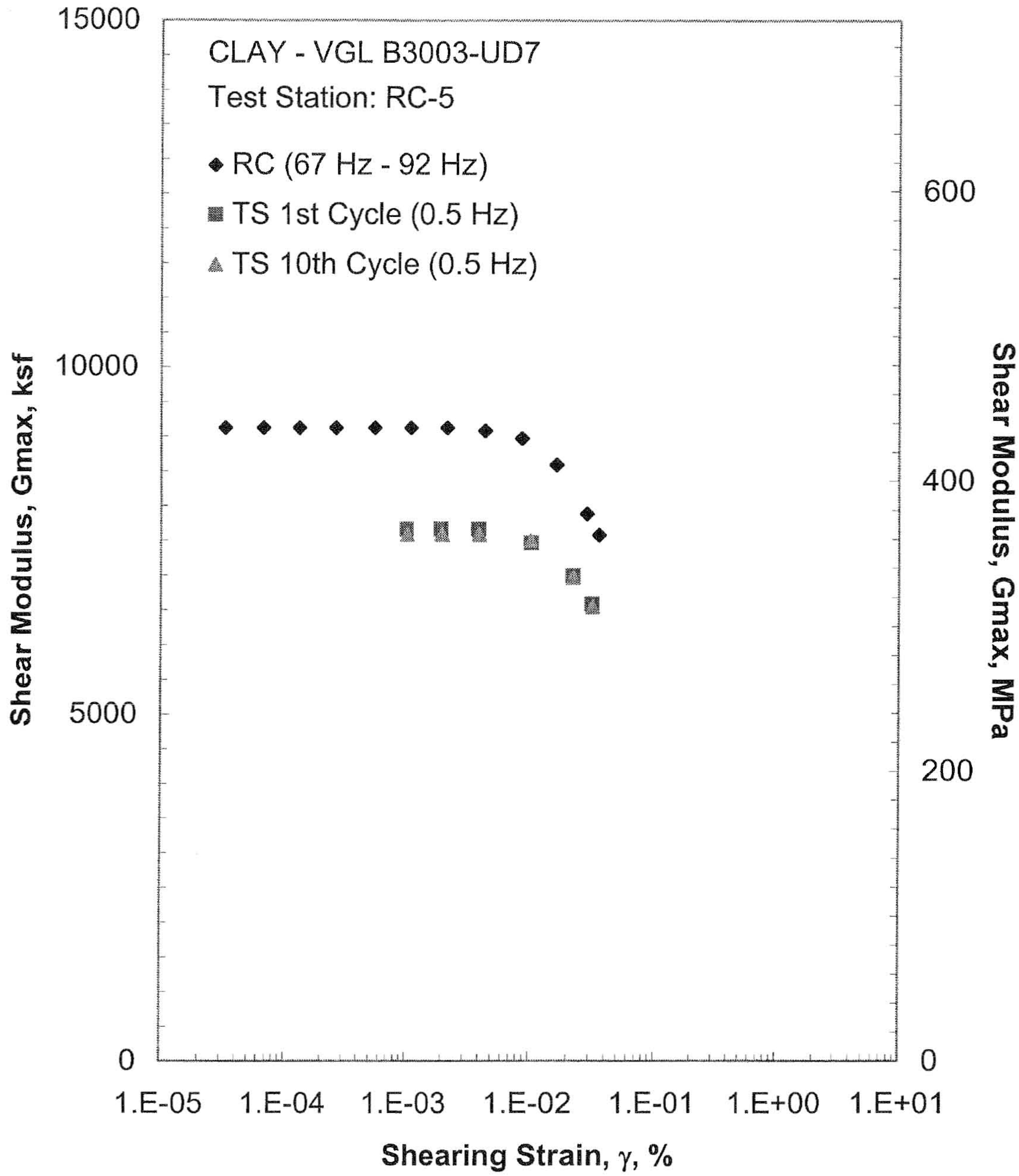


Figure F.16 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 280.7 psi from the Combined RCTS Tests

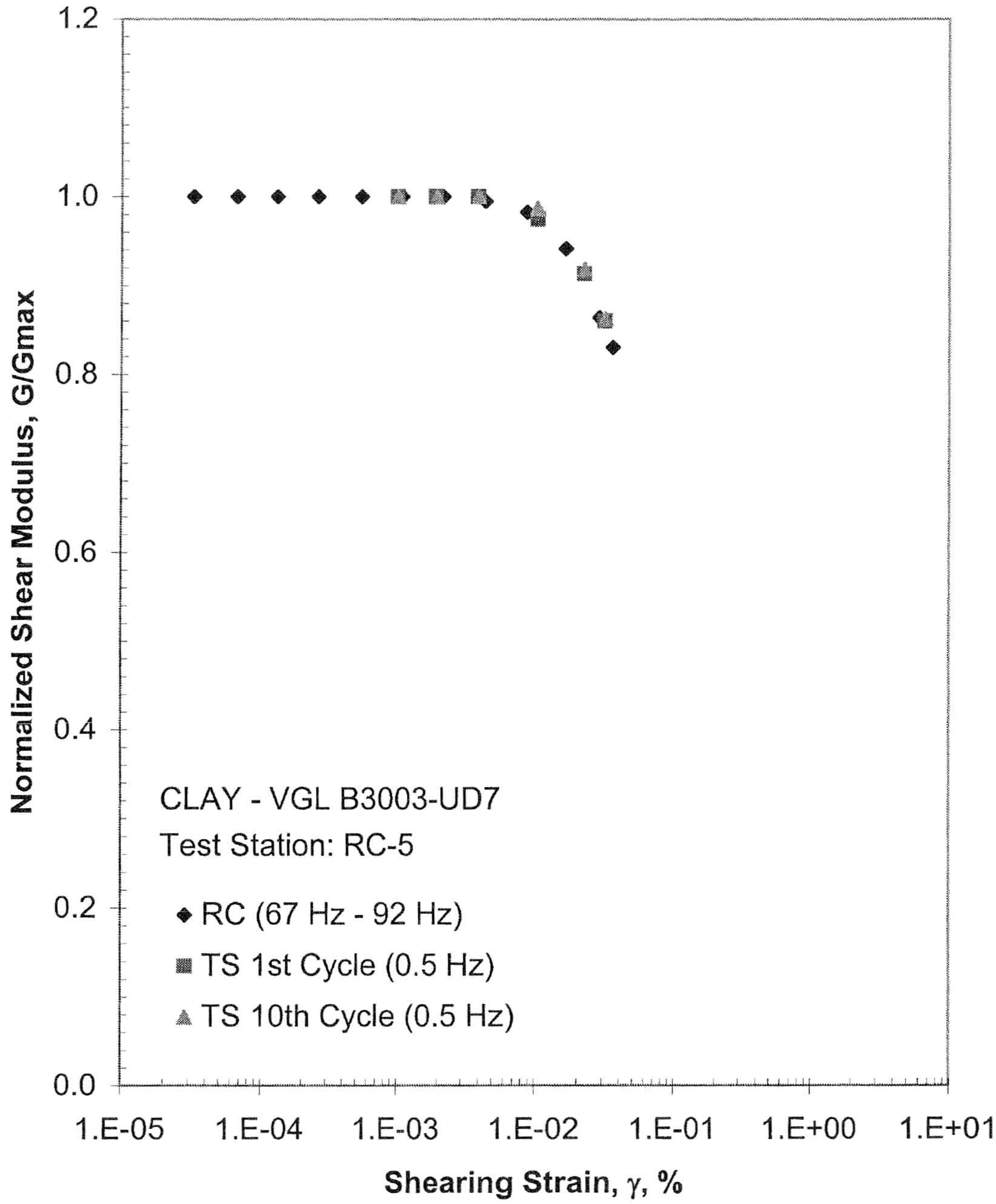


Figure F.17 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 280.7 psi from the Combined RCTS Tests

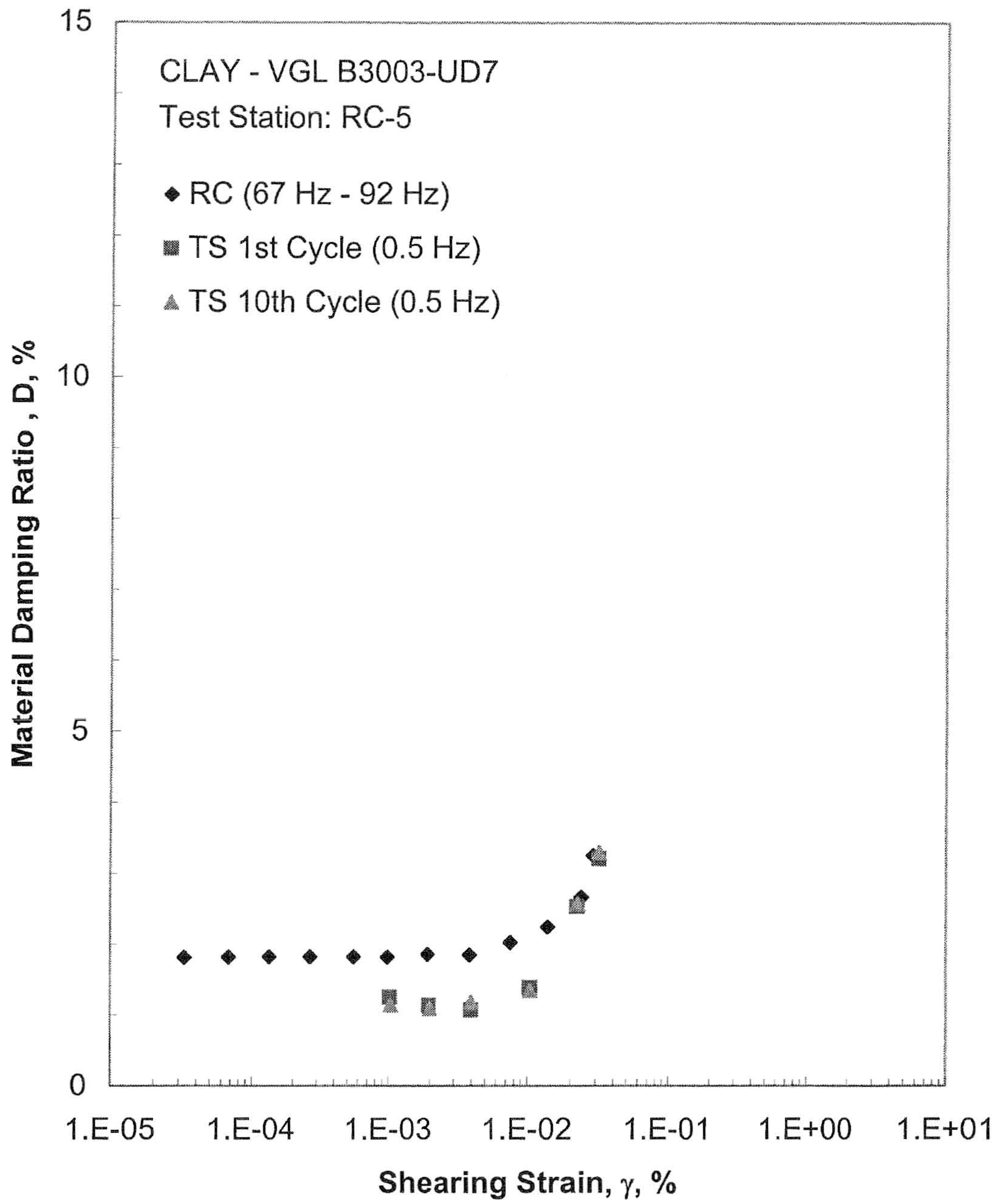


Figure F.18 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 280.7 psi from the Combined RCTS Tests

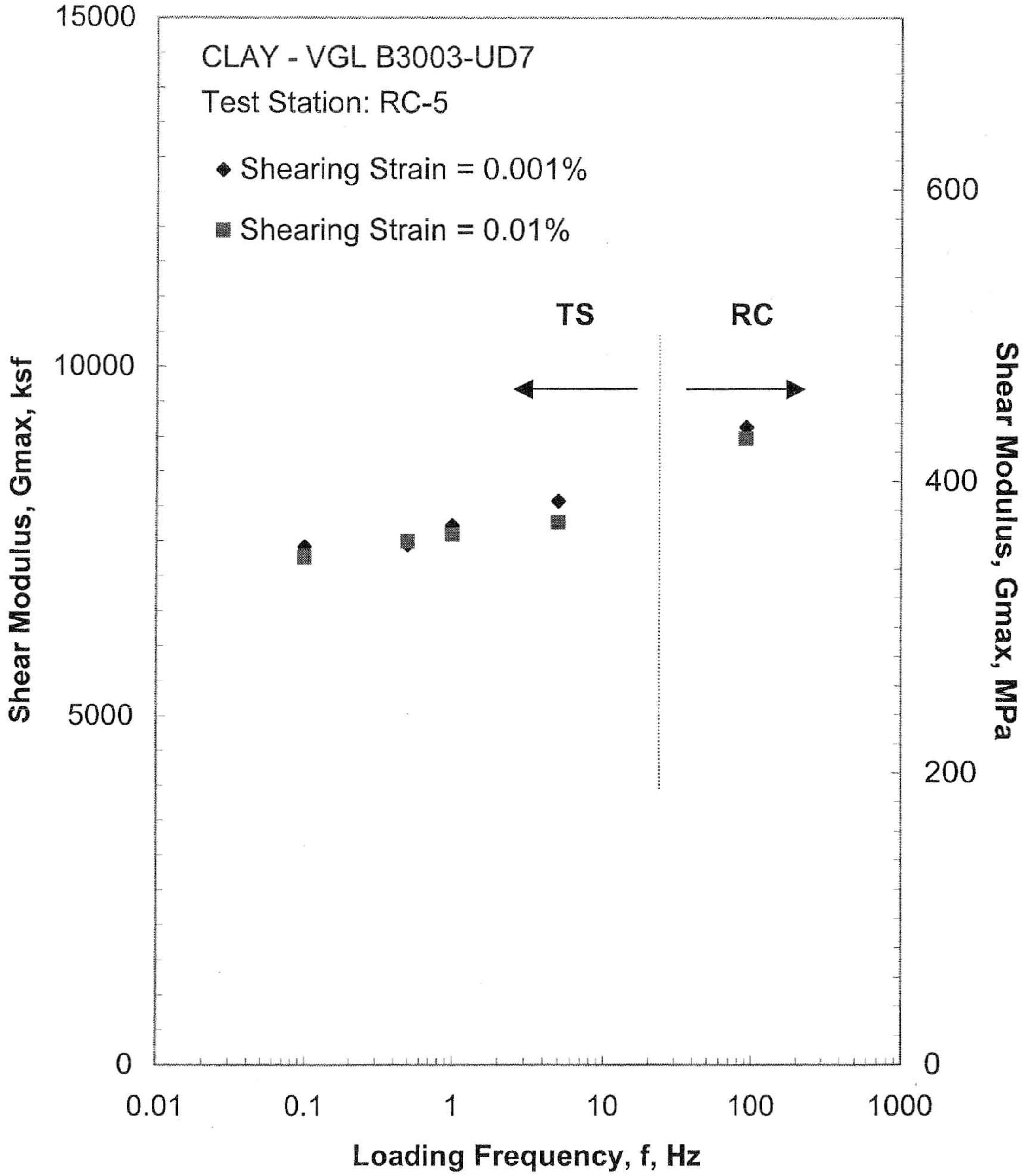


Figure F.19 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 280.7 psi from the Combined RCTS Tests

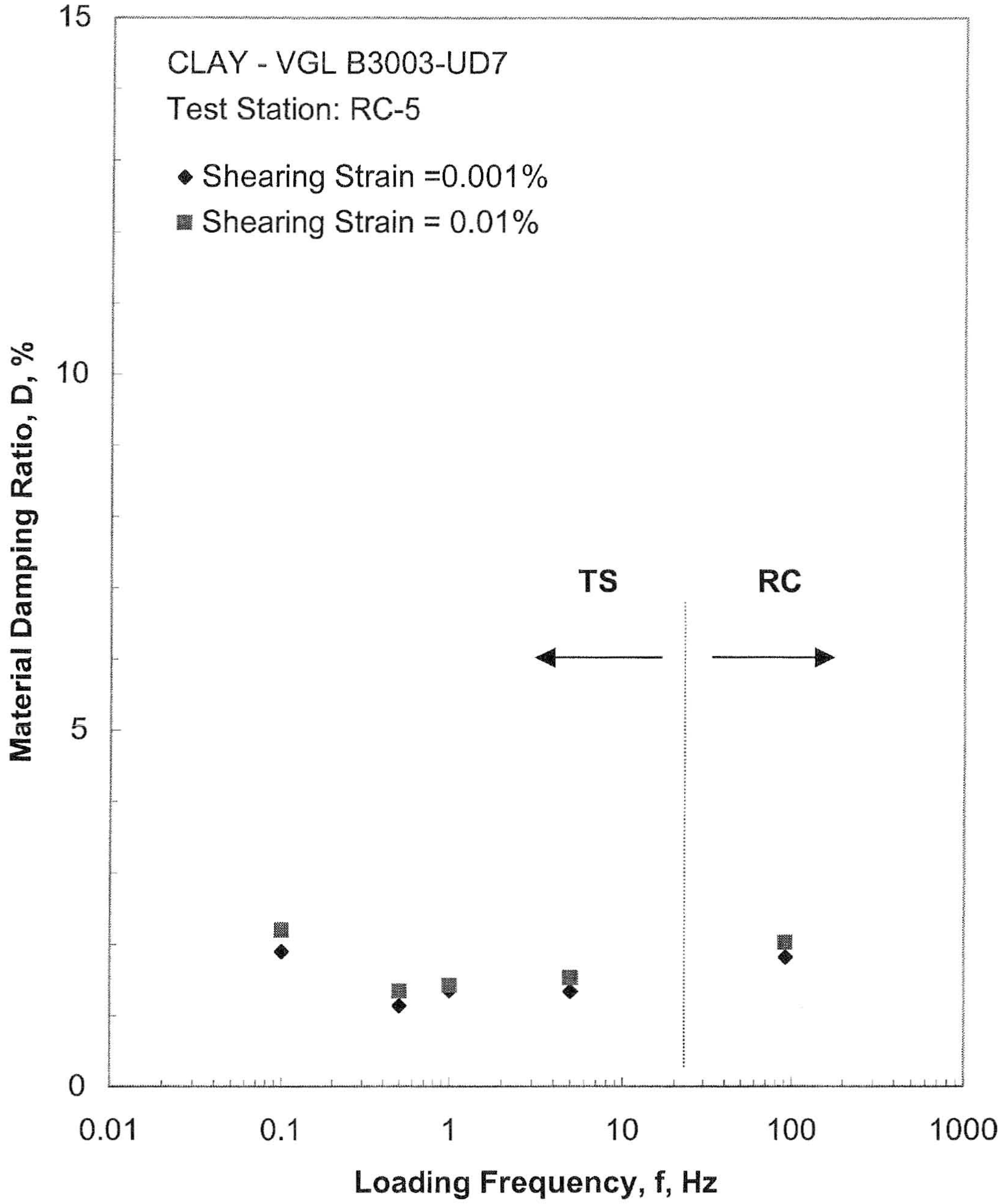


Figure F.20 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 280.7 psi from the Combined RCTS Tests

Table F.1 Variation in Low-Amplitude Shear Wave Velocity, Low-Amplitude Shear Modulus, Low-Amplitude Material Damping Ratio and Estimated Void Ratio with Isotropic Confining Pressure from RC Tests of Specimen VGL B3003-UD7

Isotropic Confining Pressure, σ_o			Low-Amplitude Shear Modulus, G_{max}		Low-Amplitude Shear Wave Velocity, Vs	Low-Amplitude Material Damping Ratio, Dmin	Estimated Void Ratio, e
(psi)	(psf)	(kPa)	(ksf)	(MPa)	(fps)	(%)	
17.5	2520	121	4268	205	1037	2.29	0.598
35.1	5054	242	4572	219	1072	2.21	0.594
70.2	10109	484	4906	235	1107	1.98	0.586
140.4	20218	967	6444	309	1257	1.91	0.555
280.7	40421	1934	8978	431	1472	1.72	0.532

Table F.2 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen VGL B3003-UD7; Isoptropic Confining Pressure, σ_o=70.2 psi (10.1 ksf = 484 kPa)

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Average$^+$ Shearing Strain, %	Material Damping Ratio^x, D, %
7.40E-05	5081	1.00	7.40E-05	1.97
1.51E-04	5081	1.00	1.51E-04	1.90
2.94E-04	5081	1.00	2.94E-04	1.97
6.14E-04	5081	1.00	6.14E-04	2.04
1.23E-03	5070	1.00	1.06E-03	2.05
2.44E-03	5070	1.00	2.05E-03	2.12
4.89E-03	5025	0.99	4.11E-03	2.16
9.69E-03	4938	0.97	8.14E-03	2.28
1.82E-02	4711	0.93	1.53E-02	2.79
3.22E-02	4265	0.79	2.54E-02	3.25
5.98E-02	3576	0.70	4.43E-02	4.81
1.22E-01	2748	0.54	7.45E-02	9.22

$^+$ Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

^{x} Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table F.3 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen VGL B3003-UD7; Isotropic Confining Pressure, σ_o = 70.2 psi (10.1 ksf =484 kPa)

First Cycle				Tenth Cycle			
Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %	Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %
1.01E-03	3420	1.00	0.91	1.02E-03	3355	1.00	0.96
1.96E-03	3420	1.00	0.86	2.00E-03	3355	1.00	0.96
3.93E-03	3418	1.00	1.04	3.93E-03	3355	1.00	1.01
1.03E-02	3251	0.95	1.68	1.04E-02	3230	0.96	1.67
2.26E-02	2951	0.86	2.69	2.29E-02	2914	0.87	2.78
4.28E-02	2340	0.68	5.63	4.27E-02	2348	0.70	5.45

Table F.4 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen VGL B3003-UD7; Isoptropic Confining Pressure, σ_o= 280.7 psi (40.4 ksf = 1934 kPa)

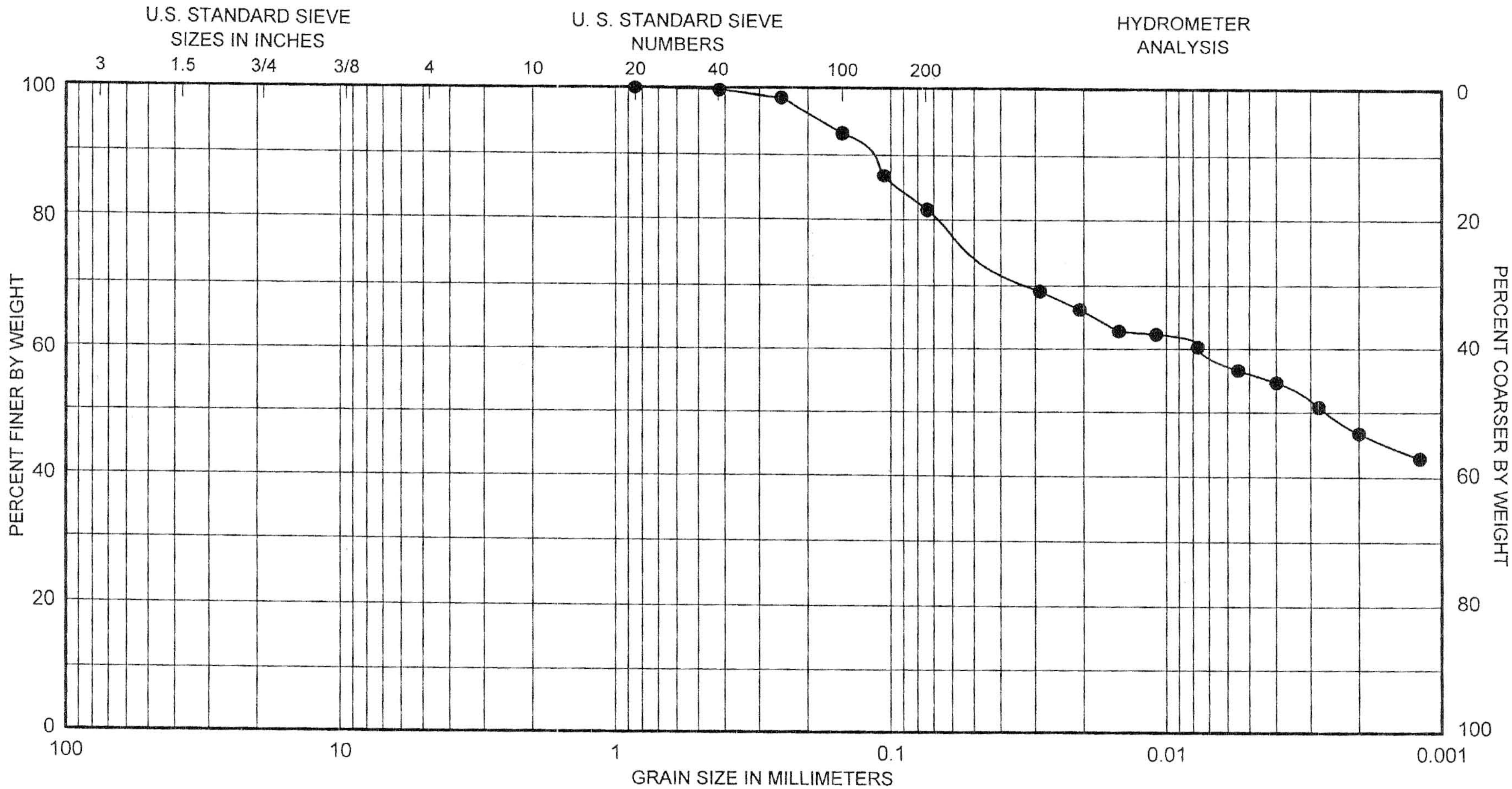
Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Average+ Shearing Strain, %	Material Damping Ratio^x, D, %
3.30E-05	9125	1.00	3.30E-05	1.82
6.80E-05	9125	1.00	6.80E-05	1.82
1.34E-04	9125	1.00	1.34E-04	1.83
2.67E-04	9125	1.00	2.67E-04	1.83
5.58E-04	9125	1.00	5.58E-04	1.83
1.11E-03	9125	1.00	9.79E-04	1.82
2.22E-03	9125	1.00	1.93E-03	1.86
4.45E-03	9078	0.99	3.87E-03	1.85
8.79E-03	8968	0.98	7.56E-03	2.03
1.65E-02	8589	0.94	1.38E-02	2.25
2.87E-02	7882	0.86	2.38E-02	2.66
3.61E-02	7577	0.83	2.89E-02	3.25

+ Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

x Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table F.5 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen VGL B3003-UD7; Isotropic Confining Pressure, σ_o=280.7 psi (40.4 ksf = 1934 kPa)

First Cycle				Tenth Cycle			
Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %	Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %
1.02E-03	7658	1.00	1.25	1.04E-03	7586	1.00	1.14
1.97E-03	7658	1.00	1.14	2.00E-03	7586	1.00	1.10
3.97E-03	7658	1.00	1.07	3.98E-03	7586	1.00	1.18
1.04E-02	7465	0.97	1.39	1.04E-02	7487	0.99	1.35
2.23E-02	6992	0.91	2.53	2.24E-02	6967	0.92	2.57
3.16E-02	6585	0.86	3.20	3.18E-02	6541	0.86	3.29



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT	C_c	C_u	D_{50}	D_{90}	CLASSIFICATION
●	B-3003-UD7	215.5			0.0026	0.13	Clay, light gray

GRAIN SIZE CURVE

FUGRO CONSULTANTS, INC.

6100 Hillcroft (77081)
P.O. Box 740010
Houston, Texas 77274
Tel: 713-369-5400
Fax: 713-369-5518

November 27, 2007

Mr. Wm. Allen Lancaster
MACTEC Engineering and Consulting, Inc.
396 Plasters Avenue
Atlanta, Georgia 30324

RE: Two (2) Reports For The Vogtle (a.k.a. VGL) Project

Dear Mr. Lancaster:

Fugro has completed two (2) RCTS tests, which are TP-B-1117 at 95% and TP-B-1117 at 97%, for the VGL project. Fugro has incorporated, as needed, Dr. Kenneth Stokoe's comments into the final reports. The final reports and the associated RCTS Test Approval by Dr. Kenneth Stokoe have been attached.

Please let us know if you have questions. Thanks.

Very truly yours,

Fugro Consultants, Inc.

Jiewu Meng, PhD, P.E.
Project Engineer

Bill DeGroff, P.E.
Laboratory Department Manager

Enclosures

DCN VGCOL 382
54 pages

RCTS TEST APROVAL

PROJECT SITE/NAME	VGL

Test ID	Sample ID	Depth B.S. (Ft)	Approved By (Initials)	Date
RCTS#G	TP-B-1117, 95%	7	KHS (+)	23 Nov 07
RCTS#H	TP-B-1117, 97%	7	KHS	23 Nov 07

Two RCTS tests for the site referenced above were tested, and two reports were prepared, by Fugro Consultants, Inc.

I have reviewed the data and associated results listed above and found them to be reasonable.

Approved By:

K. H. Stokoe

Dr. Kenneth Stokoe

(+) Very good tests. See a couple comments.

APPENDIX G

Specimen TP-B-1117
Reconstituted Engineering Fill at 95% Compaction

Borehole ---
B-1117
Depth = 7.0 ft (2.1 m)
Total Unit Weight = 118.4 lb/ft^3
Water Content = 11.9 %
Estimated In-Situ Ko = 0.5
Estimated In-Situ Mean Effective
Stress = 33.0 psi

FUGRO JOB #: 0401-1667
Testing Station: RC6

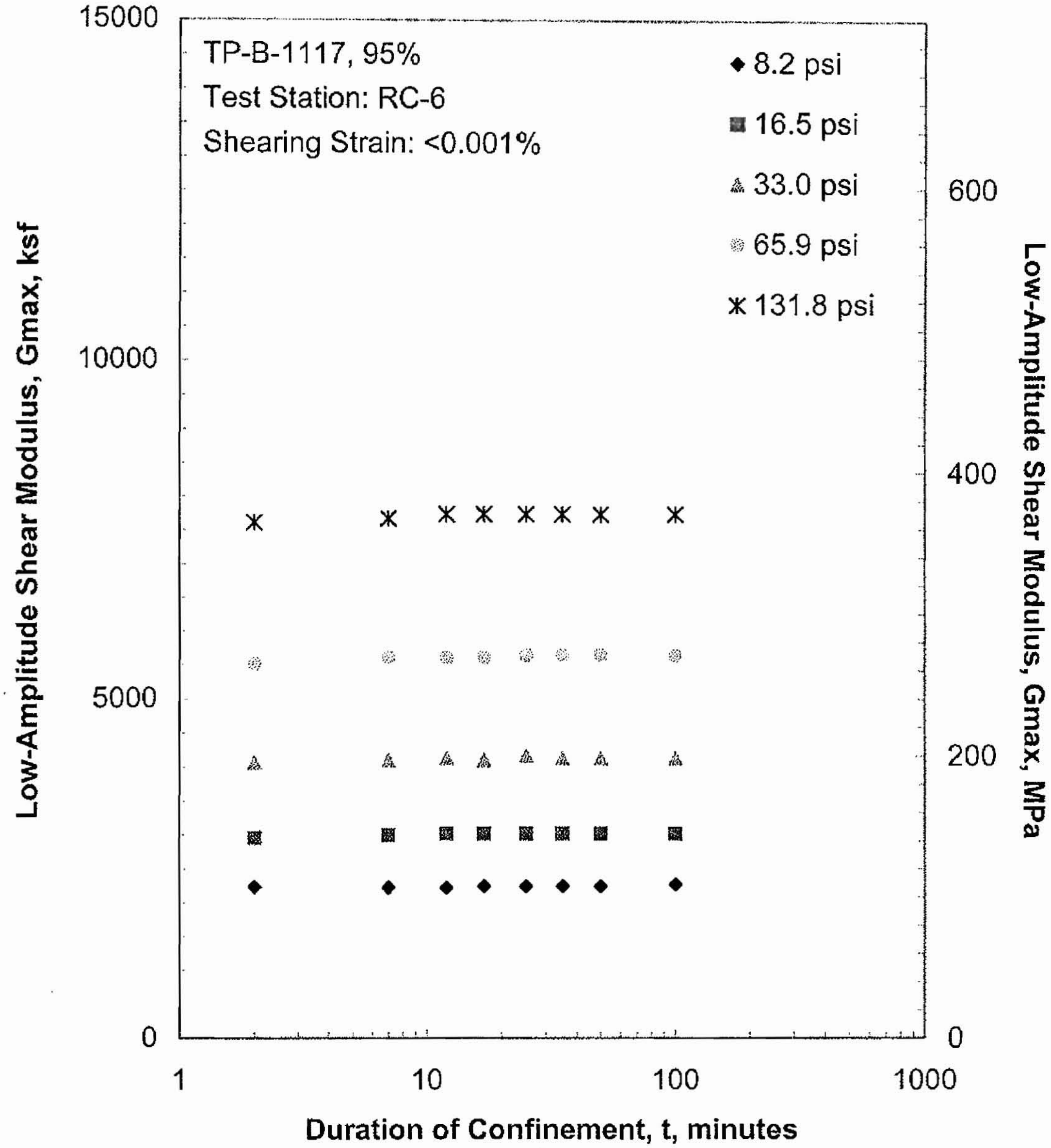


Figure G.1 Variation in Low-Amplitude Shear Modulus with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

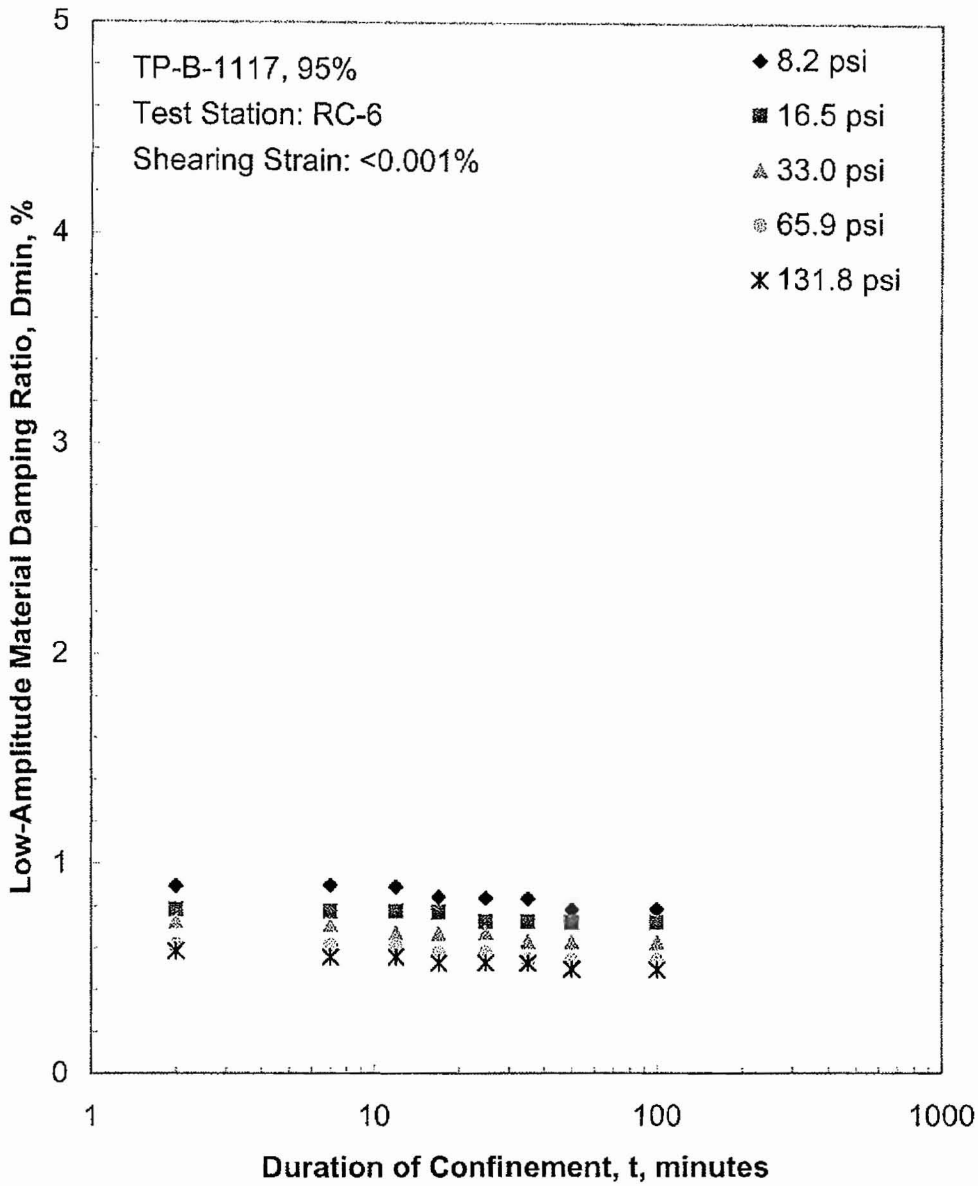


Figure G.2 Variation in Low-Amplitude Material Damping Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

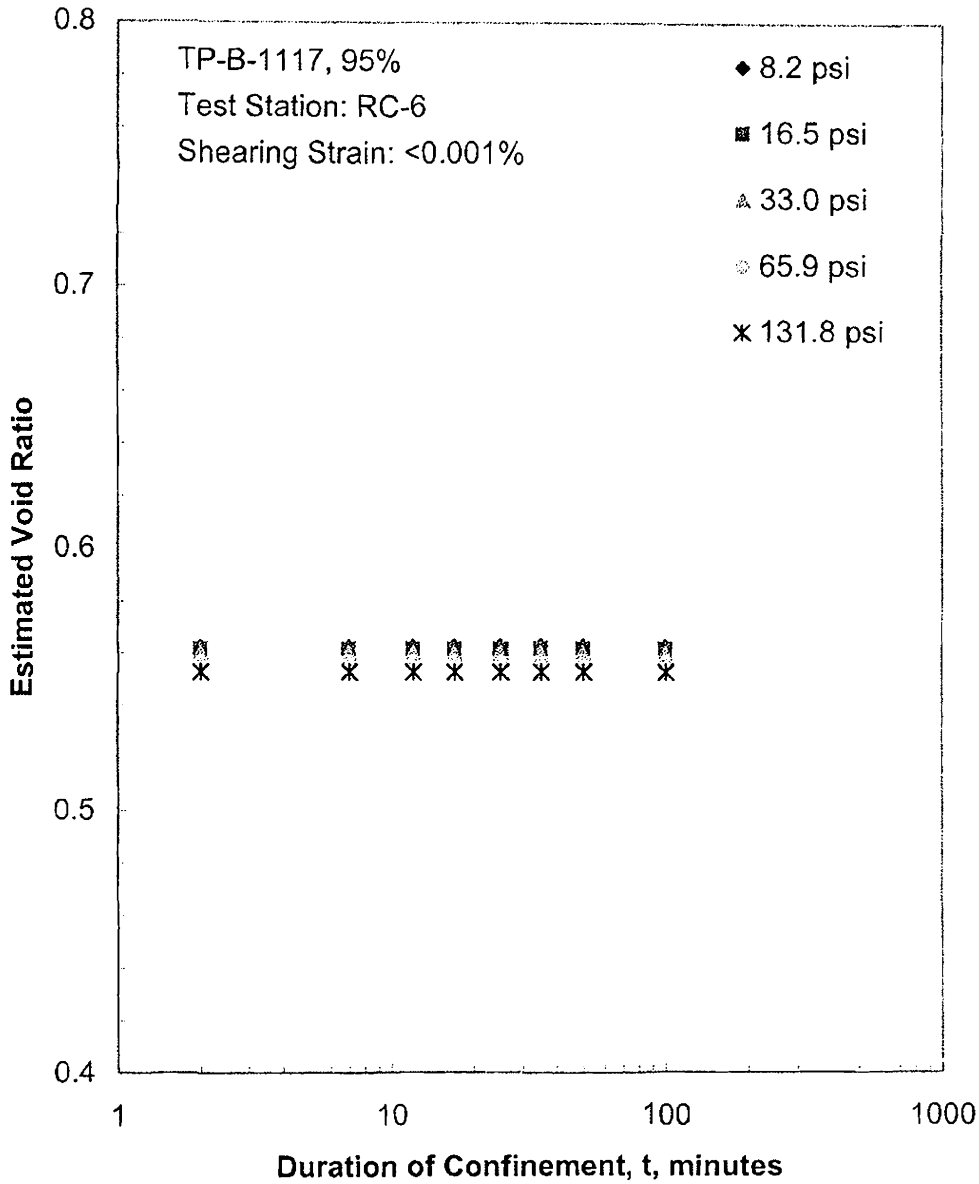


Figure G.3 Variation in Estimated Void Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

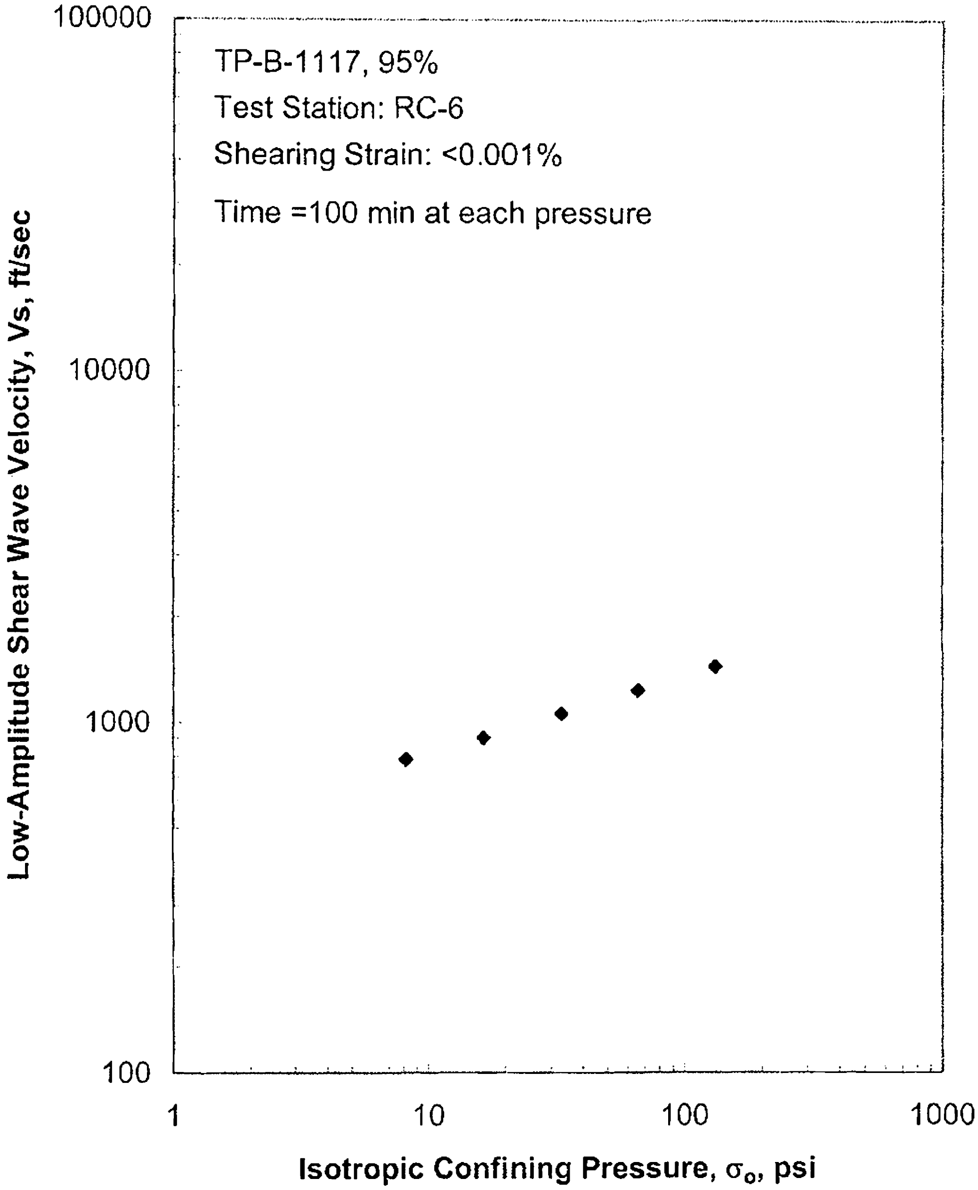


Figure G.4 Variation in Low-Amplitude Shear Wave Velocity with Isotropic Confining Pressure from Resonant Column Tests

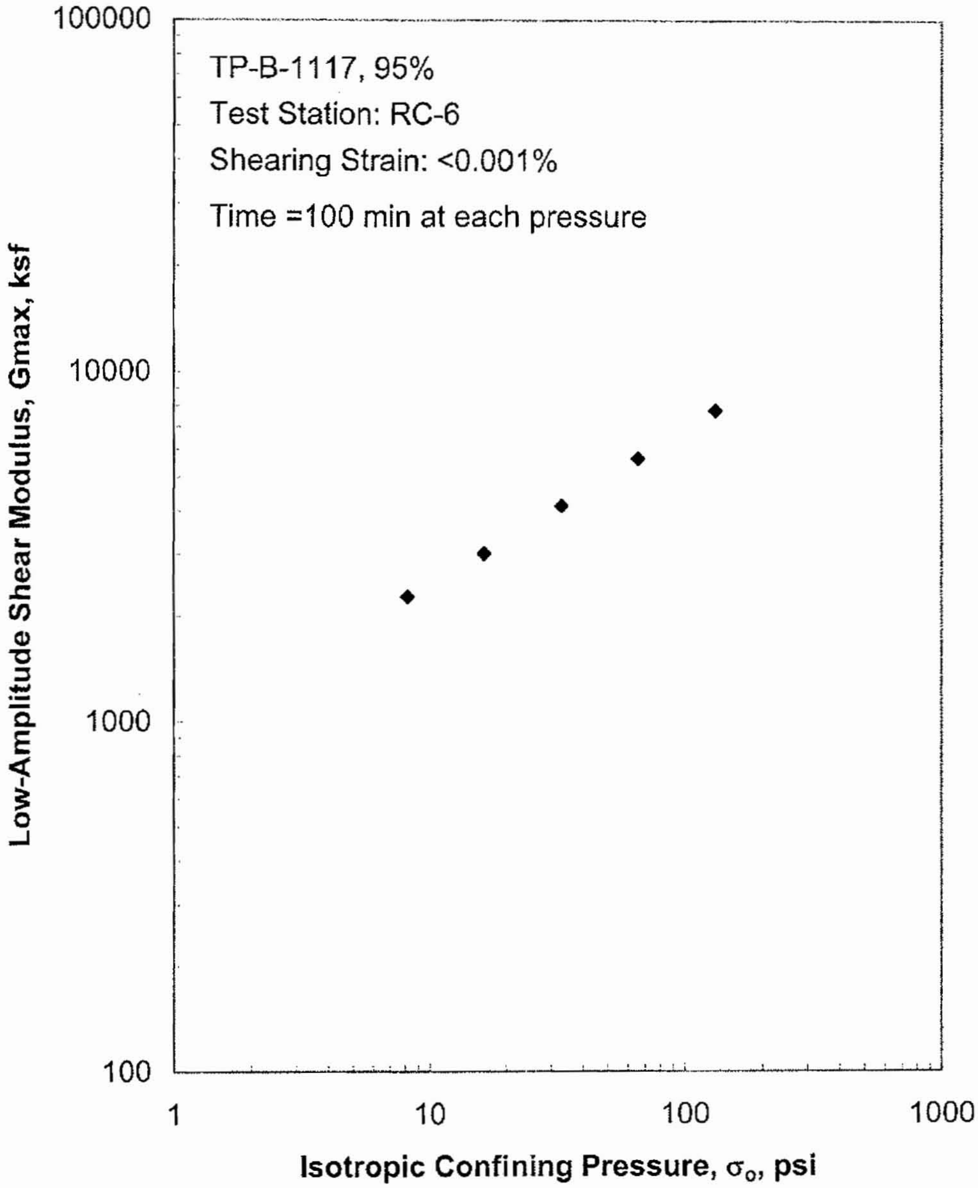


Figure G.5 Variation in Low-Amplitude Shear Modulus with Isotropic Confining Pressure from Resonant Column Tests

