwater Well; measured before well development.
08-15-19	5:00	JPN	18.4	12.3	Vented Groundwater Well; measured before well development.
08-22-19	3:30	HP	17.5	13.2	Vented Groundwater Well; measured before well sampling.
09-03-19	4:50	JPN	17.7	13.0	Groundwater Well; ¼-inch diameter vent installed.
11-14-19	3:07	RAL	17.8	12.9	Groundwater Well; ¼-inch diameter vent installed.

(1) Normally, the top of protective casing. (2) Street intersection, address, etc.

WELL/PIEZOMETER WATER LEVEL RECORD

Project Name NBC CSO Phase III **WELL/PIEZO. NO.** B17-39

Project Number 14106.02 **Sheet** 1 **of** 1

Reference(1) Ground Surface **Ref. Elev.** 32.0 NGVD 29

Foundation Sensed N/A

Location Description(2) Masonic Temple

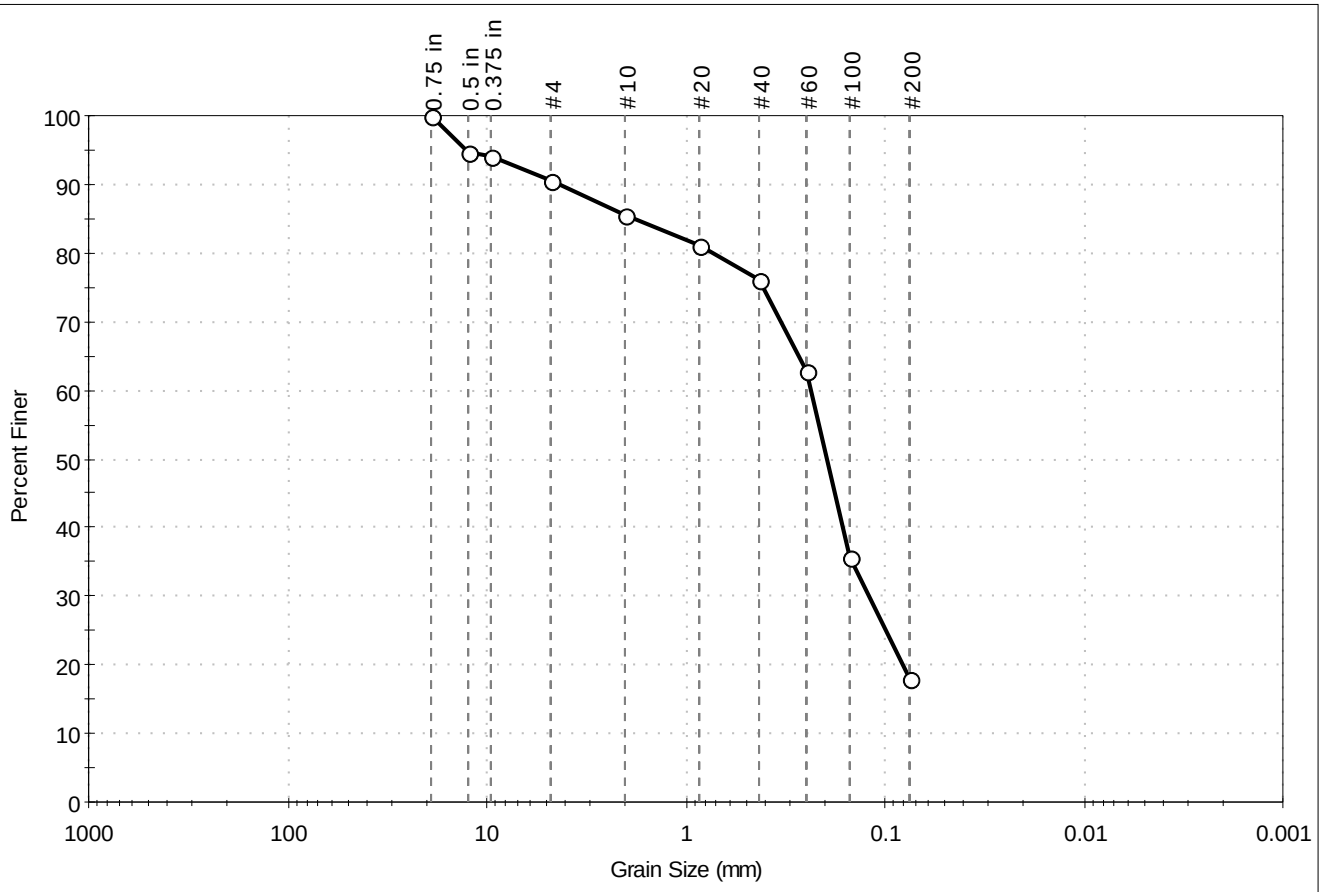
Date	Time	Read By	Depth to Water (ft)	Elevation of Water (ft)	Remarks
08-12-19	7:00	JPN	3.5	28.5	Open Boring (Packer Testing)
08-13-19	7:00	JPN	3.5	28.5	Open Boring (Packer Testing)
08-14-19	7:00	JPN	5.0	27.0	Open Boring (Packer Testing)
09-03-19	4:50	JPN	11.8	20.2	Open Boring

(1) Normally, the top of protective casing.

(2) Street intersection, address, etc.

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-8	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-4	Test Date:	05/29/18	Checked By:	emm
Depth :	6-8	Test Id:	456249		
Test Comment:	---				
Visual Description:	Moist, pale brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	9.6	72.3	18.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	95		
0.375 in	9.50	94		
#4	4.75	90		
#10	2.00	85		
#20	0.85	81		
#40	0.42	76		
#60	0.25	63		
#100	0.15	36		
#200	0.075	18		

Coefficients

D_{85} = 1.8218 mm D_{30} = 0.1201 mm

D_{60} = 0.2369 mm D_{15} = N/A

D_{50} = 0.1964 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

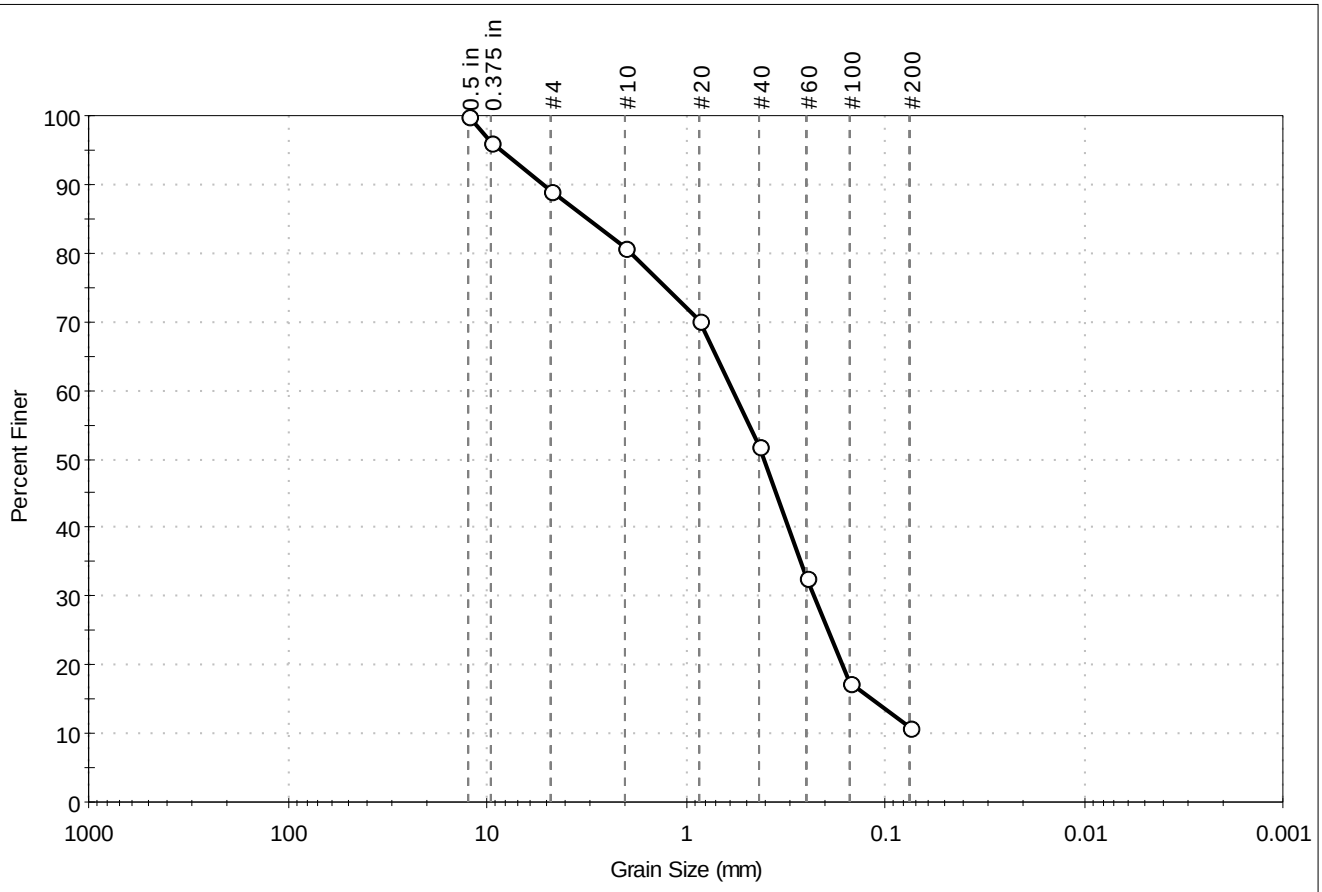
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-8	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-8	Test Date:	05/29/18	Checked By:	emm
Depth :	14-16	Test Id:	456250		
Test Comment:	---				
Visual Description:	Moist, very dark brown sand with silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	11.0	78.1	10.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	96		
#4	4.75	89		
#10	2.00	81		
#20	0.85	70		
#40	0.42	52		
#60	0.25	33		
#100	0.15	17		
#200	0.075	11		

Coefficients

D_{85} = 3.1141 mm D_{30} = 0.2290 mm

D_{60} = 0.5781 mm D_{15} = 0.1162 mm

D_{50} = 0.4032 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

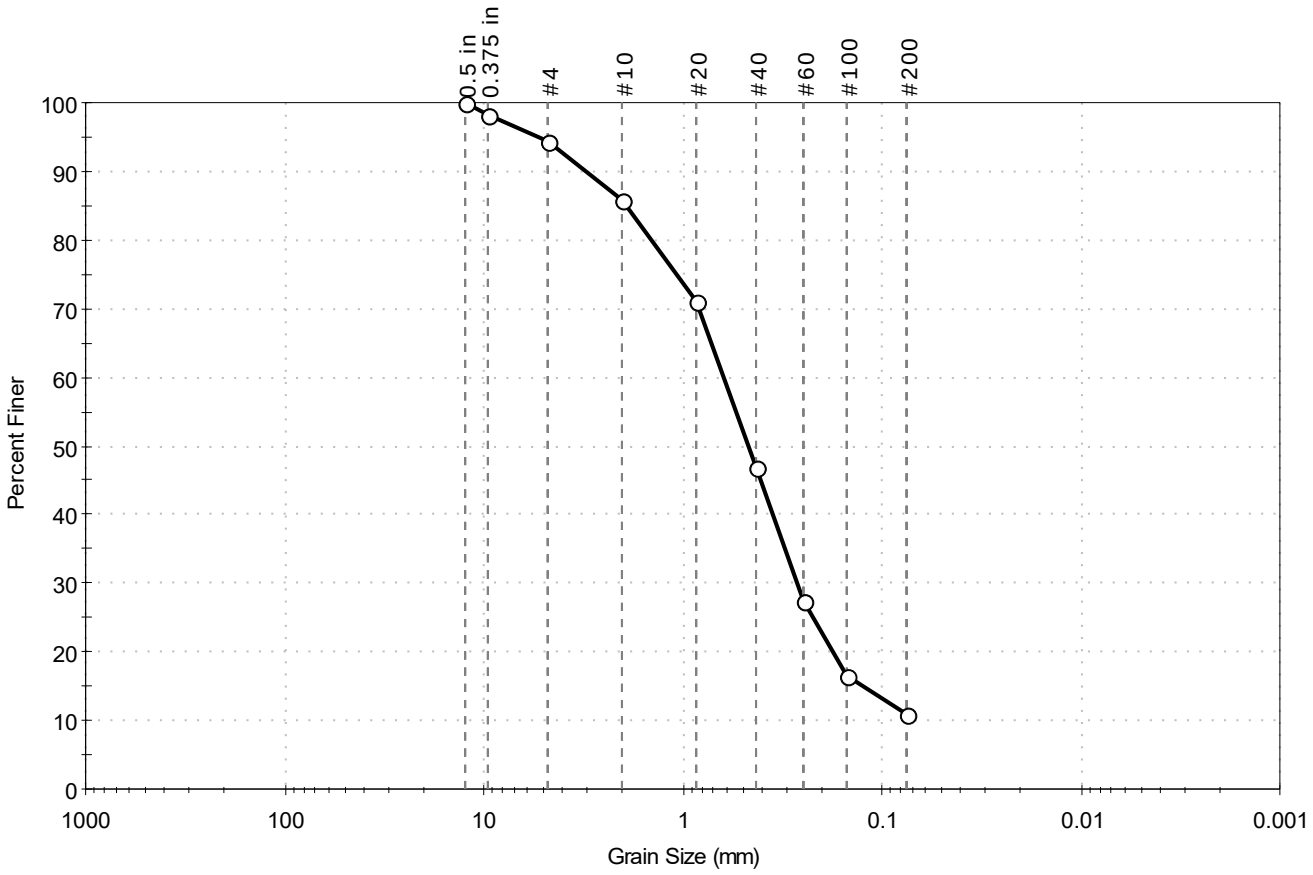
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III CSO CER				
Location:	Pawtucket, RI			Project No:	GTX-308335
Boring ID:	B17-39	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-2 (2 jars)	Test Date:	08/28/19	Checked By:	bfs
Depth :	2-4	Test Id:	519879		
Test Comment:	---				
Visual Description:	Moist, olive brown sand with silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	5.5	83.7	10.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	98		
#4	4.75	94		
#10	2.00	86		
#20	0.85	71		
#40	0.42	47		
#60	0.25	27		
#100	0.15	16		
#200	0.075	11		

Coefficients

D_{85} = 1.8953 mm
D_{30} = 0.2683 mm
D_{60} = 0.6192 mm
D_{15} = 0.1258 mm
D_{50} = 0.4640 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

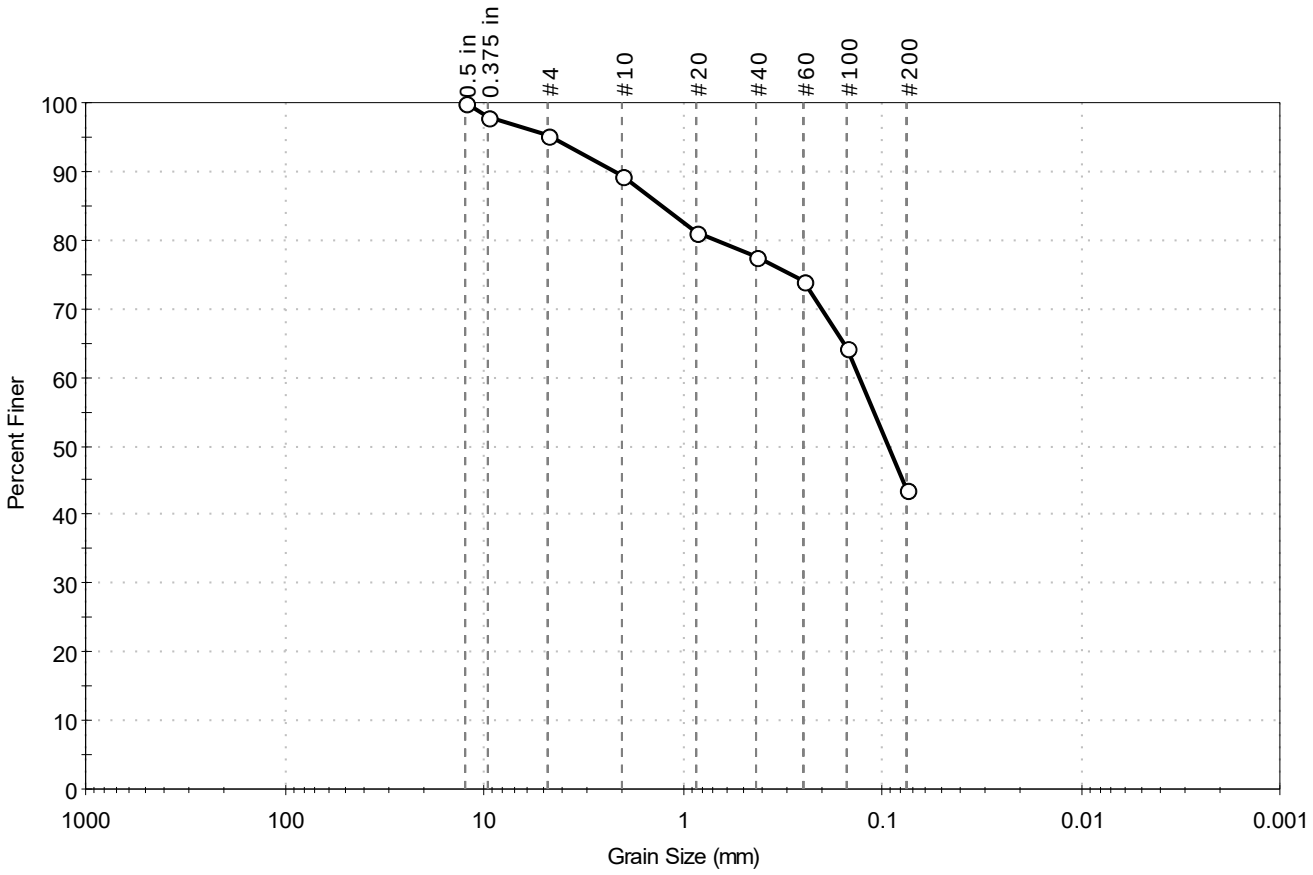
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III CSO CER				
Location:	Pawtucket, RI			Project No:	GTX-308335
Boring ID:	B17-39	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-6	Test Date:	08/28/19	Checked By:	bfs
Depth :	10-12	Test Id:	519880		
Test Comment:	---				
Visual Description:	Moist, brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	4.9	51.5	43.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	98		
#4	4.75	95		
#10	2.00	89		
#20	0.85	81		
#40	0.42	77		
#60	0.25	74		
#100	0.15	64		
#200	0.075	44		

Coefficients

D_{85} = 1.2663 mm D_{30} = N/A

D_{60} = 0.1299 mm D_{15} = N/A

D_{50} = 0.0928 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

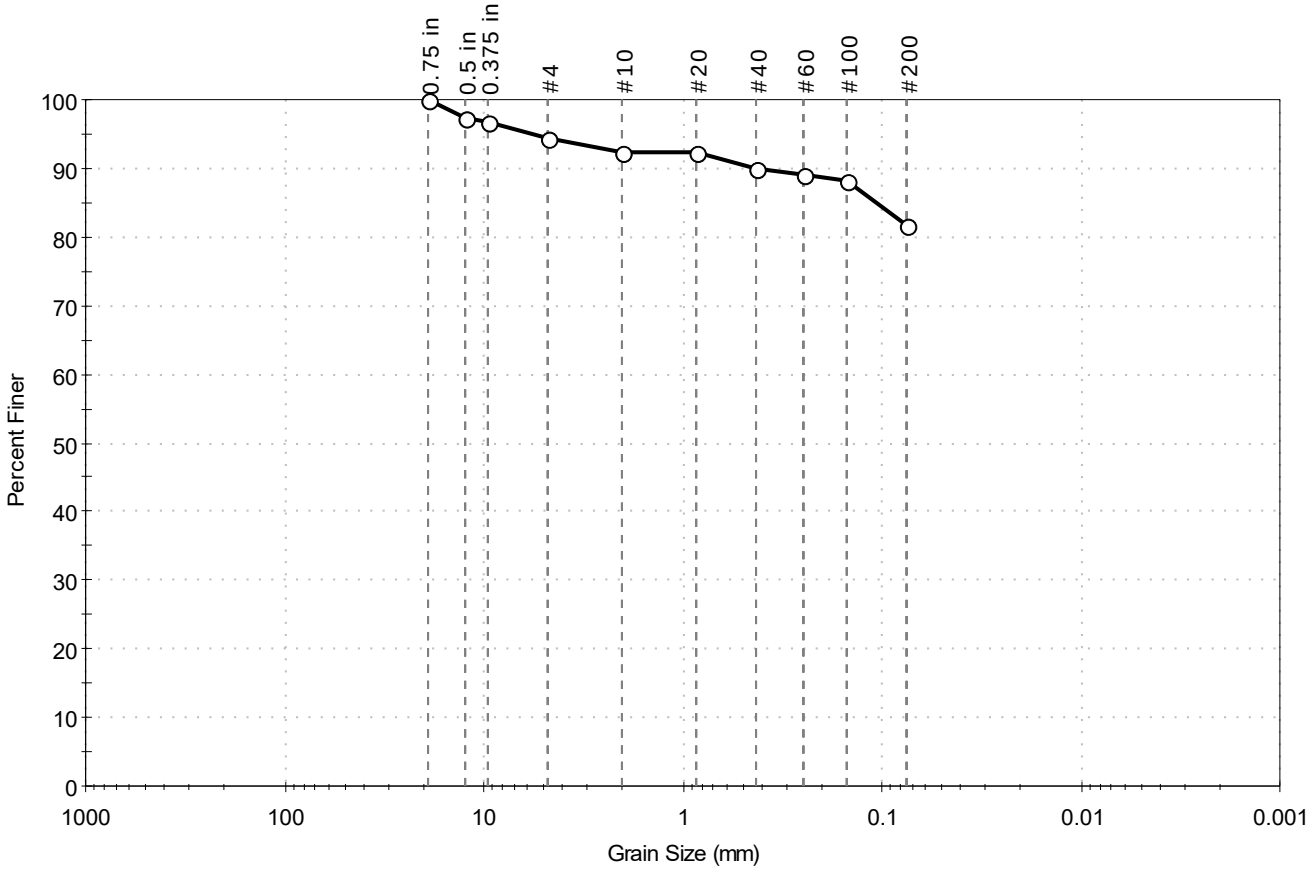
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III CSO CER				
Location:	Pawtucket, RI			Project No:	GTX-308335
Boring ID:	B17-39	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-8 (3 jars)	Test Date:	08/28/19	Checked By:	bfs
Depth :	14-16	Test Id:	519881		
Test Comment:	---				
Visual Description:	Moist, dark yellowish brown clay with sand				
Sample Comment:	Removed one unrepresentitive 1" rock weighting 57.57 g				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	5.6	12.7	81.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	97		
0.375 in	9.50	97		
#4	4.75	94		
#10	2.00	92		
#20	0.85	92		
#40	0.42	90		
#60	0.25	89		
#100	0.15	88		
#200	0.075	82		

Coefficients

D_{85} = 0.1058 mm	D_{30} = N/A
D_{60} = N/A	D_{15} = N/A
D_{50} = N/A	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM Lean CLAY with Sand (CL)

AASHTO Silty Soils (A-4 (5))

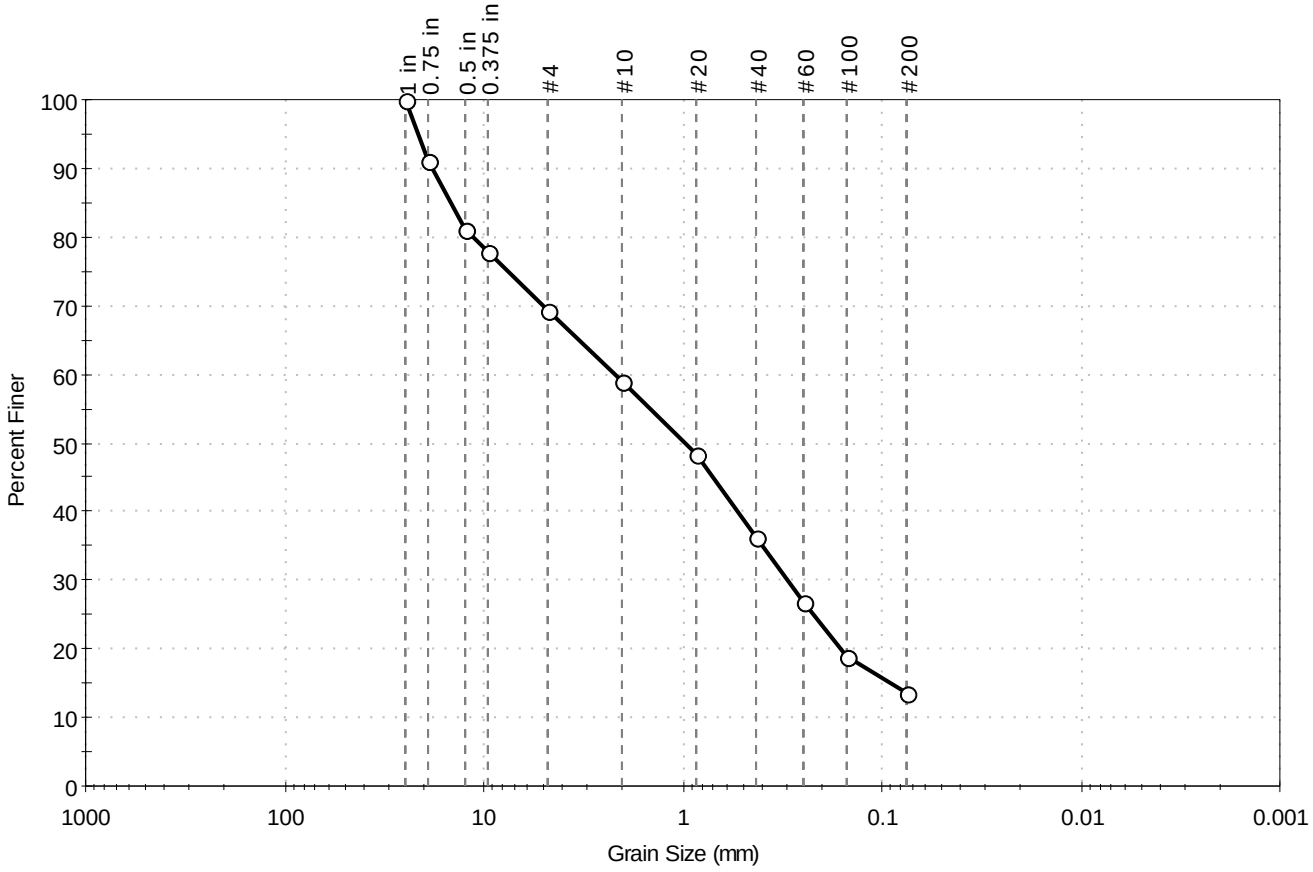
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-40	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-1	Test Date:	05/29/18	Checked By:	emm
Depth :	0.5-2.5	Test Id:	456240		
Test Comment:	---				
Visual Description:	Moist, dark brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	30.7	55.8	13.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	91		
0.5 in	12.50	81		
0.375 in	9.50	78		
#4	4.75	69		
#10	2.00	59		
#20	0.85	48		
#40	0.42	36		
#60	0.25	27		
#100	0.15	19		
#200	0.075	13		

Coefficients

D_{85} = 14.6318 mm	D_{30} = 0.2979 mm
D_{60} = 2.1787 mm	D_{15} = 0.0914 mm
D_{50} = 0.9768 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

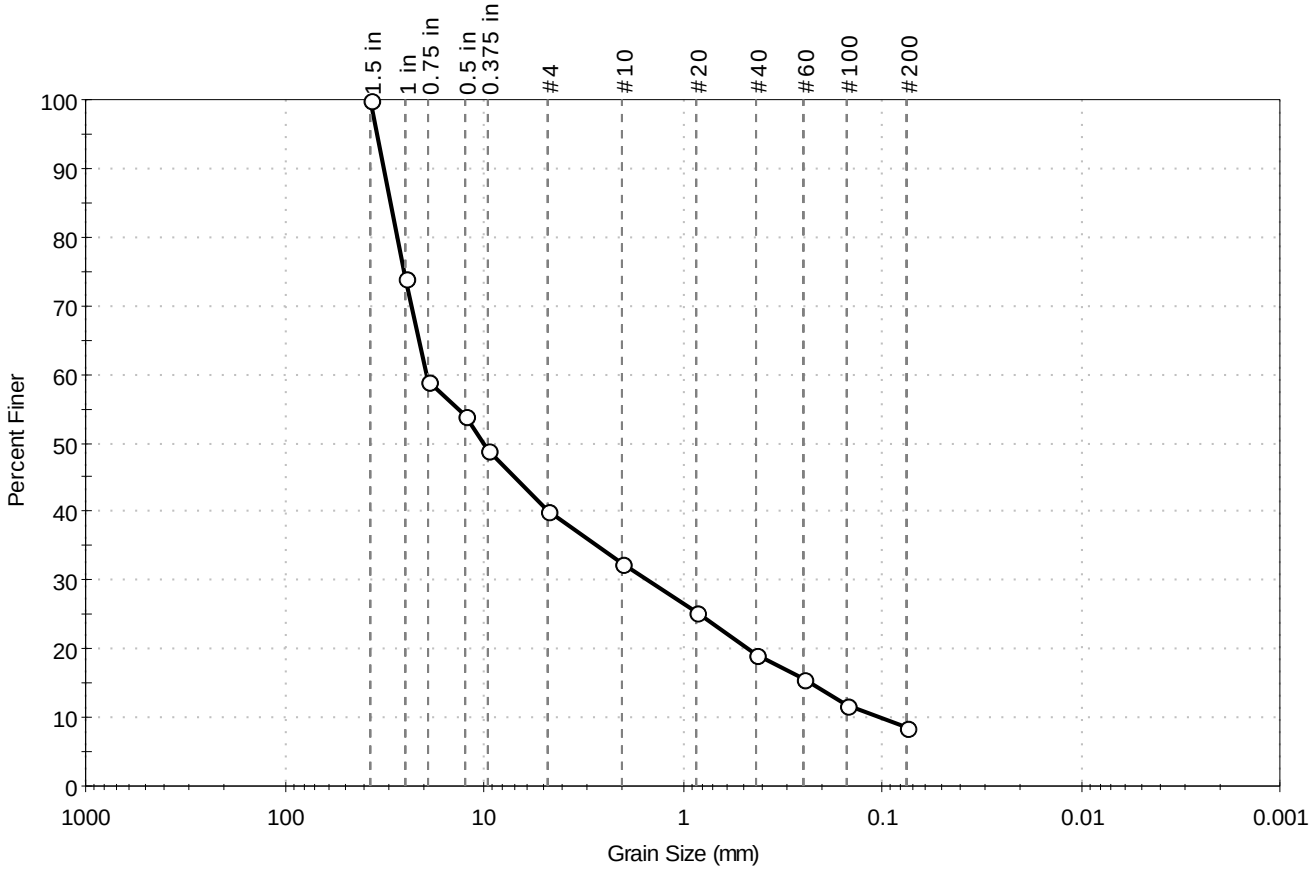
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-40	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-4	Test Date:	05/29/18	Checked By:	emm
Depth :	6-8	Test Id:	456241		
Test Comment:	---				
Visual Description:	Moist, dark gray gravel with silt and sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	59.7	31.8	8.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	74		
0.75 in	19.00	59		
0.5 in	12.50	54		
0.375 in	9.50	49		
#4	4.75	40		
#10	2.00	33		
#20	0.85	25		
#40	0.42	19		
#60	0.25	15		
#100	0.15	12		
#200	0.075	8.5		

Coefficients

D_{85} = 29.6316 mm	D_{30} = 1.4707 mm
D_{60} = 19.3202 mm	D_{15} = 0.2331 mm
D_{50} = 10.0961 mm	D_{10} = 0.1026 mm
C_u = 188.306	C_c = 1.091

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (1))

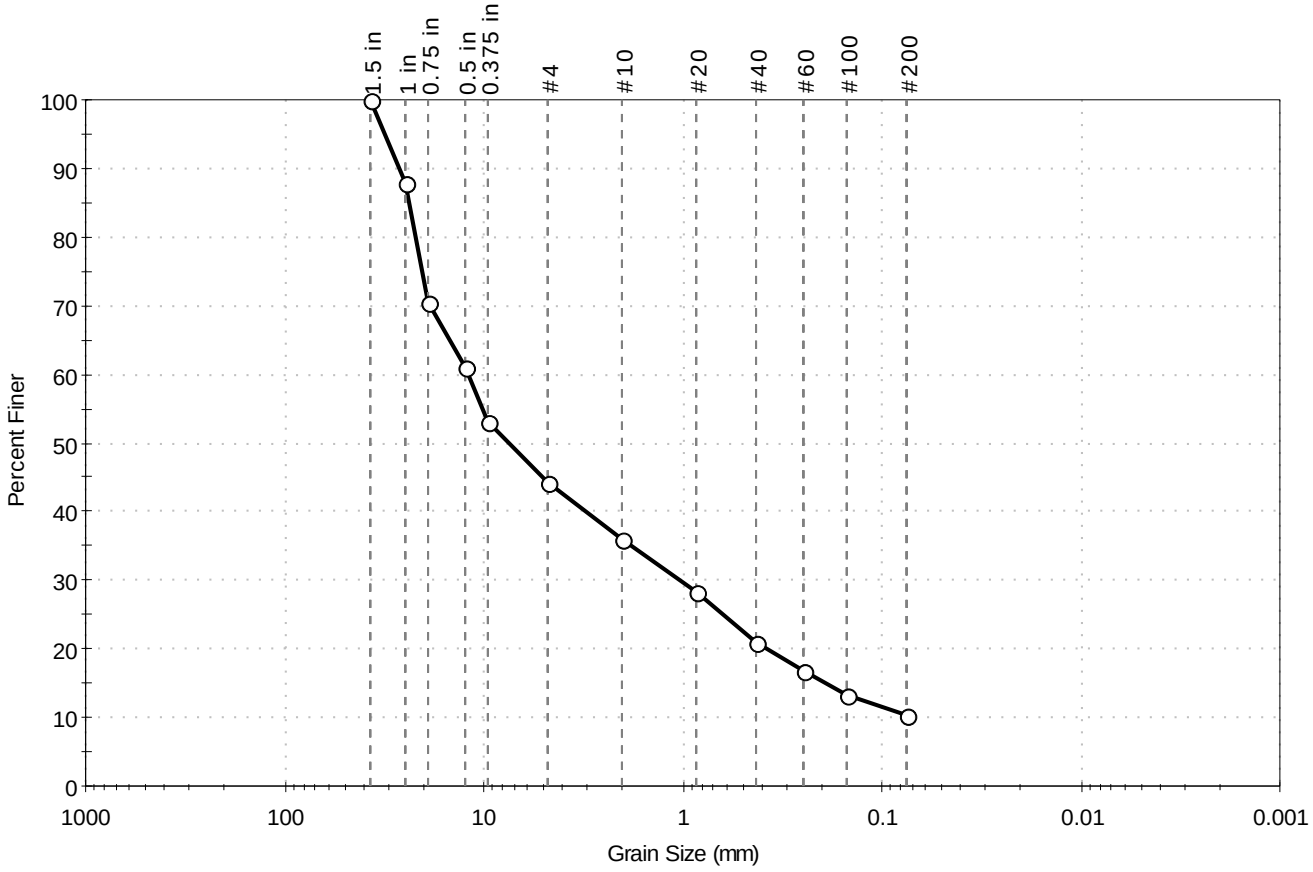
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-40	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-5	Test Date:	06/14/18	Checked By:	emm
Depth :	8-10	Test Id:	457943		
Test Comment:	---				
Visual Description:	Moist, gray gravel with silt and sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	55.8	34.0	10.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	88		
0.75 in	19.00	71		
0.5 in	12.50	61		
0.375 in	9.50	53		
#4	4.75	44		
#10	2.00	36		
#20	0.85	28		
#40	0.42	21		
#60	0.25	17		
#100	0.15	13		
#200	0.075	10		

Coefficients

D_{85} = 23.9120 mm D_{30} = 1.0329 mm

D_{60} = 12.0447 mm D_{15} = 0.1898 mm

D_{50} = 7.4379 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

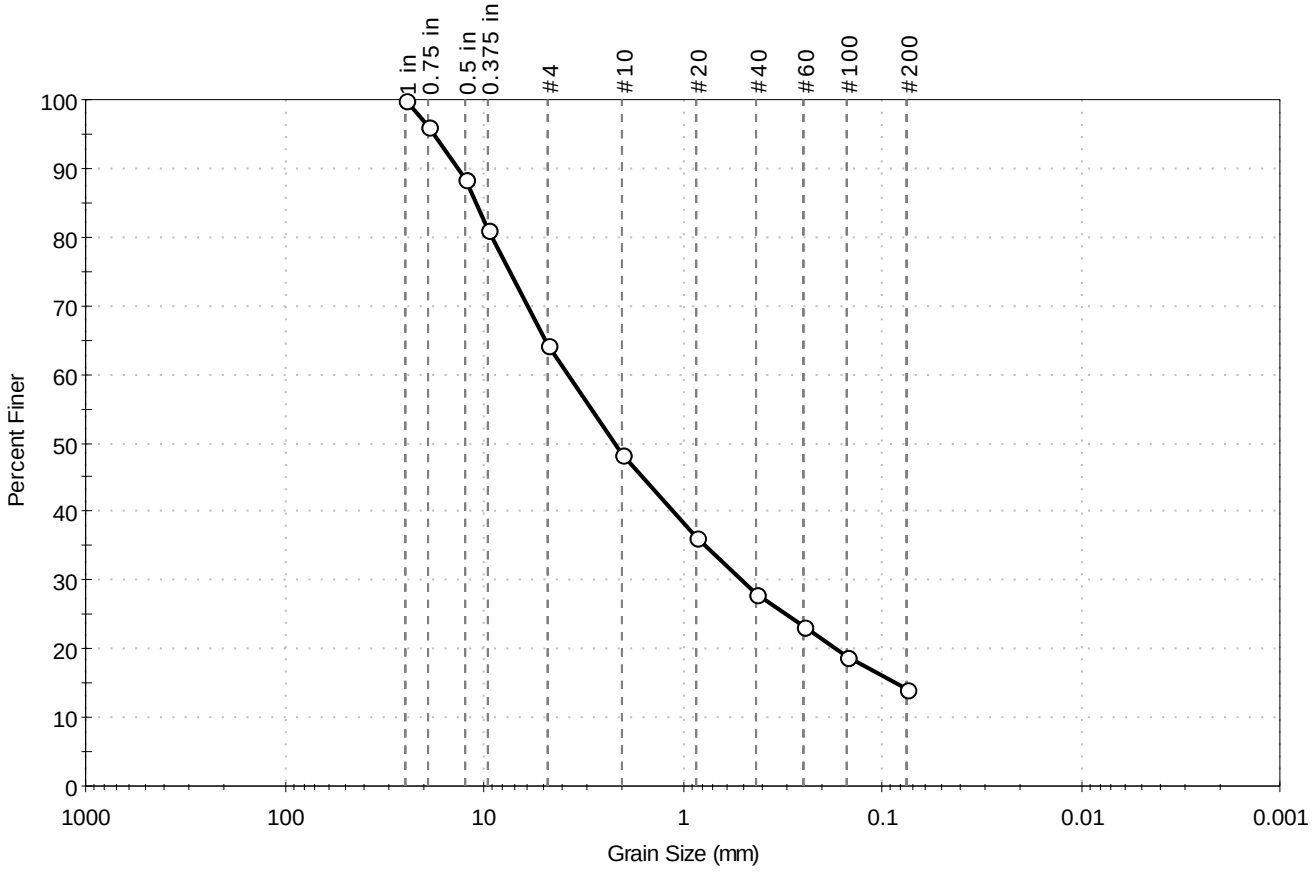
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-40	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-7	Test Date:	05/29/18	Checked By:	emm
Depth :	12-14	Test Id:	456242		
Test Comment:	---				
Visual Description:	Moist, dark brownish gray silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	35.8	50.1	14.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	96		
0.5 in	12.50	89		
0.375 in	9.50	81		
#4	4.75	64		
#10	2.00	48		
#20	0.85	36		
#40	0.42	28		
#60	0.25	23		
#100	0.15	19		
#200	0.075	14		

Coefficients

D_{85} = 10.9462 mm	D_{30} = 0.4969 mm
D_{60} = 3.7774 mm	D_{15} = 0.0855 mm
D_{50} = 2.1870 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

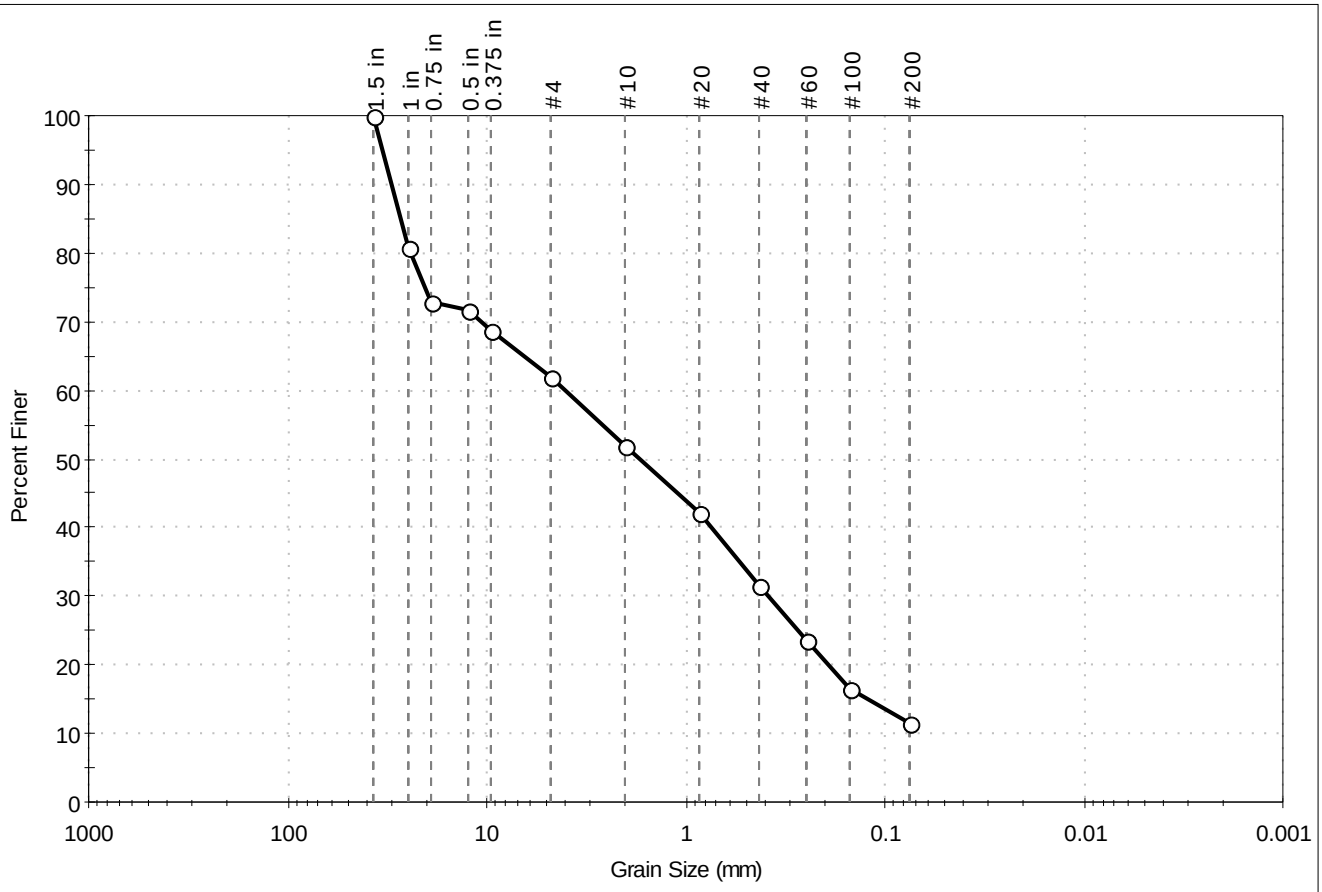
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-41	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-1A	Test Date:	05/29/18	Checked By:	emm
Depth :	0.75-2.75	Test Id:	456243		
Test Comment:	---				
Visual Description:	Moist, dark grayish brown sand with silt and gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	38.2	50.2	11.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	81		
0.75 in	19.00	73		
0.5 in	12.50	72		
0.375 in	9.50	69		
#4	4.75	62		
#10	2.00	52		
#20	0.85	42		
#40	0.42	32		
#60	0.25	24		
#100	0.15	17		
#200	0.075	12		

Coefficients

D_{85} = 27.3599 mm D_{30} = 0.3803 mm

D_{60} = 4.0503 mm D_{15} = 0.1202 mm

D_{50} = 1.6817 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

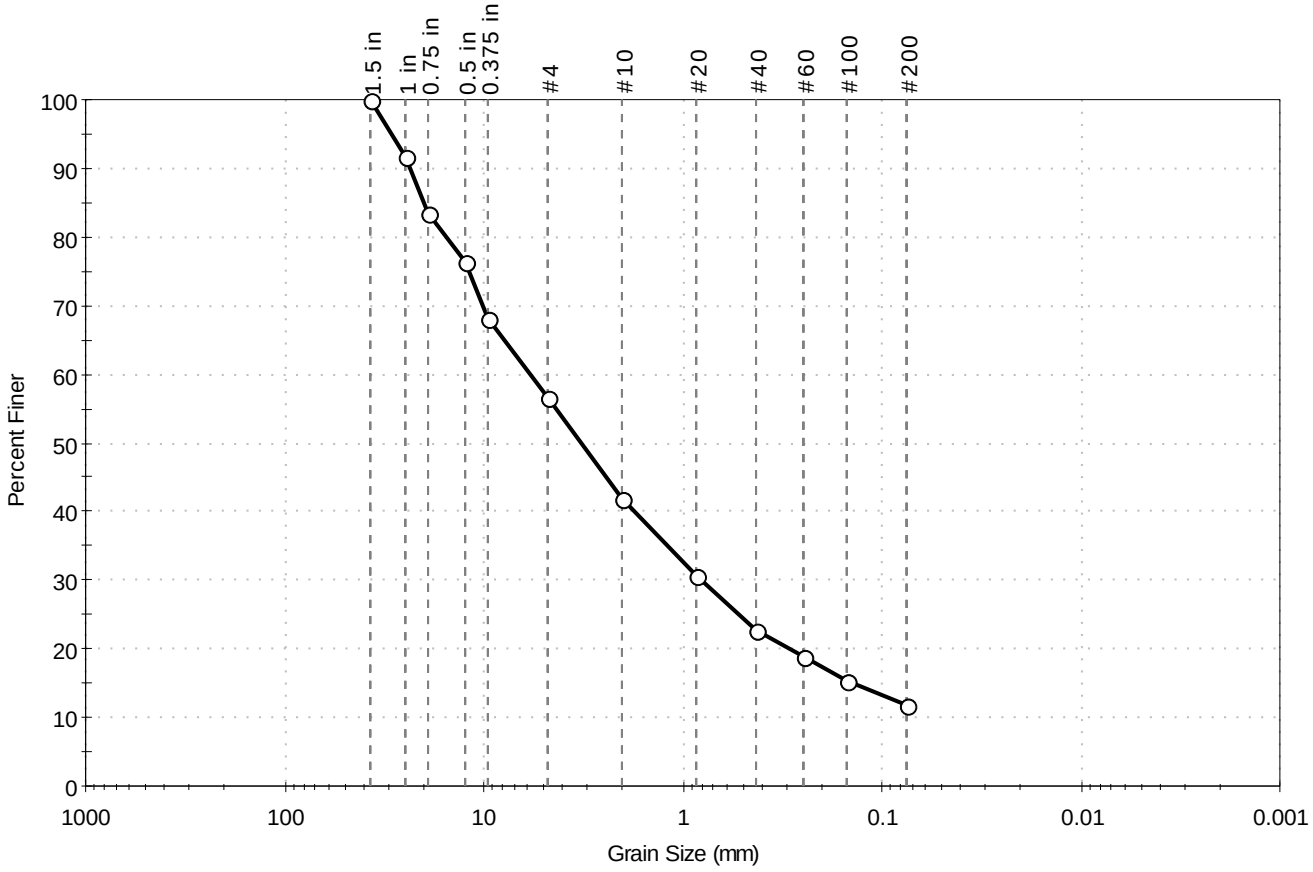
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-41	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-5	Test Date:	05/29/18	Checked By:	emm
Depth :	8-10	Test Id:	456244		
Test Comment:	---				
Visual Description:	Moist, dark brown sand with silt and gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	43.2	45.0	11.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	92		
0.75 in	19.00	84		
0.5 in	12.50	77		
0.375 in	9.50	68		
#4	4.75	57		
#10	2.00	42		
#20	0.85	31		
#40	0.42	23		
#60	0.25	19		
#100	0.15	15		
#200	0.075	12		

Coefficients

D_{85} = 19.9511 mm D_{30} = 0.8089 mm

D_{60} = 5.8038 mm D_{15} = 0.1408 mm

D_{50} = 3.2100 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

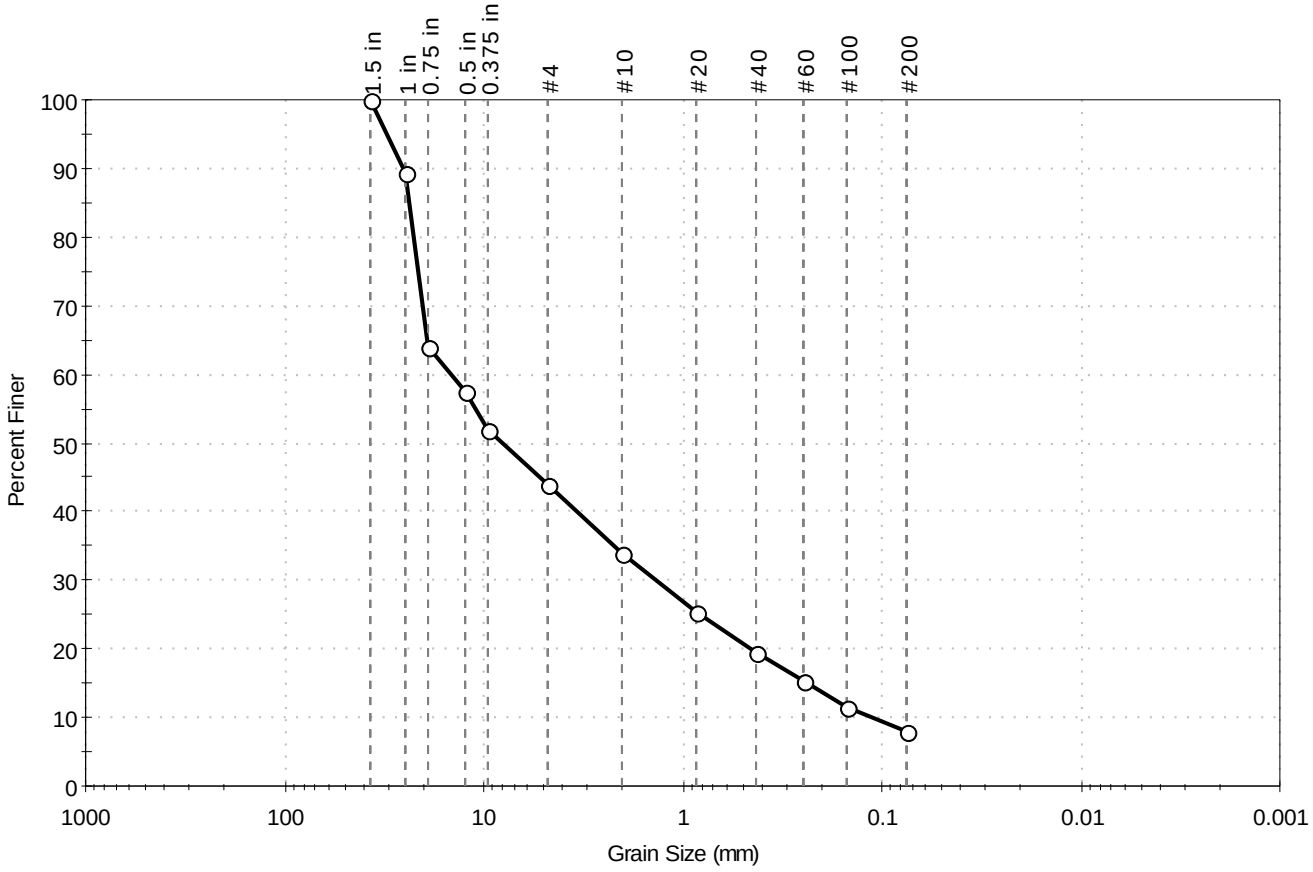
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-41	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-7	Test Date:	06/14/18	Checked By:	emm
Depth :	12-14	Test Id:	457944		
Test Comment:	---				
Visual Description:	Moist, redish dark gray gravel with silt and sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	56.2	35.8	8.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	89		
0.75 in	19.00	64		
0.5 in	12.50	58		
0.375 in	9.50	52		
#4	4.75	44		
#10	2.00	34		
#20	0.85	25		
#40	0.42	19		
#60	0.25	15		
#100	0.15	12		
#200	0.075	8.0		

Coefficients

D_{85} = 23.8175 mm	D_{30} = 1.3494 mm
D_{60} = 14.6163 mm	D_{15} = 0.2358 mm
D_{50} = 8.0521 mm	D_{10} = 0.1103 mm
C_u = 132.514	C_c = 1.129

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (1))

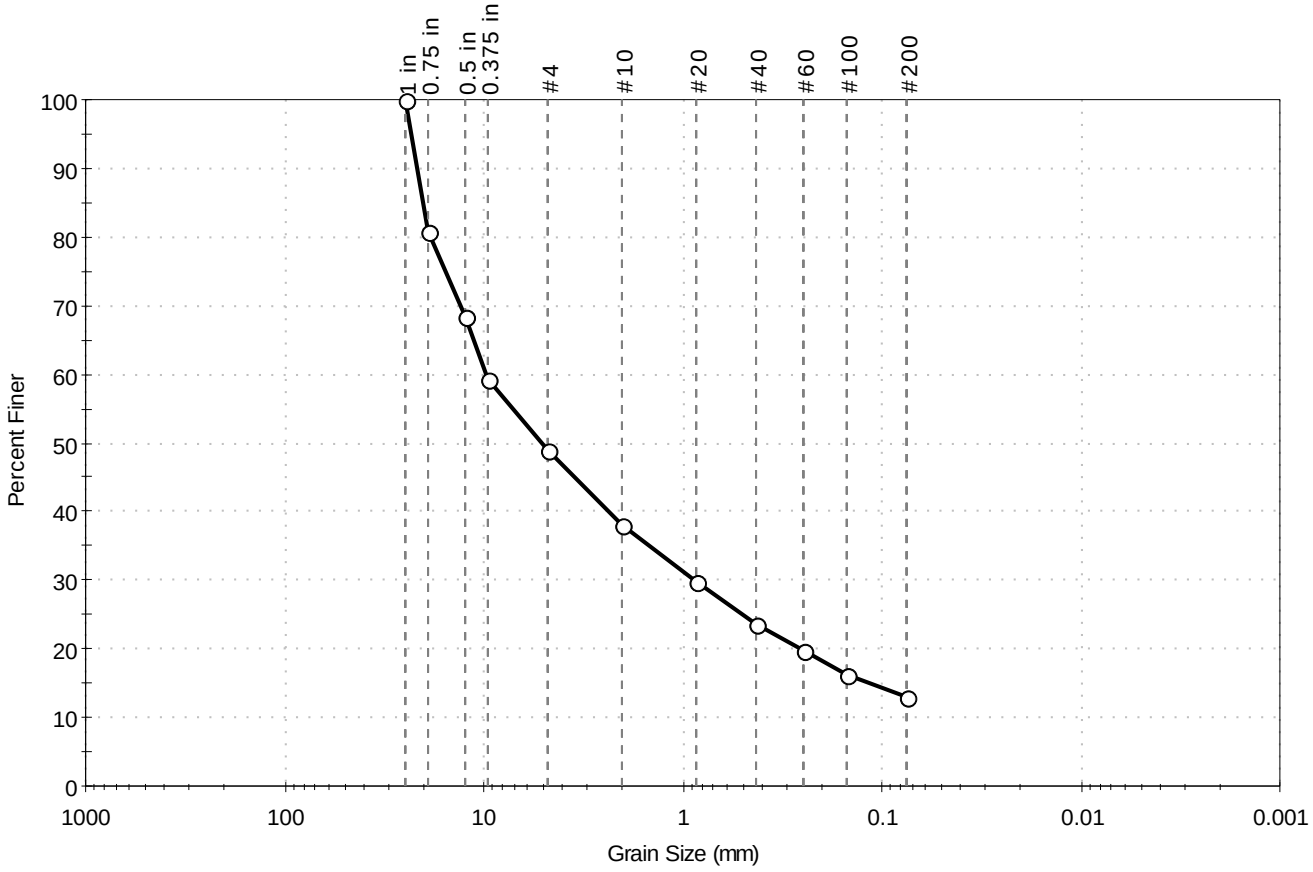
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-41	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-9B	Test Date:	05/29/18	Checked By:	emm
Depth :	16-18	Test Id:	456245		
Test Comment:	---				
Visual Description:	Moist, light olive gray silty gravel with sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	51.1	36.0	12.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	81		
0.5 in	12.50	68		
0.375 in	9.50	59		
#4	4.75	49		
#10	2.00	38		
#20	0.85	30		
#40	0.42	24		
#60	0.25	20		
#100	0.15	16		
#200	0.075	13		

