Kleinfelder Specimen ID:

K2-13-005

Boring No: R-6-1b
Sample No: SC-3

Limestone (Fort Thompson Formation)
Depth = 47.6 ft – 48.1 ft (below existing ground surface)
Total Unit Weight = 151.8 lb/ft^3
Natural Moisture Content = 3.6%
Estimated In-Situ Mean Effective Stress = 16 psi

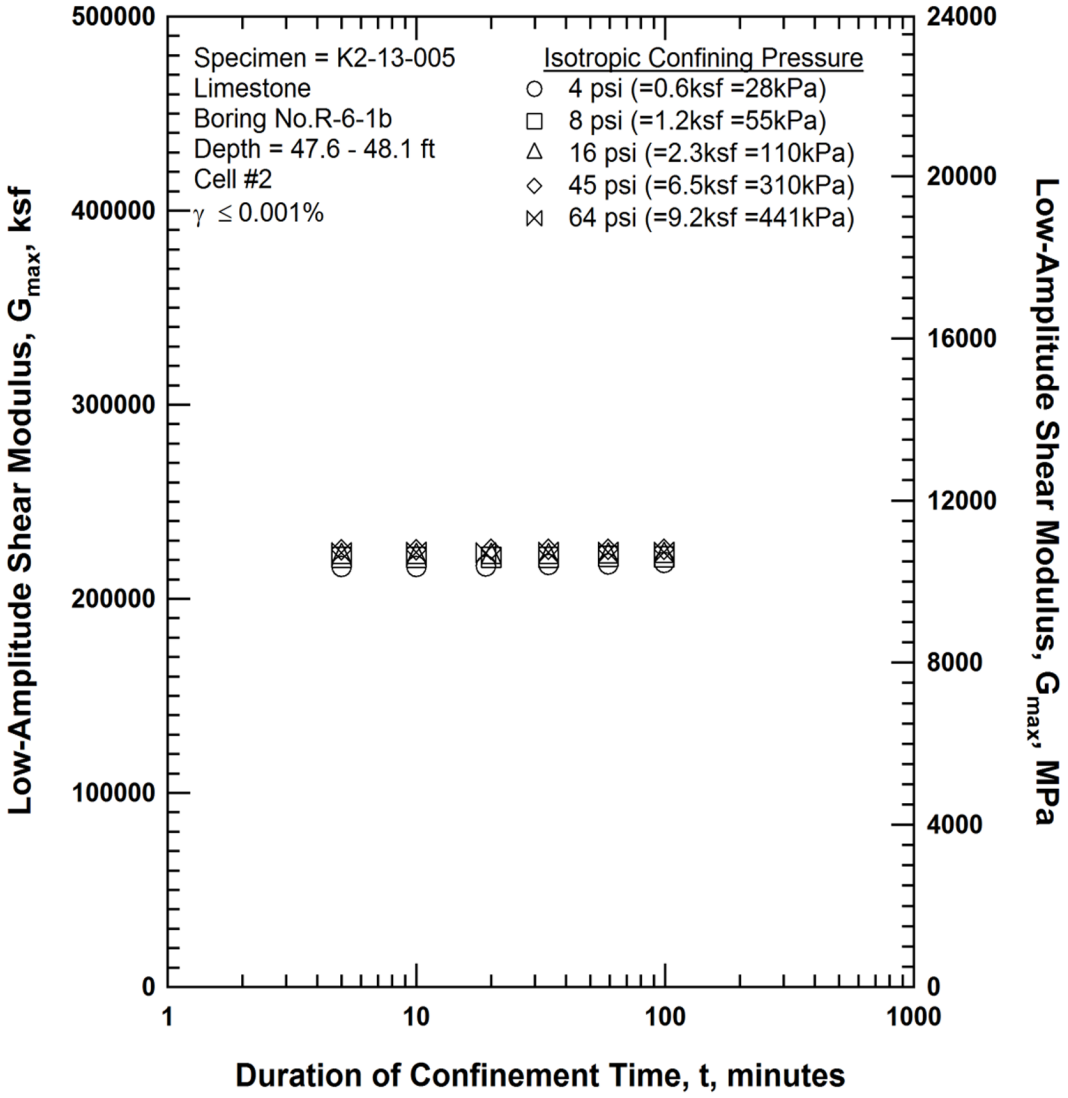

Figure F.1 Variation in Low-Amplitude Shear Modulus with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests of Specimen K2-13-005

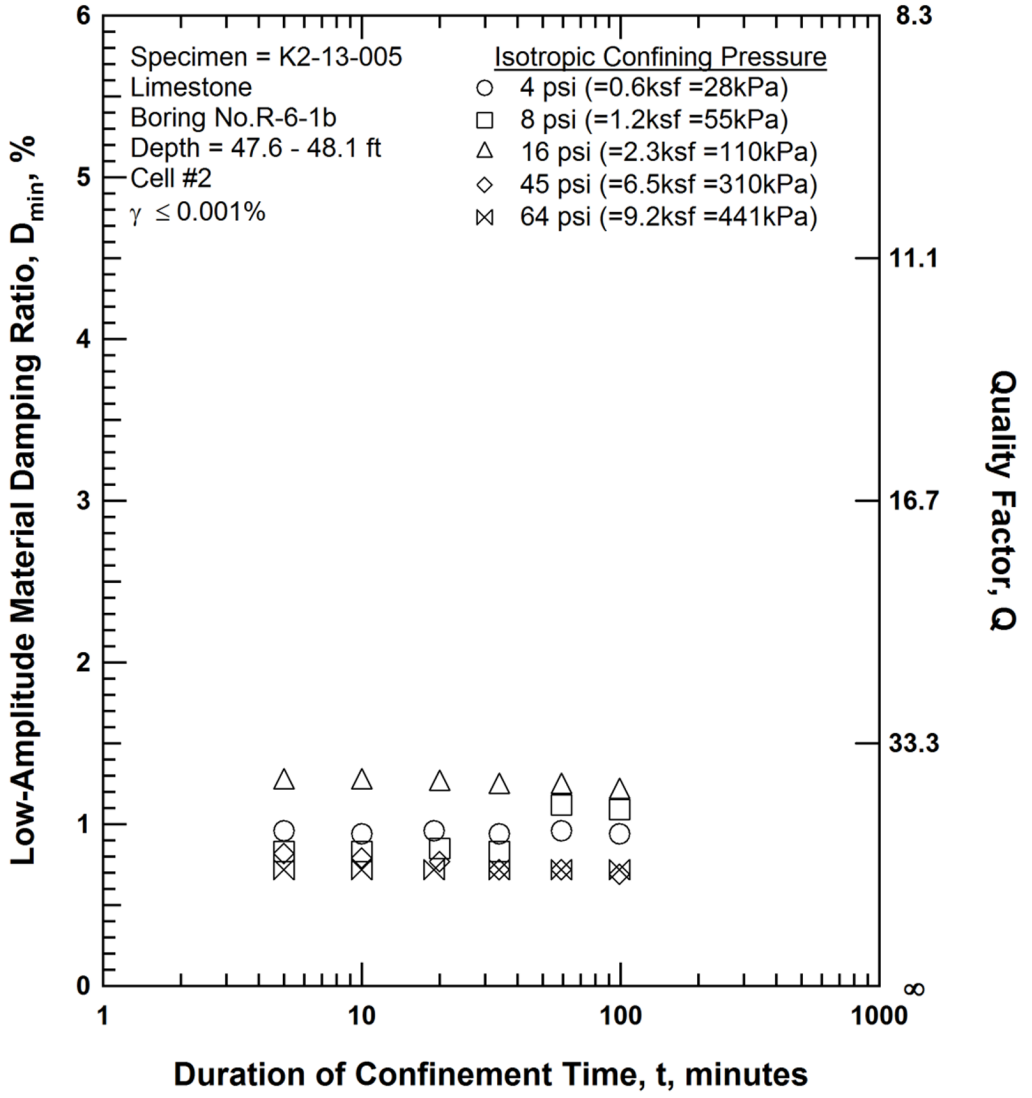

Figure F.2 Variation in Low-Amplitude Material Damping Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests of Specimen K2-13-005

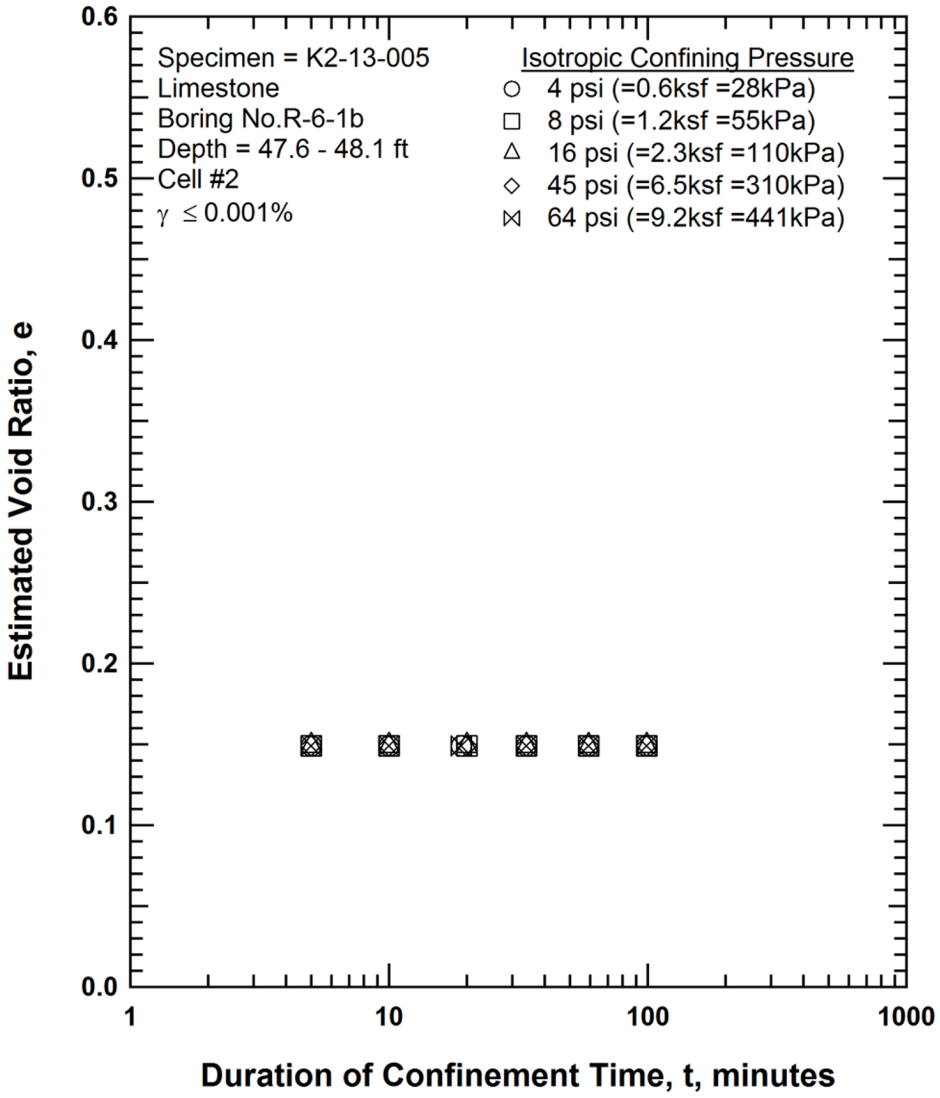

Figure F.3 Variation in Estimated Void Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Test of Specimen K2-13-005

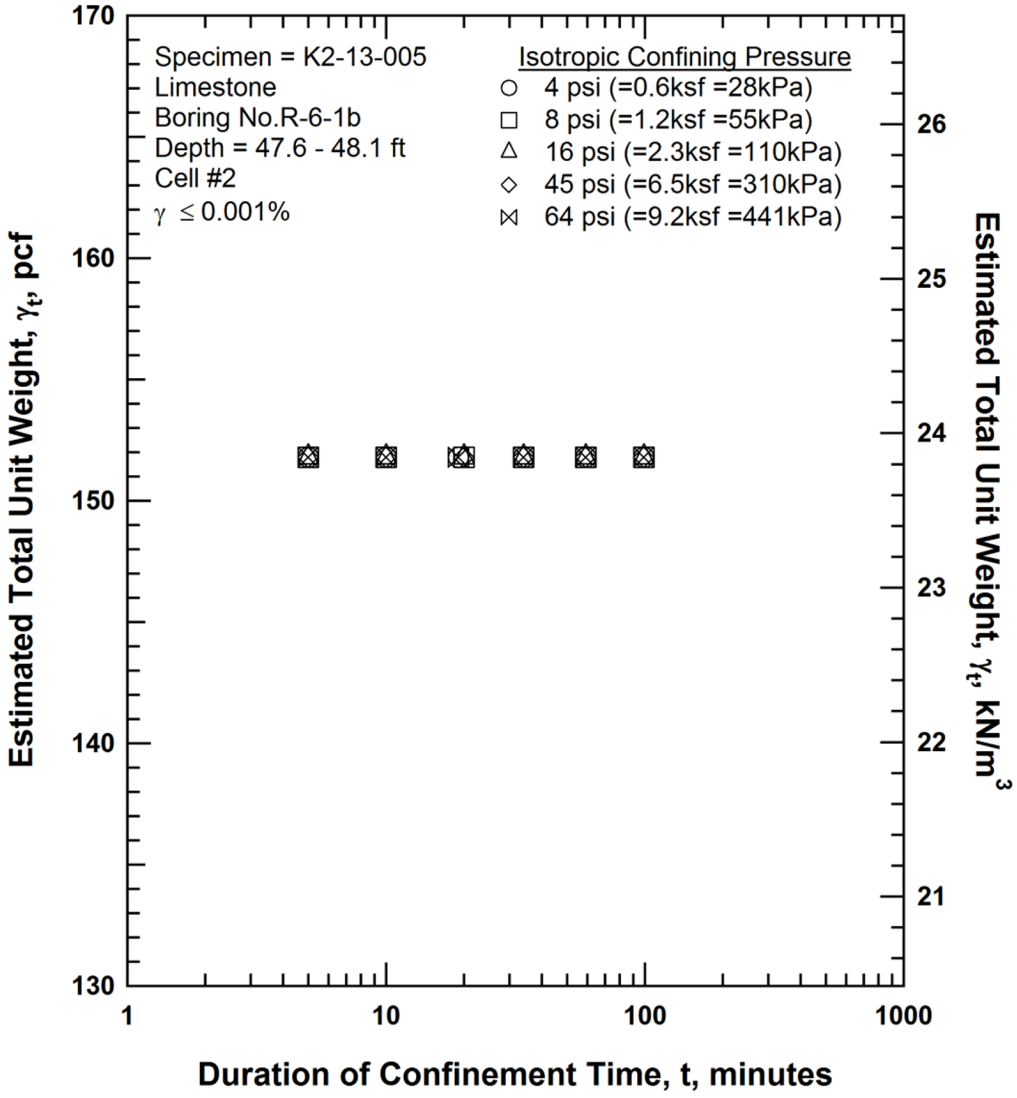

Figure F.4 Variation in Estimated Total Unit Weight with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests of Specimen K2-13-005

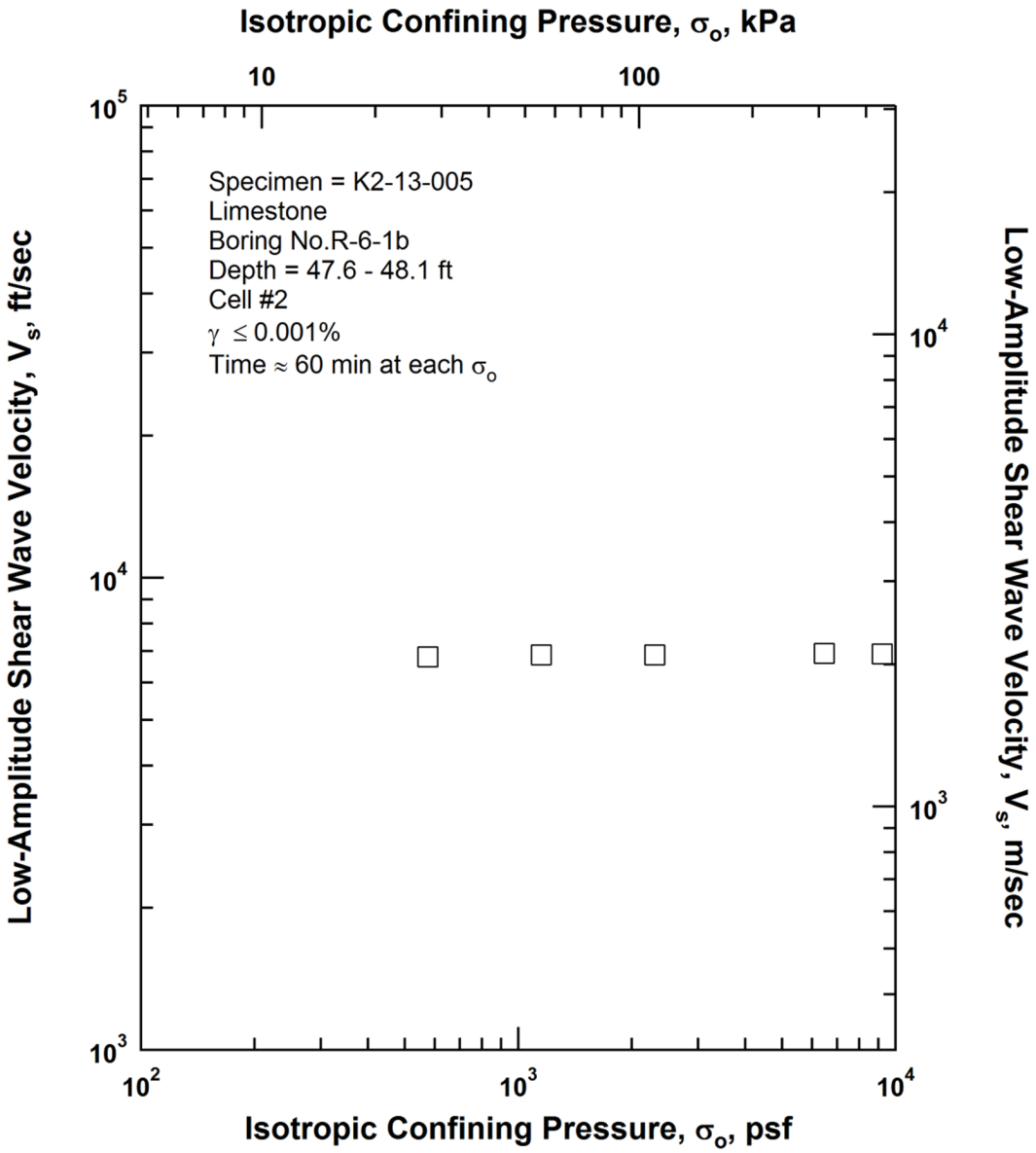

Figure F.5 Variation in Low-Amplitude Shear Wave Velocity with Isotropic Confining Pressure from Resonant Column Tests of Specimen K2-13-005

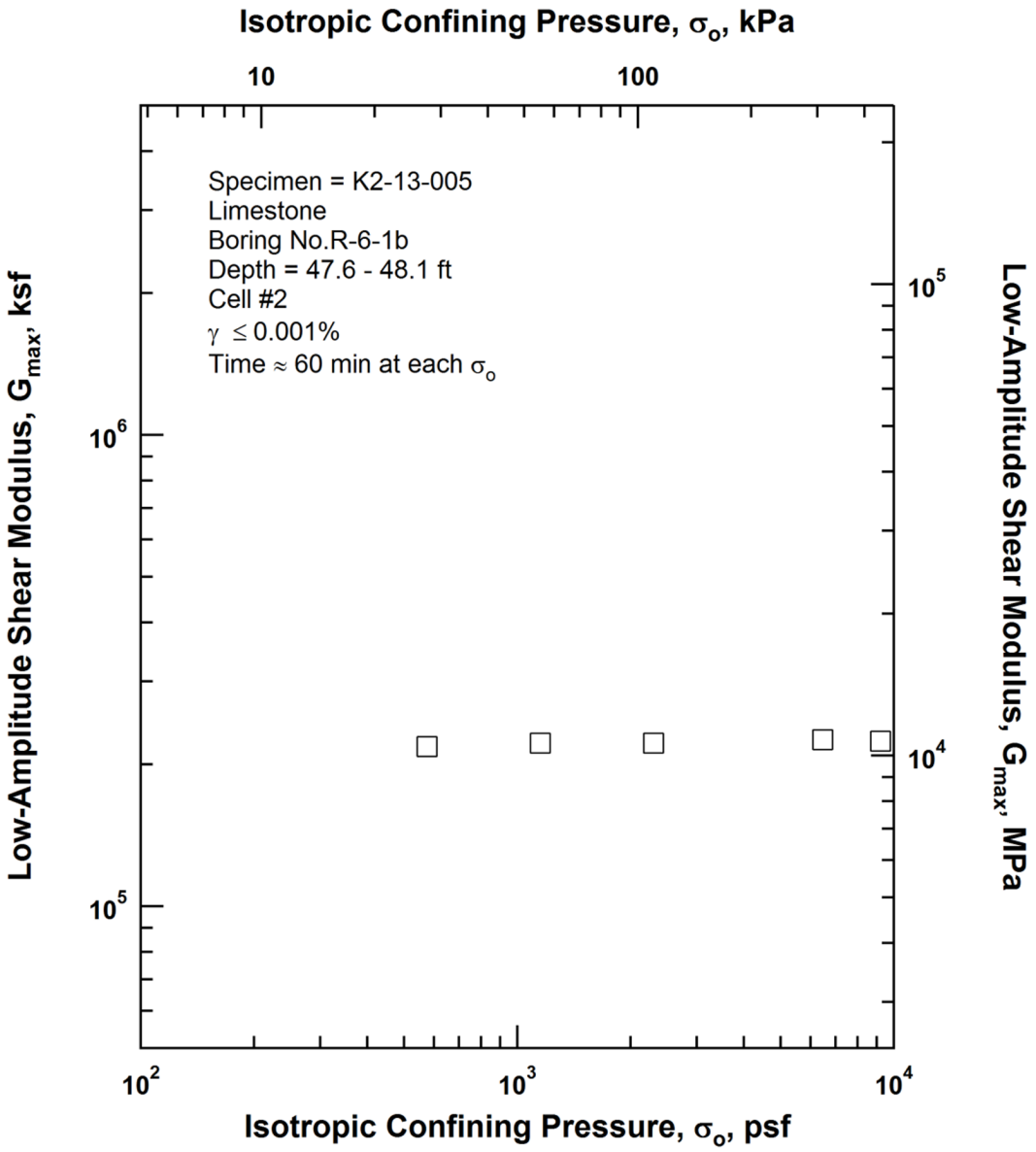

Figure F.6 Variation in Low-Amplitude Shear Modulus with Isotropic Confining Pressure from Resonant Column Test of Specimen K2-13-005