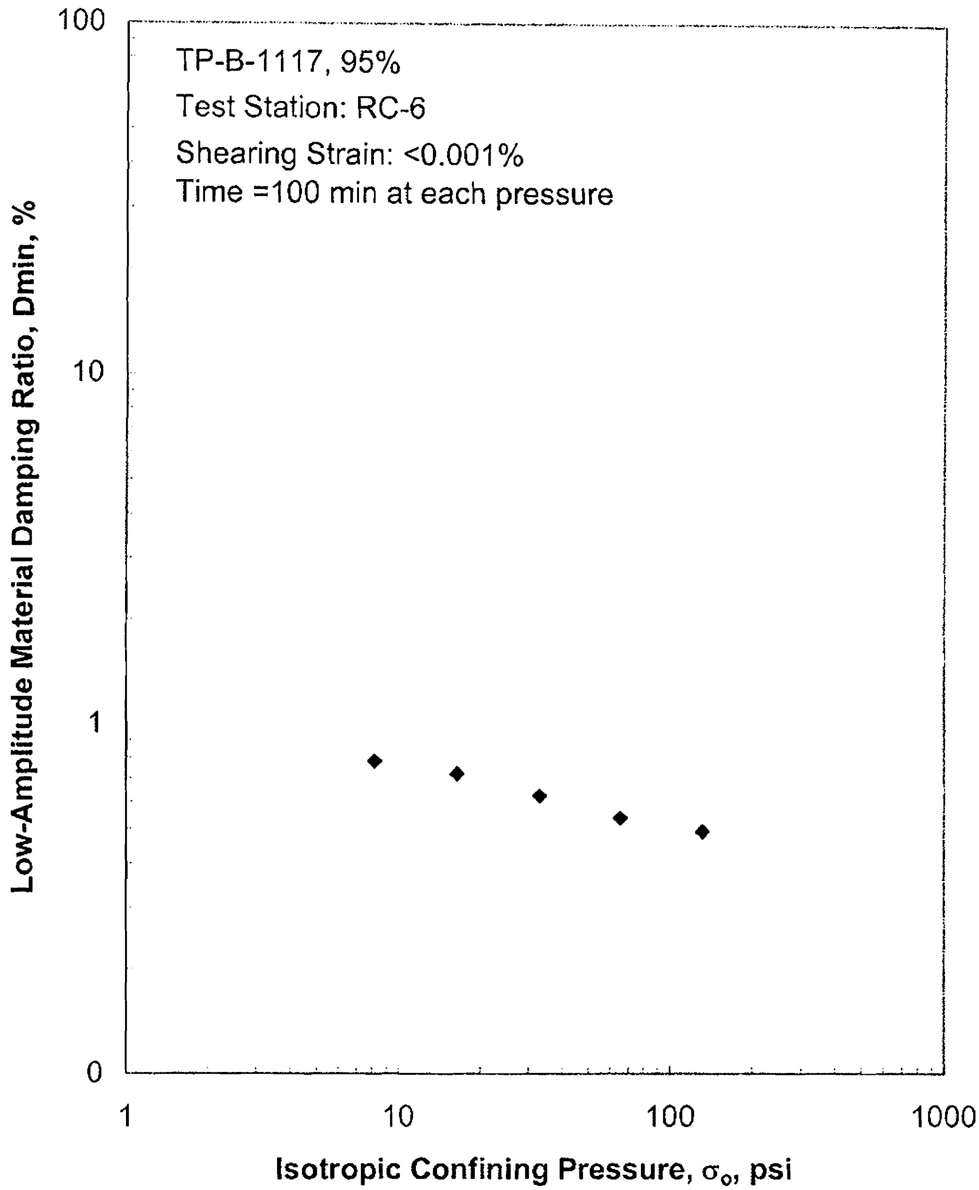


Figure G.6 Variation in Low-Amplitude Material Damping Ratio with Isotropic Confining Pressure from Resonant Column Tests

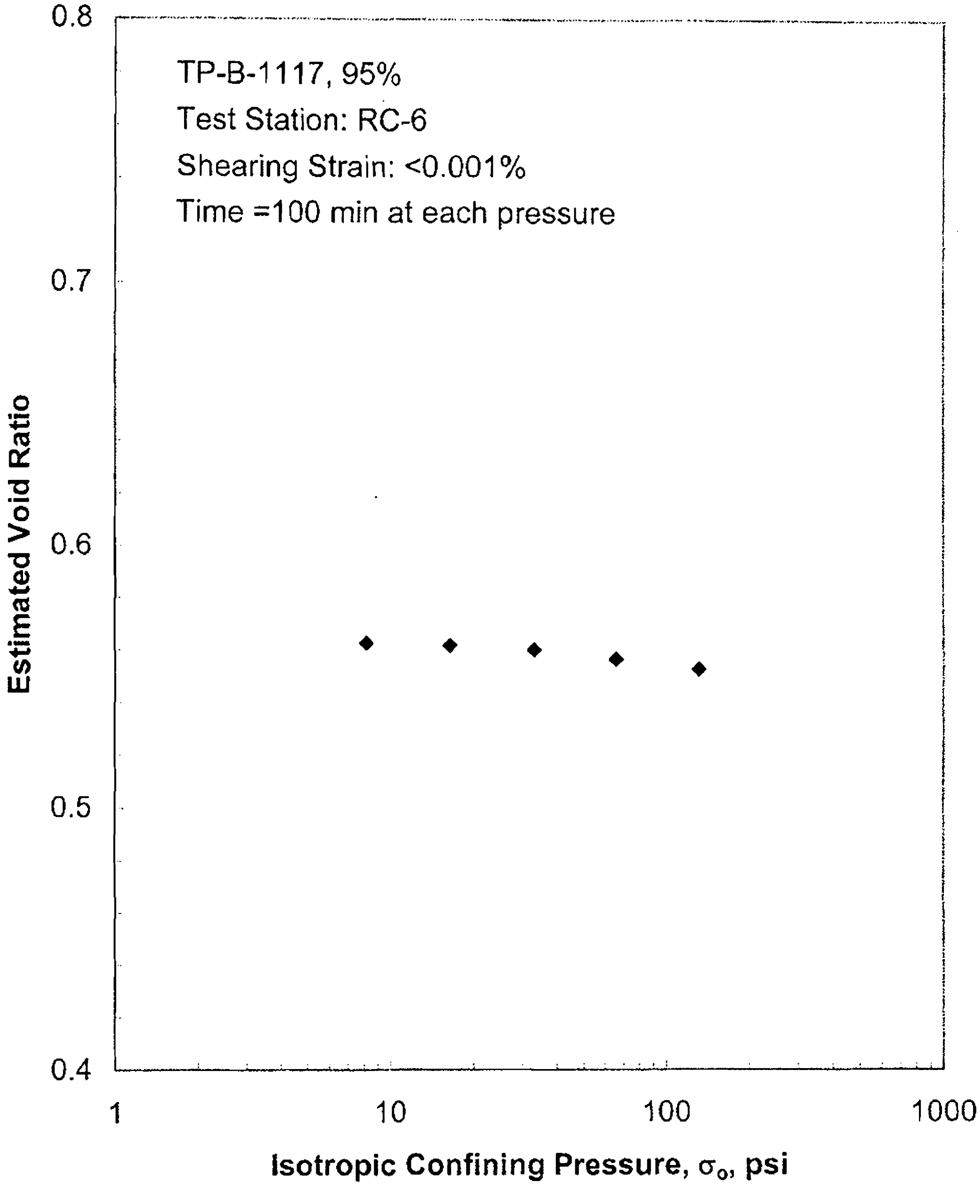


Figure G.7 Variation in Estimated Void Ratio with Isotropic Confining Pressure from Resonant Column Tests

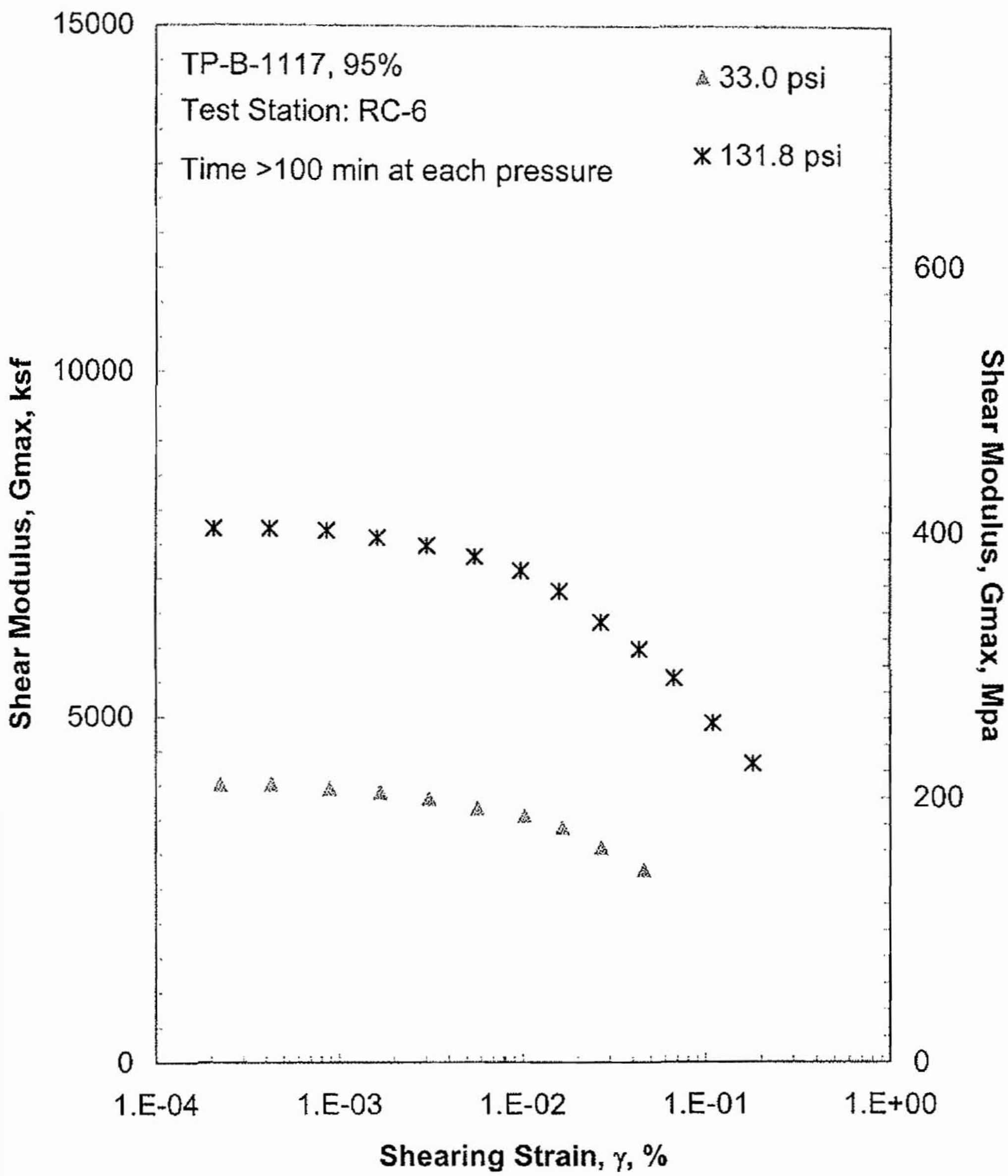


Figure G.8 Comparison of the Variation in Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

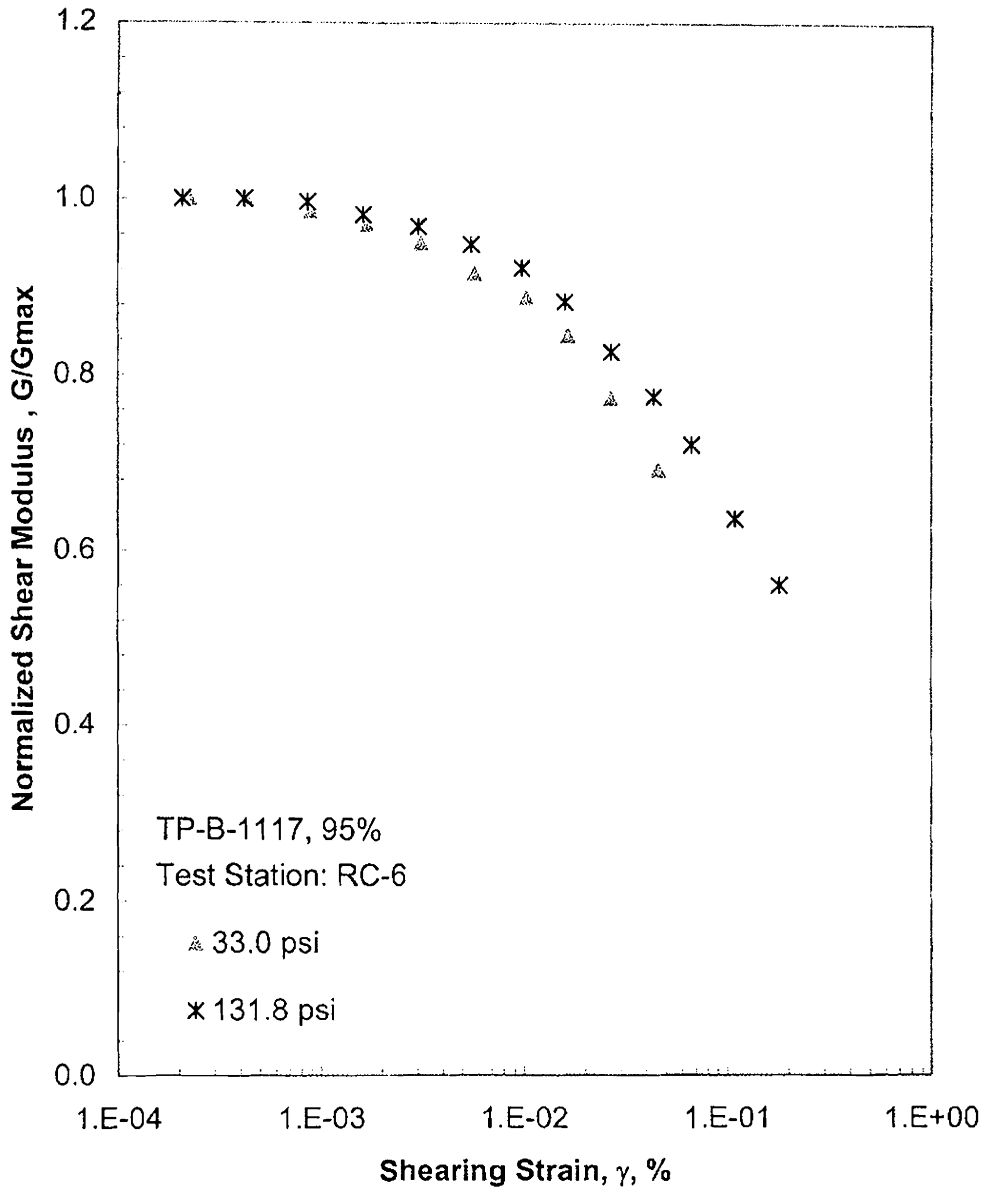


Figure G.9 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

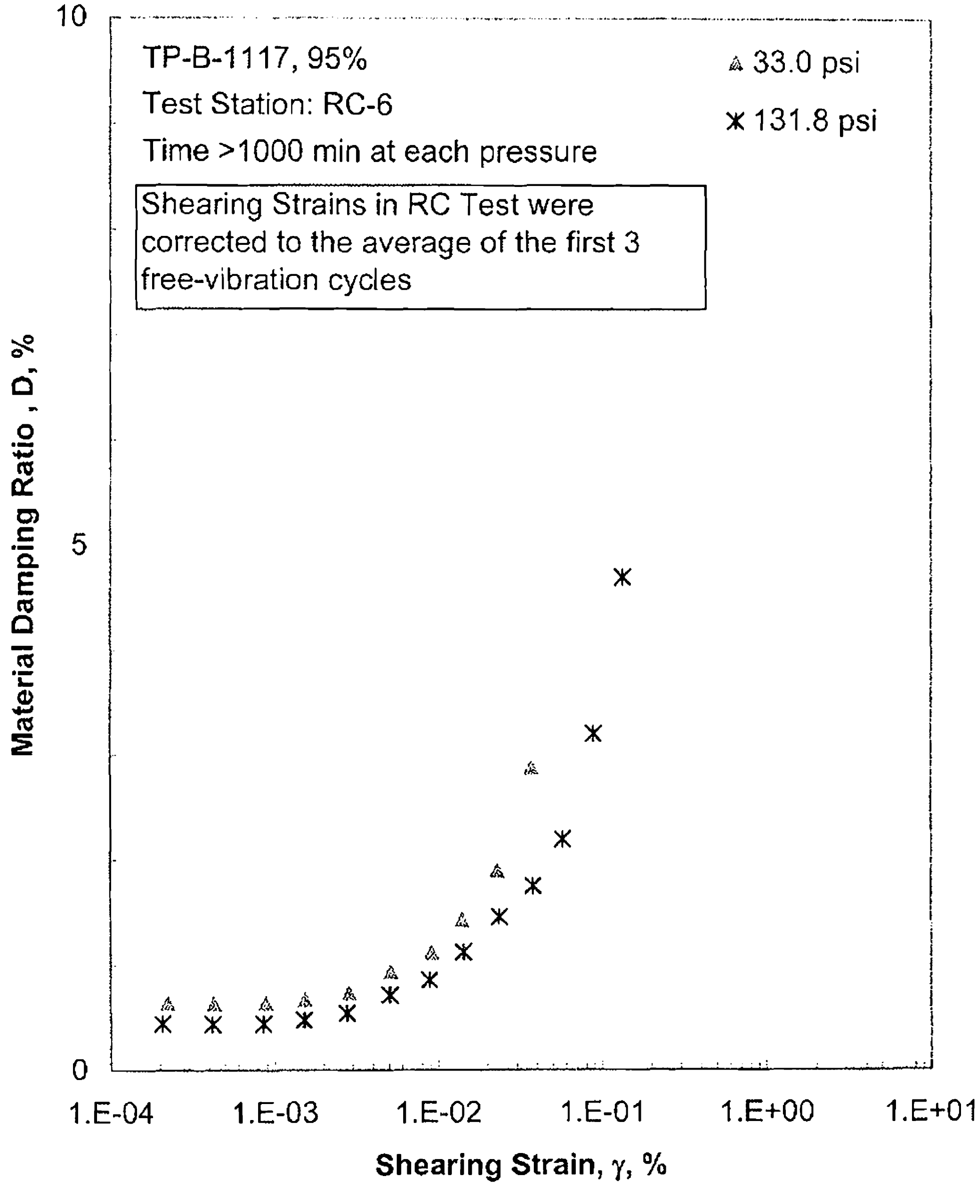


Figure G.10 Comparison of the Variation in Material Damping Ratio with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

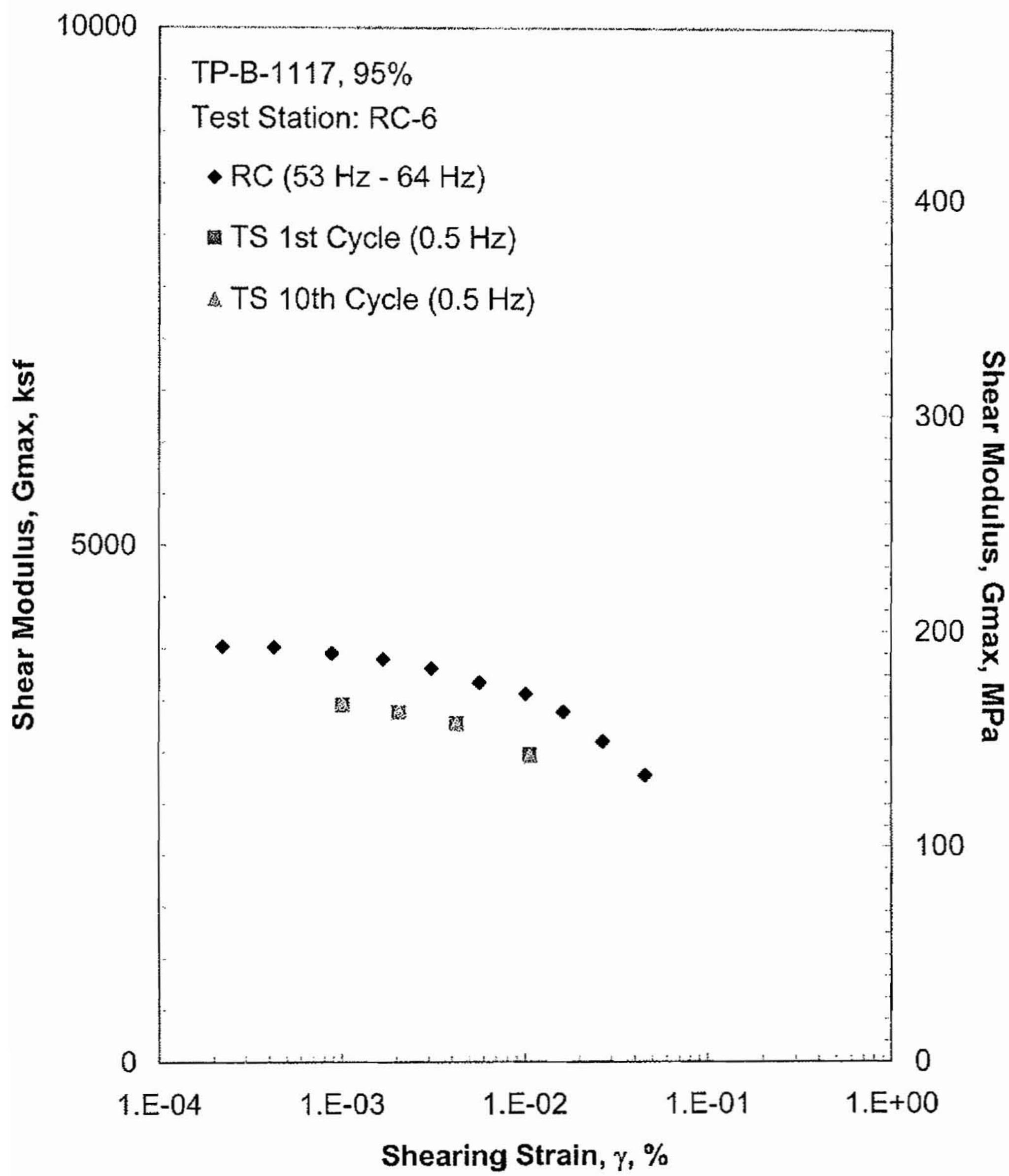


Figure G.11 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 33.0 psi from the Combined RCTS Tests

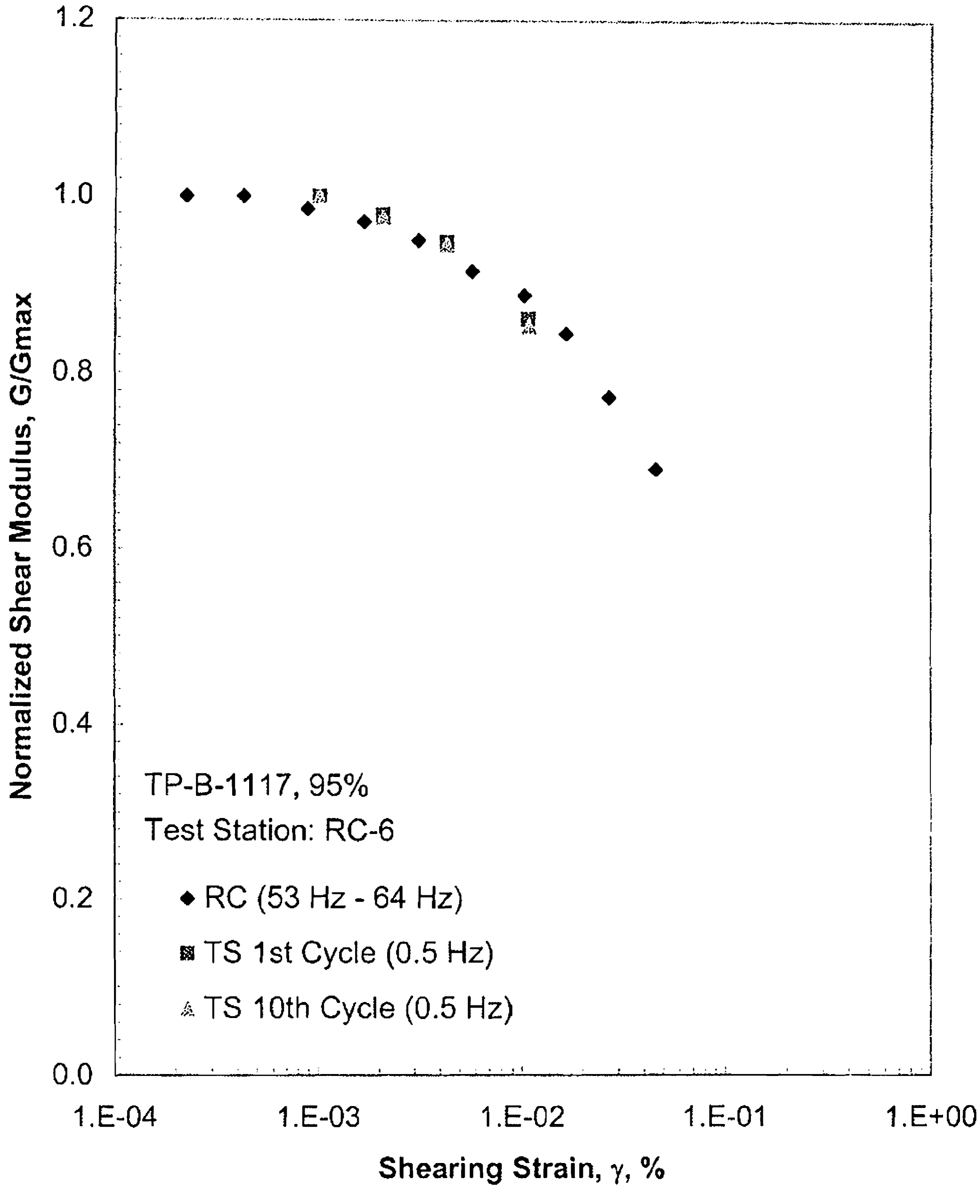


Figure G.12 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 33.0 psi from the Combined RCTS Tests

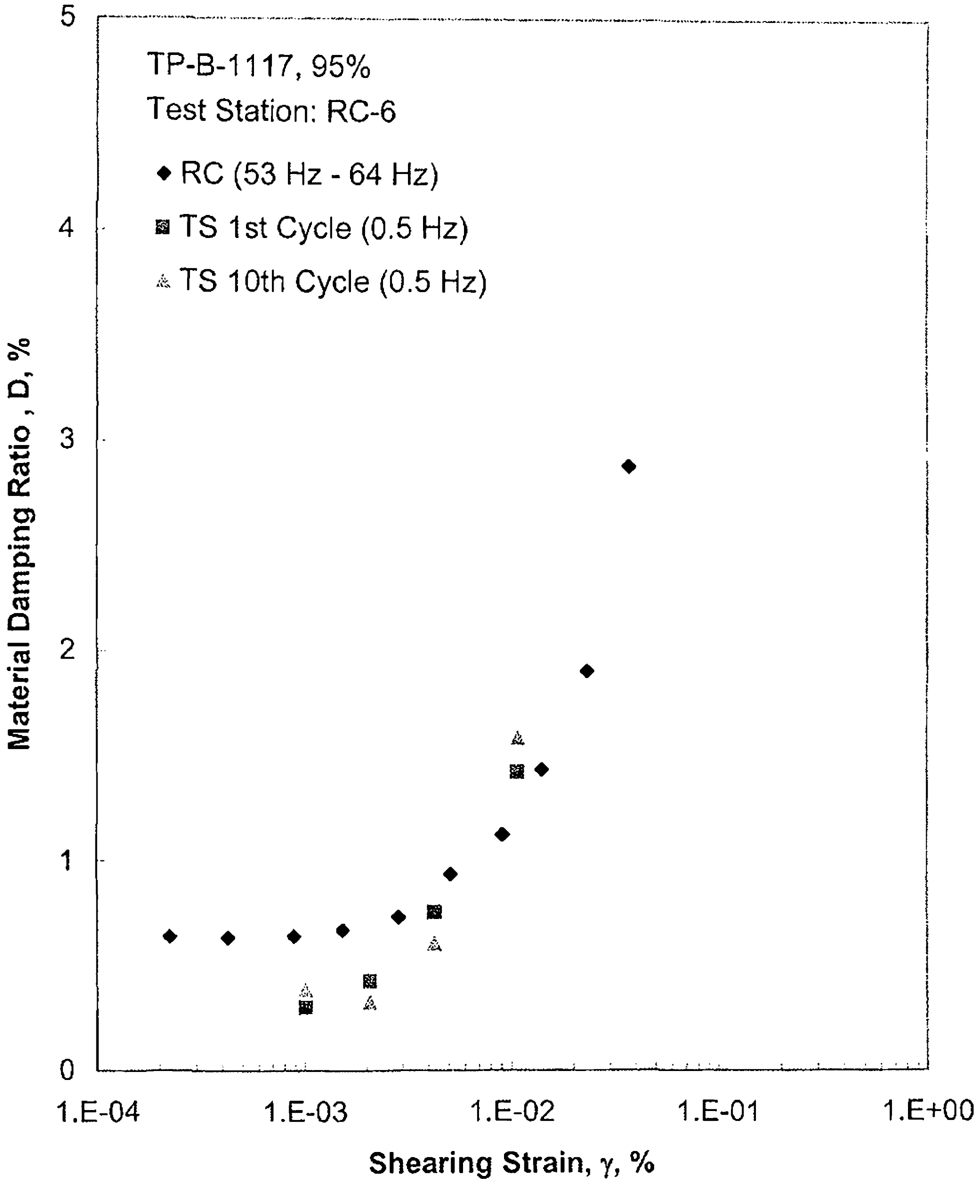


Figure G.13 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 33.0 psi from the Combined RCTS Tests

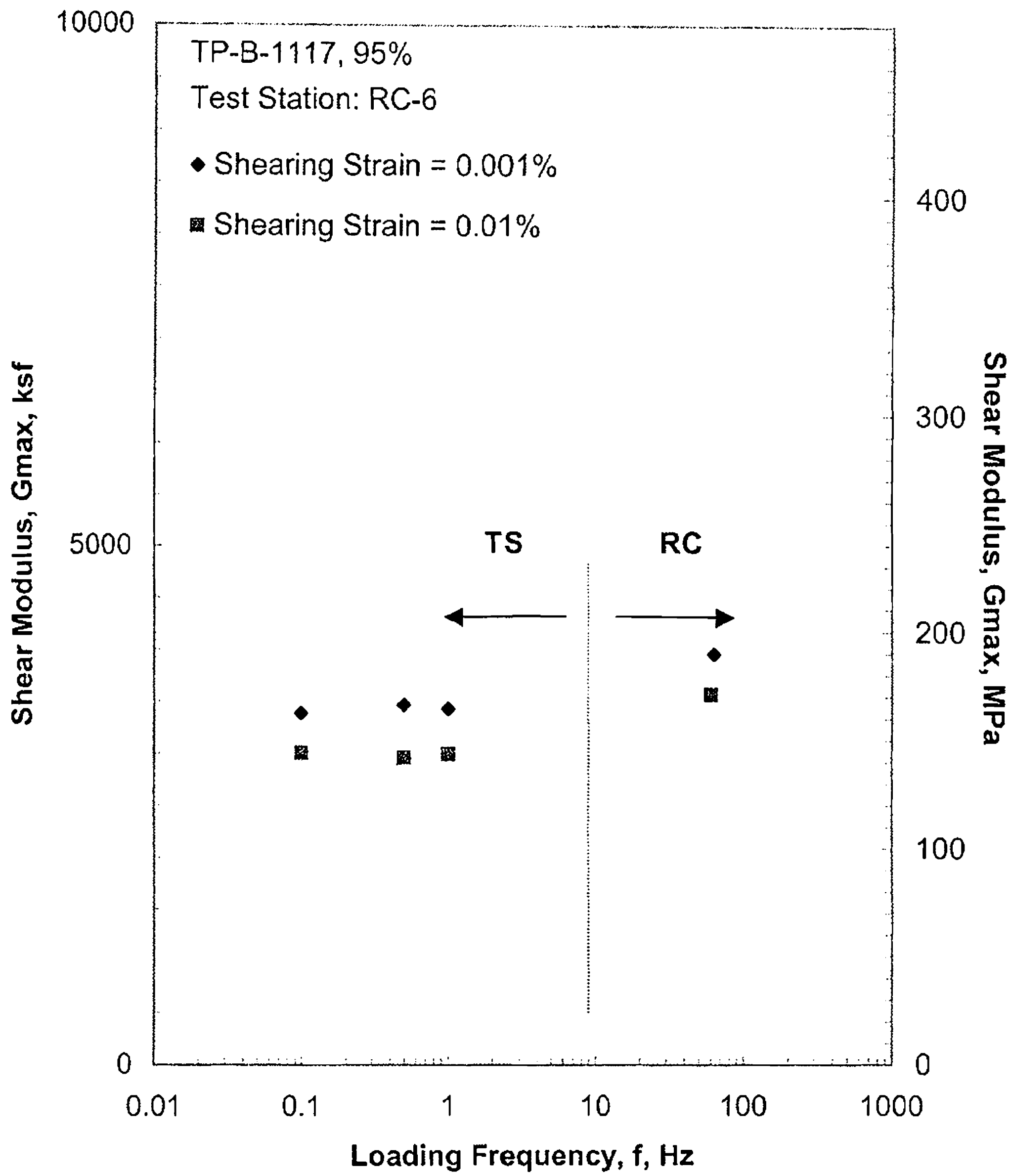


Figure G.14 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 33.0 psi from the Combined RCTS Tests

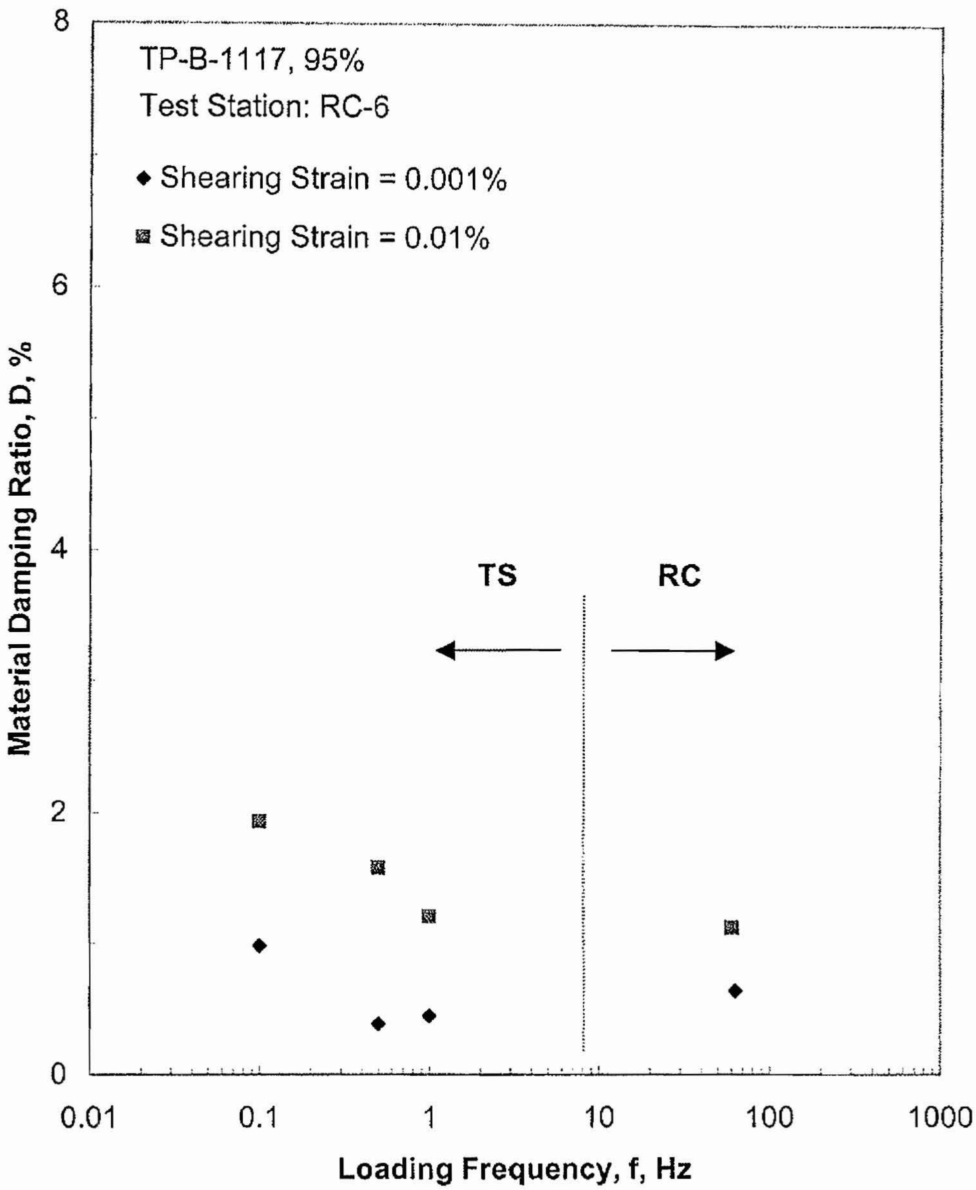


Figure G.15 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 33.0 psi from the Combined RCTS Tests

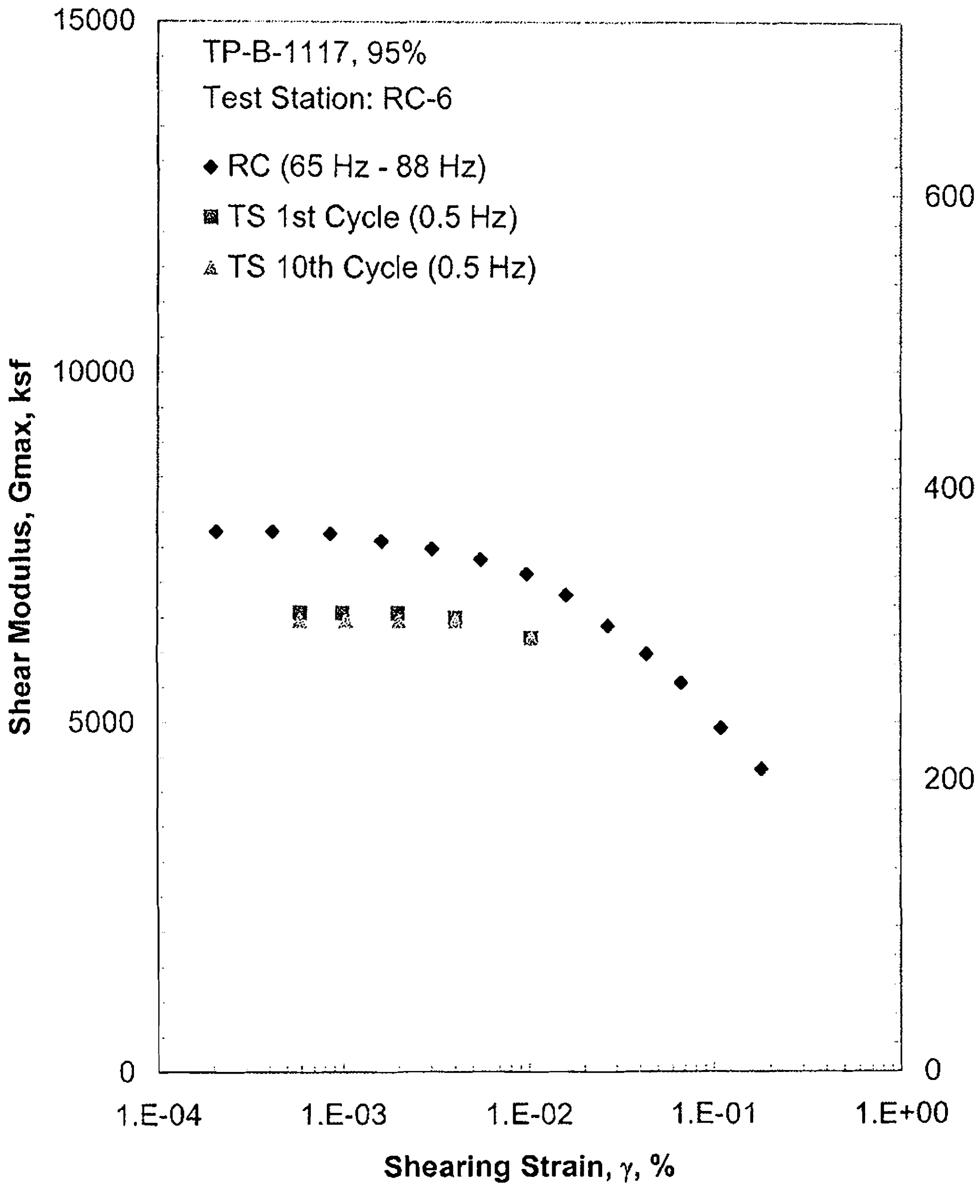


Figure G.16 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 131.8 psi from the Combined RCTS Tests

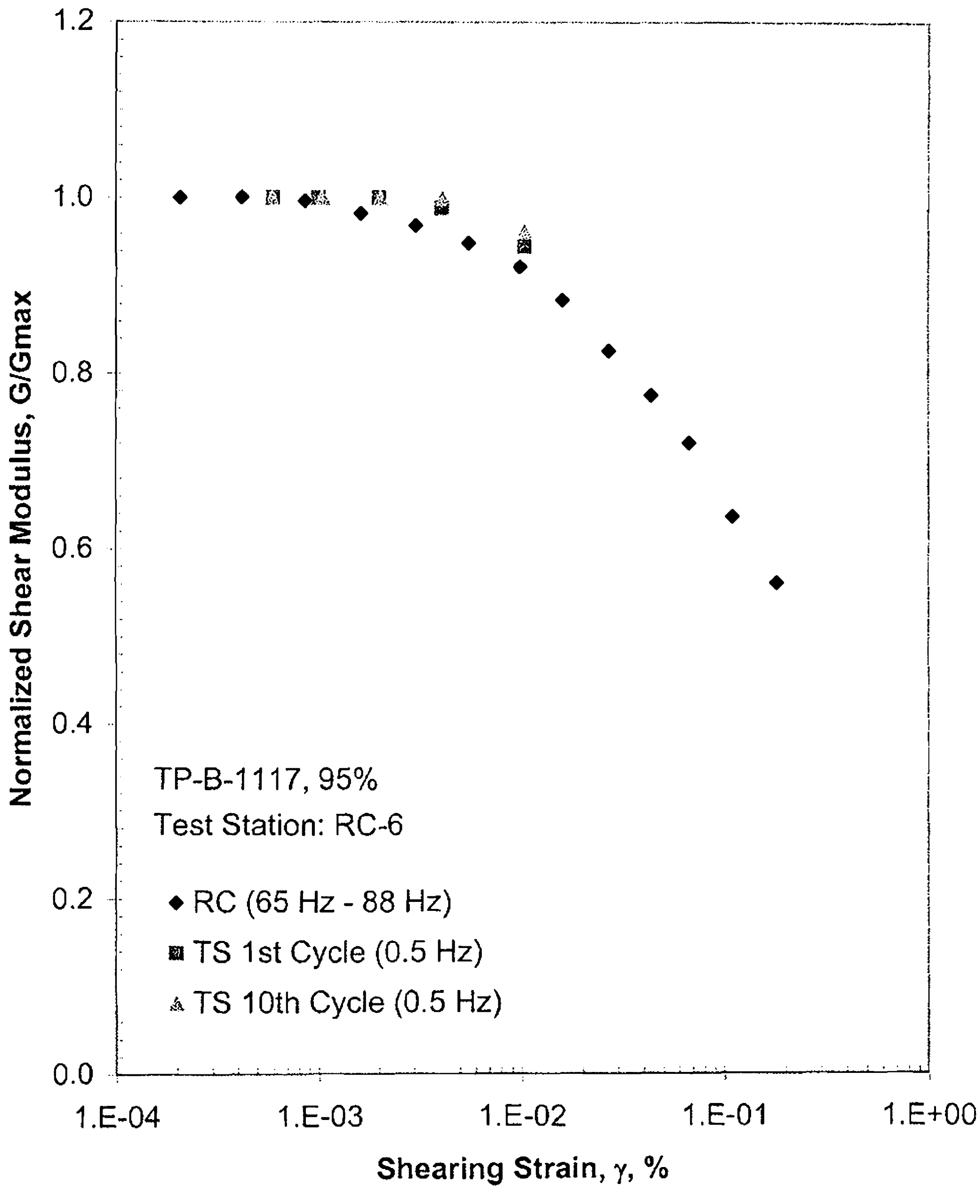


Figure G.17 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 131.8 psi from the Combined RCTS Tests

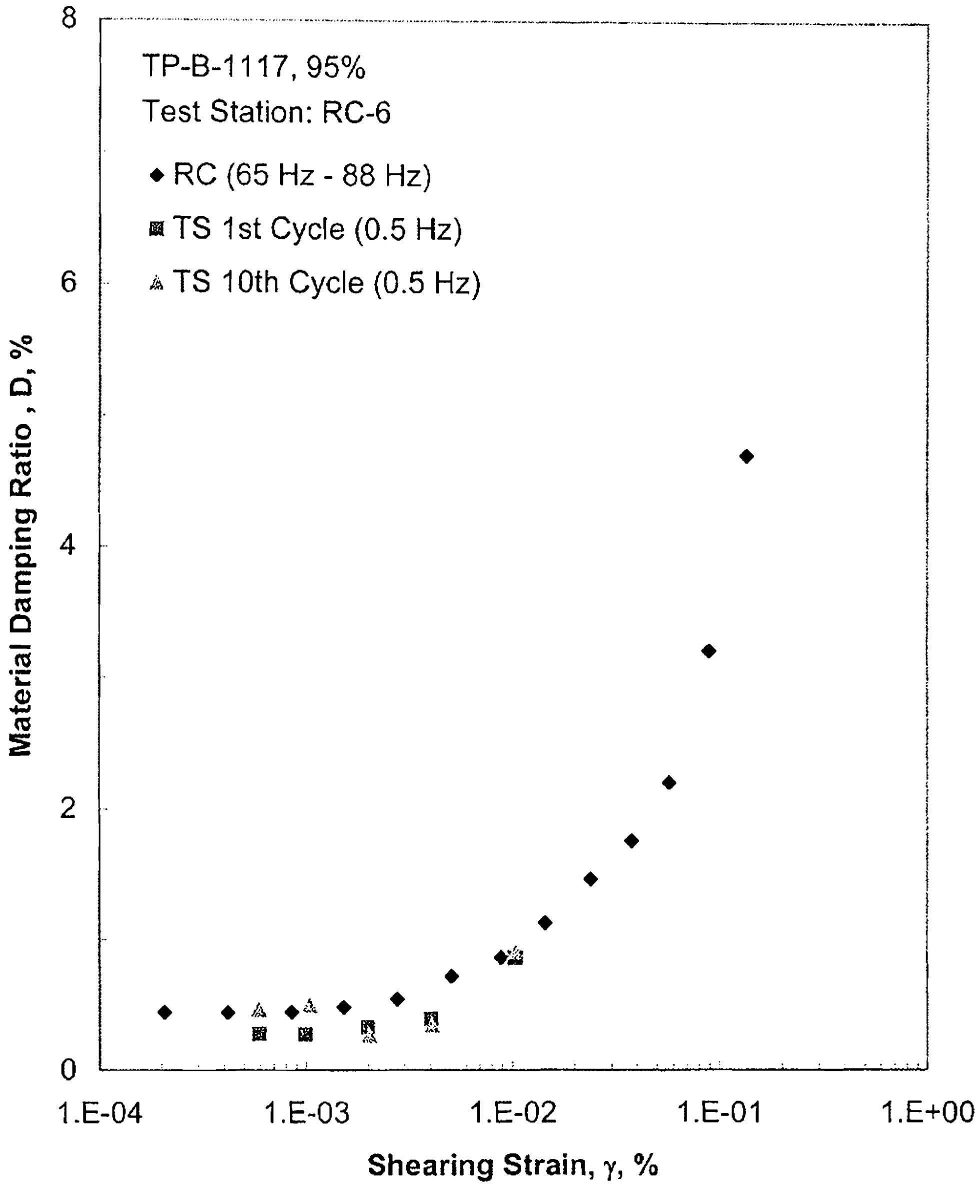


Figure G.18 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 131.8 psi from the Combined RCTS Tests

