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## **APPENDIX B**

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## **APPENDIX B**

### **Laboratory Tests**

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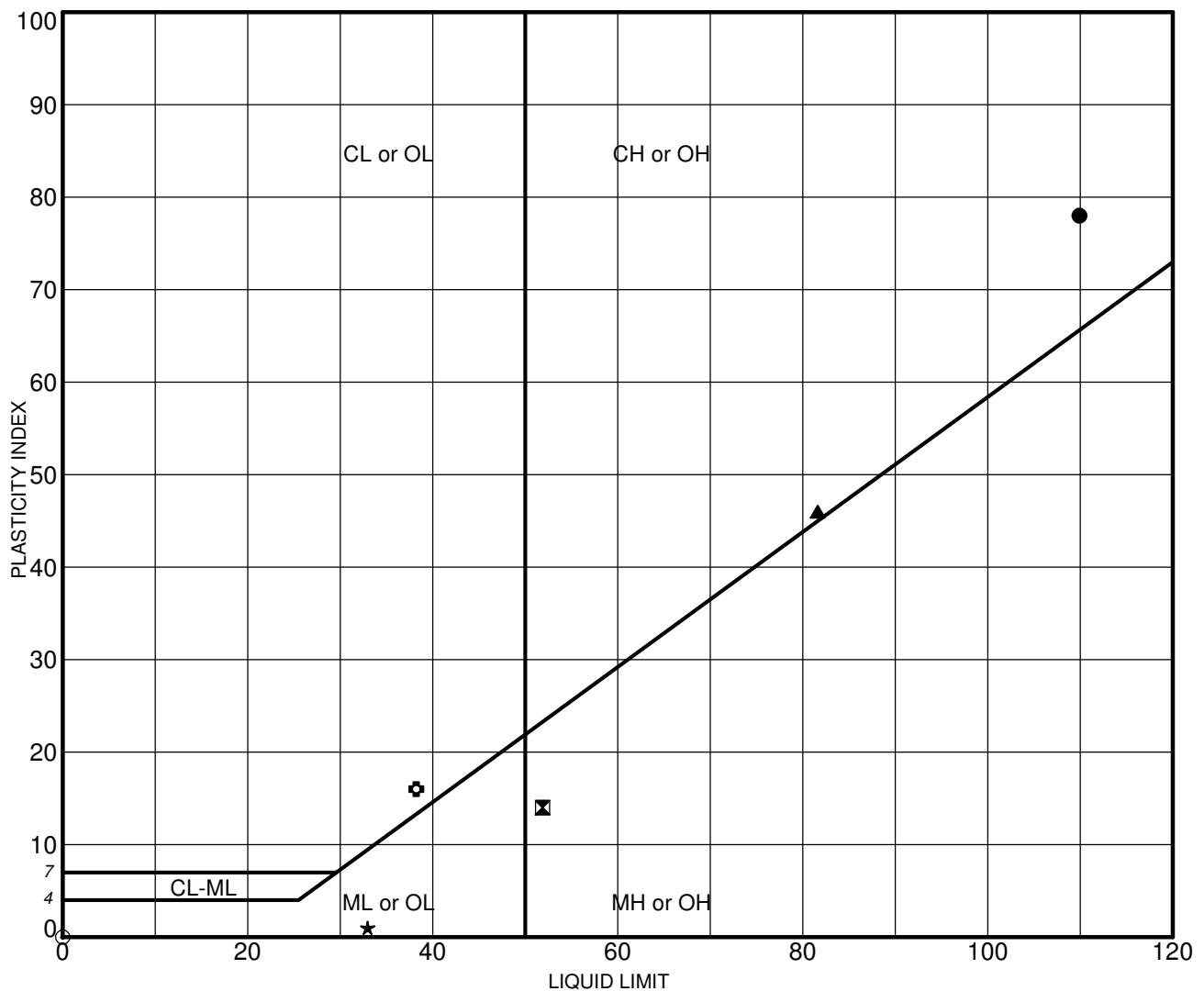
Moisture Content (ASTM D2216) and Unit Weight determinations (ASTM D2937) were performed on selected soil samples as an aid in the classification and evaluation of soil properties. The test results are presented on the Logs of Borings at the appropriate sample depths.

Six Atterberg Limits tests (ASTM D4318) were performed on selected soil samples to evaluate the liquid and plastic limits and to aid in soil classification. Test results are summarized on the Logs of Borings at the appropriate sample depths. The test results are provided on Plate B-1.

Seven Sieve Analysis tests (ASTM D6913) were performed on selected soil samples to evaluate the gradation characteristics of the soils and to aid in soil classification. Graphic presentations of the grain size distributions are provided on Plates B-2 and B-3.

Nine Unconfined Compression tests (ASTM D7012) were performed on selected core samples to evaluate the unconfined compressive strength of the rock formation encountered. Unconfined compression test results are presented on Plate B-4.

Five Unconsolidated Undrained Triaxial Compression tests (ASTM D2850) were performed on selected soil samples to evaluate the undrained shear strength of the soils. The undrained shear strength test results along with the shear stress-strain curves are presented on Plates B-5 through B-9.



