Geotechnical
Environmental and
Water Resources
Engineering

GEI Consultants

**Transfer of Fugro RCTS Report**
**Transmittal Letter No. 2**

**Via Areva ftp Site**

July 2, 2008
Project 07223

Mr. Frank X. Bellini
Field Project Manager
AREVA NP, INC.
Solomon Pond Park
400 Donald Lynch Boulevard
Marlborough, MA 01752

Dear Mr. Bellini:

**Re: Transmittal No. 2 – Resonant Column Cyclic Torsional Shear Tests (RCTS) Report**
**Nine Mile Point Site Characterization**
**Oswego, New York**

The purpose of this letter is to document GEI Consultants, Inc.'s transmittal (via your ftp site) of the Fugro RCTS Test Report dated June 20, 2008, which also includes some revisions/corrections to pages 55 - 85 dated 6/30/08. This document replaces Areva Document No. 38-9084289-000. This Transmittal is being prepared according to the AREVA NP, INC. Purchase Order and Scope of Work provided in our proposal dated July 6, 2007, which is the basis of our current contract with AREVA.

## Documents

This Letter of Transmittal No. 2 transfers Fugro RCTS Tests Reports dated June 20, 2008 (and corrected pages dated June 30, 2008) for the Nine Mile Point Site Characterization Project; it includes one document containing two RCTS tests (RCTS#A and RCTS#B) and two reports.

1. **Resonant Column Cyclic Torsional Shear Tests (RCTS) Report.**

All test samples were managed and tested in accordance with the following AREVA-approved procedures:

- 38-9058206-004: GEI Procedure 124 R4 - Transportation and Tracking of Soil and Rock Samples.
- 38-9080235-000: GEI Procedure 109 - Resonant Column Cyclic Torsional Shear CCyTS).
- 38-9065537-001: GEI Procedure 101 R1 - Water Content Measurement.

Prior to testing, all Fugro personnel involved in the work were trained to the procedures.

Please call me, Tom Kahl or Robert Lambe if you have questions regarding this Transmittal Letter.

Sincerely,

GEI CONSULTANTS, INC.

Herbert Scribner
Electronic signature inserted by D. Bishop per email approval from Herbert Scribner 7/2/08



GEI Consultants, Inc.
400 Unicorn Park Drive, Woburn, Massachusetts 01801
781.721.4000 fax 781.721.4073

**FUGRO CONSULTANTS, INC.**

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

June 20, 2008

Mr. Thomas W. Kahl
Senior Vice President
GEI Consultants, Inc.
400 Unicorn Park Drive
Woburn, MA 01801

Dear Mr. Kahl:

**RE: Letter of Transmittal**
**Resonant Column Cyclic Torsional Shear Tests**
**Backfill Samples**
**Nine Mile Point Unit 3**
**Oswego, New York**

**Test Results Summary**

Fugro performed two RCTS tests on remolded specimens of sand and gravel backfill samples provided by GEI Consultants, Inc. The **final** reports of the tests along with Dr. Kenneth Stokoe's approval sheet are presented in Attachment A.

**Test Procedures**

All test samples were managed and tested in accordance with the following AREVA-approved procedures:

- 38-9058206-004: GEI Procedure 124 R4- Transportation and Tracking of Soil and Rock Samples
- 38-9080235-000: GEI Procedure 109- Resonant Column Cyclic Torsional Shear (RCCyTS)
- 38-9065537-001: GEI Procedure 101 R1- Water Content Measurement

Prior to testing, all Fugro personnel involved in the work were trained to the procedures.

**Test Documents**

Copies of completed test forms related to the testing required by the above-referenced procedures are contained in Attachment B.

Please call me at if you have any questions.

Sincerely,

Jiewu Meng, PhD, P.E.
Project Engineer

Bill DeGroff, P.E.
Laboratory Department Manager

Enclosure(s)

# RCTS TEST APROVAL

| PROJECT SITE/NAME | Nine-Mile Point |
|---|---|

| Test ID | Sample ID | Depth B.S. (Ft) | Approved By (Initials) | Date |
|---|---|---|---|---|
| RCTS#A | Pad 1-1 | --- | KHS | 18 June '08 |
| RCTS#B | Pad 1-2 | | KHS | 18 June '08 |

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

# ATTACHMENT A

Fugro # 0411-08-1696

# APPENDIX A

Remolded Specimen Pad 1-1
Sample Location: Streeter Rathburn Road

Borehole ---NA
Sample ---NA
Depth = --- ft ( --- m)
Total Unit Weight = 125.2 lb/ft$^3$
Water Content = 7.8 %
Estimated In-Situ Mean Effective
Stress = 13 psi

FUGRO JOB #: 0411-08-1696
Testing Station: RC7

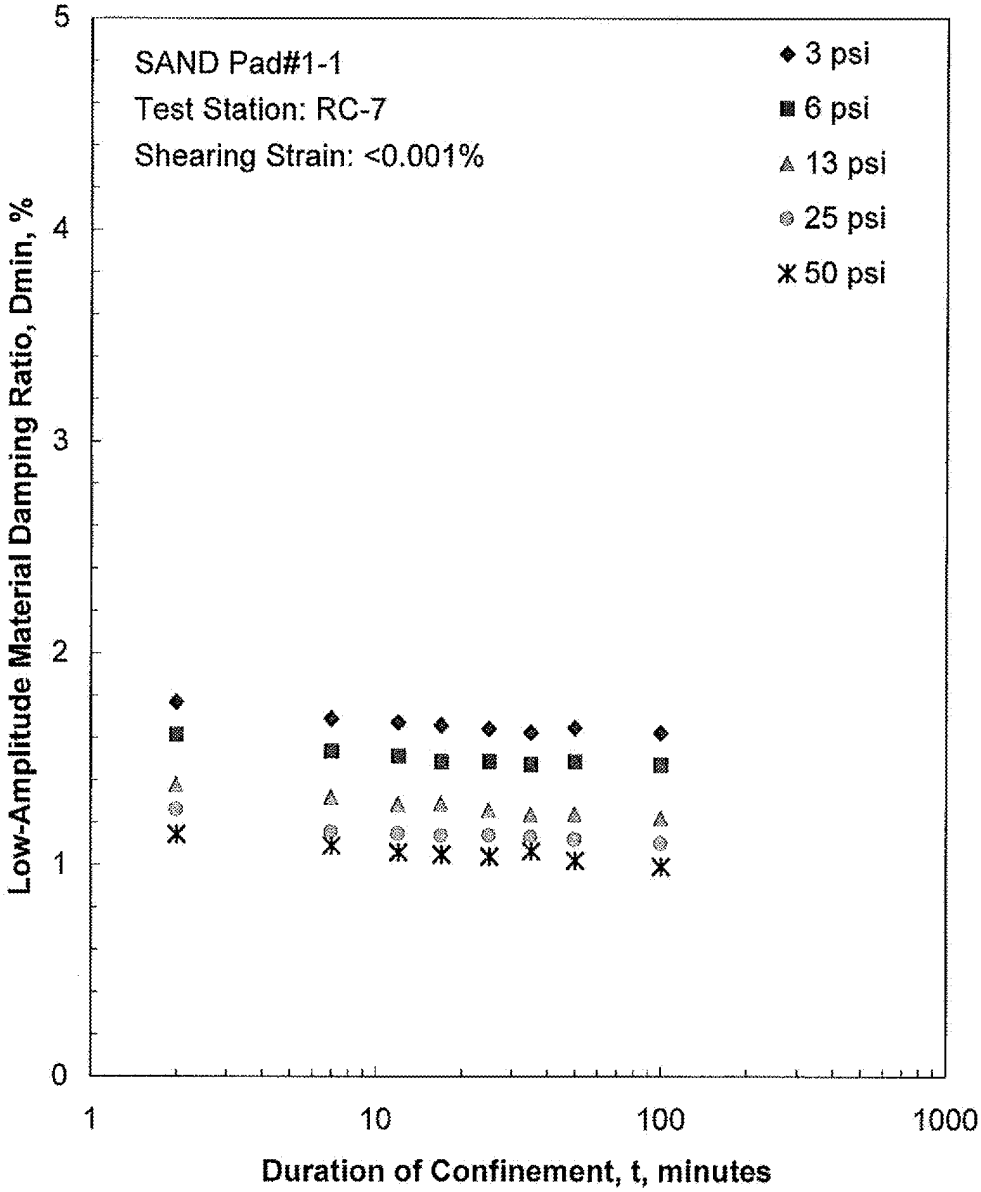



**Figure A.2 Variation in Low-Amplitude Material Damping Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests**

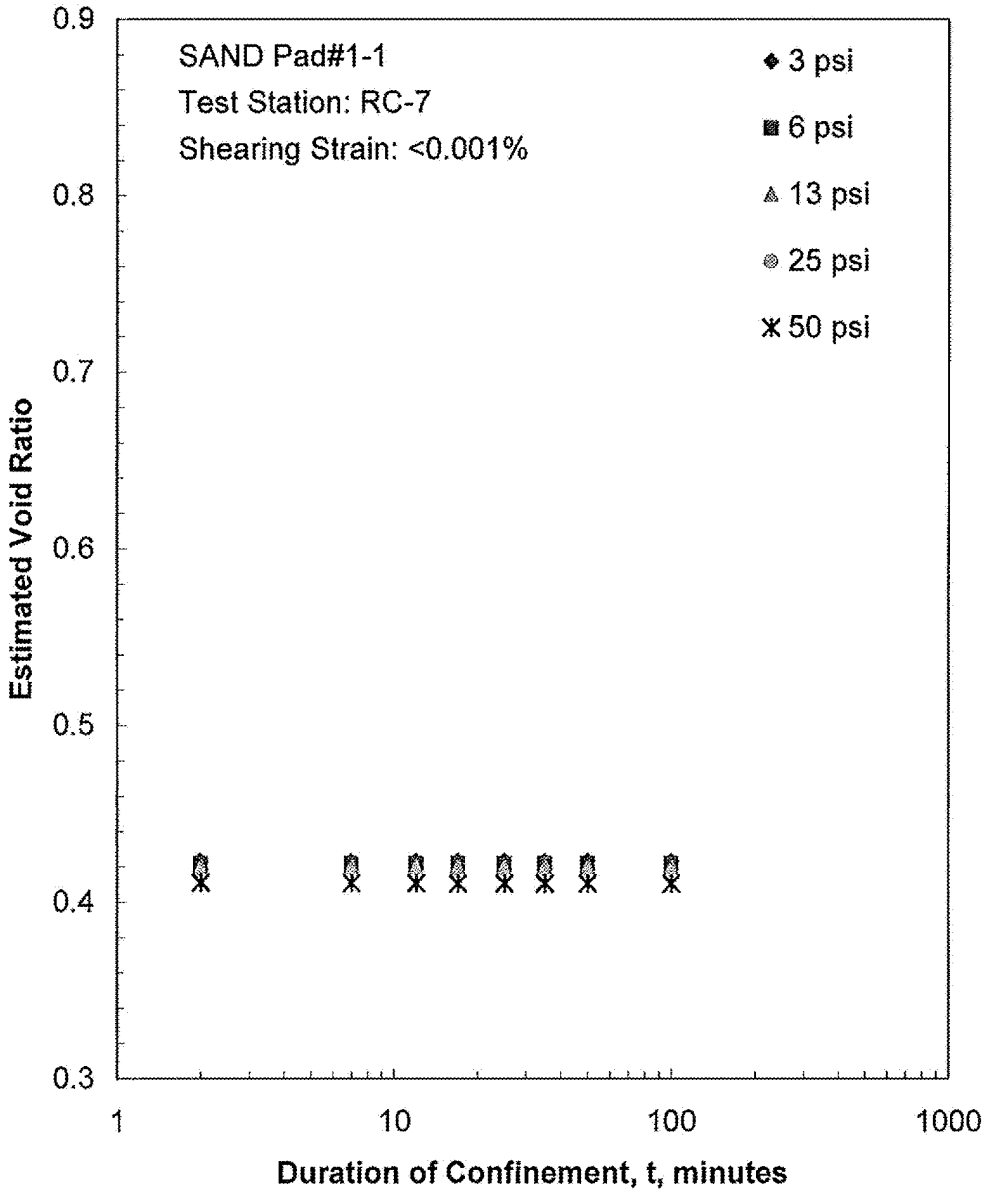



**Figure A.3 Variation in Estimated Void Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests**

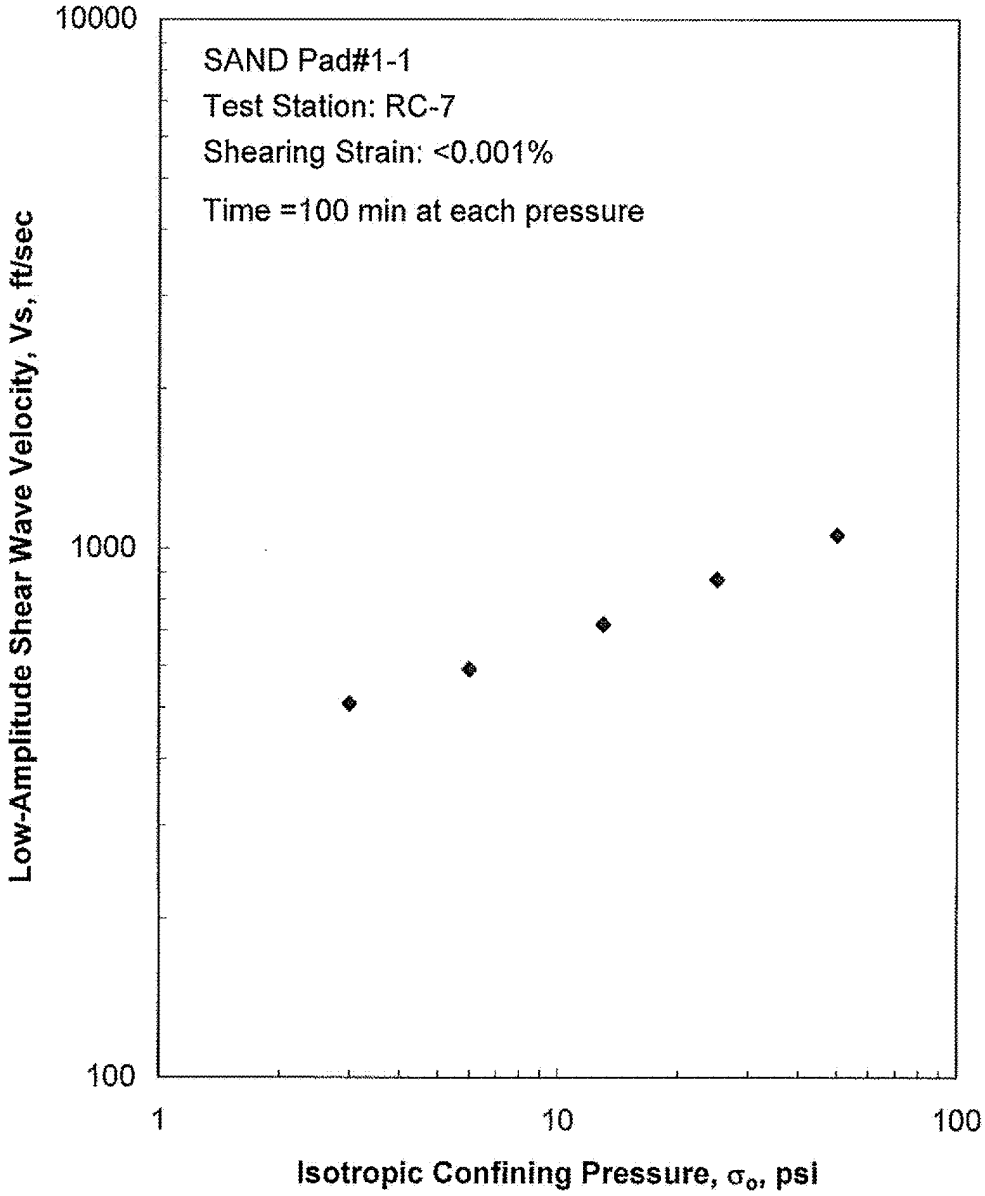



**Figure A.4 Variation in Low-Amplitude Shear Wave Velocity with Isotropic Confining Pressure from Resonant Column Tests**

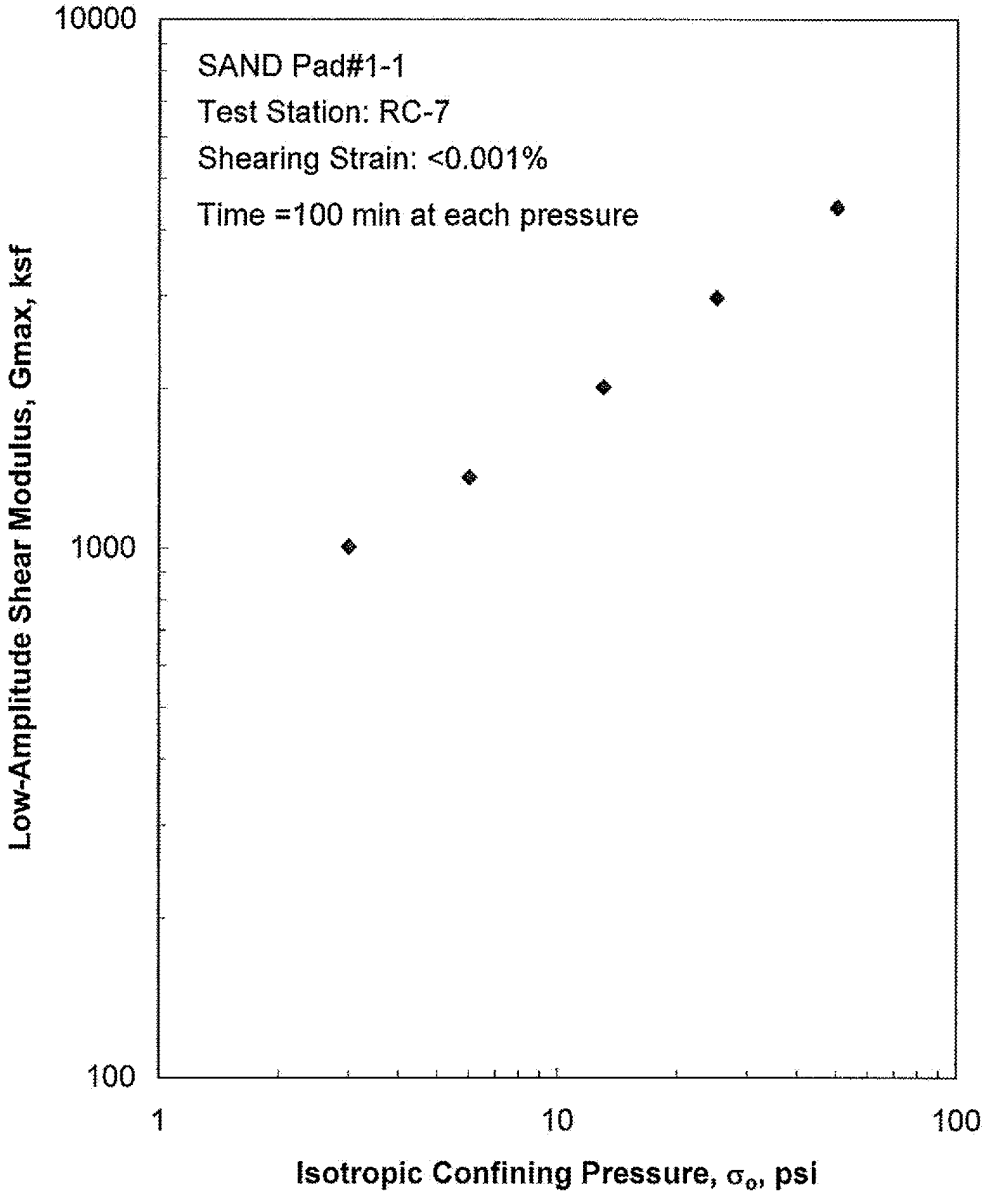



**Figure A.5 Variation in Low-Amplitude Shear Modulus with Isotropic Confining Pressure from Resonant Column Tests**

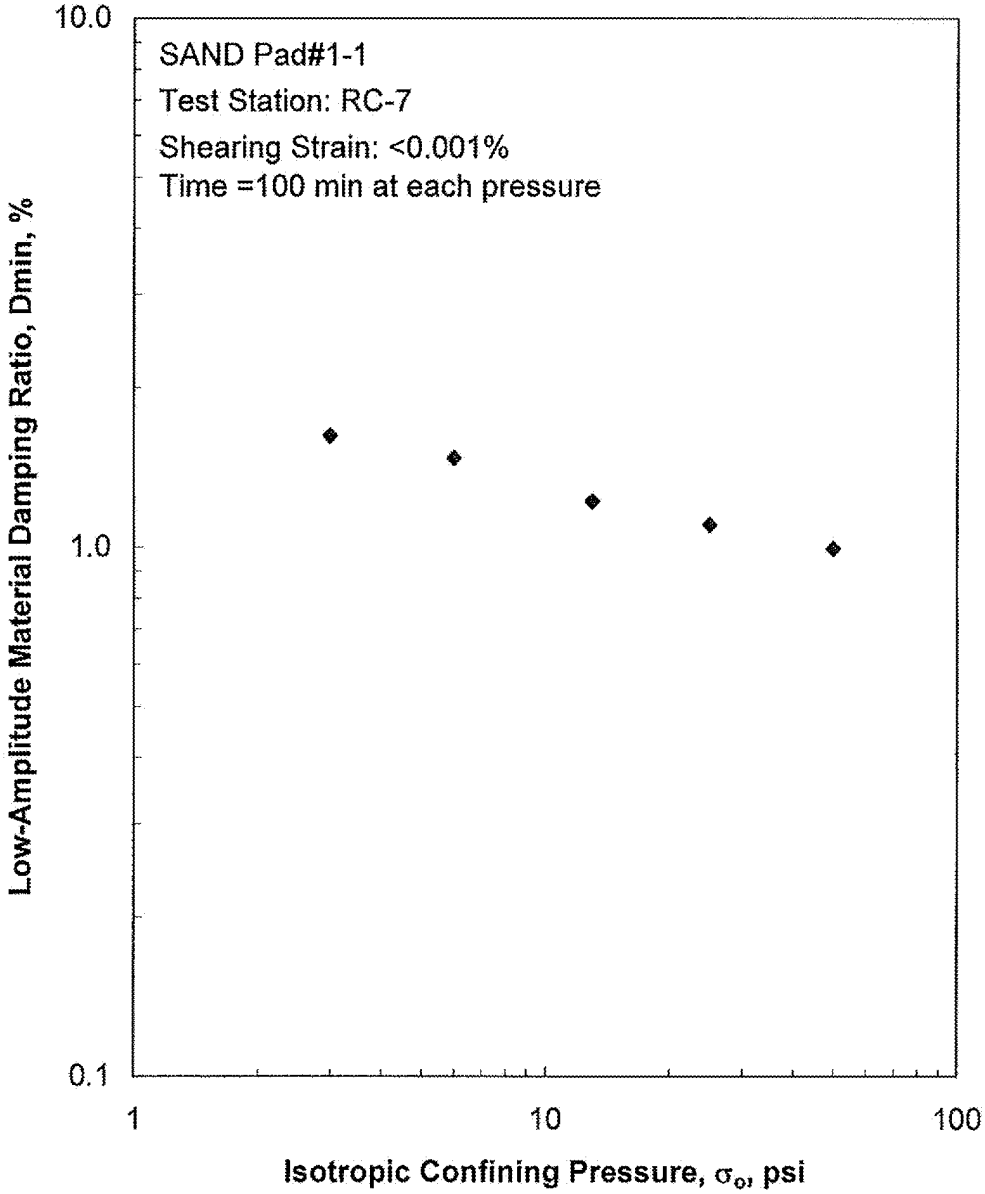



**Figure A.6 Variation in Low-Amplitude Material Damping Ratio with Isotropic Confining Pressure from Resonant Column Tests**

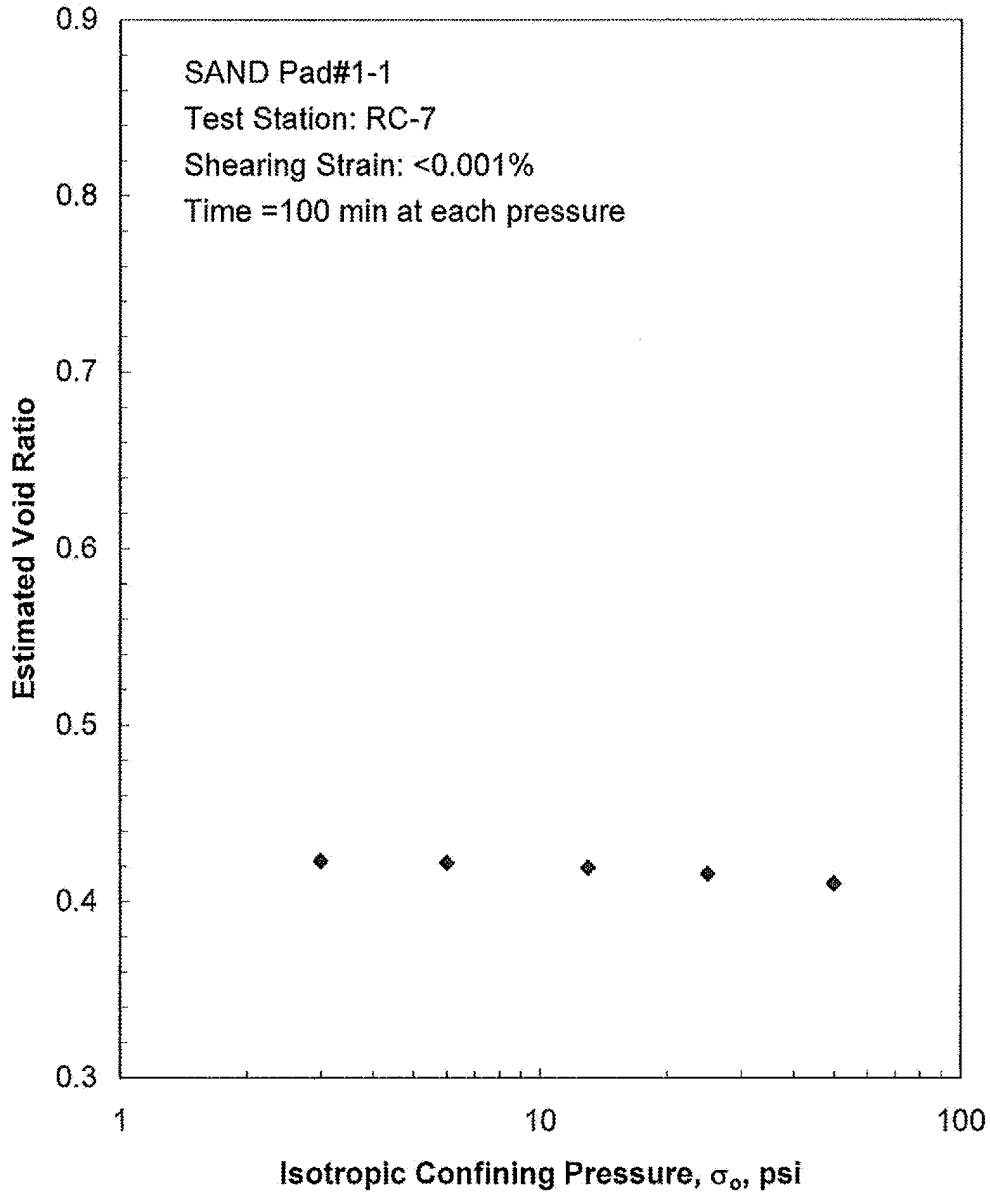



**Figure A.7 Variation in Estimated Void Ratio with Isotropic Confining Pressure from Resonant Column Tests**

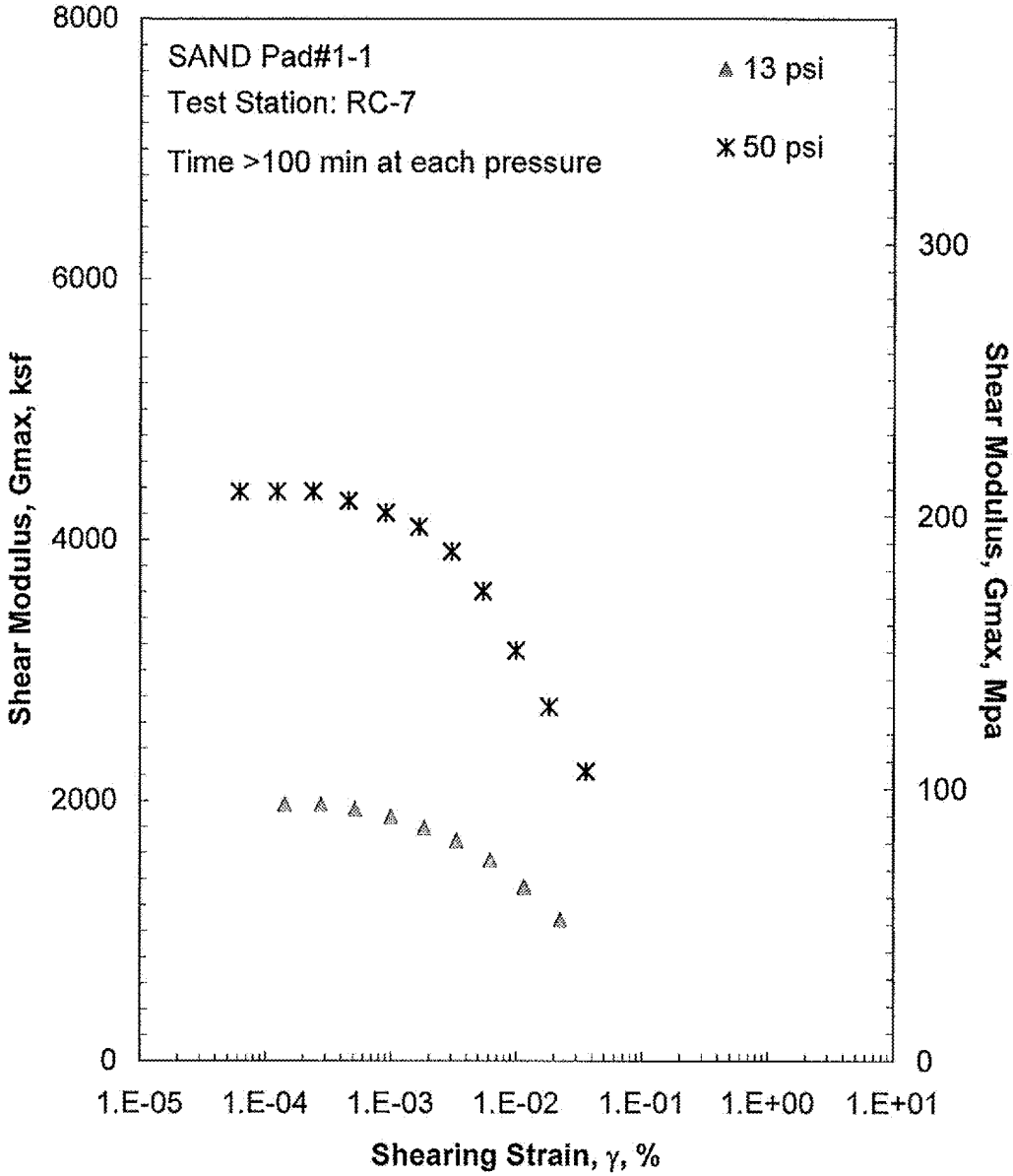



**Figure A.8 Comparison of the Variation in Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests**

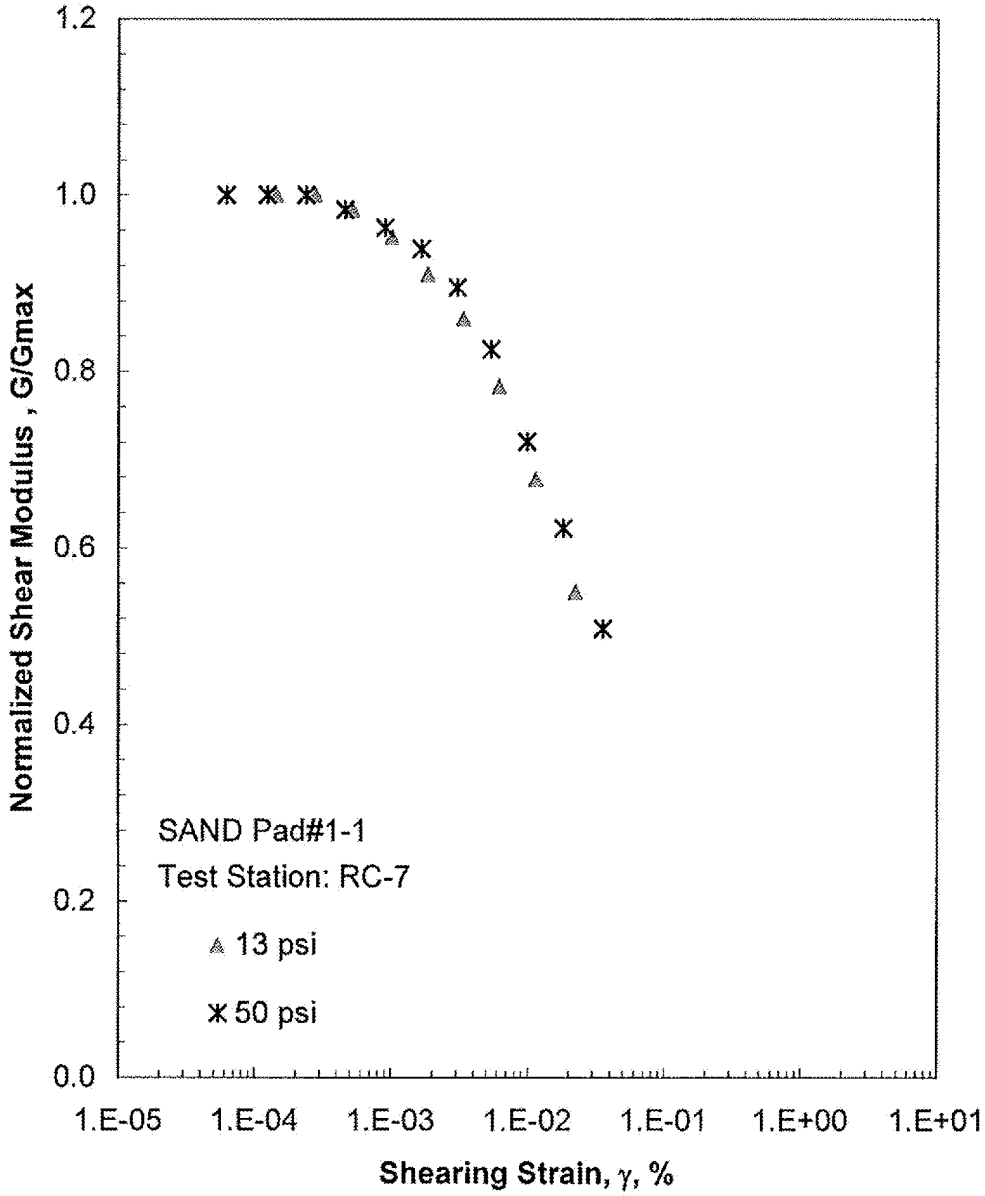



**Figure A.9 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests**

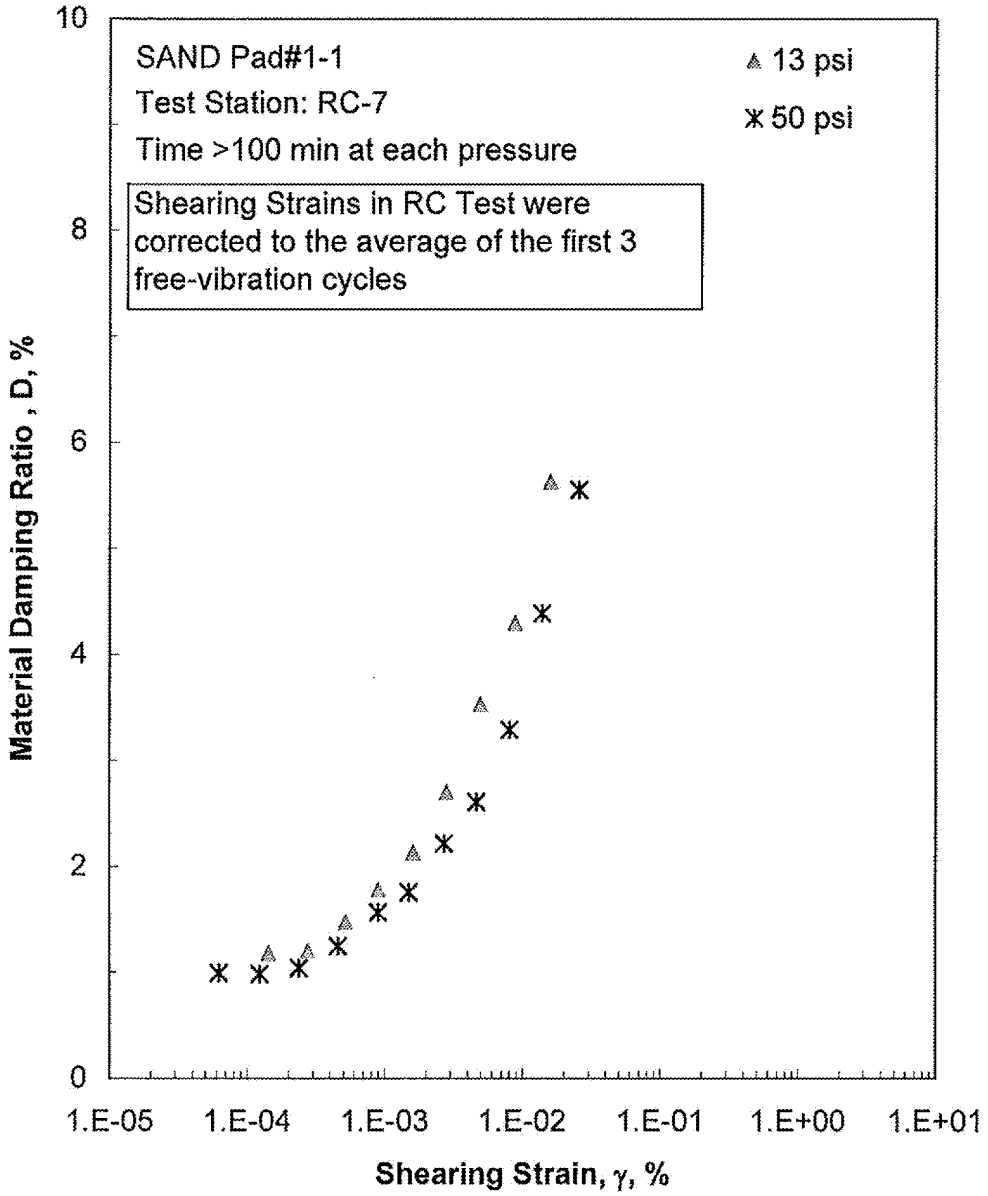



**Figure A.10 Comparison of the Variation in Material Damping Ratio with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests**