Coefficients

D_{85} = 20.1677 mm D_{30} = 0.8700 mm

D_{60} = 9.6751 mm D_{15} = 0.1153 mm

D_{50} = 5.1114 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

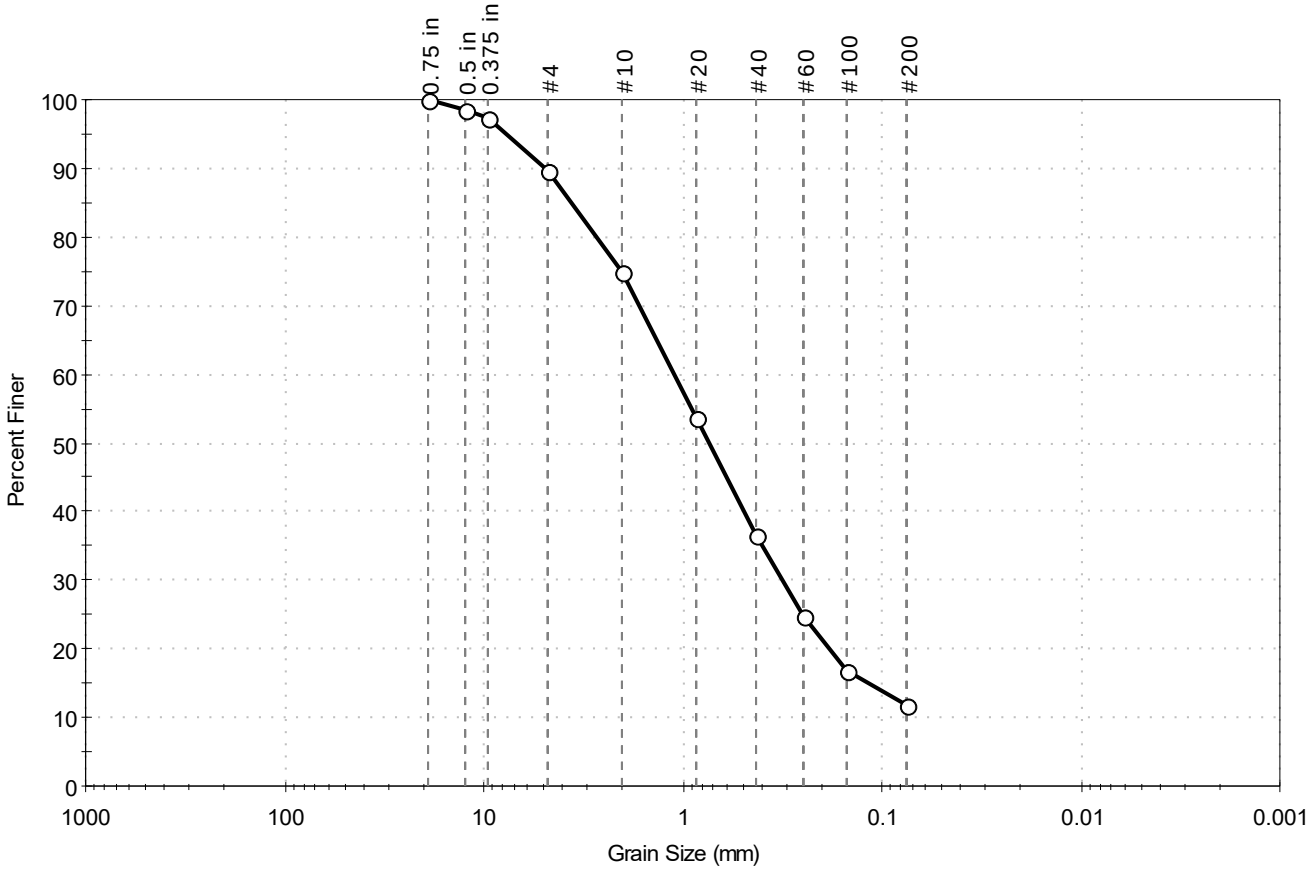
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III CSO CER				
Location:	Pawtucket, RI			Project No:	GTX-308335
Boring ID:	B17-45	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-2	Test Date:	05/31/19	Checked By:	bfs
Depth :	2-4	Test Id:	505998		
Test Comment:	---				
Visual Description:	Moist, grayish brown sand with silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	10.3	78.0	11.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	99		
0.375 in	9.50	97		
#4	4.75	90		
#10	2.00	75		
#20	0.85	54		
#40	0.42	36		
#60	0.25	25		
#100	0.15	17		
#200	0.075	12		

Coefficients

D_{85} = 3.5991 mm
D_{30} = 0.3170 mm
D_{60} = 1.0926 mm
D_{15} = 0.1165 mm
D_{50} = 0.7310 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

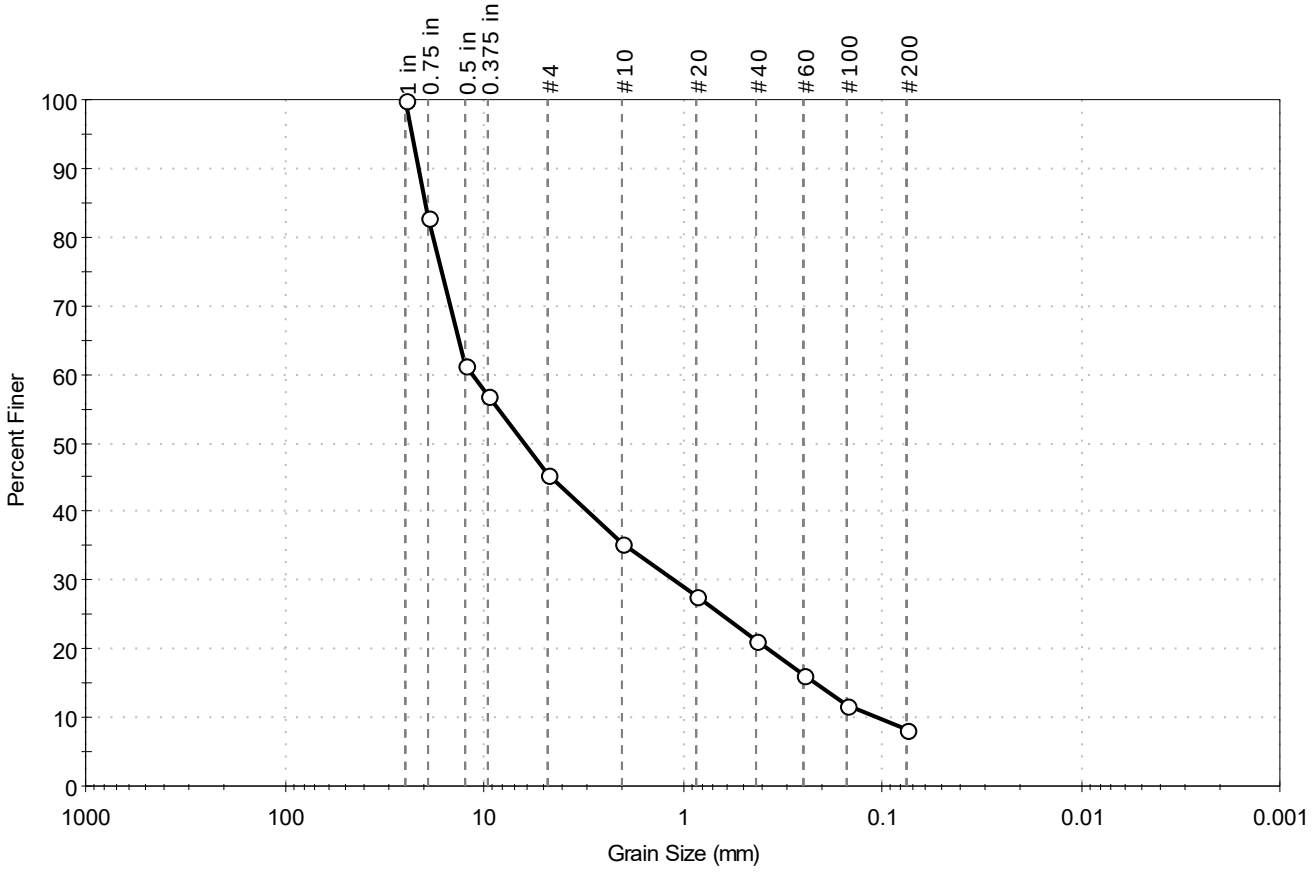
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III CSO CER				
Location:	Pawtucket, RI			Project No:	GTX-308335
Boring ID:	B17-45	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-7	Test Date:	05/31/19	Checked By:	bfs
Depth :	12-14	Test Id:	505999		
Test Comment:	---				
Visual Description:	Moist, dark yellowish brown gravel with silt and sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	54.7	36.9	8.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	83		
0.5 in	12.50	61		
0.375 in	9.50	57		
#4	4.75	45		
#10	2.00	35		
#20	0.85	28		
#40	0.42	21		
#60	0.25	16		
#100	0.15	12		
#200	0.075	8.4		

Coefficients

D_{85} = 19.6743 mm	D_{30} = 1.1015 mm
D_{60} = 11.5270 mm	D_{15} = 0.2196 mm
D_{50} = 6.2553 mm	D_{10} = 0.1052 mm
C_u = 109.572	C_c = 1.001

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (1))

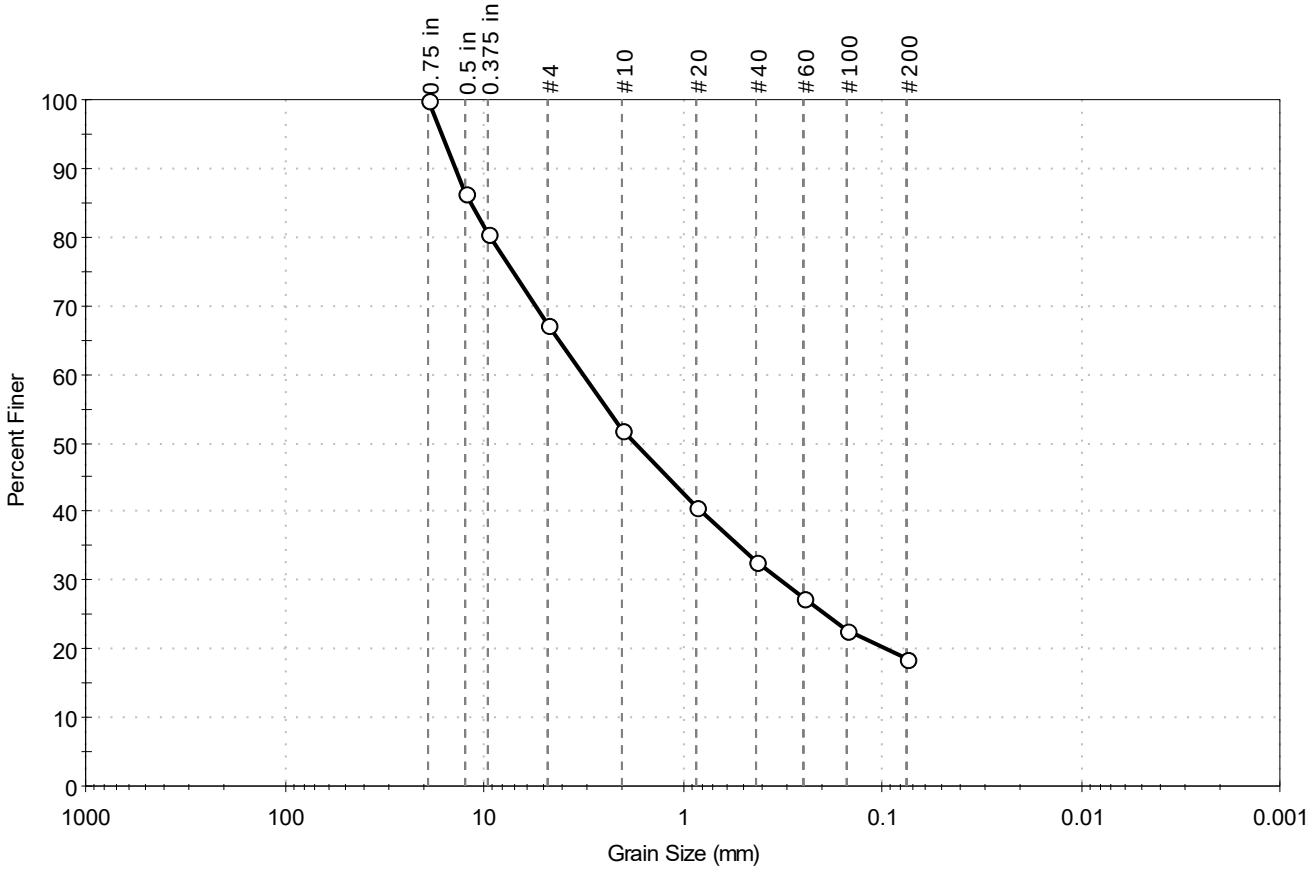
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III CSO CER				
Location:	Pawtucket, RI			Project No:	GTX-308335
Boring ID:	B17-45	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-12 (2 jars)	Test Date:	05/31/19	Checked By:	bfs
Depth :	22-24	Test Id:	506000		
Test Comment:	---				
Visual Description:	Moist, yellowish brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	32.7	48.8	18.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	86		
0.375 in	9.50	81		
#4	4.75	67		
#10	2.00	52		
#20	0.85	41		
#40	0.42	33		
#60	0.25	27		
#100	0.15	23		
#200	0.075	18		

Coefficients

D_{85} = 11.6864 mm D_{30} = 0.3230 mm

D_{60} = 3.1512 mm D_{15} = N/A

D_{50} = 1.7279 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample / Test Description

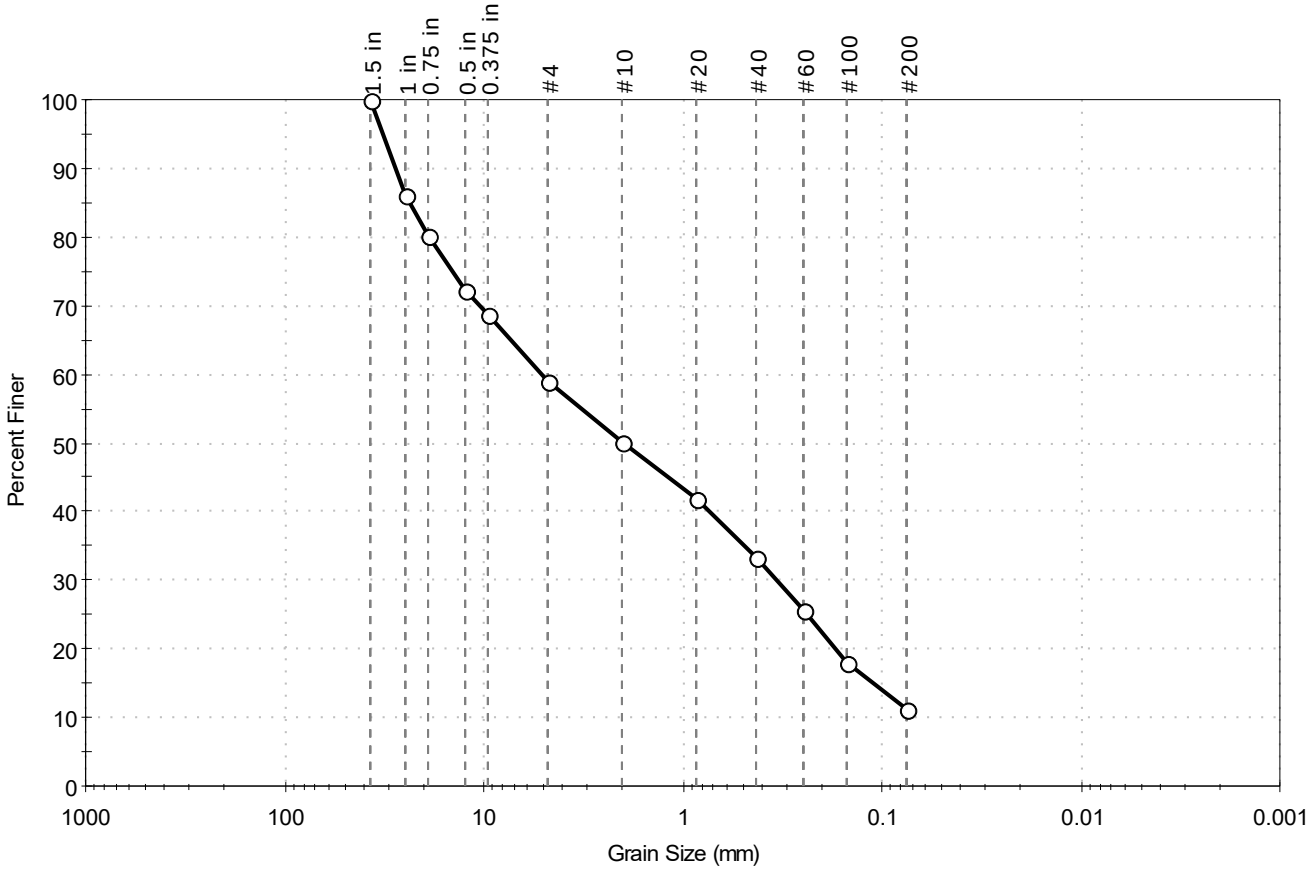
Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

GeoTesting EXPRESS

Client:	Pare Corporation				
Project:	NBC Phase III CSO CER				
Location:	Pawtucket, RI			Project No:	GTX-308335
Boring ID:	B17-46A	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-4	Test Date:	05/31/19	Checked By:	bfs
Depth :	11-13	Test Id:	506001		
Test Comment:	---				
Visual Description:	Moist, yellowish brown sand with silt and gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	41.0	47.9	11.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	86		
0.75 in	19.00	80		
0.5 in	12.50	72		
0.375 in	9.50	69		
#4	4.75	59		
#10	2.00	50		
#20	0.85	42		
#40	0.42	33		
#60	0.25	26		
#100	0.15	18		
#200	0.075	11		

Coefficients

D_{85} = 23.7257 mm
D_{30} = 0.3383 mm
D_{60} = 5.0952 mm
D_{15} = 0.1108 mm
D_{50} = 1.9779 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

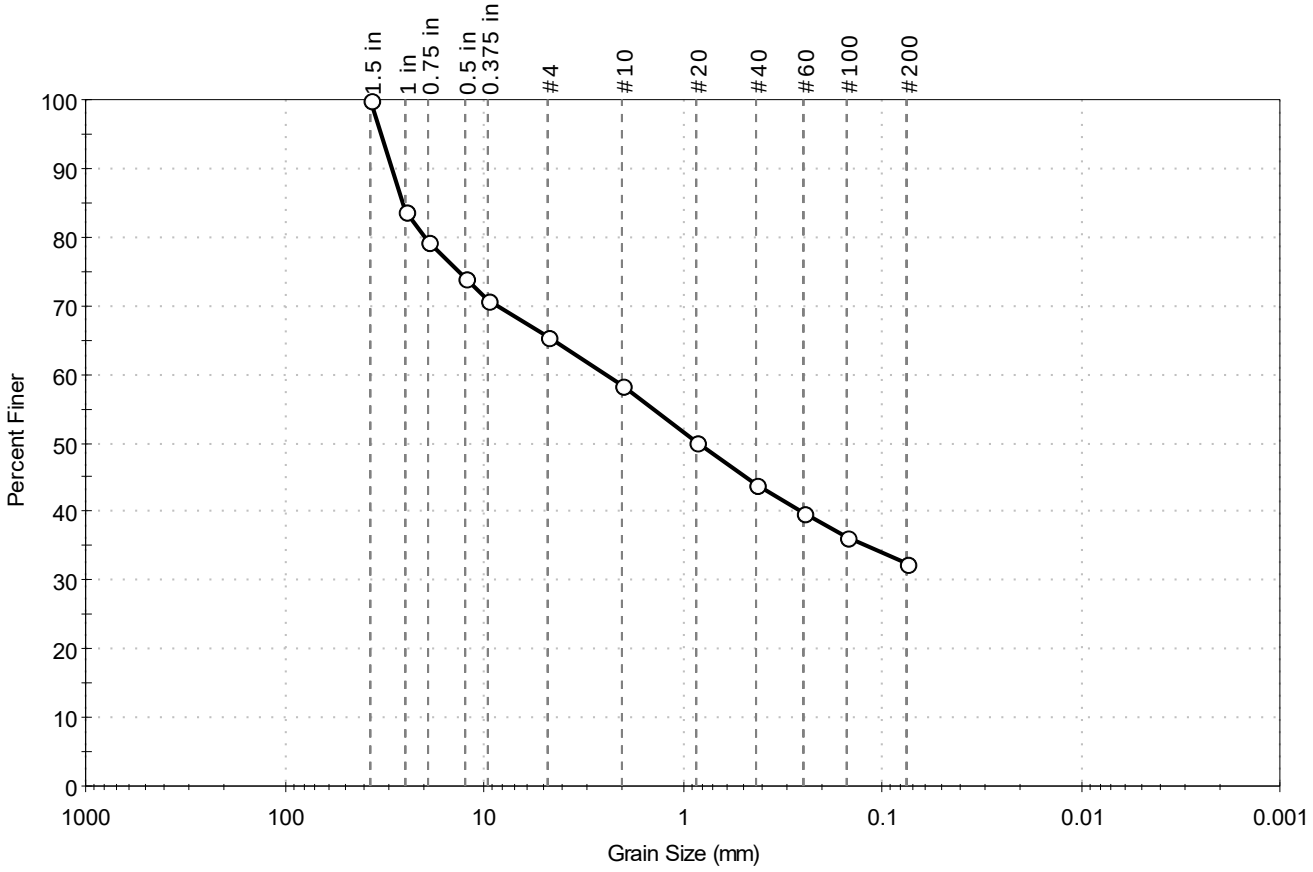
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III CSO CER				
Location:	Pawtucket, RI			Project No:	GTX-308335
Boring ID:	B17-46A	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-7 (2 jars)	Test Date:	05/31/19	Checked By:	bfs
Depth :	17-19	Test Id:	506002		
Test Comment:	---				
Visual Description:	Moist, yellowish brown silty gravel with sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	34.6	32.9	32.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	84		
0.75 in	19.00	79		
0.5 in	12.50	74		
0.375 in	9.50	71		
#4	4.75	65		
#10	2.00	58		
#20	0.85	50		
#40	0.42	44		
#60	0.25	40		
#100	0.15	36		
#200	0.075	33		

Coefficients

D_{85} = 25.8103 mm D_{30} = N/A

D_{60} = 2.4632 mm D_{15} = N/A

D_{50} = 0.8247 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-8	Sample Type:	cylinder	Tested By:	smd
Sample ID:	---	Test Date:	06/22/18	Checked By:	jsc
Depth :	28.0-28.8 ft	Test Id:	459781		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Axial Point Load Strength Index of Rock by ASTM D5731

Test No.	Specimen Depth	Diameter, in	Thickness, in	Failure Load (P), lbs	De, sq in	De, in	Is, psi	F	Is(50mm) psi	Generalized Correction Factor, K	Estimated Compressive Strength, psi
PLA-45	28.52-28.61 ft	2.40	1.02	288	3.11	1.76	*	0.952	*	19	*

Before

After

Discontinuity Failure

* Invalid Test - Specimen did not fail from point to point.

Notes: Generalized correction factor, K, used to estimate the compressive strength based on the specimen depth and ASTM D5731 Table 1.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

De = the equivalent core diameter

Is = the uncorrected point load strength index

F = the size correction factor

Is(50) = the size corrected point load strength index

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-8	Sample Type:	cylinder	Tested By:	smd
Sample ID:	---	Test Date:	06/22/18	Checked By:	jsc
Depth :	35.7-36.8 ft	Test Id:	459813		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Axial Point Load Strength Index of Rock by ASTM D5731

Test No.	Specimen Depth	Diameter, in	Thickness, in	Failure Load (P), lbs	De, sq in	De, in	Is, psi	F	Is(50mm) psi	Generalized Correction Factor, K	Estimated Compressive Strength, psi
PLA-46	35.73-35.82 ft	2.40	1.01	3,154	3.08	1.75	*	0.949	*	18	*

Before

After

Discontinuity Failure

* Invalid Test - Specimen did not fail from point to point.

Notes: Generalized correction factor, K, used to estimate the compressive strength based on the specimen depth and ASTM D5731 Table 1.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

De = the equivalent core diameter

Is = the uncorrected point load strength index

F = the size correction factor

Is(50) = the size corrected point load strength index

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-8	Sample Type:	cylinder	Tested By:	smd
Sample ID:	---	Test Date:	06/22/18	Checked By:	jsc
Depth :	35.7-36.8 ft	Test Id:	459782		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Axial Point Load Strength Index of Rock by ASTM D5731

Test No.	Specimen Depth	Diameter, in	Thickness, in	Failure Load (P), lbs	De, sq in	De, in	Is, psi	F	Is(50mm) psi	Generalized Correction Factor, K	Estimated Compressive Strength, psi
PLA-47	35.83-36.92 ft	2.40	1.00	2,887	3.06	1.75	944	0.948	895	18	17,000

Before

After

Discontinuity Failure

Notes: Generalized correction factor, K, used to estimate the compressive strength based on the specimen depth and ASTM D5731 Table 1.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

De = the equivalent core diameter

Is = the uncorrected point load strength index

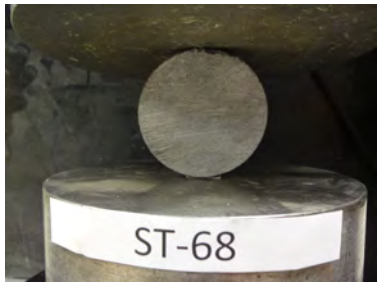
F = the size correction factor

Is(50) = the size corrected point load strength index

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-39	Sample Type:	cylinder	Tested By:	tlm
Sample ID:	---	Test Date:	09/16/19	Checked By:	smd
Depth :	39.3-40.8	Test Id:	519883		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Splitting Tensile Strength of Intact Rock Core Specimens by ASTM D3967

Specimen Depth	Test No	Thickness (L), in	Diameter (D), in	Thickness to Diameter Ratio (L/D)	Failure Load (P), lbs	Splitting Tensile Strength, psi	Failure Type
40.02 - 40.12 ft	ST-68	1.13	2.41	0.47	871	204	3



Notes: Strain rate: 2.5%/min.

ASTM requires the thickness-to-diameter ratio (L/D) of each test specimen to be between 0.2 and 0.75.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

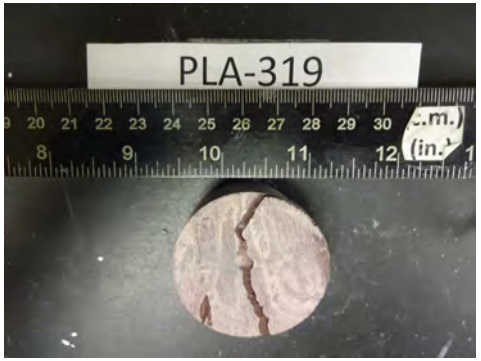
Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure (See attached photographs)

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-45	Sample Type:	tube	Tested By:	tlm
Sample ID:	---	Test Date:	06/07/19	Checked By:	smd
Depth :	29-29.4	Test Id:	506047		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Axial Point Load Strength Index of Rock by ASTM D5731

Test No.	Specimen Depth	Diameter, in	Thickness, in	Failure Load (P), lbs	De, sq in	De, in	Is, psi	F	Is(50mm) psi	Generalized Correction Factor, K	Estimated Compressive Strength, psi
PLA-319	29.0 - 29.4 ft	1.99	1.08	866	2.74	1.66	316	0.925	292	19	6,000

Before



After

Intact material and Discontinuity Failure

Notes: Generalized correction factor, K, used to estimate the compressive strength based on the specimen depth and ASTM D5731 Table 1.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

De = the equivalent core diameter

Is = the uncorrected point load strength index

F = the size correction factor

Is(50) = the size corrected point load strength index

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-45	Sample Type:	tube	Tested By:	tlm
Sample ID:	---	Test Date:	06/07/19	Checked By:	smd
Depth :	29.4-30	Test Id:	506048		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Axial Point Load Strength Index of Rock by ASTM D5731

Test No.	Specimen Depth	Diameter, in	Thickness, in	Failure Load (P), lbs	De, sq in	De, in	Is, psi	F	Is(50mm) psi	Generalized Correction Factor, K	Estimated Compressive Strength, psi
PLA-320	29.81 - 29.89 ft	1.99	1.01	1,097	2.54	1.60	431	0.910	392	18	7,760

Before

After

Intact material and Discontinuity Failure

Notes: Generalized correction factor, K, used to estimate the compressive strength based on the specimen depth and ASTM D5731 Table 1.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

De = the equivalent core diameter

Is = the uncorrected point load strength index

F = the size correction factor

Is(50) = the size corrected point load strength index

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-45	Sample Type:	tube	Tested By:	tlm
Sample ID:	---	Test Date:	06/07/19	Checked By:	smd
Depth :	42.4-43.4	Test Id:	506049		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Axial Point Load Strength Index of Rock by ASTM D5731

Test No.	Specimen Depth	Diameter, in	Thickness, in	Failure Load (P), lbs	De, sq in	De, in	Is, psi	F	Is(50mm) psi	Generalized Correction Factor, K	Estimated Compressive Strength, psi
PLA-321	42.83 - 42.92 ft	1.99	1.08	461	2.74	1.66	168	0.925	155	19	3,190

Before

After

Intact material and Discontinuity Failure

Notes: Generalized correction factor, K, used to estimate the compressive strength based on the specimen depth and ASTM D5731 Table 1.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

De = the equivalent core diameter

Is = the uncorrected point load strength index

F = the size correction factor

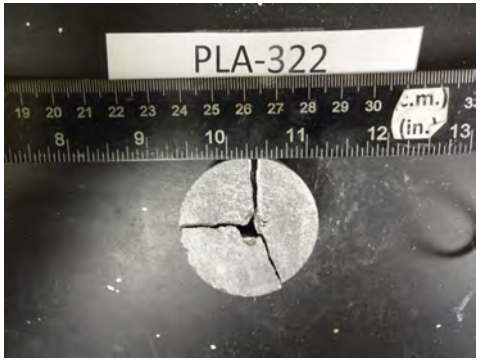
Is(50) = the size corrected point load strength index

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-45	Sample Type:	tube	Tested By:	tlm
Sample ID:	---	Test Date:	06/07/19	Checked By:	smd
Depth :	42.4-43.4	Test Id:	506076		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Axial Point Load Strength Index of Rock by ASTM D5731

Test No.	Specimen Depth	Diameter, in	Thickness, in	Failure Load (P), lbs	De, sq in	De, in	Is, psi	F	Is(50mm) psi	Generalized Correction Factor, K	Estimated Compressive Strength, psi
PLA-322	42.93 - 43.01 ft	1.99	1.03	3,138	2.62	1.62	1199	0.915	1098	19	22,800

Before



After

Intact Material Failure

Notes: Generalized correction factor, K, used to estimate the compressive strength based on the specimen depth and ASTM D5731 Table 1.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

De = the equivalent core diameter

Is = the uncorrected point load strength index

F = the size correction factor

Is(50) = the size corrected point load strength index

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	---	Sample Type:	---	Tested By:	pas
Sample ID:	---	Test Date:	06/29/18	Checked By:	jsc
Depth :	---	Test Id:	459770		

Bulk Density and Compressive Strength of Rock Core Specimens by ASTM D7012 Method C

Boring ID	Sample Number	Depth	Bulk Density, pcf	Compressive strength, psi	Failure Type	Meets ASTM D4543	Note(s)
B17-8	---	28.07-28.51ft	176	3511	2	Yes	---
B17-8	---	77.90-78.34ft	172	8759	2	Yes	---
B17-8	---	104.90-105.32 ft	168	15603	1	Yes	---
B17-8	---	132.01-132.43 ft	171	12909	1	Yes	---
B17-8	---	151.31-151.74 ft	170	2500	2	Yes	---
B17-8	---	159.45-159.88 ft	169	10800	1	Yes	---
B17-8	---	174.11-174.55 ft	170	3947	2	Yes	---

Notes: Density determined on core samples by measuring dimensions and weight and then calculating.

All specimens tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure (See attached photographs)

Client:	Pare Corpoartion	Test Date:	6/26/2018
Project Name:	NBC Phase III- Sewer Overflow	Tested By:	meo/trm
Project Location:	Pawtucket, RI	Checked By:	jsc
GTX #:	307508		
Boring ID:	B17-8		
Sample ID:	---		
Depth:	28.07-28.51 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.75	4.75	4.75
Specimen Diameter, in:	2.40	2.40	2.40
Specimen Mass, g:	993.22		
Bulk Density, lb/ft^3	176	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.0	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

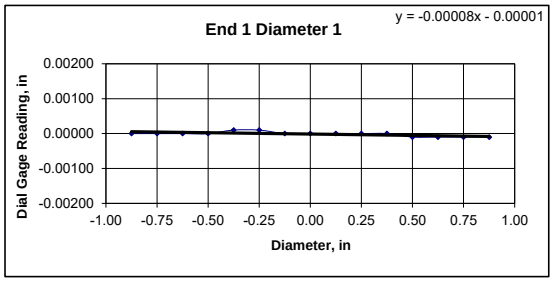
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010

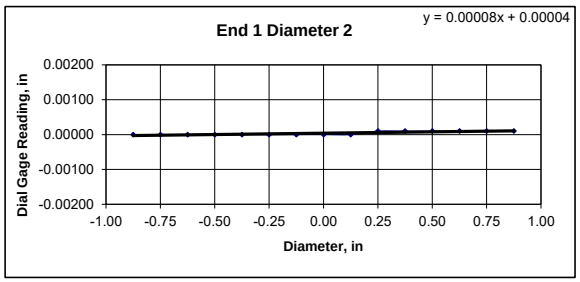
Difference between max and min readings, in:
0° = 0.00020 90° = 0.00010

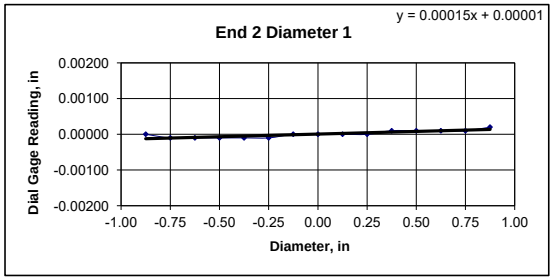
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	0.00010	0.00020
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00000	0.00000	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000

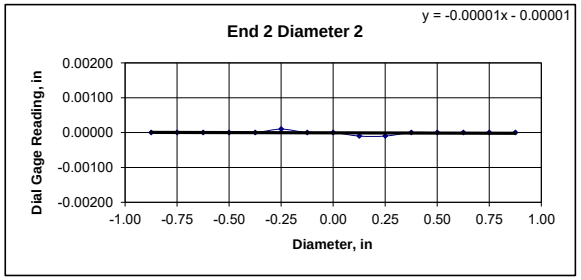
Difference between max and min readings, in:
0° = 0.0003 90° = 0.0002

Maximum difference must be < 0.0020 in. Difference = ± 0.00015
Flatness Tolerance Met? YES









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00008
Angle of Best Fit Line: 0.00442

End 2:
Slope of Best Fit Line 0.00015
Angle of Best Fit Line: 0.00851

Maximum Angular Difference: 0.00409

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00008
Angle of Best Fit Line: 0.00442

End 2:
Slope of Best Fit Line 0.00001
Angle of Best Fit Line: 0.00082

Maximum Angular Difference: 0.00360

Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00020	2.400	0.00008	0.005	YES
Diameter 2, in (rotated 90°)	0.00010	2.400	0.00004	0.002	YES
END 2					
Diameter 1, in	0.00030	2.400	0.00013	0.007	YES
Diameter 2, in (rotated 90°)	0.00020	2.400	0.00008	0.005	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? YES

Client:	Pare Corpoartion
Project Name:	NBC Phase III- Sewer Overflow
Project Location:	Pawtucket, RI
GTX #:	307508
Test Date:	6/26/2018
Tested By:	trm
Checked By:	jsc
Boring ID:	B17-8
Sample ID:	---
Depth, ft:	28.07-28.51

After cutting and grinding

After break

GeoTesting EXPRESS

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	---	Sample Type:	---	Tested By:	tlm
Sample ID:	---	Test Date:	09/05/19	Checked By:	smd
Depth :	---	Test Id:	519892		

Bulk Density and Compressive Strength of Rock Core Specimens by ASTM D7012 Method C

Boring ID	Sample Number	Depth	Bulk Density, pcf	Compressive strength, psi	Failure Type	Meets ASTM D4543	Note(s)
B17-39	---	28.0 - 28.45 ft	174	2865	2	Yes	---
B17-39	---	39.56 - 40.01 ft	180	6377	2	Yes	---
B17-39	---	52.0-52.45 ft.	174	4911	1	Yes	---
B17-39	---	69.71 - 70.16 ft	165	7599	2	Yes	---
B17-39	---	94.63 - 95.08 ft	167	5963	2	Yes	---
B17-39	---	111.74 - 112.19 ft	174	9335	3	Yes	---
B17-39	---	137.59 - 138.04 ft	167	13706	3	Yes	---

Notes: Density determined on core samples by measuring dimensions and weight and then calculating.

All specimens tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure (See attached photographs)

GeoTesting EXPRESS

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-39	Sample Type:	cylinder	Tested By:	tlm
Sample ID:	---	Test Date:	09/05/19	Checked By:	smd
Depth :	167-167.7	Test Id:	519893		
Test Comment:	---				
Visual Description:	See photograph(s)				
Sample Comment:	---				

Bulk Density and Compressive Strength of Rock Core Specimens by ASTM D7012 Method C

Boring ID	Sample Number	Depth	Bulk Density, pcf	Compressive strength, psi	Failure Type	Meets ASTM D4543	Note(s)
B17-39	---	167.18 - 167.63 ft	169	10824	3	Yes	---

Notes: Density determined on core samples by measuring dimensions and weight and then calculating.

All specimens tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure (See attached photographs)

Client:	Pare Corporation	Test Date:	9/4/2019
Project Name:	NBC Phase III -Sewer Overflow	Tested By:	jck
Project Location:	Pawtucket, RI	Checked By:	smd
GTX #:	307508		
Boring ID:	B17-39		
Sample ID:	---		
Depth:	28.0-28.45 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	5.33	5.33	5.33
Specimen Diameter, in:	2.40	2.40	2.40
Specimen Mass, g:	1104.85		
Bulk Density, lb/ft^3	174	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

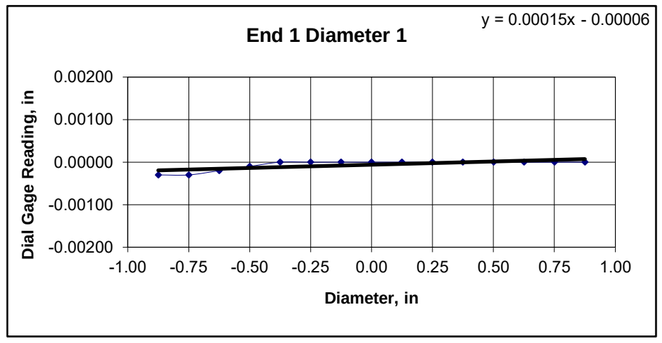
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00030	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	-0.00030	-0.00020	-0.00020	-0.00020	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

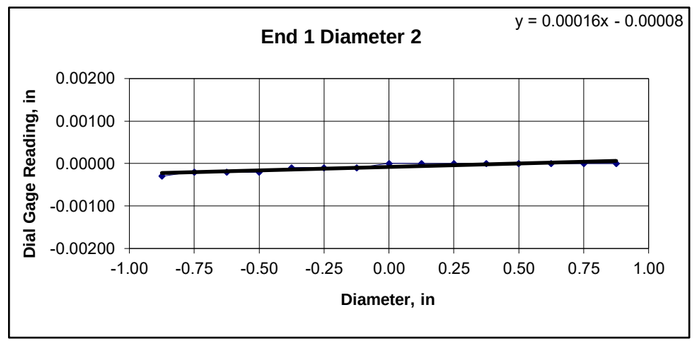
Difference between max and min readings, in:
0° = 0.00030 90° = 0.00030

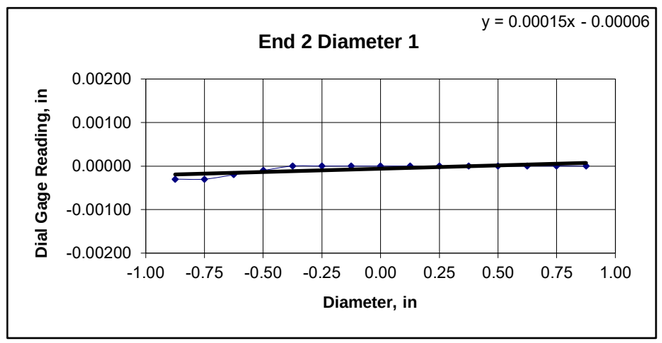
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00030	-0.00030	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	-0.00030	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

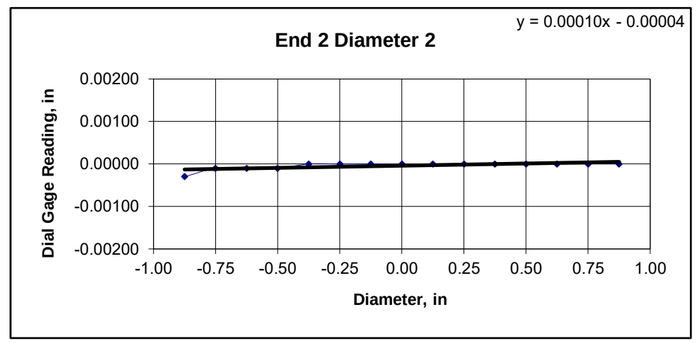
Difference between max and min readings, in:
0° = 0.0003 90° = 0.0003

Maximum difference must be < 0.0020 in. Difference = ± 0.00015
Flatness Tolerance Met? YES









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00015
Angle of Best Fit Line: 0.00868

End 2:
Slope of Best Fit Line 0.00015
Angle of Best Fit Line: 0.00868

Maximum Angular Difference: 0.00000

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00016
Angle of Best Fit Line: 0.00933

End 2:
Slope of Best Fit Line 0.00010
Angle of Best Fit Line: 0.00589

Maximum Angular Difference: 0.00344

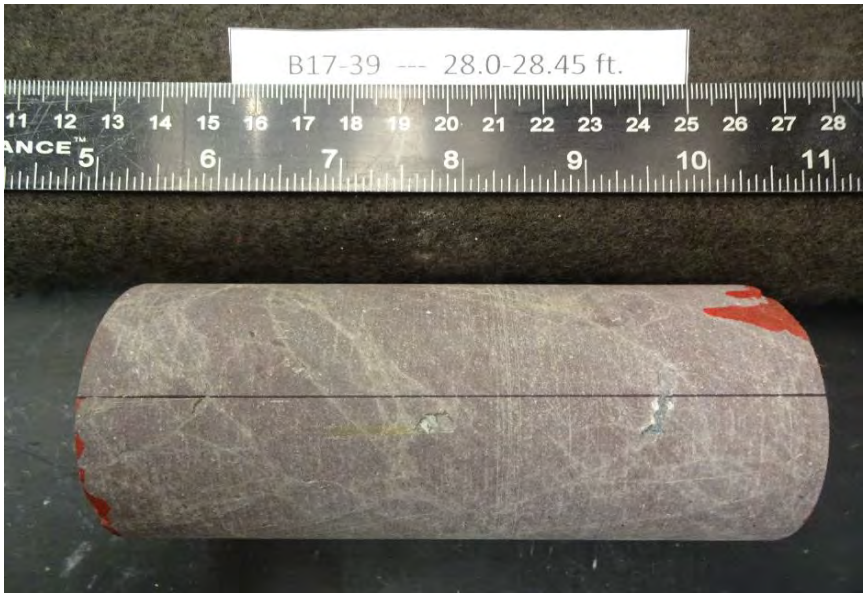
Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

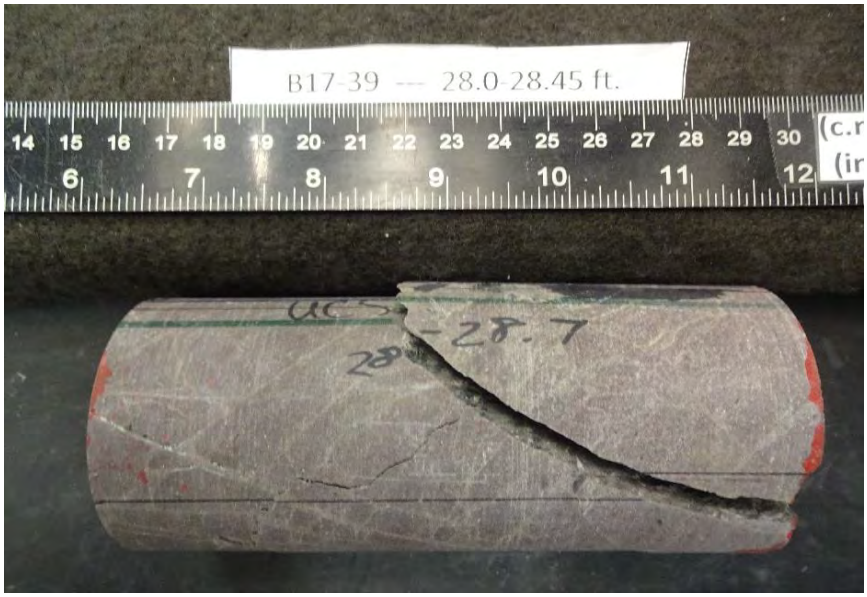
END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	2.400	0.00013	0.007	YES
Diameter 2, in (rotated 90°)	0.00030	2.400	0.00013	0.007	YES
END 2					
Diameter 1, in	0.00030	2.400	0.00013	0.007	YES
Diameter 2, in (rotated 90°)	0.00030	2.400	0.00013	0.007	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? YES

Client:	Pare Corporation
Project Name:	NBC Phase III -Sewer Overflow
Project Location:	Pawtucket, RI
GTX #:	307508
Test Date:	9/4/2019
Tested By:	jck
Checked By:	smd
Boring ID:	B17-39
Sample ID:	---
Depth, ft:	28.0-28.45



After cutting and grinding



After break

Client:	Pare Corporation	Test Date:	9/4/2019
Project Name:	NBC Phase III -Sewer Overflow	Tested By:	jck
Project Location:	Pawtucket, RI	Checked By:	smd
GTX #:	307508		
Boring ID:	B17-39		
Sample ID:	---		
Depth:	39.56-40.01 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	5.45	5.45	5.45
Specimen Diameter, in:	2.40	2.41	2.41
Specimen Mass, g:	1169.39		
Bulk Density, lb/ft^3	180	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.3	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00030	-0.00030	-0.00020	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00020	0.00020	0.00020	0.00010
Diameter 2, in (rotated 90°)	-0.00030	-0.00030	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

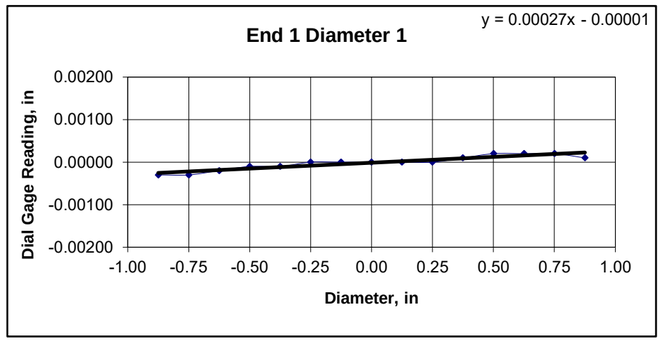
Difference between max and min readings, in: 0° = 0.00050 90° = 0.00030

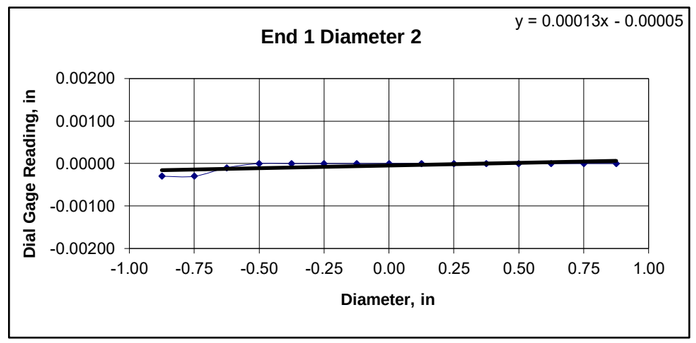
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00030	-0.00030	-0.00020	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	0.00020	0.00010
Diameter 2, in (rotated 90°)	-0.00030	-0.00030	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

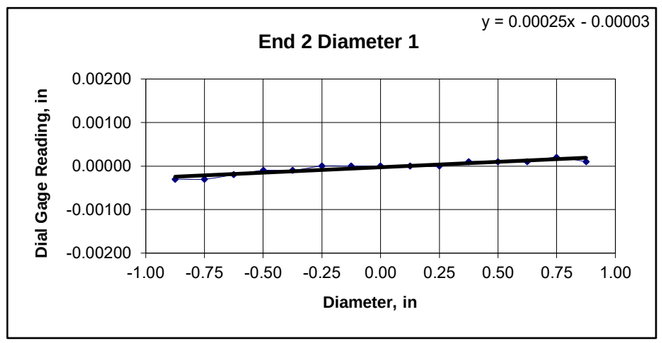
Difference between max and min readings, in: 0° = 0.0005 90° = 0.0003

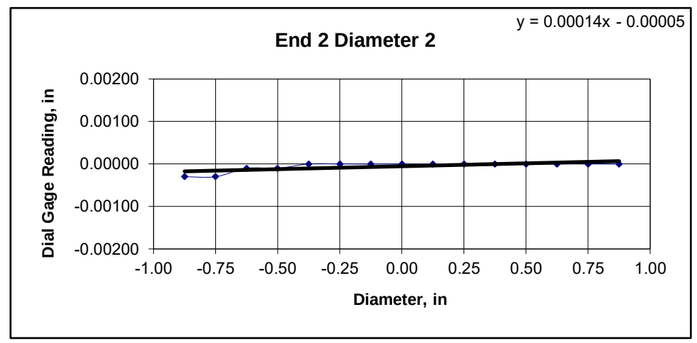
Maximum difference must be < 0.0020 in. Difference = ± 0.00025

Flatness Tolerance Met? YES









DIAMETER 1

End 1:
- Slope of Best Fit Line: 0.00027
- Angle of Best Fit Line: 0.01572

End 2:
- Slope of Best Fit Line: 0.00025
- Angle of Best Fit Line: 0.01424

Maximum Angular Difference: 0.00147

Parallelism Tolerance Met? YES

Spherically Seated

DIAMETER 2

End 1:
- Slope of Best Fit Line: 0.00013
- Angle of Best Fit Line: 0.00720

End 2:
- Slope of Best Fit Line: 0.00014
- Angle of Best Fit Line: 0.00786

Maximum Angular Difference: 0.00065

Parallelism Tolerance Met? YES

Spherically Seated

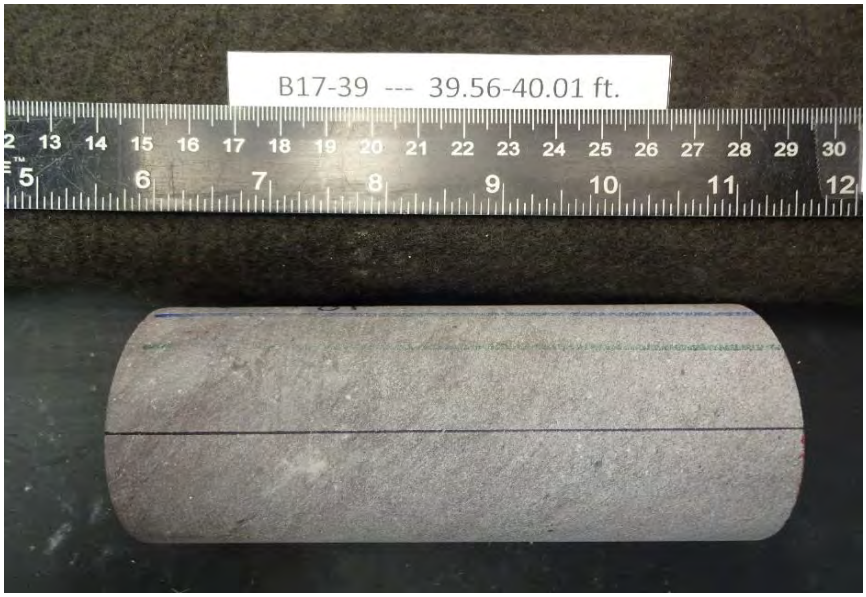
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00050	2.405	0.00021	0.012	YES
Diameter 2, in (rotated 90°)	0.00030	2.405	0.00012	0.007	YES
END 2					
Diameter 1, in	0.00050	2.405	0.00021	0.012	YES
Diameter 2, in (rotated 90°)	0.00030	2.405	0.00012	0.007	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Pare Corporation
Project Name:	NBC Phase III -Sewer Overflow
Project Location:	Pawtucket, RI
GTX #:	307508
Test Date:	9/4/2019
Tested By:	jck
Checked By:	smd
Boring ID:	B17-39
Sample ID:	---
Depth, ft:	39.56-40.01



After cutting and grinding

After break

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	---	Sample Type:	---	Tested By:	tlm
Sample ID:	---	Test Date:	06/12/19	Checked By:	smd
Depth :	---	Test Id:	506118		

Bulk Density and Compressive Strength of Rock Core Specimens by ASTM D7012 Method C

Boring ID	Sample Number	Depth	Bulk Density, pcf	Compressive strength, psi	Failure Type	Meets ASTM D4543	Note(s)
B17-45	---	30.37 - 30.73 ft	173	4565	2	Yes	---
B17-45	---	42.49 - 42.82 ft	172	5692	1	Yes	---

Notes: Density determined on core samples by measuring dimensions and weight and then calculating.

