Precision of the Dynamic Modulus and Flow Number Tests Conducted with the Asphalt Mixture Performance Tester

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

NCHRP REPORT 702

Precision of the Dynamic Modulus and Flow Number Tests Conducted with the Asphalt Mixture Performance Tester

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

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- Advanced Asphalt Technologies, LLC
- Asphalt Institute
- Dongre Laboratory Services, Inc.
- Federal Highway Administration
- Florida Department of Transportation
- Mathy Technology and Engineering Services, Inc.
- National Center for Asphalt Technologies
- Utah Department of Transportation

FOREWORD

By Edward T. Harrigan
Staff Officer
Transportation Research Board

NCHRP Report 702: Precision of the Dynamic Modulus and Flow Number Tests Conducted with the Asphalt Mixture Performance Tester describes the development of precision statements for the dynamic modulus and flow number tests conducted with the Asphalt Mixture Performance Tester (AMPT). Thus, the report will be of particular interest to materials and pavement structural design engineers in state highway agencies, as well as to materials suppliers and paving contractors.

The present hot-mix asphalt (HMA) volumetric mix design method used by the majority of state highway agencies was developed in the asphalt component of the Strategic Highway Research Program (1987–1993). This method—standardized as AASHTO M 323 and R 35—does not include a simple, mechanical "proof" test analogous to the Marshall stability and flow tests or the Hveem stabilometer method.

Though the utility and soundness of the HMA mix design method are evident by its almost ubiquitous, present-day use, mix designers from the beginning have asked for complementary performance tests to quickly and easily proof-test candidate mix designs. Work sponsored by FHWA and then NCHRP in the period 1996–2006 (and reported in *NCHRP Reports 465, 547,* and *580*) recommended three test and parameter combinations as performance tests for permanent deformation: (1) the dynamic modulus, E^*, determined with the triaxial dynamic modulus test; (2) the flow number, F_n, determined with the triaxial repeated load test; and (3) the flow time, F_T, determined with the triaxial static creep test. The dynamic modulus, E^*, also was chosen as the simple performance test for fatigue cracking as well as the chief HMA materials characterization test for HMA pavement design with the Mechanistic-Empirical Pavement Design Guide (MEPDG).

Under NCHRP Project 9-29, "Simple Performance Tester for Superpave Mix Design," Advanced Asphalt Technologies, LLC, was assigned the task of designing, procuring, and evaluating the AMPT for testing HMA mixtures for (1) permanent deformation and fatigue cracking in HMA mix design and (2) materials characterization for pavement structural design with the MEPDG.

In the portion of NCHRP Project 9-29 reported here (Phase VI), the research team conducted an interlaboratory study to prepare precision statements for the dynamic modulus and flow number tests carried out according to AASHTO TP 79, "Determining the Dynamic Modulus and Flow Number for Hot Mix Asphalt (HMA) Using the Asphalt Mixture Performance Tester (AMPT)." The interlaboratory study was designed, conducted, and analyzed in accordance with ASTM Standard Practice E691, "Conducting an Interlaboratory Study to Determine the Precision of a Test Method."

The interlaboratory study produced precision statements for (1) dynamic modulus and phase angle, (2) unconfined flow number for the NCHRP Project 9-33 testing conditions, and (3) permanent strain in confined flow number tests using the NCHRP Project 9-30A testing conditions. These precision statements are in the form of tables proposed for addition to AASHTO TP 79, subject to their review and acceptance by the AASHTO Highway Subcommittee on Materials.

This report presents the full text of the contractor's final report for Phase VI and the following nine appendices:

Appendix A: Interlaboratory Study Instructions
Appendix B: Loose Mix Dynamic Modulus Test Data
Appendix C: Prefabricated Core Dynamic Modulus Test Data
Appendix D: Loose Mix Dynamic Modulus Statistical Analysis
Appendix E: Prefabricated Core Dynamic Modulus Statistical Analysis
Appendix F: Unconfined Flow Number Test Data
Appendix G: Unconfined Flow Number Statistical Analysis
Appendix H: Confined Flow Number Test Data
Appendix I: Confined Flow Number Statistical Analysis

Earlier work completed in Phases I through V is presented in *NCHRP Reports 513, 530, 614,* and *629.*

CONTENTS

SUMMARY

Precision of the Dynamic Modulus and Flow Number Tests Conducted with the Asphalt Mixture Performance Tester

The primary objective of NCHRP Project 9-29 was to stimulate the development of commercial testing equipment to perform the three simple performance tests recommended in NCHRP Project 9-19: dynamic modulus, flow number, and flow time. The commercial equipment developed in NCHRP Project 9-29 was originally called the Simple Performance Test System. The name was changed to the Asphalt Mixture Performance Tester (AMPT) when the FHWA assumed responsibility for its implementation.

In Phases I and II of NCHRP Project 9-29, a detailed purchase specification for the AMPT was developed and two first-article devices were procured and evaluated. This evaluation concluded that the AMPT is a reasonably priced, user-friendly device for testing stiffness and permanent deformation properties of asphalt concrete. Additional work, however, was needed to further refine the AMPT for use in routine practice. This additional work was undertaken in Phases IV, V, and VI of NCHRP Project 9-29. These phases of the project included five major activities directed at implementation of the AMPT in routine practice:

1. Enhancement of the AMPT to perform dynamic modulus master curve testing required for pavement structural design and analysis,
2. Procurement and evaluation of AMPTs with dynamic modulus master curve testing capability,
3. Development of equipment for rapid preparation of test specimens for the AMPT,
4. Ruggedness testing for the dynamic modulus and flow number tests conducted in the AMPT, and
5. An interlaboratory study to develop precision statements for the dynamic modulus and flow number tests conducted in the AMPT.

This report documents the interlaboratory study that was performed in Phase VI of the project. The objective of the interlaboratory study was to develop precision statements for dynamic modulus and flow number tests conducted in accordance with AASHTO TP 79, "Determining the Dynamic Modulus and Flow Number for Hot Mix Asphalt (HMA) Using the Asphalt Mixture Performance Tester (AMPT)." The interlaboratory study was designed and analyzed in accordance with ASTM E691, "Standard Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method." Separate interlaboratory studies were conducted for (1) the dynamic modulus test, (2) unconfined flow number tests using the NCHRP Project 9-33 testing conditions, and (3) confined flow number tests using the Project 9-30A testing conditions. To separate specimen fabrication and AMPT testing effects, the three interlaboratory studies included tests on loose mix specimens compacted in the participating laboratories and prefabricated cores that were prepared in a single laboratory.

The NCHRP Project 9-29 interlaboratory study produced precision statements for (1) dynamic modulus and phase angle, (2) unconfined flow number for the NCHRP Project 9-33 testing conditions, and (3) permanent strain in confined flow number tests using the NCHRP Project 9-30A testing conditions. These precision statements, which are proposed for addition to AASHTO TP 79, are in the form of tables because AASHTO TP 79 specifies the use of multiple samples. The precision statements that were developed used specimens having an air void tolerance of ±1.0% rather than the ±0.5% currently specified in AASHTO PP 61 and AASHTO TP 79. This was done to avoid rejecting a large number of specimens. It is proposed that the air void tolerances in these provisional standards be changed to ±1.0% to be consistent with the precision statements from the interlaboratory study and to reduce the potential for specimen rejection. No systematic air void effect was detected in the interlaboratory study data over the ±1.0% tolerance range.

In general, the variability in the AMPT tests increases with decreasing specimen stiffness. High stiffness dynamic modulus tests have variability similar to complex shear modulus tests conducted on asphalt binder using a dynamic shear rheometer (AASHTO T 315). The variability of low stiffness dynamic modulus tests and the permanent deformation in confined flow number tests is higher but probably acceptable when the average of multiple tests is used. The variability of unconfined flow number tests is unacceptable considering current criteria for rutting resistance developed in NCHRP Project 9-33.

Specimen fabrication was found to be a major source of between-lab variability in both the dynamic modulus and flow number tests. A formal ruggedness study of AASHTO PP 60, "Provisional Standard Practice for Preparation of Cylindrical Performance Test Specimens Using the Superpave Gyratory Compactor (SGC)," is suggested to identify factors affecting the mechanical properties of specimens prepared using this practice and to develop appropriate levels of control for these factors. This has the potential to significantly reduce variability in the AMPT dynamic modulus and flow number tests.

Some improvement of the AMPT equipment and the AASHTO TP 79 test procedures could also be considered to reduce the variability of low stiffness dynamic modulus test data and flow number test data. These improvements include

1. The use of lower spring force sensors for the specimen-mounted deformation sensors used in the dynamic modulus test. Lower spring force sensors would reduce the potential for gauge point drift. This would reduce the variability of the low stiffness dynamic modulus measurements both within and between laboratories.
2. Improved guidance for the fabrication and use of the greased latex end friction reducers used in the flow number tests. Better control of the type, amount, and distribution of the grease is needed. Additional emphasis could be added in the test procedure that new friction reducers are needed for each test.

CHAPTER 1

Introduction and Research Approach

1.1 Problem and Purpose

NCHRP Project 9-19, "Superpave Support and Performance Models Management," recommended three simple performance tests as candidates to complement the Superpave volumetric mixture design method. These were the flow time, flow number, and dynamic modulus tests. The recommended tests are conducted in uniaxial or triaxial compression on cylindrical specimens that are sawed and cored from over-height gyratory compacted samples. Data from all three candidates were shown to correlate well with observed rutting in field pavements, and the dynamic modulus appears to have potential as a simple performance test for fatigue cracking (*1*). The dynamic modulus is also the primary material input for flexible pavement structural design in the Mechanistic-Empirical Pavement Design Guide (MEPDG) completed in NCHRP Project 1-37A (*2*). The use of this test for both mixture evaluation and structural design offers a potential link between mixture design and structural analysis that has been an underlying goal of a substantial amount of research on flexible pavement.

The objective of NCHRP Project 9-29 was to stimulate the development of commercial testing equipment that is capable of performing the NCHRP Project 9-19 performance tests. It is envisioned that this equipment will be used for two purposes: (1) as a simple performance test to complement Superpave volumetric mixture design, and (2) for the asphalt concrete material characterization required by the MEPDG and other similar flexible pavement structural design methods.

The commercial equipment developed in NCHRP Project 9-29 was originally called the Simple Performance Test System. The name was changed to the Asphalt Mixture Performance Tester (AMPT) when the FHWA assumed responsibility for its implementation. In Phase I of NCHRP Project 9-29, a detailed purchase specification for the AMPT was developed. The AMPT is capable of performing the three NCHRP Project 9-19 performance tests and standardizes the instrumentation, data acquisition, and data analysis associated with each test. In Phase II, two first-article devices were procured and evaluated. This evaluation concluded that the AMPT is a reasonably priced, user-friendly device for measuring stiffness and permanent deformation properties of asphalt concrete. Additional work, however, was needed to further refine the AMPT for use in routine practice. This additional work was undertaken in Phases IV, V, and VI of NCHRP Project 9-29. These phases of the project included five major activities directed at implementation of the AMPT in routine practice:

1. Enhancement of the AMPT to perform dynamic modulus master curve testing required for pavement structural design and analysis,
2. Procurement and evaluation of AMPTs with dynamic modulus master curve testing capability,
3. Development of equipment for rapid preparation of test specimens for the AMPT,
4. Ruggedness testing for dynamic modulus and flow number tests conducted in the AMPT, and
5. Development of precision statements for dynamic modulus and flow number tests conducted in the AMPT.

This report documents the interlaboratory study that was conducted in Phase VI of the project to develop precision statements for dynamic modulus and flow number tests conducted in the AMPT.

1.2 Scope

In Phase VI of NCHRP Project 9-29, an interlaboratory study was conducted to determine the precision of dynamic modulus and flow number tests conducted with the AMPT. The interlaboratory study was designed and analyzed in accordance with ASTM E691, "Standard Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method." Table 1 shows the eight laboratories that participated in the study. All of the laboratories included in the study were accredited by AASHTO for hot-mix asphalt testing. Dynamic modulus and flow number tests were conducted in

Table 1. Interlaboratory study participants.

Participant	Laboratory Type	AMPT Equipment
Advanced Asphalt Technologies, LLC	Commercial laboratory	Interlaken
Asphalt Institute	Commercial laboratory	IPC Global
Dongre Laboratory Services, Inc.	Commercial laboratory	IPC Global
Federal Highway Administration	Agency laboratory	IPC Global
Florida Department of Transportation	Agency laboratory	IPC Global
Mathy Technology and Engineering Services, Inc.	Commercial laboratory	IPC Global
National Center for Asphalt Technologies	Research laboratory	IPC Global
Utah Department of Transportation	Agency laboratory	IPC Global

each laboratory in accordance with the applicable sections of AASHTO TP 79, "Determining the Dynamic Modulus and Flow Number for Hot Mix Asphalt (HMA) Using the Asphalt Mixture Performance Tester (AMPT)." Specimens for the study were fabricated in accordance with AASHTO PP 60, "Preparation of Cylindrical Performance Test Specimens Using the Superpave Gyratory Compactor (SGC)." Because it was anticipated that specimen fabrication would have a major effect on the reproducibility of the dynamic modulus and flow number tests between laboratories, the study was completed for two types of test specimens: (1) fabricated in the individual laboratories from loose mix, and (2) fabricated in a single laboratory.

1.3 Experimental Design and Analysis

1.3.1 Experimental Design

The purpose of an interlaboratory study was to develop statements for the precision of a test method in terms of its repeatability and reproducibility. Repeatability is the variability between independent test results on the same material obtained in a single laboratory, by a single operator, using a single piece of testing equipment. Reproducibility is the variability between independent test results on the same material obtained in different laboratories. ASTM E691 describes the design and analysis of an interlaboratory study to determine precision statements for a test method. The interlaboratory study conducted in this project included separate interlaboratory studies for the following:

1. Dynamic modulus tests conducted in accordance with AASHTO TP 79 using test specimens fabricated in accordance with AASHTO PP 60,
2. Dynamic modulus tests conducted in accordance with AASHTO TP 79 using test specimens fabricated in a single laboratory in accordance with AASHTO PP 60,
3. Flow number tests conducted in accordance with AASHTO TP 79 using test specimens fabricated in accordance with AASHTO PP 60, and
4. Flow number tests conducted in accordance with AASHTO TP 79 using test specimens fabricated in a single laboratory in accordance with AASHTO PP 60.

Test specimens fabricated in a single laboratory were included in the interlaboratory study to determine if the major source of variability associated with the reproducibility of dynamic modulus and flow number test results was associated with AMPT equipment and the AASHTO TP 79 test methods or with specimen fabrication. Prior to starting testing in each laboratory, the AMPT was calibrated by InstroTek in accordance with the calibration procedures contained in the October 16, 2007, version of the equipment specification for the Simple Performance Test System (*3*).

The interlaboratory study included the three mixtures summarized in Table 2. These are (1) a coarse-graded 9.5-mm surface mixture produced with neat PG 64-22 binder, (2) a 12.5-mm stone matrix asphalt (SMA) mixture produced with polymer modified PG 76-22 binder, and (3) a fine-graded 25-mm base mixture produced with neat PG 64-22 binder. The different mixtures were included in the interlaboratory study to determine if the repeatability and reproducibility of the tests are affected by the nominal maximum aggregate size and/or gradation (dense-graded compared to gap-graded) of the mixture. Different binders were included to provide a range of dynamic moduli and flow numbers for tests at the same test temperature.

Dynamic modulus and flow number tests were conducted on each of the three mixtures in Table 2 by the eight laboratories listed in Table 1. Each laboratory received nine prefabricated AMPT test specimens and 12 boxes of loose mix for AMPT test specimen fabrication. Three boxes of each mix were for trial specimens to reach the specified air voids. The remaining nine boxes of each mix were used to fabricate AMPT test specimens.

Figure 1 presents a general flow chart for sample fabrication and testing in each laboratory. Detailed instructions for sample

Table 2. Mixtures included in the interlaboratory study.

Property		9.5 mm	12.5 mm	25 mm
Gradation, % passing	Sieve size, mm			
	37.5	100	100	100
	25	100	100	98
	19	100	100	90
	12.5	100	98	79
	9.5	95	81	68
	4.75	52	30	50
	2.36	38	18	36
	1.18	28	14	25
	0.60	20	13	17
	0.30	12	12	11
	0.15	7	9	8
	0.075	4.9	8.3	5.2
Asphalt content, %		5.5	6.5	4.7
Design traffic level, MESAL		<3	>30	<=30
Binder grade		PG 64-22	PG 76-22	PG 64-22
Cellulose fiber content, %		NA	0.3	NA
Coarse aggregate fractured faces, %		100/100	100/100	100/100
Flat and elongated, %		4.0	5.3	4.0
Fine aggregate angularity, %		47.4	48.3	47.3
Sand equivalent		60.4	85.0	60.7
Design gyration level		65	100	65
Design air voids, %		3.9	5.0	3.6
Design VMA, %		15.9	18.2	15.4
Design VFA, %		75.5	72.5	76.6
Filler to effective binder content ratio		1.0	NA	1.3

Note: MESAL = million equivalent single axle loads; VMA = voids in mineral aggregate; VFA = voids filled with asphalt

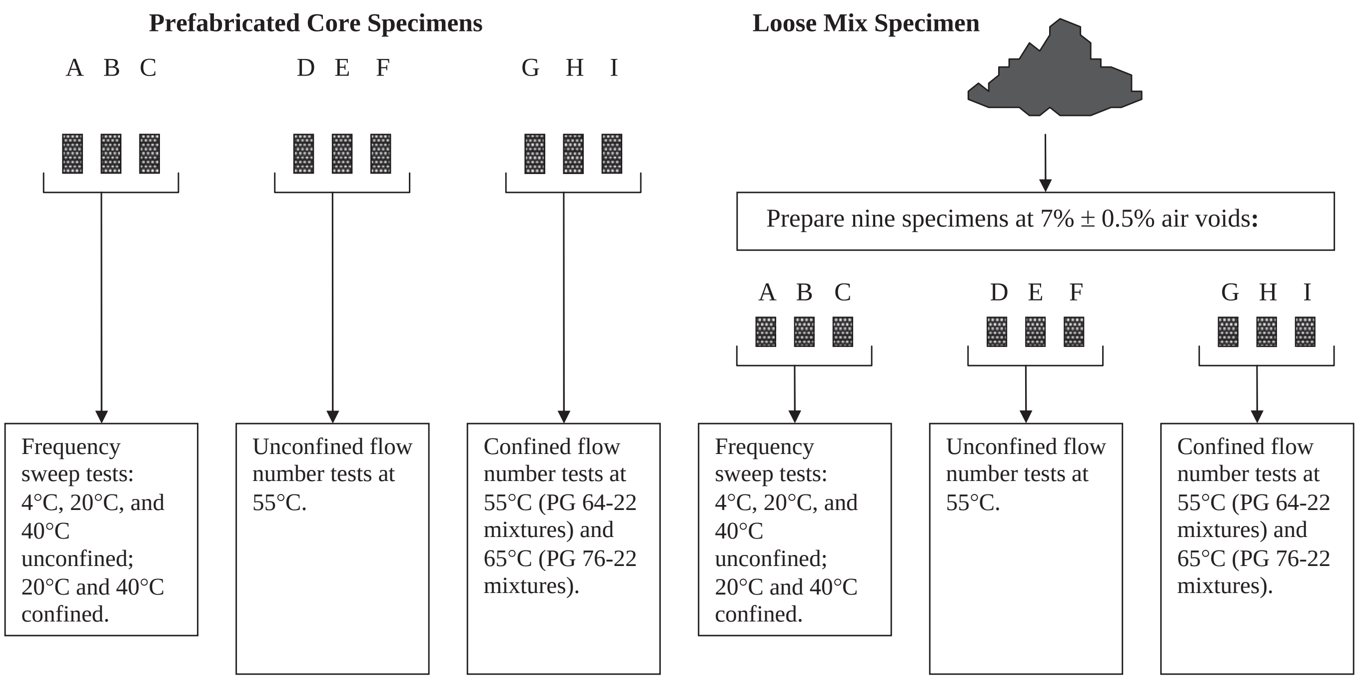


Figure 1. Flow diagram for the NCHRP Project 9-29 interlaboratory study.

fabrication and testing were provided to each laboratory. Appendix A contains the detailed instructions. These instructions are summarized as follows:

Prefabricated Specimens

1. Test three specimens for dynamic modulus in accordance with AASHTO TP 79 in the following order:
   - 20°C confined,
   - 40°C confined,
   - 4°C unconfined,
   - 20°C unconfined, and
   - 40°C unconfined.

   At each temperature, use frequencies of 10, 1, 0.1, and 0.01 Hz. For confined tests use 69 kPa confinement. Report the dynamic modulus, phase angle, and data quality statistics.

2. Test three specimens unconfined for flow number in accordance with AASHTO TP 79. Use a test temperature of 55°C for all three mixtures. Use a repeated deviatoric stress of 600 kPa and a contact deviatoric stress of 30 kPa. Calculate the flow number with the AMPT software using the Francken model algorithm. Report the flow number, average applied stresses, and the average testing temperature.
3. Test three specimens confined for flow number in accordance with AASHTO TP 79. Use test temperatures of 55°C for PG 64-22 mixtures and 65°C for PG 76-22 mixtures. Use a confining stress of 69 kPa, a repeated deviatoric stress of 483 kPa, and a contact deviatoric stress of 25 kPa. Calculate the flow number with the AMPT software using the Francken model algorithm. Report the flow number, average applied stresses, average testing temperature, and permanent strain at 10, 30, 100, 300, 1,000, 3,000, and 10,000 load cycles.

Loose Mix Samples

1. Prepare nine test specimens to a target air void content of 7.0% ± 0.5% in accordance with AASHTO PP 60. Heat the 9.5-mm and 25-mm mixtures uncovered for 2 hours at 145°C and the 12.5-mm mixture at 155°C.
2. Arrange the test specimens into three groups having approximately the same average and range of air voids.
3. Test three specimens for dynamic modulus in accordance with AASHTO TP 79 in the following order:
   - 20°C confined,
   - 40°C confined,
   - 4°C unconfined,
   - 20°C unconfined, and
   - 40°C unconfined.

   At each temperature, use frequencies of 10, 1, 0.1, and 0.01 Hz. For confined tests, use 69 kPa confinement. Report the dynamic modulus, phase angle, and data quality statistics.

4. Test three specimens unconfined for flow number in accordance with AASHTO TP 79. Use a test temperature of 55°C for all three mixtures. Use a repeated deviatoric stress of 600 kPa and a contact deviatoric stress of 30 kPa. Calculate the flow number with the AMPT software using the Francken model algorithm. Report the flow number, average applied stresses, and average testing temperature.
5. Test three specimens confined for flow number in accordance with AASHTO TP 79. Use test temperatures of 55°C for PG 64-22 mixtures and 65°C for PG 76-22 mixtures. Use a confining stress of 69 kPa, a repeated deviatoric stress of 483 kPa, and a contact deviatoric stress of 25 kPa. Calculate the flow number with the AMPT software using the Francken model algorithm. Report the flow number, average applied stresses, average testing temperature, and permanent strain at 10, 30, 100, 300, 1,000, 3,000, and 10,000 load cycles.

Data Files

Submit the data electronically using the Excel workbooks that were provided:

1. 9.5-mm cores (prefabricated specimens),
2. 9.5-mm box (loose mix),
3. 25-mm cores (prefabricated specimens),
4. 25-mm box (loose mix),
5. 12.5-mm cores (prefabricated specimens), and
6. 12.5-mm box (loose mix).

Each workbook contains a separate spreadsheet for the dynamic modulus, unconfined flow number, and confined flow number test results. Except for the confined flow number results, the data required by these spreadsheets can be cut and pasted from the AMPT output files. For the confined flow number test, the permanent strain at selected load cycles must be entered manually into the spreadsheet. Submit the completed workbooks electronically upon completion of the testing.

1.3.2 Analysis

Several analyses were conducted on the data collected from the interlaboratory study. The dynamic modulus, phase angle, flow number, and permanent strain data from the loose mix samples were analyzed in accordance with ASTM E691 to develop precision statements for the dynamic modulus and flow number tests. The data from the prefabricated cores were analyzed in the same manner to determine how much sample fabrication affected the precision of the dynamic modulus and flow number tests. The analysis of the interlaboratory study test data included the following steps:

1. **Compute consistency statistics and initial estimate of repeatability and reproducibility statistics.** The first step in the data analysis was to compute consistency statistics and initial estimates of the repeatability and reproducibility statistics using all of the data from all of the laboratories included in the interlaboratory study. Equations 1 through 6 present the statistics used in this analysis (ASTM E691).

$$s_r = \sqrt{\sum_1^p \frac{s^2}{p}} \quad (1)$$

where
s_r = repeatability standard deviation,
s = within-laboratory standard deviation, and
p = number of laboratories in the interlaboratory study.

$$s_r\% = \frac{s_r}{\bar{X}} \times 100 \quad (2)$$

where
$s_r\%$ = repeatability coefficient of variation,
s_r = repeatability standard deviation, and
$\bar{X}$ = average of the laboratory averages.

$$s_R = \sqrt{(s_x)^2 + (s_r)^2\left(\frac{n-1}{n}\right)} \quad (3)$$

where
s_R = reproducibility standard deviation,
s_x = standard deviation of the laboratory averages,
s_r = repeatability standard deviation, and
n = number of tests in each laboratory.

$$s_R\% = \frac{s_R}{\bar{X}} \times 100 \quad (4)$$

where
$s_R\%$ = reproducibility coefficient of variation,
s_R = reproducibility standard deviation, and
$\bar{X}$ = average of the laboratory averages.

$$k = \frac{s}{s_r} \quad (5)$$

where
k = within-laboratory consistency statistic,
s = within-laboratory standard deviation, and
s_r = repeatability standard deviation.

$$h = \frac{(\bar{x} - \bar{X})}{s_x} \quad (6)$$

where
h = between-laboratory consistency statistic,
s_x = standard deviation of the laboratory averages,
$\bar{x}$ = laboratory average, and
$\bar{X}$ = average of the laboratory averages.

2. **Evaluate the consistency statistics to identify questionable data.** The consistency statistics, k and h, were used to evaluate the consistency of the data collected in the interlaboratory study. The *k statistic* is a measure of consistency of the data within a laboratory, and the *h statistic* is a measure of the consistency of the data between laboratories. These values were compared to critical values that depend on the number of laboratories and number of tests per laboratory that were conducted. For the design used in the AMPT interlaboratory study, eight laboratories with three tests per laboratory, the critical values of k and h were 2.06 and 2.15, respectively (ASTM E691). Plots of the k and h statistics were also used to identify data requiring further review and to understand the characteristics of the test variability.
3. **Review questionable data and recompute the repeatability and reproducibility statistics.** Data characterized by high values of k and h were reviewed to make sure that there were no obvious errors in reporting the data. The reported data quality indicators were also reviewed to make sure that the data complied with the limits for the data quality indicators specified in AASHTO TP 79. Questionable data not meeting the data quality indicators were deleted, and the repeatability and reproducibility statistics were recalculated. The following test for outliers was used when questionable data could not be explained by review of the data quality statistics (ASTM E178):

$$T_n = \frac{|x_n - \bar{x}|}{s} \quad (7)$$

where
T_n = test statistic,
x_n = most extreme value from the average,
$\bar{x}$ = laboratory average, and
s = within-laboratory standard deviation.

The critical value for T_n at the 0.5% significance level for three observations per laboratory was 1.155 (ASTM E178). Outliers determined using Equation 7 were deleted, and the repeatability and reproducibility statistics were recomputed.
4. **Evaluate trends in the repeatability and reproducibility statistics.** Plots of the repeatability and reproducibility standard deviations were used to identify trends in these statistics so that appropriate precision statements could be developed. For construction materials, coefficients of variation often provide a better measure of the variability in a test because the standard deviations increase with increasing values of the measured data.
5. **Develop appropriate precision statements.** The form of the precision statement depends on how replicate testing is specified in the test method. The repeatability and reproducibility standard deviations or coefficients of variation

determined by one of the study laboratories and conducted in accordance with ASTM E691 are estimates of the variability of individual test results on the same material. Usually precision statements are based on the acceptable difference between two test results, *d2s* (difference two sigma limit); however, when the test procedure requires multiple results to be averaged, the precision statements must be expressed in a different form. AASHTO TP 79 specifies reporting the average of multiple tests. For the average of multiple tests, the within-laboratory variability is expressed as a maximum range (difference between the highest and lowest result included in the average). The maximum difference depends on the repeatability standard deviation or coefficient of variation; the number of test results included in the average as listed in Table 3 (ASTM C670). For the average of multiple test results in two different laboratories, the reproducibility of the test method is expressed as the maximum allowable difference between the two group averages using either Equation 8 or 9 (ASTM C670).

Table 3. Multiplier of repeatability standard deviation or coefficient of variation.

Number of Test Results Included in the Average	Multiplier of Repeatability Standard Deviation or Coefficient of Variation
2	2.8
3	3.3
4	3.6
5	3.9
6	4.0
7	4.2
8	4.3
9	4.4
10	4.5

$$d2s = \frac{2.8(s_R)}{\sqrt{n}} \tag{8}$$

$$d2s\% = \frac{2.8(s_R\%)}{\sqrt{n}} \tag{9}$$

where

$d2s$ = allowable difference between average results reported by the two laboratories,
$d2s\%$ = allowable difference between the average results reported by the two laboratories expressed as a coefficient of variation,
s_R = reproducibility standard deviation from the interlaboratory study,
$s_R\%$ = reproducibility coefficient of variation from the interlaboratory study, and
n = number of test results averaged in each laboratory.

In addition to the normal interlaboratory analysis described previously, compactor type, air voids, and the time delay between specimen fabrication and testing were also analyzed to determine if these affected the results of the interlaboratory study. Graphical analysis was used to evaluate these effects.

CHAPTER 2

Results and Analysis

2.1 Dynamic Modulus Test

Dynamic modulus test results from the individual laboratories are presented in Appendix B for the loose mix samples and Appendix C for the prefabricated cores. The results from the loose mix samples and the prefabricated cores were analyzed separately following the methods described in ASTM E691. Consistency, repeatability, and reproducibility statistics computed from the individual test results are presented in Appendix D for the loose mix specimens and in Appendix E for the prefabricated cores. Each of these appendices contains separate analyses for the dynamic modulus and phase angle for each temperature and frequency combination. This resulted in 60 estimates of precision for the dynamic modulus and phase angle for each type of specimen. The sections that follow discuss the consistency, repeatability, and reproducibility statistics for the loose mix samples and the prefabricated cores.

2.1.1 Tests on Loose Mix Specimens

2.1.1.1 Consistency Statistics

The tests on the loose mix specimens represent the level of variability expected in practice. They include variability associated with specimen fabrication as well as testing. The dynamic modulus data included a total of 1,440 measurements of dynamic modulus and phase angle (8 labs × 5 temperature/confining pressure × 4 frequencies × 3 replicates × 3 materials). This provided 480 values of the consistency statistics. The consistency statistics indicated a high degree of consistency within and between laboratories. Table 4 summarizes the percentage of the consistency statistics that exceed the critical value. Considering that the critical values were selected at the 5% level of significance, meaning that one would expect them to be exceeded 5% of the time, the dynamic modulus test data are very consistent.

Figures 2 and 3 present plots of the average dynamic modulus and the pooled coefficient of variation of the dynamic modulus. The data in these figures represent the average for the three mixtures tested. Similar data for the average phase angle and pooled standard deviation of the phase angle are shown in Figures 4 and 5. The data in these figures are sorted in increasing value of the average modulus and phase angle so that trends will be more apparent. The following observations were made based on the consistency statistics and these figures.

- The trends of the average dynamic modulus and average phase angle are similar for the eight laboratories, indicating that temperature and frequency effects are similar in the eight laboratories.
- The spread in the dynamic modulus data between laboratories increases with decreasing modulus. The spread in the phase angle data between laboratories is about the same over the range of phase angles measured. The data quality statistics for the 40°C tests were reviewed, and it was determined that the data from Lab 4 and Lab 7 did not meet the AASHTO TP 79 requirement that the deformation drift be in the direction of the applied load for the unconfined tests at 0.01 and 0.1 Hz loading and for the confined tests at 0.01 Hz loading. This indicates that the gauge points are moving apart during the test. This issue was identified during the ruggedness testing, and a check on the direction of the deformation drift was added to the test procedure (*3*). Although the gauge point drift appears to have affected the measured dynamic moduli and phase angles for these conditions, the between-laboratory consistency statistic, *h*, did not flag this data as being significantly different. These data were, therefore, retained in developing the precision statements.
- The pooled coefficient of variation for the dynamic modulus is usually less than about 15%. The standard deviation of the phase angle is usually less than about 3°. When the variability of the dynamic modulus or phase angle measurements exceeded these values, the data were considered

Table 4. Summary of loose unconfined mix dynamic modulus test data consistency.

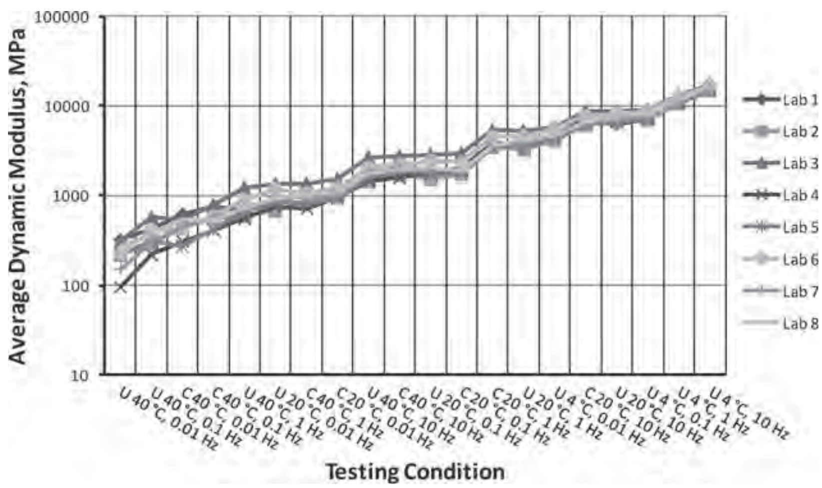
Property	Percent of Data Exceeding Critical Value	
	k (within-lab consistency)	*h* (between-lab consistency)
Dynamic modulus	3.3	1.2
Phase angle	3.8	0.2

suspect and were carefully reviewed to determine if the data should be included in computation of the repeatability and reproducibility statistics. The following data were eliminated as a result of this analysis:

- The 12.5-mm unconfined data at 4°C for Lab 4 because the data quality statistics did not comply with the levels specified in AASHTO TP 79 for all frequencies.
- The 25-mm confined data at 20°C for one sample from Lab 5 and Lab 6 because the data quality statistics did not comply with the levels specified in AASHTO TP 79 for all frequencies.

2.1.1.2 Repeatability and Reproducibility Statistics

Repeatability and reproducibility statistics for the dynamic modulus of the loose mix specimens are presented in Table 5. The variability associated with the dynamic modulus is a function of the stiffness of the specimen, generally increasing with decreasing stiffness as shown in Figures 6 and 7 for the repeatability and reproducibility coefficients of variation. Figure 6 shows that nominal maximum aggregate size affects the repeatability of the unconfined dynamic modulus



Note: In this and subsequent figures, U = unconfined and C = confined.

Figure 2. Average dynamic modulus measurements on specimens from loose mix.

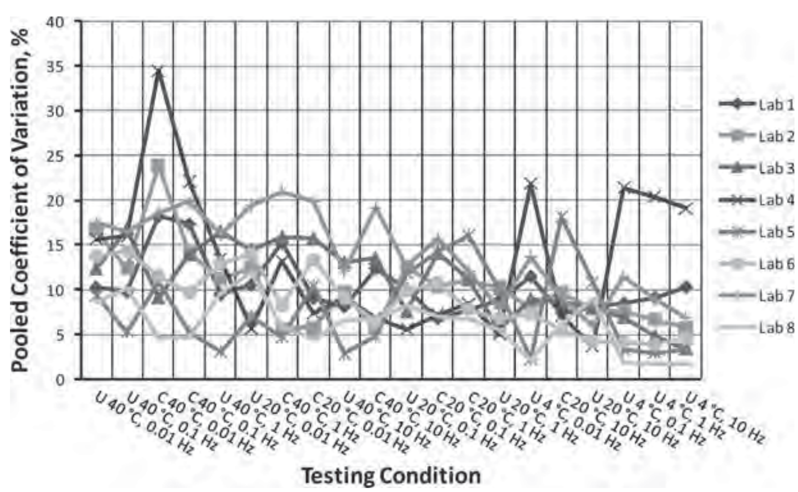


Figure 3. Pooled coefficient of variation for dynamic modulus measurements on specimens from loose mix.

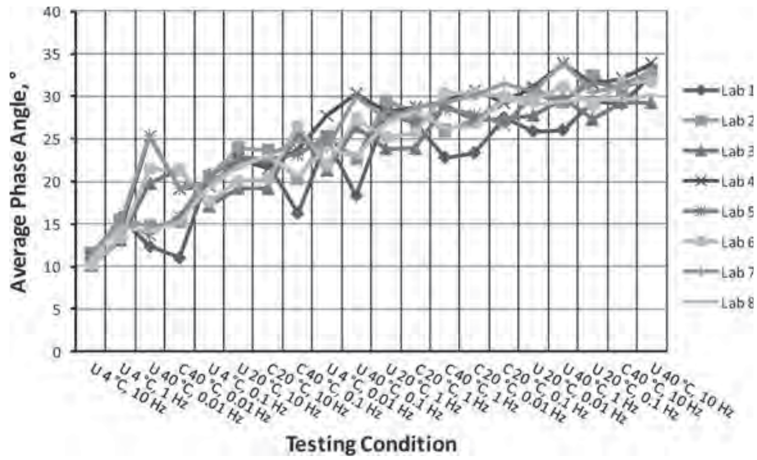


Figure 4. Average phase angle measurements for specimens from loose mix.

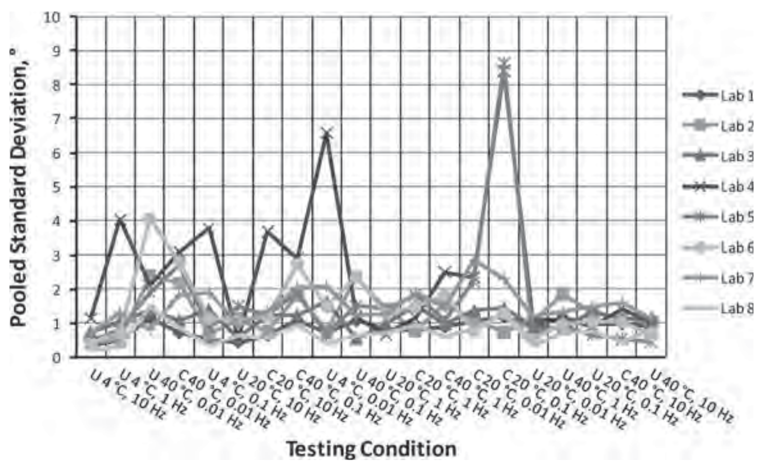
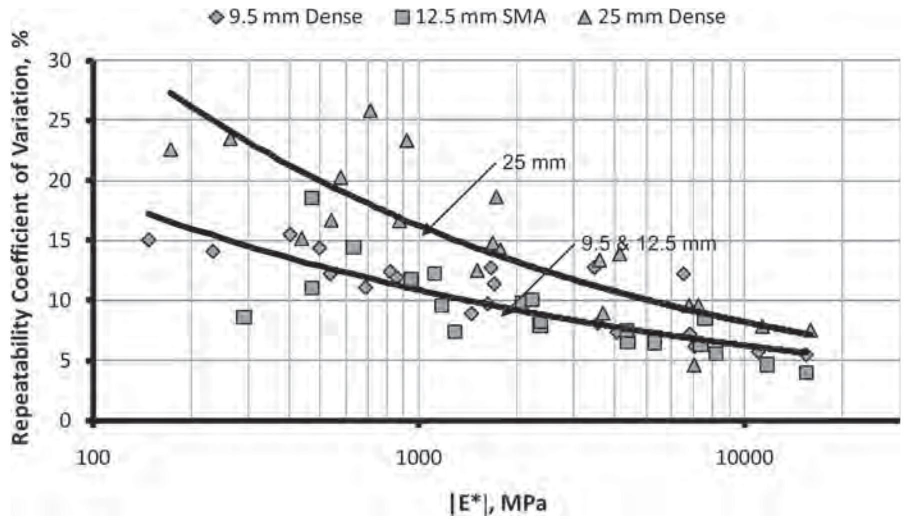


Figure 5. Pooled standard deviation for phase angle measurements on specimens from loose mix.

Table 5. Dynamic modulus repeatability and reproducibility statistics from loose mix specimens.

T, °C	f, Hz	Conf, kPa	9.5-mm Mixture					12.5-mm Mixture					25-mm Mixture				
			Avg |E*|, MPa	s_r, MPa	s_r%	S_R, MPa	s_R%	Avg |E*|, MPa	s_r, MPa	s_r%	S_R, MPa	s_R%	Avg |E*|, MPa	s_r, MPa	s_r%	S_R, MPa	s_R%
40	0.01	0	147.9	22.2	15.0	64.3	43.5	290.9	25.0	8.6	92.5	31.8	173.2	39.1	22.6	73.2	42.3
40	0.1	0	232.9	32.8	14.1	80.0	34.3	471.3	52.0	11.0	146.0	31.0	264.1	62.0	23.5	97.7	37.0
40	1	0	533.5	65.1	12.2	175.0	32.8	947.0	111.5	11.8	289.4	30.6	575.8	116.5	20.2	201.0	34.9
40	10	0	1448.9	129.0	8.9	393.6	27.2	2078.3	203.4	9.8	525.0	25.3	1509.5	188.5	12.5	404.2	26.8
20	0.01	0	685.6	75.9	11.1	179.6	26.2	1175.7	113.0	9.6	275.9	23.5	709.7	183.2	25.8	277.8	39.1
20	0.1	0	1626.9	158.3	9.7	385.8	23.7	2362.4	186.9	7.9	492.2	20.8	1685.1	249.3	14.8	523.0	31.0
20	1	0	3545.7	287.0	8.1	656.9	18.5	4386.3	285.5	6.5	722.7	16.5	3673.7	328.0	8.9	808.9	22.0
20	10	0	6788.6	488.9	7.2	822.2	12.1	7564.1	643.1	8.5	1023.9	13.5	6994.3	322.0	4.6	1157.1	16.5
4	0.01	0	4052.3	297.7	7.3	619.3	15.3	5299.0	342.6	6.5	761.1	14.4	4132.5	573.2	13.9	939.7	22.7
4	0.1	0	7034.0	434.9	6.2	775.4	11.0	8171.1	457.5	5.6	1029.5	12.6	7206.4	689.7	9.6	1210.5	16.8
4	1	0	11022.7	632.6	5.7	981.8	8.9	11698.3	543.5	4.6	1183.3	10.1	11322.8	886.0	7.8	1399.5	12.4
4	10	0	15455.3	848.1	5.5	1181.5	7.6	15453.0	614.5	4.0	1292.3	8.4	15914.3	1195.5	7.5	1556.1	9.8
40	0.01	69	401.7	62.2	15.5	120.4	30.0	469.6	87.1	18.5	170.8	36.4	436.7	66.1	15.1	121.5	27.8
40	0.1	69	494.8	71.0	14.4	132.2	26.7	630.7	91.1	14.4	189.0	30.0	538.9	89.8	16.7	154.9	28.7
40	1	69	816.1	101.1	12.4	168.7	20.7	1115.5	136.5	12.2	279.0	25.0	871.8	144.9	16.6	238.7	27.4
40	10	69	1702.0	193.7	11.4	324.2	19.0	2225.5	223.2	10.0	446.1	20.0	1777.9	252.6	14.2	473.7	26.6
20	0.01	69	854.5	101.7	11.9	197.8	23.1	1293.8	95.4	7.4	280.6	21.7	918.5	214.1	23.3	261.1	28.4
20	0.1	69	1663.3	211.4	12.7	419.4	25.2	2375.6	195.8	8.2	531.3	22.4	1729.1	321.8	18.6	462.5	26.8
20	1	69	3456.7	440.6	12.7	763.0	22.1	4371.1	327.4	7.5	790.9	18.1	3584.6	478.4	13.3	733.2	20.5
20	10	69	6492.8	792.3	12.2	1196.8	18.4	7327.4	463.1	6.3	1020.0	13.9	6741.7	644.8	9.6	973.2	14.4



Note: |E*| = dynamic modulus.