	Sample	Depth (ft)	LL	PL	PI	Description
●	B-3	26.5-28.0	110	32	78	Gray with tan mottling silty clay (CH) with a little gravel
⊠	B-5	5.5-7.0	52	38	14	Reddish brown clayey silt (MH) with some decomposed gravel
▲	B-6	5.5-7.0	82	36	46	Brown silty clay (CH) with some sand and gravel
★	B-7	5.0-6.5	33	32	1	Brown sandy silt (ML) with some gravel
⊙	B-8	5.0-6.5	NP	NP	NP	Brown sandy silt
⊕	B-9	1.0-2.5	38	22	16	Reddish brown clayey sand (SC) with some gravel

NP = NON-PLASTIC

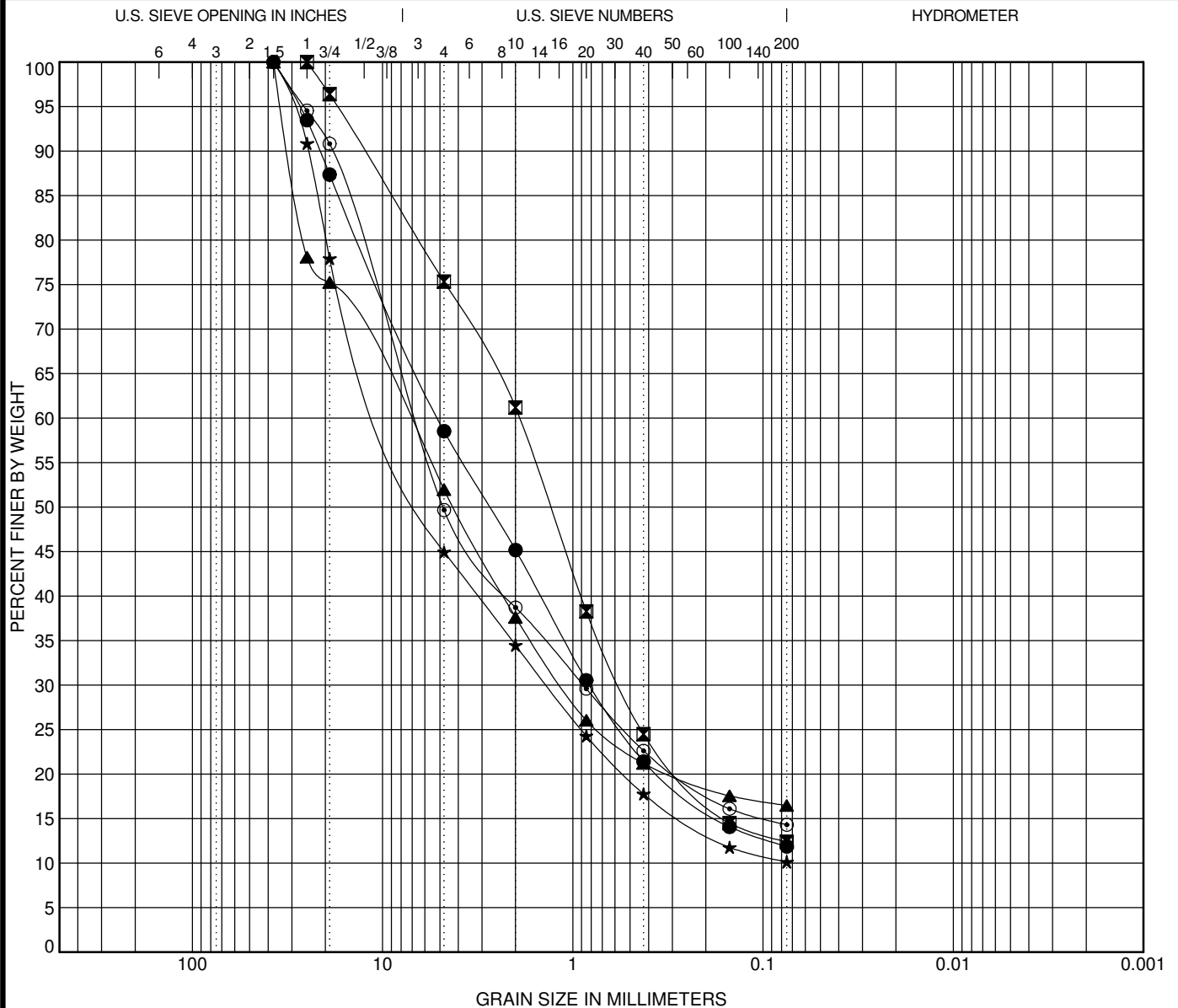


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### ATTERBERG LIMITS TEST RESULTS - ASTM D4318

INTERSTATE ROUTE H-1 AND H-201  
 DESTINATION SIGN UPGRADE/  
 REPLACEMENT, PHASE 3  
 FAP NO. NH-0300 (144)  
 ISLAND OF OAHU, HAWAII

