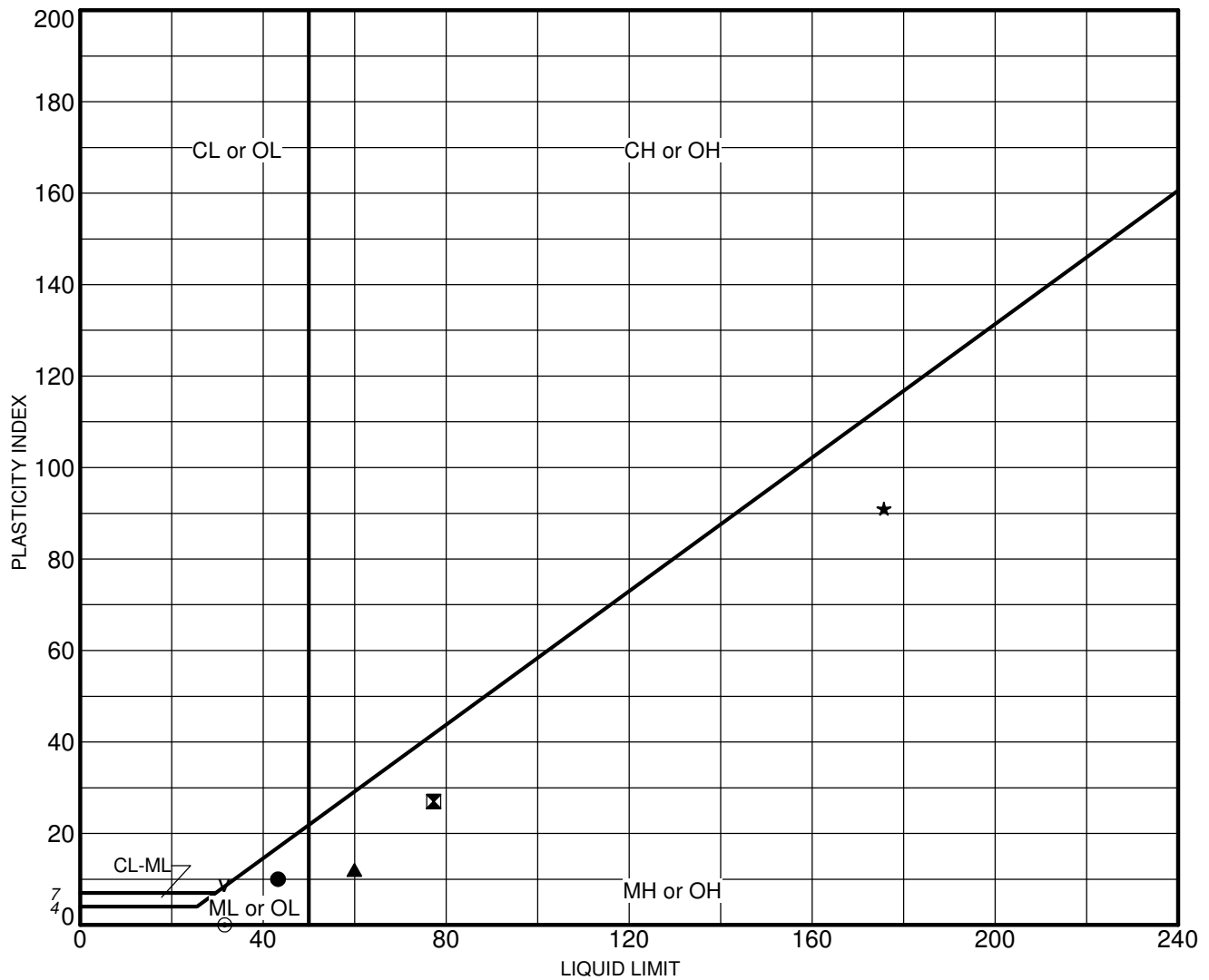




	Sample	Depth (ft)	LL	PL	PI	Description
●	B-1	5.0-6.5	43	33	10	Orangish brown with gray mottling clayey silt (ML) with some sand
⊠	B-3	10.0-11.5	77	50	27	Orangish brown with gray mottling clayey silt (MH) with some sand
▲	B-3	26.0-28.0	60	48	12	Reddish brown clayey silt (MH) with some sand
★	B-4	5.0-6.5	176	85	91	Brown with orange mottling clayey silt (MH) with some sand
⊙	B-4	15.0-16.5	32	43	NP	Brown with orange mottling clayey silt (ML) with some sand