Figure 6. Loose mix dynamic modulus repeatability coefficient of variation.

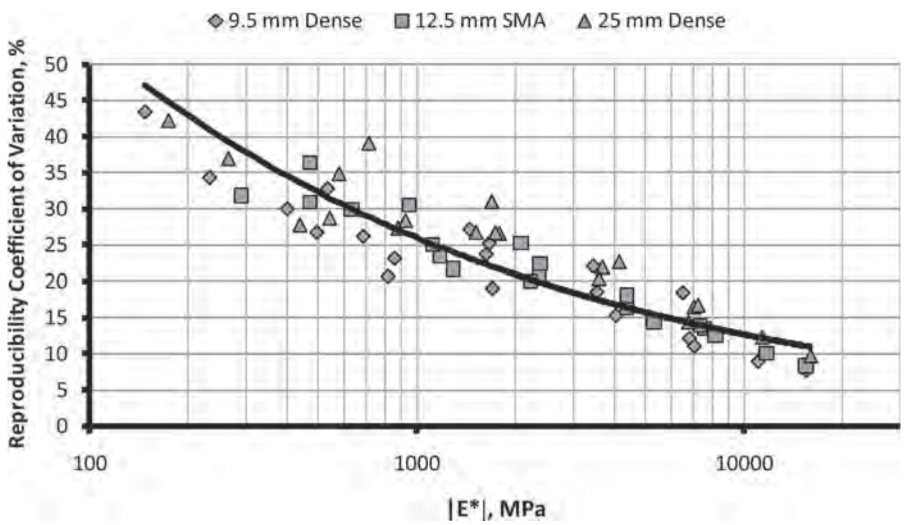


Figure 7. Loose mix unconfined modulus reproducibility coefficient of variation.

measurement, with the 25-mm mixture being less repeatable. The trend lines in Figure 6 show trends for the 25-mm mixture and the combined data from 9.5-mm and 12.5-mm mixtures. The reproducibility, shown in Figure 7, is similar for all mixtures.

Repeatability and reproducibility statistics for the phase angle of the loose mix specimens are presented in Table 6. The variability associated with the phase angle is also a function of the stiffness of the specimen, generally increasing with decreasing stiffness. Figures 8 and 9 present the repeatability and reproducibility standard deviations for the phase angle from the loose mix specimens. These figures show trends similar to the dynamic modulus, except that the effect of nominal maximum aggregate size is less apparent in the phase angle repeatability data. The trend lines in Figure 8 show trends for the 25-mm data and the combined 9.5-mm and 12.5-mm data.

2.1.2 Tests on Prefabricated Cores

2.1.2.1 Consistency Statistics

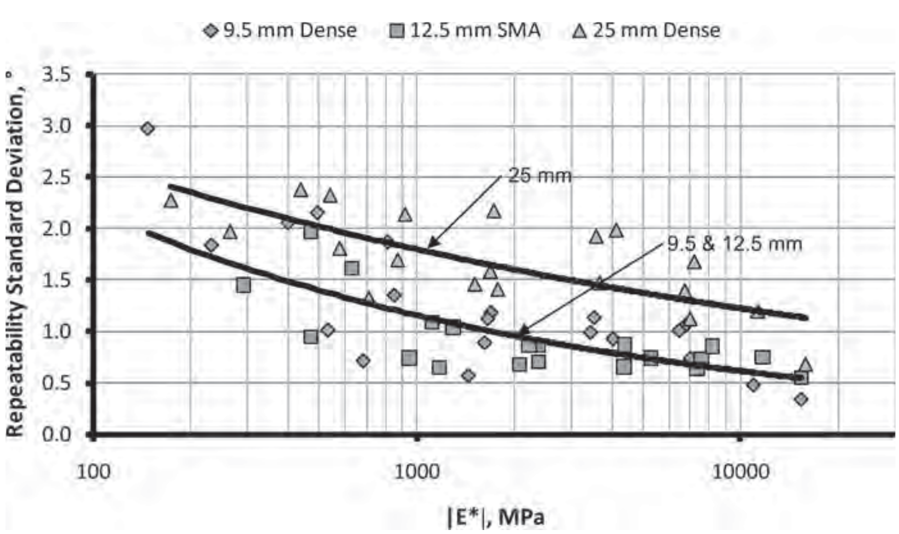
The AMPT interlaboratory study included the testing of prefabricated cores to determine whether specimen fabrication was a major contributor to the reproducibility of the dynamic modulus test. If specimen fabrication is not a major contributor to the between-laboratory variability, efforts to

Table 6. Phase angle repeatability and reproducibility statistics from loose mix specimens.

T, °C	Conf, kPa	f, Hz	9.5-mm Mixture				12.5-mm Mixture				25-mm Mixture			
			Avg |E*|, MPa	Avg Phase, °	s_r, °	S_R, °	Avg |E*|, MPa	Avg Phase, °	s_r, °	S_R, °	Avg |E*|, MPa	Avg Phase, °	s_r, °	S_R, °
40	0.01	0	147.9	17.4	3.0	7.1	290.9	20.1	1.5	4.0	173.2	15.9	2.3	8.1
40	0.1	0	232.9	25.5	1.8	5.3	471.3	25.3	0.9	3.2	264.1	24.1	2.0	6.0
40	1	0	533.5	32.1	1.0	3.2	947.0	29.2	0.7	2.0	575.8	31.0	1.8	4.0
40	10	0	1448.9	34.3	0.6	1.5	2078.3	29.8	0.7	1.7	1509.5	33.9	1.5	2.2
20	0.01	0	685.6	31.1	0.7	2.3	1175.7	27.8	0.6	1.6	709.7	30.6	1.3	2.4
20	0.1	0	1626.9	32.6	0.9	1.7	2362.4	27.7	0.9	1.8	1685.1	32.6	1.6	2.4
20	1	0	3545.7	29.7	1.1	2.1	4386.3	24.6	0.9	1.9	3673.7	29.7	1.5	2.6
20	10	0	6788.6	23.9	1.1	1.9	7564.1	19.9	0.7	1.5	6994.3	23.8	1.1	2.3
4	0.01	0	4052.3	26.6	0.9	1.7	5299.0	21.0	0.7	1.6	4132.5	27.1	2.0	2.7
4	0.1	0	7034.0	21.8	0.7	1.5	8171.1	17.3	0.9	1.6	7206.4	22.0	1.7	2.4
4	1	0	11022.7	16.3	0.5	1.1	11698.3	13.4	0.8	1.2	11322.8	16.3	1.2	1.7
4	10	0	15455.3	11.9	0.3	0.6	15453.0	10.1	0.5	0.8	15914.3	11.8	0.7	1.0
40	0.01	69	401.7	14.7	2.1	3.9	469.6	19.9	2.0	4.0	436.7	14.7	2.4	5.2
40	0.1	69	494.8	21.6	2.2	4.3	630.7	24.1	1.6	3.4	538.9	21.0	2.3	5.0
40	1	69	816.1	28.0	1.9	3.4	1115.5	27.8	1.1	2.6	871.8	27.2	1.7	3.5
40	10	69	1702.0	32.4	1.2	1.5	2225.5	29.0	0.9	1.7	1777.9	32.0	1.4	1.7
20	0.01	69	854.5	28.7	1.3	2.4	1293.8	26.9	1.0	2.6	918.5	28.6	2.1	3.6
20	0.1	69	1663.3	31.6	1.1	1.6	2375.6	27.4	0.7	2.0	1729.1	31.8	2.2	2.6
20	1	69	3456.7	29.7	1.0	1.8	4371.1	24.5	0.7	1.9	3584.6	29.9	1.9	2.4
20	10	69	6492.8	24.2	1.0	1.9	7327.4	20.0	0.6	1.7	6741.7	24.3	1.4	2.1

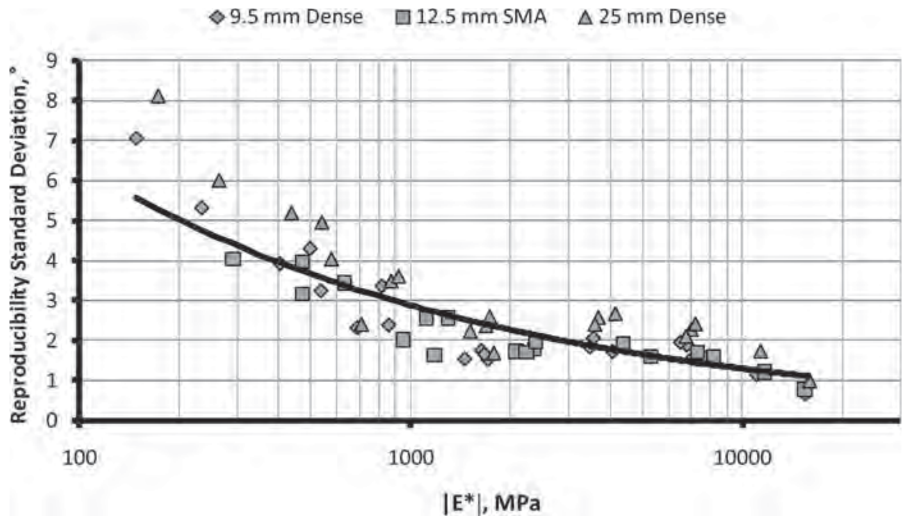
reduce variability in dynamic modulus testing with the AMPT should be directed at further refinement of the AMPT equipment and procedures. If specimen fabrication is a major contributor, then efforts to improve dynamic modulus testing in the AMPT should be directed at further standardization of specimen fabrication procedures. The dynamic modulus and phase angle data from the tests on the prefabricated cores were analyzed in the same manner as described previously for the loose mix specimens.

As with the loose mix specimens, the consistency statistics for the tests on the prefabricated cores indicated a high degree of consistency both within and between laboratories. The dynamic



Note: The variability of the phase angle was found to be a function of the dynamic modulus.

Figure 8. Loose mix phase angle repeatability standard deviation.



Note: The variability of the phase angle was found to be a function of the dynamic modulus.

Figure 9. Loose mix phase angle reproducibility standard deviation.

modulus tests on the prefabricated cores also included 1,440 measurements of dynamic modulus and phase angle and the computation of 480 consistency statistics. Table 7 summarizes the percentage of the consistency statistics that exceed the critical value. Considering that the critical values were selected at the 5% level of significance, meaning that one would expect them to be exceeded 5% of the time, the dynamic modulus test data are very consistent.

Figures 10 and 11 present plots of the average dynamic modulus and the pooled coefficient of variation of the dynamic modulus. The data in these figures represent the average for the three mixtures tested. Similar data for the average phase angle and pooled standard deviation of the phase angle are shown in Figures 12 and 13. The data in these figures are ordered from lowest to highest dynamic modulus or phase angle so that the trends for each laboratory are more apparent. The following observations were made based on the consistency statistics and these figures.

- The trends of the average dynamic modulus and average phase angle are similar for the eight laboratories, indicating that temperature and frequency effects are similar in the eight laboratories.
- There is a tighter spread in the average dynamic modulus and phase angle measurements for the prefabricated cores compared to the loose mix specimens. This indicates that specimen fabrication is likely a significant contributor to the between-laboratory variability in the dynamic modulus test.
- The lower modulus values from Lab 4 and 7 for the 0.01 and 0.1 Hz tests at 40°C are more clearly evident in the prefabricated core data. As with the data from the loose mix specimens, the drift in these tests was not in the direction of the applied load, indicating gauge point drift. Although the gauge point drift affected the data for these conditions, the between-laboratory consistency statistic, *h,* did not flag this data as being significantly different. These data were, therefore, retained in the analysis.
- The variability of the dynamic modulus and phase angle has similar magnitude to those of the tests on the loose mix specimens: dynamic modulus usually less than about 15% and standard deviation of the phase angle usually less than about 3°. When the variability of the dynamic modulus or phase angle measurements exceeded these values, the data were considered suspect and were carefully reviewed to determine if the data should be included in computation of the repeatability and reproducibility statistics. None of the data were excluded because all of the data quality statistics complied with the limits specified in AASHTO TP 79 and the test for outliers did not identify any result as an outlier.

Table 7. Summary of prefabricated core dynamic modulus test data consistency.

Property	**Percent of Data Exceeding Critical Value**	
	k (within-lab consistency)	*h* (between-lab consistency)
Dynamic modulus	3.1	2.1
Phase angle	4.6	0.6

2.1.2.2 Repeatability and Reproducibility Statistics

Repeatability and reproducibility statistics for the dynamic modulus and phase angle for the prefabricated cores are presented in Tables 8 and 9, respectively. The prefabricated core

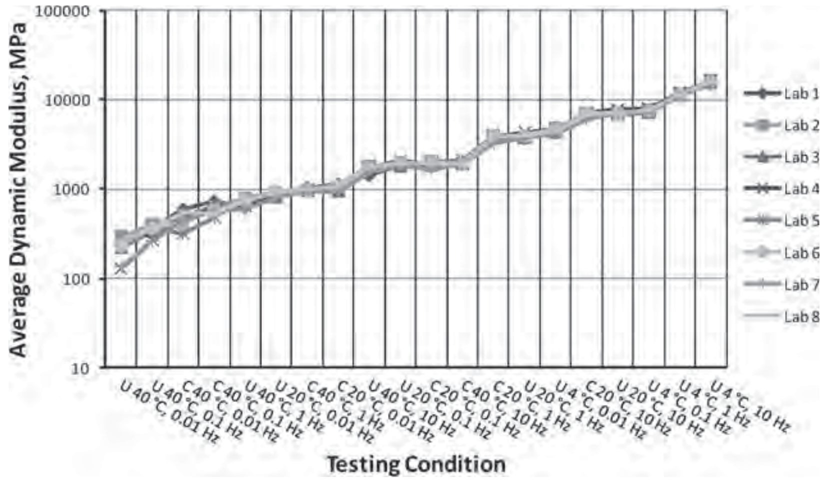


Figure 10. Average dynamic modulus for prefabricated cores.

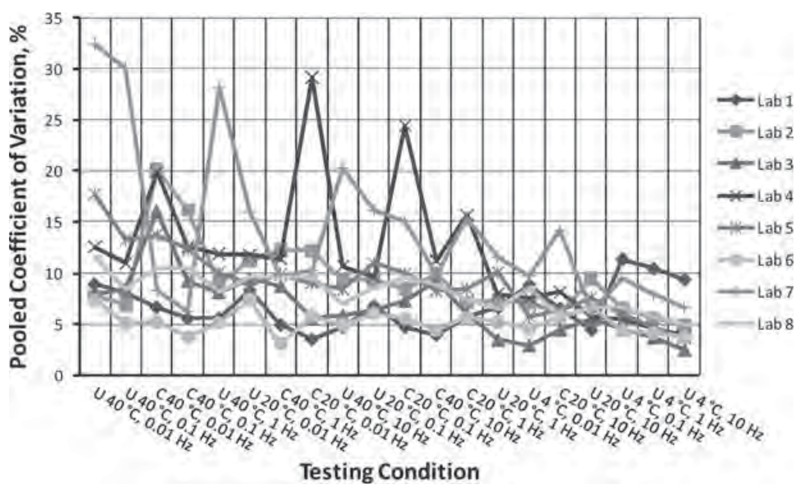


Figure 11. Pooled coefficient of variation for dynamic modulus measurements on prefabricated cores.

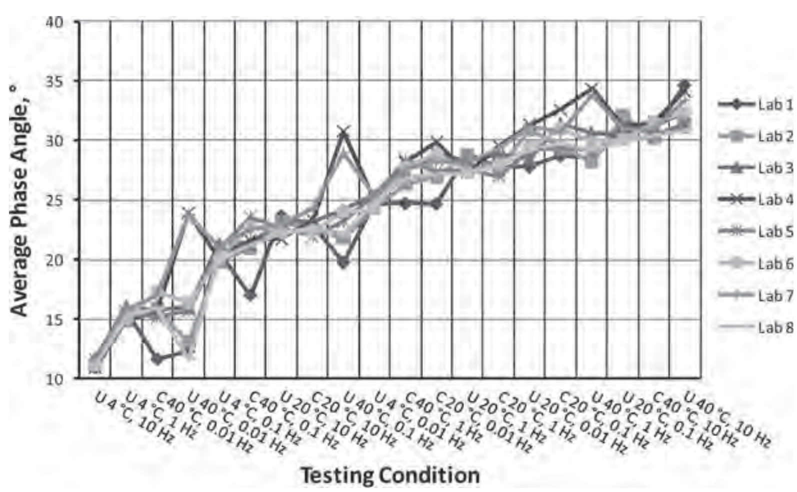


Figure 12. Average phase angle for prefabricated cores.

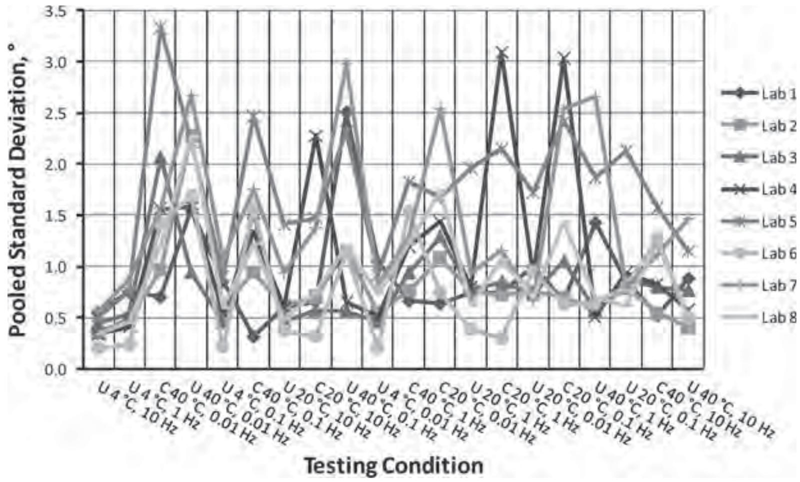


Figure 13. Pooled standard deviation for phase angle measurements on prefabricated cores.

within- and between-lab variability have trends that are similar to the loose mix data. Figures 14 and 15 present the repeatability and reproducibility coefficients of variation for the dynamic modulus. As with the loose mix data, the variability of the dynamic modulus increases with decreasing specimen stiffness. The effect of nominal maximum aggregate size is less evident in the repeatability of the dynamic modulus of the prefabricated cores than it is for the loose mix specimens, as shown in Figure 14. The trend lines shown are for the 25-mm mixture and for the combined data from the 9.5-mm and 12.5-mm mixtures. The reproducibility of the dynamic modulus of the prefabricated cores, shown in Figure 15, is similar for all mixtures. The variability for the phase angle measurement on the prefabricated cores is shown in Figures 16 and 17. The repeatability standard deviation shown in Figure 16 and the reproducibility standard deviation

Table 8. Dynamic modulus repeatability and reproducibility statistics from prefabricated cores.

T, °C	f, Hz	Conf, kPa	9.5-mm Mixture					12.5-mm Mixture					25-mm Mixture				
			Avg |E*|, MPa	s_r, MPa	s_r%	s_R, MPa	s_R%	Avg |E*|, MPa	s_r, MPa	s_r%	s_R, MPa	s_R%	Avg |E*|, MPa	s_r, MPa	s_r%	s_R, MPa	s_R%
40	0.01	0	144.9	27.8	19.2	51.0	35.2	299.2	23.5	7.9	73.5	24.6	159.9	39.5	24.7	73.9	46.2
40	0.1	0	207.8	32.8	15.8	48.0	23.1	466.1	43.0	9.2	73.9	15.9	217.8	41.6	19.1	70.6	32.4
40	1	0	467.5	50.3	10.8	76.9	16.5	929.4	99.1	10.7	134.1	14.4	470.7	66.8	14.2	95.0	20.2
40	10	0	1309.5	91.6	7.0	165.8	12.7	2056.1	199.2	9.7	245.7	11.9	1319.8	149.0	11.3	166.9	12.6
20	0.01	0	562.8	65.5	11.6	63.6	11.3	1181.0	113.4	9.6	130.1	11.0	559.7	57.9	10.3	84.8	15.2
20	0.1	0	1402.7	157.5	11.2	142.2	10.1	2381.1	219.1	9.2	244.1	10.3	1410.6	117.2	8.3	188.6	13.4
20	1	0	3257.0	288.2	8.8	266.6	8.2	4441.0	335.1	7.5	367.3	8.3	3325.1	221.0	6.6	396.2	11.9
20	10	0	6407.0	406.5	6.3	389.5	6.1	7762.5	504.5	6.5	556.9	7.2	6751.8	488.4	7.2	583.2	8.6
4	0.01	0	3720.7	238.6	6.4	256.9	6.9	5145.0	337.3	6.6	393.8	7.7	3772.9	344.3	9.1	374.0	9.9
4	0.1	0	6656.5	401.5	6.0	402.5	6.0	8046.5	556.1	6.9	582.1	7.2	6954.8	580.2	8.3	601.2	8.6
4	1	0	10762.5	514.3	4.8	500.5	4.7	11638.9	722.1	6.2	742.5	6.4	11315.7	797.5	7.0	842.5	7.4
4	10	0	15420.3	570.1	3.7	561.2	3.6	15461.2	834.3	5.4	864.0	5.6	16175.7	1000.5	6.2	1065.0	6.6
40	0.01	69	397.1	21.9	5.5	89.5	22.5	526.1	85.3	16.2	126.7	24.1	408.2	35.8	8.8	77.4	19.0
40	0.1	69	469.1	27.5	5.9	82.9	17.7	702.3	77.9	11.1	112.3	16.0	485.0	39.4	8.1	84.6	17.5
40	1	69	734.4	47.1	6.4	54.4	7.4	1197.0	110.5	9.2	105.4	8.8	759.8	68.5	9.0	67.7	8.9
40	10	69	1522.3	110.5	7.3	118.9	7.8	2315.4	189.6	8.2	177.4	7.7	1580.2	161.2	10.2	146.3	9.3
20	0.01	69	765.0	70.3	9.2	86.8	11.3	1289.4	167.6	13.0	182.7	14.2	779.0	73.7	9.5	88.6	11.4
20	0.1	69	1450.0	151.3	10.4	238.6	16.5	2377.4	276.4	11.6	272.1	11.4	1470.3	176.2	12.0	169.7	11.5
20	1	69	3117.1	319.3	10.2	557.2	17.9	4388.3	391.1	8.9	365.5	8.3	3216.6	325.3	10.1	326.1	10.1
20	10	69	6122.2	562.6	9.2	951.1	15.5	7421.2	467.9	6.3	444.0	6.0	6451.1	522.1	8.1	514.5	8.0

Table 9. Phase angle repeatability and reproducibility statistics from prefabricated cores.

T, °C	Conf, kPa	f, Hz	9.5-mm Mixture				12.5-mm Mixture				25-mm Mixture			
			Avg |E*|, MPa	Avg Phase, °	s_r, °	S_R, °	Avg |E*|, MPa	Avg Phase, °	s_r, °	S_R, °	Avg |E*|, MPa	Avg Phase, °	s_r, °	S_R, °
40	0.01	0	144.9	14.1	2.3	5.9	299.2	19.3	1.4	4.1	159.9	13.8	2.6	7.1
40	0.1	0	207.8	24.3	2.2	4.2	466.1	24.9	1.1	3.2	217.8	23.2	2.3	5.8
40	1	0	467.5	32.2	1.8	2.9	929.4	29.1	0.9	2.0	470.7	31.5	1.5	3.8
40	10	0	1309.5	35.2	0.9	1.7	2056.1	29.9	0.8	1.9	1319.8	35.1	0.9	1.6
20	0.01	0	562.8	31.6	0.9	1.9	1181.0	27.9	0.8	1.2	559.7	31.2	1.2	2.2
20	0.1	0	1402.7	33.7	1.4	1.3	2381.1	27.6	0.9	1.1	1410.6	34.0	1.1	1.4
20	1	0	3257.0	31.0	1.4	1.3	4441.0	24.5	0.8	1.2	3325.1	31.7	0.6	1.0
20	10	0	6407.0	25.1	1.1	1.0	7762.5	19.9	0.6	1.0	6751.8	25.7	0.5	1.1
4	0.01	0	3720.7	27.8	0.7	1.0	5145.0	21.5	0.6	0.7	3772.9	28.7	0.8	1.0
4	0.1	0	6656.5	23.0	0.8	1.0	8046.5	17.7	0.6	0.8	6954.8	23.5	0.9	0.9
4	1	0	10762.5	17.2	0.7	0.8	11638.9	13.6	0.5	0.7	11315.7	17.3	0.7	0.7
4	10	0	15420.3	12.5	0.5	0.5	15461.2	10.1	0.4	0.5	16175.7	12.4	0.4	0.4
40	0.01	69	397.1	12.2	1.2	1.9	526.1	18.8	1.7	2.8	408.2	12.4	2.4	2.8
40	0.1	69	469.1	19.3	1.6	3.3	702.3	23.4	1.3	2.7	485.0	19.3	1.8	2.1
40	1	69	734.4	26.7	1.0	2.0	1197.0	27.3	1.1	1.9	759.8	27.1	1.7	2.0
40	10	69	1522.3	32.6	0.8	1.0	2315.4	28.8	0.9	1.1	1580.2	33.4	1.4	1.3
20	0.01	69	765.0	28.2	2.0	2.6	1289.4	27.0	1.0	2.0	779.0	28.8	1.7	2.3
20	0.1	69	1450.0	32.5	2.0	2.3	2377.4	27.6	1.6	2.1	1470.3	33.8	1.9	2.1
20	1	69	3117.1	31.1	1.0	1.3	4388.3	24.7	1.7	1.8	3216.6	32.3	1.7	1.5
20	10	69	6122.2	25.5	1.0	1.8	7421.2	20.0	1.2	1.2	6451.1	26.1	1.3	1.2

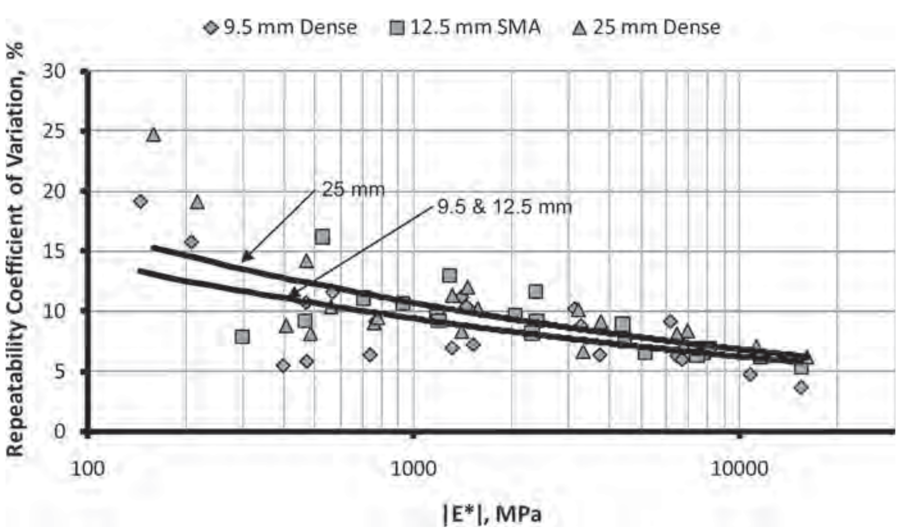


Figure 14. Prefabricated core dynamic modulus repeatability coefficient of variation.

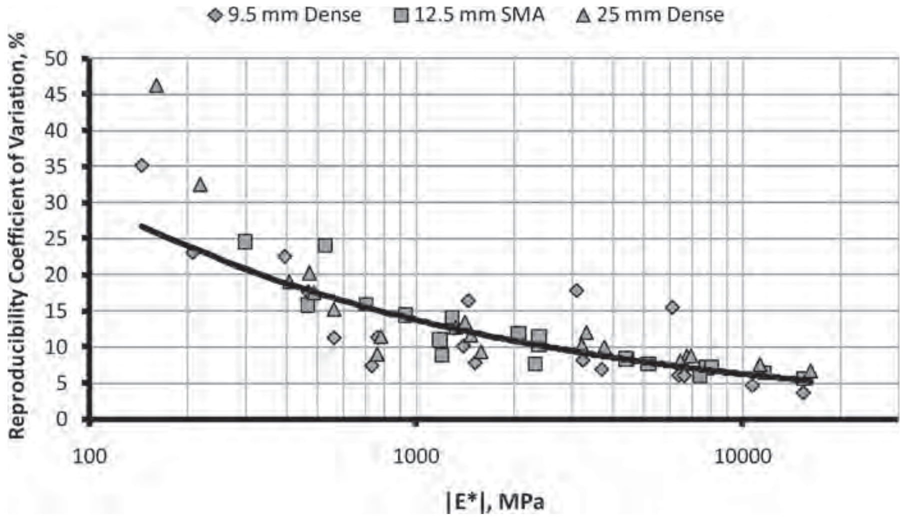
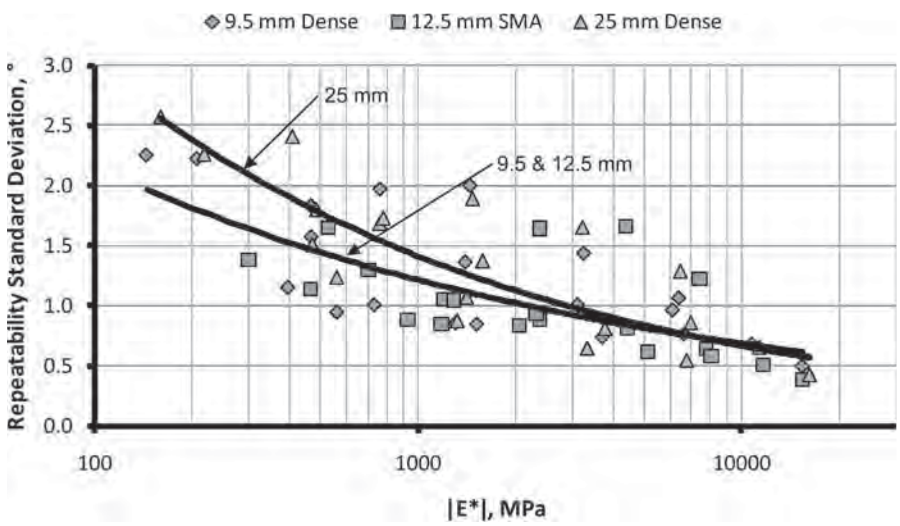
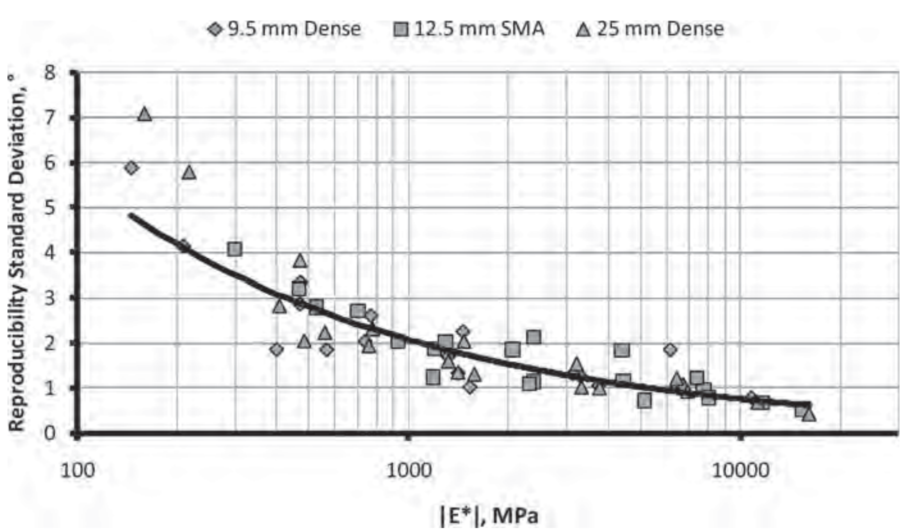


Figure 15. Prefabricated core dynamic modulus reproducibility coefficient of variation.



Note: The variability of the phase angle was found to be a function of the dynamic modulus.

Figure 16. Prefabricated core phase angle repeatability standard deviation.



Note: The variability of the phase angle was found to be a function of the dynamic modulus.

Figure 17. Prefabricated core phase angle reproducibility standard deviation.

shown in Figure 17 have trends that are also similar to those of the loose mix data. Both the repeatability and reproducibility of the phase angle improve with increasing mixture stiffness. The repeatability is poorer for the 25-mm mixture. The reproducibility is similar for the three mixtures.

2.1.3 Comparison of Loose Mix and Prefabricated Core Data

As discussed earlier, the prefabricated cores were included in the AMPT interlaboratory study to determine whether specimen fabrication was a major contributor to the reproducibility of the test. Figures 18 and 19 compare the repeatability and reproducibility statistics for the dynamic modulus for the loose mix and prefabricated core results. Figure 18 shows that the repeatability is similar for the prefabricated cores and the loose mix specimens. Figure 19, on the other hand, shows that the reproducibility is better for the prefabricated cores.

Figure 20 compares the repeatability and reproducibility of the prefabricated cores. Except for the low stiffness levels, the repeatability and reproducibility for the prefabricated cores are nearly the same. This indicates that specimen fabrication is a major source of the between-laboratory variability in the dynamic modulus test. The poorer reproducibility compared to the repeatability for low stiffness levels is probably the result of gauge point drift.

Figures 21 through 23 show similar comparisons between the prefabricated cores and the loose mix specimens for the phase angle. Figure 21 shows that the repeatability of the phase

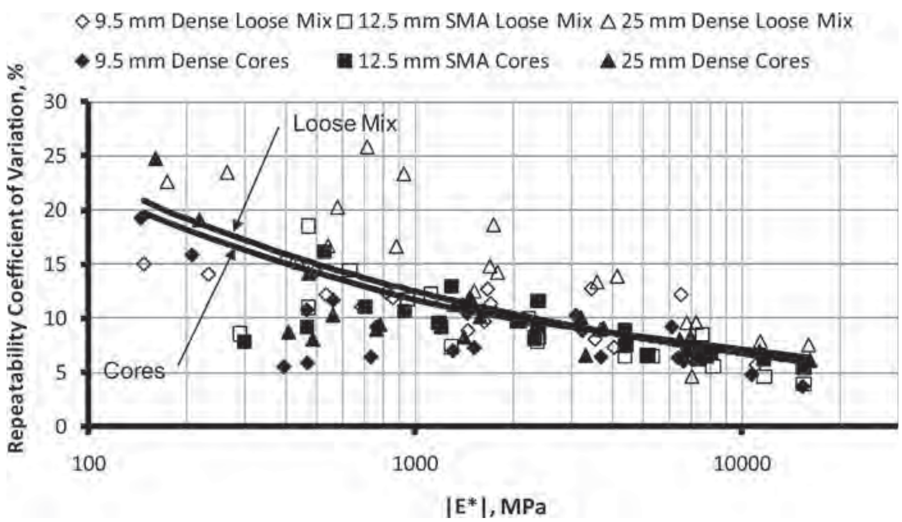


Figure 18. Comparison of dynamic modulus repeatability for prefabricated cores and loose mix specimens.

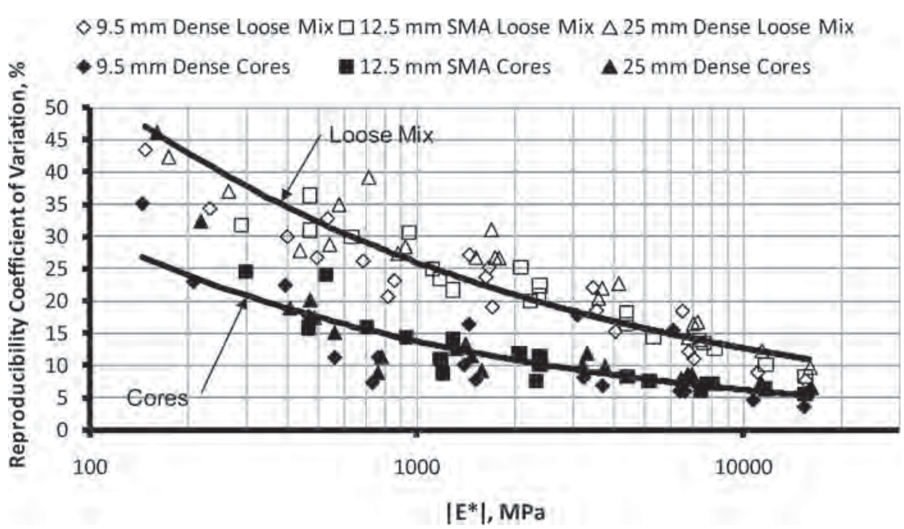


Figure 19. Comparison of dynamic modulus reproducibility for prefabricated cores and loose mix specimens.

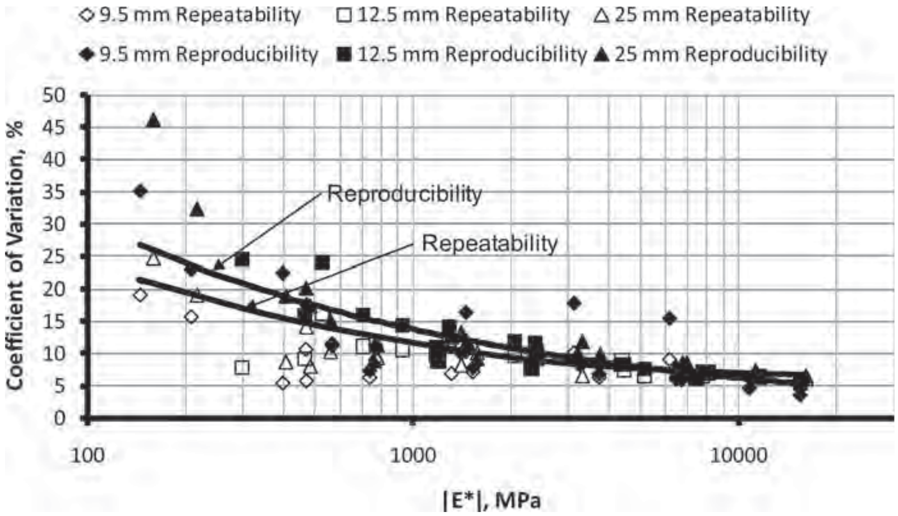
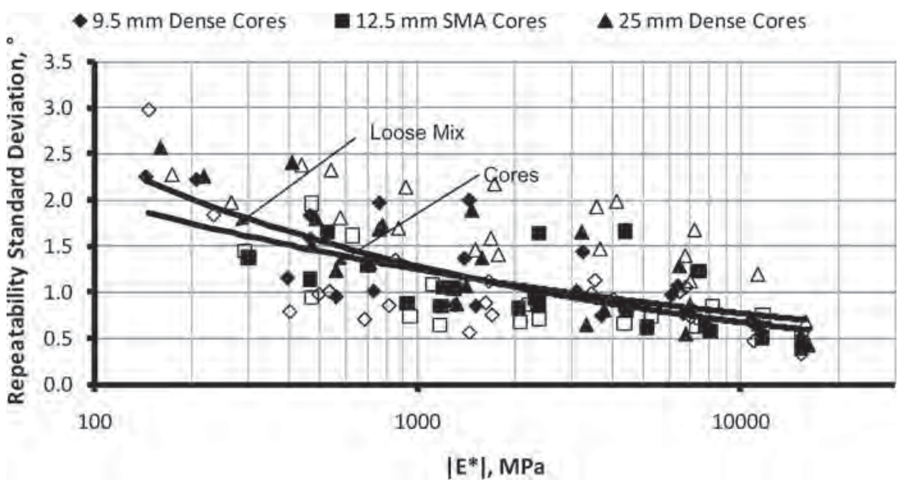
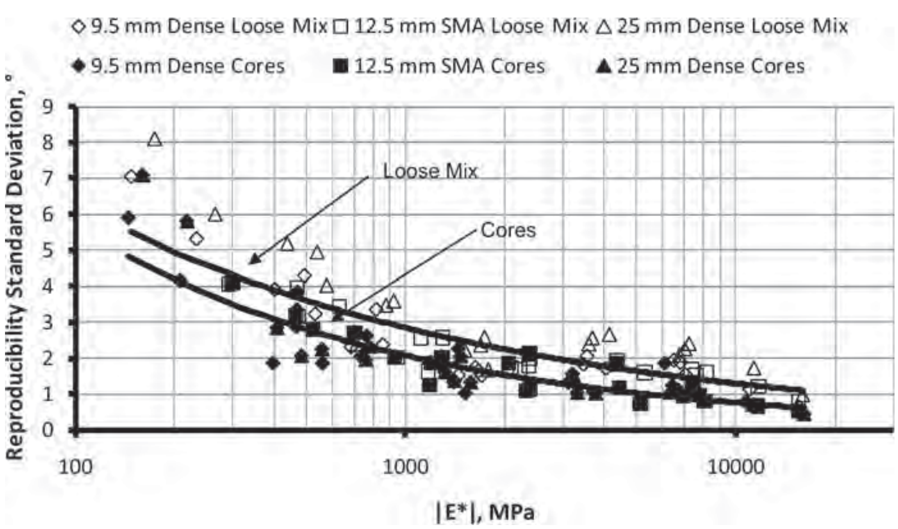


Figure 20. Comparison of dynamic modulus repeatability and reproducibility for prefabricated cores.