Plate  
**B - 1**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample	Depth (ft)	Description					LL	PL	PI	Cc	Cu	
●	B-4	5.0-6.5	Brownish gray gravelly sand (SP-SM) with a little silt								3.1	122.2
☒	B-7	15.0-16.5	Brown with multi-color mottling silty sand (SM) with some gravel								4.8	56.2
▲	B-7	25.0-26.5	Brown silty gravel (GM) with some sand									
★	B-8	15.0-16.5	Brown w/ multi-color mottling sandy gravel (GW-GM) w/ a little silt								3.0	125.4
◎	B-8	20.0-21.5	Brown silty gravel (GM) with some sand									
	Sample	Depth (ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Fine			
●	B-4	5.0-6.5	37.5	5.1	0.816		41.5	46.7	11.9			
☒	B-7	15.0-16.5	25	1.915	0.561		24.7	62.9	12.4			
▲	B-7	25.0-26.5	37.5	7.664	1.139		48.0	35.5	16.5			
★	B-8	15.0-16.5	37.5	8.943	1.374		55.1	34.8	10.1			
◎	B-8	20.0-21.5	37.5	6.729	0.883		50.3	35.4	14.3			

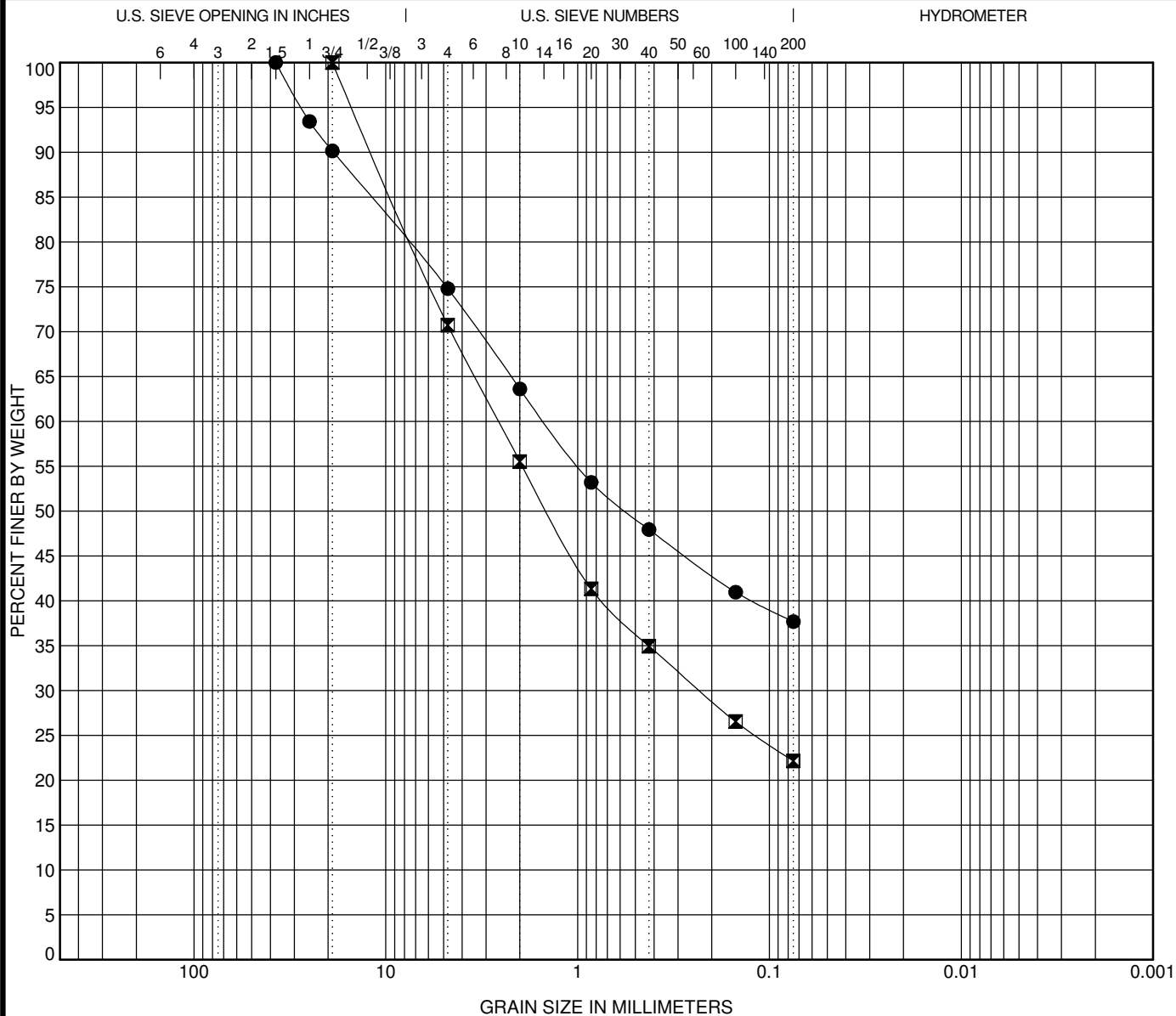


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### GRAIN SIZE DISTRIBUTION - ASTM D6913

