



**GEOLABS, INC.**  
Geotechnical Engineering

### Soil Log Legend

#### UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)


MAJOR DIVISIONS		USCS	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS	GRAVELS	CLEAN GRAVELS LESS THAN 5% FINES	GW WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES	GP POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES MORE THAN 12% FINES	GM SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	SANDS	CLEAN SANDS LESS THAN 5% FINES	SW WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES	SP POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES MORE THAN 12% FINES	SM SILTY SANDS, SAND-SILT MIXTURES
FINE-GRAINED SOILS	SILTS AND CLAYS	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	MH INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS	
		CH INORGANIC CLAYS OF HIGH PLASTICITY	
		OH ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
HIGHLY ORGANIC SOILS		PT PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

#### LEGEND

	(2-INCH) O.D. STANDARD PENETRATION TEST	LL	LIQUID LIMIT (NP=NON-PLASTIC)
	(3-INCH) O.D. MODIFIED CALIFORNIA SAMPLE	PI	PLASTICITY INDEX (NP=NON-PLASTIC)
	SHELBY TUBE SAMPLE	TV	TORVANE SHEAR (tsf)
	GRAB SAMPLE	UC	UNCONFINED COMPRESSION OR UNIAXIAL COMPRESSIVE STRENGTH
	CORE SAMPLE	TXUU	UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (ksf)
	WATER LEVEL OBSERVED IN BORING AT TIME OF DRILLING		
	WATER LEVEL OBSERVED IN BORING AFTER DRILLING		
	WATER LEVEL OBSERVED IN BORING OVERNIGHT		

Plate  
A-0.1



**GEOLABS, INC.**  
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### Soil Classification Log Key (with deviations from ASTM D2488)

#### GEOLABS, INC. CLASSIFICATION\*

GRANULAR SOIL (- #200 < 50%)	COHESIVE SOIL (- #200 ≥ 50%)
<ul style="list-style-type: none"> <li>PRIMARY constituents are composed of the largest percent of the soil mass. Primary constituents are capitalized and bold (i.e., GRAVEL, SAND)</li> <li>SECONDARY constituents are composed of a percentage less than the primary constituent. If the soil mass consists of 12 percent or more fines content, a cohesive constituent is used (SILTY or CLAYEY); otherwise, a granular constituent is used (GRAVELLY or SANDY) provided that the secondary constituent consists of 20 percent or more of the soil mass. Secondary constituents are capitalized and bold (i.e., SANDY GRAVEL, CLAYEY SAND) and precede the primary constituent.</li> <li>accessory descriptions compose of the following: with some: &gt;12% with a little: 5 - 12% with traces of: &lt;5% accessory descriptions are lower cased and follow the Primary and Secondary Constituents (i.e., SILTY GRAVEL with a little sand)</li> </ul>	<ul style="list-style-type: none"> <li>PRIMARY constituents are based on plasticity. Primary constituents are capitalized and bold (i.e., CLAY, SILT)</li> <li>SECONDARY constituents are composed of a percentage less than the primary constituent, but more than 20 percent of the soil mass. Secondary constituents are capitalized and bold (i.e., SANDY CLAY, SILTY CLAY, CLAYEY SILT) and precede the primary constituent.</li> <li>accessory descriptions compose of the following: with some: &gt;12% with a little: 5 - 12% with traces of: &lt;5% accessory descriptions are lower cased and follow the Primary and Secondary Constituents (i.e., SILTY CLAY with some sand)</li> </ul>
EXAMPLE: Soil Containing 60% Gravel, 25% Sand, 15% Fines. Described as: SILTY GRAVEL with some sand	

#### RELATIVE DENSITY / CONSISTENCY

Granular Soils			Cohesive Soils		
N-Value (Blows/Foot)	Relative Density	Consistency	N-Value (Blows/Foot)	PP Readings (tsf)	Consistency
SPT	MCS		SPT	MCS	
0 - 4	0 - 7	Very Loose	0 - 2	0 - 4	Very Soft
4 - 10	7 - 18	Loose	2 - 4	4 - 7	Soft
10 - 30	18 - 55	Medium Dense	4 - 8	7 - 15	Medium Stiff
30 - 50	55 - 91	Dense	8 - 15	15 - 27	Stiff
> 50	> 91	Very Dense	15 - 30	27 - 55	Very Stiff
			> 30	> 55	Hard

#### MOISTURE CONTENT DEFINITIONS

Dry:	Absence of moisture, dry to the touch
Moist:	Damp but no visible water
Wet:	Visible free water, usually soil is below water table