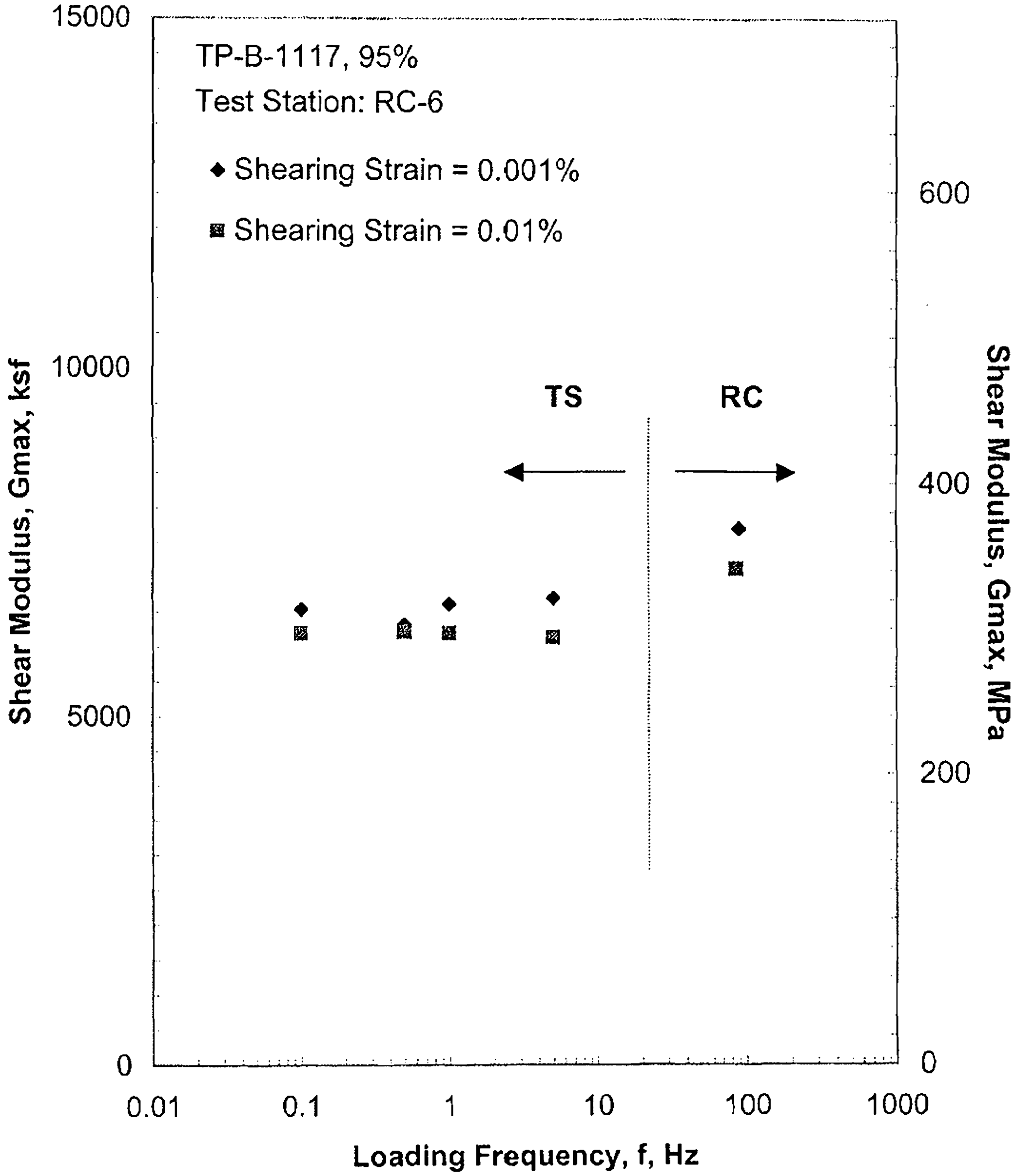


Figure G.19 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 131.8 psi from the Combined RCTS Tests

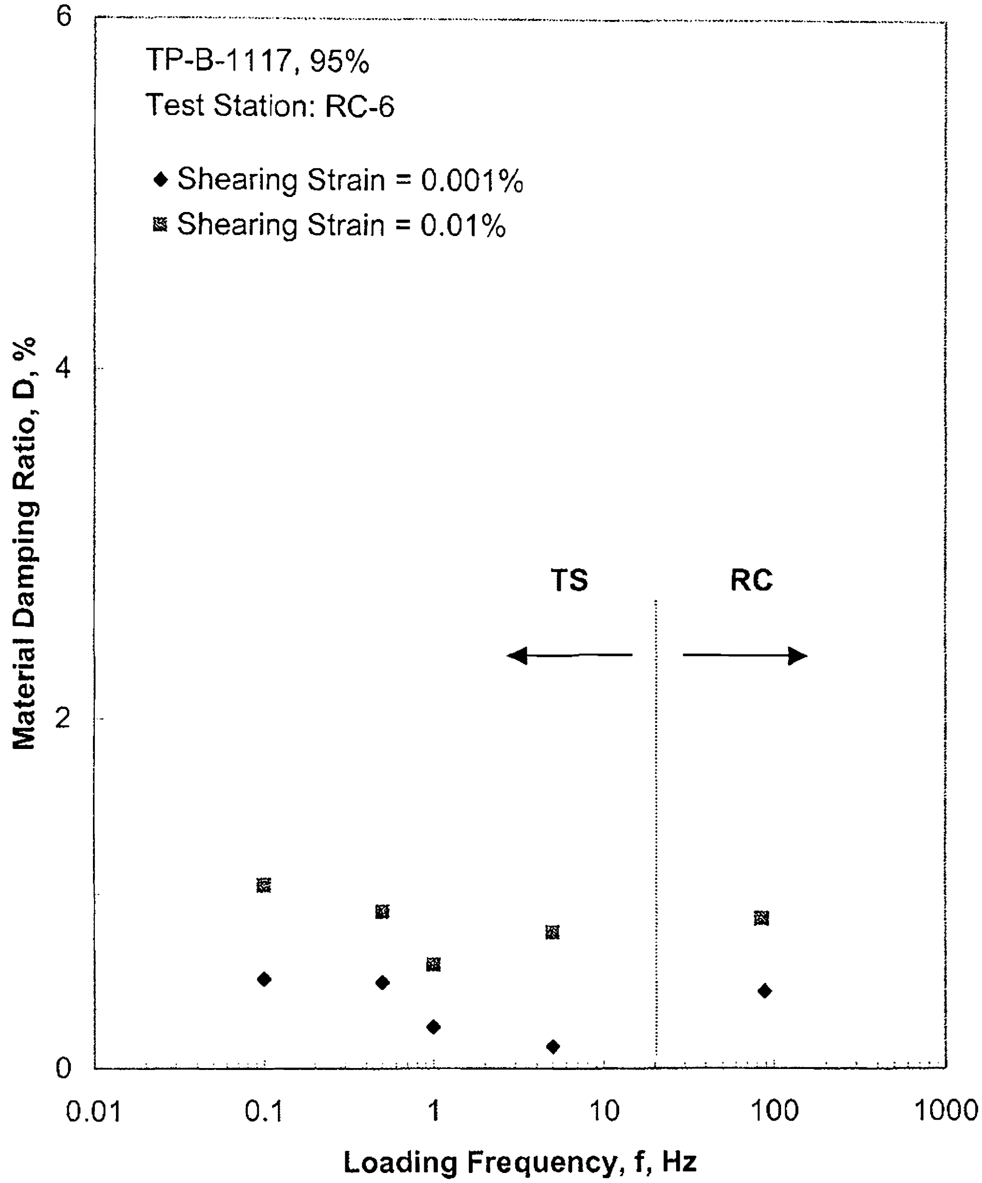


Figure G.20 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 131.8 psi from the Combined RCTS Tests

Table G.1 Variation in Low-Amplitude Shear Wave Velocity, Low-Amplitude Shear Modulus, Low-Amplitude Material Damping Ratio and Estimated Void Ratio with Isotropic Confining Pressure from RC Tests of Specimen TP-B-1117, 95%

Isotropic Confining Pressure, σ_o			Low-Amplitude Shear Modulus, G_{max}		Low-Amplitude Shear Wave Velocity, Vs	Low-Amplitude Material Damping Ratio, Dmin	Estimated Void Ratio, e
(psi)	(psf)	(kPa)	(ksf)	(MPa)	(fps)	(%)	
8.2	1181	56	2270	109	785	0.78	0.56
16.5	2376	114	3024	145	906	0.72	0.56
33.0	4752	227	4139	199	1059	0.63	0.56
65.9	9490	454	5655	271	1237	0.54	0.56
131.8	18979	908	7744	372	1446	0.50	0.55

Table G.2 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen TP-B-1117, 95%; Isoptropic Confining Pressure, σ_o=33.0 psi (4.8 ksf = 227 kPa)

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Average$^+$ Shearing Strain, %	Material Damping Ratio^x, D, %
2.24E-04	4019	1.00	2.24E-04	0.64
4.28E-04	4019	1.00	4.28E-04	0.64
8.88E-04	3961	0.99	8.88E-04	0.64
1.69E-03	3904	0.97	1.53E-03	0.67
3.12E-03	3819	0.95	2.87E-03	0.73
5.74E-03	3680	0.92	5.16E-03	0.94
1.03E-02	3570	0.89	9.12E-03	1.12
1.65E-02	3396	0.85	1.40E-02	1.43
2.69E-02	3108	0.77	2.31E-02	1.90
4.59E-02	2779	0.69	3.72E-02	2.88

$^+$ Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

^{x} Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table G.3 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen TP-B-1117, 95%; Isotropic Confining Pressure, σ_o = 33.0 psi (4.8 ksf =227 kPa)

First Cycle				Tenth Cycle			
Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %	Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %
1.02E-03	3460	1.00	0.30	1.01E-03	3471	1.00	0.39
2.08E-03	3388	0.98	0.43	2.08E-03	3390	0.98	0.33
4.29E-03	3282	0.95	0.76	4.29E-03	3281	0.95	0.61
1.07E-02	2981	0.86	1.42	1.08E-02	2962	0.85	1.58

Table G.4 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen TP-B-1117, 95%; Isoptropic Confining Pressure, σ_o= 131.8 psi (19.0 ksf = 908 kPa)

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Average^{+} Shearing Strain, %	Material Damping Ratio^{x}, D, %
2.07E-04	7730	1.00	2.07E-04	0.44
4.19E-04	7730	1.00	4.19E-04	0.44
8.56E-04	7703	1.00	8.56E-04	0.44
1.62E-03	7597	0.98	1.52E-03	0.48
3.03E-03	7491	0.97	2.79E-03	0.54
5.55E-03	7333	0.95	5.10E-03	0.72
9.79E-03	7126	0.92	8.91E-03	0.86
1.59E-02	6831	0.88	1.44E-02	1.13
2.69E-02	6388	0.83	2.40E-02	1.47
4.37E-02	5992	0.78	3.80E-02	1.76
6.69E-02	5571	0.72	5.75E-02	2.20
1.09E-01	4920	0.64	8.96E-02	3.21
1.80E-01	4333	0.56	1.35E-01	4.70

$^{+}$ Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

^{x} Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table G.5 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen TP-B-1117, 95%; Isotropic Confining Pressure, σ_o=131.8 psi (19.0 ksf = 908 kPa)

First Cycle				Tenth Cycle			
Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %	Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %
5.95E-04	6569	1.00	0.28	5.90E-04	6458	1.00	0.46
9.96E-04	6569	1.00	0.27	1.04E-03	6458	1.00	0.50
1.99E-03	6569	1.00	0.33	2.02E-03	6458	1.00	0.27
4.06E-03	6493	0.99	0.39	4.09E-03	6453	1.00	0.34
1.04E-02	6208	0.95	0.86	1.04E-02	6211	0.96	0.90

APPENDIX H

Specimen TP-B-1117
Resonstituted Engineering Fill at 97% Compaction

Borehole ---
B-1117
Depth = 7.0 ft (2.1 m)
Total Unit Weight = 119.9 lb/ft^3
Water Content = 12.5 %
Estimated In-Situ Ko = 0.5
Estimated In-Situ Mean Effective
Stress = 33.0 psi

FUGRO JOB #: 0401-1667
Testing Station: RC6

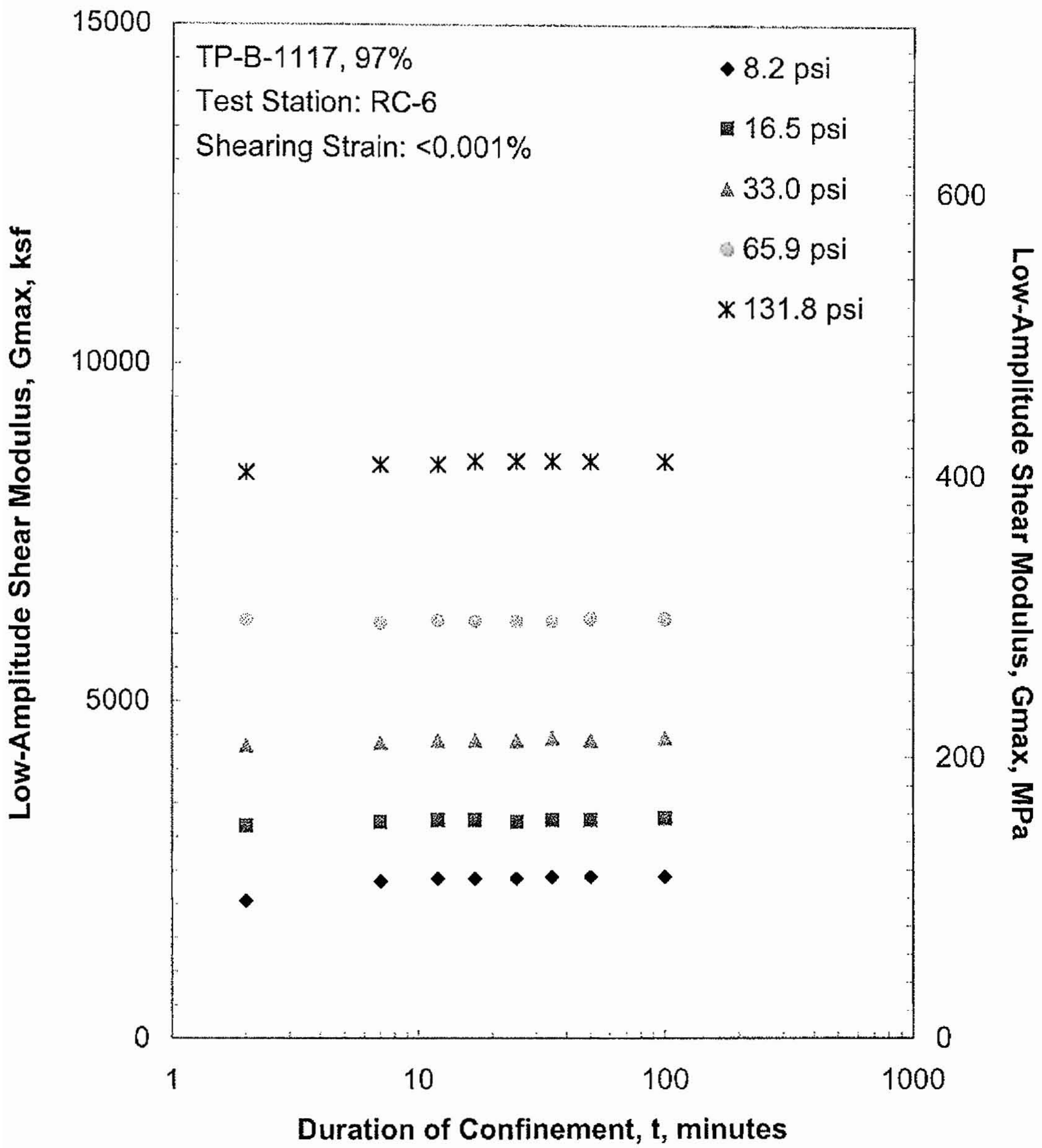


Figure H.1 Variation in Low-Amplitude Shear Modulus with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

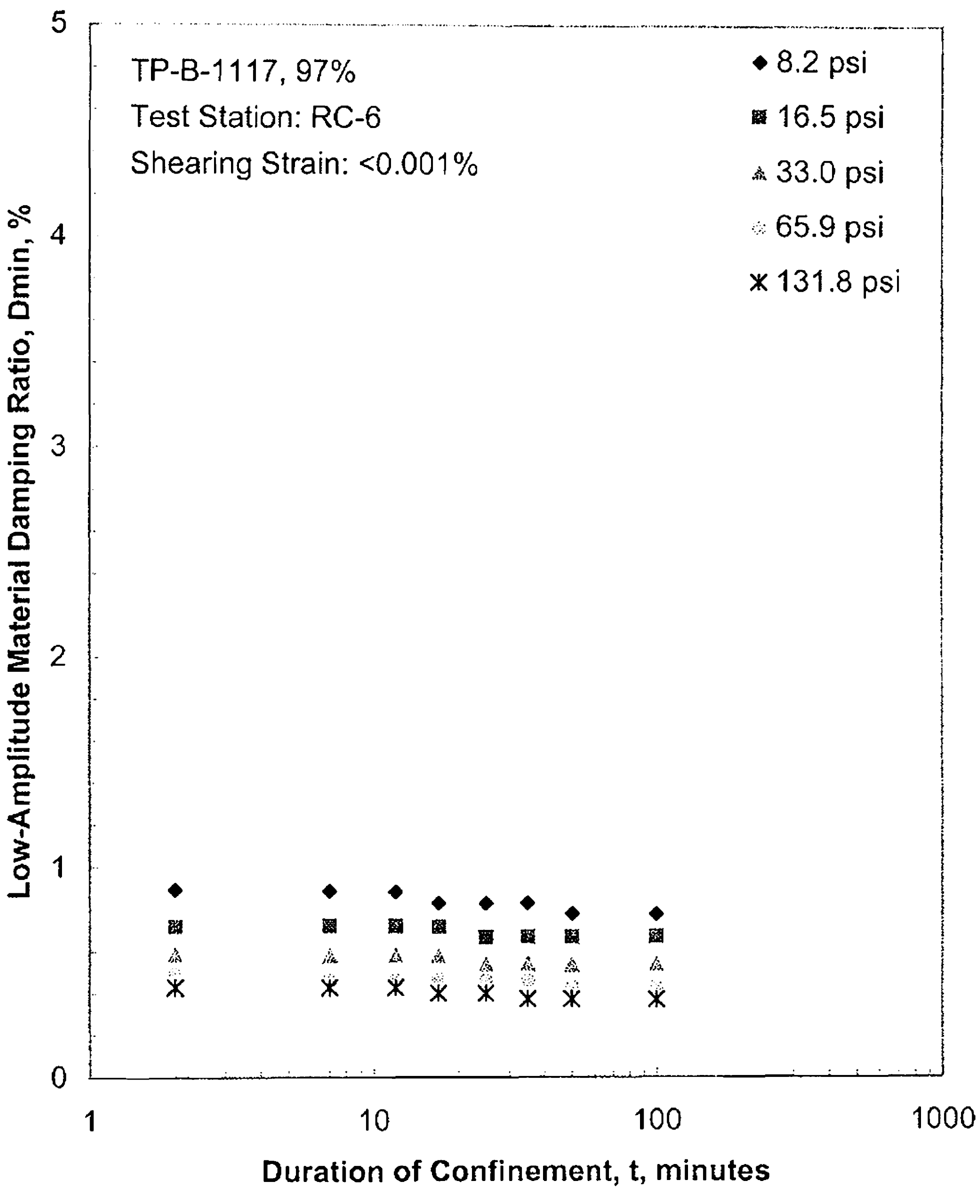


Figure H.2 Variation in Low-Amplitude Material Damping Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

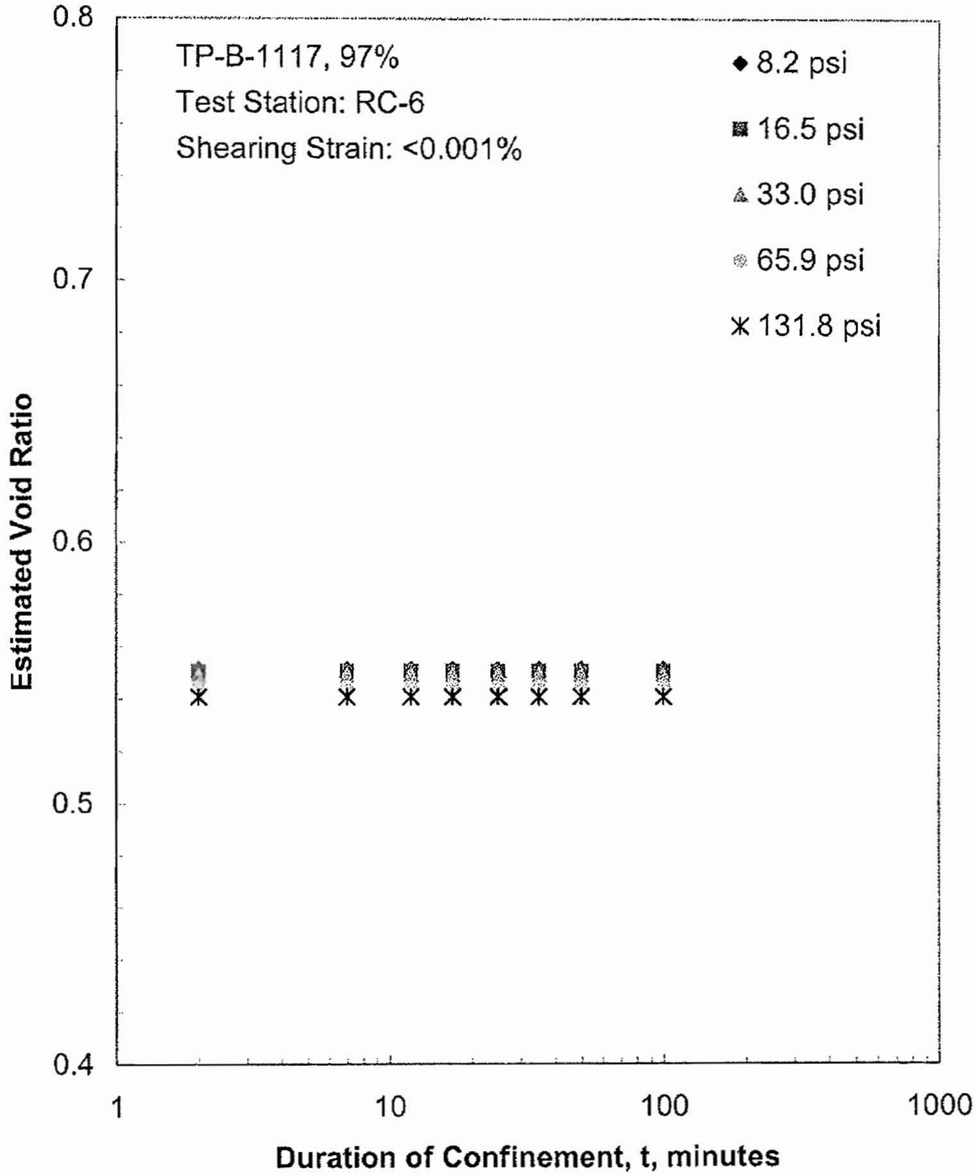


Figure H.3 Variation in Estimated Void Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

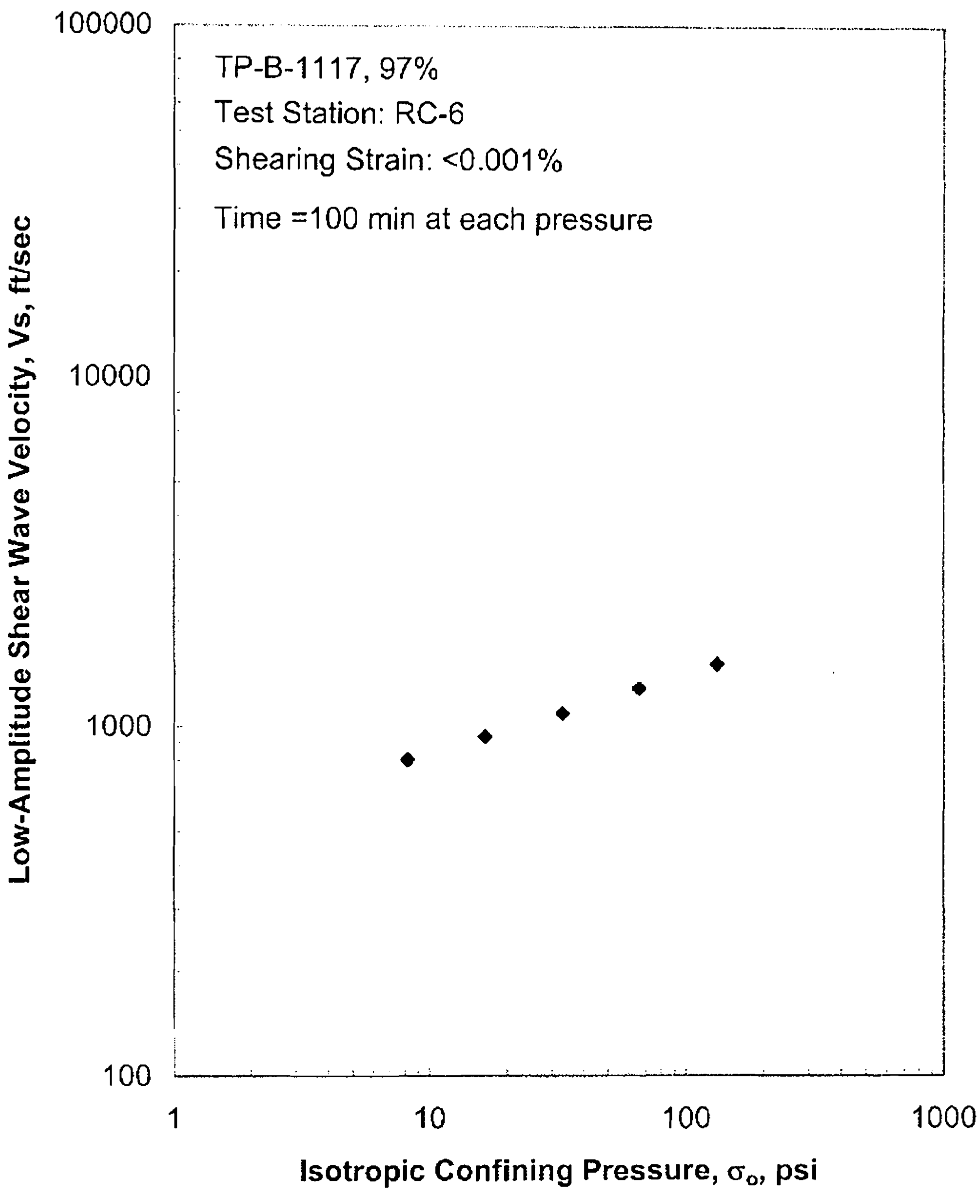


Figure H.4 Variation in Low-Amplitude Shear Wave Velocity with Isotropic Confining Pressure from Resonant Column Tests

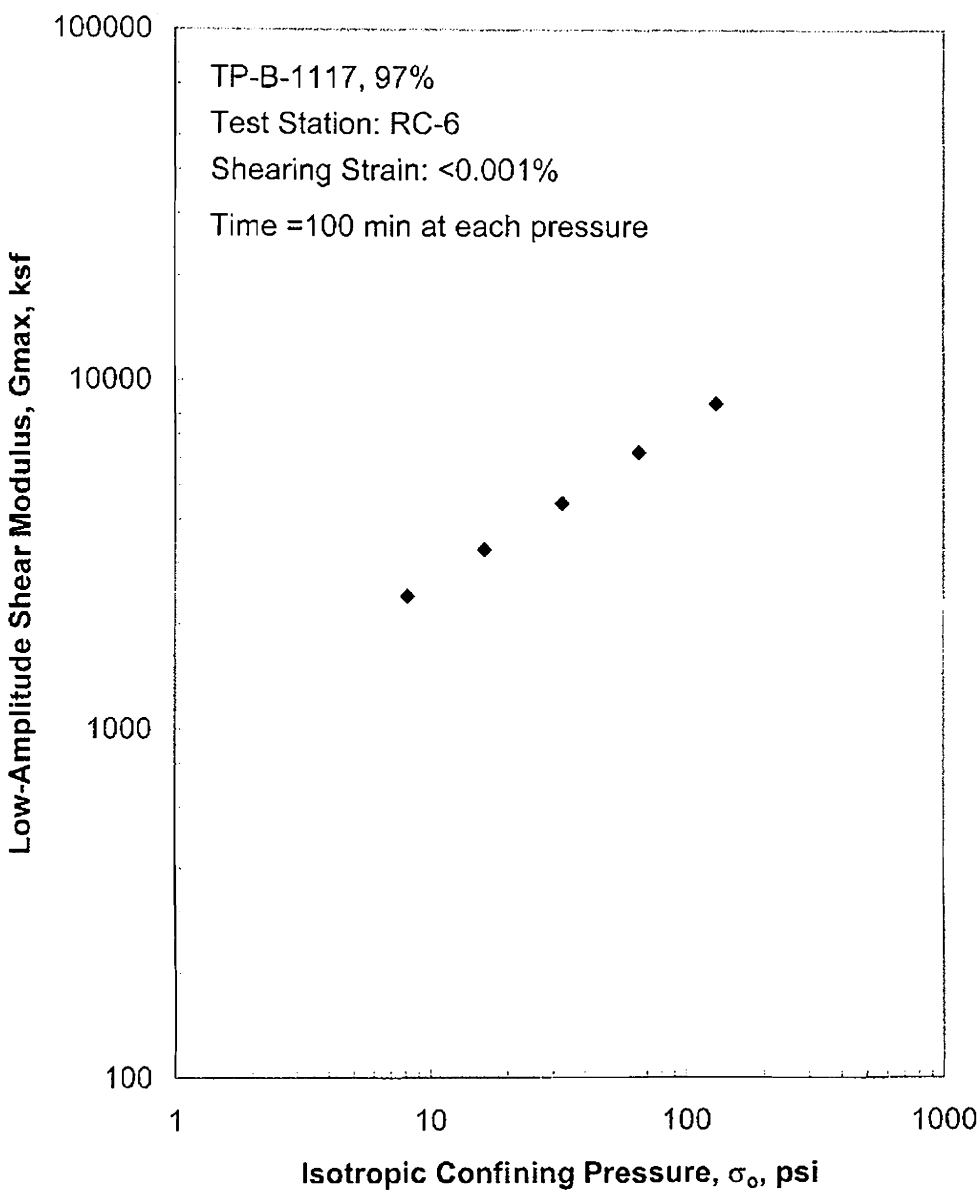


Figure H.5 Variation in Low-Amplitude Shear Modulus with Isotropic Confining Pressure from Resonant Column Tests

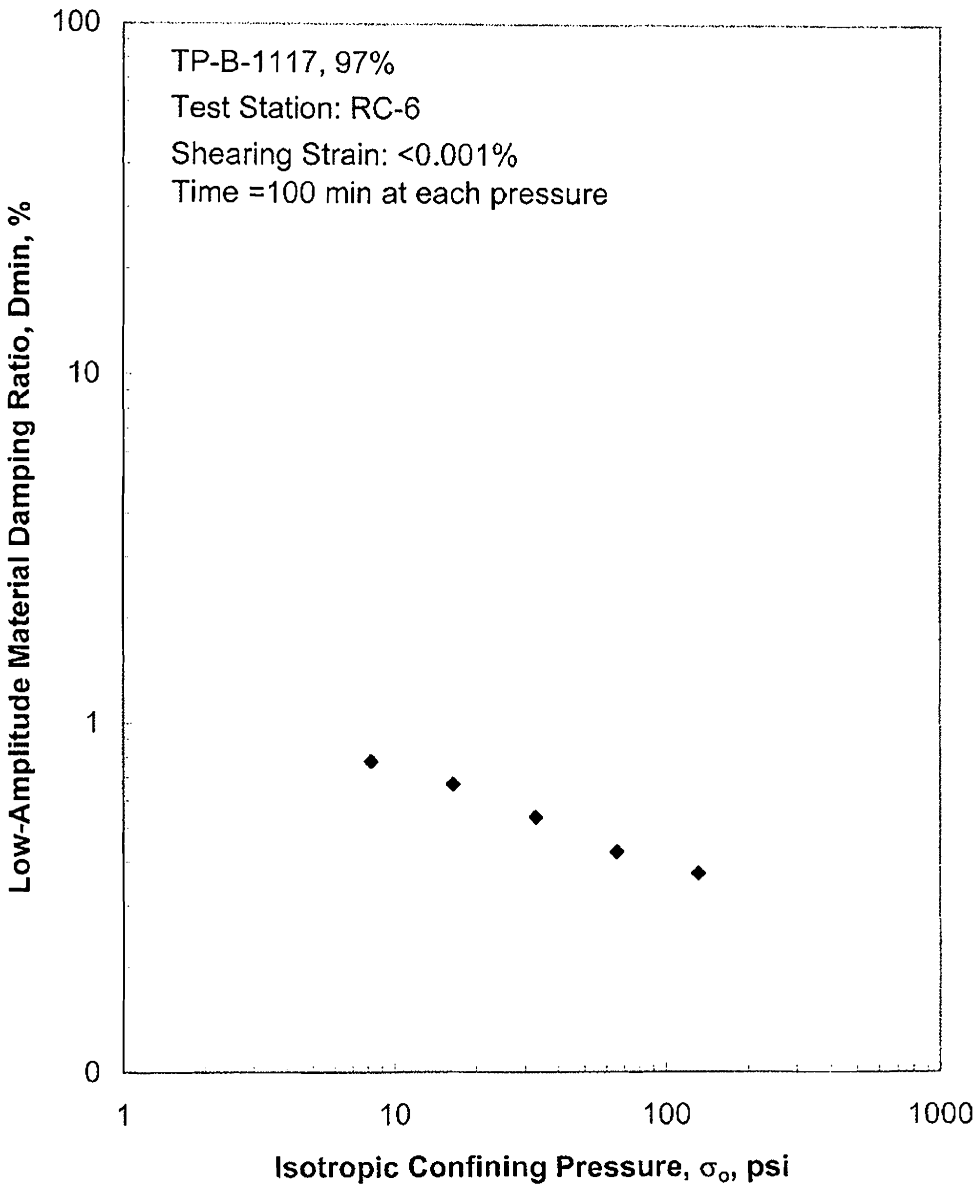


Figure H.6 Variation in Low-Amplitude Material Damping Ratio with Isotropic Confining Pressure from Resonant Column Tests

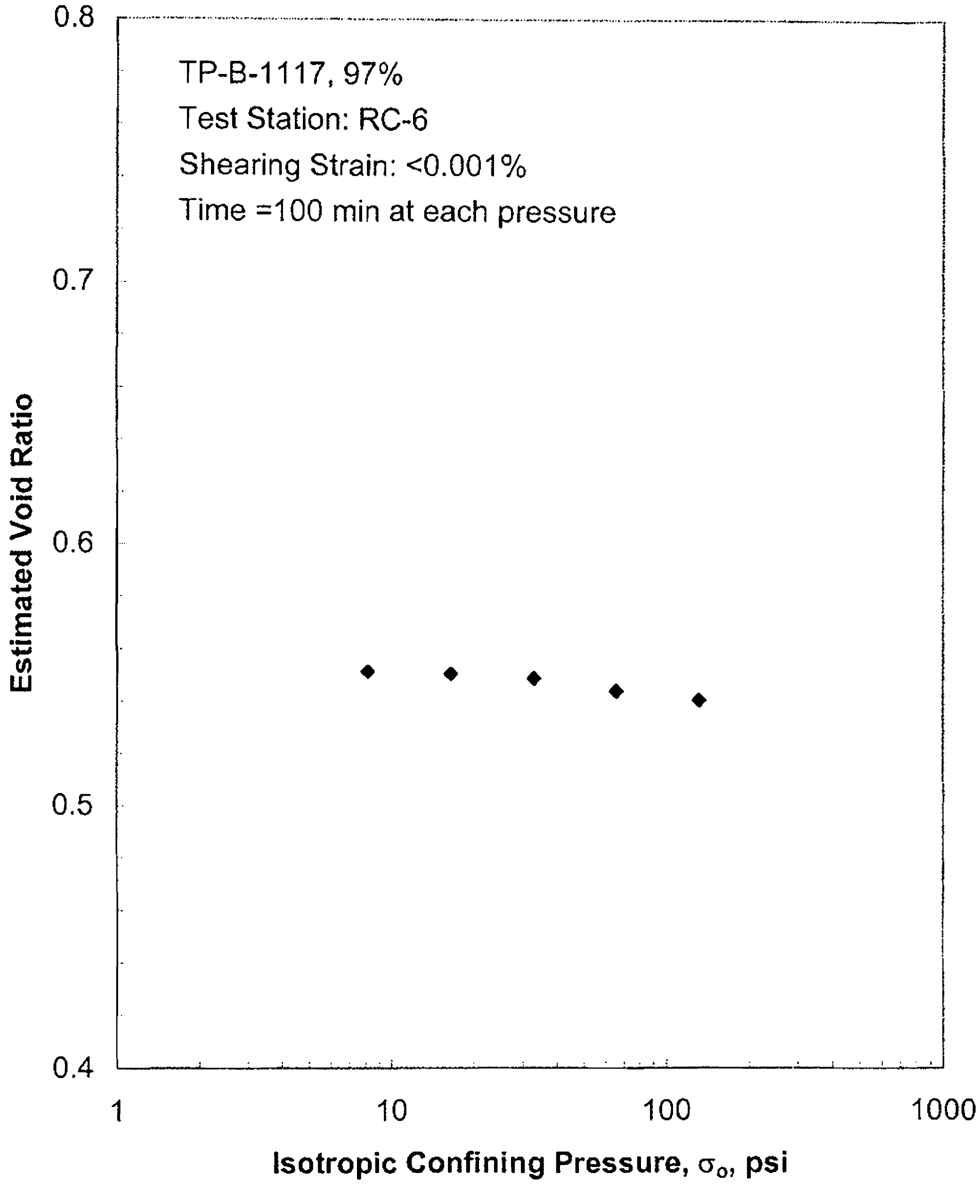


Figure H.7 Variation in Estimated Void Ratio with Isotropic Confining Pressure from Resonant Column Tests

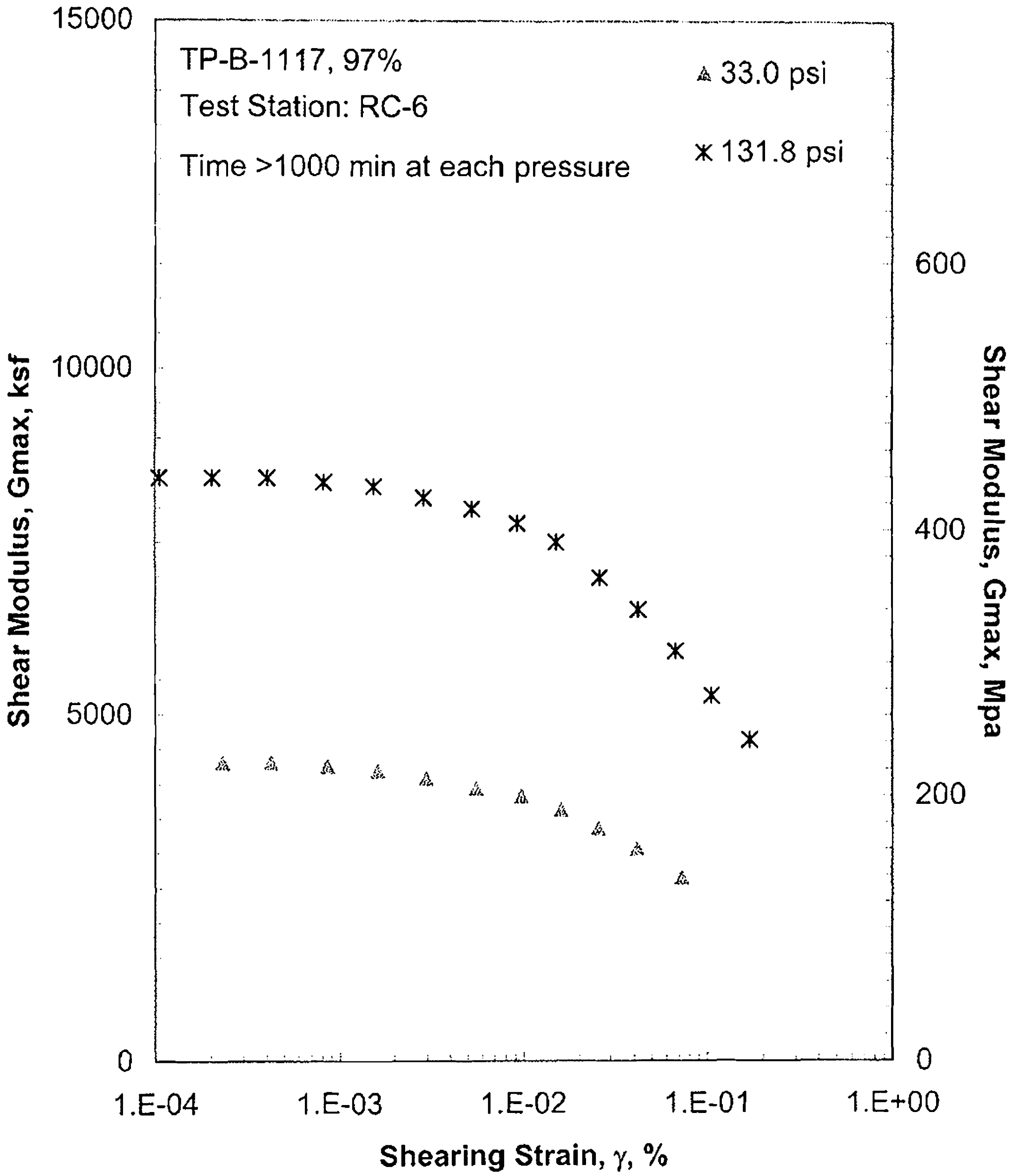


Figure H.8 Comparison of the Variation in Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

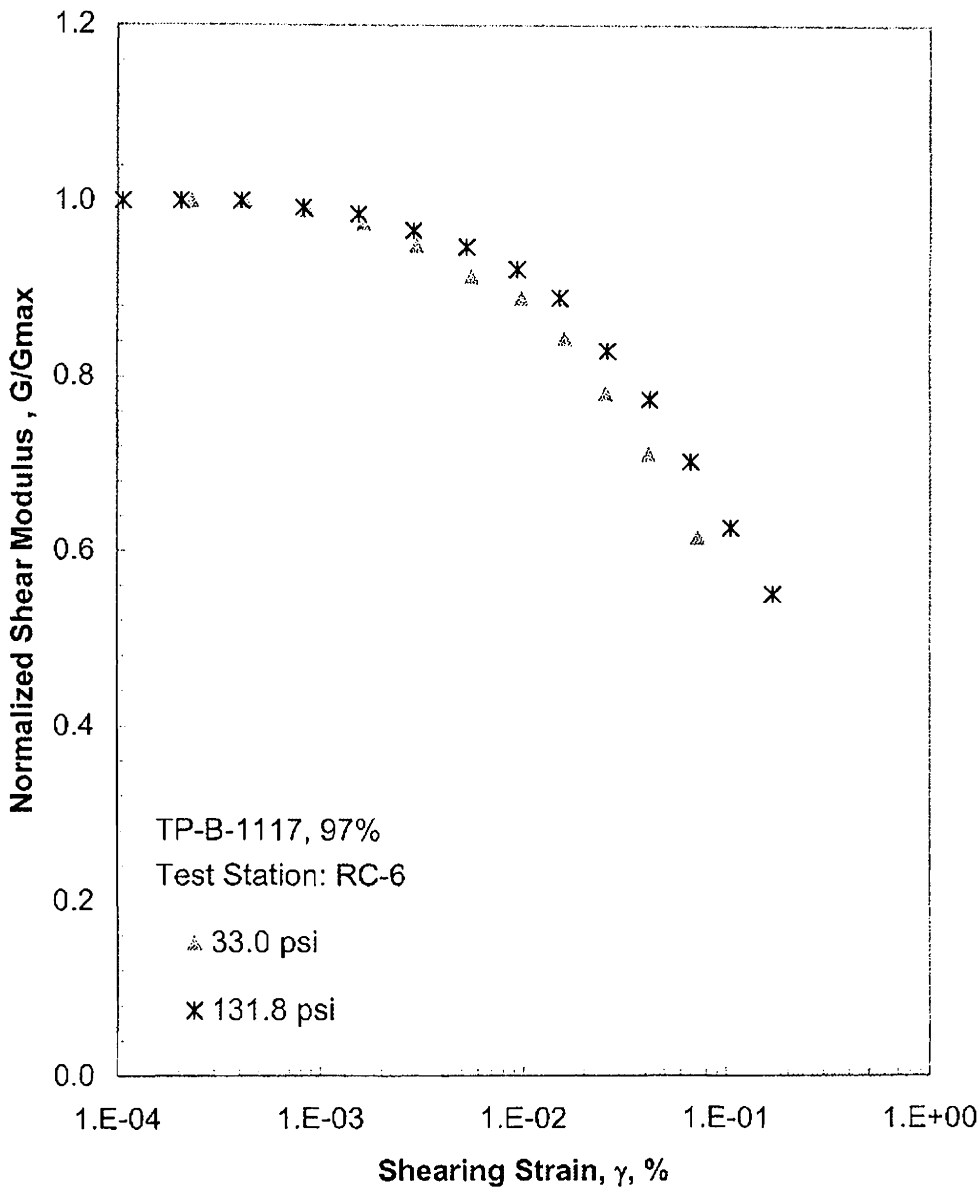


Figure H.9 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

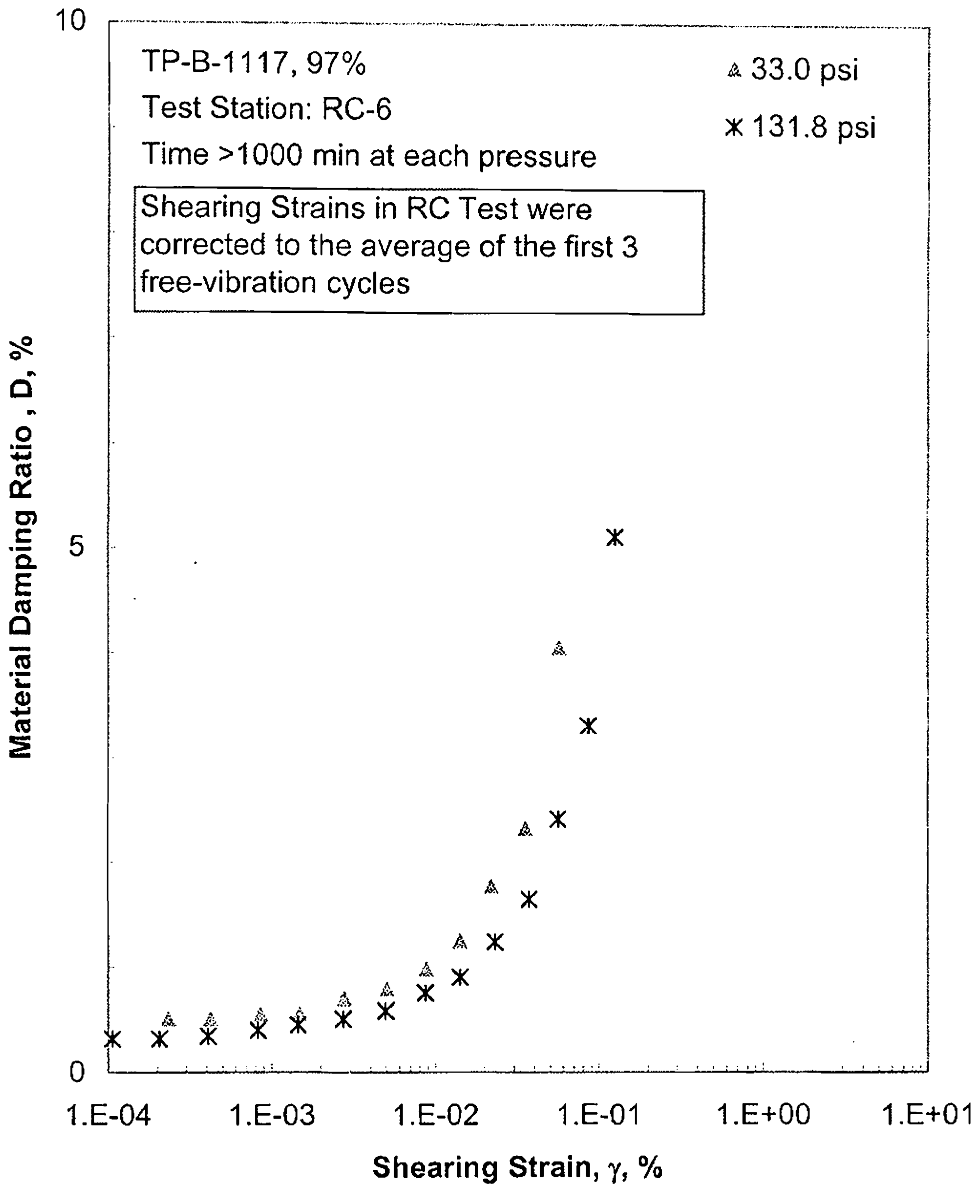


Figure H.10 Comparison of the Variation in Material Damping Ratio with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