All specimens tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure (See attached photographs)

Client:	Pare Corporation	Test Date:	6/19/2019
Project Name:	NBC Phase III -Sewer Overflow	Tested By:	jck
Project Location:	Pawtucket, RI	Checked By:	jsc
GTX #:	307508		
Boring ID:	B17-45		
Sample ID:	---		
Depth:	30.37-30.73 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	3.97	3.96	3.97
Specimen Diameter, in:	1.98	1.99	1.99
Specimen Mass, g:	556.89		
Bulk Density, lb/ft^3	173	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.0	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

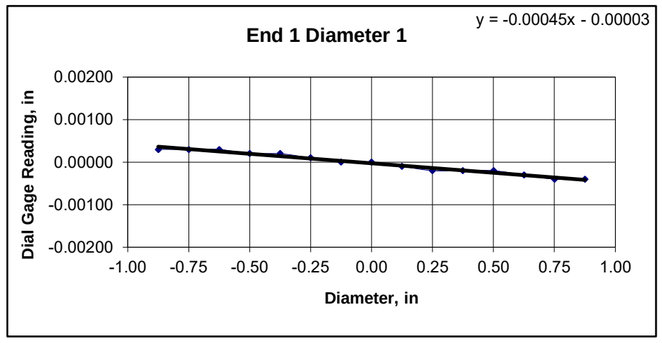
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00030	0.00030	0.00030	0.00020	0.00020	0.00010	0.00000	0.00000	-0.00010	-0.00020	-0.00020	-0.00020	-0.00030	-0.00040	-0.00040
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00020	0.00010	0.00000	0.00000	0.00000	0.00000

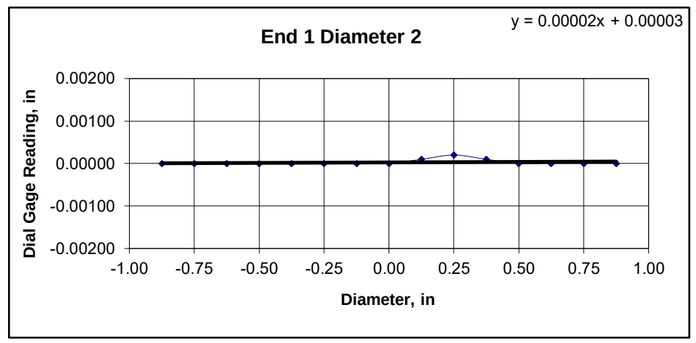
Difference between max and min readings, in:
0° = 0.00070 90° = 0.00020

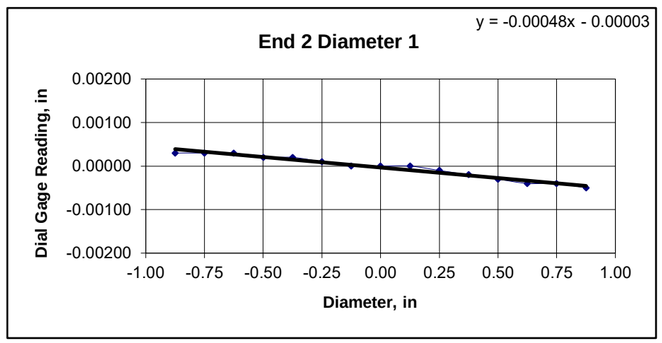
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00030	0.00030	0.00030	0.00020	0.00020	0.00010	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00030	-0.00040	-0.00040	-0.00050
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	0.00000	0.00000	0.00000	0.00000

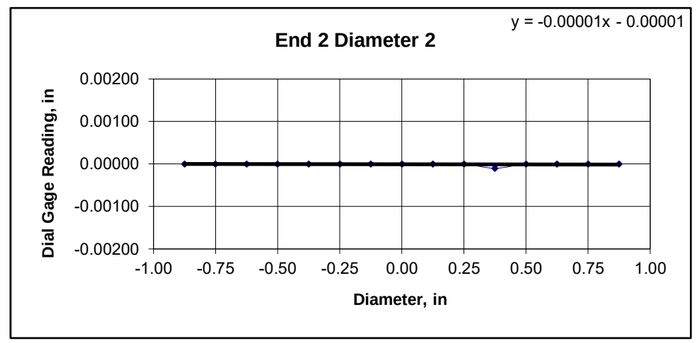
Difference between max and min readings, in:
0° = 0.0008 90° = 0.0001

Maximum difference must be < 0.0020 in. Difference = ± 0.00040
Flatness Tolerance Met? YES









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00045
Angle of Best Fit Line: 0.02554

End 2:
Slope of Best Fit Line 0.00048
Angle of Best Fit Line: 0.02767

Maximum Angular Difference: 0.00213

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00002
Angle of Best Fit Line: 0.00131

End 2:
Slope of Best Fit Line 0.00001
Angle of Best Fit Line: 0.00049

Maximum Angular Difference: 0.00082

Parallelism Tolerance Met? YES
Spherically Seated

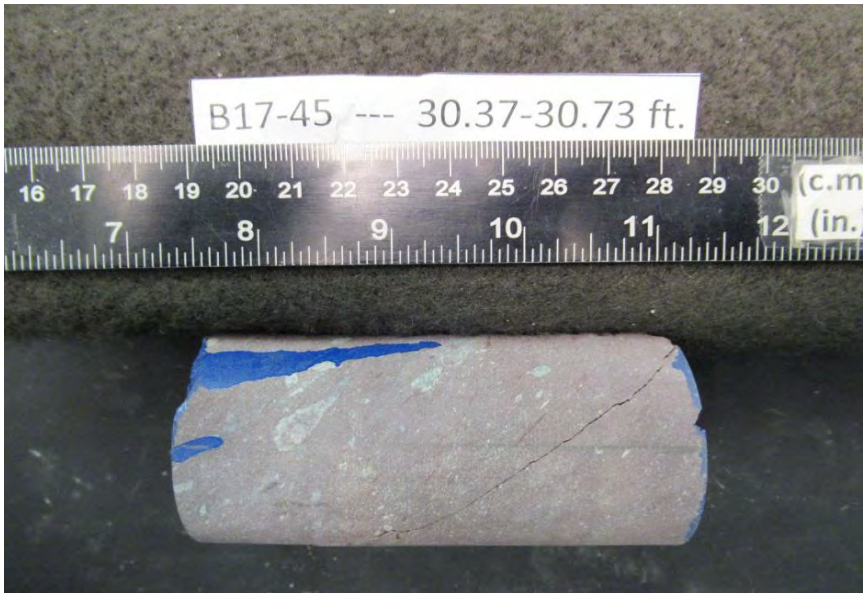
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00070	1.985	0.00035	0.020	YES
Diameter 2, in (rotated 90°)	0.00020	1.985	0.00010	0.006	YES
END 2					
Diameter 1, in	0.00080	1.985	0.00040	0.023	YES
Diameter 2, in (rotated 90°)	0.00010	1.985	0.00005	0.003	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? YES

Client:	Pare Corporation
Project Name:	NBC Phase III -Sewer Overflow
Project Location:	Pawtucket, RI
GTX #:	307508
Test Date:	6/18/2019
Tested By:	jck
Checked By:	jsc
Boring ID:	B17-45
Sample ID:	---
Depth, ft:	30.37-30.73

After cutting and grinding



After break

Client:	Pare Corporation	Test Date:	6/6/2019
Project Name:	NBC Phase III -Sewer Overflow	Tested By:	cmh
Project Location:	Pawtucket, RI	Checked By:	jsc
GTX #:	307508		
Boring ID:	B17-45		
Sample ID:	---		
Depth:	42.49-42.82 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	3.91	3.91	3.91
Specimen Diameter, in:	1.98	1.98	1.98
Specimen Mass, g:	546.03		
Bulk Density, lb/ft^3	172	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.0	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

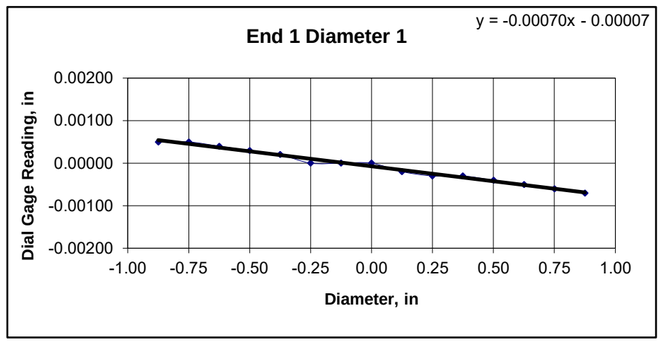
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00050	0.00050	0.00040	0.00030	0.00020	0.00000	0.00000	0.00000	-0.00020	-0.00030	-0.00030	-0.00040	-0.00050	-0.00060	-0.00070
Diameter 2, in (rotated 90°)	-0.00020	-0.00020	-0.00020	-0.00020	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00020	0.00020	0.00020	0.00020	0.00020

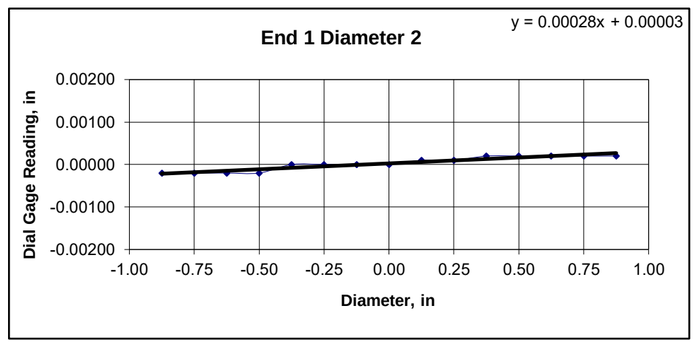
Difference between max and min readings, in:
0° = 0.00120 90° = 0.00040

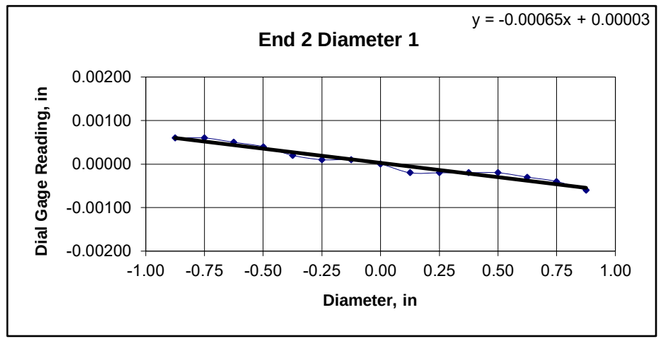
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00060	0.00060	0.00050	0.00040	0.00020	0.00010	0.00010	0.00000	-0.00020	-0.00020	-0.00020	-0.00020	-0.00030	-0.00040	-0.00060
Diameter 2, in (rotated 90°)	-0.00020	-0.00020	-0.00020	-0.00020	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00010	0.00000	0.00000	0.00010	0.00020	0.00020

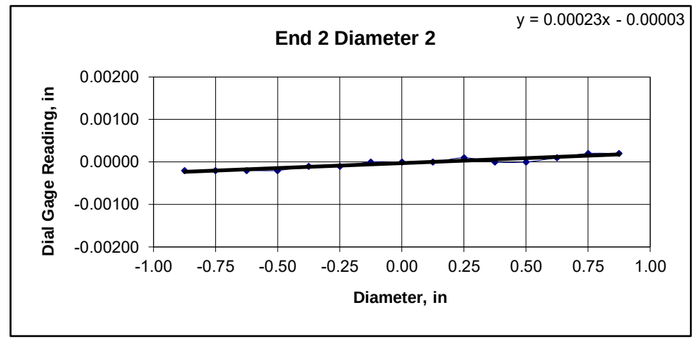
Difference between max and min readings, in:
0° = 0.0012 90° = 0.0004

Maximum difference must be < 0.0020 in. Difference = ± 0.00060
Flatness Tolerance Met? YES









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00070
Angle of Best Fit Line: 0.04027

End 2:
Slope of Best Fit Line 0.00065
Angle of Best Fit Line: 0.03749

Maximum Angular Difference: 0.00278

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00028
Angle of Best Fit Line: 0.01588

End 2:
Slope of Best Fit Line 0.00023
Angle of Best Fit Line: 0.01342

Maximum Angular Difference: 0.00246

Parallelism Tolerance Met? YES
Spherically Seated

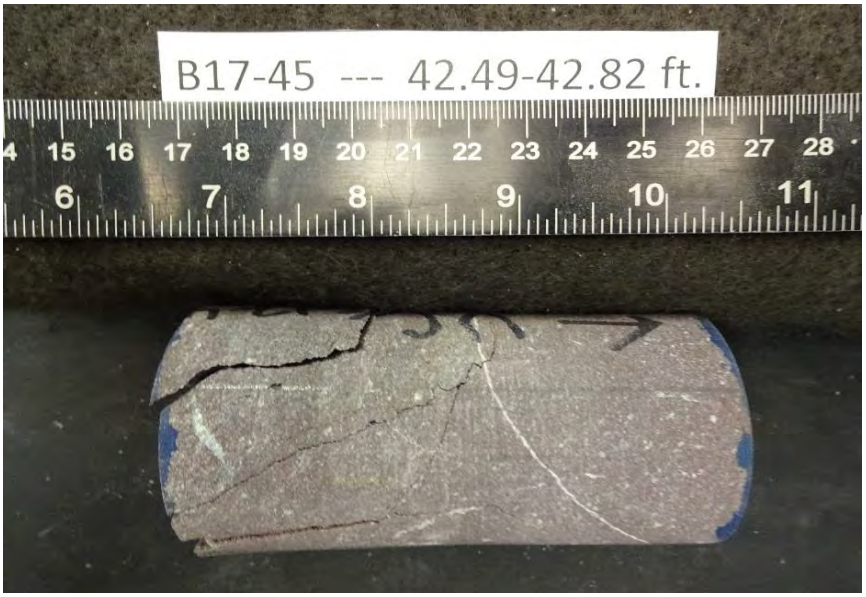
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00120	1.980	0.00061	0.035	YES
Diameter 2, in (rotated 90°)	0.00040	1.980	0.00020	0.012	YES
END 2					
Diameter 1, in	0.00120	1.980	0.00061	0.035	YES
Diameter 2, in (rotated 90°)	0.00040	1.980	0.00020	0.012	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? YES

Client:	Pare Corporation
Project Name:	NBC Phase III -Sewer Overflow
Project Location:	Pawtucket, RI
GTX #:	307508
Test Date:	6/10/2019
Tested By:	jck
Checked By:	jsc
Boring ID:	B17-45
Sample ID:	---
Depth, ft:	42.49-42.82

After cutting and grinding

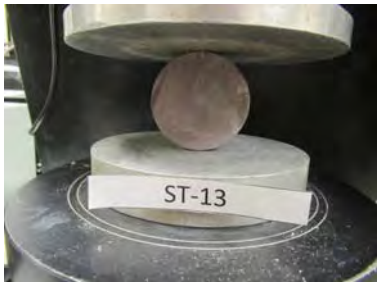


After break

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-8	Sample Type:	cylinder	Tested By:	smd
Sample ID:	---	Test Date:	06/28/18	Checked By:	jsc
Depth :	46.6-47.3 ft	Test Id:	459777		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Splitting Tensile Strength of Intact Rock Core Specimens by ASTM D3967

Specimen Depth	Test No	Thickness (L), in	Diameter (D), in	Thickness to Diameter Ratio (L/D)	Failure Load (P), lbs	Splitting Tensile Strength, psi	Failure Type
47.11-47.20 ft	St-13	1.02	2.40	0.42	5,229	1,370	2



Notes: Strain rate: 2.5%/min.

ASTM requires the thickness-to-diameter ratio (L/D) of each test specimen to be between 0.2 and 0.75.

The reported thickness (L) is the average of three measurements.

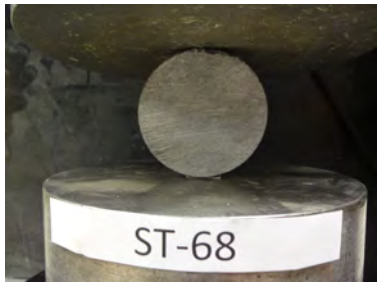
The reported diameter(D) is the average of three measurements.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure (See attached photographs)

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-39	Sample Type:	cylinder	Tested By:	tlm
Sample ID:	---	Test Date:	09/16/19	Checked By:	smd
Depth :	39.3-40.8	Test Id:	519883		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Splitting Tensile Strength of Intact Rock Core Specimens by ASTM D3967

Specimen Depth	Test No	Thickness (L), in	Diameter (D), in	Thickness to Diameter Ratio (L/D)	Failure Load (P), lbs	Splitting Tensile Strength, psi	Failure Type
40.02 - 40.12 ft	ST-68	1.13	2.41	0.47	871	204	3



Notes: Strain rate: 2.5%/min.

ASTM requires the thickness-to-diameter ratio (L/D) of each test specimen to be between 0.2 and 0.75.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure (See attached photographs)

HAGER-RICHTER
GEOSCIENCE, INC.

SEISMIC REFRACTION SURVEY
NARRAGANSETT BAY COMMISSION
COMBINED SEWER OVERFLOW PROJECT
PAWTUCKET MAIN TUNNEL SECTION
PAWTUCKET, RHODE ISLAND

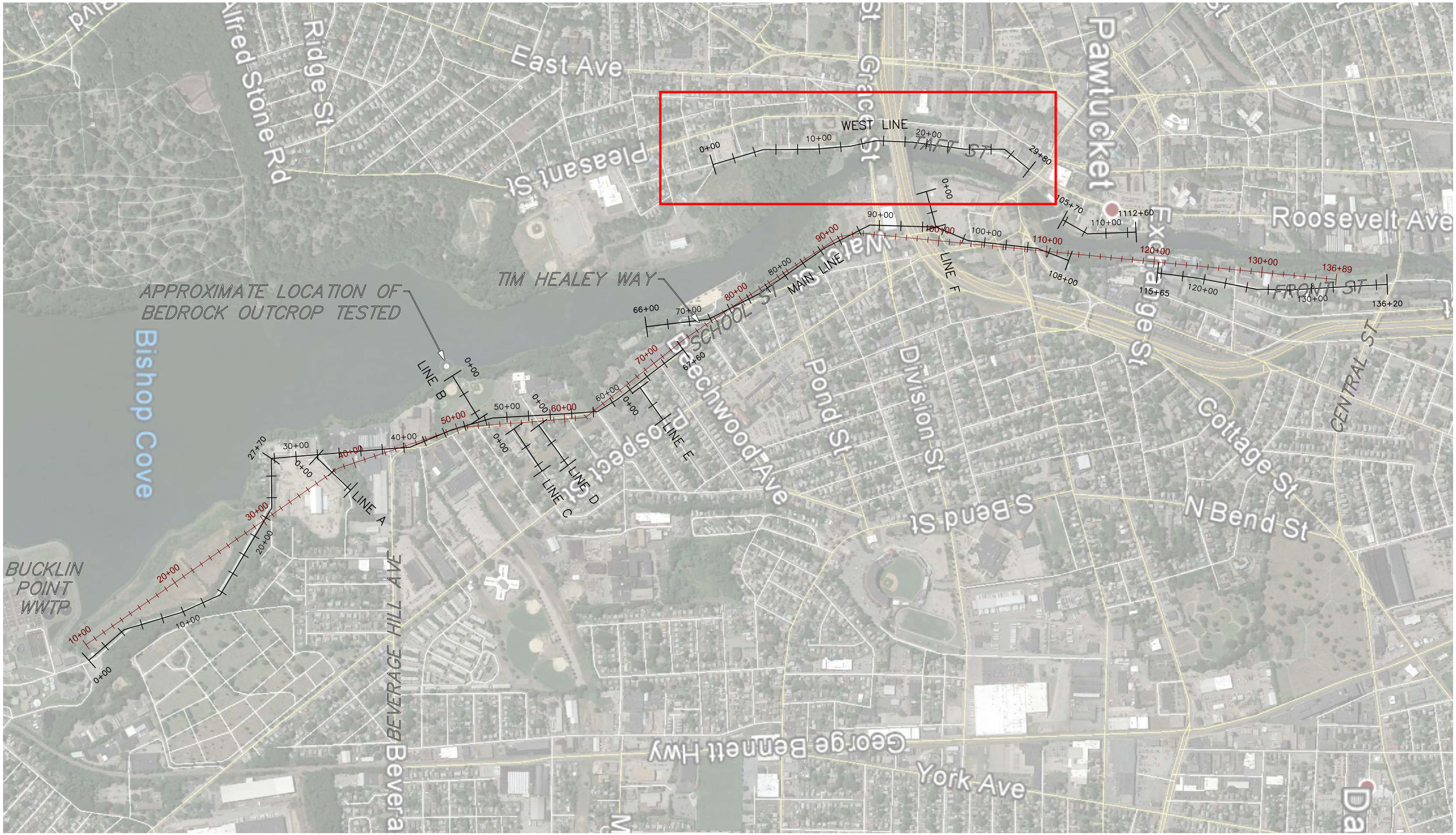
Prepared for:

Stantec
260 West Exchange Street, Suite 001
Providence, Rhode Island 02903

Prepared by:

Hager-Richter Geoscience, Inc.
8 Industrial Way - D10
Salem, New Hampshire 03079

File 17J33
November, 2017



LEGEND

0+00 — 27+70 SEISMIC LINE

130+00 — 136+89 MAIN LINE TUNNEL – ALTERNATIVE 5A ALIGNMENT PER STANTEC

SCALE (feet)
0 400 800

H-R N

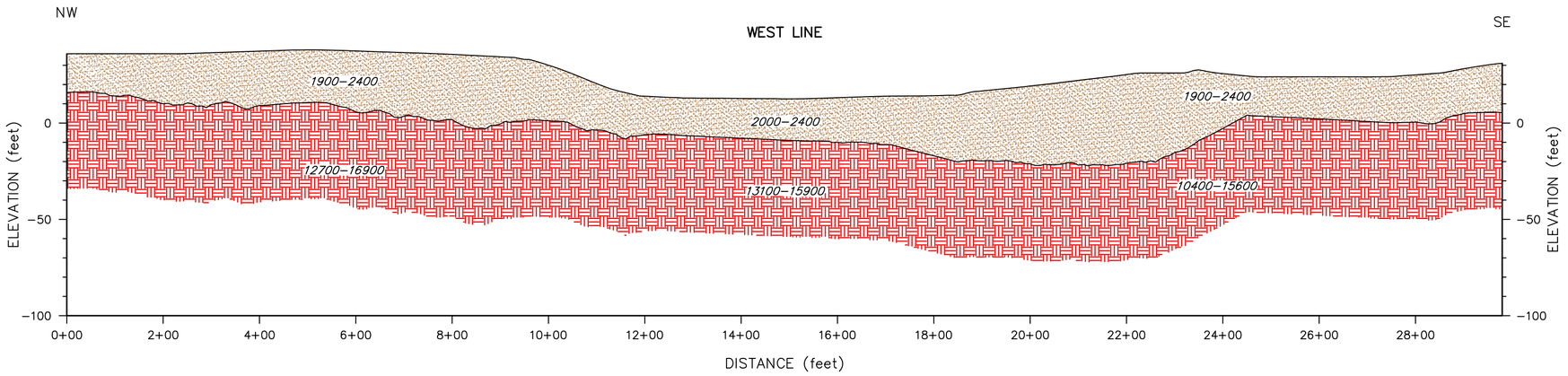
NOTE:

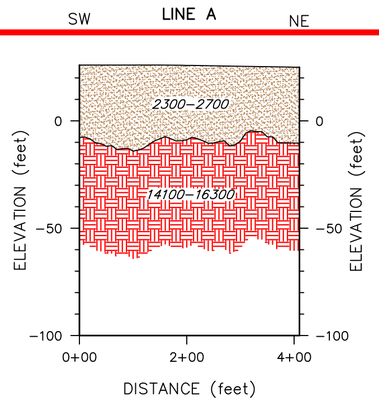
Modified from Google Earth Pro aerial photograph.

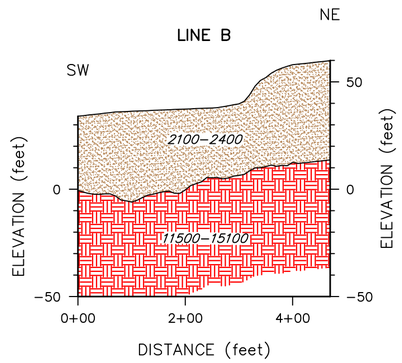
PLATE 1
SEISMIC LINE LOCATIONS
NARRAGANSETT BAY COMMISSION
COMBINED SEWER OVERFLOW PROJECT
PAWTUCKET MAIN TUNNEL SECTION
PAWTUCKET, RHODE ISLAND

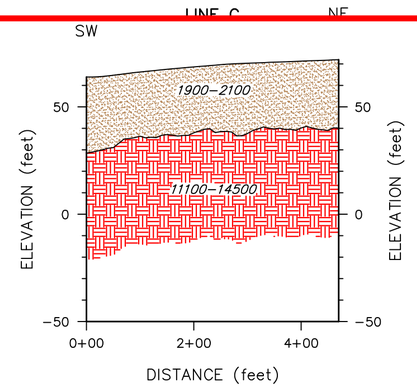
FILE 17J33 | NOVEMBER, 2017

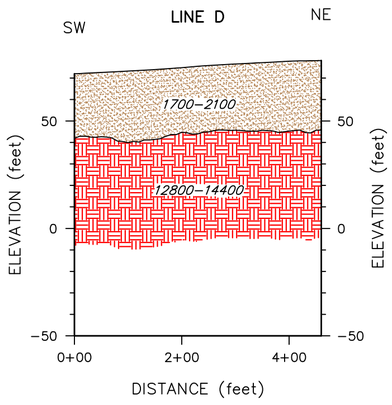
HAGER–RICHTER
SALEM, NH | FORDS, NJ

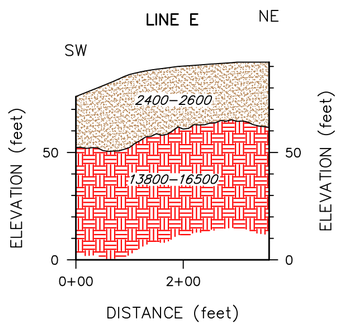


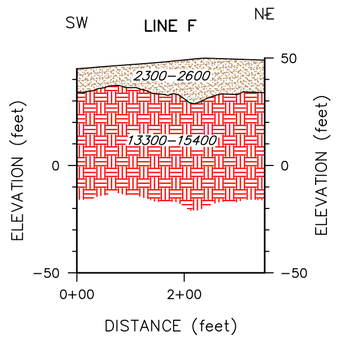












NOTES:

1. Estimated accuracy (standard deviation) of depth of bedrock is ±10% or 2 feet, whichever is greater.
2. The depths determined for bedrock are depths of competent rock; weathered and/or fractured bedrock might occur at shallower depths.
3. Surface elevations determined from plans provided by Stantec. Vertical datum is NGVD 1929.
4. Data were analyzed using the Generalized Reciprocal Method.

SCALE (feet)
0 100 200
Vertical Exaggeration = 4X

LEGEND

- UNSATURATED / PARTIALLY SATURATED SOILS
- COMPETENT BEDROCK
- 12200–14100 VELOCITY (fps)
- INTERFACE DETERMINED FROM SEISMIC REFRACTION DATA

PLATE 3
SEISMIC PROFILES – WEST LINE & CROSS LINES
NARRAGANSETT BAY COMMISSION
COMBINED SEWER OVERFLOW PROJECT
PAWTUCKET MAIN TUNNEL SECTION
PAWTUCKET, RHODE ISLAND

FILE 17J33 | NOVEMBER, 2017

HAGER–RICHTER
SALEM, NH | FORDS, NJ

Pawtucket Bridge No. 550

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	RI	BRO-0550(003) IM-0550(004) IMG-0550(005)	2010	1	196

INDEX - VOLUME 3 BRIDGE PLANS

R.I. STANDARD SPECIFICATIONS AND STANDARD DETAILS

SPECIFICATIONS TO GOVERN THIS PROJECT ARE THE R.I. STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2004 EDITION, WITH ALL REVISIONS, AND THE STATE AND FEDERAL SPECIAL PROVISIONS INCLUDED IN THE CONTRACT DOCUMENTS. STANDARD DETAILS FOR THIS PROJECT ARE R.I. STANDARD DETAILS, 1998 EDITION, WITH ALL REVISIONS.

STATE OF RHODE ISLAND

DEPARTMENT OF TRANSPORTATION

PLANS, PROFILES AND SECTIONS OF PROPOSED

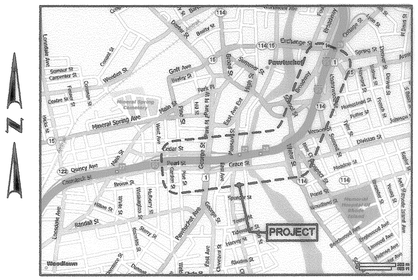
BRIDGE REPLACEMENT

PAWTUCKET BRIDGE NO. 550
I-95 OVER THE SEEKONK RIVER
VOLUME 3 BRIDGE PLANS

PROJECT LIMITS

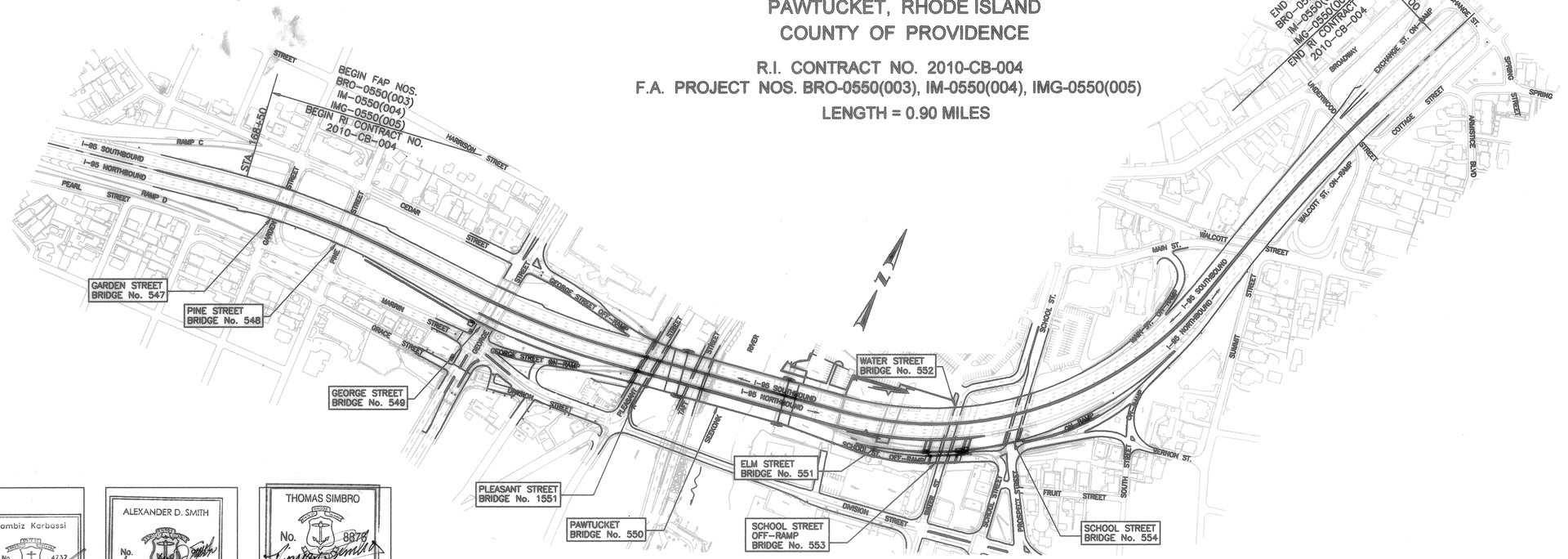
GARDEN STREET BRIDGE TO EXCHANGE STREET BRIDGE
PAWTUCKET, RHODE ISLAND
COUNTY OF PROVIDENCE

R.I. CONTRACT NO. 2010-CB-004
F.A. PROJECT NOS. BRO-0550(003), IM-0550(004), IMG-0550(005)
LENGTH = 0.90 MILES



LOCATION MAP

SEE VOLUME 1 FOR HIGHWAY PLANS
SEE VOLUME 2 FOR HIGHWAY CROSS-SECTIONS AND PROFILES
VOLUME 3 BRIDGE PLANS: BRIDGE PHASING, BRIDGE DEMOLITION, SUBSURFACE EXPLORATION
PLEASANT STREET BRIDGE NO. 1551
PAWTUCKET BRIDGE NO. 550
WATER STREET BRIDGE NO. 552
SCHOOL STREET OFF-RAMP BRIDGE NO. 553
SCHOOL STREET BRIDGE NO. 554
RETAINING WALLS
SEE VOLUME 4 FOR ELECTRICAL AND ARCHITECTURAL PLANS
SEE VOLUME 5 FOR BRIDGE PLANS: GARDEN STREET NO. 547
PINE STREET BRIDGE NO. 548
GEORGE STREET BRIDGE NO. 549
SEE VOLUME 6 FOR HIGHWAY PLANS



LAYOUT PLAN
SCALE: 1"=200'

DESIGN DESIGNATION I-95

2010 AADT = 184,600 V.P.D.
2030 AADT = 244,200 V.P.D.
2010 DHV = 14,400 V.P.H.
2030 DHV = 19,000 V.P.H.
D = 50/50
K = 7.8%
T = 13.1%
V = 50 MPH

BASE OF LEVELS
NGVD 1929 VERTICAL
RI PLANE COORDINATE SYSTEM
NAD 1983 HORIZONTAL

COMMONWEALTH ENGINEERS & CONSULTANTS, INC.
400 SMITH STREET
PROVIDENCE, RI 02908

Contract Number 2010-CB-004
Volume Number 3
Number of Sheet G-1
Total Sheets 196

R.I. DEPARTMENT OF TRANSPORTATION

APPROVED
DEPUTY CHIEF ENGINEER — DATE 3/26/10

APPROVED
CHIEF ENGINEER — DATE 3/29/10

APPROVED
DIRECTOR — DATE 3/29/10

US DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR — DATE 4/7/10

Kambiz Karbassi, No. 4737, REGISTERED PROFESSIONAL ENGINEER, 3/25/10
COMMONWEALTH ENGINEERS & CONSULTANTS, INC.
SHEETS 1-35, 55-182, 184-196

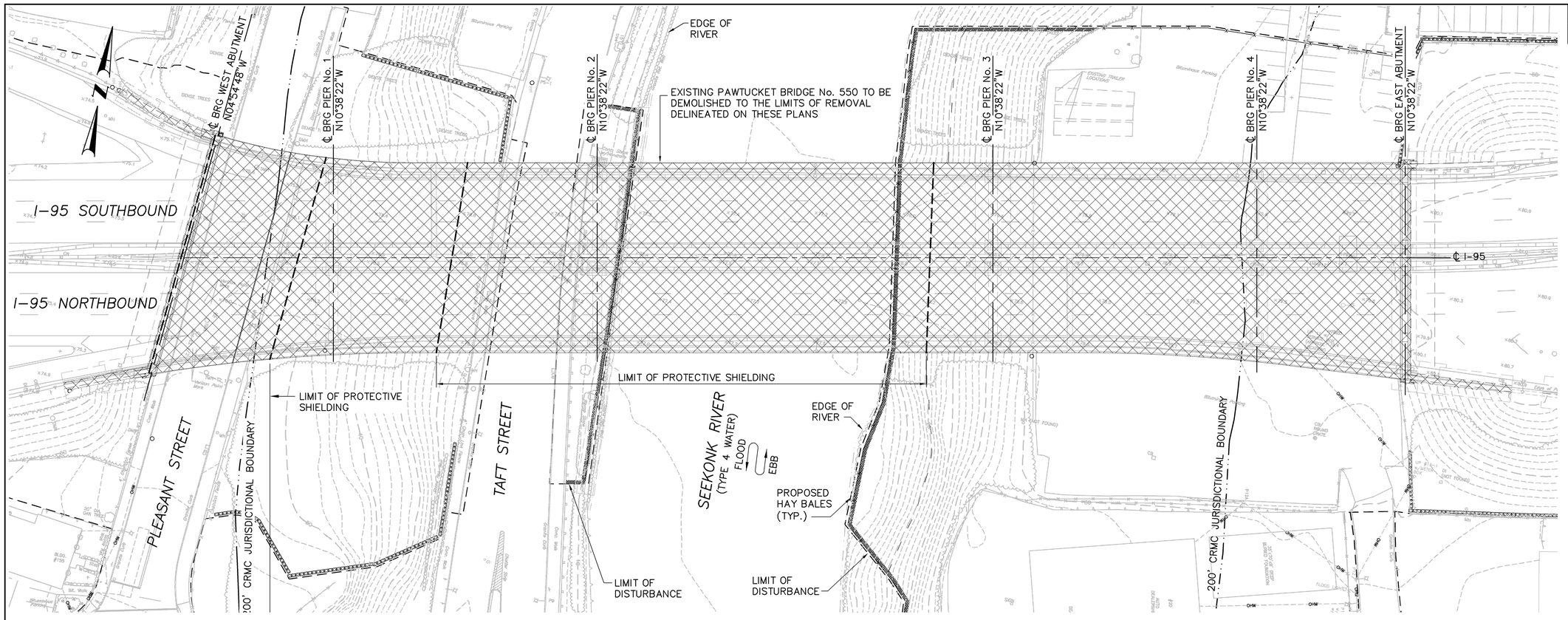
ALEXANDER D. SMITH, No. [illegible], REGISTERED PROFESSIONAL ENGINEER CIVIL 3/25/10
HALEY & ALDRICH, INC.
SHEETS 36-52, 183

THOMAS SIMBRO, No. 8876, REGISTERED PROFESSIONAL ENGINEER (CIVIL) 3-25-10
WRIGHT-PIERCE
SHEETS 53-54

CEC# 08005.00

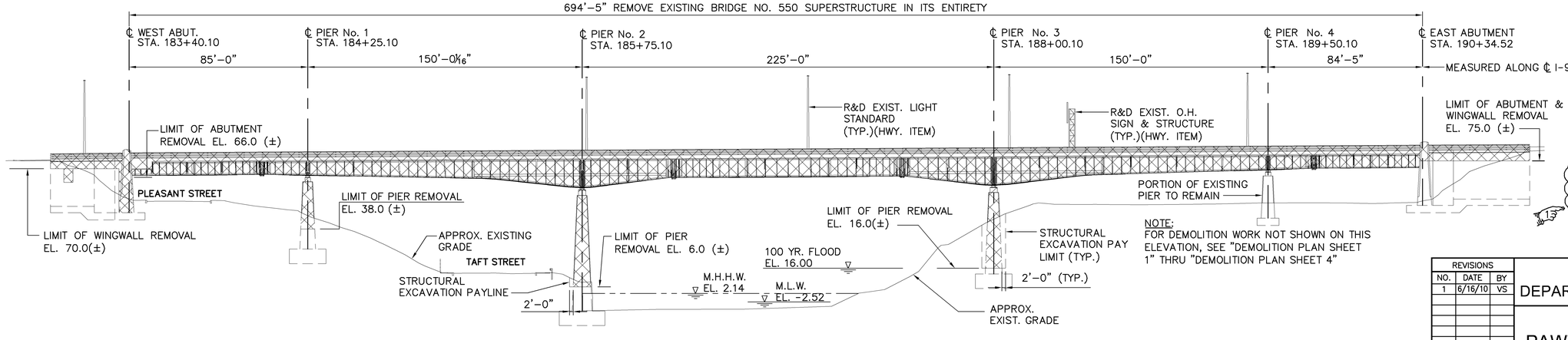
0143G_V3_001_BCOVER001

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	RI		2010	25	196



EXISTING BRIDGE PLAN

SCALE: 1"=30'



NOTE:
FOR DEMOLITION WORK NOT SHOWN ON THIS ELEVATION, SEE "DEMOLITION PLAN SHEET 1" THRU "DEMOLITION PLAN SHEET 4"

EXISTING SOUTH ELEVATION - (LOOKING NORTH)

SCALE: 1"=30'

LEGEND

DENOTES AREAS TO BE REMOVED & DISPOSED (REFER TO SECTIONS FOR DETAILED LIMITS OF REMOVAL)

R-1

NOTES:

1. THE LIMITS OF REMOVAL SHOWN ON THESE PLAN SHEETS DEPICTS THE PORTIONS OF THE EXISTING BRIDGE TO BE DEMOLISHED UNDER THIS CONTRACT. THE DEMOLITION WILL BE PERFORMED IN PHASES AS IDENTIFIED BY THE BRIDGE PHASE CONSTRUCTION SHEETS.
2. PLANS AND DETAILS SHOWN ON THE DEMOLITION PLANS ARE ILLUSTRATIVE TO DEPICT THE LIMITS OF REMOVAL. THE CONTRACTOR IS REFERRED TO THE ORIGINAL CONSTRUCTION PLANS FOR THE COMPOSITION AND DETAILS OF THE SUPERSTRUCTURE AND SUBSTRUCTURE ELEMENTS.
3. UNLESS NOTED OTHERWISE, ALL AREAS DISTURBED DURING DEMOLITION AND REMOVAL WORK SHALL BE BACKFILLED WITH COMMON BORROW AND RESTORED TO THEIR ORIGINAL CONDITION.
4. ALL ELEVATIONS ARE IN FEET AND REFERENCE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29).
5. PORTIONS OF THE SUBSTRUCTURES TO REMAIN SHALL BE FINISH GRADED TO WITHIN A TOLERANCE OF ±6 INCHES OF REMOVAL DEPTH. ALL EXISTING CONCRETE IS ASSUMED TO CONTAIN STEEL REINFORCEMENT. UNLESS NOTED OTHERWISE, ALL PROTRUDING REINFORCEMENT SHALL BE CUT FLUSH TO THE LIMIT OF REMOVAL.
6. THE DEMOLITION LIMITS SHOWN ON THESE DRAWINGS INDICATE MINIMUM LIMITS OF REMOVAL. WHERE PORTIONS OF EXISTING SUBSTRUCTURES ARE INDICATED TO REMAIN (AND NOT RE-USED), OR WHERE EXISTING SUBSTRUCTURES ARE TO BE ABANDONED IN PLACE, THE CONTRACTOR MAY, AT NO ADDITIONAL COST, REMOVE AND DISPOSE THESE ELEMENTS TO FACILITATE THE DEMOLITION OR CONSTRUCTION OPERATIONS.
7. DISPOSITION OF DEMOLITION MATERIAL TO BE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND ALL OTHER APPLICABLE REGULATIONS.
8. THE FILL MATERIAL USED TO BACKFILL VOIDS RESULTING FROM BELOW GRADE DEMOLITION SHALL BE COMMON BORROW.

ADDENDUM No. 4

REVISIONS		
NO.	DATE	BY
1	6/16/10	VS

RHODE ISLAND
DEPARTMENT OF TRANSPORTATION

BRIDGE REPLACEMENT
PAWTUCKET BRIDGE NO. 550

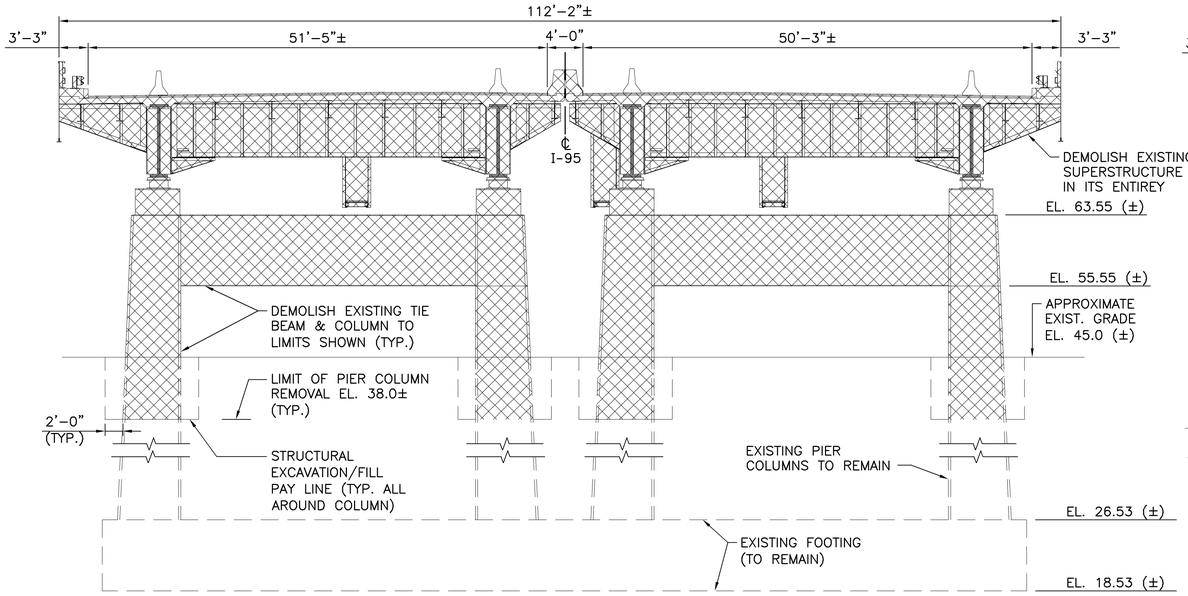
PAWTUCKET, RHODE ISLAND

DEMOLITION PLAN SHEET 1
PLAN AND ELEVATION
BRIDGE No. 550

SCALE AS SHOWN | SHEET DESIGNATION G-25

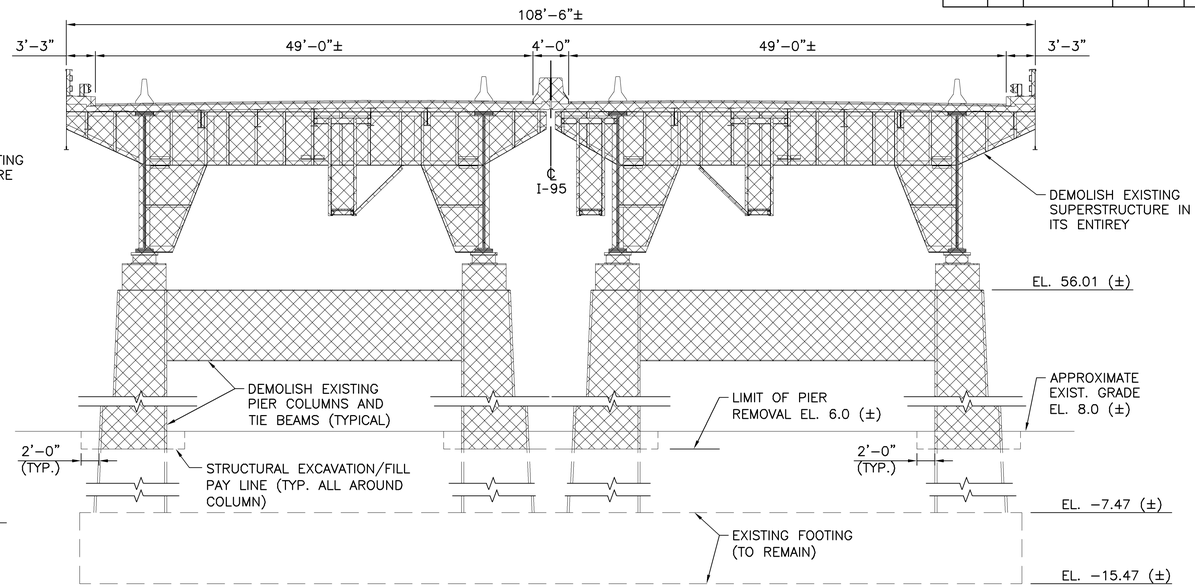
COMMONWEALTH
ENGINEERS & CONSULTANTS, INC.
400 SMITH STREET
PROVIDENCE, RI 02908

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	RI		2010	26	196



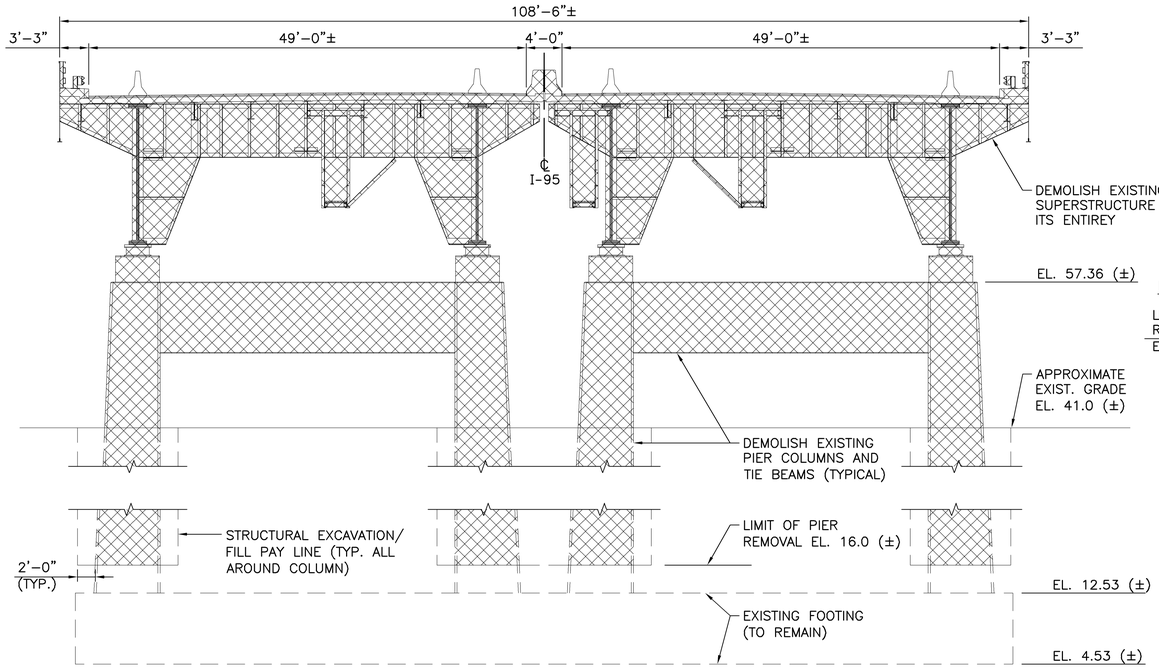
WEST ELEVATION – PIER No. 1

SCALE: 1/8"=1'-0"



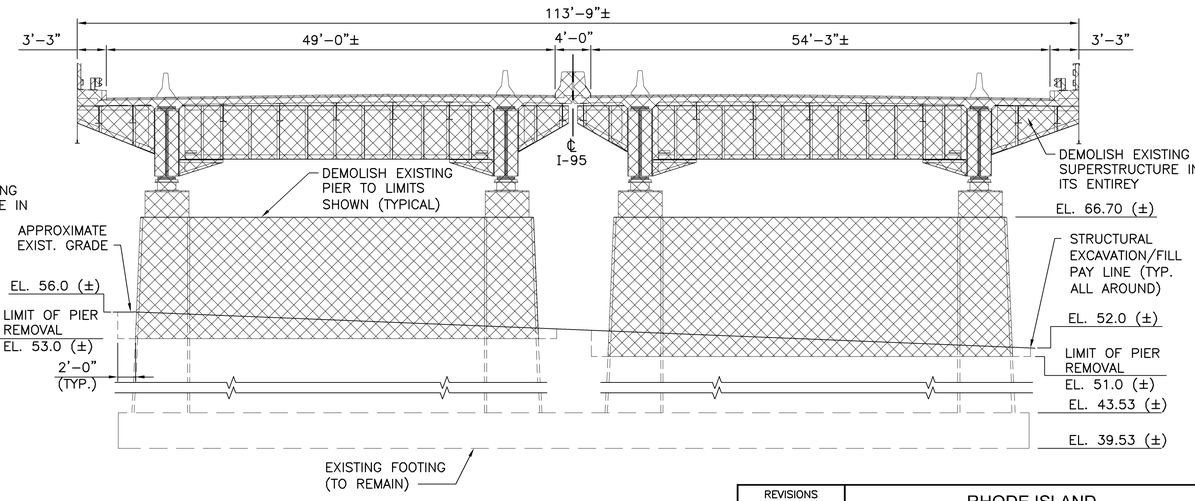
WEST ELEVATION – PIER No. 2

SCALE: 1/8"=1'-0"



WEST ELEVATION – PIER No. 3

SCALE: 1/8"=1'-0"



WEST ELEVATION – PIER No. 4

SCALE: 1/8"=1'-0"

NOTE:

1. FOR APPLICABLE NOTES, REFER TO "DEMOLITION PLAN SHEET 1".

LEGEND

DENOTES AREAS TO BE REMOVED & DISPOSED

COMMONWEALTH ENGINEERS & CONSULTANTS, INC.
400 SMITH STREET
PROVIDENCE, RI 02908

REVISIONS		
NO.	DATE	BY

RHODE ISLAND
DEPARTMENT OF TRANSPORTATION

BRIDGE REPLACEMENT
PAWTUCKET BRIDGE NO. 550

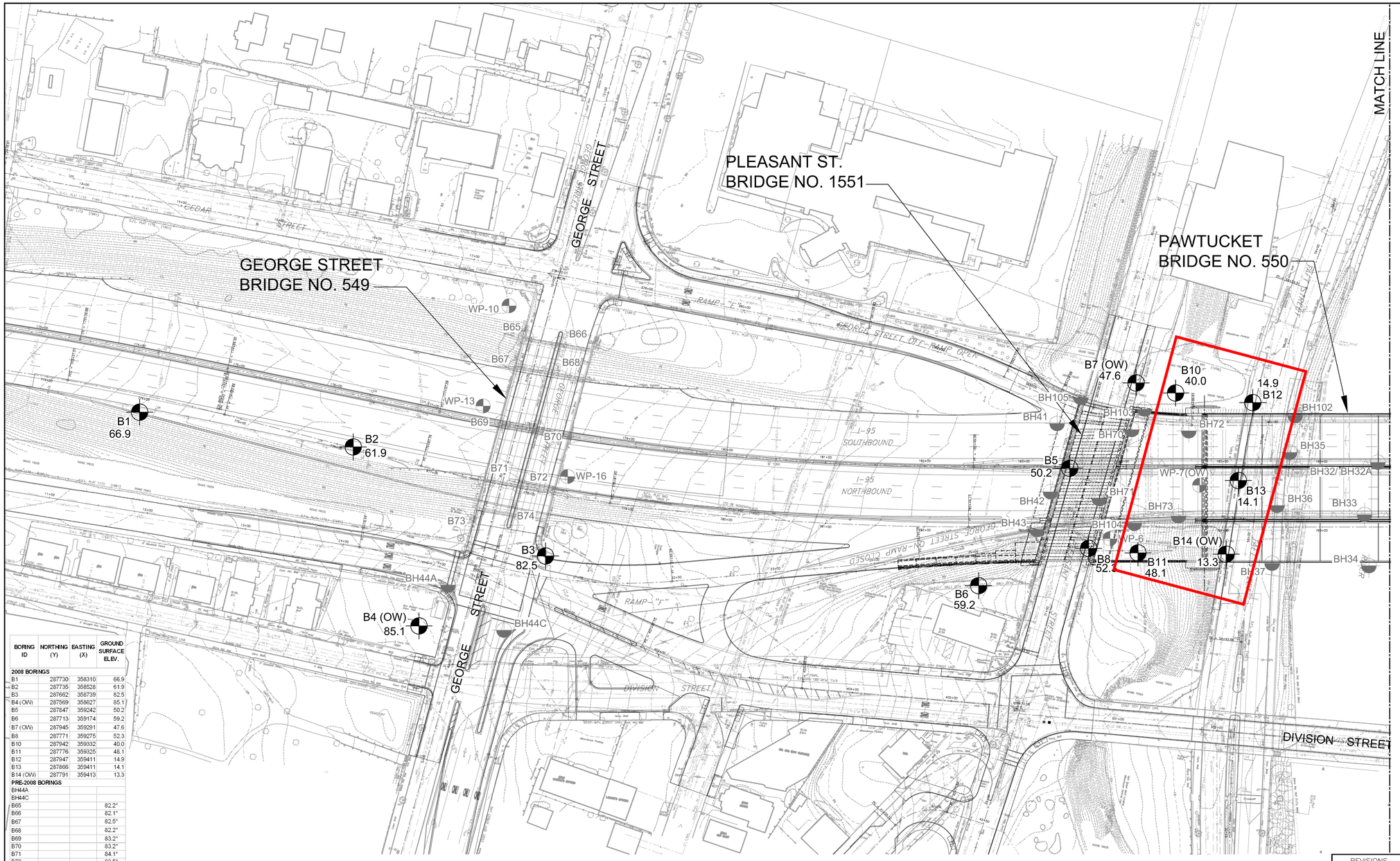
PAWTUCKET, RHODE ISLAND

DEMOLITION PLAN SHEET 2
PIER REMOVAL
BRIDGE No. 550

SCALE AS SHOWN | SHEET DESIGNATION G-26

0143G_V3_026_DEM0002

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	RI		2010	36	196



LEGEND:

- B1 66.9 — DESIGNATION, LOCATION AND GROUND SURFACE ELEVATION OF TEST BORING DRILLED BY NEW HAMPSHIRE BORING, INC. OF LONDONDERRY, NEW HAMPSHIRE IN MARCH AND APRIL 2008 IN CONNECTION WITH THE REPLACEMENT OF BRIDGE 550.
- B-1 — DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING MONITORED BY GEO TEK ENGINEERING INC. OF PROVIDENCE, RHODE ISLAND IN JULY 2001 IN CONNECTION WITH THE VERNON STREET ON-RAMP SAFETY IMPROVEMENTS. (SEE NOTE 6.)
- B65 — DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING DRILLED BY ALLSTATE DRILLING CO. OF EAST PROVIDENCE, RHODE ISLAND IN JANUARY AND FEBRUARY 1961 IN CONNECTION WITH THE CONSTRUCTION OF THE EXISTING GEORGE STREET BRIDGE (SEE NOTE 6).
- BH15 — DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING DRILLED BY AMERICAN DRILLING COMPANY OF EAST PROVIDENCE, RHODE ISLAND IN CONNECTION WITH THE CONSTRUCTION OF THE EXISTING BRIDGE 550, SCHOOL STREET BRIDGE, WATER STREET BRIDGE, AND ELM STREET BRIDGE (SEE NOTE 6).
- WP-6 — DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING MONITORED BY WRIGHT-PIERCE OF PROVIDENCE, RHODE ISLAND IN DECEMBER 2008, FEBRUARY 2009 AND JULY 2009.
- 60 — ELEVATION CONTOUR OF EXISTING GROUND SURFACE
- (OW) — DENOTES OBSERVATION WELL INSTALLED IN COMPLETED BOREHOLE

N
W E
S

0 50 100 150 200
SCALE IN FEET

BORING ID	NORTHING (Y)	EASTING (X)	GROUND SURFACE ELEV.
2008 BORINGS			
B1	287730	358310	66.9
B2	287735	358528	61.9
B3	287662	358739	82.5
B4 (OW)	287569	358627	85.1
B5	287847	359242	50.2
B6	287713	359174	59.2
B7 (OW)	287945	359291	47.6
B8	287771	359275	52.3
B10	287942	359332	40.0
B11	287776	359325	48.1
B12	287947	359411	14.9
B13	287866	359411	14.1
B14 (OW)	287791	359413	13.3
PRE-2008 BORINGS			
BH44A			
BH44C			
B65			82.2*
B66			82.1*
B67			82.5*
B68			82.2*
B69			83.2*
B70			83.2*
B71			84.1*
B72			83.5*
B73			83.6*
B74			83.6*
BH52			2.5*
BH52A			2.5*
BH53			2.5*
BH34			2.5*
BH35			7.5*
BH36			7.5*
BH37			8.0*
BH41			50.5*
BH42			51.5*
BH43			52.2*
BH70			44.5*
BH71			50.0*
BH72			30.0*
BH73			33.0*
BH102			7.5*
BH103			42.5*
BH104			42.0*
BH105			49.5*

* Estimated

NOTES:

1. EXISTING SITE CONDITIONS, CONTOURS OF EXISTING GROUND SURFACE ELEVATIONS AND LOCATION AND ORIENTATION OF EXISTING SITE FEATURES ARE TAKEN FROM THE ELECTRONIC AUTOCAD FILE STRUCTCUT_ PHASE-1D.dwg" RECEIVED BY HALEY & ALDRICH FROM COMMONWEALTH ENGINEERS & CONSULTANTS, INC. ON 14 FEBRUARY 2008.
2. PROPOSED SITE CONDITIONS AND THE LOCATION AND ORIENTATION OF PROPOSED SITE FEATURES ARE TAKEN FROM THE ELECTRONIC AUTOCAD FILE "SCHOOL STREET OPEN.dwg" RECEIVED BY HALEY & ALDRICH FROM COMMONWEALTH ENGINEERS & CONSULTANTS ON 25 JANUARY 2008.
3. LOCATIONS OF HISTORIC TEST BORINGS ARE APPROXIMATE AND WERE ESTIMATED FROM HISTORIC PLANS. LOCATIONS OF WRIGHT-PIERCE BORINGS ARE APPROXIMATE AND WERE PROVIDED IN ELECTRONIC FORMAT FROM COMMONWEALTH ENGINEERS & CONSULTANTS, INC. ON 3 DECEMBER 2009. LOCATIONS OF RECENT TEST BORINGS WERE DETERMINED IN THE FIELD BY CROSSMAN ENGINEERING, INC. USING ELECTRONIC DISTANCE MEASUREMENT AND TRIANGULATION METHODS RELATIVE TO FIXED REFERENCE POINTS.
4. COORDINATE GRID SYSTEM USED IS THE RHODE ISLAND STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM OF 1983 (NAD 83).
5. ELEVATIONS ARE IN FEET AND REFERENCE THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 29).
6. RECENT SUBSURFACE EXPLORATIONS WERE MONITORED IN THE FIELD BY HALEY & ALDRICH PERSONNEL.
7. REFER TO PROJECT GEOTECHNICAL DATA REPORT (DATED FEBRUARY 2008), APPENDIX B FOR LOGS OF RECENT TEST BORINGS (HALEY & ALDRICH), APPENDIX C FOR LOGS OF HISTORIC TEST BORINGS (OTHERS), APPENDIX D FOR OBSERVATION WELL INSTALLATION AND GROUNDWATER MONITORING REPORTS, AND APPENDIX F FOR LOGS OF TEST BORINGS BY WRIGHT-PIERCE.