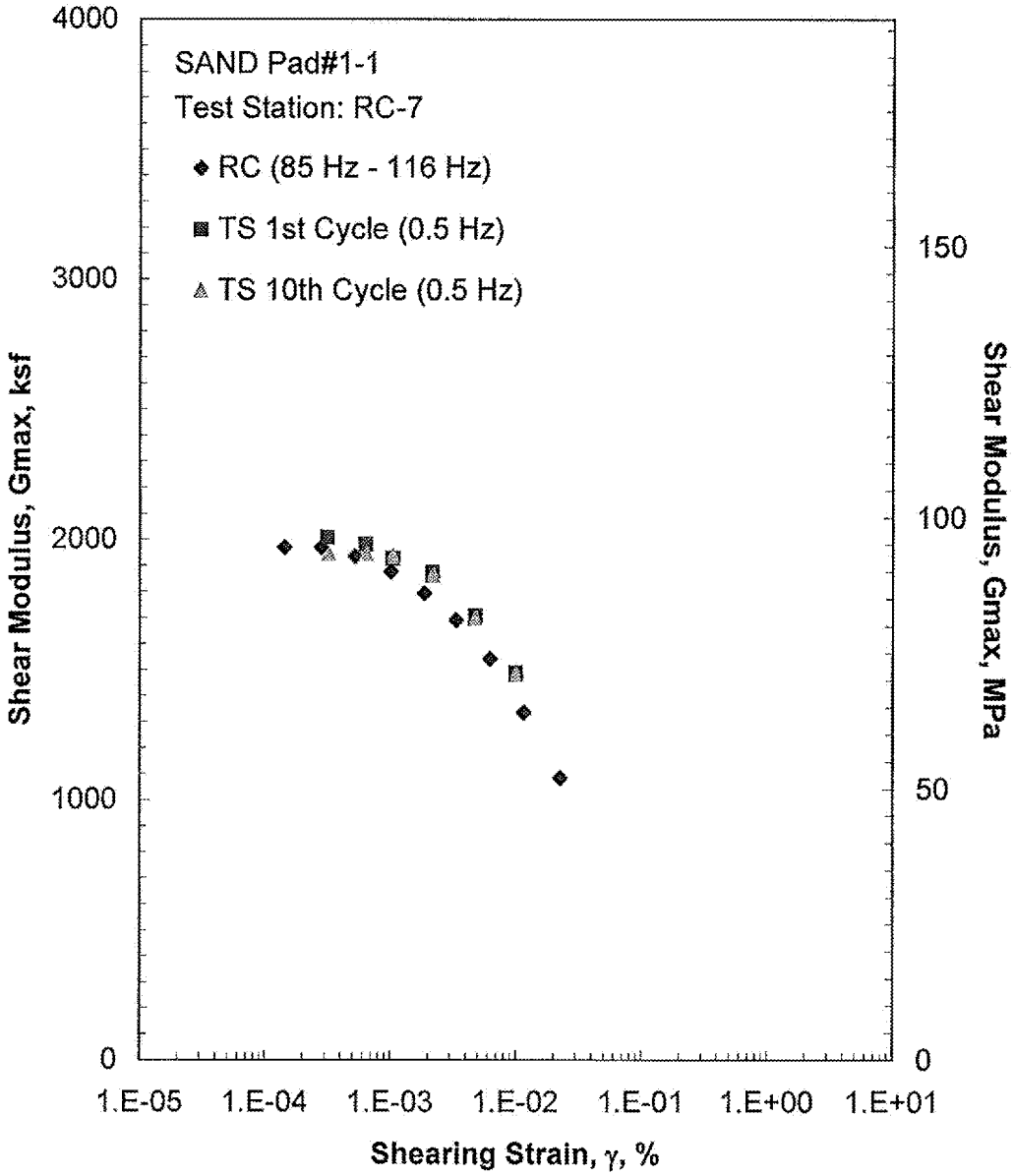



**Figure A.11 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

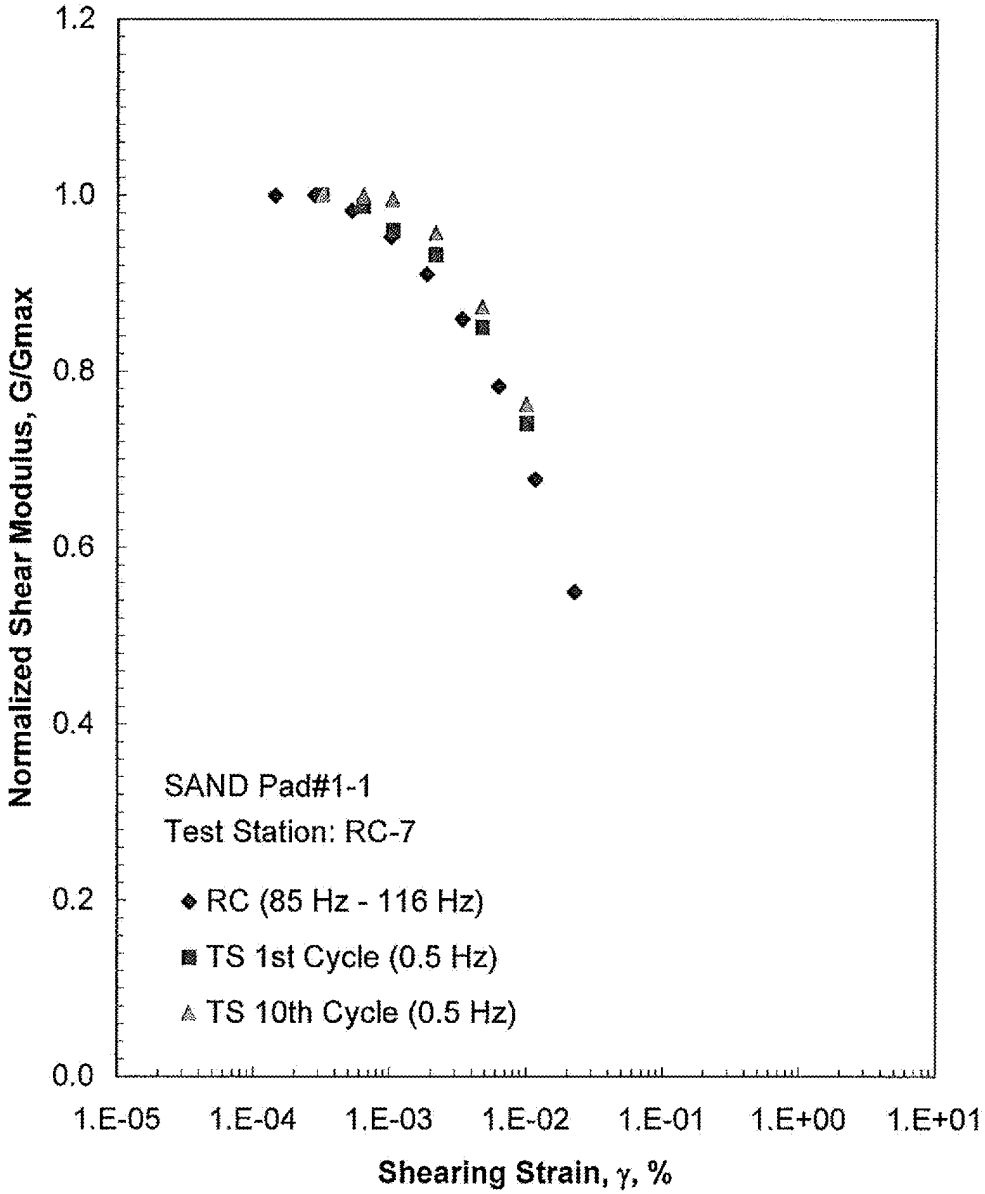



**Figure A.12 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

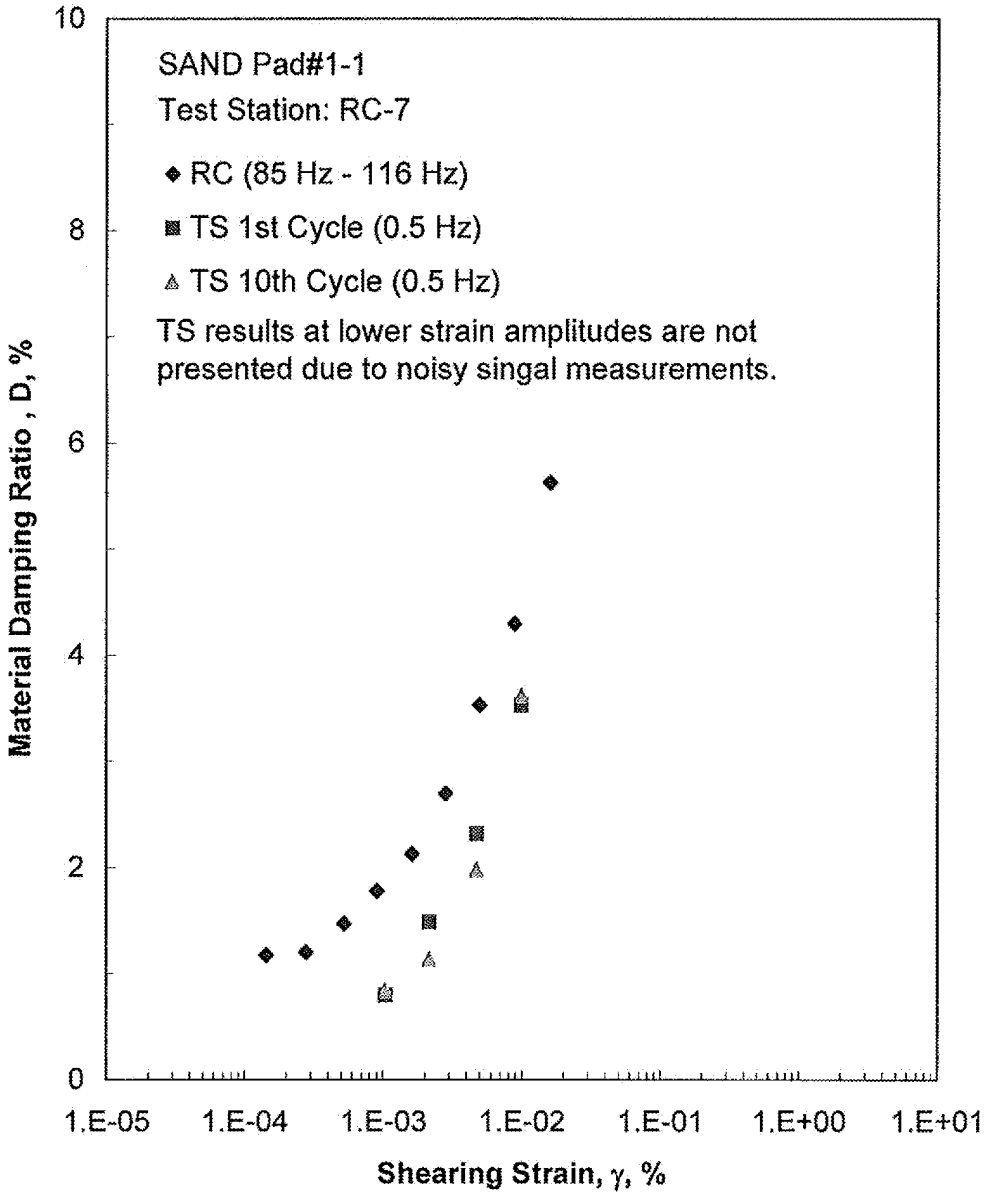



**Figure A.13 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

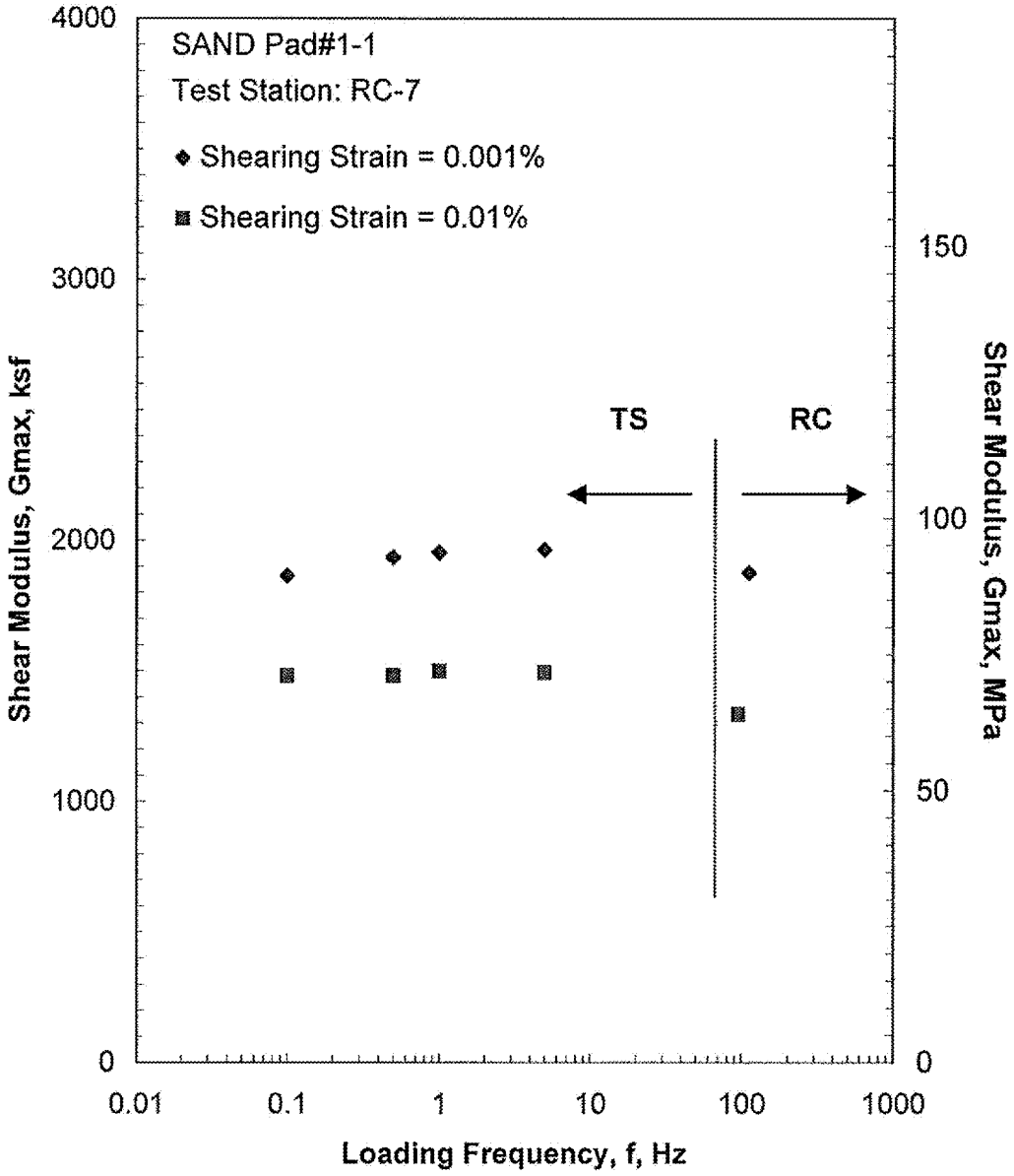



**Figure A.14 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

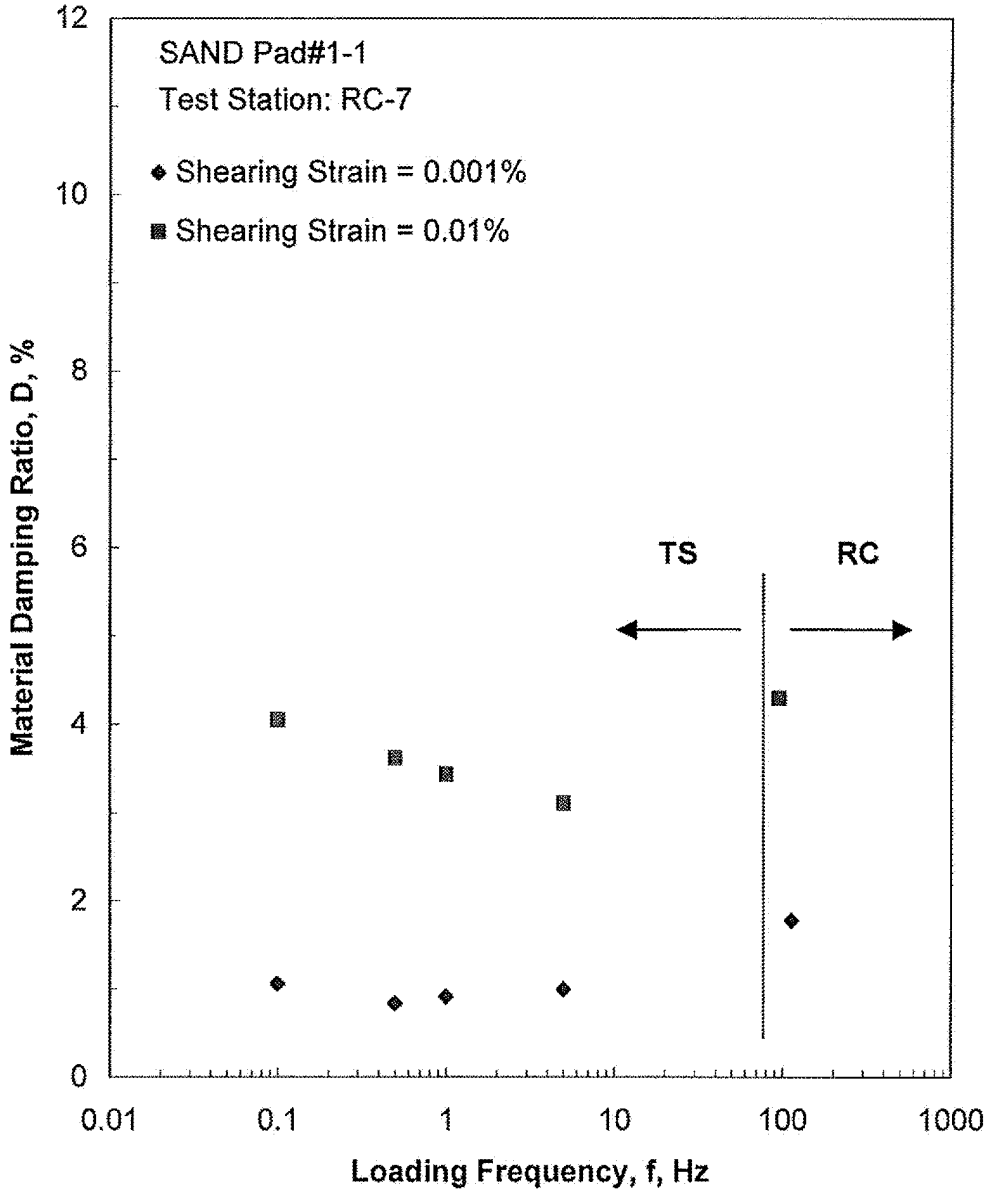



**Figure A.15 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

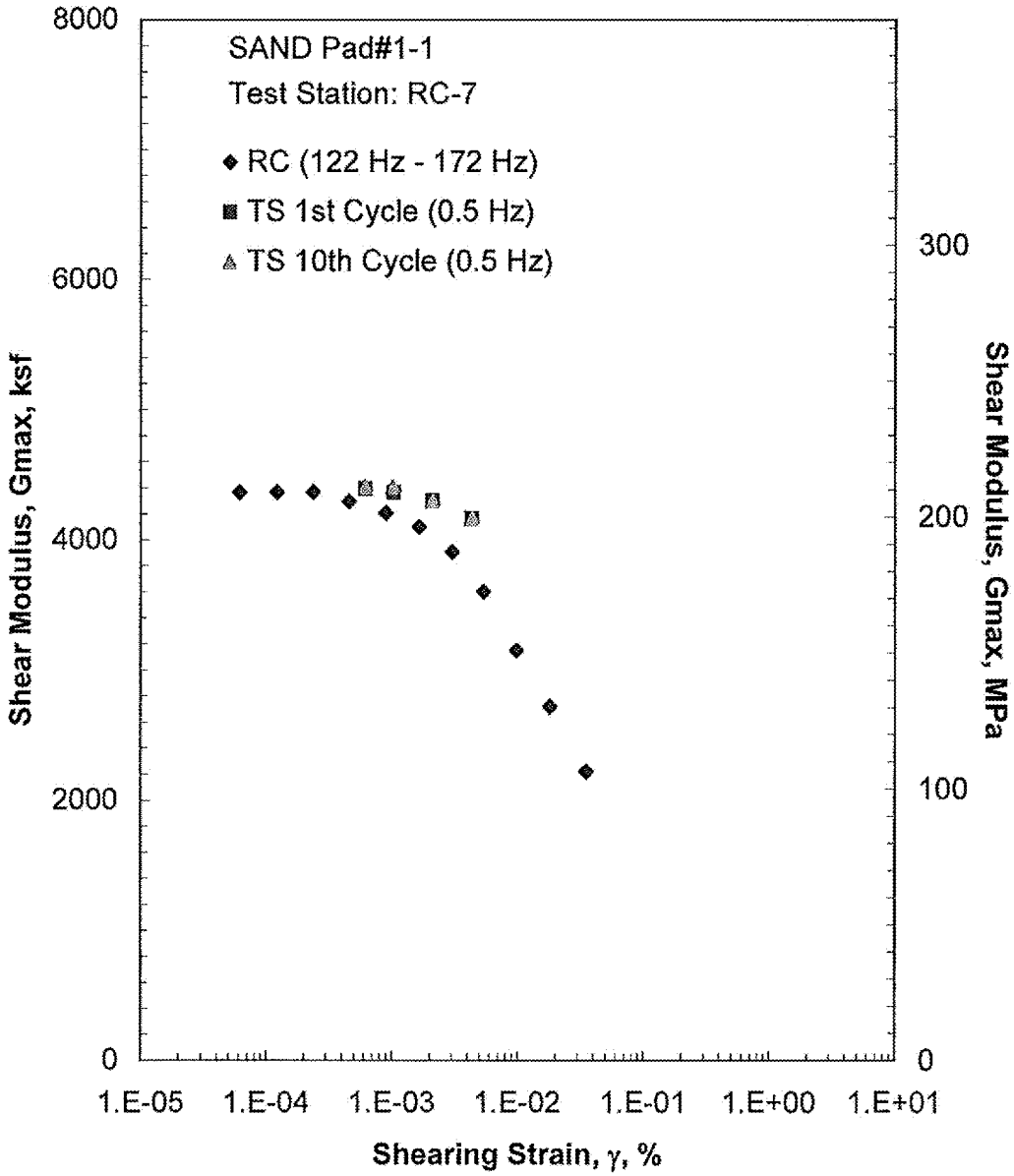



**Figure A.16 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

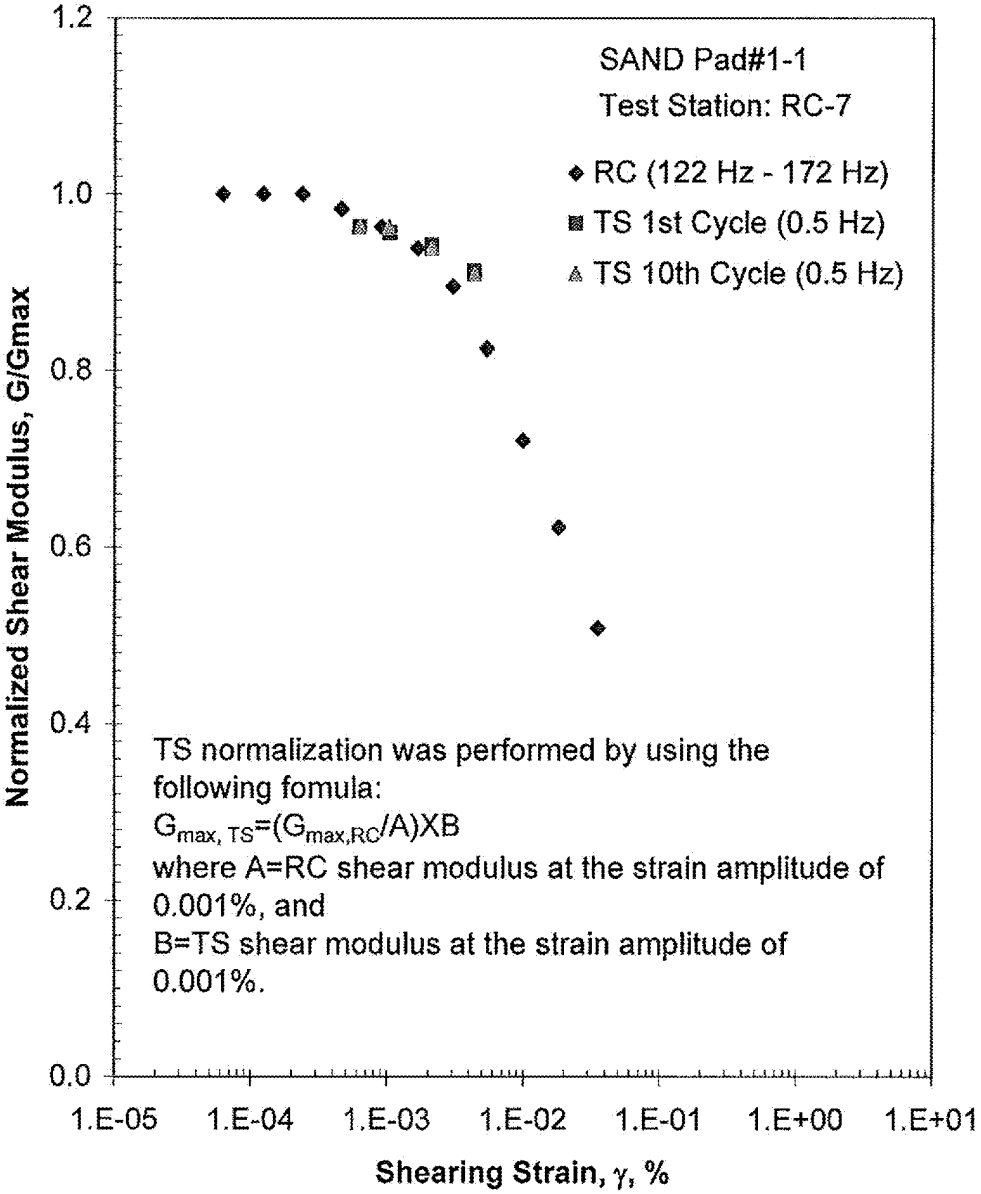



**Figure A.17 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

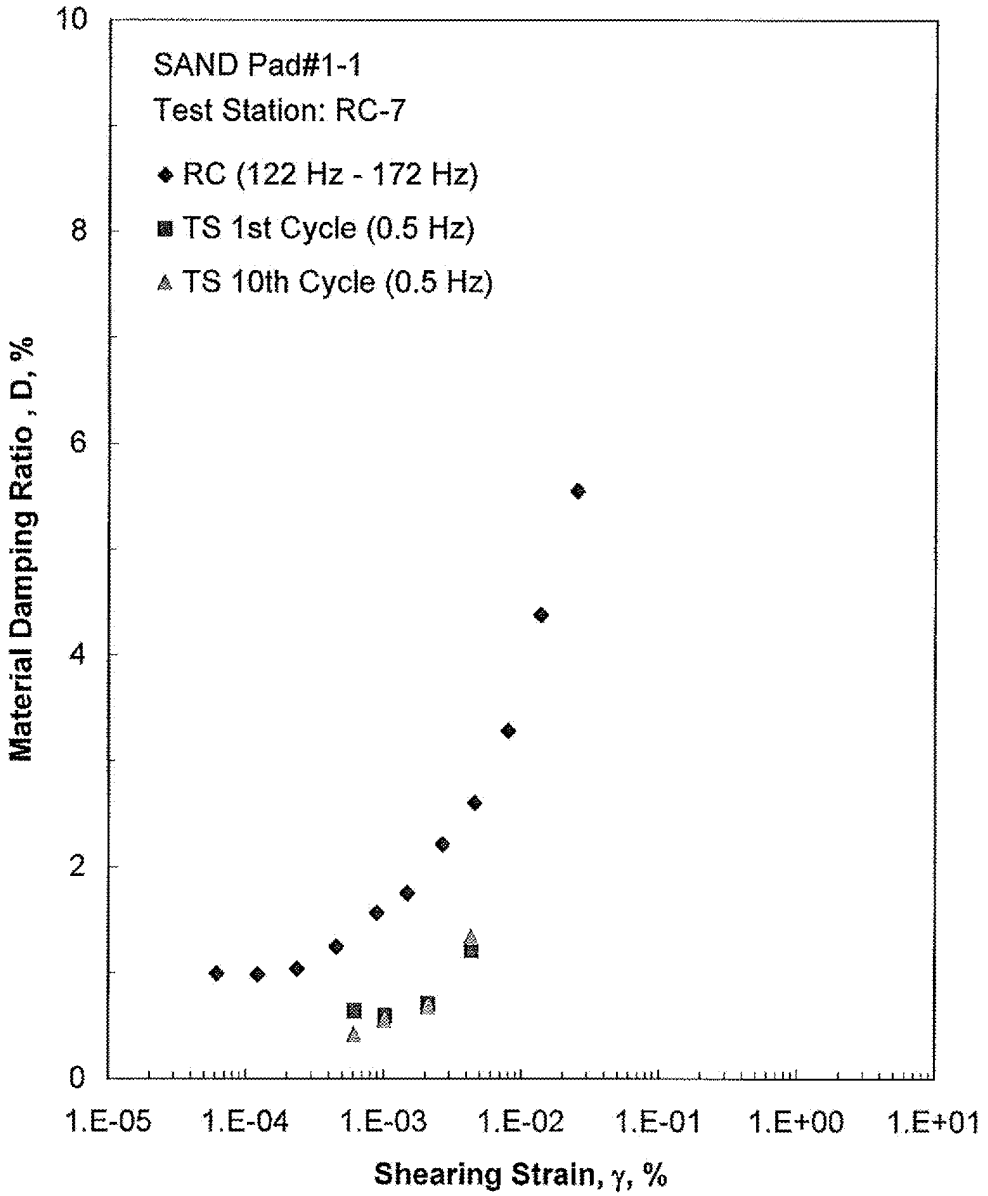



**Figure A.18 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

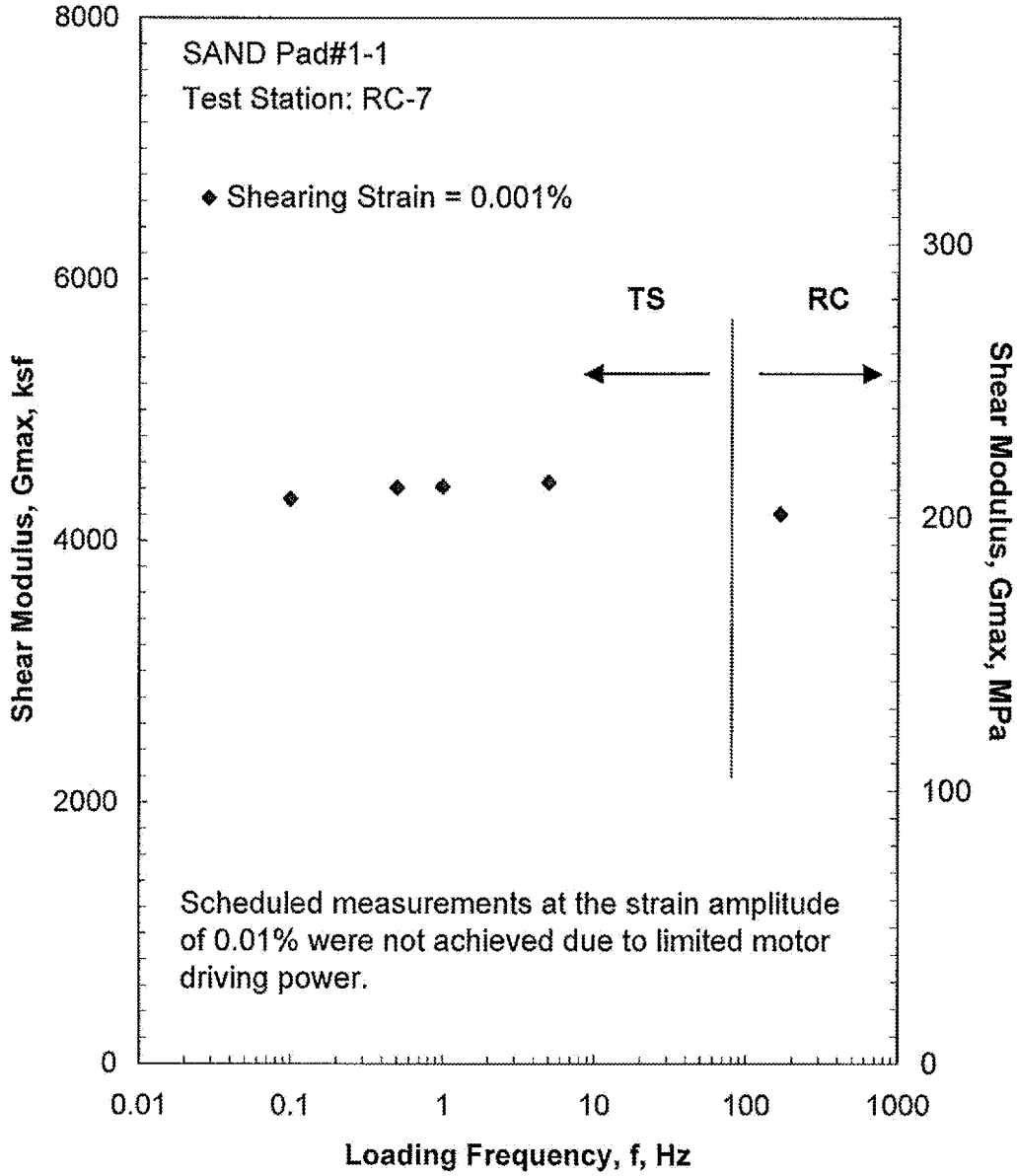



**Figure A.19 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

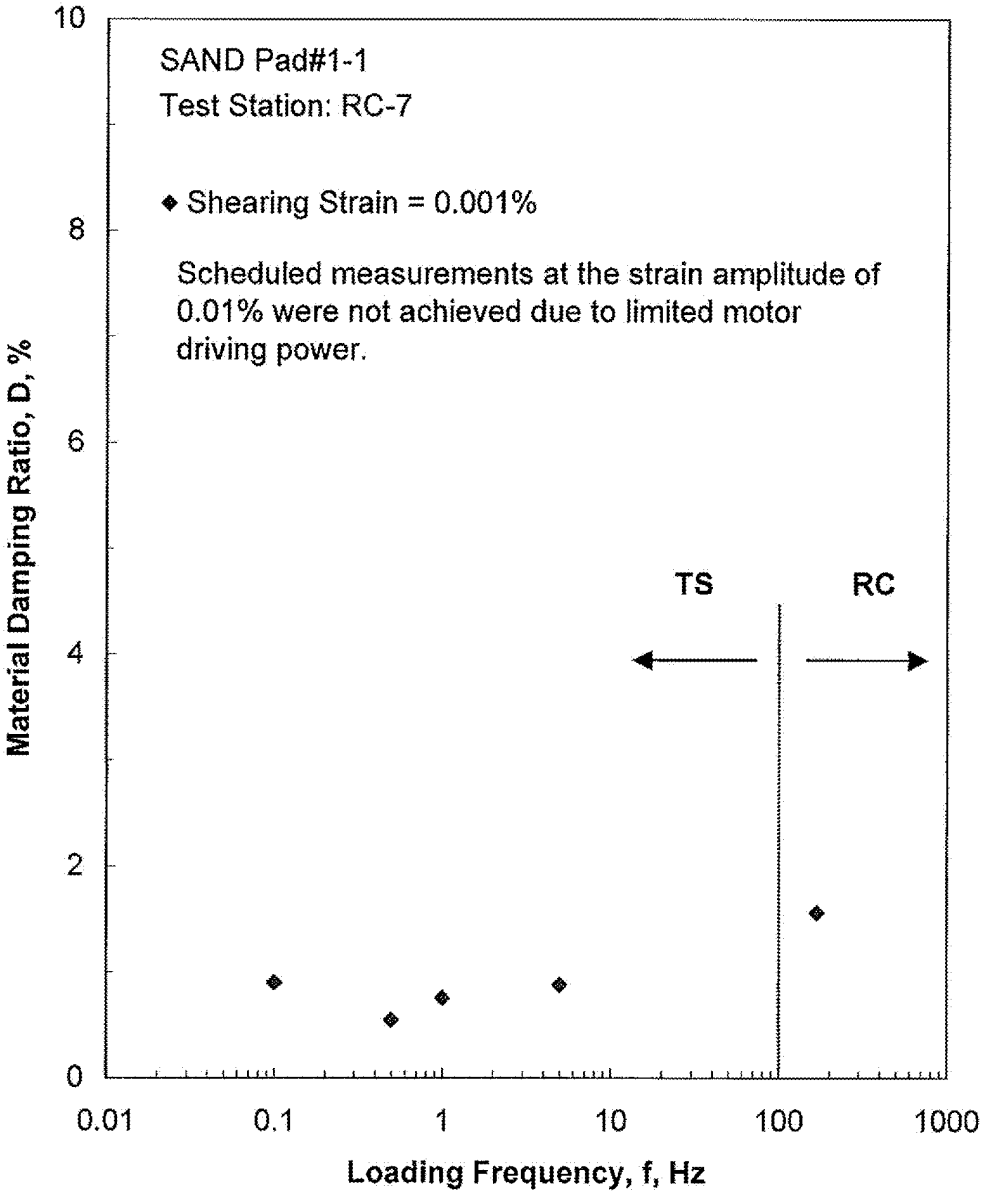



**Figure A.20 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

Table A.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 Pad 1-1

| Isotropic Confining Pressure, $\sigma_o$ | | | 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) | (%) | |
| 3 | 432 | 21 | 1007 | 48 | 508.6 | 1.62 | 0.42 |
| 6 | 864 | 41 | 1363 | 65 | 591.3 | 1.47 | 0.42 |
| 13 | 1872 | 90 | 2016 | 97 | 718.7 | 1.22 | 0.42 |
| 25 | 3600 | 172 | 2976 | 143 | 872.0 | 1.10 | 0.42 |
| 50 | 7200 | 345 | 4405 | 211 | 1058.9 | 0.99 | 0.41 |

Table A.2 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen Pad 1-1; Isoptropic Confining Pressure, $\sigma_o$= 13 psi (1.9 ksf = 90 kPa)

| Peak Shearing Strain, % | Shear Modulus, G, ksf | Normalized Shear Modulus, $G/G_{max}$ | Average[+] Shearing Strain, % | Material Damping Ratio[x], D, % |
|---|---|---|---|---|
| 1.44E-04 | 1969 | 1.00 | 1.44E-04 | 1.18 |
| 2.80E-04 | 1969 | 1.00 | 2.80E-04 | 1.21 |
| 5.24E-04 | 1935 | 0.98 | 5.24E-04 | 1.47 |
| 1.01E-03 | 1876 | 0.95 | 9.11E-04 | 1.78 |
| 1.87E-03 | 1793 | 0.91 | 1.62E-03 | 2.13 |
| 3.38E-03 | 1692 | 0.86 | 2.84E-03 | 2.70 |
| 6.24E-03 | 1542 | 0.78 | 5.00E-03 | 3.53 |
| 1.16E-02 | 1335 | 0.68 | 8.92E-03 | 4.30 |
| 2.26E-02 | 1083 | 0.55 | 1.61E-02 | 5.63 |

[+] 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 A.3 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen Pad 1-1; Isotropic Confining Pressure, $\sigma_o$= 13 psi (1.9 ksf = 90 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, % |
| 3.13E-04 | 2007 | 1.00 | 0.76 | 3.24E-04 | 1945 | 1.00 | 0.20 |
| 6.35E-04 | 1982 | 0.99 | 1.05 | 6.46E-04 | 1945 | 1.00 | 0.59 |
| 1.05E-03 | 1927 | 0.96 | 0.80 | 1.04E-03 | 1936 | 1.00 | 0.84 |
| 2.16E-03 | 1873 | 0.93 | 1.49 | 2.17E-03 | 1861 | 0.96 | 1.14 |
| 4.74E-03 | 1707 | 0.85 | 2.32 | 4.77E-03 | 1698 | 0.87 | 1.98 |
| 9.98E-03 | 1488 | 0.74 | 3.53 | 1.00E-02 | 1483 | 0.76 | 3.62 |

Table A.4 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen Pad 1-1; Isoptropic Confining Pressure, $\sigma_o$= 50 psi (7.2 ksf = 345 kPa)

| Peak Shearing Strain, % | Shear Modulus, G, ksf | Normalized Shear Modulus, $G/G_{max}$ | Average[+] Shearing Strain, % | Material Damping Ratio[x], D, % |
|---|---|---|---|---|
| 6.20E-05 | 4367 | 1.00 | 6.20E-05 | 0.99 |
| 1.23E-04 | 4367 | 1.00 | 1.23E-04 | 0.98 |
| 2.38E-04 | 4367 | 1.00 | 2.38E-04 | 1.04 |
| 4.57E-04 | 4294 | 0.98 | 4.57E-04 | 1.25 |
| 8.98E-04 | 4205 | 0.96 | 8.98E-04 | 1.57 |
| 1.66E-03 | 4100 | 0.94 | 1.49E-03 | 1.75 |
| 3.04E-03 | 3909 | 0.90 | 2.68E-03 | 2.22 |
| 5.40E-03 | 3602 | 0.83 | 4.59E-03 | 2.61 |
| 9.90E-03 | 3148 | 0.72 | 8.01E-03 | 3.29 |
| 1.82E-02 | 2719 | 0.62 | 1.38E-02 | 4.38 |
| 3.54E-02 | 2222 | 0.51 | 2.55E-02 | 5.55 |

[+] 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 A.5 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen Pad 1-1; Isotropic Confining Pressure, $\sigma_o$= 50 psi (7.2 ksf = 345 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, % |
| 6.18E-04 | 4392 | 0.96 | 0.64 | 6.16E-04 | 4408 | 0.96 | 0.42 |
| 1.04E-03 | 4364 | 0.96 | 0.60 | 1.03E-03 | 4406 | 0.96 | 0.55 |
| 2.10E-03 | 4299 | 0.94 | 0.71 | 2.11E-03 | 4297 | 0.94 | 0.68 |
| 4.35E-03 | 4167 | 0.91 | 1.21 | 4.35E-03 | 4161 | 0.91 | 1.34 |

# APPENDIX B

Remolded Specimen Pad 1-2
Sample Location: Streeter Rathburn Road

Borehole ---NA
Sample ---NA
Depth = --- ft ( --- m)
Total Unit Weight = 125.2 lb/ft$^3$
Water Content = 8.2%
Estimated In-Situ Mean Effective
Stress = 13 psi

FUGRO JOB #: 0411-08-1696
Testing Station: RC7

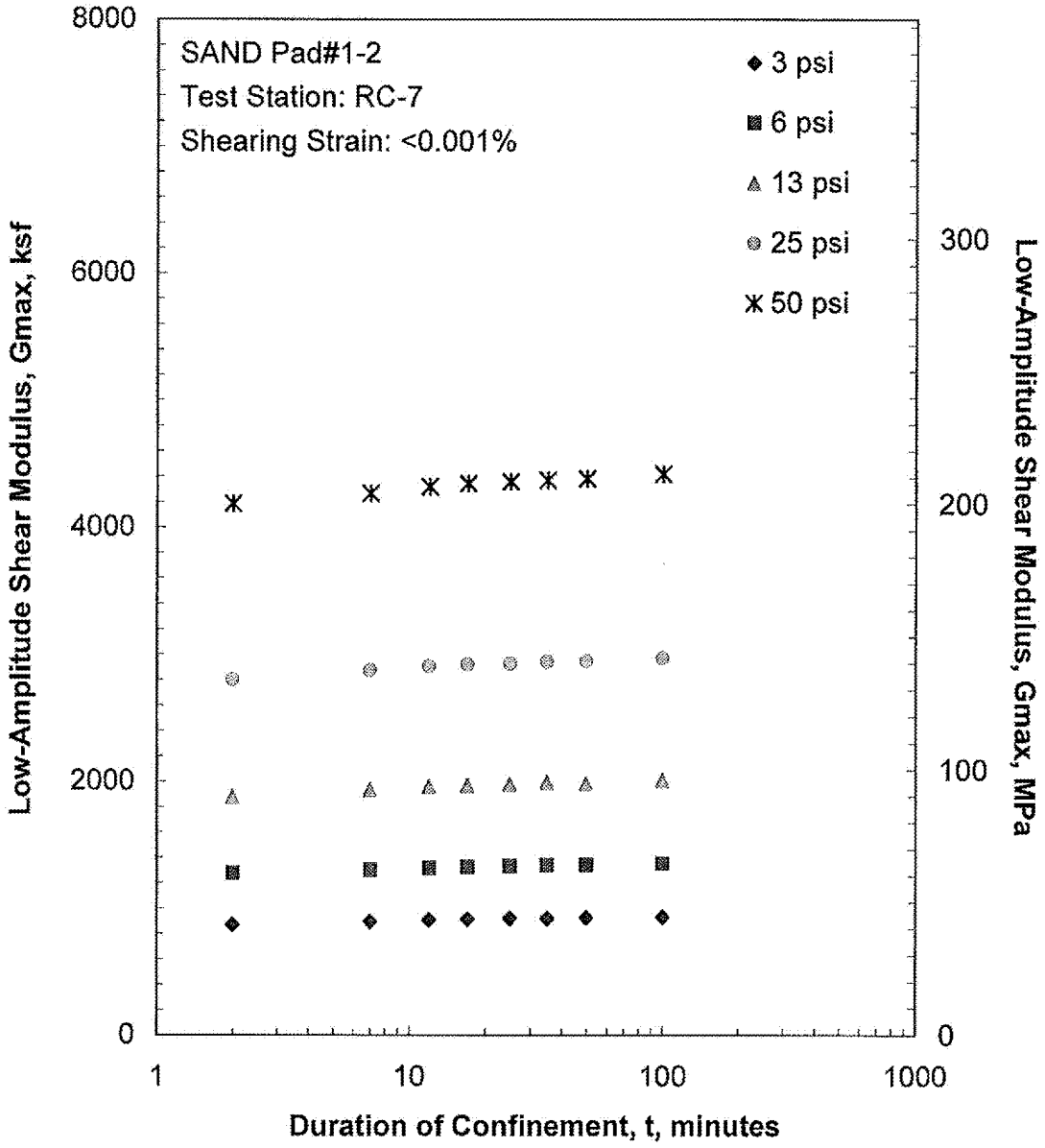



**Figure B.1 Variation in Low-Amplitude Shear Modulus with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests**

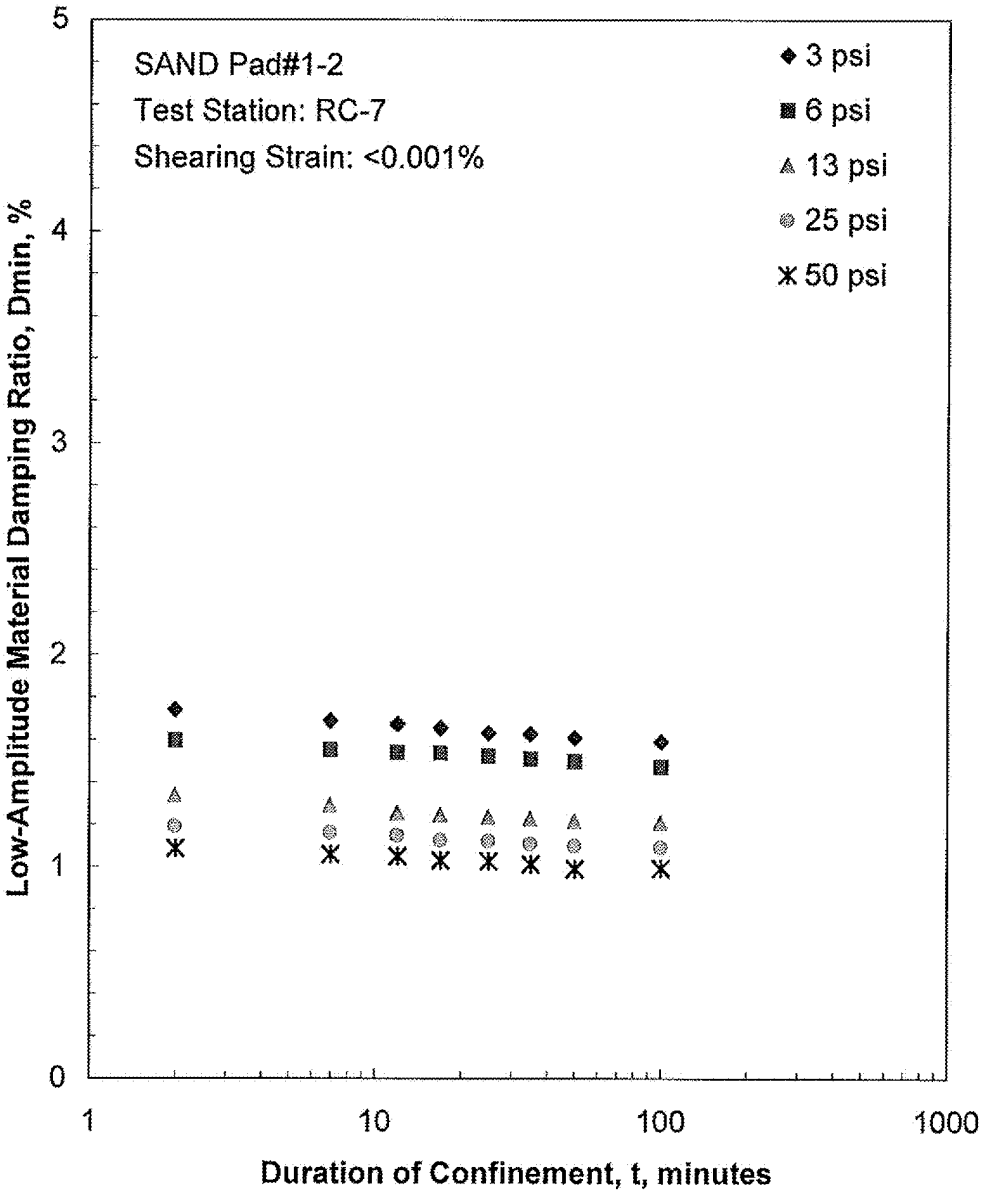



**Figure B.2 Variation in Low-Amplitude Material Damping Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests**

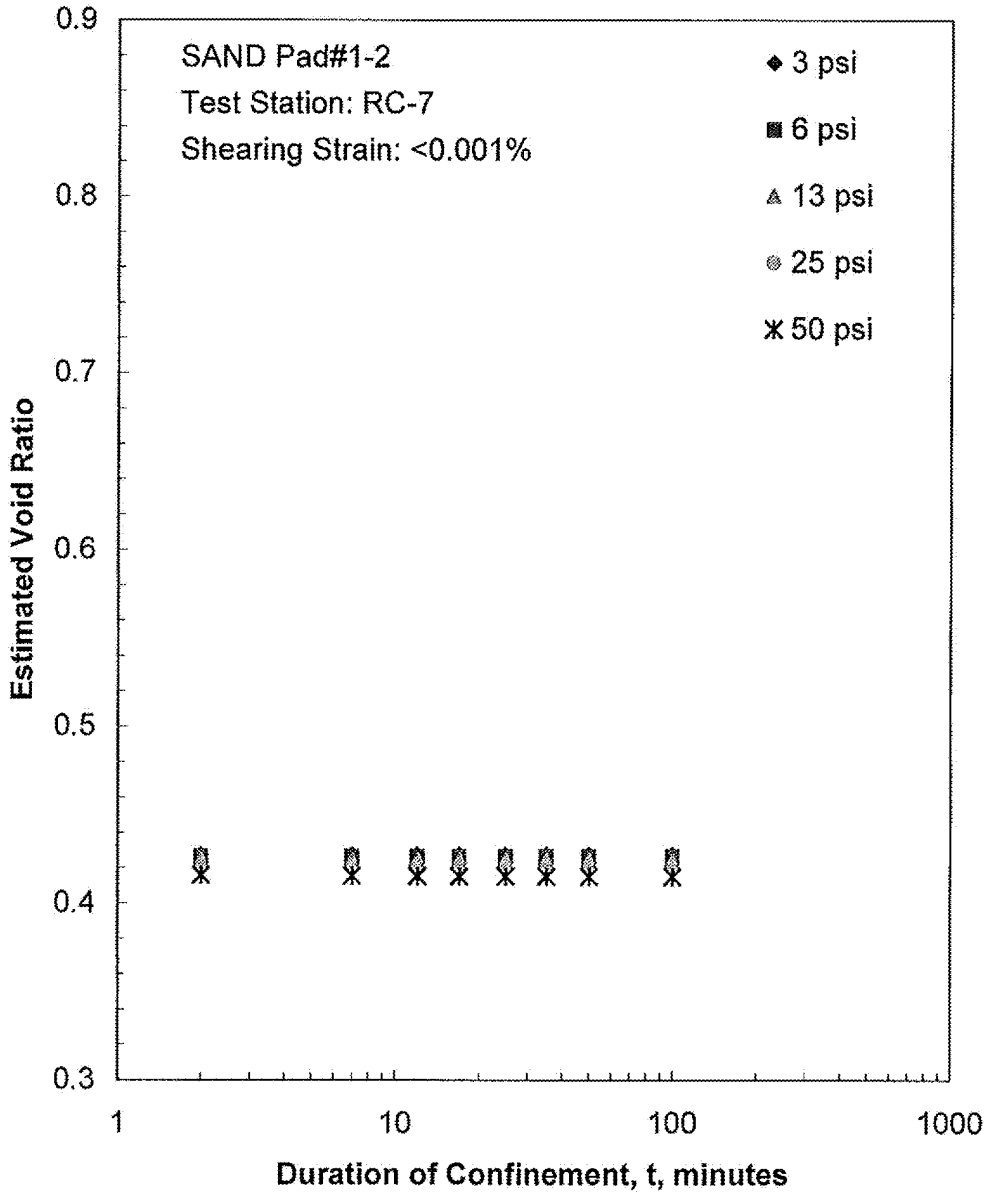



**Figure B.3 Variation in Estimated Void Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests**

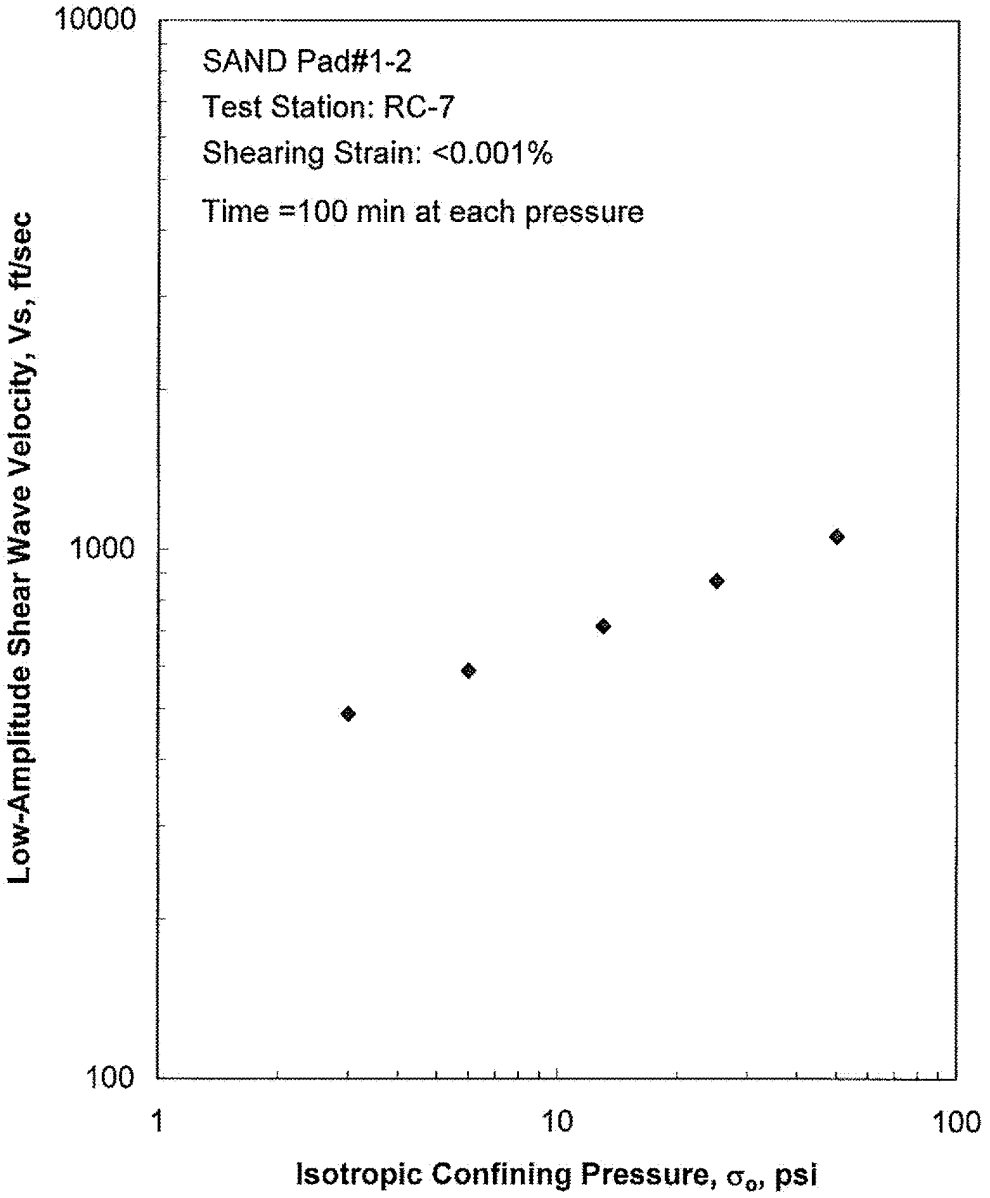



**Figure B.4 Variation in Low-Amplitude Shear Wave Velocity with Isotropic Confining Pressure from Resonant Column Tests**

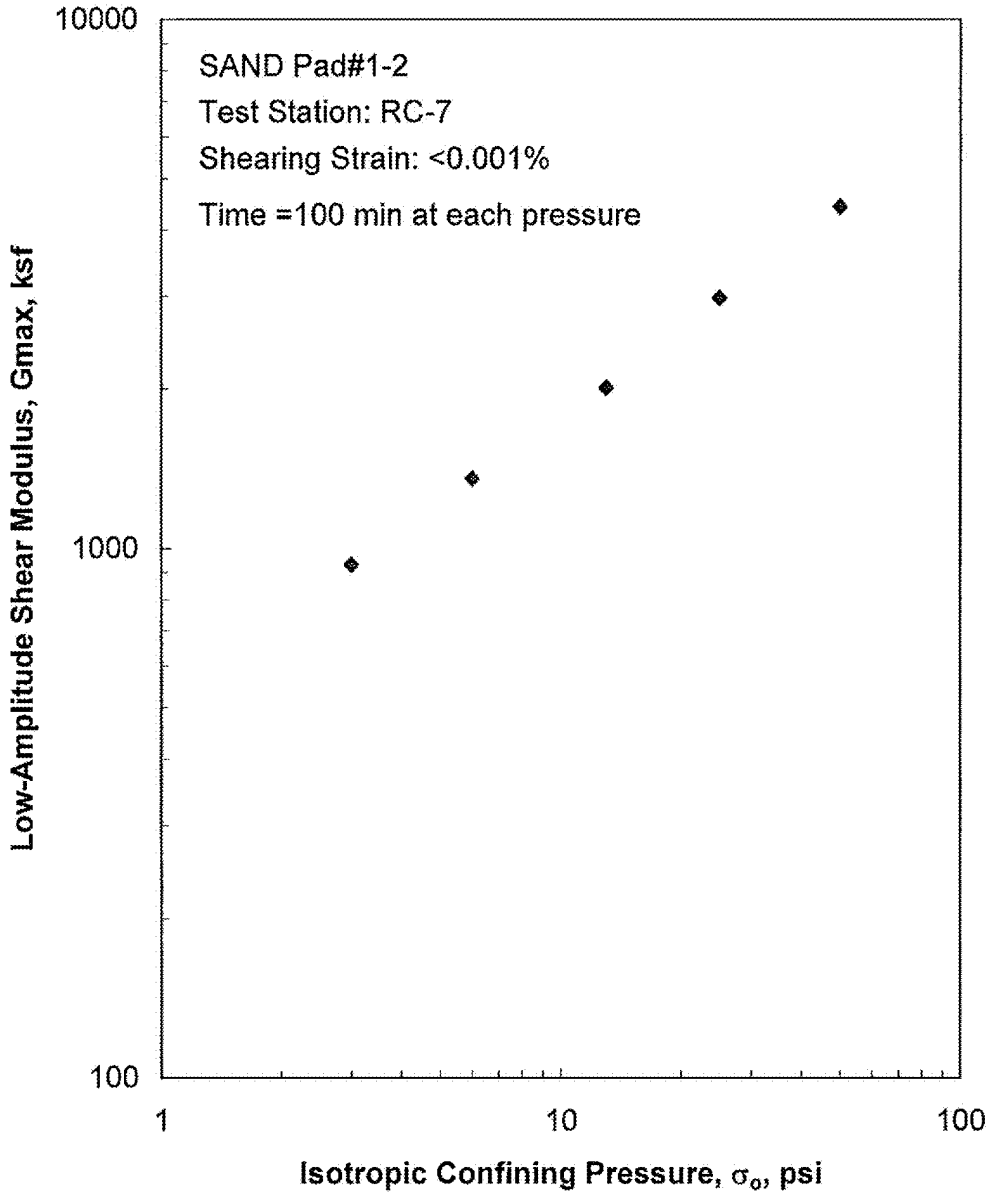



**Figure B.5 Variation in Low-Amplitude Shear Modulus with Isotropic Confining Pressure from Resonant Column Tests**

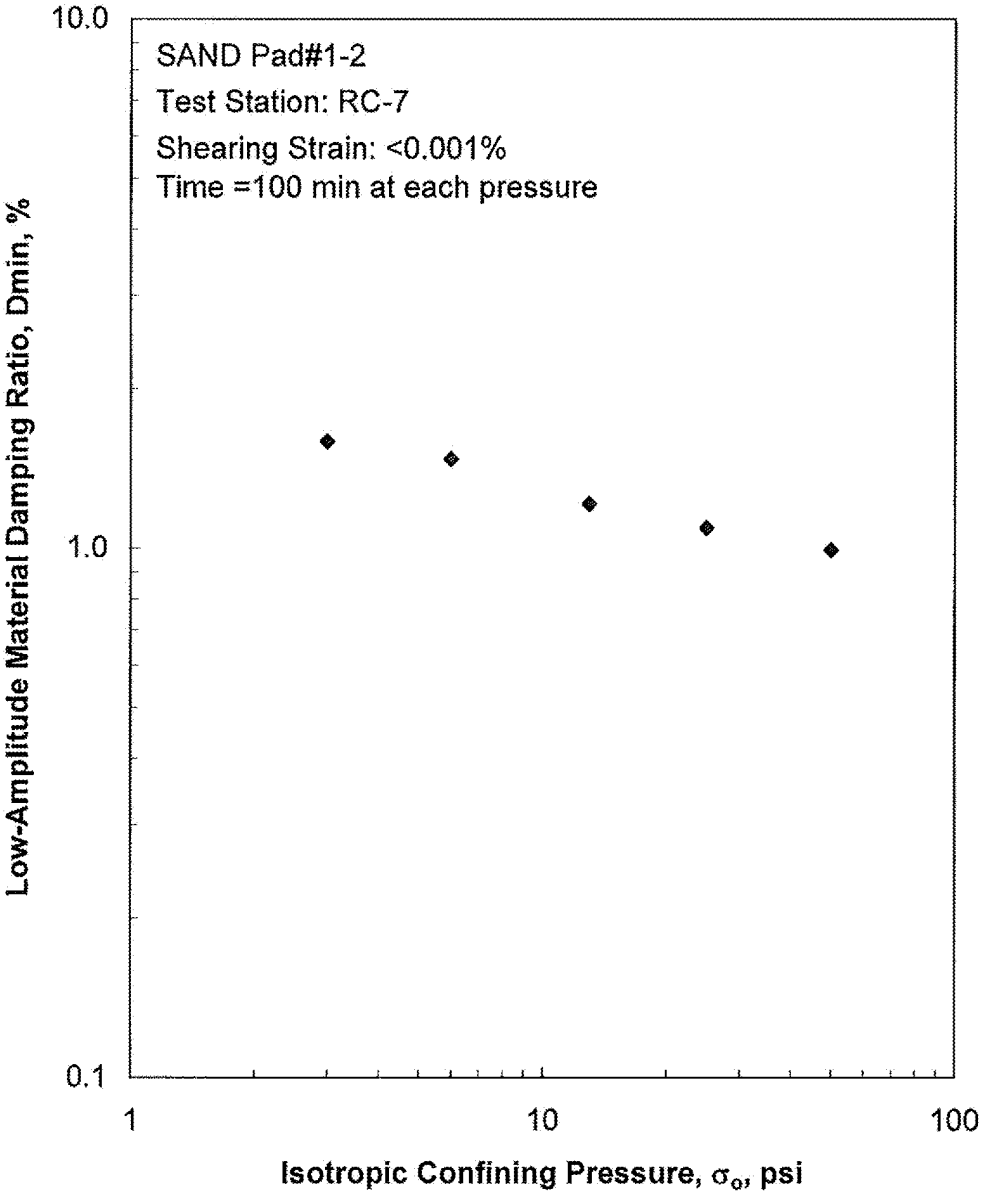



**Figure B.6 Variation in Low-Amplitude Material Damping Ratio with Isotropic Confining Pressure from Resonant Column Tests**