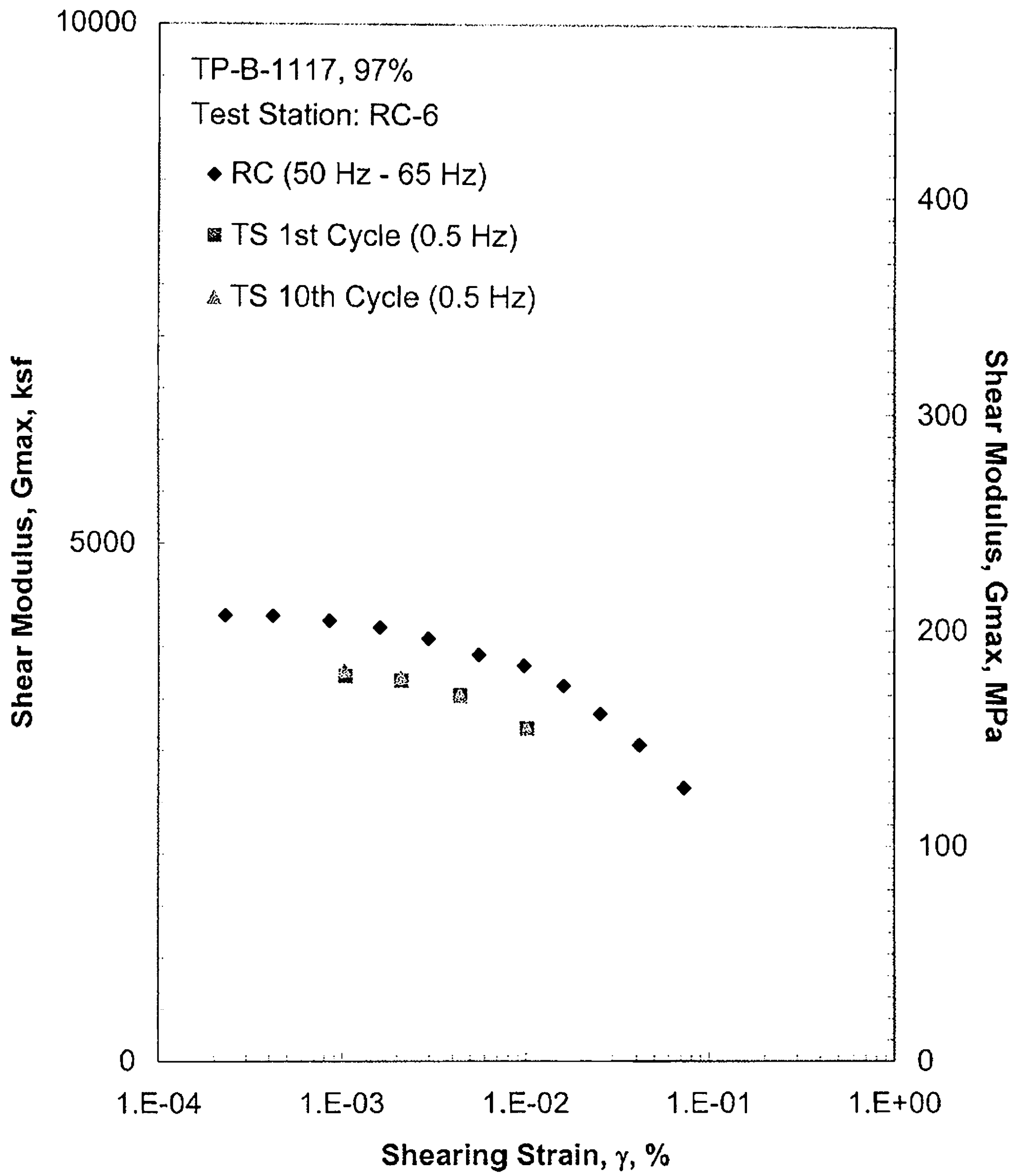


Figure H.11 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 33.0 psi from the Combined RCTS Tests

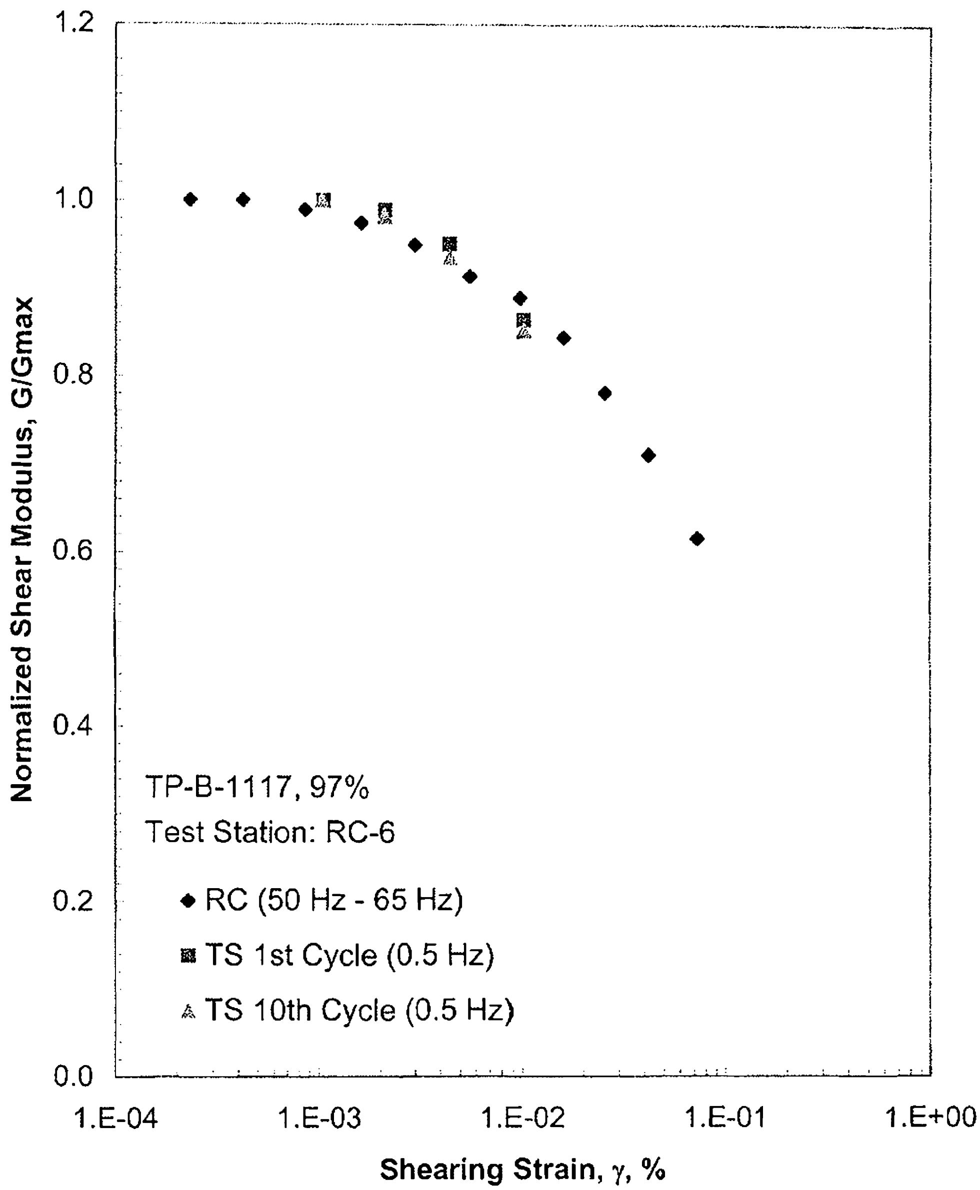


Figure H.12 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 33.0 psi from the Combined RCTS Tests

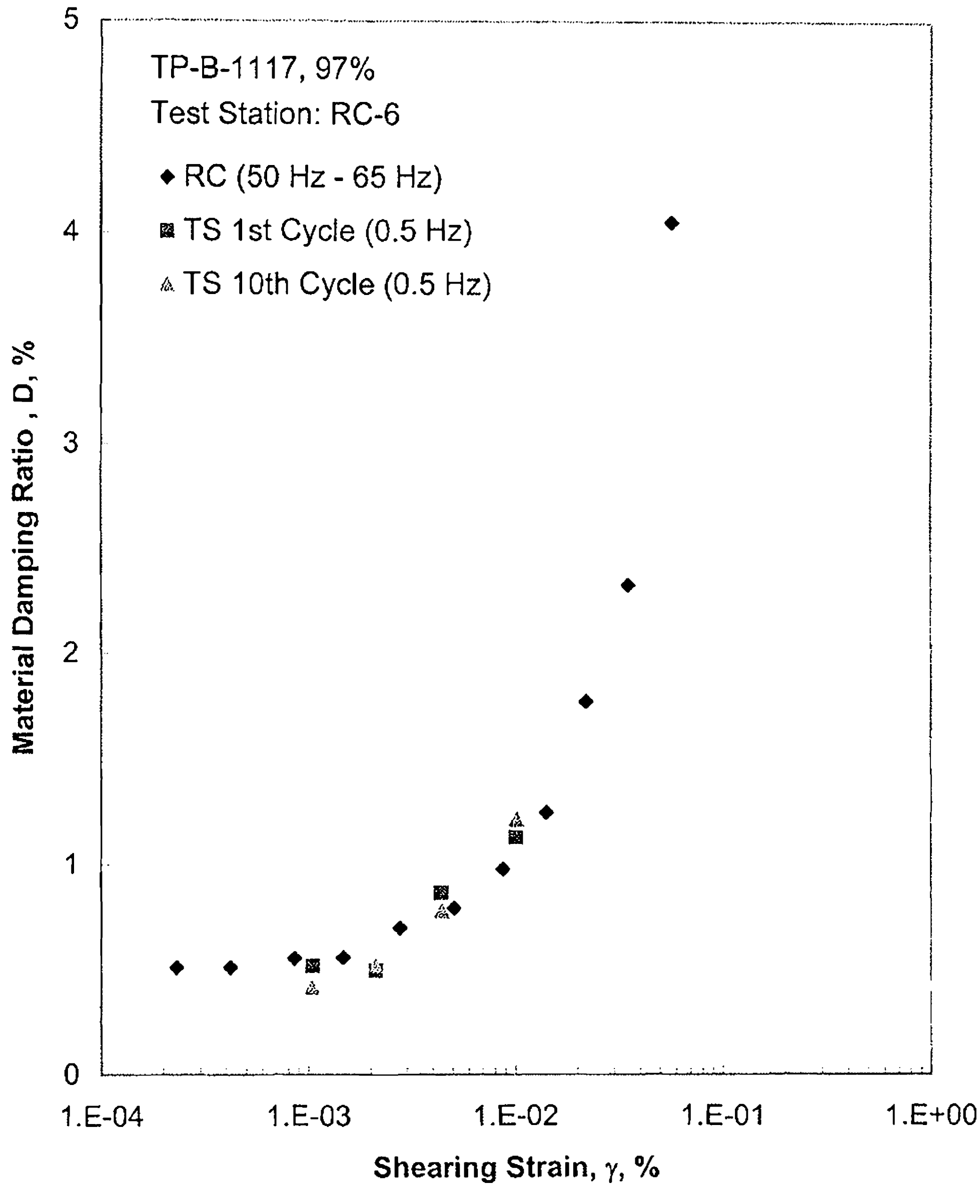


Figure H.13 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 33.0 psi from the Combined RCTS Tests

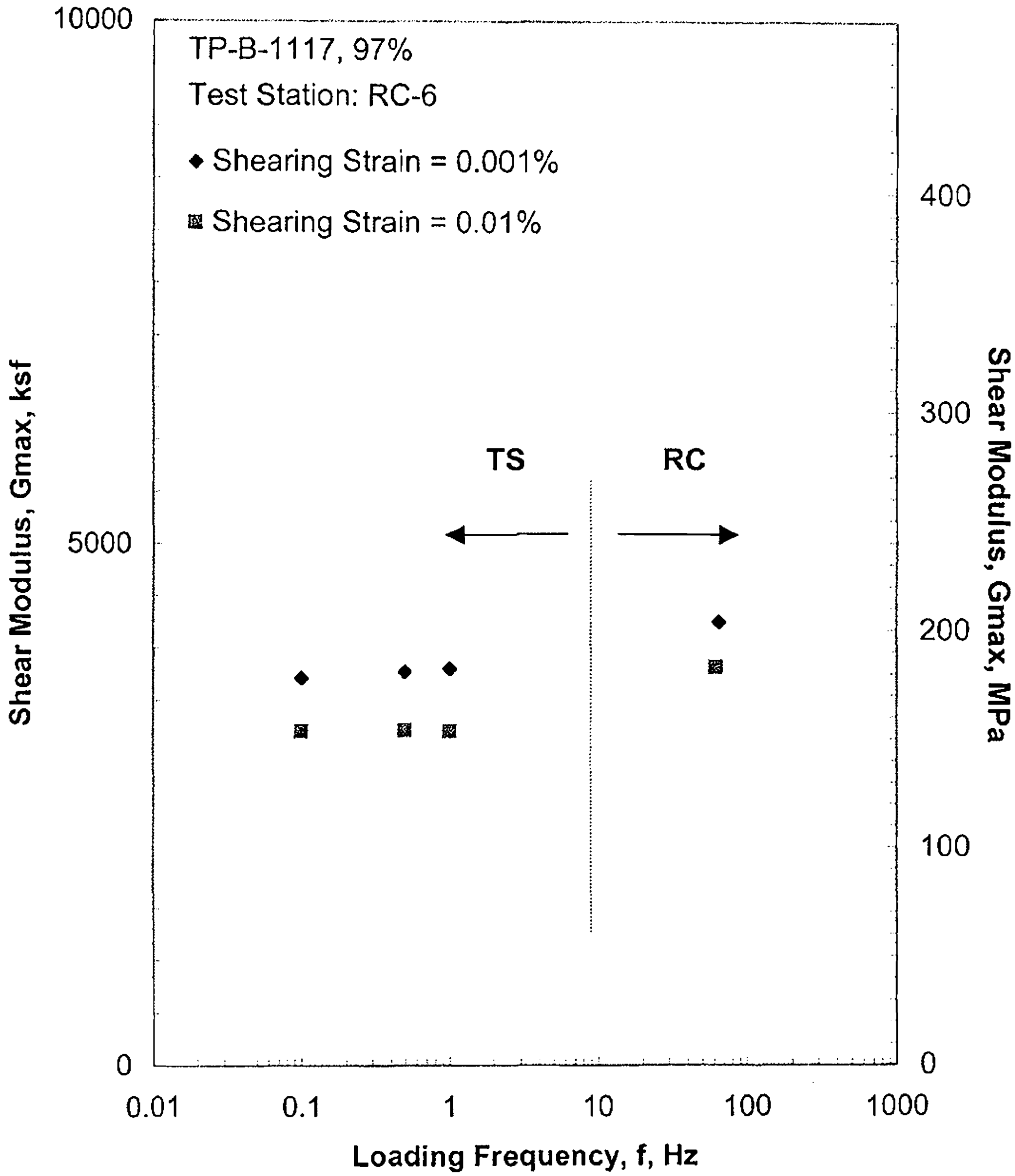


Figure H.14 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 33.0 psi from the Combined RCTS Tests

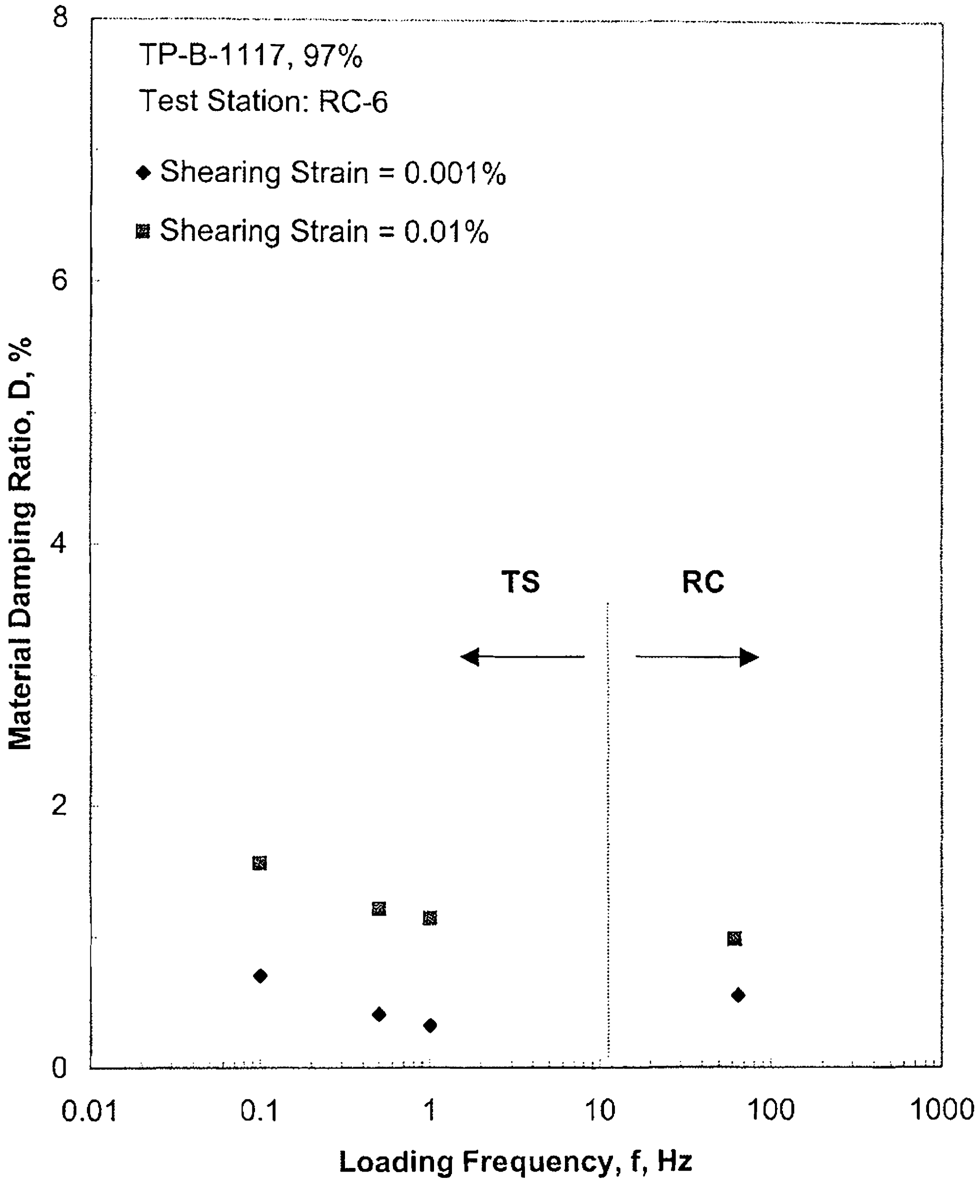


Figure H.15 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 33.0 psi from the Combined RCTS Tests

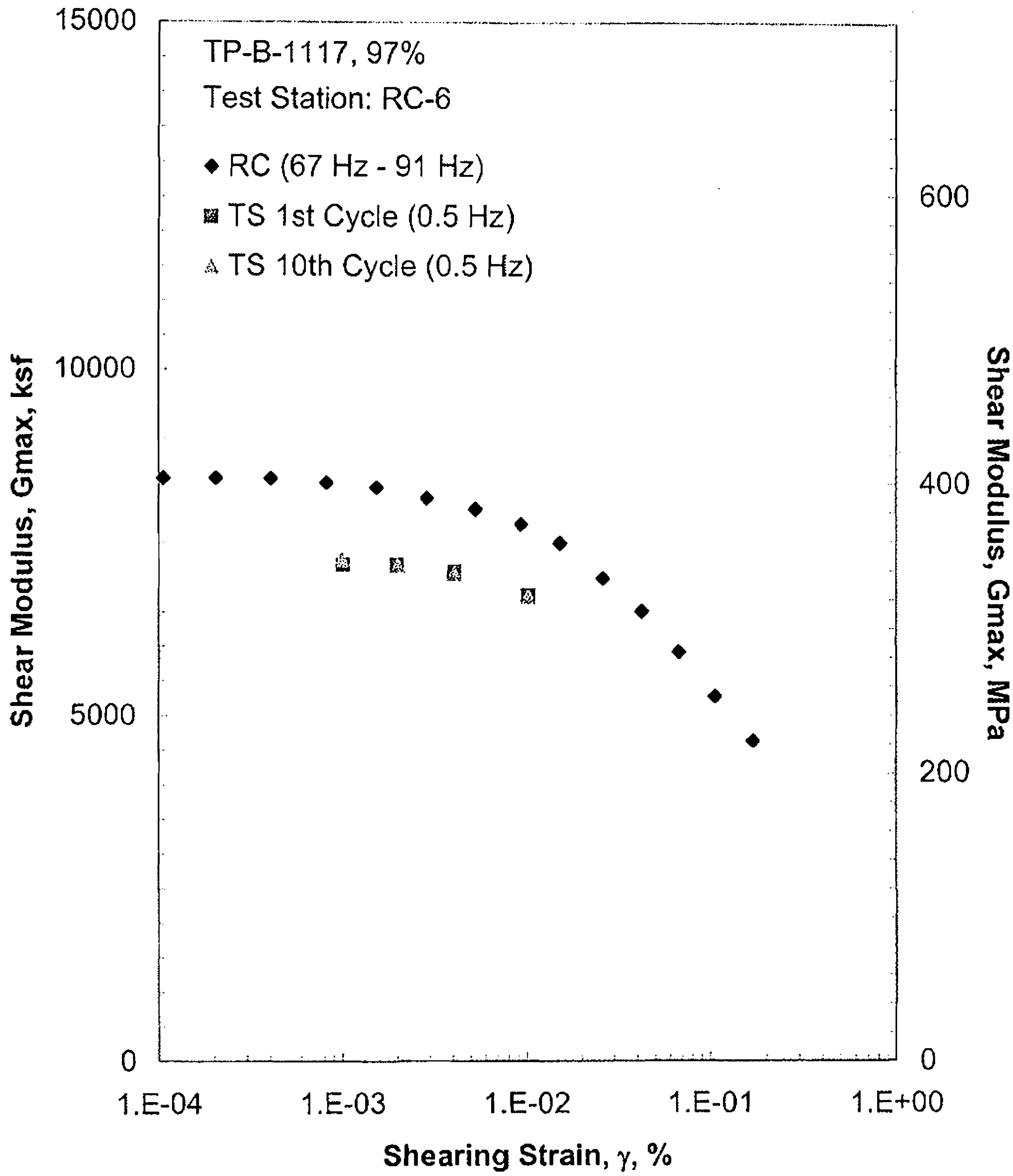


Figure H.16 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 131.8 psi from the Combined RCTS Tests

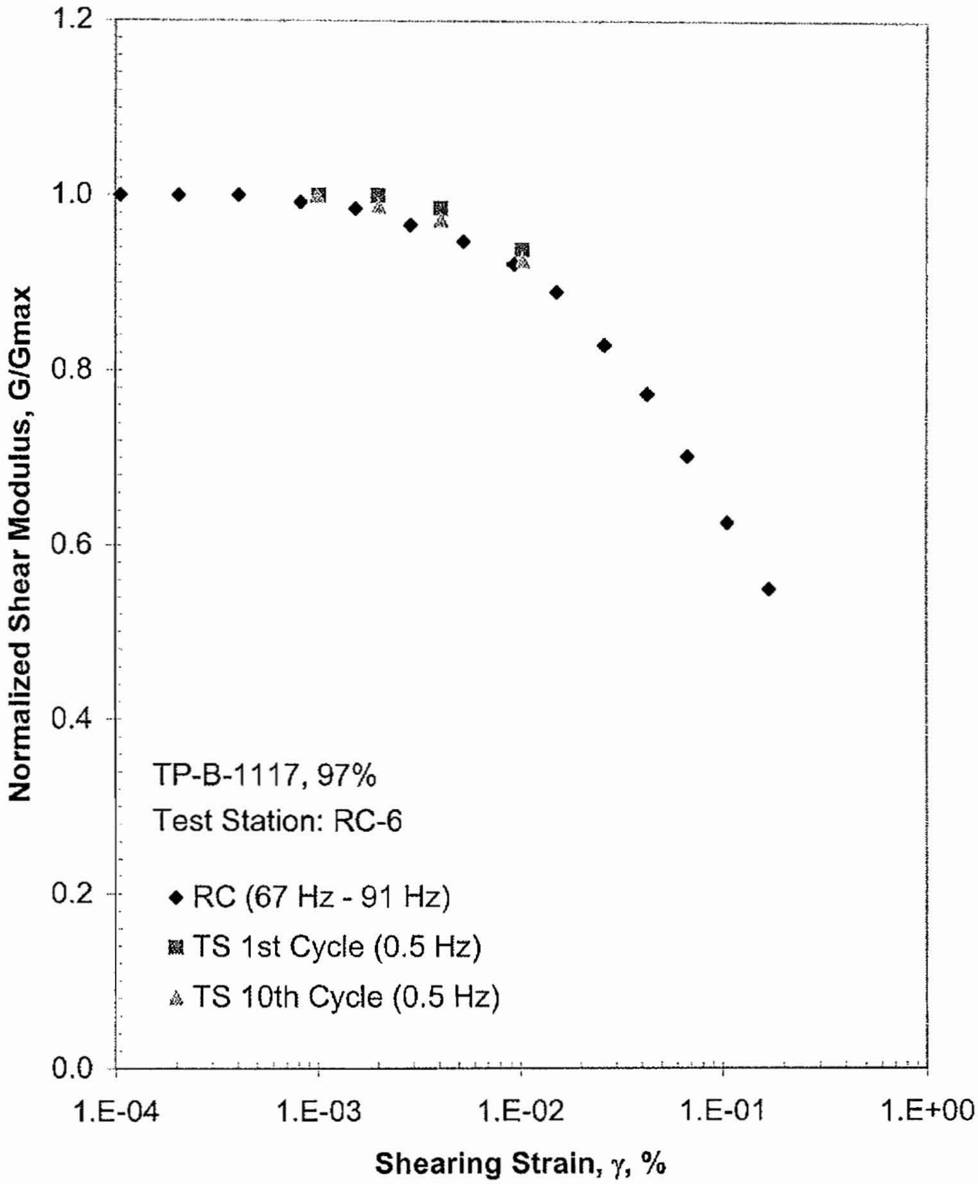


Figure H.17 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 131.8 psi from the Combined RCTS Tests

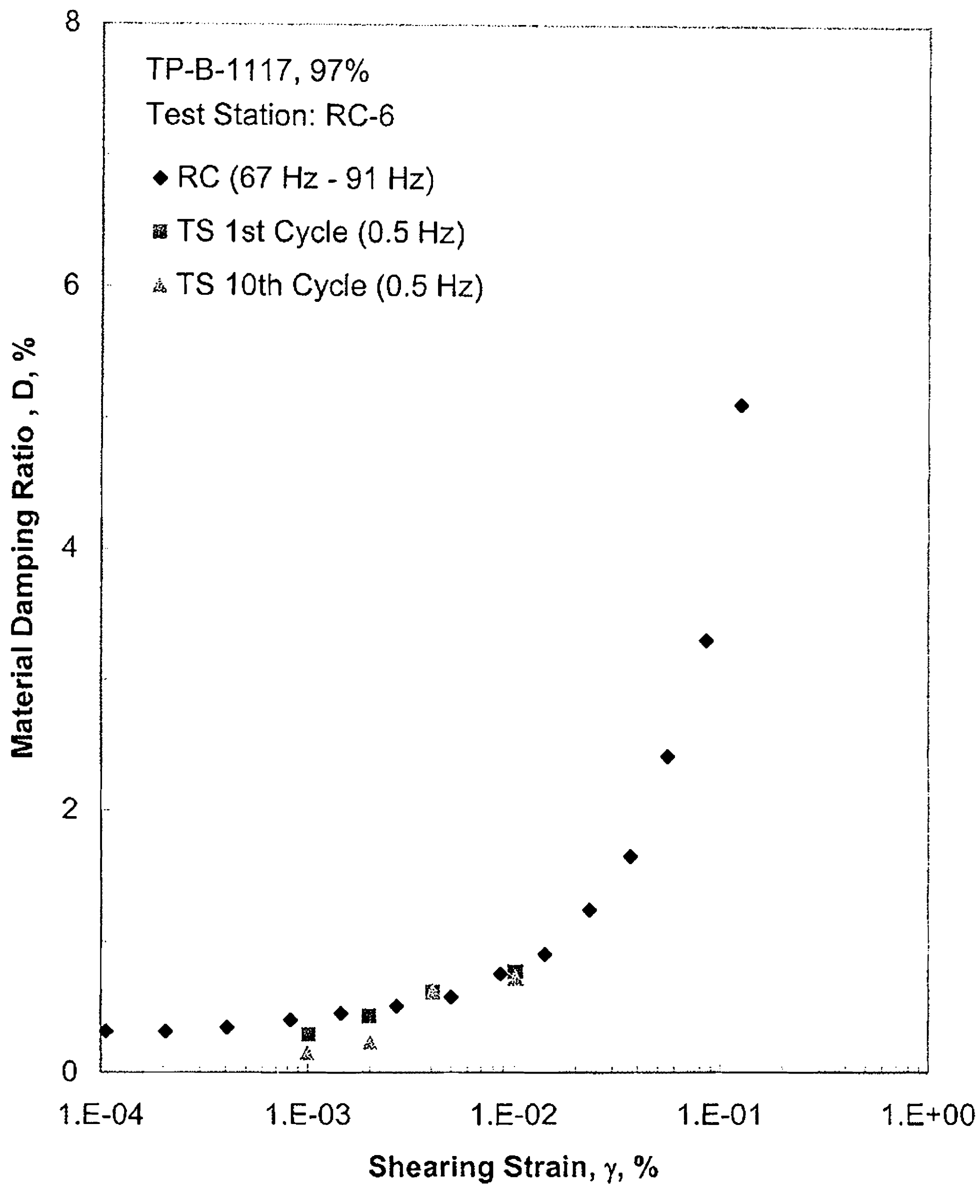


Figure H.18 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 131.8 psi from the Combined RCTS Tests

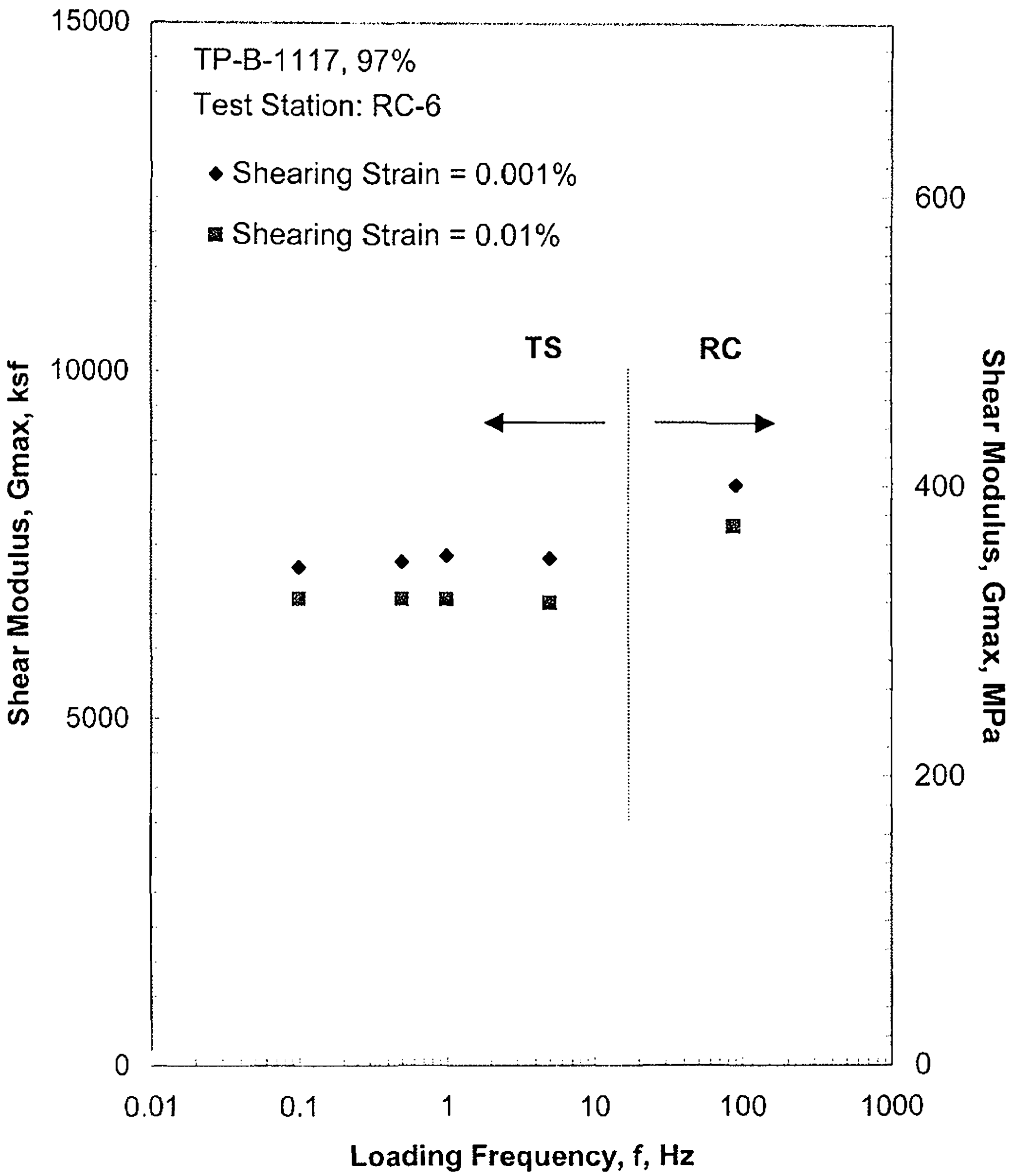


Figure H.19 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 131.8 psi from the Combined RCTS Tests

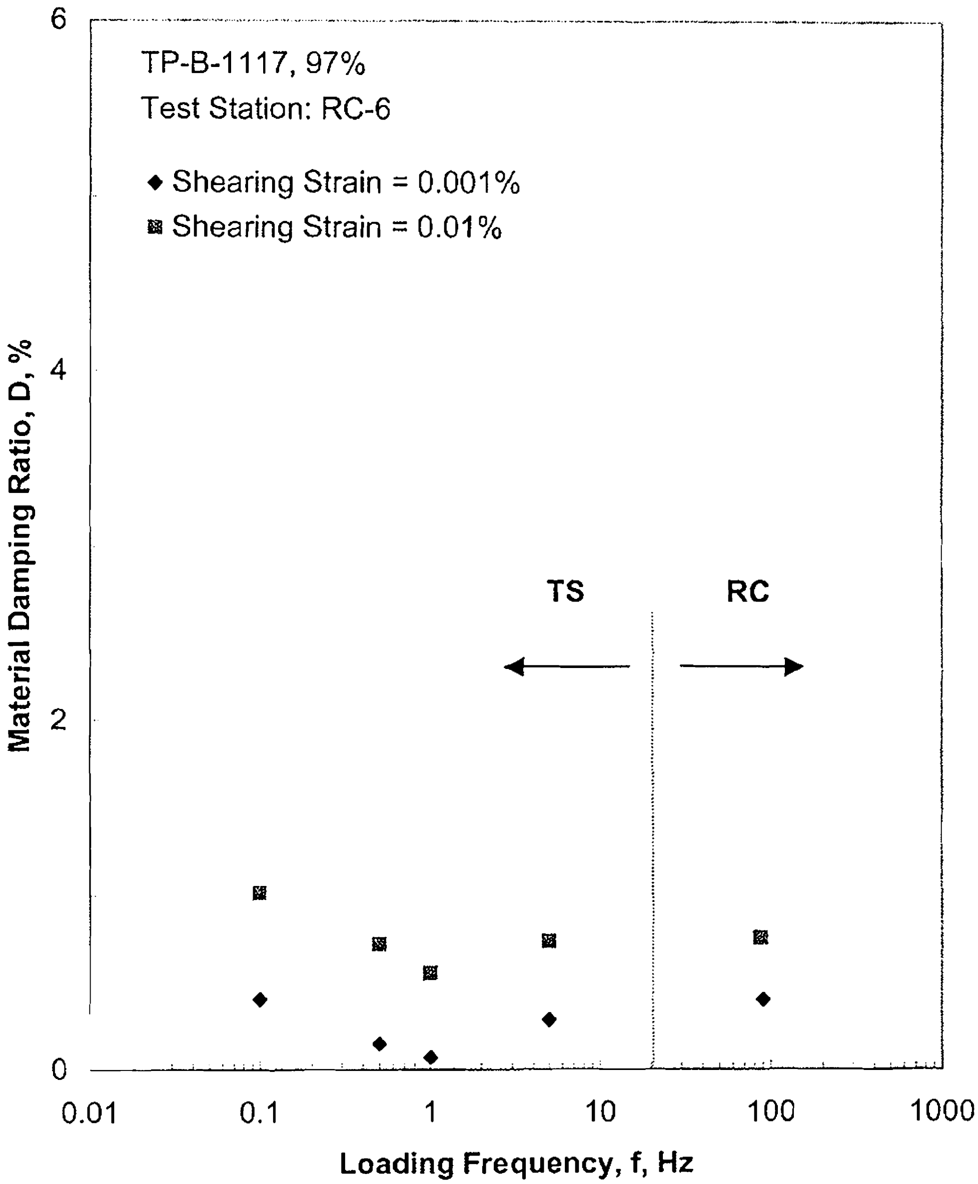


Figure H.20 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 131.8 psi from the Combined RCTS Tests

Table H.1 Variation in Low-Amplitude Shear Wave Velocity, Low-Amplitude Shear Modulus, Low-Amplitude Material Damping Ratio and Estimated Void Ratio with Isotropic Confining Pressure from RC Tests of Specimen TP-B-1117, 97%

Isotropic Confining Pressure, σ_o			Low-Amplitude Shear Modulus, G_{max}		Low-Amplitude Shear Wave Velocity, Vs	Low-Amplitude Material Damping Ratio, Dmin	Estimated Void Ratio, e
(psi)	(psf)	(kPa)	(ksf)	(MPa)	(fps)	(%)	
8.2	1181	56	2403	115	803	0.78	0.55
16.5	2376	114	3274	157	937	0.67	0.55
33.0	4752	227	4451	214	1092	0.54	0.55
65.9	9490	454	6228	299	1289	0.43	0.54
131.8	18979	908	8564	411	1510	0.37	0.54

Table H.2 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen TP-B-1117, 97%; Isoptropic Confining Pressure, σ_o=33.0 psi (4.8 ksf = 227 kPa)

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Average+ Shearing Strain, %	Material Damping Ratio^x, D, %
2.32E-04	4305	1.00	2.32E-04	0.51
4.23E-04	4305	1.00	4.23E-04	0.51
8.56E-04	4258	0.99	8.56E-04	0.55
1.63E-03	4195	0.97	1.48E-03	0.56
2.98E-03	4086	0.95	2.78E-03	0.70
5.57E-03	3934	0.91	5.07E-03	0.79
9.78E-03	3827	0.89	8.80E-03	0.98
1.61E-02	3632	0.84	1.42E-02	1.25
2.56E-02	3363	0.78	2.20E-02	1.77
4.18E-02	3061	0.71	3.51E-02	2.33
7.30E-02	2649	0.62	5.69E-02	4.05

+ Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

x Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table H.3 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen TP-B-1117, 97%; Isotropic Confining Pressure, σ_o = 33.0 psi (4.8 ksf =227 kPa)

First Cycle				Tenth Cycle			
Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %	Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %
1.05E-03	3722	1.00	0.52	1.04E-03	3777	1.00	0.41
2.13E-03	3680	0.99	0.49	2.11E-03	3709	0.98	0.52
4.43E-03	3539	0.95	0.87	4.44E-03	3533	0.94	0.78
1.02E-02	3216	0.86	1.13	1.02E-02	3218	0.85	1.22

Table H.4 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen TP-B-1117, 97%; Isoptropic Confining Pressure, σ_o= 131.8 psi (19.0 ksf = 908 kPa)

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Average+ Shearing Strain, %	Material Damping Ratio^x, D, %
1.06E-04	8427	1.00	1.06E-04	0.32
2.05E-04	8427	1.00	2.05E-04	0.32
4.08E-04	8427	1.00	4.08E-04	0.35
8.24E-04	8363	0.99	8.24E-04	0.40
1.54E-03	8300	0.98	1.45E-03	0.45
2.89E-03	8143	0.97	2.72E-03	0.51
5.30E-03	7988	0.95	4.99E-03	0.58
9.36E-03	7772	0.92	8.70E-03	0.75
1.52E-02	7498	0.89	1.42E-02	0.90
2.62E-02	6990	0.83	2.33E-02	1.24
4.25E-02	6519	0.77	3.70E-02	1.65
6.75E-02	5926	0.70	5.60E-02	2.42
1.06E-01	5282	0.63	8.60E-02	3.31
1.70E-01	4642	0.55	1.26E-01	5.11

+ Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

x Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table H.5 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen TP-B-1117, 97%; Isotropic Confining Pressure, σ_o=131.8 psi (19.0 ksf = 908 kPa)

First Cycle				Tenth Cycle			
Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %	Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %
1.01E-03	7183	1.00	0.29	9.95E-04	7258	1.00	0.15
2.00E-03	7183	1.00	0.43	2.02E-03	7170	0.99	0.23
4.08E-03	7082	0.99	0.61	4.09E-03	7058	0.97	0.62
1.02E-02	6740	0.94	0.77	1.03E-02	6720	0.93	0.72

FUGRO CONSULTANTS, INC.

6100 Hillcroft (77081)
P.O. Box 740010
Houston, Texas 77274
Tel: 713-369-5400
Fax: 713-369-5518

December 13, 2007

Mr. Wm. Allen Lancaster
MACTEC Engineering and Consulting, Inc.
396 Plasters Avenue
Atlanta, Georgia 30324

RE: Three (3) Reports For The Vogtle (a.k.a. VGL) Project

Dear Mr. Lancaster:

Fugro has completed three (3) RCTS tests, which are B3001-UD12, TP-B-1121 at 95%, and TP-B-1121 at 97%, for the VGL project. Fugro has incorporated, as applicable, Dr. Kenneth Stokoe's comments into the final reports. The final reports and the associated RCTS Test Approval by Dr. Kenneth Stokoe have been attached.

Please let us know if you have questions. Thanks.

Very truly yours,

Fugro Consultants, Inc.

Jiewu Meng, PhD, P.E.
Project Engineer

Bill DeGroff

Bill DeGroff, P.E.
Laboratory Department Manager

Enclosures

DCN V6COL 389
73 PAGES

RCTS TEST APROVAL

PROJECT SITE/NAME	VGL

Test ID	Sample ID	Depth B.S. (Ft)	Approved By (Initials)	Date
RCTS#I	B3001-UD12	291	KHS (+)	6 Dec 07
RCTS#J	TP-B-1121, 95%	7	KHS (+)	6 Dec 07
RCTS#K	TP-B-1121, 97%	7	KHS (+)	6 Dec 07

Three RCTS tests for the site referenced above were tested, and three reports were prepared, by Fugro Consultants, Inc.

I have reviewed the data and associated results listed above and found them to be reasonable.

