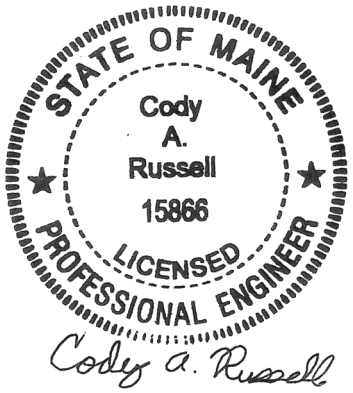
MAINE DEPARTMENT OF TRANSPORTATION
HIGHWAY PROGRAM
GEOTECHNICAL SECTION
AUGUSTA, MAINE

GEOTECHNICAL DATA REPORT

For the Rehabilitation of:

LARGE CULVERT #266578
ROUTE 202
CHINA, MAINE

Prepared by:
Cody Russell, P.E.
Geotechnical Engineer



Reviewed by:
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Senior Geotechnical Engineer

Kennebec County
WIN 24271.00

Soils Report 2022-06
Federal Project No. 2427100

March 9, 2022

INTRODUCTION

The purpose of this Geotechnical Data Report is to document subsurface information collected for the proposed rehabilitation of a 102-inch span, 115-inch rise, 154-foot long multiplate pipe arch culvert (Large Culvert #266578). This report presents the results of a limited geotechnical investigation performed at the existing culvert and the results of a limited laboratory testing program conducted on soil samples recovered during the geotechnical investigation. Large Culvert #266578 is located on Route 202, approximately 0.17 of a mile north of the southerly junction of Pond Road, as shown in the attached Location Map. Route 202 is a Highway Corridor Priority 2 road.

SUBSURFACE INVESTIGATION

Subsurface conditions were explored by drilling two (2) test borings (HB-CHI-101 and HB-CHI-101B) and two (2) probes (HB-CHI-101A and HB-CHI-102) near the existing structure by the MaineDOT drill crew. Exploration locations are presented in the attached Boring Location Plan. The details and sampling methods used, field data obtained, soil conditions encountered, and exploration locations are presented in the attached Boring Logs.

An NETTCP certified Subsurface Inspector logged the subsurface conditions encountered. The MaineDOT geotechnical engineer selected the boring and probe locations and drilling methods, designated type and depth of sampling techniques, reviewed boring and probe logs and identified field and laboratory testing requirements. The borings and probes were located in the field using taped measurements at the completion of the drilling program.

LABORATORY TESTING

A laboratory testing program was conducted on the soil samples recovered from the test boring to assist in soil classification and geologic assessment of the project site. Laboratory testing consisted of eight (8) standard grain size analyses with natural water content. The results of soil tests are included in the attached Laboratory Testing Summary Sheet and Grain Size Distribution Curves. Moisture content information and other soil test results are also provided in the attached Boring Logs.

CLOSURE

This Geotechnical Data Report has been prepared to document the geotechnical work conducted at Large Culvert #266578 on Route 202 in China, Maine in accordance with generally accepted geotechnical and foundation engineering practices. No other intended use or warranty is expressed or implied.

MaineDOT conducted a limited number of soil explorations at discrete locations at the culvert and a limited number of laboratory tests. No interpretations or conclusions have been derived from this geotechnical information. MaineDOT shall not be responsible for the Bidder's or Contractor's interpretations, estimates, or conclusions derived from the geotechnical

information. Data provided may not be representative of the subsurface conditions between exploration locations.

In the event that any changes in the nature, design, or location of the proposed project are planned, this report should be reviewed by a geotechnical engineer to assess the appropriateness of the information presented and to modify the information as appropriate to reflect the changes in design. The information presented is based in part upon a limited subsurface investigation at discrete exploratory locations completed at the site. If variations from the conditions encountered during the investigation appear evident during construction, it may also become necessary to re-evaluate the information presented in this report.