NP = NON-PLASTIC

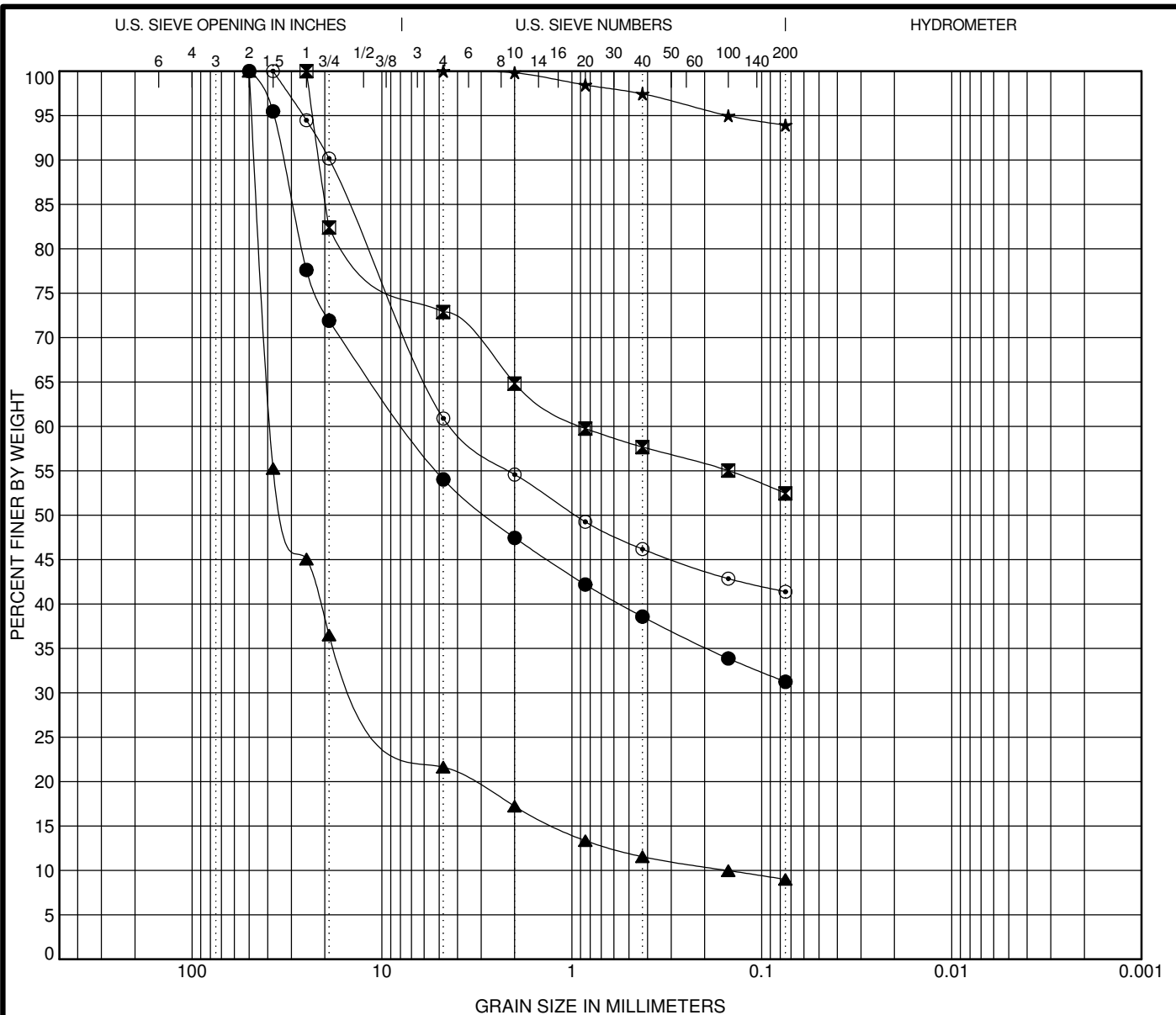


GEOLABS, INC.
 GEOTECHNICAL ENGINEERING
 W.O. 8063-00

ATTERBERG LIMITS TEST RESULTS - ASTM D4318

SEISMIC RETROFIT OF KAHOLO BRIDGE
 HAWAII BELT ROAD, PROJECT NO. BR-019-2(072)
 DISTRICT OF HAMAKUA, ISLAND OF HAWAII

Plate
C - 1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample	Depth (ft)	Description					LL	PL	PI	Cc	Cu
●	B-1	20.0-21.5	Gray and brown silty gravel (GM) with some sand									
■	B-2	42.5-44.0	Brownish gray gravelly silt (ML) with some sand									
▲	B-3	10.0-11.5	Orangish brown with gray mottling clayey silt (MH) with some sand					77	50	27	18.2	252.9
★	B-3	20.0-21.5	Orangish brown with gray mottling clayey silt (MH) with a little sand									
◎	B-4	26.0-28.0	Brown with orange mottling silty gravel (GM) with some sand									
	Sample	Depth (ft)	D100 (mm)	D60 (mm)	D30 (mm)	D10 (mm)	%Gravel	%Sand	%Fine			
●	B-1	20.0-21.5	50	7.55			46.0	22.8	31.2			
■	B-2	42.5-44.0	25	0.885			27.1	20.4	52.5			
▲	B-3	10.0-11.5	50	38.662	10.368	0.153	78.4	12.6	9.0			
★	B-3	20.0-21.5	4.75				0.0	6.1	93.9			
◎	B-4	26.0-28.0	37.5	4.201			39.1	19.5	41.4			



GEOLABS, INC.

GEOTECHNICAL ENGINEERING

W.O. 8063-00

GRAIN SIZE DISTRIBUTION - ASTM D6913

SEISMIC RETROFIT OF KAHOLO BRIDGE
HAWAII BELT ROAD, PROJECT NO. BR-019-2(072)
DISTRICT OF HAMAKUA, ISLAND OF HAWAII

Plate
C - 2

Location	Depth	Length	Diameter	Length/ Diameter Ratio	Density	Load	Compressive Strength
	(feet)	(inches)	(inches)		(pcf)	(lbs)	(psi)
B-1	42 - 42.5	5.380	2.360	2.28	118.2	2,870	660
B-1	66 - 66.5	5.440	2.380	2.29	142.8	19,110	4,300
B-2	75 - 76	5.480	2.380	2.30	115.6	5,450	1,230
B-2	95 - 96	5.350	2.390	2.24	160.3	40,740	9,080
B-3	50.5 - 51	5.520	2.390	2.31	118.8	2,700	600
B-3	61.5 - 62.5	5.400	2.390	2.26	137.3	13,650	3,040
B-4	47 - 47.5	5.000	2.320	2.16	110.8	1,770	420
B-4	58.5 - 59.5	5.300	2.380	2.23	138.5	9,930	2,230

