GZA
GeoEnvironmental, Inc.

Engineers and Scientists

MEMORANDUM

TO: Peter Clary, P.E.
Vanasse Hangen Brustlin, Inc.

FROM: Jennifer R. Baron, P.E.
Christopher L. Snow, P.E.
Russell J. Morgan

DATE: January 23, 2015

FILE NO.: 09.0025829.00

SUBJECT: Preliminary Pavement Design Basis
Gray Park and Ride, Exit 63
Gray, Maine

477 Congress Street
Suite 700
Portland, Maine
04101-3926
207-879-9190
FAX 879-0099
www.gza.com

GZA GeoEnvironmental, Inc. (GZA) has prepared this preliminary geotechnical data summary and preliminary pavement design basis evaluation for the proposed Park and Ride at Exit 63 in Gray, Maine. Our services were provided in accordance with our Subconsultant Agreement with Vanasse Hangen Brustlin, Inc. (VHB) dated November 11, 2013 and January 8, 2015, and the attached Limitations included in **Appendix A**.

The memorandum summarizes the results of subsurface explorations and subsurface conditions for the proposed park and ride and preliminary pavement design evaluations completed to date. Preliminary test boring logs and laboratory test results for the park and ride borings are provided herein; however, these data are still undergoing quality control review and may change prior to issuance of our final geotechnical design report for the project.

If necessary, this memorandum will be revised when review of the subsurface data is complete.

BACKGROUND

The project consists of reconstruction of the Exit 63 interchange for the Maine Turnpike in Gray, Maine, as shown on **Figure 1**. The existing interchange includes northbound (NB) and southbound (SB) on and off ramps that pass through a toll plaza to a signalized intersection with Route 202 on the east side of the Turnpike. The southbound (SB) on and off ramps are carried from the west side of the Turnpike to the toll plaza on the east by an overpass bridge. The SB ramp overpass bridge crosses the Turnpike approximately 1,000 feet south of the Route 202 overpass bridge.

The proposed park and ride lot is proposed approximately 1,000 feet north of Route 202 on the east side of Route 26A.

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SUBSURFACE EXPLORATIONS

GZA completed a subsurface investigation program consisting of 39 test borings for the project. The park and ride test borings (GZ-101 and GZ-102) were drilled to depths of approximately 21 to 82 feet below ground surface (bgs). The boring locations and ground surface elevations[1] were surveyed by VHB prior to drilling. The test borings associated with the proposed park and ride lot are shown on **Figure 2**.

New England Boring Contractors of Hermon, Maine coordinated utility clearance and provided drilling services. The drilling was completed on November 6, 2014. GZA personnel monitored the drilling work and prepared logs of each boring. Preliminary boring logs are included in **Appendix B**.

The borings were drilled using 2.25-inch inside diameter hollow stem augers, as noted on the boring logs. Boring GZ-101 was terminated at the proposed boring depth, with Standard Penetration Testing (SPT) and split-spoon sampling performed continuously in the upper 6 feet, then at 5-foot intervals thereafter, using a 24-inch long, 1-3/8-inch inside diameter sampler. Boring GZ-102 was advanced to greater depth to determine the overall thickness of soft, compressible soils, with SPT and split-spoon sampling was performed at 5-foot intervals to a depth of 36 feet. An AW-rod probe was then driven using a 140 pound hammer with a 30-inch drop to a total depth of 82 feet. Resistance was documented on the logs in blows per foot. The recorded resistances are an indication of variation in the density of the encountered deposits, but are not representative of the SPT N-values. Increased resistance below approximately 75 feet is judged to represent a sand or glacial till layer beneath the silty clay.

LABORATORY TESTING

GZA completed a laboratory soil testing program at the Thielsch Engineering in Cranston, Rhode Island to review visual soil classification and estimate engineering properties of the soils. The park and ride portion of the testing program included one gradation analysis / MaineDOT Frost Classification / Unified Soil Classification System (USCS) assessment and two sets of Atterberg Limits on soil samples taken from the explorations. Preliminary results of the testing are included in **Appendix C**.

SUBSURFACE CONDITIONS

Three subsurface units were encountered at the proposed park and ride site: Topsoil, Silty Clay, and possible Glacial Till. Detailed descriptions of the materials encountered at specific locations are provided in the boring logs in **Appendix B**. The encountered thicknesses, generalized descriptions and engineering properties of the units encountered, in descending order from ground surface, are summarized in the following table.

[1] Elevations referenced in this report are in feet and refer to North American Vertical Datum of 1988 (NAVD 1988).

Soil Unit	Approximate Encountered Thickness (ft)	Generalized Description
Topsoil	0.5	Very loose, dark brown, fine to medium SAND and Clayey Silt, traces of roots and leaves (USCS: SM).
Silty Clay (Stiff Crust)	5.5	Medium stiff to very stiff, gray, Clayey SILT to Silty CLAY, little to trace fine Sand (USCS: ML, CL). Occasional fine sand seams noted, up to 1/8-inch in thickness. MaineDOT Frost Classification = IV
Silty Clay (Soft)	>15 to 70	Soft to medium stiff, gray, Silty CLAY, occasional trace fine sand (USCS: CL). MaineDOT Frost Classification = IV
Possible Sand or Glacial Till	7 +	Denser material was encountered beneath the soft Silty CLAY based on effort required to advance AW rod probe at boring GZ-102.