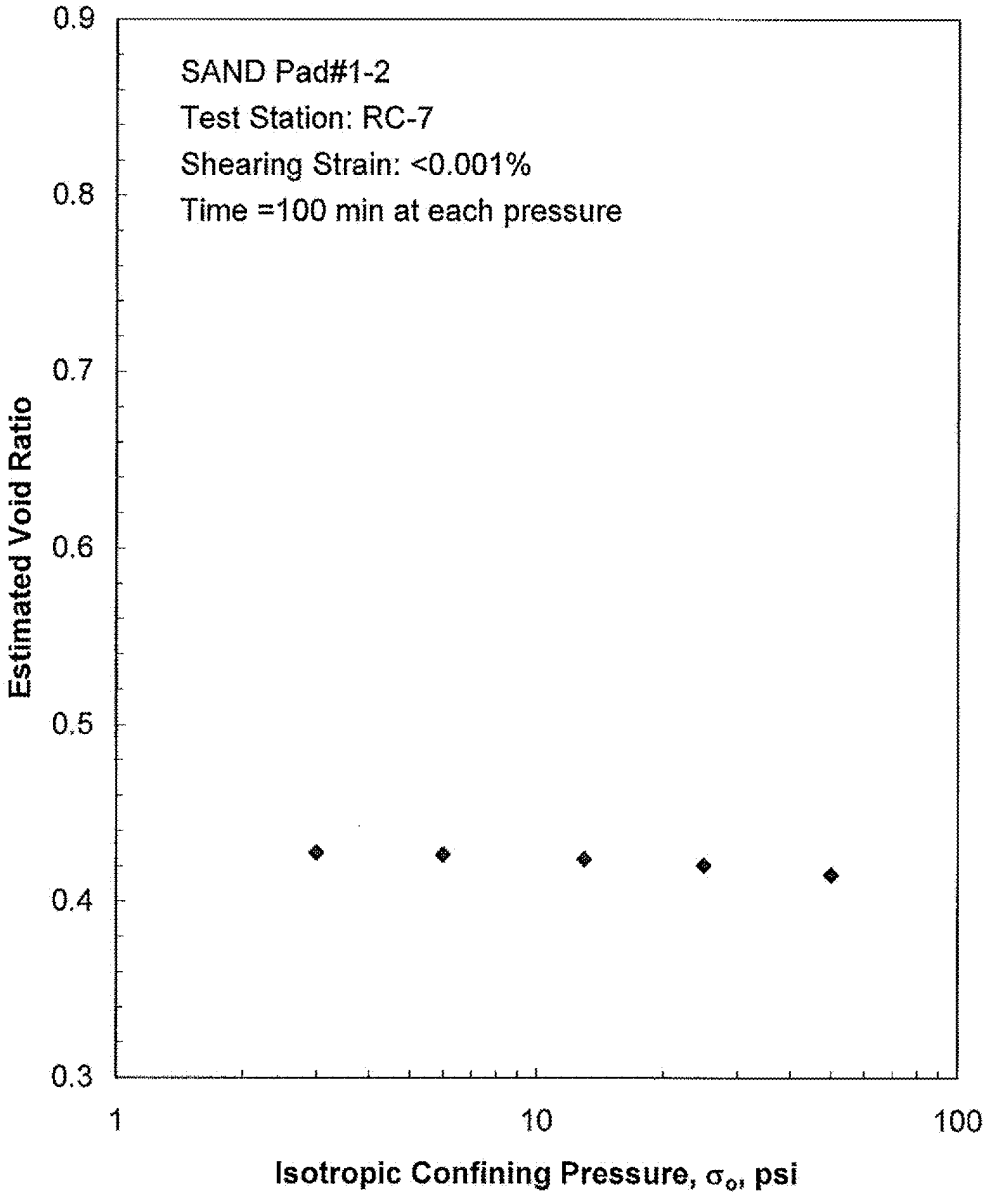



**Figure B.7 Variation in Estimated Void Ratio with Isotropic Confining Pressure from Resonant Column Tests**

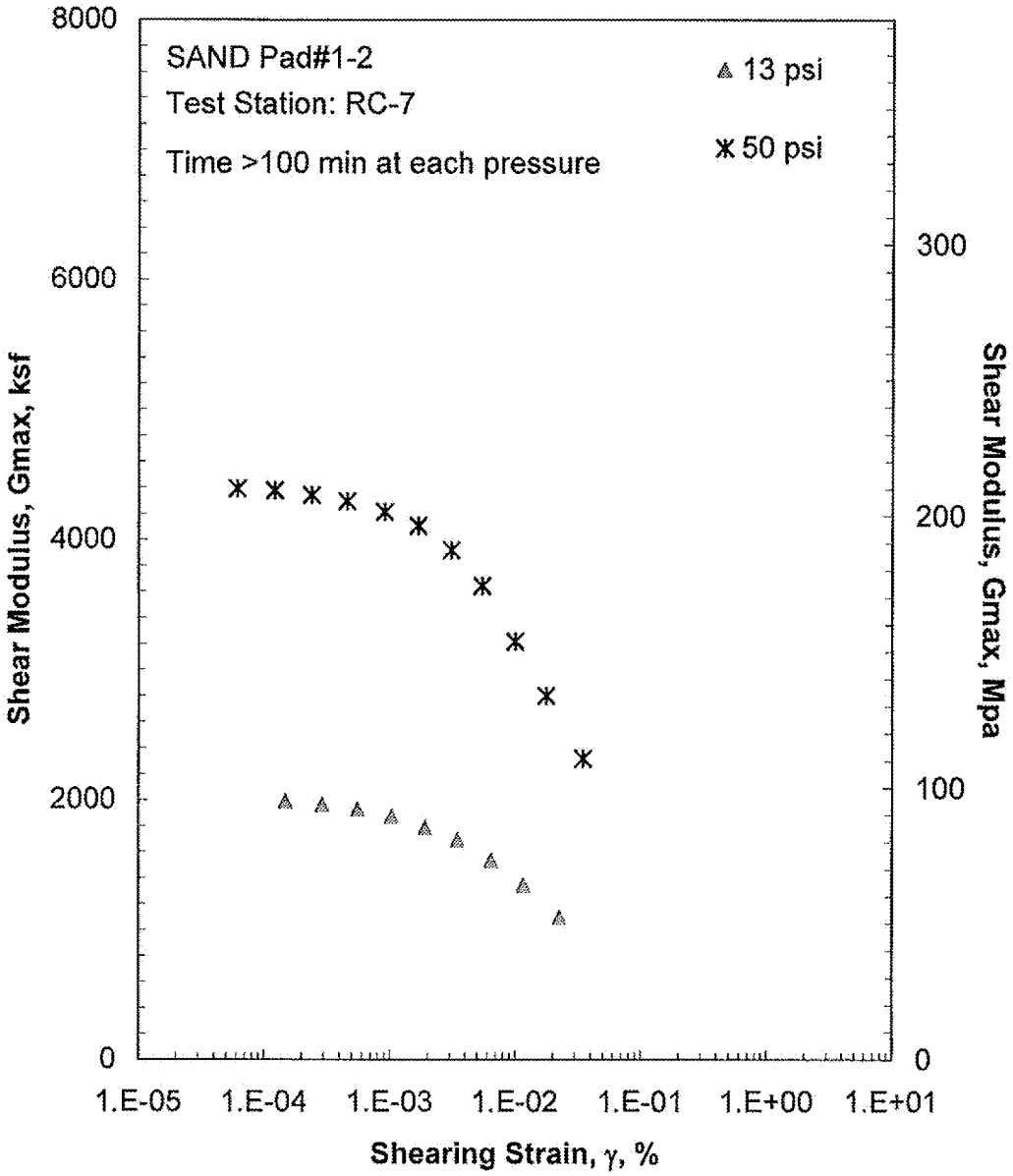



**Figure B.8 Comparison of the Variation in Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests**

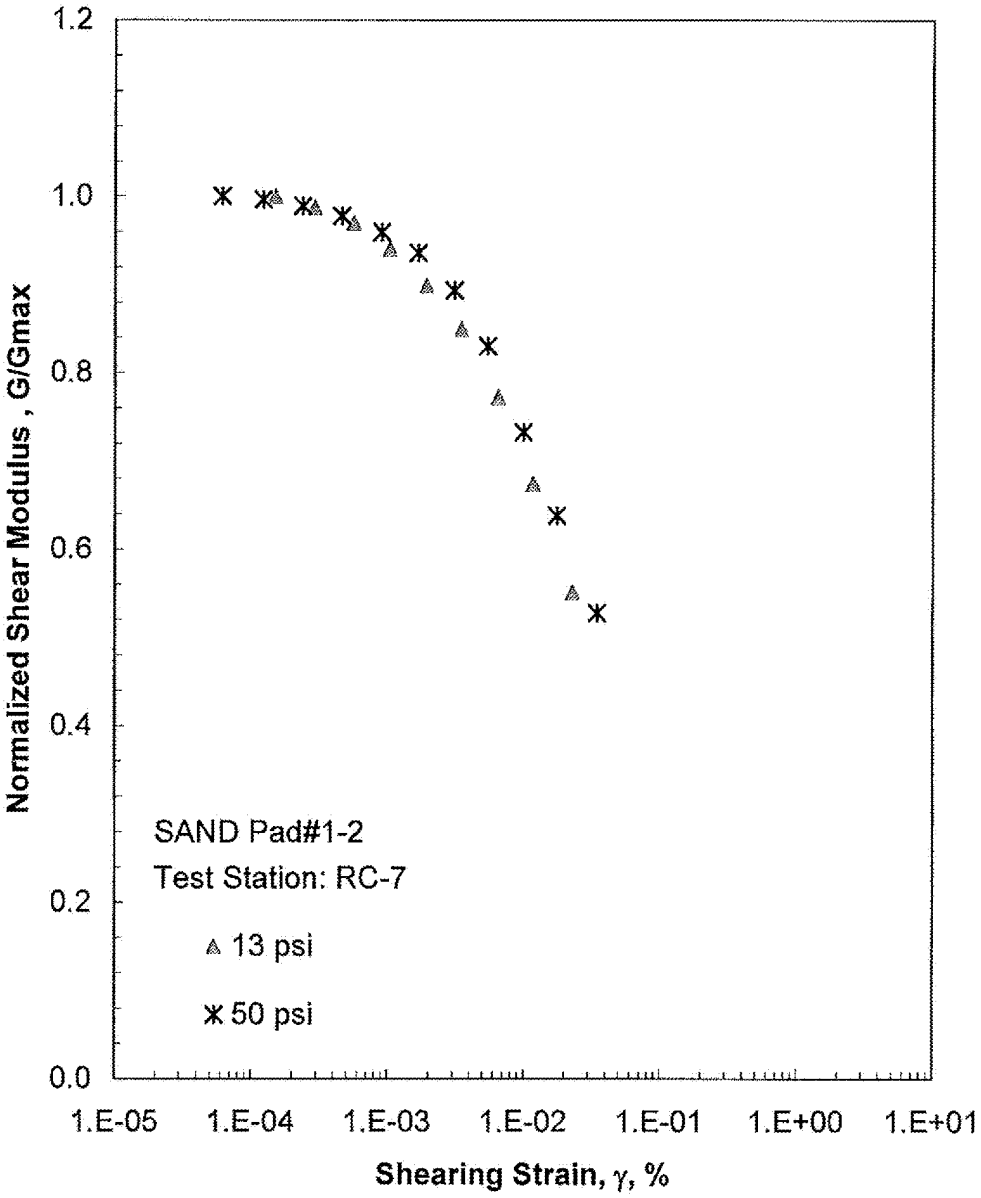



**Figure B.9 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests**

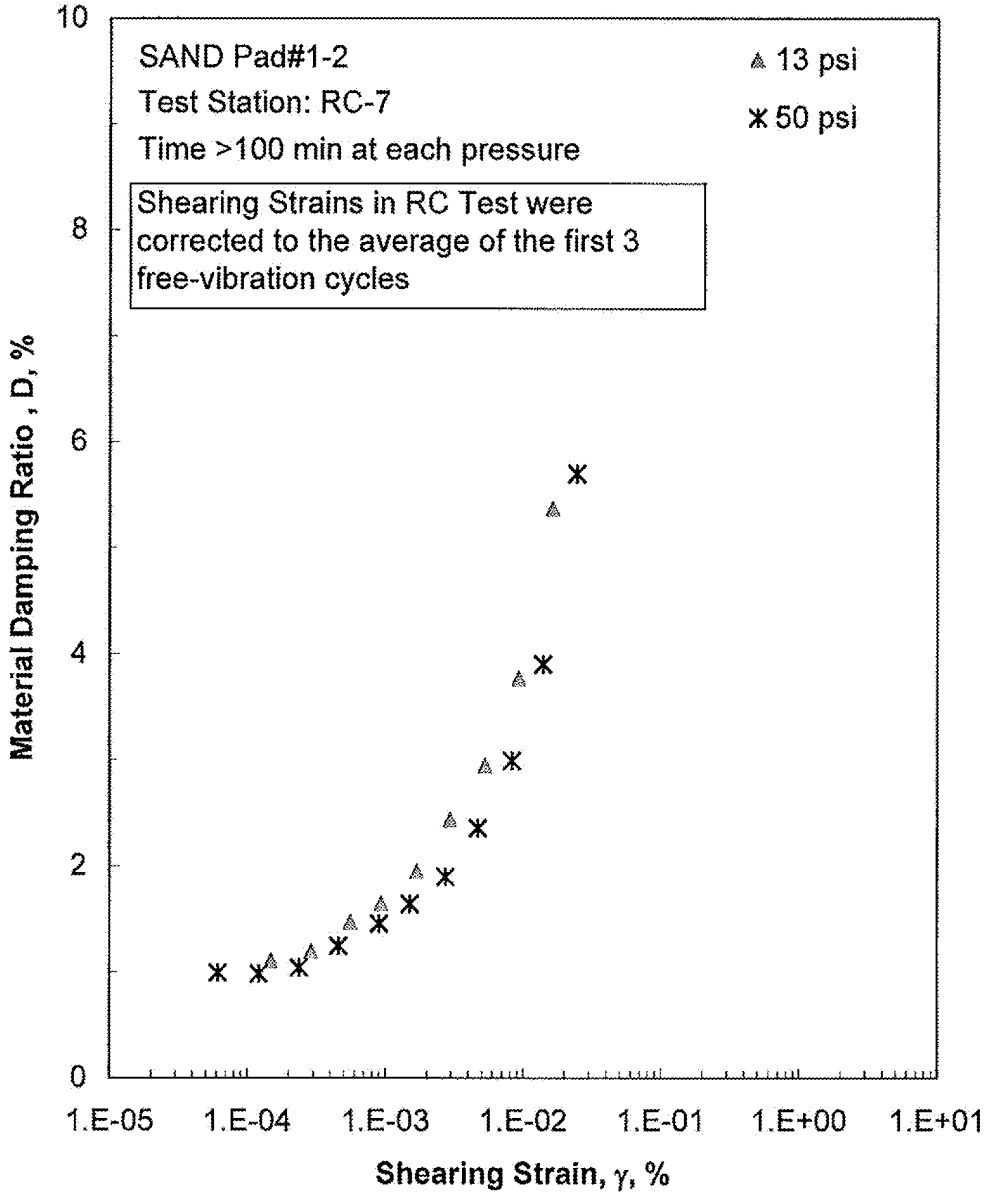



**Figure B.10 Comparison of the Variation in Material Damping Ratio with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests**

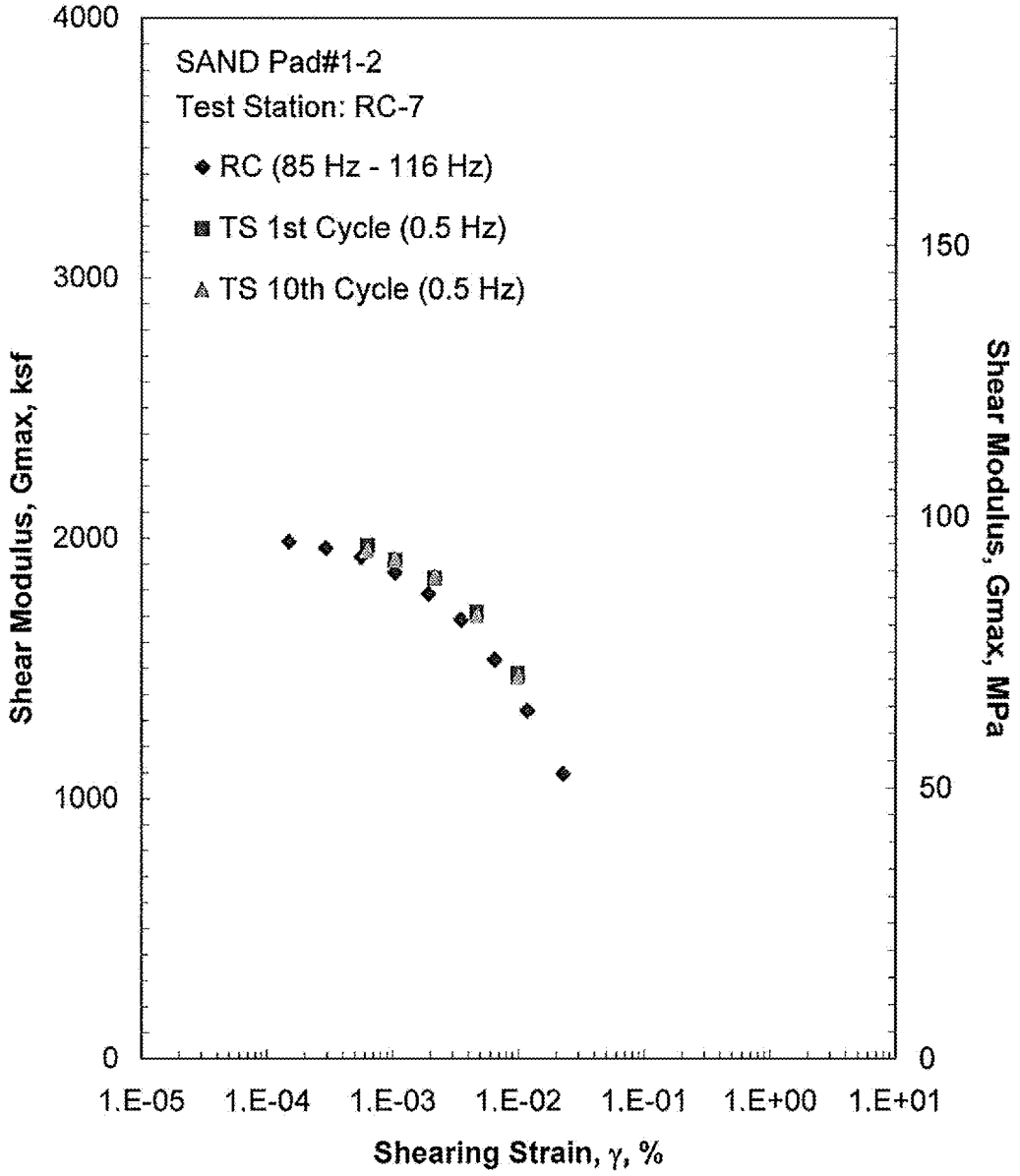



**Figure B.11 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

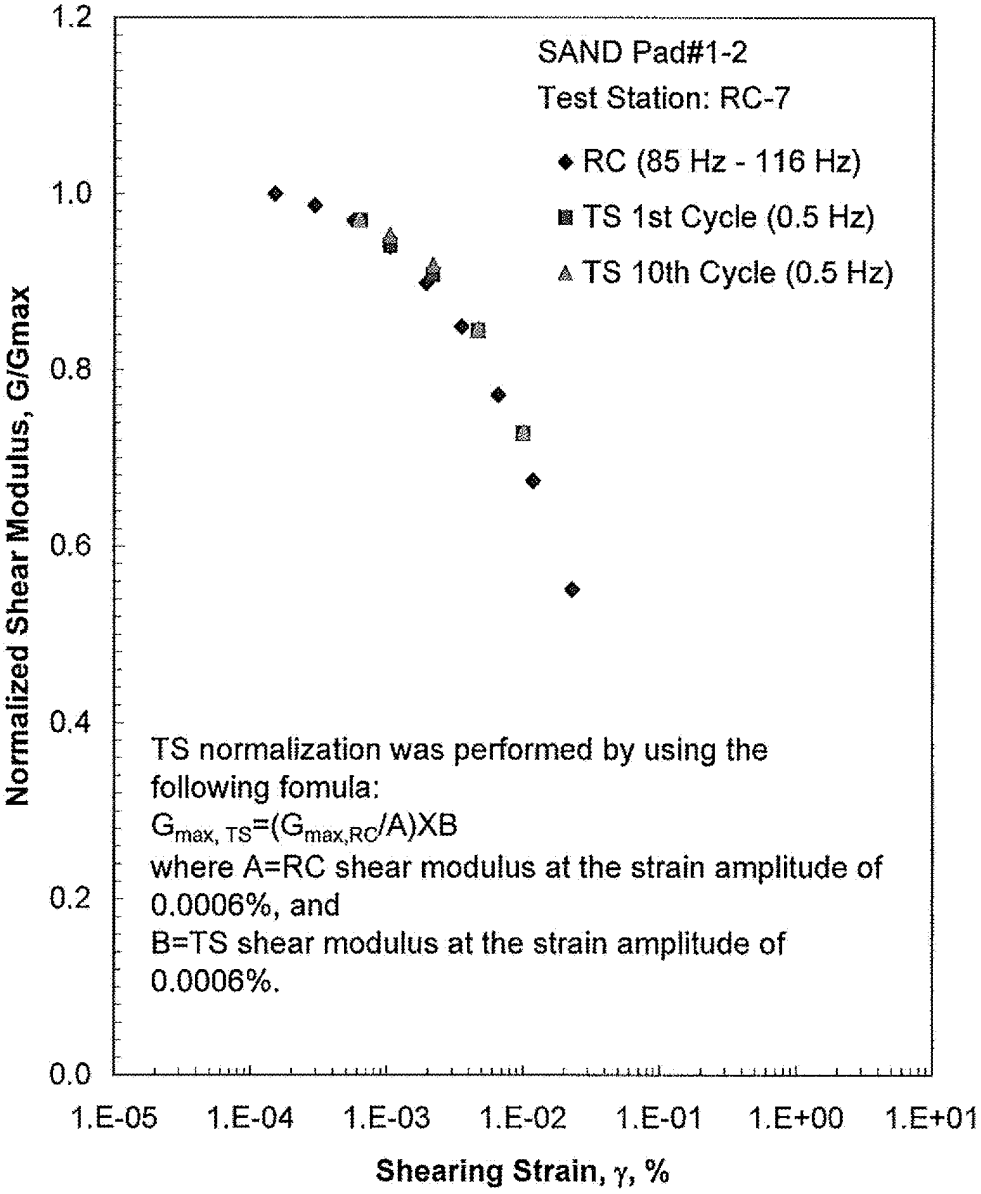



**Figure B.12 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

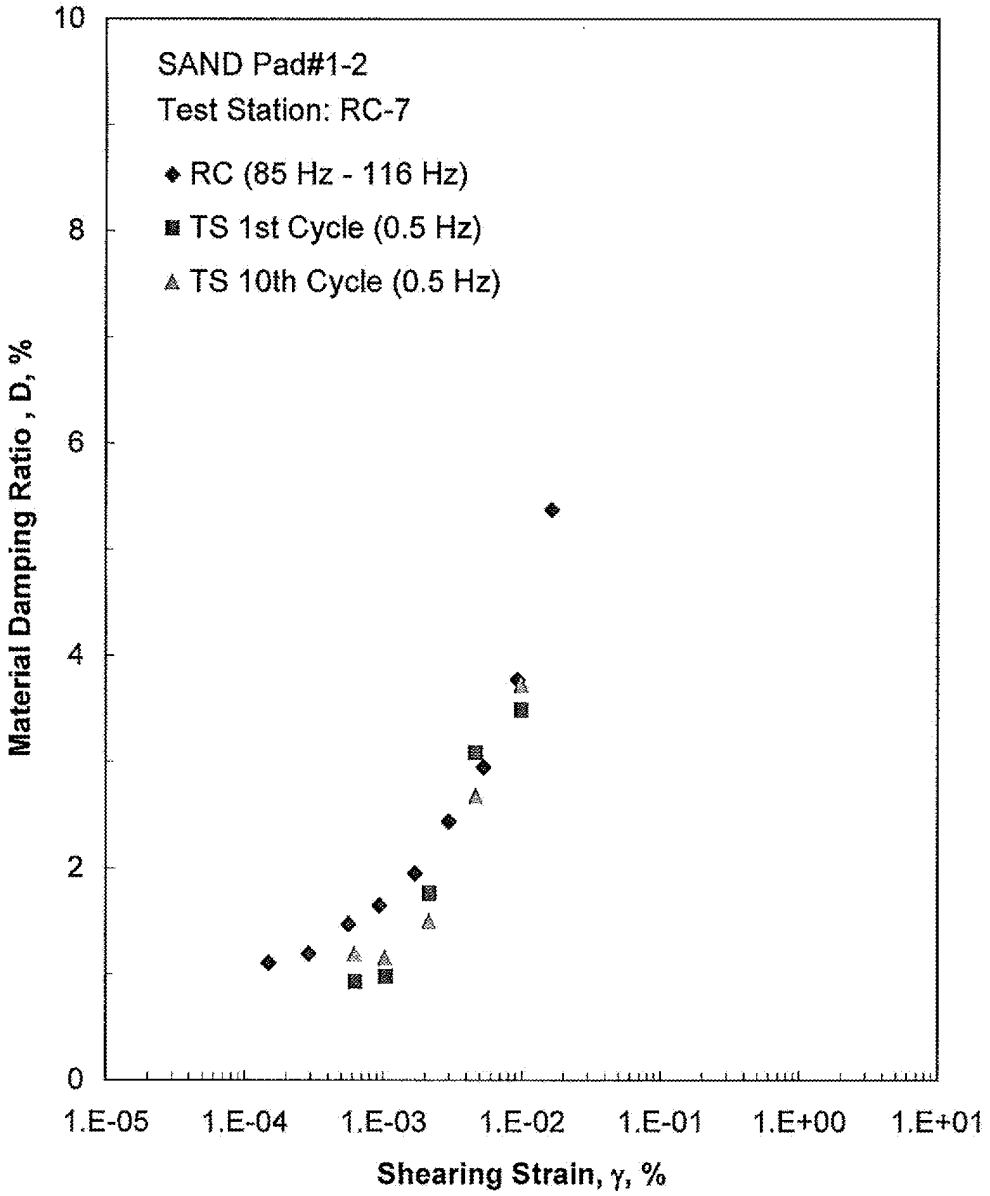



**Figure B.13 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

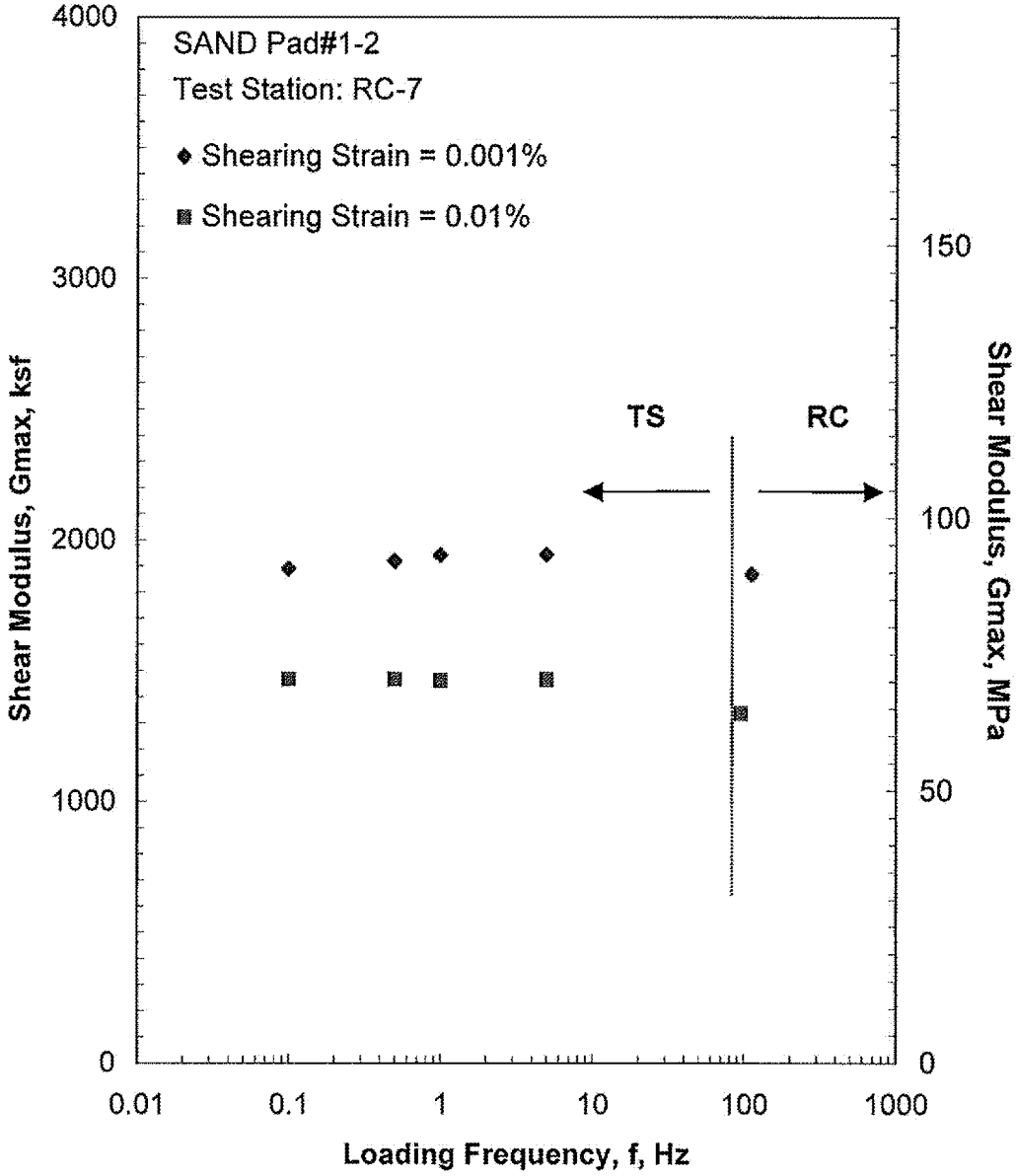



**Figure B.14 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

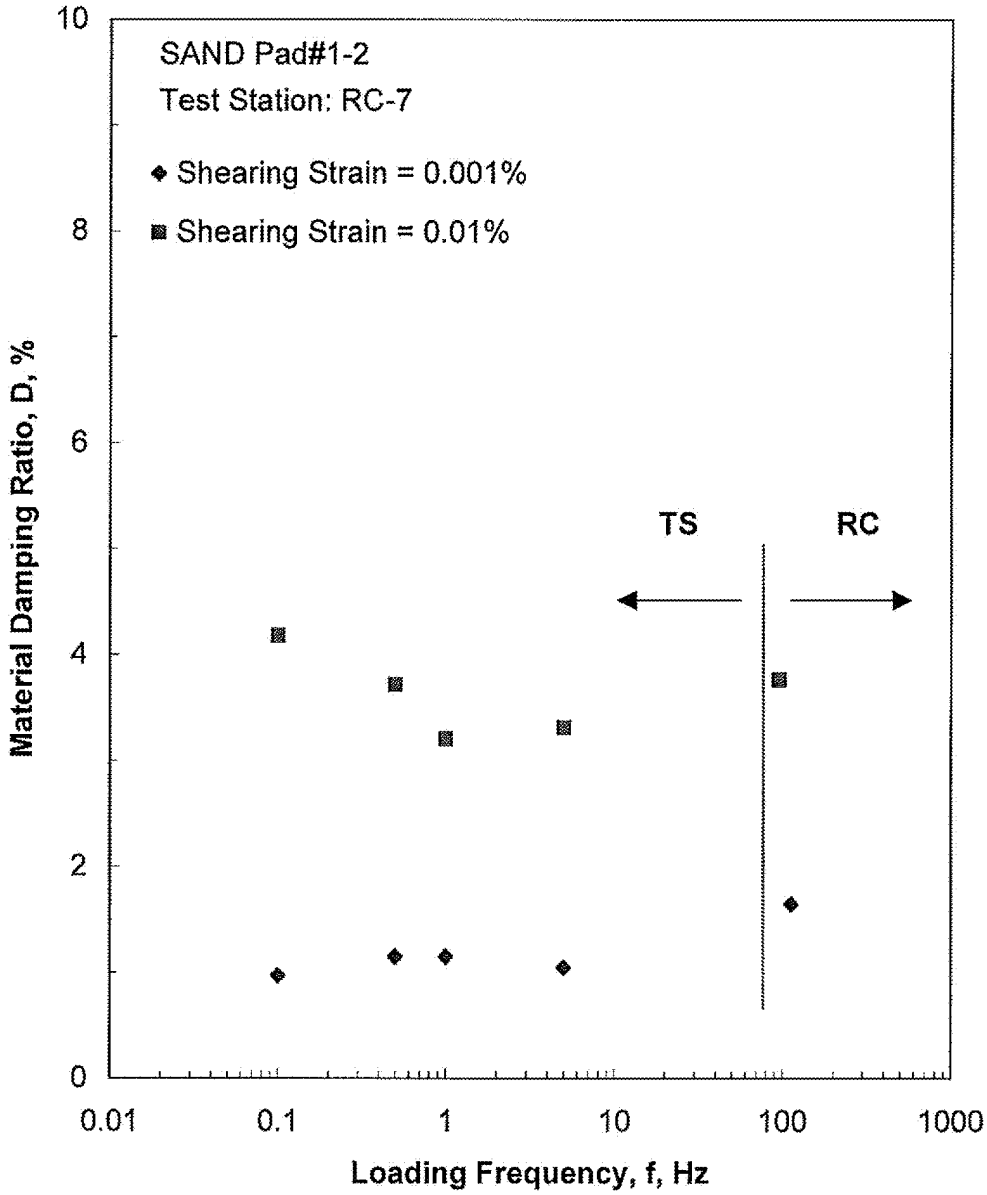



**Figure B.15 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

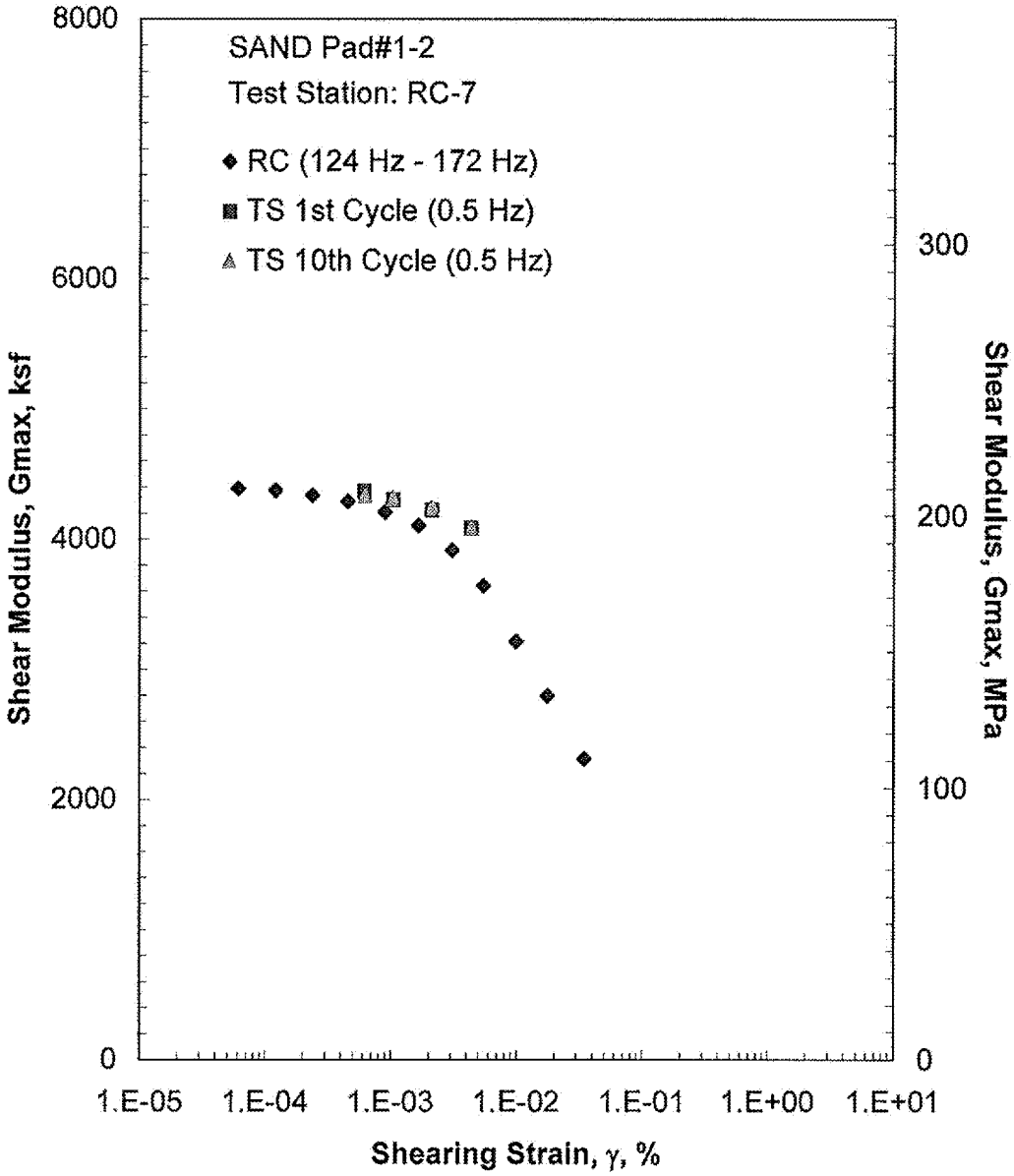



**Figure B.16 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

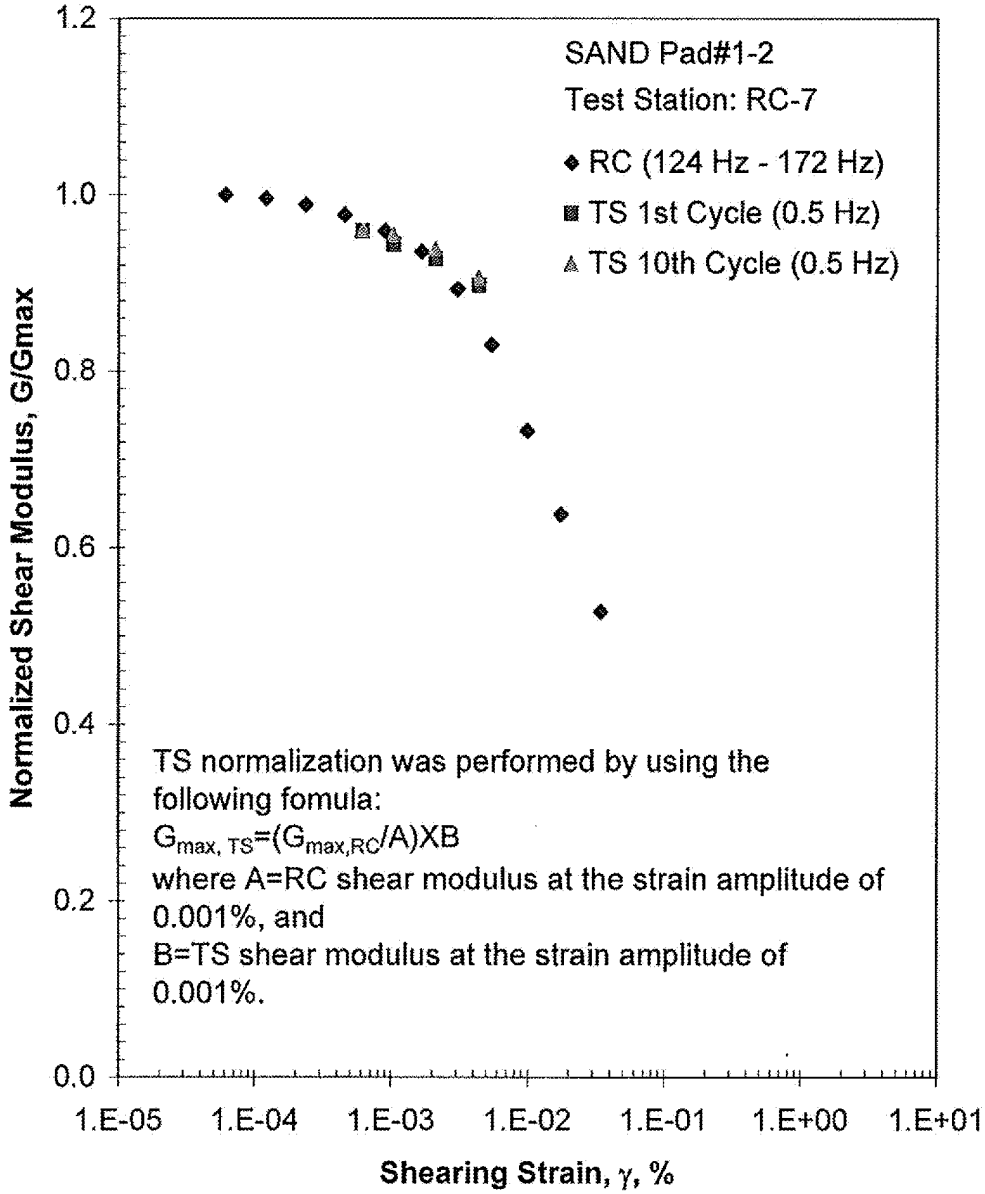



**Figure B.17 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

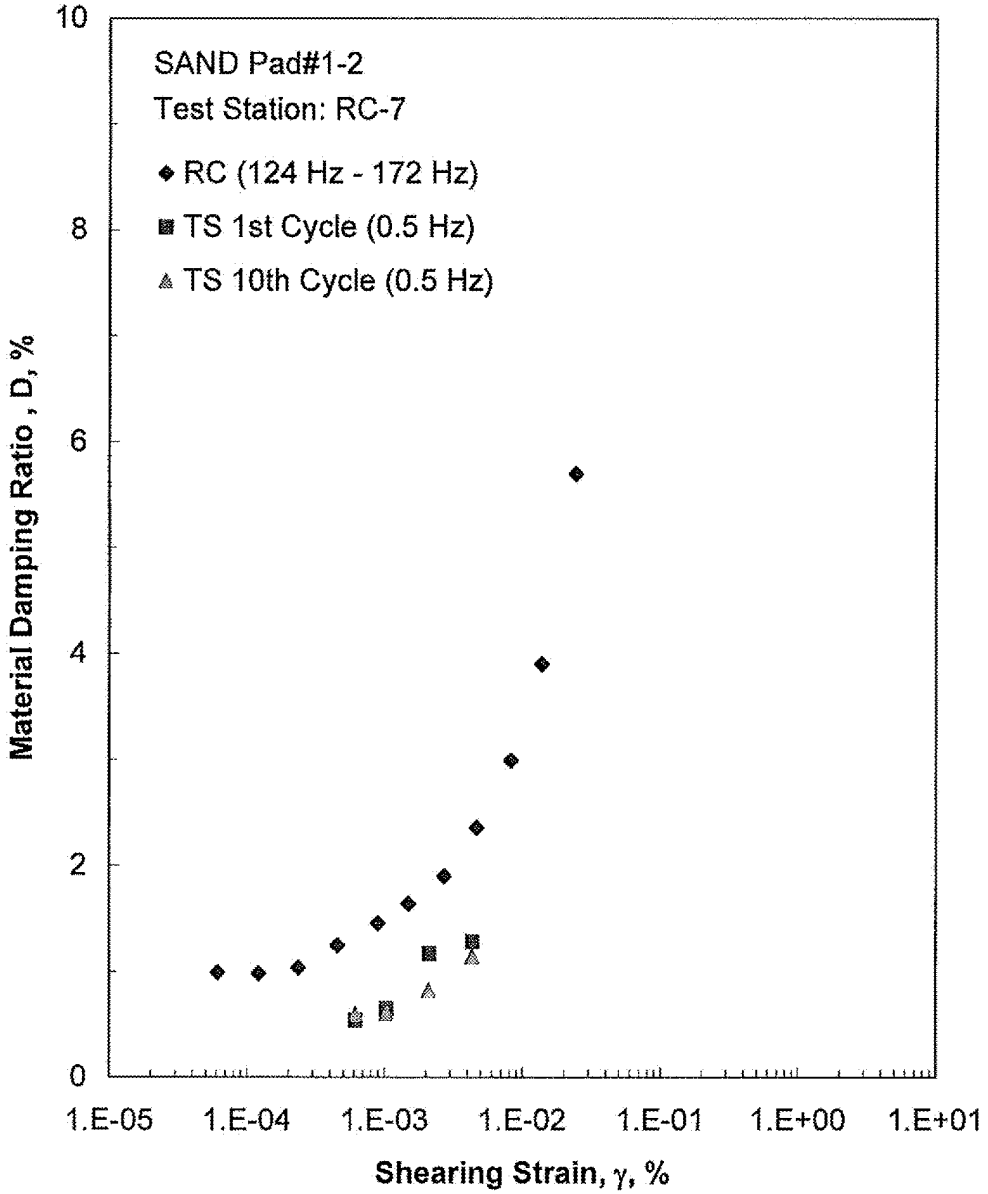



**Figure B.18 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

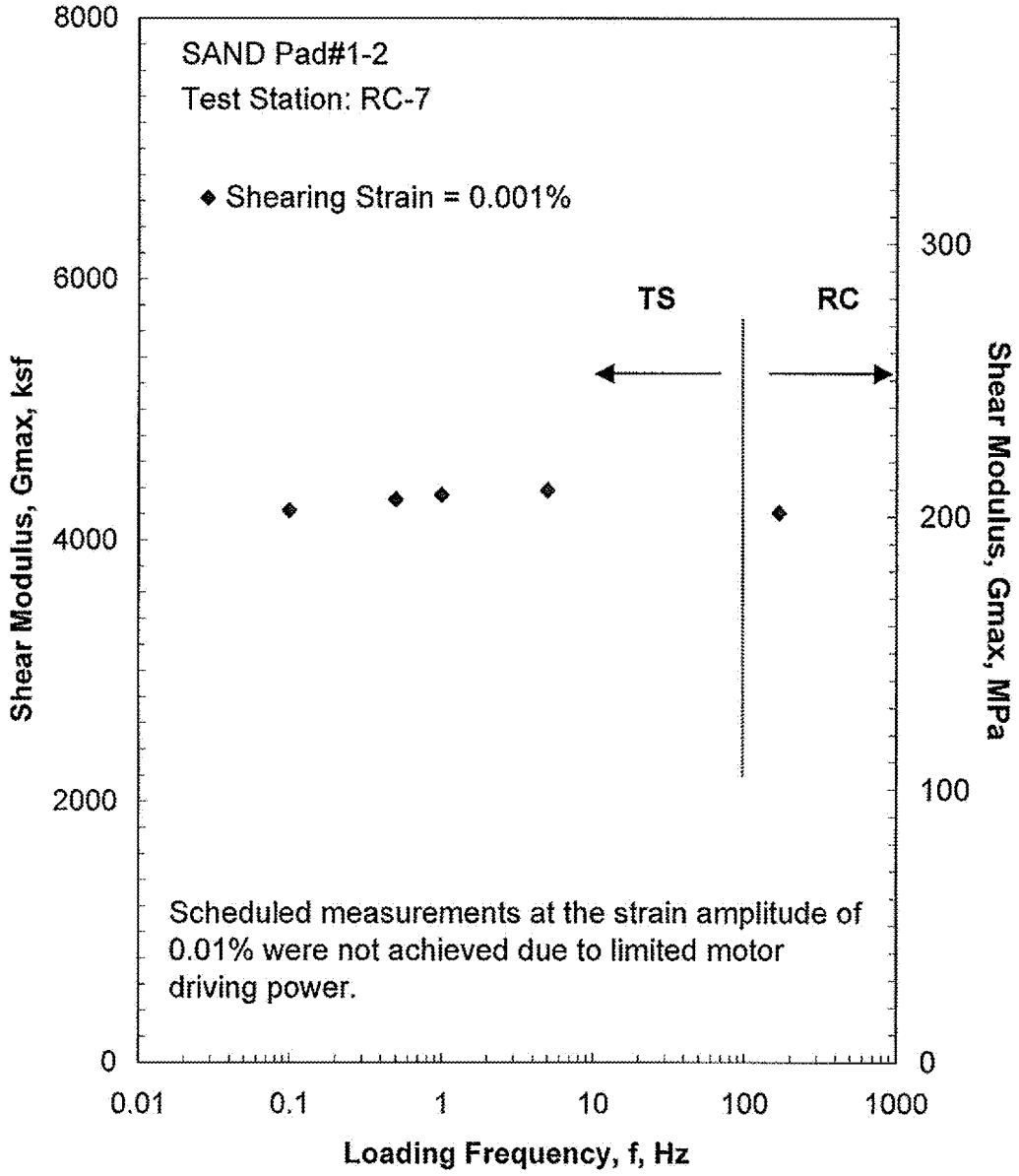



**Figure B.19 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

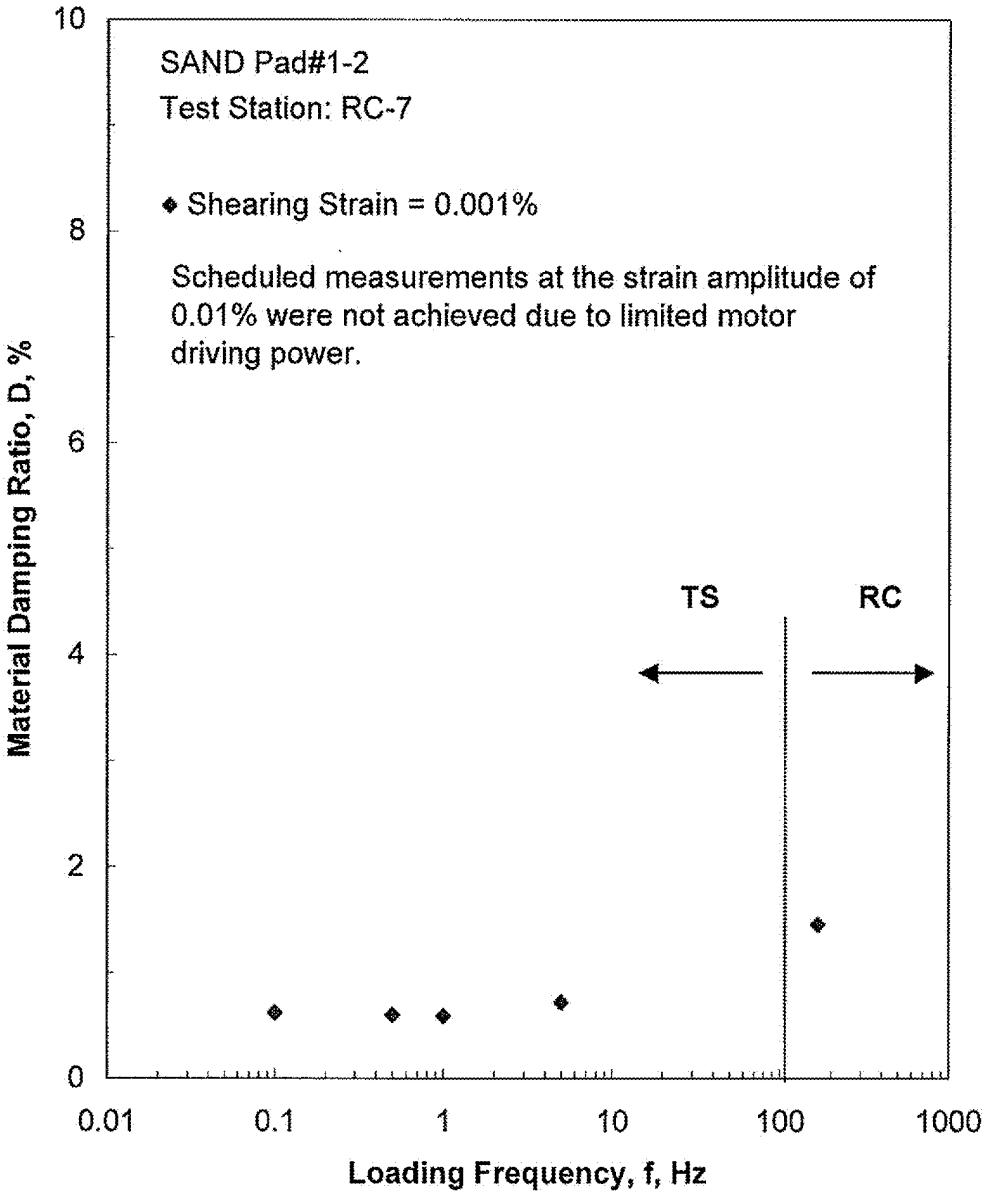



**Figure B.20 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

Table B.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 Pad 1-2

| Isotropic Confining Pressure, $\sigma_o$ | | | 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) | (%) | |
| 3 | 432 | 21 | 932 | 45 | 489.0 | 1.59 | 0.43 |
| 6 | 864 | 41 | 1355 | 65 | 589.6 | 1.47 | 0.43 |
| 13 | 1872 | 90 | 2010 | 96 | 717.4 | 1.21 | 0.42 |
| 25 | 3600 | 172 | 2971 | 143 | 871.1 | 1.09 | 0.42 |
| 50 | 7200 | 345 | 4415 | 212 | 1059.9 | 0.99 | 0.42 |

Table B.2 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen Pad1-2; Isoptropic Confining Pressure, $\sigma_o$= 13 psi (1.9 ksf = 90 kPa)

| Peak Shearing Strain, % | Shear Modulus, G, ksf | Normalized Shear Modulus, $G/G_{max}$ | Average[+] Shearing Strain, % | Material Damping Ratio[x], D, % |
|---|---|---|---|---|
| 1.50E-04 | 1988 | 1.00 | 1.50E-04 | 1.11 |
| 2.93E-04 | 1962 | 0.99 | 2.93E-04 | 1.20 |
| 5.63E-04 | 1928 | 0.97 | 5.63E-04 | 1.47 |
| 1.05E-03 | 1869 | 0.94 | 9.43E-04 | 1.65 |
| 1.93E-03 | 1786 | 0.90 | 1.70E-03 | 1.95 |
| 3.51E-03 | 1688 | 0.85 | 2.98E-03 | 2.44 |
| 6.51E-03 | 1534 | 0.77 | 5.33E-03 | 2.95 |
| 1.18E-02 | 1339 | 0.67 | 9.33E-03 | 3.77 |
| 2.29E-02 | 1095 | 0.55 | 1.65E-02 | 5.37 |

[+] 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 B.3 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen Pad1-2; Isotropic Confining Pressure, $\sigma_o$= 13 psi (1.9 ksf = 90 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, % |
| 6.31E-04 | 1972 | 0.97 | 0.93 | 6.26E-04 | 1953 | 0.97 | 1.19 |
| 1.04E-03 | 1915 | 0.94 | 0.98 | 1.04E-03 | 1919 | 0.95 | 1.15 |
| 2.17E-03 | 1847 | 0.91 | 1.76 | 2.16E-03 | 1851 | 0.92 | 1.50 |
| 4.66E-03 | 1717 | 0.84 | 3.09 | 4.70E-03 | 1703 | 0.85 | 2.68 |
| 9.91E-03 | 1480 | 0.73 | 3.49 | 1.00E-02 | 1467 | 0.73 | 3.72 |

Table B.4 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen Pad 1-2; Isoptropic Confining Pressure, $\sigma_o$= 50 psi (7.2 ksf = 345 kPa)

| Peak Shearing Strain, % | Shear Modulus, G, ksf | Normalized Shear Modulus, $G/G_{max}$ | Average[+] Shearing Strain, % | Material Damping Ratio[x], D, % |
|---|---|---|---|---|
| 6.10E-05 | 4389 | 1.00 | 6.10E-05 | 0.99 |
| 1.21E-04 | 4373 | 1.00 | 1.21E-04 | 0.98 |
| 2.37E-04 | 4340 | 0.99 | 2.37E-04 | 1.04 |
| 4.56E-04 | 4291 | 0.98 | 4.56E-04 | 1.25 |
| 8.98E-04 | 4211 | 0.96 | 8.98E-04 | 1.46 |
| 1.67E-03 | 4107 | 0.94 | 1.50E-03 | 1.64 |
| 3.06E-03 | 3918 | 0.89 | 2.72E-03 | 1.90 |
| 5.44E-03 | 3643 | 0.83 | 4.68E-03 | 2.36 |
| 9.94E-03 | 3215 | 0.73 | 8.25E-03 | 2.99 |
| 1.76E-02 | 2799 | 0.64 | 1.39E-02 | 3.90 |
| 3.46E-02 | 2316 | 0.53 | 2.45E-02 | 5.70 |

[+] 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 B.5 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen Pad 1-2; Isotropic Confining Pressure, $\sigma_c$= 50 psi (7.2 ksf = 345 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, % |
| 6.14E-04 | 4370 | 0.96 | 0.54 | 6.19E-04 | 4335 | 0.96 | 0.60 |
| 1.04E-03 | 4301 | 0.94 | 0.65 | 1.04E-03 | 4314 | 0.95 | 0.60 |
| 2.12E-03 | 4225 | 0.93 | 1.17 | 2.11E-03 | 4242 | 0.94 | 0.82 |
| 4.38E-03 | 4088 | 0.90 | 1.28 | 4.38E-03 | 4091 | 0.91 | 1.14 |

# ATTACHMENT B

Fugro # 0411-08-1696

Geotechnical
Environmental &
Water Resources
Engineering

GEI Consultants

# LETTER OF TRANSMITTAL

400 Unicorn Park Drive
Woburn, MA 01801
Phone: (781) 721-4000
Fax: (781) 721-4073
www.geiconsultants.com

| | | | |
|---|---|---|---|
| To: | Bill DeGroff | Date: | April 17, 2008 |
| | Fugro Consultants, Inc.<br>6100 Hillcroft (77081) | GEI Project No. | 07223, Task 1003 |
| | | Re: | Nine Mile Point |
| | Houston, TX 77081 | | |

**We are sending you the following enclosures:**

| No. | Type | Description |
|---|---|---|
| 1 | | Bag sample of borrow soil: Streeter Rathburn Road, Sample Pad #1 (<3/4-inch material) for RCTS testing |
| 2 | | Modified Compaction and Grain Size Distribution Curves |
| 3 | | Chain-of-Custody Form |
| | | |
| | | |

**These are transmitted as checked below:**

☐ For Approval ☐ For Your Use ☐ For Review/Comment ☐ As Requested ☐ Other

**Message:**

Bill,

Enclosed is the soil sample for the RCTS testing, along with the proctor and grain size results. When not in use, please keep the soil locked up. Also, please return a signed copy by PDF or fax of the Chain-of-Custody Form.