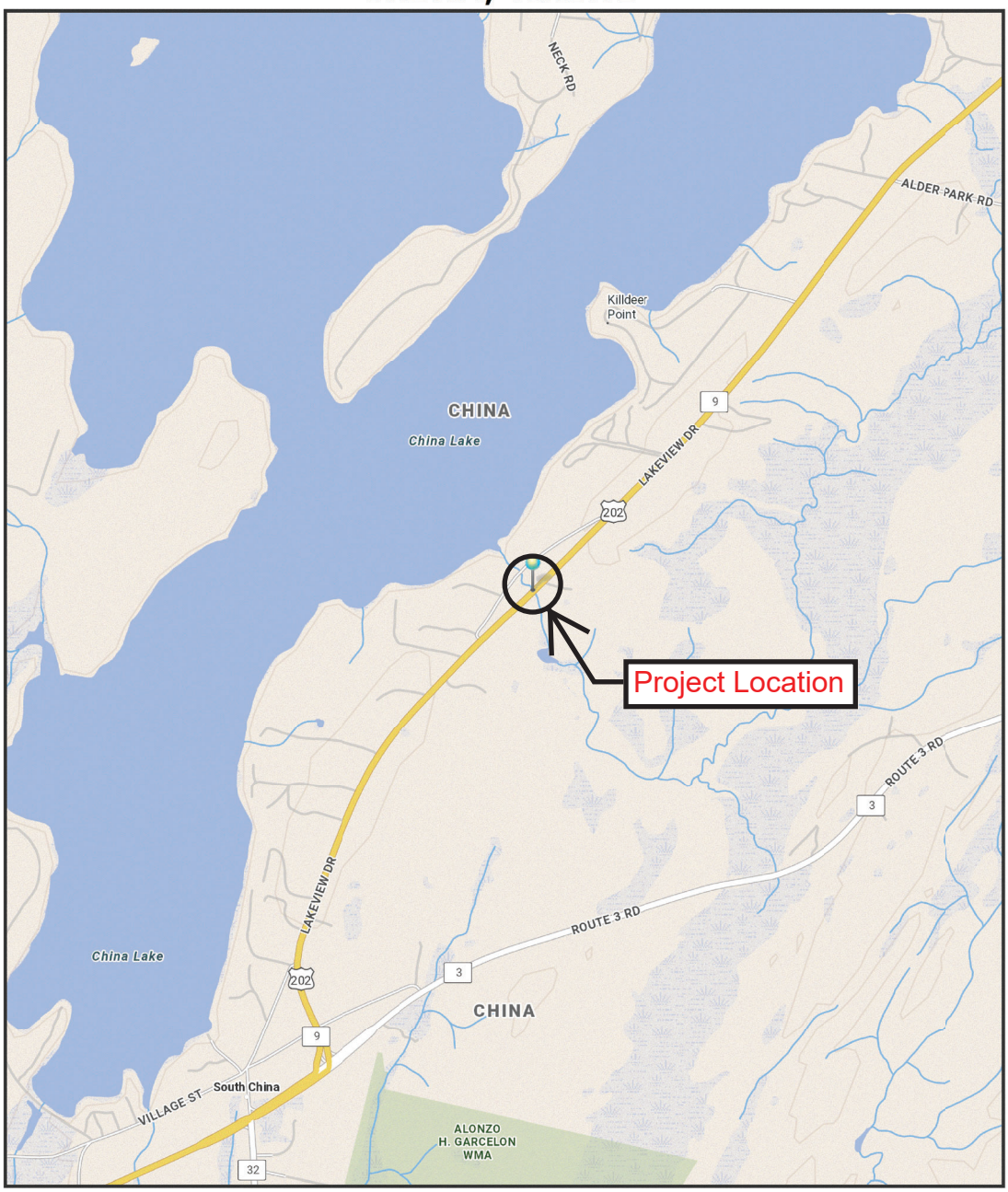
It is recommended that a geotechnical engineer be provided the opportunity for a review of the design and specifications in order that information presented in this report is properly implemented in the design and specifications.

Attachments:

Location Map
Boring Location Plan
Key to Soil and Rock Descriptions and Terms
Boring Logs
Laboratory Testing Summary Sheet
Grain Size Distribution Curves

Username: Cody.A.Russell Division: GEOTECH Date:3/9/2022

CHINA, MAINE



The Maine Department of Transportation provides this publication for information only. Reliance upon this information is at user risk. It is subject to revision and may be incomplete depending upon changing conditions. The Department assumes no liability if injuries or damages result from this information. This map is not intended to support emergency dispatch.

0.35 Miles

1 inch = 0.41 miles

Date: 2/28/2022
Time: 7:36:42 AM

SHEET NUMBER 1 OF 2	CHINA ROUTE 202 LOCATION MAP	STATE OF MAINE DEPARTMENT OF TRANSPORTATION 2427100 WIN 24271.00 HIGHWAY PLANS

CURVE DATA #1
PI = 80+29.78
D = 0°30'00.0"
Δ = 2°04'43.0" Lt.
R = 11459.16'
L = 415.72'
T = 207.88'
E = 1.89'

78+00 79+00 CURVE #1 80+00 81+00 82+00 N45°40'15.84"E 83+00 84+00 85+00

PC 78+12.90

PT 82+37.62

HB-CH1-101B
HB-CH1-101
HB-CH1-101A
HB-CH1-102

CLL CLL CLL CLL CLL CLL CLL CLL

BURIED CABLE
WOODS ENTRANCE
METAL
2" DIA METAL
42.4± BURIED CABLE
24" CMP
BOWES DRIVE WAY
1/2" DIA REBAR
IPF
CHINA DINE-AH
6" X 6" GRANITE
CM MORIN 2157 8"UP
X 6" GRANITE MON 5"UP"
DIA REBAR