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

**GEOLABS, INC.**

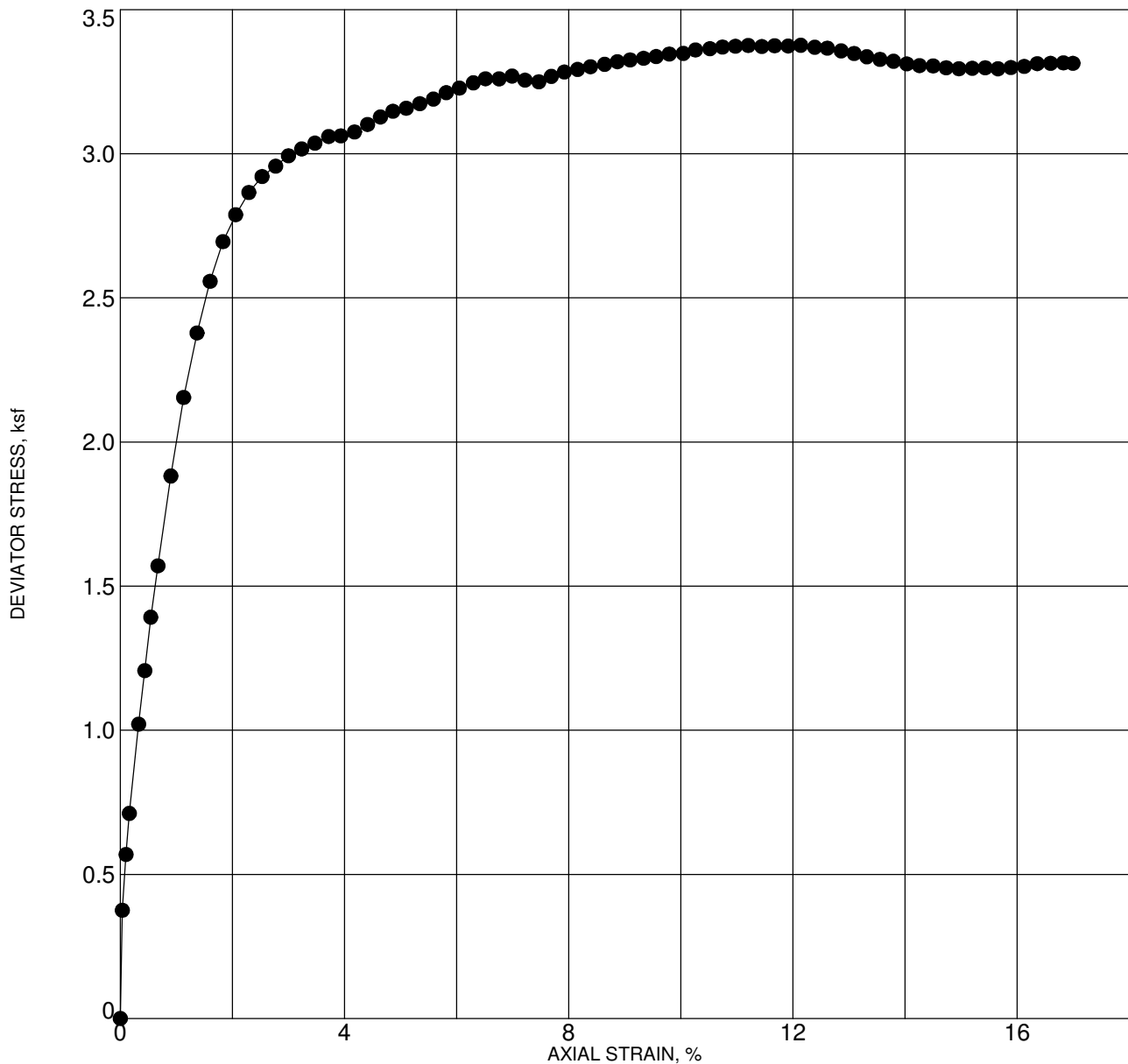
GEOTECHNICAL ENGINEERING

W.O. 8063-00

UNIAXIAL COMPRESSIVE STRENGTH TEST

SEISMIC RETROFIT OF KAHOLO BRIDGE
HAWAII BELT ROAD, PROJECT NO. BR-019-2(072)
DISTRICT OF HAMAKUA, ISLAND OF HAWAII

Plate
C - 3



Max. Deviator Stress (ksf): 3.4

Confining Stress (ksf): 1.0

Location: B-1

Depth: 10.0 - 11.5 feet

Description: Orangish brown with gray mottling clayey silt with some sand

Test Date: 6/4/2021

Dry Density (pcf)	64.7	Sample Diameter (inches)	2.413
Moisture (%)	62.3	Sample Height (inches)	5.100
Axial Strain at Failure (%)	12.1	Strain Rate (% / minute)	0.70



GEOLABS, INC.

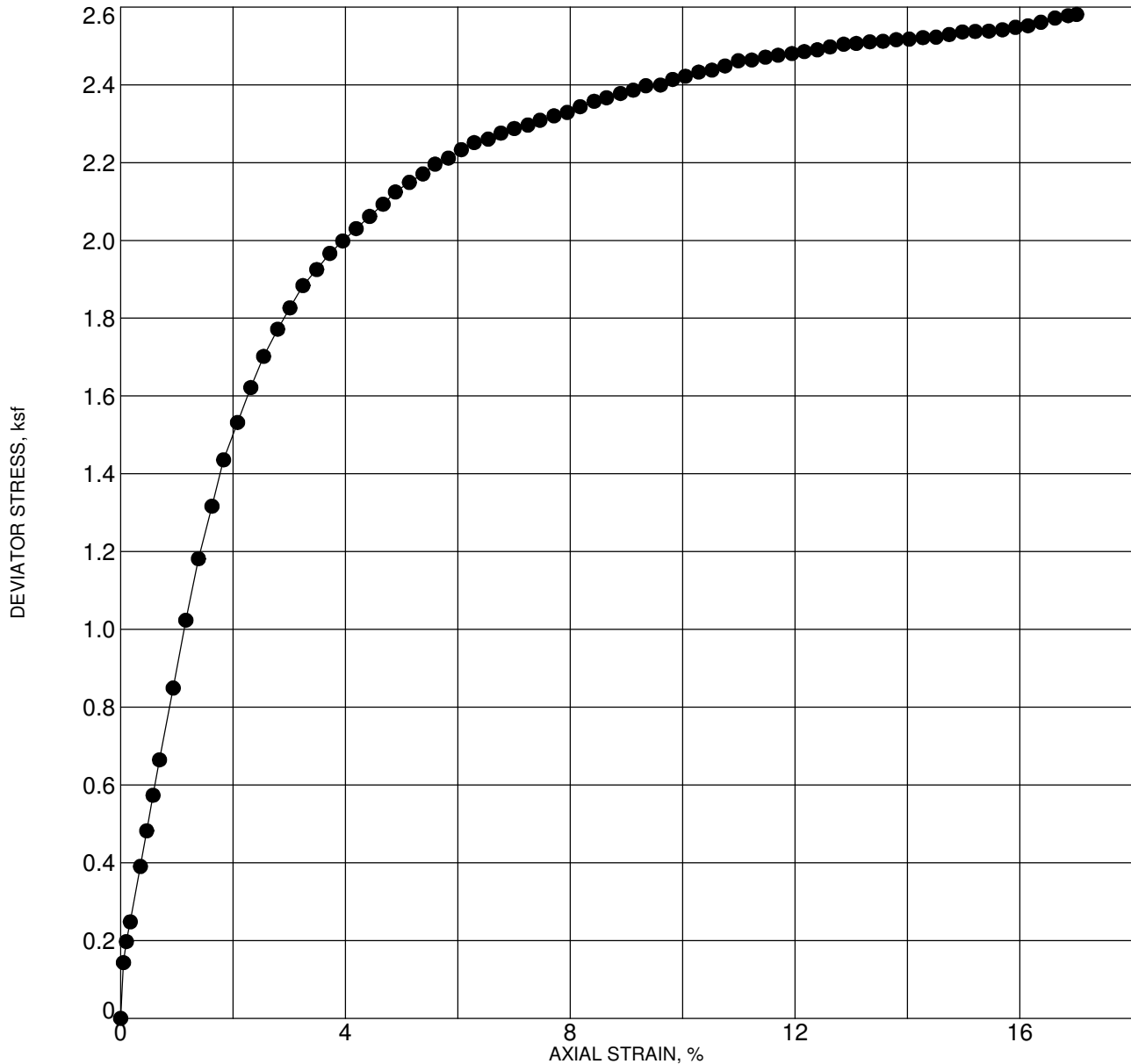
GEOTECHNICAL ENGINEERING

W.O. 8063-00

TRIAXIAL UU COMPRESSION TEST - ASTM D2850

SEISMIC RETROFIT OF KAHOLO BRIDGE
HAWAII BELT ROAD, PROJECT NO. BR-019-2(072)
DISTRICT OF HAMAKUA, ISLAND OF HAWAII

Plate
C - 4



Max. Deviator Stress (ksf): 2.5

Confining Stress (ksf): 0.5

Location: B-2

Depth: 5.0 - 6.5 feet

Description: Brown clayey silt with some sand

Test Date: 6/4/2021

Dry Density (pcf)	71.0	Sample Diameter (inches)	2.413
Moisture (%)	44.8	Sample Height (inches)	5.100
Axial Strain at Failure (%)	15.0	Strain Rate (% / minute)	0.70



GEOLABS, INC.