#### GRAIN SIZE DEFINITION

Description	Sieve Number and / or Size
Boulders	> 12 inches (305-mm)
Cobbles	3 to 12 inches (75-mm to 305-mm)
Gravel	3-inch to #4 (75-mm to 4.75-mm)
Coarse Gravel	3-inch to 3/4-inch (75-mm to 19-mm)
Fine Gravel	3/4-inch to #4 (19-mm to 4.75-mm)
Sand	#4 to #200 (4.75-mm to 0.075-mm)
Coarse Sand	#4 to #10 (4.75-mm to 2-mm)
Medium Sand	#10 to #40 (2-mm to 0.425-mm)
Fine Sand	#40 to #200 (0.425-mm to 0.075-mm)

#### ABBREVIATIONS

WOH:	Weight of Hammer
WOR:	Weight of Drill Rods
SPT:	Standard Penetration Test Split-Spoon Sampler
MCS:	Modified California Sampler
PP:	Pocket Penetrometer

Plate  
A-0.2

\*Soil descriptions are based on ASTM D2488-09a, Visual-Manual Procedure, with the above modifications by Geolabs, Inc. to the Unified Soil Classification System (USCS).

DATE	_____
SURVEY PLOTTED BY	_____
SOIL LOGS CHECKED BY	_____
DESIGNED BY	_____
NOTE BOOK	_____
QUANTITIES BY	_____
CHECKED BY	_____
No.	_____

DRAWING NAME: B:\DRAWING\DRAWING\WORKING\7341-00\_INTERSTATE\_ROUTE\_H-1\_L-&H-201\_SIGN\_UPGRADE\7341-00SHEETBORINGLOGS.DWG PLOT TIME: 10-02-23, 5:06 PM

LOG LEGEND FOR SOIL 7341-00.GPJ GEOLABS.GDT 12/19/18

SOIL CLASS LOG KEY 7341-00.GPJ GEOLABS.GDT 12/19/18



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*Gerald Y. Seki* 04/2024  
SIGNATURE EXPIRATION DATE OF THE LICENSE

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**BORING LOG LEGENDS**

INTERSTATE ROUTE H-1 AND H-201  
DESTINATION SIGN UPGRADE/REPLACEMENT, PHASE 3B  
FAP NO. NH-0300(205)

Scale: As Noted Date: Oct. 2023

SHEET No. G-1 OF 1 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-0300(205)	2024	187	197

**GEOLABS, INC.**  
Geotechnical Engineering

## Rock Log Legend

**ROCK DESCRIPTIONS**

	BASALT		CONGLOMERATE
	BOULDERS		LIMESTONE
	BRECCIA		SANDSTONE
	CLINKER		SILTSTONE
	COBBLES		TUFF
	CORAL		VOID/CAVITY

**ROCK DESCRIPTION SYSTEM**

**ROCK FRACTURE CHARACTERISTICS**

The following terms describe general fracture spacing of a rock:

Massive:	Greater than 24 inches apart
Slightly Fractured:	12 to 24 inches apart
Moderately Fractured:	6 to 12 inches apart
Closely Fractured:	3 to 6 inches apart
Severely Fractured:	Less than 3 inches apart

**DEGREE OF WEATHERING**

The following terms describe the chemical weathering of a rock:

Unweathered:	Rock shows no sign of discoloration or loss of strength.
Slightly Weathered:	Slight discoloration inwards from open fractures.
Moderately Weathered:	Discoloration throughout and noticeably weakened though not able to break by hand.
Highly Weathered:	Most minerals decomposed with some corestones present in residual soil mass. Can be broken by hand.
Extremely Weathered:	Saprolite. Mineral residue completely decomposed to soil but fabric and structure preserved.

**HARDNESS**

The following terms describe the resistance of a rock to indentation or scratching:

Very Hard:	Specimen breaks with difficulty after several "pinging" hammer blows. Example: Dense, fine grain volcanic rock
Hard:	Specimen breaks with some difficulty after several hammer blows. Example: Vesicular, vugular, coarse-grained rock
Medium Hard:	Specimen can be broken by one hammer blow. Cannot be scraped by knife. SPT may penetrate by ~25 blows per inch with bounce. Example: Porous rock such as clinker, cinder, and coral reef
Soft:	Can be indented by one hammer blow. Can be scraped or peeled by knife. SPT can penetrate by ~100 blows per foot. Example: Weathered rock, chalk-like coral reef
Very Soft:	Crumbles under hammer blow. Can be peeled and carved by knife. Can be indented by finger pressure. Example: Saprolite