Approved By:

K. H. Stokoe II

Dr. Kenneth Stokoe

(+) see notes on the figures. Only minor comments and testing looks fine

APPENDIX I

Specimen VGL B3001-UD12
(Non-Plastic; Gs=2.67)

Borehole B3001
Sample UD12
Depth = 290.5 ft (88.6 m)
Total Unit Weight = 125.6 lb/ft^3
Water Content = 20.6 %
Estimated In-Situ Ko = 0.44
Estimated In-Situ Mean Effective
Stress = 90.8 psi

FUGRO JOB #: 0401-1667
Testing Station: RC6

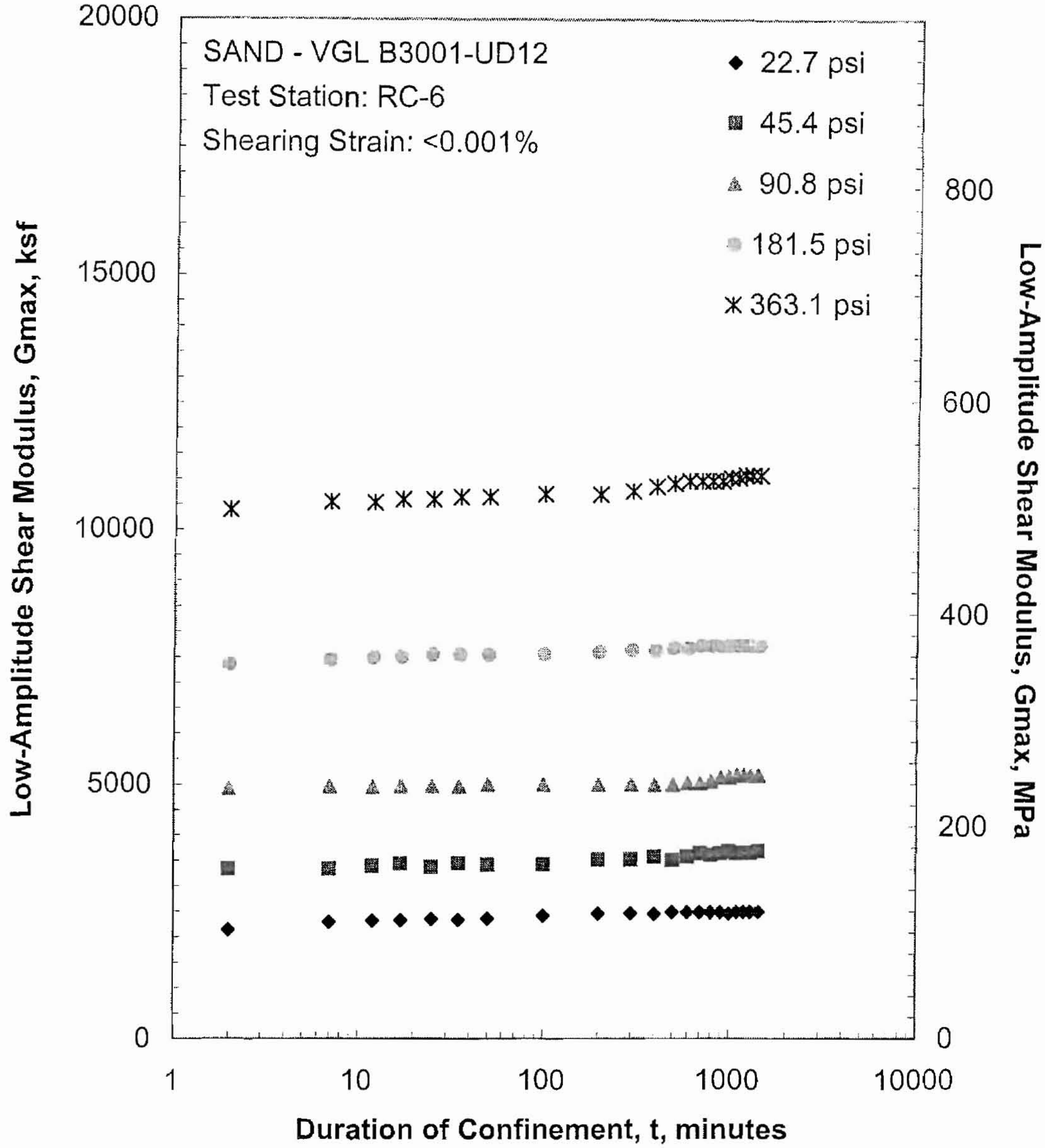


Figure I.1 Variation in Low-Amplitude Shear Modulus with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

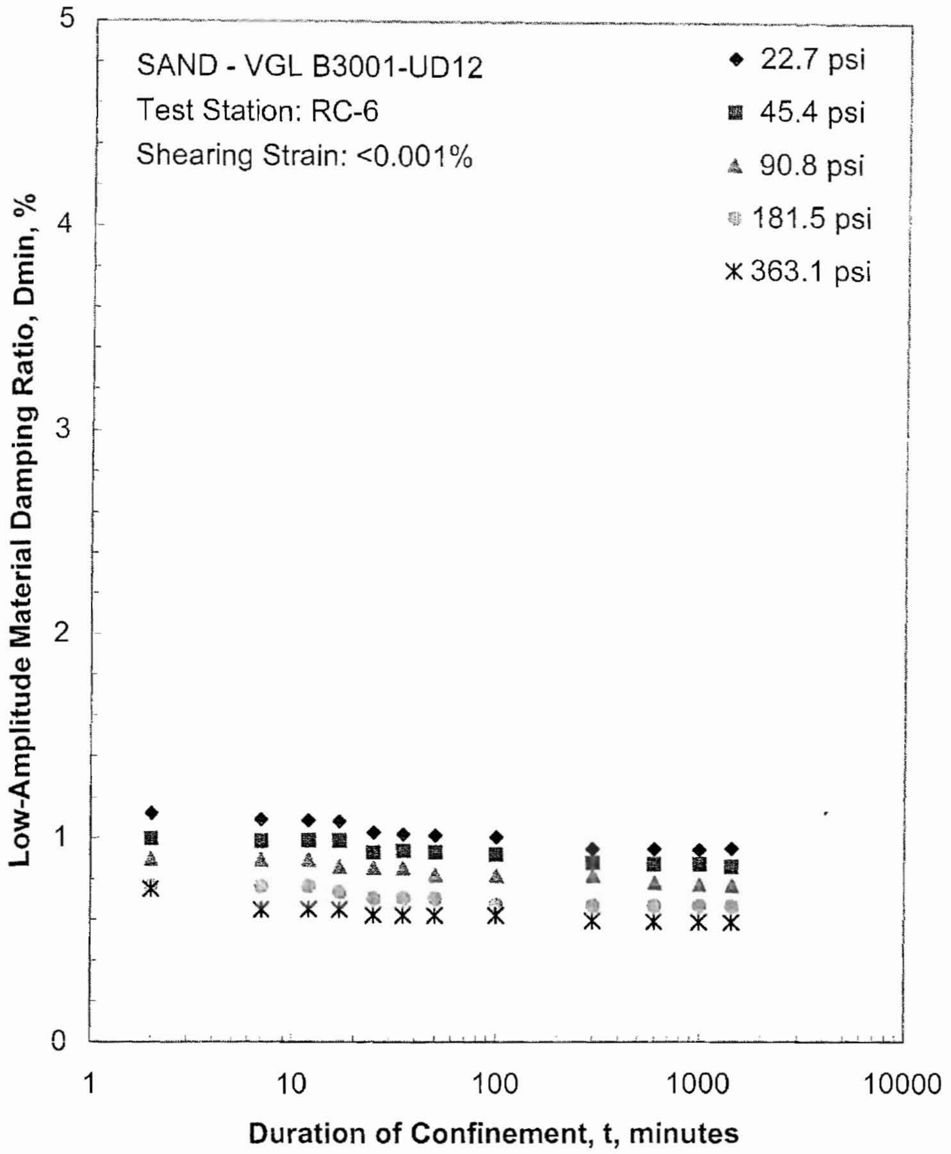


Figure I.2 Variation in Low-Amplitude Material Damping Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

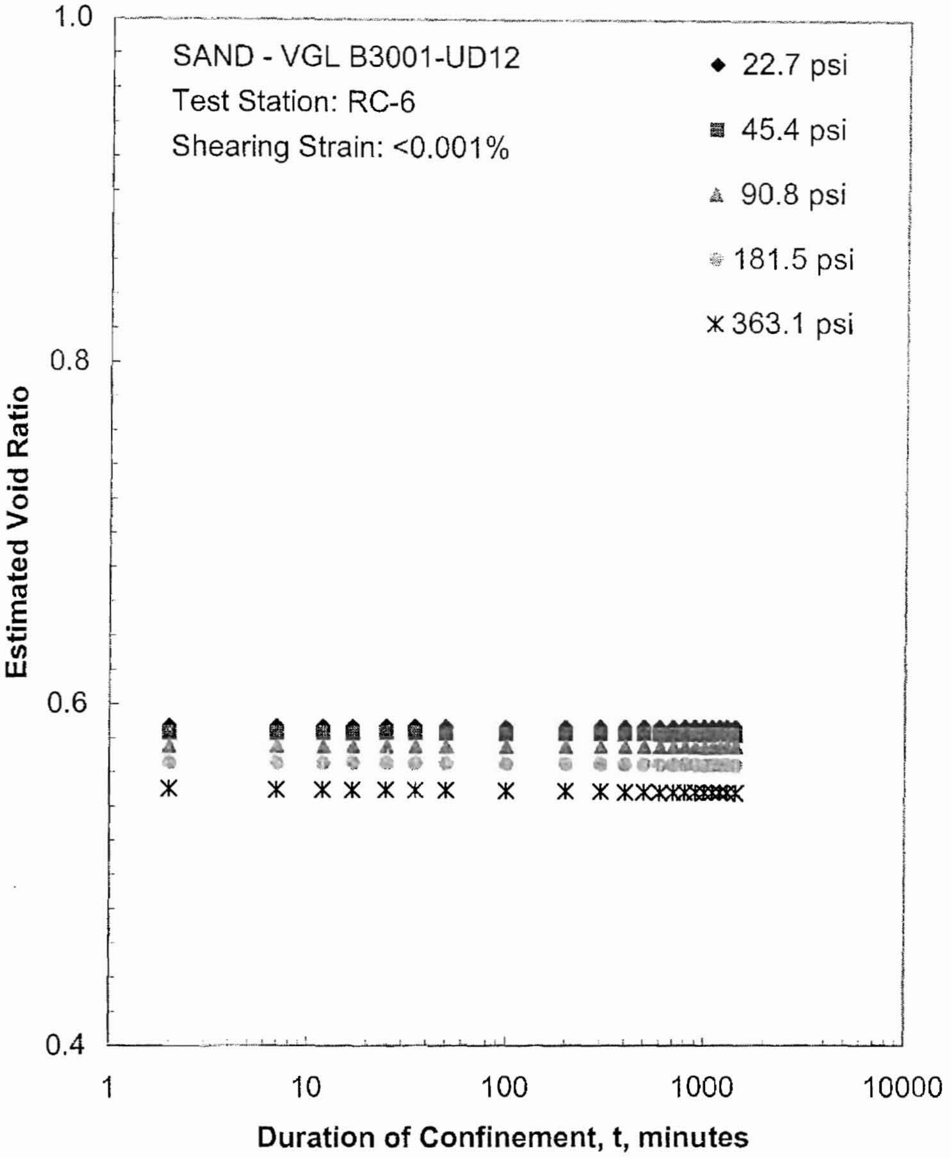


Figure I.3 Variation in Estimated Void Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

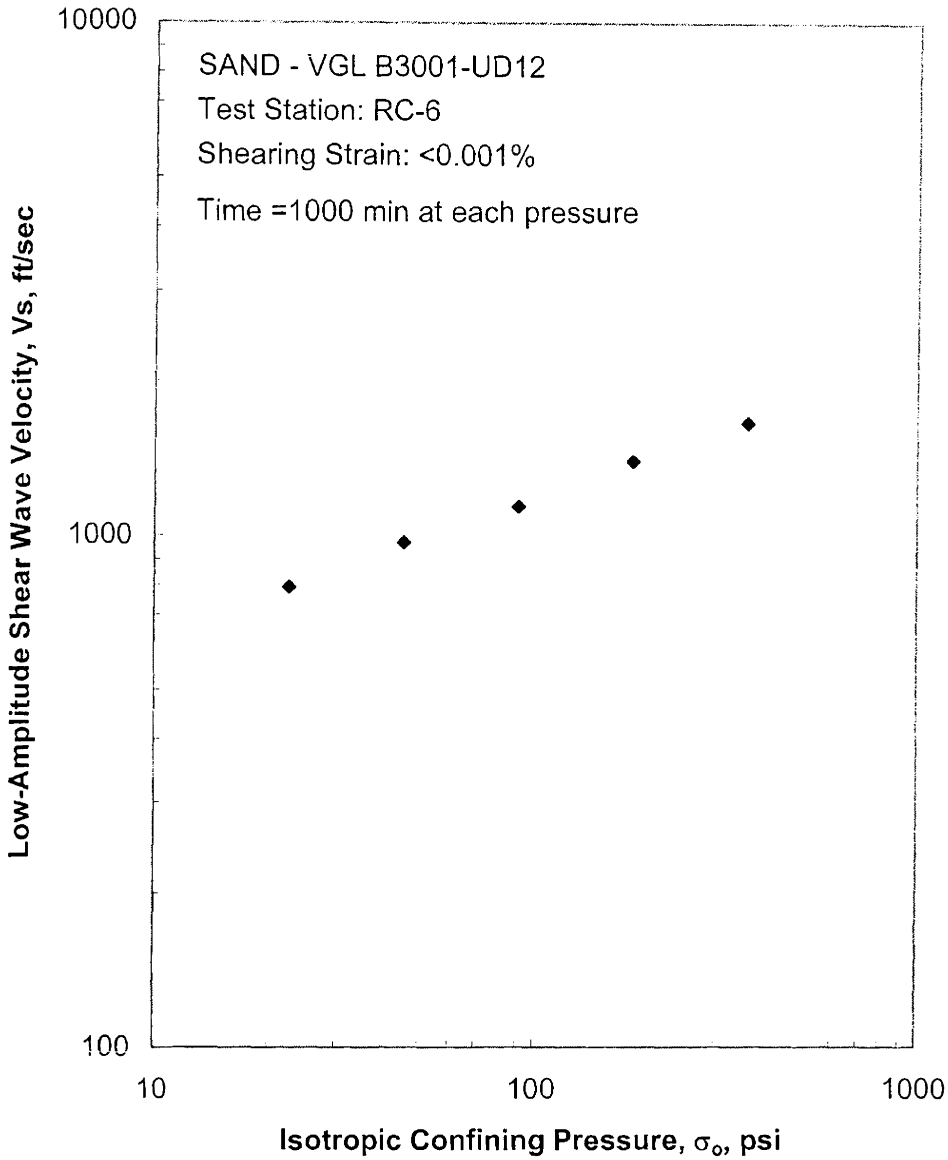


Figure I.4 Variation in Low-Amplitude Shear Wave Velocity with Isotropic Confining Pressure from Resonant Column Tests

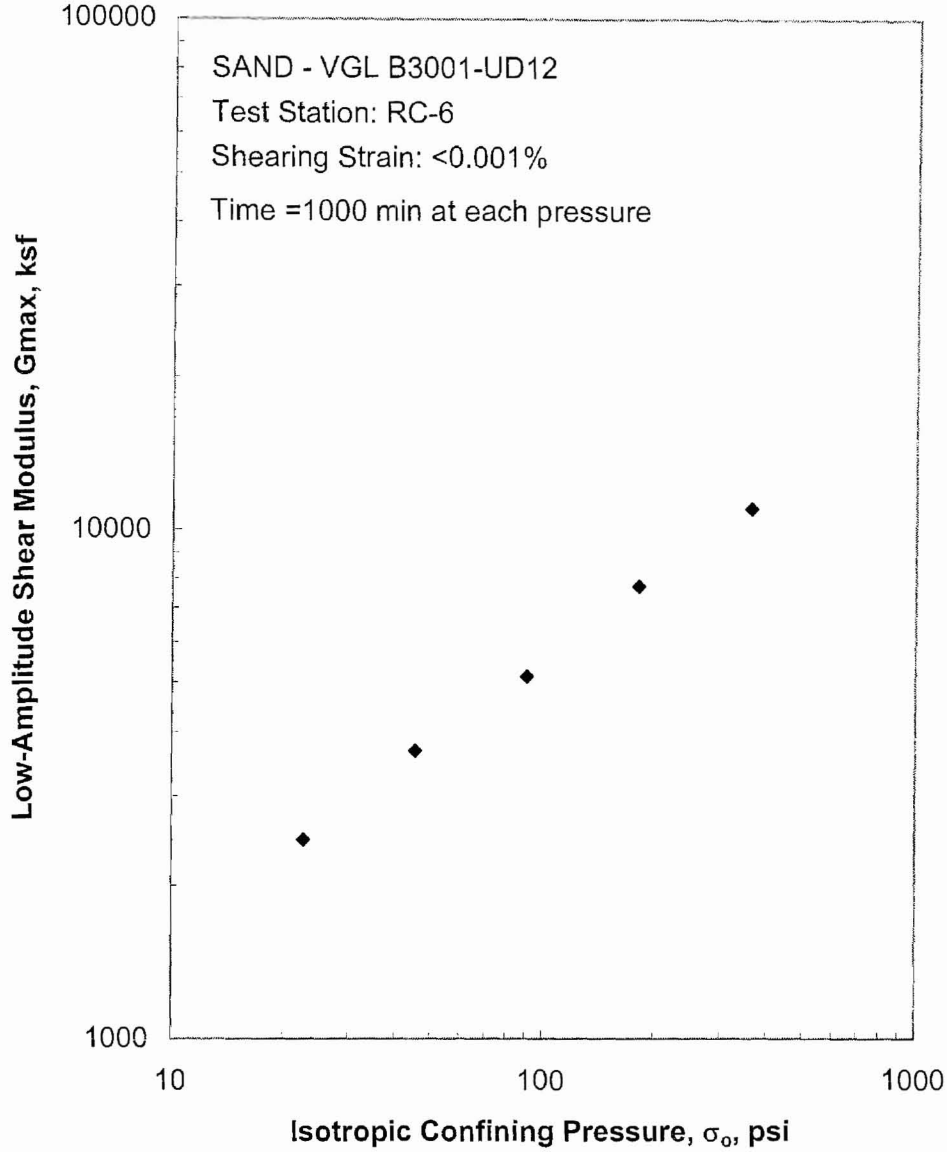


Figure I.5 Variation in Low-Amplitude Shear Modulus with Isotropic Confining Pressure from Resonant Column Tests

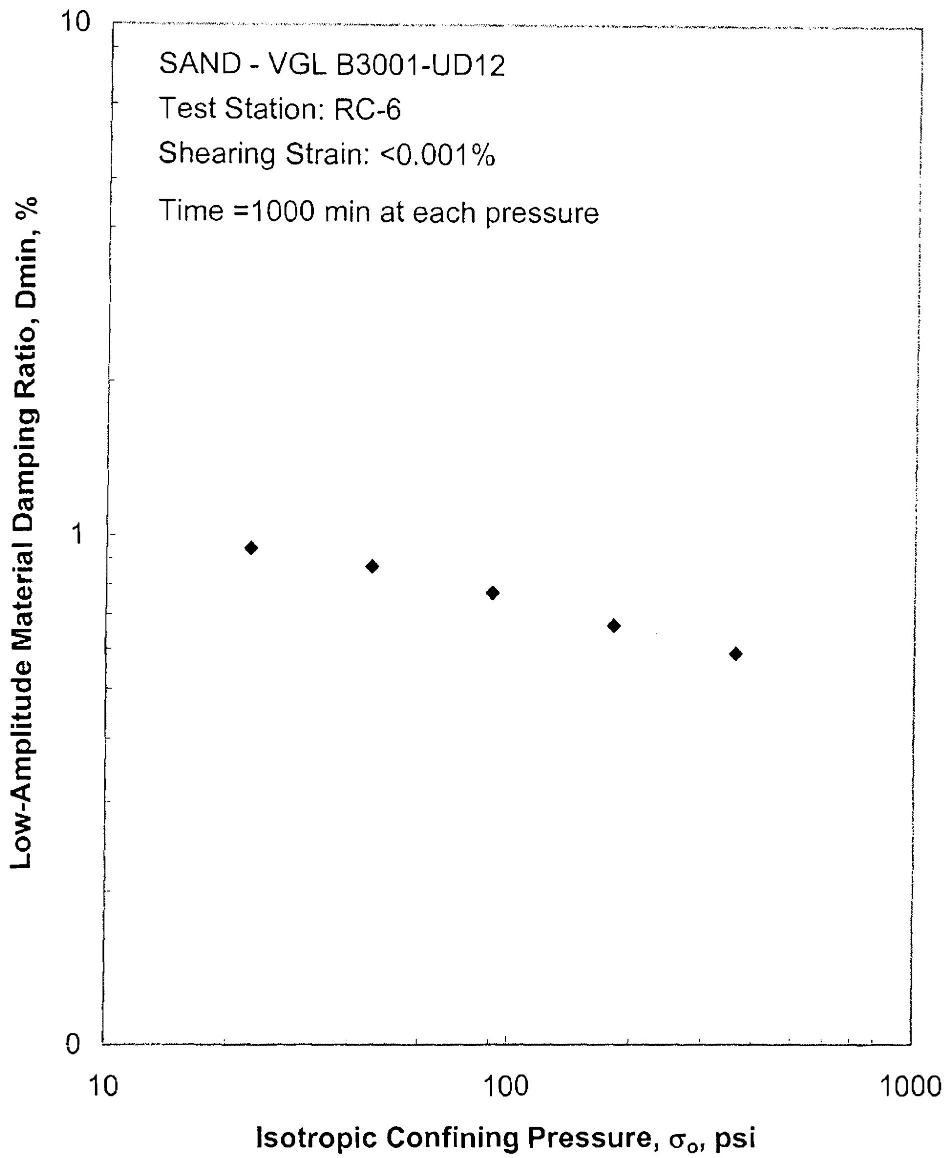


Figure I.6 Variation in Low-Amplitude Material Damping Ratio with Isotropic Confining Pressure from Resonant Column Tests

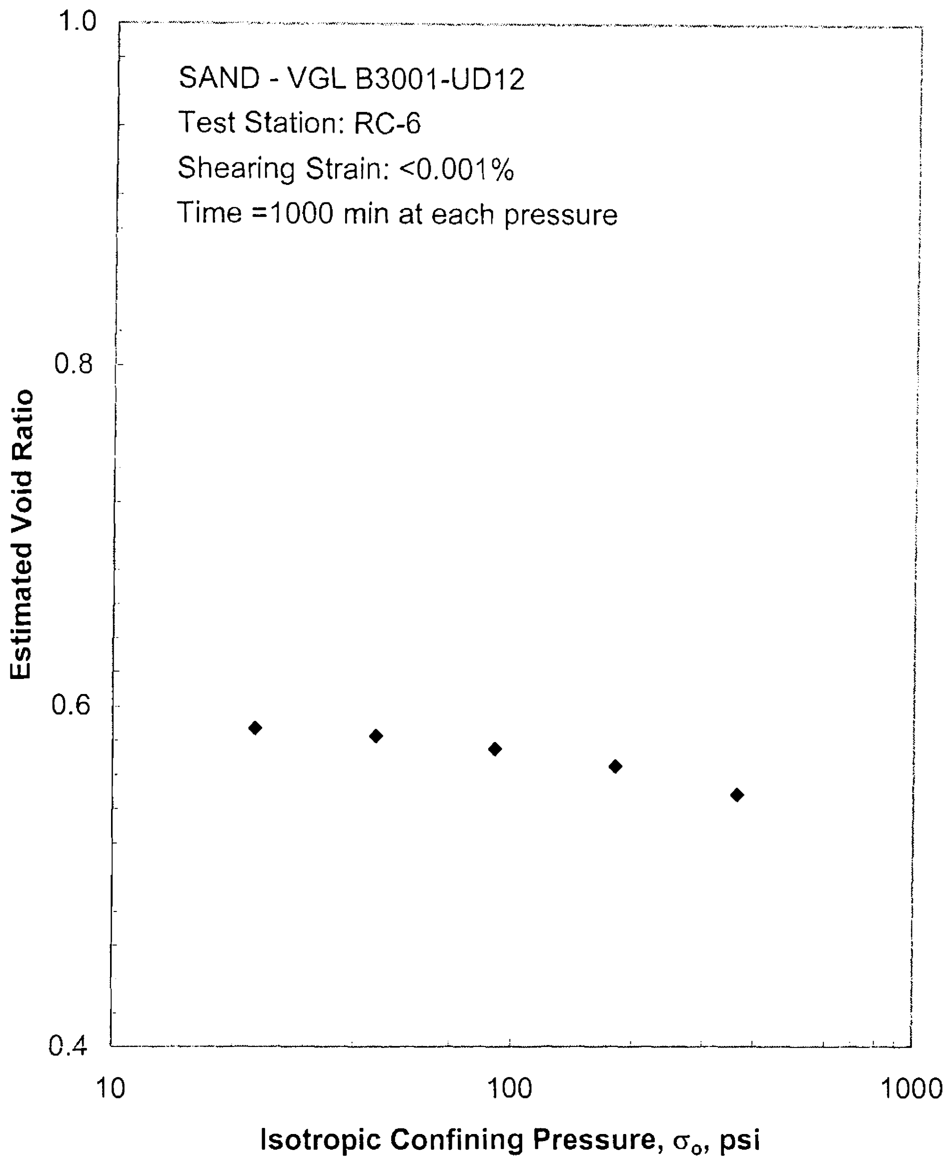


Figure I.7 Variation in Estimated Void Ratio with Isotropic Confining Pressure from Resonant Column Tests

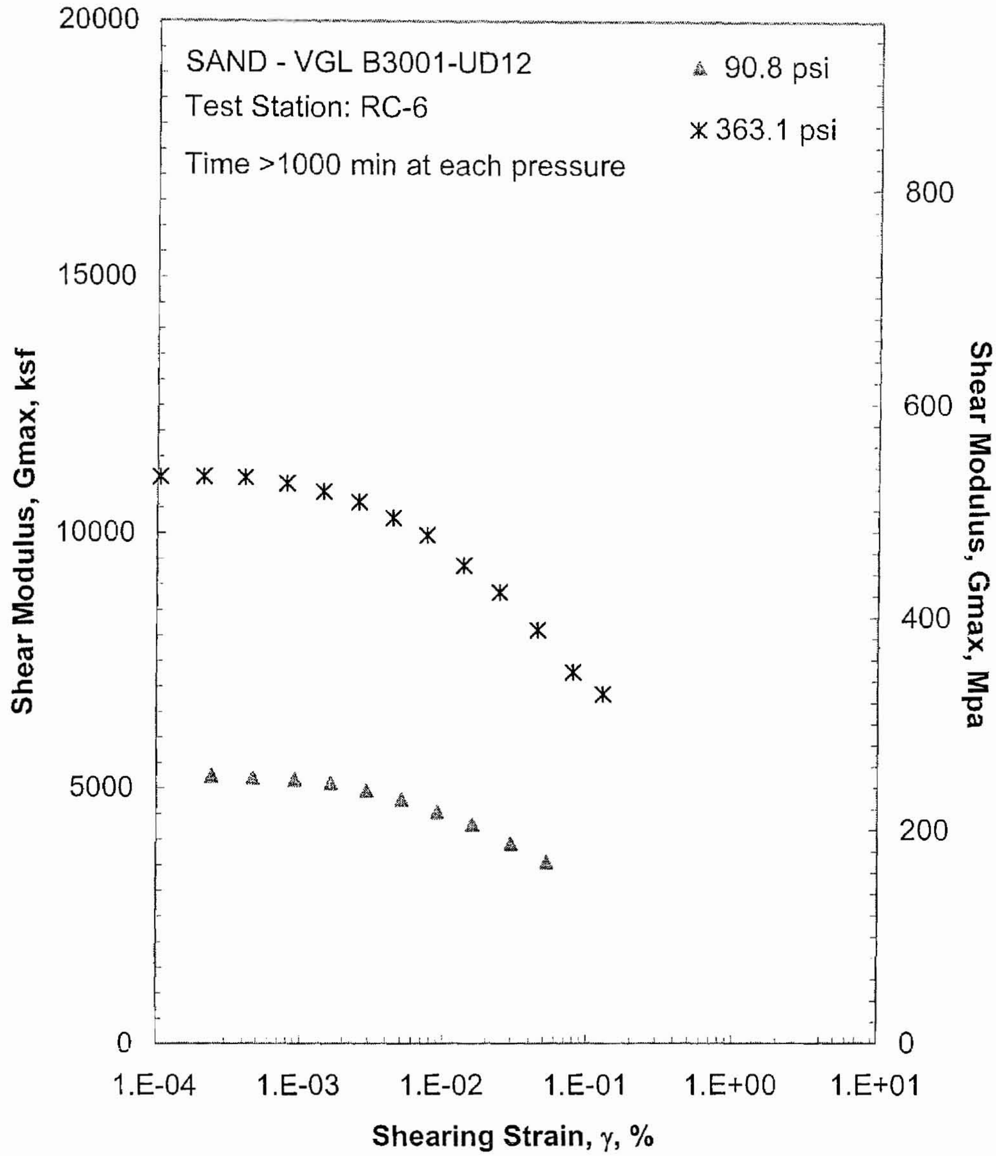


Figure I.8 Comparison of the Variation in Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

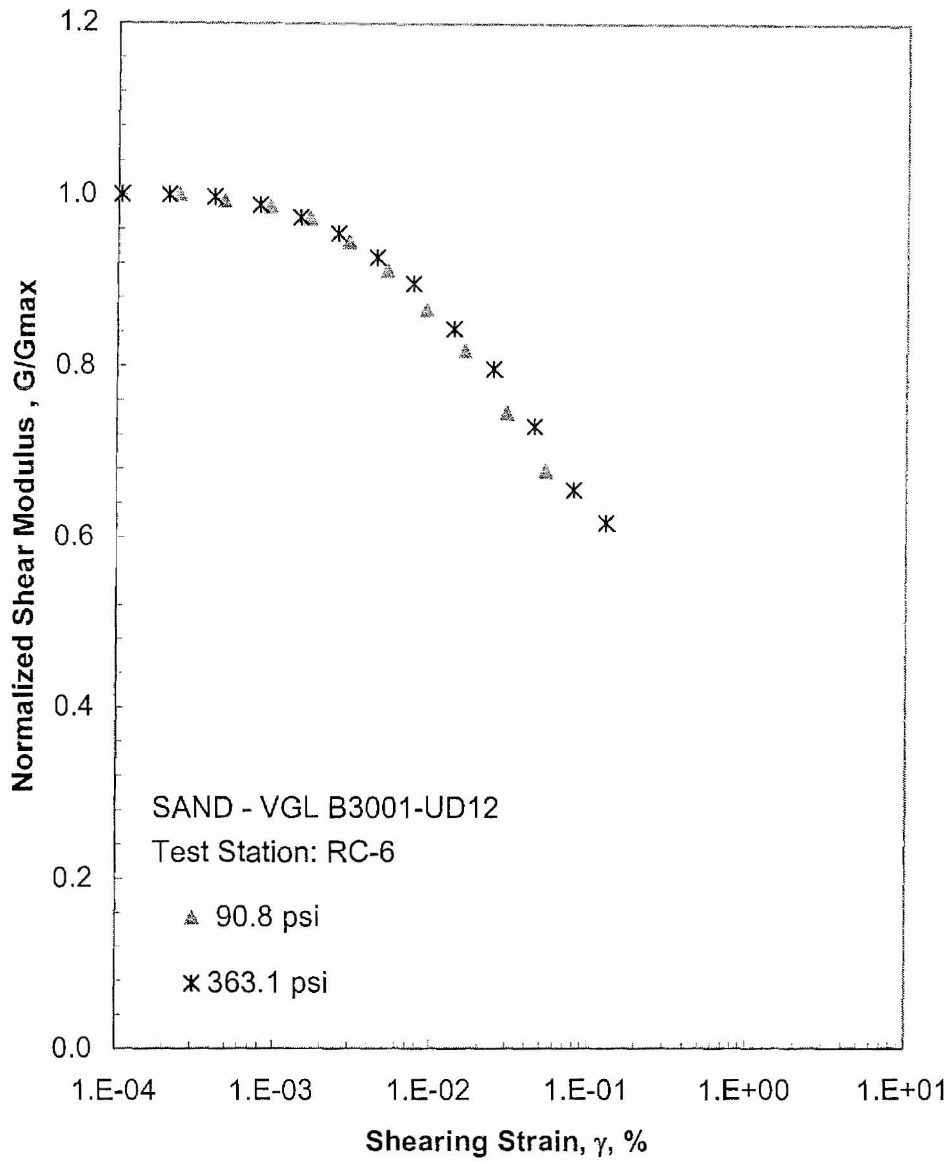


Figure I.9 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

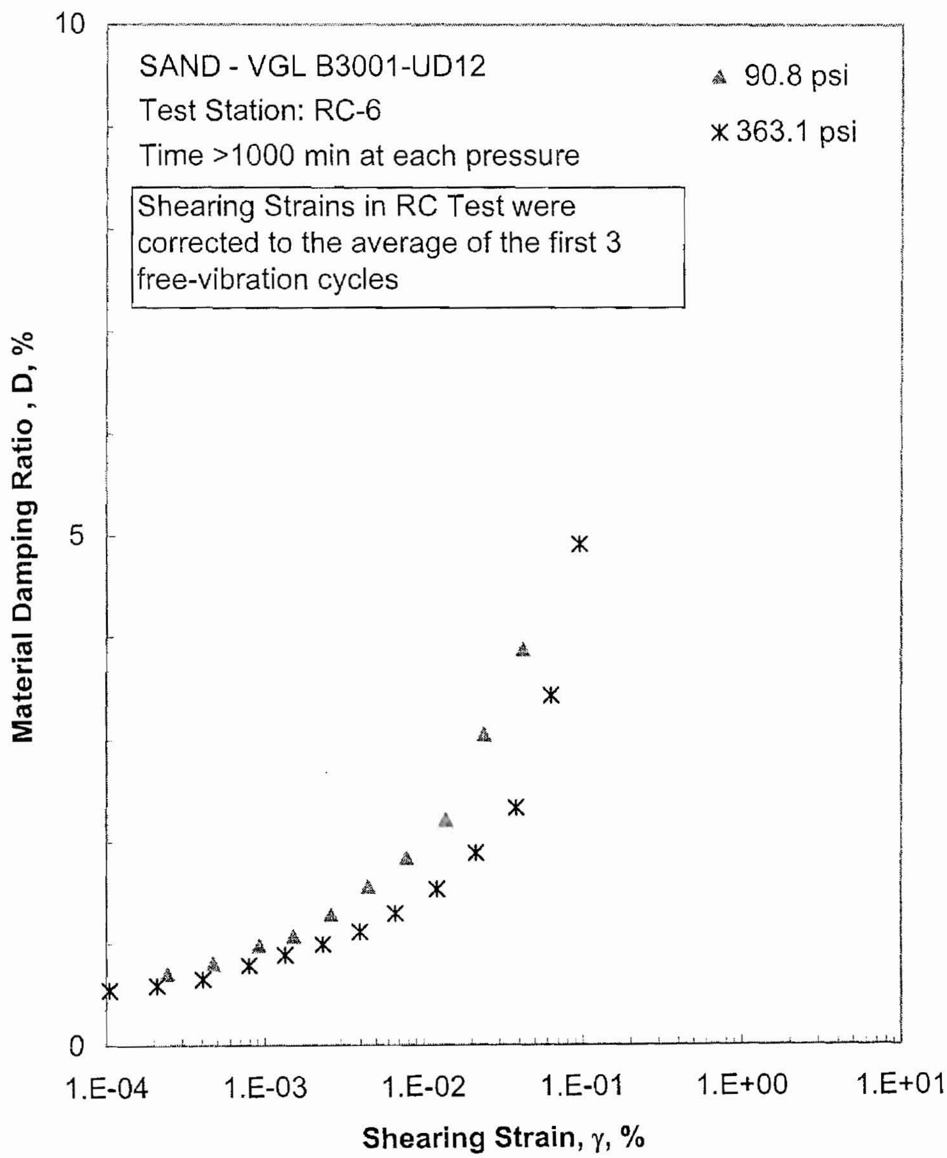


Figure I.10 Comparison of the Variation in Material Damping Ratio with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

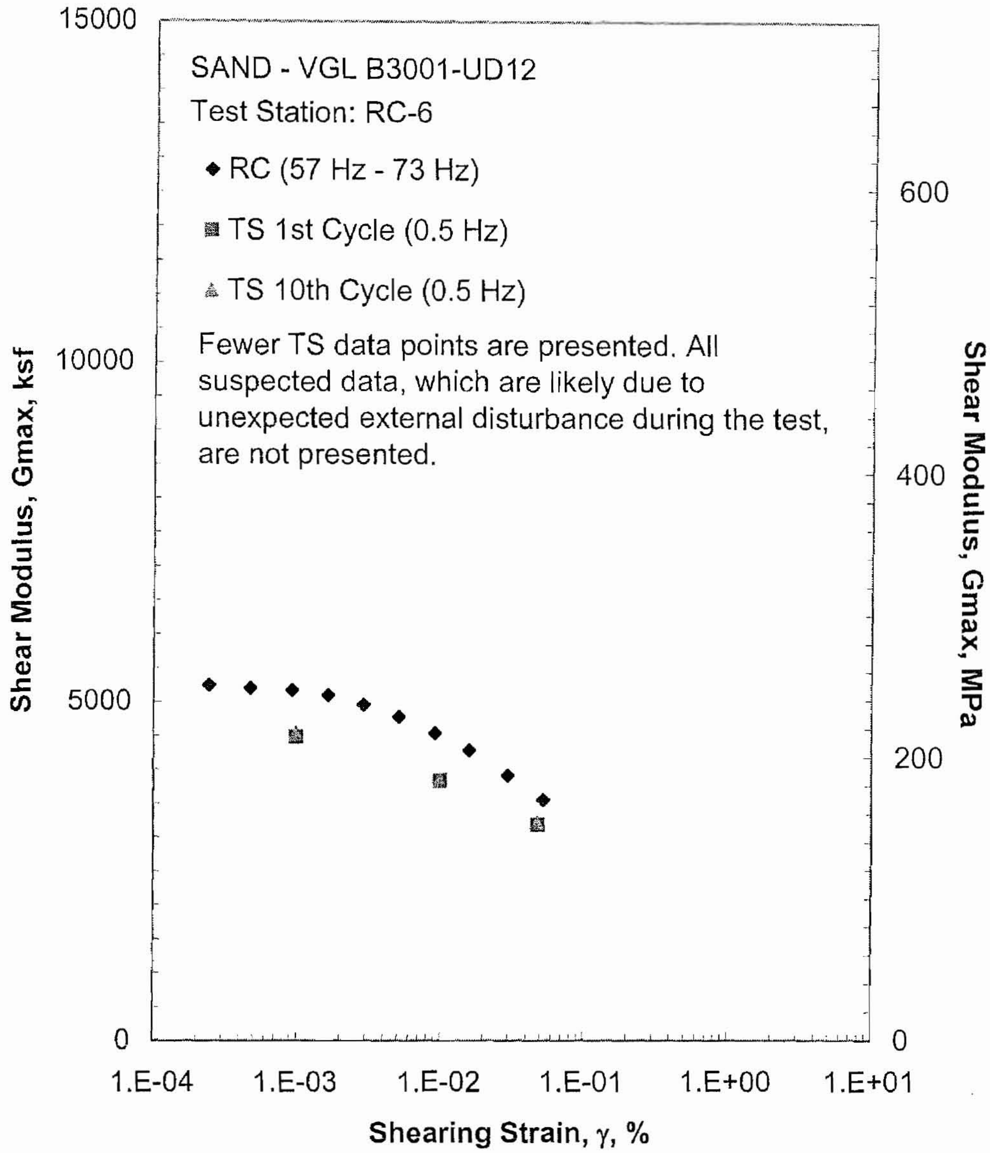


Figure I.11 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 90.8 psi from the Combined RCTS Tests

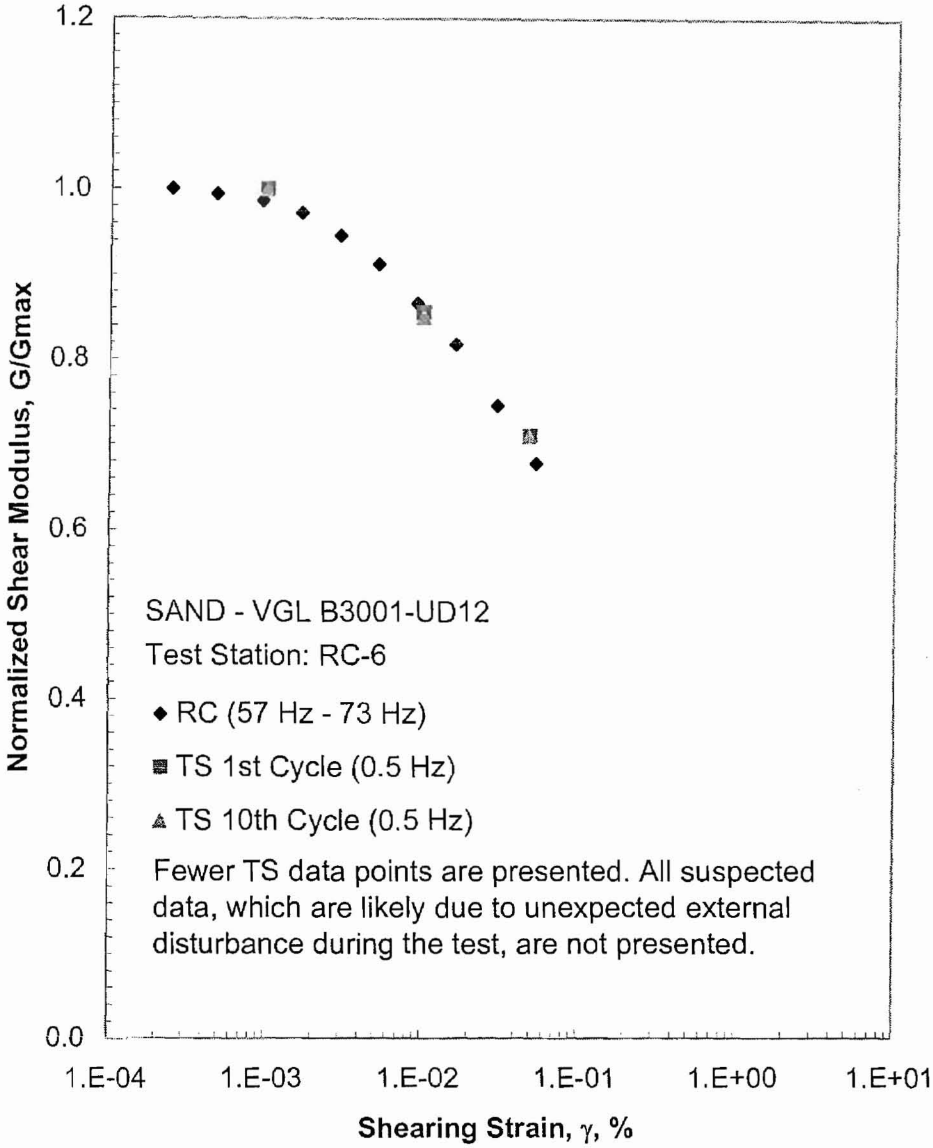


Figure I.12 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 90.8 psi from the Combined RCTS Tests

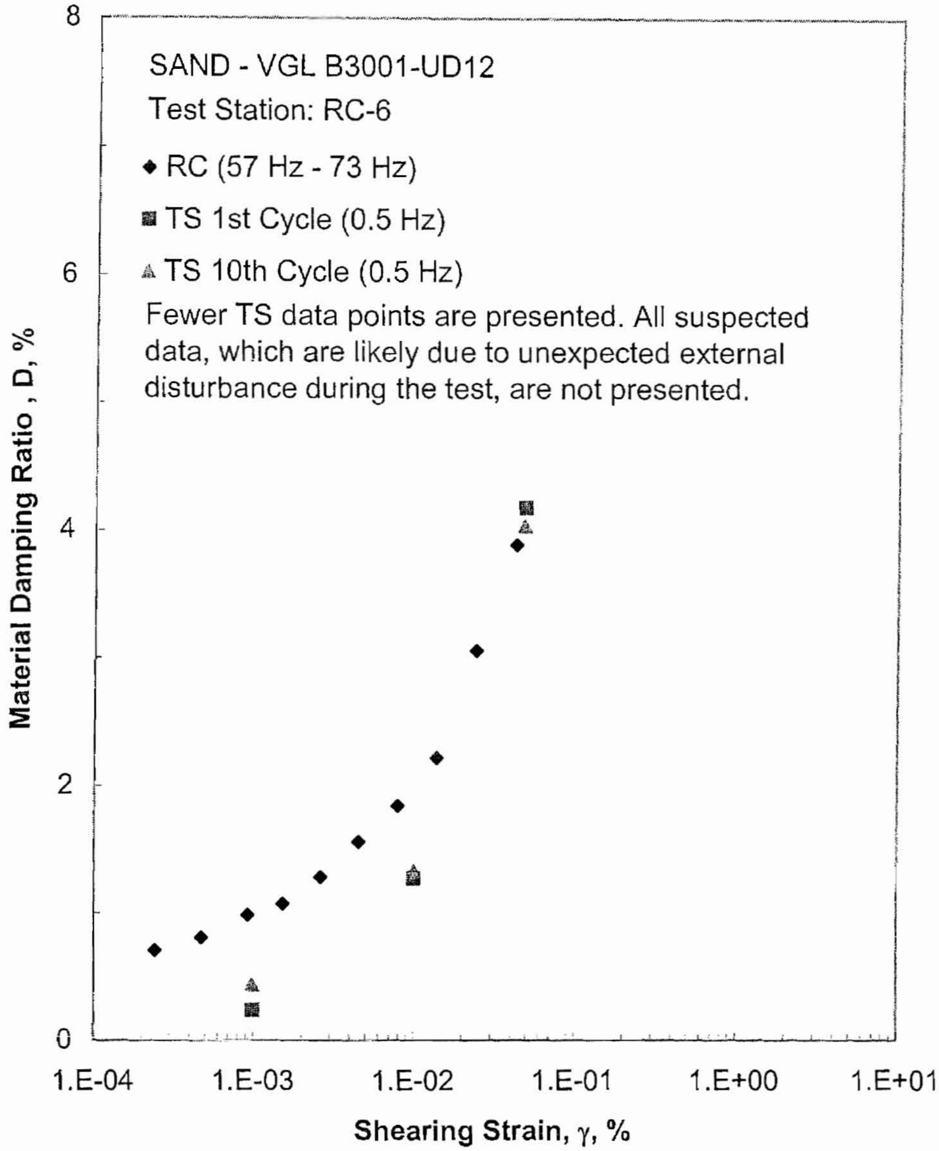


Figure I.13 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 90.8 psi from the Combined RCTS Tests

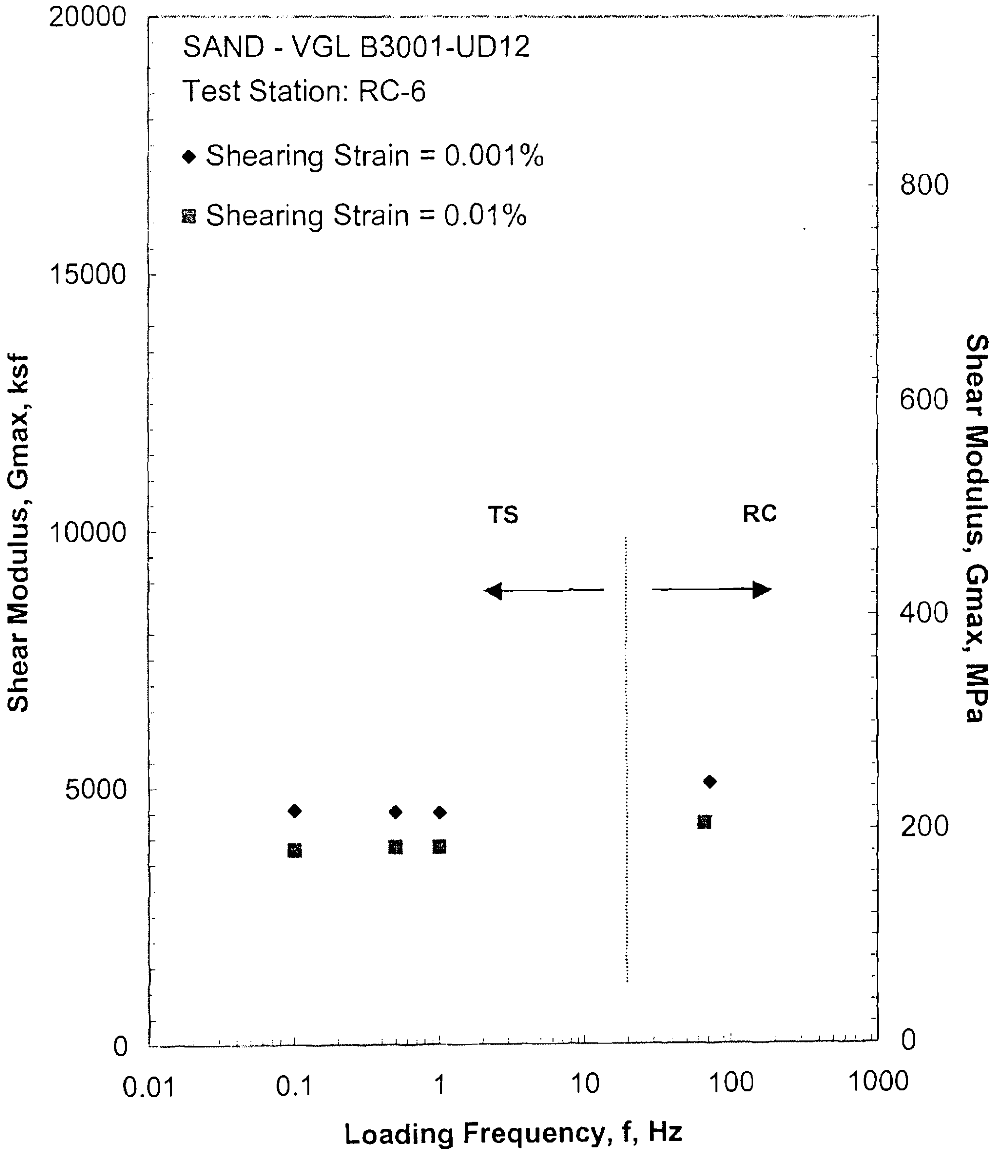


Figure I.14 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 90.8 psi from the Combined RCTS Tests

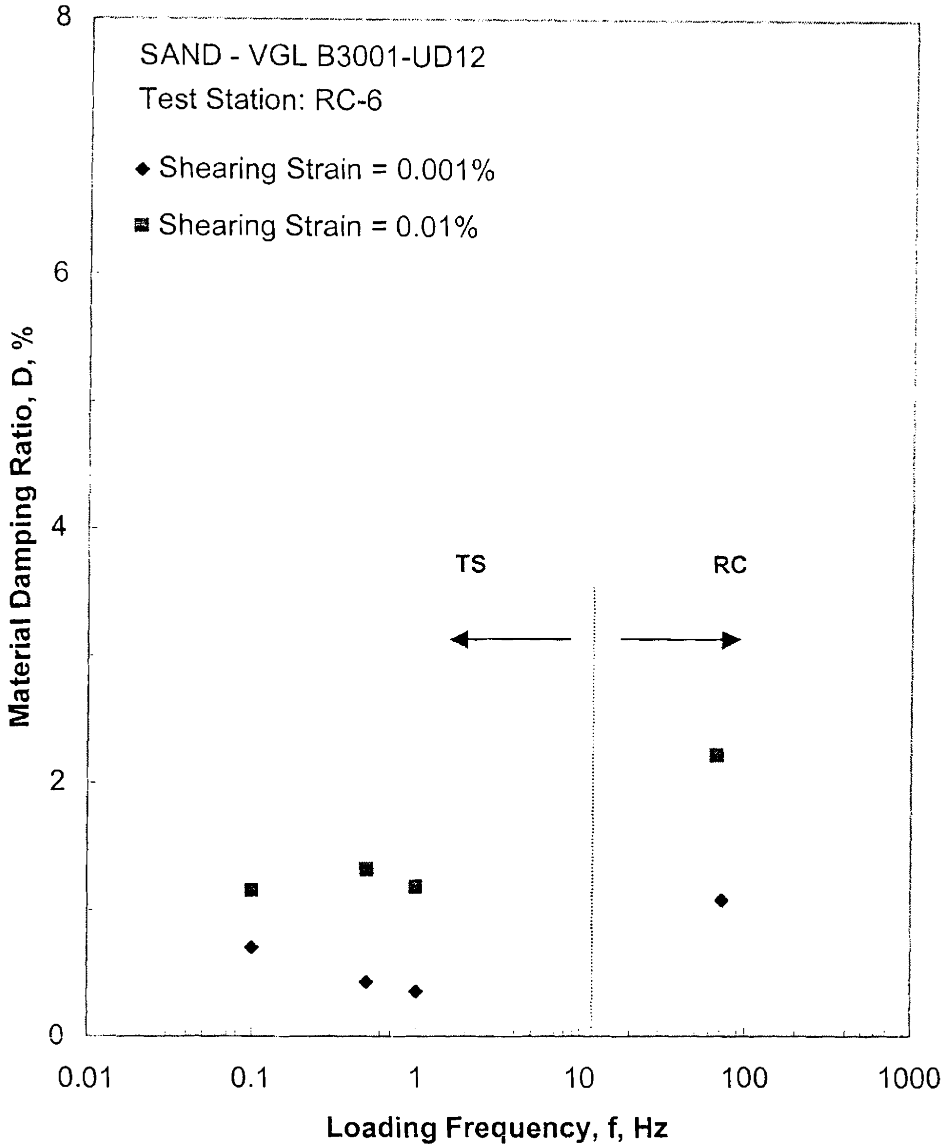


Figure I.15 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 90.8 psi from the Combined RCTS Tests

NOTE: Figures I.16 through I.20 are not available due to suspected high straining effects or unknown source(s) of disturbance during the TS tests.