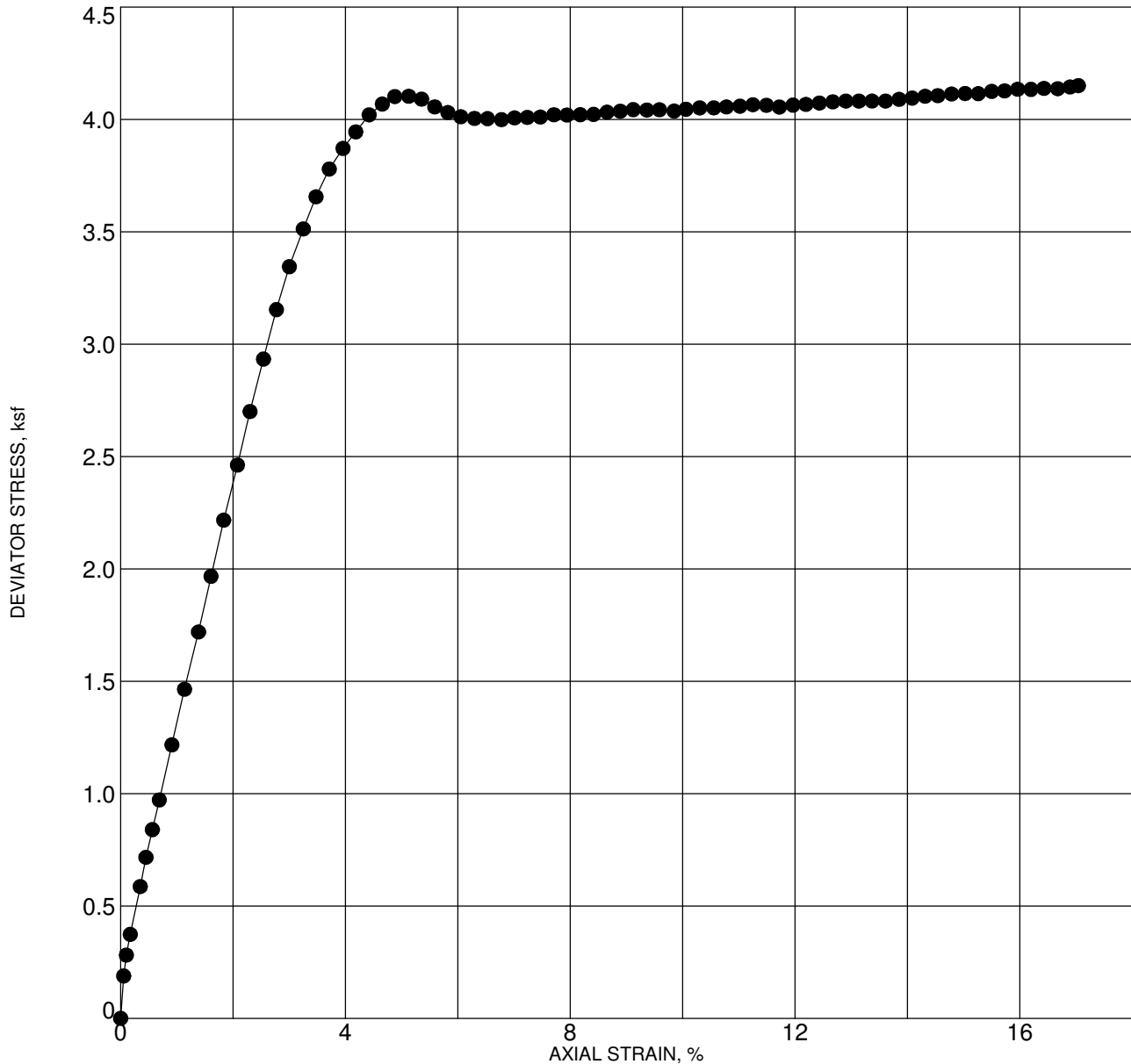
GEOTECHNICAL ENGINEERING

W.O. 8063-00

TRIAXIAL UU COMPRESSION TEST - ASTM D2850

SEISMIC RETROFIT OF KAHOLO BRIDGE
HAWAII BELT ROAD, PROJECT NO. BR-019-2(072)
DISTRICT OF HAMAKUA, ISLAND OF HAWAII

Plate
C - 5



Max. Deviator Stress (ksf): 4.1

Confining Stress (ksf): 1.0

Location: B-3

Depth: 10.0 - 11.5 feet

Description: Orangish brown with gray mottling clayey silt (MH) with some sand

Test Date: 6/4/2021

Dry Density (pcf)	65.1	Sample Diameter (inches)	2.413
Moisture (%)	49.7	Sample Height (inches)	5.100
Axial Strain at Failure (%)	14.8	Strain Rate (% / minute)	0.71



GEOLABS, INC.