LEGEND
CASED WASH BORING
PROBE

PLAN
25 0 25 50
Scale of Feet

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

2427100

WIN
24271.00

HIGHWAY PLANS

	BY	DATE	SIGNATURE
PROJ. MANAGER	-----	-----	-----
DESIGN-DETAILED	-----	-----	-----
CHECKED-REVIEWED	C.RUSSELL	MAR 2022	-----
DESIGN2-DETAILED2	-----	-----	-----
DESIGN3-DETAILED3	-----	-----	-----
REVISIONS 1	-----	-----	-----
REVISIONS 2	-----	-----	-----
REVISIONS 3	-----	-----	-----
REVISIONS 4	-----	-----	-----
FIELD CHANGES	-----	-----	-----

P.E. NUMBER

DATE

CHINA
ROUTE 202

BORING LOCATION PLAN

SHEET NUMBER
2
OF 2

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS (more than half of material is larger than No. 200 sieve size)	GRAVELS (more than half of coarse fraction is larger than No. 4 sieve size)	CLEAN GRAVELS (little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels, gravel sand mixtures, little or no fines.
		GRAVEL WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (more than half of coarse fraction is smaller than No. 4 sieve size)	CLEAN SANDS (little or no fines)	SW	Well-graded sands, Gravelly sands, little or no fines
			SP	Poorly-graded sands, Gravelly sand, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures.
FINE-GRAINED SOILS (more than half of material is smaller than No. 200 sieve size)	SILTS AND CLAYS (liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, Silty or Clayey fine sands, or Clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, Gravelly clays, Sandy clays, Silty clays, lean clays.
			OL	Organic silts and organic Silty clays of low plasticity.
	SILTS AND CLAYS (liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine Sandy or Silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
	HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.

Desired Soil Observations (in this order, if applicable):

Color (Munsell color chart)
Moisture (dry, damp, moist, wet)
Density/Consistency (from above right hand side)
Texture (fine, medium, coarse, etc.)
Name (Sand, Silty Sand, Clay, etc., including portions - trace, little, etc.)
Gradation (well-graded, poorly-graded, uniform, etc.)
Plasticity (non-plastic, slightly plastic, moderately plastic, highly plastic)
Structure (layering, fractures, cracks, etc.)
Bonding (well, moderately, loosely, etc.,)
Cementation (weak, moderate, or strong)
Geologic Origin (till, marine clay, alluvium, etc.)
Groundwater level

MODIFIED BURMISTER SYSTEM

Descriptive Term	Portion of Total (%)
trace	0 - 10
little	11 - 20
some	21 - 35
adjective (e.g. Sandy, Clayey)	36 - 50

TERMS DESCRIBING DENSITY/CONSISTENCY

Coarse-grained soils (more than half of material is larger than No. 200 sieve): Includes (1) clean gravels; (2) Silty or Clayey gravels; and (3) Silty, Clayey or Gravelly sands. Density is rated according to standard penetration resistance (N-value).

Density of Cohesionless Soils	Standard Penetration Resistance N-Value (blows per foot)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

Fine-grained soils (more than half of material is smaller than No. 200 sieve): Includes (1) inorganic and organic silts and clays; (2) Gravelly, Sandy or Silty clays; and (3) Clayey silts. Consistency is rated according to undrained shear strength as indicated.

Consistency of Cohesive soils	SPT N-Value (blows per foot)	Approximate Undrained Shear Strength (psf)	Field Guidelines
Very Soft	WOH, WOR, WOP, <2	0 - 250	Fist easily penetrates
Soft	2 - 4	250 - 500	Thumb easily penetrates
Medium Stiff	5 - 8	500 - 1000	Thumb penetrates with moderate effort
Stiff	9 - 15	1000 - 2000	Indented by thumb with great effort
Very Stiff	16 - 30	2000 - 4000	Indented by thumbnail
Hard	>30	over 4000	Indented by thumbnail with difficulty

Rock Quality Designation (RQD):

$$\text{RQD (\%)} = \frac{\text{sum of the lengths of intact pieces of core* > 4 inches}}{\text{length of core advance}}$$

*Minimum NQ rock core (1.88 in. OD of core)

Rock Quality Based on RQD

Rock Quality	RQD (%)
Very Poor	≤25
Poor	26 - 50
Fair	51 - 75
Good	76 - 90
Excellent	91 - 100

Desired Rock Observations (in this order, if applicable):

Color (Munsell color chart)
Texture (aphanitic, fine-grained, etc.)
Rock Type (granite, schist, sandstone, etc.)
Hardness (very hard, hard, mod. hard, etc.)
Weathering (fresh, very slight, slight, moderate, mod. severe, severe, etc.)
Geologic discontinuities/jointing:
-dip (horiz - 0-5 deg., low angle - 5-35 deg., mod. dipping - 35-55 deg., steep - 55-85 deg., vertical - 85-90 deg.)
-spacing (very close - <2 inch, close - 2-12 inch, mod. close - 1-3 feet, wide - 3-10 feet, very wide >10 feet)
-tightness (tight, open, or healed)
-infilling (grain size, color, etc.)
Formation (Waterville, Ellsworth, Cape Elizabeth, etc.)
RQD and correlation to rock quality (very poor, poor, etc.)
ref: ASTM D6032 and FHWA NHI-16-072 GEC 5 - Geotechnical Site Characterization, Table 4-12
Recovery (inch/inch and percentage)
Rock Core Rate (X.X ft - Y.Y ft (min:sec))