BEDROCK

Based on the probe in boring GZ-102, bedrock is at least 82 feet bgs.

GROUNDWATER

Groundwater was measured at the park and ride boring locations at depths between 8.5 and 11.5 feet bgs at the time of the explorations (approximately El. 231.5 to El. 237.5), corresponding to groundwater depths on the order or 12 to 16 feet below proposed finish pavement grades.

The groundwater observations were made at the times and under the conditions stated in the borings logs. Fluctuations in groundwater level occur due to variations in season, precipitation, and construction activities in the area. Consequently, water levels during construction are likely to vary from those encountered at the time the observations were made.

CONCLUSIONS AND RECOMMENDATIONS

GZA has conducted preliminary evaluations of geotechnical considerations relevant to pavement design at the proposed park and ride lot location, as presented below. The findings presented below may be updated in our GDR following more detailed review of the data.

FROST AND SUBGRADE CONDITIONS FOR PAVEMENT DESIGN

- The new park and ride lot will be constructed in a fill area, with anticipated total grade raises on the order of 5 feet (60 inches) or less above existing ground elevation.
- Based on the MaineDOT Highway Design Guide (HDG), the Design Freezing Index for the site is approximately 1350. Therefore, in accordance with Figure 13-3 of the HDG, considering primarily granular subgrade materials, the estimated depth of frost penetration is about 72 inches.
- In order to prevent frost-heaving of the pavement subgrade, it would be necessary to remove the frost susceptible materials to the full frost penetration depth. If a moderate amount of seasonal movement is considered acceptable, this thickness may be reduced from 6 feet to 4 to 5 feet.

- Due to the low permeability of the silty clay subgrade materials, there is potential for perched water to accumulate adjacent to the pavement and provide a source of water for possible frost action beneath pavement. To promote drainage of the pavement section, ditches should be provided on all sides of the pavement, and the bottom of the ditches should be at least 12 inches below the bottom of the subbase layer of the proposed pavement sections. Where possible, the prepared clay subgrade should be graded to drain toward the perimeter ditches.

PAVEMENT DESIGN

The following table summarizes the proposed pavement section, as presented in the VHB 60% plan submission set dated November 12, 2014. The proposed section, as tabulated below, will provide a Structural Number (SN) equal to 3.23.

Layer	Struct. Coeff	Drain Coeff	Thickness (inches)	SN	Estimated Design Life
HMA Grading 12.5mm (Surface)	0.44	1	2	0.88	20 years
HMA Grading 19.0mm	0.44	1	2	0.88	
Base Course Type A	0.12	1	4	0.48	
Subbase Type D	0.09	1	11	0.99	
			Sum	**3.23**	

GZA performed pavement design analysis in accordance with the MaineDOT HDG to confirm if the proposed pavement section was acceptable for encountered subgrade conditions. Traffic data, provided by VHB via email on January 21, 2015, indicated an AADT for the park and ride lot of 675. Based on this, GZA estimated a 20-year 18-kip ESAL equivalent of 38,550. The following assumptions were also made in accordance with the HDG.

Pavement Design Input	Value
Serviceability Loss (ΔPSI)	2.5
Reliability Factor	85%
Overall Standard Deviation	0.45

GZA calculated the minimum required SN values for the park and ride, based on an AADT of 675, provided by VHB, and the anticipated subgrade materials. It is anticipated that subgrade materials for the park and ride lot will consist of either Silty Clay or imported granular fill. The recommended soil support S-value and recommended subgrade resilient modulus values used in section analysis is presented below:

Material	Maine Frost Classification	Recommended Soil Support S-Value	Recommended Subgrade Resilient Modulus, Mr (psi)
Silty Clay	IV	3	2,800
Clean Granular Fill (new)	0	5	6,100

Based on these assumptions, the minimum required SN for pavement sections placed over in-situ Silty Clay or imported granular fill is 3.0 and 2.4, respectively, Therefore, the proposed pavement section (SN=3.23) is acceptable for either subgrade condition.

FILL MATERIAL AND PLACEMENT RECOMMENDATIONS

Fill materials beneath the pavement section should consist of MaineDOT 703.19 Granular Borrow for Underwater Backfill.

Fill materials should be placed systematically in horizontal layers not more than 12-inches in thickness prior to compaction. Compaction equipment should preferably consist of heavy, self-propelled vibratory rollers. Fill materials must be compacted to a dry density of at least 95% of the maximum dry density determined in accordance with the American Society for Testing and Materials (ASTM) D 1557. In the event that weaving or rutting begins to occur, compaction should proceed without vibration, until enough fill is in place to provide a stable base.