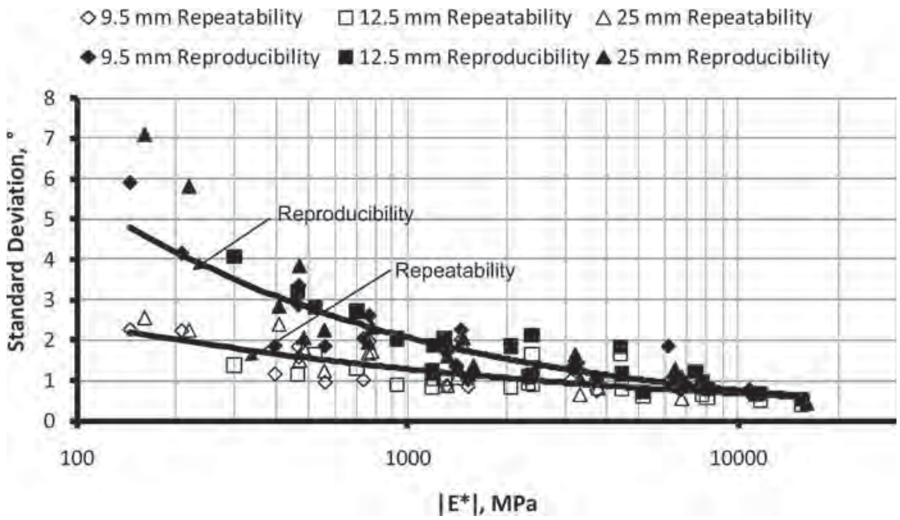
Note: The variability of the phase angle was found to be a function of the dynamic modulus.

Figure 21. Comparison of phase angle repeatability for prefabricated cores and loose mix specimens.



Note: The variability of the phase angle was found to be a function of the dynamic modulus.

Figure 22. Comparison of phase angle reproducibility for prefabricated cores and loose mix specimens.



Note: The variability of the phase angle was found to be a function of the dynamic modulus.

Figure 23. Comparison of phase angle repeatability and reproducibility for prefabricated cores.

angle is the same for the prefabricated cores and the loose mix specimens. The reproducibility of the phase angle, shown in Figure 22, is a little better for the prefabricated cores compared to the loose mix specimens. Figure 23 compares the repeatability and reproducibility of the phase angle for the prefabricated cores. As with the modulus, the repeatability and reproducibility are the same except at low stiffness levels where gauge point drift is a contributor to the reproducibility of the prefabricated cores.

2.1.4 Final Repeatability and Reproducibility Statistics

2.1.4.1 Repeatability

Since the repeatability coefficients of variation are similar for the prefabricated cores and the loose mix specimens, these data were pooled to compute the final repeatability statistics for the dynamic modulus and phase angle. The final repeatability statistics are summarized in Table 10. Figure 24 and Figure 25 show the effect of specimen stiffness and nominal maximum aggregate size on the repeatability statistics for the dynamic modulus and phase angle, respectively. Equations 10 and 11 are best-fit relationships that quantify these effects and provide equations for the development of precision statements that account for nominal maximum aggregate size and specimen stiffness effects. The fitted lines derived from Equations 10 and 11 are shown in Figures 24 and 25 for nominal maximum aggregate sizes of 9.5, 12.5, and 25 mm. The explained variance is 77% for the dynamic modulus repeatability coefficient of variation and 65% of the phase angle repeatability standard deviation.

$$s_r\% = \left[29.8e^{(0.014\times NMAS)}\right]\times|E^*|^{-\left[0.189e^{(0.012\times NMAS)}\right]} \qquad R^2 = 0.77 \qquad (10)$$

where

$s_r\%$ = repeatability coefficient of variation for $|E^*|$, %,
$NMAS$ = nominal maximum aggregate size, mm, and
$|E^*|$ = average dynamic modulus, MPa.

$$s_r = \left[4.67e^{(0.022\times NMAS)}\right]\times|E^*|^{-0.23} \qquad R^2 = 0.65 \qquad (11)$$

where

s_r = repeatability coefficient of variation for phase angle, °,
$NMAS$ = nominal maximum aggregate size, mm, and
$|E^*|$ = average dynamic modulus, MPa.

2.1.4.2 Reproducibility

The final reproducibility statistics are those from the tests on the loose mix specimens because the dynamic modulus test includes specimen fabrication. Table 11 presents the final reproducibility statistics for the dynamic modulus and phase angle. The reproducibility statistics are only a function of specimen stiffness as shown in Figure 26 for the dynamic modulus reproducibility coefficient of variation and Figure 27 for the phase angle reproducibility standard deviation. Equations 12 and 13 are best-fit relationships that quantify the specimen stiffness effects and provide equations for the development of precision statements. The explained variance is 84% for the dynamic modulus reproducibility coefficient of variation and 72% of the phase angle repeatability standard deviation.

Table 10. Final dynamic modulus and phase angle repeatability statistics.

T, °C	f, Hz	Conf, kPa	9.5-mm Dense					12.5-mm SMA					25-mm Dense				
			Modulus			Phase Angle		Modulus			Phase Angle		Modulus			Phase Angle	
			Avg, MPa	s_r, MPa	s_r %	Avg, °	s_r, °	Avg, MPa	s_r, MPa	s_r %	Avg, °	s_r, °	Avg, MPa	s_r, MPa	s_r %	Avg, °	s_r, °
40	0.01	0	145.8	25.4	17.4	15.8	2.6	295.1	24.3	8.2	19.7	1.4	166.5	39.3	23.6	14.8	2.4
40	0.1	0	220.3	32.8	14.9	24.9	2.0	468.7	47.7	10.2	25.1	1.0	240.9	52.8	21.9	23.6	2.1
40	1	0	500.5	58.2	11.6	32.1	1.5	938.2	105.5	11.2	29.2	0.8	523.3	95.0	18.2	31.2	1.7
40	10	0	1379.2	111.9	8.1	34.7	0.7	2067.2	201.3	9.7	29.9	0.8	1414.6	169.9	12.0	34.5	1.2
20	0.01	0	624.2	70.9	11.4	31.4	0.8	1178.4	113.2	9.6	27.9	0.8	634.7	135.8	21.4	30.9	1.3
20	0.1	0	1514.8	157.9	10.4	33.2	1.2	2371.8	203.6	8.6	27.6	0.9	1547.9	194.8	12.6	33.3	1.4
20	1	0	3401.3	287.6	8.5	30.3	1.3	4413.7	311.3	7.1	24.5	0.8	3499.4	279.6	8.0	30.7	1.1
20	10	0	6597.8	449.6	6.8	24.5	1.1	7663.3	578.0	7.5	19.9	0.7	6873.0	413.6	6.0	24.8	0.9
4	0.01	0	3886.5	269.8	6.9	27.2	0.8	5222.0	340.0	6.5	21.3	0.7	3952.7	472.8	12.0	27.9	1.5
4	0.1	0	6845.3	418.5	6.1	22.4	0.7	8108.8	509.2	6.3	17.5	0.7	7080.6	637.3	9.0	22.8	1.3
4	1	0	10892.6	576.5	5.3	16.8	0.6	11668.6	639.1	5.5	13.5	0.6	11319.3	842.9	7.4	16.8	1.0
4	10	0	15437.8	722.6	4.7	12.2	0.4	15457.1	732.7	4.7	10.1	0.5	16045.0	1102.3	6.9	12.1	0.6
40	0.01	69	399.4	46.6	11.7	13.2	1.0	497.8	86.2	17.3	19.3	1.8	422.5	53.2	12.6	13.6	2.4
40	0.1	69	481.9	53.9	11.2	20.2	1.3	666.5	84.8	12.7	23.8	1.5	511.9	69.4	13.5	20.1	2.1
40	1	69	775.2	78.9	10.2	27.2	0.9	1156.2	124.1	10.7	27.6	1.1	815.8	113.3	13.9	27.1	1.7
40	10	69	1612.1	157.7	9.8	32.4	0.8	2270.4	207.1	9.1	28.9	0.9	1679.0	211.9	12.6	32.7	1.4
20	0.01	69	809.7	87.4	10.8	28.5	1.7	1291.6	136.3	10.6	26.9	1.0	848.7	160.1	18.9	28.7	1.9
20	0.1	69	1556.7	183.8	11.8	32.0	1.6	2376.5	239.5	10.1	27.5	1.3	1599.7	259.4	16.2	32.8	2.0
20	1	69	3286.9	384.7	11.7	30.4	1.0	4379.7	360.7	8.2	24.6	1.3	3400.6	409.1	12.0	31.1	1.8
20	10	69	6307.5	687.1	10.9	24.9	1.0	7374.3	465.5	6.3	20.0	1.0	6596.4	586.6	8.9	25.2	1.3

$$s_r\% = 223.81 \times |E^*|^{-0.312} \qquad R^2 = 0.82 \qquad (12)$$

where

$s_R\%$ = reproducibility coefficient of variation for $|E^*|$, %, and

$|E^*|$ = average dynamic modulus, MPa.

$$s_R = 31.4 \times |E^*|^{-0.346} \qquad R^2 = 0.72 \qquad (13)$$

where

s_R = reproducibility standard deviation for phase angle, °, and

$|E^*|$ = average dynamic modulus, MPa.

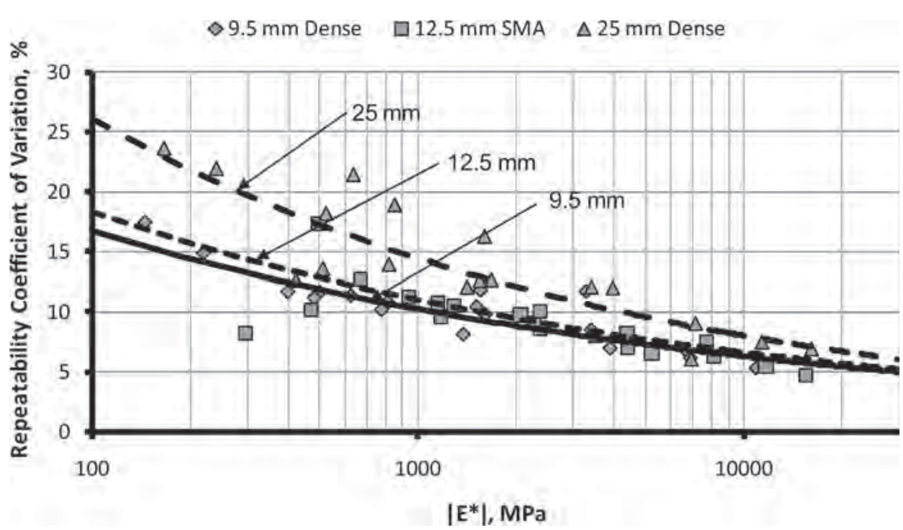
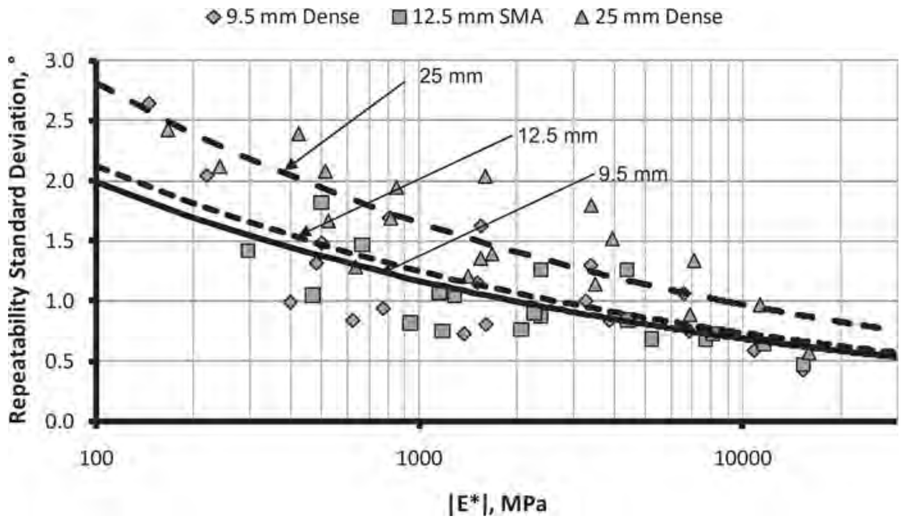


Figure 24. Final dynamic modulus repeatability coefficient of variation.



Note: The variability of the phase angle was found to be a function of the dynamic modulus.

Figure 25. Final phase angle repeatability standard deviation.

2.1.5 Precision Statements

The final repeatability and reproducibility statistics presented in the preceding section are estimates of the variability of individual test results on the same material. Usually precision statements are based on the acceptable difference between two test results, *d2s* (difference two sigma limit); however, when the test procedure requires multiple results to be averaged, the precision statements must be expressed in a different form. AASHTO TP 79 specifies reporting the average of multiple tests. For the average of multiple tests, the within-laboratory variability is expressed as a maximum range

Table 11. Final dynamic modulus and phase angle reproducibility statistics.

T, °C	f, Hz	Conf, kPa	9.5-mm Dense					12.5-mm SMA					25-mm Dense				
			Modulus			Phase Angle		Modulus			Phase Angle		Modulus			Phase Angle	
			Avg, MPa	s_R, MPa	s_R %	Avg, °	s_R, °	Avg, MPa	s_R, MPa	s_R %	Avg, °	s_R, °	Avg, MPa	s_R, MPa	s_R %	Avg, °	s_R, °
40	0.01	0	147.9	64.3	43.5	17.4	7.1	290.9	92.5	31.8	20.1	4.0	173.2	73.2	42.3	15.9	8.1
40	0.1	0	232.9	80.0	34.3	25.5	5.3	471.3	146.0	31.0	25.3	3.2	264.1	97.7	37.0	24.1	6.0
40	1	0	533.5	175.0	32.8	32.1	3.2	947.0	289.4	30.6	29.2	2.0	575.8	201.0	34.9	31.0	4.0
40	10	0	1448.9	393.6	27.2	34.3	1.5	2078.3	525.0	25.3	29.8	1.7	1509.5	404.2	26.8	33.9	2.2
20	0.01	0	685.6	179.6	26.2	31.1	2.3	1175.7	275.9	23.5	27.8	1.6	709.7	277.8	39.1	30.6	2.4
20	0.1	0	1626.9	385.8	23.7	32.6	1.7	2362.4	492.2	20.8	27.7	1.8	1685.1	523.0	31.0	32.6	2.4
20	1	0	3545.7	656.9	18.5	29.7	2.1	4386.3	722.7	16.5	24.6	1.9	3673.7	808.9	22.0	29.7	2.6
20	10	0	6788.6	822.2	12.1	23.9	1.9	7564.1	1023.9	13.5	19.9	1.5	6994.3	1157.1	16.5	23.8	2.3
4	0.01	0	4052.3	619.3	15.3	26.6	1.7	5299.0	761.1	14.4	21.0	1.6	4132.5	939.7	22.7	27.1	2.7
4	0.1	0	7034.0	775.4	11.0	21.8	1.5	8171.1	1029.5	12.6	17.3	1.6	7206.4	1210.5	16.8	22.0	2.4
4	1	0	11022.7	981.8	8.9	16.3	1.1	11698.3	1183.3	10.1	13.4	1.2	11322.8	1399.5	12.4	16.3	1.7
4	10	0	15455.3	1181.5	7.6	11.9	0.6	15453.0	1292.3	8.4	10.1	0.8	15914.3	1556.1	9.8	11.8	1.0
40	0.01	69	401.7	120.4	30.0	14.7	3.9	469.6	170.8	36.4	19.9	4.0	436.7	121.5	27.8	14.7	5.2
40	0.1	69	494.8	132.2	26.7	21.6	4.3	630.7	189.0	30.0	24.1	3.4	538.9	154.9	28.7	21.0	5.0
40	1	69	816.1	168.7	20.7	28.0	3.4	1115.5	279.0	25.0	27.8	2.6	871.8	238.7	27.4	27.2	3.5
40	10	69	1702.0	324.2	19.0	32.4	1.5	2225.5	446.1	20.0	29.0	1.7	1777.9	473.7	26.6	32.0	1.7
20	0.01	69	854.5	197.8	23.1	28.7	2.4	1293.8	280.6	21.7	26.9	2.6	918.5	261.1	28.4	28.6	3.6
20	0.1	69	1663.3	419.4	25.2	31.6	1.6	2375.6	531.3	22.4	27.4	2.0	1729.1	462.5	26.8	31.8	2.6
20	1	69	3456.7	763.0	22.1	29.7	1.8	4371.1	790.9	18.1	24.5	1.9	3584.6	733.2	20.5	29.9	2.4
20	10	69	6492.8	1196.8	18.4	24.2	1.9	7327.4	1020.0	13.9	20.0	1.7	6741.7	973.2	14.4	24.3	2.1

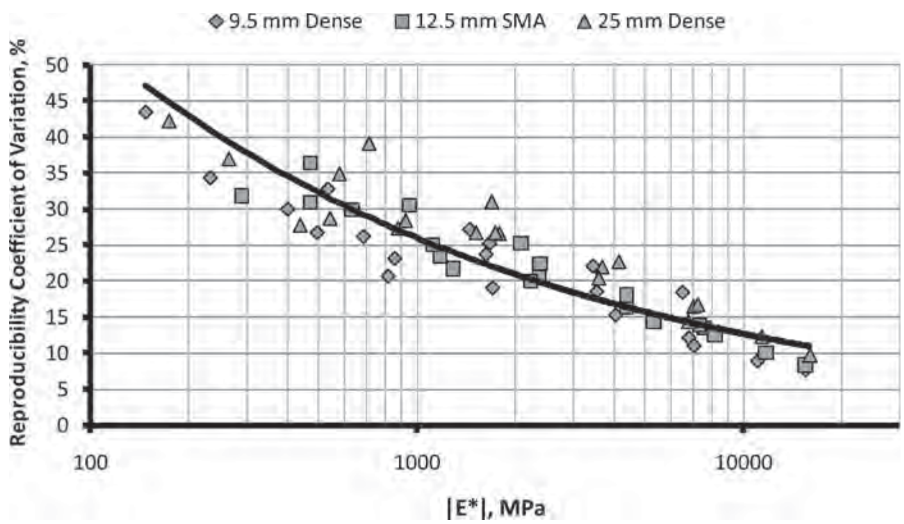


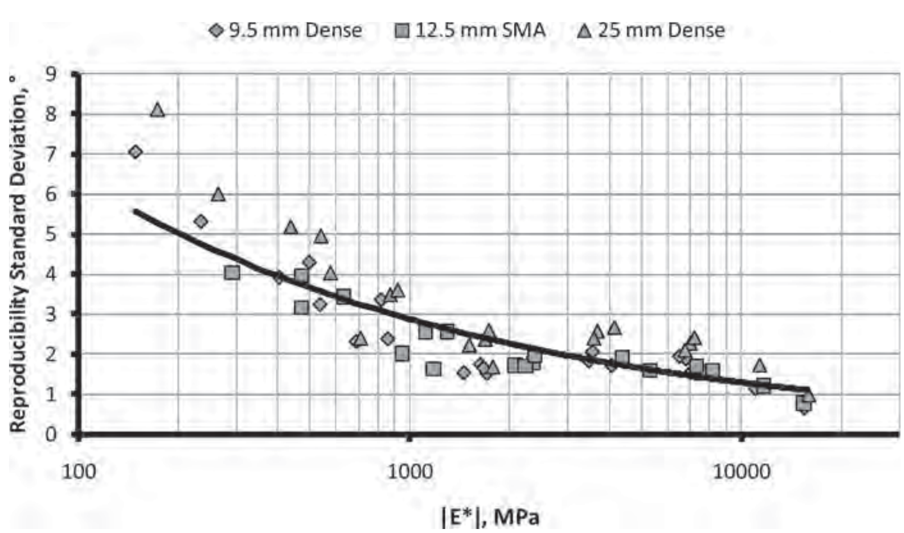
Figure 26. Final dynamic modulus reproducibility coefficient of variation.

(difference between the highest and lowest result included in the average). The maximum difference depends on the repeatability standard deviation or coefficient of variation and the multiplier from Table 3, which is a function of the number of test results included in the average. For the average of multiple test results in two different laboratories, the reproducibility of the test method is expressed as the maximum allowable difference between the two group averages using either Equation 8 or Equation 9 (ASTM C670).

Equations 10 and 11, expressing the repeatability statistics for the dynamic modulus and phase angle, were combined with appropriate multipliers from Table 3 to develop single-operator laboratory precision statements for dynamic modulus and phase angle as a function of specimen stiffness and nominal maximum aggregate size. The results are summarized in Table 12 for sample sizes ranging from 2 to 6, typical stiffness levels, and nominal maximum aggregate sizes ranging from 9.5 mm to 25 mm.

Equations 12 and 13, expressing the reproducibility statistics for the dynamic modulus and phase angle, were substituted into Equations 7 and 8 to develop between-laboratory precision statements for dynamic modulus and phase angle as a function of specimen stiffness. The results are summarized in Table 13 for sample sizes ranging from 2 to 6 and typical stiffness levels.

Because of the effect of nominal maximum aggregate size, specimen stiffness, and the use of the average of multiple specimens in the dynamic modulus test, the precision statements



Note: The variability of the phase angle was found to be a function of the dynamic modulus.

Figure 27. Final phase angle reproducibility standard deviation.

Table 12. Single-operator precision for dynamic modulus and phase angle.

Nominal Maximum Aggregate Size, mm	Average |E*| MPa	Dynamic Modulus						Phase Angle					
		s_r%	Acceptable Range for n Specimens, % of Average					s_r, °	Acceptable Range for n Specimens, °				
			n=2	n=3	n=4	n=5	n=6		n=2	n=3	n=4	n=5	n=6
9.5	≥137 to <200	15	43	51	55	60	61	1.8	5.1	6.0	6.5	7.1	7.3
9.5	≥200 to <500	13	36	42	46	50	51	1.5	4.2	4.9	5.4	5.8	6.0
9.5	≥500 to <1000	11	31	36	39	43	44	1.3	3.5	4.1	4.5	4.9	5.0
9.5	≥1000 to <2000	9	26	31	34	37	38	1.1	3.0	3.5	3.8	4.2	4.3
9.5	≥2000 to <5000	8	22	26	28	31	31	0.9	2.5	2.9	3.2	3.4	3.5
9.5	≥5000 to <10000	7	19	22	24	26	27	0.7	2.1	2.4	2.6	2.9	2.9
9.5	≥10000 to <16400	6	16	19	21	23	23	0.6	1.8	2.1	2.3	2.4	2.5
12.5	≥137 to <200	17	47	55	60	65	67	1.9	5.4	6.4	7.0	7.6	7.8
12.5	≥200 to <500	14	39	46	50	54	55	1.6	4.5	5.3	5.7	6.2	6.4
12.5	≥500 to <1000	12	33	39	42	46	47	1.3	3.7	4.4	4.8	5.2	5.3
12.5	≥1000 to <2000	10	28	33	36	39	40	1.1	3.2	3.8	4.1	4.4	4.6
12.5	≥2000 to <5000	8	23	28	30	33	33	0.9	2.6	3.1	3.4	3.7	3.7
12.5	≥5000 to <10000	7	20	23	25	28	28	0.8	2.2	2.6	2.8	3.1	3.1
12.5	≥10000 to <16400	6	17	20	22	24	24	0.7	1.9	2.2	2.4	2.6	2.7
19	≥137 to <200	20	56	66	72	78	80	2.2	6.3	7.4	8.1	8.7	9.0
19	≥200 to <500	16	46	54	59	64	65	1.8	5.2	6.1	6.6	7.2	7.4
19	≥500 to <1000	14	38	45	49	53	55	1.5	4.3	5.1	5.6	6.0	6.2
19	≥1000 to <2000	12	32	38	42	45	46	1.3	3.7	4.3	4.7	5.1	5.3
19	≥2000 to <5000	9	27	31	34	37	38	1.1	3.0	3.6	3.9	4.2	4.3
19	≥5000 to <10000	8	22	26	28	31	32	0.9	2.5	3.0	3.3	3.5	3.6
19	≥10000 to <16400	7	19	22	24	26	27	0.8	2.2	2.6	2.8	3.0	3.1
25	≥137 to <200	24	66	78	85	92	94	2.6	7.2	8.4	9.2	10.0	10.2
25	≥200 to <500	19	53	62	68	74	76	2.1	5.9	6.9	7.6	8.2	8.4
25	≥500 to <1000	16	44	51	56	61	62	1.8	4.9	5.8	6.4	6.9	7.1
25	≥1000 to <2000	13	37	43	47	51	52	1.5	4.2	5.0	5.4	5.9	6.0
25	≥2000 to <5000	11	29	35	38	41	42	1.2	3.5	4.1	4.5	4.8	4.9
25	≥5000 to <10000	9	24	29	31	34	35	1.0	2.9	3.4	3.7	4.0	4.1
25	≥10000 to <16400	7	20	24	26	28	29	0.9	2.5	2.9	3.2	3.4	3.5
Note: AMPT calibrated range is 137 MPa to 16,400 MPa.													

Table 13. Multi-laboratory precision for dynamic modulus and phase angle.

Average |E*| MPa	Dynamic Modulus						Phase Angle					
	s_R%	Acceptable Difference for Average of n Specimens, % of Average					s_R, °	Acceptable Difference for Average of n Specimens, °				
		n=2	n=3	n=4	n=5	n=6		n=2	n=3	n=4	n=5	n=6
≥137 to <200	47	33	27	23	21	19	5.5	3.9	3.2	2.8	2.5	2.3
≥200 to <500	36	25	21	18	16	15	4.1	2.9	2.4	2.1	1.9	1.7
≥500 to <1000	28	20	16	14	13	12	3.2	2.2	1.8	1.6	1.4	1.3
≥1000 to <2000	23	16	13	11	10	9	2.5	1.8	1.4	1.3	1.1	1.0
≥2000 to <5000	18	12	10	9	8	7	1.9	1.3	1.1	0.9	0.8	0.8
≥5000 to <10000	14	10	8	7	6	6	1.4	1.0	0.8	0.7	0.6	0.6
≥10000 to <16400	11	8	6	6	5	5	1.1	0.8	0.7	0.6	0.5	0.5
Note: AMPT calibrated range is 137 MPa to 16,400 MPa.												

are quite complicated. The tabular form given in Tables 12 and 13 provides a convenient representation of the test precision that can be added to the dynamic modulus test procedure in AASHTO TP 79.

2.2 Unconfined Flow Number

The unconfined flow number tests were conducted using the flow number testing conditions recommended in NCHRP Project 9-33: axial stress of 600 kPa, a representative 50% reliability high pavement temperature from LTPPBind 3.1 for locations using PG 64-22 binder, and target specimen air voids of 7.0%. As for the dynamic modulus tests, the unconfined flow number tests were conducted on specimens of loose mix compacted in each of the laboratories and on prefabricated cores prepared in a single laboratory. Unconfined flow number test results from the individual laboratories are presented in Appendix F. The results from the loose mix samples and the prefabricated cores were analyzed separately following the methods described in ASTM E691. Consistency, repeatability, and reproducibility statistics computed from the individual test results are presented in Appendix G. The sections that follow discuss the consistency, repeatability, and reproducibility statistics for the loose mix samples and the prefabricated cores.

2.2.1 Tests on Loose Mix Specimens

2.2.1.1 Consistency Statistics

The loose mix flow number data for the unconfined testing conditions included a total of 72 measurements of flow number (8 labs × 1 temperature × 3 replicates × 3 materials). This provided 24 values of the consistency statistics. Although the consistency statistics indicated that the unconfined flow number data was consistent with none of the data exceeding the limit for the between-laboratory consistency statistic, *h*, and only 8% of the data exceeding the limit for the within-laboratory consistency statistic, *k*, the data were much more variable than the dynamic modulus data. The consistency statistics evaluate the variability within and between laboratories relative to the overall variability. Figures 28 and 29 present bar charts of the average flow number and the coefficient of variation of the flow number. These figures show that there is a large between-laboratory difference in the flow number for a given mixture and that the within-laboratory variability was very high for several laboratories, particularly for the 12.5-mm SMA mixture.

In several cases it appeared that one of the test results in a particular laboratory was an outlier. This is illustrated by Table 14, which presents the data for the 12.5-mm SMA mixture. The data files for the questionable data were reviewed to determine if incorrect temperatures or stress levels were used or if the load pulse resulted in a high standard error. These types of errors were not found in the data files for the highly variable cells, so the test for outliers given in Equation 7 was applied. This resulted in two data points from the 12-mm SMA mixture—one for Lab 5 and one for Lab 6—being removed from the analysis. These cells are shaded in Table 14. Although the data from Lab 3 and Lab 4 also have high variability, the test for outliers did not identify outliers in the data for these two labs.

2.2.1.2 Repeatability and Reproducibility Statistics

The repeatability and reproducibility statistics for the unconfined flow number are summarized in Table 15. These data indicate very high within- and between-lab variability for unconfined flow number tests using the NCHRP Project 9-33 testing conditions. Both the repeatability and reproducibility

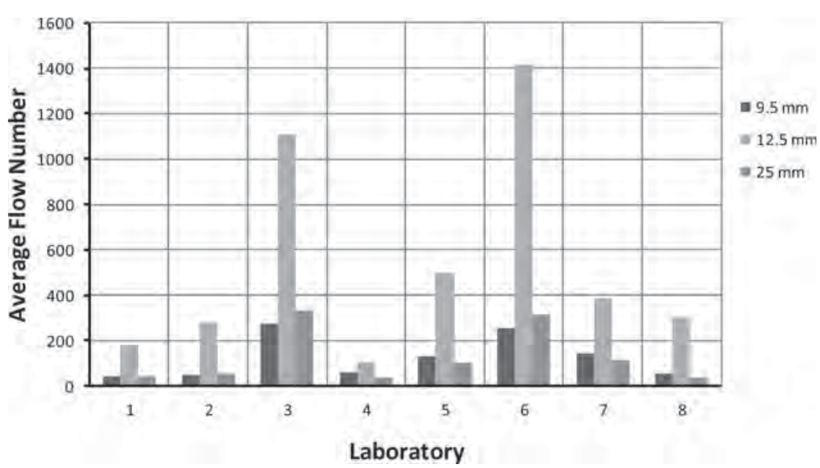


Figure 28. Average unconfined flow number for loose mix specimens.

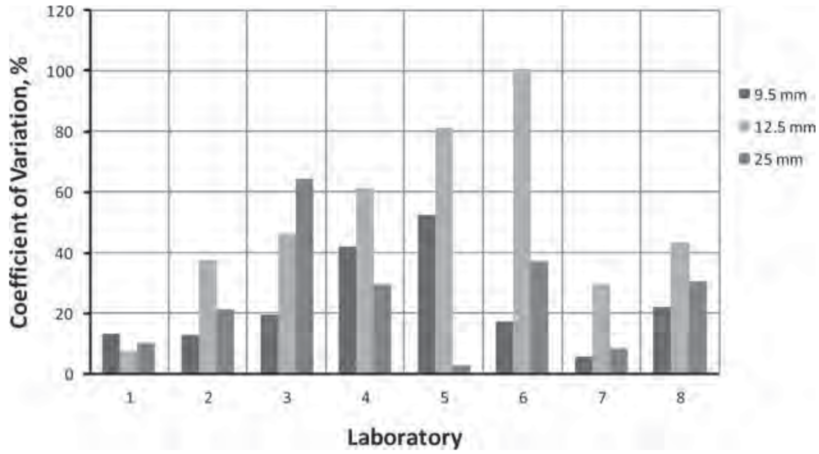


Figure 29. Variability of unconfined flow number for loose mix specimens.

coefficients of variation increase with increasing nominal maximum aggregate size, as shown in Figure 30. The repeatability coefficient of variation ranges from approximately 30% to 70%, and the reproducibility coefficient of variation is even higher, ranging from about 80% to 110%.

2.2.2 Tests on Prefabricated Cores

Analysis of the flow number data from the prefabricated cores permits an assessment of whether specimen fabrication is a major contributor to the variability observed in the flow number data from the loose mix specimens. If specimen fabrication is not a major contributor to the variability, then further refinement of the AMPT equipment and procedures to reduce flow number test variability is needed. If specimen fabrication is a major contributor, then efforts to improve the AMPT testing should be directed at further standardization of specimen fabrication procedures. The flow number data from the tests on the prefabricated cores were analyzed in the same manner as described previously for the loose mix specimens.

Table 14. Loose mix unconfined flow number test results for the 12.5-mm SMA mixture.

Lab Number	Result 1	Result 2	Result 3	Average	Standard Deviation	Coefficient of Variation
1	192	173	167	177.3	13.05	7.4
2	301	374	166	280.3	105.53	37.6
3	618	1068	1632	1106.0	508.07	45.9
4	115	154	33	100.7	61.76	61.4
5	274	253	960	495.7	402.26	81.2
6	643	542	3061	1415.3	1426.08	100.8
7	508	379	277	388.0	115.76	29.8
8	450	251	204	301.7	130.59	43.3

2.2.2.1 Consistency Statistics

Figures 31 and 32 are bar charts of the average flow number and the coefficient of variation of the flow number for the tests on the prefabricated cores. Data for the 12.5-mm SMA mixture are not included for Lab 5 because these tests were not conducted at the correct temperature. These figures show less within- and between-laboratory variability than was shown previously in Figures 28 and 29 for the loose mix specimens. The consistency statistics for the prefabricated core data flagged only one cell, the within-laboratory consistency for the 9.5-mm data from Lab 5. The data file for this cell was reviewed, and after it was determined that there were no obvious errors in the testing conditions, the test for outliers given in Equation 7 was applied and the outlier was removed from the analysis.

2.2.2.2 Repeatability and Reproducibility Statistics

The repeatability and reproducibility statistics for the unconfined flow number tests on the prefabricated cores are summarized in Table 16 and are shown as a function of aggregate size in Figure 33. The unconfined tests on the prefabricated cores do not show a strong or consistent aggregate size effect. The 12.5-mm SMA mixture is somewhat more variable,

Table 15. Repeatability and reproducibility of flow number for loose mix specimens tested using the NCHRP Project 9-33 conditions.

Mixture	Average	s_r	s_r%	s_R	s_R%
9.5 mm	126.4	36.2	28.7	97.3	77.0
12.5 mm	401.2	196.5	49.0	358.1	89.2
25 mm	128.9	86.4	67.0	142.8	110.8

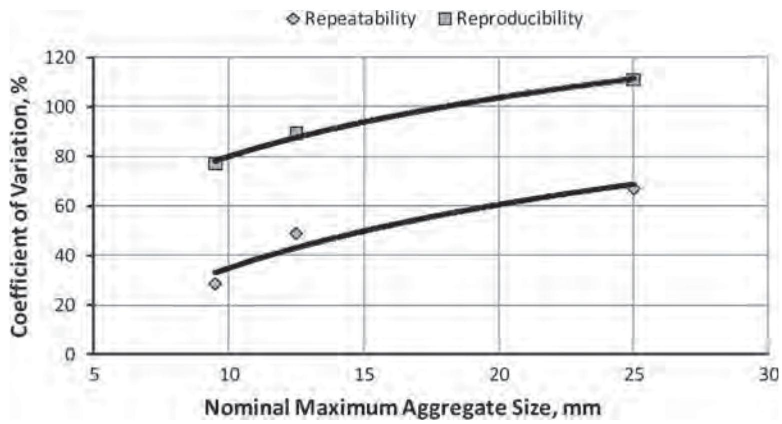


Figure 30. Effect of nominal maximum aggregate size on unconfined flow number repeatability and reproducibility statistics for loose mix specimens.

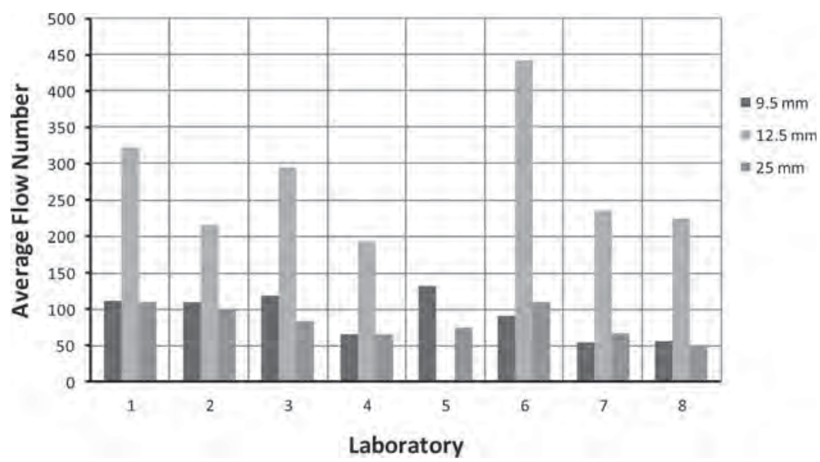


Figure 31. Average flow number for prefabricated cores.

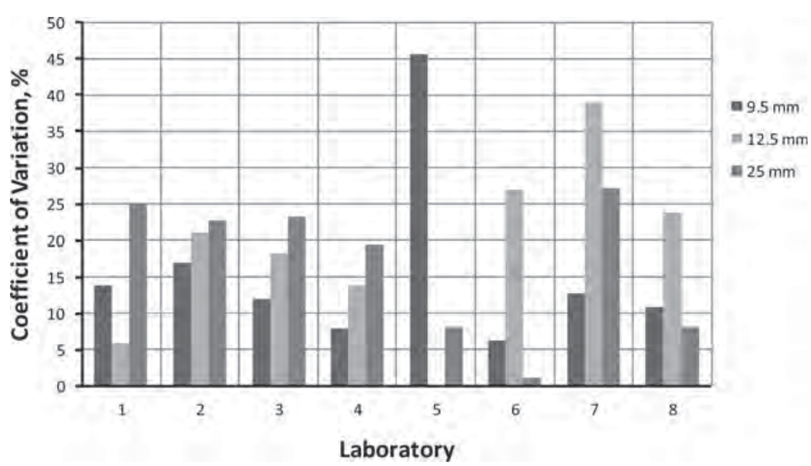


Figure 32. Variability of flow number for prefabricated cores.

Table 16. Repeatability and reproducibility of flow number for prefabricated cores tested using the NCHRP Project 9-33 conditions.

Mixture	Average	s_r	s_r%	s_R	s_R%
9.5 mm	87.6	10.9	12.5	27.7	31.6
12.5 mm	275.4	67.0	24.3	102.4	37.2
25 mm	82.2	16.5	20.1	25.7	31.2

but this may be a result of the reduced number of laboratories included in the computation of the repeatability and reproducibility statistics for this mixture.

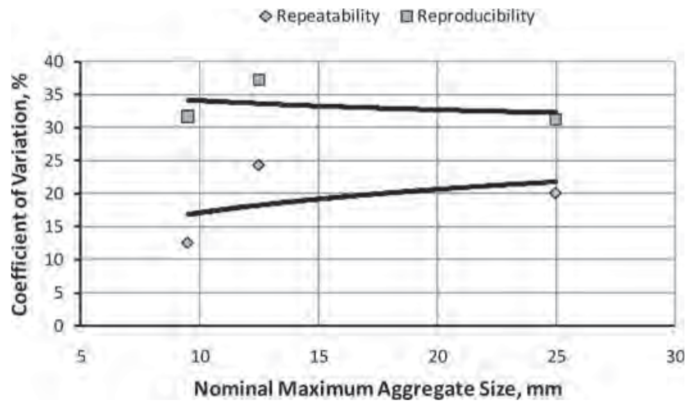


Figure 33. Effect of nominal maximum aggregate size on unconfined flow number repeatability and reproducibility statistics for the prefabricated core specimens.

2.2.3 Comparison of Loose Mix and Prefabricated Core Data

The statistics from the prefabricated cores and loose mix specimens are compared in Figure 34. This figure shows that there is a significant improvement in both the repeatability and reproducibility statistics for the tests on the prefabricated cores, indicating that differences in specimen fabrication between laboratories is a major contributor to the variability in flow numbers measured using the NCHRP Project 9-33 testing conditions.

The higher reproducibility coefficient of variation compared to the repeatability coefficient of variation for the prefabricated cores indicates that the AMPT equipment and/or the AASHTO TP 79 flow number test procedure can be improved. Since the AMPT equipment uses the same temperature and loading control for dynamic modulus and flow number testing, differences in end friction reducer fabrication between laboratories is the likely cause of the higher reproducibility coefficient of variation compared to the repeatability coefficient for the prefabricated cores. The flow number ruggedness testing showed that the end friction reducer has

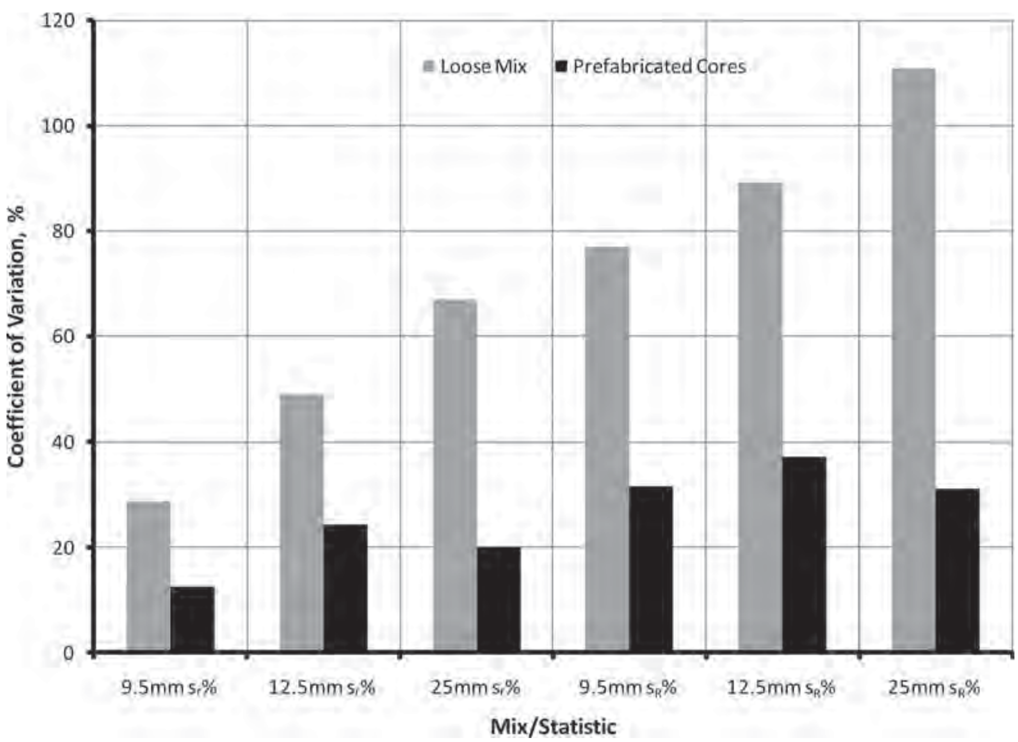


Figure 34. Comparison of the variability in the flow number test using NCHRP Project 9-33 conditions for loose mix and prefabricated core specimens.

a major effect on the flow number (*3*). AASHTO TP 79 includes an appendix that specifies how to fabricate end friction reducers. The process is somewhat subjective, and it is likely that different technicians fabricate the end friction reducers differently.