Maine Department of Transportation
Geotechnical Section
Key to Soil and Rock Descriptions and Terms
Field Identification Information

Sample Container Labeling Requirements:

WIN
Bridge Name / Town
Boring Number
Sample Number
Sample Depth
Blow Counts
Sample Recovery
Date
Personnel Initials

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Routes 202/9 Large Culvert Rehabilitation
Location: China, Maine

Boring No.: HB-CHI-101
WIN: 24271.00

Driller:	MaineDOT	**Elevation (ft.)**	261.0	**Auger ID/OD:**	5" Solid Stem
Operator:	Daggett/Niles	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	C. Russell	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	7/10/2019; 09:00-10:45	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	N/A
Boring Location:	81+48.7, 9.6 ft Lt.	**Casing ID/OD:**	NW-3"	**Water Level*:**	None Observed
Hammer Efficiency Factor:	0.886	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_V = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA	260.4		7" HMA. 0.6	
	1D	24/16	1.00 - 3.00	9/13/9/13	22	32				Brown, dry, dense, fine to coarse SAND, some gravel, some silt, (Fill).	G#337331 A-2-4, SM WC=7.3%
5	2D	24/15	5.20 - 7.20	9/8/8/17	16	24				Cobble from 4.5-5.2 ft bgs. Brown, dry, medium dense, fine to coarse SAND, some gravel, some silt, (Fill).	G#337332 A-2-4, SM WC=7.2%
10	3D	24/12	10.00 - 12.00	3/7/9/8	16	24				Brown, damp, medium dense, fine to coarse SAND, some gravel, some silt, (Fill).	G#337333 A-2-4, SM WC=8.0%
15	4D	24/10	15.00 - 17.00	9/12/13/12	25	37	40			Brown, damp, dense, Silty fine to coarse SAND, little gravel, (Fill). Hole would not stay open, dropped casing to 15.0 ft and washed hole	G#337334 A-4, SM WC=9.1%
							51				
							34				
							36				
							97				
20	MD	24/0	20.00 - 22.00	19/10/15/7	25	37	28			Failed sample attempt. Fractured cobble in tip of spoon.	
							39				
							64				
								238.0		23.0 **Bottom of Exploration at 23.0 feet below ground surface.** Likely Boulder REFUSAL. Last 5.0 ft of casing broke off in hole.	
25											

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Routes 202/9 Large Culvert Rehabilitation
Location: China, Maine

Boring No.: HB-CHI-101A
WIN: 24271.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	261.0	**Auger ID/OD:**	5" Dia.
Operator:	Daggett/Niles	**Datum:**	NAVD88	**Sampler:**	N/A
Logged By:	C. Russell	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	7/10/2019; 10:50-11:30	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	81+52.7, 9.6 ft Lt.	**Casing ID/OD:**	N/A	**Water Level*:**	None Observed

Definitions:
D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing
WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_V = Pocket Torvane Shear Strength (psf); WC = Water Content, percent ≅ = Similar or Equal too
LL = Liquid Limit; PL = Plastic Limit; PI = Plasticity Index; G = Grain Size Analysis; C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA	260.4		7" HMA.	
									0.6	
									Cobbles from 3.0-5.0 ft bgs.	
5										
10										
15							245.5		15.5	
									Bottom of Exploration at 15.5 feet below ground surface. Auger REFUSAL, tooth broke off bit.	
20										
25										

Remarks:

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Routes 202/9 Large Culvert Rehabilitation
Location: China, Maine

Boring No.: HB-CHI-101B
WIN: 24271.00

Driller:	MaineDOT	**Elevation (ft.)**	261.1	**Auger ID/OD:**	5" Solid Stem
Operator:	Daggett/Niles	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	C. Russell	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	7/10/2019-7/11/2019	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	N/A
Boring Location:	81+45.8, 9.6 ft Lt.	**Casing ID/OD:**	NW-3"	**Water Level*:**	None Observed
Hammer Efficiency Factor:	0.886	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
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MU = Unsuccessful Thin Wall Tube Sample Attempt
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MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_v = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0							SSA				
										Cobbles from 3.5-5.0 ft bgs.	
5											
										Boulder from 9.0-10.5 ft bgs.	
10											
										Cobbles to 13.5 ft bgs.	
15											
										Intermittent Cobbles.	
20											
25											

Remarks:

Attempted to core, core barrel could not make it to the bottom of boring, bent casing.
Could not recover 35.0 ft of NW Casing in borehole.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Routes 202/9 Large Culvert Rehabilitation
Location: China, Maine

Boring No.: HB-CHI-101B
WIN: 24271.00

Driller:	MaineDOT	**Elevation (ft.)**	261.1	**Auger ID/OD:**	5" Solid Stem
Operator:	Daggett/Niles	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	C. Russell	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	7/10/2019-7/11/2019	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	N/A
Boring Location:	81+45.8, 9.6 ft Lt.	**Casing ID/OD:**	NW-3"	**Water Level*:**	None Observed
Hammer Efficiency Factor:	0.886	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