SETTLEMENT

New fill on the order of 5 feet or less is anticipated within the limits of the new park and ride lot. Settlement of the parking lot will vary based on the amount of fill placement and the clay stratum thickness. Generally, the site is underlain by 5 to 10 feet of stiff silty clay over approximately 75 feet of soft, compressible, silty clay. Total estimated settlements, assuming a 3- to 5-foot grade raise and a total clay thickness of 75 feet, are anticipated to be on the order of 4 to 5 inches.

Initial settlements of approximately 1 inch or less are anticipated. In addition, most of the settlement will be a result of secondary compression, and is anticipated to occur in the time period approximately 5 to 50 years after the fill is placed.

REUSE OF ON-SITE MATERIALS

It is anticipated that soils encountered on site are **not** suitable for re-use as base course materials for the proposed pavement section. Refer to **Appendix C** for laboratory results. Excavated silty clay soil may be re-used as common borrow in landscaped areas. Due to the variability of the soils across the Site, GZA recommends that the excavated soils be assessed by a qualified geotechnical engineer to assure conformance with the gradation specifications prior to reuse of on-site materials.

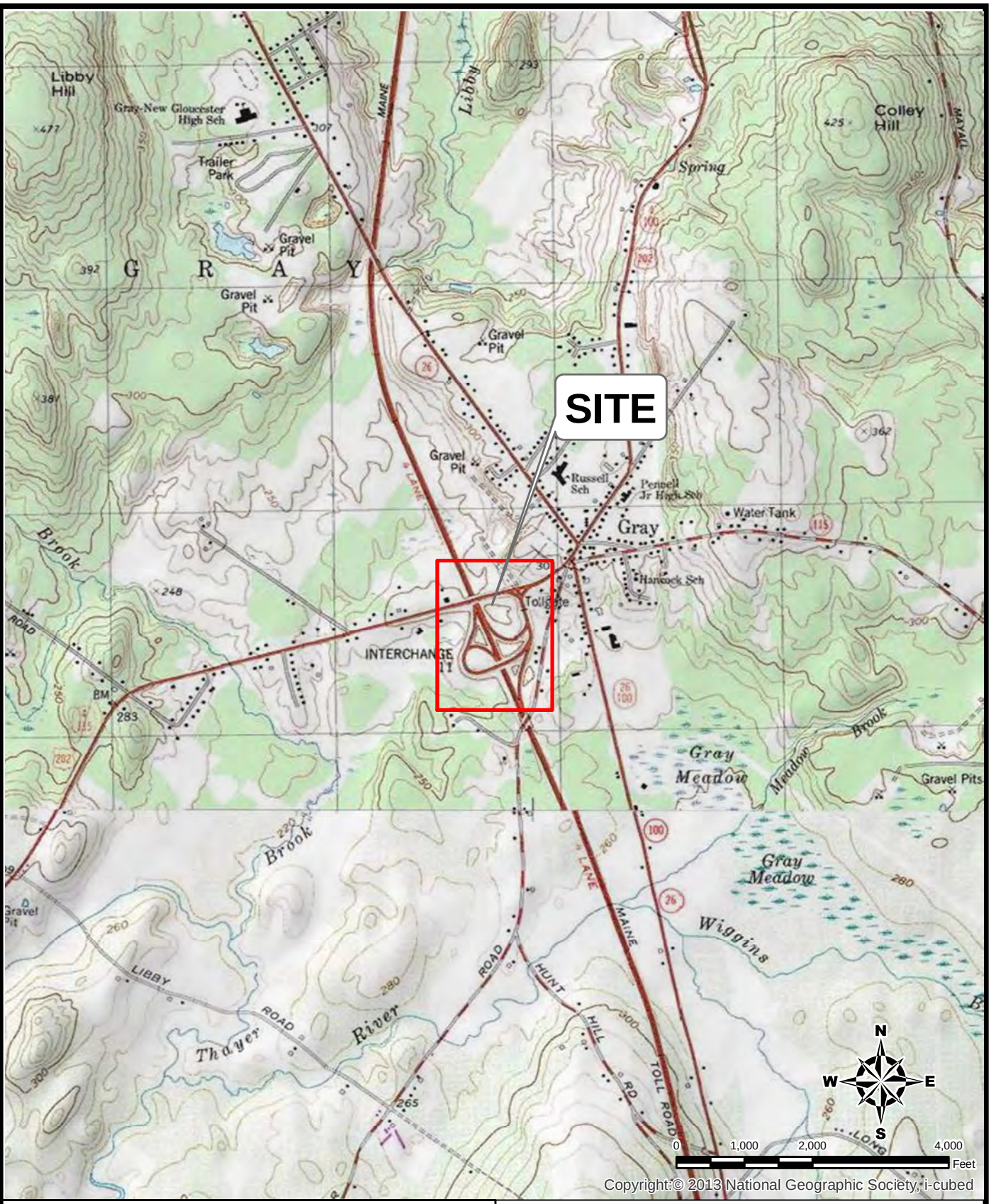
CLOSURE

We trust this information meets current project needs. Please feel free to call Jennifer Baron at (207) 358-5119 if additional information is needed.