REVISIONS		
NO.	DATE	BY

HALEY & ALDRICH

HALEY & ALDRICH, INC.
465 Medford Street, Suite 2200
Boston, MA 02129-1400
Phone: 617.886.7400
Fax: 617.886.7600
HaleyAldrich.com

RHODE ISLAND
DEPARTMENT OF TRANSPORTATION

BRIDGE REPLACEMENT
PAWTUCKET BRIDGE NO. 550

PAWTUCKET, RHODE ISLAND

SITE AND SUBSURFACE EXPLORATION LOCATION PLAN

SHEET 1 OF 2

SCALE AS SHOWN | SHEET DESIGNATION G-36

0143G_V3_036_BORELOC001

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
	RI		2010	41	196

Boring B10 – Sheet 1 of 2

RIDOT Project	Pawtucket Bridge No. 550 Replacement	BORING # :	B10
Location (C/T) :	PAWTUCKET	RIDOT Database ID # :	
RIC # :	2001-EB-003 FAP # : BRO-BCDR(009)	Date Start :	2/29/08 Date End : 2/29/08
Bridge/Road # :	Bridge No. 550/ I-95	N Coord. :	287,942 Ft.
Design Consult Co. :	Commonwealth Engineers & Consultants	E Coord. :	359,332 Ft.
Geotech Consult Co. :	Haley & Aldrich, Inc.	Ground Surface Elev., Ft. :	40.0
Inspector Name/Co. :	Scott Shay / Haley & Aldrich, Inc.	Elevation Datum	NGVD29

Methods Used to Determine Borehole Coordinates and Elevation : 2 / Survey

Drilling Firm : New Hampshire Boring, Inc. Project No. :
Drilling Foreman : Todd Penticost

Drilling Rig Make & Model : Diedrich D-50
Drilling Methods and Tools
Casing Size : 4 in Hollow Stem Auger ☐ Flight OD : ____ (in)
Methods Used to Advance Casing :
Driven (300 lbs) ☒ Push ☐ Roller Bit ☐ Spin ☐ Open Hole ☐
Drill Rod Size : ____ Wt./Ft. ____ (lbs)

Soils/Rock Sampling :
SPT Hammer Type Donut ☐ Safety ☒ Automatic Trip ☐ Other ____
Hammer Wt : 140 (lbs) Hammer Fall : 30 (in)
Split Spoon Sampler : Barrel Length : 24 Barrel ID: 1.375 (in) Barrel OD : 2 (in)
Shoe ID: 1.375 (in) Shoe OD : 2 (in)
Liner Type : Brass ☐ Stainless Steel ☐ Plastic ☐ Spring Core Catcher ☐
Undisturbed Samplers :
Shelby Tube : Length : ____ (in) ID/OD : ____ (in)
Fixed Piston Sampler Type Length : ____ (in) ID/OD : ____ (in)
Other: ____ Length : ____ (in) ID/OD : ____ (in)

Bedrock Core Barrel Type : ____ ID/OD : ____ (in) Core Diameter : ____ (in)

Groundwater Monitoring : Well Screen Depth from : ____ (ft) to ____ (ft)

Soil/Rock Samples Delivered to :
Name : Haley & Aldrich, Inc. Date :
Address : One Davol Square, Providence, RI 02903

Rhode Island Department of Transportation
Two Capitol Hill
Providence, RI 02903

RIC # : 2001-EB-003
Boring No. : B10
Database ID No. :

Boring B11 – Sheet 1 of 2

RIDOT Project	Pawtucket Bridge No. 550 Replacement	BORING # :	B11
Location (C/T) :	PAWTUCKET	RIDOT Database ID # :	
RIC # :	2001-EB-003 FAP # : BRO-BCDR(009)	Date Start :	2/28/08 Date End : 2/28/08
Bridge/Road # :	Bridge No. 550/ I-95	N Coord. :	287,776 Ft.
Design Consult Co. :	Commonwealth Engineers & Consultants	E Coord. :	359,325 Ft.
Geotech Consult Co. :	Haley & Aldrich, Inc.	Ground Surface Elev., Ft. :	48.1
Inspector Name/Co. :	Scott Shay / Haley & Aldrich, Inc.	Elevation Datum	NGVD29

Methods Used to Determine Borehole Coordinates and Elevation : 2 / Survey

Drilling Firm : New Hampshire Boring, Inc. Project No. :
Drilling Foreman : Todd Penticost

Drilling Rig Make & Model : Diedrich D-50
Drilling Methods and Tools
Casing Size : 4 in Hollow Stem Auger ☐ Flight OD : ____ (in)
Methods Used to Advance Casing :
Driven (300 lbs) ☒ Push ☐ Roller Bit ☐ Spin ☐ Open Hole ☐
Drill Rod Size : ____ Wt./Ft. ____ (lbs)

Soils/Rock Sampling :
SPT Hammer Type Donut ☐ Safety ☒ Automatic Trip ☐ Other ____
Hammer Wt : 140 (lbs) Hammer Fall : 30 (in)
Split Spoon Sampler : Barrel Length : 24 Barrel ID: 1.375 (in) Barrel OD : 2 (in)
Shoe ID: 1.375 (in) Shoe OD : 2 (in)
Liner Type : Brass ☐ Stainless Steel ☐ Plastic ☐ Spring Core Catcher ☐
Undisturbed Samplers :
Shelby Tube : Length : ____ (in) ID/OD : ____ (in)
Fixed Piston Sampler Type Length : ____ (in) ID/OD : ____ (in)
Other: ____ Length : ____ (in) ID/OD : ____ (in)

Bedrock Core Barrel Type : ____ ID/OD : ____ (in) Core Diameter : ____ (in)

Groundwater Monitoring : Well Screen Depth from : ____ (ft) to ____ (ft)

Soil/Rock Samples Delivered to :
Name : Haley & Aldrich, Inc. Date :
Address : One Davol Square, Providence, RI 02903

Rhode Island Department of Transportation
Two Capitol Hill
Providence, RI 02903

RIC # : 2001-EB-003
Boring No. : B11
Database ID No. :

Boring B12 – Sheet 1 of 3

RIDOT Project	Pawtucket Bridge No. 550 Replacement	BORING # :	B12
Location (C/T) :	PAWTUCKET	RIDOT Database ID # :	
RIC # :	2001-EB-003 FAP # : BRO-BCDR(009)	Date Start :	2/20/08 Date End : 2/20/08
Bridge/Road # :	Bridge No. 550/ I-95	N Coord. :	287,947 Ft.
Design Consult Co. :	Commonwealth Engineers & Consultants	E Coord. :	359,411 Ft.
Geotech Consult Co. :	Haley & Aldrich, Inc.	Ground Surface Elev., Ft. :	14.9
Inspector Name/Co. :	D. Palleiko/S. Shay / Haley & Aldrich, Inc.	Elevation Datum	NGVD29

Methods Used to Determine Borehole Coordinates and Elevation : 2 / Survey

Drilling Firm : New Hampshire Boring, Inc. Project No. :
Drilling Foreman : Don Dunklee

Drilling Rig Make & Model : Acker AD II
Drilling Methods and Tools
Casing Size : 4 in Hollow Stem Auger ☐ Flight OD : ____ (in)
Methods Used to Advance Casing :
Driven (300 lbs) ☒ Push ☐ Roller Bit ☐ Spin ☐ Open Hole ☐
Drill Rod Size : ____ Wt./Ft. ____ (lbs)

Soils/Rock Sampling :
SPT Hammer Type Donut ☐ Safety ☒ Automatic Trip ☐ Other ____
Hammer Wt : 140 (lbs) Hammer Fall : 30 (in)
Split Spoon Sampler : Barrel Length : 24 Barrel ID: 1.375 (in) Barrel OD : 2 (in)
Shoe ID: 1.375 (in) Shoe OD : 2 (in)
Liner Type : Brass ☐ Stainless Steel ☐ Plastic ☐ Spring Core Catcher ☐
Undisturbed Samplers :
Shelby Tube : Length : ____ (in) ID/OD : ____ (in)
Fixed Piston Sampler Type Length : ____ (in) ID/OD : ____ (in)
Other: ____ Length : ____ (in) ID/OD : ____ (in)

Bedrock Core Barrel Type : Standard double tube ID/OD : 2/2.8 (in) Core Diameter : 2 (in)

Groundwater Monitoring : Well Screen Depth from : ____ (ft) to ____ (ft)

Soil/Rock Samples Delivered to :
Name : Haley & Aldrich, Inc. Date :
Address : One Davol Square, Providence, RI 02903

Rhode Island Department of Transportation
Two Capitol Hill
Providence, RI 02903

RIC # : 2001-EB-003
Boring No. : B12
Database ID No. :

Boring B12 – Sheet 3 of 3

RIDOT Project: Pawtucket Bridge No. 550 Replacement — BORING # : B12 — Location (C/T) : PAWTUCKET — RIDOT Database ID # :

Depth Ft.	Casing Blows/Ft.	Type & Number	Pen/Rec. Core Rec. & RQD	Depth (ft)	Blows per 6 in. (Coring min/ft) [Downpress psi]	Soil and Rock Sample Description (Haley & Aldrich Modified Burmister Soil and Rock Classification System)	Depth of Stratum Change (ft)	Stratum Description	Remarks
				31.0	(8)		31.0	SANDSTONE AND SILTSTONE (continued) BOTTOM OF EXPLORATION AT 31.0 FT	

REMARKS:

Proportions Used	Sampler Type	Cohesionless	Density	Cohesive	Consistency
trace 0 to 10%	SS - Split Spoon	0 - 10	Loose	0 - 4	Soft
little 10 to 20%	UT - Shelby Tube	10 - 30	Medium Dense	4 - 8	Firm
some 20 to 35%	UP - Fixed Position	30 - 50	Dense	8 - 15	Stiff
and 35 to 50%	C - Rock Core	50 +	Very Dense	15 - 30	Very Stiff
				30 +	Hard

140# Wt x 30" fall on 2" OD SS Sampler

RIC # : 2001-EB-003
Boring No. : B12
Date Completed : 2/20/08
Database ID No. :

Boring B10 – Sheet 2 of 2

RIDOT Project	Pawtucket Bridge No. 550 Replacement	BORING # :	B10
Location (C/T) :	PAWTUCKET	RIDOT Database ID # :	
RIC # :	2001-EB-003 FAP # : BRO-BCDR(009)	Date Start :	2/29/08 Date End : 2/29/08
Bridge/Road # :	Bridge No. 550/ I-95	N Coord. :	287,942 Ft.
Design Consult Co. :	Commonwealth Engineers & Consultants	E Coord. :	359,332 Ft.
Geotech Consult Co. :	Haley & Aldrich, Inc.	Ground Surface Elev., Ft. :	40.0
Inspector Name/Co. :	Scott Shay / Haley & Aldrich, Inc.	Elevation Datum	NGVD29

Borehole Location Description: Between Pleasand Street and Taft Street

Sampler: Unless otherwise noted, soil sampler consists of a 2 in. split spoon driven using a 140 lb hammer, 30 in fall.
Casing: Unless otherwise noted, casing is driven using 300 lb hammer, falling 24 in.
Casing Size: 4 in HS Auger ____

Groundwater Observations: Date	Time	Depth	Casing at	Stab. Time

Depth Ft.	Casing Blows/Ft.	Type & Number	Pen/Rec. Core Rec. & RQD	Depth (ft)	Blows per 6 in. (Coring min/ft) [Downpress psi]	Soil and Rock Sample Description (Haley & Aldrich Modified Burmister Soil and Rock Classification System)	Depth of Stratum Change (ft)	Stratum Description	Remarks
		SS-1	24/6	0.0 – 2.0	2-2-2-4	Loose dark brown gravelly SILT, trace roots	2.5	TOPSOIL/FILL	1
5		SS-2	24/10	4.0 – 6.0	18-19-17-16	Dense brown silty SAND, little gravel. Appears to be disturbed.	8.0	FILL	
10		SS-3	24/18	9.0 – 11.0	37-28-22-18	Dense brown interbedded fine sandy SILT with coarse to medium SAND, trace fine gravel in layers up to 4.0 in. thick, trace organics	13.0	ALLUVIAL DEPOSITS	
15		SS-4	5/5	14.0 – 14.4	100/5"	Very dense brown silty SAND, little gravel, moderately well bonded with abrupt change in bottom 3.0 in. of sample to gray angular rock fragments	14.4	GLACIAL TILL; POSSIBLE TOP OF BEDROCK AT 14.2 FT; BOTTOM OF EXPLORATION AT 14.4 FT	2, 3

REMARKS: 1. Groundwater not recorded. 2. Possible Top of Bedrock at 14.2 ft. 3. Split spoon refusal at 14.4 ft.

Proportions Used	Sampler Type	Cohesionless	Density	Cohesive	Consistency
trace 0 to 10%	SS - Split Spoon	0 - 10	Loose	0 - 4	Soft
little 10 to 20%	UT - Shelby Tube	10 - 30	Medium Dense	4 - 8	Firm
some 20 to 35%	UP - Fixed Position	30 - 50	Dense	8 - 15	Stiff
and 35 to 50%	C - Rock Core	50 +	Very Dense	15 - 30	Very Stiff
				30 +	Hard

140# Wt x 30" fall on 2" OD SS Sampler

RIC # : 2001-EB-003
Boring No. : B10
Date Completed : 2/29/08
Database ID No. :

Boring B11 – Sheet 2 of 2

RIDOT Project	Pawtucket Bridge No. 550 Replacement	BORING # :	B11
Location (C/T) :	PAWTUCKET	RIDOT Database ID # :	
RIC # :	2001-EB-003 FAP # : BRO-BCDR(009)	Date Start :	2/28/08 Date End : 2/28/08
Bridge/Road # :	Bridge No. 550/ I-95	N Coord. :	287,776 Ft.
Design Consult Co. :	Commonwealth Engineers & Consultants	E Coord. :	359,325 Ft.
Geotech Consult Co. :	Haley & Aldrich, Inc.	Ground Surface Elev., Ft. :	48.1
Inspector Name/Co. :	Scott Shay / Haley & Aldrich, Inc.	Elevation Datum	NGVD29

Borehole Location Description: Between Pleasand Street and Taft Street

Sampler: Unless otherwise noted, soil sampler consists of a 2 in. split spoon driven using a 140 lb hammer, 30 in fall.
Casing: Unless otherwise noted, casing is driven using 300 lb hammer, falling 24 in.
Casing Size: 4 in HS Auger ____

Groundwater Observations: Date	Time	Depth	Casing at	Stab. Time
02/28/08	11:15	16.1	19	0.2 hr

Depth Ft.	Casing Blows/Ft.	Type & Number	Pen/Rec. Core Rec. & RQD	Depth (ft)	Blows per 6 in. (Coring min/ft) [Downpress psi]	Soil and Rock Sample Description (Haley & Aldrich Modified Burmister Soil and Rock Classification System)	Depth of Stratum Change (ft)	Stratum Description	Remarks
		SS-1	24/10	0.0 – 2.0	5-10-19-31	Medium dense dark brown silty SAND, trace coarse gravel, trace roots		FILL	
5		SS-2	24/11	4.0 – 6.0	12-14-15-19	Medium dense gray brown silty SAND, little gravel, trace roots			
10		SS-3	24/9	9.0 – 11.0	10-8-16-16	Medium dense sandy GRAVEL, some silt			
15		SS-4	24/4	14.0 – 16.0	14-6-5-12	Similar to above	17.5		
20		SS-5	12/12	19.0 – 20.0	16-22-42-100/0"	SS-5: Very dense brown silty SAND, trace gravel, moderately well bonded in-situ (6.0 in). SS-5A: Very dense gray brown to gray fractured weathered rock fragments (6.0 in.).	20.2; 20.7	GLACIAL TILL; PROBABLE TOP OF BEDROCK AT 20.2 FT; BOTTOM OF EXPLORATION AT 20.7 FT	1

REMARKS: 1. Split spoon refusal at 20.7 ft.

Proportions Used	Sampler Type	Cohesionless	Density	Cohesive	Consistency
trace 0 to 10%	SS - Split Spoon	0 - 10	Loose	0 - 4	Soft
little 10 to 20%	UT - Shelby Tube	10 - 30	Medium Dense	4 - 8	Firm
some 20 to 35%	UP - Fixed Position	30 - 50	Dense	8 - 15	Stiff
and 35 to 50%	C - Rock Core	50 +	Very Dense	15 - 30	Very Stiff
				30 +	Hard

140# Wt x 30" fall on 2" OD SS Sampler

RIC # : 2001-EB-003
Boring No. : B11
Date Completed : 2/28/08
Database ID No. :

Boring B12 – Sheet 2 of 3

RIDOT Project	Pawtucket Bridge No. 550 Replacement	BORING # :	B12
Location (C/T) :	PAWTUCKET	RIDOT Database ID # :	
RIC # :	2001-EB-003 FAP # : BRO-BCDR(009)	Date Start :	2/20/08 Date End : 2/20/08
Bridge/Road # :	Bridge No. 550/ I-95	N Coord. :	287,947 Ft.
Design Consult Co. :	Commonwealth Engineers & Consultants	E Coord. :	359,411 Ft.
Geotech Consult Co. :	Haley & Aldrich, Inc.	Ground Surface Elev., Ft. :	14.9
Inspector Name/Co. :	D. Palleiko/S. Shay / Haley & Aldrich, Inc.	Elevation Datum	NGVD29

Borehole Location Description: Taft Street

Sampler: Unless otherwise noted, soil sampler consists of a 2 in. split spoon driven using a 140 lb hammer, 30 in fall.
Casing: Unless otherwise noted, casing is driven using 300 lb hammer, falling 24 in.
Casing Size: 4 in HS Auger ____

Groundwater Observations: Date	Time	Depth	Casing at	Stab. Time

Casing blows/ft (0–14 ft): 7, 11, 29, 10, 9, 14, 8, 12, 18, 50, 51, 71, 96

Depth Ft.	Type & Number	Pen/Rec. Core Rec. & RQD	Depth (ft)	Blows per 6 in. (Coring min/ft) [Downpress psi]	Soil and Rock Sample Description (Haley & Aldrich Modified Burmister Soil and Rock Classification System)	Depth of Stratum Change (ft)	Stratum Description	Remarks
	SS-1	24/14	0.5 – 2.5	5-4-4-7	Loose olive brown silty medium to fine SAND. little fine gravel	0.3	CONCRETE; FILL	1
5	SS-2	24/8	4.0 – 6.0	10-9-16-12	Medium dense olive brown silty medium to fine SAND, little gravel, trace brick fragments			
10	SS-3	24/11	9.0 – 11.0	6-17-25-32	Dense red brown silty SAND, little coarse to fine gravel, wet	10.0; 12.0	GLACIOFLUVIAL DEPOSITS	
15	SS-4	8/5	14.0 – 14.7	28-100/2"	Very dense red brown silty medium to fine SAND, little fine gravel, moderately bonded in-situ	14.6	GLACIAL TILL; PROBABLE TOP OF BEDROCK AT 14.6 FT	
	C-5	36/35 75%	16.0	(8) (8) (8)	C-5: Hard, fresh to slightly weathered, fine-grained interbedded SANDSTONE and SILTSTONE. Bedding medium thick. Joints low angle, moderately spaced, rough, planar, fresh, open.		SANDSTONE AND SILTSTONE	
20	C-6	48/48 90%	19.0	(8) (8) (8) (8)	C-6: Similar to above.			
25	C-7	36/34 53%	23.0	(8) (8) (8)	C-7: Similar to above.			
30	C-8	60/55 88%	26.0	(8) (8) (8) (8)	C-8: Similar to above.			

REMARKS: 1. Groundwater not recorded.

Proportions Used	Sampler Type	Cohesionless	Density	Cohesive	Consistency
trace 0 to 10%	SS - Split Spoon	0 - 10	Loose	0 - 4	Soft
little 10 to 20%	UT - Shelby Tube	10 - 30	Medium Dense	4 - 8	Firm
some 20 to 35%	UP - Fixed Position	30 - 50	Dense	8 - 15	Stiff
and 35 to 50%	C - Rock Core	50 +	Very Dense	15 - 30	Very Stiff
				30 +	Hard

140# Wt x 30" fall on 2" OD SS Sampler

RIC # : 2001-EB-003
Boring No. : B12
Date Completed : 2/20/08
Database ID No. :

HALEY & ALDRICH
HALEY & ALDRICH, INC.
465 Medford Street, Suite 2200
Boston, MA 02129-1400
Phone: 617.886.7400
Fax: 617.886.7600
HaleyAldrich.com

REVISIONS		
NO.	DATE	BY

RHODE ISLAND
DEPARTMENT OF TRANSPORTATION

BRIDGE REPLACEMENT
PAWTUCKET BRIDGE NO. 550
PAWTUCKET, RHODE ISLAND

TEST BORINGS
B10, B11, B12

SCALE --
SHEET DESIGNATION G-41

0143G_V3_041_BORELOGS004

Boring B13 – Sheet 1 of 2

RIDOT Project	Pawtucket Bridge No. 550 Replacement	BORING # :	B13 (Sheet 1 of 2)
Location (C/T) :	PAWTUCKET	RIDOT Database ID # :	
RIC # :	2001-EB-003 FAP # : BRO-BCDR(009)	Date Start :	2/20/08 Date End : 2/20/08
Bridge/Road # :	Bridge No. 550/ I-95	N Coord. :	287,866 Ft.
Design Consult Co. :	Commonwealth Engineers & Consultants	E Coord. :	359,411 Ft.
Geotech Consult Co. :	Haley & Aldrich, Inc.	Ground Surface Elev., Ft. :	14.1
Inspector Name/Co. :	David Palleiko / Haley & Aldrich, Inc.	Elevation Datum	NGVD29

Methods Used to Determine Borehole Coordinates and Elevation :
2 / Survey

Drilling Firm : New Hampshire Boring, Inc. Project No. :
Drilling Foreman : Barry Wordell

Drilling Rig Make & Model : CME 75
Drilling Methods and Tools
Casing Size : 3 in Hollow Stem Auger ☐ Flight OD : (in)
Methods Used to Advance Casing :
Driven (300 lbs) ☒ Push ☐ Roller Bit ☐ Spin ☐ Open Hole ☐
Drill Rod Size : Wt./Ft. (lbs)

Soils/Rock Sampling :
SPT Hammer Type Donut ☐ Safety ☒ Automatic Trip ☐ Other
Hammer Wt : 140 (lbs) Hammer Fall : 30 (in)
Split Spoon Sampler : Barrel Length : 24 Barrel ID: 1.375 (in) Barrel OD : 2 (in)
Shoe ID: 1.375 (in) Shoe OD : 2 (in)
Liner Type : Brass ☐ Stainless Steel ☐ Plastic ☐ Spring Core Catcher ☐
Undisturbed Samplers :
Shelby Tube : Length : (in) ID/OD : (in)
Fixed Piston Sampler Type Length : (in) ID/OD : (in)
Other: Length : (in) ID/OD : (in)

Bedrock Core Barrel Type : Standard double tube ID/OD : 2/2.8 (in) Core Diameter : 2 (in)

Groundwater Monitoring : Well Screen Depth from : (ft) to (ft)

Soil/Rock Samples Delivered to :
Name : Haley & Aldrich, Inc. Date :
Address : One Davol Square, Providence, RI 02903

Rhode Island Department of Transportation
Two Capitol Hill
Providence, RI 02903

RIC # : 2001-EB-003
Boring No. : B13
Database ID No. :

Boring B14(OW) – Sheet 1 of 3

RIDOT Project	Pawtucket Bridge No. 550 Replacement	BORING # :	B14(OW) (Sheet 1 of 3)
Location (C/T) :	PAWTUCKET	RIDOT Database ID # :	
RIC # :	2001-EB-003 FAP # : BRO-BCDR(009)	Date Start :	2/20/08 Date End : 2/21/08
Bridge/Road # :	Bridge No. 550/ I-95	N Coord. :	287,791 Ft.
Design Consult Co. :	Commonwealth Engineers & Consultants	E Coord. :	359,413 Ft.
Geotech Consult Co. :	Haley & Aldrich, Inc.	Ground Surface Elev., Ft. :	13.3
Inspector Name/Co. :	David Palleiko / Haley & Aldrich, Inc.	Elevation Datum	NGVD29

Methods Used to Determine Borehole Coordinates and Elevation :
2 / Survey

Drilling Firm : New Hampshire Boring, Inc. Project No. :
Drilling Foreman : Barry Wordell

Drilling Rig Make & Model : CME 75
Drilling Methods and Tools
Casing Size : 3 in Hollow Stem Auger ☐ Flight OD : (in)
Methods Used to Advance Casing :
Driven (300 lbs) ☒ Push ☐ Roller Bit ☐ Spin ☐ Open Hole ☐
Drill Rod Size : Wt./Ft. (lbs)

Soils/Rock Sampling :
SPT Hammer Type Donut ☐ Safety ☒ Automatic Trip ☐ Other
Hammer Wt : 140 (lbs) Hammer Fall : 30 (in)
Split Spoon Sampler : Barrel Length : 24 Barrel ID: 1.375 (in) Barrel OD : 2 (in)
Shoe ID: 1.375 (in) Shoe OD : 2 (in)
Liner Type : Brass ☐ Stainless Steel ☐ Plastic ☐ Spring Core Catcher ☐
Undisturbed Samplers :
Shelby Tube : Length : (in) ID/OD : (in)
Fixed Piston Sampler Type Length : (in) ID/OD : (in)
Other: Length : (in) ID/OD : (in)

Bedrock Core Barrel Type : Standard double tube ID/OD : 2/2.8 (in) Core Diameter : 2 (in)

Groundwater Monitoring : Well Screen Depth from : 4.5 (ft) to 14.5 (ft)

Soil/Rock Samples Delivered to :
Name : Haley & Aldrich, Inc. Date :
Address : One Davol Square, Providence, RI 02903

Rhode Island Department of Transportation
Two Capitol Hill
Providence, RI 02903

RIC # : 2001-EB-003
Boring No. : B14(OW)
Database ID No. :

Boring B14(OW) – Sheet 3 of 3

RIDOT Project Pawtucket Bridge No. 550 Replacement BORING # : B14(OW) Sheet 3 of 3
Location (C/T) : PAWTUCKET RIDOT Database ID # :

DEPTH Ft.	CASING BLOWS /Ft.	Type & Number	Pen/Rec. Core Rec. & RQD	Depth (ft)	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMPLE DESCRIPTION (Haley & Aldrich Modified Burmister Soil and Rock Classification System)	Depth of Stratum Change (ft)	STRATUM DESCRIPTION	REMARKS
								BOTTOM OF EXPLORATION AT 29.5 FT	

REMARKS:

140# Wt x 30" fall on 2" OD SS Sampler

Proportions Used	Sampler Type	Cohesionless	Density	Cohesive	Consistency
trace 0 to 10%	SS - Split Spoon	0 - 10	Loose	0 - 4	Soft
little 10 to 20%	UT - Shelby Tube	10 - 30	Medium Dense	4 - 8	Firm
some 20 to 35%	UP - Fixed Position	30 - 50	Dense	8 - 15	Stiff
and 35 to 50%	C - Rock Core	50 +	Very Dense	15 - 30	Very Stiff
				30 +	Hard

RIC # : 2001-EB-003
Boring No. : B14(OW)
Date Completed : 2/21/08
Database ID No. :

Boring B15(OW) – Sheets 2 and 3 of 3 (overlaid)

RIDOT Project Pawtucket Bridge No. 550 Replacement BORING # : B15(OW) Sheet 2 of 3
Location (C/T) : PAWTUCKET RIDOT Database ID # :
RIC # : 2001-EB-003 FAP # : BRO-BCDR(009) Date Start : 2/25/08 Date End : 2/26/08
Bridge/Road # : Bridge No. 550/ I-95 N Coord. : 287,997 Ft.
Design Consult Co. : Commonwealth Engineers & Consultants E Coord. : 359,711 Ft.
Geotech Consult Co. : Haley & Aldrich, Inc. Ground Surface Elev., Ft. : 52.7
Inspector Name/Co. : Scott Shay / Haley & Aldrich, Inc. Elevation Datum NGVD29

Borehole Location Description: Top of slope, near existing Pier 3
Sampler: Unless otherwise noted, soil sampler consists of a 2 in. split spoon driven using a 140 lb hammer, 30 in fall.
Casing: Unless otherwise noted, casing is driven using 300 lb hammer, falling 24 in.
Casing Size: 4 in HS Auger

Groundwater Observations

Date	Time	Depth	Casing at	Stab. Time
02/25/08	13:05	6.1	21.5	0.6 hr
02/25/08	15:00	27.5	21	0.5 hr
02/26/08	07:10	29.8	21	16 hr

Sheet 3 of 3 (overprinted):

Type & Number	Pen/Rec. Core Rec. & RQD	Depth (ft)	Blows per 6 in. (Coring min/ft)	SOIL AND ROCK SAMPLE DESCRIPTION	Depth of Stratum Change (ft)	STRATUM DESCRIPTION	REMARKS
		31.0	(6)	coated with secondary mineralization. Conglomerate shows elongated clasts.		SILTSTONE AND CONGLOMERATE (continued)	
C-7	36/32 50%		(6)	C-6: Similar to above C-7: Similar to above			3
C-8	30/30			C-8: Similar to above			
C-9	18/18	36.5	(7)	C-9: Similar to above			4
		38.0			38.0	BOTTOM OF EXPLORATION AT 38.0 FT	

Sheet 2 of 3:

DEPTH Ft.	CASING BLOWS /Ft.	Type & Number	Pen/Rec. Core Rec. & RQD	Depth (ft)	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMPLE DESCRIPTION (Haley & Aldrich Modified Burmister Soil and Rock Classification System)	Depth of Stratum Change (ft)	STRATUM DESCRIPTION	REMARKS
	6 19	SS-1	24/13	0.0 2.0	13-15-17-15	Dense dark brown silty SAND, trace gravel, trace coarse sand-sized asphalt		FILL	
5	27 19 21 20	NR-0	24/0	4.0 6.0	8-11-11-10	No Recovery			
10	21 20 31 26 28	SS-2	24/10	9.0 11.0	8-14-13-8	Medium dense brown silty SAND, little fine gravel, wet from drilling			1
15	33 26 34 13 17	SS-3	24/4	14.0 16.0	8-5-5-6	Loose brown silty SAND with gravel-sized concrete pieces			
	10 22 24						18.0	ALLUVIAL DEPOSITS	
20		SS-4	18/14	19.0 20.5	13-6-100	Loose orange brown fine sandy SILT, trace weathered rock, highly oxidized, trace organics. Abrupt change in effort to drive split spoon at 20.3 ft.	20.3	TOP OF BEDROCK AT 20.3 FT / SILTSTONE AND CONGLOMERATE	2
25		C-5	60/53 50%	23.0	(5) (6) (5) (5) (5) (5)	C-5: Moderately hard to hard, fresh to moderately weathered, aphanitic to coarse-grained bedded SILTSTONE and CONGLOMERATE. Bedding moderate angle, extremely thin to medium thick. Primary joints bed parallel, dipping at low to moderate angle, very close to close, rough to planar, fresh to occasionally discolored, tight to open.			
30		C-6	36/36 75%	28.0	(6) (6)	Secondary joints high angle, rough, stepped,			

REMARKS: 1. [illegible] overburden: excavation is planned only for overburden. Discussed placement of screen with E. Wood (Haley & Aldrich, Inc.) prior to installation. 2. Advanced roller bit ahead of casing from 19.0 to 23.0 ft after SS4.

140# Wt x 30" fall on 2" OD SS Sampler

Proportions Used	Sampler Type	Cohesionless	Density	Cohesive	Consistency
trace 0 to 10%	SS - Split Spoon	0 - 10	Loose	0 - 4	Soft
little 10 to 20%	UT - Shelby Tube	10 - 30	Medium Dense	4 - 8	Firm
some 20 to 35%	UP - Fixed Position	30 - 50	Dense	8 - 15	Stiff
and 35 to 50%	C - Rock Core	50 +	Very Dense	15 - 30	Very Stiff
				30 +	Hard

RIC # : 2001-EB-003
Boring No. : B15(OW)
Date Completed : 2/26/08
Database ID No. :

Boring B13 – Sheet 2 of 2

RIDOT Project	Pawtucket Bridge No. 550 Replacement	BORING # :	B13 (Sheet 2 of 2)
Location (C/T) :	PAWTUCKET	RIDOT Database ID # :	
RIC # :	2001-EB-003 FAP # : BRO-BCDR(009)	Date Start :	2/20/08 Date End : 2/20/08
Bridge/Road # :	Bridge No. 550/ I-95	N Coord. :	287,866 Ft.
Design Consult Co. :	Commonwealth Engineers & Consultants	E Coord. :	359,411 Ft.
Geotech Consult Co. :	Haley & Aldrich, Inc.	Ground Surface Elev., Ft. :	14.1
Inspector Name/Co. :	David Palleiko / Haley & Aldrich, Inc.	Elevation Datum	NGVD29

Borehole Location Description: Taft Street
Sampler: Unless otherwise noted, soil sampler consists of a 2 in. split spoon driven using a 140 lb hammer, 30 in fall.
Casing: Unless otherwise noted, casing is driven using 300 lb hammer, falling 24 in.
Casing Size: 3 in HS Auger

Groundwater Observations

Date	Time	Depth	Casing at	Stab. Time

DEPTH Ft.	CASING BLOWS /Ft.	Type & Number	Pen/Rec. Core Rec. & RQD	Depth (ft)	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMPLE DESCRIPTION (Haley & Aldrich Modified Burmister Soil and Rock Classification System)	Depth of Stratum Change (ft)	STRATUM DESCRIPTION	REMARKS
		SS-1	24/4	0.5 2.5	7-15-14-15	Medium dense olive brown silty medium to fine SAND, little fine gravel	0.3	CONCRETE / FILL	1
5		SS-2	24/2	4.0 6.0	7-6-7-7	Medium dense GRAVEL. Gravel jammed in spoon tip.			
10		SS-3	24/12	9.0 11.0	6-8-34-21	Dense olive gray with olive brown mottled medium to fine sandy GRAVEL, little silt, vague relict structure.	9.0	TOP OF BEDROCK AT 9.0 FT / SANDSTONE AND CONGLOMERATE	
15		C-4	60/60 100%	11.5	(7) (8) (8) (8) (8)	C-4: Hard, fresh, light gray, fine to very coarse-grained SANDSTONE and CONGLOMERATE. Bedding thin to medium thick. No jointing discernible.			
		C-5	36/36 100%	16.5	(7) (8) (7)	C-5: Hard, fresh, light gray, fine to very coarse-grained interbedded SANDSTONE and CONGLOMERATE. Bedding thin to medium thick. No jointing discernible.			
20		C-6	60/58 97%	19.5	(6) (6) (6) (6) (5)	C-6: Hard, fresh, light gray, fine to very coarse-grained interbedded SANDSTONE and CONGLOMERATE. Bedding thin to medium thick. No jointing discernible.			
25		C-7	24/24 100%	24.5 26.5	(5) (3)	C-7: Hard, fresh, light gray, fine to very coarse-grained interbedded SANDSTONE and CONGLOMERATE. Bedding thin to medium thick. No jointing discernible.	26.5	BOTTOM OF EXPLORATION AT 26.5 FT	
30									

REMARKS: 1. Groundwater not recorded.

140# Wt x 30" fall on 2" OD SS Sampler

Proportions Used	Sampler Type	Cohesionless	Density	Cohesive	Consistency
trace 0 to 10%	SS - Split Spoon	0 - 10	Loose	0 - 4	Soft
little 10 to 20%	UT - Shelby Tube	10 - 30	Medium Dense	4 - 8	Firm
some 20 to 35%	UP - Fixed Position	30 - 50	Dense	8 - 15	Stiff
and 35 to 50%	C - Rock Core	50 +	Very Dense	15 - 30	Very Stiff
				30 +	Hard

RIC # : 2001-EB-003
Boring No. : B13
Date Completed : 2/20/08
Database ID No. :

Boring B14(OW) – Sheet 2 of 3

RIDOT Project Pawtucket Bridge No. 550 Replacement BORING # : B14(OW) Sheet 2 of 3
Location (C/T) : PAWTUCKET
RIC # : 2001-EB-003 FAP # : BRO-BCDR(009) Date Start : 2/20/08 Date End : 2/21/08
Bridge/Road # : Bridge No. 550/ I-95 N Coord. : 287,791 Ft.
Design Consult Co. : Commonwealth Engineers & Consultants E Coord. : 359,413 Ft.
Geotech Consult Co. : Haley & Aldrich, Inc. Ground Surface Elev., Ft. : 13.3
Inspector Name/Co. : David Palleiko / Haley & Aldrich, Inc. Elevation Datum NGVD29

Borehole Location Description: Taft Street
Sampler: Unless otherwise noted, soil sampler consists of a 2 in. split spoon driven using a 140 lb hammer, 30 in fall.
Casing: Unless otherwise noted, casing is driven using 300 lb hammer, falling 24 in.
Casing Size: 3 in HS Auger

Groundwater Observations

Date	Time	Depth	Casing at	Stab. Time

DEPTH Ft.	CASING BLOWS /Ft.	Type & Number	Pen/Rec. Core Rec. & RQD	Depth (ft)	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMPLE DESCRIPTION (Haley & Aldrich Modified Burmister Soil and Rock Classification System)	Depth of Stratum Change (ft)	STRATUM DESCRIPTION	REMARKS
		SS-1	24/6	0.5 2.5	4-5-5-5	Loose olive gray brown silty medium to fine SAND, little fine gravel	0.3	CONCRETE / FILL	1
5		SS-2	24/1	4.0 6.0	7-6-4-3	Loose olive gray silty fine SAND - limited recovery	7.0	GLACIOFLUVIAL DEPOSITS	
10		SS-3	24/3	9.0 11.0	19-19-11-13	Medium dense GRAVEL	13.0	GLACIAL TILL	
15		SS-4 C-5	6/4 60/58 93%	14.0 14.5	19-50/0" (8) (8) (8) (8) (8)	Dense olive gray silty medium to fine SAND, little fine gravel, weakly bonded in-situ C-5-C-7: Hard, fresh, gray green to purple, fine-grained interbedded SILTSTONE and SANDSTONE. Bedding moderate angle, thin to medium thick. Primary joint bed parallel, moderate angle, close to moderately spaced, smooth, occasionally slickensided, planar, fresh, tight. Secondary joints cross cut bedding, moderate angle, close to moderately spaced, smooth, planar, tight to open occasionally quartz healed. Single vug at 29.3 ft, 1 in. across with calcite crystals and iron staining.	14.5	TOP OF BEDROCK AT 14.5 FT / SILTSTONE AND SANDSTONE	
20		C-6	60/54 82%	19.5	(7) (8) (7) (8)				
25		C-7	60/58 80%	24.5 29.5	(7) (6) (6) (7) (8) (6)		29.5		
30									

REMARKS: 1. Groundwater not recorded.

140# Wt x 30" fall on 2" OD SS Sampler

Proportions Used	Sampler Type	Cohesionless	Density	Cohesive	Consistency
trace 0 to 10%	SS - Split Spoon	0 - 10	Loose	0 - 4	Soft
little 10 to 20%	UT - Shelby Tube	10 - 30	Medium Dense	4 - 8	Firm
some 20 to 35%	UP - Fixed Position	30 - 50	Dense	8 - 15	Stiff
and 35 to 50%	C - Rock Core	50 +	Very Dense	15 - 30	Very Stiff
				30 +	Hard

RIC # : 2001-EB-003
Boring No. : B14(OW)
Date Completed : 2/21/08
Database ID No. :

Boring B15(OW) – Sheet 1 of 3

RIDOT Project	Pawtucket Bridge No. 550 Replacement	BORING # :	B15(OW) (Sheet 1 of 3)
Location (C/T) :	PAWTUCKET	RIDOT Database ID # :	
RIC # :	2001-EB-003 FAP # : BRO-BCDR(009)	Date Start :	2/25/08 Date End : 2/26/08
Bridge/Road # :	Bridge No. 550/ I-95	N Coord. :	287,997 Ft.
Design Consult Co. :	Commonwealth Engineers & Consultants	E Coord. :	359,711 Ft.
Geotech Consult Co. :	Haley & Aldrich, Inc.	Ground Surface Elev., Ft. :	52.7
Inspector Name/Co. :	Scott Shay / Haley & Aldrich, Inc.	Elevation Datum	NGVD29

Methods Used to Determine Borehole Coordinates and Elevation :
2 / Survey

Drilling Firm : New Hampshire Boring, Inc. Project No. :
Drilling Foreman : Don Dunklee

Drilling Rig Make & Model : Acker AD II
Drilling Methods and Tools
Casing Size : 4 in Hollow Stem Auger ☐ Flight OD : (in)
Methods Used to Advance Casing :
Driven (300 lbs) ☒ Push ☐ Roller Bit ☐ Spin ☐ Open Hole ☐
Drill Rod Size : Wt./Ft. (lbs)

Soils/Rock Sampling :
SPT Hammer Type Donut ☐ Safety ☒ Automatic Trip ☐ Other
Hammer Wt : 140 (lbs) Hammer Fall : 30 (in)
Split Spoon Sampler : Barrel Length : 24 Barrel ID: 1.375 (in) Barrel OD : 2 (in)
Shoe ID: 1.375 (in) Shoe OD : 2 (in)
Liner Type : Brass ☐ Stainless Steel ☐ Plastic ☐ Spring Core Catcher ☐
Undisturbed Samplers :
Shelby Tube : Length : (in) ID/OD : (in)
Fixed Piston Sampler Type Length : (in) ID/OD : (in)
Other: Length : (in) ID/OD : (in)

Bedrock Core Barrel Type : Standard double tube ID/OD : 2/2.8 (in) Core Diameter : 2 (in)

Groundwater Monitoring : Well Screen Depth from : 10 (ft) to 20 (ft)

Soil/Rock Samples Delivered to :
Name : Haley & Aldrich, Inc. Date :
Address : One Davol Square, Providence, RI 02903

Rhode Island Department of Transportation
Two Capitol Hill
Providence, RI 02903

RIC # : 2001-EB-003
Boring No. : B15(OW)
Database ID No. :

HALEY & ALDRICH
HALEY & ALDRICH, INC.
465 Medford Street, Suite 2200
Boston, MA 02129-1400
Phone: 617.886.7400
Fax: 617.886.7600
HaleyAldrich.com

REVISIONS		
NO.	DATE	BY

RHODE ISLAND
DEPARTMENT OF TRANSPORTATION

BRIDGE REPLACEMENT
PAWTUCKET BRIDGE NO. 550

PAWTUCKET, RHODE ISLAND

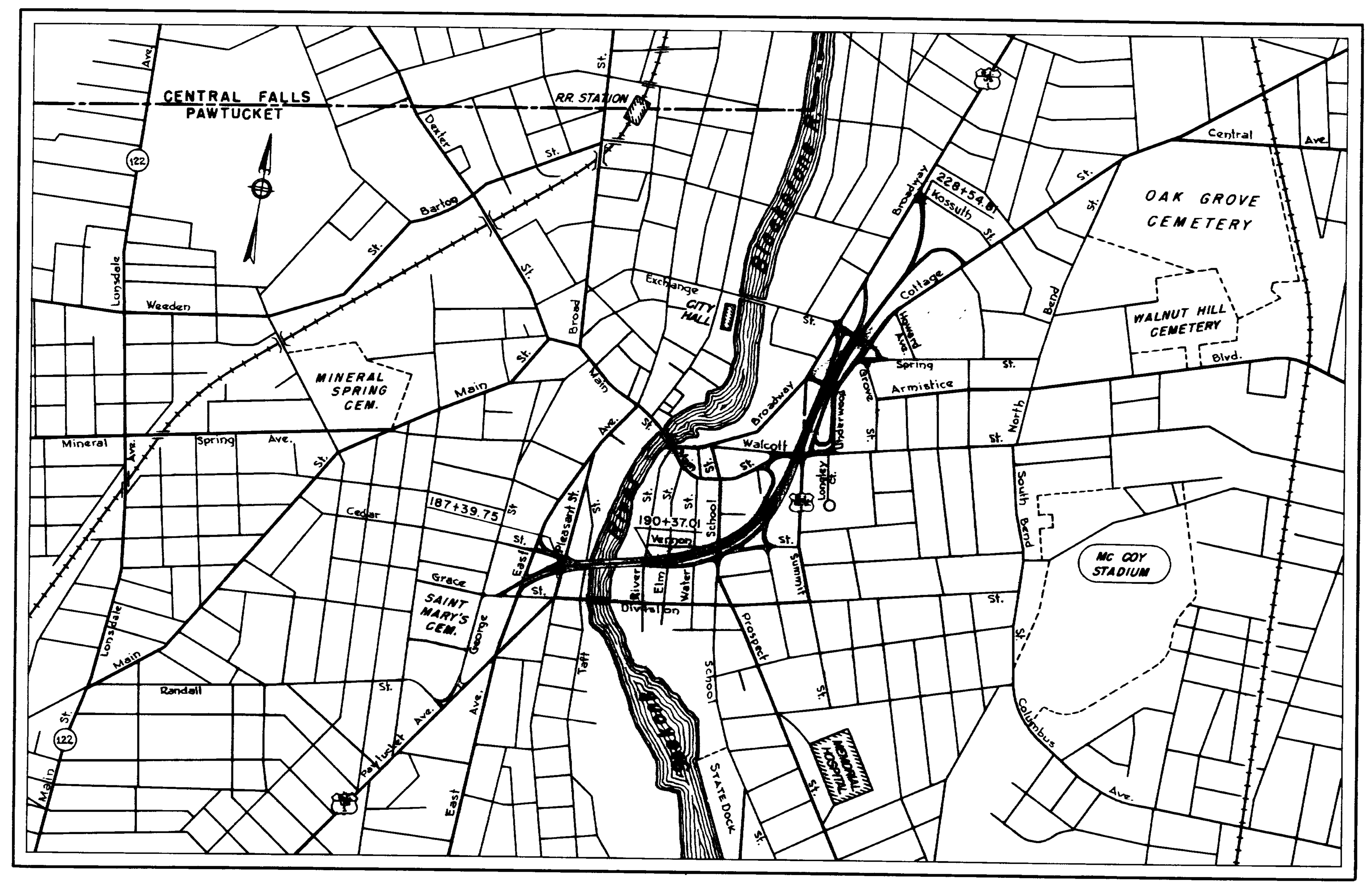
TEST BORINGS B13, B14, B15

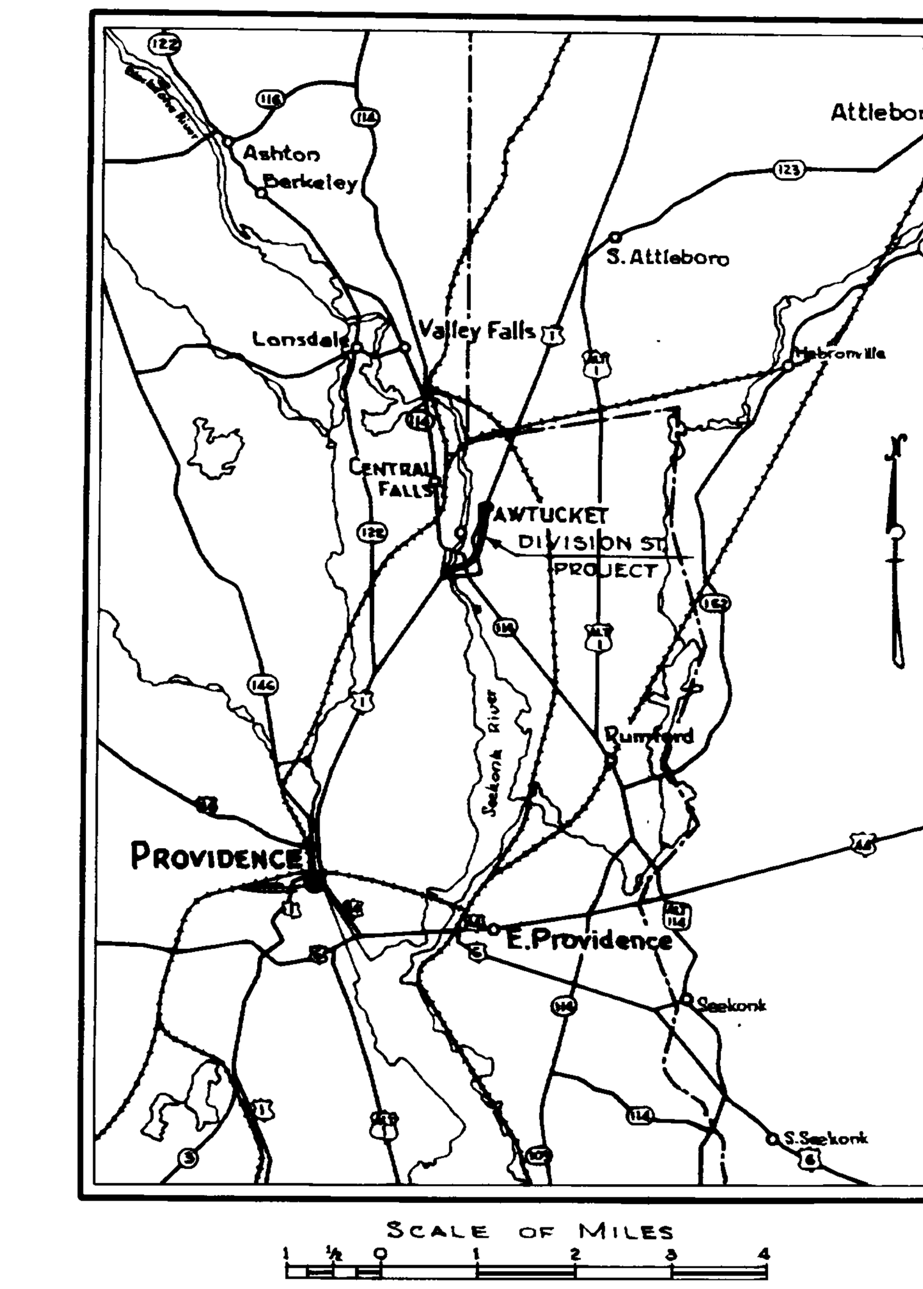
SCALE -- SHEET DESIGNATION G-42

FED. ROAD DIV. NO.	STATE	FED. AID PROJ No.	FISCAL YEAR	SHEET NO.	SHEETS
1	R. I.				

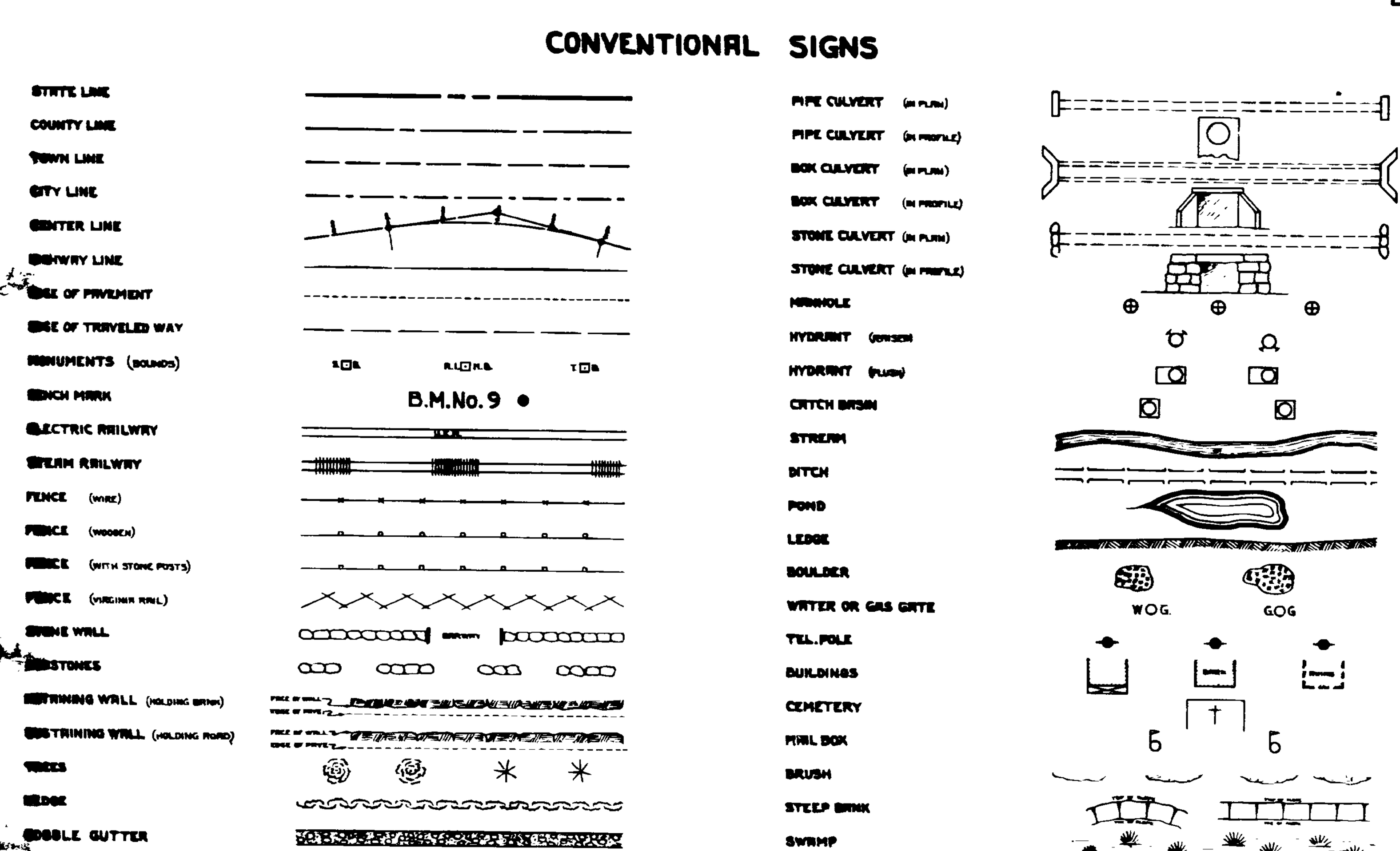
STATE OF RHODE ISLAND
DEPARTMENT OF PUBLIC WORKS
DIVISION OF ROADS AND BRIDGES

PLAN, PROFILE AND SECTIONS OF PROPOSED
STATE HIGHWAY





KEY PLAN



DIVISION ST. PROJECT
CONTRACT THREE

R.I.F.A. PROJECT NO. I-01 (11) LENGTH .723 MILES

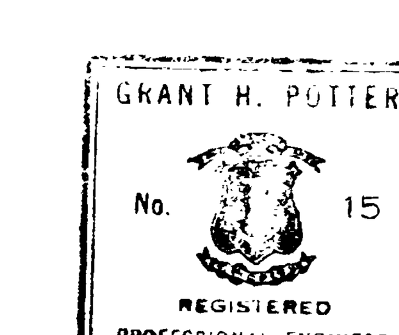
LAYOUT

1000 500 0 1000 2000
SCALE OF FEET

SCALES OF DRAWINGS

Plans, - - 1 inch = 50 feet
Profiles, - - 1 inch = 40 feet Horizontal
" - - 1 inch = 4 feet Vertical
Cross Sections, 1 inch = 10 feet

BASE OF LEVELS
PAWTUCKET MEAN HIGH WATER



Contract Number 5753
Number of Sheet 1
Total Sheets 223

R. I. DEPARTMENT OF PUBLIC WORKS
DIVISION OF ROADS AND BRIDGES

APPROVED
E. H. Henderson 4-25-57
PRINCIPAL HIGHWAY ENGINEER — DATE

APPROVED
C. T. Normandin 4/26/57
PUBLIC WORKS CONTROLLER — DATE

APPROVED
Joseph M. Vallone 4-29-57
DIRECTOR — DATE

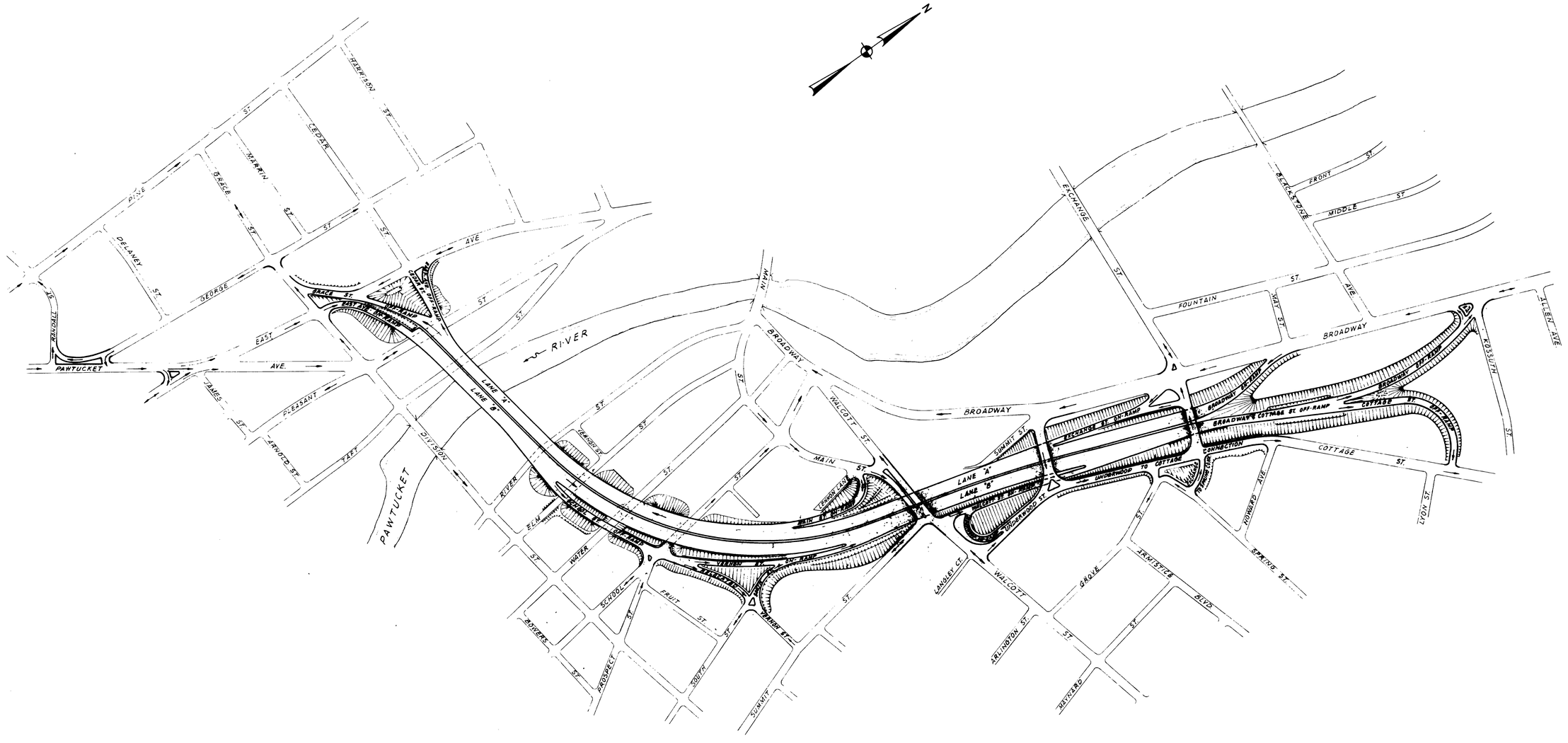
DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

APPROVED

DISTRICT ENGINEER — DATE

M NOV 1 1955

FED ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	R. I.	I-01-(11)	57	3	223



CONSTRUCTION CONTRACT THREE

RHODE ISLAND
DEPARTMENT OF PUBLIC WORKS
DIVISION OF ROADS AND BRIDGES

DIVISION STREET PROJECT

R.I. PROJECT NO. I-01-(11)

PAWTUCKET RHODE ISLAND

GENERAL PLAN

CHARLES A. MAGUIRE & ASSOCIATES
ENGINEERS
PROVIDENCE, R.I. BOSTON, MASS.
DATE FILE NO. 711
SCALE 1"=200' SHEET 3 OF 223

APPROVED _____ ENGINEER
APPROVED _____ PRINCIPAL HIGHWAY ENGINEER
FINAL DATE:

SET NO.
PRINTED
ISSUED

NOV 1 0 1955

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	R.I.	X-01-(11)	57	4	223

LEGEND AND NOTES

Building to be demolished

Bore Hole Location

Limit of Work under this contract

For Bore Hole Details See Sheet Nos. 8 Thru 13

N

INTERSECTION
RANDALL ST. & PAWTUCKET AVE.

RANDALL ST.
DELANEY ST.
ST.
GEORGE
PAWTUCKET AVE.
EAST AVE.

CEDAR ST.
EAST AVE.
OFF RAMP
ON RAMP
GRACE ST.
MARRIN ST.
GEORGE
PLEASANT ST.
TAFT ST.
SEEKONK (PAWTUCKET) RIVER
DIVISION ST.
LANE "A"
LANE "B"
MATCH LINE

B.H.41 B.H.42 B.H.43 B.H.44A B.H.44C B.H.70 B.H.71 B.H.72 B.H.73 B.H.74 B.H.75 B.H.98 B.H.99 B.H.100 B.H.101 B.H.102 B.H.103 B.H.104 B.H.105 B.H.106 B.H.107 B.H.20 B.H.21 B.H.22 B.H.25 B.H.26 B.H.27 B.H.28 B.H.29 B.H.30 B.H.31 B.H.32A B.H.33 B.H.34 B.H.35 B.H.36 B.H.37

CONSTRUCTION CONTRACT THREE
RHODE ISLAND
DEPARTMENT OF PUBLIC WORKS
DIVISION OF ROADS AND BRIDGES

DIVISION STREET PROJECT

R.I. PROJECT NO. X-01-(11)
PAWTUCKET. RHODE ISLAND

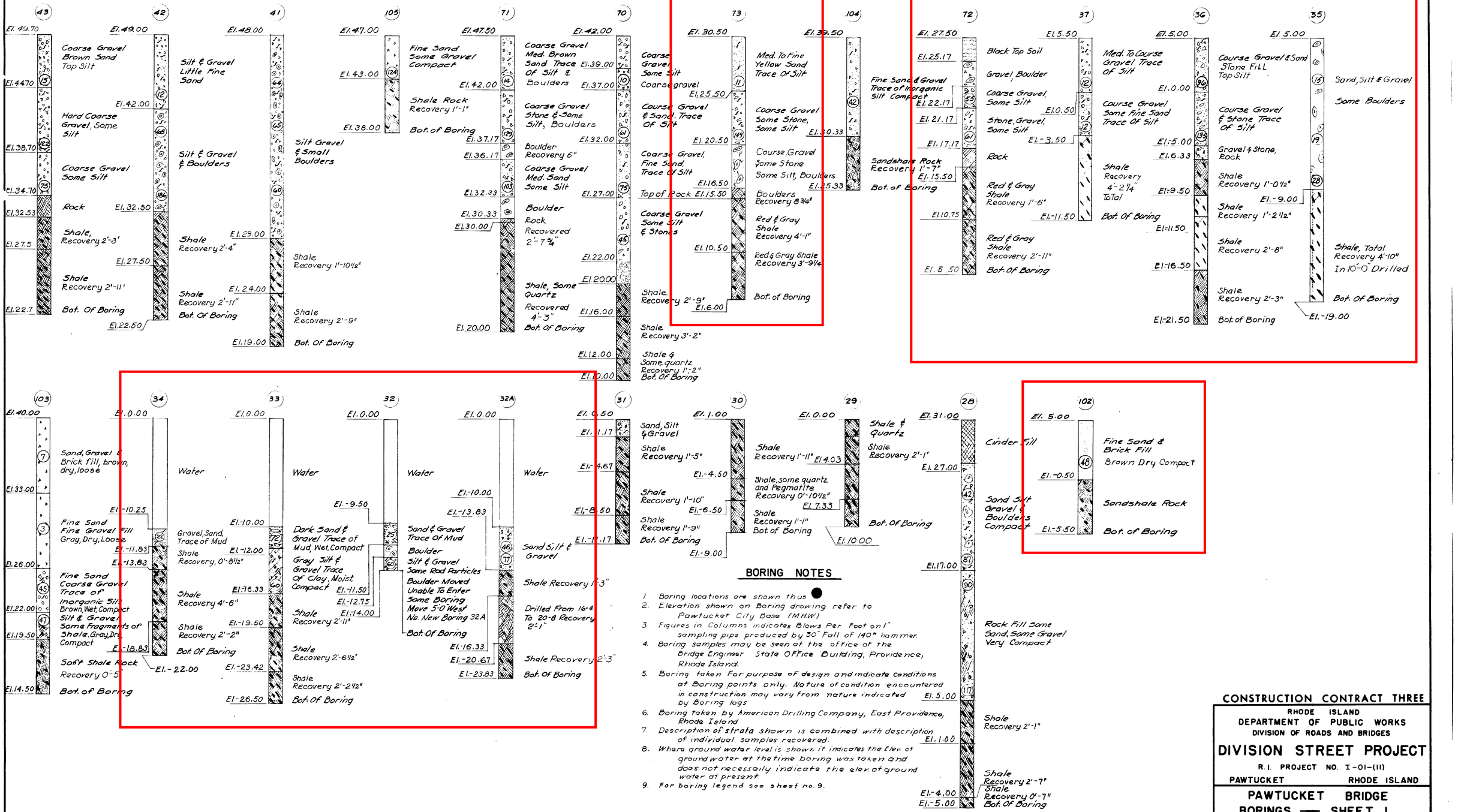
SITE & BORING PLAN No. 1

CHARLES A. MAGUIRE & ASSOCIATES
ENGINEERS
PROVIDENCE, R.I. BOSTON, MASS.
DATE FILE NO. 711
SCALE 1"=50' SHEET 4 OF 223

APPROVED _____ ENGINEER
APPROVED _____ PRINCIPAL HIGHWAY ENGINEER
FINAL DATE

SET NO. PRINTED ISSUED TO

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	R.I.	I-01-(11)	57	8	223



BORING NOTES

1. Boring locations are shown thus ●
2. Elevation shown on Boring drawing refer to Pawtucket City Base (MHW)
3. Figures in Columns indicates Blows Per Foot on 1" sampling pipe produced by 30" Fall of 140" hammer.
4. Boring samples may be seen at the office of the Bridge Engineer State Office Building, Providence, Rhode Island.
5. Boring taken For purpose of design and indicate conditions at Boring points only. Nature of condition encountered in construction may vary from nature indicated by Boring logs
6. Boring taken by American Drilling Company, East Providence, Rhode Island
7. Description of strata shown is combined with description of individual samples recovered.
8. Where ground water level is shown it indicates the Elev. of ground water at the time boring was taken and does not necessarily indicate the elev. of ground water at present
9. For boring legend see sheet no. 9.