Thanks for your help.

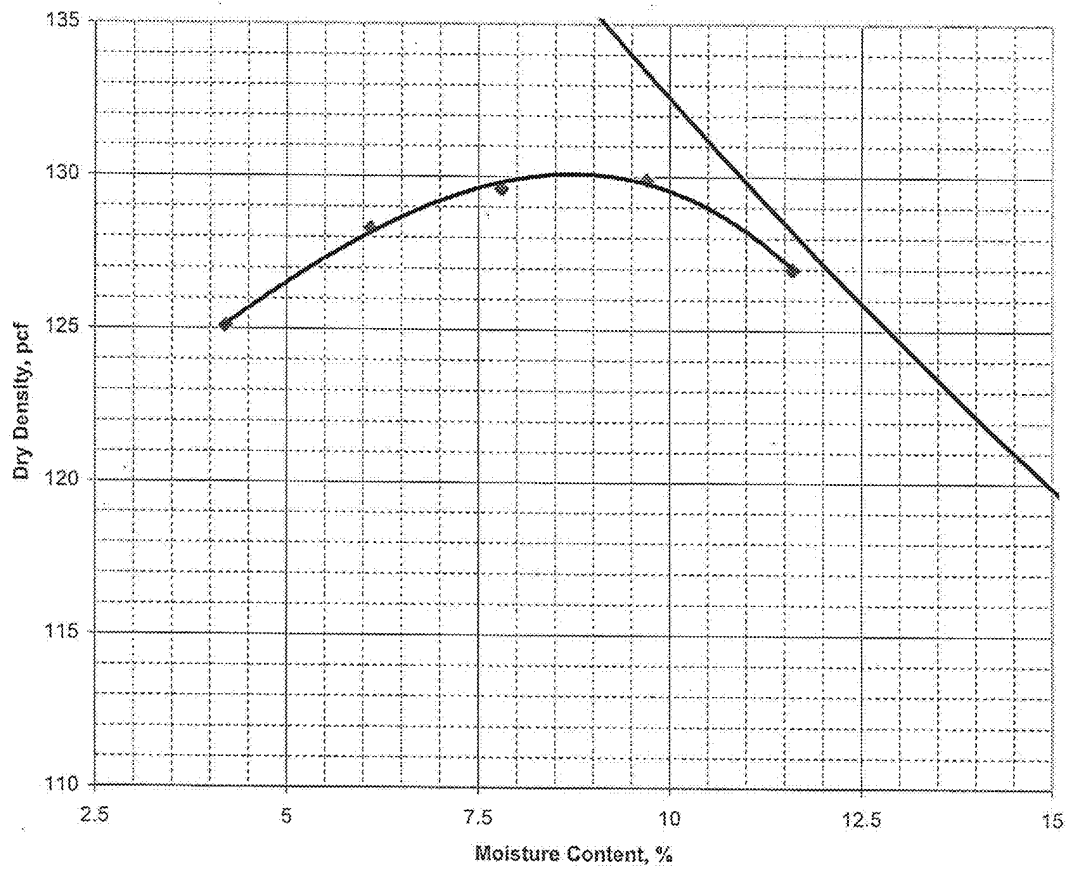
Copy to:
Project Files

Signed: Doug Aghjayan

Doug Aghjayan
Ext. 4031

*If enclosures are not as noted, kindly notify us at once.*

| Point | Moisture Content, percent | Dry Unit Wt. lb/ft$^3$ |
|---|---|---|
| 1 | 4.2 | 125.1 |
| 2 | 6.1 | 128.3 |
| 3 | 7.8 | 129.6 |
| 4 | 9.7 | 129.9 |
| 5 | 11.6 | 127 |
| 6 | NM | NM |

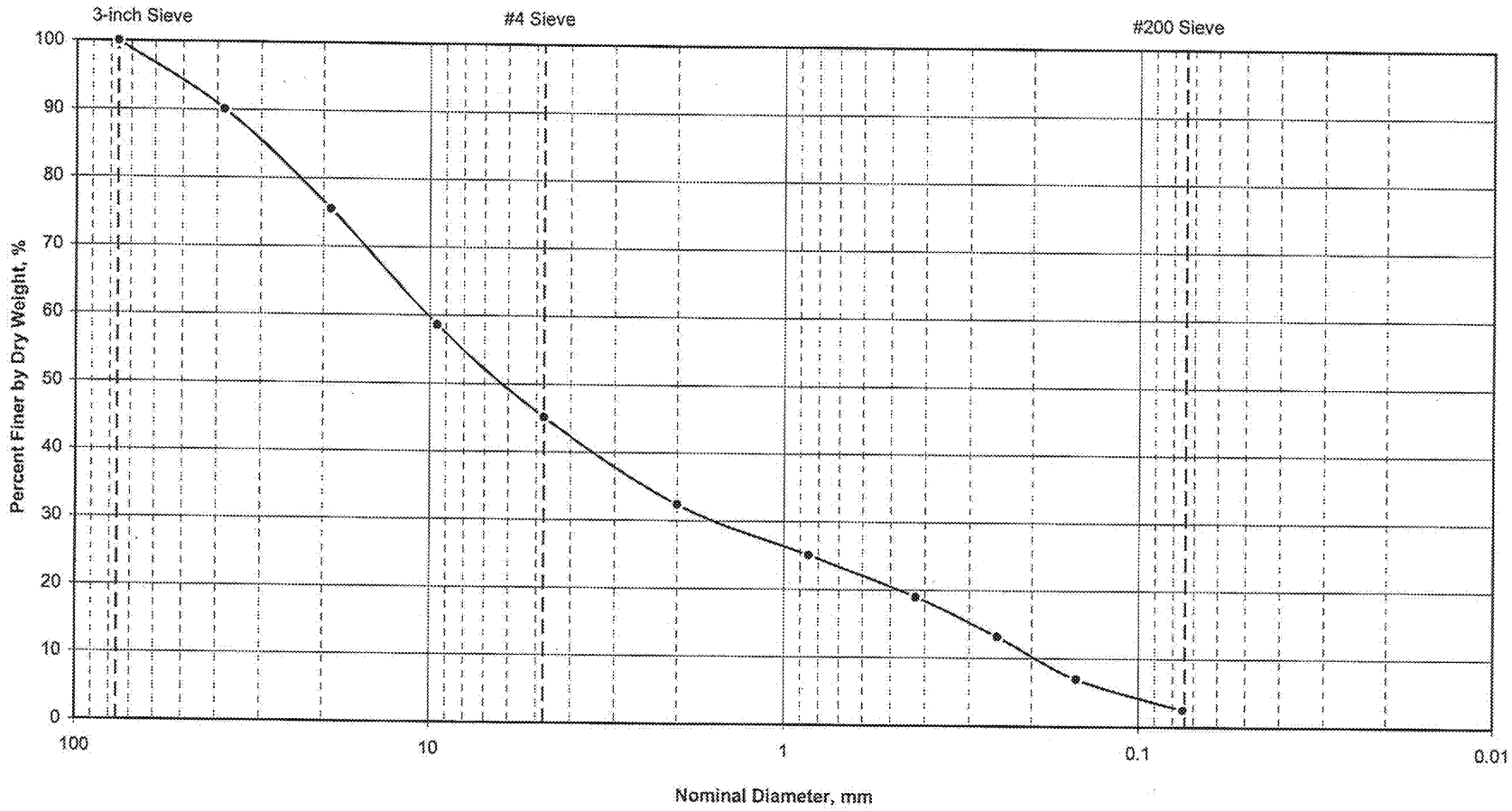



| | |
|---|---|
| Specific Gravity for Zero Air Voids Curve | 2.698 |
| Maximum Dry Density, pcf | 130.3 |
| Optimum Moisture Content, % | 9.0 |

Note: Maximum dry density and optimum moisture content are NOT corrected for oversize gravel.

| | |
|---|---|
| Compaction Test Method (A, B, or C): | C |
| Max Particle Size in Test: | 3/4 in. |
| Percent Oversize Particles >3/4 in. | 24.5 |

| | | |
|---|---|---|
| **Nine Mile Point Unit 3 Site Characterization Oswego, NY** | GEI Consultants | **Moisture - Density Curve Modified Compaction** |
| | Project 07223 | Source: Streeter Rathburn Rd. |
| | | Sample: Sample Pad #1 |
| | | Form 111.0 rev. 0 (page 3 of 3) |




| %+3" | % Gravel | % Sand | % Fines |
|---|---|---|---|
| 0.0 | 54.9 | 42.6 | 2.5 |

| | | |
|---|---|---|
| **Nine Mile Point Site Characterization**<br>**Oswego, NY** | GEI Consultants | **Grain Size Curve**<br>Boring/Test Pit No. : Streeter Rathburn Rd<br>Sample No. : Sample Pad #1 |
| | Project 07223 | Form 105.2 rev. 1 (page 2 of 2) |

file OSWEGO 5.13.08

**RCCyTS Functional Check w/Aluminum Specimen(s)**

Performed by: S. Jupic  Date: 5.13.07 5/13/07
Checked by: J Meng  Date: 5.13/08
Station # RC-7
Aluminum # MS02

**RC Check**

| Items | Expected Range | Before, B | After, A | Variation, % (B-A)/A*100% | Notes |
|---|---|---|---|---|---|
| Input voltage (mV) | NA | 40 | 40 | NA | |
| Power amplification | NA | 10 | 10 | NA | |
| Strain amplitude | NA | $5.1 \times 10^{-5}$ | $5.2 \times 10^{-5}$ | NA | |
| Charge amplification | NA | 1 | 1 | NA | |
| *Resonant freq (Hz)* | NA | 56.9 | 57 | -0.2% | |
| Sweeping width (Hz) | NA | 18 | 18 | NA | |
| # of excitation cycles | NA | 160 | 160 | NA | JS 6/20/08 |
| File name | NA | MS-2-0513B ~~MS-2-0513A~~ | | NA | MS-2-0513A |
| *Damping ratio* | NA | 0.94% | 0.87% | ~~0.1%~~ 1.2% JM 06/20/08 | |

**TS Check**

| Items | Expected Range | Before, B | After, A | Variation, % (B-A)/A*100% | Notes |
|---|---|---|---|---|---|
| Input voltage (mV) | NA | 4000 | 4000 | NA | |
| Power amplification | NA | 10 | 10 | NA | |
| Excitation frequency | NA | 0.5 | 0.5 | NA | |
| # of excitation cycles | NA | 11 | 11 | NA | |
| Strain amplitude | NA | $0.6 \times 10^{-4}$ | $0.56 \times 10^{-4}$ | NA | JS 6/20/08 |
| File name | NA | MS-2-0513TS B * ~~MS-2-0513TSA~~ | | NA | MS-2-0513TSA |
| *Shear modulus* | 27,600 MPa ± 10% | 27,989 | 26,610 | 5.2% | |
| *Damping ratio* | NA | 0.053 | 0.048 | <0.01% | use difference |

NA = not applicable

Functional check is acceptable if measured values are within the expected range, and if the variation in the values measured before and after the project testing is less than 10%.

~~* MS-2-0513TS B~~
~~-B1~~
~~-B2~~ JM 06/20/08

Form No. N/A Rev. 0

# RESONANT COLUMN CYCLIC TORSIONAL SHEAR (RCCyTS) TEST
## Specimen Setup / Take Down

Project No: 0411-08-1696 Test Type: RCTS Cell No.: RC7 File Name: N/A
Project Name: GEI Test Stress(es), σ' = 3.1, 6.2, 12.5, 25 & 50 psi (1)
Task No.: N/A Stokoe Resonant Column Device Gs = N/A ☐ Meas.; ☐ Assumed
Test No.: N/A Test Series No.: N/A Top Cap ID: 002

Assig. Remarks: (SR.RO) AS 6/20/08

☐ Tube ☐ Field Extruded ☐ Liner ☐ N/A
Boring No.: STEETER PATH A ☐ Reconstituted
Sample No.: PAD #1-1 Compostite No.: N/A
Depth (ft): N/A Specimen No.: A
☐ Spec. Selection by X-ray; ☐ Geomarine Sample

Specimen Preparation (for reconstituted samples)
Target Dry Density 115.7 Lift Thickness 29.92 mm No. Lifts 5
Final Ht. 148.77 Final Area 40.489 cm² Final Vol. 602.36 cm³
Final Total Mass 1207.87 Water Cont. 7.76

| Type Consolidation: | | |
|---|---|---|
| | ☒ Isotropic | ☐ Ko stress path |
| | ☐ Anisotropic | ☐ 45o stress path |

| Water Content (WC); | Initial - Trimming Location: Top (Wo,1) | Bottom (Wo,2) | Sides (Wo,3) | Final (Wat) (see below) |
|---|---|---|---|---|
| Container No | 823 | | | 7A |
| Mass Moist Soil + Cont. (g) | 200.35 | | AS 6/14/05 | 388.97 |
| Mass Dry Soil + Cont. (g) | 188.25 | | | 372.19 |
| Mass Container (g) | 32.23 | | | 139.34 |
| Water Content, Wo,n (%) | 7.76 | N/A | N/A | 7.21 |
| Avg. Initial WC, Wo,avg (%) | 7.76 | Final (Wat); | ☐ Slice; | Whole Spec. |

| SOIL MASSES: | Initial | Final |
|---|---|---|
| Moist + Tare (etc.)(g): | 1804.47 | 1338.77 |
| Tare (etc.) (g): | 596.60 | 139.34 |
| Spec. Moist Mass (g): | 1207.87 | 1199.43 |

EXCESS DRY SOIL (stuck to membrane, filters stones, etc.)

| | |
|---|---|
| Container No: | N/A |
| Mass Dry Soil + Container (g): | N/A |
| Mass Container (g): | N/A |
| Mass Excess Dry Soil (g): | N/A |

**Specimen Dimensions**

| Height (mm) | Initial (Ho) | Final (Hat) | Diameter (mm) | Initial (Do) | Final (Dat) |
|---|---|---|---|---|---|
| GB | 127 | | T | 72.0 | |
| 1 | 21.770 | | M | 71.9 | |
| 2 | 21.774 | | B | 71.6 | NA* |
| 3 | 21.757 | NA* | T' | | AS 6/11/08 |
| 4 | 21.768 | | M' | AS 6/19 | |
| 5 | 21.763 | | B' | | |
| Avg | 148.77 | | Avg | 71.8 | |

Measuring Devices: 2.82 Ao (cm2) = N/A
5.85 Pi Tape: ☒ Dia. Vo (cm3) = N/A
Calipers: ☐ Ht. ☐ Dia. Aat (cm2)= N/A
Dial Comparator: ☒ Ht. ☐ Dia. Vat (cm3) = N/A

**Estimated Initial Unit Weight:**
Total, gt,o (lb/ft3) = N/A Dry, gd,o (lb/ft3 )= N/A

**Membrane / Filter Paper / Apparatus**

| Membrane (mm): | Top | Bottom |
|---|---|---|
| Number: = 1 ☐ Single; ☒ Double | N/A | N/A |
| Thickness: | 0.61 | 0.78 |
| Circumference (Crm,o) | 214 | 216 |

| (1) Total thickness, if 2+ membranes | Thickness (1) | Dia.(Crm,o/p) |
|---|---|---|
| Average: | N/A | N/A |

Filter Paper: Top + Bottom: ☐ Yes ; ✓ No
Filter Strips: ☐ Yes ; ✓ No Number =
If yes number = — Vertical: ¼" & Whatman #54 or N/A
" or = N/A or Sprial: ¼" & Whatman #1 or
Mass Drive Plate & Cap, Mdpc = N/A g, N/A lbf

NA - Not Applicable; UK - Unknown; GB - Gage Block
* SAMPLE CRASHED DURING TAKING DOWN. (INITIAL LVDT READING - 3.45594)
Note: (1) Each Test Stress is identified as a Test Stage or Sequence on other data sheets.
Final Specimen Description (USCS group name & symbol, color, layering, max. part. size, slickensided, fissured, blocky, honeycombed, etc.):
Md to Coarse Sa, Br ~~Gray~~ w/ gr
AS

☐ Photo taken (internal sliced surface & outside surface) ~~6/~~ AS 5/14/08
Other Remarks

| Resonant Column Cyclic Torsional Shear (RCCyTS) Signature & Equipment Page | Boring: n/a |
|---|---|
| | Sample: PAD #1 (1) |
| | Depth (ft): n/a |
| | Test No. n/a |

| | |
|---|---|
| Project: Nine Mile Point Site Characterization<br>Location: Oswego, New York | Fugro Project No.: 0411-08-1696 |

**SIGNATURES**

| | |
|---|---|
| Specimen Trimmed/Recompacted by: | Date: 5/14/08 |
| Specimen Setup by: | Date: 5.14.08 |
| Test Performed by: (per GEI Procedure 109 rev. ___ ) | Date: 5.14.08 |
| Specimen Takedown by: | Date: 05/19/08 |
| Preliminary Calculations by: | Date: 5/21/08 |
| Calculated by: | Date: 5/21/08 |
| Reviewed by: | Date: 6/13/08 |

**EQUIPMENT USED**

| | |
|---|---|
| RCCyTS Workstation No.: RC7 | Balance ID: BA-006 |
| Caliper ID: VA-10838 | PI Tape ID: VH-10822 |
| Oven ID: #14 | Scalping Sieve Size & ID: 3/8" B-31 |
| Other (specify) ID: — | Other (specify) ID: — |

Comments/Notes: —

# Water Content Measurement

Project Name: Nine Mile Point Site Characterization, Oswego, NY

Project No.: 07223 0411-08-1696

Performed by, per Proc 101, rev ( ): DANIEL NYARKO AS

Checked By: N/A AS 5/16/08 Date: 5/14/08

AS 6/18/08

| | | | | | | |
|---|---|---|---|---|---|---|
| Determination No. | 07223 | | | | | |
| Boring | STREETER RATHBUN RD. | | | | | |
| Sample | PAD #1 | | | | | |
| Oven ID | # 14 | | | | | |
| Balance ID | BA 006 | | | | | |
| Date/Time in Oven | 6/13/08 | | | | | |
| Date/Time Out of Oven | 5/14/08 | | | | | |
| Tare No. | PAN 1 | | | | | |
| (a) Wet Wt. + Tare | 912.74 g | g | g | g | g | g |
| (b) Dry Wt. + Tare | 856.60 g | g | g | g | g | g |
| (c) Wt. Tare | 138.99 g | g | g | g | g | g |
| (d) Wt. Water (a – b) | 56.14 g | g | g | g | g | g |
| Wt. Wet Solids (a – c) | 773.75 g | g | g | g | g | g |
| (e) Wt. Dry Solids (b – c) | 717.61 g | g | g | g | g | g |
| Water Content (d/e) x 100, % | 7.8 | | | | | |
| Is Wet Wt. Enough for Method B? (yes/no) | YES | | | | | |

AS 6/18/08

Remarks:

Test Notes:
1. Oven dry at 110°C (±5°C) for 12 hours minimum.
2. Cool in desiccator for a minimum of 30 minutes before weighing.

GEI Consultants

Form 101.1, rev. 1

**RCTS Testing Record (Page 1 of 10)**

Project #: 0411-08-1696 Project: Nine Mile Point Unit 3, Oswego, New York
Specimen #: PAD #1 Specimen Description: Fill to Coarse Sand, Dry G. w/ Gravel
Tested By, per GEI Procedure 109 rev ( 0 ): [illegible] Date: 5.14.08
Checked By: [illegible] Date: 6/21/08
DS 6/18/08

Test Station: RC7

Confining Pressure: 3.1 psi **Testing Stage: X0.25**

**RC Time Effect Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 1:07 | PAD#1-P3-T_0 | 4 | 1 | 77.9 | |
| PM | 2:43 | PAD#1-P3-T_7 | 4 | 1 | 82.6 | |
| END | ~~END~~ | | ~~4~~ | ~~1~~ | ~~82.6~~ | |

DS 6/18/08 SI 6.19.08 CJ SI 6.19.08

**RC Strain Amplitude Effect Tests**

DS 6/18/08

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**RCTS Testing Record (Page 2 of 10)**

Station:_____ Date:_____ Tested by:_____ JS 6/10/08

Project #:_____ Project Name:_____

Boring #:_____ Specimen #:_____

Confining Pressure:_____ **Testing Stage: X0.25**

**TS Tests (prior to tests, fr= Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**RCTS Testing Record (Page 3 of 10)**

13
6.19.08

Station: RC 7 Date: 5.14.08 Tested by: AA Suvad Jupic
Project #: 0411-08-1696 Project Name: GEI
Boring #: STREETER MATW.RI Specimen #: PAD #1
Confining Pressure: 6.2 psi **Testing Stage: X0.5**

**RC Time Effect Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PA | 2:47 | PAD #1 - P6 - 7.0 | 6 | 1 | 92.6 | |
| PA | 4:26 | PAD #1 - P6 - 7.7 | 6 | 1 | 96.1 | |
| END | ~~[illegible]~~ | | ~~6~~ | ~~1~~ | ~~96.1~~ | |

DS 6/18/08 SJ 6.18.08 SJ SJ. 6.18.08

**RC Strain Amplitude Effect Tests**

DS 6/18/08

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**RCTS Testing Record (Page 4 of 10)**

Station:_____ Date:_____ Tested by:_____ 5 6/10/08

Project #:_____ Project Name:_____

Boring #:_____ Specimen #:_____

Confining Pressure:_____ **Testing Stage: X0.5**

**TS Tests (prior to tests, fr= Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

SI
19
6.19.08

**RCTS Testing Record (Page 5 of 10)**

Station: RC7 Date: 5.14.08 Tested by: Suvad Jupic
Project #: 0411-08-1696 Project Name: GET
Boring #: CREETER MTHRL Specimen #: PAD#1
Confining Pressure: 12.5 psi **Testing Stage: X1**

**RC Time Effect Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 4:34 | PAD#1-P12-T-0 | 6 | 1 | 113.6 | |
| PM | 5:12 | PAD#1-P12-T-7 | 6 | 1 | 116.8 | |
| END | END | | ~~6~~ | ~~1~~ | ~~116.8~~ | |
| | AS 6/18/08 | | SI | SI 6.19.08 | SI 6.19.08 | |

**RC Strain Amplitude Effect Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 8:35 | PAD#1-P12-S-0 | 3 | 1 | 115.6 | |
| | 8:36 | PAD#1-P12-S-1 | 6 | 1 | 115.1 | |
| | 8:36 | PAD#1-P12-S-2 | 12 | 1 | 114.4 | |
| | 8:36 | PAD#1-P12-S-3 | 24 | 1 | 112.6 | |
| | 8:37 | PAD#1-P12-S-4 | 48 | 1 | 110.1 | |
| | 8:38 | PAD#1-P12-SA-0 | 96 | 10 | 106.8 | |
| | 8:38 | PAD#1-P12-SA-1 | 192 | 10 | 101.9 | |
| | 8:39 | PAD#1-P12-SB-0 | 384 | 10 | 95 | |
| PM | 8:40 | PAD#1-P12-SC-0 | 768 | 10 | 84.9 | |
| | | END | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) SI 6.19.08 | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| ~~AS~~ | PAD#1-P12-SCR | 6 | 1 | 104.8 | |

PM 8:41

RCTS Testing Record (Page 6 of 10)

SJ
6.19.08

Station: RCT Date: 5.14.08 Tested by: Suvad Jupic
Project #: 0411-08-1696 Project Name: GEI
Boring #: MREETHER PATH 2 Specimen #: PAD #1
Confining Pressure: 12.5 PSI **Testing Stage: X1**

**TS Tests (prior to tests, fr= 116.8 Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | PAD#1-P12-TS 01 | 0.07 | 1.39 | 1.6-6 | |
| 0.5 | PAD#1-P12-TS 02 | 0.14 | 2.78 | 3.2-6 | |
| 0.5 | PAD#1-P12-TS 03 | 0.28 | 5.56 | 0.62-5 | |
| 0.5 | PAD#1-P12-TS 04 | 0.45 | 8.94 | 1.03-5 | |
| 0.1 | PAD#1-P12-TS 05 | 0.45 | 8.94 | 1.06-5 | |
| 0.5 | PAD#1-P12-TS 06 | | | 1.06-5 | |
| 1 | PAD#1-P12-TS 07 | | | 1.03-5 | |
| 5 | PAD#1-P12-TS 08 | | | 1.02-5 | |
| 10 | PAD#1-P12-TS 09 | 0.45 | 8.94 | 1.02-5 | |
| 0.5 | PAD#1-P12-TS 10 | 0.90 | 17.89 | 2.16-5 | |
| 0.5 | PAD#1-P12-TS 11 | 1.8 | 35.79 | 4.6-5 | |
| 0.5 | PAD#1-P12-TS 12 | 3.3 | 65.65 | 1-4 | |
| 0.1 | PAD#1-P12-TS 13 | 3.3 | 65.65 | 1.01-4 | |
| 0.5 | PAD#1-P12-TS 14 | | | 1-4 | |
| 1 | PAD#1-P12-TS 15 | | | 0.99-4 | |
| 5 | PAD#1-P12-TS 16 | | | 0.99-4 | |
| 10 | PAD#1-P12-TS 17 | 3.3 | 65.65 | 0.99.4 | |
| 0.5 | END | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 8:05 | PAD#1-P12-TSCK | 6 | 1 | 108.5 | |
| | N/A | | | | | |
| 5.16.08 | 8:32 PM | N/A | 6 | 1 | 115.4 | |
| END | | | | | | |

**RCTS Testing Record (Page 7 of 10)**

CJ
6.19.08

Station: RC7 Date: 5.15.08 Tested by: Surad Jupic
Project #: 0411-08-1696 Project Name: GEI
Boring #: [illegible] Specimen #: PAD #1
Confining Pressure: 25 psi **Testing Stage: X2**

**RC Time Effect Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 8:49 | PAD#1-P25-T.0 | 8 | 1 | 137.9 | |
| PM | 10:27 | PAD#1-P25-T.7 | 8 | 1 | 141.8 | |
| END | ~~END~~ | | | | | |

BS 6/18/08

**RC Strain Amplitude Effect Tests**

BS 6/18/08

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**RCTS Testing Record (Page 8 of 10)**

Station:_____ Date:_____ Tested by:_____ DS 6/18/08
Project #:_____ Project Name:_____
Boring #:_____ Specimen #:_____
Confining Pressure:_____ **Testing Stage: X2**

**TS Tests (prior to tests, fr= Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

SJ
6.19.08

**RCTS Testing Record (Page 9 of 10)**

Station: RC7 Date: 6.17.08 Tested by: Suvad Jupic
Project #: 0411-08-1696 Project Name: GEI
Boring #: SDEFTHER AATH RA Specimen #: PAD#1
Confining Pressure: 50 psi **Testing Stage: X4**

**RC Time Effect Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 10:30 | PAD#1-P50-T-0 | 8 | 1 | 167.3 | |
| AM | 12:08 | PAD#1-P50-T-7 | 8 | 1 | 172.37 | |
| END | | | | | | |

AS 6/18/08

**RC Strain Amplitude Effect Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| AM | 1:37 | PAD#1-P50-S-0 | 4 | 1 | 171.9 | |
| | 1:37 | PAD#1-P50-S-1 | 8 | 1 | 171.6 | |
| | 1:37 | PAD#1-P50-S-2 | 16 | 1 | 171.1 | |
| | 1:37 | PAD#1-P50-S-3 | 32 | 1 | 170.1 | |
| | 1:38 | PAD#1-P50-S-4 | 64 | 1 | 168.3 | |
| | 1:39 | PAD#1-P50-SA-0 | 128 | 10 | 166 | |
| | 1:39 | PAD#1-P50-SA-1 | 256 | 10 | 162.1 | |
| | 1:40 | PAD#1-P50-SB-0 | 512 | 10 | 155.7 | |
| | 1:41 | PAD#1-P50-SC-0 | 1024 | 10 | 145.6 | |
| | 1:42 | PAD#1-P50-SD-0 | 2048 | 10 | 134.4 | |
| AM | 1:43 | PAD#1-P50-SE-0 | 4000 | 10 | 121.5 | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| AM | 1:44 | PAD#1-P50-SCK | 8 | 1 | 154.3 | |

CJ
6/19.08

**RCTS Testing Record (Page 10 of 10)**

Station: RC 7 Date: 5.15.08 Tested by: Lt Suvad Jupic
Project #: 0411-08-1696 Project Name: GSI
Boring #: STRETCHED PATH 1 Specimen #: PAD #1
Confining Pressure: 50 psi **Testing Stage: X4**

**TS Tests (prior to tests, fr=172.3 Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | PAD#1-P50-TS01 | 0.15 | 2.98 | 1.6-6 | |
| 0.5 | PAD#1-P50-TS02 | 0.30 | 5.96 | 3.1-6 | |
| 0.5 | PAD#1-P50-TS03 | 0.60 | 11.93 | 0.6-5 | |
| 0.5 | PAD#1-P50-TS04 | 1.0 | 19.88 | 1.03-5 | |
| 0.1 | PAD#1-P50-TS05 | 1.0 | 19.88 | 1.05-5 | |
| 0.5 | PAD#1-P50-TS06 | | | 1.04-5 | |
| 1 | PAD#1-P50-TS07 | | | 1.025-5 | |
| 5 | PAD#1-P50-TS08 | | | 1.01-5 | |
| 10 | PAD#1-P50-TS09 | 1.0 | 19.88 | 1-5 | |
| 0.5 | PAD#1-P50-TS10 | 2.0 | 39.76 | 2.1-5 | |
| 0.5 | PAD#1-P50-TS11 | 4.0 | 79.59 | 4.35-5 | |
| 0.5 | PAD#1-P50-TS12 | 4.7 | 93.57 | 0.51-4 | |
| 0.1 | PAD#1-P50-TS13 | 4.7 | 93.57 | 0.51-4 | |
| 0.5 | PAD#1-P50-TS14 | | | 0.49-4 | |
| 1 | PAD#1-P50-TS15 | | | 0.49-4 | |
| 5 | PAD#1-P50-TS16 | | | 0.49-4 | |
| 10 | PAD#1-P50-TS17 | 4.7 | 93.57 | 0.485-4 | |
| 0.5 | CMD | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| AM | 12:35 | PAD#1-P50-TSCK | 8 | 1 | 168.8 | |
| AM | 1:35 | NA | 8 | 1 | 171.4 | |
| END | | | | | | |

# RESONANT COLUMN CYCLIC TORSIONAL SHEAR (RCCyTS) TEST
## Specimen Setup / Take Down

Project No: 0411-08-1696 Test Type: RCTS Cell No.: RC7 File Name: N/A
Project Name: (.C) Test Stress(es), σ' = 3.1 , 6.2 , 12.5 , 25 & 50 psi (1)
Task No.: N/A Stokoe Resonant Column Device Gs = N/A [ ] Meas.; [ ] Assumed
Test No.: N/A Test Series No.: N/A Top Cap ID: 002

Assig. Remarks: (SR,RD) 6/30 05/N/A

[ ] Tube [ ] Field Extruded [ ] Liner [ ] N/A
Boring No.: [illegible] [X] Reconstituted
Sample No.: PAD #1-2 Compostite No.: N/A
Depth (ft): N/A Specimen No.: b
[ ] Spec. Selection by X-ray; [ ] Geomarine Sample

Specimen Preparation (for reconstituted samples)
Target Dry Density 115.7 Lift Thickness 29.92 mm 5/19/08 No. Lifts 5
Final Ht. 148.77 Final Area 40.523 cm² Final Vol. 602.86 cm³
Final Total Mass 1208.92 Water Cont. 8.17 %

| Type | [X] Isotropic | [ ] Ko stress path |
|---|---|---|
| Consolidation: | [ ] Anisotropic | [ ] 45o stress path |

| Water Content (WC); | Initial - Trimming Location: Top (Wo,1) | Bottom (Wo,2) | Sides (Wo,3) | Final (Wat) (see below) |
|---|---|---|---|---|
| Container No | 163 | N/A | N/A | PA |
| Mass Moist Soil + Cont. (g) | 154.59 | | | 181.74 |
| Mass Dry Soil + Cont. (g) | 145.22 | | | 169.69 |
| Mass Container (g) | 30.49 | | | 15.91 |
| Water Content, Wo,n (%) | 8.17 | N/A | N/A | 7.84 |
| Avg. Initial WC, Wo,avg (%) | 8.17 | Final (Wat); | [ ] Slice; | [ ] Whole Spec. |

| SOIL MASSES: | Initial | Final |
|---|---|---|
| Moist + Tare (etc.)(g): | 1805.52 | 1204.7 |
| Tare (etc.) (g): | 596.60 | 0 |
| Spec. Moist Mass (g): | 1208.92 | 1204.7 |
| EXCESS DRY SOIL (stuck to membrane, filters stones, etc.) | | |
| Container No: | N/A | |
| Mass Dry Soil + Container (g): | N/A | |
| Mass Container (g): | N/A | |
| Mass Excess Dry Soil (g): | N/A | |

**Specimen Dimensions**

| Height (mm) | Initial (Ho) | Final (Hat) | Diameter (mm) | Initial (Do) | Final (Dat) |
|---|---|---|---|---|---|
| GB | 127 | | T | 71.9 | 72.2 |
| 1 | + 21.759 | 147.51 | M | 71.8 | 72.2 |
| 2 | + 21.768 | 148.65 | B | 71.8 | 72.4 |
| 3 | + 21.777 | 148.27 | T' | | |
| 4 | 21.767 | 148.01 | M' | | |
| 5 | 21.771 | 148.03 | B' | | |
| Avg | 148.76 | 147.97 | Avg | 71.83 | 72.26 |

DS 6/17/08

**Measuring Devices:**
5.80" Pi Tape: [X] Dia. 2.82
Calipers: [ ] Ht. [ ] Dia.
Dial Comparator: [X] Ht. [ ] Dia.

Ao (cm2) = N/A
Vo (cm3) = N/A
Aat (cm2)= N/A
Vat (cm3) = N/A

**Estimated Initial Unit Weight:**
Total, gt,o (lb/ft3) = N/A Dry, gd,o (lb/ft3 )= N/A

**Membrane / Filter Paper / Apparatus**

| Membrane (mm): | Top | Bottom |
|---|---|---|
| Number: = 1 Thickness: [ ] Single; [X] Double | N/A | N/A |
| | 0.70 | 0.60 |
| Circumference (Crm,o) | 216 | 216 |
| (1) Total thickness, if 2+ membranes | Thickness (1) | Dia.(Crm,o/p) |
| Average: | | |

Filter Paper: Top + Bottom: [ ] Yes ; [✓] No
Filter Strips: [ ] Yes ; [ ] No Number =
If yes number = — Vertical: ¼" & Whatman #54 or N/A
" or = or Sprial: ¼" & Whatman #1 or
Mass Drive Plate & Cap, Mdpc = N/A g, N/A lbf

NA - Not Applicable; UK - Unknown; GB - Gage Block

Note: (1) Each Test Stress is identified as a Test Stage or Sequence on other data sheets. (INTIAL LVDT READING) 7.7579

Final Specimen Description (USCS group name & symbol, color, layering, max. part. size, slickensided, fissured, blocky, honeycombed, etc.):
Med. to Coarse Sand Brown w/ many gravel

[ ] Photo taken (internal sliced surface & outside surface)
Other Remarks

| Resonant Column Cyclic Torsional Shear (RCCyTS) Signature & Equipment Page | Boring: N/A |
|---|---|
| | Sample: PAD #1 (a) |
| | Depth (ft): N/A |
| | Test No. N/A |

| | |
|---|---|
| Project: Nine Mile Point Site Characterization<br>Location: Oswego, New York | Fugro Project No.: 0411-08-1696 |

**SIGNATURES**

| | |
|---|---|
| Specimen Trimmed/Recompacted by: | Date: 5/19/08 |
| Specimen Setup by: | Date: 5.19.08 |
| Test Performed by: (per GEI Procedure 109 rev. ___ ) | Date: 5/19/08 |
| Specimen Takedown by: | Date: 5/21/08 |
| Preliminary Calculations by: | Date: 5/23/08 |
| Calculated by: | Date: 5/23/08 |
| Reviewed by: | Date: 6/13/08 |

**EQUIPMENT USED**

| | |
|---|---|
| RCCyTS Workstation No.: RC-7 | Balance ID: BA-066 |
| Caliper ID: VH-10838 | PI Tape ID: VH-10822 |
| Oven ID: #14 | Scalping Sieve Size & ID: 3/8" B-31 |
| Other (specify) ID: — | Other (specify) ID: — |

Comments/Notes: —

# Water Content Measurement

Project Name: Nine Mile Point Site Characterization, Oswego, NY

Project No.: 07223 0411-08-1696

Performed by, per Proc 101, rev ( ): DANIEL NYARKO

Checked By: [illegible] Date: ~~5/14/08~~ 6/18/08

6/18/08

| | | | | | | |
|---|---|---|---|---|---|---|
| Determination No. | 07223 | | | | | |
| Boring | STREETER RATHBUN RD. | | | | | |
| Sample | PAD #1-2 | | | | | |
| Oven ID | # 14 | | | | | |
| Balance ID | BA 006 | | | | | |
| Date/Time in Oven | 5/13/08 | | | | | |
| Date/Time Out of Oven | 5/14/08 | | | | | |
| Tare No. | PAN 1 | | | | | |
| (a) Wet Wt. + Tare | 912.74 g | g | g | g | g | g |
| (b) Dry Wt. + Tare | 856.60 g | g | g | g | g | g |
| (c) Wt. Tare | 138.99 g | g | g | g | g | g |
| (d) Wt. Water (a – b) | 56.14 g | g | g | g | g | g |
| Wt. Wet Solids (a – c) | 773.75 g | g | g | g | g | g |
| (e) Wt. Dry Solids (b – c) | 717.61 g | g | g | g | g | g |
| Water Content (d/e) x 100, % | 7.8 | | | | | |
| Is Wet Wt. Enough for Method B? (yes/no) | YES | | | | | |

6/18/08

Remarks:

Test Notes:
1. Oven dry at 110°C (±5°C) for 12 hours minimum.
2. Cool in desiccator for a minimum of 30 minutes before weighing.

GEI Consultants

Form 101.1, rev. 1

Md to corse Sand Br w/many gravels

**RCTS Testing Record (Page 1 of 10)**

Project #: 0411-08-1696 Project: Nine Mile Point Unit 3, Oswego, New York SJ 6.31.08
Specimen #: PAD # 1-2 Specimen Description: ~~Md to corse Sand Br w/many gravels~~
Tested By, per GEI Procedure 109 rev ( 0 ): Triple C Date: 5.19.08
Checked By: [signature] Date: 5/23/08

Test Station: RC 7

Confining Pressure: 3.1 psi **Testing Stage: X0.25**

**RC Time Effect Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 4:14 | PAD # 1-2 - P3 - T.0 | 4 | 1 | 76.9 | |
| PM | 5:52 | PAD # 1-2 - P3 - T.7 | 4 | 1 | 79.6 | |
| END | ~~6:00~~ | | ~~4~~ SJ | + SJ | ~~79.6~~ SJ | |

AS 6/18/08 6.19.08 6.19.08

**RC Strain Amplitude Effect Tests**

AS 5/27/08

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

AS 5/27/08

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**RCTS Testing Record (Page 2 of 10)**

Station:_____ Date:_____ Tested by:_____ AS 5/27/08

Project #:_____ Project Name:_____

Boring #:_____ Specimen #:_____

Confining Pressure:_____ **Testing Stage: X0.25**

**TS Tests (prior to tests, fr= Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**RCTS Testing Record (Page 3 of 10)**

6.19.08

RC7 C.J. 5/20/08

Station: ~~0411-08-1696~~ Date: 5.20.08 Tested by: ~~ft~~ Suvad Jupic

Project #: 0411-08-1696 Project Name: GEI

Boring #: SRR1 Specimen #: PAD # 1-2

Confining Pressure: 6.2 PSI **Testing Stage: X0.5**

**RC Time Effect Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| AM | 7:29 | PAD#1-2-P6-T-0 | 6 | 1 | 93.1 | |
| AM | 9:06 | PAD#1-2-P6-T-7 | 6 | 1 | 95.9 | |
| END | ~~[illegible]~~ | | | | | |

AS 6/18/08

**RC Strain Amplitude Effect Tests**

AS 5/28/08

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**RCTS Testing Record (Page 4 of 10)**

Station:_____ Date:_____ Tested by:_____ 5/27/08

Project #:_____ Project Name:_____

Boring #:_____ Specimen #:_____

Confining Pressure:_____ **Testing Stage: X0.5**

**TS Tests (prior to tests, fr= Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**RCTS Testing Record (Page 5 of 10)** 6.19.08 SJ

Station: RC7 Date: 6.20.08 Tested by: Suvad Jupic

Project #: 0411-08-16986 6.20.08 Project Name: GEI

Boring #: SK R1 Specimen #: PAD#1-2

Confining Pressure: 12.5 psi **Testing Stage: X1**

**RC Time Effect Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 9:20 | PAD#1-2-P12-T-0 | 6 | 1 | 112.9 | |
| PM | 11:01 | PAD#1-2-P12-T-1 | 6 | 1 | 116.6 | |
| END | ~~END~~ | | | | | |

SJ 6/19/08

**RC Strain Amplitude Effect Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 5:47 | PAD#1-2-P12-S-0 | 3 | 1 | 116.1 | |
| | 5:48 | PAD#1-2-P12-S-1 | 6 | 1 | 115.4 | |
| | 5:48 | PAD#1-2-P12-S-2 | 12 | 1 | 114.4 | |
| | 5:48 | PAD#1-2-P12-S-3 | 24 | 1 | 112.6 | |
| | 5:49 | PAD#1-2-P12-S-4 | 48 | 1 | 110.1 | |
| | 5:50 | PAD#1-2-P12-SA-0 | 96 | 10 | 106.9 | |
| | 5:50 | PAD#1-2-P12-SA-1 | 192 | 10 | 101.9 | |
| | 5:52 | PAD#1-2-P12-SB-0 | 384 | 10 | 95.2 | |
| PM | 5:53 | PAD#1-2-P12-SC-0 | 768 | 10 | 85.3 | |
| | | ~~PAD#1-2-P12~~ END | | | | |
| | | SJ 6.20.08 | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 5:54 | PAD#1-2-P12-SCK | 6 | 1 | 105.1 | |

**RCTS Testing Record (Page 6 of 10)** 6.19.08 SI

Station: RC7 Date: 5.20.08 Tested by: Surad Supic

Project #: 0941-08-169 ~~06~~ SI 5.20.08 Project Name: GEI

Boring #: SP P4 Specimen #: P4D #1-2

Confining Pressure: 12.5 PSI **Testing Stage: X1**

**TS Tests (prior to tests, fr=116.6 Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | PAD#1-2-P12-TS01 | 0.07 | 1.39 | 1.6-6 | |
| 0.5 | PAD#1-2-P12-TS02 | 0.14 | 2.78 | 3.2-6 | |
| 0.5 | PAD#1-2-P12-TS03 | 0.28 | 5.56 | 0.63-5 | |
| 0.5 | PAD#1-2-P12-TS04 | 0.45 | 8.94 | 1.03-5 | |
| 0.1 | PAD#1-2-P12-TS05 | 0.45 | 8.94 | 1.06-5 | |
| 0.5 | PAD#1-2-P12-TS06 | ↓ | ↓ | 1.04-5 | |
| 1 | PAD#1-2-P12-TS07 | | | 1.04-5 | |
| 5 | PAD#1-2-P12-TS08 | | | 1.02-5 | |
| 10 | PAD#1-2-P12-TS09 | 0.45 | 8.94 | 1.01-5 | |
| 0.5 | PAD#1-2-P12-TS10 | 0.9 | 17.90 | 2.16-5 | |
| 0.5 | PAD#1-2-P12-TS11 | 1.8 | 35.8 | 4.67-5 | |
| 0.5 | PAD#1-2-P12-TS12 | 3.3 | 65.66 | 1-4 | |
| 0.1 | PAD#1-2-P12-TS13 | 3.3 | 65.66 | 1.01-4 | |
| 0.5 | PAD#1-2-P12-TS14 | ↓ | ↓ | 0.99-4 | |
| 1 | PAD#1-2-P12-TS15 | | | 0.99-4 | |
| 5 | PAD#1-2-P12-TS16 | | | 0.99-4 | |
| 10 | PAD#1-2-P12-TS17 | 3.3 | 65.66 | 1-4 | |
| 0.5 | END | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| AM | 11:24 | PAD#1-2-P12-TSCK | 6 | 1 | 109 | |
| PM | 5:43 | N/A | 6 | 1 | 115.6 | |
| END | | N/A | N/A | N/A | N/A | |

6/19.08
RI

**RCTS Testing Record (Page 7 of 10)**

Station: RC7 Date: 5.21.08 Tested by: Suvad Jupic
Project #: 0411-08-1696 Project Name: GEI
Boring #: SR1d Specimen #: PAD#1-2
Confining Pressure: 25 psi **Testing Stage: X2**

**RC Time Effect Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| AM | 7:49 | PAD#1-2-P25-T0 | 8 | 1 | 137.6 | |
| AM | 9:29 | PAD#1-2-P25-T7 | 8 | 1 | 141.9 | |
| END | ~~T20~~ | | ~ | | | |

DS 6/18/08

**RC Strain Amplitude Effect Tests**

DS 6/27/08

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
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| | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**RCTS Testing Record (Page 8 of 10)**

Station:_____ Date:_____ Tested by:_____ 5/27/08

Project #:_____ Project Name:_____

Boring #:_____ Specimen #:_____

Confining Pressure:_____ **Testing Stage: X2**

**TS Tests (prior to tests, fr= Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

6.19.08
SJ

**RCTS Testing Record (Page 9 of 10)**

Station: RC7 Date: 6.21.08 Tested by: Sonad Jupic
Project #: 0411-08-1696 Project Name: GE1
Boring #: CR RL Specimen #: PAD #1-2
Confining Pressure: 50 Psi **Testing Stage: X4**

**RC Time Effect Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| AM | 9:41 | PAD#1-2-P50-T-0 | 8 | 1 | 167.9 | |
| AM | 11:18 | PAD#1-2-P50-T-7 | 8 | 1 | 172.6 | |
| | ~~END~~ 12:47/19/08 | | | | | |

**RC Strain Amplitude Effect Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 12:48 | PAD#1-2-P50-S-0 | 4 | 1 | 172 | |
| | 12:48 | PAD#1-2-P50-S-1 | 8 | 1 | 171.7 | |
| | 12:48 | PAD#1-2-P50-S-2 | 16 | 1 | 171.1 | |
| | 12:48 | PAD#1-2-P50-S-3 | 32 | 1 | 170.1 | |
| | 12:48 | PAD#1-2-P50-S-4 | 64 | 1 | 168.3 | |
| | 12:50 | PAD#1-2-P50-SA-0 | 128 | 10 | 166.3 | |
| | 12:50 | PAD#1-2-P50-SA-1 | 256 | 10 | 162.5 | |
| | 12:51 | PAD#1-2-P50-SB-0 | 512 | 10 | 156.6 | |
| | 12:52 | PAD#1-2-P50-SC-0 | 1024 | 10 | 146.5 | |
| | 12:52 | PAD#1-2-P50-SD-0 | 2048 | 10 | 137.1 | |
| PM | 12:53 | PAD#1-2-P50-SE-0 | 4000 | 10 | 123.7 | |
| | | END | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| 12:54 | PAD#1-2-P50-SCE | 8 | 1 | 155.8 | |

6.19.08
SL

**RCTS Testing Record (Page 10 of 10)**

Station: RC7 Date: 5.21.08 Tested by: Suvad Jupic
Project #: 0411-08-1696 Project Name: GEI
Boring #: SRR Specimen #: PAD #1-2
Confining Pressure: 50 Psi **Testing Stage: X4**

**TS Tests (prior to tests, fr= 172.6 Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | PAD#1-2-P50-TS01 | 0.15 | 2.98 | 1.6-6 | |
| 0.5 | PAD#1-2-P50-TS02 | 0.30 | 5.96 | 31-6 | |
| 0.5 | PAD#1-2-P50-TS03 | 0.6 | 11.93 | 0.6-5 | |
| 0.5 | PAD#1-2-P50-TS04 | 1.0 | 19.88 | 1.04-5 | |
| 0.1 | PAD#1-2-P50-TS05 | 1.0 | 19.88 | 1.05-5 | |
| 0.5 | PAD#1-2-P50-TS06 | | | 1.04-5 | |
| 1 | PAD#1-2-P50-TS07 | | | 1.03-5 | |
| 5 | PAD#1-2-P50-TS08 | | | 1.01-5 | |
| 10 | PAD#1-2-P50-TS09 | 1.0 | 19.88 | 1-5 | |
| 0.5 | PAD#1-2-P50-TS10 | 2. | 39.77 | 2.1-5 | |
| 0.5 | PAD#1-2-P50-TS11 | 4 | 79.61 | 4.37-5 | |
| 0.5 | PAD#1-2-P50-TS12 | 4.7 | 93.59 | 0.52-4 | |
| 0.1 | PAD#1-2-P50-TS13 | 4.7 | 93.59 | 0.53-4 | |
| 0.5 | PAD#1-2-P50-TS14 | | | 0.5-4 | |
| 1 | PAD#1-2-P50-TS15 | | | 0.5-4 | |
| 5 | PAD#1-2-P50-TS16 | | | 0.49-4 | |
| 10 | PAD#1-2-P50-TS17 | 4.7 | 93.59 | 0.48-4 | |
| 0.5 | END | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 11:50 | PAD#1-2-P50-TSCK | 8 | 1 | 169.5 | |
| AM | 12:46 | NA | 8 | 1 | 171.8 | |
| | END | | | | | |

Geotechnical
Environmental and
Water Resources
Engineering

GEI Consultants

**Transfer of Fugro RCTS Report**
**Transmittal Letter No. 1**

June 23, 2008
Project 07223

Mr. Frank X. Bellini
Field Project Manager
AREVA NP, INC.
Solomon Pond Park
400 Donald Lynch Boulevard
Marlborough, MA 01752

Dear Mr. Bellini:

**Re: Transmittal No. 1 – Resonant Column Cyclic Torsional Shear Tests (RCTS) Report**
**Nine Mile Point Site Characterization**
**Oswego, New York**

The purpose of this letter is to document GEI Consultants, Inc.'s transmittal of a compact disc containing the Fugro RCTS Tests Report dated June 20, 2008. This Transmittal is being prepared according to the AREVA NP, INC. Purchase Order and Scope of Work provided in our proposal dated July 6, 2007, which is the basis of our current contract with AREVA.