Table I.1 Variation in Low-Amplitude Shear Wave Velocity, Low-Amplitude Shear Modulus, Low-Amplitude Material Damping Ratio and Estimated Void Ratio with Isotropic Confining Pressure from RC Tests of Specimen VGL B3001-UD12

Isotropic Confining Pressure, σ_o			Low-Amplitude Shear Modulus, G_{max}		Low-Amplitude Shear Wave Velocity, Vs	Low-Amplitude Material Damping Ratio, Dmin	Estimated Void Ratio, e
(psi)	(psf)	(kPa)	(ksf)	(MPa)	(fps)	(%)	
22.7	3269	156	2466	118	795	0.94	0.59
45.4	6538	313	3689	177	970	0.87	0.58
90.8	13075	626	5144	247	1143	0.77	0.58
181.5	26136	1251	7732	371	1397	0.67	0.56
363.1	52286	2502	11025	529	1659	0.59	0.55

Table I.2 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen VGL B3001-UD12; Isoptropic Confining Pressure, σ_o=90.8 psi (13.1 ksf = 626 kPa)

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Average+ Shearing Strain, %	Material Damping Ratiox, D, %
2.43E-04	5240	1.00	2.43E-04	0.70
4.73E-04	5204	0.99	4.73E-04	0.80
9.24E-04	5168	0.99	9.24E-04	0.98
1.65E-03	5096	0.97	1.52E-03	1.07
2.92E-03	4954	0.95	2.62E-03	1.28
5.11E-03	4779	0.91	4.50E-03	1.56
9.12E-03	4540	0.87	7.84E-03	1.84
1.60E-02	4285	0.82	1.38E-02	2.22
2.97E-02	3909	0.75	2.40E-02	3.05
5.28E-02	3551	0.68	4.23E-02	3.88

+ Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

x Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table I.3 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen VGL B3001-UD12; Isotropic Confining Pressure, σ_o= 90.8 psi (13.1 ksf =626 kPa)

First Cycle				Tenth Cycle			
Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %	Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %
9.92E-04	4478	1.00	0.23	9.82E-04	4528	1.00	0.44
9.98E-03	3831	0.86	1.27	9.93E-03	3848	0.85	1.33
4.81E-02	3181	0.71	4.18	4.76E-02	3213	0.71	4.03

Table I.4 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen VGL B3001-UD12; Isoptropic Confining Pressure, σ_o= 363.1 psi (52.3 ksf = 2502 kPa)

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Average$^+$ Shearing Strain, %	Material Damping Ratio^x, D, %
1.05E-04	11106	1.00	1.05E-04	0.54
2.10E-04	11106	1.00	2.10E-04	0.59
4.09E-04	11079	1.00	4.09E-04	0.65
7.94E-04	10973	0.99	7.94E-04	0.78
1.43E-03	10816	0.97	1.35E-03	0.89
2.51E-03	10607	0.96	2.31E-03	0.99
4.37E-03	10298	0.93	3.98E-03	1.12
7.53E-03	9960	0.90	6.70E-03	1.30
1.37E-02	9373	0.84	1.22E-02	1.53
2.45E-02	8850	0.80	2.13E-02	1.89
4.50E-02	8109	0.73	3.83E-02	2.33
7.94E-02	7280	0.66	6.35E-02	3.43
1.29E-01	6852	0.62	9.52E-02	4.91

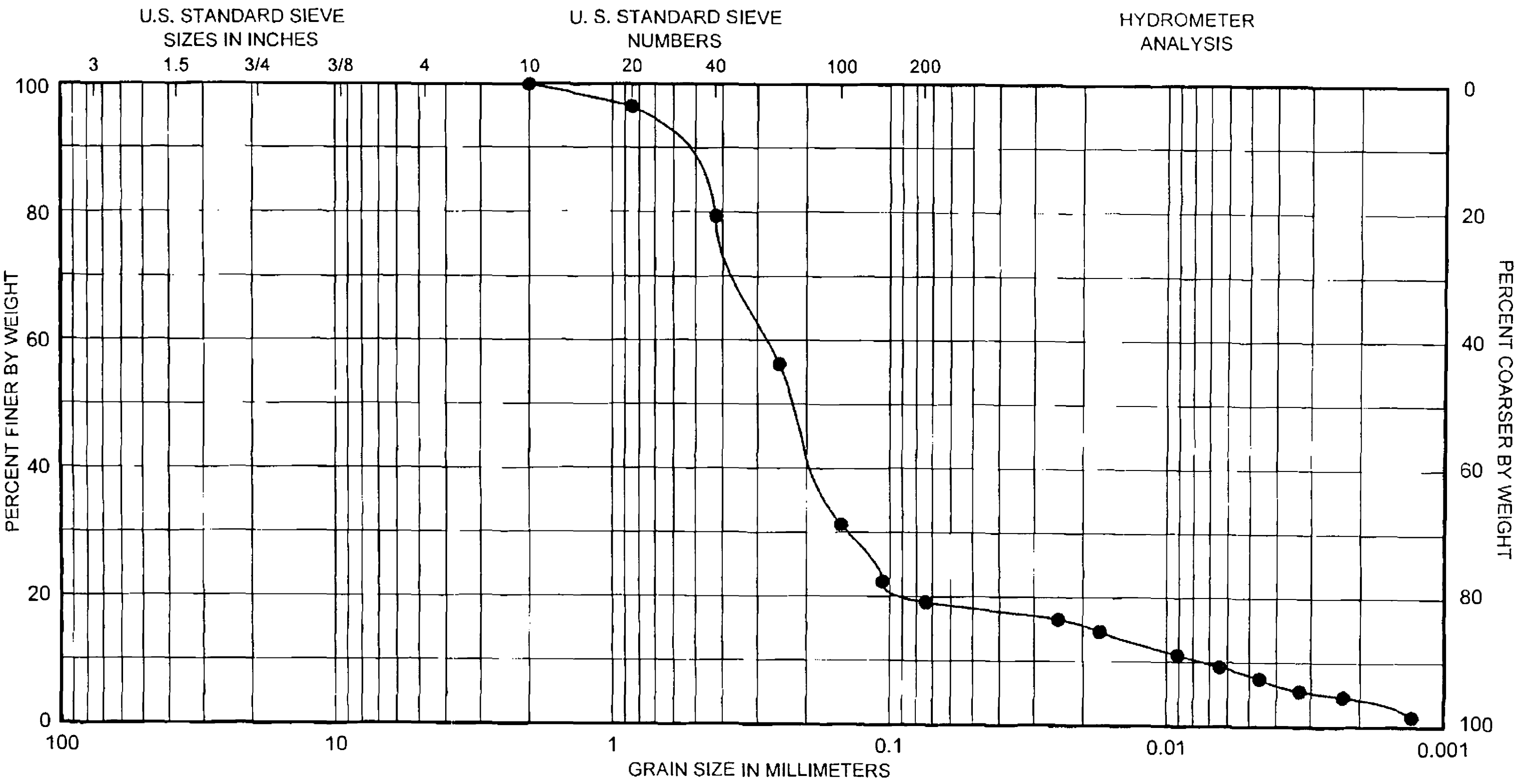
$^+$ Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

^{x} Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table I.5 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen VGL B3001-UD12; Isotropic Confining Pressure, σ_o=363.1 psi (52.3 ksf = 2502 kPa)

First Cycle				Tenth Cycle			
Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %	Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %
---*	---*	---*	---*	---*	---*	---*	---*

* No results presented due to suspected high straining effect or unknown source(s) of disturbance during the TS test.



GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

SYMBOL	BORING	DEPTH, FT	C_c	C_u	D_{50}	D_{80}	CLASSIFICATION
●	B-3001-UD12	290.5	10.20	37.02	0.2198	0.65	Sand, light gray, with mica

GRAIN SIZE CURVE

APPENDIX J

Specimen TP-B-1121, 95%
Reconstituted Engineering Fill at 95% Compaction
(Non-Plastic)

Borehole ----
B-1121
Depth = 7 ft (2.1 m)
Total Unit Weight = 117.9 lb/ft^3
Water Content = 7.2 %
Estimated In-Situ Ko = 0.5
Estimated In-Situ Mean Effective
Stress = 17 psi*

* Dr. Stokoe commented on it, which reads "*this stress level does not correspond to depth=7ft??*"

FUGRO JOB #: 0401-1667
Testing Station: RC7

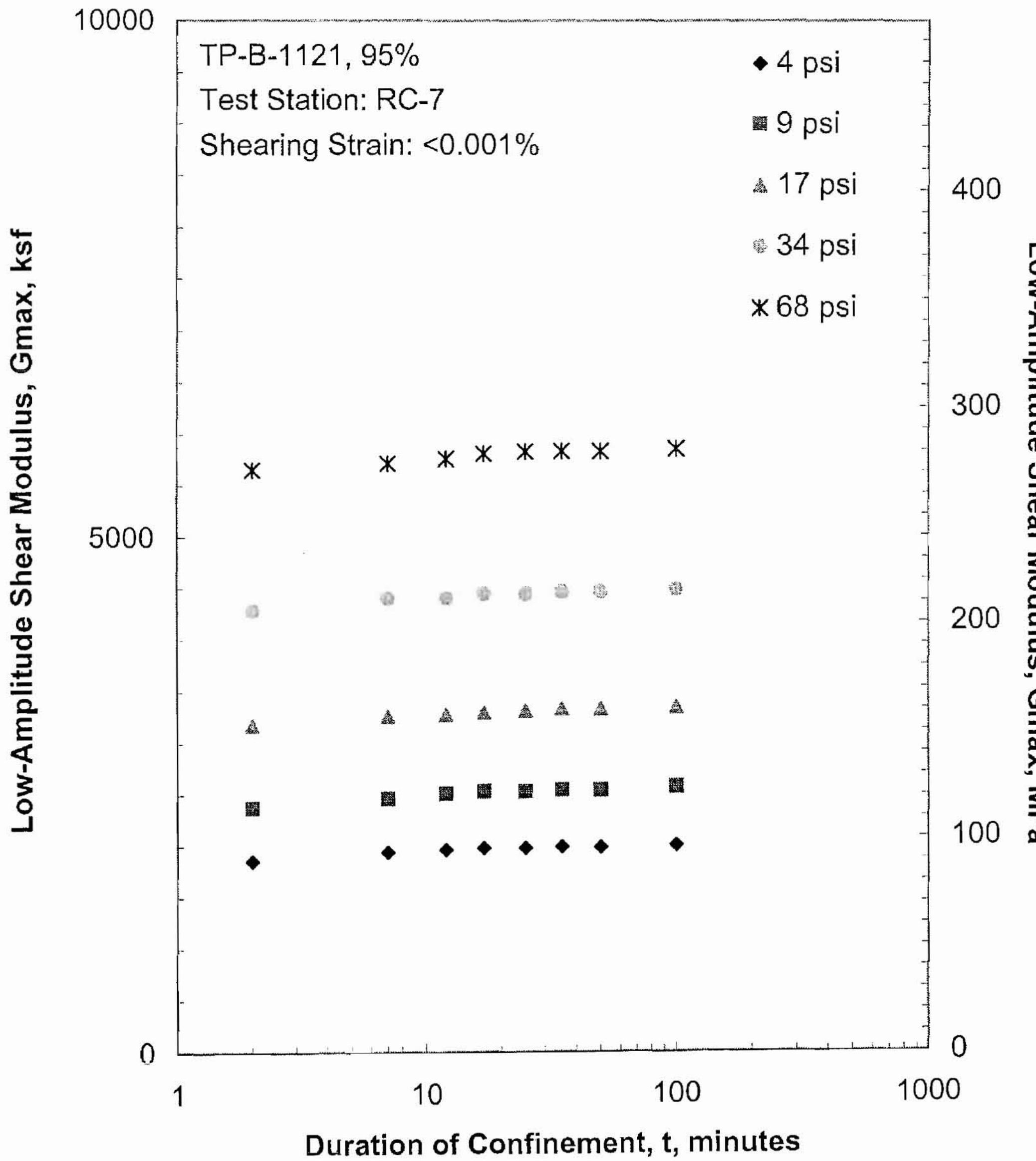


Figure J.1 Variation in Low-Amplitude Shear Modulus with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

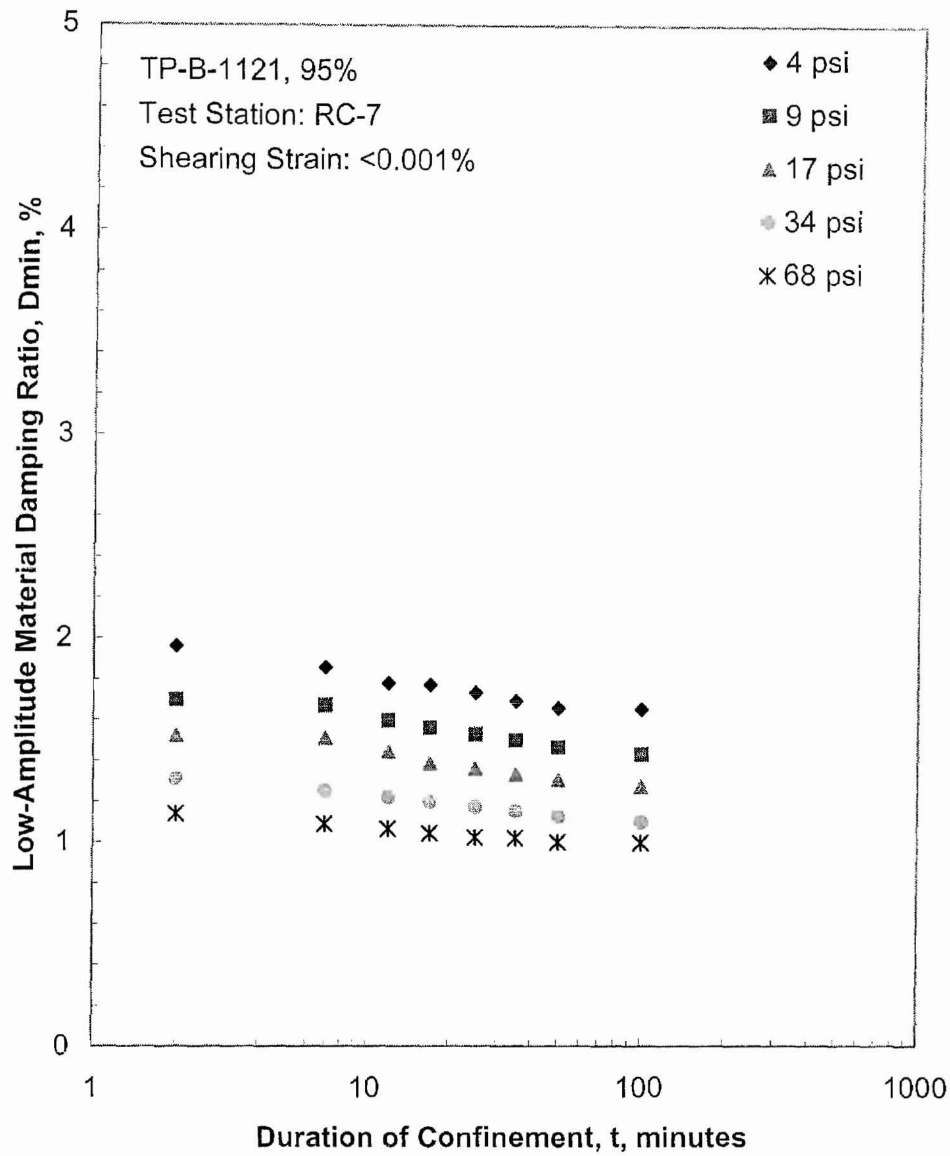


Figure J.2 Variation in Low-Amplitude Material Damping Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

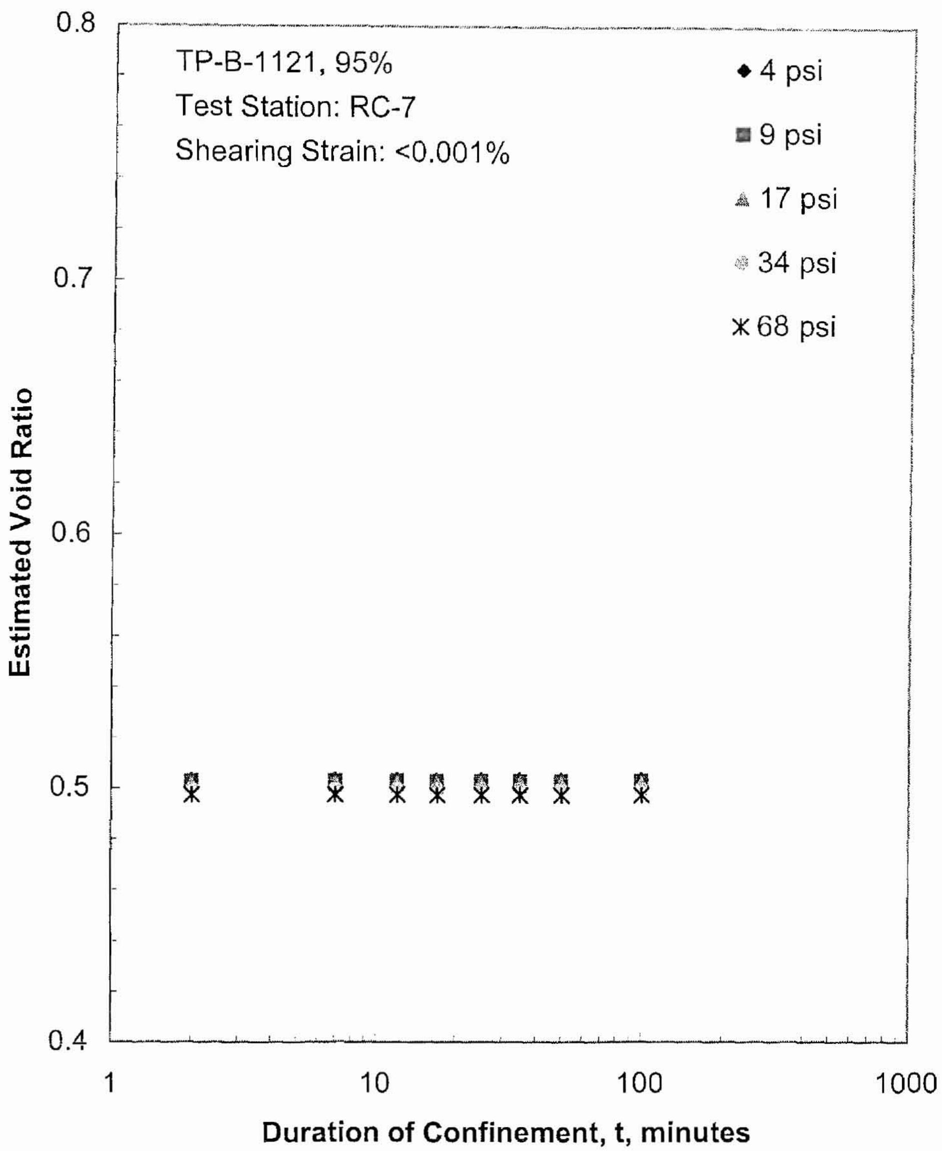


Figure J.3 Variation in Estimated Void Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

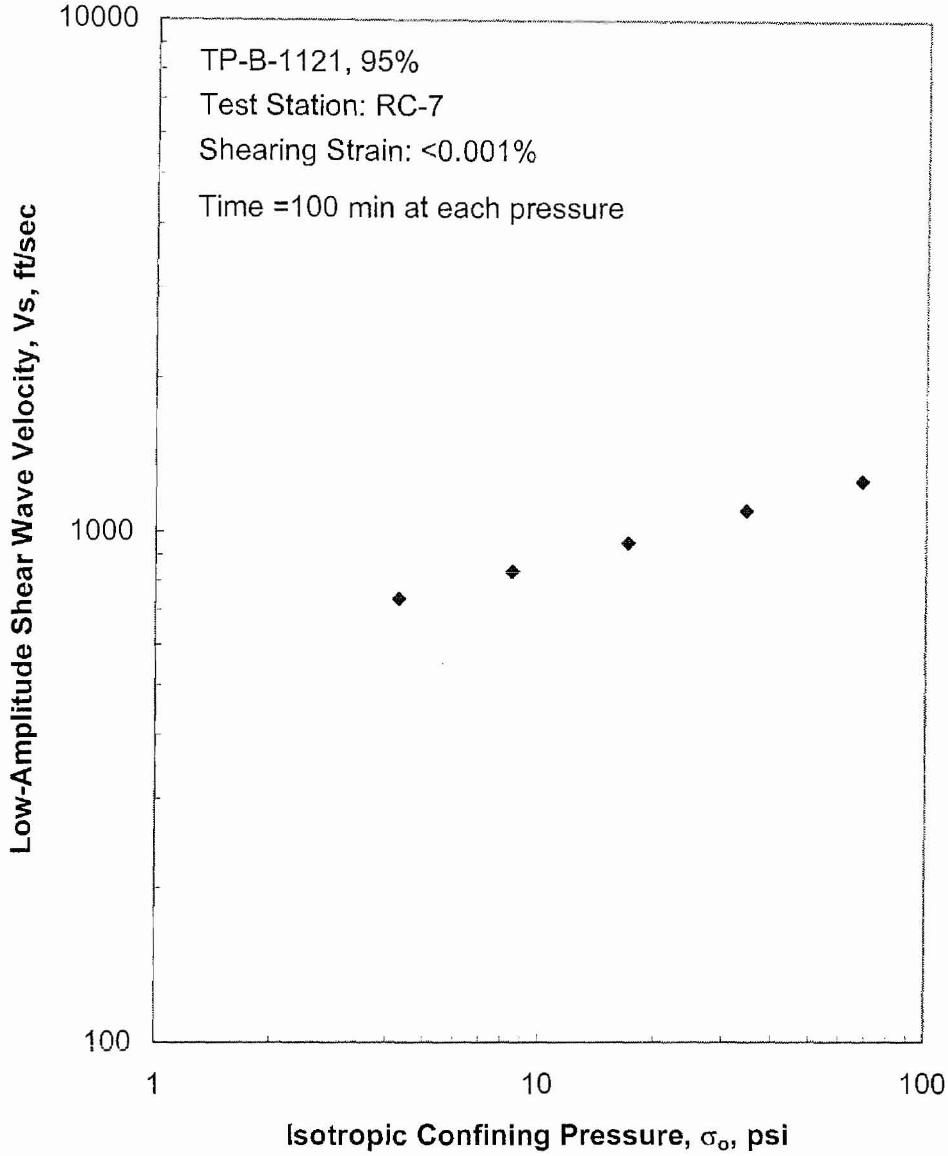


Figure J.4 Variation in Low-Amplitude Shear Wave Velocity with Isotropic Confining Pressure from Resonant Column Tests

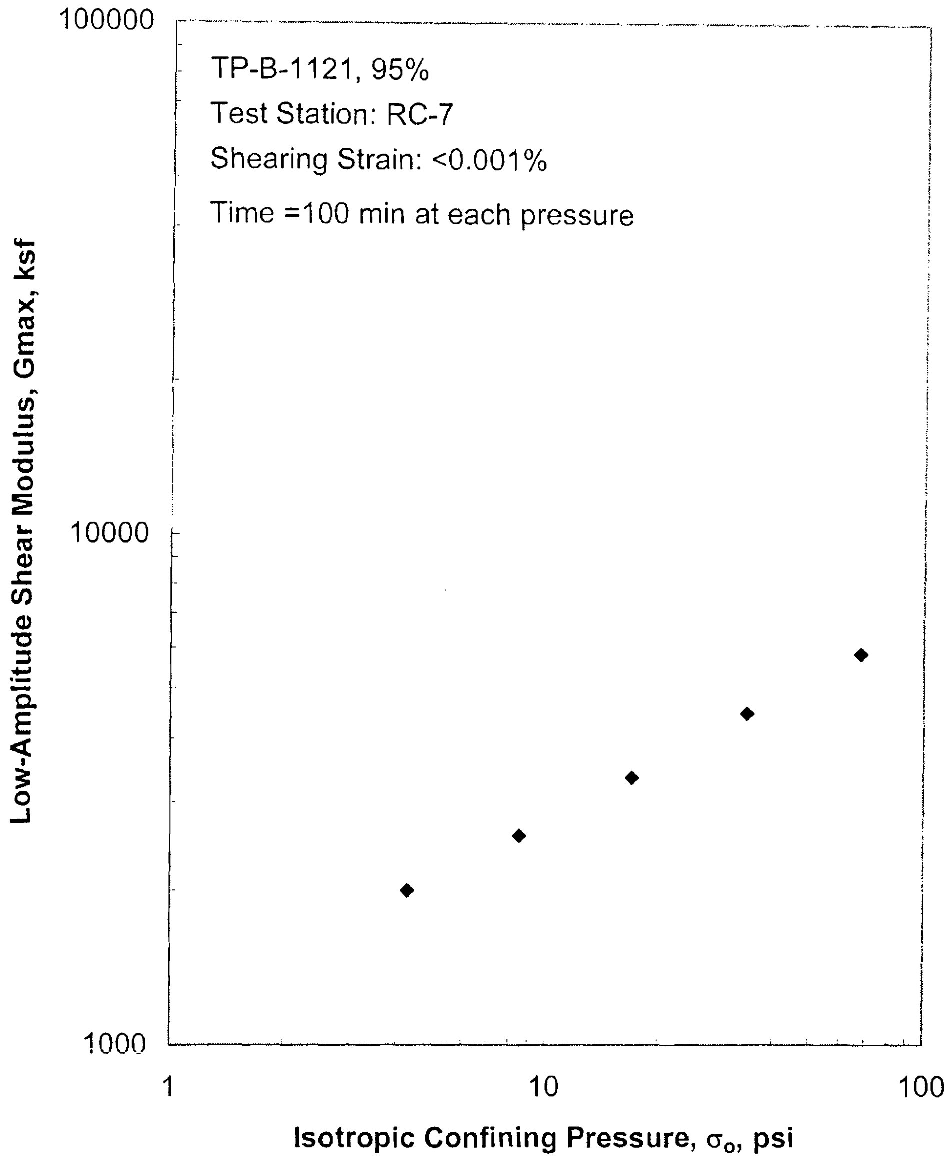


Figure J.5 Variation in Low-Amplitude Shear Modulus with Isotropic Confining Pressure from Resonant Column Tests

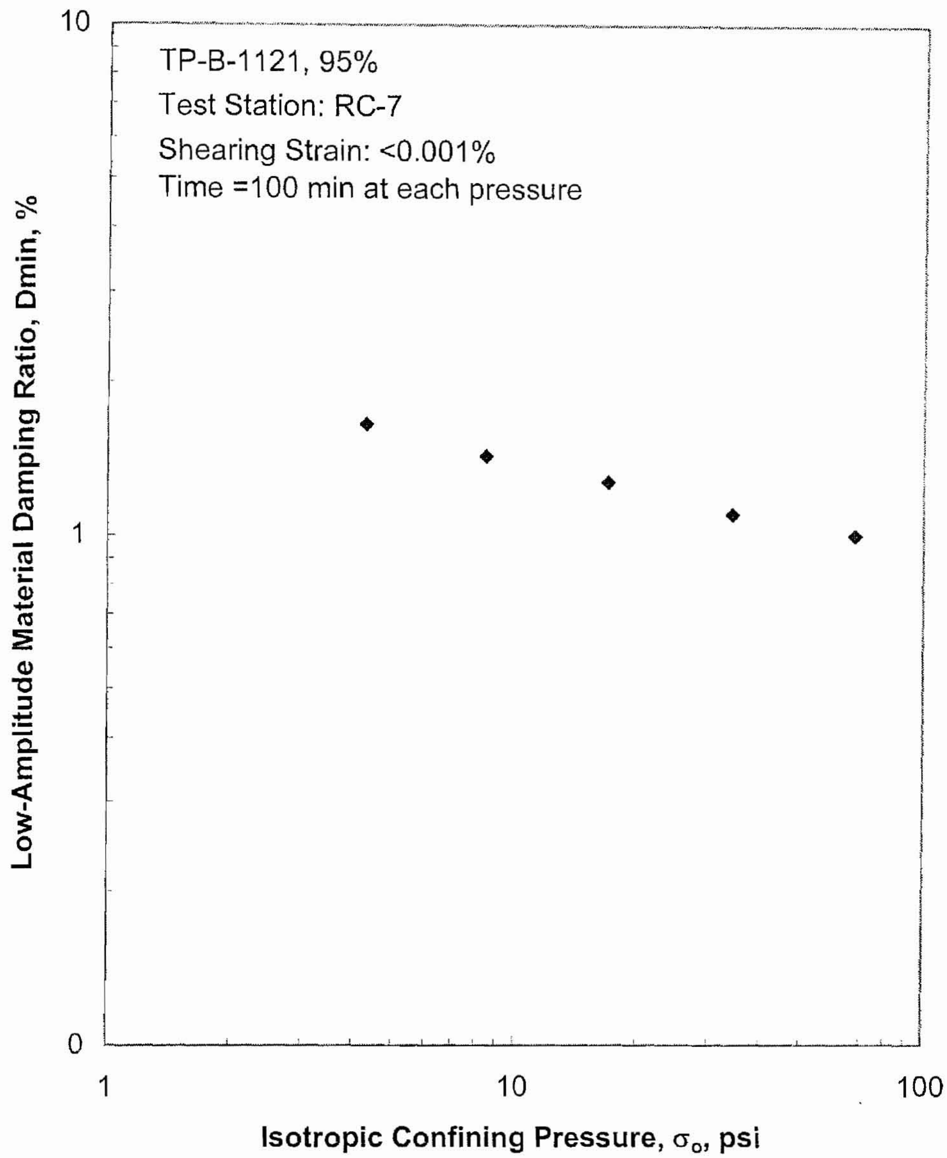


Figure J.6 Variation in Low-Amplitude Material Damping Ratio with Isotropic Confining Pressure from Resonant Column Tests

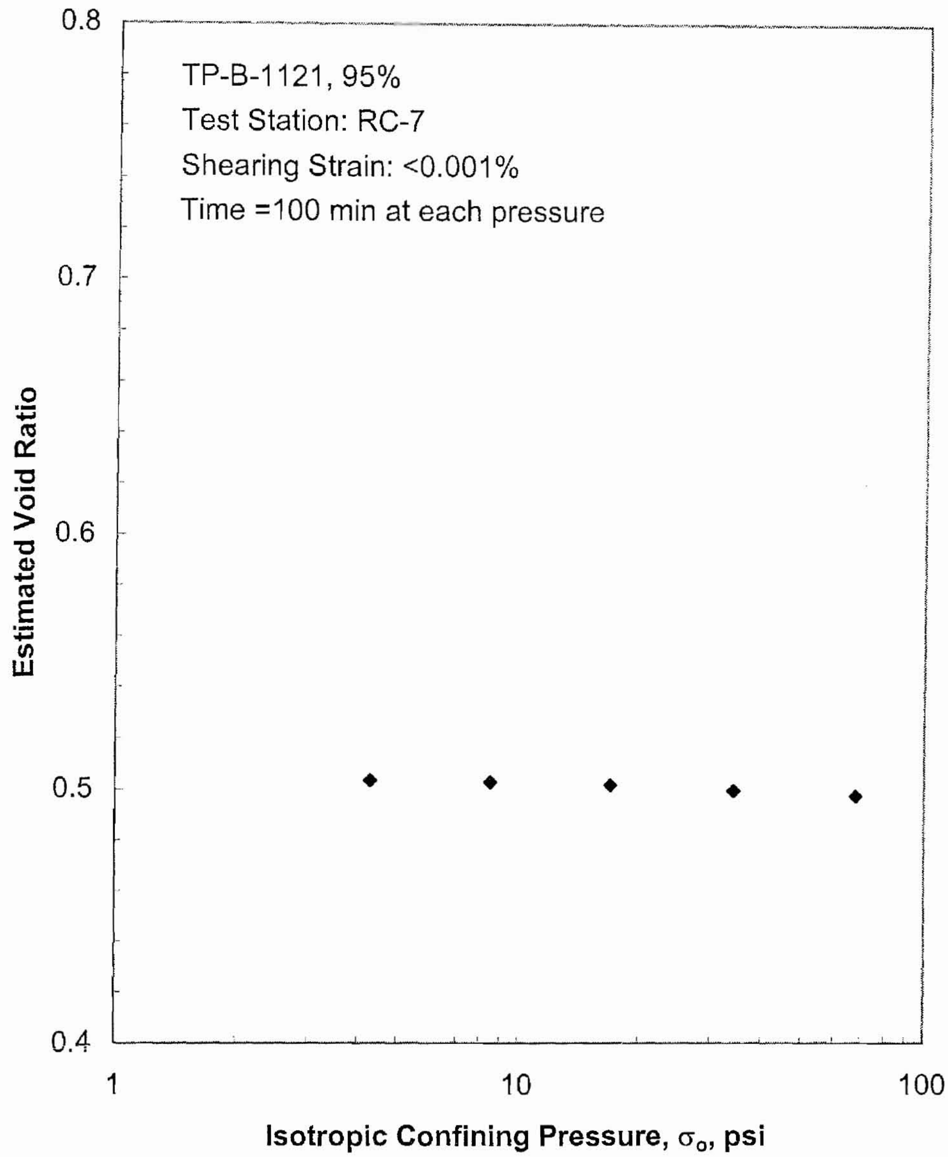


Figure J.7 Variation in Estimated Void Ratio with Isotropic Confining Pressure from Resonant Column Tests

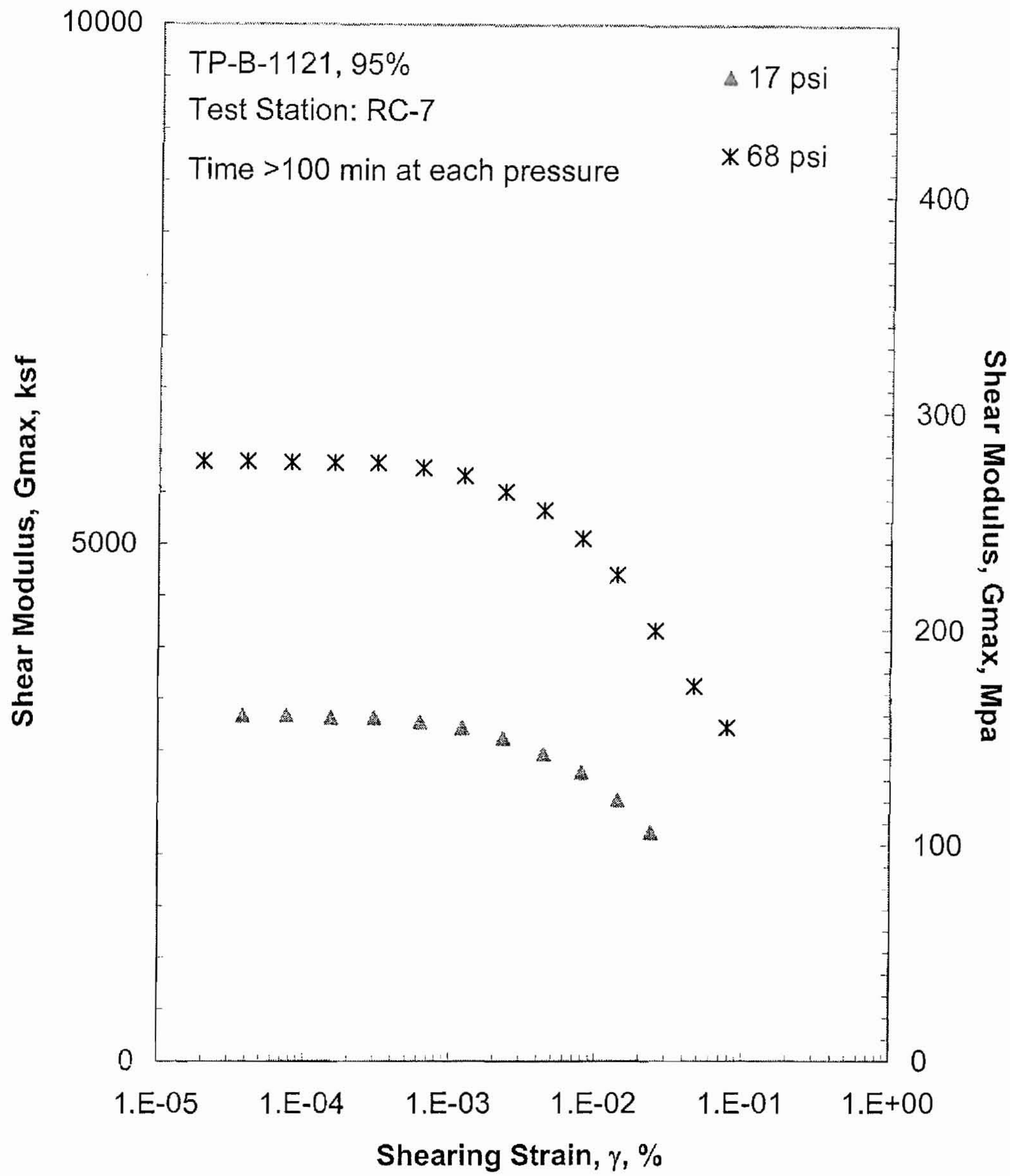


Figure J.8 Comparison of the Variation in Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

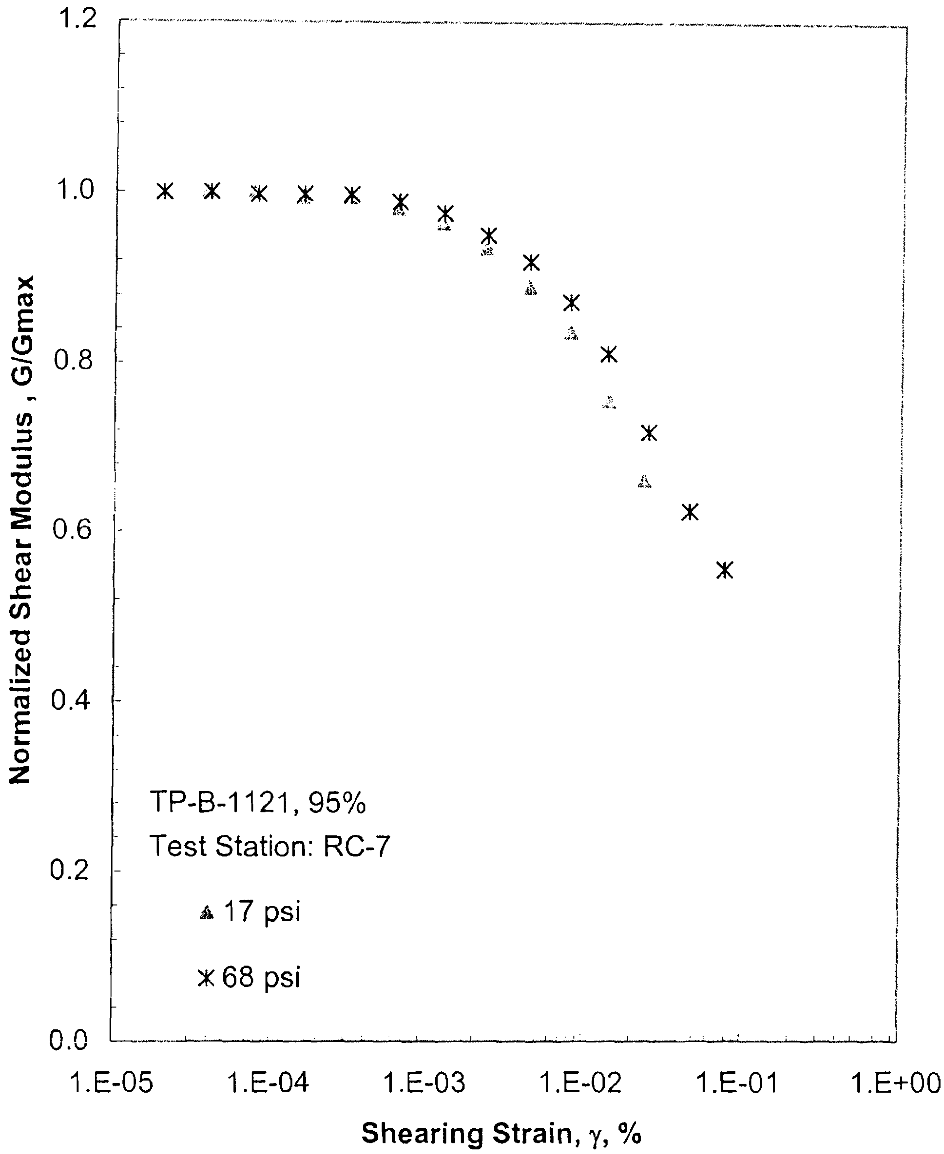


Figure J.9 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

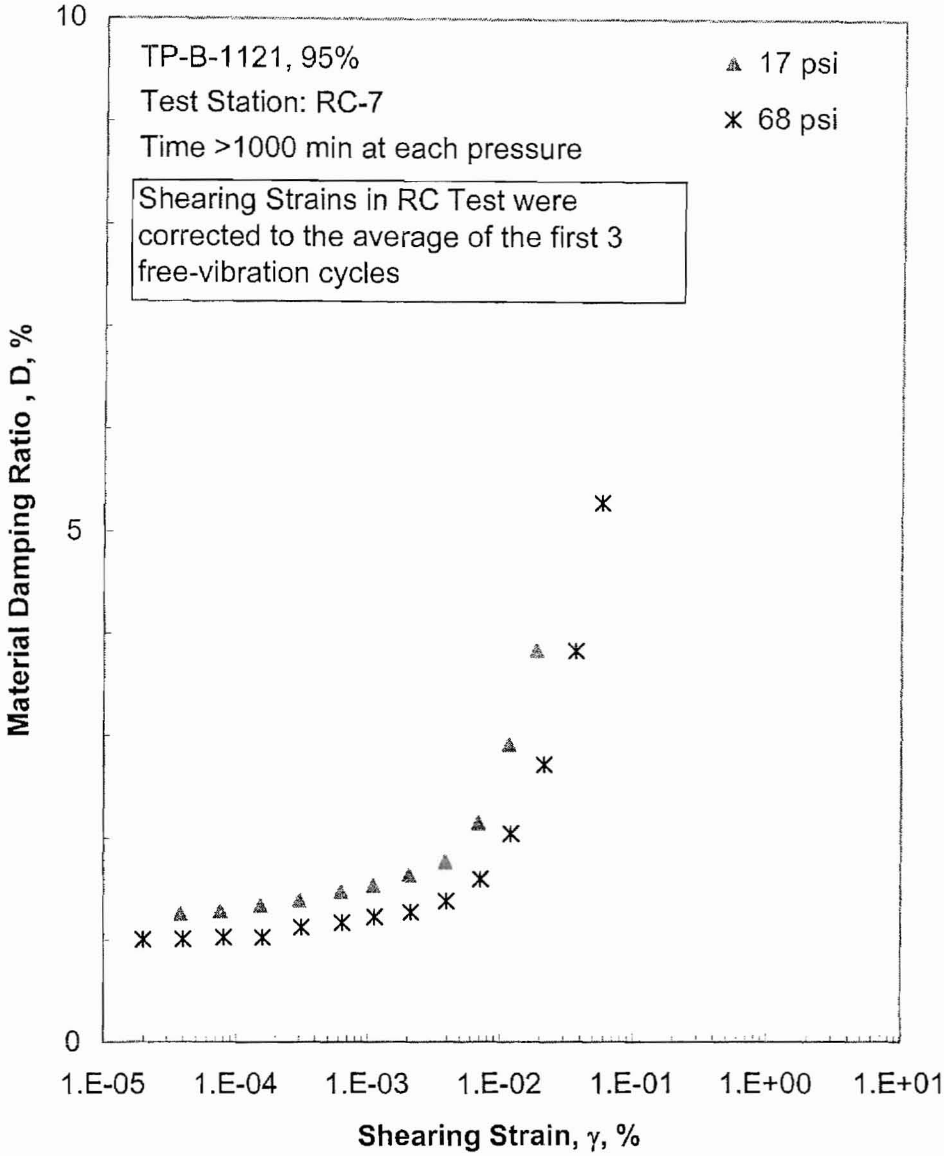


Figure J.10 Comparison of the Variation in Material Damping Ratio with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