2.2.4 Precision Statements

Single-operator and multi-laboratory precision statements for unconfined flow number testing using the NCHRP Project 9-33 testing conditions were developed using the repeatability and reproducibility statistics from the loose mix testing because these represent the level of variability expected in AASHTO TP 79. As for the dynamic modulus test, AASHTO TP 79 specifies the use of multiple samples; therefore, the single-laboratory precision is based on the range of data collected within a single laboratory, and the multi-laboratory precision is based on the allowable difference in the average flow numbers obtained in different laboratories. The effects of specimen size on the repeatability and reproducibility coefficients of variation are given by Equations 14 and 15, respectively.

$$s_r\% = 37.0 \times \ln(NMAS) - 50.4 \qquad R^2 = 0.92 \qquad (14)$$

where

$s_r\%$ = flow number repeatability coefficient of variation, %, and
$\ln(NMAS)$ = natural logarithm of the mixture nominal maximum aggregate size, mm.

$$s_R\% = 34.2 \times \ln(NMAS) + 1.1 \qquad R^2 = 0.92 \qquad (15)$$

where

$s_R\%$ = flow number reproducibility coefficient of variation, %, and
$\ln(NMAS)$ = natural logarithm of the mixture nominal maximum aggregate size, mm.

The single-operator precision for the unconfined flow number test using the NCHRP Project 9-33 testing conditions was determined by combining Equation 14 with the appropriate multiplier from Table 3 for the number of specimens tested. The results are summarized in Table 17 for nominal maximum aggregate sizes of between 9.5 mm and 25 mm and number of specimens ranging from 2 to 6. The multi-laboratory precision for the unconfined flow number test using the NCHRP Project 9-33 testing conditions was determined by combining Equation 15 with Equation 8. The results are summarized in Table 18 for nominal maximum aggregate sizes of between 9.5 mm and 25 mm and number of specimens ranging from 2 to 6. The precision statements for the unconfined flow number test are somewhat less complicated than those for the dynamic modulus, depending only on the nominal maximum aggregate size and the number of specimens being tested.

Table 17. Single-operator precision for unconfined flow number for the NCHRP Project 9-33 testing conditions.

NMAS, mm	s_r%	Acceptable Range for n Specimens, % of Average				
		n=2	n=3	n=4	n=5	n=6
9.5	32.9	92	109	118	128	132
12.5	43.1	121	142	155	168	172
19	58.5	164	193	211	228	234
25	68.7	192	227	247	268	275

Table 18. Multi-laboratory precision for unconfined flow number for the NCHRP Project 9-33 testing conditions.

NMAS, mm	s_R%	Acceptable Difference for Average of n Specimens, % of Average				
		n=2	n=3	n=4	n=5	n=6
9.5	78.1	55	45	39	35	32
12.5	87.5	62	51	44	39	36
19	101.8	72	59	51	46	42
25	111.2	79	64	56	50	45

2.3 Confined Flow Number

The confined flow number tests were conducted using the flow number testing conditions recommended in NCHRP Project 9-30A: confining stress of 69 kPa, repeated deviatoric stress of 483 kPa, and target specimen air voids of 7.0%. The tests on the PG 64-22 binder were conducted at 55°C, and those for the PG 76-22 binder were conducted at 65°C. Under these testing conditions, flow should not occur during the test; therefore, the analysis was based on the measured permanent strain at selected intervals during the test. As with the dynamic modulus and unconfined flow number tests, confined flow number tests were conducted on specimens of loose mix compacted in each of the laboratories and on prefabricated cores prepared in a single laboratory. Confined flow number test results from the individual laboratories are presented in Appendix H. The results from the loose mix samples and the prefabricated cores were analyzed separately following the methods described in ASTM E691. Consistency, repeatability, and reproducibility statistics computed from the individual test results are presented in Appendix I. The sections that follow discuss the consistency, repeatability, and reproducibility statistics for the loose mix samples and the prefabricated cores.

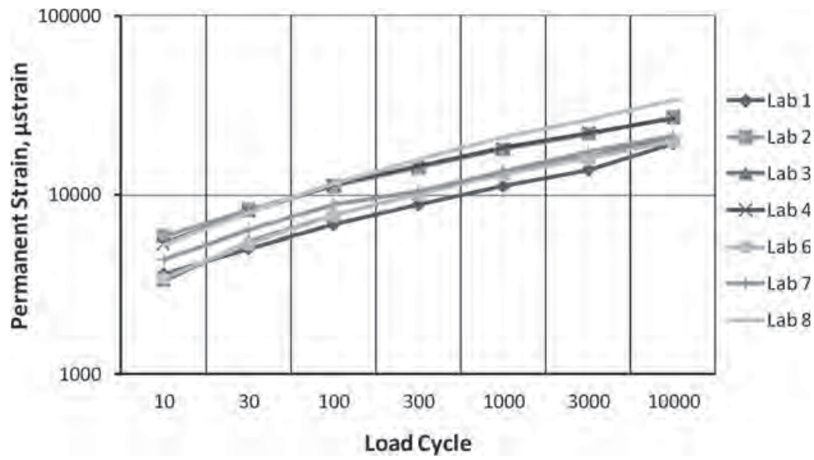


Figure 35. Average permanent strain from confined flow number tests on loose mix specimens.

2.3.1 Tests on Loose Mix Specimens

2.3.1.1 Consistency Statistics

The loose mix flow number data for the confined testing conditions included a total of 504 measurements of permanent strain (8 labs × 3 replicates × 3 materials/temperatures × 7 load cycles). Some of this data was not used in the computation of the repeatability and reproducibility statistics because flow occurred during the testing. The data that were eliminated because flow occurred included

- All mixtures from Lab 5 (63 measurements). The Lab 5 data showed flow occurred at a very low number of cycles in all tests on all mixtures, indicating a possible problem with the confining pressure system in this laboratory.
- One test on the 12.5-mm mixture for Labs 1, 2, and 7 (21 measurements). In these cases flow occurred late in the test, indicating that a leak in the membrane may have developed during the test.

The reduced data set provided 420 measurements of permanent strain from which 147 values of the consistency statistics were calculated. Based on the consistency statistics, the confined flow number test data were consistent, with none of the data exceeding the critical value for the between-laboratory consistency statistic, *h,* and 2.0% of the data exceeding the critical value of the within-laboratory consistency statistic, *k.* The critical values for the consistency statistics were selected at the 5% level of significance, meaning that one would expect them to be exceeded 5% of the time.

Figures 35 and 36 present plots of the average permanent strain and the pooled coefficient of variation of the permanent strain for selected load cycles. The data in these figures represent the average for the three mixtures tested. The following

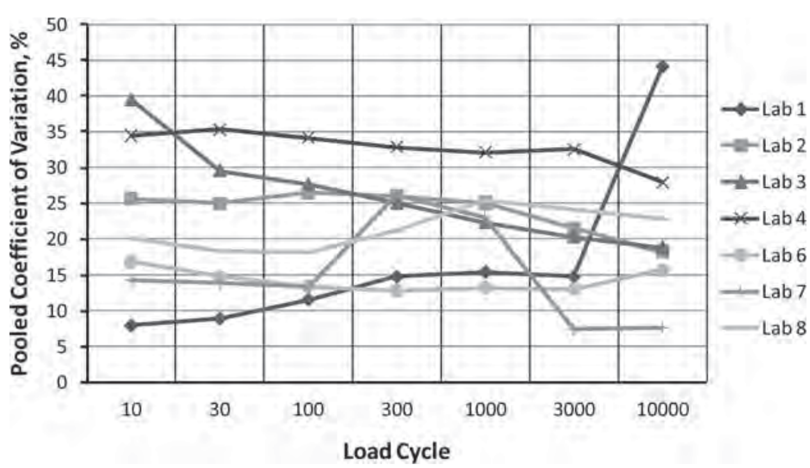


Figure 36. Pooled coefficient of variation for the permanent strain from confined flow number tests on loose mix specimens.

observations were made based on the consistency statistics and these figures.

- There is a definite laboratory effect in the permanent strain data. Labs 1, 3, 6, and 7 have lower average permanent strains for all load cycles, and Labs 2, 4, and 8 have higher average permanent strains for all load cycles.
- Lab 4 has somewhat higher variability than the other labs for most load cycles. The data files for Lab 4 were carefully reviewed to determine if the data should be included in computation of the repeatability and reproducibility statistics. No obvious errors in confining stress, temperature, or axial stress were identified. The test for outliers, Equation 7, was applied, and this test concluded that none of the data qualified as an outlier. All of the data not exhibiting flow were therefore retained and used in the computation of the repeatability and reproducibility statistics.

2.3.1.2 Repeatability and Reproducibility Statistics

Repeatability and reproducibility statistics for the confined flow number test on the loose mix specimens are presented in Table 19 and shown as a function of permanent strain in Figures 37 and 38. Neither the repeatability nor the reproducibility appears to be a function of aggregate size or permanent strain. The average repeatability coefficient of variation is 24.7%, and the average reproducibility coefficient of variation is 32.1%.

2.3.2 Tests on Prefabricated Cores

2.3.2.1 Consistency Statistics

The prefabricated core flow number data for the confined testing conditions also included a total of 504 measurements of permanent strain (8 labs × 3 replicates × 3 materials/temperatures × 7 load cycles). Some of this data was not used in the computation of the repeatability and reproducibility statistics because flow occurred during the testing. The data that were eliminated because flow occurred included

- All mixtures from Lab 5 (63 measurements). The Lab 5 data showed flow occurred at a very low number of cycles in all tests on all mixtures, indicating a possible problem with the confining pressure system in this laboratory.
- Two of the 12.5-mm mixture tests for Lab 1 and Lab 6, leaving only one valid test for these laboratories. Because two of the tests exhibited flow, the 12.5-mm mixture for these laboratories had to be eliminated from the analysis, leaving only five laboratories for computation of repeatability and reproducibility statistics for the 12.5-mm mixture. Five laboratories are too few to accurately compute variability statistics; therefore, the 12.5-mm mixture data were eliminated from the analysis (168 measurements).
- Two of the 25-mm mixture tests for Lab 1, leaving only one valid test for this mixture in this laboratory. Because two of the tests exhibited flow, the 25-mm mixture for Lab 1 had to be eliminated from the analysis (three measurements).

The reduced data set provided 327 measurements of permanent strain for the 9.5-mm and 25-mm mixtures, from which 110 values of the consistency statistics were calculated. Based on the consistency statistics, the confined flow number test data from the prefabricated cores were consistent with none of the data exceeding the critical value for the between-laboratory consistency statistic, *h,* or the within-laboratory consistency statistic, *k.*

Figures 39 and 40 present plots of the average permanent strain and the pooled coefficient of variation of the permanent strain for selected load cycles. The data in these figures represent the average for the 9.5-mm and 25-mm mixtures tested. The following observations were made based on the consistency statistics and these figures.

- The average permanent strain for Lab 1 is lower because the Lab 1 data include only the 9.5-mm mixture. The average

Table 19. Repeatability and reproducibility statistics for permanent strain in the confined flow number test on loose mix specimens.

Cycles	9.5-mm Mixture					12.5-mm Mixture					25-mm Mixture				
	Permanent Strain, Mstrain	s_r, µstrain	s_r %	s_R, µstrain	s_R %	Permanent Strain, µstrain	s_r, µstrain	s_r %	s_R, µstrain	s_R %	Permanent Strain, µstrain	s_r, µstrain	s_r %	s_R, µstrain	s_R %
10	4259.2	1294.0	30.4	1553.7	36.5	4062.3	802.9	19.8	1121.6	27.6	5097.8	1301.5	25.5	1752.5	34.4
30	6275.5	1646.6	26.2	1899.7	30.3	5903.9	1244.0	21.1	1651.0	28.0	7711.1	1919.3	24.9	2527.7	32.8
100	8722.0	2083.4	23.9	2485.5	28.5	8221.1	2068.4	25.2	2546.6	31.0	10931.8	2569.0	23.5	3484.9	31.9
300	11356.7	2465.8	21.7	3145.3	27.7	10071.4	3294.0	32.7	3956.9	39.3	14453.4	3253.9	22.5	4532.7	31.4
1000	14899.4	2942.8	19.8	4130.5	27.7	12145.2	4377.4	36.0	5161.6	42.5	19162.3	4224.6	22.0	5971.2	31.2
3000	19002.1	3621.4	19.1	5432.2	28.6	13844.9	4045.8	29.2	4972.0	35.9	24446.2	5315.0	21.7	7552.1	30.9
10000	25476.6	7101.5	27.9	8671.1	34.0	15235.7	4117.3	27.0	5399.1	35.4	31488.8	5903.7	18.7	9057.1	28.8

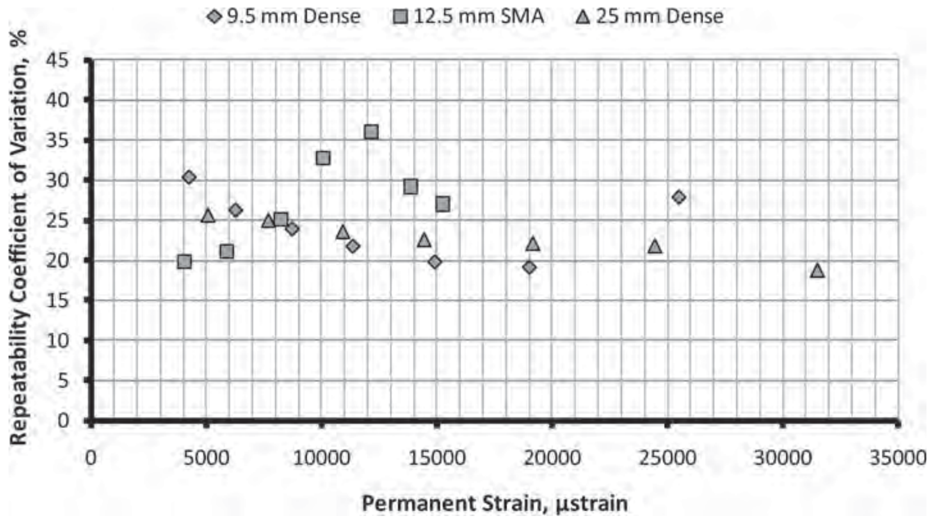


Figure 37. Repeatability coefficient of variation for permanent strain in confined flow number test on loose mix specimens.

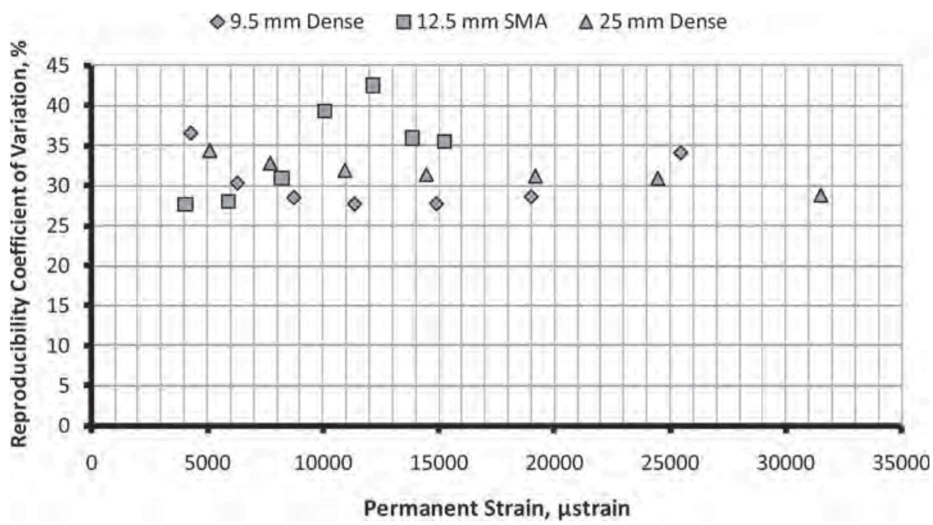


Figure 38. Reproducibility coefficient of variation for permanent strain in confined flow number test on loose mix specimens.

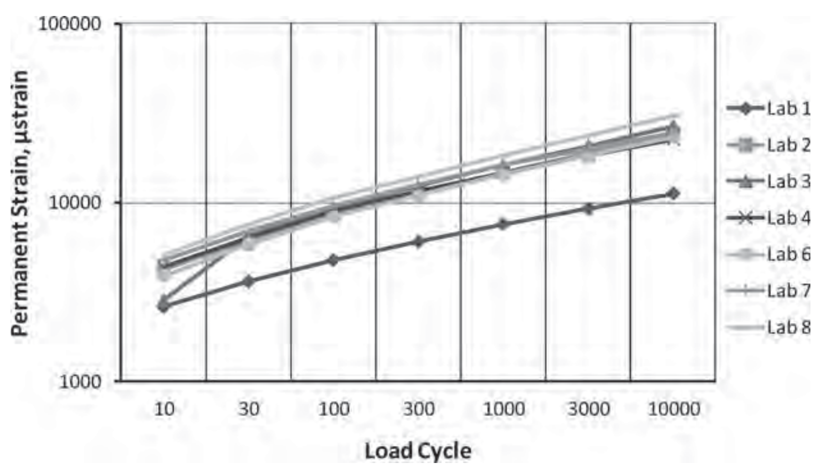


Figure 39. Average permanent strain from confined flow number tests on prefabricated cores.

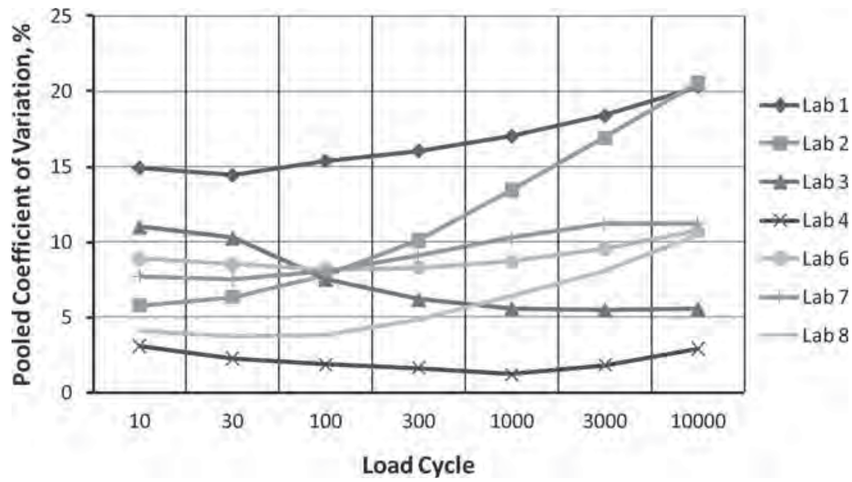


Figure 40. Pooled coefficient of variation for the permanent strain from confined flow number tests on loose mix specimens.

for the other laboratories includes both the 9.5-mm and 25-mm mixtures.

- The range of the average strain data (excluding Lab 1) for each load cycle is less than that for the tests on the loose mix specimens.
- The pooled coefficient of variation is generally lower for the prefabricated cores than for the loose mix specimens.

2.3.2.2 Repeatability and Reproducibility Statistics

Repeatability and reproducibility statistics for the confined flow number test on the prefabricated cores are presented in Table 20 and shown as a function of permanent strain in Figures 41 and 42. Neither the repeatability nor the reproducibility appears to be a function of aggregate size or permanent strain. The average repeatability coefficient of variation is 11.0%, and the average reproducibility coefficient of variation is 20.2%.

2.3.3 Comparison of Loose Mix and Prefabricated Core Data

The statistics from the prefabricated cores and loose mix are compared in Figure 43. This figure shows that there is a significant improvement in both the repeatability and reproducibility statistics for the tests on the prefabricated cores, indicating that differences in specimen fabrication between laboratories is a major contributor to the variability in the permanent strain measured using the NCHRP Project 9-30A testing conditions.

The higher reproducibility coefficient of variation compared to the repeatability coefficient of variation for the prefabricated cores indicates that the AMPT equipment and/or the AASHTO TP 79 flow number test procedure can be improved. Since the AMPT equipment and AASHTO TP 79 use the same temperature and loading control for dynamic modulus and flow number testing, differences in end friction reducer fabrication

Table 20. Repeatability and reproducibility statistics for permanent strain in the confined flow number test on prefabricated cores.

Cycles	9.5-mm Mixture					25-mm Mixture				
	Permanent Strain, μstrain	s_r, μstrain	s_r %	s_R, μstrain	s_R %	Permanent Strain, μstrain	s_r, μstrain	s_r %	s_R, μstrain	s_R %
10	3590.9	388.1	10.8	988.1	27.5	4558.1	350.2	7.7	758.9	16.6
30	5443.0	604.7	11.1	1174.3	21.6	7151.0	557.3	7.8	1071.9	15.0
100	7551.9	754.4	10.0	1632.0	21.6	10152.7	895.6	8.8	1582.4	15.6
300	9705.9	958.8	9.9	2112.4	21.8	13464.9	1422.6	10.6	2164.3	16.1
1000	12428.2	1290.1	10.4	2774.1	22.3	18081.0	2742.2	15.2	3205.1	17.7
3000	15356.7	1743.3	11.4	3556.0	23.2	22662.1	2859.7	12.6	4300.6	19.0
10000	19151.2	2466.3	12.9	4762.6	24.9	30271.6	4614.7	15.2	6061.9	20.0

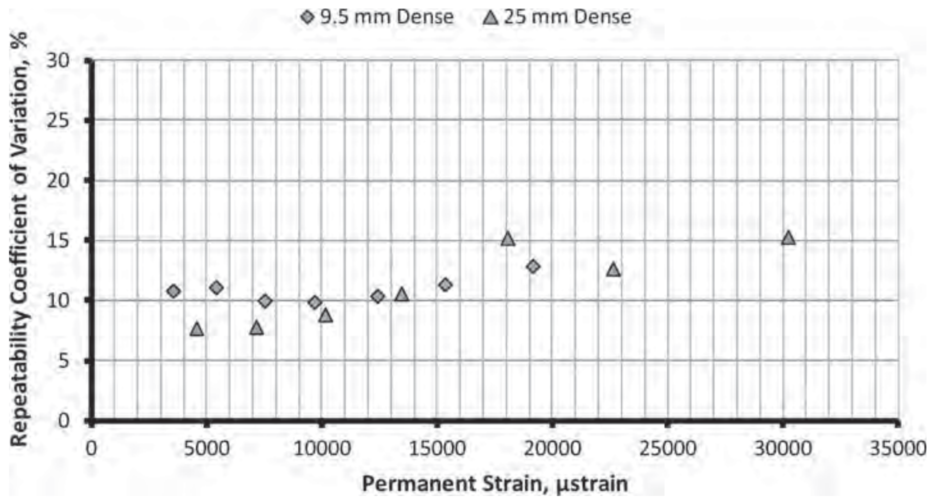


Figure 41. Repeatability coefficient of variation for permanent strain in confined flow number test on prefabricated cores.

between laboratories is the likely cause of the higher reproducibility coefficient of variation compared to the repeatability coefficient for the prefabricated cores. Flow number ruggedness testing showed that the end friction reducer has a major effect on the flow number (*3*). AASHTO TP 79 includes an appendix that specifies how to fabricate end friction reducers. The process is somewhat subjective, and it is likely that different technicians fabricate the end friction reducers differently.

2.3.4 Precision Statements

Single-operator and multi-laboratory precision statements for permanent strain in confined flow number tests using the NCHRP Project 9-30A testing conditions were developed using the repeatability and reproducibility statistics from the loose mix testing because this testing represents the level of variability expected in AASHTO TP 79. As with the dynamic modulus test, the flow number test specifies the use of multiple samples; therefore, the single-laboratory precision is based on the range of the data collected within a single laboratory, and the multi-laboratory precision is based on the allowable difference in the average flow numbers obtained in different laboratories. The repeatability and reproducibility coefficients of variation for the permanent strain in the confined flow number test were not a function of nominal maximum aggregate size or permanent strain; therefore, the precision statements are based on average values of 24.7% for

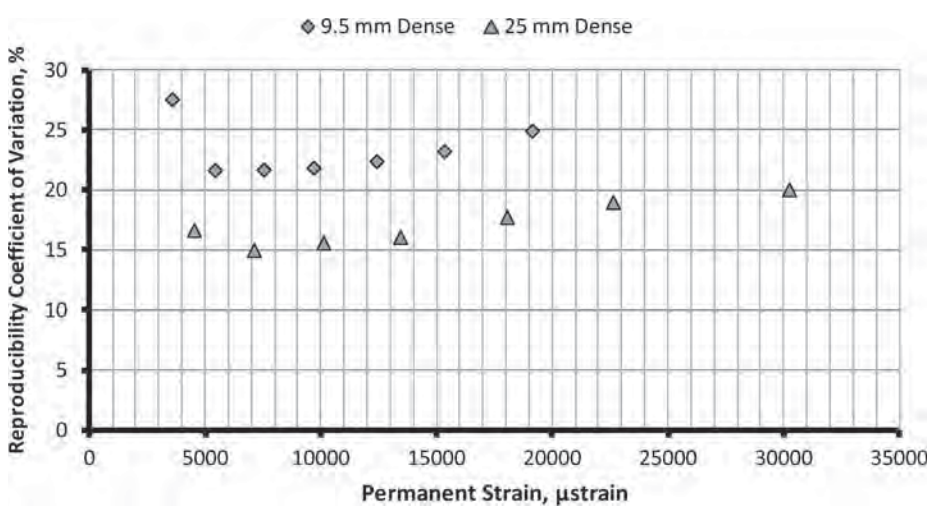


Figure 42. Reproducibility coefficient of variation for permanent strain in confined flow number test on prefabricated cores.

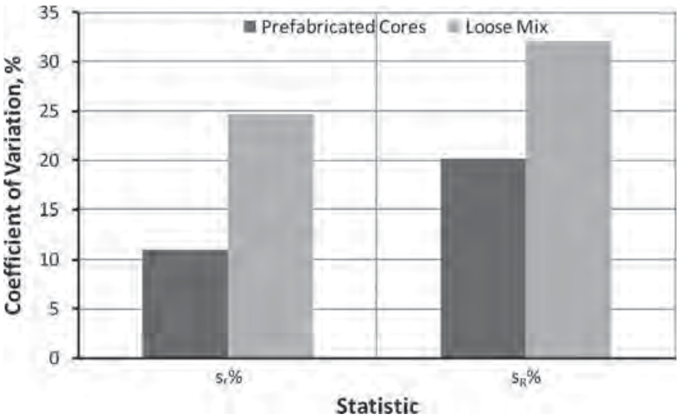


Figure 43. Comparison of the variability of permanent strain in the confined flow number test using NCHRP Project 9-30A conditions for loose mix and prefabricated core specimens.

repeatability and 32.1% for reproducibility. The single-operator precision and multi-laboratory precision for the confined flow number test are summarized in Tables 21 and 22, respectively. These precision statements are valid for nominal maximum aggregate sizes between 9.5 mm and 25 mm and number of specimens ranging from 2 to 6.

2.4 Specimen Fabrication Effects

Analysis of both the dynamic modulus and flow number test data indicated that specimen fabrication is a major source of the between-lab variability in testing with the AMPT. Some data on specimen fabrication were collected during the dynamic modulus and flow number interlaboratory studies, including data on (1) compactor type, (2) air voids, and (3) test specimen age. These specimen fabrication data were analyzed graphically to determine if they affected the modulus and flow numbers measured in the participating laboratories.

2.4.1 Compactor Type

Five different Superpave gyratory compactors were used by the laboratories that participated in the interlaboratory study.

Table 21. Single-operator precision for permanent strain in confined flow number tests using the NCHRP Project 9-30A testing conditions.

s_r%	Acceptable Range for n Specimens, % of Average				
	n=2	n=3	n=4	n=5	n=6
24.7	69.2	81.5	88.9	96.3	98.8

Table 22. Multi-laboratory precision for permanent strain in confined flow number tests using the NCHRP Project 9-30A testing conditions.

s_R%	Acceptable Difference for Average of n Specimens, % of Average				
	n=2	n=3	n=4	n=5	n=6
32.1	22.7	18.5	16.0	14.4	13.1

Table 23 shows the compactors that were used. For the analysis presented here, the Pine AFGB1A and the Gilson Brovold were combined because these are essentially the same compactor based on the Brovold design.

Figure 44 compares average dynamic modulus and flow number data grouped by laboratory and compactor type for the loose mix data. This figure shows the difference between the individual laboratory average and the grand average averaged over the three mixtures. The unconfined dynamic modulus for the testing condition of 20°C and 1.0 Hz was used because this value is near the middle of the range of measured moduli and is in the area of the master curve that is most sensitive to changes in testing conditions. The laboratory effect is clearly evident in Figure 44. Labs 3 and 6 consistently produced higher moduli and flow numbers, while Labs 1, 2, 4, and 5 consistently produced lower moduli and flow numbers. The data for Labs 7 and 8 are mixed. For these labs, the dynamic modulus is near the grand average, while the flow numbers are lower than the grand average.

There does not appear to be a compactor effect in the data presented in Figure 44. There are three cases where the same compactor was used in two different laboratories. The Pine AFGC125X was used in Labs 2 and 6. Lab 2 consistently produced moduli and flow numbers that were lower than the grand average while Lab 6 consistently produced moduli and flow numbers that were higher than the grand average. The Pine AFG1 was used in Labs 3 and 4. Lab 3

Table 23. Superpave gyratory compactors used in the AMPT interlaboratory study.

Laboratory	Compactor
1	Interlaken
2	Pine AFGC125X
3	Pine AFG1
4	Pine AFG1
5	Servopac
6	Pine AFGC125X
7	Pine AFGB1A
8	Gilson Brovold

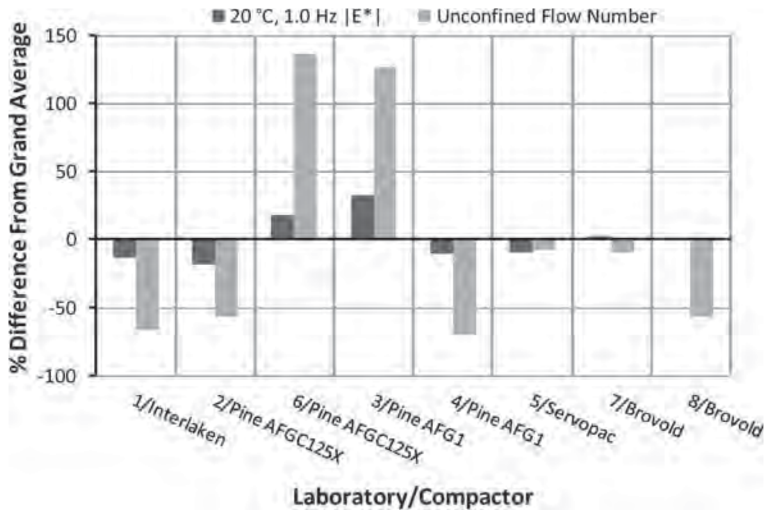


Figure 44. Comparison of average dynamic modulus and unconfined flow number grouped by laboratory and compactor type.

consistently produced moduli and flow numbers that were higher than the grand average, while Lab 6 consistently produced moduli and flow numbers that were lower than the grand average. The Brovold compactor was used in Labs 7 and 8. Moduli and flow numbers from Lab 7 were near the grand average. Moduli from Lab 8 were also near the grand average, but the flow numbers were lower than the grand average.

2.4.2 Air Voids

The target for air voids for the AMPT interlaboratory study was 7.0% with a tolerance of ±0.5%. Most of the participating laboratories reported that meeting this tolerance would result in an excessive number of rejected specimens. The tolerance was then changed to ±1.0%. To investigate if the wider air void tolerance had an effect on the reproducibility of the dynamic modulus and flow number tests, scatter plots of dynamic modulus and flow number as a function of air voids were prepared and are shown as Figures 45 and 46. Figure 45 is a scatter plot for the dynamic modulus for 20°C and 1.0 Hz loading, and Figure 46 is a scatter plot for the unconfined flow number. An air void effect is not apparent in either figure, indicating that the range of air voids was not a significant factor affecting the reproducibility of either the dynamic modulus or flow number test.

2.4.3 Specimen Age

Specimen age is a factor that may affect dynamic modulus and flow number data that were not controlled in the AMPT interlaboratory study. Both the dynamic modulus and the flow number would be expected to increase as the binder in the specimen stiffens with age. The time from mixing to testing ranged from as few as 5 days to over 200 days, and the time from compaction to testing ranged from as few as 2 days to over 150 days.

Figures 47 and 48 are scatter plots showing the effect of specimen age on the unconfined dynamic modulus for 20°C and 1.0 Hz loading. Specimen age is measured as the time from mixing to testing in Figure 47 and as the time from compaction to testing in Figure 48. These figures do not show a definitive effect of specimen age on the dynamic modulus data. Similar scatter plots for the unconfined flow number are shown in Figures 49 and 50. As with the dynamic modulus, specimen age does not appear to affect the flow number over the range of time included in the AMPT interlaboratory study.

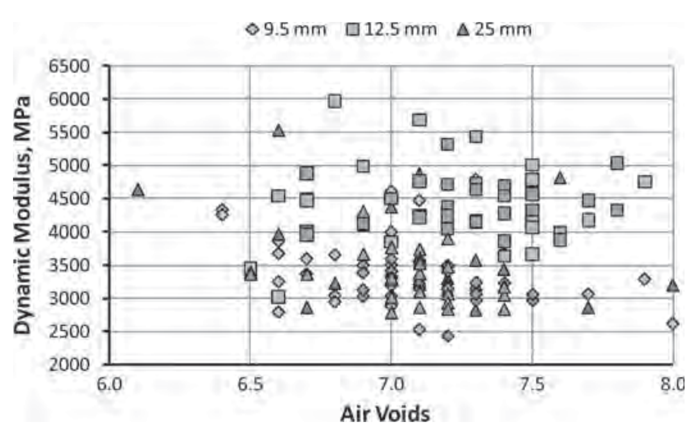


Figure 45. Effect of air voids on unconfined dynamic modulus for 20°C and 1.0 Hz loading.

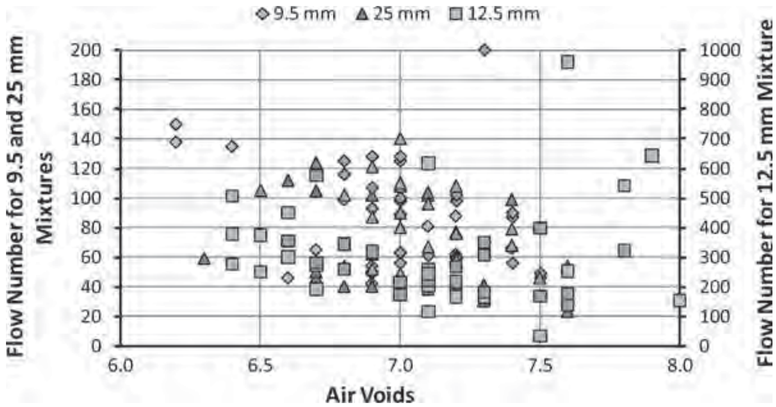


Figure 46. Effect of air voids on unconfined flow number.

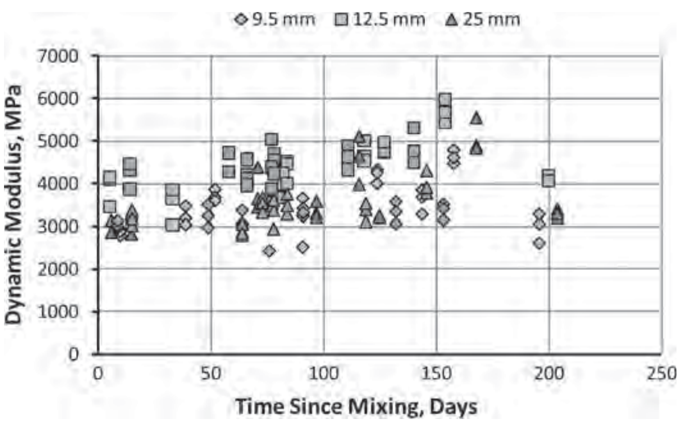


Figure 47. Effect of specimen age from mixing on unconfined dynamic modulus for 20°C and 1.0 Hz loading.

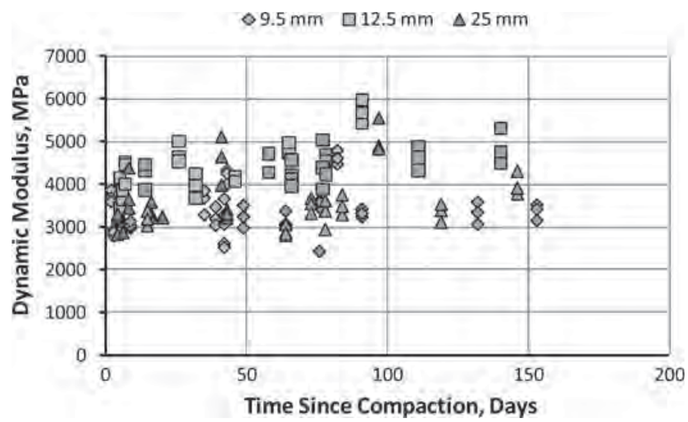


Figure 48. Effect of specimen age from compaction on unconfined dynamic modulus for 20°C and 1.0 Hz loading.

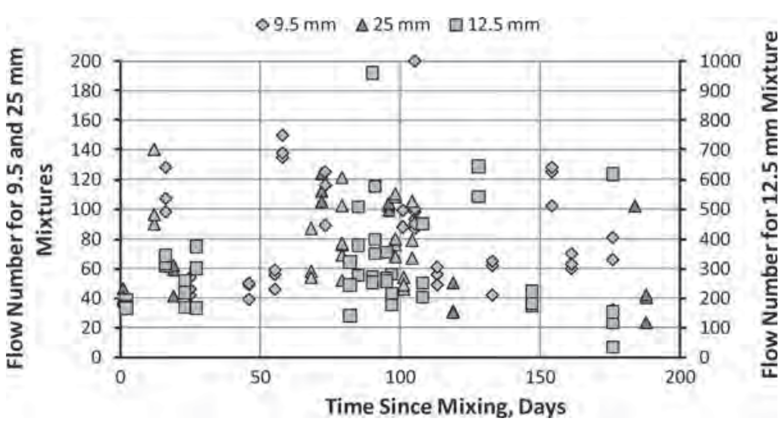


Figure 49. Effect of specimen age from mixing on unconfined flow number.

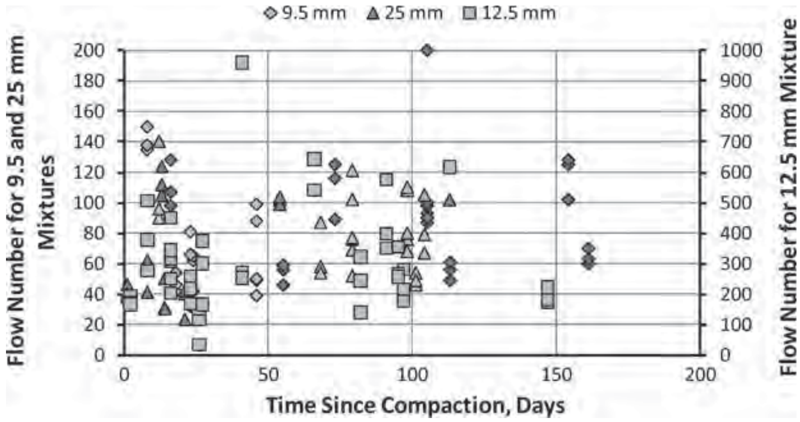


Figure 50. Effect of specimen age from compaction on unconfined flow number.

CHAPTER 3

Conclusions and Recommendations

3.1 Conclusions

The objective of the NCHRP Project 9-29 interlaboratory study was to develop precision statements for dynamic modulus and flow number tests conducted in accordance with AASHTO TP 79, "Determining the Dynamic Modulus and Flow Number for Hot Mix Asphalt (HMA) Using the Asphalt Mixture Performance Tester (AMPT)." The interlaboratory study was designed and analyzed in accordance with ASTM E691, "Standard Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method." Separate interlaboratory studies were conducted for (1) the dynamic modulus test, (2) unconfined flow number tests using the NCHRP Project 9-33 testing conditions, and (3) confined flow number tests using the NCHRP Project 9-30A testing conditions. To separate specimen fabrication and AMPT testing effects, the three interlaboratory studies included tests on loose mix specimens compacted in the participating laboratories and prefabricated cores that were prepared in a single laboratory. The following conclusions were drawn based on the NCHRP Project 9-29 interlaboratory study.

3.1.1 Dynamic Modulus Test

The within-laboratory repeatability of the dynamic modulus and phase angle were found to be a function of the stiffness of the specimen and the nominal maximum aggregate size of the mixture, increasing with decreasing stiffness and increasing nominal maximum aggregate size. The between-laboratory reproducibility was found to be a function of only the stiffness of the specimen. Both the repeatability and reproducibility of the dynamic modulus and phase angle improves as the specimen stiffness increases. Table 24 summarizes the precision statistics for the dynamic modulus and phase angle based on analysis of the loose mix data, which represents the level of variability expected in practice. These statistics are reasonable considering those reported for AASHTO T 315, "Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)." For high stiffness conditions, the repeatability coefficient of variation for the dynamic modulus ranges from 5% to 7%, which is similar to the values of 2% to 5% reported for AASHTO T 315. As the specimen stiffness decreases, the repeatability coefficient of variation increases, reaching values of 15% to 24%, with poorer repeatability for the larger nominal maximum size mixtures. For high stiffness conditions, the reproducibility coefficient of variation for the dynamic modulus is approximately 10%, which is similar to values of 6% to 14% reported for the dynamic shear rheometer. As specimen stiffness decreases, the reproducibility coefficient of variation increases, reaching values as high as 47%.

Analysis of the interlaboratory data from the prefabricated cores showed that specimen fabrication is a major component of the between-laboratory variability in the dynamic modulus test. For high to moderate stiffness conditions, the repeatability and reproducibility of the dynamic modulus and phase angle for the prefabricated cores were similar and approximately the same as the repeatability of the loose mix specimens. This indicates that specimen fabrication rather than the AMPT equipment is the major component of the between-laboratory variability in the dynamic modulus test. For low stiffness conditions, gauge point drift was evident in the data from some of the laboratories and was a contributor to the between-laboratory variability for low stiffness tests.

3.1.2 Unconfined Flow Number Test

The repeatability and reproducibility coefficients of variation for unconfined flow number tests using the NCHRP Project 9-33 testing conditions were found to be a function of mixture nominal maximum aggregate size. The precision of the test improves as the nominal maximum aggregate size of the mixture decreases. Table 25 summarizes the precision statistics for the unconfined flow number test based on analysis of the loose mix data, which represents the level of variability expected in practice. This level of variability is too high con-

Table 24. Summary of dynamic modulus and phase angle precision statistics.