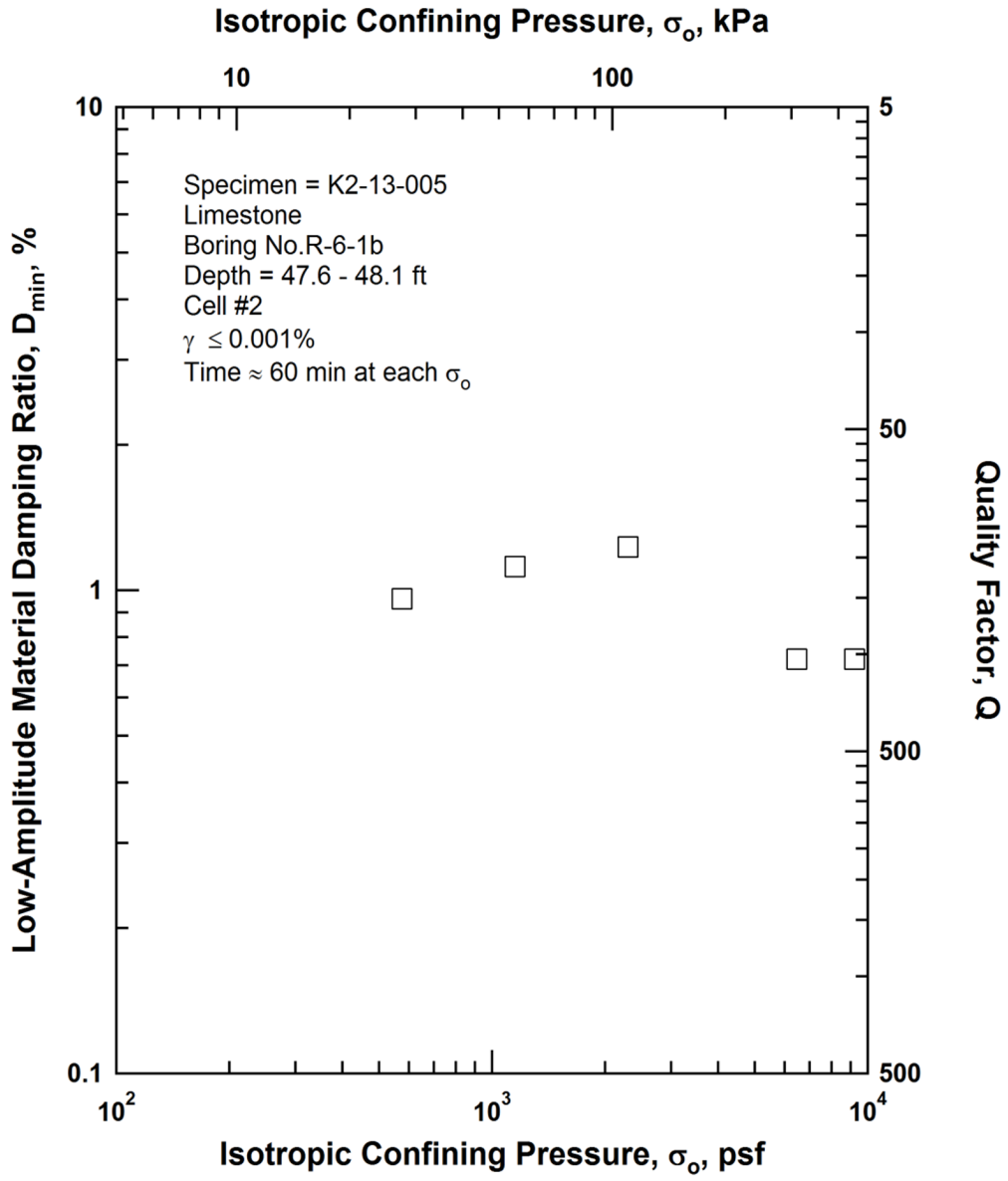

Figure F.7 Variation in Low-Amplitude Material Damping Ratio with Isotropic Confining Pressure from Resonant Column Tests of Specimen K2-13-005

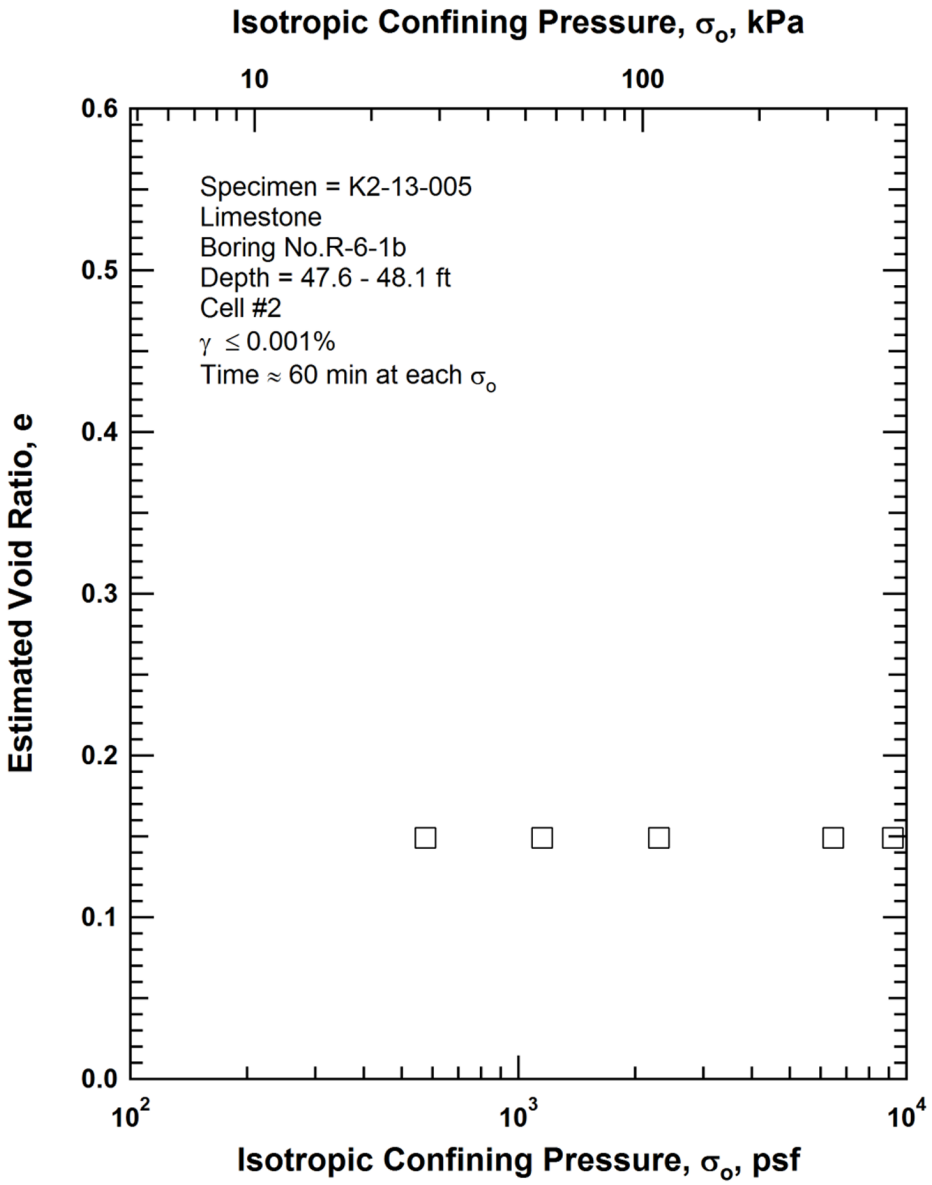

Figure F.8 Variation in Estimated Void Ratio with Isotropic Confining Pressure from Resonant Column Tests of Specimen K2-13-005

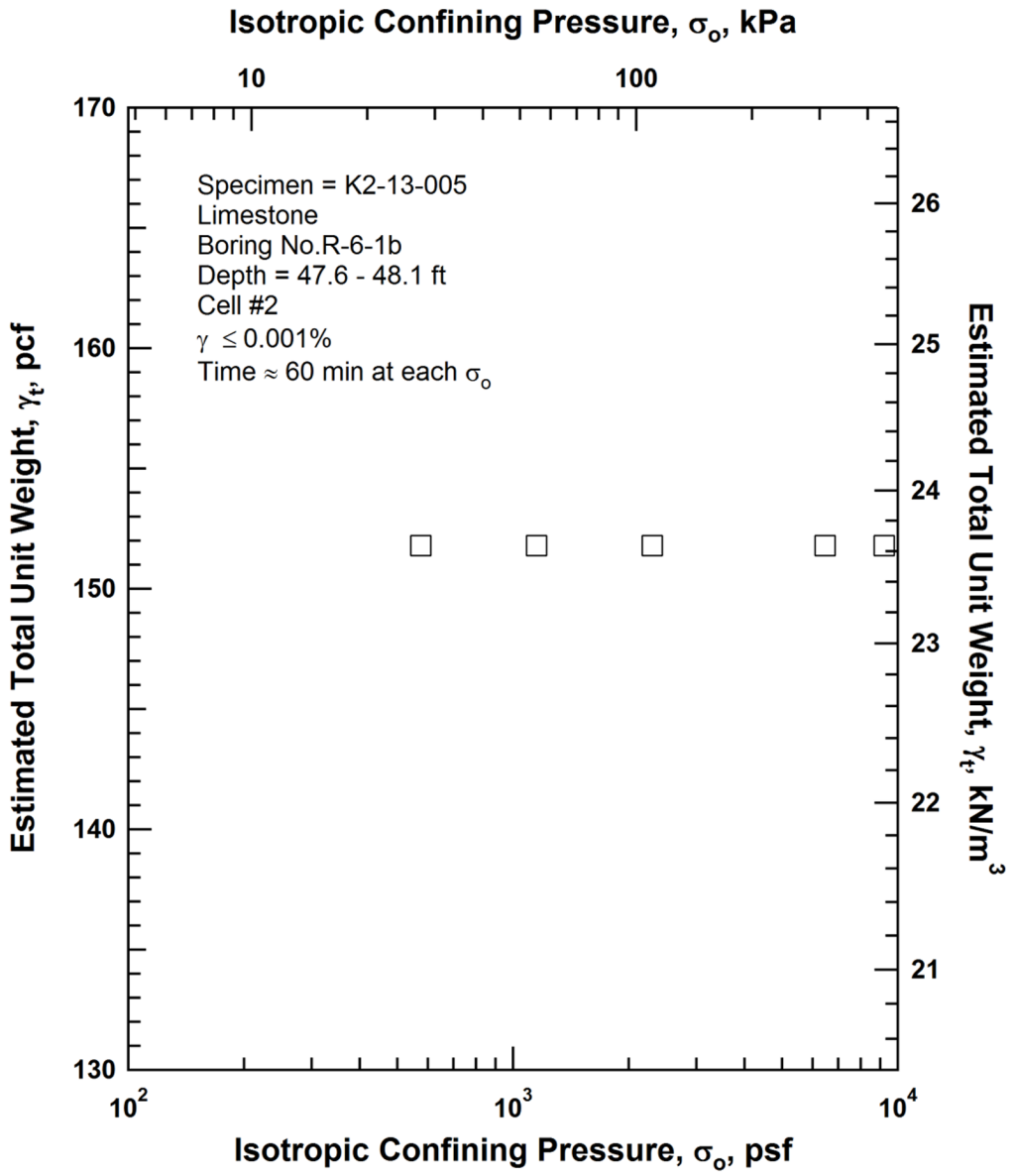

Figure F.9 Variation in Estimated Total Unit Weight with Isotropic Confining Pressure from Resonant Column Tests of Specimen K2-13-005

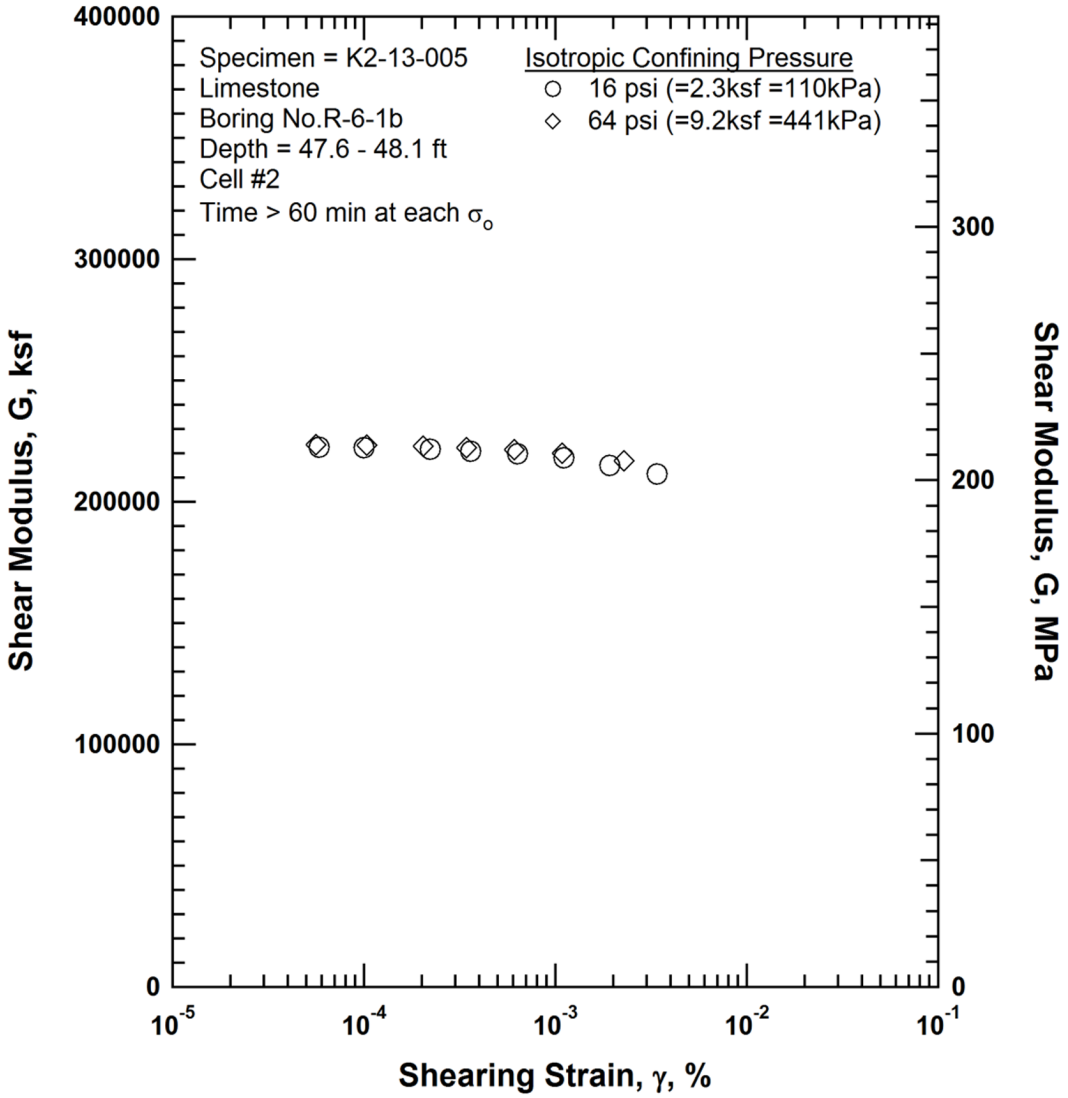

Figure F.10 Comparison of the Variation in Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests of Specimen K2-13-005

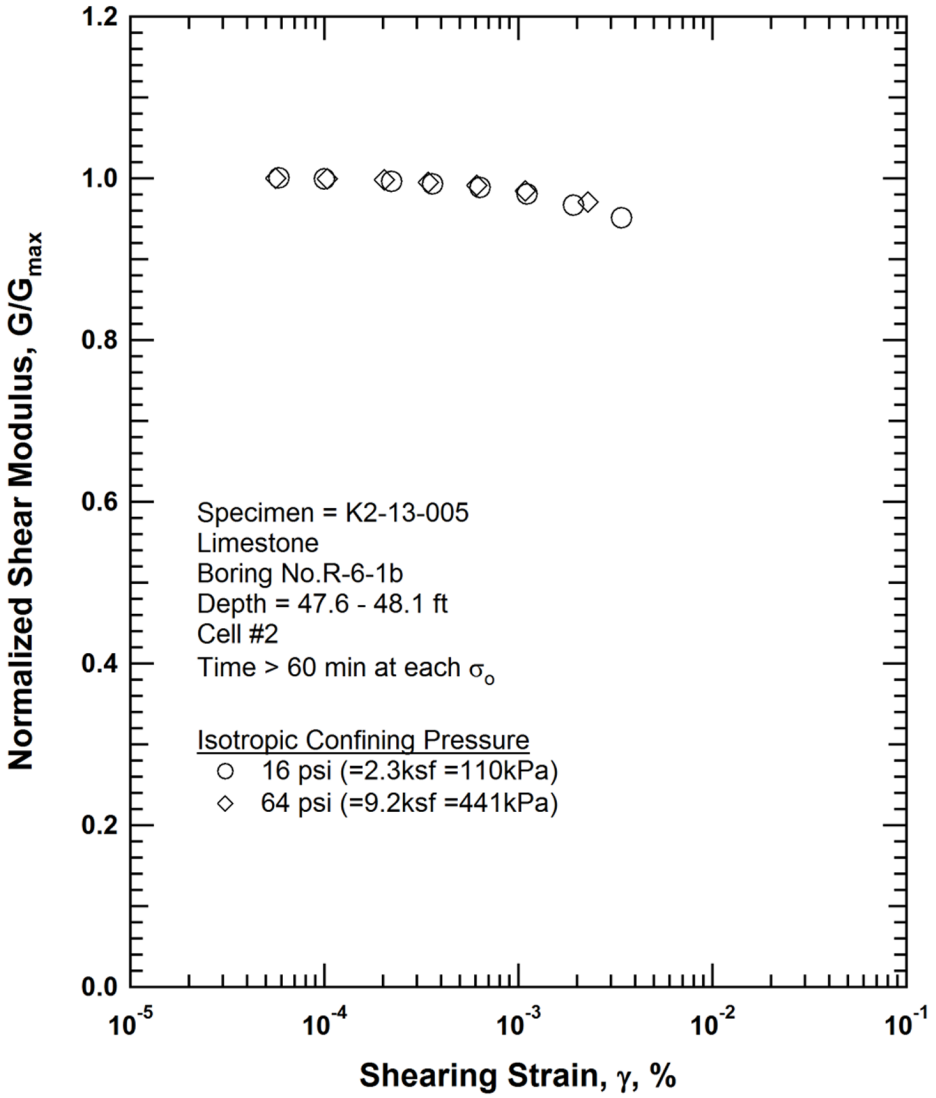

Figure F.11 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests of Specimen K2-13-005

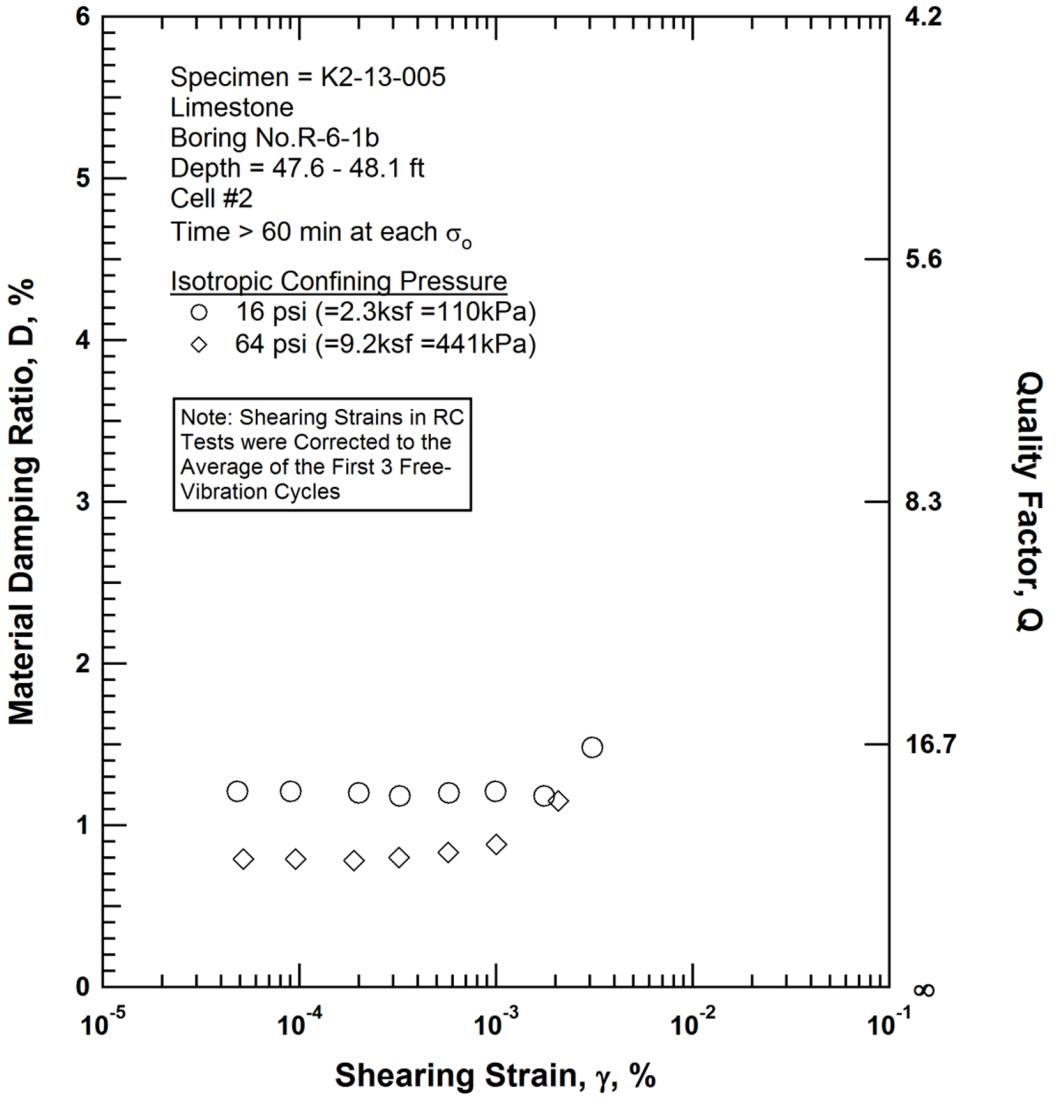

Figure F.12 Comparison of the Variation in Material Damping Ratio with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests of Specimen K2-13-005