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MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_V = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25	1D	24/18	25.00 - 27.00	15/13/16/17	29	43	26			Brown, moist, dense, fine to coarse Sandy SILT, little gravel, (Fill).	G#337335 A-4, SM WC=17.4%
							48				
							99				
							82				
							60				
30	2D	24/6	30.00 - 32.00	11/11/15/11	26	38	10			Brown, wet, dense, GRAVEL, some silt, some fine to coarse sand, (Fill).	G#337336 A-2-4, SM WC=14.2%
							38				
							55				
							248	228.1		33.0	
							121				
35	3D	9/5	35.00 - 35.75	16/50(3")	---		73			Brown and black, wet, very dense, fine to coarse SAND, some silt, some gravel, (Till).	G#337337 A-2-4, SM WC=25.1%
							47				
							OPEN HOLE				
							50				
							50+				
40	MD	4/0	40.00 - 40.33	50(4")	---					Failed sample attempt. Rock, boulder or cobble in tip of spoon, some sand and silt mixed in.	
45	4D	3.6/3.6	45.00 - 45.30	54(3.6")	---					Grey, wet, very dense, fine to coarse SAND, little silt, trace gravel, (Till).	G#337338 A-1-b, SM WC=11.1%
50											

Remarks:

Attempted to core, core barrel could not make it to the bottom of boring, bent casing.
Could not recover 35.0 ft of NW Casing in borehole.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Boring No.: HB-CHI-101B

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Routes 202/9 Large Culvert Rehabilitation
Location: China, Maine

Boring No.: HB-CHI-101B
WIN: 24271.00

Driller:	MaineDOT	**Elevation (ft.)**	261.1	**Auger ID/OD:**	5" Solid Stem
Operator:	Daggett/Niles	**Datum:**	NAVD88	**Sampler:**	Standard Split Spoon
Logged By:	C. Russell	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	140#/30"
Date Start/Finish:	7/10/2019-7/11/2019	**Drilling Method:**	Cased Wash Boring	**Core Barrel:**	N/A
Boring Location:	81+45.8, 9.6 ft Lt.	**Casing ID/OD:**	NW-3"	**Water Level*:**	None Observed
Hammer Efficiency Factor:	0.886	**Hammer Type:**	Automatic ☒ Hydraulic ☐ Rope & Cathead ☐		

Definitions:
D = Split Spoon Sample
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MU = Unsuccessful Thin Wall Tube Sample Attempt
V = Field Vane Shear Test, PP = Pocket Penetrometer
MV = Unsuccessful Field Vane Shear Test Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
HSA = Hollow Stem Auger
RC = Roller Cone
WOH = Weight of 140 lb. Hammer
WOR/C = Weight of Rods or Casing
WO1P = Weight of One Person
S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-uncorrected = Raw Field SPT N-value
Hammer Efficiency Factor = Rig Specific Annual Calibration Value
N_{60} = SPT N-uncorrected Corrected for Hammer Efficiency
N_{60} = (Hammer Efficiency Factor/60%)*N-uncorrected
T_V = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-uncorrected	N_{60}	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
50	MD	3/0	50.00 - 50.25	111(3")	---			210.8		Failed sample attempt.	
										50.3	
										Bottom of Exploration at 50.3 feet below ground surface. Spoon REFUSAL, see Remarks.	
55											
60											
65											
70											
75											

Remarks:

Attempted to core, core barrel could not make it to the bottom of boring, bent casing.
Could not recover 35.0 ft of NW Casing in borehole.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

* Water level readings have been made at times and under conditions stated. Groundwater fluctuations may occur due to conditions other than those present at the time measurements were made.

Boring No.: HB-CHI-101B

Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Routes 202/9 Large Culvert Rehabilitation
Location: China, Maine

Boring No.: HB-CHI-102
WIN: 24271.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	261.4	**Auger ID/OD:**	5" Dia.
Operator:	Daggett/Niles	**Datum:**	NAVD88	**Sampler:**	N/A
Logged By:	C. Russell	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	7/11/2019; 11:25-16:00	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	81+77.7, 8.6 ft Rt.	**Casing ID/OD:**	NW-3"	**Water Level*:**	None Observed

Definitions:
D = Spilt Spoon Sample
S = Sample off Auger Flights
B = Bucket Sample off Auger Flights
MD = Unsuccessful Split Spoon Sample Attempt
U = Thin Wall Tube Sample
MV = Unsuccessful Field Vane Shear Test Attempt
V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt
R = Rock Core Sample
SSA = Solid Stem Auger
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WOH = Weight of 140lb. Hammer
WOR/C = Weight of Rods or Casing
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S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf)
$S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf)
q_p = Unconfined Compressive Strength (ksf)
N-value = Raw Field SPT N-value
T_V = Pocket Torvane Shear Strength (psf)
WC = Water Content, percent ≅ = Similar or Equal too
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index
G = Grain Size Analysis
C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
0						SSA			Probe, no soil samples taken. Spun NW Casing to 40.0 ft bgs,	
5										
10										
15										
20										
25										