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Plate  
**B - 2**



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample		Depth (ft)	Description					LL	PL	PI	Cc	Cu
●	B-9	1.0-2.5	Reddish brown clayey sand (SC) with some gravel					38	22	16		
☒	B-9	10.0-11.3	Reddish brown and gray silty sand (SM) with some gravel									
Sample		Depth (ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Fine			
●	B-9	1.0-2.5	37.5	1.487			25.2	37.1	37.7			
☒	B-9	10.0-11.3	19	2.584	0.23		29.3	48.6	22.1			



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**GRAIN SIZE DISTRIBUTION - ASTM D6913**  
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Plate  
**B - 3**

Location	Depth	Length	Diameter	Length/ Diameter Ratio	Density	Load	Compressive Strength
	(feet)	(inches)	(inches)		(pcf)	(lbs)	(psi)
B-1	15.5 - 16	6.743	3.189	2.11	133.6	19,610	2,460
B-1	21 - 26	6.710	3.185	2.11	125.1	14,390	1,810
B-2	6 - 11	6.721	3.230	2.08	117.1	8,920	1,090
B-2	16 - 21	6.681	3.239	2.06	117.9	11,610	1,410
B-5	21.5 - 26.5	6.950	3.250	2.14	153.7	60,330	7,270
B-6	11.5 - 16.5	7.020	3.250	2.16	185.0	200,540	24,170
B-6	21.5 - 26.5	6.840	3.240	2.11	185.4	158,200	19,190
B-9	17 - 17.5	6.500	3.200	2.03	120.7	34,900	4,340
B-9	28.5 - 29	6.500	3.250	2.00	134.8	24,140	2,910

## ASTM D7012 (METHOD C)

Note: Samples were not prepared in accordance with ASTM D4543. Therefore, results reported may differ from results obtained from a test specimen that meets the requirements of Practice D4543

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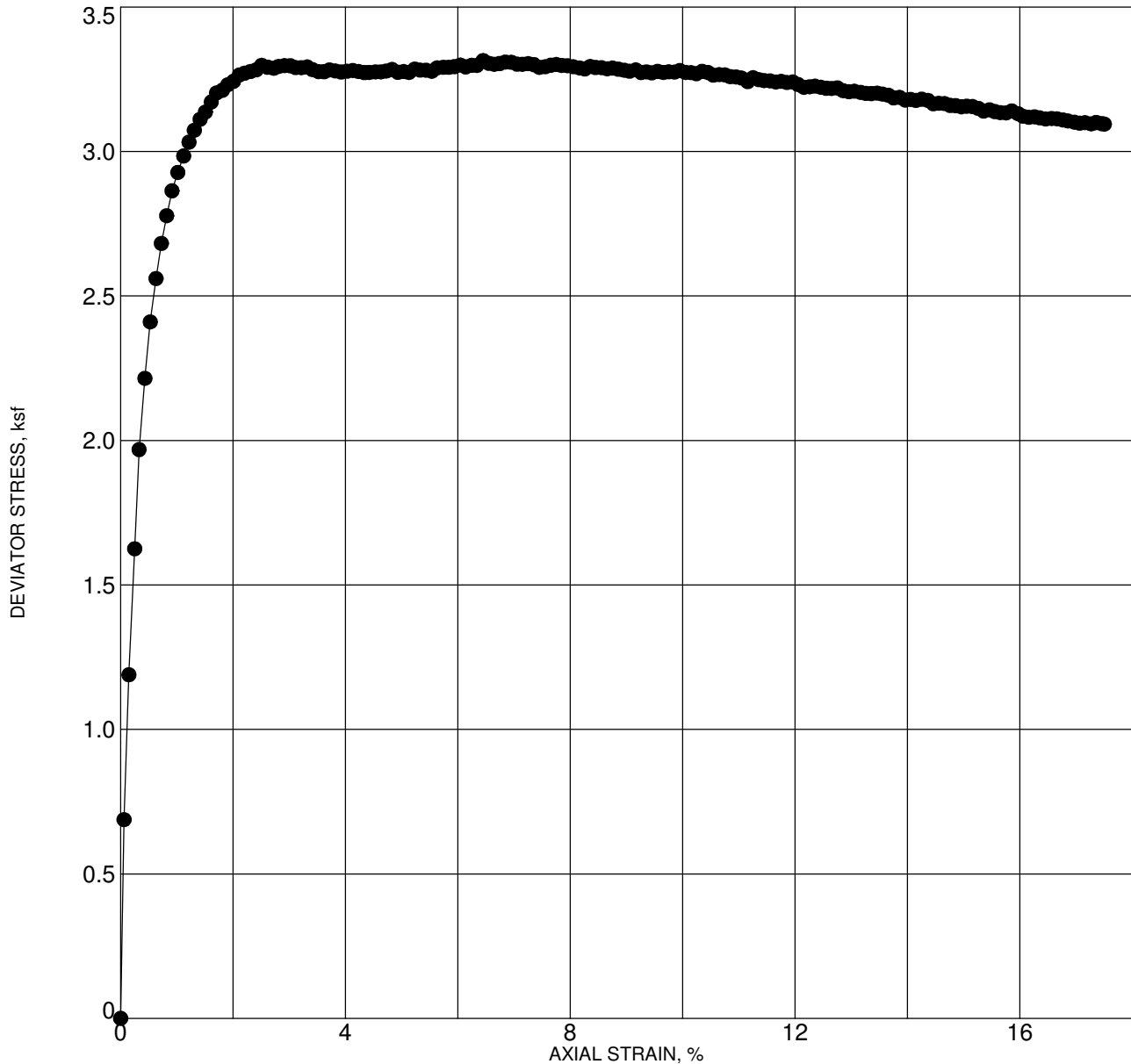
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**UNIAXIAL COMPRESSIVE STRENGTH TEST**