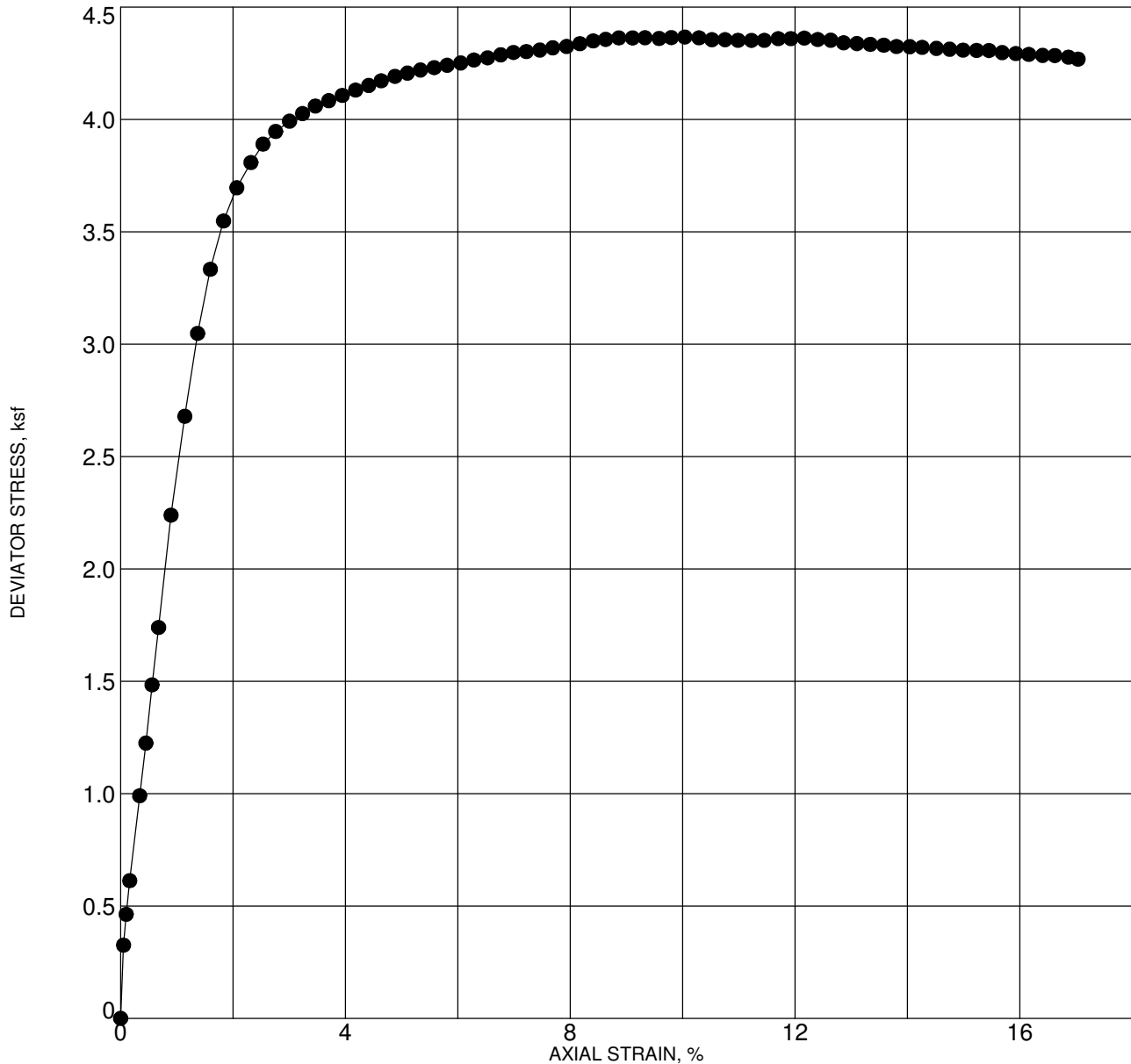
GEOTECHNICAL ENGINEERING

W.O. 8063-00

TRIAXIAL UU COMPRESSION TEST - ASTM D2850

SEISMIC RETROFIT OF KAHOLO BRIDGE
HAWAII BELT ROAD, PROJECT NO. BR-019-2(072)
DISTRICT OF HAMAKUA, ISLAND OF HAWAII

Plate
C - 6



Max. Deviator Stress (ksf): 4.4

Confining Stress (ksf): 1.5

Location: B-3

Depth: 15.0 - 16.5 feet

Description: Orangish brown with gray mottling clayey silt with some sand

Test Date: 6/4/2021

Dry Density (pcf)	56.7	Sample Diameter (inches)	2.413
Moisture (%)	67.9	Sample Height (inches)	5.100
Axial Strain at Failure (%)	10.0	Strain Rate (% / minute)	0.70



GEOLABS, INC.

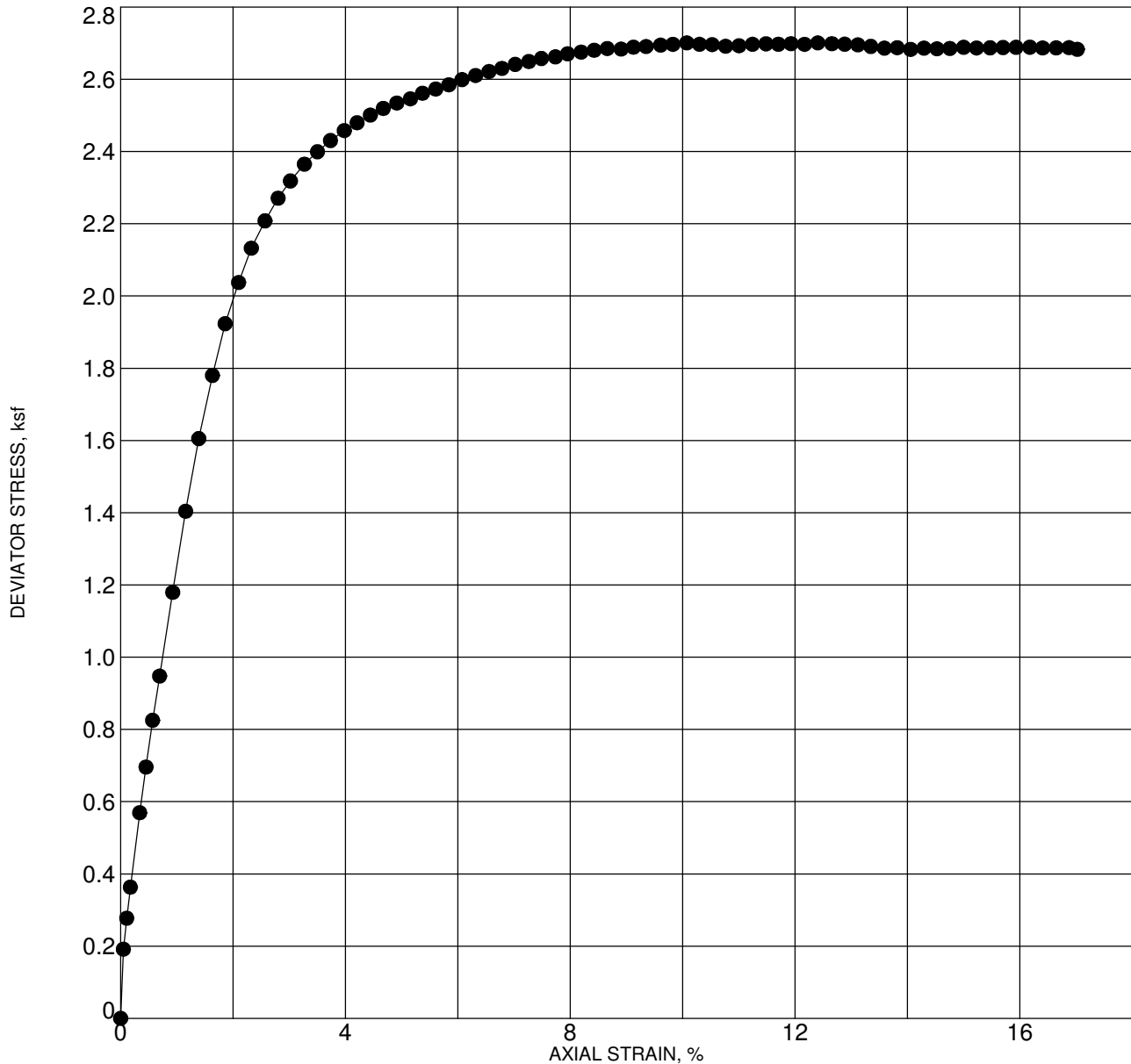
GEOTECHNICAL ENGINEERING

W.O. 8063-00

TRIAXIAL UU COMPRESSION TEST - ASTM D2850

SEISMIC RETROFIT OF KAHOLO BRIDGE
HAWAII BELT ROAD, PROJECT NO. BR-019-2(072)
DISTRICT OF HAMAKUA, ISLAND OF HAWAII

Plate
C - 7



Max. Deviator Stress (ksf): 2.7

Confining Stress (ksf): 1.0

Location: B-4

Depth: 10.0 - 11.5 feet

Description: Brown with orange mottling clayey silt with some sand

Test Date: 6/4/2021

Dry Density (pcf)	60.0	Sample Diameter (inches)	2.413
Moisture (%)	58.9	Sample Height (inches)	5.100
Axial Strain at Failure (%)	13.1	Strain Rate (% / minute)	0.70



GEOLABS, INC.