Remarks:

Due to time, drove casing flush to grade.
Crew will retreive on 7/15/2019.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Routes 202/9 Large Culvert Rehabilitation
Location: China, Maine

Boring No.: HB-CHI-102
WIN: 24271.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	261.4	**Auger ID/OD:**	5" Dia.
Operator:	Daggett/Niles	**Datum:**	NAVD88	**Sampler:**	N/A
Logged By:	C. Russell	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	7/11/2019; 11:25-16:00	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	81+77.7, 8.6 ft Rt.	**Casing ID/OD:**	NW-3"	**Water Level*:**	None Observed

Definitions:
D = Spilt Spoon Sample; S = Sample off Auger Flights; B = Bucket Sample off Auger Flights; MD = Unsuccessful Split Spoon Sample Attempt; U = Thin Wall Tube Sample; MV = Unsuccessful Field Vane Shear Test Attempt; V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt; R = Rock Core Sample; SSA = Solid Stem Auger; HSA = Hollow Stem Auger; RC = Roller Cone; WOH = Weight of 140lb. Hammer; WOR/C = Weight of Rods or Casing
WO1P = Weight of 1 Person; S_u = Peak/Remolded Field Vane Undrained Shear Strength (psf); $S_{u(lab)}$ = Lab Vane Undrained Shear Strength (psf); q_p = Unconfined Compressive Strength (ksf); N-value = Raw Field SPT N-value; T_V = Pocket Torvane Shear Strength (psf); WC = Water Content, percent ≅ = Similar or Equal too
LL = Liquid Limit; PL = Plastic Limit; PI = Plasticity Index; G = Grain Size Analysis; C = Consolidation Test

Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
25										
30										
35										
40						RC			Roller Coned ahead to 50.0 ft bgs,	
45										
50										

Remarks:

Due to time, drove casing flush to grade.
Crew will retreive on 7/15/2019.

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Maine Department of Transportation

Soil/Rock Exploration Log
US CUSTOMARY UNITS

Project: Routes 202/9 Large Culvert Rehabilitation
Location: China, Maine

Boring No.: HB-CHI-102
WIN: 24271.00

Drilling Contractor:	MaineDOT	**Elevation (ft.)**	261.4	**Auger ID/OD:**	5" Dia.
Operator:	Daggett/Niles	**Datum:**	NAVD88	**Sampler:**	N/A
Logged By:	C. Russell	**Rig Type:**	CME 45C	**Hammer Wt./Fall:**	N/A
Date Start/Finish:	7/11/2019; 11:25-16:00	**Drilling Method:**	Solid Stem Auger	**Core Barrel:**	N/A
Boring Location:	81+77.7, 8.6 ft Rt.	**Casing ID/OD:**	NW-3"	**Water Level*:**	None Observed

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V = Field Vane Shear Test, PP= Pocket Penetrometer
MU = Unsuccessful Thin Wall Tube Sample Attempt
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SSA = Solid Stem Auger
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Depth (ft.)	Sample Information: Sample No.	Pen./Rec. (in.)	Sample Depth (ft.)	Blows (/6 in.) Shear Strength (psf) or RQD (%)	N-value	Casing Blows	Elevation (ft.)	Graphic Log	Visual Description and Remarks	Laboratory Testing Results/ AASHTO and Unified Class.
50							211.4		50.0	
									Bottom of Exploration at 50.0 feet below ground surface. NO REFUSAL	
55										
60										
65										
70										
75										

Remarks:

Due to time, drove casing flush to grade.
Crew will retreive on 7/15/2019.

Stratification lines represent approximate boundaries between soil types; transitions may be gradual.

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State of Maine - Department of Transportation

Laboratory Testing Summary Sheet

Town(s): China Work Number: 24271.00

Boring & Sample Identification Number	Station (Feet)	Offset (Feet)	Depth (Feet)	Reference Number	G.S.D.C. Sheet	W.C. %	L.L.	P.I.	Classification		
									Unified	AASHTO	Frost
HB-CHI-101, 1D	81+48.7	9.6 Lt.	1.0-3.0	337331	1	7.3			SM	A-2-4	II
HB-CHI-101, 2D	81+48.7	9.6 Lt.	5.2-7.2	337332	1	7.2			SM	A-2-4	II
HB-CHI-101, 3D	81+48.7	9.6 Lt.	10.0-12.0	337333	1	8.0			SM	A-2-4	II
HB-CHI-101, 4D	81+48.7	9.6 Lt.	15.0-17.0	337334	1	9.1			SM	A-4	III
HB-CHI-101B, 1D	81+45.8	9.6 Lt.	25.0-27.0	337335	2	17.4			SM	A-4	III
HB-CHI-101B, 2D	81+45.8	9.6 Lt.	30.0-32.0	337336	2	14.2			SM	A-2-4	II
HB-CHI-101B, 3D	81+45.8	9.6 Lt.	35.0-35.75	337337	2	25.1			SM	A-2-4	II
HB-CHI-101B, 4D	81+45.8	9.6 Lt.	45.0-45.3	337338	2	11.1			SM	A-1-b	II

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 MaineDOT and Corps of Engineers Classification Systems.