Plate  
**A-0.3**

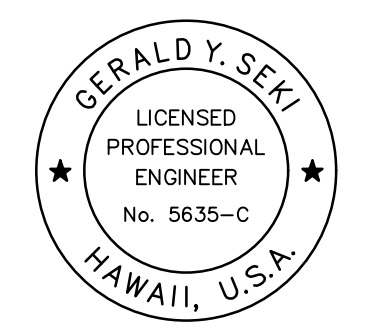
GEOTECHNICAL NOTES:

1. A geotechnical engineering report entitled "Geotechnical Engineering Exploration, Interstate Route H-1 and H-201, Destination Sign Upgrade/Replacement, Phase 3, FAP No. NH-0300 (144), Island Of Oahu, Hawaii" dated February 3, 2022 has been prepared by Geolabs, Inc. A copy of the report is on file at the office of the Engineer for review by the Contractor.
2. For boring locations, see Sheets R-2, R-3, R-5, and R-6.
3. The information presented in the logs of borings depict the subsurface conditions encountered at that specified location and at the time of the field exploration only. Variations of subsoil conditions from those depicted in the logs of borings may occur between and beyond the borings.
4. The penetration resistance shown on the logs of borings indicate the number of blows required for the specific sampler type used. The blow counts may need to be factored to obtain the Standard Penetration Test (SPT) blow counts.
5. The data given is for general information only. Bidders shall examine the site and the boring data and draw their own conclusions therefrom as to the character of materials to be encountered. The Engineer will not assume responsibility for variations of subsoil quality or conditions other than at the boring locations shown and at the time the borings were taken.

DESIGNED BY	CHECKED BY	DATE	
TRACED BY			
NOTE BOOK			
QUANTITIES BY			
CHECKED BY			

DRAWING NAME: B:\DRAWING\DRAWING\WORKING\7341-00\_INTERSTATE\_ROUTE\_H-1\_&\_H201\_SIGN\_UPGRADE\7341-00SHEETBORINGLOGS.DWG PLOT TIME: 10-02-23, 5:05 PM

LOG LEGEND FOR ROCK 7341-00.GPJ GEOLABS.GDT 12/19/18



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STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**BORING LOG LEGEND & NOTES**

**INTERSTATE ROUTE H-1 AND H-201  
DESTINATION SIGN UPGRADE/REPLACEMENT, PHASE 3B  
FAP NO. NH-0300(205)**

Scale: As Noted Date: Oct. 2023

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-0300(205)	2024	188	197

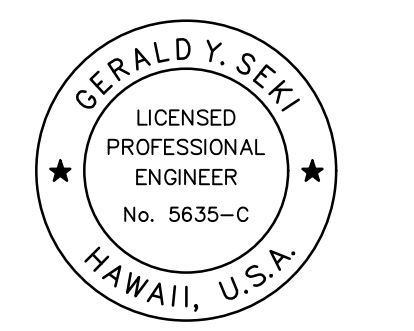
GEOLABS, INC. Geotechnical Engineering										INTERSTATE ROUTE H-1 AND H-201 DESTINATION SIGN UPGRADE/REPLACEMENT, PHASE 3 FAP NO. NH-0300 (144) ISLAND OF OAHU, HAWAII			Log of Boring 4
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Description			
										Approximate Ground Surface Elevation : N/A			
										Description			
										12-inch ASPHALTIC CONCRETE			
Sieve #200 = 11.9%	4	116			61				GW	Gray angular SANDY GRAVEL (BASALTIC) with traces of clayey silt, dense, moist (fill)			
	6				12				SP-				
	7	74			14				SM	Brownish gray GRAVELLY SAND (BASALTIC) with a little silt, medium dense, moist (fill) grades to loose			
			50						MH	grades to sandy gravel locally			
	27				23					Reddish brown CLAYEY SILT with a little gravel (basaltic), very stiff, moist (residual soil)			
			28						CH	Reddish brown SILTY CLAY, very stiff to hard, moist (residual soil)			
TXUU Su=5.8 ksf	35	172	100		82	>4.5			MH	Dark brown SILTY CLAY with some decomposed gravel, hard, moist (weathered clinker)			
									MH	Gray CLAYEY SILT with remnant rock structure, hard, moist (saprolite)			
	37				74					Gray vugular BASALT, severely to closely fractured, slightly weathered, hard (basalt formation) grades to moderately fractured			
			88	0									
			98	40						Boring terminated at 31.5 feet			
Date Started: April 15, 2018						Water Level: Not Encountered							
Date Completed: April 16, 2018													
Logged By: S. Latronic						Drill Rig: CME-45C TRUCK							
Total Depth: 31.5 feet						Drilling Method: 4" Solid Stem Auger & PQ Coring							
Work Order: 7341-00						Driving Energy: 140 lb. wt., 30 in. drop							