## Documents

This Letter of Transmittal No. 1 transfers Fugro RCTS Tests Reports dated June 20, 2008 for the Nine Mile Point Site Characterization Project; it includes one document containing two RCTS tests (RCTS#A and RCTS#B) and two reports.

.

1. **Resonant Column Cyclic Torsional Shear Tests (RCTS) Report.**

All test samples were managed and tested in accordance with the following AREVA-approved procedures:

- 38-9058206-004: GEI Procedure 124 R4 - Transportation and Tracking of Soil and Rock Samples.
- 38-9080235-000: GEI Procedure 109 - Resonant Column Cyclic Torsional Shear CCyTS).
- 38-9065537-001: GEI Procedure 101 R1- Water Content Measurement.

Prior to testing, all Fugro personnel involved in the work were trained to the procedures.

Please call me, Tom Kahl or Robert Lambe if you have questions regarding this Transmittal Letter.

Sincerely,

GEI CONSULTANTS, INC.

Herbert Scribner
Electronic signature inserted by D. Bishop per
email approval from Herbert Scribner 6/23/08
HS/db
Attachments M:\PROJECT\2007\07223\Reports-Data - Subconsultants\Fugro Consultants\Transmittal #1 Fugro RCTS test.doc

**FUGRO CONSULTANTS, INC.**

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

June 20, 2008

Mr. Thomas W. Kahl
Senior Vice President
GEI Consultants, Inc.
400 Unicorn Park Drive
Woburn, MA 01801

Dear Mr. Kahl:

**RE: Letter of Transmittal**
**Resonant Column Cyclic Torsional Shear Tests**
**Backfill Samples**
**Nine Mile Point Unit 3**
**Oswego, New York**

**Test Results Summary**

Fugro performed two RCTS tests on remolded specimens of sand and gravel backfill samples provided by GEI Consultants, Inc. The **final** reports of the tests along with Dr. Kenneth Stokoe's approval sheet are presented in Attachment A.

**Test Procedures**

All test samples were managed and tested in accordance with the following AREVA-approved procedures:

- 38-9058206-004: GEI Procedure 124 R4- Transportation and Tracking of Soil and Rock Samples
- 38-9080235-000: GEI Procedure 109- Resonant Column Cyclic Torsional Shear (RCCyTS)
- 38-9065537-001: GEI Procedure 101 R1- Water Content Measurement

Prior to testing, all Fugro personnel involved in the work were trained to the procedures.

**Test Documents**

Copies of completed test forms related to the testing required by the above-referenced procedures are contained in Attachment B.

Please call me at if you have any questions.

Sincerely,

Jiewu Meng, PhD, P.E.
Project Engineer

Bill DeGroff, P.E.
Laboratory Department Manager

Enclosure(s)

# RCTS TEST APROVAL

| PROJECT SITE/NAME | Nine-Mile Point |
|---|---|

| Test ID | Sample ID | Depth B.S. (Ft) | Approved By (Initials) | Date |
|---|---|---|---|---|
| RCTS#A | Pad 1-1 | --- | KHS (+) | 18 June '08 |
| RCTS#B | Pad 1-2 | | KHS (+) | 18 June '08 |

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

(+) Consider minor comments on a few figures. ~~However, Fig. A.16 is missing~~. I found Fig. A.16 in Appendix B. — no prob.!

# ATTACHMENT A

Fugro # 0411-08-1696

# APPENDIX A

Remolded Specimen Pad 1-1
Sample Location: Streeter Rathburn Road

Borehole ---NA
Sample ---NA
Depth = --- ft ( --- m)
Total Unit Weight = 125.2 lb/ft$^3$
Water Content = 7.8 %
Estimated In-Situ Mean Effective
Stress = 13 psi

FUGRO JOB #: 0411-08-1696
Testing Station: RC7

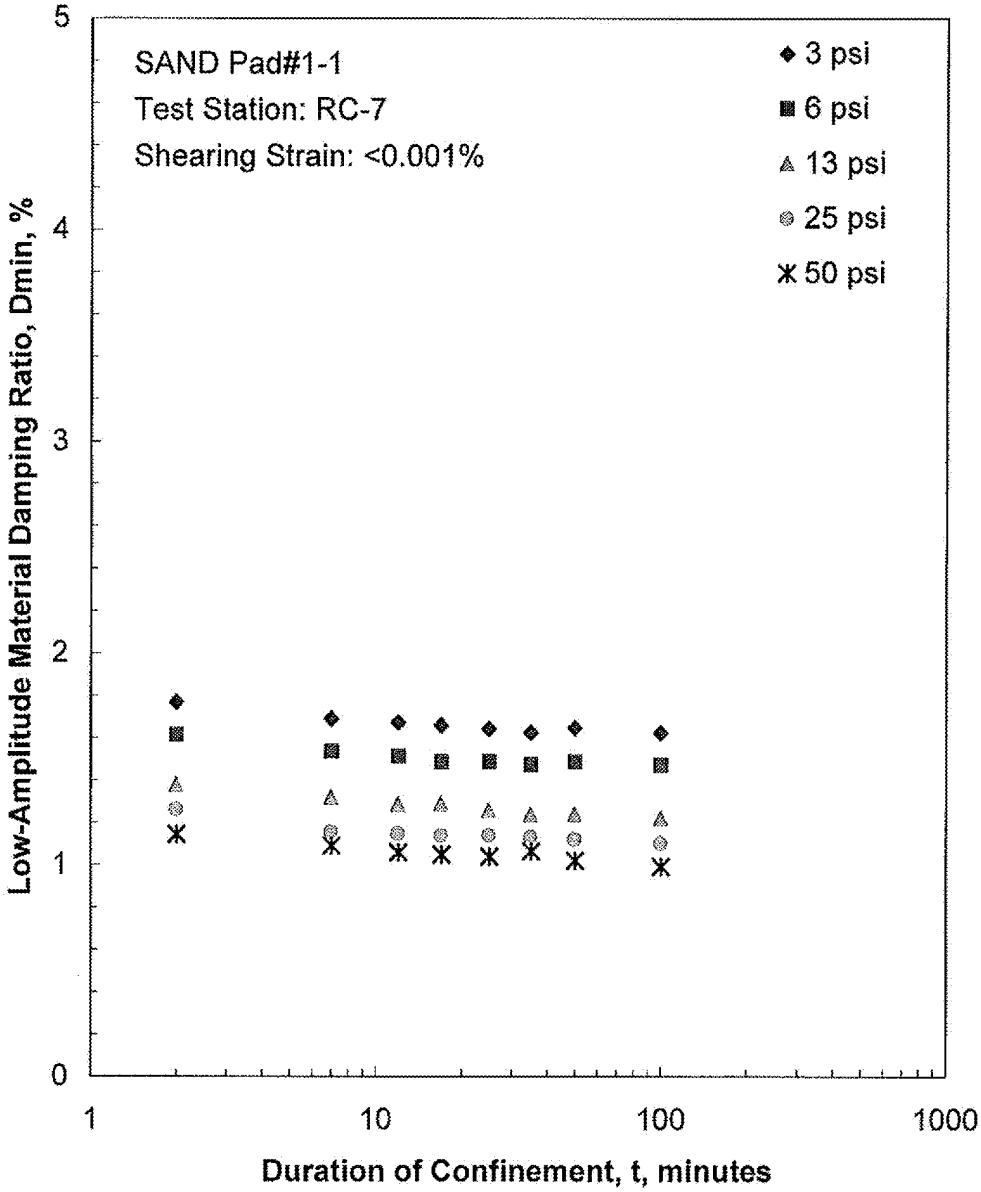



**Figure A.2 Variation in Low-Amplitude Material Damping Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests**

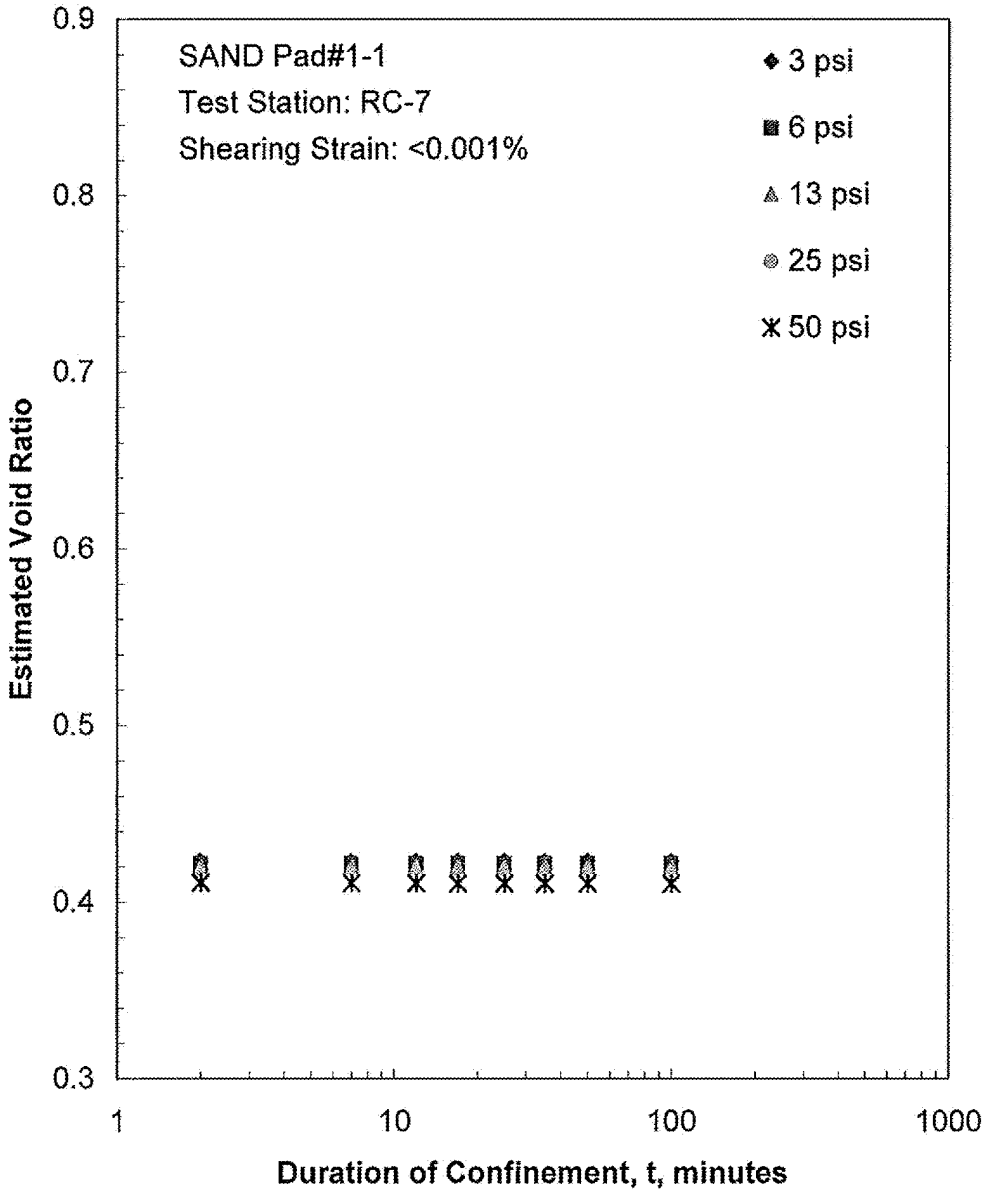



**Figure A.3 Variation in Estimated Void Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests**

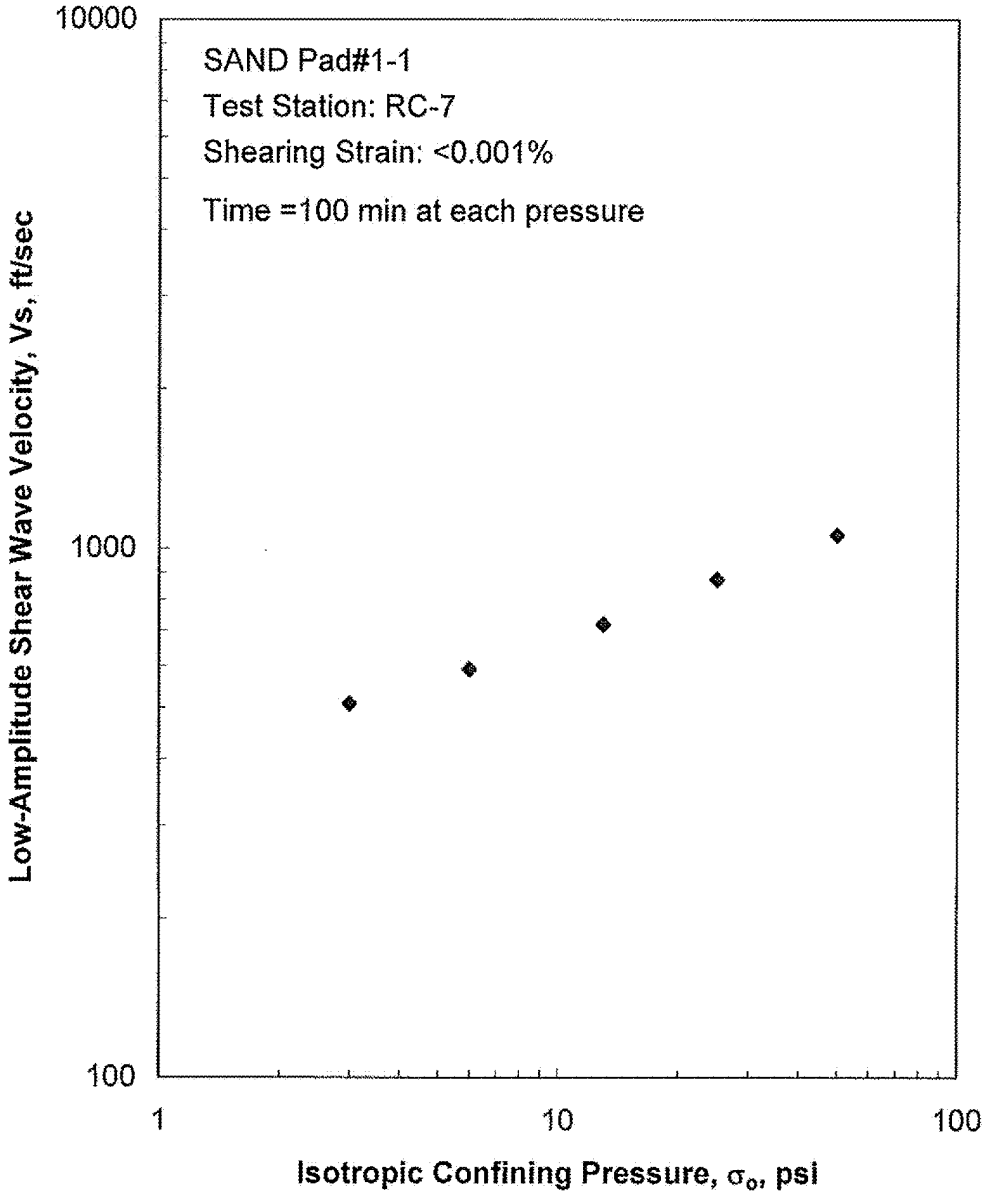



**Figure A.4 Variation in Low-Amplitude Shear Wave Velocity with Isotropic Confining Pressure from Resonant Column Tests**

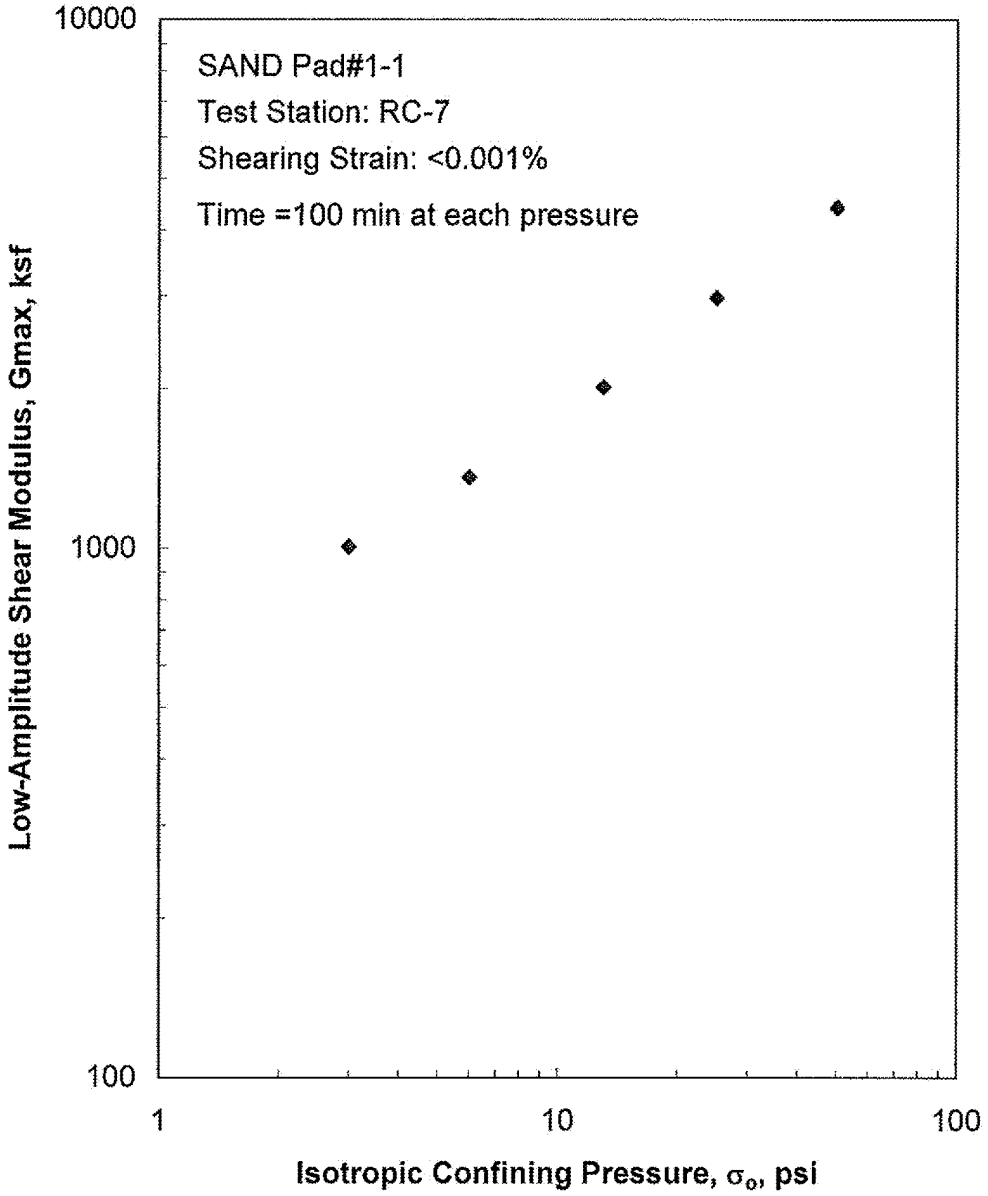



**Figure A.5 Variation in Low-Amplitude Shear Modulus with Isotropic Confining Pressure from Resonant Column Tests**

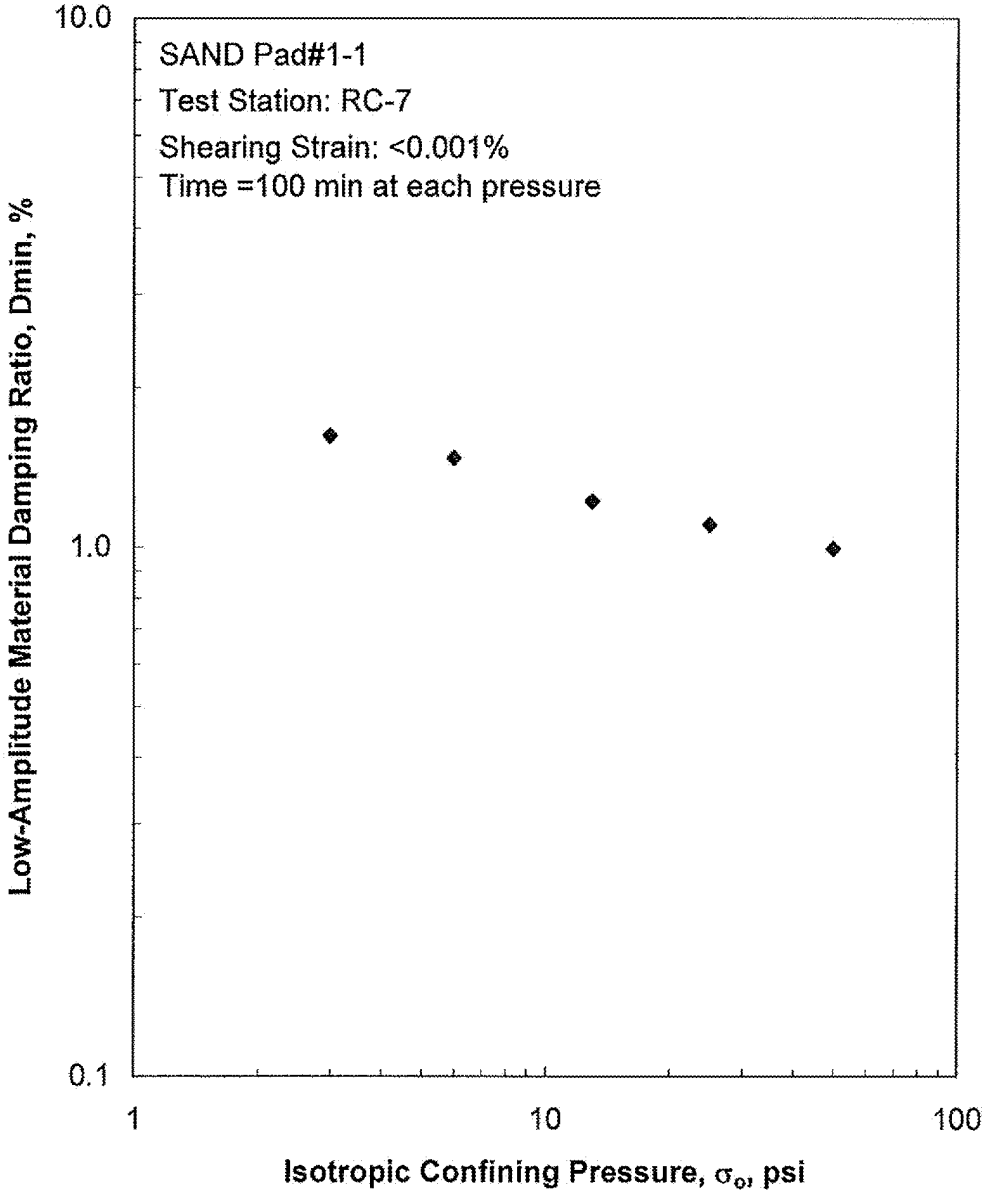



**Figure A.6 Variation in Low-Amplitude Material Damping Ratio with Isotropic Confining Pressure from Resonant Column Tests**

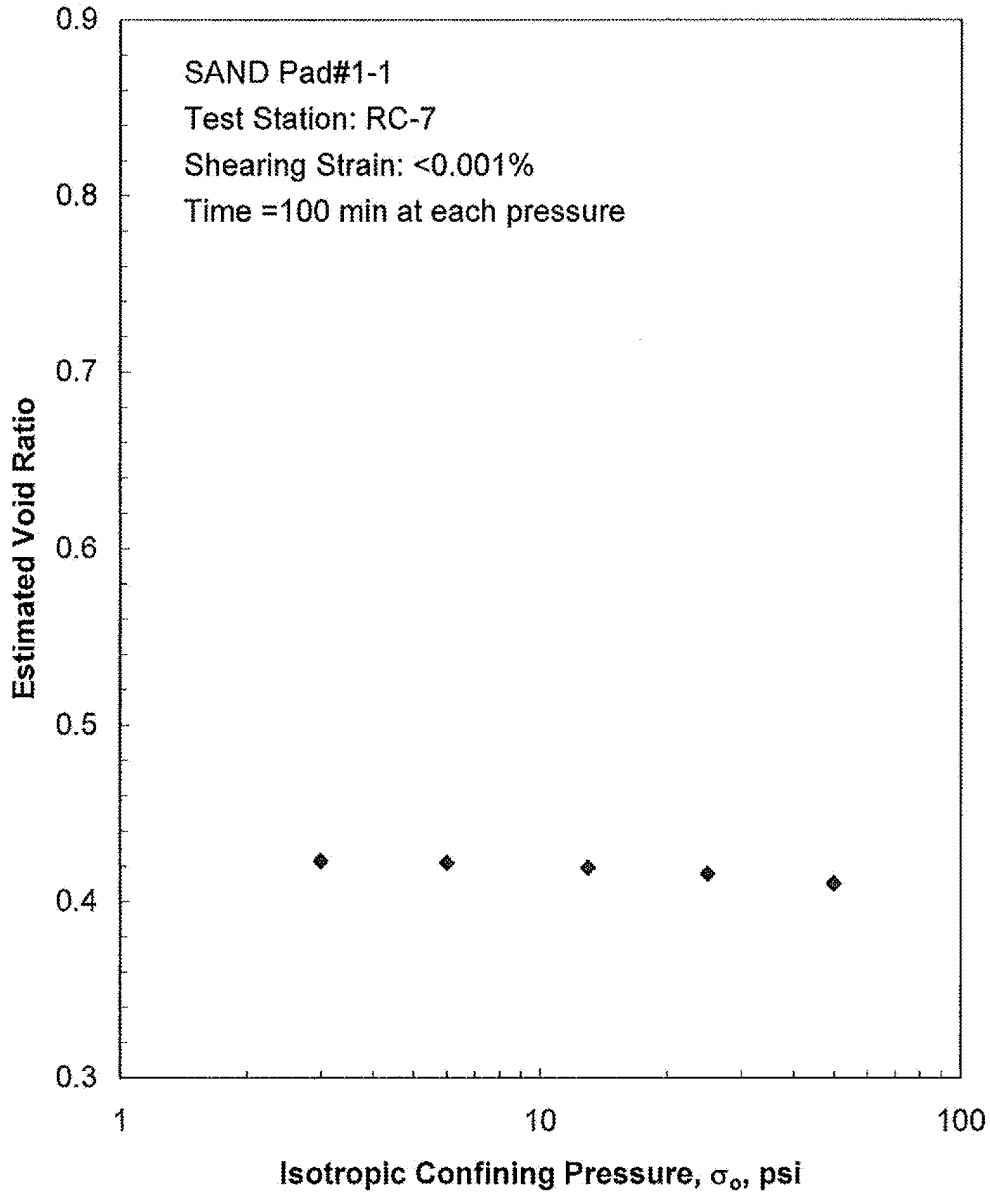



**Figure A.7 Variation in Estimated Void Ratio with Isotropic Confining Pressure from Resonant Column Tests**

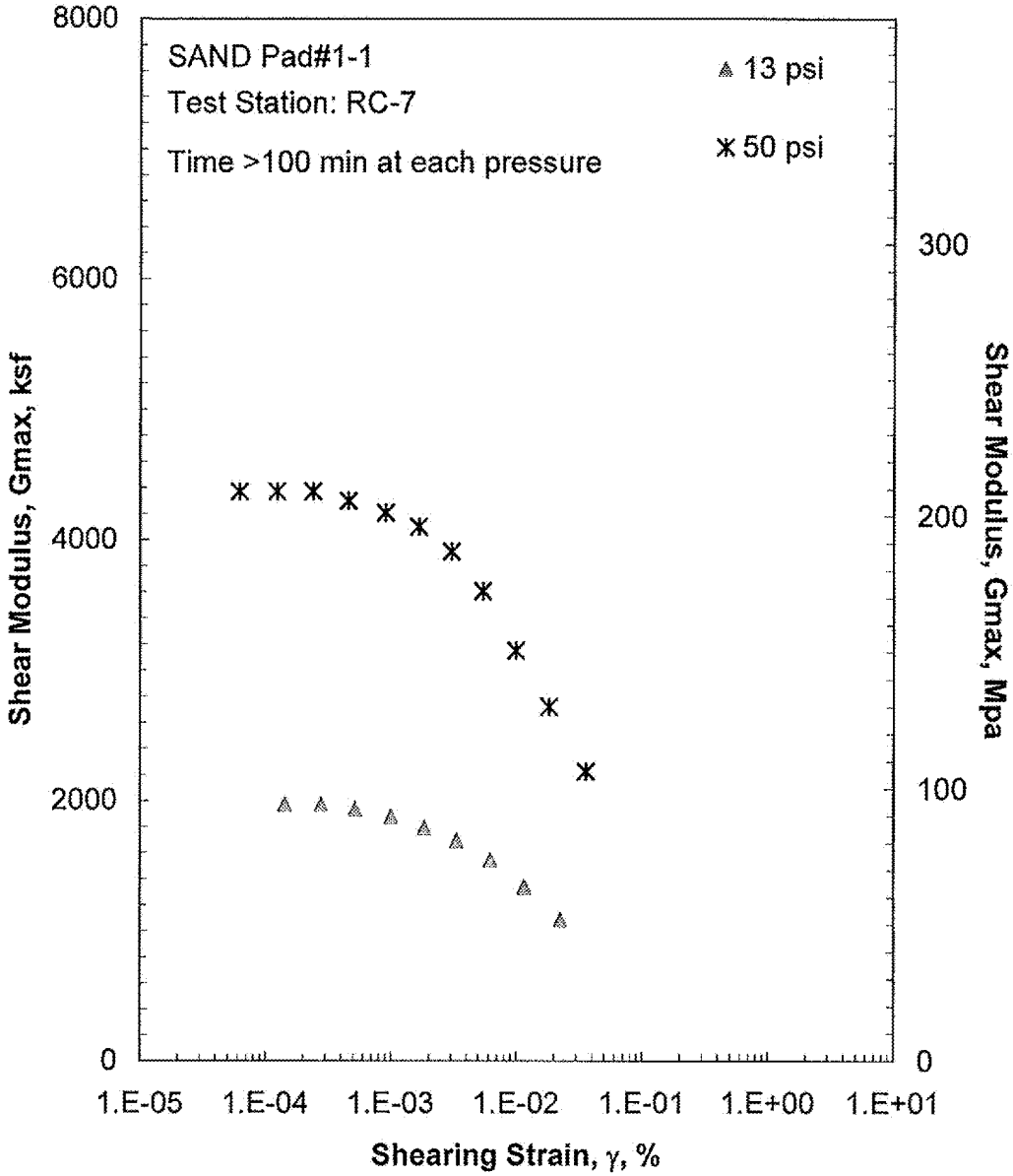



**Figure A.8 Comparison of the Variation in Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests**

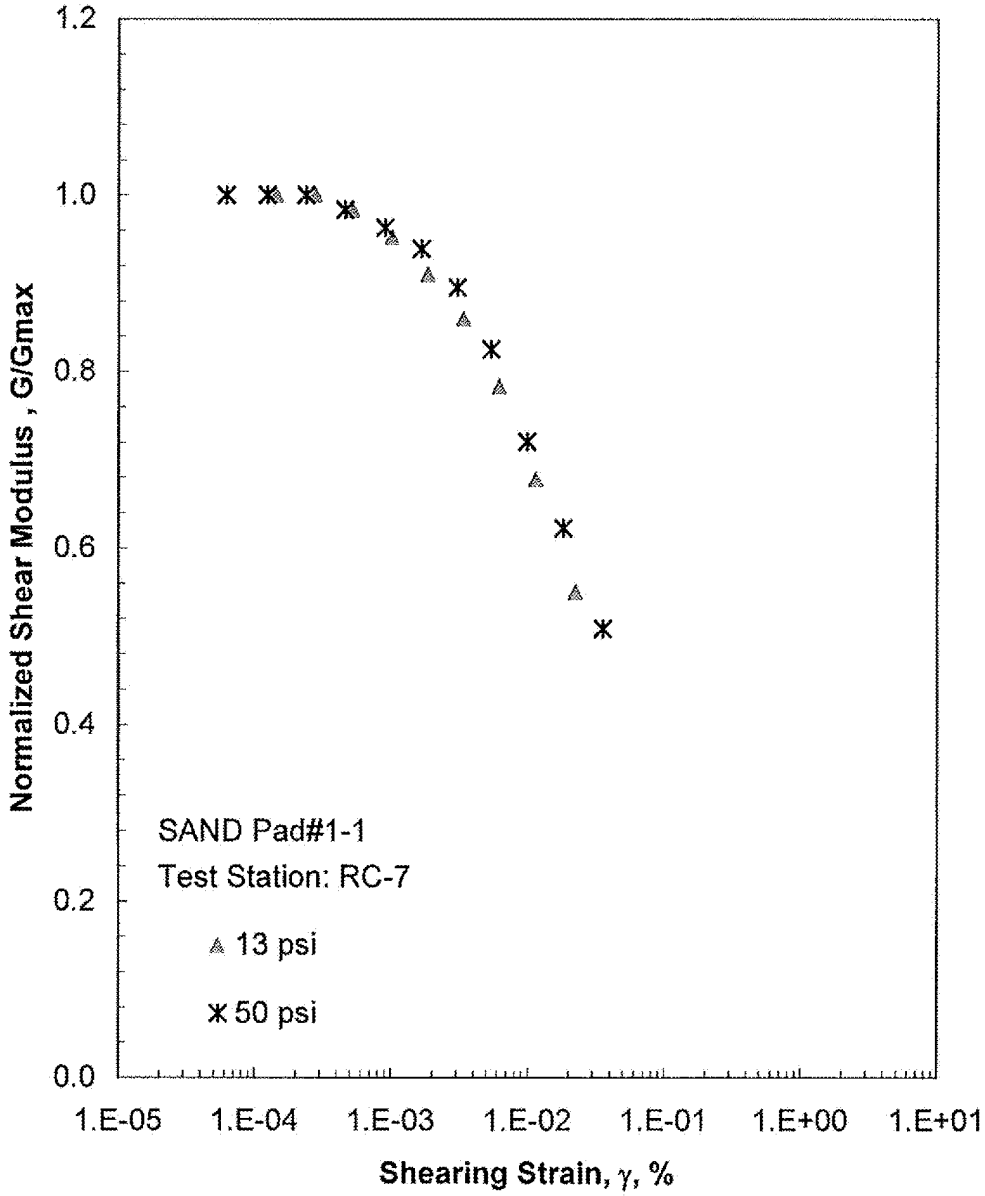



**Figure A.9 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests**

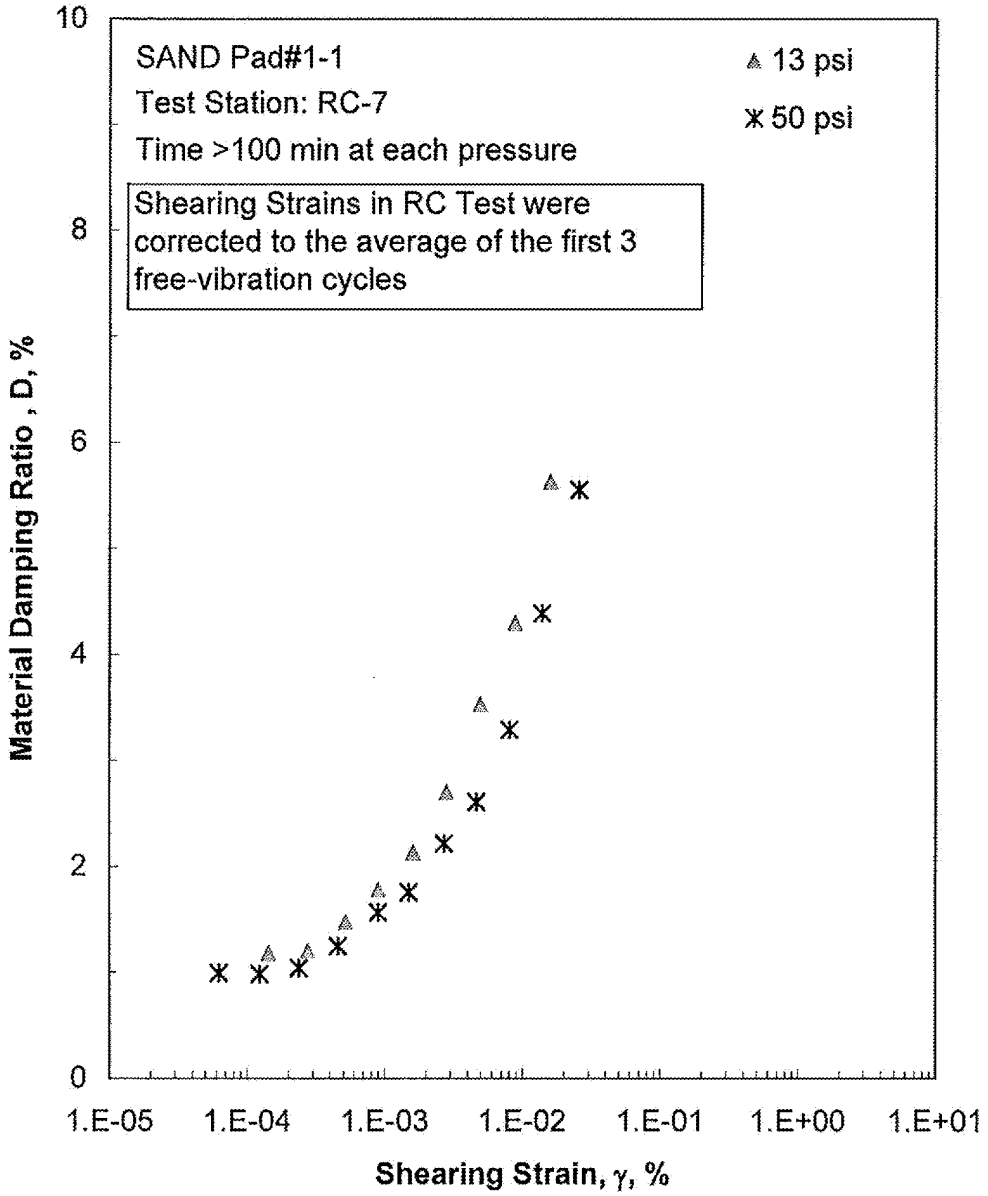



**Figure A.10 Comparison of the Variation in Material Damping Ratio with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests**