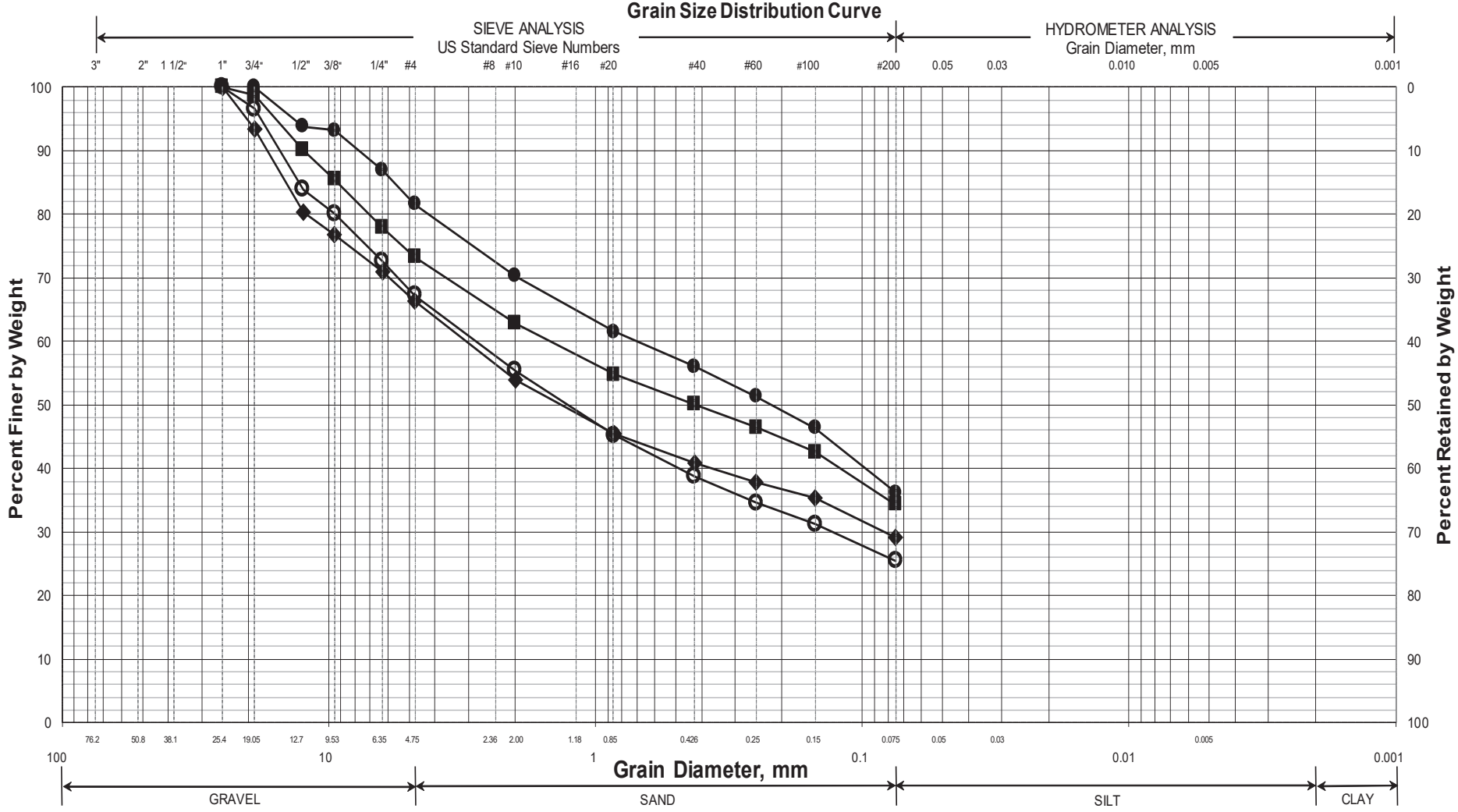
GSDC = Grain Size Distribution Curve as determined by AASHTO T 88-93 (1996) and/or ASTM D 422-63 (Reapproved 1998)