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Plate  
**B - 4**



Max. Deviator Stress (ksf): 3.2

Confining Stress (ksf): 0.6

Location: B-3

Depth: 5.5 - 7.0 feet

Description: Dark brown silty clay

Test Date: 5/25/2018

Dry Density (pcf)	85.9	Sample Diameter (inches)	2.393
Moisture (%)	32.2	Sample Height (inches)	5.107
Axial Strain at Failure (%)	15.0	Strain Rate (% / minute)	0.99



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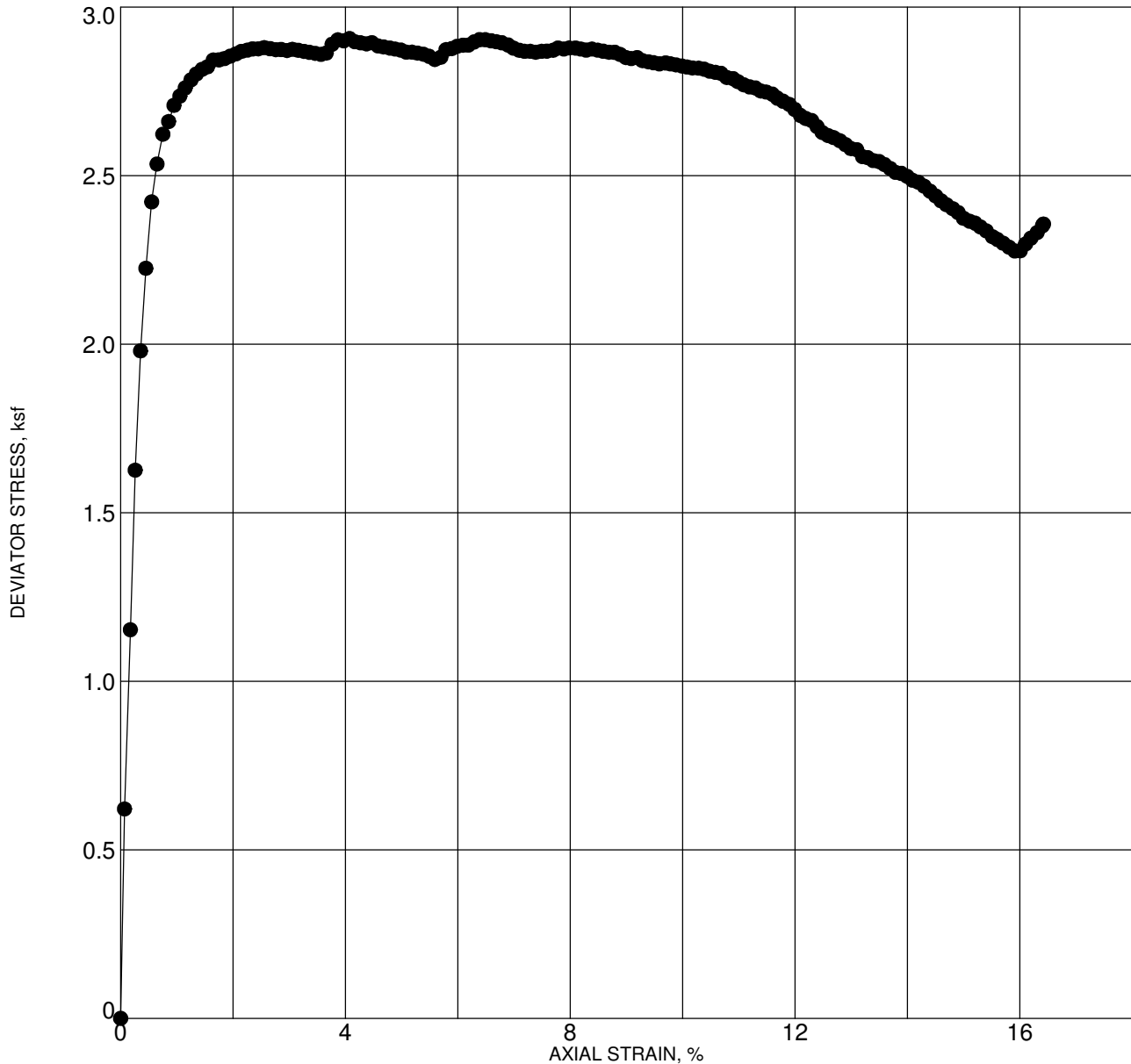
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**TRIAXIAL UU COMPRESSION TEST - ASTM D2850**