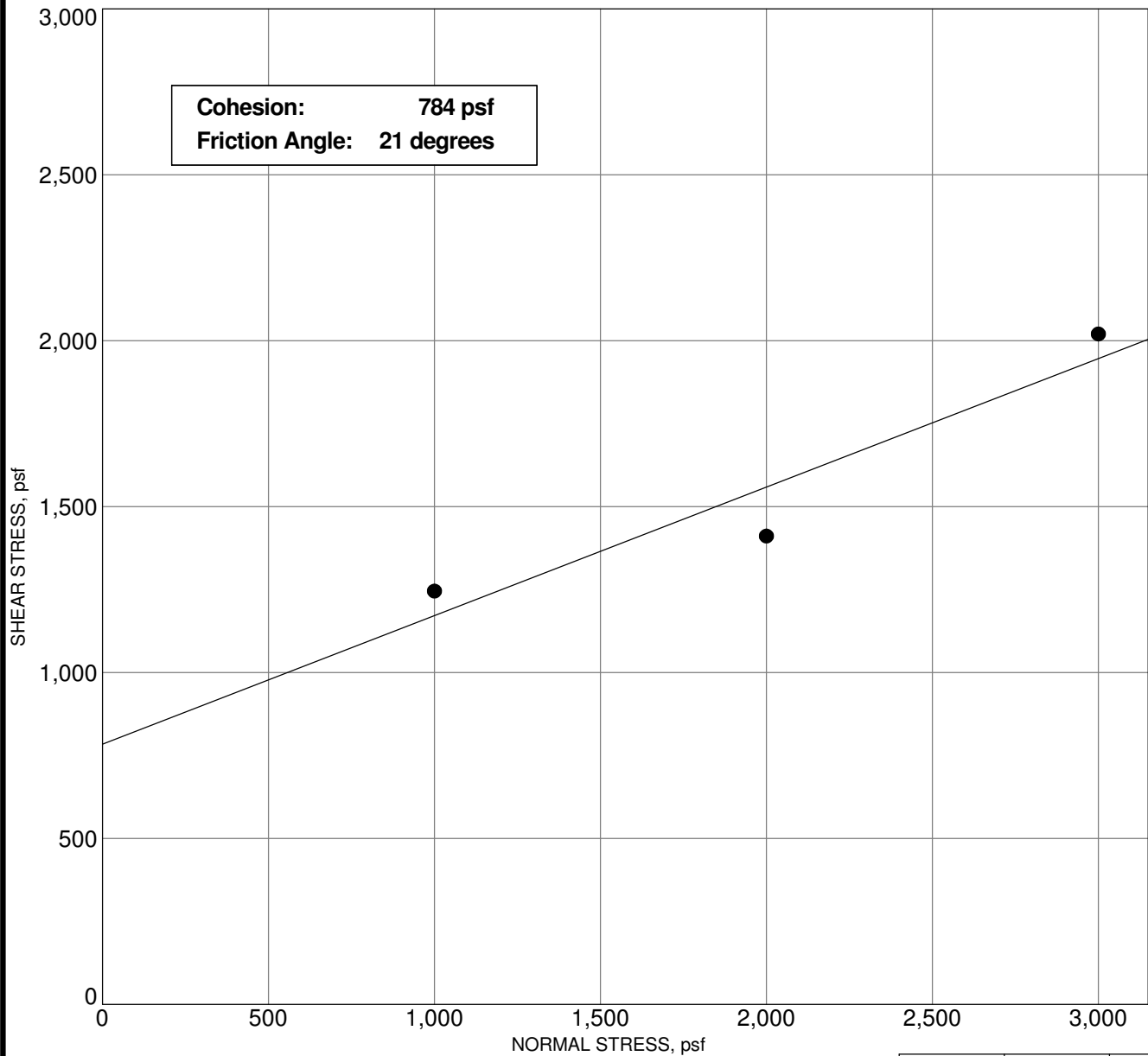
GEOTECHNICAL ENGINEERING

W.O. 8063-00

TRIAXIAL UU COMPRESSION TEST - ASTM D2850

SEISMIC RETROFIT OF KAHOLO BRIDGE
HAWAII BELT ROAD, PROJECT NO. BR-019-2(072)
DISTRICT OF HAMAKUA, ISLAND OF HAWAII

Plate
C - 8



Sample: B-1
 Depth: 15.0 - 16.5 feet
 Description: Orangish brown with gray mottling clayey silt with some sand

		Sample #1	Sample #2	Sample #3
INITIAL	Moisture Content, %	88.1	82.2	87.4
	Dry Density, pcf	52.3	56.4	53.8
	Height, inches	1.00	1.00	1.00
FINAL	Moisture Content, %	70.9	51.4	53.7
	Dry Density, pcf	51.1	58.3	56.0
	Height, inches	1.024	0.967	0.962
	Diameter, inches	2.42	2.42	2.42
	Deformation Rate, inch/minute	0.0024	0.0021	0.0023
	Normal Stress, psf	1000	2000	3000
	Peak Shear Stress, psf	1245	1411	2020
	Shear Displacement, inches	0.43	0.41	0.42