CONSTRUCTION CONTRACT THREE

RHODE ISLAND
DEPARTMENT OF PUBLIC WORKS
DIVISION OF ROADS AND BRIDGES

DIVISION STREET PROJECT

R.I. PROJECT NO. I-01-(11)

PAWTUCKET RHODE ISLAND

PAWTUCKET BRIDGE BORINGS — SHEET 1

CHARLES A. MAGUIRE & ASSOCIATES
ENGINEERS
PROVIDENCE, R.I. BOSTON, MASS.
DATE FILE NO. 711
SCALE: 1/4"=1'-0" SHEET 8 OF 223

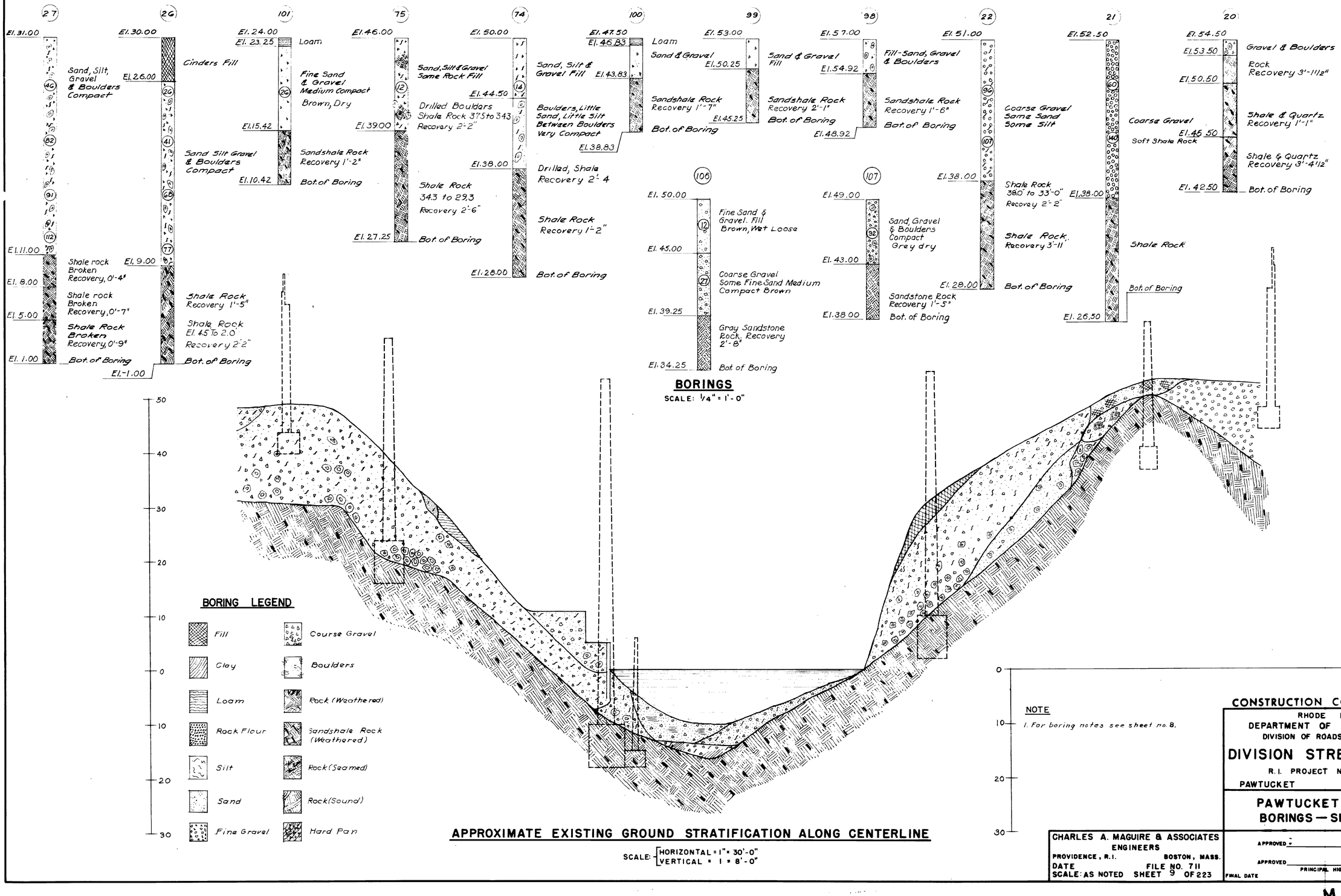
APPROVED _____ ENGINEER
APPROVED _____ PRINCIPAL HIGHWAY ENGINEER
FINAL DATE

SET NO. [ ]
PRINTED [ ]
ISSUED TO [ ]

M

NOV 1 1956

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
1	R. I.	I-01-(11)	57	9	223



CONSTRUCTION CONTRACT THREE

RHODE ISLAND
DEPARTMENT OF PUBLIC WORKS
DIVISION OF ROADS AND BRIDGES

DIVISION STREET PROJECT

R. I. PROJECT NO. I-01-(11)

PAWTUCKET RHODE ISLAND

PAWTUCKET BRIDGE BORINGS — SHEET 2

CHARLES A. MAGUIRE & ASSOCIATES
ENGINEERS
PROVIDENCE, R.I. BOSTON, MASS.
DATE FILE NO. 711
SCALE: AS NOTED SHEET 9 OF 223

APPROVED _____ ENGINEER
APPROVED _____ PRINCIPAL HIGHWAY ENGINEER
FINAL DATE

SET NO. ☐
PRINTED ☐
ISSUED TO ☐

M NOV 1 a 1956

Taft St. – Pleasant St. Branch Interceptor

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

BLACKSTONE VALLEY SEWER DISTRICT COMMISSION

PROVIDENCE, RHODE ISLAND

TAFT ST.-PLEASANT ST. BRANCH INTERCEPTER SECTION B

INLET CHAMBER DETAILS FOUND IN THIS CONTRACT... "18"

CONTRACT DRAWINGS

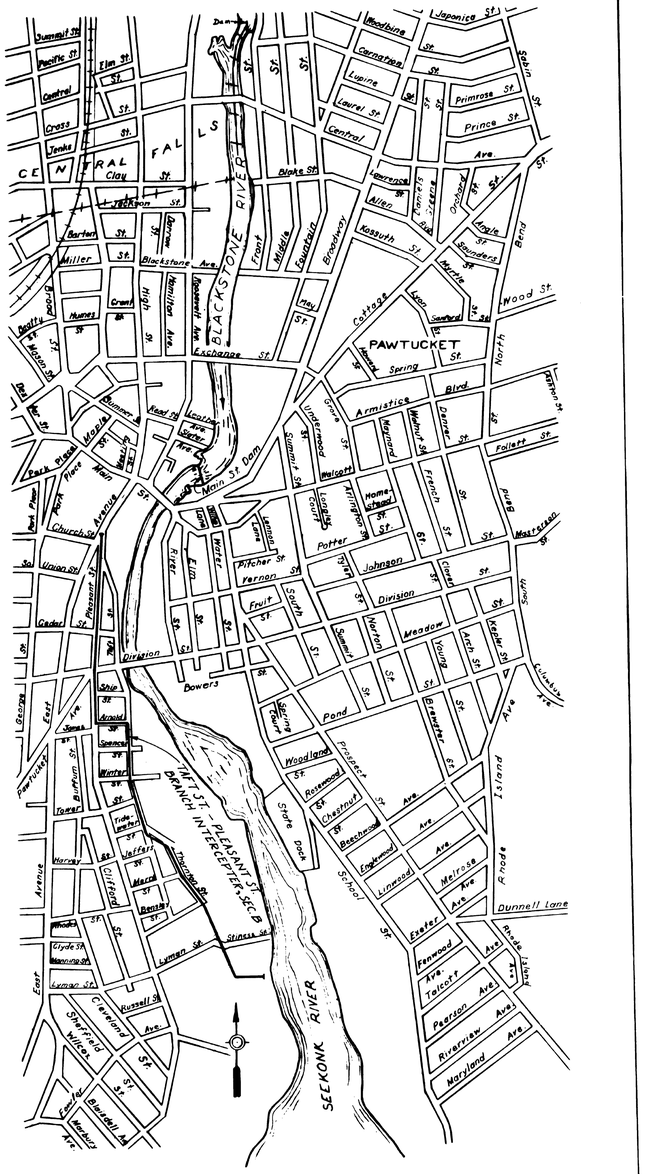
CONTRACT 18

1950

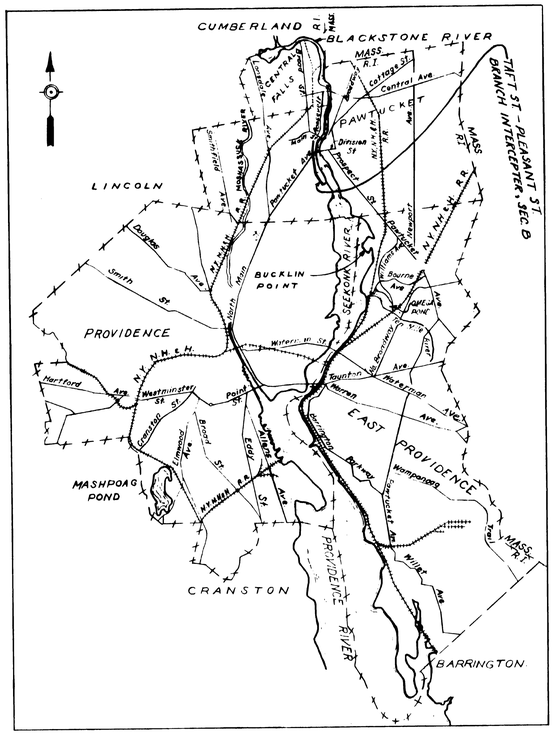
HONORABLE JOHN O. PASTORE, GOVERNOR

WILLIAM J. HALLORAN	CHAIRMAN
LUIGI SCALA	FIRST VICE CHAIRMAN
HAROLD J. CREEDON	SECOND VICE CHAIRMAN
PHILIP S. MANCINI	EX-OFFICIO
EDWARD A. McLAUGHLIN, M.D.	EX-OFFICIO
ANGELO A. BONVICIN	EXECUTIVE SECRETARY
CHARLES G. HAMMANN	CHIEF ENGINEER

METCALF & EDDY
ENGINEERS
BOSTON, MASS.



VICINITY PLAN
SCALE: 1"=600'



LOCATION MAP
SCALE: 1" = 6000'

LIST OF DRAWINGS

SHEET NO.	TITLE
1	VICINITY PLAN AND LOCATION MAP - LIST OF DRAWINGS
2	PLAN AND PROFILE - STA. 7+00± TO STA. 12+00
3	" " " STA. 12+00 TO STA. 24+00
4	" " " STA. 24+00 TO STA. 36+00
5	" " " STA. 36+00 TO STA. 48+00
6	" " " STA. 48+00 TO STA. 54+37.74
7	BYPASS CONDUIT
8	SEWER AND TRENCH SECTIONS - UNDERDRAIN DETAILS
9	MANHOLE DETAILS
10	MISCELLANEOUS DETAILS
11	SIPHON INLET STRUCTURE - PART I OF V
12	" " " PART II OF V
13	" " " PART III OF V
14	" " " PART IV OF V
15	" " " PART V OF V
16	JUNCTION CHAMBER AT LYMAN ST. - PART I OF II
17	" " " " " PART II OF II
18	MERRY ST. SEWER CONNECTION - PART I OF II
19	" " " " PART II OF II

SHEET NO.	TITLE
20	TIDEWATER ST. SEWER CONNECTION - PART I OF II
21	" " " " PART II OF II
22	PLEASANT ST. SEWER CONNECTION - PART I OF II
23	" " " " PART II OF II
24	EAST AVENUE SEWER CONNECTION - PART I OF II
25	" " " " PART II OF II
26	JUNCTION CHAMBER AT PLEASANT ST.

RECORD PLAN

BLACKSTONE VALLEY SEWER DISTRICT COMMISSION
PROVIDENCE, RHODE ISLAND

TAFT ST.-PLEASANT ST.
BRANCH INTERCEPTER
SECTION B

VICINITY PLAN AND LOCATION MAP
LIST OF DRAWINGS

SCALE: AS SHOWN OCTOBER 1950

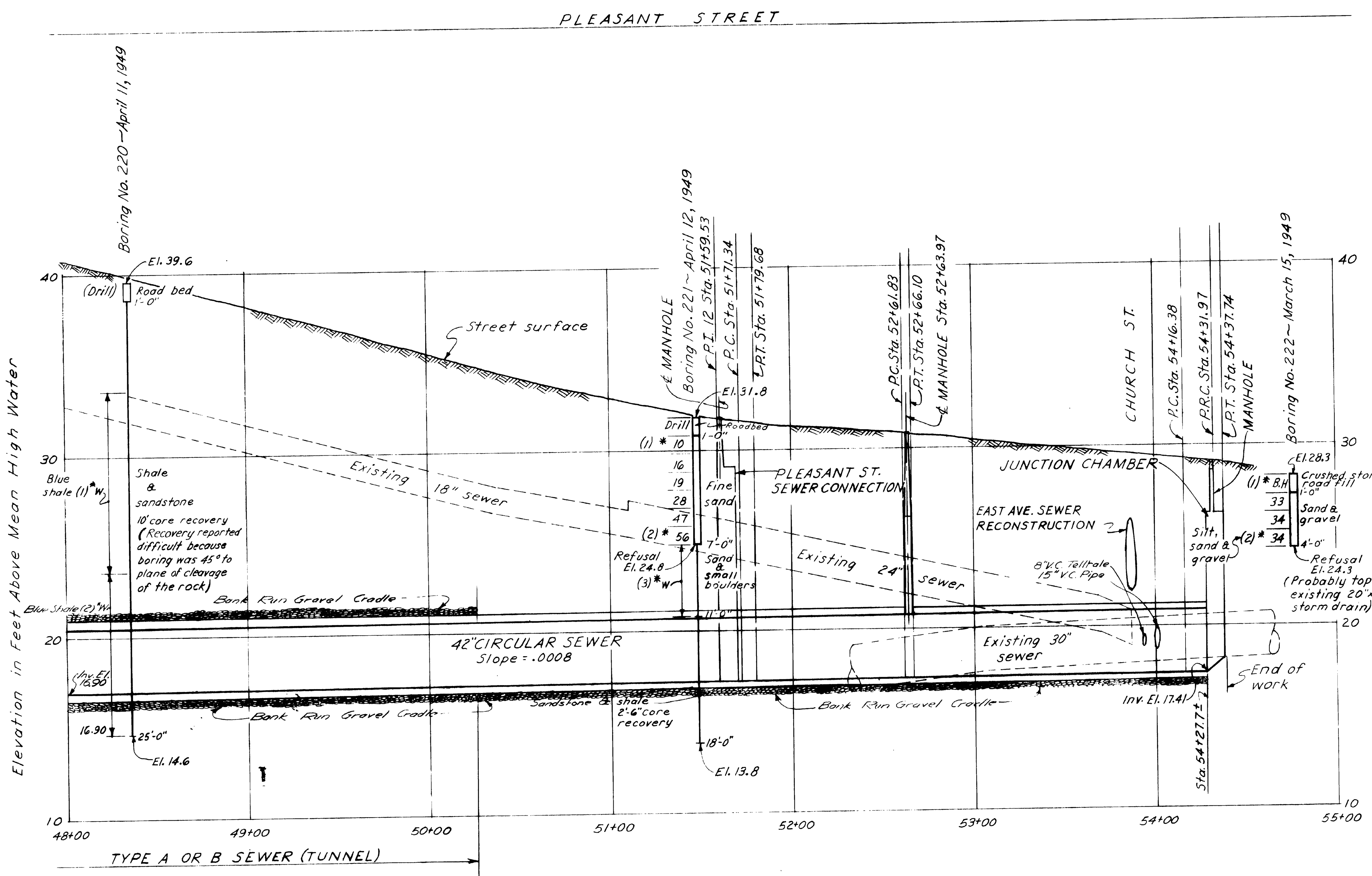
METCALF & EDDY
ENGINEERS
BOSTON, MASS.

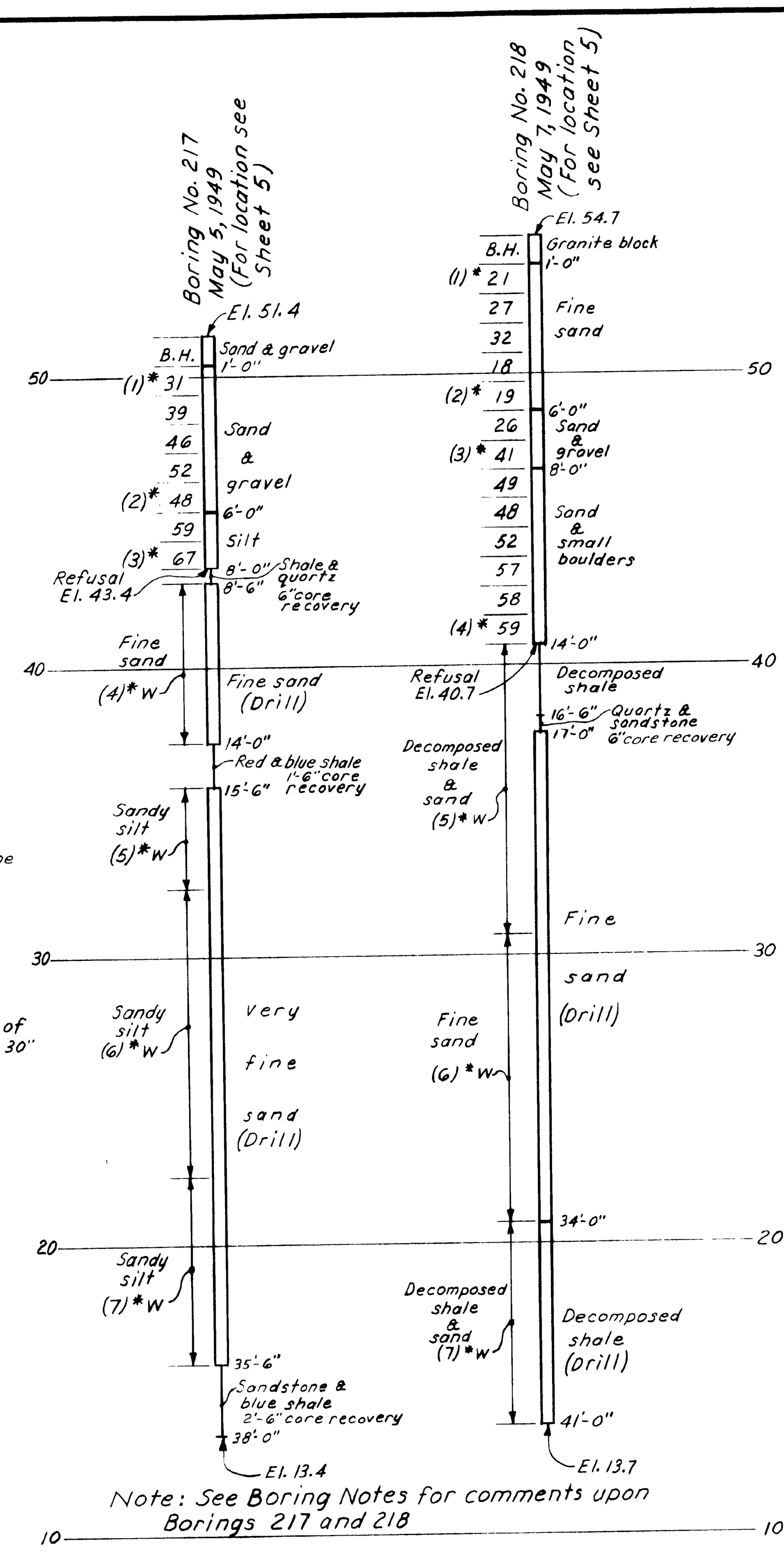
APPROVED
FOR METCALF & EDDY, ENGINEERS
R. I. REG. PROF. ENGR. NO. 353 DATE

DRAWN BY CKW
TRACED BY WS - DWS
CHECKED BY DMR

CONTRACT 18 SHEET 1 OF 26

1 OF 26





BORING AND BAR SOUNDING NOTES

An asterisk (*) indicates a point at which a sample of material was taken from the boring. The figure adjacent to the asterisk, in parentheses, is the sample number. "B.H." indicates that the sample was taken "by hand", without use of a spoon. "Drill" means that the boring within the indicated limits was made by diamond drill rather than by the wash-boring method (see Table below showing diamond-drill borings made). "W" means that the sample was obtained by catching the wash-water in a bucket or jar as it left the casing during drilling operations, the sample being composed of materials carried by the wash-water.

The other figures alongside the boring, at 1'-0" intervals, indicate the penetration, this being the number of blows required to drive an open-end 2" diameter spoon into the material a distance of 1'-0" at the point where the penetration was measured, using a 140-lb. weight falling through a distance of approximately 2'-6", ahead of the washing.

"Refusal" at the borings was reported when 50 or more blows of the weight on the spoon produced zero penetration.

Bar soundings were made by driving into the ground a 1 3/4" round iron bar, made up of sections threaded together, driven by dropping a 300-lb. weight on it. The bar had a wedge-shaped chopping bit. "Refusal" at the bar soundings was reported when additional penetration of the iron bar into the ground could not be obtained.

Bar sounding T-7 made at Sta. 11+88± is not shown because Sounding T-7A, located about 3'-0" away, penetrated several feet deeper. Sounding T-7 was made by manually driving into the ground a pointed 1" round iron bar by use of an 8-lb. sledge hammer. "Refusal" was reported at elevation 20.4 at this sounding.

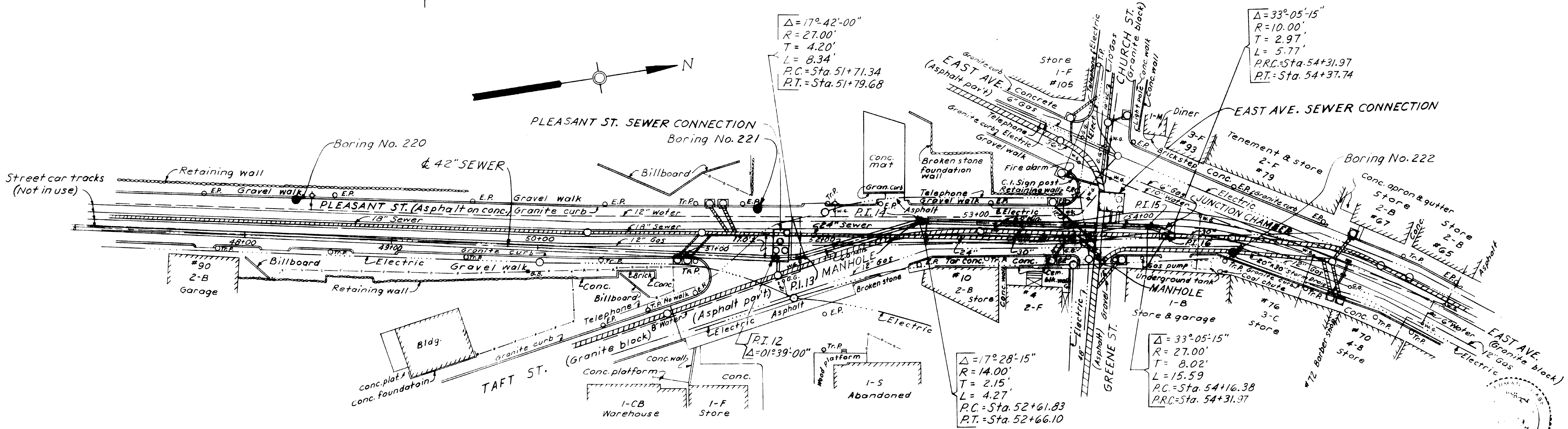
Borings 217 and 218 were considered to be erroneous or misleading because the material reported to be "fine sand" was removed by diamond drill rather than by wash-boring method. Borings 217 A and 218 A were thereupon made nearby, using wash-boring methods where possible, with the result that Borings 217 and 218 were shown to be possibly incorrect in indicating "fine sand" at certain elevations. Therefore Borings 217 A and 218 A are shown on the profile, Sheet 5, rather than Borings 217 and 218.

No guarantee is given as to the character of the material encountered in any boring, nor is any guarantee given that borings or bar soundings represent the true character of the material which will be excavated or which will underlie the proposed structures or that groundwater conditions will be as stated.

For additional information upon borings and bar soundings, including information upon groundwater, see the "Information for Bidders".

TABLE SHOWING DIAMOND-DRILL BORINGS MADE

Boring No.	Diamond-drill boring, depth from ground surface	
	From	To
206 A	15'-0" 26'-0"	16'-0" 48'-0"
216	14'-0" 35'-7"	24'-8" 36'-0"
217	8'-0"	38'-0"
217 A	12'-0" 16'-0" 19'-0"	13'-0" 17'-0" 41'-0"
218	14'-0"	41'-0"
218 A	6'-0" 11'-0" 14'-0" 20'-0"	7'-0" 12'-0" 15'-0" 44'-0"
219	9'-0"	33'-0"
220	0'-0"	25'-0"
221	0'-0" 7'-0"	1'-0" 18'-0"



DRAWN BY F.T.Q.
TRACED BY F.T.Q.
CHECKED BY F.C.T., C.F.J.

APPROVED	
FOR METCALF & EDDY, ENGINEERS	
E. Sherman Chase	10-27-50
R.I. REG. PROF. ENGR. NO. 353	DATE

RECORD DRAWING
MARCH, 1953. E.K.

BLACKSTONE VALLEY SEWER DISTRICT COMMISSION
PROVIDENCE, RHODE ISLAND

TAFT ST.-PLEASANT ST. BRANCH INTERCEPTER
SECTION B
PLAN AND PROFILE
STA. 48+00 TO STA. 54+37.74

SCALE: HOR. 1" = 40' VERT. 1" = 4'

OCTOBER 1950

METCALF & EDDY
ENGINEERS
BOSTON, MASS.

23917 H 11187

Phase IIIA-5 Historic Data

Pawtucket Tunnel RFP GDR

Pare Corporation
10 Lincoln Road, Suite 210
Foxboro, MA 02035
T: 508-543-1755
F: 508-543-1881

BORING NUMBER B17-41

TEST BORING REPORT

PROJECT NAME Narragansett Bay Commission Phase III CSO Program
CLIENT NBC/Stantec
CONTRACTOR New England Boring Contractors, Inc.

PROJECT NO. 13:308.00D/14106.02
START 5/3/2018
FINISH 5/4/2018
DRILLER NEBC
LOGGED BY HMS
CHECKED BY SJM
ELEVATION 12.8 **NORTHING** 287414.433
DATUM NGVD 1929 **EASTING** 359504.663
LOCATION Taft Street near Division Street Bridge

	CASING	SAMPLER	BARREL
Type	Steel	Split Spoon	HQ3
Inside Diameter (in.)	4	1 3/8	2 3/8
Hammer Weight (lb.)	140	140	N/A
Hammer Fall (in.)	30	30	N/A

DRILLING EQUIPMENT & PROCEDURES
Rig Make & Model: Mobile B-53
Bit Type: 3 7/8" Tricone
Drill Fluid: Water
Casing: 4"
Hoist/Hammer: Automatic Hammer

DEPTH (ft)	ELEVATION (ft)	CASING BLOWS	SPT	SAMPLE NO.	REC (in) / PEN (in)	SAMPLE DEPTH (ft)	USCS SYMBOL	GRAPHIC LOG	VISUAL-MANUAL IDENTIFICATION & DESCRIPTION (Density/consistency, color, max. particle size, structure, odor, moisture, optional descriptions, geologic interpretation)	DRILLING NOTES
0	12.8									
		X							Approximately 9" Pavement.	9" PAVEMENT
		10	9-10-12-72 (22)	S-1	15 / 24	0.75 - 2.75	SW-SM		A: Wet, medium dense, brown, fine to coarse SAND and fine to coarse GRAVEL, little silt. B: Wet, very dense, purple/brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt.	1A: PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (2) VOAs.
		18								
		146		S-2	0 / 6	2.75 - 3.25			No Recovery.	1B: PID = 0.0 ppm
		97								
5	7.8	X	28-9-7-3 (16)	S-3	8 / 24	4 - 6	GW		Wet, medium dense, purple/brown, fine to coarse GRAVEL, some fine to coarse sand, trace silt.	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (2) VOAs.
		X								
		X	3-3-4-7 (7)	S-4	5 / 24	6 - 8	GW		Wet, loose, brown, coarse GRAVEL, some fine gravel, little fine to coarse sand, trace silt.	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (2) VOAs.
		X								
		X	3-2-7-17 (9)	S-5	5 / 24	8 - 10	SW-SM		Wet, loose, brown, fine to coarse SAND and fine coarse GRAVEL, little silt.	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (2) VOAs.
10	2.8	X								
		X	6-3-8-19 (11)	S-6	3 / 24	10 - 12	GW		Wet, medium dense, brown, coarse GRAVEL, little fine to coarse sand, trace silt, trace fine gravel.	PID = 0.0 ppm
		X	14-10-16-18 (26)	S-7	13 / 24	12 - 14	GW-GM		Wet, medium dense, brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt.	PID = 0.0 ppm
		X								
15	-2.2	X	22-23-33-39 (56)	S-8	11 / 24	14 - 16	GW		Wet, very dense, tan/gray, fine to coarse GRAVEL, little fine to coarse sand, trace silt, trace clay. (Possible weathered Sandstone)	PID = 0.0 ppm
		X								
			27-56-87-51 (143)	S-9	19 / 24	16 - 18	SW		A: Wet, very dense, gray, fine to coarse SAND, some fine gravel, trace silt, trace coarse gravel. B: Wet, very dense, gray, fine to coarse GRAVEL and fine to coarse SAND, little silt. (Possible weathered Sandstone)	PID = 0.0 ppm
			103/4"	S-10	2 / 4	18 - 18.3			Wet, very dense, gray, weathered SANDSTONE recovered as fine to coarse gravel, trace fine to coarse sand, trace silt.	PID = 0.0 ppm

Bottom of borehole at 18.30 feet.

WATER LEVEL DATA

DATE/TIME	DEPTH (ft.) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER

SAMPLE IDENTIFICATION
O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

REMARKS:
1. No casing blows for the first foot. NEBC set and reset casing to make sure casing was plum.
2. Used 140 lb. hammer for casing blows from 2'-4'.
3. Starting at 4', NEBC used the kelly and weight of the drilling to advance casing.
4. NEBC determined weathered bedrock began at approximately 18.3'. NEBC advanced roller bit to competent rock at approximately 21.1'.
5. "X" within casing blows indicates blows were not counted at that interval.

TEST BORING REPORT - GINT STD US LAB.GDT - 8/6/19 11:11 - Y:\JOBS\14 JOBS\14106.02 NBC PHASE III CSO CER-RI\PHASE III FIELD WORK\BORING LOGS\14106.02 BORING LOGS.GPJ

Pare Corporation
10 Lincoln Road, Suite 210
Foxboro, MA 02035
T: 508-543-1755
F: 508-543-1881

CORE BORING REPORT

BORING NUMBER B17-41

PROJECT NO. 13:308.00D/14106.02

DEPTH (ft)	DRILL RATE (min/ft)	RUN NO.	DEPTH (ft)	ELEV. (ft)	REC (in/%)	RQD (in/%)	DISCON (#/ft)	GRAPHIC LOG	STRAT. DEPTH	VISUAL DESCRIPTION AND REMARKS	DISCONTINUITIES Depth (ft)	Type	Apt (mm)	Dip Angle	Rgh	Wea	Infill
15.0																	
15.5																	
16.0																	
16.5																	
17.0																	
17.5																	
18.0																	
18.5										Weathered Rock - No Sample Taken							
19.0																	
19.5																	
20.0																	
20.5																	
21.0																	
21.5	2.5	C-1	21.1 - 25	-8.3 - -12.2	47 100%	37 79%	1		21.1	Strong, gray, conglomeratic SANDSTONE, massive, fresh. - Quartz vein at 21.5', 5 mm±. - Quartz vein at 22.1', 3 mm±. - Quartz vein at 22.2', 2 mm±.	21.3	J	1	45	SR	F	None
22.0	4.75																
22.5							3				22.0 22.5 22.7	J J J	1 1 1	55 45 45	R SM SM	SW F F	Fe None None
23.0	2.5								23.0								
23.5	2.75						1			Strong, gray/blue, fine to coarse SANDSTONE interlaminated with Siltstone, fresh. - Bedding planes at 40°-50°.	23.3	B	1	45	SM	F	None
24.0																	
24.5	1.5						ECF (4±)				24.0 24.2 24.7 24.8-24.9	B B B ECF	1 1 1 -	45 40 45 -	SR SM SR SR	F SW SW SW	None Fe Sl Fe
25.0							7										
25.5										**Bottom of borehole at 25.0 feet.**							
26.0																	
26.5																	
27.0																	
27.5																	
28.0																	
28.5																	
29.0																	
29.5																	
30.0																	

REMARKS:
1. Dip angles are measured from horizontal (i.e., perpendicular to the core axis).
2. Wash color white.
3. Flush return blocked at approximately 22.8'. Driller moved casing up and down to unblock.
4. Boring was backfilled with cement bentonite grout from 25.0 feet to the ground surface. No groundwater monitoring well was installed.

WATER LEVEL DATA

DATE/TIME	BOT. OF SOIL CASING (ft)	BOT. OF HOLE (ft)	WATER

GROUND SURFACE EL. 12.8

Note: Refer to the key sheets within the Geotechnical Design Report for the description of rock classification system codes.

Pare Corporation
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Foxboro, MA 02035
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BORING NUMBER B17-42

TEST BORING REPORT

PROJECT NAME Narragansett Bay Commission Phase III CSO Program
CLIENT NBC/Stantec
CONTRACTOR New England Boring Contractors, Inc.

PROJECT NO. 13:308.00D/14106.02
START 5/4/2018
FINISH 5/7/2018
DRILLER NEBC
LOGGED BY HMS
CHECKED BY SJM
ELEVATION 42.9 **NORTHING** 285819.753
DATUM NGVD 1929 **EASTING** 359764.101
LOCATION Taft Street at Merry Street

	CASING	SAMPLER	BARREL
Type	Steel	Split Spoon	HQ3
Inside Diameter (in.)	4	1 3/8	2 3/8
Hammer Weight (lb.)	140	140	N/A
Hammer Fall (in.)	30	30	N/A

DRILLING EQUIPMENT & PROCEDURES
Rig Make & Model: Mobile B-53
Bit Type: 3 7/8" Tricone
Drill Fluid: Water
Casing: 4"
Hoist/Hammer: Automatic Hammer

DEPTH (ft)	ELEVATION (ft)	CASING BLOWS	SPT	SAMPLE NO.	REC (in) / PEN (in)	SAMPLE DEPTH (ft)	USCS SYMBOL	GRAPHIC LOG	VISUAL-MANUAL IDENTIFICATION & DESCRIPTION (Density/consistency, color, max. particle size, structure, odor, moisture, optional descriptions, geologic interpretation)	DRILLING NOTES
0	42.9									
		X					N/A		Approximately 8" Pavement	8" PAVEMENT
		X	18-18-21-30 (39)	S-1	19 / 24	0.67 - 2.67	SP-SM		Moist, dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt. (FILL)	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (3) VOAs.
		X								
		X	25-20-23	S-2	15 / 18	2.67 - 4	SW		Moist, dense, brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt. (FILL)	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (2) VOAs.
5	37.9	X	21-28-29-27 (57)	S-3	16 / 24	4 - 6	SW		Moist, very dense, brown, fine to coarse SAND, some fine gravel, little coarse gravel, trace silt. (FILL)	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (2) VOAs.
		X								
		X	34-27-25-30 (52)	S-4	34 / 24	6 - 8	SW		Moist/wet, very dense, brown, fine to coarse SAND, some fine to coarse gravel, trace silt. (FILL)	PID = 0.0 ppm Environmental sample taken. (1) 8 oz. Amber, (2) VOAs. Water at approximately 7.5'.
		X								
		X	32-41-25-104/2"	S-5	14 / 20	8 - 10	GW-GM		A: Wet, very dense, brown, fine to coarse SAND and fine GRAVEL, trace silt. (FILL)	PID = 0.0 ppm 2" of fill then strata change. 1' boulder at approximately 10'.
10	32.9	X					GW-GM		B: Wet, very dense, brown, fine to coarse GRAVEL and fine to coarse SAND, trace silt.	
		71								
		57								
		108								
		82								
15	27.9	X	49-71-103/1"	S-6	8 / 13	14 - 15.1	GW		Wet, very dense, brown, fine to coarse GRAVEL, little fine to coarse sand, trace silt.	PID = 0.0 ppm Boulder at approximately 15'1", weathered rock in tip. Wash color brown advanced roller bit through boulder to approximately 17'.
		X								
		X								
		X	20-12-18-16 (30)	S-7	11 / 24	17 - 19	GP		Wet, medium dense/dense, tan, coarse GRAVEL, some fine gravel, little fine to coarse sand, trace silt.	PID = 0.0 ppm
		X								
20	22.9	X	23-21-14-25 (35)	S-8	15 / 24	19 - 21	GW		Wet, dense, tan, fine to coarse GRAVEL and some fine to coarse SAND, trace silt.	PID = 0.0 ppm
		58								
		81	19-25-104/1"	S-9	7 / 13	21 - 22.1	GM		Wet, very dense, tan, fine to coarse GRAVEL and fine to coarse SAND, little silt.	PID = 0.0 ppm Obstruction at ~22'.
		X								
		X								
25	17.9		82/2"	S-10	1 / 2	24 - 24.2	SW		Wet, very dense, tan, fine to coarse SAND and fine GRAVEL, trace coarse gravel, trace silt.	PID = 0.0 ppm

WATER LEVEL DATA

DATE/TIME	DEPTH (ft.) TO: BOTTOM OF CASING	BOTTOM OF HOLE	WATER

SAMPLE IDENTIFICATION
O Open End Rod
T Thin Wall Tube
U Undisturbed Sample
S Split Spoon
G Geoprobe

REMARKS:
1. NEBC attempted a sample at 26'; however, the spoon was bouncing and did not advance.
2. "X" within casing blows indicates that blows were not counted at that interval.

(Continued Next Page)

Pare Corporation
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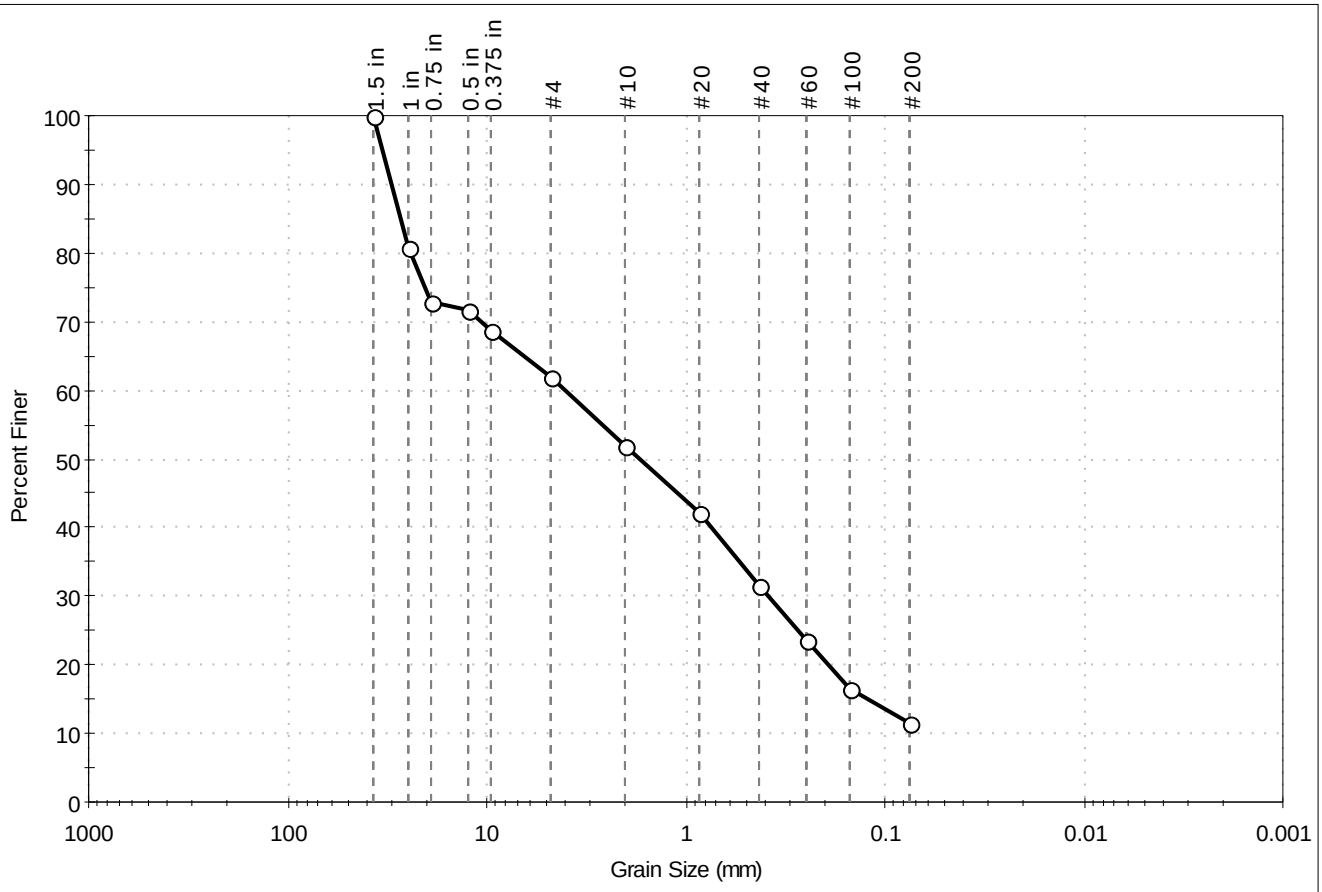
BORING NUMBER B17-42

TEST BORING REPORT

DEPTH (ft)	ELEVATION (ft)	CASING BLOWS	SPT	SAMPLE NO.	REC (in) / PEN (in)	SAMPLE DEPTH (ft)	USCS SYMBOL	GRAPHIC LOG	VISUAL-MANUAL IDENTIFICATION & DESCRIPTION (Density/consistency, color, max. particle size, structure, odor, moisture, optional descriptions, geologic interpretation)	DRILLING NOTES
25	17.9									
			50/0"	S-11	0 / 0	26 - 26			**Bottom of borehole at 26.00 feet.**	

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-41	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-1A	Test Date:	05/29/18	Checked By:	emm
Depth :	0.75-2.75	Test Id:	456243		
Test Comment:	---				
Visual Description:	Moist, dark grayish brown sand with silt and gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	38.2	50.2	11.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	81		
0.75 in	19.00	73		
0.5 in	12.50	72		
0.375 in	9.50	69		
#4	4.75	62		
#10	2.00	52		
#20	0.85	42		
#40	0.42	32		
#60	0.25	24		
#100	0.15	17		
#200	0.075	12		

Coefficients

D_{85} = 27.3599 mm D_{30} = 0.3803 mm

D_{60} = 4.0503 mm D_{15} = 0.1202 mm

D_{50} = 1.6817 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

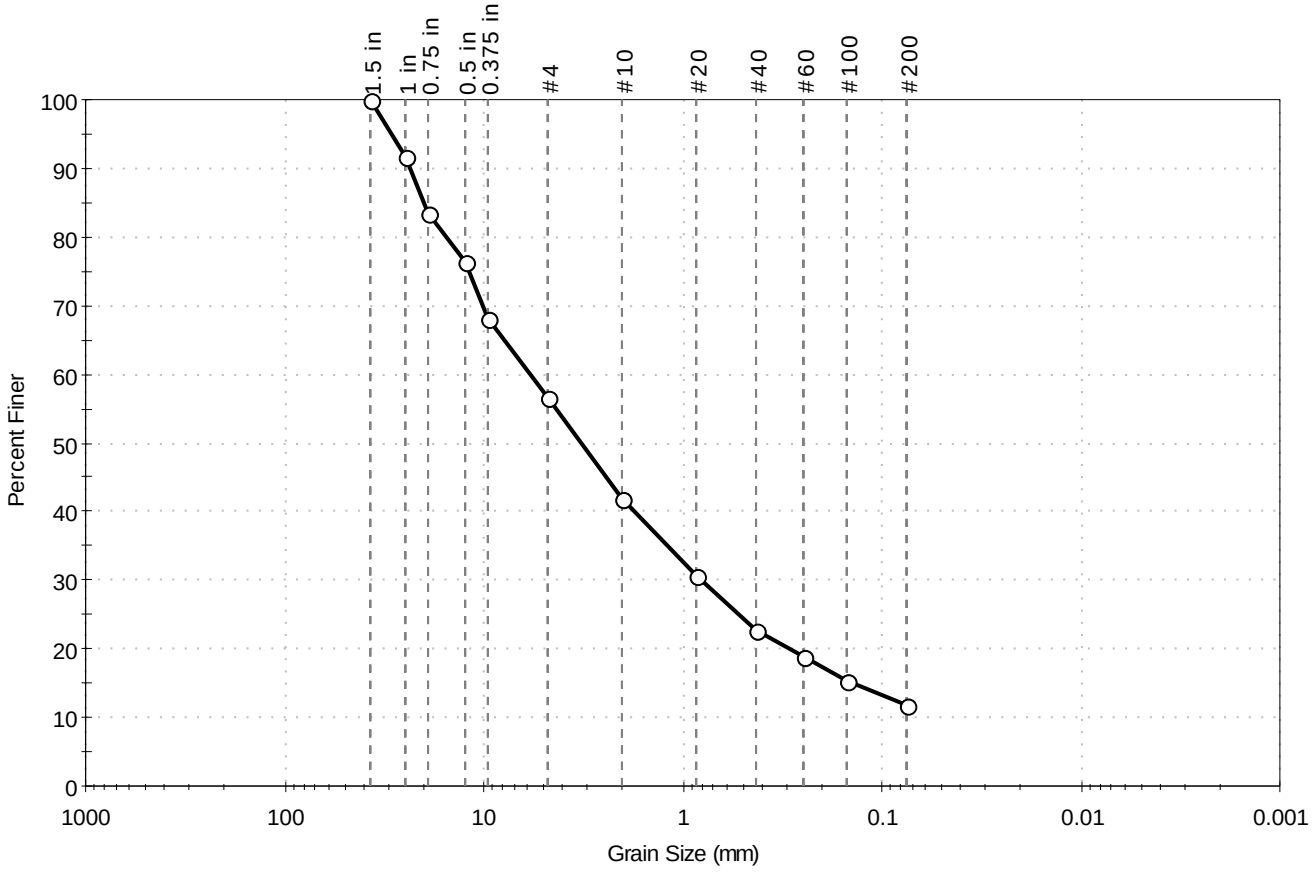
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-41	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-5	Test Date:	05/29/18	Checked By:	emm
Depth :	8-10	Test Id:	456244		
Test Comment:	---				
Visual Description:	Moist, dark brown sand with silt and gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	43.2	45.0	11.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	92		
0.75 in	19.00	84		
0.5 in	12.50	77		
0.375 in	9.50	68		
#4	4.75	57		
#10	2.00	42		
#20	0.85	31		
#40	0.42	23		
#60	0.25	19		
#100	0.15	15		
#200	0.075	12		

Coefficients

D_{85} = 19.9511 mm D_{30} = 0.8089 mm

D_{60} = 5.8038 mm D_{15} = 0.1408 mm

D_{50} = 3.2100 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

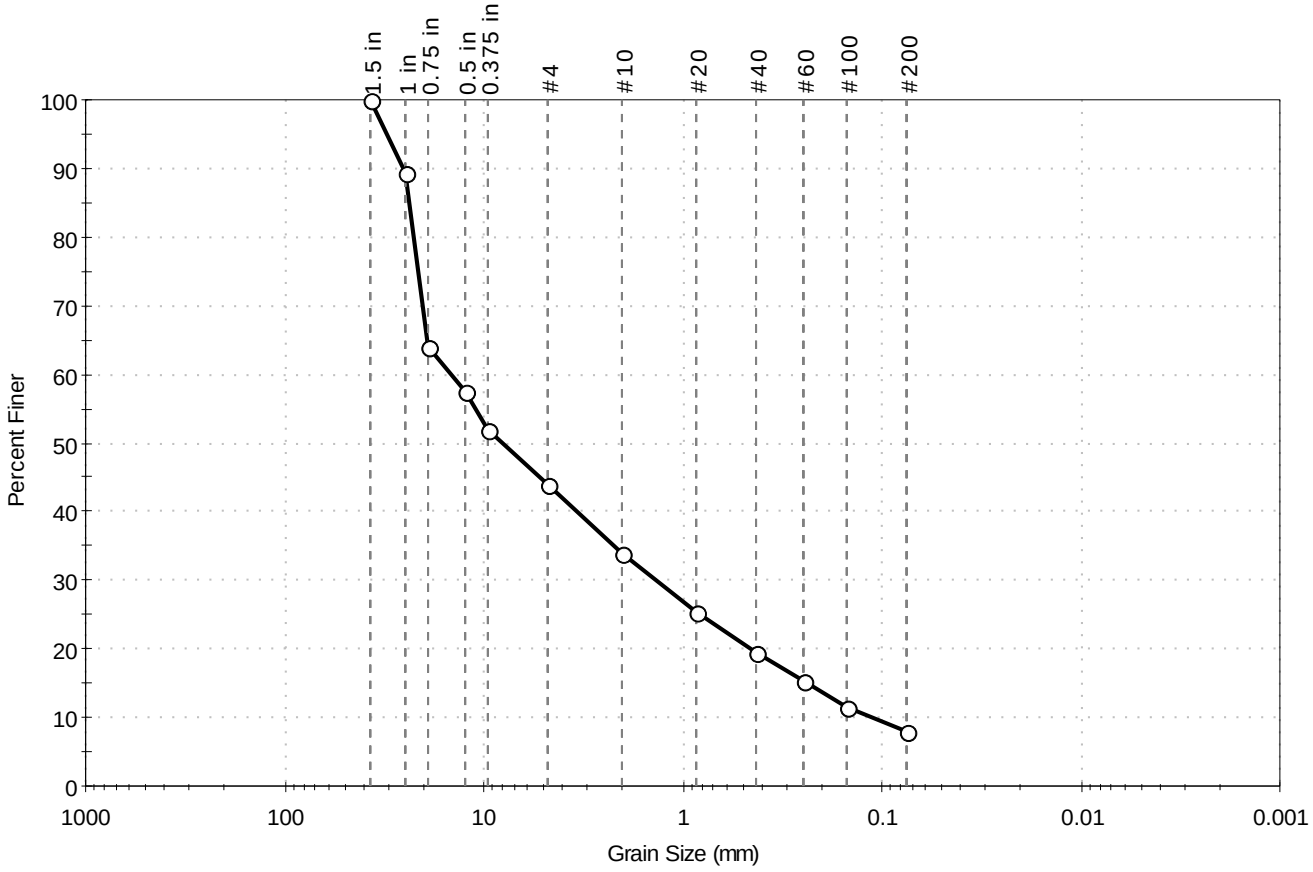
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-41	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-7	Test Date:	06/14/18	Checked By:	emm
Depth :	12-14	Test Id:	457944		
Test Comment:	---				
Visual Description:	Moist, redish dark gray gravel with silt and sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	56.2	35.8	8.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	89		
0.75 in	19.00	64		
0.5 in	12.50	58		
0.375 in	9.50	52		
#4	4.75	44		
#10	2.00	34		
#20	0.85	25		
#40	0.42	19		
#60	0.25	15		
#100	0.15	12		
#200	0.075	8.0		

Coefficients

D_{85} = 23.8175 mm	D_{30} = 1.3494 mm
D_{60} = 14.6163 mm	D_{15} = 0.2358 mm
D_{50} = 8.0521 mm	D_{10} = 0.1103 mm
C_u = 132.514	C_c = 1.129

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (1))

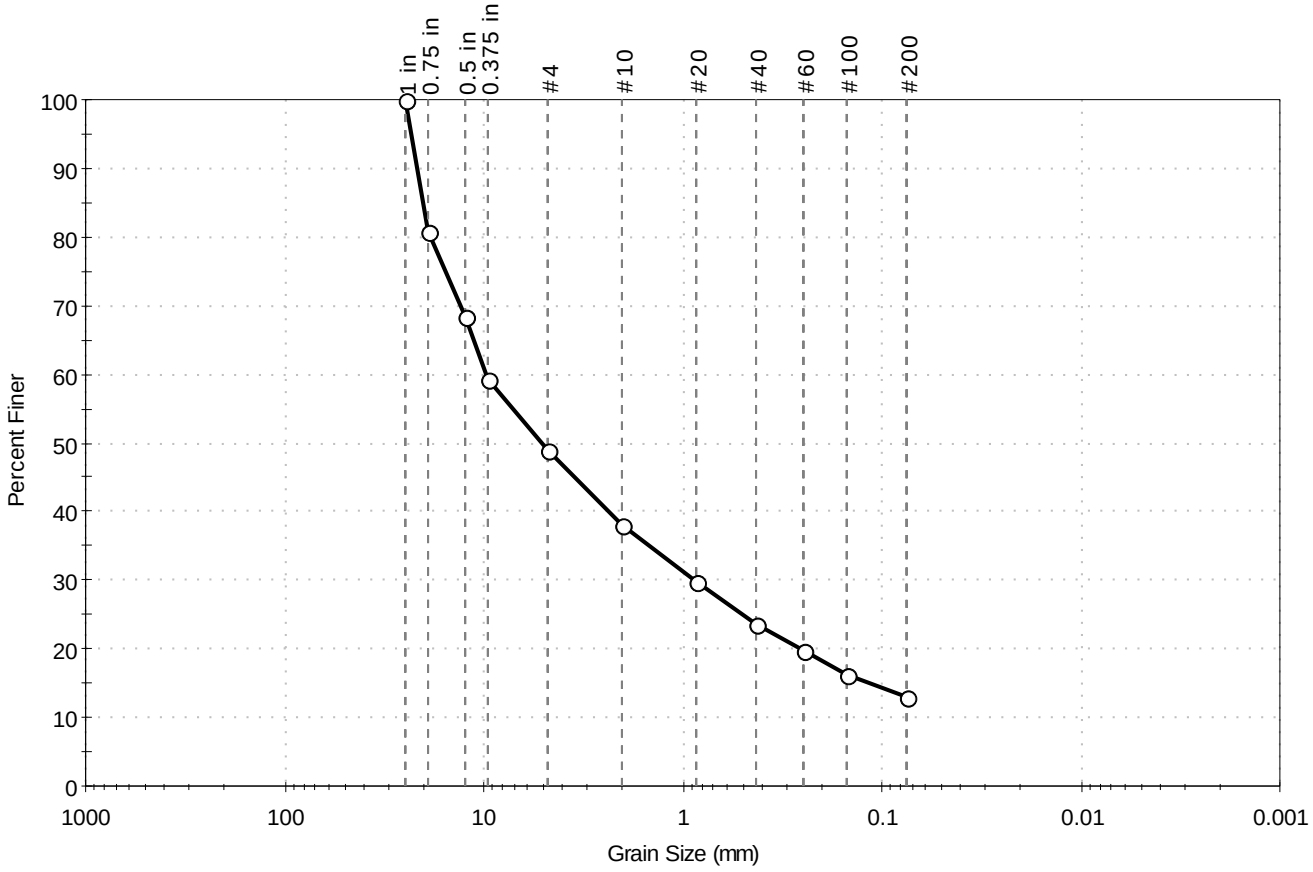
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-41	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-9B	Test Date:	05/29/18	Checked By:	emm
Depth :	16-18	Test Id:	456245		
Test Comment:	---				
Visual Description:	Moist, light olive gray silty gravel with sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	51.1	36.0	12.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	81		
0.5 in	12.50	68		
0.375 in	9.50	59		
#4	4.75	49		
#10	2.00	38		
#20	0.85	30		
#40	0.42	24		
#60	0.25	20		
#100	0.15	16		
#200	0.075	13		