JRB/CLS/RJM:idim
C:\Users\jennifer.baron\Desktop\DRAFT 25829 Pavement Design Memo 01-21-15.docx

Attachments: Figure 1 – Locus Plan
Figures 2 – Boring Location Plan
Appendix A – Limitations
Appendix B – Park and Ride Lot Boring Logs (Preliminary)
Appendix C – Preliminary Park and Ride Lot Laboratory Testing Results

FIGURES



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SOURCE : THIS MAP CONTAINS THE ESRI ARCGIS ONLINE USA TOPOGRAPHIC MAP SERVICE, PUBLISHED DECEMBER 12, 2009 BY ESRI ARCIMS SERVICES AND UPDATED AS NEEDED. THIS SERVICE USES UNIFORM NATIONALLY RECOGNIZED DATUM AND CARTOGRAPHY STANDARDS AND A VARIETY OF AVAILABLE SOURCES FROM SEVERAL DATA PROVIDERS

MAINE TURNPIKE EXIT 63
INTERCHANGE IMPROVEMENTS
GRAY, MAINE

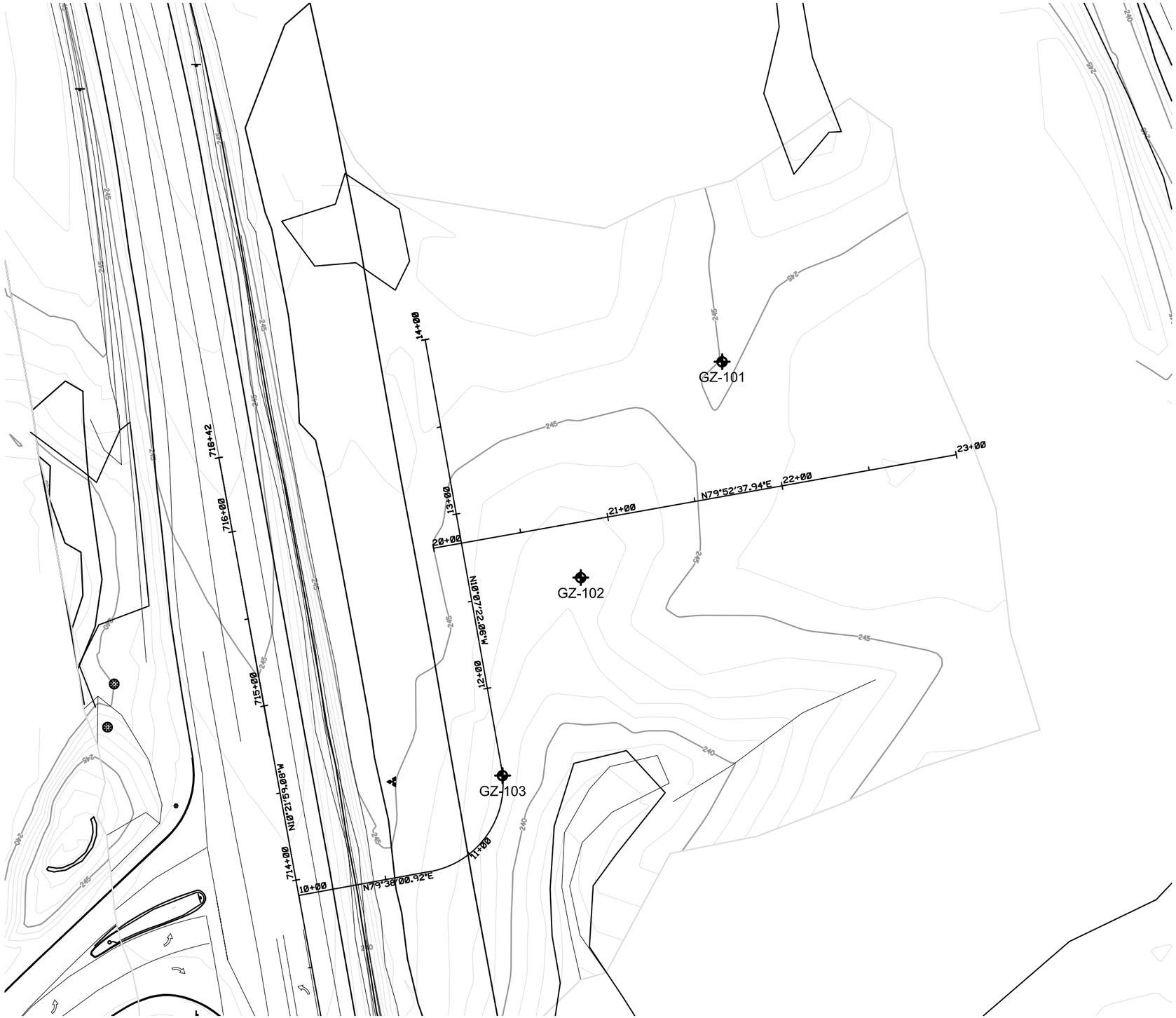
PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
VHB

LOCUS PLAN

PROJ MGR: JRB	REVIEWED BY: CLS	CHECKED BY: RJM	FIGURE
DESIGNED BY: JRB	DRAWN BY: ADM	SCALE: 1 in = 2,000 ft	1
DATE: 12/31/2014	PROJECT NO. 09.0025829.00	REVISION NO.	