Average |E*| MPa	Within-Laboratory Repeatability								Between-Laboratory Reproducibility	
	|E*| s_r%				Phase Angle s_r, °				|E*| s_R%	Phase Angle s_R, °
	9.5 mm	12.5 mm	19 mm	25 mm	9.5 mm	12.5 mm	19 mm	25 mm		
≥137 to <200	15	17	20	24	1.8	1.9	2.2	2.6	47	5.5
≥200 to <500	13	14	16	19	1.5	1.6	1.8	2.1	36	4.1
≥500 to <1000	11	12	14	16	1.3	1.3	1.5	1.8	28	3.2
≥1000 to <2000	9	10	12	13	1.1	1.1	1.3	1.5	23	2.5
≥2000 to <5000	8	8	9	11	0.9	0.9	1.1	1.2	18	1.9
≥5000 to <10000	7	7	8	9	0.7	0.8	0.9	1.0	14	1.4
≥10000 to <16400	6	6	7	7	0.6	0.7	0.8	0.9	11	1.1

Note: Calibrated range of the AMPT is 137 MPa to 16,400 MPa.

sidering the relationship between flow number and rutting resistance developed in NCHRP Project 9-33. Table 26 presents the minimum flow numbers recommended in NCHRP Project 9-33 as a function of traffic level. For a specified value of the unconfined flow number, the expected range for data collected in multiple laboratories is given by Equation 16.

$$Range = \pm \frac{t_{(\alpha/2,n-1)}\left(\frac{s_R\%}{100}\right)}{\sqrt{n}} \quad (16)$$

Where

$Range$ = expected range of unconfined flow numbers, percent of specified value,

$t_{(\alpha/2,n-1)}$ = value of t statistic for level of significance $\alpha/2$ and $n-1$ degrees of freedom,

$s_R\%$ = between-laboratory reproducibility coefficient of variation, and

n = number of samples tested.

Table 27 summarizes the expected range of data from multiple laboratories for various numbers of samples tested. These values were developed using a significance level of 0.1%, meaning that they would be exceeded no more than 10% of the time. For four samples, the range is 92% to 131% of the specified value depending on the nominal maximum aggregate size of the mixture. Even for 10 specimens, the range is 45% to 64% of the specified value.

As for the dynamic modulus data, analysis of the interlaboratory data from the prefabricated cores showed that specimen fabrication is a major component of the between-laboratory variability in the unconfined flow number test. Both the repeatability and reproducibility coefficients of variation for the prefabricated core data were approximately one-half of that determined from the loose mix specimens. Unlike for the dynamic modulus test, the reproducibility for the prefabricated cores was approximately twice the repeatability. Since all of the prefabricated cores were made in the same laboratory, this indicates the need for further refinement of the AMPT test equipment for the unconfined flow number test procedure. The AMPT equipment uses the same temperature and loading control for dynamic modulus and flow number testing; therefore, differences in end friction reducer fabrication between laboratories is the likely cause of the higher reproducibility coefficient of variation compared to the repeatability coefficient for the prefabricated cores. The flow number ruggedness testing showed that the end friction reducer has a major effect on the flow number (*3*). AASHTO TP 79 includes an appendix that specifies how to fabricate end friction reducers. The process is

Table 25. Summary of unconfined flow number precision statistics.

NMAS, mm	s_r%	s_R%
9.5	32.9	78.1
12.5	43.1	87.5
19	58.5	101.8
25	68.7	111.2

Table 26. NCHRP Project 9-33 recommended minimum flow number requirements.

Traffic Level, Million ESALs	Minimum Flow Number, Cycles
<3	—
3 to <10	50
10 to <30	190
≥30	740

Table 27. Unconfined flow number range for 90% confidence level.

NMAS, mm	Multi-Laboratory Unconfined Flow Number Range, ± Percent of Specified Value			
	4 Specimens	6 Specimens	8 Specimens	10 Specimens
9.5	92	64	52	45
12.5	103	72	59	51
19	120	84	68	59
25	131	91	74	64

somewhat subjective, and it is likely that different technicians fabricate the end friction reducers differently.

3.1.3 Confined Flow Number Test

The repeatability and reproducibility coefficients of variation for the permanent strain in confined flow number tests using the NCHRP Project 9-30A testing conditions were found to be independent of nominal maximum aggregate size and permanent strain level. For the loose mix data, the repeatability coefficient of variation was 24.7% and the reproducibility coefficient of variation was 32.1%. These values compare well with the low stiffness dynamic modulus repeatability and reproducibility statistics given in Table 24.

As for the dynamic modulus and unconfined flow number studies, the analysis of the interlaboratory data from the prefabricated cores showed that specimen fabrication is a major component of the between-laboratory variability in the permanent strain measured in the confined flow number test. Both the repeatability and reproducibility coefficients of variation for the prefabricated core data were approximately one-half of that determined from the loose mix specimens. As with the unconfined flow number test, the reproducibility for the prefabricated cores was approximately twice the repeatability. Since all of the prefabricated cores were made in the same laboratory, this indicates the need for further refinement of the AMPT test equipment or the unconfined flow number test procedure. As discussed previously, differences in end friction reducer fabrication between laboratories is the likely cause of the higher reproducibility coefficient of variation compared to the repeatability coefficient for the prefabricated core data.

3.1.4 Specimen Fabrication Effects

Although the NCHRP Project 9-29 interlaboratory study was not designed to evaluate the specimen fabrication factors affecting dynamic modulus and flow number data, some information on specimen fabrication was collected and evaluated. This information included the compactor type, air void content, and specimen age. Plots of the effects of these factors on the dynamic modulus and unconfined flow number showed that none of them had a systematic effect on the data collected in the interlaboratory study. The precision statements developed in this study are valid for a range of air voids of ±1.0% of the target.

3.2 Recommendations

The NCHRP Project 9-29 interlaboratory study produced precision statements for (1) dynamic modulus and phase angle, (2) unconfined flow number for the NCHRP Project 9-33 testing conditions, and (3) permanent strain in confined flow number tests using the NCHRP Project 9-30A testing conditions. These precision statements are in the form of tables because AASHTO TP 79 specifies the use of multiple samples. These precision statements, Tables 12 and 13 for the dynamic modulus test, Tables 17 and 18 for the unconfined flow number test, and Tables 21 and 22 are proposed for addition to AASHTO TP 79.

The precision statements that were developed used specimens having an air void tolerance of ±1.0% rather than the ±0.5% currently specified in AASHTO PP 61 and AASHTO TP 79. It is proposed that the air void tolerances in these provisional standards be changed to ±1.0% to be consistent with the precision statements from the interlaboratory study and to reduce the potential for specimen rejection. No systematic air void effect was detected in the interlaboratory study data over the ±1.0% tolerance range.

Specimen fabrication was determined to be a major source of the between-lab variability in the dynamic modulus and flow number tests. Compactor type, air void content, and specimen age were evaluated, and none were found to have a systematic effect on the NCHRP Project 9-29 interlaboratory study dynamic modulus and flow number data. A formal ruggedness study of AASHTO PP 60, "Provisional Standard Practice for Preparation of Cylindrical Performance Test Specimens Using the Superpave Gyratory Compactor (SGC)," is suggested to identify factors affecting the mechanical properties of specimens prepared using this practice and to develop appropriate levels of control for these factors.

Some changes to the AMPT equipment and the AASHTO TP 79 test procedures could also be considered to reduce the variability of low stiffness dynamic modulus test data and flow number test data:

- Gauge point drift was evident in the high-temperature dynamic modulus test data from two of the participating laboratories. The instructions to the participating laboratories cautioned that compensating springs might be needed to eliminate this effect at high temperatures, and all laboratories were provided and used compensating springs. Apparently the compensating springs did not completely balance the linear variable differential transformer spring force for two of the laboratories, and the operating technicians did not ensure that the data complied with the data quality requirement in AASHTO TP 79 that the deformation drift be compressive. Deformation sensors having near-zero spring force would reduce the potential for gauge point drift and improve the variability of the low stiffness dynamic modulus measurements both within and between laboratories.

- Differences in the fabrication and use of the greased latex end friction reducers is likely a source of significant variability in the flow number tests. Better control on the type, amount, and distribution of the grease is needed. If a spray silicone lubricant can be located, then the fabrication will be greatly simplified. Additional emphasis could be added to the test procedures regarding the need for new friction reducers for each test. Causal observation of technicians in three laboratories revealed that technicians often reuse the end friction reducers when performing flow number testing.

References

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3. Bonaquist, R. *NCHRP Report 629: Ruggedness Testing of the Dynamic Modulus and Flow Number Tests with the Simple Performance Tester.* Transportation Research Board of the National Academies, Washington, D.C., 2008.

APPENDIX A

Interlaboratory Study Instructions

Detailed Instructions for the NCHRP Project 9-29 Interlaboratory Study for Dynamic Modulus and Flow Number Testing with the Asphalt Mixture Performance Tester

1.0 Summary

The interlaboratory study for the AMPT includes three mixtures that will be tested for dynamic modulus and flow number in eight laboratories. The three mixtures are

- 9.5-mm dense-graded mixture with PG 64-22,
- 25-mm dense-graded mixture with PG 64-22, and
- 12.5-mm SMA mixture with PG 76-22.

Prior to starting testing in each lab, the AMPT will be calibrated by InstroTek. Advanced Asphalt Technologies, LLC (AAT) will arrange and pay for the calibration.

Each laboratory will receive nine prefabricated AMPT test specimens of each mixture (27 total) and 12 boxes of loose mix for AMPT test specimen fabrication (36 total). Three boxes of each mix are for trial specimens to reach the specified air voids. The remaining nine boxes of each mix are for AMPT test specimens.

Figure A1 presents a general flowchart for the testing and sample fabrication that must be done in each laboratory. This is summarized as follows for each mixture:

1.1 Prefabricated Specimens

1. Test three specimens for dynamic modulus at 20°C confined, 40°C confined, 4°C unconfined, 20°C unconfined, and 40°C unconfined. At each temperature use frequencies of 10, 1, 0.1, and 0.01 Hz. Confined test use 69 kPa confinement.
2. Test three specimens unconfined for flow number. Use a test temperature of 55°C for all three mixtures. The repeated deviatoric stress is 600 kPa, and the contact deviatoric stress is 30 kPa.
3. Test three specimens confined for flow number. Test temperature of 55°C for PG 64-22 mixtures, 65°C for PG 76-22 mixtures. Confining stress: 69 kPa, repeated deviatoric stress: 483 kPa, and contact deviatoric stress: 25 kPa.

1.2 Loose Mix Samples

1. Prepare nine test specimens to a target air void content of 7.0% ± 0.5%.
2. Test three specimens for dynamic modulus at 20°C confined, 40°C confined, 4°C unconfined, 20°C unconfined, and 40°C unconfined. At each temperature, use frequencies of 10, 1, 0.1, and 0.01 Hz. Confined test use 69 kPa confinement.
3. Test three specimens unconfined for flow number. Use a test temperature of 55°C for all three mixtures. The repeated deviatoric stress is 600 kPa, and the contact deviatoric stress is 30 kPa.
4. Test three specimens confined for flow number. Test temperature 55°C for PG 64-22 mixtures, 65°C for PG 76-22 mixtures. Confining stress: 69 kPa, repeated deviatoric stress: 483 kPa, and contact deviatoric stress: 25 kPa.

1.3 Data Files

Submit the data electronically using the Excel workbooks provided. Six separate workbooks will be provided:

1. 9.5-mm cores (prefabricated specimens),
2. 9.5-mm box (loose mix),
3. 25-mm cores (prefabricated specimens),
4. 25-mm box (loose mix),
5. 12.5-mm cores (prefabricated specimens), and
6. 12.5-mm box (loose mix).

Each workbook contains a separate spreadsheet for the dynamic modulus, unconfined flow number, and confined flow number test results. Except for the confined flow number

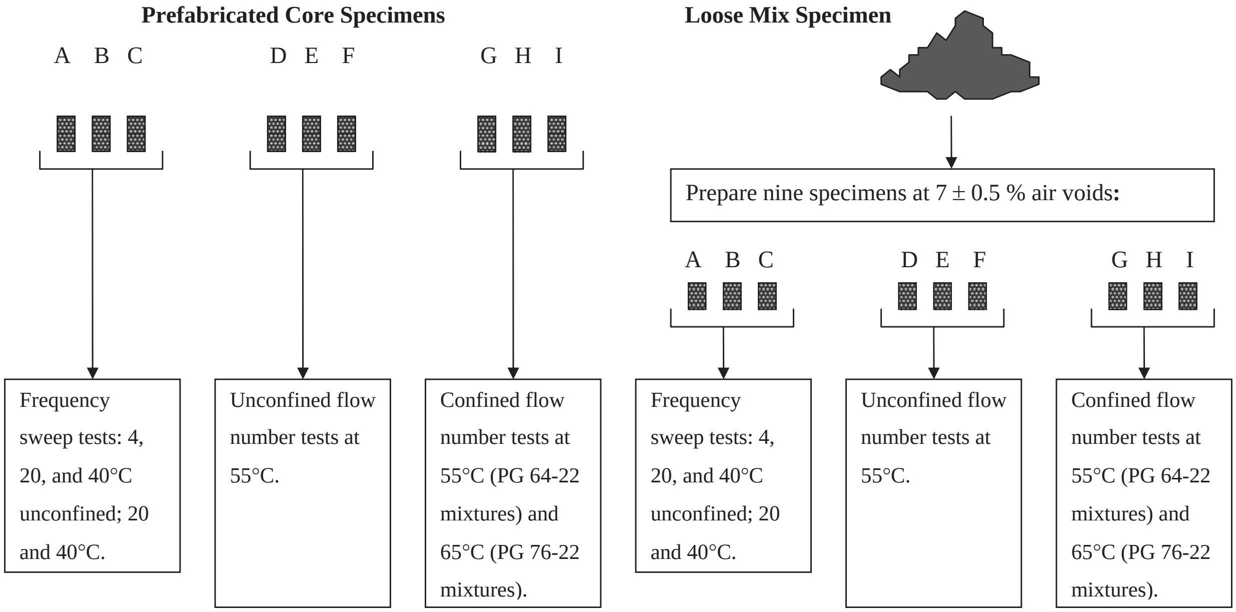

***Figure A1. Flow diagram for interlaboratory study test program.** These activities will be performed for each of three mixtures. Letters represent specimen numbers that will vary.*

results, the data required by these spreadsheets can be cut and pasted from the AMPT output files.

For the confined flow number test, the permanent strain at selected load cycles must be entered manually into the spreadsheet. The completed workbooks should be submitted electronically to aatt@erols.com upon completion of the testing.

2.0 Detailed Instructions for Prefabricated Specimens

The prefabricated specimens were prepared in AAT's laboratory and have been appropriately labeled. These specimens were grouped for the three tests based on their air void content as summarized in Table A1. The specimen identification is also included in the corresponding Excel workbooks.

2.1 Dynamic Modulus Testing

1. Perform dynamic modulus frequency sweep tests on each of the three designated dynamic modulus specimens for each mixture in accordance with AASHTO TP 79, "Standard Method of Test for Determining the Dynamic Modulus and Flow Number for Hot Mix Asphalt (HMA) Using the Asphalt Mixture Performance Tester (AMPT)." Use the following order for the testing:
   a. 20°C confined 69 kPa,
   b. 40°C confined 69 kPa
   c. 4°C unconfined
   d. 20°C unconfined
   e. 40°C unconfined

   For each of the five combinations of temperature and confinement, perform dynamic modulus tests using frequencies of 10, 1, 0.1, and 0.01 Hz, starting with the highest frequency and proceeding to the lowest frequency.
2. Perform unconfined tests without a membrane on the specimen.
3. Prior to conducting confined dynamic modulus tests, confirm that the specimen vent line is vented through the bubble chamber. This can be done by pressurizing the chamber without a specimen and verifying that the chamber vents through the bubble chamber.

   Note: Some AMPT machines have been assembled in such a manner that the specimen vent line is not properly vented through the bubble chamber.
4. Perform all tests using SI units.
5. Ensure that the data quality statistics meet the requirements given in AASHTO TP 79. Repeat tests as needed to obtain data quality statistics meeting the requirements given in AASHTO TP 79.

   Note: Preliminary testing has shown that compensating springs must be used for the tests at 40°C to provide deformation drifts that are in the direction of the applied load.
6. Record the date of testing, dynamic modulus, phase angle, temperature, confining stress, and data quality indicators in the appropriate cells of the dynamic modulus spreadsheet.

   Note: The dynamic modulus spreadsheets have been formatted to allow the data from the output file to be cut and pasted using the transpose option in Excel.

Table A1. Prefabricated specimen grouping.

Group	Specimen Identification		
	9.5 mm	25 mm	12.5 mm
Dynamic modulus	9.5-2	25-2	12.5-4
	9.5-7	25-4	12.5-5
	9.5-9	25-8	12.5-7
Unconfined flow number	9.5-3	25-1	12.5-1
	9.5-4	25-3	12.5-3
	9.5-8	25-7	12.5-6
Confined flow number	9.5-1	25-5	12.5-2
	9.5-5	25-6	12.5-8
	9.5-6	25-9	12.5-9

2.2 Unconfined Flow Number Testing

1. Perform unconfined flow number tests on each of the three designated unconfined flow number specimens at a target test temperature of 55°C using SI units.
2. Use a target repeated deviatoric stress of 600 kPa and a contact deviatoric stress of 30 kPa.
3. Continue the test to the lesser of the number of cycles yielding a permanent strain of 5% or 10,000 cycles.
4. Use the Francken model to determine the flow number.
5. Record the date of test, flow number, average contact stress, maximum load standard error, average temperature, average confining stress, average deviator stress, strain at the flow number, and Francken model error.
   Note: The unconfined flow number spreadsheets have been formatted to allow the data from the output file to be cut and pasted using the transpose option in Excel.

2.3 Confined Flow Number Testing

1. Prior to conducting confined flow number tests, confirm that the specimen vent line is vented through the bubble chamber. This can be done by pressurizing the chamber without a specimen and verifying that the chamber vents through the bubble chamber.
   Note: Some AMPT machines have been assembled in such a manner that the specimen vent line is not properly vented through the bubble chamber.
2. Perform confined flow number tests on each of the three designated confined flow number specimens using SI units. The target test temperatures for the three mixtures are 55°C for the 9.5-mm mixture, 55°C for the 25-mm mixture, and 65°C for the 12.5-mm mixture.
3. Use a confining stress of 69 kPa, a target repeated deviatoric stress of 483 kPa, and a contact deviatoric stress 25 kPa.
4. Continue the test to the lesser of the number of cycles yielding a permanent strain of 5% or 10,000 cycles.
5. Use the Francken model to determine the flow number.
6. Record the date of test, flow number, average contact stress, maximum load standard error, average temperature, average confining stress, average deviator stress, strain at the flow number, and Francken model error.
   Note: Flow will likely not occur in the confined testing, and the Francken model will report a flow number of 10,000.
   Note: The confined flow number spreadsheets have been formatted to allow the data from the output file to be cut and pasted using the transpose option in Excel.
7. Record the measured permanent strain at 10, 30, 100, 300, 1,000, 3,000, and 10,000 load cycles. This data must be manually entered into the confined flow number spreadsheets.

3.0 Detailed Instructions for Loose Mix

3.1 Specimen Preparation

1. Prepare nine AMPT specimens of each mixture to a target air void content of 7.0% ± 0.5% in accordance with AASHTO PP 60, "Preparation of Cylindrical Performance Test Specimens Using the Superpave Gyratory Compactor (SGC)," and the following directions.
2. Heat the loose mixture uncovered at the following temperatures for 2 hours:

Mixture	Temperature,°C
9.5 mm	145
25 mm	145
12.5 mm	155

3. Place the required mass of mixture in the gyratory mold and compact the specimens to the target height used in your laboratory for obtaining uniform specimens.
   Note: Extra loose mix samples have been provided for trial specimens to determine the mass of mixture needed to meet the target air void content at the target height. As initial guidance, AAT used the following mixture masses for 170-mm-tall gyratory specimens in preparing the prefabricated specimens.

Mixture	Mixture Mass, g
9.5 mm	7,300
25 mm	7,325
12.5 mm	7,080

4. Core and saw AMPT specimens meeting the dimensional tolerances specified in AASHTO PP 60.
5. Measure the bulk specific gravity of the AMPT test specimens and compute the test specimen air void content using the following maximum specific gravities:

Mixture	Maximum Specific Gravity
9.5 mm	2.699
25 mm	2.733
12.5 mm	2.643

6. Place the AMPT test specimens into three groups having approximately equal average air void contents and similar ranges. Designate one of the groups for dynamic modulus testing, one for unconfined flow number testing, and one for confined flow number testing.
7. Record the date that each specimen was compacted in the appropriate worksheet.

3.2 Dynamic Modulus Testing

- Conduct dynamic modulus testing and record the resulting data following the procedure described for the prefabricated specimens.

3.3 Unconfined Flow Number Testing

- Conduct unconfined flow number testing and record the resulting data following the procedure described for the prefabricated specimens.

3.4 Confined Flow Number Testing

- Conduct confined flow number testing and record the resulting data following the procedure described for the prefabricated specimens.

APPENDIX B

Loose Mix Dynamic Modulus Test Data

Table B1. Lab 1 loose mix unconfined dynamic modulus data for the 9.5-mm mixture.

	Mix	Compact				UNCONFINED												
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, µst	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_2	4/12/2009	4/12/2009	7.0	4	10	5/20/2009	15031.7	11.8	4.0	0.0	78.2	0.1	6.1	112.3	9.1	34.8	1.1
9.5_2	4/12/2009	4/12/2009	7.0	4	1	5/20/2009	10417.9	17.3	4.0	0.0	94.0	0.0	1.8	143.7	7.1	39.5	0.9
9.5_2	4/12/2009	4/12/2009	7.0	4	0.1	5/20/2009	6503.0	23.2	4.0	0.0	90.6	0.2	1.4	260.1	7.6	40.8	0.7
9.5_2	4/12/2009	4/12/2009	7.0	4	0.01	5/20/2009	3607.6	27.5	4.0	0.0	84.2	2.6	1.5	392.1	8.7	42.1	0.0
9.5_2	4/12/2009	4/12/2009	7.0	20	10	5/21/2009	6090.9	24.4	20.0	0.0	88.4	0.9	4.6	256.9	13.3	12.3	1.4
9.5_2	4/12/2009	4/12/2009	7.0	20	1	5/21/2009	3191.0	29.2	20.0	0.0	88.0	0.1	0.9	210.9	9.8	14.5	1.3
9.5_2	4/12/2009	4/12/2009	7.0	20	0.1	5/21/2009	1481.6	29.8	20.0	0.0	91.2	3.1	1.6	110.6	5.3	21.5	0.7
9.5_2	4/12/2009	4/12/2009	7.0	20	0.01	5/21/2009	710.0	25.0	20.0	0.0	95.8	-0.8	1.7	-1.3	4.5	30.9	0.6
9.5_2	4/12/2009	4/12/2009	7.0	40	10	5/22/2009	1222.9	34.8	40.1	0.0	91.2	1.0	6.5	194.5	16.6	17.2	1.0
9.5_2	4/12/2009	4/12/2009	7.0	40	1	5/22/2009	536.1	27.4	40.1	0.0	101.4	-0.6	3.0	40.3	6.2	20.1	1.5
9.5_2	4/12/2009	4/12/2009	7.0	40	0.1	5/22/2009	301.7	19.0	40.1	0.0	102.8	0.9	2.5	12.1	4.5	17.7	1.4
9.5_2	4/12/2009	4/12/2009	7.0	40	0.01	5/22/2009	249.1	12.0	40.0	0.0	98.0	1.7	3.1	49.3	4.7	17.7	1.0
9.5_3	4/12/2009	4/12/2009	6.8	4	10	5/20/2009	13499.3	12.3	4.3	0.0	86.2	0.4	5.3	123.9	8.7	12.2	0.3
9.5_3	4/12/2009	4/12/2009	6.8	4	1	5/20/2009	9572.7	17.6	4.2	0.0	90.8	-0.1	1.3	155.9	6.0	13.1	0.1
9.5_3	4/12/2009	4/12/2009	6.8	4	0.1	5/20/2009	6111.9	23.9	4.0	0.0	83.2	3.4	1.4	324.7	7.9	12.5	0.3
9.5_3	4/12/2009	4/12/2009	6.8	4	0.01	5/20/2009	3351.1	28.6	4.0	0.0	85.0	0.6	1.5	385.5	9.0	17.2	0.5
9.5_3	4/12/2009	4/12/2009	6.8	20	10	5/21/2009	5906.7	25.0	20.0	0.0	87.2	0.7	4.6	293.3	13.2	13.0	0.0
9.5_3	4/12/2009	4/12/2009	6.8	20	1	5/21/2009	3040.5	30.6	20.0	0.0	86.0	0.0	0.9	292.0	10.3	14.4	0.1
9.5_3	4/12/2009	4/12/2009	6.8	20	0.1	5/21/2009	1408.4	31.9	20.0	0.0	90.0	0.7	1.6	232.2	6.1	17.8	0.3
9.5_3	4/12/2009	4/12/2009	6.8	20	0.01	5/21/2009	664.1	26.4	20.0	0.0	95.6	-1.4	1.7	111.2	4.6	15.6	0.4
9.5_3	4/12/2009	4/12/2009	6.8	40	10	5/22/2009	1114.3	34.8	39.7	0.0	93.8	1.1	6.4	158.8	15.8	23.3	2.2
9.5_3	4/12/2009	4/12/2009	6.8	40	1	5/22/2009	495.6	26.3	39.7	0.0	101.4	0.1	2.1	34.9	5.2	19.9	2.3
9.5_3	4/12/2009	4/12/2009	6.8	40	0.1	5/22/2009	319.8	16.8	39.8	0.0	98.2	3.6	2.5	52.3	4.3	12.8	1.4
9.5_3	4/12/2009	4/12/2009	6.8	40	0.01	5/22/2009	246.7	10.1	40.0	0.0	97.2	-3.2	3.3	48.7	4.9	5.6	1.0
9.5_8	4/12/2009	4/12/2009	7.2	4	10	5/20/2009	15672.8	11.7	4.0	0.0	75.0	0.3	5.3	111.6	8.3	12.8	0.6
9.5_8	4/12/2009	4/12/2009	7.2	4	1	5/20/2009	11061.6	17.1	4.0	0.0	93.4	-0.2	1.4	134.2	5.4	16.4	0.4
9.5_8	4/12/2009	4/12/2009	7.2	4	0.1	5/20/2009	6951.1	22.8	3.2	0.0	89.8	-6.8	1.5	-118.1	7.3	25.3	0.7
9.5_8	4/12/2009	4/12/2009	7.2	4	0.01	5/20/2009	3740.6	26.9	4.0	0.0	81.2	-0.2	1.5	244.4	6.8	36.5	0.8
9.5_8	4/12/2009	4/12/2009	7.2	20	10	5/21/2009	6796.2	25.0	20.1	0.0	88.8	0.8	4.2	302.9	13.6	5.7	1.6
9.5_8	4/12/2009	4/12/2009	7.2	20	1	5/21/2009	3470.3	30.7	20.1	0.0	88.2	0.2	0.8	321.0	11.1	1.1	1.5
9.5_8	4/12/2009	4/12/2009	7.2	20	0.1	5/21/2009	1576.2	32.0	20.0	0.0	89.4	1.7	1.6	270.3	4.8	10.5	0.9
9.5_8	4/12/2009	4/12/2009	7.2	20	0.01	5/21/2009	729.9	27.0	20.0	0.0	92.8	-2.6	1.7	185.3	5.0	28.0	0.9
9.5_8	4/12/2009	4/12/2009	7.2	40	10	5/22/2009	1247.8	35.1	39.8	0.0	91.0	1.1	6.5	179.9	16.1	6.8	0.5
9.5_8	4/12/2009	4/12/2009	7.2	40	1	5/22/2009	531.9	27.4	39.8	0.0	99.4	-0.4	2.0	37.2	5.1	6.3	0.9
9.5_8	4/12/2009	4/12/2009	7.2	40	0.1	5/22/2009	317.4	18.1	39.9	0.0	98.4	2.9	2.6	24.7	4.2	6.7	0.7
9.5_8	4/12/2009	4/12/2009	7.2	40	0.01	5/22/2009	239.6	12.0	40.0	0.0	100.4	-1.5	3.4	18.8	4.6	5.5	1.0

Table B2. Lab 1 Loose mix confined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μst	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_2	4/12/2009	4/12/2009	7.0	4	10												
9.5_2	4/12/2009	4/12/2009	7.0	4	1												
9.5_2	4/12/2009	4/12/2009	7.0	4	0.1												
9.5_2	4/12/2009	4/12/2009	7.0	4	0.01												
9.5_2	4/12/2009	4/12/2009	7.0	20	10	5/26/2009	6229.8	24.3	20.4	68.0	89.4	0.8	4.6	234.3	13.0	18.6	0.7
9.5_2	4/12/2009	4/12/2009	7.0	20	1	5/26/2009	3267.6	28.3	20.5	68.0	89.8	0.4	0.8	184.5	9.5	18.7	0.5
9.5_2	4/12/2009	4/12/2009	7.0	20	0.1	5/26/2009	1617.1	27.8	20.4	68.0	93.0	1.6	1.6	89.4	5.4	13.3	0.1
9.5_2	4/12/2009	4/12/2009	7.0	20	0.01	5/26/2009	835.5	23.7	20.0	68.0	101.6	-1.0	1.7	64.1	4.9	7.6	0.0
9.5_2	4/12/2009	4/12/2009	7.0	40	10	5/22/2009	1660.3	30.2	40.0	68.4	92.4	0.7	5.6	121.4	11.5	7.7	0.5
9.5_2	4/12/2009	4/12/2009	7.0	40	1	5/22/2009	896.1	22.6	40.1	68.4	98.4	0.0	1.6	35.0	5.0	4.8	0.2
9.5_2	4/12/2009	4/12/2009	7.0	40	0.1	5/22/2009	628.4	14.8	40.0	68.4	100.4	4.0	1.9	28.0	4.0	0.2	0.3
9.5_2	4/12/2009	4/12/2009	7.0	40	0.01	5/22/2009	522.6	9.2	40.0	68.4	100.8	-0.8	2.1	11.7	4.1	3.9	0.1
9.5_3	4/12/2009	4/12/2009	6.8	4	10												
9.5_3	4/12/2009	4/12/2009	6.8	4	1												
9.5_3	4/12/2009	4/12/2009	6.8	4	0.1												
9.5_3	4/12/2009	4/12/2009	6.8	4	0.01												
9.5_3	4/12/2009	4/12/2009	6.8	20	10	5/26/2009	6220.8	25.0	20.2	68.0	89.4	0.7	4.5	242.9	12.8	3.3	0.6
9.5_3	4/12/2009	4/12/2009	6.8	20	1	5/26/2009	3296.0	29.8	20.1	68.0	90.0	-0.1	0.8	191.0	9.3	7.5	0.8
9.5_3	4/12/2009	4/12/2009	6.8	20	0.1	5/26/2009	1570.5	29.6	20.1	68.0	95.2	2.4	1.5	92.6	4.1	9.0	0.7
9.5_3	4/12/2009	4/12/2009	6.8	20	0.01	5/26/2009	716.0	25.5	20.0	68.1	90.6	1.7	1.8	87.8	6.0	5.7	1.0
9.5_3	4/12/2009	4/12/2009	6.8	40	10	5/22/2009	1565.7	30.2	40.0	68.4	94.0	1.0	5.7	114.3	11.0	9.8	0.5
9.5_3	4/12/2009	4/12/2009	6.8	40	1	5/22/2009	849.9	21.9	40.0	68.4	98.4	0.2	1.9	29.1	5.1	13.5	1.3
9.5_3	4/12/2009	4/12/2009	6.8	40	0.1	5/22/2009	611.0	14.1	40.0	68.4	100.2	4.0	1.9	28.7	4.1	19.9	0.6
9.5_3	4/12/2009	4/12/2009	6.8	40	0.01	5/22/2009	524.9	8.2	40.0	68.4	100.8	0.4	1.9	13.1	4.0	19.5	0.5
9.5_8	4/12/2009	4/12/2009	7.2	4	10												
9.5_8	4/12/2009	4/12/2009	7.2	4	1												
9.5_8	4/12/2009	4/12/2009	7.2	4	0.1												
9.5_8	4/12/2009	4/12/2009	7.2	4	0.01												
9.5_8	4/12/2009	4/12/2009	7.2	20	10	5/26/2009	7432.7	25.3	20.3	68.3	89.6	0.8	4.1	283.4	12.9	7.9	0.8
9.5_8	4/12/2009	4/12/2009	7.2	20	1	5/26/2009	3808.3	30.8	20.2	68.3	89.0	0.0	0.7	241.7	9.8	7.8	0.8
9.5_8	4/12/2009	4/12/2009	7.2	20	0.1	5/26/2009	1687.5	31.4	20.2	68.2	91.4	2.0	1.5	242.9	3.6	12.3	1.0
9.5_8	4/12/2009	4/12/2009	7.2	20	0.01	5/26/2009	805.3	26.4	20.0	68.0	92.8	0.7	1.7	104.5	5.1	17.0	1.1
9.5_8	4/12/2009	4/12/2009	7.2	40	10	5/22/2009	1624.3	30.6	40.0	68.5	91.6	0.8	6.0	116.6	11.8	1.1	0.2
9.5_8	4/12/2009	4/12/2009	7.2	40	1	5/22/2009	870.7	22.8	40.0	68.4	97.6	0.4	2.0	29.9	5.1	2.3	0.0
9.5_8	4/12/2009	4/12/2009	7.2	40	0.1	5/22/2009	610.5	14.9	40.0	68.5	101.2	6.1	1.9	27.2	3.2	5.5	0.4
9.5_8	4/12/2009	4/12/2009	7.2	40	0.01	5/22/2009	512.2	9.2	40.0	68.4	99.2	-0.4	1.9	3.0	4.0	5.8	0.3

Table B3. Lab 2 loose mix unconfined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_1	5/27/2009	6/3/2009	6.6	4	10	6/10/2009	15497.0	12.3	4.1	0.2	89.0	0.2	1.2	-67.4	2.7	19.2	0.4
9.5_1	5/27/2009	6/3/2009	6.6	4	1	6/10/2009	11110.0	16.7	3.9	0.2	95.0	0.0	0.4	-113.6	2.7	16.7	0.4
9.5_1	5/27/2009	6/3/2009	6.6	4	0.1	6/10/2009	6984.0	22.4	3.9	0.2	96.0	0.0	0.6	-176.5	2.7	16.2	0.5
9.5_1	5/27/2009	6/3/2009	6.6	4	0.01	6/10/2009	3837.0	27.3	4.0	0.2	94.0	0.0	0.5	-148.6	2.8	16.9	0.4
9.5_1	5/27/2009	6/3/2009	6.6	20	10	6/6/2009	5636.0	26.6	19.9	0.8	96.0	0.3	1.7	-352.5	6.9	23.2	0.5
9.5_1	5/27/2009	6/3/2009	6.6	20	1	6/6/2009	2788.0	32.6	20.0	0.6	92.0	0.0	0.5	-382.9	5.9	24.0	0.4
9.5_1	5/27/2009	6/3/2009	6.6	20	0.1	6/6/2009	1177.0	35.3	20.0	0.6	90.0	0.0	0.6	-314.2	4.4	23.7	1.0
9.5_1	5/27/2009	6/3/2009	6.6	20	0.01	6/6/2009	487.5	33.2	20.0	0.5	97.0	0.0	0.7	-107.0	4.3	22.8	1.2
9.5_1	5/27/2009	6/3/2009	6.6	40	10	6/13/2009	1329.0	34.8	40.1	0.0	86.0	0.6	4.1	-209.9	6.6	25.9	0.8
9.5_1	5/27/2009	6/3/2009	6.6	40	1	6/13/2009	480.9	31.3	40.2	0.1	96.0	0.2	1.2	-80.1	4.7	28.2	1.0
9.5_1	5/27/2009	6/3/2009	6.6	40	0.1	6/13/2009	211.6	23.4	40.1	0.1	92.0	-0.1	0.7	-100.8	6.1	30.6	1.0
9.5_1	5/27/2009	6/3/2009	6.6	40	0.01	6/13/2009	151.0	13.9	40.1	0.2	97.0	0.1	1.0	-203.5	9.1	30.7	2.5
9.5_3	5/27/2009	6/3/2009	6.8	4	10	6/10/2009	14724.0	12.3	4.0	0.2	96.0	0.2	1.2	-67.9	2.1	5.1	0.1
9.5_3	5/27/2009	6/3/2009	6.8	4	1	6/10/2009	10514.0	16.7	3.9	0.2	96.0	0.0	0.4	-112.4	2.3	3.7	0.2
9.5_3	5/27/2009	6/3/2009	6.8	4	0.1	6/10/2009	6644.0	22.3	4.0	0.2	96.0	0.0	0.6	-174.6	3.5	2.2	0.1
9.5_3	5/27/2009	6/3/2009	6.8	4	0.01	6/10/2009	3659.0	27.3	3.9	0.2	95.0	0.0	0.5	-139.1	2.5	1.4	0.2
9.5_3	5/27/2009	6/3/2009	6.8	20	10	6/6/2009	5698.0	25.3	19.8	0.7	96.0	0.4	1.7	-322.6	6.5	6.4	0.6
9.5_3	5/27/2009	6/3/2009	6.8	20	1	6/6/2009	2942.0	31.5	19.9	0.6	91.0	0.0	0.4	-347.2	5.7	2.7	0.6
9.5_3	5/27/2009	6/3/2009	6.8	20	0.1	6/6/2009	1288.0	34.3	20.0	0.6	90.0	0.0	0.7	-270.4	5.6	1.5	0.8
9.5_3	5/27/2009	6/3/2009	6.8	20	0.01	6/6/2009	530.4	32.2	19.9	0.5	100.0	0.0	0.7	-86.2	4.0	3.4	0.8
9.5_3	5/27/2009	6/3/2009	6.8	40	10	6/13/2009	1241.0	33.8	40.0	0.3	87.0	0.8	4.4	-151.3	6.0	5.5	0.6
9.5_3	5/27/2009	6/3/2009	6.8	40	1	6/13/2009	463.9	29.7	40.0	0.2	97.0	0.0	1.6	-50.0	5.0	5.4	1.0
9.5_3	5/27/2009	6/3/2009	6.8	40	0.1	6/13/2009	222.4	21.6	40.0	0.2	91.0	0.0	0.8	-73.7	6.4	4.0	1.2
9.5_3	5/27/2009	6/3/2009	6.8	40	0.01	6/13/2009	176.6	12.0	40.1	0.3	93.0	0.1	1.1	-173.0	9.0	2.9	1.6
9.5_7	5/27/2009	6/3/2009	7.0	4	10	6/10/2009	13653.0	12.4	4.1	0.3	95.0	0.2	1.2	-68.8	2.4	28.0	0.3
9.5_7	5/27/2009	6/3/2009	7.0	4	1	6/10/2009	9707.0	16.9	4.1	0.3	95.0	0.0	0.4	-113.8	2.6	25.4	0.2
9.5_7	5/27/2009	6/3/2009	7.0	4	0.1	6/10/2009	6139.0	22.4	4.0	0.3	95.0	0.0	0.6	-174.2	3.2	22.9	0.1
9.5_7	5/27/2009	6/3/2009	7.0	4	0.01	6/10/2009	3431.0	27.4	4.0	0.2	94.0	0.0	0.5	-137.5	2.9	21.3	0.8
9.5_7	5/27/2009	6/3/2009	7.0	20	10	6/6/2009	5664.0	25.4	20.0	0.5	91.0	0.4	1.7	-273.8	6.3	29.2	0.1
9.5_7	5/27/2009	6/3/2009	7.0	20	1	6/6/2009	2881.0	30.7	20.0	0.6	92.0	0.1	0.4	-252.3	4.5	28.8	0.7
9.5_7	5/27/2009	6/3/2009	7.0	20	0.1	6/6/2009	1237.0	33.6	19.9	0.6	92.0	0.0	0.7	-181.3	2.9	28.0	1.5
9.5_7	5/27/2009	6/3/2009	7.0	20	0.01	6/6/2009	514.8	32.1	20.1	0.5	101.0	0.0	0.7	-54.8	4.2	24.9	2.1
9.5_7	5/27/2009	6/3/2009	7.0	40	10	6/13/2009	1164.0	34.0	40.0	0.1	87.0	0.9	4.6	-156.9	6.1	23.0	1.0
9.5_7	5/27/2009	6/3/2009	7.0	40	1	6/13/2009	422.5	30.8	40.1	0.2	97.0	0.3	2.0	-55.3	5.4	24.8	1.2
9.5_7	5/27/2009	6/3/2009	7.0	40	0.1	6/13/2009	203.5	23.1	40.1	0.2	90.0	-0.2	0.9	-62.1	6.7	28.0	1.5
9.5_7	5/27/2009	6/3/2009	7.0	40	0.01	6/13/2009	175.8	13.2	40.1	0.3	90.0	-0.2	1.0	-192.6	10.0	31.9	1.9