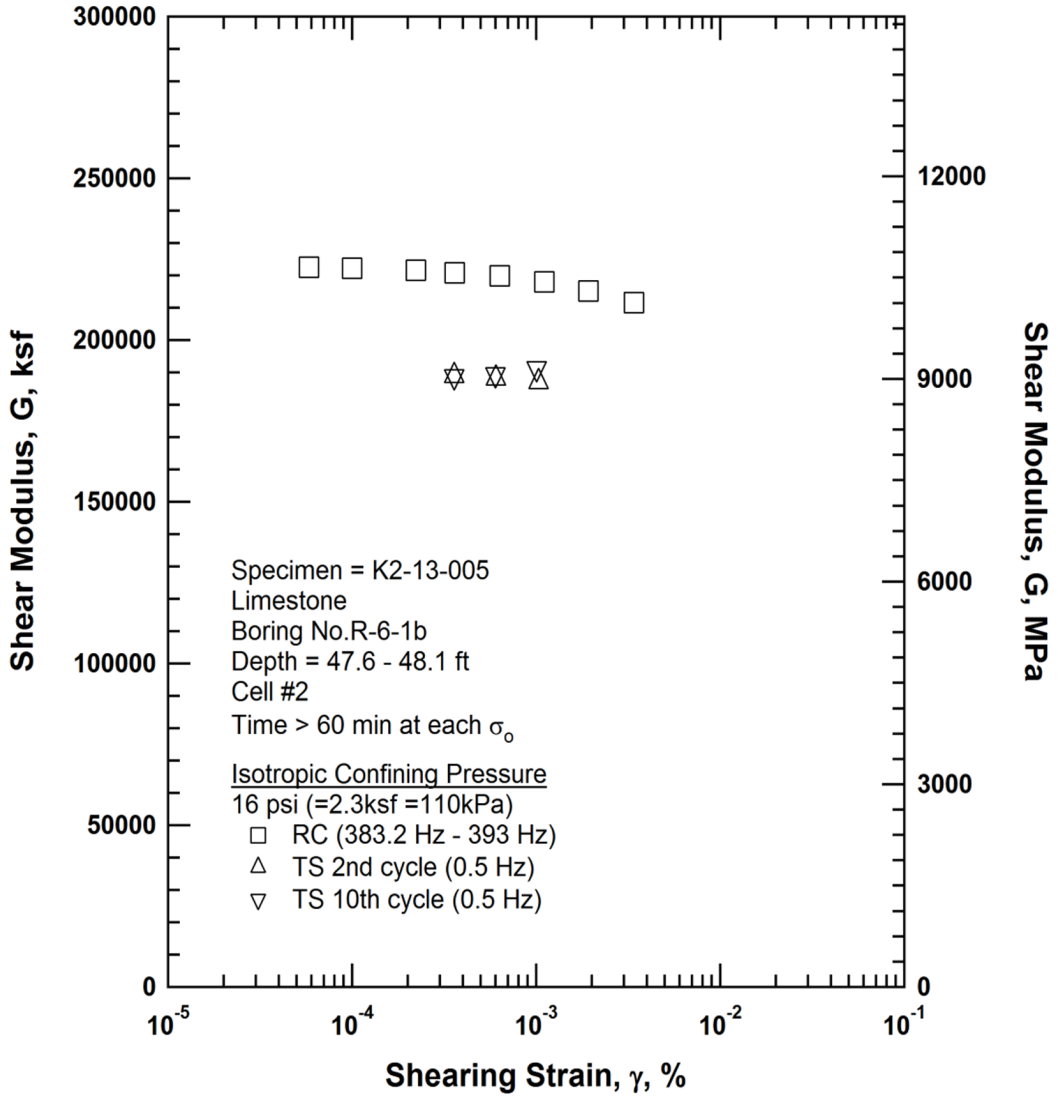

Figure F.13 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 16 psi (=2.3ksf =110kPa) from the Combined RCTS Tests of Specimen K2-13-005

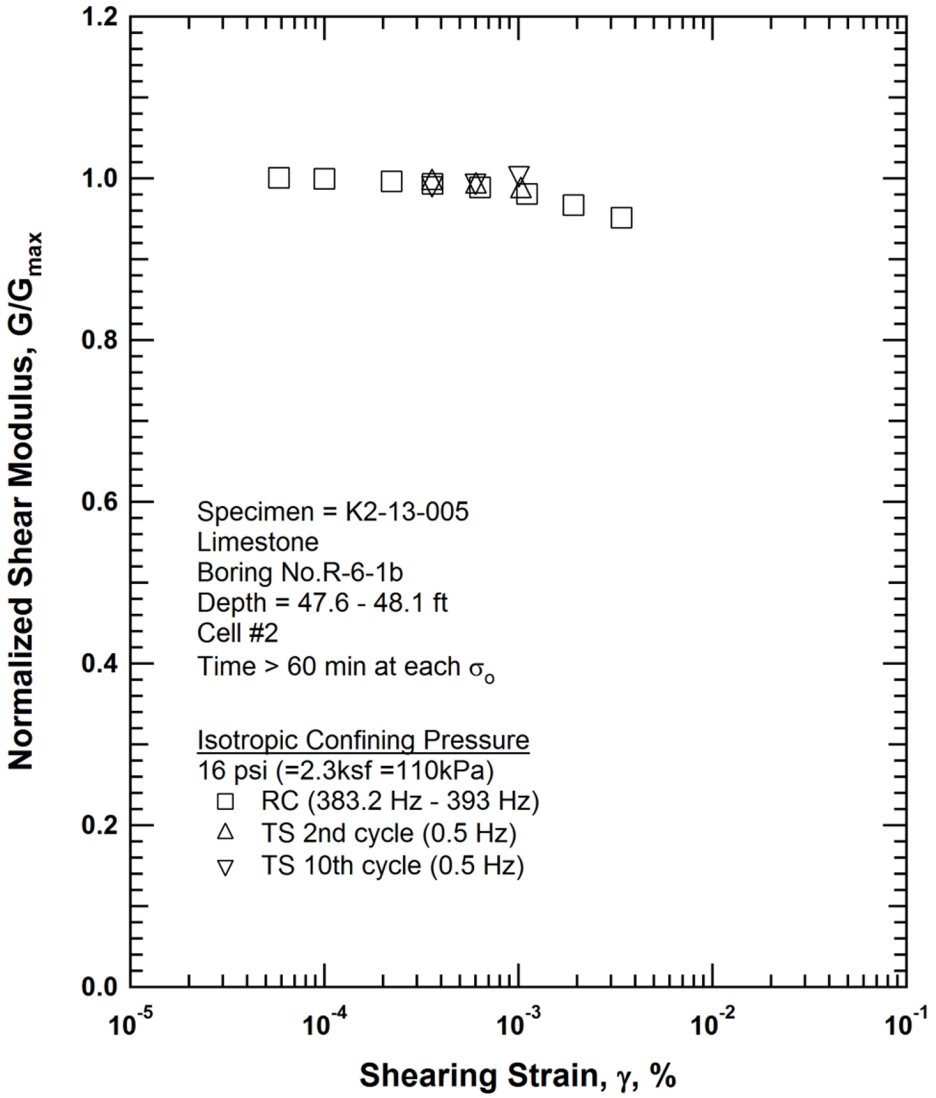

Figure F.14 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 16 psi (=2.3ksf =110kPa) from the Combined RCTS Tests of Specimen K2-13-005

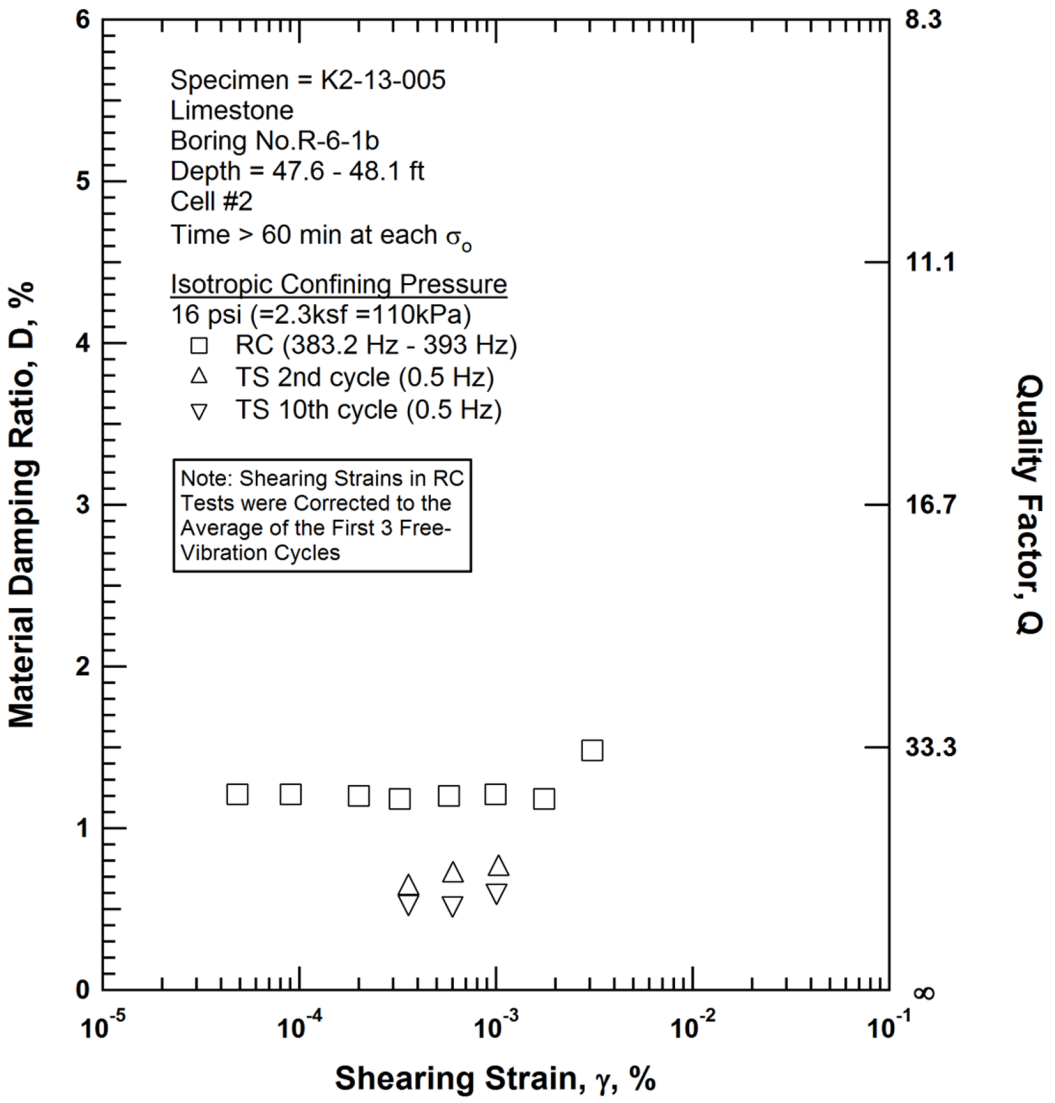

Figure F.15 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 16 psi (=2.3ksf =110kPa) from the Combined RCTS Tests of Specimen K2-13-005

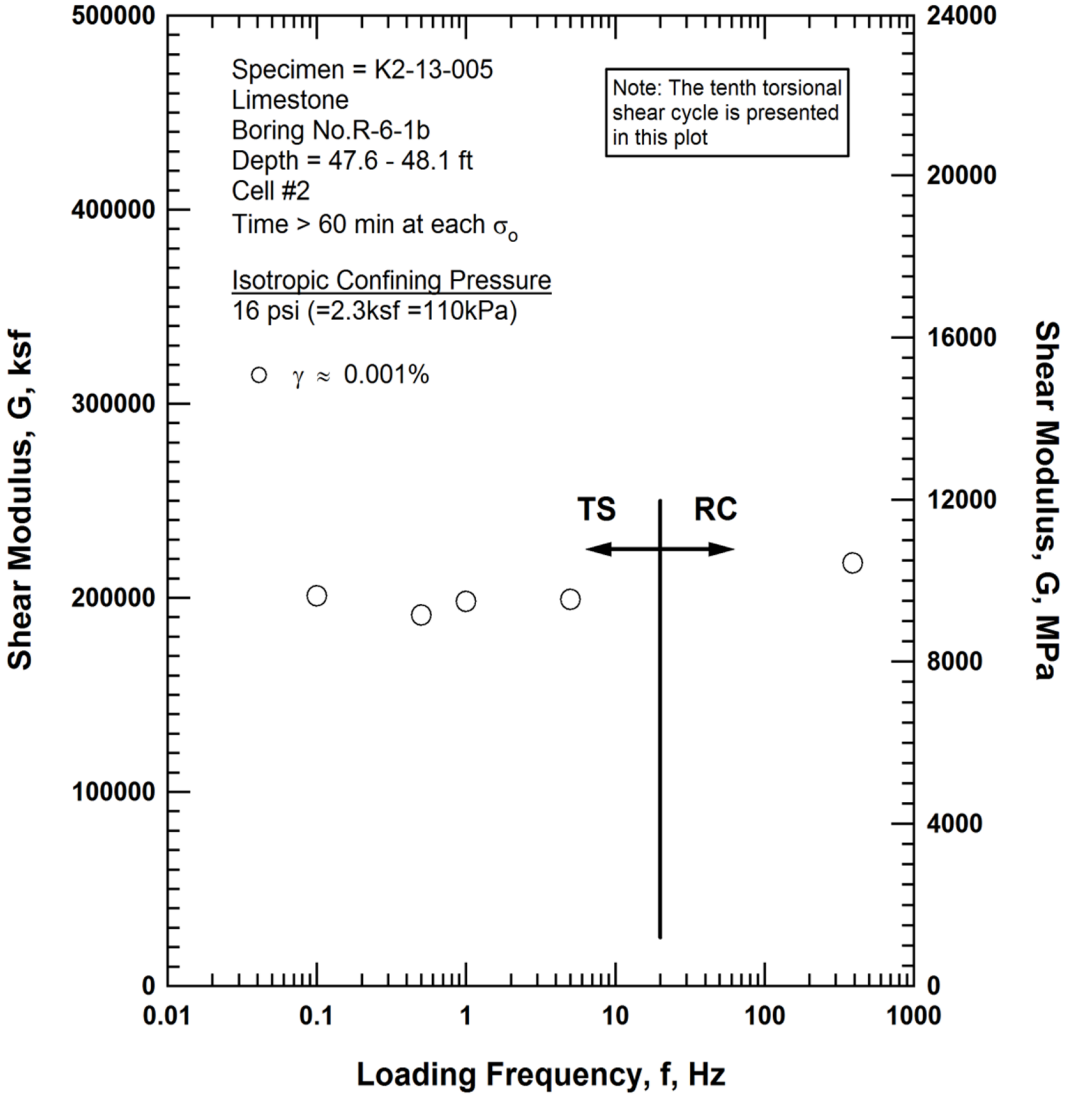

Figure F.16 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 16 psi (=2.3ksf =110kPa) from the Combined RCTS Tests of Specimen K2-13-005

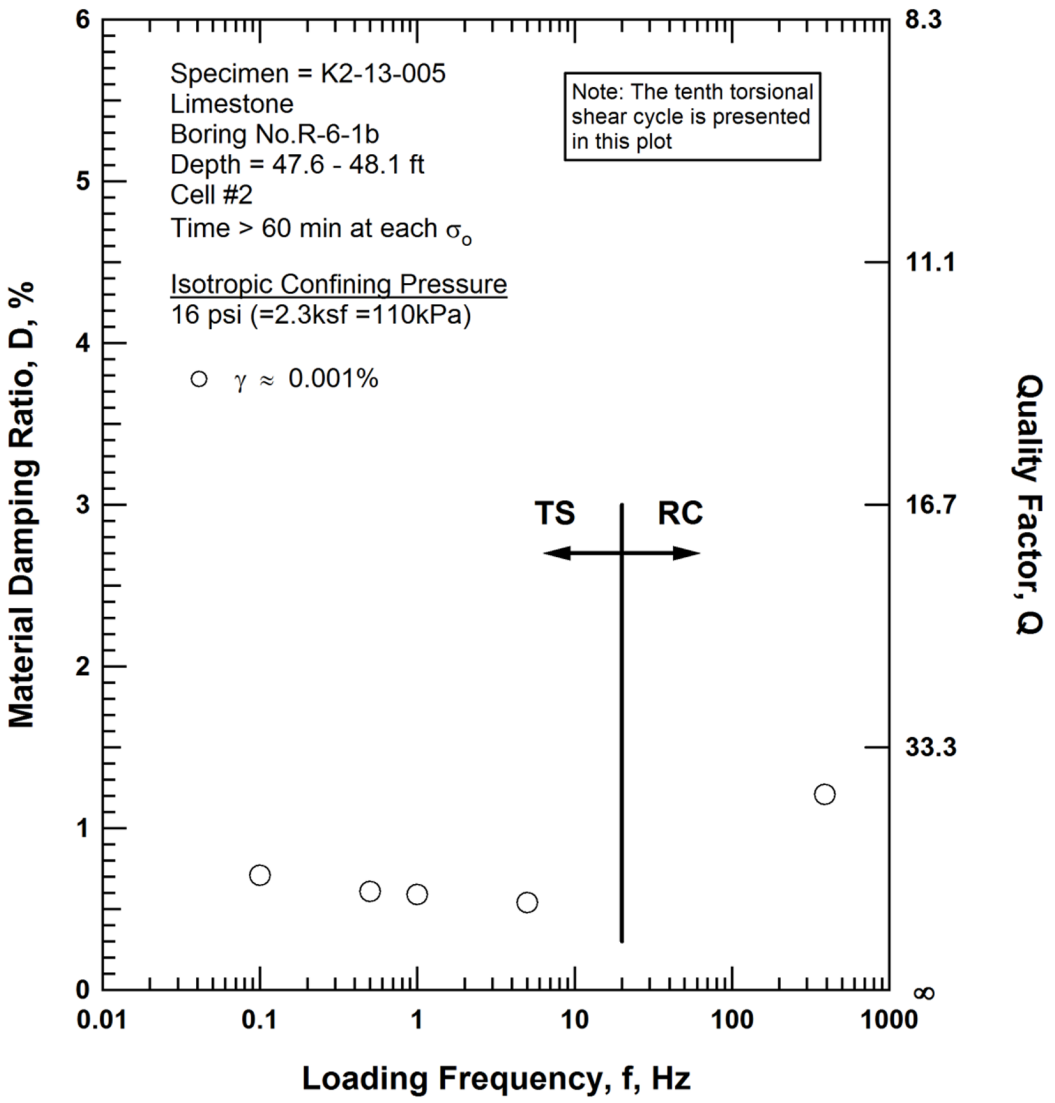

Figure F.17 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 16 psi (=2.3ksf =110kPa) from the Combined RCTS Tests of Specimen K2-13-005

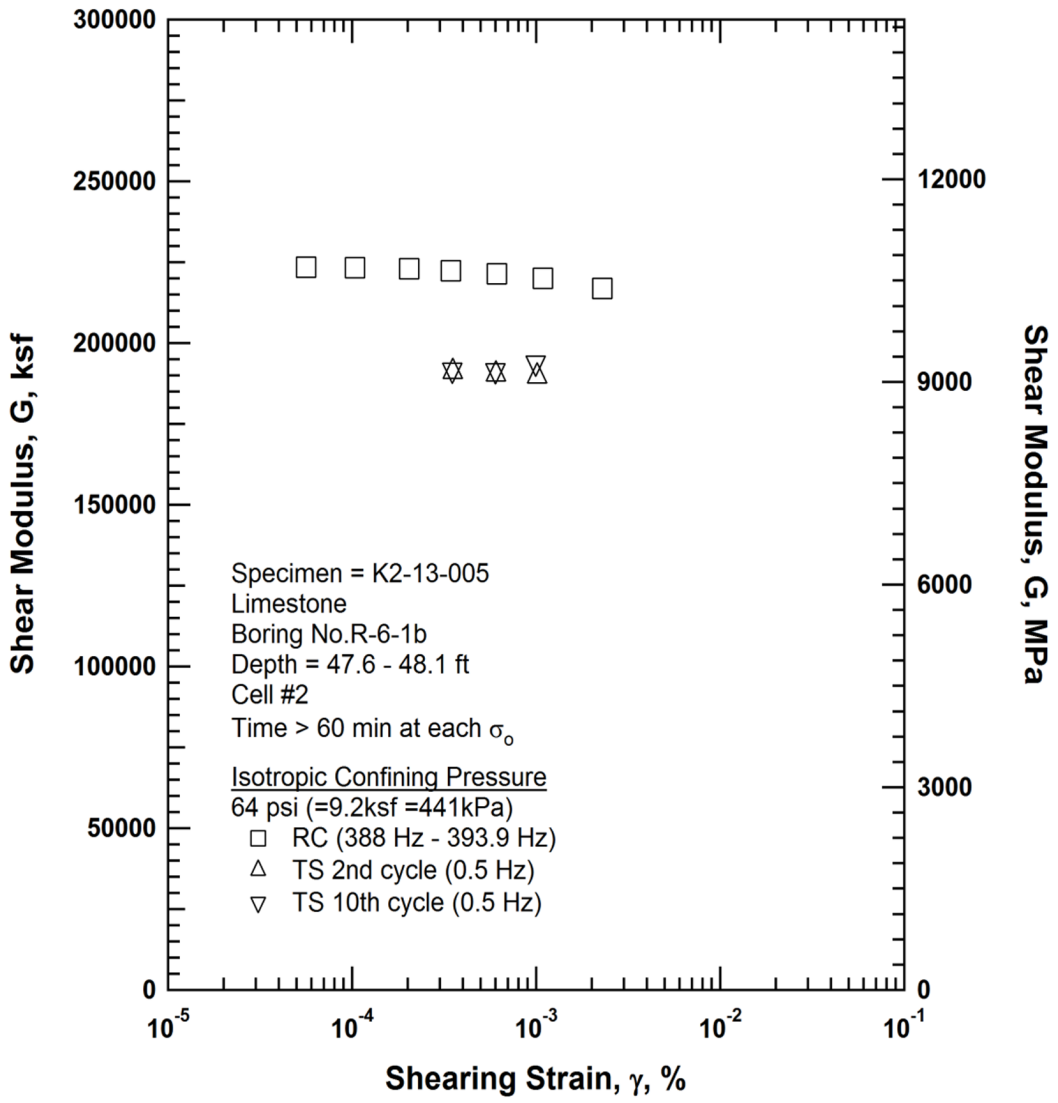

Figure F.18 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 64 psi (=9.2ksf =441kPa) from the Combined RCTS Tests of Specimen K2-13-005