GEOLABS, INC. Geotechnical Engineering										INTERSTATE ROUTE H-1 AND H-201 DESTINATION SIGN UPGRADE/REPLACEMENT, PHASE 3 FAP NO. NH-0300 (144) ISLAND OF OAHU, HAWAII			Log of Boring 6
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Description			
										Approximate Ground Surface Elevation : N/A			
										Description			
										12-inch ASPHALTIC CONCRETE			
LL=82 PI=46	16	91			50	>4.5			GW	Gray SANDY GRAVEL (BASALTIC), medium dense to dense, moist (fill)			
	30				19				MH				
					17	>4.5			CH	Brown with gray mottling CLAYEY SILT with some gravel (basaltic) and a little sand, very stiff, moist (fill)			
UC= 24170 psi	30		100	72	50/2"				SM	Brown SILTY CLAY with some sand and gravel, stiff to very stiff, moist (residual soil)			
										Brownish gray SILTY SAND (BASALTIC) with some gravel, dense to very dense, wet (saprolite)			
										Gray BASALT, slightly to moderately fractured, unweathered to slightly weathered, very hard (basalt formation) grades with clayey seams locally, closely fractured			
UC= 19190 psi													
										Boring terminated at 26.5 feet			
Date Started: April 17, 2018						Water Level: 9.6 ft. 04/17/2018 2220 HRS							
Date Completed: April 18, 2018													
Logged By: S. Latronic						Drill Rig: CME-45C TRUCK							
Total Depth: 26.5 feet						Drilling Method: 4" Solid Stem Auger & PQ Coring							
Work Order: 7341-00						Driving Energy: 140 lb. wt., 30 in. drop							

GEOLABS, INC. Geotechnical Engineering										INTERSTATE ROUTE H-1 AND H-201 DESTINATION SIGN UPGRADE/REPLACEMENT, PHASE 3 FAP NO. NH-0300 (144) ISLAND OF OAHU, HAWAII			Log of Boring 5
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)	Pocket Pen. (tsf)	Depth (feet)	Sample Graphic	USCS	Description			
										Approximate Ground Surface Elevation : N/A			
										Description			
										6-inch ASPHALTIC CONCRETE			
LL=52 PI=14	19	99			37				GW	Gray angular SANDY GRAVEL (BASALTIC), dense, moist (fill)			
	32				48				MH				
					84					Reddish brown CLAYEY SILT with some decomposed gravel, hard, moist (residual soil)			
										grades with remnant rock structure			
	42				30								
UC= 7270 psi	29	95			31/6" +50/5"	>4.5				Gray vugular BASALT, closely fractured, slightly weathered, hard (basalt formation)			
			79	29									
			100	17						grades to moderately fractured			
										Boring terminated at 31.5 feet			
Date Started: April 16, 2018						Water Level: Not Encountered							
Date Completed: April 17, 2018													
Logged By: S. Latronic						Drill Rig: CME-45C TRUCK							
Total Depth: 31.5 feet						Drilling Method: 4" Solid Stem Auger & PQ Coring							
Work Order: 7341-00						Driving Energy: 140 lb. wt., 30 in. drop							

DATE PLOTTED BY	DATE
DESIGNED BY	
TRACED BY	
DESIGNED BY	
QUANTITIES BY	
CHECKED BY	

DRAWING NAME: B:\DRAWING\DRAWING\WORKING\7341-00\_INTERSTATE\_ROUTE\_H-1\_L\_&\_H201\_SIGN\_UPGRADE\7341-00SHEETBORINGLOGS.DWG PLOT TIME: 10-02-23, 5:06 PM



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STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**BORING LOGS**

*INTERSTATE ROUTE H-1 AND H-201  
DESTINATION SIGN UPGRADE/REPLACEMENT, PHASE 3B  
FAP NO. NH-0300(205)*

Scale: As Noted      Date: Oct. 2023

SHEET No. 6-3 OF 1 SHEETS

FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
HAWAII	HAW.	NH-0300(205)	2024	189	197