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DESTINATION SIGN UPGRADE/  
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ISLAND OF OAHU, HAWAII

Plate  
**B - 5**



Max. Deviator Stress (ksf): 2.9

Confining Stress (ksf): 2.5

Location: B-3

Depth: 26.5 - 28.0 feet

Description: Gray with tan mottling silty clay (CH) with a little gravel

Test Date: 5/25/2018

Dry Density (pcf)	60.9	Sample Diameter (inches)	2.323
Moisture (%)	67.2	Sample Height (inches)	5.103
Axial Strain at Failure (%)	4.0	Strain Rate (% / minute)	1.01



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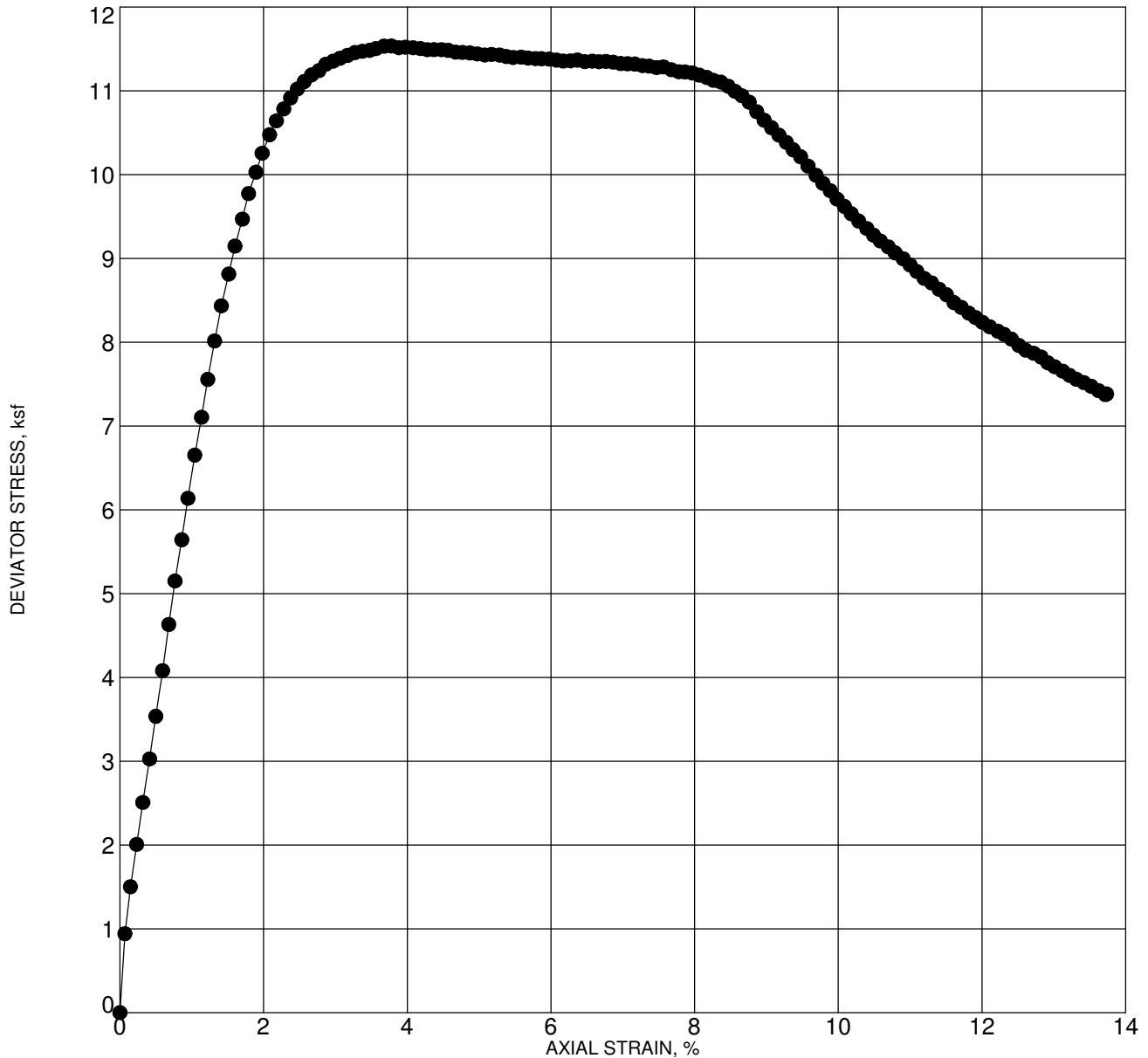
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**TRIAXIAL UU COMPRESSION TEST - ASTM D2850**