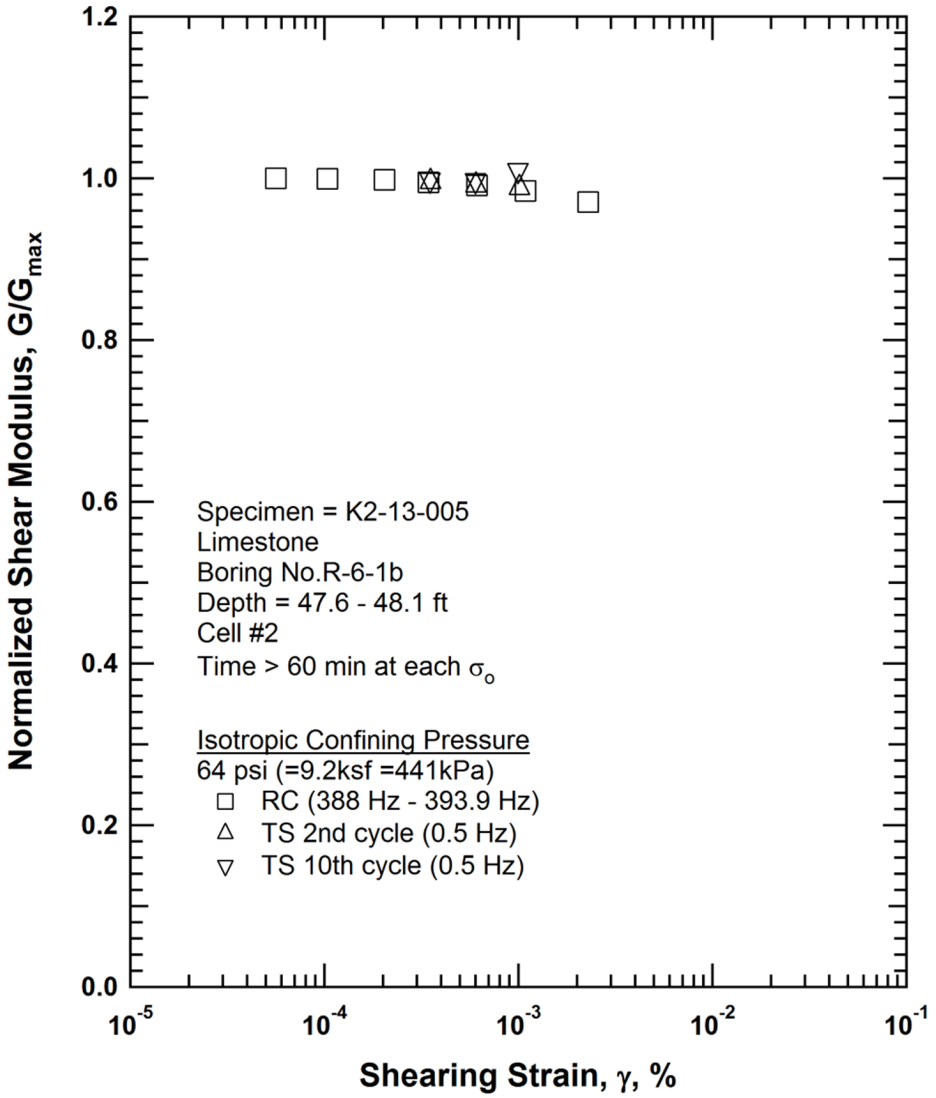

Figure F.19 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 64 psi (=9.2ksf =441kPa) from the Combined RCTS Tests of Specimen K2-13-005

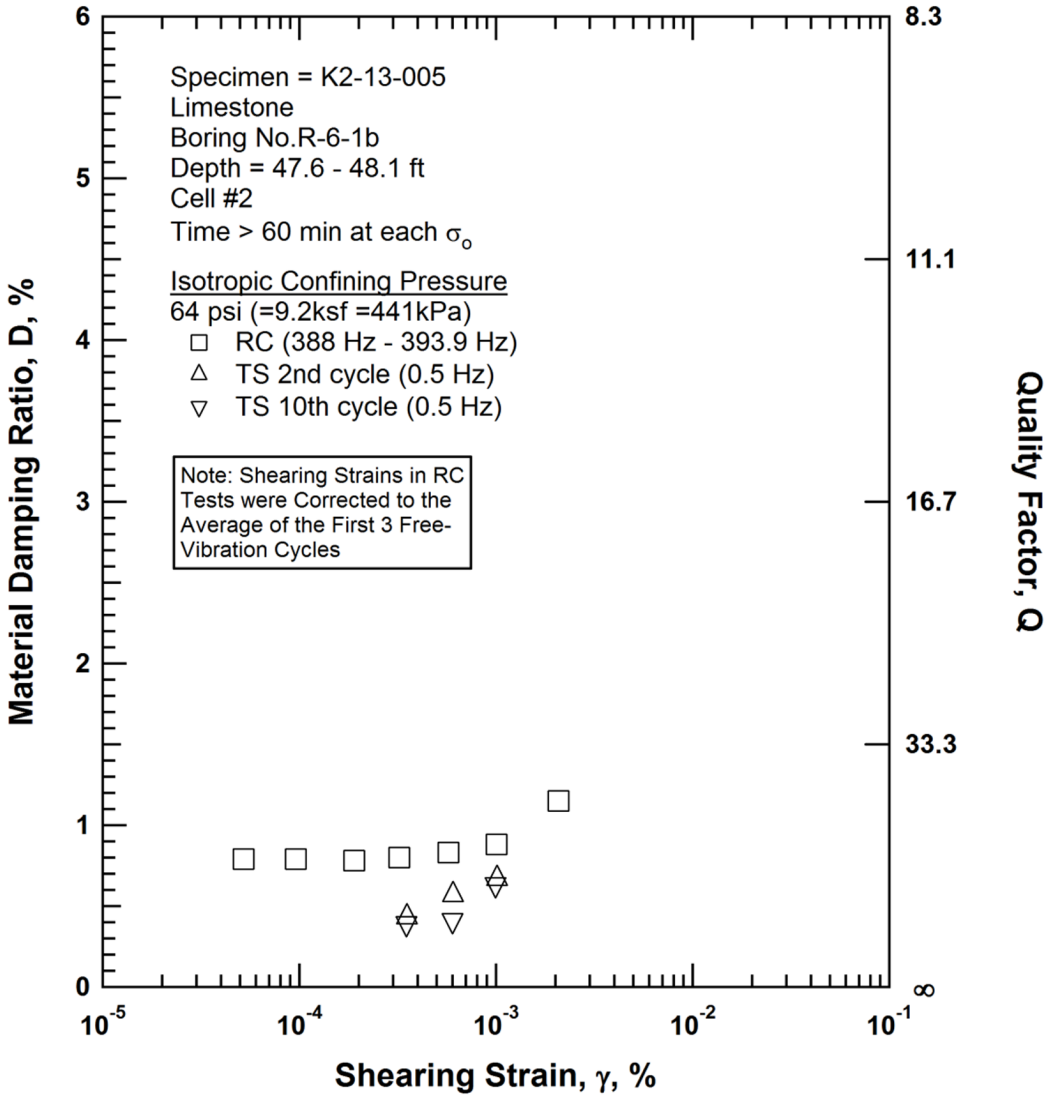

Figure F.20 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 64 psi (=9.2ksf =441kPa) from the Combined RCTS Tests of Specimen K2-13-005

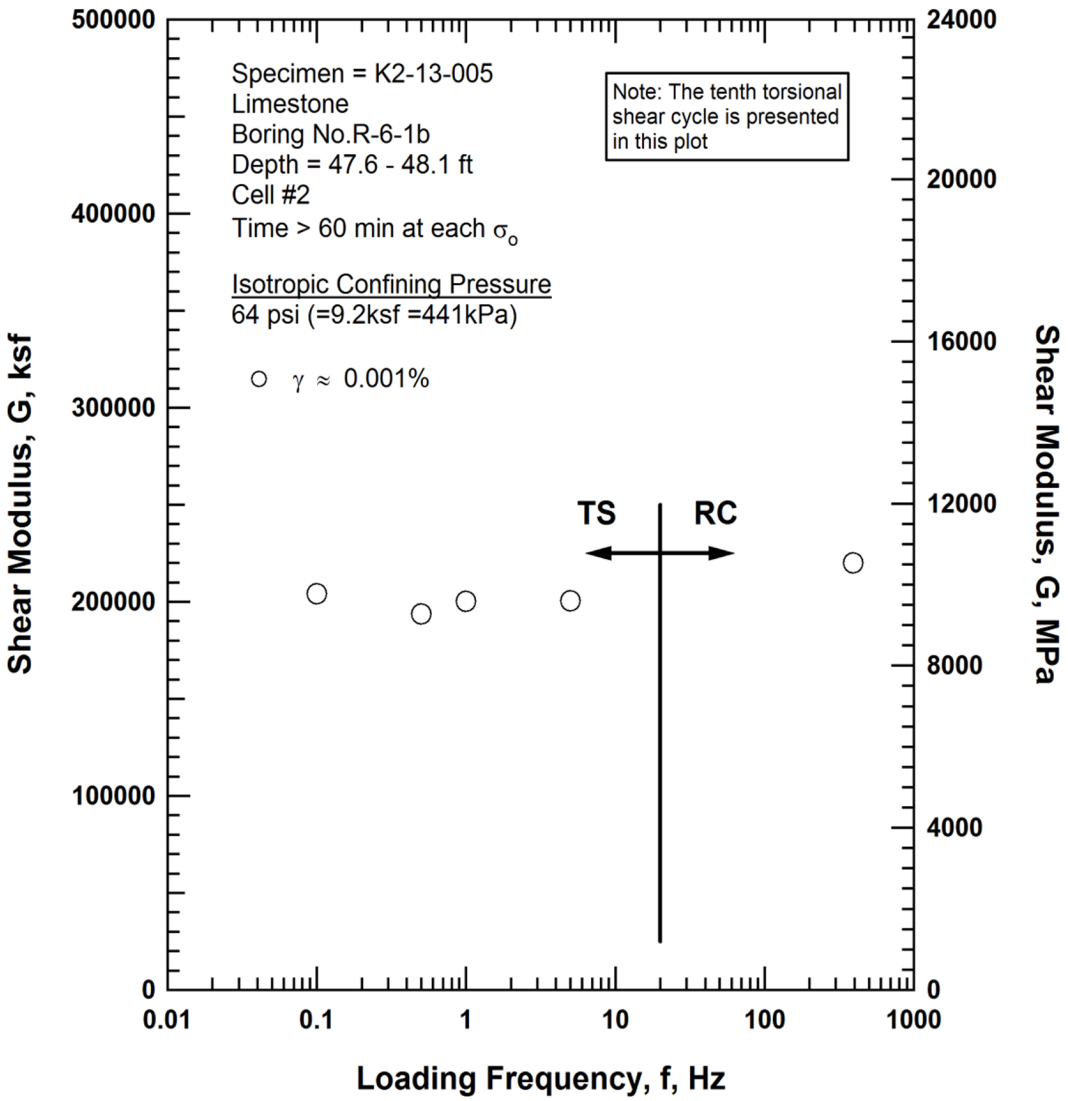

Figure F.21 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 64 psi (=9.2ksf =441kPa) from the Combined RCTS Tests of Specimen K2-13-005

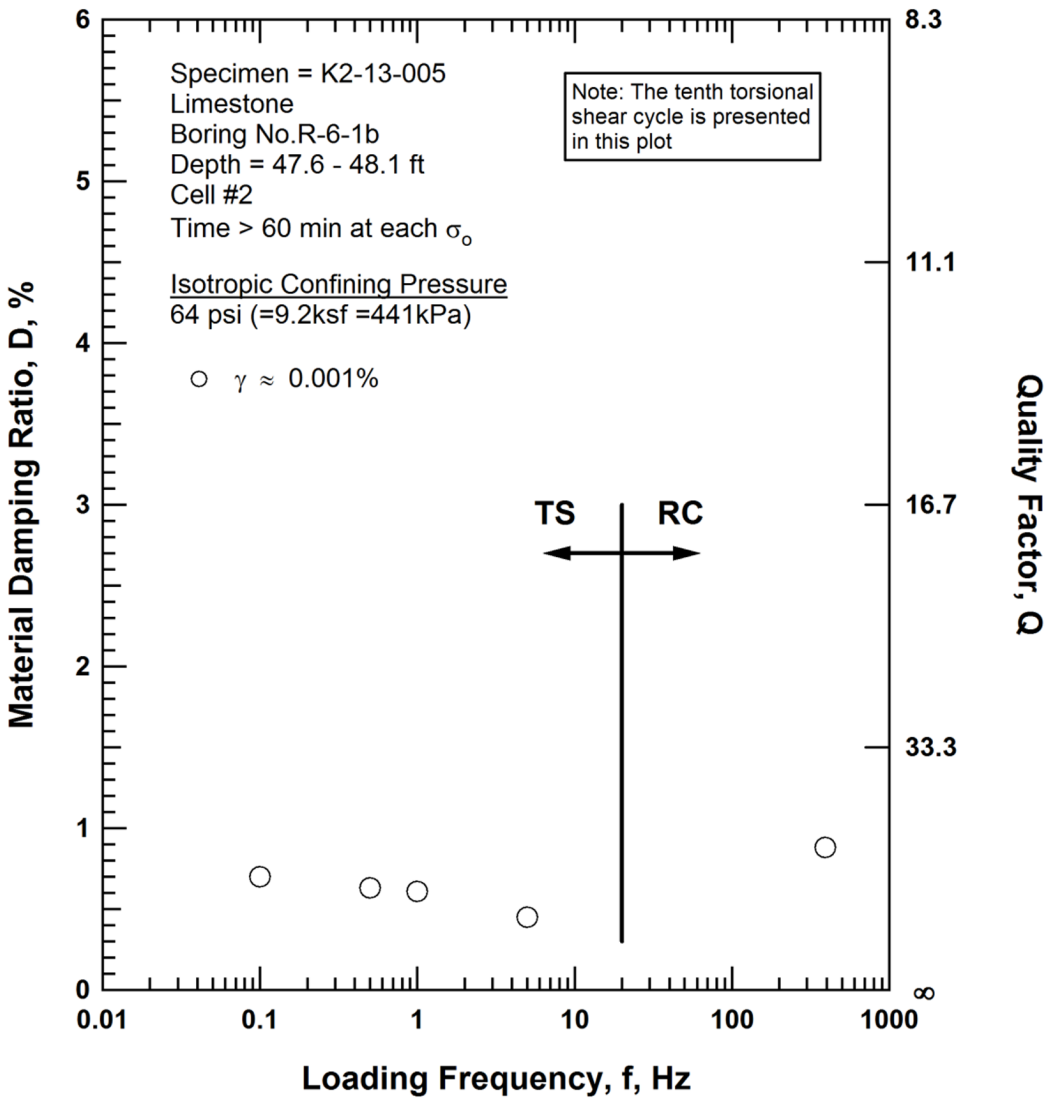

Figure F.22 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 64 psi (=9.2ksf =441kPa) from the Combined RCTS Tests of Specimen K2-13-005

Table F.1 Variation in Low-Amplitude Shear Wave Velocity, Low-Amplitude Shear Modulus, Low-Amplitude Material Damping Ratio, Estimated Void Ratio, and Estimated Total Unit Weight with Isotropic Confining Pressure from RC Tests of Specimen K2-13-005

Isotropic Confining Pressure, σ_o			Low-Amplitude Shear Modulus, G_{max}		Low-Amplitude Shear Wave Velocity, V_s	Low-Amplitude Material Damping Ratio, D_{min}	Estimated Void Ratio, e	Estimated Total Unit Weight, γ_t
(psi)	(psf)	(kPa)	(ksf)	(MPa)	(fps)	(%)	(Unitless)	(pcf)
4	576	28	217900	10433	6800	0.96	0.149	151.8
8	1152	55	221800	10621	6860	1.12	0.149	151.8
16	2304	110	222000	10627	6860	1.23	0.149	151.8
45	6480	310	225600	10801	6910	0.72	0.149	151.8
64	9216	441	223900	10720	6890	0.72	0.149	151.8

Table F.2 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen K2-13-005; Isotropic Confining Pressure σ_o = 16 psi (=2.3 ksf = 110 kPa)

Second Cycle				Tenth Cycle			
Peak Shearing Strain, γ, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %	Peak Shearing Strain, γ, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %
3.58E-04	188900	0.99	0.63	3.58E-04	188700	0.99	0.54
6.03E-04	188100	0.99	0.71	5.99E-04	189300	1.00	0.53
1.03E-03	187000	0.98	0.75	1.01E-03	191100	1.01	0.61

Table F.3 Variation in Shear Modulus, Normalized Shear Modulus, and Material Damping with Shearing Strain from RC Tests of Specimen K2-13-005; Isotropic Confining Pressure σ_o = 16 psi (=2.3 ksf = 110 kPa)

Peak Shearing Strain, γ, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Average Shearing Strain, %[(1)]	Material Damping Ratio, D, %[(2)]
5.84E-05	222500	1.00	4.83E-05	1.21
1.00E-04	222200	1.00	9.03E-05	1.21
2.22E-04	221600	1.00	2.01E-04	1.20
3.61E-04	220900	0.99	3.25E-04	1.18
6.34E-04	219900	0.99	5.76E-04	1.20
1.11E-03	218000	0.98	9.96E-04	1.21
1.92E-03	215100	0.97	1.76E-03	1.18
3.40E-03	211500	0.95	3.09E-03	1.48

(1) Average Shearing Strain from the First Three Cycle of the Free Vibration Decay Curve or from Half Power Damping for shearing strains less than 0.001%

(2) Average Damping Ratio from the First Three Cycle of the Free Vibration Decay Curve or from Half Power Damping for shearing strains less than 0.001%

Table F.4 Variation in Shear Modulus and Material Damping with Frequency from RC/TS Tests of Specimen K2-13-005; Isotropic Confining Pressure σ_o = 16 psi (=2.3 ksf = 110 kPa)

Approximate Shearing Strain, γ, %	Frequency, Hz	Shear Modulus, G, ksf	Material Damping Ratio, D, %
0.001	0.1	201100	0.71
	0.5	191100	0.61
	1.0	198100	0.59
	5.0	199100	0.54
	389.0	218000	1.21

Table F.5 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen K2-13-005; Isotropic Confining Pressure σ_o = 64 psi (=9.2 ksf = 441 kPa)

Second Cycle				Tenth Cycle			
Peak Shearing Strain, γ, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %	Peak Shearing Strain, γ, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %
3.51E-04	191200	1.00	0.43	3.51E-04	191600	1.00	0.39
6.03E-04	190300	0.99	0.57	6.00E-04	191400	1.00	0.41
3.51E-04	191200	1.00	0.43	3.51E-04	191600	1.00	0.39

Table F.6 Variation in Shear Modulus, Normalized Shear Modulus, and Material Damping with Shearing Strain from RC Tests of Specimen K2-13-005; Isotropic Confining Pressure σ_o = 64 psi (=9.2 ksf = 441 kPa)

Peak Shearing Strain, γ, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Average Shearing Strain, %[1]	Material Damping Ratio, D, %[2]
5.63E-05	223400	1.00	5.20E-05	0.79
1.04E-04	223300	1.00	9.61E-05	0.79
2.05E-04	222900	1.00	1.90E-04	0.78
3.45E-04	222300	1.00	3.21E-04	0.80
6.11E-04	221400	0.99	5.72E-04	0.83
1.09E-03	220000	0.98	1.01E-03	0.88
2.29E-03	216800	0.97	2.08E-03	1.15

[1] Average Shearing Strain from the First Three Cycle of the Free Vibration Decay Curve or from Half Power Damping for shearing strains less than 0.001%

[2] Average Damping Ratio from the First Three Cycle of the Free Vibration Decay Curve or from Half Power Damping for shearing strains less than 0.001%

Table F.7 Variation in Shear Modulus and Material Damping with Frequency from RC/TS Tests of Specimen K2-13-005; Isotropic Confining Pressure σ_o = 64 psi (=9.2 ksf = 441 kPa)

Approximate Shearing Strain, γ, %	Frequency, Hz	Shear Modulus, G, ksf	Material Damping Ratio, D, %
0.001	0.1	204300	0.7
	0.5	193800	0.63
	1	200300	0.61
	5	200600	0.45
	390.8	220000	0.88

APPENDIX G

Results for Kleinfelder Specimen ID K2-13-006

- *Specimen Preparation Notes*
- *RCTS Testing Results*

KLEINFELDER
Bright People. Right Solutions.

SPECIMEN PREPARATION NOTES

Specimen No.: K2-13-006 **Project No :** 136473 **Page** 1 **of** 3

Boring No.: R-6-1b **Date of Preparation..:** 11/7/13

Sample No..: ST-1 **Depth..:** 136.0 – 136.5 feet

Disposition of Sample

☒ No Apparent Disturbance ☐ Apparent Disturbance ☐ Compacted Sample

☐ Other (Describe)

Specimen Preparation Notes

Preparation Method :	Extruded from Shelby Tube with No Trimming		**Affixation to Platens :**	2.8-inch diameter platens, no adhesive used	
Ave. Length (in.) :	5.5528	**Ave. Diameter (in.):**	2.838	**L/D**	2.0
Total Unit Weight (pcf) :	119.9	**Moisture Content (%) :**	26.7	**% Saturation (Assume SG = 2.65):**	91.6

Specimen Testing Comments

1) Sample was extruded from the Shelby Tube directly into a latex membrane for testing on 11/7/13. No trimming of the sample was performed except to square the end.

2) Testing commenced on 11/7/13 and was completed on 11/10/13. The full test sequence was completed, with confining pressures ranging from 11 psi to 183 psi.