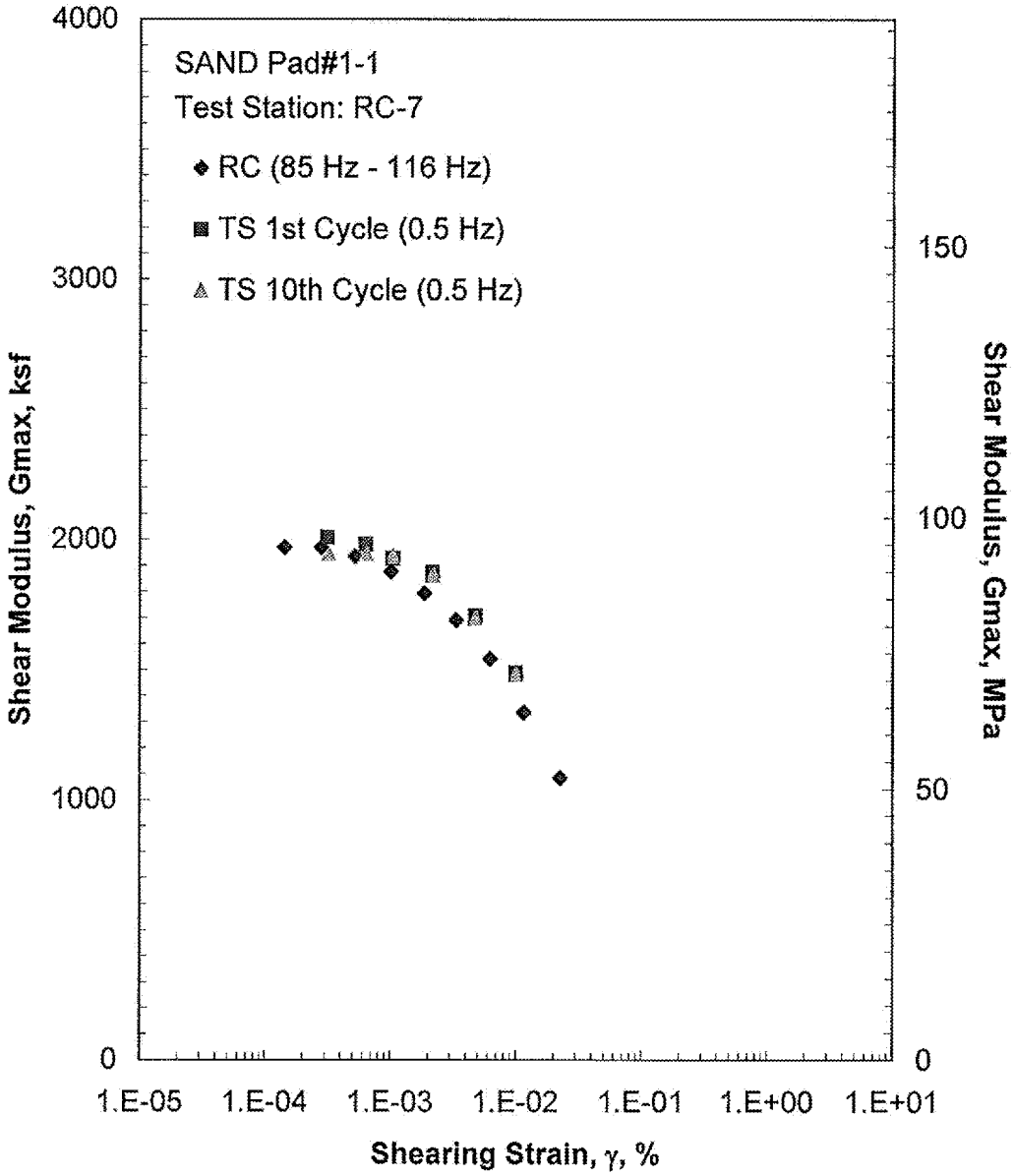



**Figure A.11 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

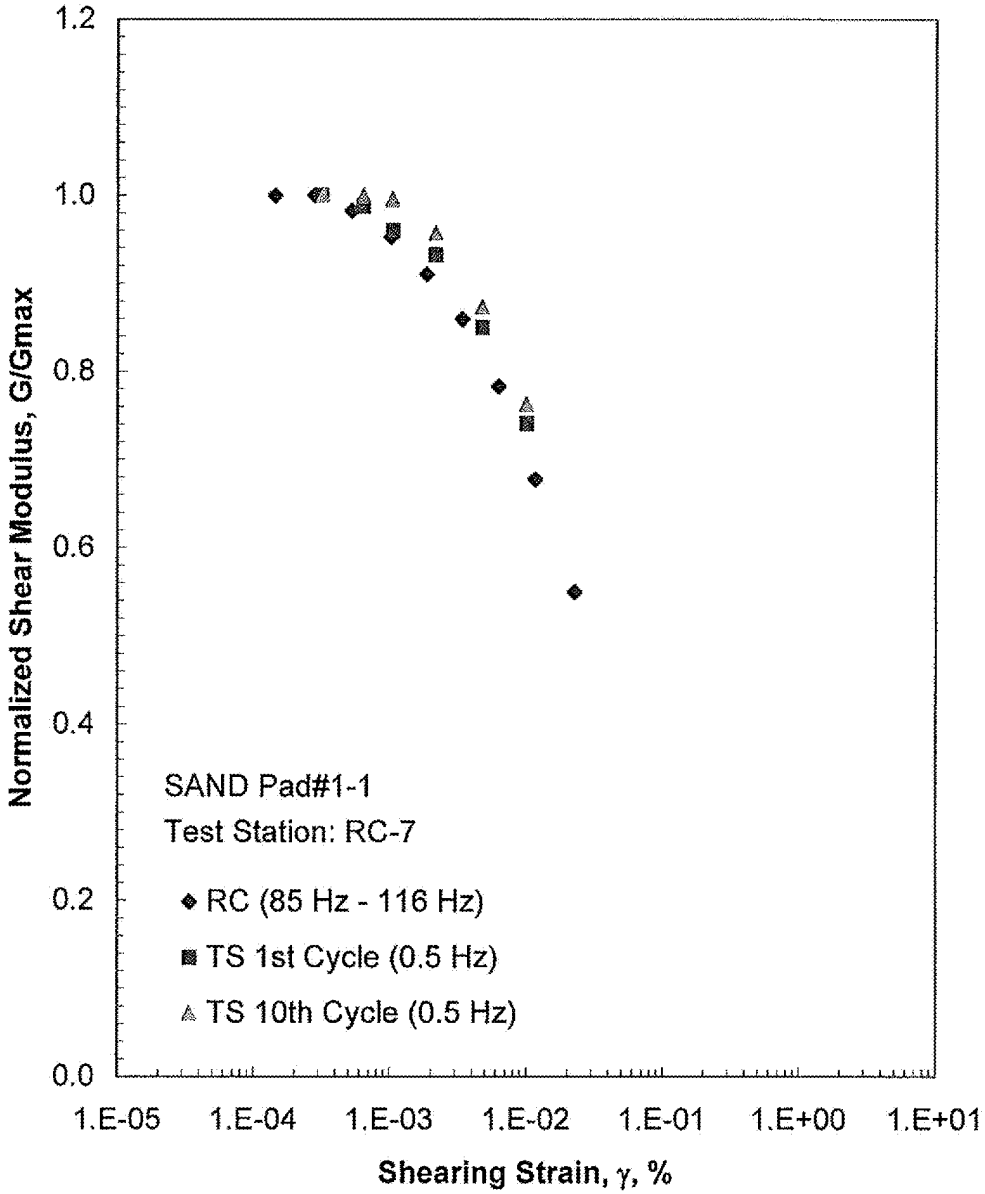



**Figure A.12 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

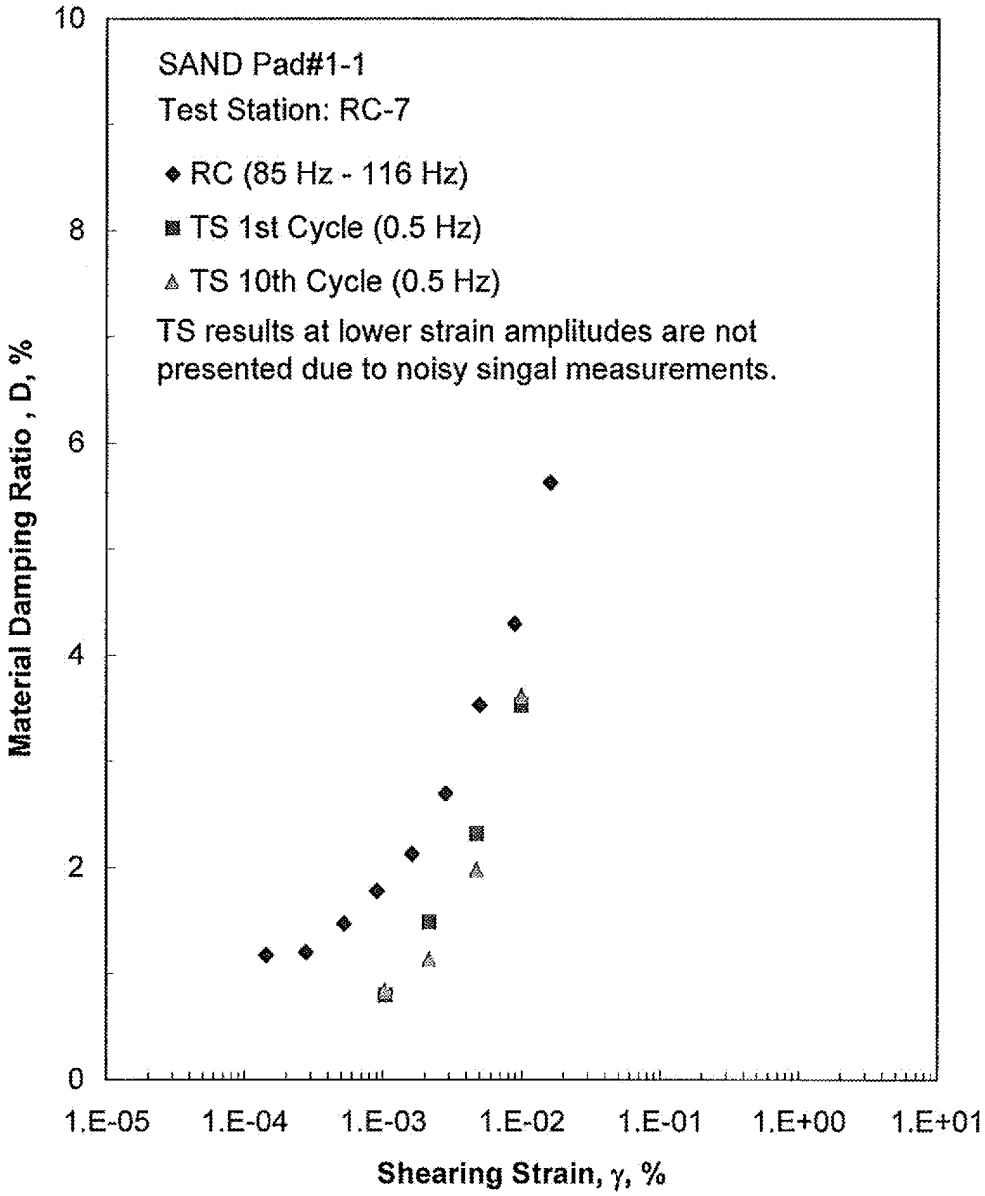



**Figure A.13 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

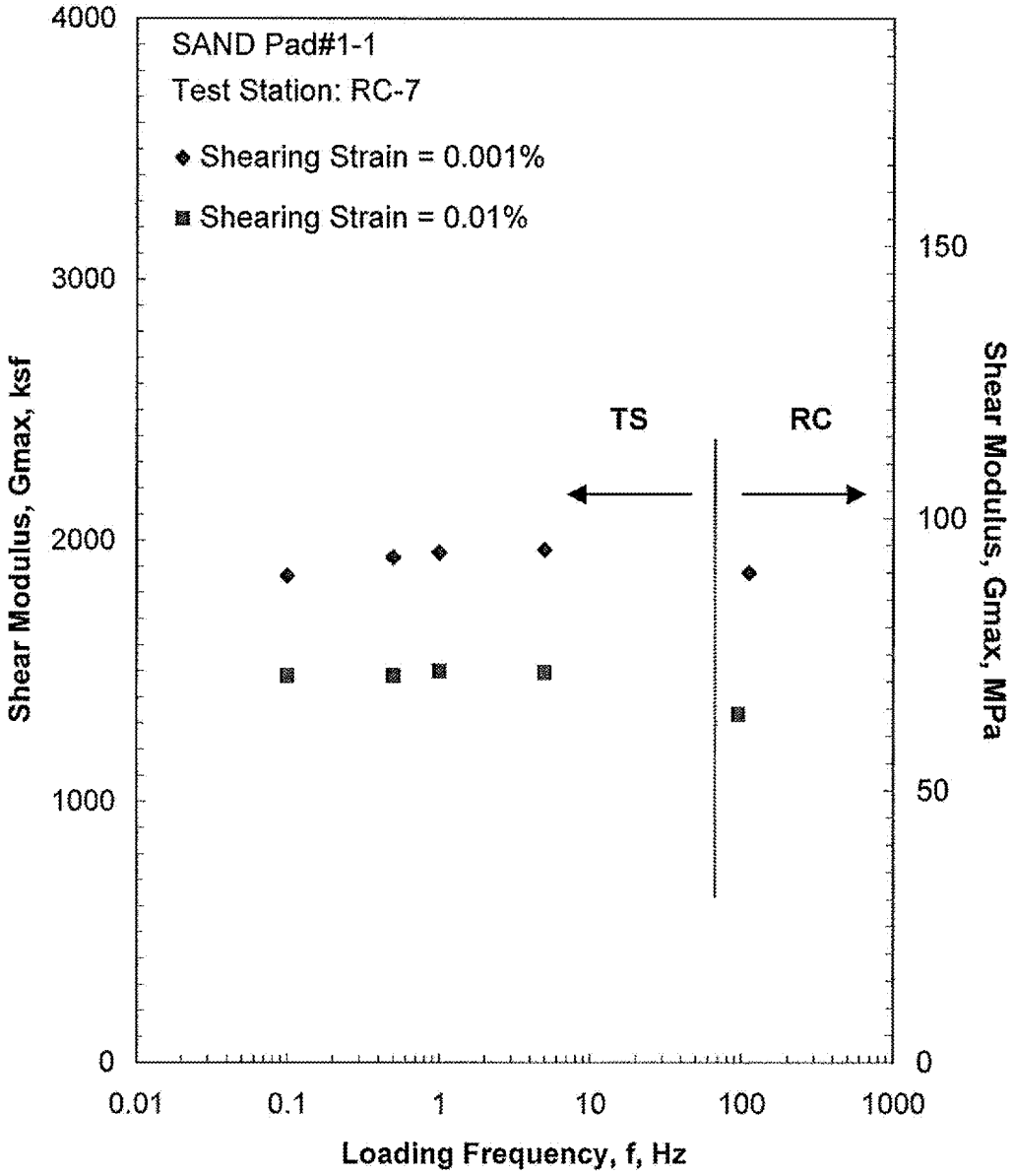



**Figure A.14 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

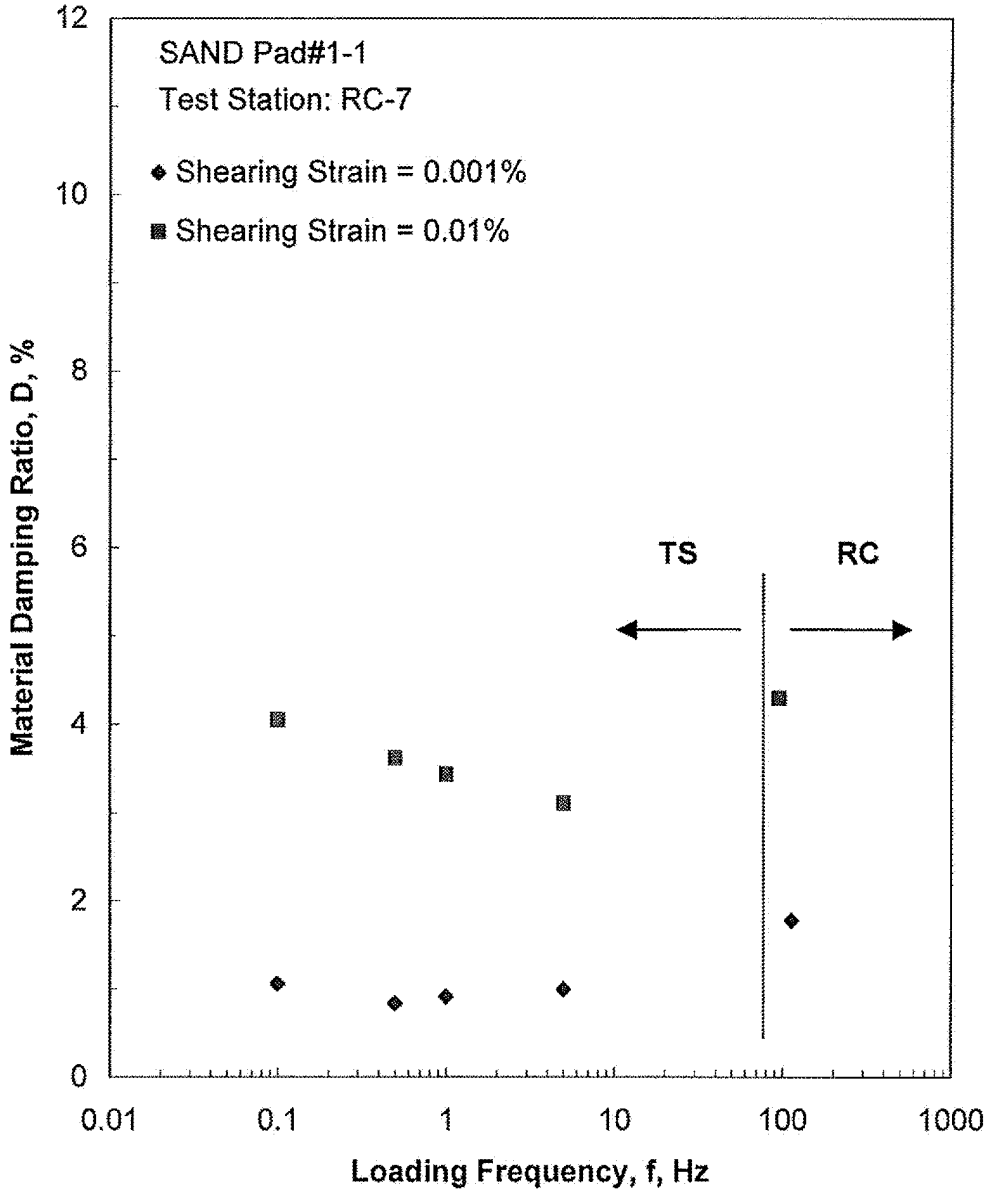



**Figure A.15 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

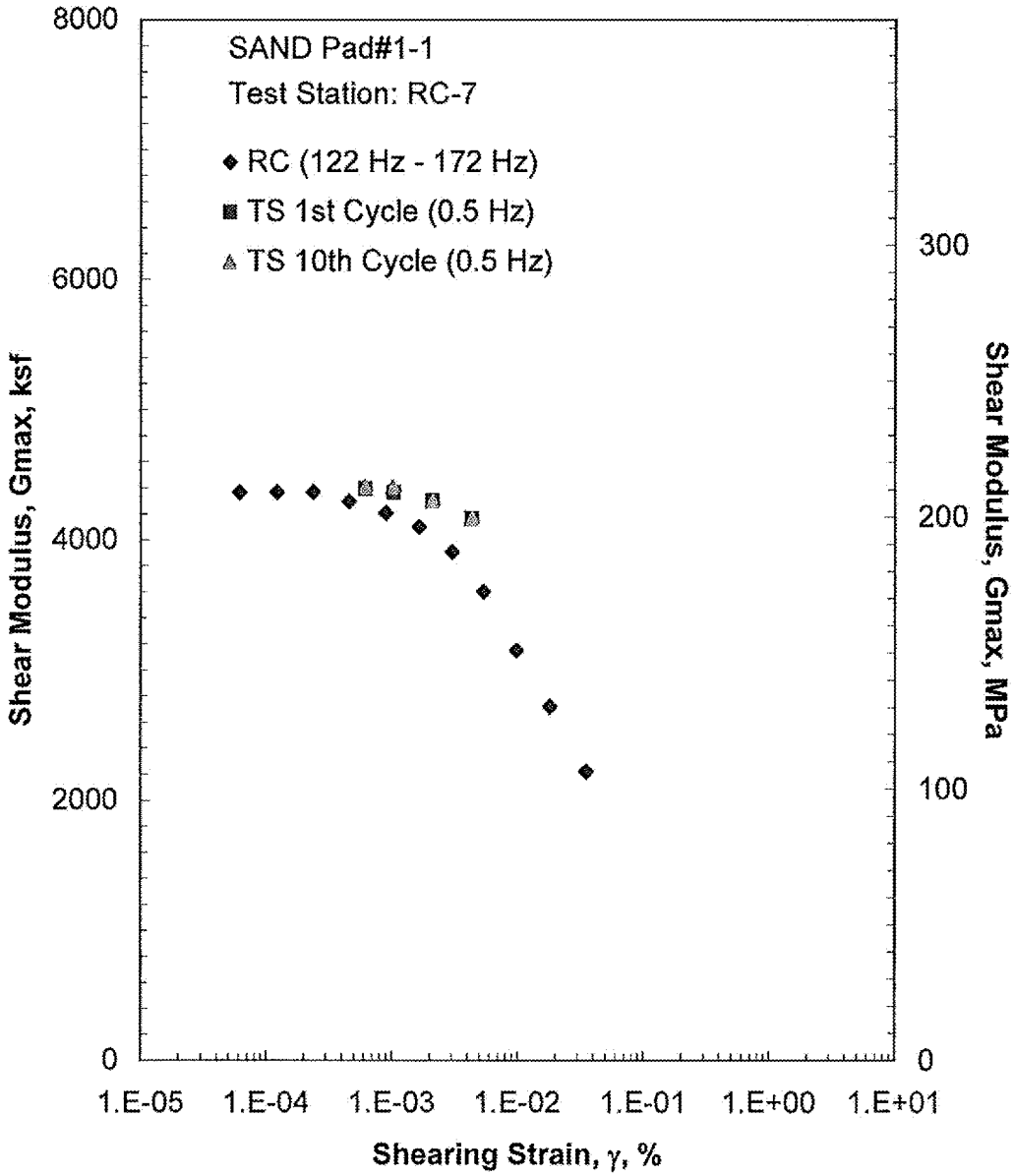



**Figure A.16 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

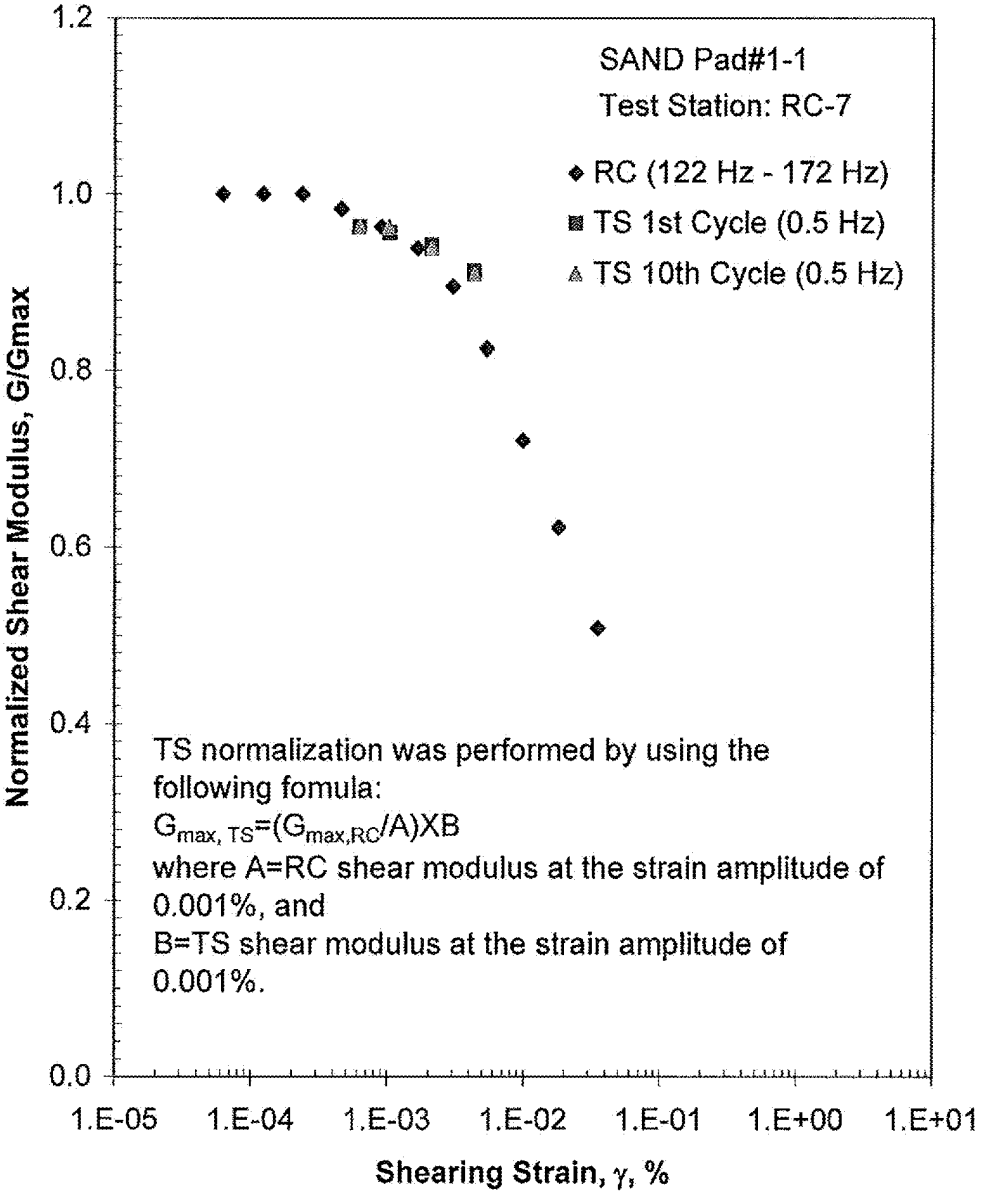



**Figure A.17 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

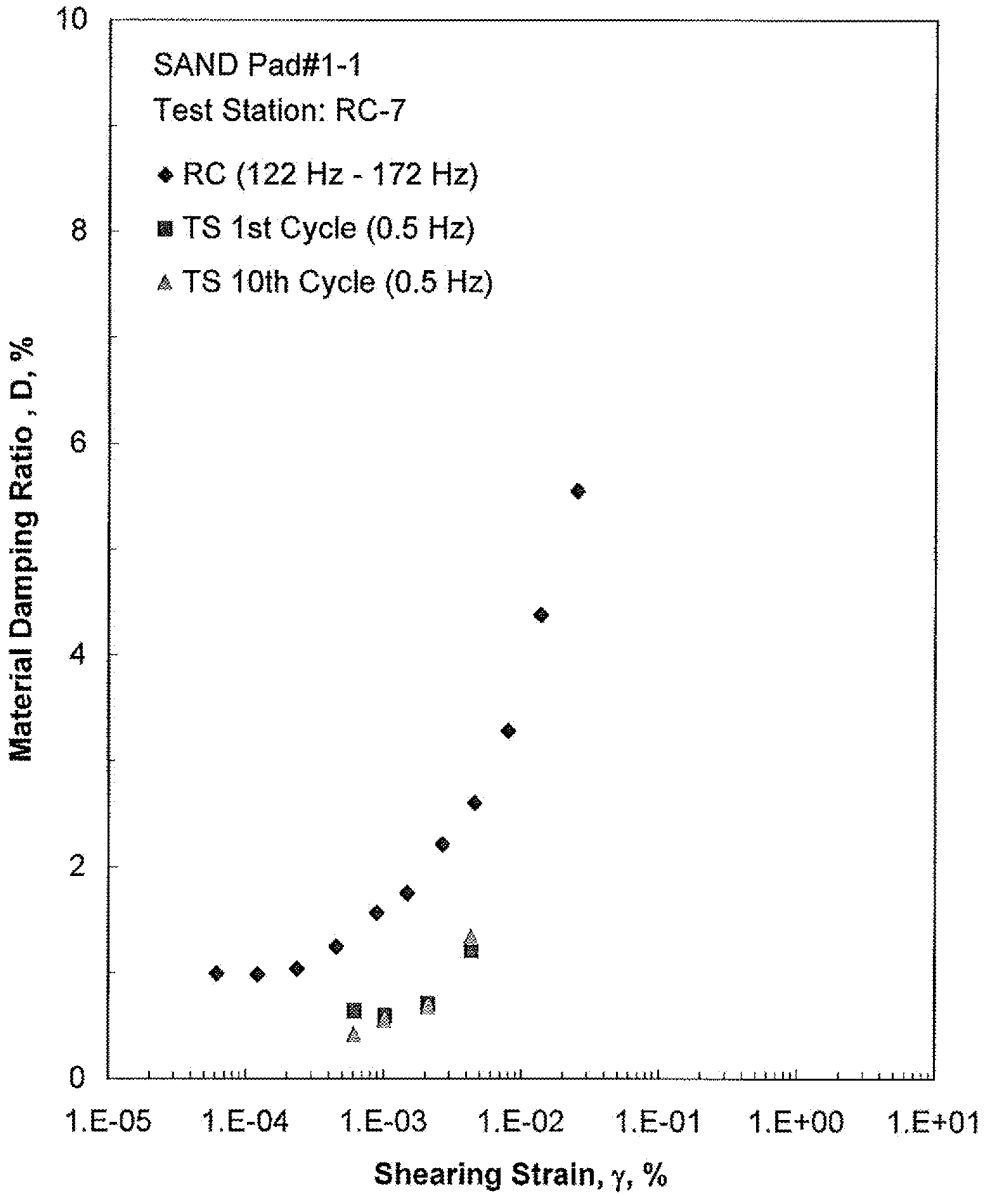



**Figure A.18 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

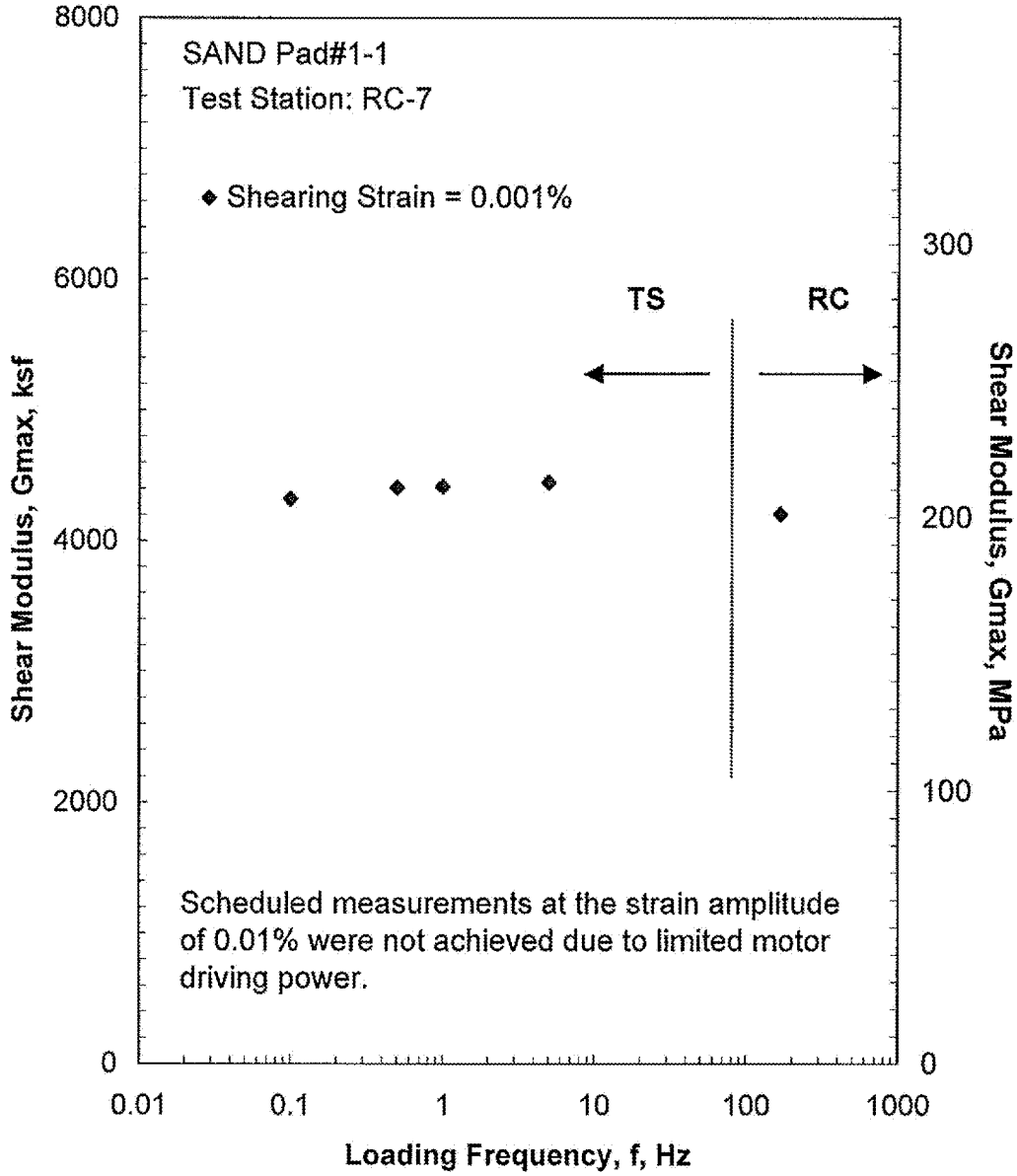



**Figure A.19 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

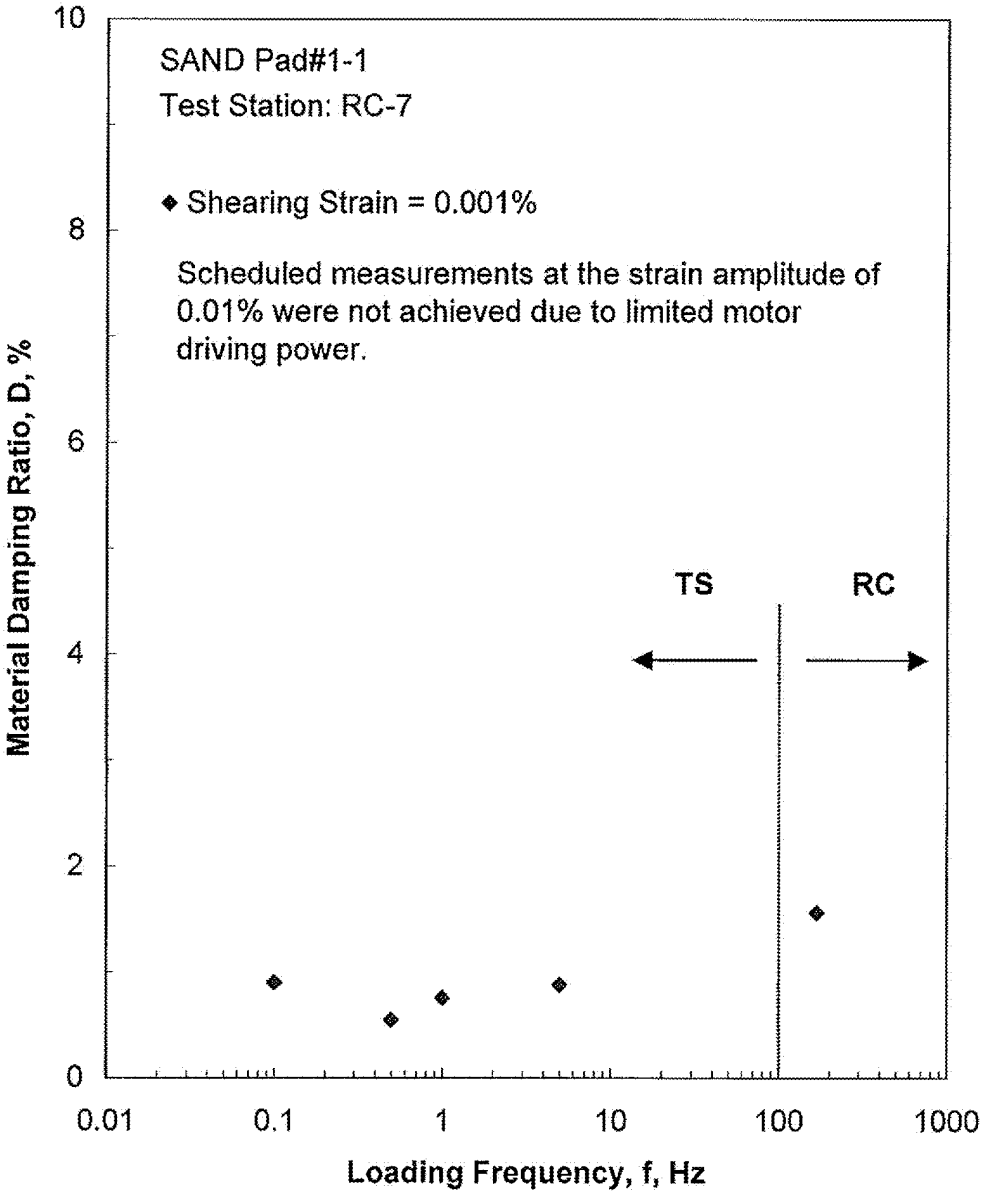



**Figure A.20 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

Table A.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 Pad 1-1

| Isotropic Confining Pressure, $\sigma_o$ | | | 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) | (%) | |
| 3 | 432 | 21 | 1007 | 48 | 508.6 | 1.62 | 0.42 |
| 6 | 864 | 41 | 1363 | 65 | 591.3 | 1.47 | 0.42 |
| 13 | 1872 | 90 | 2016 | 97 | 718.7 | 1.22 | 0.42 |
| 25 | 3600 | 172 | 2976 | 143 | 872.0 | 1.10 | 0.42 |
| 50 | 7200 | 345 | 4405 | 211 | 1058.9 | 0.99 | 0.41 |

Table A.2 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen Pad 1-1; Isoptropic Confining Pressure, $\sigma_o$= 13 psi (1.9 ksf = 90 kPa)

| Peak Shearing Strain, % | Shear Modulus, G, ksf | Normalized Shear Modulus, $G/G_{max}$ | Average[+] Shearing Strain, % | Material Damping Ratio[x], D, % |
|---|---|---|---|---|
| 1.44E-04 | 1969 | 1.00 | 1.44E-04 | 1.18 |
| 2.80E-04 | 1969 | 1.00 | 2.80E-04 | 1.21 |
| 5.24E-04 | 1935 | 0.98 | 5.24E-04 | 1.47 |
| 1.01E-03 | 1876 | 0.95 | 9.11E-04 | 1.78 |
| 1.87E-03 | 1793 | 0.91 | 1.62E-03 | 2.13 |
| 3.38E-03 | 1692 | 0.86 | 2.84E-03 | 2.70 |
| 6.24E-03 | 1542 | 0.78 | 5.00E-03 | 3.53 |
| 1.16E-02 | 1335 | 0.68 | 8.92E-03 | 4.30 |
| 2.26E-02 | 1083 | 0.55 | 1.61E-02 | 5.63 |

[+] 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 A.3 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen Pad 1-1; Isotropic Confining Pressure, $\sigma_o$= 13 psi (1.9 ksf = 90 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, % |
| 3.13E-04 | 2007 | 1.00 | 0.76 | 3.24E-04 | 1945 | 1.00 | 0.20 |
| 6.35E-04 | 1982 | 0.99 | 1.05 | 6.46E-04 | 1945 | 1.00 | 0.59 |
| 1.05E-03 | 1927 | 0.96 | 0.80 | 1.04E-03 | 1936 | 1.00 | 0.84 |
| 2.16E-03 | 1873 | 0.93 | 1.49 | 2.17E-03 | 1861 | 0.96 | 1.14 |
| 4.74E-03 | 1707 | 0.85 | 2.32 | 4.77E-03 | 1698 | 0.87 | 1.98 |
| 9.98E-03 | 1488 | 0.74 | 3.53 | 1.00E-02 | 1483 | 0.76 | 3.62 |

Table A.4 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen Pad 1-1; Isoptropic Confining Pressure, $\sigma_o$= 50 psi (7.2 ksf = 345 kPa)

| Peak Shearing Strain, % | Shear Modulus, G, ksf | Normalized Shear Modulus, $G/G_{max}$ | Average[+] Shearing Strain, % | Material Damping Ratio[x], D, % |
|---|---|---|---|---|
| 6.20E-05 | 4367 | 1.00 | 6.20E-05 | 0.99 |
| 1.23E-04 | 4367 | 1.00 | 1.23E-04 | 0.98 |
| 2.38E-04 | 4367 | 1.00 | 2.38E-04 | 1.04 |
| 4.57E-04 | 4294 | 0.98 | 4.57E-04 | 1.25 |
| 8.98E-04 | 4205 | 0.96 | 8.98E-04 | 1.57 |
| 1.66E-03 | 4100 | 0.94 | 1.49E-03 | 1.75 |
| 3.04E-03 | 3909 | 0.90 | 2.68E-03 | 2.22 |
| 5.40E-03 | 3602 | 0.83 | 4.59E-03 | 2.61 |
| 9.90E-03 | 3148 | 0.72 | 8.01E-03 | 3.29 |
| 1.82E-02 | 2719 | 0.62 | 1.38E-02 | 4.38 |
| 3.54E-02 | 2222 | 0.51 | 2.55E-02 | 5.55 |

[+] 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 A.5 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen Pad 1-1; Isotropic Confining Pressure, $\sigma_o$= 50 psi (7.2 ksf = 345 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, % |
| 6.18E-04 | 4392 | 0.96 | 0.64 | 6.16E-04 | 4408 | 0.96 | 0.42 |
| 1.04E-03 | 4364 | 0.96 | 0.60 | 1.03E-03 | 4406 | 0.96 | 0.55 |
| 2.10E-03 | 4299 | 0.94 | 0.71 | 2.11E-03 | 4297 | 0.94 | 0.68 |
| 4.35E-03 | 4167 | 0.91 | 1.21 | 4.35E-03 | 4161 | 0.91 | 1.34 |

# APPENDIX B

Remolded Specimen Pad 1-2
Sample Location: Streeter Rathburn Road

Borehole ---NA
Sample ---NA
Depth = --- ft ( --- m)
Total Unit Weight = 125.2 lb/ft$^3$
Water Content = 8.2%
Estimated In-Situ Mean Effective
Stress = 13 psi

FUGRO JOB #: 0411-08-1696
Testing Station: RC7

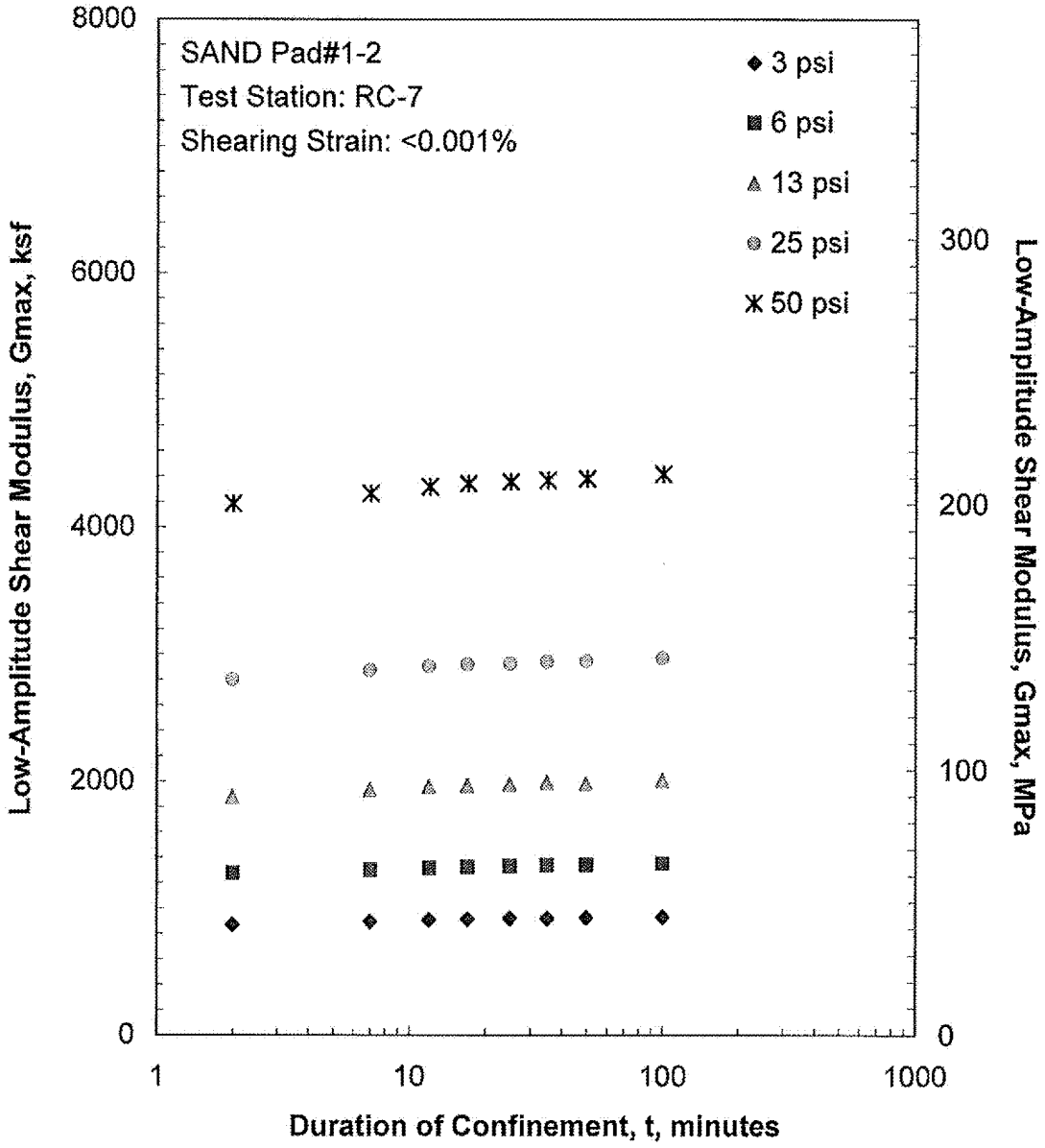



**Figure B.1 Variation in Low-Amplitude Shear Modulus with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests**

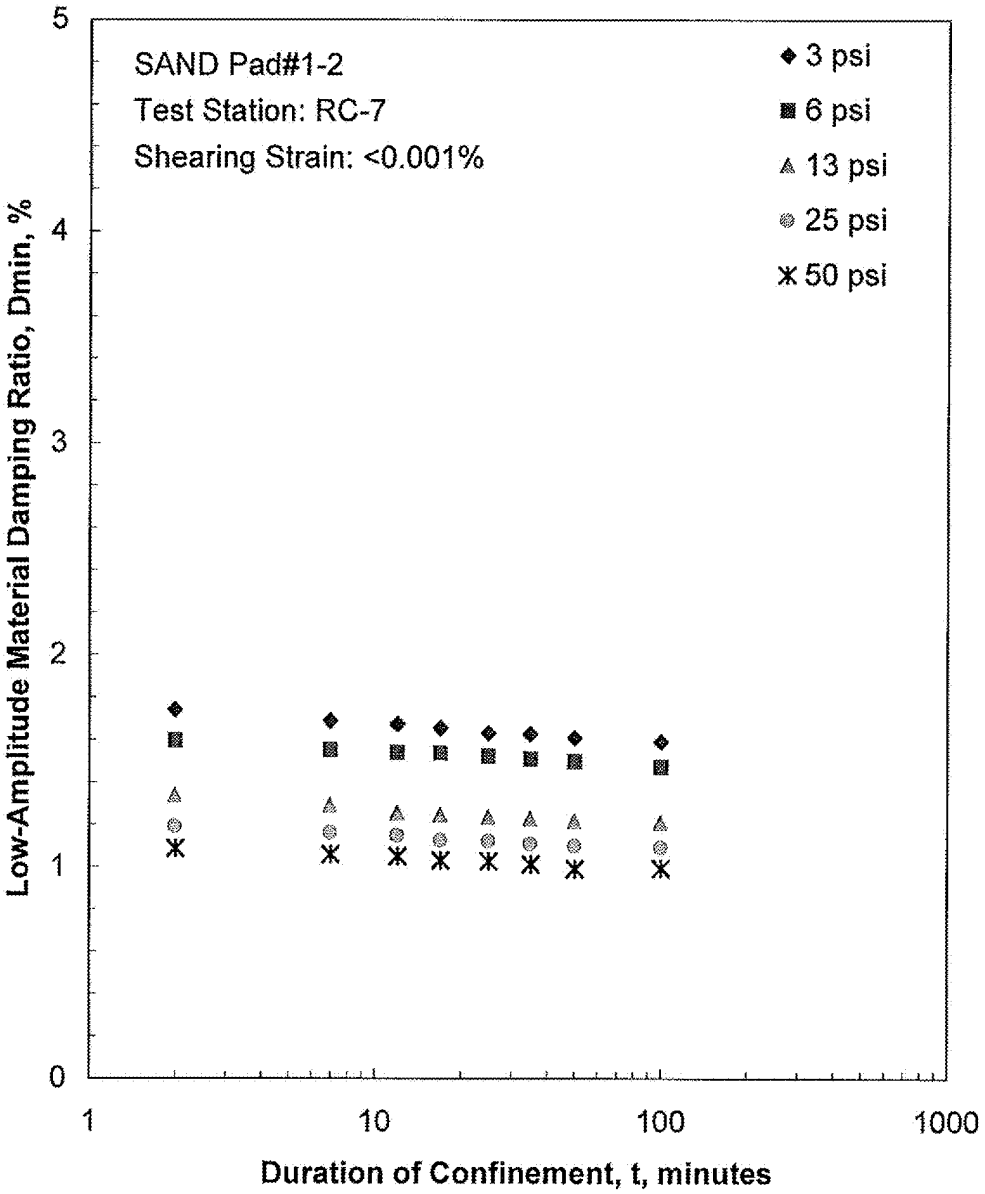



**Figure B.2 Variation in Low-Amplitude Material Damping Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests**

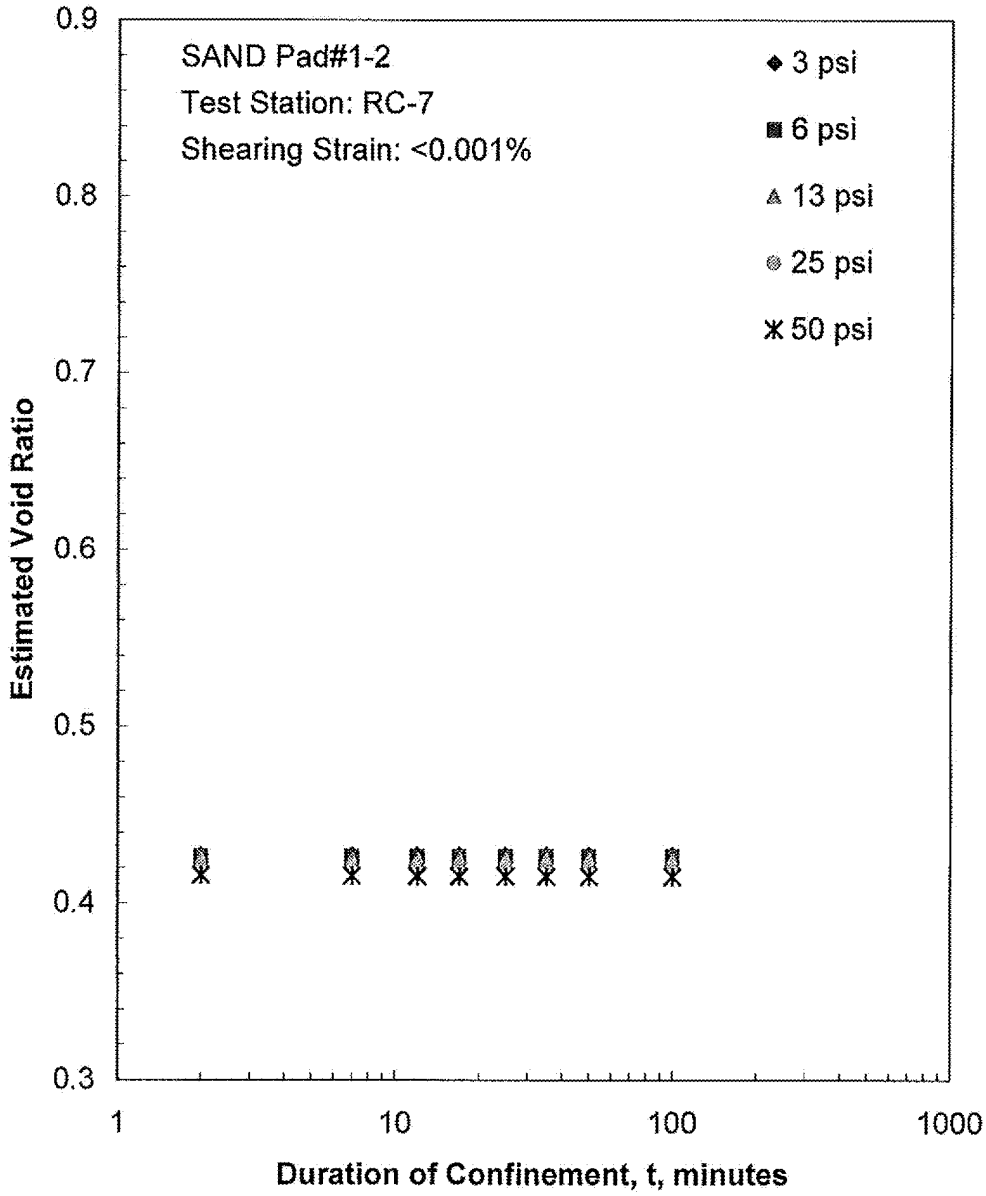



**Figure B.3 Variation in Estimated Void Ratio with Magnitude and Duration of Isotropic Confining Pressure from Resonant Column Tests**

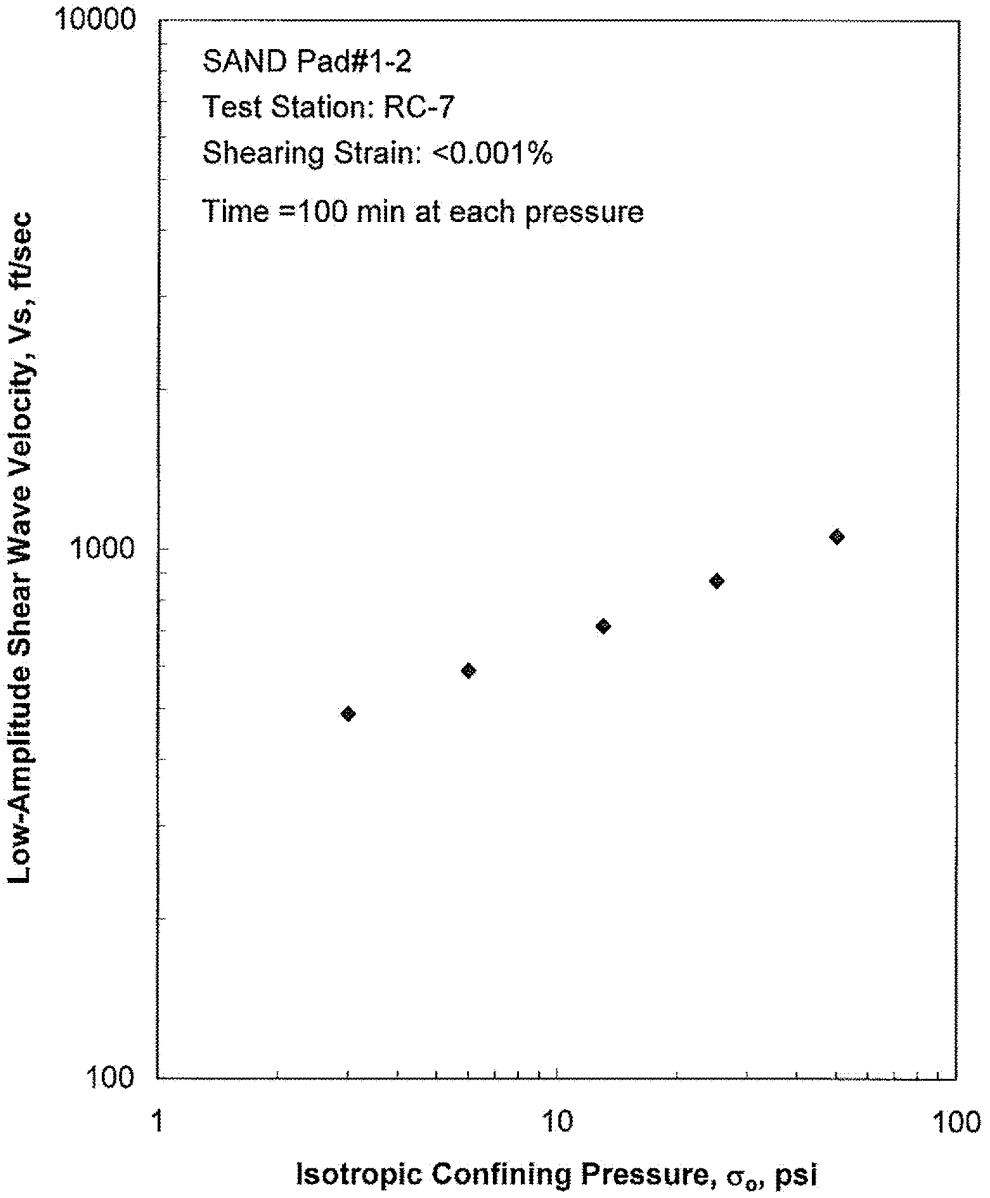



**Figure B.4 Variation in Low-Amplitude Shear Wave Velocity with Isotropic Confining Pressure from Resonant Column Tests**

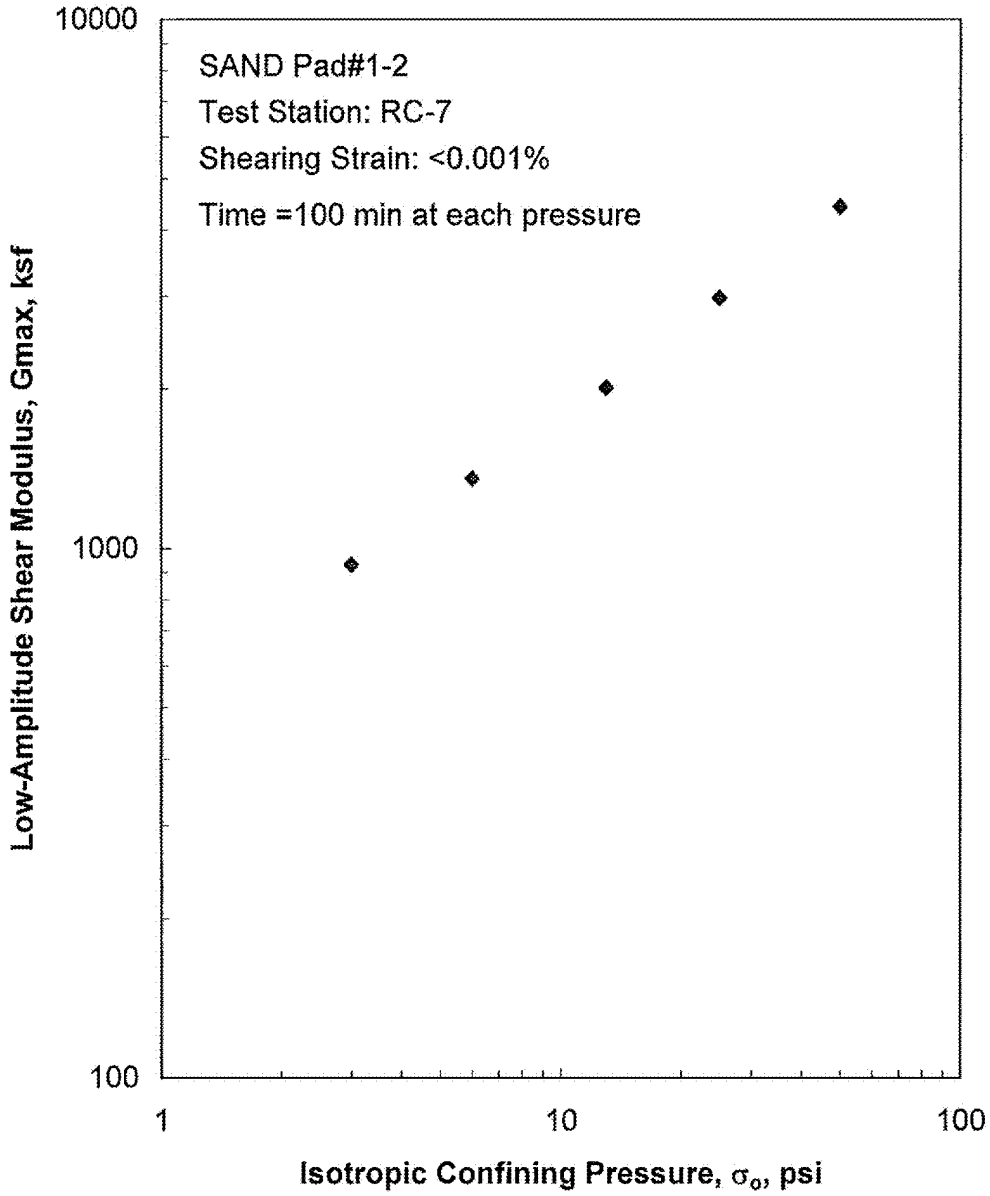



**Figure B.5 Variation in Low-Amplitude Shear Modulus with Isotropic Confining Pressure from Resonant Column Tests**

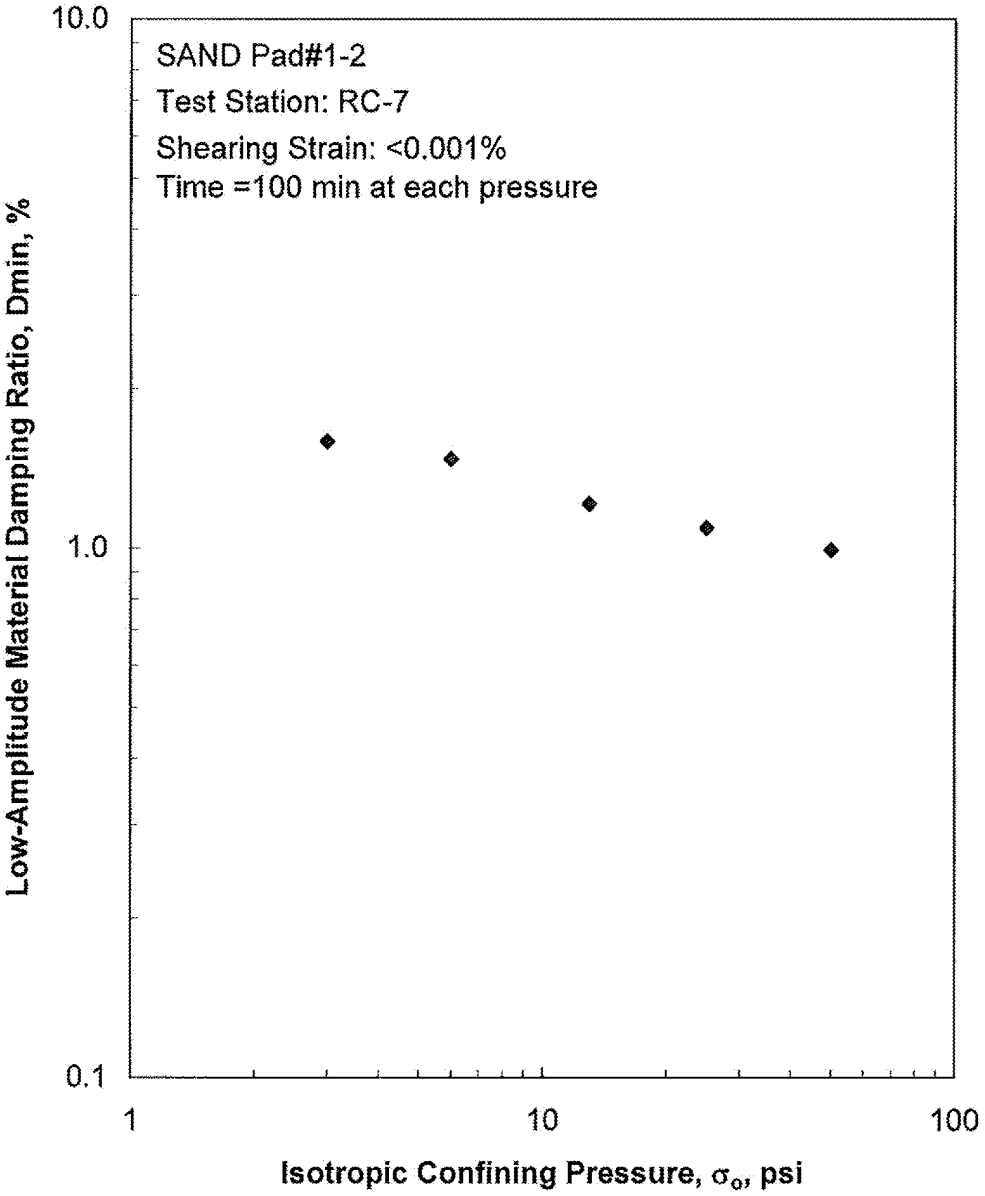



**Figure B.6 Variation in Low-Amplitude Material Damping Ratio with Isotropic Confining Pressure from Resonant Column Tests**