© 2014 - GZA GeoEnvironmental, Inc. C:\GIS\MTA\Exit 63\Figure 1 - Locus Plan.mxd, 12/31/2014, 2:24:05 PM, aimee.mountain



NOTES:

1) BASE MAP DEVELOPED FROM PLANS PROVIDED BY VHB, ENTITLED "Alignments.dgn", "Borings.dgn", "Contours.dgn", "Highway.dgn", "Text.dgn", "Topo.dgn", AND "VHB_WetlandEdges.dgn", DATED JANUARY 16, 2014.

2) THE LOCATION OF THE TEST BORINGS WERE DETERMINED BY SURVEY. THESE DATA SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

3) TEST BORING GZ-103 WAS NOT DRILLED.

LEGEND:

GZ-103 — TEST BORINGS WERE PERFORMED BY NEW ENGLAND BORING CONTRACTORS OF BROCKTON, MA ON NOVEMBER 6, 2014 AND OBSERVED BY GZA PERSONNEL.

N W E S

0 15' 30' 60' 90'
SCALE IN FEET 1" = 30'

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

GRAY INTERCHANGE
EXIT 63
GRAY, MAINE

BORING LOCATION PLAN

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
VHB

PROJ MGR: JB	REVIEWED BY: JB	CHECKED BY: JB	FIG OR DWG
DESIGNED BY: ETL	DRAWN BY: ETL	SCALE: 1" = 30'	2
DATE: JANUARY 2015	PROJECT NO. 09.0025829.00	REVISION NO. --	SHEET NO. 1 OF XX

© 2013 – GZA GeoEnvironmental, Inc. GZA-P:\09 Jobs\0025800s\09.0025829.00 – Gray Interchange\Figures-CAD\25829 Gray BLP.dwg [ANSI D – 34x22] January 22, 2015 – 10:20am evan.lonstein

APPENDICES

APPENDIX A

LIMITATIONS

GEOTECHNICAL LIMITATIONS

Use of Report

1. GZA GeoEnvironmental, Inc. (GZA) prepared this report on behalf of, and for the exclusive use of our Client for the stated purpose(s) and location(s) identified in the Proposal for Services and/or Report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not expressly identified in the contract documents, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to GZA.

Standard of Care

2. GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in Proposal for Services and/or Report, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work. If conditions other than those described in this report are found at the subject location(s), or the design has been altered in any way, GZA shall be so notified and afforded the opportunity to revise the report, as appropriate, to reflect the unanticipated changed conditions .

3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

4. In conducting our work, GZA relied upon certain information made available by public agencies, Client and/or others. GZA did not attempt to independently verify the accuracy or completeness of that information. Inconsistencies in this information which we have noted, if any, are discussed in the Report.

Subsurface Conditions

5. The generalized soil profile(s) provided in our Report are based on widely-spaced subsurface explorations and are intended only to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and were based on our assessment of subsurface conditions. The composition of strata, and the transitions between strata, may be more variable and more complex than indicated. For more specific information on soil conditions at a specific location refer to the exploration logs. The nature and extent of variations between these explorations may not become evident until further exploration or construction. If variations or other latent conditions then become evident, it will be necessary to reevaluate the conclusions and recommendations of this report.

6. In preparing this report, GZA relied on certain information provided by the Client, state and local officials, and other parties referenced therein which were made available to GZA at the time of our evaluation. GZA did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.

7. Water level readings have been made in test holes (as described in this Report) and monitoring wells at the specified times and under the stated conditions. These data have been reviewed and interpretations have been made in this Report. Fluctuations in the level of the groundwater however

occur due to temporal or spatial variations in areal recharge rates, soil heterogeneities, the presence of subsurface utilities, and/or natural or artificially induced perturbations. The water table encountered in the course of the work may differ from that indicated in the Report.

8. GZA's services did not include an assessment of the presence of oil or hazardous materials at the property. Consequently, we did not consider the potential impacts (if any) that contaminants in soil or groundwater may have on construction activities, or the use of structures on the property.

9. Recommendations for foundation drainage, waterproofing, and moisture control address the conventional geotechnical engineering aspects of seepage control. These recommendations may not preclude an environment that allows the infestation of mold or other biological pollutants.

Compliance with Codes and Regulations

10. We used reasonable care in identifying and interpreting applicable codes and regulations. These codes and regulations are subject to various, and possibly contradictory, interpretations. Compliance with codes and regulations by other parties is beyond our control.