☒ **See Attached Photographs**

SPECIMEN PREPARATION NOTES

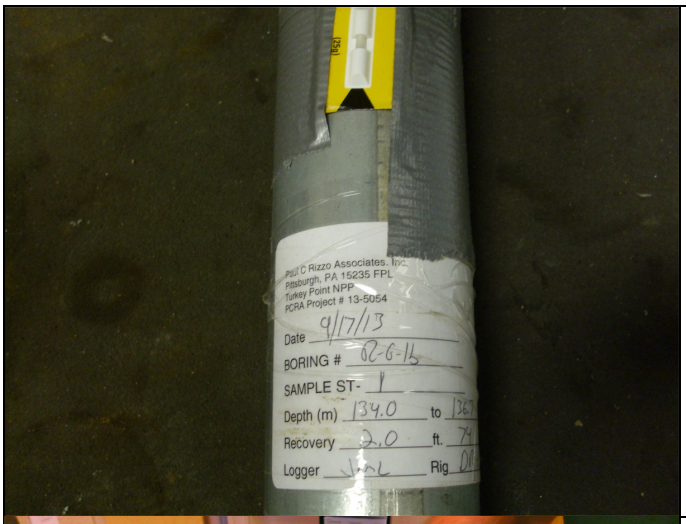

Photo G.1

Sample R-6-1b ST-1 after removal from the transport container. Note the shock indicator is untripped.

Photo G.2

Sample after subdividing the bottom 7-inches for testing.

Photo G.3

Specimen being extruded directly into latex testing membrane.

	**Photo G.4** Trimming the bottom end of the specimen square before placement on base pedestal.
	**Photo G.4** Specimen after placement on base pedestal and vacuum pressure is applied.

Kleinfelder Specimen ID:

K2-13-006

Boring No: R-6-1b
Sample No: ST-1

Silty Sand (SM)
Depth = 136.0 ft – 136.5 ft (below existing ground surface)
Total Unit Weight = 119.9 lb/ft^3
Natural Moisture Content = 26.7%
Estimated In-Situ Mean Effective Stress = 46 psi

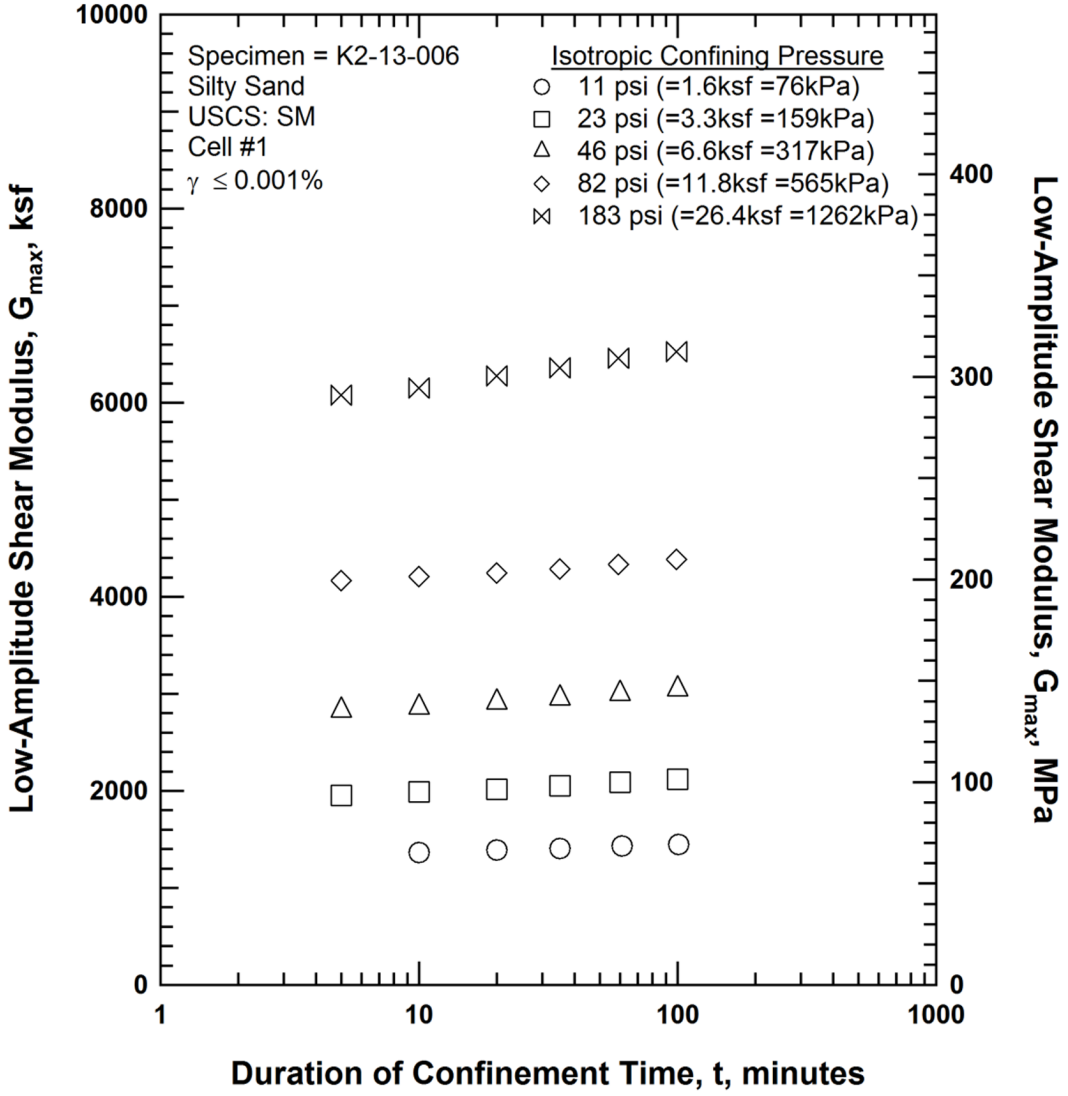

Figure G.1 Variation in Low-Amplitude Shear Modulus with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests of Specimen K2-13-006

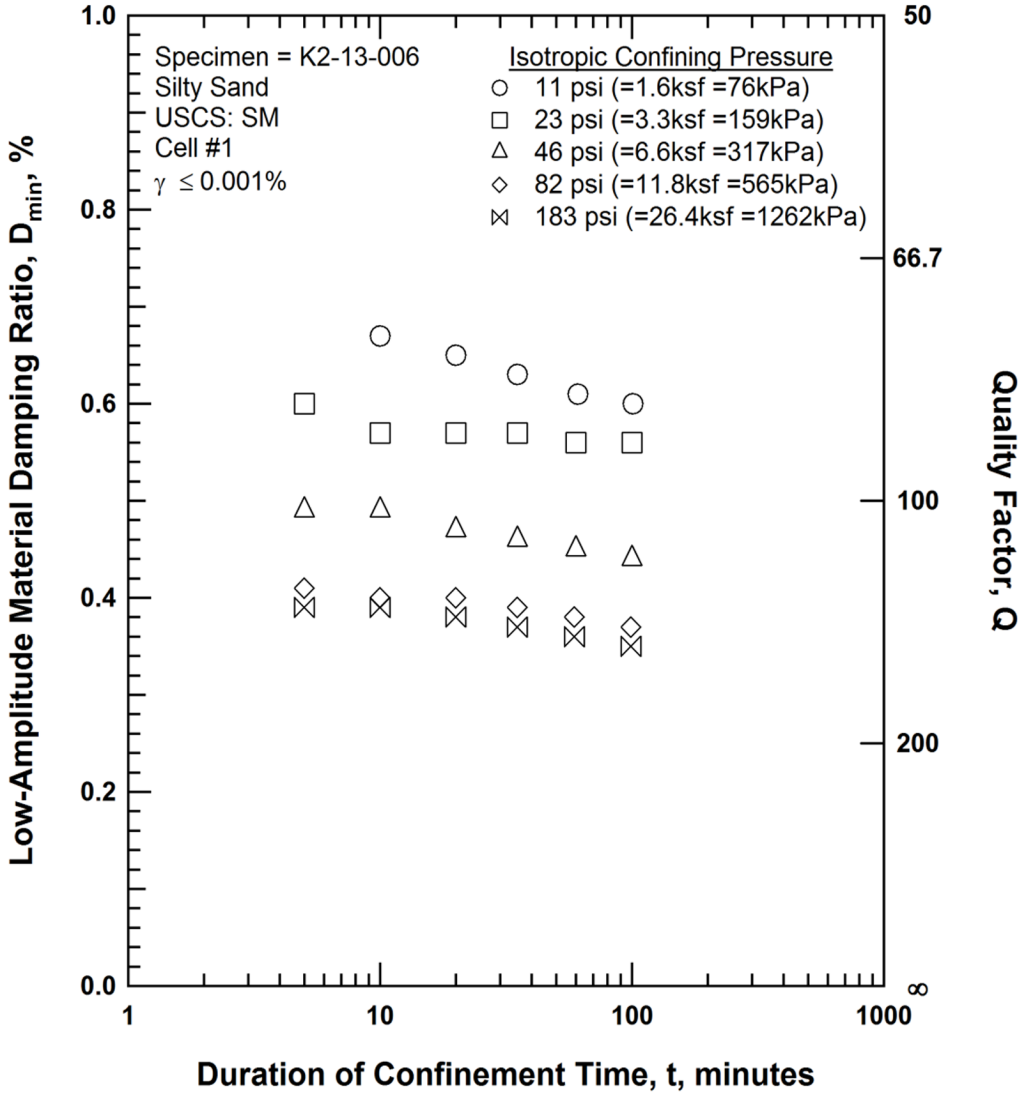

Figure G.2 Variation in Low-Amplitude Material Damping Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests of Specimen K2-13-006

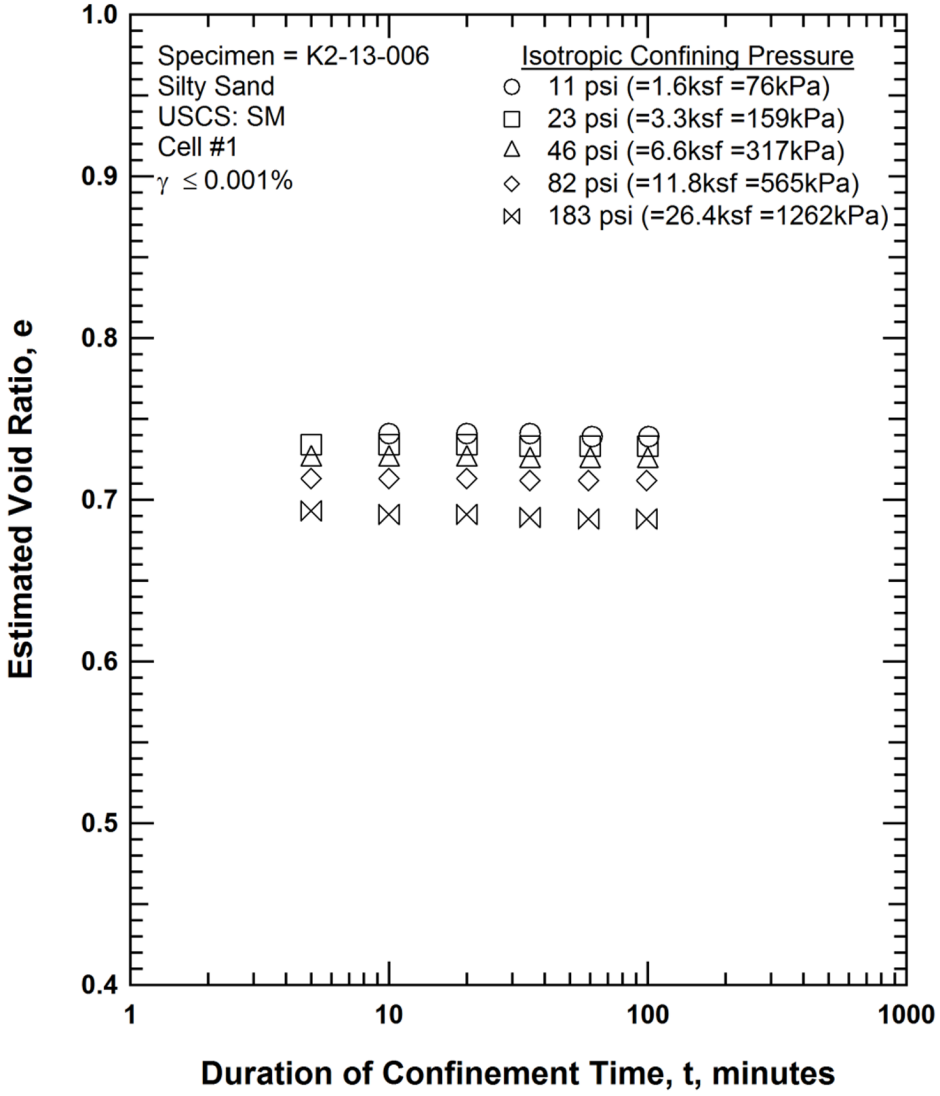

Figure G.3 Variation in Estimated Void Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Test of Specimen K2-13-006

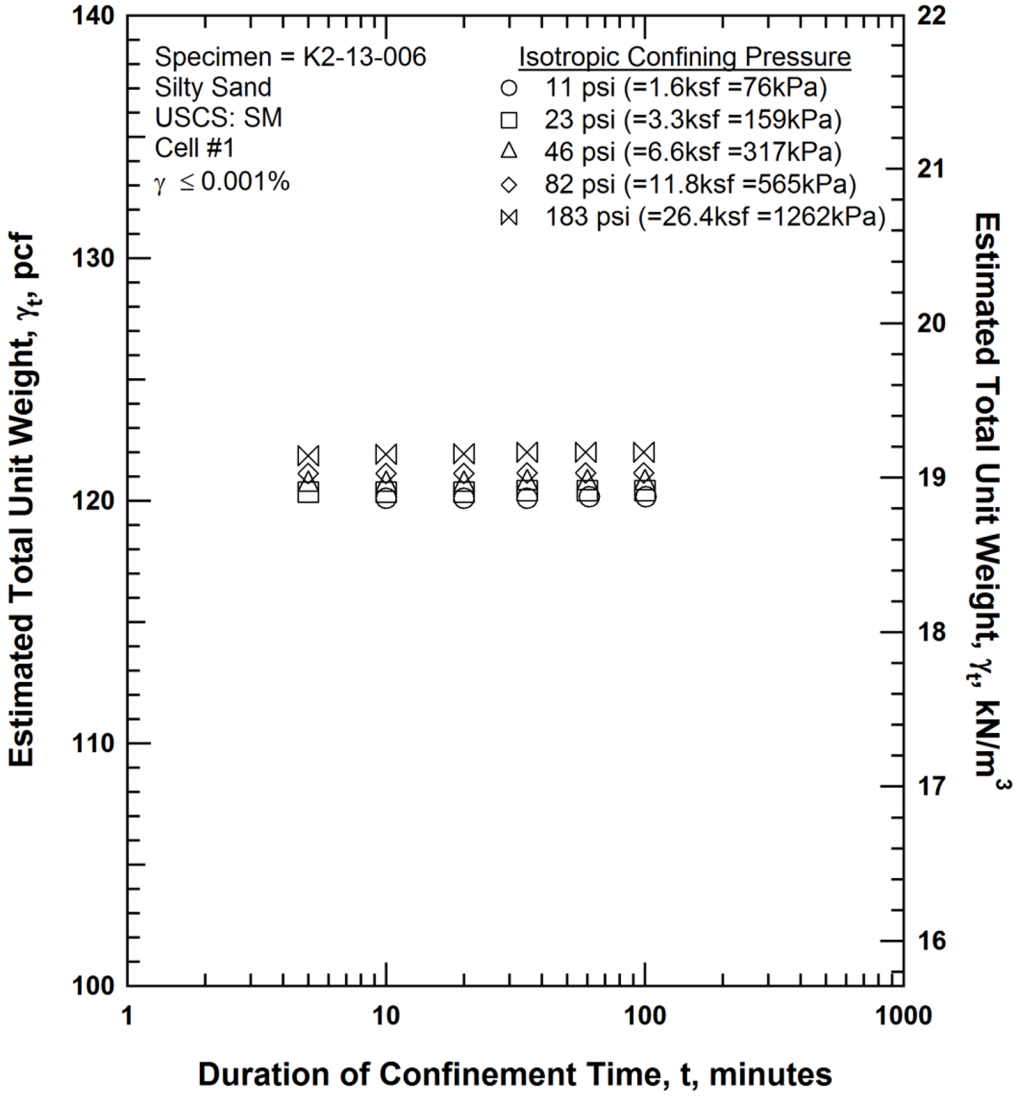

Figure G.4 Variation in Estimated Total Unit Weight with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests of Specimen K2-13-006

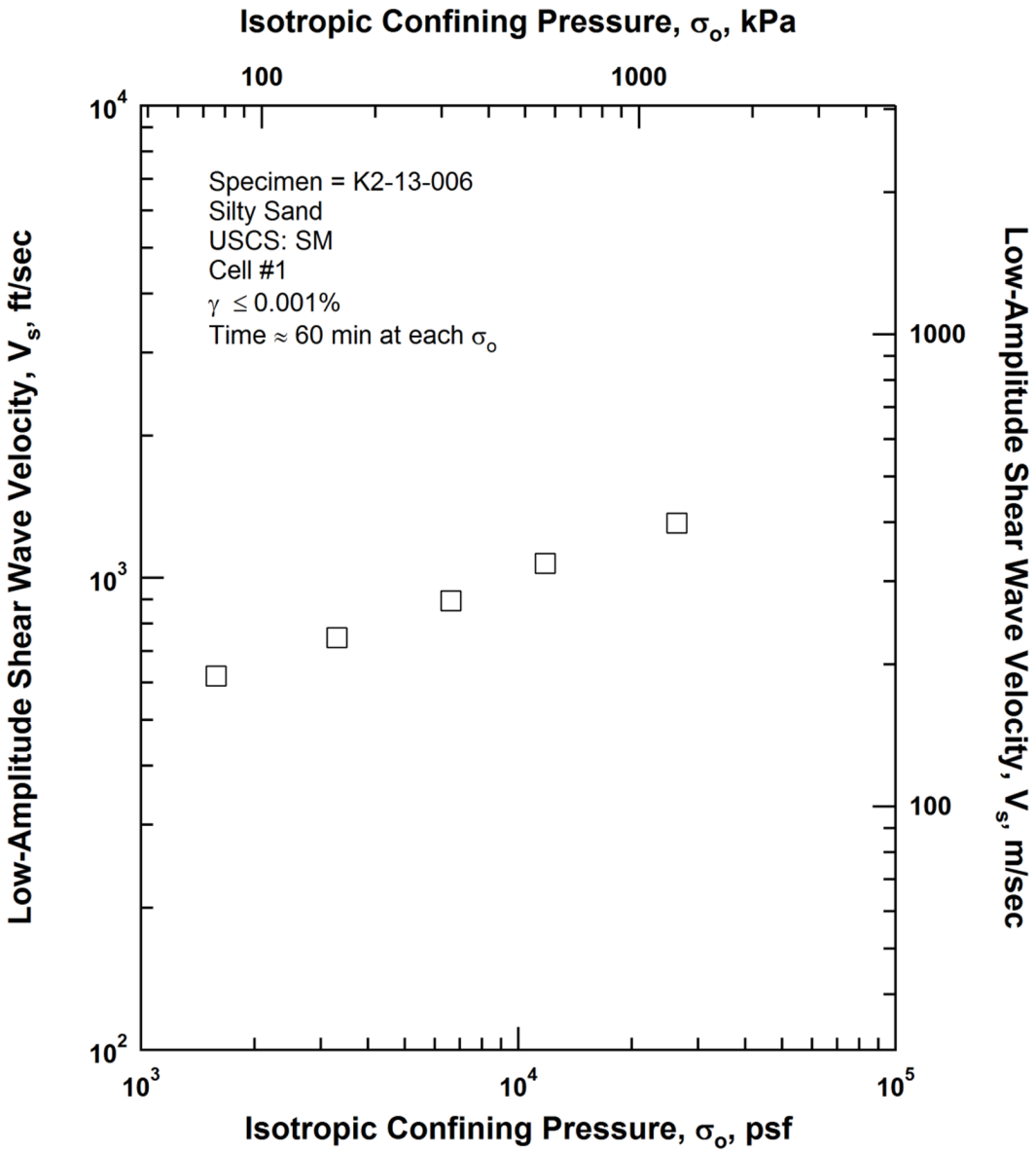

Figure G.5 Variation in Low-Amplitude Shear Wave Velocity with Isotropic Confining Pressure from Resonant Column Tests of Specimen K2-13-006

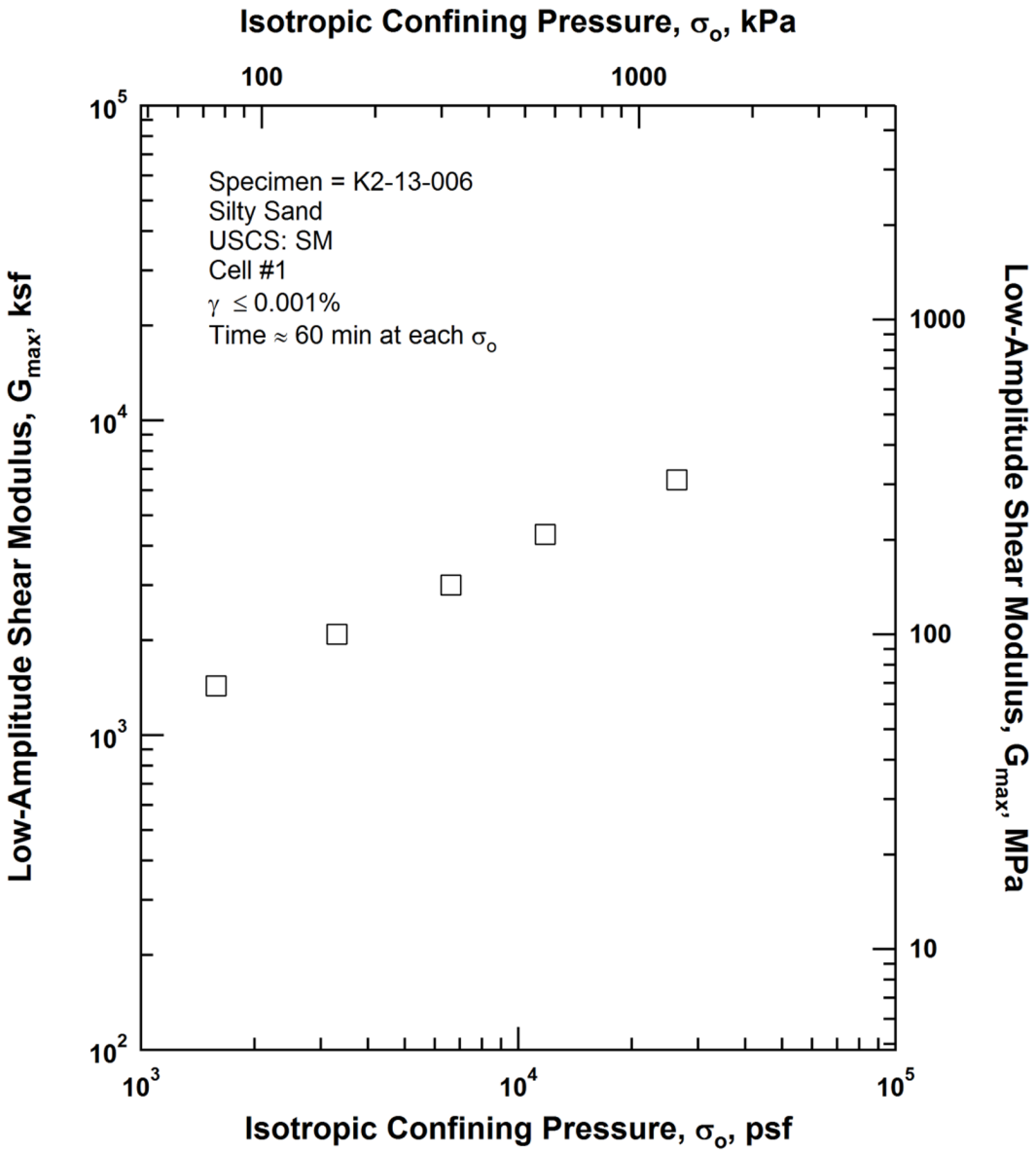

Figure G.6 Variation in Low-Amplitude Shear Modulus with Isotropic Confining Pressure from Resonant Column Test of Specimen K2-13-006