Table B4. Lab 2 loose mix confined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_1	5/27/2009	6/3/2009	6.6	4	10												
9.5_1	5/27/2009	6/3/2009	6.6	4	1												
9.5_1	5/27/2009	6/3/2009	6.6	4	0.1												
9.5_1	5/27/2009	6/3/2009	6.6	4	0.01												
9.5_1	5/27/2009	6/3/2009	6.6	20	10	6/9/2009	6166.0	25.4	20.0	68.9	90.0	0.4	1.4	-286.0	6.2	22.7	0.3
9.5_1	5/27/2009	6/3/2009	6.6	20	1	6/9/2009	3226.0	30.4	19.8	69.0	92.0	0.0	0.4	-278.8	5.0	21.8	0.1
9.5_1	5/27/2009	6/3/2009	6.6	20	0.1	6/9/2009	1527.0	31.8	20.0	69.0	90.0	0.0	0.6	-179.1	3.0	21.2	0.4
9.5_1	5/27/2009	6/3/2009	6.6	20	0.01	6/9/2009	848.3	28.6	19.9	69.0	85.0	0.0	0.7	-23.5	3.6	19.6	0.7
9.5_1	5/27/2009	6/3/2009	6.6	40	10	6/11/2009	1588.0	33.1	40.1	69.0	88.0	0.8	2.8	-193.9	5.6	6.6	0.5
9.5_1	5/27/2009	6/3/2009	6.6	40	1	6/11/2009	786.3	27.1	39.9	69.0	93.0	0.2	0.7	-52.4	2.7	5.5	0.6
9.5_1	5/27/2009	6/3/2009	6.6	40	0.1	6/11/2009	516.4	19.9	39.9	69.0	93.0	0.0	0.6	-14.0	2.9	4.1	0.6
9.5_1	5/27/2009	6/3/2009	6.6	40	0.01	6/11/2009	427.2	13.4	40.1	69.0	94.0	-0.2	0.8	12.3	3.4	4.2	0.8
9.5_3	5/27/2009	6/3/2009	6.8	4	10												
9.5_3	5/27/2009	6/3/2009	6.8	4	1												
9.5_3	5/27/2009	6/3/2009	6.8	4	0.1												
9.5_3	5/27/2009	6/3/2009	6.8	4	0.01												
9.5_3	5/27/2009	6/3/2009	6.8	20	10	6/9/2009	6023.0	25.0	20.0	69.0	93.0	0.4	1.8	-280.4	6.2	4.1	0.6
9.5_3	5/27/2009	6/3/2009	6.8	20	1	6/9/2009	3197.0	29.6	19.6	69.0	92.0	0.0	0.4	-261.0	5.1	2.4	0.5
9.5_3	5/27/2009	6/3/2009	6.8	20	0.1	6/9/2009	1532.0	30.9	20.3	69.0	91.0	0.0	0.7	-179.5	5.7	0.6	0.5
9.5_3	5/27/2009	6/3/2009	6.8	20	0.01	6/9/2009	839.1	27.6	20.0	69.0	88.0	0.0	0.6	-59.0	3.2	1.9	0.9
9.5_3	5/27/2009	6/3/2009	6.8	40	10	6/11/2009	1502.0	31.0	40.1	69.0	89.0	0.9	3.1	-123.8	4.4	3.3	0.9
9.5_3	5/27/2009	6/3/2009	6.8	40	1	6/11/2009	779.8	24.7	39.8	69.0	94.0	0.1	0.8	-30.3	2.6	6.3	1.0
9.5_3	5/27/2009	6/3/2009	6.8	40	0.1	6/11/2009	526.4	17.9	40.1	69.0	95.0	0.0	0.7	-9.6	3.0	7.2	0.7
9.5_3	5/27/2009	6/3/2009	6.8	40	0.01	6/11/2009	436.3	12.1	40.2	69.0	95.0	0.0	0.7	13.2	3.7	6.7	0.4
9.5_7	5/27/2009	6/3/2009	7.0	4	10												
9.5_7	5/27/2009	6/3/2009	7.0	4	1												
9.5_7	5/27/2009	6/3/2009	7.0	4	0.1												
9.5_7	5/27/2009	6/3/2009	7.0	4	0.01												
9.5_7	5/27/2009	6/3/2009	7.0	20	10	6/9/2009	5278.0	25.9	20.0	69.1	94.0	0.5	1.6	-298.9	6.4	29.0	0.6
9.5_7	5/27/2009	6/3/2009	7.0	20	1	6/9/2009	2797.0	30.8	19.9	69.0	92.0	0.1	0.4	-281.5	5.4	25.2	1.0
9.5_7	5/27/2009	6/3/2009	7.0	20	0.1	6/9/2009	1380.0	31.4	19.9	69.0	89.0	0.0	0.7	-183.5	4.2	22.0	1.3
9.5_7	5/27/2009	6/3/2009	7.0	20	0.01	6/9/2009	794.2	28.2	20.1	69.0	86.0	0.0	0.6	-52.2	3.2	19.9	1.7
9.5_7	5/27/2009	6/3/2009	7.0	40	10	6/11/2009	1447.0	31.0	40.0	69.0	89.0	0.9	3.7	-125.4	4.8	13.8	0.2
9.5_7	5/27/2009	6/3/2009	7.0	40	1	6/11/2009	751.7	24.7	39.9	69.0	95.0	0.1	0.9	-49.1	2.7	12.5	0.6
9.5_7	5/27/2009	6/3/2009	7.0	40	0.1	6/11/2009	509.0	18.0	40.0	69.0	95.0	0.1	0.7	-25.4	3.0	12.4	0.3
9.5_7	5/27/2009	6/3/2009	7.0	40	0.01	6/11/2009	421.2	12.5	40.0	69.0	96.0	0.0	0.8	2.8	4.0	12.5	0.2

Table B5. Lab 3 loose mix unconfined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_3	09/18/09	12/03/09	7.1	4	10	12/24/2009	16703.0	11.6	4.0	0.6	95.0	0.2	1.4	-56.8	2.1	11.0	0.3
9.5_3	09/18/09	12/03/09	7.1	4	1	12/24/2009	12016.0	15.6	3.7	0.7	99.0	0.1	0.4	-93.2	1.8	12.9	0.5
9.5_3	09/18/09	12/03/09	7.1	4	0.1	12/24/2009	7658.0	21.1	3.9	0.8	101.0	0.0	0.6	-155.6	2.5	12.4	0.3
9.5_3	09/18/09	12/03/09	7.1	4	0.01	12/24/2009	4545.0	25.7	3.9	0.8	95.0	0.0	0.5	-146.1	1.8	11.7	0.1
9.5_3	09/18/09	12/03/09	7.1	20	10	2/23/2010	8001.0	22.0	20.1	0.8	92.0	0.5	3.0	-214.2	5.1	10.6	0.2
9.5_3	09/18/09	12/03/09	7.1	20	1	2/23/2010	4470.0	27.4	20.1	0.9	93.0	0.2	1.0	-249.7	4.8	10.4	0.1
9.5_3	09/18/09	12/03/09	7.1	20	0.1	2/23/2010	2167.0	30.8	20.1	0.8	97.0	0.0	0.5	-194.1	4.0	11.2	0.5
9.5_3	09/18/09	12/03/09	7.1	20	0.01	2/23/2010	927.9	30.1	20.1	0.8	109.0	0.1	0.7	-81.3	3.1	13.5	0.9
9.5_3	09/18/09	12/03/09	7.1	40	10	2/24/2010	2184.0	32.5	40.2	0.4	84.0	0.8	6.1	-153.6	6.5	7.7	0.2
9.5_3	09/18/09	12/03/09	7.1	40	1	2/24/2010	836.9	32.3	40.2	0.5	102.0	0.7	2.6	-100.5	5.4	10.1	0.2
9.5_3	09/18/09	12/03/09	7.1	40	0.1	2/24/2010	328.9	26.6	40.1	0.5	102.0	-0.1	2.0	-51.2	5.0	14.0	0.1
9.5_3	09/18/09	12/03/09	7.1	40	0.01	2/24/2010	171.6	17.1	40.2	0.5	109.0	-0.1	1.4	-92.1	7.7	18.7	0.5
9.5_6	09/18/09	12/03/09	7.3	4	10	2/18/2010	15957.0	11.8	3.5	0.9	94.0	0.1	1.7	-56.4	2.1	7.6	0.4
9.5_6	09/18/09	12/03/09	7.3	4	1	2/18/2010	11527.0	15.6	3.6	0.9	98.0	0.1	0.6	-93.8	1.7	8.7	0.4
9.5_6	09/18/09	12/03/09	7.3	4	0.1	2/18/2010	7507.0	20.6	3.8	0.9	101.0	0.0	0.6	-153.7	2.5	9.4	0.4
9.5_6	09/18/09	12/03/09	7.3	4	0.01	2/18/2010	4609.0	24.9	3.8	0.9	95.0	0.0	0.5	-137.4	2.2	11.1	0.5
9.5_6	09/18/09	12/03/09	7.3	20	10	2/23/2010	8338.0	20.7	19.6	1.0	92.0	0.2	2.9	-180.4	4.7	1.6	0.3
9.5_6	09/18/09	12/03/09	7.3	20	1	2/23/2010	4789.0	26.1	19.7	0.9	94.0	0.2	1.0	-202.8	4.4	1.7	0.5
9.5_6	09/18/09	12/03/09	7.3	20	0.1	2/23/2010	2312.0	29.8	20.1	0.9	99.0	0.0	0.5	-143.6	3.1	1.8	0.6
9.5_6	09/18/09	12/03/09	7.3	20	0.01	2/23/2010	864.9	30.0	20.1	0.8	120.0	-0.1	0.7	-54.4	3.0	2.0	0.9
9.5_6	09/18/09	12/03/09	7.3	40	10	2/24/2010	2018.0	33.0	39.9	0.4	84.0	1.5	6.3	-164.4	7.3	16.3	0.5
9.5_6	09/18/09	12/03/09	7.3	40	1	2/24/2010	770.1	32.4	40.1	0.5	99.0	0.1	2.8	-61.6	3.7	18.3	0.9
9.5_6	09/18/09	12/03/09	7.3	40	0.1	2/24/2010	308.4	27.0	40.2	0.5	101.0	-0.7	2.1	-59.8	4.5	20.4	1.4
9.5_6	09/18/09	12/03/09	7.3	40	0.01	2/24/2010	168.1	16.8	40.2	0.5	106.0	0.0	1.5	-100.7	7.4	19.3	2.1
9.5_9	09/18/09	12/03/09	7	4	10	2/19/2010	17622.0	11.5	3.7	0.9	93.0	0.3	1.7	-51.2	2.0	3.6	0.2
9.5_9	09/18/09	12/03/09	7	4	1	2/19/2010	12874.0	14.8	3.7	0.9	98.0	0.1	0.6	-79.9	1.7	4.3	0.4
9.5_9	09/18/09	12/03/09	7	4	0.1	2/19/2010	8540.0	19.3	3.8	0.9	101.0	0.0	0.6	-122.0	2.3	5.4	0.5
9.5_9	09/18/09	12/03/09	7	4	0.01	2/19/2010	5493.0	23.0	3.8	0.9	94.0	0.0	0.5	-107.9	1.9	6.3	0.5
9.5_9	09/18/09	12/03/09	7	20	10	2/24/2010	8139.0	21.6	20.1	0.6	93.0	0.3	2.9	-191.8	4.8	7.3	0.2
9.5_9	09/18/09	12/03/09	7	20	1	2/24/2010	4607.0	26.6	20.1	0.7	93.0	0.2	0.9	-207.9	4.4	7.1	0.4
9.5_9	09/18/09	12/03/09	7	20	0.1	2/24/2010	2287.0	29.9	20.1	0.7	97.0	-0.1	0.5	-143.5	3.3	7.6	0.6
9.5_9	09/18/09	12/03/09	7	20	0.01	2/24/2010	1037.0	30.0	20.0	0.8	105.0	0.0	0.7	-37.0	2.6	7.7	0.6
9.5_9	09/18/09	12/03/09	7	40	10	2/24/2010	2449.0	31.0	40.1	0.4	85.0	0.8	5.5	-128.0	5.8	7.1	0.3
9.5_9	09/18/09	12/03/09	7	40	1	2/24/2010	982.1	31.4	40.2	0.5	98.0	-0.5	2.1	-51.2	3.4	6.3	0.5
9.5_9	09/18/09	12/03/09	7	40	0.1	2/24/2010	393.6	27.4	40.1	0.5	102.0	0.0	1.8	-51.2	4.2	4.3	1.0
9.5_9	09/18/09	12/03/09	7	40	0.01	2/24/2010	196.9	18.3	40.2	0.6	110.0	-0.1	1.4	-116.8	7.1	5.5	2.1

Table B6. Lab 3 loose mix confined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_3	09/18/09	12/03/09	7.1	4	10	[redacted]											
9.5_3	09/18/09	12/03/09	7.1	4	1												
9.5_3	09/18/09	12/03/09	7.1	4	0.1												
9.5_3	09/18/09	12/03/09	7.1	4	0.01												
9.5_3	09/18/09	12/03/09	7.1	20	10	1/20/2010	7804.0	22.3	19.9	68.8	95.0	0.3	1.8	-222.6	4.6	4.2	0.8
9.5_3	09/18/09	12/03/09	7.1	20	1	1/20/2010	4343.0	28.0	19.7	69.0	96.0	0.1	0.4	-254.7	4.8	3.9	0.8
9.5_3	09/18/09	12/03/09	7.1	20	0.1	1/20/2010	2181.0	30.6	19.8	69.0	96.0	0.0	0.6	-180.9	4.3	4.4	0.4
9.5_3	09/18/09	12/03/09	7.1	20	0.01	1/20/2010	1090.0	28.3	19.9	69.0	99.0	0.0	0.6	-5.9	2.3	5.8	0.1
9.5_3	09/18/09	12/03/09	7.1	40	10	2/23/2010	2103.0	33.4	40.2	69.3	87.0	0.4	2.4	-198.5	4.9	15.6	1.0
9.5_3	09/18/09	12/03/09	7.1	40	1	2/23/2010	964.2	31.4	40.0	69.0	92.0	0.0	0.5	-49.9	2.5	16.2	1.4
9.5_3	09/18/09	12/03/09	7.1	40	0.1	2/23/2010	575.0	26.5	39.9	69.0	87.0	0.0	0.5	33.1	3.3	16.6	1.1
9.5_3	09/18/09	12/03/09	7.1	40	0.01	2/23/2010	436.0	20.0	40.1	69.0	86.0	0.0	0.6	74.4	4.0	15.3	1.3
9.5_6	09/18/09	12/03/09	7.3	4	10	[redacted]											
9.5_6	09/18/09	12/03/09	7.3	4	1												
9.5_6	09/18/09	12/03/09	7.3	4	0.1												
9.5_6	09/18/09	12/03/09	7.3	4	0.01												
9.5_6	09/18/09	12/03/09	7.3	20	10	2/23/2010	8403.0	21.0	19.9	69.2	94.0	0.3	2.1	-185.2	4.2	7.9	0.7
9.5_6	09/18/09	12/03/09	7.3	20	1	2/23/2010	4821.0	26.6	19.6	69.0	95.0	0.1	0.7	-236.7	4.2	8.5	0.7
9.5_6	09/18/09	12/03/09	7.3	20	0.1	2/23/2010	2408.0	30.6	20.0	69.0	98.0	-0.1	0.6	-203.7	4.9	8.6	0.9
9.5_6	09/18/09	12/03/09	7.3	20	0.01	2/23/2010	1077.0	29.1	20.0	69.0	105.0	-0.1	0.8	-15.3	2.0	8.8	1.4
9.5_6	09/18/09	12/03/09	7.3	40	10	2/17/2010	1931.0	32.9	40.5	68.9	86.0	2.0	3.7	-95.5	4.4	16.3	2.1
9.5_6	09/18/09	12/03/09	7.3	40	1	2/17/2010	889.7	30.6	40.2	69.0	94.0	1.5	2.5	57.2	2.8	14.8	2.3
9.5_6	09/18/09	12/03/09	7.3	40	0.1	2/17/2010	533.6	25.6	40.0	69.0	88.0	0.1	2.1	111.7	4.3	12.9	2.3
9.5_6	09/18/09	12/03/09	7.3	40	0.01	2/17/2010	429.7	18.8	40.1	69.0	84.0	-0.1	1.6	97.0	5.1	11.6	2.3
9.5_9	09/18/09	12/03/09	7	4	10	[redacted]											
9.5_9	09/18/09	12/03/09	7	4	1												
9.5_9	09/18/09	12/03/09	7	4	0.1												
9.5_9	09/18/09	12/03/09	7	4	0.01												
9.5_9	09/18/09	12/03/09	7	20	10	2/18/2010	8476.0	21.2	20.3	68.7	98.0	0.5	2.2	-187.9	4.1	1.8	0.7
9.5_9	09/18/09	12/03/09	7	20	1	2/18/2010	4837.0	26.6	20.0	69.0	95.0	0.1	0.8	-236.1	4.1	2.9	0.6
9.5_9	09/18/09	12/03/09	7	20	0.1	2/18/2010	2480.0	30.2	19.9	69.0	96.0	0.0	0.5	-210.5	4.1	4.2	0.5
9.5_9	09/18/09	12/03/09	7	20	0.01	2/18/2010	1244.0	29.3	19.9	69.0	97.0	0.0	0.8	-60.0	2.2	4.9	0.7
9.5_9	09/18/09	12/03/09	7	40	10	2/19/2010	2418.0	31.9	40.5	69.2	86.0	1.3	3.4	-159.2	5.1	8.4	0.7
9.5_9	09/18/09	12/03/09	7	40	1	2/19/2010	1105.0	30.8	40.1	69.0	93.0	-0.3	1.9	-21.2	2.7	6.4	0.9
9.5_9	09/18/09	12/03/09	7	40	0.1	2/19/2010	638.7	25.6	40.0	69.0	89.0	0.4	1.9	23.9	2.9	2.9	0.9
9.5_9	09/18/09	12/03/09	7	40	0.01	2/19/2010	467.9	18.4	40.1	69.0	91.0	0.2	1.4	26.2	3.4	1.5	1.2

Table B7. Lab 4 loose mix unconfined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
8	11/03/09	04/06/10	8.0	4	10	5/18/2010	13680.0	12.2	4.5	1.7	93.0	0.4	2.2	-60.6	2.5	24.2	0.7
8	11/03/09	04/06/10	8.0	4	1	5/18/2010	9536.0	16.9	4.4	1.6	95.0	0.0	0.8	-116.6	2.6	26.1	1.0
8	11/03/09	04/06/10	8.0	4	0.1	5/18/2010	5887.0	23.0	4.2	1.7	97.0	0.0	0.9	-199.6	3.1	27.9	1.2
8	11/03/09	04/06/10	8.0	4	0.01	5/18/2010	3354.0	28.2	3.5	1.7	90.0	-0.1	0.6	-204.9	3.3	28.0	1.0
8	11/03/09	04/06/10	8.0	20	10	5/18/2010	5277.0	25.6	19.9	1.6	92.0	0.2	4.0	-253.9	5.8	22.3	0.7
8	11/03/09	04/06/10	8.0	20	1	5/18/2010	2613.0	32.2	19.9	1.7	91.0	0.2	1.6	-302.0	5.2	24.9	0.1
8	11/03/09	04/06/10	8.0	20	0.1	5/18/2010	1093.0	35.5	19.9	1.7	91.0	0.2	3.0	-207.7	8.6	25.9	1.3
8	11/03/09	04/06/10	8.0	20	0.01	5/18/2010	432.3	34.0	19.9	1.6	101.0	0.4	2.4	-38.1	3.6	23.5	2.1
8	11/03/09	04/06/10	8.0	40	10	5/18/2010	1111.0	35.4	43.2	1.0	81.0	0.9	8.3	-215.8	9.1	2.3	0.6
8	11/03/09	04/06/10	8.0	40	1	5/18/2010	358.9	34.1	43.2	1.0	105.0	0.3	10.3	-42.7	9.0	5.6	1.1
8	11/03/09	04/06/10	8.0	40	0.1	5/18/2010	134.3	29.2	43.4	1.0	97.0	0.2	7.6	53.5	11.3	13.5	0.7
8	11/03/09	04/06/10	8.0	40	0.01	5/18/2010	61.5	22.3	43.0	1.1	111.0	2.0	11.5	311.2	8.4	22.7	1.5
10	11/03/09	04/06/10	7.7	4	10	5/18/2010	15113.0	12.0	4.3	1.6	92.0	0.2	2.2	-56.7	8.2	1.7	0.5
10	11/03/09	04/06/10	7.7	4	1	5/18/2010	10792.0	16.8	4.3	1.7	97.0	0.1	0.8	-108.4	8.0	2.3	0.4
10	11/03/09	04/06/10	7.7	4	0.1	5/18/2010	6858.0	22.0	4.2	1.7	98.0	-0.2	0.7	-186.8	8.1	3.9	1.2
10	11/03/09	04/06/10	7.7	4	0.01	5/18/2010	3969.0	27.5	3.6	1.6	92.0	0.0	0.6	-183.9	4.3	5.2	1.0
10	11/03/09	04/06/10	7.7	20	10	5/18/2010	6007.0	24.7	19.9	1.5	92.0	0.4	4.3	-244.2	6.0	7.3	0.2
10	11/03/09	04/06/10	7.7	20	1	5/18/2010	3061.0	30.5	19.8	1.5	91.0	0.2	1.6	-253.9	5.2	7.6	0.2
10	11/03/09	04/06/10	7.7	20	0.1	5/18/2010	1321.0	33.0	19.8	1.5	92.0	-0.1	2.4	-125.7	3.6	8.3	0.4
10	11/03/09	04/06/10	7.7	20	0.01	5/18/2010	512.0	31.5	20.0	1.5	106.0	-0.3	2.2	22.2	3.3	10.3	0.5
10	11/03/09	04/06/10	7.7	40	10	5/18/2010	890.2	36.9	41.7	1.1	88.0	1.2	8.7	-165.8	8.3	17.7	1.2
10	11/03/09	04/06/10	7.7	40	1	5/18/2010	260.6	37.2	41.7	1.1	109.0	0.2	7.5	-27.6	5.6	13.8	2.0
10	11/03/09	04/06/10	7.7	40	0.1	5/18/2010	82.1	33.7	41.7	1.1	99.0	-0.6	11.6	55.3	5.4	12.2	1.9
10	11/03/09	04/06/10	7.7	40	0.01	5/18/2010	30.2	29.7	41.5	1.1	89.0	15.6	219.4	520.2	58.8	15.5	2.0
11	11/03/09	04/30/10	7.9	4	10	5/18/2010	14348.0	12.8	4.3	1.7	93.0	0.2	2.3	-64.7	4.1	5.5	0.4
11	11/03/09	04/30/10	7.9	4	1	5/18/2010	9974.0	17.5	4.3	1.7	95.0	0.1	0.8	-116.9	3.9	5.5	0.5
11	11/03/09	04/30/10	7.9	4	0.1	5/18/2010	6202.0	23.1	4.3	1.7	97.0	0.1	0.8	-185.3	4.6	6.1	0.5
11	11/03/09	04/30/10	7.9	4	0.01	5/18/2010	3511.0	28.0	4.1	1.6	92.0	-0.1	0.6	-157.4	3.6	5.5	0.5
11	11/03/09	04/30/10	7.9	20	10	5/18/2010	6393.0	24.1	19.6	1.6	92.0	0.2	4.1	-240.1	5.7	0.3	0.2
11	11/03/09	04/30/10	7.9	20	1	5/18/2010	3286.0	30.4	19.5	1.6	92.0	0.7	1.4	-277.5	4.8	2.0	0.1
11	11/03/09	04/30/10	7.9	20	0.1	5/18/2010	1424.0	33.7	19.9	1.6	92.0	-0.1	2.3	-169.3	3.3	3.5	0.2
11	11/03/09	04/30/10	7.9	20	0.01	5/18/2010	550.5	33.0	20.0	1.6	104.0	0.3	1.8	-11.7	3.0	5.0	0.5
11	11/03/09	04/30/10	7.9	40	10	5/18/2010	1142.0	36.9	42.2	1.1	81.0	1.0	7.9	-278.5	8.8	9.9	1.2
11	11/03/09	04/30/10	7.9	40	1	5/18/2010	374.0	35.8	42.4	1.1	105.0	0.5	6.6	-80.4	6.1	11.2	1.2
11	11/03/09	04/30/10	7.9	40	0.1	5/18/2010	129.2	31.4	42.8	1.1	99.0	-0.1	8.8	52.7	5.2	12.2	1.2
11	11/03/09	04/30/10	7.9	40	0.01	5/18/2010	52.6	24.1	42.4	1.1	97.0	8.9	73.5	317.7	21.6	14.0	2.0

Table B8. Lab 4 loose mix confined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
8	11/03/09	04/06/10	8.0	4	10	[redacted]											
8	11/03/09	04/06/10	8.0	4	1												
8	11/03/09	04/06/10	8.0	4	0.1												
8	11/03/09	04/06/10	8.0	4	0.01												
8	11/03/09	04/06/10	8.0	20	10	5/18/2010	5463.0	26.2	20.0	69.0	92.0	0.5	3.2	-268.6	5.0	24.6	0.3
8	11/03/09	04/06/10	8.0	20	1	5/18/2010	2756.0	32.9	19.6	69.0	92.0	0.4	1.4	-373.3	4.7	26.8	0.9
8	11/03/09	04/06/10	8.0	20	0.1	5/18/2010	1257.0	35.7	19.8	69.0	89.0	0.0	2.5	-344.5	8.5	27.3	1.3
8	11/03/09	04/06/10	8.0	20	0.01	5/18/2010	616.8	33.5	19.8	69.0	86.0	0.1	2.0	-71.2	2.7	29.9	1.6
8	11/03/09	04/06/10	8.0	40	10	5/19/2010	1103.0	36.6	39.9	69.0	87.0	0.3	7.8	-262.1	8.1	16.1	0.7
8	11/03/09	04/06/10	8.0	40	1	5/19/2010	399.0	34.7	40.0	69.0	98.0	-2.7	5.7	-61.4	5.7	17.9	0.6
8	11/03/09	04/06/10	8.0	40	0.1	5/19/2010	181.1	28.8	40.3	69.0	89.0	0.3	6.5	-16.5	4.3	20.8	1.3
8	11/03/09	04/06/10	8.0	40	0.01	5/19/2010	111.2	22.1	40.5	69.0	95.0	0.3	4.0	-17.9	4.8	24.0	0.3
10	11/03/09	04/06/10	7.7	4	10	[redacted]											
10	11/03/09	04/06/10	7.7	4	1												
10	11/03/09	04/06/10	7.7	4	0.1												
10	11/03/09	04/06/10	7.7	4	0.01												
10	11/03/09	04/06/10	7.7	20	10	5/18/2010	5956.0	24.6	19.5	69.0	92.0	0.4	3.1	-253.6	5.6	15.1	0.9
10	11/03/09	04/06/10	7.7	20	1	5/18/2010	3046.0	30.9	19.2	69.0	92.0	0.3	1.2	-323.7	5.2	15.4	0.6
10	11/03/09	04/06/10	7.7	20	0.1	5/18/2010	1433.0	33.6	19.2	69.0	89.0	0.4	2.3	-257.1	4.6	14.2	0.2
10	11/03/09	04/06/10	7.7	20	0.01	5/18/2010	768.9	31.2	19.7	69.0	83.0	0.0	2.1	-50.3	3.5	13.2	0.3
10	11/03/09	04/06/10	7.7	40	10	5/19/2010	1460.0	32.7	41.0	69.0	89.0	1.5	6.2	-206.4	6.1	9.7	1.0
10	11/03/09	04/06/10	7.7	40	1	5/19/2010	729.5	27.4	41.6	69.0	97.0	-0.3	3.3	-114.5	3.7	10.2	1.2
10	11/03/09	04/06/10	7.7	40	0.1	5/19/2010	485.9	20.4	42.6	69.0	93.0	-0.4	4.3	-107.6	4.1	10.3	0.2
10	11/03/09	04/06/10	7.7	40	0.01	5/19/2010	406.0	13.5	42.0	69.0	90.0	-0.7	2.9	-50.9	3.3	7.1	0.1
11	11/03/09	04/30/10	7.9	4	10	[redacted]											
11	11/03/09	04/30/10	7.9	4	1												
11	11/03/09	04/30/10	7.9	4	0.1												
11	11/03/09	04/30/10	7.9	4	0.01												
11	11/03/09	04/30/10	7.9	20	10	5/18/2010	6026.0	25.6	19.7	69.0	91.0	0.5	3.1	-248.9	4.8	19.9	1.9
11	11/03/09	04/30/10	7.9	20	1	5/18/2010	3087.0	31.3	19.8	69.0	92.0	0.5	1.3	-329.1	5.0	20.0	1.8
11	11/03/09	04/30/10	7.9	20	0.1	5/18/2010	1449.0	32.8	19.9	69.0	91.0	-0.2	2.4	-252.9	4.9	18.5	1.1
11	11/03/09	04/30/10	7.9	20	0.01	5/18/2010	751.0	29.7	19.8	69.0	88.0	-0.3	1.7	-4.4	3.2	14.3	0.3
11	11/03/09	04/30/10	7.9	40	10	5/19/2010	1344.0	31.2	42.4	69.0	88.0	0.8	6.0	-157.3	5.6	16.4	0.8
11	11/03/09	04/30/10	7.9	40	1	5/19/2010	686.0	25.2	42.5	69.0	98.0	-0.4	3.3	-74.0	3.5	15.8	0.7
11	11/03/09	04/30/10	7.9	40	0.1	5/19/2010	471.3	17.8	42.6	69.0	96.0	-0.5	4.3	-46.1	3.5	14.6	1.0
11	11/03/09	04/30/10	7.9	40	0.01	5/19/2010	396.7	11.9	42.0	69.0	95.0	0.1	2.8	-12.0	3.3	13.6	0.8

Table B9. Lab 5 loose mix unconfined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5-1	12/08/09	01/26/10	6.8	4	10	3/9/2010	14148.0	12.6	4.0	0.8	88	0.6	1.8	-72.0	2.6	32.0	0
9.5-1	12/08/09	01/26/10	6.8	4	1	3/9/2010	10039.0	17.0	4.0	0.8	95	0.1	0.4	-120.2	2.5	29.9	0.1
9.5-1	12/08/09	01/26/10	6.8	4	0.1	3/9/2010	6337.0	22.8	4.0	0.8	94	0	0.2	-202.9	3.4	27.8	0.2
9.5-1	12/08/09	01/26/10	6.8	4	0.01	3/9/2010	3750.0	27.5	4.0	0.8	89	0	0.4	-217.3	3.1	24.8	0.4
9.5-1	12/08/09	01/26/10	6.8	20	10	3/9/2010	6838.0	23.3	19.9	0.2	89	0.5	2.1	-261.3	5.7	24.9	0.2
9.5-1	12/08/09	01/26/10	6.8	20	1	3/9/2010	3657.0	29.4	20.0	0.2	93	0	0.6	-300.3	5.2	22.8	0.4
9.5-1	12/08/09	01/26/10	6.8	20	0.1	3/9/2010	1692.0	33.0	19.8	0.0	90	0	0.3	-286.0	4.5	22.7	0.7
9.5-1	12/08/09	01/26/10	6.8	20	0.01	3/9/2010	707.7	31.3	20.1	0.3	102	0.1	0.5	-213.7	3.9	20.7	0.8
9.5-1	12/08/09	01/26/10	6.8	40	10	3/11/2010	1283.0	34.3	40.3	0.1	85	0.4	4.9	-210.1	6.6	20.4	1.5
9.5-1	12/08/09	01/26/10	6.8	40	1	3/11/2010	487.0	29.8	40.3	0.1	96	0.1	1.7	-74.3	4.5	19.9	1.7
9.5-1	12/08/09	01/26/10	6.8	40	0.1	3/11/2010	228.1	21.0	40.3	0.1	92	-0.2	1.8	-71.5	5.8	16.5	1.8
9.5-1	12/08/09	01/26/10	6.8	40	0.01	3/11/2010	170.2	11.6	39.8	0.1	97	-0.1	1.1	-149.4	8.1	11.2	2.8
9.5-2	12/08/09	01/28/10	6.6	4	10	3/9/2010	14697.0	11.9	4.1	0.8	92	0.1	1.5	-63.7	2.1	7.3	0.5
9.5-2	12/08/09	01/28/10	6.6	4	1	3/9/2010	10505.0	16.0	4.0	0.8	96	0.1	0.4	-105.4	2.0	7.6	0.4
9.5-2	12/08/09	01/28/10	6.6	4	0.1	3/9/2010	6748.0	21.6	3.9	0.8	96	0	0.2	-188.7	2.9	7.5	0.5
9.5-2	12/08/09	01/28/10	6.6	4	0.01	3/9/2010	3944.0	26.9	3.9	0.8	93	0	0.4	-226.2	3.2	7.4	0.3
9.5-2	12/08/09	01/28/10	6.6	20	10	3/9/2010	6205.0	24.6	20.1	0.4	89	0.3	2.1	-309.1	6.4	12.4	0.4
9.5-2	12/08/09	01/28/10	6.6	20	1	3/9/2010	3250.0	30.8	20.1	0.4	91	0	0.6	-358.4	6.2	13.6	0.2
9.5-2	12/08/09	01/28/10	6.6	20	0.1	3/9/2010	1459.0	34.3	20.1	0.4	88	-0.1	0.4	-333.2	5.6	14.4	0.2
9.5-2	12/08/09	01/28/10	6.6	20	0.01	3/9/2010	624.1	32.3	20.1	0.4	97	0	0.5	-175.8	4.3	14.1	0.7
9.5-2	12/08/09	01/28/10	6.6	40	10	3/10/2010	1315.0	34.4	40.0	0.2	87	0.2	4.8	-191.3	6.6	19.8	0.4
9.5-2	12/08/09	01/28/10	6.6	40	1	3/10/2010	468.6	31.5	40.0	0.2	97	0.1	1.7	-51.3	4.2	17.2	0.7
9.5-2	12/08/09	01/28/10	6.6	40	0.1	3/10/2010	203.7	23.8	40.1	0.2	94	0.9	2.0	-45.7	5.0	17.1	0.2
9.5-2	12/08/09	01/28/10	6.6	40	0.01	3/10/2010	136.9	13.3	39.7	0.2	98	0.2	1.2	-95.4	6.9	18.5	1.7
9.5-4	12/08/09	02/01/10	7.1	4	10	3/9/2010	15095.0	12.7	4.0	0.7	93	0.5	2.0	-73.8	2.6	31.1	0.2
9.5-4	12/08/09	02/01/10	7.1	4	1	3/9/2010	10624.0	17.2	4.0	0.7	98	-0.1	0.4	-124.8	2.2	27.9	0.2
9.5-4	12/08/09	02/01/10	7.1	4	0.1	3/9/2010	6653.0	23.1	4.0	0.6	97	0	0.2	-225.5	3.4	24.5	0.4
9.5-4	12/08/09	02/01/10	7.1	4	0.01	3/9/2010	3735.0	28.5	4.0	0.6	93	0	0.4	-246.4	3.4	22.2	0.5
9.5-4	12/08/09	02/01/10	7.1	20	10	3/10/2010	5218.0	28.0	20.1	0.6	91	0.5	2.5	-420.6	7.7	12.8	0.2
9.5-4	12/08/09	02/01/10	7.1	20	1	3/10/2010	2523.0	34.0	20.1	0.7	91	0	0.7	-431.0	7.1	11.2	0.6
9.5-4	12/08/09	02/01/10	7.1	20	0.1	3/10/2010	1078.0	35.2	20.2	0.7	88	0	0.5	-346.9	6.2	12.5	0.9
9.5-4	12/08/09	02/01/10	7.1	20	0.01	3/10/2010	509.2	30.6	20.1	0.7	92	0	0.6	-161.3	5.0	13.8	0.9
9.5-4	12/08/09	02/01/10	7.1	40	10	3/10/2010	1204.0	34.4	39.8	0.2	85	0.2	5.3	-172.2	6.2	8.1	0.5
9.5-4	12/08/09	02/01/10	7.1	40	1	3/10/2010	436.7	29.9	39.7	0.2	97	0	1.9	-68.3	4.8	11.1	0.6
9.5-4	12/08/09	02/01/10	7.1	40	0.1	3/10/2010	204.5	20.0	39.8	0.4	92	-0.2	1.9	-106.6	6.1	11.8	0.2
9.5-4	12/08/09	02/01/10	7.1	40	0.01	3/10/2010	160.7	9.1	39.8	0.3	96	-0.2	1.0	-288.4	8.3	12.8	1.1

Table B10. Lab 5 loose mix confined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5-1	12/08/09	01/26/10	6.8	4	10												
9.5-1	12/08/09	01/26/10	6.8	4	1												
9.5-1	12/08/09	01/26/10	6.8	4	0.1												
9.5-1	12/08/09	01/26/10	6.8	4	0.01												
9.5-1	12/08/09	01/26/10	6.8	20	10	3/26/2010	6045.0	24.6	20.2	69.0	95.0	0.5	2.2	-279.7	6.4	9.1	0.2
9.5-1	12/08/09	01/26/10	6.8	20	1	3/26/2010	3144.0	29.5	20.0	69.0	93.0	0.0	0.7	-230.8	5.2	8.9	0.3
9.5-1	12/08/09	01/26/10	6.8	20	0.1	3/26/2010	1438.0	30.9	20.0	69.0	91.0	0.2	0.4	-120.7	3.6	6.9	0.4
9.5-1	12/08/09	01/26/10	6.8	20	0.01	3/26/2010	685.5	28.1	19.9	69.0	97.0	-0.1	0.5	-23.1	3.7	4.2	0.6
9.5-1	12/08/09	01/26/10	6.8	40	10	4/1/2010	1526.0	33.2	40.2	69.0	85.0	0.5	4.3	-162.3	6.5	20.2	0.4
9.5-1	12/08/09	01/26/10	6.8	40	1	4/1/2010	632.1	30.0	40.1	69.0	93.0	0.0	0.9	-20.0	3.1	17.9	0.6
9.5-1	12/08/09	01/26/10	6.8	40	0.1	4/1/2010	285.5	24.3	39.7	69.0	97.0	0.2	0.7	-74.3	5.6	17.0	0.5
9.5-1	12/08/09	01/26/10	6.8	40	0.01	4/1/2010	177.6	14.5	39.7	69.0	98.0	0.2	0.9	-158.8	10.2	24.1	1.1
9.5-2	12/08/09	01/28/10	6.6	4	10												
9.5-2	12/08/09	01/28/10	6.6	4	1												
9.5-2	12/08/09	01/28/10	6.6	4	0.1												
9.5-2	12/08/09	01/28/10	6.6	4	0.01												
9.5-2	12/08/09	01/28/10	6.6	20	10	3/26/2010	6201.0	24.7	20.2	69.0	92.0	0.4	2.1	-298.1	6.2	11.7	0.3
9.5-2	12/08/09	01/28/10	6.6	20	1	3/26/2010	3231.0	30.3	20.0	69.0	92.0	-0.1	0.6	-298.8	6.0	9.9	0.8
9.5-2	12/08/09	01/28/10	6.6	20	0.1	3/26/2010	1465.0	32.6	20.0	69.0	90.0	0.0	0.4	-207.7	5.0	8.5	1.1
9.5-2	12/08/09	01/28/10	6.6	20	0.01	3/26/2010	678.1	30.1	19.9	69.0	96.0	0.0	0.5	-58.1	3.4	6.5	1.1
9.5-2	12/08/09	01/28/10	6.6	40	10	4/1/2010	1574.0	33.7	40.1	69.0	84.0	0.5	4.5	-226.1	7.2	7.7	0.8
9.5-2	12/08/09	01/28/10	6.6	40	1	4/1/2010	628.6	30.8	40.1	69.0	93.0	0.3	1.0	-53.9	3.5	5.3	1.3
9.5-2	12/08/09	01/28/10	6.6	40	0.1	4/1/2010	292.3	24.6	39.9	69.0	91.0	-0.1	0.7	-47.0	4.2	3.5	1.5
9.5-2	12/08/09	01/28/10	6.6	40	0.01	4/1/2010	191.3	14.2	39.8	69.0	96.0	0.4	0.9	-89.7	7.2	5.4	2.1
9.5-4	12/08/09	02/01/10	7.1	4	10												
9.5-4	12/08/09	02/01/10	7.1	4	1												
9.5-4	12/08/09	02/01/10	7.1	4	0.1												
9.5-4	12/08/09	02/01/10	7.1	4	0.01												
9.5-4	12/08/09	02/01/10	7.1	20	10	3/29/2010	2715.0	28.4	20.3	69.0	86.0	0.1	3.9	-123.5	8.9	65.5	0.4
9.5-4	12/08/09	02/01/10	7.1	20	1	3/29/2010	1322.0	31.9	20.3	69.0	89.0	0.1	1.5	-119.2	5.7	67.7	1.6
9.5-4	12/08/09	02/01/10	7.1	20	0.1	3/29/2010	599.6	29.6	20.6	69.0	87.0	-0.2	1.0	-135.3	5.0	69.0	3.6
9.5-4	12/08/09	02/01/10	7.1	20	0.01	3/29/2010	360.7	24.9	20.0	69.0	86.0	0.1	0.7	-32.6	6.2	69.6	4.6
9.5-4	12/08/09	02/01/10	7.1	40	10	3/31/2010	1411.0	34.3	41.0	69.0	84.0	1.5	4.5	-195.6	6.4	21.9	1.2
9.5-4	12/08/09	02/01/10	7.1	40	1	3/31/2010	549.2	30.8	41.0	69.0	94.0	0.3	1.0	-38.6	3.4	23.4	1.7
9.5-4	12/08/09	02/01/10	7.1	40	0.1	3/31/2010	250.4	23.6	40.8	69.0	94.0	0.0	0.8	-38.8	4.4	24.1	1.8
9.5-4	12/08/09	02/01/10	7.1	40	0.01	3/31/2010	156.5	13.6	40.2	69.0	101.0	0.2	1.0	-67.5	7.6	27.7	3.2

Table B11. Lab 6 loose mix unconfined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
2	11/12/09	02/01/10	6.4	4	10	3/12/2010	17856.0	10.8	3.8	0.3	96.0	0.5	1.6	-46.3	2.0	8.1	0.5
2	11/12/09	02/01/10	6.4	4	1	3/12/2010	13204.0	14.4	3.8	0.3	99.0	0.1	0.4	-77.1	1.6	9.1	0.5
2	11/12/09	02/01/10	6.4	4	0.1	3/12/2010	8825.0	19.3	4.3	0.3	108.0	0.0	0.3	-154.4	3.2	10.7	0.6
2	11/12/09	02/01/10	6.4	4	0.01	3/12/2010	5265.0	24.5	4.5	0.3	101.0	0.0	0.3	-153.3	1.3	11.3	0.5
2	11/12/09	02/01/10	6.4	20	10	3/16/2010	7794.0	22.1	19.9	0.1	96.0	0.3	2.2	-208.0	4.6	9.8	0.2
2	11/12/09	02/01/10	6.4	20	1	3/16/2010	4328.0	27.8	19.9	0.1	95.0	0.1	0.6	-249.2	4.2	8.4	0.1
2	11/12/09	02/01/10	6.4	20	0.1	3/16/2010	2116.0	31.7	19.9	0.1	98.0	0.0	0.2	-224.3	3.7	7.1	0.2
2	11/12/09	02/01/10	6.4	20	0.01	3/16/2010	966.4	31.5	19.8	0.1	102.0	0.0	0.4	-81.2	2.7	6.4	0.8
2	11/12/09	02/01/10	6.4	40	10	3/17/2010	1943.0	33.9	40.1	0.2	83.0	0.4	4.9	-326.4	9.8	3.6	0.2
2	11/12/09	02/01/10	6.4	40	1	3/17/2010	783.1	32.2	40.2	0.2	96.0	0.3	1.7	-129.3	3.9	4.4	0.2
2	11/12/09	02/01/10	6.4	40	0.1	3/17/2010	330.8	26.3	40.2	0.2	100.0	0.0	0.4	-77.2	4.7	5.6	0.8
2	11/12/09	02/01/10	6.4	40	0.01	3/17/2010	181.3	17.2	39.9	0.0	106.0	0.2	0.7	-125.0	7.1	5.9	2.0
3	11/12/09	02/01/10	7.0	4	10	3/12/2010	16253.0	11.1	4.2	0.4	93.0	0.3	1.5	-50.3	2.5	8.7	0.3
3	11/12/09	02/01/10	7.0	4	1	3/12/2010	11870.0	14.8	4.2	0.4	95.0	0.1	0.5	-85.5	2.3	7.6	0.2
3	11/12/09	02/01/10	7.0	4	0.1	3/12/2010	7760.0	20.0	4.3	0.3	100.0	0.0	0.3	-148.8	2.8	6.1	0.3
3	11/12/09	02/01/10	7.0	4	0.01	3/12/2010	4569.0	25.1	4.1	0.1	98.0	0.0	0.3	-160.6	2.3	5.4	0.4
3	11/12/09	02/01/10	7.0	20	10	3/16/2010	7367.0	21.9	19.9	0.2	93.0	0.4	2.6	-214.9	4.8	2.0	0.6
3	11/12/09	02/01/10	7.0	20	1	3/16/2010	3999.0	27.9	19.9	0.2	93.0	0.2	0.7	-268.1	4.5	3.0	0.8
3	11/12/09	02/01/10	7.0	20	0.1	3/16/2010	1882.0	31.9	19.8	0.1	96.0	0.0	0.2	-250.8	4.3	4.4	1.1
3	11/12/09	02/01/10	7.0	20	0.01	3/16/2010	798.4	31.7	19.8	0.2	106.0	0.0	0.4	-104.9	3.4	5.9	1.2
3	11/12/09	02/01/10	7.0	40	10	3/17/2010	1608.0	34.8	40.2	0.0	81.0	0.0	5.8	-314.6	9.1	3.2	0.9
3	11/12/09	02/01/10	7.0	40	1	3/17/2010	558.8	34.4	40.2	0.0	99.0	0.3	2.3	-105.9	4.7	6.4	1.5
3	11/12/09	02/01/10	7.0	40	0.1	3/17/2010	189.9	31.5	40.2	0.0	106.0	0.1	0.6	-21.8	4.5	7.1	2.2
3	11/12/09	02/01/10	7.0	40	0.01	3/17/2010	76.2	27.0	40.1	0.0	118.0	0.0	1.1	113.1	5.5	6.9	1.6
9	11/12/09	02/01/10	6.4	4	10	3/15/2010	15316.0	10.2	3.9	0.3	95.0	0.3	1.4	-39.3	2.6	28.1	0.3
9	11/12/09	02/01/10	6.4	4	1	3/15/2010	11560.0	13.4	3.9	0.3	97.0	0.0	0.4	-62.2	2.3	27.6	0.4
9	11/12/09	02/01/10	6.4	4	0.1	3/15/2010	7996.0	17.7	3.9	0.3	101.0	0.0	0.3	-104.9	2.5	27.3	0.6
9	11/12/09	02/01/10	6.4	4	0.01	3/15/2010	5158.0	22.1	3.8	0.3	97.0	0.0	0.3	-131.3	2.2	27.1	0.8
9	11/12/09	02/01/10	6.4	20	10	3/16/2010	7298.0	20.3	19.9	0.0	94.0	0.3	2.5	-160.8	4.3	25.8	0.8
9	11/12/09	02/01/10	6.4	20	1	3/16/2010	4252.0	25.9	19.9	0.1	94.0	0.1	0.7	-208.8	3.9	25.0	1.0
9	11/12/09	02/01/10	6.4	20	0.1	3/16/2010	2182.0	30.5	19.8	0.0	97.0	0.0	0.2	-214.5	3.9	25.7	1.3
9	11/12/09	02/01/10	6.4	20	0.01	3/16/2010	1015.0	31.8	19.8	0.1	102.0	0.0	0.4	-97.5	3.0	28.7	1.8
9	11/12/09	02/01/10	6.4	40	10	3/17/2010	1807.0	34.4	40.2	0.0	82.0	0.3	4.9	-345.6	10.0	16.4	1.4
9	11/12/09	02/01/10	6.4	40	1	3/17/2010	715.8	35.3	40.2	0.0	95.0	0.3	1.8	-147.3	4.0	21.5	2.4
9	11/12/09	02/01/10	6.4	40	0.1	3/17/2010	271.6	33.3	40.2	0.0	103.0	0.1	0.6	-53.6	3.4	26.7	3.4
9	11/12/09	02/01/10	6.4	40	0.01	3/17/2010	110.1	29.3	40.1	0.0	115.0	-0.1	0.8	57.4	5.1	29.1	4.1