Cost Estimates

11. Unless otherwise stated, our cost estimates are only for comparative and general planning purposes. These estimates may involve approximate quantity evaluations. Note that these quantity estimates are not intended to be sufficiently accurate to develop construction bids, or to predict the actual cost of work addressed in this Report. Further, since we have no control over either when the work will take place or the labor and material costs required to plan and execute the anticipated work, our cost estimates were made by relying on our experience, the experience of others, and other sources of readily available information. Actual costs may vary over time and could be significantly more, or less, than stated in the Report.

Additional Services

12. GZA recommends that we be retained to provide services during any future: site observations, design, implementation activities, construction and/or property development/redevelopment. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design; and iv) assess the consequences of changes in technologies and/or regulations.

APPENDIX B

PARK AND RIDE LOT BORING LOGS (PRELIMINARY)

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Maine Turnpike Authority
Exit 63
Gray, Maine

EXPLORATION NO.: GZ-101
SHEET: 1 of 1
PROJECT NO: 09.0025829.00
REVIEWED BY: J. Baron

Logged By: N. Williams
Drilling Co.: New England Boring Contractors
Foreman: Brad Enos

Type of Rig: ATV
Rig Model:
Drilling Method: HSA

Boring Location: See Plan
Ground Surface Elev. (ft.): 244
Final Boring Depth (ft.): 21
Date Start - Finish: 11/6/2014 - 11/6/2014

H. Datum:
V. Datum:

Hammer Type: Donut
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 2 1/4

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)			
Date	Time	Water Depth	Stab. Time
11/6/14	1410	8.5'	20 min

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Description Depth (ft.)	Elev. (ft.)
		S-1	0.0-2.0	24	14	1 1 7 10	8	S-1: Top 6": Topsoil. Bottom 8": Medium stiff, gray-brown, Clayey SILT, some fine to medium Sand. (ML)			0.5 TOPSOIL	243.5
		S-2	2.0-4.0	24	16	8 10 11 13	21	S-2: Very stiff, brown-gray, CLAY & SILT, trace Sand. (CL)			SILTY CLAY	
5		S-3	4.0-6.0	24	20	2 3 6 6	9	S-3: Stiff, gray and brown, Silty CLAY, little fine Sand.			6	238.0
10		S-4	9.0-11.0	24	20	1 1 2 2	3	S-4: Soft to medium stiff, gray, Silty CLAY, trace fine Sand. (CL)			SILTY CLAY	
15		S-5	14.0-16.0	24	24	WOR		S-5: Soft to medium stiff, gray, Silty CLAY. (CL) Note: Approximately 1/8" seam of coarse to medium Sand at 15.0'.	1			
20		S-6	19.0-21.0	24	3	WOR		S-6: Soft to medium stiff, gray, Silty CLAY, wet. (CL)			21	223.0
								End of exploration at 21 feet.				
25												
30												

REMARKS

1 - Soil appeared very wet at top of 14.0' sample.

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-101

DRAFT

GZA TEMPLATE TEST BORING; 1/23/2015; 3:02:52 PM

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Maine Turnpike Authority
Exit 63
Gray, Maine

EXPLORATION NO.: GZ-102
SHEET: 1 of 3
PROJECT NO: 09.0025829.00
REVIEWED BY: J. Baron

Logged By: N. Williams
Drilling Co.: New England Boring Contractors
Foreman: Brad Enos

Type of Rig: ATV
Rig Model:
Drilling Method: HSA & Rod Probe

Boring Location: See Plan
Ground Surface Elev. (ft.): 242.5
Final Boring Depth (ft.): 82
Date Start - Finish: 11/6/2014 - 11/6/2014

H. Datum:
V. Datum:

Hammer Type: Donut
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 2 1/4

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)			
Date	Time	Water Depth	Stab. Time
11/6/14	1230	11.5'	20 min

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Description Depth (ft.)	Stratum Description	Elev. (ft.)
		S-1	0.0-2.0	24	14	1 1 1 5	2	S-1: Top 6": Very loose, dark brown, fine to medium SAND and Clayey Silt, with organic material (roots). (SM) Bottom 8": Gray, Silty CLAY, trace fine Sand. (CL)			0.5	TOPSOIL	242.0
												SILTY CLAY	
5		S-2	4.0-6.0	24	18	7 7 9 11	16	S-2: Very stiff, gray, Silty CLAY, trace fine Sand. (CL)			6		236.5
10		S-3	9.0-11.0	24	20	1 1 2 1	3	S-3: Soft to medium stiff, gray, Silty CLAY, wet. (CL)					
15		S-4	14.0-16.0	24	24	1 1 WOH	1	S-4: Soft to medium stiff, gray, Silty CLAY, wet. (CL)				SILTY CLAY	
20		S-5	19.0-21.0	24	20	WOR		S-5: Soft to medium stiff, gray, Silty CLAY, wet. (CL)					
25		S-6	24.0-26.0	24	6	WOR		S-6: Soft to medium stiff, gray, Silty CLAY, wet. (CL)					
30		S-7	29.0-	24	10	WOR		S-7: Soft to medium stiff, gray, Silty CLAY, wet. (CL)					