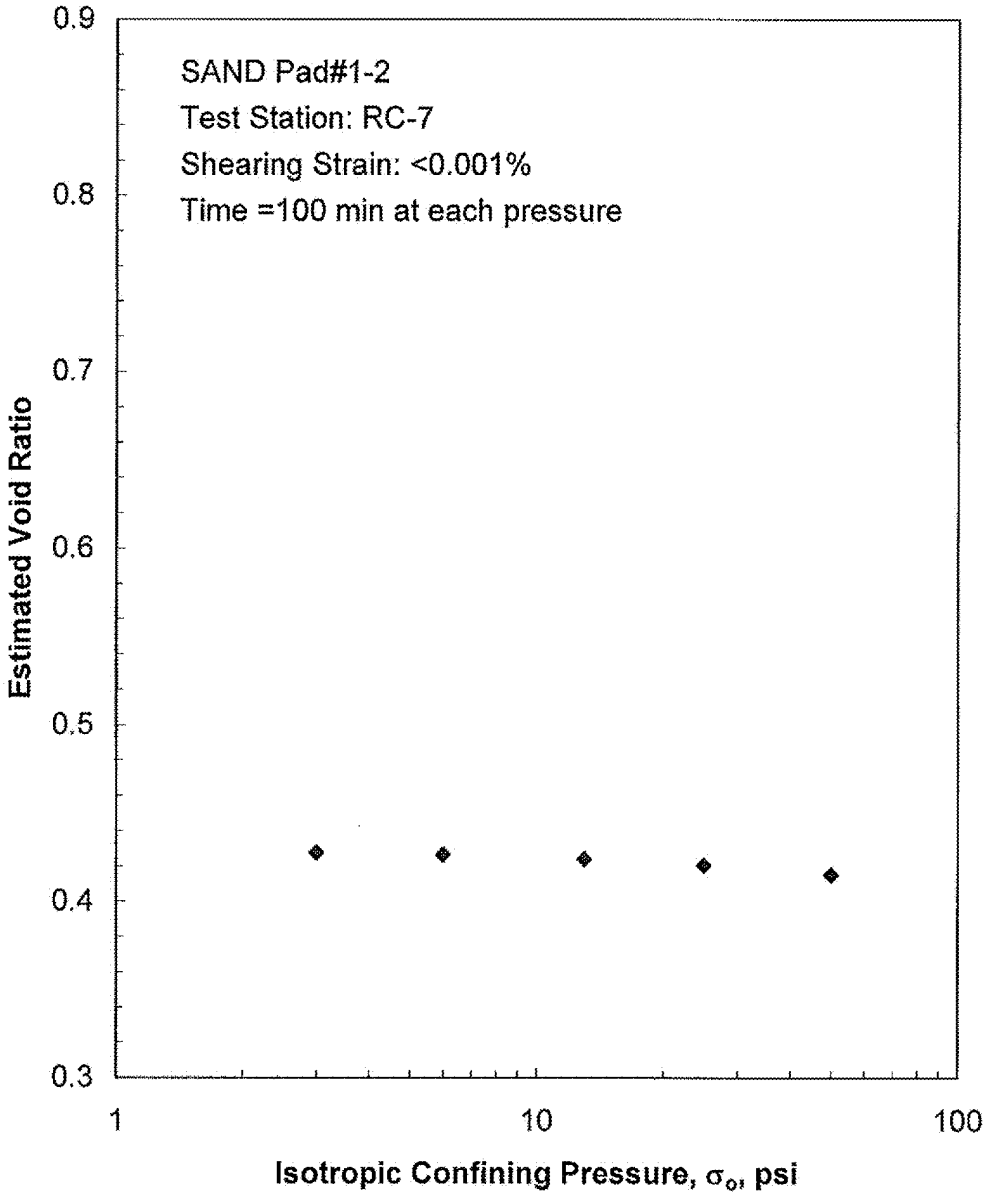



**Figure B.7 Variation in Estimated Void Ratio with Isotropic Confining Pressure from Resonant Column Tests**

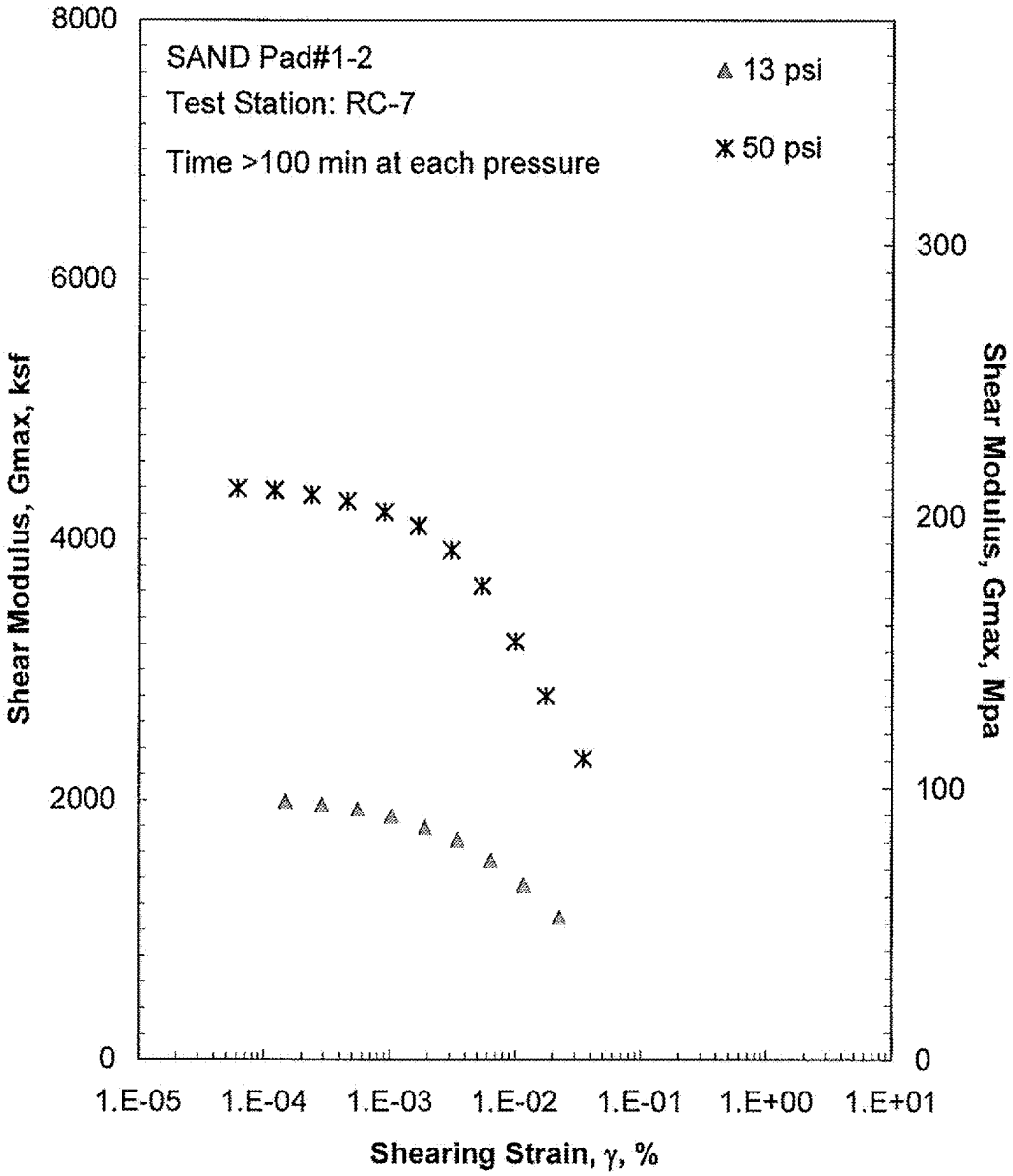



**Figure B.8 Comparison of the Variation in Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests**

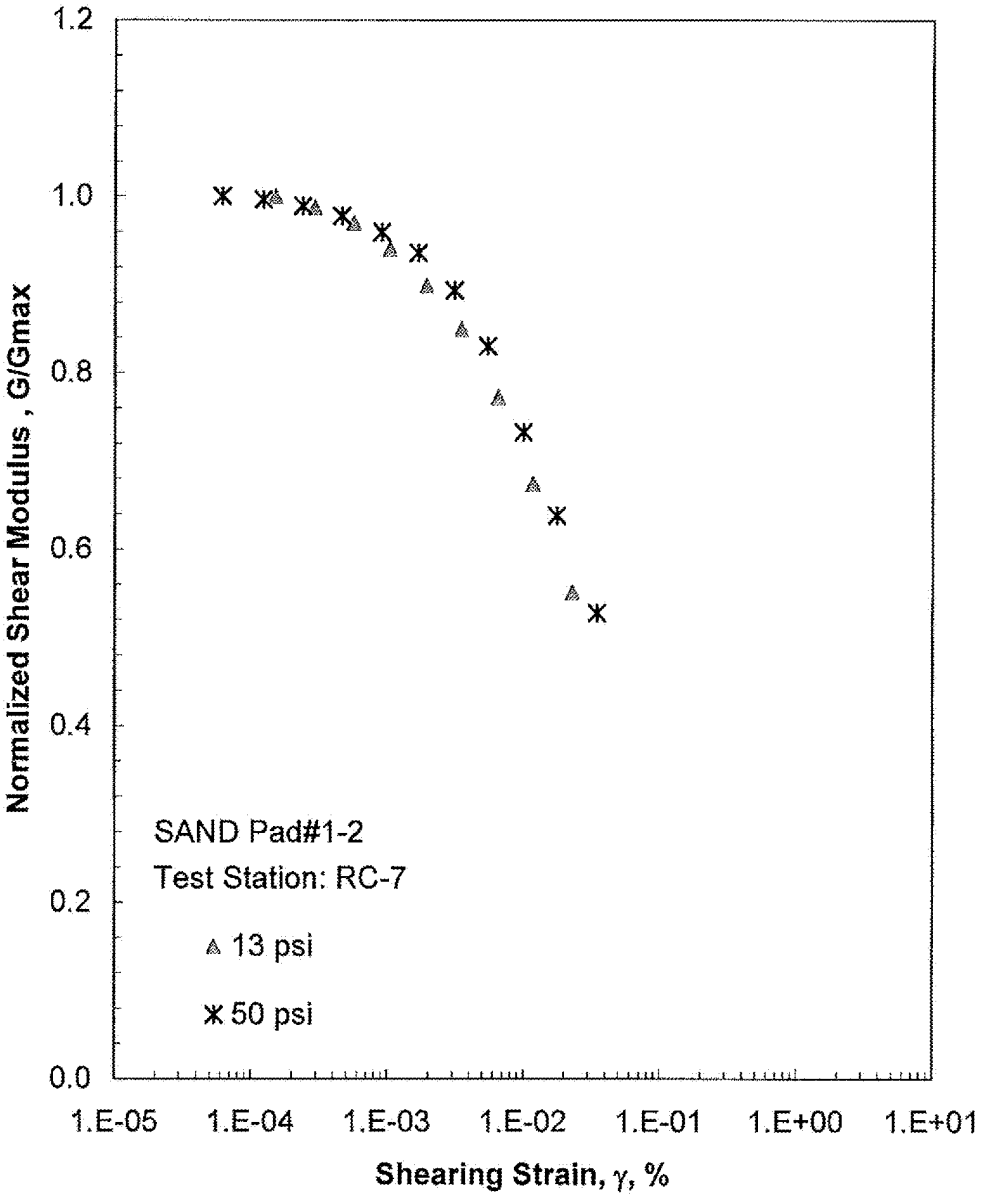



**Figure B.9 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests**

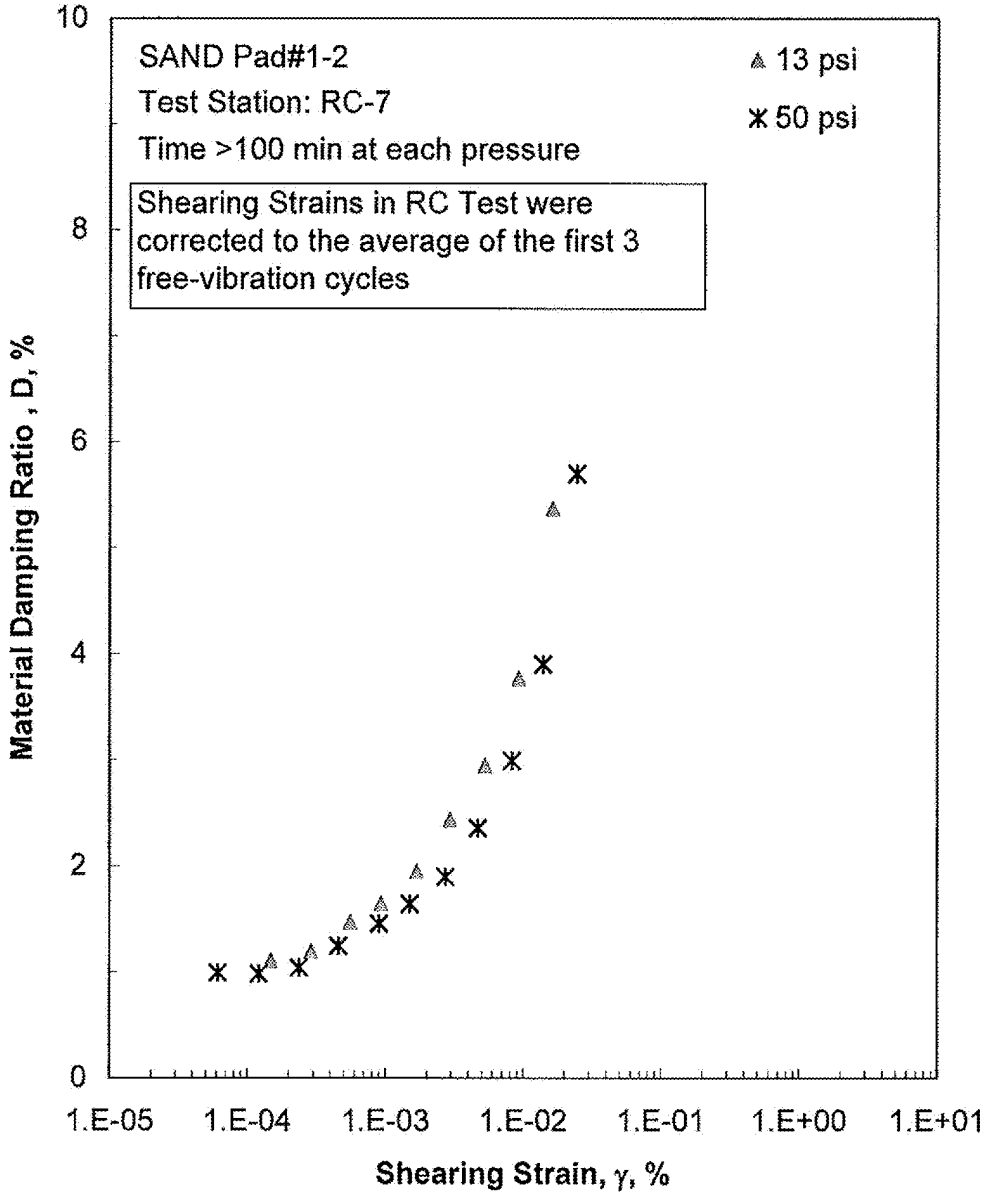



**Figure B.10 Comparison of the Variation in Material Damping Ratio with Shearing Strain and Isotropic Confining Pressure from the Resonant Column Tests**

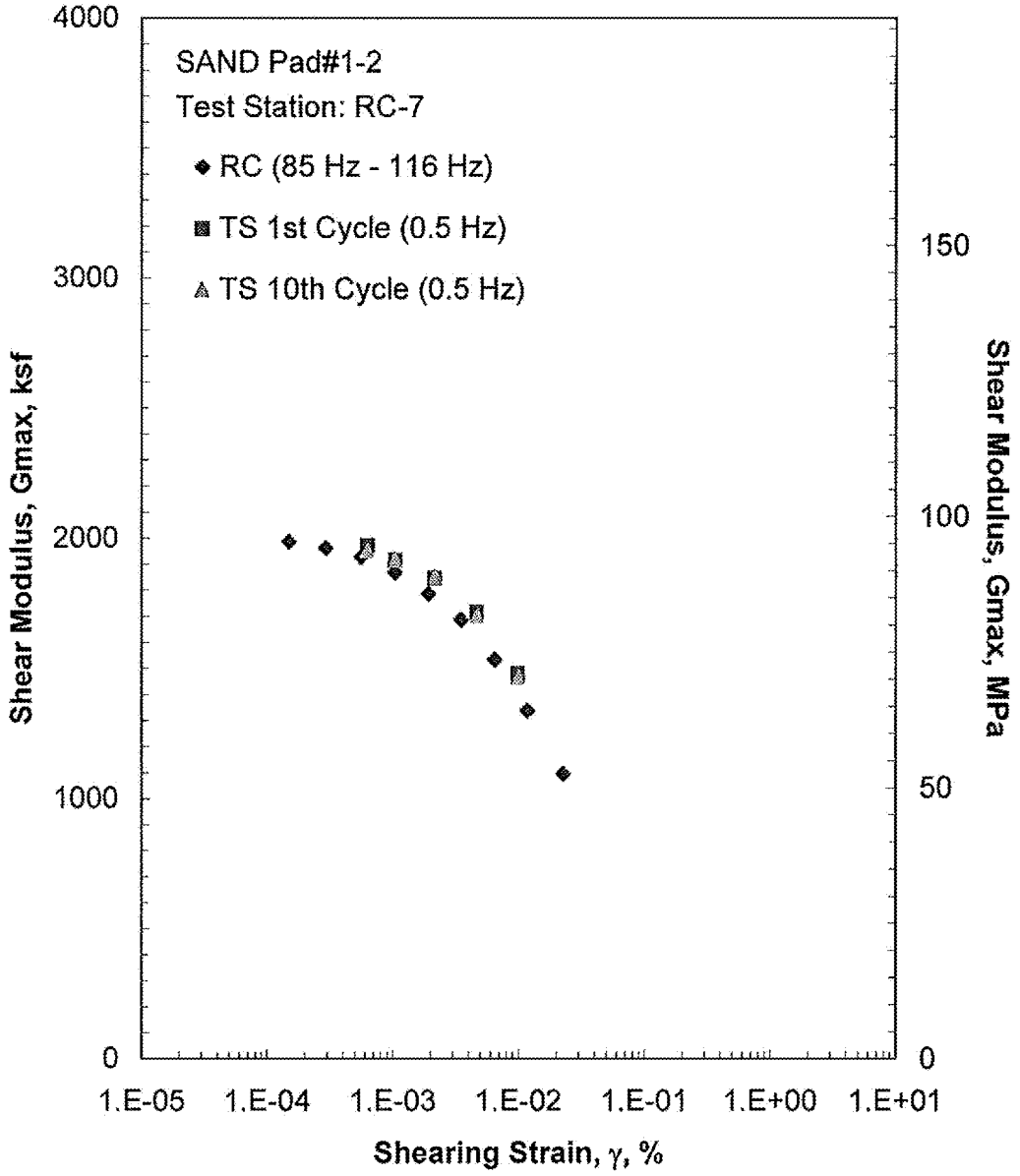



**Figure B.11 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

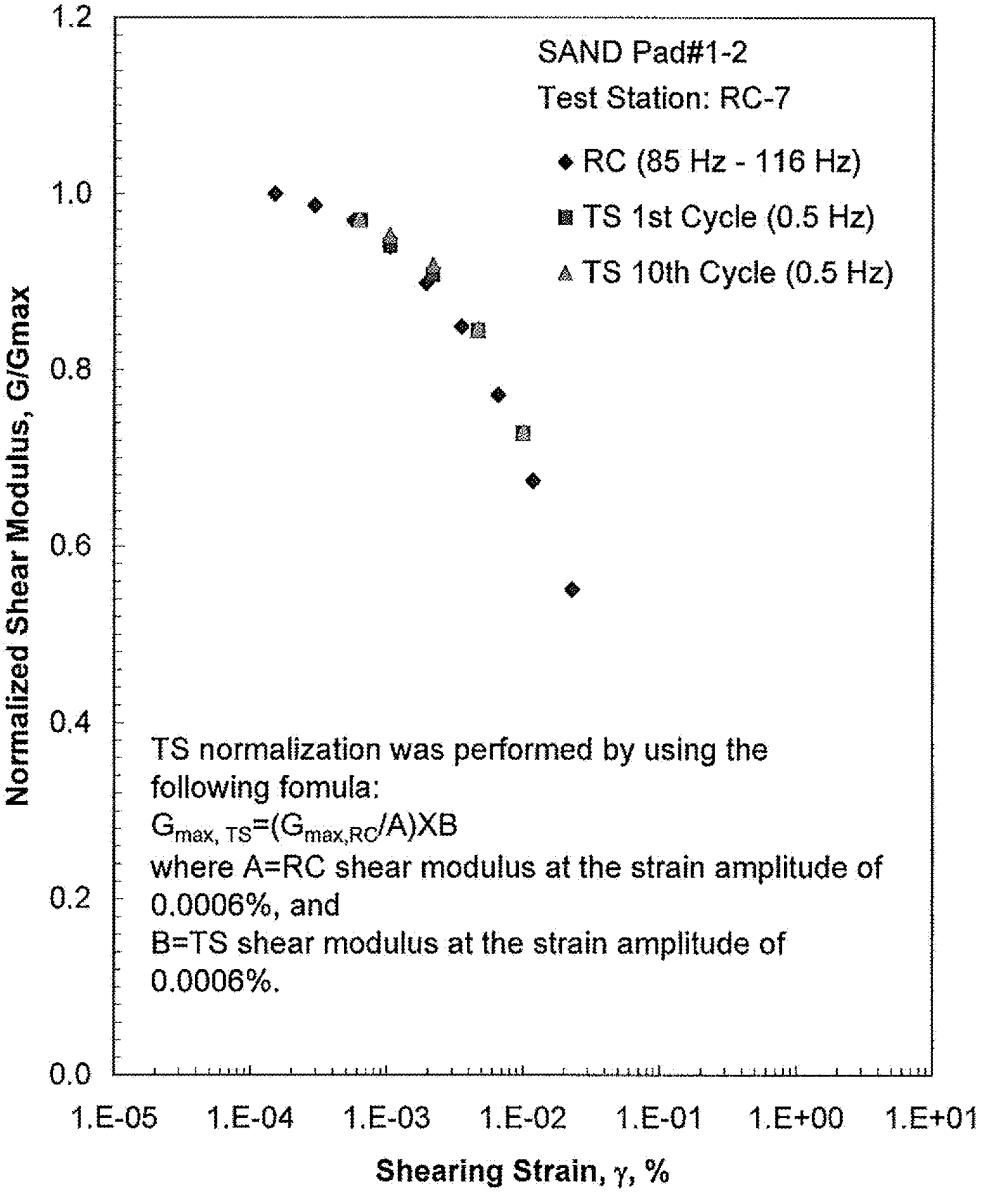



**Figure B.12 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

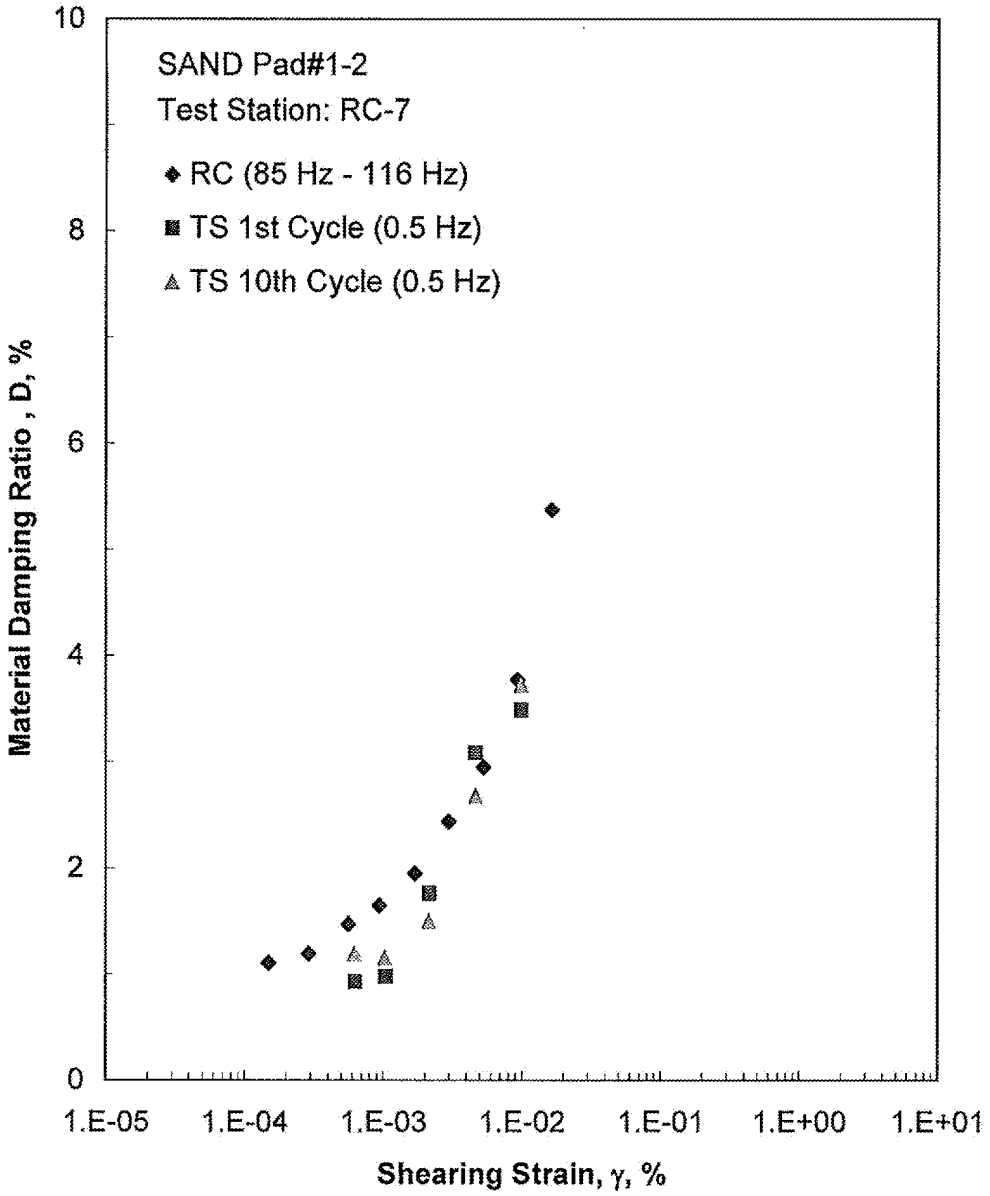



**Figure B.13 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

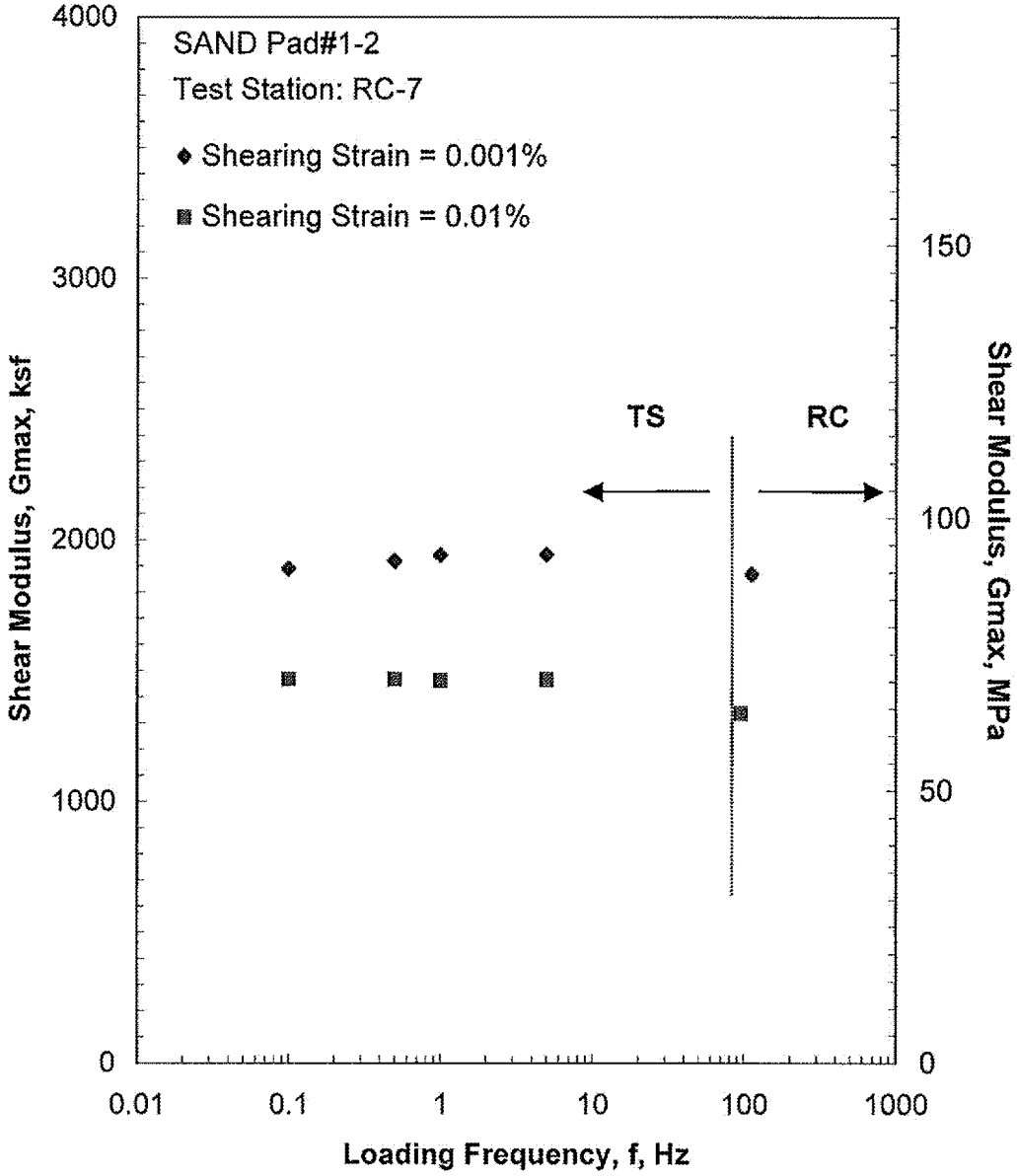



**Figure B.14 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

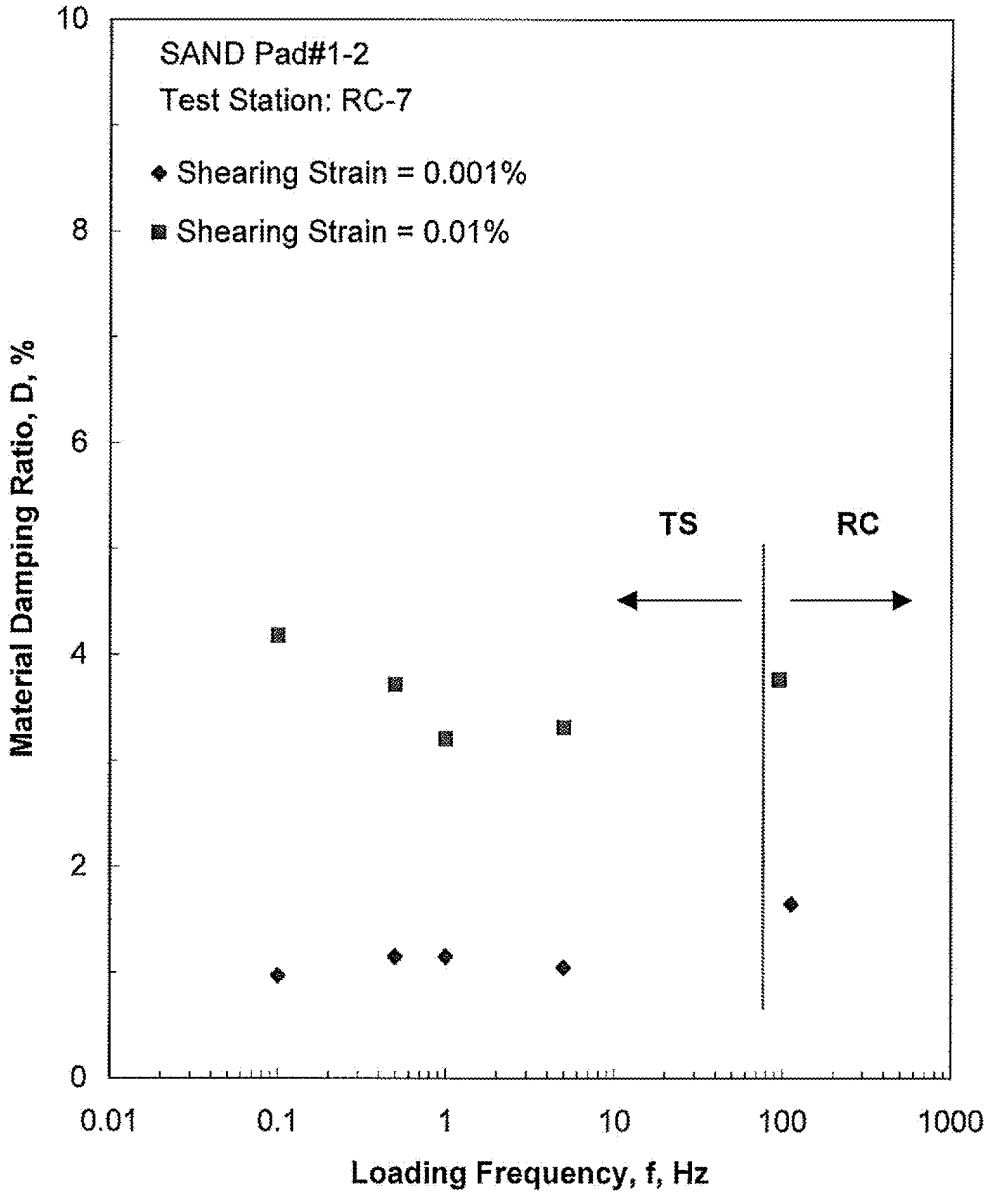



**Figure B.15 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 13 psi from the Combined RCTS Tests**

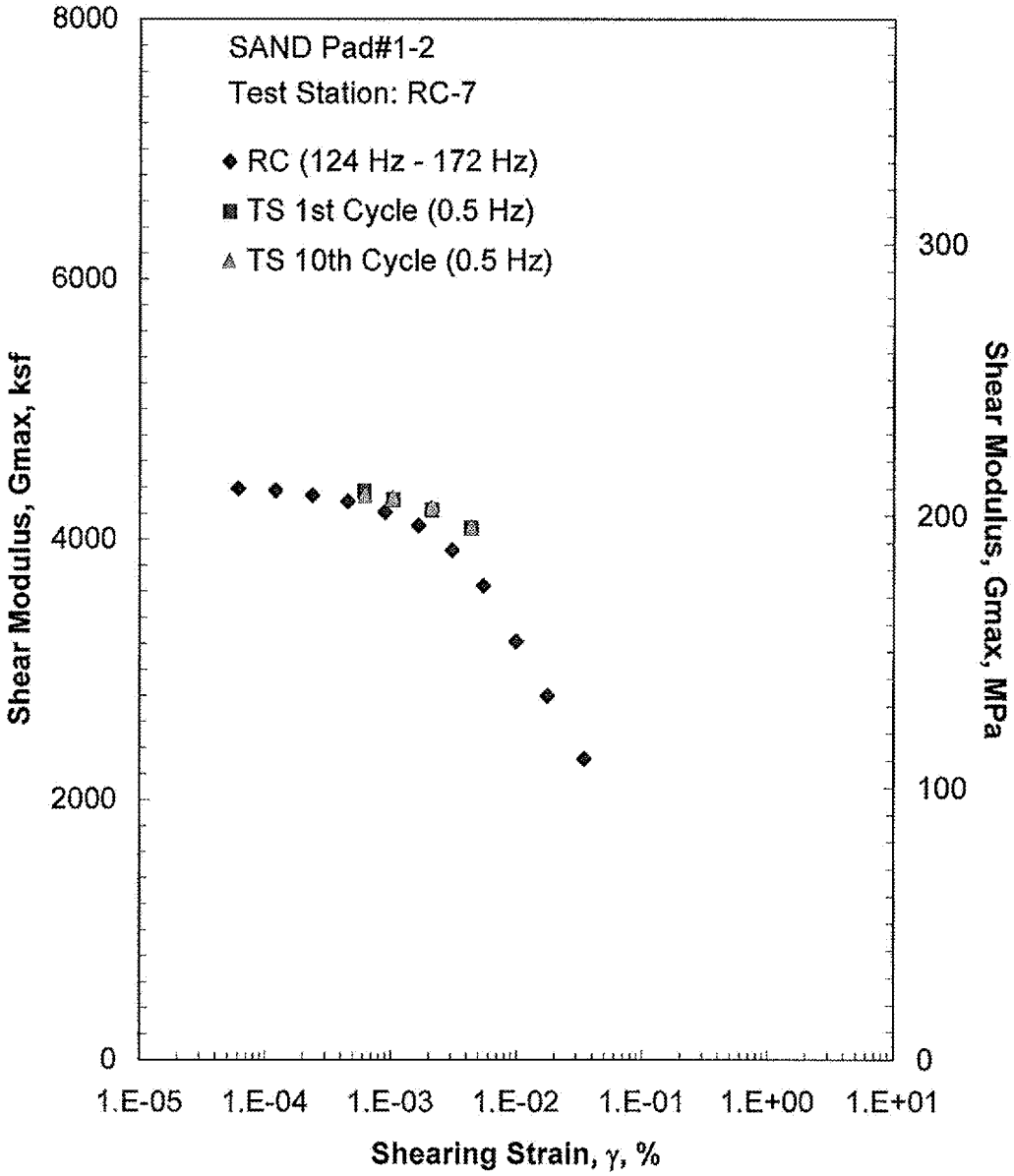



**Figure B.16 Comparison of the Variation in Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

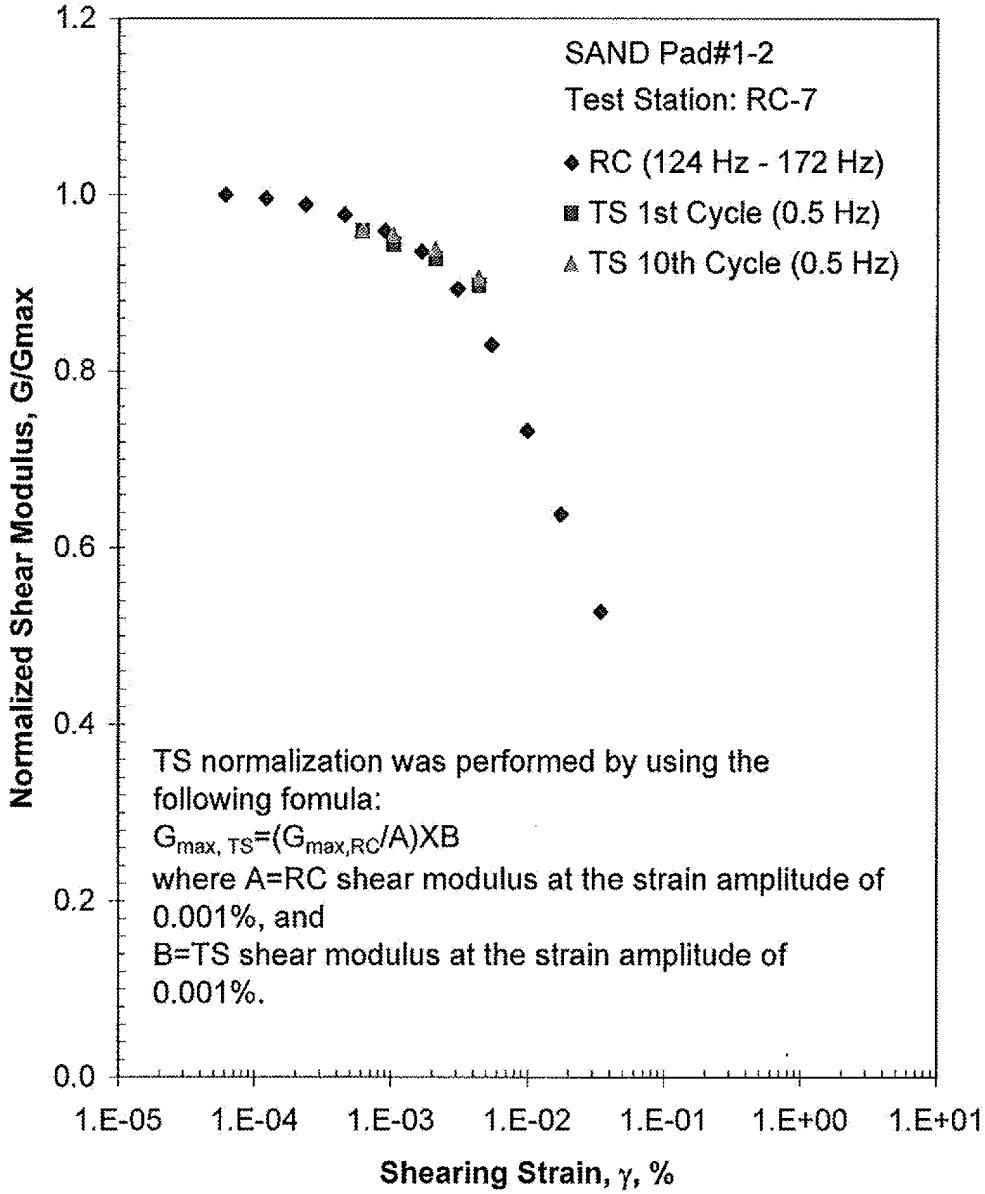



**Figure B.17 Comparison of the Variation in Normalized Shear Modulus with Shearing Strain at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

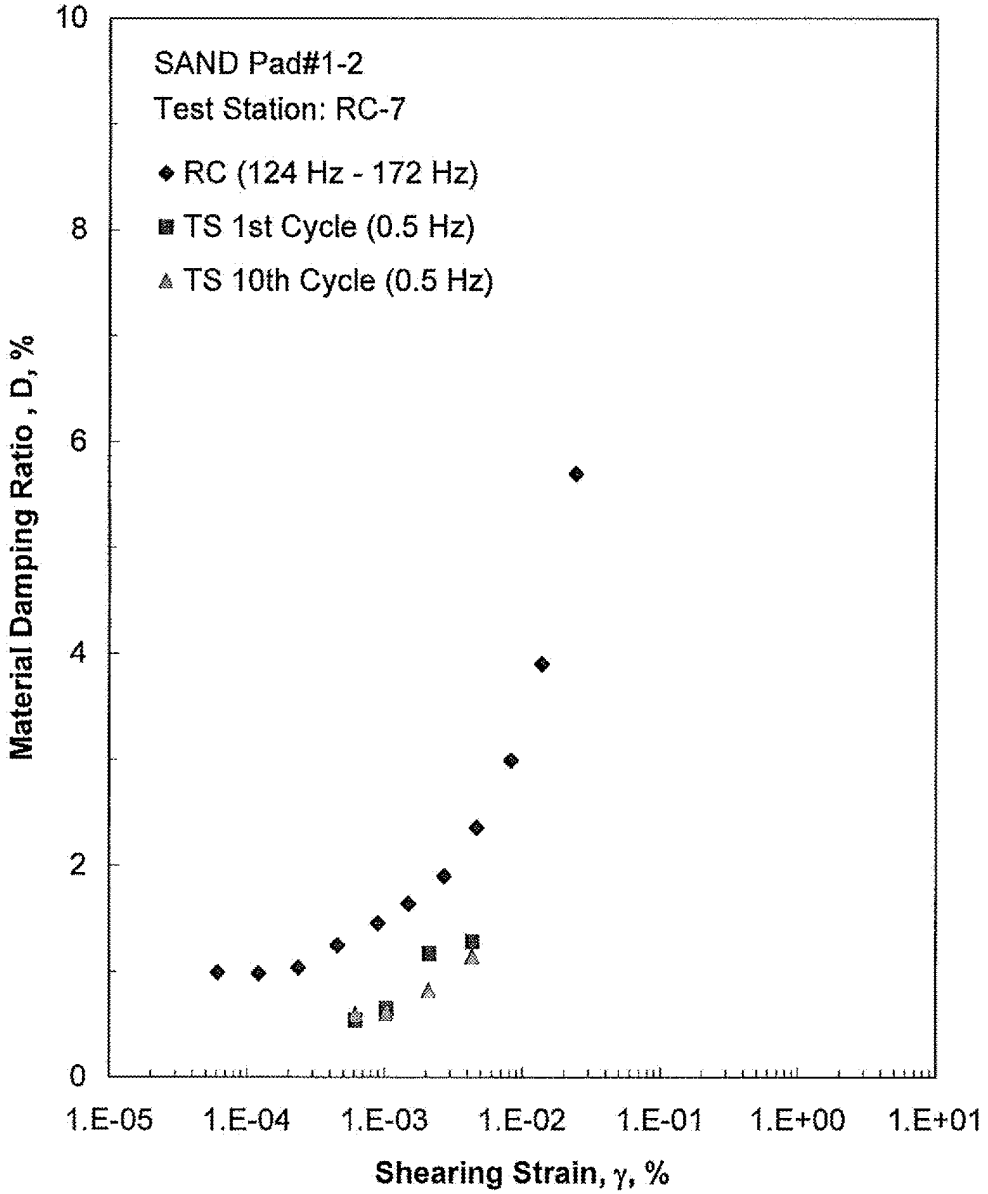



**Figure B.18 Comparison of the Variation in Material Damping Ratio with Shearing Strain at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

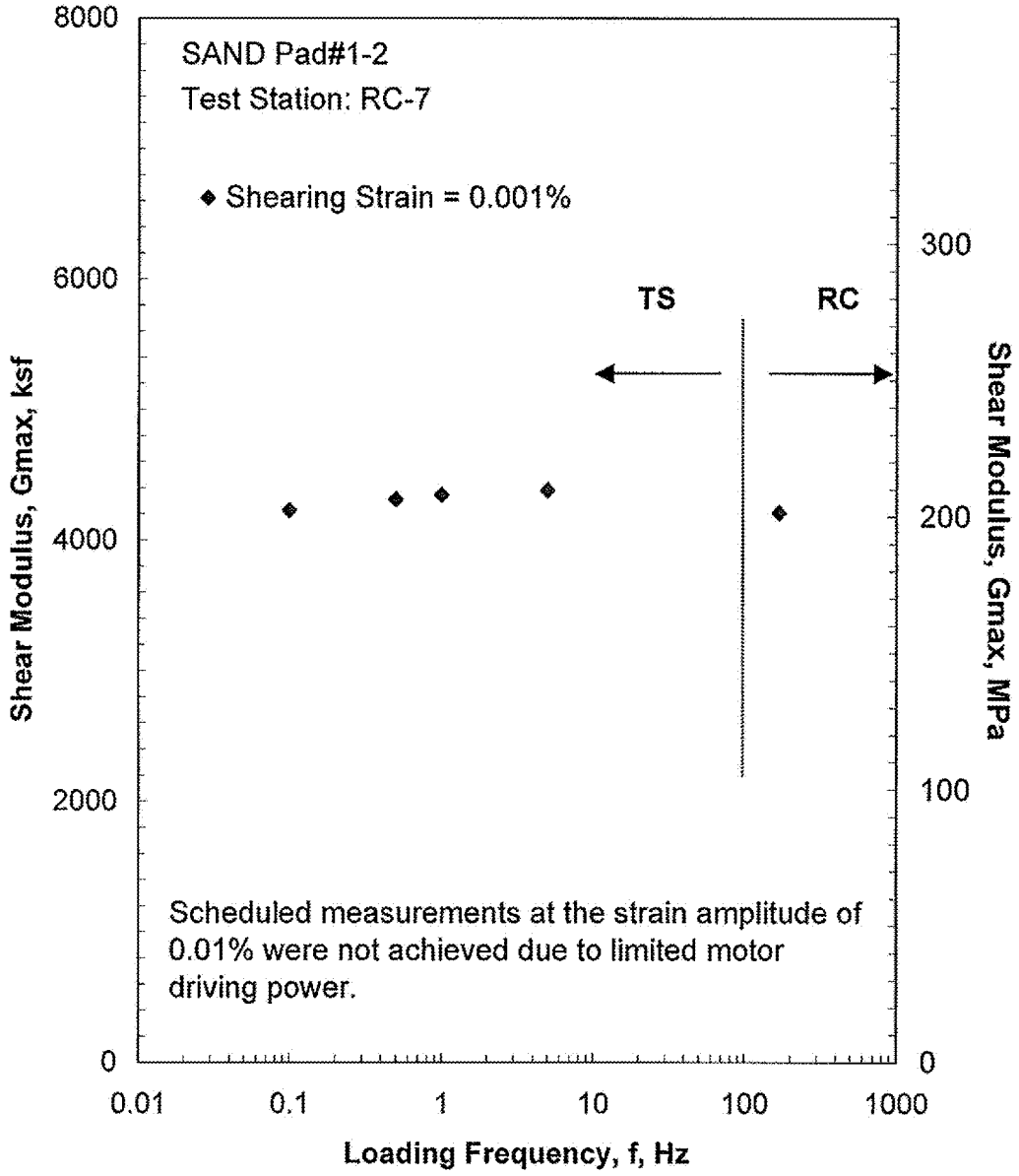



**Figure B.19 Comparison of the Variation in Shear Modulus with Loading Frequency at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

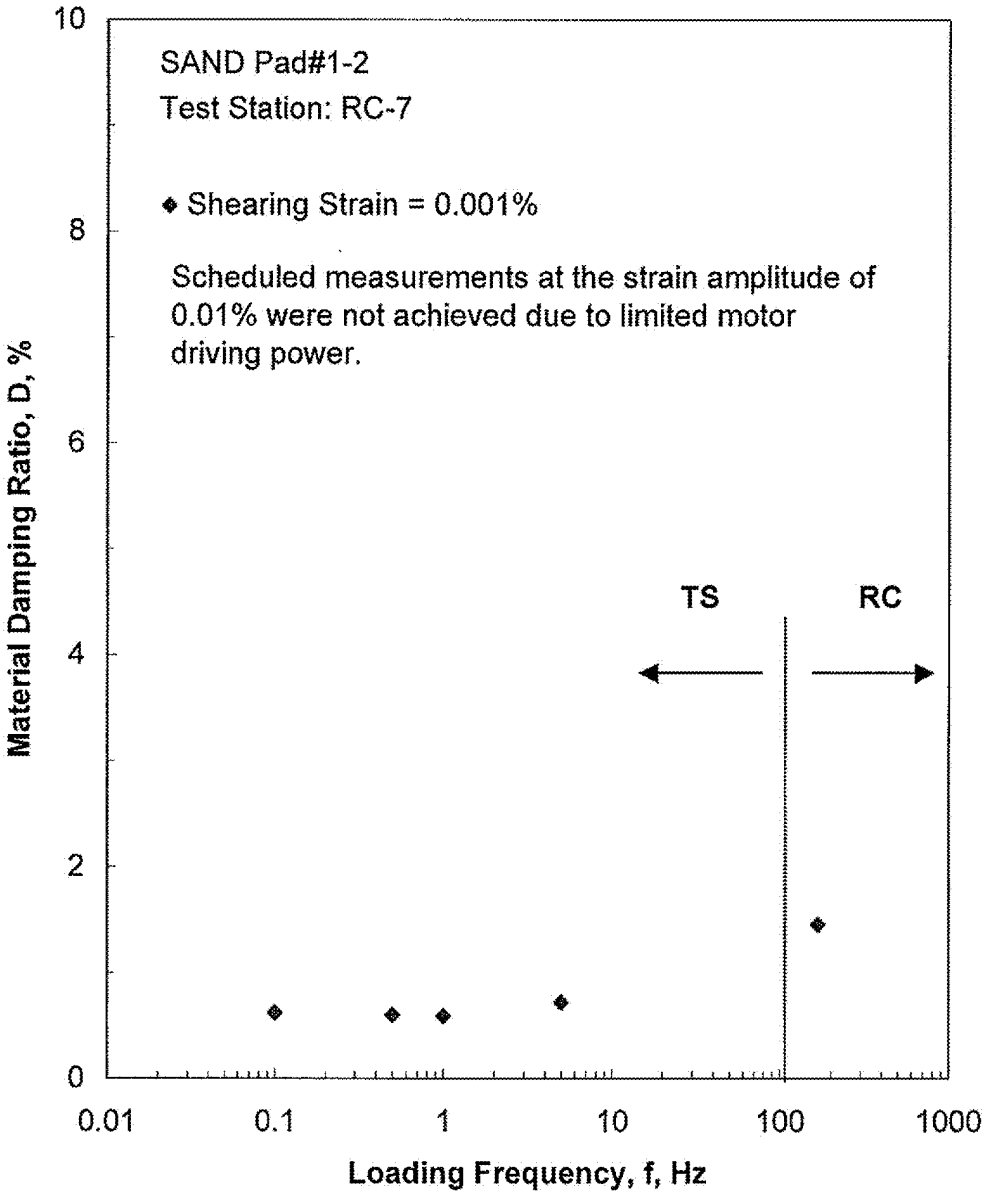



**Figure B.20 Comparison of the Variation in Material Damping Ratio with Loading Frequency at an Isotropic Confining Pressure of 50 psi from the Combined RCTS Tests**

Table B.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 Pad 1-2

| Isotropic Confining Pressure, $\sigma_o$ | | | 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) | (%) | |
| 3 | 432 | 21 | 932 | 45 | 489.0 | 1.59 | 0.43 |
| 6 | 864 | 41 | 1355 | 65 | 589.6 | 1.47 | 0.43 |
| 13 | 1872 | 90 | 2010 | 96 | 717.4 | 1.21 | 0.42 |
| 25 | 3600 | 172 | 2971 | 143 | 871.1 | 1.09 | 0.42 |
| 50 | 7200 | 345 | 4415 | 212 | 1059.9 | 0.99 | 0.42 |

Table B.2 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen Pad1-2; Isoptropic Confining Pressure, $\sigma_o$= 13 psi (1.9 ksf = 90 kPa)

| Peak Shearing Strain, % | Shear Modulus, G, ksf | Normalized Shear Modulus, $G/G_{max}$ | Average[+] Shearing Strain, % | Material Damping Ratio[x], D, % |
|---|---|---|---|---|
| 1.50E-04 | 1988 | 1.00 | 1.50E-04 | 1.11 |
| 2.93E-04 | 1962 | 0.99 | 2.93E-04 | 1.20 |
| 5.63E-04 | 1928 | 0.97 | 5.63E-04 | 1.47 |
| 1.05E-03 | 1869 | 0.94 | 9.43E-04 | 1.65 |
| 1.93E-03 | 1786 | 0.90 | 1.70E-03 | 1.95 |
| 3.51E-03 | 1688 | 0.85 | 2.98E-03 | 2.44 |
| 6.51E-03 | 1534 | 0.77 | 5.33E-03 | 2.95 |
| 1.18E-02 | 1339 | 0.67 | 9.33E-03 | 3.77 |
| 2.29E-02 | 1095 | 0.55 | 1.65E-02 | 5.37 |

[+] 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 B.3 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen Pad1-2; Isotropic Confining Pressure, $\sigma_o$= 13 psi (1.9 ksf = 90 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, % |
| 6.31E-04 | 1972 | 0.97 | 0.93 | 6.26E-04 | 1953 | 0.97 | 1.19 |
| 1.04E-03 | 1915 | 0.94 | 0.98 | 1.04E-03 | 1919 | 0.95 | 1.15 |
| 2.17E-03 | 1847 | 0.91 | 1.76 | 2.16E-03 | 1851 | 0.92 | 1.50 |
| 4.66E-03 | 1717 | 0.84 | 3.09 | 4.70E-03 | 1703 | 0.85 | 2.68 |
| 9.91E-03 | 1480 | 0.73 | 3.49 | 1.00E-02 | 1467 | 0.73 | 3.72 |

Table B.4 Variation in Shear Modulus and Material Damping Ratio with Shearing Strain from RC Tests of Specimen Pad 1-2; Isoptropic Confining Pressure, $\sigma_o$= 50 psi (7.2 ksf = 345 kPa)

| Peak Shearing Strain, % | Shear Modulus, G, ksf | Normalized Shear Modulus, $G/G_{max}$ | Average[+] Shearing Strain, % | Material Damping Ratio[x], D, % |
|---|---|---|---|---|
| 6.10E-05 | 4389 | 1.00 | 6.10E-05 | 0.99 |
| 1.21E-04 | 4373 | 1.00 | 1.21E-04 | 0.98 |
| 2.37E-04 | 4340 | 0.99 | 2.37E-04 | 1.04 |
| 4.56E-04 | 4291 | 0.98 | 4.56E-04 | 1.25 |
| 8.98E-04 | 4211 | 0.96 | 8.98E-04 | 1.46 |
| 1.67E-03 | 4107 | 0.94 | 1.50E-03 | 1.64 |
| 3.06E-03 | 3918 | 0.89 | 2.72E-03 | 1.90 |
| 5.44E-03 | 3643 | 0.83 | 4.68E-03 | 2.36 |
| 9.94E-03 | 3215 | 0.73 | 8.25E-03 | 2.99 |
| 1.76E-02 | 2799 | 0.64 | 1.39E-02 | 3.90 |
| 3.46E-02 | 2316 | 0.53 | 2.45E-02 | 5.70 |

[+] 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 B.5 Variation in Shear Modulus, Normalized Shear Modulus and Material Damping Ratio with Shearing Strain from TS Tests of Specimen Pad 1-2; Isotropic Confining Pressure, $\sigma_c$= 50 psi (7.2 ksf = 345 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, % |
| 6.14E-04 | 4370 | 0.96 | 0.54 | 6.19E-04 | 4335 | 0.96 | 0.60 |
| 1.04E-03 | 4301 | 0.94 | 0.65 | 1.04E-03 | 4314 | 0.95 | 0.60 |
| 2.12E-03 | 4225 | 0.93 | 1.17 | 2.11E-03 | 4242 | 0.94 | 0.82 |
| 4.38E-03 | 4088 | 0.90 | 1.28 | 4.38E-03 | 4091 | 0.91 | 1.14 |

# ATTACHMENT B

Fugro # 0411-08-1696

Geotechnical
Environmental &
Water Resources
Engineering

GEI Consultants

**LETTER OF TRANSMITTAL**

400 Unicorn Park Drive
Woburn, MA 01801
Phone: (781) 721-4000
Fax: (781) 721-4073
www.geiconsultants.com

| | | | |
|---|---|---|---|
| To: | Bill DeGroff | Date: | April 17, 2008 |
| | Fugro Consultants, Inc.<br>6100 Hillcroft (77081) | GEI Project No. | 07223, Task 1003 |
| | | Re: | Nine Mile Point |
| | Houston, TX 77081 | | |

We are sending you the following enclosures:

| No. | Type | Description |
|---|---|---|
| 1 | | Bag sample of borrow soil: Streeter Rathburn Road, Sample Pad #1 (<3/4-inch material) for RCTS testing |
| 2 | | Modified Compaction and Grain Size Distribution Curves |
| 3 | | Chain-of-Custody Form |
| | | |
| | | |

These are transmitted as checked below:

☐ For Approval ☐ For Your Use ☐ For Review/Comment ☐ As Requested ☐ Other

**Message:**

Bill,

Enclosed is the soil sample for the RCTS testing, along with the proctor and grain size results. When not in use, please keep the soil locked up. Also, please return a signed copy by PDF or fax of the Chain-of-Custody Form.