Coefficients

D_{85} = 20.1677 mm D_{30} = 0.8700 mm

D_{60} = 9.6751 mm D_{15} = 0.1153 mm

D_{50} = 5.1114 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

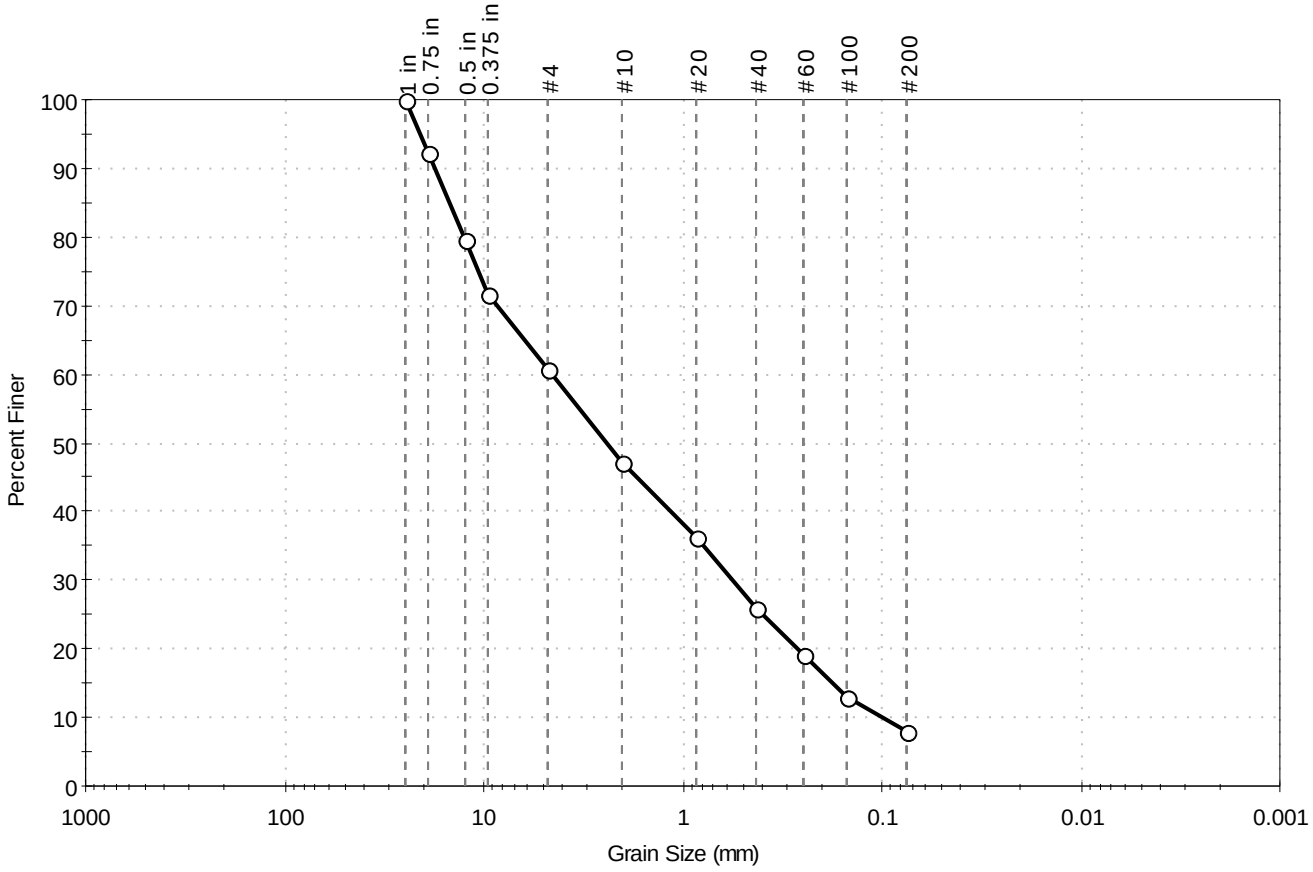
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-42	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-1	Test Date:	05/29/18	Checked By:	emm
Depth :	0.67-2.67	Test Id:	456246		
Test Comment:	---				
Visual Description:	Moist, light gray sand with silt and gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	39.2	52.7	8.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	92		
0.5 in	12.50	80		
0.375 in	9.50	72		
#4	4.75	61		
#10	2.00	47		
#20	0.85	36		
#40	0.42	26		
#60	0.25	19		
#100	0.15	13		
#200	0.075	8.1		

Coefficients

D_{85} = 14.9320 mm	D_{30} = 0.5566 mm
D_{60} = 4.5062 mm	D_{15} = 0.1770 mm
D_{50} = 2.3731 mm	D_{10} = 0.0980 mm
C_u = 45.982	C_c = 0.702

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (1))

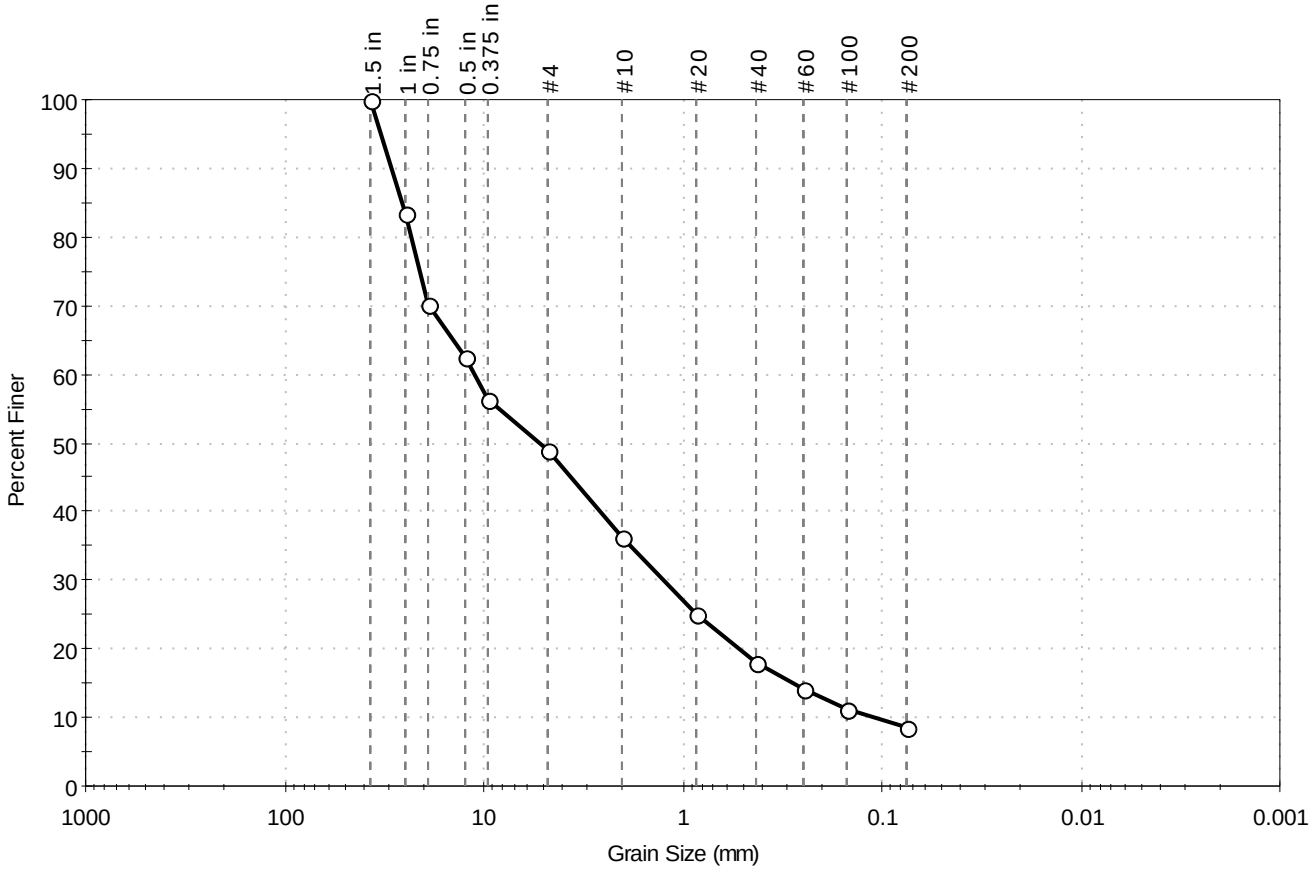
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-42	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-5B	Test Date:	05/29/18	Checked By:	emm
Depth :	8-10	Test Id:	456247		
Test Comment:	---				
Visual Description:	Moist, gray gravel with silt and sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	51.0	40.5	8.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	83		
0.75 in	19.00	70		
0.5 in	12.50	63		
0.375 in	9.50	56		
#4	4.75	49		
#10	2.00	36		
#20	0.85	25		
#40	0.42	18		
#60	0.25	14		
#100	0.15	11		
#200	0.075	8.5		

Coefficients

D_{85} = 25.9391 mm	D_{30} = 1.2400 mm
D_{60} = 11.1117 mm	D_{15} = 0.2785 mm
D_{50} = 5.1885 mm	D_{10} = 0.1093 mm
C_u = 101.662	C_c = 1.266

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (1))

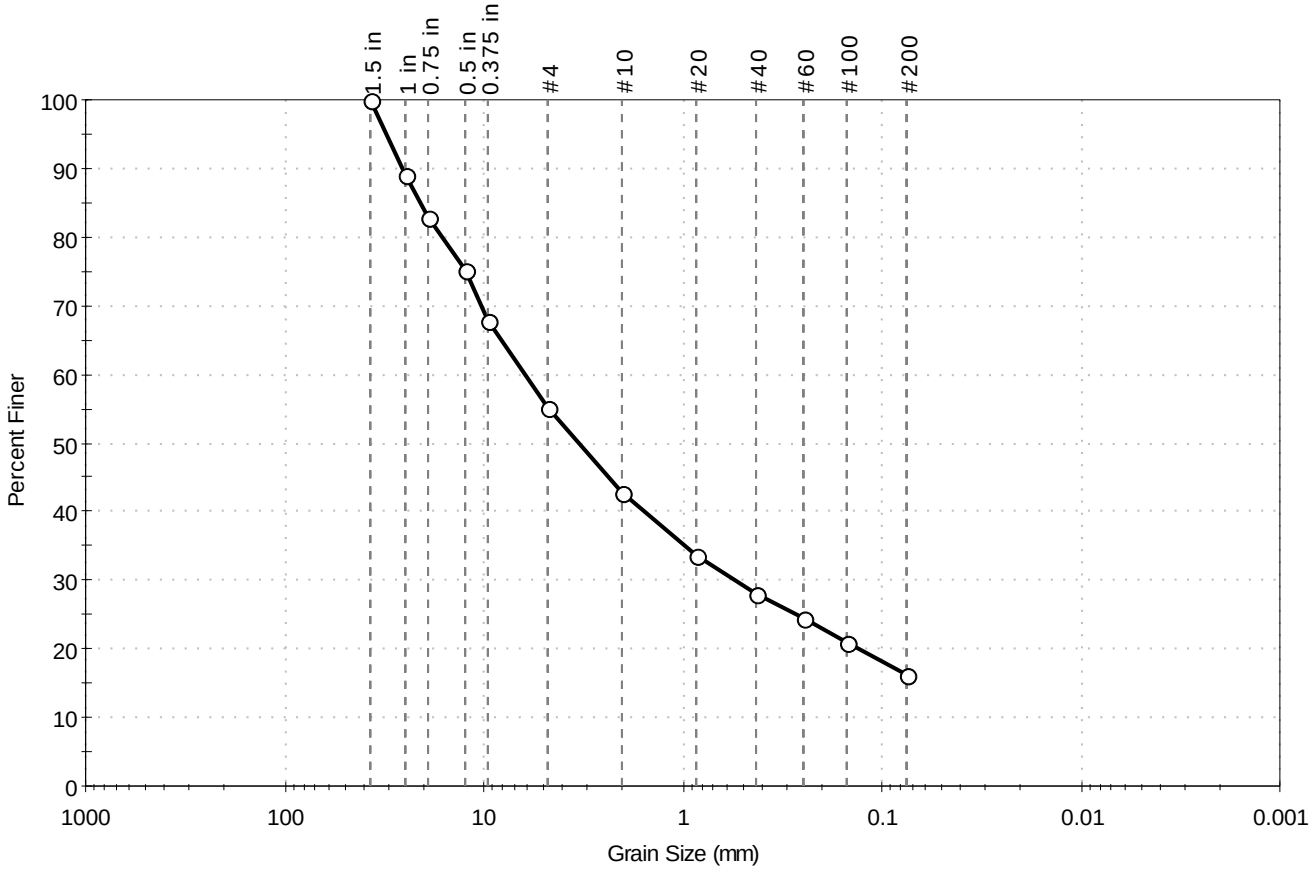
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-42	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-8	Test Date:	06/14/18	Checked By:	emm
Depth :	12-14	Test Id:	457945		
Test Comment:	---				
Visual Description:	Moist, pinkish gray silty gravel with sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	44.8	39.0	16.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	89		
0.75 in	19.00	83		
0.5 in	12.50	75		
0.375 in	9.50	68		
#4	4.75	55		
#10	2.00	43		
#20	0.85	34		
#40	0.42	28		
#60	0.25	25		
#100	0.15	21		
#200	0.075	16		

Coefficients

D_{85} = 20.7323 mm	D_{30} = 0.5392 mm
D_{60} = 6.1742 mm	D_{15} = N/A
D_{50} = 3.3205 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

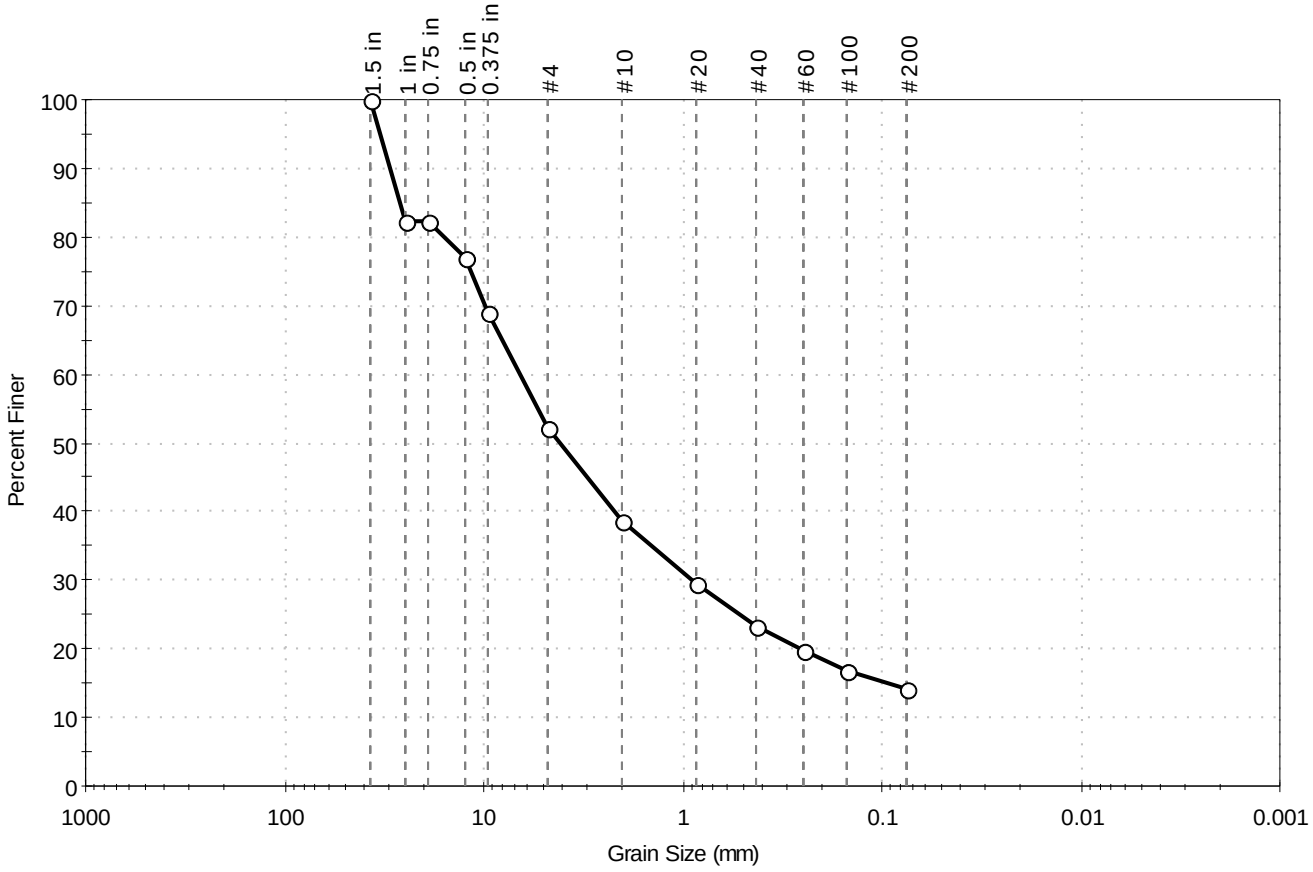
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	Pare Corporation				
Project:	NBC Phase III -Sewer Overflow				
Location:	Pawtucket, RI			Project No:	GTX-307508
Boring ID:	B17-42	Sample Type:	jar	Tested By:	jbr
Sample ID:	S-9	Test Date:	05/29/18	Checked By:	emm
Depth :	21-22.1	Test Id:	456248		
Test Comment:	---				
Visual Description:	Moist, brownish gray silty gravel with sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	47.7	38.2	14.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	82		
0.75 in	19.00	82		
0.5 in	12.50	77		
0.375 in	9.50	69		
#4	4.75	52		
#10	2.00	39		
#20	0.85	29		
#40	0.42	23		
#60	0.25	20		
#100	0.15	17		
#200	0.075	14		

Coefficients

D_{85} = 26.6542 mm	D_{30} = 0.8957 mm
D_{60} = 6.5487 mm	D_{15} = 0.0931 mm
D_{50} = 4.1062 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

HAGER-RICHTER
GEOSCIENCE, INC.

SEISMIC REFRACTION SURVEY
NARRAGANSETT BAY COMMISSION
COMBINED SEWER OVERFLOW PROJECT
PAWTUCKET MAIN TUNNEL SECTION
PAWTUCKET, RHODE ISLAND

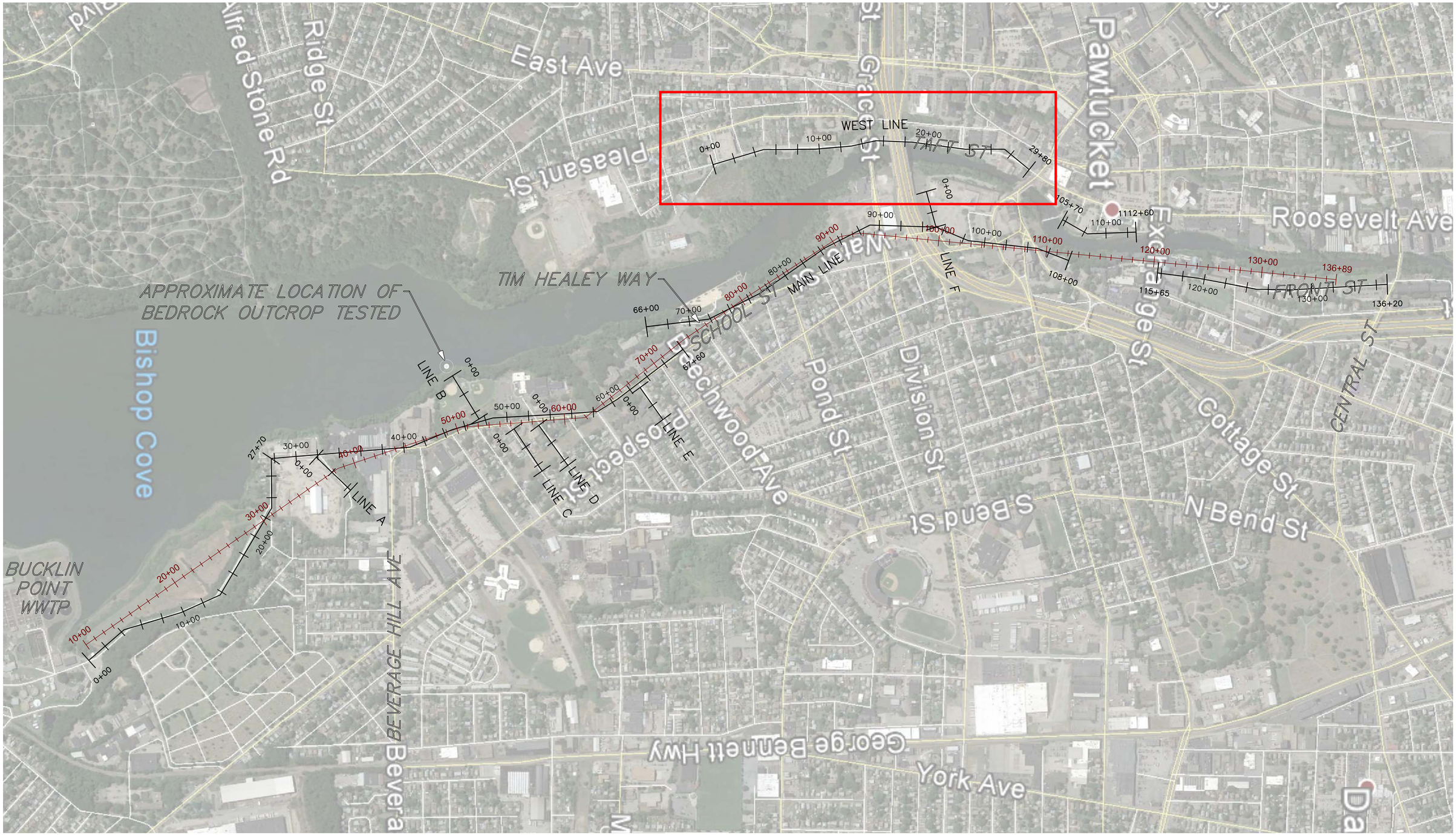
Prepared for:

Stantec
260 West Exchange Street, Suite 001
Providence, Rhode Island 02903

Prepared by:

Hager-Richter Geoscience, Inc.
8 Industrial Way - D10
Salem, New Hampshire 03079

File 17J33
November, 2017



LEGEND

0+00 — 27+70 SEISMIC LINE

130+00 — 136+89 MAIN LINE TUNNEL – ALTERNATIVE 5A ALIGNMENT PER STANTEC

SCALE (feet)
0 400 800

H-R N

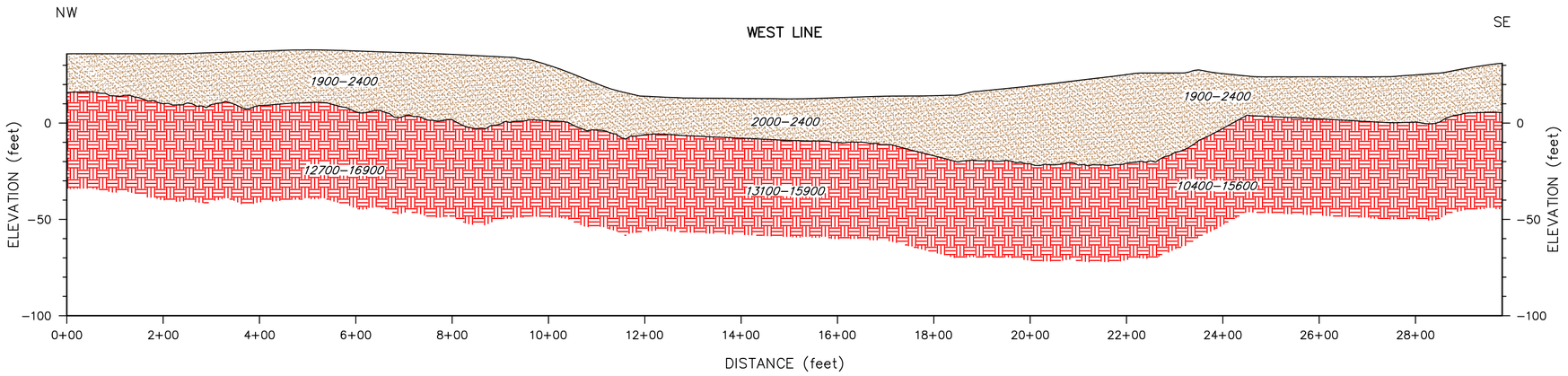
NOTE:

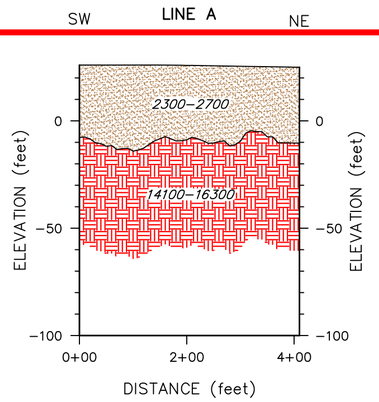
Modified from Google Earth Pro aerial photograph.

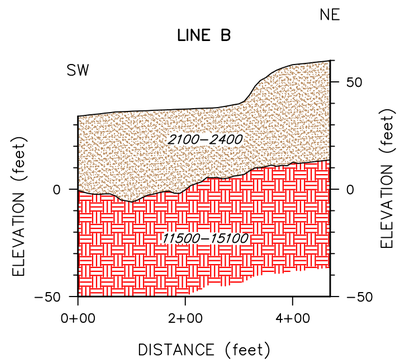
PLATE 1
SEISMIC LINE LOCATIONS
NARRAGANSETT BAY COMMISSION
COMBINED SEWER OVERFLOW PROJECT
PAWTUCKET MAIN TUNNEL SECTION
PAWTUCKET, RHODE ISLAND

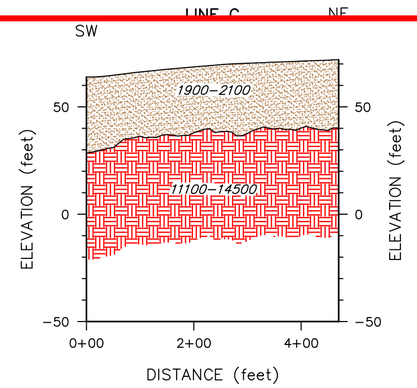
FILE 17J33 | NOVEMBER, 2017

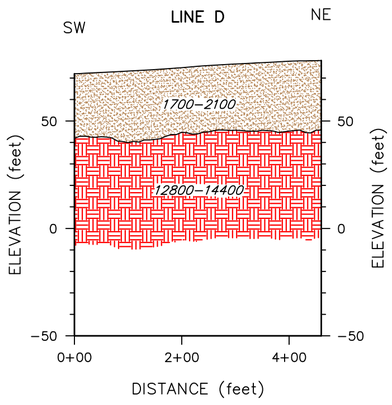
HAGER–RICHTER
SALEM, NH | FORDS, NJ

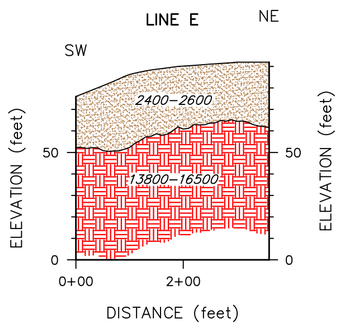


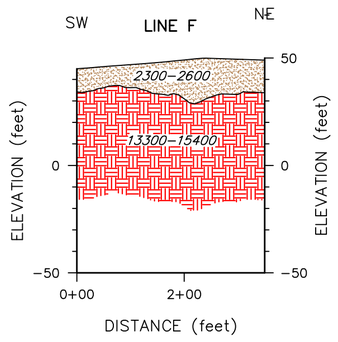












NOTES:

1. Estimated accuracy (standard deviation) of depth of bedrock is ±10% or 2 feet, whichever is greater.
2. The depths determined for bedrock are depths of competent rock; weathered and/or fractured bedrock might occur at shallower depths.
3. Surface elevations determined from plans provided by Stantec. Vertical datum is NGVD 1929.
4. Data were analyzed using the Generalized Reciprocal Method.

SCALE (feet)
0 100 200
Vertical Exaggeration = 4X

LEGEND

- UNSATURATED / PARTIALLY SATURATED SOILS
- COMPETENT BEDROCK
- 12200–14100 VELOCITY (fps)
- INTERFACE DETERMINED FROM SEISMIC REFRACTION DATA

PLATE 3
SEISMIC PROFILES – WEST LINE & CROSS LINES
NARRAGANSETT BAY COMMISSION
COMBINED SEWER OVERFLOW PROJECT
PAWTUCKET MAIN TUNNEL SECTION
PAWTUCKET, RHODE ISLAND

FILE 17J33 | NOVEMBER, 2017

HAGER–RICHTER
SALEM, NH | FORDS, NJ

Tidewater Site

Site Investigation Data Report
Former Tidewater MGP and Power Plant Site
Pawtucket, Rhode Island
RIDEM Case No. 95-022

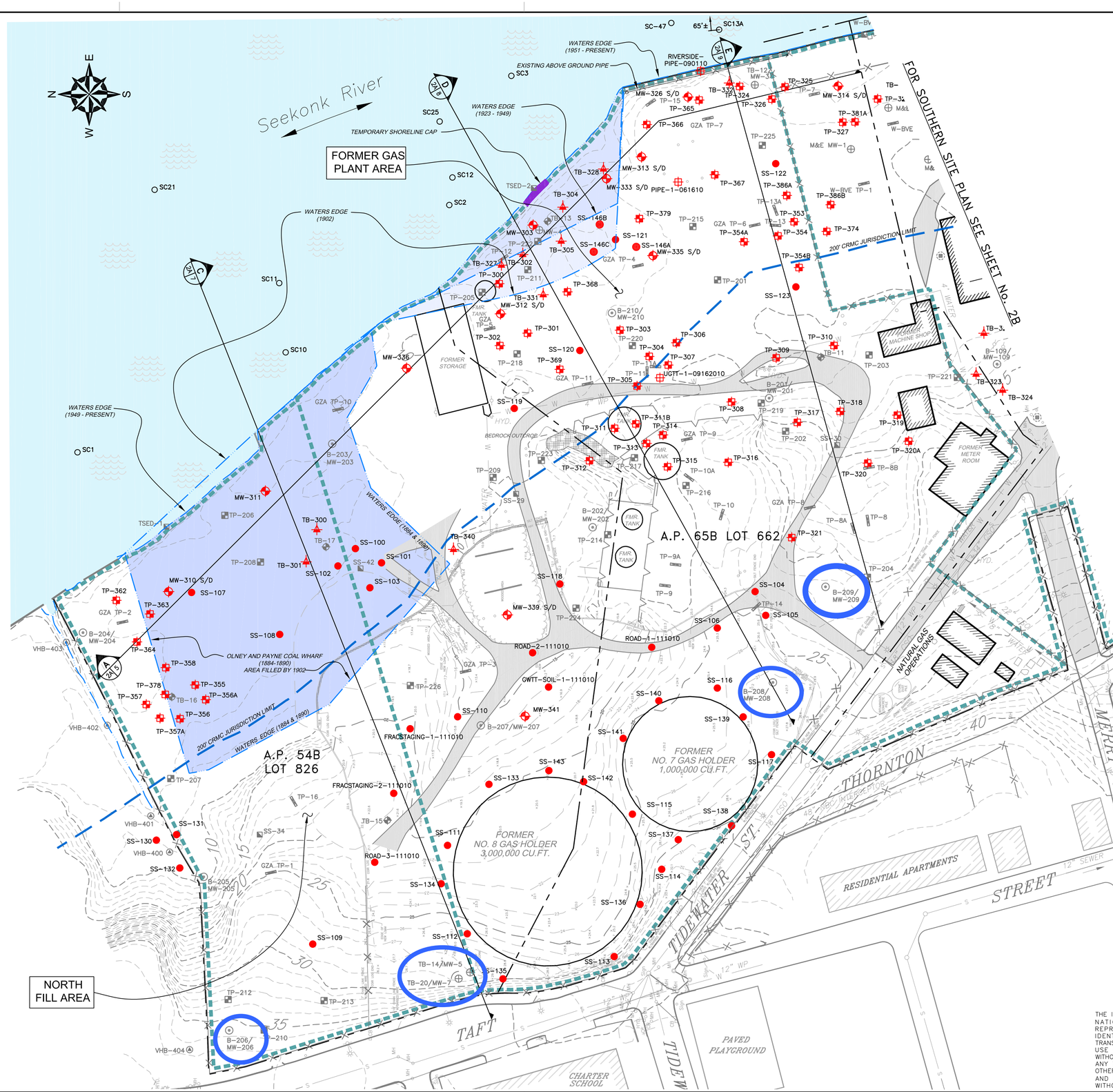
PREPARED FOR:
RIDEM, OWM
PROVIDENCE,
RHODE ISLAND

ON BEHALF OF:
nationalgrid
WALTHAM, MASSACHUSETTS

PREPARED BY:
GZA GEOENVIRONMENTAL, INC.
530 Broadway
Providence, Rhode Island
02909

DATE:
JANUARY 2011

GZA FILE NO.
05.0043654.00



LEGEND:

- SITE AREA BOUNDARIES
- EXISTING BUILDINGS ON-SITE
- EXISTING FOUNDATION/PAD ON-SITE
- EXISTING BUILDINGS/STRUCTURES OFF-SITE
- EXISTING CONTOUR (MINOR 1 FOOT INTERVAL)
- EXISTING CONTOUR (MAJOR 5 FOOT INTERVAL)
- PROPERTY LINE
- APPROX. 200 FT. CRMC JURISDICTION LIMIT
- APPROX. WATERS EDGE
- EXISTING NBC INTERCEPTOR SANITARY SEWER
- EXISTING CITY OF PAWTUCKET STORM DRAIN
- EXISTING WATER LINE
- EXISTING STORM/COMBINED SAN. SEWER OVERFLOW
- EXISTING UNDERGROUND ELECTRIC CABLE IN CONDUIT
- EXISTING UNDERGROUND ELECTRIC MH/STRUCTURE
- EXISTING ACCESS ROAD
- EXISTING RETAINING WALLS
- EXISTING FENCE
- EXISTING CATCH BASIN LOCATIONS

SAMPLE LEGEND

SS-9	ATLANTIC SURFACE SOIL SAMPLE LOCATION
TSED-6	ATLANTIC SEDIMENT SAMPLE LOCATION
W-BVE SS-3	WESTON/BLACKSTONE VALLEY ELECTRIC SEDIMENT SAMPLE LOCATION
RIDEM SS-3	RIDEM SURFACE SOIL SAMPLE LOCATION
B-109/ MW-109	MONITORING WELL/BORING (VHB) SURVEYED
TP-3A	ATLANTIC TEST PIT LOCATION
W-BVE	WESTON/BLACKSTONE VALLEY ELECTRIC TEST PIT LOCATION
GZA TP-8	GZA/VALLEY GAS TEST PIT LOCATION
TB-15	ATLANTIC SOIL BORING LOCATION
MW-3	ATLANTIC MONITORING WELL LOCATION
M&E MW-1	METCALF & EDDY MONITORING WELL LOCATION
VHB-400	VHB SURFACE SOIL SAMPLE LOCATION NON-SURVEYED
TP-204	VHB TEST PIT (2006)
GZ-01	GZA TEST PIT (2009)
TB-300	GZA TEST BORING LOCATION (2010)
MW-320 S/D	GZA MONITORING WELL LOCATION (2010)
TP-306	GZA TEST PIT LOCATION (2010)
SS-100	GZA SURFACE SOIL SAMPLE LOCATION (2010)
SC31	ARCADIS SEDIMENT SAMPLE LOCATION (2008)
PIPE-1-061610	GZA RESIDUAL MATERIAL SAMPLE (2010)

GENERAL NOTES:

1. EXISTING CONDITIONS BASE MAP DEVELOPED FROM THE FOLLOWING:
   - ELECTRONIC FILES FROM GEI CONSULTANTS, INC. (FORMERLY AES) ENTITLED "HISTORIC STRUCTURES AND SAMPLE LOCATIONS", ORIGINAL SCALE 1"=80', DATED JULY 1999
   - ELECTRONIC FILES FROM VANASSE HANGEN BRUSTLIN, INC. ENTITLED "SOIL BORING, TEST PIT AND MONITOR WELL LOCATIONS", SCALE: 1"=60', UNDATED
   - ELECTRONIC FILES FROM WELSH ASSOCIATES LAND SURVEYORS, INC. ENTITLED "TOPOGRAPHIC SURVEY (AS-BUILT), FORMER TIDEWATER FACILITY, DEMOLITION OF GAS HOLDERS NOS. 7 & 8", DATED DECEMBER 17, 2010
   - ON-SITE INVESTIGATIONS AND SURVEYS BY GZA PERSONNEL DURING VARIOUS SITE VISITS DURING 2009 AND 2010.
2. PROPERTY LINES AND LOT INFORMATION ESTABLISHED FROM INFORMATION PROVIDED ON A DRAWING ENTITLED "PERIMETER SURVEY OF LAND AT THE TIDEWATER FORMER MGP SITE IN PAWTUCKET, RHODE ISLAND FOR ATLANTIC ENVIRONMENTAL SERVICES INC." DEVELOPED BY LOUIS FEDERICI AND ASSOCIATES AND AN AUTO CAD FILE ENTITLED "MAX READ FIELD TRACK EXPANSION 2007" PROVIDED BY THE CITY OF PAWTUCKET.
3. HORIZONTAL DATUM IS BASED ON NAD 1983 FROM BASE MAPPING PROVIDED BY GEI CONSULTANTS, INC.
4. VERTICAL DATUM IS BASED ON NGVD 1929 (MSL) FROM BASE MAPPING PROVIDED BY GEI CONSULTANTS, INC.
5. REFERENCE SEWER DATA FROM SCANNED IMAGE PROVIDED BY THE CITY OF PAWTUCKET, RHODE ISLAND, ENTITLED "STUDY OF SEWERAGE FACILITIES" BY WATERMAN ENGINEERING CO. & ANDERSON NICHOLS CO. DATED NOV. 1975, ORIGINAL SCALE 1"=400' & SCANNED IMAGES OF HISTORIC PLAN & PROFILE DRAWINGS PROVIDED BY THE CITY OF PAWTUCKET, RHODE ISLAND.
6. SITE UTILITIES TAKEN FROM 1984 SANBORN MAP AND HISTORIC FIGURES PROVIDED BY NATIONAL GRID. ALL UTILITY LOCATIONS ARE APPROXIMATE AND SHOWN FOR REFERENCE ONLY.

NO.	ISSUE/DESCRIPTION	BY	DATE

FORMER TIDEWATER FACILITY

PAWTUCKET, RHODE ISLAND

EXPLORATION LOCATION PLAN
NORTH FILL AREA AND FORMER GAS PLANT AREA

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
530 BROADWAY
PROVIDENCE, RHODE ISLAND 02909
(401) 421-4140

PREPARED FOR: NATIONAL GRID

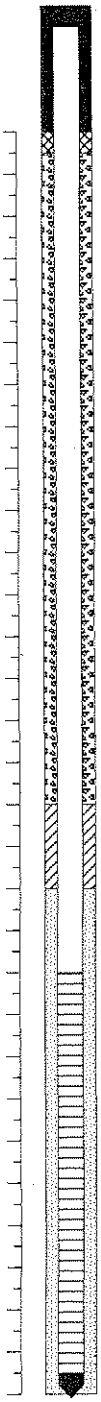
PROJ MGR: MSK	REVIEWED BY: WF	CHECKED BY: MSK	FIGURE 2A
DESIGNED BY: WF	DRAWN BY: CRD	SCALE: 1"=50'	
DATE: JANUARY 2011	PROJECT NO.: 43654.00	REVISION NO.: 0	SHEET NO. 1 OF 24

Log of Well No. MW-206

Vanasse Hangen Brustlin, Inc.

PROJECT: Tidewater		GROUND SURFACE ELEVATION AND DATUM: 35.6 ft.	
DRILLING CONTRACTOR: Subsurface Drilling & Remediation		DATE STARTED: 10-May-06	DATE FINISHED: 10-May-06
DRILLING METHOD: Hollow Stem Auger		TOTAL DEPTH (ft.): 30	SCREEN INTERVAL (ft.): 20 - 30 Feet
SAMPLING METHOD: 2-Foot Split Spoon		DEPTH TO WATER: Approx. 24 feet	CASING: 2 inch Schedule 40 PVC
HAMMER WEIGHT: 140 lbs.	DROP: 30 inches	LOGGED BY: CM	
		Project No.: 71522	

DEPTH (feet)	Sample No.	Blows per 6 inches	PID Reading	DESCRIPTION: strata thickness,color, texture, moisture, observations
0				Ground Surface
1				Augered through Brick to 1 ft.
2		7/8/12/9	ND	0.2 ft. Dk Br vf/f sand, trace silt over 0.7 ft. Blk/Dk Gr vf sand, li ash, trace slag over 0.3 ft. Lt. olive Br vf sand
3				
4		12/12/9/10		0.5 ft. Lt Olive Br vf/f sand over 0.6 ft. Lt Olive Br vf sand, trace clay
5				
6		8/9/9/13		1.5 ft. Stratified Lt Olive Br silt and Lt Gray clay over 0.2 ft. Yellowish Br coarse sand
7				
8		12/12/12/12	ND	0.6 ft. Stratified Lt Olive Br silt and Lt Gray clay over 1.4 ft. of Yell Br coarse sand
9				
10		6/8/7/6		0.3 ft. Br Yell coarse sand, trace gravel over 0.9 ft. Lt Gr coarse sand, trace gravel
11				
12		10/11/11/12	ND	1.8 ft. Lt. Gr Coarse sand, trace gravel
13				
14		15/13/9/8		1.6 ft. Lt. gr Coarse sand, trace gravel
15				
16				
17				Augered to 20 feet
18				
19				
20				
21		15/11/13/12		1.2 ft. Lt Olive Br Coarse sand, li gravel
22				
23				Augered to 25 feet
24				
25				
26		6/11/10/9		1.1 ft. Olive br coarse sand and f/c gravel, wet
27				
28				Augered to 30 feet
29				
30				
31				
32				



WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

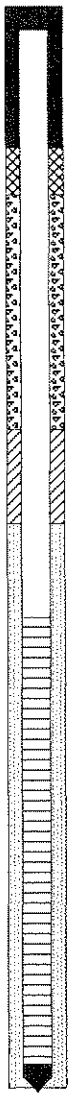
- Stand Pipe
- Cement Grout
- 2 inch diameter Schedule 40 PVC Riser Pipe
- Backfill
- Bentonite Chip Seal
- Silica Sand
- 2 inch diameter 0.010 inch slot, Sch.40PVC screen
- 2 inch Schedule 40 PVC end cap

Log of Well No. MW-208

Vanasse Hangen Brustlin, Inc.

PROJECT:	Tidewater	GROUND SURFACE ELEVATION AND DATUM: 26.4 ft.	
DRILLING CONTRACTOR:	Subsurface Drilling & Remediation	DATE STARTED: 10-May-06	DATE FINISHED: 10-May-06
DRILLING METHOD:	Hollow Stem Auger	TOTAL DEPTH (ft.): 20	SCREEN INTERVAL (ft.): 10 - 20 Feet
SAMPLING METHOD:	2-Foot Split Spoon	DEPTH TO WATER: Approx. 14 feet	CASING: 2 inch Schedule 40 PVC
HAMMER WEIGHT: 140 lbs.	DROP: 30 inches	LOGGED BY: CM	
		Project No.: 71522	

DEPTH (feet)	Sample No.	Blows per 6 inches	PID Reading	DESCRIPTION: strata thickness,color, texture, moisture, observations
0				Ground Surface
1	B-208 (0-2 ft.)	5/30/15/10		0.7 ft. Olive Br/Lt Olive Br vf/f sand, li Slag over 0.2 ft. rock/cement over 0.4 ft. Lt Olive Br/Blk vf sand and gravel
2				
3	B-208 (4-6 ft.)	10/12/12/17		No Recovery
4				
5		4/13/9/8		0.7 ft. Lt Olive Br vf/f sand, trace rock
6				
7		4/5/5/5		0.7 ft. SAA
8				
9		10/7/7/5	ND	0.6 Ft. SAA
10				
11		2/4/8/15		0.8 ft. Olive Br vf/f sand and m/c gravel
12				
13		22/22/25/27	ND	0.6 ft. SAA over 0.7 ft. Yell Br c sand, tr/li f/m gravel
14				
15		22/25/22/60	ND	0.6 ft. Olive Br vf/c sand and gravel (pieces of quartz-like rock), dense, wet, till-like
16				
17				
18				Augered to 20 ft.
19				
20				
21				
22				
23				
24				
25				
26				
27				



WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

- Stand Pipe
- 2 inch diameter Schedule 40 PVC Riser Pipe
- Cement
- Backfill
- Bentonite Chip Seal
- Silica Sand
- 2 inch diameter 0.010 inch slot, Sch.40PVC screen
- 2 inch Schedule 40 PVC end cap

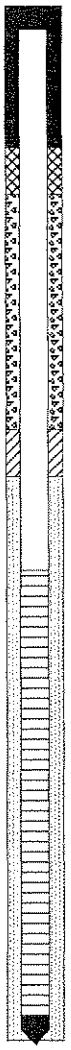
Log of Well No. MW-209

Vanasse Hangen Brustlin, Inc.

PROJECT:	Tidewater	GROUND SURFACE ELEVATION AND DATUM: 22.7 ft.	
DRILLING CONTRACTOR:	Subsurface Drilling & Remediation	DATE STARTED: 10-May-06	DATE FINISHED: 10-May-06
DRILLING METHOD:	Hollow Stem Auger	TOTAL DEPTH (ft.): 19	SCREEN INTERVAL (ft.): 9-19 ft.
SAMPLING METHOD:	2-Foot Split Spoon	DEPTH TO WATER: Approx. 14 ft.	CASING: 2 inch Schedule 40 PVC
HAMMER WEIGHT: 140 lbs.	DROP: 30 inches	LOGGED BY: CM	
		Project No.: 71522	

DEPTH (feet)	Sample No.	Blows per 6 inches	PID Reading	DESCRIPTION: strata thickness,color, texture, moisture, observations
0				Ground Surface
1	B-209 (15-17 ft.)	20/35/28/20	ND	0.2 ft. Lt Olive Br m/c sand over 1 ft. Blk/V Dk Gr vf/f sand/coal dust, trace f/m gravel
2				
3				Augered to 5 ft.
4				
5				
6		7/8/10/12	ND	1.6 ft. Lt Olive Br f/m sand, trace f gravel
7				
8				Augered to 10 ft.
9				
10				
11		5/11/10/9	ND	1.4 ft. Olive Br/Lt Olive Br vf/m sand, trace f gravel, moist
12				
13				Augered to 15 ft.
14				
15				
16		35/40/30/48	3	1.1 ft. Dk Gr vf/c sand, trace silt and c gravel, till-like, dense, wet
17				
18				Attempted to auger to 20 ft., encountered refusal at 19 ft.
19				
20				
21				
22				
23				
24				
25				
26				
27				

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Stand Pipe

2 inch diameter Schedule 40 PVC Riser Pipe

Cement Grout

Backfill

Bentonite Chip Seal

Silica Sand

2 inch diameter 0.010 inch slot, Sch.40PVC screen

2 inch Schedule 40 PVC end cap

MW-7/TB-20

Atlantic Environmental Services, Inc.

Ground Elevation: 29.24'	X Coordinate: 359651.14
Water Table Elevation: 10.34'	Y Coordinate: 286416.37
Project Number: 2061-03-05	Datum: V: NGVD 1929 (MSL) H: NAD 1983
Project Name: Tidewater	Top of PVC Elevation: 32.10'
Location: Pawtucket, RI	Conductor Casing: type: dia: 0.00in fm: 0.00' to: 0.00'
Date Started: 08/14/96	Blank Casing: type: PVC dia: 2.00in fm: -2.1' to: 14.50'
Date Completed: 08/14/96	Screens: type: Slotted size: 0.010in dia: 2.00in fm: 14.50' to: 24.50'
Drilling Contractor: B.L. Myers Bros., Inc.	Annular Fill: type: Concrete fm: 0.00' to: 2.00'
Drilling Method: Hollow Stem Auger	type: Cement Bentonite Grout fm: 2.00' to: 11.00'
Certified By: P.Georgetti	type: Bentonite fm: 11.00' to: 13.00'
Remarks:	type: Sand Filter fm: 13.00' to: 25.00'

Sample No.	Blow Count (6")	Recovery %	PID	Elevation (ft)	Material Description	Odor	Visual	Lithology	Depth (ft)	Well Construction
					Augered to 15 feet				1-2-3-4-5-6-7-8-9-10-11-12-13-14-	
				20-						
S-17	5 13 27 21	50	0 ppm		Tan/brown, and orange fine to med. Sand, some large cobbles (native), dry	None	None		15-16-	
S-19	17 18 17 15	75	0 ppm		Tan/brown fine to coarse Sand, trace Cobbles	None	None		17-18-	
S-21	90 39 40	75	0 ppm	10-	Orange/tan Silt with large cobbles and weathered bedrock/till, saturated, roots	None	None		19-	

MW-7/TB-20

Atlantic Environmental Services, Inc.

Ground Elevation: 29.24'	X Coordinate: 359651.14
Water Table Elevation: 10.34'	Y Coordinate: 286416.37
rroject Number: 2061-03-05	V: NGVD 1929 (MSL) H: NAD 1983
Project Name: Tidewater	Top of PVC Elevation: 32.10'
cation: Pawtucket, RI	Conductor Casing: type: dia: 0.00in fm: 0.00' to: 0.00'
Date Started: 08/14/96	Blank Casing: type: PVC dia: 2.00in fm: -2.1' to: 14.50'
ite Completed: 08/14/96	Screens: type: Slotted size: 0.010in dia: 2.00in fm: 14.50' to: 24.50'
..lling Contractor: [illegible] Bros., Inc.	Annular Fill: type: Concrete fm: 0.00' to: 2.00'
Drilling Method: Hollow Stem Auger	type: Cement Bentonite Grout fm: 2.00' to: 11.00'
rtified By: P.Georgetti	type: Bentonite fm: 11.00' to: 13.00'
Remarks:	type: Sand Filter fm: 13.00' to: 25.00'

Sample no.	Blow Count (6")	Recovery %	PID	Elevation (ft)	Material Description	Odor	Visual	Lithology	Depth (ft)	Well Construction
	41									
21-23	32 46 50 52	50	0 ppm		Gray fine Sand, Silt, shale, and Cobbles, moist to saturated, very tight (weathered bedrock/till)	None	None		21	
23-25	35 30 24 64	75	0 ppm		Gray/tan Silt and gray shale with medium to coarse Sand; very tight (weathered bedrock/till)	None	None		22 23 24 25	
				0					26 27 28 29	
									30 31 32 33 34	
				-10					35 36 37 38 39	

MW-5/TB-14

Atlantic Environmental Services, Inc.

Ground Elevation: 29.37'	X Coordinate: 359657.17
Water Table Elevation:	Y Coordinate: 286405.42
Project Number: 2061-03-05	Datum: V: NGVD 1929 (MSL) H: NAD 1983
Project Name: Tidewater	Top of PVC Elevation: 32.00'
Location: Pawtucket, RI	Conductor Casing: type: dia: 0.00in fm: 0.00' to: 0.00'
Date Started: 07/09/96	Blank Casing: type: PVC dia: 2.00in fm: -2.1' to: 5.50'
Date Completed: 07/09/96	Screens: type: Slotted size: 0.010in dia: 2.00in fm: 5.50' to: 15.50'
Drilling Contractor: B.L. Myers Bros., Inc.	Annular Fill: type: Concrete fm: 0.00' to: 2.00'
Drilling Method: Hollow Stem Auger	type: Bentonite fm: 2.00' to: 4.00'
Certified By: P.Georgetti	type: Sand Filter fm: 4.00' to: 15.50'
Remarks: Boring TB-14 was grouted to the surface, MW-5 was installed to a depth of 15.5 feet as shown, adjacent to TB-14.	type: Cement Bentonite Grout fm: 15.50' to: 25.00'

Sample No.	Blow Count (6")	Recovery %	PID	Elevation (ft)	Material Description	Odor	Visual	Lithology	Depth (ft)	Well Construction
-2	6 6 14 14	60	ppm		Topsoil	None	None		1	
					Gray fine Sand and Silt, some Clay, fine layering varves					
-4	12 11 17 15	70			Same, perched water (Sampled 0-2)	None	None		2 3	
-6	12 15 15 17	85			Orange fine Sand, some dark orange/black Silt; 0.2' manganese rich layer at bottom Light brown fine Sand, some Silt, moist	None	None		4 5	
-8	NR NR NR NR	85			Same, wet Dark gray Silt and Clay, wet (Sampled 4-6)	None	None		6 7	
8-10	6 4 4 8	100		20	Gray v. fine Sand and Silt, some Clay, layering, slight red/pink coloring throughout; wet	None	None		8 9	
10-12	4 3 3 7	90			Gray Silt, some Clay, wet	None	None		10 11	
12-14	3 3 3 3	90			Same, some light red/brown Silt layers	None	None		12 13	
14-16	4 6 6 7	95			Gray very fine Sand and Silt, wet	None	None		14 15	
-18	11 12 14 14	90			Orange very fine Sand and Silt Brown/pink medium Sand, some Gravel, trace Silt, wet	None	None		16 17	
-20	8 12 15 20	50		10	Red brown fine to medium Sand, some Gravel, wet	None	None		18 19	

MW-5/TB-14

Atlantic Environmental Services, Inc.

Ground Elevation: 29.37'	X Coordinate: 359657.17
Water Table Elevation:	Y Coordinate: 286405.42
Project Number: 2061-03-05	V: NGVD 1929 (MSL) H: NAD 1983
Project Name: Tidewater	Top of PVC Elevation: 32.00'
Location: Pawtucket, RI	Conductor Casing: type: dia: 0.00in fm: 0.00' to: 0.00'
Date Started: 07/09/96	Blank Casing: type: PVC dia: 2.00in fm: -2.1' to: 5.50'
Date Completed: 07/09/96	Screens: type: Slotted size: 0.010in dia: 2.00in fm: 5.50' to: 15.50'
Drilling Contractor: B.L. Myers Bros., Inc.	Annular Fill: type: Concrete fm: 0.00' to: 2.00'
Drilling Method: Hollow Stem Auger	type: Bentonite fm: 2.00' to: 4.00'
Certified By: P.Georgetti	type: Sand Filter fm: 4.00' to: 15.50'
Remarks:	type: Cement Bentonite Grout fm: 15.50' to: 25.00'

Sample No.	Blow Count (6")	Recovery %	PID	Elevation (ft)	Material Description	Odor	Visual	Lithology	Depth (ft)	Well Construction
D-22	22 32 32 30	50			Light brown Sand, Silt and Gravel, (fill), wet	None	None		21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39	
				1 0 -1 -10						

Taft St. – Pleasant St. Branch Interceptor

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

BLACKSTONE VALLEY SEWER DISTRICT COMMISSION

PROVIDENCE, RHODE ISLAND

TAFT ST.-PLEASANT ST. BRANCH INTERCEPTER SECTION B

INLET CHAMBER DETAILS FOUND IN THIS CONTRACT... "18"

CONTRACT DRAWINGS

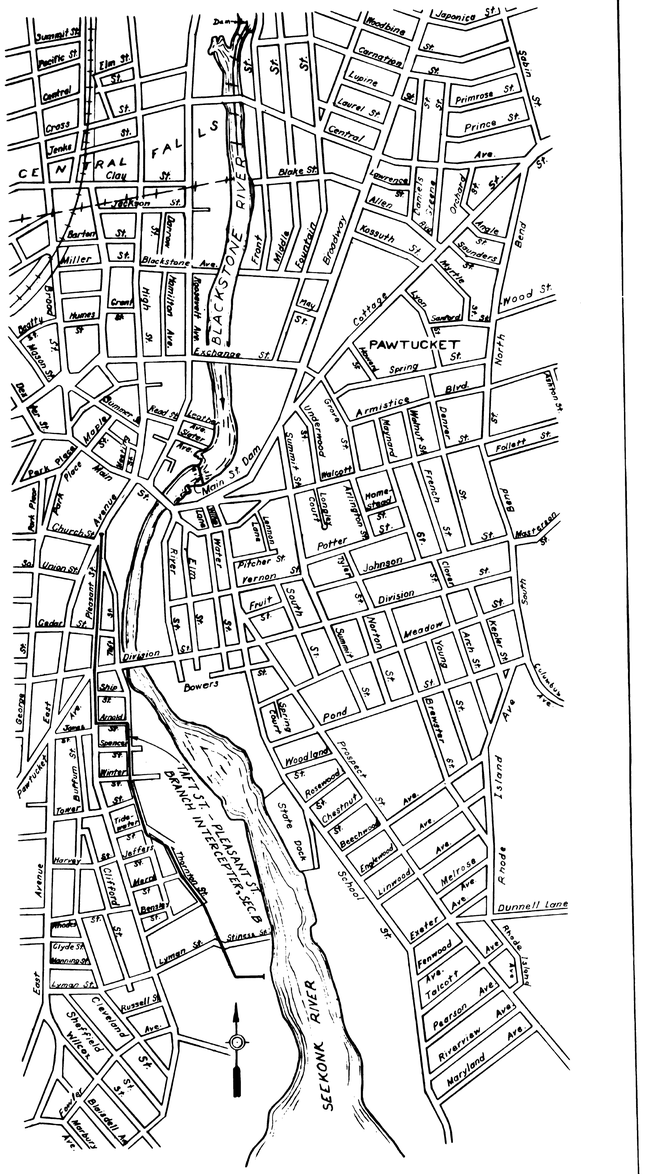
CONTRACT 18

1950

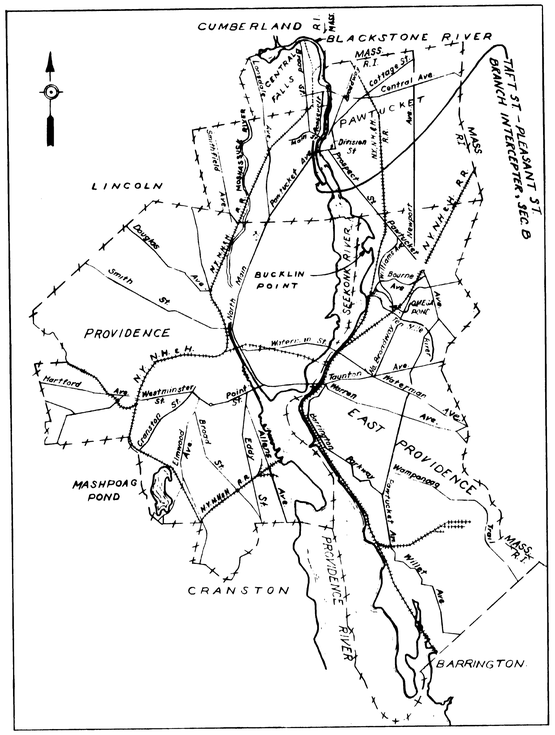
HONORABLE JOHN O. PASTORE, GOVERNOR

WILLIAM J. HALLORAN	CHAIRMAN
LUIGI SCALA	FIRST VICE CHAIRMAN
HAROLD J. CREEDON	SECOND VICE CHAIRMAN
PHILIP S. MANCINI	EX-OFFICIO
EDWARD A. McLAUGHLIN, M.D.	EX-OFFICIO
ANGELO A. BONVICIN	EXECUTIVE SECRETARY
CHARLES G. HAMMANN	CHIEF ENGINEER

METCALF & EDDY
ENGINEERS
BOSTON, MASS.