REMARKS

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-102

DRAFT

GZA TEMPLATE TEST BORING; 1/23/2015; 3:02:52 PM

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Maine Turnpike Authority
Exit 63
Gray, Maine

EXPLORATION NO.: GZ-102
SHEET: 2 of 3
PROJECT NO: 09.0025829.00
REVIEWED BY: J. Baron

Logged By: N. Williams
Drilling Co.: New England Boring Contractors
Foreman: Brad Enos

Type of Rig: ATV
Rig Model:
Drilling Method: HSA & Rod Probe

Boring Location: See Plan
Ground Surface Elev. (ft.): 242.5
Final Boring Depth (ft.): 82
Date Start - Finish: 11/6/2014 - 11/6/2014

H. Datum:
V. Datum:

Hammer Type: Donut
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 2 1/4

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)			
Date	Time	Water Depth	Stab. Time
11/6/14	1230	11.5'	20 min

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Description	Depth (ft.)	Elev. (ft.)
			31.0										
35		S-8	34.0-36.0	24	16	WOR		S-8: Soft to medium stiff, gray, Silty CLAY, wet. (CL)	1				
	WOR												
	WOR												
	1												
40	WOR												
	WOR												
	WOR												
	1												
	1												
45	WOR										SILTY CLAY		
	WOR												
	WOR												
	WOR												
	1												
50	1												
	2												
	1												
	3												
	4												
55	8												
	3												
	3												
	3												
	3												
60												60	182.5

REMARKS

1 - Began rod probe at 36.0' bgs. Blows per foot to drive AW rod are recorded on log under casing blows.

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-102

DRAFT

GZA TEMPLATE TEST BORING; 1/23/2015; 3:02:52 PM

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Maine Turnpike Authority
Exit 63
Gray, Maine

EXPLORATION NO.: GZ-102
SHEET: 3 of 3
PROJECT NO: 09.0025829.00
REVIEWED BY: J. Baron

Logged By: N. Williams
Drilling Co.: New England Boring Contractors
Foreman: Brad Enos

Type of Rig: ATV
Rig Model:
Drilling Method: HSA & Rod Probe

Boring Location: See Plan
Ground Surface Elev. (ft.): 242.5
Final Boring Depth (ft.): 82
Date Start - Finish: 11/6/2014 - 11/6/2014

H. Datum:
V. Datum:

Hammer Type: Donut
Hammer Weight (lb.): 140
Hammer Fall (in.): 30
Auger or Casing O.D./I.D Dia (in.): 2 1/4

Sampler Type: SS
Sampler O.D. (in.): 2.0
Sampler Length (in.): 24
Rock Core Size:

Groundwater Depth (ft.)			
Date	Time	Water Depth	Stab. Time
11/6/14	1230	11.5'	20 min

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Description	Depth (ft.)	Elev. (ft.)
	28												
	11												
	8												
	9												
	13												
65	12												
	11												
	15										POSSIBLE SILTY CLAY		
	18												
	15												
70	13												
	15												
	13												
	13												
	16												
75	20											75	167.5
	19												
	21												
	24										POSSIBLE GLACIAL TILL		
	24												
80	20												
	37								2			82	160.5
								End of exploration at 82 feet.					
85													
90													

REMARKS

2 - No refusal.

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Exploration No.: GZ-102

DRAFT

GZA TEMPLATE TEST BORING; 1/23/2015; 3:02:53 PM

APPENDIX C

PARK AND RIDE LOT PRELIMINARY LABORATORY TESTING RESULTS

THIELSCH ENGINEERING

State of Maine - Department of Transportation

Laboratory Testing Summary Sheet

Exit 63 Interchange

MDOT Project Number:

GZA Project Number: 09.0025829.00

Town(s): Gray, ME

Boring & Sample Identification Number	Station (Feet)	Sample No.	Depth (Feet)	Lab Number	Organic %	W.C.	L.L.	P.I.	Classification		
									Unified	AASHTO	Frost
GZ-101		S-2	2-4	32		27.6			CL	A-6	IV
GZ-102		S-3	9-11	33		38.8	39	18	CL	A-6	IV
GZ-102		S-8	34-36	34		43.5	32	13	CL	A-6	IV

Classification of these soil samples is in accordance with AASHTO Classification System M-145-40. This classification is followed by the "Frost Susceptibility Rating" from zero (non-frost susceptible) to Class IV (highly frost susceptible). The "Frost Susceptibility Rating" is based upon the MDOT and Corps of Engineers Classification Systems.