Table B12. Lab 6 loose mix confined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
2	11/12/09	02/01/10	6.4	4	10	[redacted]											
2	11/12/09	02/01/10	6.4	4	1												
2	11/12/09	02/01/10	6.4	4	0.1												
2	11/12/09	02/01/10	6.4	4	0.01												
2	11/12/09	02/01/10	6.4	20	10	3/10/2010	7392.0	22.2	20.2	69.0	94.0	0.4	1.7	-212.0	4.1	6.8	0.7
2	11/12/09	02/01/10	6.4	20	1	3/10/2010	4070.0	28.4	20.0	69.0	95.0	0.0	0.5	-294.6	4.0	5.6	1.1
2	11/12/09	02/01/10	6.4	20	0.1	3/10/2010	2012.0	32.6	19.9	69.0	97.0	0.0	0.2	-347.7	5.0	5.3	1.2
2	11/12/09	02/01/10	6.4	20	0.01	3/10/2010	1051.0	31.4	19.8	69.0	90.0	0.0	0.4	-187.3	3.4	4.4	1.1
2	11/12/09	02/01/10	6.4	40	10	3/11/2010	2109.0	33.7	40.3	69.0	89.0	0.9	2.9	-410.0	10.1	6.6	1.4
2	11/12/09	02/01/10	6.4	40	1	3/11/2010	1000.0	31.4	40.3	69.0	91.0	0.0	0.8	-170.5	3.7	6.5	0.9
2	11/12/09	02/01/10	6.4	40	0.1	3/11/2010	591.2	26.8	40.1	69.0	88.0	-0.1	0.4	-80.2	3.2	4.3	1.2
2	11/12/09	02/01/10	6.4	40	0.01	3/11/2010	455.6	19.6	40.1	69.0	85.0	-0.1	0.5	-41.7	3.0	3.4	1.3
3	11/12/09	02/01/10	7.0	4	10	[redacted]											
3	11/12/09	02/01/10	7.0	4	1												
3	11/12/09	02/01/10	7.0	4	0.1												
3	11/12/09	02/01/10	7.0	4	0.01												
3	11/12/09	02/01/10	7.0	20	10	3/10/2010	7191.0	22.3	20.3	69.0	94.0	0.4	1.9	-222.2	4.4	2.2	0.4
3	11/12/09	02/01/10	7.0	20	1	3/10/2010	3924.0	28.7	20.1	69.0	95.0	0.0	0.5	-312.2	4.2	4.5	0.2
3	11/12/09	02/01/10	7.0	20	0.1	3/10/2010	1895.0	33.3	19.7	69.0	97.0	0.0	0.2	-382.3	4.7	7.1	0.3
3	11/12/09	02/01/10	7.0	20	0.01	3/10/2010	928.3	32.6	19.8	69.0	92.0	0.0	0.4	-213.2	3.0	9.8	1.0
3	11/12/09	02/01/10	7.0	40	10	3/11/2010	1908.0	33.2	40.0	69.0	91.0	0.9	3.2	-365.2	8.7	7.7	0.9
3	11/12/09	02/01/10	7.0	40	1	3/11/2010	906.8	29.7	40.0	69.0	93.0	0.0	0.8	-159.3	2.9	8.8	0.7
3	11/12/09	02/01/10	7.0	40	0.1	3/11/2010	548.8	24.6	39.8	69.0	94.0	0.1	0.4	-134.6	3.3	9.4	0.4
3	11/12/09	02/01/10	7.0	40	0.01	3/11/2010	429.4	18.9	40.1	69.0	87.0	0.0	0.5	-80.3	3.8	9.4	0.4
9	11/12/09	02/01/10	6.4	4	10	[redacted]											
9	11/12/09	02/01/10	6.4	4	1												
9	11/12/09	02/01/10	6.4	4	0.1												
9	11/12/09	02/01/10	6.4	4	0.01												
9	11/12/09	02/01/10	6.4	20	10	3/10/2010	7432.0	20.3	20.1	69.0	94.0	0.5	1.9	-160.8	3.8	22.1	0.8
9	11/12/09	02/01/10	6.4	20	1	3/10/2010	4335.0	26.0	20.0	69.0	95.0	0.1	0.5	-227.6	3.6	19.9	1.2
9	11/12/09	02/01/10	6.4	20	0.1	3/10/2010	2266.0	30.6	19.7	69.0	97.0	0.0	0.2	-283.4	4.1	17.4	1.4
9	11/12/09	02/01/10	6.4	20	0.01	3/10/2010	1185.0	31.0	19.8	69.0	92.0	0.0	0.4	-163.9	3.4	16.2	1.6
9	11/12/09	02/01/10	6.4	40	10	3/11/2010	2035.0	32.9	40.4	69.0	91.0	0.7	2.9	-365.8	8.8	10.2	1.3
9	11/12/09	02/01/10	6.4	40	1	3/11/2010	993.0	30.8	40.3	69.0	92.0	0.0	0.8	-193.6	3.7	10.9	1.3
9	11/12/09	02/01/10	6.4	40	0.1	3/11/2010	602.5	26.2	40.1	69.0	91.0	0.0	0.4	-133.4	3.9	11.7	1.2
9	11/12/09	02/01/10	6.4	40	0.01	3/11/2010	466.7	20.4	40.0	69.0	85.0	0.0	0.5	-65.5	3.1	12.6	1.2

Table B13. Lab 7 loose mix unconfined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5-4	01/18/10	03/09/10	6.6	4	10	3/11/2010	15959.0	12.2	4.0	1.6	86.0	0.7	2.0	-73.3	2.8	7.0	0.1
9.5-4	01/18/10	03/09/10	6.6	4	1	3/11/2010	11205.0	16.8	4.0	1.5	96.0	0.0	0.5	-119.2	2.7	7.5	0.2
9.5-4	01/18/10	03/09/10	6.6	4	0.1	3/11/2010	7007.0	22.4	4.0	1.5	101.0	0.0	0.3	-187.3	4.5	8.1	0.3
9.5-4	01/18/10	03/09/10	6.6	4	0.01	3/11/2010	4051.0	27.0	4.0	1.5	95.0	0.0	0.4	-162.0	2.3	8.3	0.2
9.5-4	01/18/10	03/09/10	6.6	20	10	3/11/2010	7282.0	23.8	20.0	1.6	93.0	0.4	2.1	-276.7	5.9	1.8	0.0
9.5-4	01/18/10	03/09/10	6.6	20	1	3/11/2010	3862.0	29.8	20.0	1.5	92.0	0.1	0.5	-281.5	5.2	2.1	0.3
9.5-4	01/18/10	03/09/10	6.6	20	0.1	3/11/2010	1729.0	33.4	20.0	1.5	98.0	0.0	0.3	-188.5	3.7	3.1	0.4
9.5-4	01/18/10	03/09/10	6.6	20	0.01	3/11/2010	644.9	33.3	20.0	1.5	115.0	0.0	0.5	50.3	3.6	4.4	0.7
9.5-4	01/18/10	03/09/10	6.6	40	10	3/17/2010	1456.0	35.9	40.0	1.5	85.0	-0.5	6.2	-201.7	7.8	7.1	0.2
9.5-4	01/18/10	03/09/10	6.6	40	1	3/17/2010	444.8	37.5	40.0	1.4	104.0	0.9	8.3	-48.1	7.4	7.2	1.1
9.5-4	01/18/10	03/09/10	6.6	40	0.1	3/17/2010	160.7	32.2	40.1	1.5	104.0	-0.2	0.8	7.1	4.2	7.2	1.9
9.5-4	01/18/10	03/09/10	6.6	40	0.01	3/17/2010	70.5	25.4	40.1	1.5	110.0	-0.1	1.7	183.5	6.1	11.7	2.1
9.5-6	01/18/10	03/09/10	6.6	4	10	3/15/2010	16481.0	12.0	4.0	1.6	80.0	1.0	2.8	-71.5	2.9	5.9	0.1
9.5-6	01/18/10	03/09/10	6.6	4	1	3/15/2010	11634.0	16.3	4.0	1.6	95.0	0.1	0.7	-99.1	2.1	6.4	0.2
9.5-6	01/18/10	03/09/10	6.6	4	0.1	3/15/2010	7359.0	21.4	4.0	1.6	100.0	0.0	0.2	-136.1	2.3	5.3	0.2
9.5-6	01/18/10	03/09/10	6.6	4	0.01	3/15/2010	4322.0	25.5	4.0	1.6	97.0	0.0	0.4	-105.8	3.7	4.7	0.0
9.5-6	01/18/10	03/09/10	6.6	20	10	3/15/2010	6971.0	24.3	20.1	1.7	87.0	0.2	3.8	-282.1	6.7	3.1	0.4
9.5-6	01/18/10	03/09/10	6.6	20	1	3/15/2010	3677.0	30.0	20.1	1.6	91.0	0.1	1.0	-264.6	5.3	3.4	0.6
9.5-6	01/18/10	03/09/10	6.6	20	0.1	3/15/2010	1666.0	33.1	20.1	1.6	96.0	0.0	0.3	-178.7	3.6	2.5	0.7
9.5-6	01/18/10	03/09/10	6.6	20	0.01	3/15/2010	687.3	32.8	20.1	1.6	108.0	0.2	0.5	-10.0	3.3	0.6	1.1
9.5-6	01/18/10	03/09/10	6.6	40	10	3/17/2010	1304.0	35.6	40.0	1.6	84.0	-0.5	5.8	-177.0	6.7	4.8	0.1
9.5-6	01/18/10	03/09/10	6.6	40	1	3/17/2010	412.5	35.5	40.0	1.6	102.0	0.5	7.3	-39.7	6.7	6.4	0.6
9.5-6	01/18/10	03/09/10	6.6	40	0.1	3/17/2010	162.2	29.5	40.1	1.6	100.0	-0.3	0.9	51.5	4.4	6.6	1.3
9.5-6	01/18/10	03/09/10	6.6	40	0.01	3/17/2010	81.1	24.0	40.2	1.6	106.0	-0.5	1.6	268.8	6.9	5.9	2.4
9.5-7	01/18/10	03/09/10	6.7	4	10	3/15/2010	15179.0	12.8	4.1	1.6	81.0	0.8	2.7	-81.3	3.0	14.2	0.5
9.5-7	01/18/10	03/09/10	6.7	4	1	3/15/2010	10468.0	17.6	4.1	1.6	95.0	0.1	0.7	-118.3	2.6	20.9	0.6
9.5-7	01/18/10	03/09/10	6.7	4	0.1	3/15/2010	6463.0	23.0	4.1	1.6	99.0	0.0	0.2	-166.9	3.0	24.6	0.9
9.5-7	01/18/10	03/09/10	6.7	4	0.01	3/15/2010	3730.0	27.0	4.0	1.7	94.0	0.0	0.4	-129.7	3.3	25.0	1.1
9.5-7	01/18/10	03/09/10	6.7	20	10	3/15/2010	6916.0	24.1	20.2	1.7	88.0	0.2	3.6	-280.3	6.6	11.5	0.6
9.5-7	01/18/10	03/09/10	6.7	20	1	3/15/2010	3596.0	29.8	20.2	1.7	92.0	0.2	0.9	-262.9	5.1	14.6	0.7
9.5-7	01/18/10	03/09/10	6.7	20	0.1	3/15/2010	1589.0	33.1	20.0	1.7	98.0	0.0	0.2	-170.2	3.2	14.3	0.9
9.5-7	01/18/10	03/09/10	6.7	20	0.01	3/15/2010	589.3	33.0	20.0	1.7	115.0	0.0	0.5	50.7	3.7	11.8	1.1
9.5-7	01/18/10	03/09/10	6.7	40	10	3/17/2010	1420.0	35.5	40.0	1.6	88.0	-1.1	6.0	-170.5	6.8	4.4	0.8
9.5-7	01/18/10	03/09/10	6.7	40	1	3/17/2010	437.3	36.5	40.0	1.5	104.0	0.7	7.8	-42.7	6.9	2.4	0.6
9.5-7	01/18/10	03/09/10	6.7	40	0.1	3/17/2010	157.5	31.3	40.1	1.5	104.0	-0.4	1.0	29.0	4.0	2.9	0.9
9.5-7	01/18/10	03/09/10	6.7	40	0.01	3/17/2010	67.5	26.4	40.1	1.6	113.0	0.7	1.8	261.1	9.2	4.4	2.2

Table B14. Lab 7 loose mix confined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5-4	01/18/10	03/09/10	6.6	4	10												
9.5-4	01/18/10	03/09/10	6.6	4	1												
9.5-4	01/18/10	03/09/10	6.6	4	0.1												
9.5-4	01/18/10	03/09/10	6.6	4	0.01												
9.5-4	01/18/10	03/09/10	6.6	20	10	3/11/2010	6920.0	24.0	19.9	69.5	91.0	0.3	2.9	-247.2	6.9	19.1	0.7
9.5-4	01/18/10	03/09/10	6.6	20	1	3/11/2010	3626.0	29.6	19.7	69.5	94.0	0.2	0.6	-228.8	5.6	22.9	1.5
9.5-4	01/18/10	03/09/10	6.6	20	0.1	3/11/2010	1703.0	31.4	20.2	69.6	98.0	-0.1	0.3	-158.6	4.9	24.2	2.3
9.5-4	01/18/10	03/09/10	6.6	20	0.01	3/11/2010	888.1	28.8	20.1	69.6	95.0	0.0	0.4	-52.9	9.2	22.8	2.4
9.5-4	01/18/10	03/09/10	6.6	40	10	3/17/2010	2153.0	31.7	40.0	69.5	89.0	0.4	3.4	-138.0	5.1	9.5	0.2
9.5-4	01/18/10	03/09/10	6.6	40	1	3/17/2010	1017.0	27.9	39.8	69.5	93.0	0.0	0.8	-69.8	2.3	9.3	0.2
9.5-4	01/18/10	03/09/10	6.6	40	0.1	3/17/2010	627.0	20.9	40.0	69.6	94.0	0.1	0.3	-63.8	3.6	9.5	0.2
9.5-4	01/18/10	03/09/10	6.6	40	0.01	3/17/2010	473.6	13.8	40.0	69.6	97.0	-0.1	0.5	-36.6	3.3	7.9	0.2
9.5-6	01/18/10	03/09/10	6.6	4	10												
9.5-6	01/18/10	03/09/10	6.6	4	1												
9.5-6	01/18/10	03/09/10	6.6	4	0.1												
9.5-6	01/18/10	03/09/10	6.6	4	0.01												
9.5-6	01/18/10	03/09/10	6.6	20	10	3/15/2010	7071.0	23.5	19.8	69.5	90.0	0.4	2.7	-253.4	5.6	3.0	0.2
9.5-6	01/18/10	03/09/10	6.6	20	1	3/15/2010	3807.0	28.9	19.9	69.5	93.0	0.1	0.6	-254.5	4.5	2.3	0.9
9.5-6	01/18/10	03/09/10	6.6	20	0.1	3/15/2010	1859.0	31.0	20.0	69.6	96.0	0.0	0.2	-187.5	3.3	2.1	1.4
9.5-6	01/18/10	03/09/10	6.6	20	0.01	3/15/2010	981.5	27.7	19.9	69.6	94.0	0.0	0.4	-54.7	5.0	2.8	1.6
9.5-6	01/18/10	03/09/10	6.6	40	10	3/17/2010	1923.0	31.7	40.2	69.5	85.0	0.3	3.3	-156.3	5.1	7.4	1.0
9.5-6	01/18/10	03/09/10	6.6	40	1	3/17/2010	924.0	28.1	39.8	69.6	91.0	0.1	0.8	-92.3	2.8	7.6	1.2
9.5-6	01/18/10	03/09/10	6.6	40	0.1	3/17/2010	586.7	22.6	39.9	69.6	88.0	0.2	0.3	-85.3	3.4	7.7	0.8
9.5-6	01/18/10	03/09/10	6.6	40	0.01	3/17/2010	466.2	15.7	40.0	69.5	90.0	0.1	0.5	-51.4	3.5	9.3	0.6
9.5-7	01/18/10	03/09/10	6.7	4	10												
9.5-7	01/18/10	03/09/10	6.7	4	1												
9.5-7	01/18/10	03/09/10	6.7	4	0.1												
9.5-7	01/18/10	03/09/10	6.7	4	0.01												
9.5-7	01/18/10	03/09/10	6.7	20	10	3/11/2010	6564.0	24.3	20.2	69.4	90.0	0.4	2.7	-240.9	5.9	12.4	0.9
9.5-7	01/18/10	03/09/10	6.7	20	1	3/11/2010	3425.0	29.5	20.0	69.6	94.0	0.1	0.5	-205.3	3.7	13.8	1.2
9.5-7	01/18/10	03/09/10	6.7	20	0.1	3/11/2010	1611.0	31.1	19.9	69.6	98.0	0.2	0.2	-138.9	2.5	13.3	1.9
9.5-7	01/18/10	03/09/10	6.7	20	0.01	3/11/2010	813.9	29.5	19.9	69.6	96.0	0.0	0.4	-61.5	2.8	12.3	1.9
9.5-7	01/18/10	03/09/10	6.7	40	10	3/17/2010	1423.0	33.3	39.7	69.7	89.0	1.3	3.7	-163.0	5.9	5.9	1.4
9.5-7	01/18/10	03/09/10	6.7	40	1	3/17/2010	706.6	28.3	39.4	69.6	90.0	0.1	0.8	-126.1	3.1	6.5	1.6
9.5-7	01/18/10	03/09/10	6.7	40	0.1	3/17/2010	473.8	22.2	40.1	69.6	93.0	0.2	0.4	-150.7	4.9	6.4	1.7
9.5-7	01/18/10	03/09/10	6.7	40	0.01	3/17/2010	403.4	15.7	40.0	69.6	86.0	0.2	0.5	-103.3	4.8	4.4	1.9

Table B15. Lab 8 loose mix unconfined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
8	02/04/10	05/24/10	7.4	4	10	6/25/2010	16406.0	12.0	3.8	0.0	98.0	-0.4	1.7	-68.4	2.3	7.8	0.1
8	02/04/10	05/24/10	7.4	4	1	6/25/2010	11512.0	16.4	3.9	0.0	101.0	0.0	0.4	-109.6	1.9	7.4	0.2
8	02/04/10	05/24/10	7.4	4	0.1	6/25/2010	7215.0	21.8	4.2	0.0	100.0	0.0	0.3	-182.2	2.8	7.2	0.3
8	02/04/10	05/24/10	7.4	4	0.01	6/25/2010	3933.0	26.8	4.7	0.0	97.0	0.0	0.4	-180.4	2.0	7.0	0.2
8	02/04/10	05/24/10	7.4	20	10	6/28/2010	6938.0	23.3	20.0	-0.1	94.0	-4.5	2.2	-259.9	6.0	24.5	0.6
8	02/04/10	05/24/10	7.4	20	1	6/28/2010	3681.0	29.1	20.6	0.0	93.0	0.1	0.6	-268.8	5.1	23.2	0.5
8	02/04/10	05/24/10	7.4	20	0.1	6/28/2010	1706.0	32.2	20.2	0.0	91.0	-0.1	0.6	-186.9	4.0	21.9	0.4
8	02/04/10	05/24/10	7.4	20	0.01	6/28/2010	709.9	30.8	20.2	0.1	104.0	-0.3	0.8	-56.5	3.6	19.7	0.9
8	02/04/10	05/24/10	7.4	40	10	6/30/2010	1496.0	32.1	40.3	0.5	96.0	-12.4	5.1	-61.9	4.1	10.5	0.6
8	02/04/10	05/24/10	7.4	40	1	6/30/2010	542.6	30.8	40.6	0.0	95.0	0.0	1.0	-31.4	3.5	10.8	1.2
8	02/04/10	05/24/10	7.4	40	0.1	6/30/2010	249.7	23.4	40.5	0.0	92.0	-0.1	1.3	-18.0	5.4	13.0	2.0
8	02/04/10	05/24/10	7.4	40	0.01	6/30/2010	169.6	14.0	40.4	0.0	98.0	0.0	1.1	-103.6	10.0	17.4	**3.3**
10	02/04/10	05/24/10	7.0	4	10	6/25/2010	16306.0	11.5	3.9	-0.1	98.0	-0.3	1.7	-63.2	2.5	15.0	0.2
10	02/04/10	05/24/10	7.0	4	1	6/25/2010	11668.0	15.8	4.1	0.0	100.0	0.1	0.4	-104.3	3.2	15.5	0.4
10	02/04/10	05/24/10	7.0	4	0.1	6/25/2010	7425.0	21.3	4.7	0.0	100.0	0.0	0.3	-182.0	2.9	15.5	0.7
10	02/04/10	05/24/10	7.0	4	0.01	6/25/2010	3876.0	27.2	5.4	0.0	101.0	0.0	0.4	-197.2	2.9	14.6	0.8
10	02/04/10	05/24/10	7.0	20	10	6/28/2010	7202.0	23.1	20.1	0.0	92.0	-3.4	2.3	-257.7	5.9	19.5	0.4
10	02/04/10	05/24/10	7.0	20	1	6/28/2010	3849.0	29.1	19.7	0.3	93.0	0.0	0.5	-272.6	5.0	17.6	0.7
10	02/04/10	05/24/10	7.0	20	0.1	6/28/2010	1745.0	32.3	20.2	0.0	92.0	-0.2	0.5	-183.9	3.4	16.8	0.7
10	02/04/10	05/24/10	7.0	20	0.01	6/28/2010	693.2	30.9	20.2	0.0	106.0	-0.2	0.7	-46.2	4.2	16.3	1.2
10	02/04/10	05/24/10	7.0	40	10	6/30/2010	1534.0	32.2	40.3	0.5	96.0	-12.3	5.5	-62.4	4.5	7.9	0.3
10	02/04/10	05/24/10	7.0	40	1	6/30/2010	548.9	30.5	40.6	0.0	95.0	0.1	1.1	-34.3	3.8	7.5	0.6
10	02/04/10	05/24/10	7.0	40	0.1	6/30/2010	258.5	21.7	40.5	0.0	91.0	0.1	1.3	-5.1	5.5	9.0	1.0
10	02/04/10	05/24/10	7.0	40	0.01	6/30/2010	198.2	10.0	40.4	0.0	95.0	-0.6	1.0	-114.4	8.7	13.3	1.6
11	02/04/10	05/24/10	7.1	4	10	6/25/2010	15729.0	11.8	3.8	0.1	96.0	-0.4	1.5	-66.2	2.9	6.0	0.2
11	02/04/10	05/24/10	7.1	4	1	6/25/2010	11152.0	16.3	3.8	0.0	99.0	0.0	0.3	-110.5	2.3	6.1	0.2
11	02/04/10	05/24/10	7.1	4	0.1	6/25/2010	7042.0	22.0	3.7	0.0	99.0	0.0	0.3	-191.2	3.1	5.2	0.3
11	02/04/10	05/24/10	7.1	4	0.01	6/25/2010	3813.0	27.5	4.4	0.0	98.0	0.0	0.5	-206.8	2.5	4.0	0.5
11	02/04/10	05/24/10	7.1	20	10	6/28/2010	6394.0	24.3	19.9	0.1	92.0	-4.5	2.4	-279.0	6.4	5.5	0.6
11	02/04/10	05/24/10	7.1	20	1	6/28/2010	3283.0	30.2	20.1	0.2	92.0	0.2	0.6	-272.8	5.0	3.9	0.6
11	02/04/10	05/24/10	7.1	20	0.1	6/28/2010	1429.0	32.9	20.1	0.1	92.0	0.0	0.6	-152.2	3.3	5.2	0.2
11	02/04/10	05/24/10	7.1	20	0.01	6/28/2010	547.3	31.7	20.1	0.0	108.0	-0.1	0.8	-15.5	3.5	7.2	0.7
11	02/04/10	05/24/10	7.1	40	10	6/30/2010	1291.0	32.9	40.5	0.0	98.0	-12.1	5.6	-41.5	4.1	8.6	0.2
11	02/04/10	05/24/10	7.1	40	1	6/30/2010	453.7	30.9	40.4	0.1	96.0	0.1	1.1	-36.3	3.6	7.5	0.9
11	02/04/10	05/24/10	7.1	40	0.1	6/30/2010	219.9	21.7	40.4	0.0	90.0	-0.1	1.4	-64.2	5.7	9.1	1.9
11	02/04/10	05/24/10	7.1	40	0.01	6/30/2010	179.8	9.2	40.4	0.0	93.0	-0.1	1.1	-166.4	8.3	15.0	2.4

Table B16. Lab 8 loose mix confined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
8	02/04/10	05/24/10	7.4	4	10												
8	02/04/10	05/24/10	7.4	4	1												
8	02/04/10	05/24/10	7.4	4	0.1												
8	02/04/10	05/24/10	7.4	4	0.01												
8	02/04/10	05/24/10	7.4	20	10	06/23/10	6641.0	24.6	20.5	69.1	96.0	-7.8	2.1	-277.8	6.0	6.7	0.2
8	02/04/10	05/24/10	7.4	20	1	06/23/10	3442.0	30.6	20.0	69.0	94.0	0.1	0.5	-318.1	5.2	7.1	0.6
8	02/04/10	05/24/10	7.4	20	0.1	06/23/10	1660.0	32.5	20.0	69.0	90.0	0.0	0.6	-267.0	6.6	7.2	0.7
8	02/04/10	05/24/10	7.4	20	0.01	06/23/10	908.5	27.3	20.0	69.0	87.0	-0.1	0.7	-57.3	4.2	5.1	1.3
8	02/04/10	05/24/10	7.4	40	10	06/24/10	1869.0	31.1	40.2	69.1	89.0	-9.4	3.8	-116.3	4.5	11.1	0.8
8	02/04/10	05/24/10	7.4	40	1	06/24/10	919.8	26.8	40.1	69.0	92.0	0.1	0.8	-70.0	2.9	9.2	1.4
8	02/04/10	05/24/10	7.4	40	0.1	06/24/10	592.7	19.8	40.4	69.0	94.0	-0.1	0.7	-32.9	6.3	7.5	1.6
8	02/04/10	05/24/10	7.4	40	0.01	06/24/10	458.7	13.1	40.4	69.0	98.0	-0.1	0.8	58.3	3.9	5.2	1.7
10	02/04/10	05/24/10	7.0	4	10												
10	02/04/10	05/24/10	7.0	4	1												
10	02/04/10	05/24/10	7.0	4	0.1												
10	02/04/10	05/24/10	7.0	4	0.01												
10	02/04/10	05/24/10	7.0	20	10	06/23/10	6207.0	25.7	20.2	69.2	94.0	-7.7	2.3	-305.7	6.3	12.9	0.8
10	02/04/10	05/24/10	7.0	20	1	06/23/10	3147.0	31.8	20.1	69.0	93.0	0.0	0.5	-359.2	6.7	12.6	1.6
10	02/04/10	05/24/10	7.0	20	0.1	06/23/10	1484.0	33.1	20.1	69.0	88.0	0.0	0.5	-269.2	4.8	14.5	1.9
10	02/04/10	05/24/10	7.0	20	0.01	06/23/10	865.1	28.3	20.1	69.0	82.0	0.0	0.6	-53.3	4.0	16.7	1.2
10	02/04/10	05/24/10	7.0	40	10	06/24/10	1709.0	31.5	40.3	68.9	90.0	-5.9	4.1	-117.2	4.5	13.0	0.8
10	02/04/10	05/24/10	7.0	40	1	06/24/10	841.6	26.6	39.8	69.0	92.0	0.1	0.7	-67.9	2.6	13.4	0.6
10	02/04/10	05/24/10	7.0	40	0.1	06/24/10	543.1	19.3	40.2	69.0	94.0	-0.1	0.8	-46.9	3.5	13.8	0.4
10	02/04/10	05/24/10	7.0	40	0.01	06/24/10	435.5	12.5	40.1	69.0	95.0	0.0	0.7	-7.2	3.6	13.4	0.3
11	02/04/10	05/24/10	7.1	4	10												
11	02/04/10	05/24/10	7.1	4	1												
11	02/04/10	05/24/10	7.1	4	0.1												
11	02/04/10	05/24/10	7.1	4	0.01												
11	02/04/10	05/24/10	7.1	20	10	06/23/10	5969.0	25.3	20.4	69.0	94.0	-9.6	2.3	-281.7	6.2	8.6	0.8
11	02/04/10	05/24/10	7.1	20	1	06/23/10	3006.0	31.4	19.8	69.0	93.0	0.1	0.5	-319.2	5.0	8.6	0.8
11	02/04/10	05/24/10	7.1	20	0.1	06/23/10	1405.0	32.5	20.0	69.0	90.0	-0.1	0.6	-200.1	5.0	7.9	0.5
11	02/04/10	05/24/10	7.1	20	0.01	06/23/10	775.0	27.7	20.1	69.0	85.0	-0.1	0.6	25.9	4.1	6.7	0.3
11	02/04/10	05/24/10	7.1	40	10	06/24/10	1462.0	31.7	39.9	69.2	90.0	-7.5	4.3	-72.6	4.1	6.3	0.7
11	02/04/10	05/24/10	7.1	40	1	06/24/10	758.6	26.0	40.0	69.0	91.0	0.0	0.8	-41.4	2.6	5.4	0.5
11	02/04/10	05/24/10	7.1	40	0.1	06/24/10	523.9	18.7	40.0	69.0	94.0	-0.3	0.9	-27.0	3.1	4.1	0.5
11	02/04/10	05/24/10	7.1	40	0.01	06/24/10	434.9	12.3	40.1	69.0	95.0	-0.1	0.8	5.5	3.7	3.5	0.7

Table B17. Lab 1 loose mix unconfined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, µst	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_1	5/29/2009	5/29/2009	6.9	4	10	6/2/2009	15412.6	10.1	4.1	0.0	69.4	0.1	5.4	83.2	7.8	5.6	0.5
12.5_1	5/29/2009	5/29/2009	6.9	4	1	6/2/2009	11545.0	14.7	4.2	0.0	97.8	-0.1	2.2	91.7	5.2	0.4	0.7
12.5_1	5/29/2009	5/29/2009	6.9	4	0.1	6/2/2009	7975.7	18.8	4.0	0.0	84.8	-1.7	1.5	135.3	4.5	6.8	1.0
12.5_1	5/29/2009	5/29/2009	6.9	4	0.01	6/2/2009	5300.3	21.7	4.0	0.0	57.2	1.6	1.7	162.7	8.5	24.6	1.8
12.5_1	5/29/2009	5/29/2009	6.9	20	10	6/3/2009	6962.6	20.4	20.1	0.0	91.6	0.6	4.0	177.3	10.1	11.7	0.2
12.5_1	5/29/2009	5/29/2009	6.9	20	1	6/3/2009	4110.0	24.6	20.0	0.0	90.2	0.1	0.6	166.5	7.3	12.9	0.6
12.5_1	5/29/2009	5/29/2009	6.9	20	0.1	6/3/2009	2214.8	26.4	20.0	0.0	89.8	2.7	1.5	139.9	4.2	13.6	1.5
12.5_1	5/29/2009	5/29/2009	6.9	20	0.01	6/3/2009	1144.7	24.2	20.0	0.0	93.2	-0.3	1.5	115.2	4.0	7.8	1.8
12.5_1	5/29/2009	5/29/2009	6.9	40	10	6/5/2009	1767.5	30.6	39.8	0.0	90.6	1.1	5.9	184.0	15.7	22.3	2.2
12.5_1	5/29/2009	5/29/2009	6.9	40	1	6/5/2009	885.4	25.5	39.9	0.0	95.0	0.1	2.1	66.0	7.2	15.7	3.0
12.5_1	5/29/2009	5/29/2009	6.9	40	0.1	6/5/2009	549.1	19.4	40.0	0.0	97.4	5.7	2.2	39.6	5.6	1.3	2.6
12.5_1	5/29/2009	5/29/2009	6.9	40	0.01	6/5/2009	408.5	13.1	40.0	0.0	98.2	0.8	2.6	74.2	6.4	13.9	1.0
12.5_4	5/29/2009	5/29/2009	6.5	4	10	6/2/2009	13205.5	10.2	4.1	0.0	89.0	0.3	4.8	85.5	7.7	0.3	0.0
12.5_4	5/29/2009	5/29/2009	6.5	4	1	6/2/2009	9878.4	14.5	4.0	0.0	95.0	-0.1	1.2	89.6	4.6	1.7	0.1
12.5_4	5/29/2009	5/29/2009	6.5	4	0.1	6/2/2009	6803.9	18.5	4.0	0.0	91.2	2.3	1.4	145.2	4.4	3.6	0.0
12.5_4	5/29/2009	5/29/2009	6.5	4	0.01	6/2/2009	4092.9	21.9	4.0	0.0	49.4	-0.1	1.8	108.7	7.8	3.2	0.3
12.5_4	5/29/2009	5/29/2009	6.5	20	10	6/3/2009	5883.1	21.3	20.1	0.0	91.0	0.8	5.6	204.2	11.0	25.4	0.0
12.5_4	5/29/2009	5/29/2009	6.5	20	1	6/3/2009	3452.6	26.5	20.0	0.0	88.8	0.1	1.0	222.2	8.5	19.8	1.0
12.5_4	5/29/2009	5/29/2009	6.5	20	0.1	6/3/2009	1824.5	28.5	20.0	0.0	87.4	4.1	1.5	205.1	3.2	6.3	1.1
12.5_4	5/29/2009	5/29/2009	6.5	20	0.01	6/3/2009	937.1	26.2	20.0	0.0	92.8	-0.4	1.6	144.8	4.6	4.9	1.4
12.5_4	5/29/2009	5/29/2009	6.5	40	10	6/5/2009	1549.6	30.9	40.0	0.0	89.6	0.6	5.8	172.1	15.5	23.9	3.0
12.5_4	5/29/2009	5/29/2009	6.5	40	1	6/5/2009	750.8	26.4	40.0	0.0	94.6	0.0	2.3	57.7	7.3	13.6	3.1
12.5_4	5/29/2009	5/29/2009	6.5	40	0.1	6/5/2009	455.4	20.0	40.0	0.0	100.6	3.4	2.6	54.3	5.4	3.6	2.4
12.5_4	5/29/2009	5/29/2009	6.5	40	0.01	6/5/2009	329.8	14.6	40.0	0.0	95.8	-3.0	2.8	26.5	5.7	1.7	1.3
12.5_9	5/29/2009	5/29/2009	7.3	4	10	6/2/2009	15133.7	9.4	4.1	0.0	77.2	0.3	5.3	72.7	8.0	16.6	0.4
12.5_9	5/29/2009	5/29/2009	7.3	4	1	6/2/2009	11396.5	13.5	4.1	0.0	98.4	-0.2	1.8	81.7	5.1	19.2	0.5
12.5_9	5/29/2009	5/29/2009	7.3	4	0.1	6/2/2009	7857.8	17.7	4.0	0.0	93.4	2.4	1.3	140.2	5.1	22.8	0.7
12.5_9	5/29/2009	5/29/2009	7.3	4	0.01	6/2/2009	4900.7	21.0	4.0	0.0	83.2	-0.7	1.5	154.8	6.3	30.9	0.3
12.5_9	5/29/2009	5/29/2009	7.3	20	10	6/3/2009	7107.0	20.3	20.1	0.0	91.2	0.8	5.1	184.0	10.1	5.1	0.4
12.5_9	5/29/2009	5/29/2009	7.3	20	1	6/3/2009	4157.1	25.1	20.0	0.0	90.0	0.1	0.8	199.6	8.0	12.9	0.0
12.5_9	5/29/2009	5/29/2009	7.3	20	0.1	6/3/2009	2257.9	27.2	20.0	0.0	90.2	2.7	1.5	169.1	3.2	10.2	0.5
12.5_9	5/29/2009	5/29/2009	7.3	20	0.01	6/3/2009	1165.1	25.5	20.0	0.0	92.0	0.3	1.5	97.0	4.4	8.2	0.5
12.5_9	5/29/2009	5/29/2009	7.3	40	10	6/5/2009	1851.9	30.4	39.8	0.0	88.8	0.9	5.6	187.4	15.4	15.4	0.8
12.5_9	5/29/2009	5/29/2009	7.3	40	1	6/5/2009	914.2	26.1	40.0	0.0	91.6	0.1	1.6	48.9	6.3	17.0	0.6
12.5_9	5/29/2009	5/29/2009	7.3	40	0.1	6/5/2009	547.7	19.9	40.0	0.0	98.8	2.4	2.0	-18.0	4.4	13.7	0.2
12.5_9	5/29/2009	5/29/2009	7.3	40	0.01	6/5/2009	399.4	14.6	40.0	0.0	106.8	-0.6	2.2	-285.3	5.2	15.9	0.6

Table B18. Lab 1 loose mix confined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ degrees	Temp., C	Conf, kPa	Strain, µst	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_1	5/29/2009	5/29/2009	6.9	4	10												
12.5_1	5/29/2009	5/29/2009	6.9	4	1												
12.5_1	5/29/2009	5/29/2009	6.9	4	0.1												
12.5_1	5/29/2009	5/29/2009	6.9	4	0.01												
12.5_1	5/29/2009	5/29/2009	6.9	20	10	6/3/2009	7212.7	19.9	20.3	68.2	91.4	0.8	3.9	157.6	9.7	5.6	0.4
12.5_1	5/29/2009	5/29/2009	6.9	20	1	6/3/2009	4246.7	23.9	20.4	68.2	93.4	0.0	0.6	138.4	6.9	7.4	0.2
12.5_1	5/29/2009	5/29/2009	6.9	20	0.1	6/3/2009	2341.8	25.1	20.3	68.0	94.8	0.1	1.5	81.2	4.0	8.7	0.2
12.5_1	5/29/2009	5/29/2009	6.9	20	0.01	6/3/2009	1333.0	22.4	20.0	68.0	97.8	0.2	1.4	37.8	3.8	13.0	0.3
12.5_1	5/29/2009	5/29/2009	6.9	40	10	6/5/2009	2219.3	27.6	40.2	68.4	90.6	0.8	5.1	152.0	11.8	2.5	0.1
12.5_1	5/29/2009	5/29/2009	6.9	40	1	6/5/2009	1251.2	23.3	40.2	68.4	95.8	-0.5	1.3	64.1	5.8	5.8	0.1
12.5_1	5/29/2009	5/29/2009	6.9	40	0.1	6/5/2009	853.3	18.3	40.0	68.4	99.0	0.7	1.6	30.2	3.6	9.9	0.8
12.5_1	5/29/2009	5/29/2009	6.9	40	0.01	6/5/2009	653.6	13.9	40.0	68.4	91.4	1.6	1.6	42.1	5.5	15.7	1.3
12.5_4	5/29/2009	5/29/2009	6.5	4	10												
12.5_4	5/29/2009	5/29/2009	6.5	4	1												
12.5_4	5/29/2009	5/29/2009	6.5	4	0.1												
12.5_4	5/29/2009	5/29/2009	6.5	4	0.01												
12.5_4	5/29/2009	5/29/2009	6.5	20	10	6/3/2009	6617.6	20.3	20.4	68.2	91.8	0.8	4.1	170.1	10.3	8.1	0.1
12.5_4	5/29/2009	5/29/2009	6.5	20	1	6/3/2009	3903.7	24.7	20.3	68.2	91.8	0.0	0.7	162.3	7.5	10.9	0.1
12.5_4	5/29/2009	5/29/2009	6.5	20	0.1	6/3/2009	2168.0	26.6	20.3	68.0	93.0	3.6	1.5	129.1	5.0	11.2	0.2
12.5_4	5/29/2009	5/29/2009	6.5	20	0.01	6/3/2009	1266.4	22.9	20.0	68.0	95.8	0.8	1.4	65.0	4.5	10.7	0.6
12.5_4	5/29/2009	5/29/2009	6.5	40	10	6/5/2009	1830.9	29.3	40.1	68.4	90.4	1.0	5.3	172.3	13.0	26.4	2.1
12.5_4	5/29/2009	5/29/2009	6.5	40	1	6/5/2009	995.1	24.5	40.2	68.5	95.2	0.1	1.3	74.3	6.2	20.3	2.3
12.5_4	5/29/2009	5/29/2009	6.5	40	0.1	6/5/2009	675.0	18.9	40.0	68.4	96.2	8.5	1.7	54.8	5.6	15.5	2.2
12.5_4	5/29/2009	5/29/2009	6.5	40	0.01	6/5/2009	555.3	13.5	40.0	68.4	99.8	-3.3	1.9	-58.6	6.9	13.0	2.8
12.5_9	5/29/2009	5/29/2009	7.3	4	10												
12.5_9	5/29/2009	5/29/2009	7.3	4	1												
12.5_9	5/29/2009	5/29/2009	7.3	4	0.1												
12.5_9	5/29/2009	5/29/2009	7.3	4	0.01												
12.5_9	5/29/2009	5/29/2009	7.3	20	10	6/3/2009	7613.0	19.0	20.3	68.0	92.0	0.5	3.9	159.1	11.3	3.7	0.5
12.5_9	5/29/2009	5/29/2009	7.3	20	1	6/3/2009	4606.0	24.0	20.4	68.0	135.2	0.0	0.5	206.6	8.5	7.3	0.3
12.5_9	5/29/2009	5/29/2009	7.3	20	0.1	6/3/2009	2516.2	25.6	20.3	68.0	93.2	-1.1	1.5	89.9	5.6	9.8	0.2
12.5_9	5/29/2009	5/29/2009	7.3	20	0.01	6/3/2009	1510.1	22.6	20.0	68.0	94.6	1.8	1.6	88.1	5.9	12.0	0.3
12.5_9	5/29/2009	5/29/2009	7.3	40	10	6/5/2009	2476.9	26.9	39.4	68.4	89.6	0.9	4.6	151.4	12.7	26.2	0.7
12.5_9	5/29/2009	5/29/2009	7.3	40	1	6/5/2009	1436.9	22.8	39.8	68.4	94.4	0.2	1.0	75.8	7.0	23.1	1.5
12.5_9	5/29/2009	5/29/2009	7.3	40	0.1	6/5/2009	1030.2	16.6	40.0	68.5	93.6	2.8	1.7	50.3	5.8	15.5	1.3
12.5_9	5/29/2009	5/29/2009	7.3	40	0.01	6/5/2009	854.5	12.5	40.0	68.4	97.2	-1.4	1.6	2.9	5.8	7.1	1.5