INTERSTATE ROUTE H-1 AND H-201  
DESTINATION SIGN UPGRADE/  
REPLACEMENT, PHASE 3  
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Plate  
**B - 6**





Max. Deviator Stress (ksf): 11.5

Confining Stress (ksf): 2.0

Location: B-4

Depth: 16.5 - 18.0 feet

Description: Dark brown silty clay with some decompose gravel

Test Date: 5/25/2018

Dry Density (pcf)	84.2	Sample Diameter (inches)	2.407
Moisture (%)	35.4	Sample Height (inches)	5.107
Axial Strain at Failure (%)	3.8	Strain Rate (% / minute)	1.01



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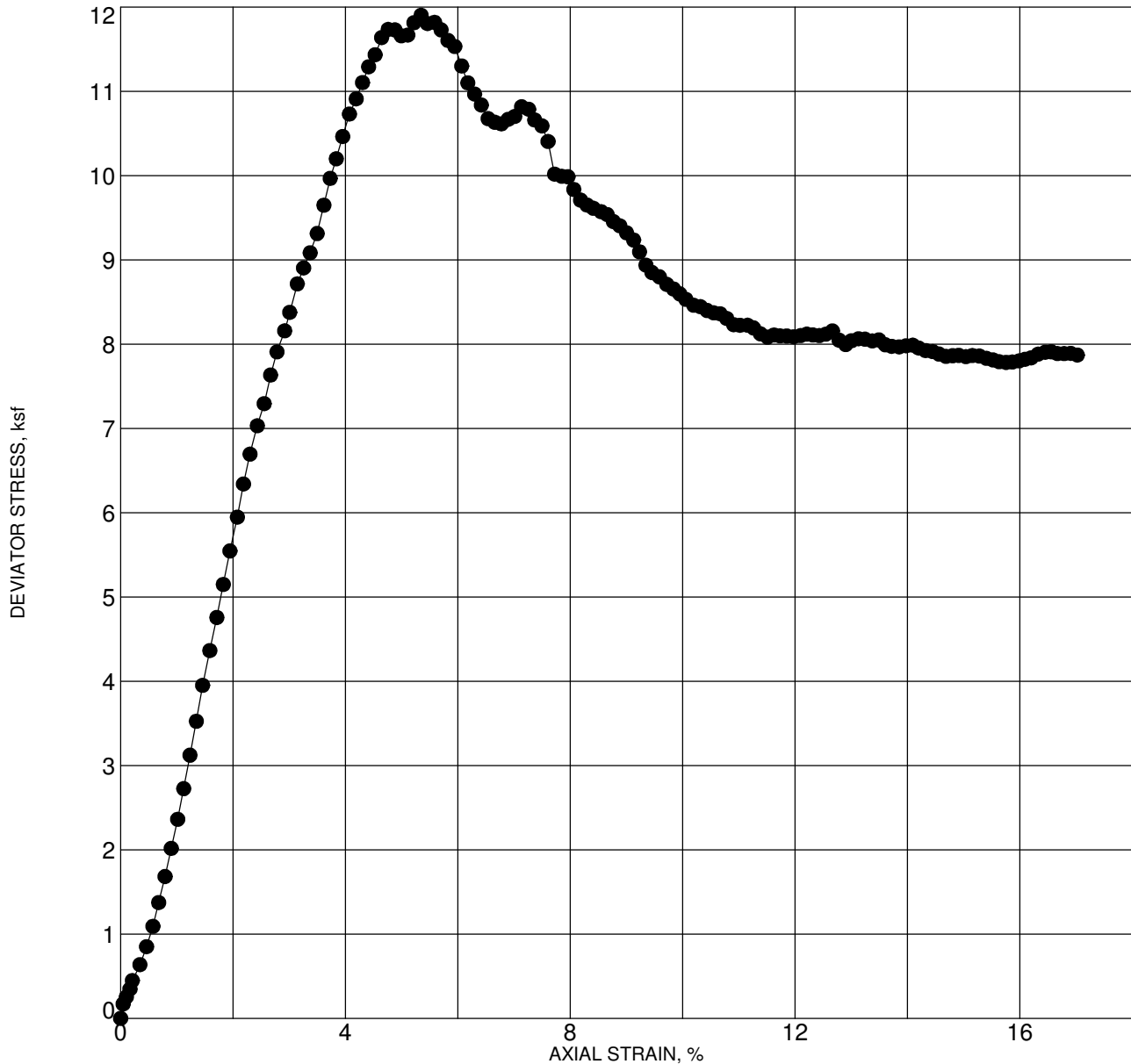
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**TRIAXIAL UU COMPRESSION TEST - ASTM D2850**

INTERSTATE ROUTE H-1 AND H-201  
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Plate  
**B - 7**