VICINITY PLAN
SCALE: 1"=600'



LOCATION MAP
SCALE: 1" = 6000'

LIST OF DRAWINGS

SHEET NO.	TITLE
1	VICINITY PLAN AND LOCATION MAP - LIST OF DRAWINGS
2	PLAN AND PROFILE - STA. 7+00± TO STA. 12+00
3	" " " STA. 12+00 TO STA. 24+00
4	" " " STA. 24+00 TO STA. 36+00
5	" " " STA. 36+00 TO STA. 48+00
6	" " " STA. 48+00 TO STA. 54+37.74
7	BYPASS CONDUIT
8	SEWER AND TRENCH SECTIONS - UNDERDRAIN DETAILS
9	MANHOLE DETAILS
10	MISCELLANEOUS DETAILS
11	SIPHON INLET STRUCTURE - PART I OF V
12	" " " PART II OF V
13	" " " PART III OF V
14	" " " PART IV OF V
15	" " " PART V OF V
16	JUNCTION CHAMBER AT LYMAN ST. - PART I OF II
17	" " " " " PART II OF II
18	MERRY ST. SEWER CONNECTION - PART I OF II
19	" " " " PART II OF II

SHEET NO.	TITLE
20	TIDEWATER ST. SEWER CONNECTION - PART I OF II
21	" " " " PART II OF II
22	PLEASANT ST. SEWER CONNECTION - PART I OF II
23	" " " " PART II OF II
24	EAST AVENUE SEWER CONNECTION - PART I OF II
25	" " " " PART II OF II
26	JUNCTION CHAMBER AT PLEASANT ST.

RECORD PLAN

BLACKSTONE VALLEY SEWER DISTRICT COMMISSION
PROVIDENCE, RHODE ISLAND

TAFT ST.-PLEASANT ST.
BRANCH INTERCEPTER
SECTION B

VICINITY PLAN AND LOCATION MAP
LIST OF DRAWINGS

SCALE: AS SHOWN OCTOBER 1950

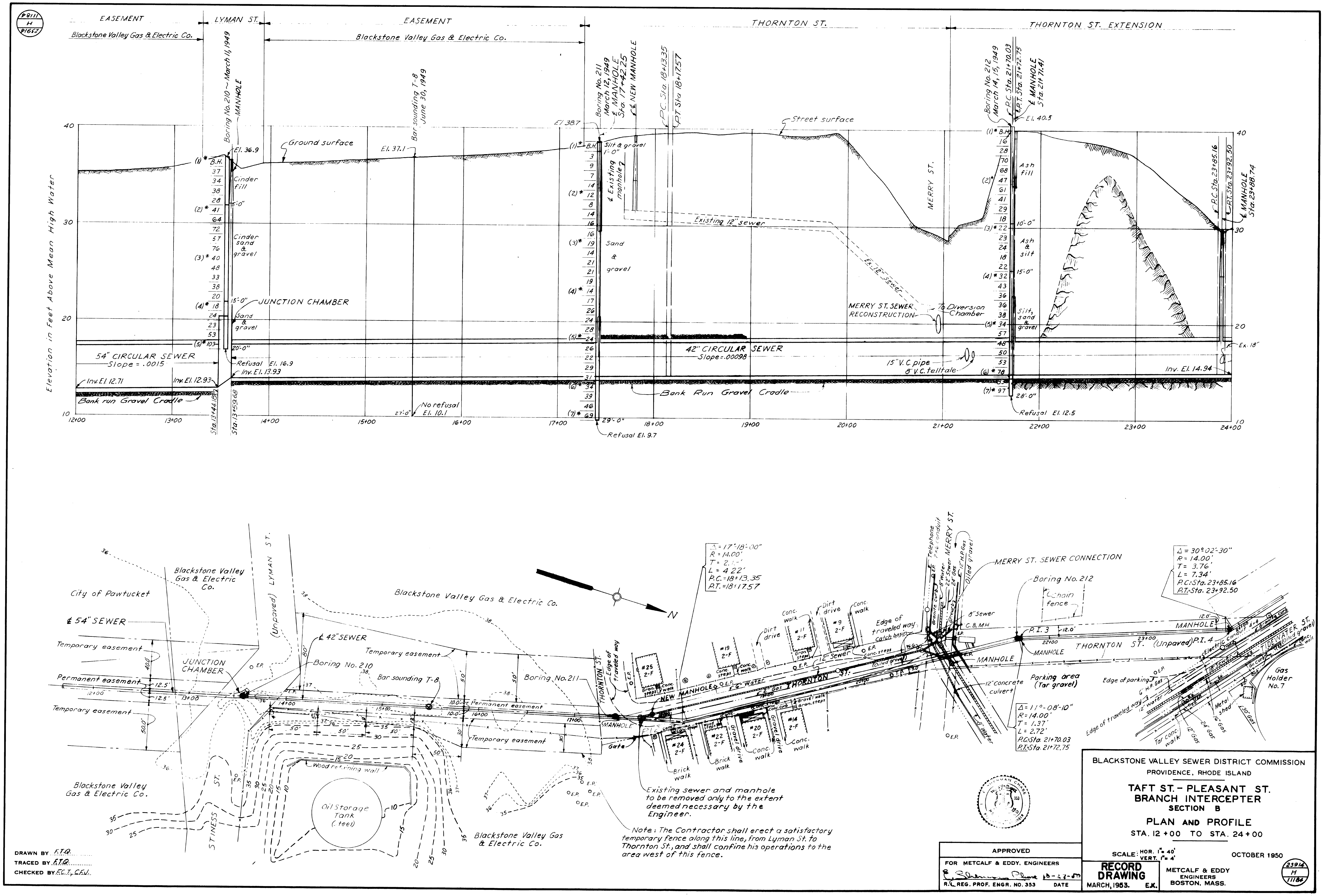
METCALF & EDDY
ENGINEERS
BOSTON, MASS.

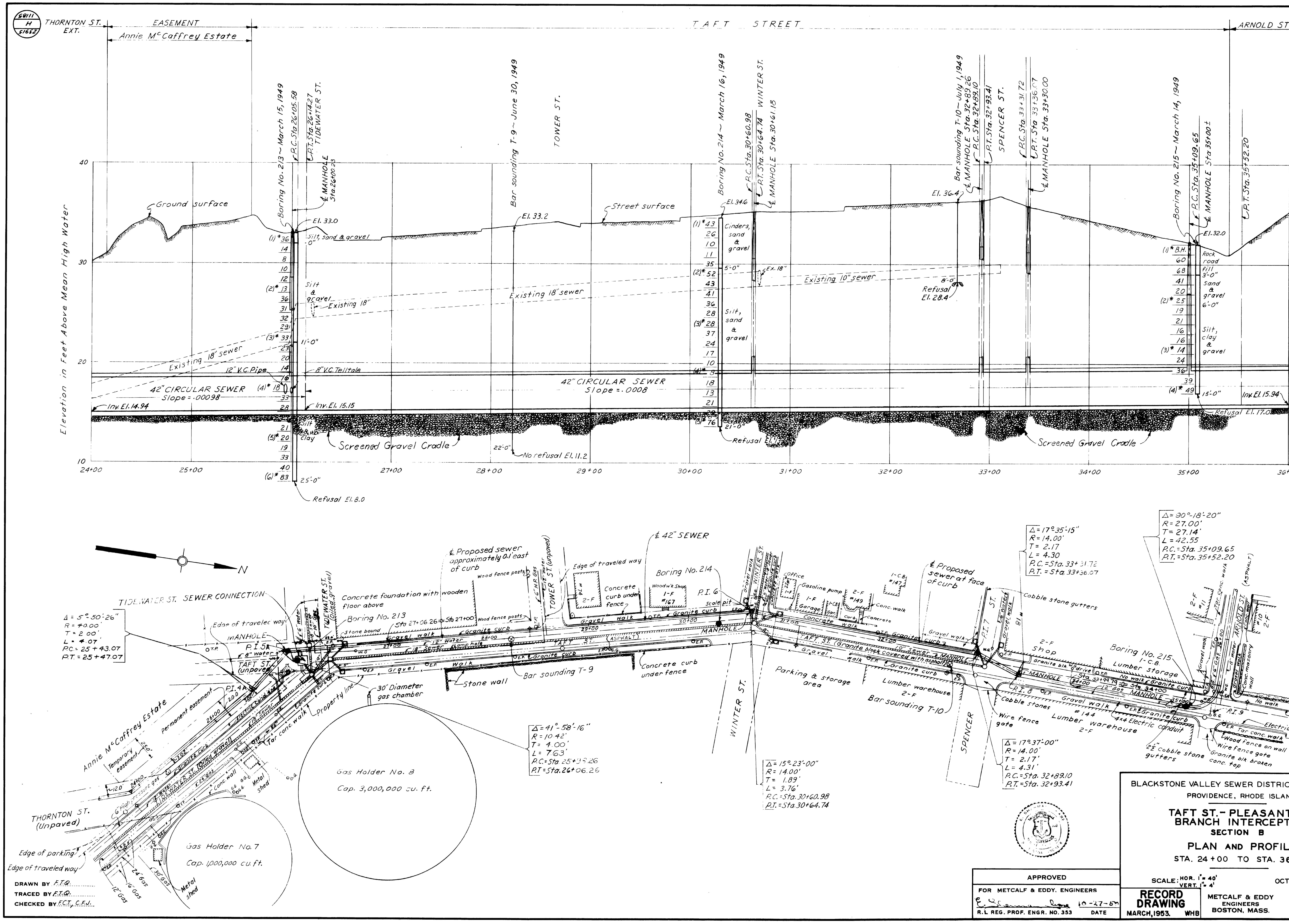
APPROVED
FOR METCALF & EDDY, ENGINEERS
R. I. REG. PROF. ENGR. NO. 353 DATE

DRAWN BY CKW
TRACED BY WS - DWS
CHECKED BY DMR

CONTRACT 18 SHEET 1 OF 26

1 OF 26


EASEMENT
LYMAN ST.
EASEMENT
THORNTON ST.
THORNTON ST. EXTENSION
Blackstone Valley Gas & Electric Co.
Blackstone Valley Gas & Electric Co.
Boring No. 210 – March 11, 1949
MANHOLE
Bar sounding T-8 June 30, 1949
Boring No. 211 March 12, 1949
℄ MANHOLE Sta. 17+42.25
℄ NEW MANHOLE
P.C. Sta. 18+13.35
P.T. Sta. 18+17.57
Boring No. 212 March 14, 15, 1949
P.C. Sta. 21+70.03
P.T. Sta. 21+72.75
℄ MANHOLE Sta. 21+71.41
P.C. Sta. 23+85.16
P.T. Sta. 23+92.50
℄ MANHOLE Sta. 23+98.74
Ground surface
Street surface
El. 36.9
El. 37.1
El. 38.7
El. 40.5
Cinder fill
Cinder sand & gravel
JUNCTION CHAMBER
Sand & gravel
Silt & gravel
Existing manhole
Existing 12" sewer
Ex. 12" sewer
MERRY ST.
Ash fill
Ash & silt
Silt, sand & gravel
MERRY ST. SEWER RECONSTRUCTION
To Diversion Chamber
54" CIRCULAR SEWER Slope = .0015
42" CIRCULAR SEWER Slope = .00098
Inv. El. 12.71
Inv. El. 12.93
Inv. El. 13.93
Inv. El. 14.94
Refusal El. 16.9
No refusal El. 10.1
Refusal El. 9.7
Refusal El. 12.5
15" V.C. pipe
8" V.C. telltale
Bank run Gravel Cradle
Bank Run Gravel Cradle
Ex. 18"
Sta. 13+44.13
Sta. 13+59.68
Elevation in Feet Above Mean High Water
12+00
13+00
14+00
15+00
16+00
17+00
18+00
19+00
20+00
21+00
22+00
23+00
24+00
City of Pawtucket
℄ 54" SEWER
Temporary easement
Permanent easement
Temporary easement
JUNCTION CHAMBER
Blackstone Valley Gas & Electric Co.
(Unpaved) LYMAN ST.
℄ 42" SEWER
Boring No. 210
Bar sounding T-8
Boring No. 211
Blackstone Valley Gas & Electric Co.
N
Δ = 17°-18'-00"
R = 14.00'
L = 4.22'
P.C. = 18+13.35
P.T. = 18+17.57
NEW MANHOLE
THORNTON ST.
Edge of traveled way
Catch basins
MERRY ST. SEWER CONNECTION
Boring No. 212
Chain fence
Δ = 30°-02'-30"
R = 14.00'
T = 3.76'
L = 7.34'
P.C. Sta. 23+85.16
P.T. Sta. 23+92.50
MANHOLE
P.I. 3
P.I. 4
THORNTON ST. (Unpaved)
TIDEWATER ST.
Gas Holder No. 7
Parking area (Tar gravel)
12" concrete culvert
Δ = 11°-08'-10"
R = 14.00'
T = 1.37'
L = 2.72'
P.C. Sta. 21+70.03
P.I. Sta. 21+72.75
Edge of parking
Edge of traveled way
Metal shed
Gate
Brick walk
Conc. walk
Dirt drive
STINESS ST.
Wood retaining wall
Oil Storage Tank (steel)
Blackstone Valley Gas & Electric Co.
Blackstone Valley Gas & Electric Co.
Existing sewer and manhole to be removed only to the extent deemed necessary by the Engineer.
Note: The Contractor shall erect a satisfactory temporary fence along this line, from Lyman St. to Thornton St., and shall confine his operations to the area west of this fence.
DRAWN BY F.T.Q.
TRACED BY F.T.Q.
CHECKED BY E.C.T., C.F.J.
APPROVED
FOR METCALF & EDDY, ENGINEERS
R.I. REG. PROF. ENGR. NO. 353
DATE
RECORD DRAWING
MARCH, 1953. E.K.
BLACKSTONE VALLEY SEWER DISTRICT COMMISSION
PROVIDENCE, RHODE ISLAND
TAFT ST. - PLEASANT ST.
BRANCH INTERCEPTER
SECTION B
PLAN AND PROFILE
STA. 12+00 TO STA. 24+00
SCALE: HOR. 1" = 40' VERT. 1" = 4'
OCTOBER 1950
METCALF & EDDY ENGINEERS BOSTON, MASS.
23914 H 11184
CONTRACT 18
SHEET 3 OF 28



DRAWN BY F.T.Q.
TRACED BY F.T.Q.
CHECKED BY F.C.T., C.F.J.

APPROVED
FOR METCALF & EDDY, ENGINEERS
R.I. REG. PROF. ENGR. NO. 353 — DATE 10-27-53

BLACKSTONE VALLEY SEWER DISTRICT COMMISSION
PROVIDENCE, RHODE ISLAND

TAFT ST.- PLEASANT ST. BRANCH INTERCEPTER
SECTION B
PLAN AND PROFILE
STA. 24+00 TO STA. 36+00

SCALE: HOR. 1" = 40' VERT. 1" = 4'
OCTOBER 1950

RECORD DRAWING
MARCH, 1953. WHB

METCALF & EDDY
ENGINEERS
BOSTON, MASS.

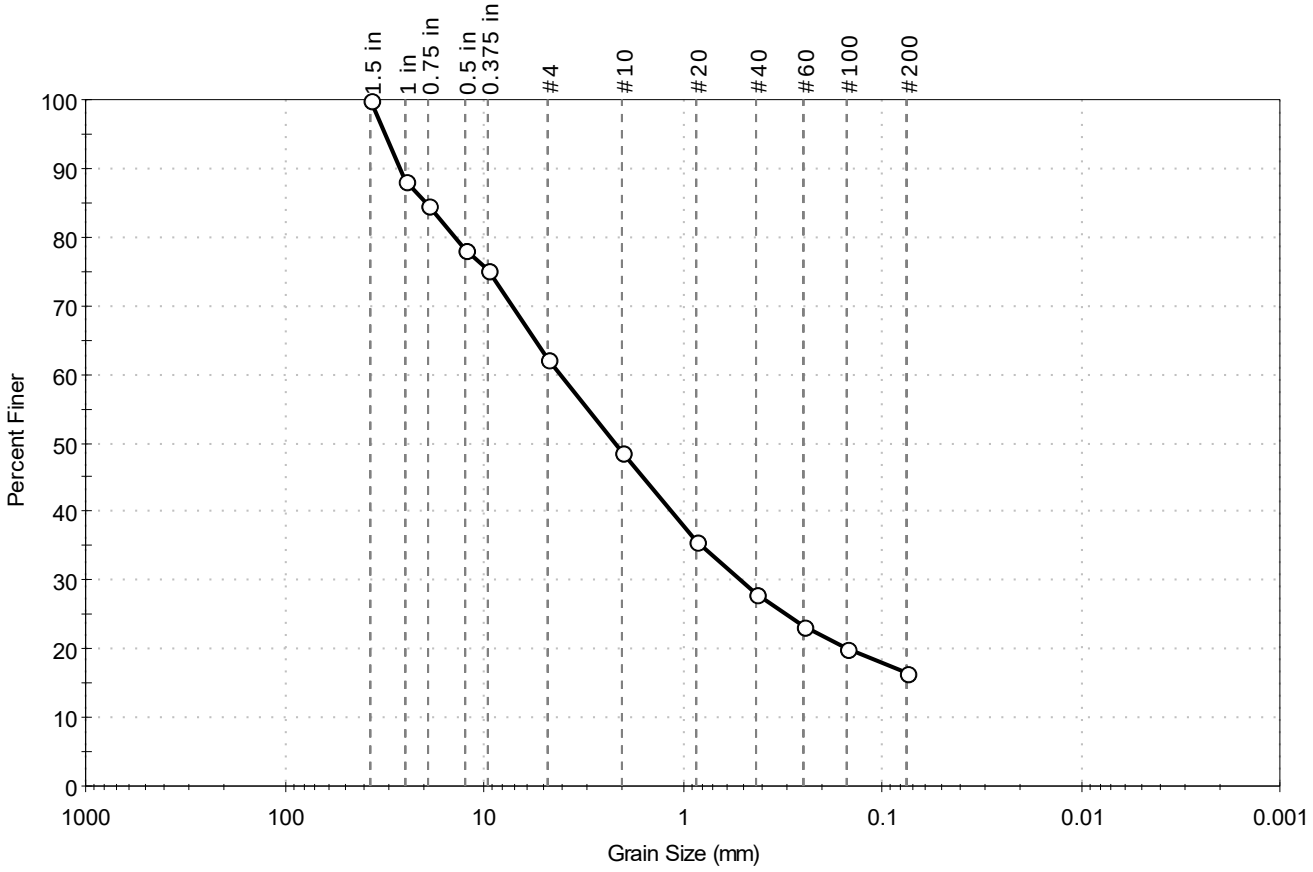
23915 H 11185

CONTRACT 18 SHEET 4 OF 26

APPENDIX E
Geotechnical Laboratory Testing Results

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation Conduits				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-1	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-1	Test Date:	10/01/19	Checked By:	bfs
Depth :	6-8 ft	Test Id:	525243		
Test Comment:	---				
Visual Description:	Moist, brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	37.6	45.8	16.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	88		
0.75 in	19.00	85		
0.5 in	12.50	78		
0.375 in	9.50	75		
#4	4.75	62		
#10	2.00	49		
#20	0.85	36		
#40	0.42	28		
#60	0.25	23		
#100	0.15	20		
#200	0.075	17		

Coefficients

D_{85} = 19.3520 mm	D_{30} = 0.5113 mm
D_{60} = 4.1040 mm	D_{15} = N/A
D_{50} = 2.1878 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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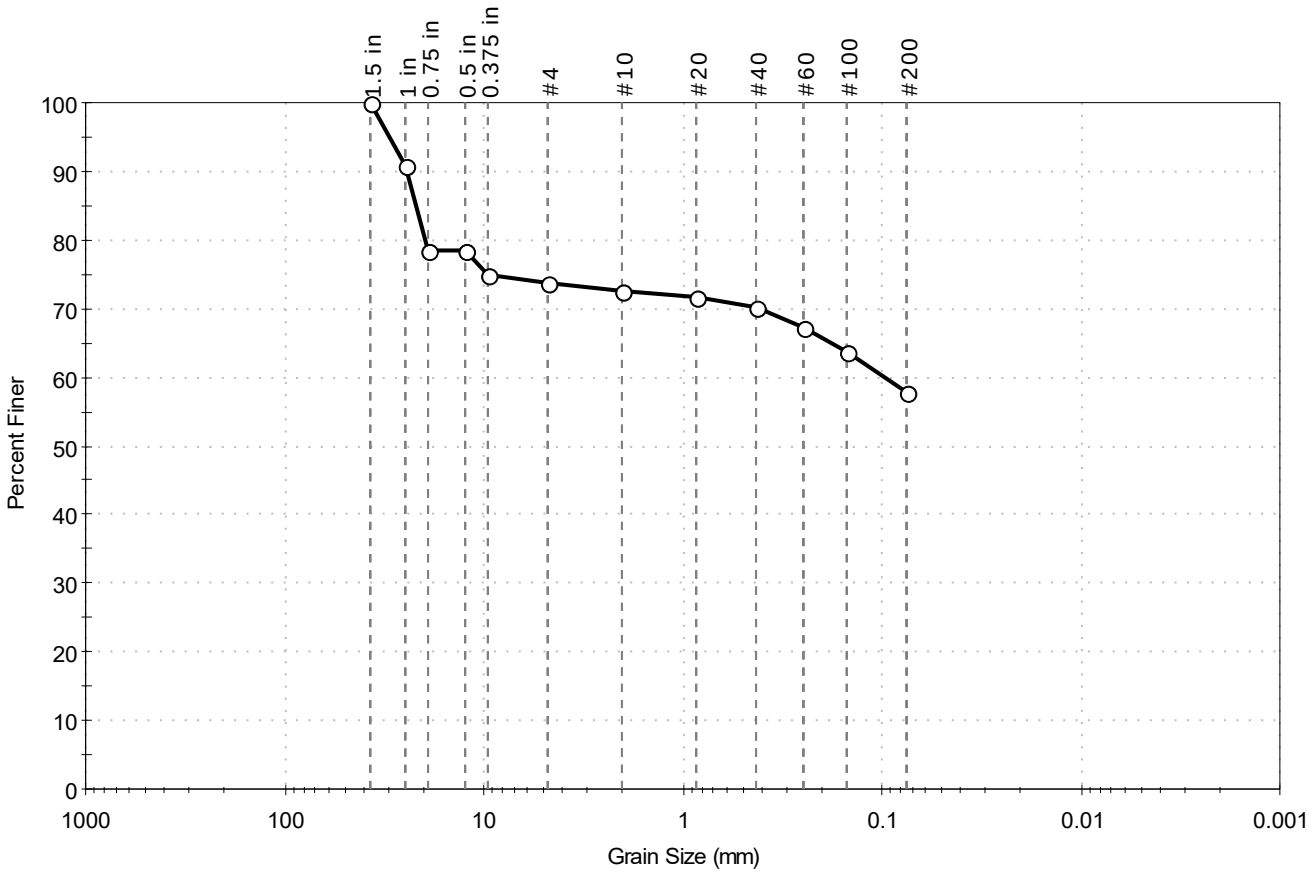
Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation Conduits				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-2	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-3	Test Date:	10/01/19	Checked By:	bfs
Depth :	10-12 ft	Test Id:	525244		
Test Comment:	---				
Visual Description:	Moist, brown silt with sand and gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	26.3	15.8	57.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	91		
0.75 in	19.00	78		
0.5 in	12.50	78		
0.375 in	9.50	75		
#4	4.75	74		
#10	2.00	73		
#20	0.85	72		
#40	0.42	70		
#60	0.25	67		
#100	0.15	64		
#200	0.075	58		

Coefficients

D_{85} = 21.9919 mm	D_{30} = N/A
D_{60} = 0.0969 mm	D_{15} = N/A
D_{50} = N/A	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

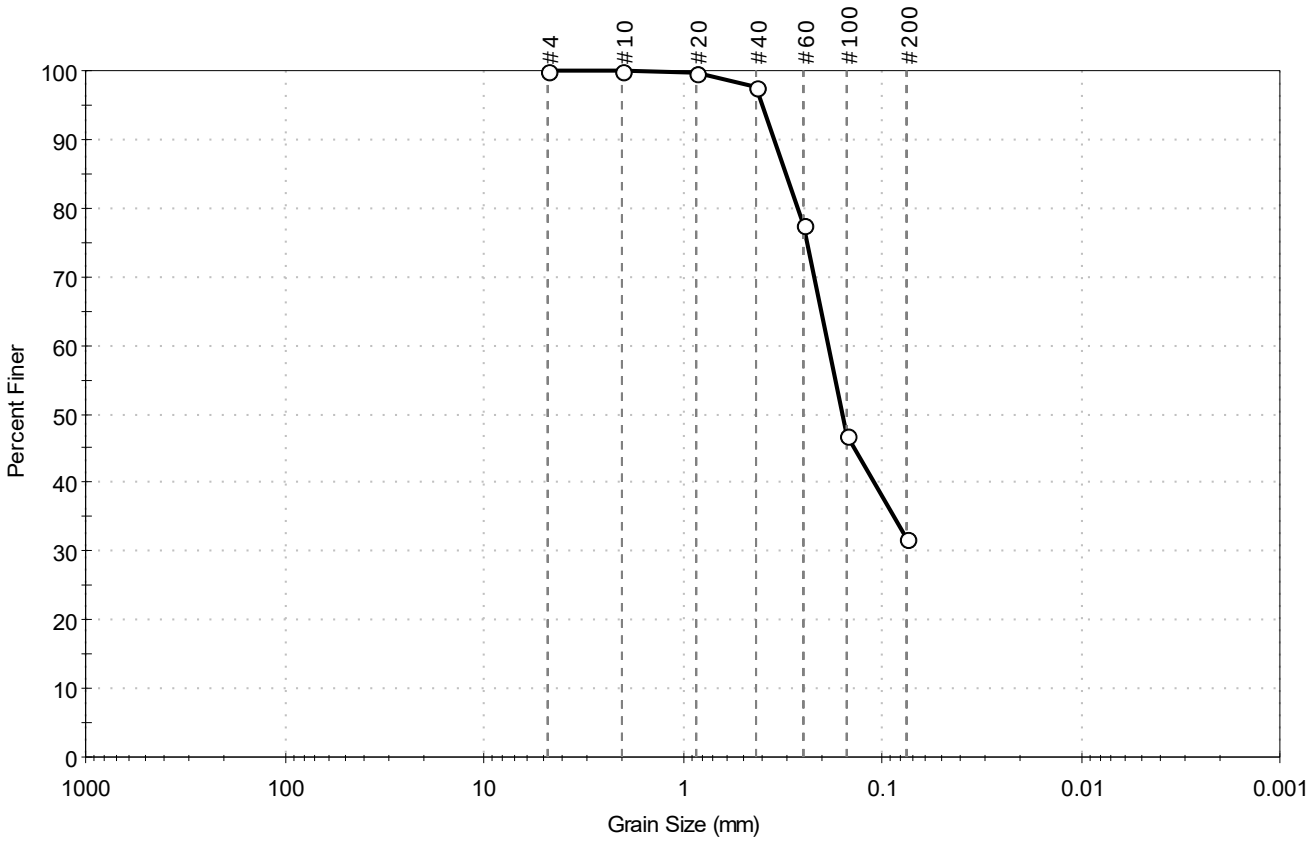
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation Conduits				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-2	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-7	Test Date:	10/01/19	Checked By:	bfs
Depth :	18-20 ft	Test Id:	525245		
Test Comment:	---				
Visual Description:	Moist, brown silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	0.0	68.1	31.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	98		
#60	0.25	78		
#100	0.15	47		
#200	0.075	32		

Coefficients

D_{85} = 0.3049 mm D_{30} = N/A

D_{60} = 0.1866 mm D_{15} = N/A

D_{50} = 0.1579 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

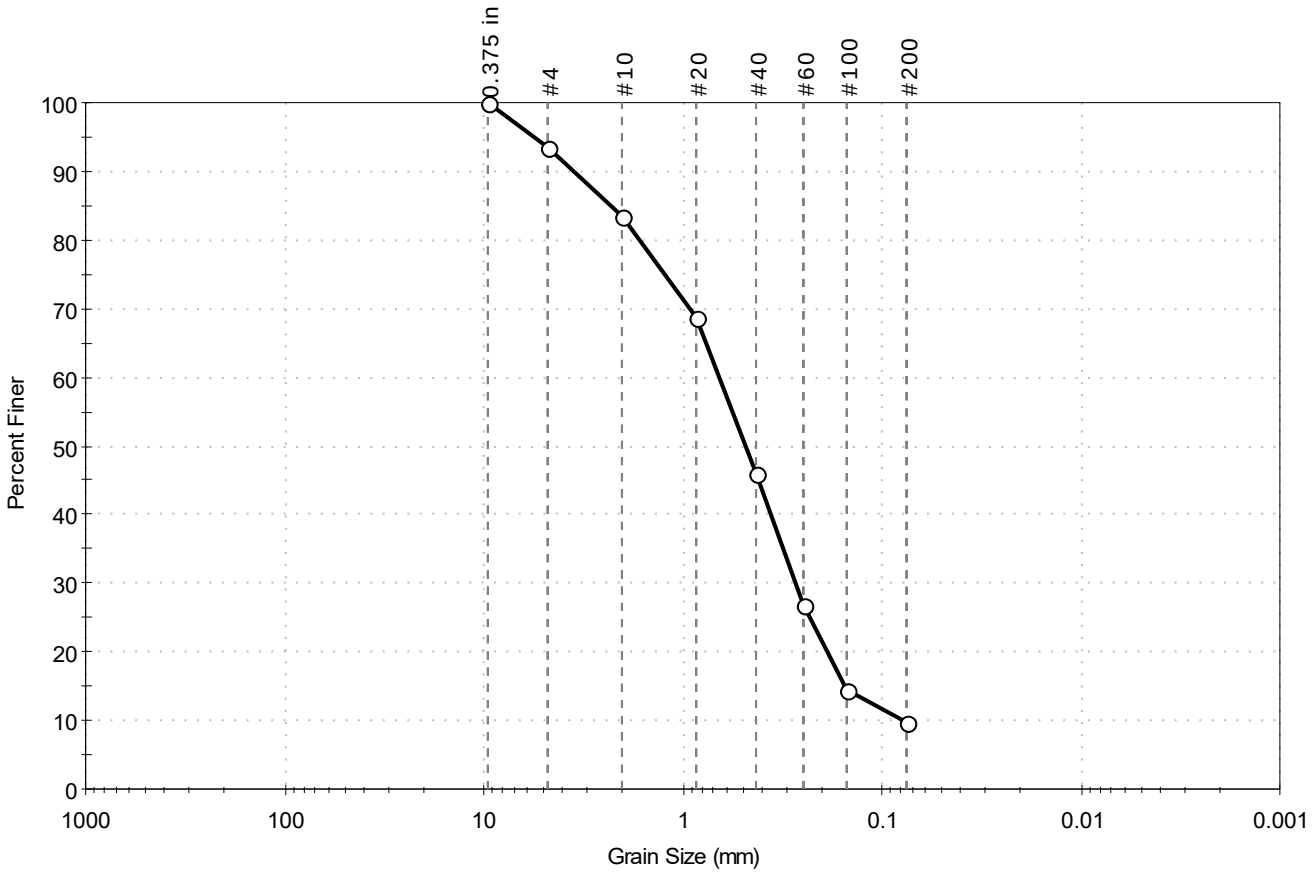
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation Conduits				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-3	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-2	Test Date:	10/01/19	Checked By:	bfs
Depth :	14-16 ft	Test Id:	525246		
Test Comment:	---				
Visual Description:	Moist, brown sand with silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	6.5	83.8	9.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	93		
#10	2.00	83		
#20	0.85	69		
#40	0.42	46		
#60	0.25	27		
#100	0.15	15		
#200	0.075	9.7		

Coefficients

D_{85} = 2.2983 mm	D_{30} = 0.2729 mm
D_{60} = 0.6501 mm	D_{15} = 0.1526 mm
D_{50} = 0.4784 mm	D_{10} = 0.0786 mm
C_u = 8.271	C_c = 1.457

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (1))

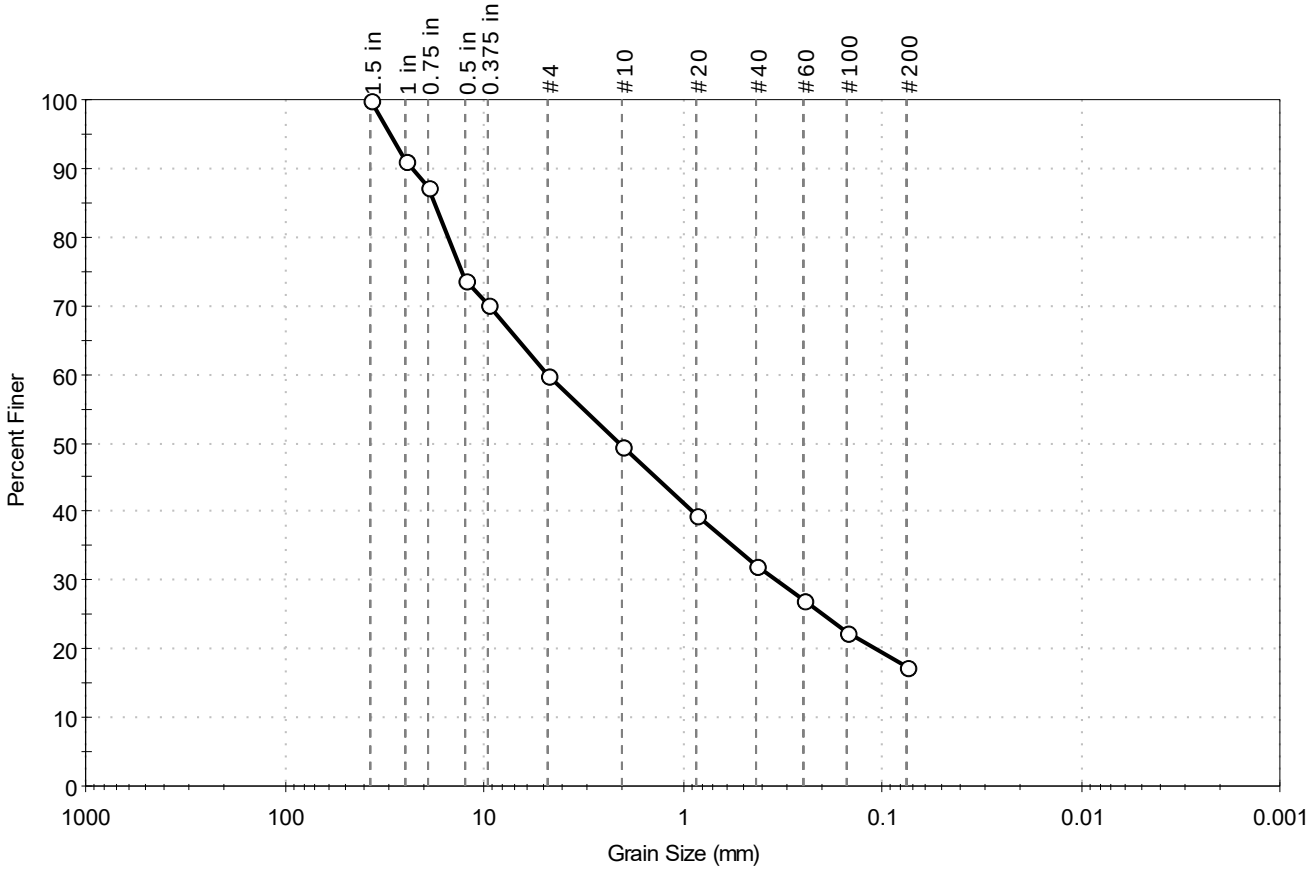
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation Conduits				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-3	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-5	Test Date:	10/01/19	Checked By:	bfs
Depth :	25-27 ft	Test Id:	525247		
Test Comment:	---				
Visual Description:	Moist, brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	40.1	42.6	17.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	91		
0.75 in	19.00	87		
0.5 in	12.50	74		
0.375 in	9.50	70		
#4	4.75	60		
#10	2.00	50		
#20	0.85	39		
#40	0.42	32		
#60	0.25	27		
#100	0.15	22		
#200	0.075	17		

Coefficients

D_{85} = 17.7034 mm	D_{30} = 0.3397 mm
D_{60} = 4.7666 mm	D_{15} = N/A
D_{50} = 2.0608 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

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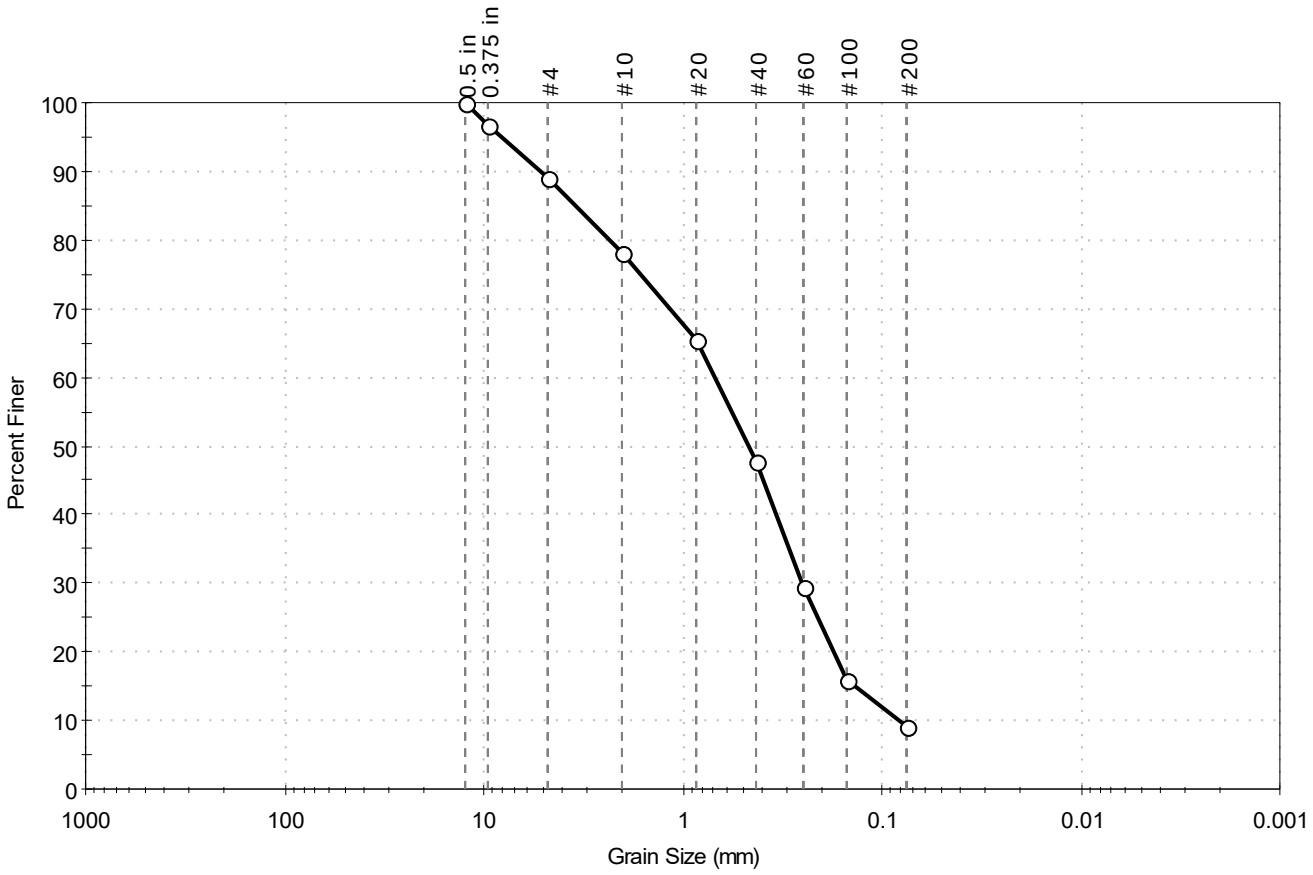
Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation Conduits				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-4C	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-2	Test Date:	10/01/19	Checked By:	bfs
Depth :	14-16 ft	Test Id:	525248		
Test Comment:	---				
Visual Description:	Moist, yellowish brown sand with silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	11.0	79.8	9.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	97		
#4	4.75	89		
#10	2.00	78		
#20	0.85	66		
#40	0.42	48		
#60	0.25	30		
#100	0.15	16		
#200	0.075	9.2		

Coefficients

D_{85} = 3.4518 mm	D_{30} = 0.2535 mm
D_{60} = 0.6837 mm	D_{15} = 0.1355 mm
D_{50} = 0.4631 mm	D_{10} = 0.0811 mm
C_u = 8.430	C_c = 1.159

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (1))

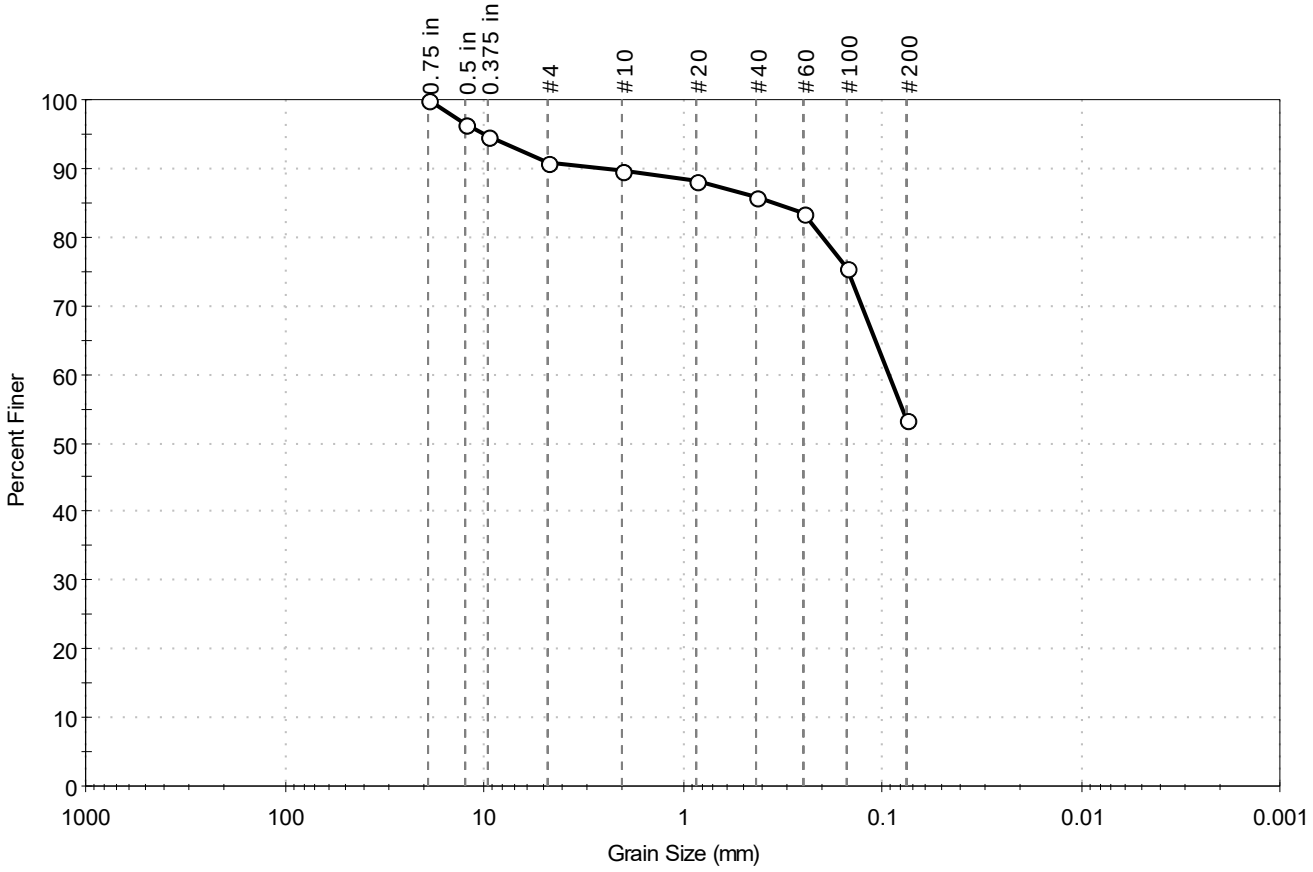
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation Conduits				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-4C	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-3b	Test Date:	10/01/19	Checked By:	bfs
Depth :	19-21 ft	Test Id:	525249		
Test Comment:	---				
Visual Description:	Moist, dark yellowish brown sandy silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	9.1	37.4	53.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	96		
0.375 in	9.50	95		
#4	4.75	91		
#10	2.00	90		
#20	0.85	88		
#40	0.42	86		
#60	0.25	84		
#100	0.15	75		
#200	0.075	54		

Coefficients

D_{85} = 0.3439 mm	D_{30} = N/A
D_{60} = 0.0921 mm	D_{15} = N/A
D_{50} = N/A	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

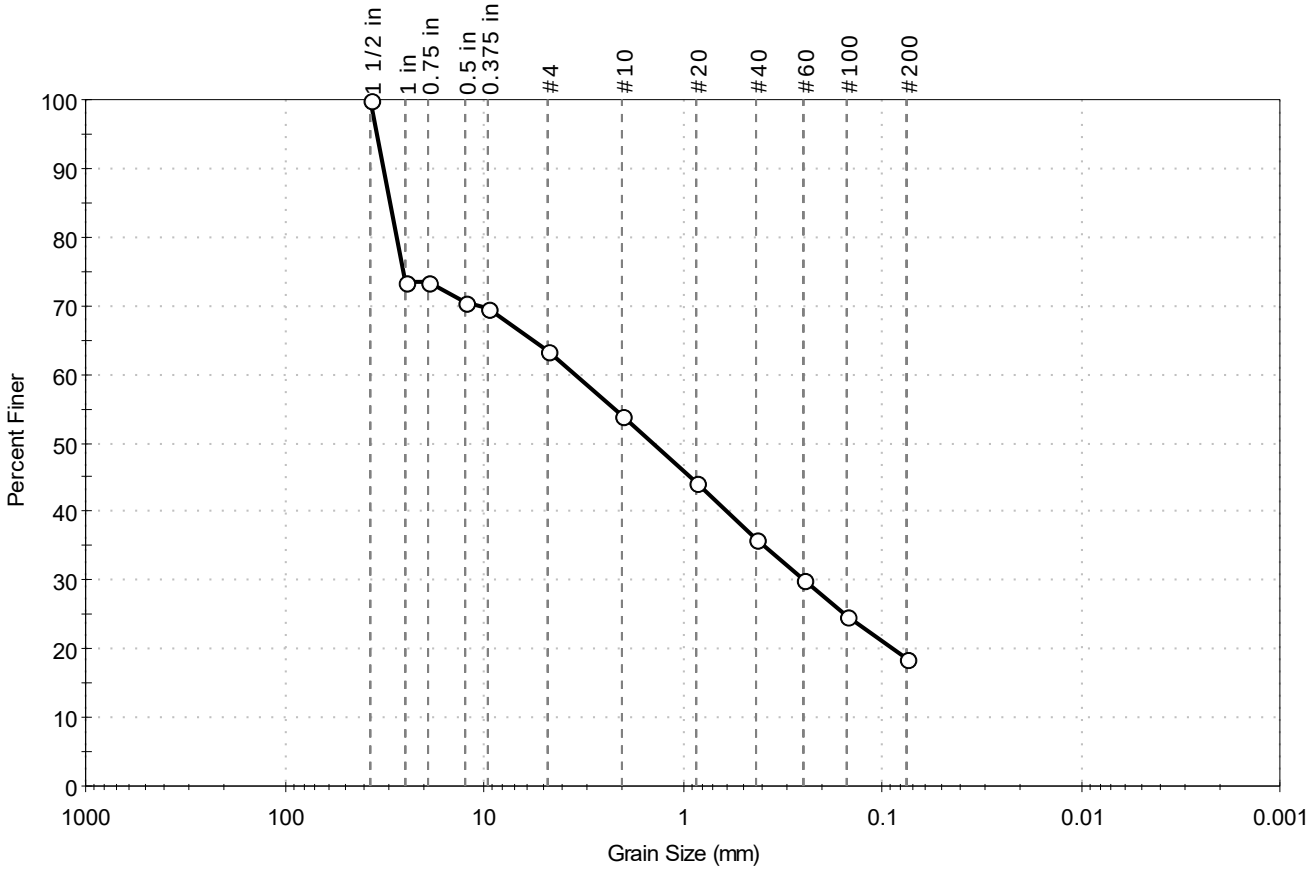
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation Conduits				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-5	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-4	Test Date:	10/01/19	Checked By:	bfs
Depth :	6-8 ft	Test Id:	525250		
Test Comment:	---				
Visual Description:	Moist, dark gray silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	36.5	45.0	18.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 1/2 in	37.50	100		
1 in	25.00	73		
0.75 in	19.00	73		
0.5 in	12.50	70		
0.375 in	9.50	70		
#4	4.75	64		
#10	2.00	54		
#20	0.85	44		
#40	0.42	36		
#60	0.25	30		
#100	0.15	25		
#200	0.075	19		

Coefficients

D_{85} = 29.8577 mm	D_{30} = 0.2452 mm
D_{60} = 3.4407 mm	D_{15} = N/A
D_{50} = 1.4144 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample / Test Description

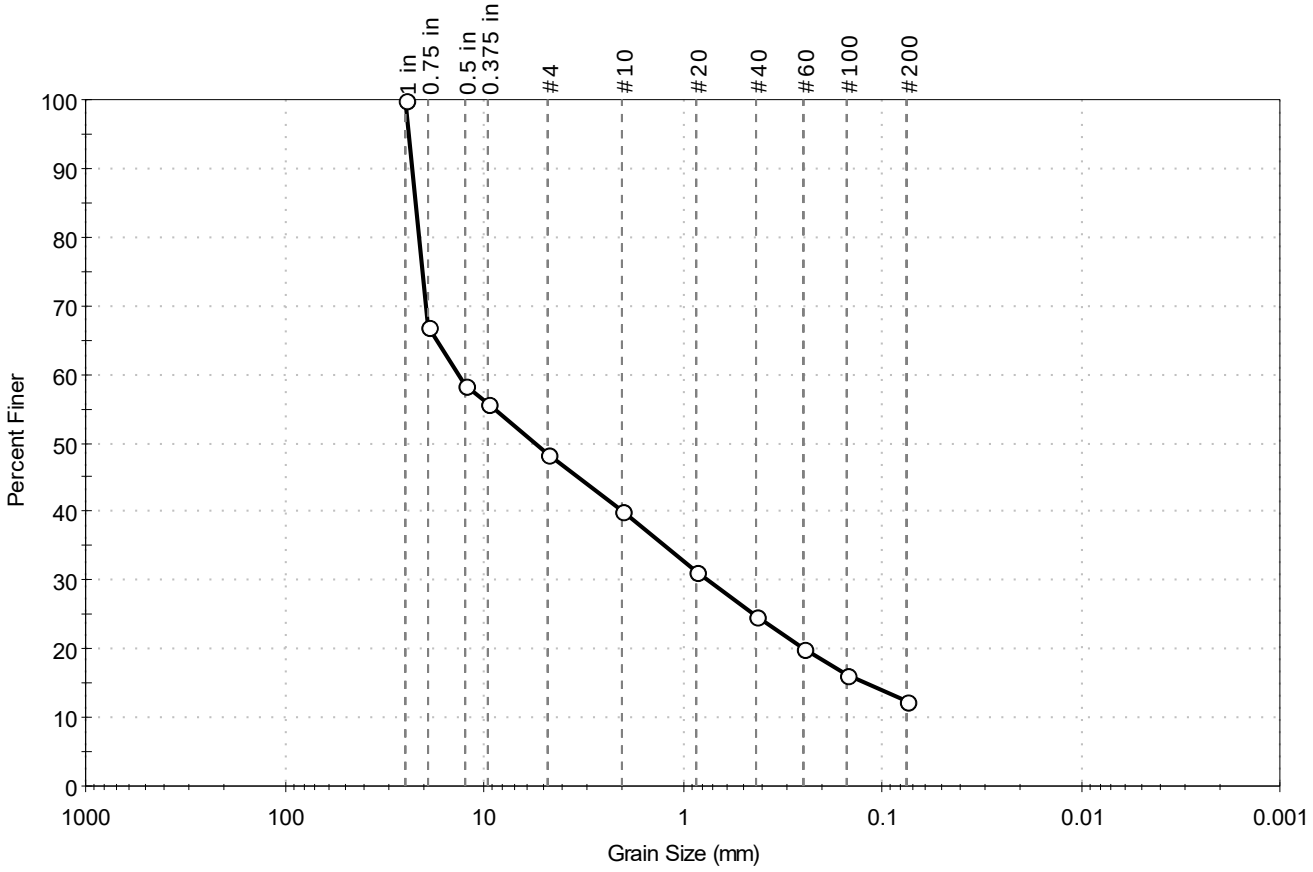
Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

GeoTesting EXPRESS

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation Conduits				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-5	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-8	Test Date:	10/01/19	Checked By:	bfs
Depth :	19-21 ft	Test Id:	525251		
Test Comment:	---				
Visual Description:	Moist, brownish yellow silty gravel with sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	51.5	36.1	12.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	67		
0.5 in	12.50	58		
0.375 in	9.50	56		
#4	4.75	48		
#10	2.00	40		
#20	0.85	31		
#40	0.42	25		
#60	0.25	20		
#100	0.15	16		
#200	0.075	12		

Coefficients

D_{85} = 22.0771 mm	D_{30} = 0.7395 mm
D_{60} = 13.5624 mm	D_{15} = 0.1220 mm
D_{50} = 5.5113 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

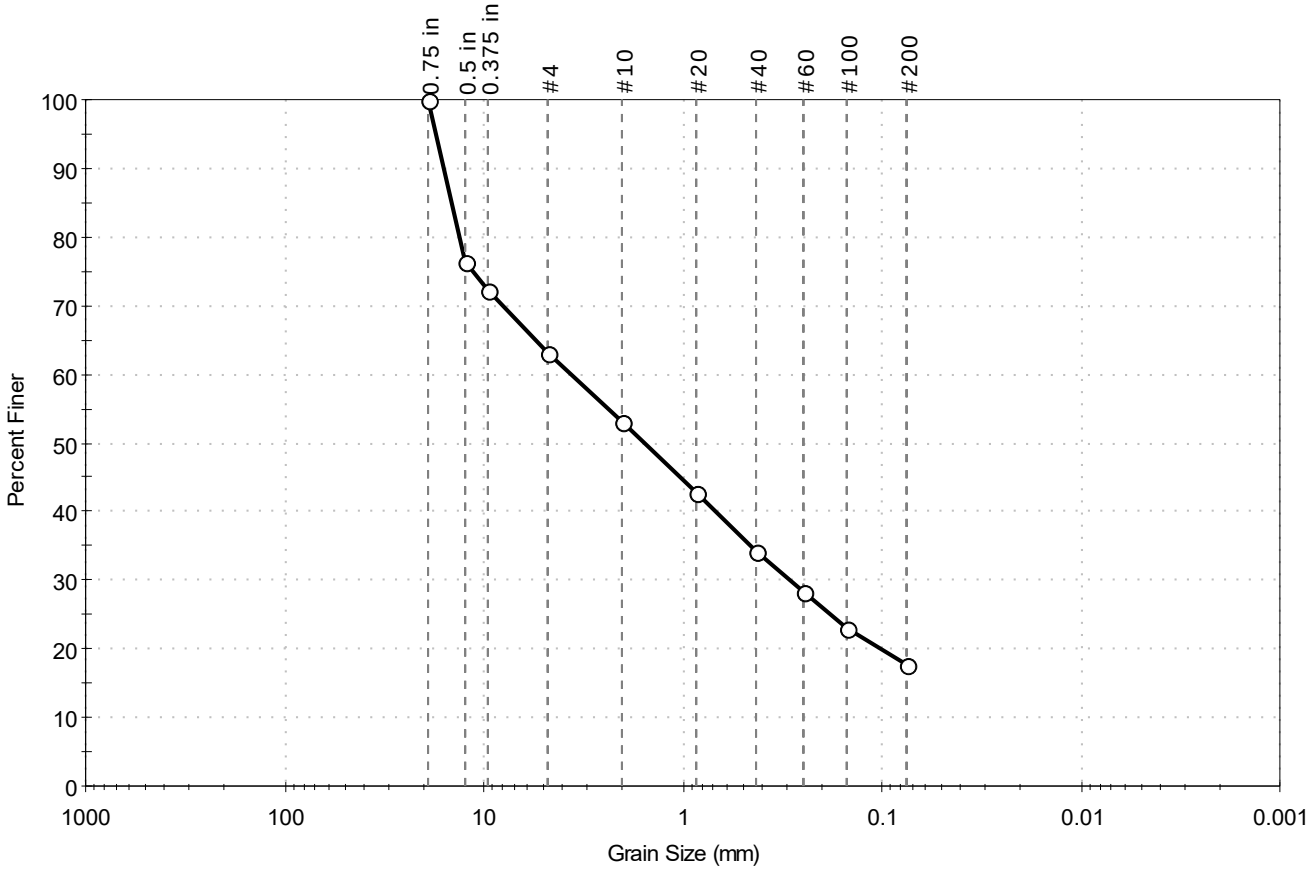
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation Conduits				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-6A	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-5	Test Date:	10/02/19	Checked By:	bfs
Depth :	19-21 ft	Test Id:	525252		
Test Comment:	---				
Visual Description:	Moist, dark gray silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	36.8	45.4	17.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	76		
0.375 in	9.50	72		
#4	4.75	63		
#10	2.00	53		
#20	0.85	43		
#40	0.42	34		
#60	0.25	28		
#100	0.15	23		
#200	0.075	18		

Coefficients

D_{85} = 14.5804 mm	D_{30} = 0.2915 mm
D_{60} = 3.6233 mm	D_{15} = N/A
D_{50} = 1.5632 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