Thanks for your help.

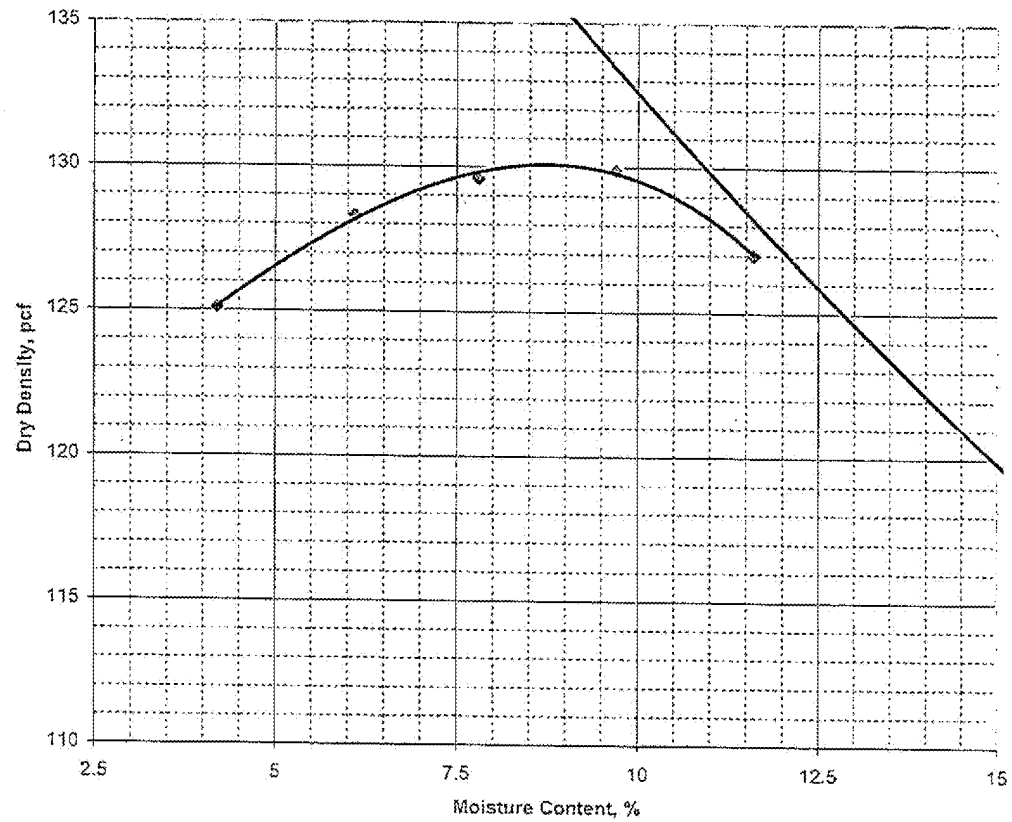
Copy to:
Project Files

Signed: Doug Aghjayan

Doug Aghjayan
Ext. 4031

*If enclosures are not as noted, kindly notify us at once.*

| Point | Moisture Content, percent | Dry Unit Wt. lb/ft$^3$ |
|---|---|---|
| 1 | 4.2 | 125.1 |
| 2 | 6.1 | 128.3 |
| 3 | 7.8 | 129.6 |
| 4 | 9.7 | 129.9 |
| 5 | 11.6 | 127 |
| 6 | NM | NM |

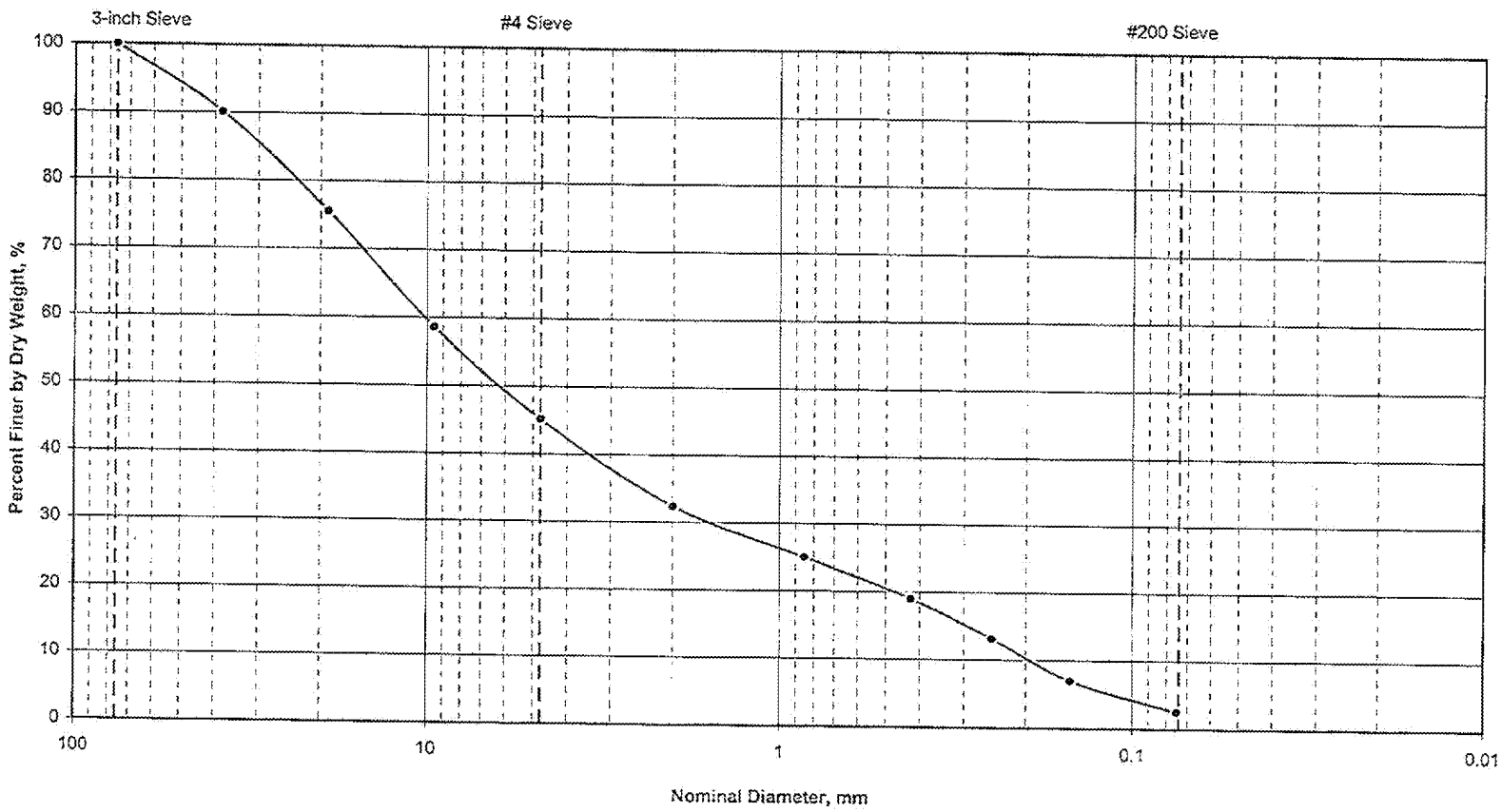



| | |
|---|---|
| Specific Gravity for Zero Air Voids Curve | 2.698 |
| Maximum Dry Density, pcf | 130.3 |
| Optimum Moisture Content, % | 9.0 |

Note: Maximum dry density and optimum moisture content are NOT corrected for oversize gravel.

| | |
|---|---|
| Compaction Test Method (A, B, or C): | C |
| Max Particle Size in Test: | 3/4 in. |
| Percent Oversize Particles >3/4 in. | 24.5 |

| | | |
|---|---|---|
| Nine Mile Point Unit 3 Site Characterization<br>Oswego, NY | GEI Consultants<br>Project 07223 | Moisture - Density Curve<br>Modified Compaction<br>Source: Streeter Rathburn Rd.<br>Sample: Sample Pad #1<br>Form 111.0 rev. 0 (page 3 of 3) |




| %+3" | % Gravel | % Sand | % Fines |
|---|---|---|---|
| 0.0 | 54.9 | 42.6 | 2.5 |

| | | |
|---|---|---|
| Nine Mile Point Site Characterization<br>Oswego, NY | GEI Consultants<br>Project 07223 | Grain Size Curve<br>Boring/Test Pit No. : Streeter Rathburn Rd<br>Sample No. : Sample Pad #1<br>Form 105.2 rev. 1 (page 2 of 2) |

file OSWEGO 5.13.

**RCCyTS Functional Check w/Aluminum Specimen(s)**

5.1

Performed by: S. Jupic — Date: 5.13.08

Checked by: J Meng — Date: 5/13/08

Station # RC-7

Aluminum # MS02

**RC Check**

| Items | Expected Range | Before, B | After, A | Variation, % (B-A)/A*100% | Notes |
|---|---|---|---|---|---|
| Input voltage (mV) | NA | 40 | 40 | NA | |
| Power amplification | NA | 10 | 10 | NA | |
| Strain amplitude | NA | $5.1 \times 10^{-5}$ | $5.2 \times 10^{-5}$ | NA | |
| Charge amplification | NA | 1 | 1 | NA | |
| *Resonant freq (Hz)* | NA | 56.9 | 57 | -0.2% | |
| Sweeping width (Hz) | NA | 18 | 18 | NA | |
| # of excitation cycles | NA | 160 | 160 | NA | JS 6/20/08 |
| File name | NA | MS-2-0513B ~~MS-2-0513A~~ | | NA | MS-2-0513A |
| *Damping ratio* | NA | 0.94% | 0.87% | ~~0.1%~~ 1.2% JM. | |

**TS Check**

| Items | Expected Range | Before, B | After, A | Variation, % (B-A)/A*100% | Notes |
|---|---|---|---|---|---|
| Input voltage (mV) | NA | 4000 | 4000 | NA | |
| Power amplification | NA | 10 | 10 | NA | |
| Excitation frequency | NA | 0.5 | 0.5 | NA | |
| # of excitation cycles | NA | 11 | 11 | NA | |
| Strain amplitude | NA | 0.6-4 | 0.5b-4 | NA | JS 6/20/08 |
| File name | NA | MS-2-0513TSB ~~MS-2-0513TSA~~ | | NA | MS-2-0513TSA |
| *Shear modulus* | 27,600 MPa ± 10% | 27,989 | 26,610 | 5.2% | |
| *Damping ratio* | NA | 0.053 | 0.048 | <0.01% | Use difference |

NA = not applicable

Functional check is acceptable if measured values are within the expected range, and if the variation in the values measured before and after the project testing is less than 10%.

* ~~MS-2-0513TSB~~ -B1 -B2 JM 06/20/08

Form No. Rev. 0

# RESONANT COLUMN CYCLIC TORSIONAL SHEAR (RCCyTS) TEST
## Specimen Setup / Take Down

Project No: 0411-08-1696 Test Type: RCTS Cell No.: RC7 File Name: N/A
Project Name: GEI Test Stress(es), σ' = 3.1, 6.2, 12.5, 25 & 50 psi (1)
Task No.: N/A Stokoe Resonant Column Device Gs = N/A [ ] Meas.; [ ] Assumed
Test No.: N/A Test Series No.: N/A Top Cap ID: 002

Assig. Remarks: (SR.RO) AS 6/20/08

[ ] Tube [ ] Field Extruded [ ] Liner [ ] N/A
Boring No.: STEGTEC PATH RH [ ] Reconstituted
Sample No.: PAD #1 - 1 Compostite No.: N/A
Depth (ft): N/A Specimen No.: A
[ ] Spec. Selection by X-ray; [ ] Geomarine Sample

Specimen Preparation (for reconstituted samples)
Target Dry Density 115.7 Lift Thickness 29.92 mm No. Lifts 5
Final Ht. 148.77 Final Area 40.489 cm² Final Vol. 602.36 cm³
Final Total Mass 1207.87 Water Cont. 7.76

Type Consolidation: [X] Isotropic [ ] Anisotropic [ ] Ko stress path [ ] 45o stress path

| Water Content (WC); | Initial - Trimming Location: Top (Wo,1) | Bottom (Wo,2) | Sides (Wo,3) | Final (Wat) (see below) |
|---|---|---|---|---|
| Container No | 823 | | | 7A |
| Mass Moist Soil + Cont. (g) | 200.35 | | | 388.97 |
| Mass Dry Soil + Cont. (g) | 188.25 | | | 372.19 |
| Mass Container (g) | 32.23 | | | 139.34 |
| Water Content, Wo,n (%) | 7.76 | N/A | N/A | 7.21 |
| Avg. Initial WC, Wo,avg (%) | 7.76 | Final (Wat); | Slice; | Whole Spec. |

AS 6/14/08

| SOIL MASSES: | Initial | Final |
|---|---|---|
| Moist + Tare (etc.)(g): | 1804.47 | 1338.77 |
| Tare (etc.) (g): | 596.60 | 139.34 |
| Spec. Moist Mass (g): | 1207.87 | 1199.43 |

EXCESS DRY SOIL (stuck to membrane, filters stones, etc.)

| | |
|---|---|
| Container No: | N/A |
| Mass Dry Soil + Container (g): | N/A |
| Mass Container (g): | N/A |
| Mass Excess Dry Soil (g): | N/A |

**Specimen Dimensions**

| Height (mm) Initial (Ho) | Final (Hat) | | Diameter (mm) Initial (Do) | Final (Dat) |
|---|---|---|---|---|
| GB 127 | | T | 72.0 | |
| 1 21.770 | | M | 71.9 | |
| 2 21.774 | | B | 71.6 | NA* |
| 3 21.757 | NA* | T' | | AS 6/14/08 |
| 4 21.768 | | M' | AS 6/14 | |
| 5 21.763 | | B' | | |
| Avg 148.77 | | Avg | 71.8 | |

Measuring Devices: Pi Tape: [X] Dia. 5.85 2.82
Calipers: [ ] Ht. [ ] Dia.
Dial Comparator: [X] Ht. [ ] Dia.

Ao (cm2) = N/A
Vo (cm3) = N/A
Aat (cm2) = N/A
Vat (cm3) = N/A

**Estimated Initial Unit Weight:**
Total, gt,o (lb/ft3) = N/A Dry, gd,o (lb/ft3) = N/A

**Membrane / Filter Paper / Apparatus**

| Membrane (mm): | Top | Bottom |
|---|---|---|
| Number: 1 Thickness: [ ] Single; [X] Double | N/A | N/A |
| | 0.61 | 0.78 |
| Circumference (Crm,o) | 214 | 216 |
| (1) Total thickness, if 2+ membranes Average: | Thickness (1) N/A | Dia.(Crm,o/p) N/A |

Filter Paper: Top + Bottom: [ ] Yes ; [✓] No
Filter Strips: [ ] Yes ; [✓] No Number =
If yes number = — Vertical: ¼" & Whatman #54 or N/A
" or = N/A or Sprial: ¼" & Whatman #1 or
Mass Drive Plate & Cap, Mdpc = N/A g, N/A lbf

NA - Not Applicable; UK - Unknown; GB - Gage Block
* SAMPLE CRASHED DURING TAKING DOWN. (INITIAL LVDT READING - 3.45694)
Note: (1) Each Test Stress is identified as a Test Stage or Sequence on other data sheets.
Final Specimen Description (USCS group name & symbol, color, layering, max. part. size, slickensided, fissured, blocky, honeycombed, etc.):
M & to Coarse Sa, Br ~~Gray~~ w/ gr

[ ] Photo taken (internal sliced surface & outside surface) AS 5/14/08
Other Remarks

| Resonant Column Cyclic Torsional Shear (RCCyTS) Signature & Equipment Page | Boring: N/A |
|---|---|
| | Sample: PAD #1 (1) |
| | Depth (ft): N/A |
| | Test No. N/A |

| | |
|---|---|
| Project: Nine Mile Point Site Characterization<br>Location: Oswego, New York | Fugro Project No.: 0411-08-1696 |

**SIGNATURES**

| | |
|---|---|
| Specimen Trimmed/Recompacted by: [signature] | Date: 5/14/08 |
| Specimen Setup by: Jupic [signature] | Date: 5.14.08 |
| Test Performed by: (per GEI Procedure 109 rev. ___ ) Jupic [signature] | Date: 5.14.08 |
| Specimen Takedown by: [signature] | Date: 05/19/08 |
| Preliminary Calculations by: [signature] | Date: 5/21/08 |
| Calculated by: [signature] | Date: 5/21/08 |
| Reviewed by: [signature] | Date: 6/13/08 |

**EQUIPMENT USED**

| | |
|---|---|
| RCCyTS Workstation No.: RC7 | Balance ID: BA-006 |
| Caliper ID: VH-10838 | PI Tape ID: VH-10822 |
| Oven ID: H14 | Scalping Sieve Size & ID: 3/8" B-31 |
| Other (specify) ID: — | Other (specify) ID: — |

Comments/Notes: —

## Water Content Measurement

Project Name: Nine Mile Point Site Characterization, Oswego, NY

Project No.: 07223 0411-08-1696

Performed by, per Proc 101, rev ( ): DANIEL NYARKO

Checked By: N/A 5/11/08 Date: 5/14/08

AS 6/18/06

| | | | | | | |
|---|---|---|---|---|---|---|
| Determination No. | 07223 | | | | | |
| Boring | STREETER RATHBUN RD | | | | | |
| Sample | PAD #1 | | | | | |
| Oven ID | # 14 | | | | | |
| Balance ID | BA 006 | | | | | |
| Date/Time In Oven | 5/13/08 | | | | | |
| Date/Time Out of Oven | 5/14/08 | | | | | |
| Tare No. | PAN 1 | | | | | |
| (a) Wet Wt. + Tare | 912.74 g | g | g | g | g | g |
| (b) Dry Wt. + Tare | 856.60 g | g | g | g | g | g |
| (c) Wt. Tare | 138.99 g | g | g | g | g | g |
| (d) Wt. Water (a – b) | 56.14 g | g | g | g | g | g |
| Wt. Wet Solids (a – c) | 773.75 g | g | g | g | g | g |
| (e) Wt. Dry Solids (b – c) | 717.61 g | g | g | g | g | g |
| Water Content (d/e) x 100, % | 7.8 | | | | | |
| Is Wet Wt. Enough for Method B? (yes/no) | YES | | | | | |

AS 6/18/08

Remarks:

Test Notes:
1. Oven dry at 110°C (±5°C) for 12 hours minimum.
2. Cool in desiccator for a minimum of 30 minutes before weighing.

GEI

Form 101.1, rev. 1

**RCTS Testing Record (Page 1 of 10)**

Project #: 0411-08-1696 Project: Nine Mile Point Unit 3, Oswego, New York
Specimen #: PAD #1 Specimen Description: M to Coarse Sand & Gravel
Tested By, per GEI Procedure 109 rev ( ): [illegible] Date: 5.14.08
Checked By: [illegible] Date: 6/21/08
DS 6/13/08

Test Station: RC7

Confining Pressure: 3.1 psi **Testing Stage: X0.25**

**RC Time Effect Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 1:03 | PAD#1-P3-T-0 | 4 | 1 | 77.9 | |
| PM | 2:43 | PAD#1-P3-T-9 | 4 | 1 | 82.6 | |
| END | ~~END~~ | | ~~4~~ | ~~1~~ | ~~82.6~~ | |

DS 6/13/08 SI 6.19.08 SI 6.19.08

**RC Strain Amplitude Effect Tests**

DS 6/13/08

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

RCTS Testing Record (Page 2 of 10)

Station:_____ Date:_____ Tested by:_____ AS 6/19/08

Project #:_____ Project Name:_____

Boring #:_____ Specimen #:_____

Confining Pressure:_____ **Testing Stage: X0.25**

**TS Tests (prior to tests, fr= Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

RCTS Testing Record (Page 3 of 10)

SJ 6.19.08

Station: RC 7 Date: 5.14.08 Tested by: ~~SS~~ Suvad Jupic
Project #: 0411-08-1696 Project Name: GEI
Boring #: STRGETER PATH.R8 Specimen #: PAD #1
Confining Pressure: 6.2 psi **Testing Stage: X0.5**

RC Time Effect Tests

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 2:47 | PAD #1 - P6 - 7.0 | 6 | 1 | 92.6 | |
| PM | 4:25 | PAD #1 - P6 - 7.1 | 6 | 1 | 96.1 | |
| END | ~~6:05~~ | | ~~6~~ | ~~1~~ | ~~96.1~~ | |

DS 6/18/08 SJ 6.19.08 SJ SJ. 6.19.08

RC Strain Amplitude Effect Tests

DS 6/18/08

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

Resonant Frequency Check after Higher Strain Amplitude Tests

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**RCTS Testing Record (Page 4 of 10)**

Station:_____ Date:_____ Tested by:_____ AS 6/18/08

Project #:_____ Project Name:_____

Boring #:_____ Specimen #:_____

Confining Pressure:_____ **Testing Stage: X0.5**

**TS Tests (prior to tests, fr= Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

SI
19
6.19.08

RCTS Testing Record (Page 5 of 10)

Station: RC7 Date: 5.14.08 Tested by: ~~AA~~ Suvad Jupic
Project #: 0411-08-1696 Project Name: GE
Boring #: CPRETER2ATHR1. Specimen #: PAD#1
Confining Pressure: 12.5 psi **Testing Stage: X1**

RC Time Effect Tests

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 4:34 | PAD#1-P12-T-0 | 6 | 1 | 113.5 | |
| PM | 6:12 | PAD#1-P12-T-7 | 6 | 1 | 116.8 | |
| END | ~~END~~ | | ~~6~~ | ~~1~~ | ~~116.8~~ | |

AS 6/18/08 SI 6.19.08 SI 6.19.08 SI 6.19.08

RC Strain Amplitude Effect Tests

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 8:35 | PAD#1-P12-S-0 | 3 | 1 | 115.6 | |
| | 8:36 | PAD#1-P12-S-1 | 6 | 1 | 115.1 | |
| | 8:36 | PAD#1-P12-S-2 | 12 | 1 | 114.4 | |
| | 8:36 | PAD#1-P12-S-3 | 24 | 1 | 112.6 | |
| | 8:37 | PAD#1-P12-S-4 | 48 | 1 | 110.1 | |
| | 8:38 | PAD#1-P12-SA-0 | 96 | 10 | 106.8 | |
| | 8:38 | PAD#1-P12-SA-1 | 192 | 10 | 101.9 | |
| | 8:39 | PAD#1-P12-SB-0 | 384 | 10 | 95 | |
| PM | 8:40 | PAD#1-P12-SC-0 | 768 | 10 | 84.9 | |
| | | END | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Resonant Frequency Check after Higher Strain Amplitude Tests

| Time (min) SI 6.19.08 | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| ~~AA~~ | PAD#1-P12-SCK | 6 | 1 | 104.8 | |

PM 8:41

RCTS Testing Record (Page 6 of 10)

SJ
6.19.08

Station: RC7 Date: 5.14.08 Tested by: Surad Jupic

Project #: 0411-08-1696 Project Name: GE1

Boring #: STRETHER PATH Specimen #: PAD # 1

Confining Pressure: 12.5 PSI **Testing Stage: X1**

TS Tests (prior to tests, fr= 116.8 Hz)

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | PAD#1-P12-TS 01 | 0.07 | 1.39 | 1.6-6 | |
| 0.5 | PAD#1-P12-TS 02 | 0.14 | 2.78 | 3.2-6 | |
| 0.5 | PAD#1-P12-TS 03 | 0.28 | 5.56 | 0.62-5 | |
| 0.5 | PAD#1-P12-TS 04 | 0.45 | 8.94 | 1.03-5 | |
| 0.1 | PAD#1-P12-TS 05 | 0.45 | 8.94 | 1.06-5 | |
| 0.5 | PAD#1-P12-TS 06 | | | 1.06-5 | |
| 1 | PAD#1-P12-TS 07 | | | 1.03-5 | |
| 5 | PAD#1-P12-TS 08 | | | 1.02-5 | |
| 10 | PAD#1-P12-TS 09 | 0.45 | 8.94 | 1.02-5 | |
| 0.5 | PAD#1-P12-TS 10 | 0.90 | 17.89 | 2.16-5 | |
| 0.5 | PAD#1-P12-TS 11 | 1.8 | 35.79 | 4.6-5 | |
| 0.5 | PAD#1-P12-TS 12 | 3.3 | 65.65 | 1-4 | |
| 0.1 | PAD#1-P12-TS 13 | 3.3 | 65.65 | 1.01-4 | |
| 0.5 | PAD#1-P12-TS 14 | | | 1-4 | |
| 1 | PAD#1-P12-TS 15 | | | 0.99-4 | |
| 5 | PAD#1-P12-TS 16 | | | 0.99-4 | |
| 10 | PAD#1-P12-TS 17 | 3.3 | 65.65 | 0.99.4 | |
| 0.5 | END | | | | |
| 0.5 | | | | | |

Resonant Frequency Check after Higher Strain Amplitude Tests

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 8:05 | PAD#1-P12-TSCK | 6 | 1 | 108.5 | |
| | | N/A | | | | |
| 5.16.08 | 8:32 PM | N/A | 6 | 1 | 115.4 | |
| END | | | | | | |

RCTS Testing Record (Page 7 of 10)

6.19.08

Station: RC7 Date: 6.18.08 Tested by: Suvad Jupic

Project #: 0411-08-1666 Project Name: GEI

Boring #: TOGETHER PATH RL Specimen #: PAD #1

Confining Pressure: 20 psi **Testing Stage: X2**

RC Time Effect Tests

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 8:49 | PAD#1-P25-T.0 | 8 | 1 | 137.9 | |
| PM | 10:27 | PAD#1-P25-T.7 | 8 | 1 | 141.8 | |
| END | 4:00 | | | | | |

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RC Strain Amplitude Effect Tests

AS 6/18/08

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

Resonant Frequency Check after Higher Strain Amplitude Tests

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

RCTS Testing Record (Page 8 of 10)

Station:_____ Date:_____ Tested by:_____ DS 6/18/08

Project #:_____ Project Name:_____

Boring #:_____ Specimen #:_____

Confining Pressure:_____ **Testing Stage: X2**

**TS Tests (prior to tests, fr= Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

SJ
6.19.08

RCTS Testing Record (Page 9 of 10)

Station: RC7 Date: 6.17.08 Tested by: Suvad Jupic
Project #: 0411-08-1696 Project Name: GET
Boring #: [illegible] Specimen #: PAD#1
Confining Pressure: 50 psi **Testing Stage: X4**

RC Time Effect Tests

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 10:30 | PAD#1-P50-T-0 | 8 | 1 | 167.3 | |
| AM | 12:08 | PAD#1-P50-T-7 | 8 | 1 | 172.37 | |
| END | End | | | | | |

SJS 6/18/08

RC Strain Amplitude Effect Tests

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| AM | 1:37 | PAD#1-P50-S-0 | 4 | 1 | 171.9 | |
| | 1:37 | PAD#1-P50-S-1 | 8 | 1 | 171.6 | |
| | 1:37 | PAD#1-P50-S-2 | 16 | 1 | 171.1 | |
| | 1:37 | PAD#1-P50-S-3 | 32 | 1 | 170.1 | |
| | 1:38 | PAD#1-P50-S-4 | 64 | 1 | 168.3 | |
| | 1:39 | PAD#1-P50-SA-0 | 128 | 10 | 166 | |
| | 1:39 | PAD#1-P50-SA-1 | 256 | 10 | 162.1 | |
| | 1:40 | PAD#1-P50-SB-0 | 512 | 10 | 157.7 | |
| | 1:41 | PAD#1-P50-SC-0 | 1024 | 10 | 145.6 | |
| | 1:42 | PAD#1-P50-SD-0 | 2048 | 10 | 134.4 | |
| AM | 1:43 | PAD#1-P50-SE-0 | 4000 | 10 | 121.5 | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Resonant Frequency Check after Higher Strain Amplitude Tests

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| AM | 1:44 | PAD#1-P50-SCK | 8 | 1 | 154.3 | |

SJ
6.19.08

**RCTS Testing Record (Page 10 of 10)**

Station: RC 7 Date: 5.15.08 Tested by: Surad Jupic
Project #: 0411-08-1696 Project Name: GEI
Boring #: [illegible] Specimen #: PAD #1
Confining Pressure: 50 psi **Testing Stage: X4**

**TS Tests (prior to tests, fr=172.3 Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | PAD#1-P50-TS01 | 0.15 | 2.98 | 1.6-6 | |
| 0.5 | PAD#1-P50-TS02 | 0.30 | 5.96 | 3.1-6 | |
| 0.5 | PAD#1-P50-TS03 | 0.60 | 11.93 | 0.6-5 | |
| 0.5 | PAD#1-P50-TS04 | 1.0 | 19.88 | 1.03-5 | |
| 0.1 | PAD#1-P50-TS05 | 1.0 | 19.88 | 1.05-5 | |
| 0.5 | PAD#1-P50-TS06 | | | 1.04-5 | |
| 1 | PAD#1-P50-TS07 | ↓ | ↓ | 1.025-5 | |
| 5 | PAD#1-P50-TS08 | ↓ | ↓ | 1.01-5 | |
| 10 | PAD#1-P50-TS09 | 1.0 | 19.88 | 1-5 | |
| 0.5 | PAD#1-P50-TS10 | 2.0 | 39.76 | 2.1-5 | |
| 0.5 | PAD#1-P50-TS11 | 4.0 | 79.59 | 4.25-5 | |
| 0.5 | PAD#1-P50-TS12 | 4.7 | 93.57 | 0.51-4 | |
| 0.1 | PAD#1-P50-TS13 | 4.7 | 93.57 | 0.51-4 | |
| 0.5 | PAD#1-P50-TS14 | ↓ | ↓ | 0.49-4 | |
| 1 | PAD#1-P50-TS15 | ↓ | ↓ | 0.49-4 | |
| 5 | PAD#1-P50-TS16 | ↓ | ↓ | 0.49-4 | |
| 10 | PAD#1-P50-TS17 | 4.7 | 93.57 | 0.485-4 | |
| 0.5 | END | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| AM | 12:35 | PAD#1-P50-RCK | 8 | 1 | 168.8 | |
| AM | 1:35 | NA | 8 | 1 | 171.4 | |
| | END | | | | | |

# RESONANT COLUMN CYCLIC TORSIONAL SHEAR (RCCyTS) TEST
## Specimen Setup / Take Down

Project No: 0411-08-1696 Test Type: RCTS Cell No.: RC7 File Name: N/A
Project Name: (,E) Test Stress(es), σ' = 3.1 , 6.2 , 12.5 , 25 & 50 psi (1)
Task No.: N/A Stokoe Resonant Column Device Gs = N/A [ ] Meas.; [ ] Assumed
Test No.: N/A Test Series No. N/A Top Cap ID: 002

Assig. Remarks: (SR,RD) 5/19/08

[ ] Tube [ ] Field Extruded [ ] Liner [ ] N/A
Boring No.: [illegible] [X] Reconstituted
Sample No.: PAD #1-2 Composite No.: N/A
Depth (ft): N/A Specimen No.: b
[ ] Spec. Selection by X-ray; [ ] Geomarine Sample

Specimen Preparation (for reconstituted samples)
Target Dry Density 115.7 Lift Thickness 29.92 mm 5/19/08 No. Lifts 5
Final Ht. 148.77 Final Area 40.523 cm² Final Vol. 602.86 cm³
Final Total Mass 1208.92 Water Cont. 8.17 %

| Type | [X] Isotropic | [ ] Ko stress path |
|---|---|---|
| Consolidation: | [ ] Anisotropic | [ ] 45o stress path |

| Water Content (WC): | Initial - Trimming Location: Top (Wo,1) | Bottom (Wo,2) | Sides (Wo,3) | Final (Wat) (see below) |
|---|---|---|---|---|
| Container No | 163 | | N/A | PA |
| Mass Moist Soil + Cont. (g) | 154.59 | | | 181.74 |
| Mass Dry Soil + Cont. (g) | 145.22 | | | 169.69 |
| Mass Container (g) | 30.49 | | | 15.91 |
| Water Content, Wo,n (%) | 8.17 | N/A | N/A | 7.84 |
| Avg. Initial WC, Wo,avg (%) | 8.17 | Final (Wat); | [ ] Slice; | [ ] Whole Spec. |

| SOIL MASSES: | Initial | Final |
|---|---|---|
| Moist + Tare (etc.)(g): | 1805.52 | 1204.7 |
| Tare (etc.) (g): | 596.60 | 0 |
| Spec. Moist Mass (g): | 1208.92 | 1204.7 |
| EXCESS DRY SOIL (stuck to membrane, filters stones, etc.) | | |
| Container No: | | N/A |
| Mass Dry Soil + Container (g): | | N/A |
| Mass Container (g): | | N/A |
| Mass Excess Dry Soil (g): | | N/A |

**Specimen Dimensions**

| Height (mm) | Initial (Ho) | Final (Haf) | Diameter (mm) | Initial (Do) | Final (Daf) |
|---|---|---|---|---|---|
| GB | 127 | | T | 71.9 | 72.2 |
| 1 | + 21.759 | 147.57 | M | 71.8 | 72.2 |
| 2 | + 21.768 | 148.65 | B | 71.8 | 72.4 |
| 3 | + 21.777 | 148.27 | T' | | |
| 4 | 21.767 | 148.01 | M' | | |
| 5 | 21.771 | 148.03 | B' | | |
| Avg | 148.16 | 147.97 | Avg | 71.83 | 72.26 |

DS 5/19/08

Measuring Devices:
5.80" Pi Tape: [X] Dia. 2.82
Calipers: [ ] Ht. [ ] Dia.
Dial Comparator: [X] Ht. [ ] Dia.

Ao (cm2) = N/A
Vo (cm3) = N/A
Aat (cm2)= N/A
Vat (cm3) = N/A

**Estimated Initial Unit Weight:**
Total, gt,o (lb/ft3) = N/A Dry, gd,o (lb/ft3 )= N/A

**Membrane / Filter Paper / Apparatus**

| Membrane (mm): | Top | Bottom |
|---|---|---|
| Number: = 1 [ ] Single; [X] Double | N/A / 0.70 | N/A / 0.60 |
| Circumference (Crm,o) | 216 | 216 |
| (1) Total thickness, if 2+ membranes | Thickness (1) | Dia.(Crm,o/p) |
| Average: | | |

Filter Paper: Top + Bottom: [ ] Yes ; [✓] No
Filter Strips: [ ] Yes ; [ ] No Number =
If yes number = ✓ Vertical: ¼" & Whatman #54 or N/A
" or = or Sprial: ¼" & Whatman #1 or
Mass Drive Plate & Cap, Mdpc = N/A g, N/A lbf

NA - Not Applicable; UK - Unknown; GB - Gage Block

(INITIAL LVDT READING) 3.70579

Note: (1) Each Test Stress is identified as a Test Stage or Sequence on other data sheets.
Final Specimen Description (USCS group name & symbol, color, layering, max. part. size, slickensided, fissured, blocky, honeycombed, etc.):
Med. to Coarse Sand Brown w/ many gravel

[ ] Photo taken (internal sliced surface & outside surface)
Other Remarks

| Resonant Column Cyclic Torsional Shear (RCCyTS) Signature & Equipment Page | Boring: N/A |
|---|---|
| | Sample: PAD #1 (2) |
| | Depth (ft): N/A |
| | Test No. N/A |

| | |
|---|---|
| Project: Nine Mile Point Site Characterization<br>Location: Oswego, New York | Fugro Project No.: 0411-08-1696 |

**SIGNATURES**

| | |
|---|---|
| Specimen Trimmed/Recompacted by: | Date: 5/19/08 |
| Specimen Setup by: | Date: 5.19.08 |
| Test Performed by: (per GEI Procedure 109 rev. ___) | Date: 5/19/08 |
| Specimen Takedown by: | Date: 5/21/08 |
| Preliminary Calculations by: | Date: 5/23/08 |
| Calculated by: | Date: 5/23/08 |
| Reviewed by: | Date: 6/13/08 |

**EQUIPMENT USED**

| | |
|---|---|
| RCCyTS Workstation No.: RC-7 | Balance ID: BA-006 |
| Caliper ID: VH-10838 | PI Tape ID: VH-10822 |
| Oven ID: #14 | Scalping Sieve Size & ID: 3/8" B-31 |
| Other (specify) ID: ——— | Other (specify) ID: ——— |

Comments/Notes: ———

## Water Content Measurement

Project Name: Nine Mile Point Site Characterization, Oswego, NY

Project No.: 07223 0411-08-1696

Performed by, per Proc 101, rev ( ): DANIEL NYARKO

Checked By: N/A Date: ~~5/14/08~~ 6/18/08

6/18/08

| | | | | | | |
|---|---|---|---|---|---|---|
| Determination No. | 07223 | | | | | |
| Boring | STREETER RATHBUN RD. | | | | | |
| Sample | PAD #1-2 | | | | | |
| Oven ID | # 14 | | | | | |
| Balance ID | BA 006 | | | | | |
| Date/Time in Oven | 6/13/08 | | | | | |
| Date/Time Out of Oven | 5/14/08 | | | | | |
| Tare No. | PAN 1 | | | | | |
| (a) Wet Wt. + Tare | 912.74 g | g | g | g | g | g |
| (b) Dry Wt. + Tare | 856.60 g | g | g | g | g | g |
| (c) Wt. Tare | 138.99 g | g | g | g | g | g |
| (d) Wt. Water (a – b) | 56.14 g | g | g | g | g | g |
| Wt. Wet Solids (a – c) | 773.75 g | g | g | g | g | g |
| (e) Wt. Dry Solids (b – c) | 717.61 g | g | g | g | g | g |
| Water Content (d/e) x 100, % | 7.8 | | | | | |
| Is Wet Wt. Enough for Method B? (yes/no) | YES | | | | | |

DS 6/18/08

Remarks:

Test Notes:
1. Oven dry at 110°C (±5°C) for 12 hours minimum.
2. Cool in desiccator for a minimum of 30 minutes before weighing.

GEI Consultants

Form 101.1, rev. 1

**RCTS Testing Record (Page 1 of 10)**

Project #: 0411-08-1696 Project: Nine Mile Point Unit 3, Oswego, New York
Specimen #: PAD 1-2 Specimen Description: Fine to coarse sand & w/ many gravel
Tested By, per GEI Procedure 109 rev ( ): [illegible] Date: 5.19.08
Checked By: [illegible] Date: 5/23/08

Test Station: RC 7

Confining Pressure: 3.1 psi **Testing Stage: X0.25**

**RC Time Effect Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 4:14 | PAD 1-2 - P3 - T0 | 4 | 1 | 76.9 | |
| PM | 5:52 | PAD 1-2 - P3 - T7 | 4 | 1 | 79.6 | |
| 2ND | ~~[illegible]~~ | | ~~[illegible]~~ | ~~[illegible]~~ | ~~[illegible]~~ | |

AS 6/17/08 6.19.08 6.19.08

**RC Strain Amplitude Effect Tests**

AS 5/27/08

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

AS 5/27/08

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

RCTS Testing Record (Page 2 of 10)

Station:_____ Date:_____ Tested by:_____ MS 5/27/08

Project #:_____ Project Name:_____

Boring #:_____ Specimen #:_____

Confining Pressure:_____ **Testing Stage: X0.25**

**TS Tests (prior to tests, fr= Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

RCTS Testing Record (Page 3 of 10)

RC7 C.I. 6/20/08

6.19.08

Station: 0411-08-1696 Date: 6.20.08 Tested by: ft Suvad Jupic

Project #: 0411-08-1696 Project Name: GE 1

Boring #: 12 R3 Specimen #: PAD # 1-2

Confining Pressure: 6.2 PSI **Testing Stage: X0.5**

RC Time Effect Tests

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| AM | 7:29 | PAD# 1-2-P6-T-0 | 6 | 1 | 93.1 | |
| AM | 9:06 | PAD# 1-2-P6-T-7 | " | 1 | 95.9 | |
| EJO | [illegible] | | | | | |

AS 6/16/08

RC Strain Amplitude Effect Tests

AS 5/27/08

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

Resonant Frequency Check after Higher Strain Amplitude Tests

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

**RCTS Testing Record (Page 4 of 10)**

Station:_____ Date:_____ Tested by:_____ 5/27/06

Project #:_____ Project Name:_____

Boring #:_____ Specimen #:_____

Confining Pressure:_____ **Testing Stage: X0.5**

**TS Tests (prior to tests, fr= Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

RCTS Testing Record (Page 5 of 10)

6.19.08
SJ

Station: RC7 Date: 6.20.08 Tested by: ~~SJ~~ Suvad Jupic
Project #: 0411-08-169 Project Name: GEI
Boring #: SE B1 Specimen #: PAD#1-2
Confining Pressure: 12.5 Psi **Testing Stage: X1**

RC Time Effect Tests

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 9:20 | PAD#1-2-P12-T-0 | 6 | 1 | 112.9 | |
| PM | 11:01 | PAD#1-2-P12-T-1 | 6 | 1 | 116.6 | |
| END | ~~END~~ SJ 6/19/08 | | | | | |

RC Strain Amplitude Effect Tests

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 5:47 | PAD#1-2-P12-S-0 | 3 | 1 | 116.1 | |
| | 5:48 | PAD#1-2-P12-S-1 | 6 | 1 | 115.4 | |
| | 5:48 | PAD#1-2-P12-S-2 | 12 | 1 | 114.4 | |
| | 5:48 | PAD#1-2-P12-S-3 | 24 | 1 | 112.6 | |
| | 5:49 | PAD#1-2-P12-S-4 | 48 | 1 | 110.1 | |
| | 5:50 | PAD#1-2-P12-SA-0 | 96 | 10 | 106.9 | |
| | 5:50 | PAD#1-2-P12-SA-1 | 192 | 10 | 101.9 | |
| | 5:52 | PAD#1-2-P12-SB-0 | 384 | 10 | 95.2 | |
| PM | 5:53 | PAD#1-2-P12-SC-0 | 768 | 10 | 85.3 | |
| | | ~~PAD#1-2-P12~~ END SJ 6.20.08 | | | | |

Resonant Frequency Check after Higher Strain Amplitude Tests

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 5:54 | PAD#1-2-P12-SCR | 6 | 1 | 105.1 | |

RCTS Testing Record (Page 6 of 10)

6.19.08 SJ

Station: RC 7 Date: 8.20.08 Tested by: Surad Jupic

Project #: 0411-08-169 6.20.08 Project Name: GE 1

Boring #: SB P8 Specimen #: PAD #1-2

Confining Pressure: 12.5 PSI **Testing Stage: X1**

TS Tests (prior to tests, fr=116.6 Hz)

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | PAD#1-2-P12-TS01 | 0.07 | 1.39 | 1.6-6 | |
| 0.5 | PAD#1-2-P12-TS02 | 0.14 | 2.78 | 3.2-6 | |
| 0.5 | PAD#1-2-P12-TS03 | 0.28 | 5.56 | 0.63-5 | |
| 0.5 | PAD#1-2-P12-TS04 | 0.45 | 8.94 | 1.03-5 | |
| 0.1 | PAD#1-2-P12-TS05 | 0.45 | 8.94 | 1.06-5 | |
| 0.5 | PAD#1-2-P12-TS06 | ↓ | ↓ | 1.04-5 | |
| 1 | PAD#1-2-P12-TS07 | | | 1.04-5 | |
| 5 | PAD#1-2-P12-TS08 | | | 1.02-5 | |
| 10 | PAD#1-2-P12-TS09 | 0.45 | 8.94 | 1.01-5 | |
| 0.5 | PAD#1-2-P12-TS10 | 0.9 | 17.90 | 2.16-5 | |
| 0.5 | PAD#1-2-P12-TS11 | 1.8 | 35.8 | 4.67-5 | |
| 0.5 | PAD#1-2-P12-TS12 | 3.3 | 65.66 | 1-4 | |
| 0.1 | PAD#1-2-P12-TS13 | 3.3 | 65.66 | 1.01-4 | |
| 0.5 | PAD#1-2-P12-TS14 | ↓ | ↓ | 0.99-4 | |
| 1 | PAD#1-2-P12-TS15 | | | 0.99-4 | |
| 5 | PAD#1-2-P12-TS16 | | | 0.99-4 | |
| 10 | PAD#1-2-P12-TS17 | 3.3 | 65.66 | 1-4 | |
| 0.5 | END | | | | |
| 0.5 | | | | | |

Resonant Frequency Check after Higher Strain Amplitude Tests

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| AM | 11:24 | PAD#1-2-P12-TSCK | 6 | 1 | 109 | |
| PM | 5:43 | N/A | 6 | 1 | 115.6 | |
| | END | N/A | N/A | N/A | N/A | |

6.19.08
CI

RCTS Testing Record (Page 7 of 10)

Station: CC7 Date: 5.21.08 Tested by: Suvad Jupic
Project #: 0411-08-1696 Project Name: GE1
Boring #: SRM Specimen #: PAD#1-2
Confining Pressure: 25 PSI **Testing Stage: X2**

RC Time Effect Tests

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| AM | 7:49 | PAD#1-2-P25-T_0 | 8 | 1 | 137.6 | |
| AM | 9:29 | PAD#1-2-P25-T_7 | 8 | 1 | 141.9 | |
| END | TOA | | " | | | |

DS 8/18/08

RC Strain Amplitude Effect Tests

DS 5/27/08

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

Resonant Frequency Check after Higher Strain Amplitude Tests

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

RCTS Testing Record (Page 8 of 10)

Station:_____ Date:_____ Tested by:_____ 5/27/08

Project #:_____ Project Name:_____

Boring #:_____ Specimen #:_____

Confining Pressure:_____ **Testing Stage: X2**

**TS Tests (prior to tests, fr= Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |
| 0.1 | | | | | |
| 0.5 | | | | | |
| 1 | | | | | |
| 5 | | | | | |
| 10 | | | | | |
| 0.5 | | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| | | | | | |

6.19.08
SI

RCTS Testing Record (Page 9 of 10)

Station: RC7 Date: 5.21.08 Tested by: Suvad Jupic
Project #: 0411-08-1696 Project Name: GE1
Boring #: SR RL Specimen #: PAD #1-2
Confining Pressure: 50 Psi **Testing Stage: X4**

RC Time Effect Tests

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| AM | 9:41 | PAD#1-2-P50-T0 | 8 | 1 | 167.9 | |
| AM | [illegible] | PAD#1-2-P50-T-7 | 8 | 1 | 172.6 | |
| | END | | | | | |

5/19/08

RC Strain Amplitude Effect Tests

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 12:48 | PAD#1-2-P50-S-0 | 4 | 1 | 172 | |
| | 12:48 | PAD#1-2-P50-S-1 | 8 | 1 | 171.7 | |
| | 12:48 | PAD#1-2-P50-S-2 | 16 | 1 | 171.1 | |
| | 12:48 | PAD#1-2-P50-S-3 | 32 | 1 | 170.1 | |
| | 12:48 | PAD#1-2-P50-S-4 | 64 | 1 | 168.3 | |
| | 12:50 | PAD#1-2-P50-SA-0 | 128 | 10 | 166.3 | |
| | 12:50 | PAD#1-2-P50-SA-1 | 256 | 10 | 162.5 | |
| | 12:51 | PAD#1-2-P50-SB-0 | 512 | 10 | 156.6 | |
| | 12:52 | PAD#1-2-P50-SC-0 | 1024 | 10 | 146.5 | |
| | 12:52 | PAD#1-2-P50-SD-0 | 2048 | 10 | 137.1 | |
| PM | 12:53 | PAD#1-2-P50-SE-0 | 4000 | 10 | 123.7 | |
| | | END | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Resonant Frequency Check after Higher Strain Amplitude Tests

| Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|
| 12:54 | PAD#1-2-P50-SCL | 8 | 1 | 155.8 | |

6/19/08
SI

**RCTS Testing Record (Page 10 of 10)**

Station: RC7 Date: 5.21.08 Tested by: Suvad Jupic
Project #: 0411-08-1696 Project Name: GEI
Boring #: CRM Specimen #: PAD #1-2
Confining Pressure: 50 PSI **Testing Stage: X4**

**TS Tests (prior to tests, fr=172.6 Hz)**

| Frequency (Hz) | File Name | Pre-Amp Input (mV) | Post-Amp Input (mV) | Strain Amplitude | Notes |
|---|---|---|---|---|---|
| 0.5 | PAD#1-2-P50-TS01 | 0.15 | 2.98 | 1.6-6 | |
| 0.5 | PAD#1-2-P50-TS02 | 0.30 | 5.96 | 31-6 | |
| 0.5 | PAD#1-2-P50-TS03 | 0.6 | 11.93 | 06-5 | |
| 0.5 | PAD#1-2-P50-TS04 | 1 | 19.88 | 1.04-5 | |
| 0.1 | PAD#1-2-P50-TS05 | 1 | 19.88 | 1.05-5 | |
| 0.5 | PAD#1-2-P50-TS06 | | | 1.04-5 | |
| 1 | PAD#1-2-P50-TS07 | | | 1.03-5 | |
| 5 | PAD#1-2-P50-TS08 | | | 1.01-5 | |
| 10 | PAD#1-2-P50-TS09 | 1 | 19.88 | 1-5 | |
| 0.5 | PAD#1-2-P50-TS10 | 2 | 39.77 | 2.1-5 | |
| 0.5 | PAD#1-2-P50-TS11 | 4 | 79.61 | 4.77-5 | |
| 0.5 | PAD#1-2-P50-TS12 | 4.7 | 93.57 | 0.52-4 | |
| 0.1 | PAD#1-2-P50-TS13 | 4.7 | 93.57 | 0.53-4 | |
| 0.5 | PAD#1-2-P50-TS14 | | | 0.5-4 | |
| 1 | PAD#1-2-P50-TS15 | | | 0.5-4 | |
| 5 | PAD#1-2-P50-TS16 | | | 0.49-4 | |
| 10 | PAD#1-2-P50-TS17 | 4.7 | 93.59 | 0.48-4 | |
| 0.5 | END | | | | |
| 0.5 | | | | | |

**Resonant Frequency Check after Higher Strain Amplitude Tests**

| | Time (min) | File Name | Input (mV) | Gain @ Charge Amplifier | fr (Hz) | Notes |
|---|---|---|---|---|---|---|
| PM | 11:50 | PAD#1-2-P50-TSCK | 8 | 1 | 169.5 | |
| AM | 12:40 | NA | 8 | 1 | 171.8 | |
| END | | | | | | |