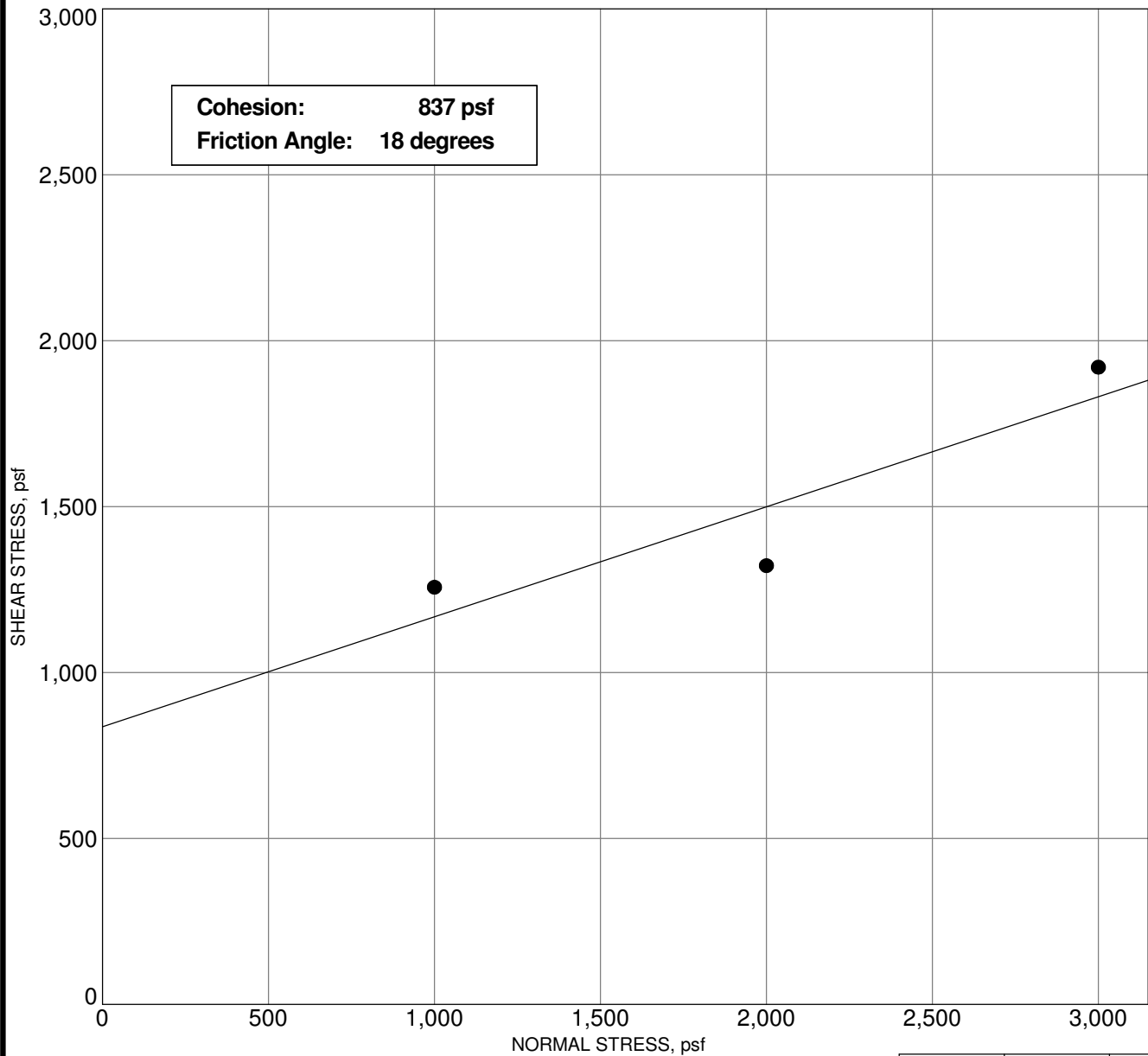


GEOLABS, INC.
 GEOTECHNICAL ENGINEERING
 W.O. 8063-00

DIRECT SHEAR TEST - ASTM D3080

SEISMIC RETROFIT OF KAHOLO BRIDGE
 HAWAII BELT ROAD, PROJECT NO. BR-019-2(072)
 DISTRICT OF HAMAKUA, ISLAND OF HAWAII

Plate
C - 9



Sample: B-2
Depth: 15.0 - 16.5 feet
Description: Brown clayey silt with some sand

		Sample #1	Sample #2	Sample #3
INITIAL	Moisture Content, %	80.0	74.0	74.2
	Dry Density, pcf	57.2	57.6	60.0
	Height, inches	1.00	1.00	1.00
FINAL	Moisture Content, %	68.0	64.1	62.5
	Dry Density, pcf	56.5	58.5	60.6
	Height, inches	1.013	0.986	0.990
	Diameter, inches	2.42	2.42	2.42
	Deformation Rate, inch/minute	0.0024	0.0007	0.0005
	Normal Stress, psf	1000	2000	3000
	Peak Shear Stress, psf	1257	1322	1920
	Shear Displacement, inches	0.42	0.36	0.35



GEOLABS, INC.

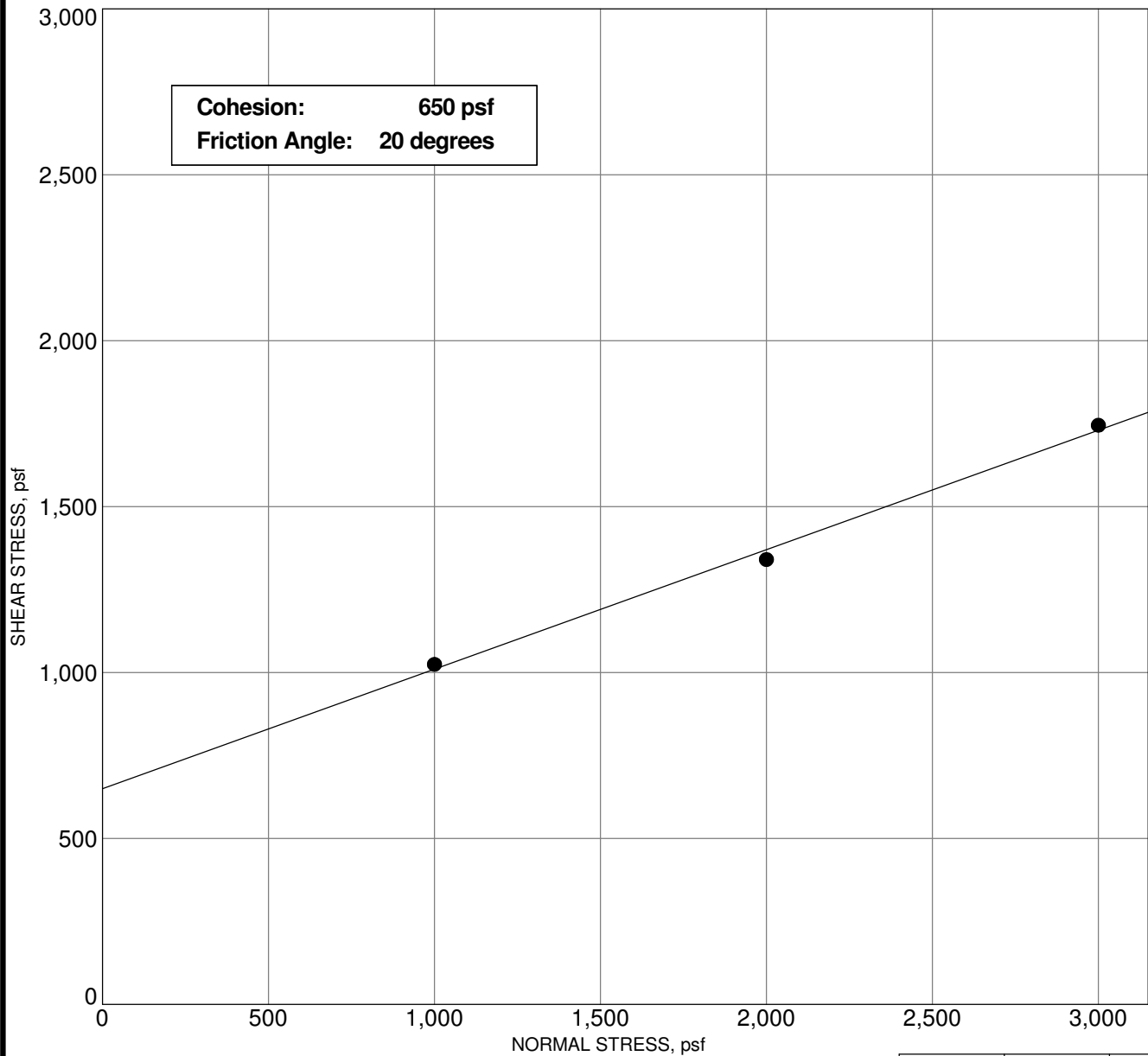
GEOTECHNICAL ENGINEERING

W.O. 8063-00

DIRECT SHEAR TEST - ASTM D3080

SEISMIC RETROFIT OF KAHOLO BRIDGE
HAWAII BELT ROAD, PROJECT NO. BR-019-2(072)
DISTRICT OF HAMAKUA, ISLAND OF HAWAII

Plate
C - 10



Sample: B-3
 Depth: 20.0 - 21.5 feet
 Description: Orangish brown with gray mottling clayey silt (MH) with a little sand