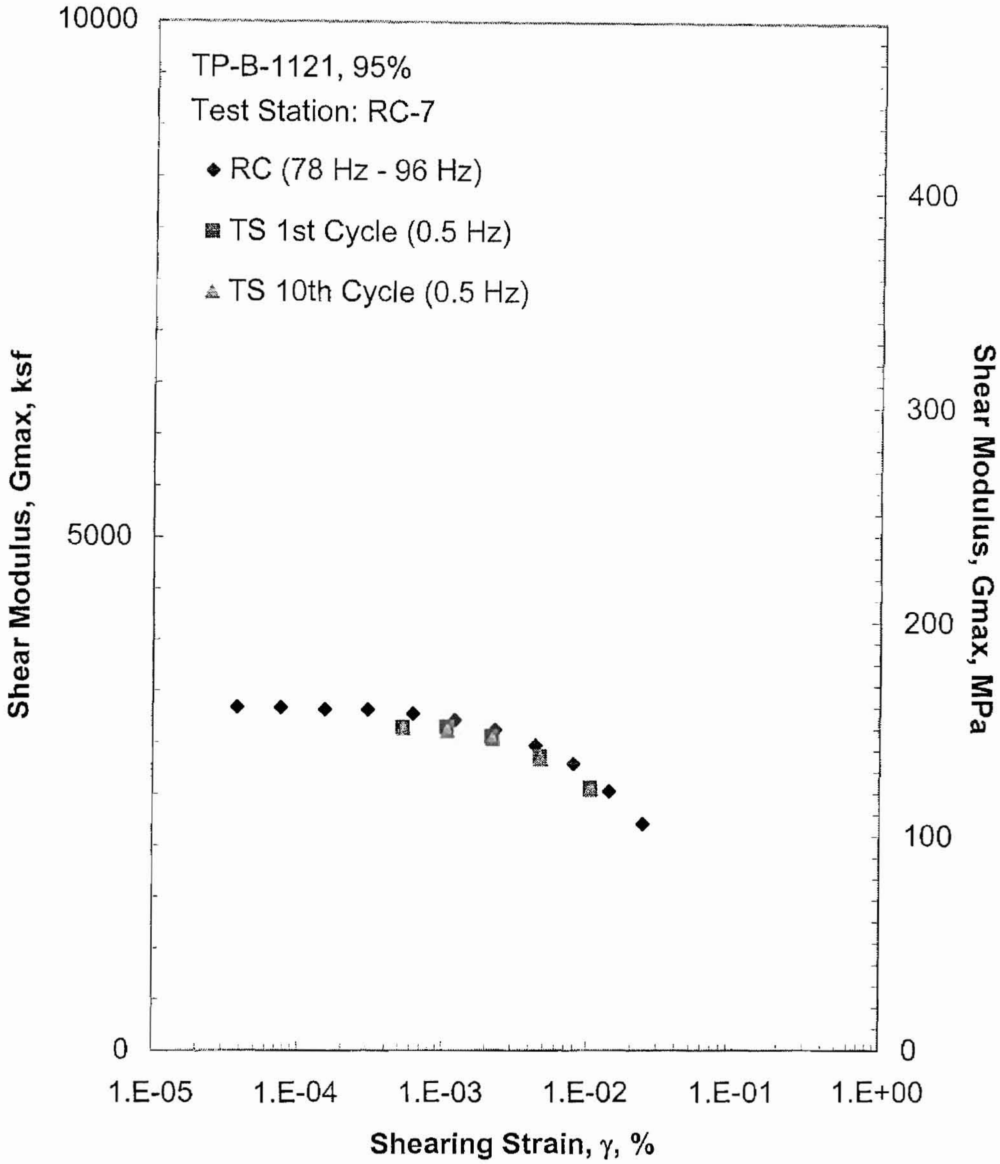


Figure J.11 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 17 psi from the Combined RCTS Tests

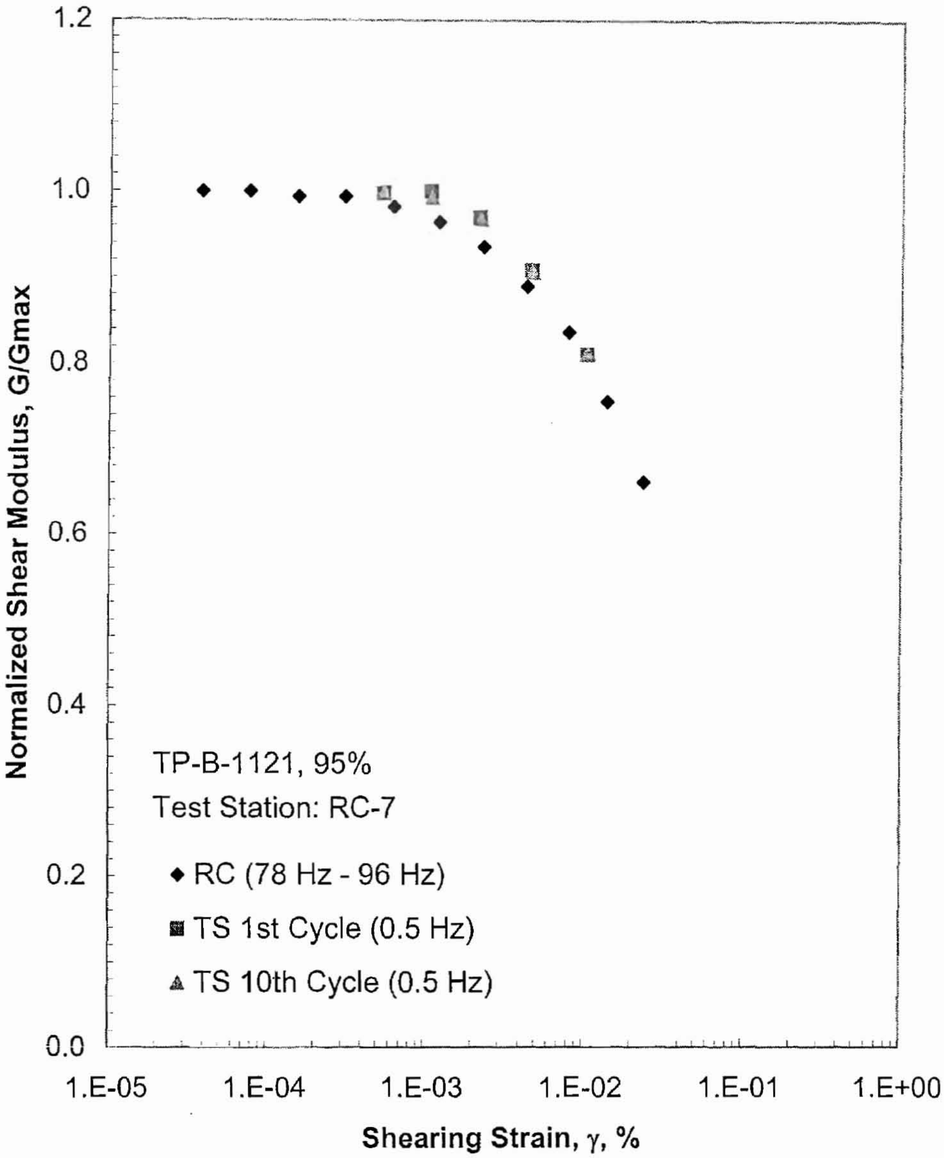


Figure J.12 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 17 psi from the Combined RCTS Tests

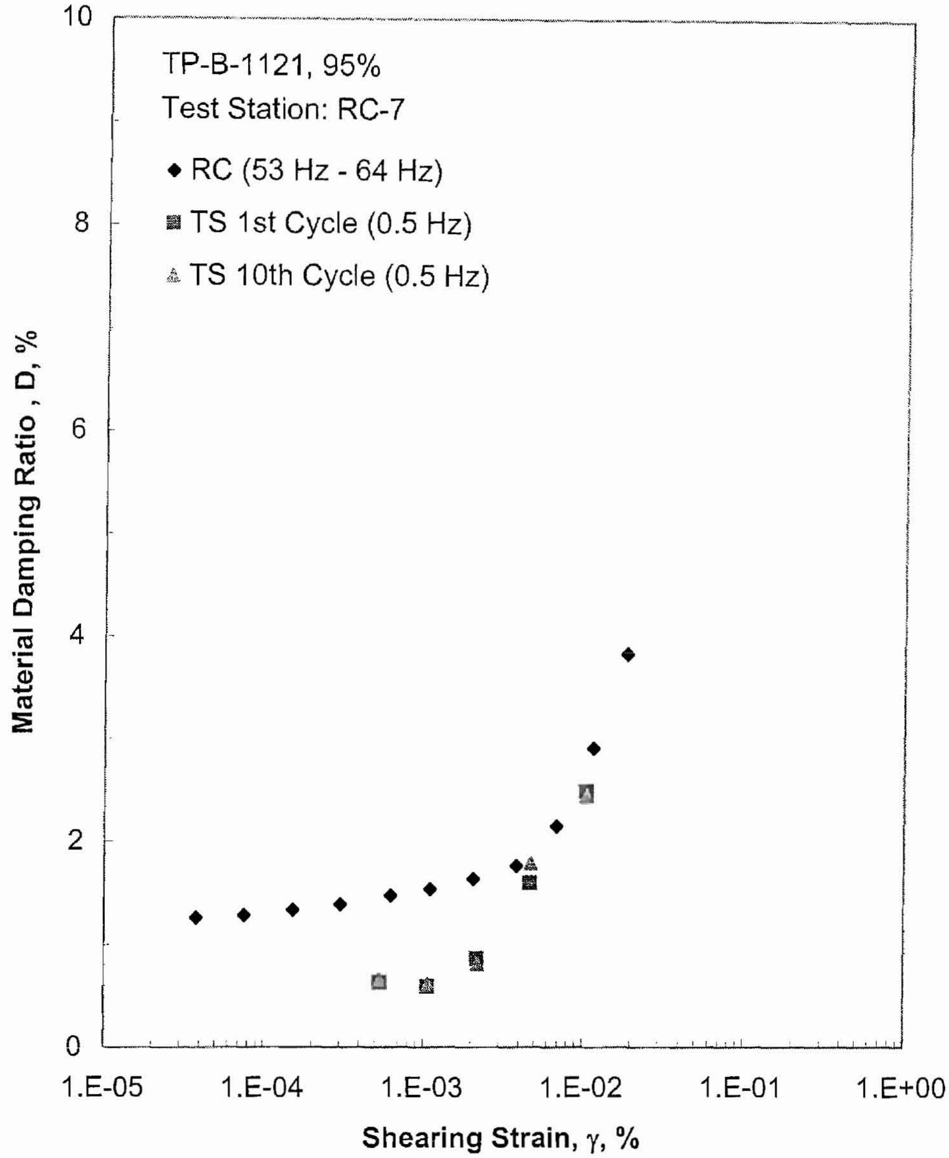


Figure J.13 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 17 psi from the Combined RCTS Tests

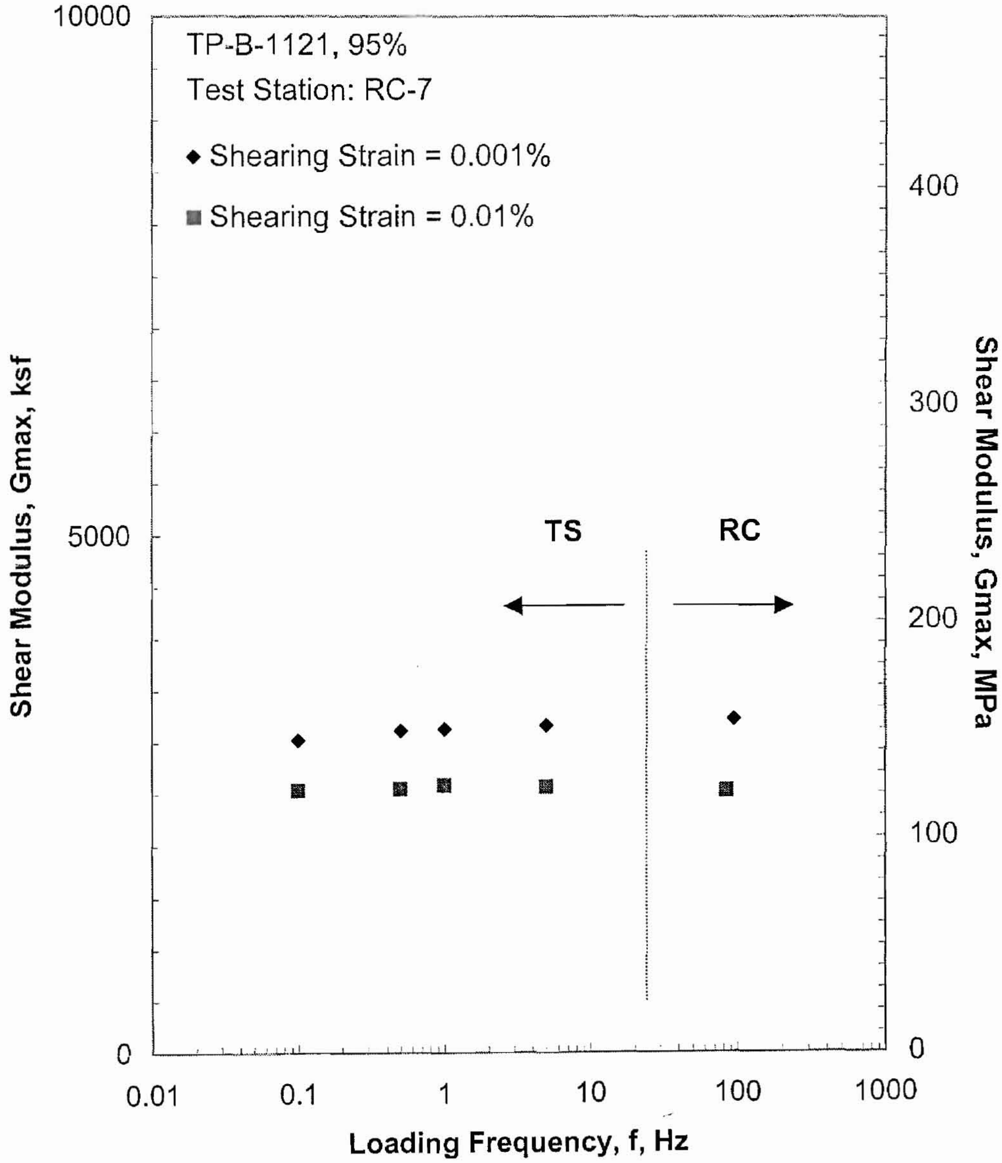


Figure J.14 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 17 psi from the Combined RCTS Tests

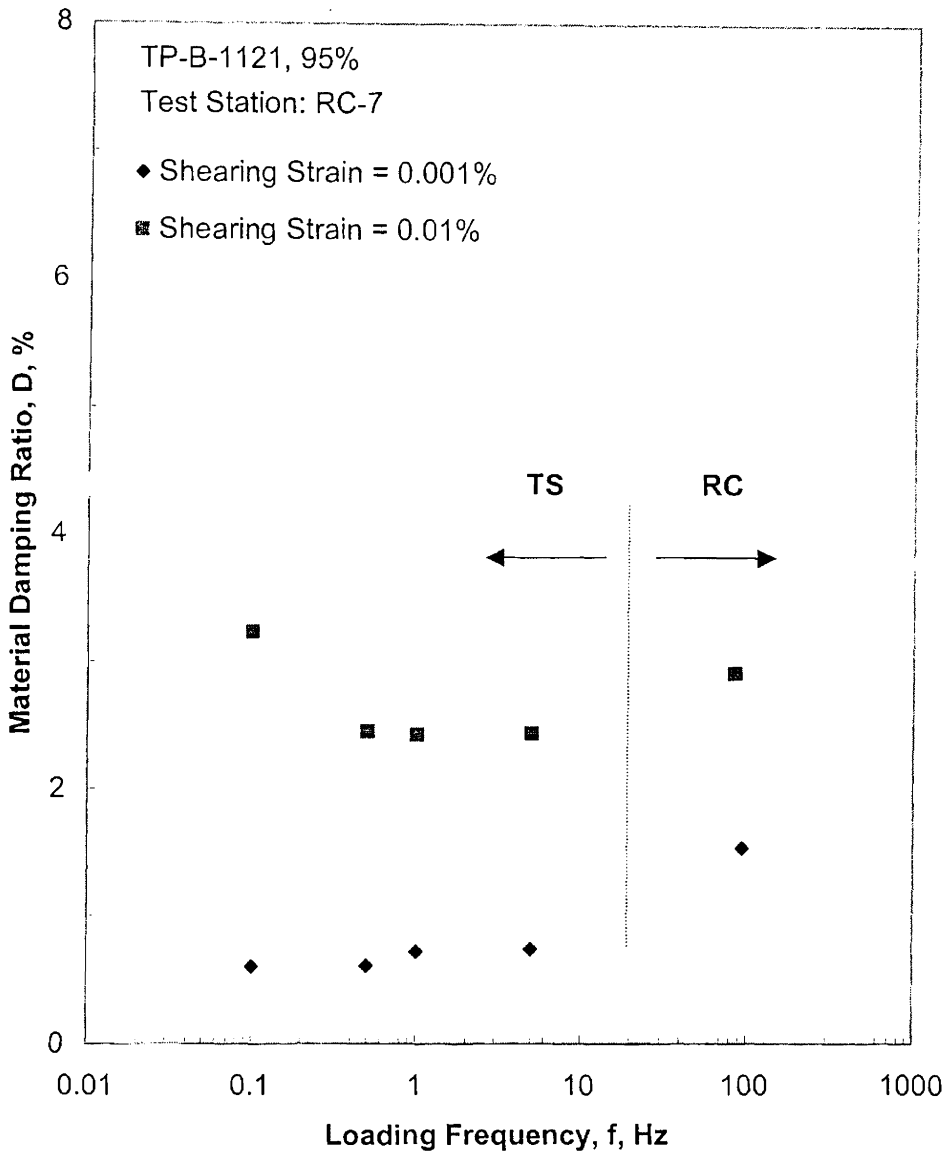


Figure J.15 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 17 psi from the Combined RCTS Tests

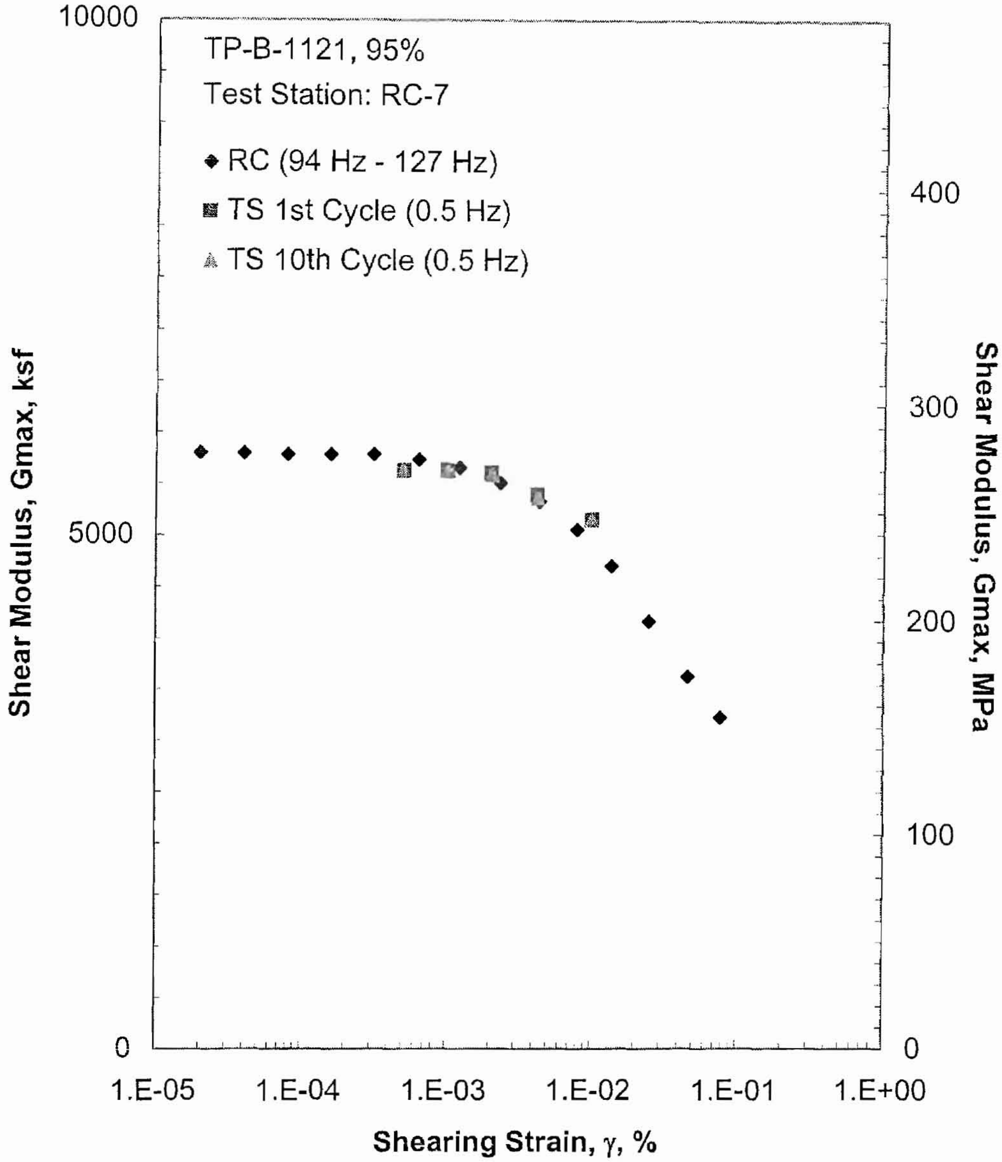


Figure J.16 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 68 psi from the Combined RCTS Tests

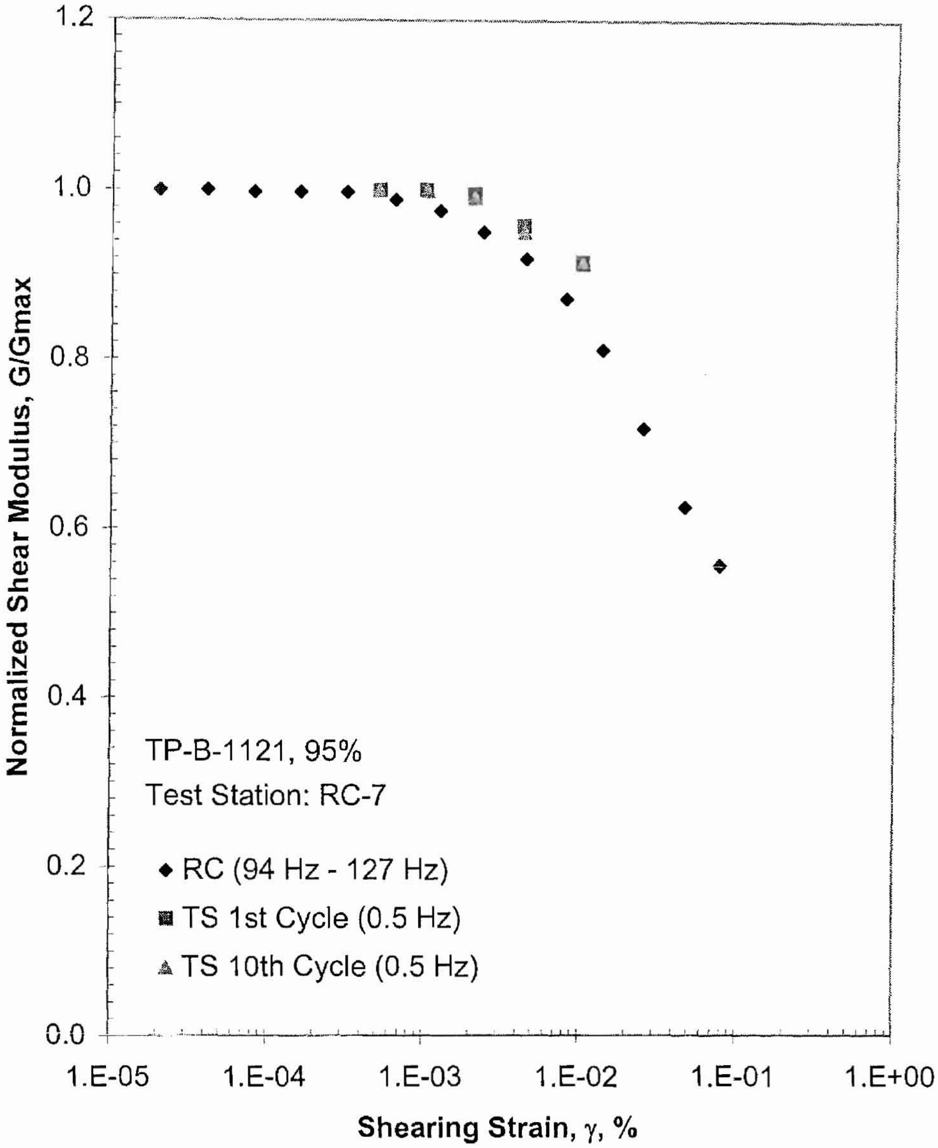


Figure J.17 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 68 psi from the Combined RCTS Tests

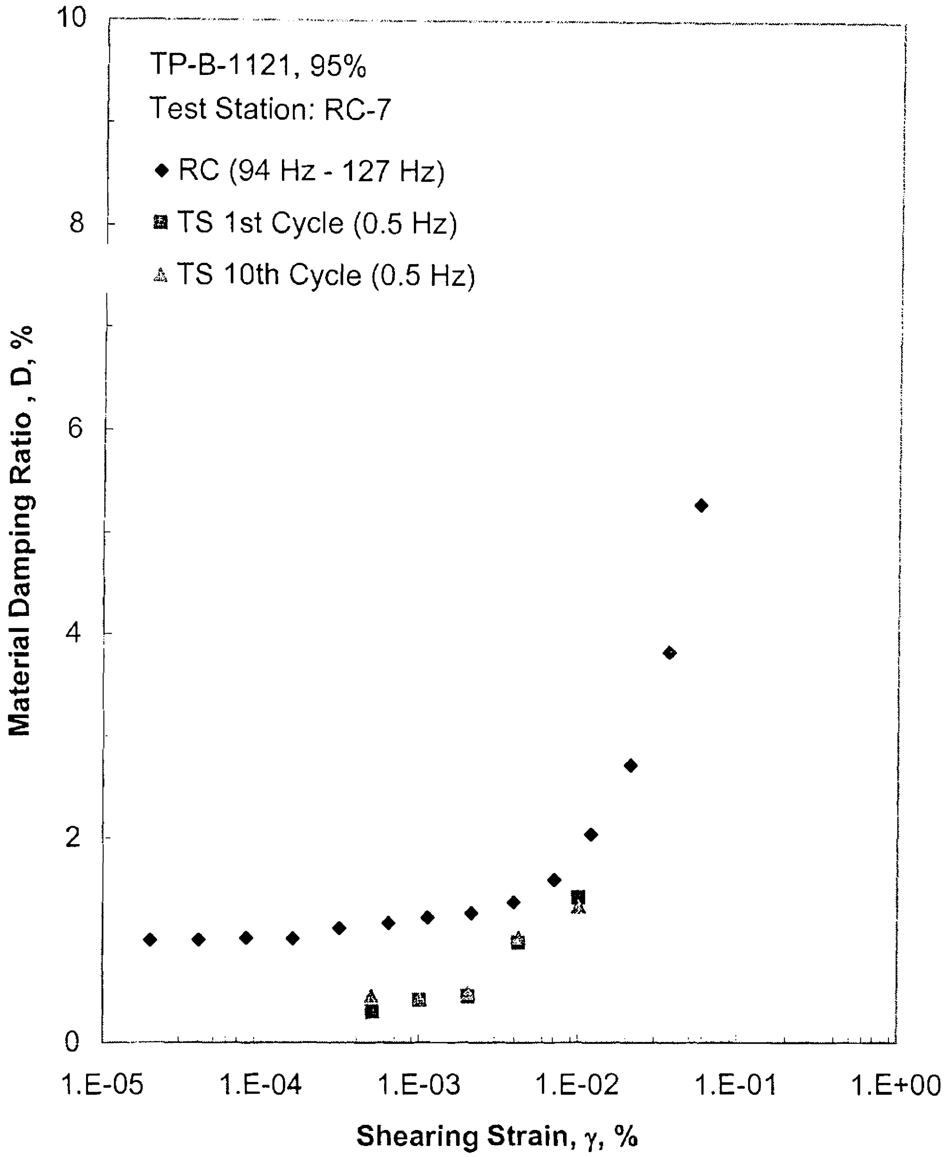


Figure J.18 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 68 psi from the Combined RCTS Tests

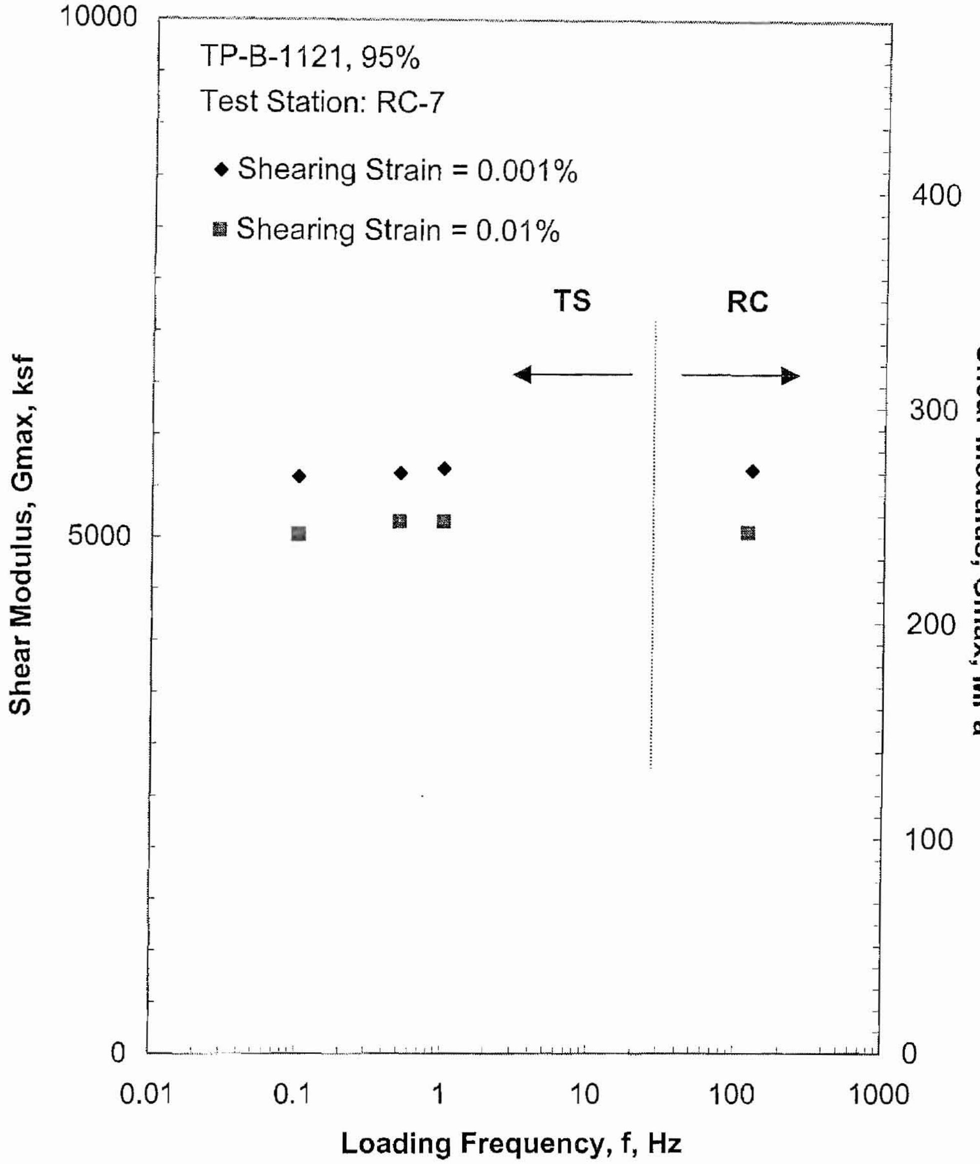


Figure J.19 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 68 psi from the Combined RCTS Tests

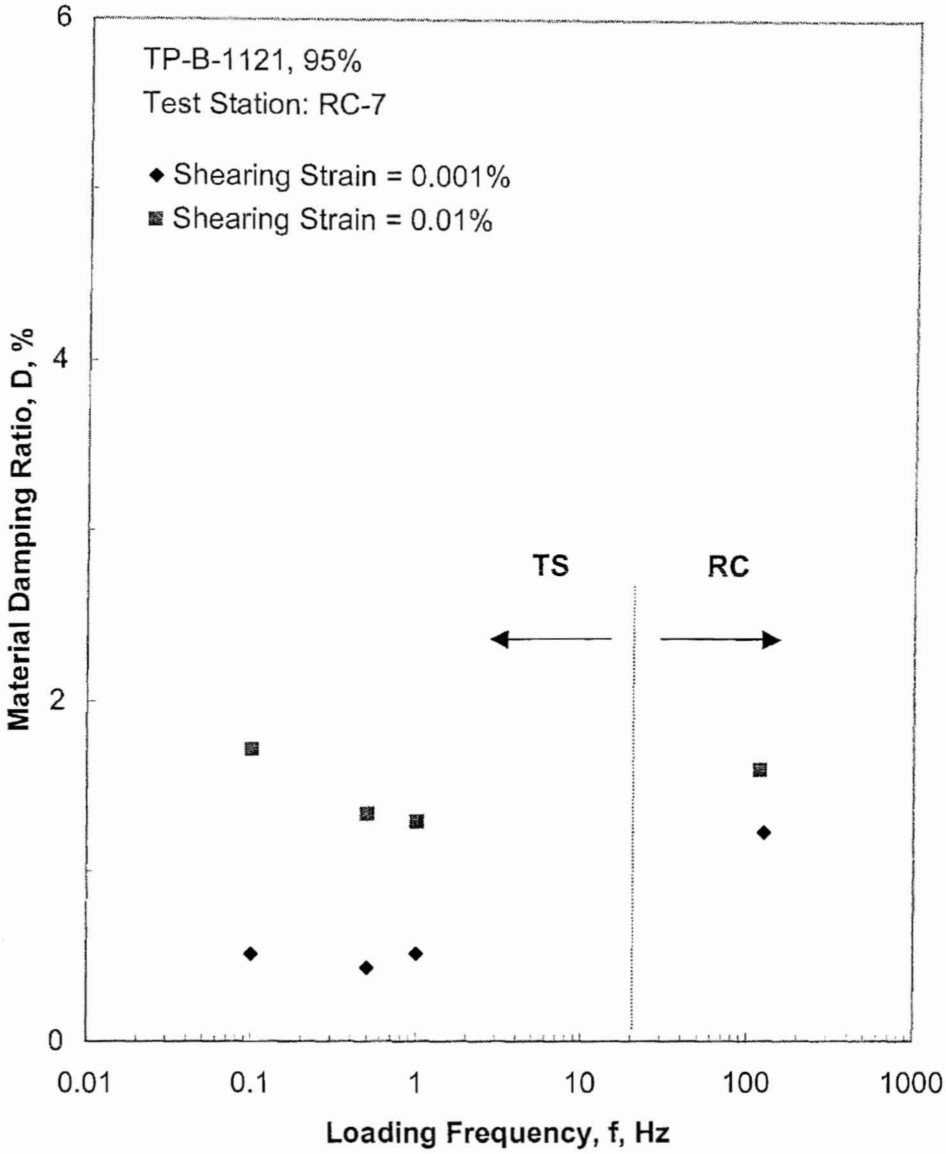


Figure J.20 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 68 psi from the Combined RCTS Tests

Table J.1 Variation in Low-Amplitude Shear Wave Velocity, Low-Amplitude Shear Modulus, Low-Amplitude Material Damping Ratio and Estimated Void Ratio with Isotropic Confining Pressure from RC Tests of Specimen TP-B-1121, 95%

Isotropic Confining Pressure, σ_o			Low-Amplitude Shear Modulus, G_{max}		Low-Amplitude Shear Wave Velocity, Vs	Low-Amplitude Material Damping Ratio, Dmin	Estimated Void Ratio, e
(psi)	(psf)	(kPa)	(ksf)	(MPa)	(fps)	(%)	
4	619	30	2007	96	740	1.66	0.50
9	1224	59	2576	124	838	1.43	0.50
17	2448	117	3350	161	955	1.28	0.50
34	4925	236	4485	215	1105	1.10	0.50
68	9792	469	5857	281	1261	1.00	0.50

Table J.2 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of SpecimenTP-B-1121, 95%; Isoptropic Confining Pressure, σ_o=17 psi (2.4 ksf = 117 kPa)

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Average$^+$ Shearing Strain, %	Material Damping Ratio^x, D, %
3.80E-05	3340	1.00	3.80E-05	1.26
7.60E-05	3340	1.00	7.60E-05	1.29
1.53E-04	3320	0.99	1.53E-04	1.34
3.02E-04	3320	0.99	3.02E-04	1.39
6.21E-04	3280	0.98	6.21E-04	1.48
1.21E-03	3221	0.96	1.10E-03	1.54
2.31E-03	3124	0.94	2.06E-03	1.64
4.37E-03	2971	0.89	3.85E-03	1.77
7.97E-03	2795	0.84	6.86E-03	2.15
1.41E-02	2525	0.76	1.15E-02	2.92
2.39E-02	2210	0.66	1.86E-02	3.84

$^+$ Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

^{x} Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table J.3 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen TP-B-1121, 95%; Isotropic Confining Pressure, σ_o = 17 psi (2.4 ksf =117 kPa)

First Cycle				Tenth Cycle			
Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %	Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %
5.30E-04	3147	1.00	0.63	5.32E-04	3136	1.00	0.66
1.06E-03	3153	1.00	0.59	1.07E-03	3114	0.99	0.61
2.19E-03	3057	0.97	0.86	2.20E-03	3034	0.97	0.81
4.66E-03	2865	0.91	1.60	4.70E-03	2841	0.91	1.79
1.05E-02	2557	0.81	2.50	1.05E-02	2546	0.81	2.45

Table J.4 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen TP-B-1121, 95%; Isoptropic Confining Pressure, σ_o= 68 psi (9.8 ksf = 469 kPa)

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Average+ Shearing Strain, %	Material Damping Ratiox, D, %
2.00E-05	5800	1.00	2.00E-05	1.01
4.00E-05	5800	1.00	4.00E-05	1.01
8.00E-05	5788	1.00	8.00E-05	1.03
1.58E-04	5788	1.00	1.58E-04	1.03
3.12E-04	5788	1.00	3.12E-04	1.13
6.37E-04	5737	0.99	6.37E-04	1.17
1.23E-03	5662	0.98	1.13E-03	1.23
2.35E-03	5512	0.95	2.13E-03	1.28
4.38E-03	5335	0.92	3.94E-03	1.38
8.00E-03	5059	0.87	7.12E-03	1.60
1.38E-02	4708	0.81	1.20E-02	2.05
2.53E-02	4170	0.72	2.13E-02	2.72
4.66E-02	3629	0.63	3.68E-02	3.83
7.81E-02	3231	0.56	5.70E-02	5.29

+ Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

x Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table J.5 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen TP-B-1121, 95%; Isotropic Confining Pressure, σ_o=68 psi (9.8 ksf = 469 kPa)

First Cycle				Tenth Cycle			
Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %	Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %
5.07E-04	5632	1.00	0.30	5.00E-04	5642	1.00	0.46
1.01E-03	5632	1.00	0.42	1.01E-03	5642	1.00	0.43
2.04E-03	5609	1.00	0.46	2.04E-03	5594	0.99	0.49
4.23E-03	5397	0.96	0.98	4.26E-03	5367	0.95	1.03
1.00E-02	5157	0.92	1.42	1.01E-02	5155	0.91	1.34

APPENDIX K

Specimen TP-B-1121, 97%
Reconstituted Engineering Fill at 97% Compaction
(Non-Plastic)

Borehole ----
B-1121
Depth = 7.0 ft (2.1 m)
Total Unit Weight = 120.6 lb/ft^3
Water Content = 7.0 %
Estimated In-Situ Ko = 0.5
Estimated In-Situ Mean Effective
Stress = 17 psi

FUGRO JOB #: 0401-1667
Testing Station: RC7

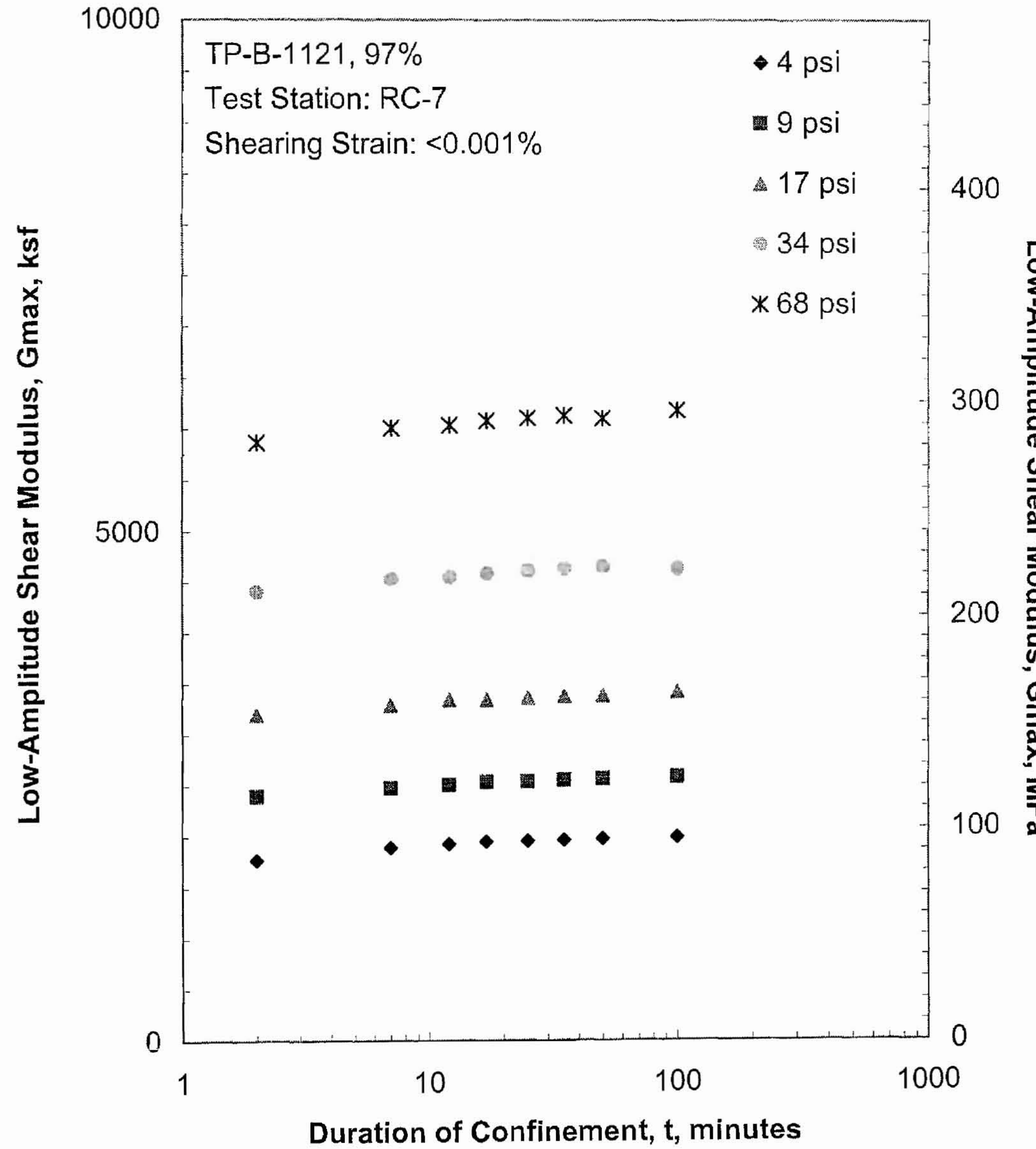


Figure K.1 Variation in Low-Amplitude Shear Modulus with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

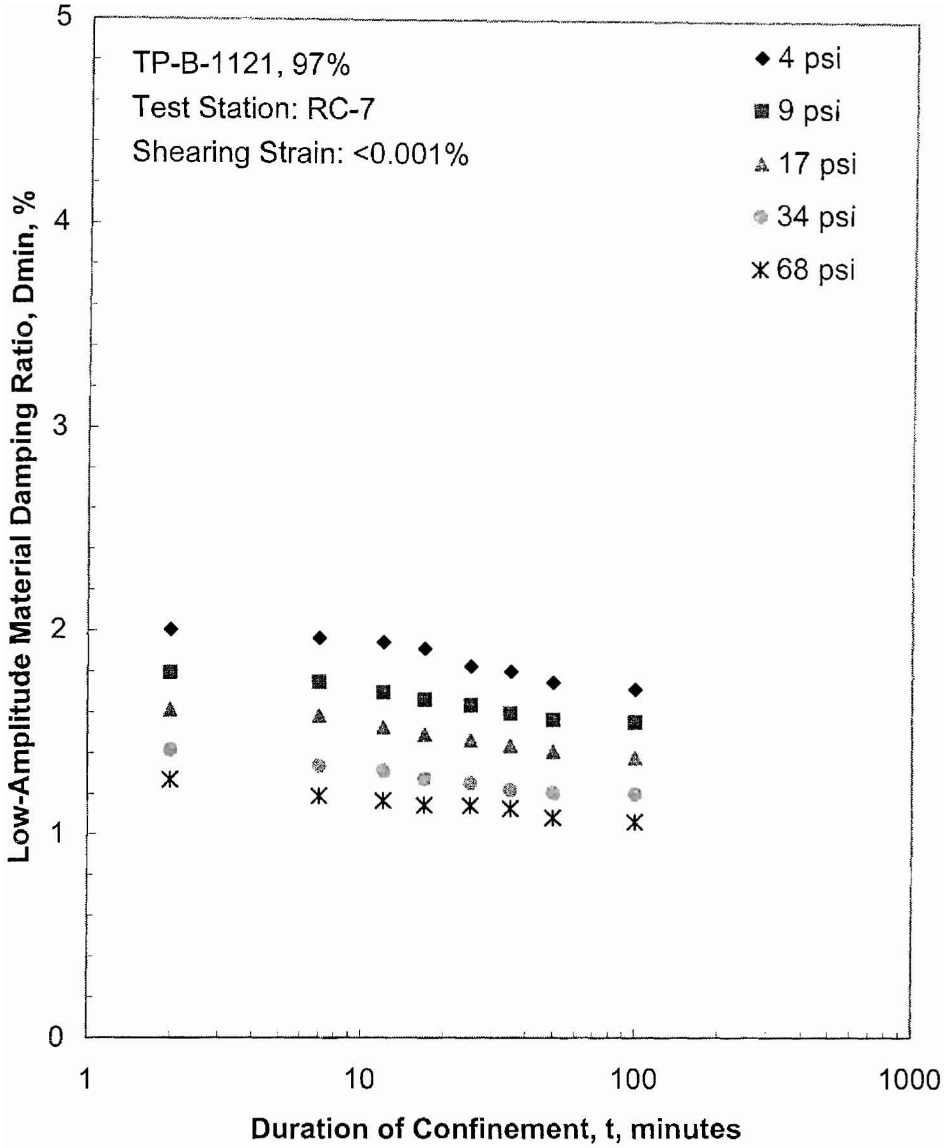


Figure K.2 Variation in Low-Amplitude Material Damping Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

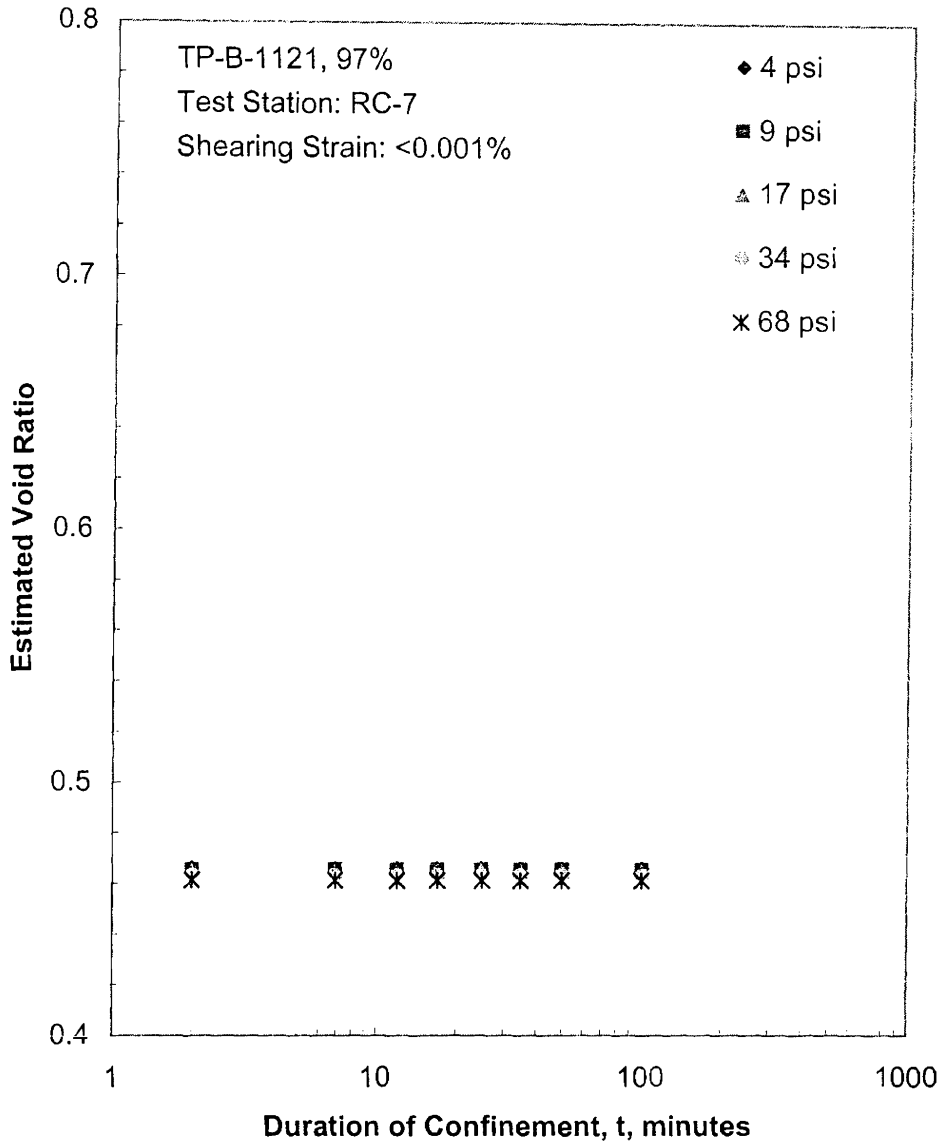


Figure K.3 Variation in Estimated Void Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests