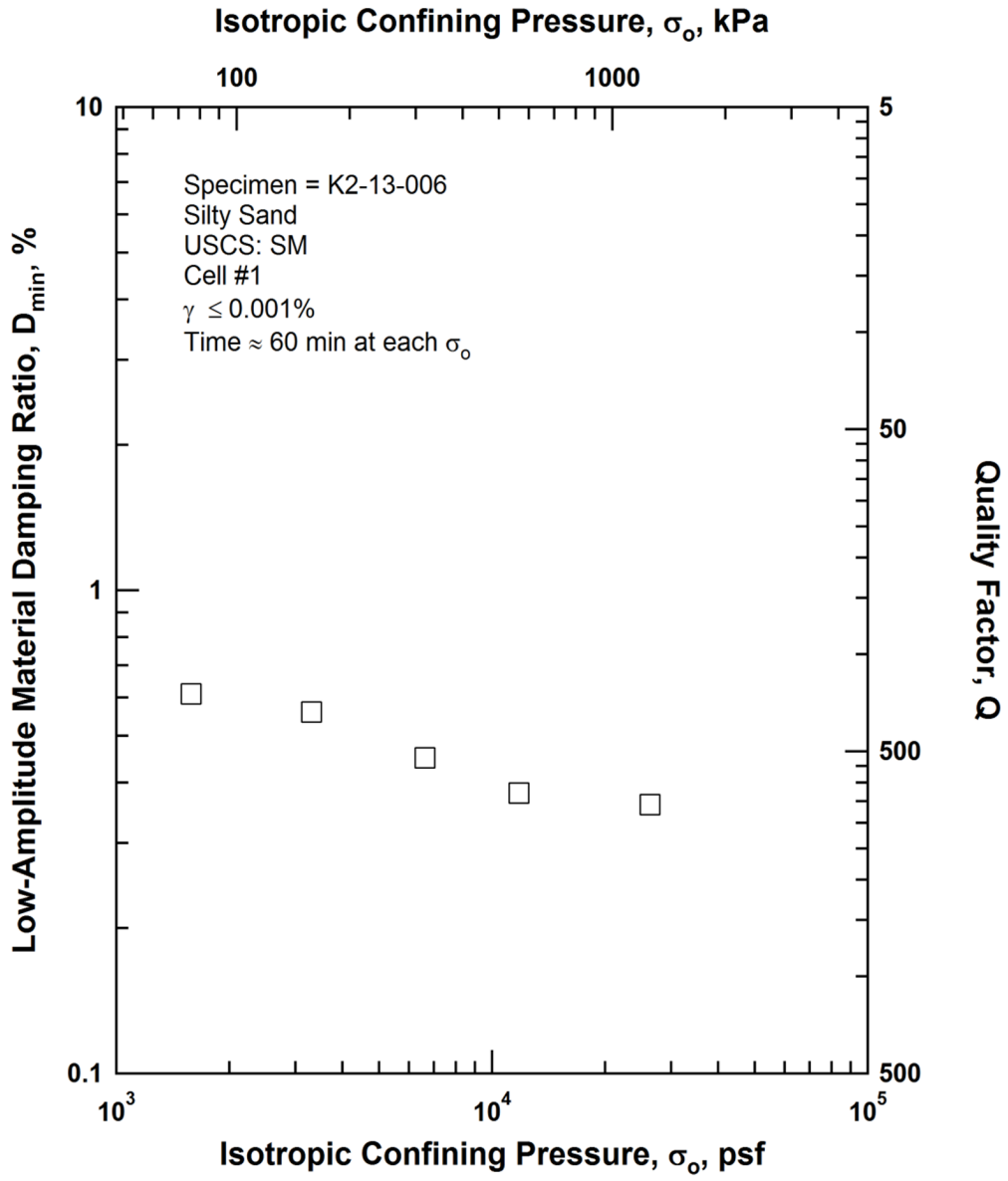

Figure G.7 Variation in Low-Amplitude Material Damping Ratio with Isotropic Confining Pressure from Resonant Column Tests of Specimen K2-13-006

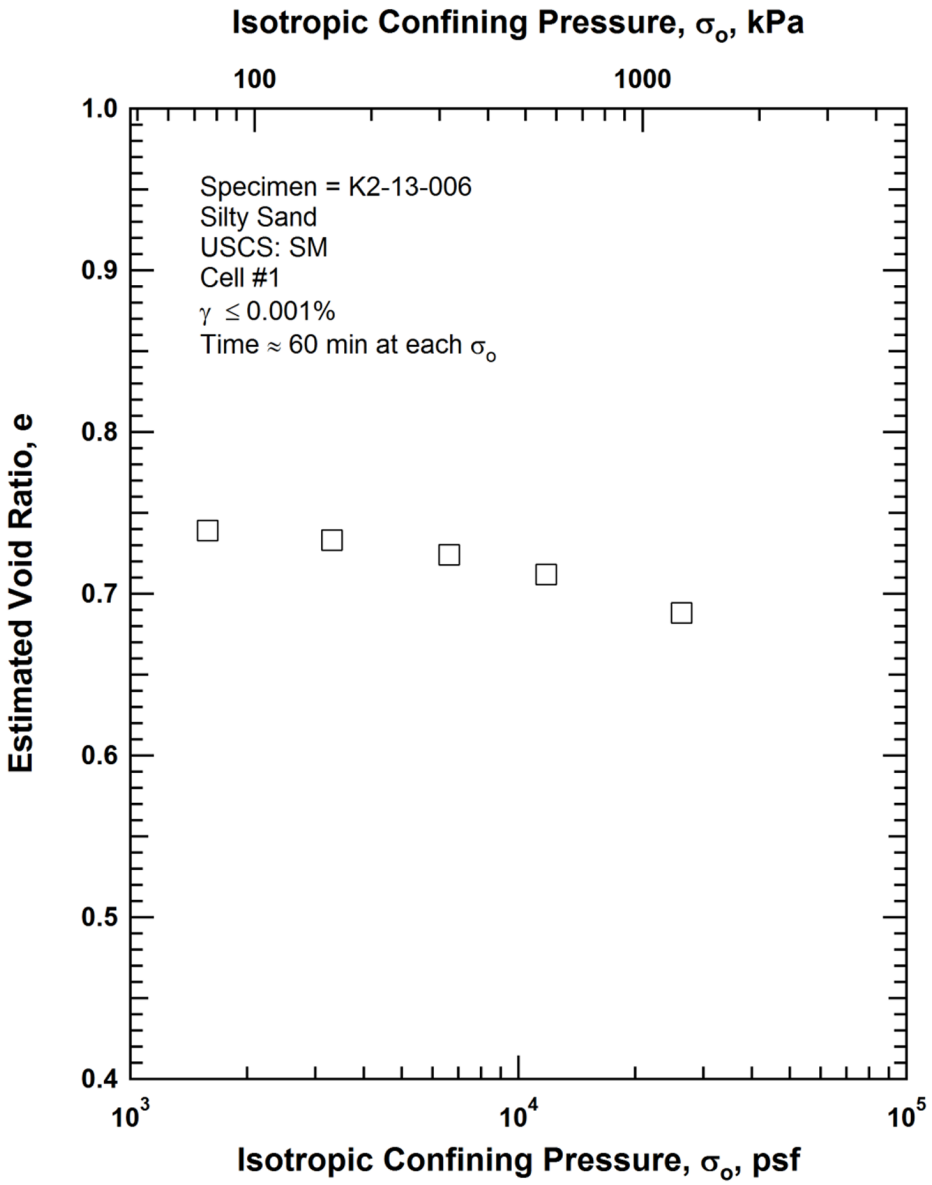

Figure G.8 Variation in Estimated Void Ratio with Isotropic Confining Pressure from Resonant Column Tests of Specimen K2-13-006

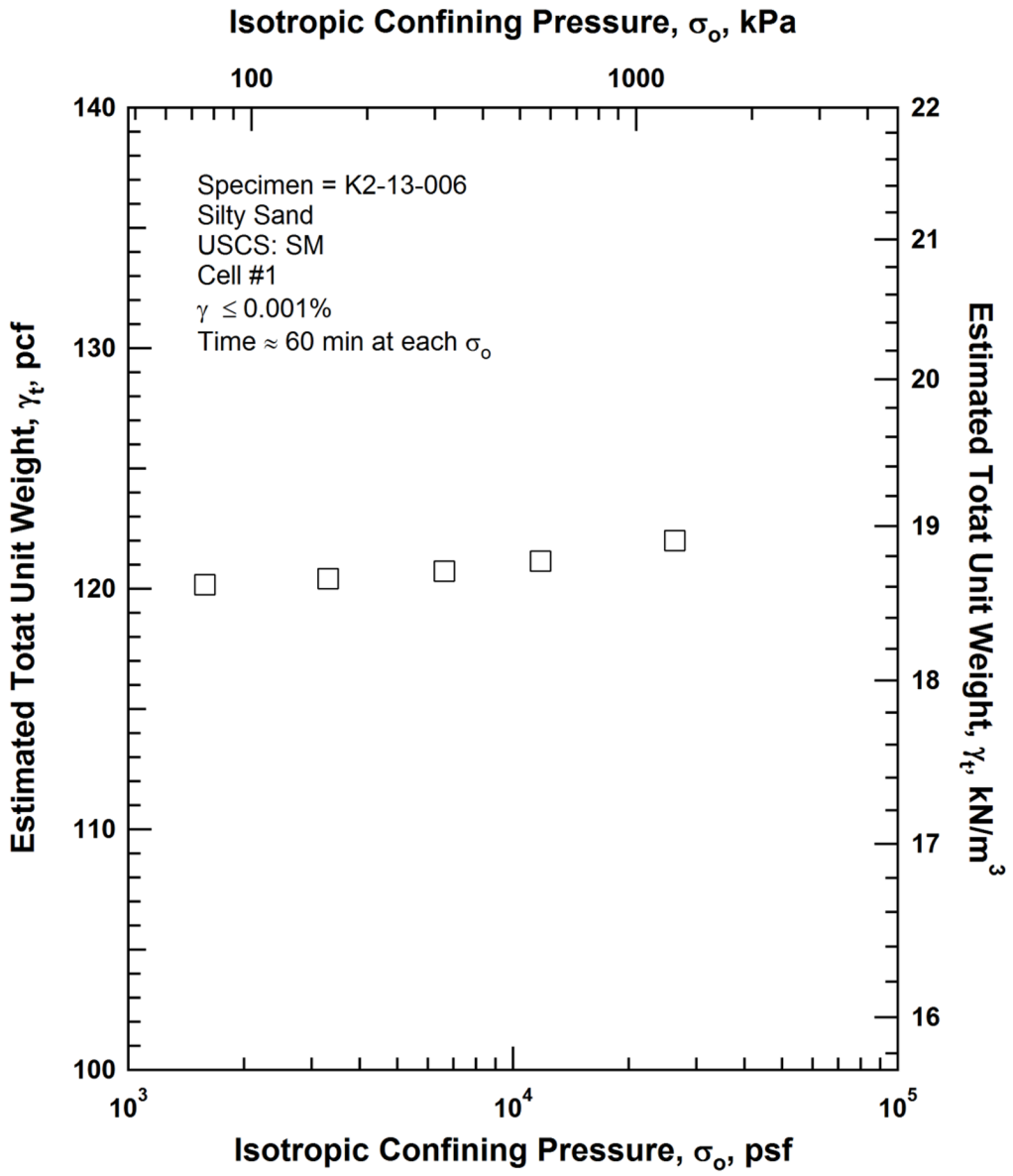

Figure G.9 Variation in Estimated Total Unit Weight with Isotropic Confining Pressure from Resonant Column Tests of Specimen K2-13-006

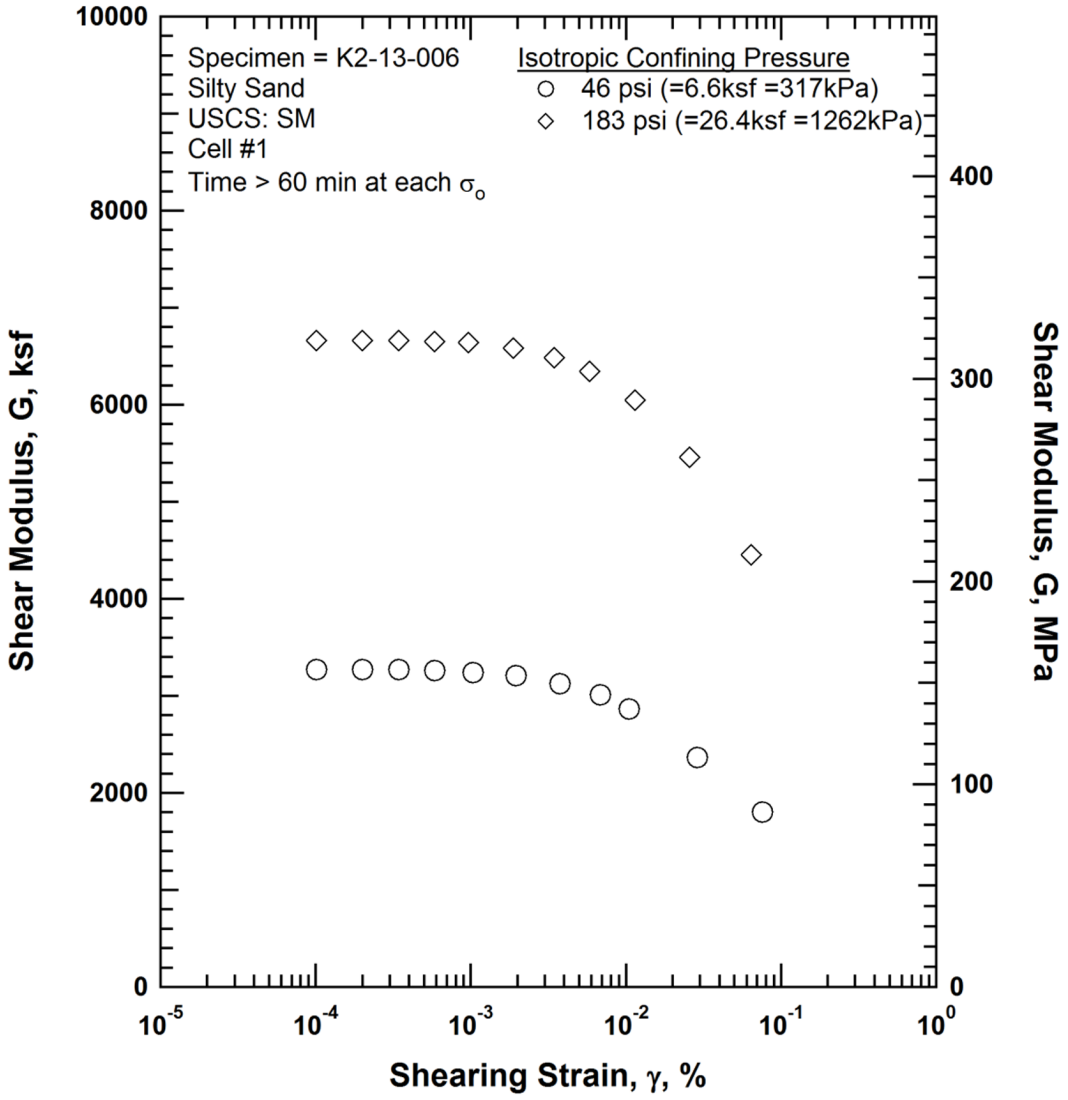

Figure G.10 Comparison of the Variation in Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests of Specimen K2-13-006

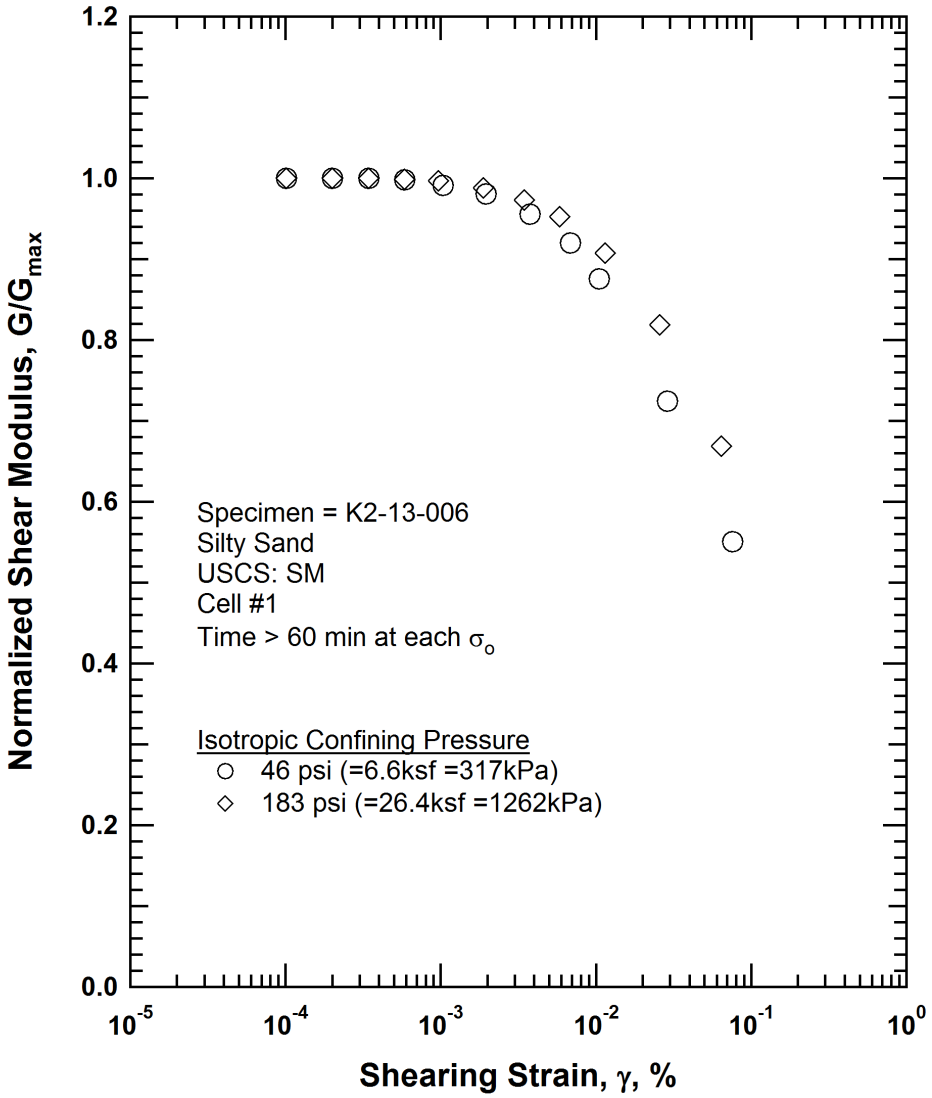

Figure G.11 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests of Specimen K2-13-006

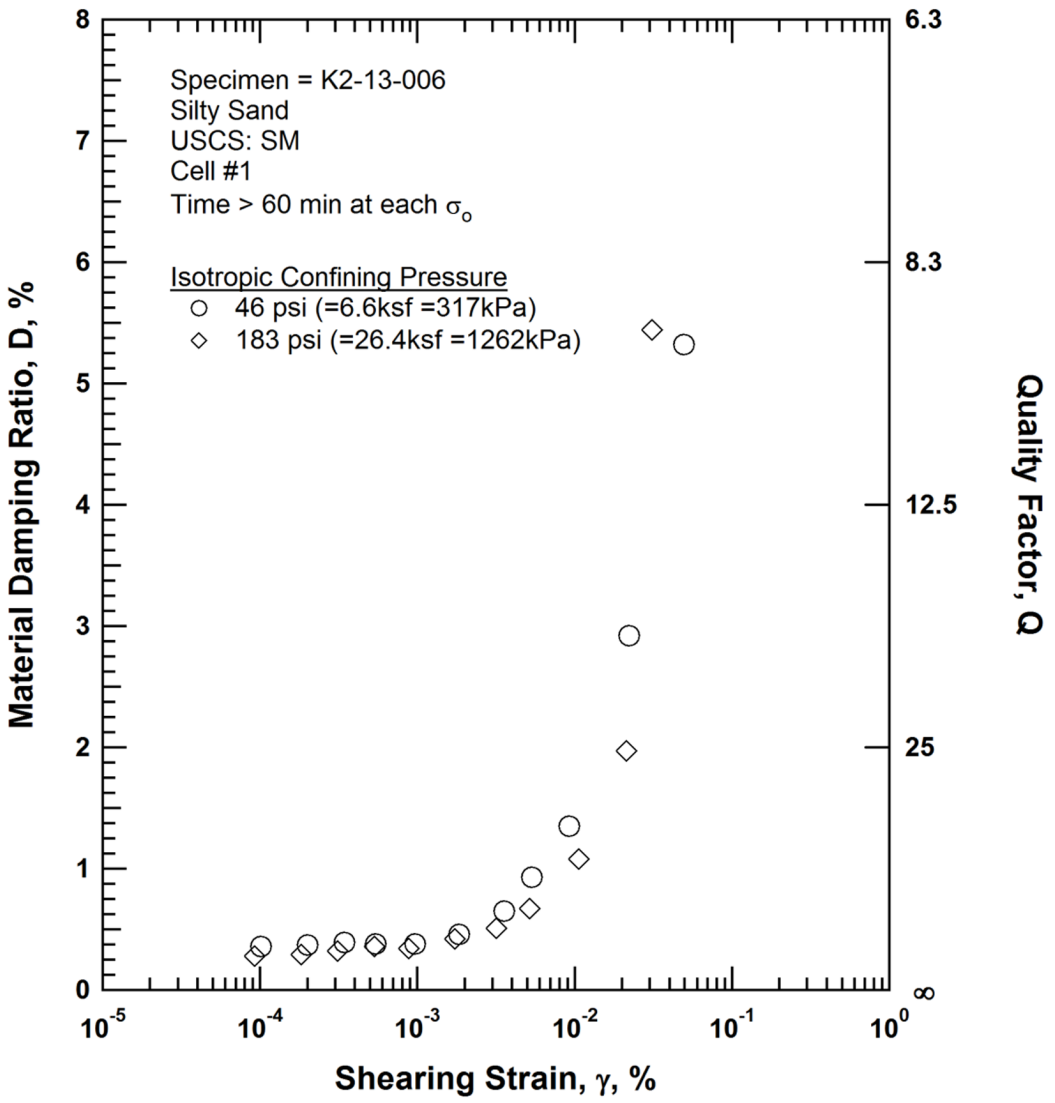

Figure G.12 Comparison of the Variation in Material Damping Ratio with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests of Specimen K2-13-006