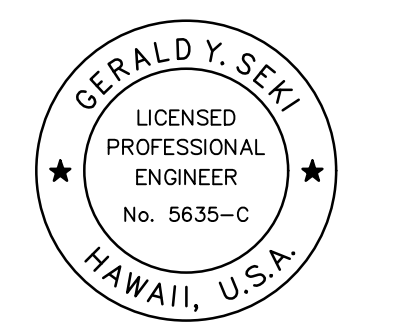
Geotechnical Engineering		INTERSTATE ROUTE H-1 AND H-201 DESTINATION SIGN UPGRADE/REPLACEMENT, PHASE 3 FAP NO. NH-0300 (144) ISLAND OF OAHU, HAWAII			Log of Boring 7
Approximate Ground Surface Elevation (feet) : 36 *					
Description					
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)
LL=33 PI=1 TXUU Su=6.0 ksf	11 36	77			56 20
					77/6" +25/1"
Sieve #200 = 12.4%	27	77			37
	40				10
Sieve #200 = 16.5%	27	104			19
	42				18
	48	82			28
	42				16/6" +25/1"
	32	85			25/1"
Boring terminated at 45.6 feet					
* Elevations estimated from Topographic Survey Map prepared by Controlpoint Surveying, Inc. dated February 20, 2018.					
Date Started: January 4, 2022			Water Level: 23.3 ft. 01/04/2022 1115 HRS		
Date Completed: January 4, 2022			Drill Rig: CME-75DG2		
Logged By: B. Aiu			Drilling Method: 4" Solid-Stem Auger & PQ Coring		
Total Depth: 45.6 feet			Driving Energy: 140 lb. wt., 30 in. drop		
Work Order: 7341-00					

Geotechnical Engineering		INTERSTATE ROUTE H-1 AND H-201 DESTINATION SIGN UPGRADE/REPLACEMENT, PHASE 3 FAP NO. NH-0300 (144) ISLAND OF OAHU, HAWAII			Log of Boring 8
Approximate Ground Surface Elevation (feet) : 35.5 *					
Description					
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)
LL=NP PI=NP TXUU Su=4.8 ksf	11 40	123			99 51
	18	82			121
Sieve #200 = 10.1%	19	95			25
	27				28
Sieve #200 = 14.3%	38	91			33
	16				25/1"
Boring terminated at 30.1 feet					
* Elevations estimated from Topographic Survey Map prepared by Controlpoint Surveying, Inc. dated February 20, 2018.					
Date Started: January 3, 2022			Water Level: 22.7 ft. 01/03/2022 1035 HRS		
Date Completed: January 3, 2022			Drill Rig: CME-75DG2		
Logged By: B. Aiu			Drilling Method: 4" Solid-Stem Auger & PQ Coring		
Total Depth: 30.1 feet			Driving Energy: 140 lb. wt., 30 in. drop		
Work Order: 7341-00					

Geotechnical Engineering		INTERSTATE ROUTE H-1 AND H-201 DESTINATION SIGN UPGRADE/REPLACEMENT, PHASE 3 FAP NO. NH-0300 (144) ISLAND OF OAHU, HAWAII			Log of Boring 9
Approximate Ground Surface Elevation : N/A					
Description					
Other Tests	Moisture Content (%)	Dry Unit Weight (pcf)	Core Recovery (%)	RQD (%)	Penetration Resistance (blows/foot)
LL=38 PI=16 Sieve #200 = 37.7%	25 11	92			18 109
	28	83			34/6" +50/4"
Sieve #200 = 22.1%	27				100 21
					100 47
UC= 4340 psi					97 10
					100 63
UC= 2910 psi					
Boring terminated at 31 feet					
Date Started: January 5, 2022			Water Level: Not Encountered		
Date Completed: January 6, 2022			Drill Rig: CME-75DG2		
Logged By: B. Aiu			Drilling Method: 4" Solid-Stem Auger & PQ Coring		
Total Depth: 31 feet			Driving Energy: 140 lb. wt., 30 in. drop		
Work Order: 7341-00					

DESIGNED BY	DATE
CHECKED BY	
QUANTITIES BY	
NOTED BY	
DATE	

DRAWING NAME: B:\DRAWING\DRAWING\WORKING\7341-00\_INTERSTATE\_ROUTE\_H-1\_L\_&\_H201\_SIGN\_UPGRADE\7341-00SHEETBORINGLOGS.DWG PLOT TIME: 10-02-23, 5:06 PM



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DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**BORING LOGS**

*INTERSTATE ROUTE H-1 AND H-201  
DESTINATION SIGN UPGRADE/REPLACEMENT, PHASE 3B  
FAP NO. NH-0300(205)*

Scale: As Noted Date: Oct. 2023

SHEET No. 6-4 OF 1 SHEETS