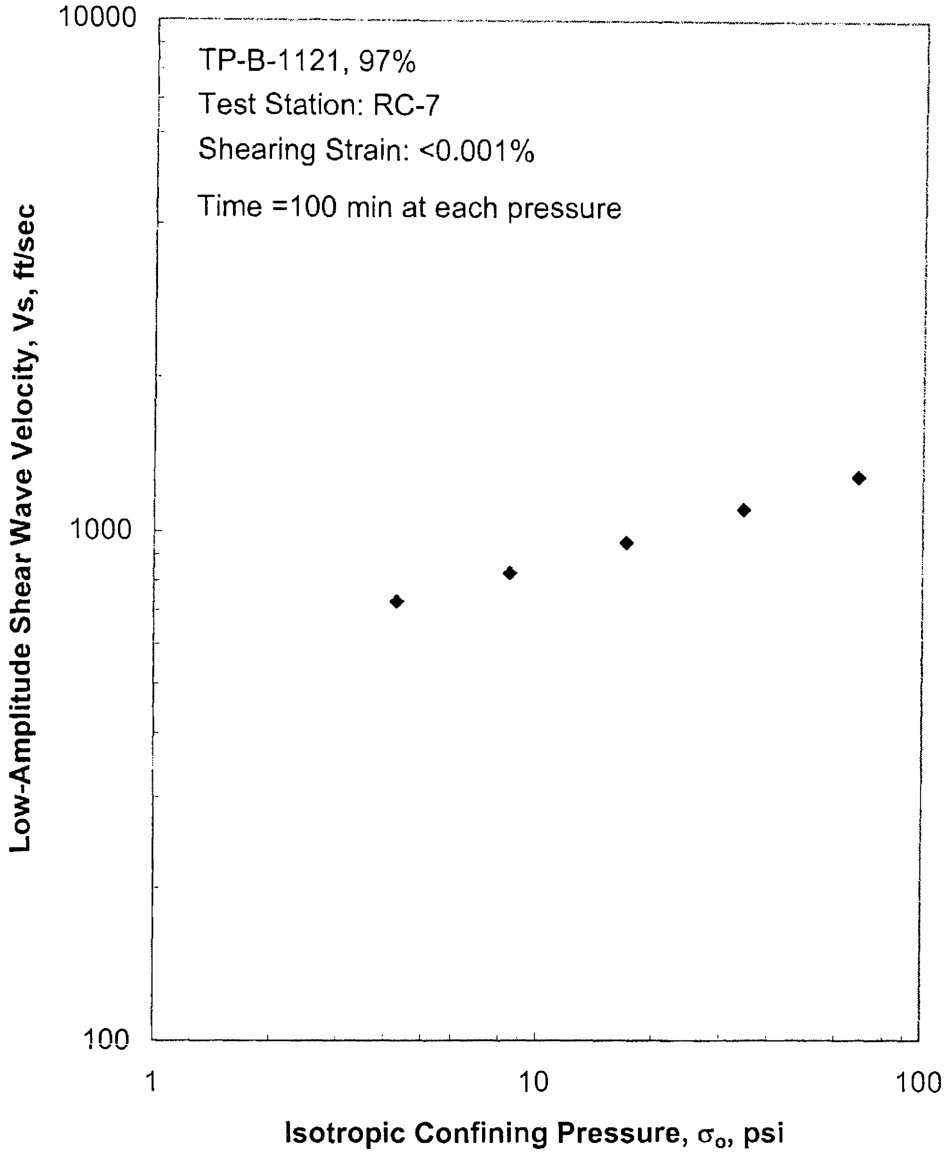


Figure K.4 Variation in Low-Amplitude Shear Wave Velocity with Isotropic Confining Pressure from Resonant Column Tests

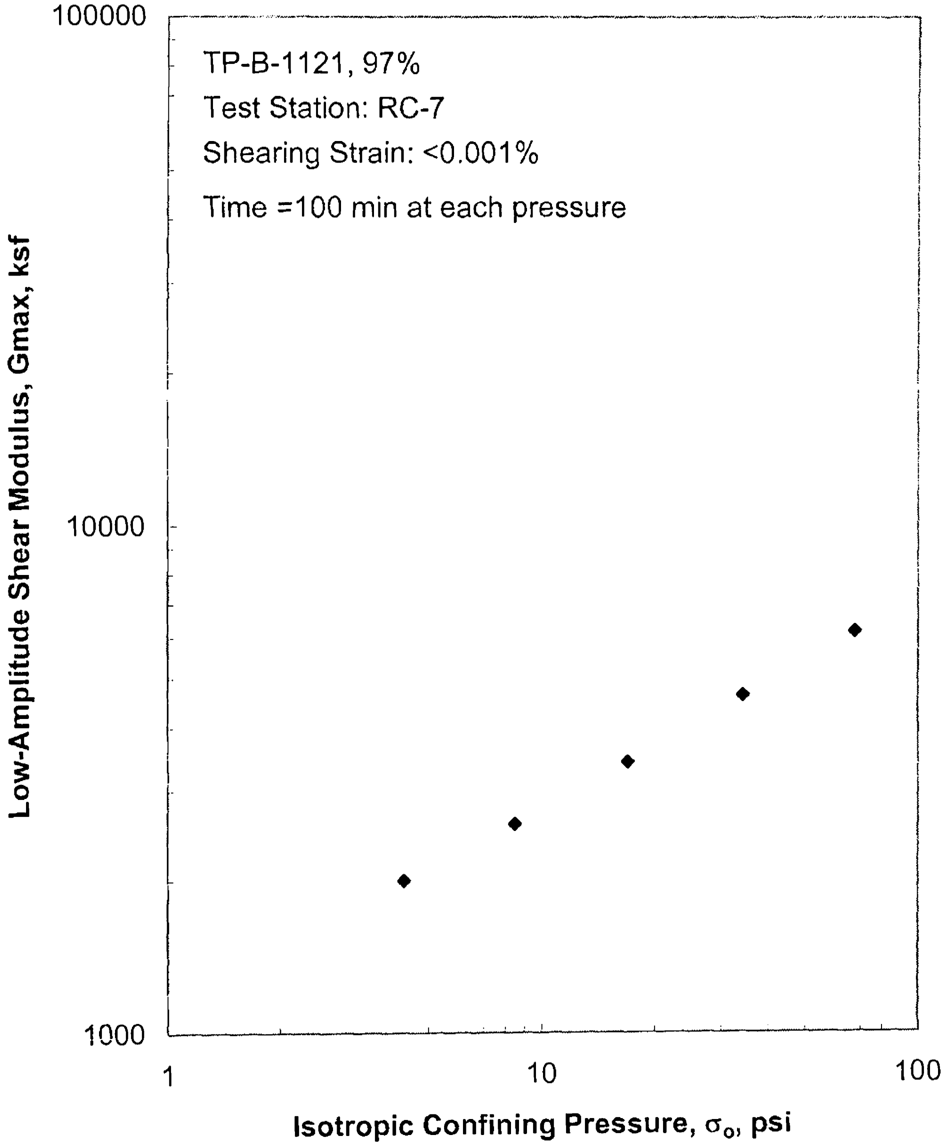


Figure K.5 Variation in Low-Amplitude Shear Modulus with Isotropic Confining Pressure from Resonant Column Tests

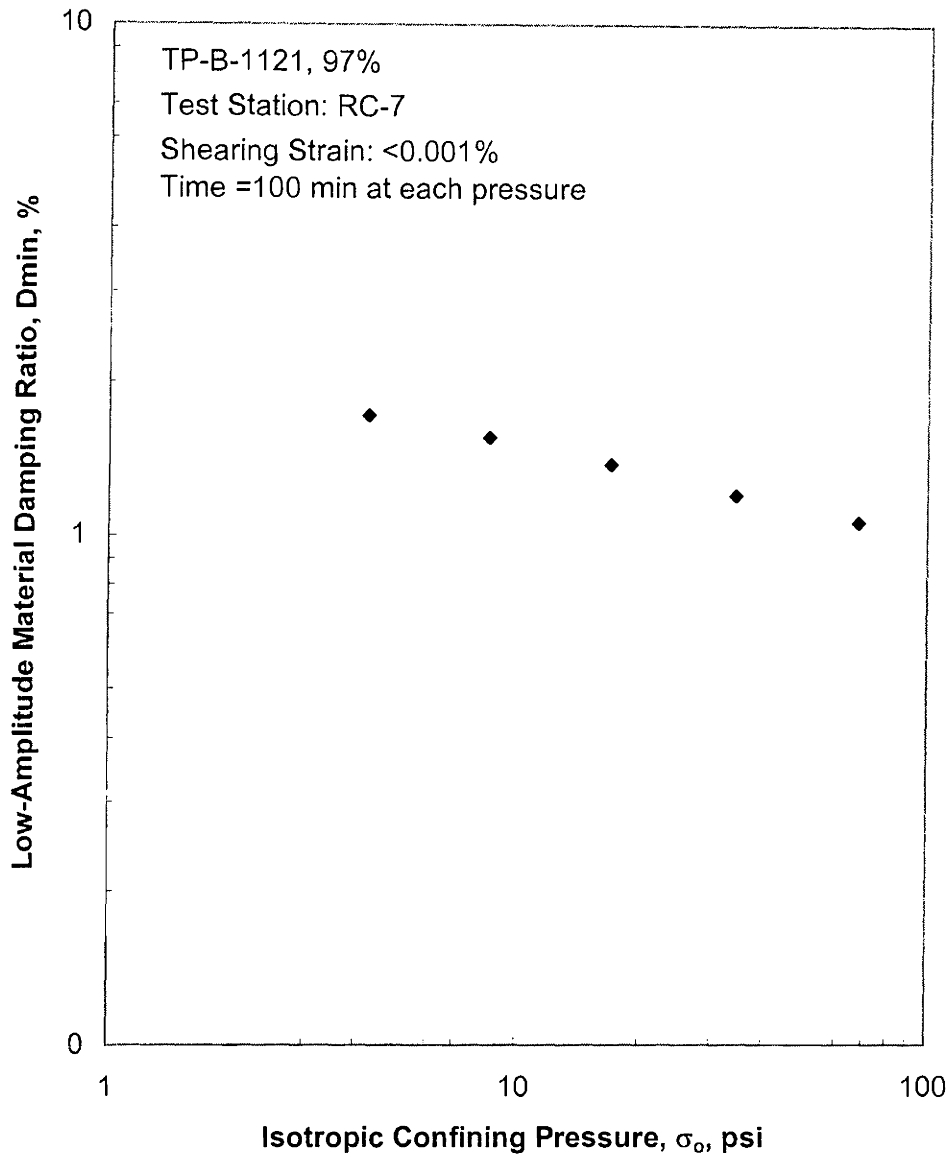


Figure K.6 Variation in Low-Amplitude Material Damping Ratio with Isotropic Confining Pressure from Resonant Column Tests

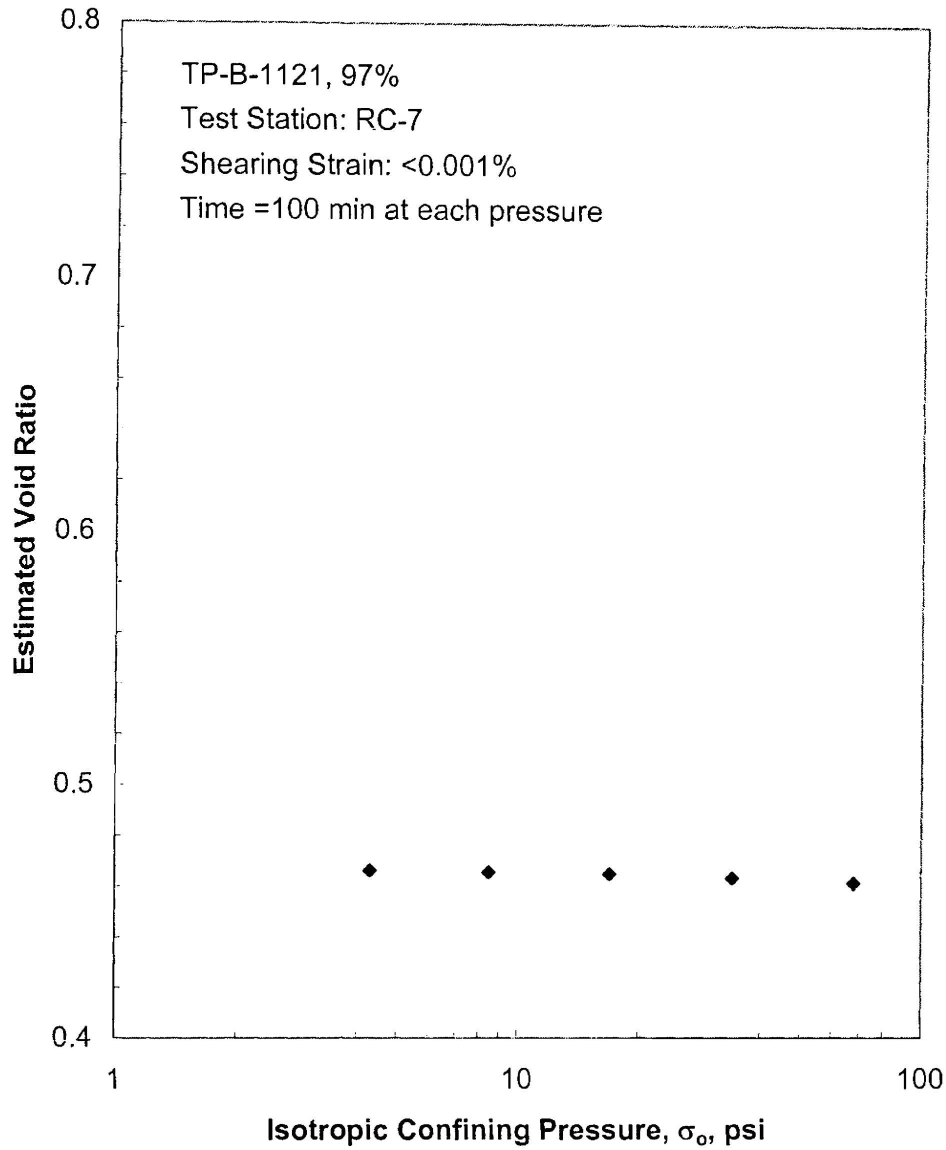


Figure K.7 Variation in Estimated Void Ratio with Isotropic Confining Pressure from Resonant Column Tests

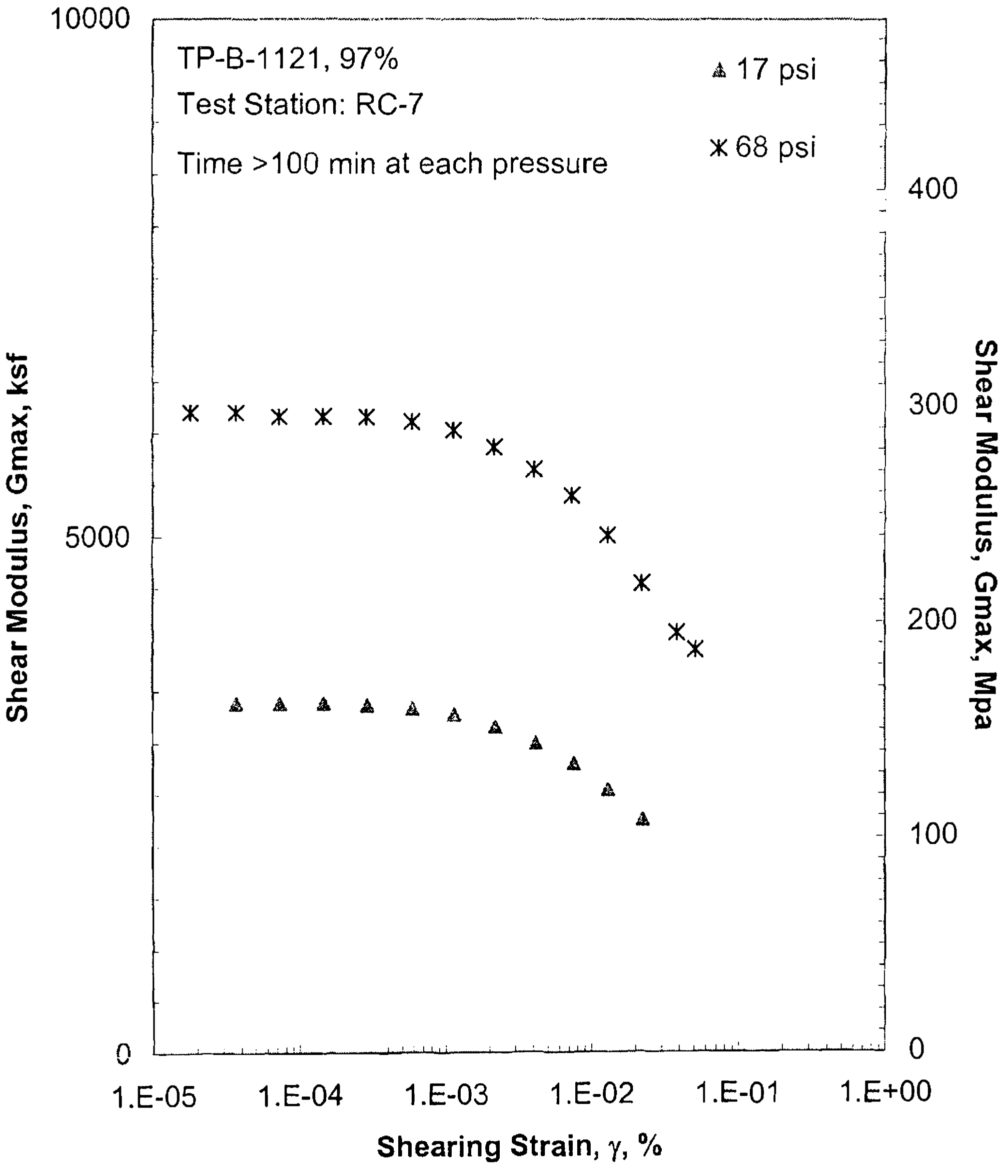


Figure K.8 Comparison of the Variation in Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

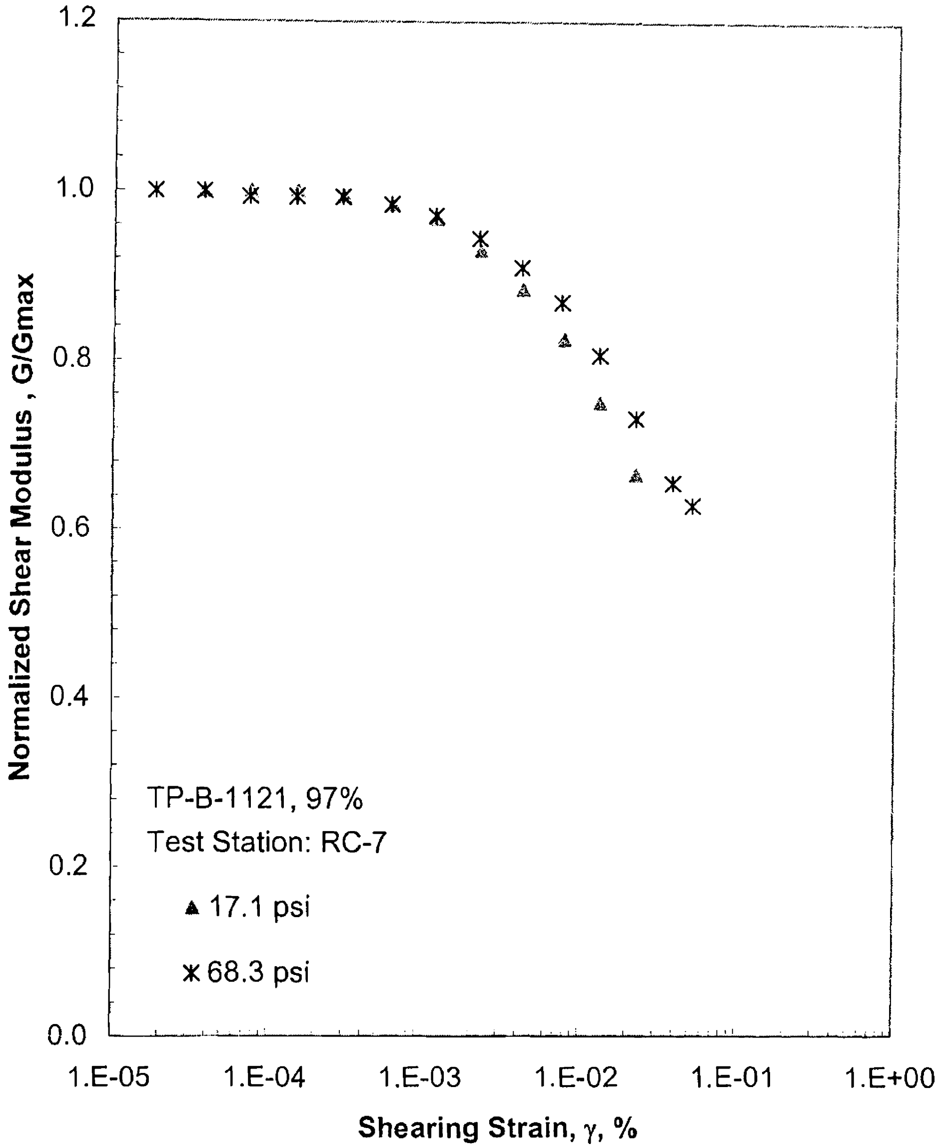


Figure K.9 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

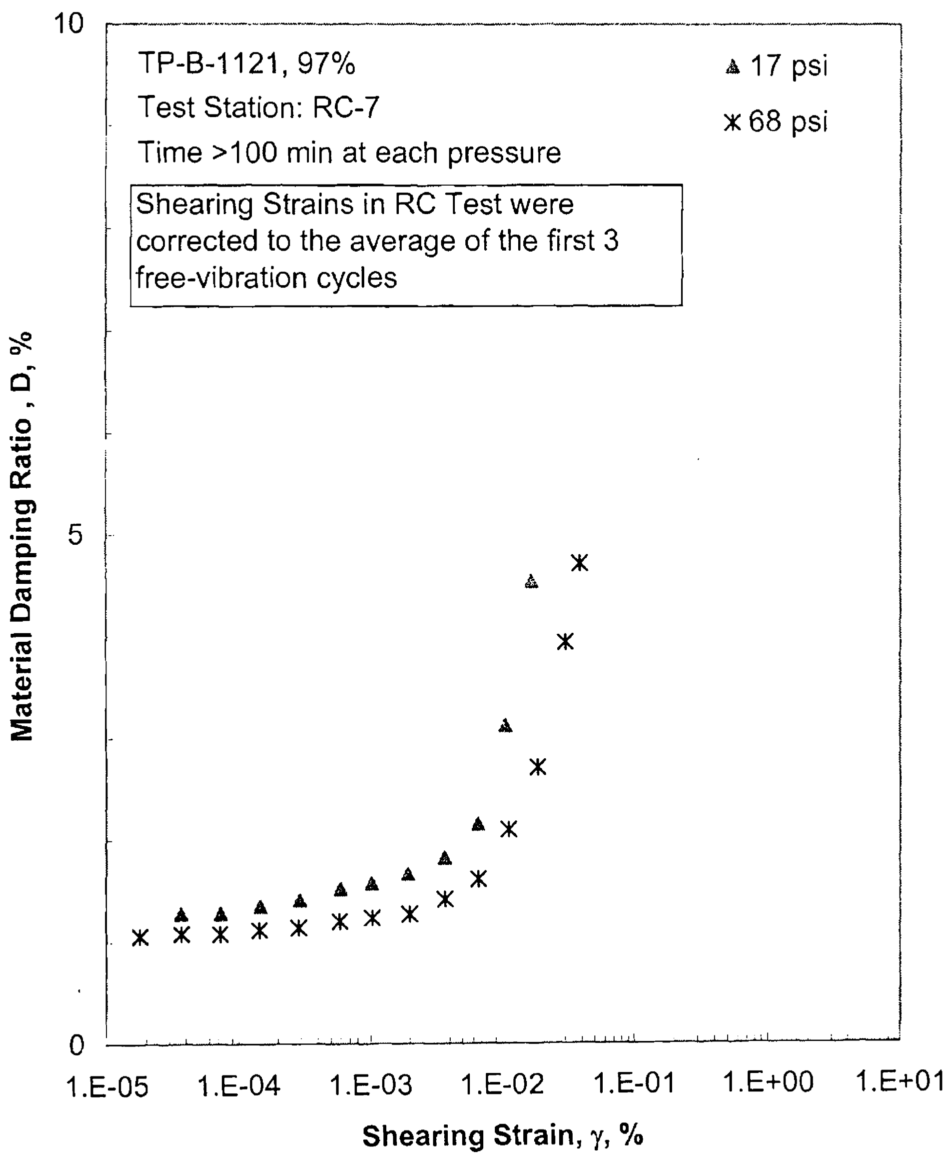


Figure K.10 Comparison of the Variation in Material Damping Ratio with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests

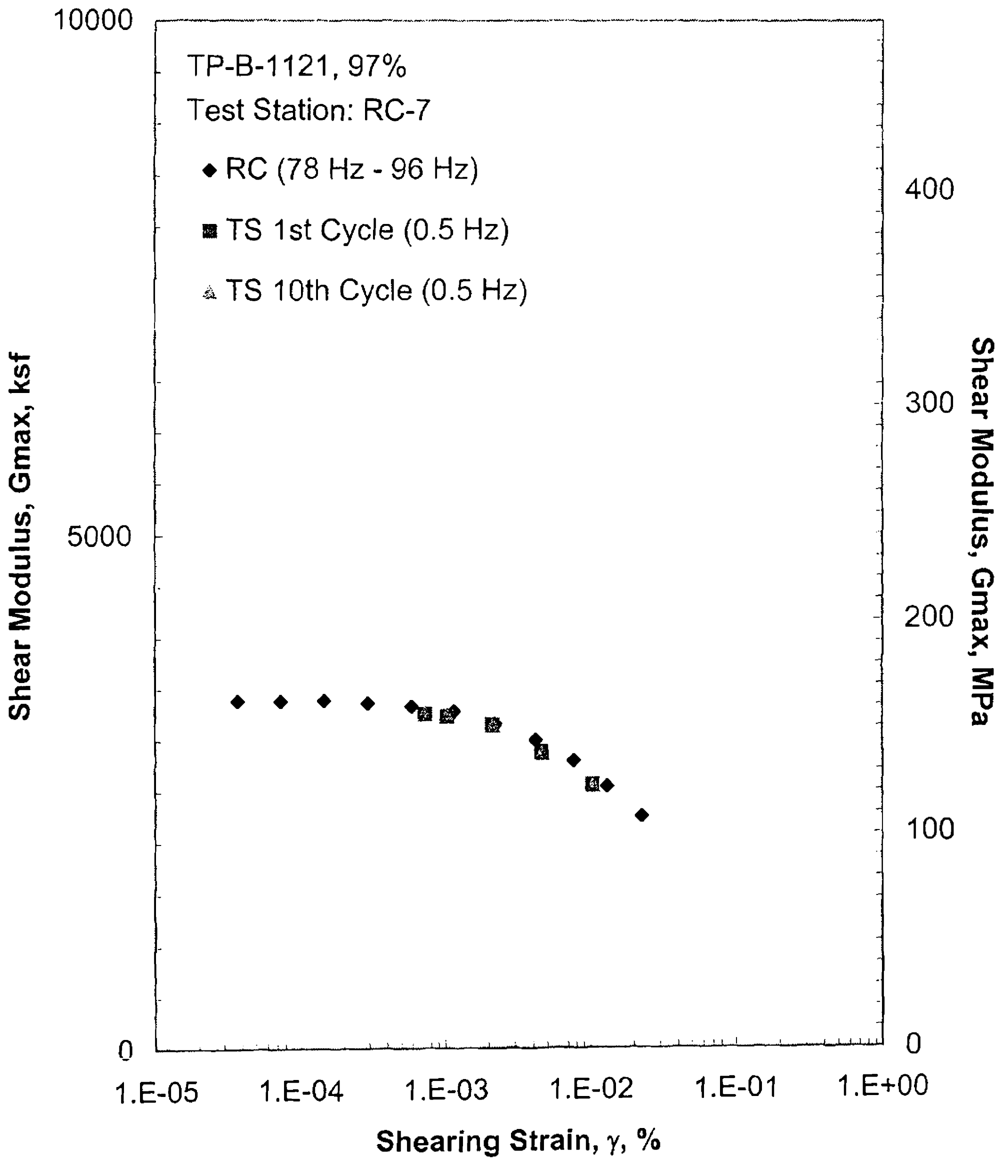


Figure K.11 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 17 psi from the Combined RCTS Tests

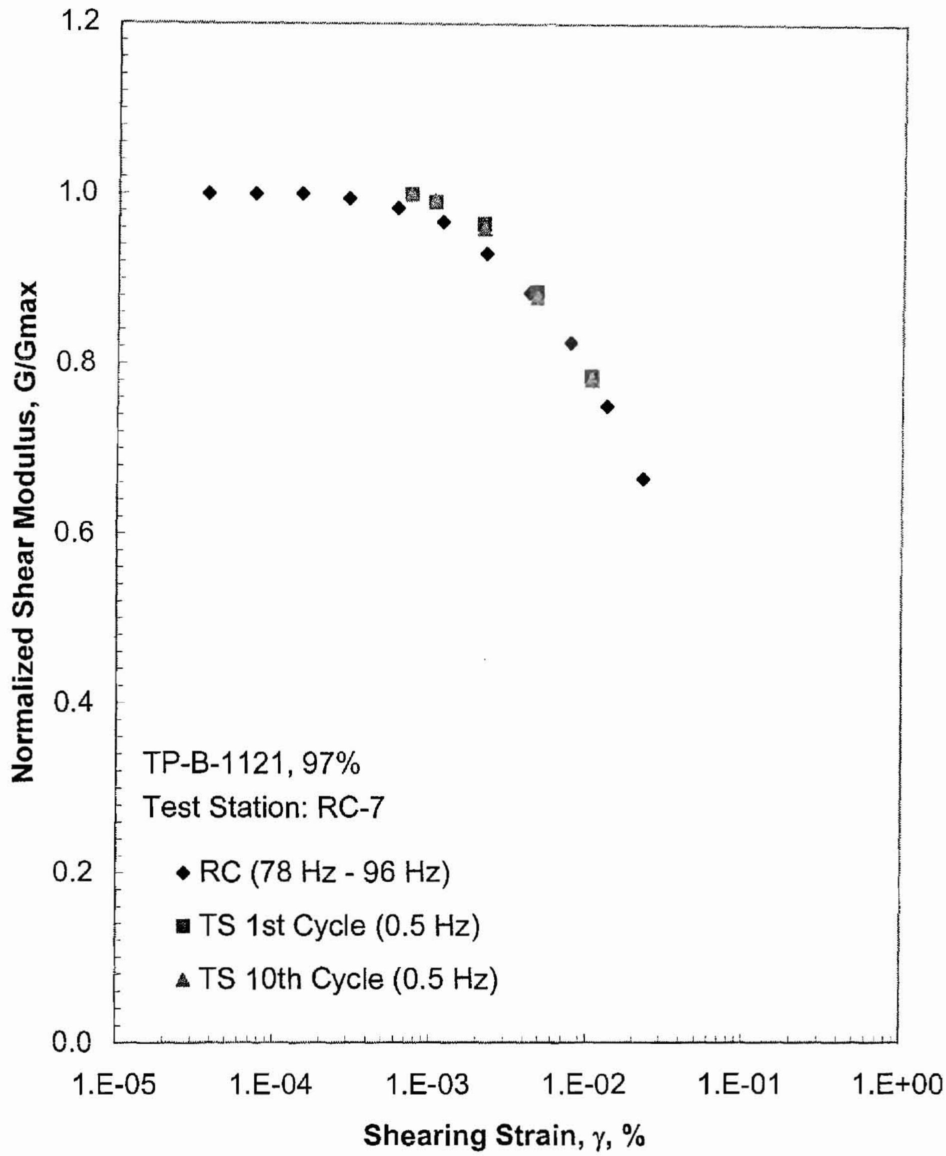


Figure K.12 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 17 psi from the Combined RCTS Tests

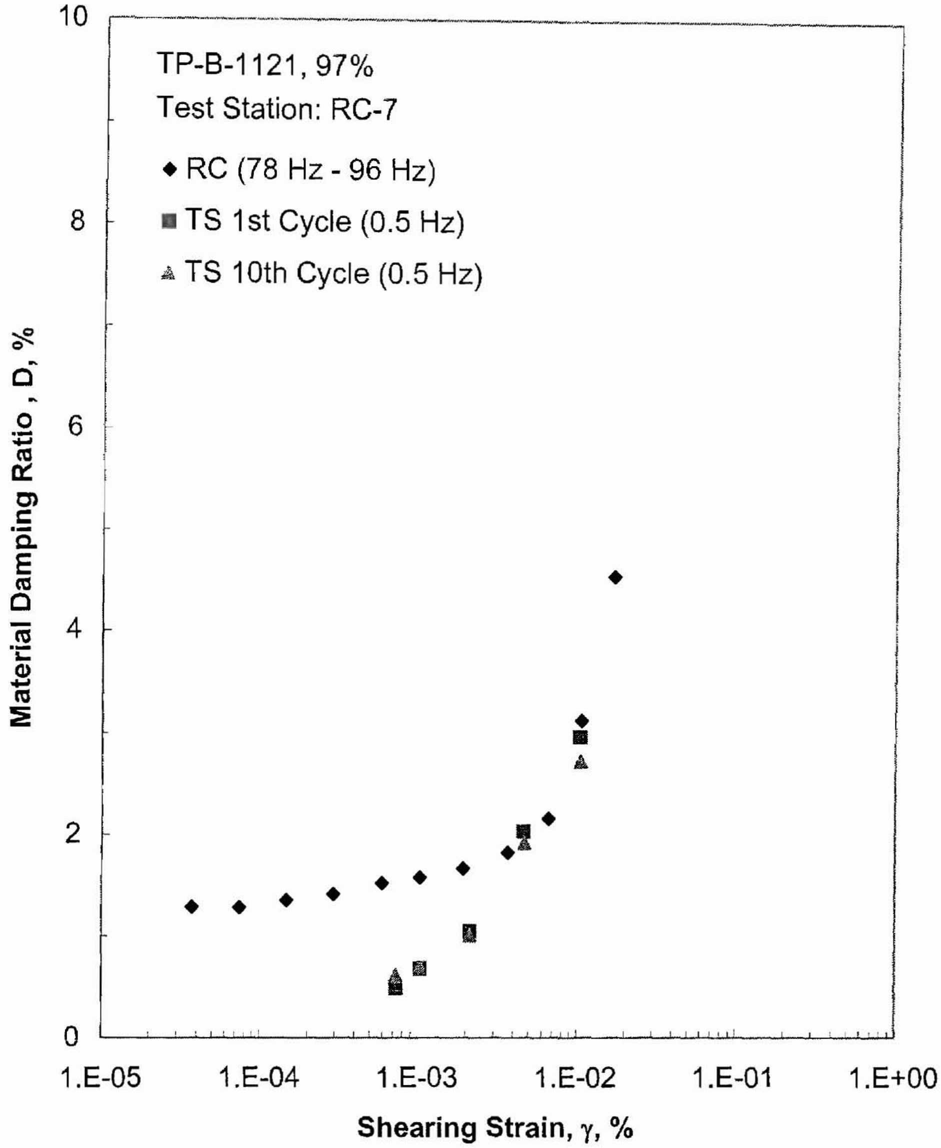


Figure K.13 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 17 psi from the Combined RCTS Tests

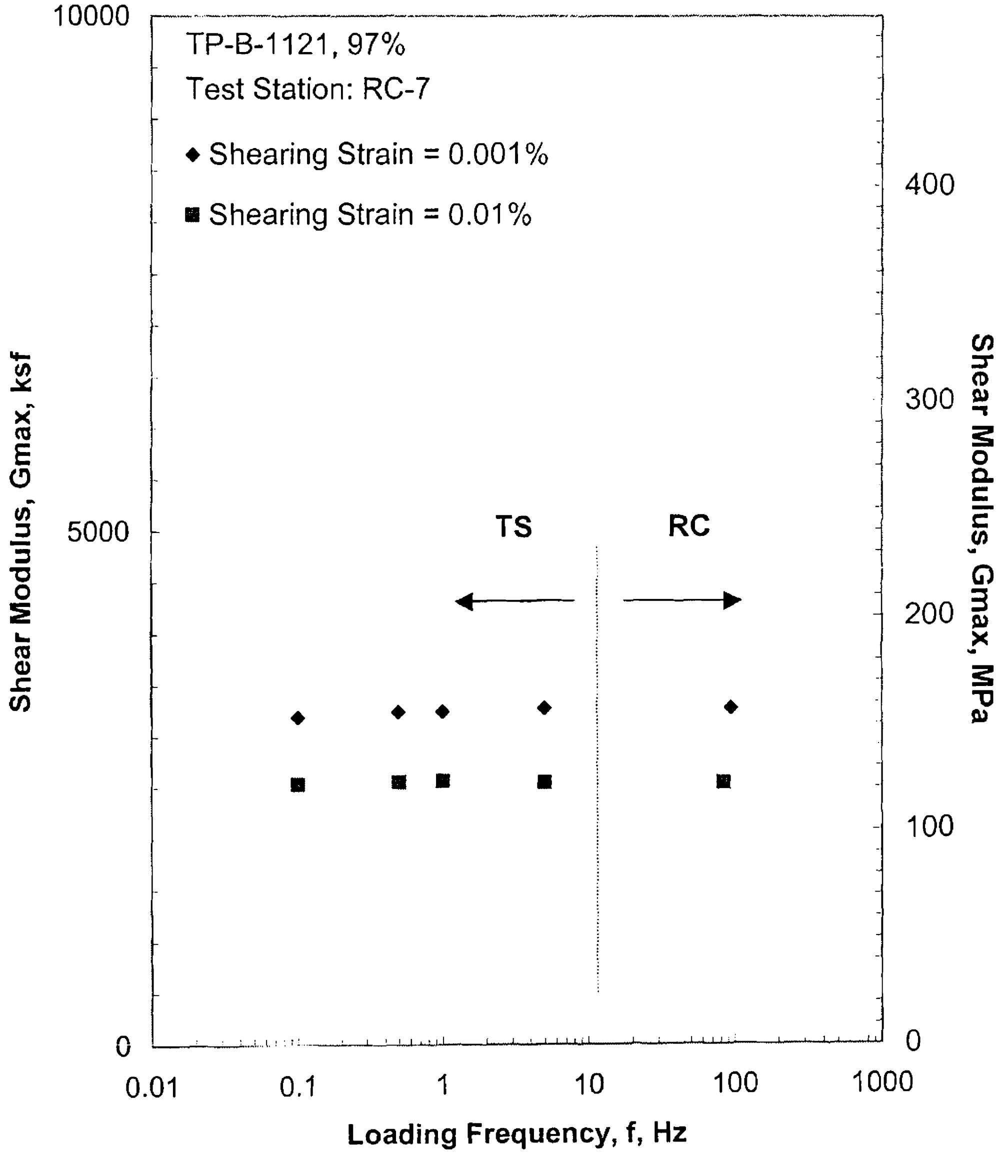


Figure K.14 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 17 psi from the Combined RCTS Tests

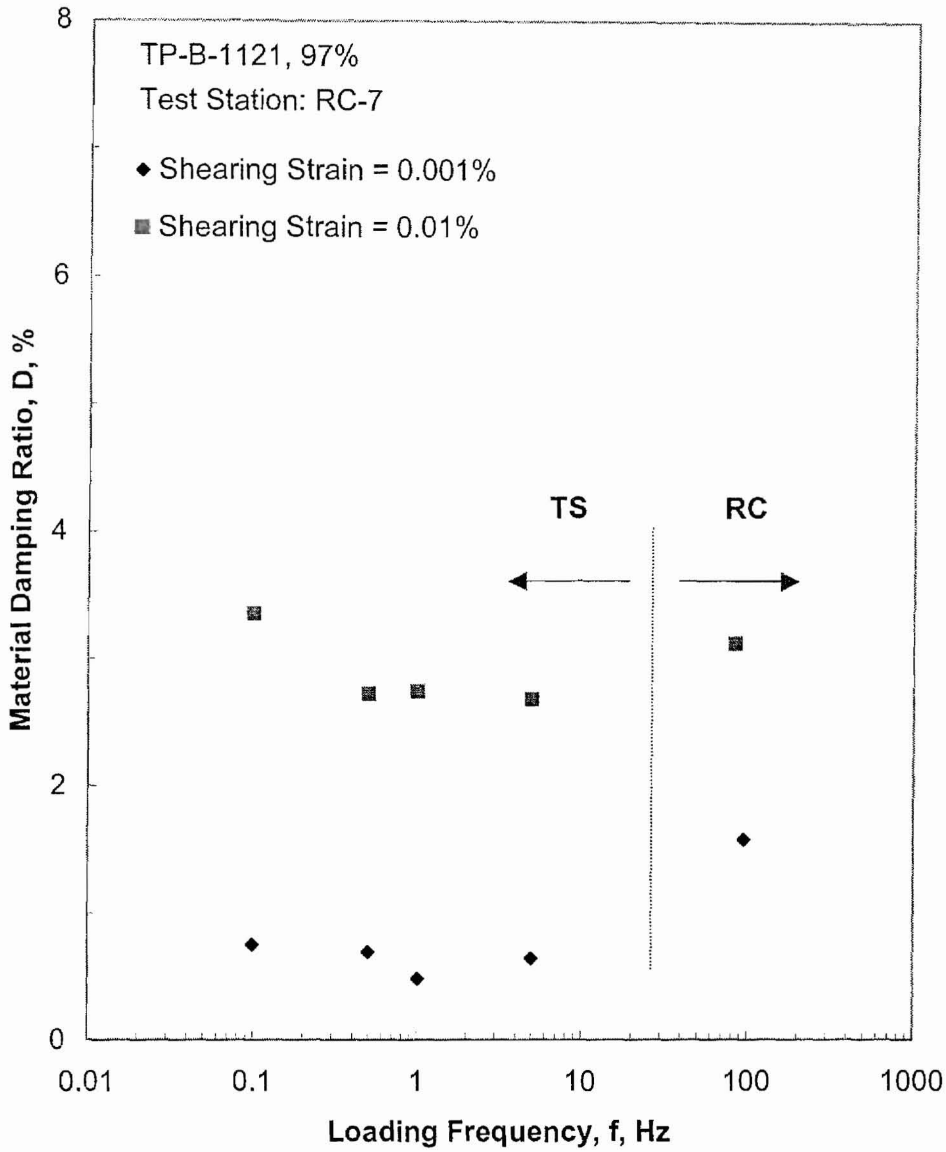


Figure K.15 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 17 psi from the Combined RCTS Tests

NOTE: Figures K.16 through K.20 are not available due to suspected high straining effects or unknown source(s) of disturbance during the TS tests.

Table K.1 Variation in Low-Amplitude Shear Wave Velocity, Low-Amplitude Shear Modulus, Low-Amplitude Material Damping Ratio and Estimated Void Ratio with Isotropic Confining Pressure from RC Tests of Specimen TP-B-1121, 97%

Isotropic Confining Pressure, σ_o			Low-Amplitude Shear Modulus, G_{max}		Low-Amplitude Shear Wave Velocity, Vs	Low-Amplitude Material Damping Ratio, Dmin	Estimated Void Ratio, e
(psi)	(psf)	(kPa)	(ksf)	(MPa)	(fps)	(%)	
4	619	30	1996	96	729	1.72	0.47
9	1224	59	2586	124	830	1.56	0.47
17	2448	117	3416	164	954	1.38	0.46
34	4925	236	4632	222	1110	1.20	0.46
68	9792	469	6177	297	1281	1.06	0.46

Table K.2 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen TP-B-1121, 97%; Isoptropic Confining Pressure, σ_o=17 psi (2.4 ksf = 117 kPa)

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Average+ Shearing Strain, %	Material Damping Ratio^x, D, %
3.70E-05	3386	1.00	3.70E-05	1.28
7.40E-05	3386	1.00	7.40E-05	1.28
1.47E-04	3386	1.00	1.47E-04	1.36
2.92E-04	3368	0.99	2.92E-04	1.41
5.97E-04	3332	0.98	5.97E-04	1.52
1.15E-03	3278	0.97	1.03E-03	1.58
2.21E-03	3153	0.93	1.92E-03	1.67
4.18E-03	2997	0.88	3.68E-03	1.83
7.67E-03	2798	0.83	6.59E-03	2.16
1.31E-02	2545	0.75	1.06E-02	3.12
2.25E-02	2255	0.67	1.69E-02	4.54

+ Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

x Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table K.3 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen TP-B-1121, 97%; Isotropic Confining Pressure, σ_o = 17 psi (2.4 ksf =117 kPa)

First Cycle				Tenth Cycle			
Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %	Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %
7.32E-04	3258	1.00	0.48	7.30E-04	3268	1.00	0.61
1.03E-03	3227	0.99	0.68	1.03E-03	3243	0.99	0.69
2.12E-03	3146	0.97	1.05	2.13E-03	3138	0.96	1.01
4.63E-03	2885	0.89	2.03	4.65E-03	2872	0.88	1.92
1.04E-02	2561	0.79	2.96	1.05E-02	2555	0.78	2.72

Table K.4 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen TP-B-1121, 97%; Isoptropic Confining Pressure, σ_o= 68 psi (9.8 ksf = 469 kPa)

Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Average+ Shearing Strain, %	Material Damping Ratio^x, D, %
1.80E-05	6206	1.00	1.80E-05	1.06
3.70E-05	6206	1.00	3.70E-05	1.08
7.30E-05	6165	0.99	7.30E-05	1.08
1.45E-04	6165	0.99	1.45E-04	1.12
2.88E-04	6165	0.99	2.88E-04	1.14
5.89E-04	6110	0.98	5.89E-04	1.20
1.14E-03	6028	0.97	1.05E-03	1.24
2.18E-03	5867	0.95	1.98E-03	1.27
4.08E-03	5649	0.91	3.71E-03	1.42
7.41E-03	5397	0.87	6.59E-03	1.62
1.30E-02	5010	0.81	1.13E-02	2.11
2.24E-02	4546	0.73	1.88E-02	2.72
3.87E-02	4072	0.66	3.02E-02	3.94
5.16E-02	3905	0.63	3.87E-02	4.72

+ Average Shearing Strain from the First Three Cycles of the Free Vibration Decay Curve

x Average Damping Ratio from the First Three Cycles of the Free Vibration Decay Curve

Table K.5 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen TP-B-1121, 97%; Isotropic Confining Pressure, σ_o=68 psi (9.8 ksf = 469 kPa)

First Cycle				Tenth Cycle			
Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %	Peak Shearing Strain, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %
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* No results presented due to suspected high straining effect or unknown source(s) of disturbance during the TS test.