Max. Deviator Stress (ksf): 11.9

Confining Stress (ksf): 0.5

Location: B-7

Depth: 5.0 - 6.5 feet

Description: Brown sandy silt (ML) with some gravel

Test Date: 1/18/2022

Dry Density (pcf)	72.9	Sample Diameter (inches)	2.413
Moisture (%)	32.1	Sample Height (inches)	5.100
Axial Strain at Failure (%)	5.3	Strain Rate (% / minute)	0.70



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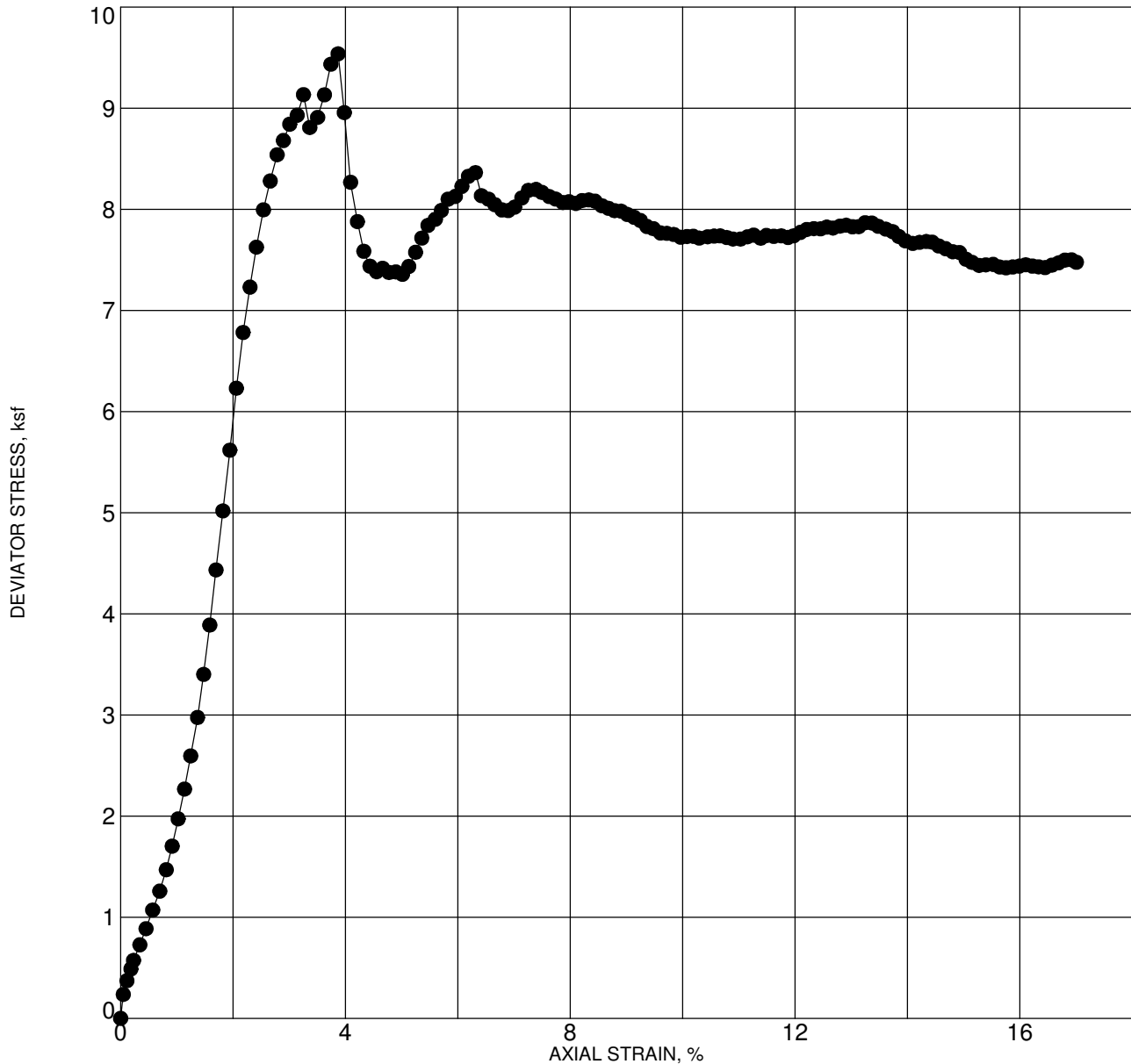
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**TRIAXIAL UU COMPRESSION TEST - ASTM D2850**

INTERSTATE ROUTE H-1 AND H-201  
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Plate  
**B - 8**



Max. Deviator Stress (ksf): 9.5

Confining Stress (ksf): 0.5

Location: B-8

Depth: 5.0 - 6.5 feet

Description: Brown sandy silt

Test Date: 1/19/2022

Dry Density (pcf)	76.7	Sample Diameter (inches)	2.413
Moisture (%)	27.2	Sample Height (inches)	5.100
Axial Strain at Failure (%)	3.9	Strain Rate (% / minute)	0.70



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**TRIAXIAL UU COMPRESSION TEST - ASTM D2850**

INTERSTATE ROUTE H-1 AND H-201  
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Plate  
**B - 9**