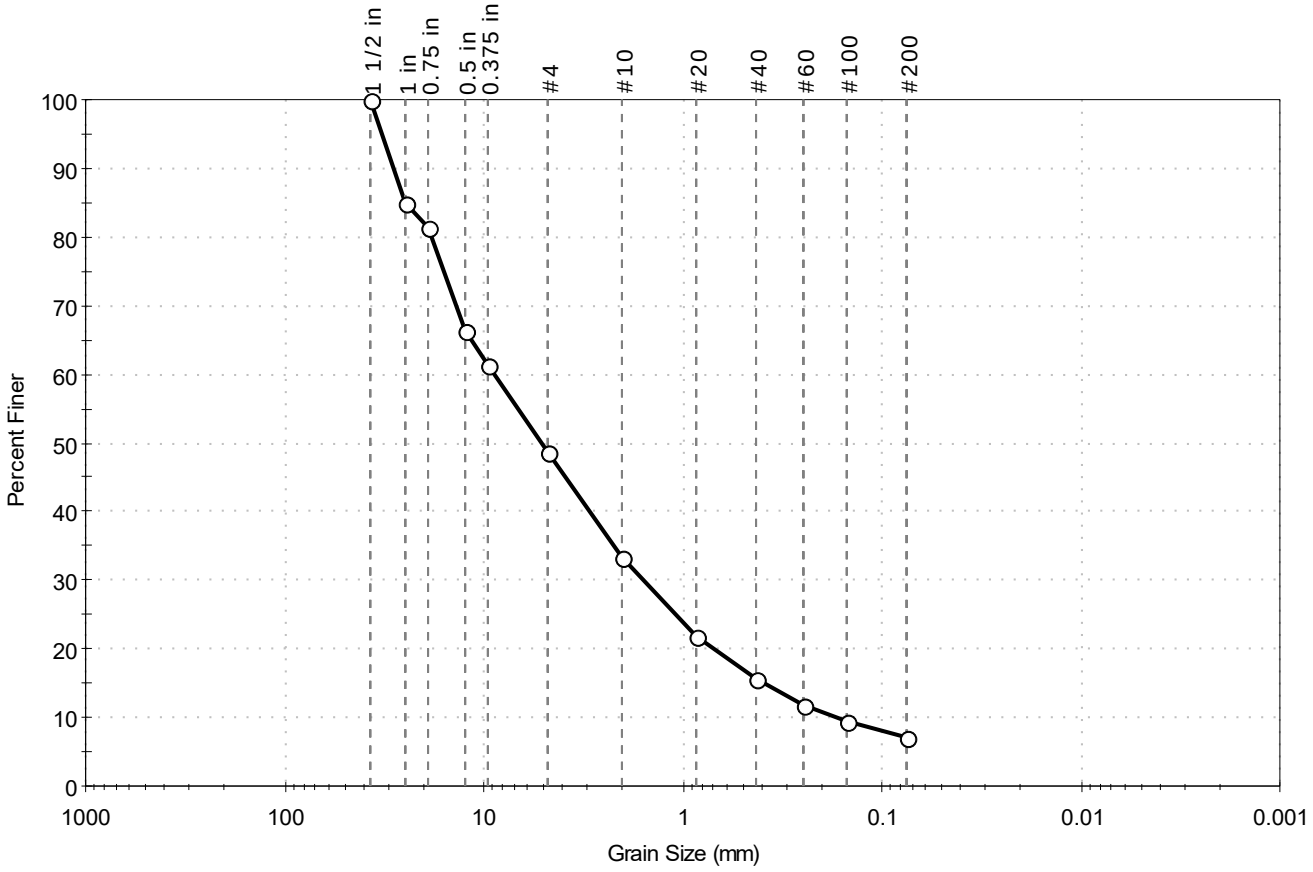
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation Conduits				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-7	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-5	Test Date:	10/01/19	Checked By:	bfs
Depth :	8-10 ft	Test Id:	525253		
Test Comment:	---				
Visual Description:	Moist, brown gravel with silt and sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	51.2	41.6	7.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 1/2 in	37.50	100		
1 in	25.00	85		
0.75 in	19.00	81		
0.5 in	12.50	66		
0.375 in	9.50	61		
#4	4.75	49		
#10	2.00	33		
#20	0.85	22		
#40	0.42	16		
#60	0.25	12		
#100	0.15	9		
#200	0.075	7.2		

Coefficients

D_{85} = 24.9033 mm	D_{30} = 1.5670 mm
D_{60} = 8.8356 mm	D_{15} = 0.3907 mm
D_{50} = 5.0743 mm	D_{10} = 0.1719 mm
C_u = 51.400	C_c = 1.617

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (1))

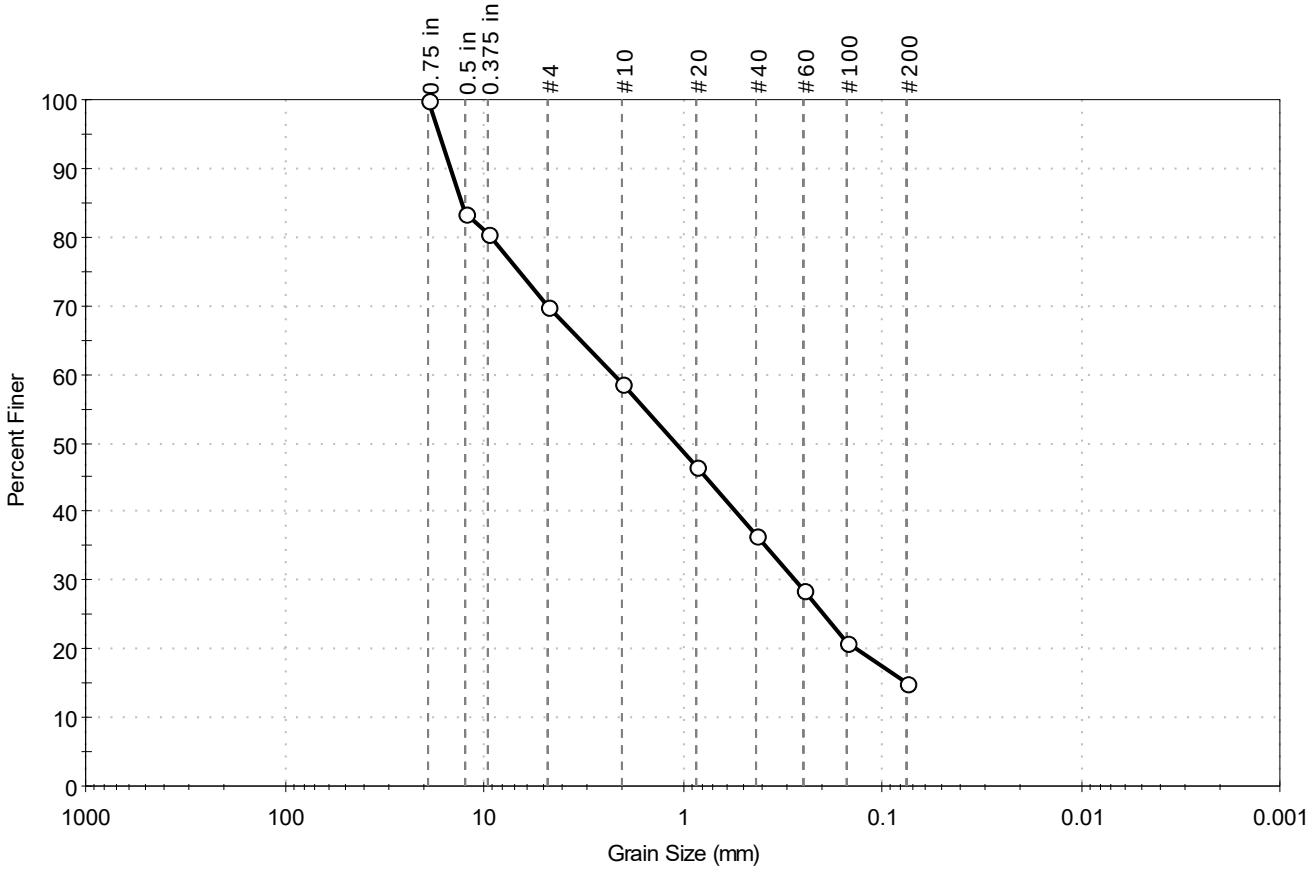
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation Conduits				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-7	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-7	Test Date:	10/01/19	Checked By:	bfs
Depth :	14-16 ft	Test Id:	525254		
Test Comment:	---				
Visual Description:	Moist, yellowish brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	30.2	54.9	14.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	83		
0.375 in	9.50	80		
#4	4.75	70		
#10	2.00	59		
#20	0.85	46		
#40	0.42	37		
#60	0.25	29		
#100	0.15	21		
#200	0.075	15		

Coefficients

D_{85} = 13.0323 mm
D_{30} = 0.2730 mm
D_{60} = 2.2099 mm
D_{15} = 0.0755 mm
D_{50} = 1.0873 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

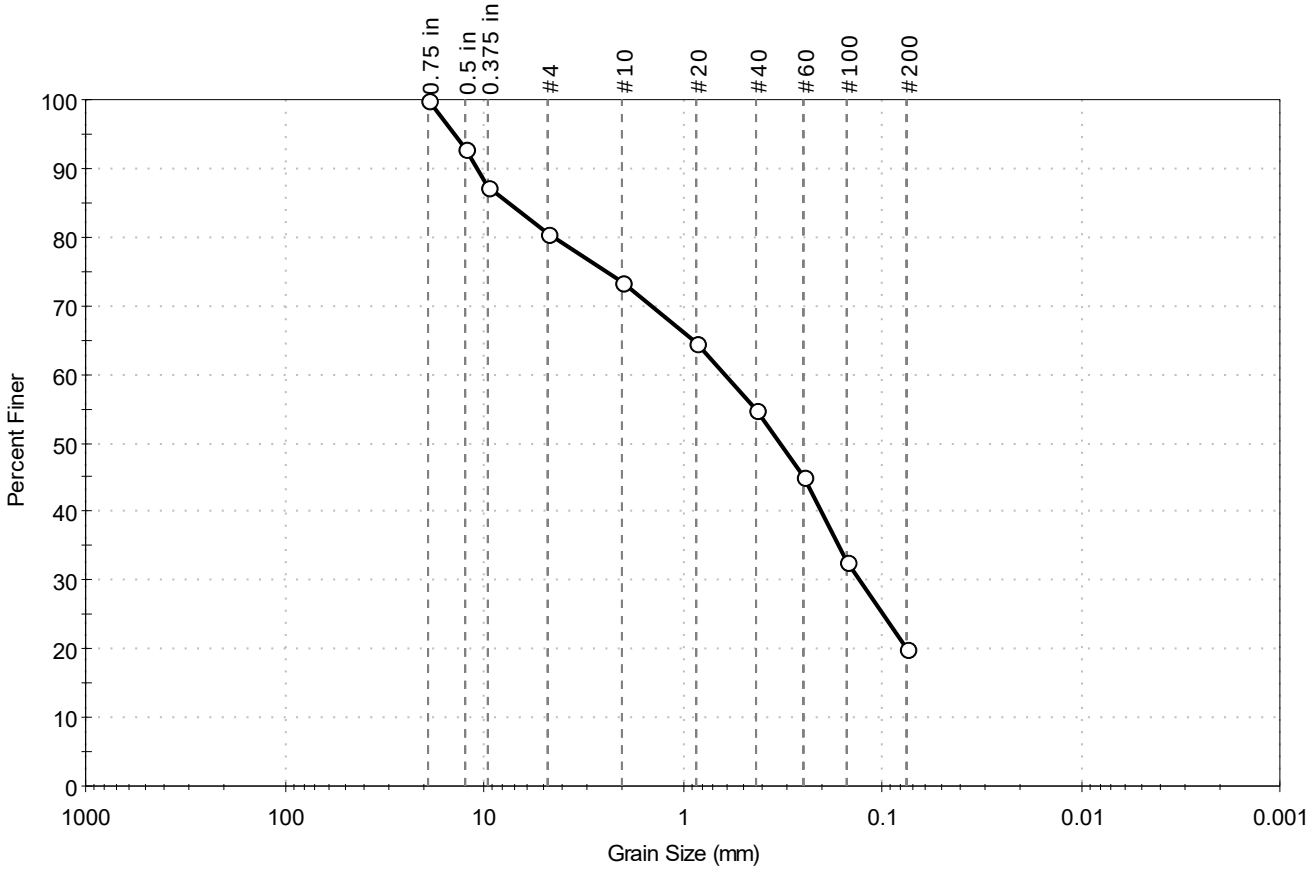
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation Conduits				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-8	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-3	Test Date:	10/01/19	Checked By:	bfs
Depth :	10-12 ft	Test Id:	525255		
Test Comment:	---				
Visual Description:	Moist, dark yellowish brown silty sand with gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	19.4	60.5	20.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	93		
0.375 in	9.50	87		
#4	4.75	81		
#10	2.00	74		
#20	0.85	65		
#40	0.42	55		
#60	0.25	45		
#100	0.15	33		
#200	0.075	20		

Coefficients

D_{85} = 7.5492 mm
D_{30} = 0.1285 mm
D_{60} = 0.6145 mm
D_{15} = N/A
D_{50} = 0.3250 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

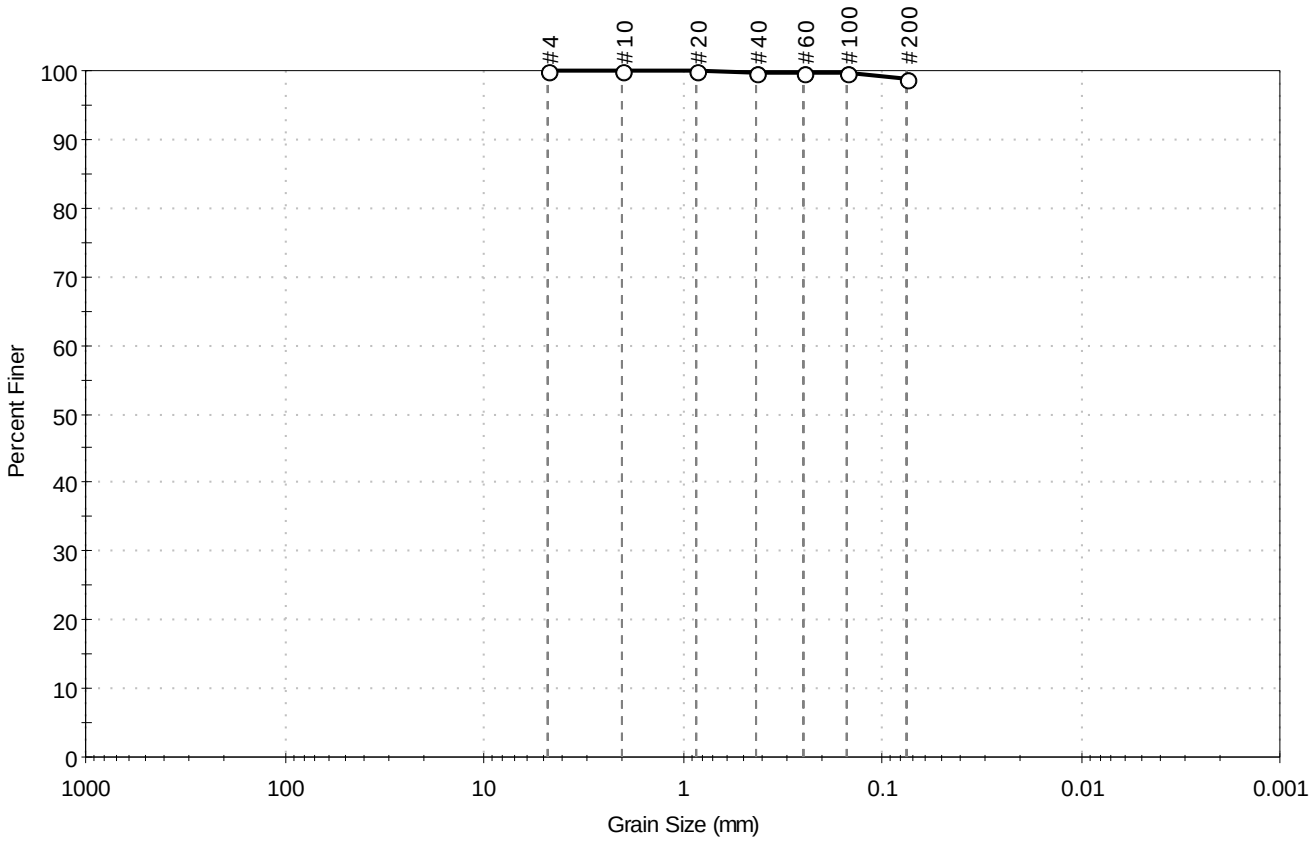
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation C				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-9	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-4	Test Date:	03/06/20	Checked By:	jsc
Depth :	17-19	Test Id:	548429		
Test Comment:	---				
Visual Description:	Moist, dark gray silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.0	1.3	98.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	100		
#200	0.075	99		

Coefficients

D_{85} = N/A	D_{30} = N/A
D_{60} = N/A	D_{15} = N/A
D_{50} = N/A	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

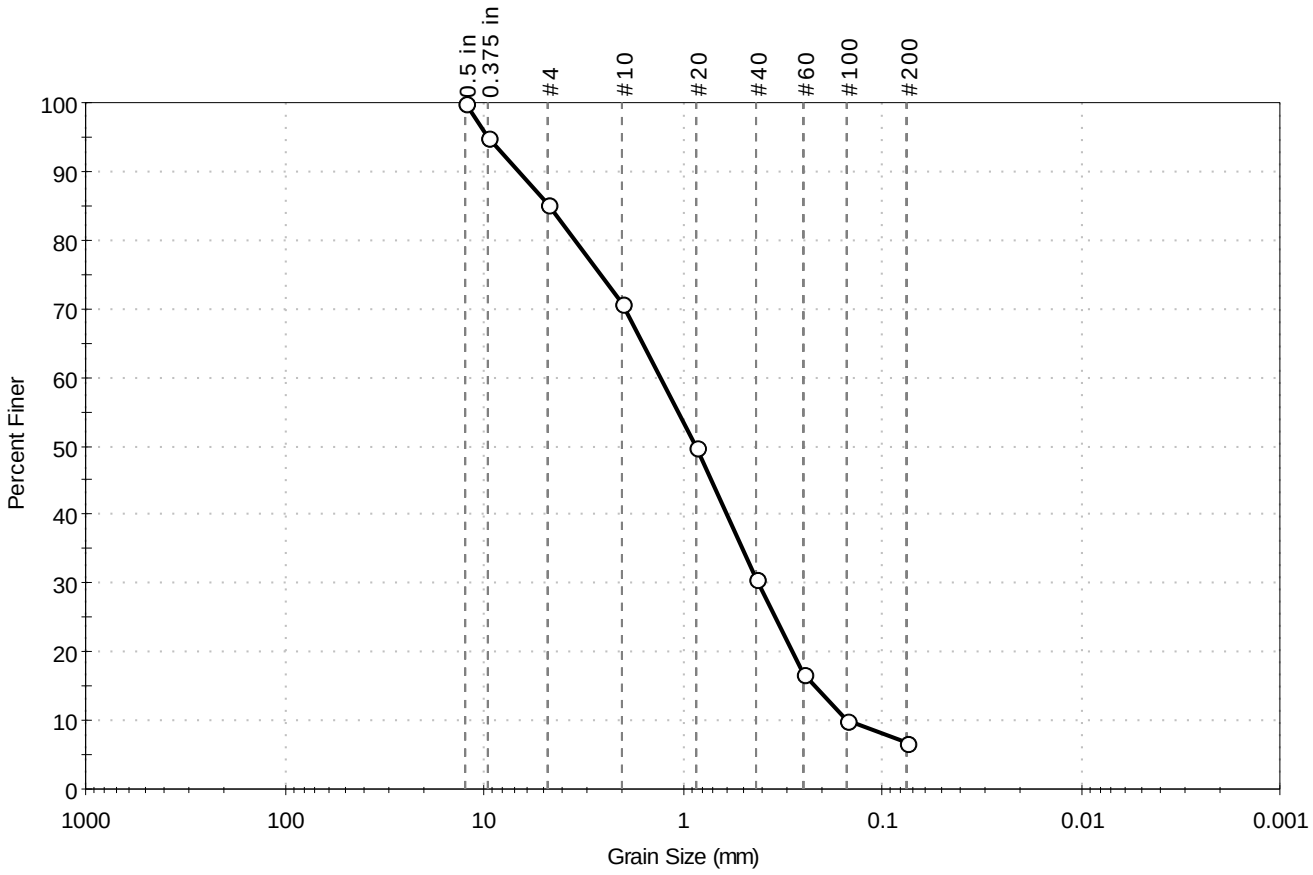
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation C				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-9	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-6	Test Date:	03/06/20	Checked By:	jsc
Depth :	21-23	Test Id:	548430		
Test Comment:	---				
Visual Description:	Moist, brown sand with silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	14.7	78.5	6.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	95		
#4	4.75	85		
#10	2.00	71		
#20	0.85	50		
#40	0.42	31		
#60	0.25	17		
#100	0.15	10		
#200	0.075	6.8		

Coefficients

D_{85} = 4.6702 mm	D_{30} = 0.4162 mm
D_{60} = 1.2858 mm	D_{15} = 0.2161 mm
D_{50} = 0.8514 mm	D_{10} = 0.1468 mm
C_u = 8.759	C_c = 0.918

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (1))

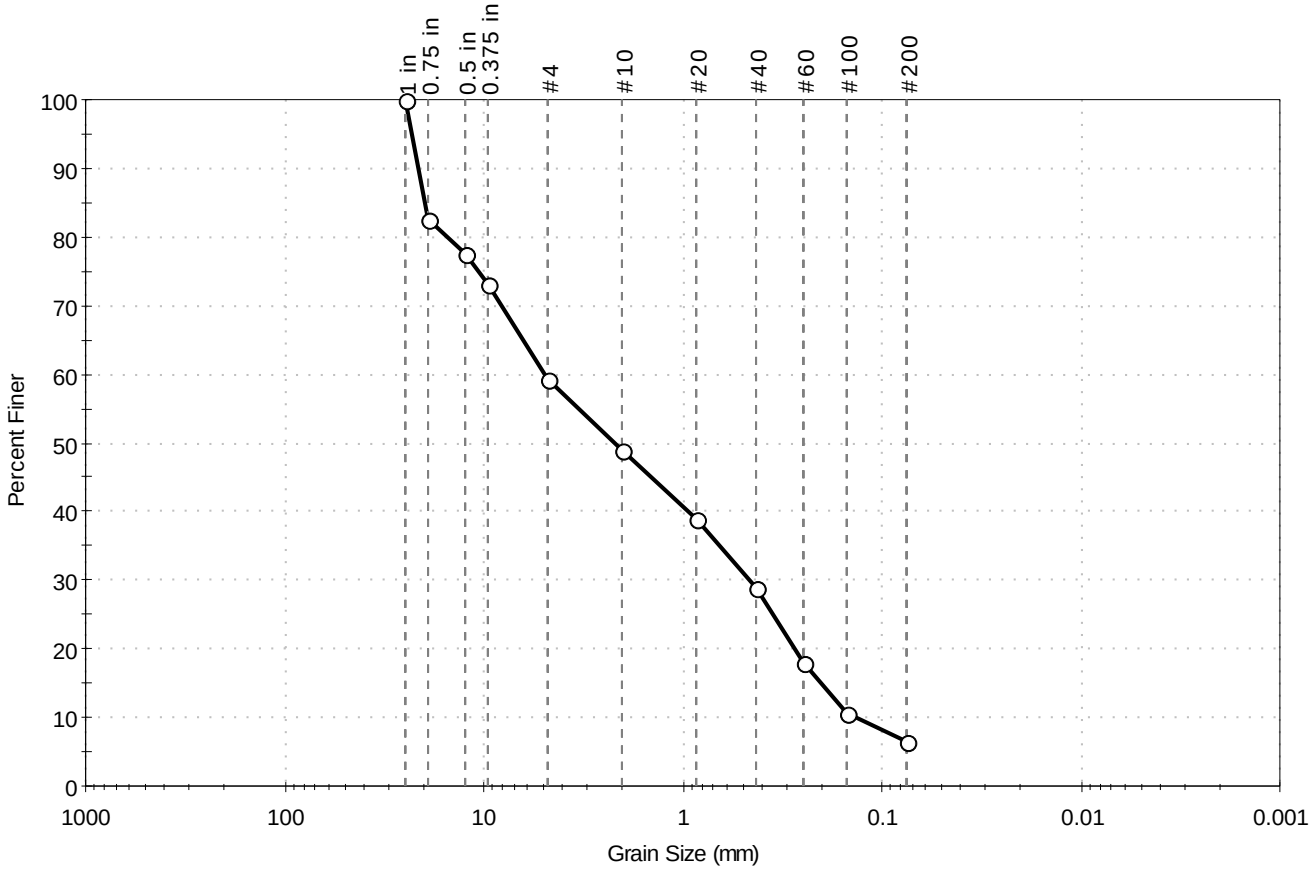
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation C				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-10	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-6	Test Date:	03/06/20	Checked By:	jsc
Depth :	16-18	Test Id:	548431		
Test Comment:	---				
Visual Description:	Moist, dark grayish brown sand with silt and gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	40.6	52.9	6.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	83		
0.5 in	12.50	78		
0.375 in	9.50	73		
#4	4.75	59		
#10	2.00	49		
#20	0.85	39		
#40	0.42	29		
#60	0.25	18		
#100	0.15	11		
#200	0.075	6.5		

Coefficients

D_{85} = 19.7135 mm	D_{30} = 0.4573 mm
D_{60} = 4.8886 mm	D_{15} = 0.2036 mm
D_{50} = 2.1741 mm	D_{10} = 0.1327 mm
C_u = 36.839	C_c = 0.322

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (1))

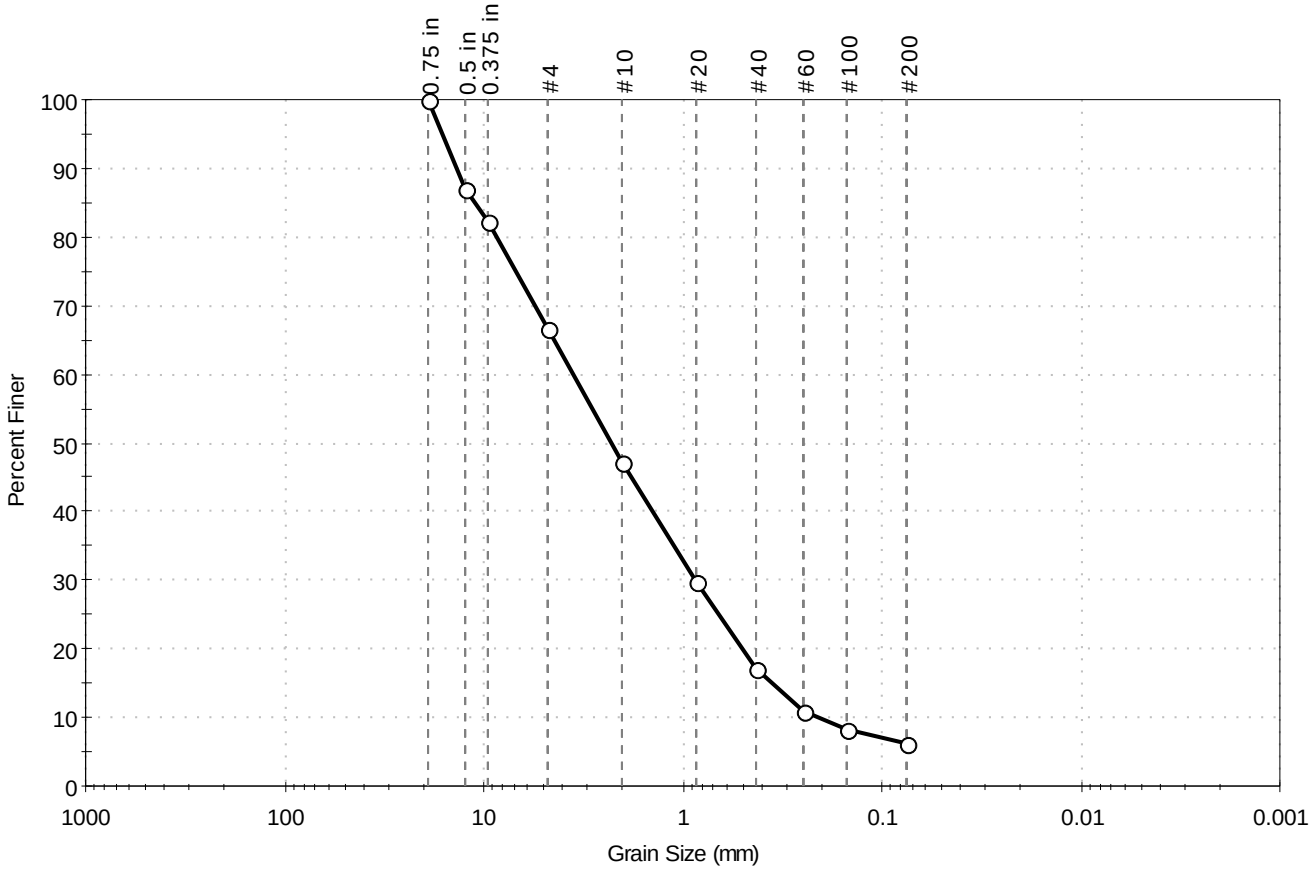
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation C				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-11	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-7	Test Date:	03/06/20	Checked By:	jsc
Depth :	19-21	Test Id:	548432		
Test Comment:	---				
Visual Description:	Moist, brown sand with silt and gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	33.2	60.5	6.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	87		
0.375 in	9.50	82		
#4	4.75	67		
#10	2.00	47		
#20	0.85	30		
#40	0.42	17		
#60	0.25	11		
#100	0.15	8		
#200	0.075	6.3		

Coefficients

D_{85} = 11.1640 mm
D_{30} = 0.8586 mm
D_{60} = 3.5163 mm
D_{15} = 0.3506 mm
D_{50} = 2.2608 mm
D_{10} = 0.2069 mm
C_u = 16.995
C_c = 1.013

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (1))

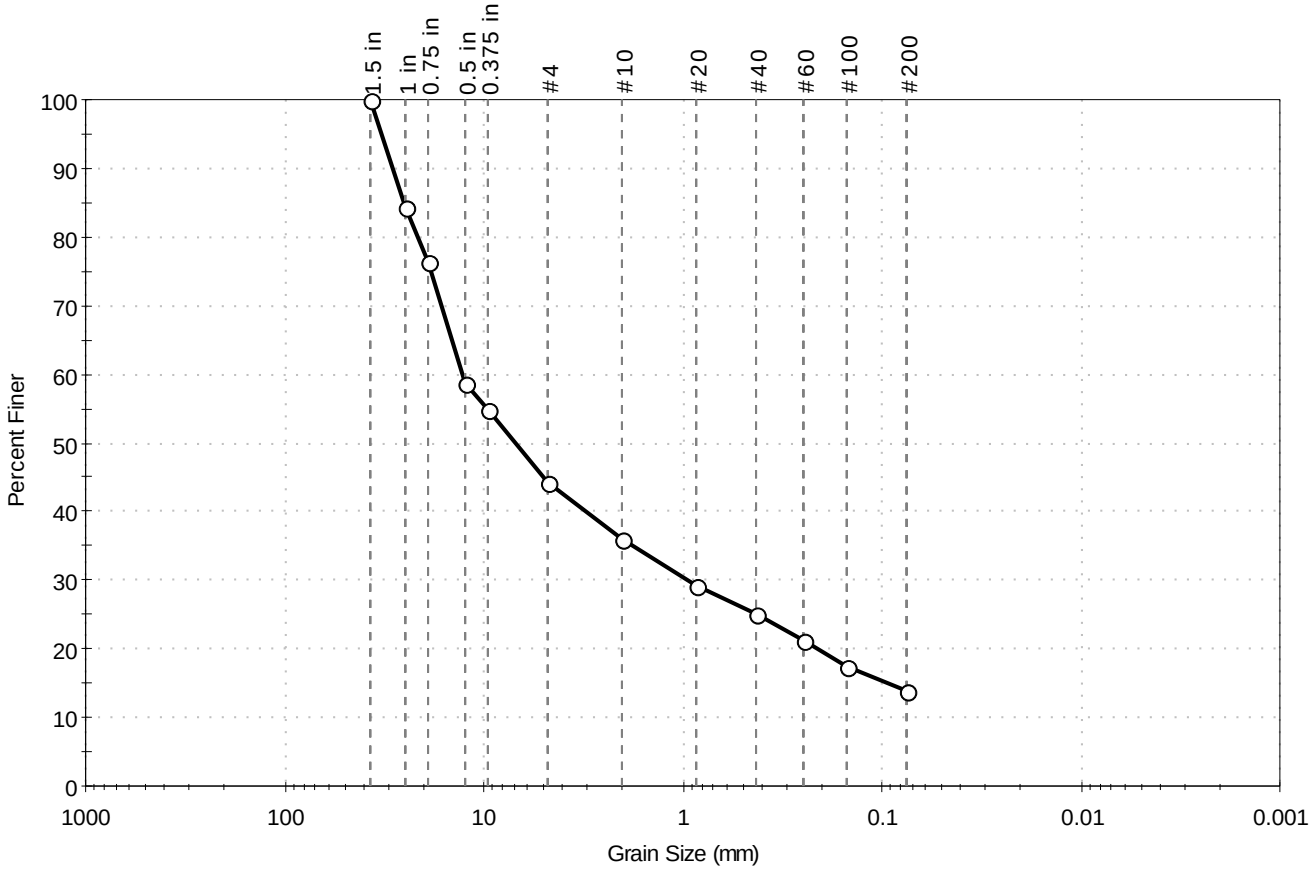
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation C				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-12	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-7	Test Date:	03/06/20	Checked By:	jsc
Depth :	27-29	Test Id:	548433		
Test Comment:	---				
Visual Description:	Moist, dark olive gray silty gravel with sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	55.8	30.5	13.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	84		
0.75 in	19.00	76		
0.5 in	12.50	59		
0.375 in	9.50	55		
#4	4.75	44		
#10	2.00	36		
#20	0.85	29		
#40	0.42	25		
#60	0.25	21		
#100	0.15	17		
#200	0.075	14		

Coefficients

D_{85} = 25.3728 mm	D_{30} = 0.9231 mm
D_{60} = 12.8882 mm	D_{15} = 0.0960 mm
D_{50} = 6.9001 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

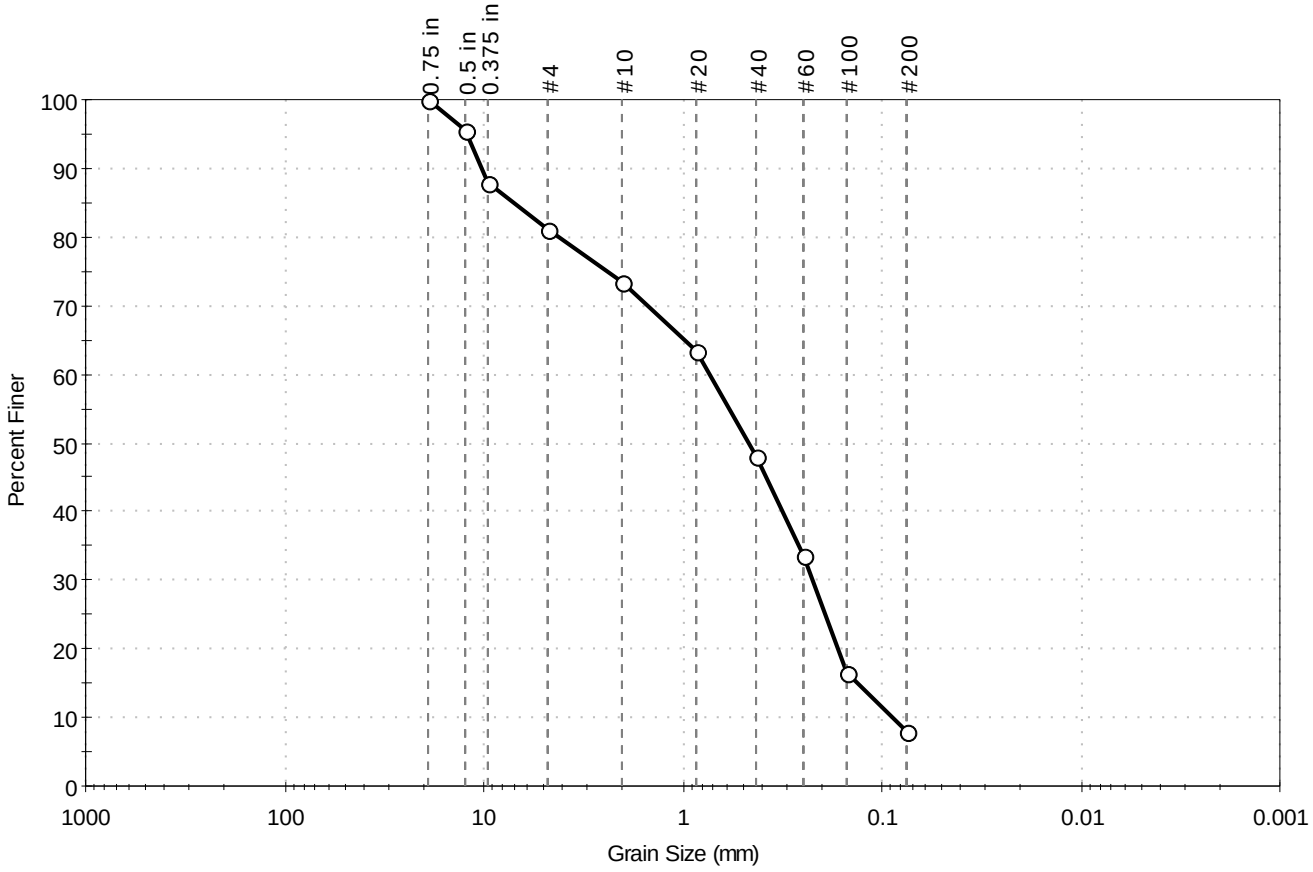
Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation C				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-13	Sample Type:	jar	Tested By:	ckg
Sample ID:	S-2a	Test Date:	03/06/20	Checked By:	jsc
Depth :	8-10	Test Id:	548434		
Test Comment:	---				
Visual Description:	Moist, very dark grayish brown sand with silt and gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	18.9	73.1	8.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	95		
0.375 in	9.50	88		
#4	4.75	81		
#10	2.00	74		
#20	0.85	63		
#40	0.42	48		
#60	0.25	34		
#100	0.15	17		
#200	0.075	8.0		

Coefficients

D_{85} = 7.0320 mm	D_{30} = 0.2241 mm
D_{60} = 0.7302 mm	D_{15} = 0.1321 mm
D_{50} = 0.4624 mm	D_{10} = 0.0883 mm
C_u = 8.270	C_c = 0.779

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (1))

Sample / Test Description

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation C				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	---	Sample Type:	---	Tested By:	tlm
Sample ID:	---	Test Date:	03/03/20	Checked By:	smd
Depth :	---	Test Id:	547063		

Bulk Density and Compressive Strength of Rock Core Specimens by ASTM D7012 Method C

Boring ID	Sample Number	Depth	Bulk Density, pcf	Compressive strength, psi	Failure Type	Meets ASTM D4543	Note(s)
B-9	C-1	29.89 - 30.27 ft	170	14240	3	Yes	---
B-10	C-1	22.29 - 22.67 ft	173	7325	2	Yes	---

Notes: Density determined on core samples by measuring dimensions and weight and then calculating.

All specimens tested at the approximate as-received moisture content and at standard laboratory temperature.

The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure (See attached photographs)

Client:	McMillen Jacobs Associates	Test Date:	3/2/2020
Project Name:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation C	Tested By:	cmh
Project Location:	Providence, RI	Checked By:	smd
GTX #:	310677		
Boring ID:	B-9		
Sample ID:	C-1		
Depth:	29.89-30.27 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.34	4.34	4.34
Specimen Diameter, in:	1.98	1.98	1.98
Specimen Mass, g:	598.48		
Bulk Density, lb/ft^3	170	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

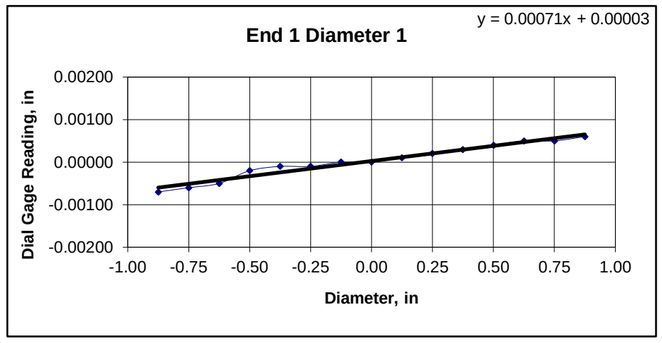
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00070	-0.00060	-0.00050	-0.00020	-0.00010	-0.00010	0.00000	0.00000	0.00010	0.00020	0.00030	0.00040	0.00050	0.00050	0.00060
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010

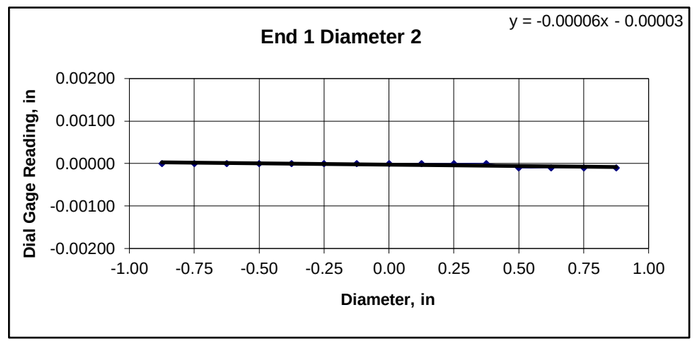
Difference between max and min readings, in:
0° = 0.00130 90° = 0.00010

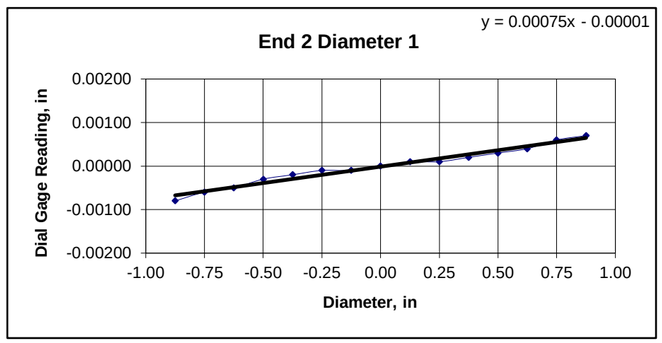
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00080	-0.00060	-0.00050	-0.00030	-0.00020	-0.00010	-0.00010	0.00000	0.00010	0.00010	0.00020	0.00030	0.00040	0.00060	0.00070
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010

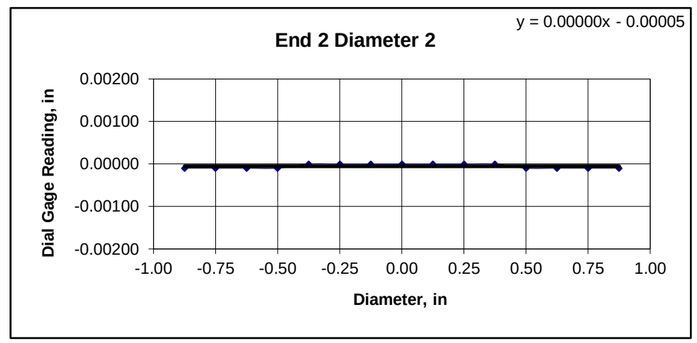
Difference between max and min readings, in:
0° = 0.0015 90° = 0.0001

Maximum difference must be < 0.0020 in. Difference = ± 0.00075
Flatness Tolerance Met? YES









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00071
Angle of Best Fit Line: 0.04093

End 2:
Slope of Best Fit Line 0.00075
Angle of Best Fit Line: 0.04322

Maximum Angular Difference: 0.00229

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00006
Angle of Best Fit Line: 0.00360

End 2:
Slope of Best Fit Line 0.00000
Angle of Best Fit Line: 0.00000

Maximum Angular Difference: 0.00360

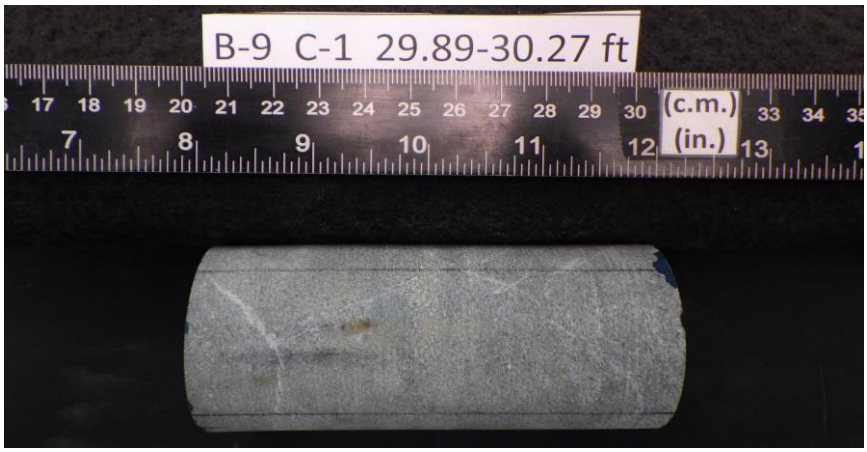
Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00130	1.980	0.00066	0.038	YES
Diameter 2, in (rotated 90°)	0.00010	1.980	0.00005	0.003	YES
END 2					
Diameter 1, in	0.00150	1.980	0.00076	0.043	YES
Diameter 2, in (rotated 90°)	0.00010	1.980	0.00005	0.003	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? YES

Client:	McMillen Jacobs Associates
Project Name:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation C
Project Location:	Providence, RI
GTX #:	310677
Test Date:	3/3/2020
Tested By:	cmh
Checked By:	smd
Boring ID:	B-9
Sample ID:	C-1
Depth, ft:	29.89-30.27 ft



After cutting and grinding

After break

Client:	McMillen Jacobs Associates	Test Date:	3/2/2020
Project Name:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation C	Tested By:	cmh
Project Location:	Providence, RI	Checked By:	smd
GTX #:	310677		
Boring ID:	B-10		
Sample ID:	C-1		
Depth:	22.29-22.67 ft		
Visual Description:	See photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	4.44	4.44	4.44
Specimen Diameter, in:	1.97	1.96	1.97
Specimen Mass, g:	610.99		
Bulk Density, lb/ft^3	173	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.3	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

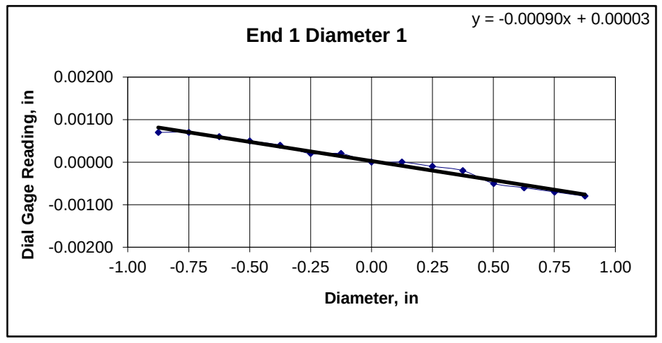
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00070	0.00070	0.00060	0.00050	0.00040	0.00020	0.00020	0.00000	0.00000	-0.00010	-0.00020	-0.00050	-0.00060	-0.00070	-0.00080
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00020

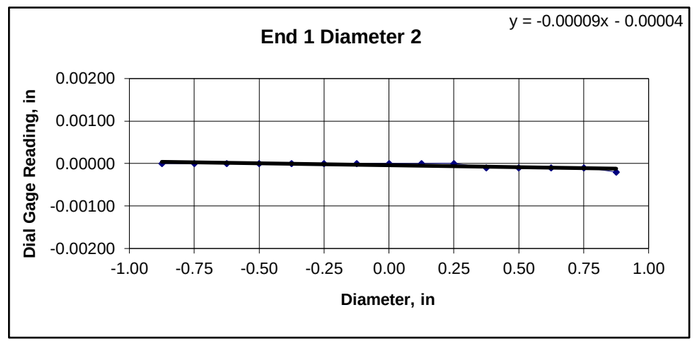
Difference between max and min readings, in:
0° = 0.00150 90° = 0.00020

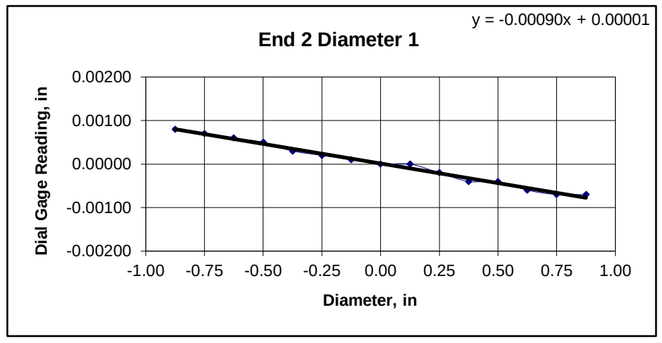
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00080	0.00070	0.00060	0.00050	0.00030	0.00020	0.00010	0.00000	0.00000	-0.00020	-0.00040	-0.00040	-0.00060	-0.00070	-0.00070
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010

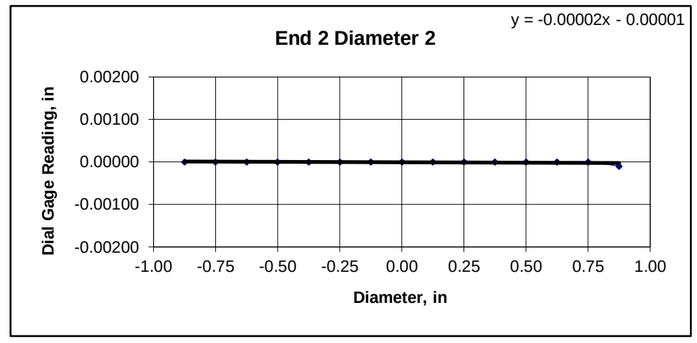
Difference between max and min readings, in:
0° = 0.0015 90° = 0.0001

Maximum difference must be < 0.0020 in. Difference = ± 0.00075
Flatness Tolerance Met? YES









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00090
Angle of Best Fit Line: 0.05157

End 2:
Slope of Best Fit Line 0.00090
Angle of Best Fit Line: 0.05157

Maximum Angular Difference: 0.00000

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00009
Angle of Best Fit Line: 0.00524

End 2:
Slope of Best Fit Line 0.00002
Angle of Best Fit Line: 0.00115

Maximum Angular Difference: 0.00409

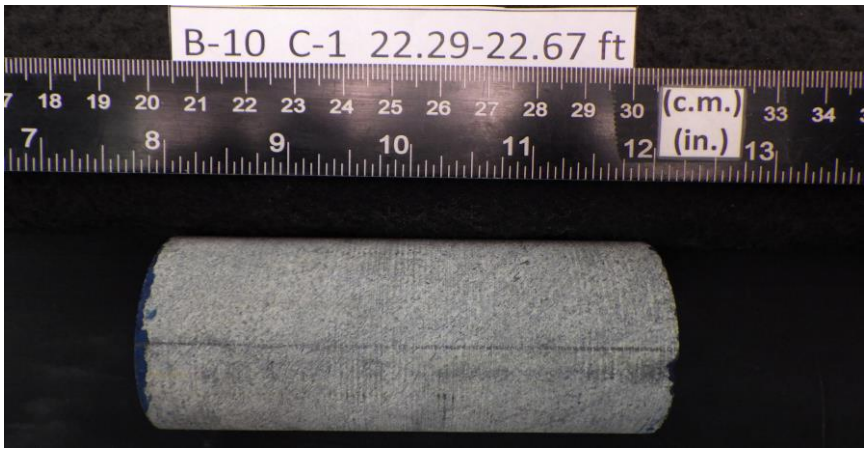
Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

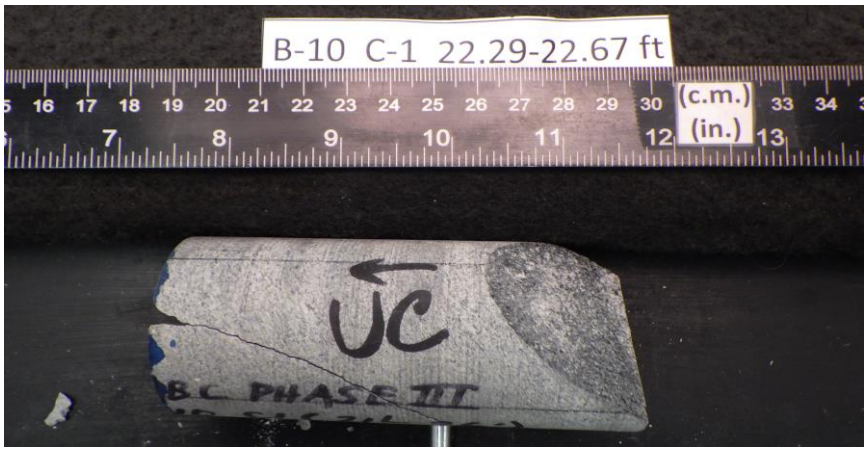
END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00150	1.965	0.00076	0.044	YES
Diameter 2, in (rotated 90°)	0.00020	1.965	0.00010	0.006	YES
END 2					
Diameter 1, in	0.00150	1.965	0.00076	0.044	YES
Diameter 2, in (rotated 90°)	0.00010	1.965	0.00005	0.003	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? YES

Client:	McMillen Jacobs Associates
Project Name:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation C
Project Location:	Providence, RI
GTX #:	310677
Test Date:	3/3/2020
Tested By:	cmh
Checked By:	smd
Boring ID:	B-10
Sample ID:	C-1
Depth, ft:	22.29-22.67



After cutting and grinding



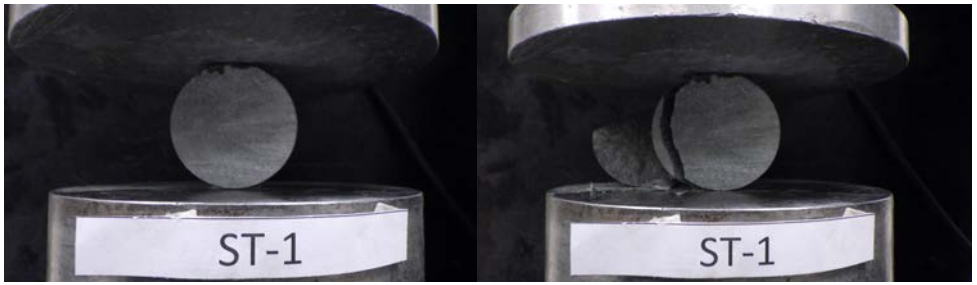
After break

GeoTesting EXPRESS

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation C				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-9	Sample Type:	jar	Tested By:	tlm
Sample ID:	C-1	Test Date:	03/02/20	Checked By:	smd
Depth :	29.8-30.4 ft	Test Id:	547064		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Splitting Tensile Strength of Intact Rock Core Specimens by ASTM D3967

Specimen Depth	Test No	Thickness (L), in	Diameter (D), in	Thickness to Diameter Ratio (L/D)	Failure Load (P), lbs	Splitting Tensile Strength, psi	Failure Type
29.80-29.88 ft	ST-1	1.21	1.99	0.61	4,872	1,290	1



Notes: Strain rate: 2.5%/min.

ASTM requires the thickness-to-diameter ratio (L/D) of each test specimen to be between 0.2 and 0.75.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

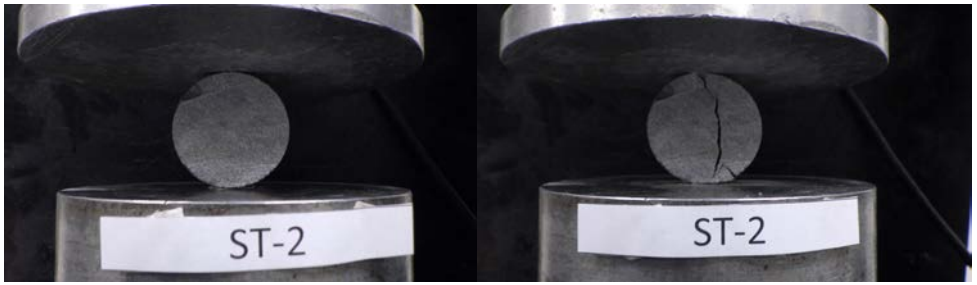
Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure (See attached photographs)

GeoTesting EXPRESS

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation C				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-10	Sample Type:	jar	Tested By:	tlm
Sample ID:	C-1	Test Date:	03/02/20	Checked By:	smd
Depth :	22.2-22.7 ft	Test Id:	547065		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Splitting Tensile Strength of Intact Rock Core Specimens by ASTM D3967

Specimen Depth	Test No	Thickness (L), in	Diameter (D), in	Thickness to Diameter Ratio (L/D)	Failure Load (P), lbs	Splitting Tensile Strength, psi	Failure Type
22.20-22.28 ft	ST-2	1.00	1.97	0.51	4,478	1,440	1



Notes: Strain rate: 2.5%/min.

ASTM requires the thickness-to-diameter ratio (L/D) of each test specimen to be between 0.2 and 0.75.

The reported thickness (L) is the average of three measurements.

The reported diameter(D) is the average of three measurements.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure; 3 = Intact Material and Discontinuity Failure (See attached photographs)

GeoTesting EXPRESS

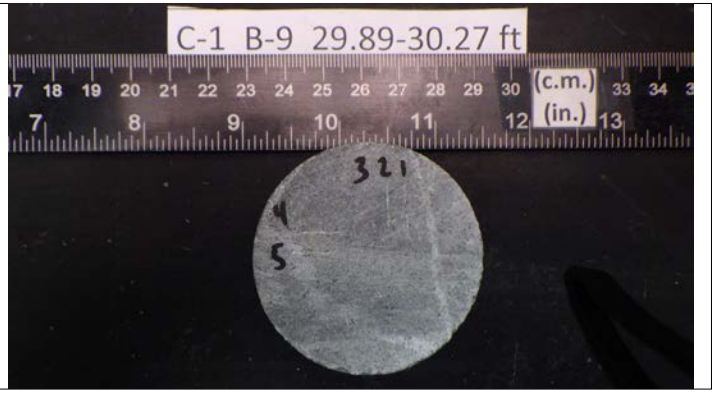
Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation C				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-9	Sample Type:	jar	Tested By:	tlm
Sample ID:	C-1	Test Date:	03/06/20	Checked By:	jsc
Depth :	29.8-30.4 ft	Test Id:	547281		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
B-9	C-1	29.89-30.27 ft	1	4.8	4.6	4.70	
			2	3.3	3.2	3.25	
			3	3.2	3.3	3.25	
			4	3.7	4.0	3.85	
			5	1.9	2.2	2.05	
			Average CAIs			3.42	
			Average CAI *			3.87	
					CERCHAR Abrasiveness Index Classification	**High abrasiveness**	

Notes

Test Surface: Saw Cut
Moisture Condition: As Received
Apparatus Type: Original CERCHAR
Stylus Hardness: Rockwell Hardess 54/56 HRC
Stylus Displacement Relative to Rock Fabric:
Styli 1-3: Normal; Styli 4-5: Parallel
* CAI = (0.99 * CAIs) + 0.48
CAIs = CERCHAR index for smooth (saw cut) surface
CAI = CERCHAR index for natural surface
Comments:



GeoTesting EXPRESS

Client:	McMillen Jacobs Associates				
Project:	NBC CSO Phase III: IIIA-4 & IIIA-5 Consolidation C				
Location:	Providence, RI			Project No:	GTX-310677
Boring ID:	B-10	Sample Type:	jar	Tested By:	tlm
Sample ID:	C-1	Test Date:	03/06/20	Checked By:	jsc
Depth :	22.2-22.7 ft	Test Id:	547282		
Test Comment:	---				
Visual Description:	---				
Sample Comment:	---				

Abrasiveness of Rock Using the Cerchar Method by ASTM D7625

Boring ID	Sample ID	Depth	Stylus No	Reading 1	Reading 2	Average	Comments
B-10	C-1	22.29-22.67 ft	1	4.2	3.9	4.05	
			2	3.0	2.8	2.90	
			3	4.3	4.0	4.15	
			4	3.9	3.0	3.45	
			5	2.0	2.0	2.00	
			Average CAIs			3.31	
			Average CAI *			3.76	
					CERCHAR Abrasiveness Index Classification	**High abrasiveness**	

Notes

Test Surface: Saw Cut
Moisture Condition: As Received
Apparatus Type: Original CERCHAR
Stylus Hardness: Rockwell Hardess 54/56 HRC
Stylus Displacement Relative to Rock Fabric:
Styli 1-3: Normal; Styli 4-5: Parallel
* CAI = (0.99 * CAIs) + 0.48
CAIs = CERCHAR index for smooth (saw cut) surface
CAI = CERCHAR index for natural surface
Comments: