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16. Abstract (Limit: 200 words)

This study deals with the experimental investigation of the effects of moisture and density on the elastic moduli and strength of four subgrade soils generally representing the range of road conditions in Minnesota. The testing approach involved i) reduced-scale simulation of field compaction, ii) field-type testing on prismatic soil volumes, and iii) element testing on cylindrical soil specimens. The field-type testing included: i) the GeoGauge, ii) the PRIMA 100 device, iii) the modified light weight deflectometer (LWD) device, iv) the portable vibratory deflectometer (PVD) and v) the Dynamic Cone Penetrometer (DCP). To compare the Young's modulus values stemming from the field-type and laboratory experiments, cylindrical specimens were extracted from the prismatic soil volumes and tested for the resilient modulus (M_r), small-strain Young's modulus using bender elements.

The results reveal that both moisture and density have a measurable effect on the elastic modulus and strength of all four soils. On the element testing side, the small strain estimates from the bender element tests were in good agreement with the resilient modulus values. In the context of field testing, there was significant scatter of the estimated Young's moduli depending upon the particular testing device.

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Moisture Effects on PVD and DCP Measurements

Final Report

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Executive Summary

This study deals with the experimental investigation of the effects of moisture and density on the elastic moduli and strength of four subgrade soils generally representing the range of road conditions in Minnesota. The test matrix was designed to include three moisture contents and two densities for each of the four soils for a total 24 soil-moisture-density combinations. The testing approach involved i) reduced-scale simulation of field compaction, ii) field-type testing on prismatic soil volumes, and iii) element testing on cylindrical soil specimens. The container for the prismatic soil volumes was designed to minimize boundary effects; the reduced-scale compaction was likewise affected to mimic construction conditions. The field-type testing included: i) the GeoGauge, ii) the PRIMA 100 device, iii) the modified light weight deflectometer (LWD) device, iv) the portable vibratory deflectometer (PVD) and v) the Dynamic Cone Penetrometer (DCP). To compare the Young's modulus values stemming from the field-type and laboratory experiments, cylindrical specimens were extracted from the prismatic soil volumes and tested for the resilient modulus (M_r), small-strain Young's modulus using bender elements.

The results reveal that both moisture and density have a measurable effect on the elastic modulus and strength of all four soils. On the element testing side, the small strain estimates from the bender element tests were in good agreement with the resilient modulus values. In the context of field testing, there was significant scatter of the estimated Young's moduli depending upon the particular testing device. It was found, however, that the values from the modified LWD device correlated reasonably well with the BE-M_r values for all soil conditions. The DCP was effective in quantifying the uniformity of compacted soil volumes, and through empirical formulas, the apparent Young's modulus.

Chapter 1

Introduction

1.1 Objectives

Quantitative in situ assessment of subgrade quality represents one of the key elements for a comprehensive transition from empirical to mechanistic based pavement design. Traditionally, density has been used as an indicator for properly compacted soils. However, proper density does not necessarily guarantee sufficient stiffness or strength. Moreover, the effects of moisture on the mechanical behavior of soils must be included to account for seasonal variations of field measured stiffness and strength. For example, the *2002 Design Guide for New and Rehabilitated Pavement Structures* requires flexible pavements to be designed considering the resilient modulus of the soil subgrade, wherein changes in moisture and seasonal effects influence modulus values.

Non-destructive testing devices are being used to evaluate the stiffness of road subgrades in the field whereas laboratory testing typically determines mechanical properties of soils used during pavement design. Field methods are still being evaluated as viable methods to measure in situ stiffness or strength of subgrade soils during construction.

This research is focused on understanding and quantifying the relationship between the field and laboratory estimates of the soil stiffness and strength under varying moisture conditions. This is project aimed at quantifying the effects of moisture on portable vibratory devices and dynamic cone penetrometer measurements. This research is aimed at providing a link between design specifications and construction practices (in particular quality assurance procedures) and thus elevating the mechanistic-empirical pavement design.

The objective of this research is to quantify the effects of density and moisture on the stiffness of fine-grained subgrade soils. A benefit of this project is the development of laboratory framework for quantitative assessment of the seasonal soil stiffness estimates stemming from portable measurement devices.

1.2 Scope

To elevate the quality assurance practices and field testing of subgrade and granular base profiles, this project is focused on: 1) developing a laboratory procedure for quantifying the effects of moisture on the soil's stiffness and strength characteristics; and 2) relating the laboratory measurements to field-type estimates of the associated soil parameters. Constitutive modeling was beyond the scope of this project and not conducted. A significant portion of this project will be devoted to the analysis and syntheses of experimental data to quantify the relationship between field and laboratory measurements of the soil's stiffness and strength under varying moisture and density conditions.

A prior project [15] developed a systematic procedure for simultaneous testing of the resilient modulus and seismic moduli. The project described in this report is the involved simulating field compaction of fine-grained soils in the laboratory.

To correlate the field and laboratory estimates of soil stiffness and strength, a steel soil container for reduced scale field testing was designed and fabricated. Four fine-grained soils (given generic names A, B, C, and D by the authors) were obtained from Mn/DOT and the soils were mixed to predetermined moisture contents. Two densities and three moisture contents were prepared for each soil resulting in 24 sample subgrades. Each sample consisted of three lifts of known weight compacted with a sheepsfoot plate to specified heights for a given density following the associated sample preparation procedure. The stiffness of the sample was measured with field devices: GeoGauge, PRIMA 100, Modified LWD, Portable Vibratory Deflectometer and Dynamic Cone Penetrometer. Three cylindrical 98.5 mm (3.88 in.) diameter soil specimens were extracted from the sample. Resilient modulus, bender element and triaxial compression tests were performed on two cylindrical specimens while the third was given to the Soil Science Department at the University of Minnesota for unsaturated property testing. A significant portion of this project was devoted to the analysis and comparison of experimental data to quantify the relationship between field-type and laboratory measurements of the soil's stiffness and strength under varying moisture and density conditions.

1.3 Organization

This report consists of six chapters. Chapter 2 describes the laboratory testing techniques and the non-destructive field testing devices used in this research. Chapter 3 presents enhanced testing procedures for the PRIMA 100, Modified LWD, and Portable Vibratory Deflectometer. The steel container dimension verification in addition to a summarized testing procedure is in Chapter 4. Chapter 5 describes the moduli calculations for each device, and Chapter 6 reports conclusions with recommendations for future work.

Chapter 2

Background

Quality control (QC) and quality assurance (QA) involving non-destructive stiffness characterization can prevent over compaction and/or identify problematic areas in road construction. QC/QA can also create standards for contractual items more reliable than density testing. Field tests are a result of a need for rapid QC/QA. This research compares results from various field devices and laboratory tests.

2.1 Laboratory Testing Methods

2.1.1 Resilient Modulus

The resilient modulus M_r is defined as the change in axial stress (deviator or cyclic stress) $\Delta\sigma_a$ divided by the recoverable axial strain $\Delta\varepsilon_a$ at a given level of confinement:

$$M_r = \frac{\Delta\sigma_a}{\Delta\varepsilon_a} \tag{2.1}$$

Resilient modulus of fine-grained soils is affected by confinement, density and water content. NCHRP 1-28A (Table 2.1) is a testing protocol used to measure the resilient modulus of soils. NCHRP 1-28A is expected to become the future standard testing protocol and replace LTPP 46, FHWA T292, and FHWA T294 methods [38]. The flow chart (Fig. 2.1) identifies the appropriate testing procedure for a material. The 1-28A protocol requires a closed-loop,

Table 2.1: Resilient modulus test sequence [45]

Procedure II (Cohesive Subgrades)										
Sequence	Confining Pressure		Contact Stress		Cyclic Stress		Maximum Stress		Nrep
	kPa	psi	kPa	psi	kPa	psi	kPa	psi	
0	27.6	4.0	5.5	0.8	48.3	7.0	53.8	7.8	1000
1	55.2	8.0	11.0	1.6	27.6	4.0	38.6	5.6	100
2	41.4	6.0	8.3	1.2	27.6	4.0	35.9	5.2	100
3	27.6	4.0	5.5	0.8	27.6	4.0	33.1	4.8	100
4	13.8	2.0	2.8	0.4	27.6	4.0	30.4	4.4	100
5	55.2	8.0	11.0	1.6	48.3	7.0	59.3	8.6	100
6	41.4	6.0	8.3	1.2	48.3	7.0	56.6	8.2	100
7	27.6	4.0	5.5	0.8	48.3	7.0	53.8	7.8	100
8	13.8	2.0	2.8	0.4	48.3	7.0	51.1	7.4	100
9	55.2	8.0	11.0	1.6	69.0	10.0	80.0	11.6	100
10	41.4	6.0	8.3	1.2	69.0	10.0	77.3	11.2	100
11	27.6	4.0	5.5	0.8	69.0	10.0	74.5	10.8	100
12	13.8	2.0	2.8	0.4	69.0	10.0	71.8	10.4	100
13	55.2	8.0	11.0	1.6	96.6	14.0	107.6	15.6	100
14	41.4	6.0	8.3	1.2	96.6	14.0	104.9	15.2	100
15	27.6	4.0	5.5	0.8	96.6	14.0	102.1	14.8	100
16	13.8	2.0	2.8	0.4	96.6	14.0	99.4	14.4	100

servo-hydraulic load frame with a function generator capable of applying a haversine-shaped load pulse over a range of load durations, load levels, and rest periods [45]. It requires a triaxial cell chamber made of polycarbonate, acrylic, or other suitable see-through material to be pressurized by air and large enough to accept specimens of 152 mm (6.0 in.) in diameter. An internal, electronic load cell is required to record the maximum load within 0.5% and spring loaded linear variable differential transformers (LVDTs) are mounted on the specimen to record deformation [45]. For fine-grained soils, the load pulse (Fig. 2.2) is a 0.2 second sinusoidal loading pulse followed by a 0.8 second rest period.

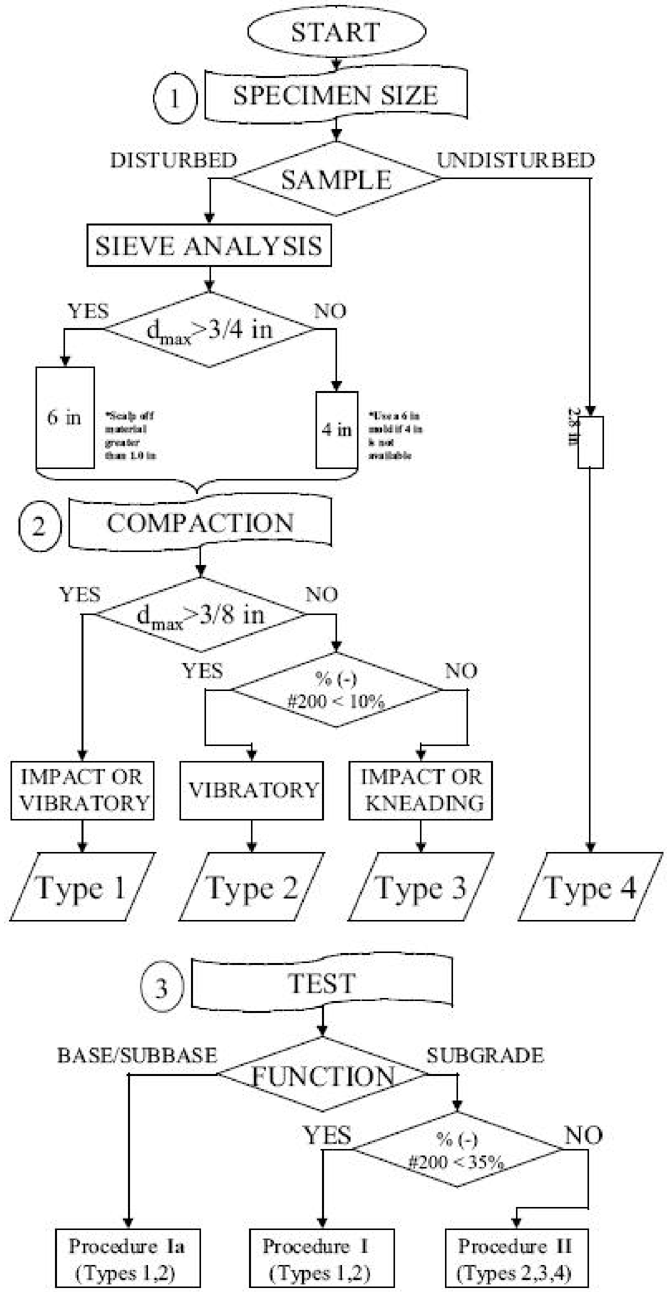


Figure 2.1: Test method flow chart [45]

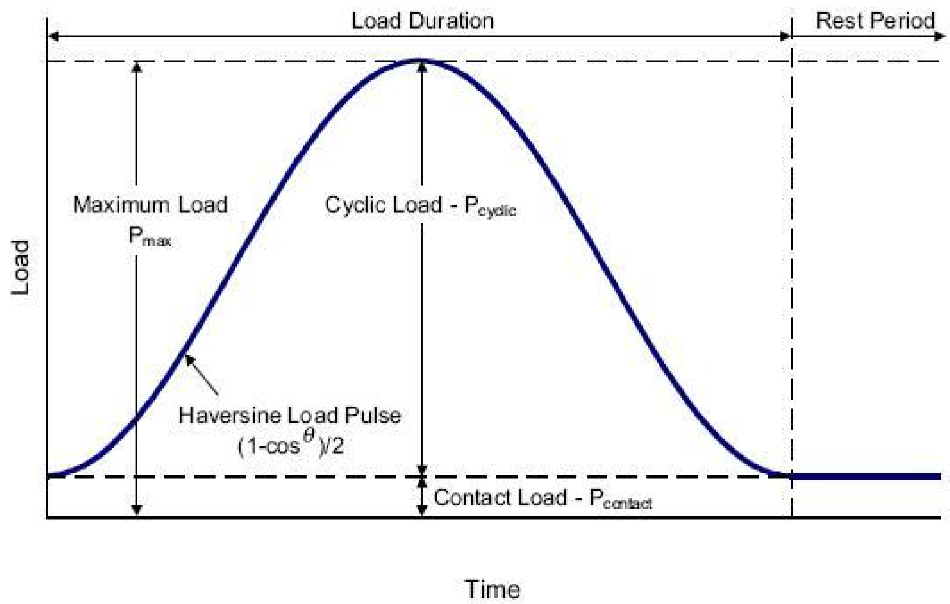


Figure 2.2: Resilient modulus pulse definitions [45]

The test sequence requires loading at 17 stress states (Table 2.1). The conditioning cycle is the first step that consists of 1000 repetitions at a confining pressure of 28 kPa (4.0 psi) and a deviator stress of 55 kPa (8.0 psi). The remaining 16 steps consist of 100 repetitions with differing confining pressures and deviator stresses. The recoverable strain from the last five loading pulses of each step are used to calculate the Young's modulus. A resilient modulus is calculated from each of the five last loading pulses of each sequence. These five values are used to calculate the resilient modulus for each cycle, and the five values are then averaged for the M_r value corresponding to that confining pressure and deviator stress combination.

2.1.2 Bender Element

The bender element technique was developed by Shirley and Hampton in 1977 [21]. This test estimates the Young's modulus and shear modulus of a specimen from the primary and secondary wave speeds.

A bender element is an electro-mechanical transducer that either bends or contracts as voltage is applied or generates a voltage as it deforms. A bender element consists of a thin metal shim placed between two piezoelectric ceramic bimorphs that protrudes 1 mm into the specimen. A current passes through the piezoelectric material causing it to contract. As the piezoelectric material contracts, it moves the metal shim such that it generates a wave that travels through the specimen. The wave is received at the opposite end of the specimen by the opposing bender element. The primary wave (Fig. 2.3), or more commonly called P-wave, is generated as the metal shim deforms axially. The P-wave is received by the opposing bender element with a phase shift of 180 degrees. The secondary, shear (Fig. 2.3) or S-wave, is a result of the metal shim in the bender element contracting side to side. The S-wave is read in-phase by the opposing bender element due to the element orientation (Fig. 2.4). The amplitude of the induced P- and S- waves are very small, and the recording

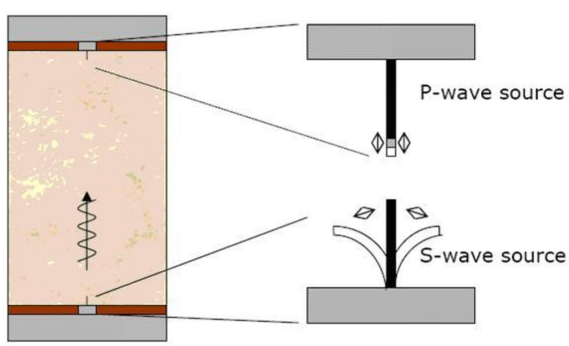


Figure 2.3: Bender element wave description [15]

of the output needs to be very accurate [8, 44]. The obtained (small-strain) moduli are often

Figure 2.4: Proper alignment for S-waves [16]

referred to as E_{MAX} and G_{MAX}. These values are calculated from wave velocities c_P and c_S which are determined from propagation times t_p and t_s of the P- and S-waves and their travel distance L, respectively:

$$c_P = \frac{L}{t_P} \tag{2.2}$$

$$c_S = \frac{L}{t_S} \tag{2.3}$$

A problem with bender element testing is the difficulty in determining the wave arrival time used to calculate wave speeds [21]. Several approaches have been used to determine arrival times: peak signal compared to peak arrival, linearly extrapolating the slope of the sent and received signals to the x-axis and determining the arrival time, or cross correlating the sent signal to the received signal. Averaging the cross correlation of the frequency response function and linearly interpolating the cross power spectrum phase diagram can be regarded as the most accurate method for determining the wave arrival time [44].

Viggiani and Atkinson [44] proposed using sine waves as an input signal instead of square waves. This produced a received signal that was generally of a similar shape. Viggiani and Atkinson state in both slow and dynamic cyclic loading tests stress-strain loops show little or no hysteresis, which means that the behavior is conservative and little or no energy is dissipated [33]. Davich [15] reported good agreement of the bender element results with M_r data, and in most cases, lower moisture contents exhibited larger E_{MAX} values in granular material.

2.1.3 Triaxial Compression

The triaxial compression test is the most widely used shear strength test [12]. A cylindrical specimen of a length to diameter ratio of two is encased by a thin rubber membrane (Fig. 2.5) and placed inside a pressure chamber [14]. The specimen is subjected to a confining

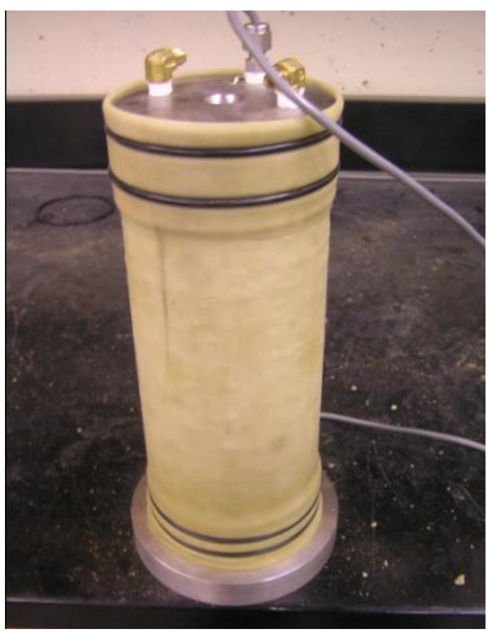


Figure 2.5: Specimen placed inside rubber membranes

pressure and the axial load is increased until failure. Failure occurs on a plane where a critical combination of shear stress and effective normal stress develops. A failure envelope can be constructed from multiple tests performed on specimens at different confining pressures (Fig. 2.6).

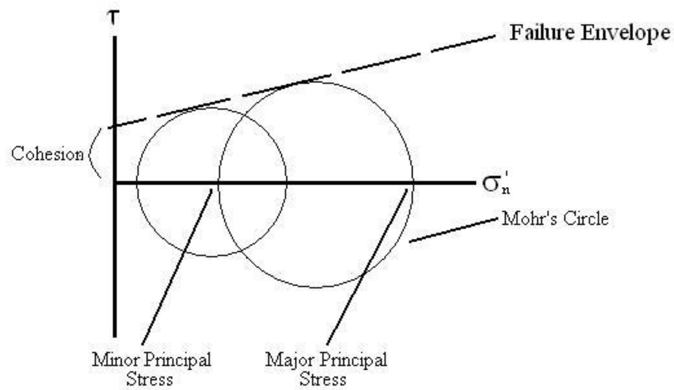


Figure 2.6: Mohr's diagram

The confining pressure is the minor principal stress. The combination of the confining pressure and deviatoric stress, provided there are no shear stresses on the ends of the specimen, is the major principal stress. Shear strength is expressed as a linear function of the cohesion c', normal stress at failure σ_n, suction s, and the angle of internal friction ϕ' [12]:

$$\tau = c' + (\sigma_n + s)\tan\phi' \tag{2.4}$$

If soil suction is not measured, the shear strength parameters c and ϕ, estimated from the total stresses, are influenced by suction s.

2.2 Field-Type Testing Methods

2.2.1 GeoGauge

The GeoGauge, manufactured by Humboldt Mfg. (Norridge, IL), is a hand-portable device that evaluates compaction quality control [41]. It weighs 10 kg (22 lb), is 280 mm (11 in.) in diameter and 270 mm (10 in.) tall. Figure 2.7 shows the validation mass that accompanies the device for on site calibration. The device rests on the soil via a ring shaped foot (Fig. 2.8). A schematic of GeoGauge components is shown in Fig. 2.9. Seating the

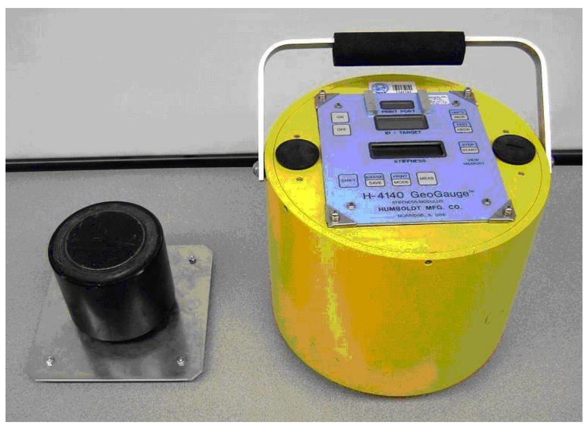


Figure 2.7: Verification mass and GeoGauge device

GeoGauge can affect performance. The manufacturer's user guide recommends more than 60% [41] or 80% [42] of the ring-shaped foot's area needs to be in contact with the soil . The manufacturer also recommends a thin layer, 3.2 mm (0.13 in.), of moist sand to be placed between the ring-shaped foot and the soil surface to ensure a proper contact area [43]. The GeoGauge operates without a load cell, so its weight is the assumed force during operation. The device consists of two geophones that measure surface velocity (Fig. 2.9). During each test, the mechanical shaker displaces the foot in 25 frequencies. The intervals increase in

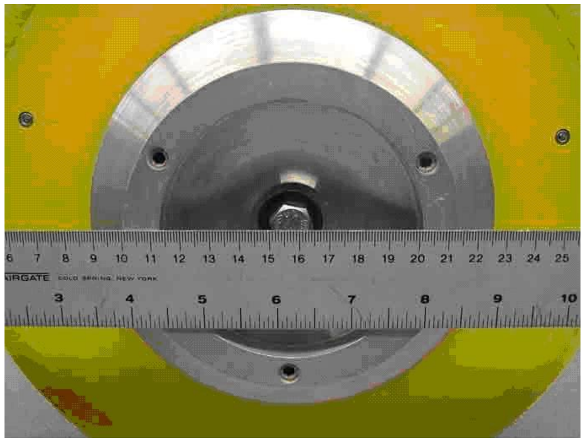
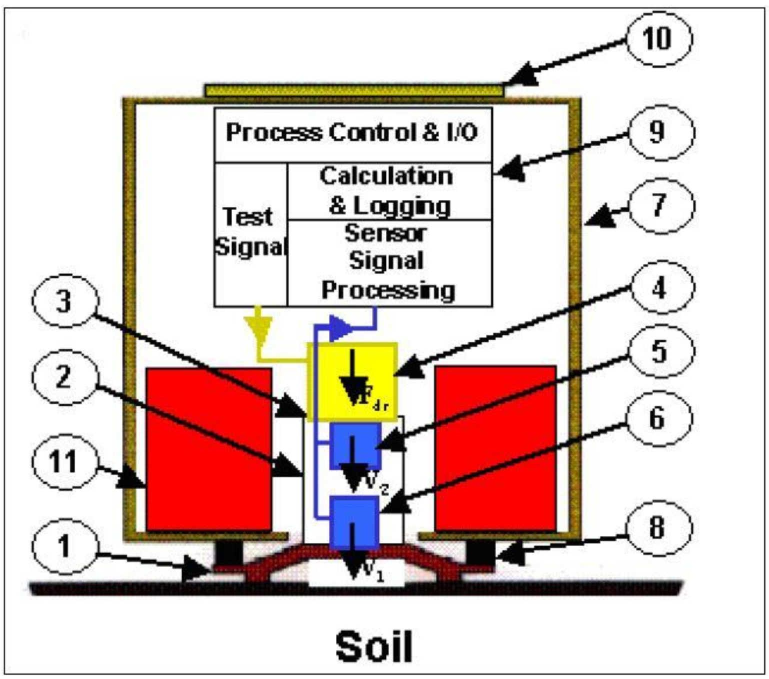


Figure 2.8: Ring shaped loading plate



1. Rigid foot with annular ring
2. Rigid cylindrical sleeve
3. Clamped flexible plate
4. Electro-mechanical shaker
5. Upper velocity sensor
6. Lower velocity sensor
7. External case
8. Vibration isolation mounts
9. Electronics
10. Control and display
11. Power supply

Figure 2.9: GeoGauge schematic [34]

4 Hz segments, from 100 to 196 Hz. The stiffness of the soil is determined by averaging the readings taken at each interval. ASTM designation D6758-02 states, "the stiffness, in force per unit displacement, is determined by imparting a small force to the surface of the ground, measuring the resulting surface velocity and calculating the stiffness. This is done over a frequency range and the results are averaged" [3]. The GeoGauge is capable of storing information for modulus determination on a personal computer. An infrared interface cable transmits information to a computer for further analysis.

Alshibli et al. [6] conducted Geogauge tests on clay and clayey-silt compacted in two 1.52 x 0.91 x 0.91 m (5 x 3 x 3 ft) containers. Coefficients of variation for GeoGauge moduli estimations ranged from 4.3% to 21% while the corresponding elastic moduli were 67 MPa (9717 psi) and 162.3 (23540 psi) on the compacted soil surfaces in these containers. Munir [28] showed that the depth of influence for the GeoGauge was between 190 - 200 mm (7.5 and 8 in.) by testing varying layer thicknesses of different layered materials. Siekmeier et al. [39] performed GeoGauge tests in conjunction with other field-type testing devices on a granular base at the MnROAD facility and concluded that the modulus was lower when compared to other devices due to the lower contact pressure. Chen et al. [11] completed approximately 100 field tests on different subgrade and base material with the GeoGauge, remarking that the device may lose accuracy on materials that exceeded 23 $\frac{kN}{mm}$ $(130,000\ \frac{lb}{in.})$ in stiffness.

2.2.2 PRIMA 100

The PRIMA 100 is a portable falling weight deflectometer manufactured by Carl Bro Pavement Consultants (Kolding, Denmark). It is also known as a light weight deflectometer (LWD), and it is based on the design of the popular falling weight deflectometers (FWD) [20]. The FWD imparts a force on a circular loading plate in contact with a prepared surface. A series of geophones, located radially away from the center of the loading plate, measure velocity from which moduli can be determined [30]. The PRIMA 100 contains a falling mass that impacts a circular loading plate in contact with the surface, and a geophone measures the surface's velocity response. The PRIMA 100 device is similar to the FWD in that it transmits an impact load on a circular loading plate and the soil response is measured. Typically one geophone placed in-line with the falling mass although additional geophones can be utilized by the PRIMA 100 devices [38].

The PRIMA 100 device, shown in Fig. 2.10, weighs 27 kg (60 lb) and is 1.28 m (50 in.) tall with a 200 mm (8 in.) diameter loading plate, which can be varied to accommodate different soil conditions. The maximum drop height is 850 mm (33 in.). The amount of force generated by the falling mass can be varied by increasing or decreasing the drop height with an adjustable mass release trigger. When released, it slides along the handle and impacts the PRIMA 100 lower unit housing a load cell and a spring mounted geophone (Fig. 2.11). The impact results in a sine-shaped loading pulse, which simulates loading from a vehicle.

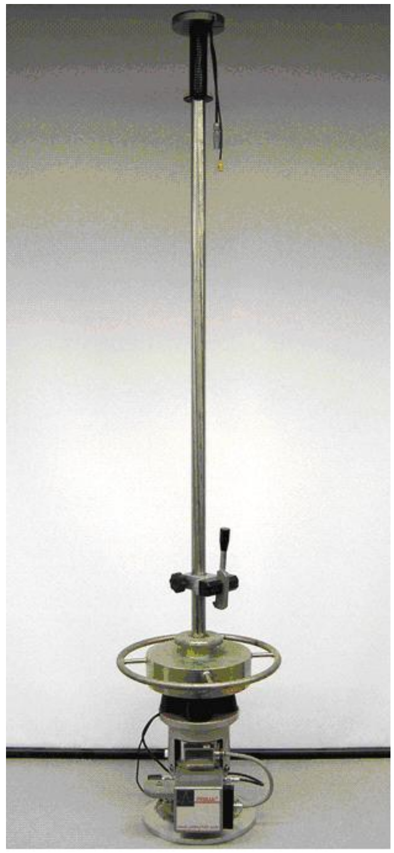


Figure 2.10: PRIMA 100 device

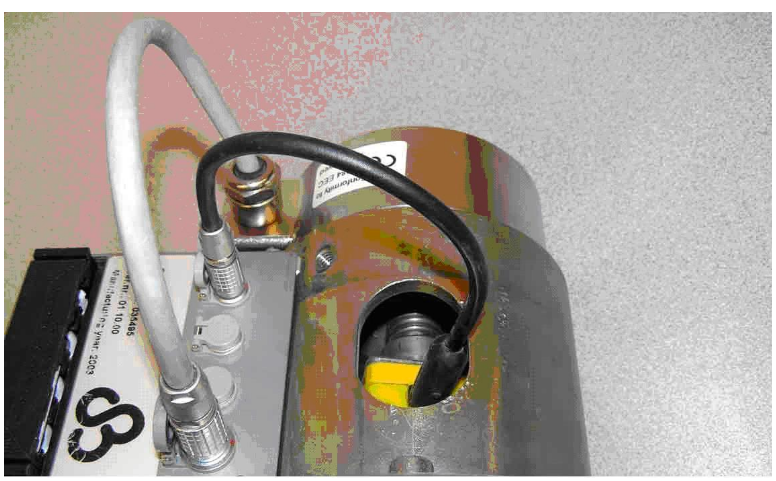


Figure 2.11: PRIMA 100 sensors

The velocity of the soil is measured as the falling mass impacts rubber buffers on the lower unit enclosure. The geophone is centered underneath the loading plate (Fig. 2.12), and it is attached to a spring to remain in contact with the soil as the mass impacts the rubber buffers. After impact, PRIMA 100 software records the maximum force and displacement; these values are used to estimate stiffness and the value is displayed.

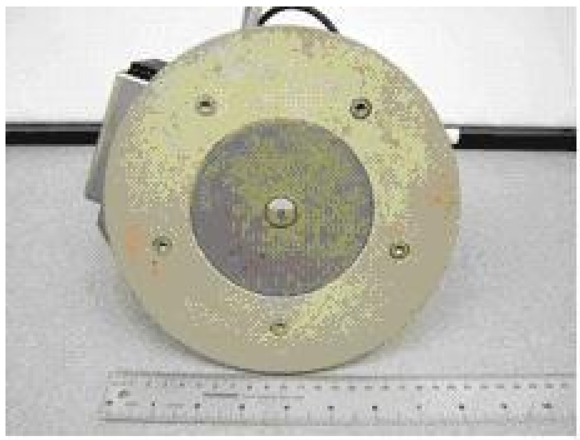


Figure 2.12: PRIMA 100 loading plate

Alshibli et al. [6] reported the LWD showed wide scatter and poor repeatability of measurements when testing weak subgrade layers. For example, the coefficient of variations ranged from 1.2% to 46.3% and the LWD moduli estimations were 171.4 MPa (24,860 psi) and 28.5 MPa (4133 psi) respectively on the compacted samples mentioned Section 2.2.1. Nazzal [28] reported PRIMA 100 coefficients of variations ranging from 2.1 to 28 % for modulus values up to 50 MPa (7250 psi) such that it was difficult to conduct the LWD test on very weak material. The general trend for C_{var} decreased as the modulus increased. Camargo et al. [9] performed LWD measurements on three Minnesota trunk highways in 2005 and reported it could be used as a quality assurance tool in conjunction with the BOMAG IC roller.

2.2.3 Modified LWD

The modified procedure was designed as a laboratory setup that verifies stiffness estimations from portable deflectometer devices [19]. The testing apparatus is called the Beam Verification Tester (BVT) (Fig 2.13). The PRIMA 100 is modified by removing the falling weight, as shown in Fig. 2.14. The modified LWD device can be attached to the BVT and tapped to identify steel beam stiffness, as shown in Fig. 2.13. This setup has been tested on the BVT to verify that a smaller load level is independent of the static stiffness for a linear system [19].

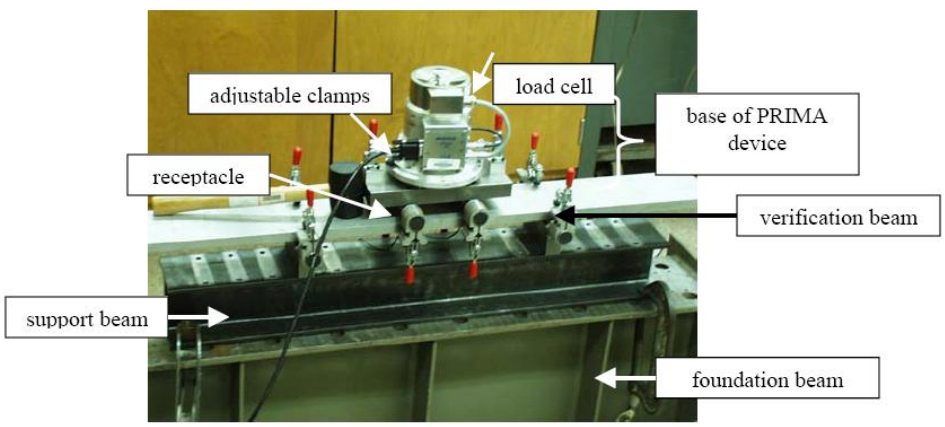


Figure 2.13: Beam Verification Testing setup [19]

The modified LWD setup can also be placed on prepared subgrade. The falling mass is removed and a rubber mallet is used to tap the lower unit (Fig. 2.15); a Fast Fourier Transformation is performed on the data collected using a spectral analyzer. Determination of the static stiffness from the frequency response function is the basis for calculating Young's modulus. The use of the modified setup takes advantage of the linearity of materials at low strain levels [19]. Hoffmann et al. [19] reported that the sensor calibration of the PRIMA 100 device was satisfactory. However, the data interpretation method that uses peak values

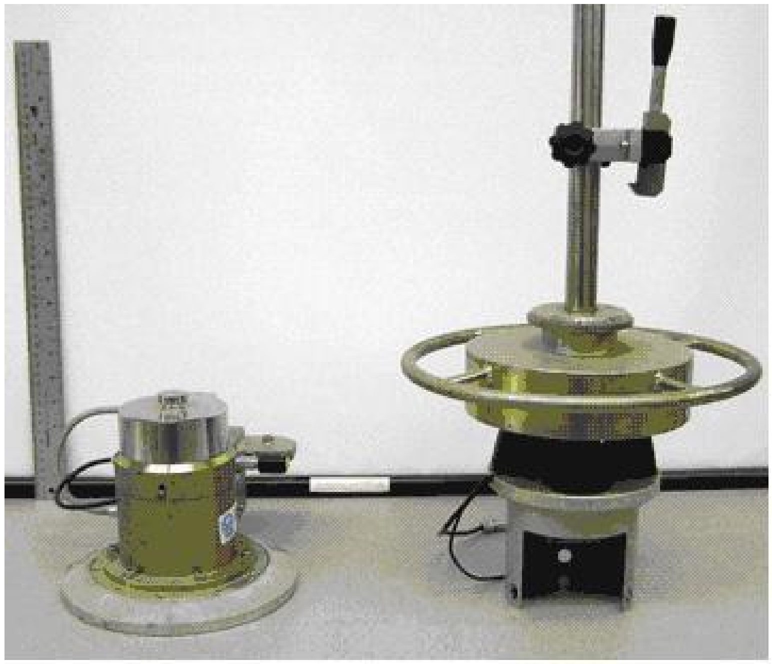


Figure 2.14: Lower half of the PRIMA 100

Figure 2.15: Rubber mallet tapping the modified LWD

for the load and displacement imbedded in the device at that time disregarded the inertial effects of the peak force to peak displacement resulting in systematic errors. Carl Bro. now markets FFT software for use with the PRIMA 100 [38]. Hoffmann et al. [19] did show that the peak to peak based method of back analysis used by the PRIMA 100 produces incorrect estimates of the static stiffness with an error often exceeding 100%. A spectral-based data interpretation method was proposed and showed good agreement between the true static stiffness of the BVT and its LWD estimates [19].

2.2.4 Portable Vibratory Deflectometer

A portable vibratory deflectometer (PVD) measures the load-frequency response of a rigid plate on a half space. The rigid plate resting on a large volume of flat soil is subjected to random vertical vibration generated by an electromagnetic shaker, as shown in Fig. 2.16 [18].

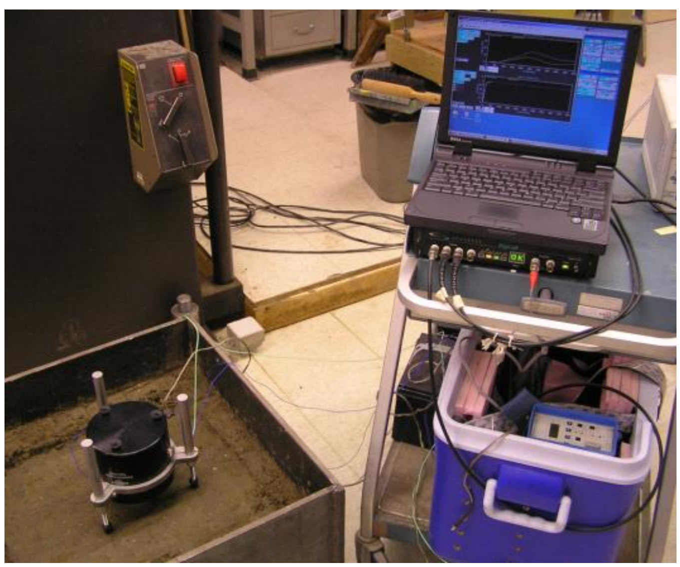


Figure 2.16: PVD test setup

The 12 mm (0.5 in.) thick and 63 mm (2.5 in.) diameter loading plate (Figs. 2.18) is bolted to model 4809 Bruel & Kjaer (Denmark) shaker. The excitation device produces linear motion over the frequency range of 10 to 20,000 Hz (Fig. 2.17). Two model 352A10 PCB (Depew, NY) accelerometers are mounted on the loading plate shown in Fig. 2.19. The signal from the accelerometers is received by the 482A22 PCB Piezotronics signal conditioner and passed on to a Siglab 20-42 (San Jose, CA) spectrum analyzer. The Kistler 9011A

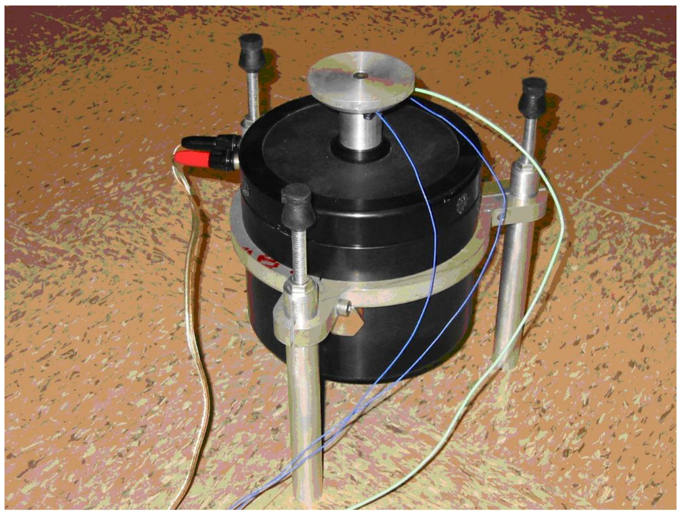


Figure 2.17: Bruel & Kjaer vibration exciter type 4809

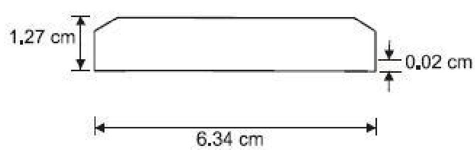


Figure 2.18: PVD loading plate

(Hampshire, UK) load cell has a 15 kN capacity (3370 lb.) and an 18 kN (4045 lb.) overload limit. It is positioned between the excitation device and loading plate, and the signal from the load cell is received by a Kistler dual mode amplifier, and in turn, sent to the Siglab 20-42 spectrum analyzer. Computer software produces a random excitation signal that is sent to the Rockford Fosgate Power 150a1 (Tempe, AZ) amplifier. The signal is then sent to the vibratory device. A schematic describing the setup is shown in Fig. 2.21.

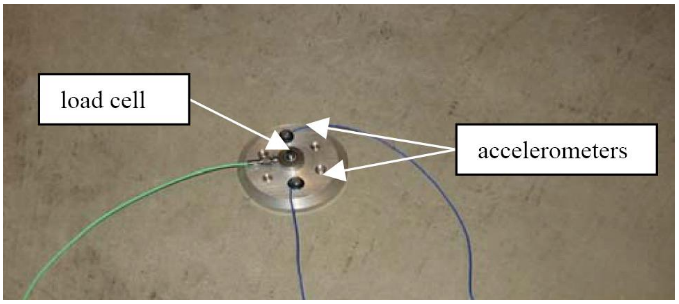


Figure 2.19: PVD loading plate with accelerometers and load cell

The sensors attached to the loading plate monitor the applied vertical load and its corresponding acceleration, both as a function of time. Random oscillations from 0 - 5000 Hz are transmitted to the soil via the exciter and loading plate (Fig. 2.20). Using the

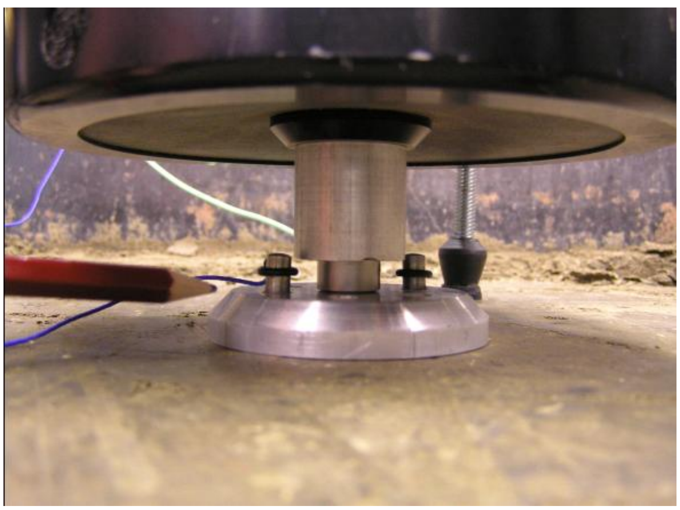


Figure 2.20: PVD loading plate in contact with soil

SigLab 20-42 spectrum analyzer, the analog time signals are digitized and converted to the frequency domain [36]. The test runs stacking data continuously as the system is excited. MATLAB software converts the force and velocity measurements from the time domain into the frequency domain.

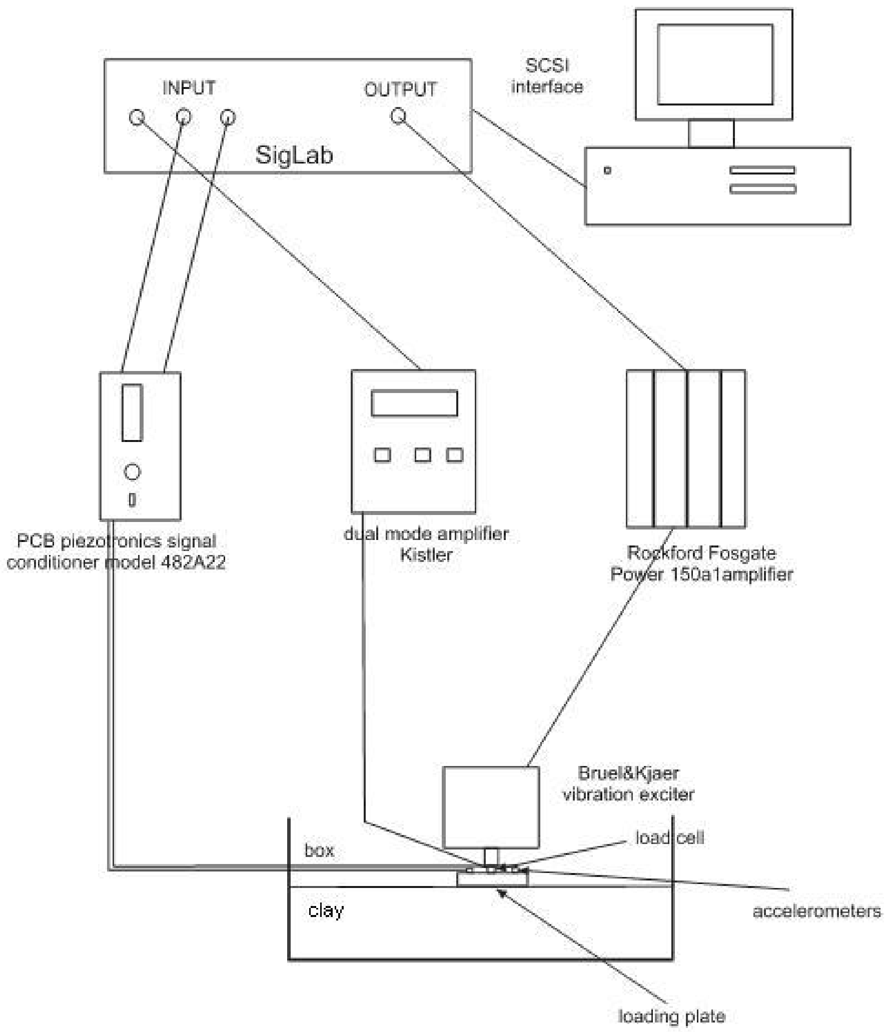


Figure 2.21: PVD schematic

2.2.5 Dynamic Cone Penetrometer

The dynamic cone penetrometer (DCP) was developed 1956, and applications of the DCP include correlations to the California Bearing Ratio (CBR), unconfined compressive strength, resilient modulus, and shear strength of soils [7, 22]. The DCP is simple to use and durable to withstand field conditions. The 4.6 kg (10.1 lb) or 8 kg (17.6 lb) sliding mass falls 575 mm (22.6 in.) and impacts the anvil/coupler assembly (Fig. 2.22). The energy is transmitted through the anvil/coupler assembly and 1 m (3.3 ft) drive rod to the cone (Fig. 2.23). The cone is attached to the end of the 1 m (3.3 ft) drive rod, and it is driven into the soil by lifting the sliding hammer and releasing it [4]. The cone is 20 mm (0.67 in.) in diameter with a 60 degree angle. A vertical displacement is recorded after each drop. The DCP penetration

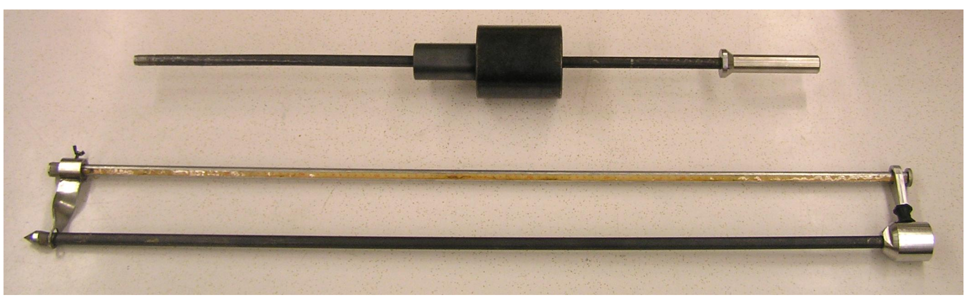


Figure 2.22: Dynamic Cone Penetrometer disassembled

index (DPI) is the only value obtained from this device; all subsequent applications are derived from correlations. The DPI is an average displacement of the apparatus from the falling mass for depth intervals. The DCP produces shear failure in the soil similar to the bearing capacity failure of a foundation [40]. Siekmeier et al. [39] suggest that the DCP is most useful for verifying the consistency and uniformity at constructions sites.

Figure 2.23: Removable cone tip

2.2.6 Percometer

The Percometer estimates volumetric moisture content for soil [9]. This device is manufactured by ADEK (Estonia) [5]. It measures temperature, a dielectric permittivity, and electrical conductivity. The Percometer consists of a hand-held computer, a 2 m (6 ft) cord, and a 200 mm (8 in.) long probe with a 60 mm (2.4 in.) diameter sensor plate as shown in Fig. 2.24. The probe is pressed against a material, and the hand-held computer emits a small electrical current that passes through the sensor plate and material wrapping back to the shell of the probe.

Figure 2.24: Percometer

Chapter 3

Enhanced Data Interpretation

3.1 PRIMA Device

Conventionally, the PRIMA-soil stiffness k is determined from the peak force divided by the peak displacement which inevitably includes inertial effects and thus introduces a systematic error into the estimation of soil's Young modulus E. To overcome the problem, a method proposed by Hoffmann et al. [19] utilizes the frequency-domain analysis to extrapolate the dynamic force and deflection data toward the zero frequency and thus filter out the undesirable inertial effects. In this process, the low-frequency data (0-20 Hz) are disregarded from the fitting process owing to the excessive signal-to noise ratio caused by inherent geophone limitations. As a result, the "true" static stiffness, k^{st}, of the PRIMA-soil system is estimated by fitting the intermediate-frequency (20-150 Hz) values of the FFT-transformed force-deflection ratio. In the context of an elasto-static analysis, such k^{st} can be used, assuming a suitable value for the Poisson's ratio and an appropriate stress distribution factor for beneath the loading plate to calculate the soil's Young's modulus. The superscript distinguishes it from k estimated at high frequencies. On modeling the soil as a semi-infinite, homogeneous, isotropic, linear-elastic half-space, it can be shown that

$$E = \frac{4k^{\mathrm{st}}}{\pi d}\left(1-\nu^2\right) I_s \tag{3.1}$$

where d is the diameter of the circular loading plate, and I_s is a stress distribution factor depending on its flexibility [12]. More precisely,

- $I_s = 1$ for the flexible ($E_{\mathrm{plate}} \ll E_{\mathrm{soil}}$) plate,
- $I_s = \frac{\pi}{4}$ for the rigid ($E_{\mathrm{plate}} \gg E_{\mathrm{soil}}$) plate.

Here it is noted that the second equation for I_s assumes that the soil uniformly displaces under the entire loading plate. Accordingly, it does not account for the fact that the inner geophone moves independently from the loading plate and thus violates the rigid plate assumption. In this context, it may be reasonable to expect that the actual value of I_s characterizing the PRIMA device is somewhere in between the extreme values of $\pi/4 = 0.785$ and 1. Owing to a relatively narrow range characterizing the possible values of I_s, the ensuing analysis assumes $I_s = 1$ for simplicity.

3.1.1 Data Acquisition

To estimate the static stiffness k^{st} in (3.1), the entire PRIMA force and motion records must be utilized to transform the temporal data into the frequency domain. This is achieved by applying the Fast Fourier Transform (FFT) to the transient force and velocity records stemming from the PRIMA 100 device. With reference to Fig. 3.1, the frequency-domain analysis is performed with the aid of the Siglab 20-42 four-channel spectrum analyzer (frequency range 0-20kHz), which stores and processes the entire (i.e. full) force and velocity records.

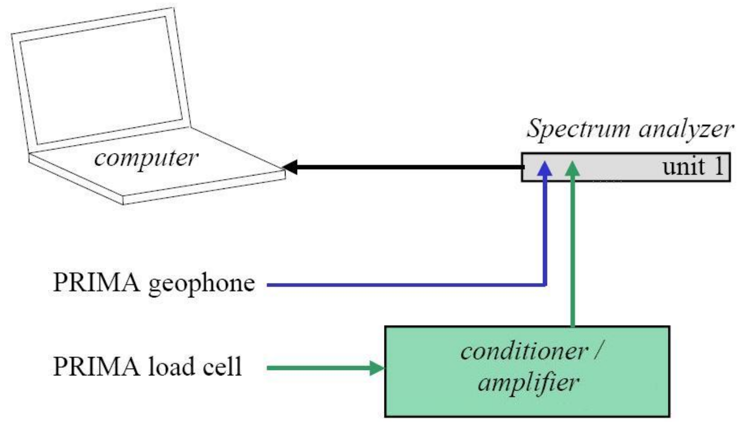


Figure 3.1: Data acquisition system for the enhanced interpretation of PRIMA 100 measurements [19]

Velocity measurement: The PRIMA 100 geophone rests on a spring; it moves independently of the lower unit housing. As the housing is impacted by the falling weight or the mallet, the load is transmitted from the housing to the loading plate. Movement of the magnet within the geophone induces a current in the coil that is proportional to velocity by applying Faraday's Law of Induction [30]. The geophone outputs a voltage proportional to the difference in vertical motion between the ground surface and the geophone housing. Signal/noise ratios reduce reliability of measurements. For instance, a geophone with a natural frequency of 5 Hz should not be used to measure data with frequencies below 10 to 20 Hertz.

Force measurement: The load cell conditioner for the modified setup is a Vishay strain gage (Malvern, PA) conditioner model 2120 with a model 2110A power supply. The PRIMA 100 load cell contains eight strain gages and outputs a voltage from impact that is conditioned/amplified and sent to the signal conditioner.

Both signals, received by the Siglab 20-42 spectrum analyzer, are sent to the portable computer for further processing and graphical display. All data processing, both within the spectrum analyzer and the portable computer, is performed using MATLAB software.

3.1.2 Fourier Transform and Frequency Response Function

The Fourier transform is used to convert a signal recorded in the time domain, $y(t)$, to a frequency domain representation $Y(f)$ where f denotes the frequency of the excitation. The Fourier transform of a continuous function of time $y(t)$ is given by

$$Y(f) = \int_{-\infty}^{\infty} y(t)e^{-i2\pi ft}dt \tag{3.2}$$

where $i = \sqrt{-1}$. Conversely, the inverse Fourier transform of a continuous function of frequency $Y(f)$ is defined as

$$y(t) = \int_{-\infty}^{\infty} Y(f)e^{i2\pi ft}df \tag{3.3}$$

On the basis of (3.2), any *linear* single-input-single-output system with temporal input $x(t)$ and temporal output $y(t)$ can be characterized in the frequency domain in terms of its frequency response function;

$$FRF(f) \;=\; \frac{Y(f)}{X(f)} \tag{3.4}$$

a complex-valued function which signifies the output per unit input as a function of frequency.

For experimental records that are inevitably of finite duration, however, (3.2) must be superseded by its discrete counterpart termed the Discrete Fourier Transform (DFT). With reference to a discrete (i.e. digitized) temporal record $y(t_k)$ $(t_k = k\Delta t, k = 0, 1, 2, \ldots M)$, its DFT is given by

$$Y(f_j) = \Delta t \sum_{k=0}^{M} y(t_k)e^{-i(2\pi f_j)t_k}, \qquad j = 0, 1, 2, \ldots M \tag{3.5}$$

On the basis of (3.5), a discrete version of (3.10) that is suitable for engineering applications (in terms of its robustness to experimental noise) can be written as

$$FRF(f_j) \;=\; \frac{S_{yx}(f_j)}{S_{xx}(f_j)}, \qquad j = 0, 1, 2, \ldots M \tag{3.6}$$

where, for multiple test realizations ($i = 1, 2, \ldots N_T$)

$$S_{yx}(f_j) = \frac{1}{N_T} \sum_{i=1}^{N_T} [X^*(f_j)]_i \, [Y(f_j)]_i \,, \tag{3.7}$$

$$S_{xx}(f_j) = \frac{1}{N_T} \sum_{i=1}^{N_T} [X^*(f_j)]_i \, [X(f_j)]_i \,, \qquad j = 0, 1, 2, \ldots M \tag{3.8}$$

denote respectively the cross-spectral and power-spectral density estimates computed from the discrete input and output records $x(t_k)$ and $y(t_k)$ $(t_k = k\Delta t, k = 0, 1, 2, \ldots M)$, and "*" stands for complex conjugation. Equations (3.5)–(3.8) form a basis for the operation of the Siglab 20-42 spectrum analyzer.

To estimate the quality of recorded data, the coherence function is used:

$$\gamma_{yz}^2(f_j) = \frac{| \, S_{yx}(f_j) \, |^2}{S_{xx}(f_j) G_{yy}(f_j)} \tag{3.9}$$

The value of the coherence function provides system linearity information as it varies from 0 to 1. If no correlation between the input and output signals is present, the value of $\gamma_{yz}^2(f_s)$ is equal to 0. Conversely, the value of $\gamma_{yz}^2(f_s)$ equal to 1 indicates the perfect linearity of a system without noise contamination. Accordingly, the value between 0 and 1 indicates the presence of noise and non-linearity in the system.

3.1.3 Mobility Function

In the enhanced interpretation of the PRIMA 100 measurements, the force record $p(t)$ is taken as an input, and the geophone (i.e. velocity) record $v(t)$ is taken as an output from the PRIMA-soil system which can accordingly be characterized in terms of its frequency response function

$$M(f) = \frac{V(f)}{P(f)}, \tag{3.10}$$

herein termed the *mobility function*. On modeling the PRIMA-soil system as a Single-Degree-of-Freedom (SDOF) system characterized by the spring constant k^{st}, dashpot c, and mass m, the Young modulus of the soil tested can be effectively calculated by first fitting the SDOF model in terms of $M(F)$ to the experimental data as a means to calculate k^{st} and then using (3.1). Here it is noted that the process of fitting the SDOF model to experimental mobility data (in the frequency domain) effectively amounts to the extrapolation of dynamic stiffness to its zero-frequency limit.

3.1.4 Young's Modulus from PRIMA Test

To properly effect the frequency-domain extrapolation of the dynamic records $p(t)$ and $v(t)$ toward the static value, a Single-Degree-of-Freedom (SDOF) model is used in the analysis. On recalling that $M(f)$ is complex-valued, fitting of the SDOF model to the experimental data is performed in terms of the real part of the mobility function.

Single-Degree-of-Freedom system: a SDOF system, shown in Fig. 3.2, consists of a mass m, a massless dashpot with a damping coefficient c, and a massless spring of constant k^{st}. The mass is subjected to a transient force $p(t)$ which results in a dynamic deflection $x(t)$ whose velocity is denoted by $\dot{x}(t) = v(t)$. The governing differential equation for the SDOF can be written in terms of its deflection $x(t)$ as

$$m\ddot{x}(t) + c\dot{x}(t) + k^{\mathrm{st}}x(t) = p(t) \tag{3.11}$$

Here $\dot{x}(t)$ and $\ddot{x}(t)$ denote respectively the velocity and acceleration of the mass m as elucidated earlier. On employing the definition of the undamped natural (circular) frequency of a SDOF system

$$\omega_n = \sqrt{\frac{k^{\mathrm{st}}}{m}} \tag{3.12}$$

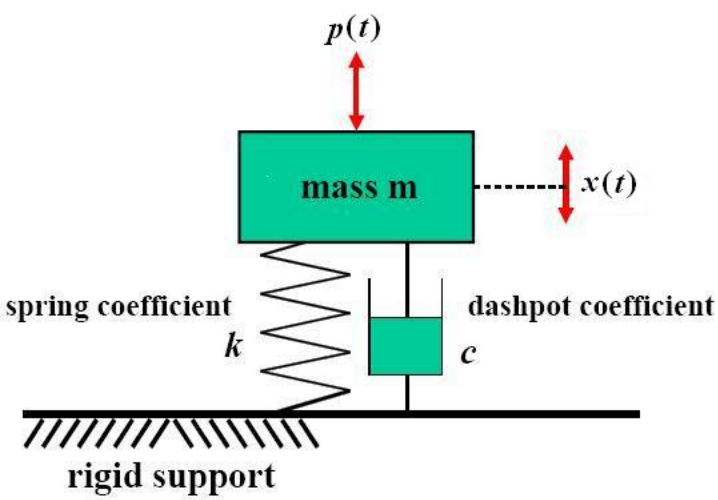


Figure 3.2: SDOF system [19]

and that of the damping ratio

$$\xi = \frac{c}{2m\omega_n} \tag{3.13}$$

where

$$\omega \ = \ 2\pi\, f$$

denotes the circular frequency in general, governing equation (3.11) can be conveniently rewritten as

$$\ddot{x}(t) + 2\xi\omega_n\dot{x}(t) + \omega_n^2 x(t) = \frac{p(t)}{m}. \tag{3.14}$$

Mobility function for the SDOF system: as shown in [19], an application of the Fourier transform to (3.14) results in

$$\dot{X}(f)\left[i\omega + 2\xi\omega_n + \frac{\omega_n^2}{i\omega}\right] = \frac{P(f)}{m} \tag{3.15}$$

On the basis of (3.15), the mobility function for a SDOF system can be computed as

$$M(f) = \frac{\dot{X}(f)}{P(f)} = \frac{i\omega/k^{\mathrm{st}}}{(1-\beta^2) + 2i\xi\beta}, \qquad \beta = \frac{\omega}{\omega_n} = \frac{2\pi f}{\omega_n} \tag{3.16}$$

Fitting procedure: for fitting purposes, the mobility function in (3.16) can be decomposed into real and imaginary parts as

$$\mathrm{Re}\left[M(\omega)\right] = \frac{2\xi\beta\omega/k^{\mathrm{st}}}{\left(1-\beta^2\right)^2 + \left(2\xi\beta\right)^2} \tag{3.17}$$

and

$$\mathrm{Im}\left[M(\omega)\right] = \frac{(\omega\omega_n - \beta^3)/(k^{\mathrm{st}}\omega_n)}{\left(1-\beta^2\right)^2 + \left(2\xi\beta\right)^2} \tag{3.18}$$

An example of the fitted (real part of the) mobility function and the resulting value of the static PRIMA-soil stiffness k^{st} are shown in Fig. 3.3. The corresponding plot of the coherence function is shown in Fig. 3.4 which indicates the high quality of dynamic data in light of the fact that the coherence function is close to unity for most frequencies. In the fitting procedure, it is assumed that the mass of the SDOF system corresponds to that of the bottom PRIMA assembly i.e. $m = 10$ kg, so that the optimal fit between the PRIMA experiment and SDOF theory is achieved via non-linear optimization (implemented in MATLAB) in terms of k^{st} and c. With the k^{st} obtained in this way, the Young's modulus of the soil can be directly estimated from (3.1), i.e. as

$$E = \frac{4k^{\mathrm{st}}}{\pi d}\left(1-\nu^2\right) \tag{3.19}$$

where it is assumed that $I_s = 1$ as examined earlier.

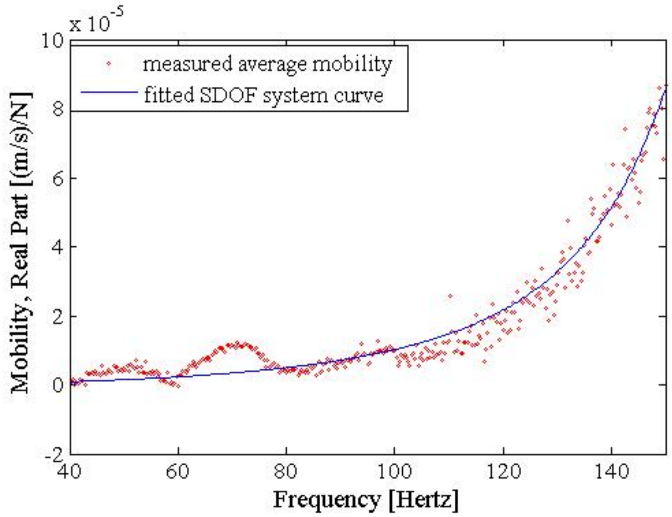


Figure 3.3: Fitted mobility function for C_9.5_103, $k^{\text{stat}} = 13.3$ MN/m

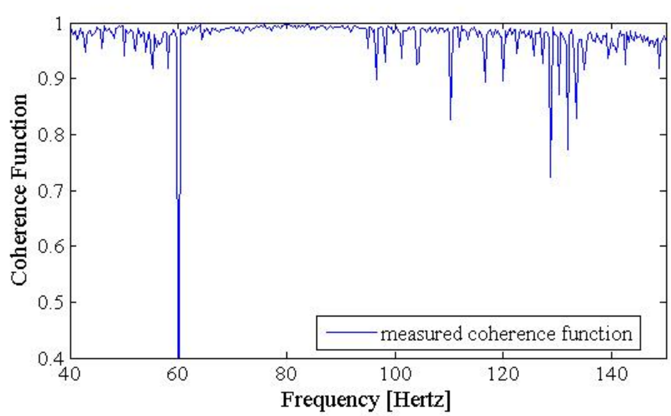


Figure 3.4: Coherence function for C_9.5_103

3.2 Portable Vibratory Deflectometer

Prior to using the portable vibratory deflectometer (PVD) on the soil specimen, a so-called "air test" is required to determine the apparent mass of the footing attached to the vibratory exciter. This mass, which includes that of the aluminum footing, accelerometers, and participating cables, is a prerequisite for fitting the theoretical PVD transfer function to the experimental data; a process that, similar to the SDOF fitting procedure described in Section 3.1.4, results in an estimate of the Young's modulus of the soil.

3.2.1 Accelerance Function

In the PVD test [18], a rigid plate resting on the surface of a flat, large volume of soil, approximating a semi-infinite solid, is subjected to random vertical vibration generated by an electromagnetic shaker (Fig. 3.5). The sensors attached to the loading plate monitor the applied vertical load (force) and the corresponding acceleration, both as a function of time. The signals from the sensors are sampled, digitized and converted to the frequency domain using the Discrete Fourier Transform described earlier. In this setting, a counterpart of the mobility function $M(f)$ (see Section 3.1.3) that is suitable for synthesizing the dynamic characteristics of the PVD-soil system (Fig. 3.5) is termed the *accelerance function* and defined as

$$A(f) = \frac{\ddot{X}(f)}{P(f)} \tag{3.20}$$

where $\ddot{X}(f)$ and $P(f)$ denote respectively the Fourier transforms of the *average* vertical acceleration of the loading plate and the applied vibratory force. Figure 3.6 shows an example of the experimental accelerance function, in terms of its real and imaginary parts, obtained from the PVD test.

A typical plot of $1/A^{\mathrm{air}}(f)$ obtained during PVD testing in air (no soil reaction), the

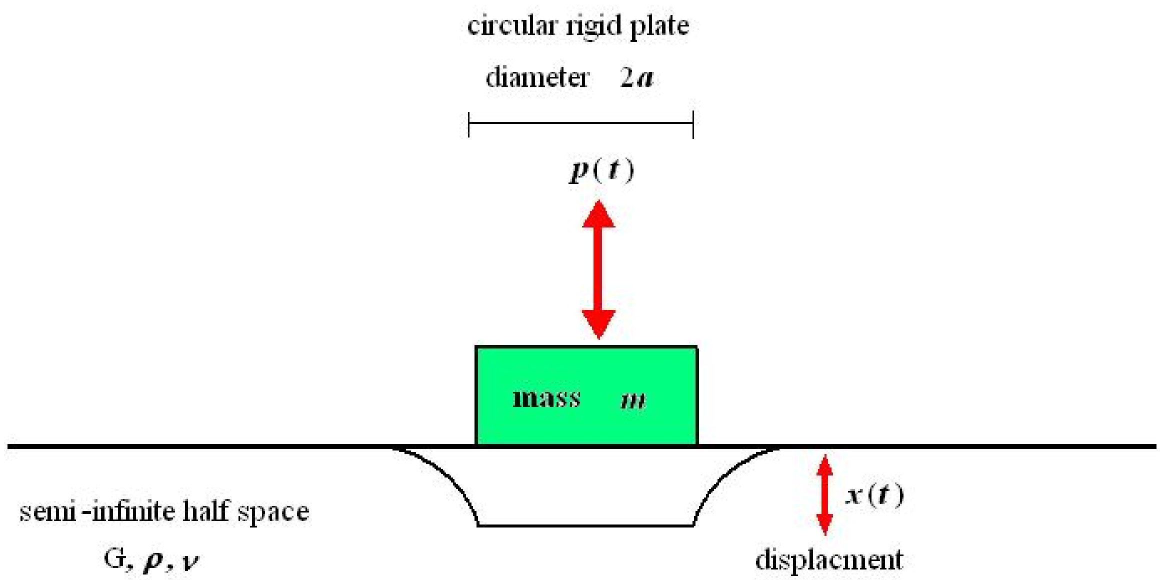


Figure 3.5: Schematics of the PVD test

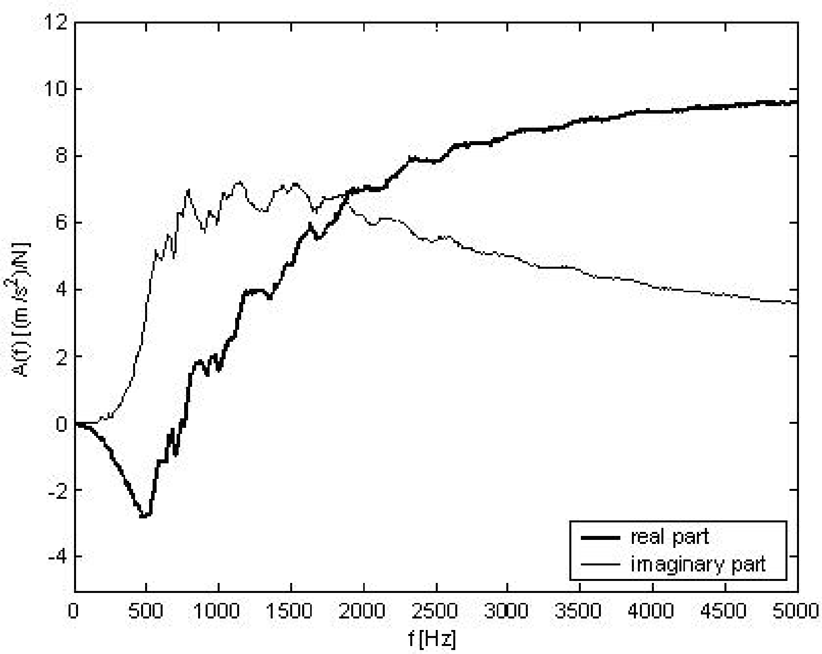


Figure 3.6: Experimental accelerance function $A(f)$ obtained from the PVD experiment

so-called air test, is shown in Fig. 3.7. One may note that, by virtue of the Newton's second law, quantity

$$\mathcal{M}(f) = \frac{1}{A^{\rm air}(f)} \tag{3.21}$$

signifies the apparent mass of the loading plate.

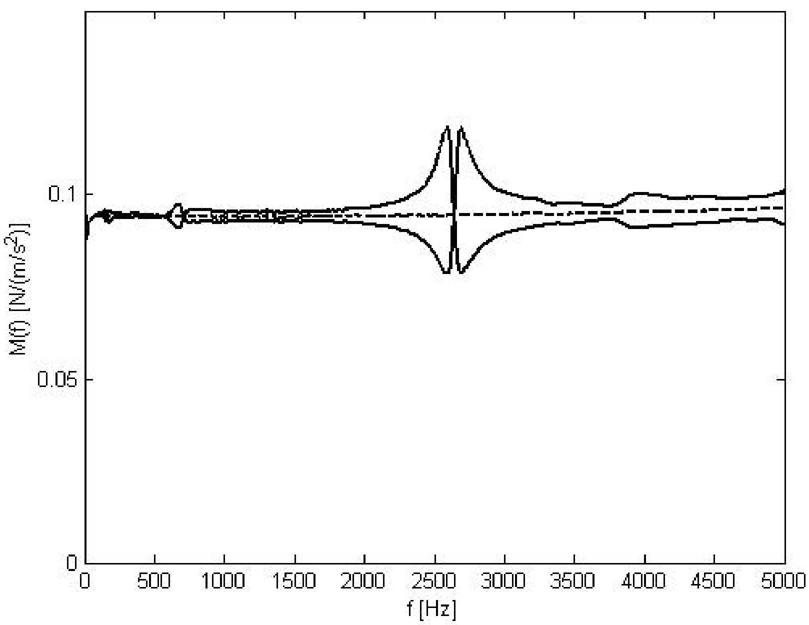


Figure 3.7: Inverse of the accelerance function, $1/A^{\rm air}(f)$: the air test

3.2.2 Interfacial Accelerance Function

With reference to (3.20), one may note that $\ddot{X}(f)$ denotes the acceleration at the loading *plate/soil interface* when the plate is in contact with the soil, while $P(f)$ describes the frequency content of the dynamic load applied to *the top* of the loading plate. Accordingly, such acceleration-force relationship includes the inertial resistance (i.e. the mass) of the loading plate which must be eliminated before the soil's stiffness and thus modulus can be estimated from $A(f)$. To this end, it is useful to introduce the so-called *interfacial* accelerance function

$$A_{vv}(f) = \frac{\ddot{X}(f)}{\mathcal{P}(f)} \tag{3.22}$$

which describes the loading plate/soil response in an alternative fashion which takes into account the load applied at the loading plate/soil interface, $\mathcal{P}(f)$, rather than the load $P(f)$ applied to the top of the loading plate. In other words, in the interfacial accelerance function (Fig. 3.8), the effect of the inertia of the loading plate is removed from the experimental accelerance function (3.20) through

$$A_{vv}(f) = \left[\frac{1}{A(f)} - \mathcal{M}(f)\right]^{-1} \tag{3.23}$$

where $\mathcal{M}(f) = 1/A^{\text{air}}(f)$ denotes the apparent mass of the loading plate as described earlier.

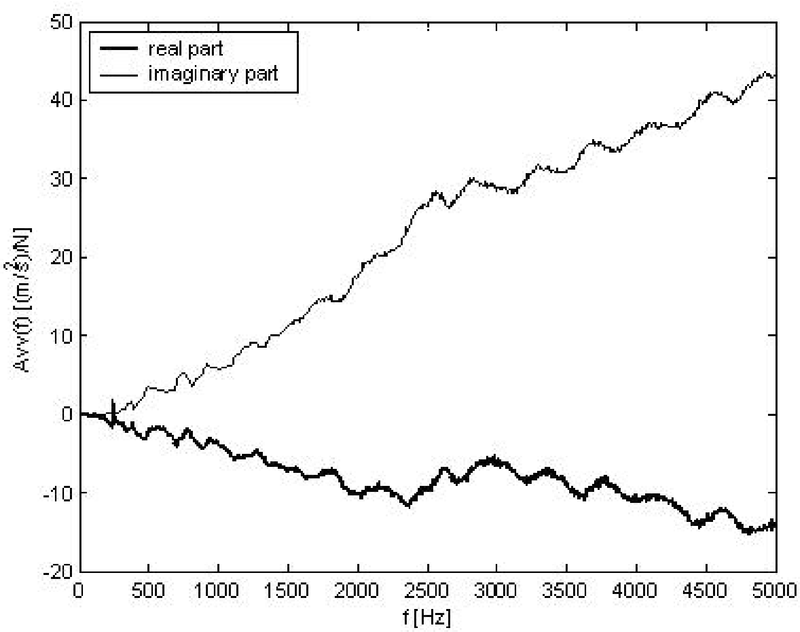


Figure 3.8: Interfacial accelerance function $A_{vv}(f)$ obtained from the PVD experiment

3.2.3 Interfacial Compliance Function

A transfer function that directly reflects the PVD-soil stiffness characteristics relates the vertical *displacement* (as opposed to acceleration) of the loading plate-soil interface to the applied force. This quantity, defined as

$$C_{vv}(f) = \frac{X(f)}{F(f)} \tag{3.24}$$

is termed the *interfacial compliance* function. Employing the basic Fourier transform identities, it can be shown that $\ddot{X}(f) = -(2\pi f)^2 X(f)$ and thus

$$C_{vv}(f) = -\frac{1}{(2\pi f)^2} A_{vv}(f) = -\frac{1}{(2\pi f)^2} \left[\frac{1}{A(f)} - \mathcal{M}(f) \right]^{-1} \tag{3.25}$$

A typical interfacial compliance function obtained from the PVD experiment is shown in Fig. 3.9.

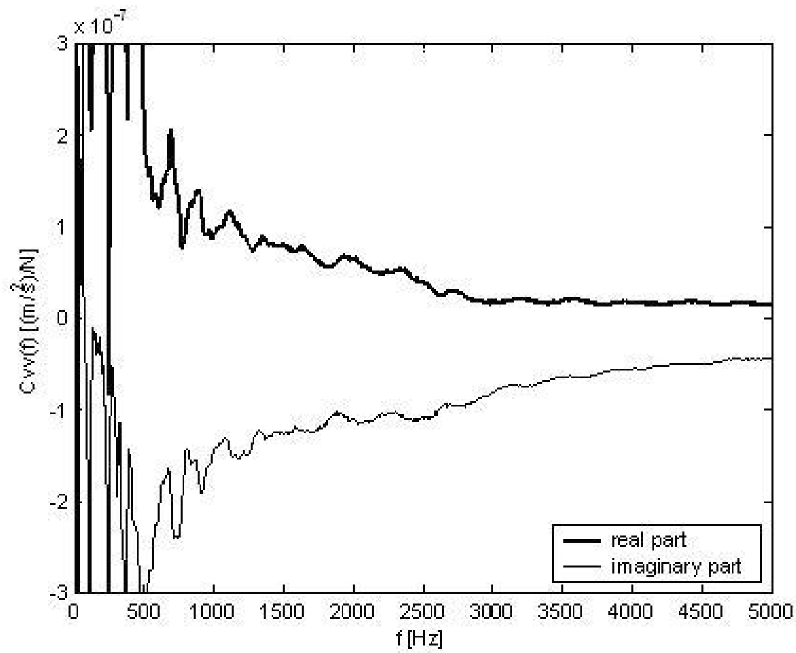


Figure 3.9: Interfacial compliance function $C_{vv}(f)$ obtained from the PVD experiment

3.2.4 Young's Modulus from PVD Test

A theoretical solution for the interfacial compliance function in the case of a rigid circular plate of diameter d in frictionless contact with the surface of a homogeneous elastic half space [26, 27, 31, 32] can be conveniently written as

$$C_{vv}(f) = C_{vv}(0)\,\bar{C}_{vv}(\bar{\omega}), \qquad \bar{\omega} = \pi d f \sqrt{\frac{\rho}{G}}, \tag{3.26}$$

Here $\bar{\omega}$ denotes the dimensionless circular frequency; G is the shear modulus; ρ is the mass density of the half-space;

$$C_{vv}(0) = \frac{1-\nu}{2Gd} \tag{3.27}$$

denotes the static value of the interfacial compliance, and $\bar{C}_{vv}(\bar{\omega})$ is tabulated e.g. in [32]. As an example, variation of $\bar{C}_{vv}$ with $\bar{\omega}$ assuming $\nu = 0.25$ is plotted in Fig. 3.10. It is well known from numerical simulations and tabulated values that $\bar{C}_{vv}(\bar{\omega})$ is relatively insensitive to the Poisson's ratio in the range $0 \leq \nu \leq 0.4$ [37]. As a result, the theoretical values of $\bar{C}_{vv}$ from Fig. 3.10 can be taken as representative for all soils considered in this study. On the basis of this result, formulas (3.25)–(3.27), and the tabulated values of $\bar{C}_{vv}(\bar{\omega})$, a minimization procedure is implemented in MATLAB wherein the theoretical (interfacial) accelerance function A_{vv} stemming from (3.25) and (3.26) is fitted to its experimental counterpart (3.22) by iteratively adjusting the soil's shear modulus G. Upon convergence, such fitting process produces an "optimal" shear modulus, $G^{\rm opt}$, that minimizes the misfit between the experimental (interfacial) accelerance function and its theoretical counterpart. With this result, the Young's modulus from the PVD test can be calculated (assuming $\nu = 0.4$ for the Poisson's ratio) as

$$E = 2G^{\rm opt}(1+\nu) = 2.8\,G^{\rm opt} \tag{3.28}$$

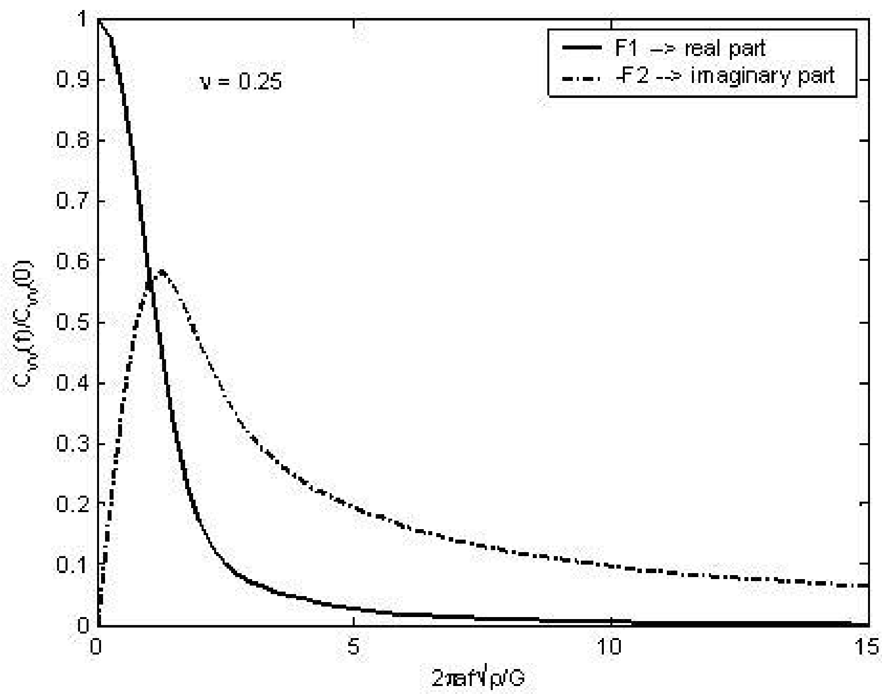


Figure 3.10: Theoretical variation of $\bar{C}_{vv}(\bar{\omega})$

As an illustration of the quality of the fitting procedure, Fig. 3.11 compares the experimental accelerance function, $A(f)$, with the theoretical result computed from (3.25) and (3.26) with $G = G^{\mathrm{opt}}$.

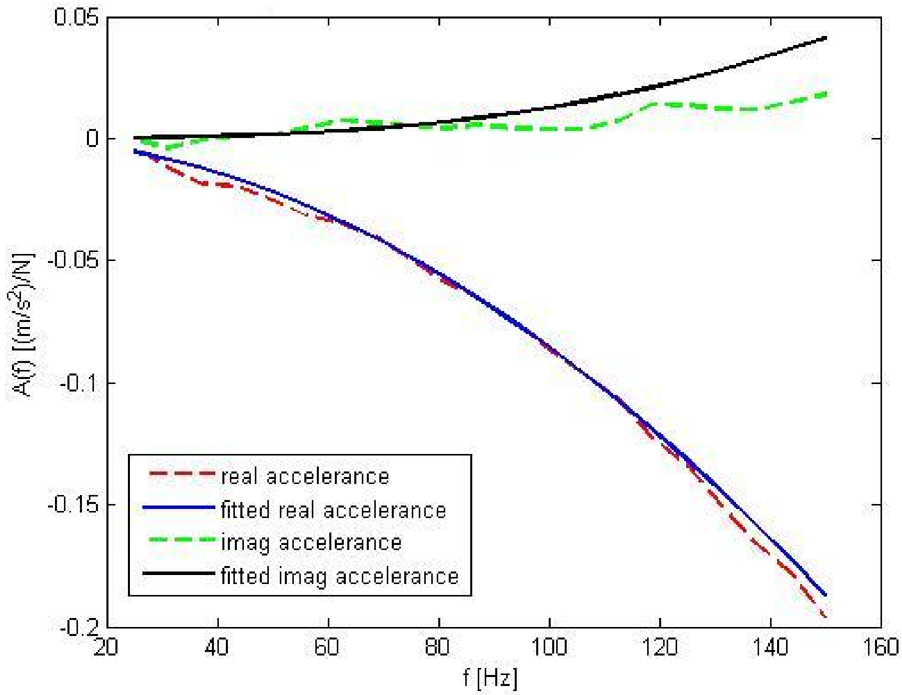


Figure 3.11: Experimental accelerance function from the PVD test and its theoretical counterpart for $G = G^{\mathrm{opt}}$

Chapter 4

Laboratory Tests

4.1 Steel Container

When conducting field-type tests (e.g., GeoGauge, PRIMA 100, Modified LWD, Portable Vibratory Deflectometer, and Dynamic Cone Penetration) in a laboratory environment, the size of the soil sample should be as large as possible to simulate field (in-situ) conditions. On the other hand, the maximum dimensions of the soil sample that can be used in the laboratory are related to the preparation technique. In this project, the technique selected was quasi-static, kneading compaction of pulverized, dried, fine-grained soils mixed with appropriate amounts of water. The compaction was executed in an MTS 810 load frame, which allowed for accommodating a prismatic steel container with 12.7 mm (0.5 in.) thick walls, and inner dimensions of 584 mm x 584 mm x 381 mm (23 in. x 23 in. x 15 in.), Fig. 4.1. The soil sample compacted in the container was also sufficiently large to extract three cylindrical specimens: two for resilient modulus (M_r), bender element, and strength testing, and one for soil water retention curve (SWRC) and strength tests conducted at the University of Minnesota Dept. of Soil, Water, and Climate.

The selection of a prismatic container rather than cylindrical was motivated by undesirable reflection of waves induced by the GeoGauge and PVD devices. It is well known [25]

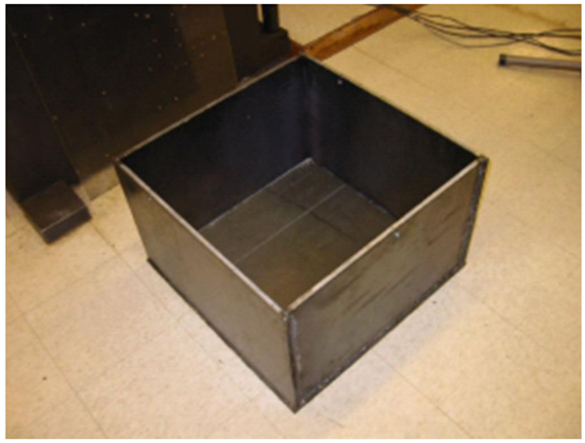


Figure 4.1: Prismatic steel container

that reflected waves in a cylindrical container tend to concentrate in the central region - the walls act as a focusing boundary - and this may affect measurements. In addition, PVD verification tests were conducted to justify that the dimensions of the steel container were sufficient to minimize the effect of wall reflection.

4.2 Verification Tests

One type of soil, Quikrete Sand No.1113 manufactured by the Quikrete Company (Atlanta, Georgia), was used in the verification tests. The results of Grain Size Analysis, ASTM D422 (Appendix A.1), are shown in Fig. 4.2 as the grain size distribution curve. Table 4.1 shows the corresponding gradation parameters; D_{50} is the mean diameter, C_u is the uniformity coefficient, and C_c is the coefficient of gradation. According to AASHTO Classification System, the tested soil is classified as A-1-b material. The maximum and minimum mass

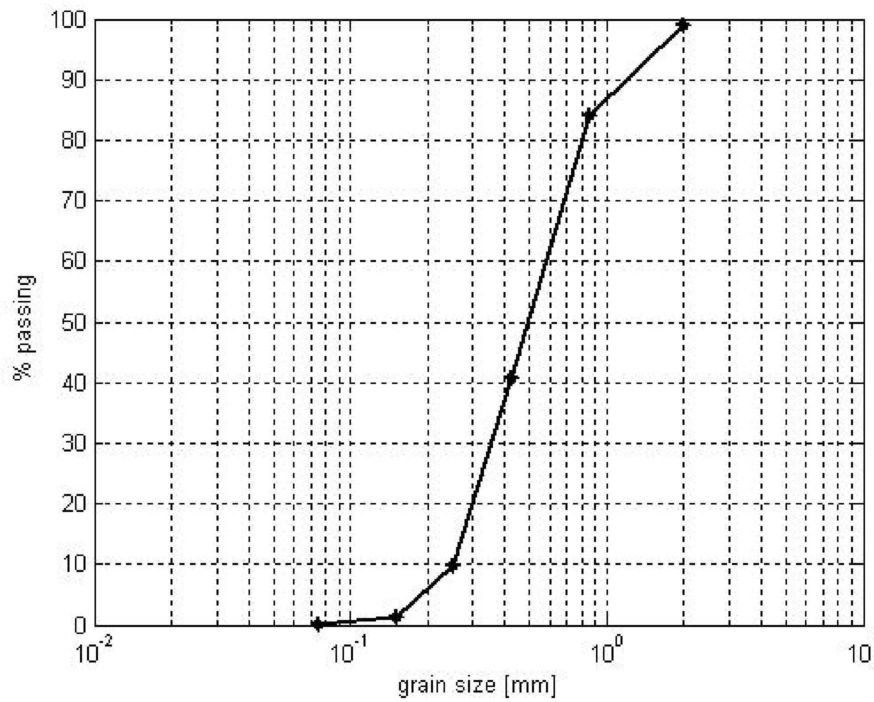


Figure 4.2: Grain size distribution of Quikrete Sand No.1113

Table 4.1: Gradation parameters of tested soils

Parameters	D_{50} [mm]	C_u [-]	C_C [-]	$\gamma_{min(d)}$ [kN/m^3] [pcf]	$\gamma_{max(d)}$ [kN/m^3] [pcf]	ρ_{min} [kg/m^3]	ρ_{max} [kg/m^3]
Quikrete Sand No. 1113	0.5	2.14	0.88	15.1 100	17.8 112	1622	1816

densities and dry unit weights of the Quikrete Sand No.1113 were determined from tests following ASTM Test Designation D 4253-00 and D 4254-00 (Appendix A.1). The resulting mean densities and unit weights are shown in Table 4.1.

The verification tests on Quikrete Sand No.1113 were conducted in two prismatic containers made of 25.4 mm (1 in.) thick plywood with outer reinforcement: a) small, and b) large (Fig. 4.3 and Table 4.2). The containers were filled with Quikrete Sand No.1113

a) b)

Figure 4.3: Prismatic plywood containers a) small, and b) large

Table 4.2: Inner dimensions for sand containers

Container	Width [m] [in.]	Length [m] [in.]	Depth [m] [in.]
Small	0.34 13.4	0.42 16.5	0.3 11.8
Large	1.22 48.0	1.52 59.8	0.51 20.1

to predetermined heights by air-pluviation. This technique ensured uniform relative density $D_r \approx 90\%$. The raining device consisted of a plastic bucket with a flexible hose of inner diameter d = 26 mm (1.02 in.) attached to the bottom of the bucket (Fig. 4.4). The lower opening of the hose was controlled by a washer whose size was selected from trial tests (Appendix A.2). The opening diameter of 6.3 mm (0.25 in.) and the raining height 787 mm

(31 in.) were selected. The pluviation height was adjusted after filling each 51 mm (2 in.) layer. During the pluviation, the lower end of the flexible hose was moved to obtain a flat, uniform layer. Eight hours were required to fill the small container up to 262 mm (10.3 in.) height and significantly more for the large container. During this operation, the total weight of material placed was carefully tracked. The resultant density of the sand was calculated from known weight and volume of the sand. The PVD tests were performed by placing the

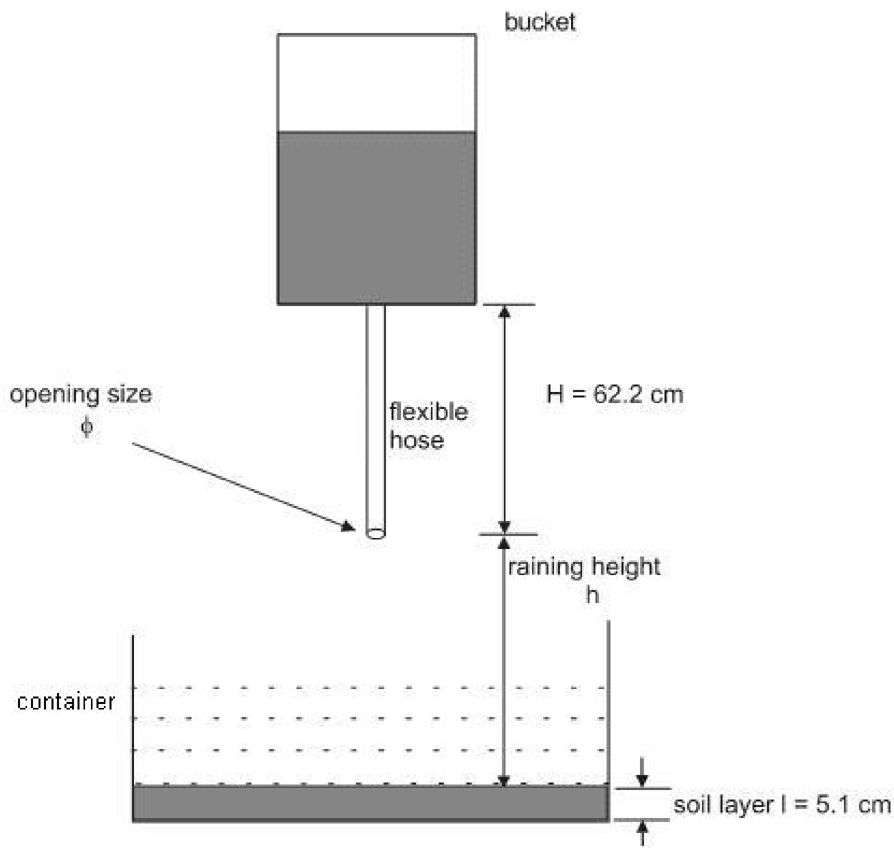


Figure 4.4: Pluviation setup

circular loading plate of the device directly on the sand surface. The sensors attached to the loading plate measured the force and acceleration in the time domain. With reference to Eqn. 3.10, the vertical dynamic force applied to the loading plate was taken as the input to the system, whereas the vertical acceleration and resulting force at the soil foundation interface was taken as an output.

To investigate the effect of contact pressure q, the static pre-load exerted by the moving armature of the device was varied. As the armature is connected to the body of the device by a set of internal flexures, the magnitude of the downward force on the sand was adjusted by changing the distance between the device's body and the sand. The magnitude of the average static pressure was determined at the end of each test from the load cell readings while lifting up (unloading) the device from the sand surface. To assess the influence of the walls, the location of the device was varied, Fig. 4.5. The experimental data were fitted to

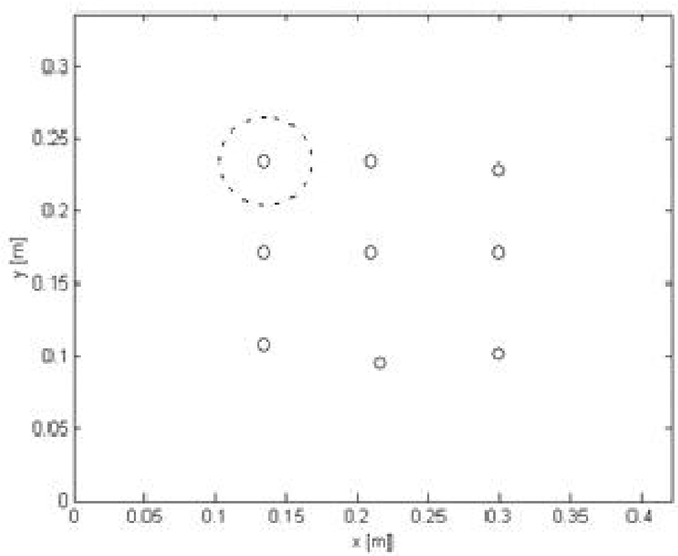


Figure 4.5: Location of the center of the loading plate in the small container

the theoretical solution (Eqn. 3.26) following the methodology described in Section 3.2. In the computations, the Poisson's ratio $v = 0.25$ was selected [36]. The resulting values of the shear modulus G for an equivalent linear elastic material are shown in Fig. 4.6 as a function of contact pressure q (Appendix A.3). It is noted that the computed values of the equivalent shear modulus G were practically independent of the location of the loading plate on the surface of the sand in the container. This implies insignificant influence of the boundaries of the containers on the values of G. The results shown in Fig. 4.6 can be approximated by

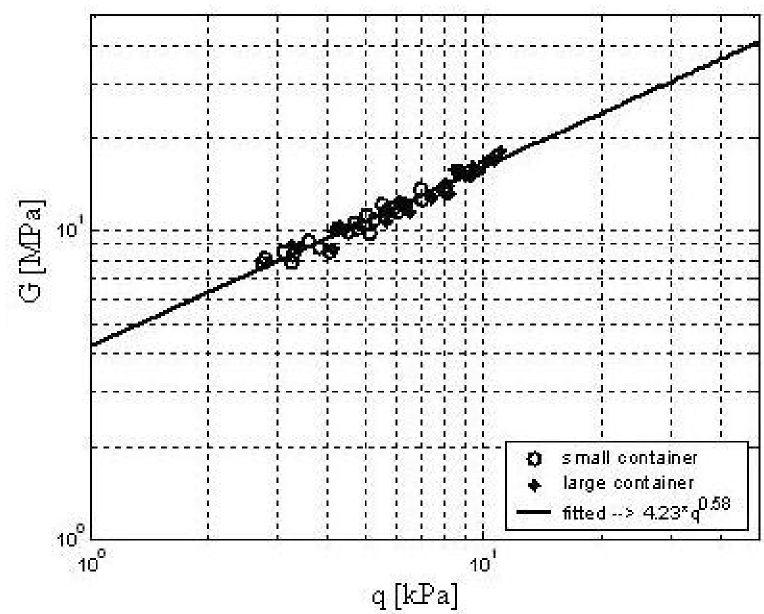


Figure 4.6: Equivalent shear modulus vs. average contact pressure

the expression

$$G = G_0 \frac{q}{q'}^{0.58} \tag{4.1}$$

where q is in kPa, $q' = 1$ kPa is the reference pressure, and $G_o = 4.23$ MPa. In the tests conducted on Silica Sand by Guzina [18], a similar relationship between the equivalent shear modulus and average contact pressure with $n = 0.5$ was obtained. As shown in Fig. 4.7, the difference in data fit for Quikrete Sand assuming n = 0.58 and n = 0.5 is small.

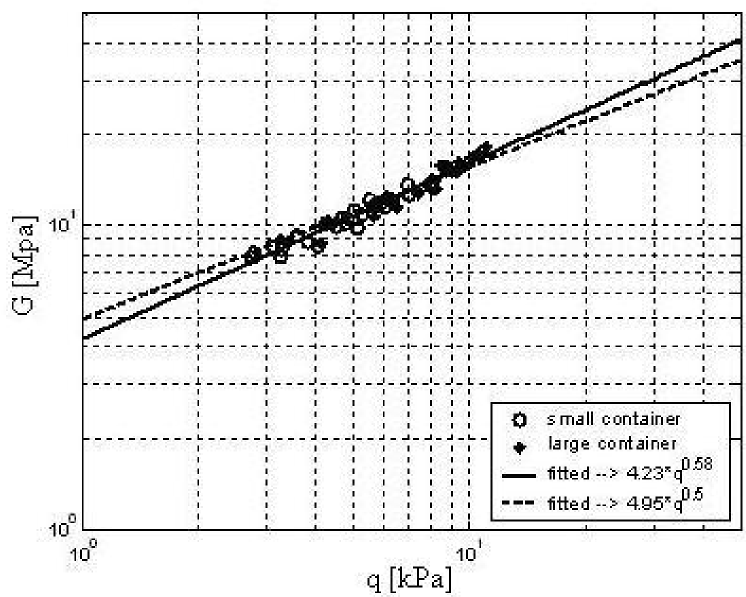


Figure 4.7: Equivalent shear modulus vs. average contact pressure

4.3 Fine-Grained Soils

4.3.1 Soil Description

Four fine-grained soils were supplied by the Minnesota Department of Transportation (Mn/DOT). These soils were selected to represent the range of fine-grained soils that would be classified as "fine-grained subgrade soils." The soils were given names for ease of use: A, B, C and D. Mn/DOT had performed gradations and standard Proctor compaction tests for these samples; the data are included in Appendix B. Descriptions of each soil and their target unit weight and moisture contents are shown in Table 4.3. Fig. 4.8 illustrates the target unit weight relations to the maximum dry unit weight.

Table 4.3: Soil descriptions

Name	Mn Road	Duluth	Red Wing	Red Lake Falls
	Soil A	Soil B	Soil C	Soil D
Average Std. Proctor Dry Unit Weight	106 lb/ft^3	90 lb/ft^3	112 lb/ft^3	103 lb/ft^3
Average Opt. Moisture Content	15%	27%	13%	18%
Average Liquid Limit (%)	28.2	84.6	N/A	38.1
Average Plastic Limit (%)	16.9	32.7	N/A	21.4
Average % Silt	45.7	19.0	81.4	65.4
Average % Clay	13.5	77.0	5.2	25.8
Average R-Value	16.5	10.9	53.8	21.3
Mn/DOT Textural Class.	L	C	Si	SiCL
AASHTO Group	A-4, A-6	A-7-6	A-4	A-4, A-7-6
98% Proctor Dry Unit Weight				
100% Opt. Moisture Content	15%	27%	13%	18%
80% Opt. Moisture Content	12%	22%	10%	14%
60% Opt. Moisture Content	9% *	16%	8%	11%
103% Proctor Dry Unit Weight				
90% Opt. Moisture Content	13.5%	24%	12%	16%
75% Opt. Moisture Content	11%	19.5%	9.5%	13%
60% Opt. Moisture Content	9%	16%	8%	11%

* Sample A, 7.5% target moisture content = 50%w_{opt}

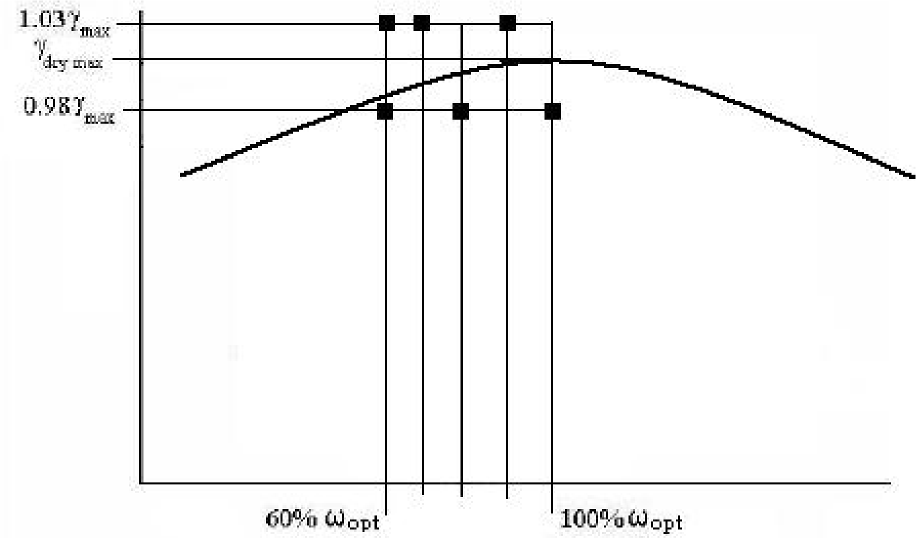


Figure 4.8: Schematic of moisture content and dry unit weight selection (Table 4.3)

4.3.2 Preparation of Soil Samples

The amount of soil required for preparing prismatic samples in the steel container was determined from the soil's dry unit weight and the moisture content necessary to achieve a target unit weight. Typically, 160 to 180 kg (350 to 400 lb) of soil was broken down in order to dry evenly in an oven for 24 hours. To prevent the soil from collecting excess moisture from the air, the dried soil was stored in sealed plastic buckets. The dry soils were crushed and pulverized. 3 kg (6.6 lb) of soil, and from 100 ml (3.4 oz) to 400 ml (13.6 oz) of water depending on the target moisture content, were mixed in a blender (Fig. 4.9). After the mixing process, the soil was stored in sealed plastic buckets. The buckets were placed in a humidity controlled room for at least 24 hours to temper. Moisture samples were taken at this time in random places within the buckets as shown in Fig. 4.10. After this period, adjustments to the moisture content were made if needed. Approximately 55 kg (120 lb) of tempered soil was placed in the steel container resting on the base of the MTS 810 load frame,

Figure 4.9: Mixing blender

Figure 4.10: Soil canister with approximately 90 kg (200 lb) of soil D

with a sheepsfoot plate fixed to the crosshead (Fig. 4.11a). The sheepsfoot plate comprised of 41 protrusions with dimensions 38.1 x 50.8 x 50.8 mm (1.5 x 2 x 2 in.) corresponding to a 0.106m^2 (164$in.^2$) loading area, Fig. 4.11b. The soil was first slightly pre-compacted with

a) b)

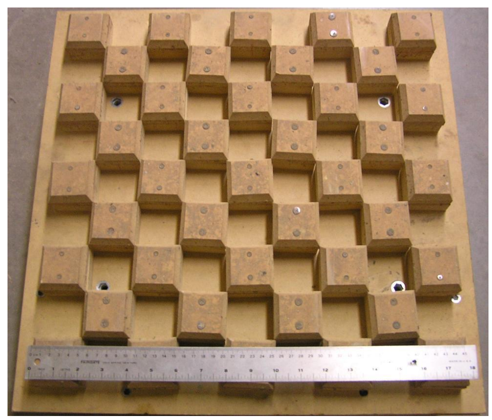


Figure 4.11: a) MTS load frame b) sheepsfoot plate

a hand-held mass to obtain a flat surface. Next, the steel container was elevated against the sheepsfoot plate to compact the soil to a known height in order to achieve a predetermined unit weight as specified in Table 4.3.1 and Fig. 4.12. This process was repeated four times per lift with a repositioned sheepsfoot plate to compact the entire surface of the soil (Fig. 4.13).

Two more soil lifts were placed and compacted in the steel container to obtain a desired final thickness of the soil. Between each lift, the surface of the soil was scarified to assure adequate bonding between each lift. After the final soil lift had been compacted, hand tools were used to shave and flatten the surface to ensure proper surface for testing with the portable field devices. For each of the four soils tested, six samples were compacted

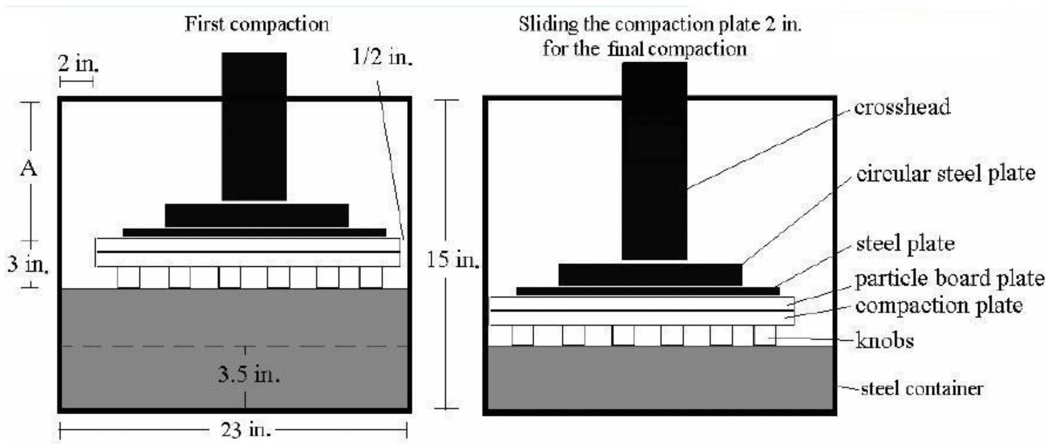


Figure 4.12: Compaction process

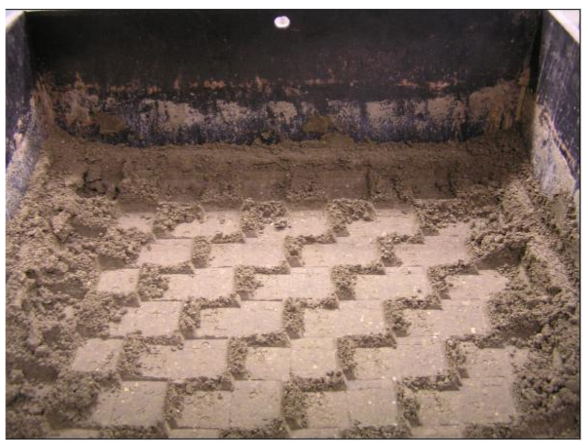


Figure 4.13: Soil D surface after four presses

and used for testing (Table 4.4). The additional samples for soils A and B were used as trial samples and discarded before testing. The detailed procedure for fine-grained sample preparation in the steel container is included in Appendix C.

a) b)

Figure 4.14: a) & b) Soil D prepared surfaces

Table 4.4: Number of compacted soil samples in steel container

Soil	Compacted Samples
A	7
B	7
C	6
D	6

4.4 Tests in Steel Container

Seven different field-type tests were conducted on the compacted fine-grained soils in the steel container. The field-type devices were described in Chapter 2 and detailed procedures regarding their operation can be found in Appendix E. The tests were performed in the following order: Percometer, GeoGauge, Portable Vibratory Deflectometer, modified LWD, GeoGauge with a layer of wet sand (for soil D), Standard LWD, and Dynamic Cone Penetrometer. The tests were run in the specified locations, as shown in Fig. 4.15. Two testing locations were 127 mm (5 in.) from the sides and one testing location was centered in the steel container. However, the DCP is a destructive test and was conducted at the distance of 146 mm (5.7 in.) away from two corners of the steel container. Table 4.5 shows the matrix of tests conducted in the steel container. After the first Percometer test, the device was sent back to Mn/DOT for calibration and returned for testing soils B, C, and D. The PVD was under repair for soil A and one trial on soil C. The modified LWD was implemented midway through research due to limited resources, and the PRIMA 100 was returned to Mn/DOT before the last two steel containers were compacted. The GeoGauge was tested with sand for soil D after a meeting with Humboldt representatives on February 16, 2005.

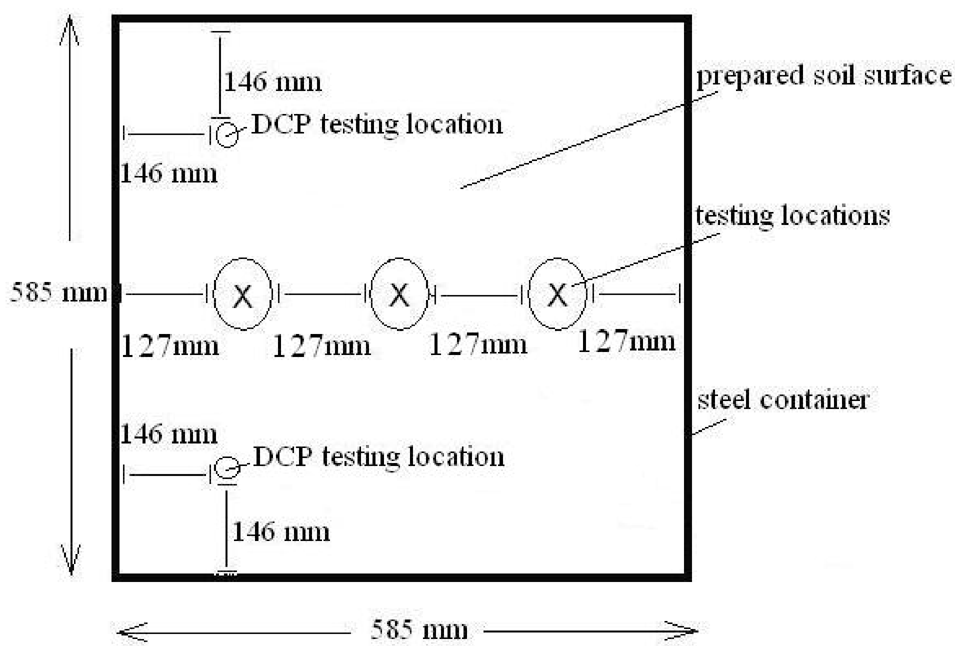


Figure 4.15: Testing locations

Table 4.5: Matrix of tests conducted in the steel container

Prismatic Sample	Perco-meter	Geo-Gauge	PVD	Mod. LWD	Geo-Gauge with sand	PRIMA 100	DCP
A_13.5_105	N/A	X	N/A	N/A	N/A	X	X
A_10.5_105	N/A	X	N/A	N/A	N/A	X	X
A_7.5_105	N/A	X	N/A	N/A	N/A	X	X
A_15_100	X	X	N/A	N/A	N/A	X	X
A_12_100	N/A	X	N/A	N/A	N/A	X	X
A_9_100	N/A	X	N/A	N/A	N/A	X	X
B_24_103	X	X	X	X	N/A	N/A	X
B_19.5_103	X	X	X	X	N/A	X	X
B_16_103	X	X	X	N/A	N/A	X	X
B_27_98	X	X	X	X	N/A	X	X
B_22_98	X	X	X	X	N/A	X	X
B_16_98	X	X	X	N/A	N/A	X	X
C_12_103	X	X	N/A	X	N/A	X	X
C_9.5_103	X	X	X	X	N/A	X	X
C_8_103	X	X	X	X	N/A	X	X
C_13_98	X	X	X	X	N/A	N/A	X
C_10_98	X	X	X	X	N/A	X	X
C_8_98	X	X	X	X	N/A	X	X
D_16_103	X	X	X	X	X	X	X
D_13_103	X	X	X	X	X	X	X
D_11_103	X	X	X	X	X	X	X
D_18_98	X	X	X	X	X	X	X
D_14_98	X	X	X	N/A	X	X	X
D_11_98	X	X	X	X	X	X	X

"X" indicates sample was tested

"N/A" indicates sample was not tested

4.5 Tests on Cylindrical Specimens

4.5.1 Extraction and Storage of Cylindrical Specimens

Cylindrical thin wall specimens for resilient modulus, bender element, and strength testing were collected the steel container immediately after completion of the field-type testing [1]. These locations are shown in Fig. 4.16. This was done by first replacing the sheepsfoot plate

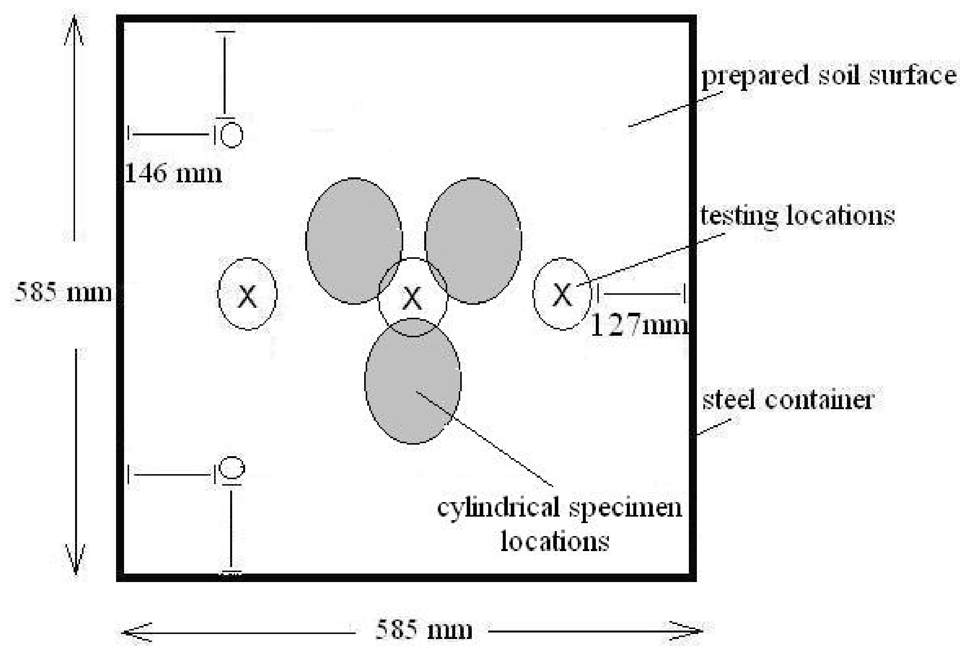


Figure 4.16: Cylindrical specimen locations within soil container

in the 810 MTS load frame by three 101.6 mm (4 in.) in diameter, 3.2 mm (0.13 in.) in thickness, and 381 mm (15 in.) in length stainless steel tubes attached to the crosshead. Next, the steel container was raised against the thin-walled tubes arranged in a triangle at a constant rate of 1 mm/s (0.04 in./s), Fig. 4.17a. After the steel tubes were pushed into the soil, they were detached from the cross-head, and the steel container with the compacted soil was placed on the floor. The three tubes were then extracted by excavation (Fig. 4.17b).

After the steel tubes were extracted, four moisture content specimens of approximately 80 g each were taken from the excavated soil. Cylindrical soil specimens were extracted from

a) b)

Figure 4.17: a) Stainless tubes and b) specimen extraction

the stainless steel tubes with a fabricated extruder (Fig. 4.18). The extruder consisted of two hydraulic actuators connected to a hydraulic piston. The hydraulic piston was mounted vertically to prevent lateral stressing of the specimen induced by gravity after Soil A sample completion. The stainless tube was connected to a collar on the hydraulic piston, and the soil was pushed out by pumping the hydraulic actuator by hand. To prevent moisture loss, the soil specimens were immediately covered with plastic wrap and placed inside sealed plastic containers. The plastic containers with soil specimens were placed in a humidity-controlled room until they were laboratory tested. A detailed procedure for extraction and storage of cylindrical specimens is given in Appendix F.

The soil was compacted into the steel container and tested with field devices on a prepared surface the same day. Immediately afterwards, the cylindrical specimens were extracted from the container for laboratory testing. Table 4.6 shows the date the soil was compacted into the steel container, field-type device tested, and laboratory tested. This may have effected

Figure 4.18: Soil extruder

the results, and the aging effects need investigation.

4.5.2 Specimen Preparation for Testing

Upon opening the sealed containers stored in the humidity-controlled room, the cylindrical specimens were carefully removed and plastic wrap discarded. Next, each specimen was trimmed with a carbide blade to a length of approximately 203 mm (8 in.). After trimming, a carpenter's square was used to check if the cylindrical soil specimen needed to be trimmed again. Next, the length and mass of the specimen was recorded. The trimmed specimens were placed in between the two aluminum platens seen in Fig. 4.19. These two platens housed the bender elements (Section 2.1.2). The thin metal shims of the bender elements could not be pushed into the soil specimens A and D with lower moisture contents, so the soil was notched out of the trimmed ends. The notches were just large enough for a tight fit to allow bender elements to excite the specimen. If the notch size was larger than the bender element shim, petroleum jelly was used to fill the notch to create a coupling between the soil specimen and the bender element shim. After the soil specimen was placed on the lower platen, two rubber membranes were slipped over the top to encase the specimen, and

Table 4.6: Dates soil was compacted in the steel container, field-type device tested, and laboratory tested

Spec Name	Date Sample Created	Date Sample Tested	Specimen Testing Date
A_1_13.5_105	6/21/2004	6/21/2004	7/8/2004
A_2_13.5_105	6/21/2004	6/21/2004	11/20/2004
A_1_10.5_105	7/12/2004	7/12/2004	11/21/2004
A_2_10.5_105	7/12/2004	7/12/2004	11/21/2004
A_1_7.5_105	7/28/2004	7/28/2004	11/28/2004
A_2_7.5_105	7/28/2004	7/28/2004	11/28/2004
A_3_15_100	6/1/2004	6/1/2004	11/20/2004
A_4_15_100	6/1/2004	6/1/2004	11/20/2004
A_1_12_100	6/25/2004	6/25/2004	11/21/2004
A_2_12_100	6/25/2004	6/25/2004	11/21/2004
A_1_9_100	7/20/2004	7/20/2004	11/22/2004
A_2_9_100	7/20/2004	7/20/2004	11/28/2004
B_1_24_103	1/27/2005	1/27/2005	10/11/2005
B_2_24_103	1/27/2005	1/27/2005	10/12/2005
B_1_19.5_103	4/11/2005	4/11/2005	10/12/2005
B_2_19.5_103	4/11/2005	4/11/2005	10/12/2005
B_1_16_103	4/29/2005	4/29/2005	10/11/2005
B_2_16_103	4/29/2005	4/29/2005	10/11/2005
B_1_27_98	1/27/2005	1/27/2005	10/10/2005
B_2_27_98	1/27/2005	1/27/2005	10/10/2005
B_1_22_98	7/24/2005	7/24/2005	10/12/2005
B_2_22_98	7/24/2005	7/24/2005	10/12/2005
B_1_16_98	7/16/2005	7/16/2005	7/16/2005
B_2_16_98	7/16/2005	7/16/2005	7/16/2005
C_1_12_103	3/4/2005	3/4/2005	6/21/2005
C_2_12_103	3/4/2005	3/4/2005	6/22/2005
C_1_9.5_103	4/15/2005	4/15/2005	6/28/2005
C_2_9.5_103	4/15/2005	4/15/2005	6/28/2005
C_1_8_103	4/1/2005	4/1/2005	6/23/2005
C_2_8_103	4/1/2005	4/1/2005	6/28/2005
C_1_13_98	2/3/2005	2/3/2005	6/20/2005
C_2_13_98	2/3/2005	2/3/2005	6/20/2005
C_1_10_98	2/11/2005	2/11/2005	6/23/2005
C_2_10_98	2/11/2005	2/11/2005	6/23/2005
C_1_8_98	7/21/2005	7/21/2005	8/19/2005
C_2_8_98	7/21/2005	7/21/2005	8/23/2005
D_1_16_103	8/3/2005	8/3/2005	8/22/2005
D_2_16_103	8/3/2005	8/3/2005	8/22/2005
D_1_13_103	9/4/2005	9/4/2005	10/9/2005
D_2_13_103	9/1/2005	9/1/2005	10/9/2005
D_1_11_103	8/27/2005	8/27/2005	10/9/2005
D_2_11_103	8/27/2005	8/27/2005	10/9/2005
D_1_18_98	9/14/2005	9/14/2005	10/8/2005
D_2_18_98	9/14/2005	9/14/2005	10/8/2005
D_1_14_98	7/18/2005	7/18/2005	8/17/2005
D_2_14_98	7/18/2005	7/18/2005	8/17/2005
D_1_11_98	8/23/2005	8/23/2005	9/26/2005
D_2_11_98	8/25/2005	8/25/2005	9/28/2005

Figure 4.19: Lower platen housing bender element

the upper platen was placed. Two rubber 102 mm (4 in.) in diameter O-rings were placed over the membranes in machined grooves in each platen as shown in Fig. 4.20a.

The axial displacements of the cylindrical specimens were measured by means of Linear Variable Differential Transformers (LVDTs). Two sets of LVDTs were used: 1) long, 1.27 mm/volt (0.05 in./volt) in sensitivity, and 2) short, 0.6 mm/volt (0.025 in./volt) in sensitivity. Upon analyzing the results of tests on soil A with the long LVDTs, it became evident that in some tests the signal-to-noise level was large and the established test criterion for the signal-to-noise ratio (SNR) was not met. Therefore, more sensitive LVDTs were used in all tests on soils B, C, and D. Calibration information regarding the LVDTs is in Appendix D.1, and load cell calibration is in Appendix D.2. Parallel analysis and testing for soil A was not conducted due to load frame availability and time restrictions.

Three LVDTs were mounted in an aluminum collar-type fixture (Fig. 4.20b) placed over the rubber membranes. The LVDTs were positioned at equal distances around the specimen.

a) b)

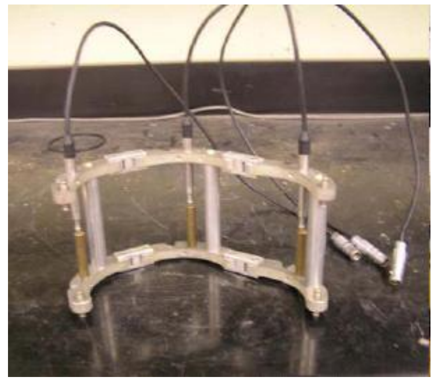


Figure 4.20: a) Encased soil specimen and b) LVDTs collar-type holder

The fixture was attached to the specimen by four 19 mm (0.75 in.) in diameter rubber O-rings. A second collar-type fixture with columns as contacts for the LVDT spring-loaded tips was placed 102 mm (4 in.) below the upper fixture. Spacers were used to hold both collars 102 mm (4 in.) apart while attaching to the specimen to maintain the gage length. The spacers were removed once the collars were in place, and this allowed the two collars to move independently of each other.

One 102 mm (4 in.) aluminum spacer was placed on the triaxial apparatus base. The specimen enclosed by two platens was placed on the aluminum spacer, and the LVDTs, load cell extension cable and bender element wiring were connected to their corresponding electrical feed-throughs in the triaxial apparatus base. The triaxial apparatus base was set on a steel plate at the base of an MTS 858 table top, servo-hydraulic load frame with an actuator mounted in the crosshead.

After placing the triaxial apparatus base in the load frame (Fig. 4.22), a ball bearing was placed on the top specimen platen, and a plexiglass confining chamber was slid over the specimen (Fig. 4.21). Next, the load cell was screwed into a piston passing through the upper platen of the triaxial apparatus, and its extension cable was connected to the load cell. The upper triaxial apparatus platen was attached to the three steel columns protruding from the base of the apparatus. Care was exercised to align the ball bearing with the load cell. The LVDTs wiring and bender element wiring were connected to their respective signal conditioners. A detailed procedure for specimen preparation for testing is given in Appendix G.

Figure 4.21: Specimen in triaxial chamber

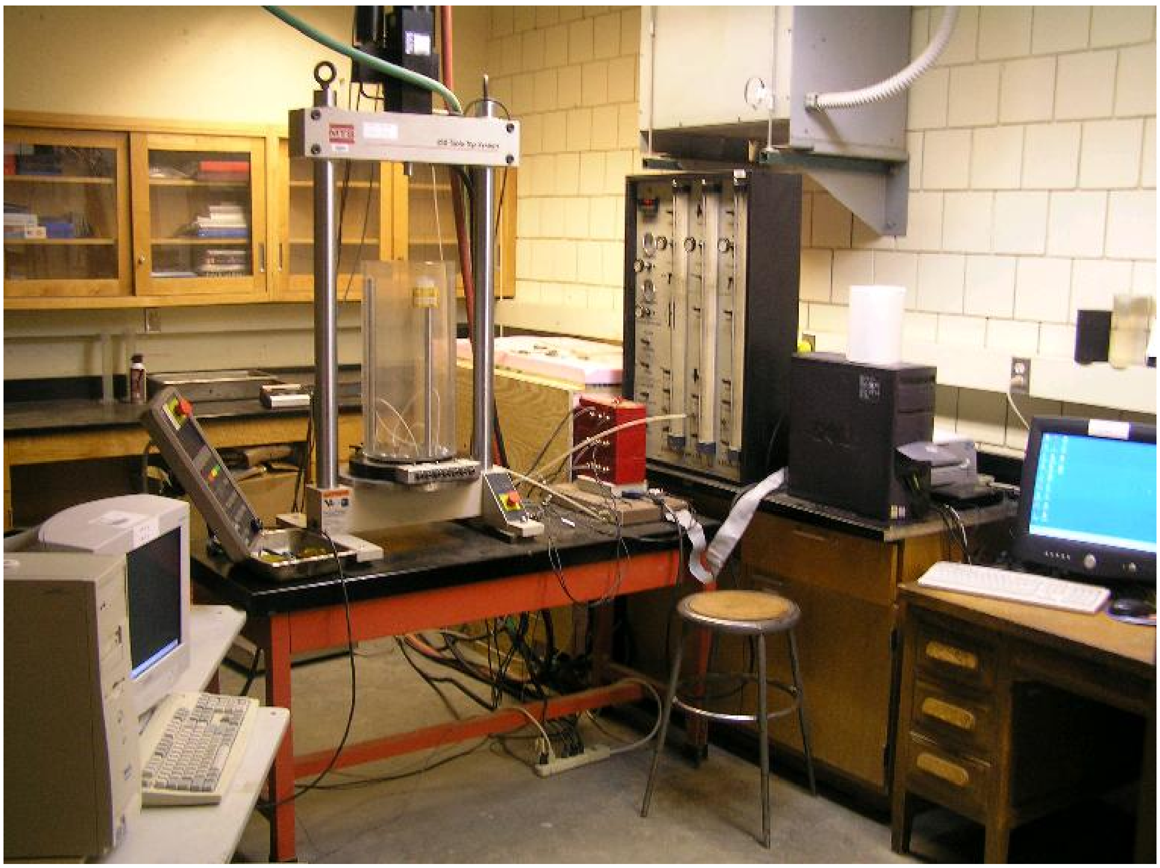


Figure 4.22: Resilient modulus, bender element, and triaxial testing lab

4.5.3 Resilient Modulus Testing

The resilient modulus tests were conducted according to the NCHRP 1-28A protocol. LabView software recorded axial load and three LVDT displacements at a rate of 430 points per second due to an increased buffer size (as opposed to 400 points per second recommended by Mn/DOT). The required sequence of deviatoric stresses and the number of cycles were programmed into the MTS TestWare software. The confining pressure was controlled manually with a Humboldt Flexpanel I pressure regulator (Fig. 4.23). The operation of the MTS

Figure 4.23: Humboldt Flexpanel I pressure regulator

858 load frame was controlled by the MTS TestStar hardware (console and computer) and powered by a hydraulic pump. Table 4.7 shows the sequence of confining pressure, contact stress, cyclic stress, maximum (total) stress and the number of cycles applied. Undesirable upper specimen platen rotation and the resulting non-symmetrical deformation of the specimen were assessed by stopping the conditioning sequence at 100 cycles and analyzing LVDT displacement histories. Figures 4.24 and 4.25 show the response of the specimen without and with upper platen rotation, respectively. In case of non-homogeneous deformation, the

Table 4.7: Resilient modulus test sequence [45]

Procedure II (Cohesive Subgrades)									
Sequence	Confining Pressure		Contact Stress		Cyclic Stress		Maximum Stress		Nrep
	kPa	psi	kPa	psi	kPa	psi	kPa	psi	
0	27.6	4.0	5.5	0.8	48.3	7.0	53.8	7.8	1000
1	55.2	8.0	11.0	1.6	27.6	4.0	38.6	5.6	100
2	41.4	6.0	8.3	1.2	27.6	4.0	35.9	5.2	100
3	27.6	4.0	5.5	0.8	27.6	4.0	33.1	4.8	100
4	13.8	2.0	2.8	0.4	27.6	4.0	30.4	4.4	100
5	55.2	8.0	11.0	1.6	48.3	7.0	59.3	8.6	100
6	41.4	6.0	8.3	1.2	48.3	7.0	56.6	8.2	100
7	27.6	4.0	5.5	0.8	48.3	7.0	53.8	7.8	100
8	13.8	2.0	2.8	0.4	48.3	7.0	51.1	7.4	100
9	55.2	8.0	11.0	1.6	69.0	10.0	80.0	11.6	100
10	41.4	6.0	8.3	1.2	69.0	10.0	77.3	11.2	100
11	27.6	4.0	5.5	0.8	69.0	10.0	74.5	10.8	100
12	13.8	2.0	2.8	0.4	69.0	10.0	71.8	10.4	100
13	55.2	8.0	11.0	1.6	96.6	14.0	107.6	15.6	100
14	41.4	6.0	8.3	1.2	96.6	14.0	104.9	15.2	100
15	27.6	4.0	5.5	0.8	96.6	14.0	102.1	14.8	100
16	13.8	2.0	2.8	0.4	96.6	14.0	99.4	14.4	100

upper plate of the triaxial apparatus was removed, the specimen platen was realigned, and the test resumed.

Filenames created in TestWare were named using the scheme {soil type}_{specimen number}_{% target moisture}_{% target Proctor}_{step number}. For example, A_1_15_100_7, where the letter defines the soil type, the first number is the specimen number, the second number is the target moisture content, the third number is the target percent Proctor unit weight of the specimen, and the last number refers to the step in the sequence. As seen in Table 4.8, there were 17 steps in total for a sequence and therefore 17 appropriately named file for each test. Table 4.8 depicts the matrix of the resilient modulus tests conducted. Specimens C_2_9.5_103 and C_1_98_98 had broken into two equal lengths during sampling and the two pieces were put back together and tested. Samples C_2_8_103 and C_2_10_98 also broke during sampling resulting in two different length specimens; the larger specimen was tested. A detailed procedure for resilient modulus testing is in Appendix G.

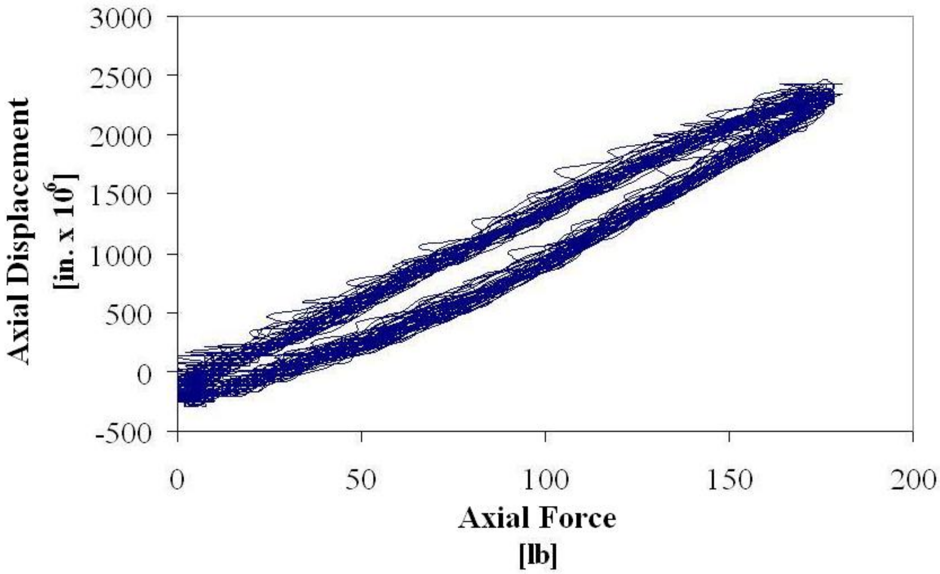


Figure 4.24: LVDT response without upper platen rotation

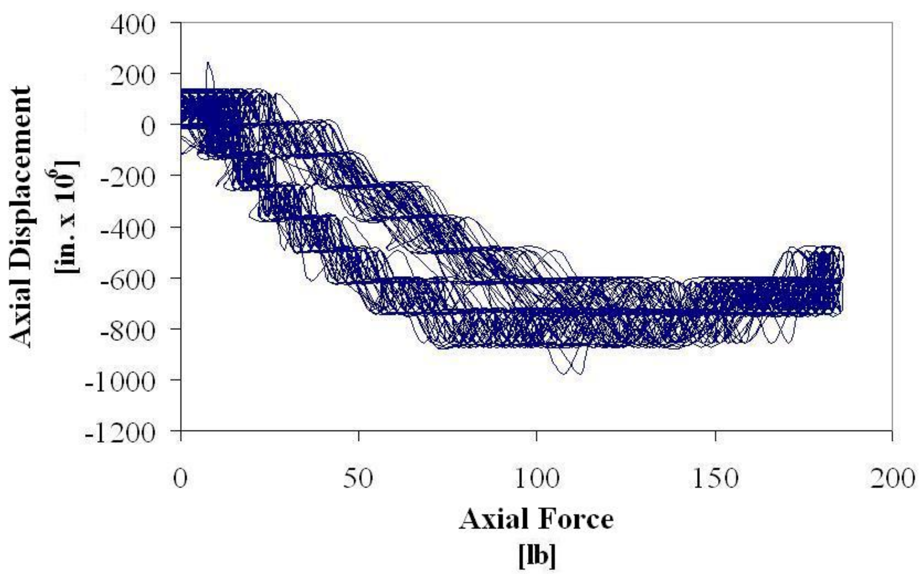


Figure 4.25: LVDT response with upper platen rotation

Table 4.8: Resilient modulus test matrix

Specimen Name	M_r Test
A_1_13.5_105	
A_2_13.5_105	X
A_1_10.5_105	X
A_2_10.5_105	X
A_1_7.5_105	X
A_2_7.5_105	X
A_3_15_100	X
A_4_15_100	X
A_1_12_100	X
A_2_12_100	X
A_1_9_100	X
A_2_9_100	X
B2_1_24_103	X
B2_2_24_103	X
B2_1_19.5_103	X
B2_2_19.5_103	X
B2_1_16_103	X
B2_2_16_103	X
B2_1_27_98	X
B2_2_27_98	X
B2_1_22_98	X
B2_2_22_98	X
B_1_16_98	X
B_2_16_98	X
C_1_12_103	X
C_2_12_103	X
C_1_9.5_103	X
C_2_9.5_103	X
C_1_8_103	X
C_2_8_103	X
C_1_13_98	X
C_2_13_98	X
C_1_10_98	X
C_2_10_98	X
C_1_8_98	X
C_2_8_98	X
D_1_16_103	X
D_2_16_103	X
D_1_13_103	X
D_2_13_103	X
D_1_11_103	X
D_2_11_103	X
D_1_18_98	X
D_2_18_98	X
D_1_14_98	X
D_2_14_98	X
D_1_11_98	X
D_2_11_98	X

"X" indicates specimen was tested

4.5.4 Bender Element Testing

After completion of the resilient modulus test, the actuator was raised approximately 25 mm (1 in.), and the hydraulic pump for the loading frame was turned off to eliminate interference with the bender element test. Table 4.9 refers to the information input into the GDS software prior to testing. The P-wave testing and the S-wave testing were performed

Table 4.9: GDS software input parameters

Specimen Length	[mm]
Sample Frequency	100000 sec^{-1}
Sampling Time	10 msec
Wave Form	Sinusiodal
Period	0.8 msec
Amplitude	14
Stacking	Automatic
Trigger Type	S/W
Tests per Stack	50
Delay Between Tests	0.1

separately. This required switching the cables connecting the bender elements to the signal generator/acquisition controller. Each test was conducted manually at adjusted confining pressure levels of 55.2, 41.4, 27.6 and 13.8 kPa (8, 6, 4 and 2 psi) with no vertical contact stress. The GDS software automatically generated filenames for each test. Table 4.10 shows the bender element test matrix. A detailed procedure for bender element testing is in Appendix H.

Table 4.10: Bender element test matrix

Specimen Name	P-wave [8 psi]	P-wave [6 psi]	P-wave [4 psi]	P-wave [2 psi]	S-wave [8 psi]	S-wave [6 psi]	S-wave [4 psi]	S-wave [2 psi]
A_1_13.5_105								
A_2_13.5_105	X	X	X	X	X	X	X	X
A_1_10.5_105	X	X	X	X	X	X	X	X
A_2_10.5_105	X	X	X	X	X	X	X	X
A_1_7.5_105	X	X	X	X	X	X	X	X
A_2_7.5_105	X	X	X	X	X	X	X	X
A_3_15_100								
A_4_15_100			X	X			X	X
A_1_12_100			X	X			X	X
A_2_12_100	X	X	X	X	X	X	X	X
A_1_9_100	X	X	X		X	X	X	X
A_2_9_100	X	X	X	X	X	X	X	X
B2_1_24_103	X	X	X	X	X	X	X	X
B2_2_24_103	X	X	X	X	X	X	X	X
B2_1_19.5_103	X	X	X	X	X	X	X	X
B2_2_19.5_103	X	X	X	X	X	X	X	X
B2_1_16_103	X	X	X	X	X	X	X	X
B2_2_16_103	X	X	X	X	X	X	X	X
B2_1_27_98	X	X	X	X	X	X	X	X
B2_2_27_98	X	X	X	X	X	X	X	X
B2_1_22_98	X	X	X	X	X	X	X	X
B2_2_22_98	X	X	X	X	X	X	X	X
B_1_16_98	X	X	X	X	X	X	X	X
B_2_16_98	X	X	X	X	X	X	X	X
C_1_12_103	X	X	X	X	X	X	X	X
C_2_12_103	X	X	X	X	X	X	X	X
C_1_9.5_103								
C_2_9.5_103								
C_1_8_103	X	X	X	X	X	X	X	X
C_2_8_103								X
C_1_13_98	X	X	X	X	X	X	X	X
C_2_13_98								
C_1_10_98	X	X	X	X	X	X	X	X
C_2_10_98	X	X	X	X	X	X	X	X
C_1_8_98								
C_2_8_98	X	X	X	X	X	X	X	X
D_1_16_103	X	X	X	X	X	X	X	X
D_2_16_103	X	X	X	X	X	X	X	X
D_1_13_103	X	X	X	X	X	X	X	
D_2_13_103	X	X	X	X	X	X	X	X
D_1_11_103	X	X	X	X	X	X	X	X
D_2_11_103	X	X	X	X	X	X	X	X
D_1_18_98	X	X	X	X	X	X	X	X
D_2_18_98	X	X	X	X	X	X	X	
D_1_14_98	X	X	X	X	X	X	X	X
D_2_14_98	X	X	X	X	X	X	X	X
D_1_11_98	X	X	X	X	X	X	X	X
D_2_11_98	X	X	X	X	X	X	X	X

"X" indicates specimen was tested

4.5.5 Strength Testing

The triaxial compression tests to determine soil strength were performed after completion of the bender element tests. The confining pressure within the triaxial chamber was released, the apparatus upper platen and the chamber removed, and the collar-type fixtures holding the LVDTs were carefully detached from the specimen. Next, the triaxial apparatus was reassembled and placed in the MTS 858 load frame. Care was exercised in aligning the cylindrical specimen with the actuator.

Twelve cylindrical specimens were tested following the M_r and bender element procedures for each type of soil. However, the actual number of shear strength tests for soils A and B were eight and ten because some specimens fractured during removal of the LVDTs and were discarded. The specimens were tested with the stroke rate of 0.76 mm/sec (0.03 in./sec), and two confining pressures: 27.6 kPa (4 psi) and 55.2 kPa (8 psi) (Appendix I. One 80 g moisture content was sampled from the shear plane or specimen crush zone. Cylindrical specimens were named using the scheme {soil type}_{specimen number}_{% Target moisture}_{% target Proctor}_{confinement}. For example, A_1_15_100_shear8psi, where the letter defines the soil type, the first number is the specimen number, the second number is the target moisture content, the third number is the target percent Proctor unit weight of the specimen, and the phrase indicated a shear test performed at 4 or 8 psi. Table 4.11 shows the strength testing matrix. A detailed procedure for strength testing is in Appendix I.

Table 4.11: Shear strength test matrix [45]

Specimen Name	4 psi Confine-ment	8 psi Confine-ment
A_1_13.5_105		
A_2_13.5_105		X
A_1_10.5_105	X	
A_2_10.5_105		X
A_1_7.5_105		
A_2_7.5_105		
A_3_15_100	X	
A_4_15_100		X
A_1_12_100	X	
A_2_12_100		X
A_1_9_100	X	
A_2_9_100		
B2_1_24_103		X
B2_2_24_103		X
B2_1_19.5_103	X	
B2_2_19.5_103		X
B2_1_16_103		X
B2_2_16_103		
B2_1_27_98		X
B2_2_27_98	X	
B2_1_22_98		X
B2_2_22_98	X	
B_1_16_98		X
B_2_16_98		
C_1_12_103		X
C_2_12_103	X	
C_1_9.5_103		X
C_2_9.5_103	X	
C_1_8_103		X
C_2_8_103	X	
C_1_13_98		X
C_2_13_98	X	
C_1_10_98		X
C_2_10_98	X	
C_1_8_98		X
C_2_8_98	X	
D_1_16_103		X
D_2_16_103	X	
D_1_13_103		X
D_2_13_103	X	
D_1_11_103		X
D_2_11_103	X	
D_1_18_98		X
D_2_18_98	X	
D_1_14_98		X
D_2_14_98	X	
D_1_11_98		X
D_2_11_98	X	

"X" indicates specimen was tested

Chapter 5

Experimental Data and Comparison

In what follows, the data obtained from the laboratory and field-type testing programs are tabulated and discussed. The prismatic soil volumes compacted in a steel container are designated as *prismatic samples* while the elements extracted from the prismatic samples are called *cylindrical specimens*. Chapter 5 contains four major sections: 5.1 lists the compaction stresses applied to obtain the required density at the given moisture content; 5.2 describes the moisture and density characteristics of compacted soil volumes and extruded cylindrical specimens; 5.3 deals with the laboratory tests, while Section 5.4 highlights the results obtained from field-type testing.

5.1 Compaction Stresses

Prismatic samples were named using the scheme {soil type}_{% target moisture}_{% target Proctor}. For example, A_13.5_105 designates soil A with 13.5% target moisture content, and 105% target standard Proctor density.

Each prismatic sample was compacted in the steel container described in Section 4.3.2. The soil compaction load histories for each lift in the soil containers were recorded. Stresses were calculated from the maximum load divided by the nominal area of the compaction plate. Figures 5.1-5.4 show the maximum compaction stress applied to each lift of soil. The conditions are identified above each bar by the target Proctor percentage and target moisture content percentage. If a second or third lift compaction record appears to be missing in a bar (e.g. Fig. 5.2), then the maximum force of that lift was less than the previous lift. For completeness, a table of maximum compaction stresses is listed in Appendix M.

Figures 5.1-5.4 illustrate the significant compaction stresses needed to achieve the target densities above 100% Proctor. For example, the compaction stress for soil A almost doubled when compacting the soil at 9% target moisture and 100% target Proctor to 7.5% target moisture and 105% target Proctor.

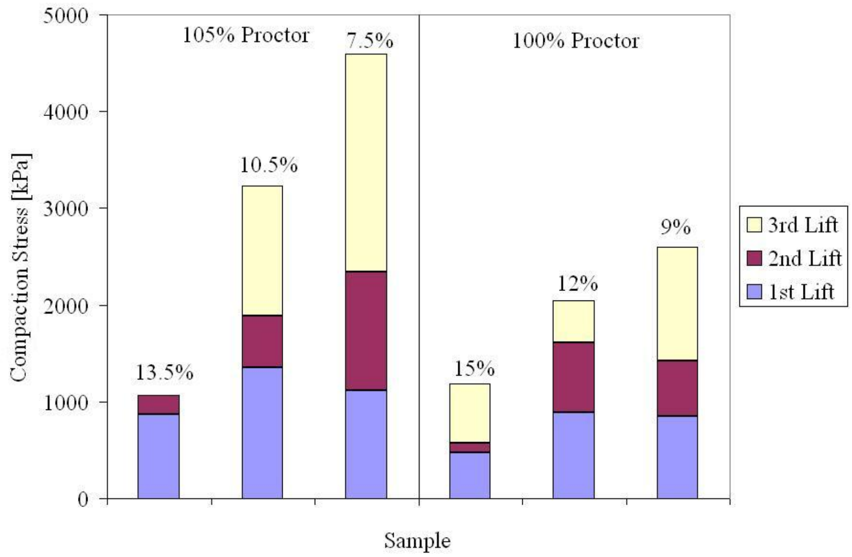


Figure 5.1: Maximum compaction stress applied to each lift for Soil A

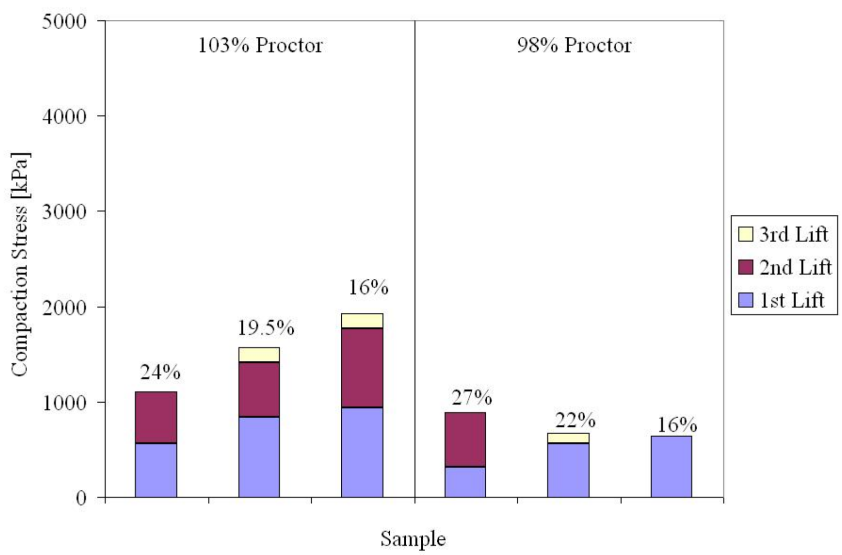


Figure 5.2: Maximum compaction stress applied to each lift for Soil B

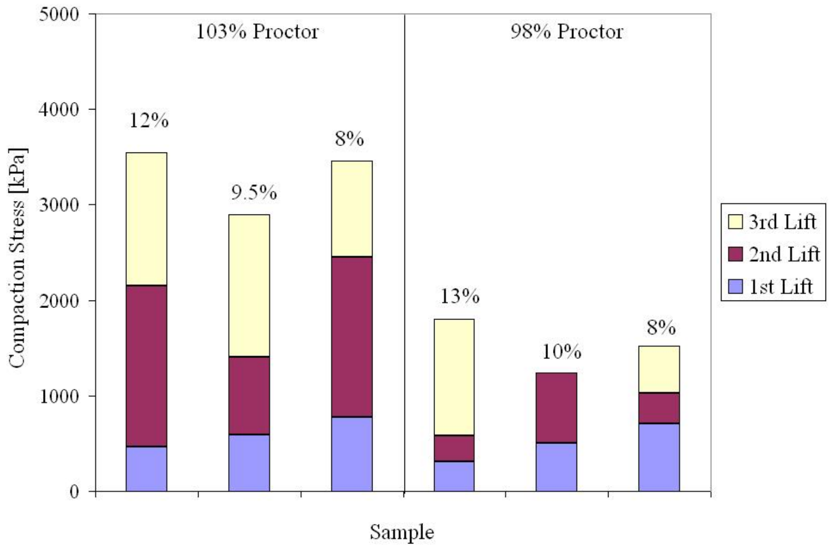


Figure 5.3: Maximum compaction stress applied to each lift for Soil C

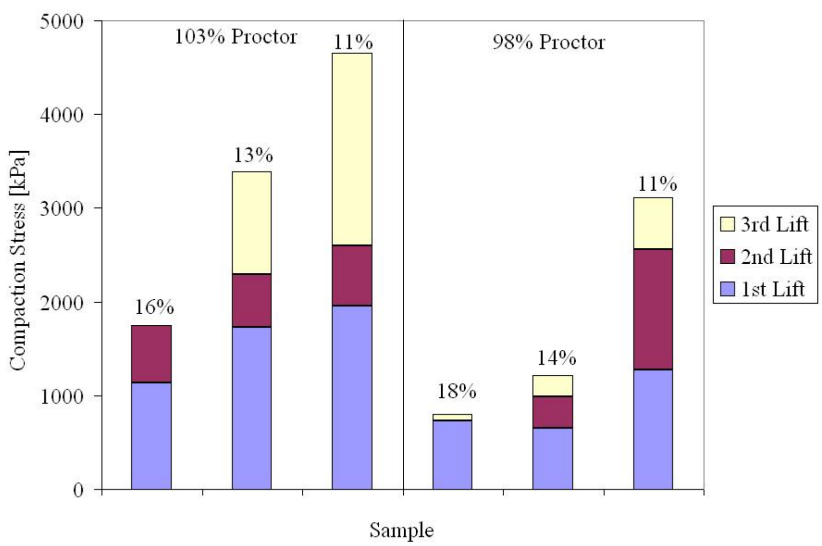


Figure 5.4: Maximum compaction stress applied to each lift for Soil D

5.2 Moisture Contents and Unit Weights

The following list summarizes the notation used in Tables 5.1-5.3.

$w^{\mathbf{box}}_{\mathbf{targ}} =$ target moisture content for prismatic (box) sample [%]

$w^{\mathbf{cyl}}_{\mathbf{targ}} =$ target moisture content for cylindrical specimen [%]

$w^{\mathbf{box}}_{\mathbf{act}} =$ average (actual) moisture content of the soil compacted into prismatic sample [%]

$w^{\mathbf{cyl}}_{\mathbf{act}} =$ average (actual) moisture content of the cylindrical specimen [%]

$\Delta w^{\mathbf{box}} = \frac{w^{\text{box}}_{\text{act}} - w^{\text{box}}_{\text{targ}}}{w^{\text{box}}_{\text{targ}}} \times 100 \;\; [\%]$

$\Delta w^{\mathbf{cyl}} = \frac{w^{\text{cyl}}_{\text{act}} - w^{\text{cyl}}_{\text{targ}}}{w^{\text{cyl}}_{\text{targ}}} \times 100 \;\; [\%]$

$\Delta w = \frac{w^{\text{cyl}}_{\text{act}} - w^{\text{box}}_{\text{act}}}{w^{\text{box}}_{\text{act}}} \times 100 \;\; [\%]$

$\pm w^{\mathbf{Cyl}}_{\mathbf{Box}} = w^{\text{Cyl}}_{\text{Act}} - w^{\text{Box}}_{\text{Act}}$

$\pm w_{\mathbf{box}} = w^{\text{box}}_{\text{targ}} - w^{\text{box}}_{\text{act}}$

$\pm w_{\mathbf{cyl}} = w^{\text{cyl}}_{\text{targ}} - w^{\text{cyl}}_{\text{act}}$

$\gamma^{\mathbf{box}}_{\mathbf{targ\text{-}d}} =$ target dry unit weight of the prismatic sample [pcf]

$\gamma^{\mathbf{cyl}}_{\mathbf{targ\text{-}d}} =$ target dry unit weight of the cylindrical specimen [pcf]

$\gamma^{\mathbf{box}}_{\mathbf{act\text{-}d}} =$ actual dry unit weight of the prismatic sample [pcf] computed by dividing its weight by (box volume $\times(1 + w^{\text{box}}_{\text{act}})$)

$\gamma^{\mathbf{cyl}}_{\mathbf{act\text{-}d}} =$ actual dry unit weight of the cylindrical specimen [pcf] computed by dividing its weight by (cylinder volume $\times(1 + w^{\text{cyl}}_{\text{act}})$)

$\rho^{\mathbf{box}}_{\mathbf{targ\text{-}d}} =$ target dry density of the prismatic sample [kg/m^3]

$\rho^{\mathbf{cyl}}_{\mathbf{targ\text{-}d}} =$ target dry density of the cylindrical specimen [kg/m^3]

$\rho^{\mathbf{box}}_{\mathbf{act\text{-}d}} =$ actual dry density of the prismatic sample [kg/m^3] computed by dividing its mass by (box volume $\times(1 + w^{\text{box}}_{\text{act}})$)

$\rho^{\mathbf{cyl}}_{\mathbf{act\text{-}d}} =$ actual dry density of the cylindrical specimen [kg/m^3] computed by dividing its mass by (cylinder volume $\times(1 + w^{\text{cyl}}_{\text{act}})$)

$\Delta\rho^{\mathbf{box}}_{\mathbf{d}} = \frac{\rho^{\text{box}}_{\text{act-d}} - \rho^{\text{box}}_{\text{targ-d}}}{\rho^{\text{box}}_{\text{act-d}}} \times 100 \;\; [\%]$

$\Delta\rho^{\mathbf{cyl}}_{\mathbf{d}} = \frac{\rho^{\text{cyl}}_{\text{act-d}} - \rho^{\text{cyl}}_{\text{targ-d}}}{\rho^{\text{cyl}}_{\text{act-d}}} \times 100 \;\; [\%]$

$\Delta\rho_{\mathbf{d}} = \frac{\rho^{\text{cyl}}_{\text{act-d}} - \rho^{\text{box}}_{\text{act-d}}}{\rho^{\text{box}}_{\text{act-d}}} \times 100 \;\; [\%]$

Std. Proctor $= \frac{\rho_{\text{act-d}}}{\rho_{\text{peak tar-d}}} \times 100 \;\; [\%]$

Cyl. Length= actual length of the cylindrical specimen

Cyl. Diameter= actual diameter of the cylindrical specimen.

Table 5.1 presents the moisture and density characteristics of the prismatic samples. As can be seen from the table, the maximum and minimum values of Δw^{box} are respectively 17.4% and -6.2%, with the mean of 1.4%. In this study, emphasis was placed on achieving maximum uniformity within the limits of the preparation procedure. For some samples, the water and soil did not mix thoroughly resulting in minor inhomogeneities within the sample. By nature, no mixing process can result in a perfectly homogenous sample. The maximum and minimum values of $\Delta\rho^{\text{box}}$ are respectively 1.3% and -9.0%, with the mean of -3.3%. During compaction, the edges of the soil surface had to be compacted by hand. For conditions when the soil was stiff, the edges could not be compacted with hand tools to the predetermined level. In addition, as the sheepsfoot form was pressed into the soil, the soil surface would rebound such that the soil lift was not compacted to the predetermined height. As a result, the prismatic samples were slightly under-compacted with respect to the target density as implied by the negative mean value of $\Delta\rho^{\text{box}}$. Furthermore, the displacement of the load point was not measured, so the stiffness of the soil could not be estimated from the compaction process.

Table 5.1: Target and actual characteristics of prismatic samples

Prismatic Sample	w_{targ} [%]	w_{act} [%]	$\pm w_{opt}$ [%]	Δw [%]	$\gamma_{targ\text{-}d}$ [pcf]	$\gamma_{act\text{-}d}$ [pcf]	$\rho_{targ\text{-}d}$ [kg/m^3]	$\rho_{act\text{-}d}$ [kg/m^3]	$\Delta\rho$ [%]	Std. Proctor [%]
A_13.5_105	13.5	14.1	0.9	4.3	111.3	109.4	1783	1752	-1.8	103.2
A_10.5_105	10.5	11.2	3.8	6.2	111.3	104.7	1783	1678	-6.3	98.8
A_7.5_105	7.5	7.7	7.4	2.0	111.3	104.2	1783	1670	-6.8	98.3
A_15_100	15.0	15.6	-0.6	3.8	106	103.6	1698	1659	-2.4	97.7
A_12_100	12.0	11.5	3.5	-4.3	106	105.2	1698	1685	-0.8	99.2
A_9_100	9.0	10.9	4.1	17.4	106	99.1	1698	1587	-7.0	93.5
B_24_103	24.0	23.6	3.4	-1.7	92.7	92.5	1485	1481	-0.3	102.7
B_19.5_103	19.5	19.2	7.8	-1.6	92.7	90.2	1485	1444	-2.8	100.2
B_16_103	16.0	17.4	9.6	8.0	92.7	93.9	1485	1505	1.3	104.4
B_27_98	27.0	26.1	0.9	-3.4	88.2	87.3	1413	1399	-1.0	97.0
B_22_98	22.0	22.0	5.0	0.0	88.2	86.6	1413	1387	-1.9	96.2
B_16_98	16.0	16.3	10.7	1.8	88.2	88.0	1413	1409	-0.3	97.7
C_12_103	12.0	11.3	1.7	-6.2	115.4	106.1	1848	1700	-8.7	94.8
C_9.5_103	9.5	9.4	3.6	-1.1	115.4	110.9	1848	1777	-4.0	99.1
C_8_103	8.0	8.4	4.6	4.8	115.4	107.7	1848	1725	-7.1	96.2
C_13_98	13.0	12.4	0.6	-4.8	109.8	100.7	1758	1613	-9.0	89.9
C_10_98	10.0	10.1	2.9	1.0	109.8	107.5	1758	1721	-2.1	95.9
C_8_98	8.0	8.4	4.6	4.8	109.8	106.4	1758	1705	-3.1	95.0
D_16_103	16	16.3	1.7	1.8	106.1	102.4	1699	1640	-3.6	99.4
D_13_103	13	13.3	4.7	2.3	106.1	105.9	1699	1697	-0.1	102.9
D_11_103	11	10.6	7.4	-3.8	106.1	104.0	1699	1665	-2.0	100.9
D_18_98	18	18.6	-0.6	3.2	100.9	100.4	1617	1609	-0.5	97.5
D_14_98	14	14.2	3.8	1.4	100.9	100.8	1617	1614	-0.2	97.8
D_11_98	11	10.7	7.3	-2.8	100.9	93.2	1617	1494	-8.3	90.5

Table 5.2 shows the moisture and density values for the cylindrical specimens. The length of the specimen varied because of difficulties in trimming.

Table 5.2: Target and actual characteristics of cylindrical specimens

Cylindrical Specimen	$w_{targ}^{Cyl.}$ [%]	$w_{act}^{Cyl.}$ [%]	$\pm w_{opt}^{Cyl.}$ [%]	$\Delta w^{Cyl.}$ [%]	Length [mm]	Length [in.]	Diameter [mm]	Diameter [in.]	$\gamma_{targ}^{Cyl.}$ [pcf]	$\gamma_{act}^{Cyl.}$ [pcf]	$\rho_{targ}^{Cyl.}$ [kg/m^3]	$\rho_{act}^{Cyl.}$ [kg/m^3]	$\Delta\rho^{Cyl.}$ [%]	Std. Proctor [%]
A_2_13.5_105	13.5	12.4	2.6	-8.9	200	7.88	98.4	3.88	111.3	112.3	1783	1798	0.9	105.9
A_1_10.5_105	10.5	11.6	3.4	9.5	203	8.00	98.4	3.88	111.3	108.6	1783	1739	-2.5	102.4
A_2_10.5_105	10.5	11.8	3.2	11.0	203	8.00	98.4	3.88	111.3	109.2	1783	1749	-1.9	103.0
A_1_7.5_105	7.5	7.6	7.4	1.3	154	6.10	98.4	3.88	111.3	111.1	1783	1779	-0.2	104.8
A_2_7.5_105	7.5	7.4	7.7	-2.0	168	6.63	98.4	3.88	111.3	107.8	1783	1727	-3.2	101.7
A_3_15_100	15.0	15.8	-0.8	5.1	203	8.00	98.4	3.88	106.0	108.6	1698	1740	2.4	102.5
A_4_15_100	15.0	15.4	-0.4	2.6	200	7.88	98.4	3.88	106.0	111.1	1698	1780	4.6	104.8
A_1_12_100	12.0	12.4	2.6	3.2	203	8.00	98.4	3.88	106.0	107.0	1698	1714	1.0	101.0
A_2_12_100	12.0	12.2	2.8	1.6	203	8.00	98.4	3.88	106.0	107.4	1698	1720	1.3	101.3
A_1_9_100	9.0	10.7	4.3	15.9	203	8.00	98.4	3.88	106.0	102.6	1698	1643	-3.4	96.8
A_2_9_100	9.0	10.0	5.0	10.0	140	5.50	98.4	3.88	106.0	100.8	1698	1615	-5.1	95.1
B_1_24_103	24.0	22.9	4.1	-4.9	191	7.50	98.4	3.88	92.7	96.2	1485	1542	3.7	106.9
B_2_24_103	24.0	23.0	4.0	-4.4	200	7.88	98.4	3.88	92.7	95.0	1485	1521	2.4	105.5
B_1_19.5_103	19.5	18.5	8.5	-5.3	195	7.69	98.4	3.88	92.7	92.3	1485	1479	-0.4	102.6
B_2_19.5_103	19.5	18.3	8.7	-6.4	200	7.88	98.4	3.88	92.7	98.6	1485	1579	5.9	109.5
B_1_16_103	16.0	16.5	10.5	3.1	191	7.50	98.4	3.88	92.7	98.6	1485	1579	5.9	109.5
B_2_16_103	16.0	16.4	10.6	2.1	192	7.57	98.4	3.88	92.7	102.2	1485	1637	9.3	113.5
B_1_27_98	27.0	23.1	3.9	-16.9	197	7.75	98.4	3.88	88.2	93.9	1413	1504	6.1	104.3
B_2_27_98	27.0	24.0	3.0	-12.5	197	7.75	98.4	3.88	88.2	90.2	1413	1445	2.2	100.2
B_1_22_98	22.0	21.2	5.8	-3.6	196	7.70	98.4	3.88	88.2	90.2	1413	1446	2.3	100.3
B_2_22_98	22.0	21.5	5.5	-2.4	198	7.81	98.4	3.88	88.2	93.0	1413	1490	5.2	103.4
B_1_16_98	16.0	16.0	11.0	-0.2	203	8.00	98.4	3.88	88.2	87.0	1413	1393	-1.4	96.6
B_2_16_98	16.0	16.3	10.7	1.8	205	8.06	98.4	3.88	88.2	90.1	1413	1443	2.1	100.1
C_1_12_103	12.0	10.9	2.1	-10.6	200	7.88	98.4	3.88	115.4	108.1	1848	1732	-6.7	96.6
C_2_12_103	12.0	10.9	2.1	-10.6	197	7.75	98.4	3.88	115.4	107.8	1848	1726	-7.1	96.2
C_1_9.5_103	9.5	8.8	4.2	-8.3	202	7.94	98.4	3.88	115.4	109.6	1848	1756	-5.3	97.9
C_2_9.5_103	9.5	9.1	3.9	-4.5	202	7.94	98.4	3.88	115.4	95.5	1848	1530	-20.8	85.3
C_1_8_103	8.0	8.4	4.6	4.9	194	7.63	98.4	3.88	115.4	109.7	1848	1757	-5.2	97.9
C_2_8_103	8.0	8.2	4.8	2.0	173	6.81	98.4	3.88	115.4	108.6	1848	1740	-6.2	97.0
C_1_13_98	13.0	12.1	0.9	-7.3	216	8.50	98.4	3.88	109.8	102.1	1758	1635	-7.5	91.1
C_2_13_98	13.0	12.3	0.7	-5.6	205	8.06	98.4	3.88	109.8	101.3	1758	1623	-8.3	90.5
C_1_10_98	10.0	9.3	3.7	-7.1	203	8.00	98.4	3.88	109.8	104.2	1758	1669	-5.4	93.0
C_2_10_98	10.0	9.0	4.0	-11.6	162	6.38	98.4	3.88	109.8	103.6	1758	1659	-6.0	92.5
C_1_8_98	8.0	8.4	4.6	4.9	237	9.31	98.4	3.88	109.8	106.0	1758	1698	-3.5	94.7
C_2_8_98	8.0	8.8	4.2	9.5	210	8.25	98.4	3.88	109.8	106.6	1758	1707	-3.0	95.1
D_1_16_103	16.0	15.6	2.4	-2.5	202	7.94	98.4	3.88	106.1	106.1	1699	1700	0.0	103.0
D_2_16_103	16.0	15.6	2.4	-2.7	204	8.03	98.4	3.88	106.1	105.8	1699	1695	-0.3	102.7
D_1_13_103	13.0	13.1	4.9	0.5	210	8.25	98.4	3.88	106.1	111.8	1699	1791	5.1	108.6
D_2_13_103	13.0	13.2	4.8	1.6	211	8.31	98.4	3.88	106.1	110.8	1699	1775	4.3	107.6
D_1_11_103	11.0	10.5	7.5	-4.9	206	8.13	98.4	3.88	106.1	105.7	1699	1693	-0.4	102.6
D_2_11_103	11.0	10.6	7.4	-3.9	205	8.06	98.4	3.88	106.1	105.9	1699	1697	-0.1	102.8
D_1_18_98	18.0	18.3	-0.3	1.6	206	8.13	103.6	4.08	100.9	97.3	1617	1559	-3.7	94.5
D_2_18_98	18.0	18.4	-0.4	2.0	213	8.38	98.4	3.88	100.9	99.8	1617	1598	-1.2	96.9
D_1_14_98	14.0	14.3	3.7	2.2	205	8.06	98.4	3.88	100.9	103.2	1617	1653	2.2	100.2
D_2_14_98	14.0	13.6	4.4	-3.1	203	8.00	98.4	3.88	100.9	104.9	1617	1680	3.8	101.8
D_1_11_98	11.0	10.7	7.3	-3.0	203	8.00	98.4	3.88	100.9	106.7	1617	1710	5.4	103.6
D_2_11_98	11.0	10.7	7.3	-3.0	203	8.00	98.4	3.88	100.9	107.8	1617	1726	6.3	104.6

The maximum and minimum values of Δw^{cyl} in Table 5.2 are respectively 15.9% and -16.9%, with the mean of -1.3%. The variation in moisture content between the target and actual values can be attributed to the minor non-uniformities throughout the prismatic sample, moisture loss while handling the cylindrical specimen, and transfer of water through the cellophane wrapping and plastic container while in the humid room. The maximum and minimum values of $\Delta\rho^{\mathrm{cyl}}$ are respectively 9.3% and -20.8%, with the mean of 0.3%. The friction between the steel tubes and soil contributed to specimen compaction as the soil was lifted into steel tubes and as the specimens were extruded from the steel tubes. A non-stick spray was applied to the inside of the steel tubes to minimize this effect.

Table 5.3 highlights the effect of specimen extraction and storage on the change in density and moisture. For example, as the soil was pushed into steel tubes, friction between surfaces resulted in further compaction of the specimen. In addition, the specimens were extruded by pushing them out of the steel tubes causing additional specimen compaction. The maximum and minimum values of Δw in Table 5.3 are respectively 7.8% and -12.1%, with a mean value of -2.4%. The maximum and minimum values of $\Delta\rho$ are respectively 15.6% and -13.9%, with the mean value of 2.9%.

Table 5.3: Characteristics of actual prismatic samples and cylindrical specimens

Prismatic Sample	w^{Box}_{Act} [%]	γ^{Box}_{Act} [pcf]	ρ^{Box}_{Act} [kg/m^3]	Cylindrical Specimen	w^{Cyl}_{Act} [%]	γ^{Cyl}_{Act} [pcf]	ρ^{Cyl}_{Act} [kg/m^3]	$\pm w^{Cyl}_{Box}$	Δw_{Act} [%]	$\Delta\rho$ [%]
A_13.5_105	14.1	109.4	1752	A_2_13.5_105	12.4	112.3	1798	-1.70	-12.1	2.6
A_10.5_105	11.2	104.7	1678	A_1_10.5_105	11.6	108.6	1739	0.40	3.6	3.6
				A_2_10.5_105	11.8	109.2	1749	0.60	5.4	4.2
A_7.5_105	7.7	104.2	1670	A_1_7.5_105	7.6	111.1	1779	-0.05	-0.7	6.6
				A_2_7.5_105	7.4	107.8	1727	-0.30	-3.9	3.4
A_15_100	15.6	103.6	1659	A_3_15_100	15.8	108.6	1740	0.21	1.3	4.9
				A_4_15_100	15.4	111.1	1780	-0.20	-1.3	7.3
A_12_100	11.5	105.2	1685	A_1_12_100	12.4	107.0	1714	0.90	7.8	1.7
				A_2_12_100	12.2	107.4	1720	0.70	6.1	2.1
A_9_100	10.9	99.1	1587	A_1_9_100	10.7	102.6	1643	-0.20	-1.8	3.5
				A_2_9_100	10.0	100.8	1615	-0.90	-8.3	1.8
B_24_103	23.6	92.5	1481	B_1_24_103	22.9	96.2	1542	-0.71	-3.0	4.1
				B_2_24_103	23.0	95.0	1521	-0.62	-2.6	2.7
B_19.5_103	19.2	90.2	1444	B_1_19.5_103	18.5	92.3	1479	-0.68	-3.5	2.4
				B_2_19.5_103	18.3	98.6	1579	-0.88	-4.6	9.3
B_16_103	17.4	93.9	1505	B_1_16_103	16.5	98.6	1579	-0.90	-5.1	4.9
				B_2_16_103	16.4	102.2	1637	-1.05	-6.0	8.8
B_27_98	26.1	87.3	1399	B_1_27_98	23.1	93.9	1504	-3.00	-11.5	7.5
				B_2_27_98	24.0	90.2	1445	-2.10	-8.0	3.3
B_22_98	22.0	86.6	1387	B_1_22_98	21.2	90.2	1446	-0.77	-3.5	4.2
				B_2_22_98	21.5	93.0	1490	-0.51	-2.3	7.4
B_16_98	16.3	88.0	1409	B_1_16_98	16.0	87.0	1393	-0.33	-2.0	*-1.1*
				B_2_16_98	16.3	90.1	1443	-0.01	0.0	2.4
C_12_103	11.3	106.1	1700	C_1_12_103	10.9	108.1	1732	-0.45	-4.0	1.9
				C_2_12_103	10.9	107.8	1726	-0.45	-4.0	1.5
C_9.5_103	9.4	110.9	1777	C_1_9.5_103	8.8	109.6	1756	-0.63	-6.7	*-1.2*
				C_2_9.5_103	9.1	95.5	1530	-0.31	-3.3	*-13.9*
C_8_103	8.4	107.7	1725	C_1_8_103	8.4	109.7	1757	0.01	0.1	1.8
				C_2_8_103	8.2	108.6	1740	-0.24	-2.9	0.9
C_13_98	12.4	100.7	1613	C_1_13_98	12.1	102.1	1635	-0.29	-2.3	1.4
				C_2_13_98	12.3	101.3	1623	-0.09	-0.8	0.6
C_10_98	10.1	107.5	1721	C_1_10_98	9.3	104.2	1669	-0.76	-7.6	*-3.1*
				C_2_10_98	9.0	103.6	1659	-1.14	-11.3	*-3.6*
C_8_98	8.4	106.4	1705	C_1_8_98	8.4	106.0	1698	0.01	0.1	*-0.4*
				C_2_8_98	8.8	106.6	1707	0.44	5.2	0.1
D_16_103	16.3	102.4	1640	D_1_16_103	15.6	106.1	1700	-0.69	-4.2	3.7
				D_2_16_103	15.6	105.8	1695	-0.72	-4.4	3.4
D_13_103	13.3	105.9	1697	D_1_13_103	13.1	111.8	1791	-0.24	-1.8	5.5
				D_2_13_103	13.2	110.8	1775	-0.09	-0.7	4.6
D_11_103	10.6	104.0	1665	D_1_11_103	10.5	105.7	1693	-0.11	-1.1	1.6
				D_2_11_103	10.6	105.9	1697	-0.01	-0.1	1.9
D_18_98	18.6	100.4	1609	D_1_18_98	18.3	97.3	1559	-0.30	-1.6	*-3.1*
				D_2_18_98	18.4	99.8	1598	-0.23	-1.3	*-0.7*
D_14_98	14.2	100.8	1614	D_1_14_98	14.3	103.2	1653	0.11	0.8	2.4
				D_2_14_98	13.6	104.9	1680	-0.62	-4.4	4.1
D_11_98	10.7	93.2	1494	D_1_11_98	10.7	106.7	1710	-0.02	-0.2	14.5
				D_2_11_98	10.7	107.8	1726	-0.02	-0.2	15.6

5.3 Laboratory Tests on Cylindrical Specimens

Stiffness and strength tests were performed on cylindrical soil specimens. Specifically, resilient modulus and bender element ($BE - M_r$) testing was conducted on the 48 specimens, followed by triaxial compression experiments with no pore pressure measurements (only total stresses were measured).

5.3.1 Resilient Modulus

Specimen alignment within the triaxial chamber is important, especially when testing stiff materials. Due to misalignment and/or specimen inhomogeneities, deformation measurements can vary among the LVDTs [15]. As a result, it was important to apply criteria to evaluate the data. The criteria included angle of rotation (θ), signal-to-noise ratio (SNR) and coefficient of variation (COV). Table 5.4 outlines the criteria established by Mn/DOT and the UM, and Tables 5.5 and 5.6 indicate the percent of the data that passed the various criteria.

Table 5.4: QC/QA criteria

	SNR δ	SNR F	θ	COV
UM	>3, 2LVDT >1.5, 1LVDT	>10	<0.04°	<10%
Mn/DOT	>3, 3LVDT	>10	<0.04°	<10%

Table 5.5: MnDOT QC/QA passing rate [%]

Soil	SNR δ1 >3	SNR δ2 >3	SNR δ3 >3	SNR F >10	θ <0.04°	COV <10%	Final MnDOT
A	35.1	87.3	87.6	99.0	77.3	59.7	8.9
B	96.6	88.8	100.0	99.7	94.1	99.0	80.4
C	62.1	96.7	95.7	99.2	87.0	79.7	50.3
D	88.1	97.2	99.8	99.3	98.3	91.7	83.9
Total	71.2	92.6	96.0	99.3	89.4	83.0	56.9

To consider the possibility of including more data, the SNR value was reduced for one LVDT, to allow for a situation where the position of the sensor was normal to the axis of rotation, such that the positive displacement from the axial force is reduced by the negative displacement from the rotation. This would then cause the overall displacement measured by the LVDT to be quite small, resulting in a small SNR value. Further analysis needs to be performed for this so-called UM criterion, where one LVDT was allowed to violate SNR > 3 but SNR > 1.5 as long as the other two satisfied the SNR criterion (SNR > 3); the advantage of this criterion would be in an increase of usable resilient modulus data for all soils. Nonetheless, the data that failed to pass the prescribed Mn/DOT limits were not used in the analysis.

Table 5.6: UM QC/QA passing rate [%]

Soil	SNR δ1 >1.5	SNR δ2 >3	SNR δ3 >3	SNR F >10	θ <0.04°	COV <10%	Final UM
A	57.2	87.3	87.6	99.0	77.3	59.7	17.6
B	99.1	88.8	100.0	99.7	94.1	99.0	88.1
C	73.5	96.7	95.7	99.2	87.0	79.7	53.0
D	92.1	97.2	99.8	99.3	98.3	91.7	86.0
Total	81.0	92.6	96.0	99.3	89.4	83.0	62.1

Rotation

Specimen misalignment results in eccentric loading where the top specimen platen rotates causing non-uniform loading. In addition, the three LVDTs recording the specimen response vary from one to the other. It was shown that the mean of the three LVDT displacement readings is equal to the displacement from the axial stress [10, 23], and the angle of rotation, θ, is calculated by using

$$cos\theta = \frac{\frac{3}{4}D}{\sqrt{\delta_1^2 + \delta_2^2 + \delta_3^2 - \delta_1\delta_2 - \delta_1\delta_3 + \frac{9}{16}D^2}} \tag{5.1}$$

where δ_i= axial displacement (LVDT$_i$) and D= diameter of specimen.

For the 16 steps (stress states) in each sequence and the last 5 cycles of each step, the angle of rotation for all specimens was analyzed. Those cycles that exceeded the maximum of angle of rotation limit (0.04^o) were not used in the analysis.

Signal-to-Noise Ratio (SNR)

Since the LVDTs measure small displacements, noise during a resilient modulus test adversely affects displacement data. As a result, a coefficient called the Signal-to-Noise Ratio (SNR) was introduced. The SNR compares maximum displacement to instrument noise defined as [10]

$$SNR = \frac{\delta_M}{3 * \sigma_B} \tag{5.2}$$

where δ_M = maximum displacement and σ_B = baseline standard deviation. An SNR value of 3 was chosen by Mn/DOT for the minimum limit for each LVDT at each cycle. Also, a separate SNR limit of 10 was chosen for the quality of force measurements. Both criteria were applied to each cycle's last five loading pulses. If one cycle had either more than one LVDT or force violating the respective SNR limits, the cycle was excluded from further analysis.

Coefficient of Variation (COV)

An M$_r$ value is calculated for each of the last five cycles of every sequence in the NCHRP 1-28A testing protocol, and the resilient modulus values will vary. However, it is important to limit the maximum amount of variance. Accordingly, the coefficient of variation (COV), defined as

$$COV[\%] = \frac{\sigma}{\overline{M_r}} \tag{5.3}$$

was introduced, where σ = standard deviation of the resilient modulus during last five cycles and $\overline{M_r}$ = the mean resilient modulus of the last five cycles. The sequences that failed to pass the maximum COV limit of 10% were excluded from further analysis.

In summary, the resilient modulus results were scrutinized by the maximum angle of rotation, minimum SNR and maximum COV. The resilient modulus results that failed to pass the criteria were excluded. Acceptable criteria for the M_r data were:

- Load Signal-to-Noise Ratio (SNR) ≥ 10
- Deflection Signal-to-Noise Ratio (SNR) ≥ 3
- M_r COV [%] $\leq 10\%$
- Rotation Angle $< 0.04^0$

The percentages of failed cycles for each soil are listed in Table 5.7.

Table 5.7: Percentages of failed cycles

Soil A [%]	Soil B [%]	Soil C [%]	Soil D [%]	Total [%]
91.1	19.6	49.7	16.1	43.1

Testing Results

As an example, Tables 5.8 and 5.9 show a summary of the last five cycles for one (Soil D) cylindrical specimen before and after applying the QC/QA criteria. On the basis of results such as those in Table 5.9 and Appendix J, a variation of the resilient modulus is plotted in Figs. 5.5–5.12 as a function of the deviator stress and confining pressure for each soil-density-moisture combination. To generate the graphs, the resilient modulus values during the last five cycles of testing were averaged. As each soil-density-moisture combination was tested via two cylindrical specimens, the results of the duplicate tests were also averaged.

In each figure, a single surface was generated using a local smoothing technique available through the plotting software SigmaPlot 9.0 (Appendix N). For the ease of comparison, all graphs carry common scales in terms of deviator stress, confining pressure and modulus. Some surfaces are of limited extent (in particular, soil A) because of the QC/QA criteria for resilient modulus data. With reference to the soil type, it is apparent that soils A and D are characterized by the highest values of M_r. In order of decreasing modulus, soils A and D are followed by soils B and C. As expected, the increase in density invariably results in an increase of M_r.

As can be seen in the plots, soil moisture has a significant effect upon M_r. Depending on the particular values of the deviator stress and confining pressure, the prescribed variation in moisture caused differences in the M_r as high as 100%. Typically, the maximum values of the M_r for a given soil were achieved under the minimum or intermediate moisture contents. Figures 5.5, 5.6, 5.7, and 5.8 summarize the values of M_r for soils A and B grouped according to target Proctor densities. Figures 5.9, 5.10, 5.11 and 5.12 summarize the variation of M_r for soils C and D again grouped according to target Proctor densities. For the actual densities of the specimens, refer to Table 5.2.

Table 5.8: Raw Resilient modulus values for D_1_16_103

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	226	0.010	0.009	0.012	0.030	0.00010	297
0.06	226	0.010	0.009	0.012	0.030	0.00010	296
0.06	216	0.010	0.009	0.012	0.028	0.00010	283
0.06	230	0.010	0.010	0.012	0.030	0.00010	292
0.06	226	0.010	0.009	0.012	0.030	0.00010	298
0.06	388	0.017	0.017	0.022	0.051	0.00018	275
0.06	381	0.017	0.017	0.022	0.050	0.00018	270
0.06	386	0.016	0.017	0.022	0.051	0.00018	279
0.06	388	0.016	0.017	0.022	0.051	0.00018	280
0.06	389	0.016	0.017	0.022	0.051	0.00018	281
0.06	551	0.024	0.026	0.032	0.072	0.00027	267
0.06	551	0.024	0.026	0.032	0.072	0.00027	267
0.06	541	0.025	0.026	0.033	0.071	0.00028	256
0.06	540	0.025	0.026	0.033	0.071	0.00028	256
0.06	552	0.025	0.026	0.033	0.072	0.00028	261
0.06	774	0.037	0.038	0.049	0.101	0.00041	250
0.06	768	0.037	0.038	0.049	0.101	0.00041	248
0.06	758	0.037	0.038	0.049	0.099	0.00041	245
0.06	756	0.037	0.038	0.049	0.099	0.00040	245
0.06	757	0.037	0.038	0.050	0.099	0.00041	243
0.04	216	0.010	0.009	0.012	0.028	0.00010	286
0.04	217	0.010	0.009	0.012	0.028	0.00010	285
0.04	216	0.010	0.010	0.012	0.028	0.00010	276
0.04	216	0.010	0.009	0.013	0.028	0.00010	276
0.04	216	0.010	0.010	0.012	0.028	0.00010	276
0.04	378	0.018	0.017	0.022	0.050	0.00019	266
0.04	378	0.016	0.017	0.023	0.050	0.00018	268
0.04	391	0.017	0.017	0.023	0.051	0.00019	274
0.04	385	0.016	0.017	0.023	0.050	0.00018	274
0.04	408	0.017	0.017	0.023	0.054	0.00019	285
0.04	562	0.025	0.027	0.035	0.074	0.00028	259
0.04	552	0.024	0.027	0.035	0.072	0.00028	257
0.04	540	0.024	0.027	0.035	0.071	0.00028	252
0.04	541	0.024	0.027	0.035	0.071	0.00028	252
0.04	541	0.024	0.027	0.035	0.071	0.00028	252
0.04	768	0.036	0.040	0.052	0.101	0.00042	240
0.04	768	0.037	0.040	0.051	0.101	0.00042	240
0.04	757	0.037	0.040	0.051	0.099	0.00042	237
0.04	756	0.037	0.040	0.051	0.099	0.00042	236
0.04	768	0.037	0.040	0.052	0.101	0.00042	238
0.03	216	0.011	0.009	0.012	0.028	0.00010	273
0.03	216	0.011	0.009	0.012	0.028	0.00010	273
0.03	216	0.011	0.010	0.012	0.028	0.00011	264
0.03	216	0.011	0.009	0.012	0.028	0.00010	273
0.03	216	0.011	0.009	0.012	0.028	0.00010	273
0.03	384	0.017	0.018	0.023	0.050	0.00019	268
0.03	407	0.018	0.017	0.024	0.053	0.00019	275
0.03	379	0.018	0.017	0.024	0.050	0.00019	256
0.03	390	0.018	0.017	0.024	0.051	0.00019	263
0.03	391	0.018	0.018	0.024	0.051	0.00019	264
0.03	551	0.026	0.028	0.035	0.072	0.00029	248
0.03	552	0.026	0.028	0.036	0.072	0.00029	245
0.03	540	0.027	0.028	0.035	0.071	0.00029	241
0.03	541	0.026	0.028	0.036	0.071	0.00029	241
0.03	541	0.026	0.027	0.035	0.071	0.00029	247
0.03	773	0.038	0.042	0.055	0.101	0.00044	229
0.03	777	0.037	0.041	0.054	0.102	0.00043	235
0.03	769	0.038	0.042	0.054	0.101	0.00044	229
0.03	758	0.037	0.041	0.054	0.099	0.00043	229
0.03	768	0.037	0.041	0.055	0.101	0.00044	231
0.01	217	0.012	0.008	0.013	0.028	0.00011	258
0.01	216	0.012	0.008	0.013	0.028	0.00011	258
0.01	217	0.011	0.008	0.013	0.028	0.00011	266
0.01	217	0.011	0.008	0.012	0.028	0.00010	275
0.01	216	0.012	0.008	0.012	0.028	0.00011	266
0.01	390	0.020	0.016	0.024	0.051	0.00020	259
0.01	390	0.021	0.017	0.024	0.051	0.00020	251
0.01	380	0.020	0.017	0.024	0.050	0.00020	247
0.01	380	0.021	0.017	0.024	0.050	0.00020	245
0.01	385	0.020	0.016	0.024	0.050	0.00020	255
0.01	542	0.028	0.028	0.038	0.071	0.00031	232
0.01	552	0.028	0.028	0.038	0.072	0.00031	236
0.01	553	0.029	0.028	0.038	0.072	0.00031	234
0.01	542	0.028	0.028	0.036	0.071	0.00030	235
0.01	542	0.028	0.028	0.036	0.071	0.00030	234
0.01	770	0.040	0.043	0.056	0.101	0.00046	221
0.01	770	0.040	0.043	0.056	0.101	0.00046	221
0.01	759	0.040	0.043	0.056	0.099	0.00046	218
0.01	770	0.041	0.043	0.056	0.101	0.00046	220
0.01	769	0.041	0.043	0.056	0.101	0.00046	220

Table 5.9: QC/QA Resilient modulus values for D_1_16_103

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT1} > 3$	$SNR_{LVDT2} > 3$	$SNR_{LVDT3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	$\theta < 0.1°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	237
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	296
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	283
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	292
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	298
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	275
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	270
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	279
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	280
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	281
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	267
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	267
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	256
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	256
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	261
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	250
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	248
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	245
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	245
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	243
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	286
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	285
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	276
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	276
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	276
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	266
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	268
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	274
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	274
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	285
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	259
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	257
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	252
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	252
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	252
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	240
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	240
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	237
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	236
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	238
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	273
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	273
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	264
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	273
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	273
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	268
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	275
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	256
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	263
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	264
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	248
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	245
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	241
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	241
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	247
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	229
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	235
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	229
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	229
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	231
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	258
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	258
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	266
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	275
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	266
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	259
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	251
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	247
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	245
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	255
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	232
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	236
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	234
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	235
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	234
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	221
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	221
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	218
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	220
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	220

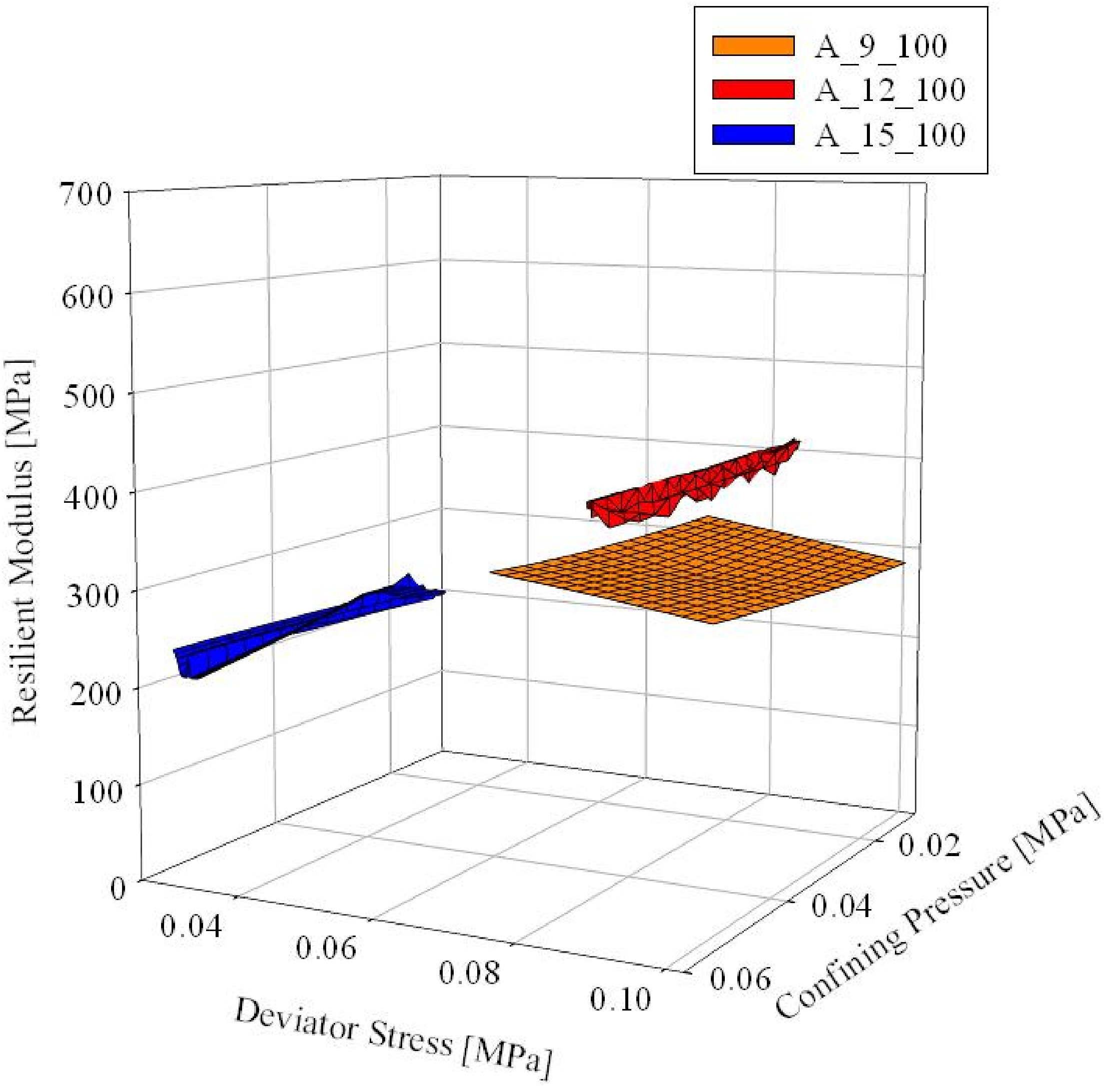


Figure 5.5: Resilient modulus for soil A, 100% target standard Proctor

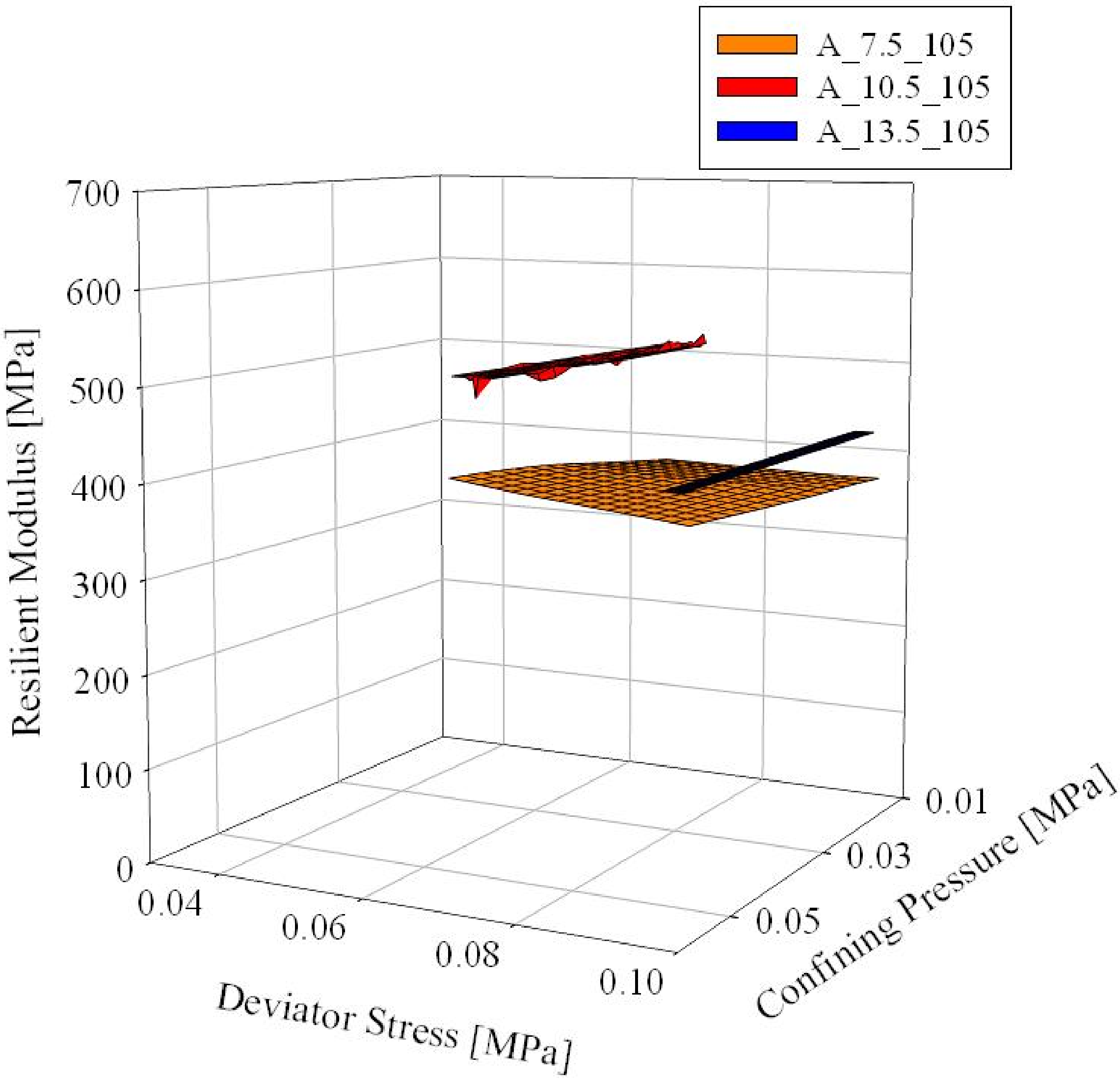


Figure 5.6: Resilient modulus for soil A, 105% target standard Proctor

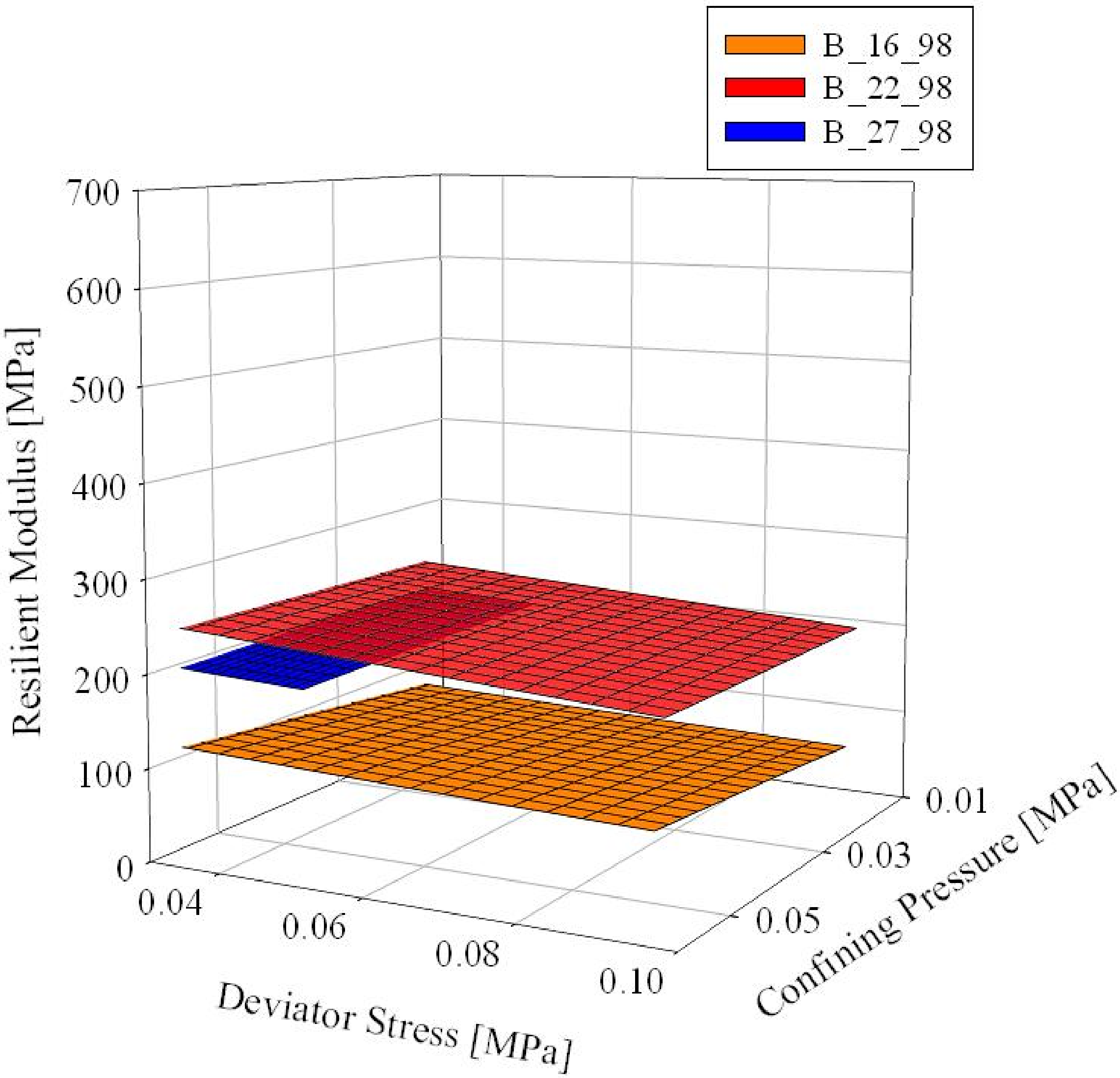


Figure 5.7: Resilient modulus for soil B, 98% target standard Proctor

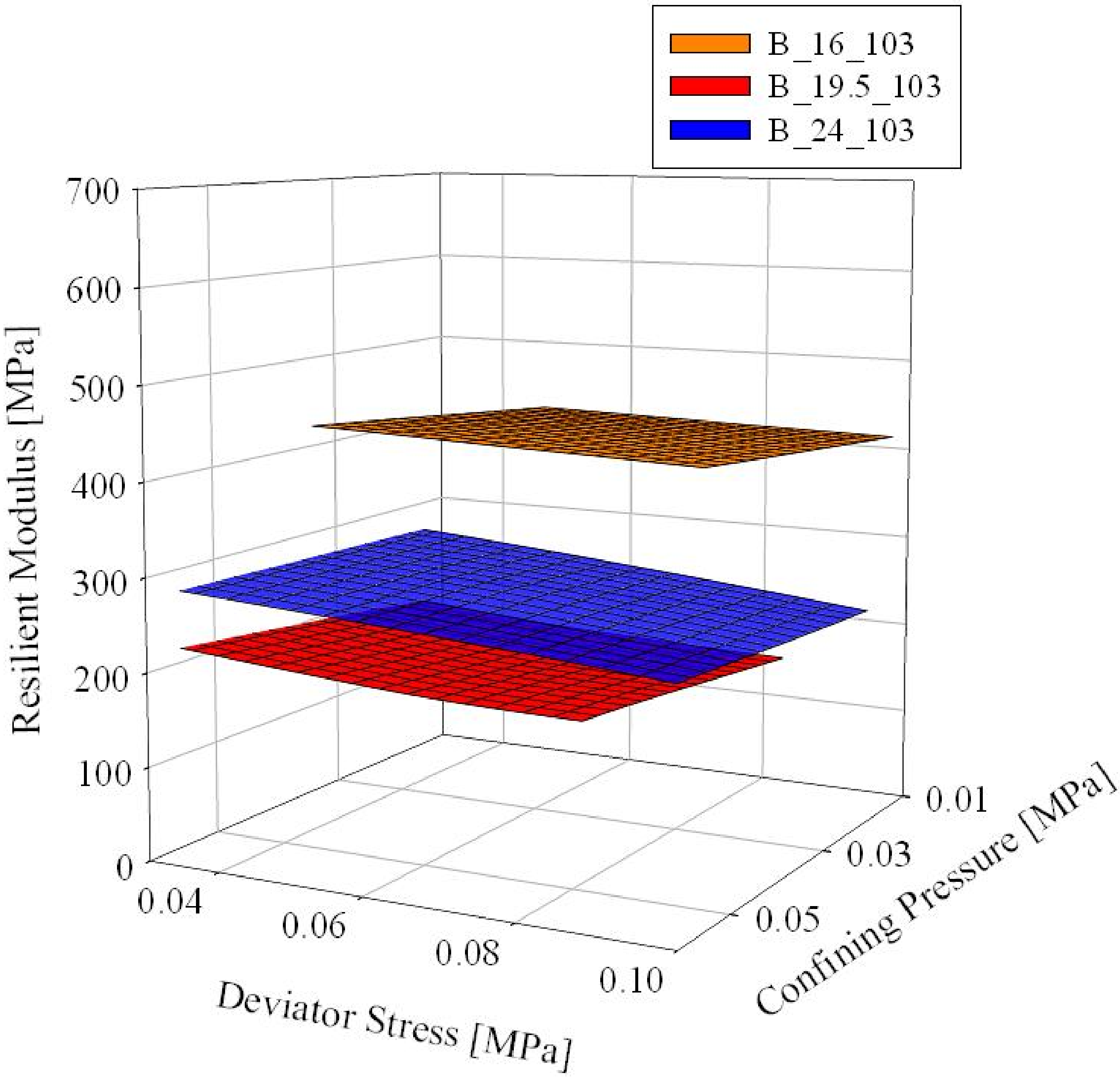


Figure 5.8: Resilient modulus for soil B, 103% target standard Proctor

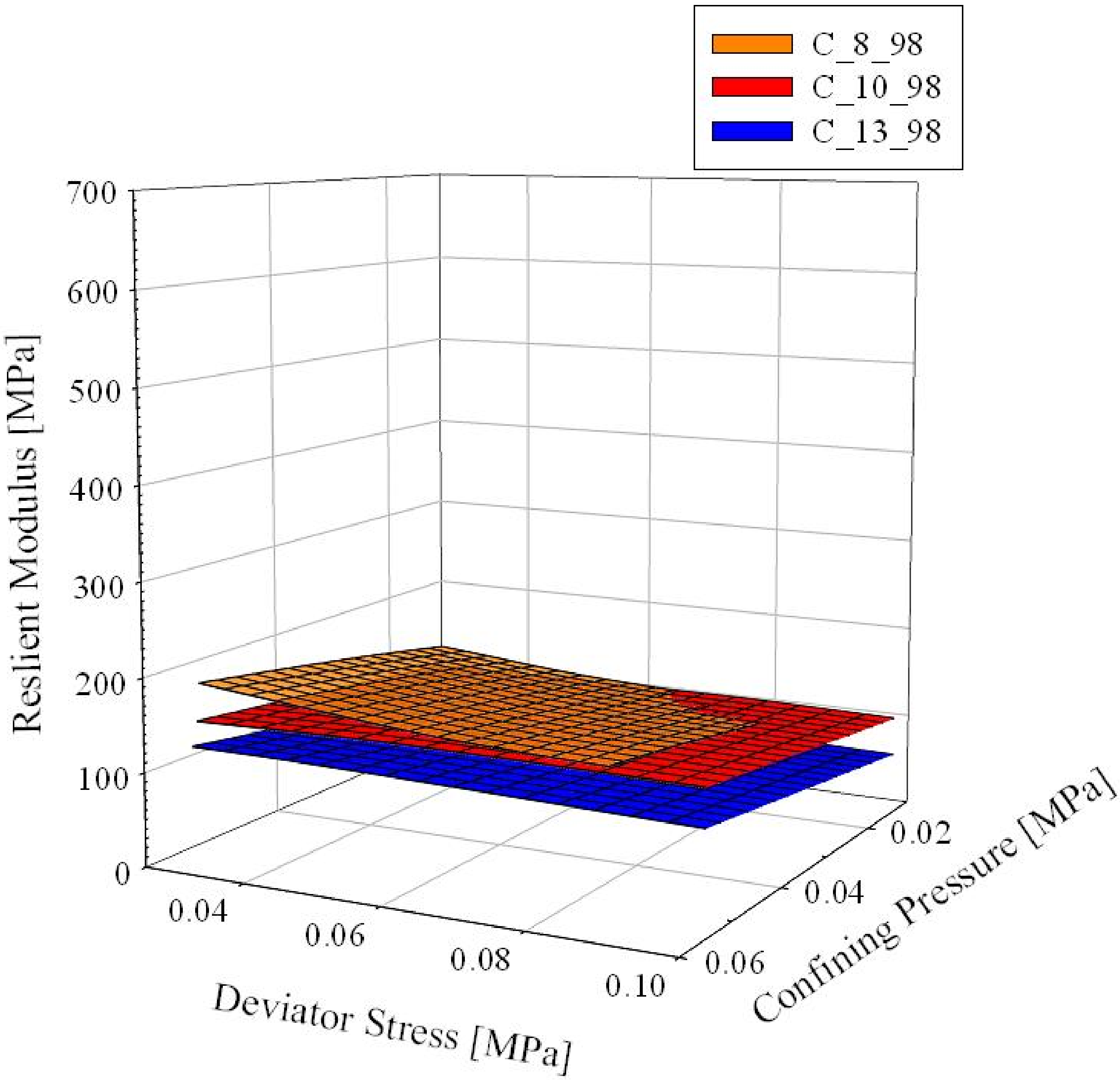


Figure 5.9: Resilient modulus for soil C, 98% target standard Proctor

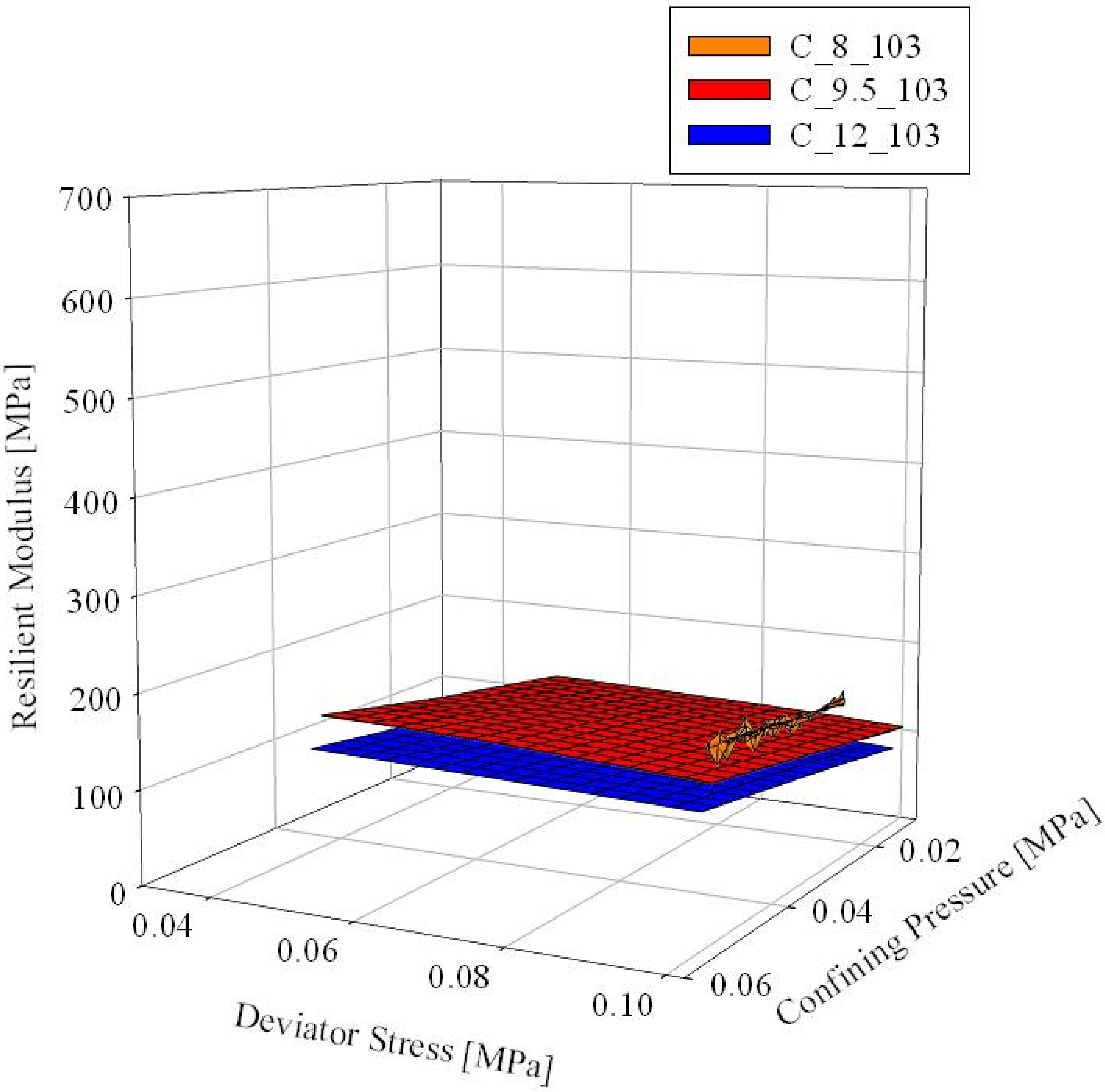


Figure 5.10: Resilient modulus for soil C, 103% target standard Proctor

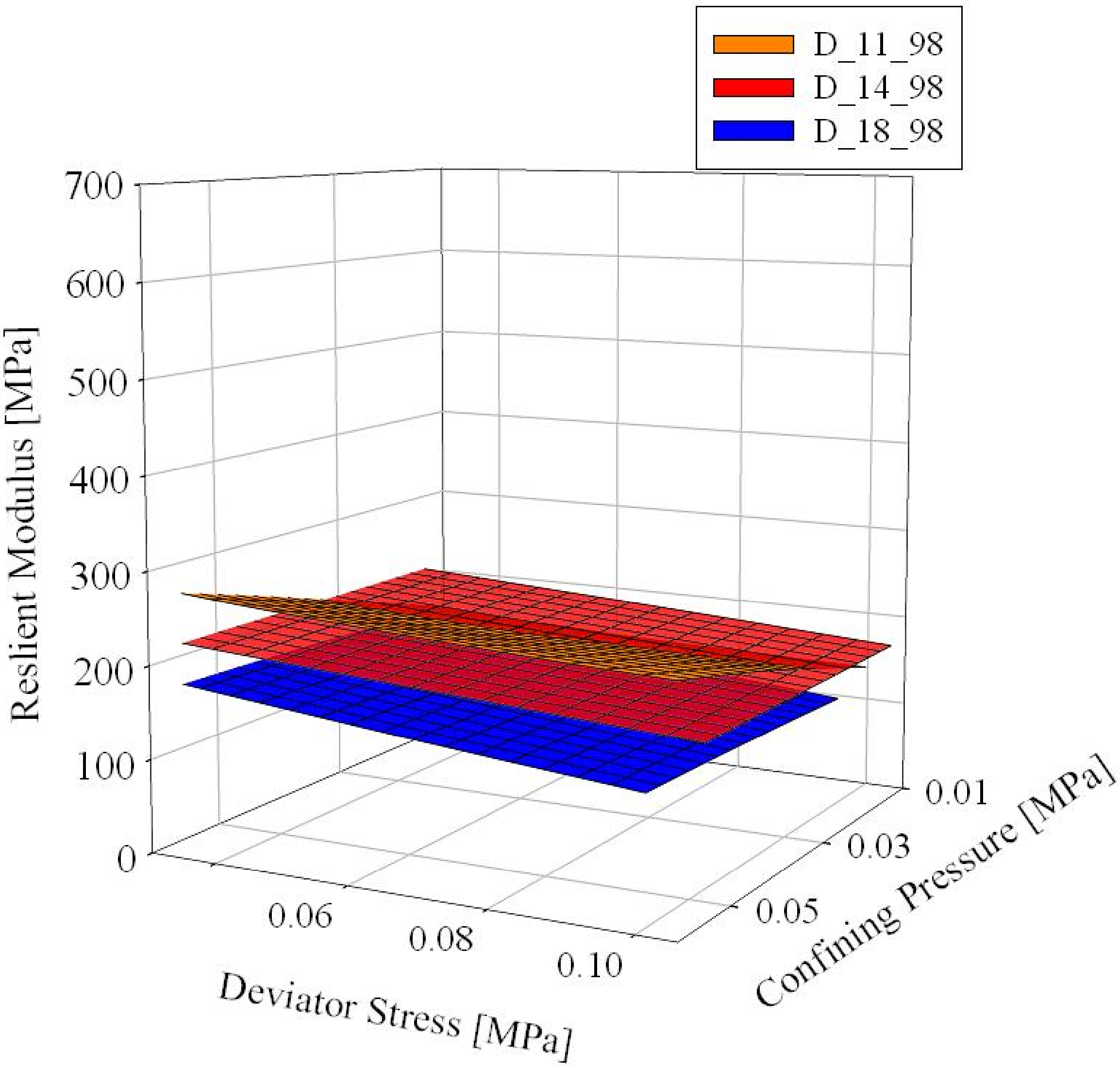


Figure 5.11: Resilient modulus for soil D, 98% target standard Proctor

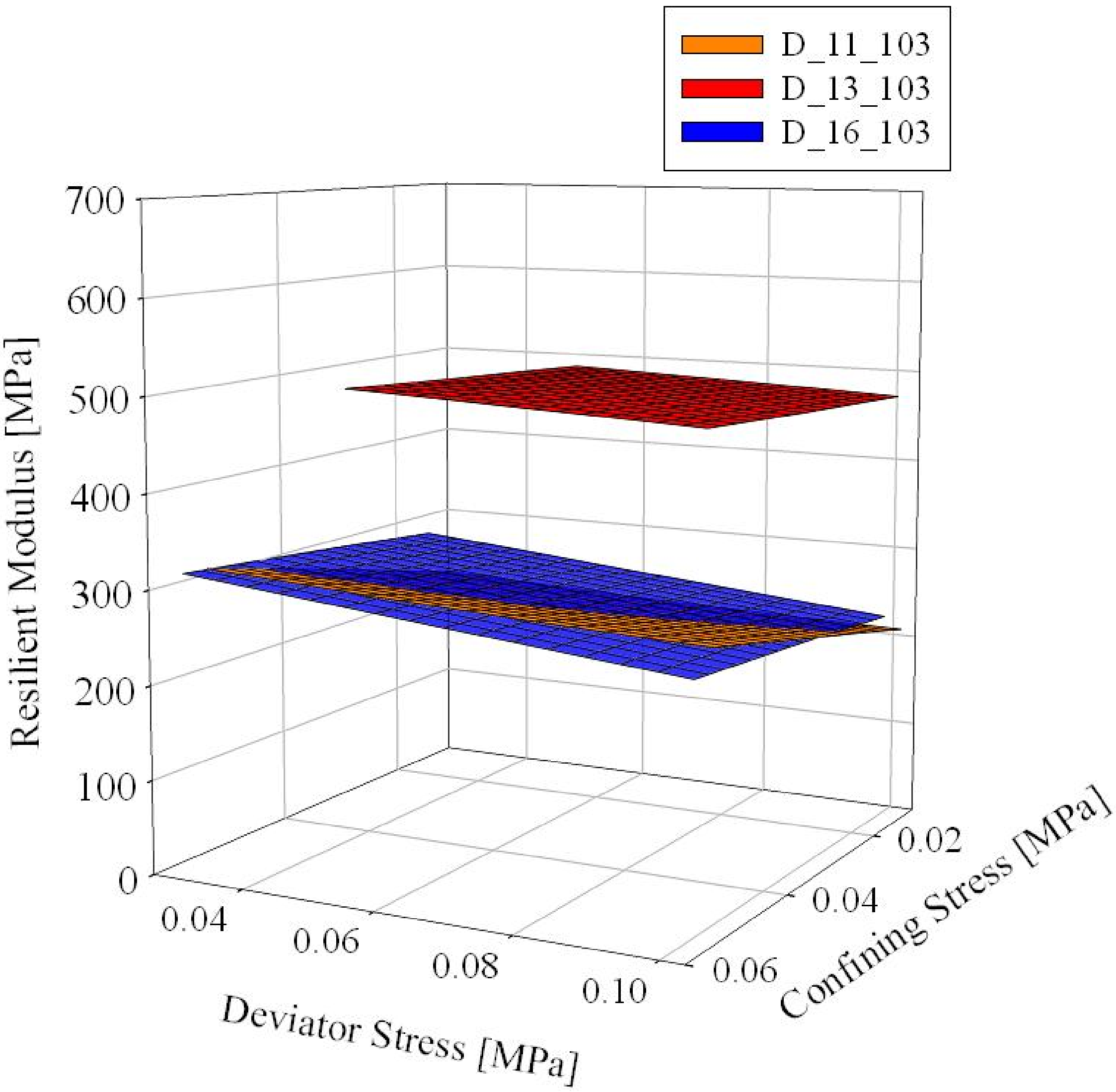


Figure 5.12: Resilient modulus for soil D, 103% target standard Proctor

To evaluate the effect of density and moisture on stiffness as measured by $BE-M_r$ testing and field devices, a representative value of the modulus at a given level of confinement and deviator stress must be selected. The basis for this stress state was guided by the prismatic samples. Because the state of stress in the container was not uniform, the vertical (σ_v) and horizontal (σ_h) stresses in the middle of the container (0.15 m) were estimated based on a total unit weight of 18.5 kN/m^3 (118 pcf) and K = 0.5: σ_v = 2.8 kPa, σ_h = 1.4 kPa. Thus, the mean (confining) stress at a depth of 0.15 m was p = 1.9 kPa and the deviator stress was $\Delta\sigma_a$ = 0.9 kPa. This stress state is represented most closely by the loading sequence from the resilient modulus protocol with the (lowest) confining pressure p = 14 kPa (2 psi) and deviator stress $\Delta\sigma_a$ = 27 kPa (3.8 psi). If the M_r data did not pass the QC/QA criteria at the p = 14 kPa, $\Delta\sigma_a$ = 27 kPa stress state, then the data at the closest stress state but passing the QC/QA criteria were used.

Figures 5.13-5.16 represent the data from the comprehensive testing program involving the 48 resilient modulus tests, where actual (not target) values of density and moisture content are shown. Each plot contains 10-12 data points for the four soils (A, B, C, D) prepared at two densities and three moisture contents with two replicates for each condition. A single surface was generated using a local smoothing technique available through the plotting software SigmaPlot 9.0. For soils A and D (Figs. 5.13 and 5.16), the surfaces illustrate the complex behavior as moisture varies at a given density. For soils B and C (Figs. 5.14 and 5.15), the general trend of increased modulus with increased density and decreased moisture is followed. The values for the representative resilient modulus versus, density and moisture content are listed in Tables 5.10 and 5.11.

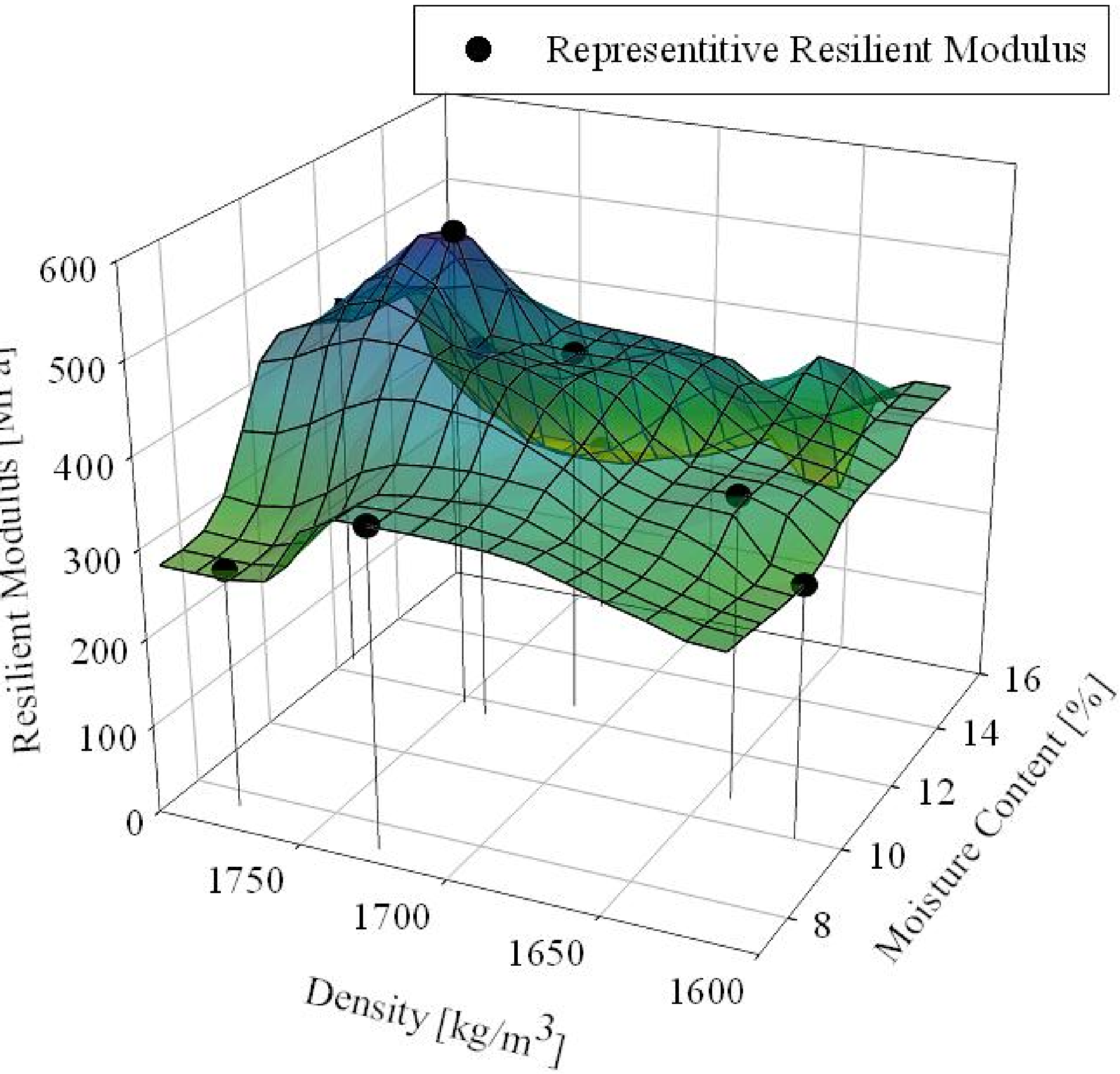


Figure 5.13: Representative resilient modulus for soil A vs. density and moisture content

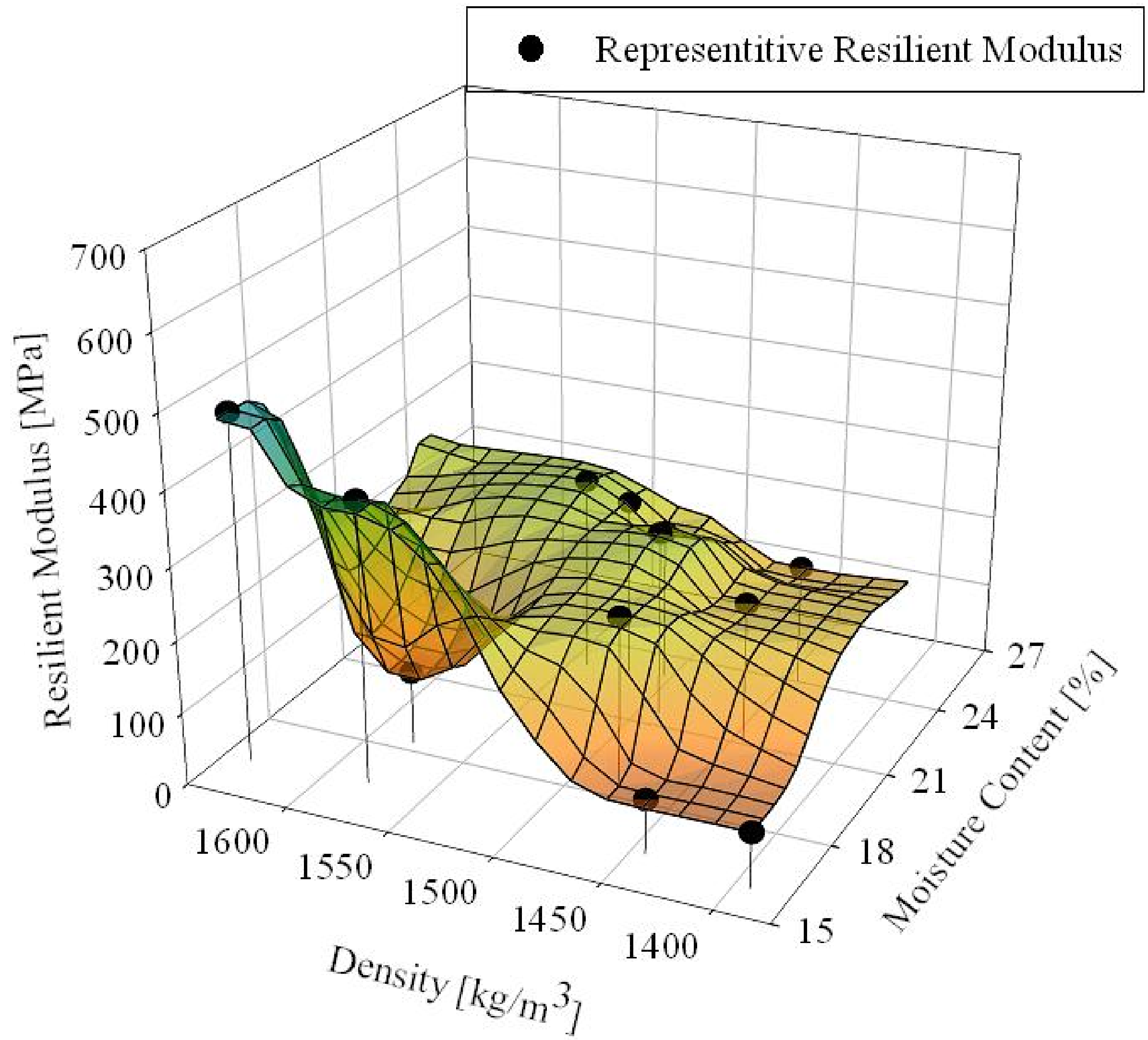


Figure 5.14: Representative resilient modulus for soil B vs. density and moisture content

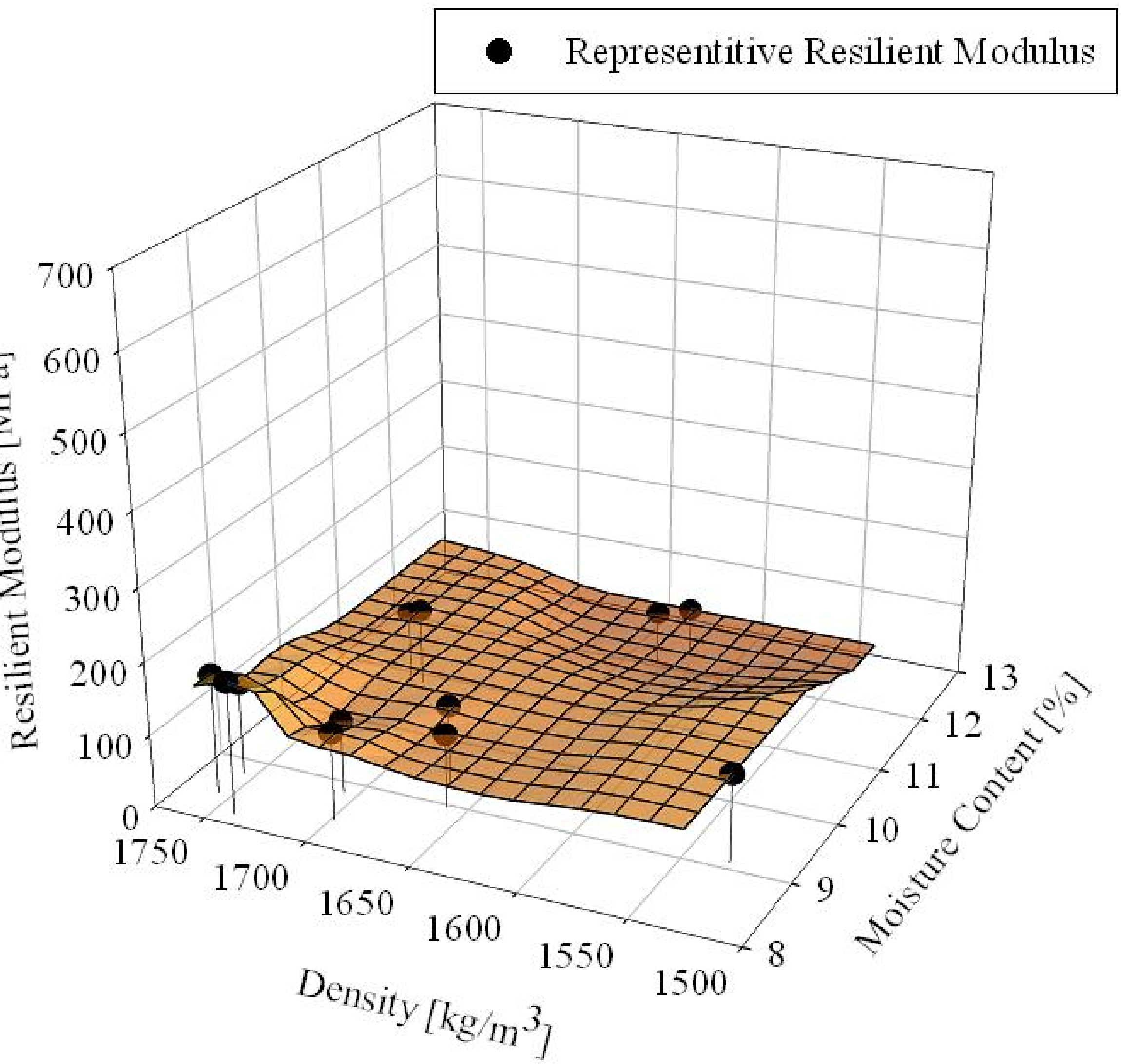


Figure 5.15: Representative resilient modulus for soil C vs. density and moisture content

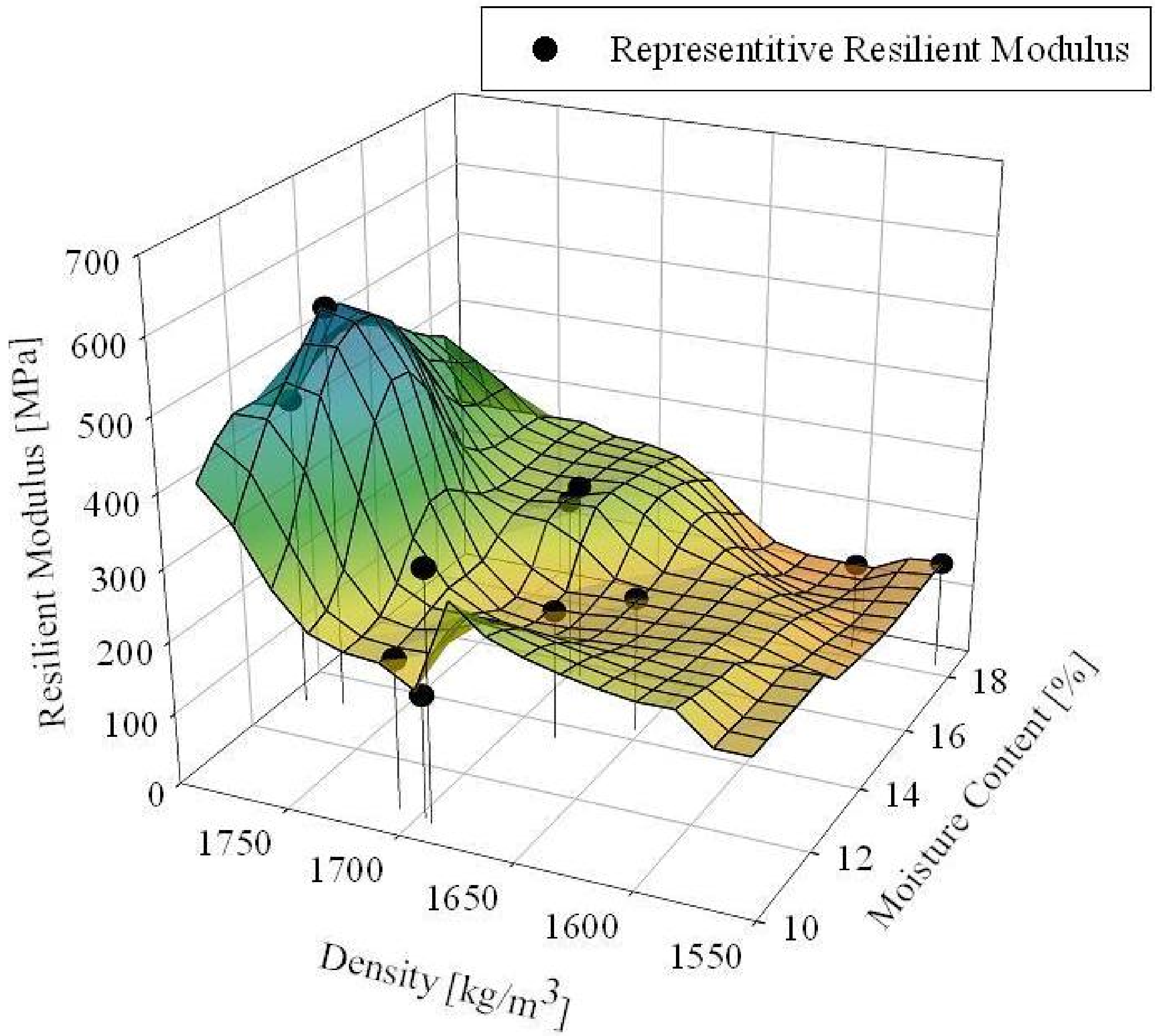


Figure 5.16: Representative resilient modulus for soil D vs. density and moisture content

Table 5.10: Representative, minimum, and maximum resilient modulus values for the cylindrical specimens of A and B

Cylindrical Specimen	w_{act} [%]	ρ_{act} [kg/m^3]	Min. M_r [MPa]	Max. M_r [MPa]	Repr. M_r [MPa]	σ_3 [MPa]	σ_{DEV} [MPa]
A_2_13.5_105	12.4	1798	395	453	427	0.01	0.10
A_1_10.5_105	11.6	1739	406	476	432	0.01	0.07
A_2_10.5_105	11.8	1749	521	724	550	0.01	0.07
A_1_7.5_105	7.6	1779	272	318	272	0.04	0.09
A_2_7.5_105	7.4	1727	344	447	360	0.01	0.07
A_3_15_100	15.8	1740	189	232	206	0.01	0.03
A_4_15_100	15.4	1780	N/A	N/A	N/A	N/A	N/A
A_1_12_100	12.4	1714	377	429	419	0.01	0.09
A_2_12_100	12.2	1720	N/A	N/A	N/A	N/A	N/A
A_1_9_100	10.7	1643	302	573	347	0.01	0.08
A_2_9_100	10.0	1615	259	304	288	0.01	0.07
B_1_24_103	22.9	1542	263	303	271	0.01	0.03
B_2_24_103	23.0	1521	220	272	249	0.01	0.03
B_1_19.5_103	18.5	1479	200	256	232	0.01	0.03
B_2_19.5_103	18.3	1579	101	186	101	0.01	0.03
B_1_16_103	16.5	1579	352	448	387	0.01	0.03
B_2_16_103	16.4	1637	469	530	476	0.01	0.05
B_1_27_98	23.1	1504	186	230	213	0.01	0.03
B_2_27_98	24.0	1445	161	173	169	0.01	0.03
B_1_22_98	21.2	1446	163	210	193	0.01	0.03
B_2_22_98	21.5	1490	232	295	261	0.01	0.05
B_1_16_98	16.0	1393	66	114	76	0.01	0.03
B_2_16_98	16.3	1443	62	112	75	0.01	0.03

*N/A - No data passed Mn/DOT resilient modulus criteria

Table 5.11: Representative, minimum, and maximum resilient modulus values for the cylindrical specimens of C and D

Cylindrical Specimen	w_{act} [%]	ρ_{act} [kg/m^3]	Min. M_r [MPa]	Max. M_r [MPa]	Repr. M_r [MPa]	σ_3 [MPa]	σ_{DEV} [MPa]
C_1_12_103	10.9	1732	92	144	101	0.01	0.05
C_2_12_103	10.9	1726	102	153	108	0.01	0.05
C_1_9.5_103	8.8	1756	114	180	128	0.01	0.05
C_2_9.5_103	9.1	1530	112	189	122	0.01	0.05
C_1_8_103	8.4	1757	166	203	166	0.03	0.10
C_2_8_103	8.2	1740	162	211	184	0.03	0.10
C_1_13_98	12.1	1635	65	119	71	0.01	0.03
C_2_13_98	12.3	1623	69	120	71	0.01	0.03
C_1_10_98	9.3	1669	110	162	110	0.01	0.05
C_2_10_98	9.0	1659	96	150	103	0.01	0.05
C_1_8_98	8.4	1698	98	191	122	0.01	0.02
C_2_8_98	8.8	1707	101	186	101	0.01	0.03
D_1_16_103	15.6	1700	218	298	266	0.01	0.03
D_2_16_103	15.6	1695	236	336	280	0.01	0.02
D_1_13_103	13.1	1791	407	460	429	0.01	0.03
D_2_13_103	13.2	1775	526	600	538	0.01	0.05
D_1_11_103	10.5	1693	306	399	326	0.01	0.03
D_2_11_103	10.6	1697	122	235	131	0.01	0.03
D_1_18_98	18.3	1559	122	198	165	0.01	0.03
D_2_18_98	18.4	1598	92	169	139	0.01	0.03
D_1_14_98	14.3	1653	150	251	188	0.01	0.03
D_2_14_98	13.6	1680	142	237	188	0.01	0.03
D_1_11_98	10.7	1710	146	278	151	0.01	0.05
D_1_11_98	10.7	1710	146	278	294	0.01	0.05

5.3.2 Bender Element

The bender element test used a sine pulse as the input signal. The typical test result for an S-wave is shown in Fig. 5.17. A clear waveform was obtained by filtering the high-frequency noise. However, the first arrival of the S-wave was often masked by an initial deflection due to near field effects. It can be seen that the received signal has the same general form as

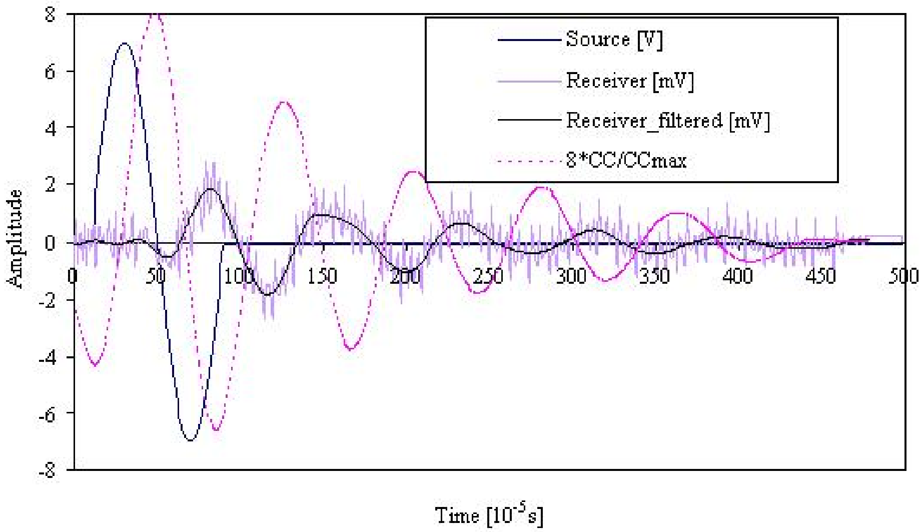


Figure 5.17: Bender element test result for S-wave

the input signal. To help in determining the time of the first arrival, a cross-correlation technique was used. Let $x(t)$ represent the input signal; the received signal $y(t)$ can be taken as a time-shifted copy of $x(t)$. The cross-correlation is defined as:

$$CC(t_s) = \sum_{i=0}^{N_r} x(t_i)y(t_i + t_s) \tag{5.4}$$

where $N_r = T_r \times f_s$, $t_i = \frac{i}{f_s}$, T_r is the record time, f_s is the sampling frequency, and t_s is the time shift. Let $t_s = \frac{n}{f_s}$, n is a shift number. Equation (5.4) can be rewritten as

$$CC(n) = \sum_{i=0}^{N_r} x_i y_{i+n} \tag{5.5}$$

Let n_m denote the shift number that maximizes CC; then the travel time can be computed as $t_s = \frac{n_m}{f_s}$, which graphically corresponds to the location (time) of the maximum of the dashed CC curve in Fig. 5.17. The S-wave velocity can then be calculated as $c_s = \frac{L}{t_s}$, where L is the travel distance and t_s is the estimated travel time. For the P-wave, the analysis procedure is similar; a typical result is shown in Fig. 5.18. To evaluate the quality of the

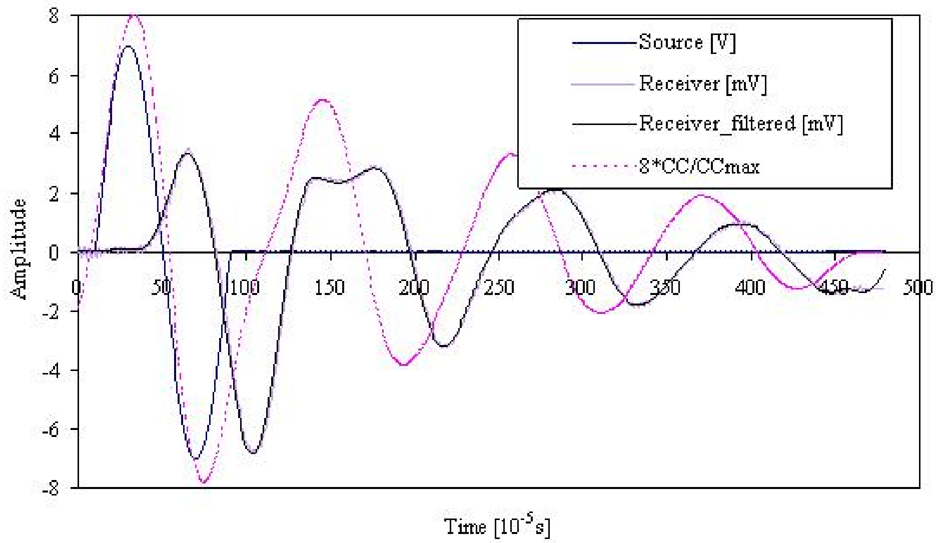


Figure 5.18: Bender element test result for P-wave

received signal, the signal-to-noise ratio (S/N) was calculated from the amplitude of the first peak of the received signal divided by the mean amplitude of the noise. The noise was taken as the difference between the received signal and the filtered signal.

Using the S-wave velocity c_s and the P-wave velocity c_p, the material properties of each specimen can be obtained:

$$c_s = \sqrt{\frac{G}{\rho}} \Longrightarrow G = \rho c_s^2 \tag{5.6}$$

$$\frac{c_p}{c_s} = \sqrt{\frac{2-2\nu}{1-2\nu}} \Longrightarrow \nu = \frac{c_p^2 - 2c_s^2}{2\left(c_p^2 - c_s^2\right)} \tag{5.7}$$

$$c_p = \sqrt{\frac{E(1-\nu)}{\rho(1+\nu)(1-2\nu)}} \Longrightarrow E = \frac{\rho c_p^2 (1+\nu)(1-2\nu)}{1-\nu} \tag{5.8}$$

where E is the Young modulus, ν is the Poisson's ratio, and ρ is the measured mass density of the soil. Tables 5.12–5.15 summarize the bender element results for the 48 cylindrical specimens from the four soils.

Table 5.12: Bender element test results for soil A (Mn/ROAD)

Specimen	ρ [kg/m^3]	p_0 [kPa]	c_s [m/s]	c_p [m/s]	G [MPa]	ν [-]	E [MPa]	ν [-]	E [MPa]	M_r [MPa]	M_r/E [-]	S/N (S-wave)	S/N (P-wave)
A_2_13.5_105	2021	55.2	317		203					445		1.3	
A_2_13.5_105	2021	44.8	312		197							1.7	
A_2_13.5_105	2021	44.1		448		*0.35*	253	*0.20*	365				7.1
A_2_13.5_105	2021	31.7		502		*0.35*	318	*0.20*	459	450	0.98		13.6
A_2_13.5_105	2021	17.9		490		*0.35*	303	*0.20*	438	438	1.00		14.7
A_1_10.5_105	1941	9.7		448		*0.35*	242	*0.20*	350	454	1.30		6.2
A_1_10.5_105	1941	31.0		438		*0.35*	232	*0.20*	336	439	1.31		2.6
A_1_10.5_105	1941	43.4		468		*0.35*	265	*0.20*	383	431	1.13		11.1
A_1_10.5_105	1941	47.6		624		*0.35*	471	*0.20*	681	431	0.63		2.0
A_1_10.5_105	1941	60.7	307		183					442		3.4	
A_1_10.5_105	1941	40.0	275		146					431		7.0	
A_1_10.5_105	1941	24.1	264		135					439		13.9	
A_1_10.5_105	1941	27.6	261		132					439		14.6	
A_2_10.5_105	1955	14.5		502		*0.35*	308	*0.20*	444	573	1.29		2.9
A_2_10.5_105	1955	30.3		515		*0.35*	323	*0.20*	467	614	1.31		4.2
A_2_10.5_105	1955	44.8		665		*0.35*	538	*0.20*	777	625	0.80		4.3
A_2_10.5_105	1955	61.4		687		*0.35*	574	*0.20*	830	668	0.80		3.7
A_2_10.5_105	1955	61.4	361		255					668		3.3	
A_2_10.5_105	1955	35.9	332		216					625		2.7	
A_2_10.5_105	1955	26.2	307		185					614		3.9	
A_2_10.5_105	1955	12.4	294		169					573		4.9	
A_4_15_100	2054	13.8	332		227					211		2.0	
A_1_12_100	1927	15.2		515		*0.35*	318	*0.20*	460	419	0.91		1.9
A_1_12_100	1927	29.6		448		*0.35*	241	*0.20*	348				5.7
A_2_12_100	1930	15.9		429		*0.35*	222	*0.20*	320				8.4
A_2_12_100	1930	24.1		438		*0.35*	231	*0.20*	334				5.0
A_2_12_100	1930	40.7		438		*0.35*	231	*0.20*	334				7.3
A_2_12_100	1930	54.5	349		235							1.1	
A_2_12_100	1930	26.9	271		142							1.8	
A_2_12_100	1930	15.2	271		142							4.1	

Table 5.13: Bender element test results for soil B (TH 23)

Specimen	ρ [kg/m^3]	p_0 [kPa]	c_s [m/s]	c_p [m/s]	G [MPa]	ν [-]	E [MPa]	M_r [MPa]	M_r/E [-]	S/N (S-wave)	S/N (P-wave)
B_1_24_103	1895	13.8	217	449	89	0.35	240	274	1.14	26.2	16.8
B_1_24_103	1895	27.6	217	460	89	0.36	241	293	1.21	1.9	16.7
B_1_24_103	1895	41.4	236	509	105	0.36	287	281	0.98	12.1	14.7
B_1_24_103	1895	55.2	251	539	120	0.36	326	295	0.90	9.0	14.5
B_2_24_103	1871	13.8	213	550	85	0.41	239	258	1.08	30.3	2.5
B_2_24_103	1871	27.6	300	582	168	0.32	444	253	0.57	33.6	5.7
B_2_24_103	1871	41.4	296	683	163	0.38	452	259	0.57	11.2	1.2
B_2_24_103	1871	55.2	291	683	159	0.39	441	259	0.59	6.8	1.3
B_1_19.5_103	1753	13.8	245	509	105	0.35	283	229	0.81	4.6	6.8
B_1_19.5_103	1753	27.6	254	552	113	0.37	310	228	0.74	3.8	3.6
B_1_19.5_103	1753	41.4	272	569	130	0.35	351	235	0.67	4.1	4.4
B_1_19.5_103	1753	55.2	284	624	142	0.37	388	253	0.65	2.8	4.1
B_2_19.5_103	1868	13.8	257	483	124	0.30	322	101	0.31	9.1	25.7
B_2_19.5_103	1868	27.6	264	521	130	0.33	346	120	0.35	6.8	15.1
B_2_19.5_103	1868	41.4	300	535	168	0.27	427	139	0.32	13.0	16.1
B_2_19.5_103	1868	55.2	314	582	185	0.29	478	183	0.38	7.2	15.5
B_1_16_103	1839	13.8	269	539	133	0.33	356	373	1.05	31.0	14.1
B_1_16_103	1839	27.6	242	589	107	0.40	301	392	1.30	37.1	18.2
B_1_16_103	1839	41.4	248	628	113	0.41	319	419	1.31	19.7	15.2
B_1_16_103	1839	55.2	277	628	141	0.38	390	430	1.10	37.1	16.6
B_2_16_103	1904	13.8	380	497	276	N/A	N/A	476	N/A	6.0	35.0
B_2_16_103	1904	27.6	313	554	186	0.27	472	497	1.05	7.7	19.3
B_2_16_103	1904	41.4	313	669	186	0.36	507	507	1.00	16.4	17.0
B_2_16_103	1904	55.2	323	746	199	0.38	551	501	0.91	6.4	20.3
B_1_27_98	1851	13.8	221	375	91	0.23	223	219	0.98	6.0	11.2
B_1_27_98	1851	27.6	227	414	95	0.29	245	225	0.92	9.4	8.9
B_1_27_98	1851	41.4	260	443	125	0.24	309	226	0.73	1.8	4.0
B_1_27_98	1851	55.2	271	513	136	0.31	354	227	0.64	0.9	1.9
B_2_27_98	1791	13.8	227	406	92	0.27	234	170	0.73	1.3	0.4
B_2_27_98	1791	27.6	235	423	99	0.28	252	169	0.67	5.0	0.3
B_1_22_98	1753	13.8	218	461	83	0.36	225	193	0.86	23.5	1.6
B_1_22_98	1753	27.6	230	509	93	0.37	255	196	0.77	4.6	0.9
B_1_22_98	1753	41.4	230	645	93	0.43	266	199	0.75	5.4	0.5
B_1_22_98	1753	55.2	233	668	95	0.43	273	203	0.74	12.7	0.5
B_2_22_98	1811	13.8	231	427	97	0.29	250	258	1.03	5.4	6.9
B_2_22_98	1811	27.6	237	446	101	0.30	265	271	1.03	2.4	6.5
B_2_22_98	1811	41.4	252	468	115	0.30	298	271	0.91	4.7	5.7
B_2_22_98	1811	55.2	255	517	118	0.34	315	280	0.89	3.1	3.9

Table 5.14: Bender element test results for soil C (TH 58)

Specimen	ρ [kg/m^3]	p_0 [kPa]	c_s [m/s]	c_p [m/s]	G [MPa]	ν [-]	E [MPa]	M_r [MPa]	M_r/E [-]	S/N (S-wave)	S/N (P-wave)
C_1_12_103	1920	13.8	206	347	82	0.23	201	99	0.49	11.0	11.4
C_1_12_103	1920	27.6	222	381	95	0.24	236	117	0.50	8.3	12.8
C_1_12_103	1920	41.4	233	421	104	0.28	267	128	0.48	19.9	10.7
C_1_12_103	1920	55.2	248	450	118	0.28	302	141	0.47	12.8	12.1
C_2_12_103	1914	13.8	220	381	93	0.25	231	110	0.48	17.4	19.2
C_2_12_103	1914	27.6	233	404	104	0.25	260	118	0.45	22.8	18.9
C_2_12_103	1914	41.4	244	450	114	0.29	295	138	0.47	22.0	14.9
C_2_12_103	1914	41.4	254	471	123	0.30	320	138	0.43	32.4	14.5
C_1_8_103	1904	13.8	240	468	110	0.32	290	N/A	N/A	4.1	8.9
C_1_8_103	1904	27.6	263	549	132	0.35	356	166	0.47	4.1	9.9
C_1_8_103	1904	41.4	278	640	147	0.38	408	182	0.45	3.8	7.6
C_1_8_103	1904	55.2	291	738	161	0.41	454	197	0.43	2.4	4.0
C_1_13_98	1833	13.8	184	293	62	0.17	146	71	0.48	7.9	6.8
C_1_13_98	1833	27.6	196	315	71	0.18	167	83	0.50	12.0	10.3
C_1_13_98	1833	41.4	212	345	82	0.20	197	102	0.52	4.9	8.8
C_1_13_98	1833	55.2	228	375	95	0.21	230	115	0.50	2.7	4.2
C_1_10_98	1824	13.8	204	347	76	0.24	188	116	0.62	18.6	22.1
C_1_10_98	1824	27.6	228	404	94	0.27	240	129	0.54	13.6	17.5
C_1_10_98	1824	41.4	241	450	106	0.30	276	145	0.53	4.3	14.8
C_1_10_98	1824	55.2	257	483	121	0.30	314	158	0.50	19.9	11.0
C_2_8_98	1858	13.8	240	409	107	0.24	265	101	0.38	1.9	8.6
C_2_8_98	1858	27.6	251	440	117	0.26	294	120	0.41	1.7	5.9
C_2_8_98	1858	41.4	265	507	130	0.31	342	139	0.4	1.3	4.8

Table 5.15: Bender element test results for soil D (TH 32)

Specimen	ρ [kg/m^3]	p_0 [kPa]	c_s [m/s]	c_p [m/s]	G [MPa]	ν [-]	E [MPa]	M_r [MPa]	M_r/E [-]	S/N (S-wave)	S/N (P-wave)
D_1_16_103	1966	13.8	227	475	101	0.35	274	265	0.97	2.3	12.1
D_1_16_103	1966	27.6	246	499	119	0.34	320	271	0.85	4.2	12.8
D_1_16_103	1966	41.4	259	570	132	0.37	362	280	0.77	3.2	12.9
D_2_16_103	1959	13.8	316	505	195	0.18	460	288	0.63	4.2	10.2
D_2_16_103	1959	27.6	342	561	230	0.20	553	304	0.55	5.2	10.2
D_2_16_103	1959	41.4	354	652	246	0.29	635	310	0.49	3.7	6.4
D_2_16_103	1959	55.2	348	721	238	0.35	641	321	0.50	4.0	6.1
D_1_13_103	2025	13.8	310	N/A	194	N/A	N/A	438	N/A	5.7	N/A
D_1_13_103	2025	27.6	324	611	213	0.30	555	442	0.80	7.8	17.8
D_1_13_103	2025	41.4	364	830	269	0.38	742	448	0.60	8.6	24.6
D_1_13_103	2025	55.2	371	N/A	278	N/A	N/A	444	N/A	18.0	N/A
D_2_13_103	2010	13.8	327	634	215	0.32	566	548	0.97	4.5	28.0
D_2_13_103	2010	27.6	349	774	244	0.37	670	556	0.83	6.3	20.2
D_2_13_103	2010	41.4	410	836	338	0.34	907	582	0.64	5.1	18.3
D_2_13_103	2010	55.2	427	1101	366	0.41	1033	572	0.55	4.5	0.8
D_1_11_103	1870	13.8	276	619	143	0.38	393	331	0.84	10.9	32.7
D_1_11_103	1870	27.6	296	705	164	0.39	457	363	0.79	10.9	22.3
D_1_11_103	1870	41.4	305	730	174	0.39	485	380	0.78	2.0	19.3
D_1_11_103	1870	55.2	359	818	241	0.38	664	391	0.59	2.1	14.4
D_2_11_103	1877	13.8	245	461	112	0.30	293	129	0.44	13.5	10.2
D_2_11_103	1877	27.6	267	521	134	0.32	354	164	0.46	19.1	15.6
D_2_11_103	1877	41.4	308	564	178	0.29	457	200	0.44	9.9	15.4
D_2_11_103	1877	55.2	344	752	222	0.37	608	232	0.38	8.1	12.4
D_1_18_98	1844	27.6	179	464	56	0.41	167	180	1.08	2.5	1.4
D_1_18_98	1844	41.4	182	486	61	0.42	174	183	1.05	2.4	0.7
D_1_18_98	1844	55.2	189	474	66	0.41	185	185	1.00	0.9	0.6
D_2_18_98	1891	13.8	237	N/A	106	N/A	N/A	140	N/A	N/A	N/A
D_2_18_98	1891	27.6	251	413	119	0.21	288	146	0.51	9.6	6.2
D_2_18_98	1891	41.4	257	439	125	0.24	310	155	0.50	4.6	3.0
D_2_18_98	1891	55.2	277	514	145	0.29	376	161	0.43	1.7	1.5
D_1_14_98	1889	13.8	232	439	102	0.31	266	219	0.82	2.7	6.3
D_1_14_98	1889	27.6	240	470	109	0.32	289	225	0.78	2.5	6.9
D_1_14_98	1889	41.4	306	505	177	0.21	428	226	0.53	3.1	5.2
D_1_14_98	1889	55.2	326	594	201	0.28	515	227	0.44	4.0	4.3
D_2_14_98	1908	13.8	321	423	197	N/A	N/A	195	N/A	3.1	10.0
D_2_14_98	1908	27.6	337	485	217	N/A	N/A	194	N/A	2.4	5.5
D_2_14_98	1908	41.4	321	524	197	0.20	471	199	0.42	3.1	4.6
D_2_14_98	1908	55.2	326	585	203	0.27	518	204	0.39	3.1	4.3
D_1_11_98	1893	13.8	251	447	119	0.27	303	155	0.51	12.4	5.1
D_1_11_98	1893	27.6	279	609	147	0.37	403	201	0.50	7.1	8.4
D_1_11_98	1893	41.4	309	670	181	0.36	494	233	0.47	7.3	11.0
D_1_11_98	1893	55.2	341	804	220	0.39	611	273	0.45	4.3	3.1
D_2_11_98	1911	13.8	234	543	104	0.39	289	294	1.02	5.2	33.0
D_2_11_98	1911	27.6	258	648	127	0.41	357	N/A	N/A	1.1	17.2
D_2_11_98	1911	41.4	275	693	145	0.41	407	450	1.10	1.9	15.3
D_2_11_98	1911	55.2	279	804	149	0.43	426	N/A	N/A	2.2	17.4

5.3.3 Shear Strength

The cylindrical specimens were strength tested at the confining pressure of either 28 kPa (4.0 psi) or 55 kPa (8.0 psi) following the resilient modulus testing sequence. Table 5.16 summarizes the results from strength testing in terms of the quantities listed:

Length= actual length of the cylindrical specimen [mm]

$w_{\mathbf{targ}}^{\mathbf{box}} =$ target moisture content for the prismatic sample [%]

$\mathrm{P}_{MAX} =$ maximum load at specimen failure [N]

$\delta_{MAX} =$ axial deformation at maximum load [mm]

$\varepsilon_{MAX} =$ maximum strain at specimen failure [-]

$\sigma_{MAX} = \frac{P_{MAX}}{\text{specimen area}}$ [kPa]

$\sigma_3 =$ confining pressure [kPa]

$\sigma_1 = \sigma_3 + \sigma_{MAX}$ [kPa]

$\beta_{\mathbf{f}} =$ orientation of the failure plane from the σ_3-direction [deg]

$\phi_{obs} = 2 * (\beta_{\mathrm{f}} - 45^{\mathrm{o}})$ [deg]

$c_{calc} = \frac{\sigma_1 - \sigma_3 k_p}{2\sqrt{k_p}}$ [kPa]

$\phi_{calc} = \sin^{-1}\left(\frac{k_p - 1}{k_p + 1}\right)\frac{180}{\pi}$ [deg]

The two cylindrical specimens from one prismatic sample were required to be tested in order to calculate k_p (slope of the failure envelope plotted in the principal stress plane), cohesion c and friction angle ϕ_{calc}. However, some specimens prematurely broke while handling them for strength testing; these are identified in Table 5.16 by hyphens. Typically, lower moisture contents, higher densities and larger confining pressures resulted in larger σ_{MAX} values. For the actual density and moisture content information, refer to Table 5.2.

Table 5.16: Shear strength results for soils A, B, C and D

Specimen	Length [mm]	w_{Act} [%]	ρ_{Act} [kg/m^3]	P_{MAX} [N]	δ_{MAX} [mm]	ε_{MAX} [-]	σ_{MAX} [kPa]	σ_3 [kPa]	σ_1 [kPa]	ϕ_{obs} [deg.]	c_{calc} [kPa]	ϕ_{calc} [deg.]
A_1_135_105	-	-		-	-	-	-	-	-	-	-	-
A_2_135_105	200	12.4	1798	7189	0.020	9.8E-05	947	64	1011	40		
A_1_105_105	203	11.6	1739	5962	0.005	2.6E-05	786	28	813	-	-	-
A_2_105_105	203	11.8	1749	13	0.022	1.1E-04	2	28	813	50		
A_1_7.5_100	-	7.6	1779	-	-	-	-	-	-	0	-	-
A_2_7.5_100	-	7.4	1727	-	-	-	-	-	-	-		
A_4_15_100	200	15.8	1740	3475	0.006	3.0E-05	458	55	513	40	64	39
A_3_15_100	203	15.4	1780	2758	0.020	1.0E-04	363	28	391	40		
A_1_12_100	203	12.4	1714	5462	0.005	2.7E-05	720	28	747	40	-	-
A_2_12_100	203	12.2	1720	5017	0.007	3.3E-05	661	55	716	-		
A_1_9_100	203	10.7	1643	1640	0.034	1.7E-04	216	28	244	-	-	-
A_2_9_100	-	10.0	1615	-	-	-	-	-	-	-		
B_1_24_103	191	22.9	1542	4843	0.012	6.2E-05	638	55	693	20	212	18
B_2_24_103	200	23.0	1521	4441	0.016	8.0E-05	585	28	640	10		
B_1_195_103	195	18.5	1479	4452	0.005	2.4E-05	587	28	614	*0*	72	50
B_2_195_103	200	18.3	1579	5853	0.007	3.7E-05	771	55	826	20		
B_1_16_103	191	16.5	1579	9133	0.010	5.1E-05	1203	55	1259	-	-	-
B_1_16_103	-	16.4	1637	-	-	-	-	-	-	-		
B_1_27_98	197	23.1	1504	3627	0.016	7.9E-05	478	55	533	10	61	41
B_2_27_98	203	24.0	1445	2834	0.008	4.2E-05	373	28	401	0		
B_1_22_98	196	21.2	1446	3475	0.013	6.6E-05	458	55	513	30	-	-
B_2_22_98	198	21.5	1490	3812	0.011	5.5E-05	502	28	530	0		
B_1_16_98	-	16.0	1393	-	-	-	-	-	-	-	-	-
B_2_16_98	205	16.3	1443	2476	0.020	9.8E-05	326	55	381	65		
C_1_12_103	200	10.9	1732	3540	0.013	6.4E-05	467	55	522	-	119	26
C_2_12_103	197	10.9	1726	3214	0.009	4.8E-05	424	28	451	50		
C_1_95_103	202	8.8	1756	3746	0.008	4.0E-05	494	55	549	50	97	33
C_2_95_103	202	9.1	1530	3236	0.007	3.6E-05	426	28	454	40		
C_1_8_103	194	8.4	1757	4637	0.021	1.1E-04	611	55	666	50	138	31
C_2_8_10	173	8.2	1740	4181	0.007	4.1E-05	551	28	579	50		
C_1_13_98	216	12.1	1635	2280	0.019	9.0E-05	301	55	356	40	49	32
C_2_13_98	205	12.3	1623	1814	0.027	1.3E-04	239	28	267	40		
C_1_10_98	203	9.3	1669	3540	0.013	6.4E-05	467	55	522	50	23	49
C_2_10_98	162	9.0	1659	2237	0.009	5.7E-05	295	28	322	40		
C_1_8_98	237	8.4	1698	2997	0.014	5.8E-05	395	55	450	-	118	20
C_2_8_98	210	8.8	1707	2780	0.011	5.0E-05	366	28	394	40		
D_1_16_103	202	15.6	1700	6331	0.023	1.2E-04	834	55	889	36	198	32
D_2_16_103	204	15.6	1695	5864	0.017	8.2E-05	773	28	800	40		
D_1_13_103	210	13.1	1791	9306	0.011	5.1E-05	1226	55	1282	30	-	-
D_2_13_103	211	13.2	1775	9991	0.012	5.5E-05	1317	28	1344	30		
D_1_11_103	206	10.5	1693	9578	0.015	7.0E-05	1262	55	1317	-	100	57
D_2_11_103	205	10.6	1697	7374	0.011	5.3E-05	972	28	999	30		
D_1_18_98	206	18.3	1559	3312	0.035	1.7E-04	436	55	492	40	55	40
D_2_18_98	213	18.4	1598	2552	0.016	7.7E-05	336	28	364	50		
D_1_14_98	205	14.3	1653	4485	0.012	6.0E-05	591	55	646	30	-	-
D_2_14_98	203	13.6	1680	4724	0.014	6.7E-05	622	28	650	36		
D_1_11_98	203	10.7	1710	4094	0.013	6.2E-05	485	55	541	-	-	-
D_2_11_98	203	10.7	1726	7460	0.024	1.2E-04	983	28	1011	-		

5.4 Field-Type Tests on Prismatic Samples

This section summarizes the results from the GeoGauge, PRIMA, Modified LWD, PVD and DCP tests performed on prismatic soil samples for four soils, two densities and three moisture contents for a total of 24 tests.

5.4.1 GeoGauge

The GeoGauge tests on every prismatic soil sample were preceded by the verification test (Appendix K) using the supplied reference mass. As an illustration, Fig. 5.19 shows the apparent stiffness variation over the frequency range 100–196 Hz and a line indicating the mean value stemming from one such test. Theoretically, this variation should be a quadratic function of the vibration frequency.

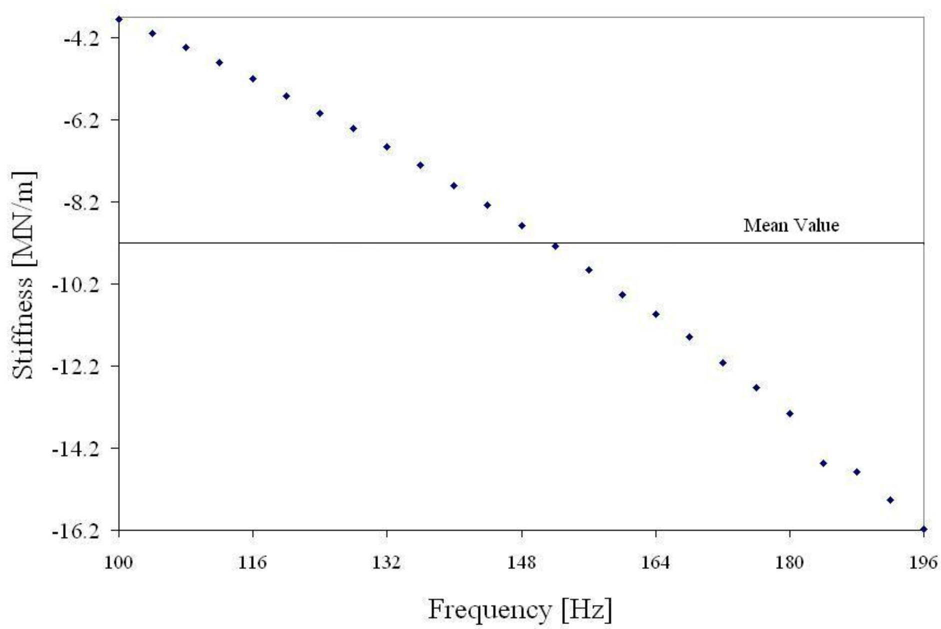


Figure 5.19: GeoGauge stiffness readings on verification mass

When testing soil samples, the average stiffness H_{SG} is displayed on the device after the completion of every vibration test. On the basis of this quantity, the soil's Young's modulus is calculated as

$$E = H_{SG} * \frac{(1 - \nu^2)}{1.77 * R} \tag{5.9}$$

where E = Young's modulus (MPa); H_{SG} = GeoGauge reading (MN/m); ν = Poisson's ratio; R = radius of the annular GeoGauge footing (57.15 mm or 2.25 in.) [6]. The Young's modulus is determined from a spreadsheet supplied by Humboldt that utilizes 5.9 where H_{SG} is calculated from the in-phase (real) and out-of-phase (imaginary) force and displacement data from each of the 25 sampling frequencies (100–196 Hz) and a Poisson's ratio of 0.40. As an illustration, Fig. 5.20 shows the GeoGauge-soil stiffness for Soil A and a line indicating the mean value with the target water content of 13.5% and target standard Proctor density of 105%. It is the preference of the author to summarize the GeoGauge results for all soils, moisture contents, and densities in Fig. 5.21 showing the medians and variation of the Young's modulus estimates for each prismatic sample. The data show a significant variability of the modulus estimates for soils A and D. In contrast, the variation in the Young's modulus values for soils B and C is not as great. This observation is consistent with that in [11]. For completeness, Table 5.17 explicitly lists the values from Fig. 5.21. Note that for all tests in Table 5.17, the GeoGauge footing was in *direct contact* with the soil, and Table 5.18 are GeoGauge results for soil D with a thin layer of sand between the footing and compacted soil.

To assess the effect of contact conditions, additional sets of tests were performed with a thin sand layer between the soil and the footing as a means to achieve full contact. As an example, Fig. 5.22 shows the comparison of the Young's modulus estimates with and without the contact sand layer for soil D. It is evident that the presence of the contact layer results in an increase of the apparent Young's modulus of the soil.

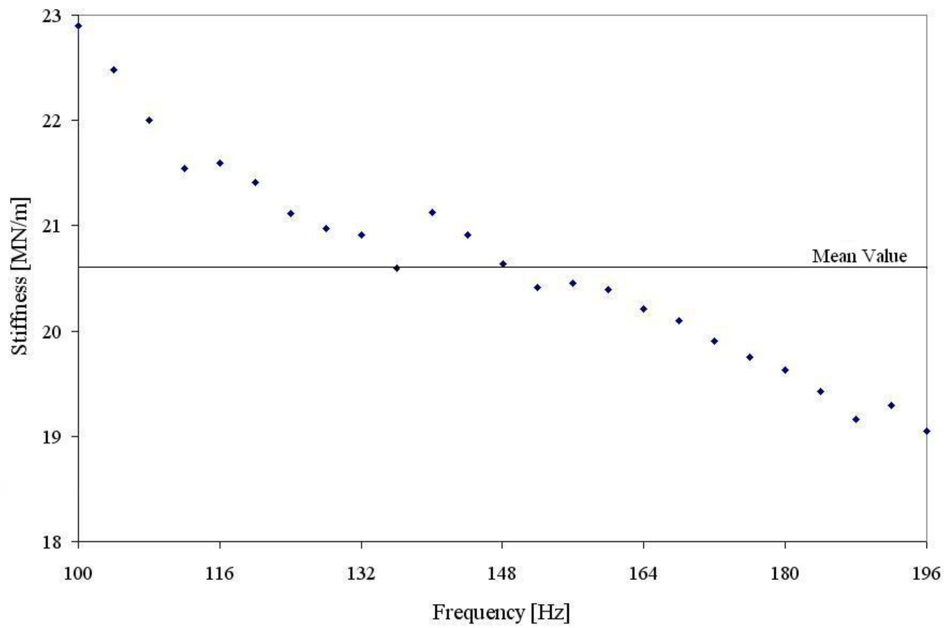


Figure 5.20: GeoGauge stiffness measurements on soil A: $w_{\text{targ}} = 13.5\%$, 105% target standard Proctor

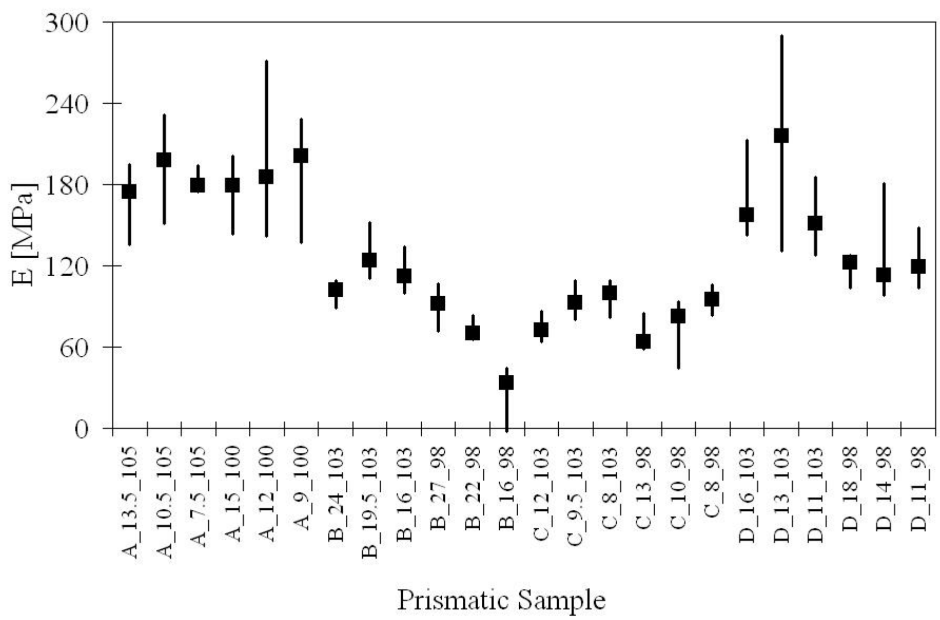


Figure 5.21: Young's modulus (median and range) values from GeoGauge tests: soils A, B, C, and D

Table 5.17: High, low, median, mean, and COV values for GeoGauge tests: soils A, B, C, and D without sand

Prismatic Sample	E_{HIGH} [MPa]	E_{LOW} [MPa]	E_{MEDIAN} [MPa]	Mean [Mpa]	COV [%]
A_13.5_105	195	136	174	174	10
A_10.5_105	231	151	198	202	15
A_7.5_105	194	174	180	182	5
A_15_100	201	144	179	176	12
A_12_100	271	142	185	190	20
A_9_100	229	137	201	192	18
B_24_103	109	89	102	100	7
B_19.5_103	152	111	124	127	10
B_16_103	134	100	112	113	11
B_27_98	107	72	92	89	16
B_22_98	83	66	70	73	9
B_16_98	44	-2	33	29	53
C_12_103	87	64	72	74	10
C_9.5_103	109	80	93	93	9
C_8_103	109	82	99	98	10
C_13_98	85	59	64	67	15
C_10_98	94	45	83	71	28
C_8_98	106	83	95	96	9
D_16_103	212	143	157	165	14
D_13_103	290	131	216	212	25
D_11_103	186	128	151	157	14
D_18_98	128	103	123	119	7
D_14_98	181	98	113	128	23
D_11_98	148	104	120	124	13

Table 5.18: High, low, median, mean, and COV values for GeoGauge with sand for soil D

Prismatic Sample	E_{HIGH} [MPa]	E_{LOW} [MPa]	E_{MEDIAN} [MPa]	E_{MEAN} [Mpa]	COV [%]
D_16_103_sand	242	205	224	225	6
D_13_103_sand	298	229	281	270	10
D_11_103_sand	279	192	258	253	10
D_18_98_sand	151	126	146	144	5
D_14_98_sand	177	152	166	165	5
D_11_98_sand	241	143	205	201	14

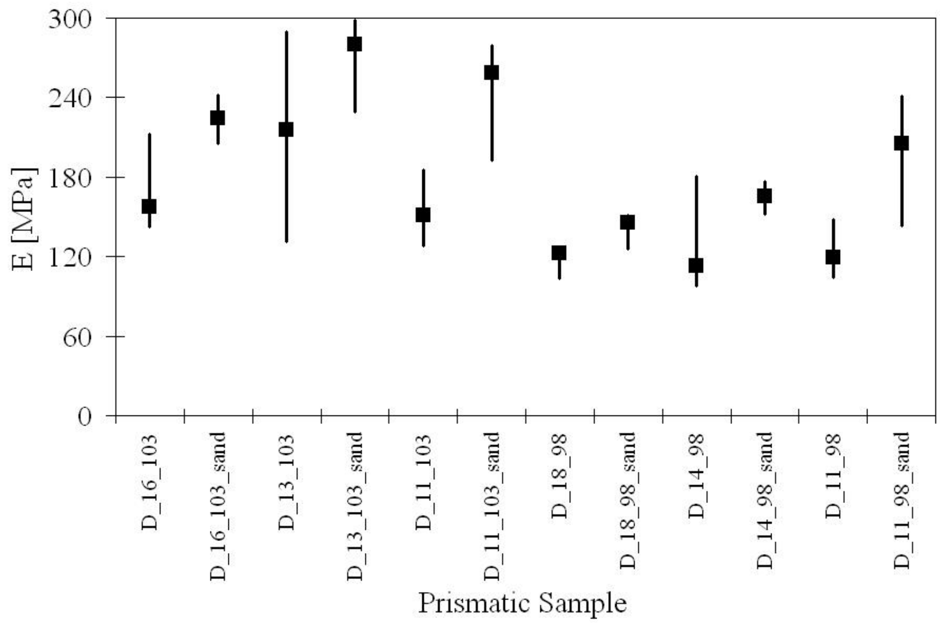


Figure 5.22: Effect of the contact sand layer on the Young's modulus values from GeoGauge tests: soil D

5.4.2 PRIMA and Modified LWD

Each prescribed location (see Fig. 4.15) on the surface of the prismatic sample was tested using the PRIMA 100 and Modified LWD devices. The results for each location were obtained by calculating the mean of three test replicates. Each (standard) PRIMA test was performed at three different drop heights, namely 100 mm, 500 mm, and 900 mm (see Appendix E). Five drops occured at each height. The first two drops at each drop height were used to seat the device. The following three drops were included in the analysis.

Two methods were used in analyzing data: the peak to peak (P2P) method and the frequency response function (FRF) technique. In the peak to peak method, the values corresponding to the maximum force and the maximum deflection were used to calculate the

LWD-soil stiffness according to

$$k = \frac{F_{PEAK}}{x_{PEAK}} \tag{5.10}$$

In the FRF method, a discrete Fast Fourier Transform (DFT) was applied to the time histories of both force and deflection records. By examining the ratio of the cross-spectral and power spectral density functions of the DFT, the frequency response function was determined. Due to inherent limitations of the device's internal geophone, the low frequency range (< 20 Hz) of the motion measurements was characterized by a low SNR ratio and excluded from the analysis. To mitigate the problem, a single-degree-of-freedom (SDOF) system model was fit to experimental data in the range of 20-50 Hz and extrapolated through the "noisy" region. This fitting process resulted in the calculation of the SDOF's spring constant, identified with the static stiffness, k^{st}, of the PRIMA-soil system (see Section 3.1).

Regardless of the method for estimating the stiffness of the PRIMA-soil system, the soil's Young's modulus is computed as

$$E = 4I_s \frac{(1-\nu^2)}{\pi d} * k^* \tag{5.11}$$

where $k^* = k = F_{PEAK}/x_{PEAK}$ for the P2P method, and $k^* = k^{\text{st}}$ following the FRF approach. Here again the assumed value of the flexibility factor is $I_s = 1$, the Poisson's ratio is taken as $\nu = 0.4$, and d is the diameter of the loading plate. Tables 5.19 and 5.20 summarize the Young's modulus estimates stemming respectively from the PRIMA 100 and the Modified LWD device. The maximum, minimum, and median values for these tables combine all drop heights per location and all drops on the respective soil sample. For both devices, the modulus estimates are computed using the alternative P2P and FRF methods.

The gray cells indicate the tests performed using the modified Keros LWD device, and white cells indicate tests from the modified Carl Bro LWD device. For completeness, Figs. 5.23-5.38 show the FRF and P2P estimates for both PRIMA 100 and Modified LWD, three

Table 5.19: Maximum, minimum, and median Young's modulus estimates combining all drop heights from PRIMA 100 device: P2P and FRF methods

Prismatic Sample	$E_{P2P(MAX)}$ [MPa]	$E_{P2P(MIN)}$ [MPa]	$E_{P2P(MED)}$ [MPa]	$E_{FRF(MAX)}$ [MPa]	$E_{FRF(MIN)}$ [MPa]	$E_{FRF(MED)}$ [MPa]
A_13.5_105	305	259	265	205	120	166
A_10.5_105	-	-	-	-	-	-
A_7.5_105	-	-	-	-	-	-
A_15_100	51	44	48	1040	232	511
A_12_100	213	196	210	273	222	240
A_9_100	237	217	228	229	211	224
B_24_103	-	-	-	-	-	-
B_19.5_103	246	158	195	339	212	262
B_16_103	235	142	185	388	196	280
B_27_98	207	116	166	429	247	312
B_22_98	118	44	77	1201	320	665
B_16_98	-	-	-	-	-	-
C_12_103	118	52	83	951	430	671
C_9.5_103	128	72	92	807	389	616
C_8_103	223	125	165	457	233	325
C_13_98	-	-	-	-	-	-
C_10_98	91	34	56	1857	522	984
C_8_98	191	67	104	870	263	506
D_16_103	241	149	176	389	202	265
D_13_103	458	279	389	230	81	164
D_11_103	434	350	396	203	110	146
D_18_98	188	64	108	1041	232	511
D_14_98	173	105	144	527	268	359
D_11_98	278	188	236	297	154	217

Table 5.20: Maximum, minimum, and median Young's modulus estimates from Modified LWD device: P2P and FRF methods

Prismatic Sample	$E_{P2P(MAX)}$ [MPa]	$E_{P2P(MIN)}$ [MPa]	$E_{P2P(MED)}$ [MPa]	$E_{FRF(MAX)}$ [MPa]	$E_{FRF(MIN)}$ [MPa]	$E_{FRF(MED)}$ [MPa]
A_13.5_105	-	-	-	-	-	-
A_10.5_105	-	-	-	-	-	-
A_7.5_105	-	-	-	-	-	-
A_15_100	-	-	-	-	-	-
A_12_100	-	-	-	-	-	-
A_9_100	-	-	-	-	-	-
B_24_103	142	79	115	138	39	69
B_19.5_103	203	56	153	191	71	148
B_16_103	-	-	-	-	-	-
B_27_98	198	145	157	201	139	161
B_22_98	645	290	360	253	125	173
B_16_98	-	-	-	-	-	-
C_12_103	129	119	119	84	76	76
C_9.5_103	149	140	142	126	65	86
C_8_103	249	158	198	209	85	141
C_13_98	97	77	83	58	44	52
C_10_98	110	59	99	103	38	48
C_8_98	2025	240	776	215	76	125
D_16_103	689	161	392	389	202	265
D_13_103	698	61	380	575	337	431
D_11_103	556	112	429	473	294	404
D_18_98	740	91	215	454	103	225
D_14_98	-	-	-	-	-	-
D_11_98	1121	87	680	454	258	307

drop heights, and three testing locations. Note that some of the data from the prismatic soil samples were excluded from the figures due to unacceptable SNR because time histories could not be interpreted. This can be partially attributed to the internal resonance phenomena, the so-called "box effect", associated with the limited size and high stiffness of the samples tested. In particular, Figs. 5.23-5.38 include only one density-moisture combination for soil A, four for soil B, five for soil C, and six for soil D. From the trendlines, it appears that the FRF method of interpretation may not be suitable for the PRIMA 100 device on box samples, as it indicates the increase in modulus with the increase in strain (drop height). One of the possible reasons for this apparent behavior is that the falling weight typically produces impacts with higher energy and lower frequency content then the hammer tap thus possibly resulting in amplification of the "box effect". In contrast, the FRF method in combination with the Modified LWD device is expected to yield the most consistent estimates of the small strain Young's modulus from any of the field testing devices in this study.

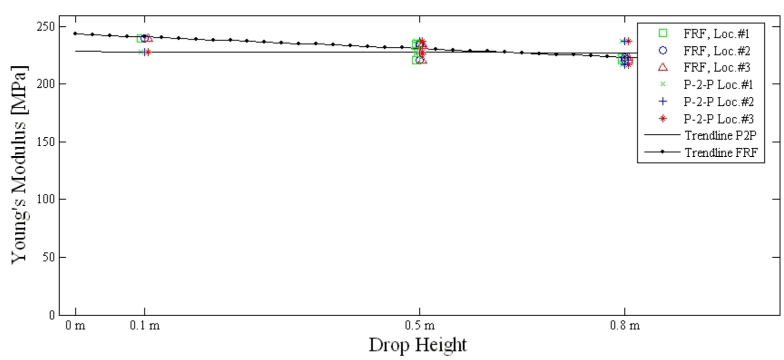


Figure 5.23: Young's modulus values from PRIMA test (A_9_100)

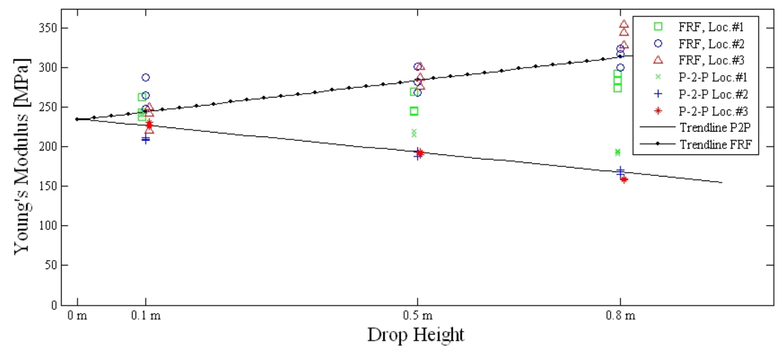


Figure 5.24: Young's modulus values from PRIMA test (B_19.5_103)

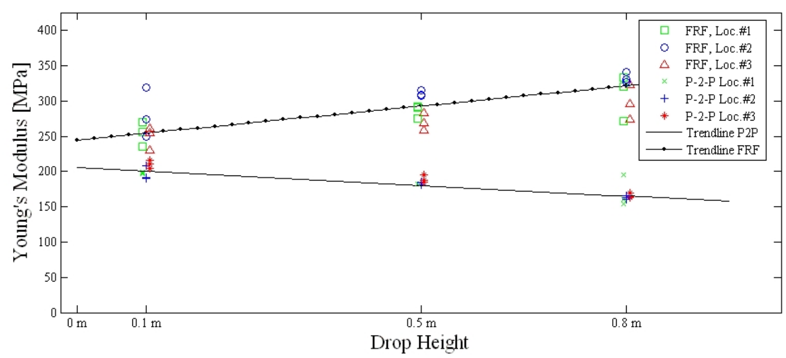


Figure 5.25: Young's modulus values from PRIMA test (B_16_103)

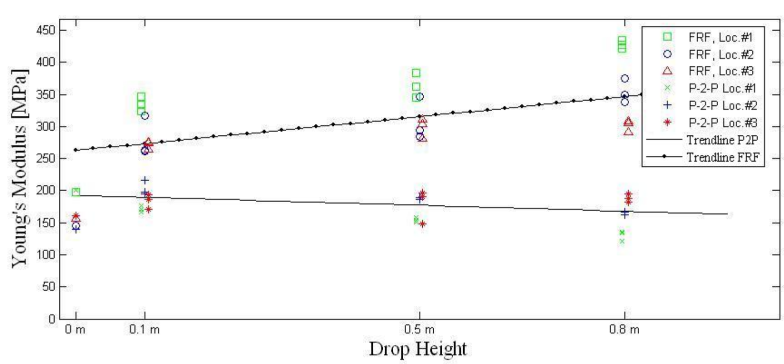


Figure 5.26: Young's modulus values from PRIMA and Modified LWD tests (B_27_98)

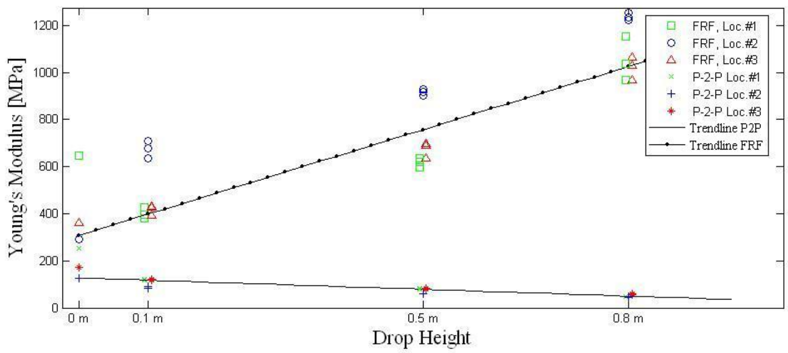


Figure 5.27: Young's modulus values from PRIMA and Modified LWD tests (B_22_98)

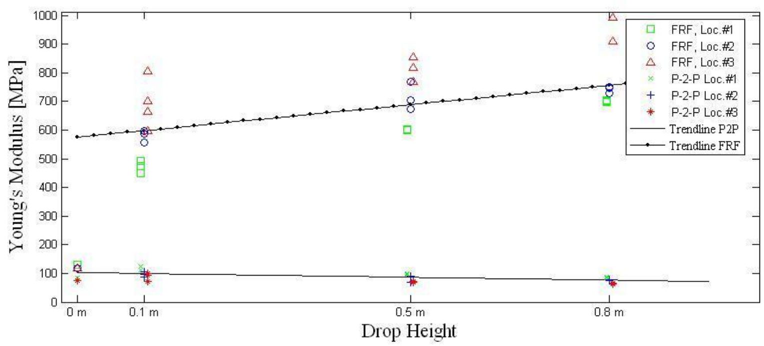


Figure 5.28: Young's modulus values from PRIMA and Modified LWD tests (C_12_103)

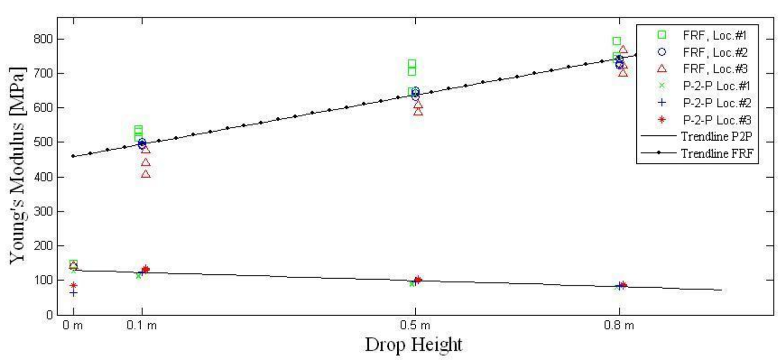


Figure 5.29: Young's modulus values from PRIMA and Modified LWD tests (C_9.5_103)

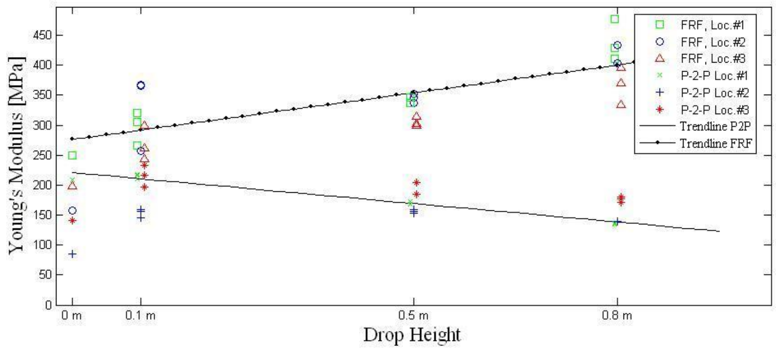


Figure 5.30: Young's modulus values from PRIMA and Modified LWD tests (C_8_103)

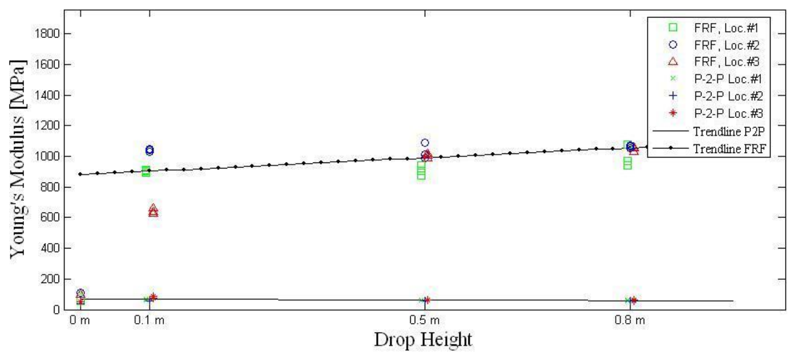


Figure 5.31: Young's modulus values from PRIMA and Modified LWD tests (C_10_98)

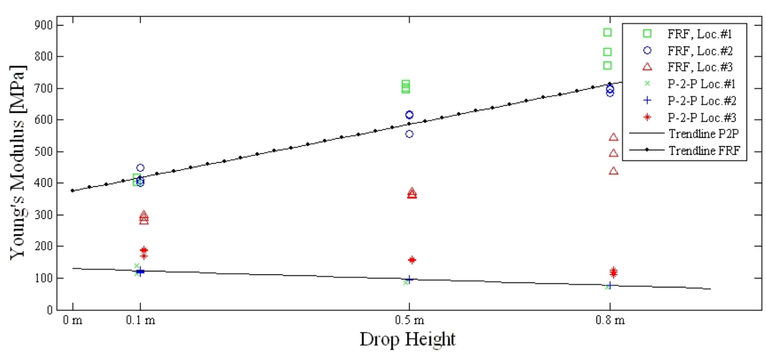


Figure 5.32: Young's modulus values from PRIMA test (C_8_98)

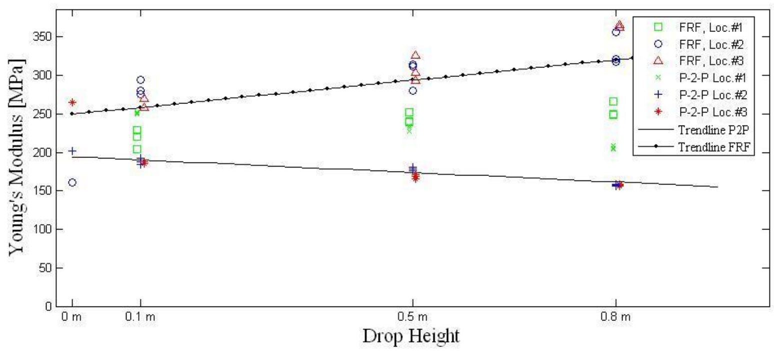


Figure 5.33: Young's modulus values from PRIMA and Modified LWD tests (D_16_103)

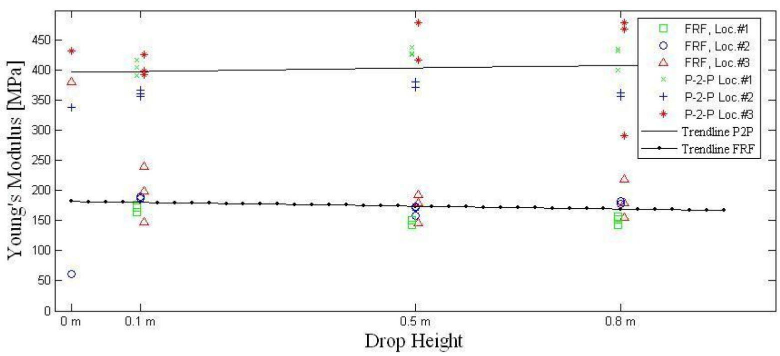


Figure 5.34: Young's modulus values from PRIMA and Modified LWD tests (D_13_103)

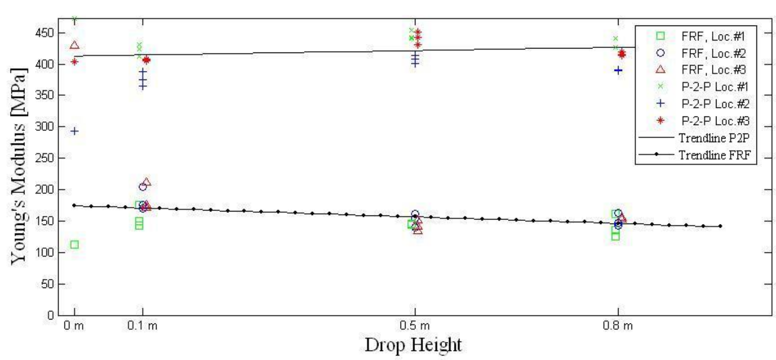


Figure 5.35: Young's modulus values from PRIMA and Modified LWD tests (D_11_103)

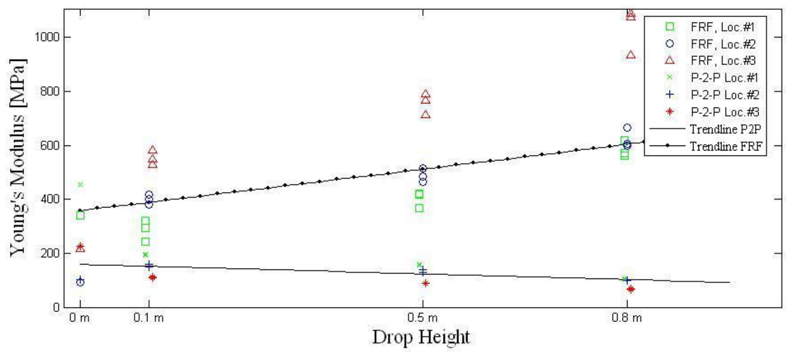


Figure 5.36: Young's modulus values from PRIMA and Modified LWD tests (D_18_98)

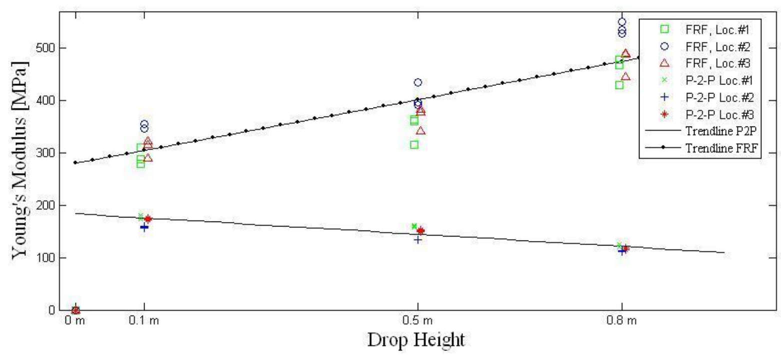


Figure 5.37: Young's modulus values from PRIMA test (D_14_98)

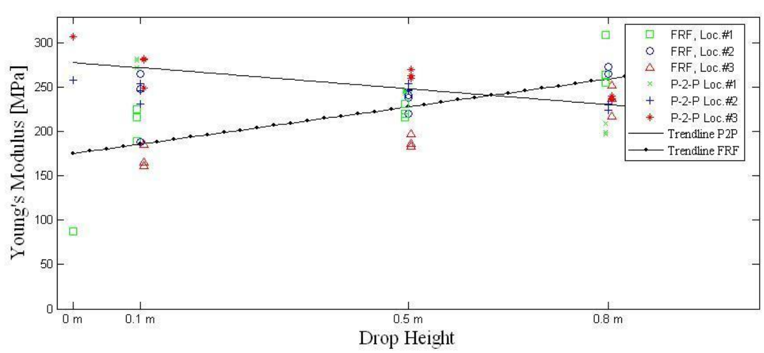


Figure 5.38: Young's modulus values from PRIMA and Modified LWD tests (D_11_98)

5.4.3 Portable Vibratory Deflectometer (PVD)

During PVD testing, two accelerometers mounted on the PVD loading plate were used to trace the disk acceleration, while the applied, vibratory load was measured by a load cell. Spectrum analyzer Siglab 20-42 generated the discrete Fourier transform (DFT) of the acceleration and force records. A Matlab 7.0 script was used to compute the ratio of the induced plate acceleration and applied force in the frequency domain to determine the FRFs corresponding to each accelerometer. The FRFs from the two accelerometers were averaged to obtain the measured accelerance, less the mass of the PVD's vibrating footing. Using an initial estimate of the soil's shear modulus, the dimensionless theoretical data were "unwrapped" to compute the dimensionless theoretical compliance function. This function was further used to fit the theoretical accelerance to the measured accelerance by varying the soil's shear modulus. Finally, the Young's modulus was estimated from the "optimal" shear modulus, G^{opt}, assuming $\nu = 0.4$ for the Poisson's ratio so that

$$E = 2G^{\text{opt}}(1+\nu) = 2.8\, G^{\text{opt}} \tag{5.12}$$

Figure 5.39 shows an example fit between the experimental and fitted accelerance functions for Soil B ($w_{\text{targ}} = 19.5\%$, 103% target standard Proctor). The frequency range chosen for analysis was characterized by satisfactory SNR. For completeness, the actual values are listed in Table 5.21. The Young's modulus estimates from PVD testing are summarized in Fig. 5.40 and Table 5.21 which lists the high, median and low Young's modulus values for the prismatic samples. Note that the data for soil-moisture-density combinations with an unacceptable SNR in terms of the force and acceleration measurements (mostly those for Soil A) are excluded. A second, perhaps more important observation is that the listed Young's modulus estimates (i.e. those stemming from the measurements with acceptable SNR) are characterized by the values that are significantly smaller than those obtained from other field testing devices. A likely reason for such deviation is a relatively low stiffness of the PVD testing frame compared to that of the prismatic soil specimens [24]. If this hypothesis is correct, it can be further concluded that the utility of the PVD device in its present form may be limited to soils with a Young's modulus on the order of 100 MPa or less.

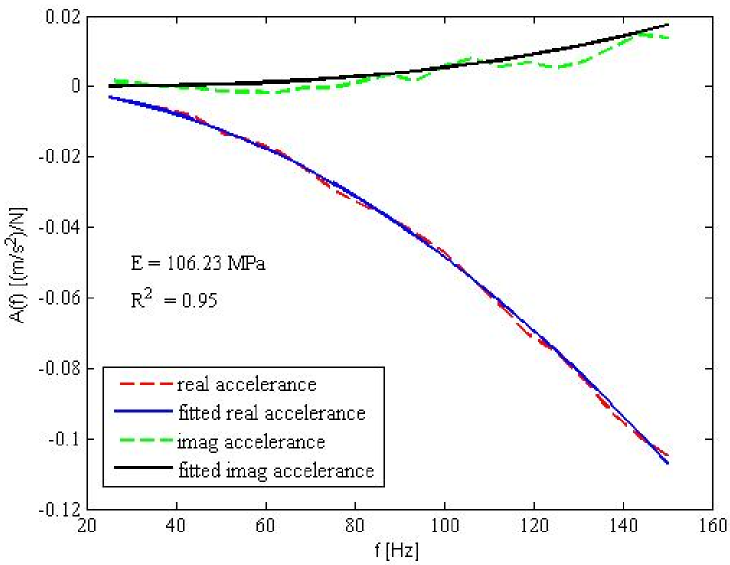


Figure 5.39: Experimental and fitted accelerance functions, Soil B (w_{targ} = 19.5%, 103% target Proctor) at testing location 2

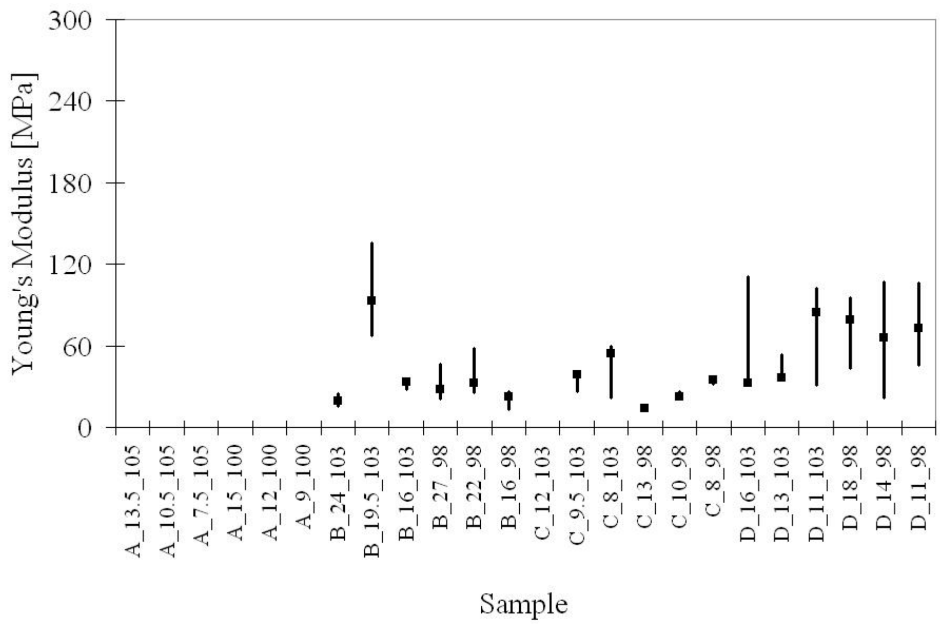


Figure 5.40: Young's modulus values (median and range) from PVD tests on prismatic samples: soils B, C and D

Table 5.21: High, low and median Young's modulus values from PVD tests on prismatic samples: soils B, C and D

Prismatic Sample	E_{HIGH} [MPa]	E_{LOW} [MPa]	E_{MEDIAN} [MPa]
A_13.5_105	-	-	-
A_10.5_105	-	-	-
A_7.5_105	-	-	-
A_15_100	-	-	-
A_12_100	-	-	-
A_9_100	-	-	-
B_24_103	25	16	20
B_19.5_103	136	67	93
B_16_103	34	28	33
B_27_98	46	21	28
B_22_98	58	25	33
B_16_98	26	13	22
C_12_103	-	-	-
C_9.5_103	40	27	39
C_8_103	59	21	54
C_13_98	14	13	14
C_10_98	27	21	23
C_8_98	37	32	35
D_16_103	111	33	33
D_13_103	53	35	36
D_11_103	102	31	84
D_18_98	95	43	79
D_14_98	107	21	66
D_11_98	106	46	73

5.4.4 Dynamic Cone Penetrometer

The Dynamic Cone Penetrometer (DCP) consists of a mass that impacts an anvil/coupler assembly, driving a cone into the soil. The corresponding displacements are recorded. The DCP penetration index (DPI) is the average depth per blow. The DPI does not include seating from the weight of the apparatus or the last drop. The first drop is included in the analysis due to the limited depth of the container. Note that typical practice, including the MN/DOT specification, does not include the seating drop in the DPI calculation. A typical penetration index versus depth is shown in Fig. 5.41.

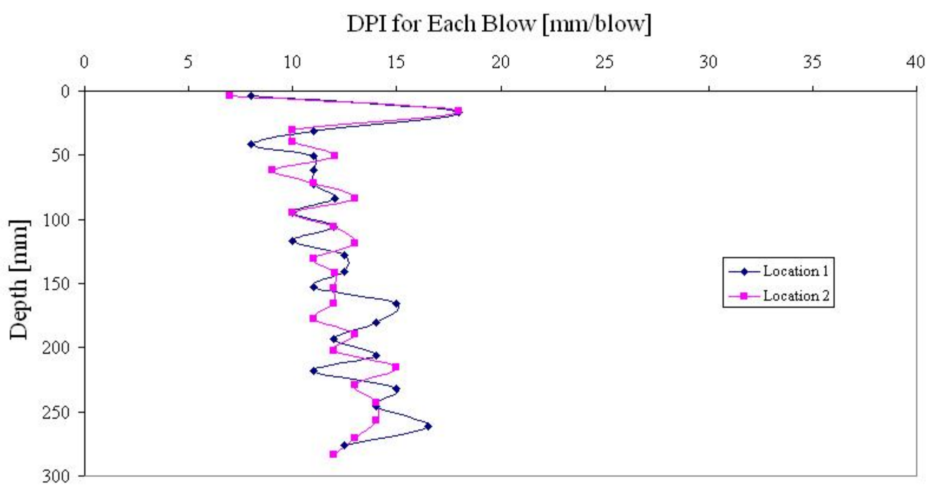


Figure 5.41: DCP penetration index (DPI) vs. depth, Soil A $w_{\text{targ}} = 12\%$, 100% target standard Proctor

The California bearing ratio (CBR) was determined from the DPI following ASTM D 6951 and the Young's modulus was calculated using the method of [35]. In addition, [17] developed a correlation between the penetration index and resilient modulus. The units of DPI for both equations are mm/blow.

Equation 5.13 was used for a CBR greater than 10 percent.

$$CBR_{\%} = \frac{(292)}{(DPI)^{1.12}} \tag{5.13}$$

Equation 5.14 was used for a CBR less than 10 percent.

$$CBR_{\%} = \frac{(1)}{(0.017019 * DPI)^2} \tag{5.14}$$

Young's modulus was calculated from the CBR by using the equation suggested by [35]:

$$E_{MPa}^{(1)} = 17.58 * CBR^{0.64} \tag{5.15}$$

A relationship between DPI (mm/blow) and resilient modulus (MPa) for fine-grained materials was developed by [17]:

$$M_r^{(2)} = 532.1 * DPI^{-0.492} \tag{5.16}$$

Table 5.22 contains the estimates of modulus from the two approaches by utilizing the overall average penetration index. The DPI over the entire depth of the prismatic soil container excluded seating from the weight of the device and the final blow.

Table 5.22: Young's modulus and resilient modulus estimated from DCP correlations

Prismatic Sample	$E^{(1)}$ (Overall Average) [MPa]	$M_r^{(2)}$ (Overall Average) [MPa]
A_13.5_105	110	154
A_10.5_105	144	186
A_7.5_105	213	244
A_15_100	57	99
A_12_100	114	158
A_9_100	153	194
B_24_103	57	99
B_19.5_103	104	149
B_16_103	122	166
B_27_98	59	100
B_22_98	67	110
B_16_98	96	141
C_12_103	109	154
C_9.5_103	110	155
C_8_103	131	174
C_13_98	74	118
C_10_98	89	134
C_8_98	105	150
D_16_103	105	150
D_13_103	151	192
D_11_103	228	255
D_18_98	63	106
D_14_98	85	130
D_11_98	184	220

5.4.5 Percometer

The Percometer evaluated dielectric permittivities on compacted soil samples in the testing locations shown in Fig. 4.15. Furthermore, the device also tested soil B and soil D cylindrical specimens. Table 5.23 shows statistical data from Percometer results on the soil samples. Table 5.24 shows statistical data from the tests conducted on the cylindrical specimens. The Percometer was tested in the center of the trimmed end of the cylindrical specimen before resilient modulus testing. Trial Percometer tests were executed at the edge of the cross-sectional area of the specimen. If the Percometer was run at the edge, the device would not display a result.

Table 5.23: Statistical data from Percometer results on soil samples

Container ID	Permittivity					Conductivity				
	High [J]	Low [J]	Median [J]	Mean [J]	COV [%]	High [µS/cm]	Low [µS/cm]	Median [µS/cm]	Mean [µS/cm]	COV [%]
A_13.5_105	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A_10.5_105	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A_7.5_105	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A_15_100	27.2	20.8	24.1	24.0	13.3	9	0	4	4.0	93.5
A_12_100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A_9_100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
B_24_103	47.2	34.9	40.0	40.8	14.6	44	8	23	24.4	54.8
B_19.5_103	42.5	18.7	33.0	31.7	24.1	108	0	14	21.3	144.4
B_16_103	30.2	11.2	28.7	26.3	22.9	44	0	18	20.1	93.0
B_27_98	45.4	22.9	32.3	32.2	23.4	21	0	3	5.6	126.3
B_22_98	49.4	31.3	40.3	40.3	14.1	135	0	52	54.4	79.4
B_16_98	24.0	16.0	20.9	20.1	14.3	48	18	23	26.6	42.6
C_12_103	19.3	11.2	17.6	16.4	17.3	117	8	44	46.9	72.9
C_9.5_103	17.9	14.4	16.4	16.2	6.4	60	8	28	25.9	67.6
C_8_103	17.7	10.9	16.2	15.6	14.1	46	0	13	16.3	96.6
C_13_98	18.6	10.5	17.2	15.8	20.6	43	0	0	8.6	223.6
C_10_98	15.3	13.9	14.7	14.5	3.7	90	2	61	45.9	69.8
C_8_98	18.0	15.8	17.1	17.0	3.8	74	25	49	52.9	28.6
D_16_103	45.6	35.4	38.2	39.6	9.3	114	3	57	61.6	59.9
D_13_103	38.6	30.0	34.4	34.6	9.4	54	2	21	22.7	69.6
D_11_103	31.8	23.0	26.1	26.9	13.1	26	0	7	7.6	108.4
D_18_98	49.4	28.5	43.4	41.8	16.7	211	3	16	60.1	142.9
D_14_98	36.6	21.2	30.0	30.1	18.7	185	39	96	105.5	44.5
D_11_98	28.7	17.0	25.5	24.4	15.5	61	0	28	23.1	92.3

"N/A" indicates sample was not tested

Table 5.24: Statistical data from Percometer results on cylindrical specimens

Container ID	Spec. #1									
	Permittivity					Conductivity				
	High [J]	Low [J]	Medain [J]	Mean [J]	COV [%]	High [μS/cm]	Low [μS/cm]	Median [μS/cm]	Mean [μS/cm]	COV [%]
A_13.5_105	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A_10.5_105	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A_7.5_105	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A_15_100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A_12_100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A_9_100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
B_24_103	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
B_19.5_103	38.9	37.5	38.3	38.2	1.8	18	4	17	13.0	60.1
B_16_103	39.0	37.9	38.3	38.4	1.4	13	4	5	7.3	67.3
B_27_98	42.5	39.7	42.0	41.4	3.6	90	56	81	75.7	23.3
B_22_98	38.0	37.0	37.2	37.4	1.4	16	2	10	9.3	75.3
B_16_98	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C_12_103	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C_9.5_103	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C_8_103	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C_13_98	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C_10_98	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C_8_98	16.7	15.8	16.3	16.3	2.8	24	12	23	19.7	33.9
D_16_103	34.8	24.1	34.1	31.0	19.3	26	10	21	19.0	43.1
D_13_103	36.1	31.5	35.4	34.6	6.0	6	0	5	4.0	67.7
D_11_103	30.9	29.7	30.1	30.2	2.0	1	0	1	0.7	86.6
D_18_98	38.4	33.1	34.7	35.4	7.7	81	18	57	52.0	61.1
D_14_98	36.4	36.0	36.1	36.2	0.6	40	11	30	27.0	54.6
D_11_98	25.8	20.6	21.3	22.6	12.5	10	3	6	6.3	55.5
	Spec. #2									
A_13.5_105	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A_10.5_105	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A_7.5_105	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A_15_100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A_12_100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A_9_100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
B_24_103	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
B_19.5_103	35.4	32.6	33.9	34.0	3.4	27	0	9	4.5	139.1
B_16_103	36.6	35.2	36.2	36.0	2.0	20	18	19	19.0	5.3
B_27_98	38.1	36.4	37.3	37.3	3.2	106	80	93	93.0	19.8
B_22_98	44.0	43.4	43.9	43.8	0.7	46	36	39	36.0	14.7
B_16_98	32.2	31.7	32.0	32.0	1.1	7	3	5	5.0	56.6
C_12_103	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C_9.5_103	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C_8_103	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C_13_98	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C_10_98	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C_8_98	19.1	18.8	19.0	19.0	0.8	18	10	14	15.0	28.2
D_16_103	31.4	30.1	31.0	30.8	2.2	10	7	8	8.0	18.3
D_13_103	36.1	32.3	34.8	34.4	4.5	11	0	4	1.0	127.6
D_11_103	30.9	30.2	30.7	30.6	1.2	3	1	2	1.0	69.3
D_18_98	35.6	34.4	34.4	34.8	2.0	49	21	33	30.0	42.9
D_14_98	33.3	31.7	32.4	32.5	2.5	21	13	18	21.0	25.2
D_11_98	25.3	24.4	25.0	24.9	1.8	5	0	3	3.0	94.4

"N/A" indicates sample was not tested (see Section 4.4)

5.5 Comparison Between *BE*-M_r and other Modulus Estimates

In what follows, a summary comparison is presented in the form of diagrams where the Young's modulus estimates from the field devices are plotted versus their laboratory counterparts from bender element and resilient modulus (*BE*-M_r) testing. As explained in Section 5.3.1, a representative value of the modulus from *BE*-M_r testing is associated with the state of stress corresponding to a confining pressure of 14 kPa (2 psi) and a deviator stress of 27 kPa (3.8 psi). The plots are organized according to the testing device used and the results are presented separately for each soil. For clarity of presentation, different symbols are used to distinguish between varying density and moisture conditions. The detailed information on the particular modulus estimates with density and moisture is contained in Section 5.2.

5.5.1 Bender Element (BE) versus Resilient Modulus (M_r)

As shown in Figs. 5.42-5.45, the bender element estimates of the Young's modulus ($\mathrm{E_{BE}}$) correlate reasonably well with the resilient modulus. This is perhaps not surprising as both tests were performed on common specimens which ensured identical density and moisture conditions under a controlled laboratory setting. Given the fact that the strain levels associated with (seismic) BE testing were significantly smaller that those imposed by the M_r protocol, it was expected that the BE estimates would exceed the resilient modulus values under the same testing conditions. With reference to the relationship

$$E_{BE} \;=\; \alpha\, M_r, \tag{5.17}$$

this was confirmed by the results from soils B, C, and D which show the respective fitted values of α = 1.14, 2.14 and 1.51, and R^2 = 0.40, N/A, 0.87, 0.47 (An R^2 = N/A, not available, was associated with the zero-intercept constraint imposed in the least squares fit.)

The interpretation for soil A was complicated by inconclusive shear wave velocities. As a result, a value of Poisson's ratio needed to be assumed: $\nu = 0.20$ and $\nu = 0.35$. These values bound the results from soil D, which behaved in a similar manner to soil A with respect to elastic response. The results from Soil A with $\nu = 0.35$ do not follow the expected trend, as $\alpha = 0.71$. However, with $\nu = 0.20$, the fitting parameter was $\alpha = 1.02$. Here it is also useful to note that A was the first soil tested and the BE-M_r procedures were being fine-tuned.

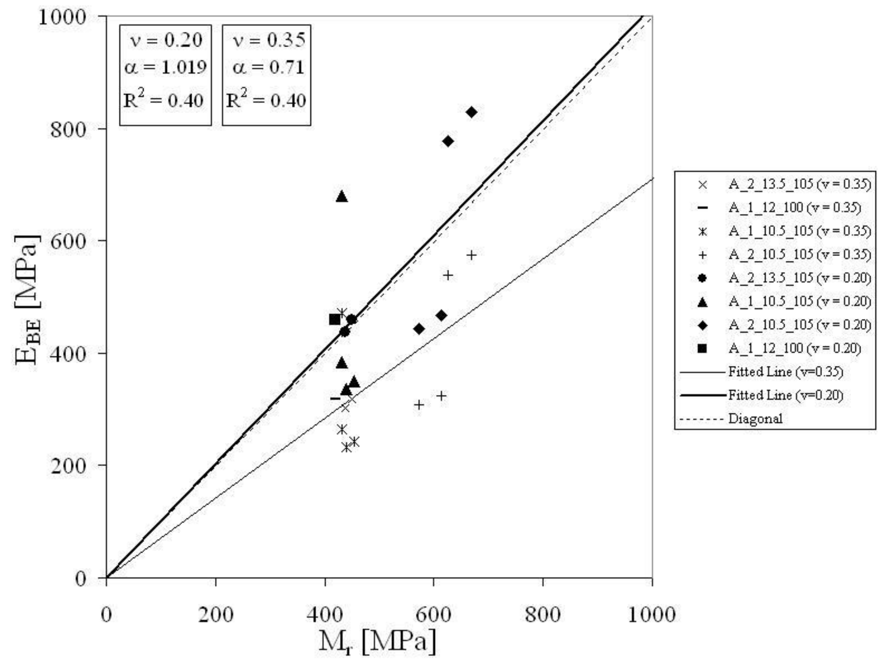


Figure 5.42: Bender element vs. resilient modulus for Soil A

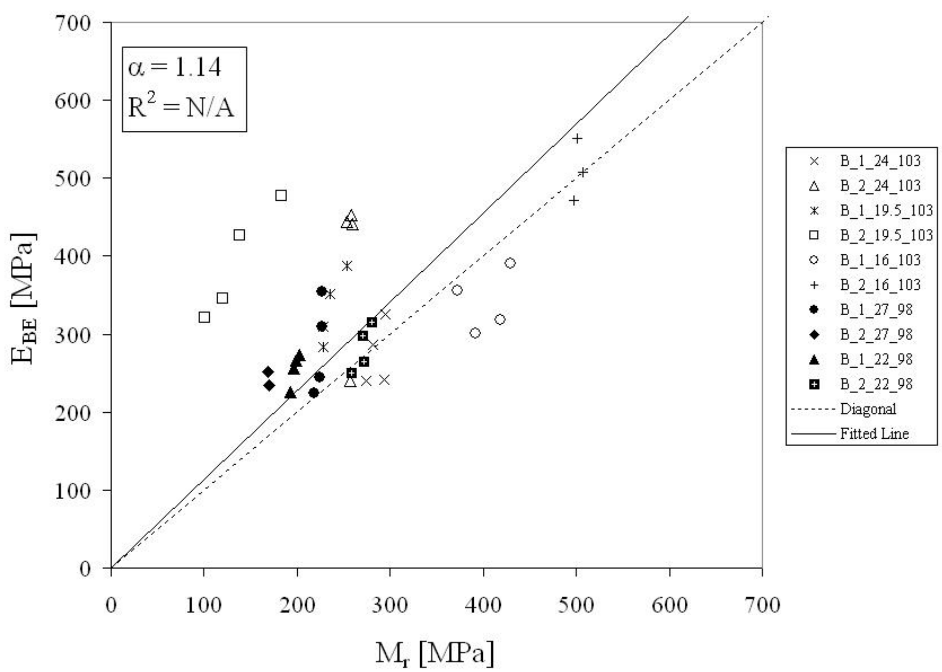


Figure 5.43: Bender element vs. resilient modulus for Soil B

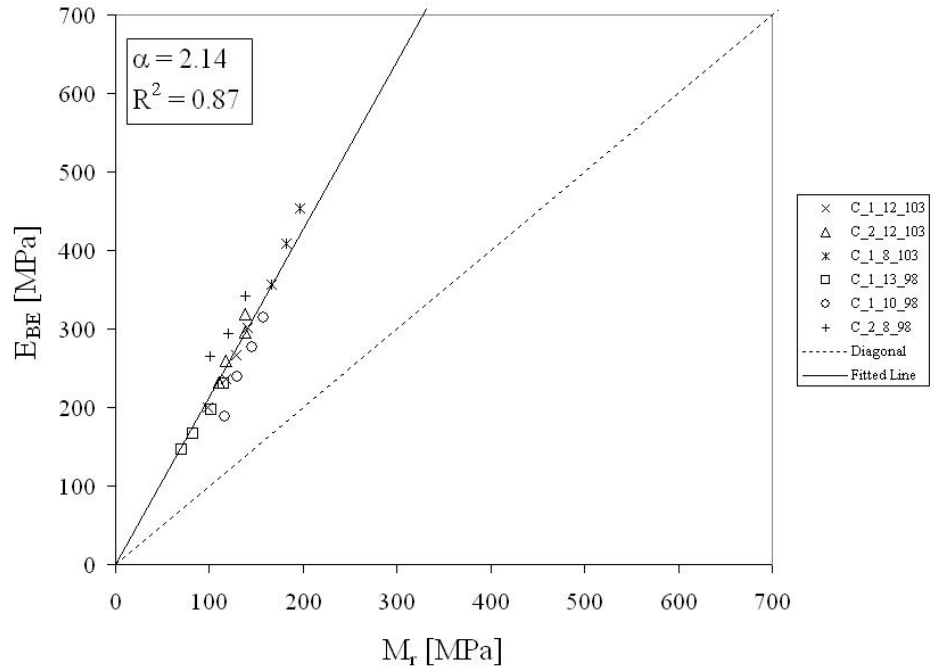


Figure 5.44: Bender element vs. resilient modulus for Soil C

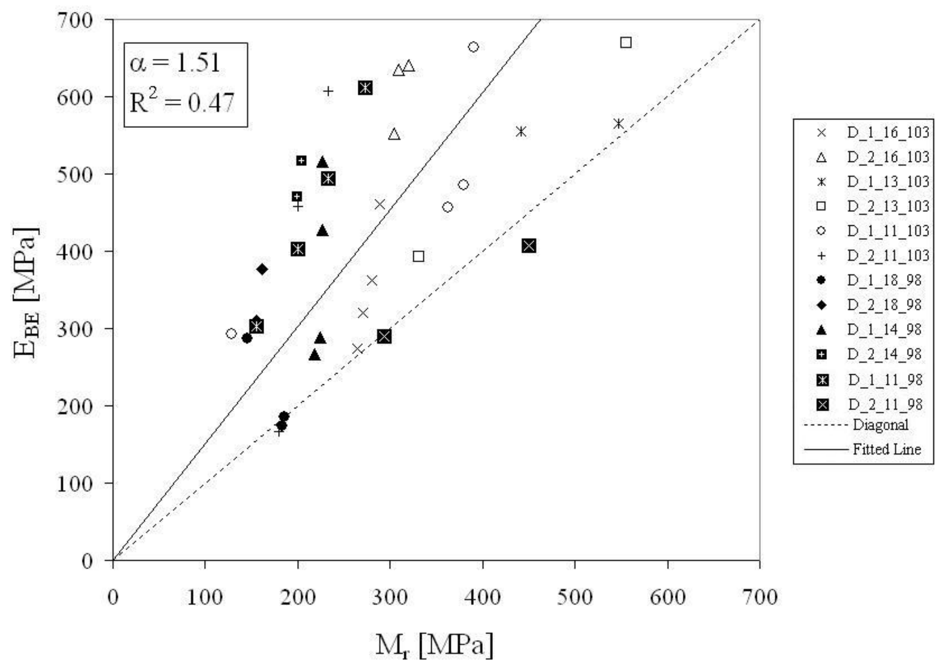


Figure 5.45: Bender element vs. resilient modulus for Soil D

5.5.2 GeoGauge versus BE-M_r

Figures 5.46-5.53 show a comparison of the GeoGauge results with BE and M_r values for soils A–D, respectively. A striking feature of the results is an apparent insensitivity of the GeoGauge modulus estimates to the changes in density and moisture conditions. For the uniformity of presentation, however, a linear relationship is sought in the form

$$E_{GGD} = \alpha M_r, \tag{5.18}$$

yielding the α values in the range 0.34–0.71 for the M_r comparisons and 0.36–0.66 for the BE comparisons. The GeoGauge modulus estimations presented in this section do not include tests performed with sand.

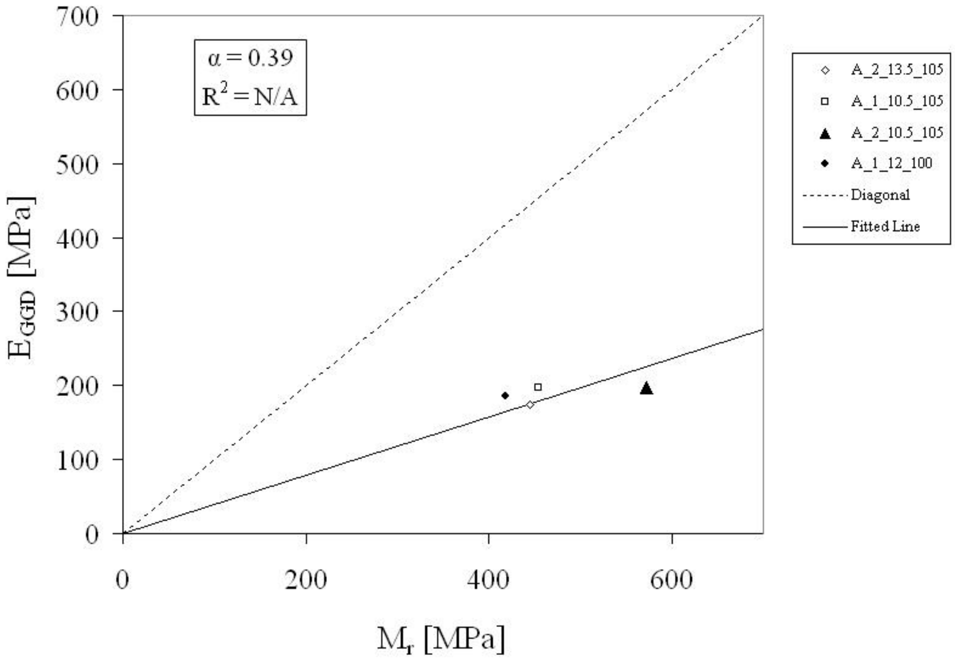


Figure 5.46: GeoGauge vs. resilient modulus for soil A

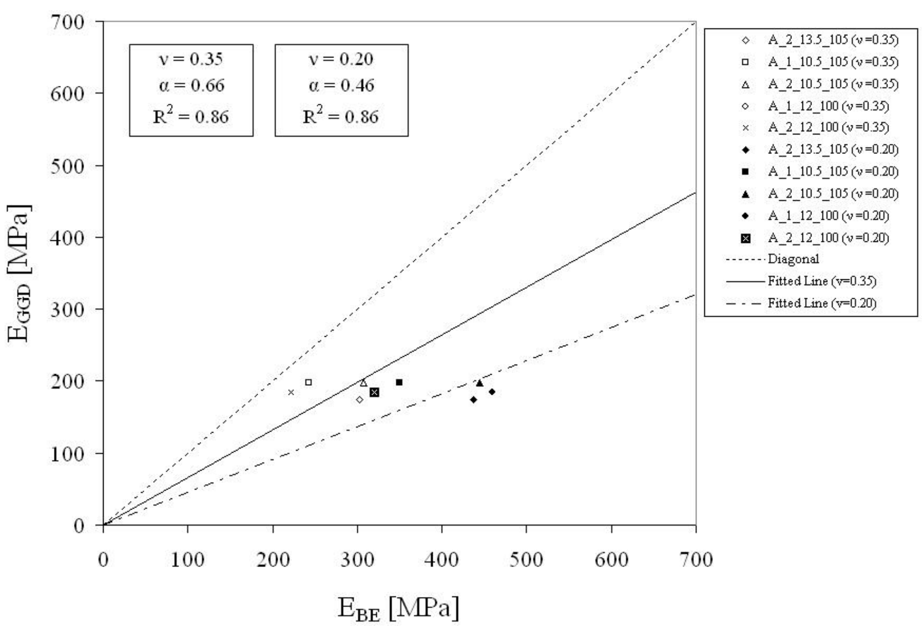


Figure 5.47: GeoGauge vs. bender element for soil A

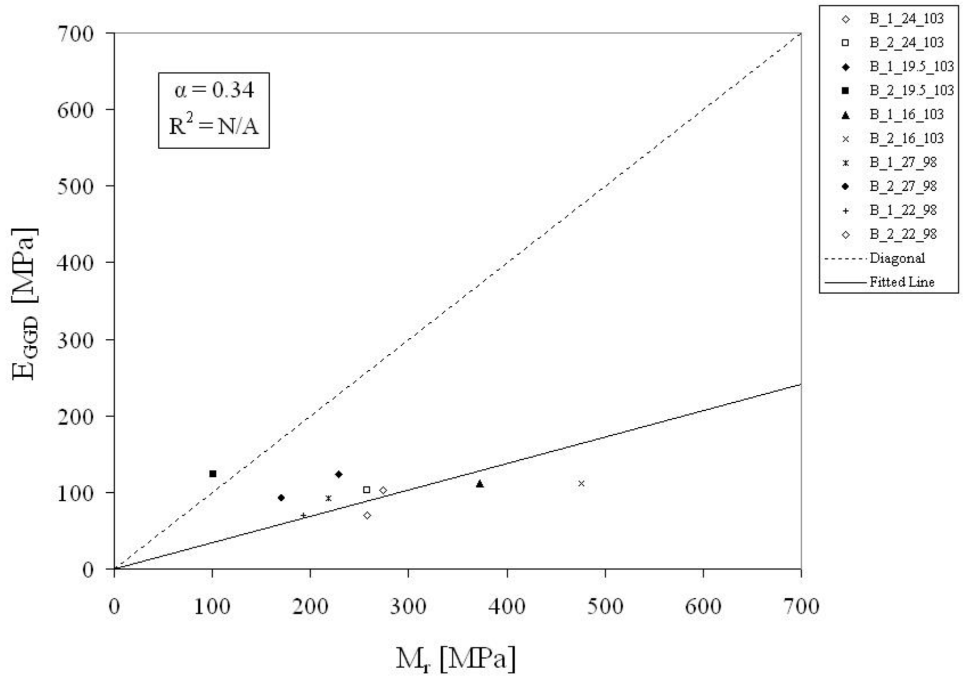


Figure 5.48: GeoGauge vs. resilient modulus for soil B

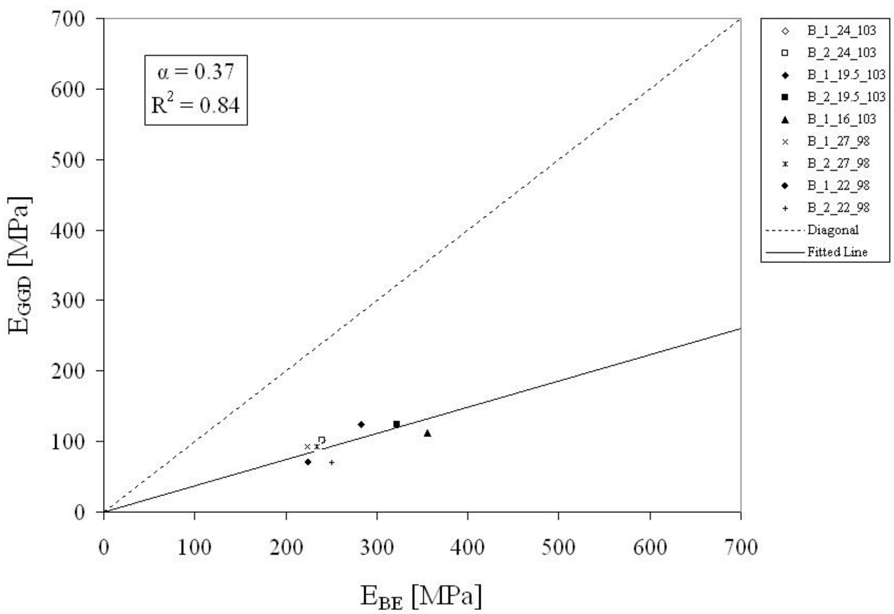


Figure 5.49: GeoGauge vs. bender element for soil B

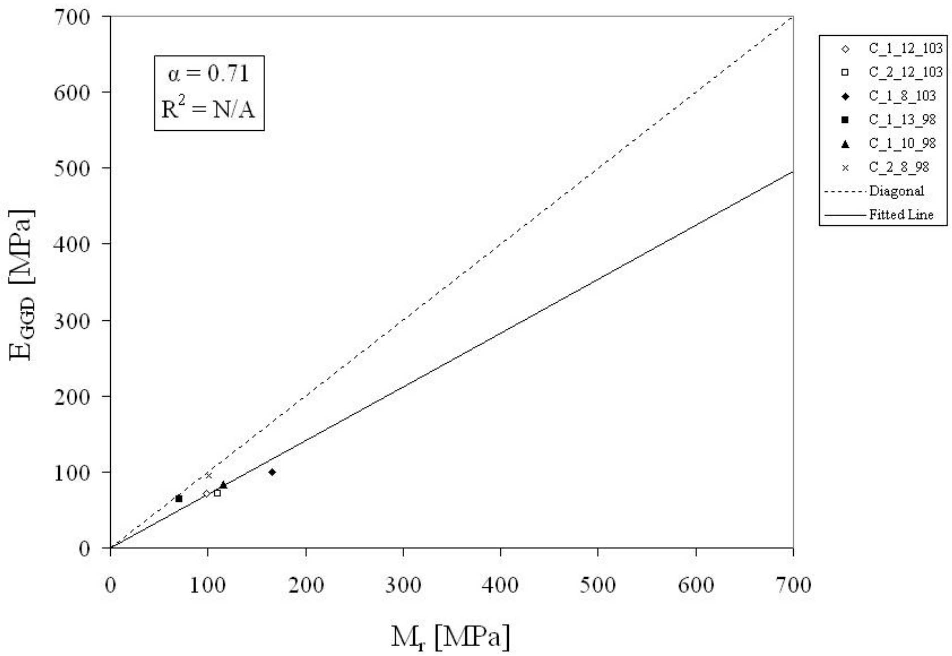


Figure 5.50: GeoGauge vs. resilient modulus for soil C

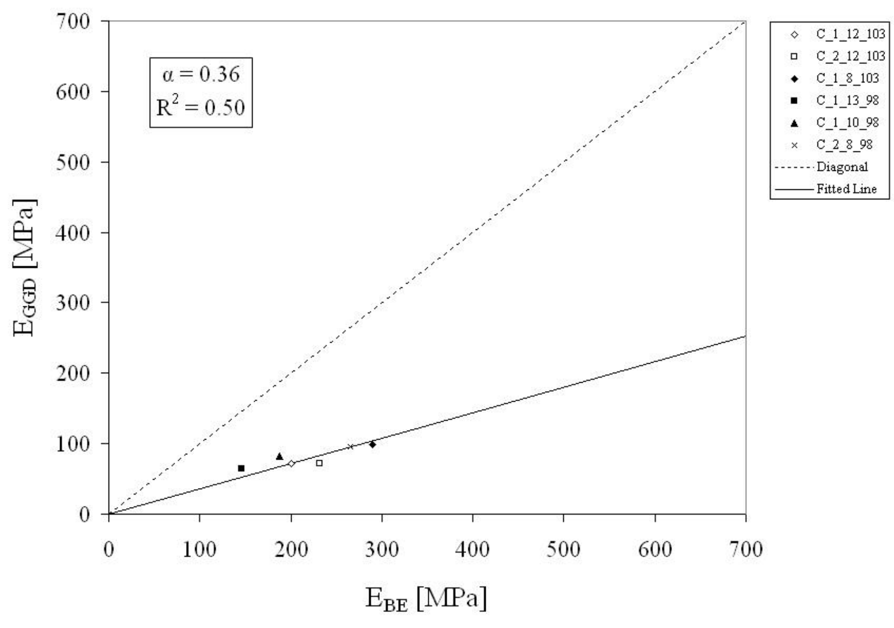


Figure 5.51: GeoGauge vs. bender element for soil C

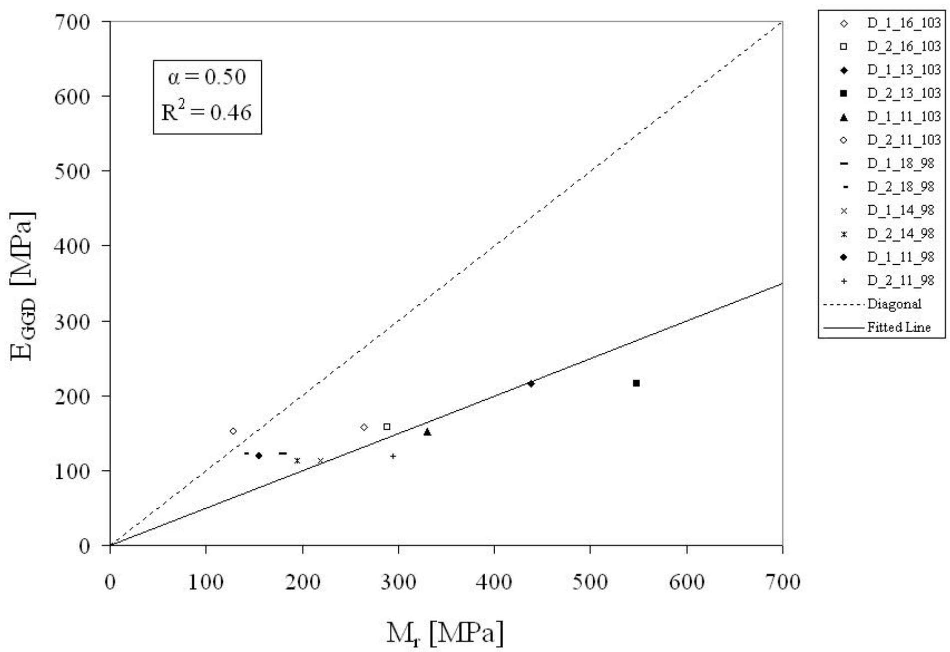


Figure 5.52: GeoGauge vs. resilient modulus for soil D

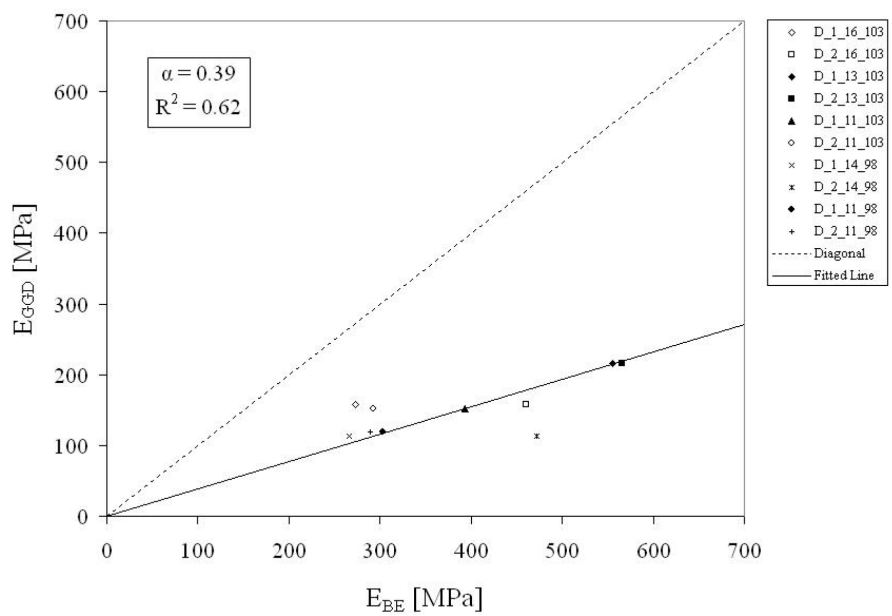


Figure 5.53: GeoGauge vs. bender element for soil D

5.5.3 PRIMA versus BE-M_r

In what follows, the four sets of PRIMA modulus estimates are presented in Figs. 5.54–5.81. In the order of appearance, they describe the results from the PRIMA 100 device (P2P and FRF estimates) and the Modified LWD device (P2P and FRF estimates).

PRIMA-100 P2P

Figures 5.54–5.61 show a comparison of the PRIMA-100 P2P results with BE-M_r values for soils A–D. Note that the graphs incorporate the cumulative results for all featured drop heights and all testing locations. As discussed earlier, the meaningful results for Soil A are scarce owing to the difficulties in applying the established testing procedures to this soil. Regarding soils B, C and D, on the other hand, there is an overall trend of increasing PRIMA values with increasing M_r despite a significant scatter of the experimental data. With reference to the formula

$$E_{P2P} \;=\; \alpha\, M_r, \tag{5.19}$$

the values of α for the four soils are found to be 0.55, 0.53, 0.85 and 0.85 respectively. Here it is interesting to note that the PRIMA-100 P2P trend lines are consistently *below* the 1:1 reference relation despite the fact that the overall strain levels associated with PRIMA 100 testing are lower than those imposed by the M_r testing protocol. Furthermore, the α values for the BE comparisons are 0.80, 0.56, 0.43, and 0.65 respectively.

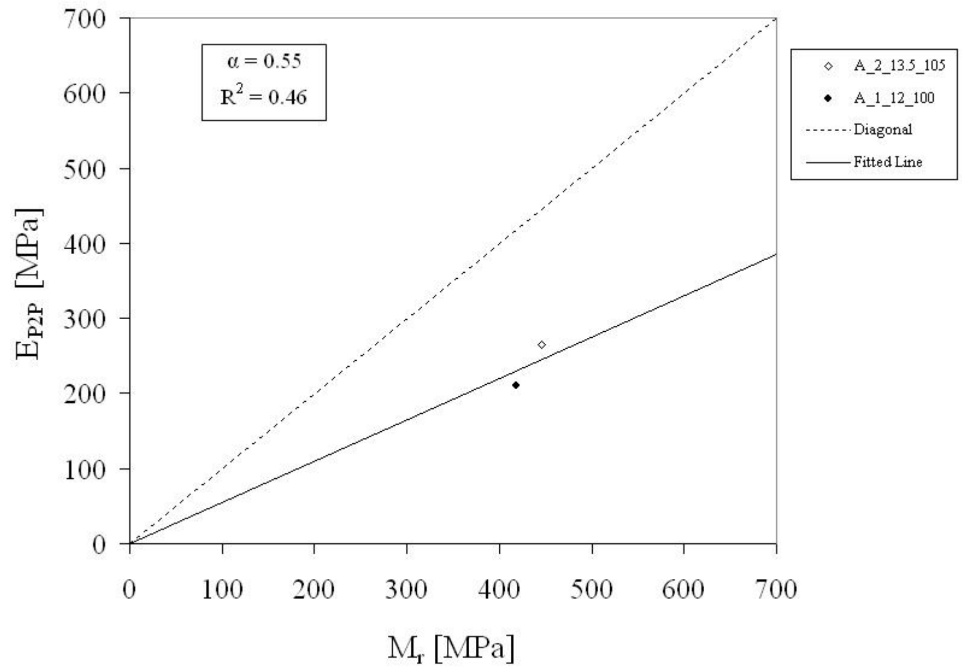


Figure 5.54: PRIMA-100 P2P vs. resilient modulus for soil A

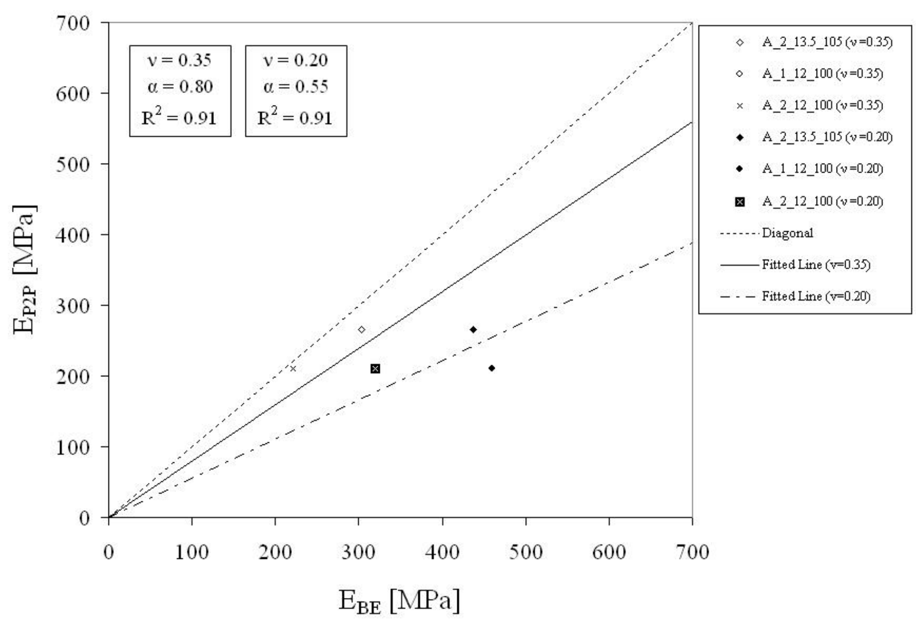


Figure 5.55: PRIMA-100 P2P vs. bender element for soil A

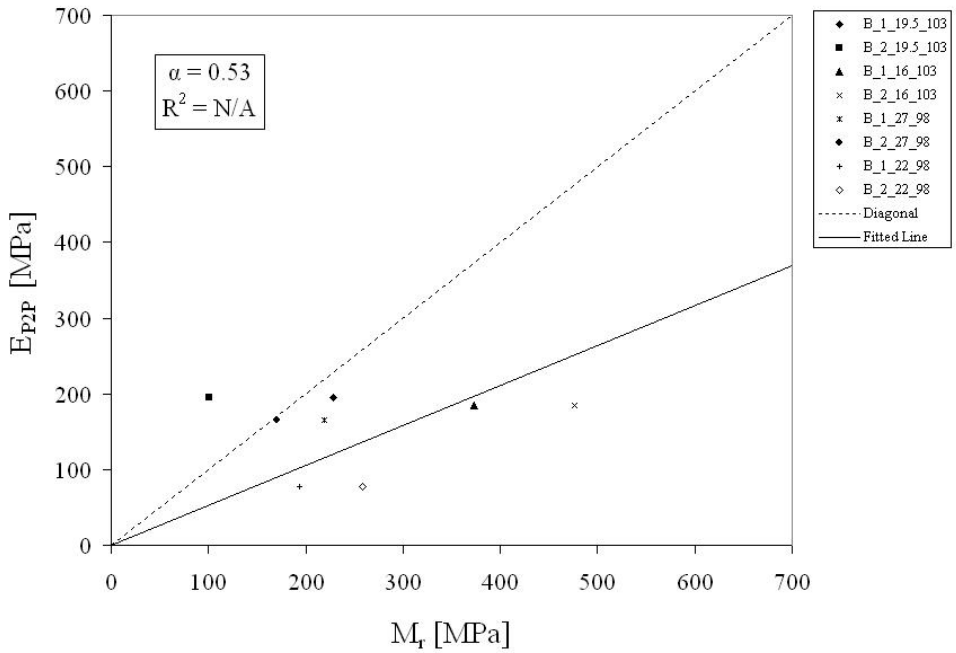


Figure 5.56: PRIMA-100 P2P vs. resilient modulus for soil B

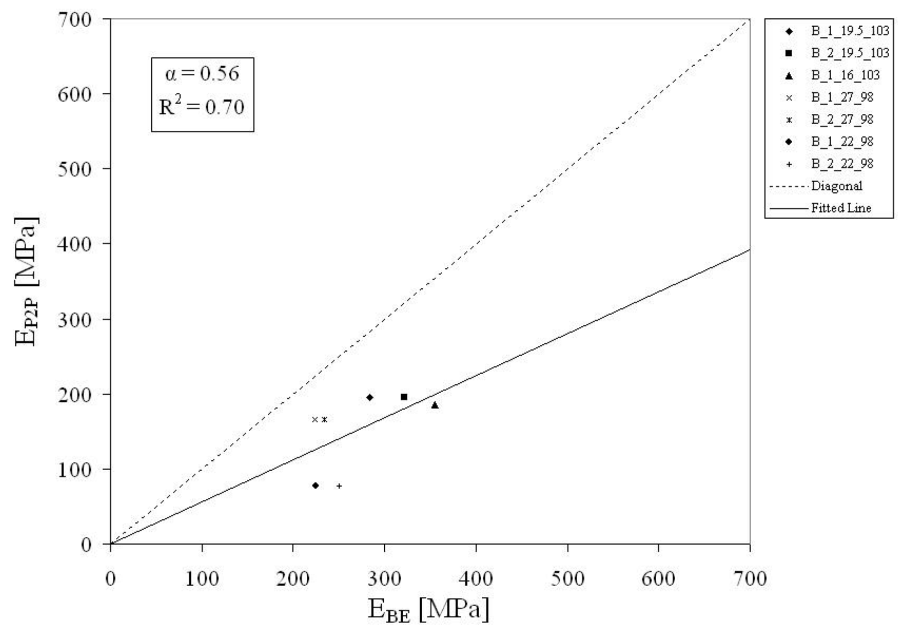


Figure 5.57: PRIMA-100 P2P vs. bender element for soil B

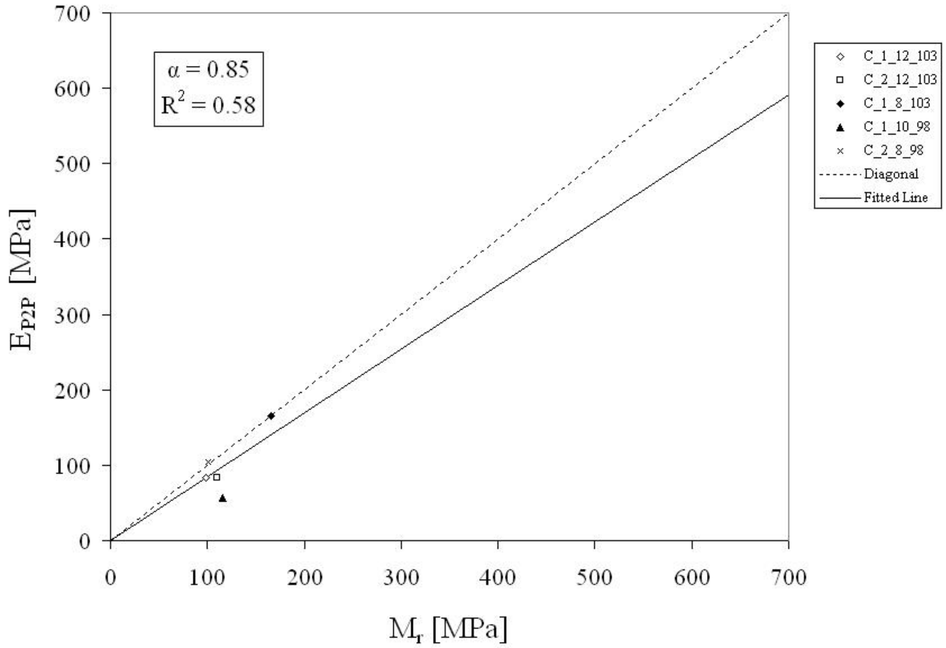


Figure 5.58: PRIMA-100 P2P vs. resilient modulus for soil C

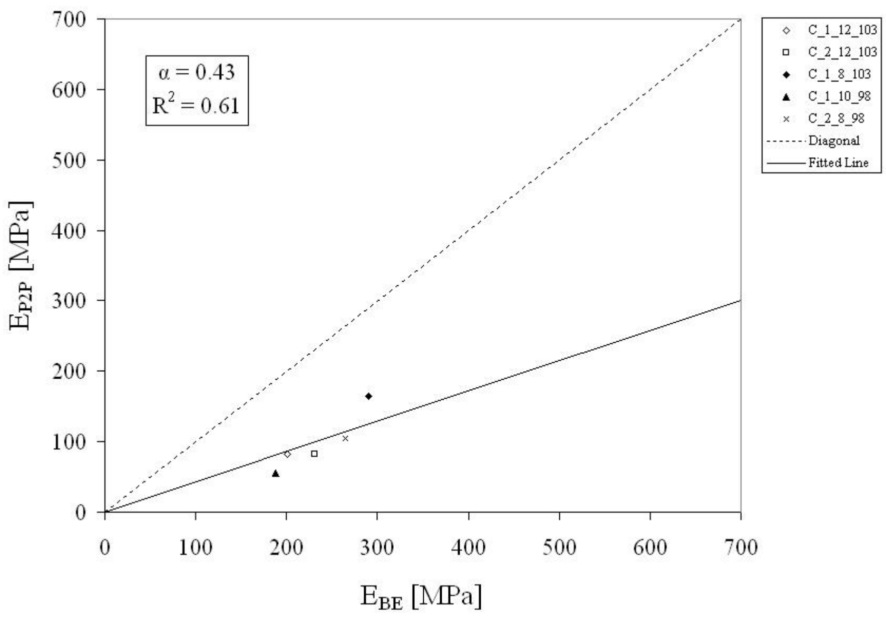


Figure 5.59: PRIMA-100 P2P vs. bender element for soil C

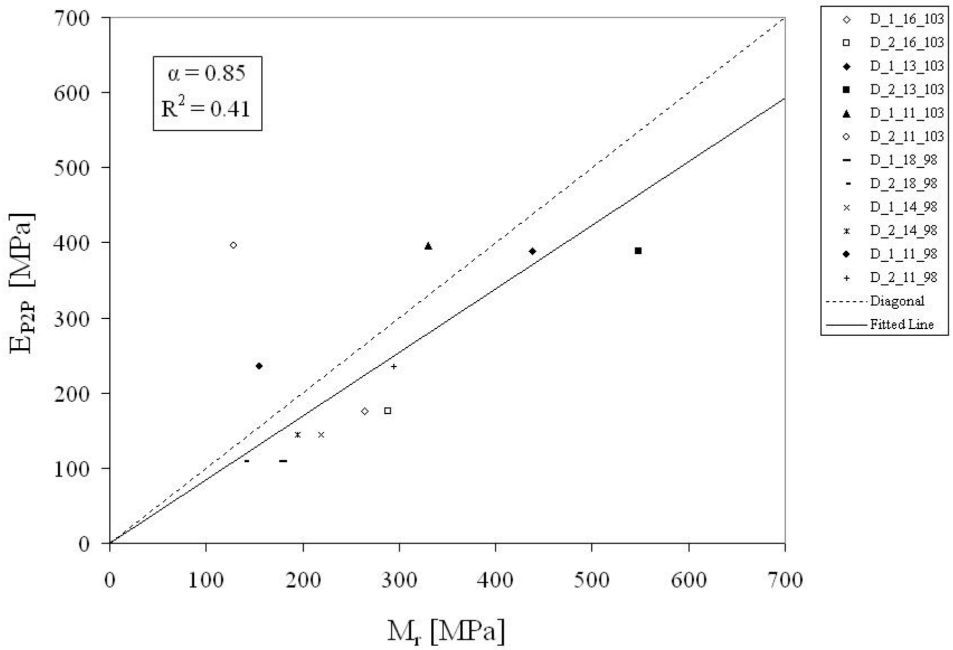


Figure 5.60: PRIMA-100 P2P vs. resilient modulus for soil D

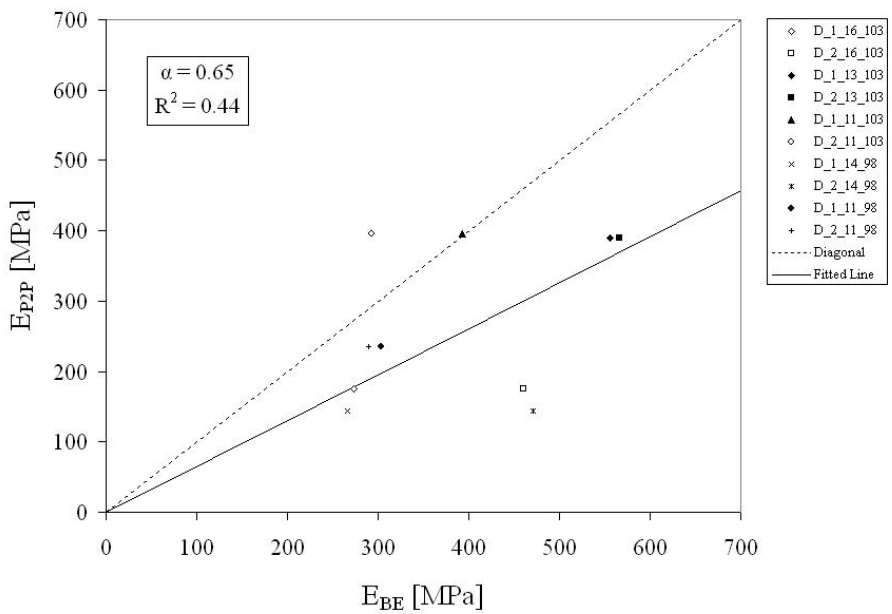


Figure 5.61: PRIMA-100 P2P vs. bender element for soil D

PRIMA-100 FRF

Figures 5.62-5.69 compare the PRIMA-100 FRF results with the corresponding BE-M_r values for soils A–D, respectively. On introducing the formula

$$E_{FRF} \;=\; \alpha\, M_r, \tag{5.20}$$

as a means to relate the two sets of data, the values of α for the four soils are found to be 0.47, 1.22, 4.92 and 0.77 for the M_r comparisons and 0.74, 1.36, 2.48, and 0.64 for the BE comparisons. Beyond the aforementioned comment on the measurements from Soil A, it is noted that the PRIMA-100 FRF results are characterized by a significantly higher degree of scatter than their P2P counterparts in Figs. 5.54–5.61. This observation suggests that the enhanced, FRF interpretation of the PRIMA 100 results may not be suitable for the testing configurations considered.

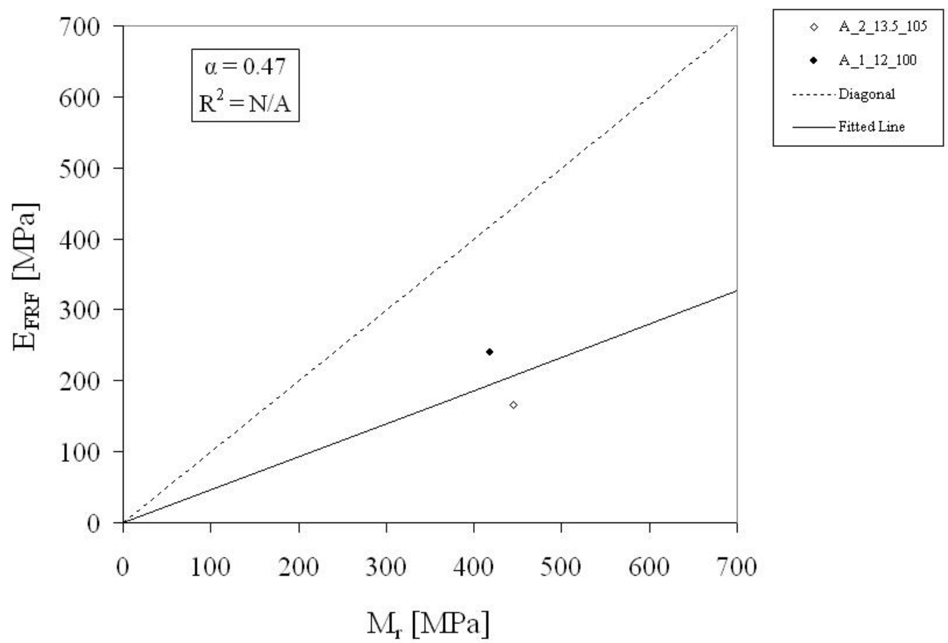


Figure 5.62: PRIMA-100 FRF vs. resilient modulus for soil A

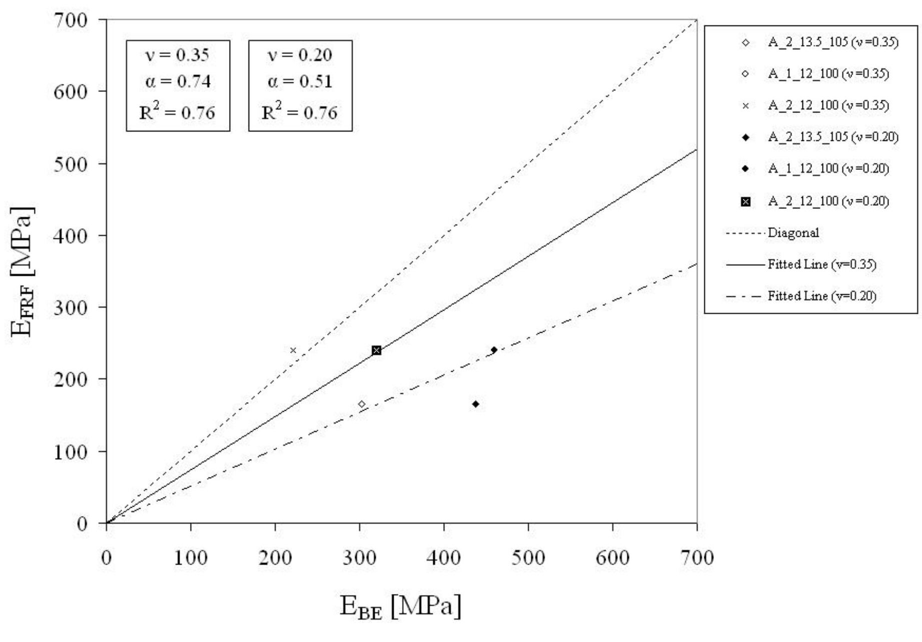


Figure 5.63: PRIMA-100 FRF vs. bender element for soil A

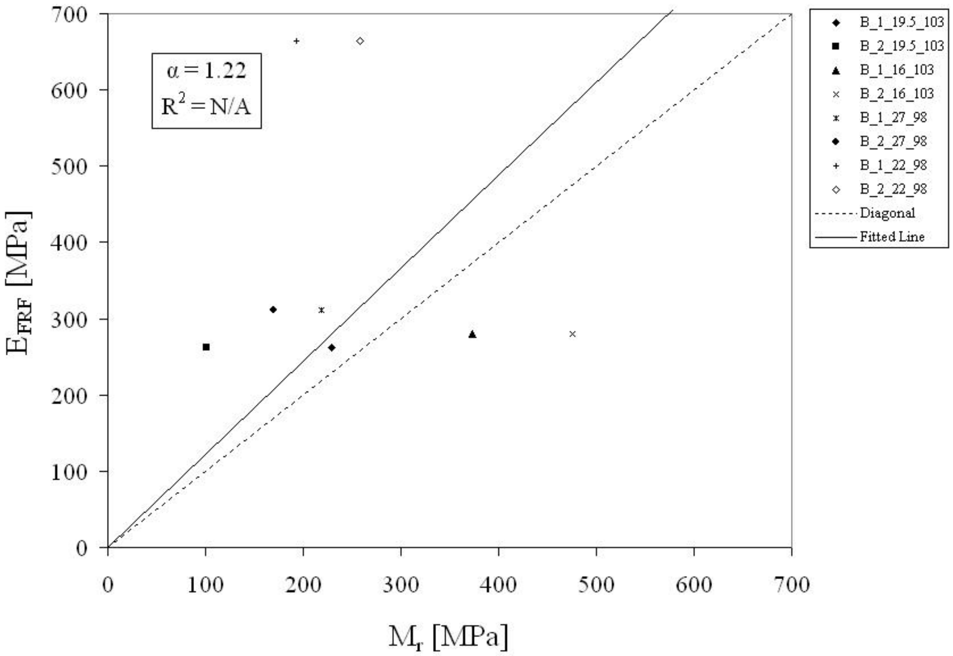


Figure 5.64: PRIMA-100 FRF vs. resilient modulus for soil B

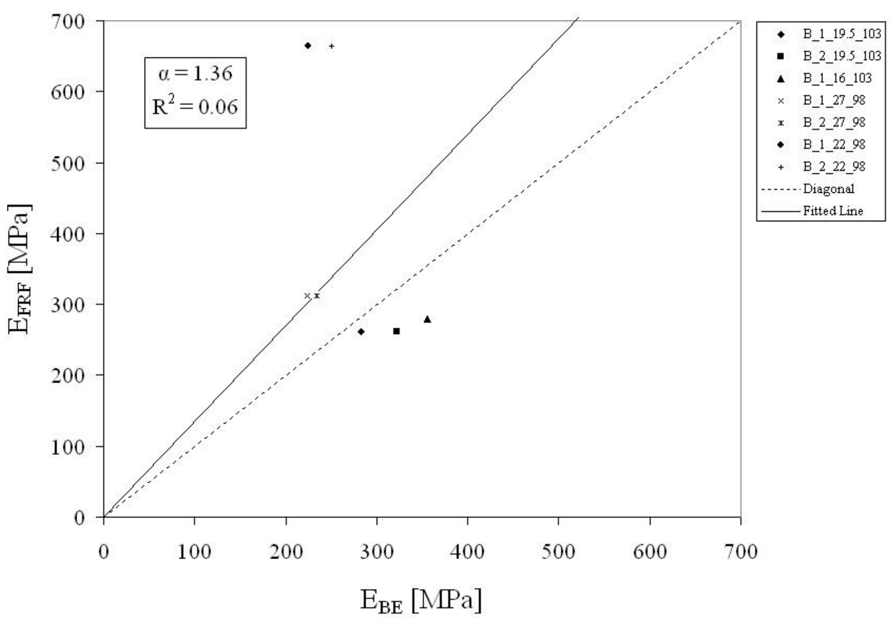


Figure 5.65: PRIMA-100 FRF vs. bender element for soil B

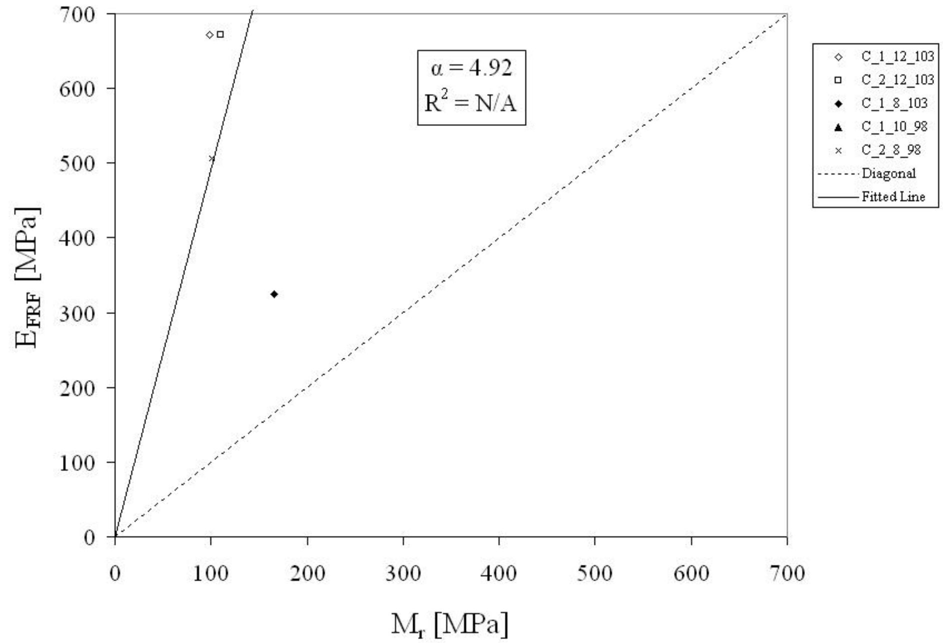


Figure 5.66: PRIMA-100 FRF vs. resilient modulus for soil C

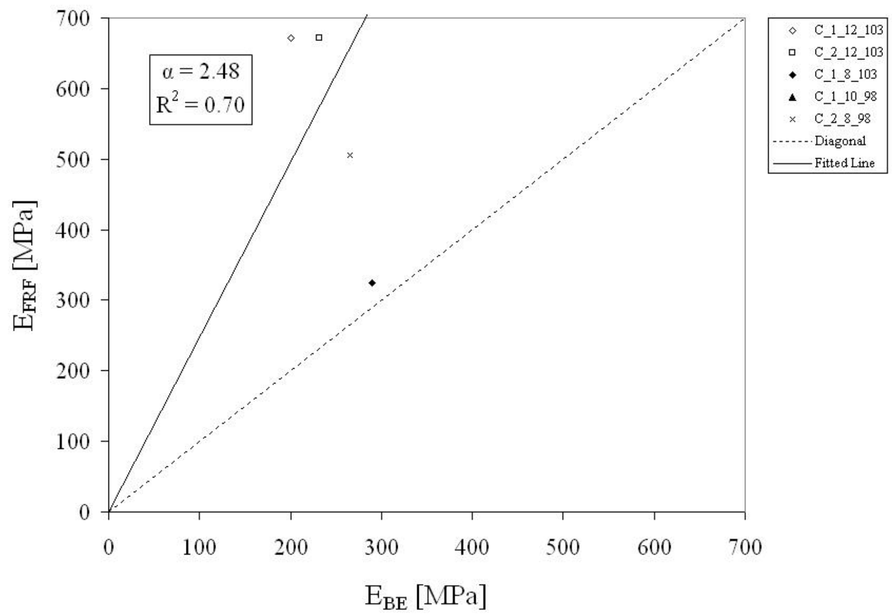


Figure 5.67: PRIMA-100 FRF vs. bender element for soil C

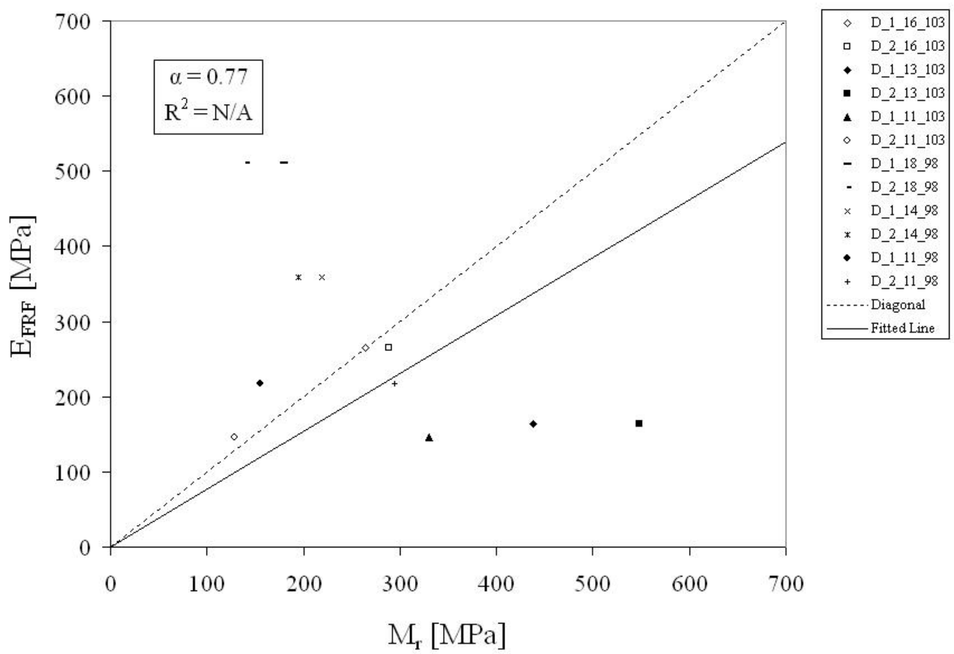


Figure 5.68: PRIMA-100 FRF vs. resilient modulus for soil D

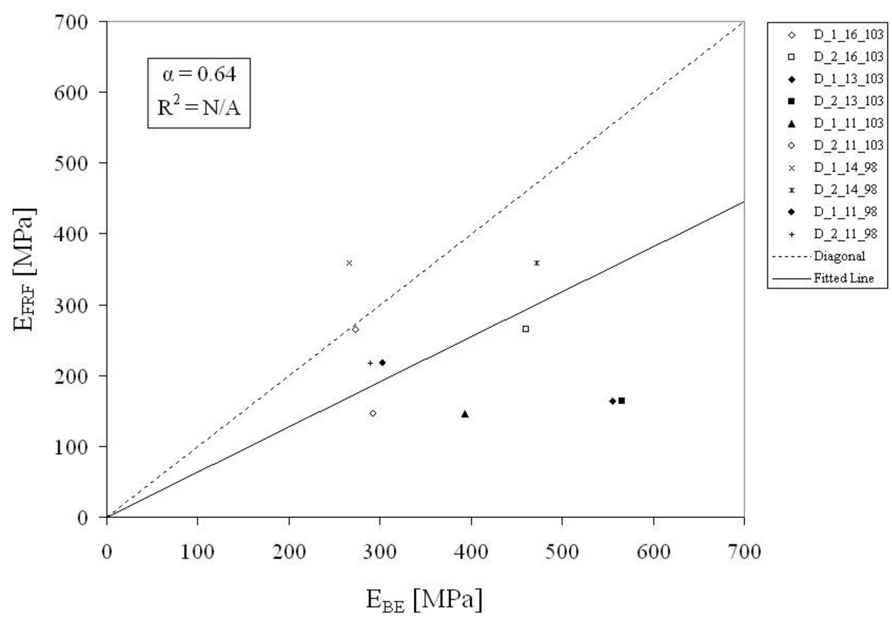


Figure 5.69: PRIMA-100 FRF vs. bender element for soil D

Modified LWD P2P

For completeness, Figs. 5.70–5.75 compare the Modified LWD P2P results with the corresponding M_r and BE values for soils B–D. Here it is noted that the Modified LWD tests were not performed on Soil A. Again, with reference the formula

$$E_{P2P}^{\mathrm{mod}} \;=\; \alpha\, M_r, \tag{5.21}$$

in can be seen that α for the soils B, C, and D takes the respective values of 0.87, 1.11 and 1.25 for M_r and 0.76, 0.60, 1.05 for BE. In light of the preceding presentation (PRIMA-100 FRF), however, the Modified LWD measurements should not be used in conjunction with P2P data interpretation.

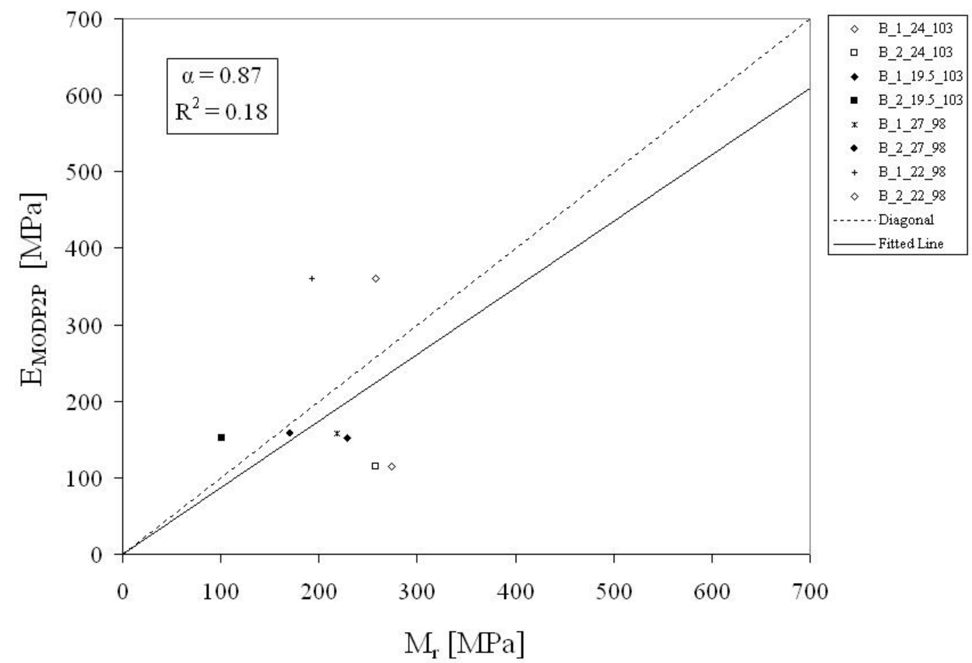


Figure 5.70: Modified LWD P2P vs. resilient modulus for soil B

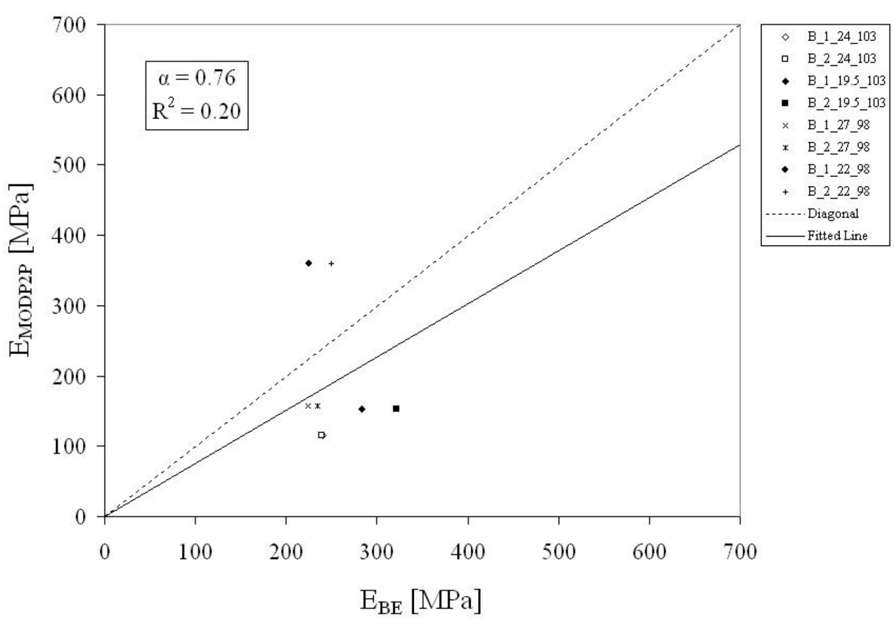


Figure 5.71: Modified LWD P2P vs. bender element for soil B

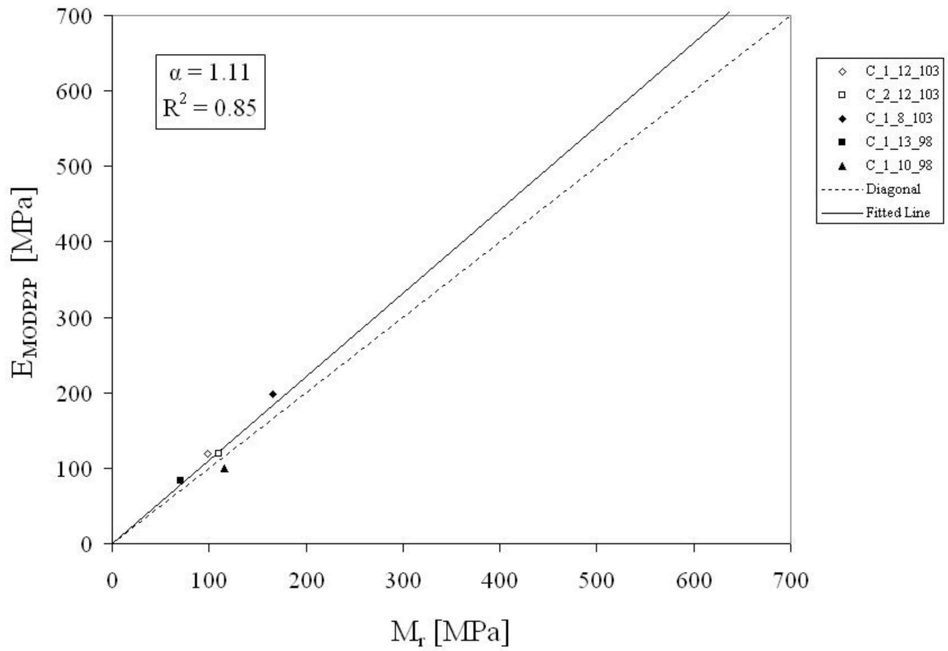


Figure 5.72: Modified LWD P2P vs. resilient modulus for soil C

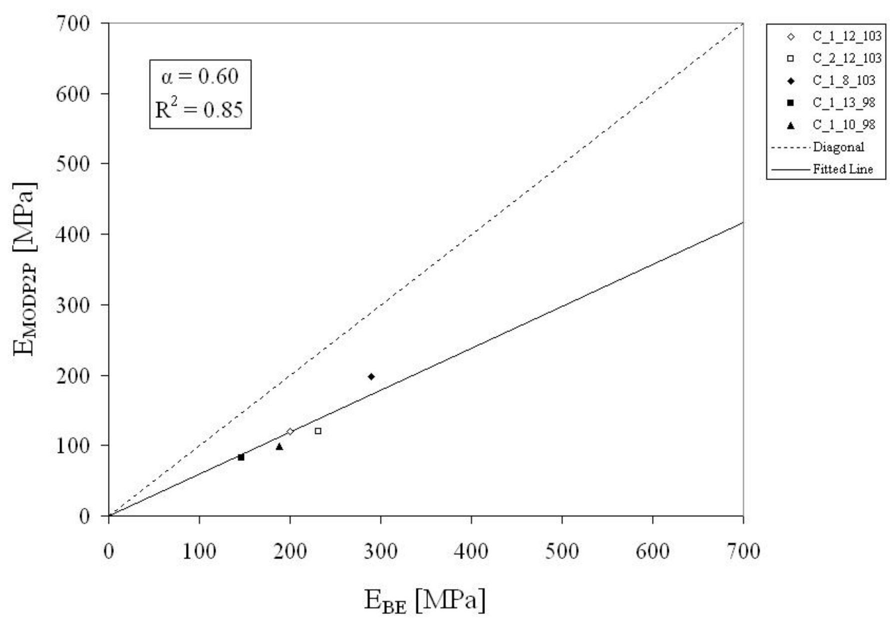


Figure 5.73: Modified LWD P2P vs. bender element for soil C

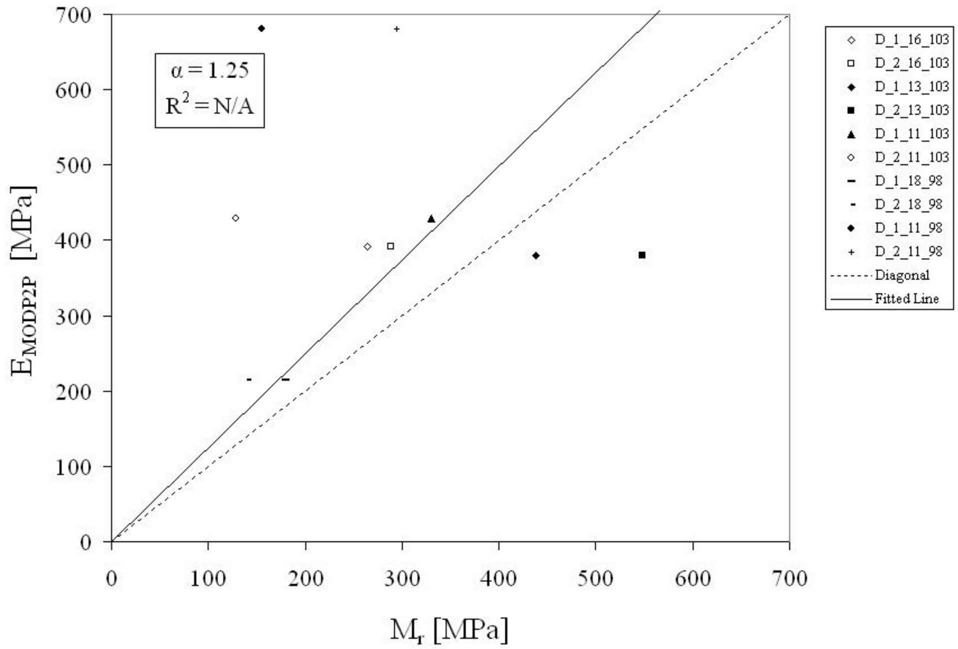


Figure 5.74: Modified LWD P2P vs. resilient modulus for soil D

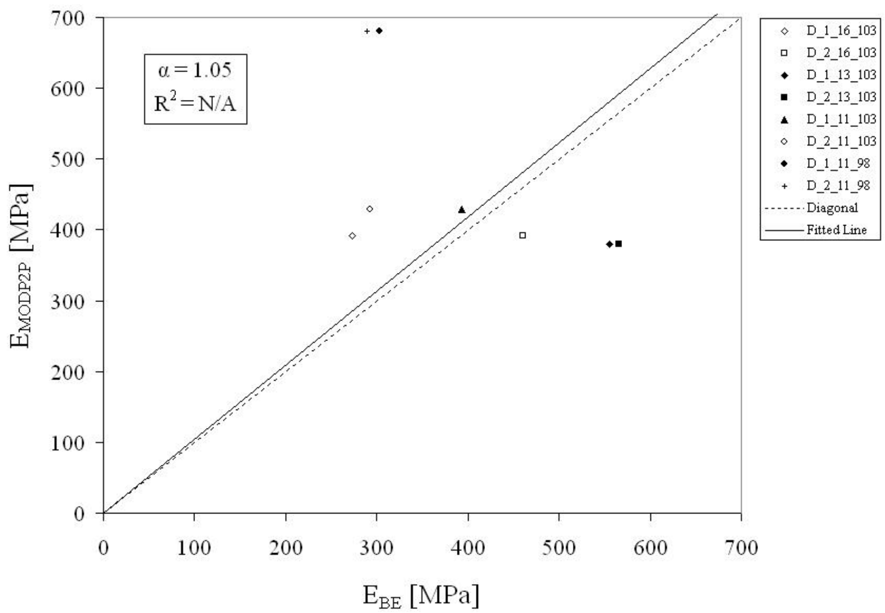


Figure 5.75: Modified LWD P2P vs. bender element for soil D

Modified LWD FRF

Figures 5.76–5.81 show a comparison of the Modified LWD FRF results with the corresponding BE-M_r values for soils B, C and D, respectively. Similar to the case of the PRIMA-100 P2P results, there is an overall trend of increasing PRIMA values with increasing M_r. The trend lines computed according to

$$E_{FRF}^{\mathrm{mod}} \;=\; \alpha \, M_r, \tag{5.22}$$

yield the α values that are closer to unity that in any other field test performed on soils B, C and D. In particular, the values of α for these three soils were found to be 0.59, 0.79 and 1.04 for the Modified LWD FRF versus M_r estimates. The Modified LWD FRF versus BE estimates yielded α values of 0.54, 0.41, 0.86. In view of this result, this field device and associated data interpretation is recommended as a tool for relating the laboratory and field measurements of the Young's modulus of subgrade soils.

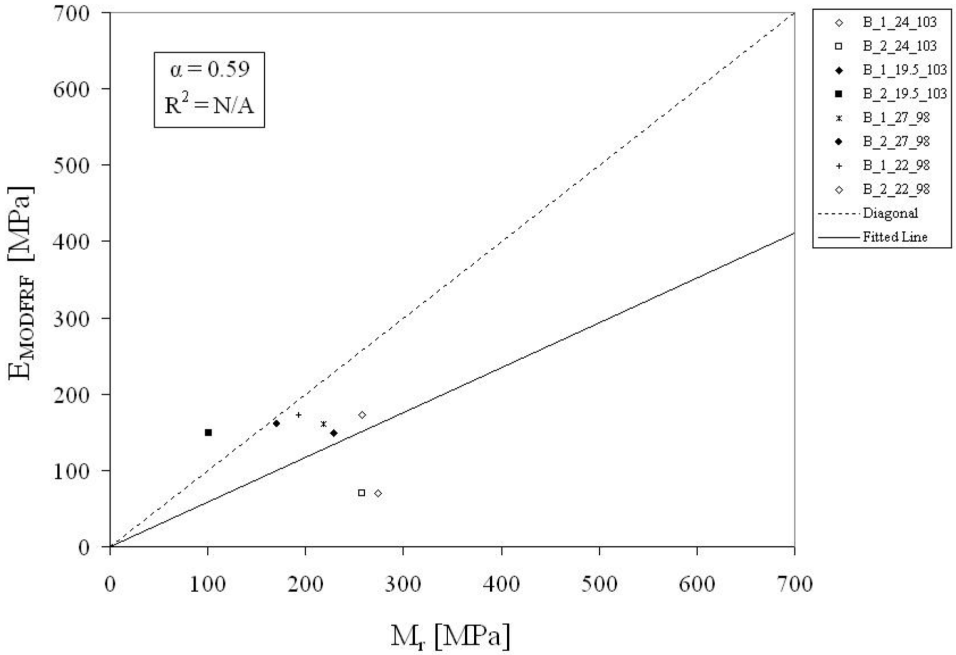


Figure 5.76: Modified LWD FRF vs. resilient modulus for soil B

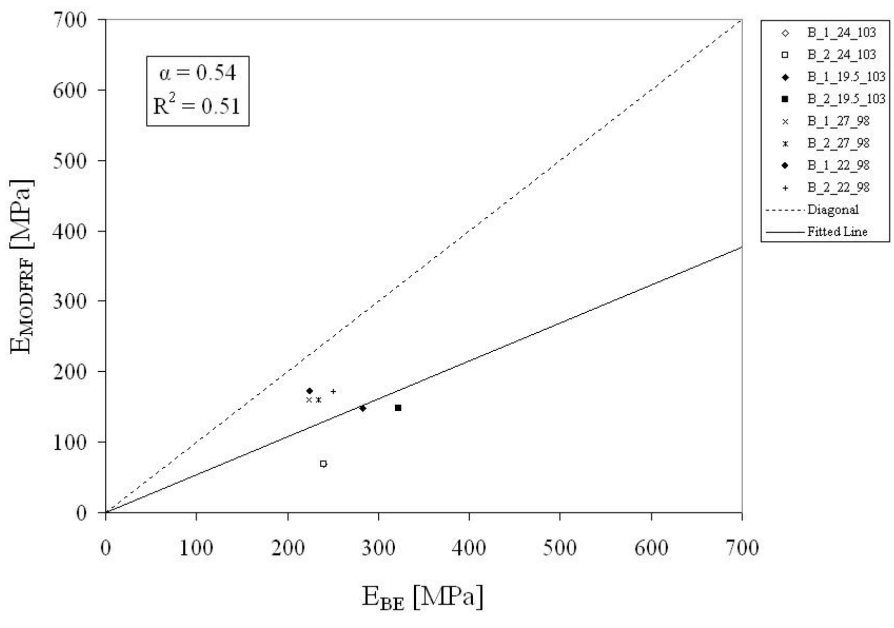


Figure 5.77: Modified LWD FRF vs. bender element for soil B

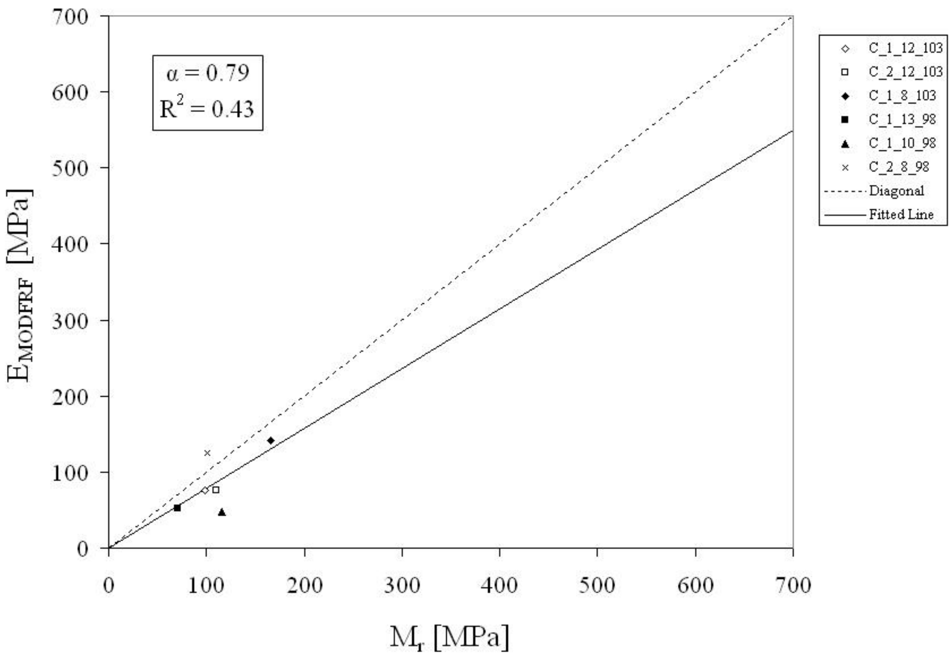


Figure 5.78: Modified LWD FRF vs. resilient modulus for soil C

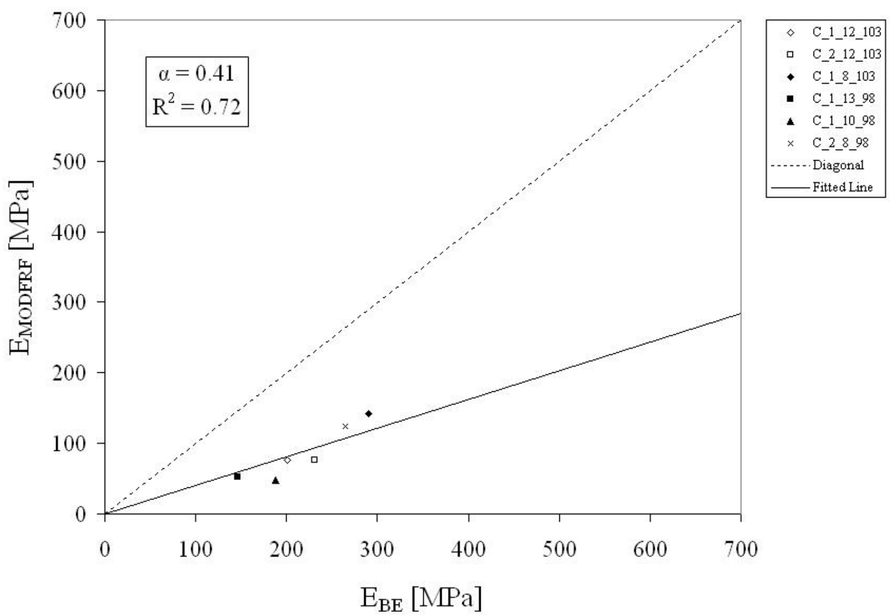


Figure 5.79: Modified LWD FRF vs. bender element for soil C

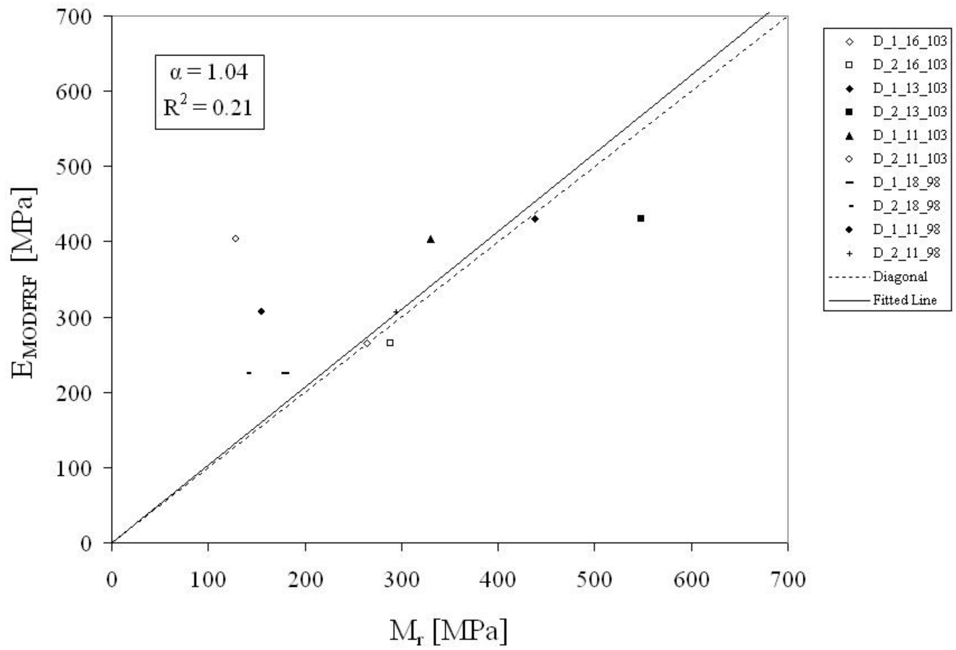


Figure 5.80: Modified LWD FRF vs. resilient modulus for soil D

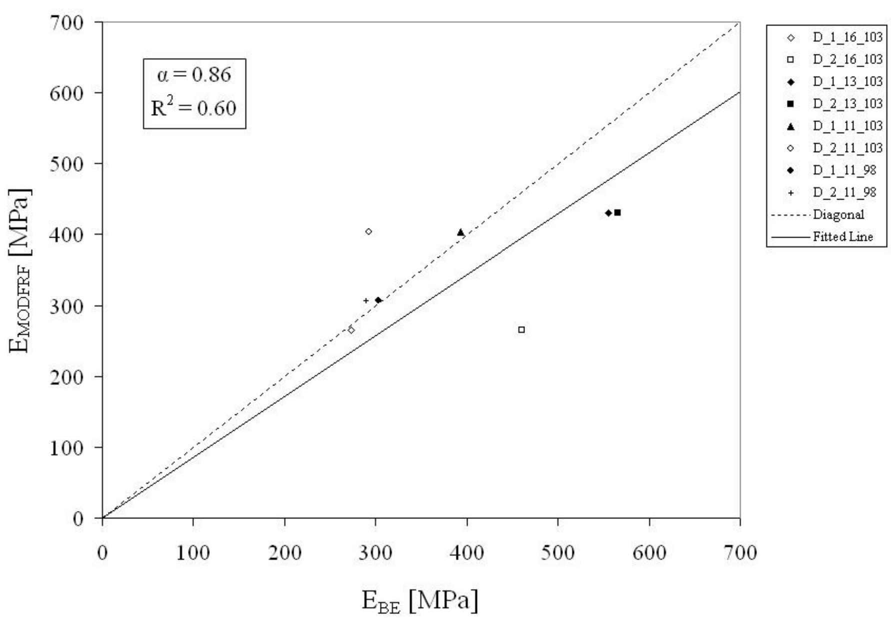


Figure 5.81: Modified LWD FRF vs. bender element for soil D

5.5.4 PVD and BE-M_r

Figures 5.82–5.87 compare the respective PVD results with their BE-M_r counterparts for soils B, C and D. Here it is noted that the PVD testing of soil A did not yield meaningful results and is thus omitted from the presentation. An interesting feature of the the plots is that the PVD estimates generally provide a lower bound on all field estimates of the Young's modulus. With reference to the equation

$$E_{PVD} = \alpha M_r, \tag{5.23}$$

this observation is evident from the fact that the values of α are less than 0.3 for all three soils tested. Furthermore, the same can be said for the α values comparing the PVD to BE, where ≤ 0.16. As examined earlier, this behavior is perhaps a consequence of the relatively low stiffness of the PVD loading frame relative to stiffness of the soils tested. In general, such configurations tend to result in an under-estimation of stiffness [24].

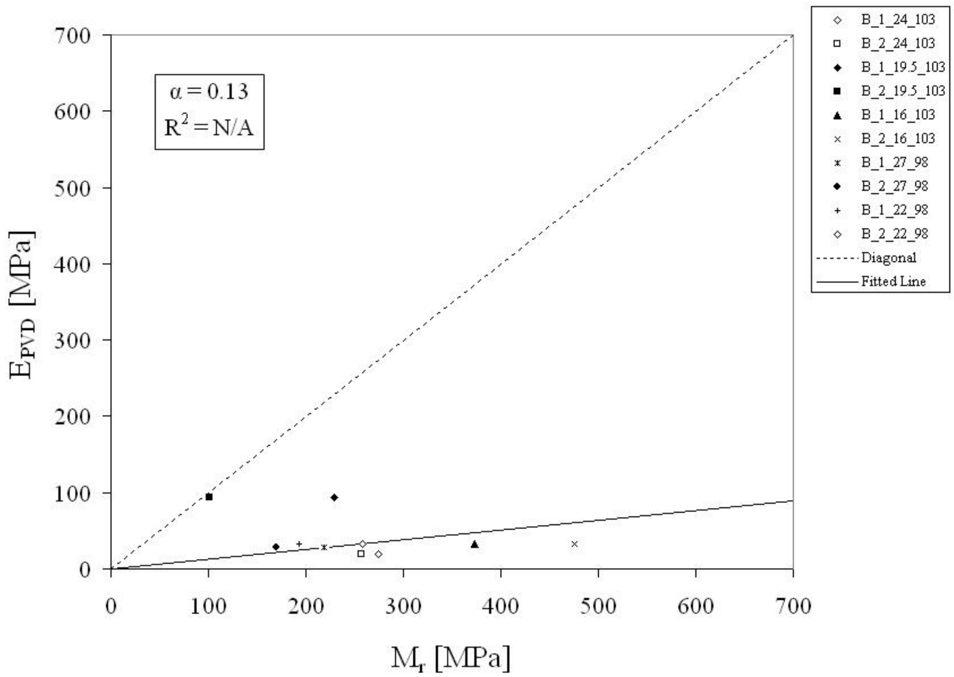


Figure 5.82: PVD vs. resilient modulus for soil B

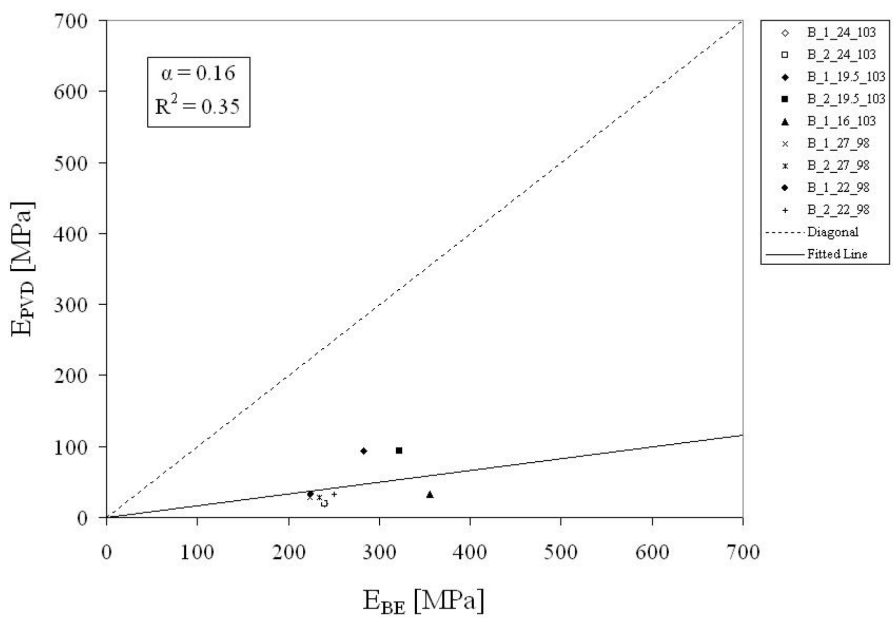


Figure 5.83: PVD vs. bender element for soil B

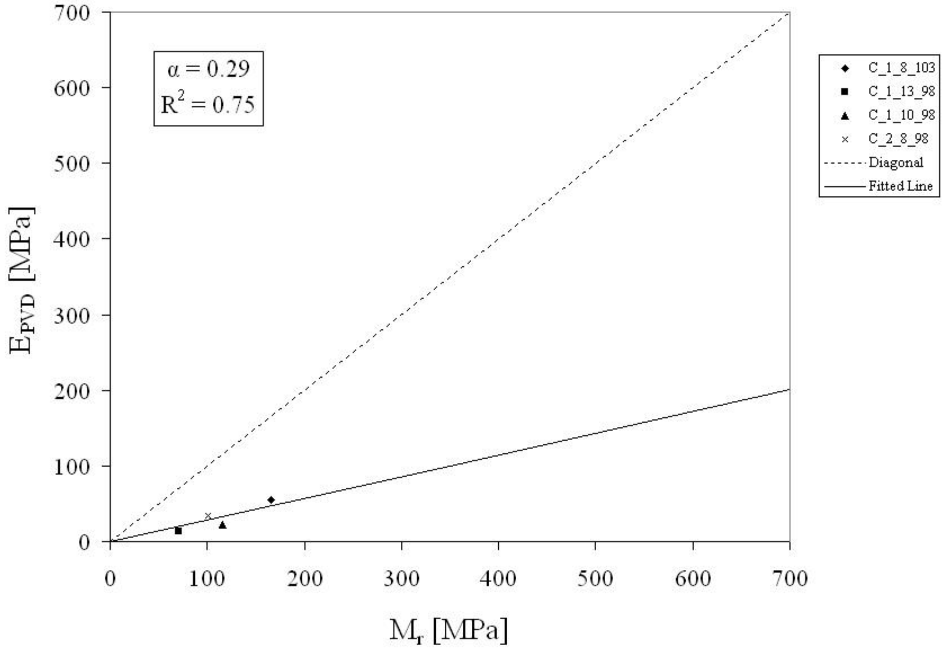


Figure 5.84: PVD vs. resilient modulus for soil C

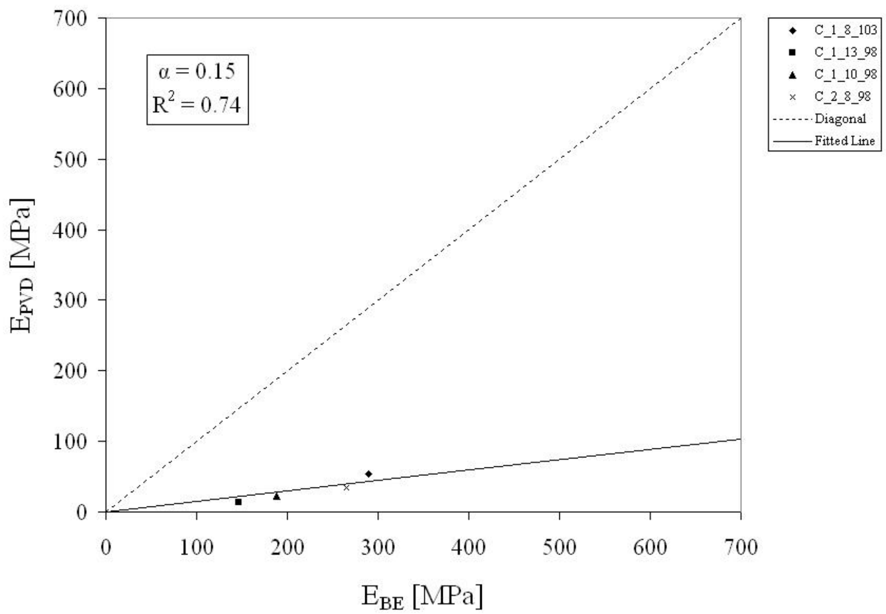


Figure 5.85: PVD vs. bender element for soil C

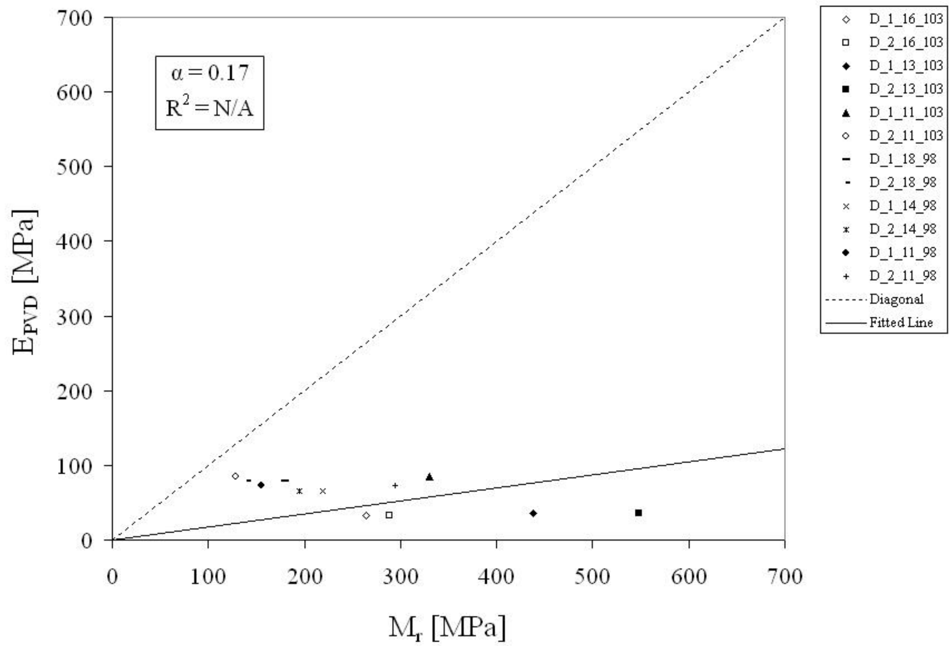


Figure 5.86: PVD vs. resilient modulus for soil D

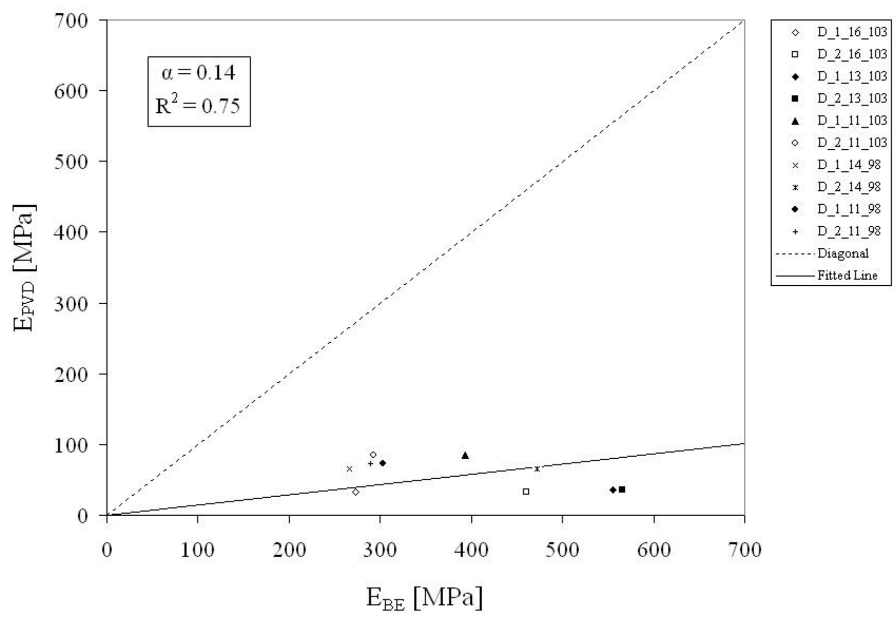


Figure 5.87: PVD vs. bender element for soil D

5.5.5 DCP versus BE-M_r

Figures 5.88–5.99 compare the respective DCP estimates with the correlated M_r and BE values for soils A, B, C and D. As noted previously, the DCP provides an index for evaluating the uniformity of the subgrade. In addition, the various correlations for strength and stiffness can be used to compare with the laboratory measurements. With reference to the equation

$$E_{DCP} \;=\; \alpha \, M_r, \tag{5.24}$$

the values of α vary from 0.38 to 1.28. The α values for the BE comparisons to the Young's modulus correlations are 0.44, 0.30, 0.46, and 0.35. Thus, the correlations need to be modified for the particular soils tested.

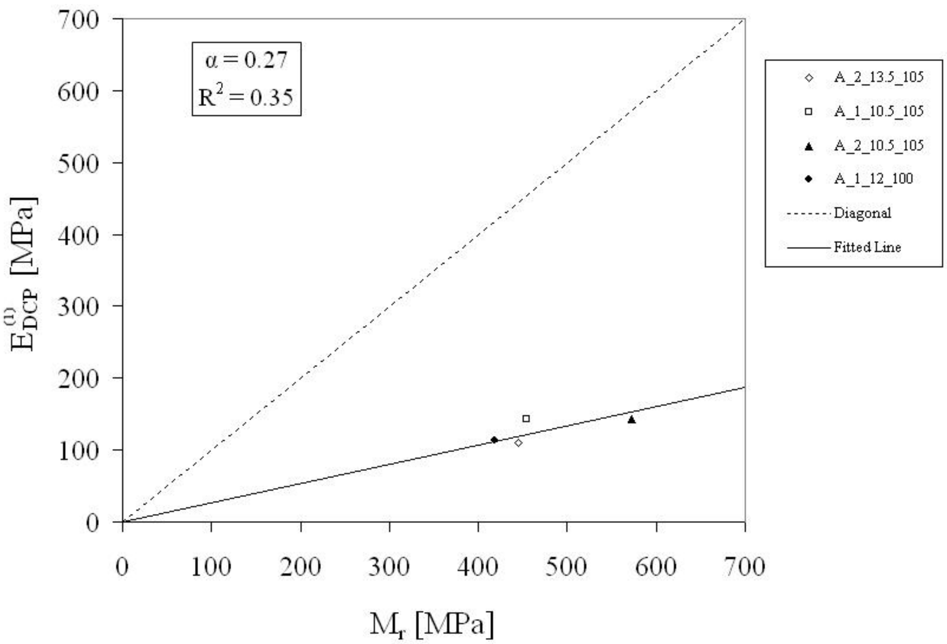


Figure 5.88: DCP-CBR correlation vs. resilient modulus for soil A

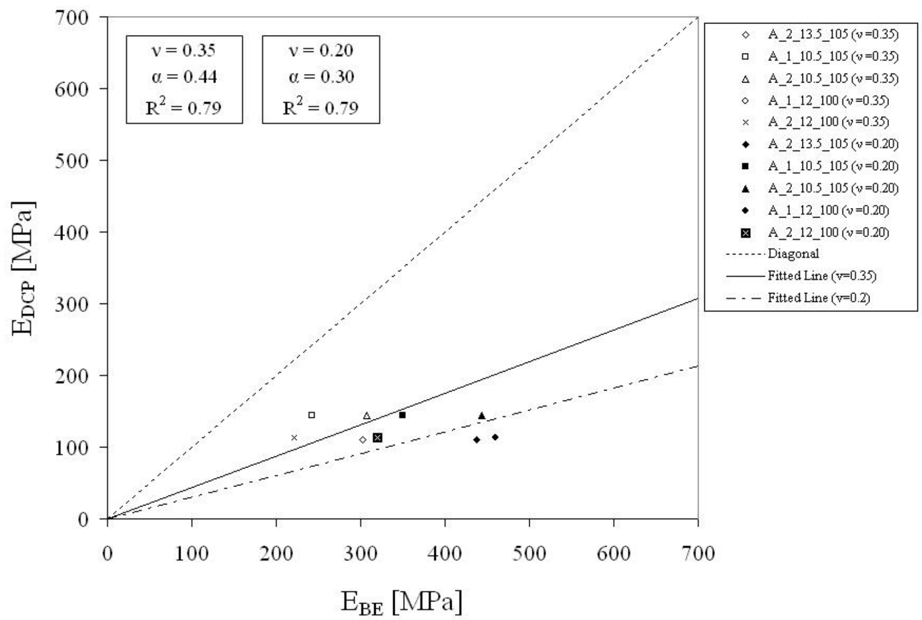


Figure 5.89: DCP-CBR correlation vs. bender element for soil A

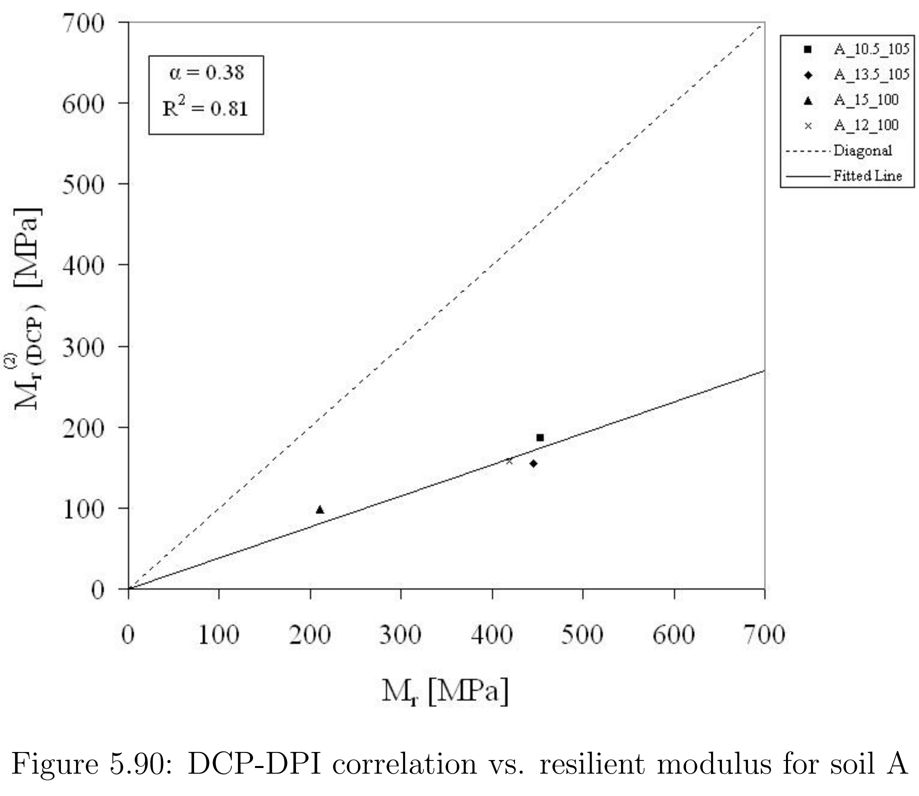


Figure 5.90: DCP-DPI correlation vs. resilient modulus for soil A

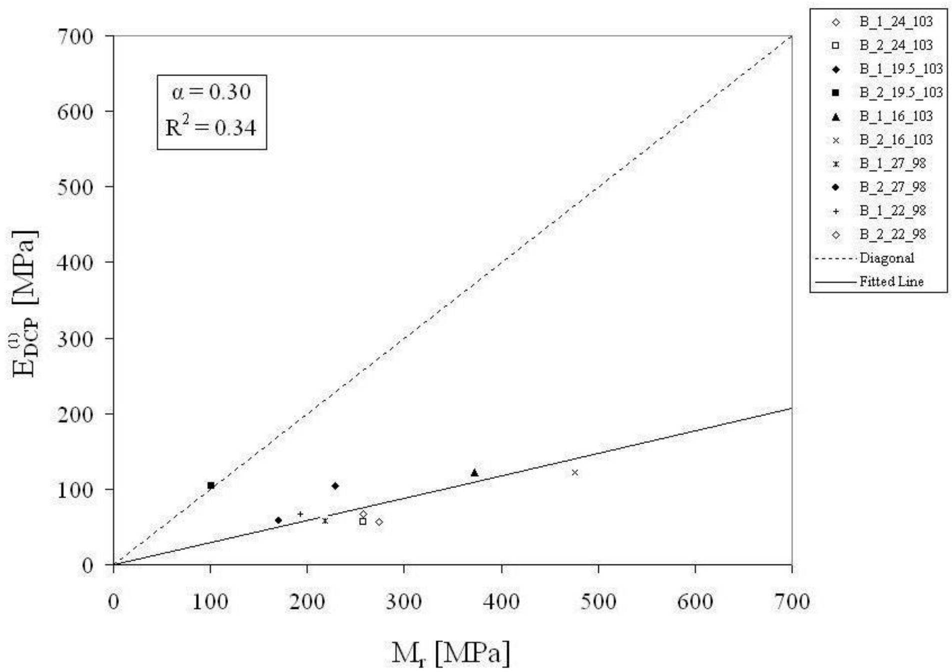


Figure 5.91: DCP-CBR correlation vs. resilient modulus for soil B

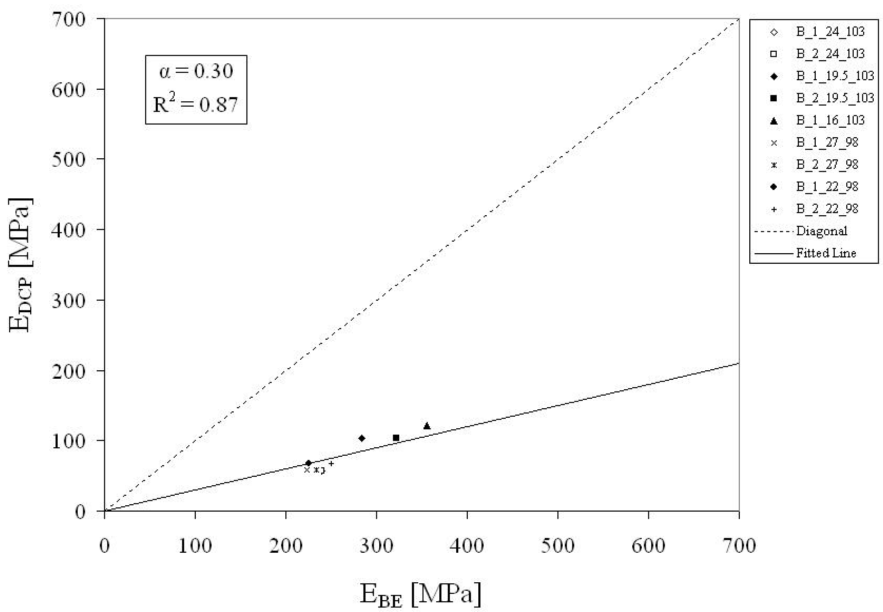


Figure 5.92: DCP-CBR correlation vs. bender element for soil B

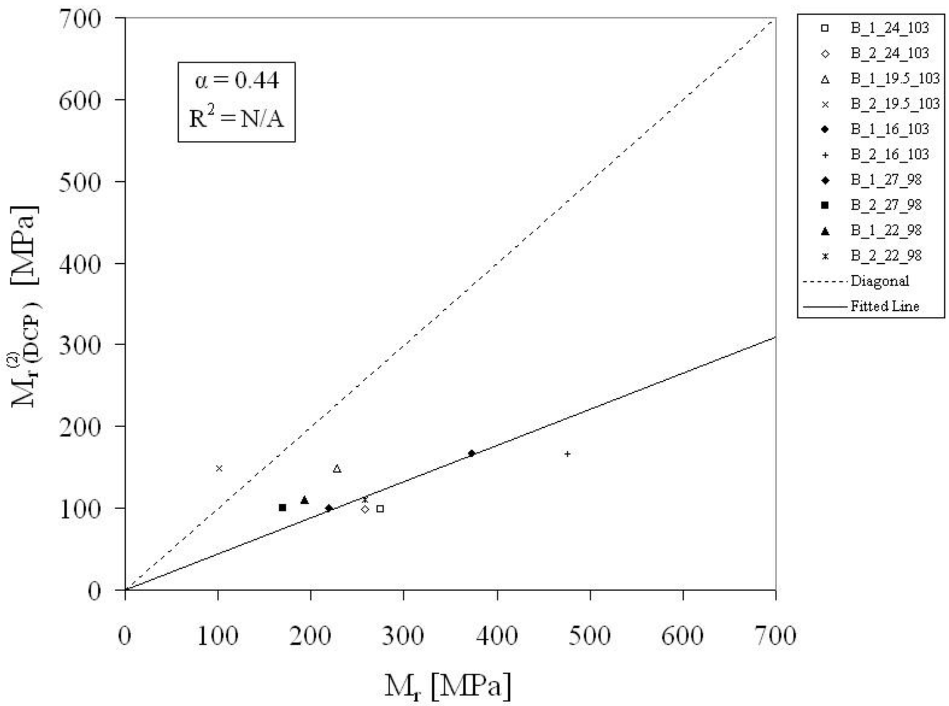


Figure 5.93: DCP-DPI correlation vs. resilient modulus for soil B

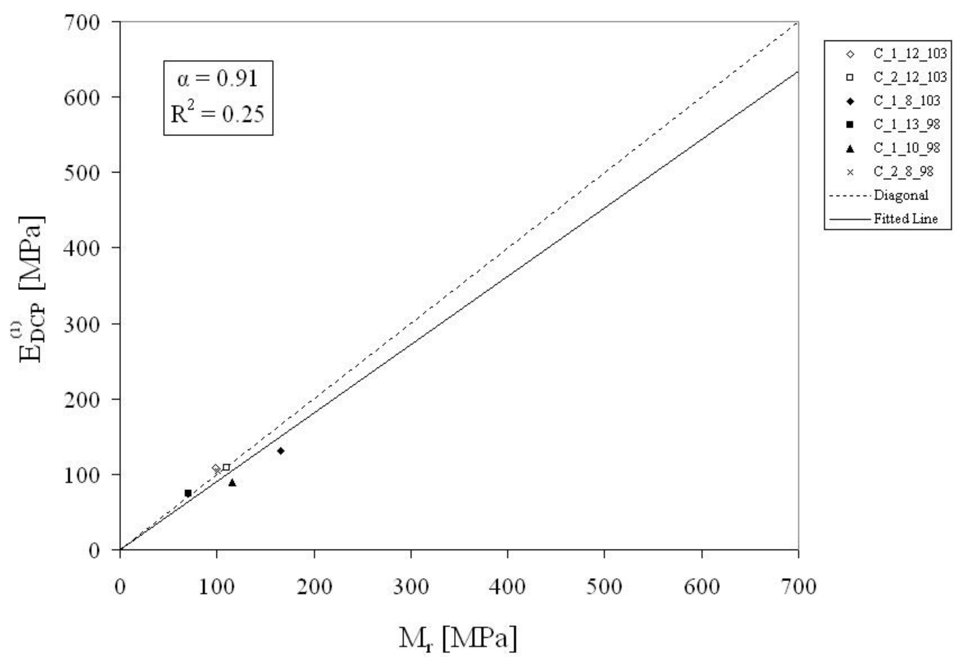


Figure 5.94: DCP-CBR correlation vs. resilient modulus for soil C

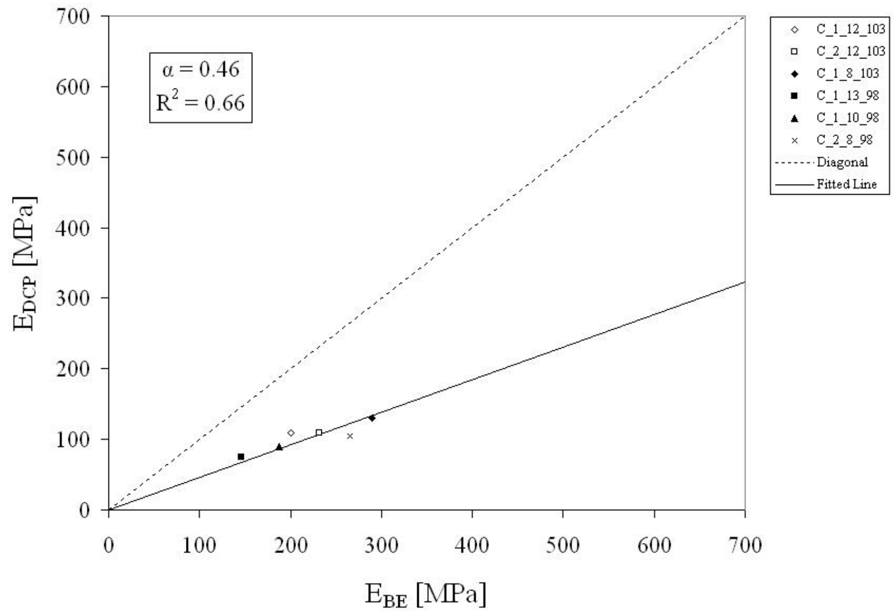


Figure 5.95: DCP-CBR correlation vs. bender element for soil C

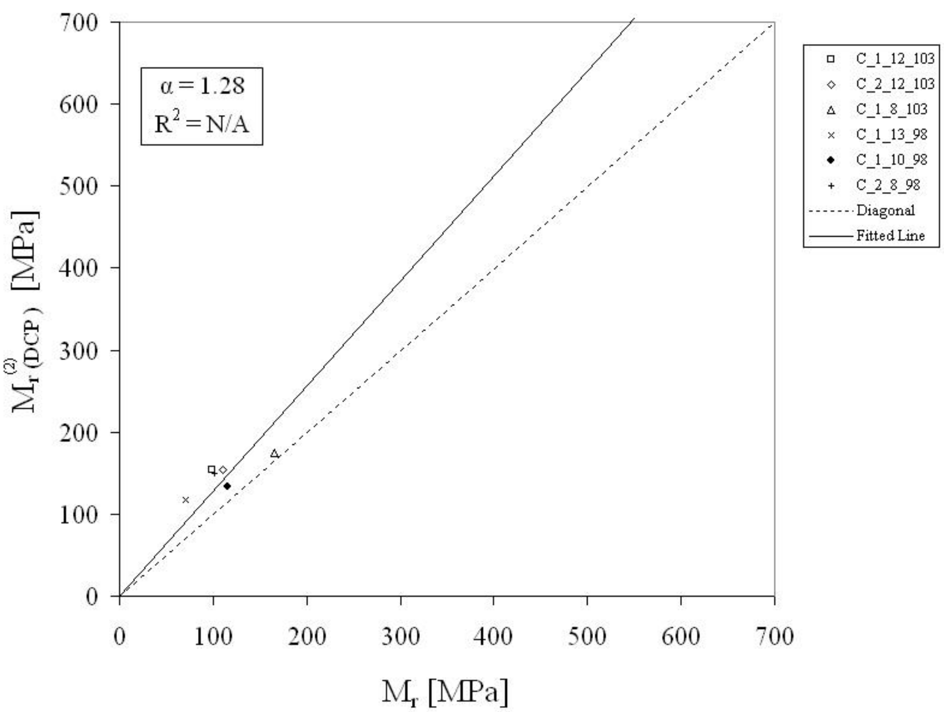


Figure 5.96: DCP-DPI correlation vs. resilient modulus for soil C

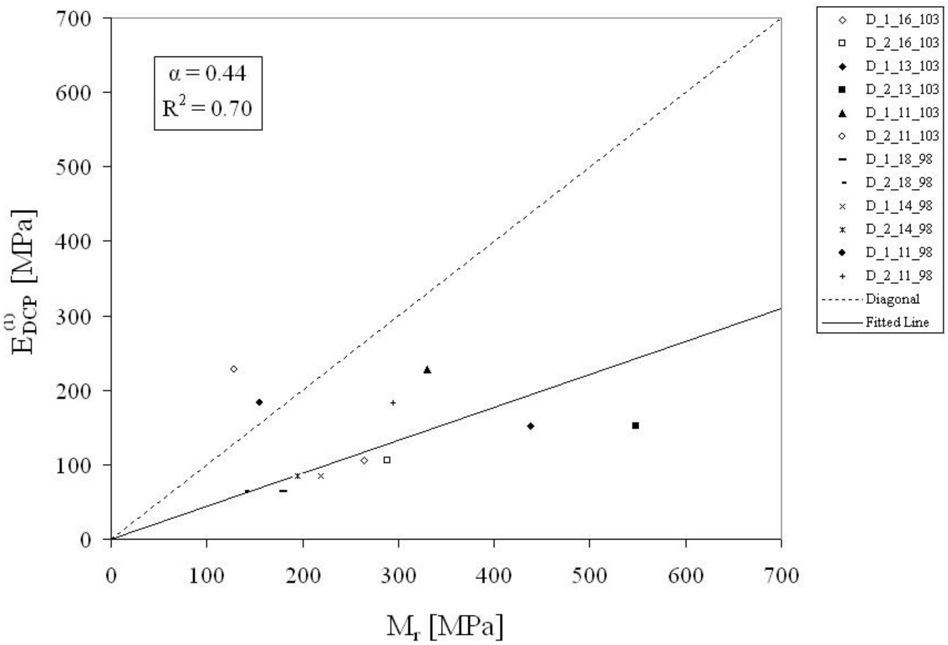


Figure 5.97: DCP-CBR correlation vs. resilient modulus for soil D

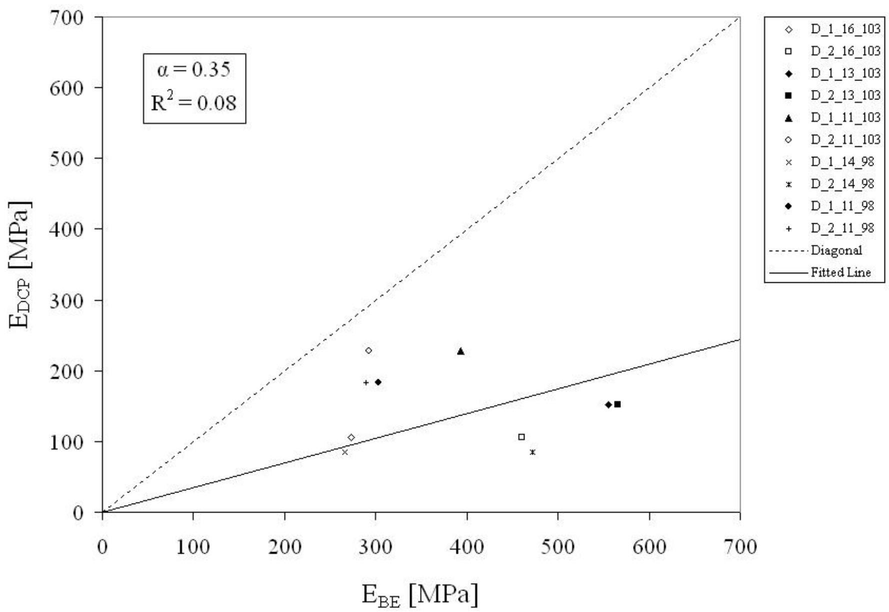


Figure 5.98: DCP-CBR correlation vs. bender element for soil D

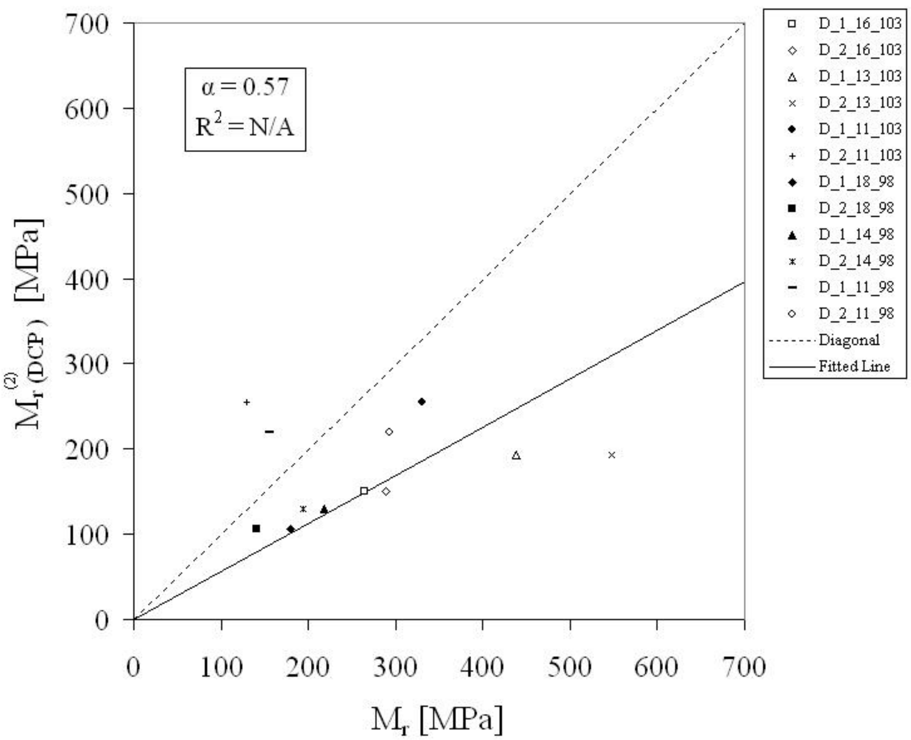


Figure 5.99: DCP-DPI correlation vs. resilient modulus for soil D

Chapter 6

Closing Remarks

To elevate the quality assurance practices and field testing of unpaved subgrade and granular base profiles, the project focused on: i) the development of a laboratory procedure for understanding and quantifying the effects of moisture on the soil's stiffness and strength characteristics; and ii) relating the laboratory measurements to field estimates of the associated soil parameters. The test matrix included four fine-grained soils representative of the road conditions in Minnesota. For each soil, two Proctor densities and three moisture contents were tested for a total of 24 soil-moisture-density combinations.

The testing methodology incorporated i) laboratory simulation of the field compaction by means of a servo-hydraulic load frame, ii) field-type testing on prismatic soil samples with approximate volume of 0.1m^3, and iii) stiffness and strength testing on cylindrical soil specimens. The container for the prismatic soil volumes was designed to minimize the boundary effects; the reduced-scale compaction was designed to mimic the construction conditions. The field-type testing includes i) the GeoGauge, ii) the PRIMA 100 device, iii) the modified LWD device, iv) the Portable Vibratory Deflectometer and v) the Dynamic Cone Penetrometer (DCP). To compare the Young's modulus values stemming from the field and laboratory experiments, cylindrical specimens were extracted from the prismatic soil volumes and tested for the resilient modulus (M_r) and small-strain Young's modulus using bender elements.

The results reveal that stress state, moisture, and density have a significant effect on the Young's modulus and strength of all four soils. On the element testing side, the small strain estimates from the bender element tests were in good agreement with the resilient modulus values. In the context of field testing, there was significant variation of the estimated Young's modulus depending upon the particular testing device. It was found, however, that the values from the modified LWD device correlated reasonably well with the M_r values for all soil conditions. The DCP was effective in quantifying the uniformity of compacted soil volumes, and through empirical formulas, the apparent Young's modulus.

Among all field testing and data interpretation schemes, the Modified LWD approach used in conjunction with the frequency response function (FRF) interpretation procedure was found to yield the values of Young's modulus that are, in terms of the trend line, closest to the resilient modulus values. Accordingly, it is recommended for a systematic field trial on fine-grained soils in the State of Minnesota.

Recommendations

- *Establishing the relationship of the M_r data with respect to established pavement design modulus values*

The relationship of the M_r values with respect to typical pavement design M_r values must be considered within the context of the soil type, stress state, and compacted characteristics (density, soil structure, moisture, and aging). In addition, the compactive effort and method to achieve a density at a given moisture level are parameters that should be considered in evaluating stiffness. It is recommended that future work investigate M_r values at a fixed compactive effort, and compare the measured M_r with design values.

- *Validity of M_r data using one lvdt that violates SNR*

Evaluation of data to estimate M_r values must involve measurements of deformation from three LVDTs, and this was done for all reported M_r values. In general, two LVDTs cannot provide sufficient information to calculate axial strain. However, the criterion of signal-to-noise ratio being greater than three (SNR > 3) for all LVDTs could be relaxed to allow one LVDT to have an SNR > 1.5 while the other two LVDTs must have an SNR > 3 because of the position of the sensor relative to the axis of rotation. Future work should consider the effect of the lower SNR value for one LVDT in evaluation of M_r.

- *MnROAD soil, M_r tests*

Based on the bender element results, it appears that the M_r values may have been affected by the sensitivity of the LVDTs. This illustrates the importance of bender element measurements in conjunction with M_r testing. Further testing should be performed on Soil A (MnROAD soil) to verify the reported stiffness values. Bender elements or some other nondestructive seismic procedure should be considered during M_r testing.

- *Resilient modulus data as a function of stress state, density, and moisture*

The variation of M_r values with stress state, density and moisture is presented in Figures 5.5 - 5.16. Future work should include a regression analysis to quantify the behavior exhibited in these figures.

- *Density and moisture changes, and time effects on specimens, field-type tests to M_r*

To minimize the changes in moisture from the time of specimen preparation to the time of its testing, prismatic soil containers were tested on the day of their preparation as it was difficult to moisture-seal such large volumes of soil. Due to a broad scope of the project, there was an inherent time delay between the extraction of cylindrical specimens and their (resilient modulus/bender element/strength) testing as summarized in Table 4.6. To prevent significant moisture changes during this delay period, the specimens were i) wrapped in a plastic wrap, ii) placed inside moisture-sealed containers, and iii) stored inside a humidity-controlled room. The "post-mortem" tests on the strength-tested resilient modulus specimens revealed that the total loss of moisture (from the day of extraction) was typically 0.5-1% and no more than 3% in terms of the specimens' water content (Table 5.3). The effect of aging during this period that ranged from three weeks to nine months is not known.

- *Box size boundary effects for each device*

The final design of the prismatic soil container (Fig. 4.1) used to evaluate the performance of field testing devices is a result of a year-long study (Chapter 4 and Appendix A). In the investigation, pilot experiments were performed using Quikrete Sand # 1113 and the Portable Vibratory Deflectometer (PVD) as test soil and field device, respectively. A comparison of the PVD results stemming from the use of a "small" and "large" plywood container (see Fig. 4.3 and Table 4.2) led to the conclusion that the "small" container is sufficient size to reasonably simulate the field conditions. The final design resulted in a prismatic steel container (Fig. 4.1) that is measurably larger that the "small" plywood box. The final dimensions were limited by the size of the MTS load frame used to compact the soils. While the particular effect of the container boundaries on the performance of each field device cannot be ascertained at this point, it is expected that "box effect" on "low"-frequency devices is larger than that on a"high"-frequency apparatus. In view of its importance on parametric laboratory studies, this topic is recommended as a topic of future research.

- *Device comparison considering stress state, density, and moisture*

The comparison of field testing devices is by default limited to the in-situ stress condition (sometimes referred to as the K_0-condition). Accordingly, no parametric study is possible in this regard. The effects of moisture and density on the device comparison, on the other hand, are summarized qualitatively in Figs. 5.42-5.99 where each data point is marked according to the moisture and density state of soil tested. While some of the figures indicate that the field testing devices may be less sensitive to an increase in soil density than the resilient modulus test, the overall trends vary from one soil (and device) to another, and no overall statement can be made in this regard without further interpretation of the data.

- *The objective of this research was the following: To elevate the quality assurance practices and field testing of unpaved subgrade and granular base profiles, the proposed project is focused on:* 1) *the development of a laboratory procedure for understanding and quantifying the effects of moisture on the soil's stiffness and strength characteristics; and* 2) *relating the laboratory measurements to field estimates of the associated soil parameters.*

To the authors' knowledge, this is one of the first broad-scoped studies aimed at comparing the laboratory and field measures of the soil's Young's modulus under varying density and moisture conditions. In this investigation, we advanced a number of new concepts such as the combined bender element-resilient modulus (BE-M_r) testing - Item 1 - and improved (frequency analysis-based) interpretation of LWD measurements - Item 2. While the questions of improving the QC/QA practices and relating the field to laboratory measurements are far too complex to be definitively answered within a single study, we believe that the results of this investigation represent a necessary cornerstone for advancing the theory and practice of pavement construction.

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Appendix A

Container Verification

A.1 Description of Soils

Sieve analysis results performed on the sands used for container verification are in Table A.1 and A.2. The mean value of the maximum dry unit weight $\gamma_{d(max)} = 17.81\frac{kN}{m^3}$ (Table A.3). The mean value of the minimum dry unit weight $\gamma_{d(max)} = 15.91\frac{kN}{m^3}$(Table A.4).

Table A.1: Grain size analysis for Play Sand

U.S. Standard Sieve Size	Opening [mm]	Percent of soil retained on each sieve	Percent passing
10	2.000	0.97	99.03
20	0.850	14.86	84.17
40	0.425	43.30	40.87
60	0.250	31.08	9.80
100	0.150	8.40	1.40
200	0.075	1.26	0.14
Pan	-	0.14	0

The maximum and minimum dry unit weight values for the Silica Sand were provided by U.S. Silica Company. According to the test performed by U.s. Silica Company (Certificate of Analysis), the maximum and minimum dry unit weights were $\gamma_{d(max)} = 17.47\frac{kN}{m^3}$ and $\gamma_{d(min)} = 14.41\frac{kN}{m^3}$, respectively.

A.2 Experimental Procedure

The height and the opening of the flexible hose were varied to obtain the desired density as shown in Table A.5.

The circular loading plate of the exciter was placed directly on the sand surface. The sensors attached to the loading plate measured the force and acceleration in the time domain.

Table A.2: Grain size analysis for Silica Sand

U.S. Standard Sieve Size	Opening [mm]	Percent of soil retained on each sieve	Percent passing
20	0.850	0.0	100
40	0.425	0.4	99.8
50	0.300	3.2	99.4
70	0.212	19.5	96.2
100	0.150	48.1	76.7
140	0.106	24.4	28.6
200	0.075	3.8	4.2
270	0.053	0.4	0.4
Pan		0.0	0.0

Table A.3: Maximum density and dry unit weight for Silica Sand

No. of sample	$\rho_{d(max)}$ [kg/m^3]	$\gamma_{d(max)}$ [kN/m^3]
1	1820	17.85
2	1840	18.05
3	1800	17.66
4	1810	17.76
5	1820	17.85
6	1800	17.66

With reference to Eq. 3.10, the vertical dynamic force applied to the loading plate was taken as the input to the system, whereas the vertical acceleration and resulting force at the soil foundation interface was taken as an output.

To investigate the sand stiffness, the static pre-load exerted was varied by the moving armature of the exciter. The armature was connected to the body of the exciter by a set of internal flexures, and the magnitude of the downward force on the sand was adjusted by changing the distance between the exciter's body and the sand. Three different average contact pressures q were selected. The magnitude of the average static pressure was determined

Table A.4: Minimum density and dry unit weight for Silica Sand

No. of sample	$\rho_{d(max)}$ [kg/m^3]	$\gamma_{d(max)}$ [kN/m^3]
1	1820	17.85
2	1840	18.05
3	1800	17.66
4	1810	17.76
5	1820	17.85
6	1800	17.66

Table A.5: Pluviation results

h [cm]	opening size ϕ [cm]	γ_d [kN/m^3]	D_r [%]
48.30	0.74	17.63	82
60.10	1.24	17.37	79
60.10	1.11	17.41	81
60.10	0.81	17.23	83
81.30	0.81	17.33	87
78.70	**0.63**	**17.60**	**90**

at the end of each test from the load cell readings while lifting up (unloading) the exciter from the sand surface. To assess the influence of the walls, the location of the exciter was varied as shown in Fig. A.1. The experimental data were fitted to the theoretical solution, Eq. 3.26 which contains two material parameters, namely, the Poisson's ratio ν and shear modulus G. These parameters pertain to an equivalent, linear elastic material model. To determine the values of ν and G, the accelerance function was used for fitting purposes. As examined earlier, the latter quantity is given by:

$$A(f) = \left[\mathcal{M}(f) - \frac{1}{(2\pi f)^2 C_{vv}(f)}\right]^{-1} \tag{A.1}$$

where C_{vv} is the interfacial compliance obtained from theoretical solution, (3.24), and $\mathcal{M}(f)$ is the loading-plate transfer function, (3.21). To obtain ν and G, this quantity was fitted to the accelerance function, (3.20), obtained from experimental measurements.

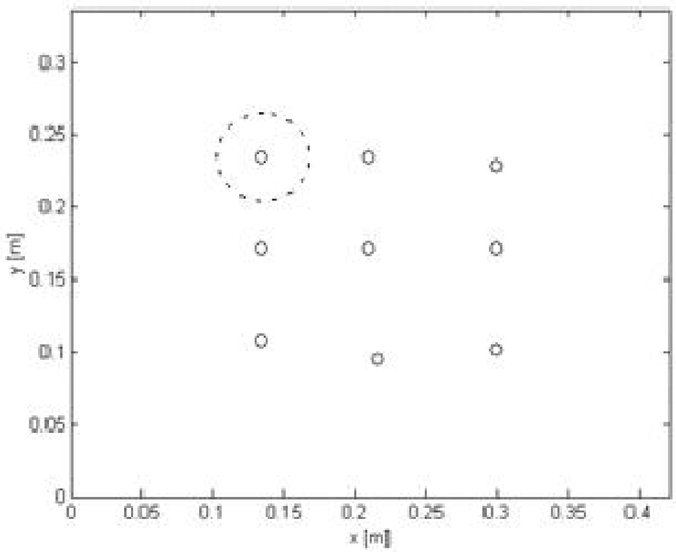

Figure A.1: Location of the center of the loading plate in the small container

A.3 Results

In the fitting procedure, software Matlab 7.0.1 was used. At each frequency point where the experimental data was measured, the theoretical value of the ordinary accelerance $A(f)$ was computed by minimizing a misfit-type objective function for different initial guess values of ν and G. Two different fitting schemes were applied: in the first, the minimization was performed for both parameters ν and G; in the second, a realistic mean value of $\nu = 0.25$ was assumed. A built-in MATLAB algorithm was used based on an unconstrained nonlinear optimization. The algorithm uses the simplex search method of Nelder and Mead [29]. The objective function, D, was defined as a cumulative squared difference between the experimental and analytical values of $A(f)$ in terms of its real and imaginary parts. Figures A.2, A.3, and A.4 illustrate typical results of the ordinary accelerance fitting procedure when minimizing both ν and G for one location of the exciter and different average contact pressure q in the small container. The results for the large container are shown in Figs. A.5, A.6, A.7.

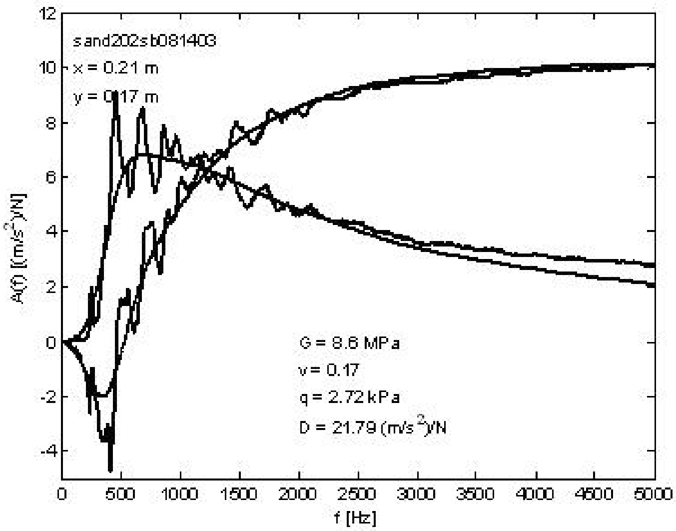

Figure A.2: Experimental and fitted ordinary accelerance functions for small container, q = 2.72 kPa

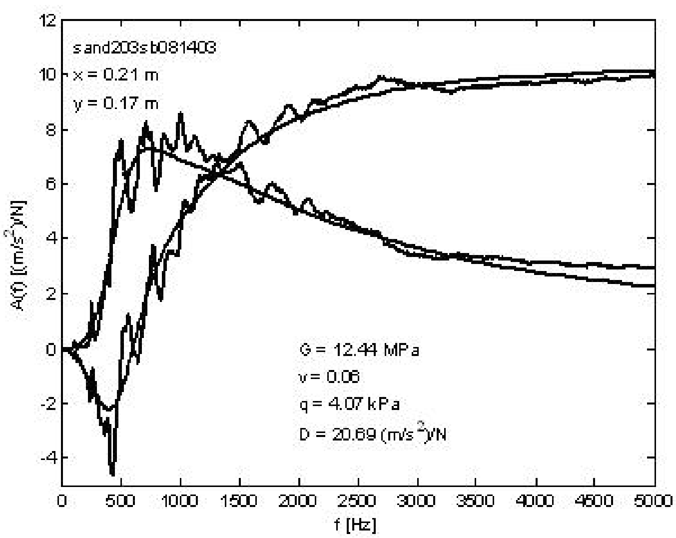

Figure A.3: Experimental and fitted ordinary accelerance functions for small container, q = 4.07 kPa

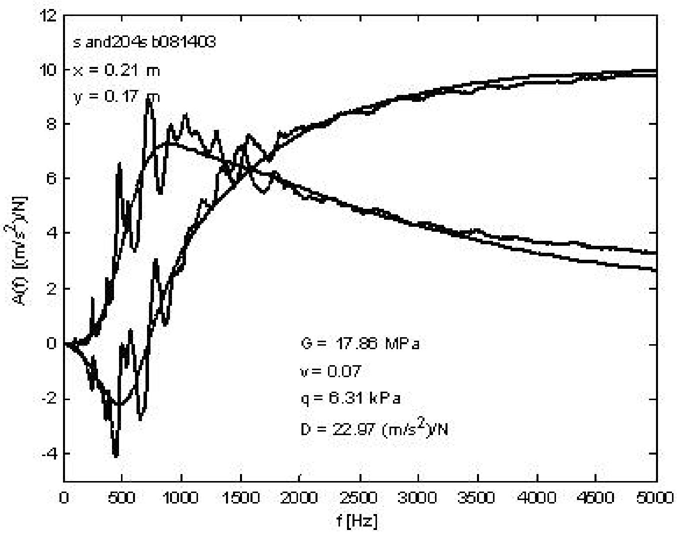

Figure A.4: Experimental and fitted ordinary accelerance functions for small container, q = 6.31 kPa

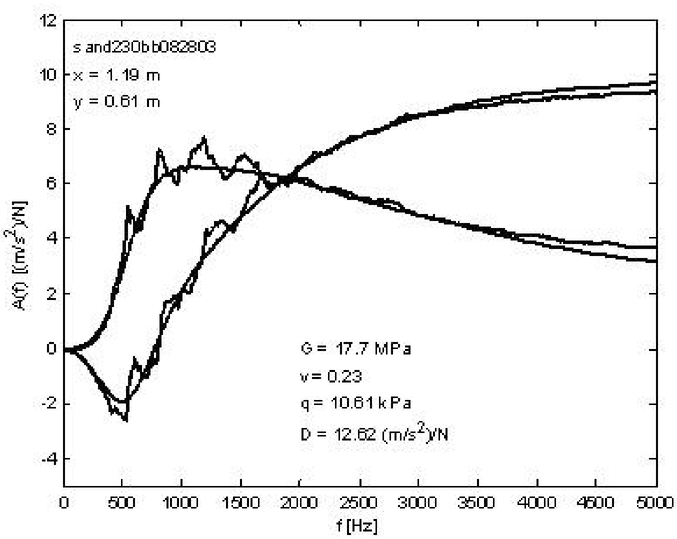

Figure A.5: Experimental and fitted ordinary accelerance functions for small container, q = 6.31 kPa

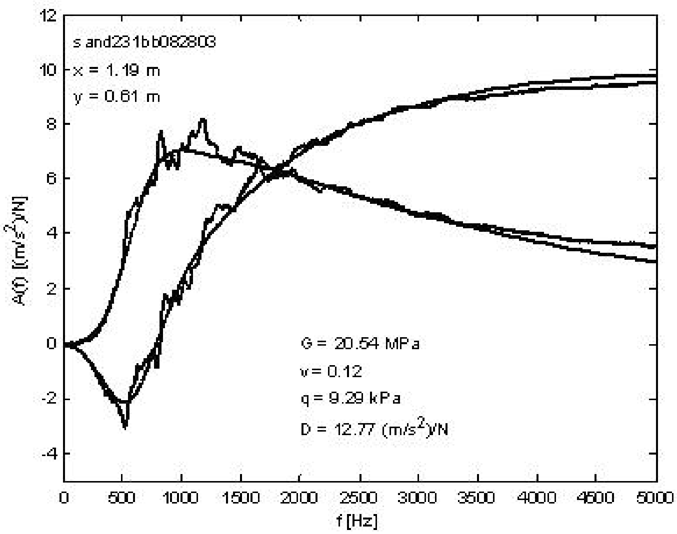

Figure A.6: Experimental and fitted ordinary accelerance functions for large container, q = 9.29 kPa

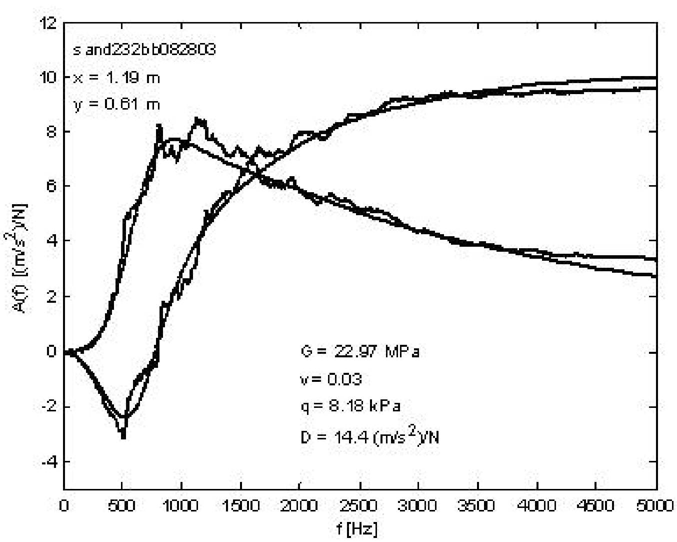

Figure A.7: Experimental and fitted ordinary accelerance functions for large container, q = 8.18 kPa

Figures A.8, A.9 and A.10 show the results of minimization with respect to G for = 0.25 in the small container. The results for the large container are shown in Figs. A.11, A.12 and A.13. When comparing the ordinary accelerance function obtained from the tests in

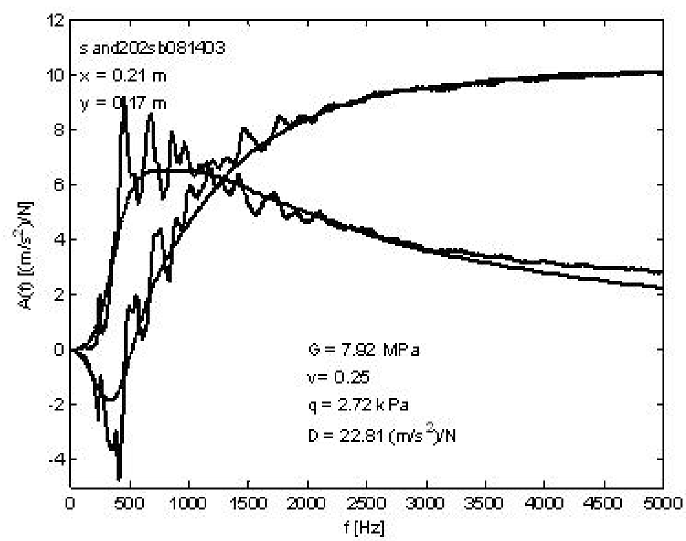

Figure A.8: Experimental and fitted ordinary accelerance functions for small container, q= 2.72 kPa

the small and large containers, it is evident that the local fluctuations (caused primarily by the container dimensions) are greater in the case of the small container. However, the fitted ordinary accelerance functions were nearly identical for both tests. In addition, the computed values of the equivalent shear modulus G were practically independent on the location of the exciter on the surface of the sand in the box. This implies insignificant influence of the boundaries of the containers on the values of G. Figure A.14 shows the equivalent shear modulus G as a function of the average contact pressure q. The results can be approximated by the expression

$$G = G_0 \frac{q}{q'}^{0.58} \tag{A.1}$$

where $q' = 1$ kpa is the reference pressure, and $G_0 = 4.23 MPa$. The values of the equivalent

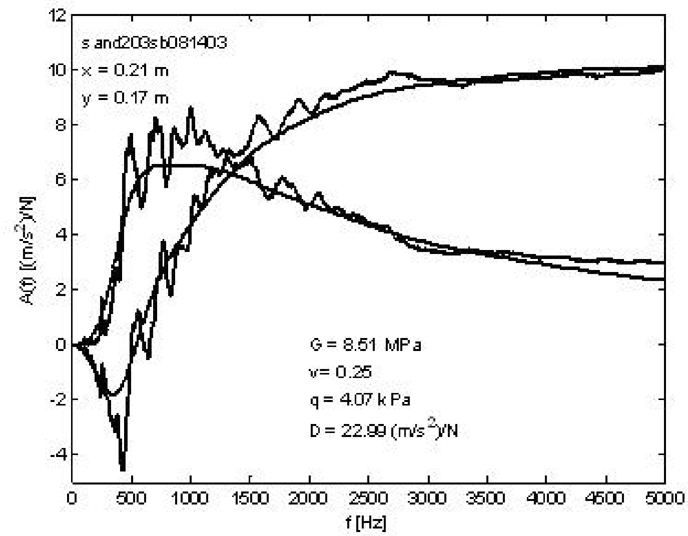

Figure A.9: Experimental and fitted ordinary accelerance functions for small container, q = 4.07 kPa

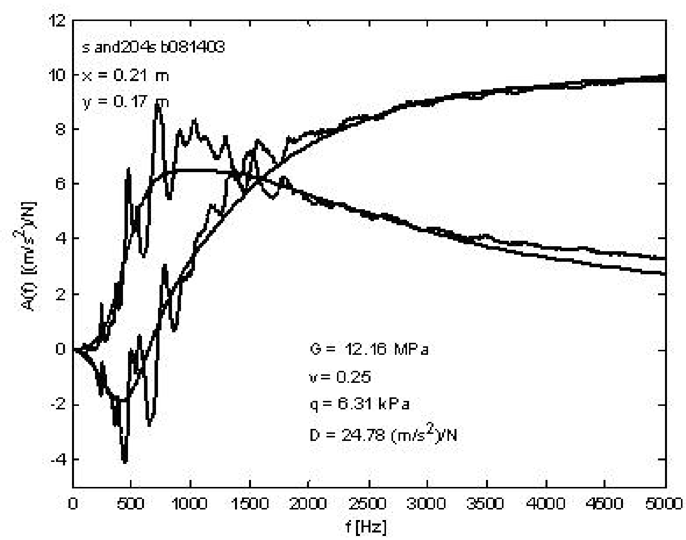

Figure A.10: Experimental and fitted ordinary accelerance functions for small container, q = 6.31 kPa

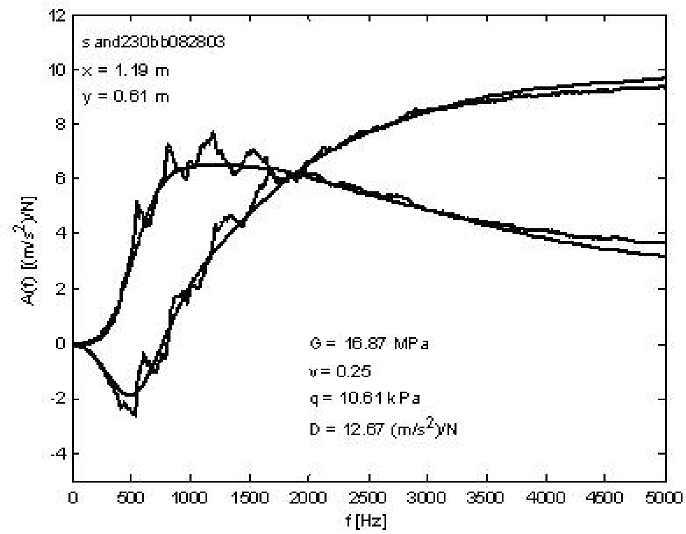

Figure A.11: Experimental and fitted ordinary accelerance functions for large container, q = 10.61 kPa

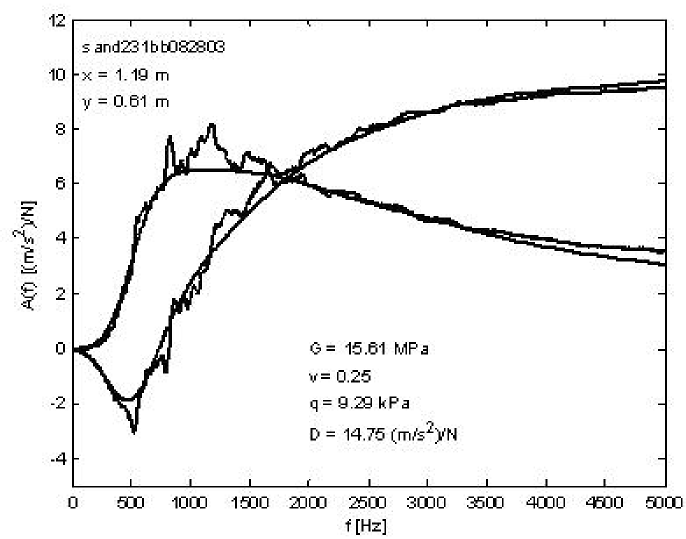

Figure A.12: Experimental and fitted ordinary accelerance functions for large container, q = 9.29 kPa

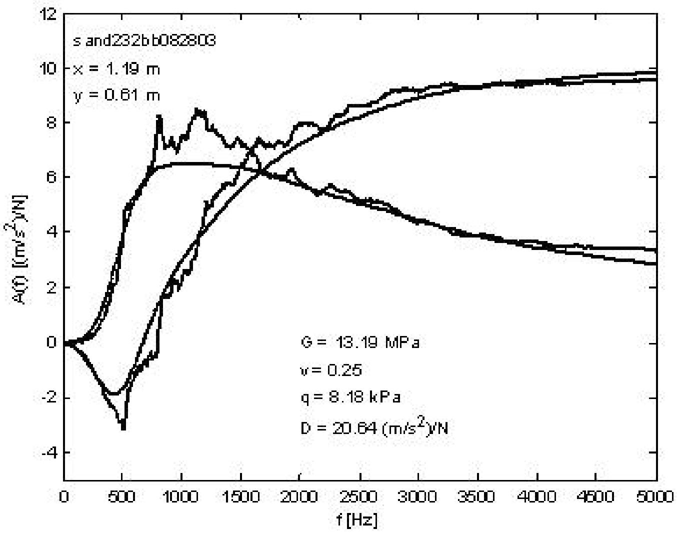

Figure A.13: Experimental and fitted ordinary accelerance functions for large container, q = 8.18 kPa

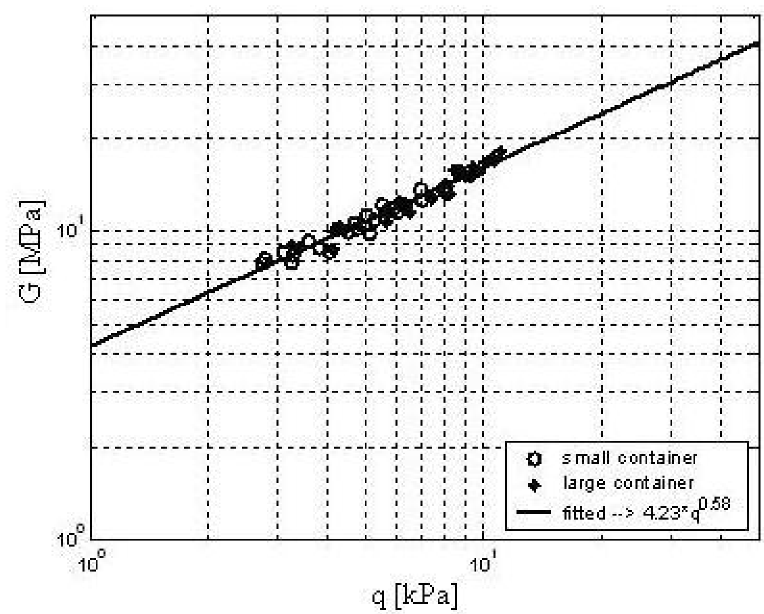

Figure A.14: Equivalent shear modulus vs. average contact pressure shear modulus G were used to calculate the vertical static stiffness of the circular loading plate/elastic half-space system given by

$$k_v = \frac{4Ga}{1-\nu} \tag{A.2}$$

Figure A.15 shows the computed vertical static stiffness for $\nu = 0.25$. In the tests conducted

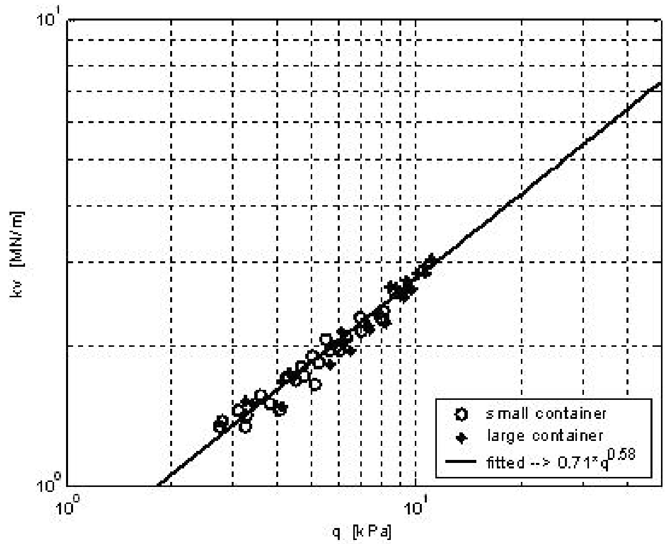

Figure A.15: Normal static stiffness vs. average contact stress for various locations of the exciter (small container and large container)

on Silica Sand by Guzina [18], a similar relationship (Eq. A.1) between the equivalent shear modulus and average contact pressure with $n = 0.5$ was obtained. As shown in Fig. A.16, the difference in data fit for Play Sand assuming n = 0.58 and n = 0.5 is small.

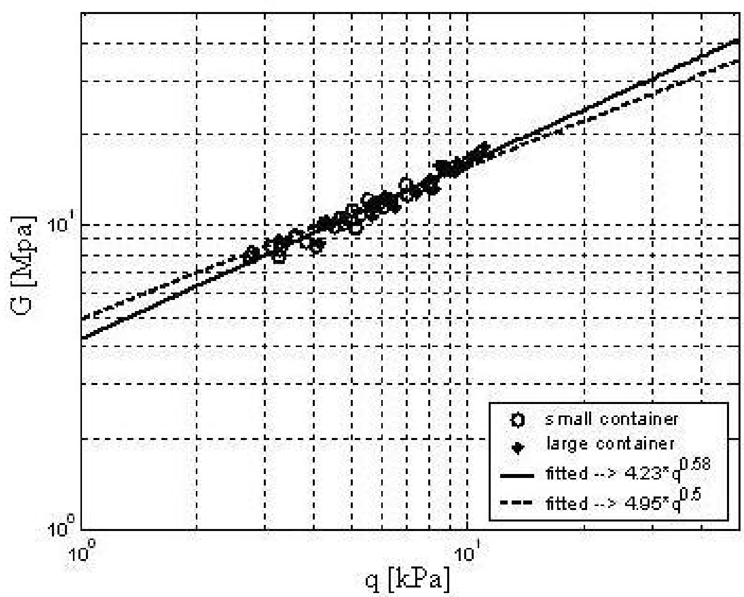

Figure A.16: Equivalent shear modulus vs. average contact pressure

Appendix B

Soil Information

B.1 Soil A

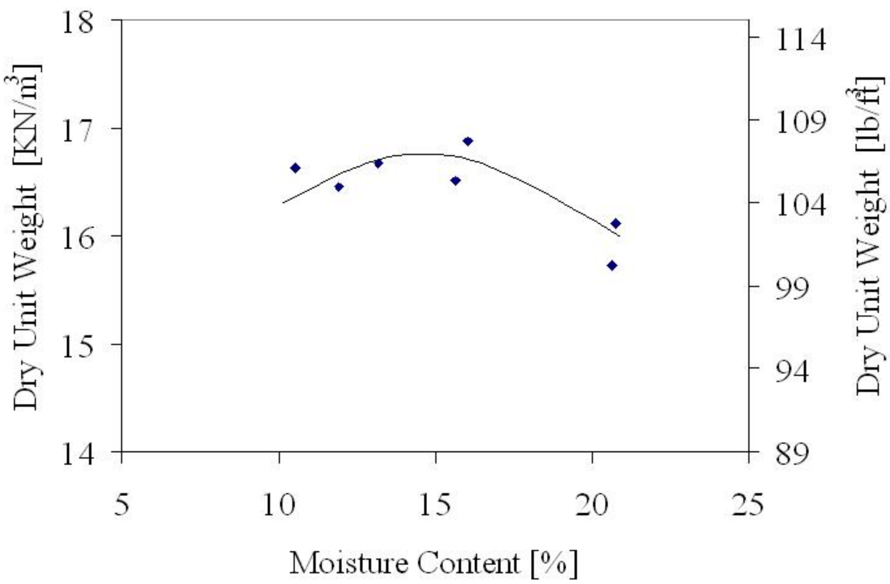

Figure B.1: Soil A (MnROAD) Proctor curve

Table B.1: Soil A (MnROAD) Proctor table

Mass of the Mold and Wet Soil [g]	Mold [g]	Wet Soil and Pan [g]	Dry and Pan [g]	Pan [g]	Moisture Content [%]	Unit Weight [KN/m^3]	Dry Unit Weight [KN/m^3]	Unit Weight [pcf]	Dry Unit Weight [pcf]
6005.60	4238.60	934.50	879.10	352.30	10.52	18.38	16.63	116.94	105.81
6052.00	4238.60	887.80	826.40	359.90	13.16	18.86	16.67	120.01	106.05
6121.70	4238.60	998.00	911.40	371.00	16.03	19.58	16.88	124.62	107.41
6110.70	4238.60	849.60	765.30	359.20	20.76	19.47	16.12	123.90	102.60
6010.00	4238.60	1055.20	980.30	352.20	11.92	18.42	16.46	117.23	104.74
6073.50	4238.60	1084.10	985.40	353.60	15.62	19.08	16.50	121.43	105.03
6062.30	4238.60	942.80	842.50	356.30	20.63	18.97	15.72	120.69	100.05

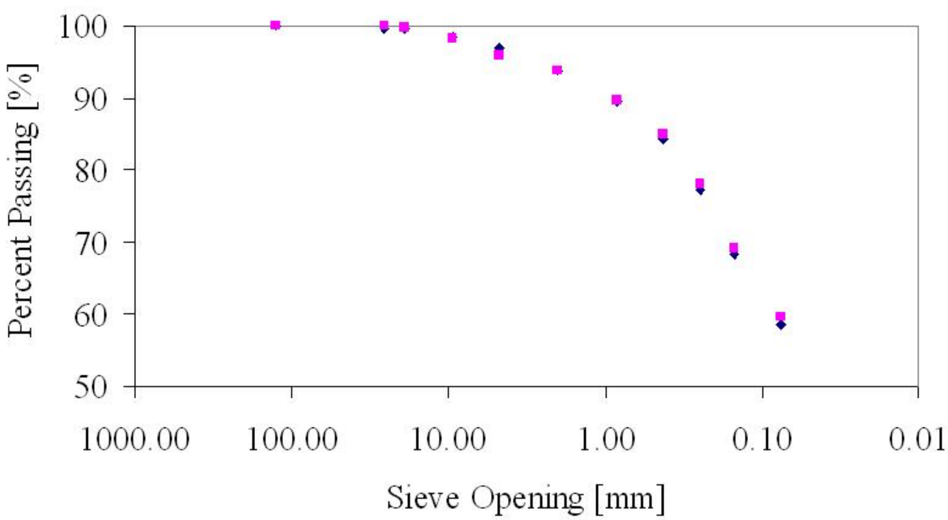

Figure B.2: Soil A (MnROAD) sieve analysis curve

Table B.2: Soil A (MnROAD) sieve analysis table

	Test One	Test Two
Sieve Size	Passing [%]	Passing [%]
2 in.	100.00	100.00
1 in.	99.50	100.00
0.75 in.	99.50	99.70
0.375 in.	98.50	98.20
#4	96.90	96.00
#10	93.70	93.80
#20	89.50	89.70
#40	84.30	85.00
#60	77.30	78.20
#100	68.30	69.20
#200	58.60	59.70

Table B.3: Soil A (MnROAD) classification

	Test One	Test Two
Liquid Limit	30.50	25.80
Plastic Limit	17.40	16.40
Plasticity Index	13.10	9.40
% Silt	46.00	45.30
% Clay	12.60	14.50
Textural Class	L	L
AASHTO Group	A-6	A-4
Group Index	5.00	2.90
Opt. Moisture [%]	14.40	16.10
Max Dry Unit Weight [pcf]	105.30	107.40
R-Value	15.60	17.50
Specific Gravity	-	-
AASHTO Testing Methods	T87 T88 T89 T90 T99 T100 T190	

B.2 Soil B

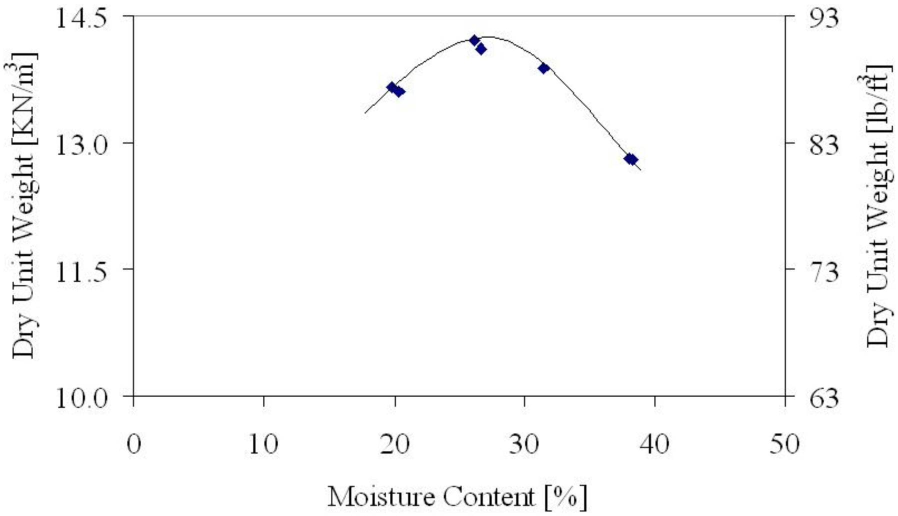

Figure B.3: Soil B (TH 23) Proctor curve

Table B.4: Soil B (TH 23) Proctor table

Mass of the Mold and Wet Soil [g]	Mold [g]	Wet Soil and Pan [g]	Dry and Pan [g]	Pan [g]	Moisture Content [%]	Unit Weight [KN/m^3]	Dry Unit Weight [KN/m^3]	Unit Weight [pcf]	Dry Unit Weight [pcf]
5788.50	4214.00	1006.00	895.50	352.60	20.35	16.37	13.61	104.20	86.58
5931.60	4214.00	845.00	742.30	356.80	26.64	17.86	14.10	113.67	89.76
5913.70	4214.00	777.30	660.50	353.30	38.02	17.68	12.81	112.49	81.50
5788.10	4214.00	942.40	844.90	352.80	19.81	16.37	13.66	104.17	86.95
5937.00	4214.00	940.20	819.40	357.20	26.14	17.92	14.21	114.03	90.40
5968.20	4214.00	1016.00	858.50	357.50	31.44	18.24	13.88	116.09	88.33
5914.70	4214.00	898.30	747.60	353.50	38.24	17.69	12.79	112.55	81.42

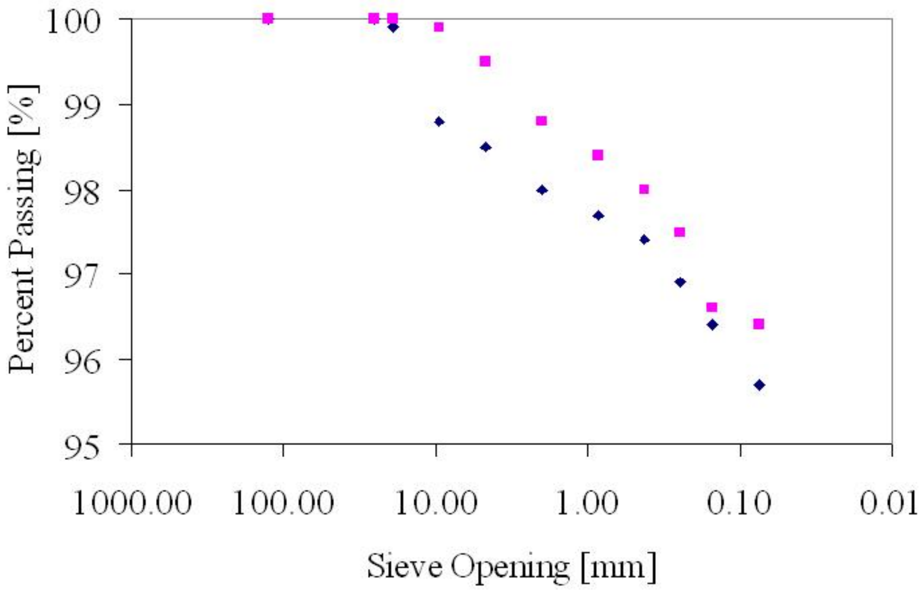

Figure B.4: Soil B (TH 23) sieve analysis curve

Table B.5: Soil B (TH 23) sieve analysis table

	Test One	Test Two
Sieve Size	Passing [%]	Passing [%]
2 in.	100.00	100.00
1 in.	100.00	100.00
0.75 in.	99.90	100.00
0.375 in.	98.80	99.90
#4	98.50	99.50
#10	98.00	98.80
#20	97.70	98.40
#40	97.40	98.00
#60	96.90	97.50
#100	96.40	96.60
#200	95.70	96.40

Table B.6: Soil B (TH 23) classification

	Test One	Test Two
Liquid Limit	84.30	84.90
Plastic Limit	32.60	32.90
Plasticity Index	51.70	52.00
% Silt	16.90	21.20
% Clay	78.80	75.20
Textural Class	C	C
AASHTO Group	A-7-6	A-7-6
Group Index	59.20	60.30
Opt. Moisture [%]	27.00	26.50
Max Dry Unit Weight [pcf]	89.70	90.40
R-Value	9.30	12.40
Specific Gravity	2.73	2.73
AASHTO Testing Methods	T87 T88 T89 T90 T99 T100 T190	

B.3 Soil C

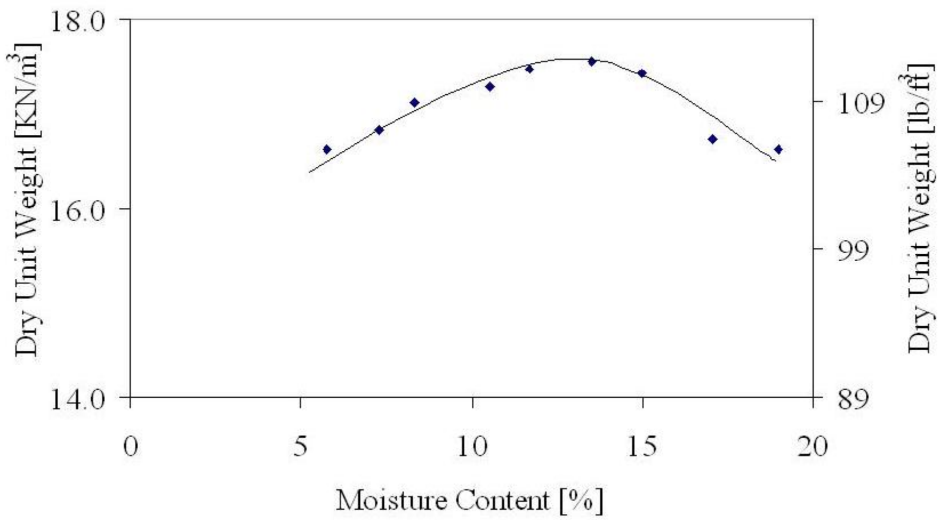

Figure B.5: Soil C (TH 58) Proctor curve

Table B.7: Soil C (TH 58) Proctor table

Mass of the Mold and Wet Soil [g]	Mold [g]	Wet Soil and Pan [g]	Dry and Pan [g]	Pan [g]	Moisture Content [%]	Unit Weight [KN/m^3]	Dry Unit Weight [KN/m^3]	Unit Weight [pcf]	Dry Unit Weight [pcf]
5973.00	4237.50	825.90	793.70	351.80	7.29	18.05	16.82	114.86	107.06
6074.90	4237.50	863.10	815.10	360.30	10.55	19.11	17.28	121.60	109.99
6152.90	4237.50	1007.70	930.20	356.20	13.50	19.92	17.55	126.76	111.68
6121.30	4237.50	1041.10	941.70	359.20	17.06	19.59	16.74	124.67	106.50
5927.90	4237.50	793.80	769.70	349.70	5.74	17.58	16.63	111.87	105.80
6021.00	4237.50	906.70	864.20	352.90	8.31	18.55	17.12	118.03	108.97
6114.10	4237.50	998.70	931.90	359.50	11.67	19.52	17.48	124.19	111.22
6164.80	4237.50	803.10	745.40	360.20	14.98	20.04	17.43	127.55	110.93
6139.90	4237.50	811.50	738.80	355.50	18.97	19.78	16.63	125.90	105.83

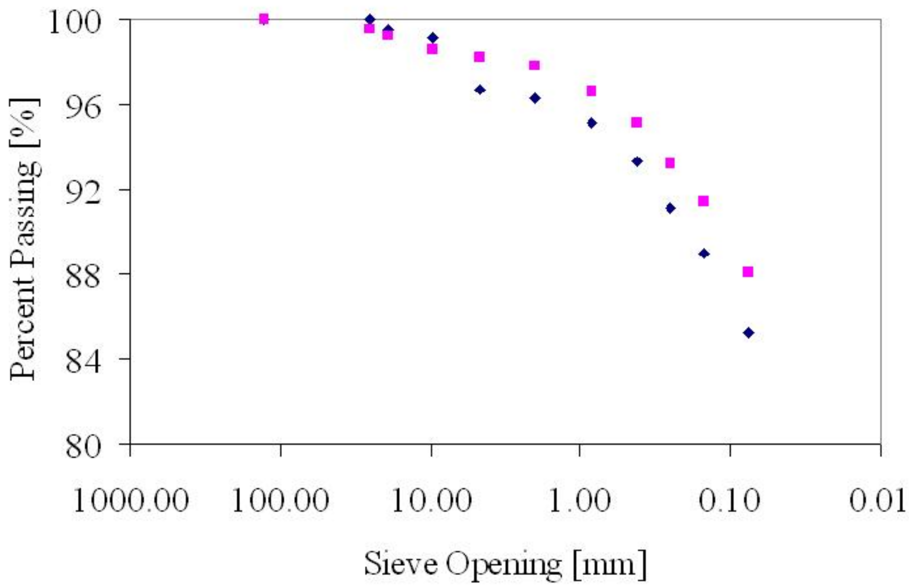

Figure B.6: Soil C (TH 58) sieve analysis curve

Table B.8: Soil C (TH 58) sieve analysis table

	Test One	Test Two
Sieve Size	Passing [%]	Passing [%]
2 in.	100.0	100.0
1 in.	100.0	99.5
0.75 in.	99.5	99.2
0.375 in.	99.1	98.6
#4	96.7	98.2
#10	96.3	97.8
#20	95.1	96.6
#40	93.3	95.1
#60	91.1	93.2
#100	89.0	91.4
#200	85.3	88.1

Table B.9: Soil C (TH 58) classification

	Test One	Test Two
Liquid Limit	0	0
Plastic Limit	0	0
Plasticity Index	0	0
% Silt	80.4	82.4
% Clay	4.80	5.70
Textural Class	Si	Si
AASHTO Group	A-4	A-4
Group Index	0	0
Opt. Moisture [%]	13.2	13.2
Max Dry Unit Weight [pcf]	111.7	111.5
R-Value	54.6	52.9
Specific Gravity	2.69	2.69
AASHTO Testing Methods	T87 T88 T89 T90 T99 T100 T190	

B.4 Soil D

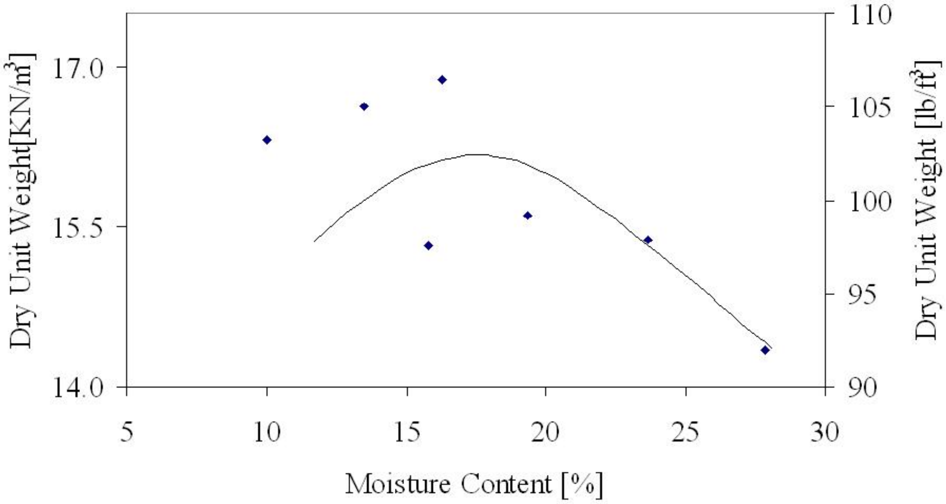

Figure B.7: Soil D (TH 32) Proctor curve

Table B.10: Soil D (TH 32) Proctor table

Mass of the Mold and Wet Soil [g]	Mold [g]	Wet Soil and Pan [g]	Dry and Pan [g]	Pan [g]	Moisture Content [%]	Unit Weight [KN/m^3]	Dry Unit Weight [KN/m^3]	Unit Weight [pcf]	Dry Unit Weight [pcf]
5921.60	4215.50	858.50	790.60	360.80	15.80	17.74	15.32	112.91	97.51
6006.10	4215.50	914.10	823.10	352.90	19.35	18.62	15.60	118.50	99.29
6044.20	4215.50	858.20	762.90	359.60	23.63	19.02	15.38	121.02	97.89
5978.60	4215.50	986.30	848.60	353.80	27.83	18.34	14.34	116.68	91.28
5941.10	4215.50	879.80	831.40	348.70	10.03	17.95	16.31	114.20	103.79
6029.70	4215.50	919.70	852.60	354.80	13.48	18.87	16.63	120.06	105.80
6102.30	4215.50	898.80	822.60	353.70	16.25	19.62	16.88	124.87	107.41
6089.60	4215.50	875.10	785.70	353.90	20.70	19.49	16.15	124.03	102.75

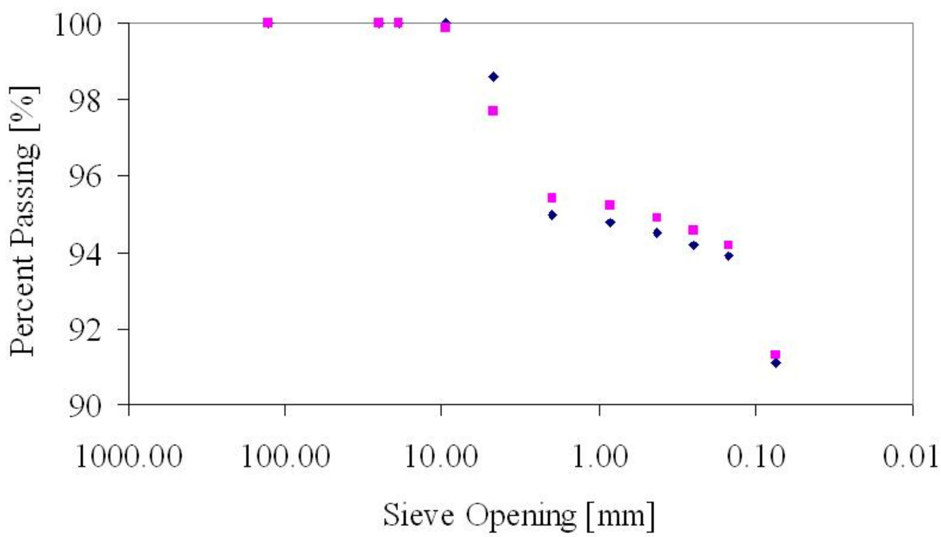

Figure B.8: Soil D (TH 32) sieve analysis curve

Table B.11: Soil D (TH 32) sieve analysis table

	Test One	Test Two
Sieve Size	Passing [%]	Passing [%]
2 in.	100	100
1 in.	100	100
0.75 in.	100	100
0.375 in.	100	99.9
#4	98.6	97.7
#10	95.0	95.4
#20	94.8	95.2
#40	94.5	94.9
#60	94.2	94.6
#100	93.9	94.2
#200	91.1	91.3

Table B.12: Soil D (TH 32) classification

	Test One	Test Two
Liquid Limit	44.4	31.8
Plastic Limit	21.1	21.7
Plasticity Index	23.3	10.1
% Silt	63.8	67.0
% Clay	27.3	24.3
Textural Class	SiCL	SiCL
AASHTO Group	A-7-6	A-4
Group Index	22.60	9.00
Opt. Moisture [%]	20.4	16.3
Max Dry Unit Weight [pcf]	99.4	107.4
R-Value	17.0	25.6
Specific Gravity	-	-
AASHTO Testing Methods	T87 T88 T89 T90 T99 T100 T190	

Appendix C

Fine-Grained Soil Preparation in Steel Container Procedure

1. Pass the desired soil through 1 in. sieve. Place the desired soil in a tray (24 in. x 12 in. x 6 in.). Dry the soil in the tray in an oven for 24 hours at 250^{o}F. Remove the soil from the oven and pulverize it using the Mn/DOT Pulverizer.

2. Select the moisture content of the soil from Table 2.

Table C.1: Soil Descriptions

Name	Mn Road	Duluth	Red Wing	Red Lake Falls
	Soil A	Soil B	Soil C	Soil D
Average Std. Proctor Dry Unit Weight	106 lb/ft^3	90 lb/ft^3	112 lb/ft^3	103 lb/ft^3
Average Opt. Moisture Content	15%	27%	13%	18%
Average Liquid Limit (%)	28.2	84.6	N/A	38.1
Average Plastic Limit (%)	16.9	32.7	N/A	21.4
Average % Silt	45.7	19.0	81.4	65.4
Average % Clay	13.5	77.0	5.2	25.8
Average R-Value	16.5	10.9	53.8	21.3
Mn/DOT Textural Class.	L	C	Si	SiCL
AASHTO Group	A-4, A-6	A-7-6	A-4	A-4, A-7-6
98% Proctor Dry Unit Weight				
100% Opt. Moisture Content	15%	27%	13%	18%
80% Opt. Moisture Content	12%	22%	10%	14%
60% Opt. Moisture Content	9% *	16%	8%	11%
103% Proctor Dry Unit Weight				
90% Opt. Moisture Content	13.5%	24%	12%	16%
75% Opt. Moisture Content	11%	19.5%	9.5%	13%
60% Opt. Moisture Content	9%	16%	8%	11%

* Sample A, 7.5% target moisture content was $w_{OPT} * 50\%$

3. Determine the mass of soil and the volume of water to be mixed for the sample to attain the desired density and moisture content. The sample is required to have a volume of 3.2 ft^3 to fill up the steel container to 10.5 in. depth.

4. Mix the correct amount of water and soil using an industrial size blender.

5. Take approximately 300 g of soil and place in three moisture cups (100 g each). Place the moisture cups in the oven for 24 hours at 260^{o}F [2].

6. Remove the cups from the oven and calculate the moisture content. If the moisture content is lower than the target, add water to the soil and mix again. Repeat moisture determination. Place the soil in large plastic buckets, seal the buckets with plastic foil and leave in humidity controlled room for 24 hours to allow the soil to temper.

7. Install the aluminum hoisting beam with a rolling cart underneath the MTS 810 load-frame crosshead. Connect the hoisting beam and the 3.2 ft^3 steel container by three chains. Raise the crosshead until the bottom of the steel container is slightly above the actuator in the MTS loadframe. Slide the steel container over the actuator and lower it until it sets. Remove the aluminum hoisting beam.

8. Attach the square steel plate to the circular plate using steel straps and bolts. Connect the loading plate with knobs and the particle-board plate to the square steel plate using another set of steel straps and bolts. Place planks across the steel container to hold the form stationary, lower the crosshead with the steel plate and attach it to the loading plate with knobs.

9. Raise the crosshead so the first lift of loose soil can be poured into the steel container.

10. Determine one-third of the total weight of the soil required for the appropriate density. Fill up a 5-gallon bucket resting on a scale with soil to the required weight. Repeat the operation two more times to obtain three lifts of soil, each of which will be compacted to a thickness of 3.5 in for a total thickness of 10.5 in.

11. Place the first lift in the steel container and level it. Use a flat, 10 to 15 lb weight to lightly compact the lift by dropping it 3 in. over the entire surface of the lift.

12. Open the TestStar file "Rocklab810100KN".

13. Open the TestWare file "compactionstroke".

14. Lower the sheepsfoot loading plate until first contact with the soil and lock the crosshead in place. Slide the sheepsfoot plate to one edge of the steel container until it is 0.5 in.

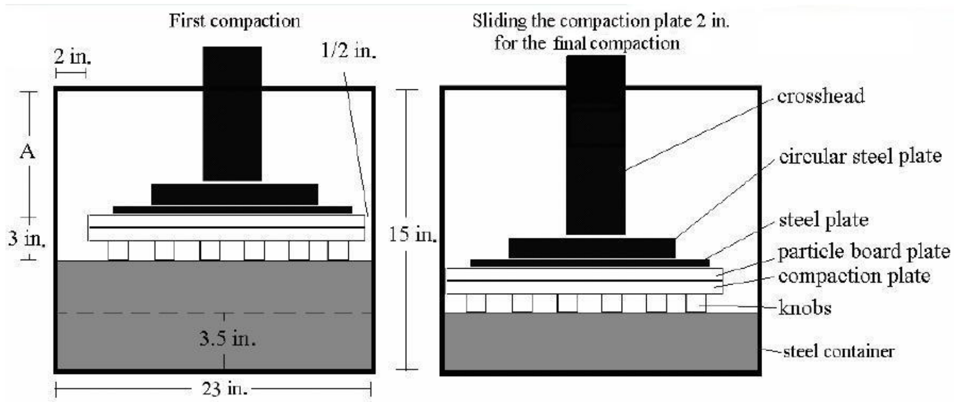

Figure C.1: Side view of steel container with first lift of soil

away from the side while neither one of the remaining sides is not in contact with the steel container.

15. Measure the distance from the top of the particle-board plate to the top edge of the steel container, Fig. C.1 (Distance "A"). Add 3 in. to this distance. This extra distance accounts for the thickness of the particle-board plate and the loading plate with knobs. Subtract the obtained distance from 15 in. The resulting distance defines the thickness of the first lift of the un-compacted soil in the steel container.

16. As the compacted lift requires a thickness of 3.5 in., subtract this value from the thickness of the un-compacted soil determined in step 15. The result defines the distance required for the MTS actuator in the base of the loading frame to rise for the target unit weight.

17. Convert the actuator rise distance into millimeters. Input the result in the TestWare program "compactionstroke" window "Ramp up". Next, enter the same distance as negative in the "Ramp down" window. Save the input values before running the test; otherwise, the test will not run with the new input. The compaction sequence run by the "Ramp up" "Ramp down" compaction stroke program is displacement controlled,

and the corresponding force history is recorded.

18. Input the maximum force and maximum displacement interlocks in TestStar. Choose reasonable settings for the system. For lower moisture contents, the actuator force required to reach required unit weight will increase significantly (as much as 4 times when compared to higher moisture contents).

19. Run the compaction stroke program.

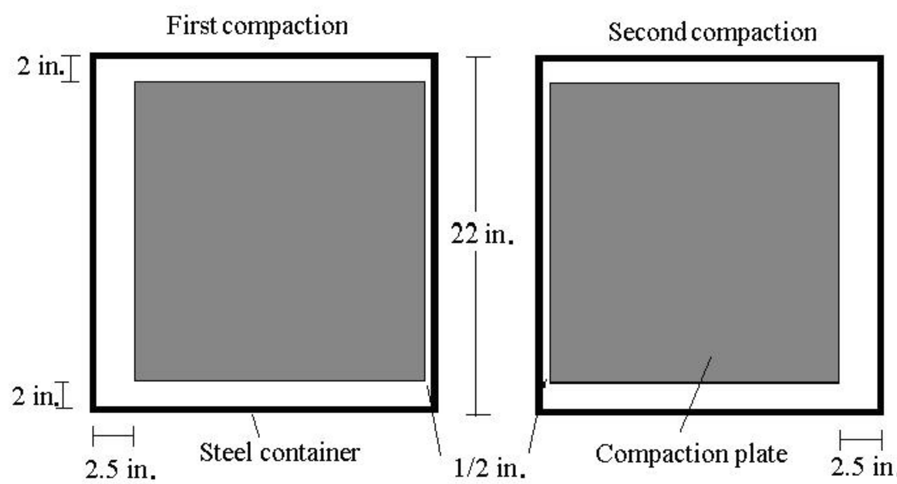

Figure C.2: Top view of compaction plate location in first and second step of compaction

20. When the first compaction sequence is complete and the actuator has returned to the initial height, slide the sheepsfoot loading plate 2 in. away from the initial distance of 0.5 in (see Figs. C.1 and C.2). Sliding the sheepsfoot loading plate by 2 in. shifts the knobs, thereby covering the entire surface of the lift with knobs.

21. Run the compaction sequence again.

22. Compact the soil around the edges of the steel container with a steel block to level the surface over the whole container. Scratch the surface with a shovel and fill the steel

container with the second lift of soil.

23. Repeat steps 14-22 for the second and third soil lift.

24. After the 3rd lift, remove the sheepsfoot compaction plate, particle board plate, and the steel plate. Attach the aluminum hoisting beam to the crosshead and attach the chains to the steel container. Lift up the steel container, move it outside the loading frame, and lower the container onto the floor. Make sure that the steel container is stable on the floor. Use steel shims if necessary.

25. Close out of the TestWare and TestStar software without saving.

26. Trim the soil surface by sliding a metal block with sharp edges and corners over the surface to eliminate irregularities on the surface.

27. Measure the distance from the top of the soil to the top of the steel container in each corner. Weigh the soil that was trimmed out of the container and subtract it from the total weight of the soil. Determine the unit weight of the soil in the container.

28. Cover the steel container with a plastic foil.

Appendix D

Resilient Modulus System Calibration

D.1 LVDTs

The 6 mm (0.236 in) LVDTs with the 6 mm range were calibrated using a Vernier scale and a voltmeter. The LVDT was mounted on the Vernier scale and a voltmeter was connected to the LVDT signal conditioner. As the Vernier was adjusted, the induced voltage from the LVDT conditioner was recorded. Fig. D.1 shows Vernier displacement and output voltage. The slopes of the lines were evaluated and input into LabView [13].

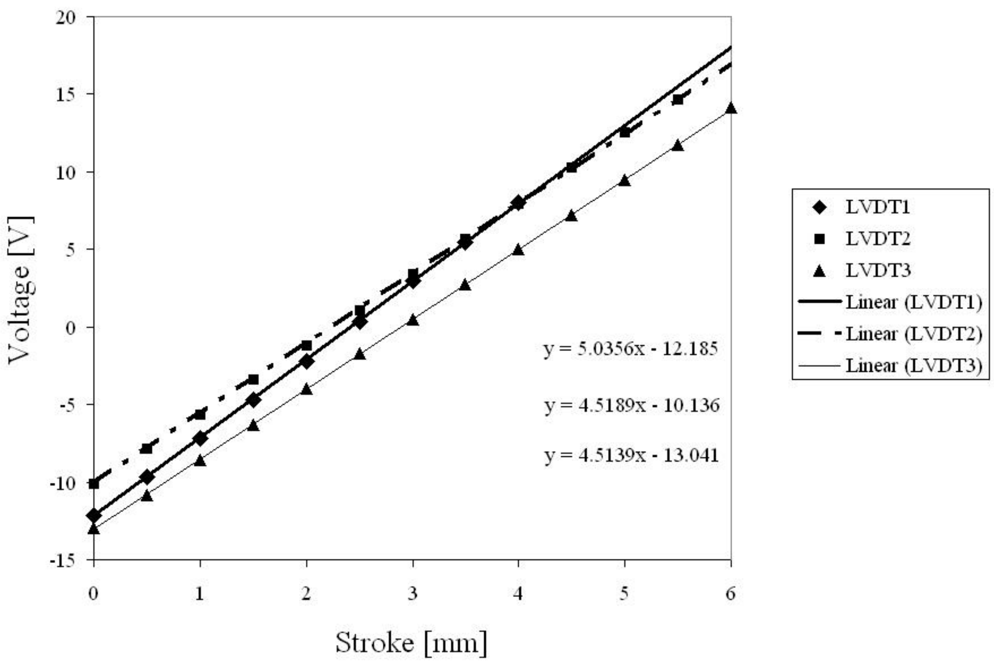

Figure D.1: LVDT calibration

D.2 Load Cell

The range of the load cell was 22.2 kN [5000 lb]. It was calibrated using a 22.2 kN [5000 lb] capacity proving ring. To calibrate the load cell, an initial load of 0.044 kN (10 lb) was applied to the proving ring. The load was increased on 0.445 kN (100 lb) increments to a maximum load of 6.23 kN (1400 lb). The corresponding force was calculated knowing the displacement of the proving ring. The slope of the line in Fig. D.2 was input into TestStar [13].

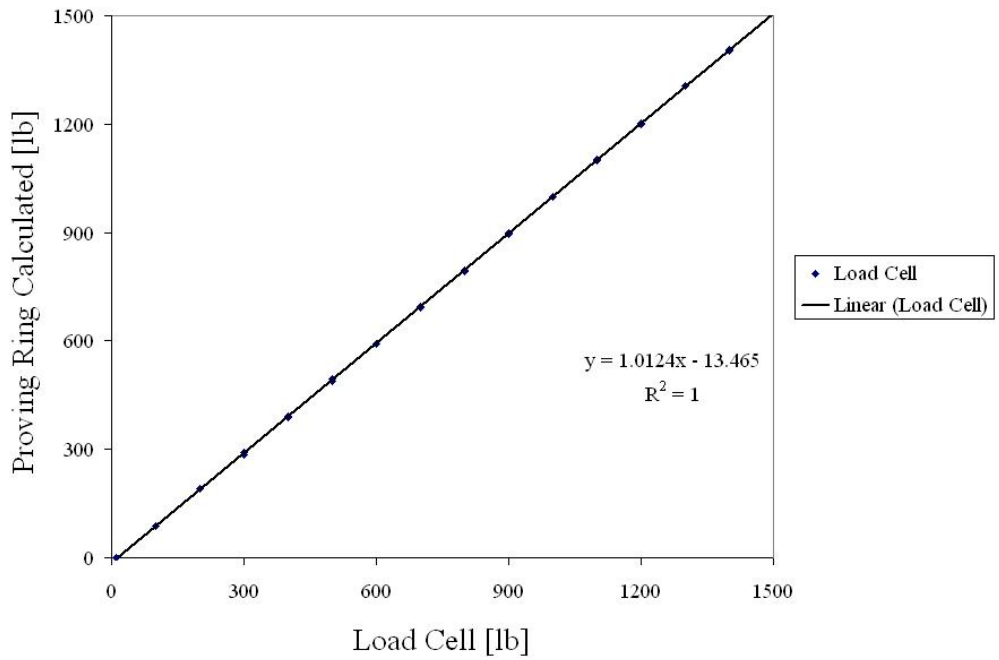

Figure D.2: Load cell calibration

Appendix E

Field-Type Testing Procedures

E.1 Percometer Testing Procedure

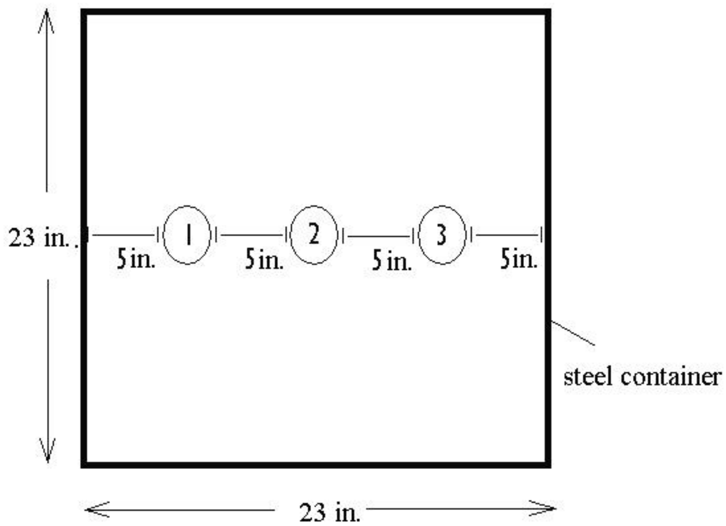

Figure E.1: Percometer testing locations (top view)

1. Turn the Percometer on.
2. Perform validation checks with the Percometer on verification blocks that come with it. The dielectric constant is written on the blocks. Hold the surface probe on one block at a time and press #4 on the keypad to take a measurement. Record the validation measurements every day of use.
3. Percometer will be run on the soil in the steel container in locations specified in Fig. E.1.
4. Place the probe of the Percometer onto the designated 1 location and hold it in place firmly with approximately 5 lb of force to maintain 100% contact with the soil. Press the #4 button.
5. Record the temperature, dielectric value, and electrical conductivity measurements.

6. Pick up the probe and re-set on the surface.

7. Repeat steps 3-6 three times at each of the three locations on the sample subgrade in the steel container.

E.2 GeoGauge Testing Procedure (** With Sand)

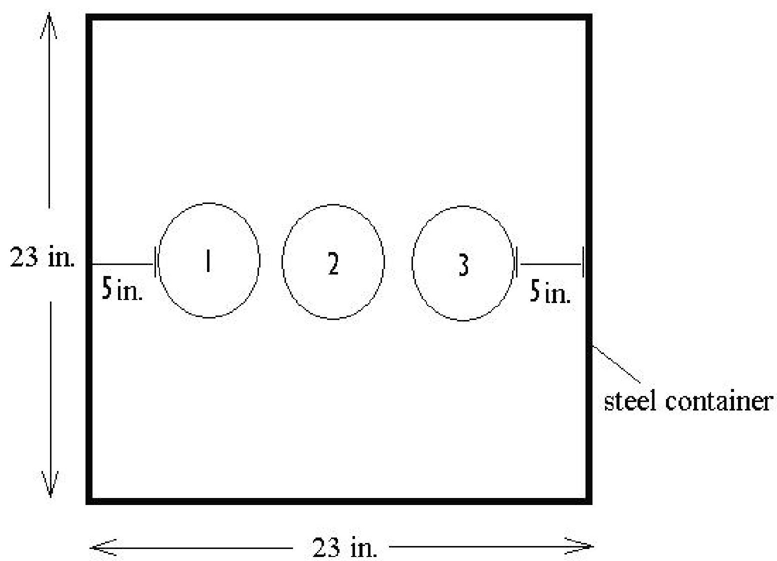

Figure E.2: GeoGauge testing locations (top view)

1. Remove the GeoGauge from the case and turn it on. Set the GeoGauge to read S.I. units by pressing the "units" button until SI-S is displayed and erase the memory.

2. Place the GeoGauge onto the verification mass and press the "test" button.

3. The display first shows the signal to noise ratio, then the density, and finally the stiffness. The stiffness value should range -8.8 to -9.8 $\frac{MN}{m}$. If it is out of this range, seek directions from Humboldt. If the stiffness is in the allowable range, set the GeoGauge onto the surface of the sample subgrade in the steel container at location 1 specified in Fig. E.2. More than 60% [41] or 80% [42] of the GeoGauge foot must be in contact with the soil surface otherwise place an 1/8 in. lift of damp sand between the foot and the soil surface [43].

4. Press the test button and allow 90 seconds for the test. After the test, press the 'save' button and write down the data displayed. Pick the GeoGauge up, reset it, and repeat the measurement process.

5. Repeat step 4 for the locations 2 and 3 shown in Fig. E.2 with two tests at each location.

6. Utilize the GeoGauge Data Download Guide supplied in the user's manual to store the data for future use.

7. Turn off the GeoGauge.

E.3 Portable Vibratory Deflectometer Testing Procedure

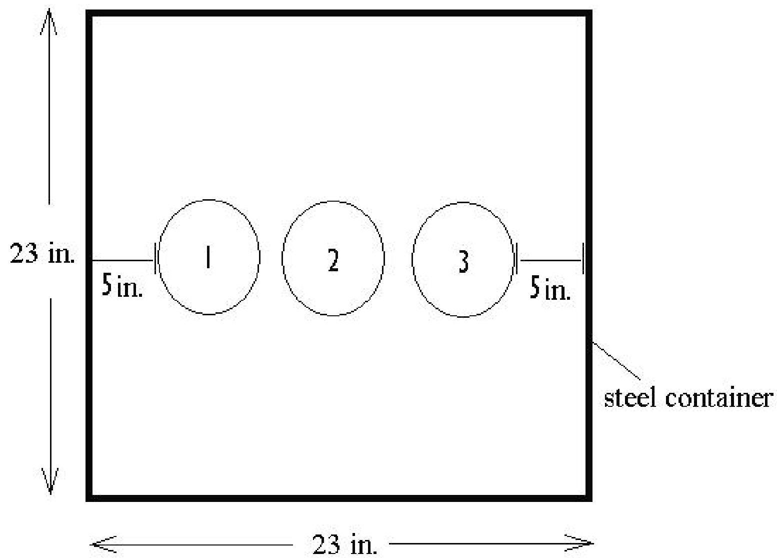

Figure E.3: PVD testing locations (top view)

1. Place the PVD with accelerometers, load cell and loading plate on location 1 (Fig. E.3) on the sample soil subgrade in the steel container.

2. Level the PVD by adjusting its feet.

3. Connect the accelerometer cables to the PCB piezotronics signal condition channels 1 and 2.

4. Connect the signal conditioner cables to the Siglab console channels 2 and 3.

5. Connect the load cell cable to the Kislter amplifier.

6. Connect the Kistler amplifier cable to the Siglab console channel 1.

7. Connect the Rockford Fosgate 150a1 power amplifier to the PVD.
8. Connect the Rockford Fosgate 150a1 power amplifier to the Siglab console channel "output."
9. Attach the positive and negative power clamps from the Rockford Fosgate 150a1 power amplifier to a 12 volt battery.
10. Plug in the signal conditioner and the Siglab console to power outlets.
11. Connect the Siglab console to a personal computer with MATLAB 7.0 and Siglab software. Now the setup should be connected as shown in Fig.E.4.
12. Turn on the PCB piezotronic amplifier.
13. Turn on the Siglab console.
14. Turn on the personal computer, open Siglab, and type ".vna" in the command line and press enter.
15. Check the calibration numbers and channel configurations for the load cell and accelerometers in Siglab.
16. Reset the Kistler dual mode amplifier.
17. Click the "run" button and the test will automatically stack 150 trials. Check the coherence curve in the Siglab display as it should read 1. If it does not, stop the test, and reset the PVD on the sample surface.
18. Save the test as B_22_98_1. The letter B represents the soil type, the second number is the moisture content of the sample, the third number is the percent Proctor unit weight of the sample, and the last number is the location number.
19. Repeat steps 15-17 for the other two locations.

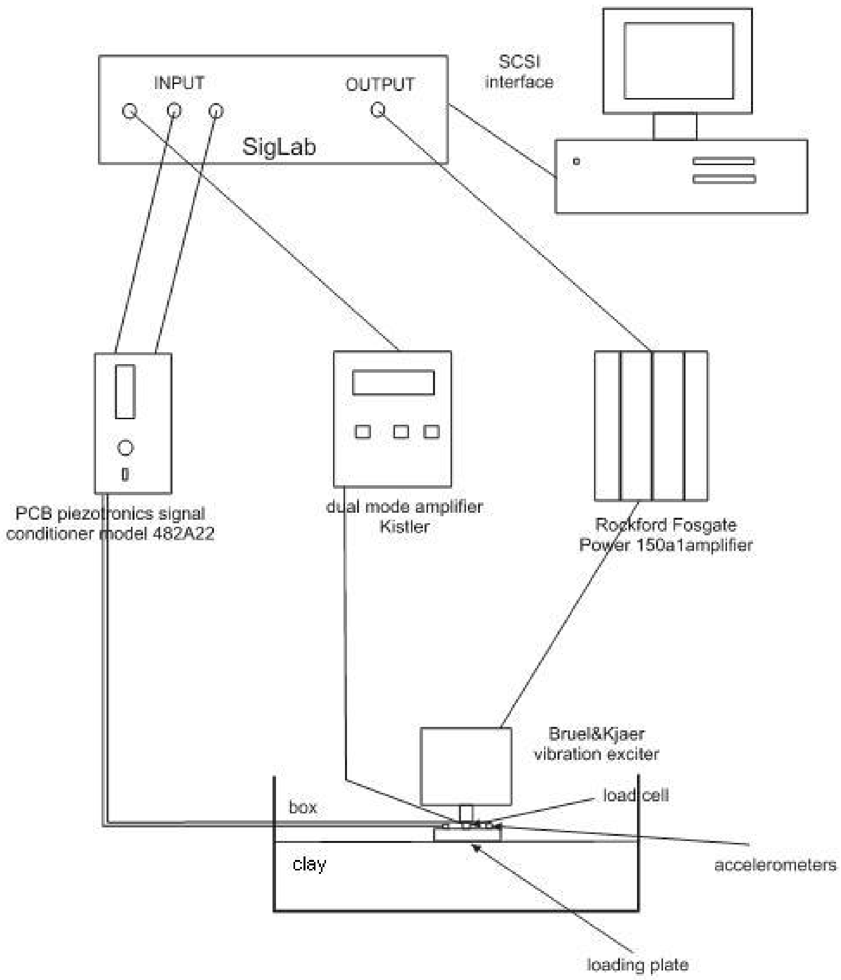

Figure E.4: PVD connection schematic

20. When finished, close out of Siglab and MATLAB. Shut off the personal computer. Disconnect the positive and negative clamps from the 12 volt battery. Remove the PVD from the sample surface and place it on the cart.

E.4 LWD Testing Procedure

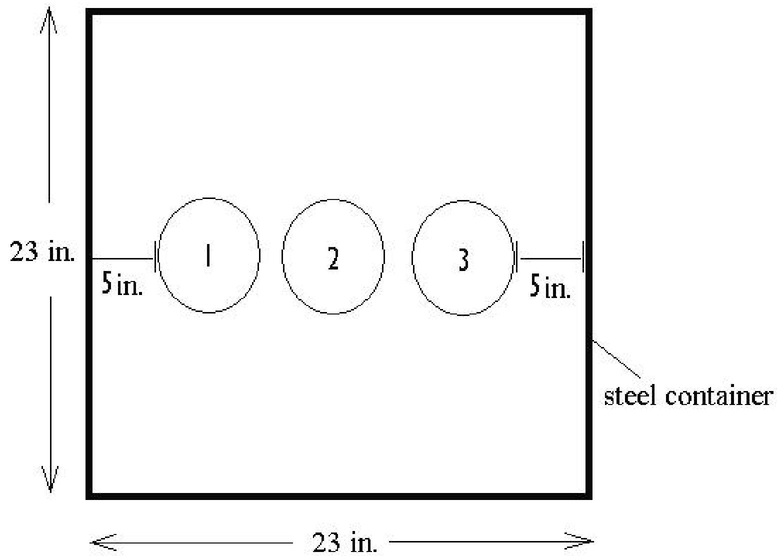

Figure E.5: Light Weight Deflectometer testing locations (top view)

The PRIMA 100 comes with software that needs to be installed on the computer. The software installation procedure is found in the user's manual [20].

1. Set the LWD with 200 mm diameter plate on location 1 shown in Fig. E.5.

2. Connect the LWD control panel to a communications port in the back of the computer.

3. Turn on the LWD.

4. Open the program "Data Acquisition." Enter your name and the main LWD menu will come up. Click the "save" button, input the file name, e.g. "soilC13_98_1.txt" (C13_98_1 implies soil with 13% moisture content at 98% Proctor unit weight testing at location 1 as shown in Fig. E.5), and select the location where the file is to be saved. Click OK.

5. Three different drop heights are used at each location: 100 mm, 500 mm, and 900 mm. Set weight release mechanism to a height of 100 mm. Lock the 10 kg falling weight to the release mechanism.

6. Press the “Test Run” button on the right side of the LWD panel.

7. The ”Ready for Next Drop” message will appear on the LWD panel. Press the “Test Run” button.

8. The panel will read, “SAMPLING”.

9. The LWD shaft should be perpendicular to the plane of the soil; the shaft has a little play in it.

10. Wrap one hand around the grip on the shaft of the LWD to steady it, and slowly depress the small, black handle with the free hand to drop the weight.

11. The graph on the computer screen will plot two lines indicating the force and displacement versus time, and several numbers will appear in the table on the upper right hand side of the screen. Copy the peak load and displacement to a hard-copy.

12. The gauge will prompt you to save or delete the data.

13. Press the “Test Run” button on the LWD display panel for 0.5 seconds to save it or press and hold it for 2 seconds to delete it.

14. The old data will disappear and the “Ready for Next Drop” button will appear.

15. Lift the mass and lock it in place.

16. Perform four more drops repeating steps 6-15. Drops one and two are seating drops and drops three, four, and five are measurement drops.

17. Repeat steps 4-16 for the other heights (500 mm, 900 mm) for location number one.

18. Move on to locations 2 and 3 repeat steps 6-17.

19. After the last drop for location 3, turn off the LWD display panel. Close out of the computer program.

E.5 Modified LWD Testing Procedure

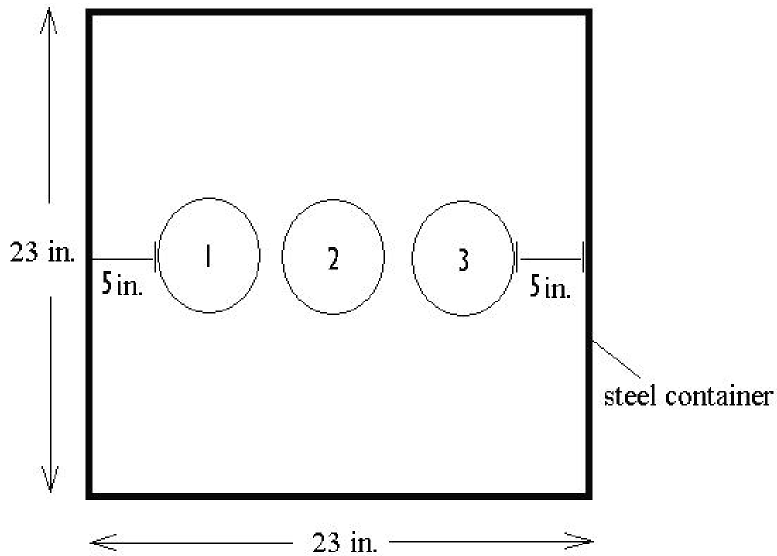

Figure E.6: Modified LWD testing locations (top view)

1. Remove the sliding handle and falling mass by unscrewing three screws (Alan wrench required) in the from the LWD impact cap.
2. Proceed with steps 1-8 in the LWD Testing Procedure.
3. Hold the LWD lower unit with one hand to ensure no movement at the loading plate/soil surface.
4. Tap the loading cap with a rubber mallet lightly enough for the load cell to trigger.
5. Proceed with steps 11-14 in the LWD Testing Procedure.
6. Repeat steps 3-5 four more times.
7. Move onto locations 2 and 3 and repeat steps 3-6.

E.6 Dynamic Cone Penetrometer Testing Procedure

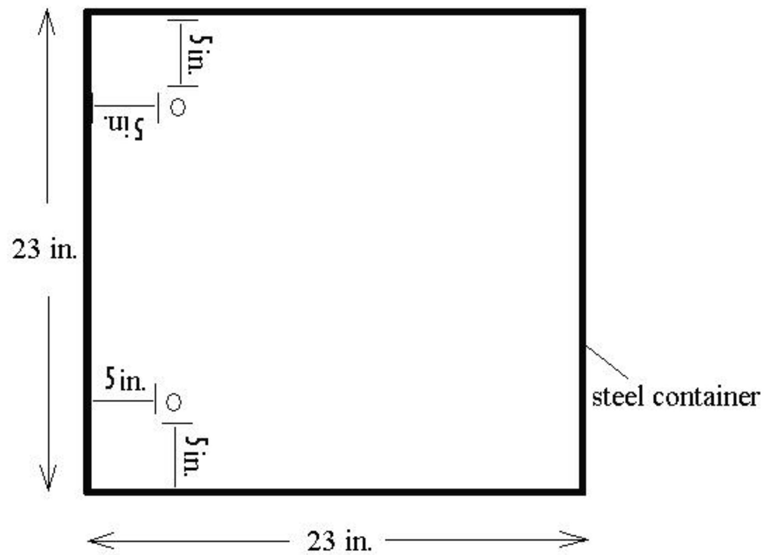

Figure E.7: DCP testing locations (top view)

1. Remove the Dynamic Cone Penetrometer (DCP) from the carrying case and assemble by screwing the two portions together.

2. Tighten the DCP tip to the lower half of the apparatus to maintain a strong connection during the test. This has been known to loosen as it is used. Hold the DCP vertically in one of the locations specified in Fig. E.7. Two tests will be performed using the DCP.

3. Record in an EXCEL spreadsheet the initial reading on the measuring stick following cone seating instructions in ASTM D 6951 - 03. Lift the hammer to the handle at the top of the DCP.

4. Drop and record the depth of the drive by reading the displacement from the measuring scale.

5. Repeat step 4 until 10.5 in. (270 mm) has been reached. Disregard the last reading.
6. Remove the DCP from the location by pulling it upwards and repeat steps 2-4 in the other location specified in Fig. E.7.
7. Clean the DCP and place it back into the case.

Appendix F

Fine-Grained Soil Specimen Extraction Procedure

1. Attach the aluminum hoisting beam to the MTS 810 crosshead and attach the chains to the steel container. Lift up the steel container, move it inside the loading frame, and lower it onto the actuator. Detach the chains from the steel container.
2. Fasten the 100 mm (4 in.) in diameter stainless steel tubes into the holes in the circular plate under the crosshead using bolts.
3. Open the TestStar file "Rocklab810_100KN".
4. Open the TestWare file "compactionstroke".
5. Spray a non-stick chemical, i.e. PAM Cooking Spray or silicone, inside the steel tubes.
6. Lower the MTS 810 crosshead until the steel tubes contact the soil.
7. In the TestWare file "compactionstroke," input 139 mm in the box "Ramp Up" and 0 mm for "Ramp Down." Input the interlock limits.
8. Run the program.
9. Unscrew the bolts holding the steel tubes from the circular plate.
10. Lower the actuator back to its initial position by entering 139 mm in the "Ramp Down" box and zero in the "Ramp Up" box.
11. Lower the MTS 810 crosshead to reattach the steel tubes.
12. Repeat steps 8 and 9.
13. Detach the steel tubes from the circular plate.
14. Close out of the TestStar and TestWare programs.
15. Attach the aluminum hoisting beam to the MTS 810 crosshead and attach the chains to the steel container. Lift up the steel container, move it outside the loading frame,

and lower the container onto the floor. Make sure that the steel container is stable on the floor. Use steel shims if necessary.

16. Extract 1.5 in. thin wall samples for the Soil Science Department of the University of Minnesota for Mn/DOT contract 81655#103 and CFMS#A5762.

17. Excavate around the perimeter of the steel container at 51 mm (2 in.) intervals with a tiling spade.

18. Place the excavated soil back into sealable containers to prevent drying.

19. Use the extruder to vertically extract the specimens from the steel tubes.

20. Weigh the specimens and determine its volume to calculate the unit weight. Place the specimens into 152 mm x 304 mm (6 in. x 12 in.) sealed plastic cylindrical containers and label them accordingly for resilient modulus testing. Label the specimen as, for example, B_1_16_103 where the letter defines the soil type, the first number is the specimen number, the second number is the target moisture content, and the third number is the target percent Proctor unit weight of the specimen.

21. Store the specimens in a humidity controllable environment for no more than 90 days to reduce aging affects in the specimens.

22. Create a table with "Sample ID", "Date Soil Compacted", "Date Container Tested", "Date M_r Tested", "Measured Average Density", and "Measured Average Moisture Content" as headings.

Appendix G

Fine-Grained Soil Resilient Modulus Testing Procedure

1. Remove the cylindrical specimens from the storage container.

2. Trim the specimen to a length of 203 mm (8 in.). Verify that the ends of the specimen are flat and perpendicular to the specimen's axis of symmetry by placing the specimen's end on a flat surface and check for rocking. If there is rocking, trim.

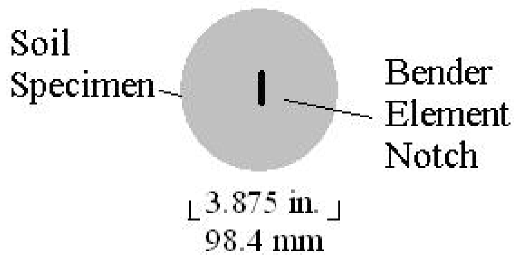

Figure G.1: Specimen for bender element notch location (end view)

3. Scratch a 12.7 mm x 8 mm notch, 8 mm deep (0.5 in. x 0.25 in., 0.25 in. deep) in both ends of the specimen as shown in Fig. G.1: these notches will house the bender element fins. Weigh the specimen and record the final volume dimensions.

4. Fill the notch with 2 g of petroleum jelly to ensure bender element contact to the specimen.

5. Place the 101.6 mm (4 in.) in diameter, 6 mm (0.25 in.) thick stainless steel spacer on the bottom platen housing the lower bender element. Place the specimen on the stainless steel spacer aligning the bender element fin in the 12.7 mm x 8 mm (0.5 in. x 0.25 in.) notch.

6. Place a 101.6 mm (4 in.) in diameter latex membrane inside the 101.6 mm (4 in.) in diameter aluminum membrane mold and wrap 25.4 mm (1 in.) of the latex membrane around the ends of the mold. Apply suction to the membrane mold. Place the aluminum membrane mold with the latex membrane over the specimen.

7. Unwrap the latex membrane from the mold and slide it over the bottom bender element platen. Unwrap the top and remove the mold.

8. Repeat steps 6 and 7 for one more latex membrane.

9. Roll two 101.6 mm (4 in.) O-rings onto the aluminum membrane mold. Place the aluminum membrane mold over the specimen with two latex membranes. Roll the two O-rings onto the bottom bender element platen and place them into the machined groves. Roll two more O-rings onto the specimen for the upper platen.

10. Place another 101.6 mm (4 in.) stainless steel spacer on top of the specimen aligning the bender element fin in the notch. Put the upper platen on top of the 101.6 mm (4 in.) stainless steel spacer, wrap the membranes over the upper bender element platen, and secure the membranes in place by rolling up the O-rings from the top of the specimen.

11. Place the 101.6 mm (4 in.). thick aluminum spacer on the bottom plate of the triaxial apparatus.

12. Place the specimen assembly in the center of the triaxial apparatus on top of the 101.6 mm (4 in.) thick spacer. Use caution when handling the specimen.

13. Attach the air hoses from the triaxial apparatus to the upper and lower bender element platens.

14. Slide the three-LVDT holder into place over the specimen surrounded by the membrane. Make certain that there is no space between between the LVDT holder and the membrane. Check that the three LVDTs are resting evenly on top of their pedestals and that none of the lead wires in the cell are impeding their movement. Close the three-LVDT holder using rubber O-rings.

15. Remove the spacers from the LVDT holder.

16. Connect the interior load cell lead wire, the three LVDT lead wires, and both of the bender element lead wires to their respective LEMO connectors on the base of the triaxial apparatus.

17. Place a steel ball bearing on top of the upper bender element platen. Carefully slide the plexiglass chamber over the prepared specimen and LVDT holder until it rests on the base of the triaxial apparatus.

18. Place the triaxial apparatus inside of the MTS 858 table top system loading frame.

19. Place the triaxial apparatus top plate with the load cell attached to the shaft above the plexiglass chamber and screw the shaft to the actuator. Press the triaxial apparatus top plate down into the triaxial chamber. Align the triaxial apparatus holes with the three columns that are connected to the triaxial apparatus base. Secure the triaxial apparatus top plate with three bolts.

20. Lock the plexiglass chamber onto the triaxial apparatus by screwing down the circular plates that are on the triaxial apparatus top plate.

21. Attach all of the external wiring to the back of the triaxial apparatus and the two air hoses to the front of the triaxial apparatus.

22. Look over the entire system to double check everything is connected properly.

23. Turn on the air to the system; open the valve on the triaxial apparatus top plate briefly to make certain that air is flowing.

24. Close the valve and listen for leaks in the system.

25. Pressurize the cell to 8 psi (55.2 kPa).

26. Open the TestWare program "Final Mr Testing Procedure - External" on the loading frame computer. Also open the LabView program named "Mr Data Collection" on the laptop.

27. Define the data channels in LabView and make certain that it records at least 400 points per second.

28. Lower the actuator with the load cell attached down onto the steel ball bearing.

29. Run the resilient modulus testing procedure following NCHRP 1-28a.

30. After the conditioning cycle is finished, open the data file for the conditioning cycle in a spreadsheet. Plot the LVDTs vs. force and check for specimen rotation. Smooth ovals should be seen in the plots; irregular ovals indicate specimen rotation. If they are not, remove the triaxial apparatus from the loading frame, re-position the specimen, and place the specimen back in the loading frame. When lowering the actuator onto the steel ball located on the upper platen of the 101.6 mm (4 in.) specimen, watch the actuator to prevent bending of the specimen. Run the conditioning cycle again and check for specimen rotation again.

31. Open the Mr Data Collection screen. Run the data collection; save data under filenames created in TestWare, for example, A_1_15_100_7, where the letter defines the soil type, the first number is the specimen number, the second number is the target moisture content, the third number is the target percent Proctor unit weight of the specimen, and the last number refers to the step in the sequence. Start the data collection at the same moment as the resilient modulus test.

32. After the NCHRP 1-28a protocol is finished, the TestWare program will automatically run a shear strength routine unless stopped. Do not run this portion of the test. Acceptable criteria for the specimen are:

    - ☐ Load Signal-to-Noise Ratio (SNR) ≥ 10
    - ☐ Deflection Signal-to-Noise Ratio (SNR) ≥ 3
    - ☐ M_r COV [%] $\leq 10\%$
    - ☐ Rotation Angle $< 0.04^0$

33. Disconnect the load cell from the steel ball bearing by moving the actuator up.

Appendix H

Bender Element Testing Procedure

1. Place a 101.6 mm (4 in.) in diameter, 6 mm (0.25 in.) thick stainless steel spacer on the bottom specimen platen.
2. Place a 98.4 mm (3.88 in.) cylindrical soil specimen on the steel spacer.
3. Place two rubber membranes over a 98.4 mm (3.88 in.) diameter cylindrical soil specimen.
4. Place a 101.6 mm (4 in.) in diameter, 6 mm (0.25 in.) thick stainless steel spacer on top of the specimen.
5. Set the top specimen platen on the steel spacer on top of the specimen followed by setting 4, 101.6 mm (4 in.) rubber O-rings for the machined grooves in the top and bottom specimen platens.
6. Seal the cylindrical specimen by rolling the 4 O-rings into the platen machined grooves.
7. Place the bottom triaxial apparatus platen on the MTS 858 loading base.
8. Set the 101.6 mm (4 in.) thick aluminum spacer on the bottom triaxial apparatus platen.
9. Put the specimen on top of the aluminum spacer.
10. Connect the bender element cables to the electrical feed-throughs and air pressure tubes to the bottom triaxial apparatus platen.
11. Place the plexiglass chamber over the specimen. Make sure the chamber slips over the large rubber O-ring in the bottom triaxial apparatus platen.
12. Open the GDS bender element program on the laptop.
13. Enter the parameters shown in Table H.1.

Table H.1: GDS Bender Element input parameters

Specimen Length	[mm]
Sample Frequency	100000 sec^{-1}
Sampling Time	10 msec
Wave Form	Sinusiodal
Period	0.8 msec
Amplitude	14
Stacking	Automatic
Trigger Type	S/W
Tests per Stack	50
Delay Between Tests	0.1

14. Loosen the set screw on the top triaxial apparatus platen to allow it to slide along the load cell extension.

15. Lower the actuator enough to allow the top triaxial apparatus platen to be fastened to the three steel columns protruding from the bottom triaxial apparatus platen.

16. Connect the air pressure line to from the pressure regulator to the bottom triaxial apparatus platen.

17. Manually adjust the confining pressure to 8 psi (55.2 MPa).

18. Execute the bender element test at confining pressures 55.2, 41.4, 27.6 and 13.8 MPa (8, 6, 4 and 2 psi) without a vertical contact stress. Record the name of the saved files. The cables from the GDS signal conditioner to the bottom triaxial apparatus platen need to be switched when changing from a P-wave test to an S-wave test and vice versa.

19. Run and stack a sufficient number of P and S-wave tests to obtain a clear signal (usually 10-50). Save the signals and exit the program.

20. Shut off the data collection when the bender element test is completed.

21. After the test is completed, remove the specimen from the chamber and return all components in their proper locations.

Appendix I

Strength Testing Procedure

1. Place a 101.6 mm (4 in.) in diameter, 6 mm (0.25 in.) thick stainless steel spacer on the bottom specimen platen.

2. Place a 98.4 mm (3.88 in.) cylindrical soil specimen on the steel spacer.

3. Place two rubber membranes over a 98.4 mm (3.88 in.) diameter cylindrical soil specimen.

4. Place a 101.6 mm (4 in.) in diameter, 6 mm (0.25 in.) thick stainless steel spacer on top of the specimen.

5. Set the top specimen platen on the steel spacer on top of the specimen followed by setting 4, 101.6 mm (4 in.) rubber O-rings for the machined grooves in the top and bottom specimen platens.

6. Seal the cylindrical specimen by rolling the 4 O-rings into the platen machined grooves.

7. Place the bottom triaxial apparatus platen on the MTS 858 loading base.

8. Set the 101.6 mm (4 in.) thick aluminum spacer on the bottom triaxial apparatus platen.

9. Put the specimen on top of the aluminum spacer.

10. Connect the bender element cables to the electrical feed-throughs and air pressure tubes to the bottom triaxial apparatus platen.

11. Place the plexiglass chamber over the specimen. Make sure the chamber slips over the large rubber O-ring in the bottom triaxial apparatus platen.

12. Place a steel ball in the top specimen platen.

13. Turn on the MTS hydraulic pump.

14. Turn on the MTS controller.

15. Screw the load cell into the extension shaft. Slide the extension shaft through the top triaxial apparatus platen.

16. Screw the extension shaft and top triaxial apparatus platen into the MTS 858 actuator.

17. Connect the load cell extension cable to the load cell.

18. Loosen the set screw on the top triaxial apparatus platen to allow it to slide along the load cell extension.

19. Lower the actuator enough to allow the top triaxial apparatus platen to be fastened to the three steel columns protruding from the bottom triaxial apparatus platen.

20. Connect the air pressure line to from the pressure regulator to the bottom triaxial apparatus platen.

21. Lower the actuator to the specimen. Exercise care to place the specimen in-line with the actuator.

22. Manually adjust the confining pressure to 55.2 or 27.6 kPa (8 or 4 psi).

23. Open the LabView program named "M_r Data Collection" on the laptop. Set channel 0 to stroke, channel 1 to load cell, and a sampling rate of at least 400. Filenames created for the strength test are named, for example, A_1_15_100_shear8psi, where the letter defines the soil type, the first number is the specimen number, the second number is the target moisture content, the third number is the target percent Proctor unit weight of the specimen, and the phrase indicated a shear test performed at 4 or 8 psi.

24. Open the TestWare program "4 inch Final Shear Strength" on the loading frame computer.

25. Lower the actuator and apply a small contact load on the specimen.

26. Begin recording data with LabView.

27. Run the TestWare shear strength routine.
28. After the specimen has failed, stop the TestWare and LabView routines.
29. Dismantle the triaxial apparatus.
30. Record the angle of the shear plane on the specimen.
31. Take one moisture sample from the shear plane of the specimen.

Appendix J

Resilient Modulus Data and Resilient Modulus Data with QC/QA

J.1 Resilient Modulus Data [SI]

Table J.1: Resilient modulus data (A_2_135_105)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	228	0.011	0.010	0.005	0.030	0.00009	350
0.06	233	-0.012	0.010	0.006	0.031	0.00001	2476
0.06	238	-0.013	0.010	0.006	0.031	0.00001	3530
0.06	228	-0.008	0.010	0.006	0.030	0.00002	1266
0.06	227	0.014	0.010	0.006	0.030	0.00010	305
0.06	389	0.013	0.018	0.007	0.051	0.00013	406
0.06	390	0.010	0.018	0.010	0.051	0.00013	406
0.06	389	-0.010	0.015	0.007	0.051	0.00004	1323
0.06	390	-0.010	0.018	0.007	0.051	0.00005	1011
0.06	391	0.014	0.018	0.007	0.051	0.00013	396
0.06	552	-0.010	0.023	0.013	0.072	0.00008	867
0.06	551	0.013	0.026	0.013	0.072	0.00017	427
0.06	553	0.012	0.026	0.013	0.073	0.00017	437
0.06	551	-0.013	0.026	0.013	0.072	0.00008	870
0.06	562	-0.013	0.026	0.013	0.074	0.00008	873
0.06	771	0.017	0.035	0.016	0.101	0.00022	453
0.06	779	0.013	0.035	0.016	0.102	0.00021	486
0.06	769	0.020	0.035	0.016	0.101	0.00023	433
0.06	767	0.014	0.035	0.019	0.101	0.00022	450
0.06	779	0.010	0.035	0.016	0.102	0.00020	510
0.04	234	-0.008	0.010	0.007	0.031	0.00003	1156
0.04	246	0.011	0.010	0.007	0.032	0.00009	355
0.04	228	0.016	0.010	0.004	0.030	0.00010	308
0.04	228	-0.010	0.010	0.004	0.030	0.00001	2362
0.04	228	-0.008	0.010	0.004	0.030	0.00002	1632
0.04	389	0.012	0.018	0.009	0.051	0.00013	401
0.04	391	-0.009	0.018	0.009	0.051	0.00006	878
0.04	389	0.011	0.018	0.009	0.051	0.00013	404
0.04	390	0.015	0.019	0.009	0.051	0.00014	373
0.04	391	-0.011	0.019	0.009	0.051	0.00005	993
0.04	548	0.012	0.026	0.011	0.072	0.00016	453
0.04	566	-0.011	0.026	0.010	0.074	0.00008	902
0.04	551	0.012	0.026	0.011	0.072	0.00016	453
0.04	553	-0.012	0.038	0.026	0.072	0.00017	418
0.04	552	-0.013	0.026	0.011	0.072	0.00008	951
0.04	794	0.012	0.037	0.016	0.104	0.00021	489
0.04	780	0.014	0.037	0.016	0.102	0.00022	469
0.04	780	0.017	0.040	0.016	0.102	0.00024	426
0.04	780	0.010	0.040	0.016	0.102	0.00022	473
0.04	780	0.018	0.040	0.016	0.102	0.00024	424
0.03	227	0.012	0.010	0.005	0.030	0.00009	349
0.03	226	-0.010	0.009	0.005	0.030	0.00002	1938
0.03	227	-0.010	0.010	0.005	0.030	0.00001	2252
0.03	226	0.012	0.013	0.005	0.030	0.00009	313
0.03	226	-0.010	0.013	0.005	0.030	0.00003	1145
0.03	389	0.009	0.017	0.007	0.051	0.00011	470
0.03	389	-0.013	0.017	0.010	0.051	0.00005	1102
0.03	389	-0.011	0.020	0.010	0.051	0.00006	830
0.03	389	0.011	0.020	0.010	0.051	0.00013	381
0.03	389	-0.012	0.020	0.010	0.051	0.00006	848
0.03	554	0.012	0.027	0.012	0.073	0.00017	440
0.03	555	0.018	0.027	0.012	0.073	0.00019	392
0.03	554	-0.010	0.027	0.012	0.073	0.00009	774
0.03	553	-0.011	0.027	0.012	0.073	0.00009	795
0.03	553	-0.009	0.027	0.012	0.073	0.00010	743
0.03	784	0.012	0.042	0.016	0.103	0.00023	450
0.03	788	0.016	0.038	0.016	0.103	0.00023	443
0.03	788	0.016	0.038	0.016	0.103	0.00023	444
0.03	782	0.014	0.038	0.016	0.102	0.00022	457
0.03	780	0.021	0.042	0.016	0.102	0.00026	395
0.01	228	0.016	0.013	0.008	0.030	0.00012	253
0.01	231	-0.009	0.009	0.008	0.030	0.00003	1155
0.01	226	-0.009	0.013	0.008	0.030	0.00004	798
0.01	227	-0.012	0.013	0.008	0.030	0.00003	1158
0.01	218	-0.011	0.012	0.008	0.029	0.00003	926
0.01	392	-0.013	0.019	0.010	0.051	0.00006	929
0.01	392	-0.012	0.020	0.010	0.051	0.00006	925
0.01	391	0.012	0.019	0.010	0.051	0.00013	381
0.01	391	-0.015	0.019	0.010	0.051	0.00005	1118
0.01	391	0.010	0.019	0.010	0.051	0.00013	401
0.01	569	-0.012	0.029	0.011	0.075	0.00009	817
0.01	554	0.013	0.029	0.014	0.073	0.00018	397
0.01	554	0.011	0.026	0.011	0.073	0.00016	461
0.01	554	0.012	0.029	0.011	0.073	0.00017	430
0.01	565	0.012	0.029	0.011	0.074	0.00017	434
0.01	782	0.013	0.041	0.016	0.103	0.00023	445
0.01	782	0.012	0.041	0.016	0.102	0.00023	449
0.01	772	0.015	0.041	0.016	0.101	0.00024	427
0.01	780	0.014	0.041	0.016	0.102	0.00024	435
0.01	792	0.013	0.041	0.016	0.104	0.00023	447

Table J.2: Resilient modulus data (A_1_105_105)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	227	0.007	0.008	0.003	0.028	0.00006	457
0.06	226	-0.009	0.009	0.004	0.028	0.00001	2405
0.06	228	0.010	0.009	0.003	0.028	0.00007	388
0.06	232	-0.007	0.008	0.003	0.029	0.00002	1668
0.06	242	0.006	0.008	0.003	0.030	0.00006	517
0.06	389	0.014	0.014	0.006	0.048	0.00011	437
0.06	390	0.010	0.013	0.006	0.048	0.00010	490
0.06	388	0.013	0.013	0.006	0.048	0.00011	447
0.06	389	0.011	0.013	0.006	0.048	0.00010	480
0.06	389	0.011	0.013	0.006	0.048	0.00010	483
0.06	552	0.013	0.022	0.011	0.068	0.00015	454
0.06	552	0.015	0.022	0.008	0.068	0.00015	465
0.06	552	0.012	0.022	0.008	0.068	0.00014	494
0.06	551	0.017	0.019	0.011	0.068	0.00015	440
0.06	552	0.017	0.019	0.011	0.068	0.00015	444
0.06	768	0.023	0.030	0.014	0.095	0.00022	434
0.06	779	0.026	0.030	0.014	0.096	0.00023	420
0.06	779	0.024	0.030	0.014	0.096	0.00022	430
0.06	767	0.022	0.033	0.014	0.095	0.00023	420
0.06	780	0.024	0.030	0.014	0.096	0.00022	434
0.04	217	0.009	0.007	0.004	0.027	0.00007	411
0.04	215	0.008	0.007	0.004	0.027	0.00006	430
0.04	216	0.006	0.007	0.004	0.027	0.00006	459
0.04	216	-0.006	0.007	0.004	0.027	0.00002	1629
0.04	216	0.010	0.007	0.004	0.027	0.00007	379
0.04	390	0.011	0.013	0.004	0.048	0.00009	534
0.04	390	0.015	0.013	0.004	0.048	0.00010	468
0.04	378	0.011	0.013	0.004	0.047	0.00009	523
0.04	391	0.011	0.013	0.007	0.048	0.00010	486
0.04	389	0.013	0.013	0.004	0.048	0.00010	501
0.04	552	0.016	0.020	0.009	0.068	0.00015	455
0.04	552	0.018	0.020	0.009	0.068	0.00016	436
0.04	552	0.018	0.020	0.006	0.068	0.00014	474
0.04	551	0.017	0.020	0.009	0.068	0.00015	451
0.04	551	0.017	0.020	0.009	0.068	0.00015	449
0.04	785	0.024	0.032	0.011	0.097	0.00022	444
0.04	771	0.024	0.032	0.011	0.095	0.00022	435
0.04	769	0.024	0.032	0.011	0.095	0.00022	430
0.04	769	0.028	0.032	0.011	0.095	0.00023	406
0.04	771	0.023	0.032	0.011	0.095	0.00022	442
0.03	216	0.006	0.010	-0.004	0.027	0.00004	687
0.03	217	0.007	0.010	-0.004	0.027	0.00004	629
0.03	217	0.007	0.010	-0.004	0.027	0.00004	635
0.03	216	0.008	0.010	-0.004	0.027	0.00004	600
0.03	215	0.005	0.010	-0.004	0.027	0.00004	725
0.03	380	0.014	0.014	0.003	0.047	0.00010	455
0.03	379	0.011	0.014	0.006	0.047	0.00010	454
0.03	389	0.014	0.014	0.003	0.048	0.00010	464
0.03	390	0.009	0.014	0.003	0.048	0.00009	554
0.03	379	0.014	0.011	0.006	0.047	0.00010	458
0.03	544	0.016	0.020	0.008	0.067	0.00014	463
0.03	555	0.019	0.020	0.008	0.068	0.00015	444
0.03	553	0.017	0.019	0.008	0.068	0.00015	466
0.03	553	0.016	0.023	0.008	0.068	0.00015	445
0.03	553	0.018	0.020	0.008	0.068	0.00015	458
0.03	770	0.023	0.031	0.013	0.095	0.00022	434
0.03	781	0.023	0.031	0.010	0.096	0.00021	459
0.03	769	0.028	0.031	0.010	0.095	0.00023	419
0.03	772	0.026	0.031	0.013	0.095	0.00023	411
0.03	779	0.026	0.031	0.010	0.096	0.00022	436
0.01	218	-0.006	0.010	0.003	0.027	0.00002	1154
0.01	219	0.005	0.010	-0.003	0.027	0.00004	705
0.01	218	0.011	0.007	-0.003	0.027	0.00005	570
0.01	218	0.008	0.007	0.003	0.027	0.00006	448
0.01	230	0.007	0.010	-0.003	0.028	0.00005	629
0.01	391	0.010	0.014	0.004	0.048	0.00009	524
0.01	392	0.014	0.014	0.004	0.048	0.00011	450
0.01	392	0.009	0.014	0.004	0.048	0.00009	541
0.01	391	0.011	0.014	0.004	0.048	0.00010	493
0.01	391	0.014	0.014	0.004	0.048	0.00011	456
0.01	553	0.017	0.020	0.007	0.068	0.00014	476
0.01	552	0.016	0.020	0.007	0.068	0.00014	481
0.01	553	0.017	0.020	0.007	0.068	0.00014	476
0.01	563	0.017	0.020	0.007	0.069	0.00014	484
0.01	552	0.022	0.020	0.007	0.068	0.00016	432
0.01	771	0.022	0.032	0.012	0.095	0.00022	436
0.01	774	0.020	0.032	0.012	0.095	0.00021	455
0.01	782	0.025	0.032	0.012	0.096	0.00023	428
0.01	771	0.025	0.032	0.012	0.095	0.00023	418
0.01	783	0.024	0.031	0.012	0.097	0.00022	434

Table J.3: Resilient modulus data (A_2_105_105)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	215	0.010	-0.016	0.019	0.028	0.00004	650
0.06	216	0.012	-0.013	0.019	0.028	0.00006	471
0.06	220	0.010	-0.013	0.019	0.029	0.00005	531
0.06	343	-0.069	-0.050	0.019	0.045	-0.00033	-137
0.06	225	0.008	-0.013	0.019	0.030	0.00005	625
0.06	389	0.014	-0.021	0.030	0.051	0.00007	702
0.06	390	0.014	-0.021	0.030	0.051	0.00007	704
0.06	378	0.017	-0.021	0.029	0.050	0.00008	599
0.06	390	0.017	-0.021	0.030	0.051	0.00008	623
0.06	389	0.014	-0.021	0.029	0.051	0.00007	712
0.06	551	0.019	-0.021	0.036	0.072	0.00011	639
0.06	555	0.022	-0.021	0.039	0.073	0.00013	540
0.06	561	0.023	-0.024	0.036	0.074	0.00012	635
0.06	556	0.018	-0.020	0.039	0.073	0.00012	601
0.06	551	0.020	-0.020	0.039	0.072	0.00013	573
0.06	770	0.030	-0.023	0.051	0.101	0.00019	529
0.06	770	0.029	-0.023	0.051	0.101	0.00019	532
0.06	770	0.029	-0.023	0.051	0.101	0.00019	533
0.06	770	0.032	-0.023	0.051	0.101	0.00020	510
0.06	769	0.031	-0.023	0.051	0.101	0.00020	515
0.04	215	0.008	-0.012	0.017	0.028	0.00004	678
0.04	216	0.011	-0.015	0.017	0.028	0.00004	705
0.04	217	0.011	-0.012	0.017	0.028	0.00005	568
0.04	217	0.014	-0.012	0.017	0.028	0.00006	477
0.04	216	-0.007	-0.015	0.017	0.028	-0.00002	-1629
0.04	389	0.011	-0.017	0.028	0.051	0.00007	724
0.04	388	0.015	-0.017	0.028	0.051	0.00008	612
0.04	389	0.016	-0.017	0.028	0.051	0.00009	595
0.04	389	0.015	-0.017	0.028	0.051	0.00008	612
0.04	382	0.016	-0.017	0.028	0.050	0.00009	581
0.04	553	0.020	-0.020	0.037	0.072	0.00012	591
0.04	554	0.022	-0.020	0.037	0.073	0.00013	559
0.04	553	0.024	-0.020	0.037	0.072	0.00013	542
0.04	555	0.019	-0.021	0.037	0.073	0.00012	615
0.04	553	0.019	-0.020	0.037	0.073	0.00012	612
0.04	780	0.034	-0.022	0.048	0.102	0.00020	508
0.04	780	0.033	-0.022	0.048	0.102	0.00020	522
0.04	772	0.032	-0.022	0.048	0.101	0.00019	524
0.04	776	0.033	-0.022	0.048	0.102	0.00020	517
0.04	783	0.030	-0.022	0.048	0.103	0.00019	553
0.03	228	0.007	-0.012	0.017	0.030	0.00004	792
0.03	228	0.008	-0.012	0.017	0.030	0.00004	686
0.03	217	0.010	-0.012	0.014	0.028	0.00004	746
0.03	217	0.011	-0.012	0.014	0.028	0.00004	708
0.03	229	0.008	-0.009	0.017	0.030	0.00005	558
0.03	389	0.014	-0.011	0.024	0.051	0.00009	569
0.03	379	0.015	-0.014	0.024	0.050	0.00008	618
0.03	379	0.015	-0.014	0.024	0.050	0.00008	609
0.03	378	0.013	-0.011	0.024	0.050	0.00009	573
0.03	379	0.011	-0.011	0.025	0.050	0.00008	633
0.03	556	0.020	-0.018	0.032	0.073	0.00011	668
0.03	553	0.021	-0.018	0.035	0.072	0.00012	586
0.03	554	0.020	-0.018	0.035	0.073	0.00012	609
0.03	542	0.019	-0.018	0.035	0.071	0.00012	613
0.03	542	0.023	-0.018	0.035	0.071	0.00013	552
0.03	782	0.033	-0.023	0.048	0.103	0.00019	546
0.03	771	0.032	-0.023	0.048	0.101	0.00019	542
0.03	769	0.030	-0.024	0.048	0.101	0.00018	562
0.03	782	0.029	-0.024	0.048	0.102	0.00018	581
0.03	771	0.031	-0.023	0.048	0.101	0.00018	554
0.01	218	0.006	-0.008	0.012	0.029	0.00003	922
0.01	218	0.010	-0.008	0.012	0.029	0.00005	633
0.01	229	0.014	-0.008	0.012	0.030	0.00006	518
0.01	219	0.008	-0.008	0.012	0.029	0.00004	765
0.01	218	0.009	-0.008	0.012	0.029	0.00004	684
0.01	381	0.013	-0.015	0.023	0.050	0.00007	717
0.01	381	0.014	-0.015	0.023	0.050	0.00007	686
0.01	381	0.017	-0.015	0.023	0.050	0.00008	602
0.01	381	0.013	-0.015	0.023	0.050	0.00007	747
0.01	381	0.018	-0.015	0.023	0.050	0.00008	598
0.01	554	0.025	-0.018	0.036	0.073	0.00014	521
0.01	556	0.016	-0.018	0.036	0.073	0.00011	656
0.01	555	0.022	-0.018	0.036	0.073	0.00013	566
0.01	554	0.021	-0.019	0.036	0.073	0.00013	574
0.01	555	0.023	-0.018	0.036	0.073	0.00013	550
0.01	772	0.032	-0.027	0.050	0.101	0.00018	554
0.01	783	0.033	-0.027	0.050	0.103	0.00019	553
0.01	781	0.033	-0.024	0.050	0.102	0.00020	520
0.01	771	0.032	-0.024	0.050	0.101	0.00019	522
0.01	771	0.036	-0.024	0.050	0.101	0.00020	495

Table J.4: Resilient modulus data (A_1_75_105)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	227	-0.009	0.013	0.013	0.030	0.00006	522
0.06	228	0.007	0.013	0.013	0.030	0.00011	277
0.06	229	-0.008	0.013	0.013	0.030	0.00006	495
0.06	227	-0.006	0.013	0.013	0.030	0.00006	458
0.06	227	-0.008	0.013	0.013	0.030	0.00006	484
0.06	392	-0.005	0.023	0.022	0.051	0.00013	392
0.06	398	-0.006	0.023	0.022	0.052	0.00013	403
0.06	387	0.005	0.023	0.022	0.051	0.00017	306
0.06	390	-0.006	0.023	0.022	0.051	0.00013	403
0.06	389	-0.008	0.023	0.022	0.051	0.00012	412
0.06	552	-0.005	0.032	0.032	0.072	0.00019	376
0.06	551	-0.008	0.032	0.032	0.072	0.00018	394
0.06	551	-0.006	0.032	0.032	0.072	0.00019	385
0.06	551	0.005	0.032	0.032	0.072	0.00023	321
0.06	551	-0.005	0.032	0.032	0.072	0.00019	376
0.06	780	0.011	0.043	0.044	0.102	0.00032	318
0.06	769	0.010	0.043	0.044	0.101	0.00032	319
0.06	769	0.009	0.042	0.044	0.101	0.00031	321
0.06	780	0.009	0.043	0.044	0.102	0.00031	325
0.06	769	0.011	0.043	0.044	0.101	0.00032	315
0.04	216	-0.007	0.022	0.012	0.028	0.00009	329
0.04	216	0.007	0.019	0.012	0.028	0.00012	233
0.04	226	0.006	0.022	0.015	0.030	0.00014	211
0.04	227	0.005	0.022	0.015	0.030	0.00014	219
0.04	227	-0.006	0.022	0.015	0.030	0.00010	298
0.04	389	-0.005	0.033	0.023	0.051	0.00017	304
0.04	389	-0.006	0.033	0.023	0.051	0.00016	309
0.04	389	-0.007	0.030	0.023	0.051	0.00015	339
0.04	393	-0.005	0.033	0.023	0.051	0.00017	309
0.04	391	0.007	0.033	0.023	0.051	0.00021	246
0.04	553	-0.007	0.043	0.034	0.072	0.00023	316
0.04	553	0.007	0.043	0.034	0.073	0.00028	260
0.04	553	-0.007	0.043	0.034	0.073	0.00023	312
0.04	553	-0.005	0.043	0.034	0.072	0.00024	303
0.04	553	0.008	0.043	0.034	0.072	0.00028	259
0.04	783	0.007	0.055	0.048	0.103	0.00036	286
0.04	780	0.008	0.054	0.048	0.102	0.00036	284
0.04	769	0.007	0.054	0.048	0.101	0.00036	282
0.04	771	0.008	0.054	0.048	0.101	0.00036	280
0.04	770	0.011	0.054	0.048	0.101	0.00037	272
0.03	217	0.006	0.022	0.014	0.028	0.00014	204
0.03	218	-0.007	0.025	0.014	0.029	0.00011	271
0.03	217	-0.005	0.022	0.014	0.028	0.00010	278
0.03	216	-0.005	0.022	0.014	0.028	0.00010	276
0.03	217	-0.006	0.022	0.014	0.028	0.00010	290
0.03	392	-0.005	0.037	0.022	0.051	0.00018	291
0.03	392	0.005	0.037	0.022	0.051	0.00021	246
0.03	381	-0.008	0.037	0.022	0.050	0.00017	298
0.03	393	-0.005	0.037	0.022	0.051	0.00018	289
0.03	392	-0.005	0.037	0.022	0.051	0.00018	291
0.03	553	0.007	0.047	0.033	0.072	0.00029	253
0.03	559	0.005	0.047	0.034	0.073	0.00028	258
0.03	574	0.006	0.047	0.037	0.075	0.00030	254
0.03	560	0.003	0.048	0.034	0.073	0.00028	265
0.03	553	-0.007	0.047	0.034	0.073	0.00024	297
0.03	782	0.006	0.061	0.050	0.103	0.00038	266
0.03	782	-0.007	0.061	0.050	0.102	0.00034	301
0.03	782	0.008	0.061	0.050	0.103	0.00039	262
0.03	781	-0.006	0.061	0.050	0.102	0.00034	299
0.03	780	0.005	0.058	0.050	0.102	0.00037	276
0.01	218	0.008	0.028	0.013	0.029	0.00016	181
0.01	217	-0.009	0.024	0.012	0.028	0.00009	307
0.01	217	0.005	0.024	0.012	0.028	0.00014	209
0.01	218	-0.008	0.024	0.012	0.029	0.00009	303
0.01	219	0.005	0.024	0.013	0.029	0.00014	207
0.01	382	-0.006	0.038	0.023	0.050	0.00018	277
0.01	392	0.005	0.041	0.023	0.051	0.00023	226
0.01	392	0.008	0.041	0.023	0.051	0.00024	218
0.01	392	-0.006	0.038	0.023	0.051	0.00018	285
0.01	392	-0.008	0.038	0.023	0.051	0.00018	293
0.01	555	-0.007	0.050	0.035	0.073	0.00026	283
0.01	555	-0.007	0.051	0.035	0.073	0.00026	282
0.01	556	0.007	0.051	0.035	0.073	0.00030	240
0.01	554	-0.008	0.051	0.035	0.073	0.00026	284
0.01	566	-0.007	0.051	0.032	0.074	0.00025	300
0.01	784	0.006	0.066	0.050	0.103	0.00040	258
0.01	781	0.009	0.066	0.050	0.102	0.00041	251
0.01	785	-0.005	0.063	0.050	0.103	0.00035	291
0.01	781	-0.008	0.063	0.050	0.102	0.00034	298
0.01	782	0.009	0.066	0.050	0.103	0.00041	252

Table J.5: Resilient modulus data (A_2_75_105)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	239	-0.008	0.009	0.008	0.031	0.00003	1049
0.06	228	0.010	0.009	0.008	0.030	0.00009	346
0.06	228	-0.008	0.009	0.008	0.030	0.00003	1002
0.06	228	-0.010	0.009	0.008	0.030	0.00002	1274
0.06	227	0.011	0.009	0.005	0.030	0.00008	373
0.06	389	0.012	0.015	0.012	0.051	0.00013	395
0.06	388	-0.007	0.015	0.012	0.051	0.00007	763
0.06	389	0.009	0.015	0.012	0.051	0.00012	425
0.06	388	0.011	0.015	0.012	0.051	0.00012	410
0.06	388	-0.011	0.015	0.012	0.051	0.00005	966
0.06	0	0.000	0.000	0.000	0.000	0.00000	#DIV/0!
0.06	0	0.000	0.000	0.000	0.000	0.00000	#DIV/0!
0.06	0	0.000	0.000	0.000	0.000	0.00000	#DIV/0!
0.06	0	0.000	0.000	0.000	0.000	0.00000	#DIV/0!
0.06	0	0.000	0.000	0.000	0.000	0.00000	#DIV/0!
0.06	779	0.021	0.033	0.023	0.102	0.00025	406
0.06	768	0.022	0.033	0.023	0.101	0.00026	395
0.06	782	0.021	0.033	0.024	0.102	0.00025	402
0.06	771	0.018	0.033	0.027	0.101	0.00025	398
0.06	770	0.023	0.033	0.024	0.101	0.00026	386
0.04	217	-0.010	0.006	0.007	0.028	0.00001	3486
0.04	217	0.013	0.006	0.007	0.029	0.00008	342
0.04	228	0.009	0.006	0.007	0.030	0.00007	428
0.04	218	0.008	0.006	0.007	0.029	0.00007	423
0.04	227	0.015	0.006	0.007	0.030	0.00009	328
0.04	389	0.013	0.013	0.010	0.051	0.00012	436
0.04	389	0.009	0.013	0.010	0.051	0.00011	481
0.04	389	0.008	0.013	0.013	0.051	0.00011	453
0.04	389	0.015	0.013	0.010	0.051	0.00012	414
0.04	390	0.013	0.013	0.010	0.051	0.00012	428
0.04	550	0.019	0.021	0.016	0.072	0.00018	392
0.04	552	0.021	0.021	0.016	0.072	0.00019	382
0.04	556	0.015	0.021	0.016	0.073	0.00017	423
0.04	570	0.014	0.021	0.016	0.075	0.00017	447
0.04	551	0.017	0.021	0.016	0.072	0.00018	410
0.04	770	0.026	0.033	0.025	0.101	0.00027	369
0.04	772	0.020	0.030	0.025	0.101	0.00025	412
0.04	781	0.029	0.033	0.025	0.102	0.00028	361
0.04	780	0.019	0.030	0.025	0.102	0.00024	427
0.04	780	0.020	0.033	0.025	0.102	0.00025	404
0.03	228	0.005	0.008	0.006	0.030	0.00006	476
0.03	227	0.010	0.005	0.006	0.030	0.00007	424
0.03	216	-0.008	0.008	0.006	0.028	0.00002	1254
0.03	216	-0.007	0.005	0.009	0.028	0.00003	1129
0.03	228	0.008	0.005	0.006	0.030	0.00006	465
0.03	381	0.014	0.011	0.013	0.050	0.00012	412
0.03	392	0.012	0.011	0.013	0.051	0.00012	441
0.03	380	-0.008	0.011	0.013	0.050	0.00005	1031
0.03	381	0.011	0.014	0.012	0.050	0.00012	406
0.03	392	0.010	0.011	0.012	0.051	0.00011	476
0.03	554	0.019	0.019	0.018	0.073	0.00019	390
0.03	551	0.017	0.019	0.019	0.072	0.00018	401
0.03	556	0.021	0.019	0.015	0.073	0.00018	402
0.03	566	0.013	0.019	0.016	0.074	0.00016	471
0.03	554	0.019	0.019	0.016	0.073	0.00018	413
0.03	781	0.032	0.031	0.023	0.102	0.00028	362
0.03	782	0.016	0.031	0.023	0.102	0.00023	445
0.03	782	0.025	0.031	0.023	0.102	0.00026	393
0.03	772	0.025	0.031	0.023	0.101	0.00026	388
0.03	782	0.024	0.031	0.026	0.103	0.00027	384
0.01	219	0.011	0.006	0.008	0.029	0.00008	341
0.01	229	0.006	0.006	0.008	0.030	0.00007	441
0.01	229	-0.009	0.006	0.008	0.030	0.00002	1549
0.01	227	0.012	0.006	0.008	0.030	0.00009	337
0.01	228	-0.013	0.006	0.008	0.030	0.00000	7524
0.01	390	0.016	0.013	0.013	0.051	0.00014	372
0.01	391	0.011	0.013	0.013	0.051	0.00012	430
0.01	390	0.013	0.013	0.013	0.051	0.00012	410
0.01	390	0.020	0.012	0.013	0.051	0.00015	345
0.01	389	-0.019	0.012	0.013	0.051	0.00002	2650
0.01	557	0.024	0.021	0.018	0.073	0.00021	353
0.01	564	0.020	0.021	0.018	0.074	0.00020	376
0.01	558	0.022	0.021	0.018	0.073	0.00020	359
0.01	555	0.022	0.021	0.018	0.073	0.00020	360
0.01	553	0.017	0.021	0.018	0.073	0.00018	394
0.01	785	0.024	0.031	0.026	0.103	0.00026	390
0.01	781	0.027	0.031	0.026	0.102	0.00028	372
0.01	784	0.026	0.031	0.026	0.103	0.00027	380
0.01	794	0.026	0.031	0.026	0.104	0.00027	386
0.01	783	0.034	0.031	0.026	0.103	0.00030	344

Table J.6: Resilient modulus data (A_3_15_100)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	235	0.023	-0.008	0.031	0.031	0.00015	202
0.06	216	0.021	-0.008	0.031	0.028	0.00015	192
0.06	213	0.020	-0.007	0.028	0.028	0.00013	210
0.06	212	0.020	-0.007	0.031	0.028	0.00014	197
0.06	223	0.019	-0.008	0.031	0.029	0.00014	211
0.06	380	0.030	-0.013	0.052	0.050	0.00023	218
0.06	390	0.040	-0.013	0.052	0.051	0.00026	197
0.06	376	0.035	-0.013	0.052	0.049	0.00024	201
0.06	376	0.039	-0.013	0.052	0.049	0.00026	193
0.06	376	0.038	-0.013	0.052	0.049	0.00025	195
0.06	540	0.052	-0.018	0.082	0.071	0.00038	186
0.06	540	0.054	-0.018	0.082	0.071	0.00039	182
0.06	541	0.056	-0.018	0.082	0.071	0.00040	179
0.06	540	0.051	-0.018	0.082	0.071	0.00038	187
0.06	551	0.057	-0.018	0.082	0.072	0.00040	182
0.06	769	0.077	-0.021	0.128	0.101	0.00060	168
0.06	769	0.083	-0.021	0.125	0.101	0.00061	165
0.06	769	0.082	-0.021	0.124	0.101	0.00061	166
0.06	758	0.085	-0.021	0.127	0.099	0.00063	158
0.06	768	0.078	-0.021	0.124	0.101	0.00059	169
0.04	215	0.033	-0.017	0.029	0.028	0.00015	189
0.04	216	0.026	-0.017	0.029	0.028	0.00013	225
0.04	204	0.024	-0.017	0.029	0.027	0.00012	226
0.04	216	0.026	-0.017	0.029	0.028	0.00012	227
0.04	204	0.023	-0.017	0.029	0.027	0.00012	232
0.04	378	0.046	-0.024	0.054	0.050	0.00025	200
0.04	383	0.046	-0.024	0.057	0.050	0.00026	196
0.04	393	0.049	-0.024	0.054	0.052	0.00025	202
0.04	377	0.044	-0.024	0.057	0.049	0.00025	196
0.04	379	0.048	-0.024	0.054	0.050	0.00025	196
0.04	553	0.066	-0.030	0.085	0.072	0.00040	183
0.04	542	0.065	-0.030	0.088	0.071	0.00040	176
0.04	542	0.068	-0.030	0.088	0.071	0.00041	173
0.04	552	0.072	-0.030	0.088	0.072	0.00043	170
0.04	555	0.065	-0.030	0.085	0.073	0.00039	185
0.04	771	0.094	-0.031	0.136	0.101	0.00065	154
0.04	769	0.093	-0.034	0.136	0.101	0.00064	157
0.04	771	0.097	-0.034	0.136	0.101	0.00065	155
0.04	770	0.093	-0.030	0.136	0.101	0.00065	155
0.04	771	0.096	-0.034	0.136	0.101	0.00065	155
0.03	0	0.000	0.000	0.000	0.000	0.00000	#DIV/0!
0.03	0	0.000	0.000	0.000	0.000	0.00000	#DIV/0!
0.03	0	0.000	0.000	0.000	0.000	0.00000	#DIV/0!
0.03	0	0.000	0.000	0.000	0.000	0.00000	#DIV/0!
0.03	0	0.000	0.000	0.000	0.000	0.00000	#DIV/0!
0.03	373	0.052	-0.030	0.057	0.049	0.00026	191
0.03	378	0.052	-0.030	0.056	0.050	0.00026	193
0.03	383	0.049	-0.030	0.059	0.050	0.00026	195
0.03	379	0.051	-0.027	0.056	0.050	0.00027	188
0.03	380	0.048	-0.030	0.056	0.050	0.00025	203
0.03	544	0.068	-0.035	0.090	0.071	0.00041	176
0.03	544	0.068	-0.035	0.090	0.071	0.00041	176
0.03	544	0.073	-0.034	0.090	0.071	0.00042	168
0.03	554	0.070	-0.034	0.090	0.073	0.00041	176
0.03	542	0.072	-0.034	0.090	0.071	0.00042	170
0.03	760	0.101	-0.038	0.140	0.100	0.00067	149
0.03	759	0.103	-0.037	0.143	0.099	0.00068	145
0.03	759	0.098	-0.037	0.140	0.100	0.00066	151
0.03	771	0.100	-0.037	0.143	0.101	0.00067	150
0.03	770	0.100	-0.037	0.143	0.101	0.00068	149
0.01	204	0.031	-0.021	0.029	0.027	0.00013	209
0.01	204	0.029	-0.018	0.029	0.027	0.00013	206
0.01	205	0.029	-0.018	0.029	0.027	0.00013	203
0.01	205	0.024	-0.018	0.029	0.027	0.00012	232
0.01	206	0.029	-0.018	0.029	0.027	0.00013	203
0.01	370	0.051	-0.030	0.059	0.049	0.00026	187
0.01	380	0.043	-0.031	0.059	0.050	0.00023	213
0.01	381	0.051	-0.031	0.059	0.050	0.00026	192
0.01	371	0.058	-0.031	0.059	0.049	0.00028	172
0.01	370	0.057	-0.031	0.059	0.048	0.00028	173
0.01	551	0.075	-0.039	0.094	0.072	0.00043	169
0.01	570	0.072	-0.039	0.094	0.075	0.00042	180
0.01	545	0.080	-0.039	0.094	0.071	0.00044	162
0.01	545	0.074	-0.039	0.094	0.071	0.00042	168
0.01	544	0.074	-0.039	0.094	0.071	0.00042	168
0.01	771	0.107	-0.042	0.145	0.101	0.00069	147
0.01	771	0.102	-0.042	0.144	0.101	0.00067	151
0.01	770	0.109	-0.042	0.144	0.101	0.00069	146
0.01	768	0.105	-0.042	0.144	0.101	0.00068	148
0.01	769	0.102	-0.042	0.144	0.101	0.00067	151

Table J.7: Resilient modulus data (A_4_15_100)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	216	0.029	-0.005	0.005	0.030	0.00010	297
0.06	216	0.028	-0.006	-0.004	0.030	0.00006	483
0.06	217	0.028	-0.006	0.005	0.030	0.00009	309
0.06	218	0.028	-0.006	0.005	0.030	0.00009	320
0.06	217	0.026	-0.006	0.005	0.030	0.00009	333
0.06	388	0.051	-0.010	0.010	0.054	0.00017	301
0.06	379	0.053	-0.010	0.010	0.053	0.00017	285
0.06	379	0.052	-0.009	0.010	0.053	0.00017	293
0.06	390	0.046	-0.010	0.010	0.054	0.00015	335
0.06	389	0.051	-0.010	0.010	0.054	0.00017	305
0.06	553	0.074	-0.016	0.023	0.077	0.00026	274
0.06	552	0.077	-0.016	0.023	0.077	0.00027	263
0.06	541	0.075	-0.016	0.020	0.075	0.00026	276
0.06	551	0.074	-0.016	0.023	0.077	0.00026	274
0.06	552	0.080	-0.016	0.023	0.077	0.00028	256
0.06	770	0.098	-0.023	0.057	0.107	0.00043	232
0.06	770	0.107	-0.023	0.057	0.107	0.00046	218
0.06	770	0.106	-0.023	0.057	0.107	0.00046	220
0.06	781	0.108	-0.022	0.057	0.109	0.00047	220
0.06	780	0.105	-0.022	0.057	0.109	0.00046	223
0.04	215	0.038	-0.013	-0.005	0.030	0.00007	431
0.04	215	0.034	-0.013	-0.008	0.030	0.00004	653
0.04	215	0.034	-0.013	-0.005	0.030	0.00005	526
0.04	215	0.030	-0.013	-0.005	0.030	0.00004	727
0.04	215	0.033	-0.013	-0.005	0.030	0.00005	565
0.04	379	0.064	-0.021	-0.012	0.053	0.00010	485
0.04	378	0.062	-0.021	-0.009	0.053	0.00011	467
0.04	377	0.066	-0.021	-0.009	0.053	0.00012	416
0.04	378	0.066	-0.021	-0.009	0.053	0.00012	414
0.04	379	0.062	-0.021	-0.009	0.053	0.00011	466
0.04	568	0.091	-0.029	0.012	0.079	0.00024	309
0.04	553	0.094	-0.029	0.012	0.077	0.00025	288
0.04	552	0.095	-0.029	0.012	0.077	0.00026	284
0.04	554	0.090	-0.029	0.012	0.077	0.00024	305
0.04	553	0.086	-0.029	0.012	0.077	0.00023	320
0.04	771	0.121	-0.037	0.050	0.107	0.00044	229
0.04	770	0.118	-0.036	0.050	0.107	0.00043	233
0.04	771	0.120	-0.036	0.050	0.107	0.00044	230
0.04	770	0.126	-0.036	0.050	0.107	0.00046	220
0.04	770	0.122	-0.036	0.050	0.107	0.00044	227
0.03	208	0.041	-0.013	-0.008	0.029	0.00007	415
0.03	207	0.039	-0.013	-0.008	0.029	0.00006	451
0.03	208	0.040	-0.013	-0.008	0.029	0.00006	450
0.03	207	0.038	-0.016	-0.008	0.029	0.00005	576
0.03	207	0.036	-0.016	-0.008	0.029	0.00004	726
0.03	378	0.071	-0.024	-0.012	0.053	0.00012	422
0.03	380	0.073	-0.024	-0.012	0.053	0.00012	407
0.03	389	0.071	-0.024	-0.012	0.054	0.00012	443
0.03	377	0.066	-0.024	-0.012	0.053	0.00010	495
0.03	380	0.064	-0.024	-0.012	0.053	0.00009	532
0.03	554	0.099	-0.032	-0.012	0.077	0.00018	402
0.03	554	0.097	-0.032	0.010	0.077	0.00025	295
0.03	554	0.097	-0.032	-0.009	0.077	0.00018	398
0.03	555	0.098	-0.032	0.010	0.077	0.00025	294
0.03	554	0.096	-0.032	0.010	0.077	0.00024	298
0.03	770	0.131	-0.042	0.047	0.107	0.00045	225
0.03	771	0.129	-0.042	0.047	0.107	0.00044	228
0.03	771	0.134	-0.042	0.047	0.107	0.00046	221
0.03	770	0.129	-0.042	0.047	0.107	0.00044	228
0.03	769	0.134	-0.042	0.047	0.107	0.00046	220
0.01	207	0.042	-0.015	-0.011	0.029	0.00005	494
0.01	207	0.034	-0.015	-0.010	0.029	0.00003	973
0.01	207	0.043	-0.015	-0.011	0.029	0.00006	482
0.01	206	0.038	-0.015	-0.010	0.029	0.00004	641
0.01	206	0.038	-0.015	-0.011	0.029	0.00004	670
0.01	381	0.073	-0.028	-0.013	0.053	0.00010	481
0.01	380	0.079	-0.028	-0.013	0.053	0.00012	399
0.01	380	0.070	-0.028	-0.013	0.053	0.00009	527
0.01	381	0.074	-0.028	-0.013	0.053	0.00011	465
0.01	379	0.075	-0.028	-0.013	0.053	0.00011	443
0.01	556	0.107	-0.037	-0.012	0.077	0.00019	382
0.01	555	0.101	-0.037	-0.012	0.077	0.00017	426
0.01	553	0.103	-0.037	-0.012	0.077	0.00018	405
0.01	555	0.102	-0.037	-0.012	0.077	0.00017	416
0.01	555	0.102	-0.037	-0.012	0.077	0.00018	411
0.01	772	0.137	-0.046	0.044	0.108	0.00044	228
0.01	776	0.143	-0.046	0.044	0.108	0.00046	221
0.01	793	0.138	-0.046	0.044	0.110	0.00044	234
0.01	783	0.139	-0.046	0.044	0.109	0.00045	229
0.01	772	0.136	-0.046	0.044	0.108	0.00044	231

Table J.8: Resilient modulus data (A_1_12_100)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	181	0.008	0.009	0.006	0.024	0.00008	307
0.06	181	-0.008	0.010	-0.003	0.024	-0.00001	-4609
0.06	181	-0.009	0.010	0.006	0.024	0.00002	1085
0.06	192	0.008	0.010	-0.003	0.025	0.00005	529
0.06	181	-0.006	0.010	-0.003	0.024	0.00000	-43293
0.06	326	0.010	0.015	0.007	0.043	0.00010	409
0.06	326	0.007	0.018	0.007	0.043	0.00011	400
0.06	336	0.009	0.015	0.007	0.044	0.00010	428
0.06	336	0.008	0.015	0.007	0.044	0.00010	444
0.06	336	0.008	0.015	0.007	0.044	0.00010	453
0.06	500	0.013	0.025	0.008	0.066	0.00015	438
0.06	500	0.013	0.025	0.008	0.066	0.00015	441
0.06	501	0.013	0.025	0.008	0.066	0.00015	434
0.06	500	0.013	0.025	0.008	0.066	0.00015	436
0.06	500	0.013	0.028	0.008	0.066	0.00016	407
0.06	700	0.017	0.038	0.013	0.092	0.00022	413
0.06	699	0.023	0.035	0.016	0.092	0.00024	377
0.06	699	0.018	0.035	0.013	0.092	0.00022	424
0.06	700	0.019	0.038	0.013	0.092	0.00023	403
0.06	704	0.015	0.038	0.013	0.092	0.00022	429
0.04	186	-0.007	0.009	0.004	0.024	0.00002	1202
0.04	201	-0.005	0.009	0.004	0.026	0.00003	962
0.04	170	-0.008	0.009	0.004	0.022	0.00002	1416
0.04	170	0.010	0.009	0.004	0.022	0.00008	295
0.04	180	-0.006	0.009	0.004	0.024	0.00002	963
0.04	326	0.005	0.019	0.004	0.043	0.00009	465
0.04	332	-0.008	0.019	0.004	0.044	0.00005	896
0.04	330	0.008	0.019	0.004	0.043	0.00010	424
0.04	324	0.011	0.019	0.004	0.042	0.00011	384
0.04	324	0.008	0.019	0.004	0.042	0.00010	419
0.04	501	0.015	0.028	0.005	0.066	0.00016	411
0.04	501	0.015	0.028	0.005	0.066	0.00016	414
0.04	500	0.012	0.028	0.005	0.066	0.00015	439
0.04	500	0.009	0.028	0.005	0.066	0.00014	475
0.04	500	0.015	0.028	0.009	0.066	0.00017	392
0.04	701	0.017	0.041	0.010	0.092	0.00022	410
0.04	707	0.023	0.041	0.010	0.093	0.00024	379
0.04	704	0.020	0.041	0.010	0.092	0.00023	396
0.04	699	0.016	0.041	0.010	0.092	0.00022	412
0.04	700	0.019	0.041	0.010	0.092	0.00023	394
0.03	166	0.008	0.010	-0.003	0.022	0.00005	470
0.03	181	0.007	0.010	-0.003	0.024	0.00004	548
0.03	161	-0.008	0.010	-0.003	0.021	-0.00001	-3354
0.03	162	0.007	0.010	-0.003	0.021	0.00004	487
0.03	161	0.005	0.010	-0.003	0.021	0.00004	547
0.03	316	0.010	0.021	-0.004	0.041	0.00009	475
0.03	320	0.007	0.021	-0.004	0.042	0.00008	538
0.03	333	-0.174	0.086	-0.066	0.044	-0.00051	-86
0.03	327	0.009	0.021	-0.004	0.043	0.00008	526
0.03	326	0.007	0.021	-0.004	0.043	0.00008	565
0.03	502	0.011	0.031	-0.004	0.066	0.00012	543
0.03	502	0.015	0.034	-0.004	0.066	0.00015	450
0.03	502	0.011	0.034	-0.007	0.066	0.00012	531
0.03	502	0.018	0.034	-0.004	0.066	0.00015	427
0.03	491	0.013	0.034	-0.004	0.064	0.00014	461
0.03	700	0.018	0.046	-0.006	0.092	0.00019	483
0.03	700	0.022	0.045	-0.006	0.092	0.00020	451
0.03	700	0.018	0.045	-0.006	0.092	0.00019	486
0.03	700	0.021	0.045	-0.006	0.092	0.00020	461
0.03	689	0.023	0.045	-0.006	0.090	0.00021	439
0.01	0	0.000	0.000	0.000	0.000	0.00000	#DIV/0!
0.01	0	0.000	0.000	0.000	0.000	0.00000	#DIV/0!
0.01	0	0.000	0.000	0.000	0.000	0.00000	#DIV/0!
0.01	0	0.000	0.000	0.000	0.000	0.00000	#DIV/0!
0.01	0	0.000	0.000	0.000	0.000	0.00000	#DIV/0!
0.01	316	0.010	0.020	-0.007	0.041	0.00008	534
0.01	316	-0.007	0.020	-0.007	0.041	0.00002	1971
0.01	316	-0.006	0.023	-0.004	0.041	0.00004	963
0.01	315	0.010	0.020	-0.004	0.041	0.00009	482
0.01	315	0.012	0.020	-0.007	0.041	0.00008	503
0.01	496	0.017	0.034	-0.006	0.065	0.00015	433
0.01	496	0.013	0.034	-0.006	0.065	0.00014	474
0.01	496	0.018	0.034	-0.006	0.065	0.00015	426
0.01	496	0.014	0.034	-0.006	0.065	0.00014	465
0.01	495	0.013	0.034	-0.006	0.065	0.00014	472
0.01	690	0.023	0.046	-0.005	0.090	0.00021	430
0.01	689	0.023	0.046	-0.005	0.090	0.00021	432
0.01	700	0.024	0.046	-0.005	0.092	0.00021	428
0.01	700	0.018	0.046	-0.005	0.092	0.00020	468
0.01	700	0.029	0.046	-0.008	0.092	0.00022	419

Table J.9: Resilient modulus data (A_2_12_100)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	226	-0.005	0.002	0.015	0.030	0.00004	744
0.06	231	-0.005	-0.004	0.015	0.030	0.00002	1554
0.06	246	0.008	0.002	0.015	0.032	0.00008	401
0.06	227	-0.009	-0.004	0.015	0.030	0.00001	4897
0.06	225	-0.008	-0.004	0.015	0.029	0.00001	3142
0.06	389	0.008	0.005	0.028	0.051	0.00013	381
0.06	390	-0.006	-0.004	0.027	0.051	0.00006	904
0.06	390	-0.007	0.005	0.027	0.051	0.00009	594
0.06	389	0.005	0.005	0.027	0.051	0.00012	410
0.06	390	0.007	0.005	0.027	0.051	0.00013	395
0.06	552	0.009	0.006	0.038	0.072	0.00017	414
0.06	541	-0.008	0.006	0.041	0.071	0.00013	553
0.06	552	-0.006	0.006	0.041	0.072	0.00013	537
0.06	553	0.007	0.006	0.041	0.072	0.00018	402
0.06	552	0.011	0.006	0.041	0.072	0.00019	377
0.06	781	0.011	0.010	0.060	0.102	0.00026	387
0.06	768	0.010	0.010	0.060	0.101	0.00026	385
0.06	768	0.010	0.010	0.060	0.101	0.00026	385
0.06	768	0.007	0.010	0.060	0.101	0.00025	402
0.06	779	0.011	0.010	0.060	0.102	0.00026	387
0.04	228	0.007	-0.004	0.015	0.030	0.00006	492
0.04	227	-0.008	-0.004	0.015	0.030	0.00001	2797
0.04	228	0.007	-0.004	0.015	0.030	0.00006	512
0.04	228	-0.007	-0.004	0.015	0.030	0.00001	2016
0.04	228	0.005	-0.004	0.015	0.030	0.00005	548
0.04	394	0.007	-0.004	0.027	0.052	0.00010	523
0.04	405	-0.005	-0.004	0.027	0.053	0.00006	907
0.04	389	0.007	0.002	0.030	0.051	0.00013	391
0.04	388	-0.008	-0.004	0.027	0.051	0.00005	1024
0.04	389	0.006	-0.004	0.027	0.051	0.00009	540
0.04	553	-0.008	-0.004	0.042	0.072	0.00010	748
0.04	552	-0.007	0.005	0.042	0.072	0.00013	543
0.04	552	0.007	0.002	0.042	0.072	0.00017	434
0.04	552	-0.005	0.005	0.042	0.072	0.00014	524
0.04	551	0.009	-0.004	0.042	0.072	0.00016	465
0.04	768	0.011	0.005	0.064	0.101	0.00026	384
0.04	768	0.016	0.008	0.064	0.101	0.00029	346
0.04	780	0.011	0.005	0.064	0.102	0.00027	386
0.04	768	0.008	0.005	0.064	0.101	0.00025	396
0.04	768	-0.050	0.011	0.064	0.101	0.00008	1237
0.03	229	0.005	-0.002	0.017	0.030	0.00007	454
0.03	230	-0.008	-0.002	0.018	0.030	0.00002	1228
0.03	229	-0.007	-0.002	0.017	0.030	0.00003	1064
0.03	230	-0.010	-0.002	0.017	0.030	0.00002	1527
0.03	230	-0.005	-0.002	0.017	0.030	0.00003	881
0.03	392	0.007	-0.004	0.031	0.051	0.00011	451
0.03	397	0.009	-0.004	0.031	0.052	0.00012	426
0.03	401	-0.005	-0.004	0.031	0.053	0.00007	703
0.03	393	0.008	-0.004	0.031	0.052	0.00012	434
0.03	392	0.010	-0.004	0.031	0.051	0.00012	421
0.03	553	0.009	-0.004	0.046	0.073	0.00017	430
0.03	565	0.006	-0.004	0.046	0.074	0.00016	466
0.03	554	0.010	-0.004	0.046	0.073	0.00017	426
0.03	564	0.012	-0.004	0.046	0.074	0.00018	414
0.03	554	0.008	-0.004	0.046	0.073	0.00017	438
0.03	770	0.011	-0.005	0.069	0.101	0.00025	406
0.03	782	0.013	-0.005	0.069	0.103	0.00025	404
0.03	774	0.013	-0.005	0.069	0.102	0.00025	401
0.03	796	0.011	-0.005	0.069	0.104	0.00025	420
0.03	771	0.014	-0.005	0.069	0.101	0.00026	392
0.01	228	-0.006	0.003	0.018	0.030	0.00005	611
0.01	229	0.009	0.003	0.018	0.030	0.00010	301
0.01	217	0.009	0.003	0.018	0.028	0.00010	291
0.01	229	0.009	0.003	0.018	0.030	0.00010	305
0.01	218	-0.007	0.003	0.018	0.029	0.00005	586
0.01	383	0.007	-0.004	0.034	0.050	0.00012	421
0.01	382	0.009	-0.004	0.034	0.050	0.00013	393
0.01	383	0.009	-0.004	0.031	0.050	0.00012	428
0.01	392	0.010	-0.004	0.030	0.051	0.00012	431
0.01	382	0.008	-0.004	0.034	0.050	0.00012	410
0.01	552	0.009	-0.007	0.047	0.072	0.00016	451
0.01	553	0.009	-0.004	0.047	0.072	0.00017	423
0.01	553	0.008	-0.004	0.047	0.073	0.00017	431
0.01	564	0.012	-0.004	0.047	0.074	0.00018	405
0.01	552	0.010	-0.004	0.047	0.072	0.00017	415
0.01	772	0.011	-0.007	0.070	0.101	0.00024	420
0.01	773	0.014	-0.007	0.070	0.101	0.00025	400
0.01	771	0.014	-0.004	0.070	0.101	0.00026	387
0.01	781	0.015	-0.004	0.070	0.102	0.00026	388
0.01	774	0.013	-0.004	0.073	0.101	0.00027	377

Table J.10: Resilient modulus data (A_1_9_100)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	215	0.013	0.016	-0.009	0.032	0.00007	455
0.06	215	0.013	0.013	-0.009	0.032	0.00006	534
0.06	216	0.016	0.013	-0.009	0.031	0.00007	437
0.06	216	0.018	0.013	-0.009	0.032	0.00008	420
0.06	228	0.013	0.016	-0.012	0.032	0.00006	540
0.06	380	0.019	0.027	-0.010	0.054	0.00012	435
0.06	391	0.023	0.027	-0.010	0.054	0.00014	389
0.06	379	0.018	0.027	-0.010	0.054	0.00012	437
0.06	381	0.022	0.027	-0.010	0.054	0.00014	399
0.06	387	0.018	0.027	-0.010	0.055	0.00012	452
0.06	552	0.028	0.044	-0.014	0.077	0.00020	382
0.06	554	0.030	0.044	-0.015	0.077	0.00021	373
0.06	557	0.027	0.044	-0.012	0.077	0.00021	369
0.06	557	0.031	0.047	-0.012	0.079	0.00023	337
0.06	554	0.026	0.044	-0.012	0.077	0.00020	378
0.06	769	0.040	0.068	-0.015	0.107	0.00033	330
0.06	768	0.044	0.068	-0.015	0.109	0.00034	319
0.06	769	0.042	0.071	-0.015	0.109	0.00035	315
0.06	769	0.046	0.071	-0.015	0.107	0.00036	298
0.06	772	0.043	0.068	-0.015	0.109	0.00034	325
0.04	217	0.016	0.015	-0.012	0.031	0.00007	481
0.04	217	0.017	0.015	-0.012	0.032	0.00007	444
0.04	217	0.011	0.018	-0.012	0.032	0.00006	539
0.04	218	0.017	0.015	-0.012	0.031	0.00007	458
0.04	217	0.018	0.015	-0.012	0.031	0.00007	430
0.04	379	0.025	0.029	-0.018	0.054	0.00013	421
0.04	389	0.022	0.032	-0.018	0.055	0.00013	431
0.04	390	0.024	0.029	-0.018	0.055	0.00012	449
0.04	389	0.026	0.029	-0.018	0.056	0.00013	428
0.04	379	0.026	0.029	-0.018	0.053	0.00013	403
0.04	555	0.039	0.048	-0.021	0.077	0.00023	332
0.04	554	0.040	0.048	-0.021	0.077	0.00023	328
0.04	553	0.039	0.048	-0.021	0.077	0.00023	336
0.04	555	0.038	0.048	-0.021	0.077	0.00023	338
0.04	554	0.034	0.048	-0.021	0.077	0.00021	359
0.04	781	0.049	0.075	-0.021	0.109	0.00036	303
0.04	782	0.047	0.072	-0.021	0.109	0.00034	318
0.04	782	0.045	0.075	-0.021	0.107	0.00034	311
0.04	774	0.046	0.075	-0.021	0.107	0.00035	307
0.04	789	0.049	0.075	-0.021	0.107	0.00036	298
0.03	206	0.020	0.016	-0.012	0.032	0.00009	376
0.03	218	0.015	0.016	-0.012	0.031	0.00007	459
0.03	207	0.014	0.016	-0.012	0.032	0.00007	492
0.03	216	0.014	0.016	-0.012	0.031	0.00006	480
0.03	217	0.014	0.016	-0.012	0.031	0.00006	473
0.03	380	0.029	0.032	-0.019	0.053	0.00015	363
0.03	380	0.027	0.032	-0.019	0.053	0.00014	384
0.03	379	0.027	0.032	-0.019	0.055	0.00014	393
0.03	383	0.026	0.029	-0.019	0.055	0.00013	434
0.03	391	0.018	0.032	-0.019	0.053	0.00011	497
0.03	575	0.037	0.050	-0.023	0.077	0.00022	342
0.03	554	0.039	0.050	-0.023	0.077	0.00023	335
0.03	555	0.036	0.050	-0.023	0.077	0.00022	352
0.03	555	0.040	0.050	-0.023	0.077	0.00024	327
0.03	555	0.039	0.050	-0.023	0.077	0.00023	334
0.03	773	0.050	0.078	-0.022	0.109	0.00037	295
0.03	772	0.051	0.078	-0.022	0.109	0.00037	292
0.03	784	0.050	0.078	-0.022	0.109	0.00037	295
0.03	785	0.050	0.075	-0.025	0.109	0.00034	316
0.03	774	0.053	0.078	-0.025	0.107	0.00037	292
0.01	218	0.019	0.016	-0.012	0.031	0.00008	401
0.01	208	0.014	0.016	-0.012	0.031	0.00006	512
0.01	208	0.012	0.016	-0.012	0.031	0.00005	593
0.01	205	0.013	0.015	-0.012	0.031	0.00006	556
0.01	219	0.019	0.016	-0.012	0.031	0.00008	406
0.01	397	0.025	0.034	-0.021	0.054	0.00013	416
0.01	381	0.023	0.030	-0.021	0.053	0.00011	469
0.01	382	0.026	0.033	-0.021	0.053	0.00013	399
0.01	392	0.029	0.033	-0.021	0.056	0.00014	391
0.01	225	0.373	1.380	1.756	0.055	0.01433	4
0.01	555	0.038	0.053	-0.023	0.077	0.00024	326
0.01	555	0.034	0.053	-0.023	0.077	0.00022	350
0.01	555	0.037	0.053	-0.023	0.077	0.00023	334
0.01	555	0.036	0.050	-0.023	0.077	0.00022	353
0.01	555	0.041	0.050	-0.023	0.077	0.00023	330
0.01	772	0.056	0.080	-0.027	0.109	0.00038	288
0.01	782	0.054	0.077	-0.027	0.109	0.00036	300
0.01	782	0.054	0.080	-0.024	0.109	0.00038	284
0.01	783	0.053	0.077	-0.024	0.109	0.00037	293
0.01	783	0.055	0.077	-0.024	0.107	0.00038	285

Table J.11: Resilient modulus data (A_2_9_100)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	229	0.007	0.012	0.009	0.030	0.00009	336
0.06	229	-0.009	0.011	0.009	0.030	0.00004	799
0.06	225	0.010	0.011	0.009	0.030	0.00010	285
0.06	229	0.010	0.011	0.009	0.030	0.00010	280
0.06	226	-0.008	0.011	0.009	0.030	0.00004	715
0.06	387	0.012	0.022	0.013	0.051	0.00015	315
0.06	387	0.011	0.022	0.013	0.051	0.00015	318
0.06	387	0.018	0.021	0.013	0.051	0.00017	279
0.06	388	0.014	0.021	0.013	0.051	0.00016	299
0.06	397	-0.011	0.022	0.013	0.052	0.00008	636
0.06	554	0.012	0.031	0.019	0.073	0.00021	329
0.06	553	0.013	0.031	0.019	0.072	0.00021	326
0.06	553	0.015	0.031	0.022	0.072	0.00023	300
0.06	564	0.012	0.031	0.023	0.074	0.00021	324
0.06	553	0.017	0.031	0.022	0.072	0.00023	293
0.06	769	0.025	0.046	0.034	0.101	0.00035	275
0.06	781	0.016	0.046	0.034	0.102	0.00032	304
0.06	780	0.015	0.046	0.037	0.102	0.00032	297
0.06	768	0.017	0.046	0.034	0.101	0.00032	296
0.06	784	0.020	0.046	0.034	0.103	0.00033	294
0.04	225	-0.006	0.010	0.008	0.030	0.00004	729
0.04	227	-0.009	0.010	0.008	0.030	0.00003	958
0.04	227	-0.009	0.010	0.008	0.030	0.00003	934
0.04	225	0.009	0.013	0.008	0.030	0.00010	282
0.04	225	0.011	0.010	0.008	0.030	0.00009	297
0.04	388	0.012	0.020	0.013	0.051	0.00015	327
0.04	391	0.012	0.020	0.016	0.051	0.00016	307
0.04	395	0.013	0.020	0.016	0.052	0.00016	303
0.04	403	0.008	0.020	0.013	0.053	0.00013	369
0.04	379	0.014	0.020	0.013	0.050	0.00016	300
0.04	553	0.013	0.032	0.023	0.072	0.00022	305
0.04	551	0.019	0.032	0.023	0.072	0.00024	282
0.04	553	0.016	0.032	0.023	0.072	0.00023	294
0.04	552	0.010	0.032	0.023	0.072	0.00021	323
0.04	552	0.016	0.032	0.023	0.072	0.00023	296
0.04	781	0.027	0.051	0.036	0.102	0.00037	259
0.04	782	0.023	0.051	0.036	0.102	0.00036	268
0.04	769	0.020	0.050	0.036	0.101	0.00035	274
0.04	769	0.025	0.050	0.035	0.101	0.00036	261
0.04	768	0.019	0.050	0.035	0.101	0.00034	276
0.03	231	-0.010	0.011	0.010	0.030	0.00003	825
0.03	226	-0.012	0.011	0.010	0.030	0.00003	932
0.03	232	0.009	0.011	0.010	0.030	0.00010	291
0.03	220	0.014	0.011	0.010	0.029	0.00011	240
0.03	220	-0.011	0.010	0.010	0.029	0.00003	841
0.03	381	0.012	0.022	0.017	0.050	0.00017	276
0.03	382	-0.012	0.022	0.017	0.050	0.00009	528
0.03	392	0.015	0.022	0.017	0.051	0.00018	272
0.03	393	0.012	0.022	0.017	0.052	0.00017	290
0.03	381	-0.011	0.022	0.017	0.050	0.00009	509
0.03	552	0.013	0.031	0.024	0.072	0.00022	305
0.03	553	0.016	0.031	0.024	0.072	0.00023	293
0.03	552	-0.012	0.034	0.024	0.072	0.00015	452
0.03	552	0.016	0.031	0.023	0.072	0.00023	295
0.03	552	0.015	0.034	0.023	0.072	0.00024	284
0.03	782	0.021	0.049	0.036	0.103	0.00035	275
0.03	782	0.022	0.049	0.036	0.103	0.00035	272
0.03	782	0.018	0.049	0.036	0.103	0.00034	284
0.03	781	0.017	0.049	0.036	0.102	0.00034	286
0.03	769	0.023	0.049	0.036	0.101	0.00035	268
0.01	225	0.013	0.010	0.010	0.030	0.00011	259
0.01	226	-0.013	0.011	0.010	0.030	0.00002	1134
0.01	226	-0.014	0.011	0.010	0.030	0.00002	1300
0.01	225	-0.007	0.011	0.010	0.029	0.00004	659
0.01	225	0.010	0.011	0.010	0.029	0.00010	276
0.01	391	-0.009	0.022	0.017	0.051	0.00010	484
0.01	378	0.010	0.022	0.017	0.050	0.00016	293
0.01	382	0.011	0.022	0.017	0.050	0.00016	289
0.01	404	0.015	0.022	0.017	0.053	0.00018	280
0.01	391	-0.010	0.022	0.017	0.051	0.00010	502
0.01	555	0.014	0.032	0.023	0.073	0.00023	304
0.01	556	0.014	0.035	0.023	0.073	0.00024	288
0.01	554	0.011	0.035	0.023	0.073	0.00023	300
0.01	553	0.013	0.032	0.023	0.073	0.00022	306
0.01	554	0.015	0.032	0.023	0.073	0.00023	299
0.01	782	0.022	0.049	0.038	0.103	0.00036	270
0.01	783	0.024	0.049	0.038	0.103	0.00037	264
0.01	782	0.020	0.049	0.038	0.103	0.00035	275
0.01	782	0.024	0.052	0.034	0.102	0.00036	266
0.01	770	0.017	0.052	0.034	0.101	0.00034	280

Table J.12: Resilient modulus data (B_1_24_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	226	0.010	0.003	0.018	0.030	0.00010	298
0.06	227	0.010	0.003	0.018	0.030	0.00010	297
0.06	225	0.010	0.003	0.017	0.030	0.00010	298
0.06	227	0.010	0.003	0.018	0.030	0.00010	297
0.06	225	0.011	0.003	0.017	0.030	0.00010	288
0.06	378	0.018	0.004	0.031	0.050	0.00017	287
0.06	388	0.018	0.004	0.031	0.051	0.00017	295
0.06	377	0.019	0.004	0.031	0.049	0.00018	281
0.06	390	0.018	0.005	0.031	0.051	0.00018	289
0.06	387	0.019	0.004	0.031	0.051	0.00018	289
0.06	565	0.027	0.006	0.045	0.074	0.00025	291
0.06	551	0.028	0.006	0.046	0.072	0.00026	276
0.06	540	0.028	0.006	0.045	0.071	0.00026	274
0.06	539	0.028	0.006	0.045	0.071	0.00026	275
0.06	552	0.028	0.006	0.046	0.072	0.00026	277
0.06	768	0.042	0.007	0.067	0.101	0.00038	265
0.06	768	0.042	0.007	0.067	0.101	0.00038	265
0.06	769	0.043	0.007	0.067	0.101	0.00038	263
0.06	767	0.040	0.007	0.067	0.101	0.00038	267
0.06	767	0.041	0.007	0.067	0.101	0.00038	265
0.04	215	0.010	0.003	0.017	0.028	0.00010	277
0.04	215	0.010	0.003	0.017	0.028	0.00010	277
0.04	216	0.010	0.003	0.017	0.028	0.00010	279
0.04	215	0.009	0.003	0.017	0.028	0.00010	287
0.04	215	0.009	0.003	0.017	0.028	0.00010	287
0.04	376	0.018	0.004	0.031	0.049	0.00017	283
0.04	388	0.019	0.004	0.031	0.051	0.00018	285
0.04	391	0.018	0.004	0.031	0.051	0.00018	293
0.04	397	0.018	0.004	0.031	0.052	0.00018	297
0.04	387	0.019	0.004	0.031	0.051	0.00018	286
0.04	551	0.028	0.006	0.046	0.072	0.00026	274
0.04	551	0.027	0.005	0.046	0.072	0.00026	281
0.04	551	0.027	0.006	0.047	0.072	0.00026	274
0.04	550	0.028	0.005	0.046	0.072	0.00026	278
0.04	551	0.027	0.005	0.046	0.072	0.00026	282
0.04	767	0.040	0.007	0.069	0.101	0.00038	263
0.04	768	0.040	0.007	0.068	0.101	0.00038	265
0.04	767	0.040	0.007	0.069	0.101	0.00038	263
0.04	768	0.040	0.007	0.069	0.101	0.00038	263
0.04	767	0.040	0.007	0.068	0.101	0.00038	266
0.03	215	0.010	0.004	0.018	0.028	0.00010	276
0.03	219	0.009	0.003	0.018	0.029	0.00010	301
0.03	228	0.010	0.003	0.018	0.030	0.00010	303
0.03	219	0.009	0.003	0.018	0.029	0.00010	299
0.03	216	0.010	0.003	0.018	0.028	0.00010	286
0.03	391	0.018	0.005	0.032	0.051	0.00018	288
0.03	390	0.017	0.004	0.032	0.051	0.00017	293
0.03	390	0.016	0.005	0.032	0.051	0.00017	293
0.03	389	0.017	0.005	0.031	0.051	0.00018	288
0.03	379	0.017	0.004	0.032	0.050	0.00017	285
0.03	552	0.026	0.006	0.048	0.072	0.00026	274
0.03	551	0.026	0.006	0.047	0.072	0.00026	278
0.03	553	0.026	0.006	0.047	0.073	0.00026	278
0.03	553	0.025	0.006	0.048	0.072	0.00026	278
0.03	553	0.025	0.006	0.047	0.072	0.00026	281
0.03	758	0.039	0.006	0.071	0.099	0.00038	262
0.03	769	0.039	0.007	0.072	0.101	0.00039	261
0.03	759	0.039	0.007	0.072	0.099	0.00039	257
0.03	768	0.040	0.007	0.072	0.101	0.00039	259
0.03	769	0.039	0.007	0.071	0.101	0.00038	263
0.01	217	0.008	0.004	0.020	0.029	0.00010	271
0.01	217	0.007	0.004	0.020	0.029	0.00010	279
0.01	217	0.007	0.004	0.020	0.028	0.00010	280
0.01	218	0.008	0.004	0.020	0.029	0.00011	271
0.01	217	0.008	0.004	0.019	0.028	0.00010	271
0.01	390	0.014	0.007	0.035	0.051	0.00018	281
0.01	382	0.015	0.007	0.035	0.050	0.00019	270
0.01	391	0.014	0.006	0.034	0.051	0.00018	289
0.01	389	0.015	0.006	0.034	0.051	0.00018	281
0.01	391	0.015	0.006	0.035	0.051	0.00018	281
0.01	554	0.023	0.007	0.051	0.073	0.00027	270
0.01	558	0.023	0.007	0.050	0.073	0.00027	276
0.01	570	0.022	0.007	0.051	0.075	0.00027	281
0.01	553	0.022	0.008	0.052	0.073	0.00027	272
0.01	564	0.535	0.668	0.275	0.074	0.00485	15
0.01	770	0.034	0.008	0.075	0.101	0.00039	261
0.01	770	0.035	0.008	0.075	0.101	0.00039	259
0.01	769	0.035	0.008	0.075	0.101	0.00039	258
0.01	758	0.034	0.008	0.076	0.099	0.00039	257
0.01	773	0.035	0.008	0.076	0.101	0.00039	259

Table J.13: Resilient modulus data (B_2_24_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	240	0.012	0.011	0.012	0.032	0.00012	272
0.06	240	0.013	0.011	0.012	0.031	0.00012	265
0.06	241	0.014	0.011	0.013	0.032	0.00012	257
0.06	230	0.013	0.012	0.012	0.030	0.00012	252
0.06	230	0.013	0.012	0.012	0.030	0.00012	252
0.06	399	0.021	0.019	0.022	0.052	0.00020	256
0.06	389	0.023	0.019	0.022	0.051	0.00021	241
0.06	388	0.022	0.019	0.022	0.051	0.00021	245
0.06	388	0.023	0.019	0.022	0.051	0.00021	242
0.06	401	0.022	0.018	0.022	0.053	0.00020	261
0.06	562	0.035	0.027	0.032	0.074	0.00031	240
0.06	564	0.034	0.028	0.032	0.074	0.00031	240
0.06	564	0.034	0.027	0.032	0.074	0.00030	243
0.06	551	0.034	0.026	0.032	0.072	0.00030	241
0.06	564	0.034	0.028	0.032	0.074	0.00031	240
0.06	767	0.050	0.038	0.047	0.100	0.00044	228
0.06	768	0.051	0.039	0.047	0.101	0.00045	224
0.06	778	0.052	0.038	0.047	0.102	0.00045	228
0.06	778	0.050	0.039	0.047	0.102	0.00044	230
0.06	778	0.051	0.039	0.047	0.102	0.00045	228
0.04	234	0.014	0.011	0.012	0.031	0.00012	254
0.04	235	0.013	0.012	0.012	0.031	0.00012	254
0.04	234	0.012	0.010	0.012	0.031	0.00011	269
0.04	235	0.012	0.012	0.012	0.031	0.00012	259
0.04	237	0.013	0.012	0.012	0.031	0.00012	257
0.04	388	0.023	0.019	0.022	0.051	0.00021	243
0.04	389	0.022	0.019	0.022	0.051	0.00021	247
0.04	389	0.022	0.019	0.022	0.051	0.00021	246
0.04	391	0.023	0.019	0.022	0.051	0.00021	244
0.04	394	0.022	0.019	0.022	0.052	0.00021	249
0.04	553	0.033	0.028	0.032	0.072	0.00030	238
0.04	554	0.034	0.027	0.032	0.073	0.00030	238
0.04	562	0.034	0.028	0.032	0.074	0.00031	240
0.04	551	0.033	0.028	0.032	0.072	0.00030	238
0.04	552	0.034	0.028	0.032	0.072	0.00031	236
0.04	779	0.051	0.040	0.047	0.102	0.00045	227
0.04	784	0.051	0.040	0.048	0.103	0.00046	225
0.04	779	0.050	0.039	0.047	0.102	0.00044	230
0.04	780	0.050	0.041	0.047	0.102	0.00045	227
0.04	781	0.050	0.041	0.048	0.102	0.00046	225
0.03	229	0.013	0.011	0.012	0.030	0.00012	251
0.03	227	0.012	0.012	0.012	0.030	0.00012	250
0.03	227	0.012	0.011	0.012	0.030	0.00012	258
0.03	228	0.013	0.011	0.012	0.030	0.00012	251
0.03	227	0.012	0.011	0.012	0.030	0.00012	257
0.03	391	0.022	0.020	0.022	0.051	0.00021	243
0.03	400	0.023	0.020	0.022	0.052	0.00021	247
0.03	389	0.022	0.020	0.022	0.051	0.00021	243
0.03	389	0.022	0.019	0.022	0.051	0.00021	248
0.03	387	0.022	0.019	0.022	0.051	0.00020	248
0.03	552	0.034	0.029	0.031	0.072	0.00031	235
0.03	552	0.033	0.029	0.032	0.072	0.00031	235
0.03	563	0.034	0.029	0.031	0.074	0.00031	240
0.03	563	0.033	0.030	0.032	0.074	0.00031	237
0.03	552	0.034	0.030	0.031	0.072	0.00031	233
0.03	768	0.050	0.042	0.047	0.101	0.00046	220
0.03	780	0.049	0.042	0.046	0.102	0.00045	226
0.03	780	0.049	0.042	0.046	0.102	0.00045	226
0.03	779	0.050	0.042	0.047	0.102	0.00046	222
0.03	781	0.050	0.041	0.046	0.102	0.00045	226
0.01	230	0.011	0.013	0.013	0.030	0.00012	249
0.01	235	0.010	0.012	0.013	0.031	0.00011	268
0.01	238	0.010	0.013	0.013	0.031	0.00012	263
0.01	229	0.011	0.012	0.013	0.030	0.00012	253
0.01	227	0.011	0.012	0.013	0.030	0.00012	255
0.01	391	0.021	0.021	0.022	0.051	0.00021	242
0.01	392	0.020	0.021	0.022	0.051	0.00021	246
0.01	392	0.021	0.022	0.022	0.051	0.00022	238
0.01	391	0.019	0.021	0.022	0.051	0.00021	250
0.01	391	0.021	0.021	0.022	0.051	0.00021	242
0.01	554	0.031	0.030	0.033	0.073	0.00031	235
0.01	555	0.030	0.031	0.033	0.073	0.00031	235
0.01	553	0.032	0.030	0.033	0.072	0.00031	232
0.01	554	0.031	0.031	0.033	0.073	0.00031	233
0.01	559	0.031	0.031	0.033	0.073	0.00031	235
0.01	782	0.048	0.044	0.049	0.103	0.00046	222
0.01	792	0.048	0.044	0.049	0.104	0.00046	225
0.01	780	0.047	0.045	0.049	0.102	0.00046	221
0.01	781	0.048	0.045	0.049	0.102	0.00047	220
0.01	780	0.048	0.044	0.049	0.102	0.00046	221

Table J.14: Resilient modulus data (B_1_195_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	226	0.013	0.008	0.015	0.030	0.00012	253
0.06	226	0.013	0.008	0.015	0.030	0.00012	255
0.06	227	0.013	0.007	0.015	0.030	0.00012	255
0.06	224	0.013	0.008	0.015	0.029	0.00012	248
0.06	226	0.012	0.007	0.015	0.030	0.00012	256
0.06	377	0.023	0.015	0.027	0.049	0.00021	232
0.06	388	0.022	0.015	0.027	0.051	0.00021	242
0.06	378	0.022	0.014	0.027	0.050	0.00021	239
0.06	388	0.022	0.014	0.027	0.051	0.00021	246
0.06	379	0.022	0.014	0.027	0.050	0.00021	238
0.06	553	0.032	0.023	0.041	0.072	0.00031	232
0.06	554	0.033	0.023	0.041	0.073	0.00032	230
0.06	554	0.033	0.023	0.041	0.073	0.00032	230
0.06	552	0.032	0.023	0.040	0.072	0.00031	235
0.06	564	0.033	0.023	0.041	0.074	0.00032	235
0.06	780	0.046	0.035	0.059	0.102	0.00046	223
0.06	784	0.046	0.035	0.059	0.103	0.00046	224
0.06	800	0.047	0.035	0.059	0.105	0.00046	227
0.06	767	0.046	0.036	0.059	0.101	0.00046	218
0.06	768	0.046	0.035	0.057	0.101	0.00045	222
0.04	226	0.013	0.007	0.016	0.030	0.00012	249
0.04	215	0.013	0.008	0.016	0.028	0.00012	230
0.04	226	0.014	0.008	0.016	0.030	0.00013	235
0.04	216	0.013	0.008	0.016	0.028	0.00012	230
0.04	216	0.014	0.007	0.016	0.028	0.00012	230
0.04	388	0.023	0.014	0.029	0.051	0.00021	238
0.04	379	0.024	0.014	0.029	0.050	0.00022	228
0.04	390	0.024	0.015	0.029	0.051	0.00022	231
0.04	390	0.023	0.014	0.029	0.051	0.00021	238
0.04	382	0.022	0.014	0.029	0.050	0.00021	234
0.04	557	0.034	0.023	0.042	0.073	0.00032	226
0.04	560	0.034	0.023	0.043	0.073	0.00033	225
0.04	541	0.033	0.022	0.042	0.071	0.00032	224
0.04	552	0.034	0.022	0.042	0.072	0.00032	227
0.04	551	0.033	0.022	0.042	0.072	0.00032	227
0.04	780	0.048	0.035	0.061	0.102	0.00047	217
0.04	784	0.048	0.035	0.061	0.103	0.00047	218
0.04	800	0.048	0.035	0.061	0.105	0.00047	222
0.04	768	0.048	0.035	0.061	0.101	0.00047	213
0.04	769	0.048	0.035	0.061	0.101	0.00047	213
0.03	216	0.014	0.008	0.017	0.028	0.00013	224
0.03	215	0.014	0.008	0.017	0.028	0.00013	220
0.03	214	0.014	0.008	0.017	0.028	0.00013	222
0.03	219	0.014	0.006	0.017	0.029	0.00012	234
0.03	232	0.014	0.007	0.017	0.030	0.00013	241
0.03	384	0.025	0.014	0.030	0.050	0.00022	224
0.03	384	0.025	0.014	0.030	0.050	0.00022	224
0.03	384	0.024	0.014	0.031	0.050	0.00023	221
0.03	398	0.024	0.014	0.030	0.052	0.00022	234
0.03	385	0.025	0.014	0.030	0.050	0.00022	225
0.03	552	0.034	0.022	0.045	0.072	0.00033	219
0.03	551	0.035	0.023	0.045	0.072	0.00034	215
0.03	561	0.035	0.023	0.045	0.074	0.00034	219
0.03	562	0.035	0.022	0.045	0.074	0.00033	221
0.03	552	0.035	0.023	0.045	0.072	0.00034	215
0.03	769	0.049	0.034	0.064	0.101	0.00048	208
0.03	780	0.049	0.034	0.065	0.102	0.00049	210
0.03	779	0.050	0.034	0.065	0.102	0.00049	208
0.03	769	0.049	0.034	0.065	0.101	0.00049	207
0.03	768	0.049	0.035	0.064	0.101	0.00049	207
0.01	217	0.016	0.007	0.016	0.028	0.00013	221
0.01	216	0.015	0.007	0.016	0.028	0.00013	226
0.01	215	0.014	0.006	0.016	0.028	0.00012	232
0.01	226	0.014	0.007	0.017	0.030	0.00013	232
0.01	225	0.015	0.007	0.016	0.030	0.00013	233
0.01	406	0.025	0.014	0.032	0.053	0.00023	229
0.01	391	0.026	0.014	0.032	0.051	0.00023	218
0.01	391	0.025	0.014	0.032	0.051	0.00023	222
0.01	391	0.025	0.014	0.032	0.051	0.00023	222
0.01	389	0.026	0.014	0.032	0.051	0.00023	218
0.01	563	0.036	0.022	0.048	0.074	0.00035	212
0.01	553	0.037	0.022	0.047	0.072	0.00035	208
0.01	564	0.036	0.022	0.047	0.074	0.00035	214
0.01	553	0.036	0.022	0.047	0.073	0.00035	210
0.01	564	0.036	0.022	0.047	0.074	0.00035	214
0.01	768	0.051	0.034	0.069	0.101	0.00050	200
0.01	770	0.051	0.034	0.069	0.101	0.00050	200
0.01	769	0.051	0.034	0.069	0.101	0.00050	200
0.01	770	0.051	0.034	0.069	0.101	0.00050	200
0.01	780	0.051	0.034	0.069	0.102	0.00050	203

Table J.15: Resilient modulus data (B_2_195_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	226	-0.003	0.018	0.009	0.030	0.00008	368
0.06	237	-0.003	0.018	0.009	0.031	0.00008	386
0.06	226	-0.003	0.018	0.009	0.030	0.00008	370
0.06	228	-0.003	0.019	0.009	0.030	0.00008	367
0.06	225	-0.003	0.018	0.010	0.030	0.00008	353
0.06	391	0.005	0.029	0.016	0.051	0.00016	316
0.06	390	0.005	0.029	0.015	0.051	0.00016	322
0.06	390	0.005	0.030	0.015	0.051	0.00016	315
0.06	390	0.004	0.029	0.016	0.051	0.00016	322
0.06	391	0.004	0.029	0.016	0.051	0.00016	323
0.06	562	0.011	0.040	0.021	0.074	0.00024	311
0.06	551	0.011	0.040	0.020	0.072	0.00023	309
0.06	551	0.010	0.040	0.021	0.072	0.00023	309
0.06	550	0.011	0.040	0.021	0.072	0.00024	305
0.06	551	0.011	0.040	0.021	0.072	0.00024	306
0.06	768	0.021	0.056	0.029	0.101	0.00034	292
0.06	779	0.021	0.056	0.030	0.102	0.00035	294
0.06	778	0.021	0.056	0.030	0.102	0.00035	294
0.06	779	0.021	0.056	0.029	0.102	0.00035	293
0.06	789	0.021	0.055	0.028	0.103	0.00034	304
0.04	227	-0.004	0.020	0.010	0.030	0.00009	346
0.04	228	-0.004	0.020	0.010	0.030	0.00009	347
0.04	228	-0.004	0.020	0.010	0.030	0.00009	348
0.04	226	-0.005	0.018	0.010	0.030	0.00008	376
0.04	228	-0.004	0.020	0.010	0.030	0.00009	347
0.04	404	0.004	0.030	0.017	0.053	0.00016	322
0.04	388	0.004	0.030	0.015	0.051	0.00016	317
0.04	388	0.004	0.031	0.015	0.051	0.00017	305
0.04	388	0.004	0.030	0.017	0.051	0.00016	311
0.04	390	0.004	0.030	0.016	0.051	0.00016	317
0.04	552	0.010	0.042	0.022	0.072	0.00024	300
0.04	561	0.010	0.041	0.021	0.074	0.00024	310
0.04	561	0.010	0.041	0.022	0.074	0.00024	306
0.04	550	0.010	0.043	0.021	0.072	0.00024	300
0.04	553	0.010	0.043	0.022	0.073	0.00024	296
0.04	777	0.020	0.058	0.030	0.102	0.00035	289
0.04	771	0.019	0.057	0.030	0.101	0.00035	289
0.04	778	0.019	0.057	0.030	0.102	0.00035	292
0.04	770	0.019	0.059	0.030	0.101	0.00035	287
0.04	778	0.019	0.057	0.029	0.102	0.00035	292
0.03	216	-0.004	0.020	0.011	0.028	0.00009	321
0.03	230	-0.004	0.020	0.011	0.030	0.00009	341
0.03	222	-0.004	0.019	0.011	0.029	0.00008	343
0.03	248	-0.004	0.019	0.011	0.033	0.00008	383
0.03	218	-0.004	0.019	0.011	0.029	0.00009	335
0.03	389	-0.004	0.031	0.016	0.051	0.00014	359
0.03	390	-0.004	0.030	0.016	0.051	0.00014	368
0.03	390	-0.004	0.031	0.017	0.051	0.00015	350
0.03	388	-0.004	0.031	0.016	0.051	0.00014	359
0.03	389	-0.004	0.030	0.016	0.051	0.00014	366
0.03	552	0.010	0.043	0.022	0.072	0.00025	294
0.03	553	0.010	0.044	0.022	0.072	0.00025	294
0.03	552	0.009	0.043	0.022	0.072	0.00024	298
0.03	553	0.009	0.042	0.022	0.072	0.00024	303
0.03	551	0.009	0.043	0.022	0.072	0.00024	298
0.03	779	0.020	0.060	0.030	0.102	0.00036	286
0.03	768	0.020	0.058	0.030	0.101	0.00035	285
0.03	780	0.020	0.058	0.030	0.102	0.00035	289
0.03	779	0.020	0.058	0.030	0.102	0.00035	289
0.03	768	0.020	0.058	0.030	0.101	0.00035	285
0.01	227	-0.003	0.018	0.010	0.030	0.00008	370
0.01	217	-0.002	0.019	0.010	0.028	0.00009	326
0.01	217	-0.002	0.018	0.010	0.028	0.00008	339
0.01	221	-0.002	0.019	0.010	0.029	0.00009	331
0.01	228	-0.003	0.019	0.010	0.030	0.00008	356
0.01	390	-0.004	0.031	0.016	0.051	0.00014	360
0.01	390	-0.004	0.032	0.016	0.051	0.00015	351
0.01	389	-0.004	0.032	0.016	0.051	0.00015	350
0.01	389	0.003	0.032	0.016	0.051	0.00017	304
0.01	387	-0.004	0.031	0.016	0.051	0.00014	358
0.01	563	0.009	0.044	0.022	0.074	0.00025	299
0.01	564	0.009	0.043	0.021	0.074	0.00024	307
0.01	553	0.009	0.044	0.021	0.073	0.00024	298
0.01	565	0.009	0.044	0.022	0.074	0.00025	300
0.01	554	0.009	0.044	0.021	0.073	0.00024	298
0.01	770	0.018	0.062	0.029	0.101	0.00036	282
0.01	769	0.018	0.062	0.029	0.101	0.00036	282
0.01	770	0.018	0.062	0.029	0.101	0.00036	282
0.01	779	0.019	0.062	0.028	0.102	0.00036	286
0.01	784	0.017	0.062	0.029	0.103	0.00036	287

Table J.16: Resilient modulus data (B_1_16_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	236	0.008	0.008	0.005	0.031	0.00007	445
0.06	229	0.008	0.009	0.005	0.030	0.00007	429
0.06	226	0.008	0.008	0.005	0.030	0.00007	426
0.06	225	0.008	0.008	0.005	0.030	0.00007	426
0.06	226	0.008	0.008	0.005	0.030	0.00007	424
0.06	389	0.014	0.014	0.008	0.051	0.00012	423
0.06	390	0.014	0.014	0.009	0.051	0.00012	412
0.06	390	0.014	0.015	0.008	0.051	0.00012	411
0.06	389	0.014	0.014	0.008	0.051	0.00012	424
0.06	389	0.014	0.014	0.008	0.051	0.00012	423
0.06	566	0.021	0.021	0.014	0.074	0.00018	405
0.06	566	0.021	0.021	0.012	0.074	0.00018	413
0.06	562	0.020	0.021	0.012	0.074	0.00018	418
0.06	552	0.021	0.021	0.012	0.072	0.00018	402
0.06	552	0.021	0.021	0.012	0.072	0.00018	402
0.06	778	0.029	0.030	0.019	0.102	0.00025	401
0.06	768	0.030	0.030	0.019	0.101	0.00026	390
0.06	779	0.029	0.030	0.019	0.102	0.00025	401
0.06	783	0.030	0.030	0.019	0.103	0.00026	396
0.06	791	0.030	0.030	0.019	0.104	0.00026	402
0.04	239	0.008	0.008	0.005	0.031	0.00007	448
0.04	228	0.008	0.009	0.005	0.030	0.00007	407
0.04	228	0.009	0.008	0.005	0.030	0.00007	406
0.04	227	0.008	0.008	0.005	0.030	0.00007	426
0.04	227	0.008	0.009	0.005	0.030	0.00007	406
0.04	391	0.014	0.015	0.009	0.051	0.00013	410
0.04	380	0.015	0.015	0.009	0.050	0.00013	387
0.04	389	0.015	0.016	0.009	0.051	0.00013	387
0.04	392	0.015	0.016	0.009	0.051	0.00013	389
0.04	390	0.014	0.015	0.009	0.051	0.00012	409
0.04	552	0.022	0.021	0.013	0.072	0.00019	385
0.04	552	0.021	0.021	0.013	0.072	0.00018	393
0.04	552	0.022	0.021	0.013	0.072	0.00019	385
0.04	551	0.022	0.021	0.013	0.072	0.00019	385
0.04	563	0.021	0.021	0.013	0.074	0.00018	400
0.04	783	0.030	0.031	0.019	0.103	0.00026	389
0.04	794	0.031	0.031	0.019	0.104	0.00027	389
0.04	781	0.030	0.031	0.019	0.102	0.00026	388
0.04	779	0.031	0.031	0.019	0.102	0.00027	382
0.04	778	0.031	0.031	0.019	0.102	0.00027	382
0.03	227	0.010	0.008	0.005	0.030	0.00008	395
0.03	227	0.010	0.009	0.005	0.030	0.00008	377
0.03	216	0.009	0.008	0.005	0.028	0.00007	395
0.03	226	0.009	0.009	0.005	0.030	0.00007	397
0.03	226	0.009	0.009	0.005	0.030	0.00008	395
0.03	391	0.017	0.015	0.008	0.051	0.00013	396
0.03	391	0.017	0.016	0.008	0.051	0.00014	377
0.03	390	0.016	0.016	0.008	0.051	0.00013	386
0.03	399	0.016	0.016	0.008	0.052	0.00013	397
0.03	393	0.017	0.016	0.008	0.052	0.00013	386
0.03	552	0.023	0.022	0.012	0.072	0.00019	385
0.03	551	0.024	0.022	0.013	0.072	0.00019	372
0.03	563	0.024	0.022	0.012	0.074	0.00019	386
0.03	552	0.023	0.022	0.012	0.072	0.00019	386
0.03	552	0.024	0.023	0.013	0.072	0.00020	366
0.03	781	0.034	0.032	0.019	0.102	0.00028	368
0.03	780	0.033	0.032	0.019	0.102	0.00027	373
0.03	780	0.034	0.032	0.019	0.102	0.00028	369
0.03	780	0.032	0.032	0.019	0.102	0.00027	377
0.03	790	0.034	0.032	0.020	0.104	0.00028	369
0.01	229	0.011	0.009	0.003	0.030	0.00008	387
0.01	219	0.012	0.009	0.003	0.029	0.00008	369
0.01	219	0.012	0.009	0.003	0.029	0.00008	369
0.01	216	0.012	0.009	0.003	0.028	0.00008	354
0.01	227	0.011	0.009	0.003	0.030	0.00008	385
0.01	390	0.019	0.016	0.007	0.051	0.00014	370
0.01	391	0.020	0.016	0.007	0.051	0.00014	362
0.01	401	0.020	0.016	0.007	0.053	0.00014	373
0.01	390	0.019	0.016	0.007	0.051	0.00014	371
0.01	393	0.020	0.016	0.007	0.051	0.00014	363
0.01	565	0.028	0.024	0.011	0.074	0.00020	362
0.01	566	0.027	0.024	0.011	0.074	0.00020	367
0.01	554	0.026	0.024	0.011	0.073	0.00020	361
0.01	556	0.027	0.024	0.011	0.073	0.00020	360
0.01	552	0.027	0.024	0.011	0.072	0.00020	355
0.01	783	0.036	0.035	0.018	0.103	0.00029	352
0.01	797	0.036	0.035	0.018	0.105	0.00029	357
0.01	784	0.036	0.035	0.018	0.103	0.00029	352
0.01	786	0.035	0.035	0.018	0.103	0.00029	356
0.01	787	0.036	0.034	0.018	0.103	0.00029	357

Table J.17: Resilient modulus data (B_2_16_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	226	0.005	0.003	0.010	0.030	0.00006	495
0.06	226	0.004	0.002	0.010	0.030	0.00005	559
0.06	227	0.005	0.003	0.010	0.030	0.00006	498
0.06	227	0.004	0.003	0.010	0.030	0.00006	523
0.06	226	0.005	0.002	0.010	0.030	0.00006	528
0.06	389	0.009	0.003	0.018	0.051	0.00010	518
0.06	389	0.008	0.003	0.018	0.051	0.00009	553
0.06	390	0.009	0.004	0.018	0.051	0.00010	501
0.06	386	0.008	0.003	0.018	0.051	0.00010	533
0.06	389	0.008	0.003	0.019	0.051	0.00010	515
0.06	555	0.015	0.004	0.026	0.073	0.00014	502
0.06	551	0.013	0.003	0.026	0.072	0.00014	530
0.06	563	0.014	0.003	0.025	0.074	0.00014	521
0.06	549	0.014	0.004	0.025	0.072	0.00014	498
0.06	551	0.013	0.004	0.025	0.072	0.00014	512
0.06	780	0.023	0.008	0.033	0.102	0.00021	488
0.06	767	0.022	0.008	0.033	0.100	0.00021	489
0.06	777	0.023	0.008	0.033	0.102	0.00021	487
0.06	769	0.022	0.008	0.033	0.101	0.00021	489
0.06	778	0.022	0.008	0.033	0.102	0.00021	495
0.04	226	0.005	0.002	0.011	0.030	0.00006	485
0.04	227	0.004	0.002	0.011	0.030	0.00006	518
0.04	225	0.005	0.002	0.011	0.030	0.00006	487
0.04	226	0.004	0.002	0.011	0.030	0.00006	515
0.04	226	0.004	0.003	0.011	0.030	0.00006	511
0.04	388	0.008	0.003	0.019	0.051	0.00010	516
0.04	389	0.007	0.004	0.019	0.051	0.00010	514
0.04	388	0.008	0.004	0.019	0.051	0.00010	499
0.04	390	0.008	0.004	0.019	0.051	0.00010	500
0.04	389	0.007	0.004	0.019	0.051	0.00010	515
0.04	555	0.013	0.004	0.027	0.073	0.00015	496
0.04	566	0.013	0.004	0.027	0.074	0.00015	505
0.04	552	0.013	0.004	0.026	0.072	0.00014	504
0.04	549	0.013	0.004	0.027	0.072	0.00015	492
0.04	554	0.013	0.004	0.028	0.073	0.00015	500
0.04	782	0.020	0.007	0.034	0.102	0.00020	510
0.04	796	0.020	0.007	0.036	0.104	0.00020	510
0.04	777	0.020	0.008	0.034	0.102	0.00020	497
0.04	777	0.020	0.007	0.034	0.102	0.00020	507
0.04	788	0.020	0.008	0.035	0.103	0.00021	495
0.03	224	0.004	0.002	0.012	0.029	0.00006	501
0.03	231	0.004	0.002	0.012	0.030	0.00006	521
0.03	225	0.003	0.002	0.013	0.030	0.00006	509
0.03	225	0.003	0.002	0.012	0.029	0.00005	543
0.03	217	0.003	0.002	0.012	0.028	0.00006	514
0.03	390	0.007	0.003	0.021	0.051	0.00010	502
0.03	378	0.007	0.003	0.021	0.050	0.00010	485
0.03	389	0.006	0.003	0.021	0.051	0.00010	516
0.03	388	0.008	0.003	0.021	0.051	0.00011	484
0.03	390	0.007	0.003	0.021	0.051	0.00010	499
0.03	549	0.011	0.003	0.029	0.072	0.00014	512
0.03	553	0.011	0.004	0.029	0.073	0.00015	500
0.03	551	0.012	0.004	0.029	0.072	0.00015	487
0.03	552	0.013	0.004	0.029	0.072	0.00015	478
0.03	541	0.013	0.004	0.029	0.071	0.00015	469
0.03	781	0.019	0.006	0.039	0.102	0.00021	490
0.03	782	0.019	0.007	0.039	0.102	0.00021	483
0.03	770	0.019	0.007	0.039	0.101	0.00021	476
0.03	783	0.019	0.007	0.039	0.103	0.00021	485
0.03	769	0.019	0.007	0.039	0.101	0.00021	478
0.01	227	0.003	0.002	0.012	0.030	0.00006	520
0.01	215	0.003	0.002	0.012	0.028	0.00006	495
0.01	226	0.002	0.002	0.012	0.030	0.00005	549
0.01	217	0.003	0.002	0.012	0.028	0.00006	496
0.01	218	0.003	0.002	0.012	0.029	0.00006	497
0.01	393	0.006	0.003	0.022	0.051	0.00010	507
0.01	393	0.006	0.003	0.022	0.052	0.00010	506
0.01	379	0.006	0.004	0.022	0.050	0.00010	476
0.01	390	0.006	0.003	0.022	0.051	0.00010	505
0.01	379	0.006	0.003	0.022	0.050	0.00010	493
0.01	554	0.009	0.004	0.032	0.073	0.00015	498
0.01	551	0.010	0.004	0.031	0.072	0.00015	488
0.01	556	0.010	0.004	0.032	0.073	0.00015	490
0.01	556	0.010	0.004	0.031	0.073	0.00015	495
0.01	573	0.010	0.004	0.031	0.075	0.00015	508
0.01	785	0.018	0.005	0.042	0.103	0.00021	487
0.01	781	0.017	0.006	0.043	0.102	0.00022	475
0.01	770	0.016	0.005	0.043	0.101	0.00021	484
0.01	779	0.017	0.006	0.041	0.102	0.00021	484
0.01	779	0.017	0.006	0.042	0.102	0.00021	483

Table J.18: Resilient modulus data (B_1_27_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	226	0.012	0.013	0.015	0.030	0.00013	229
0.06	226	0.012	0.013	0.015	0.030	0.00013	228
0.06	226	0.012	0.013	0.015	0.030	0.00013	228
0.06	226	0.012	0.014	0.015	0.030	0.00013	223
0.06	230	0.013	0.013	0.015	0.030	0.00013	228
0.06	389	0.022	0.024	0.027	0.051	0.00024	214
0.06	389	0.022	0.024	0.027	0.051	0.00024	215
0.06	381	0.022	0.024	0.027	0.050	0.00024	209
0.06	390	0.023	0.023	0.028	0.051	0.00024	212
0.06	389	0.023	0.024	0.028	0.051	0.00024	210
0.06	551	0.035	0.035	0.039	0.072	0.00036	202
0.06	552	0.034	0.035	0.040	0.072	0.00036	202
0.06	551	0.033	0.035	0.039	0.072	0.00035	206
0.06	553	0.035	0.035	0.039	0.072	0.00036	203
0.06	558	0.035	0.035	0.039	0.073	0.00036	205
0.06	782	0.052	0.053	0.058	0.102	0.00053	192
0.06	779	0.052	0.053	0.057	0.102	0.00053	192
0.06	786	0.052	0.051	0.057	0.103	0.00053	196
0.06	781	0.051	0.052	0.057	0.102	0.00052	195
0.06	780	0.053	0.051	0.057	0.102	0.00053	193
0.04	226	0.011	0.013	0.016	0.030	0.00013	230
0.04	227	0.012	0.012	0.016	0.030	0.00013	225
0.04	227	0.011	0.013	0.016	0.030	0.00013	230
0.04	225	0.011	0.012	0.016	0.029	0.00013	230
0.04	225	0.012	0.014	0.016	0.029	0.00014	218
0.04	390	0.021	0.024	0.029	0.051	0.00024	210
0.04	389	0.021	0.024	0.029	0.051	0.00024	210
0.04	377	0.020	0.024	0.028	0.049	0.00024	210
0.04	390	0.020	0.024	0.029	0.051	0.00024	213
0.04	389	0.020	0.024	0.028	0.051	0.00024	216
0.04	560	0.032	0.035	0.041	0.073	0.00035	209
0.04	550	0.033	0.036	0.040	0.072	0.00036	202
0.04	553	0.033	0.035	0.042	0.072	0.00036	202
0.04	551	0.033	0.036	0.041	0.072	0.00036	202
0.04	563	0.033	0.035	0.041	0.074	0.00035	208
0.04	770	0.050	0.051	0.058	0.101	0.00052	192
0.04	784	0.052	0.052	0.059	0.103	0.00054	191
0.04	795	0.051	0.051	0.060	0.104	0.00053	197
0.04	778	0.051	0.052	0.059	0.102	0.00053	192
0.04	780	0.051	0.052	0.059	0.102	0.00053	192
0.03	226	0.010	0.013	0.017	0.030	0.00013	229
0.03	227	0.010	0.013	0.018	0.030	0.00013	223
0.03	227	0.011	0.013	0.017	0.030	0.00013	224
0.03	216	0.010	0.012	0.017	0.028	0.00013	224
0.03	216	0.010	0.012	0.017	0.028	0.00013	224
0.03	389	0.018	0.023	0.030	0.051	0.00023	217
0.03	383	0.018	0.023	0.030	0.050	0.00023	214
0.03	404	0.018	0.024	0.031	0.053	0.00024	219
0.03	390	0.018	0.023	0.031	0.051	0.00024	216
0.03	389	0.018	0.023	0.031	0.051	0.00024	215
0.03	557	0.030	0.034	0.043	0.073	0.00035	206
0.03	556	0.030	0.034	0.044	0.073	0.00036	204
0.03	557	0.031	0.034	0.043	0.073	0.00036	204
0.03	568	0.031	0.034	0.044	0.074	0.00036	206
0.03	556	0.030	0.034	0.044	0.073	0.00036	204
0.03	780	0.050	0.052	0.064	0.102	0.00054	188
0.03	769	0.049	0.052	0.063	0.101	0.00054	188
0.03	770	0.048	0.052	0.063	0.101	0.00053	189
0.03	770	0.048	0.051	0.063	0.101	0.00053	190
0.03	782	0.049	0.051	0.064	0.102	0.00054	190
0.01	216	0.010	0.012	0.019	0.028	0.00013	213
0.01	218	0.009	0.012	0.019	0.029	0.00013	219
0.01	218	0.009	0.012	0.019	0.029	0.00013	218
0.01	217	0.009	0.012	0.019	0.028	0.00013	218
0.01	228	0.010	0.011	0.020	0.030	0.00013	225
0.01	389	0.018	0.021	0.033	0.051	0.00024	215
0.01	392	0.017	0.021	0.033	0.051	0.00024	218
0.01	389	0.017	0.022	0.033	0.051	0.00024	214
0.01	391	0.018	0.021	0.033	0.051	0.00024	215
0.01	392	0.017	0.021	0.034	0.051	0.00024	215
0.01	559	0.030	0.033	0.047	0.073	0.00036	202
0.01	574	0.030	0.033	0.047	0.075	0.00036	207
0.01	554	0.030	0.033	0.047	0.073	0.00036	200
0.01	564	0.030	0.033	0.047	0.074	0.00036	203
0.01	553	0.029	0.032	0.047	0.073	0.00036	203
0.01	785	0.050	0.050	0.063	0.103	0.00053	193
0.01	774	0.051	0.051	0.063	0.102	0.00054	188
0.01	774	0.051	0.049	0.065	0.101	0.00054	188
0.01	774	0.052	0.051	0.064	0.101	0.00055	186
0.01	783	0.050	0.049	0.063	0.103	0.00053	192

Table J.19: Resilient modulus data (B_2_27_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	225	0.024	0.002	0.021	0.031	0.00015	190
0.06	225	0.024	0.002	0.020	0.032	0.00015	195
0.06	226	0.024	0.002	0.021	0.032	0.00015	192
0.06	226	0.025	0.002	0.021	0.031	0.00016	188
0.06	225	0.025	0.002	0.020	0.031	0.00015	193
0.06	388	0.043	0.004	0.041	0.052	0.00029	177
0.06	387	0.043	0.004	0.041	0.054	0.00029	177
0.06	389	0.043	0.004	0.041	0.053	0.00029	177
0.06	378	0.043	0.004	0.040	0.054	0.00028	175
0.06	389	0.042	0.004	0.041	0.053	0.00029	179
0.06	551	0.063	0.006	0.063	0.077	0.00043	167
0.06	550	0.063	0.006	0.063	0.077	0.00043	167
0.06	550	0.063	0.006	0.063	0.077	0.00043	166
0.06	550	0.064	0.006	0.063	0.077	0.00044	165
0.06	551	0.062	0.006	0.063	0.079	0.00043	168
0.06	768	0.090	0.015	0.093	0.109	0.00065	155
0.06	768	0.091	0.016	0.093	0.109	0.00066	154
0.06	756	0.090	0.016	0.092	0.111	0.00065	152
0.06	767	0.089	0.016	0.091	0.107	0.00065	155
0.06	771	0.090	0.016	0.092	0.107	0.00065	155
0.04	227	0.026	0.002	0.020	0.031	0.00016	191
0.04	216	0.025	0.002	0.019	0.030	0.00015	186
0.04	216	0.025	0.002	0.019	0.032	0.00015	186
0.04	216	0.025	0.002	0.019	0.030	0.00015	186
0.04	217	0.025	0.002	0.020	0.030	0.00016	183
0.04	388	0.044	0.004	0.038	0.054	0.00028	179
0.04	379	0.044	0.004	0.039	0.053	0.00029	174
0.04	378	0.043	0.004	0.039	0.054	0.00028	176
0.04	389	0.043	0.004	0.039	0.054	0.00028	181
0.04	377	0.044	0.004	0.039	0.053	0.00028	174
0.04	547	0.066	0.006	0.062	0.078	0.00044	163
0.04	557	0.066	0.006	0.062	0.078	0.00044	167
0.04	543	0.066	0.006	0.061	0.075	0.00043	164
0.04	542	0.065	0.006	0.062	0.077	0.00043	164
0.04	553	0.065	0.006	0.062	0.077	0.00043	167
0.04	797	0.095	0.013	0.093	0.109	0.00066	158
0.04	758	0.095	0.013	0.092	0.109	0.00066	151
0.04	768	0.096	0.013	0.092	0.111	0.00066	152
0.04	768	0.095	0.013	0.092	0.107	0.00066	153
0.04	768	0.095	0.013	0.092	0.107	0.00066	153
0.03	216	0.026	0.003	0.019	0.030	0.00016	178
0.03	216	0.026	0.003	0.019	0.030	0.00016	178
0.03	216	0.025	0.002	0.018	0.030	0.00015	190
0.03	216	0.026	0.003	0.019	0.030	0.00016	178
0.03	228	0.027	0.003	0.019	0.032	0.00016	184
0.03	389	0.047	0.004	0.035	0.054	0.00028	180
0.03	378	0.047	0.004	0.035	0.054	0.00028	177
0.03	379	0.048	0.004	0.035	0.054	0.00029	174
0.03	378	0.048	0.004	0.035	0.055	0.00028	174
0.03	389	0.049	0.004	0.035	0.054	0.00029	177
0.03	541	0.070	0.006	0.057	0.077	0.00044	163
0.03	542	0.070	0.006	0.058	0.077	0.00044	162
0.03	541	0.069	0.006	0.057	0.078	0.00043	164
0.03	551	0.070	0.006	0.058	0.078	0.00044	165
0.03	553	0.069	0.006	0.058	0.077	0.00043	167
0.03	758	0.102	0.011	0.091	0.107	0.00067	148
0.03	758	0.101	0.011	0.091	0.109	0.00067	149
0.03	758	0.101	0.011	0.090	0.109	0.00066	150
0.03	769	0.102	0.011	0.091	0.107	0.00067	151
0.03	769	0.101	0.011	0.090	0.107	0.00066	152
0.01	217	0.028	0.004	0.017	0.030	0.00016	180
0.01	217	0.028	0.004	0.017	0.030	0.00016	180
0.01	217	0.028	0.004	0.017	0.030	0.00016	180
0.01	216	0.028	0.004	0.017	0.032	0.00016	180
0.01	217	0.027	0.004	0.017	0.031	0.00015	184
0.01	379	0.049	0.005	0.033	0.057	0.00028	175
0.01	380	0.050	0.005	0.033	0.055	0.00029	173
0.01	379	0.049	0.005	0.033	0.054	0.00028	175
0.01	379	0.050	0.005	0.034	0.054	0.00029	171
0.01	384	0.049	0.005	0.033	0.054	0.00028	177
0.01	540	0.074	0.006	0.054	0.079	0.00044	162
0.01	541	0.074	0.006	0.055	0.077	0.00044	161
0.01	552	0.074	0.006	0.055	0.079	0.00044	164
0.01	552	0.074	0.006	0.055	0.077	0.00044	164
0.01	551	0.074	0.005	0.055	0.079	0.00044	164
0.01	771	0.106	0.010	0.087	0.107	0.00067	151
0.01	761	0.107	0.010	0.087	0.107	0.00067	149
0.01	771	0.106	0.009	0.087	0.107	0.00067	151
0.01	770	0.106	0.010	0.087	0.107	0.00067	152
0.01	760	0.107	0.011	0.087	0.109	0.00067	148

Table J.20: Resilient modulus data (B_1_22_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	218	0.009	0.012	0.021	0.029	0.00014	203
0.06	216	0.009	0.013	0.021	0.028	0.00014	201
0.06	218	0.009	0.013	0.021	0.029	0.00014	201
0.06	217	0.009	0.013	0.021	0.028	0.00014	200
0.06	228	0.009	0.013	0.021	0.030	0.00014	210
0.06	389	0.020	0.026	0.034	0.051	0.00026	196
0.06	388	0.019	0.026	0.034	0.051	0.00026	198
0.06	377	0.020	0.026	0.034	0.049	0.00026	188
0.06	380	0.020	0.027	0.034	0.050	0.00026	189
0.06	379	0.019	0.026	0.034	0.050	0.00026	193
0.06	556	0.033	0.040	0.047	0.073	0.00039	185
0.06	540	0.032	0.041	0.047	0.071	0.00039	180
0.06	551	0.032	0.041	0.047	0.072	0.00039	184
0.06	550	0.032	0.040	0.047	0.072	0.00039	186
0.06	552	0.032	0.041	0.047	0.072	0.00039	184
0.06	757	0.051	0.063	0.065	0.099	0.00059	168
0.06	769	0.053	0.064	0.066	0.101	0.00060	168
0.06	769	0.051	0.064	0.066	0.101	0.00059	170
0.06	767	0.051	0.062	0.066	0.101	0.00059	171
0.06	768	0.052	0.063	0.066	0.101	0.00060	169
0.04	218	0.008	0.011	0.026	0.029	0.00015	193
0.04	216	0.008	0.011	0.024	0.028	0.00014	197
0.04	218	0.008	0.011	0.025	0.029	0.00014	198
0.04	217	0.008	0.010	0.024	0.028	0.00014	202
0.04	216	0.008	0.010	0.024	0.028	0.00014	202
0.04	387	0.016	0.024	0.038	0.051	0.00026	197
0.04	377	0.017	0.024	0.038	0.049	0.00026	189
0.04	376	0.017	0.025	0.038	0.049	0.00027	186
0.04	387	0.017	0.025	0.038	0.051	0.00027	191
0.04	386	0.016	0.024	0.038	0.051	0.00026	196
0.04	549	0.030	0.041	0.051	0.072	0.00040	181
0.04	550	0.029	0.041	0.051	0.072	0.00039	183
0.04	550	0.029	0.041	0.051	0.072	0.00040	182
0.04	551	0.030	0.039	0.051	0.072	0.00040	183
0.04	540	0.030	0.041	0.051	0.071	0.00040	177
0.04	768	0.048	0.064	0.071	0.101	0.00060	168
0.04	758	0.046	0.064	0.071	0.099	0.00059	167
0.04	768	0.048	0.064	0.071	0.101	0.00060	168
0.04	769	0.047	0.063	0.070	0.101	0.00059	171
0.04	779	0.048	0.064	0.071	0.102	0.00060	170
0.03	218	0.007	0.011	0.027	0.029	0.00015	195
0.03	218	0.008	0.010	0.027	0.029	0.00015	196
0.03	218	0.007	0.011	0.027	0.029	0.00015	195
0.03	218	0.006	0.011	0.027	0.029	0.00014	200
0.03	218	0.008	0.010	0.027	0.029	0.00015	196
0.03	378	0.013	0.024	0.044	0.050	0.00027	187
0.03	378	0.014	0.023	0.044	0.050	0.00027	187
0.03	377	0.013	0.023	0.044	0.049	0.00026	189
0.03	377	0.013	0.024	0.044	0.049	0.00027	187
0.03	388	0.013	0.024	0.044	0.051	0.00027	192
0.03	550	0.023	0.039	0.058	0.072	0.00040	182
0.03	550	0.023	0.040	0.058	0.072	0.00040	180
0.03	538	0.023	0.039	0.058	0.071	0.00040	178
0.03	549	0.024	0.040	0.058	0.072	0.00040	179
0.03	549	0.023	0.039	0.058	0.072	0.00039	182
0.03	770	0.042	0.063	0.079	0.101	0.00060	167
0.03	770	0.042	0.064	0.079	0.101	0.00061	166
0.03	769	0.041	0.064	0.079	0.101	0.00060	167
0.03	769	0.041	0.064	0.079	0.101	0.00060	167
0.03	769	0.041	0.064	0.079	0.101	0.00060	167
0.01	216	0.005	0.011	0.028	0.028	0.00015	193
0.01	215	0.005	0.011	0.028	0.028	0.00015	194
0.01	215	0.006	0.011	0.028	0.028	0.00015	194
0.01	218	0.005	0.011	0.028	0.029	0.00015	195
0.01	216	0.006	0.011	0.028	0.028	0.00015	190
0.01	402	0.009	0.024	0.048	0.053	0.00027	197
0.01	381	0.010	0.023	0.049	0.050	0.00027	182
0.01	391	0.011	0.023	0.049	0.051	0.00028	186
0.01	382	0.011	0.022	0.049	0.050	0.00027	184
0.01	388	0.010	0.023	0.049	0.051	0.00027	188
0.01	546	0.018	0.040	0.067	0.072	0.00041	174
0.01	546	0.018	0.040	0.067	0.072	0.00041	174
0.01	548	0.018	0.040	0.067	0.072	0.00041	175
0.01	558	0.018	0.039	0.067	0.073	0.00041	179
0.01	551	0.018	0.040	0.067	0.072	0.00041	177
0.01	759	0.034	0.065	0.087	0.099	0.00061	163
0.01	758	0.034	0.065	0.087	0.099	0.00061	163
0.01	769	0.034	0.065	0.087	0.101	0.00061	165
0.01	759	0.034	0.065	0.087	0.099	0.00061	163
0.01	769	0.034	0.065	0.087	0.101	0.00061	165

Table J.21: Resilient modulus data (B_2_22_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	244	0.007	0.018	0.010	0.031	0.00011	274
0.06	215	0.005	0.018	0.010	0.032	0.00011	290
0.06	225	0.006	0.018	0.010	0.032	0.00011	283
0.06	214	0.007	0.018	0.010	0.031	0.00011	273
0.06	226	0.007	0.019	0.009	0.031	0.00012	274
0.06	377	0.015	0.030	0.016	0.052	0.00020	258
0.06	377	0.013	0.030	0.017	0.054	0.00020	270
0.06	390	0.014	0.031	0.018	0.053	0.00020	258
0.06	388	0.013	0.030	0.017	0.054	0.00020	271
0.06	389	0.014	0.030	0.016	0.053	0.00020	264
0.06	549	0.024	0.043	0.025	0.077	0.00030	256
0.06	552	0.024	0.044	0.025	0.077	0.00031	253
0.06	551	0.023	0.043	0.025	0.077	0.00030	259
0.06	551	0.023	0.043	0.025	0.077	0.00030	258
0.06	551	0.024	0.044	0.025	0.079	0.00031	258
0.06	767	0.038	0.061	0.037	0.109	0.00045	243
0.06	769	0.037	0.062	0.037	0.109	0.00045	244
0.06	767	0.038	0.061	0.038	0.111	0.00045	248
0.06	778	0.037	0.060	0.038	0.107	0.00044	241
0.06	767	0.037	0.062	0.037	0.107	0.00045	239
0.04	223	0.007	0.019	0.011	0.031	0.00012	260
0.04	229	0.005	0.019	0.011	0.030	0.00011	261
0.04	215	0.005	0.018	0.010	0.032	0.00011	295
0.04	215	0.007	0.018	0.010	0.030	0.00011	265
0.04	215	0.006	0.019	0.010	0.030	0.00011	264
0.04	378	0.013	0.033	0.017	0.054	0.00020	264
0.04	379	0.013	0.032	0.017	0.053	0.00020	262
0.04	388	0.013	0.032	0.017	0.054	0.00020	266
0.04	377	0.013	0.033	0.017	0.054	0.00020	265
0.04	378	0.012	0.033	0.017	0.053	0.00020	265
0.04	551	0.021	0.046	0.026	0.078	0.00031	254
0.04	550	0.022	0.045	0.025	0.078	0.00030	256
0.04	551	0.020	0.046	0.025	0.075	0.00030	252
0.04	552	0.021	0.046	0.025	0.077	0.00030	254
0.04	562	0.022	0.047	0.025	0.077	0.00031	249
0.04	768	0.035	0.064	0.038	0.109	0.00045	242
0.04	768	0.036	0.064	0.037	0.109	0.00045	243
0.04	778	0.036	0.064	0.037	0.111	0.00045	248
0.04	768	0.035	0.065	0.038	0.107	0.00045	236
0.04	768	0.036	0.064	0.038	0.107	0.00045	237
0.03	221	0.003	0.019	0.012	0.030	0.00011	271
0.03	239	0.004	0.020	0.011	0.030	0.00012	260
0.03	217	0.004	0.020	0.011	0.030	0.00011	260
0.03	215	0.003	0.019	0.011	0.030	0.00011	284
0.03	228	0.004	0.020	0.011	0.032	0.00011	283
0.03	380	0.010	0.034	0.019	0.054	0.00021	257
0.03	388	0.009	0.034	0.019	0.054	0.00020	262
0.03	389	0.010	0.033	0.019	0.054	0.00020	262
0.03	387	0.010	0.034	0.019	0.055	0.00021	268
0.03	390	0.011	0.034	0.019	0.054	0.00021	253
0.03	551	0.020	0.047	0.026	0.077	0.00031	251
0.03	552	0.020	0.048	0.026	0.077	0.00031	247
0.03	561	0.019	0.048	0.026	0.078	0.00031	255
0.03	551	0.019	0.048	0.026	0.078	0.00031	255
0.03	552	0.020	0.047	0.026	0.077	0.00031	251
0.03	769	0.033	0.067	0.038	0.107	0.00045	236
0.03	768	0.032	0.066	0.038	0.109	0.00045	243
0.03	771	0.033	0.067	0.038	0.109	0.00045	240
0.03	776	0.033	0.067	0.038	0.107	0.00045	236
0.03	784	0.033	0.067	0.038	0.107	0.00045	236
0.01	216	0.003	0.020	0.013	0.030	0.00012	258
0.01	206	0.002	0.019	0.013	0.030	0.00011	274
0.01	206	0.002	0.019	0.013	0.030	0.00011	271
0.01	217	0.002	0.019	0.013	0.032	0.00011	285
0.01	217	0.002	0.019	0.013	0.031	0.00011	284
0.01	390	0.005	0.036	0.021	0.057	0.00021	275
0.01	390	0.007	0.036	0.021	0.055	0.00021	257
0.01	379	0.006	0.036	0.021	0.054	0.00021	261
0.01	388	0.007	0.035	0.021	0.054	0.00021	262
0.01	389	0.007	0.036	0.021	0.054	0.00021	256
0.01	554	0.014	0.051	0.029	0.079	0.00031	254
0.01	555	0.014	0.051	0.028	0.077	0.00031	252
0.01	556	0.014	0.051	0.028	0.079	0.00031	257
0.01	554	0.014	0.052	0.029	0.077	0.00031	247
0.01	554	0.015	0.051	0.028	0.079	0.00031	255
0.01	769	0.028	0.071	0.041	0.107	0.00046	232
0.01	768	0.029	0.069	0.040	0.107	0.00045	238
0.01	770	0.029	0.070	0.040	0.107	0.00046	234
0.01	769	0.027	0.069	0.041	0.107	0.00045	238
0.01	768	0.028	0.070	0.040	0.109	0.00045	240

Table J.22: Resilient modulus data (B_1_16_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	224	0.025	0.027	0.027	0.029	0.00026	113
0.06	211	0.025	0.027	0.026	0.028	0.00025	109
0.06	212	0.026	0.025	0.026	0.028	0.00025	109
0.06	224	0.026	0.027	0.026	0.029	0.00026	114
0.06	212	0.025	0.027	0.027	0.028	0.00026	108
0.06	374	0.047	0.046	0.047	0.049	0.00046	106
0.06	376	0.048	0.046	0.047	0.049	0.00046	106
0.06	377	0.047	0.046	0.048	0.049	0.00046	107
0.06	375	0.048	0.047	0.047	0.049	0.00047	105
0.06	376	0.048	0.047	0.047	0.049	0.00047	106
0.06	538	0.073	0.069	0.070	0.070	0.00069	102
0.06	538	0.073	0.070	0.070	0.071	0.00070	101
0.06	549	0.073	0.071	0.071	0.072	0.00070	102
0.06	537	0.072	0.070	0.069	0.070	0.00069	102
0.06	549	0.073	0.070	0.069	0.072	0.00069	104
0.06	755	0.108	0.102	0.103	0.099	0.00103	96
0.06	766	0.108	0.103	0.104	0.100	0.00103	97
0.06	766	0.108	0.102	0.102	0.100	0.00103	98
0.06	755	0.108	0.103	0.104	0.099	0.00103	96
0.06	754	0.108	0.103	0.103	0.099	0.00103	96
0.04	213	0.028	0.028	0.030	0.028	0.00028	98
0.04	213	0.028	0.027	0.030	0.028	0.00028	99
0.04	214	0.028	0.027	0.029	0.028	0.00028	101
0.04	214	0.028	0.027	0.030	0.028	0.00028	99
0.04	214	0.028	0.028	0.030	0.028	0.00029	98
0.04	375	0.052	0.051	0.054	0.049	0.00051	96
0.04	376	0.052	0.051	0.053	0.049	0.00051	97
0.04	375	0.051	0.050	0.054	0.049	0.00051	96
0.04	375	0.052	0.051	0.054	0.049	0.00052	95
0.04	376	0.052	0.052	0.054	0.049	0.00052	95
0.04	548	0.080	0.077	0.079	0.072	0.00078	93
0.04	547	0.081	0.077	0.081	0.072	0.00078	92
0.04	537	0.080	0.077	0.080	0.070	0.00078	91
0.04	538	0.080	0.077	0.080	0.070	0.00078	91
0.04	537	0.080	0.076	0.080	0.070	0.00077	91
0.04	758	0.117	0.112	0.115	0.099	0.00113	88
0.04	753	0.117	0.112	0.115	0.099	0.00113	88
0.04	753	0.118	0.113	0.115	0.099	0.00113	87
0.04	752	0.118	0.112	0.114	0.099	0.00113	87
0.04	765	0.118	0.113	0.115	0.100	0.00113	89
0.03	216	0.032	0.031	0.036	0.028	0.00032	88
0.03	206	0.031	0.031	0.034	0.027	0.00031	86
0.03	215	0.032	0.032	0.034	0.028	0.00032	88
0.03	215	0.031	0.030	0.034	0.028	0.00031	90
0.03	215	0.032	0.031	0.035	0.028	0.00032	87
0.03	378	0.059	0.057	0.063	0.050	0.00059	85
0.03	377	0.059	0.057	0.062	0.049	0.00059	84
0.03	378	0.059	0.057	0.063	0.049	0.00059	85
0.03	377	0.059	0.057	0.063	0.049	0.00059	84
0.03	375	0.059	0.056	0.061	0.049	0.00058	85
0.03	538	0.090	0.085	0.092	0.071	0.00088	80
0.03	538	0.089	0.084	0.091	0.071	0.00087	82
0.03	527	0.089	0.085	0.091	0.069	0.00087	79
0.03	542	0.089	0.085	0.091	0.071	0.00087	82
0.03	546	0.089	0.085	0.091	0.072	0.00087	82
0.03	745	0.131	0.126	0.133	0.098	0.00128	76
0.03	744	0.132	0.126	0.133	0.098	0.00128	76
0.03	758	0.131	0.124	0.132	0.099	0.00127	78
0.03	754	0.132	0.125	0.133	0.099	0.00128	77
0.03	752	0.132	0.126	0.132	0.099	0.00128	77
0.01	215	0.037	0.036	0.040	0.028	0.00037	76
0.01	216	0.038	0.036	0.040	0.028	0.00037	76
0.01	216	0.036	0.035	0.039	0.028	0.00036	79
0.01	205	0.036	0.035	0.039	0.027	0.00036	74
0.01	216	0.037	0.036	0.040	0.028	0.00037	76
0.01	367	0.071	0.066	0.075	0.048	0.00070	69
0.01	367	0.070	0.066	0.075	0.048	0.00069	70
0.01	379	0.071	0.067	0.075	0.050	0.00070	71
0.01	378	0.071	0.066	0.075	0.049	0.00070	71
0.01	367	0.071	0.066	0.077	0.048	0.00070	69
0.01	529	0.107	0.100	0.113	0.069	0.00105	66
0.01	530	0.107	0.099	0.111	0.069	0.00104	67
0.01	530	0.107	0.100	0.111	0.069	0.00105	66
0.01	530	0.107	0.100	0.111	0.069	0.00104	67
0.01	529	0.107	0.100	0.111	0.069	0.00104	67
0.01	746	0.153	0.144	0.158	0.098	0.00149	66
0.01	746	0.153	0.143	0.158	0.098	0.00149	66
0.01	745	0.152	0.143	0.157	0.098	0.00149	66
0.01	745	0.152	0.144	0.157	0.098	0.00149	66
0.01	746	0.152	0.143	0.159	0.098	0.00149	66

Table J.23: Resilient modulus data (B_2_16_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	216	0.026	0.024	0.028	0.028	0.00026	110
0.06	228	0.027	0.025	0.029	0.030	0.00027	112
0.06	226	0.027	0.025	0.029	0.030	0.00026	112
0.06	227	0.027	0.025	0.029	0.030	0.00027	112
0.06	218	0.026	0.025	0.028	0.029	0.00026	109
0.06	400	0.050	0.045	0.055	0.052	0.00049	106
0.06	377	0.050	0.045	0.057	0.049	0.00050	99
0.06	380	0.050	0.045	0.055	0.050	0.00049	101
0.06	395	0.050	0.045	0.055	0.052	0.00049	105
0.06	401	0.050	0.046	0.057	0.053	0.00050	105
0.06	551	0.075	0.068	0.086	0.072	0.00075	96
0.06	552	0.075	0.068	0.086	0.072	0.00075	96
0.06	552	0.075	0.068	0.086	0.072	0.00075	96
0.06	551	0.075	0.068	0.086	0.072	0.00075	96
0.06	551	0.075	0.067	0.086	0.072	0.00075	96
0.06	757	0.112	0.102	0.126	0.099	0.00112	89
0.06	779	0.113	0.103	0.126	0.102	0.00112	91
0.06	758	0.112	0.101	0.125	0.099	0.00111	90
0.06	757	0.112	0.102	0.126	0.099	0.00112	89
0.06	768	0.112	0.102	0.126	0.101	0.00112	90
0.04	236	0.028	0.026	0.032	0.031	0.00028	109
0.04	217	0.028	0.027	0.033	0.028	0.00029	99
0.04	218	0.028	0.027	0.033	0.029	0.00029	99
0.04	217	0.029	0.026	0.033	0.028	0.00029	100
0.04	217	0.028	0.027	0.033	0.028	0.00029	99
0.04	380	0.053	0.050	0.063	0.050	0.00054	92
0.04	381	0.054	0.049	0.062	0.050	0.00054	93
0.04	381	0.053	0.048	0.064	0.050	0.00054	92
0.04	390	0.054	0.049	0.062	0.051	0.00054	94
0.04	381	0.054	0.051	0.063	0.050	0.00055	91
0.04	542	0.081	0.073	0.096	0.071	0.00082	87
0.04	541	0.081	0.073	0.097	0.071	0.00082	86
0.04	541	0.081	0.074	0.095	0.071	0.00082	87
0.04	552	0.081	0.074	0.096	0.072	0.00082	88
0.04	556	0.081	0.074	0.096	0.073	0.00082	89
0.04	758	0.122	0.110	0.141	0.099	0.00122	81
0.04	759	0.121	0.110	0.139	0.099	0.00122	82
0.04	758	0.121	0.111	0.139	0.099	0.00122	81
0.04	758	0.121	0.110	0.140	0.099	0.00122	82
0.04	758	0.122	0.110	0.139	0.099	0.00122	82
0.03	217	0.031	0.028	0.037	0.028	0.00032	90
0.03	219	0.032	0.028	0.038	0.029	0.00032	89
0.03	217	0.032	0.028	0.038	0.028	0.00032	89
0.03	218	0.032	0.028	0.038	0.029	0.00032	89
0.03	217	0.031	0.028	0.037	0.028	0.00031	91
0.03	380	0.060	0.055	0.071	0.050	0.00061	82
0.03	380	0.061	0.055	0.071	0.050	0.00061	81
0.03	380	0.061	0.055	0.072	0.050	0.00062	81
0.03	378	0.060	0.054	0.071	0.050	0.00061	82
0.03	414	-0.106	-0.873	-0.052	0.054	-0.00338	-16
0.03	542	0.090	0.080	0.109	0.071	0.00092	78
0.03	545	0.090	0.081	0.109	0.071	0.00092	78
0.03	550	0.090	0.081	0.109	0.072	0.00092	79
0.03	555	0.090	0.081	0.109	0.073	0.00092	79
0.03	543	0.090	0.081	0.109	0.071	0.00092	78
0.03	759	0.135	0.121	0.159	0.099	0.00136	73
0.03	771	0.135	0.121	0.160	0.101	0.00137	74
0.03	760	0.134	0.121	0.159	0.100	0.00136	73
0.03	769	0.135	0.121	0.160	0.101	0.00137	74
0.03	747	0.134	0.121	0.159	0.098	0.00136	72
0.01	206	0.037	0.030	0.041	0.027	0.00035	76
0.01	207	0.037	0.031	0.042	0.027	0.00036	75
0.01	208	0.036	0.030	0.041	0.027	0.00035	78
0.01	229	0.037	0.030	0.042	0.030	0.00036	84
0.01	218	0.036	0.030	0.042	0.029	0.00035	81
0.01	380	0.074	0.061	0.084	0.050	0.00072	69
0.01	369	0.074	0.061	0.084	0.048	0.00072	67
0.01	369	0.075	0.062	0.084	0.048	0.00072	67
0.01	380	0.075	0.061	0.084	0.050	0.00072	69
0.01	369	0.075	0.061	0.084	0.048	0.00072	67
0.01	531	0.106	0.089	0.126	0.070	0.00106	66
0.01	531	0.106	0.090	0.126	0.070	0.00106	66
0.01	532	0.106	0.090	0.127	0.070	0.00106	66
0.01	531	0.107	0.090	0.125	0.070	0.00106	66
0.01	532	0.105	0.089	0.125	0.070	0.00105	67
0.01	764	0.159	0.137	0.187	0.100	0.00158	63
0.01	767	0.160	0.136	0.187	0.101	0.00158	63
0.01	760	0.159	0.136	0.187	0.100	0.00158	63
0.01	748	0.158	0.135	0.187	0.098	0.00157	62
0.01	748	0.158	0.136	0.187	0.098	0.00158	62

Table J.24: Resilient modulus data (C_1_12_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	214	-0.017	0.023	0.023	0.028	0.00009	299
0.06	226	-0.013	0.023	0.023	0.030	0.00011	259
0.06	217	-0.016	0.023	0.023	0.028	0.00010	268
0.06	217	-0.014	0.023	0.023	0.028	0.00011	252
0.06	216	0.020	0.023	0.023	0.028	0.00022	124
0.06	389	0.021	0.042	0.042	0.051	0.00034	140
0.06	378	0.026	0.042	0.042	0.050	0.00036	129
0.06	389	0.025	0.042	0.042	0.051	0.00036	134
0.06	390	0.018	0.042	0.042	0.051	0.00033	144
0.06	427	1.762	3.425	2.891	0.056	0.02650	2
0.06	551	0.033	0.064	0.060	0.072	0.00052	131
0.06	551	0.033	0.064	0.060	0.072	0.00052	132
0.06	550	0.024	0.064	0.060	0.072	0.00049	140
0.06	555	0.029	0.064	0.060	0.073	0.00051	135
0.06	568	0.033	0.065	0.064	0.074	0.00053	132
0.06	769	0.041	0.092	0.088	0.101	0.00073	130
0.06	771	0.047	0.096	0.089	0.101	0.00076	125
0.06	768	0.041	0.092	0.088	0.101	0.00073	130
0.06	768	0.042	0.092	0.088	0.101	0.00073	130
0.06	778	0.042	0.092	0.091	0.102	0.00074	130
0.04	216	-0.014	0.024	0.025	0.028	0.00012	229
0.04	216	0.023	0.024	0.026	0.028	0.00024	111
0.04	217	0.016	0.025	0.026	0.028	0.00022	123
0.04	216	0.015	0.024	0.025	0.028	0.00021	125
0.04	217	-0.016	0.024	0.026	0.028	0.00011	240
0.04	390	0.021	0.046	0.046	0.051	0.00037	130
0.04	390	0.023	0.047	0.046	0.051	0.00038	127
0.04	390	0.027	0.047	0.045	0.051	0.00039	123
0.04	380	0.025	0.047	0.046	0.050	0.00039	122
0.04	391	-0.042	0.047	0.046	0.051	0.00017	292
0.04	554	0.029	0.072	0.069	0.073	0.00056	123
0.04	553	0.032	0.072	0.069	0.073	0.00057	121
0.04	565	0.032	0.072	0.069	0.074	0.00057	123
0.04	553	0.037	0.072	0.069	0.073	0.00058	117
0.04	553	0.032	0.072	0.069	0.072	0.00057	121
0.04	769	0.053	0.105	0.101	0.101	0.00085	111
0.04	782	0.043	0.108	0.102	0.103	0.00083	116
0.04	769	0.053	0.105	0.101	0.101	0.00085	111
0.04	770	0.051	0.105	0.101	0.101	0.00084	112
0.04	770	0.047	0.105	0.101	0.101	0.00083	114
0.03	218	0.023	0.029	0.029	0.029	0.00026	102
0.03	218	-0.016	0.029	0.029	0.029	0.00014	195
0.03	217	-0.016	0.029	0.028	0.028	0.00014	197
0.03	217	0.024	0.029	0.032	0.029	0.00028	97
0.03	218	0.021	0.029	0.029	0.029	0.00026	105
0.03	391	0.021	0.053	0.052	0.051	0.00041	117
0.03	390	0.027	0.056	0.052	0.051	0.00044	108
0.03	392	0.029	0.056	0.052	0.051	0.00045	108
0.03	396	0.030	0.053	0.052	0.052	0.00044	110
0.03	399	0.026	0.053	0.052	0.052	0.00043	114
0.03	553	0.037	0.080	0.078	0.072	0.00064	106
0.03	555	0.042	0.084	0.079	0.073	0.00067	102
0.03	556	0.039	0.084	0.078	0.073	0.00066	104
0.03	555	0.038	0.084	0.079	0.073	0.00066	104
0.03	554	0.041	0.084	0.078	0.073	0.00066	103
0.03	770	0.053	0.122	0.115	0.101	0.00096	99
0.03	771	0.058	0.125	0.116	0.101	0.00098	97
0.03	771	0.059	0.122	0.115	0.101	0.00097	98
0.03	770	0.058	0.122	0.118	0.101	0.00098	97
0.03	770	0.055	0.119	0.115	0.101	0.00095	100
0.01	218	0.025	0.030	0.033	0.029	0.00029	93
0.01	218	0.020	0.033	0.033	0.029	0.00028	96
0.01	218	0.022	0.030	0.033	0.029	0.00028	96
0.01	218	-0.018	0.030	0.033	0.029	0.00015	184
0.01	217	0.026	0.030	0.032	0.028	0.00029	92
0.01	380	0.036	0.061	0.062	0.050	0.00052	90
0.01	380	0.031	0.061	0.059	0.050	0.00050	94
0.01	379	0.034	0.061	0.059	0.050	0.00051	93
0.01	380	0.030	0.061	0.059	0.050	0.00049	95
0.01	379	0.033	0.061	0.062	0.050	0.00051	92
0.01	543	0.046	0.095	0.092	0.071	0.00077	87
0.01	543	0.044	0.095	0.092	0.071	0.00076	88
0.01	543	0.051	0.095	0.091	0.071	0.00078	86
0.01	543	0.043	0.095	0.091	0.071	0.00075	89
0.01	543	0.048	0.094	0.091	0.071	0.00076	88
0.01	759	0.069	0.147	0.136	0.100	0.00115	81
0.01	771	0.064	0.147	0.136	0.101	0.00114	84
0.01	770	0.069	0.146	0.136	0.101	0.00115	82
0.01	759	0.072	0.143	0.136	0.100	0.00115	81
0.01	760	0.063	0.146	0.136	0.100	0.00113	83

Table J.25: Resilient modulus data (C_2_12_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	228	-0.016	0.023	0.021	0.030	0.00009	328
0.06	227	0.022	0.023	0.021	0.030	0.00022	137
0.06	217	-0.025	0.023	0.021	0.028	0.00006	464
0.06	226	0.022	0.023	0.021	0.030	0.00021	138
0.06	216	0.019	0.023	0.021	0.028	0.00020	138
0.06	380	0.025	0.039	0.039	0.050	0.00034	146
0.06	390	0.020	0.039	0.039	0.051	0.00032	158
0.06	390	0.025	0.039	0.039	0.051	0.00034	150
0.06	388	0.025	0.039	0.039	0.051	0.00034	150
0.06	389	0.024	0.039	0.039	0.051	0.00033	152
0.06	552	0.032	0.057	0.061	0.072	0.00049	146
0.06	541	0.031	0.057	0.058	0.071	0.00048	147
0.06	551	0.032	0.057	0.058	0.072	0.00048	150
0.06	551	0.029	0.057	0.058	0.072	0.00047	153
0.06	553	0.033	0.057	0.058	0.072	0.00049	149
0.06	768	0.045	0.080	0.088	0.101	0.00070	144
0.06	769	0.041	0.080	0.088	0.101	0.00069	147
0.06	758	0.042	0.083	0.088	0.099	0.00070	142
0.06	769	0.044	0.083	0.088	0.101	0.00071	143
0.06	767	0.044	0.083	0.087	0.101	0.00070	143
0.04	217	0.023	0.025	0.022	0.028	0.00023	125
0.04	217	0.016	0.025	0.022	0.028	0.00021	139
0.04	218	0.022	0.025	0.022	0.029	0.00022	128
0.04	217	0.022	0.025	0.022	0.029	0.00022	128
0.04	218	0.018	0.025	0.022	0.029	0.00021	136
0.04	396	0.027	0.045	0.044	0.052	0.00038	137
0.04	408	0.029	0.045	0.044	0.053	0.00038	139
0.04	380	0.019	0.045	0.040	0.050	0.00034	145
0.04	380	0.022	0.045	0.044	0.050	0.00036	137
0.04	379	0.020	0.045	0.040	0.050	0.00035	144
0.04	553	0.035	0.067	0.067	0.072	0.00055	131
0.04	557	0.035	0.066	0.066	0.073	0.00055	133
0.04	558	0.030	0.067	0.067	0.073	0.00054	136
0.04	543	0.034	0.067	0.064	0.071	0.00054	132
0.04	543	0.034	0.067	0.067	0.071	0.00055	130
0.04	769	0.044	0.093	0.100	0.101	0.00078	130
0.04	769	0.053	0.096	0.096	0.101	0.00080	126
0.04	769	0.047	0.096	0.096	0.101	0.00079	128
0.04	769	0.048	0.096	0.096	0.101	0.00079	128
0.04	758	0.052	0.096	0.096	0.099	0.00080	124
0.03	209	0.014	0.029	0.023	0.027	0.00022	127
0.03	197	0.019	0.029	0.023	0.026	0.00023	112
0.03	207	-0.019	0.029	0.023	0.027	0.00011	258
0.03	208	0.019	0.029	0.023	0.027	0.00023	119
0.03	206	0.015	0.028	0.023	0.027	0.00022	124
0.03	379	-0.019	0.051	0.045	0.050	0.00025	195
0.03	391	0.024	0.051	0.045	0.051	0.00040	129
0.03	380	0.019	0.051	0.045	0.050	0.00038	131
0.03	379	0.024	0.051	0.045	0.050	0.00040	125
0.03	380	0.027	0.051	0.045	0.050	0.00041	123
0.03	543	0.034	0.076	0.071	0.071	0.00059	120
0.03	543	0.036	0.076	0.071	0.071	0.00060	119
0.03	553	0.038	0.076	0.071	0.073	0.00061	119
0.03	543	0.040	0.076	0.071	0.071	0.00062	116
0.03	543	0.038	0.076	0.071	0.071	0.00061	117
0.03	787	0.055	0.111	0.113	0.103	0.00091	113
0.03	772	0.049	0.108	0.109	0.101	0.00087	116
0.03	761	0.055	0.111	0.110	0.100	0.00090	110
0.03	771	0.050	0.108	0.109	0.101	0.00088	115
0.03	760	0.047	0.111	0.110	0.100	0.00088	114
0.01	216	0.020	0.034	0.020	0.028	0.00024	116
0.01	211	0.022	0.035	0.020	0.028	0.00025	109
0.01	217	0.021	0.038	0.020	0.029	0.00026	110
0.01	206	0.018	0.035	0.020	0.027	0.00024	113
0.01	207	0.021	0.034	0.020	0.027	0.00025	109
0.01	381	0.031	0.063	0.045	0.050	0.00046	109
0.01	381	0.029	0.063	0.045	0.050	0.00045	111
0.01	392	0.035	0.060	0.045	0.051	0.00046	112
0.01	381	0.032	0.063	0.045	0.050	0.00046	108
0.01	381	0.030	0.063	0.045	0.050	0.00045	111
0.01	542	0.040	0.092	0.076	0.071	0.00068	104
0.01	543	0.045	0.092	0.076	0.071	0.00070	102
0.01	554	0.044	0.092	0.076	0.073	0.00070	104
0.01	543	0.044	0.092	0.076	0.071	0.00070	102
0.01	543	0.040	0.092	0.076	0.071	0.00068	104
0.01	763	0.063	0.127	0.121	0.100	0.00102	98
0.01	759	0.062	0.130	0.122	0.099	0.00103	96
0.01	775	0.063	0.127	0.122	0.102	0.00102	99
0.01	760	0.056	0.130	0.122	0.100	0.00101	99
0.01	760	0.059	0.130	0.122	0.100	0.00102	98

Table J.26: Resilient modulus data (C_1_95_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	226	-0.014	0.020	0.011	0.030	0.00006	534
0.06	226	-0.017	0.020	0.011	0.030	0.00005	591
0.06	227	-0.015	0.020	0.011	0.030	0.00005	521
0.06	227	-0.016	0.020	0.011	0.030	0.00005	579
0.06	237	0.015	0.020	0.011	0.031	0.00015	195
0.06	400	0.025	0.034	0.026	0.052	0.00028	177
0.06	390	0.017	0.037	0.026	0.051	0.00026	184
0.06	389	0.017	0.037	0.026	0.051	0.00026	184
0.06	390	0.021	0.037	0.026	0.051	0.00027	176
0.06	389	0.019	0.037	0.026	0.051	0.00027	179
0.06	563	0.025	0.053	0.043	0.074	0.00040	175
0.06	563	0.022	0.053	0.043	0.074	0.00038	180
0.06	563	0.035	0.050	0.043	0.074	0.00042	166
0.06	563	0.033	0.053	0.043	0.074	0.00042	166
0.06	552	0.025	0.053	0.043	0.072	0.00039	173
0.06	779	0.039	0.075	0.067	0.102	0.00060	161
0.06	780	0.043	0.075	0.067	0.102	0.00061	158
0.06	769	0.045	0.072	0.067	0.101	0.00060	157
0.06	768	0.043	0.072	0.067	0.101	0.00060	159
0.06	779	0.037	0.075	0.067	0.102	0.00059	164
0.04	226	0.021	0.024	0.011	0.030	0.00018	152
0.04	227	0.015	0.024	0.011	0.030	0.00016	170
0.04	227	0.017	0.024	0.012	0.030	0.00017	164
0.04	238	0.020	0.021	0.011	0.031	0.00017	170
0.04	227	0.015	0.021	0.011	0.030	0.00015	180
0.04	400	0.024	0.038	0.030	0.052	0.00030	163
0.04	400	-0.026	0.039	0.030	0.052	0.00014	354
0.04	389	0.023	0.038	0.030	0.051	0.00030	161
0.04	399	0.024	0.038	0.030	0.052	0.00030	163
0.04	403	0.020	0.038	0.030	0.053	0.00029	173
0.04	563	0.037	0.057	0.048	0.074	0.00047	149
0.04	552	0.028	0.057	0.049	0.072	0.00044	156
0.04	552	0.026	0.060	0.048	0.072	0.00044	154
0.04	563	0.033	0.060	0.048	0.074	0.00046	149
0.04	562	0.034	0.060	0.049	0.074	0.00047	148
0.04	759	0.045	0.086	0.075	0.099	0.00068	138
0.04	769	0.039	0.086	0.075	0.101	0.00065	145
0.04	780	0.038	0.086	0.075	0.102	0.00065	147
0.04	781	0.051	0.086	0.075	0.102	0.00070	138
0.04	780	0.042	0.086	0.075	0.102	0.00067	144
0.03	227	0.015	0.024	0.015	0.030	0.00018	157
0.03	230	0.016	0.024	0.015	0.030	0.00018	156
0.03	234	0.019	0.021	0.015	0.031	0.00018	160
0.03	253	0.019	0.024	0.015	0.033	0.00019	162
0.03	227	0.014	0.024	0.015	0.030	0.00018	160
0.03	390	0.031	0.040	0.034	0.051	0.00035	138
0.03	390	0.028	0.040	0.031	0.051	0.00032	148
0.03	390	0.022	0.043	0.031	0.051	0.00032	152
0.03	391	0.026	0.044	0.035	0.051	0.00034	141
0.03	390	0.030	0.043	0.034	0.051	0.00035	137
0.03	558	0.032	0.063	0.054	0.073	0.00049	140
0.03	584	0.037	0.063	0.055	0.077	0.00051	142
0.03	553	0.034	0.066	0.054	0.073	0.00051	135
0.03	553	0.038	0.063	0.055	0.073	0.00051	133
0.03	563	0.037	0.063	0.054	0.074	0.00051	137
0.03	774	0.052	0.093	0.081	0.101	0.00074	128
0.03	769	0.051	0.093	0.081	0.101	0.00074	128
0.03	770	0.053	0.094	0.084	0.101	0.00076	125
0.03	781	0.052	0.094	0.082	0.102	0.00075	129
0.03	781	0.053	0.097	0.082	0.102	0.00076	127
0.01	227	0.022	0.023	0.016	0.030	0.00020	139
0.01	227	-0.016	0.023	0.016	0.030	0.00008	363
0.01	228	0.023	0.023	0.016	0.030	0.00020	138
0.01	227	0.019	0.026	0.016	0.030	0.00020	139
0.01	228	0.016	0.026	0.016	0.030	0.00019	147
0.01	390	0.031	0.046	0.037	0.051	0.00038	128
0.01	390	0.028	0.046	0.037	0.051	0.00037	132
0.01	391	0.030	0.046	0.037	0.051	0.00037	129
0.01	390	0.028	0.049	0.037	0.051	0.00038	128
0.01	390	0.025	0.046	0.037	0.051	0.00036	135
0.01	564	0.041	0.073	0.059	0.074	0.00057	122
0.01	552	0.041	0.073	0.059	0.072	0.00057	120
0.01	553	0.040	0.070	0.059	0.072	0.00055	123
0.01	552	0.040	0.070	0.059	0.072	0.00055	123
0.01	563	0.039	0.070	0.059	0.074	0.00055	127
0.01	770	0.057	0.104	0.092	0.101	0.00083	114
0.01	770	0.056	0.107	0.092	0.101	0.00083	114
0.01	758	0.059	0.101	0.092	0.099	0.00082	114
0.01	770	0.053	0.104	0.092	0.101	0.00082	116
0.01	780	0.053	0.107	0.092	0.102	0.00082	117

Table J.27: Resilient modulus data (C_2_95_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	226	0.021	0.023	-0.007	0.030	0.00012	240
0.06	225	0.018	0.023	-0.007	0.030	0.00011	266
0.06	237	0.019	0.023	-0.007	0.031	0.00011	270
0.06	237	0.015	0.026	0.005	0.031	0.00015	204
0.06	237	0.017	0.023	-0.007	0.031	0.00011	286
0.06	400	0.025	0.039	0.010	0.052	0.00024	215
0.06	399	0.024	0.039	0.010	0.052	0.00024	218
0.06	399	0.030	0.039	0.010	0.052	0.00026	202
0.06	400	-0.021	0.039	0.010	0.052	0.00009	566
0.06	400	0.032	0.039	0.010	0.052	0.00027	195
0.06	561	0.038	0.059	0.020	0.074	0.00038	192
0.06	552	0.040	0.059	0.020	0.072	0.00039	185
0.06	562	0.030	0.059	0.020	0.074	0.00036	206
0.06	561	0.033	0.059	0.020	0.074	0.00037	202
0.06	561	0.041	0.059	0.019	0.074	0.00039	189
0.06	778	0.045	0.088	0.042	0.102	0.00057	178
0.06	782	0.051	0.087	0.042	0.103	0.00059	173
0.06	776	0.051	0.084	0.041	0.102	0.00058	176
0.06	792	0.047	0.087	0.041	0.104	0.00058	180
0.06	791	0.049	0.087	0.044	0.104	0.00059	176
0.04	237	0.019	0.026	0.005	0.031	0.00017	188
0.04	237	0.019	0.026	0.005	0.031	0.00017	188
0.04	237	0.018	0.027	0.005	0.031	0.00016	193
0.04	237	0.017	0.026	0.005	0.031	0.00016	195
0.04	238	-0.015	0.026	0.005	0.031	0.00006	562
0.04	400	0.031	0.044	0.012	0.052	0.00028	185
0.04	401	0.025	0.044	0.012	0.053	0.00026	200
0.04	400	0.029	0.044	0.012	0.052	0.00028	189
0.04	400	0.028	0.043	0.012	0.052	0.00027	192
0.04	399	0.030	0.044	0.012	0.052	0.00028	186
0.04	565	0.042	0.064	0.021	0.074	0.00042	177
0.04	574	0.038	0.064	0.021	0.075	0.00040	186
0.04	563	0.039	0.068	0.021	0.074	0.00042	176
0.04	562	0.039	0.064	0.021	0.074	0.00041	180
0.04	563	0.040	0.064	0.021	0.074	0.00041	180
0.04	779	0.053	0.095	0.047	0.102	0.00064	160
0.04	768	0.056	0.095	0.050	0.101	0.00066	153
0.04	779	0.050	0.095	0.047	0.102	0.00063	162
0.04	768	0.052	0.095	0.046	0.101	0.00063	159
0.04	768	0.056	0.095	0.046	0.101	0.00064	156
0.03	227	0.022	0.029	0.005	0.030	0.00018	165
0.03	237	0.017	0.029	0.005	0.031	0.00017	187
0.03	239	0.021	0.032	0.005	0.031	0.00019	167
0.03	233	0.022	0.029	0.005	0.031	0.00018	168
0.03	247	0.022	0.032	0.005	0.032	0.00019	169
0.03	401	0.032	0.049	0.012	0.053	0.00031	172
0.03	400	0.032	0.052	0.012	0.052	0.00032	166
0.03	390	0.039	0.052	0.015	0.051	0.00035	146
0.03	400	0.035	0.052	0.012	0.052	0.00033	161
0.03	401	0.030	0.052	0.012	0.053	0.00031	170
0.03	563	0.037	0.075	0.027	0.074	0.00046	161
0.03	563	0.036	0.073	0.027	0.074	0.00044	166
0.03	564	0.052	0.072	0.027	0.074	0.00050	148
0.03	552	0.046	0.072	0.027	0.072	0.00047	153
0.03	563	0.044	0.075	0.027	0.074	0.00048	154
0.03	769	0.059	0.107	0.057	0.101	0.00073	137
0.03	779	0.056	0.107	0.057	0.102	0.00072	141
0.03	770	0.063	0.104	0.058	0.101	0.00074	137
0.03	780	0.060	0.107	0.057	0.102	0.00074	139
0.03	781	0.058	0.108	0.058	0.102	0.00073	140
0.01	228	0.021	0.032	0.007	0.030	0.00020	151
0.01	228	0.025	0.036	0.007	0.030	0.00022	136
0.01	227	-0.019	0.035	-0.006	0.030	0.00003	855
0.01	228	0.027	0.035	0.006	0.030	0.00023	133
0.01	238	0.022	0.032	0.007	0.031	0.00020	156
0.01	391	0.034	0.058	0.022	0.051	0.00037	137
0.01	389	0.035	0.061	0.022	0.051	0.00039	132
0.01	391	0.029	0.058	0.022	0.051	0.00036	144
0.01	396	0.046	0.061	0.022	0.052	0.00043	122
0.01	411	0.038	0.061	0.022	0.054	0.00040	135
0.01	555	0.047	0.088	0.041	0.073	0.00058	126
0.01	566	0.051	0.084	0.038	0.074	0.00057	130
0.01	565	0.044	0.087	0.038	0.074	0.00056	133
0.01	566	0.046	0.084	0.039	0.074	0.00055	134
0.01	555	0.052	0.084	0.039	0.073	0.00057	127
0.01	770	0.069	0.125	0.081	0.101	0.00090	112
0.01	769	0.068	0.121	0.081	0.101	0.00088	114
0.01	782	0.067	0.121	0.081	0.102	0.00088	116
0.01	781	0.063	0.124	0.081	0.102	0.00088	116
0.01	781	0.062	0.121	0.081	0.102	0.00086	118

Table J.28: Resilient modulus data (C_1_8_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	216	-0.016	0.031	-0.007	0.028	0.00002	1142
0.06	215	-0.012	0.034	-0.007	0.028	0.00005	598
0.06	228	-0.017	0.034	-0.007	0.030	0.00003	973
0.06	221	-0.015	0.034	-0.007	0.029	0.00004	735
0.06	247	-0.013	0.030	-0.007	0.032	0.00004	898
0.06	389	0.015	0.046	0.018	0.051	0.00026	195
0.06	388	0.018	0.046	0.018	0.051	0.00027	190
0.06	389	-0.021	0.046	0.018	0.051	0.00014	363
0.06	388	0.014	0.046	0.018	0.051	0.00026	199
0.06	389	-0.021	0.045	0.018	0.051	0.00014	361
0.06	552	0.022	0.058	0.032	0.072	0.00037	196
0.06	552	0.023	0.058	0.032	0.072	0.00037	195
0.06	552	0.022	0.058	0.032	0.072	0.00037	198
0.06	552	0.018	0.061	0.032	0.072	0.00036	200
0.06	552	0.015	0.058	0.032	0.072	0.00034	211
0.06	768	0.029	0.076	0.052	0.101	0.00052	195
0.06	768	0.029	0.079	0.052	0.101	0.00052	192
0.06	773	0.025	0.075	0.052	0.101	0.00050	203
0.06	787	0.026	0.075	0.055	0.103	0.00051	200
0.06	769	0.032	0.075	0.052	0.101	0.00052	193
0.04	216	-0.017	0.035	-0.006	0.028	0.00004	756
0.04	216	0.014	0.035	-0.006	0.028	0.00014	201
0.04	215	0.015	0.035	0.006	0.028	0.00018	154
0.04	218	-0.015	0.035	-0.006	0.029	0.00004	662
0.04	222	-0.018	0.035	-0.006	0.029	0.00004	804
0.04	399	0.014	0.049	0.018	0.052	0.00027	195
0.04	385	0.017	0.049	0.018	0.051	0.00028	182
0.04	392	-0.017	0.049	0.018	0.051	0.00016	312
0.04	392	0.016	0.050	0.018	0.051	0.00027	188
0.04	392	0.013	0.049	0.018	0.051	0.00026	195
0.04	553	0.019	0.065	0.033	0.072	0.00039	188
0.04	553	-0.019	0.065	0.033	0.072	0.00026	278
0.04	553	0.017	0.065	0.033	0.073	0.00038	192
0.04	553	0.021	0.065	0.033	0.073	0.00039	186
0.04	563	0.024	0.065	0.033	0.074	0.00040	184
0.04	769	0.034	0.081	0.057	0.101	0.00056	179
0.04	780	0.027	0.084	0.057	0.102	0.00055	186
0.04	780	0.030	0.084	0.057	0.102	0.00056	182
0.04	769	0.026	0.084	0.056	0.101	0.00055	184
0.04	769	0.033	0.084	0.056	0.101	0.00057	178
0.03	217	-0.013	0.038	0.008	0.028	0.00011	263
0.03	222	0.014	0.038	0.005	0.029	0.00019	156
0.03	238	-0.014	0.038	0.008	0.031	0.00011	293
0.03	216	0.014	0.038	0.008	0.028	0.00020	143
0.03	217	-0.016	0.038	0.008	0.028	0.00010	288
0.03	391	0.017	0.054	0.021	0.051	0.00030	170
0.03	390	0.016	0.054	0.021	0.051	0.00030	173
0.03	391	-0.015	0.057	0.018	0.051	0.00020	260
0.03	395	0.016	0.054	0.021	0.052	0.00030	175
0.03	410	0.018	0.054	0.018	0.054	0.00029	184
0.03	553	0.024	0.071	0.036	0.073	0.00043	168
0.03	552	0.020	0.071	0.036	0.072	0.00042	173
0.03	553	0.022	0.071	0.036	0.072	0.00042	171
0.03	553	0.019	0.071	0.036	0.073	0.00041	175
0.03	552	0.022	0.071	0.036	0.072	0.00042	171
0.03	770	0.031	0.092	0.061	0.101	0.00060	167
0.03	770	0.028	0.095	0.061	0.101	0.00060	167
0.03	770	0.029	0.092	0.061	0.101	0.00060	169
0.03	770	0.030	0.092	0.061	0.101	0.00060	168
0.03	770	0.033	0.092	0.061	0.101	0.00061	166
0.01	217	-0.016	0.044	0.009	0.028	0.00012	240
0.01	218	-0.016	0.041	0.012	0.029	0.00012	236
0.01	217	0.016	0.041	0.009	0.028	0.00022	132
0.01	228	-0.016	0.041	0.009	0.030	0.00011	274
0.01	217	-0.016	0.044	0.009	0.028	0.00012	239
0.01	391	-0.018	0.062	0.025	0.051	0.00023	226
0.01	391	0.015	0.062	0.025	0.051	0.00034	153
0.01	381	-0.015	0.062	0.025	0.050	0.00024	211
0.01	380	-0.014	0.062	0.025	0.050	0.00024	206
0.01	393	0.017	0.062	0.025	0.052	0.00034	151
0.01	554	0.022	0.080	0.042	0.073	0.00048	152
0.01	554	0.018	0.080	0.042	0.073	0.00046	157
0.01	554	0.022	0.080	0.039	0.073	0.00046	156
0.01	554	0.019	0.080	0.042	0.073	0.00046	156
0.01	553	0.014	0.080	0.043	0.073	0.00045	162
0.01	792	0.030	0.103	0.070	0.104	0.00066	156
0.01	774	0.035	0.103	0.070	0.101	0.00068	149
0.01	771	0.034	0.103	0.070	0.101	0.00068	149
0.01	770	0.036	0.103	0.070	0.101	0.00068	147
0.01	770	0.035	0.103	0.070	0.101	0.00068	148

Table J.29: Resilient modulus data (C_2_8_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	231	0.013	-0.013	0.027	0.030	0.00009	340
0.06	234	0.017	-0.013	0.027	0.031	0.00010	307
0.06	262	0.017	-0.013	0.027	0.034	0.00010	344
0.06	241	0.020	-0.013	0.027	0.032	0.00011	289
0.06	240	0.020	-0.013	0.027	0.032	0.00011	282
0.06	401	0.020	-0.012	0.039	0.053	0.00016	338
0.06	400	0.022	-0.012	0.039	0.052	0.00016	329
0.06	404	0.020	-0.012	0.039	0.053	0.00015	345
0.06	426	0.025	-0.012	0.039	0.056	0.00017	330
0.06	391	0.024	-0.012	0.039	0.051	0.00017	304
0.06	554	0.027	0.020	0.053	0.073	0.00033	222
0.06	564	0.024	0.020	0.053	0.074	0.00032	232
0.06	562	0.029	0.020	0.056	0.074	0.00034	215
0.06	566	0.029	0.020	0.053	0.074	0.00033	223
0.06	571	0.025	0.020	0.053	0.075	0.00032	234
0.06	780	0.035	0.042	0.071	0.102	0.00048	211
0.06	770	0.034	0.042	0.071	0.101	0.00048	209
0.06	790	0.033	0.045	0.074	0.104	0.00050	207
0.06	770	0.039	0.042	0.071	0.101	0.00050	203
0.06	780	0.035	0.045	0.071	0.102	0.00050	206
0.04	240	0.019	-0.015	0.028	0.031	0.00011	300
0.04	239	0.018	-0.012	0.031	0.031	0.00012	253
0.04	239	0.015	-0.011	0.028	0.031	0.00010	301
0.04	232	0.018	-0.015	0.031	0.030	0.00012	265
0.04	243	0.013	-0.014	0.028	0.032	0.00009	361
0.04	402	0.023	-0.014	0.044	0.053	0.00017	304
0.04	401	0.020	-0.014	0.044	0.053	0.00016	320
0.04	389	0.019	-0.014	0.044	0.051	0.00016	319
0.04	400	0.024	-0.014	0.044	0.052	0.00018	296
0.04	404	0.021	-0.011	0.044	0.053	0.00018	298
0.04	565	0.028	0.020	0.059	0.074	0.00035	210
0.04	553	0.029	0.018	0.058	0.072	0.00034	211
0.04	563	0.029	0.021	0.061	0.074	0.00036	203
0.04	553	0.031	0.017	0.058	0.073	0.00035	207
0.04	552	0.030	0.021	0.058	0.072	0.00036	203
0.04	781	0.035	0.045	0.079	0.102	0.00052	196
0.04	791	0.039	0.045	0.079	0.104	0.00053	194
0.04	780	0.040	0.045	0.079	0.102	0.00054	190
0.04	769	0.032	0.042	0.079	0.101	0.00050	200
0.04	781	0.032	0.042	0.079	0.102	0.00050	204
0.03	228	0.018	-0.014	0.031	0.030	0.00012	258
0.03	228	0.013	-0.014	0.034	0.030	0.00011	274
0.03	228	0.019	-0.014	0.031	0.030	0.00012	257
0.03	226	0.016	-0.014	0.031	0.030	0.00011	272
0.03	238	0.020	-0.014	0.031	0.031	0.00012	259
0.03	382	0.028	-0.012	0.048	0.050	0.00021	238
0.03	401	0.031	-0.012	0.048	0.053	0.00022	239
0.03	402	0.025	-0.015	0.048	0.053	0.00019	279
0.03	402	0.022	-0.015	0.051	0.053	0.00019	278
0.03	402	0.023	-0.012	0.051	0.053	0.00020	261
0.03	566	0.031	0.017	0.067	0.074	0.00038	197
0.03	572	0.030	0.017	0.067	0.075	0.00037	201
0.03	567	0.031	0.017	0.067	0.074	0.00038	197
0.03	555	0.032	0.017	0.067	0.073	0.00038	192
0.03	555	0.029	0.017	0.067	0.073	0.00037	197
0.03	781	0.038	0.042	0.086	0.102	0.00054	188
0.03	781	0.037	0.045	0.086	0.102	0.00055	186
0.03	770	0.036	0.045	0.086	0.101	0.00055	184
0.03	770	0.043	0.045	0.086	0.101	0.00057	177
0.03	781	0.039	0.045	0.086	0.102	0.00056	184
0.01	230	0.020	-0.011	0.033	0.030	0.00014	215
0.01	233	0.020	-0.008	0.030	0.031	0.00014	221
0.01	247	0.017	-0.008	0.030	0.032	0.00013	251
0.01	228	0.015	-0.008	0.030	0.030	0.00012	241
0.01	227	0.018	-0.008	0.030	0.030	0.00013	222
0.01	400	0.029	-0.009	0.052	0.052	0.00024	222
0.01	402	0.031	-0.009	0.052	0.053	0.00024	217
0.01	392	0.026	-0.009	0.052	0.051	0.00023	225
0.01	391	0.024	-0.009	0.052	0.051	0.00022	234
0.01	390	0.029	-0.009	0.052	0.051	0.00024	217
0.01	564	0.028	0.019	0.073	0.074	0.00039	189
0.01	564	0.035	0.018	0.073	0.074	0.00042	178
0.01	564	0.033	0.019	0.073	0.074	0.00041	181
0.01	554	0.036	0.019	0.073	0.073	0.00042	173
0.01	553	0.028	0.015	0.073	0.073	0.00038	190
0.01	781	0.045	0.049	0.096	0.102	0.00063	163
0.01	781	0.043	0.049	0.096	0.102	0.00062	166
0.01	781	0.047	0.049	0.096	0.102	0.00063	162
0.01	770	0.043	0.046	0.096	0.101	0.00061	166
0.01	770	0.044	0.049	0.096	0.101	0.00062	163

Table J.30: Resilient modulus data (C_1_13_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	215	0.017	0.027	0.027	0.028	0.00023	120
0.06	214	-0.015	0.027	0.030	0.028	0.00014	199
0.06	226	-0.017	0.027	0.030	0.030	0.00013	222
0.06	216	0.023	0.027	0.030	0.028	0.00026	107
0.06	216	0.022	0.027	0.030	0.028	0.00026	109
0.06	390	0.029	0.050	0.053	0.051	0.00043	119
0.06	389	0.033	0.050	0.052	0.051	0.00045	114
0.06	391	0.032	0.050	0.053	0.051	0.00044	116
0.06	387	0.034	0.050	0.055	0.051	0.00046	111
0.06	392	0.023	0.050	0.052	0.051	0.00041	125
0.06	541	0.045	0.074	0.079	0.071	0.00065	109
0.06	542	0.041	0.074	0.082	0.071	0.00065	109
0.06	540	0.037	0.077	0.082	0.071	0.00064	110
0.06	552	0.046	0.074	0.082	0.072	0.00066	109
0.06	552	0.049	0.077	0.079	0.072	0.00067	108
0.06	758	0.063	0.109	0.115	0.099	0.00094	105
0.06	768	0.059	0.109	0.115	0.101	0.00093	109
0.06	769	0.059	0.109	0.115	0.101	0.00093	109
0.06	769	0.056	0.108	0.118	0.101	0.00092	109
0.06	769	0.060	0.108	0.114	0.101	0.00093	109
0.04	218	-0.018	0.030	0.035	0.029	0.00016	184
0.04	219	0.026	0.031	0.036	0.029	0.00030	95
0.04	217	0.017	0.030	0.032	0.028	0.00026	108
0.04	219	0.028	0.031	0.036	0.029	0.00031	93
0.04	219	0.021	0.031	0.033	0.029	0.00028	104
0.04	379	0.032	0.058	0.061	0.050	0.00050	100
0.04	390	0.030	0.055	0.061	0.051	0.00048	107
0.04	379	0.029	0.058	0.061	0.050	0.00049	102
0.04	378	0.035	0.055	0.061	0.050	0.00049	100
0.04	379	0.029	0.058	0.061	0.050	0.00048	102
0.04	551	0.046	0.087	0.091	0.072	0.00073	99
0.04	552	0.048	0.084	0.090	0.072	0.00073	99
0.04	552	0.053	0.087	0.091	0.072	0.00075	96
0.04	551	0.054	0.084	0.090	0.072	0.00075	96
0.04	572	2.236	3.954	3.219	0.075	0.03087	2
0.04	769	0.068	0.123	0.136	0.101	0.00107	94
0.04	769	0.065	0.123	0.136	0.101	0.00106	95
0.04	759	0.069	0.126	0.133	0.100	0.00107	93
0.04	759	0.077	0.123	0.136	0.099	0.00110	90
0.04	770	0.064	0.126	0.136	0.101	0.00107	95
0.03	218	0.028	0.035	0.040	0.029	0.00034	85
0.03	216	0.029	0.035	0.039	0.028	0.00034	84
0.03	207	0.027	0.035	0.040	0.027	0.00033	81
0.03	206	0.023	0.035	0.040	0.027	0.00032	84
0.03	206	0.025	0.035	0.040	0.027	0.00033	82
0.03	380	0.038	0.069	0.074	0.050	0.00060	83
0.03	379	0.041	0.066	0.074	0.050	0.00059	84
0.03	383	0.042	0.066	0.074	0.050	0.00060	84
0.03	389	0.045	0.066	0.074	0.051	0.00061	84
0.03	386	0.041	0.066	0.075	0.051	0.00060	85
0.03	542	0.052	0.100	0.107	0.071	0.00085	84
0.03	542	0.058	0.100	0.107	0.071	0.00087	82
0.03	542	0.054	0.097	0.106	0.071	0.00084	84
0.03	543	0.059	0.101	0.107	0.071	0.00088	81
0.03	542	0.057	0.100	0.107	0.071	0.00087	82
0.03	760	0.081	0.145	0.157	0.100	0.00126	79
0.03	770	0.086	0.145	0.157	0.101	0.00127	79
0.03	760	0.079	0.145	0.157	0.100	0.00125	79
0.03	760	0.081	0.145	0.157	0.100	0.00126	79
0.03	759	0.078	0.145	0.157	0.100	0.00125	80
0.01	206	0.035	0.035	0.048	0.027	0.00039	69
0.01	207	0.033	0.039	0.048	0.027	0.00039	69
0.01	207	0.032	0.036	0.048	0.027	0.00038	71
0.01	206	0.032	0.036	0.048	0.027	0.00038	71
0.01	207	0.026	0.039	0.048	0.027	0.00037	73
0.01	369	0.047	0.076	0.088	0.048	0.00069	70
0.01	369	0.051	0.076	0.089	0.048	0.00071	68
0.01	369	0.057	0.076	0.088	0.048	0.00073	67
0.01	369	0.049	0.076	0.089	0.048	0.00070	69
0.01	380	0.042	0.076	0.089	0.050	0.00068	73
0.01	532	0.077	0.119	0.131	0.070	0.00107	65
0.01	532	0.069	0.119	0.128	0.070	0.00104	67
0.01	532	0.072	0.119	0.131	0.070	0.00106	66
0.01	532	0.073	0.116	0.131	0.070	0.00105	67
0.01	533	0.077	0.116	0.131	0.070	0.00106	66
0.01	749	0.096	0.176	0.191	0.098	0.00152	65
0.01	750	0.106	0.176	0.190	0.098	0.00155	64
0.01	756	0.098	0.176	0.190	0.099	0.00152	65
0.01	762	0.093	0.175	0.190	0.100	0.00150	66
0.01	749	0.100	0.175	0.190	0.098	0.00153	64

Table J.31: Resilient modulus data (C_2_13_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	215	0.017	0.027	0.027	0.028	0.00023	120
0.06	214	-0.015	0.027	0.030	0.028	0.00014	199
0.06	226	-0.017	0.027	0.030	0.030	0.00013	222
0.06	216	0.023	0.027	0.030	0.028	0.00026	107
0.06	216	0.022	0.027	0.030	0.028	0.00026	109
0.06	378	0.025	0.049	0.053	0.050	0.00041	120
0.06	378	0.027	0.049	0.053	0.050	0.00042	118
0.06	378	0.030	0.049	0.053	0.050	0.00043	115
0.06	379	0.025	0.049	0.053	0.050	0.00041	120
0.06	379	0.026	0.049	0.053	0.050	0.00042	119
0.06	541	0.037	0.074	0.077	0.071	0.00061	115
0.06	540	0.037	0.073	0.077	0.071	0.00062	115
0.06	539	0.042	0.076	0.077	0.071	0.00064	110
0.06	551	0.045	0.076	0.077	0.072	0.00065	111
0.06	540	0.039	0.073	0.077	0.071	0.00062	114
0.06	758	0.061	0.110	0.111	0.099	0.00092	108
0.06	759	0.054	0.106	0.114	0.099	0.00090	111
0.06	758	0.061	0.109	0.113	0.099	0.00093	107
0.06	758	0.056	0.109	0.113	0.099	0.00091	109
0.06	768	0.059	0.108	0.113	0.101	0.00092	109
0.04	216	0.018	0.030	0.034	0.028	0.00027	105
0.04	217	-0.017	0.030	0.034	0.028	0.00016	183
0.04	216	0.022	0.033	0.034	0.028	0.00029	96
0.04	216	0.020	0.030	0.034	0.028	0.00028	103
0.04	215	0.020	0.030	0.034	0.028	0.00028	102
0.04	379	0.028	0.055	0.058	0.050	0.00047	107
0.04	379	0.034	0.056	0.062	0.050	0.00050	100
0.04	379	0.031	0.059	0.062	0.050	0.00050	100
0.04	389	0.033	0.055	0.062	0.051	0.00049	103
0.04	379	0.025	0.055	0.059	0.050	0.00045	109
0.04	541	0.044	0.086	0.088	0.071	0.00071	99
0.04	541	0.045	0.083	0.088	0.071	0.00071	101
0.04	555	0.044	0.086	0.091	0.073	0.00072	101
0.04	549	0.047	0.086	0.091	0.072	0.00073	98
0.04	553	0.048	0.086	0.088	0.073	0.00073	100
0.04	756	0.061	0.123	0.128	0.099	0.00102	97
0.04	757	0.063	0.122	0.131	0.099	0.00104	96
0.04	760	0.062	0.126	0.128	0.100	0.00103	96
0.04	765	0.070	0.126	0.131	0.100	0.00107	93
0.04	780	0.063	0.125	0.131	0.102	0.00105	98
0.03	218	0.019	0.039	0.040	0.029	0.00032	89
0.03	206	0.025	0.038	0.040	0.027	0.00034	80
0.03	217	0.025	0.035	0.037	0.028	0.00032	89
0.03	217	0.019	0.035	0.037	0.028	0.00030	95
0.03	206	0.025	0.038	0.040	0.027	0.00034	79
0.03	387	0.033	0.068	0.073	0.051	0.00057	89
0.03	381	0.040	0.068	0.073	0.050	0.00059	84
0.03	381	0.036	0.068	0.073	0.050	0.00058	86
0.03	381	0.040	0.068	0.073	0.050	0.00059	84
0.03	380	0.035	0.068	0.073	0.050	0.00058	86
0.03	542	0.048	0.099	0.106	0.071	0.00083	85
0.03	542	0.051	0.102	0.106	0.071	0.00085	83
0.03	542	0.052	0.102	0.103	0.071	0.00084	84
0.03	542	0.051	0.102	0.106	0.071	0.00085	83
0.03	542	0.052	0.102	0.103	0.071	0.00085	84
0.03	761	0.077	0.149	0.153	0.100	0.00124	80
0.03	770	0.072	0.145	0.152	0.101	0.00121	83
0.03	761	0.067	0.149	0.154	0.100	0.00121	82
0.03	750	0.077	0.148	0.153	0.098	0.00124	79
0.03	748	0.070	0.148	0.153	0.098	0.00122	81
0.01	208	0.025	0.045	0.046	0.027	0.00038	72
0.01	206	0.025	0.045	0.046	0.027	0.00038	71
0.01	206	0.025	0.045	0.046	0.027	0.00038	71
0.01	206	0.020	0.042	0.043	0.027	0.00034	78
0.01	217	0.024	0.045	0.046	0.028	0.00038	76
0.01	379	0.050	0.081	0.085	0.050	0.00071	70
0.01	369	0.047	0.078	0.086	0.048	0.00069	70
0.01	384	0.043	0.081	0.086	0.050	0.00069	73
0.01	397	0.039	0.084	0.086	0.052	0.00068	76
0.01	369	0.046	0.081	0.086	0.048	0.00070	69
0.01	532	0.059	0.122	0.125	0.070	0.00100	69
0.01	531	0.065	0.122	0.125	0.070	0.00102	68
0.01	534	0.055	0.125	0.125	0.070	0.00100	70
0.01	541	0.057	0.125	0.128	0.071	0.00101	70
0.01	536	0.058	0.125	0.128	0.070	0.00102	69
0.01	752	0.085	0.178	0.186	0.099	0.00148	67
0.01	768	0.093	0.179	0.187	0.101	0.00150	67
0.01	750	0.082	0.182	0.187	0.098	0.00148	66
0.01	747	0.083	0.184	0.186	0.098	0.00149	66
0.01	747	0.090	0.184	0.186	0.098	0.00151	65

Table J.32: Resilient modulus data (C_1_10_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	215	-0.015	0.020	0.023	0.028	0.00009	303
0.06	226	-0.017	0.020	0.026	0.030	0.00010	311
0.06	215	-0.016	0.020	0.023	0.028	0.00009	313
0.06	224	-0.013	0.020	0.023	0.029	0.00010	301
0.06	217	-0.018	0.020	0.026	0.028	0.00009	309
0.06	378	0.018	0.036	0.039	0.050	0.00030	163
0.06	377	0.018	0.036	0.039	0.049	0.00030	163
0.06	387	-0.018	0.036	0.042	0.051	0.00020	258
0.06	378	-0.018	0.033	0.039	0.050	0.00018	281
0.06	378	0.017	0.036	0.039	0.050	0.00030	164
0.06	541	0.029	0.051	0.057	0.071	0.00045	158
0.06	540	0.021	0.051	0.057	0.071	0.00042	167
0.06	540	0.027	0.051	0.057	0.071	0.00044	160
0.06	540	0.030	0.051	0.057	0.071	0.00045	156
0.06	541	0.027	0.054	0.056	0.071	0.00045	157
0.06	758	0.040	0.075	0.079	0.099	0.00064	156
0.06	769	0.042	0.078	0.079	0.101	0.00065	154
0.06	758	0.033	0.075	0.079	0.099	0.00061	162
0.06	769	0.036	0.075	0.079	0.101	0.00062	162
0.06	769	0.043	0.075	0.079	0.101	0.00065	156
0.04	223	-0.012	0.023	0.028	0.029	0.00013	225
0.04	234	-0.015	0.023	0.028	0.031	0.00012	256
0.04	215	0.014	0.023	0.025	0.028	0.00021	137
0.04	217	-0.017	0.020	0.025	0.029	0.00010	298
0.04	216	0.016	0.020	0.028	0.028	0.00021	134
0.04	379	0.019	0.038	0.046	0.050	0.00034	148
0.04	379	0.029	0.038	0.046	0.050	0.00037	134
0.04	391	0.024	0.038	0.046	0.051	0.00036	144
0.04	381	0.018	0.038	0.046	0.050	0.00034	149
0.04	387	-0.021	0.038	0.046	0.051	0.00020	247
0.04	553	0.034	0.055	0.064	0.072	0.00050	145
0.04	542	0.023	0.055	0.064	0.071	0.00047	153
0.04	542	0.026	0.055	0.064	0.071	0.00047	150
0.04	540	0.032	0.055	0.063	0.071	0.00049	144
0.04	544	0.033	0.055	0.064	0.071	0.00050	143
0.04	769	0.037	0.085	0.092	0.101	0.00070	143
0.04	769	0.043	0.085	0.089	0.101	0.00071	142
0.04	758	0.036	0.082	0.089	0.099	0.00068	146
0.04	769	0.038	0.082	0.089	0.101	0.00069	147
0.04	769	0.042	0.085	0.089	0.101	0.00071	142
0.03	217	-0.013	0.022	0.031	0.028	0.00013	217
0.03	217	-0.018	0.022	0.031	0.028	0.00012	246
0.03	216	0.018	0.022	0.031	0.028	0.00023	121
0.03	217	0.016	0.022	0.031	0.028	0.00023	125
0.03	217	0.018	0.022	0.031	0.028	0.00023	122
0.03	380	0.025	0.039	0.053	0.050	0.00038	129
0.03	380	0.020	0.040	0.053	0.050	0.00037	134
0.03	378	0.020	0.039	0.053	0.050	0.00037	135
0.03	381	0.024	0.039	0.053	0.050	0.00038	131
0.03	386	0.020	0.039	0.053	0.051	0.00037	137
0.03	553	0.029	0.061	0.073	0.072	0.00054	135
0.03	552	0.035	0.061	0.073	0.072	0.00055	131
0.03	556	0.031	0.061	0.073	0.073	0.00054	134
0.03	555	0.031	0.061	0.073	0.073	0.00054	134
0.03	541	0.026	0.064	0.073	0.071	0.00054	132
0.03	770	0.041	0.094	0.105	0.101	0.00079	128
0.03	759	0.044	0.094	0.104	0.099	0.00079	125
0.03	769	0.042	0.093	0.104	0.101	0.00079	128
0.03	769	0.043	0.093	0.104	0.101	0.00079	128
0.03	758	0.042	0.090	0.104	0.099	0.00077	129
0.01	218	0.017	0.019	0.037	0.029	0.00024	120
0.01	206	0.014	0.019	0.040	0.027	0.00024	113
0.01	207	0.019	0.019	0.037	0.027	0.00025	110
0.01	207	-0.018	0.019	0.037	0.027	0.00012	220
0.01	218	-0.020	0.019	0.040	0.029	0.00013	222
0.01	401	0.028	0.041	0.063	0.053	0.00043	121
0.01	380	0.018	0.041	0.066	0.050	0.00041	122
0.01	380	0.031	0.041	0.066	0.050	0.00045	110
0.01	380	0.030	0.038	0.063	0.050	0.00043	117
0.01	381	0.020	0.041	0.066	0.050	0.00042	120
0.01	553	0.034	0.064	0.089	0.073	0.00061	118
0.01	553	0.037	0.064	0.089	0.073	0.00062	117
0.01	543	0.035	0.064	0.089	0.071	0.00062	115
0.01	553	0.032	0.064	0.089	0.072	0.00061	119
0.01	542	0.028	0.067	0.089	0.071	0.00060	118
0.01	771	0.044	0.099	0.123	0.101	0.00087	116
0.01	771	0.047	0.099	0.123	0.101	0.00088	114
0.01	759	0.050	0.099	0.126	0.100	0.00090	110
0.01	770	0.047	0.102	0.126	0.101	0.00090	112
0.01	771	0.049	0.102	0.123	0.101	0.00090	112

Table J.33: Resilient modulus data (C_2_10_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	217	-0.014	0.022	0.023	0.028	0.00010	284
0.06	217	-0.015	0.022	0.023	0.028	0.00010	287
0.06	216	0.013	0.022	0.020	0.028	0.00018	158
0.06	216	0.014	0.025	0.023	0.028	0.00020	139
0.06	215	0.015	0.025	0.023	0.028	0.00020	138
0.06	388	0.024	0.042	0.041	0.051	0.00035	145
0.06	390	0.024	0.042	0.038	0.051	0.00034	149
0.06	389	0.020	0.042	0.041	0.051	0.00034	150
0.06	389	0.017	0.042	0.038	0.051	0.00032	160
0.06	389	0.023	0.042	0.041	0.051	0.00035	147
0.06	551	0.032	0.062	0.058	0.072	0.00050	144
0.06	552	0.025	0.062	0.061	0.072	0.00049	148
0.06	552	0.030	0.062	0.058	0.072	0.00049	146
0.06	552	0.024	0.062	0.061	0.072	0.00048	150
0.06	552	0.032	0.062	0.058	0.072	0.00050	145
0.06	767	0.045	0.092	0.089	0.101	0.00074	136
0.06	767	0.039	0.089	0.089	0.101	0.00071	141
0.06	768	0.043	0.092	0.089	0.101	0.00073	137
0.06	767	0.042	0.092	0.089	0.101	0.00073	137
0.06	768	0.043	0.093	0.089	0.101	0.00073	137
0.04	217	0.019	0.025	0.022	0.028	0.00022	132
0.04	228	-0.015	0.028	0.022	0.030	0.00011	262
0.04	217	0.015	0.025	0.022	0.028	0.00020	142
0.04	216	0.016	0.025	0.025	0.028	0.00021	132
0.04	217	0.013	0.024	0.022	0.028	0.00019	146
0.04	390	0.027	0.047	0.044	0.051	0.00039	131
0.04	390	0.022	0.047	0.044	0.051	0.00037	138
0.04	390	0.016	0.047	0.045	0.051	0.00036	144
0.04	383	0.025	0.047	0.041	0.050	0.00037	135
0.04	430	-1.474	-3.084	-2.328	0.056	-0.02259	-2
0.04	572	0.034	0.070	0.066	0.075	0.00056	135
0.04	552	0.034	0.070	0.066	0.072	0.00056	130
0.04	552	0.030	0.073	0.066	0.072	0.00055	131
0.04	552	0.037	0.070	0.066	0.072	0.00057	127
0.04	563	0.039	0.073	0.066	0.074	0.00058	126
0.04	769	0.045	0.102	0.098	0.101	0.00081	125
0.04	769	0.044	0.105	0.098	0.101	0.00081	124
0.04	769	0.052	0.104	0.098	0.101	0.00083	121
0.04	769	0.046	0.104	0.098	0.101	0.00081	124
0.04	769	0.047	0.104	0.098	0.101	0.00082	123
0.03	228	0.022	0.028	0.027	0.030	0.00025	120
0.03	216	0.021	0.028	0.027	0.028	0.00025	115
0.03	220	0.016	0.031	0.023	0.029	0.00023	125
0.03	212	0.019	0.028	0.026	0.028	0.00024	116
0.03	229	0.019	0.028	0.026	0.030	0.00024	125
0.03	382	0.024	0.054	0.047	0.050	0.00041	122
0.03	390	0.034	0.054	0.047	0.051	0.00044	116
0.03	390	0.030	0.054	0.047	0.051	0.00043	119
0.03	390	0.022	0.054	0.050	0.051	0.00042	123
0.03	380	0.025	0.054	0.047	0.050	0.00041	120
0.03	543	0.035	0.080	0.072	0.071	0.00062	116
0.03	553	0.033	0.080	0.075	0.073	0.00062	117
0.03	553	0.035	0.083	0.075	0.073	0.00064	114
0.03	553	0.033	0.083	0.075	0.073	0.00063	115
0.03	552	0.038	0.080	0.075	0.072	0.00063	114
0.03	771	0.057	0.120	0.111	0.101	0.00094	107
0.03	759	0.054	0.119	0.111	0.100	0.00093	107
0.03	781	0.054	0.122	0.111	0.102	0.00094	109
0.03	759	0.051	0.121	0.111	0.099	0.00093	107
0.03	770	0.049	0.118	0.111	0.101	0.00091	111
0.01	218	0.022	0.028	0.033	0.029	0.00027	104
0.01	217	0.015	0.028	0.033	0.028	0.00025	113
0.01	217	0.018	0.028	0.033	0.029	0.00026	109
0.01	217	0.017	0.028	0.033	0.028	0.00026	111
0.01	216	0.020	0.028	0.033	0.028	0.00027	106
0.01	380	0.026	0.055	0.060	0.050	0.00046	108
0.01	379	0.032	0.059	0.059	0.050	0.00049	101
0.01	380	0.032	0.055	0.060	0.050	0.00048	103
0.01	380	0.030	0.056	0.059	0.050	0.00048	105
0.01	379	0.030	0.059	0.059	0.050	0.00049	102
0.01	554	0.043	0.089	0.090	0.073	0.00073	100
0.01	554	0.037	0.090	0.087	0.073	0.00070	104
0.01	554	0.037	0.089	0.087	0.073	0.00070	104
0.01	543	0.042	0.090	0.090	0.071	0.00073	98
0.01	543	0.045	0.090	0.090	0.071	0.00074	96
0.01	771	0.059	0.135	0.129	0.101	0.00106	95
0.01	760	0.066	0.138	0.129	0.100	0.00109	91
0.01	771	0.062	0.138	0.129	0.101	0.00108	94
0.01	771	0.061	0.138	0.129	0.101	0.00108	94
0.01	771	0.066	0.138	0.129	0.101	0.00109	93

Table J.34: Resilient modulus data (C_1_8_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	223	0.017	0.015	0.015	0.029	0.00015	191
0.06	213	0.017	0.015	0.015	0.028	0.00015	182
0.06	223	0.018	0.014	0.015	0.029	0.00016	188
0.06	223	0.017	0.015	0.016	0.029	0.00016	187
0.06	224	0.018	0.015	0.015	0.029	0.00016	188
0.06	386	0.034	0.027	0.028	0.051	0.00029	173
0.06	386	0.033	0.027	0.029	0.051	0.00029	173
0.06	387	0.034	0.027	0.029	0.051	0.00030	171
0.06	387	0.034	0.028	0.029	0.051	0.00030	169
0.06	388	0.034	0.028	0.029	0.051	0.00030	169
0.06	547	0.052	0.043	0.042	0.072	0.00045	161
0.06	548	0.052	0.043	0.043	0.072	0.00045	160
0.06	560	0.051	0.043	0.043	0.073	0.00045	164
0.06	549	0.051	0.043	0.043	0.072	0.00045	161
0.06	559	0.052	0.043	0.043	0.073	0.00045	164
0.06	776	0.076	0.063	0.064	0.102	0.00067	152
0.06	777	0.076	0.063	0.063	0.102	0.00066	153
0.06	767	0.076	0.063	0.063	0.101	0.00066	151
0.06	777	0.077	0.063	0.062	0.102	0.00067	153
0.06	765	0.077	0.063	0.063	0.100	0.00067	150
0.04	224	0.021	0.016	0.016	0.029	0.00017	170
0.04	224	0.021	0.016	0.016	0.029	0.00017	170
0.04	223	0.021	0.015	0.016	0.029	0.00017	173
0.04	223	0.021	0.016	0.017	0.029	0.00018	166
0.04	211	0.021	0.015	0.017	0.028	0.00017	161
0.04	397	0.040	0.030	0.030	0.052	0.00033	158
0.04	386	0.040	0.030	0.030	0.051	0.00033	154
0.04	385	0.040	0.030	0.030	0.050	0.00033	153
0.04	385	0.039	0.029	0.030	0.051	0.00032	157
0.04	397	0.040	0.030	0.030	0.052	0.00033	158
0.04	550	0.059	0.047	0.046	0.072	0.00050	145
0.04	555	0.060	0.046	0.046	0.073	0.00050	146
0.04	569	0.060	0.047	0.046	0.075	0.00050	149
0.04	559	0.059	0.047	0.046	0.073	0.00050	147
0.04	548	0.059	0.046	0.045	0.072	0.00049	145
0.04	767	0.090	0.071	0.069	0.101	0.00076	133
0.04	771	0.089	0.071	0.069	0.101	0.00075	134
0.04	786	0.089	0.070	0.069	0.103	0.00075	138
0.04	775	0.089	0.070	0.069	0.102	0.00075	136
0.04	776	0.089	0.071	0.069	0.102	0.00075	136
0.03	214	0.024	0.018	0.016	0.028	0.00019	147
0.03	224	0.024	0.018	0.016	0.029	0.00019	152
0.03	214	0.024	0.018	0.016	0.028	0.00019	147
0.03	214	0.025	0.019	0.016	0.028	0.00020	142
0.03	212	0.024	0.018	0.016	0.028	0.00019	144
0.03	377	0.046	0.035	0.032	0.049	0.00037	133
0.03	389	0.048	0.035	0.032	0.051	0.00037	136
0.03	378	0.048	0.035	0.032	0.050	0.00037	132
0.03	389	0.047	0.035	0.032	0.051	0.00037	137
0.03	376	0.047	0.034	0.031	0.049	0.00037	135
0.03	538	0.071	0.052	0.050	0.071	0.00057	125
0.03	551	0.072	0.052	0.050	0.072	0.00057	127
0.03	550	0.072	0.053	0.050	0.072	0.00057	126
0.03	550	0.071	0.052	0.050	0.072	0.00057	128
0.03	550	0.072	0.053	0.050	0.072	0.00057	126
0.03	767	0.105	0.078	0.076	0.101	0.00085	118
0.03	756	0.104	0.078	0.076	0.099	0.00085	117
0.03	756	0.104	0.078	0.076	0.099	0.00085	117
0.03	756	0.105	0.078	0.076	0.099	0.00085	117
0.03	768	0.105	0.078	0.076	0.101	0.00085	118
0.01	174	0.029	0.016	0.011	0.023	0.00018	124
0.01	184	0.030	0.016	0.011	0.024	0.00019	129
0.01	174	0.030	0.016	0.011	0.023	0.00019	122
0.01	173	0.028	0.015	0.010	0.023	0.00017	131
0.01	185	0.031	0.016	0.012	0.024	0.00019	125
0.01	360	0.060	0.036	0.029	0.047	0.00041	115
0.01	360	0.060	0.037	0.029	0.047	0.00041	114
0.01	360	0.060	0.037	0.029	0.047	0.00041	114
0.01	360	0.060	0.036	0.029	0.047	0.00041	115
0.01	360	0.060	0.036	0.029	0.047	0.00041	115
0.01	533	0.090	0.058	0.049	0.070	0.00065	108
0.01	532	0.090	0.058	0.049	0.070	0.00065	108
0.01	543	0.090	0.059	0.049	0.071	0.00065	109
0.01	533	0.090	0.058	0.049	0.070	0.00065	108
0.01	532	0.090	0.058	0.049	0.070	0.00065	108
0.01	750	0.130	0.090	0.081	0.098	0.00099	100
0.01	751	0.131	0.088	0.081	0.098	0.00099	100
0.01	750	0.130	0.089	0.082	0.098	0.00099	100
0.01	751	0.131	0.089	0.082	0.098	0.00099	99
0.01	740	0.129	0.089	0.082	0.097	0.00099	98

Table J.35: Resilient modulus data (C_2_8_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	227	0.018	0.017	0.016	0.030	0.00017	178
0.06	227	0.017	0.016	0.017	0.030	0.00016	182
0.06	227	0.017	0.017	0.016	0.030	0.00016	182
0.06	227	0.017	0.016	0.016	0.030	0.00016	186
0.06	225	0.017	0.016	0.016	0.030	0.00016	186
0.06	392	0.032	0.032	0.029	0.051	0.00031	168
0.06	390	0.032	0.032	0.029	0.051	0.00031	168
0.06	390	0.033	0.032	0.029	0.051	0.00031	166
0.06	380	0.032	0.031	0.029	0.050	0.00030	165
0.06	392	0.032	0.032	0.029	0.051	0.00031	168
0.06	551	0.048	0.048	0.043	0.072	0.00046	158
0.06	563	0.048	0.048	0.045	0.074	0.00046	160
0.06	561	0.048	0.047	0.044	0.074	0.00046	160
0.06	551	0.048	0.046	0.043	0.072	0.00045	160
0.06	551	0.048	0.047	0.043	0.072	0.00046	158
0.06	774	0.069	0.069	0.067	0.101	0.00067	152
0.06	790	0.069	0.068	0.065	0.104	0.00067	156
0.06	769	0.068	0.067	0.066	0.101	0.00066	152
0.06	769	0.069	0.068	0.066	0.101	0.00067	151
0.06	780	0.069	0.068	0.066	0.102	0.00067	153
0.04	227	0.020	0.019	0.017	0.030	0.00018	162
0.04	227	0.019	0.018	0.017	0.030	0.00018	168
0.04	228	0.019	0.019	0.017	0.030	0.00018	165
0.04	227	0.019	0.019	0.017	0.030	0.00018	165
0.04	227	0.019	0.019	0.017	0.030	0.00018	165
0.04	390	0.034	0.035	0.032	0.051	0.00033	154
0.04	379	0.035	0.035	0.032	0.050	0.00034	148
0.04	392	0.036	0.035	0.032	0.051	0.00034	152
0.04	383	0.034	0.035	0.032	0.050	0.00033	151
0.04	393	0.035	0.035	0.032	0.052	0.00034	153
0.04	563	0.053	0.053	0.048	0.074	0.00051	146
0.04	557	0.054	0.053	0.048	0.073	0.00051	144
0.04	553	0.053	0.052	0.048	0.072	0.00051	143
0.04	560	0.053	0.052	0.048	0.073	0.00050	146
0.04	553	0.053	0.052	0.048	0.072	0.00050	144
0.04	780	0.077	0.075	0.071	0.102	0.00073	140
0.04	780	0.078	0.075	0.072	0.102	0.00074	138
0.04	780	0.077	0.075	0.072	0.102	0.00074	139
0.04	769	0.076	0.075	0.072	0.101	0.00073	138
0.04	779	0.077	0.075	0.072	0.102	0.00074	139
0.03	227	0.022	0.023	0.019	0.030	0.00021	140
0.03	227	0.022	0.023	0.019	0.030	0.00021	142
0.03	216	0.021	0.022	0.019	0.028	0.00020	140
0.03	215	0.021	0.022	0.019	0.028	0.00020	138
0.03	216	0.022	0.022	0.019	0.028	0.00021	138
0.03	382	0.041	0.042	0.036	0.050	0.00039	128
0.03	392	0.042	0.042	0.037	0.051	0.00040	129
0.03	379	0.039	0.040	0.035	0.050	0.00038	132
0.03	379	0.039	0.040	0.036	0.050	0.00038	131
0.03	381	0.040	0.042	0.036	0.050	0.00039	129
0.03	553	0.060	0.061	0.055	0.072	0.00058	126
0.03	542	0.061	0.060	0.055	0.071	0.00058	123
0.03	554	0.061	0.061	0.055	0.073	0.00058	125
0.03	564	0.062	0.061	0.055	0.074	0.00058	127
0.03	553	0.060	0.061	0.055	0.072	0.00058	126
0.03	770	0.088	0.086	0.082	0.101	0.00084	120
0.03	770	0.088	0.086	0.082	0.101	0.00084	120
0.03	770	0.088	0.086	0.082	0.101	0.00084	120
0.03	769	0.088	0.086	0.082	0.101	0.00084	120
0.03	770	0.087	0.086	0.082	0.101	0.00084	121
0.01	220	0.025	0.027	0.021	0.029	0.00024	122
0.01	220	0.025	0.027	0.022	0.029	0.00024	120
0.01	220	0.025	0.027	0.023	0.029	0.00024	118
0.01	219	0.026	0.027	0.022	0.029	0.00024	118
0.01	220	0.026	0.027	0.022	0.029	0.00024	118
0.01	391	0.048	0.051	0.041	0.051	0.00046	112
0.01	392	0.049	0.050	0.041	0.051	0.00046	112
0.01	396	0.049	0.051	0.041	0.052	0.00046	112
0.01	394	0.049	0.050	0.041	0.052	0.00046	112
0.01	383	0.049	0.050	0.041	0.050	0.00046	109
0.01	553	0.071	0.072	0.064	0.072	0.00068	107
0.01	544	0.072	0.072	0.064	0.071	0.00068	105
0.01	542	0.072	0.072	0.064	0.071	0.00068	104
0.01	542	0.072	0.072	0.063	0.071	0.00068	104
0.01	554	0.072	0.072	0.064	0.073	0.00068	106
0.01	765	0.104	0.103	0.097	0.100	0.00100	101
0.01	766	0.103	0.103	0.097	0.100	0.00099	101
0.01	765	0.102	0.103	0.097	0.100	0.00099	101
0.01	765	0.103	0.105	0.096	0.100	0.00100	101
0.01	765	0.104	0.102	0.098	0.100	0.00100	101

Table J.36: Resilient modulus data (D_1_16_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	226	0.010	0.009	0.012	0.030	0.00010	297
0.06	226	0.010	0.009	0.012	0.030	0.00010	296
0.06	216	0.010	0.009	0.012	0.028	0.00010	283
0.06	230	0.010	0.010	0.012	0.030	0.00010	292
0.06	226	0.010	0.009	0.012	0.030	0.00010	298
0.06	388	0.017	0.017	0.022	0.051	0.00018	275
0.06	381	0.017	0.017	0.022	0.050	0.00018	270
0.06	386	0.016	0.017	0.022	0.051	0.00018	279
0.06	388	0.016	0.017	0.022	0.051	0.00018	280
0.06	389	0.016	0.017	0.022	0.051	0.00018	281
0.06	551	0.024	0.026	0.032	0.072	0.00027	267
0.06	551	0.024	0.026	0.032	0.072	0.00027	267
0.06	541	0.025	0.026	0.033	0.071	0.00028	256
0.06	540	0.025	0.026	0.033	0.071	0.00028	256
0.06	552	0.025	0.026	0.033	0.072	0.00028	261
0.06	774	0.037	0.038	0.049	0.101	0.00041	250
0.06	768	0.037	0.038	0.049	0.101	0.00041	248
0.06	758	0.037	0.038	0.049	0.099	0.00041	245
0.06	756	0.037	0.038	0.049	0.099	0.00040	245
0.06	757	0.037	0.038	0.050	0.099	0.00041	243
0.04	216	0.010	0.009	0.012	0.028	0.00010	286
0.04	217	0.010	0.009	0.012	0.028	0.00010	285
0.04	216	0.010	0.010	0.012	0.028	0.00010	276
0.04	216	0.010	0.009	0.013	0.028	0.00010	276
0.04	216	0.010	0.010	0.012	0.028	0.00010	276
0.04	378	0.018	0.017	0.022	0.050	0.00019	266
0.04	378	0.016	0.017	0.023	0.050	0.00018	268
0.04	391	0.017	0.017	0.023	0.051	0.00019	274
0.04	385	0.016	0.017	0.023	0.050	0.00018	274
0.04	408	0.017	0.017	0.023	0.054	0.00019	285
0.04	562	0.025	0.027	0.035	0.074	0.00028	259
0.04	552	0.024	0.027	0.035	0.072	0.00028	257
0.04	540	0.024	0.027	0.035	0.071	0.00028	252
0.04	541	0.024	0.027	0.035	0.071	0.00028	252
0.04	541	0.024	0.027	0.035	0.071	0.00028	252
0.04	768	0.036	0.040	0.052	0.101	0.00042	240
0.04	768	0.037	0.040	0.051	0.101	0.00042	240
0.04	757	0.037	0.040	0.051	0.099	0.00042	237
0.04	756	0.037	0.040	0.051	0.099	0.00042	236
0.04	768	0.037	0.040	0.052	0.101	0.00042	238
0.03	216	0.011	0.009	0.012	0.028	0.00010	273
0.03	216	0.011	0.009	0.012	0.028	0.00010	273
0.03	216	0.011	0.010	0.012	0.028	0.00011	264
0.03	216	0.011	0.009	0.012	0.028	0.00010	273
0.03	216	0.011	0.009	0.012	0.028	0.00010	273
0.03	384	0.017	0.018	0.023	0.050	0.00019	268
0.03	407	0.018	0.017	0.024	0.053	0.00019	275
0.03	379	0.018	0.017	0.024	0.050	0.00019	256
0.03	390	0.018	0.017	0.024	0.051	0.00019	263
0.03	391	0.018	0.018	0.024	0.051	0.00019	264
0.03	551	0.026	0.028	0.035	0.072	0.00029	248
0.03	552	0.026	0.028	0.036	0.072	0.00029	245
0.03	540	0.027	0.028	0.035	0.071	0.00029	241
0.03	541	0.026	0.028	0.036	0.071	0.00029	241
0.03	541	0.026	0.027	0.035	0.071	0.00029	247
0.03	773	0.038	0.042	0.055	0.101	0.00044	229
0.03	777	0.037	0.041	0.054	0.102	0.00043	235
0.03	769	0.038	0.042	0.054	0.101	0.00044	229
0.03	758	0.037	0.041	0.054	0.099	0.00043	229
0.03	768	0.037	0.041	0.055	0.101	0.00044	231
0.01	217	0.012	0.008	0.013	0.028	0.00011	258
0.01	216	0.012	0.008	0.013	0.028	0.00011	258
0.01	217	0.011	0.008	0.013	0.028	0.00011	266
0.01	217	0.011	0.008	0.012	0.028	0.00010	275
0.01	216	0.012	0.008	0.012	0.028	0.00011	266
0.01	390	0.020	0.016	0.024	0.051	0.00020	259
0.01	390	0.021	0.017	0.024	0.051	0.00020	251
0.01	380	0.020	0.017	0.024	0.050	0.00020	247
0.01	380	0.021	0.017	0.024	0.050	0.00020	245
0.01	385	0.020	0.016	0.024	0.050	0.00020	255
0.01	542	0.028	0.028	0.038	0.071	0.00031	232
0.01	552	0.028	0.028	0.038	0.072	0.00031	236
0.01	553	0.029	0.028	0.038	0.072	0.00031	234
0.01	542	0.028	0.028	0.036	0.071	0.00030	235
0.01	542	0.028	0.028	0.036	0.071	0.00030	234
0.01	770	0.040	0.043	0.056	0.101	0.00046	221
0.01	770	0.040	0.043	0.056	0.101	0.00046	221
0.01	759	0.040	0.043	0.056	0.099	0.00046	218
0.01	770	0.041	0.043	0.056	0.101	0.00046	220
0.01	769	0.041	0.043	0.056	0.101	0.00046	220

Table J.37: Resilient modulus data (D_2_16_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	225	0.016	0.006	0.006	0.030	0.00009	314
0.06	224	0.015	0.006	0.006	0.029	0.00009	323
0.06	214	0.015	0.006	0.006	0.028	0.00009	308
0.06	225	0.015	0.005	0.006	0.030	0.00009	336
0.06	225	0.015	0.006	0.006	0.030	0.00009	322
0.06	377	0.025	0.013	0.013	0.049	0.00017	300
0.06	388	0.025	0.013	0.013	0.051	0.00017	308
0.06	388	0.025	0.013	0.013	0.051	0.00017	308
0.06	388	0.026	0.013	0.013	0.051	0.00017	303
0.06	389	0.026	0.013	0.013	0.051	0.00017	303
0.06	551	0.035	0.021	0.020	0.072	0.00025	290
0.06	551	0.034	0.021	0.022	0.072	0.00025	290
0.06	550	0.035	0.022	0.021	0.072	0.00026	283
0.06	563	0.034	0.021	0.022	0.074	0.00025	293
0.06	545	0.034	0.021	0.020	0.071	0.00025	288
0.06	756	0.048	0.034	0.034	0.099	0.00038	262
0.06	758	0.048	0.033	0.034	0.099	0.00038	265
0.06	762	0.047	0.033	0.034	0.100	0.00037	269
0.06	775	0.049	0.033	0.034	0.102	0.00038	269
0.06	756	0.048	0.033	0.033	0.099	0.00037	267
0.04	235	0.017	0.005	0.007	0.031	0.00010	314
0.04	226	0.017	0.005	0.006	0.030	0.00009	313
0.04	226	0.017	0.005	0.006	0.030	0.00009	314
0.04	226	0.017	0.005	0.007	0.030	0.00010	302
0.04	216	0.016	0.005	0.006	0.028	0.00009	310
0.04	378	0.028	0.012	0.013	0.050	0.00017	289
0.04	378	0.027	0.011	0.013	0.050	0.00016	301
0.04	389	0.028	0.012	0.013	0.051	0.00017	297
0.04	378	0.028	0.012	0.013	0.050	0.00017	288
0.04	389	0.027	0.012	0.013	0.051	0.00017	302
0.04	541	0.037	0.020	0.021	0.071	0.00025	280
0.04	551	0.037	0.019	0.021	0.072	0.00025	290
0.04	552	0.038	0.020	0.021	0.072	0.00026	282
0.04	552	0.038	0.020	0.020	0.072	0.00026	283
0.04	551	0.038	0.020	0.020	0.072	0.00026	283
0.04	771	0.052	0.032	0.034	0.101	0.00039	262
0.04	767	0.053	0.032	0.033	0.101	0.00038	261
0.04	769	0.052	0.032	0.033	0.101	0.00038	264
0.04	768	0.052	0.033	0.033	0.101	0.00039	260
0.04	757	0.051	0.032	0.033	0.099	0.00038	261
0.03	216	0.017	0.004	0.007	0.028	0.00009	305
0.03	227	0.018	0.004	0.007	0.030	0.00010	311
0.03	227	0.018	0.005	0.007	0.030	0.00010	309
0.03	227	0.018	0.004	0.007	0.030	0.00010	310
0.03	216	0.018	0.005	0.007	0.028	0.00010	286
0.03	389	0.030	0.010	0.014	0.051	0.00018	291
0.03	378	0.030	0.010	0.014	0.050	0.00018	283
0.03	390	0.030	0.010	0.014	0.051	0.00018	291
0.03	389	0.030	0.010	0.012	0.051	0.00017	296
0.03	390	0.030	0.010	0.014	0.051	0.00018	291
0.03	541	0.043	0.017	0.021	0.071	0.00026	268
0.03	551	0.043	0.017	0.019	0.072	0.00026	277
0.03	551	0.043	0.017	0.019	0.072	0.00026	277
0.03	541	0.043	0.017	0.019	0.071	0.00026	272
0.03	540	0.043	0.018	0.021	0.071	0.00027	264
0.03	757	0.058	0.030	0.032	0.099	0.00040	251
0.03	757	0.058	0.030	0.032	0.099	0.00040	251
0.03	769	0.058	0.030	0.033	0.101	0.00040	253
0.03	769	0.059	0.030	0.032	0.101	0.00040	253
0.03	768	0.058	0.030	0.032	0.101	0.00040	255
0.01	229	0.021	0.004	0.006	0.030	0.00011	285
0.01	231	0.020	0.004	0.006	0.030	0.00010	298
0.01	234	0.020	0.004	0.006	0.031	0.00010	301
0.01	217	0.020	0.004	0.006	0.028	0.00010	277
0.01	228	0.021	0.005	0.006	0.030	0.00011	280
0.01	390	0.037	0.008	0.011	0.051	0.00018	277
0.01	379	0.038	0.008	0.011	0.050	0.00019	265
0.01	380	0.037	0.008	0.011	0.050	0.00018	269
0.01	380	0.038	0.008	0.011	0.050	0.00019	265
0.01	390	0.037	0.008	0.012	0.051	0.00019	272
0.01	541	0.051	0.015	0.019	0.071	0.00028	253
0.01	554	0.051	0.015	0.019	0.073	0.00028	260
0.01	558	0.051	0.016	0.019	0.073	0.00028	258
0.01	572	0.050	0.016	0.019	0.075	0.00028	268
0.01	541	0.050	0.015	0.019	0.071	0.00028	256
0.01	759	0.070	0.028	0.030	0.099	0.00042	236
0.01	771	0.069	0.027	0.030	0.101	0.00042	243
0.01	758	0.069	0.027	0.030	0.099	0.00042	239
0.01	780	0.069	0.027	0.030	0.102	0.00042	246
0.01	757	0.069	0.027	0.030	0.099	0.00041	239

Table J.38: Resilient modulus data (D_1_13_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	218	0.013	0.004	0.004	0.029	0.00007	423
0.06	227	0.010	0.004	0.004	0.030	0.00006	490
0.06	227	0.011	0.004	0.004	0.030	0.00006	465
0.06	228	0.013	0.004	0.004	0.030	0.00007	423
0.06	227	0.011	0.004	0.004	0.030	0.00006	467
0.06	391	0.019	0.008	0.008	0.051	0.00012	439
0.06	402	0.018	0.010	0.008	0.053	0.00012	448
0.06	402	0.019	0.009	0.008	0.053	0.00012	450
0.06	401	0.018	0.010	0.008	0.053	0.00012	447
0.06	402	0.019	0.010	0.008	0.053	0.00012	435
0.06	575	0.025	0.015	0.012	0.075	0.00017	443
0.06	575	0.025	0.015	0.011	0.075	0.00017	453
0.06	566	0.025	0.015	0.012	0.074	0.00017	434
0.06	553	0.025	0.015	0.012	0.072	0.00017	426
0.06	553	0.026	0.014	0.012	0.072	0.00017	427
0.06	780	0.034	0.023	0.017	0.102	0.00024	426
0.06	780	0.034	0.023	0.017	0.102	0.00024	427
0.06	781	0.034	0.023	0.017	0.102	0.00024	427
0.06	769	0.033	0.023	0.016	0.101	0.00023	433
0.06	770	0.033	0.021	0.017	0.101	0.00023	433
0.04	228	0.013	0.004	0.005	0.030	0.00007	424
0.04	227	0.012	0.005	0.005	0.030	0.00007	420
0.04	227	0.013	0.004	0.005	0.030	0.00007	424
0.04	228	0.012	0.004	0.005	0.030	0.00007	444
0.04	228	0.012	0.004	0.004	0.030	0.00006	469
0.04	401	0.019	0.009	0.008	0.053	0.00012	447
0.04	401	0.018	0.009	0.008	0.053	0.00011	460
0.04	399	0.018	0.009	0.008	0.052	0.00011	459
0.04	389	0.019	0.009	0.008	0.051	0.00012	436
0.04	388	0.018	0.010	0.008	0.051	0.00012	436
0.04	565	0.026	0.015	0.011	0.074	0.00017	430
0.04	575	0.026	0.015	0.011	0.075	0.00017	438
0.04	575	0.027	0.016	0.011	0.075	0.00018	422
0.04	575	0.026	0.015	0.011	0.075	0.00017	439
0.04	566	0.027	0.016	0.011	0.074	0.00018	421
0.04	780	0.035	0.022	0.016	0.102	0.00024	427
0.04	780	0.035	0.023	0.016	0.102	0.00024	421
0.04	780	0.035	0.022	0.016	0.102	0.00024	428
0.04	780	0.035	0.022	0.016	0.102	0.00024	428
0.04	768	0.034	0.022	0.016	0.101	0.00024	428
0.03	226	0.013	0.005	0.005	0.030	0.00007	407
0.03	232	0.012	0.005	0.004	0.030	0.00007	447
0.03	227	0.013	0.004	0.005	0.030	0.00007	427
0.03	230	0.013	0.004	0.005	0.030	0.00007	430
0.03	236	0.011	0.005	0.005	0.031	0.00007	454
0.03	395	0.020	0.009	0.008	0.052	0.00012	415
0.03	408	0.019	0.009	0.009	0.053	0.00012	437
0.03	393	0.018	0.009	0.009	0.052	0.00012	434
0.03	390	0.020	0.008	0.008	0.051	0.00012	423
0.03	392	0.019	0.009	0.008	0.051	0.00012	423
0.03	566	0.027	0.014	0.011	0.074	0.00017	436
0.03	580	0.027	0.015	0.011	0.076	0.00017	438
0.03	570	0.026	0.015	0.011	0.075	0.00017	439
0.03	567	0.027	0.015	0.012	0.074	0.00018	418
0.03	565	0.026	0.014	0.011	0.074	0.00017	445
0.03	781	0.036	0.022	0.017	0.102	0.00025	416
0.03	791	0.036	0.022	0.017	0.104	0.00025	423
0.03	781	0.035	0.023	0.017	0.102	0.00025	417
0.03	771	0.037	0.022	0.017	0.101	0.00025	407
0.03	781	0.037	0.022	0.017	0.102	0.00025	413
0.01	217	0.012	0.005	0.004	0.028	0.00007	411
0.01	226	0.011	0.005	0.004	0.030	0.00007	454
0.01	228	0.011	0.005	0.005	0.030	0.00007	429
0.01	216	0.010	0.005	0.005	0.028	0.00007	430
0.01	228	0.011	0.004	0.005	0.030	0.00007	455
0.01	390	0.019	0.009	0.009	0.051	0.00012	422
0.01	402	0.019	0.009	0.009	0.053	0.00012	434
0.01	390	0.018	0.009	0.009	0.051	0.00012	433
0.01	390	0.018	0.009	0.009	0.051	0.00012	434
0.01	401	0.018	0.009	0.009	0.053	0.00012	446
0.01	564	0.026	0.014	0.013	0.074	0.00017	429
0.01	565	0.026	0.014	0.013	0.074	0.00017	428
0.01	564	0.027	0.014	0.013	0.074	0.00018	421
0.01	554	0.026	0.013	0.012	0.073	0.00017	438
0.01	565	0.027	0.014	0.013	0.074	0.00018	421
0.01	770	0.036	0.021	0.017	0.101	0.00024	412
0.01	782	0.035	0.021	0.017	0.102	0.00024	424
0.01	781	0.037	0.021	0.017	0.102	0.00025	413
0.01	781	0.037	0.021	0.017	0.102	0.00025	412
0.01	780	0.036	0.020	0.016	0.102	0.00024	430

Table J.39: Resilient modulus data (D_2_13_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	238	0.003	0.005	0.008	0.031	0.00005	617
0.06	227	0.003	0.005	0.008	0.030	0.00005	586
0.06	226	0.003	0.005	0.007	0.030	0.00005	584
0.06	228	0.004	0.005	0.007	0.030	0.00005	557
0.06	233	0.003	0.005	0.007	0.031	0.00005	606
0.06	389	0.007	0.008	0.011	0.051	0.00009	575
0.06	388	0.007	0.008	0.012	0.051	0.00009	557
0.06	389	0.006	0.008	0.012	0.051	0.00009	576
0.06	401	0.007	0.008	0.012	0.053	0.00009	574
0.06	389	0.006	0.008	0.012	0.051	0.00009	578
0.06	563	0.009	0.012	0.017	0.074	0.00012	593
0.06	563	0.010	0.012	0.017	0.074	0.00013	579
0.06	553	0.009	0.012	0.017	0.072	0.00012	582
0.06	553	0.010	0.012	0.017	0.072	0.00013	567
0.06	551	0.009	0.012	0.017	0.072	0.00012	579
0.06	779	0.013	0.017	0.025	0.102	0.00018	562
0.06	779	0.012	0.017	0.025	0.102	0.00018	572
0.06	780	0.013	0.018	0.025	0.102	0.00018	553
0.06	780	0.013	0.018	0.025	0.102	0.00019	552
0.06	779	0.012	0.018	0.025	0.102	0.00018	561
0.04	226	0.004	0.005	0.007	0.030	0.00005	562
0.04	226	0.004	0.005	0.007	0.030	0.00005	560
0.04	226	0.004	0.005	0.007	0.030	0.00005	559
0.04	228	0.004	0.005	0.007	0.030	0.00005	569
0.04	254	0.004	0.005	0.007	0.033	0.00005	628
0.04	394	0.006	0.008	0.012	0.052	0.00009	587
0.04	414	0.006	0.008	0.013	0.054	0.00009	593
0.04	381	0.006	0.008	0.013	0.050	0.00009	546
0.04	391	0.006	0.008	0.012	0.051	0.00009	583
0.04	401	0.006	0.008	0.012	0.053	0.00009	600
0.04	564	0.010	0.012	0.019	0.074	0.00013	550
0.04	563	0.009	0.012	0.018	0.074	0.00013	577
0.04	564	0.008	0.012	0.018	0.074	0.00012	592
0.04	552	0.009	0.013	0.019	0.072	0.00014	534
0.04	554	0.008	0.012	0.018	0.073	0.00013	581
0.04	791	0.012	0.018	0.026	0.104	0.00018	571
0.04	780	0.012	0.018	0.026	0.102	0.00018	562
0.04	780	0.012	0.018	0.026	0.102	0.00018	554
0.04	769	0.012	0.017	0.026	0.101	0.00018	556
0.04	780	0.012	0.018	0.026	0.102	0.00018	562
0.03	227	0.004	0.005	0.007	0.030	0.00005	555
0.03	229	0.003	0.006	0.007	0.030	0.00005	597
0.03	234	0.004	0.005	0.008	0.031	0.00006	538
0.03	247	0.002	0.005	0.007	0.032	0.00005	650
0.03	227	0.003	0.005	0.007	0.030	0.00005	596
0.03	391	0.005	0.010	0.014	0.051	0.00009	542
0.03	391	0.005	0.010	0.013	0.051	0.00009	559
0.03	390	0.004	0.010	0.014	0.051	0.00009	559
0.03	400	0.006	0.010	0.013	0.052	0.00009	555
0.03	393	0.005	0.010	0.013	0.052	0.00009	564
0.03	554	0.008	0.014	0.019	0.073	0.00013	545
0.03	552	0.007	0.013	0.019	0.072	0.00013	573
0.03	564	0.008	0.013	0.020	0.074	0.00013	555
0.03	553	0.008	0.013	0.019	0.072	0.00013	560
0.03	553	0.008	0.013	0.020	0.072	0.00013	544
0.03	782	0.011	0.019	0.028	0.103	0.00019	535
0.03	770	0.010	0.018	0.028	0.101	0.00018	546
0.03	771	0.010	0.018	0.028	0.101	0.00019	546
0.03	781	0.011	0.019	0.028	0.102	0.00019	535
0.03	782	0.011	0.019	0.028	0.103	0.00019	536
0.01	229	0.002	0.006	0.009	0.030	0.00005	552
0.01	229	0.002	0.007	0.009	0.030	0.00006	521
0.01	229	-0.001	0.007	0.009	0.030	0.00005	621
0.01	218	-0.001	0.006	0.009	0.029	0.00004	640
0.01	217	0.002	0.006	0.009	0.028	0.00005	530
0.01	394	0.002	0.010	0.015	0.052	0.00009	566
0.01	402	0.003	0.010	0.015	0.053	0.00009	558
0.01	395	0.003	0.010	0.015	0.052	0.00009	546
0.01	391	-0.002	0.010	0.015	0.051	0.00008	650
0.01	391	0.003	0.010	0.015	0.051	0.00010	538
0.01	565	0.005	0.014	0.023	0.074	0.00014	543
0.01	564	0.004	0.014	0.022	0.074	0.00013	556
0.01	554	0.005	0.014	0.021	0.073	0.00013	549
0.01	564	0.005	0.014	0.022	0.074	0.00014	543
0.01	564	0.004	0.014	0.022	0.074	0.00013	556
0.01	802	0.008	0.021	0.031	0.105	0.00020	538
0.01	790	0.007	0.020	0.031	0.104	0.00019	550
0.01	771	0.007	0.020	0.031	0.101	0.00019	536
0.01	782	0.008	0.021	0.031	0.103	0.00020	526
0.01	770	0.008	0.020	0.031	0.101	0.00019	528

Table J.40: Resilient modulus data (D_1_11_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	228	0.012	0.010	0.003	0.030	0.00008	377
0.06	240	0.012	0.010	0.002	0.031	0.00008	411
0.06	238	0.011	0.010	0.002	0.031	0.00007	430
0.06	230	0.012	0.008	0.003	0.030	0.00008	396
0.06	302	-0.706	-1.118	-0.457	0.040	-0.00748	-5
0.06	390	0.018	0.015	0.007	0.051	0.00013	380
0.06	391	0.017	0.015	0.007	0.051	0.00013	390
0.06	402	0.018	0.015	0.007	0.053	0.00013	398
0.06	391	0.017	0.015	0.007	0.051	0.00013	389
0.06	402	0.018	0.015	0.007	0.053	0.00013	399
0.06	563	0.024	0.021	0.013	0.074	0.00019	387
0.06	575	0.025	0.021	0.013	0.075	0.00019	388
0.06	564	0.025	0.021	0.013	0.074	0.00019	381
0.06	563	0.024	0.022	0.013	0.074	0.00020	374
0.06	564	0.025	0.021	0.013	0.074	0.00019	381
0.06	781	0.033	0.030	0.021	0.102	0.00028	372
0.06	781	0.034	0.031	0.020	0.102	0.00028	368
0.06	781	0.035	0.031	0.021	0.102	0.00028	360
0.06	792	0.034	0.030	0.021	0.104	0.00028	374
0.06	792	0.034	0.031	0.021	0.104	0.00028	369
0.04	238	0.012	0.010	0.003	0.031	0.00008	380
0.04	227	0.011	0.010	0.003	0.030	0.00008	377
0.04	237	0.012	0.010	0.003	0.031	0.00008	382
0.04	239	0.012	0.010	0.003	0.031	0.00008	380
0.04	238	0.012	0.010	0.003	0.031	0.00008	381
0.04	389	0.019	0.016	0.008	0.051	0.00014	369
0.04	390	0.019	0.016	0.008	0.051	0.00014	368
0.04	390	0.019	0.016	0.008	0.051	0.00014	369
0.04	401	0.019	0.017	0.009	0.053	0.00015	360
0.04	390	0.019	0.016	0.008	0.051	0.00014	369
0.04	575	0.026	0.022	0.015	0.075	0.00021	361
0.04	564	0.026	0.022	0.015	0.074	0.00021	354
0.04	564	0.026	0.022	0.015	0.074	0.00021	354
0.04	564	0.026	0.023	0.015	0.074	0.00021	349
0.04	564	0.026	0.023	0.015	0.074	0.00021	348
0.04	783	0.035	0.032	0.021	0.103	0.00029	355
0.04	793	0.035	0.032	0.022	0.104	0.00029	356
0.04	796	0.036	0.032	0.022	0.104	0.00030	353
0.04	800	0.035	0.032	0.022	0.105	0.00029	359
0.04	800	0.035	0.032	0.021	0.105	0.00029	363
0.03	239	0.011	0.010	0.004	0.031	0.00008	380
0.03	239	0.012	0.010	0.004	0.031	0.00009	364
0.03	239	0.012	0.010	0.004	0.031	0.00009	363
0.03	228	0.012	0.010	0.004	0.030	0.00009	348
0.03	228	0.011	0.010	0.004	0.030	0.00008	361
0.03	402	0.019	0.018	0.009	0.053	0.00015	348
0.03	403	0.020	0.017	0.009	0.053	0.00015	350
0.03	403	0.020	0.017	0.008	0.053	0.00015	352
0.03	403	0.020	0.017	0.008	0.053	0.00015	352
0.03	402	0.020	0.017	0.008	0.053	0.00015	353
0.03	565	0.028	0.027	0.017	0.074	0.00023	318
0.03	564	0.029	0.025	0.017	0.074	0.00023	317
0.03	565	0.029	0.027	0.017	0.074	0.00024	313
0.03	570	0.028	0.027	0.017	0.075	0.00023	320
0.03	572	0.029	0.027	0.017	0.075	0.00024	317
0.03	782	0.038	0.033	0.024	0.102	0.00031	332
0.03	782	0.039	0.034	0.024	0.102	0.00032	324
0.03	782	0.038	0.033	0.024	0.103	0.00031	332
0.03	782	0.038	0.033	0.024	0.102	0.00031	332
0.03	794	0.039	0.033	0.024	0.104	0.00031	333
0.01	240	0.012	0.011	0.005	0.031	0.00009	341
0.01	229	0.012	0.011	0.005	0.030	0.00009	325
0.01	228	0.012	0.011	0.005	0.030	0.00009	326
0.01	228	0.012	0.011	0.005	0.030	0.00009	325
0.01	230	0.011	0.011	0.005	0.030	0.00009	337
0.01	391	0.020	0.019	0.010	0.051	0.00016	324
0.01	401	0.021	0.020	0.010	0.053	0.00017	319
0.01	391	0.021	0.019	0.010	0.051	0.00016	317
0.01	402	0.021	0.019	0.010	0.053	0.00016	326
0.01	403	0.021	0.020	0.010	0.053	0.00017	319
0.01	566	0.029	0.026	0.016	0.074	0.00023	321
0.01	566	0.029	0.025	0.015	0.074	0.00023	326
0.01	566	0.030	0.026	0.017	0.074	0.00024	311
0.01	566	0.030	0.026	0.015	0.074	0.00023	316
0.01	565	0.030	0.026	0.017	0.074	0.00024	312
0.01	783	0.040	0.037	0.025	0.103	0.00034	306
0.01	782	0.040	0.037	0.025	0.102	0.00033	306
0.01	792	0.040	0.037	0.025	0.104	0.00033	310
0.01	784	0.039	0.036	0.025	0.103	0.00033	313
0.01	788	0.040	0.037	0.025	0.103	0.00034	308

Table J.41: Resilient modulus data (D_2_11_103)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	228	0.013	0.013	0.013	0.030	0.00013	229
0.06	229	0.013	0.013	0.012	0.030	0.00013	235
0.06	228	0.013	0.013	0.012	0.030	0.00013	235
0.06	228	0.013	0.013	0.012	0.030	0.00013	235
0.06	229	0.013	0.013	0.013	0.030	0.00013	228
0.06	400	0.024	0.023	0.025	0.052	0.00024	221
0.06	399	0.024	0.023	0.025	0.052	0.00024	220
0.06	404	0.022	0.024	0.025	0.053	0.00023	229
0.06	397	0.022	0.023	0.025	0.052	0.00023	226
0.06	415	0.023	0.023	0.025	0.054	0.00023	234
0.06	555	0.033	0.034	0.038	0.073	0.00035	209
0.06	564	0.035	0.034	0.038	0.074	0.00035	210
0.06	556	0.034	0.034	0.038	0.073	0.00035	209
0.06	553	0.035	0.034	0.039	0.073	0.00035	206
0.06	575	0.035	0.034	0.040	0.075	0.00035	212
0.06	781	0.047	0.048	0.058	0.102	0.00050	205
0.06	781	0.048	0.048	0.057	0.102	0.00050	204
0.06	779	0.046	0.047	0.057	0.102	0.00049	207
0.06	780	0.048	0.047	0.057	0.102	0.00050	205
0.06	780	0.048	0.047	0.057	0.102	0.00050	205
0.04	216	0.014	0.015	0.016	0.028	0.00014	197
0.04	217	0.014	0.015	0.016	0.028	0.00014	196
0.04	227	0.015	0.015	0.016	0.030	0.00015	201
0.04	228	0.014	0.015	0.016	0.030	0.00014	206
0.04	228	0.015	0.015	0.016	0.030	0.00015	202
0.04	392	0.027	0.026	0.031	0.051	0.00028	184
0.04	401	0.027	0.026	0.031	0.053	0.00028	189
0.04	390	0.027	0.026	0.031	0.051	0.00028	184
0.04	390	0.027	0.026	0.031	0.051	0.00028	184
0.04	391	0.026	0.026	0.031	0.051	0.00028	186
0.04	553	0.039	0.039	0.045	0.073	0.00040	181
0.04	562	0.039	0.039	0.045	0.074	0.00040	184
0.04	562	0.039	0.038	0.045	0.074	0.00040	185
0.04	563	0.039	0.039	0.045	0.074	0.00040	185
0.04	563	0.039	0.038	0.045	0.074	0.00040	186
0.04	781	0.053	0.053	0.066	0.102	0.00057	181
0.04	780	0.053	0.053	0.066	0.102	0.00056	181
0.04	780	0.053	0.053	0.066	0.102	0.00056	181
0.04	780	0.052	0.054	0.065	0.102	0.00056	182
0.04	791	0.053	0.054	0.065	0.104	0.00056	183
0.03	224	0.017	0.018	0.020	0.029	0.00018	162
0.03	247	0.018	0.018	0.021	0.032	0.00019	174
0.03	218	0.018	0.018	0.020	0.029	0.00018	156
0.03	229	0.018	0.018	0.020	0.030	0.00018	163
0.03	228	0.017	0.018	0.020	0.030	0.00018	166
0.03	393	0.032	0.031	0.038	0.052	0.00033	157
0.03	391	0.032	0.032	0.039	0.051	0.00034	152
0.03	391	0.031	0.032	0.039	0.051	0.00033	154
0.03	390	0.031	0.032	0.038	0.051	0.00033	154
0.03	402	0.030	0.032	0.038	0.053	0.00033	160
0.03	574	0.047	0.045	0.057	0.075	0.00049	155
0.03	563	0.046	0.045	0.056	0.074	0.00048	153
0.03	554	0.045	0.044	0.056	0.073	0.00047	154
0.03	563	0.045	0.044	0.057	0.074	0.00048	155
0.03	564	0.046	0.045	0.057	0.074	0.00048	153
0.03	770	0.063	0.061	0.078	0.101	0.00066	152
0.03	770	0.062	0.061	0.078	0.101	0.00066	153
0.03	782	0.062	0.061	0.078	0.103	0.00066	155
0.03	782	0.062	0.061	0.079	0.102	0.00066	155
0.03	781	0.063	0.061	0.078	0.102	0.00066	155
0.01	230	0.024	0.020	0.026	0.030	0.00023	131
0.01	218	0.025	0.020	0.025	0.029	0.00023	125
0.01	228	0.024	0.020	0.026	0.030	0.00023	131
0.01	228	0.025	0.020	0.026	0.030	0.00023	130
0.01	219	0.024	0.020	0.026	0.029	0.00023	126
0.01	393	0.040	0.036	0.048	0.051	0.00041	126
0.01	392	0.041	0.036	0.047	0.051	0.00041	125
0.01	392	0.041	0.037	0.048	0.051	0.00042	123
0.01	390	0.042	0.037	0.048	0.051	0.00042	123
0.01	406	0.041	0.037	0.047	0.053	0.00041	130
0.01	567	0.058	0.052	0.069	0.074	0.00059	126
0.01	565	0.056	0.055	0.070	0.074	0.00059	125
0.01	553	0.057	0.053	0.070	0.072	0.00059	122
0.01	556	0.058	0.053	0.070	0.073	0.00059	122
0.01	570	0.058	0.053	0.069	0.075	0.00059	126
0.01	782	0.078	0.072	0.097	0.102	0.00081	126
0.01	782	0.078	0.072	0.096	0.102	0.00081	127
0.01	781	0.077	0.072	0.096	0.102	0.00080	128
0.01	792	0.078	0.073	0.096	0.104	0.00081	128
0.01	782	0.077	0.073	0.096	0.103	0.00081	127

Table J.42: Resilient modulus data (D_1_18_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	237	0.015	0.019	0.011	0.029	0.00015	198
0.06	227	0.016	0.020	0.011	0.028	0.00015	181
0.06	226	0.015	0.020	0.012	0.028	0.00015	181
0.06	236	0.017	0.020	0.011	0.029	0.00016	186
0.06	224	0.016	0.020	0.011	0.028	0.00015	181
0.06	391	0.030	0.035	0.024	0.048	0.00029	166
0.06	391	0.030	0.035	0.024	0.048	0.00029	167
0.06	398	0.028	0.035	0.023	0.049	0.00028	172
0.06	388	0.030	0.035	0.023	0.048	0.00029	164
0.06	461	-0.929	-0.967	-0.219	0.057	-0.00694	-8
0.06	553	0.046	0.052	0.038	0.068	0.00045	152
0.06	562	0.047	0.052	0.039	0.069	0.00045	153
0.06	555	0.047	0.052	0.039	0.068	0.00045	151
0.06	572	0.046	0.053	0.040	0.070	0.00045	155
0.06	562	0.047	0.053	0.039	0.069	0.00045	152
0.06	781	0.074	0.079	0.065	0.096	0.00071	135
0.06	770	0.075	0.079	0.065	0.095	0.00072	132
0.06	770	0.074	0.079	0.065	0.095	0.00071	133
0.06	769	0.074	0.078	0.064	0.095	0.00071	134
0.06	780	0.074	0.079	0.065	0.096	0.00072	134
0.04	226	0.016	0.020	0.011	0.028	0.00015	182
0.04	226	0.015	0.021	0.011	0.028	0.00015	181
0.04	227	0.016	0.021	0.010	0.028	0.00015	182
0.04	231	0.016	0.021	0.011	0.028	0.00016	181
0.04	240	0.016	0.021	0.011	0.030	0.00016	188
0.04	393	0.031	0.035	0.023	0.048	0.00029	165
0.04	392	0.030	0.035	0.023	0.048	0.00029	167
0.04	393	0.030	0.035	0.023	0.048	0.00029	167
0.04	392	0.030	0.036	0.023	0.048	0.00029	166
0.04	392	0.029	0.036	0.023	0.048	0.00029	167
0.04	564	0.047	0.054	0.038	0.069	0.00046	152
0.04	554	0.046	0.053	0.037	0.068	0.00045	153
0.04	565	0.048	0.054	0.038	0.069	0.00046	151
0.04	566	0.048	0.054	0.038	0.070	0.00046	151
0.04	554	0.046	0.054	0.038	0.068	0.00045	150
0.04	770	0.076	0.081	0.064	0.095	0.00072	131
0.04	759	0.075	0.081	0.063	0.093	0.00072	130
0.04	770	0.076	0.081	0.064	0.095	0.00073	131
0.04	771	0.075	0.081	0.064	0.095	0.00072	131
0.04	770	0.075	0.081	0.064	0.095	0.00072	131
0.03	230	0.016	0.022	0.010	0.028	0.00016	181
0.03	229	0.016	0.022	0.010	0.028	0.00015	182
0.03	219	0.016	0.022	0.010	0.027	0.00016	173
0.03	230	0.016	0.022	0.010	0.028	0.00016	182
0.03	230	0.017	0.021	0.010	0.028	0.00016	182
0.03	391	0.030	0.038	0.021	0.048	0.00029	164
0.03	391	0.029	0.039	0.021	0.048	0.00029	166
0.03	391	0.031	0.040	0.022	0.048	0.00030	158
0.03	392	0.030	0.039	0.021	0.048	0.00030	163
0.03	392	0.029	0.039	0.021	0.048	0.00029	165
0.03	565	0.048	0.057	0.038	0.069	0.00047	149
0.03	552	0.047	0.055	0.038	0.068	0.00046	148
0.03	554	0.046	0.055	0.038	0.068	0.00046	149
0.03	553	0.047	0.057	0.038	0.068	0.00046	147
0.03	554	0.048	0.057	0.037	0.068	0.00046	147
0.03	782	0.077	0.084	0.064	0.096	0.00074	131
0.03	770	0.076	0.084	0.062	0.095	0.00073	130
0.03	771	0.077	0.084	0.064	0.095	0.00074	129
0.03	770	0.077	0.085	0.064	0.095	0.00074	128
0.03	760	0.078	0.085	0.064	0.093	0.00074	126
0.01	218	0.018	0.025	0.007	0.027	0.00016	165
0.01	218	0.017	0.024	0.007	0.027	0.00016	168
0.01	220	0.017	0.025	0.007	0.027	0.00016	169
0.01	228	0.016	0.024	0.007	0.028	0.00016	181
0.01	229	0.018	0.024	0.008	0.028	0.00017	170
0.01	392	0.031	0.044	0.017	0.048	0.00030	159
0.01	382	0.032	0.044	0.017	0.047	0.00031	153
0.01	391	0.032	0.045	0.017	0.048	0.00031	156
0.01	380	0.032	0.044	0.017	0.047	0.00030	153
0.01	392	0.032	0.045	0.017	0.048	0.00031	156
0.01	566	0.048	0.065	0.032	0.070	0.00048	146
0.01	554	0.048	0.065	0.031	0.068	0.00047	144
0.01	565	0.049	0.065	0.032	0.070	0.00048	145
0.01	554	0.050	0.064	0.032	0.068	0.00048	142
0.01	555	0.050	0.064	0.032	0.068	0.00048	142
0.01	770	0.079	0.094	0.059	0.095	0.00076	125
0.01	759	0.079	0.094	0.058	0.093	0.00076	123
0.01	771	0.079	0.095	0.058	0.095	0.00076	125
0.01	770	0.080	0.095	0.058	0.095	0.00076	124
0.01	760	0.081	0.094	0.058	0.094	0.00077	122

Table J.43: Resilient modulus data (D_2_18_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	226	0.019	0.017	0.022	0.030	0.00019	158
0.06	227	0.018	0.017	0.022	0.030	0.00018	161
0.06	236	0.017	0.017	0.021	0.031	0.00018	169
0.06	227	0.019	0.017	0.022	0.030	0.00019	159
0.06	227	0.018	0.017	0.022	0.030	0.00019	159
0.06	392	0.035	0.032	0.043	0.051	0.00036	143
0.06	391	0.034	0.032	0.042	0.051	0.00036	143
0.06	391	0.034	0.032	0.042	0.051	0.00036	144
0.06	379	0.034	0.032	0.042	0.050	0.00035	140
0.06	391	0.034	0.033	0.042	0.051	0.00036	143
0.06	564	0.055	0.052	0.067	0.074	0.00057	129
0.06	561	0.056	0.052	0.068	0.074	0.00057	128
0.06	555	0.055	0.051	0.068	0.073	0.00057	128
0.06	558	0.055	0.050	0.067	0.073	0.00057	129
0.06	560	0.055	0.051	0.066	0.073	0.00057	130
0.06	757	0.085	0.084	0.106	0.099	0.00090	110
0.06	758	0.086	0.084	0.106	0.099	0.00090	110
0.06	768	0.086	0.083	0.105	0.101	0.00090	112
0.06	769	0.086	0.084	0.105	0.101	0.00090	111
0.06	769	0.087	0.084	0.106	0.101	0.00091	111
0.04	218	0.019	0.017	0.023	0.029	0.00019	149
0.04	218	0.019	0.017	0.023	0.029	0.00019	148
0.04	227	0.018	0.017	0.023	0.030	0.00019	158
0.04	227	0.018	0.017	0.021	0.030	0.00018	162
0.04	228	0.018	0.017	0.023	0.030	0.00019	158
0.04	389	0.035	0.033	0.043	0.051	0.00036	140
0.04	391	0.036	0.033	0.043	0.051	0.00037	139
0.04	389	0.035	0.033	0.043	0.051	0.00036	140
0.04	390	0.035	0.033	0.044	0.051	0.00037	139
0.04	389	0.036	0.033	0.043	0.051	0.00037	139
0.04	553	0.056	0.052	0.069	0.072	0.00058	125
0.04	564	0.057	0.053	0.070	0.074	0.00059	125
0.04	554	0.057	0.052	0.069	0.073	0.00058	124
0.04	554	0.056	0.052	0.070	0.073	0.00059	124
0.04	542	0.057	0.052	0.070	0.071	0.00059	121
0.04	765	0.090	0.087	0.113	0.100	0.00095	106
0.04	767	0.090	0.087	0.112	0.101	0.00095	106
0.04	758	0.089	0.086	0.112	0.099	0.00094	105
0.04	769	0.090	0.086	0.112	0.101	0.00095	107
0.04	769	0.090	0.087	0.112	0.101	0.00095	106
0.03	229	0.019	0.017	0.022	0.030	0.00019	156
0.03	218	0.020	0.018	0.024	0.029	0.00020	141
0.03	228	0.020	0.018	0.024	0.030	0.00020	148
0.03	217	0.019	0.017	0.023	0.029	0.00019	148
0.03	217	0.019	0.017	0.024	0.029	0.00020	146
0.03	391	0.037	0.034	0.046	0.051	0.00039	132
0.03	390	0.037	0.034	0.046	0.051	0.00039	132
0.03	378	0.036	0.034	0.045	0.050	0.00038	131
0.03	380	0.037	0.034	0.045	0.050	0.00038	130
0.03	380	0.037	0.034	0.046	0.050	0.00039	129
0.03	542	0.058	0.054	0.073	0.071	0.00061	116
0.03	555	0.058	0.054	0.074	0.073	0.00061	119
0.03	552	0.059	0.055	0.073	0.072	0.00062	117
0.03	543	0.058	0.055	0.074	0.071	0.00061	116
0.03	554	0.058	0.055	0.074	0.073	0.00061	118
0.03	761	0.095	0.090	0.121	0.100	0.00100	100
0.03	779	0.094	0.090	0.121	0.102	0.00100	102
0.03	768	0.094	0.091	0.121	0.101	0.00100	101
0.03	759	0.094	0.091	0.121	0.099	0.00100	99
0.03	759	0.095	0.090	0.121	0.100	0.00100	99
0.01	219	0.020	0.018	0.024	0.029	0.00021	139
0.01	229	0.020	0.018	0.024	0.030	0.00021	146
0.01	218	0.020	0.018	0.024	0.029	0.00021	139
0.01	218	0.020	0.018	0.024	0.029	0.00021	139
0.01	217	0.020	0.018	0.024	0.028	0.00020	139
0.01	389	0.040	0.035	0.049	0.051	0.00041	126
0.01	380	0.040	0.035	0.050	0.050	0.00041	121
0.01	392	0.040	0.036	0.051	0.051	0.00042	123
0.01	389	0.039	0.036	0.050	0.051	0.00041	124
0.01	380	0.040	0.035	0.049	0.050	0.00041	122
0.01	543	0.064	0.059	0.081	0.071	0.00067	106
0.01	543	0.064	0.059	0.081	0.071	0.00067	106
0.01	554	0.063	0.059	0.081	0.073	0.00067	109
0.01	553	0.063	0.059	0.081	0.073	0.00067	109
0.01	554	0.063	0.059	0.081	0.073	0.00067	109
0.01	760	0.101	0.096	0.132	0.100	0.00108	92
0.01	771	0.099	0.096	0.132	0.101	0.00107	94
0.01	771	0.101	0.096	0.132	0.101	0.00108	94
0.01	760	0.100	0.096	0.131	0.100	0.00108	93
0.01	760	0.100	0.096	0.131	0.100	0.00108	93

Table J.44: Resilient modulus data (D_1_14_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	215	0.018	0.010	0.011	0.028	0.00013	222
0.06	215	0.017	0.010	0.011	0.028	0.00013	224
0.06	219	0.017	0.010	0.011	0.029	0.00013	228
0.06	241	0.017	0.010	0.011	0.032	0.00013	251
0.06	216	0.017	0.010	0.011	0.028	0.00013	225
0.06	399	0.032	0.020	0.020	0.052	0.00024	221
0.06	388	0.032	0.021	0.020	0.051	0.00024	212
0.06	389	0.032	0.020	0.021	0.051	0.00024	212
0.06	388	0.032	0.021	0.020	0.051	0.00024	212
0.06	389	0.032	0.020	0.021	0.051	0.00024	213
0.06	540	0.048	0.032	0.031	0.071	0.00036	194
0.06	540	0.048	0.032	0.031	0.071	0.00036	194
0.06	540	0.048	0.031	0.031	0.071	0.00036	196
0.06	540	0.048	0.032	0.031	0.071	0.00036	195
0.06	540	0.047	0.032	0.031	0.071	0.00036	195
0.06	746	0.070	0.051	0.048	0.098	0.00055	177
0.06	757	0.069	0.051	0.048	0.099	0.00055	180
0.06	768	0.069	0.051	0.049	0.101	0.00055	182
0.06	768	0.069	0.052	0.048	0.101	0.00055	182
0.06	768	0.070	0.051	0.049	0.101	0.00056	181
0.04	216	0.019	0.010	0.011	0.028	0.00013	213
0.04	216	0.018	0.010	0.011	0.028	0.00013	218
0.04	216	0.018	0.010	0.011	0.028	0.00013	218
0.04	215	0.018	0.010	0.011	0.028	0.00013	217
0.04	226	0.019	0.009	0.011	0.030	0.00013	228
0.04	378	0.034	0.020	0.020	0.050	0.00025	202
0.04	379	0.035	0.019	0.020	0.050	0.00024	203
0.04	378	0.035	0.019	0.020	0.050	0.00025	202
0.04	388	0.035	0.019	0.020	0.051	0.00024	208
0.04	392	0.035	0.019	0.020	0.051	0.00024	211
0.04	541	0.052	0.032	0.031	0.071	0.00038	188
0.04	540	0.052	0.032	0.031	0.071	0.00038	188
0.04	552	0.052	0.032	0.031	0.072	0.00038	192
0.04	552	0.052	0.032	0.031	0.072	0.00038	192
0.04	552	0.052	0.032	0.030	0.072	0.00038	193
0.04	758	0.076	0.051	0.049	0.099	0.00058	172
0.04	768	0.076	0.048	0.050	0.101	0.00057	175
0.04	769	0.076	0.049	0.049	0.101	0.00057	176
0.04	769	0.076	0.050	0.051	0.101	0.00058	173
0.04	758	0.076	0.049	0.049	0.099	0.00057	173
0.03	221	0.021	0.009	0.012	0.029	0.00014	212
0.03	216	0.021	0.009	0.012	0.028	0.00014	207
0.03	216	0.020	0.009	0.012	0.028	0.00013	211
0.03	216	0.021	0.009	0.012	0.028	0.00014	205
0.03	216	0.020	0.009	0.012	0.028	0.00014	210
0.03	378	0.039	0.019	0.020	0.050	0.00026	194
0.03	378	0.039	0.019	0.020	0.050	0.00026	194
0.03	378	0.039	0.019	0.020	0.050	0.00026	194
0.03	378	0.039	0.019	0.020	0.050	0.00026	194
0.03	378	0.039	0.019	0.020	0.050	0.00026	194
0.03	550	0.058	0.031	0.031	0.072	0.00040	183
0.03	553	0.058	0.031	0.032	0.073	0.00040	182
0.03	558	0.060	0.032	0.031	0.073	0.00040	182
0.03	571	0.059	0.031	0.031	0.075	0.00040	189
0.03	553	0.059	0.031	0.031	0.072	0.00040	183
0.03	758	0.085	0.050	0.052	0.099	0.00061	162
0.03	758	0.085	0.050	0.051	0.099	0.00061	163
0.03	762	0.085	0.051	0.052	0.100	0.00062	162
0.03	760	0.085	0.051	0.051	0.100	0.00061	163
0.03	759	0.085	0.050	0.051	0.100	0.00061	163
0.01	216	0.022	0.007	0.013	0.028	0.00014	202
0.01	219	0.023	0.008	0.013	0.029	0.00014	199
0.01	222	0.023	0.007	0.013	0.029	0.00014	203
0.01	237	0.022	0.007	0.013	0.031	0.00014	222
0.01	206	0.022	0.008	0.013	0.027	0.00014	188
0.01	391	0.044	0.016	0.024	0.051	0.00027	187
0.01	394	0.045	0.016	0.024	0.052	0.00028	188
0.01	391	0.044	0.017	0.024	0.051	0.00028	186
0.01	384	0.044	0.017	0.024	0.050	0.00027	183
0.01	380	0.044	0.017	0.024	0.050	0.00028	179
0.01	541	0.066	0.027	0.034	0.071	0.00042	170
0.01	542	0.066	0.027	0.034	0.071	0.00042	170
0.01	552	0.067	0.028	0.034	0.072	0.00042	171
0.01	546	0.066	0.027	0.034	0.072	0.00042	171
0.01	551	0.067	0.027	0.035	0.072	0.00042	170
0.01	748	0.096	0.048	0.055	0.098	0.00066	150
0.01	758	0.097	0.048	0.055	0.099	0.00066	151
0.01	758	0.097	0.048	0.054	0.099	0.00065	152
0.01	758	0.097	0.048	0.055	0.099	0.00066	151
0.01	769	0.097	0.049	0.055	0.101	0.00066	152

Table J.45: Resilient modulus data (D_2_14_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	236	0.012	0.011	0.017	0.031	0.00013	237
0.06	225	0.012	0.011	0.017	0.030	0.00013	226
0.06	226	0.012	0.012	0.017	0.030	0.00013	221
0.06	225	0.012	0.011	0.017	0.030	0.00013	227
0.06	236	0.013	0.011	0.017	0.031	0.00013	233
0.06	389	0.027	0.020	0.029	0.051	0.00025	206
0.06	389	0.026	0.021	0.028	0.051	0.00024	209
0.06	389	0.026	0.021	0.028	0.051	0.00024	209
0.06	379	0.027	0.020	0.028	0.050	0.00025	202
0.06	388	0.026	0.021	0.028	0.051	0.00025	207
0.06	550	0.041	0.031	0.042	0.072	0.00038	192
0.06	551	0.041	0.031	0.042	0.072	0.00038	193
0.06	552	0.040	0.031	0.042	0.072	0.00037	194
0.06	551	0.041	0.031	0.042	0.072	0.00037	193
0.06	562	0.041	0.032	0.042	0.074	0.00038	195
0.06	769	0.064	0.047	0.062	0.101	0.00057	178
0.06	768	0.064	0.048	0.062	0.101	0.00057	176
0.06	768	0.064	0.048	0.062	0.101	0.00057	177
0.06	778	0.065	0.048	0.063	0.102	0.00058	177
0.06	779	0.064	0.048	0.062	0.102	0.00057	179
0.04	227	0.013	0.011	0.018	0.030	0.00014	217
0.04	215	0.014	0.011	0.018	0.028	0.00014	202
0.04	226	0.013	0.011	0.018	0.030	0.00014	217
0.04	227	0.013	0.011	0.018	0.030	0.00014	217
0.04	220	0.013	0.011	0.018	0.029	0.00014	212
0.04	390	0.026	0.021	0.030	0.051	0.00025	203
0.04	389	0.026	0.022	0.030	0.051	0.00025	201
0.04	388	0.027	0.022	0.030	0.051	0.00026	197
0.04	401	0.026	0.022	0.030	0.053	0.00025	206
0.04	384	0.027	0.022	0.030	0.050	0.00026	195
0.04	558	0.042	0.034	0.044	0.073	0.00039	186
0.04	568	0.043	0.034	0.044	0.075	0.00040	188
0.04	552	0.043	0.034	0.043	0.072	0.00039	184
0.04	540	0.042	0.033	0.043	0.071	0.00039	184
0.04	552	0.043	0.034	0.044	0.072	0.00040	183
0.04	769	0.068	0.051	0.065	0.101	0.00061	167
0.04	769	0.067	0.051	0.065	0.101	0.00060	167
0.04	768	0.067	0.051	0.064	0.101	0.00060	168
0.04	779	0.066	0.051	0.065	0.102	0.00060	171
0.04	779	0.067	0.051	0.065	0.102	0.00060	170
0.03	227	0.013	0.013	0.018	0.030	0.00015	205
0.03	228	0.013	0.012	0.019	0.030	0.00014	209
0.03	227	0.014	0.013	0.018	0.030	0.00015	200
0.03	216	0.014	0.012	0.018	0.028	0.00015	195
0.03	216	0.013	0.013	0.018	0.028	0.00015	193
0.03	390	0.027	0.024	0.032	0.051	0.00027	186
0.03	390	0.027	0.024	0.031	0.051	0.00027	189
0.03	389	0.028	0.024	0.031	0.051	0.00027	186
0.03	389	0.027	0.024	0.032	0.051	0.00027	186
0.03	379	0.027	0.024	0.032	0.050	0.00028	181
0.03	553	0.046	0.038	0.045	0.072	0.00042	171
0.03	553	0.045	0.038	0.045	0.072	0.00042	172
0.03	542	0.046	0.038	0.045	0.071	0.00043	167
0.03	543	0.045	0.038	0.046	0.071	0.00042	168
0.03	553	0.045	0.038	0.047	0.073	0.00043	170
0.03	769	0.071	0.056	0.067	0.101	0.00063	159
0.03	771	0.072	0.056	0.067	0.101	0.00064	158
0.03	764	0.072	0.057	0.068	0.100	0.00064	155
0.03	790	0.072	0.057	0.067	0.104	0.00064	162
0.03	769	0.071	0.056	0.067	0.101	0.00063	159
0.01	216	0.014	0.016	0.018	0.028	0.00016	179
0.01	226	0.014	0.016	0.018	0.030	0.00016	188
0.01	216	0.015	0.016	0.018	0.028	0.00016	175
0.01	227	0.014	0.016	0.018	0.030	0.00016	188
0.01	217	0.015	0.015	0.018	0.028	0.00016	179
0.01	392	0.029	0.029	0.033	0.051	0.00030	173
0.01	391	0.029	0.029	0.033	0.051	0.00030	172
0.01	381	0.029	0.029	0.033	0.050	0.00030	167
0.01	392	0.029	0.029	0.033	0.051	0.00030	172
0.01	381	0.029	0.029	0.033	0.050	0.00030	167
0.01	553	0.048	0.045	0.049	0.073	0.00046	156
0.01	553	0.047	0.045	0.048	0.072	0.00046	158
0.01	552	0.047	0.045	0.049	0.072	0.00046	157
0.01	553	0.047	0.045	0.048	0.073	0.00046	158
0.01	553	0.048	0.044	0.049	0.073	0.00046	157
0.01	780	0.075	0.066	0.072	0.102	0.00070	147
0.01	770	0.075	0.065	0.073	0.101	0.00070	145
0.01	758	0.074	0.066	0.073	0.099	0.00070	142
0.01	759	0.074	0.065	0.072	0.099	0.00069	144
0.01	770	0.075	0.065	0.072	0.101	0.00069	145

Table J.46: Resilient modulus data (D_1_11_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	224	0.006	0.011	0.016	0.029	0.00011	273
0.06	223	0.006	0.011	0.016	0.029	0.00011	272
0.06	226	0.006	0.011	0.016	0.030	0.00011	275
0.06	228	0.006	0.011	0.016	0.030	0.00011	278
0.06	225	0.007	0.011	0.016	0.029	0.00011	266
0.06	403	0.011	0.023	0.030	0.053	0.00021	251
0.06	408	0.011	0.022	0.030	0.053	0.00021	259
0.06	398	0.010	0.023	0.030	0.052	0.00021	253
0.06	387	0.011	0.022	0.030	0.051	0.00021	247
0.06	387	0.011	0.023	0.030	0.051	0.00021	243
0.06	548	0.017	0.034	0.042	0.072	0.00031	236
0.06	548	0.016	0.034	0.042	0.072	0.00030	238
0.06	560	0.016	0.034	0.042	0.073	0.00030	244
0.06	560	0.017	0.034	0.043	0.073	0.00031	239
0.06	560	0.017	0.034	0.042	0.073	0.00030	242
0.06	781	0.025	0.050	0.056	0.102	0.00043	237
0.06	781	0.026	0.050	0.056	0.102	0.00044	235
0.06	771	0.026	0.050	0.055	0.101	0.00043	234
0.06	771	0.026	0.050	0.056	0.101	0.00043	233
0.06	781	0.026	0.050	0.056	0.102	0.00043	236
0.04	223	0.006	0.013	0.020	0.029	0.00013	226
0.04	212	0.006	0.012	0.020	0.028	0.00013	222
0.04	224	0.006	0.013	0.019	0.029	0.00013	233
0.04	224	0.006	0.012	0.019	0.029	0.00012	239
0.04	245	0.006	0.013	0.020	0.032	0.00013	248
0.04	386	0.011	0.026	0.034	0.051	0.00023	217
0.04	386	0.011	0.025	0.034	0.051	0.00023	220
0.04	386	0.011	0.026	0.034	0.051	0.00023	216
0.04	396	0.012	0.025	0.034	0.052	0.00023	222
0.04	386	0.012	0.025	0.034	0.051	0.00023	216
0.04	560	0.017	0.039	0.048	0.073	0.00034	214
0.04	559	0.017	0.038	0.048	0.073	0.00034	216
0.04	563	0.018	0.039	0.048	0.074	0.00034	215
0.04	557	0.018	0.039	0.048	0.073	0.00034	213
0.04	575	0.018	0.038	0.048	0.075	0.00034	222
0.04	772	0.027	0.055	0.065	0.101	0.00048	210
0.04	783	0.027	0.055	0.065	0.103	0.00048	213
0.04	782	0.027	0.055	0.065	0.103	0.00048	213
0.04	772	0.027	0.055	0.065	0.101	0.00048	211
0.04	772	0.027	0.055	0.065	0.101	0.00048	211
0.03	225	0.007	0.014	0.024	0.030	0.00015	200
0.03	225	0.008	0.015	0.024	0.030	0.00015	191
0.03	237	0.007	0.014	0.023	0.031	0.00014	216
0.03	225	0.007	0.015	0.023	0.030	0.00015	200
0.03	225	0.008	0.014	0.024	0.030	0.00015	196
0.03	387	0.013	0.029	0.042	0.051	0.00027	186
0.03	398	0.013	0.029	0.042	0.052	0.00027	191
0.03	387	0.013	0.029	0.042	0.051	0.00027	186
0.03	387	0.014	0.029	0.042	0.051	0.00028	184
0.03	387	0.013	0.029	0.042	0.051	0.00027	186
0.03	567	0.018	0.043	0.058	0.074	0.00039	189
0.03	557	0.018	0.043	0.058	0.073	0.00039	186
0.03	566	0.019	0.043	0.058	0.074	0.00040	188
0.03	556	0.019	0.043	0.058	0.073	0.00040	184
0.03	557	0.019	0.043	0.058	0.073	0.00040	185
0.03	784	0.028	0.063	0.078	0.103	0.00056	185
0.03	773	0.030	0.062	0.078	0.101	0.00056	181
0.03	773	0.029	0.063	0.078	0.101	0.00056	181
0.03	773	0.029	0.062	0.078	0.101	0.00056	182
0.03	783	0.029	0.063	0.078	0.103	0.00056	184
0.01	219	0.008	0.009	0.034	0.029	0.00017	172
0.01	202	0.008	0.008	0.034	0.026	0.00016	161
0.01	225	0.007	0.008	0.034	0.029	0.00016	181
0.01	206	0.008	0.009	0.033	0.027	0.00016	164
0.01	216	0.008	0.009	0.035	0.028	0.00017	169
0.01	390	0.016	0.025	0.059	0.051	0.00033	155
0.01	380	0.017	0.025	0.059	0.050	0.00033	151
0.01	390	0.016	0.025	0.058	0.051	0.00033	157
0.01	390	0.016	0.025	0.059	0.051	0.00033	155
0.01	390	0.016	0.026	0.058	0.051	0.00033	157
0.01	538	0.024	0.043	0.080	0.071	0.00048	146
0.01	549	0.023	0.042	0.079	0.072	0.00047	152
0.01	549	0.025	0.044	0.080	0.072	0.00049	147
0.01	549	0.024	0.043	0.079	0.072	0.00048	150
0.01	549	0.025	0.043	0.079	0.072	0.00048	149
0.01	766	0.036	0.068	0.108	0.100	0.00069	145
0.01	765	0.036	0.067	0.106	0.100	0.00069	146
0.01	766	0.035	0.068	0.107	0.100	0.00069	146
0.01	777	0.036	0.068	0.107	0.102	0.00069	147
0.01	776	0.036	0.068	0.107	0.102	0.00069	147

Table J.47: Resilient modulus data (D_2_11_98)

σ_3 [MPa]	q [N]	$\delta_{LVDT\#1}$ [mm]	$\delta_{LVDT\#2}$ [mm]	$\delta_{LVDT\#3}$ [mm]	σ_{DEV} [MPa]	ε [-]	M_R [MPa]
0.06	223	-0.011	0.012	0.006	0.029	0.00002	1303
0.06	224	-0.011	0.012	0.006	0.029	0.00003	1170
0.06	223	0.012	0.013	0.006	0.029	0.00010	288
0.06	223	-0.019	0.012	0.006	0.029	0.00000	-15264
0.06	222	-0.022	0.012	0.006	0.029	-0.00001	-2304
0.06	387	-0.013	0.014	0.007	0.051	0.00003	2003
0.06	387	-0.011	0.014	0.007	0.051	0.00003	1540
0.06	386	-0.011	0.014	0.007	0.051	0.00003	1640
0.06	386	-0.011	0.014	0.007	0.051	0.00003	1539
0.06	387	-0.010	0.014	0.007	0.051	0.00003	1477
0.06	547	-0.004	0.015	0.007	0.072	0.00006	1235
0.06	560	-0.007	0.015	0.007	0.073	0.00005	1551
0.06	564	-0.005	0.015	0.007	0.074	0.00006	1330
0.06	566	-0.004	0.015	0.007	0.074	0.00006	1319
0.06	558	0.012	0.015	0.007	0.073	0.00011	662
0.06	776	-0.012	0.016	0.006	0.102	0.00003	3021
0.06	765	0.014	0.016	0.006	0.100	0.00012	859
0.06	765	-0.018	0.016	0.006	0.100	0.00001	9437
0.06	766	-0.010	0.016	0.006	0.100	0.00004	2631
0.06	776	-0.015	0.016	0.006	0.102	0.00002	4718
0.04	224	-0.015	0.022	0.012	0.029	0.00006	465
0.04	223	0.012	0.022	0.013	0.029	0.00015	189
0.04	222	-0.008	0.023	0.012	0.029	0.00009	334
0.04	224	0.016	0.022	0.012	0.029	0.00016	179
0.04	223	0.013	0.022	0.012	0.029	0.00015	193
0.04	386	-0.016	0.024	0.013	0.051	0.00007	746
0.04	386	-0.014	0.024	0.013	0.051	0.00007	679
0.04	384	0.012	0.023	0.013	0.050	0.00016	315
0.04	374	0.020	0.022	0.013	0.049	0.00018	269
0.04	385	0.023	0.023	0.013	0.050	0.00019	259
0.04	558	0.013	0.023	0.015	0.073	0.00017	440
0.04	548	0.011	0.023	0.015	0.072	0.00016	450
0.04	563	0.014	0.023	0.015	0.074	0.00017	436
0.04	569	0.012	0.024	0.015	0.075	0.00017	449
0.04	556	0.014	0.023	0.015	0.073	0.00017	435
0.04	770	0.009	0.026	0.014	0.101	0.00016	628
0.04	779	-0.012	0.026	0.015	0.102	0.00009	1079
0.04	766	-0.009	0.026	0.014	0.100	0.00010	1010
0.04	766	-0.014	0.026	0.014	0.100	0.00009	1173
0.04	776	-0.012	0.026	0.014	0.102	0.00009	1128
0.03	225	-0.007	0.031	0.019	0.030	0.00014	205
0.03	225	0.005	0.031	0.019	0.030	0.00018	161
0.03	225	-0.008	0.031	0.019	0.030	0.00014	211
0.03	224	-0.008	0.031	0.019	0.029	0.00014	211
0.03	217	-0.010	0.031	0.019	0.028	0.00013	216
0.03	387	-0.010	0.033	0.020	0.051	0.00014	356
0.03	377	-0.013	0.033	0.019	0.049	0.00013	381
0.03	388	-0.008	0.033	0.019	0.051	0.00015	349
0.03	388	0.013	0.033	0.019	0.051	0.00022	235
0.03	386	-0.012	0.033	0.019	0.051	0.00013	382
0.03	550	-0.009	0.034	0.022	0.072	0.00015	471
0.03	562	0.018	0.034	0.022	0.074	0.00024	305
0.03	551	0.018	0.034	0.022	0.072	0.00024	298
0.03	549	0.006	0.034	0.022	0.072	0.00020	356
0.03	560	0.010	0.034	0.022	0.073	0.00021	345
0.03	766	0.010	0.037	0.022	0.100	0.00023	445
0.03	776	-0.007	0.037	0.022	0.102	0.00017	595
0.03	766	-0.014	0.037	0.022	0.100	0.00015	674
0.03	766	0.010	0.038	0.022	0.100	0.00023	439
0.03	777	-0.015	0.038	0.022	0.102	0.00015	695
0.01	224	0.007	0.045	0.028	0.029	0.00026	111
0.01	224	-0.007	0.044	0.028	0.029	0.00021	139
0.01	216	0.009	0.044	0.028	0.028	0.00027	106
0.01	235	-0.005	0.045	0.028	0.031	0.00022	137
0.01	218	-0.016	0.045	0.028	0.029	0.00019	153
0.01	388	-0.013	0.047	0.029	0.051	0.00021	244
0.01	388	-0.024	0.047	0.029	0.051	0.00017	294
0.01	387	-0.019	0.047	0.030	0.051	0.00019	266
0.01	387	-0.019	0.047	0.029	0.051	0.00019	267
0.01	388	-0.014	0.047	0.029	0.051	0.00021	247
0.01	564	0.005	0.049	0.032	0.074	0.00028	262
0.01	559	0.014	0.049	0.032	0.073	0.00031	237
0.01	554	0.006	0.049	0.032	0.073	0.00028	255
0.01	559	-0.006	0.049	0.032	0.073	0.00025	299
0.01	549	-0.011	0.049	0.032	0.072	0.00023	317
0.01	779	0.008	0.053	0.034	0.102	0.00031	328
0.01	778	-0.013	0.054	0.034	0.102	0.00025	412
0.01	778	0.007	0.053	0.034	0.102	0.00031	330
0.01	767	-0.011	0.053	0.034	0.101	0.00025	403
0.01	767	0.008	0.053	0.034	0.101	0.00031	323

J.2 Resilient Modulus Data [US Customary]

Table J.48: Resilient modulus data (A_2_135_105)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	51.34	0.00042	0.00039	0.00021	4.34	0.00009	50715
8	52.44	-0.00046	0.00039	0.00022	4.44	0.00001	359167
8	53.41	-0.00051	0.00039	0.00022	4.52	0.00001	511925
8	51.26	-0.00033	0.00040	0.00022	4.34	0.00002	183668
8	51.14	0.00056	0.00039	0.00022	4.32	0.00010	44237
8	87.49	0.00052	0.00070	0.00029	7.40	0.00013	58813
8	87.65	0.00039	0.00071	0.00041	7.41	0.00013	58846
8	87.56	-0.00041	0.00058	0.00029	7.41	0.00004	191856
8	87.59	-0.00039	0.00071	0.00029	7.41	0.00005	146582
8	87.82	0.00056	0.00070	0.00029	7.43	0.00013	57373
8	124.04	-0.00041	0.00091	0.00050	10.49	0.00008	125688
8	123.83	0.00051	0.00102	0.00050	10.47	0.00017	61962
8	124.34	0.00047	0.00103	0.00050	10.52	0.00017	63324
8	123.78	-0.00053	0.00103	0.00050	10.47	0.00008	126202
8	126.27	-0.00052	0.00103	0.00050	10.68	0.00008	126633
8	173.36	0.00066	0.00138	0.00064	14.66	0.00022	65719
8	175.02	0.00052	0.00137	0.00063	14.80	0.00021	70470
8	172.79	0.00079	0.00137	0.00064	14.61	0.00023	62738
8	172.44	0.00055	0.00137	0.00076	14.58	0.00022	65330
8	175.06	0.00040	0.00137	0.00063	14.81	0.00020	73931
6	52.64	-0.00033	0.00038	0.00027	4.45	0.00003	167653
6	55.22	0.00044	0.00038	0.00026	4.67	0.00009	51531
6	51.15	0.00064	0.00038	0.00015	4.33	0.00010	44605
6	51.22	-0.00037	0.00038	0.00014	4.33	0.00001	342607
6	51.18	-0.00031	0.00038	0.00015	4.33	0.00002	236772
6	87.55	0.00046	0.00072	0.00035	7.40	0.00013	58208
6	87.90	-0.00037	0.00073	0.00034	7.43	0.00006	127287
6	87.55	0.00045	0.00072	0.00035	7.40	0.00013	58553
6	87.61	0.00057	0.00073	0.00034	7.41	0.00014	54098
6	87.88	-0.00045	0.00073	0.00034	7.43	0.00005	144072
6	123.10	0.00046	0.00102	0.00042	10.41	0.00016	65744
6	127.25	-0.00044	0.00102	0.00041	10.76	0.00008	130786
6	123.94	0.00048	0.00102	0.00041	10.48	0.00016	65767
6	124.32	-0.00045	0.00151	0.00103	10.51	0.00017	60621
6	124.20	-0.00052	0.00102	0.00042	10.50	0.00008	137876
6	178.48	0.00048	0.00146	0.00062	15.09	0.00021	70948
6	175.37	0.00054	0.00145	0.00062	14.83	0.00022	68013
6	175.37	0.00069	0.00158	0.00062	14.83	0.00024	61771
6	175.41	0.00040	0.00157	0.00062	14.84	0.00022	68634
6	175.35	0.00070	0.00157	0.00062	14.83	0.00024	61519
4	50.99	0.00046	0.00038	0.00019	4.31	0.00009	50633
4	50.82	-0.00038	0.00037	0.00019	4.30	0.00002	281098
4	51.13	-0.00041	0.00037	0.00019	4.32	0.00001	326599
4	50.90	0.00045	0.00049	0.00019	4.30	0.00009	45388
4	50.78	-0.00038	0.00050	0.00019	4.29	0.00003	166095
4	87.55	0.00037	0.00066	0.00027	7.40	0.00011	68238
4	87.51	-0.00050	0.00066	0.00039	7.40	0.00005	159772
4	87.46	-0.00044	0.00078	0.00039	7.40	0.00006	120381
4	87.42	0.00044	0.00078	0.00039	7.39	0.00013	55224
4	87.36	-0.00045	0.00078	0.00039	7.39	0.00006	123006
4	124.58	0.00046	0.00106	0.00047	10.54	0.00017	63838
4	124.68	0.00070	0.00106	0.00047	10.55	0.00019	56879
4	124.44	-0.00040	0.00105	0.00047	10.52	0.00009	112230
4	124.36	-0.00043	0.00106	0.00047	10.52	0.00009	115376
4	124.37	-0.00035	0.00106	0.00047	10.52	0.00010	107752
4	176.24	0.00046	0.00164	0.00064	14.91	0.00023	65213
4	177.23	0.00065	0.00151	0.00064	14.99	0.00023	64218
4	177.14	0.00065	0.00151	0.00063	14.98	0.00023	64417
4	175.74	0.00055	0.00151	0.00063	14.86	0.00022	66286
4	175.42	0.00084	0.00163	0.00064	14.84	0.00026	57347
2	51.16	0.00062	0.00049	0.00030	4.33	0.00012	36679
2	52.00	-0.00036	0.00037	0.00031	4.40	0.00003	167521
2	50.77	-0.00035	0.00049	0.00030	4.29	0.00004	115773
2	50.98	-0.00049	0.00050	0.00030	4.31	0.00003	167986
2	49.06	-0.00042	0.00049	0.00030	4.15	0.00003	134373
2	88.03	-0.00049	0.00077	0.00039	7.45	0.00006	134700
2	88.17	-0.00049	0.00077	0.00039	7.46	0.00006	134162
2	87.98	0.00046	0.00077	0.00039	7.44	0.00013	55267
2	87.83	-0.00060	0.00076	0.00039	7.43	0.00005	162101
2	87.95	0.00038	0.00076	0.00039	7.44	0.00013	58165
2	127.82	-0.00047	0.00114	0.00043	10.81	0.00009	118490
2	124.46	0.00051	0.00113	0.00055	10.53	0.00018	57604
2	124.47	0.00045	0.00101	0.00043	10.53	0.00016	66809
2	124.46	0.00046	0.00113	0.00044	10.53	0.00017	62438
2	127.12	0.00048	0.00113	0.00043	10.75	0.00017	62891
2	175.83	0.00050	0.00163	0.00063	14.87	0.00023	64547
2	175.72	0.00048	0.00163	0.00063	14.86	0.00023	65189
2	173.60	0.00058	0.00163	0.00064	14.68	0.00024	61898
2	175.44	0.00056	0.00162	0.00063	14.84	0.00024	63131
2	178.07	0.00053	0.00163	0.00063	15.06	0.00023	64895

Table J.49: Resilient modulus data (A_1_105_105)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.92	0.00026	0.00033	0.00013	4.05	0.00006	66331
8	50.80	-0.00033	0.00033	0.00014	4.04	0.00001	348825
8	51.23	0.00040	0.00034	0.00014	4.08	0.00007	56343
8	52.18	-0.00026	0.00033	0.00013	4.15	0.00002	241880
8	54.51	0.00023	0.00033	0.00013	4.34	0.00006	75050
8	87.42	0.00054	0.00053	0.00025	6.96	0.00011	63346
8	87.75	0.00040	0.00053	0.00025	6.98	0.00010	71118
8	87.33	0.00051	0.00053	0.00025	6.95	0.00011	64893
8	87.44	0.00042	0.00053	0.00025	6.96	0.00010	69598
8	87.49	0.00042	0.00053	0.00024	6.96	0.00010	70113
8	124.01	0.00049	0.00086	0.00044	9.87	0.00015	65911
8	124.02	0.00057	0.00086	0.00032	9.87	0.00015	67395
8	124.03	0.00047	0.00086	0.00032	9.87	0.00014	71594
8	123.96	0.00067	0.00074	0.00044	9.86	0.00015	63780
8	124.09	0.00066	0.00074	0.00044	9.87	0.00015	64338
8	172.72	0.00090	0.00118	0.00053	13.74	0.00022	62892
8	175.07	0.00102	0.00119	0.00053	13.93	0.00023	60903
8	175.04	0.00095	0.00119	0.00054	13.93	0.00022	62352
8	172.45	0.00086	0.00131	0.00053	13.72	0.00023	60851
8	175.32	0.00094	0.00119	0.00054	13.95	0.00022	62915
6	48.78	0.00034	0.00029	0.00016	3.88	0.00007	59570
6	48.31	0.00030	0.00029	0.00016	3.84	0.00006	62433
6	48.52	0.00025	0.00029	0.00016	3.86	0.00006	66589
6	48.55	-0.00025	0.00029	0.00016	3.86	0.00002	236198
6	48.53	0.00040	0.00029	0.00016	3.86	0.00007	54922
6	87.68	0.00044	0.00050	0.00014	6.98	0.00009	77521
6	87.65	0.00059	0.00050	0.00015	6.98	0.00010	67941
6	85.01	0.00043	0.00050	0.00015	6.77	0.00009	75795
6	87.99	0.00043	0.00050	0.00027	7.00	0.00010	70487
6	87.44	0.00051	0.00050	0.00015	6.96	0.00010	72638
6	124.06	0.00064	0.00080	0.00036	9.87	0.00015	65931
6	124.19	0.00072	0.00080	0.00036	9.88	0.00016	63244
6	124.05	0.00069	0.00080	0.00023	9.87	0.00014	68814
6	123.97	0.00066	0.00080	0.00035	9.87	0.00015	65470
6	123.92	0.00067	0.00080	0.00035	9.86	0.00015	65082
6	176.38	0.00093	0.00124	0.00044	14.04	0.00022	64419
6	173.41	0.00094	0.00125	0.00044	13.80	0.00022	63082
6	172.83	0.00096	0.00124	0.00044	13.75	0.00022	62421
6	172.97	0.00112	0.00125	0.00044	13.76	0.00023	58830
6	173.31	0.00090	0.00124	0.00044	13.79	0.00022	64139
4	48.57	0.00023	0.00038	-0.00015	3.87	0.00004	99685
4	48.73	0.00028	0.00038	-0.00015	3.88	0.00004	91288
4	48.74	0.00028	0.00038	-0.00015	3.88	0.00004	92075
4	48.65	0.00031	0.00038	-0.00015	3.87	0.00004	87086
4	48.35	0.00021	0.00037	-0.00015	3.85	0.00004	105090
4	85.36	0.00054	0.00056	0.00014	6.79	0.00010	65948
4	85.22	0.00042	0.00056	0.00025	6.78	0.00010	65836
4	87.56	0.00055	0.00056	0.00013	6.97	0.00010	67308
4	87.70	0.00035	0.00056	0.00013	6.98	0.00009	80376
4	85.20	0.00053	0.00044	0.00025	6.78	0.00010	66356
4	122.18	0.00064	0.00077	0.00032	9.72	0.00014	67146
4	124.78	0.00076	0.00077	0.00032	9.93	0.00015	64451
4	124.40	0.00067	0.00077	0.00033	9.90	0.00015	67569
4	124.35	0.00062	0.00089	0.00033	9.90	0.00015	64527
4	124.34	0.00070	0.00077	0.00032	9.89	0.00015	66457
4	173.15	0.00089	0.00121	0.00053	13.78	0.00022	62927
4	175.66	0.00090	0.00121	0.00041	13.98	0.00021	66566
4	172.96	0.00110	0.00121	0.00041	13.76	0.00023	60835
4	173.56	0.00104	0.00121	0.00053	13.81	0.00023	59648
4	175.04	0.00103	0.00121	0.00041	13.93	0.00022	63181
2	49.06	-0.00024	0.00039	0.00013	3.90	0.00002	167338
2	49.15	0.00019	0.00039	-0.00012	3.91	0.00004	102315
2	49.00	0.00042	0.00027	-0.00013	3.90	0.00005	82658
2	49.06	0.00033	0.00027	0.00012	3.90	0.00006	64958
2	51.65	0.00028	0.00039	-0.00012	4.11	0.00005	91174
2	87.90	0.00038	0.00056	0.00016	6.99	0.00009	76031
2	88.10	0.00056	0.00057	0.00016	7.01	0.00011	65214
2	88.14	0.00034	0.00057	0.00016	7.01	0.00009	78505
2	87.96	0.00045	0.00057	0.00016	7.00	0.00010	71473
2	87.95	0.00054	0.00056	0.00016	7.00	0.00011	66099
2	124.26	0.00067	0.00078	0.00027	9.89	0.00014	69069
2	124.02	0.00065	0.00078	0.00027	9.87	0.00014	69706
2	124.27	0.00067	0.00078	0.00027	9.89	0.00014	69075
2	126.57	0.00068	0.00078	0.00027	10.07	0.00014	70202
2	124.06	0.00085	0.00078	0.00027	9.87	0.00016	62590
2	173.29	0.00088	0.00125	0.00049	13.79	0.00022	63275
2	174.00	0.00079	0.00124	0.00048	13.85	0.00021	66050
2	175.72	0.00097	0.00124	0.00049	13.98	0.00023	62107
2	173.25	0.00100	0.00124	0.00049	13.79	0.00023	60568
2	176.02	0.00095	0.00124	0.00048	14.01	0.00022	62976

Table J.50: Resilient modulus data (A_2_105_105)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	48.34	0.00039	-0.00063	0.00076	4.09	0.00004	94216
8	48.48	0.00046	-0.00050	0.00076	4.10	0.00006	68309
8	49.46	0.00040	-0.00051	0.00076	4.18	0.00005	77060
8	77.20	-0.00273	-0.00197	0.00076	6.53	-0.00033	-19916
8	50.69	0.00031	-0.00050	0.00076	4.29	0.00005	90653
8	87.45	0.00054	-0.00083	0.00116	7.40	0.00007	101771
8	87.74	0.00054	-0.00084	0.00116	7.42	0.00007	102117
8	85.00	0.00067	-0.00083	0.00116	7.19	0.00008	86820
8	87.63	0.00065	-0.00083	0.00116	7.41	0.00008	90327
8	87.56	0.00054	-0.00083	0.00116	7.41	0.00007	103196
8	123.89	0.00074	-0.00081	0.00142	10.48	0.00011	92676
8	124.77	0.00088	-0.00081	0.00155	10.55	0.00013	78320
8	126.15	0.00089	-0.00093	0.00143	10.67	0.00012	92088
8	124.90	0.00071	-0.00080	0.00155	10.56	0.00012	87203
8	123.98	0.00078	-0.00081	0.00154	10.49	0.00013	83044
8	173.21	0.00117	-0.00091	0.00202	14.65	0.00019	76791
8	173.14	0.00116	-0.00090	0.00202	14.64	0.00019	77160
8	173.06	0.00115	-0.00089	0.00202	14.64	0.00019	77250
8	173.07	0.00126	-0.00090	0.00201	14.64	0.00020	73904
8	172.82	0.00124	-0.00090	0.00201	14.62	0.00020	74720
6	48.37	0.00032	-0.00048	0.00066	4.09	0.00004	98312
6	48.64	0.00042	-0.00060	0.00066	4.11	0.00004	102243
6	48.83	0.00042	-0.00048	0.00066	4.13	0.00005	82375
6	48.83	0.00053	-0.00048	0.00067	4.13	0.00006	69165
6	48.53	-0.00027	-0.00061	0.00066	4.10	-0.00002	-236219
6	87.35	0.00044	-0.00068	0.00109	7.39	0.00007	104959
6	87.28	0.00058	-0.00068	0.00109	7.38	0.00008	88809
6	87.54	0.00062	-0.00068	0.00109	7.40	0.00009	86309
6	87.34	0.00059	-0.00068	0.00109	7.39	0.00008	88778
6	85.88	0.00063	-0.00068	0.00109	7.26	0.00009	84212
6	124.30	0.00080	-0.00080	0.00147	10.51	0.00012	85752
6	124.49	0.00088	-0.00080	0.00148	10.53	0.00013	81097
6	124.29	0.00093	-0.00080	0.00147	10.51	0.00013	78640
6	124.73	0.00075	-0.00081	0.00148	10.55	0.00012	89215
6	124.35	0.00075	-0.00080	0.00147	10.52	0.00012	88826
6	175.29	0.00136	-0.00085	0.00190	14.83	0.00020	73738
6	175.29	0.00130	-0.00085	0.00191	14.83	0.00020	75646
6	173.52	0.00126	-0.00085	0.00191	14.68	0.00019	75987
6	174.37	0.00131	-0.00085	0.00190	14.75	0.00020	74968
6	176.07	0.00117	-0.00085	0.00191	14.89	0.00019	80195
4	51.29	0.00026	-0.00047	0.00066	4.34	0.00004	114858
4	51.32	0.00033	-0.00047	0.00067	4.34	0.00004	99553
4	48.69	0.00038	-0.00047	0.00054	4.12	0.00004	108137
4	48.75	0.00042	-0.00047	0.00054	4.12	0.00004	102654
4	51.39	0.00033	-0.00035	0.00067	4.35	0.00005	80907
4	87.53	0.00055	-0.00044	0.00096	7.40	0.00009	82498
4	85.17	0.00057	-0.00057	0.00096	7.20	0.00008	89636
4	85.17	0.00058	-0.00057	0.00096	7.20	0.00008	88351
4	85.01	0.00052	-0.00044	0.00096	7.19	0.00009	83081
4	85.10	0.00042	-0.00045	0.00097	7.20	0.00008	91818
4	125.06	0.00079	-0.00072	0.00124	10.58	0.00011	96934
4	124.32	0.00084	-0.00072	0.00136	10.51	0.00012	84994
4	124.62	0.00078	-0.00072	0.00137	10.54	0.00012	88354
4	121.79	0.00075	-0.00072	0.00137	10.30	0.00012	88912
4	121.80	0.00090	-0.00072	0.00137	10.30	0.00013	80088
4	175.82	0.00128	-0.00092	0.00189	14.87	0.00019	79123
4	173.37	0.00127	-0.00092	0.00189	14.66	0.00019	78635
4	172.96	0.00119	-0.00093	0.00189	14.63	0.00018	81506
4	175.72	0.00115	-0.00093	0.00189	14.86	0.00018	84276
4	173.41	0.00122	-0.00092	0.00190	14.67	0.00018	80393
2	48.98	0.00024	-0.00032	0.00046	4.14	0.00003	133765
2	48.92	0.00040	-0.00032	0.00046	4.14	0.00005	91875
2	51.48	0.00055	-0.00031	0.00046	4.35	0.00006	75064
2	49.12	0.00031	-0.00032	0.00046	4.15	0.00004	110991
2	49.05	0.00037	-0.00032	0.00045	4.15	0.00004	99225
2	85.70	0.00052	-0.00058	0.00090	7.25	0.00007	103925
2	85.67	0.00056	-0.00058	0.00090	7.25	0.00007	99494
2	85.64	0.00068	-0.00058	0.00090	7.24	0.00008	87360
2	85.65	0.00049	-0.00058	0.00089	7.24	0.00007	108324
2	85.69	0.00069	-0.00058	0.00089	7.25	0.00008	86789
2	124.64	0.00099	-0.00073	0.00141	10.54	0.00014	75521
2	125.08	0.00065	-0.00072	0.00141	10.58	0.00011	95152
2	124.84	0.00086	-0.00073	0.00142	10.56	0.00013	82034
2	124.45	0.00084	-0.00073	0.00141	10.53	0.00013	83181
2	124.86	0.00090	-0.00072	0.00141	10.56	0.00013	79727
2	173.60	0.00127	-0.00106	0.00198	14.68	0.00018	80352
2	175.94	0.00131	-0.00106	0.00198	14.88	0.00019	80188
2	175.69	0.00132	-0.00093	0.00198	14.86	0.00020	75381
2	173.34	0.00128	-0.00093	0.00198	14.66	0.00019	75706
2	173.36	0.00140	-0.00093	0.00199	14.66	0.00020	71730

Table J.51: Resilient modulus data (A_1_75_105)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	51.04	-0.00034	0.00051	0.00051	4.32	0.00006	75762
8	51.17	0.00026	0.00052	0.00051	4.33	0.00011	40196
8	51.42	-0.00031	0.00052	0.00051	4.35	0.00006	71758
8	51.00	-0.00025	0.00052	0.00051	4.31	0.00006	66386
8	50.92	-0.00030	0.00052	0.00051	4.31	0.00006	70146
8	88.14	-0.00021	0.00090	0.00088	7.45	0.00013	56841
8	89.43	-0.00023	0.00090	0.00088	7.56	0.00013	58450
8	87.00	0.00021	0.00090	0.00088	7.36	0.00017	44375
8	87.69	-0.00026	0.00090	0.00088	7.42	0.00013	58505
8	87.51	-0.00030	0.00091	0.00088	7.40	0.00012	59779
8	124.20	-0.00019	0.00125	0.00125	10.50	0.00019	54557
8	123.98	-0.00030	0.00126	0.00125	10.49	0.00018	57115
8	123.97	-0.00025	0.00125	0.00125	10.49	0.00019	55805
8	123.98	0.00020	0.00125	0.00125	10.49	0.00023	46513
8	123.93	-0.00020	0.00126	0.00125	10.48	0.00019	54586
8	175.44	0.00045	0.00168	0.00173	14.84	0.00032	46116
8	172.98	0.00038	0.00168	0.00174	14.63	0.00032	46233
8	172.90	0.00036	0.00167	0.00173	14.62	0.00031	46582
8	175.33	0.00036	0.00168	0.00173	14.83	0.00031	47154
8	172.99	0.00044	0.00167	0.00173	14.63	0.00032	45634
6	48.56	-0.00029	0.00085	0.00047	4.11	0.00009	47657
6	48.55	0.00026	0.00073	0.00047	4.11	0.00012	33866
6	50.76	0.00024	0.00085	0.00059	4.29	0.00014	30541
6	51.01	0.00018	0.00085	0.00060	4.31	0.00014	31772
6	51.09	-0.00025	0.00085	0.00060	4.32	0.00010	43271
6	87.45	-0.00020	0.00131	0.00090	7.40	0.00017	44139
6	87.37	-0.00023	0.00131	0.00090	7.39	0.00016	44860
6	87.43	-0.00028	0.00119	0.00090	7.39	0.00015	49184
6	88.31	-0.00020	0.00131	0.00089	7.47	0.00017	44805
6	87.91	0.00029	0.00131	0.00090	7.44	0.00021	35707
6	124.30	-0.00029	0.00170	0.00135	10.51	0.00023	45792
6	124.39	0.00029	0.00170	0.00135	10.52	0.00028	37724
6	124.42	-0.00026	0.00171	0.00135	10.52	0.00023	45198
6	124.23	-0.00019	0.00170	0.00135	10.51	0.00024	44012
6	124.21	0.00031	0.00170	0.00135	10.51	0.00028	37589
6	176.07	0.00028	0.00215	0.00188	14.89	0.00036	41460
6	175.32	0.00030	0.00214	0.00188	14.83	0.00036	41226
6	172.90	0.00028	0.00213	0.00188	14.62	0.00036	40935
6	173.25	0.00031	0.00214	0.00188	14.65	0.00036	40609
6	173.08	0.00043	0.00213	0.00188	14.64	0.00037	39511
4	48.76	0.00025	0.00088	0.00054	4.12	0.00014	29655
4	48.97	-0.00028	0.00100	0.00054	4.14	0.00011	39319
4	48.81	-0.00020	0.00088	0.00055	4.13	0.00010	40337
4	48.52	-0.00019	0.00088	0.00055	4.10	0.00010	40063
4	48.75	-0.00025	0.00088	0.00055	4.12	0.00010	42072
4	88.08	-0.00021	0.00145	0.00088	7.45	0.00018	42262
4	88.12	0.00018	0.00145	0.00087	7.45	0.00021	35670
4	85.64	-0.00031	0.00145	0.00087	7.24	0.00017	43237
4	88.28	-0.00019	0.00145	0.00088	7.47	0.00018	41964
4	88.11	-0.00020	0.00144	0.00088	7.45	0.00018	42191
4	124.25	0.00026	0.00186	0.00131	10.51	0.00029	36705
4	125.58	0.00021	0.00187	0.00132	10.62	0.00028	37445
4	128.97	0.00025	0.00186	0.00144	10.91	0.00030	36804
4	125.91	0.00013	0.00187	0.00133	10.65	0.00028	38424
4	124.41	-0.00026	0.00186	0.00133	10.52	0.00024	43080
4	175.81	0.00025	0.00240	0.00197	14.87	0.00038	38632
4	175.76	-0.00028	0.00240	0.00197	14.87	0.00034	43653
4	175.82	0.00032	0.00240	0.00197	14.87	0.00039	38019
4	175.69	-0.00025	0.00240	0.00197	14.86	0.00034	43309
4	175.46	0.00021	0.00227	0.00197	14.84	0.00037	40030
2	48.99	0.00031	0.00108	0.00050	4.14	0.00016	26279
2	48.78	-0.00034	0.00096	0.00049	4.13	0.00009	44588
2	48.72	0.00019	0.00096	0.00049	4.12	0.00014	30241
2	49.01	-0.00032	0.00096	0.00049	4.14	0.00009	43935
2	49.14	0.00021	0.00096	0.00049	4.16	0.00014	29953
2	85.77	-0.00024	0.00149	0.00092	7.25	0.00018	40123
2	88.20	0.00020	0.00162	0.00092	7.46	0.00023	32723
2	88.07	0.00030	0.00161	0.00092	7.45	0.00024	31598
2	88.20	-0.00025	0.00149	0.00092	7.46	0.00018	41387
2	88.09	-0.00031	0.00149	0.00092	7.45	0.00018	42505
2	124.87	-0.00028	0.00199	0.00138	10.56	0.00026	41029
2	124.81	-0.00027	0.00199	0.00138	10.56	0.00026	40866
2	124.90	0.00026	0.00199	0.00139	10.56	0.00030	34881
2	124.60	-0.00030	0.00199	0.00138	10.54	0.00026	41134
2	127.18	-0.00029	0.00199	0.00126	10.76	0.00025	43464
2	176.20	0.00022	0.00260	0.00196	14.90	0.00040	37410
2	175.68	0.00035	0.00259	0.00196	14.86	0.00041	36389
2	176.45	-0.00020	0.00248	0.00196	14.92	0.00035	42160
2	175.59	-0.00030	0.00247	0.00196	14.85	0.00034	43161
2	175.88	0.00033	0.00260	0.00196	14.87	0.00041	36525

Table J.52: Resilient modulus data (A_2_75_105)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	53.74	-0.00031	0.00034	0.00032	4.55	0.00003	152185
8	51.30	0.00038	0.00034	0.00032	4.34	0.00009	50111
8	51.17	-0.00031	0.00034	0.00033	4.33	0.00003	145276
8	51.16	-0.00038	0.00034	0.00033	4.33	0.00002	184846
8	51.06	0.00042	0.00034	0.00020	4.32	0.00008	54031
8	87.34	0.00048	0.00059	0.00048	7.39	0.00013	57220
8	87.19	-0.00027	0.00059	0.00048	7.37	0.00007	110600
8	87.50	0.00037	0.00059	0.00048	7.40	0.00012	61697
8	87.23	0.00041	0.00059	0.00048	7.38	0.00012	59491
8	87.32	-0.00044	0.00059	0.00048	7.39	0.00005	140076
8	0.00	0.00000	0.00000	0.00000	0.00	0.00000	#DIV/0!
8	0.00	0.00000	0.00000	0.00000	0.00	0.00000	#DIV/0!
8	0.00	0.00000	0.00000	0.00000	0.00	0.00000	#DIV/0!
8	0.00	0.00000	0.00000	0.00000	0.00	0.00000	#DIV/0!
8	0.00	0.00000	0.00000	0.00000	0.00	0.00000	#DIV/0!
8	175.09	0.00081	0.00128	0.00092	14.81	0.00025	58821
8	172.68	0.00085	0.00129	0.00092	14.60	0.00026	57248
8	175.71	0.00084	0.00129	0.00093	14.86	0.00025	58332
8	173.26	0.00071	0.00129	0.00105	14.65	0.00025	57673
8	173.03	0.00092	0.00129	0.00093	14.63	0.00026	55946
6	48.75	-0.00040	0.00024	0.00026	4.12	0.00001	505531
6	48.88	0.00049	0.00025	0.00026	4.13	0.00008	49630
6	51.25	0.00034	0.00024	0.00026	4.33	0.00007	62045
6	48.90	0.00031	0.00024	0.00026	4.14	0.00007	61419
6	51.01	0.00058	0.00025	0.00026	4.31	0.00009	47612
6	87.41	0.00050	0.00050	0.00040	7.39	0.00012	63281
6	87.34	0.00037	0.00050	0.00040	7.39	0.00011	69724
6	87.55	0.00033	0.00050	0.00052	7.40	0.00011	65744
6	87.50	0.00058	0.00050	0.00040	7.40	0.00012	60035
6	87.64	0.00052	0.00050	0.00040	7.41	0.00012	62122
6	123.71	0.00075	0.00083	0.00063	10.46	0.00018	56919
6	124.14	0.00081	0.00083	0.00063	10.50	0.00019	55418
6	124.90	0.00061	0.00083	0.00063	10.56	0.00017	61392
6	128.15	0.00055	0.00083	0.00063	10.84	0.00017	64831
6	123.76	0.00066	0.00083	0.00063	10.47	0.00018	59466
6	173.16	0.00102	0.00128	0.00098	14.65	0.00027	53531
6	173.47	0.00080	0.00117	0.00098	14.67	0.00025	59708
6	175.55	0.00115	0.00128	0.00098	14.85	0.00028	52310
6	175.33	0.00073	0.00116	0.00098	14.83	0.00024	61909
6	175.37	0.00077	0.00129	0.00098	14.83	0.00025	58584
4	51.21	0.00019	0.00033	0.00024	4.33	0.00006	68993
4	50.92	0.00040	0.00020	0.00023	4.31	0.00007	61425
4	48.55	-0.00030	0.00033	0.00024	4.11	0.00002	181834
4	48.61	-0.00027	0.00021	0.00036	4.11	0.00003	163738
4	51.19	0.00032	0.00021	0.00024	4.33	0.00006	67400
4	85.61	0.00054	0.00042	0.00050	7.24	0.00012	59793
4	88.02	0.00048	0.00042	0.00050	7.44	0.00012	63920
4	85.47	-0.00033	0.00042	0.00049	7.23	0.00005	149489
4	85.59	0.00044	0.00055	0.00049	7.24	0.00012	58854
4	88.11	0.00039	0.00042	0.00049	7.45	0.00011	69075
4	124.45	0.00074	0.00077	0.00072	10.53	0.00019	56611
4	123.98	0.00067	0.00077	0.00073	10.49	0.00018	58112
4	124.99	0.00081	0.00077	0.00060	10.57	0.00018	58319
4	127.26	0.00052	0.00076	0.00061	10.76	0.00016	68273
4	124.61	0.00073	0.00077	0.00061	10.54	0.00018	59896
4	175.63	0.00126	0.00122	0.00091	14.85	0.00028	52514
4	175.71	0.00062	0.00123	0.00091	14.86	0.00023	64608
4	175.76	0.00099	0.00123	0.00091	14.87	0.00026	56933
4	173.53	0.00098	0.00123	0.00092	14.68	0.00026	56269
4	175.80	0.00094	0.00123	0.00103	14.87	0.00027	55766
2	49.16	0.00044	0.00025	0.00032	4.16	0.00008	49471
2	51.58	0.00025	0.00025	0.00032	4.36	0.00007	63953
2	51.44	-0.00034	0.00026	0.00032	4.35	0.00002	224658
2	50.99	0.00049	0.00025	0.00032	4.31	0.00009	48832
2	51.15	-0.00052	0.00025	0.00032	4.33	0.00000	1091310
2	87.60	0.00065	0.00050	0.00050	7.41	0.00014	53948
2	88.00	0.00043	0.00050	0.00050	7.44	0.00012	62358
2	87.71	0.00050	0.00049	0.00050	7.42	0.00012	59498
2	87.71	0.00079	0.00049	0.00050	7.42	0.00015	50048
2	87.54	-0.00076	0.00049	0.00050	7.40	0.00002	384317
2	125.22	0.00093	0.00084	0.00072	10.59	0.00021	51253
2	126.82	0.00080	0.00084	0.00071	10.73	0.00020	54605
2	125.45	0.00088	0.00084	0.00072	10.61	0.00020	52133
2	124.72	0.00086	0.00084	0.00072	10.55	0.00020	52271
2	124.43	0.00066	0.00084	0.00072	10.52	0.00018	57089
2	176.37	0.00094	0.00122	0.00101	14.92	0.00026	56523
2	175.67	0.00108	0.00122	0.00101	14.86	0.00028	53970
2	176.22	0.00102	0.00122	0.00101	14.90	0.00027	55165
2	178.53	0.00101	0.00122	0.00101	15.10	0.00027	56030
2	176.05	0.00135	0.00122	0.00101	14.89	0.00030	49894

Table J.53: Resilient modulus data (A_3_15_100)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	52.92	0.00090	-0.00030	0.00123	4.48	0.00015	29339
8	48.58	0.00084	-0.00030	0.00123	4.11	0.00015	27805
8	47.86	0.00080	-0.00029	0.00109	4.05	0.00013	30428
8	47.69	0.00077	-0.00029	0.00121	4.03	0.00014	28584
8	50.15	0.00076	-0.00030	0.00121	4.24	0.00014	30562
8	85.51	0.00120	-0.00050	0.00204	7.23	0.00023	31651
8	87.65	0.00157	-0.00050	0.00205	7.41	0.00026	28538
8	84.47	0.00139	-0.00050	0.00204	7.14	0.00024	29200
8	84.62	0.00152	-0.00050	0.00205	7.16	0.00026	28064
8	84.53	0.00150	-0.00050	0.00204	7.15	0.00025	28246
8	121.41	0.00203	-0.00070	0.00323	10.27	0.00038	26979
8	121.28	0.00213	-0.00070	0.00322	10.26	0.00039	26461
8	121.72	0.00221	-0.00070	0.00323	10.29	0.00040	26032
8	121.48	0.00201	-0.00070	0.00323	10.27	0.00038	27162
8	123.83	0.00224	-0.00070	0.00323	10.47	0.00040	26353
8	172.90	0.00303	-0.00084	0.00503	14.62	0.00060	24308
8	172.87	0.00327	-0.00083	0.00490	14.62	0.00061	23911
8	172.81	0.00322	-0.00083	0.00489	14.62	0.00061	24096
8	170.49	0.00335	-0.00083	0.00501	14.42	0.00063	22982
8	172.64	0.00307	-0.00082	0.00488	14.60	0.00059	24557
6	48.37	0.00131	-0.00067	0.00115	4.09	0.00015	27350
6	48.46	0.00102	-0.00067	0.00116	4.10	0.00013	32634
6	45.94	0.00094	-0.00067	0.00115	3.89	0.00012	32801
6	48.60	0.00100	-0.00067	0.00116	4.11	0.00012	32967
6	45.88	0.00089	-0.00067	0.00116	3.88	0.00012	33718
6	85.06	0.00183	-0.00096	0.00212	7.19	0.00025	28968
6	86.01	0.00180	-0.00096	0.00224	7.27	0.00026	28429
6	88.42	0.00191	-0.00096	0.00211	7.48	0.00025	29330
6	84.76	0.00174	-0.00096	0.00224	7.17	0.00025	28476
6	85.17	0.00189	-0.00096	0.00212	7.20	0.00025	28394
6	124.32	0.00259	-0.00120	0.00337	10.51	0.00040	26538
6	121.94	0.00256	-0.00120	0.00348	10.31	0.00040	25544
6	121.83	0.00266	-0.00119	0.00348	10.30	0.00041	25024
6	124.00	0.00283	-0.00119	0.00347	10.49	0.00043	24644
6	124.66	0.00256	-0.00120	0.00336	10.54	0.00039	26784
6	173.35	0.00369	-0.00121	0.00537	14.66	0.00065	22403
6	172.85	0.00366	-0.00132	0.00536	14.62	0.00064	22802
6	173.27	0.00381	-0.00132	0.00536	14.65	0.00065	22418
6	173.10	0.00368	-0.00120	0.00535	14.64	0.00065	22431
6	173.27	0.00378	-0.00132	0.00535	14.65	0.00065	22494
4	0.00	0.00000	0.00000	0.00000	0.00	0.00000	#DIV/0!
4	0.00	0.00000	0.00000	0.00000	0.00	0.00000	#DIV/0!
4	0.00	0.00000	0.00000	0.00000	0.00	0.00000	#DIV/0!
4	0.00	0.00000	0.00000	0.00000	0.00	0.00000	#DIV/0!
4	0.00	0.00000	0.00000	0.00000	0.00	0.00000	#DIV/0!
4	83.85	0.00204	-0.00118	0.00222	7.09	0.00026	27654
4	85.07	0.00205	-0.00118	0.00222	7.19	0.00026	27992
4	86.15	0.00194	-0.00118	0.00234	7.29	0.00026	28216
4	85.29	0.00202	-0.00105	0.00221	7.21	0.00027	27216
4	85.32	0.00191	-0.00117	0.00221	7.22	0.00025	29397
4	122.38	0.00268	-0.00136	0.00355	10.35	0.00041	25481
4	122.27	0.00269	-0.00136	0.00354	10.34	0.00041	25457
4	122.19	0.00289	-0.00136	0.00355	10.33	0.00042	24423
4	124.44	0.00277	-0.00135	0.00354	10.52	0.00041	25483
4	121.96	0.00283	-0.00136	0.00355	10.31	0.00042	24649
4	170.89	0.00398	-0.00148	0.00552	14.45	0.00067	21618
4	170.56	0.00404	-0.00147	0.00564	14.43	0.00068	21075
4	170.69	0.00387	-0.00148	0.00551	14.44	0.00066	21897
4	173.24	0.00392	-0.00147	0.00564	14.65	0.00067	21759
4	173.11	0.00395	-0.00147	0.00563	14.64	0.00068	21663
2	45.85	0.00121	-0.00082	0.00114	3.88	0.00013	30371
2	45.80	0.00112	-0.00070	0.00114	3.87	0.00013	29824
2	46.08	0.00115	-0.00070	0.00114	3.90	0.00013	29464
2	46.00	0.00095	-0.00070	0.00114	3.89	0.00012	33580
2	46.26	0.00115	-0.00071	0.00114	3.91	0.00013	29508
2	83.19	0.00199	-0.00120	0.00233	7.04	0.00026	27068
2	85.41	0.00168	-0.00120	0.00233	7.22	0.00023	30955
2	85.54	0.00200	-0.00120	0.00233	7.23	0.00026	27809
2	83.40	0.00227	-0.00120	0.00233	7.05	0.00028	24904
2	83.12	0.00225	-0.00120	0.00233	7.03	0.00028	25039
2	123.79	0.00295	-0.00152	0.00370	10.47	0.00043	24539
2	128.18	0.00282	-0.00152	0.00369	10.84	0.00042	26089
2	122.55	0.00314	-0.00152	0.00370	10.37	0.00044	23430
2	122.43	0.00293	-0.00152	0.00369	10.35	0.00042	24398
2	122.29	0.00292	-0.00152	0.00369	10.34	0.00042	24385
2	173.31	0.00422	-0.00167	0.00569	14.66	0.00069	21327
2	173.36	0.00401	-0.00167	0.00569	14.66	0.00067	21900
2	173.05	0.00429	-0.00166	0.00568	14.64	0.00069	21160
2	172.65	0.00413	-0.00166	0.00566	14.60	0.00068	21528
2	172.81	0.00402	-0.00166	0.00567	14.62	0.00067	21868

Table J.54: Resilient modulus data (A_4_15_100)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	48.59	0.00116	-0.00021	0.00020	4.37	0.00010	43147
8	48.67	0.00109	-0.00022	-0.00017	4.37	0.00006	70051
8	48.69	0.00112	-0.00022	0.00020	4.38	0.00009	44864
8	48.90	0.00109	-0.00022	0.00020	4.40	0.00009	46420
8	48.72	0.00104	-0.00022	0.00021	4.38	0.00009	48367
8	87.27	0.00203	-0.00038	0.00038	7.84	0.00017	43629
8	85.15	0.00208	-0.00037	0.00038	7.65	0.00017	41374
8	85.13	0.00203	-0.00037	0.00038	7.65	0.00017	42451
8	87.68	0.00182	-0.00038	0.00038	7.88	0.00015	48653
8	87.53	0.00201	-0.00038	0.00037	7.87	0.00017	44308
8	124.35	0.00292	-0.00064	0.00090	11.18	0.00026	39802
8	124.03	0.00304	-0.00064	0.00090	11.15	0.00027	38195
8	121.64	0.00295	-0.00064	0.00077	10.93	0.00026	40006
8	123.87	0.00291	-0.00064	0.00090	11.13	0.00026	39705
8	124.03	0.00314	-0.00064	0.00090	11.15	0.00028	37142
8	173.01	0.00386	-0.00090	0.00224	15.55	0.00043	33720
8	173.00	0.00420	-0.00089	0.00224	15.55	0.00046	31609
8	173.12	0.00416	-0.00089	0.00224	15.56	0.00046	31903
8	175.65	0.00424	-0.00088	0.00224	15.79	0.00047	31845
8	175.32	0.00414	-0.00088	0.00224	15.76	0.00046	32326
6	48.37	0.00150	-0.00050	-0.00021	4.35	0.00007	62463
6	48.27	0.00135	-0.00050	-0.00033	4.34	0.00004	94686
6	48.44	0.00136	-0.00050	-0.00021	4.35	0.00005	76322
6	48.41	0.00118	-0.00050	-0.00021	4.35	0.00004	105488
6	48.35	0.00131	-0.00050	-0.00021	4.35	0.00005	81962
6	85.13	0.00252	-0.00083	-0.00046	7.65	0.00010	70376
6	84.95	0.00245	-0.00083	-0.00034	7.64	0.00011	67675
6	84.85	0.00259	-0.00083	-0.00034	7.63	0.00012	60324
6	84.99	0.00261	-0.00083	-0.00034	7.64	0.00012	60080
6	85.11	0.00244	-0.00083	-0.00034	7.65	0.00011	67604
6	127.62	0.00359	-0.00115	0.00045	11.47	0.00024	44848
6	124.35	0.00371	-0.00115	0.00046	11.18	0.00025	41818
6	124.12	0.00374	-0.00114	0.00046	11.16	0.00026	41149
6	124.46	0.00354	-0.00115	0.00046	11.19	0.00024	44278
6	124.21	0.00339	-0.00114	0.00046	11.16	0.00023	46385
6	173.25	0.00475	-0.00144	0.00197	15.57	0.00044	33283
6	173.19	0.00466	-0.00143	0.00197	15.57	0.00043	33809
6	173.36	0.00473	-0.00144	0.00198	15.58	0.00044	33369
6	173.15	0.00496	-0.00143	0.00197	15.56	0.00046	31951
6	173.05	0.00479	-0.00143	0.00197	15.55	0.00044	32928
4	46.69	0.00162	-0.00051	-0.00032	4.20	0.00007	60182
4	46.59	0.00155	-0.00051	-0.00032	4.19	0.00006	65401
4	46.80	0.00156	-0.00051	-0.00032	4.21	0.00006	65318
4	46.48	0.00151	-0.00063	-0.00032	4.18	0.00005	83509
4	46.59	0.00140	-0.00063	-0.00032	4.19	0.00004	105313
4	84.92	0.00281	-0.00094	-0.00046	7.63	0.00012	61198
4	85.40	0.00287	-0.00094	-0.00047	7.68	0.00012	59057
4	87.39	0.00279	-0.00094	-0.00047	7.86	0.00012	64183
4	84.86	0.00261	-0.00094	-0.00047	7.63	0.00010	71738
4	85.37	0.00253	-0.00094	-0.00047	7.67	0.00009	77117
4	124.60	0.00390	-0.00127	-0.00046	11.20	0.00018	58297
4	124.48	0.00383	-0.00127	0.00039	11.19	0.00025	42760
4	124.63	0.00380	-0.00127	-0.00034	11.20	0.00018	57694
4	124.69	0.00385	-0.00127	0.00039	11.21	0.00025	42627
4	124.58	0.00380	-0.00126	0.00039	11.20	0.00024	43208
4	173.12	0.00516	-0.00164	0.00187	15.56	0.00045	32639
4	173.36	0.00509	-0.00164	0.00187	15.58	0.00044	33090
4	173.27	0.00527	-0.00164	0.00187	15.58	0.00046	31990
4	173.15	0.00508	-0.00164	0.00187	15.56	0.00044	33106
4	172.98	0.00527	-0.00164	0.00187	15.55	0.00046	31917
2	46.50	0.00166	-0.00059	-0.00041	4.18	0.00005	71589
2	46.49	0.00133	-0.00059	-0.00041	4.18	0.00003	141112
2	46.63	0.00168	-0.00059	-0.00041	4.19	0.00006	69937
2	46.41	0.00151	-0.00059	-0.00041	4.17	0.00004	92900
2	46.35	0.00149	-0.00059	-0.00042	4.17	0.00004	97231
2	85.68	0.00287	-0.00109	-0.00053	7.70	0.00010	69704
2	85.46	0.00312	-0.00109	-0.00053	7.68	0.00012	57860
2	85.32	0.00275	-0.00109	-0.00052	7.67	0.00009	76390
2	85.61	0.00291	-0.00109	-0.00053	7.70	0.00011	67505
2	85.17	0.00296	-0.00109	-0.00053	7.66	0.00011	64258
2	124.90	0.00421	-0.00146	-0.00046	11.23	0.00019	55431
2	124.73	0.00396	-0.00146	-0.00046	11.21	0.00017	61853
2	124.38	0.00406	-0.00145	-0.00046	11.18	0.00018	58721
2	124.78	0.00401	-0.00146	-0.00046	11.22	0.00017	60383
2	124.69	0.00403	-0.00145	-0.00046	11.21	0.00018	59643
2	173.48	0.00541	-0.00181	0.00172	15.59	0.00044	33111
2	174.48	0.00562	-0.00181	0.00172	15.68	0.00046	32052
2	178.21	0.00543	-0.00181	0.00172	16.02	0.00044	33911
2	176.08	0.00547	-0.00181	0.00172	15.83	0.00045	33194
2	173.57	0.00534	-0.00180	0.00172	15.60	0.00044	33469

Table J.55: Resilient modulus data (A_1_12_100)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	40.79	0.00032	0.00037	0.00024	3.45	0.00008	44580
8	40.78	-0.00032	0.00038	-0.00012	3.45	-0.00001	-668505
8	40.76	-0.00035	0.00038	0.00024	3.45	0.00002	157313
8	43.26	0.00032	0.00038	-0.00013	3.66	0.00005	76673
8	40.72	-0.00026	0.00038	-0.00013	3.44	0.00000	-6279161
8	73.24	0.00038	0.00060	0.00027	6.19	0.00010	59252
8	73.21	0.00029	0.00072	0.00027	6.19	0.00011	57984
8	75.43	0.00037	0.00060	0.00027	6.38	0.00010	62122
8	75.54	0.00032	0.00060	0.00027	6.39	0.00010	64337
8	75.49	0.00030	0.00060	0.00027	6.39	0.00010	65733
8	112.36	0.00050	0.00097	0.00032	9.50	0.00015	63480
8	112.48	0.00049	0.00097	0.00032	9.51	0.00015	63920
8	112.53	0.00052	0.00097	0.00032	9.52	0.00015	62996
8	112.41	0.00052	0.00097	0.00032	9.51	0.00015	63273
8	112.40	0.00052	0.00109	0.00032	9.51	0.00016	59041
8	157.28	0.00067	0.00149	0.00051	13.30	0.00022	59873
8	157.24	0.00091	0.00137	0.00064	13.30	0.00024	54731
8	157.14	0.00072	0.00137	0.00051	13.29	0.00022	61476
8	157.33	0.00074	0.00148	0.00051	13.31	0.00023	58470
8	158.29	0.00059	0.00148	0.00051	13.39	0.00022	62155
6	41.77	-0.00027	0.00037	0.00015	3.53	0.00002	174373
6	45.13	-0.00019	0.00037	0.00015	3.82	0.00003	139542
6	38.19	-0.00033	0.00037	0.00015	3.23	0.00002	205382
6	38.11	0.00039	0.00037	0.00015	3.22	0.00008	42729
6	40.56	-0.00022	0.00037	0.00015	3.43	0.00002	139699
6	73.27	0.00020	0.00074	0.00016	6.20	0.00009	67490
6	74.65	-0.00032	0.00074	0.00016	6.31	0.00005	129935
6	74.09	0.00032	0.00074	0.00016	6.27	0.00010	61516
6	72.79	0.00042	0.00074	0.00016	6.16	0.00011	55653
6	72.78	0.00032	0.00074	0.00016	6.16	0.00010	60753
6	112.62	0.00061	0.00110	0.00021	9.52	0.00016	59578
6	112.69	0.00059	0.00111	0.00021	9.53	0.00016	60047
6	112.48	0.00048	0.00109	0.00021	9.51	0.00015	63714
6	112.48	0.00035	0.00109	0.00021	9.51	0.00014	68863
6	112.48	0.00059	0.00109	0.00033	9.51	0.00017	56857
6	157.66	0.00067	0.00163	0.00040	13.33	0.00022	59437
6	159.01	0.00091	0.00162	0.00040	13.45	0.00024	55036
6	158.33	0.00077	0.00163	0.00040	13.39	0.00023	57382
6	157.16	0.00064	0.00162	0.00040	13.29	0.00022	59816
6	157.26	0.00077	0.00163	0.00040	13.30	0.00023	57101
4	37.36	0.00030	0.00039	-0.00013	3.16	0.00005	68183
4	40.74	0.00026	0.00039	-0.00013	3.45	0.00004	79486
4	36.26	-0.00033	0.00039	-0.00013	3.07	-0.00001	-486423
4	36.32	0.00027	0.00039	-0.00014	3.07	0.00004	70606
4	36.26	0.00021	0.00039	-0.00014	3.07	0.00004	79335
4	71.03	0.00040	0.00082	-0.00017	6.01	0.00009	68821
4	71.95	0.00029	0.00082	-0.00017	6.08	0.00008	78102
4	74.80	-0.00686	0.00337	-0.00260	6.33	-0.00051	-12453
4	73.45	0.00033	0.00081	-0.00017	6.21	0.00008	76227
4	73.24	0.00027	0.00081	-0.00017	6.19	0.00008	81912
4	112.89	0.00041	0.00121	-0.00017	9.55	0.00012	78793
4	112.85	0.00059	0.00133	-0.00016	9.54	0.00015	65303
4	112.94	0.00045	0.00133	-0.00029	9.55	0.00012	76949
4	112.81	0.00069	0.00133	-0.00017	9.54	0.00015	61983
4	110.46	0.00051	0.00133	-0.00016	9.34	0.00014	66931
4	157.40	0.00071	0.00179	-0.00022	13.31	0.00019	70070
4	157.44	0.00087	0.00179	-0.00022	13.32	0.00020	65474
4	157.46	0.00070	0.00179	-0.00022	13.32	0.00019	70465
4	157.40	0.00082	0.00179	-0.00022	13.31	0.00020	66919
4	155.00	0.00090	0.00179	-0.00022	13.11	0.00021	63608
2	0.00	0.00000	0.00000	0.00000	0.00	0.00000	#DIV/0!
2	0.00	0.00000	0.00000	0.00000	0.00	0.00000	#DIV/0!
2	0.00	0.00000	0.00000	0.00000	0.00	0.00000	#DIV/0!
2	0.00	0.00000	0.00000	0.00000	0.00	0.00000	#DIV/0!
2	0.00	0.00000	0.00000	0.00000	0.00	0.00000	#DIV/0!
2	71.08	0.00041	0.00079	-0.00027	6.01	0.00008	77470
2	70.99	-0.00027	0.00080	-0.00027	6.00	0.00002	285801
2	70.93	-0.00025	0.00091	-0.00015	6.00	0.00004	139658
2	70.77	0.00039	0.00080	-0.00015	5.99	0.00009	69867
2	70.73	0.00046	0.00079	-0.00027	5.98	0.00008	73020
2	111.45	0.00067	0.00135	-0.00022	9.43	0.00015	62832
2	111.44	0.00051	0.00136	-0.00022	9.43	0.00014	68711
2	111.45	0.00070	0.00135	-0.00022	9.43	0.00015	61762
2	111.48	0.00055	0.00135	-0.00022	9.43	0.00014	67417
2	111.39	0.00052	0.00135	-0.00022	9.42	0.00014	68499
2	155.01	0.00090	0.00182	-0.00020	13.11	0.00021	62418
2	154.94	0.00089	0.00182	-0.00020	13.10	0.00021	62721
2	157.36	0.00094	0.00182	-0.00019	13.31	0.00021	62082
2	157.39	0.00073	0.00182	-0.00019	13.31	0.00020	67924
2	157.34	0.00112	0.00182	-0.00031	13.31	0.00022	60778

Table J.56: Resilient modulus data (A_2_12_100)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.83	-0.00020	0.00008	0.00059	4.30	0.00004	107946
8	51.86	-0.00020	-0.00016	0.00059	4.39	0.00002	225431
8	55.34	0.00030	0.00008	0.00058	4.68	0.00008	58110
8	51.05	-0.00036	-0.00016	0.00059	4.32	0.00001	710259
8	50.49	-0.00031	-0.00016	0.00059	4.27	0.00001	455681
8	87.47	0.00031	0.00021	0.00109	7.40	0.00013	55332
8	87.62	-0.00025	-0.00015	0.00108	7.41	0.00006	131136
8	87.57	-0.00026	0.00022	0.00108	7.41	0.00009	86097
8	87.52	0.00020	0.00021	0.00108	7.40	0.00012	59441
8	87.65	0.00027	0.00021	0.00107	7.41	0.00013	57231
8	124.06	0.00035	0.00025	0.00150	10.49	0.00017	60069
8	121.67	-0.00033	0.00025	0.00162	10.29	0.00013	80157
8	124.07	-0.00025	0.00024	0.00162	10.49	0.00013	77821
8	124.24	0.00029	0.00025	0.00162	10.51	0.00018	58359
8	124.17	0.00044	0.00025	0.00162	10.50	0.00019	54621
8	175.48	0.00044	0.00038	0.00236	14.84	0.00026	56093
8	172.76	0.00041	0.00038	0.00235	14.61	0.00026	55859
8	172.69	0.00040	0.00038	0.00235	14.61	0.00026	55844
8	172.65	0.00028	0.00038	0.00235	14.60	0.00025	58253
8	175.11	0.00044	0.00038	0.00235	14.81	0.00026	56109
6	51.22	0.00028	-0.00014	0.00059	4.33	0.00006	71290
6	51.05	-0.00032	-0.00014	0.00059	4.32	0.00001	405699
6	51.25	0.00026	-0.00014	0.00059	4.33	0.00006	74227
6	51.24	-0.00027	-0.00014	0.00058	4.33	0.00001	292336
6	51.16	0.00020	-0.00014	0.00059	4.33	0.00005	79543
6	88.69	0.00028	-0.00017	0.00107	7.50	0.00010	75898
6	91.04	-0.00020	-0.00017	0.00107	7.70	0.00006	131605
6	87.42	0.00029	0.00008	0.00119	7.39	0.00013	56737
6	87.22	-0.00030	-0.00017	0.00107	7.38	0.00005	148475
6	87.43	0.00024	-0.00016	0.00106	7.39	0.00009	78312
6	124.22	-0.00033	-0.00017	0.00167	10.51	0.00010	108416
6	124.07	-0.00026	0.00019	0.00167	10.49	0.00013	78685
6	124.04	0.00026	0.00007	0.00167	10.49	0.00017	62948
6	124.03	-0.00020	0.00019	0.00167	10.49	0.00014	76014
6	123.96	0.00037	-0.00017	0.00167	10.48	0.00016	67456
6	172.71	0.00042	0.00020	0.00252	14.61	0.00026	55755
6	172.72	0.00064	0.00033	0.00252	14.61	0.00029	50200
6	175.39	0.00045	0.00021	0.00253	14.83	0.00027	55966
6	172.71	0.00032	0.00021	0.00252	14.61	0.00025	57414
6	172.58	-0.00199	0.00045	0.00251	14.60	0.00008	179377
4	51.58	0.00019	-0.00008	0.00069	4.36	0.00007	65821
4	51.66	-0.00032	-0.00007	0.00069	4.37	0.00002	178049
4	51.50	-0.00027	-0.00008	0.00069	4.36	0.00003	154331
4	51.63	-0.00038	-0.00007	0.00069	4.37	0.00002	221466
4	51.70	-0.00020	-0.00008	0.00068	4.37	0.00003	127707
4	88.02	0.00028	-0.00015	0.00124	7.44	0.00011	65469
4	89.20	0.00037	-0.00015	0.00124	7.54	0.00012	61779
4	90.21	-0.00020	-0.00014	0.00124	7.63	0.00007	101972
4	88.32	0.00033	-0.00014	0.00124	7.47	0.00012	62999
4	88.07	0.00038	-0.00015	0.00124	7.45	0.00012	61000
4	124.38	0.00037	-0.00017	0.00183	10.52	0.00017	62402
4	126.95	0.00025	-0.00018	0.00183	10.74	0.00016	67630
4	124.51	0.00039	-0.00017	0.00183	10.53	0.00017	61718
4	126.90	0.00049	-0.00017	0.00183	10.73	0.00018	60097
4	124.50	0.00033	-0.00018	0.00183	10.53	0.00017	63579
4	173.21	0.00044	-0.00018	0.00273	14.65	0.00025	58875
4	175.78	0.00049	-0.00018	0.00273	14.87	0.00025	58599
4	174.09	0.00050	-0.00018	0.00272	14.72	0.00025	58117
4	178.87	0.00044	-0.00019	0.00273	15.13	0.00025	60945
4	173.23	0.00055	-0.00018	0.00273	14.65	0.00026	56821
2	51.33	-0.00025	0.00012	0.00071	4.34	0.00005	88675
2	51.39	0.00036	0.00013	0.00071	4.35	0.00010	43694
2	48.72	0.00034	0.00013	0.00071	4.12	0.00010	42145
2	51.37	0.00034	0.00013	0.00072	4.34	0.00010	44188
2	49.11	-0.00026	0.00013	0.00072	4.15	0.00005	84982
2	86.06	0.00026	-0.00016	0.00133	7.28	0.00012	61044
2	85.87	0.00036	-0.00016	0.00133	7.26	0.00013	56968
2	86.00	0.00035	-0.00015	0.00120	7.27	0.00012	62042
2	88.22	0.00039	-0.00016	0.00120	7.46	0.00012	62471
2	85.89	0.00030	-0.00016	0.00132	7.26	0.00012	59487
2	124.12	0.00034	-0.00028	0.00186	10.50	0.00016	65360
2	124.32	0.00035	-0.00015	0.00186	10.51	0.00017	61312
2	124.40	0.00032	-0.00016	0.00186	10.52	0.00017	62453
2	126.85	0.00049	-0.00016	0.00186	10.73	0.00018	58789
2	124.20	0.00039	-0.00016	0.00186	10.50	0.00017	60186
2	173.46	0.00042	-0.00028	0.00275	14.67	0.00024	60847
2	173.68	0.00057	-0.00028	0.00276	14.69	0.00025	58019
2	173.25	0.00054	-0.00016	0.00275	14.65	0.00026	56159
2	175.57	0.00057	-0.00015	0.00275	14.85	0.00026	56252
2	173.91	0.00050	-0.00015	0.00288	14.71	0.00027	54688

Table J.57: Resilient modulus data (A_1_9_100)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	48.43	0.00050	0.00064	-0.00035	4.63	0.00007	66043
8	48.34	0.00050	0.00052	-0.00034	4.62	0.00006	77458
8	48.57	0.00064	0.00051	-0.00035	4.55	0.00007	63356
8	48.65	0.00069	0.00051	-0.00035	4.62	0.00008	60943
8	51.26	0.00050	0.00064	-0.00047	4.57	0.00006	78364
8	85.41	0.00074	0.00105	-0.00038	7.83	0.00012	63037
8	87.80	0.00090	0.00105	-0.00038	7.82	0.00014	56424
8	85.19	0.00072	0.00105	-0.00038	7.83	0.00012	63378
8	85.68	0.00085	0.00106	-0.00038	7.85	0.00014	57866
8	86.90	0.00071	0.00106	-0.00038	8.03	0.00012	65492
8	124.14	0.00112	0.00173	-0.00057	11.20	0.00020	55435
8	124.56	0.00116	0.00174	-0.00057	11.17	0.00021	54166
8	125.22	0.00107	0.00174	-0.00046	11.17	0.00021	53477
8	125.22	0.00122	0.00187	-0.00046	11.40	0.00023	48940
8	124.46	0.00101	0.00175	-0.00046	11.16	0.00020	54879
8	172.85	0.00156	0.00269	-0.00058	15.54	0.00033	47814
8	172.74	0.00174	0.00268	-0.00058	15.78	0.00034	46295
8	172.81	0.00167	0.00281	-0.00058	15.76	0.00035	45642
8	172.81	0.00182	0.00281	-0.00058	15.53	0.00036	43229
8	173.59	0.00168	0.00269	-0.00058	15.84	0.00034	47180
6	48.87	0.00062	0.00058	-0.00046	4.55	0.00007	69745
6	48.88	0.00068	0.00059	-0.00046	4.58	0.00007	64443
6	48.86	0.00042	0.00071	-0.00046	4.58	0.00006	78173
6	49.09	0.00065	0.00058	-0.00046	4.55	0.00007	66475
6	48.89	0.00070	0.00059	-0.00046	4.55	0.00007	62383
6	85.13	0.00100	0.00115	-0.00070	7.84	0.00013	61036
6	87.47	0.00086	0.00128	-0.00071	7.91	0.00013	62441
6	87.70	0.00093	0.00115	-0.00070	7.99	0.00012	65074
6	87.47	0.00103	0.00115	-0.00070	8.14	0.00013	62012
6	85.16	0.00103	0.00115	-0.00070	7.66	0.00013	58469
6	124.68	0.00154	0.00190	-0.00083	11.17	0.00023	48177
6	124.45	0.00158	0.00189	-0.00083	11.14	0.00023	47518
6	124.33	0.00152	0.00189	-0.00082	11.17	0.00023	48712
6	124.81	0.00150	0.00190	-0.00083	11.16	0.00023	49061
6	124.62	0.00135	0.00189	-0.00082	11.15	0.00021	52056
6	175.68	0.00193	0.00295	-0.00082	15.79	0.00036	43936
6	175.70	0.00186	0.00283	-0.00082	15.80	0.00034	46083
6	175.72	0.00177	0.00295	-0.00082	15.54	0.00034	45071
6	173.99	0.00182	0.00294	-0.00082	15.53	0.00035	44522
6	177.29	0.00193	0.00294	-0.00082	15.52	0.00036	43251
4	46.40	0.00080	0.00064	-0.00047	4.66	0.00009	54516
4	48.91	0.00061	0.00065	-0.00048	4.57	0.00007	66604
4	46.49	0.00057	0.00064	-0.00047	4.68	0.00007	71348
4	48.65	0.00055	0.00064	-0.00047	4.45	0.00006	69573
4	48.68	0.00057	0.00064	-0.00047	4.44	0.00006	68645
4	85.45	0.00114	0.00127	-0.00075	7.70	0.00015	52621
4	85.39	0.00105	0.00127	-0.00075	7.71	0.00014	55639
4	85.13	0.00106	0.00127	-0.00076	7.92	0.00014	56954
4	86.05	0.00103	0.00114	-0.00075	7.94	0.00013	62947
4	87.86	0.00069	0.00126	-0.00075	7.70	0.00011	72067
4	129.22	0.00147	0.00197	-0.00090	11.16	0.00022	49668
4	124.52	0.00153	0.00197	-0.00090	11.17	0.00023	48544
4	124.87	0.00140	0.00197	-0.00090	11.16	0.00022	51024
4	124.84	0.00159	0.00197	-0.00090	11.16	0.00024	47410
4	124.85	0.00154	0.00197	-0.00091	11.16	0.00023	48403
4	173.73	0.00198	0.00306	-0.00087	15.80	0.00037	42847
4	173.62	0.00203	0.00306	-0.00087	15.81	0.00037	42320
4	176.17	0.00198	0.00306	-0.00087	15.81	0.00037	42763
4	176.39	0.00195	0.00294	-0.00099	15.78	0.00034	45761
4	173.92	0.00208	0.00306	-0.00099	15.55	0.00037	42349
2	49.11	0.00074	0.00062	-0.00047	4.56	0.00008	58188
2	46.82	0.00055	0.00062	-0.00048	4.56	0.00006	74277
2	46.69	0.00047	0.00061	-0.00048	4.56	0.00005	86008
2	46.03	0.00050	0.00061	-0.00047	4.54	0.00006	80654
2	49.26	0.00074	0.00062	-0.00048	4.55	0.00008	58816
2	89.17	0.00097	0.00132	-0.00082	7.89	0.00013	60394
2	85.62	0.00089	0.00120	-0.00082	7.64	0.00011	68071
2	85.99	0.00101	0.00132	-0.00082	7.73	0.00013	57804
2	88.04	0.00113	0.00132	-0.00082	8.16	0.00014	56705
2	50.59	0.03832	0.05433	0.06913	7.91	0.01433	552
2	124.83	0.00151	0.00208	-0.00092	11.21	0.00024	47351
2	124.86	0.00134	0.00208	-0.00092	11.23	0.00022	50769
2	124.79	0.00146	0.00208	-0.00092	11.20	0.00023	48458
2	124.79	0.00143	0.00195	-0.00092	11.18	0.00022	51218
2	124.70	0.00160	0.00196	-0.00092	11.20	0.00023	47862
2	173.47	0.00219	0.00316	-0.00107	15.81	0.00038	41756
2	175.76	0.00214	0.00303	-0.00107	15.81	0.00036	43497
2	175.73	0.00212	0.00315	-0.00095	15.80	0.00038	41251
2	176.10	0.00210	0.00304	-0.00095	15.80	0.00037	42541
2	176.10	0.00215	0.00304	-0.00095	15.56	0.00038	41400

Table J.58: Resilient modulus data (A_2_9_100)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	51.46	0.00027	0.00045	0.00035	4.35	0.00009	48740
8	51.44	-0.00037	0.00044	0.00035	4.35	0.00004	115937
8	50.66	0.00038	0.00045	0.00034	4.28	0.00010	41288
8	51.40	0.00041	0.00045	0.00035	4.35	0.00010	40596
8	50.87	-0.00033	0.00045	0.00035	4.30	0.00004	103771
8	87.09	0.00046	0.00085	0.00051	7.37	0.00015	45631
8	87.02	0.00044	0.00085	0.00051	7.36	0.00015	46086
8	87.09	0.00070	0.00085	0.00051	7.37	0.00017	40400
8	87.33	0.00056	0.00085	0.00051	7.39	0.00016	43384
8	89.29	-0.00044	0.00085	0.00052	7.55	0.00008	92229
8	124.63	0.00049	0.00124	0.00077	10.54	0.00021	47739
8	124.26	0.00051	0.00123	0.00076	10.51	0.00021	47298
8	124.25	0.00060	0.00124	0.00089	10.51	0.00023	43581
8	126.77	0.00046	0.00123	0.00089	10.72	0.00021	46955
8	124.21	0.00068	0.00123	0.00089	10.51	0.00023	42440
8	172.88	0.00098	0.00183	0.00134	14.62	0.00035	39829
8	175.52	0.00064	0.00183	0.00133	14.84	0.00032	44144
8	175.32	0.00060	0.00183	0.00146	14.83	0.00032	43117
8	172.73	0.00068	0.00182	0.00134	14.61	0.00032	42984
8	176.25	0.00079	0.00183	0.00133	14.91	0.00033	42615
6	50.66	-0.00025	0.00040	0.00031	4.28	0.00004	105804
6	50.93	-0.00036	0.00040	0.00031	4.31	0.00003	138984
6	50.97	-0.00035	0.00040	0.00031	4.31	0.00003	135427
6	50.67	0.00035	0.00052	0.00031	4.29	0.00010	40884
6	50.64	0.00043	0.00039	0.00030	4.28	0.00009	43109
6	87.22	0.00045	0.00078	0.00052	7.38	0.00015	47435
6	88.00	0.00046	0.00078	0.00065	7.44	0.00016	44484
6	88.87	0.00051	0.00078	0.00065	7.52	0.00016	43919
6	90.61	0.00031	0.00078	0.00052	7.66	0.00013	53484
6	85.18	0.00057	0.00078	0.00052	7.20	0.00016	43505
6	124.27	0.00053	0.00127	0.00089	10.51	0.00022	44249
6	123.98	0.00075	0.00127	0.00089	10.49	0.00024	40835
6	124.24	0.00063	0.00127	0.00089	10.51	0.00023	42601
6	124.16	0.00038	0.00126	0.00089	10.50	0.00021	46856
6	124.05	0.00062	0.00126	0.00089	10.49	0.00023	42916
6	175.66	0.00107	0.00199	0.00141	14.86	0.00037	37497
6	175.72	0.00092	0.00199	0.00140	14.86	0.00036	38918
6	172.93	0.00077	0.00199	0.00140	14.63	0.00035	39684
6	172.79	0.00098	0.00199	0.00139	14.61	0.00036	37849
6	172.65	0.00076	0.00198	0.00139	14.60	0.00034	40014
4	51.88	-0.00040	0.00042	0.00039	4.39	0.00003	119610
4	50.81	-0.00046	0.00042	0.00040	4.30	0.00003	135177
4	52.06	0.00037	0.00042	0.00039	4.40	0.00010	42158
4	49.47	0.00054	0.00042	0.00039	4.18	0.00011	34847
4	49.36	-0.00041	0.00041	0.00039	4.17	0.00003	122002
4	85.62	0.00049	0.00087	0.00068	7.24	0.00017	39976
4	85.79	-0.00048	0.00087	0.00068	7.26	0.00009	76549
4	88.16	0.00059	0.00087	0.00068	7.46	0.00018	39419
4	88.32	0.00046	0.00087	0.00067	7.47	0.00017	42111
4	85.70	-0.00043	0.00087	0.00067	7.25	0.00009	73759
4	124.18	0.00051	0.00123	0.00094	10.50	0.00022	44196
4	124.27	0.00063	0.00124	0.00093	10.51	0.00023	42424
4	124.12	-0.00048	0.00135	0.00093	10.50	0.00015	65580
4	124.19	0.00062	0.00123	0.00092	10.50	0.00023	42724
4	124.15	0.00060	0.00135	0.00092	10.50	0.00024	41236
4	175.78	0.00083	0.00194	0.00143	14.87	0.00035	39938
4	175.89	0.00088	0.00195	0.00143	14.88	0.00035	39449
4	175.84	0.00070	0.00194	0.00144	14.87	0.00034	41208
4	175.58	0.00067	0.00194	0.00143	14.85	0.00034	41544
4	172.99	0.00089	0.00194	0.00143	14.63	0.00035	38829
2	50.69	0.00050	0.00041	0.00038	4.29	0.00011	37497
2	50.74	-0.00050	0.00042	0.00037	4.29	0.00002	164441
2	50.71	-0.00054	0.00042	0.00038	4.29	0.00002	188557
2	50.55	-0.00029	0.00042	0.00038	4.28	0.00004	95574
2	50.58	0.00041	0.00042	0.00038	4.28	0.00010	40022
2	87.80	-0.00034	0.00088	0.00066	7.43	0.00010	70258
2	85.03	0.00038	0.00088	0.00066	7.19	0.00016	42457
2	85.97	0.00043	0.00088	0.00065	7.27	0.00016	41970
2	90.83	0.00060	0.00088	0.00066	7.68	0.00018	40560
2	88.00	-0.00038	0.00088	0.00066	7.44	0.00010	72881
2	124.72	0.00054	0.00126	0.00090	10.55	0.00023	44102
2	124.90	0.00057	0.00138	0.00090	10.56	0.00024	41801
2	124.59	0.00045	0.00139	0.00090	10.54	0.00023	43507
2	124.33	0.00051	0.00126	0.00090	10.52	0.00022	44353
2	124.62	0.00057	0.00126	0.00090	10.54	0.00023	43434
2	175.90	0.00086	0.00194	0.00149	14.88	0.00036	39156
2	175.93	0.00096	0.00194	0.00148	14.88	0.00037	38313
2	175.78	0.00079	0.00194	0.00148	14.87	0.00035	39826
2	175.72	0.00093	0.00206	0.00136	14.86	0.00036	38584
2	173.08	0.00065	0.00206	0.00136	14.64	0.00034	40666

Table J.59: Resilient modulus data (B_1_24_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.86	0.00040	0.00010	0.00069	4.30	0.00010	43220
8	51.10	0.00040	0.00010	0.00069	4.32	0.00010	43138
8	50.64	0.00040	0.00010	0.00069	4.28	0.00010	43149
8	51.00	0.00041	0.00010	0.00069	4.31	0.00010	43086
8	50.64	0.00044	0.00010	0.00069	4.28	0.00010	41777
8	85.00	0.00072	0.00015	0.00121	7.19	0.00017	41568
8	87.23	0.00071	0.00015	0.00120	7.38	0.00017	42766
8	84.77	0.00075	0.00015	0.00121	7.17	0.00018	40749
8	87.73	0.00072	0.00020	0.00121	7.42	0.00018	41883
8	86.99	0.00075	0.00015	0.00120	7.36	0.00018	41889
8	126.92	0.00106	0.00022	0.00178	10.73	0.00025	42168
8	123.86	0.00110	0.00022	0.00182	10.48	0.00026	40054
8	121.39	0.00110	0.00022	0.00178	10.27	0.00026	39798
8	121.17	0.00110	0.00022	0.00177	10.25	0.00026	39831
8	123.99	0.00110	0.00022	0.00182	10.49	0.00026	40116
8	172.59	0.00163	0.00028	0.00265	14.60	0.00038	38401
8	172.64	0.00164	0.00028	0.00264	14.60	0.00038	38407
8	172.84	0.00168	0.00028	0.00265	14.62	0.00038	38089
8	172.42	0.00159	0.00028	0.00264	14.58	0.00038	38772
8	172.49	0.00163	0.00028	0.00264	14.59	0.00038	38470
6	48.39	0.00041	0.00013	0.00068	4.09	0.00010	40223
6	48.43	0.00041	0.00013	0.00068	4.10	0.00010	40241
6	48.67	0.00041	0.00013	0.00068	4.12	0.00010	40407
6	48.30	0.00037	0.00013	0.00068	4.08	0.00010	41560
6	48.43	0.00037	0.00013	0.00068	4.10	0.00010	41554
6	84.50	0.00071	0.00017	0.00121	7.15	0.00017	40985
6	87.12	0.00075	0.00017	0.00122	7.37	0.00018	41377
6	87.96	0.00071	0.00017	0.00122	7.44	0.00018	42489
6	89.30	0.00071	0.00017	0.00122	7.55	0.00018	43107
6	87.08	0.00075	0.00017	0.00121	7.36	0.00018	41467
6	123.92	0.00110	0.00025	0.00182	10.48	0.00026	39706
6	123.89	0.00106	0.00021	0.00182	10.48	0.00026	40825
6	123.85	0.00106	0.00025	0.00186	10.47	0.00026	39711
6	123.73	0.00109	0.00021	0.00182	10.46	0.00026	40270
6	123.87	0.00105	0.00021	0.00182	10.48	0.00026	40853
6	172.50	0.00159	0.00027	0.00273	14.59	0.00038	38134
6	172.57	0.00159	0.00027	0.00269	14.60	0.00038	38483
6	172.38	0.00159	0.00027	0.00273	14.58	0.00038	38147
6	172.55	0.00159	0.00027	0.00273	14.59	0.00038	38150
6	172.46	0.00159	0.00027	0.00268	14.59	0.00038	38533
4	48.25	0.00038	0.00015	0.00069	4.08	0.00010	39983
4	49.28	0.00034	0.00011	0.00069	4.17	0.00010	43714
4	51.31	0.00038	0.00011	0.00070	4.34	0.00010	43910
4	49.13	0.00034	0.00011	0.00070	4.16	0.00010	43402
4	48.48	0.00038	0.00011	0.00070	4.10	0.00010	41523
4	87.96	0.00069	0.00020	0.00124	7.44	0.00018	41789
4	87.63	0.00069	0.00016	0.00124	7.41	0.00017	42557
4	87.76	0.00065	0.00020	0.00124	7.42	0.00017	42542
4	87.48	0.00069	0.00020	0.00124	7.40	0.00018	41734
4	85.17	0.00069	0.00016	0.00124	7.20	0.00017	41337
4	124.16	0.00103	0.00024	0.00189	10.50	0.00026	39771
4	123.90	0.00103	0.00024	0.00185	10.48	0.00026	40347
4	124.34	0.00103	0.00024	0.00185	10.52	0.00026	40347
4	124.23	0.00099	0.00024	0.00189	10.51	0.00026	40328
4	124.26	0.00099	0.00024	0.00185	10.51	0.00026	40826
4	170.34	0.00152	0.00025	0.00278	14.41	0.00038	37939
4	172.79	0.00152	0.00029	0.00282	14.61	0.00039	37843
4	170.61	0.00152	0.00029	0.00283	14.43	0.00039	37292
4	172.67	0.00156	0.00029	0.00282	14.60	0.00039	37558
4	172.81	0.00152	0.00029	0.00278	14.62	0.00038	38201
2	48.88	0.00032	0.00017	0.00077	4.13	0.00010	39377
2	48.89	0.00028	0.00017	0.00077	4.14	0.00010	40473
2	48.72	0.00028	0.00017	0.00077	4.12	0.00010	40565
2	48.96	0.00032	0.00017	0.00077	4.14	0.00011	39297
2	48.82	0.00032	0.00017	0.00077	4.13	0.00010	39353
2	87.64	0.00056	0.00027	0.00136	7.41	0.00018	40686
2	85.97	0.00060	0.00027	0.00136	7.27	0.00019	39227
2	87.94	0.00055	0.00022	0.00136	7.44	0.00018	41848
2	87.48	0.00059	0.00022	0.00136	7.40	0.00018	40820
2	87.85	0.00060	0.00023	0.00136	7.43	0.00018	40778
2	124.48	0.00091	0.00030	0.00203	10.53	0.00027	39133
2	125.47	0.00091	0.00029	0.00198	10.61	0.00027	39994
2	128.24	0.00087	0.00030	0.00202	10.85	0.00027	40811
2	124.33	0.00087	0.00030	0.00203	10.52	0.00027	39500
2	126.78	0.02106	0.02629	0.01083	10.72	0.00485	2212
2	173.18	0.00135	0.00033	0.00297	14.65	0.00039	37828
2	173.09	0.00139	0.00033	0.00297	14.64	0.00039	37509
2	172.95	0.00139	0.00033	0.00297	14.63	0.00039	37457
2	170.49	0.00135	0.00033	0.00297	14.42	0.00039	37227
2	173.78	0.00138	0.00033	0.00297	14.70	0.00039	37603

Table J.60: Resilient modulus data (B_2_24_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	54.06	0.00049	0.00043	0.00048	4.57	0.00012	39384
8	53.90	0.00053	0.00042	0.00047	4.56	0.00012	38390
8	54.24	0.00053	0.00043	0.00052	4.59	0.00012	37315
8	51.69	0.00049	0.00047	0.00047	4.37	0.00012	36487
8	51.67	0.00050	0.00047	0.00047	4.37	0.00012	36564
8	89.75	0.00084	0.00075	0.00086	7.59	0.00020	37145
8	87.41	0.00092	0.00075	0.00086	7.39	0.00021	34993
8	87.33	0.00088	0.00075	0.00086	7.39	0.00021	35594
8	87.31	0.00092	0.00075	0.00086	7.38	0.00021	35039
8	90.13	0.00085	0.00071	0.00086	7.62	0.00020	37822
8	126.36	0.00136	0.00105	0.00127	10.69	0.00031	34843
8	126.73	0.00132	0.00109	0.00127	10.72	0.00031	34875
8	126.81	0.00133	0.00105	0.00127	10.73	0.00030	35244
8	123.94	0.00132	0.00101	0.00127	10.48	0.00030	34974
8	126.70	0.00133	0.00110	0.00127	10.72	0.00031	34755
8	172.34	0.00195	0.00149	0.00185	14.58	0.00044	33041
8	172.55	0.00200	0.00153	0.00186	14.59	0.00045	32527
8	174.96	0.00203	0.00149	0.00186	14.80	0.00045	33069
8	174.85	0.00195	0.00153	0.00185	14.79	0.00044	33326
8	174.90	0.00199	0.00153	0.00185	14.79	0.00045	33068
6	52.59	0.00055	0.00042	0.00048	4.45	0.00012	36909
6	52.92	0.00051	0.00046	0.00049	4.48	0.00012	36793
6	52.50	0.00047	0.00041	0.00048	4.44	0.00011	38976
6	52.76	0.00048	0.00046	0.00049	4.46	0.00012	37582
6	53.37	0.00051	0.00046	0.00048	4.51	0.00012	37226
6	87.15	0.00091	0.00075	0.00085	7.37	0.00021	35296
6	87.55	0.00087	0.00076	0.00085	7.40	0.00021	35786
6	87.36	0.00087	0.00076	0.00085	7.39	0.00021	35722
6	87.93	0.00092	0.00076	0.00085	7.44	0.00021	35322
6	88.54	0.00087	0.00076	0.00085	7.49	0.00021	36164
6	124.26	0.00129	0.00110	0.00127	10.51	0.00030	34514
6	124.44	0.00133	0.00106	0.00127	10.52	0.00030	34527
6	126.25	0.00132	0.00109	0.00126	10.68	0.00031	34839
6	123.90	0.00129	0.00110	0.00126	10.48	0.00030	34478
6	124.07	0.00132	0.00109	0.00126	10.49	0.00031	34200
6	175.19	0.00199	0.00158	0.00184	14.82	0.00045	32892
6	176.35	0.00200	0.00159	0.00189	14.91	0.00046	32665
6	175.14	0.00195	0.00153	0.00184	14.81	0.00044	33402
6	175.29	0.00196	0.00162	0.00184	14.83	0.00045	32867
6	175.50	0.00196	0.00162	0.00188	14.84	0.00046	32585
4	51.47	0.00050	0.00045	0.00048	4.35	0.00012	36431
4	50.94	0.00046	0.00049	0.00048	4.31	0.00012	36274
4	51.12	0.00046	0.00045	0.00048	4.32	0.00012	37412
4	51.17	0.00050	0.00045	0.00048	4.33	0.00012	36444
4	50.95	0.00046	0.00045	0.00048	4.31	0.00012	37235
4	87.84	0.00087	0.00080	0.00086	7.43	0.00021	35236
4	89.91	0.00090	0.00080	0.00085	7.60	0.00021	35790
4	87.41	0.00086	0.00080	0.00085	7.39	0.00021	35306
4	87.37	0.00086	0.00076	0.00085	7.39	0.00021	35923
4	86.97	0.00086	0.00075	0.00085	7.36	0.00020	35953
4	124.10	0.00132	0.00114	0.00123	10.50	0.00031	34080
4	123.99	0.00128	0.00114	0.00127	10.49	0.00031	34043
4	126.47	0.00132	0.00114	0.00123	10.70	0.00031	34791
4	126.47	0.00129	0.00118	0.00127	10.70	0.00031	34341
4	124.03	0.00132	0.00118	0.00122	10.49	0.00031	33771
4	172.67	0.00198	0.00165	0.00186	14.60	0.00046	31925
4	175.36	0.00194	0.00165	0.00182	14.83	0.00045	32837
4	175.44	0.00195	0.00165	0.00182	14.84	0.00045	32807
4	175.19	0.00199	0.00166	0.00187	14.82	0.00046	32267
4	175.47	0.00199	0.00162	0.00183	14.84	0.00045	32774
2	51.75	0.00043	0.00050	0.00053	4.38	0.00012	36095
2	52.79	0.00039	0.00046	0.00053	4.47	0.00011	38826
2	53.48	0.00039	0.00050	0.00053	4.52	0.00012	38214
2	51.39	0.00043	0.00046	0.00053	4.35	0.00012	36695
2	51.00	0.00042	0.00046	0.00052	4.31	0.00012	36945
2	87.97	0.00085	0.00083	0.00087	7.44	0.00021	35048
2	88.12	0.00080	0.00083	0.00088	7.45	0.00021	35691
2	88.17	0.00085	0.00087	0.00088	7.46	0.00022	34531
2	87.98	0.00077	0.00083	0.00087	7.44	0.00021	36209
2	87.99	0.00084	0.00083	0.00087	7.44	0.00021	35138
2	124.59	0.00123	0.00117	0.00131	10.54	0.00031	34061
2	124.78	0.00120	0.00121	0.00131	10.55	0.00031	34021
2	124.21	0.00127	0.00117	0.00131	10.51	0.00031	33619
2	124.50	0.00123	0.00121	0.00130	10.53	0.00031	33808
2	125.76	0.00123	0.00121	0.00131	10.64	0.00031	34040
2	175.88	0.00189	0.00173	0.00194	14.87	0.00046	32131
2	178.07	0.00189	0.00173	0.00193	15.06	0.00046	32585
2	175.39	0.00185	0.00177	0.00193	14.83	0.00046	32111
2	175.64	0.00189	0.00177	0.00193	14.85	0.00047	31887
2	175.38	0.00189	0.00173	0.00193	14.83	0.00046	32113

Table J.61: Resilient modulus data (B_1_195_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.81	0.00049	0.00030	0.00061	4.30	0.00012	36745
8	50.89	0.00049	0.00030	0.00061	4.30	0.00012	36922
8	50.96	0.00050	0.00029	0.00061	4.31	0.00012	37003
8	50.47	0.00053	0.00030	0.00060	4.27	0.00012	35958
8	50.77	0.00049	0.00029	0.00060	4.29	0.00012	37098
8	84.68	0.00091	0.00059	0.00106	7.16	0.00021	33629
8	87.19	0.00087	0.00059	0.00106	7.37	0.00021	35107
8	84.90	0.00087	0.00055	0.00106	7.18	0.00021	34715
8	87.12	0.00087	0.00055	0.00106	7.37	0.00021	35676
8	85.21	0.00088	0.00056	0.00107	7.21	0.00021	34590
8	124.28	0.00126	0.00089	0.00160	10.51	0.00031	33636
8	124.50	0.00130	0.00089	0.00160	10.53	0.00032	33296
8	124.45	0.00130	0.00089	0.00160	10.53	0.00032	33363
8	124.16	0.00126	0.00089	0.00156	10.50	0.00031	34072
8	126.81	0.00130	0.00089	0.00160	10.73	0.00032	34013
8	175.34	0.00182	0.00137	0.00231	14.83	0.00046	32302
8	176.24	0.00182	0.00137	0.00231	14.91	0.00046	32497
8	179.85	0.00186	0.00137	0.00231	15.21	0.00046	32907
8	172.40	0.00182	0.00141	0.00231	14.58	0.00046	31612
8	172.57	0.00182	0.00137	0.00226	14.60	0.00045	32144
6	50.76	0.00052	0.00026	0.00065	4.29	0.00012	36090
6	48.28	0.00052	0.00030	0.00064	4.08	0.00012	33400
6	50.84	0.00056	0.00031	0.00065	4.30	0.00013	34125
6	48.47	0.00052	0.00031	0.00065	4.10	0.00012	33338
6	48.49	0.00056	0.00026	0.00065	4.10	0.00012	33422
6	87.29	0.00089	0.00055	0.00113	7.38	0.00021	34466
6	85.12	0.00093	0.00055	0.00113	7.20	0.00022	33068
6	87.60	0.00093	0.00060	0.00114	7.41	0.00022	33432
6	87.65	0.00089	0.00056	0.00113	7.41	0.00021	34526
6	85.96	0.00088	0.00055	0.00113	7.27	0.00021	33956
6	125.20	0.00132	0.00090	0.00165	10.59	0.00032	32840
6	125.96	0.00132	0.00090	0.00169	10.65	0.00033	32614
6	121.58	0.00128	0.00086	0.00165	10.28	0.00032	32544
6	124.18	0.00132	0.00086	0.00165	10.50	0.00032	32931
6	123.93	0.00132	0.00086	0.00164	10.48	0.00032	32910
6	175.36	0.00189	0.00136	0.00242	14.83	0.00047	31404
6	176.21	0.00189	0.00136	0.00241	14.90	0.00047	31557
6	179.78	0.00189	0.00136	0.00241	15.21	0.00047	32214
6	172.59	0.00189	0.00136	0.00241	14.60	0.00047	30936
6	172.77	0.00189	0.00136	0.00241	14.61	0.00047	30953
4	48.50	0.00054	0.00031	0.00067	4.10	0.00013	32519
4	48.43	0.00057	0.00030	0.00067	4.10	0.00013	31849
4	48.17	0.00056	0.00030	0.00066	4.07	0.00013	32164
4	49.18	0.00056	0.00025	0.00066	4.16	0.00012	33920
4	52.18	0.00056	0.00029	0.00066	4.41	0.00013	34981
4	86.40	0.00097	0.00054	0.00119	7.31	0.00022	32507
4	86.40	0.00097	0.00054	0.00119	7.31	0.00022	32523
4	86.34	0.00096	0.00054	0.00123	7.30	0.00023	32073
4	89.39	0.00093	0.00054	0.00119	7.56	0.00022	33964
4	86.58	0.00097	0.00054	0.00119	7.32	0.00022	32563
4	124.06	0.00133	0.00086	0.00177	10.49	0.00033	31814
4	123.81	0.00136	0.00090	0.00177	10.47	0.00034	31198
4	126.18	0.00136	0.00090	0.00177	10.67	0.00034	31791
4	126.28	0.00136	0.00086	0.00177	10.68	0.00033	32110
4	124.04	0.00136	0.00090	0.00177	10.49	0.00034	31205
4	172.84	0.00194	0.00134	0.00253	14.62	0.00048	30197
4	175.27	0.00193	0.00134	0.00258	14.82	0.00049	30417
4	175.18	0.00197	0.00134	0.00258	14.82	0.00049	30198
4	172.78	0.00193	0.00134	0.00258	14.61	0.00049	29986
4	172.66	0.00193	0.00138	0.00253	14.60	0.00049	29974
2	48.69	0.00061	0.00028	0.00065	4.12	0.00013	32012
2	48.59	0.00057	0.00028	0.00065	4.11	0.00013	32754
2	48.28	0.00057	0.00024	0.00064	4.08	0.00012	33719
2	50.86	0.00057	0.00028	0.00069	4.30	0.00013	33584
2	50.65	0.00060	0.00028	0.00064	4.28	0.00013	33724
2	91.20	0.00099	0.00054	0.00125	7.71	0.00023	33286
2	87.94	0.00103	0.00054	0.00125	7.44	0.00023	31680
2	87.89	0.00099	0.00054	0.00125	7.43	0.00023	32138
2	87.80	0.00099	0.00053	0.00125	7.43	0.00023	32160
2	87.50	0.00102	0.00053	0.00125	7.40	0.00023	31651
2	126.67	0.00141	0.00087	0.00189	10.71	0.00035	30784
2	124.25	0.00146	0.00087	0.00185	10.51	0.00035	30195
2	126.85	0.00142	0.00087	0.00185	10.73	0.00035	31062
2	124.41	0.00142	0.00087	0.00185	10.52	0.00035	30433
2	126.81	0.00142	0.00088	0.00185	10.73	0.00035	31054
2	172.65	0.00199	0.00134	0.00270	14.60	0.00050	29053
2	173.06	0.00200	0.00134	0.00271	14.64	0.00050	29039
2	172.97	0.00200	0.00134	0.00271	14.63	0.00050	29032
2	173.11	0.00200	0.00134	0.00271	14.64	0.00050	29061
2	175.27	0.00200	0.00134	0.00270	14.82	0.00050	29443

Table J.62: Resilient modulus data (B_2_195_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.86	-0.00012	0.00072	0.00037	4.30	0.00008	53365
8	53.37	-0.00013	0.00072	0.00037	4.51	0.00008	56040
8	50.76	-0.00012	0.00072	0.00037	4.29	0.00008	53602
8	51.19	-0.00013	0.00073	0.00037	4.33	0.00008	53161
8	50.66	-0.00012	0.00072	0.00041	4.28	0.00008	51189
8	87.96	0.00019	0.00113	0.00063	7.44	0.00016	45771
8	87.65	0.00019	0.00113	0.00058	7.41	0.00016	46686
8	87.78	0.00019	0.00117	0.00058	7.42	0.00016	45731
8	87.63	0.00015	0.00113	0.00062	7.41	0.00016	46742
8	87.94	0.00015	0.00113	0.00063	7.44	0.00016	46812
8	126.39	0.00043	0.00158	0.00083	10.69	0.00024	45037
8	123.80	0.00043	0.00158	0.00079	10.47	0.00023	44874
8	123.91	0.00039	0.00158	0.00083	10.48	0.00023	44856
8	123.69	0.00043	0.00158	0.00083	10.46	0.00024	44262
8	123.96	0.00043	0.00158	0.00083	10.48	0.00024	44348
8	172.76	0.00081	0.00221	0.00112	14.61	0.00034	42389
8	175.01	0.00081	0.00220	0.00116	14.80	0.00035	42588
8	174.99	0.00081	0.00220	0.00116	14.80	0.00035	42603
8	175.08	0.00081	0.00220	0.00116	14.81	0.00035	42565
8	177.48	0.00081	0.00216	0.00112	15.01	0.00034	44119
6	51.13	-0.00014	0.00077	0.00040	4.32	0.00009	50248
6	51.18	-0.00014	0.00077	0.00040	4.33	0.00009	50263
6	51.15	-0.00015	0.00077	0.00040	4.33	0.00009	50410
6	50.80	-0.00018	0.00072	0.00040	4.30	0.00008	54505
6	51.32	-0.00015	0.00078	0.00040	4.34	0.00009	50340
6	90.83	0.00014	0.00118	0.00066	7.68	0.00016	46655
6	87.31	0.00014	0.00118	0.00061	7.38	0.00016	46041
6	87.27	0.00018	0.00122	0.00061	7.38	0.00017	44269
6	87.22	0.00014	0.00117	0.00065	7.38	0.00016	45087
6	87.60	0.00014	0.00118	0.00061	7.41	0.00016	46032
6	124.10	0.00039	0.00164	0.00087	10.50	0.00024	43457
6	126.05	0.00039	0.00163	0.00082	10.66	0.00024	45016
6	126.20	0.00039	0.00163	0.00087	10.67	0.00024	44355
6	123.69	0.00039	0.00168	0.00082	10.46	0.00024	43468
6	124.37	0.00039	0.00168	0.00087	10.52	0.00024	43003
6	174.77	0.00077	0.00230	0.00116	14.78	0.00035	41912
6	173.22	0.00076	0.00226	0.00116	14.65	0.00035	41983
6	174.96	0.00077	0.00226	0.00116	14.80	0.00035	42341
6	173.18	0.00076	0.00231	0.00116	14.65	0.00035	41571
6	174.91	0.00077	0.00226	0.00116	14.79	0.00035	42394
4	48.64	-0.00016	0.00080	0.00042	4.11	0.00009	46571
4	51.66	-0.00016	0.00080	0.00042	4.37	0.00009	49391
4	49.93	-0.00016	0.00076	0.00042	4.22	0.00008	49759
4	55.76	-0.00016	0.00075	0.00042	4.72	0.00008	55609
4	48.97	-0.00016	0.00076	0.00042	4.14	0.00009	48545
4	87.48	-0.00015	0.00123	0.00063	7.40	0.00014	52037
4	87.57	-0.00015	0.00119	0.00063	7.41	0.00014	53364
4	87.61	-0.00015	0.00123	0.00067	7.41	0.00015	50714
4	87.27	-0.00015	0.00123	0.00063	7.38	0.00014	52059
4	87.44	-0.00015	0.00119	0.00063	7.40	0.00014	53086
4	124.20	0.00039	0.00171	0.00086	10.50	0.00025	42634
4	124.32	0.00039	0.00171	0.00086	10.51	0.00025	42592
4	123.99	0.00035	0.00171	0.00086	10.49	0.00024	43161
4	124.28	0.00035	0.00167	0.00086	10.51	0.00024	43880
4	123.92	0.00035	0.00171	0.00086	10.48	0.00024	43197
4	175.20	0.00077	0.00235	0.00117	14.82	0.00036	41495
4	172.69	0.00077	0.00230	0.00117	14.61	0.00035	41298
4	175.31	0.00077	0.00230	0.00117	14.83	0.00035	41948
4	175.07	0.00077	0.00230	0.00117	14.81	0.00035	41932
4	172.73	0.00077	0.00230	0.00117	14.61	0.00035	41368
2	51.14	-0.00012	0.00070	0.00038	4.32	0.00008	53723
2	48.75	-0.00008	0.00074	0.00038	4.12	0.00009	47217
2	48.71	-0.00008	0.00070	0.00038	4.12	0.00008	49101
2	49.70	-0.00008	0.00074	0.00038	4.20	0.00009	47983
2	51.15	-0.00012	0.00074	0.00038	4.33	0.00008	51695
2	87.64	-0.00015	0.00121	0.00064	7.41	0.00014	52245
2	87.57	-0.00015	0.00125	0.00064	7.41	0.00015	50935
2	87.36	-0.00014	0.00125	0.00064	7.39	0.00015	50819
2	87.37	0.00013	0.00125	0.00063	7.39	0.00017	44033
2	87.09	-0.00014	0.00121	0.00063	7.37	0.00014	51989
2	126.58	0.00035	0.00174	0.00088	10.71	0.00025	43335
2	126.76	0.00035	0.00170	0.00083	10.72	0.00024	44599
2	124.43	0.00035	0.00174	0.00083	10.52	0.00024	43154
2	126.96	0.00035	0.00174	0.00087	10.74	0.00025	43508
2	124.44	0.00035	0.00174	0.00083	10.52	0.00024	43180
2	173.04	0.00069	0.00245	0.00115	14.63	0.00036	40885
2	172.93	0.00069	0.00245	0.00116	14.63	0.00036	40841
2	173.00	0.00069	0.00245	0.00116	14.63	0.00036	40898
2	175.03	0.00073	0.00244	0.00111	14.80	0.00036	41415
2	176.14	0.00069	0.00245	0.00116	14.90	0.00036	41646

Table J.63: Resilient modulus data (B_1_16_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	53.14	0.00030	0.00033	0.00020	4.49	0.00007	64544
8	51.40	0.00030	0.00033	0.00020	4.35	0.00007	62233
8	50.77	0.00030	0.00033	0.00020	4.29	0.00007	61722
8	50.64	0.00030	0.00033	0.00020	4.28	0.00007	61744
8	50.74	0.00030	0.00033	0.00020	4.29	0.00007	61523
8	87.46	0.00056	0.00057	0.00032	7.40	0.00012	61395
8	87.64	0.00056	0.00057	0.00037	7.41	0.00012	59743
8	87.64	0.00056	0.00061	0.00032	7.41	0.00012	59596
8	87.50	0.00056	0.00057	0.00032	7.40	0.00012	61455
8	87.55	0.00056	0.00057	0.00032	7.40	0.00012	61286
8	127.33	0.00083	0.00083	0.00053	10.77	0.00018	58807
8	127.33	0.00083	0.00083	0.00049	10.77	0.00018	59916
8	126.32	0.00080	0.00083	0.00049	10.68	0.00018	60557
8	124.04	0.00083	0.00084	0.00049	10.49	0.00018	58320
8	124.06	0.00084	0.00084	0.00049	10.49	0.00018	58272
8	174.89	0.00114	0.00118	0.00074	14.79	0.00025	58092
8	172.63	0.00118	0.00118	0.00074	14.60	0.00026	56588
8	175.19	0.00114	0.00118	0.00074	14.82	0.00025	58145
8	176.08	0.00118	0.00118	0.00074	14.89	0.00026	57461
8	177.82	0.00118	0.00118	0.00074	15.04	0.00026	58295
6	53.72	0.00033	0.00032	0.00019	4.54	0.00007	64943
6	51.29	0.00033	0.00036	0.00019	4.34	0.00007	59097
6	51.18	0.00037	0.00032	0.00020	4.33	0.00007	58900
6	51.12	0.00033	0.00032	0.00019	4.32	0.00007	61791
6	51.01	0.00033	0.00036	0.00019	4.31	0.00007	58836
6	87.85	0.00056	0.00058	0.00036	7.43	0.00013	59397
6	85.39	0.00060	0.00058	0.00036	7.22	0.00013	56141
6	87.49	0.00060	0.00062	0.00036	7.40	0.00013	56176
6	88.17	0.00060	0.00062	0.00036	7.46	0.00013	56429
6	87.64	0.00056	0.00058	0.00036	7.41	0.00012	59319
6	124.13	0.00089	0.00085	0.00052	10.50	0.00019	55873
6	124.11	0.00084	0.00084	0.00052	10.50	0.00018	56945
6	124.12	0.00088	0.00085	0.00053	10.50	0.00019	55846
6	123.78	0.00088	0.00084	0.00052	10.47	0.00019	55905
6	126.58	0.00085	0.00085	0.00052	10.71	0.00018	57990
6	176.01	0.00119	0.00122	0.00075	14.89	0.00026	56401
6	178.60	0.00123	0.00123	0.00076	15.11	0.00027	56379
6	175.62	0.00119	0.00122	0.00075	14.85	0.00026	56257
6	175.18	0.00123	0.00122	0.00075	14.82	0.00027	55467
6	174.93	0.00123	0.00122	0.00075	14.79	0.00027	55471
4	51.09	0.00040	0.00031	0.00020	4.32	0.00008	57238
4	51.05	0.00040	0.00035	0.00020	4.32	0.00008	54711
4	48.63	0.00036	0.00031	0.00019	4.11	0.00007	57239
4	50.82	0.00035	0.00035	0.00019	4.30	0.00007	57510
4	50.86	0.00035	0.00035	0.00019	4.30	0.00008	57295
4	87.87	0.00065	0.00057	0.00033	7.43	0.00013	57472
4	87.86	0.00069	0.00062	0.00033	7.43	0.00014	54725
4	87.62	0.00065	0.00061	0.00033	7.41	0.00013	55974
4	89.61	0.00064	0.00061	0.00032	7.58	0.00013	57561
4	88.41	0.00066	0.00062	0.00033	7.48	0.00013	55980
4	123.99	0.00090	0.00087	0.00048	10.49	0.00019	55859
4	123.95	0.00094	0.00087	0.00052	10.48	0.00019	53981
4	126.46	0.00094	0.00087	0.00048	10.70	0.00019	56026
4	124.09	0.00090	0.00087	0.00048	10.49	0.00019	55948
4	124.14	0.00094	0.00091	0.00052	10.50	0.00020	53100
4	175.50	0.00134	0.00126	0.00073	14.84	0.00028	53439
4	175.31	0.00130	0.00126	0.00073	14.83	0.00027	54107
4	175.33	0.00133	0.00126	0.00073	14.83	0.00028	53466
4	175.33	0.00126	0.00126	0.00073	14.83	0.00027	54747
4	177.64	0.00133	0.00126	0.00077	15.02	0.00028	53565
2	51.45	0.00045	0.00036	0.00012	4.35	0.00008	56178
2	49.19	0.00045	0.00036	0.00012	4.16	0.00008	53447
2	49.13	0.00046	0.00036	0.00012	4.16	0.00008	53499
2	48.59	0.00049	0.00036	0.00011	4.11	0.00008	51316
2	51.01	0.00045	0.00036	0.00012	4.31	0.00008	55901
2	87.63	0.00076	0.00063	0.00027	7.41	0.00014	53707
2	87.84	0.00080	0.00063	0.00027	7.43	0.00014	52491
2	90.09	0.00079	0.00063	0.00027	7.62	0.00014	54119
2	87.71	0.00076	0.00063	0.00027	7.42	0.00014	53786
2	88.28	0.00080	0.00063	0.00027	7.47	0.00014	52673
2	127.09	0.00108	0.00093	0.00044	10.75	0.00020	52453
2	127.18	0.00105	0.00093	0.00045	10.76	0.00020	53231
2	124.59	0.00104	0.00093	0.00044	10.54	0.00020	52396
2	125.06	0.00105	0.00093	0.00045	10.58	0.00020	52213
2	124.10	0.00108	0.00093	0.00044	10.50	0.00020	51457
2	176.06	0.00143	0.00136	0.00071	14.89	0.00029	50981
2	179.22	0.00143	0.00137	0.00071	15.16	0.00029	51795
2	176.29	0.00143	0.00136	0.00071	14.91	0.00029	51078
2	176.70	0.00140	0.00137	0.00071	14.94	0.00029	51642
2	176.83	0.00144	0.00132	0.00071	14.96	0.00029	51713

Table J.64: Resilient modulus data (B_2_16_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.72	0.00020	0.00011	0.00041	4.29	0.00006	71767
8	50.74	0.00016	0.00007	0.00041	4.29	0.00005	81104
8	51.04	0.00020	0.00011	0.00041	4.32	0.00006	72218
8	51.00	0.00016	0.00011	0.00041	4.31	0.00006	75906
8	50.80	0.00019	0.00007	0.00041	4.30	0.00006	76542
8	87.51	0.00037	0.00011	0.00070	7.40	0.00010	75060
8	87.40	0.00030	0.00011	0.00070	7.39	0.00009	80149
8	87.76	0.00037	0.00015	0.00070	7.42	0.00010	72601
8	86.88	0.00033	0.00011	0.00070	7.35	0.00010	77253
8	87.35	0.00033	0.00011	0.00074	7.39	0.00010	74641
8	124.75	0.00058	0.00014	0.00102	10.55	0.00014	72813
8	123.96	0.00050	0.00013	0.00101	10.48	0.00014	76911
8	126.51	0.00057	0.00013	0.00100	10.70	0.00014	75503
8	123.37	0.00057	0.00017	0.00100	10.43	0.00014	72237
8	123.85	0.00053	0.00017	0.00100	10.47	0.00014	74304
8	175.40	0.00089	0.00032	0.00130	14.83	0.00021	70711
8	172.34	0.00085	0.00032	0.00129	14.58	0.00021	70867
8	174.60	0.00089	0.00032	0.00129	14.77	0.00021	70694
8	172.93	0.00085	0.00032	0.00130	14.63	0.00021	70928
8	174.83	0.00085	0.00032	0.00130	14.79	0.00021	71790
6	50.70	0.00019	0.00010	0.00044	4.29	0.00006	70403
6	50.95	0.00014	0.00010	0.00045	4.31	0.00006	75154
6	50.64	0.00019	0.00010	0.00045	4.28	0.00006	70651
6	50.78	0.00015	0.00010	0.00045	4.29	0.00006	74688
6	50.77	0.00015	0.00010	0.00045	4.29	0.00006	74116
6	87.31	0.00033	0.00010	0.00075	7.38	0.00010	74860
6	87.44	0.00029	0.00015	0.00075	7.40	0.00010	74511
6	87.29	0.00033	0.00014	0.00075	7.38	0.00010	72371
6	87.58	0.00033	0.00015	0.00075	7.41	0.00010	72522
6	87.56	0.00029	0.00014	0.00075	7.41	0.00010	74690
6	124.70	0.00053	0.00016	0.00108	10.55	0.00015	71941
6	127.32	0.00053	0.00016	0.00108	10.77	0.00015	73191
6	124.17	0.00053	0.00016	0.00104	10.50	0.00014	73065
6	123.32	0.00053	0.00016	0.00107	10.43	0.00015	71293
6	124.65	0.00050	0.00016	0.00109	10.54	0.00015	72568
6	175.72	0.00078	0.00027	0.00136	14.86	0.00020	73976
6	178.88	0.00079	0.00027	0.00140	15.13	0.00020	73897
6	174.63	0.00079	0.00031	0.00136	14.77	0.00020	72130
6	174.78	0.00078	0.00027	0.00136	14.78	0.00020	73547
6	177.26	0.00080	0.00032	0.00139	14.99	0.00021	71861
4	50.36	0.00016	0.00008	0.00047	4.26	0.00006	72691
4	51.85	0.00015	0.00008	0.00046	4.38	0.00006	75603
4	50.60	0.00012	0.00008	0.00050	4.28	0.00006	73842
4	50.51	0.00011	0.00008	0.00046	4.27	0.00005	78746
4	48.70	0.00012	0.00008	0.00047	4.12	0.00006	74505
4	87.59	0.00026	0.00013	0.00083	7.41	0.00010	72777
4	85.04	0.00026	0.00013	0.00083	7.19	0.00010	70381
4	87.43	0.00022	0.00013	0.00083	7.39	0.00010	74885
4	87.29	0.00030	0.00013	0.00083	7.38	0.00011	70250
4	87.76	0.00026	0.00014	0.00083	7.42	0.00010	72421
4	123.51	0.00042	0.00013	0.00114	10.45	0.00014	74230
4	124.33	0.00042	0.00017	0.00115	10.52	0.00015	72457
4	123.89	0.00046	0.00017	0.00115	10.48	0.00015	70572
4	124.06	0.00050	0.00017	0.00115	10.49	0.00015	69280
4	121.54	0.00050	0.00017	0.00114	10.28	0.00015	68032
4	175.62	0.00073	0.00022	0.00155	14.85	0.00021	71069
4	175.72	0.00073	0.00026	0.00155	14.86	0.00021	70063
4	173.01	0.00073	0.00026	0.00155	14.63	0.00021	69102
4	176.09	0.00073	0.00026	0.00155	14.89	0.00021	70271
4	172.96	0.00073	0.00026	0.00154	14.63	0.00021	69323
2	51.03	0.00011	0.00009	0.00049	4.32	0.00006	75483
2	48.44	0.00011	0.00009	0.00049	4.10	0.00006	71768
2	50.78	0.00007	0.00009	0.00049	4.29	0.00005	79574
2	48.75	0.00011	0.00009	0.00049	4.12	0.00006	71909
2	49.08	0.00011	0.00009	0.00049	4.15	0.00006	72094
2	88.24	0.00022	0.00012	0.00088	7.46	0.00010	73529
2	88.46	0.00023	0.00012	0.00088	7.48	0.00010	73413
2	85.17	0.00022	0.00016	0.00087	7.20	0.00010	69014
2	87.66	0.00022	0.00012	0.00087	7.41	0.00010	73297
2	85.24	0.00022	0.00012	0.00087	7.21	0.00010	71479
2	124.48	0.00035	0.00016	0.00124	10.53	0.00015	72292
2	123.90	0.00038	0.00016	0.00124	10.48	0.00015	70748
2	124.97	0.00039	0.00016	0.00124	10.57	0.00015	71055
2	125.09	0.00039	0.00015	0.00123	10.58	0.00015	71803
2	128.77	0.00039	0.00016	0.00123	10.89	0.00015	73734
2	176.46	0.00070	0.00020	0.00164	14.92	0.00021	70591
2	175.59	0.00066	0.00025	0.00168	14.85	0.00022	68933
2	173.07	0.00062	0.00021	0.00168	14.64	0.00021	70159
2	175.21	0.00065	0.00025	0.00163	14.82	0.00021	70173
2	175.14	0.00065	0.00025	0.00163	14.81	0.00021	70107

Table J.65: Resilient modulus data (B_1_27_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.78	0.00046	0.00050	0.00059	4.29	0.00013	33191
8	50.72	0.00046	0.00050	0.00059	4.29	0.00013	33106
8	50.72	0.00046	0.00051	0.00059	4.29	0.00013	33067
8	50.73	0.00046	0.00054	0.00059	4.29	0.00013	32376
8	51.74	0.00050	0.00050	0.00059	4.38	0.00013	33055
8	87.49	0.00086	0.00095	0.00106	7.40	0.00024	31069
8	87.39	0.00085	0.00094	0.00105	7.39	0.00024	31111
8	85.64	0.00086	0.00095	0.00106	7.24	0.00024	30311
8	87.60	0.00089	0.00090	0.00109	7.41	0.00024	30812
8	87.53	0.00089	0.00094	0.00109	7.40	0.00024	30448
8	123.83	0.00137	0.00137	0.00154	10.47	0.00036	29309
8	124.16	0.00133	0.00138	0.00159	10.50	0.00036	29357
8	123.81	0.00129	0.00137	0.00154	10.47	0.00035	29929
8	124.23	0.00136	0.00137	0.00154	10.51	0.00036	29514
8	125.37	0.00137	0.00137	0.00154	10.60	0.00036	29773
8	175.76	0.00204	0.00207	0.00230	14.87	0.00053	27850
8	175.04	0.00204	0.00207	0.00226	14.80	0.00053	27871
8	176.79	0.00204	0.00203	0.00226	14.95	0.00053	28376
8	175.53	0.00200	0.00203	0.00226	14.85	0.00052	28308
8	175.29	0.00207	0.00203	0.00225	14.83	0.00053	28003
6	50.72	0.00043	0.00049	0.00063	4.29	0.00013	33327
6	50.94	0.00047	0.00049	0.00063	4.31	0.00013	32628
6	51.01	0.00043	0.00050	0.00063	4.31	0.00013	33316
6	50.57	0.00042	0.00049	0.00062	4.28	0.00013	33341
6	50.55	0.00046	0.00053	0.00063	4.28	0.00014	31562
6	87.61	0.00084	0.00094	0.00114	7.41	0.00024	30451
6	87.34	0.00084	0.00093	0.00114	7.39	0.00024	30452
6	84.82	0.00080	0.00093	0.00109	7.17	0.00024	30430
6	87.57	0.00080	0.00094	0.00114	7.41	0.00024	30844
6	87.39	0.00080	0.00094	0.00110	7.39	0.00024	31261
6	125.82	0.00125	0.00137	0.00160	10.64	0.00035	30261
6	123.65	0.00129	0.00141	0.00159	10.46	0.00036	29261
6	124.30	0.00129	0.00137	0.00164	10.51	0.00036	29335
6	123.98	0.00129	0.00141	0.00160	10.49	0.00036	29282
6	126.53	0.00129	0.00137	0.00160	10.70	0.00035	30198
6	173.02	0.00197	0.00202	0.00230	14.63	0.00052	27910
6	176.15	0.00205	0.00205	0.00234	14.90	0.00054	27745
6	178.80	0.00201	0.00201	0.00234	15.12	0.00053	28503
6	175.01	0.00200	0.00205	0.00234	14.80	0.00053	27779
6	175.28	0.00201	0.00205	0.00234	14.82	0.00053	27776
4	50.90	0.00038	0.00052	0.00066	4.30	0.00013	33245
4	51.01	0.00038	0.00052	0.00070	4.31	0.00013	32415
4	51.07	0.00042	0.00052	0.00066	4.32	0.00013	32422
4	48.54	0.00038	0.00047	0.00066	4.11	0.00013	32463
4	48.65	0.00038	0.00048	0.00066	4.11	0.00013	32475
4	87.49	0.00073	0.00092	0.00118	7.40	0.00023	31501
4	86.13	0.00073	0.00092	0.00117	7.28	0.00023	31035
4	90.73	0.00073	0.00096	0.00121	7.67	0.00024	31780
4	87.63	0.00072	0.00091	0.00120	7.41	0.00024	31336
4	87.34	0.00072	0.00091	0.00120	7.39	0.00024	31231
4	125.22	0.00120	0.00135	0.00171	10.59	0.00035	29881
4	125.06	0.00119	0.00135	0.00175	10.58	0.00036	29580
4	125.23	0.00123	0.00135	0.00171	10.59	0.00036	29633
4	127.72	0.00123	0.00135	0.00175	10.80	0.00036	29903
4	125.07	0.00119	0.00135	0.00175	10.58	0.00036	29630
4	175.43	0.00197	0.00205	0.00250	14.84	0.00054	27313
4	172.95	0.00193	0.00205	0.00246	14.63	0.00054	27240
4	173.01	0.00189	0.00205	0.00247	14.63	0.00053	27377
4	173.16	0.00190	0.00202	0.00247	14.65	0.00053	27508
4	175.72	0.00194	0.00202	0.00252	14.86	0.00054	27523
2	48.55	0.00041	0.00046	0.00073	4.11	0.00013	30881
2	48.91	0.00037	0.00046	0.00073	4.14	0.00013	31812
2	49.00	0.00037	0.00047	0.00073	4.14	0.00013	31638
2	48.82	0.00037	0.00046	0.00073	4.13	0.00013	31604
2	51.15	0.00041	0.00042	0.00077	4.33	0.00013	32589
2	87.46	0.00072	0.00082	0.00131	7.40	0.00024	31188
2	88.08	0.00068	0.00083	0.00132	7.45	0.00024	31636
2	87.35	0.00068	0.00086	0.00131	7.39	0.00024	31102
2	87.92	0.00072	0.00082	0.00131	7.44	0.00024	31218
2	88.12	0.00068	0.00083	0.00136	7.45	0.00024	31185
2	125.74	0.00119	0.00131	0.00186	10.63	0.00036	29247
2	129.15	0.00119	0.00131	0.00186	10.92	0.00036	30008
2	124.61	0.00119	0.00131	0.00186	10.54	0.00036	28971
2	126.88	0.00119	0.00131	0.00186	10.73	0.00036	29512
2	124.34	0.00115	0.00127	0.00186	10.52	0.00036	29476
2	176.37	0.00196	0.00195	0.00250	14.92	0.00053	27941
2	174.07	0.00200	0.00199	0.00250	14.72	0.00054	27252
2	173.92	0.00199	0.00195	0.00254	14.71	0.00054	27236
2	173.94	0.00203	0.00199	0.00254	14.71	0.00055	26907
2	176.05	0.00199	0.00194	0.00249	14.89	0.00053	27834

Table J.66: Resilient modulus data (B_2_27_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.53	0.00094	0.00008	0.00084	4.57	0.00015	27605
8	50.52	0.00093	0.00008	0.00080	4.57	0.00015	28339
8	50.71	0.00093	0.00008	0.00084	4.58	0.00015	27805
8	50.78	0.00097	0.00008	0.00084	4.54	0.00016	27296
8	50.69	0.00097	0.00008	0.00080	4.56	0.00015	28008
8	87.22	0.00169	0.00015	0.00160	7.61	0.00029	25712
8	87.07	0.00169	0.00015	0.00160	7.84	0.00029	25721
8	87.35	0.00169	0.00015	0.00161	7.63	0.00029	25732
8	84.92	0.00169	0.00015	0.00156	7.83	0.00028	25330
8	87.52	0.00166	0.00015	0.00161	7.66	0.00029	25972
8	123.80	0.00249	0.00024	0.00248	11.17	0.00043	24164
8	123.74	0.00249	0.00024	0.00248	11.19	0.00043	24157
8	123.68	0.00248	0.00024	0.00248	11.19	0.00043	24145
8	123.71	0.00253	0.00024	0.00248	11.16	0.00044	23970
8	123.84	0.00245	0.00024	0.00248	11.40	0.00043	24341
8	172.69	0.00354	0.00061	0.00365	15.76	0.00065	22471
8	172.56	0.00357	0.00065	0.00365	15.84	0.00066	22281
8	170.07	0.00356	0.00065	0.00364	16.17	0.00065	21990
8	172.46	0.00352	0.00065	0.00360	15.50	0.00065	22539
8	173.32	0.00355	0.00065	0.00364	15.51	0.00065	22447
6	51.01	0.00100	0.00008	0.00079	4.56	0.00016	27691
6	48.45	0.00100	0.00008	0.00075	4.34	0.00015	27017
6	48.50	0.00100	0.00008	0.00074	4.57	0.00015	27015
6	48.63	0.00100	0.00008	0.00075	4.36	0.00015	26993
6	48.71	0.00100	0.00008	0.00079	4.36	0.00016	26478
6	87.22	0.00173	0.00016	0.00152	7.85	0.00028	25978
6	85.17	0.00174	0.00016	0.00152	7.65	0.00029	25248
6	84.88	0.00170	0.00016	0.00152	7.87	0.00028	25519
6	87.35	0.00170	0.00016	0.00152	7.88	0.00028	26245
6	84.80	0.00173	0.00016	0.00152	7.73	0.00028	25235
6	122.93	0.00262	0.00022	0.00243	11.25	0.00044	23695
6	125.18	0.00261	0.00022	0.00243	11.32	0.00044	24150
6	122.17	0.00261	0.00022	0.00238	10.93	0.00043	23778
6	121.81	0.00257	0.00022	0.00242	11.16	0.00043	23722
6	124.35	0.00257	0.00022	0.00242	11.14	0.00043	24222
6	179.26	0.00372	0.00053	0.00368	15.76	0.00066	22959
6	170.33	0.00373	0.00053	0.00364	15.84	0.00066	21896
6	172.60	0.00377	0.00053	0.00363	16.16	0.00066	22092
6	172.59	0.00373	0.00053	0.00363	15.51	0.00066	22191
6	172.62	0.00373	0.00053	0.00363	15.53	0.00066	22185
4	48.57	0.00104	0.00013	0.00074	4.36	0.00016	25795
4	48.59	0.00104	0.00013	0.00074	4.35	0.00016	25855
4	48.53	0.00100	0.00009	0.00070	4.33	0.00015	27602
4	48.45	0.00104	0.00013	0.00074	4.42	0.00016	25833
4	51.23	0.00108	0.00013	0.00074	4.69	0.00016	26652
4	87.34	0.00187	0.00015	0.00138	7.77	0.00028	26051
4	85.08	0.00183	0.00015	0.00139	7.77	0.00028	25629
4	85.21	0.00188	0.00015	0.00139	7.76	0.00029	25285
4	85.00	0.00187	0.00015	0.00139	8.03	0.00028	25278
4	87.42	0.00191	0.00015	0.00139	7.78	0.00029	25697
4	121.70	0.00275	0.00022	0.00226	11.15	0.00044	23609
4	121.81	0.00275	0.00022	0.00230	11.13	0.00044	23454
4	121.56	0.00271	0.00022	0.00226	11.34	0.00043	23790
4	123.78	0.00274	0.00022	0.00229	11.35	0.00044	23909
4	124.22	0.00270	0.00022	0.00230	11.15	0.00043	24176
4	170.38	0.00400	0.00045	0.00358	15.54	0.00067	21522
4	170.34	0.00396	0.00045	0.00358	15.75	0.00067	21636
4	170.43	0.00396	0.00045	0.00354	15.75	0.00066	21755
4	172.82	0.00400	0.00045	0.00358	15.53	0.00067	21851
4	172.90	0.00396	0.00045	0.00354	15.52	0.00066	22085
2	48.85	0.00109	0.00014	0.00067	4.38	0.00016	26060
2	48.89	0.00109	0.00014	0.00067	4.37	0.00016	26141
2	48.82	0.00108	0.00014	0.00067	4.34	0.00016	26152
2	48.63	0.00108	0.00014	0.00067	4.57	0.00016	26074
2	48.76	0.00105	0.00014	0.00067	4.55	0.00015	26665
2	85.18	0.00194	0.00019	0.00128	8.20	0.00028	25359
2	85.52	0.00197	0.00019	0.00128	7.90	0.00029	25163
2	85.30	0.00194	0.00019	0.00128	7.90	0.00028	25392
2	85.22	0.00197	0.00019	0.00132	7.89	0.00029	24792
2	86.33	0.00194	0.00019	0.00128	7.87	0.00028	25666
2	121.47	0.00291	0.00022	0.00212	11.39	0.00044	23459
2	121.52	0.00291	0.00022	0.00216	11.17	0.00044	23308
2	124.07	0.00291	0.00022	0.00216	11.40	0.00044	23823
2	124.09	0.00291	0.00022	0.00216	11.18	0.00044	23851
2	123.96	0.00290	0.00022	0.00216	11.40	0.00044	23858
2	173.34	0.00419	0.00038	0.00344	15.52	0.00067	21964
2	171.06	0.00419	0.00037	0.00344	15.56	0.00067	21673
2	173.34	0.00419	0.00037	0.00344	15.55	0.00067	21971
2	173.16	0.00418	0.00038	0.00344	15.56	0.00067	21979
2	170.89	0.00423	0.00042	0.00344	15.75	0.00067	21461

Table J.67: Resilient modulus data (B_1_22_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	48.92	0.00037	0.00049	0.00083	4.14	0.00014	29406
8	48.66	0.00037	0.00049	0.00083	4.12	0.00014	29134
8	49.05	0.00037	0.00050	0.00083	4.15	0.00014	29197
8	48.84	0.00037	0.00050	0.00083	4.13	0.00014	29040
8	51.35	0.00037	0.00050	0.00084	4.34	0.00014	30495
8	87.47	0.00077	0.00101	0.00135	7.40	0.00026	28420
8	87.22	0.00073	0.00101	0.00134	7.38	0.00026	28721
8	84.67	0.00081	0.00101	0.00134	7.16	0.00026	27257
8	85.33	0.00077	0.00105	0.00135	7.22	0.00026	27346
8	85.10	0.00073	0.00101	0.00135	7.20	0.00026	27977
8	125.01	0.00129	0.00159	0.00185	10.57	0.00039	26862
8	121.38	0.00125	0.00163	0.00184	10.27	0.00039	26112
8	123.88	0.00125	0.00163	0.00184	10.48	0.00039	26661
8	123.68	0.00124	0.00158	0.00184	10.46	0.00039	26908
8	124.00	0.00125	0.00163	0.00184	10.49	0.00039	26697
8	170.16	0.00203	0.00250	0.00256	14.39	0.00059	24357
8	172.83	0.00211	0.00250	0.00260	14.62	0.00060	24320
8	172.90	0.00203	0.00250	0.00260	14.62	0.00059	24599
8	172.54	0.00202	0.00246	0.00260	14.59	0.00059	24741
8	172.58	0.00206	0.00250	0.00260	14.60	0.00060	24481
6	48.95	0.00032	0.00044	0.00101	4.14	0.00015	28039
6	48.59	0.00032	0.00045	0.00096	4.11	0.00014	28560
6	48.91	0.00032	0.00045	0.00096	4.14	0.00014	28667
6	48.71	0.00032	0.00041	0.00096	4.12	0.00014	29368
6	48.60	0.00032	0.00040	0.00096	4.11	0.00014	29344
6	87.06	0.00064	0.00094	0.00151	7.36	0.00026	28573
6	84.73	0.00068	0.00095	0.00151	7.17	0.00026	27352
6	84.62	0.00068	0.00099	0.00151	7.16	0.00027	26974
6	87.07	0.00069	0.00099	0.00151	7.36	0.00027	27709
6	86.85	0.00065	0.00095	0.00151	7.35	0.00026	28446
6	123.43	0.00116	0.00160	0.00202	10.44	0.00040	26228
6	123.72	0.00112	0.00160	0.00202	10.46	0.00039	26492
6	123.62	0.00112	0.00160	0.00202	10.46	0.00040	26456
6	123.77	0.00116	0.00155	0.00203	10.47	0.00040	26488
6	121.38	0.00116	0.00160	0.00203	10.27	0.00040	25734
6	172.65	0.00190	0.00250	0.00280	14.60	0.00060	24324
6	170.48	0.00183	0.00251	0.00281	14.42	0.00059	24244
6	172.71	0.00190	0.00250	0.00280	14.61	0.00060	24330
6	172.86	0.00186	0.00246	0.00276	14.62	0.00059	24758
6	175.20	0.00190	0.00250	0.00280	14.82	0.00060	24687
4	48.99	0.00026	0.00044	0.00106	4.14	0.00015	28303
4	49.05	0.00030	0.00040	0.00106	4.15	0.00015	28382
4	48.98	0.00026	0.00044	0.00106	4.14	0.00015	28256
4	49.08	0.00022	0.00044	0.00106	4.15	0.00014	28994
4	49.10	0.00030	0.00040	0.00106	4.15	0.00015	28431
4	84.91	0.00051	0.00093	0.00174	7.18	0.00027	27061
4	84.95	0.00055	0.00089	0.00174	7.18	0.00027	27103
4	84.84	0.00051	0.00089	0.00174	7.18	0.00026	27426
4	84.86	0.00051	0.00093	0.00174	7.18	0.00027	27066
4	87.19	0.00051	0.00093	0.00174	7.37	0.00027	27787
4	123.66	0.00092	0.00155	0.00229	10.46	0.00040	26352
4	123.55	0.00092	0.00159	0.00229	10.45	0.00040	26137
4	121.03	0.00092	0.00155	0.00228	10.24	0.00040	25882
4	123.42	0.00096	0.00159	0.00228	10.44	0.00040	25947
4	123.34	0.00092	0.00154	0.00228	10.43	0.00039	26435
4	173.05	0.00165	0.00249	0.00311	14.64	0.00060	24229
4	173.05	0.00165	0.00253	0.00311	14.64	0.00061	24081
4	172.88	0.00161	0.00253	0.00311	14.62	0.00060	24213
4	172.81	0.00161	0.00253	0.00311	14.62	0.00060	24205
4	172.95	0.00161	0.00253	0.00311	14.63	0.00060	24213
2	48.49	0.00022	0.00044	0.00110	4.10	0.00015	28054
2	48.43	0.00022	0.00044	0.00110	4.10	0.00015	28131
2	48.35	0.00022	0.00043	0.00109	4.09	0.00015	28143
2	49.06	0.00022	0.00044	0.00111	4.15	0.00015	28218
2	48.61	0.00025	0.00044	0.00110	4.11	0.00015	27592
2	90.33	0.00037	0.00093	0.00191	7.64	0.00027	28578
2	85.58	0.00041	0.00092	0.00195	7.24	0.00027	26460
2	87.81	0.00045	0.00092	0.00194	7.43	0.00028	26963
2	85.79	0.00045	0.00088	0.00194	7.26	0.00027	26619
2	87.24	0.00041	0.00091	0.00192	7.38	0.00027	27323
2	122.76	0.00070	0.00158	0.00265	10.38	0.00041	25264
2	122.82	0.00070	0.00158	0.00265	10.39	0.00041	25272
2	123.19	0.00070	0.00158	0.00266	10.42	0.00041	25327
2	125.43	0.00070	0.00154	0.00265	10.61	0.00041	26015
2	123.93	0.00070	0.00157	0.00262	10.48	0.00041	25742
2	170.55	0.00134	0.00256	0.00343	14.42	0.00061	23595
2	170.41	0.00134	0.00256	0.00343	14.41	0.00061	23590
2	172.91	0.00134	0.00256	0.00343	14.62	0.00061	23936
2	170.53	0.00134	0.00256	0.00343	14.42	0.00061	23632
2	172.96	0.00134	0.00255	0.00342	14.63	0.00061	23988

Table J.68: Resilient modulus data (B_2_22_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	54.91	0.00027	0.00070	0.00041	4.57	0.00011	39715
8	48.34	0.00020	0.00070	0.00041	4.57	0.00011	42084
8	50.48	0.00023	0.00070	0.00041	4.58	0.00011	40997
8	48.08	0.00027	0.00069	0.00041	4.54	0.00011	39542
8	50.82	0.00027	0.00074	0.00037	4.56	0.00012	39681
8	84.82	0.00060	0.00119	0.00065	7.61	0.00020	37459
8	84.80	0.00052	0.00119	0.00069	7.84	0.00020	39210
8	87.60	0.00056	0.00120	0.00069	7.63	0.00020	37383
8	87.21	0.00052	0.00119	0.00068	7.83	0.00020	39255
8	87.46	0.00056	0.00120	0.00065	7.66	0.00020	38266
8	123.35	0.00093	0.00170	0.00098	11.17	0.00030	37200
8	124.09	0.00093	0.00175	0.00098	11.19	0.00031	36671
8	123.89	0.00090	0.00170	0.00097	11.19	0.00030	37560
8	123.85	0.00090	0.00170	0.00098	11.16	0.00030	37440
8	123.95	0.00094	0.00175	0.00098	11.40	0.00031	37359
8	172.44	0.00150	0.00241	0.00145	15.76	0.00045	35297
8	172.84	0.00146	0.00246	0.00146	15.84	0.00045	35376
8	172.49	0.00149	0.00241	0.00149	16.17	0.00045	35926
8	174.97	0.00146	0.00237	0.00149	15.50	0.00044	34957
8	172.45	0.00146	0.00245	0.00145	15.51	0.00045	34717
6	50.20	0.00026	0.00075	0.00043	4.56	0.00012	37772
6	51.47	0.00018	0.00076	0.00043	4.34	0.00011	37883
6	48.34	0.00018	0.00071	0.00039	4.57	0.00011	42723
6	48.24	0.00026	0.00071	0.00039	4.36	0.00011	38408
6	48.25	0.00022	0.00075	0.00039	4.36	0.00011	38351
6	84.89	0.00049	0.00128	0.00068	7.85	0.00020	38318
6	85.11	0.00049	0.00124	0.00068	7.65	0.00020	37976
6	87.15	0.00049	0.00128	0.00068	7.87	0.00020	38587
6	84.86	0.00049	0.00128	0.00068	7.88	0.00020	38486
6	84.91	0.00045	0.00128	0.00068	7.73	0.00020	38384
6	123.93	0.00084	0.00180	0.00103	11.25	0.00031	36829
6	123.68	0.00088	0.00179	0.00098	11.32	0.00030	37159
6	123.91	0.00081	0.00179	0.00099	10.93	0.00030	36566
6	124.01	0.00085	0.00180	0.00099	11.16	0.00030	36912
6	126.31	0.00088	0.00184	0.00099	11.14	0.00031	36089
6	172.67	0.00139	0.00251	0.00150	15.76	0.00045	35041
6	172.56	0.00142	0.00251	0.00145	15.84	0.00045	35277
6	174.97	0.00142	0.00251	0.00145	16.16	0.00045	35987
6	172.60	0.00139	0.00255	0.00149	15.51	0.00045	34244
6	172.66	0.00142	0.00251	0.00150	15.53	0.00045	34309
4	49.63	0.00011	0.00073	0.00049	4.36	0.00011	39300
4	53.76	0.00015	0.00078	0.00045	4.35	0.00012	37652
4	48.84	0.00015	0.00078	0.00045	4.33	0.00011	37670
4	48.38	0.00011	0.00073	0.00045	4.42	0.00011	41143
4	51.18	0.00015	0.00078	0.00045	4.69	0.00011	41016
4	85.32	0.00041	0.00135	0.00075	7.77	0.00021	37241
4	87.30	0.00037	0.00134	0.00074	7.77	0.00020	37951
4	87.37	0.00041	0.00130	0.00074	7.76	0.00020	38055
4	86.90	0.00041	0.00134	0.00074	8.03	0.00021	38821
4	87.71	0.00045	0.00135	0.00075	7.78	0.00021	36764
4	123.93	0.00079	0.00185	0.00103	11.15	0.00031	36415
4	124.04	0.00080	0.00190	0.00103	11.13	0.00031	35866
4	126.21	0.00076	0.00189	0.00102	11.34	0.00031	37021
4	123.84	0.00076	0.00190	0.00103	11.35	0.00031	37007
4	124.16	0.00079	0.00186	0.00103	11.15	0.00031	36402
4	172.90	0.00131	0.00264	0.00149	15.54	0.00045	34271
4	172.61	0.00127	0.00260	0.00149	15.75	0.00045	35297
4	173.32	0.00130	0.00264	0.00149	15.75	0.00045	34768
4	174.48	0.00131	0.00264	0.00150	15.53	0.00045	34233
4	176.35	0.00131	0.00264	0.00149	15.52	0.00045	34235
2	48.49	0.00010	0.00080	0.00050	4.38	0.00012	37453
2	46.27	0.00006	0.00076	0.00050	4.37	0.00011	39682
2	46.42	0.00006	0.00076	0.00050	4.34	0.00011	39233
2	48.72	0.00006	0.00076	0.00050	4.57	0.00011	41360
2	48.76	0.00006	0.00076	0.00050	4.55	0.00011	41129
2	87.73	0.00021	0.00143	0.00083	8.20	0.00021	39857
2	87.58	0.00028	0.00143	0.00083	7.90	0.00021	37339
2	85.29	0.00025	0.00143	0.00083	7.90	0.00021	37817
2	87.30	0.00028	0.00139	0.00083	7.89	0.00021	37951
2	87.38	0.00028	0.00143	0.00083	7.87	0.00021	37143
2	124.45	0.00057	0.00199	0.00114	11.39	0.00031	36900
2	124.68	0.00056	0.00200	0.00110	11.17	0.00031	36591
2	124.91	0.00056	0.00200	0.00111	11.40	0.00031	37289
2	124.64	0.00057	0.00204	0.00115	11.18	0.00031	35800
2	124.44	0.00060	0.00199	0.00110	11.40	0.00031	37010
2	172.88	0.00112	0.00281	0.00160	15.52	0.00046	33625
2	172.74	0.00112	0.00273	0.00156	15.56	0.00045	34524
2	173.06	0.00116	0.00277	0.00156	15.55	0.00046	33971
2	172.94	0.00108	0.00273	0.00160	15.56	0.00045	34519
2	172.71	0.00112	0.00277	0.00156	15.75	0.00045	34747

Table J.69: Resilient modulus data (B_1_16_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.27	0.00100	0.00105	0.00107	4.25	0.00026	16358
8	47.48	0.00099	0.00104	0.00102	4.02	0.00025	15788
8	47.73	0.00104	0.00100	0.00101	4.04	0.00025	15872
8	50.36	0.00103	0.00105	0.00101	4.26	0.00026	16559
8	47.72	0.00100	0.00104	0.00105	4.04	0.00026	15642
8	84.00	0.00185	0.00182	0.00187	7.10	0.00046	15380
8	84.58	0.00190	0.00183	0.00183	7.15	0.00046	15422
8	84.78	0.00186	0.00183	0.00187	7.17	0.00046	15472
8	84.22	0.00189	0.00186	0.00185	7.12	0.00047	15265
8	84.55	0.00189	0.00186	0.00186	7.15	0.00047	15302
8	120.87	0.00287	0.00272	0.00275	10.22	0.00069	14724
8	120.92	0.00287	0.00276	0.00275	10.23	0.00070	14658
8	123.51	0.00286	0.00280	0.00278	10.45	0.00070	14852
8	120.82	0.00285	0.00274	0.00273	10.22	0.00069	14727
8	123.42	0.00286	0.00275	0.00273	10.44	0.00069	15026
8	169.63	0.00427	0.00401	0.00404	14.35	0.00103	13978
8	172.19	0.00426	0.00406	0.00408	14.56	0.00103	14091
8	172.23	0.00427	0.00401	0.00404	14.57	0.00103	14194
8	169.74	0.00426	0.00405	0.00408	14.36	0.00103	13898
8	169.55	0.00426	0.00405	0.00407	14.34	0.00103	13906
6	47.93	0.00110	0.00112	0.00119	4.05	0.00028	14255
6	47.91	0.00110	0.00107	0.00120	4.05	0.00028	14419
6	48.09	0.00110	0.00108	0.00116	4.07	0.00028	14621
6	48.02	0.00110	0.00108	0.00120	4.06	0.00028	14429
6	48.09	0.00110	0.00112	0.00120	4.07	0.00029	14251
6	84.32	0.00204	0.00200	0.00213	7.13	0.00051	13865
6	84.54	0.00204	0.00200	0.00208	7.15	0.00051	14010
6	84.25	0.00203	0.00199	0.00211	7.13	0.00051	13958
6	84.27	0.00206	0.00203	0.00211	7.13	0.00052	13802
6	84.45	0.00206	0.00203	0.00211	7.14	0.00052	13822
6	123.11	0.00314	0.00304	0.00313	10.41	0.00078	13427
6	123.01	0.00318	0.00304	0.00317	10.40	0.00078	13292
6	120.78	0.00314	0.00305	0.00314	10.22	0.00078	13142
6	120.86	0.00315	0.00305	0.00314	10.22	0.00078	13142
6	120.81	0.00314	0.00301	0.00314	10.22	0.00077	13202
6	170.43	0.00460	0.00440	0.00452	14.41	0.00113	12799
6	169.33	0.00460	0.00439	0.00451	14.32	0.00113	12728
6	169.33	0.00463	0.00443	0.00451	14.32	0.00113	12660
6	169.15	0.00463	0.00443	0.00451	14.31	0.00113	12656
6	172.02	0.00463	0.00443	0.00451	14.55	0.00113	12857
4	48.53	0.00126	0.00120	0.00140	4.10	0.00032	12758
4	46.26	0.00122	0.00121	0.00132	3.91	0.00031	12505
4	48.40	0.00125	0.00124	0.00136	4.09	0.00032	12756
4	48.41	0.00122	0.00120	0.00136	4.09	0.00031	13035
4	48.22	0.00125	0.00123	0.00140	4.08	0.00032	12606
4	85.01	0.00232	0.00225	0.00246	7.19	0.00059	12274
4	84.64	0.00231	0.00225	0.00246	7.16	0.00059	12233
4	84.87	0.00232	0.00225	0.00246	7.18	0.00059	12260
4	84.84	0.00232	0.00225	0.00247	7.18	0.00059	12233
4	84.37	0.00231	0.00220	0.00242	7.14	0.00058	12353
4	120.98	0.00353	0.00337	0.00363	10.23	0.00088	11666
4	120.91	0.00349	0.00332	0.00358	10.23	0.00087	11821
4	118.50	0.00350	0.00336	0.00359	10.02	0.00087	11513
4	121.92	0.00350	0.00333	0.00359	10.31	0.00087	11872
4	122.64	0.00350	0.00337	0.00359	10.37	0.00087	11909
4	167.47	0.00517	0.00495	0.00522	14.16	0.00128	11082
4	167.28	0.00521	0.00495	0.00522	14.15	0.00128	11037
4	170.51	0.00517	0.00490	0.00522	14.42	0.00127	11323
4	169.59	0.00520	0.00490	0.00522	14.34	0.00128	11229
4	169.12	0.00520	0.00494	0.00521	14.30	0.00128	11178
2	48.36	0.00147	0.00141	0.00156	4.09	0.00037	11072
2	48.53	0.00148	0.00142	0.00156	4.10	0.00037	11050
2	48.52	0.00143	0.00136	0.00152	4.10	0.00036	11419
2	46.00	0.00143	0.00137	0.00152	3.89	0.00036	10802
2	48.47	0.00147	0.00141	0.00156	4.10	0.00037	11061
2	82.56	0.00280	0.00259	0.00296	6.98	0.00070	10045
2	82.42	0.00275	0.00258	0.00296	6.97	0.00069	10087
2	85.15	0.00280	0.00264	0.00297	7.20	0.00070	10281
2	84.87	0.00280	0.00259	0.00296	7.18	0.00070	10318
2	82.56	0.00281	0.00260	0.00302	6.98	0.00070	9950
2	119.00	0.00421	0.00395	0.00443	10.06	0.00105	9593
2	119.15	0.00421	0.00390	0.00438	10.08	0.00104	9677
2	119.15	0.00421	0.00395	0.00439	10.08	0.00105	9639
2	119.08	0.00420	0.00394	0.00438	10.07	0.00104	9646
2	119.03	0.00420	0.00394	0.00438	10.07	0.00104	9647
2	167.61	0.00601	0.00567	0.00621	14.18	0.00149	9509
2	167.63	0.00601	0.00563	0.00621	14.18	0.00149	9537
2	167.50	0.00600	0.00562	0.00620	14.17	0.00149	9537
2	167.43	0.00600	0.00567	0.00620	14.16	0.00149	9513
2	167.61	0.00599	0.00564	0.00624	14.18	0.00149	9517

Table J.70: Resilient modulus data (B_2_16_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	48.53	0.00102	0.00094	0.00112	4.10	0.00026	15991
8	51.15	0.00106	0.00098	0.00116	4.33	0.00027	16218
8	50.88	0.00105	0.00098	0.00115	4.30	0.00026	16277
8	51.01	0.00106	0.00098	0.00115	4.31	0.00027	16227
8	48.91	0.00103	0.00099	0.00112	4.14	0.00026	15792
8	89.87	0.00196	0.00179	0.00218	7.60	0.00049	15389
8	84.69	0.00195	0.00178	0.00222	7.16	0.00050	14411
8	85.37	0.00196	0.00179	0.00218	7.22	0.00049	14617
8	88.84	0.00196	0.00179	0.00218	7.51	0.00049	15220
8	90.05	0.00196	0.00179	0.00223	7.62	0.00050	15275
8	123.95	0.00295	0.00269	0.00339	10.48	0.00075	13948
8	124.10	0.00296	0.00269	0.00340	10.50	0.00075	13927
8	124.02	0.00295	0.00269	0.00340	10.49	0.00075	13919
8	123.83	0.00295	0.00269	0.00340	10.47	0.00075	13898
8	123.89	0.00296	0.00265	0.00340	10.48	0.00075	13951
8	170.22	0.00442	0.00401	0.00496	14.40	0.00112	12907
8	175.19	0.00446	0.00406	0.00496	14.82	0.00112	13202
8	170.33	0.00442	0.00397	0.00492	14.41	0.00111	12984
8	170.17	0.00442	0.00402	0.00496	14.39	0.00112	12889
8	172.68	0.00442	0.00402	0.00497	14.60	0.00112	13072
6	53.13	0.00112	0.00102	0.00128	4.49	0.00028	15791
6	48.73	0.00112	0.00106	0.00128	4.12	0.00029	14308
6	48.92	0.00112	0.00106	0.00128	4.14	0.00029	14333
6	48.87	0.00112	0.00102	0.00128	4.13	0.00029	14470
6	48.81	0.00112	0.00106	0.00128	4.13	0.00029	14297
6	85.45	0.00210	0.00195	0.00247	7.23	0.00054	13304
6	85.70	0.00211	0.00191	0.00243	7.25	0.00054	13497
6	85.70	0.00210	0.00191	0.00251	7.25	0.00054	13343
6	87.78	0.00213	0.00194	0.00245	7.42	0.00054	13661
6	85.56	0.00214	0.00199	0.00247	7.24	0.00055	13149
6	121.88	0.00318	0.00288	0.00379	10.31	0.00082	12556
6	121.72	0.00318	0.00288	0.00383	10.29	0.00082	12504
6	121.61	0.00318	0.00292	0.00374	10.28	0.00082	12554
6	124.14	0.00318	0.00291	0.00378	10.50	0.00082	12765
6	124.89	0.00317	0.00291	0.00378	10.56	0.00082	12852
6	170.38	0.00480	0.00434	0.00553	14.41	0.00122	11784
6	170.52	0.00476	0.00435	0.00549	14.42	0.00122	11854
6	170.32	0.00476	0.00438	0.00549	14.41	0.00122	11817
6	170.36	0.00476	0.00434	0.00553	14.41	0.00122	11821
6	170.32	0.00479	0.00434	0.00548	14.41	0.00122	11833
4	48.87	0.00123	0.00110	0.00145	4.13	0.00032	13111
4	49.34	0.00128	0.00111	0.00150	4.17	0.00032	12887
4	48.76	0.00127	0.00110	0.00149	4.12	0.00032	12852
4	48.99	0.00126	0.00110	0.00149	4.14	0.00032	12905
4	48.76	0.00123	0.00110	0.00144	4.12	0.00031	13143
4	85.39	0.00236	0.00216	0.00281	7.22	0.00061	11823
4	85.35	0.00240	0.00215	0.00281	7.22	0.00061	11767
4	85.36	0.00239	0.00215	0.00284	7.22	0.00062	11727
4	85.01	0.00235	0.00214	0.00279	7.19	0.00061	11838
4	93.16	-0.00417	-0.03439	-0.00206	7.88	-0.00338	-2328
4	121.82	0.00355	0.00315	0.00428	10.30	0.00092	11258
4	122.49	0.00355	0.00319	0.00431	10.36	0.00092	11258
4	123.74	0.00354	0.00318	0.00431	10.47	0.00092	11387
4	124.81	0.00354	0.00318	0.00430	10.56	0.00092	11500
4	122.03	0.00354	0.00318	0.00430	10.32	0.00092	11249
4	170.53	0.00533	0.00478	0.00627	14.42	0.00136	10568
4	173.23	0.00533	0.00478	0.00631	14.65	0.00137	10704
4	170.75	0.00529	0.00478	0.00627	14.44	0.00136	10604
4	172.98	0.00533	0.00477	0.00631	14.63	0.00137	10700
4	167.83	0.00528	0.00477	0.00626	14.19	0.00136	10439
2	46.38	0.00147	0.00117	0.00160	3.92	0.00035	11095
2	46.57	0.00147	0.00122	0.00164	3.94	0.00036	10903
2	46.65	0.00143	0.00117	0.00160	3.95	0.00035	11251
2	51.57	0.00148	0.00118	0.00165	4.36	0.00036	12157
2	49.02	0.00143	0.00118	0.00164	4.15	0.00035	11706
2	85.43	0.00293	0.00242	0.00330	7.23	0.00072	10023
2	82.95	0.00289	0.00242	0.00330	7.02	0.00072	9776
2	83.01	0.00294	0.00242	0.00330	7.02	0.00072	9726
2	85.53	0.00294	0.00238	0.00330	7.23	0.00072	10066
2	83.04	0.00294	0.00238	0.00331	7.02	0.00072	9763
2	119.40	0.00417	0.00351	0.00498	10.10	0.00106	9571
2	119.48	0.00417	0.00355	0.00498	10.10	0.00106	9553
2	119.62	0.00418	0.00355	0.00499	10.12	0.00106	9547
2	119.35	0.00421	0.00355	0.00494	10.09	0.00106	9536
2	119.56	0.00413	0.00351	0.00493	10.11	0.00105	9650
2	171.76	0.00624	0.00540	0.00737	14.53	0.00158	9170
2	172.39	0.00628	0.00536	0.00737	14.58	0.00158	9201
2	170.83	0.00624	0.00536	0.00737	14.45	0.00158	9137
2	168.11	0.00623	0.00531	0.00736	14.22	0.00157	9028
2	168.18	0.00623	0.00536	0.00736	14.22	0.00158	9008

Table J.71: Resilient modulus data (C_1_12_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	48.17	-0.00068	0.00091	0.00089	4.07	0.00009	43348
8	50.86	-0.00053	0.00092	0.00090	4.30	0.00011	37631
8	48.68	-0.00062	0.00092	0.00090	4.12	0.00010	38814
8	48.74	-0.00056	0.00092	0.00090	4.12	0.00011	36587
8	48.63	0.00077	0.00092	0.00090	4.11	0.00022	17927
8	87.51	0.00081	0.00165	0.00167	7.40	0.00034	20283
8	84.89	0.00102	0.00164	0.00166	7.18	0.00036	18742
8	87.48	0.00097	0.00165	0.00167	7.40	0.00036	19504
8	87.67	0.00069	0.00165	0.00167	7.42	0.00033	20931
8	96.07	0.06937	0.13483	0.11383	8.12	0.02650	288
8	123.92	0.00132	0.00254	0.00238	10.48	0.00052	18983
8	123.95	0.00129	0.00253	0.00237	10.48	0.00052	19105
8	123.68	0.00093	0.00253	0.00237	10.46	0.00049	20279
8	124.81	0.00115	0.00254	0.00237	10.56	0.00051	19650
8	127.71	0.00131	0.00254	0.00251	10.80	0.00053	19169
8	172.77	0.00162	0.00364	0.00348	14.61	0.00073	18878
8	173.30	0.00184	0.00377	0.00349	14.66	0.00076	18180
8	172.73	0.00163	0.00364	0.00347	14.61	0.00073	18865
8	172.57	0.00165	0.00363	0.00346	14.60	0.00073	18864
8	175.01	0.00166	0.00362	0.00357	14.80	0.00074	18878
6	48.46	-0.00057	0.00096	0.00100	4.10	0.00012	33249
6	48.49	0.00092	0.00096	0.00101	4.10	0.00024	16041
6	48.87	0.00063	0.00097	0.00101	4.13	0.00022	17899
6	48.51	0.00059	0.00096	0.00100	4.10	0.00021	18159
6	48.74	-0.00063	0.00096	0.00101	4.12	0.00011	34804
6	87.66	0.00082	0.00183	0.00179	7.41	0.00037	18838
6	87.65	0.00091	0.00183	0.00180	7.41	0.00038	18442
6	87.67	0.00106	0.00183	0.00179	7.42	0.00039	17871
6	85.41	0.00100	0.00183	0.00180	7.22	0.00039	17626
6	88.00	-0.00164	0.00183	0.00180	7.44	0.00017	42324
6	124.59	0.00113	0.00283	0.00273	10.54	0.00056	17776
6	124.42	0.00124	0.00283	0.00272	10.52	0.00057	17486
6	126.93	0.00124	0.00282	0.00272	10.74	0.00057	17852
6	124.43	0.00145	0.00283	0.00272	10.52	0.00058	16994
6	124.29	0.00125	0.00282	0.00271	10.51	0.00057	17486
6	172.86	0.00210	0.00414	0.00399	14.62	0.00085	16140
6	175.80	0.00168	0.00427	0.00400	14.87	0.00083	16871
6	172.96	0.00210	0.00413	0.00399	14.63	0.00085	16146
6	173.04	0.00200	0.00414	0.00399	14.63	0.00084	16305
6	173.14	0.00186	0.00414	0.00399	14.64	0.00083	16546
4	49.06	0.00090	0.00114	0.00112	4.15	0.00026	14810
4	49.07	-0.00061	0.00114	0.00113	4.15	0.00014	28283
4	48.80	-0.00062	0.00113	0.00112	4.13	0.00014	28573
4	48.88	0.00094	0.00113	0.00124	4.13	0.00028	14058
4	49.03	0.00081	0.00114	0.00113	4.15	0.00026	15213
4	87.96	0.00083	0.00208	0.00206	7.44	0.00041	16918
4	87.75	0.00106	0.00221	0.00206	7.42	0.00044	15734
4	88.03	0.00113	0.00221	0.00205	7.45	0.00045	15617
4	88.98	0.00118	0.00208	0.00205	7.53	0.00044	16000
4	89.70	0.00102	0.00208	0.00205	7.59	0.00043	16604
4	124.25	0.00147	0.00316	0.00306	10.51	0.00064	15426
4	124.75	0.00165	0.00329	0.00309	10.55	0.00067	14833
4	125.07	0.00152	0.00330	0.00309	10.58	0.00066	15087
4	124.82	0.00150	0.00330	0.00310	10.56	0.00066	15113
4	124.47	0.00160	0.00329	0.00309	10.53	0.00066	14904
4	173.10	0.00210	0.00482	0.00454	14.64	0.00096	14422
4	173.25	0.00229	0.00494	0.00455	14.65	0.00098	14052
4	173.25	0.00232	0.00481	0.00454	14.65	0.00097	14176
4	173.21	0.00226	0.00482	0.00467	14.65	0.00098	14083
4	173.15	0.00215	0.00469	0.00453	14.64	0.00095	14538
2	49.06	0.00098	0.00119	0.00129	4.15	0.00029	13552
2	48.94	0.00077	0.00132	0.00129	4.14	0.00028	13859
2	48.99	0.00088	0.00119	0.00128	4.14	0.00028	13971
2	48.94	-0.00072	0.00119	0.00128	4.14	0.00015	26747
2	48.84	0.00102	0.00119	0.00127	4.13	0.00029	13400
2	85.39	0.00142	0.00240	0.00245	7.22	0.00052	13015
2	85.32	0.00123	0.00240	0.00232	7.22	0.00050	13693
2	85.28	0.00135	0.00239	0.00232	7.21	0.00051	13420
2	85.40	0.00117	0.00240	0.00232	7.22	0.00049	13847
2	85.30	0.00130	0.00239	0.00244	7.21	0.00051	13275
2	122.12	0.00183	0.00374	0.00362	10.33	0.00077	12687
2	121.99	0.00174	0.00373	0.00362	10.32	0.00076	12820
2	122.05	0.00199	0.00372	0.00360	10.32	0.00078	12509
2	122.12	0.00169	0.00372	0.00359	10.33	0.00075	12951
2	122.04	0.00188	0.00370	0.00358	10.32	0.00076	12726
2	170.66	0.00270	0.00577	0.00537	14.43	0.00115	11782
2	173.32	0.00251	0.00578	0.00537	14.66	0.00114	12119
2	173.13	0.00272	0.00576	0.00537	14.64	0.00115	11939
2	170.68	0.00283	0.00563	0.00536	14.44	0.00115	11793
2	170.75	0.00249	0.00575	0.00535	14.44	0.00113	11994

Table J.72: Resilient modulus data (C_2_12_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	51.26	-0.00064	0.00090	0.00083	4.34	0.00009	47602
8	51.14	0.00087	0.00090	0.00083	4.32	0.00022	19903
8	48.72	-0.00100	0.00090	0.00083	4.12	0.00006	67285
8	50.86	0.00085	0.00090	0.00083	4.30	0.00021	20035
8	48.56	0.00073	0.00090	0.00083	4.11	0.00020	20063
8	85.38	0.00100	0.00155	0.00154	7.22	0.00034	21188
8	87.58	0.00080	0.00155	0.00154	7.41	0.00032	22896
8	87.74	0.00099	0.00155	0.00154	7.42	0.00034	21796
8	87.30	0.00100	0.00154	0.00153	7.38	0.00034	21762
8	87.39	0.00094	0.00154	0.00153	7.39	0.00033	22097
8	124.15	0.00126	0.00225	0.00242	10.50	0.00049	21216
8	121.59	0.00123	0.00225	0.00230	10.28	0.00048	21362
8	123.90	0.00126	0.00224	0.00229	10.48	0.00048	21693
8	123.97	0.00114	0.00224	0.00229	10.49	0.00047	22173
8	124.21	0.00130	0.00225	0.00229	10.51	0.00049	21578
8	172.72	0.00178	0.00316	0.00346	14.61	0.00070	20868
8	172.80	0.00161	0.00316	0.00346	14.61	0.00069	21300
8	170.34	0.00167	0.00328	0.00345	14.41	0.00070	20580
8	172.81	0.00175	0.00328	0.00345	14.62	0.00071	20700
8	172.53	0.00171	0.00327	0.00344	14.59	0.00070	20788
6	48.84	0.00091	0.00097	0.00086	4.13	0.00023	18132
6	48.83	0.00064	0.00097	0.00085	4.13	0.00021	20096
6	48.94	0.00085	0.00097	0.00086	4.14	0.00022	18539
6	48.88	0.00086	0.00097	0.00085	4.13	0.00022	18508
6	49.03	0.00069	0.00097	0.00086	4.15	0.00021	19746
6	89.03	0.00105	0.00178	0.00172	7.53	0.00038	19889
6	91.72	0.00113	0.00177	0.00172	7.76	0.00038	20168
6	85.42	0.00075	0.00177	0.00159	7.22	0.00034	21058
6	85.35	0.00086	0.00178	0.00172	7.22	0.00036	19877
6	85.16	0.00079	0.00177	0.00159	7.20	0.00035	20839
6	124.23	0.00139	0.00262	0.00263	10.51	0.00055	18991
6	125.14	0.00137	0.00262	0.00262	10.58	0.00055	19232
6	125.35	0.00119	0.00262	0.00262	10.60	0.00054	19771
6	122.05	0.00133	0.00262	0.00250	10.32	0.00054	19198
6	122.14	0.00134	0.00262	0.00262	10.33	0.00055	18839
6	172.91	0.00174	0.00365	0.00392	14.62	0.00078	18837
6	172.86	0.00207	0.00377	0.00379	14.62	0.00080	18213
6	172.94	0.00186	0.00378	0.00380	14.63	0.00079	18612
6	172.86	0.00191	0.00377	0.00380	14.62	0.00079	18520
6	170.45	0.00206	0.00377	0.00379	14.42	0.00080	17982
4	46.95	0.00055	0.00114	0.00089	3.97	0.00022	18440
4	44.24	0.00073	0.00114	0.00089	3.74	0.00023	16303
4	46.53	-0.00076	0.00113	0.00089	3.94	0.00011	37459
4	46.82	0.00073	0.00113	0.00090	3.96	0.00023	17207
4	46.32	0.00061	0.00112	0.00089	3.92	0.00022	17991
4	85.25	-0.00074	0.00201	0.00178	7.21	0.00025	28326
4	87.80	0.00095	0.00202	0.00179	7.43	0.00040	18732
4	85.43	0.00075	0.00202	0.00179	7.23	0.00038	19033
4	85.15	0.00096	0.00201	0.00179	7.20	0.00040	18181
4	85.38	0.00106	0.00202	0.00179	7.22	0.00041	17787
4	122.02	0.00132	0.00300	0.00281	10.32	0.00059	17379
4	122.11	0.00140	0.00300	0.00281	10.33	0.00060	17189
4	124.33	0.00150	0.00299	0.00281	10.52	0.00061	17302
4	121.99	0.00159	0.00300	0.00281	10.32	0.00062	16754
4	122.03	0.00150	0.00300	0.00281	10.32	0.00061	16930
4	177.01	0.00216	0.00437	0.00443	14.97	0.00091	16386
4	173.47	0.00191	0.00425	0.00431	14.67	0.00087	16815
4	171.07	0.00215	0.00437	0.00432	14.47	0.00090	16015
4	173.38	0.00197	0.00424	0.00431	14.66	0.00088	16721
4	170.95	0.00184	0.00437	0.00431	14.46	0.00088	16485
2	48.48	0.00078	0.00136	0.00080	4.10	0.00024	16759
2	47.51	0.00088	0.00138	0.00080	4.02	0.00025	15792
2	48.88	0.00084	0.00148	0.00079	4.13	0.00026	15930
2	46.31	0.00072	0.00136	0.00079	3.92	0.00024	16376
2	46.48	0.00082	0.00136	0.00079	3.93	0.00025	15860
2	85.60	0.00123	0.00248	0.00177	7.24	0.00046	15832
2	85.73	0.00113	0.00250	0.00177	7.25	0.00045	16114
2	88.12	0.00138	0.00237	0.00177	7.45	0.00046	16210
2	85.60	0.00126	0.00250	0.00177	7.24	0.00046	15710
2	85.72	0.00116	0.00249	0.00178	7.25	0.00045	16039
2	121.96	0.00158	0.00362	0.00301	10.31	0.00068	15098
2	121.98	0.00178	0.00362	0.00300	10.32	0.00070	14741
2	124.49	0.00173	0.00362	0.00301	10.53	0.00070	15108
2	122.07	0.00174	0.00362	0.00300	10.32	0.00070	14822
2	122.09	0.00159	0.00362	0.00300	10.33	0.00068	15102
2	171.46	0.00247	0.00501	0.00478	14.50	0.00102	14200
2	170.53	0.00245	0.00513	0.00478	14.42	0.00103	13993
2	174.25	0.00247	0.00500	0.00479	14.74	0.00102	14423
2	170.82	0.00221	0.00513	0.00479	14.45	0.00101	14307
2	170.83	0.00231	0.00512	0.00478	14.45	0.00102	14195

Table J.73: Resilient modulus data (C_1_95_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.91	-0.00055	0.00079	0.00043	4.31	0.00006	77482
8	50.74	-0.00066	0.00079	0.00043	4.29	0.00005	85657
8	51.02	-0.00057	0.00079	0.00043	4.32	0.00005	75529
8	50.95	-0.00063	0.00078	0.00043	4.31	0.00005	83904
8	53.29	0.00059	0.00078	0.00043	4.51	0.00015	28264
8	89.91	0.00100	0.00133	0.00101	7.60	0.00028	25728
8	87.64	0.00069	0.00145	0.00101	7.41	0.00026	26632
8	87.55	0.00068	0.00144	0.00101	7.40	0.00026	26700
8	87.71	0.00082	0.00145	0.00101	7.42	0.00027	25574
8	87.34	0.00074	0.00145	0.00101	7.39	0.00027	26031
8	126.54	0.00099	0.00208	0.00169	10.70	0.00040	25398
8	126.55	0.00085	0.00208	0.00169	10.70	0.00038	26162
8	126.52	0.00137	0.00196	0.00169	10.70	0.00042	24080
8	126.53	0.00129	0.00207	0.00167	10.70	0.00042	24010
8	124.00	0.00097	0.00207	0.00167	10.49	0.00039	25102
8	175.17	0.00155	0.00296	0.00265	14.81	0.00060	23350
8	175.32	0.00171	0.00296	0.00264	14.83	0.00061	22916
8	172.98	0.00176	0.00283	0.00264	14.63	0.00060	22831
8	172.74	0.00169	0.00283	0.00263	14.61	0.00060	23071
8	175.06	0.00145	0.00295	0.00263	14.81	0.00059	23811
6	50.90	0.00083	0.00093	0.00044	4.30	0.00018	22015
6	50.95	0.00059	0.00093	0.00045	4.31	0.00016	24690
6	50.97	0.00066	0.00093	0.00045	4.31	0.00017	23764
6	53.51	0.00081	0.00082	0.00045	4.53	0.00017	24672
6	50.94	0.00059	0.00081	0.00045	4.31	0.00015	26167
6	89.98	0.00093	0.00151	0.00119	7.61	0.00030	23678
6	89.99	-0.00103	0.00152	0.00119	7.61	0.00014	51321
6	87.46	0.00089	0.00151	0.00119	7.40	0.00030	23290
6	89.80	0.00094	0.00151	0.00118	7.60	0.00030	23634
6	90.69	0.00078	0.00150	0.00117	7.67	0.00029	25070
6	126.52	0.00146	0.00224	0.00191	10.70	0.00047	21540
6	124.11	0.00108	0.00224	0.00191	10.50	0.00044	22636
6	124.01	0.00101	0.00237	0.00191	10.49	0.00044	22389
6	126.47	0.00130	0.00237	0.00191	10.70	0.00046	21651
6	126.36	0.00134	0.00237	0.00192	10.69	0.00047	21442
6	170.53	0.00178	0.00338	0.00297	14.42	0.00068	20024
6	172.91	0.00153	0.00337	0.00296	14.62	0.00065	21027
6	175.31	0.00151	0.00337	0.00296	14.83	0.00065	21343
6	175.57	0.00202	0.00337	0.00297	14.85	0.00070	20049
6	175.42	0.00166	0.00337	0.00297	14.84	0.00067	20926
4	50.96	0.00060	0.00096	0.00058	4.31	0.00018	22716
4	51.61	0.00064	0.00096	0.00058	4.36	0.00018	22579
4	52.70	0.00074	0.00085	0.00059	4.46	0.00018	23145
4	56.89	0.00077	0.00096	0.00058	4.81	0.00019	23499
4	51.11	0.00056	0.00096	0.00058	4.32	0.00018	23152
4	87.74	0.00124	0.00159	0.00136	7.42	0.00035	20013
4	87.74	0.00109	0.00159	0.00122	7.42	0.00032	21505
4	87.72	0.00087	0.00171	0.00123	7.42	0.00032	22024
4	87.90	0.00103	0.00172	0.00136	7.43	0.00034	20431
4	87.69	0.00117	0.00171	0.00135	7.42	0.00035	19823
4	125.43	0.00127	0.00248	0.00213	10.61	0.00049	20353
4	131.27	0.00147	0.00248	0.00215	11.10	0.00051	20579
4	124.37	0.00134	0.00260	0.00214	10.52	0.00051	19522
4	124.33	0.00151	0.00248	0.00215	10.52	0.00051	19342
4	126.53	0.00147	0.00247	0.00214	10.70	0.00051	19852
4	173.97	0.00204	0.00368	0.00320	14.71	0.00074	18627
4	172.95	0.00202	0.00368	0.00321	14.63	0.00074	18545
4	173.10	0.00210	0.00368	0.00333	14.64	0.00076	18153
4	175.52	0.00204	0.00368	0.00321	14.84	0.00075	18746
4	175.69	0.00208	0.00381	0.00322	14.86	0.00076	18430
2	51.12	0.00088	0.00090	0.00065	4.32	0.00020	20117
2	51.12	-0.00062	0.00090	0.00064	4.32	0.00008	52674
2	51.22	0.00091	0.00090	0.00064	4.33	0.00020	19969
2	51.10	0.00076	0.00101	0.00064	4.32	0.00020	20165
2	51.17	0.00064	0.00102	0.00064	4.33	0.00019	21273
2	87.68	0.00123	0.00182	0.00146	7.42	0.00038	18571
2	87.64	0.00111	0.00182	0.00146	7.41	0.00037	19073
2	87.88	0.00120	0.00182	0.00146	7.43	0.00037	18727
2	87.66	0.00112	0.00194	0.00146	7.41	0.00038	18536
2	87.78	0.00100	0.00182	0.00146	7.42	0.00036	19573
2	126.71	0.00162	0.00287	0.00233	10.72	0.00057	17737
2	124.14	0.00161	0.00287	0.00233	10.50	0.00057	17415
2	124.26	0.00158	0.00275	0.00232	10.51	0.00055	17834
2	124.19	0.00156	0.00275	0.00232	10.50	0.00055	17870
2	126.67	0.00152	0.00275	0.00232	10.71	0.00055	18359
2	173.07	0.00226	0.00409	0.00362	14.64	0.00083	16586
2	173.04	0.00219	0.00421	0.00362	14.63	0.00083	16494
2	170.51	0.00231	0.00396	0.00361	14.42	0.00082	16471
2	173.04	0.00209	0.00409	0.00361	14.63	0.00082	16887
2	175.39	0.00208	0.00421	0.00361	14.83	0.00082	16924

Table J.74: Resilient modulus data (C_2_95_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.81	0.00084	0.00092	-0.00027	4.30	0.00012	34869
8	50.65	0.00069	0.00091	-0.00027	4.28	0.00011	38618
8	53.26	0.00073	0.00092	-0.00027	4.50	0.00011	39209
8	53.31	0.00058	0.00104	0.00022	4.51	0.00015	29581
8	53.38	0.00066	0.00092	-0.00027	4.51	0.00011	41448
8	89.89	0.00100	0.00155	0.00038	7.60	0.00024	31113
8	89.79	0.00095	0.00155	0.00039	7.59	0.00024	31548
8	89.80	0.00117	0.00155	0.00039	7.60	0.00026	29266
8	89.91	-0.00083	0.00155	0.00039	7.60	0.00009	82113
8	89.85	0.00127	0.00155	0.00039	7.60	0.00027	28331
8	126.18	0.00149	0.00233	0.00077	10.67	0.00038	27884
8	123.99	0.00157	0.00233	0.00078	10.49	0.00039	26896
8	126.45	0.00119	0.00233	0.00077	10.69	0.00036	29853
8	126.22	0.00128	0.00233	0.00077	10.67	0.00037	29244
8	126.21	0.00160	0.00232	0.00076	10.67	0.00039	27368
8	174.82	0.00177	0.00345	0.00165	14.79	0.00057	25860
8	175.89	0.00201	0.00344	0.00164	14.88	0.00059	25163
8	174.42	0.00200	0.00331	0.00163	14.75	0.00058	25492
8	177.98	0.00185	0.00343	0.00162	15.05	0.00058	26178
8	177.85	0.00192	0.00342	0.00175	15.04	0.00059	25463
6	53.20	0.00076	0.00103	0.00020	4.50	0.00017	27250
6	53.25	0.00076	0.00103	0.00019	4.50	0.00017	27275
6	53.37	0.00070	0.00105	0.00020	4.51	0.00016	27924
6	53.28	0.00067	0.00104	0.00020	4.51	0.00016	28288
6	53.50	-0.00058	0.00104	0.00020	4.53	0.00006	81441
6	90.00	0.00122	0.00172	0.00047	7.61	0.00028	26858
6	90.09	0.00098	0.00172	0.00047	7.62	0.00026	28940
6	89.89	0.00115	0.00171	0.00046	7.60	0.00028	27399
6	90.01	0.00111	0.00171	0.00047	7.61	0.00027	27792
6	89.71	0.00120	0.00171	0.00046	7.59	0.00028	26996
6	127.04	0.00165	0.00254	0.00083	10.74	0.00042	25730
6	128.96	0.00149	0.00254	0.00083	10.91	0.00040	26965
6	126.54	0.00152	0.00266	0.00084	10.70	0.00042	25579
6	126.39	0.00155	0.00253	0.00083	10.69	0.00041	26122
6	126.63	0.00157	0.00253	0.00083	10.71	0.00041	26072
6	175.04	0.00207	0.00375	0.00184	14.80	0.00064	23189
6	172.69	0.00222	0.00375	0.00195	14.61	0.00066	22133
6	175.12	0.00197	0.00374	0.00183	14.81	0.00063	23553
6	172.70	0.00204	0.00374	0.00182	14.61	0.00063	23051
6	172.64	0.00219	0.00373	0.00182	14.60	0.00064	22644
4	51.13	0.00085	0.00113	0.00019	4.32	0.00018	23987
4	53.37	0.00068	0.00113	0.00019	4.51	0.00017	27165
4	53.82	0.00081	0.00125	0.00019	4.55	0.00019	24220
4	52.32	0.00085	0.00113	0.00019	4.43	0.00018	24413
4	55.54	0.00087	0.00125	0.00019	4.70	0.00019	24462
4	90.18	0.00125	0.00193	0.00049	7.63	0.00031	24945
4	89.98	0.00126	0.00205	0.00048	7.61	0.00032	24059
4	87.75	0.00155	0.00205	0.00060	7.42	0.00035	21213
4	89.94	0.00138	0.00205	0.00048	7.61	0.00033	23334
4	90.15	0.00118	0.00205	0.00047	7.62	0.00031	24689
4	126.59	0.00146	0.00297	0.00107	10.71	0.00046	23366
4	126.61	0.00140	0.00286	0.00107	10.71	0.00044	24144
4	126.70	0.00205	0.00285	0.00106	10.72	0.00050	21532
4	124.20	0.00180	0.00284	0.00106	10.50	0.00047	22120
4	126.65	0.00173	0.00297	0.00106	10.71	0.00048	22331
4	172.89	0.00232	0.00422	0.00226	14.62	0.00073	19939
4	175.15	0.00222	0.00423	0.00225	14.81	0.00072	20440
4	173.14	0.00247	0.00410	0.00227	14.64	0.00074	19889
4	175.28	0.00236	0.00422	0.00226	14.82	0.00074	20118
4	175.49	0.00227	0.00423	0.00226	14.84	0.00073	20310
2	51.26	0.00083	0.00127	0.00026	4.34	0.00020	21963
2	51.19	0.00098	0.00140	0.00026	4.33	0.00022	19676
2	50.99	-0.00075	0.00139	-0.00023	4.31	0.00003	124068
2	51.23	0.00106	0.00139	0.00025	4.33	0.00023	19233
2	53.61	0.00086	0.00127	0.00026	4.53	0.00020	22675
2	87.82	0.00134	0.00229	0.00085	7.43	0.00037	19878
2	87.54	0.00138	0.00241	0.00086	7.40	0.00039	19086
2	87.86	0.00113	0.00229	0.00086	7.43	0.00036	20820
2	88.92	0.00182	0.00242	0.00086	7.52	0.00043	17682
2	92.32	0.00151	0.00242	0.00087	7.81	0.00040	19540
2	124.84	0.00186	0.00345	0.00163	10.56	0.00058	18279
2	127.34	0.00200	0.00332	0.00151	10.77	0.00057	18919
2	127.00	0.00171	0.00344	0.00151	10.74	0.00056	19342
2	127.14	0.00180	0.00332	0.00152	10.75	0.00055	19404
2	124.88	0.00204	0.00332	0.00152	10.56	0.00057	18433
2	173.16	0.00272	0.00490	0.00318	14.65	0.00090	16258
2	172.97	0.00267	0.00477	0.00317	14.63	0.00088	16540
2	175.73	0.00263	0.00478	0.00318	14.86	0.00088	16862
2	175.69	0.00250	0.00490	0.00317	14.86	0.00088	16873
2	175.47	0.00244	0.00477	0.00317	14.84	0.00086	17166

Table J.75: Resilient modulus data (C_1_8_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	48.63	-0.00064	0.00121	-0.00027	4.11	0.00002	165598
8	48.41	-0.00049	0.00133	-0.00027	4.09	0.00005	86785
8	51.22	-0.00068	0.00133	-0.00027	4.33	0.00003	141085
8	49.74	-0.00058	0.00133	-0.00027	4.21	0.00004	106613
8	55.50	-0.00049	0.00120	-0.00027	4.69	0.00004	130291
8	87.39	0.00060	0.00181	0.00073	7.39	0.00026	28330
8	87.30	0.00069	0.00180	0.00073	7.38	0.00027	27541
8	87.44	-0.00084	0.00180	0.00073	7.40	0.00014	52663
8	87.22	0.00055	0.00179	0.00072	7.38	0.00026	28904
8	87.44	-0.00081	0.00179	0.00071	7.40	0.00014	52399
8	124.10	0.00087	0.00229	0.00126	10.50	0.00037	28479
8	124.06	0.00091	0.00229	0.00125	10.49	0.00037	28338
8	124.04	0.00085	0.00229	0.00125	10.49	0.00037	28684
8	124.09	0.00069	0.00241	0.00125	10.49	0.00036	28951
8	124.03	0.00060	0.00228	0.00124	10.49	0.00034	30541
8	172.72	0.00115	0.00299	0.00206	14.61	0.00052	28296
8	172.64	0.00113	0.00309	0.00206	14.60	0.00052	27884
8	173.72	0.00097	0.00297	0.00206	14.69	0.00050	29408
8	176.94	0.00103	0.00297	0.00218	14.96	0.00051	29066
8	172.91	0.00125	0.00297	0.00206	14.62	0.00052	27939
6	48.48	-0.00069	0.00138	-0.00024	4.10	0.00004	109637
6	48.48	0.00055	0.00138	-0.00024	4.10	0.00014	29184
6	48.31	0.00057	0.00137	0.00025	4.09	0.00018	22350
6	49.05	-0.00060	0.00137	-0.00025	4.15	0.00004	95950
6	49.91	-0.00069	0.00138	-0.00025	4.22	0.00004	116681
6	89.62	0.00057	0.00194	0.00071	7.58	0.00027	28216
6	86.65	0.00068	0.00194	0.00071	7.33	0.00028	26356
6	88.02	-0.00068	0.00195	0.00071	7.44	0.00016	45249
6	88.12	0.00062	0.00195	0.00071	7.45	0.00027	27251
6	88.02	0.00051	0.00195	0.00071	7.44	0.00026	28225
6	124.27	0.00076	0.00256	0.00131	10.51	0.00039	27240
6	124.28	-0.00074	0.00256	0.00131	10.51	0.00026	40343
6	124.39	0.00065	0.00257	0.00131	10.52	0.00038	27911
6	124.38	0.00081	0.00257	0.00131	10.52	0.00039	26949
6	126.68	0.00095	0.00256	0.00131	10.71	0.00040	26700
6	172.96	0.00132	0.00319	0.00223	14.63	0.00056	26033
6	175.31	0.00105	0.00331	0.00223	14.83	0.00055	26997
6	175.37	0.00119	0.00331	0.00223	14.83	0.00056	26450
6	172.82	0.00104	0.00331	0.00222	14.62	0.00055	26708
6	172.82	0.00128	0.00331	0.00222	14.62	0.00057	25751
4	48.87	-0.00052	0.00151	0.00031	4.13	0.00011	38196
4	49.84	0.00055	0.00150	0.00019	4.22	0.00019	22568
4	53.46	-0.00054	0.00151	0.00031	4.52	0.00011	42557
4	48.57	0.00055	0.00151	0.00031	4.11	0.00020	20809
4	48.69	-0.00063	0.00150	0.00031	4.12	0.00010	41818
4	87.93	0.00068	0.00212	0.00082	7.44	0.00030	24681
4	87.75	0.00061	0.00212	0.00082	7.42	0.00030	25123
4	87.81	-0.00058	0.00224	0.00070	7.43	0.00020	37755
4	88.89	0.00063	0.00211	0.00082	7.52	0.00030	25332
4	92.11	0.00070	0.00211	0.00070	7.79	0.00029	26704
4	124.39	0.00094	0.00280	0.00142	10.52	0.00043	24432
4	124.10	0.00079	0.00279	0.00142	10.50	0.00042	25161
4	124.28	0.00085	0.00281	0.00142	10.51	0.00042	24860
4	124.34	0.00075	0.00280	0.00142	10.52	0.00041	25403
4	124.20	0.00086	0.00280	0.00142	10.50	0.00042	24815
4	173.19	0.00121	0.00364	0.00240	14.65	0.00060	24275
4	173.07	0.00109	0.00376	0.00239	14.64	0.00060	24252
4	173.07	0.00114	0.00363	0.00239	14.64	0.00060	24519
4	173.09	0.00119	0.00363	0.00239	14.64	0.00060	24333
4	173.13	0.00128	0.00363	0.00239	14.64	0.00061	24057
2	48.74	-0.00065	0.00172	0.00035	4.12	0.00012	34825
2	48.91	-0.00062	0.00160	0.00047	4.14	0.00012	34240
2	48.80	0.00064	0.00160	0.00035	4.13	0.00022	19136
2	51.26	-0.00064	0.00160	0.00035	4.34	0.00011	39758
2	48.86	-0.00064	0.00173	0.00035	4.13	0.00012	34642
2	87.91	-0.00072	0.00245	0.00099	7.44	0.00023	32755
2	87.82	0.00059	0.00245	0.00099	7.43	0.00034	22131
2	85.56	-0.00061	0.00245	0.00099	7.24	0.00024	30636
2	85.32	-0.00054	0.00245	0.00099	7.22	0.00024	29885
2	88.32	0.00066	0.00245	0.00099	7.47	0.00034	21852
2	124.61	0.00088	0.00317	0.00167	10.54	0.00048	22111
2	124.45	0.00072	0.00316	0.00167	10.53	0.00046	22762
2	124.54	0.00086	0.00316	0.00155	10.53	0.00046	22669
2	124.49	0.00074	0.00315	0.00167	10.53	0.00046	22678
2	124.42	0.00057	0.00315	0.00167	10.52	0.00045	23428
2	178.03	0.00118	0.00406	0.00274	15.06	0.00066	22644
2	173.91	0.00137	0.00405	0.00275	14.71	0.00068	21608
2	173.24	0.00135	0.00405	0.00275	14.65	0.00068	21574
2	173.18	0.00142	0.00404	0.00275	14.65	0.00068	21392
2	173.21	0.00138	0.00405	0.00275	14.65	0.00068	21497

Table J.76: Resilient modulus data (C_2_8_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	51.92	0.00053	-0.00051	0.00106	4.39	0.00009	49308
8	52.71	0.00066	-0.00051	0.00106	4.46	0.00010	44466
8	58.96	0.00065	-0.00051	0.00106	4.99	0.00010	49880
8	54.08	0.00077	-0.00052	0.00106	4.57	0.00011	41857
8	54.05	0.00080	-0.00051	0.00105	4.57	0.00011	40948
8	90.06	0.00080	-0.00048	0.00154	7.62	0.00016	48975
8	90.03	0.00085	-0.00048	0.00154	7.61	0.00016	47774
8	90.88	0.00078	-0.00048	0.00155	7.69	0.00015	50084
8	95.67	0.00097	-0.00049	0.00155	8.09	0.00017	47845
8	87.81	0.00096	-0.00048	0.00154	7.43	0.00017	44071
8	124.48	0.00105	0.00079	0.00208	10.53	0.00033	32185
8	126.82	0.00095	0.00079	0.00208	10.73	0.00032	33656
8	126.42	0.00113	0.00079	0.00219	10.69	0.00034	31236
8	127.31	0.00113	0.00079	0.00208	10.77	0.00033	32271
8	128.33	0.00098	0.00078	0.00208	10.85	0.00032	33885
8	175.40	0.00136	0.00165	0.00280	14.83	0.00048	30617
8	173.08	0.00134	0.00165	0.00279	14.64	0.00048	30329
8	177.62	0.00131	0.00178	0.00292	15.02	0.00050	30018
8	173.00	0.00153	0.00165	0.00280	14.63	0.00050	29371
8	175.30	0.00137	0.00178	0.00279	14.83	0.00050	29912
6	53.99	0.00073	-0.00057	0.00110	4.57	0.00011	43458
6	53.65	0.00072	-0.00045	0.00122	4.54	0.00012	36718
6	53.65	0.00060	-0.00045	0.00110	4.54	0.00010	43616
6	52.25	0.00073	-0.00057	0.00122	4.42	0.00012	38418
6	54.64	0.00053	-0.00057	0.00110	4.62	0.00009	52324
6	90.27	0.00090	-0.00056	0.00174	7.63	0.00017	44081
6	90.08	0.00080	-0.00055	0.00172	7.62	0.00016	46442
6	87.51	0.00075	-0.00055	0.00173	7.40	0.00016	46309
6	90.00	0.00095	-0.00056	0.00173	7.61	0.00018	42993
6	90.92	0.00083	-0.00043	0.00173	7.69	0.00018	43239
6	126.96	0.00112	0.00081	0.00231	10.74	0.00035	30456
6	124.32	0.00112	0.00069	0.00230	10.51	0.00034	30635
6	126.59	0.00113	0.00081	0.00242	10.71	0.00036	29452
6	124.42	0.00121	0.00068	0.00230	10.52	0.00035	30054
6	124.07	0.00118	0.00081	0.00229	10.49	0.00036	29400
6	175.50	0.00138	0.00176	0.00313	14.84	0.00052	28408
6	177.93	0.00153	0.00177	0.00311	15.05	0.00053	28198
6	175.37	0.00159	0.00177	0.00311	14.83	0.00054	27506
6	172.88	0.00128	0.00164	0.00311	14.62	0.00050	29063
6	175.51	0.00126	0.00164	0.00311	14.84	0.00050	29647
4	51.24	0.00072	-0.00054	0.00121	4.33	0.00012	37432
4	51.34	0.00052	-0.00054	0.00133	4.34	0.00011	39732
4	51.28	0.00073	-0.00055	0.00121	4.34	0.00012	37230
4	50.88	0.00064	-0.00054	0.00120	4.30	0.00011	39452
4	53.52	0.00077	-0.00054	0.00121	4.53	0.00012	37612
4	85.79	0.00110	-0.00048	0.00190	7.26	0.00021	34512
4	90.14	0.00123	-0.00047	0.00188	7.62	0.00022	34628
4	90.33	0.00097	-0.00060	0.00189	7.64	0.00019	40482
4	90.30	0.00087	-0.00060	0.00201	7.64	0.00019	40276
4	90.28	0.00089	-0.00048	0.00201	7.64	0.00020	37801
4	127.19	0.00122	0.00068	0.00263	10.76	0.00038	28521
4	128.68	0.00117	0.00068	0.00263	10.88	0.00037	29173
4	127.38	0.00122	0.00068	0.00263	10.77	0.00038	28549
4	124.84	0.00125	0.00068	0.00262	10.56	0.00038	27829
4	124.83	0.00113	0.00068	0.00263	10.56	0.00037	28538
4	175.62	0.00148	0.00165	0.00340	14.85	0.00054	27292
4	175.50	0.00144	0.00177	0.00339	14.84	0.00055	26974
4	173.10	0.00143	0.00177	0.00340	14.64	0.00055	26620
4	173.08	0.00168	0.00178	0.00339	14.64	0.00057	25646
4	175.58	0.00153	0.00177	0.00339	14.85	0.00056	26616
2	51.65	0.00080	-0.00042	0.00130	4.37	0.00014	31172
2	52.41	0.00078	-0.00031	0.00118	4.43	0.00014	32078
2	55.60	0.00067	-0.00030	0.00118	4.70	0.00013	36396
2	51.16	0.00061	-0.00030	0.00118	4.33	0.00012	34889
2	51.14	0.00073	-0.00030	0.00118	4.32	0.00013	32205
2	89.94	0.00113	-0.00034	0.00204	7.61	0.00024	32254
2	90.32	0.00121	-0.00035	0.00205	7.64	0.00024	31485
2	88.05	0.00104	-0.00035	0.00205	7.45	0.00023	32644
2	87.97	0.00093	-0.00035	0.00205	7.44	0.00022	33889
2	87.71	0.00113	-0.00035	0.00205	7.42	0.00024	31453
2	126.83	0.00109	0.00073	0.00288	10.73	0.00039	27401
2	126.76	0.00139	0.00073	0.00287	10.72	0.00042	25788
2	126.83	0.00128	0.00073	0.00288	10.73	0.00041	26310
2	124.47	0.00144	0.00073	0.00287	10.53	0.00042	25058
2	124.41	0.00110	0.00061	0.00287	10.52	0.00038	27609
2	175.58	0.00179	0.00194	0.00380	14.85	0.00063	23683
2	175.59	0.00170	0.00193	0.00378	14.85	0.00062	24022
2	175.50	0.00185	0.00193	0.00379	14.84	0.00063	23526
2	173.19	0.00170	0.00180	0.00379	14.65	0.00061	24108
2	173.04	0.00172	0.00193	0.00379	14.63	0.00062	23614

Table J.77: Resilient modulus data (C_1_13_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	48.25	0.00066	0.00107	0.00108	4.08	0.00023	17437
8	48.04	-0.00057	0.00107	0.00119	4.06	0.00014	28875
8	50.89	-0.00065	0.00107	0.00119	4.30	0.00013	32143
8	48.46	0.00092	0.00106	0.00119	4.10	0.00026	15509
8	48.52	0.00085	0.00106	0.00119	4.10	0.00026	15877
8	87.79	0.00113	0.00198	0.00207	7.42	0.00043	17205
8	87.52	0.00132	0.00197	0.00207	7.40	0.00045	16597
8	87.80	0.00124	0.00197	0.00207	7.43	0.00044	16860
8	87.10	0.00136	0.00196	0.00218	7.37	0.00046	16059
8	88.16	0.00089	0.00196	0.00206	7.46	0.00041	18200
8	121.67	0.00178	0.00293	0.00312	10.29	0.00065	15769
8	121.83	0.00162	0.00293	0.00324	10.30	0.00065	15865
8	121.48	0.00145	0.00304	0.00323	10.27	0.00064	15981
8	124.04	0.00180	0.00292	0.00323	10.49	0.00066	15843
8	124.06	0.00191	0.00304	0.00311	10.49	0.00067	15618
8	170.30	0.00249	0.00428	0.00453	14.40	0.00094	15289
8	172.70	0.00233	0.00427	0.00452	14.61	0.00093	15762
8	172.96	0.00232	0.00428	0.00452	14.63	0.00093	15797
8	172.89	0.00220	0.00426	0.00464	14.62	0.00092	15814
8	172.91	0.00237	0.00426	0.00450	14.62	0.00093	15770
6	48.95	-0.00072	0.00120	0.00139	4.14	0.00016	26666
6	49.27	0.00101	0.00120	0.00140	4.17	0.00030	13830
6	48.68	0.00069	0.00119	0.00127	4.12	0.00026	15699
6	49.17	0.00109	0.00121	0.00141	4.16	0.00031	13449
6	49.30	0.00083	0.00121	0.00129	4.17	0.00028	15037
6	85.23	0.00127	0.00228	0.00240	7.21	0.00050	14532
6	87.66	0.00120	0.00216	0.00240	7.41	0.00048	15455
6	85.17	0.00115	0.00228	0.00240	7.20	0.00049	14834
6	85.00	0.00139	0.00215	0.00239	7.19	0.00049	14539
6	85.12	0.00115	0.00227	0.00239	7.20	0.00048	14862
6	123.95	0.00181	0.00342	0.00357	10.48	0.00073	14296
6	124.09	0.00189	0.00330	0.00356	10.49	0.00073	14399
6	124.14	0.00208	0.00342	0.00356	10.50	0.00075	13910
6	123.91	0.00215	0.00329	0.00355	10.48	0.00075	13993
6	128.63	0.08805	0.15566	0.12671	10.88	0.03087	352
6	172.97	0.00268	0.00483	0.00537	14.63	0.00107	13622
6	172.97	0.00257	0.00483	0.00536	14.63	0.00106	13750
6	170.67	0.00270	0.00495	0.00525	14.43	0.00107	13434
6	170.61	0.00305	0.00482	0.00536	14.43	0.00110	13085
6	173.13	0.00252	0.00495	0.00535	14.64	0.00107	13707
4	48.95	0.00112	0.00137	0.00156	4.14	0.00034	12270
4	48.67	0.00114	0.00137	0.00155	4.12	0.00034	12155
4	46.46	0.00105	0.00138	0.00156	3.93	0.00033	11819
4	46.25	0.00090	0.00137	0.00156	3.91	0.00032	12244
4	46.40	0.00100	0.00138	0.00156	3.92	0.00033	11960
4	85.35	0.00150	0.00272	0.00293	7.22	0.00060	12110
4	85.29	0.00160	0.00260	0.00293	7.21	0.00059	12134
4	86.06	0.00164	0.00260	0.00293	7.28	0.00060	12187
4	87.41	0.00178	0.00260	0.00293	7.39	0.00061	12136
4	86.68	0.00160	0.00260	0.00294	7.33	0.00060	12319
4	121.96	0.00204	0.00394	0.00420	10.31	0.00085	12157
4	121.90	0.00229	0.00395	0.00420	10.31	0.00087	11862
4	121.93	0.00211	0.00382	0.00419	10.31	0.00084	12233
4	122.14	0.00234	0.00396	0.00420	10.33	0.00088	11805
4	121.79	0.00225	0.00395	0.00419	10.30	0.00087	11895
4	170.78	0.00318	0.00572	0.00618	14.44	0.00126	11487
4	173.21	0.00338	0.00572	0.00619	14.65	0.00127	11496
4	170.75	0.00313	0.00572	0.00618	14.44	0.00125	11530
4	170.79	0.00321	0.00572	0.00618	14.45	0.00126	11474
4	170.69	0.00308	0.00572	0.00618	14.44	0.00125	11574
2	46.26	0.00137	0.00140	0.00190	3.91	0.00039	10063
2	46.51	0.00130	0.00153	0.00190	3.93	0.00039	9985
2	46.46	0.00125	0.00140	0.00190	3.93	0.00038	10354
2	46.36	0.00128	0.00140	0.00190	3.92	0.00038	10280
2	46.48	0.00102	0.00153	0.00190	3.93	0.00037	10590
2	82.94	0.00184	0.00299	0.00348	7.01	0.00069	10133
2	82.99	0.00201	0.00299	0.00349	7.02	0.00071	9926
2	82.86	0.00223	0.00299	0.00348	7.01	0.00073	9664
2	83.02	0.00193	0.00300	0.00349	7.02	0.00070	10001
2	85.44	0.00166	0.00299	0.00349	7.23	0.00068	10644
2	119.65	0.00302	0.00468	0.00516	10.12	0.00107	9447
2	119.65	0.00273	0.00469	0.00504	10.12	0.00104	9748
2	119.65	0.00284	0.00468	0.00515	10.12	0.00106	9582
2	119.67	0.00287	0.00455	0.00515	10.12	0.00105	9655
2	119.72	0.00303	0.00455	0.00515	10.13	0.00106	9538
2	168.33	0.00379	0.00692	0.00751	14.24	0.00152	9376
2	168.70	0.00417	0.00691	0.00749	14.27	0.00155	9217
2	169.85	0.00386	0.00691	0.00750	14.37	0.00152	9436
2	171.30	0.00366	0.00690	0.00749	14.49	0.00150	9628
2	168.32	0.00395	0.00690	0.00748	14.24	0.00153	9320

Table J.78: Resilient modulus data (C_2_13_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	48.25	0.00066	0.00107	0.00108	4.08	0.00023	17437
8	48.04	-0.00057	0.00107	0.00119	4.06	0.00014	28875
8	50.89	-0.00065	0.00107	0.00119	4.30	0.00013	32143
8	48.46	0.00092	0.00106	0.00119	4.10	0.00026	15509
8	48.52	0.00085	0.00106	0.00119	4.10	0.00026	15877
8	85.03	0.00097	0.00192	0.00207	7.19	0.00041	17386
8	85.01	0.00107	0.00192	0.00207	7.19	0.00042	17071
8	85.05	0.00119	0.00192	0.00207	7.19	0.00043	16660
8	85.17	0.00098	0.00191	0.00207	7.20	0.00041	17420
8	85.23	0.00103	0.00191	0.00207	7.21	0.00042	17239
8	121.61	0.00144	0.00290	0.00304	10.28	0.00061	16732
8	121.39	0.00147	0.00289	0.00303	10.27	0.00062	16652
8	121.28	0.00167	0.00301	0.00303	10.26	0.00064	15972
8	123.91	0.00176	0.00301	0.00302	10.48	0.00065	16145
8	121.43	0.00154	0.00288	0.00302	10.27	0.00062	16550
8	170.44	0.00241	0.00432	0.00436	14.42	0.00092	15612
8	170.58	0.00213	0.00418	0.00448	14.43	0.00090	16045
8	170.39	0.00240	0.00429	0.00446	14.41	0.00093	15516
8	170.31	0.00221	0.00428	0.00445	14.40	0.00091	15800
8	172.54	0.00234	0.00427	0.00443	14.59	0.00092	15853
6	48.56	0.00071	0.00118	0.00135	4.11	0.00027	15229
6	48.79	-0.00068	0.00119	0.00136	4.13	0.00016	26553
6	48.47	0.00088	0.00130	0.00135	4.10	0.00029	13896
6	48.63	0.00077	0.00118	0.00136	4.11	0.00028	14895
6	48.41	0.00079	0.00118	0.00135	4.09	0.00028	14758
6	85.19	0.00110	0.00218	0.00230	7.21	0.00047	15480
6	85.20	0.00133	0.00219	0.00243	7.21	0.00050	14526
6	85.20	0.00123	0.00231	0.00243	7.21	0.00050	14490
6	87.39	0.00131	0.00218	0.00242	7.39	0.00049	15002
6	85.19	0.00097	0.00218	0.00230	7.21	0.00045	15852
6	121.62	0.00173	0.00338	0.00346	10.29	0.00071	14406
6	121.56	0.00176	0.00325	0.00345	10.28	0.00071	14580
6	124.77	0.00172	0.00338	0.00358	10.55	0.00072	14588
6	123.35	0.00184	0.00338	0.00358	10.43	0.00073	14231
6	124.38	0.00191	0.00337	0.00345	10.52	0.00073	14458
6	170.04	0.00242	0.00482	0.00503	14.38	0.00102	14071
6	170.08	0.00247	0.00482	0.00515	14.39	0.00104	13876
6	170.86	0.00243	0.00495	0.00504	14.45	0.00103	13964
6	172.05	0.00276	0.00496	0.00516	14.55	0.00107	13556
6	175.31	0.00249	0.00494	0.00515	14.83	0.00105	14148
4	48.99	0.00076	0.00152	0.00159	4.14	0.00032	12870
4	46.29	0.00098	0.00151	0.00159	3.92	0.00034	11539
4	48.71	0.00099	0.00139	0.00146	4.12	0.00032	12866
4	48.87	0.00075	0.00140	0.00147	4.13	0.00030	13730
4	46.21	0.00097	0.00151	0.00159	3.91	0.00034	11521
4	86.90	0.00128	0.00266	0.00288	7.35	0.00057	12911
4	85.55	0.00157	0.00267	0.00288	7.24	0.00059	12186
4	85.64	0.00142	0.00267	0.00289	7.24	0.00058	12462
4	85.68	0.00157	0.00267	0.00289	7.25	0.00059	12180
4	85.37	0.00137	0.00266	0.00289	7.22	0.00058	12525
4	121.86	0.00190	0.00390	0.00419	10.31	0.00083	12374
4	121.76	0.00202	0.00403	0.00419	10.30	0.00085	12069
4	121.88	0.00205	0.00403	0.00407	10.31	0.00084	12200
4	121.93	0.00201	0.00402	0.00419	10.31	0.00085	12107
4	121.94	0.00204	0.00403	0.00407	10.31	0.00085	12200
4	170.98	0.00302	0.00585	0.00604	14.46	0.00124	11638
4	173.04	0.00285	0.00570	0.00600	14.63	0.00121	12070
4	171.13	0.00266	0.00585	0.00604	14.47	0.00121	11935
4	168.51	0.00304	0.00584	0.00603	14.25	0.00124	11474
4	168.23	0.00276	0.00583	0.00602	14.23	0.00122	11686
2	46.87	0.00099	0.00177	0.00180	3.96	0.00038	10434
2	46.32	0.00099	0.00178	0.00180	3.92	0.00038	10301
2	46.30	0.00100	0.00177	0.00179	3.92	0.00038	10300
2	46.32	0.00080	0.00166	0.00168	3.92	0.00034	11368
2	48.82	0.00094	0.00178	0.00180	4.13	0.00038	10961
2	85.10	0.00199	0.00319	0.00336	7.20	0.00071	10111
2	83.03	0.00186	0.00308	0.00338	7.02	0.00069	10137
2	86.41	0.00170	0.00320	0.00338	7.31	0.00069	10595
2	89.35	0.00153	0.00332	0.00337	7.56	0.00068	11033
2	82.93	0.00183	0.00320	0.00337	7.01	0.00070	10017
2	119.59	0.00233	0.00479	0.00493	10.11	0.00100	10069
2	119.41	0.00257	0.00479	0.00492	10.10	0.00102	9862
2	120.09	0.00217	0.00490	0.00491	10.16	0.00100	10174
2	121.71	0.00225	0.00490	0.00503	10.29	0.00101	10145
2	120.44	0.00228	0.00491	0.00503	10.19	0.00102	10011
2	169.09	0.00336	0.00701	0.00733	14.30	0.00148	9695
2	172.70	0.00365	0.00704	0.00737	14.61	0.00150	9708
2	168.60	0.00325	0.00717	0.00738	14.26	0.00148	9619
2	168.03	0.00328	0.00724	0.00731	14.21	0.00149	9562
2	168.01	0.00354	0.00724	0.00731	14.21	0.00151	9428

Table J.79: Resilient modulus data (C_1_10_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	48.39	-0.00059	0.00080	0.00091	4.09	0.00009	43956
8	50.82	-0.00068	0.00080	0.00103	4.30	0.00010	45069
8	48.42	-0.00062	0.00080	0.00090	4.10	0.00009	45424
8	50.43	-0.00052	0.00079	0.00090	4.26	0.00010	43716
8	48.84	-0.00070	0.00079	0.00101	4.13	0.00009	44784
8	84.94	0.00069	0.00142	0.00153	7.18	0.00030	23659
8	84.66	0.00069	0.00141	0.00152	7.16	0.00030	23687
8	87.05	-0.00069	0.00141	0.00164	7.36	0.00020	37369
8	84.94	-0.00071	0.00130	0.00153	7.18	0.00018	40750
8	85.02	0.00068	0.00142	0.00153	7.19	0.00030	23780
8	121.63	0.00113	0.00202	0.00224	10.29	0.00045	22902
8	121.46	0.00083	0.00202	0.00223	10.27	0.00042	24255
8	121.34	0.00106	0.00202	0.00223	10.26	0.00044	23240
8	121.46	0.00119	0.00201	0.00223	10.27	0.00045	22663
8	121.52	0.00106	0.00214	0.00222	10.28	0.00045	22739
8	170.42	0.00158	0.00296	0.00311	14.41	0.00064	22602
8	172.93	0.00164	0.00308	0.00311	14.63	0.00065	22407
8	170.30	0.00130	0.00296	0.00310	14.40	0.00061	23504
8	172.82	0.00141	0.00296	0.00310	14.62	0.00062	23476
8	172.94	0.00171	0.00296	0.00310	14.63	0.00065	22613
6	50.19	-0.00047	0.00092	0.00111	4.24	0.00013	32582
6	52.65	-0.00059	0.00092	0.00111	4.45	0.00012	37096
6	48.40	0.00056	0.00092	0.00099	4.09	0.00021	19912
6	48.88	-0.00066	0.00081	0.00100	4.13	0.00010	43236
6	48.51	0.00061	0.00080	0.00112	4.10	0.00021	19466
6	85.28	0.00074	0.00150	0.00181	7.21	0.00034	21396
6	85.18	0.00116	0.00150	0.00181	7.20	0.00037	19377
6	87.97	0.00095	0.00151	0.00182	7.44	0.00036	20851
6	85.74	0.00072	0.00150	0.00181	7.25	0.00034	21547
6	86.91	-0.00085	0.00150	0.00180	7.35	0.00020	35888
6	124.23	0.00133	0.00216	0.00250	10.51	0.00050	21036
6	121.81	0.00091	0.00216	0.00251	10.30	0.00047	22147
6	121.84	0.00103	0.00216	0.00251	10.30	0.00047	21713
6	121.49	0.00125	0.00216	0.00250	10.28	0.00049	20865
6	122.27	0.00131	0.00216	0.00250	10.34	0.00050	20768
6	172.92	0.00148	0.00334	0.00364	14.63	0.00070	20756
6	172.97	0.00168	0.00335	0.00352	14.63	0.00071	20543
6	170.43	0.00141	0.00323	0.00351	14.41	0.00068	21230
6	172.90	0.00150	0.00323	0.00352	14.62	0.00069	21283
6	172.97	0.00167	0.00335	0.00352	14.63	0.00071	20559
4	48.85	-0.00052	0.00087	0.00123	4.13	0.00013	31539
4	48.69	-0.00070	0.00086	0.00122	4.12	0.00012	35699
4	48.66	0.00072	0.00086	0.00122	4.12	0.00023	17611
4	48.73	0.00064	0.00086	0.00122	4.12	0.00023	18171
4	48.68	0.00071	0.00086	0.00122	4.12	0.00023	17689
4	85.33	0.00100	0.00155	0.00208	7.22	0.00038	18746
4	85.48	0.00080	0.00156	0.00209	7.23	0.00037	19500
4	84.94	0.00078	0.00155	0.00207	7.18	0.00037	19581
4	85.74	0.00094	0.00155	0.00208	7.25	0.00038	19060
4	86.79	0.00080	0.00155	0.00207	7.34	0.00037	19921
4	124.24	0.00114	0.00241	0.00289	10.51	0.00054	19574
4	124.06	0.00136	0.00241	0.00288	10.49	0.00055	18936
4	124.95	0.00121	0.00241	0.00288	10.57	0.00054	19503
4	124.83	0.00124	0.00241	0.00288	10.56	0.00054	19410
4	121.63	0.00102	0.00254	0.00288	10.29	0.00054	19204
4	173.05	0.00163	0.00370	0.00412	14.64	0.00079	18587
4	170.52	0.00173	0.00368	0.00411	14.42	0.00079	18175
4	172.80	0.00166	0.00368	0.00410	14.61	0.00079	18598
4	172.86	0.00170	0.00367	0.00408	14.62	0.00079	18569
4	170.43	0.00165	0.00354	0.00408	14.41	0.00077	18670
2	48.92	0.00066	0.00074	0.00145	4.14	0.00024	17432
2	46.42	0.00055	0.00075	0.00157	3.93	0.00024	16424
2	46.45	0.00075	0.00075	0.00145	3.93	0.00025	15997
2	46.53	-0.00072	0.00075	0.00145	3.94	0.00012	31973
2	48.97	-0.00078	0.00075	0.00158	4.14	0.00013	32217
2	90.06	0.00109	0.00162	0.00247	7.62	0.00043	17619
2	85.39	0.00071	0.00162	0.00258	7.22	0.00041	17663
2	85.52	0.00124	0.00163	0.00259	7.23	0.00045	15896
2	85.51	0.00116	0.00150	0.00246	7.23	0.00043	16931
2	85.55	0.00078	0.00162	0.00259	7.24	0.00042	17405
2	124.36	0.00134	0.00252	0.00349	10.52	0.00061	17172
2	124.33	0.00144	0.00252	0.00349	10.52	0.00062	16950
2	122.04	0.00139	0.00252	0.00349	10.32	0.00062	16743
2	124.30	0.00128	0.00252	0.00349	10.51	0.00061	17315
2	121.90	0.00111	0.00264	0.00349	10.31	0.00060	17082
2	173.25	0.00174	0.00391	0.00484	14.65	0.00087	16761
2	173.24	0.00185	0.00391	0.00484	14.65	0.00088	16595
2	170.72	0.00197	0.00391	0.00495	14.44	0.00090	15994
2	173.21	0.00185	0.00403	0.00495	14.65	0.00090	16239
2	173.24	0.00192	0.00403	0.00483	14.65	0.00090	16304

Table J.80: Resilient modulus data (C_2_10_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	48.76	-0.00056	0.00085	0.00091	4.12	0.00010	41133
8	48.78	-0.00058	0.00086	0.00091	4.13	0.00010	41673
8	48.56	0.00051	0.00085	0.00078	4.11	0.00018	22965
8	48.53	0.00056	0.00097	0.00091	4.10	0.00020	20209
8	48.32	0.00058	0.00098	0.00090	4.09	0.00020	19951
8	87.27	0.00094	0.00165	0.00162	7.38	0.00035	21023
8	87.60	0.00096	0.00166	0.00150	7.41	0.00034	21609
8	87.46	0.00080	0.00166	0.00162	7.40	0.00034	21744
8	87.40	0.00066	0.00165	0.00150	7.39	0.00032	23255
8	87.56	0.00090	0.00166	0.00161	7.41	0.00035	21321
8	123.92	0.00127	0.00245	0.00229	10.48	0.00050	20936
8	123.99	0.00098	0.00245	0.00242	10.49	0.00049	21522
8	124.14	0.00119	0.00245	0.00230	10.50	0.00049	21217
8	124.17	0.00093	0.00245	0.00242	10.50	0.00048	21739
8	124.11	0.00127	0.00245	0.00229	10.50	0.00050	20958
8	172.46	0.00175	0.00364	0.00349	14.59	0.00074	19701
8	172.50	0.00155	0.00352	0.00350	14.59	0.00071	20438
8	172.72	0.00169	0.00364	0.00349	14.61	0.00073	19876
8	172.50	0.00166	0.00364	0.00349	14.59	0.00073	19932
8	172.65	0.00168	0.00365	0.00349	14.60	0.00073	19881
6	48.82	0.00076	0.00097	0.00086	4.13	0.00022	19123
6	51.18	-0.00057	0.00109	0.00085	4.33	0.00011	37931
6	48.85	0.00059	0.00097	0.00085	4.13	0.00020	20548
6	48.58	0.00063	0.00097	0.00098	4.11	0.00021	19184
6	48.81	0.00052	0.00096	0.00085	4.13	0.00019	21218
6	87.67	0.00108	0.00186	0.00175	7.42	0.00039	18984
6	87.59	0.00085	0.00185	0.00174	7.41	0.00037	19975
6	87.64	0.00064	0.00186	0.00176	7.41	0.00036	20875
6	86.03	0.00098	0.00186	0.00163	7.28	0.00037	19521
6	96.56	-0.05805	-0.12141	-0.09163	8.17	-0.02259	-361
6	128.55	0.00133	0.00275	0.00261	10.87	0.00056	19511
6	124.17	0.00132	0.00275	0.00261	10.50	0.00056	18879
6	124.17	0.00117	0.00287	0.00261	10.50	0.00055	18931
6	124.15	0.00147	0.00275	0.00261	10.50	0.00057	18447
6	126.60	0.00155	0.00287	0.00260	10.71	0.00058	18320
6	172.84	0.00179	0.00401	0.00388	14.62	0.00081	18139
6	172.82	0.00175	0.00412	0.00387	14.62	0.00081	18016
6	172.92	0.00203	0.00411	0.00386	14.63	0.00083	17536
6	172.84	0.00181	0.00410	0.00386	14.62	0.00081	17949
6	172.99	0.00185	0.00410	0.00386	14.63	0.00082	17895
4	51.35	0.00086	0.00110	0.00105	4.34	0.00025	17333
4	48.62	0.00082	0.00110	0.00104	4.11	0.00025	16677
4	49.38	0.00062	0.00122	0.00092	4.18	0.00023	18113
4	47.65	0.00074	0.00109	0.00104	4.03	0.00024	16827
4	51.37	0.00075	0.00109	0.00103	4.34	0.00024	18186
4	85.94	0.00095	0.00212	0.00185	7.27	0.00041	17693
4	87.72	0.00132	0.00213	0.00185	7.42	0.00044	16769
4	87.75	0.00118	0.00213	0.00186	7.42	0.00043	17200
4	87.79	0.00087	0.00214	0.00199	7.42	0.00042	17823
4	85.40	0.00097	0.00214	0.00187	7.22	0.00041	17425
4	121.99	0.00138	0.00316	0.00284	10.32	0.00062	16773
4	124.33	0.00129	0.00316	0.00296	10.52	0.00062	17015
4	124.42	0.00139	0.00328	0.00296	10.52	0.00064	16546
4	124.39	0.00130	0.00328	0.00296	10.52	0.00063	16740
4	124.13	0.00150	0.00316	0.00296	10.50	0.00063	16541
4	173.25	0.00224	0.00470	0.00439	14.65	0.00094	15520
4	170.65	0.00213	0.00468	0.00438	14.43	0.00093	15493
4	175.59	0.00215	0.00479	0.00436	14.85	0.00094	15766
4	170.59	0.00200	0.00477	0.00436	14.43	0.00093	15550
4	173.17	0.00191	0.00464	0.00436	14.65	0.00091	16116
2	48.94	0.00088	0.00111	0.00131	4.14	0.00027	15057
2	48.87	0.00060	0.00111	0.00131	4.13	0.00025	16420
2	48.88	0.00072	0.00111	0.00131	4.13	0.00026	15837
2	48.86	0.00066	0.00111	0.00132	4.13	0.00026	16050
2	48.63	0.00079	0.00112	0.00130	4.11	0.00027	15394
2	85.52	0.00101	0.00217	0.00236	7.23	0.00046	15668
2	85.29	0.00127	0.00232	0.00233	7.21	0.00049	14630
2	85.45	0.00126	0.00218	0.00235	7.23	0.00048	14993
2	85.39	0.00119	0.00219	0.00233	7.22	0.00048	15186
2	85.31	0.00119	0.00231	0.00232	7.21	0.00049	14855
2	124.45	0.00169	0.00352	0.00353	10.53	0.00073	14442
2	124.51	0.00146	0.00353	0.00342	10.53	0.00070	15030
2	124.49	0.00146	0.00352	0.00342	10.53	0.00070	15040
2	122.10	0.00166	0.00353	0.00353	10.33	0.00073	14209
2	121.98	0.00179	0.00352	0.00354	10.32	0.00074	13986
2	173.36	0.00233	0.00531	0.00507	14.66	0.00106	13843
2	170.77	0.00260	0.00544	0.00506	14.44	0.00109	13238
2	173.30	0.00245	0.00544	0.00506	14.66	0.00108	13584
2	173.34	0.00241	0.00543	0.00507	14.66	0.00108	13622
2	173.35	0.00260	0.00543	0.00507	14.66	0.00109	13419

Table J.81: Resilient modulus data (C_1_8_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.09	0.00067	0.00057	0.00060	4.24	0.00015	27694
8	47.84	0.00066	0.00057	0.00060	4.05	0.00015	26468
8	50.14	0.00070	0.00057	0.00060	4.24	0.00016	27231
8	50.24	0.00066	0.00057	0.00064	4.25	0.00016	27191
8	50.29	0.00070	0.00057	0.00060	4.25	0.00016	27254
8	86.87	0.00135	0.00107	0.00109	7.35	0.00029	25071
8	86.77	0.00131	0.00107	0.00114	7.34	0.00029	25064
8	87.06	0.00135	0.00107	0.00114	7.36	0.00030	24820
8	87.00	0.00135	0.00111	0.00114	7.36	0.00030	24560
8	87.19	0.00135	0.00111	0.00114	7.37	0.00030	24569
8	122.95	0.00203	0.00168	0.00164	10.40	0.00045	23326
8	123.22	0.00203	0.00168	0.00168	10.42	0.00045	23204
8	125.87	0.00200	0.00168	0.00169	10.65	0.00045	23800
8	123.41	0.00200	0.00168	0.00168	10.44	0.00045	23387
8	125.78	0.00203	0.00167	0.00168	10.64	0.00045	23717
8	174.55	0.00301	0.00250	0.00250	14.76	0.00067	22116
8	174.59	0.00301	0.00250	0.00246	14.77	0.00066	22231
8	172.35	0.00301	0.00250	0.00246	14.58	0.00066	21946
8	174.60	0.00304	0.00249	0.00246	14.77	0.00067	22165
8	172.03	0.00304	0.00248	0.00250	14.55	0.00067	21782
6	50.26	0.00082	0.00064	0.00062	4.25	0.00017	24622
6	50.30	0.00082	0.00064	0.00062	4.25	0.00017	24624
6	50.24	0.00082	0.00060	0.00062	4.25	0.00017	25061
6	50.13	0.00082	0.00064	0.00066	4.24	0.00018	24012
6	47.42	0.00081	0.00059	0.00066	4.01	0.00017	23288
6	89.34	0.00157	0.00119	0.00120	7.56	0.00033	22907
6	86.85	0.00157	0.00119	0.00119	7.35	0.00033	22275
6	86.58	0.00157	0.00119	0.00119	7.32	0.00033	22233
6	86.61	0.00153	0.00115	0.00119	7.33	0.00032	22714
6	89.36	0.00157	0.00119	0.00120	7.56	0.00033	22904
6	123.62	0.00233	0.00185	0.00179	10.46	0.00050	20992
6	124.80	0.00237	0.00181	0.00179	10.55	0.00050	21216
6	128.01	0.00237	0.00185	0.00179	10.83	0.00050	21591
6	125.75	0.00233	0.00185	0.00179	10.64	0.00050	21348
6	123.15	0.00232	0.00181	0.00179	10.42	0.00049	21102
6	172.43	0.00354	0.00281	0.00273	14.58	0.00076	19293
6	173.25	0.00352	0.00280	0.00272	14.65	0.00075	19445
6	176.71	0.00351	0.00275	0.00271	14.95	0.00075	19971
6	174.29	0.00350	0.00274	0.00271	14.74	0.00075	19750
6	174.52	0.00350	0.00278	0.00270	14.76	0.00075	19721
4	48.17	0.00094	0.00072	0.00064	4.07	0.00019	21249
4	50.46	0.00096	0.00072	0.00064	4.27	0.00019	22044
4	48.05	0.00093	0.00072	0.00064	4.06	0.00019	21285
4	48.08	0.00097	0.00076	0.00064	4.07	0.00020	20566
4	47.77	0.00096	0.00072	0.00064	4.04	0.00019	20943
4	84.73	0.00183	0.00136	0.00125	7.17	0.00037	19359
4	87.43	0.00188	0.00136	0.00125	7.39	0.00037	19745
4	84.96	0.00187	0.00136	0.00125	7.19	0.00037	19203
4	87.50	0.00184	0.00136	0.00125	7.40	0.00037	19925
4	84.51	0.00187	0.00132	0.00121	7.15	0.00037	19527
4	121.04	0.00279	0.00204	0.00196	10.24	0.00057	18098
4	123.77	0.00283	0.00204	0.00196	10.47	0.00057	18396
4	123.55	0.00283	0.00208	0.00196	10.45	0.00057	18262
4	123.66	0.00279	0.00204	0.00196	10.46	0.00057	18505
4	123.58	0.00283	0.00208	0.00195	10.45	0.00057	18275
4	172.44	0.00412	0.00308	0.00299	14.58	0.00085	17171
4	169.97	0.00411	0.00308	0.00299	14.38	0.00085	16937
4	169.85	0.00411	0.00308	0.00299	14.37	0.00085	16928
4	170.06	0.00412	0.00308	0.00299	14.38	0.00085	16936
4	172.67	0.00412	0.00309	0.00300	14.60	0.00085	17171
2	39.05	0.00114	0.00063	0.00043	3.30	0.00018	17959
2	41.43	0.00119	0.00063	0.00042	3.50	0.00019	18679
2	39.06	0.00117	0.00064	0.00044	3.30	0.00019	17645
2	38.94	0.00110	0.00059	0.00039	3.29	0.00017	18934
2	41.67	0.00121	0.00064	0.00048	3.52	0.00019	18160
2	80.94	0.00237	0.00141	0.00113	6.85	0.00041	16743
2	80.97	0.00237	0.00145	0.00113	6.85	0.00041	16596
2	80.92	0.00237	0.00145	0.00113	6.84	0.00041	16592
2	80.94	0.00236	0.00141	0.00113	6.85	0.00041	16743
2	80.95	0.00237	0.00141	0.00113	6.85	0.00041	16750
2	119.87	0.00354	0.00228	0.00193	10.14	0.00065	15684
2	119.68	0.00353	0.00228	0.00194	10.12	0.00065	15664
2	121.98	0.00353	0.00232	0.00194	10.32	0.00065	15874
2	119.86	0.00353	0.00228	0.00194	10.14	0.00065	15683
2	119.61	0.00353	0.00228	0.00194	10.12	0.00065	15649
2	168.68	0.00511	0.00352	0.00321	14.27	0.00099	14457
2	168.88	0.00515	0.00348	0.00320	14.28	0.00099	14483
2	168.71	0.00511	0.00352	0.00321	14.27	0.00099	14466
2	168.75	0.00514	0.00352	0.00321	14.27	0.00099	14431
2	166.38	0.00510	0.00352	0.00321	14.07	0.00099	14278

Table J.82: Resilient modulus data (C_2_8_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	51.05	0.00070	0.00068	0.00062	4.32	0.00017	25885
8	51.09	0.00066	0.00064	0.00067	4.32	0.00016	26406
8	50.95	0.00066	0.00068	0.00062	4.31	0.00016	26384
8	50.93	0.00066	0.00064	0.00062	4.31	0.00016	26996
8	50.68	0.00065	0.00063	0.00062	4.29	0.00016	27048
8	88.05	0.00126	0.00126	0.00116	7.45	0.00031	24307
8	87.76	0.00125	0.00126	0.00115	7.42	0.00031	24313
8	87.77	0.00129	0.00125	0.00115	7.42	0.00031	24078
8	85.52	0.00125	0.00121	0.00116	7.23	0.00030	23953
8	88.04	0.00125	0.00126	0.00116	7.45	0.00031	24378
8	123.92	0.00189	0.00187	0.00171	10.48	0.00046	22988
8	126.55	0.00189	0.00187	0.00176	10.70	0.00046	23262
8	126.14	0.00189	0.00187	0.00175	10.67	0.00046	23241
8	123.89	0.00189	0.00183	0.00171	10.48	0.00045	23176
8	123.79	0.00189	0.00187	0.00171	10.47	0.00046	22986
8	173.90	0.00271	0.00270	0.00262	14.71	0.00067	21978
8	177.59	0.00271	0.00270	0.00257	15.02	0.00067	22574
8	172.98	0.00267	0.00265	0.00262	14.63	0.00066	22106
8	172.84	0.00271	0.00269	0.00262	14.62	0.00067	21890
8	175.33	0.00271	0.00269	0.00261	14.83	0.00067	22223
6	50.92	0.00078	0.00075	0.00067	4.31	0.00018	23478
6	50.93	0.00074	0.00071	0.00067	4.31	0.00018	24384
6	51.15	0.00074	0.00075	0.00067	4.33	0.00018	23936
6	51.07	0.00074	0.00075	0.00067	4.32	0.00018	23882
6	50.93	0.00074	0.00075	0.00067	4.31	0.00018	23883
6	87.61	0.00136	0.00139	0.00124	7.41	0.00033	22280
6	85.16	0.00139	0.00139	0.00125	7.20	0.00034	21435
6	88.09	0.00140	0.00140	0.00125	7.45	0.00034	22108
6	86.20	0.00136	0.00139	0.00125	7.29	0.00033	21913
6	88.32	0.00139	0.00139	0.00125	7.47	0.00034	22239
6	126.60	0.00209	0.00207	0.00190	10.71	0.00051	21200
6	125.20	0.00213	0.00207	0.00190	10.59	0.00051	20820
6	124.28	0.00210	0.00207	0.00190	10.51	0.00051	20798
6	125.98	0.00210	0.00207	0.00190	10.65	0.00050	21104
6	124.26	0.00209	0.00206	0.00189	10.51	0.00050	20847
6	175.31	0.00302	0.00296	0.00281	14.83	0.00073	20243
6	175.37	0.00306	0.00296	0.00285	14.83	0.00074	20063
6	175.38	0.00302	0.00296	0.00285	14.83	0.00074	20140
6	172.83	0.00298	0.00295	0.00285	14.62	0.00073	19975
6	175.23	0.00302	0.00296	0.00285	14.82	0.00074	20143
4	51.00	0.00088	0.00089	0.00076	4.31	0.00021	20373
4	51.10	0.00085	0.00089	0.00077	4.32	0.00021	20664
4	48.62	0.00081	0.00085	0.00076	4.11	0.00020	20350
4	48.38	0.00085	0.00085	0.00076	4.09	0.00020	19967
4	48.65	0.00085	0.00085	0.00077	4.11	0.00021	20043
4	85.87	0.00163	0.00164	0.00142	7.26	0.00039	18554
4	88.16	0.00167	0.00164	0.00146	7.46	0.00040	18739
4	85.27	0.00155	0.00159	0.00137	7.21	0.00038	19163
4	85.26	0.00155	0.00159	0.00142	7.21	0.00038	19004
4	85.61	0.00159	0.00164	0.00142	7.24	0.00039	18695
4	124.30	0.00236	0.00240	0.00215	10.51	0.00058	18269
4	121.76	0.00240	0.00236	0.00216	10.30	0.00058	17883
4	124.51	0.00240	0.00240	0.00215	10.53	0.00058	18175
4	126.77	0.00244	0.00240	0.00215	10.72	0.00058	18413
4	124.28	0.00236	0.00240	0.00215	10.51	0.00058	18268
4	173.00	0.00346	0.00339	0.00324	14.63	0.00084	17411
4	173.14	0.00345	0.00339	0.00324	14.64	0.00084	17425
4	173.09	0.00345	0.00339	0.00324	14.64	0.00084	17417
4	172.94	0.00345	0.00339	0.00324	14.63	0.00084	17420
4	173.11	0.00341	0.00338	0.00324	14.64	0.00084	17508
2	49.41	0.00097	0.00106	0.00081	4.18	0.00024	17682
2	49.37	0.00097	0.00106	0.00085	4.18	0.00024	17407
2	49.45	0.00097	0.00106	0.00090	4.18	0.00024	17122
2	49.28	0.00101	0.00105	0.00085	4.17	0.00024	17173
2	49.46	0.00101	0.00106	0.00085	4.18	0.00024	17159
2	87.84	0.00188	0.00201	0.00161	7.43	0.00046	16200
2	88.14	0.00192	0.00197	0.00162	7.45	0.00046	16258
2	89.01	0.00192	0.00201	0.00162	7.53	0.00046	16282
2	88.59	0.00193	0.00198	0.00162	7.49	0.00046	16272
2	86.12	0.00192	0.00197	0.00162	7.28	0.00046	15858
2	124.30	0.00281	0.00285	0.00250	10.51	0.00068	15451
2	122.21	0.00282	0.00285	0.00251	10.34	0.00068	15166
2	121.88	0.00284	0.00284	0.00250	10.31	0.00068	15113
2	121.95	0.00285	0.00284	0.00250	10.31	0.00068	15122
2	124.46	0.00285	0.00284	0.00250	10.53	0.00068	15421
2	171.88	0.00409	0.00404	0.00382	14.54	0.00100	14590
2	172.13	0.00406	0.00404	0.00383	14.56	0.00099	14649
2	171.92	0.00402	0.00404	0.00382	14.54	0.00099	14692
2	172.00	0.00405	0.00413	0.00378	14.55	0.00100	14595
2	172.03	0.00410	0.00402	0.00385	14.55	0.00100	14595

Table J.83: Resilient modulus data (D_1_16_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.87	0.00040	0.00034	0.00046	4.30	0.00010	43082
8	50.74	0.00039	0.00034	0.00047	4.29	0.00010	43003
8	48.50	0.00040	0.00034	0.00046	4.10	0.00010	41103
8	51.72	0.00040	0.00038	0.00046	4.37	0.00010	42393
8	50.82	0.00039	0.00034	0.00046	4.30	0.00010	43161
8	87.20	0.00068	0.00068	0.00086	7.38	0.00018	39905
8	85.60	0.00068	0.00068	0.00086	7.24	0.00018	39173
8	86.87	0.00064	0.00068	0.00086	7.35	0.00018	40442
8	87.15	0.00064	0.00068	0.00086	7.37	0.00018	40601
8	87.42	0.00064	0.00068	0.00085	7.39	0.00018	40699
8	123.93	0.00095	0.00102	0.00127	10.48	0.00027	38749
8	123.98	0.00095	0.00102	0.00127	10.49	0.00027	38761
8	121.56	0.00099	0.00102	0.00131	10.28	0.00028	37102
8	121.46	0.00098	0.00102	0.00131	10.27	0.00028	37139
8	124.01	0.00099	0.00102	0.00131	10.49	0.00028	37883
8	173.99	0.00146	0.00149	0.00191	14.72	0.00041	36315
8	172.72	0.00146	0.00149	0.00192	14.61	0.00041	36026
8	170.30	0.00146	0.00149	0.00192	14.40	0.00041	35549
8	170.06	0.00146	0.00149	0.00191	14.38	0.00040	35539
8	170.25	0.00146	0.00149	0.00195	14.40	0.00041	35252
6	48.48	0.00039	0.00034	0.00046	4.10	0.00010	41458
6	48.71	0.00039	0.00034	0.00046	4.12	0.00010	41386
6	48.53	0.00039	0.00038	0.00046	4.10	0.00010	40061
6	48.51	0.00039	0.00034	0.00050	4.10	0.00010	40036
6	48.59	0.00039	0.00038	0.00046	4.11	0.00010	39965
6	85.05	0.00070	0.00068	0.00086	7.19	0.00019	38510
6	84.94	0.00063	0.00068	0.00090	7.18	0.00018	38931
6	87.99	0.00066	0.00068	0.00090	7.44	0.00019	39715
6	86.48	0.00063	0.00068	0.00090	7.31	0.00018	39724
6	91.77	0.00066	0.00068	0.00090	7.76	0.00019	41358
6	126.39	0.00099	0.00106	0.00136	10.69	0.00028	37544
6	124.09	0.00096	0.00106	0.00136	10.49	0.00028	37235
6	121.49	0.00096	0.00106	0.00136	10.28	0.00028	36482
6	121.61	0.00096	0.00106	0.00136	10.28	0.00028	36509
6	121.64	0.00096	0.00106	0.00136	10.29	0.00028	36518
6	172.75	0.00142	0.00157	0.00205	14.61	0.00042	34782
6	172.76	0.00146	0.00157	0.00200	14.61	0.00042	34789
6	170.28	0.00146	0.00157	0.00200	14.40	0.00042	34318
6	170.06	0.00146	0.00157	0.00200	14.38	0.00042	34278
6	172.63	0.00146	0.00157	0.00204	14.60	0.00042	34501
4	48.49	0.00042	0.00034	0.00048	4.10	0.00010	39600
4	48.53	0.00042	0.00034	0.00048	4.10	0.00010	39584
4	48.64	0.00042	0.00039	0.00048	4.11	0.00011	38261
4	48.61	0.00042	0.00034	0.00048	4.11	0.00010	39622
4	48.64	0.00042	0.00034	0.00048	4.11	0.00010	39539
4	86.29	0.00067	0.00069	0.00089	7.30	0.00019	38923
4	91.52	0.00070	0.00069	0.00093	7.74	0.00019	39942
4	85.19	0.00070	0.00069	0.00093	7.21	0.00019	37183
4	87.60	0.00070	0.00069	0.00093	7.41	0.00019	38195
4	87.80	0.00071	0.00069	0.00094	7.43	0.00019	38222
4	123.98	0.00102	0.00110	0.00137	10.49	0.00029	36007
4	124.00	0.00102	0.00110	0.00141	10.49	0.00029	35587
4	121.45	0.00106	0.00110	0.00137	10.27	0.00029	34924
4	121.58	0.00102	0.00110	0.00141	10.28	0.00029	34885
4	121.60	0.00103	0.00106	0.00137	10.28	0.00029	35768
4	173.82	0.00151	0.00165	0.00215	14.70	0.00044	33149
4	174.63	0.00148	0.00161	0.00211	14.77	0.00043	34094
4	172.82	0.00151	0.00165	0.00211	14.62	0.00044	33257
4	170.34	0.00147	0.00161	0.00211	14.41	0.00043	33273
4	172.73	0.00147	0.00161	0.00215	14.61	0.00044	33477
2	48.73	0.00048	0.00033	0.00051	4.12	0.00011	37460
2	48.67	0.00048	0.00033	0.00051	4.12	0.00011	37490
2	48.79	0.00044	0.00033	0.00051	4.13	0.00011	38517
2	48.80	0.00044	0.00033	0.00047	4.13	0.00010	39852
2	48.58	0.00047	0.00033	0.00047	4.11	0.00011	38538
2	87.64	0.00079	0.00064	0.00094	7.41	0.00020	37628
2	87.75	0.00083	0.00068	0.00094	7.42	0.00020	36371
2	85.32	0.00079	0.00068	0.00094	7.22	0.00020	35891
2	85.48	0.00082	0.00068	0.00094	7.23	0.00020	35464
2	86.48	0.00079	0.00064	0.00094	7.31	0.00020	37049
2	121.88	0.00111	0.00110	0.00148	10.31	0.00031	33578
2	124.19	0.00110	0.00110	0.00148	10.50	0.00031	34231
2	124.31	0.00114	0.00110	0.00148	10.51	0.00031	33912
2	121.81	0.00110	0.00110	0.00143	10.30	0.00030	34016
2	121.77	0.00110	0.00110	0.00143	10.30	0.00030	33985
2	173.04	0.00158	0.00168	0.00221	14.63	0.00046	32101
2	173.02	0.00158	0.00168	0.00221	14.63	0.00046	32090
2	170.57	0.00158	0.00168	0.00221	14.43	0.00046	31647
2	173.07	0.00162	0.00167	0.00221	14.64	0.00046	31919
2	172.91	0.00162	0.00168	0.00221	14.62	0.00046	31872

Table J.84: Resilient modulus data (D_2_16_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.60	0.00063	0.00025	0.00024	4.28	0.00009	45496
8	50.41	0.00059	0.00025	0.00024	4.26	0.00009	46909
8	48.18	0.00060	0.00025	0.00024	4.07	0.00009	44702
8	50.64	0.00060	0.00021	0.00024	4.28	0.00009	48739
8	50.60	0.00060	0.00025	0.00025	4.28	0.00009	46718
8	84.78	0.00097	0.00051	0.00051	7.17	0.00017	43447
8	87.29	0.00097	0.00051	0.00051	7.38	0.00017	44740
8	87.26	0.00097	0.00051	0.00051	7.38	0.00017	44716
8	87.31	0.00101	0.00051	0.00051	7.38	0.00017	43886
8	87.37	0.00100	0.00051	0.00051	7.39	0.00017	43942
8	123.81	0.00136	0.00082	0.00081	10.47	0.00025	42094
8	123.97	0.00133	0.00082	0.00085	10.49	0.00025	42065
8	123.66	0.00136	0.00086	0.00085	10.46	0.00026	40975
8	126.55	0.00136	0.00082	0.00085	10.70	0.00025	42546
8	122.57	0.00136	0.00081	0.00080	10.37	0.00025	41818
8	170.02	0.00188	0.00135	0.00132	14.38	0.00038	37984
8	170.35	0.00188	0.00130	0.00132	14.41	0.00038	38397
8	171.23	0.00183	0.00130	0.00132	14.48	0.00037	38979
8	174.32	0.00191	0.00130	0.00132	14.74	0.00038	39010
8	170.01	0.00187	0.00130	0.00128	14.38	0.00037	38770
6	52.89	0.00068	0.00021	0.00029	4.47	0.00010	45531
6	50.85	0.00068	0.00021	0.00025	4.30	0.00009	45383
6	50.81	0.00068	0.00021	0.00025	4.30	0.00009	45511
6	50.82	0.00068	0.00021	0.00029	4.30	0.00010	43853
6	48.52	0.00064	0.00021	0.00024	4.10	0.00009	44916
6	85.02	0.00108	0.00047	0.00051	7.19	0.00017	41870
6	85.06	0.00105	0.00042	0.00051	7.19	0.00016	43605
6	87.43	0.00108	0.00047	0.00051	7.39	0.00017	43093
6	84.97	0.00108	0.00047	0.00051	7.19	0.00017	41836
6	87.49	0.00105	0.00047	0.00051	7.40	0.00017	43870
6	121.55	0.00145	0.00078	0.00081	10.28	0.00025	40608
6	123.98	0.00144	0.00074	0.00081	10.49	0.00025	42060
6	124.11	0.00149	0.00078	0.00081	10.50	0.00026	40941
6	124.08	0.00148	0.00078	0.00081	10.49	0.00026	41007
6	123.88	0.00148	0.00078	0.00081	10.48	0.00026	40988
6	173.33	0.00204	0.00124	0.00135	14.66	0.00039	38021
6	172.51	0.00207	0.00124	0.00131	14.59	0.00038	37917
6	172.83	0.00203	0.00124	0.00131	14.62	0.00038	38293
6	172.63	0.00207	0.00128	0.00130	14.60	0.00039	37648
6	170.22	0.00203	0.00124	0.00130	14.40	0.00038	37795
4	48.66	0.00069	0.00017	0.00026	4.12	0.00009	44288
4	51.03	0.00072	0.00017	0.00026	4.32	0.00010	45060
4	51.11	0.00069	0.00021	0.00026	4.32	0.00010	44808
4	50.92	0.00073	0.00017	0.00026	4.31	0.00010	44915
4	48.66	0.00073	0.00021	0.00026	4.12	0.00010	41420
4	87.54	0.00119	0.00038	0.00053	7.40	0.00018	42157
4	85.06	0.00119	0.00038	0.00053	7.19	0.00018	41010
4	87.58	0.00119	0.00038	0.00053	7.41	0.00018	42165
4	87.39	0.00119	0.00038	0.00049	7.39	0.00017	42987
4	87.69	0.00119	0.00038	0.00053	7.42	0.00018	42206
4	121.51	0.00169	0.00068	0.00081	10.28	0.00026	38866
4	123.77	0.00169	0.00067	0.00077	10.47	0.00026	40184
4	123.79	0.00169	0.00067	0.00077	10.47	0.00026	40232
4	121.52	0.00169	0.00067	0.00077	10.28	0.00026	39419
4	121.46	0.00169	0.00072	0.00081	10.27	0.00027	38348
4	170.12	0.00230	0.00118	0.00126	14.39	0.00040	36422
4	170.25	0.00230	0.00118	0.00126	14.40	0.00040	36440
4	172.82	0.00230	0.00118	0.00131	14.62	0.00040	36637
4	172.96	0.00234	0.00118	0.00126	14.63	0.00040	36717
4	172.63	0.00230	0.00118	0.00127	14.60	0.00040	36934
2	51.39	0.00084	0.00017	0.00025	4.35	0.00011	41372
2	51.95	0.00080	0.00017	0.00025	4.39	0.00010	43214
2	52.67	0.00080	0.00017	0.00025	4.45	0.00010	43651
2	48.70	0.00080	0.00017	0.00025	4.12	0.00010	40245
2	51.28	0.00081	0.00021	0.00025	4.34	0.00011	40677
2	87.70	0.00145	0.00032	0.00044	7.42	0.00018	40218
2	85.26	0.00148	0.00032	0.00044	7.21	0.00019	38444
2	85.39	0.00145	0.00033	0.00044	7.22	0.00018	39079
2	85.34	0.00148	0.00032	0.00044	7.22	0.00019	38446
2	87.65	0.00145	0.00033	0.00049	7.41	0.00019	39397
2	121.62	0.00202	0.00059	0.00075	10.29	0.00028	36739
2	124.56	0.00202	0.00059	0.00075	10.53	0.00028	37686
2	125.33	0.00202	0.00063	0.00075	10.60	0.00028	37416
2	128.57	0.00198	0.00063	0.00075	10.87	0.00028	38858
2	121.67	0.00199	0.00059	0.00075	10.29	0.00028	37187
2	170.53	0.00276	0.00112	0.00117	14.42	0.00042	34270
2	173.25	0.00273	0.00108	0.00117	14.65	0.00042	35288
2	170.50	0.00273	0.00107	0.00117	14.42	0.00042	34734
2	175.38	0.00274	0.00107	0.00117	14.83	0.00042	35722
2	170.14	0.00273	0.00107	0.00118	14.39	0.00041	34686

Table J.85: Resilient modulus data (D_1_13_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	49.06	0.00050	0.00015	0.00017	4.15	0.00007	61323
8	50.99	0.00041	0.00015	0.00017	4.31	0.00006	71133
8	51.00	0.00045	0.00015	0.00017	4.31	0.00006	67436
8	51.21	0.00053	0.00015	0.00017	4.33	0.00007	61415
8	50.98	0.00045	0.00015	0.00017	4.31	0.00006	67736
8	87.98	0.00074	0.00033	0.00033	7.44	0.00012	63697
8	90.31	0.00070	0.00038	0.00033	7.64	0.00012	65029
8	90.43	0.00074	0.00034	0.00033	7.65	0.00012	65286
8	90.22	0.00070	0.00038	0.00033	7.63	0.00012	64875
8	90.31	0.00074	0.00038	0.00033	7.64	0.00012	63084
8	129.28	0.00098	0.00060	0.00047	10.93	0.00017	64229
8	129.16	0.00098	0.00060	0.00042	10.92	0.00017	65637
8	127.13	0.00098	0.00060	0.00047	10.75	0.00017	62978
8	124.32	0.00098	0.00060	0.00047	10.51	0.00017	61803
8	124.27	0.00102	0.00056	0.00047	10.51	0.00017	61914
8	175.43	0.00133	0.00089	0.00066	14.84	0.00024	61814
8	175.46	0.00133	0.00089	0.00066	14.84	0.00024	61860
8	175.57	0.00133	0.00089	0.00066	14.85	0.00024	61881
8	172.96	0.00129	0.00089	0.00062	14.63	0.00023	62818
8	173.04	0.00129	0.00084	0.00066	14.63	0.00023	62804
6	51.24	0.00050	0.00015	0.00020	4.33	0.00007	61451
6	51.06	0.00046	0.00019	0.00020	4.32	0.00007	60870
6	51.02	0.00050	0.00015	0.00020	4.32	0.00007	61441
6	51.17	0.00046	0.00015	0.00020	4.33	0.00007	64339
6	51.18	0.00046	0.00015	0.00016	4.33	0.00006	68047
6	90.21	0.00076	0.00035	0.00030	7.63	0.00012	64891
6	90.25	0.00072	0.00035	0.00031	7.63	0.00011	66674
6	89.80	0.00071	0.00035	0.00031	7.60	0.00011	66620
6	87.36	0.00075	0.00035	0.00030	7.39	0.00012	63247
6	87.29	0.00071	0.00039	0.00031	7.38	0.00012	63164
6	127.10	0.00104	0.00058	0.00044	10.75	0.00017	62303
6	129.33	0.00104	0.00058	0.00044	10.94	0.00017	63597
6	129.26	0.00108	0.00062	0.00044	10.93	0.00018	61198
6	129.34	0.00104	0.00058	0.00044	10.94	0.00017	63642
6	127.19	0.00104	0.00062	0.00045	10.76	0.00018	61029
6	175.44	0.00136	0.00088	0.00063	14.84	0.00024	62000
6	175.43	0.00137	0.00092	0.00063	14.84	0.00024	61056
6	175.36	0.00136	0.00088	0.00063	14.83	0.00024	62021
6	175.32	0.00136	0.00088	0.00063	14.83	0.00024	62142
6	172.76	0.00132	0.00088	0.00063	14.61	0.00024	62036
4	50.84	0.00050	0.00018	0.00020	4.30	0.00007	58983
4	52.23	0.00047	0.00018	0.00016	4.42	0.00007	64780
4	50.98	0.00050	0.00014	0.00020	4.31	0.00007	61958
4	51.78	0.00050	0.00014	0.00020	4.38	0.00007	62318
4	53.12	0.00044	0.00018	0.00020	4.49	0.00007	65859
4	88.70	0.00079	0.00037	0.00033	7.50	0.00012	60188
4	91.68	0.00076	0.00037	0.00034	7.75	0.00012	63356
4	88.34	0.00071	0.00037	0.00034	7.47	0.00012	62921
4	87.78	0.00079	0.00033	0.00033	7.42	0.00012	61388
4	88.17	0.00075	0.00037	0.00033	7.46	0.00012	61396
4	127.30	0.00106	0.00055	0.00044	10.77	0.00017	63263
4	130.47	0.00106	0.00059	0.00044	11.03	0.00017	63522
4	128.13	0.00101	0.00059	0.00044	10.84	0.00017	63685
4	127.38	0.00106	0.00059	0.00048	10.77	0.00018	60681
4	127.07	0.00102	0.00055	0.00044	10.75	0.00017	64493
4	175.59	0.00141	0.00088	0.00066	14.85	0.00025	60399
4	177.81	0.00141	0.00088	0.00065	15.04	0.00025	61340
4	175.49	0.00137	0.00092	0.00065	14.84	0.00025	60448
4	173.41	0.00145	0.00088	0.00065	14.67	0.00025	59000
4	175.64	0.00145	0.00087	0.00065	14.85	0.00025	59892
2	48.69	0.00046	0.00019	0.00017	4.12	0.00007	59567
2	50.89	0.00042	0.00019	0.00017	4.30	0.00007	65918
2	51.23	0.00043	0.00019	0.00022	4.33	0.00007	62182
2	48.65	0.00038	0.00019	0.00022	4.11	0.00007	62436
2	51.28	0.00042	0.00015	0.00022	4.34	0.00007	65971
2	87.79	0.00076	0.00035	0.00035	7.42	0.00012	61264
2	90.38	0.00076	0.00035	0.00035	7.64	0.00012	62893
2	87.77	0.00072	0.00035	0.00035	7.42	0.00012	62850
2	87.77	0.00072	0.00035	0.00035	7.42	0.00012	62982
2	90.20	0.00072	0.00035	0.00035	7.63	0.00012	64677
2	126.78	0.00101	0.00055	0.00051	10.72	0.00017	62168
2	126.99	0.00101	0.00055	0.00051	10.74	0.00017	62102
2	126.78	0.00105	0.00055	0.00051	10.72	0.00018	61092
2	124.45	0.00101	0.00050	0.00047	10.53	0.00017	63591
2	126.99	0.00105	0.00055	0.00051	10.74	0.00018	61067
2	173.14	0.00142	0.00084	0.00068	14.64	0.00024	59775
2	175.73	0.00139	0.00084	0.00068	14.86	0.00024	61443
2	175.64	0.00146	0.00084	0.00068	14.85	0.00025	59867
2	175.54	0.00146	0.00084	0.00068	14.85	0.00025	59821
2	175.45	0.00142	0.00080	0.00064	14.84	0.00024	62397

Table J.86: Resilient modulus data (D_2_13_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	53.55	0.00011	0.00020	0.00030	4.53	0.00005	89469
8	50.97	0.00012	0.00020	0.00030	4.31	0.00005	84961
8	50.78	0.00012	0.00020	0.00029	4.29	0.00005	84638
8	51.35	0.00016	0.00020	0.00029	4.34	0.00005	80836
8	52.45	0.00012	0.00020	0.00029	4.44	0.00005	87859
8	87.44	0.00028	0.00033	0.00045	7.40	0.00009	83427
8	87.26	0.00028	0.00033	0.00049	7.38	0.00009	80756
8	87.43	0.00024	0.00033	0.00049	7.39	0.00009	83577
8	90.05	0.00028	0.00033	0.00049	7.62	0.00009	83218
8	87.50	0.00024	0.00033	0.00049	7.40	0.00009	83856
8	126.49	0.00035	0.00046	0.00068	10.70	0.00012	86033
8	126.47	0.00038	0.00046	0.00068	10.70	0.00013	83951
8	124.23	0.00035	0.00046	0.00068	10.51	0.00012	84356
8	124.28	0.00039	0.00046	0.00068	10.51	0.00013	82249
8	123.94	0.00035	0.00046	0.00068	10.48	0.00012	84027
8	175.18	0.00052	0.00067	0.00098	14.82	0.00018	81509
8	175.17	0.00048	0.00067	0.00098	14.81	0.00018	83014
8	175.32	0.00052	0.00072	0.00098	14.83	0.00018	80198
8	175.45	0.00052	0.00072	0.00098	14.84	0.00019	80041
8	175.14	0.00049	0.00072	0.00098	14.81	0.00018	81391
6	50.80	0.00015	0.00019	0.00029	4.30	0.00005	81578
6	50.85	0.00015	0.00019	0.00029	4.30	0.00005	81176
6	50.76	0.00015	0.00019	0.00029	4.29	0.00005	81037
6	51.23	0.00015	0.00019	0.00029	4.33	0.00005	82493
6	56.99	0.00015	0.00019	0.00029	4.82	0.00005	91073
6	88.61	0.00025	0.00033	0.00048	7.49	0.00009	85184
6	93.15	0.00024	0.00033	0.00053	7.88	0.00009	85974
6	85.58	0.00024	0.00032	0.00053	7.24	0.00009	79251
6	87.90	0.00025	0.00032	0.00049	7.43	0.00009	84600
6	90.07	0.00024	0.00032	0.00048	7.62	0.00009	86970
6	126.84	0.00039	0.00048	0.00075	10.73	0.00013	79711
6	126.67	0.00035	0.00048	0.00070	10.71	0.00013	83648
6	126.90	0.00032	0.00048	0.00070	10.73	0.00012	85908
6	124.02	0.00035	0.00052	0.00075	10.49	0.00014	77511
6	124.63	0.00032	0.00048	0.00070	10.54	0.00013	84274
6	177.91	0.00045	0.00071	0.00102	15.05	0.00018	82765
6	175.38	0.00045	0.00071	0.00102	14.83	0.00018	81555
6	175.46	0.00049	0.00071	0.00101	14.84	0.00018	80352
6	172.79	0.00049	0.00067	0.00101	14.61	0.00018	80626
6	175.44	0.00046	0.00071	0.00102	14.84	0.00018	81550
4	51.08	0.00014	0.00022	0.00029	4.32	0.00005	80432
4	51.58	0.00010	0.00022	0.00029	4.36	0.00005	86521
4	52.56	0.00014	0.00022	0.00033	4.45	0.00006	77962
4	55.46	0.00010	0.00021	0.00028	4.69	0.00005	94272
4	51.05	0.00010	0.00022	0.00028	4.32	0.00005	86448
4	87.90	0.00019	0.00038	0.00057	7.43	0.00009	78632
4	87.93	0.00019	0.00038	0.00053	7.44	0.00009	81059
4	87.78	0.00015	0.00038	0.00057	7.42	0.00009	81124
4	89.93	0.00023	0.00038	0.00053	7.61	0.00009	80485
4	88.34	0.00019	0.00038	0.00053	7.47	0.00009	81861
4	124.47	0.00030	0.00055	0.00075	10.53	0.00013	79102
4	124.19	0.00026	0.00050	0.00075	10.50	0.00013	83089
4	126.78	0.00030	0.00051	0.00079	10.72	0.00013	80471
4	124.31	0.00030	0.00051	0.00075	10.51	0.00013	81196
4	124.24	0.00030	0.00051	0.00079	10.51	0.00013	78950
4	175.80	0.00042	0.00077	0.00111	14.87	0.00019	77634
4	173.20	0.00039	0.00072	0.00111	14.65	0.00018	79233
4	173.36	0.00038	0.00073	0.00111	14.66	0.00019	79224
4	175.50	0.00042	0.00077	0.00111	14.84	0.00019	77540
4	175.88	0.00042	0.00077	0.00111	14.87	0.00019	77711
2	51.41	0.00007	0.00023	0.00035	4.35	0.00005	80072
2	51.40	0.00007	0.00027	0.00035	4.35	0.00006	75556
2	51.42	-0.00004	0.00027	0.00035	4.35	0.00005	90007
2	49.05	-0.00004	0.00023	0.00035	4.15	0.00004	92878
2	48.74	0.00007	0.00023	0.00035	4.12	0.00005	76913
2	88.62	0.00009	0.00041	0.00060	7.50	0.00009	82090
2	90.35	0.00012	0.00041	0.00060	7.64	0.00009	80930
2	88.71	0.00013	0.00041	0.00060	7.50	0.00009	79248
2	87.96	-0.00007	0.00041	0.00060	7.44	0.00008	94293
2	88.00	0.00013	0.00041	0.00061	7.44	0.00010	78100
2	126.94	0.00019	0.00056	0.00089	10.74	0.00014	78803
2	126.77	0.00015	0.00056	0.00089	10.72	0.00013	80693
2	124.55	0.00019	0.00056	0.00084	10.53	0.00013	79579
2	126.84	0.00019	0.00056	0.00089	10.73	0.00014	78794
2	126.78	0.00015	0.00056	0.00088	10.72	0.00013	80676
2	180.25	0.00031	0.00082	0.00122	15.24	0.00020	78050
2	177.55	0.00027	0.00077	0.00122	15.02	0.00019	79743
2	173.28	0.00027	0.00077	0.00122	14.66	0.00019	77724
2	175.84	0.00030	0.00082	0.00122	14.87	0.00020	76252
2	173.17	0.00031	0.00077	0.00122	14.65	0.00019	76578

Table J.87: Resilient modulus data (D_1_11_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	51.35	0.00046	0.00038	0.00012	4.34	0.00008	54694
8	53.85	0.00046	0.00038	0.00008	4.55	0.00008	59598
8	53.47	0.00042	0.00038	0.00007	4.52	0.00007	62314
8	51.65	0.00046	0.00033	0.00012	4.37	0.00008	57426
8	67.84	-0.02781	-0.04400	-0.01798	5.74	-0.00748	-767
8	87.63	0.00072	0.00060	0.00029	7.41	0.00013	55072
8	87.88	0.00069	0.00060	0.00029	7.43	0.00013	56494
8	90.35	0.00069	0.00061	0.00029	7.64	0.00013	57761
8	87.91	0.00069	0.00060	0.00029	7.44	0.00013	56359
8	90.46	0.00069	0.00061	0.00029	7.65	0.00013	57829
8	126.62	0.00093	0.00084	0.00052	10.71	0.00019	56120
8	129.16	0.00097	0.00084	0.00052	10.92	0.00019	56280
8	126.71	0.00097	0.00084	0.00052	10.72	0.00019	55207
8	126.50	0.00096	0.00088	0.00052	10.70	0.00020	54267
8	126.72	0.00097	0.00084	0.00052	10.72	0.00019	55223
8	175.59	0.00129	0.00118	0.00083	14.85	0.00028	53927
8	175.60	0.00133	0.00122	0.00079	14.85	0.00028	53352
8	175.56	0.00136	0.00122	0.00083	14.85	0.00028	52147
8	178.08	0.00132	0.00118	0.00083	15.06	0.00028	54198
8	178.00	0.00132	0.00122	0.00083	15.05	0.00028	53528
6	53.60	0.00046	0.00039	0.00013	4.53	0.00008	55182
6	51.04	0.00042	0.00040	0.00013	4.32	0.00008	54688
6	53.36	0.00046	0.00039	0.00013	4.51	0.00008	55356
6	53.66	0.00046	0.00040	0.00013	4.54	0.00008	55179
6	53.43	0.00046	0.00039	0.00013	4.52	0.00008	55235
6	87.56	0.00075	0.00061	0.00030	7.41	0.00014	53451
6	87.68	0.00075	0.00061	0.00030	7.42	0.00014	53429
6	87.69	0.00075	0.00061	0.00030	7.42	0.00014	53459
6	90.12	0.00075	0.00066	0.00034	7.62	0.00015	52271
6	87.77	0.00075	0.00061	0.00030	7.42	0.00014	53558
6	129.35	0.00103	0.00087	0.00061	10.94	0.00021	52307
6	126.84	0.00103	0.00087	0.00060	10.73	0.00021	51357
6	126.88	0.00103	0.00087	0.00061	10.73	0.00021	51360
6	126.89	0.00103	0.00092	0.00060	10.73	0.00021	50564
6	126.72	0.00103	0.00091	0.00061	10.72	0.00021	50451
6	176.09	0.00139	0.00125	0.00083	14.89	0.00029	51552
6	178.22	0.00138	0.00125	0.00088	15.07	0.00029	51584
6	178.96	0.00142	0.00125	0.00087	15.14	0.00030	51260
6	179.95	0.00138	0.00125	0.00088	15.22	0.00029	52074
6	179.91	0.00138	0.00125	0.00083	15.22	0.00029	52692
4	53.78	0.00043	0.00041	0.00015	4.55	0.00008	55095
4	53.64	0.00047	0.00041	0.00015	4.54	0.00009	52757
4	53.69	0.00047	0.00041	0.00015	4.54	0.00009	52678
4	51.24	0.00047	0.00041	0.00015	4.33	0.00009	50499
4	51.31	0.00043	0.00041	0.00015	4.34	0.00008	52362
4	90.41	0.00076	0.00072	0.00034	7.65	0.00015	50484
4	90.54	0.00080	0.00068	0.00034	7.66	0.00015	50696
4	90.55	0.00080	0.00067	0.00033	7.66	0.00015	51002
4	90.54	0.00080	0.00067	0.00033	7.66	0.00015	51098
4	90.47	0.00080	0.00067	0.00033	7.65	0.00015	51243
4	127.11	0.00109	0.00105	0.00067	10.75	0.00023	46071
4	126.81	0.00112	0.00100	0.00067	10.73	0.00023	46038
4	127.00	0.00112	0.00104	0.00067	10.74	0.00024	45462
4	128.25	0.00109	0.00105	0.00067	10.85	0.00023	46372
4	128.65	0.00112	0.00105	0.00067	10.88	0.00024	45926
4	175.76	0.00148	0.00130	0.00093	14.87	0.00031	48120
4	175.72	0.00152	0.00134	0.00093	14.86	0.00032	47058
4	175.88	0.00149	0.00130	0.00093	14.87	0.00031	48118
4	175.75	0.00148	0.00130	0.00093	14.86	0.00031	48113
4	178.39	0.00153	0.00130	0.00093	15.09	0.00031	48283
2	53.89	0.00048	0.00045	0.00018	4.56	0.00009	49434
2	51.45	0.00048	0.00045	0.00018	4.35	0.00009	47191
2	51.35	0.00048	0.00044	0.00018	4.34	0.00009	47291
2	51.28	0.00048	0.00045	0.00018	4.34	0.00009	47124
2	51.69	0.00044	0.00045	0.00018	4.37	0.00009	48905
2	87.88	0.00078	0.00074	0.00038	7.43	0.00016	46954
2	90.23	0.00082	0.00078	0.00038	7.63	0.00017	46242
2	87.95	0.00082	0.00073	0.00038	7.44	0.00016	45967
2	90.44	0.00082	0.00073	0.00038	7.65	0.00016	47309
2	90.49	0.00082	0.00078	0.00038	7.65	0.00017	46330
2	127.18	0.00113	0.00104	0.00061	10.76	0.00023	46485
2	127.17	0.00113	0.00099	0.00061	10.76	0.00023	47336
2	127.28	0.00117	0.00103	0.00065	10.77	0.00024	45172
2	127.15	0.00117	0.00103	0.00061	10.75	0.00023	45893
2	127.05	0.00117	0.00103	0.00065	10.75	0.00024	45185
2	175.93	0.00158	0.00145	0.00098	14.88	0.00034	44406
2	175.71	0.00159	0.00145	0.00098	14.86	0.00033	44369
2	178.05	0.00158	0.00145	0.00098	15.06	0.00033	44958
2	176.15	0.00154	0.00141	0.00098	14.90	0.00033	45409
2	177.23	0.00158	0.00145	0.00098	14.99	0.00034	44728

Table J.88: Resilient modulus data (D_2_11_103)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	51.16	0.00052	0.00051	0.00053	4.33	0.00013	33183
8	51.48	0.00053	0.00052	0.00049	4.35	0.00013	34042
8	51.20	0.00052	0.00051	0.00049	4.33	0.00013	34068
8	51.29	0.00052	0.00052	0.00049	4.34	0.00013	34134
8	51.37	0.00053	0.00052	0.00053	4.34	0.00013	33122
8	90.00	0.00094	0.00093	0.00099	7.61	0.00024	31984
8	89.69	0.00093	0.00092	0.00099	7.59	0.00024	31953
8	90.81	0.00086	0.00093	0.00099	7.68	0.00023	33158
8	89.36	0.00086	0.00092	0.00099	7.56	0.00023	32745
8	93.26	0.00089	0.00092	0.00098	7.89	0.00023	33974
8	124.69	0.00132	0.00134	0.00151	10.55	0.00035	30327
8	126.69	0.00136	0.00134	0.00151	10.71	0.00035	30494
8	124.94	0.00132	0.00134	0.00151	10.57	0.00035	30342
8	124.37	0.00136	0.00134	0.00152	10.52	0.00035	29894
8	129.20	0.00136	0.00134	0.00156	10.93	0.00035	30813
8	175.54	0.00184	0.00187	0.00227	14.85	0.00050	29760
8	175.54	0.00189	0.00188	0.00225	14.85	0.00050	29604
8	175.16	0.00180	0.00187	0.00225	14.81	0.00049	30062
8	175.28	0.00188	0.00187	0.00224	14.82	0.00050	29711
8	175.42	0.00188	0.00187	0.00224	14.84	0.00050	29738
6	48.59	0.00054	0.00058	0.00061	4.11	0.00014	28503
6	48.73	0.00054	0.00058	0.00062	4.12	0.00014	28451
6	51.07	0.00058	0.00058	0.00062	4.32	0.00015	29193
6	51.21	0.00054	0.00058	0.00061	4.33	0.00014	29883
6	51.18	0.00058	0.00058	0.00062	4.33	0.00015	29230
6	88.10	0.00108	0.00104	0.00124	7.45	0.00028	26672
6	90.18	0.00108	0.00103	0.00123	7.63	0.00028	27431
6	87.66	0.00107	0.00103	0.00123	7.41	0.00028	26698
6	87.68	0.00107	0.00103	0.00123	7.42	0.00028	26703
6	87.82	0.00104	0.00103	0.00123	7.43	0.00028	26965
6	124.36	0.00152	0.00152	0.00177	10.52	0.00040	26207
6	126.44	0.00152	0.00152	0.00176	10.69	0.00040	26756
6	126.45	0.00152	0.00151	0.00176	10.69	0.00040	26763
6	126.62	0.00152	0.00152	0.00176	10.71	0.00040	26790
6	126.67	0.00152	0.00148	0.00177	10.71	0.00040	26996
6	175.64	0.00210	0.00207	0.00261	14.85	0.00057	26269
6	175.36	0.00210	0.00207	0.00261	14.83	0.00056	26281
6	175.29	0.00210	0.00207	0.00261	14.83	0.00056	26241
6	175.44	0.00206	0.00211	0.00257	14.84	0.00056	26393
6	177.79	0.00210	0.00211	0.00257	15.04	0.00056	26614
4	50.27	0.00066	0.00071	0.00079	4.25	0.00018	23549
4	55.52	0.00069	0.00071	0.00083	4.70	0.00019	25203
4	49.11	0.00070	0.00071	0.00079	4.15	0.00018	22607
4	51.55	0.00070	0.00072	0.00079	4.36	0.00018	23707
4	51.27	0.00066	0.00071	0.00079	4.34	0.00018	24064
4	88.42	0.00124	0.00122	0.00149	7.48	0.00033	22758
4	87.86	0.00127	0.00125	0.00152	7.43	0.00034	22051
4	87.86	0.00123	0.00125	0.00152	7.43	0.00033	22314
4	87.72	0.00123	0.00125	0.00151	7.42	0.00033	22300
4	90.40	0.00119	0.00125	0.00151	7.65	0.00033	23214
4	129.08	0.00183	0.00177	0.00223	10.92	0.00049	22481
4	126.55	0.00179	0.00177	0.00222	10.70	0.00048	22221
4	124.65	0.00176	0.00173	0.00219	10.54	0.00047	22273
4	126.49	0.00176	0.00173	0.00223	10.70	0.00048	22480
4	126.79	0.00180	0.00177	0.00223	10.72	0.00048	22176
4	173.19	0.00248	0.00240	0.00307	14.65	0.00066	22108
4	173.12	0.00244	0.00240	0.00307	14.64	0.00066	22218
4	175.88	0.00245	0.00240	0.00307	14.87	0.00066	22532
4	175.72	0.00244	0.00240	0.00312	14.86	0.00066	22419
4	175.56	0.00248	0.00240	0.00307	14.85	0.00066	22442
2	51.67	0.00094	0.00080	0.00102	4.37	0.00023	19011
2	48.97	0.00097	0.00080	0.00097	4.14	0.00023	18164
2	51.35	0.00093	0.00080	0.00101	4.34	0.00023	19057
2	51.34	0.00097	0.00079	0.00101	4.34	0.00023	18840
2	49.22	0.00094	0.00080	0.00101	4.16	0.00023	18237
2	88.24	0.00158	0.00143	0.00188	7.46	0.00041	18306
2	88.21	0.00162	0.00143	0.00187	7.46	0.00041	18185
2	88.18	0.00162	0.00147	0.00191	7.46	0.00042	17885
2	87.76	0.00164	0.00147	0.00190	7.42	0.00042	17786
2	91.28	0.00161	0.00146	0.00185	7.72	0.00041	18796
2	127.41	0.00227	0.00207	0.00273	10.78	0.00059	18293
2	127.10	0.00222	0.00215	0.00277	10.75	0.00059	18077
2	124.30	0.00225	0.00210	0.00276	10.51	0.00059	17714
2	124.90	0.00226	0.00210	0.00277	10.56	0.00059	17757
2	128.16	0.00226	0.00211	0.00273	10.84	0.00059	18325
2	175.76	0.00307	0.00285	0.00381	14.87	0.00081	18322
2	175.72	0.00306	0.00284	0.00380	14.86	0.00081	18388
2	175.65	0.00301	0.00283	0.00378	14.86	0.00080	18517
2	177.95	0.00308	0.00287	0.00377	15.05	0.00081	18599
2	175.88	0.00305	0.00286	0.00376	14.87	0.00081	18458

Table J.89: Resilient modulus data (D_1_18_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	53.19	0.00058	0.00076	0.00043	4.22	0.00015	28677
8	50.99	0.00062	0.00080	0.00043	4.05	0.00015	26289
8	50.87	0.00058	0.00080	0.00047	4.04	0.00015	26199
8	53.09	0.00066	0.00079	0.00042	4.21	0.00016	26956
8	50.47	0.00062	0.00079	0.00043	4.01	0.00015	26262
8	87.87	0.00117	0.00136	0.00093	6.97	0.00029	24140
8	87.81	0.00117	0.00136	0.00093	6.97	0.00029	24159
8	89.52	0.00112	0.00138	0.00092	7.11	0.00028	24935
8	87.31	0.00120	0.00138	0.00092	6.93	0.00029	23748
8	103.68	-0.03656	-0.03805	-0.00863	8.23	-0.00694	-1186
8	124.28	0.00182	0.00205	0.00149	9.86	0.00045	22099
8	126.25	0.00185	0.00204	0.00153	10.02	0.00045	22208
8	124.84	0.00185	0.00204	0.00153	9.91	0.00045	21953
8	128.51	0.00181	0.00208	0.00157	10.20	0.00045	22430
8	126.40	0.00184	0.00207	0.00153	10.03	0.00045	22115
8	175.49	0.00291	0.00310	0.00256	13.93	0.00071	19510
8	173.02	0.00294	0.00310	0.00256	13.73	0.00072	19160
8	173.15	0.00290	0.00309	0.00256	13.74	0.00071	19278
8	172.89	0.00289	0.00309	0.00251	13.72	0.00071	19384
8	175.45	0.00293	0.00312	0.00256	13.93	0.00072	19410
6	50.79	0.00063	0.00077	0.00043	4.03	0.00015	26407
6	50.70	0.00059	0.00081	0.00044	4.02	0.00015	26266
6	51.09	0.00063	0.00082	0.00039	4.06	0.00015	26423
6	51.88	0.00063	0.00082	0.00043	4.12	0.00016	26267
6	53.93	0.00063	0.00082	0.00044	4.28	0.00016	27196
6	88.30	0.00122	0.00139	0.00090	7.01	0.00029	23988
6	88.10	0.00118	0.00139	0.00090	6.99	0.00029	24225
6	88.25	0.00118	0.00139	0.00090	7.00	0.00029	24249
6	88.17	0.00117	0.00143	0.00090	7.00	0.00029	24019
6	88.08	0.00114	0.00143	0.00090	6.99	0.00029	24244
6	126.80	0.00183	0.00213	0.00151	10.06	0.00046	22096
6	124.54	0.00179	0.00209	0.00147	9.89	0.00045	22197
6	126.91	0.00187	0.00213	0.00151	10.07	0.00046	21953
6	127.20	0.00188	0.00213	0.00151	10.10	0.00046	21972
6	124.48	0.00183	0.00212	0.00151	9.88	0.00045	21721
6	173.13	0.00298	0.00318	0.00253	13.74	0.00072	18965
6	170.67	0.00294	0.00318	0.00248	13.55	0.00072	18882
6	173.20	0.00299	0.00319	0.00253	13.75	0.00073	18953
6	173.34	0.00295	0.00319	0.00253	13.76	0.00072	19067
6	173.21	0.00294	0.00318	0.00253	13.75	0.00072	19067
4	51.72	0.00062	0.00086	0.00039	4.11	0.00016	26286
4	51.39	0.00062	0.00085	0.00039	4.08	0.00015	26339
4	49.25	0.00062	0.00086	0.00039	3.91	0.00016	25097
4	51.64	0.00062	0.00086	0.00039	4.10	0.00016	26366
4	51.75	0.00066	0.00082	0.00039	4.11	0.00016	26398
4	87.86	0.00119	0.00152	0.00082	6.97	0.00029	23770
4	87.99	0.00115	0.00152	0.00082	6.98	0.00029	24006
4	87.92	0.00123	0.00156	0.00086	6.98	0.00030	22906
4	88.02	0.00119	0.00152	0.00082	6.99	0.00030	23680
4	88.04	0.00115	0.00152	0.00082	6.99	0.00029	23987
4	126.99	0.00189	0.00223	0.00149	10.08	0.00047	21567
4	124.06	0.00184	0.00218	0.00148	9.85	0.00046	21464
4	124.56	0.00181	0.00218	0.00149	9.89	0.00046	21620
4	124.32	0.00185	0.00222	0.00149	9.87	0.00046	21303
4	124.50	0.00189	0.00223	0.00145	9.88	0.00046	21321
4	175.75	0.00303	0.00330	0.00251	13.95	0.00074	18937
4	173.09	0.00299	0.00330	0.00246	13.74	0.00073	18842
4	173.25	0.00303	0.00330	0.00250	13.75	0.00074	18672
4	173.20	0.00303	0.00334	0.00250	13.75	0.00074	18584
4	170.78	0.00307	0.00334	0.00250	13.56	0.00074	18261
2	49.01	0.00071	0.00097	0.00028	3.89	0.00016	23881
2	49.07	0.00067	0.00096	0.00028	3.90	0.00016	24431
2	49.41	0.00067	0.00097	0.00028	3.92	0.00016	24464
2	51.26	0.00063	0.00096	0.00028	4.07	0.00016	26201
2	51.40	0.00070	0.00096	0.00032	4.08	0.00017	24625
2	88.12	0.00123	0.00172	0.00068	6.99	0.00030	23113
2	85.98	0.00128	0.00173	0.00068	6.82	0.00031	22218
2	87.91	0.00126	0.00176	0.00068	6.98	0.00031	22622
2	85.37	0.00126	0.00171	0.00068	6.78	0.00030	22225
2	88.03	0.00127	0.00176	0.00068	6.99	0.00031	22578
2	127.18	0.00191	0.00257	0.00126	10.09	0.00048	21116
2	124.53	0.00190	0.00257	0.00122	9.88	0.00047	20852
2	127.06	0.00194	0.00257	0.00126	10.08	0.00048	20970
2	124.60	0.00198	0.00253	0.00126	9.89	0.00048	20569
2	124.77	0.00198	0.00253	0.00126	9.90	0.00048	20613
2	173.20	0.00311	0.00368	0.00231	13.75	0.00076	18133
2	170.70	0.00311	0.00369	0.00230	13.55	0.00076	17883
2	173.25	0.00311	0.00373	0.00230	13.75	0.00076	18067
2	173.19	0.00314	0.00373	0.00230	13.75	0.00076	17981
2	170.92	0.00319	0.00370	0.00230	13.57	0.00077	17730

Table J.90: Resilient modulus data (D_2_18_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.77	0.00073	0.00067	0.00085	4.29	0.00019	22866
8	50.93	0.00069	0.00067	0.00085	4.31	0.00018	23379
8	53.00	0.00068	0.00067	0.00085	4.48	0.00018	24511
8	50.99	0.00073	0.00067	0.00085	4.31	0.00019	23018
8	50.95	0.00073	0.00067	0.00085	4.31	0.00019	23020
8	88.10	0.00137	0.00127	0.00168	7.45	0.00036	20718
8	87.86	0.00136	0.00126	0.00167	7.43	0.00036	20788
8	87.99	0.00136	0.00126	0.00167	7.44	0.00036	20862
8	85.13	0.00135	0.00125	0.00166	7.20	0.00035	20329
8	87.96	0.00135	0.00129	0.00166	7.44	0.00036	20744
8	126.80	0.00218	0.00204	0.00263	10.72	0.00057	18779
8	126.12	0.00220	0.00203	0.00266	10.67	0.00057	18569
8	124.75	0.00217	0.00199	0.00267	10.55	0.00057	18557
8	125.43	0.00216	0.00198	0.00266	10.61	0.00057	18718
8	125.86	0.00216	0.00202	0.00261	10.65	0.00057	18805
8	170.12	0.00336	0.00330	0.00416	14.39	0.00090	15960
8	170.32	0.00340	0.00329	0.00416	14.41	0.00090	15934
8	172.69	0.00339	0.00329	0.00415	14.61	0.00090	16188
8	172.81	0.00338	0.00332	0.00414	14.62	0.00090	16167
8	172.87	0.00342	0.00332	0.00418	14.62	0.00091	16070
6	49.04	0.00075	0.00067	0.00089	4.15	0.00019	21589
6	48.91	0.00074	0.00066	0.00090	4.14	0.00019	21536
6	51.04	0.00070	0.00066	0.00089	4.32	0.00019	22972
6	51.01	0.00070	0.00066	0.00084	4.31	0.00018	23507
6	51.24	0.00071	0.00067	0.00089	4.33	0.00019	22959
6	87.39	0.00138	0.00130	0.00168	7.39	0.00036	20332
6	87.94	0.00143	0.00130	0.00169	7.44	0.00037	20161
6	87.49	0.00138	0.00130	0.00168	7.40	0.00036	20357
6	87.72	0.00138	0.00130	0.00173	7.42	0.00037	20174
6	87.50	0.00142	0.00130	0.00168	7.40	0.00037	20172
6	124.24	0.00221	0.00206	0.00272	10.51	0.00058	18060
6	126.70	0.00224	0.00210	0.00276	10.72	0.00059	18108
6	124.48	0.00224	0.00206	0.00272	10.53	0.00058	17999
6	124.61	0.00221	0.00206	0.00276	10.54	0.00059	17988
6	121.86	0.00224	0.00205	0.00275	10.31	0.00059	17551
6	172.09	0.00353	0.00342	0.00443	14.55	0.00095	15340
6	172.37	0.00356	0.00341	0.00442	14.58	0.00095	15361
6	170.44	0.00352	0.00337	0.00442	14.42	0.00094	15296
6	172.96	0.00356	0.00337	0.00442	14.63	0.00095	15478
6	172.88	0.00356	0.00341	0.00441	14.62	0.00095	15425
4	51.53	0.00074	0.00068	0.00089	4.36	0.00019	22661
4	48.96	0.00078	0.00073	0.00093	4.14	0.00020	20408
4	51.33	0.00078	0.00073	0.00093	4.34	0.00020	21436
4	48.88	0.00074	0.00068	0.00089	4.13	0.00019	21502
4	48.88	0.00074	0.00068	0.00093	4.13	0.00020	21148
4	87.93	0.00146	0.00135	0.00183	7.44	0.00039	19217
4	87.66	0.00146	0.00135	0.00183	7.41	0.00039	19201
4	85.01	0.00142	0.00135	0.00178	7.19	0.00038	18998
4	85.34	0.00146	0.00135	0.00178	7.22	0.00038	18872
4	85.37	0.00146	0.00135	0.00183	7.22	0.00039	18692
4	121.93	0.00230	0.00214	0.00289	10.31	0.00061	16890
4	124.71	0.00230	0.00214	0.00290	10.55	0.00061	17244
4	124.10	0.00233	0.00217	0.00289	10.50	0.00062	17039
4	122.05	0.00230	0.00218	0.00290	10.32	0.00061	16807
4	124.44	0.00230	0.00218	0.00290	10.52	0.00061	17126
4	171.14	0.00373	0.00354	0.00475	14.47	0.00100	14453
4	175.07	0.00370	0.00354	0.00475	14.81	0.00100	14823
4	172.63	0.00369	0.00358	0.00474	14.60	0.00100	14584
4	170.59	0.00369	0.00358	0.00475	14.43	0.00100	14399
4	170.68	0.00373	0.00354	0.00474	14.44	0.00100	14420
2	49.12	0.00079	0.00072	0.00096	4.15	0.00021	20201
2	51.58	0.00079	0.00072	0.00096	4.36	0.00021	21158
2	49.07	0.00079	0.00072	0.00096	4.15	0.00021	20147
2	48.96	0.00079	0.00072	0.00096	4.14	0.00021	20122
2	48.74	0.00079	0.00071	0.00096	4.12	0.00020	20144
2	87.55	0.00156	0.00138	0.00193	7.40	0.00041	18233
2	85.36	0.00157	0.00139	0.00198	7.22	0.00041	17536
2	88.05	0.00157	0.00144	0.00199	7.45	0.00042	17876
2	87.50	0.00152	0.00143	0.00198	7.40	0.00041	18040
2	85.48	0.00157	0.00139	0.00194	7.23	0.00041	17717
2	122.11	0.00251	0.00234	0.00320	10.33	0.00067	15392
2	122.04	0.00251	0.00233	0.00320	10.32	0.00067	15400
2	124.55	0.00247	0.00233	0.00320	10.53	0.00067	15783
2	124.36	0.00247	0.00233	0.00320	10.52	0.00067	15775
2	124.46	0.00247	0.00233	0.00320	10.53	0.00067	15791
2	170.75	0.00396	0.00378	0.00518	14.44	0.00108	13409
2	173.22	0.00392	0.00378	0.00518	14.65	0.00107	13648
2	173.35	0.00396	0.00379	0.00518	14.66	0.00108	13608
2	170.75	0.00395	0.00378	0.00518	14.44	0.00108	13427
2	170.82	0.00395	0.00378	0.00518	14.45	0.00108	13430

Table J.91: Resilient modulus data (D_1_14_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	48.34	0.00069	0.00041	0.00042	4.09	0.00013	32183
8	48.36	0.00069	0.00041	0.00042	4.09	0.00013	32422
8	49.32	0.00069	0.00041	0.00042	4.17	0.00013	33117
8	54.23	0.00069	0.00041	0.00042	4.59	0.00013	36392
8	48.58	0.00069	0.00041	0.00042	4.11	0.00013	32646
8	89.63	0.00126	0.00080	0.00079	7.58	0.00024	31982
8	87.33	0.00126	0.00084	0.00079	7.39	0.00024	30790
8	87.50	0.00126	0.00079	0.00083	7.40	0.00024	30812
8	87.24	0.00126	0.00084	0.00078	7.38	0.00024	30767
8	87.50	0.00126	0.00079	0.00083	7.40	0.00024	30876
8	121.39	0.00188	0.00127	0.00122	10.27	0.00036	28180
8	121.34	0.00188	0.00127	0.00122	10.26	0.00036	28177
8	121.35	0.00187	0.00123	0.00122	10.26	0.00036	28487
8	121.37	0.00187	0.00127	0.00122	10.26	0.00036	28239
8	121.31	0.00187	0.00127	0.00121	10.26	0.00036	28290
8	167.78	0.00274	0.00200	0.00189	14.19	0.00055	25724
8	170.22	0.00273	0.00199	0.00188	14.40	0.00055	26126
8	172.66	0.00273	0.00199	0.00193	14.60	0.00055	26346
8	172.69	0.00273	0.00203	0.00188	14.61	0.00055	26386
8	172.67	0.00276	0.00199	0.00192	14.60	0.00056	26275
6	48.54	0.00076	0.00041	0.00043	4.11	0.00013	30857
6	48.67	0.00072	0.00041	0.00043	4.12	0.00013	31604
6	48.61	0.00072	0.00041	0.00043	4.11	0.00013	31563
6	48.39	0.00072	0.00041	0.00043	4.09	0.00013	31456
6	50.79	0.00076	0.00037	0.00043	4.30	0.00013	33021
6	85.01	0.00135	0.00081	0.00079	7.19	0.00025	29278
6	85.11	0.00139	0.00076	0.00079	7.20	0.00024	29408
6	85.03	0.00139	0.00076	0.00079	7.19	0.00025	29323
6	87.23	0.00138	0.00076	0.00079	7.38	0.00024	30178
6	88.15	0.00138	0.00076	0.00079	7.46	0.00024	30543
6	121.57	0.00205	0.00126	0.00120	10.28	0.00038	27309
6	121.46	0.00205	0.00126	0.00120	10.27	0.00038	27284
6	124.06	0.00205	0.00126	0.00120	10.49	0.00038	27885
6	124.08	0.00205	0.00127	0.00120	10.49	0.00038	27849
6	124.10	0.00204	0.00126	0.00120	10.50	0.00038	27940
6	170.51	0.00301	0.00199	0.00195	14.42	0.00058	24907
6	172.75	0.00301	0.00190	0.00199	14.61	0.00057	25432
6	172.91	0.00300	0.00195	0.00194	14.62	0.00057	25456
6	172.90	0.00301	0.00199	0.00199	14.62	0.00058	25130
6	170.31	0.00300	0.00195	0.00194	14.40	0.00057	25079
4	49.61	0.00082	0.00037	0.00046	4.20	0.00014	30677
4	48.55	0.00082	0.00037	0.00046	4.11	0.00014	29967
4	48.52	0.00079	0.00037	0.00045	4.10	0.00013	30584
4	48.67	0.00083	0.00037	0.00046	4.12	0.00014	29805
4	48.60	0.00079	0.00037	0.00046	4.11	0.00014	30431
4	84.94	0.00153	0.00074	0.00081	7.18	0.00026	28070
4	85.01	0.00153	0.00074	0.00081	7.19	0.00026	28082
4	84.99	0.00153	0.00074	0.00081	7.19	0.00026	28072
4	84.98	0.00153	0.00074	0.00081	7.19	0.00026	28067
4	84.92	0.00153	0.00074	0.00080	7.18	0.00026	28097
4	123.75	0.00230	0.00121	0.00123	10.47	0.00040	26480
4	124.40	0.00230	0.00121	0.00128	10.52	0.00040	26385
4	125.44	0.00234	0.00125	0.00124	10.61	0.00040	26347
4	128.42	0.00231	0.00121	0.00123	10.86	0.00040	27422
4	124.28	0.00231	0.00121	0.00124	10.51	0.00040	26479
4	170.32	0.00334	0.00196	0.00205	14.41	0.00061	23515
4	170.33	0.00335	0.00196	0.00201	14.41	0.00061	23638
4	171.30	0.00335	0.00200	0.00205	14.49	0.00062	23497
4	170.96	0.00335	0.00200	0.00201	14.46	0.00061	23579
4	170.73	0.00335	0.00196	0.00201	14.44	0.00061	23684
2	48.58	0.00088	0.00028	0.00052	4.11	0.00014	29335
2	49.17	0.00089	0.00033	0.00052	4.16	0.00014	28857
2	49.86	0.00092	0.00028	0.00052	4.22	0.00014	29406
2	53.34	0.00088	0.00028	0.00052	4.51	0.00014	32135
2	46.30	0.00089	0.00033	0.00052	3.92	0.00014	27198
2	87.82	0.00173	0.00062	0.00094	7.43	0.00027	27168
2	88.63	0.00176	0.00061	0.00093	7.50	0.00028	27217
2	87.90	0.00172	0.00065	0.00093	7.43	0.00028	27002
2	86.29	0.00171	0.00065	0.00093	7.30	0.00027	26560
2	85.35	0.00175	0.00065	0.00093	7.22	0.00028	26023
2	121.72	0.00259	0.00108	0.00134	10.29	0.00042	24694
2	121.81	0.00259	0.00108	0.00134	10.30	0.00042	24683
2	124.15	0.00263	0.00112	0.00134	10.50	0.00042	24765
2	122.66	0.00259	0.00108	0.00134	10.37	0.00042	24839
2	123.80	0.00263	0.00108	0.00138	10.47	0.00042	24703
2	168.09	0.00380	0.00190	0.00216	14.22	0.00066	21697
2	170.45	0.00384	0.00191	0.00216	14.42	0.00066	21891
2	170.45	0.00384	0.00190	0.00212	14.42	0.00065	22019
2	170.41	0.00383	0.00190	0.00216	14.41	0.00066	21896
2	172.91	0.00383	0.00195	0.00216	14.62	0.00066	22101