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 NP = Non Plastic

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

Maine Department of Transportation
Grain Size Distribution Curve

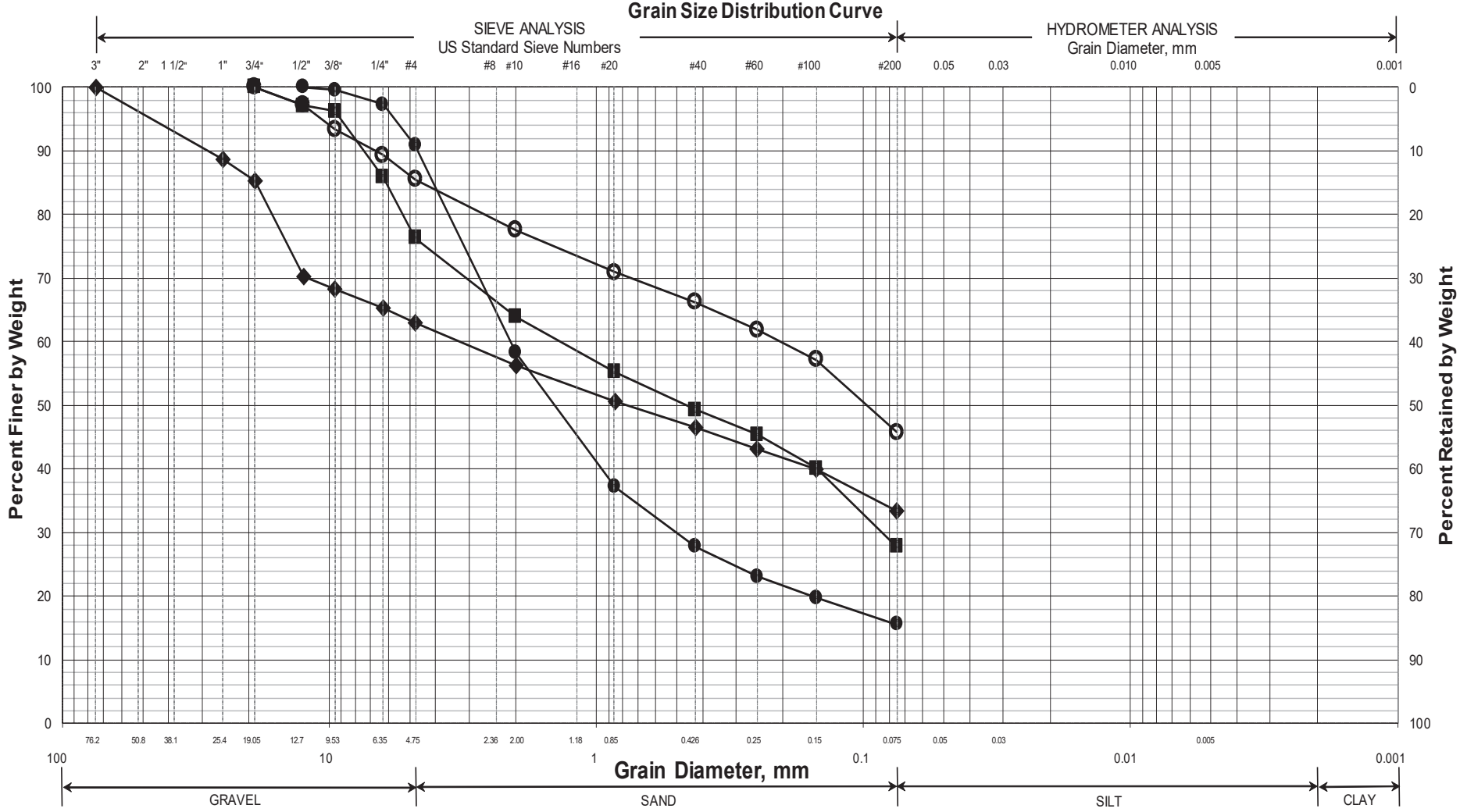


UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-CHI-101/1D	81+48.7	9.6 LT	1.0-3.0	SAND, some gravel, some silt.	7.3			
◆	HB-CHI-101/2D	81+48.7	9.6 LT	5.2-7.2	SAND, some gravel, some silt.	7.2			
■	HB-CHI-101/3D	81+48.7	9.6 LT	10.0-12.0	SAND, some silt, some gravel.	8.0			
●	HB-CHI-101/4D	81+48.7	9.6 LT	15.0-17.0	Silty SAND, little gravel.	9.1			
▲									
×									

WIN
024271.00
Town
China
Reported by/Date
WHITE, TERRY A 2/28/2022

Maine Department of Transportation
Grain Size Distribution Curve



UNIFIED CLASSIFICATION

	Boring/Sample No.	Station	Offset, ft	Depth, ft	Description	WC, %	LL	PL	PI
○	HB-CHI-101B/1D	81+45.8	9.6 LT	25.0-27.0	Sandy SILT, little gravel.	17.4			
◆	HB-CHI-101B/2D	81+45.8	9.6 LT	30.0-32.0	GRAVEL, some silt, some sand.	14.2			
■	HB-CHI-101B/3D	81+45.8	9.6 LT	35.0-35.75	SAND, some silt, some gravel.	25.1			
●	HB-CHI-101B/4D	81+45.8	9.6 LT	45.0-45.3	SAND, little silt, trace gravel.	11.1			
▲									
×									

WIN
024271.00
Town
China
Reported by/Date
WHITE, TERRY A 2/28/2022