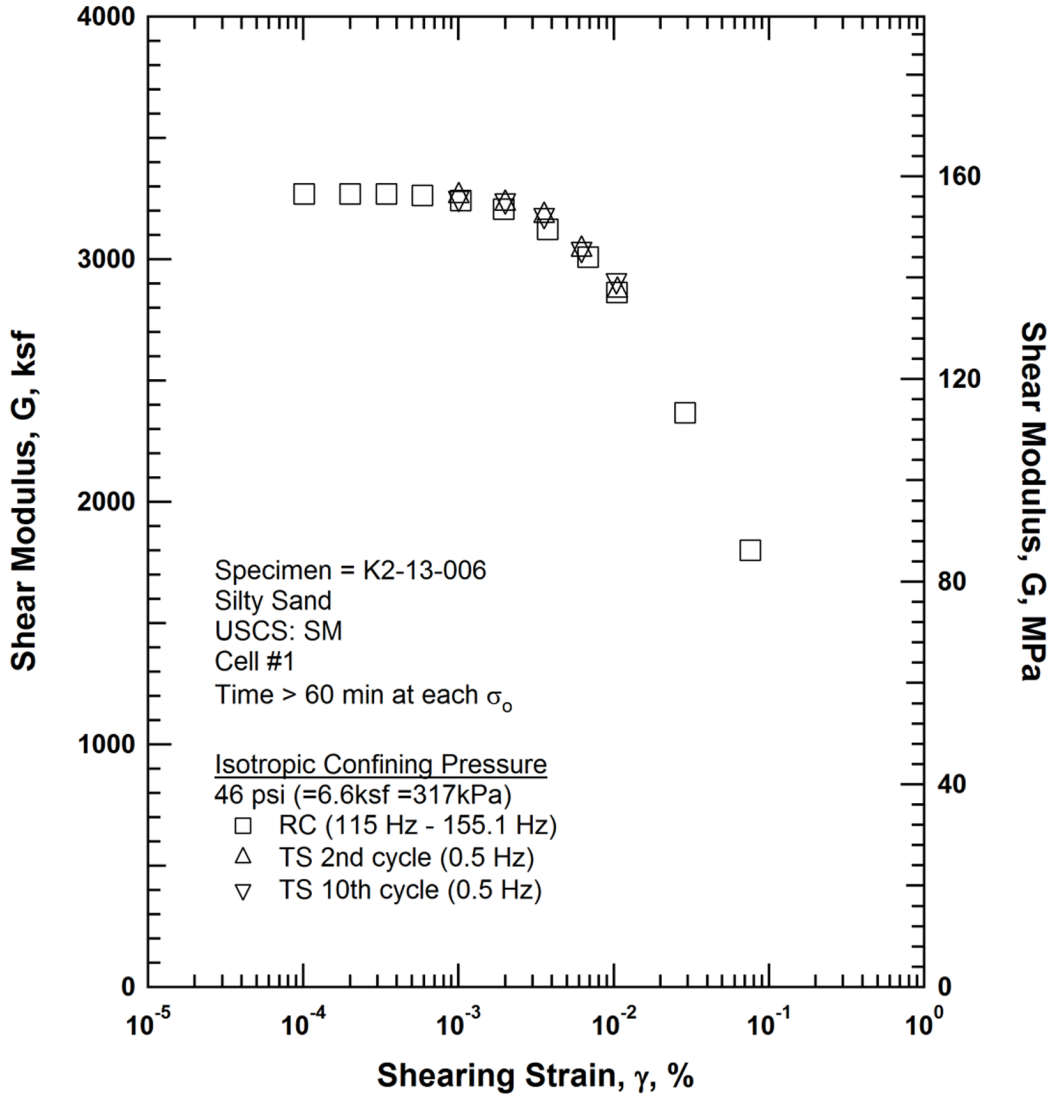

Figure G.13 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 46 psi (=6.6ksf =317kPa) from the Combined RCTS Tests of Specimen K2-13-006

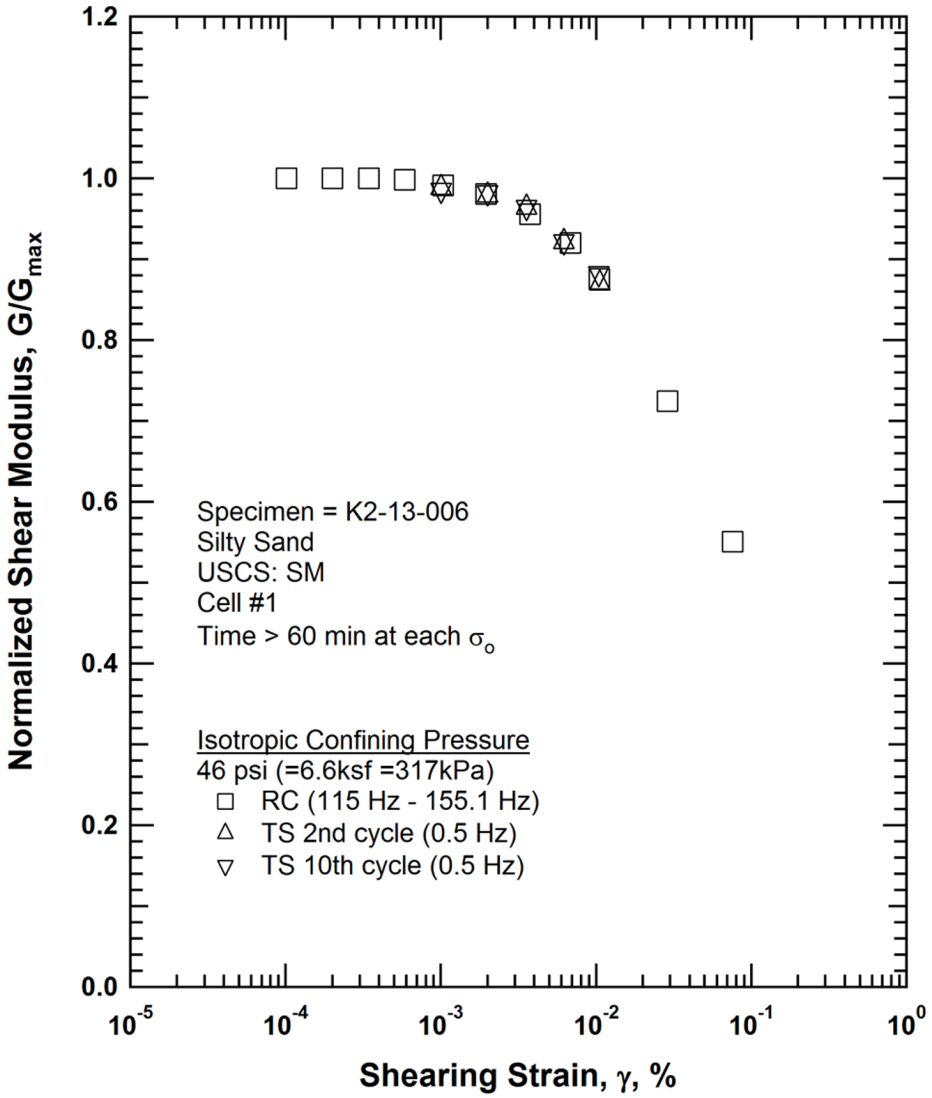

Figure G.14 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 46 psi (=6.6ksf =317kPa) from the Combined RCTS Tests of Specimen K2-13-006

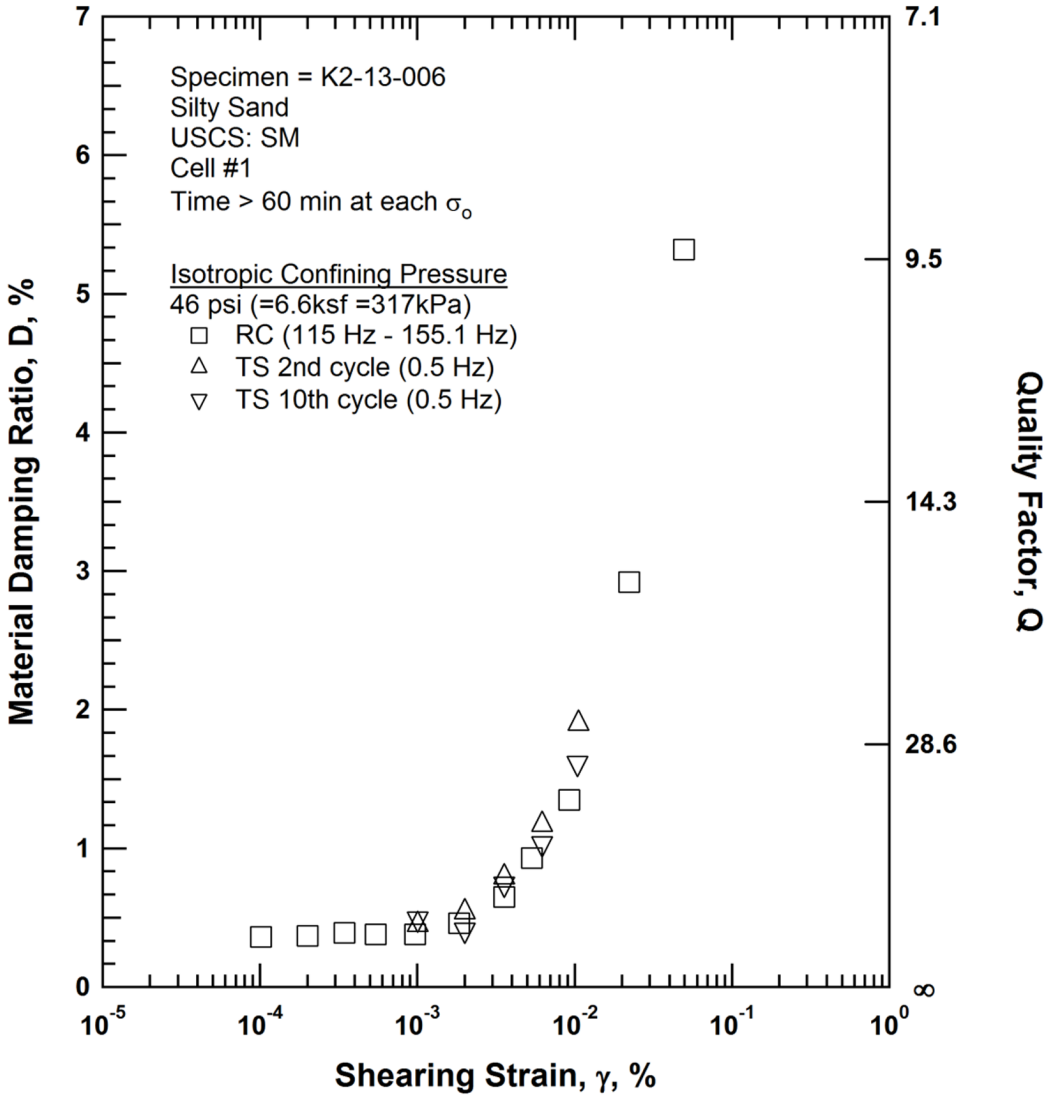

Figure G.15 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 46 psi (=6.6ksf =317kPa) from the Combined RCTS Tests of Specimen K2-13-006

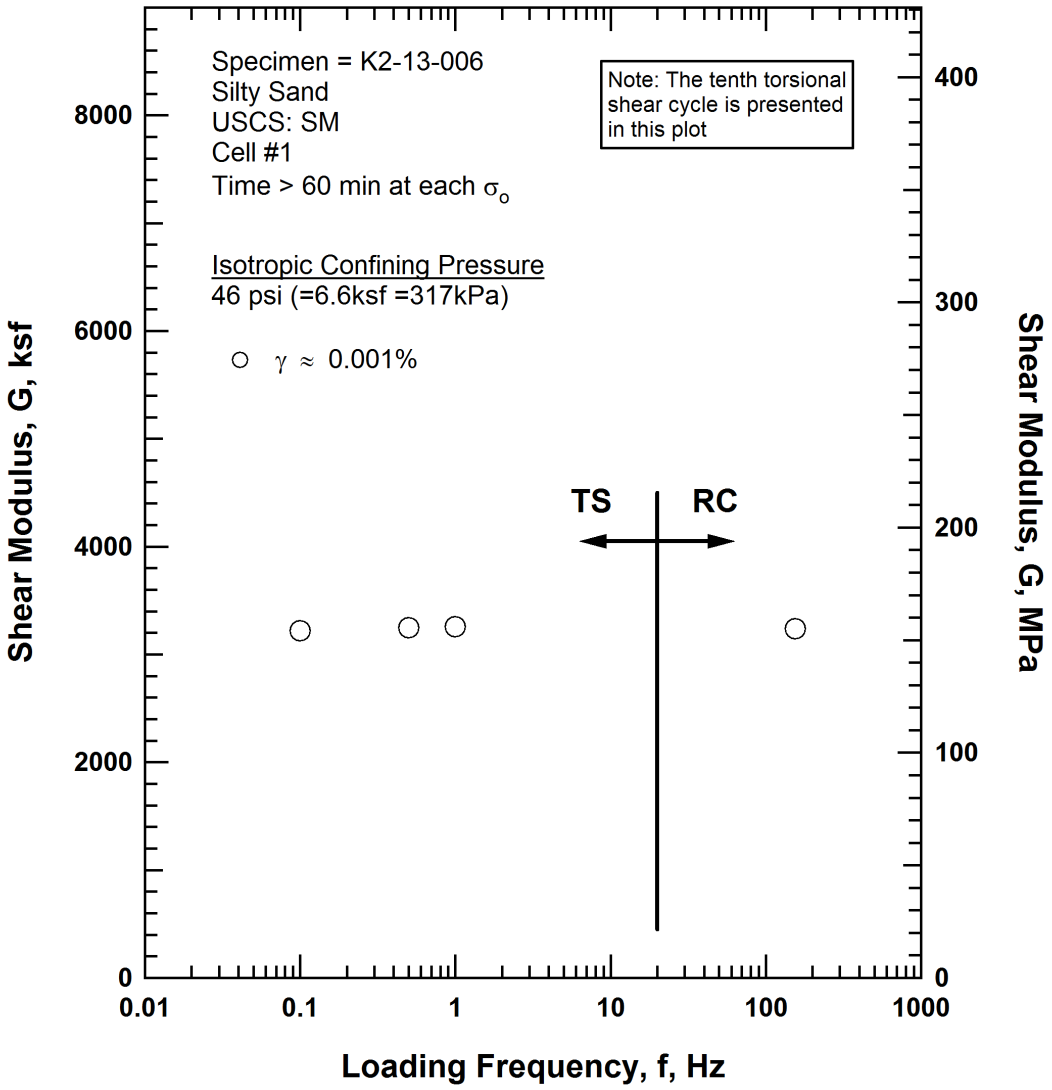

Figure G.16 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 46 psi (=6.6ksf =317kPa) from the Combined RCTS Tests of Specimen K2-13-006

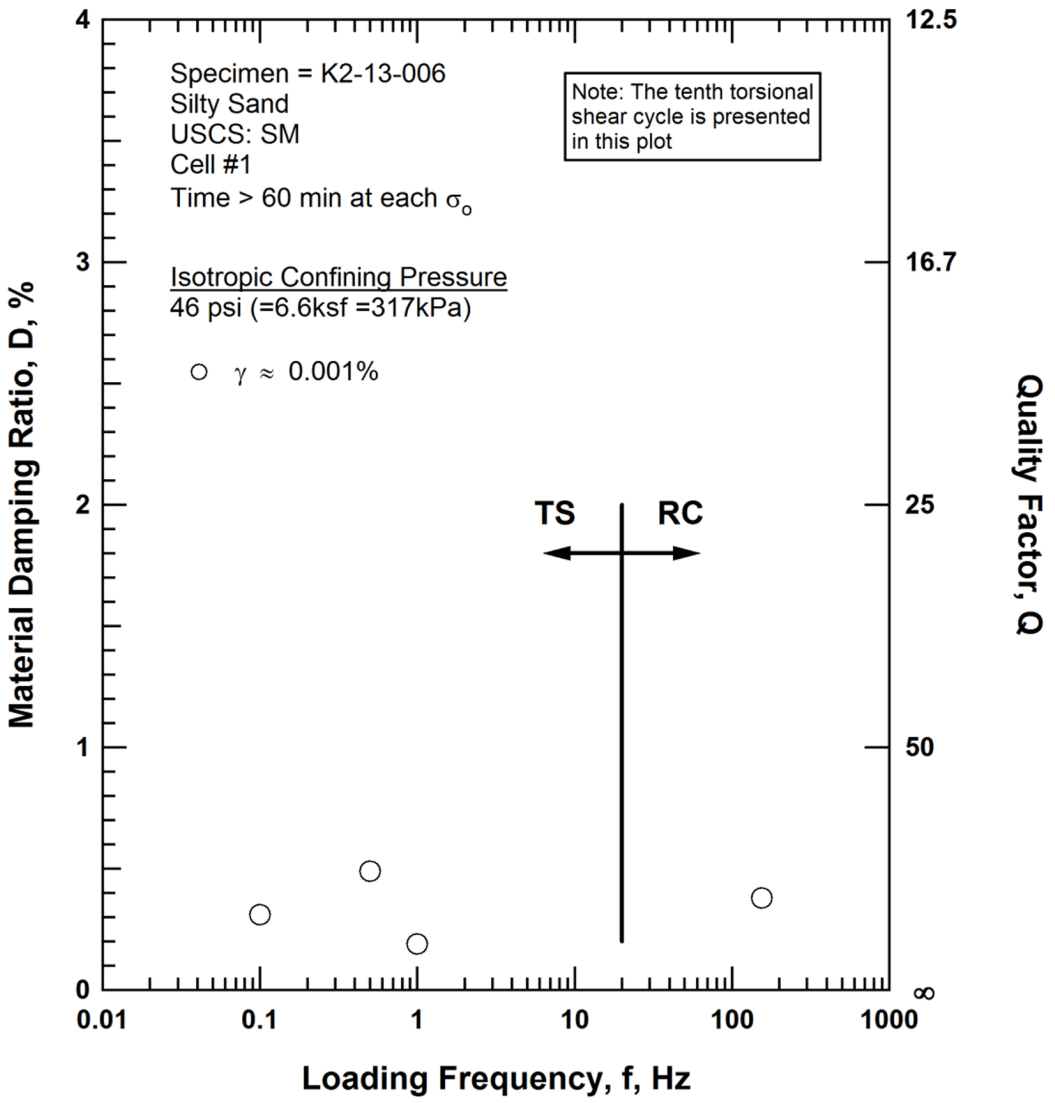

Figure G.17 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 46 psi (=6.6ksf =317kPa) from the Combined RCTS Tests of Specimen K2-13-006

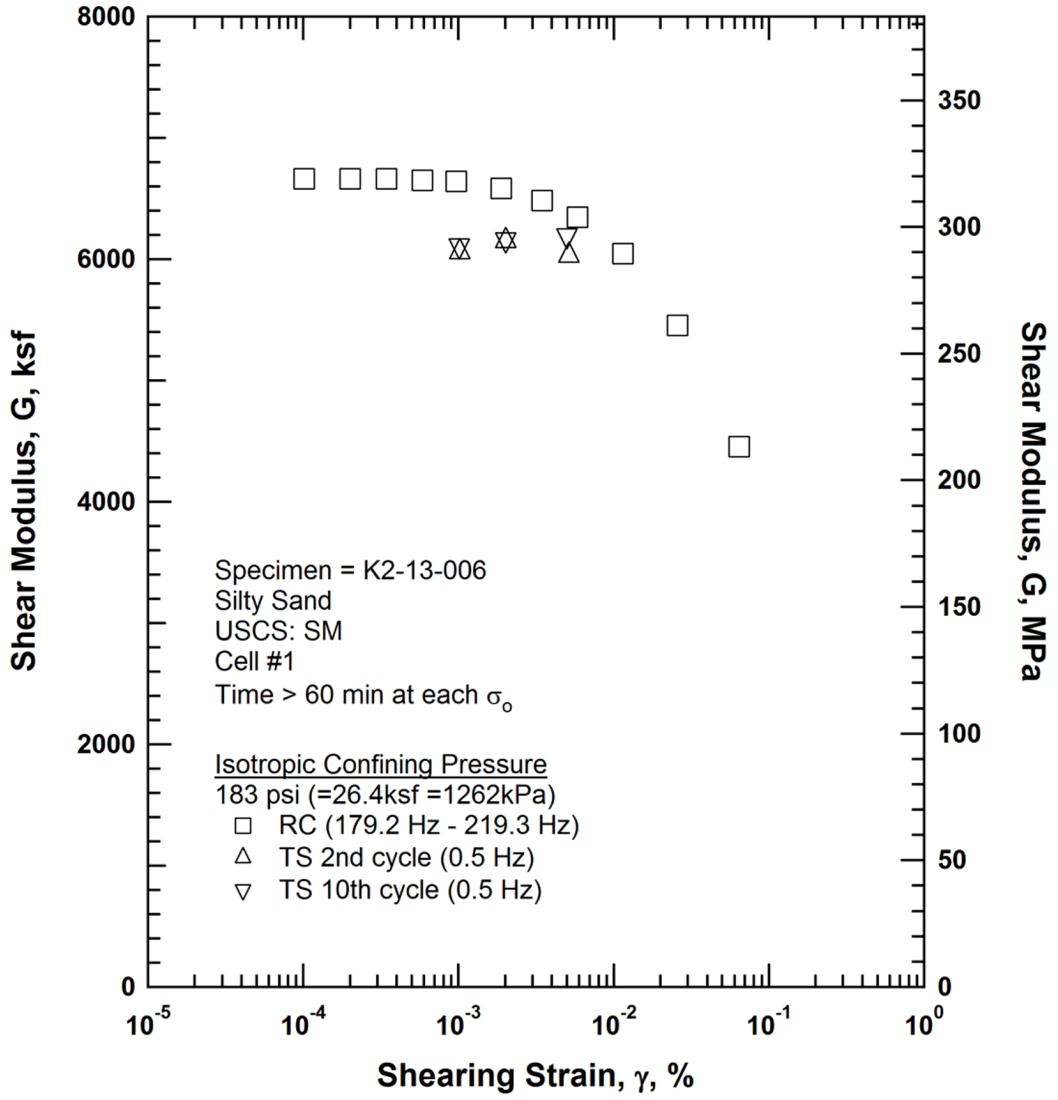

Figure G.18 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 183 psi (=26.4ksf =1262kPa) from the Combined RCTS Tests of Specimen K2-13-006