Table J.92: Resilient modulus data (D_2_14_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	52.98	0.00049	0.00042	0.00065	4.48	0.00013	34373
8	50.69	0.00049	0.00042	0.00065	4.29	0.00013	32849
8	50.76	0.00049	0.00046	0.00065	4.29	0.00013	32054
8	50.67	0.00049	0.00042	0.00065	4.29	0.00013	32943
8	53.06	0.00052	0.00042	0.00065	4.49	0.00013	33843
8	87.35	0.00105	0.00079	0.00113	7.39	0.00025	29819
8	87.45	0.00102	0.00082	0.00109	7.40	0.00024	30302
8	87.34	0.00102	0.00081	0.00109	7.39	0.00024	30339
8	85.13	0.00106	0.00080	0.00109	7.20	0.00025	29236
8	87.30	0.00102	0.00083	0.00109	7.38	0.00025	30057
8	123.74	0.00162	0.00123	0.00164	10.47	0.00038	27889
8	123.90	0.00162	0.00123	0.00164	10.48	0.00038	27933
8	124.01	0.00158	0.00123	0.00164	10.49	0.00037	28206
8	123.85	0.00162	0.00123	0.00164	10.47	0.00037	27984
8	126.25	0.00162	0.00127	0.00164	10.68	0.00038	28253
8	172.77	0.00251	0.00186	0.00244	14.61	0.00057	25755
8	172.76	0.00251	0.00190	0.00244	14.61	0.00057	25597
8	172.55	0.00250	0.00190	0.00243	14.59	0.00057	25641
8	174.99	0.00254	0.00190	0.00247	14.80	0.00058	25706
8	175.15	0.00254	0.00190	0.00243	14.81	0.00057	25904
6	50.92	0.00050	0.00044	0.00070	4.31	0.00014	31497
6	48.43	0.00054	0.00044	0.00070	4.10	0.00014	29337
6	50.86	0.00050	0.00044	0.00070	4.30	0.00014	31523
6	51.00	0.00050	0.00044	0.00070	4.31	0.00014	31488
6	49.45	0.00050	0.00044	0.00070	4.18	0.00014	30734
6	87.58	0.00101	0.00083	0.00117	7.41	0.00025	29467
6	87.53	0.00101	0.00087	0.00117	7.40	0.00025	29088
6	87.16	0.00105	0.00087	0.00117	7.37	0.00026	28629
6	90.14	0.00101	0.00087	0.00117	7.62	0.00025	29933
6	86.26	0.00105	0.00088	0.00117	7.30	0.00026	28270
6	125.49	0.00166	0.00133	0.00173	10.61	0.00039	27007
6	127.79	0.00170	0.00133	0.00173	10.81	0.00040	27261
6	124.09	0.00169	0.00133	0.00169	10.49	0.00039	26745
6	121.49	0.00166	0.00129	0.00169	10.28	0.00039	26626
6	124.19	0.00170	0.00133	0.00173	10.50	0.00040	26518
6	172.81	0.00268	0.00202	0.00256	14.62	0.00061	24158
6	172.90	0.00265	0.00203	0.00256	14.62	0.00060	24271
6	172.66	0.00264	0.00202	0.00251	14.60	0.00060	24425
6	175.02	0.00260	0.00202	0.00255	14.80	0.00060	24765
6	175.19	0.00264	0.00202	0.00255	14.82	0.00060	24638
4	50.95	0.00050	0.00052	0.00072	4.31	0.00015	29692
4	51.23	0.00051	0.00048	0.00073	4.33	0.00014	30326
4	51.06	0.00054	0.00052	0.00073	4.32	0.00015	29029
4	48.63	0.00054	0.00048	0.00073	4.11	0.00015	28243
4	48.52	0.00051	0.00052	0.00073	4.10	0.00015	28052
4	87.72	0.00108	0.00096	0.00126	7.42	0.00027	27035
4	87.59	0.00108	0.00096	0.00122	7.41	0.00027	27357
4	87.48	0.00111	0.00095	0.00122	7.40	0.00027	27029
4	87.42	0.00108	0.00095	0.00126	7.39	0.00027	26939
4	85.19	0.00108	0.00096	0.00126	7.21	0.00028	26196
4	124.28	0.00182	0.00149	0.00179	10.51	0.00042	24743
4	124.27	0.00178	0.00149	0.00179	10.51	0.00042	24903
4	121.90	0.00182	0.00149	0.00179	10.31	0.00043	24220
4	122.02	0.00179	0.00150	0.00179	10.32	0.00042	24390
4	124.41	0.00179	0.00150	0.00184	10.52	0.00043	24658
4	172.88	0.00278	0.00219	0.00264	14.62	0.00063	23054
4	173.38	0.00282	0.00219	0.00264	14.66	0.00064	22988
4	171.79	0.00282	0.00225	0.00266	14.53	0.00064	22539
4	177.51	0.00283	0.00224	0.00262	15.01	0.00064	23434
4	172.92	0.00279	0.00219	0.00263	14.63	0.00063	23053
2	48.53	0.00056	0.00062	0.00071	4.10	0.00016	25956
2	50.91	0.00056	0.00062	0.00071	4.31	0.00016	27224
2	48.53	0.00060	0.00063	0.00071	4.10	0.00016	25436
2	51.05	0.00056	0.00063	0.00071	4.32	0.00016	27318
2	48.73	0.00060	0.00058	0.00072	4.12	0.00016	26021
2	88.19	0.00116	0.00113	0.00129	7.46	0.00030	25030
2	87.92	0.00116	0.00113	0.00129	7.44	0.00030	24977
2	85.68	0.00116	0.00113	0.00129	7.25	0.00030	24284
2	88.01	0.00116	0.00113	0.00129	7.44	0.00030	24963
2	85.63	0.00116	0.00113	0.00129	7.24	0.00030	24264
2	124.41	0.00189	0.00175	0.00194	10.52	0.00046	22649
2	124.28	0.00185	0.00175	0.00190	10.51	0.00046	22946
2	124.12	0.00185	0.00175	0.00194	10.50	0.00046	22750
2	124.33	0.00185	0.00176	0.00190	10.52	0.00046	22917
2	124.33	0.00189	0.00172	0.00194	10.52	0.00046	22748
2	175.33	0.00295	0.00260	0.00282	14.83	0.00070	21268
2	173.03	0.00296	0.00256	0.00286	14.63	0.00070	20971
2	170.51	0.00292	0.00260	0.00286	14.42	0.00070	20646
2	170.59	0.00292	0.00256	0.00282	14.43	0.00069	20869
2	173.02	0.00296	0.00256	0.00282	14.63	0.00069	21062

Table J.93: Resilient modulus data (D_1_11_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.33	0.00022	0.00043	0.00064	4.26	0.00011	39645
8	50.20	0.00023	0.00043	0.00064	4.25	0.00011	39463
8	50.81	0.00023	0.00043	0.00064	4.30	0.00011	39844
8	51.18	0.00022	0.00043	0.00064	4.33	0.00011	40305
8	50.58	0.00026	0.00043	0.00064	4.28	0.00011	38616
8	90.62	0.00043	0.00091	0.00119	7.66	0.00021	36354
8	91.63	0.00043	0.00086	0.00119	7.75	0.00021	37561
8	89.45	0.00039	0.00090	0.00119	7.57	0.00021	36701
8	87.08	0.00043	0.00086	0.00118	7.36	0.00021	35856
8	86.93	0.00043	0.00090	0.00118	7.35	0.00021	35260
8	123.21	0.00067	0.00134	0.00165	10.42	0.00031	34160
8	123.26	0.00063	0.00134	0.00165	10.43	0.00030	34590
8	125.80	0.00063	0.00133	0.00165	10.64	0.00030	35336
8	125.87	0.00067	0.00133	0.00169	10.65	0.00031	34629
8	125.98	0.00067	0.00133	0.00165	10.65	0.00030	35037
8	175.58	0.00100	0.00198	0.00221	14.85	0.00043	34320
8	175.60	0.00103	0.00198	0.00221	14.85	0.00044	34134
8	173.34	0.00103	0.00197	0.00217	14.66	0.00043	34000
8	173.25	0.00103	0.00197	0.00221	14.65	0.00043	33778
8	175.62	0.00103	0.00196	0.00220	14.85	0.00043	34301
6	50.20	0.00025	0.00053	0.00078	4.25	0.00013	32729
6	47.67	0.00024	0.00048	0.00077	4.03	0.00013	32237
6	50.30	0.00025	0.00053	0.00074	4.25	0.00013	33723
6	50.36	0.00025	0.00049	0.00074	4.26	0.00012	34632
6	55.14	0.00025	0.00053	0.00078	4.66	0.00013	35922
6	86.67	0.00042	0.00103	0.00135	7.33	0.00023	31481
6	86.67	0.00042	0.00098	0.00135	7.33	0.00023	31931
6	86.83	0.00042	0.00103	0.00136	7.34	0.00023	31400
6	89.01	0.00046	0.00099	0.00136	7.53	0.00023	32239
6	86.72	0.00046	0.00099	0.00136	7.33	0.00023	31376
6	125.82	0.00069	0.00153	0.00190	10.64	0.00034	31064
6	125.73	0.00069	0.00149	0.00190	10.63	0.00034	31333
6	126.49	0.00069	0.00153	0.00190	10.70	0.00034	31194
6	125.23	0.00069	0.00153	0.00190	10.59	0.00034	30872
6	129.29	0.00069	0.00149	0.00190	10.93	0.00034	32182
6	173.51	0.00105	0.00218	0.00255	14.67	0.00048	30491
6	176.06	0.00105	0.00218	0.00255	14.89	0.00048	30918
6	175.84	0.00105	0.00217	0.00255	14.87	0.00048	30954
6	173.60	0.00104	0.00218	0.00255	14.68	0.00048	30541
6	173.60	0.00105	0.00217	0.00255	14.68	0.00048	30547
4	50.68	0.00028	0.00055	0.00094	4.29	0.00015	29052
4	50.63	0.00032	0.00059	0.00093	4.28	0.00015	27762
4	53.26	0.00028	0.00055	0.00089	4.50	0.00014	31262
4	50.63	0.00028	0.00059	0.00089	4.28	0.00015	29044
4	50.64	0.00032	0.00055	0.00093	4.28	0.00015	28451
4	87.01	0.00050	0.00113	0.00165	7.36	0.00027	26932
4	89.49	0.00051	0.00113	0.00165	7.57	0.00027	27717
4	86.97	0.00051	0.00113	0.00164	7.36	0.00027	26914
4	86.99	0.00054	0.00113	0.00165	7.36	0.00028	26635
4	86.98	0.00051	0.00113	0.00164	7.36	0.00027	26925
4	127.40	0.00073	0.00169	0.00229	10.77	0.00039	27433
4	125.19	0.00073	0.00169	0.00230	10.59	0.00039	26937
4	127.34	0.00077	0.00169	0.00229	10.77	0.00040	27209
4	125.06	0.00077	0.00169	0.00229	10.58	0.00040	26747
4	125.26	0.00077	0.00169	0.00229	10.59	0.00040	26762
4	176.26	0.00111	0.00250	0.00307	14.91	0.00056	26789
4	173.88	0.00119	0.00245	0.00307	14.71	0.00056	26296
4	173.87	0.00115	0.00249	0.00307	14.71	0.00056	26274
4	173.82	0.00115	0.00245	0.00307	14.70	0.00056	26433
4	176.00	0.00115	0.00250	0.00307	14.89	0.00056	26619
2	49.15	0.00030	0.00036	0.00135	4.16	0.00017	24886
2	45.31	0.00030	0.00032	0.00135	3.83	0.00016	23412
2	50.48	0.00029	0.00033	0.00134	4.27	0.00016	26201
2	46.24	0.00030	0.00035	0.00132	3.91	0.00016	23856
2	48.63	0.00030	0.00034	0.00137	4.11	0.00017	24515
2	87.67	0.00062	0.00100	0.00234	7.42	0.00033	22512
2	85.33	0.00066	0.00099	0.00231	7.22	0.00033	21882
2	87.64	0.00061	0.00100	0.00230	7.41	0.00033	22748
2	87.77	0.00062	0.00100	0.00234	7.42	0.00033	22532
2	87.66	0.00062	0.00101	0.00228	7.41	0.00033	22774
2	120.92	0.00095	0.00169	0.00315	10.23	0.00048	21197
2	123.41	0.00091	0.00165	0.00311	10.44	0.00047	22097
2	123.48	0.00099	0.00174	0.00314	10.44	0.00049	21358
2	123.40	0.00095	0.00170	0.00309	10.44	0.00048	21816
2	123.40	0.00099	0.00170	0.00309	10.44	0.00048	21679
2	172.16	0.00141	0.00267	0.00423	14.56	0.00069	21029
2	172.06	0.00141	0.00263	0.00419	14.55	0.00069	21227
2	172.10	0.00137	0.00268	0.00423	14.56	0.00069	21108
2	174.65	0.00141	0.00267	0.00423	14.77	0.00069	21322
2	174.48	0.00140	0.00267	0.00421	14.76	0.00069	21354

Table J.94: Resilient modulus data (D_2_11_98)

σ_3 [psi]	q [lb]	$\delta_{LVDT\#1}$ [in.]	$\delta_{LVDT\#2}$ [in.]	$\delta_{LVDT\#3}$ [in.]	σ_{DEV} [psi]	ε [-]	M_R [psi]
8	50.22	-0.00045	0.00048	0.00024	4.25	0.00002	188919
8	50.28	-0.00042	0.00048	0.00024	4.25	0.00003	169689
8	50.08	0.00046	0.00052	0.00023	4.24	0.00010	41790
8	50.07	-0.00073	0.00047	0.00023	4.23	0.00000	-2213795
8	50.00	-0.00086	0.00047	0.00023	4.23	-0.00001	-334195
8	87.02	-0.00052	0.00055	0.00028	7.36	0.00003	290533
8	86.96	-0.00043	0.00054	0.00028	7.35	0.00003	223408
8	86.87	-0.00045	0.00054	0.00028	7.35	0.00003	237885
8	86.80	-0.00043	0.00055	0.00028	7.34	0.00003	223251
8	87.10	-0.00041	0.00054	0.00028	7.37	0.00003	214263
8	122.90	-0.00015	0.00058	0.00027	10.39	0.00006	179098
8	125.95	-0.00028	0.00058	0.00027	10.65	0.00005	224947
8	126.90	-0.00019	0.00058	0.00028	10.73	0.00006	192955
8	127.17	-0.00017	0.00057	0.00027	10.76	0.00006	191351
8	125.46	0.00047	0.00058	0.00027	10.61	0.00011	96005
8	174.41	-0.00046	0.00062	0.00024	14.75	0.00003	438181
8	171.98	0.00054	0.00062	0.00024	14.55	0.00012	124528
8	172.02	-0.00073	0.00062	0.00024	14.55	0.00001	1368672
8	172.19	-0.00040	0.00062	0.00024	14.56	0.00004	381621
8	174.36	-0.00060	0.00062	0.00024	14.75	0.00002	684305
6	50.45	-0.00057	0.00086	0.00047	4.27	0.00006	67464
6	50.12	0.00049	0.00086	0.00051	4.24	0.00015	27423
6	49.93	-0.00032	0.00090	0.00047	4.22	0.00009	48375
6	50.41	0.00065	0.00086	0.00047	4.26	0.00016	25954
6	50.22	0.00049	0.00086	0.00047	4.25	0.00015	28002
6	86.70	-0.00063	0.00093	0.00052	7.33	0.00007	108174
6	86.75	-0.00055	0.00093	0.00051	7.34	0.00007	98454
6	86.31	0.00048	0.00092	0.00051	7.30	0.00016	45748
6	84.11	0.00079	0.00089	0.00051	7.11	0.00018	39076
6	86.47	0.00090	0.00092	0.00051	7.31	0.00019	37542
6	125.51	0.00052	0.00091	0.00057	10.62	0.00017	63880
6	123.27	0.00043	0.00092	0.00058	10.43	0.00016	65297
6	126.58	0.00054	0.00092	0.00058	10.71	0.00017	63276
6	127.93	0.00046	0.00096	0.00057	10.82	0.00017	65058
6	125.10	0.00053	0.00091	0.00058	10.58	0.00017	63082
6	173.02	0.00037	0.00102	0.00054	14.63	0.00016	91044
6	175.15	-0.00047	0.00102	0.00058	14.81	0.00009	156424
6	172.17	-0.00037	0.00102	0.00054	14.56	0.00010	146447
6	172.14	-0.00053	0.00102	0.00054	14.56	0.00009	170099
6	174.45	-0.00048	0.00102	0.00054	14.75	0.00009	163532
4	50.64	-0.00026	0.00124	0.00076	4.28	0.00014	29720
4	50.65	0.00021	0.00123	0.00075	4.28	0.00018	23380
4	50.68	-0.00030	0.00123	0.00075	4.29	0.00014	30566
4	50.32	-0.00032	0.00123	0.00075	4.26	0.00014	30659
4	48.83	-0.00040	0.00123	0.00075	4.13	0.00013	31348
4	86.97	-0.00041	0.00132	0.00081	7.36	0.00014	51570
4	84.72	-0.00052	0.00132	0.00076	7.17	0.00013	55196
4	87.28	-0.00033	0.00132	0.00076	7.38	0.00015	50608
4	87.27	0.00052	0.00132	0.00076	7.38	0.00022	34119
4	86.83	-0.00049	0.00131	0.00076	7.34	0.00013	55417
4	123.72	-0.00034	0.00133	0.00086	10.46	0.00015	68295
4	126.42	0.00071	0.00133	0.00085	10.69	0.00024	44214
4	123.76	0.00073	0.00132	0.00085	10.47	0.00024	43236
4	123.49	0.00025	0.00132	0.00085	10.44	0.00020	51645
4	125.88	0.00038	0.00132	0.00085	10.65	0.00021	50044
4	172.25	0.00038	0.00147	0.00086	14.57	0.00023	64584
4	174.56	-0.00027	0.00146	0.00086	14.76	0.00017	86257
4	172.28	-0.00053	0.00146	0.00086	14.57	0.00015	97782
4	172.19	0.00038	0.00150	0.00086	14.56	0.00023	63645
4	174.63	-0.00061	0.00151	0.00086	14.77	0.00015	100763
2	50.31	0.00028	0.00179	0.00110	4.26	0.00026	16158
2	50.29	-0.00029	0.00174	0.00109	4.25	0.00021	20096
2	48.55	0.00036	0.00174	0.00109	4.11	0.00027	15396
2	52.92	-0.00018	0.00178	0.00110	4.48	0.00022	19925
2	49.00	-0.00063	0.00178	0.00109	4.14	0.00019	22178
2	87.11	-0.00053	0.00186	0.00116	7.37	0.00021	35419
2	87.29	-0.00094	0.00186	0.00116	7.38	0.00017	42633
2	87.04	-0.00077	0.00186	0.00120	7.36	0.00019	38549
2	86.93	-0.00074	0.00186	0.00116	7.35	0.00019	38656
2	87.11	-0.00055	0.00186	0.00116	7.37	0.00021	35830
2	126.75	0.00021	0.00192	0.00126	10.72	0.00028	37987
2	125.69	0.00054	0.00192	0.00126	10.63	0.00031	34340
2	124.63	0.00024	0.00192	0.00126	10.54	0.00028	37001
2	125.76	-0.00023	0.00191	0.00126	10.64	0.00025	43398
2	123.45	-0.00045	0.00191	0.00126	10.44	0.00023	46003
2	175.02	0.00030	0.00210	0.00132	14.80	0.00031	47615
2	174.95	-0.00050	0.00214	0.00132	14.80	0.00025	59808
2	174.89	0.00028	0.00210	0.00132	14.79	0.00031	47924
2	172.46	-0.00043	0.00210	0.00132	14.59	0.00025	58428
2	172.53	0.00032	0.00210	0.00132	14.59	0.00031	46832

J.3 Resilient Modulus Data With QC/QA [SI]

Table J.95: Resilient modulus data with QC/QA(A_2_135_105)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	No	No	Yes	No	**No**	×
0.06	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	453
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	433
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	450
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	No	No	Yes	No	**No**	×
0.04	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	450
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	444
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	395
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	No	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	449
0.01	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	427
0.01	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×

Table J.96: Resilient modulus data with QC/QA(A_1_105_105)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	No	No	No	Yes	Yes	No	**No**	×
0.06	0.03	No	No	No	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.03	No	No	No	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	No	No	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	440
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	444
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	434
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	420
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	430
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	420
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	434
0.04	0.03	No	No	No	Yes	Yes	No	**No**	×
0.04	0.03	No	No	No	Yes	Yes	No	**No**	×
0.04	0.03	No	No	No	Yes	Yes	No	**No**	×
0.04	0.03	No	No	No	Yes	Yes	No	**No**	×
0.04	0.03	No	No	No	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	No	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	No	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	No	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	No	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	No	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	444
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	435
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	430
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	406
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	442
0.03	0.03	No	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	444
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	434
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	459
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	419
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	411
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	436
0.01	0.03	No	No	No	Yes	Yes	No	**No**	×
0.01	0.03	No	No	No	Yes	Yes	No	**No**	×
0.01	0.03	No	No	No	Yes	Yes	No	**No**	×
0.01	0.03	No	No	No	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	No	Yes	Yes	Yes	**No**	×
0.01	0.05	No	Yes	No	Yes	Yes	Yes	**No**	×
0.01	0.05	No	Yes	No	Yes	Yes	Yes	**No**	×
0.01	0.05	No	Yes	No	Yes	Yes	Yes	**No**	×
0.01	0.05	No	Yes	No	Yes	Yes	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	476
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	432
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	436
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	455
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	428
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	418
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	434

Table J.97: Resilient modulus data with QC/QA(A_2_105_105)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	No	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	702
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	704
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	599
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	623
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	712
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	639
0.06	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	601
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	573
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	724
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	612
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	595
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	612
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	581
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	591
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	559
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	542
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	615
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	612
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	618
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	609
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	668
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	586
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	609
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	613
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	552
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	521
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	656
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	566
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	574
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	550
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.98: Resilient modulus data with QC/QA(A_1_75_105)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	318
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	315
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	272
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.08	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.10	No	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.10	No	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.10	No	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.10	No	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	No	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×

Table J.99: Resilient modulus data with QC/QA(A_2_75_105)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.00							**No**	×
0.06	0.00							**No**	×
0.06	0.00							**No**	×
0.06	0.00							**No**	×
0.06	0.00							**No**	×
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	406
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	395
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	402
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	398
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	386
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	392
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	382
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	423
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	447
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	410
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	369
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	412
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	361
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	404
0.03	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	390
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	401
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	402
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	413
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	362
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	393
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	388
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	384
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	376
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	359
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	360
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	394
0.01	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	390
0.01	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	372
0.01	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	380
0.01	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	386
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	344

Table J.100: Resilient modulus data with QC/QA(A_4_15_100)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	No	No	No	Yes	Yes	No	**No**	×
0.06	0.03	Yes	No	No	Yes	Yes	No	**No**	×
0.06	0.03	Yes	No	No	Yes	Yes	No	**No**	×
0.06	0.03	Yes	No	No	Yes	Yes	No	**No**	×
0.06	0.03	No	No	No	Yes	Yes	No	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.03	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	Yes	Yes	No	Yes	Yes	No	**No**	×
0.04	0.03	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	Yes	Yes	No	Yes	Yes	No	**No**	×
0.04	0.03	Yes	Yes	No	Yes	Yes	No	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.03	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	No	No	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	No	No	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	No	No	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	No	No	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	No	No	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	No	No	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	No	No	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	No	No	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	No	No	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	No	No	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.03	Yes	Yes	Yes	Yes	No	No	**No**	×
0.01	0.03	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	Yes	Yes	Yes	Yes	No	No	**No**	×
0.01	0.03	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	No	No	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	No	No	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	No	No	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	No	No	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	No	No	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.101: Resilient modulus data with QC/QA(A_3_15_100)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	202
0.06	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	192
0.06	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	210
0.06	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	189
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	225
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	226
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	227
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	232
0.04	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.00							**No**	×
0.03	0.00							**No**	×
0.03	0.00							**No**	×
0.03	0.00							**No**	×
0.03	0.00							**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	209
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	206
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	203
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	232
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	203
0.01	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.102: Resilient modulus data with QC/QA(A_1_12_100)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.02	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.02	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.02	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.02	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.04	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.04	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.04	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.04	No	Yes	No	Yes	Yes	Yes	**No**	×
0.06	0.04	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.09	No	Yes	Yes	Yes	Yes	Yes	**Yes**	413
0.06	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	377
0.06	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	424
0.06	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.09	No	Yes	Yes	Yes	Yes	Yes	**Yes**	429
0.04	0.02	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	No	No	Yes	No	**No**	×
0.04	0.02	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.02	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.02	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.04	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.04	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.04	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.04	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.04	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.07	No	Yes	No	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	No	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	No	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.09	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	379
0.04	0.09	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.09	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.02	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.02	No	Yes	No	No	Yes	No	**No**	×
0.03	0.02	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.02	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.02	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.04	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.04	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.04	No	No	No	No	No	No	**No**	×
0.03	0.04	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.04	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.06	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.09	No	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.09	Yes	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.09	No	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.09	Yes	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.09	No	Yes	No	Yes	Yes	Yes	**No**	×
0.01	0.00							**No**	×
0.01	0.00							**No**	×
0.01	0.00							**No**	×
0.01	0.00							**No**	×
0.01	0.00							**No**	×
0.01	0.04	No	Yes	No	Yes	Yes	No	**No**	×
0.01	0.04	No	Yes	No	Yes	Yes	No	**No**	×
0.01	0.04	No	Yes	No	Yes	Yes	No	**No**	×
0.01	0.04	No	Yes	No	Yes	Yes	No	**No**	×
0.01	0.04	No	Yes	No	Yes	Yes	No	**No**	×
0.01	0.06	Yes	Yes	No	Yes	Yes	Yes	**No**	×
0.01	0.06	No	Yes	No	Yes	Yes	Yes	**No**	×
0.01	0.06	No	Yes	No	Yes	Yes	Yes	**No**	×
0.01	0.07	No	Yes	No	Yes	Yes	Yes	**No**	×
0.01	0.06	No	Yes	No	Yes	Yes	Yes	**No**	×
0.01	0.09	Yes	Yes	No	Yes	Yes	Yes	**No**	×
0.01	0.09	No	Yes	No	Yes	Yes	Yes	**No**	×
0.01	0.09	No	Yes	No	Yes	Yes	Yes	**No**	×
0.01	0.09	Yes	Yes	No	Yes	Yes	Yes	**No**	×
0.01	0.09	Yes	Yes	No	Yes	Yes	Yes	**Yes**	419

Table J.103: Resilient modulus data with QC/QA(A_2_12_100)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	No	Yes	No	Yes	No	**No**	×
0.06	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	No	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	No	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	No	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	No	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	No	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	No	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	No	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	No	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	No	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.07	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.07	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.07	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.07	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.07	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.10	No	No	Yes	Yes	No	No	**No**	×
0.04	0.10	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.10	No	No	Yes	Yes	No	No	**No**	×
0.04	0.10	No	No	Yes	Yes	No	No	**No**	×
0.04	0.10	No	No	Yes	Yes	No	No	**No**	×
0.03	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	No	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	No	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	No	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	No	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	No	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	No	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	No	No	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	No	No	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	No	No	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	No	No	Yes	Yes	Yes	Yes	**No**	×
0.03	0.10	No	No	Yes	Yes	No	Yes	**No**	×
0.03	0.10	No	No	Yes	Yes	No	Yes	**No**	×
0.03	0.10	No	No	Yes	Yes	No	Yes	**No**	×
0.03	0.10	No	No	Yes	Yes	No	Yes	**No**	×
0.03	0.10	No	No	Yes	Yes	No	Yes	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.10	No	No	Yes	Yes	No	Yes	**No**	×
0.01	0.10	No	No	Yes	Yes	No	Yes	**No**	×
0.01	0.10	No	No	Yes	Yes	No	Yes	**No**	×
0.01	0.10	No	No	Yes	Yes	No	Yes	**No**	×
0.01	0.10	No	No	Yes	Yes	No	Yes	**No**	×

Table J.104: Resilient modulus data with QC/QA(A_1_9_100)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	382
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	376
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	373
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	335
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	381
0.06	0.09	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.09	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.09	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.09	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	466
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	446
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	417
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	412
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	430
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	445
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	414
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	405
0.04	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	Yes	Yes	Yes	Yes	No	No	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.105: Resilient modulus data with QC/QA(A_2_9_100)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	300
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	293
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	275
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	304
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	297
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	296
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	294
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	282
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	294
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	296
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	259
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	268
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	274
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	261
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	276
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	No	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	275
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	272
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	284
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	268
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	304
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	288
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	270
0.01	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	264
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	275
0.01	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	266
0.01	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	280

Table J.106: Resilient modulus data with QC/QA(B_1_24_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	298
0.06	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	297
0.06	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	288
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	287
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	295
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	281
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	289
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	289
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	291
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	276
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	274
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	275
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	277
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	265
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	265
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	263
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	267
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	265
0.04	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	277
0.04	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	277
0.04	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	279
0.04	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	287
0.04	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	286
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	283
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	285
0.04	0.05	Yes	No	Yes	Yes	Yes	Yes	**Yes**	293
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	297
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	286
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	274
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	281
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	274
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	278
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	282
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	276
0.03	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	301
0.03	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	303
0.03	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	299
0.03	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	286
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	288
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	293
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	293
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	288
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	285
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	274
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	278
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	278
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	278
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	281
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	271
0.01	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	279
0.01	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	280
0.01	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	271
0.01	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	271
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	281
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	270
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	289
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	281
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	281
0.01	0.07	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	No	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.107: Resilient modulus data with QC/QA(B_2_24_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	272
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	265
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	257
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	252
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	252
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	256
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	241
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	245
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	242
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	261
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	240
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	240
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	243
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	241
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	240
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	228
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	224
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	228
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	230
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	228
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	254
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	254
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	269
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	259
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	257
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	243
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	247
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	246
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	244
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	249
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	238
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	238
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	240
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	238
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	236
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	227
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	225
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	230
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	227
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	225
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	251
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	250
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	258
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	251
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	257
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	243
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	247
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	243
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	248
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	248
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	235
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	235
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	240
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	237
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	233
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	220
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	226
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	226
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	222
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	226
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	249
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	268
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	263
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	253
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	255
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	242
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	246
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	238
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	250
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	242
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	235
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	235
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	232
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	233
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	235
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	222
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	225
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	221
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	220
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	221

Table J.108: Resilient modulus data with QC/QA(B_1_195_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	253
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	255
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	255
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	248
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	256
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	232
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	242
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	239
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	246
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	238
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	232
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	230
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	230
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	235
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	235
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	223
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	224
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	227
0.06	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	218
0.06	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	222
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	249
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	230
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	235
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	230
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	230
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	238
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	228
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	231
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	238
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	234
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	226
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	225
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	224
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	227
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	227
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	217
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	218
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	222
0.04	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	213
0.04	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	213
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	224
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	220
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	222
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	234
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	241
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	224
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	224
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	221
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	234
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	225
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	219
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	215
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	219
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	221
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	215
0.03	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	208
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	210
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	208
0.03	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	207
0.03	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	207
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	221
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	226
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	232
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	232
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	233
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	229
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	218
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	222
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	222
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	218
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	212
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	208
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	214
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	210
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	214
0.01	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	200
0.01	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	200
0.01	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	200
0.01	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	200
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	203

Table J.109: Resilient modulus data with QC/QA(B_2_195_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	368
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	386
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	370
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	367
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	353
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	316
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	322
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	315
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	322
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	323
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	311
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	309
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	309
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	305
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	306
0.06	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	292
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	294
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	294
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	293
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	304
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	346
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	347
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	348
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	376
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	347
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	322
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	317
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	305
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	311
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	317
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	300
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	310
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	306
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	300
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	296
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	289
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	289
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	292
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	287
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	292
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	321
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	341
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	343
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	383
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	335
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	359
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	368
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	350
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	359
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	366
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	294
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	294
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	298
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	303
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	298
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	286
0.03	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	285
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	289
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	289
0.03	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	285
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	370
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	326
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	339
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	331
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	356
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	360
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	351
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	350
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	304
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	358
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	299
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	307
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	298
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	300
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	298
0.01	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	282
0.01	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	282
0.01	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	282
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	286
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	287

Table J.110: Resilient modulus data with QC/QA(B_1_16_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	445
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	429
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	426
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	426
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	424
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	423
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	412
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	411
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	424
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	423
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	405
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	413
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	418
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	402
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	402
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	401
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	390
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	401
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	396
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	402
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	448
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	407
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	406
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	426
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	406
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	410
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	387
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	387
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	389
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	409
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	385
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	393
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	385
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	385
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	400
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	389
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	389
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	388
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	382
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	382
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	395
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	377
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	395
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	397
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	395
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	396
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	377
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	386
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	397
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	386
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	385
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	372
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	386
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	386
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	366
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	368
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	373
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	369
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	377
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	369
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	387
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	368
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	369
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	354
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	385
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	370
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	362
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	373
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	371
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	363
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	362
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	367
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	361
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	360
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	355
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	352
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	357
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	352
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	356
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	357

Table J.111: Resilient modulus data with QC/QA(B_2_16_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	Yes	No	Yes	Yes	Yes	Yes	**Yes**	501
0.06	0.05	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	502
0.06	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	530
0.06	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	521
0.06	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	498
0.06	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	512
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	488
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	489
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	487
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	489
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	495
0.04	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	Yes	No	Yes	Yes	Yes	Yes	**Yes**	514
0.04	0.05	Yes	No	Yes	Yes	Yes	Yes	**Yes**	499
0.04	0.05	Yes	No	Yes	Yes	Yes	Yes	**Yes**	500
0.04	0.05	Yes	No	Yes	Yes	Yes	Yes	**Yes**	515
0.04	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	496
0.04	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	505
0.04	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	504
0.04	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	492
0.04	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	500
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	510
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	509
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	497
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	507
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	495
0.03	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	No	Yes	No	Yes	Yes	**No**	×
0.03	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	Yes	No	Yes	Yes	Yes	Yes	**Yes**	502
0.03	0.05	Yes	No	Yes	Yes	Yes	Yes	**Yes**	485
0.03	0.05	Yes	No	Yes	Yes	Yes	Yes	**Yes**	516
0.03	0.05	Yes	No	Yes	Yes	Yes	Yes	**Yes**	484
0.03	0.05	Yes	No	Yes	Yes	Yes	Yes	**Yes**	499
0.03	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	512
0.03	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	500
0.03	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	487
0.03	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	478
0.03	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	469
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	490
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	483
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	476
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	484
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	478
0.01	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	Yes	No	Yes	Yes	Yes	Yes	**Yes**	476
0.01	0.05	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	498
0.01	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	488
0.01	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	490
0.01	0.07	Yes	No	Yes	Yes	Yes	Yes	**Yes**	495
0.01	0.08	Yes	No	Yes	Yes	Yes	Yes	**Yes**	508
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	487
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	475
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	484
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	484
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	483

Table J.112: Resilient modulus data with QC/QA(B_1_27_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	229
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	228
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	228
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	223
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	228
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	214
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	215
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	209
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	212
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	210
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	206
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	203
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	205
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	192
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	192
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	196
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	195
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	193
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	230
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	225
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	230
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	230
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	218
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	210
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	210
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	210
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	213
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	216
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	209
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	208
0.04	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	192
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	191
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	197
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	192
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	192
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	229
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	223
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	224
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	224
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	224
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	217
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	214
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	219
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	216
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	215
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	206
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	204
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	204
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	206
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	204
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.03	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.03	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	189
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	190
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	190
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	213
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	219
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	218
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	218
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	225
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	215
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	218
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	214
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	215
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	215
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	207
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	200
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	203
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	203
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	193
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	192

Table J.113: Resilient modulus data with QC/QA(B_2_27_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	229
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	228
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	228
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	223
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	228
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	214
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	215
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	209
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	212
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	210
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	206
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	203
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	205
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	192
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	192
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	196
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	195
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	193
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	230
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	225
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	230
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	230
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	218
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	210
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	210
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	210
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	213
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	216
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	209
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	208
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	192
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	191
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	197
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	192
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	192
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	229
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	223
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	224
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	224
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	224
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	217
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	214
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	219
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	216
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	215
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	206
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	204
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	204
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	206
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	204
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	189
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	190
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	190
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	213
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	219
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	218
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	218
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	225
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	215
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	218
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	214
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	215
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	215
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.01	0.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	207
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	200
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	203
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	203
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	193
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	192

Table J.114: Resilient modulus data with QC/QA(B_1_22_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	203
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	201
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	201
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	200
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	210
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	196
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	198
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	189
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	193
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	185
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	180
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	184
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	184
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	168
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	168
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	170
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	171
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	169
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	193
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	197
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	198
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	197
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	189
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	191
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	196
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	181
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	183
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	183
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	177
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	168
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	167
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	168
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	171
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	170
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	195
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	196
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	195
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	200
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	196
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	187
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	187
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	189
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	187
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	192
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	180
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	178
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	179
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	167
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	166
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	167
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	167
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	167
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	193
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	194
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	194
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	195
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	190
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	197
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	184
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	174
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	174
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	175
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	179
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	177
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	163
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	163
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	165
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	163
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	165

Table J.115: Resilient modulus data with QC/QA(B_2_22_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	No	Yes	Yes	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	290
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	283
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	273
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	274
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	258
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	270
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	258
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	271
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	264
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	256
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	253
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	259
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	258
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	258
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	243
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	244
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	248
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	241
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	239
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	260
0.04	0.03	No	Yes	Yes	No	Yes	Yes	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	295
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	265
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	264
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	264
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	262
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	266
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	265
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	265
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	254
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	256
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	252
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	254
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	249
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	242
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	243
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	248
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	236
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	237
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	260
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	260
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	284
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	283
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	257
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	262
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	262
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	268
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	253
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	251
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	247
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	255
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	255
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	251
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	236
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	243
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	240
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	236
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	236
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	258
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	275
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	257
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	261
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	262
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	256
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	254
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	252
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	257
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	247
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	255
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	232
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	238
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	234
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	238
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	240

Table J.116: Resilient modulus data with QC/QA(B_1_16_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	113
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	114
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	108
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	106
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	106
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	107
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	105
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	105
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	102
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	101
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	102
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	102
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	104
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	96
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	97
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	98
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	96
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	96
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	98
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	99
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	101
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	99
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	98
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	96
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	97
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	96
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	95
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	95
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	93
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	92
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	91
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	91
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	91
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	88
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	88
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	87
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	87
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	89
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	88
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	86
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	88
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	90
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	87
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	85
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	84
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	85
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	84
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	85
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	80
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	82
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	79
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	82
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	82
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	76
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	76
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	78
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	77
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	77
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	76
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	76
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	79
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	74
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	76
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	69
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	70
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	71
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	71
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	69
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	66
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	67
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	66
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	67
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	67
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	66
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	66
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	66
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	66
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	66

Table J.117: Resilient modulus data with QC/QA(B_2_16_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	110
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	112
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	112
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	112
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	106
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	99
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	101
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	105
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	105
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	96
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	96
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	96
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	96
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	96
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	89
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	91
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	90
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	89
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	90
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	99
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	99
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	100
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	99
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	92
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	93
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	92
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	94
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	91
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	87
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	86
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	87
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	88
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	89
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	81
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	82
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	81
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	81
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	82
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	90
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	89
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	89
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	89
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	91
0.03	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	No	No	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	78
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	78
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	79
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	79
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	78
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	73
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	74
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	73
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	74
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	72
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	76
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	75
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	78
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	84
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	81
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	69
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	67
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	67
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	69
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	67
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	66
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	66
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	66
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	66
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	67
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62

Table J.118: Resilient modulus data with QC/QA(C_1_12_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.06	No	No	No	No	No	No	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	139
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	140
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	144
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	140
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	138
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	133
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	138
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	138
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	138
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	No	No	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	130
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	128
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	131
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	125
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	128
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	118
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	118
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	119
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	115
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	114
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	117
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	122
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	113
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	111
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	111
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	95
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	100
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	98
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	101
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	97
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	93
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	94
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	92
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	95
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	93
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.119: Resilient modulus data with QC/QA(C_2_12_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	146
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	150
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	152
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	146
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	147
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	150
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	153
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	149
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	144
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	147
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	142
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	143
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	143
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	137
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	139
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	131
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	133
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	136
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	132
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	130
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	130
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	126
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	128
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	128
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	124
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	No	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	120
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	119
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	119
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	116
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	117
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	Yes	Yes	No	Yes	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	111
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	112
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	108
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	111
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	104
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	102
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	104
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	102
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	104
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.120: Resilient modulus data with QC/QA(C_1_95_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	177
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	175
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	180
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	166
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	166
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	173
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	161
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	158
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	157
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	159
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	164
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	No	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	149
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	156
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	154
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	149
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	148
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	138
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	145
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	147
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	138
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	144
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	Yes	Yes	Yes	No	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	138
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	148
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	141
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	137
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	140
0.03	0.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	142
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	135
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	133
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	137
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	128
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	128
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	125
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	129
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	127
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	128
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	132
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	129
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	128
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	135
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	122
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	120
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	123
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	123
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	127
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	114
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	114
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	114
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	116
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	117

Table J.121: Resilient modulus data with QC/QA(C_2_95_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.05	Yes	Yes	No	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	Yes	Yes	No	Yes	Yes	No	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	189
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	178
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	173
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	176
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	180
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	176
0.04	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	177
0.04	0.08	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	180
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	160
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	153
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	162
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	159
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	156
0.03	0.03	No	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.03	Yes	Yes	No	Yes	Yes	Yes	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	146
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	161
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	166
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	148
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	153
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	154
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	137
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	141
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	137
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	139
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	140
0.01	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.01	0.03	Yes	Yes	No	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.01	0.03	Yes	Yes	No	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	122
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	126
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	130
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	133
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	134
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	127
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	112
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	114
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	116
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	118

Table J.122: Resilient modulus data with QC/QA(C_1_8_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	No	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	No	No	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	195
0.06	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	192
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	203
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	200
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	193
0.04	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	No	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.07	No	Yes	Yes	Yes	No	No	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	179
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	184
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	178
0.03	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	No	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	No	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.10	No	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	No	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	No	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	166
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	No	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	No	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	No	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	No	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	No	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	No	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	No	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	No	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	No	Yes	Yes	Yes	No	Yes	**No**	×

Table J.123: Resilient modulus data with QC/QA(C_2_8_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	No	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	No	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	No	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.06	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	No	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	211
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	209
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	207
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	203
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	206
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	No	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	No	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	No	No	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	196
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	194
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	190
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	200
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	204
0.03	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	Yes	No	Yes	Yes	No	Yes	**No**	×
0.03	0.05	No	No	Yes	Yes	No	Yes	**No**	×
0.03	0.05	No	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.05	No	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.05	No	No	Yes	Yes	No	Yes	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.08	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	184
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	177
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	184
0.01	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	No	Yes	No	Yes	Yes	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	No	No	Yes	Yes	No	Yes	**No**	×
0.01	0.05	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	No	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	Yes	No	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	163
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	166
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	162
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	166
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	163

Table J.124: Resilient modulus data with QC/QA(C_1_13_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	119
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	114
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	116
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	111
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	110
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	108
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	105
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	100
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	107
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	102
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	100
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	102
0.04	0.07	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.08	No	No	No	No	No	No	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	85
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	84
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	81
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	82
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	83
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	84
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	84
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	84
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	85
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	84
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	82
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	84
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	81
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	82
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	69
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	69
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	71
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	71
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	73
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	70
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	68
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	67
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	69
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	73
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	65
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	67
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	66
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.125: Resilient modulus data with QC/QA(C_2_13_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	120
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	118
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	115
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	120
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	119
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	115
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	115
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	110
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	111
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	114
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	108
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	107
0.06	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	107
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	100
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	100
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	103
0.04	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	99
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	101
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	101
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	98
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	100
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	80
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	89
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	79
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	89
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	84
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	86
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	84
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	86
0.03	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	83
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	84
0.03	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	84
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	72
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	71
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	71
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	70
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	70
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	73
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	76
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	69
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.126: Resilient modulus data with QC/QA(C_1_10_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	No	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	No	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	158
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	160
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	156
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	157
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	156
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	154
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	162
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	162
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	156
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	No	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	No	No	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	145
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	150
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	144
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	143
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	143
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	142
0.04	0.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	146
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	147
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	142
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	129
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	135
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	131
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	134
0.03	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	134
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	132
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	121
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	110
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	117
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	118
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	117
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	115
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	119
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	118
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.127: Resilient modulus data with QC/QA(C_2_10_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	145
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	149
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	150
0.06	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	147
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	144
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	148
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	146
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	150
0.06	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	144
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	136
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	141
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	137
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	137
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	137
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.06	No	No	No	No	No	No	**No**	×
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	135
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	130
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	131
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	127
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	126
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	121
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.04	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	120
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	No	Yes	Yes	**No**	×
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	122
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	116
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	119
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	116
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	117
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	114
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	115
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	114
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.03	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**Yes**	104
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	108
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	101
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	103
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	105
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	102
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	100
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	104
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	104
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	98
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	96
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.128: Resilient modulus data with QC/QA(C_1_8_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	191
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	187
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	173
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	173
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	171
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	169
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	169
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	161
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	160
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	164
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	161
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	164
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	152
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	153
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	151
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	153
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	150
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	170
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	170
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	173
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	166
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	161
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	158
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	154
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	153
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	157
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	158
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	145
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	146
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	149
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	147
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	145
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	133
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	134
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	138
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	136
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	136
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	147
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	152
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	147
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	142
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	144
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	133
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	136
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	132
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	137
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	135
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	125
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	127
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	126
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	128
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	126
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	118
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	117
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	117
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	117
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	118
0.01	0.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	124
0.01	0.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	129
0.01	0.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	122
0.01	0.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	131
0.01	0.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	125
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	115
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	114
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	114
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	115
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	115
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	108
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	108
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	108
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	108
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	100
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	100
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	100
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	99
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	98

Table J.129: Resilient modulus data with QC/QA(C_2_8_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	178
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	168
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	168
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	166
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	165
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	168
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	158
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	160
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	160
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	160
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	158
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	152
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	156
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	152
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	151
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	153
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	162
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	168
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	165
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	165
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	165
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	154
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	148
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	152
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	151
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	153
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	146
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	144
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	143
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	146
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	144
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	140
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	138
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	139
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	138
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	139
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	140
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	142
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	140
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	138
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	138
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	128
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	129
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	132
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	131
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	129
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	126
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	123
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	125
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	127
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	126
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	120
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	120
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	120
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	120
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	121
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	122
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	120
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	118
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	118
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	118
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	112
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	112
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	112
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	112
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	107
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	105
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	104
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	104
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	106
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	101
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	101
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	101
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	101
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	101

Table J.130: Resilient modulus data with QC/QA(D_1_16_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	297
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	296
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	283
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	292
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	298
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	275
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	270
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	279
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	280
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	281
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	267
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	267
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	256
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	256
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	261
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	250
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	248
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	245
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	245
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	243
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	286
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	285
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	276
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	276
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	276
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	266
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	268
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	274
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	274
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	285
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	259
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	257
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	252
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	252
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	252
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	240
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	240
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	237
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	236
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	238
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	273
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	273
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	264
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	273
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	273
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	268
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	275
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	256
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	263
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	264
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	248
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	245
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	241
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	241
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	247
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	229
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	235
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	229
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	229
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	231
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	258
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	258
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	266
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	275
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	266
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	259
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	251
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	247
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	245
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	255
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	232
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	236
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	234
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	235
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	234
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	221
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	221
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	218
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	220
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	220

Table J.131: Resilient modulus data with QC/QA(D_2_16_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	314
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	323
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	308
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	336
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	322
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	300
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	308
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	308
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	303
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	303
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	290
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	290
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	283
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	293
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	288
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	262
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	265
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	269
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	269
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	267
0.04	0.03	Yes	Yes	Yes	No	Yes	Yes	**No**	×
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	313
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	314
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	302
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	310
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	289
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	301
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	297
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	288
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	302
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	280
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	290
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	282
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	283
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	283
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	262
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	261
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	264
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	260
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	261
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	305
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	311
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	309
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	310
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	286
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	291
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	283
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	291
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	296
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	291
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	268
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	277
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	277
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	272
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	264
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	251
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	251
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	253
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	253
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	255
0.01	0.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	285
0.01	0.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	298
0.01	0.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	301
0.01	0.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	277
0.01	0.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	280
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	277
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	265
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	269
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	265
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	272
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	253
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	260
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	258
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	268
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	256
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	236
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	243
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	239
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	246
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	239

Table J.132: Resilient modulus data with QC/QA(D_1_13_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	439
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	448
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	450
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	447
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	435
0.06	0.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	443
0.06	0.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	453
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	434
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	426
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	427
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	426
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	427
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	427
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	433
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	433
0.04	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	447
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	460
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	459
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	436
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	435
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	430
0.04	0.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	438
0.04	0.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	422
0.04	0.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	439
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	421
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	427
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	421
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	428
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	428
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	428
0.03	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	430
0.03	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	454
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	415
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	437
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	434
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	423
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	423
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	436
0.03	0.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	438
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	439
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	418
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	445
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	416
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	423
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	417
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	407
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	413
0.01	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	429
0.01	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	430
0.01	0.03	Yes	No	Yes	Yes	Yes	Yes	**Yes**	455
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	422
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	434
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	433
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	434
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	446
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	429
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	428
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	421
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	438
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	421
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	412
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	424
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	413
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	412
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	430

Table J.133: Resilient modulus data with QC/QA(D_2_13_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	575
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	557
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	576
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	574
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	578
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	593
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	579
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	582
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	567
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	579
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	562
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	572
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	553
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	552
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	561
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	587
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	593
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	546
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	583
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	600
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	550
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	577
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	592
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	534
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	581
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	571
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	562
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	554
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	556
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	562
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	No	Yes	Yes	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	542
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	559
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	559
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	555
0.03	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	564
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	545
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	573
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	555
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	560
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	544
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	535
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	546
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	546
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	535
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	536
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	558
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	546
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	538
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	543
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	556
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	549
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	543
0.01	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	556
0.01	0.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	538
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	550
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	536
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	526
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	528

Table J.134: Resilient modulus data with QC/QA(D_1_11_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.04	No	No	No	No	No	No	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	380
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	390
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	398
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	389
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	399
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	387
0.06	0.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	388
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	381
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	374
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	381
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	372
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	368
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	360
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	374
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	369
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	380
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	377
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	382
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	380
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	381
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	369
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	368
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	369
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	360
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	369
0.04	0.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	361
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	354
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	354
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	349
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	348
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	355
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	356
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	353
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	359
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	363
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	380
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	364
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	363
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	348
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	361
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	348
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	350
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	352
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	352
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	353
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	318
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	317
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	313
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	320
0.03	0.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	317
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	332
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	324
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	332
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	332
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	333
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	341
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	325
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	326
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	325
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	337
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	324
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	319
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	317
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	326
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	319
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	320
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	326
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	311
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	316
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	312
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	306
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	306
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	310
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	313
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	308

Table J.135: Resilient modulus data with QC/QA(D_2_11_103)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	229
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	235
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	235
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	235
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	228
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	221
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	220
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	229
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	226
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	234
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	209
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	210
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	209
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	206
0.06	0.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	212
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	205
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	204
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	207
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	205
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	205
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	197
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	196
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	201
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	206
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	184
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	189
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	184
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	184
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	181
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	184
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	185
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	185
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	181
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	181
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	181
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	183
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	162
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	174
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	156
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	163
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	166
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	157
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	152
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	154
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	154
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	160
0.03	0.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	155
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	153
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	154
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	155
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	153
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	152
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	153
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	155
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	155
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	155
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	131
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	125
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	131
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	130
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	126
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	126
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	125
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	123
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	123
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	130
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	126
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	125
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	122
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	122
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	126
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	126
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	127
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	128
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	128
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	127

Table J.136: Resilient modulus data with QC/QA(D_1_18_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	198
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	181
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	181
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	181
0.06	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	Yes	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.06	No	No	No	No	No	No	**No**	×
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	152
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	153
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	151
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	155
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	152
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	135
0.06	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	132
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	133
0.06	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	134
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	134
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	181
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	181
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	165
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	167
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	167
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	166
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	167
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	152
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	153
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	151
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	151
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	150
0.04	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	131
0.04	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	130
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	131
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	131
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	131
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	181
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	173
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	164
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	166
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	158
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	163
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	165
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	149
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	148
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	149
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	147
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	147
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	131
0.03	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	130
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	129
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	128
0.03	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	126
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	165
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	168
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	169
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	181
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	170
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	159
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	153
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	156
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	153
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	156
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	146
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	144
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	145
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	142
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	142
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	125
0.01	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	123
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	125
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	124
0.01	0.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	122

Table J.137: Resilient modulus data with QC/QA(D_2_18_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	158
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	161
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	169
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	159
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	159
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	143
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	143
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	144
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	140
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	143
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	129
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	128
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	128
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	129
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	130
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	110
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	110
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	112
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	111
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	111
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	149
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	148
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	158
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	162
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	158
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	140
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	139
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	140
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	139
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	139
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	125
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	125
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	124
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	124
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	121
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	106
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	106
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	105
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	107
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	106
0.03	0.03	Yes	Yes	Yes	No	Yes	Yes	**No**	×
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	141
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	148
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	148
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	146
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	132
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	132
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	131
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	130
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	129
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	116
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	119
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	117
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	116
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	118
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	100
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	102
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	101
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	99
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	99
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	139
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	146
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	139
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	139
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	139
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	126
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	121
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	123
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	124
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	122
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	106
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	106
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	109
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	92
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	94
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	94
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	93
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	93

Table J.138: Resilient modulus data with QC/QA(D_1_14_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	222
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	224
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	228
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	251
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	225
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	221
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	212
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	212
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	212
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	213
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	194
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	194
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	196
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	195
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	195
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	177
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	180
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	181
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	213
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	218
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	218
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	217
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	228
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	203
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	208
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	211
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	192
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	192
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	193
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	172
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	175
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	176
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	173
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	173
0.03	0.03	Yes	Yes	Yes	No	Yes	Yes	**No**	×
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	207
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	211
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	205
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	210
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	194
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	194
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	194
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	194
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	194
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	183
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	189
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	183
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	162
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	163
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	162
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	163
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	163
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	199
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	203
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	222
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	187
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	183
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	179
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	170
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	170
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	171
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	171
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	170
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	150
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	151
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	152
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	151
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	152

Table J.139: Resilient modulus data with QC/QA(D_2_14_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	237
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	226
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	221
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	227
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	233
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	206
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	209
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	209
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	207
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	192
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	193
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	194
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	193
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	195
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	178
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	176
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	177
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	177
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	179
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	217
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	202
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	217
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	217
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	212
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	203
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	201
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	197
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	206
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	195
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	184
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	184
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	183
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	167
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	167
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	168
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	171
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	170
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	205
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	209
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	200
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	195
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	193
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	189
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	181
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	171
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	172
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	167
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	168
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	170
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	159
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	158
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	155
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	162
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	159
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	179
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	175
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.01	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	179
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	173
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	172
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	167
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	172
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	167
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	156
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	158
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	157
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	158
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	157
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	147
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	145
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	142
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	144
0.01	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	145

Table J.140: Resilient modulus data with QC/QA(D_1_11_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	273
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	272
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	275
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	278
0.06	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	266
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	251
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	259
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	253
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	247
0.06	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	243
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	236
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	238
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	244
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	239
0.06	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	242
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	237
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	235
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	234
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	233
0.06	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	236
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	226
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	222
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	233
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	239
0.04	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	248
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	217
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	220
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	216
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	222
0.04	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	216
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	214
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	216
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	215
0.04	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	213
0.04	0.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	222
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	210
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	213
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	213
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	211
0.04	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	211
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	200
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	191
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	216
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	200
0.03	0.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	196
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	191
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	184
0.03	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	189
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	186
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	188
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	184
0.03	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	185
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	185
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	181
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	181
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	182
0.03	0.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	184
0.01	0.03	Yes	No	Yes	Yes	Yes	#VALUE!	**#VALUE!**	#VALUE!
0.01	0.03	Yes	No	Yes	Yes	Yes	#VALUE!	**#VALUE!**	#VALUE!
0.01	0.03	Yes	No	Yes	No	Yes	#VALUE!	**#VALUE!**	#VALUE!
0.01	0.03	Yes	No	Yes	Yes	Yes	#VALUE!	**#VALUE!**	#VALUE!
0.01	0.03	Yes	No	Yes	Yes	Yes	#VALUE!	**#VALUE!**	#VALUE!
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	155
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	151
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	157
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	155
0.01	0.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	157
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	146
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	152
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	147
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	150
0.01	0.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	149
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
0.01	0.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.141: Resilient modulus data with QC/QA(D_2_11_98)

σ_3 [MPa]	σ_{DEV} [MPa]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [MPa]
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.10	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.10	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.10	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.10	No	Yes	Yes	Yes	Yes	No	**No**	×
0.06	0.10	No	Yes	Yes	Yes	No	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**Yes**	450
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.07	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.04	0.10	No	Yes	Yes	Yes	No	No	**No**	×
0.04	0.10	No	Yes	Yes	Yes	No	No	**No**	×
0.04	0.10	No	Yes	Yes	Yes	No	No	**No**	×
0.04	0.10	No	Yes	Yes	Yes	No	No	**No**	×
0.04	0.10	No	Yes	Yes	Yes	No	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.05	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.10	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.10	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.10	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.10	No	Yes	Yes	Yes	Yes	No	**No**	×
0.03	0.10	No	Yes	Yes	Yes	No	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.03	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**Yes**	294
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.05	No	Yes	Yes	Yes	Yes	Yes	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.07	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.10	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.10	No	Yes	Yes	Yes	No	No	**No**	×
0.01	0.10	No	Yes	Yes	Yes	Yes	No	**No**	×
0.01	0.10	No	Yes	Yes	Yes	No	No	**No**	×
0.01	0.10	No	Yes	Yes	Yes	Yes	No	**No**	×

J.4 Resilient Modulus Data With QC/QA [US Customary]

Table J.142: Resilient modulus data with QC/QA(A_2_135_105)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.34	No	Yes	No	Yes	Yes	No	**No**	×
8	4.44	No	Yes	No	Yes	Yes	No	**No**	×
8	4.52	No	Yes	No	No	Yes	No	**No**	×
8	4.34	No	Yes	No	Yes	Yes	No	**No**	×
8	4.32	No	Yes	No	Yes	Yes	No	**No**	×
8	7.40	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.41	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.41	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.41	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.43	No	Yes	Yes	Yes	Yes	No	**No**	×
8	10.49	No	Yes	Yes	Yes	Yes	No	**No**	×
8	10.47	No	Yes	Yes	Yes	Yes	No	**No**	×
8	10.52	No	Yes	Yes	Yes	Yes	No	**No**	×
8	10.47	No	Yes	Yes	Yes	Yes	No	**No**	×
8	10.68	No	Yes	Yes	Yes	Yes	No	**No**	×
8	14.66	No	Yes	Yes	Yes	Yes	Yes	**Yes**	65718
8	14.80	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	14.61	No	Yes	Yes	Yes	Yes	Yes	**Yes**	62737
8	14.58	No	Yes	Yes	Yes	Yes	Yes	**Yes**	65329
8	14.81	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	4.45	No	Yes	No	Yes	Yes	No	**No**	×
6	4.67	No	Yes	No	No	Yes	No	**No**	×
6	4.33	No	Yes	No	Yes	Yes	No	**No**	×
6	4.33	No	Yes	No	Yes	Yes	No	**No**	×
6	4.33	No	Yes	No	Yes	Yes	No	**No**	×
6	7.40	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.43	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.40	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.41	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.43	No	Yes	Yes	Yes	Yes	No	**No**	×
6	10.41	No	Yes	Yes	Yes	Yes	No	**No**	×
6	10.76	No	Yes	Yes	Yes	Yes	No	**No**	×
6	10.48	No	Yes	Yes	Yes	Yes	No	**No**	×
6	10.51	No	Yes	Yes	Yes	Yes	No	**No**	×
6	10.50	No	Yes	Yes	Yes	Yes	No	**No**	×
6	15.09	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	14.83	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	14.83	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	14.84	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	14.83	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	4.31	No	Yes	No	Yes	Yes	No	**No**	×
4	4.30	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.32	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.30	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.29	No	Yes	No	Yes	Yes	No	**No**	×
4	7.40	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.40	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.40	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.39	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.39	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.54	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.54	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.52	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.52	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.52	No	Yes	Yes	Yes	Yes	No	**No**	×
4	14.91	No	Yes	Yes	Yes	Yes	Yes	**Yes**	65213
4	14.99	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	14.98	No	Yes	Yes	Yes	Yes	Yes	**Yes**	64416
4	14.86	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	14.84	No	Yes	Yes	Yes	Yes	Yes	**Yes**	57346
2	4.33	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.40	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.29	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.31	No	Yes	Yes	No	Yes	No	**No**	×
2	4.15	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.45	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.46	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.44	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.43	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.44	No	Yes	Yes	Yes	Yes	No	**No**	×
2	10.81	No	Yes	Yes	Yes	Yes	No	**No**	×
2	10.53	No	Yes	Yes	Yes	Yes	No	**No**	×
2	10.53	No	Yes	Yes	Yes	Yes	No	**No**	×
2	10.53	No	Yes	Yes	Yes	Yes	No	**No**	×
2	10.75	No	Yes	Yes	Yes	Yes	No	**No**	×
2	14.87	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	14.86	No	Yes	Yes	Yes	Yes	Yes	**Yes**	65188
2	14.68	No	Yes	Yes	Yes	Yes	Yes	**Yes**	61898
2	14.84	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	15.06	No	Yes	Yes	Yes	Yes	Yes	**No**	×

Table J.143: Resilient modulus data with QC/QA(A_1_105_105)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.31	No	No	No	Yes	Yes	No	**No**	×
8	4.30	No	No	No	Yes	Yes	No	**No**	×
8	4.33	No	Yes	No	Yes	Yes	No	**No**	×
8	4.41	No	No	No	Yes	Yes	No	**No**	×
8	4.61	No	Yes	No	No	Yes	No	**No**	×
8	7.39	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	7.42	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	7.39	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	7.39	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	7.40	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.49	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.49	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.49	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63780
8	10.49	No	Yes	Yes	Yes	Yes	Yes	**Yes**	64338
8	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62892
8	14.81	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	60903
8	14.80	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62352
8	14.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	60851
8	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62915
6	4.13	No	No	No	Yes	Yes	No	**No**	×
6	4.09	No	No	No	Yes	Yes	No	**No**	×
6	4.10	No	No	No	Yes	Yes	No	**No**	×
6	4.11	No	No	No	Yes	Yes	No	**No**	×
6	4.10	No	No	No	Yes	Yes	No	**No**	×
6	7.42	No	Yes	No	Yes	Yes	Yes	**No**	×
6	7.41	No	Yes	No	Yes	Yes	Yes	**No**	×
6	7.19	No	Yes	No	Yes	Yes	Yes	**No**	×
6	7.44	No	Yes	No	Yes	Yes	Yes	**No**	×
6	7.39	No	Yes	No	Yes	Yes	Yes	**No**	×
6	10.49	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.48	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.48	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	14.92	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	64419
6	14.67	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63082
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62421
6	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	58830
6	14.66	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	64139
4	4.11	No	Yes	No	Yes	Yes	Yes	**No**	×
4	4.12	No	Yes	No	Yes	Yes	Yes	**No**	×
4	4.12	No	Yes	No	Yes	Yes	Yes	**No**	×
4	4.11	No	Yes	No	Yes	Yes	Yes	**No**	×
4	4.09	No	Yes	No	Yes	Yes	Yes	**No**	×
4	7.22	No	Yes	No	Yes	Yes	Yes	**No**	×
4	7.21	No	Yes	No	Yes	Yes	Yes	**No**	×
4	7.41	No	Yes	No	Yes	Yes	Yes	**No**	×
4	7.42	No	Yes	No	Yes	Yes	Yes	**No**	×
4	7.21	No	Yes	No	Yes	Yes	Yes	**No**	×
4	10.33	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	64451
4	10.52	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.52	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.52	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62927
4	14.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	66566
4	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	60835
4	14.68	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	59648
4	14.80	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63181
2	4.15	No	No	No	Yes	Yes	No	**No**	×
2	4.16	No	No	No	Yes	Yes	No	**No**	×
2	4.14	No	No	No	Yes	Yes	No	**No**	×
2	4.15	No	No	No	Yes	Yes	No	**No**	×
2	4.37	No	Yes	No	Yes	Yes	No	**No**	×
2	7.43	No	Yes	No	Yes	Yes	Yes	**No**	×
2	7.45	No	Yes	No	Yes	Yes	Yes	**No**	×
2	7.45	No	Yes	No	Yes	Yes	Yes	**No**	×
2	7.44	No	Yes	No	Yes	Yes	Yes	**No**	×
2	7.44	No	Yes	No	Yes	Yes	Yes	**No**	×
2	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	69075
2	10.71	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62590
2	14.66	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63275
2	14.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	66050
2	14.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62107
2	14.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	60568
2	14.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62976

Table J.144: Resilient modulus data with QC/QA(A_2_105_105)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.09	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.10	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.18	No	Yes	Yes	Yes	Yes	No	**No**	×
8	6.53	No	Yes	Yes	Yes	No	No	**No**	×
8	4.29	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.40	No	Yes	Yes	Yes	Yes	Yes	**Yes**	101770
8	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	102116
8	7.19	No	Yes	Yes	Yes	Yes	Yes	**Yes**	86819
8	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	90326
8	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	103194
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	92675
8	10.55	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	10.67	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	10.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	87202
8	10.49	No	Yes	Yes	Yes	Yes	Yes	**Yes**	83043
8	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.62	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	4.09	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.11	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.10	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.39	No	Yes	Yes	Yes	Yes	Yes	**Yes**	104958
6	7.38	No	Yes	Yes	Yes	Yes	Yes	**Yes**	88808
6	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	86308
6	7.39	No	Yes	Yes	Yes	Yes	Yes	**Yes**	88777
6	7.26	No	Yes	Yes	Yes	Yes	Yes	**Yes**	84211
6	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	85751
6	10.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	81096
6	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	78639
6	10.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	89214
6	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	88825
6	14.83	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.83	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.68	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.75	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.89	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	4.34	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.34	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.35	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.40	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.20	No	Yes	Yes	Yes	Yes	Yes	**Yes**	89635
4	7.20	No	Yes	Yes	Yes	Yes	Yes	**Yes**	88350
4	7.19	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.20	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	96933
4	10.51	No	Yes	Yes	Yes	Yes	Yes	**Yes**	84993
4	10.54	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	88353
4	10.30	No	Yes	Yes	Yes	Yes	Yes	**Yes**	88911
4	10.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	80087
4	14.87	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.66	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.63	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.86	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.67	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	4.14	No	No	Yes	Yes	Yes	No	**No**	×
2	4.14	No	No	Yes	Yes	Yes	No	**No**	×
2	4.35	No	No	Yes	Yes	Yes	No	**No**	×
2	4.15	No	No	Yes	Yes	Yes	No	**No**	×
2	4.15	No	No	Yes	Yes	Yes	No	**No**	×
2	7.25	Yes	Yes	Yes	Yes	Yes	No	**No**	×
2	7.25	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.24	Yes	Yes	Yes	Yes	Yes	No	**No**	×
2	7.24	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.25	Yes	Yes	Yes	Yes	Yes	No	**No**	×
2	10.54	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	75521
2	10.58	No	Yes	Yes	Yes	Yes	Yes	**Yes**	95151
2	10.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	82033
2	10.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	83180
2	10.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	79727
2	14.68	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.88	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.86	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.66	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.66	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.145: Resilient modulus data with QC/QA(A_1_75_105)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.32	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.33	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.35	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.31	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.31	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.45	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.56	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.36	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.42	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.40	No	Yes	Yes	Yes	Yes	No	**No**	×
8	10.50	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.49	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.48	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.49	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.48	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	14.84	No	Yes	Yes	Yes	Yes	Yes	**Yes**	46116
8	14.63	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	14.62	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	14.83	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	14.63	No	Yes	Yes	Yes	Yes	Yes	**Yes**	45634
6	4.11	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.11	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.29	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.31	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.32	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.40	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.39	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.39	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.47	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.43	No	Yes	Yes	Yes	Yes	No	**No**	×
6	10.51	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.52	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.52	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.51	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.50	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	14.89	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	14.83	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	14.62	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	14.65	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	14.64	No	Yes	Yes	Yes	Yes	Yes	**Yes**	39511
4	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.14	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.10	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.45	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.45	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.24	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.47	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.45	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.51	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.62	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.91	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.65	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.52	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	14.87	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	14.87	No	Yes	Yes	Yes	No	Yes	**No**	×
4	14.87	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	14.86	No	Yes	Yes	Yes	No	Yes	**No**	×
4	14.84	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	4.14	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.14	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.16	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.25	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.46	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.45	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.46	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.45	No	Yes	Yes	Yes	Yes	No	**No**	×
2	10.56	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.56	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.56	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.54	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.76	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	14.90	No	Yes	Yes	Yes	No	Yes	**No**	×
2	14.86	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	14.92	No	Yes	Yes	Yes	No	Yes	**No**	×
2	14.85	No	Yes	Yes	Yes	No	Yes	**No**	×
2	14.87	No	Yes	Yes	Yes	Yes	Yes	**No**	×

Table J.146: Resilient modulus data with QC/QA(A_2_75_105)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [psi]
8	4.55	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.34	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.33	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.33	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.32	No	No	Yes	Yes	Yes	No	**No**	×
8	7.39	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.37	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.40	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.38	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.39	No	Yes	Yes	Yes	Yes	No	**No**	×
8	0.00							**No**	×
8	0.00							**No**	×
8	0.00							**No**	×
8	0.00							**No**	×
8	0.00							**No**	×
8	14.81	No	Yes	Yes	Yes	Yes	Yes	**Yes**	58820
8	14.60	No	Yes	Yes	Yes	Yes	Yes	**Yes**	57247
8	14.86	No	Yes	Yes	Yes	Yes	Yes	**Yes**	58331
8	14.65	No	Yes	Yes	Yes	Yes	Yes	**Yes**	57672
8	14.63	No	Yes	Yes	Yes	Yes	Yes	**Yes**	55945
6	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.13	No	No	Yes	Yes	Yes	No	**No**	×
6	4.33	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.14	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.31	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.39	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.39	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.40	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.40	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.41	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.46	No	Yes	Yes	Yes	Yes	Yes	**Yes**	56919
6	10.50	No	Yes	Yes	Yes	Yes	Yes	**Yes**	55417
6	10.56	No	Yes	Yes	Yes	Yes	Yes	**Yes**	61391
6	10.84	No	Yes	Yes	Yes	Yes	Yes	**Yes**	64831
6	10.47	No	Yes	Yes	Yes	Yes	Yes	**Yes**	59465
6	14.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53530
6	14.67	No	Yes	Yes	Yes	Yes	Yes	**Yes**	59708
6	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52309
6	14.83	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	14.83	No	Yes	Yes	Yes	Yes	Yes	**Yes**	58584
4	4.33	No	No	Yes	Yes	Yes	No	**No**	×
4	4.31	No	No	Yes	Yes	Yes	No	**No**	×
4	4.11	No	No	Yes	Yes	Yes	No	**No**	×
4	4.11	No	No	Yes	Yes	Yes	No	**No**	×
4	4.33	No	No	Yes	Yes	Yes	No	**No**	×
4	7.24	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.44	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.23	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.24	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.45	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.52	No	Yes	Yes	Yes	Yes	Yes	**Yes**	56610
4	10.49	No	Yes	Yes	Yes	Yes	Yes	**Yes**	58111
4	10.57	No	Yes	Yes	Yes	Yes	Yes	**Yes**	58318
4	10.76	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.54	No	Yes	Yes	Yes	Yes	Yes	**Yes**	59895
4	14.65	No	Yes	Yes	Yes	Yes	Yes	**Yes**	52513
4	14.66	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	14.67	No	Yes	Yes	Yes	Yes	Yes	**Yes**	56932
4	14.68	No	Yes	Yes	Yes	Yes	Yes	**Yes**	56268
4	14.67	No	Yes	Yes	Yes	Yes	Yes	**Yes**	55766
2	4.16	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.36	No	No	Yes	Yes	Yes	No	**No**	×
2	4.35	No	No	Yes	Yes	Yes	No	**No**	×
2	4.31	No	No	Yes	Yes	Yes	No	**No**	×
2	4.33	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.41	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.44	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.42	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.42	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.40	No	Yes	Yes	Yes	Yes	No	**No**	×
2	10.59	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.73	No	Yes	Yes	Yes	Yes	Yes	**Yes**	54605
2	10.61	No	Yes	Yes	Yes	Yes	Yes	**Yes**	52133
2	10.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52270
2	10.52	No	Yes	Yes	Yes	Yes	Yes	**Yes**	57089
2	14.92	No	Yes	Yes	Yes	Yes	Yes	**Yes**	56523
2	14.86	No	Yes	Yes	Yes	Yes	Yes	**Yes**	53969
2	14.90	No	Yes	Yes	Yes	Yes	Yes	**Yes**	55164
2	15.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	56029
2	14.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	49893

Table J.147: Resilient modulus data with QC/QA(A_3_15_100)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.48	Yes	No	Yes	Yes	Yes	Yes	**Yes**	29338
8	4.11	Yes	No	Yes	Yes	Yes	Yes	**Yes**	27804
8	4.05	Yes	No	Yes	Yes	Yes	Yes	**Yes**	30427
8	4.03	No	No	Yes	Yes	Yes	Yes	**No**	×
8	4.24	No	No	Yes	Yes	Yes	Yes	**No**	×
8	7.23	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	7.41	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	7.14	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	7.16	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	7.15	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	10.27	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	10.26	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	10.29	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	10.27	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	10.47	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.62	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.62	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.62	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.42	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.60	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	4.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27349
6	4.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	32633
6	3.89	No	Yes	Yes	Yes	Yes	Yes	**Yes**	32801
6	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32967
6	3.88	No	Yes	Yes	Yes	Yes	Yes	**Yes**	33718
6	7.19	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	7.27	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	7.48	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	7.17	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	7.20	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	10.51	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	10.31	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	10.30	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	10.49	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	10.54	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.66	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.62	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	0.00							**No**	×
4	0.00							**No**	×
4	0.00							**No**	×
4	0.00							**No**	×
4	0.00							**No**	×
4	7.09	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	7.19	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	7.29	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	7.21	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	7.22	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	10.35	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	10.34	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	10.33	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	10.52	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	10.31	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.45	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.42	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.44	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	3.88	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30370
2	3.87	No	Yes	Yes	Yes	Yes	Yes	**Yes**	29824
2	3.90	No	Yes	Yes	Yes	Yes	Yes	**Yes**	29463
2	3.89	No	Yes	Yes	Yes	Yes	Yes	**Yes**	33580
2	3.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29508
2	7.04	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	7.22	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	7.23	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	7.05	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	7.03	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	10.47	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	10.84	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	10.36	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	10.35	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	10.34	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.66	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.66	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.60	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.62	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.148: Resilient modulus data with QC/QA(A_4_15_100)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.11	No	No	No	Yes	Yes	No	**No**	×
8	4.12	Yes	No	No	Yes	Yes	No	**No**	×
8	4.12	Yes	No	No	Yes	Yes	No	**No**	×
8	4.14	Yes	No	No	Yes	Yes	No	**No**	×
8	4.12	No	No	No	Yes	Yes	No	**No**	×
8	7.38	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	7.20	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	7.20	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
8	7.40	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	10.52	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	10.49	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	10.29	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	10.48	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	10.49	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.63	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.63	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.86	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.83	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	4.09	Yes	Yes	Yes	Yes	Yes	No	**No**	×
6	4.08	Yes	Yes	No	Yes	Yes	No	**No**	×
6	4.10	Yes	Yes	Yes	Yes	Yes	No	**No**	×
6	4.09	Yes	Yes	No	Yes	Yes	No	**No**	×
6	4.09	Yes	Yes	No	Yes	Yes	No	**No**	×
6	7.20	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	7.18	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	7.18	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	7.19	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	7.20	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	10.79	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	10.52	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	10.50	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	10.53	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	10.50	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.66	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	3.95	Yes	Yes	Yes	Yes	Yes	No	**No**	×
4	3.94	Yes	Yes	Yes	Yes	Yes	No	**No**	×
4	3.96	Yes	Yes	Yes	Yes	Yes	No	**No**	×
4	3.93	Yes	Yes	Yes	Yes	Yes	No	**No**	×
4	3.94	Yes	Yes	Yes	Yes	Yes	No	**No**	×
4	7.18	Yes	Yes	Yes	Yes	No	No	**No**	×
4	7.22	Yes	Yes	Yes	Yes	No	No	**No**	×
4	7.39	Yes	Yes	Yes	Yes	No	No	**No**	×
4	7.18	Yes	Yes	Yes	Yes	No	No	**No**	×
4	7.22	Yes	Yes	Yes	Yes	No	No	**No**	×
4	10.54	Yes	Yes	Yes	Yes	No	No	**No**	×
4	10.53	Yes	Yes	Yes	Yes	No	No	**No**	×
4	10.54	Yes	Yes	Yes	Yes	No	No	**No**	×
4	10.55	Yes	Yes	Yes	Yes	No	No	**No**	×
4	10.54	Yes	Yes	Yes	Yes	No	No	**No**	×
4	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.66	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.63	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	3.93	Yes	Yes	Yes	Yes	No	No	**No**	×
2	3.93	Yes	Yes	Yes	Yes	Yes	No	**No**	×
2	3.94	Yes	Yes	Yes	Yes	No	No	**No**	×
2	3.92	Yes	Yes	Yes	Yes	Yes	No	**No**	×
2	3.92	Yes	Yes	Yes	Yes	Yes	No	**No**	×
2	7.25	Yes	Yes	Yes	Yes	No	No	**No**	×
2	7.23	Yes	Yes	Yes	Yes	No	No	**No**	×
2	7.22	Yes	Yes	Yes	Yes	No	No	**No**	×
2	7.24	Yes	Yes	Yes	Yes	No	No	**No**	×
2	7.20	Yes	Yes	Yes	Yes	No	No	**No**	×
2	10.56	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	10.55	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	10.52	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	10.55	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	10.55	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.67	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.76	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	15.07	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.89	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.68	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.149: Resilient modulus data with QC/QA(A_1_12_100)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	3.45	No	Yes	No	Yes	Yes	No	**No**	×
8	3.45	No	Yes	No	Yes	Yes	No	**No**	×
8	3.45	No	Yes	No	Yes	Yes	No	**No**	×
8	3.66	No	Yes	No	Yes	Yes	No	**No**	×
8	3.44	No	Yes	No	Yes	Yes	No	**No**	×
8	6.19	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	6.19	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	6.38	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	6.39	No	Yes	No	Yes	Yes	Yes	**No**	×
8	6.38	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	9.50	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	9.51	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	9.52	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	9.51	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	9.51	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	13.30	No	Yes	Yes	Yes	Yes	Yes	**Yes**	59872
8	13.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	54730
8	13.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61476
8	13.31	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
8	13.39	No	Yes	Yes	Yes	Yes	Yes	**Yes**	62154
6	3.53	No	Yes	No	Yes	Yes	No	**No**	×
6	3.82	No	Yes	No	No	Yes	No	**No**	×
6	3.23	No	Yes	No	Yes	Yes	No	**No**	×
6	3.22	No	Yes	No	Yes	Yes	No	**No**	×
6	3.43	No	Yes	No	Yes	Yes	No	**No**	×
6	6.20	No	Yes	No	Yes	Yes	No	**No**	×
6	6.31	No	Yes	No	Yes	Yes	No	**No**	×
6	6.27	No	Yes	No	Yes	Yes	No	**No**	×
6	6.16	No	Yes	No	Yes	Yes	No	**No**	×
6	6.16	No	Yes	No	Yes	Yes	No	**No**	×
6	9.52	No	Yes	No	Yes	Yes	Yes	**No**	×
6	9.53	No	Yes	No	Yes	Yes	Yes	**No**	×
6	9.51	No	Yes	No	Yes	Yes	Yes	**No**	×
6	9.51	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	9.51	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	13.33	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	13.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55035
6	13.39	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	13.29	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	13.30	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
4	3.16	No	Yes	No	Yes	Yes	No	**No**	×
4	3.45	No	Yes	No	No	Yes	No	**No**	×
4	3.07	No	Yes	No	Yes	Yes	No	**No**	×
4	3.07	No	Yes	No	Yes	Yes	No	**No**	×
4	3.07	No	Yes	No	Yes	Yes	No	**No**	×
4	6.01	No	Yes	No	Yes	Yes	No	**No**	×
4	6.08	No	Yes	No	Yes	Yes	No	**No**	×
4	6.33	No	No	No	No	No	No	**No**	×
4	6.21	No	Yes	No	Yes	Yes	No	**No**	×
4	6.19	No	Yes	No	Yes	Yes	No	**No**	×
4	9.55	No	Yes	No	Yes	Yes	No	**No**	×
4	9.54	No	Yes	No	Yes	Yes	No	**No**	×
4	9.55	No	Yes	No	Yes	Yes	No	**No**	×
4	9.54	No	Yes	No	Yes	Yes	No	**No**	×
4	9.34	No	Yes	No	Yes	Yes	No	**No**	×
4	13.31	No	Yes	No	Yes	Yes	Yes	**No**	×
4	13.32	Yes	Yes	No	Yes	Yes	Yes	**No**	×
4	13.32	No	Yes	No	Yes	Yes	Yes	**No**	×
4	13.31	Yes	Yes	No	Yes	Yes	Yes	**No**	×
4	13.11	No	Yes	No	Yes	Yes	Yes	**No**	×
2	0.00							**No**	×
2	0.00							**No**	×
2	0.00							**No**	×
2	0.00							**No**	×
2	0.00							**No**	×
2	6.01	No	Yes	No	Yes	Yes	No	**No**	×
2	6.00	No	Yes	No	Yes	Yes	No	**No**	×
2	6.00	No	Yes	No	Yes	Yes	No	**No**	×
2	5.99	No	Yes	No	Yes	Yes	No	**No**	×
2	5.98	No	Yes	No	Yes	Yes	No	**No**	×
2	9.43	Yes	Yes	No	Yes	Yes	Yes	**No**	×
2	9.43	No	Yes	No	Yes	Yes	Yes	**No**	×
2	9.43	No	Yes	No	Yes	Yes	Yes	**No**	×
2	9.43	No	Yes	No	Yes	Yes	Yes	**No**	×
2	9.42	No	Yes	No	Yes	Yes	Yes	**No**	×
2	13.11	Yes	Yes	No	Yes	Yes	Yes	**No**	×
2	13.10	No	Yes	No	Yes	Yes	Yes	**No**	×
2	13.31	No	Yes	No	Yes	Yes	Yes	**No**	×
2	13.31	Yes	Yes	No	Yes	Yes	Yes	**No**	×
2	13.31	Yes	Yes	No	Yes	Yes	Yes	**Yes**	60778

Table J.150: Resilient modulus data with QC/QA(A_2_12_100)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.30	No	No	Yes	Yes	Yes	No	**No**	×
8	4.39	No	No	Yes	Yes	Yes	No	**No**	×
8	4.68	No	No	Yes	No	Yes	No	**No**	×
8	4.32	No	No	Yes	Yes	Yes	No	**No**	×
8	4.27	No	No	Yes	Yes	Yes	No	**No**	×
8	7.40	No	No	Yes	Yes	Yes	No	**No**	×
8	7.41	No	No	Yes	Yes	Yes	No	**No**	×
8	7.41	No	No	Yes	Yes	Yes	No	**No**	×
8	7.40	No	No	Yes	Yes	Yes	No	**No**	×
8	7.41	No	No	Yes	Yes	Yes	No	**No**	×
8	10.49	No	No	Yes	Yes	Yes	No	**No**	×
8	10.29	No	No	Yes	Yes	Yes	No	**No**	×
8	10.49	No	No	Yes	Yes	Yes	No	**No**	×
8	10.51	No	No	Yes	Yes	Yes	No	**No**	×
8	10.50	No	Yes	Yes	Yes	Yes	No	**No**	×
8	14.84	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	14.61	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	14.60	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	14.60	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	14.81	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	4.33	No	No	Yes	Yes	Yes	No	**No**	×
6	4.32	No	No	Yes	Yes	Yes	No	**No**	×
6	4.33	No	No	Yes	Yes	Yes	No	**No**	×
6	4.33	No	No	Yes	Yes	Yes	No	**No**	×
6	4.33	No	No	Yes	Yes	Yes	No	**No**	×
6	7.50	No	No	Yes	Yes	Yes	No	**No**	×
6	7.70	No	No	Yes	Yes	Yes	No	**No**	×
6	7.39	No	No	Yes	Yes	Yes	No	**No**	×
6	7.38	No	No	Yes	Yes	Yes	No	**No**	×
6	7.39	No	No	Yes	Yes	Yes	No	**No**	×
6	10.51	No	No	Yes	Yes	Yes	No	**No**	×
6	10.49	No	No	Yes	Yes	Yes	No	**No**	×
6	10.49	No	No	Yes	Yes	Yes	No	**No**	×
6	10.49	No	No	Yes	Yes	Yes	No	**No**	×
6	10.48	No	No	Yes	Yes	Yes	No	**No**	×
6	14.61	No	No	Yes	Yes	No	No	**No**	×
6	14.61	No	No	Yes	Yes	Yes	No	**No**	×
6	14.83	No	No	Yes	Yes	No	No	**No**	×
6	14.61	No	No	Yes	Yes	No	No	**No**	×
6	14.60	No	No	Yes	Yes	No	No	**No**	×
4	4.36	No	No	Yes	Yes	Yes	No	**No**	×
4	4.37	No	No	Yes	Yes	Yes	No	**No**	×
4	4.36	No	No	Yes	Yes	Yes	No	**No**	×
4	4.37	No	No	Yes	Yes	Yes	No	**No**	×
4	4.37	No	No	Yes	Yes	Yes	No	**No**	×
4	7.44	No	No	Yes	Yes	Yes	No	**No**	×
4	7.54	No	No	Yes	Yes	Yes	No	**No**	×
4	7.63	No	No	Yes	Yes	Yes	No	**No**	×
4	7.47	No	No	Yes	Yes	Yes	No	**No**	×
4	7.45	No	No	Yes	Yes	Yes	No	**No**	×
4	10.52	No	No	Yes	Yes	Yes	Yes	**No**	×
4	10.74	No	No	Yes	Yes	Yes	Yes	**No**	×
4	10.53	No	No	Yes	Yes	Yes	Yes	**No**	×
4	10.73	No	No	Yes	Yes	Yes	Yes	**No**	×
4	10.53	No	No	Yes	Yes	Yes	Yes	**No**	×
4	14.65	No	No	Yes	Yes	No	Yes	**No**	×
4	14.87	No	No	Yes	Yes	No	Yes	**No**	×
4	14.72	No	No	Yes	Yes	No	Yes	**No**	×
4	15.13	No	No	Yes	Yes	No	Yes	**No**	×
4	14.65	No	No	Yes	Yes	No	Yes	**No**	×
2	4.34	No	No	Yes	Yes	Yes	No	**No**	×
2	4.35	No	No	Yes	Yes	Yes	No	**No**	×
2	4.12	No	No	Yes	Yes	Yes	No	**No**	×
2	4.34	No	No	Yes	Yes	Yes	No	**No**	×
2	4.15	No	No	Yes	Yes	Yes	No	**No**	×
2	7.28	No	No	Yes	Yes	Yes	Yes	**No**	×
2	7.26	No	No	Yes	Yes	Yes	Yes	**No**	×
2	7.27	No	No	Yes	Yes	Yes	Yes	**No**	×
2	7.46	No	No	Yes	Yes	Yes	Yes	**No**	×
2	7.26	No	No	Yes	Yes	Yes	Yes	**No**	×
2	10.50	No	No	Yes	Yes	Yes	Yes	**No**	×
2	10.51	No	No	Yes	Yes	Yes	Yes	**No**	×
2	10.52	No	No	Yes	Yes	Yes	Yes	**No**	×
2	10.73	No	No	Yes	Yes	Yes	Yes	**No**	×
2	10.50	No	No	Yes	Yes	Yes	Yes	**No**	×
2	14.67	No	No	Yes	Yes	No	Yes	**No**	×
2	14.69	No	No	Yes	Yes	No	Yes	**No**	×
2	14.65	No	No	Yes	Yes	No	Yes	**No**	×
2	14.85	No	No	Yes	Yes	No	Yes	**No**	×
2	14.71	No	No	Yes	Yes	No	Yes	**No**	×

Table J.151: Resilient modulus data with QC/QA(A_1_9_100)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.35	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.35	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.28	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.35	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.30	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.37	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.36	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.37	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.39	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.55	No	Yes	Yes	Yes	Yes	No	**No**	×
8	10.54	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.51	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.51	No	Yes	Yes	Yes	Yes	Yes	**Yes**	43581
8	10.72	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.50	No	Yes	Yes	Yes	Yes	Yes	**Yes**	42440
8	14.62	No	Yes	Yes	Yes	Yes	Yes	**Yes**	39829
8	14.84	No	Yes	Yes	Yes	Yes	Yes	**Yes**	44144
8	14.83	No	Yes	Yes	Yes	Yes	Yes	**Yes**	43117
8	14.61	No	Yes	Yes	Yes	Yes	Yes	**Yes**	42984
8	14.91	No	Yes	Yes	Yes	Yes	Yes	**Yes**	42615
6	4.28	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.31	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.31	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.29	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.28	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.38	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.44	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.52	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.66	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.20	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.51	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.49	No	Yes	Yes	Yes	Yes	Yes	**Yes**	40835
6	10.51	No	Yes	Yes	Yes	Yes	Yes	**Yes**	42601
6	10.50	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.49	No	Yes	Yes	Yes	Yes	Yes	**Yes**	42916
6	14.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37497
6	14.86	No	Yes	Yes	Yes	Yes	Yes	**Yes**	38918
6	14.63	No	Yes	Yes	Yes	Yes	Yes	**Yes**	39684
6	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37849
6	14.60	No	Yes	Yes	Yes	Yes	Yes	**Yes**	40014
4	4.39	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.30	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.40	No	Yes	Yes	No	Yes	No	**No**	×
4	4.18	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.17	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.24	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.26	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.46	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.47	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.25	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.50	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.51	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.50	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.50	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.50	No	Yes	Yes	Yes	Yes	No	**No**	×
4	14.87	No	Yes	Yes	Yes	Yes	Yes	**Yes**	39938
4	14.88	No	Yes	Yes	Yes	Yes	Yes	**Yes**	39449
4	14.87	No	Yes	Yes	Yes	Yes	Yes	**Yes**	41208
4	14.85	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	14.63	No	Yes	Yes	Yes	Yes	Yes	**Yes**	38829
2	4.29	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.29	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.29	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.28	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.28	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.43	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.19	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.27	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.68	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.44	No	Yes	Yes	Yes	Yes	No	**No**	×
2	10.55	No	Yes	Yes	Yes	Yes	Yes	**Yes**	44102
2	10.56	No	Yes	Yes	Yes	Yes	Yes	**Yes**	41801
2	10.54	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.52	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.54	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	14.88	No	Yes	Yes	Yes	Yes	Yes	**Yes**	39156
2	14.88	No	Yes	Yes	Yes	Yes	Yes	**Yes**	38313
2	14.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39826
2	14.86	No	Yes	Yes	Yes	Yes	Yes	**Yes**	38584
2	14.64	No	Yes	Yes	Yes	Yes	Yes	**Yes**	40666

Table J.152: Resilient modulus data with QC/QA(A_2_9_100)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [psi]
8	4.35	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.35	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.28	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.35	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.30	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.37	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.36	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.37	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.39	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.55	No	Yes	Yes	Yes	Yes	No	**No**	×
8	10.54	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.51	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.51	No	Yes	Yes	Yes	Yes	Yes	**Yes**	43581
8	10.72	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.50	No	Yes	Yes	Yes	Yes	Yes	**Yes**	42440
8	14.62	No	Yes	Yes	Yes	Yes	Yes	**Yes**	39829
8	14.84	No	Yes	Yes	Yes	Yes	Yes	**Yes**	44144
8	14.83	No	Yes	Yes	Yes	Yes	Yes	**Yes**	43117
8	14.61	No	Yes	Yes	Yes	Yes	Yes	**Yes**	42984
8	14.91	No	Yes	Yes	Yes	Yes	Yes	**Yes**	42615
6	4.28	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.31	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.31	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.29	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.28	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.38	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.44	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.52	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.66	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.20	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.51	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.49	No	Yes	Yes	Yes	Yes	Yes	**Yes**	40835
6	10.51	No	Yes	Yes	Yes	Yes	Yes	**Yes**	42601
6	10.50	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.49	No	Yes	Yes	Yes	Yes	Yes	**Yes**	42916
6	14.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37497
6	14.86	No	Yes	Yes	Yes	Yes	Yes	**Yes**	38918
6	14.63	No	Yes	Yes	Yes	Yes	Yes	**Yes**	39684
6	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37849
6	14.60	No	Yes	Yes	Yes	Yes	Yes	**Yes**	40014
4	4.39	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.30	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.40	No	Yes	Yes	No	Yes	No	**No**	×
4	4.18	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.17	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.24	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.26	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.46	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.47	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.25	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.50	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.51	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.50	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.50	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.50	No	Yes	Yes	Yes	Yes	No	**No**	×
4	14.87	No	Yes	Yes	Yes	Yes	Yes	**Yes**	39938
4	14.88	No	Yes	Yes	Yes	Yes	Yes	**Yes**	39449
4	14.87	No	Yes	Yes	Yes	Yes	Yes	**Yes**	41208
4	14.85	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	14.63	No	Yes	Yes	Yes	Yes	Yes	**Yes**	38829
2	4.29	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.29	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.29	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.28	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.28	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.43	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.19	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.27	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.68	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.44	No	Yes	Yes	Yes	Yes	No	**No**	×
2	10.55	No	Yes	Yes	Yes	Yes	Yes	**Yes**	44102
2	10.56	No	Yes	Yes	Yes	Yes	Yes	**Yes**	41801
2	10.54	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.52	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.54	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	14.88	No	Yes	Yes	Yes	Yes	Yes	**Yes**	39156
2	14.88	No	Yes	Yes	Yes	Yes	Yes	**Yes**	38313
2	14.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39826
2	14.86	No	Yes	Yes	Yes	Yes	Yes	**Yes**	38584
2	14.64	No	Yes	Yes	Yes	Yes	Yes	**Yes**	40666

Table J.153: Resilient modulus data with QC/QA(B_1_24_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.30	Yes	No	Yes	Yes	Yes	Yes	**Yes**	43220
8	4.32	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	4.28	Yes	No	Yes	Yes	Yes	Yes	**Yes**	43148
8	4.31	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	4.28	Yes	No	Yes	Yes	Yes	Yes	**Yes**	41776
8	7.19	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41567
8	7.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42766
8	7.17	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40748
8	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41883
8	7.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41888
8	10.73	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42167
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40054
8	10.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39797
8	10.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39831
8	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40116
8	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38401
8	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38406
8	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38088
8	14.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38772
8	14.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38470
6	4.09	Yes	No	Yes	Yes	Yes	Yes	**Yes**	40222
6	4.10	Yes	No	Yes	Yes	Yes	Yes	**Yes**	40241
6	4.12	Yes	No	Yes	Yes	Yes	Yes	**Yes**	40407
6	4.08	Yes	No	Yes	Yes	Yes	Yes	**Yes**	41559
6	4.10	Yes	No	Yes	Yes	Yes	Yes	**Yes**	41553
6	7.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40985
6	7.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41376
6	7.44	Yes	No	Yes	Yes	Yes	Yes	**Yes**	42489
6	7.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43107
6	7.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41466
6	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39705
6	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40825
6	10.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39710
6	10.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40270
6	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40853
6	14.59	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.60	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.58	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.59	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.59	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	4.08	Yes	No	Yes	Yes	Yes	Yes	**Yes**	39983
4	4.17	Yes	No	Yes	Yes	Yes	Yes	**Yes**	43714
4	4.34	Yes	No	Yes	Yes	Yes	Yes	**Yes**	43909
4	4.16	Yes	No	Yes	Yes	Yes	Yes	**Yes**	43402
4	4.10	Yes	No	Yes	Yes	Yes	Yes	**Yes**	41522
4	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41789
4	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42556
4	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42541
4	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41733
4	7.20	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41336
4	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39770
4	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40346
4	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40347
4	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40327
4	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40826
4	14.41	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.61	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.43	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.60	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.62	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	4.13	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39376
2	4.14	Yes	No	Yes	Yes	Yes	Yes	**Yes**	40473
2	4.12	Yes	No	Yes	Yes	Yes	Yes	**Yes**	40564
2	4.14	Yes	No	Yes	Yes	Yes	Yes	**Yes**	39296
2	4.13	Yes	No	Yes	Yes	Yes	Yes	**Yes**	39352
2	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40686
2	7.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39227
2	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41847
2	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40820
2	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40778
2	10.53	Yes	Yes	Yes	Yes	Yes	No	**No**	×
2	10.61	Yes	Yes	Yes	Yes	Yes	No	**No**	×
2	10.85	Yes	Yes	Yes	Yes	Yes	No	**No**	×
2	10.52	Yes	Yes	Yes	Yes	Yes	No	**No**	×
2	10.72	Yes	Yes	Yes	Yes	No	No	**No**	×
2	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.63	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.42	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.70	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.154: Resilient modulus data with QC/QA(B_2_24_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.57	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39384
8	4.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38390
8	4.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37315
8	4.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36487
8	4.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36564
8	7.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37145
8	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34993
8	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35594
8	7.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35039
8	7.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37822
8	10.69	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34843
8	10.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34875
8	10.73	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35244
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34974
8	10.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34755
8	14.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33041
8	14.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32527
8	14.80	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33069
8	14.79	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33326
8	14.79	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33068
6	4.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36909
6	4.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36793
6	4.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38976
6	4.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37582
6	4.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37226
6	7.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35296
6	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35786
6	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35722
6	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35322
6	7.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36164
6	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34514
6	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34527
6	10.68	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34839
6	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34478
6	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34200
6	14.82	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32892
6	14.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32665
6	14.81	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33402
6	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32867
6	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32585
4	4.35	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36431
4	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36274
4	4.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37412
4	4.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36444
4	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37235
4	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35236
4	7.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35790
4	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35306
4	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35923
4	7.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35953
4	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34080
4	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34043
4	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34791
4	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34341
4	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33771
4	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31925
4	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32837
4	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32807
4	14.82	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32267
4	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32774
2	4.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36095
2	4.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38826
2	4.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38214
2	4.35	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36695
2	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36945
2	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35048
2	7.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35691
2	7.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34531
2	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36209
2	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35138
2	10.54	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34061
2	10.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34021
2	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33619
2	10.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33808
2	10.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34040
2	14.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32131
2	15.06	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32585
2	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32111
2	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31887
2	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32113

Table J.155: Resilient modulus data with QC/QA(B_1_195_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [psi]
8	4.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36744
8	4.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36922
8	4.06	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37003
8	4.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35958
8	4.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37098
8	6.74	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33628
8	6.94	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35107
8	6.76	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34715
8	6.93	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35676
8	6.78	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34589
8	9.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33636
8	9.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33296
8	9.90	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33363
8	9.88	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34072
8	10.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34013
8	13.95	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32302
8	14.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32496
8	14.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32907
8	13.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31612
8	13.73	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32144
6	4.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36090
6	3.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33400
6	4.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34125
6	3.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33338
6	3.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33421
6	6.95	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34465
6	6.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33068
6	6.97	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33432
6	6.98	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34525
6	6.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33955
6	9.96	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32839
6	10.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32613
6	9.67	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32544
6	9.88	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32931
6	9.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32910
6	13.95	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31404
6	14.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31557
6	14.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32214
6	13.73	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30936
6	13.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30952
4	3.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32519
4	3.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31849
4	3.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32163
4	3.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33919
4	4.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34981
4	6.88	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32507
4	6.88	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32522
4	6.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32073
4	7.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33964
4	6.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32562
4	9.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31814
4	9.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31198
4	10.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31791
4	10.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32110
4	9.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31204
4	13.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30197
4	13.95	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30416
4	13.94	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30198
4	13.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29986
4	13.74	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29974
2	3.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32012
2	3.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32753
2	3.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33718
2	4.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33584
2	4.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33724
2	7.26	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33286
2	7.00	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31680
2	6.99	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32137
2	6.99	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32160
2	6.96	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31650
2	10.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30783
2	9.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30195
2	10.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31062
2	9.90	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30432
2	10.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31054
2	13.74	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29052
2	13.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29039
2	13.76	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29031
2	13.78	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29060
2	13.95	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29443

Table J.156: Resilient modulus data with QC/QA(B_2_195_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53365
8	4.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	56040
8	4.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53601
8	4.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53161
8	4.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51188
8	7.00	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	45770
8	6.98	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	46685
8	6.99	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	45731
8	6.97	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	46741
8	7.00	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	46811
8	10.06	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	45037
8	9.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44873
8	9.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44856
8	9.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44262
8	9.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44347
8	13.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42388
8	13.93	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42588
8	13.92	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42602
8	13.93	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42565
8	14.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44119
6	4.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	50248
6	4.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	50263
6	4.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	50409
6	4.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	54504
6	4.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	50340
6	7.23	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	46655
6	6.95	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	46040
6	6.94	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44269
6	6.94	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	45086
6	6.97	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	46031
6	9.88	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43456
6	10.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	45016
6	10.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44354
6	9.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43468
6	9.90	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43003
6	13.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41912
6	13.78	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41982
6	13.92	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42341
6	13.78	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41571
6	13.92	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42393
4	3.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	46571
4	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	49390
4	3.97	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	49758
4	4.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55608
4	3.90	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	48545
4	6.96	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52036
4	6.97	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53363
4	6.97	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	50713
4	6.94	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52058
4	6.96	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53085
4	9.88	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42633
4	9.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42591
4	9.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43160
4	9.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43879
4	9.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43197
4	13.94	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41495
4	13.74	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41298
4	13.95	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41948
4	13.93	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41931
4	13.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41368
2	4.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53722
2	3.88	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	47217
2	3.88	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	49101
2	3.95	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	47983
2	4.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51694
2	6.97	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52244
2	6.97	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	50934
2	6.95	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	50818
2	6.95	No	Yes	Yes	Yes	Yes	Yes	**Yes**	44033
2	6.93	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51988
2	10.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43335
2	10.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44598
2	9.90	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43154
2	10.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43507
2	9.90	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43180
2	13.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40884
2	13.76	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40840
2	13.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40898
2	13.93	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41414
2	14.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41646

Table J.157: Resilient modulus data with QC/QA(B_1_16_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	64544
8	4.35	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62232
8	4.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61721
8	4.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61743
8	4.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61522
8	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61394
8	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	59742
8	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	59596
8	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61454
8	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61286
8	10.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	58806
8	10.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	59915
8	10.68	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	60557
8	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	58319
8	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	58272
8	14.79	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	58091
8	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	56587
8	14.82	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	58145
8	14.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	57460
8	15.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	58294
6	4.54	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	64942
6	4.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	59096
6	4.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	58899
6	4.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61790
6	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	58835
6	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	59396
6	7.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	56140
6	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	56176
6	7.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	56428
6	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	59318
6	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55873
6	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	56944
6	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55845
6	10.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55904
6	10.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	57989
6	14.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	56401
6	15.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	56379
6	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	56257
6	14.82	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55467
6	14.79	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55470
4	4.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	57237
4	4.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	54711
4	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	57238
4	4.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	57509
4	4.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	57294
4	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	57471
4	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	54725
4	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55973
4	7.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	57561
4	7.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55980
4	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55858
4	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53980
4	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	56025
4	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55947
4	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53100
4	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53438
4	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	54106
4	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53465
4	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	54746
4	15.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53565
2	4.35	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	56177
2	4.16	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53446
2	4.16	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53498
2	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51315
2	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55900
2	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53706
2	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52491
2	7.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	54118
2	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53786
2	7.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52672
2	10.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52453
2	10.76	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53230
2	10.54	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52396
2	10.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52212
2	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51456
2	14.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	50981
2	15.16	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51795
2	14.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51078
2	14.94	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51641
2	14.96	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51713

Table J.158: Resilient modulus data with QC/QA(B_2_16_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.29	No	No	Yes	Yes	Yes	Yes	**No**	×
8	4.29	No	No	Yes	Yes	Yes	Yes	**No**	×
8	4.32	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	4.31	No	No	Yes	Yes	Yes	Yes	**No**	×
8	4.30	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	7.40	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	7.39	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	7.42	Yes	No	Yes	Yes	Yes	Yes	**Yes**	72600
8	7.35	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	7.39	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	10.55	Yes	No	Yes	Yes	Yes	Yes	**Yes**	72812
8	10.48	Yes	No	Yes	Yes	Yes	Yes	**Yes**	76910
8	10.70	Yes	No	Yes	Yes	Yes	Yes	**Yes**	75502
8	10.43	Yes	No	Yes	Yes	Yes	Yes	**Yes**	72236
8	10.47	Yes	No	Yes	Yes	Yes	Yes	**Yes**	74303
8	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	70710
8	14.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	70866
8	14.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	70693
8	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	70927
8	14.79	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	71790
6	4.29	No	No	Yes	Yes	Yes	Yes	**No**	×
6	4.31	No	No	Yes	Yes	Yes	Yes	**No**	×
6	4.28	No	No	Yes	Yes	Yes	Yes	**No**	×
6	4.29	No	No	Yes	Yes	Yes	Yes	**No**	×
6	4.29	No	No	Yes	Yes	Yes	Yes	**No**	×
6	7.38	Yes	No	Yes	Yes	Yes	Yes	**No**	×
6	7.39	Yes	No	Yes	Yes	Yes	Yes	**Yes**	74511
6	7.38	Yes	No	Yes	Yes	Yes	Yes	**Yes**	72370
6	7.41	Yes	No	Yes	Yes	Yes	Yes	**Yes**	72521
6	7.41	Yes	No	Yes	Yes	Yes	Yes	**Yes**	74689
6	10.55	Yes	No	Yes	Yes	Yes	Yes	**Yes**	71940
6	10.77	Yes	No	Yes	Yes	Yes	Yes	**Yes**	73190
6	10.50	Yes	No	Yes	Yes	Yes	Yes	**Yes**	73065
6	10.43	Yes	No	Yes	Yes	Yes	Yes	**Yes**	71292
6	10.54	Yes	No	Yes	Yes	Yes	Yes	**Yes**	72567
6	14.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	73975
6	15.13	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	73896
6	14.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	72129
6	14.78	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	73546
6	14.99	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	71860
4	4.26	No	No	Yes	Yes	Yes	Yes	**No**	×
4	4.38	No	No	Yes	No	Yes	Yes	**No**	×
4	4.28	No	No	Yes	Yes	Yes	Yes	**No**	×
4	4.27	No	No	Yes	Yes	Yes	Yes	**No**	×
4	4.12	No	No	Yes	Yes	Yes	Yes	**No**	×
4	7.41	Yes	No	Yes	Yes	Yes	Yes	**Yes**	72776
4	7.19	Yes	No	Yes	Yes	Yes	Yes	**Yes**	70380
4	7.39	Yes	No	Yes	Yes	Yes	Yes	**Yes**	74884
4	7.38	Yes	No	Yes	Yes	Yes	Yes	**Yes**	70249
4	7.42	Yes	No	Yes	Yes	Yes	Yes	**Yes**	72420
4	10.45	Yes	No	Yes	Yes	Yes	Yes	**Yes**	74229
4	10.52	Yes	No	Yes	Yes	Yes	Yes	**Yes**	72456
4	10.48	Yes	No	Yes	Yes	Yes	Yes	**Yes**	70571
4	10.49	Yes	No	Yes	Yes	Yes	Yes	**Yes**	69280
4	10.28	Yes	No	Yes	Yes	Yes	Yes	**Yes**	68031
4	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	71068
4	14.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	70062
4	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	69101
4	14.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	70270
4	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	69322
2	4.32	No	No	Yes	Yes	Yes	Yes	**No**	×
2	4.10	No	No	Yes	Yes	Yes	Yes	**No**	×
2	4.29	No	No	Yes	Yes	Yes	Yes	**No**	×
2	4.12	No	No	Yes	Yes	Yes	Yes	**No**	×
2	4.15	No	No	Yes	Yes	Yes	Yes	**No**	×
2	7.46	Yes	No	Yes	Yes	Yes	Yes	**No**	×
2	7.48	Yes	No	Yes	Yes	Yes	Yes	**No**	×
2	7.20	Yes	No	Yes	Yes	Yes	Yes	**Yes**	69013
2	7.41	Yes	No	Yes	Yes	Yes	Yes	**No**	×
2	7.21	No	No	Yes	Yes	Yes	Yes	**No**	×
2	10.53	Yes	No	Yes	Yes	Yes	Yes	**Yes**	72291
2	10.48	Yes	No	Yes	Yes	Yes	Yes	**Yes**	70747
2	10.57	Yes	No	Yes	Yes	Yes	Yes	**Yes**	71054
2	10.58	Yes	No	Yes	Yes	Yes	Yes	**Yes**	71802
2	10.89	Yes	No	Yes	Yes	Yes	Yes	**Yes**	73733
2	14.92	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	70591
2	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	68933
2	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	70159
2	14.82	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	70172
2	14.81	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	70107

Table J.159: Resilient modulus data with QC/QA(B_1_27_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33191
8	4.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33105
8	4.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33067
8	4.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32376
8	4.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33055
8	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31069
8	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31111
8	7.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30311
8	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30812
8	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30448
8	10.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29308
8	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29357
8	10.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29929
8	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29514
8	10.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29773
8	14.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27849
8	14.80	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27870
8	14.95	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28376
8	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28308
8	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28003
6	4.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33327
6	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32628
6	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33316
6	4.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33340
6	4.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31562
6	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30451
6	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30452
6	7.17	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30430
6	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30843
6	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31261
6	10.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30261
6	10.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29260
6	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29335
6	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29282
6	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30197
6	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27910
6	14.90	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27744
6	15.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28503
6	14.80	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27779
6	14.82	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27775
4	4.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33244
4	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32414
4	4.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32422
4	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32463
4	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32474
4	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31500
4	7.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31035
4	7.67	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31780
4	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31336
4	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31231
4	10.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29880
4	10.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29580
4	10.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29632
4	10.80	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29903
4	10.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29629
4	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27312
4	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27239
4	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27376
4	14.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27508
4	14.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27523
2	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30881
2	4.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31811
2	4.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31638
2	4.13	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31604
2	4.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32589
2	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31187
2	7.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31635
2	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31102
2	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31217
2	7.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31185
2	10.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29247
2	10.92	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30008
2	10.54	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28970
2	10.73	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29512
2	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29476
2	14.92	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27941
2	14.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27252
2	14.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27235
2	14.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26907
2	14.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27834

Table J.160: Resilient modulus data with QC/QA(B_2_27_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [psi]
8	4.02	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	4.02	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	4.04	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	4.04	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	4.03	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	6.94	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24192
8	6.93	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24202
8	6.95	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24211
8	6.76	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23834
8	6.96	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24437
8	9.85	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	9.85	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	9.84	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	9.84	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	9.85	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	13.74	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	13.73	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	13.53	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	13.72	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	13.79	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	4.06	Yes	No	Yes	Yes	Yes	Yes	**No**	×
6	3.86	Yes	No	Yes	Yes	Yes	Yes	**No**	×
6	3.86	Yes	No	Yes	Yes	Yes	Yes	**No**	×
6	3.87	Yes	No	Yes	Yes	Yes	Yes	**No**	×
6	3.88	Yes	No	Yes	Yes	Yes	Yes	**No**	×
6	6.94	Yes	No	Yes	Yes	Yes	Yes	**Yes**	24443
6	6.78	Yes	No	Yes	Yes	Yes	Yes	**Yes**	23756
6	6.75	Yes	No	Yes	Yes	Yes	Yes	**Yes**	24011
6	6.95	Yes	No	Yes	Yes	Yes	Yes	**Yes**	24694
6	6.75	Yes	No	Yes	Yes	Yes	Yes	**Yes**	23744
6	9.78	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	9.96	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	9.72	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	9.69	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	9.90	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.27	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	13.55	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	13.74	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	13.73	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	13.74	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	3.87	Yes	No	Yes	Yes	Yes	Yes	**Yes**	24271
4	3.87	Yes	No	Yes	Yes	Yes	Yes	**Yes**	24327
4	3.86	Yes	No	Yes	Yes	Yes	Yes	**No**	×
4	3.86	Yes	No	Yes	Yes	Yes	Yes	**Yes**	24307
4	4.08	Yes	No	Yes	Yes	Yes	Yes	**Yes**	25078
4	6.95	Yes	No	Yes	Yes	Yes	Yes	**Yes**	24512
4	6.77	Yes	No	Yes	Yes	Yes	Yes	**Yes**	24114
4	6.78	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23791
4	6.76	Yes	No	Yes	Yes	Yes	Yes	**Yes**	23784
4	6.96	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24179
4	9.68	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	9.69	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	9.67	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	9.85	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	9.88	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	13.56	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	13.56	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	13.56	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	13.75	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	13.76	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	3.89	Yes	No	Yes	Yes	Yes	Yes	**Yes**	24521
2	3.89	Yes	No	Yes	Yes	Yes	Yes	**Yes**	24596
2	3.88	Yes	No	Yes	Yes	Yes	Yes	**Yes**	24607
2	3.87	Yes	No	Yes	Yes	Yes	Yes	**Yes**	24533
2	3.88	Yes	No	Yes	Yes	Yes	Yes	**Yes**	25090
2	6.78	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23861
2	6.81	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23676
2	6.79	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23892
2	6.78	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23327
2	6.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24149
2	9.67	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	9.67	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	9.87	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	9.87	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	9.86	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	13.79	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	13.61	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	13.79	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	13.78	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	13.60	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.161: Resilient modulus data with QC/QA(B_1_22_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29406
8	4.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29134
8	4.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29197
8	4.13	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29040
8	4.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30495
8	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28420
8	7.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28720
8	7.16	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27256
8	7.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27346
8	7.20	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27976
8	10.57	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26861
8	10.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26112
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26661
8	10.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26907
8	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26696
8	14.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24356
8	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24319
8	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24598
8	14.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24740
8	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24481
6	4.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28039
6	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28560
6	4.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28666
6	4.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29367
6	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29344
6	7.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28572
6	7.17	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27352
6	7.16	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26974
6	7.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27709
6	7.35	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28445
6	10.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26228
6	10.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26491
6	10.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26456
6	10.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26488
6	10.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25734
6	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24324
6	14.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24244
6	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24330
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24758
6	14.82	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24686
4	4.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28303
4	4.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28382
4	4.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28256
4	4.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28994
4	4.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28431
4	7.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27061
4	7.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27102
4	7.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27426
4	7.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27065
4	7.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27786
4	10.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26352
4	10.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26136
4	10.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25882
4	10.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25947
4	10.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26435
4	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24228
4	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24081
4	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24213
4	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24204
4	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24213
2	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28053
2	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28130
2	4.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28142
2	4.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28218
2	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27592
2	7.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28578
2	7.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26460
2	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26963
2	7.26	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26619
2	7.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27322
2	10.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25263
2	10.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25272
2	10.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25327
2	10.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26015
2	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25742
2	14.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23595
2	14.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23589
2	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23935
2	14.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23631
2	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23988

Table J.162: Resilient modulus data with QC/QA(B_2_22_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [psi]
8	4.64	Yes	Yes	Yes	No	Yes	Yes	**No**	×
8	4.09	No	Yes	Yes	Yes	Yes	Yes	**Yes**	42084
8	4.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40997
8	4.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39542
8	4.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39681
8	7.17	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37459
8	7.17	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39210
8	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37383
8	7.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39255
8	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38266
8	10.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37200
8	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36671
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37560
8	10.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37440
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37359
8	14.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35297
8	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35376
8	14.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35926
8	14.80	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34957
8	14.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34717
6	4.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37772
6	4.35	No	Yes	Yes	No	Yes	Yes	**No**	×
6	4.09	No	Yes	Yes	Yes	Yes	Yes	**Yes**	42723
6	4.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38408
6	4.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38351
6	7.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38318
6	7.20	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37976
6	7.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38587
6	7.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38486
6	7.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38384
6	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36829
6	10.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37159
6	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36566
6	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36912
6	10.68	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36089
6	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35041
6	14.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35277
6	14.80	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35987
6	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34244
6	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34309
4	4.20	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	4.55	No	Yes	Yes	Yes	Yes	Yes	**Yes**	37652
4	4.13	No	Yes	Yes	Yes	Yes	Yes	**Yes**	37670
4	4.09	No	Yes	Yes	Yes	Yes	Yes	**Yes**	41143
4	4.33	No	Yes	Yes	Yes	Yes	Yes	**Yes**	41016
4	7.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37241
4	7.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37951
4	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38055
4	7.35	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38821
4	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36764
4	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36415
4	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35866
4	10.67	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37021
4	10.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37007
4	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36402
4	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34271
4	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35297
4	14.66	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34768
4	14.76	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34233
4	14.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34235
2	4.10	No	Yes	Yes	Yes	Yes	Yes	**Yes**	37453
2	3.91	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	3.93	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	4.12	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	4.12	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39857
2	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37339
2	7.21	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37817
2	7.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37951
2	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37143
2	10.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36900
2	10.54	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36591
2	10.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37289
2	10.54	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35800
2	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37010
2	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33625
2	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34524
2	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33971
2	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34519
2	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34747

Table J.163: Resilient modulus data with QC/QA(B_1_16_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16357
8	4.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15788
8	4.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15872
8	4.26	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16559
8	4.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15642
8	7.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15379
8	7.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15422
8	7.17	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15471
8	7.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15264
8	7.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15301
8	10.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14724
8	10.23	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14658
8	10.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14852
8	10.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14726
8	10.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15026
8	14.35	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13978
8	14.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14091
8	14.57	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14193
8	14.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13898
8	14.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13906
6	4.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14255
6	4.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14419
6	4.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14620
6	4.06	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14429
6	4.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14251
6	7.13	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13865
6	7.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14010
6	7.13	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13957
6	7.13	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13802
6	7.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13822
6	10.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13427
6	10.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13292
6	10.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13142
6	10.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13142
6	10.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13202
6	14.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12799
6	14.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12728
6	14.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12660
6	14.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12656
6	14.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12857
4	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12758
4	3.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12505
4	4.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12756
4	4.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13035
4	4.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12605
4	7.19	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12274
4	7.16	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12233
4	7.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12260
4	7.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12233
4	7.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12353
4	10.23	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11665
4	10.23	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11821
4	10.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11513
4	10.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11872
4	10.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11909
4	14.16	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11082
4	14.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11037
4	14.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11322
4	14.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11229
4	14.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11178
2	4.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11071
2	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11050
2	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11419
2	3.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10802
2	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11061
2	6.98	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10045
2	6.97	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10087
2	7.20	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10281
2	7.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10318
2	6.98	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9950
2	10.06	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9593
2	10.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9676
2	10.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9639
2	10.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9645
2	10.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9646
2	14.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9509
2	14.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9537
2	14.17	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9537
2	14.16	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9512
2	14.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9517

Table J.164: Resilient modulus data with QC/QA(B_2_16_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15991
8	4.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16218
8	4.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16277
8	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16227
8	4.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15792
8	7.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15389
8	7.16	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14411
8	7.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14617
8	7.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15220
8	7.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15274
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13948
8	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13927
8	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13919
8	10.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13898
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13951
8	14.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12907
8	14.82	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13201
8	14.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12984
8	14.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12889
8	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13072
6	4.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15791
6	4.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14307
6	4.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14333
6	4.13	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14470
6	4.13	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14297
6	7.23	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13304
6	7.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13497
6	7.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13343
6	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13661
6	7.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13149
6	10.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12556
6	10.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12504
6	10.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12553
6	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12765
6	10.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12852
6	14.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11784
6	14.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11854
6	14.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11817
6	14.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11820
6	14.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11832
4	4.13	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13111
4	4.17	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12886
4	4.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12852
4	4.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12905
4	4.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13143
4	7.22	Yes	Yes	Yes	Yes	Yes	No	**No**	×
4	7.22	Yes	Yes	Yes	Yes	Yes	No	**No**	×
4	7.22	Yes	Yes	Yes	Yes	Yes	No	**No**	×
4	7.19	Yes	Yes	Yes	Yes	Yes	No	**No**	×
4	7.88	Yes	Yes	Yes	Yes	No	No	**No**	×
4	10.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11258
4	10.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11258
4	10.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11387
4	10.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11500
4	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11249
4	14.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10568
4	14.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10704
4	14.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10604
4	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10700
4	14.19	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10439
2	3.92	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11095
2	3.94	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10903
2	3.95	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11251
2	4.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12156
2	4.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11706
2	7.23	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10023
2	7.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9776
2	7.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9726
2	7.23	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10066
2	7.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9763
2	10.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9571
2	10.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9553
2	10.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9547
2	10.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9536
2	10.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9650
2	14.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9170
2	14.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9201
2	14.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9137
2	14.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9028
2	14.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9008

Table J.165: Resilient modulus data with QC/QA(C_1_12_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.07	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.30	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.11	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.40	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.18	Yes	Yes	Yes	Yes	Yes	No	**No**	×
8	7.40	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.41	No	Yes	Yes	Yes	Yes	No	**No**	×
8	8.12	No	No	No	No	No	No	**No**	×
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20175
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20304
8	10.46	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.56	No	Yes	Yes	Yes	Yes	Yes	**Yes**	20884
8	10.80	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20372
8	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20063
8	14.66	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19322
8	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20049
8	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20048
8	14.80	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20063
6	4.10	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.10	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.10	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.41	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.41	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.41	Yes	Yes	Yes	Yes	Yes	No	**No**	×
6	7.22	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.44	Yes	Yes	Yes	Yes	No	No	**No**	×
6	10.54	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18893
6	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18584
6	10.74	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18974
6	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18062
6	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18584
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17153
6	14.87	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17160
6	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17329
6	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	4.15	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.15	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.13	Yes	Yes	Yes	Yes	Yes	No	**No**	×
4	4.15	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.44	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16722
4	7.45	No	Yes	Yes	Yes	Yes	Yes	**Yes**	16598
4	7.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17005
4	7.59	No	Yes	Yes	Yes	Yes	Yes	**Yes**	17647
4	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16395
4	10.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15765
4	10.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16035
4	10.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16062
4	10.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15840
4	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	4.15	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.14	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.14	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.14	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13833
2	7.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14553
2	7.21	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14263
2	7.22	No	Yes	Yes	Yes	Yes	Yes	**Yes**	14716
2	7.21	No	Yes	Yes	Yes	Yes	Yes	**Yes**	14109
2	10.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13484
2	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13625
2	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13295
2	10.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13764
2	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13526
2	14.43	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.66	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.44	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.44	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.166: Resilient modulus data with QC/QA(C_2_12_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.34	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.32	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.30	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.11	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.22	No	Yes	Yes	Yes	Yes	Yes	**Yes**	21188
8	7.41	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	7.42	No	Yes	Yes	Yes	Yes	Yes	**Yes**	21795
8	7.38	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	7.39	No	Yes	Yes	Yes	Yes	Yes	**Yes**	22096
8	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21216
8	10.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21361
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21692
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22172
8	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21578
8	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20868
8	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21300
8	14.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20579
8	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20699
8	14.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20787
6	4.13	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	4.13	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	4.14	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	4.13	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	4.15	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.53	No	Yes	Yes	Yes	Yes	Yes	**Yes**	19888
6	7.76	No	Yes	Yes	Yes	Yes	Yes	**Yes**	20167
6	7.22	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.22	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.20	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18991
6	10.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19232
6	10.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19771
6	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19198
6	10.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18838
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18837
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18212
6	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18611
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18520
6	14.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17982
4	3.97	No	Yes	Yes	Yes	Yes	No	**No**	×
4	3.74	No	Yes	Yes	Yes	Yes	No	**No**	×
4	3.94	No	Yes	Yes	Yes	Yes	No	**No**	×
4	3.96	No	Yes	Yes	Yes	Yes	No	**No**	×
4	3.92	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.21	No	Yes	Yes	Yes	No	No	**No**	×
4	7.43	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.23	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.20	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.22	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17378
4	10.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17189
4	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17302
4	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16754
4	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16930
4	14.97	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.67	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.47	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.66	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.46	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	4.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	4.02	No	Yes	Yes	No	Yes	Yes	**No**	×
2	4.13	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	3.92	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	3.93	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	7.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15832
2	7.25	No	Yes	Yes	Yes	Yes	Yes	**Yes**	16113
2	7.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16209
2	7.24	No	Yes	Yes	Yes	Yes	Yes	**Yes**	15710
2	7.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16039
2	10.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15098
2	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14741
2	10.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15108
2	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14822
2	10.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15102
2	14.50	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.42	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.74	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.45	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.45	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.167: Resilient modulus data with QC/QA(C_1_95_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [psi]
8	4.31	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.29	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.32	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.31	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.51	No	No	Yes	Yes	Yes	No	**No**	×
8	7.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25728
8	7.41	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	7.40	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	7.42	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	7.39	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.70	No	Yes	Yes	Yes	Yes	Yes	**Yes**	25398
8	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26162
8	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24080
8	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24010
8	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25102
8	14.81	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23350
8	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22916
8	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22831
8	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23071
8	14.81	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23811
6	4.30	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	4.31	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	4.31	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	4.53	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	4.31	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.61	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.61	Yes	Yes	Yes	Yes	No	No	**No**	×
6	7.40	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.60	Yes	Yes	Yes	Yes	Yes	No	**No**	×
6	7.67	No	Yes	Yes	Yes	Yes	No	**No**	×
6	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21540
6	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22636
6	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22389
6	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21651
6	10.69	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21442
6	14.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20024
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21027
6	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21343
6	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20049
6	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20926
4	4.31	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	4.36	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	4.46	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	4.81	Yes	Yes	Yes	No	Yes	Yes	**No**	×
4	4.32	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20013
4	7.42	No	Yes	Yes	Yes	Yes	Yes	**Yes**	21505
4	7.42	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.43	No	Yes	Yes	Yes	Yes	Yes	**Yes**	20431
4	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19823
4	10.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20353
4	11.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20579
4	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19522
4	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19342
4	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19852
4	14.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18627
4	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18545
4	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18153
4	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18746
4	14.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18430
2	4.32	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.32	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.33	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.32	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.33	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18571
2	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19073
2	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18727
2	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18536
2	7.42	No	Yes	Yes	Yes	Yes	Yes	**Yes**	19573
2	10.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17737
2	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17415
2	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17834
2	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17870
2	10.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18359
2	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16586
2	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16494
2	14.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16471
2	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16887
2	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16924

Table J.168: Resilient modulus data with QC/QA(C_2_95_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.30	No	Yes	No	Yes	Yes	No	**No**	×
8	4.28	No	Yes	No	Yes	Yes	No	**No**	×
8	4.50	No	Yes	No	Yes	Yes	No	**No**	×
8	4.51	No	Yes	No	Yes	Yes	No	**No**	×
8	4.51	No	Yes	No	Yes	Yes	No	**No**	×
8	7.60	Yes	Yes	No	Yes	Yes	No	**No**	×
8	7.59	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.60	No	Yes	No	Yes	Yes	No	**No**	×
8	7.60	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.60	Yes	Yes	No	Yes	Yes	No	**No**	×
8	10.67	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.69	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.67	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.67	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27368
8	14.79	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25859
8	14.88	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25162
8	14.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25492
8	15.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26177
8	15.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25463
6	4.50	No	Yes	No	Yes	Yes	No	**No**	×
6	4.50	No	Yes	No	Yes	Yes	No	**No**	×
6	4.51	No	Yes	No	Yes	Yes	No	**No**	×
6	4.51	No	Yes	No	Yes	Yes	No	**No**	×
6	4.52	No	Yes	No	Yes	Yes	No	**No**	×
6	7.61	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.62	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.60	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.61	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.59	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.74	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25729
6	10.91	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.69	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26072
6	14.80	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23188
6	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22133
6	14.81	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23553
6	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23051
6	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22644
4	4.32	No	Yes	No	Yes	Yes	Yes	**No**	×
4	4.51	No	Yes	No	Yes	Yes	Yes	**No**	×
4	4.55	No	Yes	No	Yes	Yes	Yes	**No**	×
4	4.42	No	Yes	No	Yes	Yes	Yes	**No**	×
4	4.70	Yes	Yes	No	Yes	Yes	Yes	**No**	×
4	7.63	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.61	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21213
4	7.61	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.62	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.71	No	Yes	Yes	Yes	Yes	Yes	**Yes**	23366
4	10.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24144
4	10.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21531
4	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22119
4	10.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22331
4	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19939
4	14.81	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20439
4	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19888
4	14.82	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20118
4	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20310
2	4.34	No	Yes	No	Yes	Yes	No	**No**	×
2	4.33	Yes	Yes	No	Yes	Yes	No	**No**	×
2	4.31	No	Yes	No	Yes	Yes	No	**No**	×
2	4.33	Yes	Yes	No	Yes	Yes	No	**No**	×
2	4.53	No	Yes	No	Yes	Yes	No	**No**	×
2	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
2	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
2	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
2	7.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17682
2	7.81	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18279
2	10.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18919
2	10.74	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19342
2	10.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19404
2	10.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18433
2	14.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16258
2	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16540
2	14.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16862
2	14.86	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17166

Table J.169: Resilient modulus data with QC/QA(C_1_8_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.11	No	Yes	No	Yes	Yes	No	**No**	×
8	4.09	No	Yes	No	Yes	Yes	No	**No**	×
8	4.33	No	Yes	No	Yes	Yes	No	**No**	×
8	4.21	No	Yes	No	Yes	Yes	No	**No**	×
8	4.69	No	Yes	No	Yes	Yes	No	**No**	×
8	7.39	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.38	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.39	No	Yes	Yes	Yes	No	No	**No**	×
8	7.38	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.39	No	Yes	Yes	Yes	No	No	**No**	×
8	10.50	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.49	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.49	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.49	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.49	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28296
8	14.60	No	Yes	Yes	Yes	Yes	Yes	**Yes**	27884
8	14.69	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29408
8	14.96	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29065
8	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27939
6	4.10	No	Yes	No	Yes	Yes	No	**No**	×
6	4.10	No	Yes	No	Yes	Yes	No	**No**	×
6	4.09	No	Yes	No	Yes	Yes	No	**No**	×
6	4.15	No	Yes	No	Yes	Yes	No	**No**	×
6	4.22	No	Yes	No	Yes	Yes	No	**No**	×
6	7.58	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.33	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.44	No	Yes	Yes	Yes	No	No	**No**	×
6	7.45	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.44	No	Yes	Yes	Yes	Yes	No	**No**	×
6	10.51	No	Yes	Yes	Yes	Yes	No	**No**	×
6	10.51	No	Yes	Yes	Yes	No	No	**No**	×
6	10.52	No	Yes	Yes	Yes	Yes	No	**No**	×
6	10.52	No	Yes	Yes	Yes	Yes	No	**No**	×
6	10.71	No	Yes	Yes	Yes	Yes	No	**No**	×
6	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26032
6	14.83	No	Yes	Yes	Yes	Yes	Yes	**Yes**	26997
6	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26449
6	14.62	No	Yes	Yes	Yes	Yes	Yes	**Yes**	26708
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25751
4	4.13	No	Yes	No	Yes	Yes	No	**No**	×
4	4.22	No	Yes	No	Yes	Yes	No	**No**	×
4	4.52	No	Yes	No	Yes	Yes	No	**No**	×
4	4.11	No	Yes	No	Yes	Yes	No	**No**	×
4	4.12	No	Yes	No	Yes	Yes	No	**No**	×
4	7.44	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.42	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.43	No	Yes	Yes	Yes	No	No	**No**	×
4	7.52	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.79	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.52	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.50	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.51	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.52	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.50	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	14.65	No	Yes	Yes	Yes	No	Yes	**No**	×
4	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.64	No	Yes	Yes	Yes	No	Yes	**No**	×
4	14.64	No	Yes	Yes	Yes	No	Yes	**No**	×
4	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24056
2	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.14	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.34	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.43	No	Yes	Yes	Yes	No	No	**No**	×
2	7.43	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.24	No	Yes	Yes	Yes	No	No	**No**	×
2	7.22	No	Yes	Yes	Yes	No	No	**No**	×
2	7.47	No	Yes	Yes	Yes	Yes	No	**No**	×
2	10.54	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.53	No	Yes	Yes	Yes	No	Yes	**No**	×
2	10.53	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.53	No	Yes	Yes	Yes	No	Yes	**No**	×
2	10.52	No	Yes	Yes	Yes	No	Yes	**No**	×
2	15.06	No	Yes	Yes	Yes	No	Yes	**No**	×
2	14.71	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.65	No	Yes	Yes	Yes	No	Yes	**No**	×
2	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.65	No	Yes	Yes	Yes	No	Yes	**No**	×

Table J.170: Resilient modulus data with QC/QA(C_2_8_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [psi]
8	4.39	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	4.46	No	No	Yes	Yes	Yes	Yes	**No**	×
8	4.99	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	4.57	No	No	Yes	Yes	Yes	Yes	**No**	×
8	4.57	No	No	Yes	Yes	Yes	Yes	**No**	×
8	7.62	No	No	Yes	Yes	Yes	Yes	**No**	×
8	7.61	No	No	Yes	Yes	Yes	Yes	**No**	×
8	7.69	No	No	Yes	Yes	Yes	Yes	**No**	×
8	8.09	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	7.43	No	No	Yes	Yes	Yes	Yes	**No**	×
8	10.53	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.73	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.69	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.77	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.85	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
8	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30617
8	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30329
8	15.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30018
8	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29371
8	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29912
6	4.57	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.54	No	No	Yes	Yes	Yes	No	**No**	×
6	4.54	No	No	Yes	Yes	Yes	No	**No**	×
6	4.42	No	No	Yes	Yes	Yes	No	**No**	×
6	4.62	No	No	Yes	Yes	Yes	No	**No**	×
6	7.63	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.62	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.40	No	No	Yes	Yes	Yes	Yes	**No**	×
6	7.61	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.69	No	No	Yes	Yes	Yes	Yes	**No**	×
6	10.74	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.71	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
6	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28408
6	15.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28198
6	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27506
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29063
6	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29646
4	4.33	No	No	Yes	Yes	Yes	Yes	**No**	×
4	4.34	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	4.34	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	4.30	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	4.53	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.26	Yes	No	Yes	Yes	No	Yes	**No**	×
4	7.62	No	No	Yes	Yes	No	Yes	**No**	×
4	7.64	No	Yes	Yes	Yes	No	Yes	**No**	×
4	7.64	No	Yes	Yes	Yes	No	Yes	**No**	×
4	7.64	No	No	Yes	Yes	No	Yes	**No**	×
4	10.76	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.88	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.77	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.56	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.56	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
4	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27292
4	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26974
4	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26620
4	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25646
4	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26615
2	4.37	No	No	Yes	Yes	Yes	Yes	**No**	×
2	4.43	No	No	Yes	Yes	Yes	Yes	**No**	×
2	4.70	No	No	Yes	No	Yes	Yes	**No**	×
2	4.33	No	No	Yes	Yes	Yes	Yes	**No**	×
2	4.32	No	No	Yes	Yes	Yes	Yes	**No**	×
2	7.61	Yes	No	Yes	Yes	Yes	Yes	**No**	×
2	7.64	No	No	Yes	Yes	No	Yes	**No**	×
2	7.45	No	No	Yes	Yes	Yes	Yes	**No**	×
2	7.44	No	No	Yes	Yes	Yes	Yes	**No**	×
2	7.42	Yes	No	Yes	Yes	No	Yes	**No**	×
2	10.73	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.72	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.73	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.53	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
2	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23682
2	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24022
2	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23526
2	14.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24108
2	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23614

Table J.171: Resilient modulus data with QC/QA(C_1_13_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [psi]
8	4.08	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.06	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.30	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.10	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.10	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.42	No	Yes	Yes	Yes	Yes	Yes	**Yes**	17205
8	7.40	No	Yes	Yes	Yes	Yes	Yes	**Yes**	16596
8	7.43	No	Yes	Yes	Yes	Yes	Yes	**Yes**	16860
8	7.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16058
8	7.46	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15769
8	10.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15864
8	10.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15981
8	10.49	No	Yes	Yes	Yes	Yes	Yes	**Yes**	15843
8	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15618
8	14.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15289
8	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15761
8	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15797
8	14.62	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15770
6	4.14	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.17	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.16	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.17	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.21	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14532
6	7.41	No	Yes	Yes	Yes	Yes	Yes	**Yes**	15454
6	7.20	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14834
6	7.19	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14539
6	7.20	No	Yes	Yes	Yes	Yes	Yes	**Yes**	14862
6	10.48	Yes	Yes	Yes	Yes	Yes	No	**No**	×
6	10.49	Yes	Yes	Yes	Yes	Yes	No	**No**	×
6	10.50	Yes	Yes	Yes	Yes	Yes	No	**No**	×
6	10.48	Yes	Yes	Yes	Yes	Yes	No	**No**	×
6	10.88	No	No	No	No	No	No	**No**	×
6	14.63	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.63	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.43	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.43	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	4.14	No	Yes	Yes	Yes	Yes	Yes	**Yes**	12270
4	4.12	No	Yes	Yes	Yes	Yes	Yes	**Yes**	12155
4	3.93	No	Yes	Yes	Yes	Yes	Yes	**Yes**	11819
4	3.91	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	3.92	No	Yes	Yes	Yes	Yes	Yes	**Yes**	11959
4	7.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12110
4	7.21	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12134
4	7.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12187
4	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12136
4	7.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12319
4	10.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12157
4	10.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11862
4	10.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12233
4	10.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11804
4	10.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11894
4	14.44	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.44	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.44	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.44	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	3.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10063
2	3.93	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9985
2	3.93	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10354
2	3.92	No	Yes	Yes	Yes	Yes	Yes	**Yes**	10280
2	3.93	No	Yes	Yes	Yes	Yes	Yes	**Yes**	10590
2	7.01	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10132
2	7.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9926
2	7.01	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9664
2	7.02	No	Yes	Yes	Yes	Yes	Yes	**Yes**	10001
2	7.23	No	Yes	Yes	Yes	Yes	Yes	**Yes**	10644
2	10.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9447
2	10.12	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	10.12	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	10.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9655
2	10.13	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	9538
2	14.24	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.27	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.36	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.49	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.24	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.172: Resilient modulus data with QC/QA(C_2_13_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.08	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.06	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.30	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.10	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.10	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.19	No	Yes	Yes	Yes	Yes	Yes	**Yes**	17386
8	7.19	No	Yes	Yes	Yes	Yes	Yes	**Yes**	17071
8	7.19	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16660
8	7.20	No	Yes	Yes	Yes	Yes	Yes	**Yes**	17420
8	7.21	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17239
8	10.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16731
8	10.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16652
8	10.26	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15972
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16144
8	10.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16550
8	14.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15612
8	14.43	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15516
8	14.40	Yes	Yes	Yes	Yes	No	Yes	**No**	×
8	14.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15853
6	4.11	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.10	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.11	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.09	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.21	No	Yes	Yes	Yes	Yes	Yes	**Yes**	15480
6	7.21	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14526
6	7.21	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14490
6	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15002
6	7.21	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14406
6	10.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14580
6	10.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14588
6	10.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14231
6	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14458
6	14.38	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.38	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.45	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.55	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.83	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	4.14	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	3.92	No	Yes	Yes	Yes	Yes	Yes	**Yes**	11539
4	4.12	No	Yes	Yes	Yes	Yes	Yes	**Yes**	12866
4	4.13	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	3.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11521
4	7.35	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12911
4	7.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12186
4	7.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12462
4	7.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12179
4	7.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12525
4	10.31	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	10.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12068
4	10.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12199
4	10.31	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	10.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	12199
4	14.46	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.63	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.47	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.25	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.23	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	3.96	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10434
2	3.92	No	Yes	Yes	Yes	Yes	Yes	**Yes**	10301
2	3.92	No	Yes	Yes	Yes	Yes	Yes	**Yes**	10300
2	3.92	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
2	4.13	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	7.20	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10111
2	7.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10137
2	7.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10595
2	7.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	11033
2	7.01	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	10017
2	10.11	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	10.10	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	10.16	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	10.29	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	10.19	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.30	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.61	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.26	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.21	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.21	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.173: Resilient modulus data with QC/QA(C_1_10_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [psi]
8	4.09	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	4.30	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	4.10	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	4.26	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	4.13	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	7.18	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.16	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.36	No	Yes	Yes	Yes	No	No	**No**	×
8	7.18	No	Yes	Yes	Yes	No	No	**No**	×
8	7.19	No	Yes	Yes	Yes	Yes	No	**No**	×
8	10.29	No	Yes	Yes	Yes	Yes	Yes	**Yes**	22902
8	10.27	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	10.26	No	Yes	Yes	Yes	Yes	Yes	**Yes**	23239
8	10.27	No	Yes	Yes	Yes	Yes	Yes	**Yes**	22662
8	10.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22738
8	14.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22602
8	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22407
8	14.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23504
8	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23475
8	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22613
6	4.24	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.45	No	Yes	Yes	No	Yes	No	**No**	×
6	4.09	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.10	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.21	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.20	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.44	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.25	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.35	No	Yes	Yes	Yes	No	No	**No**	×
6	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21036
6	10.30	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.30	No	Yes	Yes	Yes	Yes	Yes	**Yes**	21712
6	10.28	No	Yes	Yes	Yes	Yes	Yes	**Yes**	20864
6	10.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20768
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20755
6	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20543
6	14.41	No	Yes	Yes	Yes	Yes	Yes	**Yes**	21230
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21283
6	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20559
4	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.22	No	Yes	Yes	Yes	Yes	Yes	**Yes**	18746
4	7.23	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.18	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.25	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.34	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19574
4	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18936
4	10.57	No	Yes	Yes	Yes	Yes	Yes	**Yes**	19503
4	10.56	No	Yes	Yes	Yes	Yes	Yes	**Yes**	19410
4	10.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19204
4	14.64	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.42	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.61	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.62	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.41	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	4.14	No	Yes	Yes	Yes	Yes	No	**No**	×
2	3.93	No	Yes	Yes	Yes	Yes	No	**No**	×
2	3.93	No	Yes	Yes	Yes	Yes	No	**No**	×
2	3.94	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.14	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.62	No	Yes	Yes	Yes	Yes	Yes	**Yes**	17619
2	7.22	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	7.23	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15896
2	7.23	No	Yes	Yes	Yes	Yes	Yes	**Yes**	16931
2	7.24	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17172
2	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16950
2	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16743
2	10.51	No	Yes	Yes	Yes	Yes	Yes	**Yes**	17314
2	10.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17082
2	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.44	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.174: Resilient modulus data with QC/QA(C_2_10_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [psi]
8	4.12	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.11	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.10	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.09	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21023
8	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21609
8	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21744
8	7.39	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21321
8	10.48	No	Yes	Yes	Yes	Yes	Yes	**Yes**	20935
8	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21521
8	10.50	No	Yes	Yes	Yes	Yes	Yes	**Yes**	21217
8	10.50	No	Yes	Yes	Yes	Yes	Yes	**Yes**	21739
8	10.50	No	Yes	Yes	Yes	Yes	Yes	**Yes**	20958
8	14.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19701
8	14.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20438
8	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19876
8	14.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19932
8	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19881
6	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.33	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.11	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.41	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.41	Yes	Yes	Yes	Yes	Yes	No	**No**	×
6	7.41	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.28	No	Yes	Yes	Yes	Yes	No	**No**	×
6	8.17	No	No	No	No	No	No	**No**	×
6	10.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19510
6	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18879
6	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18931
6	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18447
6	10.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18319
6	14.62	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.62	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17536
6	14.62	Yes	Yes	Yes	Yes	No	Yes	**No**	×
6	14.63	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	4.34	No	Yes	Yes	Yes	Yes	Yes	**Yes**	17333
4	4.11	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	4.18	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	4.03	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	4.34	No	Yes	Yes	No	Yes	Yes	**No**	×
4	7.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17693
4	7.42	No	Yes	Yes	Yes	Yes	Yes	**Yes**	16769
4	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17200
4	7.42	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.22	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16773
4	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17015
4	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16546
4	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16739
4	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16540
4	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.43	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.85	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.43	Yes	Yes	Yes	Yes	No	Yes	**No**	×
4	14.65	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	4.14	No	Yes	Yes	Yes	Yes	Yes	**Yes**	15057
2	4.13	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	4.13	Yes	Yes	Yes	Yes	Yes	Yes	**No**	×
2	4.13	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	4.11	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	7.23	No	Yes	Yes	Yes	Yes	Yes	**Yes**	15668
2	7.21	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14630
2	7.23	No	Yes	Yes	Yes	Yes	Yes	**Yes**	14993
2	7.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15186
2	7.21	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14855
2	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14442
2	10.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15030
2	10.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15040
2	10.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14209
2	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13986
2	14.66	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.44	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.66	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.66	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.66	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.175: Resilient modulus data with QC/QA(C_1_8_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27694
8	4.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26468
8	4.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27230
8	4.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27191
8	4.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27253
8	7.35	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25070
8	7.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25064
8	7.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24820
8	7.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24559
8	7.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24568
8	10.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23326
8	10.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23204
8	10.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23800
8	10.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23387
8	10.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23717
8	14.76	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22115
8	14.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22231
8	14.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21946
8	14.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22164
8	14.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21782
6	4.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24621
6	4.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24624
6	4.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25060
6	4.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24011
6	4.01	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23287
6	7.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22907
6	7.35	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22274
6	7.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22233
6	7.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22714
6	7.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22904
6	10.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20991
6	10.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21216
6	10.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21591
6	10.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21347
6	10.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21101
6	14.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19293
6	14.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19445
6	14.95	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19971
6	14.74	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19750
6	14.76	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19721
4	4.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21249
4	4.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22044
4	4.06	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21284
4	4.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20566
4	4.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20943
4	7.17	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19359
4	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19745
4	7.19	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19202
4	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19925
4	7.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19527
4	10.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18097
4	10.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18396
4	10.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18261
4	10.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18505
4	10.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18275
4	14.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17171
4	14.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16937
4	14.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16927
4	14.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16936
4	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17171
2	3.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17959
2	3.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18679
2	3.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17645
2	3.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18934
2	3.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18160
2	6.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16742
2	6.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16596
2	6.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16591
2	6.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16743
2	6.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16750
2	10.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15684
2	10.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15663
2	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15874
2	10.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15683
2	10.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15649
2	14.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14457
2	14.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14483
2	14.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14466
2	14.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14431
2	14.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14278

Table J.176: Resilient modulus data with QC/QA(C_2_8_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.06	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25884
8	4.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26406
8	4.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26384
8	4.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26996
8	4.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27048
8	7.01	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24307
8	6.98	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24313
8	6.98	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24078
8	6.81	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23953
8	7.01	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24378
8	9.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22987
8	10.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23262
8	10.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23241
8	9.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23176
8	9.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22986
8	4.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21978
8	4.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22573
8	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22106
8	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21890
8	4.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22223
6	7.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23477
6	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24384
6	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23936
6	7.23	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23882
6	7.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23883
6	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22280
6	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21435
6	10.67	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22108
6	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21913
6	10.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22239
6	14.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21200
6	15.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20820
6	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20797
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21103
6	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20846
6	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20242
6	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20063
6	4.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20140
6	4.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19974
6	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20143
4	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20372
4	7.20	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20664
4	7.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20350
4	7.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19966
4	7.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20043
4	10.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18554
4	10.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18738
4	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19163
4	10.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19004
4	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18695
4	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18268
4	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17883
4	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18175
4	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18413
4	14.82	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18268
4	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17410
4	4.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17425
4	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17417
4	4.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17419
4	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17508
2	7.26	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17682
2	7.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17407
2	7.21	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17121
2	7.21	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17172
2	7.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17159
2	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16200
2	10.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16258
2	10.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16282
2	10.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16272
2	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15858
2	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15451
2	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15165
2	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15113
2	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15122
2	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15421
2	4.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14590
2	4.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14649
2	4.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14692
2	4.17	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14595
2	4.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14595

Table J.177: Resilient modulus data with QC/QA(D_1_16_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43081
8	4.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43003
8	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41102
8	4.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42393
8	4.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43160
8	7.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39904
8	7.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39173
8	7.35	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40441
8	7.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40601
8	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40699
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38748
8	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38760
8	10.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37102
8	10.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37138
8	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37883
8	14.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36315
8	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36026
8	14.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35548
8	14.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35538
8	14.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35252
6	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41458
6	4.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41385
6	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40060
6	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40036
6	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39964
6	7.19	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38509
6	7.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38930
6	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39714
6	7.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39723
6	7.76	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41358
6	10.69	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37543
6	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37235
6	10.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36482
6	10.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36509
6	10.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36518
6	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34781
6	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34789
6	14.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34318
6	14.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34278
6	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34500
4	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39600
4	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39583
4	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38261
4	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39622
4	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39538
4	7.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38923
4	7.74	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39942
4	7.21	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37183
4	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38195
4	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38221
4	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36007
4	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35586
4	10.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34924
4	10.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34883
4	10.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35768
4	14.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33148
4	14.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34094
4	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33257
4	14.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33272
4	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33477
2	4.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37460
2	4.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37490
2	4.13	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38516
2	4.13	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39852
2	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38538
2	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37628
2	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36370
2	7.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35891
2	7.23	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35464
2	7.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37048
2	10.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33578
2	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34231
2	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33912
2	10.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34016
2	10.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33984
2	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32100
2	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32090
2	14.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31647
2	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31919
2	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31872

Table J.178: Resilient modulus data with QC/QA(D_2_16_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [psi]
8	4.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	45496
8	4.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	46908
8	4.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44702
8	4.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	48738
8	4.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	46718
8	7.35	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43447
8	7.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44739
8	7.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44715
8	7.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43886
8	7.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43942
8	10.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42094
8	10.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42064
8	10.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40975
8	10.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42546
8	10.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41817
8	14.76	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37984
8	14.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38396
8	14.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38979
8	14.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39010
8	14.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38770
6	4.25	Yes	Yes	Yes	No	Yes	Yes	**No**	×
6	4.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	45383
6	4.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	45511
6	4.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43852
6	4.01	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44915
6	7.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41870
6	7.35	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43604
6	7.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43093
6	7.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41836
6	7.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43870
6	10.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40608
6	10.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42059
6	10.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40941
6	10.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41006
6	10.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40988
6	14.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38021
6	14.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37916
6	14.95	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38293
6	14.74	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37647
6	14.76	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37794
4	4.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44287
4	4.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	45059
4	4.06	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44808
4	4.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44915
4	4.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41420
4	7.17	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42156
4	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41009
4	7.19	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42165
4	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42987
4	7.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	42206
4	10.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38865
4	10.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40184
4	10.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40231
4	10.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39418
4	10.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38348
4	14.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36422
4	14.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36439
4	14.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36636
4	14.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36717
4	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36934
2	3.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	41372
2	3.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43213
2	3.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	43650
2	3.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40244
2	3.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40676
2	6.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40217
2	6.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38443
2	6.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39079
2	6.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38446
2	6.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39396
2	10.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36739
2	10.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37685
2	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37416
2	10.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38857
2	10.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37187
2	14.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34270
2	14.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35288
2	14.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34733
2	14.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35722
2	14.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34686

Table J.179: Resilient modulus data with QC/QA(D_1_13_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.15	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	4.31	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	4.31	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	4.33	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	4.31	Yes	No	Yes	Yes	Yes	Yes	**No**	×
8	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63696
8	7.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	65028
8	7.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	65286
8	7.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	64874
8	7.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63083
8	10.93	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	64228
8	10.92	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	65636
8	10.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62977
8	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61802
8	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61913
8	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61813
8	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61860
8	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61880
8	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62817
8	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62804
6	4.33	Yes	No	Yes	Yes	Yes	Yes	**No**	×
6	4.32	Yes	No	Yes	Yes	Yes	Yes	**No**	×
6	4.32	Yes	No	Yes	Yes	Yes	Yes	**No**	×
6	4.33	Yes	No	Yes	Yes	Yes	Yes	**No**	×
6	4.33	Yes	No	Yes	Yes	Yes	Yes	**No**	×
6	7.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	64890
6	7.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	66673
6	7.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	66620
6	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63247
6	7.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63164
6	10.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62303
6	10.94	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63596
6	10.93	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61197
6	10.94	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63642
6	10.76	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61028
6	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62000
6	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61056
6	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62020
6	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62141
6	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62035
4	4.30	Yes	No	Yes	Yes	Yes	Yes	**No**	×
4	4.42	Yes	No	Yes	Yes	Yes	Yes	**No**	×
4	4.31	Yes	No	Yes	Yes	Yes	Yes	**No**	×
4	4.38	Yes	No	Yes	Yes	Yes	Yes	**Yes**	62317
4	4.49	Yes	No	Yes	Yes	Yes	Yes	**Yes**	65859
4	7.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	60188
4	7.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63355
4	7.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62920
4	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61387
4	7.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61395
4	10.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63262
4	11.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63521
4	10.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63685
4	10.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	60680
4	10.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	64492
4	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	60398
4	15.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61339
4	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	60448
4	14.67	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	59000
4	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	59891
2	4.12	Yes	No	Yes	Yes	Yes	Yes	**No**	×
2	4.30	Yes	No	Yes	Yes	Yes	Yes	**No**	×
2	4.33	Yes	No	Yes	Yes	Yes	Yes	**Yes**	62181
2	4.11	Yes	No	Yes	Yes	Yes	Yes	**Yes**	62435
2	4.34	Yes	No	Yes	Yes	Yes	Yes	**Yes**	65970
2	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61264
2	7.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62892
2	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62849
2	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62982
2	7.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	64676
2	10.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62167
2	10.74	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62101
2	10.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61091
2	10.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	63590
2	10.74	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61066
2	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	59774
2	14.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	61442
2	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	59867
2	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	59820
2	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	62396

Table J.180: Resilient modulus data with QC/QA(D_2_13_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [psi]
8	4.53	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	4.31	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	4.29	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	4.34	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	4.44	No	Yes	Yes	Yes	Yes	Yes	**No**	×
8	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	83426
8	7.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	80755
8	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	83576
8	7.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	83217
8	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	83855
8	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	86032
8	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	83951
8	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	84355
8	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	82248
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	84026
8	14.82	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	81508
8	14.81	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	83013
8	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	80197
8	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	80040
8	14.81	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	81390
6	4.30	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	4.30	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	4.29	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	4.33	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	4.82	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	7.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	85183
6	7.88	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	85973
6	7.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	79251
6	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	84599
6	7.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	86969
6	10.73	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	79710
6	10.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	83648
6	10.73	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	85907
6	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	77511
6	10.54	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	84273
6	15.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	82764
6	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	81554
6	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	80351
6	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	80625
6	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	81549
4	4.32	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	4.36	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	4.44	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	4.69	No	Yes	Yes	No	Yes	Yes	**No**	×
4	4.32	No	Yes	Yes	Yes	Yes	Yes	**No**	×
4	7.43	No	Yes	Yes	Yes	Yes	Yes	**Yes**	78631
4	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	81058
4	7.42	No	Yes	Yes	Yes	Yes	Yes	**Yes**	81123
4	7.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	80484
4	7.47	No	Yes	Yes	Yes	Yes	Yes	**Yes**	81860
4	10.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	79101
4	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	83088
4	10.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	80470
4	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	81195
4	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	78949
4	14.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	77633
4	14.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	79232
4	14.66	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	79223
4	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	77539
4	14.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	77710
2	4.35	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	4.35	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	4.35	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	4.15	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	4.12	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	7.49	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	7.64	No	Yes	Yes	Yes	Yes	Yes	**Yes**	80929
2	7.50	No	Yes	Yes	Yes	Yes	Yes	**Yes**	79247
2	7.44	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	7.44	No	Yes	Yes	Yes	Yes	Yes	**Yes**	78099
2	10.74	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	78802
2	10.72	No	Yes	Yes	Yes	Yes	Yes	**Yes**	80692
2	10.53	No	Yes	Yes	Yes	Yes	Yes	**Yes**	79578
2	10.73	No	Yes	Yes	Yes	Yes	Yes	**Yes**	78793
2	10.72	No	Yes	Yes	Yes	Yes	Yes	**Yes**	80675
2	15.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	78049
2	15.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	79742
2	14.66	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	77723
2	14.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	76251
2	14.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	76577

Table J.181: Resilient modulus data with QC/QA(D_1_11_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.34	Yes	Yes	Yes	Yes	Yes	No	**No**	×
8	4.55	Yes	Yes	Yes	Yes	Yes	No	**No**	×
8	4.52	Yes	Yes	Yes	Yes	Yes	No	**No**	×
8	4.37	Yes	Yes	Yes	Yes	Yes	No	**No**	×
8	5.74	No	No	No	No	No	No	**No**	×
8	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55071
8	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	56494
8	7.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	57761
8	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	56358
8	7.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	57828
8	10.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	56120
8	10.92	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	56279
8	10.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55206
8	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	54267
8	10.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55222
8	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53926
8	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53352
8	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52147
8	15.06	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	54197
8	15.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53528
6	4.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55181
6	4.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	54688
6	4.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55355
6	4.54	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55178
6	4.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55235
6	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53450
6	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53428
6	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53458
6	7.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52271
6	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	53557
6	10.94	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52307
6	10.73	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51357
6	10.73	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51360
6	10.73	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	50563
6	10.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	50450
6	14.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51551
6	15.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51583
6	15.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51259
6	15.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52074
6	15.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52691
4	4.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	55094
4	4.54	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52756
4	4.54	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52677
4	4.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	50498
4	4.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	52362
4	7.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	50484
4	7.66	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	50695
4	7.66	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51001
4	7.66	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51098
4	7.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	51243
4	10.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	46071
4	10.73	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	46037
4	10.74	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	45462
4	10.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	46371
4	10.88	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	45926
4	14.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	48119
4	14.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	47058
4	14.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	48117
4	14.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	48113
4	15.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	48282
2	4.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	49434
2	4.35	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	47190
2	4.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	47290
2	4.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	47124
2	4.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	48905
2	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	46953
2	7.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	46242
2	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	45966
2	7.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	47308
2	7.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	46330
2	10.76	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	46484
2	10.76	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	47336
2	10.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	45171
2	10.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	45893
2	10.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	45184
2	14.88	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44405
2	14.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44369
2	15.06	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44958
2	14.90	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	45408
2	14.99	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	44727

Table J.182: Resilient modulus data with QC/QA(D_2_11_103)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [psi]
8	4.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33183
8	4.35	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34041
8	4.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34068
8	4.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34134
8	4.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33122
8	7.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31984
8	7.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31953
8	7.68	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33158
8	7.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32744
8	7.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33974
8	10.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30327
8	10.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30494
8	10.57	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30341
8	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29894
8	10.93	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30812
8	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29759
8	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29603
8	14.81	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30062
8	14.82	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29711
8	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29738
6	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28503
6	4.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28451
6	4.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29192
6	4.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29883
6	4.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29230
6	7.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26672
6	7.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27430
6	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26698
6	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26702
6	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26964
6	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26206
6	10.69	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26756
6	10.69	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26763
6	10.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26789
6	10.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26996
6	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26268
6	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26281
6	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26240
6	14.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26392
6	15.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26614
4	4.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23549
4	4.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25202
4	4.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22607
4	4.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23707
4	4.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24064
4	7.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22757
4	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22051
4	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22314
4	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22300
4	7.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23214
4	10.92	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22481
4	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22221
4	10.54	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22273
4	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22479
4	10.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22175
4	14.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22108
4	14.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22218
4	14.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22532
4	14.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22419
4	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22442
2	4.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19011
2	4.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18163
2	4.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19057
2	4.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18840
2	4.16	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18237
2	7.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18306
2	7.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18185
2	7.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17884
2	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17786
2	7.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18795
2	10.78	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18293
2	10.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18077
2	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17713
2	10.56	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17756
2	10.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18325
2	14.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18321
2	14.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18387
2	14.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18517
2	15.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18599
2	14.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18458

Table J.183: Resilient modulus data with QC/QA(D_1_18_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.23	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28677
8	4.06	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26289
8	4.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26199
8	4.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26956
8	4.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26262
8	6.99	Yes	Yes	Yes	Yes	Yes	No	**No**	×
8	6.99	Yes	Yes	Yes	Yes	Yes	No	**No**	×
8	7.12	Yes	Yes	Yes	Yes	Yes	No	**No**	×
8	6.95	Yes	Yes	Yes	Yes	Yes	No	**No**	×
8	8.25	No	No	No	No	No	No	**No**	×
8	9.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22099
8	10.05	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22208
8	9.93	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21953
8	10.23	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22430
8	10.06	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22115
8	13.96	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19510
8	13.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19160
8	13.78	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19278
8	13.76	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19384
8	13.96	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19410
6	4.04	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26407
6	4.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26266
6	4.07	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26423
6	4.13	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26267
6	4.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27196
6	7.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23988
6	7.01	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24225
6	7.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24249
6	7.02	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24019
6	7.01	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24244
6	10.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22096
6	9.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22197
6	10.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21953
6	10.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21972
6	9.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21721
6	13.78	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18965
6	13.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18882
6	13.78	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18953
6	13.79	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19067
6	13.78	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19067
4	4.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26286
4	4.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26339
4	3.92	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25097
4	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26366
4	4.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26398
4	6.99	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23770
4	7.00	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24006
4	7.00	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22906
4	7.00	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23680
4	7.01	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23987
4	10.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21567
4	9.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21464
4	9.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21620
4	9.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21303
4	9.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21321
4	13.99	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18937
4	13.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18842
4	13.79	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18672
4	13.78	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18584
4	13.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18261
2	3.90	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23881
2	3.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24431
2	3.93	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24464
2	4.08	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26201
2	4.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24625
2	7.01	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23113
2	6.84	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22218
2	7.00	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22622
2	6.79	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22225
2	7.01	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22578
2	10.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21116
2	9.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20852
2	10.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20970
2	9.92	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20569
2	9.93	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20613
2	13.78	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18133
2	13.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17883
2	13.79	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18067
2	13.78	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17981
2	13.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17730

Table J.184: Resilient modulus data with QC/QA(D_2_18_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [psi]
8	4.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22866
8	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23378
8	4.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24511
8	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23018
8	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23020
8	7.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20717
8	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20788
8	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20862
8	7.20	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20329
8	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20744
8	10.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18779
8	10.67	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18569
8	10.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18556
8	10.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18717
8	10.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18805
8	14.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15960
8	14.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15934
8	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16188
8	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16167
8	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16070
6	4.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21589
6	4.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21536
6	4.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22971
6	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23507
6	4.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22959
6	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20332
6	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20161
6	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20357
6	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20174
6	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20172
6	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18060
6	10.72	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18107
6	10.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17999
6	10.54	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17988
6	10.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17551
6	14.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15340
6	14.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15361
6	14.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15296
6	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15477
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15425
4	4.36	Yes	Yes	Yes	No	Yes	Yes	**No**	×
4	4.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20408
4	4.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21435
4	4.13	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21502
4	4.13	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21148
4	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19216
4	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	19201
4	7.19	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18998
4	7.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18872
4	7.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18692
4	10.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16890
4	10.55	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17244
4	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17039
4	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	16806
4	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17126
4	14.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14453
4	14.81	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14823
4	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14584
4	14.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14399
4	14.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	14420
2	4.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20201
2	4.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21158
2	4.15	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20147
2	4.14	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20122
2	4.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20144
2	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18233
2	7.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17536
2	7.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17876
2	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	18040
2	7.23	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	17716
2	10.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15391
2	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15400
2	10.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15783
2	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15775
2	10.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	15790
2	14.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13409
2	14.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13648
2	14.66	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13608
2	14.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13427
2	14.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	13430

Table J.185: Resilient modulus data with QC/QA(D_1_14_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [psi]
8	4.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32183
8	4.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32422
8	4.17	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33117
8	4.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36391
8	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32645
8	7.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31981
8	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30789
8	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30812
8	7.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30767
8	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30875
8	10.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28179
8	10.26	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28177
8	10.26	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28487
8	10.26	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28238
8	10.26	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28289
8	14.19	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25724
8	14.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26126
8	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26346
8	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26385
8	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26275
6	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30856
6	4.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31604
6	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31562
6	4.09	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31456
6	4.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33021
6	7.19	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29278
6	7.20	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29408
6	7.19	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29323
6	7.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30178
6	7.45	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30543
6	10.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27309
6	10.27	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27283
6	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27885
6	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27849
6	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27940
6	14.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24907
6	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25431
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25455
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25130
6	14.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25078
4	4.20	Yes	Yes	Yes	No	Yes	Yes	**No**	×
4	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29967
4	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30583
4	4.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29804
4	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30431
4	7.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28070
4	7.19	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28081
4	7.19	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28072
4	7.19	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28067
4	7.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28097
4	10.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26480
4	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26384
4	10.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26346
4	10.86	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27422
4	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26479
4	14.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23514
4	14.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23637
4	14.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23497
4	14.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23579
4	14.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23684
2	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29334
2	4.16	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28856
2	4.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29406
2	4.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32134
2	3.92	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27197
2	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27168
2	7.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27217
2	7.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27002
2	7.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26560
2	7.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26023
2	10.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24693
2	10.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24682
2	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24765
2	10.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24839
2	10.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24703
2	14.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21697
2	14.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21891
2	14.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22019
2	14.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21896
2	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22100

Table J.186: Resilient modulus data with QC/QA(D_2_14_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34373
8	4.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32848
8	4.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32054
8	4.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32943
8	4.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33843
8	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29818
8	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30302
8	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30339
8	7.20	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29235
8	7.38	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30057
8	10.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27888
8	10.48	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27932
8	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28206
8	10.47	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27984
8	10.68	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28253
8	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25755
8	14.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25597
8	14.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25641
8	14.80	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25705
8	14.81	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25903
6	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31497
6	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29337
6	4.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31522
6	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31488
6	4.18	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30734
6	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29466
6	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29088
6	7.37	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28628
6	7.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29933
6	7.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28270
6	10.61	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27007
6	10.81	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27261
6	10.49	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26745
6	10.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26625
6	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26518
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24157
6	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24271
6	14.60	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24425
6	14.80	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24765
6	14.82	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24637
4	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29692
4	4.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30325
4	4.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29029
4	4.11	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28243
4	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28052
4	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27035
4	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27357
4	7.40	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27029
4	7.39	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26939
4	7.21	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26196
4	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24742
4	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24902
4	10.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24220
4	10.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24390
4	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24658
4	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23054
4	14.66	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22988
4	14.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22539
4	15.01	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23434
4	14.62	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	23053
2	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25956
2	4.31	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27224
2	4.10	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25436
2	4.32	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27318
2	4.12	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26021
2	7.46	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	25030
2	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24977
2	7.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24284
2	7.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24963
2	7.24	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	24264
2	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22648
2	10.51	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22946
2	10.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22750
2	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22917
2	10.52	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22747
2	14.83	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21268
2	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20971
2	14.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20645
2	14.43	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	20869
2	14.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21061

Table J.187: Resilient modulus data with QC/QA(D_1_11_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	Pass Criterion	M_R [psi]
8	4.26	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39644
8	4.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39462
8	4.30	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	39844
8	4.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	40304
8	4.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	38616
8	7.66	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36353
8	7.75	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	37561
8	7.57	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	36700
8	7.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35855
8	7.35	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35260
8	10.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34160
8	10.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34589
8	10.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35335
8	10.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34628
8	10.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35036
8	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34319
8	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34133
8	14.66	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34000
8	14.65	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33778
8	14.85	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34301
6	4.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32728
6	4.03	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32236
6	4.25	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	33723
6	4.26	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	34631
6	4.66	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	35921
6	7.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31481
6	7.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31930
6	7.34	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31399
6	7.53	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32239
6	7.33	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31376
6	10.64	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31064
6	10.63	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31333
6	10.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31194
6	10.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30871
6	10.93	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	32181
6	14.67	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30490
6	14.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30918
6	14.87	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30953
6	14.68	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30540
6	14.68	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	30546
4	4.29	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29052
4	4.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27762
4	4.50	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	31262
4	4.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	29044
4	4.28	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	28451
4	7.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26931
4	7.57	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27716
4	7.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26914
4	7.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26634
4	7.36	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26925
4	10.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27433
4	10.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26937
4	10.77	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	27209
4	10.58	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26746
4	10.59	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26761
4	14.91	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26789
4	14.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26296
4	14.71	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26273
4	14.70	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26433
4	14.89	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	26619
2	4.16	Yes	No	Yes	Yes	Yes	#VALUE!	**#VALUE!**	#VALUE!
2	3.83	Yes	No	Yes	Yes	Yes	#VALUE!	**#VALUE!**	#VALUE!
2	4.27	Yes	No	Yes	No	Yes	#VALUE!	**#VALUE!**	#VALUE!
2	3.91	Yes	No	Yes	Yes	Yes	#VALUE!	**#VALUE!**	#VALUE!
2	4.11	Yes	No	Yes	Yes	Yes	#VALUE!	**#VALUE!**	#VALUE!
2	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22512
2	7.22	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21882
2	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22747
2	7.42	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22532
2	7.41	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22774
2	10.23	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21197
2	10.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	22097
2	10.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21358
2	10.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21816
2	10.44	Yes	Yes	Yes	Yes	Yes	Yes	**Yes**	21678
2	14.56	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.55	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.56	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.77	Yes	Yes	Yes	Yes	No	Yes	**No**	×
2	14.76	Yes	Yes	Yes	Yes	No	Yes	**No**	×

Table J.188: Resilient modulus data with QC/QA(D_2_11_98)

σ_3 [psi]	σ_{DEV} [psi]	$SNR_{LVDT\#1} > 3$	$SNR_{LVDT\#2} > 3$	$SNR_{LVDT\#3} > 3$	$SNR_q > 10$	$\theta < 0.04°$	COV < 10%	**Pass Criterion**	M_R [psi]
8	4.25	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.25	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.24	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.23	No	Yes	Yes	Yes	Yes	No	**No**	×
8	4.23	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.36	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.35	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.35	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.34	No	Yes	Yes	Yes	Yes	No	**No**	×
8	7.37	No	Yes	Yes	Yes	Yes	No	**No**	×
8	10.39	No	Yes	Yes	Yes	Yes	No	**No**	×
8	10.65	No	Yes	Yes	Yes	Yes	No	**No**	×
8	10.73	No	Yes	Yes	Yes	Yes	No	**No**	×
8	10.76	No	Yes	Yes	Yes	Yes	No	**No**	×
8	10.61	No	Yes	Yes	Yes	Yes	No	**No**	×
8	14.75	No	Yes	Yes	Yes	Yes	No	**No**	×
8	14.54	No	Yes	Yes	Yes	Yes	No	**No**	×
8	14.55	No	Yes	Yes	Yes	Yes	No	**No**	×
8	14.56	No	Yes	Yes	Yes	Yes	No	**No**	×
8	14.75	No	Yes	Yes	Yes	No	No	**No**	×
6	4.27	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.24	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.22	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.26	No	Yes	Yes	Yes	Yes	No	**No**	×
6	4.25	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.33	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.34	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.30	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.11	No	Yes	Yes	Yes	Yes	No	**No**	×
6	7.31	No	Yes	Yes	Yes	Yes	No	**No**	×
6	10.62	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.43	No	Yes	Yes	Yes	Yes	Yes	**Yes**	65296
6	10.71	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.82	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	10.58	No	Yes	Yes	Yes	Yes	Yes	**No**	×
6	14.63	No	Yes	Yes	Yes	No	No	**No**	×
6	14.81	No	Yes	Yes	Yes	No	No	**No**	×
6	14.56	No	Yes	Yes	Yes	No	No	**No**	×
6	14.56	No	Yes	Yes	Yes	No	No	**No**	×
6	14.75	No	Yes	Yes	Yes	No	No	**No**	×
4	4.28	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.28	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.29	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.26	No	Yes	Yes	Yes	Yes	No	**No**	×
4	4.13	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.36	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.17	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.38	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.38	No	Yes	Yes	Yes	Yes	No	**No**	×
4	7.34	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.46	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.69	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.47	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.44	No	Yes	Yes	Yes	Yes	No	**No**	×
4	10.65	No	Yes	Yes	Yes	Yes	No	**No**	×
4	14.57	No	Yes	Yes	Yes	Yes	No	**No**	×
4	14.76	No	Yes	Yes	Yes	Yes	No	**No**	×
4	14.57	No	Yes	Yes	Yes	Yes	No	**No**	×
4	14.56	No	Yes	Yes	Yes	Yes	No	**No**	×
4	14.77	No	Yes	Yes	Yes	No	No	**No**	×
2	4.26	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.25	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.11	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.48	No	Yes	Yes	Yes	Yes	No	**No**	×
2	4.14	No	Yes	Yes	Yes	Yes	No	**No**	×
2	7.37	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	7.38	No	Yes	Yes	Yes	Yes	Yes	**Yes**	42632
2	7.36	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	7.35	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	7.37	No	Yes	Yes	Yes	Yes	Yes	**No**	×
2	10.72	No	Yes	Yes	Yes	Yes	No	**No**	×
2	10.63	No	Yes	Yes	Yes	Yes	No	**No**	×
2	10.54	No	Yes	Yes	Yes	Yes	No	**No**	×
2	10.64	No	Yes	Yes	Yes	Yes	No	**No**	×
2	10.44	No	Yes	Yes	Yes	Yes	No	**No**	×
2	14.80	No	Yes	Yes	Yes	Yes	No	**No**	×
2	14.80	No	Yes	Yes	Yes	No	No	**No**	×
2	14.79	No	Yes	Yes	Yes	Yes	No	**No**	×
2	14.59	No	Yes	Yes	Yes	No	No	**No**	×
2	14.59	No	Yes	Yes	Yes	Yes	No	**No**	×

Appendix K

GeoGauge Results [SI]

K.1 Soil A

Table K.1: GeoGauge results for A_13.5_105 and A_10.5_105 at loc. 2

A_13.5_105

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	0.000	0.000	0.002	0.000	0.078	-0.120	0.269	-1.436	41.2	#DIV/0!	21.9	181.9
2	104	0	0	0.000	0.000	0.000	0.000	0.125	-0.337	0.283	-1.516	#DIV/0!	#DIV/0!	21.4	177.8
3	108	0	0	0.000	0.000	0.002	0.002	0.173	-0.566	0.293	-1.565	42.9	56.7	20.9	173.9
4	112	0	0	0.000	0.002	0.002	0.002	0.225	-0.803	0.291	-1.582	43.5	54.2	20.7	172.1
5	116	0	0	0.002	0.002	0.002	0.002	0.273	-1.045	0.276	-1.563	41.0	54.7	20.8	172.6
6	120	0	0	0.002	0.002	0.002	0.002	0.320	-1.284	0.264	-1.516	41.6	55.2	20.7	171.8
7	124	0	0	0.000	0.002	0.002	0.002	0.374	-1.521	0.242	-1.433	45.2	55.6	20.3	168.7
8	128	0	0	0.002	0.000	0.002	0.002	0.415	-1.738	0.210	-1.321	42.6	59.0	20.3	169.0
9	132	0	0	0.002	0.002	0.002	0.002	0.457	-1.943	0.176	-1.184	43.0	56.4	20.2	167.9
10	136	0	0	0.002	0.002	0.000	0.002	0.498	-2.134	0.129	-1.018	46.5	56.7	20.0	166.0
11	140	0	0	0.002	0.002	0.002	0.002	0.510	-2.283	0.085	-0.833	43.5	56.9	20.5	170.2
12	144	0	0	0.000	0.002	0.002	0.002	0.540	-2.427	0.049	-0.645	46.9	57.2	20.3	168.9
13	148	0	0	0.002	0.002	0.002	0.002	0.566	-2.549	0.000	-0.437	44.3	57.5	20.1	166.9
14	152	0	0	0.002	0.002	0.002	0.002	0.586	-2.646	-0.056	-0.215	44.6	57.7	19.9	165.2
15	156	0	0	0.002	0.002	0.002	0.002	0.593	-2.720	-0.110	0.012	44.8	57.9	19.9	165.5
16	160	0	0	0.002	0.002	0.002	0.002	0.601	-2.771	-0.159	0.244	45.1	58.1	19.9	165.2
17	164	0	0	0.002	0.002	0.002	0.002	0.603	-2.803	-0.215	0.476	45.4	58.3	19.8	164.2
18	168	0	0	0.002	0.002	0.002	0.002	0.603	-2.810	-0.269	0.706	45.6	58.5	19.6	162.9
19	172	0	0	0.002	0.002	0.002	0.002	0.596	-2.793	-0.325	0.933	45.9	58.6	19.5	161.6
20	176	0	0	0.002	0.002	0.002	0.002	0.583	-2.759	-0.381	1.155	46.1	58.8	19.3	160.3
21	180	0	0	0.002	0.002	0.002	0.002	0.566	-2.708	-0.437	1.384	46.3	58.9	19.2	159.3
22	184	0	0	0.002	0.002	0.002	0.002	0.542	-2.632	-0.496	1.606	46.6	59.0	19.0	157.8
23	188	0	0	0.002	0.002	0.002	0.002	0.515	-2.537	-0.544	1.777	46.7	59.1	18.8	155.8
24	192	0	0	0.002	0.002	0.002	0.002	0.474	-2.441	-0.586	1.965	46.8	59.2	18.9	157.0
25	196	0	0	0.002	0.002	0.002	0.002	0.444	-2.329	-0.640	2.168	47.1	59.3	18.7	155.0
													Averages	20.0	166.3

Mass (kg):	1.1137
Poisson's Ratio:	0.40

A_10.5_105

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	0.002	0.000	0.002	0.000	0.066	-0.122	0.237	-1.428	37.0	#DIV/0!	24.6	204.2
2	104	0	0	0.000	0.000	0.002	0.002	0.115	-0.339	0.239	-1.509	40.7	56.0	24.4	202.8
3	108	0	0	0.002	0.002	0.002	0.002	0.164	-0.569	0.225	-1.555	38.1	53.6	24.7	204.8
4	112	0	0	0.000	0.002	0.002	0.002	0.205	-0.803	0.188	-1.570	41.1	54.2	25.6	212.5
5	116	0	0	-0.002	0.002	0.005	0.002	0.212	-1.042	0.161	-1.553	33.8	54.7	28.6	237.2
6	120	0	0	0.000	0.002	0.000	0.002	0.222	-1.279	0.178	-1.504	#DIV/0!	55.1	29.3	243.6
7	124	0	0	-0.002	0.002	-0.002	0.002	0.247	-1.509	0.164	-1.423	38.7	55.6	29.8	247.4
8	128	0	0	-0.002	0.002	-0.005	0.002	0.278	-1.726	0.149	-1.316	35.2	56.0	29.3	243.6
9	132	0	0	0.000	0.002	-0.002	0.002	0.313	-1.938	0.127	-1.177	42.8	56.3	28.7	238.7
10	136	0	0	0.000	0.002	0.000	0.002	0.327	-2.104	0.098	-1.008	#DIV/0!	56.6	29.3	243.1
11	140	0	0	0.002	0.002	0.002	0.002	0.354	-2.275	0.076	-0.835	40.4	56.9	28.8	239.2
12	144	0	0	0.005	0.002	0.000	0.002	0.381	-2.405	0.044	-0.640	37.9	57.2	28.0	232.4
13	148	0	0	0.005	0.000	0.000	0.002	0.408	-2.527	0.007	-0.435	38.4	60.4	27.2	225.5
14	152	0	0	0.005	0.002	-0.002	0.002	0.405	-2.622	-0.039	-0.217	37.5	57.6	27.8	231.0
15	156	0	0	0.005	0.000	-0.002	0.002	0.410	-2.695	-0.081	0.010	37.7	60.9	27.8	230.5
16	160	0	0	0.005	0.002	0.000	0.002	0.422	-2.744	-0.127	0.239	39.1	58.0	26.9	223.4
17	164	0	0	0.005	0.002	0.002	0.000	0.415	-2.766	-0.173	0.474	38.3	61.2	26.8	222.7
18	168	0	0	0.005	0.002	0.005	0.002	0.403	-2.773	-0.210	0.708	36.4	58.4	27.1	225.0
19	172	0	0	0.002	0.002	0.005	0.002	0.398	-2.769	-0.259	0.940	38.8	58.6	26.5	219.7
20	176	0	0	0.000	0.002	0.005	0.002	0.376	-2.739	-0.313	1.147	40.0	58.7	25.8	214.7
21	180	0	0	0.000	0.002	0.002	0.002	0.332	-2.681	-0.359	1.367	46.0	58.8	25.8	214.0
22	184	0	0	0.000	0.002	0.002	0.000	0.269	-2.595	-0.391	1.582	45.8	61.9	26.2	217.2
23	188	0	0	0.000	0.002	0.002	0.000	0.227	-2.495	-0.393	1.748	45.4	61.9	27.2	225.9
24	192	0	0	0.002	0.002	0.002	0.000	0.193	-2.397	-0.398	1.934	42.1	62.0	28.2	234.0
25	196	0	0	0.005	0.002	0.002	0.000	0.156	-2.283	-0.408	2.124	38.1	62.1	28.7	238.5
													Averages	27.3	226.9