		Sample #1	Sample #2	Sample #3
INITIAL	Moisture Content, %	94.2	65.4	71.2
	Dry Density, pcf	45.6	54.4	54.1
	Height, inches	1.00	1.00	1.00
FINAL	Moisture Content, %	73.9	69.8	67.2
	Dry Density, pcf	45.8	54.9	55.5
	Height, inches	0.996	0.992	0.975
	Diameter, inches	2.42	2.42	2.42
	Deformation Rate, inch/minute	0.0025	0.0022	0.0015
	Normal Stress, psf	1000	2000	3000
	Peak Shear Stress, psf	1025	1341	1745
	Shear Displacement, inches	0.43	0.42	0.37

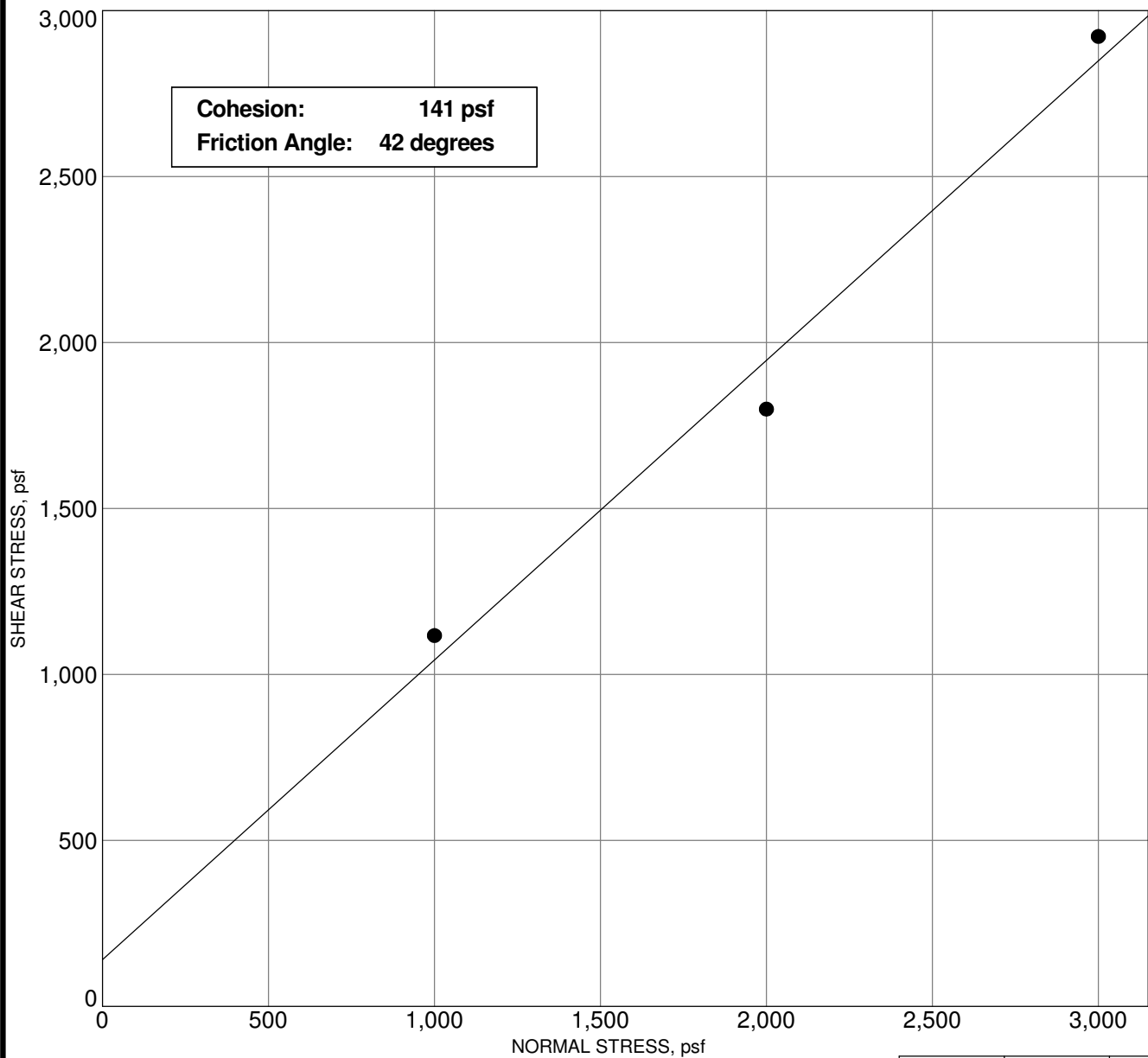


GEOLABS, INC.
 GEOTECHNICAL ENGINEERING
 W.O. 8063-00

DIRECT SHEAR TEST - ASTM D3080

SEISMIC RETROFIT OF KAHOLO BRIDGE
 HAWAII BELT ROAD, PROJECT NO. BR-019-2(072)
 DISTRICT OF HAMAKUA, ISLAND OF HAWAII

Plate
C - 11



Sample: B-4
Depth: 20.0 - 20.9 feet
Description: Brown with orange mottling clayey silt with some sand

		Sample #1	Sample #2	Sample #3
INITIAL	Moisture Content, %	74.4	61.7	68.1
	Dry Density, pcf	56.4	63.4	61.5
	Height, inches	1.00	1.00	1.00
FINAL	Moisture Content, %	66.8	55.6	56.3
	Dry Density, pcf	54.4	64.0	63.1
	Height, inches	1.038	0.991	0.974
	Diameter, inches	2.42	2.42	2.42
	Deformation Rate, inch/minute	0.0024	0.0023	0.0023
	Normal Stress, psf	1000	2000	3000
	Peak Shear Stress, psf	1117	1799	2922
	Shear Displacement, inches	0.43	0.41	0.41



GEOLABS, INC.
GEOTECHNICAL ENGINEERING
W.O. 8063-00

DIRECT SHEAR TEST - ASTM D3080

SEISMIC RETROFIT OF KAHOLO BRIDGE
HAWAII BELT ROAD, PROJECT NO. BR-019-2(072)
DISTRICT OF HAMAKUA, ISLAND OF HAWAII

Plate
C - 12