GSDC = Grain Size Distribution Curve as determined by AASHTO T 88-93 (1996) and/or ASTM D 422-63 (Reapproved 1998)

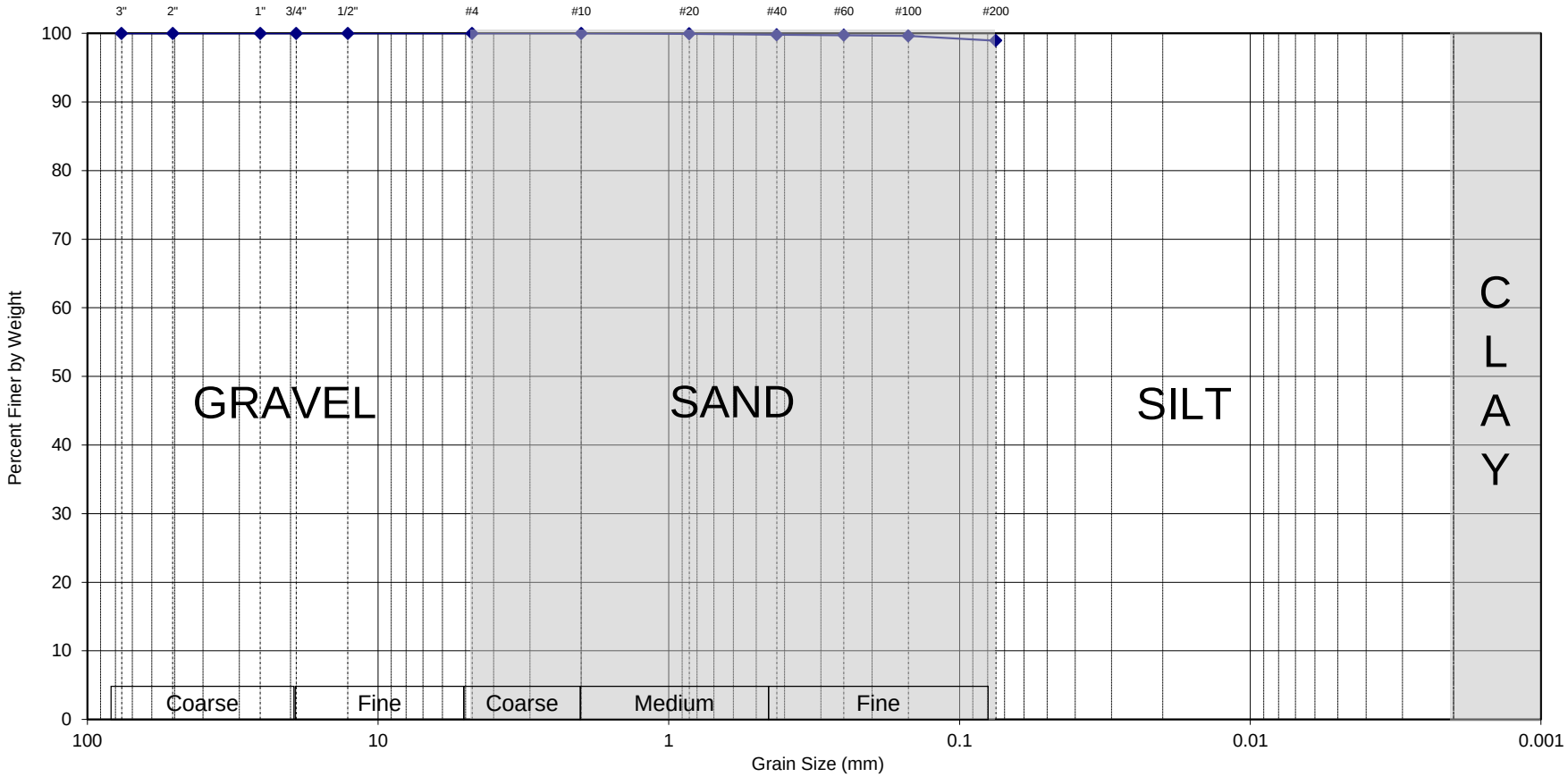
WC = water content as determined by AASHTO T 265-93 and/or ASTM D 2216-98

LL = Liquid limit as determined by AASHTO T 89-96 and/or ASTM D 4318-98

PI = Plasticity Index as determined by AASHTO 90-96 and/or ASTM D4318-98

ASTM D422

U.S. STANDARD SIEVE AND HYDROMETER



Gravel	Sand	Fines
0.0%	1.1%	98.9%

Lab #	Exploration	Sample	Depth	Description	WC	LL	PL	PI
32	GZ-101	S-2	2-4'	Gray-brown CLAY & SILT, trace Sand (CL)	27.6			

Sieve Size	% Passing
¾"	100.0
½"	100.0
#4	100.0
#10	100.0
#20	99.9
#40	99.8
#60	99.7
#100	99.6
#200	98.9

THIELSCH ENGINEERING
195 Frances Ave., Cranston, RI 02910
401-467-6454

74-14-0003
Exit 63 Interchange
Gray, ME
GZA Project # 09.0025829.00

Tested by: LM Date: 12/17/14
Reviewed by: MBP Date: 12/24/14