Mass (kg):	1.1137
Poisson's Ratio:	0.40

Table K.2: GeoGauge results for A_7.5_105 and A_15_100 at loc. 2

A_7.5_105

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	-0.002	0.000	-0.002	0.000	0.061	-0.122	0.291	-1.438	38.7	#DIV/0!	20.8	172.5
2	104	0	0	-0.002	0.000	-0.002	0.000	0.112	-0.339	0.303	-1.519	39.4	#DIV/0!	20.6	171.1
3	108	0	0	0.000	0.000	-0.002	0.002	0.166	-0.569	0.305	-1.567	43.1	56.7	20.5	170.4
4	112	0	0	0.000	0.000	0.000	0.002	0.227	-0.806	0.281	-1.582	#DIV/0!	57.2	20.8	172.9
5	116	0	0	-0.002	0.002	0.000	0.002	0.247	-1.047	0.251	-1.565	43.2	54.7	22.7	188.9
6	120	0	0	0.000	0.000	-0.002	0.002	0.278	-1.284	0.239	-1.514	43.5	58.2	23.2	192.2
7	124	0	0	0.002	0.002	-0.002	0.002	0.317	-1.516	0.244	-1.433	41.3	55.6	22.5	187.1
8	128	0	0	0.005	0.002	-0.002	0.002	0.361	-1.731	0.225	-1.326	37.8	56.0	22.2	184.5
9	132	0	0	0.005	0.002	0.000	0.002	0.403	-1.941	0.198	-1.189	39.3	56.4	22.1	183.1
10	136	0	0	0.002	0.002	0.000	0.000	0.444	-2.129	0.166	-1.030	45.8	59.7	21.7	180.5
11	140	0	0	0.002	0.002	0.002	0.000	0.479	-2.295	0.122	-0.850	43.1	60.0	21.6	179.7
12	144	0	0	0.002	0.002	0.002	0.000	0.510	-2.439	0.081	-0.652	43.5	60.3	21.4	177.7
13	148	0	0	0.002	0.002	0.002	0.002	0.537	-2.559	0.032	-0.442	43.9	57.5	21.2	175.9
14	152	0	0	0.000	0.002	0.000	0.002	0.549	-2.656	-0.020	-0.222	#DIV/0!	57.8	21.3	177.0
15	156	0	0	0.000	0.002	0.000	0.002	0.564	-2.729	-0.068	0.007	#DIV/0!	58.0	21.2	175.9
16	160	0	0	0.000	0.002	0.000	0.002	0.574	-2.776	-0.125	0.239	#DIV/0!	58.1	21.0	174.1
17	164	0	0	0.002	0.000	0.000	0.002	0.574	-2.803	-0.188	0.474	47.9	61.3	20.8	172.8
18	168	0	0	0.002	0.002	0.000	0.002	0.564	-2.808	-0.239	0.708	48.0	58.5	20.9	173.8
19	172	0	0	0.000	0.002	0.000	0.002	0.559	-2.793	-0.288	0.940	#DIV/0!	58.6	20.8	172.9
20	176	0	0	0.002	0.002	0.002	0.002	0.554	-2.764	-0.344	1.165	45.5	58.8	20.5	170.2
21	180	0	0	0.002	0.002	0.000	0.002	0.530	-2.717	-0.417	1.392	48.8	58.9	20.1	167.3
22	184	0	0	0.002	0.002	0.002	0.000	0.488	-2.637	-0.481	1.614	46.0	62.1	20.0	166.1
23	188	0	0	0.002	0.002	0.000	0.002	0.439	-2.539	-0.518	1.780	48.9	59.1	20.2	167.6
24	192	0	0	0.002	0.002	0.000	0.002	0.410	-2.441	-0.562	1.970	49.1	59.2	20.0	166.0
25	196	0	0	0.005	0.002	0.000	0.002	0.344	-2.324	-0.613	2.166	43.2	59.3	19.8	164.7
													Averages	21.1	175.4

Mass (kg):	1.1137
Poisson's Ratio:	0.40

A_15_100

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	-0.005	0.000	-0.005	0.002	0.359	-0.125	0.227	-1.438	35.8	55.4	9.1	75.7
2	104	0	0	0.000	0.002	-0.007	0.002	0.359	-0.342	0.139	-1.516	34.4	53.1	10.0	82.8
3	108	0	0	0.002	0.000	-0.005	0.002	0.278	-0.569	0.081	-1.565	34.5	56.7	14.8	122.8
4	112	0	0	0.002	0.002	-0.007	0.002	0.249	-0.803	0.093	-1.582	30.7	54.2	21.3	176.5
5	116	0	0	0.002	0.002	-0.007	0.002	0.251	-1.045	0.117	-1.567	31.1	54.7	25.0	208.0
6	120	0	0	0.005	0.002	-0.005	0.002	0.283	-1.287	0.129	-1.519	33.1	55.2	25.0	207.8
7	124	0	0	0.007	0.002	0.000	0.002	0.313	-1.519	0.137	-1.436	33.4	55.6	25.0	207.4
8	128	0	0	0.007	0.002	0.002	0.002	0.354	-1.736	0.129	-1.328	33.8	56.0	24.1	199.7
9	132	0	0	0.005	0.002	0.002	0.002	0.405	-1.943	0.110	-1.194	37.7	56.4	22.7	188.8
10	136	0	0	0.005	0.002	0.002	0.002	0.459	-2.136	0.071	-1.033	38.6	56.7	21.4	177.8
11	140	0	0	0.002	0.002	0.002	0.002	0.515	-2.300	0.007	-0.845	43.5	57.0	19.8	164.2
12	144	0	0	0.000	0.002	0.002	0.002	0.530	-2.441	-0.100	-0.647	46.9	57.3	18.7	155.5
13	148	0	0	0.000	0.002	0.000	0.002	0.454	-2.561	-0.203	-0.435	#DIV/0!	57.5	19.3	160.2
14	152	0	0	0.000	0.000	-0.002	0.002	0.383	-2.654	-0.188	-0.215	44.9	60.8	23.6	196.0
15	156	0	0	0.000	0.000	-0.002	0.002	0.388	-2.727	-0.168	0.012	44.8	61.0	26.0	216.2
16	160	0	0	0.002	0.002	0.000	0.002	0.403	-2.776	-0.181	0.242	45.1	58.1	26.3	218.0
17	164	0	0	0.002	0.002	0.000	0.002	0.420	-2.803	-0.208	0.476	45.7	58.3	25.7	213.4
18	168	0	0	0.002	0.002	0.002	0.002	0.430	-2.810	-0.247	0.710	43.1	58.5	25.0	207.5
19	172	0	0	0.002	0.002	0.002	0.002	0.432	-2.798	-0.293	0.940	43.6	58.6	24.3	201.4
20	176	0	0	0.002	0.002	0.002	0.002	0.417	-2.764	-0.339	1.157	43.9	58.8	23.9	198.3
21	180	0	0	0.002	0.002	0.002	0.002	0.393	-2.715	-0.388	1.387	44.1	58.9	23.6	196.0
22	184	0	0	0.002	0.002	0.002	0.002	0.356	-2.632	-0.422	1.604	44.1	59.0	23.8	197.5
23	188	0	0	0.002	0.002	0.002	0.002	0.322	-2.537	-0.442	1.772	44.0	59.0	24.1	200.2
24	192	0	0	0.002	0.002	0.002	0.002	0.293	-2.437	-0.459	1.960	44.0	59.1	24.6	204.0
25	196	0	0	0.002	0.002	0.000	0.002	0.271	-2.327	-0.476	2.156	47.0	59.3	25.0	207.3
													Averages	22.1	183.3

Mass (kg):	1.1137
Poisson's Ratio:	0.40

Table K.3: GeoGauge results for A_12_1005 and A_9_100 at loc. 2

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
				A_7.5_105											
1	100	0	0	-0.002	0.000	-0.002	0.000	0.061	-0.122	0.291	-1.438	38.7	#DIV/0!	20.8	172.5
2	104	0	0	-0.002	0.000	-0.002	0.000	0.112	-0.339	0.303	-1.519	39.4	#DIV/0!	20.6	171.1
3	108	0	0	0.000	0.000	-0.002	0.002	0.166	-0.569	0.305	-1.567	43.1	56.7	20.5	170.4
4	112	0	0	0.000	0.000	0.000	0.002	0.227	-0.806	0.281	-1.582	#DIV/0!	57.2	20.8	172.9
5	116	0	0	-0.002	0.002	0.000	0.002	0.247	-1.047	0.251	-1.565	43.2	54.7	22.7	188.9
6	120	0	0	0.000	0.000	-0.002	0.002	0.278	-1.284	0.239	-1.514	43.5	58.2	23.2	192.2
7	124	0	0	0.002	0.002	-0.002	0.002	0.317	-1.516	0.244	-1.433	41.3	55.6	22.5	187.1
8	128	0	0	0.005	0.002	-0.002	0.002	0.361	-1.731	0.225	-1.326	37.8	56.0	22.2	184.5
9	132	0	0	0.005	0.002	0.000	0.002	0.403	-1.941	0.198	-1.189	39.3	56.4	22.1	183.1
10	136	0	0	0.002	0.002	0.000	0.000	0.444	-2.129	0.166	-1.030	45.8	59.7	21.7	180.5
11	140	0	0	0.002	0.002	0.002	0.000	0.479	-2.295	0.122	-0.850	43.1	60.0	21.6	179.7
12	144	0	0	0.002	0.002	0.002	0.000	0.510	-2.439	0.081	-0.652	43.5	60.3	21.4	177.7
13	148	0	0	0.002	0.002	0.002	0.002	0.537	-2.559	0.032	-0.442	43.9	57.5	21.2	175.9
14	152	0	0	0.000	0.002	0.000	0.002	0.549	-2.656	-0.020	-0.222	#DIV/0!	57.8	21.3	177.0
15	156	0	0	0.000	0.002	0.000	0.002	0.564	-2.729	-0.068	0.007	#DIV/0!	58.0	21.2	175.9
16	160	0	0	0.000	0.002	0.000	0.002	0.574	-2.776	-0.125	0.239	#DIV/0!	58.1	21.0	174.1
17	164	0	0	0.002	0.000	0.000	0.002	0.574	-2.803	-0.188	0.474	47.9	61.3	20.8	172.8
18	168	0	0	0.002	0.002	0.000	0.002	0.564	-2.808	-0.239	0.708	48.0	58.5	20.9	173.8
19	172	0	0	0.000	0.002	0.000	0.002	0.559	-2.793	-0.288	0.940	#DIV/0!	58.6	20.8	172.9
20	176	0	0	0.002	0.002	0.002	0.002	0.554	-2.764	-0.344	1.165	45.5	58.8	20.5	170.2
21	180	0	0	0.002	0.002	0.000	0.002	0.530	-2.717	-0.417	1.392	48.8	58.9	20.1	167.3
22	184	0	0	0.002	0.002	0.002	0.000	0.488	-2.637	-0.481	1.614	46.0	62.1	20.0	166.1
23	188	0	0	0.002	0.002	0.000	0.002	0.439	-2.539	-0.518	1.780	48.9	59.1	20.2	167.6
24	192	0	0	0.002	0.002	0.000	0.002	0.410	-2.441	-0.562	1.970	49.1	59.2	20.0	166.0
25	196	0	0	0.005	0.002	0.000	0.002	0.344	-2.324	-0.613	2.166	43.2	59.3	19.8	164.7
													Averages:	21.1	175.4

Mass (kg):	1.1137
Poisson's Ratio:	0.40

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
				A_15_100											
1	100	0	0	-0.005	0.000	-0.005	0.002	0.359	-0.125	0.227	-1.438	35.8	55.4	9.1	75.7
2	104	0	0	0.000	0.002	-0.007	0.002	0.359	-0.342	0.139	-1.516	34.4	53.1	10.0	82.8
3	108	0	0	0.002	0.000	-0.005	0.002	0.278	-0.569	0.081	-1.565	34.5	56.7	14.8	122.8
4	112	0	0	0.002	0.002	-0.007	0.002	0.249	-0.803	0.093	-1.582	30.7	54.2	21.3	176.5
5	116	0	0	0.002	0.002	-0.007	0.002	0.251	-1.045	0.117	-1.567	31.1	54.7	25.0	208.0
6	120	0	0	0.005	0.002	-0.005	0.002	0.283	-1.287	0.129	-1.519	33.1	55.2	25.0	207.8
7	124	0	0	0.007	0.002	0.000	0.002	0.313	-1.519	0.137	-1.436	33.4	55.6	25.0	207.4
8	128	0	0	0.007	0.002	0.002	0.002	0.354	-1.736	0.129	-1.328	33.8	56.0	24.1	199.7
9	132	0	0	0.005	0.002	0.002	0.002	0.405	-1.943	0.110	-1.194	37.7	56.4	22.7	188.8
10	136	0	0	0.005	0.002	0.002	0.002	0.459	-2.136	0.071	-1.033	38.6	56.7	21.4	177.8
11	140	0	0	0.002	0.002	0.002	0.002	0.515	-2.300	0.007	-0.845	43.5	57.0	19.8	164.2
12	144	0	0	0.000	0.002	0.002	0.002	0.530	-2.441	-0.100	-0.647	46.9	57.3	18.7	155.5
13	148	0	0	0.000	0.002	0.000	0.002	0.454	-2.561	-0.203	-0.435	#DIV/0!	57.5	19.3	160.2
14	152	0	0	0.000	0.000	-0.002	0.002	0.383	-2.654	-0.188	-0.215	44.9	60.8	23.6	196.0
15	156	0	0	0.000	0.000	-0.002	0.002	0.388	-2.727	-0.168	0.012	44.8	61.0	26.0	216.2
16	160	0	0	0.002	0.002	0.000	0.002	0.403	-2.776	-0.181	0.242	45.1	58.1	26.3	218.0
17	164	0	0	0.002	0.002	0.000	0.002	0.420	-2.803	-0.208	0.476	45.7	58.3	25.7	213.4
18	168	0	0	0.002	0.002	0.002	0.002	0.430	-2.810	-0.247	0.710	43.1	58.5	25.0	207.5
19	172	0	0	0.002	0.002	0.002	0.002	0.432	-2.798	-0.293	0.940	43.6	58.6	24.3	201.4
20	176	0	0	0.002	0.002	0.002	0.002	0.417	-2.764	-0.339	1.157	43.9	58.8	23.9	198.3
21	180	0	0	0.002	0.002	0.002	0.002	0.393	-2.715	-0.388	1.387	44.1	58.9	23.6	196.0
22	184	0	0	0.002	0.002	0.002	0.002	0.356	-2.632	-0.422	1.604	44.1	59.0	23.8	197.5
23	188	0	0	0.002	0.002	0.002	0.002	0.322	-2.537	-0.442	1.772	44.0	59.0	24.1	200.2
24	192	0	0	0.002	0.002	0.002	0.002	0.293	-2.437	-0.459	1.960	44.0	59.1	24.6	204.0
25	196	0	0	0.002	0.002	0.000	0.002	0.271	-2.327	-0.476	2.156	47.0	59.3	25.0	207.3
													Averages:	22.1	183.3

Mass (kg):	1.1137
Poisson's Ratio:	0.40

K.2 Soil B

Table K.4: GeoGauge results for B.24.103 and B.19.5.103 at loc. 2

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Real Force (Nfcos)	Imag. Displ. (Nxsin)	Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Real Force (Dfcos)	Imag. Displ. (Dxsin)	Imag. Force (Dxsin)	SNR, dB Displ.	Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
				B_24_103											
1	100	0	0	0.000	0.000	0.002	0.000	0.112	-0.120	0.591	-1.516	47.8	#DIV/0!	10.9	90.7
2	104	0	0	0.002	0.000	0.000	0.000	0.210	-0.349	0.618	-1.604	48.5	#DIV/0!	10.9	90.5
3	108	0	0	0.002	0.002	0.000	0.000	0.322	-0.591	0.649	-1.658	49.5	57.2	10.6	87.7
4	112	0	0	0.005	0.002	0.000	0.002	0.449	-0.842	0.659	-1.675	44.3	54.7	10.3	85.3
5	116	0	0	0.000	0.000	-0.002	0.000	0.593	-1.101	0.642	-1.658	51.1	#DIV/0!	10.0	82.7
6	120	0	0	0.015	0.000	0.010	0.002	0.676	-1.350	0.500	-1.616	33.6	58.7	10.8	89.5
7	124	0	0	0.037	0.000	0.015	0.000	0.869	-1.609	0.503	-1.528	28.1	#DIV/0!	9.6	80.0
8	128	0	0	0.029	0.000	0.012	0.002	1.003	-1.838	0.420	-1.411	30.7	59.5	9.3	77.3
9	132	0	0	0.024	0.000	0.007	0.000	1.157	-2.068	0.217	-1.282	33.3	#DIV/0!	8.8	73.1
10	136	0	0	0.015	0.000	0.005	0.000	1.211	-2.295	0.063	-1.084	37.9	#DIV/0!	8.9	73.8
11	140	0	0	0.007	0.000	0.002	0.000	1.260	-2.466	-0.215	-0.872	44.4	#DIV/0!	8.3	69.1
12	144	0	0	0.002	0.002	-0.002	0.002	1.108	-2.603	-0.437	-0.654	50.8	57.8	8.5	71.0
13	148	0	0	0.000	0.000	-0.002	0.000	0.940	-2.722	-0.586	-0.425	53.1	#DIV/0!	8.8	73.2
14	152	0	0	0.000	0.000	-0.005	0.000	0.762	-2.813	-0.627	-0.193	46.1	#DIV/0!	9.7	80.3
15	156	0	0	0.000	0.000	-0.005	0.000	0.657	-2.883	-0.625	0.042	45.4	#DIV/0!	10.8	89.8
16	160	0	0	-0.002	0.000	-0.005	0.000	0.549	-2.927	-0.557	0.276	43.1	#DIV/0!	13.1	109.1
17	164	0	0	-0.007	0.000	-0.002	0.000	0.554	-2.957	-0.520	0.515	39.9	#DIV/0!	14.9	124.1
18	168	0	0	-0.007	0.000	0.000	0.000	0.557	-2.961	-0.527	0.757	40.4	#DIV/0!	15.8	130.9
19	172	0	0	-0.007	0.002	0.000	0.000	0.552	-2.944	-0.530	0.999	40.4	62.1	16.6	138.3
20	176	0	0	-0.007	0.000	0.002	0.000	0.562	-2.910	-0.544	1.230	40.1	#DIV/0!	17.1	141.7
21	180	0	0	-0.007	0.000	0.000	0.000	0.569	-2.864	-0.574	1.472	40.9	#DIV/0!	17.2	143.1
22	184	0	0	-0.007	0.002	0.000	0.000	0.574	-2.783	-0.618	1.709	41.2	62.5	17.1	141.6
23	188	0	0	-0.002	0.000	0.000	0.000	0.569	-2.690	-0.659	1.892	51.0	#DIV/0!	16.8	139.8
24	192	0	0	-0.002	0.000	0.000	0.000	0.569	-2.593	-0.703	2.097	51.4	#DIV/0!	16.7	138.3
25	196	0	0	0.000	0.000	0.000	0.000	0.562	-2.480	-0.769	2.310	#DIV/0!	#DIV/0!	16.3	135.1
													Averages	12.3	102.2

Mass (kg):	1.1137
Poisson's Ratio:	0.40

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Real Force (Nfcos)	Imag. Displ. (Nxsin)	Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Real Force (Dfcos)	Imag. Displ. (Dxsin)	Imag. Force (Dxsin)	SNR, dB Displ.	Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
				B_19.5_103											
1	100	0	0	0.000	0.000	0.000	0.000	0.059	-0.122	0.342	-1.460	#DIV/0!	#DIV/0!	17.7	147.1
2	104	0	0	0.000	0.000	0.000	0.000	0.110	-0.342	0.359	-1.543	#DIV/0!	#DIV/0!	17.7	147.0
3	108	0	0	0.000	0.000	0.000	0.000	0.166	-0.576	0.371	-1.594	#DIV/0!	#DIV/0!	17.6	146.0
4	112	0	0	0.000	0.000	0.000	0.000	0.225	-0.815	0.371	-1.611	#DIV/0!	#DIV/0!	17.6	146.1
5	116	0	0	0.000	0.000	0.002	0.000	0.288	-1.064	0.366	-1.594	45.6	#DIV/0!	17.4	144.7
6	120	0	0	0.002	0.000	0.005	0.000	0.334	-1.306	0.342	-1.543	38.9	#DIV/0!	17.9	149.0
7	124	0	0	0.007	0.000	0.005	0.000	0.403	-1.545	0.325	-1.462	35.4	#DIV/0!	17.5	145.3
8	128	0	0	0.005	0.000	0.005	0.000	0.464	-1.768	0.293	-1.353	38.0	#DIV/0!	17.3	143.7
9	132	0	0	0.005	0.000	0.005	0.002	0.513	-1.982	0.251	-1.213	38.3	59.6	17.4	144.5
10	136	0	0	0.002	0.000	0.005	0.000	0.559	-2.168	0.212	-1.023	40.8	#DIV/0!	17.2	143.0
11	140	0	0	0.002	0.000	0.002	0.000	0.608	-2.329	0.159	-0.859	45.2	#DIV/0!	17.0	141.2
12	144	0	0	0.002	0.000	0.002	0.002	0.640	-2.478	0.093	-0.664	45.4	60.4	17.1	141.9
13	148	0	0	0.005	0.000	0.000	0.000	0.671	-2.603	0.037	-0.449	42.8	#DIV/0!	17.0	141.0
14	152	0	0	0.005	0.000	0.000	0.000	0.691	-2.705	-0.029	-0.225	43.0	#DIV/0!	17.0	141.2
15	156	0	0	0.002	0.002	0.000	0.000	0.706	-2.781	-0.093	0.010	49.3	61.1	17.0	141.0
16	160	0	0	0.000	0.002	0.000	0.000	0.720	-2.832	-0.159	0.247	#DIV/0!	61.3	16.8	139.6
17	164	0	0	-0.002	0.000	0.000	0.000	0.715	-2.864	-0.242	0.488	49.8	#DIV/0!	16.8	139.3
18	168	0	0	-0.002	0.000	0.000	0.000	0.698	-2.871	-0.298	0.720	49.9	#DIV/0!	17.0	141.6
19	172	0	0	0.000	0.002	0.000	0.000	0.698	-2.859	-0.356	0.950	#DIV/0!	61.8	16.9	140.3
20	176	0	0	0.000	0.002	0.000	0.000	0.688	-2.822	-0.430	1.177	#DIV/0!	62.0	16.6	138.0
21	180	0	0	0.000	0.002	0.002	0.000	0.667	-2.769	-0.508	1.416	50.7	62.1	16.4	136.3
22	184	0	0	-0.002	0.002	0.002	0.000	0.627	-2.686	-0.576	1.643	47.8	62.2	16.4	136.0
23	188	0	0	-0.002	0.002	0.000	0.000	0.591	-2.595	-0.652	1.821	51.1	62.3	16.0	132.7
24	192	0	0	-0.007	0.002	-0.002	0.000	0.554	-2.498	-0.720	2.021	41.4	62.4	15.7	130.7
25	196	0	0	-0.002	0.000	0.000	0.000	0.461	-2.378	-0.801	2.229	51.6	#DIV/0!	15.5	129.0
													Averages	17.0	141.0

Mass (kg):	1.1137
Poisson's Ratio:	0.40

Table K.5: GeoGauge results for B_16_103 and B_27_98 at loc. 2

B_16_103

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Real Force (Nfcos)	Noise Imag. Displ. (Nxsin)	Noise Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Real Force (Dfcos)	Signal Imag. Displ. (Dxsin)	Signal Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	0.000	0.000	0.002	0.000	0.142	-0.142	0.388	-1.450	44.6	#DIV/0!	14.5	120.0
2	104	0	0	0.000	0.000	0.002	0.000	0.159	-0.349	0.415	-1.533	45.2	#DIV/0!	14.9	123.4
3	108	0	0	0.000	0.000	0.000	0.000	0.212	-0.579	0.444	-1.589	#DIV/0!	#DIV/0!	14.5	120.8
4	112	0	0	-0.002	0.000	0.000	0.000	0.283	-0.818	0.457	-1.606	46.9	#DIV/0!	14.3	118.5
5	116	0	0	-0.002	0.000	0.000	0.000	0.359	-1.064	0.457	-1.592	47.5	#DIV/0!	14.1	117.0
6	120	0	0	0.007	0.000	0.000	0.000	0.413	-1.309	0.417	-1.541	38.1	#DIV/0!	14.7	122.3
7	124	0	0	0.015	0.000	-0.002	0.002	0.515	-1.548	0.415	-1.462	33.0	58.8	13.8	115.0
8	128	0	0	0.012	0.000	0.000	0.002	0.586	-1.768	0.376	-1.353	35.1	59.2	13.8	114.6
9	132	0	0	0.010	0.002	0.002	0.002	0.654	-1.980	0.344	-1.216	37.3	56.6	13.6	113.2
10	136	0	0	0.005	0.000	0.002	0.000	0.723	-2.175	0.283	-1.050	43.1	#DIV/0!	13.5	112.5
11	140	0	0	0.005	0.000	0.002	0.000	0.779	-2.349	0.225	-0.864	43.4	#DIV/0!	13.5	112.1
12	144	0	0	0.005	0.000	0.000	0.000	0.820	-2.495	0.149	-0.662	44.6	#DIV/0!	13.6	112.8
13	148	0	0	0.002	0.000	0.000	0.000	0.872	-2.627	0.071	-0.444	51.1	#DIV/0!	13.4	111.5
14	152	0	0	0.000	0.000	0.000	0.000	0.901	-2.732	0.000	-0.225	#DIV/0!	#DIV/0!	13.5	111.8
15	156	0	0	0.000	0.000	0.000	0.000	0.925	-2.808	-0.078	0.005	#DIV/0!	#DIV/0!	13.4	111.6
16	160	0	0	0.000	0.000	0.000	0.002	0.940	-2.859	-0.166	0.244	#DIV/0!	61.4	13.4	111.4
17	164	0	0	0.000	0.002	0.000	0.000	0.947	-2.886	-0.249	0.483	#DIV/0!	61.6	13.4	111.2
18	168	0	0	0.002	0.002	0.000	0.002	0.942	-2.891	-0.334	0.723	52.2	58.7	13.4	111.4
19	172	0	0	0.002	0.002	0.000	0.000	0.940	-2.878	-0.415	0.957	52.5	61.9	13.4	111.0
20	176	0	0	0.000	0.002	0.000	0.000	0.930	-2.844	-0.500	1.189	#DIV/0!	62.0	13.3	110.3
21	180	0	0	0.000	0.000	0.000	0.002	0.908	-2.795	-0.598	1.431	#DIV/0!	62.2	13.2	109.7
22	184	0	0	0.000	0.000	0.000	0.000	0.874	-2.712	-0.688	1.663	#DIV/0!	#DIV/0!	13.1	109.2
23	188	0	0	0.000	0.000	0.000	0.000	0.837	-2.622	-0.774	1.843	#DIV/0!	#DIV/0!	13.0	107.9
24	192	0	0	0.000	0.000	-0.002	0.000	0.793	-2.527	-0.862	2.046	53.6	#DIV/0!	12.9	107.1
25	196	0	0	0.000	0.000	0.000	0.000	0.725	-2.410	-0.957	2.258	#DIV/0!	#DIV/0!	12.8	106.4
													Averages	13.6	113.3

Mass (kg):	1.1137
Poisson's Ratio:	0.40

B_27_98

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Real Force (Nfcos)	Noise Imag. Displ. (Nxsin)	Noise Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Real Force (Dfcos)	Signal Imag. Displ. (Dxsin)	Signal Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	0.000	0.000	0.002	-0.002	0.161	-0.129	0.713	-1.482	49.5	55.7	8.7	72.4
2	104	0	0	0.012	0.000	0.000	0.000	0.327	-0.354	0.757	-1.567	36.6	#DIV/0!	8.3	69.2
3	108	0	0	0.032	-0.002	0.010	0.000	0.432	-0.596	0.742	-1.621	28.3	57.0	8.6	71.7
4	112	0	0	0.046	0.000	0.024	-0.002	0.522	-0.845	0.649	-1.621	24.0	57.5	9.4	77.9
5	116	0	0	0.042	0.000	0.029	-0.002	0.583	-1.086	0.654	-1.609	24.7	58.0	9.6	79.7
6	120	0	0	0.032	0.000	0.012	0.000	0.710	-1.338	0.657	-1.563	29.1	#DIV/0!	9.3	77.2
7	124	0	0	0.020	0.000	0.002	0.000	0.950	-1.604	0.598	-1.477	35.1	#DIV/0!	8.5	70.7
8	128	0	0	0.015	0.000	0.002	0.002	0.930	-1.802	0.374	-1.331	36.6	59.3	9.6	79.7
9	132	0	0	0.020	0.000	0.012	0.000	0.974	-2.004	0.425	-1.211	33.3	#DIV/0!	9.7	80.8
10	136	0	0	0.007	0.000	0.012	0.000	1.089	-2.202	0.334	-1.050	38.1	#DIV/0!	9.5	78.9
11	140	0	0	-0.007	0.000	0.005	0.000	1.211	-2.385	0.190	-0.859	42.9	#DIV/0!	9.2	76.4
12	144	0	0	-0.015	0.000	0.007	0.000	1.201	-2.532	0.054	-0.654	37.3	#DIV/0!	9.6	80.1
13	148	0	0	-0.012	0.002	0.007	0.002	1.199	-2.656	-0.022	-0.442	38.5	57.8	10.0	83.2
14	152	0	0	-0.007	0.002	0.005	0.002	1.233	-2.756	-0.115	-0.217	43.0	58.1	10.0	83.4
15	156	0	0	-0.002	0.002	0.010	0.000	1.257	-2.832	-0.193	0.012	42.0	61.3	10.1	83.9
16	160	0	0	-0.002	0.002	0.010	-0.002	1.296	-2.893	-0.276	0.254	42.4	58.5	10.0	83.5
17	164	0	0	0.007	0.005	0.010	-0.002	1.309	-2.927	-0.403	0.500	41.0	54.7	10.0	83.1
18	168	0	0	0.007	0.002	0.005	-0.002	1.321	-2.937	-0.500	0.742	44.1	58.9	10.0	82.9
19	172	0	0	0.005	0.002	0.002	0.000	1.355	-2.927	-0.627	0.989	48.7	62.0	9.7	80.9
20	176	0	0	-0.007	0.000	0.002	0.000	1.348	-2.896	-0.750	1.226	46.0	#DIV/0!	9.7	80.4
21	180	0	0	-0.007	0.000	0.007	-0.002	1.338	-2.849	-0.891	1.475	43.8	62.4	9.6	79.4
22	184	0	0	-0.005	0.000	0.017	-0.002	1.321	-2.773	-1.030	1.716	39.5	62.5	9.4	78.3
23	188	0	0	-0.024	0.002	0.012	-0.002	1.233	-2.678	-1.218	1.909	36.1	59.6	9.2	76.7
24	192	0	0	-0.032	0.002	0.010	-0.002	1.211	-2.585	-1.389	2.126	34.9	59.7	9.0	74.5
25	196	0	0	-0.017	0.002	0.022	-0.002	1.121	-2.466	-1.560	2.354	36.8	59.9	8.8	73.5
													Averages	9.4	78.3

Mass (kg):	1.1137
Poisson's Ratio:	0.40

Table K.6: GeoGauge results for B_12_98 and B_16_98 at loc. 2

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
				B_22_98											
1	100	0	0	0.000	0.000	-0.005	0.000	0.112	-0.125	0.610	-1.445	42.1	#DIV/0!	10.0	83.0
2	104	0	0	-0.002	0.000	-0.007	0.002	0.222	-0.342	0.637	-1.523	38.8	56.1	9.9	82.3
3	108	0	0	-0.002	0.000	-0.010	0.002	0.332	-0.576	0.659	-1.575	37.3	56.7	9.8	81.2
4	112	0	0	-0.002	0.000	-0.010	0.002	0.454	-0.811	0.669	-1.592	38.1	57.3	9.5	79.3
5	116	0	0	-0.002	0.000	-0.005	0.002	0.613	-1.050	0.645	-1.577	44.2	57.8	9.2	76.4
6	120	0	0	0.005	0.000	-0.005	0.002	0.732	-1.301	0.591	-1.538	42.7	58.3	9.3	76.9
7	124	0	0	0.012	0.000	-0.010	0.002	0.808	-1.545	0.505	-1.455	35.7	58.8	9.6	80.1
8	128	0	0	0.005	0.000	-0.010	0.000	0.933	-1.777	0.444	-1.340	39.5	#DIV/0!	9.4	77.9
9	132	0	0	0.002	0.000	-0.007	0.000	1.082	-1.987	0.212	-1.179	43.1	#DIV/0!	8.9	73.7
10	136	0	0	0.000	0.000	-0.005	0.002	0.906	-2.153	0.112	-1.021	45.4	59.8	11.0	91.2
11	140	0	0	0.000	0.000	0.000	0.000	0.962	-2.324	0.144	-0.845	#DIV/0!	#DIV/0!	11.1	92.1
12	144	0	0	-0.005	0.000	0.002	0.000	1.042	-2.473	0.085	-0.647	45.6	#DIV/0!	10.8	89.6
13	148	0	0	-0.005	0.000	0.002	0.000	1.123	-2.605	-0.010	-0.432	46.3	#DIV/0!	10.5	86.9
14	152	0	0	-0.007	0.000	0.002	0.000	1.184	-2.708	-0.132	-0.210	43.8	#DIV/0!	10.2	84.8
15	156	0	0	-0.007	0.000	0.000	0.000	1.221	-2.783	-0.264	0.027	44.6	#DIV/0!	10.0	83.3
16	160	0	0	-0.005	0.000	-0.005	0.000	1.245	-2.837	-0.400	0.264	45.5	#DIV/0!	9.9	81.8
17	164	0	0	0.002	0.000	-0.002	0.002	1.238	-2.864	-0.579	0.510	51.9	61.5	9.6	79.9
18	168	0	0	0.000	0.000	-0.007	0.002	1.199	-2.866	-0.725	0.752	45.6	61.7	9.6	79.4
19	172	0	0	-0.002	0.000	-0.010	0.002	1.160	-2.849	-0.872	0.994	43.2	61.8	9.4	78.3
20	176	0	0	-0.002	0.000	-0.007	0.000	1.055	-2.810	-1.072	1.235	45.8	#DIV/0!	9.1	75.9
21	180	0	0	-0.005	0.000	-0.002	0.000	0.837	-2.742	-1.240	1.482	48.8	#DIV/0!	9.0	74.7
22	184	0	0	-0.002	0.000	0.005	-0.002	0.623	-2.642	-1.235	1.699	48.1	62.2	9.5	79.0
23	188	0	0	0.000	0.000	0.010	-0.002	0.535	-2.546	-1.196	1.865	42.6	62.2	10.1	84.2
24	192	0	0	0.000	0.000	0.005	0.000	0.413	-2.439	-1.191	2.051	48.2	#DIV/0!	10.5	87.4
25	196	0	0	0.000	0.000	0.000	0.000	0.371	-2.329	-1.125	2.241	#DIV/0!	#DIV/0!	11.6	96.2
													Averages	9.9	82.2
				B_16_98											
1	100	0	0	0.000	0.000	-0.002	0.000	0.625	-0.154	2.227	-1.492	59.5	#DIV/0!	3.1	25.4
2	104	0	0	0.002	0.002	0.000	0.000	1.091	-0.388	2.415	-1.577	60.7	56.5	2.9	24.5
3	108	0	0	0.000	0.000	0.000	0.000	1.726	-0.640	2.568	-1.631	#DIV/0!	#DIV/0!	2.8	23.1
4	112	0	0	-0.002	0.000	-0.002	0.000	2.356	-0.901	2.610	-1.648	60.2	#DIV/0!	2.7	22.3
5	116	0	0	0.007	0.000	0.000	0.000	3.223	-1.182	2.603	-1.626	55.0	#DIV/0!	2.5	20.9
6	120	0	0	0.000	0.000	-0.027	0.002	4.294	-1.467	2.156	-1.553	45.1	58.8	2.3	19.5
7	124	0	0	-0.010	0.000	-0.046	0.002	4.998	-1.768	1.453	-1.436	40.8	59.4	2.3	19.4
8	128	0	0	0.002	0.002	-0.044	0.002	4.998	-2.061	0.227	-1.252	41.1	56.9	2.5	20.4
9	132	0	0	0.012	0.000	-0.017	0.002	4.998	-2.344	-1.719	-0.935	48.0	60.3	2.3	18.7
10	136	0	0	-0.007	0.002	0.005	0.000	4.114	-2.429	-4.402	-0.527	56.7	60.2	1.7	14.0
11	140	0	0	-0.042	0.002	-0.012	0.000	1.494	-2.341	-5.000	-0.266	41.6	59.7	1.2	9.9
12	144	0	0	-0.024	0.002	-0.015	0.000	-0.479	-2.292	-5.000	-0.149	44.9	59.5	0.6	5.1
13	148	0	0	-0.017	0.002	-0.022	0.002	-2.041	-2.319	-5.000	-0.083	45.8	56.5	0.2	2.0
14	152	0	0	-0.002	0.000	-0.020	0.002	-2.190	-2.405	-3.701	0.034	46.8	59.9	-0.1	-1.0
15	156	0	0	0.002	0.000	-0.015	0.002	-2.134	-2.478	-2.703	0.190	47.3	60.2	-0.6	-4.8
16	160	0	0	0.000	0.000	-0.010	0.000	-1.819	-2.546	-1.907	0.359	48.6	#DIV/0!	-1.2	-10.0
17	164	0	0	0.000	0.000	-0.002	0.000	-1.350	-2.605	-1.458	0.557	58.2	#DIV/0!	-1.6	-13.5
18	168	0	0	0.000	0.000	0.000	0.000	-0.984	-2.634	-1.245	0.771	#DIV/0!	#DIV/0!	-1.4	-11.8
19	172	0	0	0.005	0.002	-0.002	0.000	-0.647	-2.642	-1.099	0.986	47.4	61.3	-0.3	-2.3
20	176	0	0	0.007	0.000	-0.010	0.002	-0.320	-2.637	-1.108	1.211	39.5	61.5	2.9	24.1
21	180	0	0	0.005	-0.002	-0.010	0.002	-0.007	-2.617	-1.230	1.450	41.0	58.8	6.2	51.6
22	184	0	0	0.010	-0.002	-0.007	0.002	0.178	-2.556	-1.455	1.697	41.6	59.0	7.1	58.7
23	188	0	0	0.007	-0.002	-0.002	0.002	0.364	-2.485	-1.711	1.897	47.1	59.1	7.1	59.1
24	192	0	0	0.010	0.000	-0.005	0.002	0.488	-2.407	-2.053	2.129	45.7	62.4	6.7	55.9
25	196	0	0	0.007	0.000	-0.002	0.002	0.530	-2.302	-2.510	2.385	50.4	62.7	6.2	51.4
													Averages	2.3	19.3

B_22_98:

Mass (kg):	1.1137
Poisson's Ratio:	0.40

B_16_98:

Mass (kg):	1.1137
Poisson's Ratio:	0.40

K.3 Soil C

Table K.7: GeoGauge results for C_12_103 and C_9.5_103 at loc. 2

C_12_103

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	0.000	0.000	0.010	-0.002	0.139	-0.125	0.723	-1.494	37.5	55.8	8.8	72.7
2	104	0	0	0.000	0.000	0.007	0.000	0.264	-0.352	0.730	-1.580	40.5	#DIV/0!	9.0	74.4
3	108	0	0	0.000	0.000	0.010	0.000	0.352	-0.588	0.762	-1.633	38.7	#DIV/0!	9.0	74.5
4	112	0	0	-0.002	0.000	0.007	0.000	0.481	-0.837	0.764	-1.650	41.4	#DIV/0!	8.9	74.1
5	116	0	0	0.000	0.000	0.015	0.000	0.620	-1.091	0.776	-1.636	36.6	#DIV/0!	8.7	72.1
6	120	0	0	0.010	0.000	0.022	0.000	0.703	-1.338	0.740	-1.584	32.6	#DIV/0!	9.0	74.4
7	124	0	0	0.017	0.000	0.017	0.000	0.913	-1.584	0.686	-1.499	33.5	#DIV/0!	8.5	70.3
8	128	0	0	0.027	0.000	0.007	0.000	1.069	-1.809	0.593	-1.389	32.9	#DIV/0!	8.3	68.8
9	132	0	0	0.032	0.002	0.002	0.000	1.079	-2.053	0.444	-1.260	31.3	59.9	9.1	75.8
10	136	0	0	0.029	0.002	-0.005	0.000	1.235	-2.253	0.366	-1.072	32.7	60.2	8.7	71.9
11	140	0	0	0.027	0.000	-0.012	0.002	1.289	-2.422	0.188	-0.876	32.9	60.5	8.8	73.1
12	144	0	0	0.022	0.002	-0.017	0.002	1.318	-2.571	0.100	-0.674	33.5	57.7	9.0	74.9
13	148	0	0	0.010	0.000	-0.017	0.002	1.384	-2.703	0.002	-0.452	36.9	61.0	9.0	74.5
14	152	0	0	0.000	0.000	-0.024	0.002	1.426	-2.810	-0.129	-0.217	35.4	61.2	9.0	74.6
15	156	0	0	-0.007	0.002	-0.017	0.002	1.475	-2.893	-0.232	0.020	38.1	58.5	8.9	74.2
16	160	0	0	-0.002	0.000	-0.005	0.002	1.560	-2.952	-0.396	0.269	49.4	61.7	8.6	71.3
17	164	0	0	0.000	0.000	0.000	0.000	1.541	-2.981	-0.610	0.525	#DIV/0!	#DIV/0!	8.5	70.8
18	168	0	0	0.012	0.000	0.005	0.000	1.543	-2.991	-0.789	0.781	42.4	#DIV/0!	8.4	69.7
19	172	0	0	0.020	0.000	0.005	0.000	1.516	-2.976	-1.006	1.038	39.1	#DIV/0!	8.2	68.0
20	176	0	0	0.010	0.000	-0.007	0.002	1.423	-2.935	-1.221	1.289	43.7	62.4	8.1	67.0
21	180	0	0	0.005	0.000	-0.007	0.002	1.257	-2.874	-1.401	1.548	46.6	62.5	8.1	67.4
22	184	0	0	0.017	0.000	-0.056	0.010	1.145	-2.783	-1.587	1.799	30.5	50.6	8.0	66.1
23	188	0	0	0.022	0.000	-0.083	0.012	0.842	-2.664	-1.577	1.970	26.4	48.7	8.4	69.9
24	192	0	0	0.049	-0.005	-0.071	0.010	0.615	-2.542	-1.506	2.156	25.5	49.7	9.1	75.4
25	196	0	0	0.046	-0.002	-0.046	0.007	0.566	-2.427	-1.553	2.363	28.0	52.8	9.3	76.9
													Averages	8.7	72.1

Mass (kg):	1.1137
Poisson's Ratio:	0.40

C_9.5_103

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	0.010	0.000	0.007	0.000	0.085	-0.127	0.547	-1.462	33.1	#DIV/0!	11.3	93.8
2	104	0	0	0.012	0.000	0.012	0.000	0.186	-0.347	0.542	-1.548	30.4	#DIV/0!	11.8	97.8
3	108	0	0	0.012	0.000	0.010	0.002	0.256	-0.583	0.596	-1.599	32.4	56.9	11.3	93.6
4	112	0	0	0.000	0.000	0.005	0.002	0.393	-0.828	0.596	-1.619	43.3	57.4	10.9	90.9
5	116	0	0	-0.017	0.002	0.000	0.002	0.469	-1.077	0.562	-1.599	32.6	54.9	11.4	94.3
6	120	0	0	-0.017	0.002	-0.005	0.002	0.645	-1.328	0.554	-1.548	33.6	55.4	10.4	86.1
7	124	0	0	-0.022	0.002	-0.005	0.002	0.767	-1.567	0.386	-1.453	31.6	55.8	10.5	87.2
8	128	0	0	-0.022	0.002	0.010	-0.002	0.703	-1.785	0.325	-1.345	30.2	56.2	12.3	102.1
9	132	0	0	-0.015	0.000	0.027	-0.002	0.791	-1.985	0.303	-1.187	28.8	59.5	11.8	98.0
10	136	0	0	0.012	-0.002	0.034	-0.002	0.869	-2.175	0.305	-1.045	28.1	56.9	11.5	95.5
11	140	0	0	0.024	-0.005	0.029	-0.002	0.930	-2.341	0.227	-0.859	28.0	53.2	11.5	95.4
12	144	0	0	0.012	-0.005	0.017	0.000	1.001	-2.498	0.112	-0.659	33.6	54.5	11.3	94.0
13	148	0	0	0.000	-0.002	0.007	0.000	1.069	-2.627	0.017	-0.442	43.3	60.8	11.1	91.9
14	152	0	0	0.000	-0.002	0.002	0.000	1.106	-2.729	-0.100	-0.212	53.2	61.0	11.0	91.3
15	156	0	0	0.005	-0.002	0.005	0.002	1.125	-2.808	-0.195	0.024	44.4	58.2	11.0	91.6
16	160	0	0	0.007	0.000	0.002	0.000	1.211	-2.881	-0.432	0.278	44.4	#DIV/0!	10.1	83.8
17	164	0	0	0.022	0.002	0.000	0.000	1.094	-2.891	-0.461	0.505	34.7	61.6	11.1	91.9
18	168	0	0	0.020	0.005	-0.002	-0.002	1.128	-2.900	-0.598	0.750	36.2	54.8	10.6	88.1
19	172	0	0	0.029	0.002	-0.002	0.000	1.062	-2.878	-0.708	0.989	32.8	61.9	10.8	89.4
20	176	0	0	0.022	0.002	-0.005	0.000	1.050	-2.844	-0.828	1.223	35.5	62.1	10.5	87.6
21	180	0	0	-0.010	0.005	-0.020	0.002	0.845	-2.778	-1.084	1.479	36.0	55.2	10.0	83.1
22	184	0	0	-0.095	0.012	-0.090	0.007	0.991	-2.715	-1.040	1.702	20.8	47.0	10.4	86.0
23	188	0	0	-0.061	0.007	-0.110	0.012	0.647	-2.590	-1.277	1.899	21.1	47.1	9.8	81.1
24	192	0	0	-0.042	0.005	-0.066	0.007	0.457	-2.476	-1.345	2.100	25.2	51.3	9.7	80.3
25	196	0	0	0.027	-0.002	0.007	0.000	0.259	-2.344	-1.311	2.295	33.6	62.6	10.0	83.0
													Averages	10.9	90.3

Mass (kg):	1.1137
Poisson's Ratio:	0.40

Table K.8: GeoGauge results for C_8_103 and C_13_98 at loc. 2

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data Real Force (Nfcos)	Noise Data Imag. Displ. (Nxsin)	Noise Data Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data Real Force (Dfcos)	Signal Data Imag. Displ. (Dxsin)	Signal Data Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
				C_8_103											
1	100	0	0	-0.007	-0.002	0.010	-0.002	0.081	-0.120	0.537	-1.484	33.0	52.7	11.7	96.9
2	104	0	0	-0.010	0.000	0.007	-0.002	0.166	-0.344	0.559	-1.570	33.6	56.4	11.8	97.6
3	108	0	0	-0.007	0.000	0.007	-0.002	0.247	-0.583	0.581	-1.621	35.7	57.0	11.7	97.1
4	112	0	0	-0.007	0.000	0.002	0.000	0.352	-0.830	0.574	-1.638	38.8	#DIV/0!	11.7	97.3
5	116	0	0	-0.002	0.000	0.007	0.000	0.447	-1.079	0.562	-1.621	39.4	#DIV/0!	11.7	97.1
6	120	0	0	-0.010	0.000	0.007	0.000	0.547	-1.328	0.518	-1.567	35.8	#DIV/0!	11.8	97.7
7	124	0	0	-0.015	0.002	0.007	0.000	0.654	-1.575	0.498	-1.487	34.0	59.0	11.4	94.9
8	128	0	0	-0.007	0.000	-0.005	0.000	0.759	-1.804	0.444	-1.375	40.0	#DIV/0!	11.2	93.2
9	132	0	0	0.015	0.000	-0.024	0.005	0.806	-2.034	0.369	-1.223	29.9	53.7	11.7	97.1
10	136	0	0	0.015	-0.002	-0.024	0.005	0.903	-2.200	0.320	-1.045	30.5	53.0	11.2	92.9
11	140	0	0	0.007	0.002	-0.020	0.002	0.984	-2.380	0.227	-0.864	33.7	57.3	11.1	92.0
12	144	0	0	0.002	0.002	-0.012	0.002	1.035	-2.532	0.132	-0.669	38.5	57.6	11.1	92.4
13	148	0	0	0.005	0.000	-0.005	0.005	1.082	-2.659	0.051	-0.454	43.9	54.8	11.1	92.3
14	152	0	0	0.007	0.000	0.000	0.002	1.123	-2.766	-0.066	-0.225	43.7	61.1	11.0	91.7
15	156	0	0	0.005	-0.002	-0.010	0.002	1.145	-2.847	-0.190	0.017	40.5	58.3	11.0	91.4
16	160	0	0	0.000	-0.002	-0.012	0.002	1.162	-2.898	-0.322	0.259	39.9	58.5	10.9	90.2
17	164	0	0	0.000	0.000	-0.015	0.000	1.104	-2.922	-0.447	0.505	38.2	#DIV/0!	11.2	92.8
18	168	0	0	0.002	0.000	-0.017	0.002	1.106	-2.932	-0.544	0.750	37.1	61.9	11.1	92.2
19	172	0	0	0.000	0.000	-0.010	0.002	1.094	-2.917	-0.657	0.994	42.3	62.0	11.0	91.3
20	176	0	0	-0.010	0.000	0.005	0.000	1.047	-2.886	-0.803	1.230	41.6	#DIV/0!	10.8	89.8
21	180	0	0	-0.010	0.000	0.007	0.000	0.977	-2.830	-0.933	1.484	40.9	#DIV/0!	10.8	89.4
22	184	0	0	0.037	-0.005	0.000	0.000	0.981	-2.749	-1.084	1.724	32.0	56.5	10.3	85.2
23	188	0	0	0.051	-0.007	-0.005	0.002	0.811	-2.642	-1.160	1.907	28.8	52.5	10.5	87.0
24	192	0	0	0.044	-0.005	0.015	0.000	0.674	-2.532	-1.270	2.114	29.8	56.6	10.3	85.9
25	196	0	0	0.029	-0.002	0.017	0.000	0.513	-2.402	-1.289	2.317	32.2	62.7	10.7	88.7
													Averages	11.1	92.6

Mass (kg):	1.1137
Poisson's Ratio:	0.40

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data Real Force (Nfcos)	Noise Data Imag. Displ. (Nxsin)	Noise Data Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data Real Force (Dfcos)	Signal Data Imag. Displ. (Dxsin)	Signal Data Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
				C_13_98											
1	100	0	0	0.000	0.000	0.000	0.000	0.146	-0.132	0.884	-1.501	#DIV/0!	#DIV/0!	7.4	61.7
2	104	0	0	0.000	0.000	0.000	0.000	0.320	-0.369	0.945	-1.580	#DIV/0!	#DIV/0!	7.2	60.0
3	108	0	0	0.002	0.000	0.000	0.000	0.505	-0.596	0.972	-1.621	53.0	#DIV/0!	7.0	58.4
4	112	0	0	0.002	0.000	-0.002	0.000	0.789	-0.835	0.938	-1.643	51.0	#DIV/0!	6.7	55.3
5	116	0	0	0.002	0.000	0.000	0.000	0.869	-1.089	0.654	-1.638	53.0	#DIV/0!	7.7	64.0
6	120	0	0	-0.002	0.002	-0.007	0.002	0.854	-1.350	0.637	-1.589	42.8	55.6	8.6	71.3
7	124	0	0	-0.005	0.000	-0.010	0.002	0.967	-1.621	0.684	-1.506	40.7	59.1	8.4	69.8
8	128	0	0	-0.005	0.000	-0.007	0.000	1.094	-1.826	0.623	-1.360	43.1	#DIV/0!	8.2	68.2
9	132	0	0	-0.002	0.000	-0.005	0.002	1.230	-2.039	0.574	-1.235	47.9	59.8	8.0	66.8
10	136	0	0	0.000	0.000	-0.005	0.002	1.367	-2.239	0.481	-1.072	49.4	60.1	7.9	65.7
11	140	0	0	0.000	0.000	-0.002	0.000	1.514	-2.422	0.359	-0.881	56.1	#DIV/0!	7.7	64.1
12	144	0	0	0.000	0.000	0.000	0.002	1.604	-2.581	0.200	-0.676	#DIV/0!	60.8	7.7	64.2
13	148	0	0	0.000	0.000	0.002	0.000	1.697	-2.717	0.059	-0.449	56.8	#DIV/0!	7.7	63.7
14	152	0	0	0.000	0.000	0.000	0.000	1.772	-2.825	-0.110	-0.215	#DIV/0!	#DIV/0!	7.6	63.2
15	156	0	0	0.000	0.000	0.000	0.000	1.848	-2.910	-0.286	0.032	#DIV/0!	#DIV/0!	7.5	62.2
16	160	0	0	0.000	0.002	0.000	0.000	1.936	-2.974	-0.508	0.286	#DIV/0!	61.8	7.3	60.4
17	164	0	0	-0.002	0.000	0.000	0.000	1.917	-3.003	-0.791	0.547	58.6	#DIV/0!	7.2	59.7
18	168	0	0	0.000	0.000	-0.002	0.000	1.855	-3.008	-1.030	0.808	58.8	#DIV/0!	7.2	59.6
19	172	0	0	0.010	0.000	-0.007	0.002	1.750	-2.986	-1.213	1.060	44.8	62.3	7.3	60.5
20	176	0	0	0.015	0.000	-0.007	0.002	1.748	-2.957	-1.399	1.306	42.7	62.4	7.2	59.6
21	180	0	0	0.012	0.000	-0.005	0.002	1.675	-2.905	-1.714	1.577	45.2	62.6	6.9	57.5
22	184	0	0	0.007	0.000	0.000	0.000	1.379	-2.808	-2.000	1.838	50.4	#DIV/0!	6.8	56.7
23	188	0	0	0.002	0.000	0.002	0.000	1.187	-2.698	-2.131	2.034	57.0	#DIV/0!	6.8	56.8
24	192	0	0	0.002	0.000	0.000	0.000	0.747	-2.556	-2.253	2.246	59.8	#DIV/0!	6.8	56.3
25	196	0	0	0.000	0.000	0.000	0.000	0.471	-2.417	-2.090	2.434	#DIV/0!	#DIV/0!	7.3	61.0
													Averages	7.4	61.9

Mass (kg):	1.1137
Poisson's Ratio:	0.40

Table K.9: GeoGauge results for C_10_98 and C_8_98 at loc. 2

C_10_98

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	0.000	0.000	0.002	0.000	0.183	-0.129	0.962	-1.497	52.1	#DIV/0!	6.7	55.7
2	104	0	0	-0.002	0.000	0.002	0.000	0.332	-0.354	1.013	-1.584	49.8	#DIV/0!	6.7	55.6
3	108	0	0	0.005	0.002	0.005	0.002	0.515	-0.601	1.072	-1.638	44.7	54.1	6.5	54.0
4	112	0	0	0.000	0.000	0.012	0.000	0.720	-0.854	1.082	-1.660	40.5	#DIV/0!	6.4	53.2
5	116	0	0	0.002	0.000	0.022	0.000	0.920	-1.121	1.118	-1.643	36.3	#DIV/0!	6.2	51.5
6	120	0	0	0.000	-0.002	0.007	0.000	1.150	-1.377	1.052	-1.587	46.6	58.7	6.1	50.9
7	124	0	0	-0.010	0.000	-0.005	0.000	1.348	-1.611	0.886	-1.472	43.4	#DIV/0!	6.2	51.1
8	128	0	0	-0.010	0.000	-0.010	0.002	1.528	-1.836	0.837	-1.375	42.0	59.5	6.1	50.4
9	132	0	0	0.005	0.000	-0.002	0.002	1.672	-2.053	0.706	-1.235	50.4	59.8	6.1	50.9
10	136	0	0	0.015	0.000	-0.005	0.005	1.912	-2.263	0.583	-1.067	42.2	54.2	5.9	49.0
11	140	0	0	-0.015	0.002	-0.002	0.002	2.109	-2.449	0.386	-0.872	43.2	57.5	5.8	47.9
12	144	0	0	-0.024	0.005	-0.007	0.002	2.307	-2.610	0.122	-0.657	39.1	53.9	5.6	46.5
13	148	0	0	-0.015	0.005	-0.005	0.002	2.446	-2.756	-0.139	-0.425	44.0	54.2	5.5	45.9
14	152	0	0	-0.010	0.000	-0.007	0.000	2.607	-2.871	-0.459	-0.173	46.7	#DIV/0!	5.4	44.4
15	156	0	0	-0.002	0.000	0.015	-0.002	2.634	-2.954	-0.886	0.095	45.4	61.7	5.2	43.6
16	160	0	0	0.007	0.000	0.029	0.000	2.646	-3.013	-1.309	0.366	39.8	#DIV/0!	5.1	42.4
17	164	0	0	0.007	0.000	0.017	0.000	2.429	-3.032	-1.680	0.637	44.0	#DIV/0!	5.2	42.8
18	168	0	0	0.010	0.000	0.007	0.000	2.275	-3.030	-2.070	0.908	48.0	#DIV/0!	5.0	41.9
19	172	0	0	-0.015	0.002	0.017	0.000	1.921	-2.986	-2.329	1.172	42.6	62.4	5.1	42.4
20	176	0	0	-0.034	0.002	0.007	0.000	1.741	-2.939	-2.358	1.406	38.5	62.5	5.4	44.8
21	180	0	0	-0.042	0.005	-0.007	0.002	1.672	-2.893	-2.415	1.655	36.9	55.7	5.6	46.7
22	184	0	0	-0.061	0.007	-0.066	0.007	1.653	-2.815	-2.659	1.919	30.8	50.3	5.6	46.3
23	188	0	0	-0.024	0.002	-0.105	0.012	1.729	-2.737	-3.091	2.156	30.3	48.9	5.3	43.9
24	192	0	0	-0.005	0.002	-0.095	0.012	1.499	-2.617	-3.586	2.424	32.2	49.1	5.0	41.9
25	196	0	0	0.002	0.002	-0.103	0.015	1.077	-2.456	-4.500	2.764	33.1	47.9	4.6	38.0
													Averages	5.7	47.3

Mass (kg):	1.1137
Poisson's Ratio:	0.40

C_8_98

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	-0.002	0.000	-0.002	0.000	0.085	-0.122	0.522	-1.443	43.7	#DIV/0!	11.6	96.6
2	104	0	0	-0.002	0.000	-0.002	0.000	0.164	-0.339	0.542	-1.521	44.3	#DIV/0!	11.7	97.5
3	108	0	0	0.000	-0.002	0.000	0.000	0.254	-0.569	0.562	-1.572	#DIV/0!	56.7	11.6	96.5
4	112	0	0	0.000	0.000	-0.002	0.000	0.349	-0.811	0.569	-1.589	48.7	#DIV/0!	11.5	95.4
5	116	0	0	0.002	0.000	-0.002	0.002	0.449	-1.055	0.554	-1.572	46.3	57.8	11.4	95.0
6	120	0	0	0.005	0.000	0.000	0.000	0.549	-1.296	0.530	-1.526	43.9	#DIV/0!	11.3	94.2
7	124	0	0	0.005	0.000	-0.002	0.002	0.630	-1.531	0.479	-1.438	43.2	58.7	11.5	95.6
8	128	0	0	0.005	0.000	-0.002	0.002	0.732	-1.753	0.435	-1.331	43.9	59.1	11.3	93.5
9	132	0	0	0.002	0.000	-0.002	0.000	0.811	-1.965	0.381	-1.182	48.3	#DIV/0!	11.2	93.2
10	136	0	0	-0.002	0.000	-0.002	0.000	0.906	-2.139	0.320	-1.025	48.9	#DIV/0!	10.9	90.4
11	140	0	0	-0.010	0.000	-0.002	0.002	0.962	-2.312	0.210	-0.850	39.8	60.1	11.0	91.6
12	144	0	0	-0.012	0.000	0.000	0.000	1.018	-2.463	0.095	-0.652	38.5	#DIV/0!	11.0	91.4
13	148	0	0	-0.010	0.000	0.005	0.002	1.042	-2.590	-0.029	-0.437	39.6	60.6	11.1	92.2
14	152	0	0	-0.010	0.000	0.007	0.000	1.035	-2.688	-0.107	-0.215	38.6	#DIV/0!	11.5	95.3
15	156	0	0	-0.005	0.000	0.007	0.002	1.052	-2.764	-0.195	0.017	41.7	61.1	11.5	95.5
16	160	0	0	-0.002	0.000	0.005	0.000	1.082	-2.817	-0.283	0.251	46.2	#DIV/0!	11.4	94.4
17	164	0	0	-0.002	0.000	0.005	0.000	1.091	-2.847	-0.396	0.493	46.6	#DIV/0!	11.2	93.3
18	168	0	0	-0.005	0.002	0.007	0.000	1.077	-2.854	-0.488	0.728	42.6	61.6	11.3	93.9
19	172	0	0	-0.007	0.002	0.010	0.000	1.077	-2.839	-0.603	0.964	40.1	61.8	11.1	92.2
20	176	0	0	-0.010	0.002	0.005	0.002	1.069	-2.805	-0.730	1.196	41.5	58.9	10.8	90.1
21	180	0	0	-0.007	0.007	0.002	0.002	1.035	-2.756	-0.884	1.438	44.9	52.1	10.6	87.7
22	184	0	0	-0.002	0.005	0.002	0.000	0.947	-2.668	-1.023	1.672	52.1	56.2	10.4	86.7
23	188	0	0	-0.002	0.005	0.002	0.000	0.864	-2.576	-1.135	1.855	52.3	56.3	10.3	85.4
24	192	0	0	0.000	0.002	0.000	0.000	0.742	-2.471	-1.272	2.061	#DIV/0!	62.4	10.1	83.5
25	196	0	0	0.005	0.002	-0.005	0.000	0.542	-2.339	-1.387	2.271	46.7	62.5	9.9	81.9
													Averages	11.1	92.1

Mass (kg):	1.1137
Poisson's Ratio:	0.40

K.4 Soil D

Table K.10: GeoGauge results for D_16_103 and D_13_103 at loc. 2

D_16_103

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	-0.002	0.000	0.000	0.000	0.078	-0.122	0.259	-1.431	40.9	#DIV/0!	21.8	180.8
2	104	0	0	0.000	0.000	0.000	0.000	0.112	-0.334	0.278	-1.511	#DIV/0!	#DIV/0!	21.4	177.3
3	108	0	0	0.000	0.000	0.000	0.000	0.154	-0.564	0.288	-1.560	#DIV/0!	#DIV/0!	21.1	175.6
4	112	0	0	0.002	0.000	0.000	0.000	0.205	-0.801	0.293	-1.575	43.3	#DIV/0!	20.6	171.3
5	116	0	0	0.005	0.000	0.000	0.000	0.251	-1.040	0.286	-1.560	37.8	#DIV/0!	20.6	171.3
6	120	0	0	0.007	0.002	0.005	0.000	0.315	-1.277	0.295	-1.511	33.8	58.2	19.3	160.4
7	124	0	0	0.012	0.002	0.005	0.002	0.366	-1.501	0.232	-1.433	30.4	55.6	19.9	165.6
8	128	0	0	0.007	0.000	0.002	0.000	0.386	-1.726	0.195	-1.335	35.0	#DIV/0!	21.1	174.9
9	132	0	0	0.002	0.000	0.005	0.000	0.420	-1.938	0.183	-1.191	38.5	#DIV/0!	21.0	174.0
10	136	0	0	-0.002	0.000	0.002	0.002	0.461	-2.122	0.146	-1.030	42.9	59.7	20.6	171.1
11	140	0	0	-0.002	0.002	0.000	0.000	0.498	-2.290	0.100	-0.845	46.4	60.0	20.3	169.0
12	144	0	0	0.002	0.000	0.005	0.000	0.518	-2.432	0.054	-0.649	39.6	#DIV/0!	20.5	170.4
13	148	0	0	0.000	0.000	0.002	0.002	0.530	-2.551	-0.010	-0.439	46.7	60.5	20.7	171.6
14	152	0	0	-0.002	0.000	0.000	0.000	0.549	-2.649	-0.049	-0.217	47.1	#DIV/0!	20.5	170.3
15	156	0	0	-0.005	0.000	0.000	0.002	0.544	-2.717	-0.105	0.010	41.1	60.9	20.8	173.0
16	160	0	0	-0.005	0.000	0.000	0.000	0.552	-2.766	-0.151	0.239	41.4	#DIV/0!	20.7	172.0
17	164	0	0	-0.002	0.000	0.000	0.000	0.554	-2.795	-0.205	0.476	47.7	#DIV/0!	20.5	170.6
18	168	0	0	-0.002	0.000	0.000	0.002	0.540	-2.803	-0.261	0.708	47.8	61.5	20.6	171.3
19	172	0	0	-0.002	0.000	0.000	0.000	0.542	-2.791	-0.320	0.935	48.2	#DIV/0!	20.1	166.7
20	176	0	0	0.000	0.000	0.000	0.000	0.513	-2.756	-0.374	1.155	#DIV/0!	#DIV/0!	20.2	167.6
21	180	0	0	0.000	0.000	0.002	0.002	0.474	-2.703	-0.432	1.382	48.4	61.9	20.2	167.5
22	184	0	0	0.000	0.000	0.002	0.002	0.422	-2.620	-0.469	1.602	48.2	62.0	20.6	171.4
23	188	0	0	0.000	0.000	0.002	0.002	0.393	-2.524	-0.498	1.768	48.3	62.0	20.6	171.5
24	192	0	0	0.000	0.000	0.000	0.002	0.371	-2.429	-0.537	1.958	#DIV/0!	62.1	20.4	169.7
25	196	0	0	-0.002	0.000	0.000	0.000	0.315	-2.314	-0.579	2.156	48.6	#DIV/0!	20.4	169.2
													Averages	20.6	171.0

Mass (kg): 1.1137
Poisson's Ratio: 0.40

D_13_103

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	0.002	0.000	-0.002	0.000	0.039	-0.120	0.186	-1.426	34.8	#DIV/0!	31.2	258.9
2	104	0	0	0.000	0.002	-0.002	0.000	0.063	-0.334	0.193	-1.506	38.4	56.0	31.5	261.7
3	108	0	0	0.000	0.000	-0.002	0.000	0.098	-0.562	0.200	-1.555	39.2	#DIV/0!	30.8	255.8
4	112	0	0	-0.002	0.000	-0.002	0.000	0.132	-0.796	0.198	-1.572	36.8	#DIV/0!	30.8	255.5
5	116	0	0	0.000	0.000	0.002	0.000	0.159	-1.038	0.195	-1.555	40.3	#DIV/0!	31.0	257.0
6	120	0	0	0.000	0.000	-0.002	0.000	0.186	-1.274	0.198	-1.506	40.9	#DIV/0!	30.5	252.9
7	124	0	0	0.000	0.000	-0.005	0.000	0.237	-1.506	0.171	-1.426	35.5	#DIV/0!	29.6	245.6
8	128	0	0	0.000	0.000	-0.005	0.000	0.266	-1.726	0.151	-1.321	35.9	#DIV/0!	29.6	245.7
9	132	0	0	0.000	0.000	-0.002	0.000	0.320	-1.938	0.132	-1.184	43.0	#DIV/0!	27.4	227.4
10	136	0	0	0.000	0.002	0.000	0.000	0.334	-2.131	-0.017	-0.969	#DIV/0!	59.6	26.3	218.4
11	140	0	0	0.000	0.000	0.000	0.000	0.300	-2.278	0.051	-0.828	#DIV/0!	#DIV/0!	33.0	274.0
12	144	0	0	-0.005	0.000	0.002	0.000	0.332	-2.375	0.015	-0.618	35.7	#DIV/0!	30.6	253.7
13	148	0	0	-0.007	0.002	0.005	0.000	0.349	-2.507	-0.012	-0.435	32.0	60.4	30.2	251.0
14	152	0	0	-0.007	0.000	0.005	0.000	0.347	-2.607	-0.059	-0.220	32.0	#DIV/0!	30.6	254.1
15	156	0	0	-0.005	0.000	0.005	0.000	0.337	-2.681	-0.083	0.002	34.0	#DIV/0!	31.9	264.6
16	160	0	0	-0.002	0.000	0.002	0.000	0.352	-2.729	-0.115	0.229	40.6	#DIV/0!	30.7	255.1
17	164	0	0	0.000	0.000	0.002	0.000	0.349	-2.754	-0.154	0.461	43.9	#DIV/0!	30.3	251.6
18	168	0	0	0.000	0.000	0.005	0.000	0.332	-2.756	-0.210	0.696	38.1	#DIV/0!	29.5	244.7
19	172	0	0	0.002	0.000	0.002	0.000	0.303	-2.742	-0.229	0.925	40.8	#DIV/0!	30.9	257.0
20	176	0	0	0.000	0.002	0.002	0.000	0.283	-2.722	-0.251	1.145	43.8	61.7	31.7	262.9
21	180	0	0	0.002	0.000	0.005	0.000	0.261	-2.676	-0.266	1.353	36.7	#DIV/0!	32.7	271.4
22	184	0	0	0.002	0.002	0.002	0.000	0.244	-2.588	-0.291	1.563	40.8	61.9	32.4	269.3
23	188	0	0	0.002	0.002	0.002	0.000	0.220	-2.493	-0.305	1.729	40.7	61.9	32.8	272.1
24	192	0	0	0.002	0.002	0.002	0.000	0.203	-2.397	-0.322	1.914	40.8	62.0	32.9	272.8
25	196	0	0	0.002	0.000	0.002	0.000	0.181	-2.285	-0.352	2.109	41.2	#DIV/0!	32.0	265.9
													Averages	30.8	256.0

Mass (kg): 1.1137
Poisson's Ratio: 0.40

Table K.11: GeoGauge results for D_11_103 and D_18_98 at loc. 2

D_11_103

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	0.000	-0.002	0.000	0.000	0.107	-0.132	0.369	-1.445	#DIV/0!	55.5	15.7	130.1
2	104	0	0	0.002	0.002	0.000	0.000	0.261	-0.369	0.354	-1.526	45.1	56.2	14.0	116.0
3	108	0	0	0.000	0.002	0.000	0.000	0.283	-0.591	0.166	-1.533	#DIV/0!	56.6	16.6	137.7
4	112	0	0	0.000	0.002	0.000	0.002	0.205	-0.803	0.178	-1.550	#DIV/0!	54.1	25.1	208.2
5	116	0	0	-0.002	0.002	-0.002	0.002	0.212	-1.035	0.212	-1.541	38.8	54.6	25.5	211.6
6	120	0	0	0.000	0.002	0.000	0.002	0.271	-1.272	0.222	-1.497	#DIV/0!	55.1	23.3	193.2
7	124	0	0	0.005	0.002	0.002	0.000	0.305	-1.501	0.217	-1.418	36.7	58.5	23.1	191.8
8	128	0	0	0.005	0.000	0.002	0.000	0.347	-1.716	0.210	-1.316	37.4	#DIV/0!	22.5	186.8
9	132	0	0	0.002	0.000	0.002	0.000	0.388	-1.921	0.193	-1.179	42.0	#DIV/0!	22.0	182.9
10	136	0	0	0.005	0.000	0.002	0.000	0.442	-2.104	0.156	-1.023	38.7	#DIV/0!	21.2	175.8
11	140	0	0	0.005	0.000	0.000	0.000	0.461	-2.285	0.117	-0.852	39.8	#DIV/0!	21.8	180.7
12	144	0	0	0.010	0.000	0.002	0.002	0.496	-2.422	0.081	-0.652	34.0	60.2	21.3	176.9
13	148	0	0	0.010	0.000	0.005	0.000	0.520	-2.542	0.024	-0.439	33.6	#DIV/0!	21.1	175.6
14	152	0	0	0.007	0.000	0.005	0.000	0.537	-2.637	-0.024	-0.220	35.7	#DIV/0!	21.0	174.8
15	156	0	0	0.005	0.000	0.002	0.000	0.542	-2.710	-0.073	0.007	40.0	#DIV/0!	21.2	176.3
16	160	0	0	0.002	0.000	0.005	0.000	0.554	-2.761	-0.112	0.239	40.3	#DIV/0!	21.1	175.3
17	164	0	0	0.000	0.000	0.002	0.000	0.569	-2.793	-0.159	0.474	47.7	#DIV/0!	20.8	172.4
18	168	0	0	0.000	0.000	0.002	0.000	0.571	-2.805	-0.227	0.703	48.0	#DIV/0!	20.4	169.2
19	172	0	0	0.002	0.002	0.000	0.000	0.571	-2.791	-0.273	0.923	48.3	61.6	20.2	167.7
20	176	0	0	0.002	0.002	0.000	0.002	0.540	-2.747	-0.327	1.143	48.2	58.7	20.5	170.2
21	180	0	0	0.002	0.005	-0.002	0.002	0.530	-2.700	-0.391	1.370	45.6	54.9	20.0	166.5
22	184	0	0	0.002	0.005	0.000	0.002	0.503	-2.620	-0.449	1.592	48.8	55.0	19.8	164.7
23	188	0	0	0.000	0.002	0.000	0.002	0.471	-2.527	-0.491	1.760	#DIV/0!	59.0	19.8	164.2
24	192	0	0	0.000	0.002	0.000	0.000	0.435	-2.429	-0.532	1.953	#DIV/0!	62.1	19.8	164.7
25	196	0	0	0.000	0.000	-0.002	0.000	0.398	-2.317	-0.576	2.148	49.2	#DIV/0!	19.8	164.2
													Averages	20.7	171.9

Mass (kg):	1.1137
Poisson's Ratio:	0.40

D_18_98

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	0.005	0.000	0.000	0.000	0.090	-0.122	0.388	-1.436	38.2	#DIV/0!	15.1	125.6
2	104	0	0	0.005	0.000	0.000	0.000	0.151	-0.339	0.405	-1.516	38.9	#DIV/0!	15.1	125.2
3	108	0	0	0.002	0.000	0.000	0.000	0.217	-0.569	0.415	-1.567	45.7	#DIV/0!	15.0	124.5
4	112	0	0	0.000	0.000	-0.002	0.000	0.293	-0.808	0.415	-1.584	46.4	#DIV/0!	14.8	122.7
5	116	0	0	0.002	0.002	0.000	0.000	0.369	-1.050	0.400	-1.567	47.0	57.8	14.7	121.7
6	120	0	0	0.007	0.000	0.005	0.000	0.457	-1.292	0.337	-1.514	36.2	#DIV/0!	14.7	121.7
7	124	0	0	0.007	0.000	0.012	0.000	0.537	-1.528	0.332	-1.433	32.9	#DIV/0!	14.0	116.5
8	128	0	0	0.005	0.000	0.012	0.000	0.605	-1.746	0.239	-1.316	33.9	#DIV/0!	14.0	116.3
9	132	0	0	0.005	0.000	0.010	0.000	0.605	-1.951	0.193	-1.179	35.3	#DIV/0!	15.1	125.3
10	136	0	0	0.002	0.002	0.005	0.000	0.659	-2.131	0.144	-0.989	41.8	59.7	14.8	122.6
11	140	0	0	0.002	0.002	0.002	0.000	0.706	-2.280	0.076	-0.837	46.3	60.0	14.5	120.4
12	144	0	0	0.000	0.000	0.002	0.000	0.740	-2.429	-0.015	-0.647	49.6	#DIV/0!	14.3	118.9
13	148	0	0	-0.005	0.000	-0.002	0.000	0.723	-2.554	-0.125	-0.435	42.6	#DIV/0!	14.6	121.5
14	152	0	0	-0.005	0.002	-0.005	0.000	0.706	-2.654	-0.168	-0.215	40.4	60.8	15.3	127.4
15	156	0	0	-0.005	0.000	-0.007	0.000	0.723	-2.729	-0.215	0.015	38.7	#DIV/0!	15.3	127.4
16	160	0	0	0.000	0.000	-0.005	0.000	0.740	-2.778	-0.281	0.249	44.2	#DIV/0!	15.1	125.1
17	164	0	0	0.002	0.000	0.000	0.000	0.745	-2.808	-0.386	0.488	50.7	#DIV/0!	14.5	120.3
18	168	0	0	0.002	0.000	0.002	0.000	0.684	-2.810	-0.491	0.728	47.7	#DIV/0!	14.4	120.0
19	172	0	0	0.000	0.000	0.002	0.000	0.662	-2.798	-0.542	0.955	50.9	#DIV/0!	14.6	121.2
20	176	0	0	0.000	0.000	0.000	0.000	0.620	-2.759	-0.640	1.177	#DIV/0!	#DIV/0!	14.1	117.1
21	180	0	0	0.000	0.000	0.000	0.002	0.530	-2.700	-0.732	1.411	#DIV/0!	61.9	13.8	114.6
22	184	0	0	0.002	0.000	0.000	0.000	0.410	-2.610	-0.784	1.631	51.2	#DIV/0!	13.8	114.7
23	188	0	0	0.000	0.000	0.000	0.000	0.332	-2.512	-0.786	1.797	#DIV/0!	#DIV/0!	14.2	118.1
24	192	0	0	0.002	0.000	0.002	0.000	0.234	-2.407	-0.779	1.982	47.4	#DIV/0!	14.7	122.1
25	196	0	0	0.005	0.000	0.002	0.000	0.146	-2.290	-0.771	2.175	43.2	#DIV/0!	15.1	125.3
													Averages	14.6	121.4

Mass (kg):	1.1137
Poisson's Ratio:	0.40

Table K.12: GeoGauge results for D_14_98 and D_11_98 at loc. 2

D_14_98

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	-0.002	0.000	0.002	0.000	0.088	-0.122	0.400	-1.440	41.5	#DIV/0!	14.8	122.8
2	104	0	0	0.000	0.000	0.002	0.000	0.144	-0.339	0.415	-1.521	45.1	#DIV/0!	14.9	124.1
3	108	0	0	0.000	0.000	0.000	0.000	0.217	-0.569	0.427	-1.572	#DIV/0!	#DIV/0!	14.7	122.3
4	112	0	0	0.000	0.000	0.000	0.000	0.286	-0.806	0.425	-1.587	#DIV/0!	#DIV/0!	14.7	122.2
5	116	0	0	0.000	0.000	0.000	0.000	0.366	-1.050	0.413	-1.570	#DIV/0!	#DIV/0!	14.5	120.5
6	120	0	0	-0.007	0.000	0.000	0.000	0.439	-1.289	0.393	-1.521	38.1	#DIV/0!	14.4	119.4
7	124	0	0	-0.002	0.000	0.000	0.000	0.520	-1.523	0.342	-1.438	48.1	#DIV/0!	14.3	118.6
8	128	0	0	0.002	0.000	0.002	0.000	0.581	-1.738	0.291	-1.328	45.5	#DIV/0!	14.3	118.7
9	132	0	0	0.002	0.000	0.007	0.000	0.664	-1.951	0.164	-1.201	38.9	#DIV/0!	13.9	115.1
10	136	0	0	0.002	0.000	0.005	0.000	0.593	-2.141	0.161	-1.033	41.0	#DIV/0!	16.4	136.3
11	140	0	0	0.000	0.000	0.002	0.000	0.667	-2.310	0.122	-0.850	48.9	#DIV/0!	15.6	129.1
12	144	0	0	0.002	0.000	-0.002	0.000	0.701	-2.451	0.051	-0.652	46.2	#DIV/0!	15.5	128.5
13	148	0	0	0.002	0.000	-0.005	0.002	0.730	-2.573	-0.029	-0.439	42.5	60.6	15.3	127.1
14	152	0	0	0.002	0.000	-0.002	0.002	0.742	-2.673	-0.085	-0.217	46.7	60.8	15.5	128.5
15	156	0	0	0.002	0.000	0.000	0.002	0.747	-2.747	-0.149	0.015	49.9	61.0	15.6	129.5
16	160	0	0	0.000	0.000	0.000	0.000	0.757	-2.795	-0.215	0.244	#DIV/0!	#DIV/0!	15.5	128.7
17	164	0	0	0.002	0.000	0.000	0.000	0.757	-2.825	-0.298	0.486	50.5	#DIV/0!	15.3	127.4
18	168	0	0	0.000	0.000	0.000	0.000	0.742	-2.832	-0.366	0.720	#DIV/0!	#DIV/0!	15.4	128.0
19	172	0	0	0.000	0.000	-0.002	0.000	0.730	-2.820	-0.435	0.950	50.8	#DIV/0!	15.4	127.5
20	176	0	0	-0.002	0.000	0.000	0.000	0.725	-2.786	-0.518	1.174	51.2	#DIV/0!	15.0	124.2
21	180	0	0	-0.002	0.000	0.000	0.000	0.686	-2.732	-0.615	1.409	51.5	#DIV/0!	14.7	121.8
22	184	0	0	0.000	0.000	0.000	0.000	0.620	-2.646	-0.698	1.636	#DIV/0!	#DIV/0!	14.6	121.1
23	188	0	0	0.000	0.000	0.002	0.000	0.569	-2.551	-0.759	1.809	51.8	#DIV/0!	14.4	119.9
24	192	0	0	0.000	0.000	0.002	0.000	0.505	-2.451	-0.830	2.007	52.0	#DIV/0!	14.2	118.3
25	196	0	0	-0.002	0.000	0.005	0.000	0.398	-2.332	-0.901	2.212	45.1	#DIV/0!	14.0	116.7
													Averages	14.9	123.9

Mass (kg):	1.1137
Poisson's Ratio:	0.40

D_11_98

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	-0.002	0.000	0.002	0.000	0.122	-0.132	0.476	-1.450	43.1	#DIV/0!	12.4	103.3
2	104	0	0	-0.002	0.000	0.002	0.000	0.273	-0.359	0.525	-1.533	44.7	#DIV/0!	11.1	91.8
3	108	0	0	-0.002	0.000	0.000	0.000	0.576	-0.620	0.376	-1.560	49.0	#DIV/0!	8.7	72.2
4	112	0	0	0.000	0.000	0.000	0.000	0.393	-0.823	0.049	-1.536	#DIV/0!	#DIV/0!	11.0	91.1
5	116	0	0	0.002	0.000	0.002	0.000	0.269	-1.040	0.137	-1.531	38.8	#DIV/0!	22.7	188.3
6	120	0	0	0.000	0.000	-0.005	0.000	0.295	-1.272	0.188	-1.492	37.1	#DIV/0!	22.6	187.7
7	124	0	0	-0.005	0.000	-0.007	0.000	0.339	-1.504	0.222	-1.418	33.3	#DIV/0!	21.3	176.6
8	128	0	0	-0.005	0.000	-0.005	0.000	0.398	-1.719	0.227	-1.313	36.4	#DIV/0!	19.9	165.5
9	132	0	0	-0.005	0.000	-0.005	0.000	0.464	-1.921	0.215	-1.182	37.4	#DIV/0!	18.8	155.7
10	136	0	0	0.000	0.000	-0.002	0.002	0.530	-2.097	0.168	-1.040	47.1	59.6	17.9	148.6
11	140	0	0	0.000	0.000	0.000	0.002	0.574	-2.295	0.132	-0.850	#DIV/0!	60.0	17.8	147.7
12	144	0	0	0.000	0.002	0.002	0.002	0.608	-2.434	0.081	-0.652	48.0	57.3	17.6	146.5
13	148	0	0	0.002	0.000	0.002	0.002	0.647	-2.556	0.022	-0.439	45.5	60.5	17.3	143.3
14	152	0	0	0.002	0.002	0.000	0.002	0.657	-2.651	-0.051	-0.217	48.6	57.7	17.4	144.3
15	156	0	0	0.000	0.002	-0.002	0.002	0.669	-2.727	-0.098	0.012	48.8	58.0	17.5	145.0
16	160	0	0	0.000	0.000	-0.002	0.002	0.693	-2.778	-0.159	0.244	49.3	61.2	17.1	141.7
17	164	0	0	0.000	0.000	-0.002	0.002	0.718	-2.810	-0.227	0.479	49.8	61.3	16.6	137.7
18	168	0	0	0.000	0.000	-0.002	0.002	0.715	-2.820	-0.322	0.713	50.1	61.5	16.2	134.7
19	172	0	0	0.000	0.000	0.000	0.002	0.693	-2.803	-0.391	0.940	#DIV/0!	61.7	16.3	135.1
20	176	0	0	0.000	0.000	0.002	0.002	0.676	-2.766	-0.447	1.160	50.4	61.8	16.3	135.2
21	180	0	0	0.000	0.002	0.002	0.000	0.654	-2.717	-0.532	1.392	50.8	61.9	16.0	132.5
22	184	0	0	0.000	0.002	0.000	0.000	0.593	-2.634	-0.608	1.616	#DIV/0!	62.0	16.0	132.6
23	188	0	0	-0.002	0.002	0.000	0.000	0.557	-2.539	-0.657	1.790	50.9	62.1	15.9	132.0
24	192	0	0	-0.002	0.002	0.002	0.000	0.500	-2.441	-0.710	1.982	48.0	62.2	15.9	132.2
25	196	0	0	0.000	0.000	0.005	0.000	0.449	-2.327	-0.752	2.183	45.1	#DIV/0!	16.1	133.4
													Averages	16.6	138.2

Mass (kg):	1.1137
Poisson's Ratio:	0.40

K.5 Soil D With a Thin Layer of Sand

Table K.13: GeoGauge results for D_16_103 and D_13_103 at loc. 2 with a thin layer of compacted sand

D_16_103_sand

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	0.000	0.000	0.000	0.000	0.066	-0.120	0.188	-1.431	#DIV/0!	#DIV/0!	29.1	241.4
2	104	0	0	0.000	0.000	0.002	0.000	0.081	-0.334	0.198	-1.514	38.8	#DIV/0!	29.8	247.9
3	108	0	0	0.002	0.000	0.002	0.000	0.112	-0.564	0.210	-1.560	36.8	#DIV/0!	28.8	239.3
4	112	0	0	0.000	0.000	0.002	0.000	0.146	-0.801	0.220	-1.577	40.7	#DIV/0!	27.9	231.3
5	116	0	0	0.000	0.000	0.002	0.000	0.190	-1.040	0.215	-1.560	41.4	#DIV/0!	27.1	225.4
6	120	0	0	-0.005	0.000	-0.007	0.000	0.254	-1.279	0.217	-1.511	31.6	#DIV/0!	24.6	204.6
7	124	0	0	-0.007	0.000	-0.012	0.000	0.264	-1.511	0.188	-1.431	27.1	#DIV/0!	26.8	222.6
8	128	0	0	-0.005	0.002	-0.010	0.002	0.295	-1.726	0.166	-1.323	29.8	56.0	26.8	222.5
9	132	0	0	-0.005	0.000	-0.005	0.000	0.322	-1.934	0.144	-1.189	34.2	#DIV/0!	26.9	223.7
10	136	0	0	-0.002	0.000	-0.002	0.000	0.344	-2.124	0.117	-1.030	40.5	#DIV/0!	27.3	226.3
11	140	0	0	-0.002	0.002	0.000	0.000	0.391	-2.285	0.076	-0.818	44.2	59.9	25.6	212.7
12	144	0	0	-0.007	0.000	0.000	0.000	0.400	-2.415	0.034	-0.642	34.8	#DIV/0!	26.0	216.3
13	148	0	0	-0.007	0.000	0.000	0.000	0.410	-2.537	-0.010	-0.437	35.0	#DIV/0!	26.2	217.8
14	152	0	0	-0.002	0.000	0.000	0.000	0.422	-2.632	-0.046	-0.220	44.8	#DIV/0!	26.1	216.4
15	156	0	0	0.000	0.000	0.002	0.000	0.413	-2.705	-0.088	0.005	44.8	#DIV/0!	26.8	222.7
16	160	0	0	0.002	0.002	0.002	0.000	0.420	-2.751	-0.120	0.232	42.0	61.1	26.6	220.9
17	164	0	0	0.000	0.000	0.000	0.000	0.420	-2.778	-0.164	0.466	#DIV/0!	#DIV/0!	26.3	218.4
18	168	0	0	0.005	0.000	0.002	0.000	0.410	-2.783	-0.208	0.701	38.5	#DIV/0!	26.2	217.9
19	172	0	0	0.010	0.000	0.005	0.000	0.408	-2.773	-0.244	0.930	32.8	#DIV/0!	26.0	215.7
20	176	0	0	0.010	0.000	0.005	0.002	0.386	-2.742	-0.288	1.147	32.9	61.7	25.9	215.4
21	180	0	0	0.012	0.000	0.007	0.002	0.359	-2.693	-0.339	1.372	30.8	61.9	25.5	211.9
22	184	0	0	0.010	-0.002	0.012	0.002	0.325	-2.612	-0.364	1.584	29.9	58.9	26.1	216.6
23	188	0	0	0.005	-0.002	0.015	0.002	0.291	-2.515	-0.383	1.750	29.9	59.0	26.4	219.4
24	192	0	0	0.000	0.000	0.012	0.000	0.278	-2.419	-0.417	1.938	32.3	#DIV/0!	25.8	214.2
25	196	0	0	-0.005	0.000	0.005	0.000	0.227	-2.305	-0.452	2.134	37.3	#DIV/0!	25.6	212.4
													Averages	26.7	221.3

Mass (kg):	1.1137
Poisson's Ratio:	0.40

D_13_103_sand

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	0.002	0.000	0.000	0.000	0.029	-0.120	0.168	-1.431	36.9	#DIV/0!	34.8	288.7
2	104	0	0	0.005	0.000	0.007	0.000	0.054	-0.334	0.176	-1.511	26.4	#DIV/0!	34.9	290.1
3	108	0	0	0.002	0.002	0.007	0.002	0.083	-0.562	0.183	-1.560	28.3	53.6	34.3	284.5
4	112	0	0	0.002	0.002	0.007	0.002	0.112	-0.796	0.183	-1.575	28.9	54.2	34.2	283.6
5	116	0	0	0.002	0.002	0.005	0.002	0.144	-1.040	0.176	-1.560	32.4	54.7	34.3	284.8
6	120	0	0	0.000	0.000	0.005	0.000	0.173	-1.277	0.156	-1.509	33.6	#DIV/0!	35.1	291.3
7	124	0	0	-0.002	0.000	0.010	0.000	0.200	-1.506	0.156	-1.431	28.0	#DIV/0!	34.1	283.1
8	128	0	0	-0.002	0.000	0.007	0.000	0.234	-1.724	0.134	-1.323	30.9	#DIV/0!	33.4	277.7
9	132	0	0	0.000	0.000	0.005	0.000	0.256	-1.931	0.122	-1.187	35.3	#DIV/0!	33.3	276.9
10	136	0	0	0.000	0.000	0.002	0.000	0.291	-2.126	0.098	-1.030	42.0	#DIV/0!	32.2	267.4
11	140	0	0	0.000	0.002	0.000	0.000	0.305	-2.300	0.063	-0.842	#DIV/0!	60.0	32.8	272.1
12	144	0	0	0.000	0.002	0.002	0.000	0.315	-2.393	0.029	-0.635	42.2	60.1	32.6	270.6
13	148	0	0	0.002	0.002	0.002	0.000	0.330	-2.524	-0.007	-0.439	39.6	60.4	32.3	267.9
14	152	0	0	0.005	0.000	0.000	0.000	0.332	-2.622	-0.046	-0.225	36.7	#DIV/0!	32.4	269.3
15	156	0	0	0.005	0.000	0.000	0.000	0.325	-2.695	-0.076	0.002	36.7	#DIV/0!	33.4	277.3
16	160	0	0	0.005	0.002	-0.005	0.000	0.332	-2.742	-0.095	0.229	34.0	61.0	33.2	275.7
17	164	0	0	0.000	0.002	-0.005	0.000	0.334	-2.769	-0.134	0.464	37.4	61.2	32.4	269.1
18	168	0	0	-0.002	0.000	-0.005	0.002	0.310	-2.771	-0.198	0.698	36.6	61.4	31.5	261.6
19	172	0	0	-0.002	0.000	-0.002	0.000	0.298	-2.761	-0.203	0.935	40.4	#DIV/0!	33.3	276.6
20	176	0	0	0.000	0.000	0.000	0.000	0.266	-2.747	-0.229	1.143	#DIV/0!	#DIV/0!	34.4	285.4
21	180	0	0	0.000	0.000	0.000	0.000	0.225	-2.681	-0.269	1.350	#DIV/0!	#DIV/0!	33.7	280.1
22	184	0	0	0.002	0.000	0.000	0.000	0.181	-2.603	-0.300	1.577	43.1	#DIV/0!	33.0	274.3
23	188	0	0	0.000	0.000	-0.002	0.000	0.220	-2.507	-0.291	1.738	43.5	#DIV/0!	34.2	284.2
24	192	0	0	0.000	0.000	0.000	0.000	0.198	-2.410	-0.300	1.924	#DIV/0!	#DIV/0!	35.1	291.4
25	196	0	0	0.000	0.000	0.000	0.000	0.178	-2.297	-0.320	2.119	#DIV/0!	#DIV/0!	35.0	290.5
													Averages	33.6	279.0

Mass (kg):	1.1137
Poisson's Ratio:	0.40

Table K.14: GeoGauge results for D_11_103 and D_18_98 at loc. 2 with a thin layer of compacted sand

D_11_103_sand

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Real Force (Nfcos)	Noise Imag. Displ. (Nxsin)	Noise Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Real Force (Dfcos)	Signal Imag. Displ. (Dxsin)	Signal Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	0.000	0.000	0.000	0.000	0.032	-0.120	0.190	-1.438	#DIV/0!	#DIV/0!	31.0	257.6
2	104	0	0	-0.002	-0.002	0.000	-0.002	0.059	-0.339	0.200	-1.526	38.6	53.1	31.2	258.8
3	108	0	0	0.000	0.000	0.000	-0.005	0.090	-0.564	0.203	-1.567	#DIV/0!	50.7	31.2	259.5
4	112	0	0	0.000	0.000	0.000	-0.005	0.125	-0.801	0.205	-1.587	#DIV/0!	51.2	30.9	256.3
5	116	0	0	0.000	0.000	0.002	-0.002	0.156	-1.042	0.200	-1.570	40.3	57.8	31.0	257.1
6	120	0	0	0.000	0.002	0.000	0.000	0.181	-1.282	0.181	-1.521	#DIV/0!	58.2	32.5	269.6
7	124	0	0	0.000	0.000	-0.002	0.000	0.227	-1.516	0.176	-1.440	41.4	#DIV/0!	30.4	252.6
8	128	0	0	0.000	0.000	0.000	0.000	0.254	-1.736	0.161	-1.333	#DIV/0!	#DIV/0!	30.5	253.1
9	132	0	0	0.000	0.000	0.000	0.002	0.281	-1.946	0.139	-1.199	#DIV/0!	59.4	30.6	253.9
10	136	0	0	0.000	0.000	-0.002	0.002	0.332	-2.158	0.120	-1.038	43.2	59.8	28.5	236.8
11	140	0	0	0.002	0.000	0.000	0.002	0.303	-2.271	0.017	-0.779	41.9	59.9	32.1	266.9
12	144	0	0	0.000	0.000	0.002	0.002	0.315	-2.405	0.042	-0.647	42.3	60.2	32.8	272.5
13	148	0	0	0.000	0.000	0.002	0.000	0.344	-2.534	0.015	-0.444	43.0	#DIV/0!	31.4	260.3
14	152	0	0	-0.005	0.000	0.002	0.002	0.349	-2.632	-0.024	-0.227	36.1	60.7	31.6	262.6
15	156	0	0	-0.002	0.002	0.002	0.000	0.349	-2.708	-0.054	0.000	40.2	60.9	32.2	267.1
16	160	0	0	0.002	0.002	0.002	0.000	0.352	-2.756	-0.076	0.227	40.4	61.1	32.4	269.3
17	164	0	0	0.002	0.002	0.002	0.000	0.361	-2.783	-0.110	0.464	40.8	61.3	31.6	262.3
18	168	0	0	0.002	0.002	0.000	0.000	0.361	-2.788	-0.154	0.698	44.1	61.4	30.9	256.7
19	172	0	0	0.002	0.000	0.000	0.000	0.354	-2.776	-0.178	0.930	44.2	#DIV/0!	31.3	260.0
20	176	0	0	0.007	-0.005	0.000	0.002	0.356	-2.761	-0.217	1.143	35.1	54.8	30.4	252.4
21	180	0	0	0.007	0.000	-0.002	0.005	0.337	-2.710	-0.254	1.360	34.8	55.9	30.4	252.8
22	184	0	0	0.007	0.007	0.000	0.002	0.315	-2.622	-0.298	1.577	35.4	52.0	29.8	247.4
23	188	0	0	0.005	0.005	0.000	0.002	0.281	-2.524	-0.320	1.748	38.8	55.0	30.3	251.5
24	192	0	0	0.005	0.005	0.002	0.000	0.256	-2.427	-0.349	1.938	38.0	56.1	30.0	249.4
25	196	0	0	0.005	0.002	0.002	0.000	0.225	-2.314	-0.371	2.131	38.0	62.2	30.3	251.5
													Averages	31.0	257.5

Mass (kg):	1.1137
Poisson's Ratio:	0.40

D_18_98_sand

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Real Force (Nfcos)	Noise Imag. Displ. (Nxsin)	Noise Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Real Force (Dfcos)	Signal Imag. Displ. (Dxsin)	Signal Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	0.000	0.000	0.000	0.000	0.063	-0.120	0.295	-1.438	#DIV/0!	#DIV/0!	19.9	165.1
2	104	0	0	0.002	0.000	0.000	0.000	0.107	-0.337	0.310	-1.521	42.6	#DIV/0!	19.8	164.7
3	108	0	0	0.002	0.000	0.000	0.000	0.161	-0.566	0.320	-1.567	43.3	#DIV/0!	19.5	161.7
4	112	0	0	0.002	0.000	0.002	0.000	0.217	-0.803	0.322	-1.584	41.0	#DIV/0!	19.2	159.2
5	116	0	0	0.002	0.000	0.002	0.000	0.278	-1.047	0.315	-1.567	41.7	#DIV/0!	18.8	156.4
6	120	0	0	-0.007	0.000	-0.002	0.000	0.295	-1.284	0.303	-1.519	34.8	#DIV/0!	19.9	165.1
7	124	0	0	-0.015	0.000	-0.002	0.000	0.391	-1.521	0.269	-1.438	30.1	#DIV/0!	18.6	154.3
8	128	0	0	-0.012	0.000	-0.005	0.000	0.439	-1.738	0.227	-1.328	31.5	#DIV/0!	18.6	154.4
9	132	0	0	-0.007	0.000	-0.002	0.000	0.488	-1.948	0.188	-1.189	36.6	#DIV/0!	18.4	152.6
10	136	0	0	-0.005	0.002	0.000	0.000	0.544	-2.144	0.132	-1.021	41.2	59.8	17.8	148.1
11	140	0	0	0.000	0.000	0.000	0.000	0.562	-2.280	0.068	-0.835	#DIV/0!	#DIV/0!	18.0	149.6
12	144	0	0	0.000	0.002	0.000	0.000	0.601	-2.429	-0.007	-0.652	#DIV/0!	60.3	17.5	145.0
13	148	0	0	0.000	0.002	0.000	0.000	0.579	-2.556	-0.083	-0.439	#DIV/0!	60.5	18.3	151.9
14	152	0	0	0.000	0.000	-0.002	0.000	0.574	-2.654	-0.129	-0.220	47.6	#DIV/0!	18.7	155.7
15	156	0	0	-0.002	0.000	0.000	0.000	0.579	-2.727	-0.166	0.010	47.8	#DIV/0!	19.0	157.5
16	160	0	0	-0.002	0.000	0.000	0.000	0.598	-2.776	-0.220	0.242	48.3	#DIV/0!	18.4	153.2
17	164	0	0	-0.002	0.000	0.000	0.000	0.605	-2.803	-0.320	0.483	49.0	#DIV/0!	17.4	144.4
18	168	0	0	-0.002	0.000	0.002	0.000	0.552	-2.805	-0.415	0.723	46.0	#DIV/0!	17.2	142.4
19	172	0	0	-0.002	0.000	0.002	0.002	0.525	-2.791	-0.449	0.952	46.0	61.6	17.6	145.9
20	176	0	0	0.000	0.000	0.002	0.000	0.479	-2.759	-0.530	1.172	49.3	#DIV/0!	17.0	141.1
21	180	0	0	0.002	0.002	0.002	0.000	0.405	-2.700	-0.603	1.399	46.5	61.9	16.5	137.0
22	184	0	0	0.000	0.002	0.002	0.000	0.293	-2.610	-0.635	1.619	49.1	62.0	16.5	137.3
23	188	0	0	-0.002	0.002	0.000	0.000	0.234	-2.512	-0.630	1.782	48.8	62.0	17.1	142.0
24	192	0	0	-0.002	0.000	0.000	0.002	0.151	-2.407	-0.615	1.968	48.3	62.1	17.7	147.2
25	196	0	0	-0.002	0.002	0.000	0.000	0.083	-2.292	-0.601	2.158	47.9	62.2	18.3	151.9
													Averages	18.2	151.4

Mass (kg):	1.1137
Poisson's Ratio:	0.40

Table K.15: GeoGauge results for D_14_98 and D_11_98 at loc. 2 with a thin layer of compacted sand

D_14_98_sand

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	-0.002	0.000	-0.005	0.000	0.054	-0.120	0.271	-1.436	34.1	#DIV/0!	21.7	180.3
2	104	0	0	-0.002	0.000	-0.002	0.000	0.090	-0.337	0.288	-1.516	38.8	#DIV/0!	21.5	178.7
3	108	0	0	-0.002	0.000	0.002	0.000	0.137	-0.566	0.291	-1.565	39.4	#DIV/0!	21.7	180.2
4	112	0	0	-0.002	0.000	0.002	0.000	0.186	-0.803	0.293	-1.582	40.0	#DIV/0!	21.5	178.2
5	116	0	0	0.002	0.002	0.002	0.000	0.239	-1.045	0.283	-1.565	40.6	57.7	21.3	176.8
6	120	0	0	0.005	0.002	0.005	0.000	0.293	-1.284	0.261	-1.516	35.1	58.2	21.2	176.1
7	124	0	0	0.007	0.000	0.005	0.000	0.334	-1.519	0.244	-1.436	33.4	#DIV/0!	21.2	176.2
8	128	0	0	0.007	0.000	0.002	0.000	0.376	-1.736	0.222	-1.328	35.1	#DIV/0!	21.1	175.4
9	132	0	0	0.005	0.000	0.002	0.000	0.425	-1.948	0.183	-1.191	38.6	#DIV/0!	20.8	172.9
10	136	0	0	0.002	0.002	0.002	0.000	0.457	-2.141	0.137	-1.011	42.8	59.7	21.0	174.2
11	140	0	0	0.002	0.002	-0.002	0.000	0.481	-2.275	0.107	-0.833	43.1	59.9	20.9	173.3
12	144	0	0	0.007	0.002	-0.005	0.000	0.508	-2.422	0.044	-0.652	35.3	60.2	20.8	172.7
13	148	0	0	0.007	0.002	-0.005	0.000	0.522	-2.546	-0.007	-0.442	35.5	60.5	20.9	173.7
14	152	0	0	0.007	0.000	-0.002	0.000	0.540	-2.646	-0.059	-0.222	36.9	#DIV/0!	20.7	172.2
15	156	0	0	0.005	0.000	0.002	0.000	0.535	-2.720	-0.098	0.007	40.0	#DIV/0!	21.3	176.8
16	160	0	0	0.002	0.000	0.005	0.000	0.549	-2.769	-0.146	0.239	40.4	#DIV/0!	20.9	173.4
17	164	0	0	0.000	0.000	0.005	0.000	0.554	-2.795	-0.205	0.474	41.7	#DIV/0!	20.5	170.5
18	168	0	0	0.000	0.000	0.005	0.000	0.542	-2.803	-0.261	0.708	41.8	#DIV/0!	20.6	170.8
19	172	0	0	0.000	0.000	0.002	0.000	0.537	-2.793	-0.308	0.938	48.1	#DIV/0!	20.5	169.9
20	176	0	0	0.000	0.000	0.002	0.000	0.530	-2.761	-0.361	1.155	48.4	#DIV/0!	20.1	167.1
21	180	0	0	0.002	0.000	0.002	0.000	0.513	-2.712	-0.435	1.384	45.8	#DIV/0!	19.5	162.2
22	184	0	0	0.002	-0.002	0.002	0.002	0.469	-2.625	-0.498	1.604	45.9	59.0	19.3	160.2
23	188	0	0	0.002	0.000	0.002	0.002	0.422	-2.532	-0.542	1.775	46.0	62.1	19.2	159.5
24	192	0	0	0.000	0.000	0.002	0.000	0.386	-2.434	-0.591	1.968	49.2	#DIV/0!	18.9	157.3
25	196	0	0	0.000	0.000	0.005	0.000	0.310	-2.317	-0.657	2.168	43.4	#DIV/0!	18.4	152.5
													Averages	20.6	171.2

Mass (kg):	1.1137
Poisson's Ratio:	0.40

D_11_98_sand

Bin Number	Freq. (Hz)	Noise Overload Flag	Signal Overload Flag	Noise Data (volts) Real Displ. (Nxcos)	Noise Data (volts) Real Force (Nfcos)	Noise Data (volts) Imag. Displ. (Nxsin)	Noise Data (volts) Imag. Force (Nfsin)	Signal Data (volts) Real Displ. (Dxcos)	Signal Data (volts) Real Force (Dfcos)	Signal Data (volts) Imag. Displ. (Dxsin)	Signal Data (volts) Imag. Force (Dxsin)	SNR, dB Displ.	SNR, dB Force	Measured Stiffness (MN/m)	Calculated Young's Modulus (MPa)
1	100	0	0	0.002	0.000	-0.002	0.000	0.042	-0.120	0.234	-1.436	36.8	#DIV/0!	25.2	209.1
2	104	0	0	0.002	0.000	-0.002	0.000	0.076	-0.334	0.242	-1.516	37.3	#DIV/0!	25.5	212.1
3	108	0	0	0.000	0.000	-0.002	0.000	0.110	-0.564	0.249	-1.565	40.9	#DIV/0!	25.5	212.1
4	112	0	0	-0.002	0.000	-0.002	0.000	0.154	-0.801	0.249	-1.582	38.6	#DIV/0!	25.3	210.3
5	116	0	0	0.000	0.000	0.000	0.000	0.193	-1.045	0.242	-1.565	#DIV/0!	#DIV/0!	25.5	211.6
6	120	0	0	-0.005	0.000	-0.002	0.000	0.232	-1.284	0.247	-1.519	35.8	#DIV/0!	24.7	205.2
7	124	0	0	-0.012	0.002	-0.002	0.002	0.281	-1.516	0.210	-1.436	29.0	55.6	25.0	207.2
8	128	0	0	-0.012	0.000	-0.002	0.000	0.305	-1.733	0.186	-1.328	29.2	#DIV/0!	25.7	213.2
9	132	0	0	-0.007	0.000	0.000	0.000	0.349	-1.948	0.168	-1.194	34.5	#DIV/0!	24.8	206.3
10	136	0	0	0.000	0.000	0.005	0.000	0.410	-2.168	0.129	-1.025	38.9	#DIV/0!	23.5	195.1
11	140	0	0	0.005	0.000	0.005	0.000	0.383	-2.251	0.056	-0.796	35.0	#DIV/0!	25.7	213.3
12	144	0	0	0.010	0.000	0.005	0.000	0.410	-2.407	0.046	-0.645	31.6	#DIV/0!	25.4	211.1
13	148	0	0	0.017	0.000	0.000	0.000	0.435	-2.532	-0.002	-0.439	28.1	#DIV/0!	24.9	206.4
14	152	0	0	0.010	0.000	-0.002	0.000	0.442	-2.632	-0.051	-0.222	32.9	#DIV/0!	24.9	206.8
15	156	0	0	0.005	0.000	0.000	0.000	0.430	-2.705	-0.076	0.002	39.0	#DIV/0!	26.1	217.0
16	160	0	0	0.002	0.002	0.000	0.000	0.454	-2.754	-0.112	0.232	45.6	61.1	25.1	208.2
17	164	0	0	0.002	0.002	-0.002	0.000	0.461	-2.783	-0.161	0.469	43.0	61.3	24.5	203.8
18	168	0	0	-0.002	0.000	-0.002	0.002	0.452	-2.786	-0.244	0.708	43.4	61.4	23.5	195.3
19	172	0	0	0.002	0.000	-0.002	0.002	0.420	-2.778	-0.271	0.940	43.2	61.6	24.7	204.8
20	176	0	0	0.007	0.000	-0.002	0.002	0.415	-2.756	-0.317	1.147	36.6	61.7	24.0	199.6
21	180	0	0	0.007	0.000	-0.005	0.005	0.383	-2.703	-0.369	1.367	35.6	55.9	23.8	197.4
22	184	0	0	0.000	0.000	-0.005	0.005	0.347	-2.612	-0.415	1.589	40.9	55.9	23.5	194.8
23	188	0	0	0.000	0.000	-0.005	0.002	0.308	-2.517	-0.444	1.758	40.9	62.0	23.4	194.4
24	192	0	0	0.000	0.000	-0.005	0.002	0.254	-2.417	-0.471	1.948	40.8	62.1	23.6	195.7
25	196	0	0	-0.002	0.000	-0.007	0.002	0.205	-2.302	-0.500	2.144	36.9	62.2	23.4	194.0
													Averages	24.7	205.0

Mass (kg):	1.1137
Poisson's Ratio:	0.40

Appendix L

Modified LWD Results

This appendix contains information regarding Modified LWD analysis.

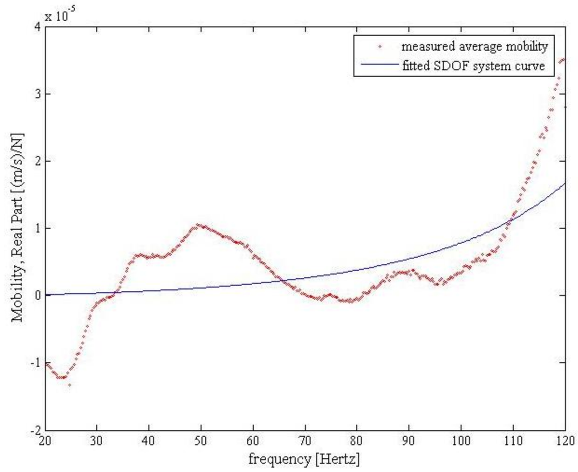

Figure L.1: Modified LWD (mobility, real part) (B_24_103) for loc. 2

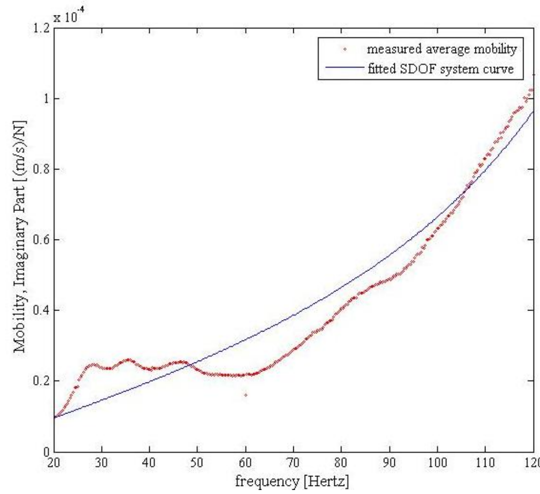

Figure L.2: Modified LWD (mobility, imag. part) (B_24_103) for loc. 2

Median Stiffness = 10.76 MN/m; Median Young's Modulus = 115 MPa

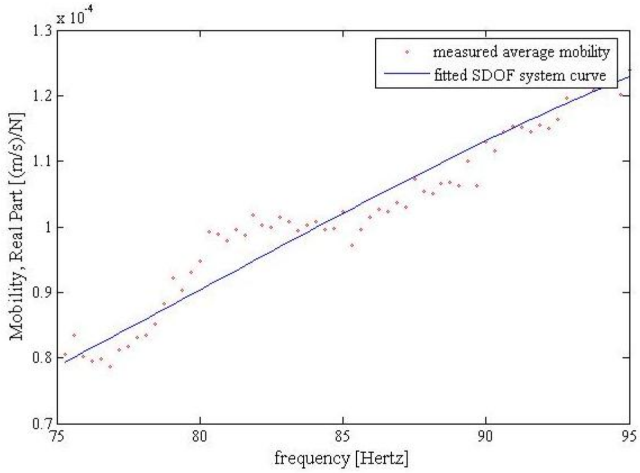

Figure L.3: Modified LWD (mobility, real part) (B_19.5_103) for loc. 2

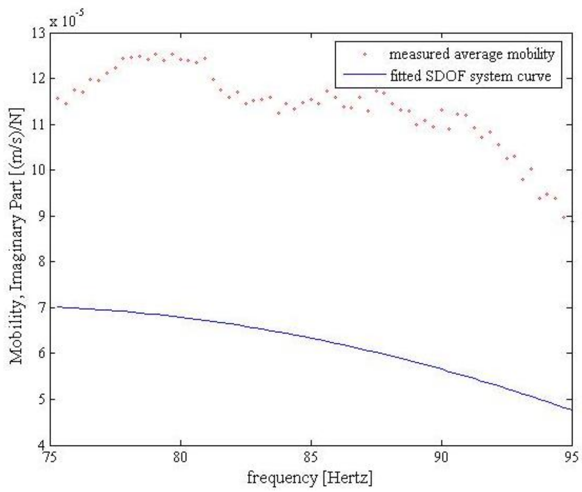

Figure L.4: Modified LWD (mobility, imag. part) (B_19.5_103) for loc. 2

Median Stiffness = 14.26 MN/m; Median Young's Modulus = 152 MPa

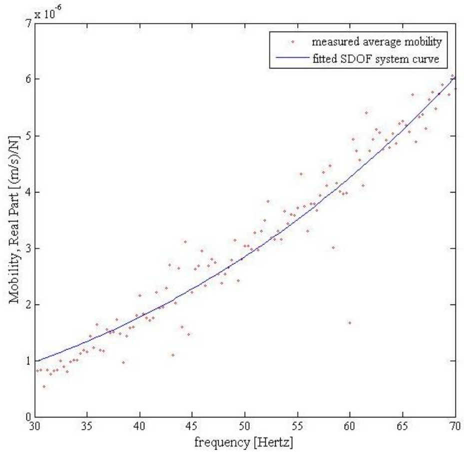

Figure L.5: Modified LWD (mobility, real part) (B_27_98) for loc. 2

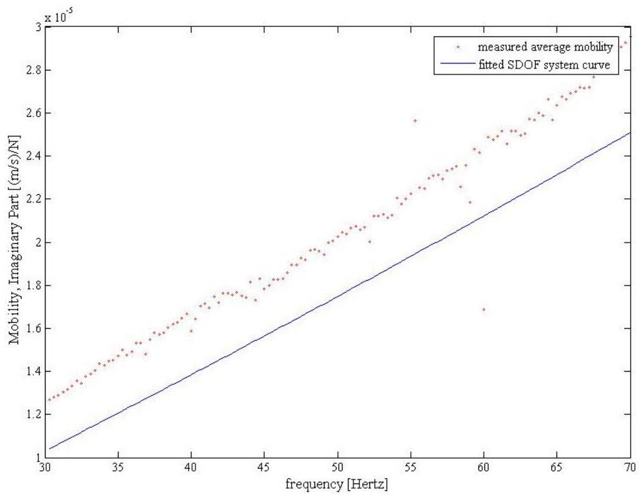

Figure L.6: Modified LWD (mobility, imag. part) (B_27_98) for loc. 2

Median Stiffness = 14.7 MN/m; Median Young's Modulus = 157 MPa

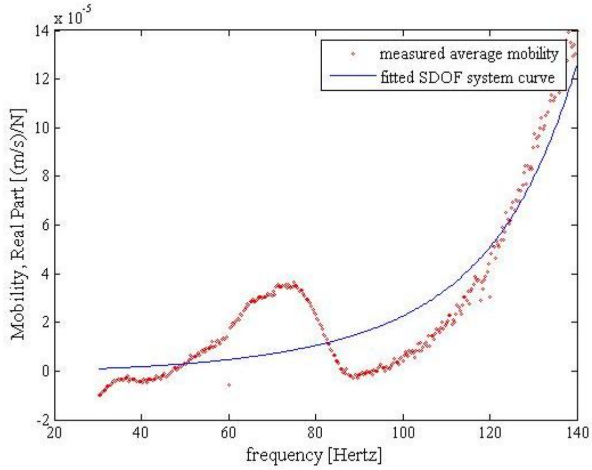

Figure L.7: Modified LWD (mobility, real part) (C_12_103) for loc. 2

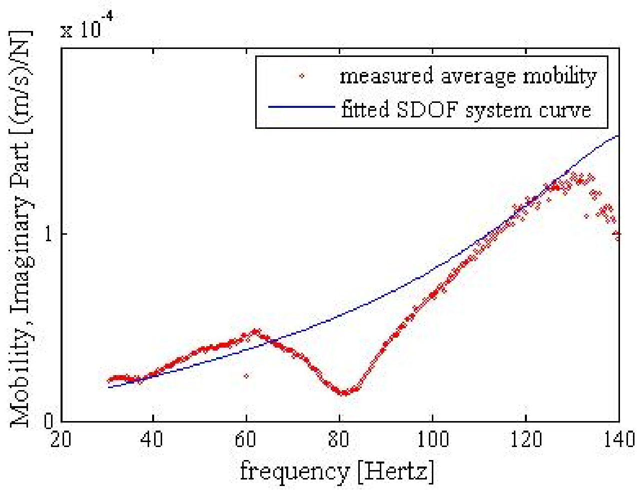

Figure L.8: Modified LWD (mobility, imag. part) (C_12_103) for loc. 2

Median Stiffness = 11.16 MN/m; Median Young's Modulus = 119 MPa

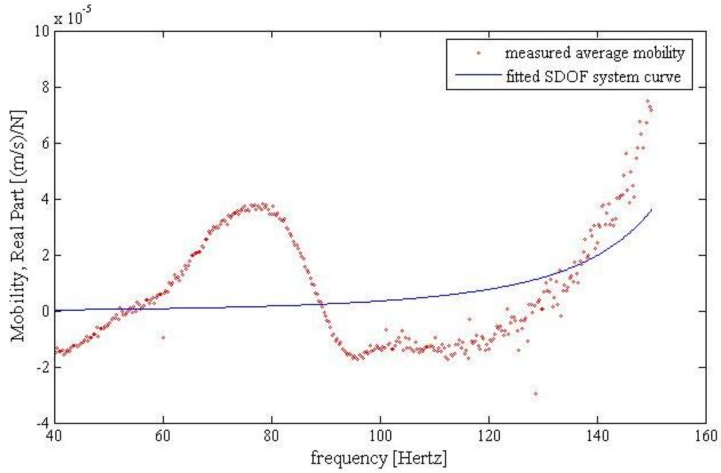

Figure L.9: Modified LWD (mobility, real part) (C_9.5_103) for loc. 2

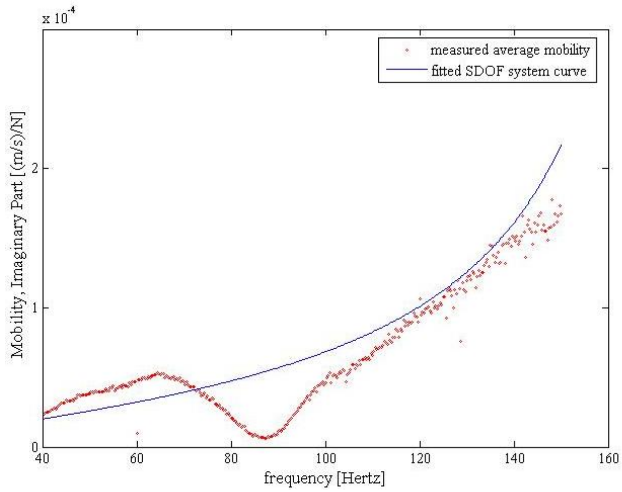

Figure L.10: Modified LWD (mobility, imag. part) (C_9.5_103) for loc. 2

Median Stiffness = 13.25 MN/m; Median Young's Modulus = 141 MPa

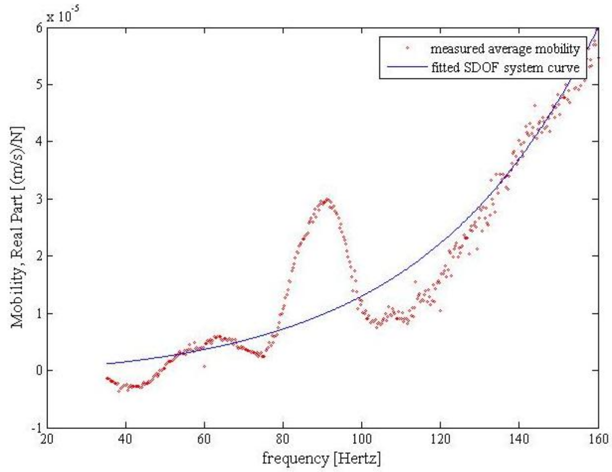

Figure L.11: Modified LWD (mobility, real part) (C_8_103) for loc. 2

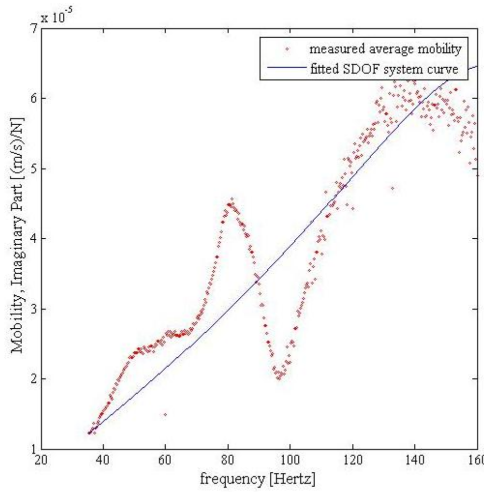

Figure L.12: Modified LWD (mobility, imag. part) (C_8_103) for loc. 2

Median Stiffness = 18.47 MN/m; Median Young's Modulus = 197.5 MPa

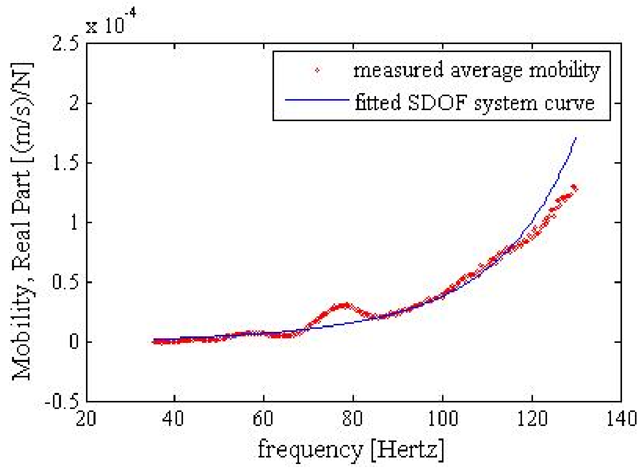

Figure L.13: Modified LWD (mobility, real part) (C_13_98) for loc. 2

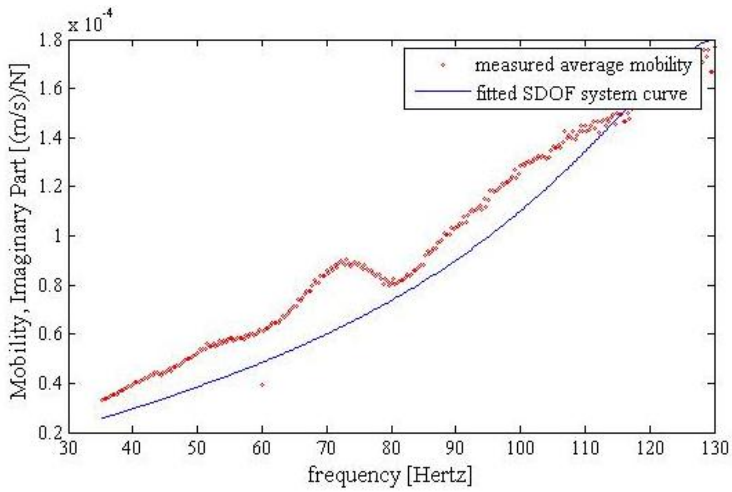

Figure L.14: Modified LWD (mobility, imag. part) (C_13_98) for loc. 2

Median Stiffness = 7.74 MN/m; Median Young's Modulus = 83 MPa

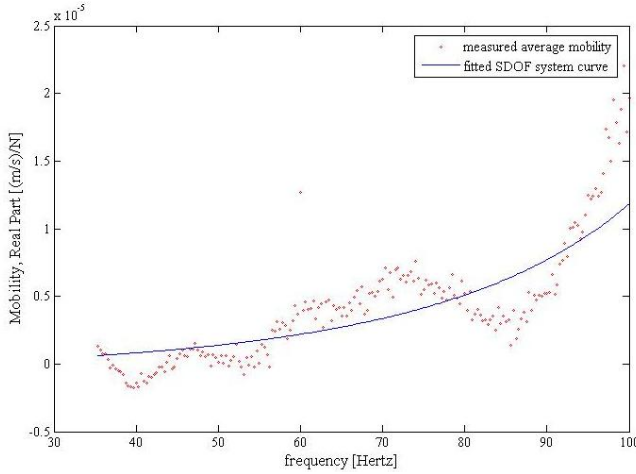

Figure L.15: Modified LWD (mobility, real part) (C_10_98) for loc. 2

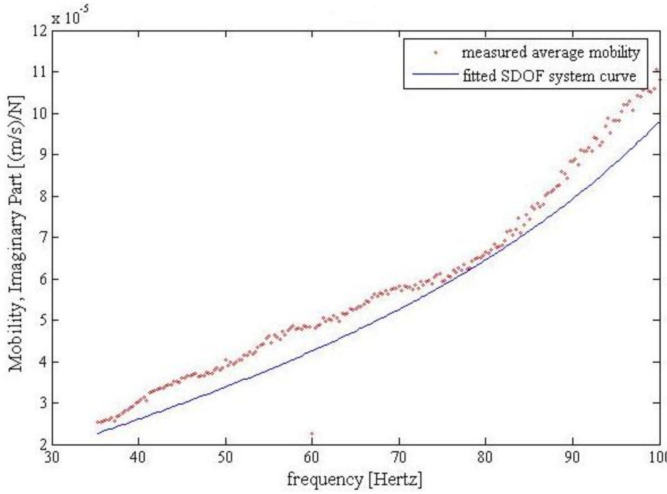

Figure L.16: Modified LWD (mobility, imag. part) (C_10_98) for loc. 2

Median Stiffness = 9.3 MN/m; Median Young's Modulus = 99 MPa

Appendix M

Compaction Stress

Table M.1: Maximum compaction stress for each lift

Sample	Lift	Force [KN]	Compaction Stress [kPa]
A_13.5_105	1	92	867
	2	113	1066
	3	N/A	N/A
A_10.5_105	1	144	1357
	2	200	1889
	3	341	3227
A_7.5_105	1	118	1119
	2	248	2340
	3	486	4592
A_15_100	1	51	478
	2	60	569
	3	126	1188
A_12_100	1	94	886
	2	170	1608
	3	216	2046
A_9_100	1	90	851
	2	150	1419
	3	275	2595
B_24_103	1	59	561
	2	118	1111
	3	82	776
B_19.5_103	1	89	843
	2	149	1413
	3	166	1571
B_16_103	1	99	938
	2	187	1766
	3	204	1928
B_27_98	1	34	321
	2	94	891
	3	77	731
B_22_98	1	60	563
	2	60	565
	3	71	670
B_16_98	1	68	645
	2	61	579
	3	61	573

Sample	Lift	Force [KN]	Compaction Stress [kPa]
C_12_103	1	49	461
	2	228	2153
	3	376	3550
C_9.5_103	1	62	589
	2	148	1401
	3	306	2893
C_8_103	1	82	775
	2	259	2448
	3	366	3462
C_13_98	1	33	314
	2	61	579
	3	191	1801
C_10_98	1	53	504
	2	131	1237
	3	122	1150
C_8_98	1	74	704
	2	109	1026
	3	161	1521
D_16_103	1	120	1136
	2	185	1752
	3	175	1654
D_13_103	1	183	1733
	2	243	2293
	3	359	3390
D_11_103	1	207	1961
	2	275	2600
	3	493	4656
D_18_98	1	77	727
	2	63	595
	3	70	665
D_14_98	1	69	653
	2	104	987
	3	128	1214
D_11_98	1	135	1274
	2	270	2555
	3	329	3113

Table M.2: Maximum compaction stress for each lift

Sample	Lift	Force [lb]	Compaction Stress [psi]
A_13.5_105	1	20631	141
	2	25363	174
	3	N/A	N/A
A_10.5_105	1	32270	221
	2	44925	308
	3	76747	526
A_7.5_105	1	26606	182
	2	55660	381
	3	109212	748
A_15_100	1	11361	78
	2	13525	93
	3	28259	194
A_12_100	1	21082	144
	2	38243	262
	3	48665	333
A_9_100	1	20234	139
	2	33745	231
	3	61731	423
B_24_103	1	13343	91
	2	26424	181
	3	18446	126
B_19.5_103	1	20056	137
	2	33598	230
	3	37357	256
B_16_103	1	22305	153
	2	41991	288
	3	45851	314
B_27_98	1	7637	52
	2	21183	145
	3	17377	119
B_22_98	1	13394	92
	2	13440	92
	3	15933	109
B_16_98	1	15349	105
	2	13761	94
	3	13630	93

Sample	Lift	Force [lb]	Compaction Stress [psi]
C_12_103	1	10970	75
	2	51208	351
	3	84432	578
C_9.5_103	1	14013	96
	2	33327	228
	3	68800	471
C_8_103	1	18438	126
	2	58215	399
	3	82337	564
C_13_98	1	7471	51
	2	13773	94
	3	42839	293
C_10_98	1	11996	82
	2	29425	202
	3	27342	187
C_8_98	1	16739	115
	2	24404	167
	3	36184	248
D_16_103	1	27013	185
	2	41677	285
	3	39347	269
D_13_103	1	41221	282
	2	54538	374
	3	80638	552
D_11_103	1	46636	319
	2	61839	424
	3	110737	758
D_18_98	1	17280	118
	2	14145	97
	3	15809	108
D_14_98	1	15542	106
	2	23482	161
	3	28863	198
D_11_98	1	30296	208
	2	60759	416
	3	74049	507

Appendix N

Surface Plot Information

A Loess smoother within SigmaPlot was chosen to generate surfaces for the 3D plots. The Loess model is a local smoothing technique with tri-cube weighting and polynomial regression. The sampling proportion was 1.0 with and a one degree polynomial. The resilient modulus data for the plots were subjected to the UM SNR and rotation criteria.

Appendix O

PVD Results

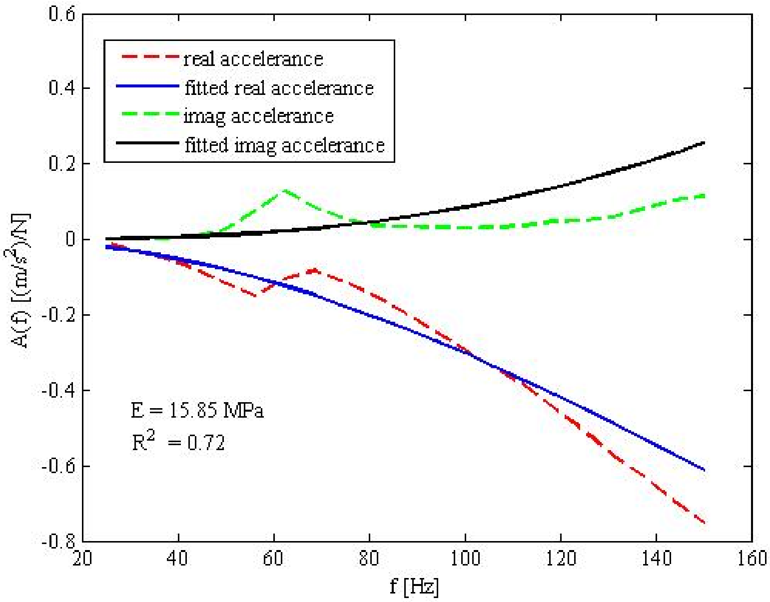

Figure O.1: PVD result at loc. 2 (B_24_103)

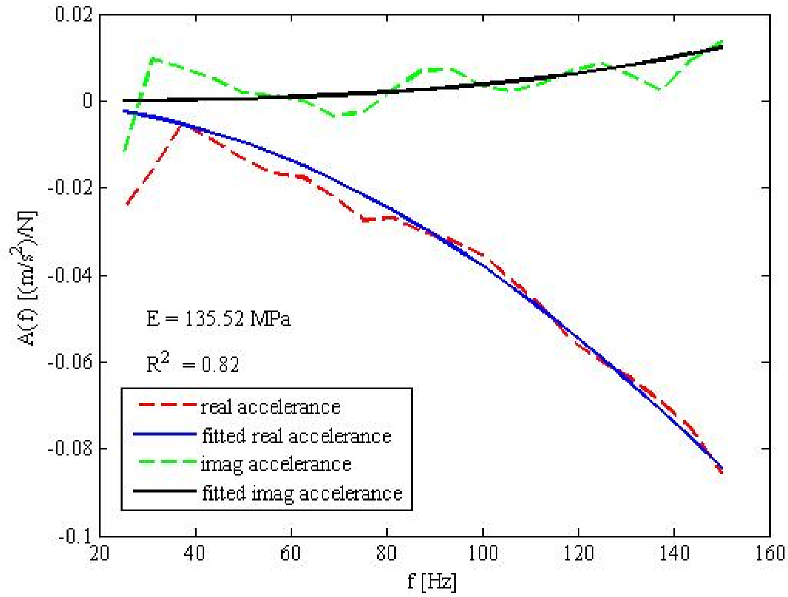

Figure O.2: PVD result at loc. 2 (B_19.5_103)

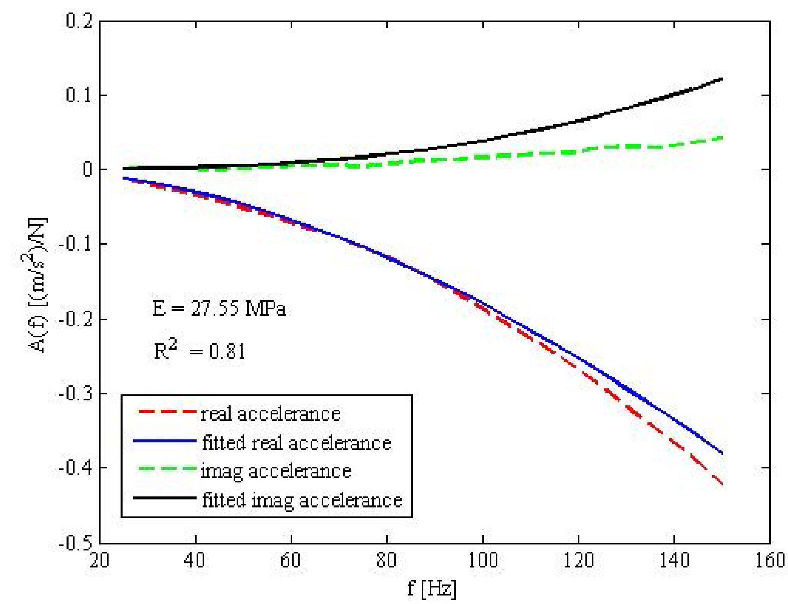

Figure O.3: PVD result at loc. 2 (B_16_103)

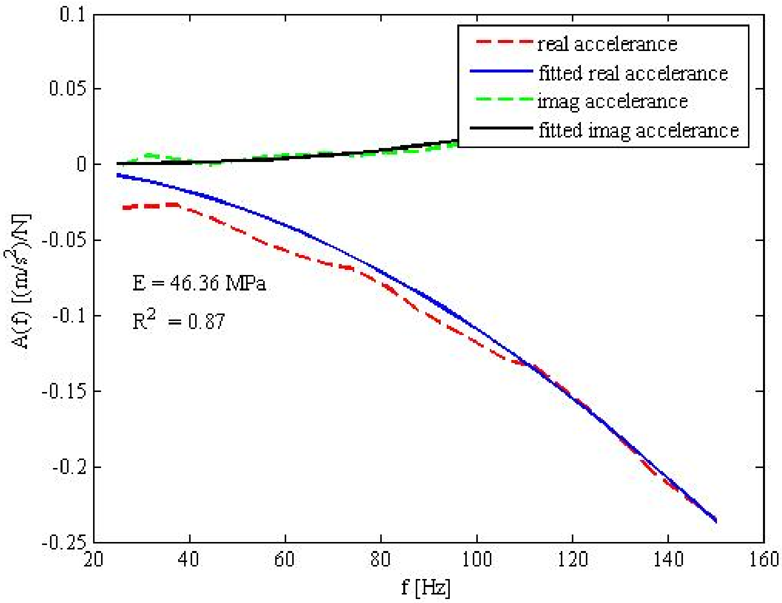

Figure O.4: PVD result at loc. 2 (B_27_98)

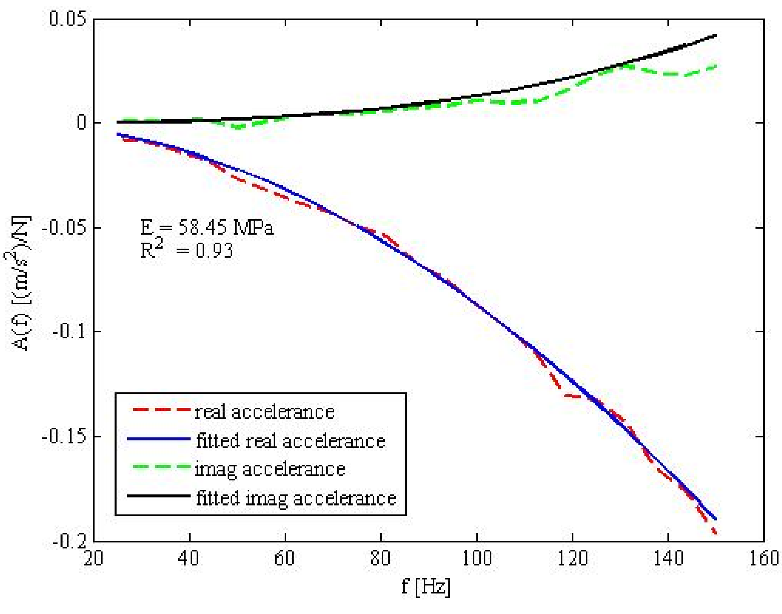

Figure O.5: PVD result at loc. 2 (B_22_98)

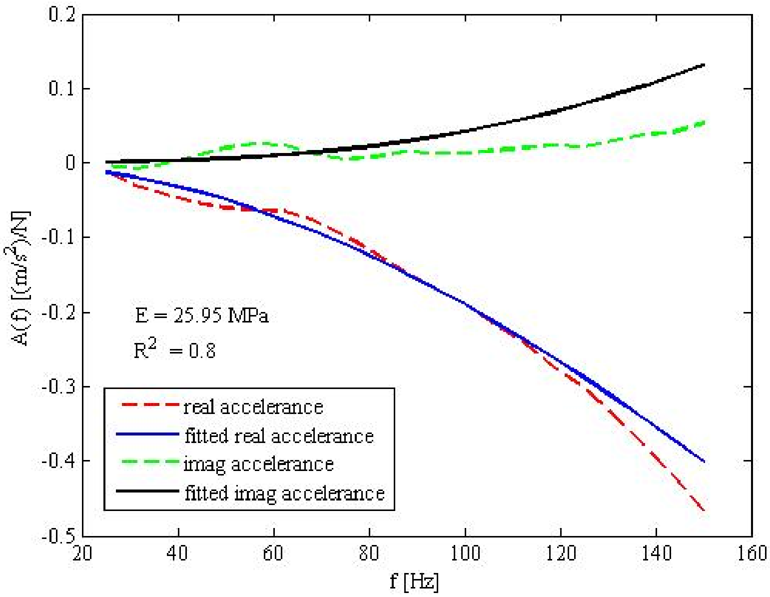

Figure O.6: PVD result at loc. 2 (B_16_98)

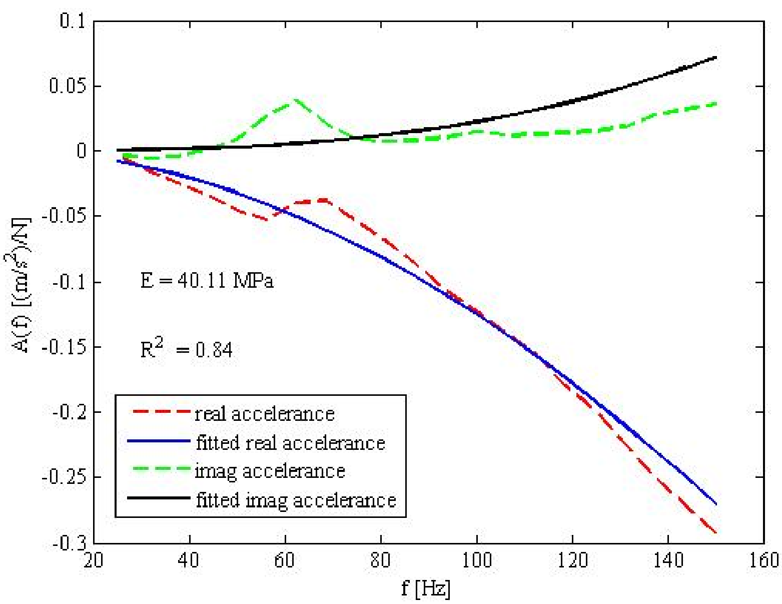

Figure O.7: PVD result at loc. 2 (C_9.5_103)

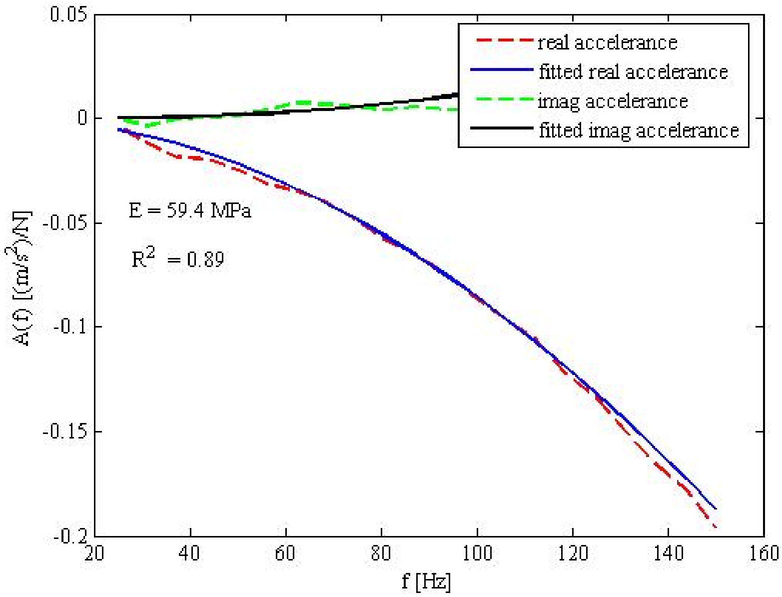

Figure O.8: PVD result at loc. 2 (C_8_103)

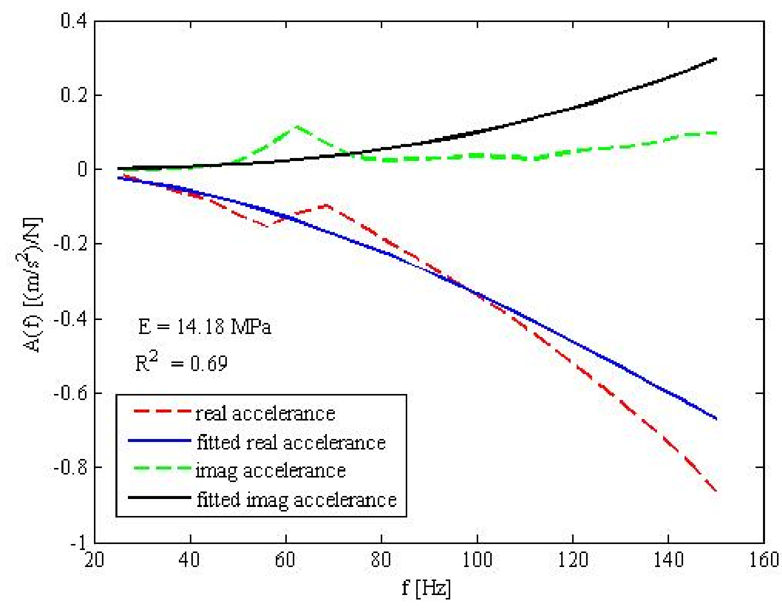

Figure O.9: PVD result at loc. 2 (C_13_98)

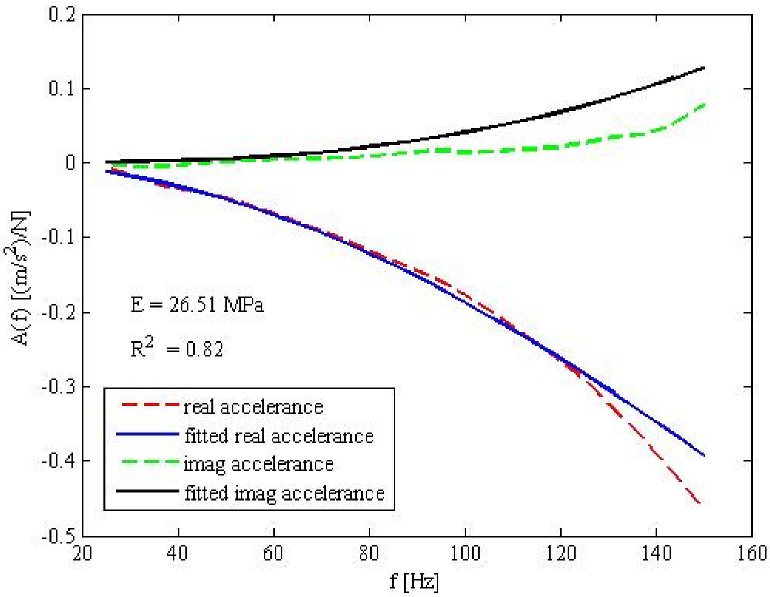

Figure O.10: PVD result at loc. 2 (C_10_98)

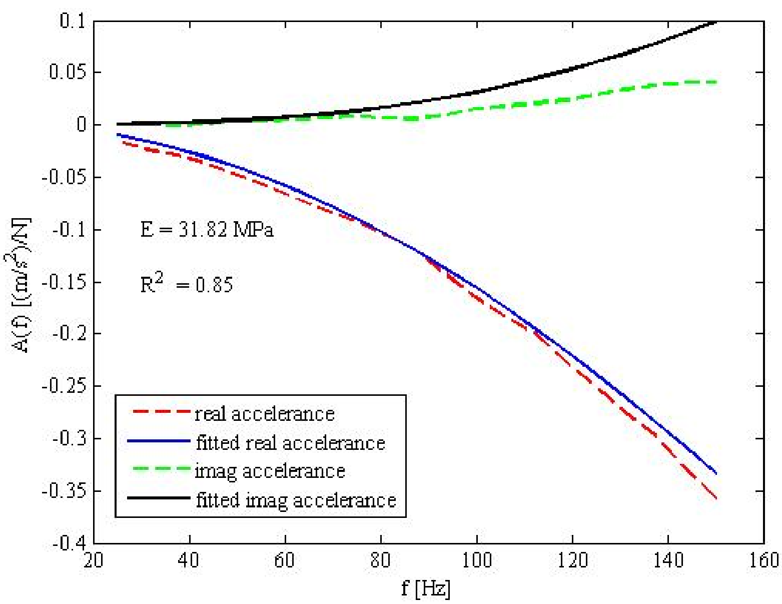

Figure O.11: PVD result at loc. 2 (C_8_98)

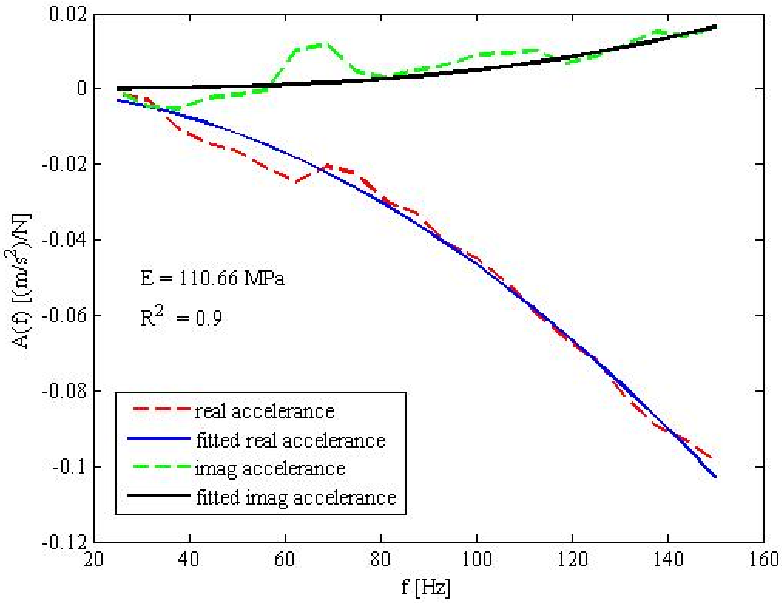

Figure O.12: PVD result at loc. 2 (D_16_103)

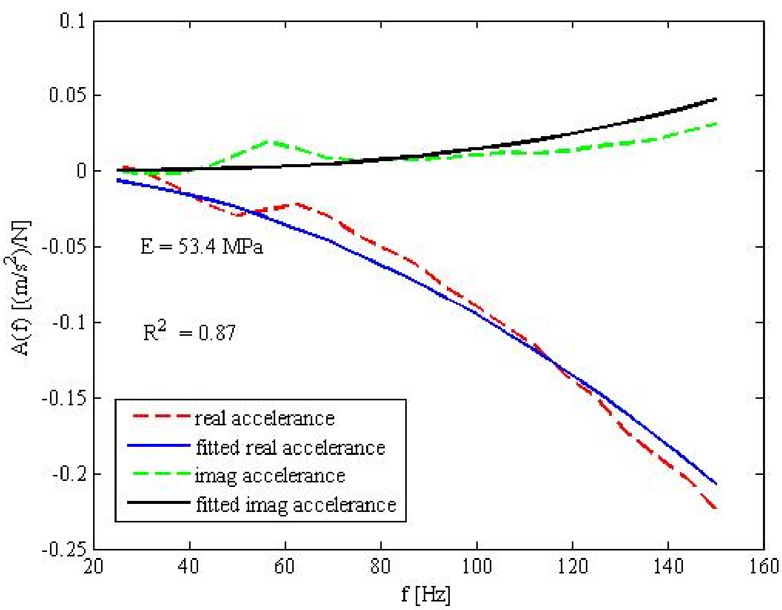

Figure O.13: PVD result at loc. 2 (D_13_103)

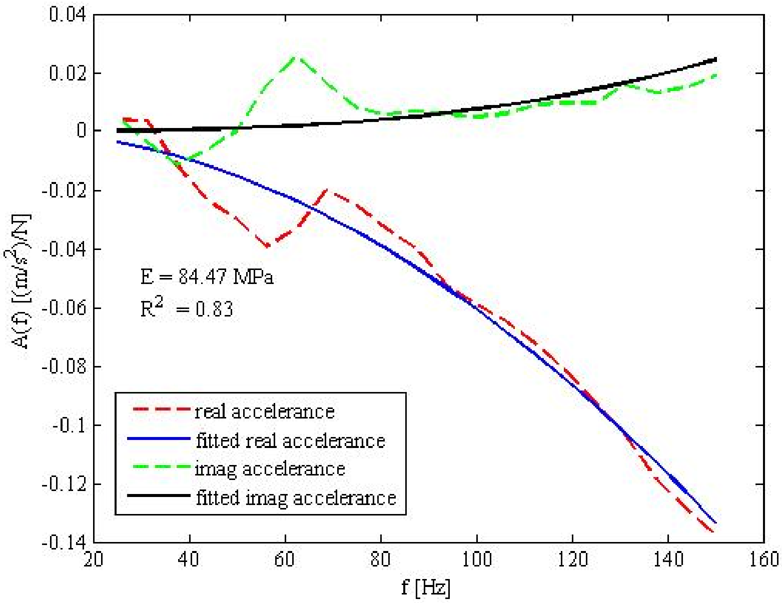

Figure O.14: PVD result at loc. 2 (D_11_103)

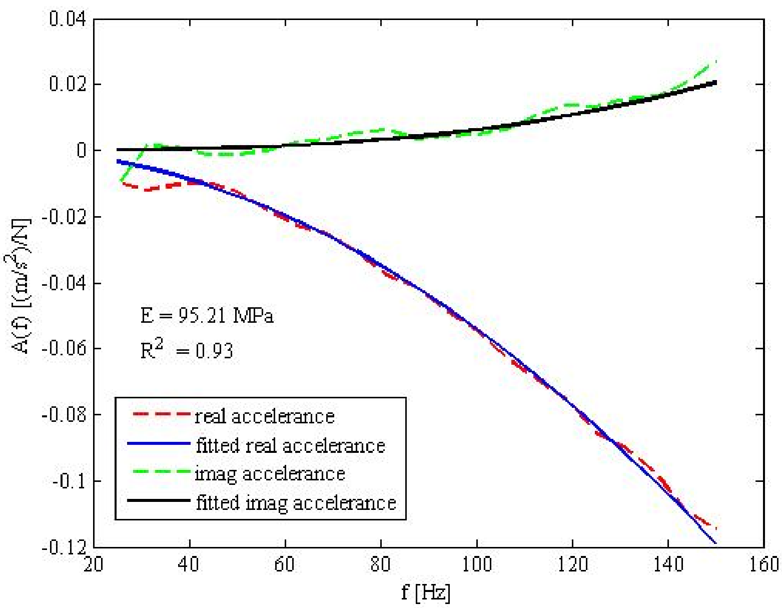

Figure O.15: PVD result at loc. 2 (D_18_98)

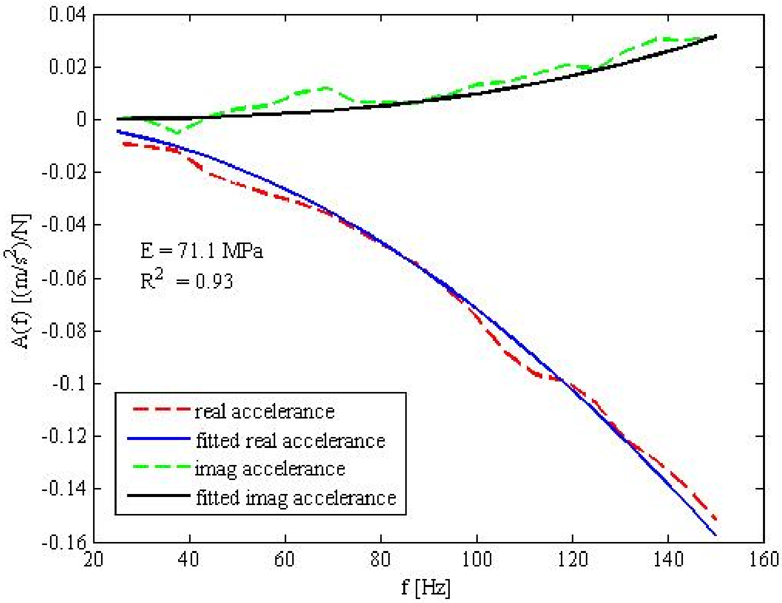

Figure O.16: PVD result at loc. 2 (D_14_98)

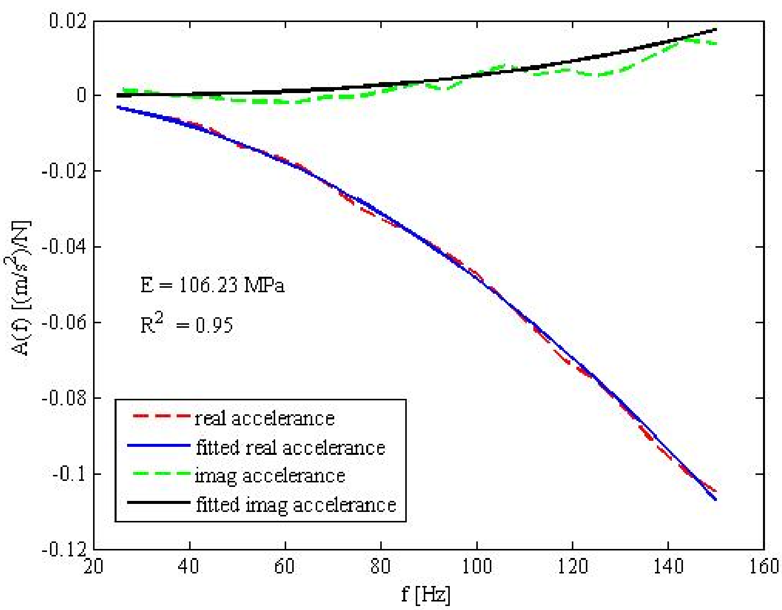

Figure O.17: PVD result at loc. 2 (D_11_98)

Appendix P

DCP Results

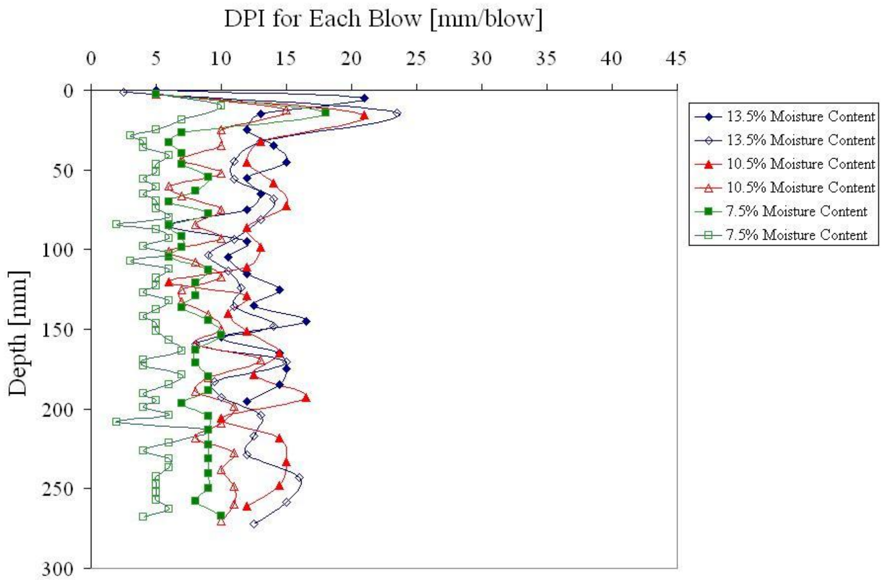

Figure P.1: DPI vs. Depth for soil A at 105% target Proctor

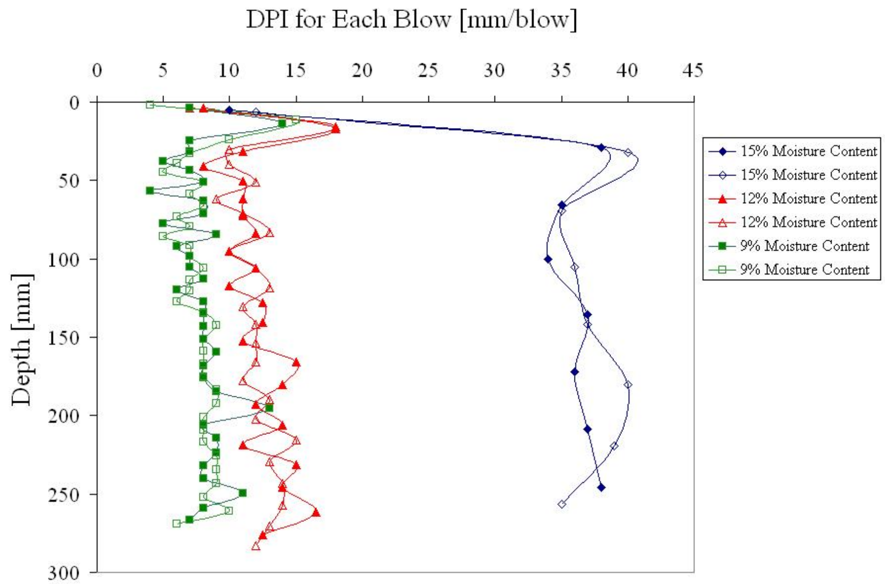

Figure P.2: DPI vs. Depth for soil A at 100% target Proctor

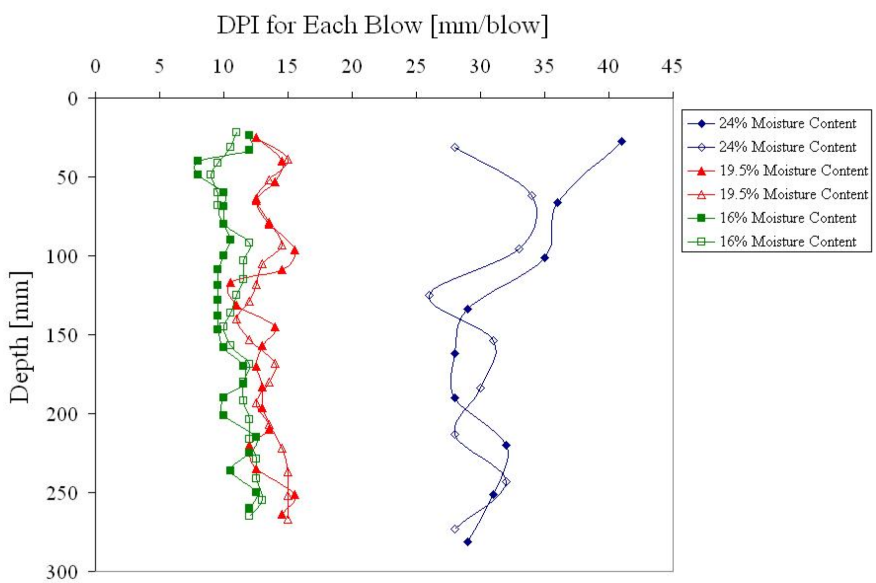

Figure P.3: DPI vs. depth for soil B at 103% target Proctor

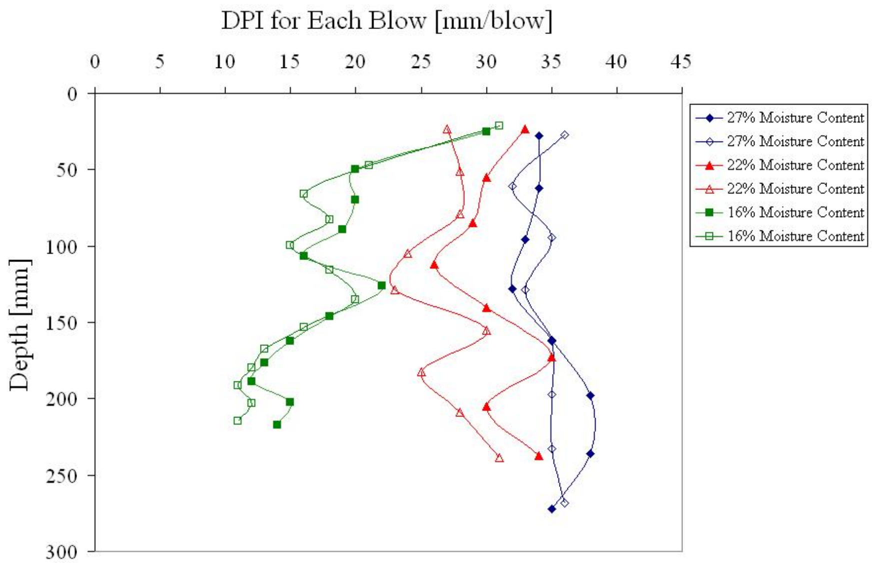

Figure P.4: DPI vs. depth for soil B at 98% target Proctor

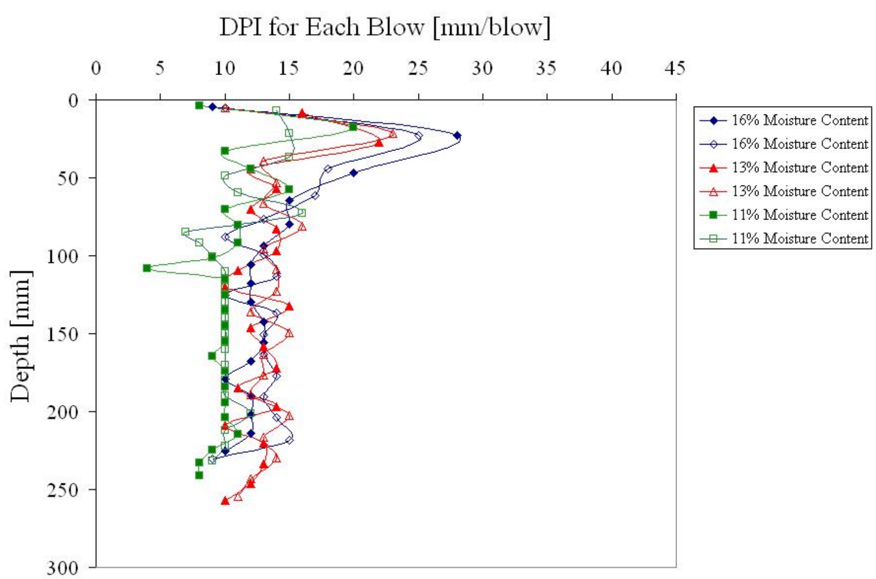

Figure P.5: DPI vs. depth for soil C at 103% target Proctor

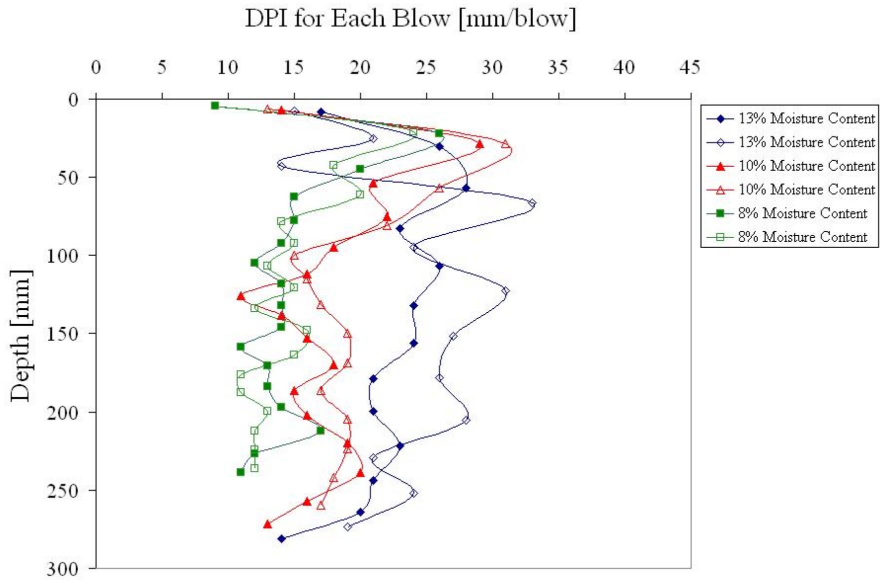

Figure P.6: DPI vs. depth for soil C at 98% target Proctor

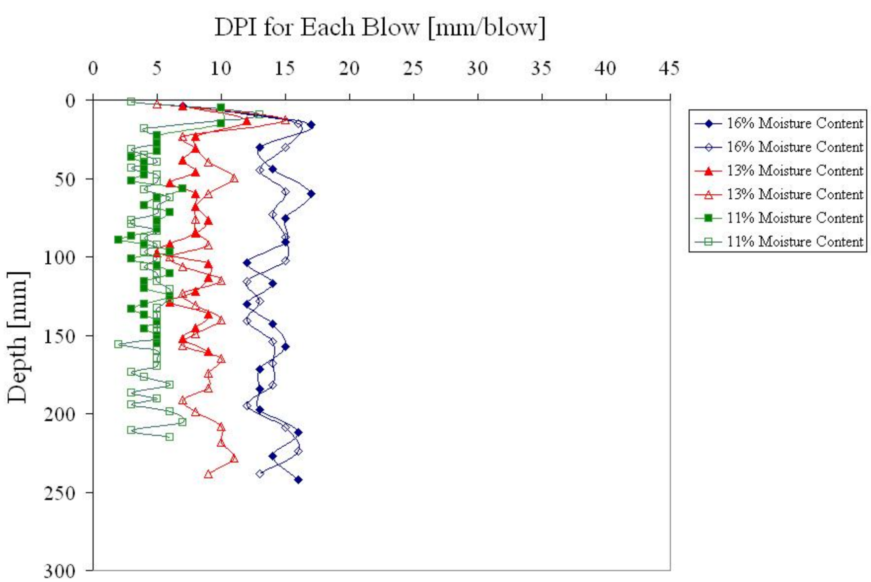

Figure P.7: DPI vs. depth for soil D at 103% target Proctor

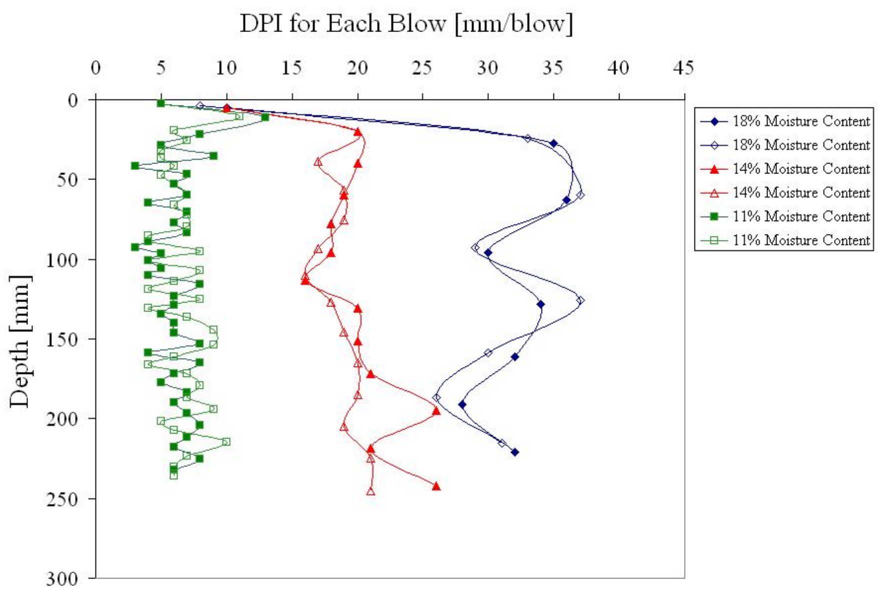

Figure P.8: DPI vs. depth for soil D at 98% target Proctor

Appendix Q

Post Test Specimen Pictures

Figure Q.1: Specimen picA_1_9_100

Figure Q.2: Specimens A_2_12_100, A_1_10.5_105, and A_1_9_100

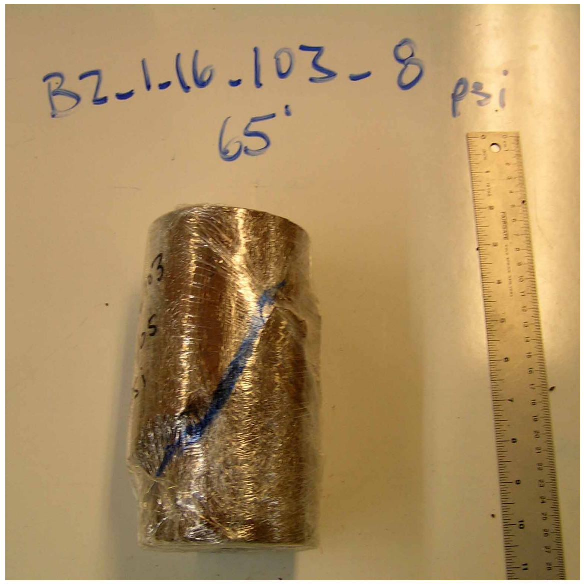

Figure Q.3: Specimen B_1_16_103

Figure Q.4: Specimen B_1_16_98

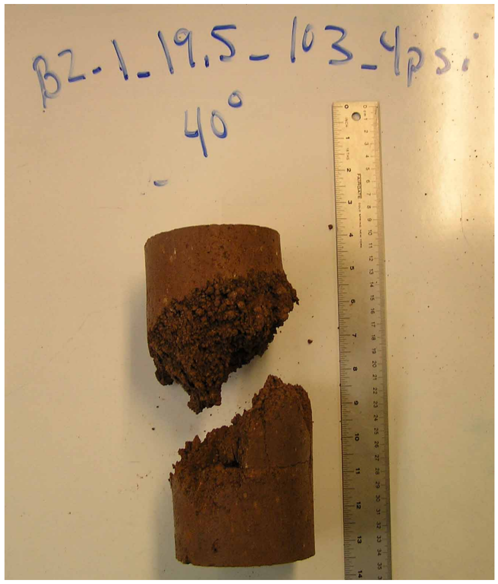

Figure Q.5: Specimen B_1_19.5_103

Figure Q.6: Specimen B_1_22_98

Figure Q.7: Specimen B_1_24_103

Figure Q.8: Specimen B_1_27_98

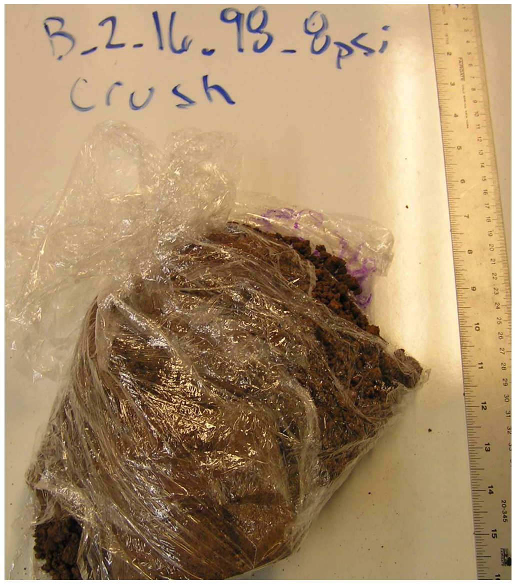

Figure Q.9: Specimen B_2_16_98

Figure Q.10: Specimen B_2_19.5_103

Figure Q.11: Specimen B_2_22_98

Figure Q.12: Specimen B_2_24_103

Figure Q.13: Specimen B_2_27_98

Figure Q.14: Specimen C_1_12_103

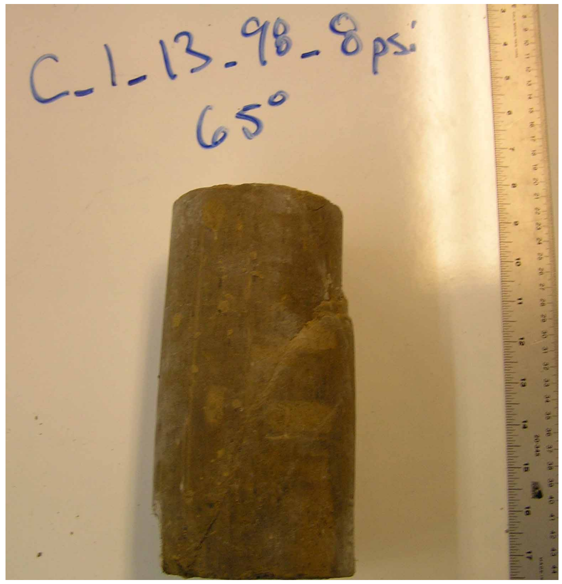

Figure Q.15: Specimen C_1_13_98

Figure Q.16: Specimen C_2_12_103

Figure Q.17: Specimen C_1_8_103

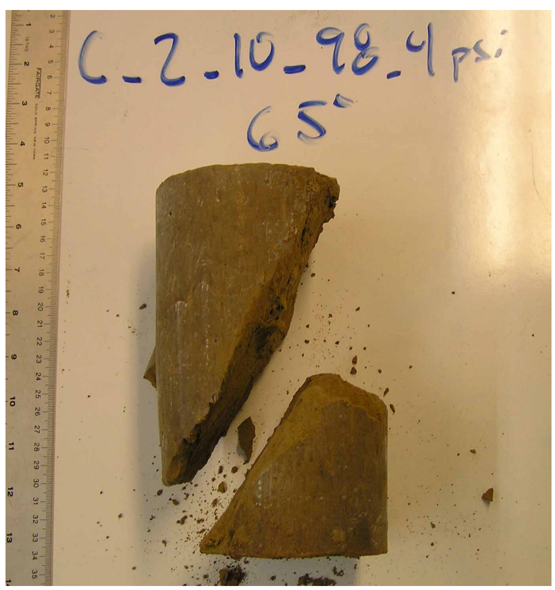

Figure Q.18: Specimen C_2_10_98

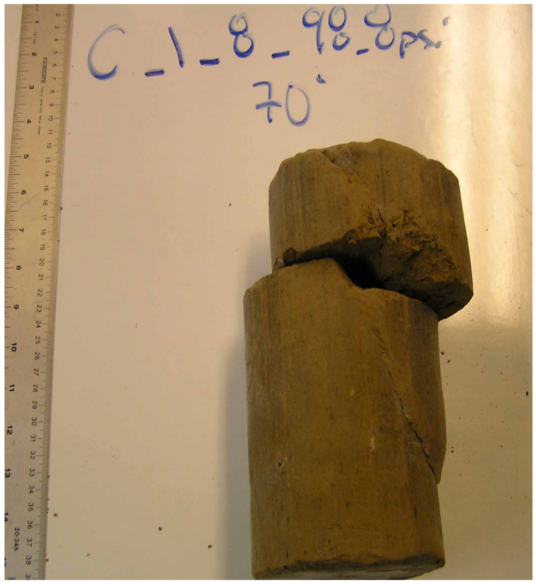

Figure Q.19: Specimen C_1_8_98

Figure Q.20: Specimen C_1_9.5_103

Figure Q.21: Specimen C_2_13_98

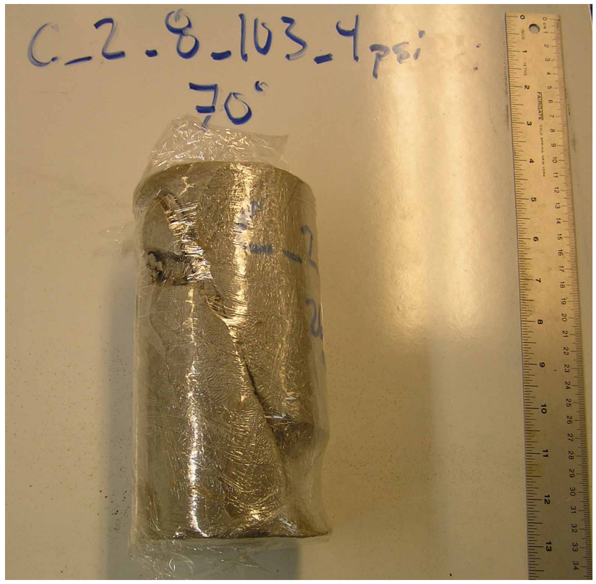

Figure Q.22: Specimen C_2_8_103

Figure Q.23: Specimen C_2_8_98

Figure Q.24: Specimen D_1_13_103

Figure Q.25: Specimen D_1_14_98

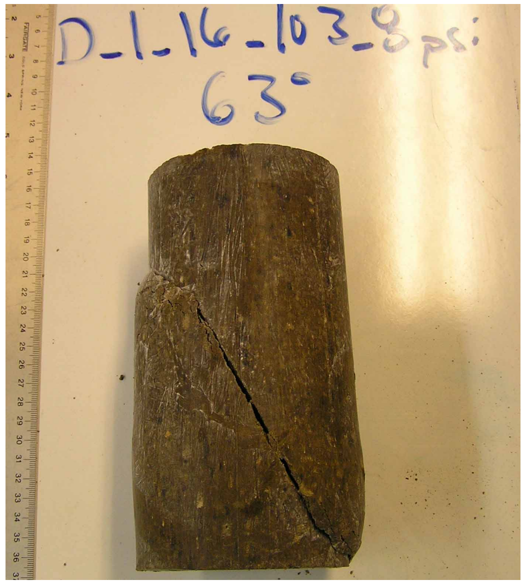

Figure Q.26: Specimen D_1_16_103

Figure Q.27: Specimen D_2_18_98