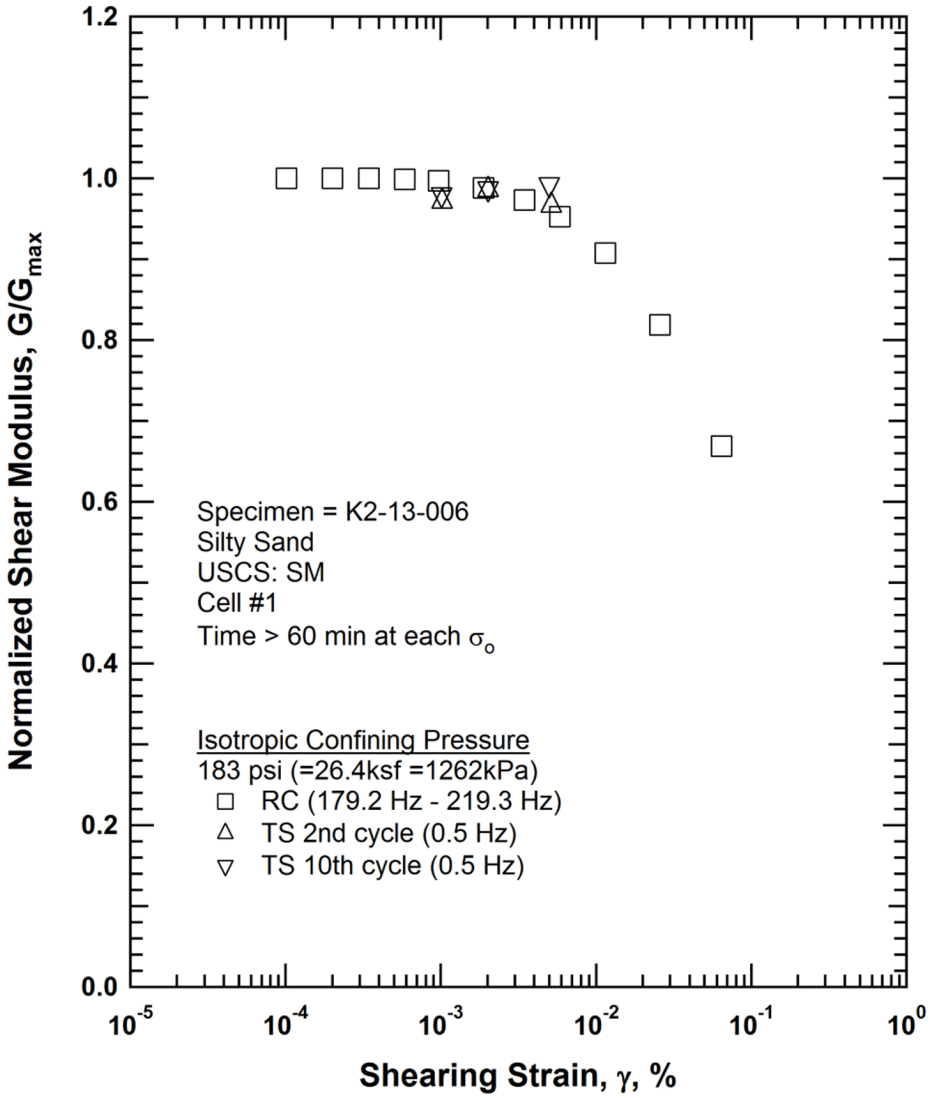

Figure G.19 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 183 psi (=26.4ksf =1262kPa) from the Combined RCTS Tests of Specimen K2-13-006

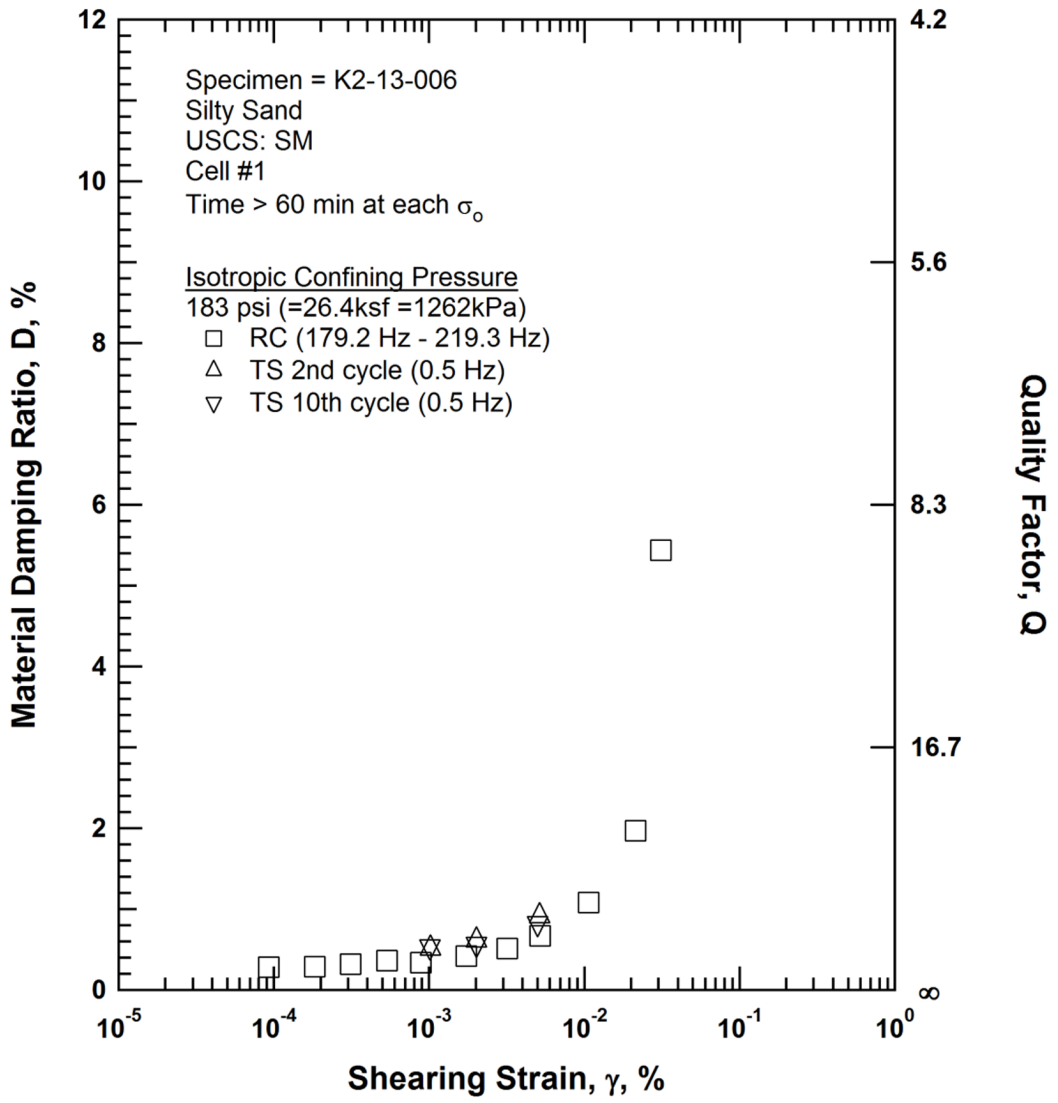

Figure G.20 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 183 psi (=26.4ksf =1262kPa) from the Combined RCTS Tests of Specimen K2-13-006

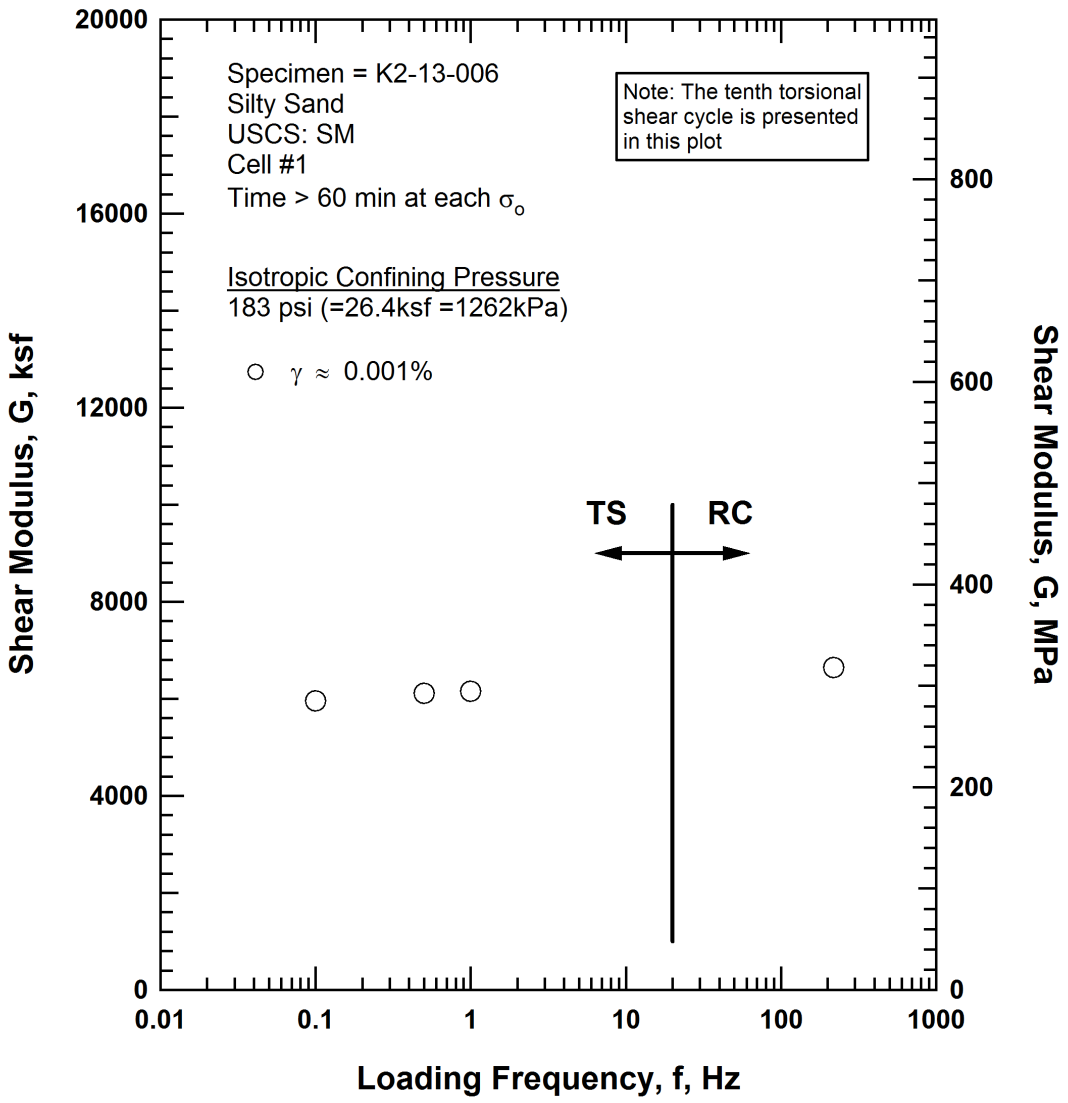

Figure G.21 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 183 psi (=26.4ksf =1262kPa) from the Combined RCTS Tests of Specimen K2-13-006

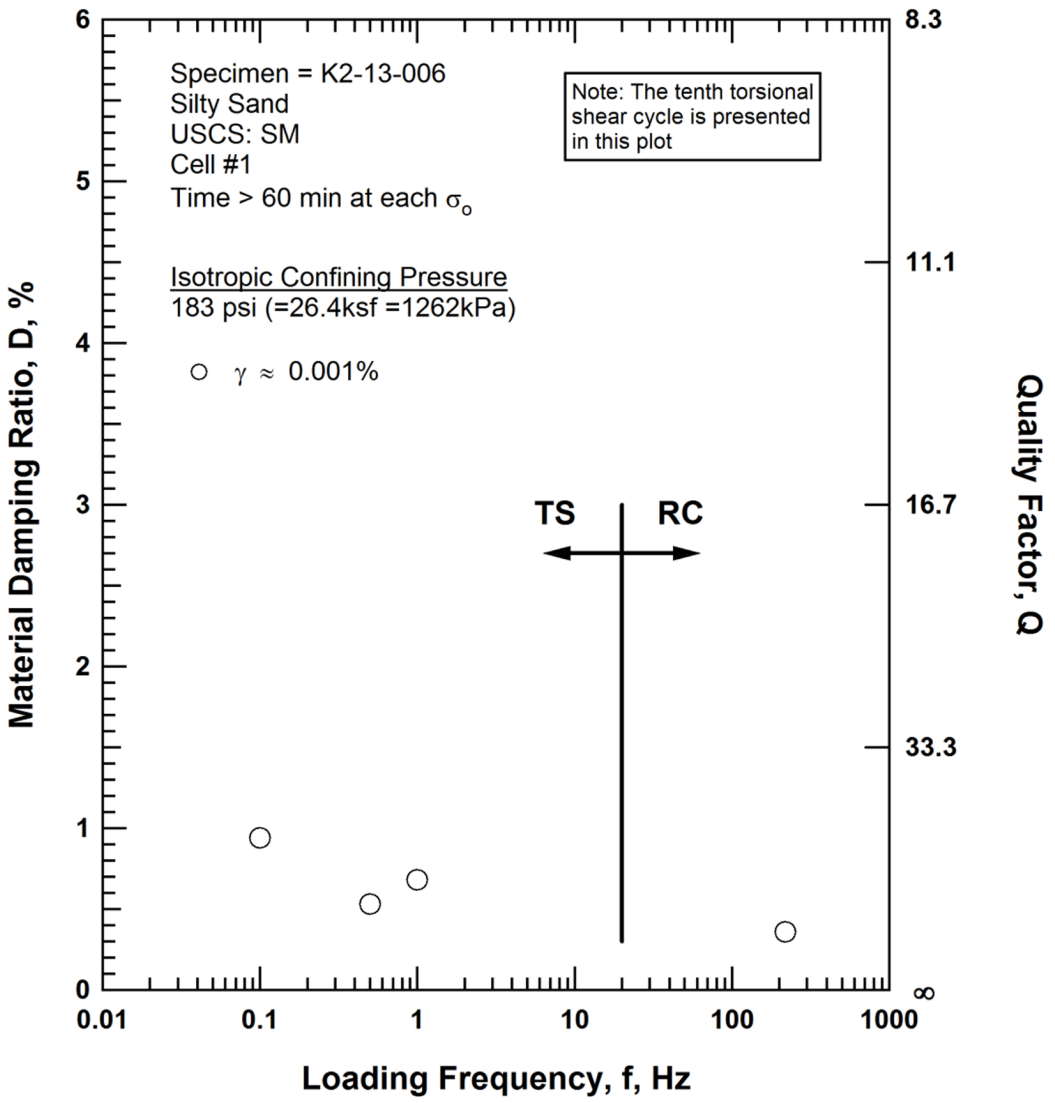

Figure G.22 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 183 psi (=26.4ksf =1262kPa) from the Combined RCTS Tests of Specimen K2-13-006

Table G.1 Variation in Low-Amplitude Shear Wave Velocity, Low-Amplitude Shear Modulus, Low-Amplitude Material Damping Ratio, Estimated Void Ratio, and Estimated Total Unit Weight with Isotropic Confining Pressure from RC Tests of Specimen K2-13-006

Isotropic Confining Pressure, σ_o			Low-Amplitude Shear Modulus, G_{max}		Low-Amplitude Shear Wave Velocity, V_s	Low-Amplitude Material Damping Ratio, D_{min}	Estimated Void Ratio, e	Estimated Total Unit Weight, γ_t
(psi)	(psf)	(kPa)	(ksf)	(MPa)	(fps)	(%)	(Unitless)	(pcf)
11	1584	76	1430	69	620	0.61	0.739	120.2
23	3312	159	2090	100	750	0.56	0.733	120.4
46	6624	317	3000	144	890	0.45	0.724	120.7
82	11808	565	4340	208	1070	0.38	0.712	121.1
183	26352	1262	6460	309	1310	0.36	0.688	122.0

Table G.2 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen K2-13-006; Isotropic Confining Pressure σ_o = 46 psi (=6.6 ksf = 317 kPa)

Second Cycle				Tenth Cycle			
Peak Shearing Strain, γ, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %	Peak Shearing Strain, γ, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %
1.01E-03	3260	0.99	0.45	1.01E-03	3250	0.98	0.49
2.01E-03	3230	0.98	0.54	2.01E-03	3240	0.98	0.41
3.57E-03	3180	0.96	0.79	3.58E-03	3180	0.96	0.74
6.20E-03	3040	0.92	1.17	6.19E-03	3040	0.92	1.03
1.06E-02	2870	0.87	1.90	1.04E-02	2910	0.88	1.61

Table G.3 Variation in Shear Modulus, Normalized Shear Modulus, and Material Damping with Shearing Strain from RC Tests of Specimen K2-13-006; Isotropic Confining Pressure σ_o = 46 psi (=6.6 ksf = 317 kPa)

Peak Shearing Strain, γ, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Average Shearing Strain, %[1]	Material Damping Ratio, D, %[2]
1.01E-04	3270	1.00	1.01E-04	0.36
2.00E-04	3270	1.00	2.00E-04	0.37
3.44E-04	3270	1.00	3.44E-04	0.39
5.87E-04	3260	1.00	5.45E-04	0.38
1.03E-03	3240	0.99	9.65E-04	0.38
1.95E-03	3210	0.98	1.84E-03	0.46
3.76E-03	3120	0.96	3.58E-03	0.65
6.86E-03	3010	0.92	5.33E-03	0.93
1.05E-02	2860	0.88	9.26E-03	1.35
2.89E-02	2370	0.72	2.21E-02	2.92
7.57E-02	1800	0.55	4.96E-02	5.32

[1] Average Shearing Strain from the First Three Cycle of the Free Vibration Decay Curve or from Half Power Damping for shearing strains less than 0.001%

[2] Average Damping Ratio from the First Three Cycle of the Free Vibration Decay Curve or from Half Power Damping for shearing strains less than 0.001%

Table G.4 Variation in Shear Modulus and Material Damping with Frequency from RC/TS Tests of Specimen K2-13-006; Isotropic Confining Pressure σ_o = 46 psi (=6.6 ksf = 317 kPa)

Approximate Shearing Strain, γ, %	Frequency, Hz	Shear Modulus, G, ksf	Material Damping Ratio, D, %
0.001	0.1	3220	0.31
	0.5	3250	0.49
	1.0	3260	0.19
	154.4	3240	0.38

Table G.5 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen K2-13-006; Isotropic Confining Pressure σ_o = 183 psi (=26.4 ksf = 1262 kPa)

Second Cycle				Tenth Cycle			
Peak Shearing Strain, γ, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %	Peak Shearing Strain, γ, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Material Damping Ratio, D, %
1.02E-03	6060	0.97	0.51	1.01E-03	6110	0.98	0.53
2.02E-03	6150	0.99	0.61	2.01E-03	6160	0.99	0.56
5.15E-03	6030	0.97	0.91	5.01E-03	6190	0.99	0.82

(1) Results were Averaged for the First Ten Cycles at this Shearing Strain

Table G.6 Variation in Shear Modulus, Normalized Shear Modulus, and Material Damping with Shearing Strain from RC Tests of Specimen K2-13-006; Isotropic Confining Pressure σ_o = 183 psi (=26.4 ksf = 1262 kPa)

Peak Shearing Strain, γ, %	Shear Modulus, G, ksf	Normalized Shear Modulus, G/G_{max}	Average Shearing Strain, %(1)	Material Damping Ratio, D, %(2)
1.01E-04	6660	1.00	9.28E-05	0.28
2.00E-04	6660	1.00	1.83E-04	0.29
3.43E-04	6660	1.00	3.13E-04	0.32
5.86E-04	6650	1.00	5.34E-04	0.36
9.66E-04	6640	1.00	8.81E-04	0.34
1.88E-03	6580	0.99	1.73E-03	0.42
3.47E-03	6480	0.97	3.18E-03	0.51
5.84E-03	6350	0.95	5.17E-03	0.67
1.15E-02	6050	0.91	1.07E-02	1.08
2.57E-02	5460	0.82	2.14E-02	1.97
6.42E-02	4450	0.67	3.10E-02	5.44

(1) Average Shearing Strain from the First Three Cycle of the Free Vibration Decay Curve or from Half Power Damping for shearing strains less than 0.001%

(2) Average Damping Ratio from the First Three Cycle of the Free Vibration Decay Curve or from Half Power Damping for shearing strains less than 0.001%

Table G.7 Variation in Shear Modulus and Material Damping with Frequency from RC/TS Tests of Specimen K2-13-006; Isotropic Confining Pressure σ_o = 183 psi (=26.4 ksf = 1262 kPa)

Approximate Shearing Strain, γ, %	Frequency, Hz	Shear Modulus, G, ksf	Material Damping Ratio, D, %
0.001	0.1	5960	0.94
	0.5	6110	0.53
	1	6160	0.68
	218.9	6640	0.36