Table B19. Lab 2 loose mix unconfined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_3	5/28/2009	6/24/2009	6.6	4	10	7/1/2009	13474.0	11.4	4.1	0.1	96.0	0.1	1.7	-54.2	2.8	8.7	0.0
12.5_3	5/28/2009	6/24/2009	6.6	4	1	7/1/2009	9847.0	15.0	3.9	0.1	98.0	0.0	0.4	-82.2	2.5	6.9	0.2
12.5_3	5/28/2009	6/24/2009	6.6	4	0.1	7/1/2009	6548.0	19.5	4.1	0.1	98.0	0.0	0.6	-121.5	3.2	6.2	0.4
12.5_3	5/28/2009	6/24/2009	6.6	4	0.01	7/1/2009	3975.0	23.7	3.9	0.0	95.0	0.0	0.5	-115.9	2.3	5.7	0.7
12.5_3	5/28/2009	6/24/2009	6.6	20	10	6/30/2009	5563.0	23.5	20.0	0.0	93.0	0.3	1.8	-255.8	5.9	13.7	0.2
12.5_3	5/28/2009	6/24/2009	6.6	20	1	6/30/2009	3025.0	28.7	20.1	0.1	93.0	0.0	0.4	-271.6	5.5	9.3	0.8
12.5_3	5/28/2009	6/24/2009	6.6	20	0.1	6/30/2009	1475.0	31.4	19.9	0.0	88.0	0.0	0.6	-214.0	5.1	8.3	1.2
12.5_3	5/28/2009	6/24/2009	6.6	20	0.01	6/30/2009	703.5	30.0	20.1	0.0	95.0	0.0	0.6	-93.1	4.4	8.3	1.4
12.5_3	5/28/2009	6/24/2009	6.6	40	10	7/3/2009	1458.0	31.4	40.1	0.0	81.0	0.2	4.0	-227.2	8.5	6.7	1.3
12.5_3	5/28/2009	6/24/2009	6.6	40	1	7/3/2009	643.7	28.0	40.2	0.1	92.0	0.2	1.3	-86.3	4.9	6.0	1.6
12.5_3	5/28/2009	6/24/2009	6.6	40	0.1	7/3/2009	334.1	22.2	40.1	0.1	87.0	0.1	0.6	-64.9	5.7	5.9	1.5
12.5_3	5/28/2009	6/24/2009	6.6	40	0.01	7/3/2009	252.2	16.1	40.0	0.1	92.0	0.0	0.9	-141.4	7.6	9.2	1.6
12.5_5	5/28/2009	6/24/2009	7.4	4	10	7/1/2009	13996.0	10.4	4.1	0.1	96.0	0.2	1.2	-46.9	3.2	41.6	0.5
12.5_5	5/28/2009	6/24/2009	7.4	4	1	7/1/2009	10647.0	13.8	4.0	0.1	94.0	0.0	0.4	-67.9	3.2	39.7	0.6
12.5_5	5/28/2009	6/24/2009	7.4	4	0.1	7/1/2009	7345.0	18.0	4.0	0.1	94.0	0.0	0.6	-99.6	3.1	39.0	0.8
12.5_5	5/28/2009	6/24/2009	7.4	4	0.01	7/1/2009	4572.0	22.3	3.9	0.1	96.0	0.0	0.5	-97.2	3.3	38.1	0.6
12.5_5	5/28/2009	6/24/2009	7.4	20	10	6/30/2009	6245.0	21.2	19.8	0.1	88.0	0.4	1.7	-183.2	5.7	43.0	1.3
12.5_5	5/28/2009	6/24/2009	7.4	20	1	6/30/2009	3635.0	25.6	19.9	0.1	90.0	0.1	0.5	-186.7	4.5	43.0	0.9
12.5_5	5/28/2009	6/24/2009	7.4	20	0.1	6/30/2009	1842.0	28.4	20.1	0.1	89.0	0.0	0.6	-164.9	5.0	44.1	0.5
12.5_5	5/28/2009	6/24/2009	7.4	20	0.01	6/30/2009	888.1	27.8	20.1	0.0	100.0	0.0	0.6	-94.0	5.5	44.6	0.6
12.5_5	5/28/2009	6/24/2009	7.4	40	10	7/3/2009	1617.0	30.5	39.9	0.0	77.0	0.2	4.0	-225.5	8.8	35.2	1.1
12.5_5	5/28/2009	6/24/2009	7.4	40	1	7/3/2009	718.1	27.2	40.1	0.1	91.0	0.1	1.1	-98.1	4.9	39.1	1.4
12.5_5	5/28/2009	6/24/2009	7.4	40	0.1	7/3/2009	363.9	21.2	40.2	0.0	86.0	0.0	0.7	-109.8	5.6	44.3	2.7
12.5_5	5/28/2009	6/24/2009	7.4	40	0.01	7/3/2009	272.5	13.9	40.1	0.1	92.0	0.0	0.8	-161.1	28.4	45.9	5.3
12.5_8	5/28/2009	6/24/2009	7.0	4	10	7/1/2009	15385.0	10.5	4.1	0.0	97.0	0.2	1.2	-47.7	2.4	16.8	0.2
12.5_8	5/28/2009	6/24/2009	7.0	4	1	7/1/2009	11562.0	13.9	3.9	0.0	97.0	0.0	0.4	-69.6	2.2	14.1	0.3
12.5_8	5/28/2009	6/24/2009	7.0	4	0.1	7/1/2009	7875.0	18.2	4.0	0.0	98.0	0.0	0.6	-107.0	2.2	12.4	0.2
12.5_8	5/28/2009	6/24/2009	7.0	4	0.01	7/1/2009	4734.0	22.8	4.0	0.0	98.0	0.0	0.5	-110.5	2.3	11.0	0.2
12.5_8	5/28/2009	6/24/2009	7.0	20	10	6/30/2009	6697.0	21.2	19.9	0.1	97.0	0.4	1.6	-211.5	5.3	25.1	0.4
12.5_8	5/28/2009	6/24/2009	7.0	20	1	6/30/2009	3855.0	26.4	20.0	0.1	92.0	0.1	0.5	-248.4	4.6	21.4	0.1
12.5_8	5/28/2009	6/24/2009	7.0	20	0.1	6/30/2009	1943.0	30.1	20.2	0.1	90.0	0.0	0.6	-242.1	4.2	19.8	0.7
12.5_8	5/28/2009	6/24/2009	7.0	20	0.01	6/30/2009	898.4	29.9	20.0	0.0	98.0	0.0	0.6	-132.8	3.9	17.0	1.2
12.5_8	5/28/2009	6/24/2009	7.0	40	10	7/3/2009	1782.0	31.8	40.0	-0.1	82.0	0.3	3.5	-283.3	9.2	5.8	0.2
12.5_8	5/28/2009	6/24/2009	7.0	40	1	7/3/2009	773.1	29.6	40.1	0.0	92.0	0.2	0.9	-110.6	4.7	8.2	0.3
12.5_8	5/28/2009	6/24/2009	7.0	40	0.1	7/3/2009	374.8	24.6	40.0	0.1	88.0	0.1	0.6	-88.3	5.4	11.4	0.3
12.5_8	5/28/2009	6/24/2009	7.0	40	0.01	7/3/2009	263.8	18.9	39.9	0.1	92.0	0.0	0.8	-172.3	8.3	16.0	1.1

Table B20. Lab 2 loose mix confined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_3	5/28/2009	6/24/2009	6.6	4	10	[redacted]											
12.5_3	5/28/2009	6/24/2009	6.6	4	1												
12.5_3	5/28/2009	6/24/2009	6.6	4	0.1												
12.5_3	5/28/2009	6/24/2009	6.6	4	0.01												
12.5_3	5/28/2009	6/24/2009	6.6	20	10	7/2/2009	5583.0	22.9	20.0	69.0	95.0	0.3	1.4	-217.1	5.3	4.6	0.5
12.5_3	5/28/2009	6/24/2009	6.6	20	1	7/2/2009	3158.0	26.7	19.8	69.0	92.0	0.0	0.4	-193.6	4.2	5.6	0.8
12.5_3	5/28/2009	6/24/2009	6.6	20	0.1	7/2/2009	1682.0	27.8	19.9	69.0	89.0	0.0	0.6	-145.2	2.3	6.5	1.0
12.5_3	5/28/2009	6/24/2009	6.6	20	0.01	7/2/2009	1036.0	24.9	20.2	69.0	87.0	0.0	0.6	-66.9	3.6	6.4	1.0
12.5_3	5/28/2009	6/24/2009	6.6	40	10	7/3/2009	1735.0	28.8	40.2	69.0	88.0	0.9	2.6	-175.0	4.8	10.6	0.7
12.5_3	5/28/2009	6/24/2009	6.6	40	1	7/3/2009	966.6	25.0	40.1	69.0	91.0	0.1	0.6	-110.1	3.5	9.5	0.7
12.5_3	5/28/2009	6/24/2009	6.6	40	0.1	7/3/2009	696.1	19.7	40.2	69.0	89.0	0.0	0.6	-95.3	3.6	10.2	0.2
12.5_3	5/28/2009	6/24/2009	6.6	40	0.01	7/3/2009	594.8	14.7	40.0	69.0	92.0	0.1	0.6	-34.1	3.8	9.4	0.3
12.5_5	5/28/2009	6/24/2009	7.4	4	10	[redacted]											
12.5_5	5/28/2009	6/24/2009	7.4	4	1												
12.5_5	5/28/2009	6/24/2009	7.4	4	0.1												
12.5_5	5/28/2009	6/24/2009	7.4	4	0.01												
12.5_5	5/28/2009	6/24/2009	7.4	20	10	7/2/2009	6476.0	21.5	20.1	69.0	91.0	0.2	1.5	-180.8	5.2	39.0	0.5
12.5_5	5/28/2009	6/24/2009	7.4	20	1	7/2/2009	3829.0	25.5	20.0	69.0	91.0	0.0	0.4	-156.5	4.0	37.2	0.2
12.5_5	5/28/2009	6/24/2009	7.4	20	0.1	7/2/2009	2018.0	27.6	20.1	69.0	90.0	-0.1	0.6	-94.3	3.6	34.7	0.5
12.5_5	5/28/2009	6/24/2009	7.4	20	0.01	7/2/2009	1071.0	26.4	20.0	69.0	96.0	0.0	0.6	-29.2	3.9	29.6	0.9
12.5_5	5/28/2009	6/24/2009	7.4	40	10	7/3/2009	1906.0	29.0	40.1	69.0	88.0	0.4	2.8	-204.4	6.8	22.7	0.7
12.5_5	5/28/2009	6/24/2009	7.4	40	1	7/3/2009	965.8	26.1	40.1	69.0	94.0	0.0	0.7	-67.5	3.4	20.2	1.2
12.5_5	5/28/2009	6/24/2009	7.4	40	0.1	7/3/2009	551.9	21.9	40.0	69.0	94.0	0.0	0.6	-37.3	4.0	20.3	1.1
12.5_5	5/28/2009	6/24/2009	7.4	40	0.01	7/3/2009	369.5	18.0	40.0	69.0	99.0	0.0	0.7	-11.5	4.9	19.1	0.8
12.5_8	5/28/2009	6/24/2009	7.0	4	10	[redacted]											
12.5_8	5/28/2009	6/24/2009	7.0	4	1												
12.5_8	5/28/2009	6/24/2009	7.0	4	0.1												
12.5_8	5/28/2009	6/24/2009	7.0	4	0.01												
12.5_8	5/28/2009	6/24/2009	7.0	20	10	7/2/2009	6847.0	21.3	20.0	69.0	96.0	0.3	1.6	-192.3	5.2	8.4	0.3
12.5_8	5/28/2009	6/24/2009	7.0	20	1	7/2/2009	3983.0	25.8	19.9	69.0	92.0	0.0	0.4	-194.1	4.1	7.3	0.2
12.5_8	5/28/2009	6/24/2009	7.0	20	0.1	7/2/2009	2059.0	28.6	20.2	69.0	91.0	0.0	0.6	-144.6	4.0	6.6	0.3
12.5_8	5/28/2009	6/24/2009	7.0	20	0.01	7/2/2009	1054.0	27.6	20.0	69.0	95.0	0.0	0.5	-69.0	3.9	5.4	0.6
12.5_8	5/28/2009	6/24/2009	7.0	40	10	7/3/2009	1867.0	30.9	40.2	68.9	88.0	0.5	2.8	-275.6	8.3	12.4	0.8
12.5_8	5/28/2009	6/24/2009	7.0	40	1	7/3/2009	888.9	28.6	40.1	69.0	93.0	0.1	0.7	-120.8	3.8	13.1	1.1
12.5_8	5/28/2009	6/24/2009	7.0	40	0.1	7/3/2009	496.2	24.5	40.1	69.0	88.0	-0.1	0.6	-52.7	4.5	13.0	1.4
12.5_8	5/28/2009	6/24/2009	7.0	40	0.01	7/3/2009	331.8	20.8	39.9	69.0	96.0	-0.1	0.7	-32.5	5.1	11.9	1.6

Table B21. Lab 3 loose mix unconfined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				UNCONFINED												
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_2	10/01/09	12/03/09	6.8	4	10	3/3/2010	16996.0	10.1	4.0	0.9	95.0	-0.1	1.7	-38.1	2.0	12.2	0.1
12.5_2	10/01/09	12/03/09	6.8	4	1	3/3/2010	12950.0	13.0	4.0	0.9	99.0	0.1	0.6	-53.7	1.6	13.4	0.5
12.5_2	10/01/09	12/03/09	6.8	4	0.1	3/3/2010	9168.0	16.4	4.0	1.0	102.0	0.0	0.6	-79.6	1.8	15.8	0.2
12.5_2	10/01/09	12/03/09	6.8	4	0.01	3/3/2010	6166.0	19.7	4.0	1.0	98.0	0.0	0.5	-81.0	1.5	18.8	0.5
12.5_2	10/01/09	12/03/09	6.8	20	10	3/4/2010	9428.0	17.6	20.1	0.8	94.0	0.2	2.7	-122.1	3.8	15.5	0.5
12.5_2	10/01/09	12/03/09	6.8	20	1	3/4/2010	5971.0	21.7	20.2	0.9	95.0	0.2	0.8	-142.7	3.4	17.4	0.6
12.5_2	10/01/09	12/03/09	6.8	20	0.1	3/4/2010	3375.0	25.0	20.1	0.9	98.0	0.0	0.6	-132.3	3.1	19.7	0.7
12.5_2	10/01/09	12/03/09	6.8	20	0.01	3/4/2010	1600.0	26.2	20.1	0.8	111.0	0.0	0.7	-76.7	3.0	21.0	0.5
12.5_2	10/01/09	12/03/09	6.8	40	10	3/5/2010	3484.0	26.6	39.0	0.2	84.0	0.4	5.2	-171.7	6.3	20.6	0.8
12.5_2	10/01/09	12/03/09	6.8	40	1	3/5/2010	1707.0	28.2	38.9	0.3	92.0	-0.2	2.7	-108.0	3.8	21.4	0.4
12.5_2	10/01/09	12/03/09	6.8	40	0.1	3/5/2010	813.2	26.6	39.4	0.4	96.0	0.2	1.3	-96.2	4.3	19.5	0.6
12.5_2	10/01/09	12/03/09	6.8	40	0.01	3/5/2010	426.7	21.0	40.4	0.6	109.0	-0.1	1.1	-157.8	6.9	16.6	1.4
12.5_7	10/01/09	12/03/09	7.3	4	10	3/3/2010	17491.0	8.4	4.0	1.0	93.0	0.0	1.8	-27.2	2.5	14.6	0.2
12.5_7	10/01/09	12/03/09	7.3	4	1	3/3/2010	13844.0	10.6	4.0	1.0	98.0	0.1	0.6	-35.1	1.9	15.3	0.4
12.5_7	10/01/09	12/03/09	7.3	4	0.1	3/3/2010	10257.0	13.6	4.0	1.0	102.0	0.0	0.6	-52.6	2.1	17.1	0.4
12.5_7	10/01/09	12/03/09	7.3	4	0.01	3/3/2010	6729.0	17.6	4.0	1.0	105.0	0.0	0.5	-62.4	2.1	19.3	0.5
12.5_7	10/01/09	12/03/09	7.3	20	10	3/4/2010	8549.0	17.5	19.8	0.7	93.0	0.1	3.2	-114.8	4.4	15.0	0.5
12.5_7	10/01/09	12/03/09	7.3	20	1	3/4/2010	5429.0	21.5	19.9	0.8	94.0	0.2	0.9	-131.8	3.6	17.3	0.5
12.5_7	10/01/09	12/03/09	7.3	20	0.1	3/4/2010	3126.0	24.7	20.2	0.8	97.0	0.0	0.5	-124.2	3.4	19.7	0.2
12.5_7	10/01/09	12/03/09	7.3	20	0.01	3/4/2010	1638.0	25.9	20.1	0.8	103.0	-0.1	0.6	-73.2	2.9	20.9	0.4
12.5_7	10/01/09	12/03/09	7.3	40	10	3/5/2010	2754.0	26.9	40.3	0.0	89.0	-0.2	5.5	-134.8	6.1	5.7	0.3
12.5_7	10/01/09	12/03/09	7.3	40	1	3/5/2010	1341.0	27.8	40.3	0.0	91.0	0.2	1.8	-90.2	3.8	5.2	0.6
12.5_7	10/01/09	12/03/09	7.3	40	0.1	3/5/2010	668.1	25.4	40.3	0.0	88.0	0.0	0.4	-72.4	4.4	7.8	1.2
12.5_7	10/01/09	12/03/09	7.3	40	0.01	3/5/2010	396.7	20.5	40.2	0.0	97.0	0.0	0.8	-75.2	6.3	12.9	1.8
12.5_9	10/01/09	12/03/09	7.1	4	10	3/4/2010	17905.0	8.5	4.0	0.9	94.0	0.3	1.9	-27.7	2.0	11.0	0.4
12.5_9	10/01/09	12/03/09	7.1	4	1	3/4/2010	14220.0	10.6	4.1	0.9	99.0	0.1	0.6	-35.6	1.2	11.9	0.4
12.5_9	10/01/09	12/03/09	7.1	4	0.1	3/4/2010	10491.0	13.6	4.0	0.9	103.0	0.0	0.6	-46.4	1.3	13.4	0.7
12.5_9	10/01/09	12/03/09	7.1	4	0.01	3/4/2010	6828.0	17.6	4.0	0.9	105.0	0.0	0.5	-55.7	1.2	15.2	0.8
12.5_9	10/01/09	12/03/09	7.1	20	10	3/4/2010	8844.0	17.2	19.7	0.9	94.0	0.1	2.7	-107.7	3.8	8.1	0.5
12.5_9	10/01/09	12/03/09	7.1	20	1	3/4/2010	5682.0	21.0	19.7	0.9	95.0	0.2	0.8	-123.6	2.9	9.4	0.6
12.5_9	10/01/09	12/03/09	7.1	20	0.1	3/4/2010	3341.0	24.2	20.2	0.9	98.0	0.0	0.6	-113.4	2.8	10.5	0.4
12.5_9	10/01/09	12/03/09	7.1	20	0.01	3/4/2010	1825.0	25.6	20.1	0.8	101.0	0.0	0.7	-53.7	2.4	11.1	0.1
12.5_9	10/01/09	12/03/09	7.1	40	10	3/5/2010	3217.0	26.3	40.3	0.5	85.0	0.4	4.9	-165.3	5.8	15.7	0.5
12.5_9	10/01/09	12/03/09	7.1	40	1	3/5/2010	1634.0	27.9	40.3	0.5	92.0	0.4	1.8	-119.3	3.7	16.0	0.5
12.5_9	10/01/09	12/03/09	7.1	40	0.1	3/5/2010	809.5	26.7	40.3	0.5	94.0	-0.4	1.4	-94.9	4.1	15.8	0.6
12.5_9	10/01/09	12/03/09	7.1	40	0.01	3/5/2010	434.9	22.6	40.3	0.5	106.0	0.0	1.2	-105.4	6.0	15.8	0.8

Table B22. Lab 3 loose mix confined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_2	10/01/09	12/03/09	6.8	4	10												
12.5_2	10/01/09	12/03/09	6.8	4	1												
12.5_2	10/01/09	12/03/09	6.8	4	0.1												
12.5_2	10/01/09	12/03/09	6.8	4	0.01												
12.5_2	10/01/09	12/03/09	6.8	20	10	3/1/2010	9608.0	17.6	19.9	68.8	95.0	0.2	2.1	-117.7	3.6	8.5	0.2
12.5_2	10/01/09	12/03/09	6.8	20	1	3/1/2010	6052.0	21.8	19.7	69.0	97.0	0.1	0.7	-143.6	2.9	10.5	0.2
12.5_2	10/01/09	12/03/09	6.8	20	0.1	3/1/2010	3408.0	25.5	20.1	69.0	100.0	0.0	0.6	-159.1	3.1	15.0	0.6
12.5_2	10/01/09	12/03/09	6.8	20	0.01	3/1/2010	1704.0	26.8	20.0	69.0	105.0	0.0	0.7	-95.6	2.4	19.9	0.5
12.5_2	10/01/09	12/03/09	6.8	40	10	3/2/2010	2746.0	26.4	40.4	69.0	93.0	0.2	3.7	-102.8	4.6	29.8	1.3
12.5_2	10/01/09	12/03/09	6.8	40	1	3/2/2010	1406.0	26.5	40.5	69.0	92.0	0.2	0.8	-13.7	2.8	31.8	1.2
12.5_2	10/01/09	12/03/09	6.8	40	0.1	3/2/2010	828.9	24.2	40.2	69.0	89.0	0.1	0.3	30.6	3.0	32.3	0.6
12.5_2	10/01/09	12/03/09	6.8	40	0.01	3/2/2010	609.1	20.9	40.2	69.0	89.0	0.0	0.7	47.1	4.0	28.9	0.9
12.5_7	10/01/09	12/03/09	7.3	4	10												
12.5_7	10/01/09	12/03/09	7.3	4	1												
12.5_7	10/01/09	12/03/09	7.3	4	0.1												
12.5_7	10/01/09	12/03/09	7.3	4	0.01												
12.5_7	10/01/09	12/03/09	7.3	20	10	3/1/2010	8520.0	16.9	20.5	69.0	98.0	0.4	1.9	-105.2	3.2	6.1	0.8
12.5_7	10/01/09	12/03/09	7.3	20	1	3/1/2010	5442.0	20.8	20.5	69.0	96.0	0.2	0.5	-119.2	3.0	5.6	1.0
12.5_7	10/01/09	12/03/09	7.3	20	0.1	3/1/2010	3210.0	23.9	20.3	69.0	94.0	0.0	0.4	-111.5	2.7	7.0	0.7
12.5_7	10/01/09	12/03/09	7.3	20	0.01	3/1/2010	1859.0	24.1	20.2	69.0	94.0	0.0	0.6	-65.9	2.5	7.4	0.4
12.5_7	10/01/09	12/03/09	7.3	40	10	3/2/2010	3097.0	27.0	40.3	69.0	87.0	0.9	3.4	-164.5	4.6	8.1	0.6
12.5_7	10/01/09	12/03/09	7.3	40	1	3/2/2010	1618.0	28.0	39.9	69.0	93.0	0.0	1.3	-116.2	3.1	9.5	0.3
12.5_7	10/01/09	12/03/09	7.3	40	0.1	3/2/2010	898.1	26.1	39.9	69.0	96.0	0.0	1.3	-88.4	3.0	12.9	0.1
12.5_7	10/01/09	12/03/09	7.3	40	0.01	3/2/2010	597.2	22.8	39.9	69.0	92.0	0.0	1.1	-11.8	4.1	15.0	0.4
12.5_9	10/01/09	12/03/09	7.1	4	10												
12.5_9	10/01/09	12/03/09	7.1	4	1												
12.5_9	10/01/09	12/03/09	7.1	4	0.1												
12.5_9	10/01/09	12/03/09	7.1	4	0.01												
12.5_9	10/01/09	12/03/09	7.1	20	10	3/1/2010	9961.0	15.5	20.2	69.0	95.0	0.2	2.0	-83.5	3.0	16.4	0.8
12.5_9	10/01/09	12/03/09	7.1	20	1	3/1/2010	6608.0	19.2	20.1	69.0	97.0	0.1	0.6	-106.0	2.3	17.3	0.8
12.5_9	10/01/09	12/03/09	7.1	20	0.1	3/1/2010	3978.0	23.2	19.9	69.0	100.0	0.0	0.6	-135.4	2.5	18.5	0.4
12.5_9	10/01/09	12/03/09	7.1	20	0.01	3/1/2010	2086.0	25.4	19.9	69.0	106.0	0.0	0.6	-106.9	1.9	17.4	0.1
12.5_9	10/01/09	12/03/09	7.1	40	10	3/2/2010	3450.0	26.1	39.7	69.1	88.0	0.6	3.1	-169.1	4.7	13.9	0.5
12.5_9	10/01/09	12/03/09	7.1	40	1	3/2/2010	1829.0	27.7	39.6	69.0	93.0	0.2	1.2	-133.4	3.0	14.1	0.6
12.5_9	10/01/09	12/03/09	7.1	40	0.1	3/2/2010	1004.0	26.6	39.9	69.0	95.0	0.0	1.2	-98.4	3.3	12.7	1.1
12.5_9	10/01/09	12/03/09	7.1	40	0.01	3/2/2010	619.7	23.6	39.9	69.0	97.0	0.0	1.1	-12.7	3.4	9.5	1.7

Table B23. Lab 4 loose mix unconfined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
4	11/02/09	04/05/10	7.7	4	10	5/20/2010	21627.0	8.4	4.5	1.7	74.0	0.3	3.4	-23.6	26.8	63.9	2.1
4	11/02/09	04/05/10	7.7	4	1	5/20/2010	16341.0	4.7	4.4	1.7	94.0	0.3	0.8	-53.2	46.6	68.1	25.9
4	11/02/09	04/05/10	7.7	4	0.1	5/20/2010	11244.0	9.6	4.1	1.7	97.0	0.0	0.6	12.6	450.4	70.9	39.6
4	11/02/09	04/05/10	7.7	4	0.01	5/20/2010	7355.0	38.1	3.5	1.7	92.0	-0.1	0.5	-281.8	727.8	71.2	22.4
4	11/02/09	04/05/10	7.7	20	10	5/21/2010	7154.0	20.7	20.1	1.5	91.0	0.2	4.3	-156.2	5.0	3.2	0.5
4	11/02/09	04/05/10	7.7	20	1	5/21/2010	4174.0	25.6	20.0	1.4	91.0	0.1	1.4	-177.6	4.2	4.2	0.4
4	11/02/09	04/05/10	7.7	20	0.1	5/21/2010	2127.0	29.1	20.0	1.5	91.0	0.2	1.7	-106.4	3.0	5.9	0.5
4	11/02/09	04/05/10	7.7	20	0.01	5/21/2010	945.5	29.8	20.0	1.4	103.0	-0.2	1.5	46.7	3.0	6.8	0.4
4	11/02/09	04/05/10	7.7	40	10	5/22/2010											
4	11/02/09	04/05/10	7.7	40	1	5/22/2010											
4	11/02/09	04/05/10	7.7	40	0.1	5/22/2010											
4	11/02/09	04/05/10	7.7	40	0.01	5/22/2010											
7	11/02/09	04/06/10	7.5	4	10	5/20/2010	14324.0	11.4	4.5	1.8	93.0	0.2	2.2	-46.0	2.4	16.6	0.2
7	11/02/09	04/06/10	7.5	4	1	5/20/2010	10548.0	15.2	4.4	1.8	96.0	0.1	0.8	-71.9	1.9	16.3	0.2
7	11/02/09	04/06/10	7.5	4	0.1	5/20/2010	7179.0	19.5	4.0	1.8	98.0	0.0	0.8	-87.8	2.3	15.9	0.2
7	11/02/09	04/06/10	7.5	4	0.01	5/20/2010	4772.0	22.8	3.4	1.7	90.0	0.1	0.6	-70.6	2.3	14.0	0.4
7	11/02/09	04/06/10	7.5	20	10	5/21/2010	6970.0	19.7	20.1	1.4	92.0	0.4	3.8	-139.4	4.6	2.4	0.7
7	11/02/09	04/06/10	7.5	20	1	5/21/2010	4184.0	24.6	20.0	1.4	91.0	0.4	1.3	-173.1	3.6	0.9	0.9
7	11/02/09	04/06/10	7.5	20	0.1	5/21/2010	2191.0	28.2	20.0	1.4	91.0	0.0	1.7	-125.8	3.3	2.0	1.0
7	11/02/09	04/06/10	7.5	20	0.01	5/21/2010	1024.0	29.3	19.9	1.4	100.0	0.4	1.5	12.4	3.0	3.7	0.6
7	11/02/09	04/06/10	7.5	40	10	5/22/2010	1816.0	30.9	41.2	1.1	85.0	-0.2	8.2	-226.1	9.4	2.6	0.9
7	11/02/09	04/06/10	7.5	40	1	5/22/2010	764.1	31.2	41.8	1.1	96.0	0.8	4.0	-73.7	5.9	5.1	0.7
7	11/02/09	04/06/10	7.5	40	0.1	5/22/2010	335.1	28.8	43.3	1.0	92.0	0.2	4.8	122.3	6.3	8.9	0.8
7	11/02/09	04/06/10	7.5	40	0.01	5/22/2010	147.9	24.2	42.8	1.1	113.0	-2.6	13.4	441.2	8.3	10.7	1.1
10	11/02/09	04/06/10	7.5	4	10	5/20/2010	14528.0	10.1	4.5	1.7	91.0	0.2	2.4	-37.3	3.8	3.6	0.7
10	11/02/09	04/06/10	7.5	4	1	5/20/2010	11019.0	13.5	4.4	1.7	97.0	0.1	0.7	-61.8	3.2	2.9	0.7
10	11/02/09	04/06/10	7.5	4	0.1	5/20/2010	7686.0	17.7	4.1	1.7	100.0	0.1	0.8	-91.9	2.7	1.0	1.0
10	11/02/09	04/06/10	7.5	4	0.01	5/20/2010	5152.0	21.4	3.5	1.7	93.0	0.1	0.6	-109.1	6.8	1.1	1.0
10	11/02/09	04/06/10	7.5	20	10	5/21/2010	7035.0	20.6	19.6	1.7	92.0	0.3	3.4	-151.3	4.5	10.0	0.1
10	11/02/09	04/06/10	7.5	20	1	5/21/2010	4064.0	25.5	19.7	1.7	91.0	0.1	1.2	-177.6	3.8	10.0	0.4
10	11/02/09	04/06/10	7.5	20	0.1	5/21/2010	2070.0	29.1	19.9	1.7	91.0	-0.5	2.0	-129.9	3.5	11.0	0.8
10	11/02/09	04/06/10	7.5	20	0.01	5/21/2010	966.8	29.7	19.9	1.6	99.0	0.0	1.9	-31.2	4.6	11.1	1.5
10	11/02/09	04/06/10	7.5	40	10	5/22/2010	1637.0	32.2	43.0	1.0	88.0	0.1	9.5	-237.1	9.3	10.1	0.4
10	11/02/09	04/06/10	7.5	40	1	5/22/2010	656.3	32.7	43.1	1.0	96.0	1.6	8.5	-88.7	7.5	7.9	0.3
10	11/02/09	04/06/10	7.5	40	0.1	5/22/2010	277.1	29.4	43.2	1.0	92.0	0.2	6.6	54.9	5.9	5.1	1.3
10	11/02/09	04/06/10	7.5	40	0.01	5/22/2010	124.6	26.0	42.4	1.1	106.0	-0.9	16.9	369.7	10.2	7.4	2.4

Table B24. Lab 4 loose mix confined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
4	11/02/09	04/05/10	7.7	4	10												
4	11/02/09	04/05/10	7.7	4	1												
4	11/02/09	04/05/10	7.7	4	0.1												
4	11/02/09	04/05/10	7.7	4	0.01												
4	11/02/09	04/05/10	7.7	20	10	5/14/2010	7693.0	20.2	20.3	69.0	91.0	0.3	4.2	-163.5	11.2	13.8	1.4
4	11/02/09	04/05/10	7.7	20	1	5/14/2010	4505.0	25.5	20.2	69.0	92.0	0.3	1.3	-212.9	9.0	13.0	1.4
4	11/02/09	04/05/10	7.7	20	0.1	5/14/2010	2308.0	29.5	20.2	69.0	92.0	0.0	1.8	-189.9	4.5	13.4	1.5
4	11/02/09	04/05/10	7.7	20	0.01	5/14/2010	1131.0	29.9	18.8	69.0	95.0	0.0	2.0	-59.7	3.6	18.7	0.6
4	11/02/09	04/05/10	7.7	40	10	5/19/2010	1786.0	32.1	40.4	69.0	85.0	0.1	7.3	-236.4	8.4	10.6	1.2
4	11/02/09	04/05/10	7.7	40	1	5/19/2010	732.7	32.3	40.9	69.0	97.0	-0.5	4.1	-40.4	5.1	14.6	1.7
4	11/02/09	04/05/10	7.7	40	0.1	5/19/2010	336.3	28.8	42.0	69.0	92.0	0.1	4.6	152.2	4.1	21.7	1.4
4	11/02/09	04/05/10	7.7	40	0.01	5/19/2010	170.9	24.0	41.4	69.0	103.0	0.2	2.7	278.6	8.6	31.9	1.0
7	11/02/09	04/06/10	7.5	4	10												
7	11/02/09	04/06/10	7.5	4	1												
7	11/02/09	04/06/10	7.5	4	0.1												
7	11/02/09	04/06/10	7.5	4	0.01												
7	11/02/09	04/06/10	7.5	20	10	5/14/2010	7120.0	19.9	20.5	68.9	94.0	0.6	2.8	-148.1	3.8	10.3	1.3
7	11/02/09	04/06/10	7.5	20	1	5/14/2010	4231.0	25.1	20.3	69.0	93.0	0.0	1.2	-201.6	3.9	10.4	1.7
7	11/02/09	04/06/10	7.5	20	0.1	5/14/2010	2222.0	29.0	19.9	69.0	92.0	0.1	1.9	-185.0	2.9	10.7	2.2
7	11/02/09	04/06/10	7.5	20	0.01	5/14/2010	1089.0	28.1	20.1	69.0	96.0	-0.1	2.0	-40.5	2.9	12.2	3.5
7	11/02/09	04/06/10	7.5	40	10	5/19/2010	1665.0	31.1	41.2	69.0	86.0	0.6	6.2	-242.2	7.3	13.9	1.4
7	11/02/09	04/06/10	7.5	40	1	5/19/2010	723.4	30.7	41.7	69.0	96.0	-0.8	2.9	-85.1	4.6	16.8	1.4
7	11/02/09	04/06/10	7.5	40	0.1	5/19/2010	379.1	26.9	42.2	69.0	85.0	0.0	4.8	38.9	3.9	17.2	1.1
7	11/02/09	04/06/10	7.5	40	0.01	5/19/2010	344.7	25.7	41.5	69.0	62.0	0.4	2.9	153.1	14.6	14.2	1.1
10	11/02/09	04/06/10	7.5	4	10												
10	11/02/09	04/06/10	7.5	4	1												
10	11/02/09	04/06/10	7.5	4	0.1												
10	11/02/09	04/06/10	7.5	4	0.01												
10	11/02/09	04/06/10	7.5	20	10	5/14/2010	7403.0	20.4	19.7	69.0	93.0	0.3	3.2	-149.3	4.3	22.8	0.9
10	11/02/09	04/06/10	7.5	20	1	5/14/2010	4284.0	25.5	19.8	69.0	92.0	0.4	1.3	-184.9	3.4	23.2	0.7
10	11/02/09	04/06/10	7.5	20	0.1	5/14/2010	2189.0	29.3	20.0	69.0	92.0	0.0	2.0	-168.7	3.3	24.2	0.4
10	11/02/09	04/06/10	7.5	20	0.01	5/14/2010	1058.0	29.6	20.1	69.0	96.0	-0.2	1.7	-62.2	2.9	26.3	0.8
10	11/02/09	04/06/10	7.5	40	10	5/19/2010	1810.0	31.5	40.7	69.0	87.0	0.5	5.7	-250.3	7.4	5.6	1.0
10	11/02/09	04/06/10	7.5	40	1	5/19/2010	788.3	31.4	41.0	69.0	97.0	-1.3	3.1	-144.5	5.3	10.9	1.7
10	11/02/09	04/06/10	7.5	40	0.1	5/19/2010	403.9	27.8	41.1	69.0	87.0	-0.3	4.4	-26.9	5.4	17.1	2.5
10	11/02/09	04/06/10	7.5	40	0.01	5/19/2010	235.4	23.0	41.1	69.0	98.0	0.4	2.3	7.4	10.4	19.0	2.7

Table B25. Lab 5 loose mix unconfined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5-2	12/23/09	02/11/10	7.6	4	10	3/11/2010	14868.0	10.9	4.1	0.8	96.0	0.1	2.0	-46.6	2.4	18.8	0.3
12.5-2	12/23/09	02/11/10	7.6	4	1	3/11/2010	11112.0	14.0	4.1	0.8	100.0	0.1	0.4	-72.5	1.9	18.0	0.5
12.5-2	12/23/09	02/11/10	7.6	4	0.1	3/11/2010	7649.0	18.1	4.0	0.8	101.0	0.0	0.2	-119.7	2.2	17.3	0.5
12.5-2	12/23/09	02/11/10	7.6	4	0.01	3/11/2010	4946.0	22.1	4.1	0.8	95.0	0.0	0.3	-139.2	2.4	17.0	0.6
12.5-2	12/23/09	02/11/10	7.6	20	10	3/15/2010	6811.0	20.8	20.2	0.4	95.0	0.3	2.0	-194.0	4.7	26.0	0.7
12.5-2	12/23/09	02/11/10	7.6	20	1	3/15/2010	3981.0	25.6	20.1	0.4	95.0	0.0	0.6	-209.0	4.0	25.4	0.7
12.5-2	12/23/09	02/11/10	7.6	20	0.1	3/15/2010	2094.0	28.9	20.1	0.4	90.0	0.1	0.3	-201.7	3.8	24.9	0.7
12.5-2	12/23/09	02/11/10	7.6	20	0.01	3/15/2010	1071.0	29.1	20.0	0.5	93.0	0.0	0.5	-117.9	3.6	23.4	0.9
12.5-2	12/23/09	02/11/10	7.6	40	10	3/15/2010	1795.0	31.1	40.0	0.2	81.0	-1.0	4.9	-258.3	8.0	11.3	0.4
12.5-2	12/23/09	02/11/10	7.6	40	1	3/15/2010	777.8	30.2	40.0	0.2	91.0	0.1	1.4	-147.7	4.4	9.6	0.8
12.5-2	12/23/09	02/11/10	7.6	40	0.1	3/15/2010	380.8	25.6	40.1	0.3	86.0	-0.5	1.5	-140.5	5.2	9.0	0.9
12.5-2	12/23/09	02/11/10	7.6	40	0.01	3/15/2010	256.9	19.7	39.9	0.3	92.0	-0.1	0.7	-134.5	7.1	8.5	1.3
12.5-6	12/23/09	02/17/10	7.5	4	10	3/12/2010	15279.0	10.5	4.0	0.8	108.0	0.1	2.5	-53.4	4.1	33.0	0.8
12.5-6	12/23/09	02/17/10	7.5	4	1	3/12/2010	11567.0	13.5	4.0	0.8	99.0	0.1	0.4	-63.0	2.7	31.7	0.5
12.5-6	12/23/09	02/17/10	7.5	4	0.1	3/12/2010	8064.0	17.8	3.9	0.8	100.0	0.0	0.2	-109.0	2.9	28.1	0.9
12.5-6	12/23/09	02/17/10	7.5	4	0.01	3/12/2010	5095.0	22.4	3.9	0.7	97.0	0.0	0.3	-138.9	2.3	23.1	1.1
12.5-6	12/23/09	02/17/10	7.5	20	10	3/12/2010	6374.0	21.8	19.8	0.6	97.0	0.3	2.2	-223.5	5.6	17.7	0.8
12.5-6	12/23/09	02/17/10	7.5	20	1	3/12/2010	3665.0	26.6	19.9	0.6	93.0	0.1	0.6	-231.9	4.6	13.0	0.9
12.5-6	12/23/09	02/17/10	7.5	20	0.1	3/12/2010	1919.0	29.5	19.9	0.6	88.0	-0.1	0.3	-220.6	4.5	11.2	0.6
12.5-6	12/23/09	02/17/10	7.5	20	0.01	3/12/2010	1022.0	28.8	19.9	0.6	90.0	0.1	0.5	-145.1	4.0	11.2	0.5
12.5-6	12/23/09	02/17/10	7.5	40	10	3/15/2010	1813.0	30.2	40.3	0.2	82.0	0.5	4.7	-262.7	7.3	5.5	1.1
12.5-6	12/23/09	02/17/10	7.5	40	1	3/15/2010	813.8	28.9	40.3	0.3	91.0	0.2	1.3	-164.7	4.5	7.0	1.1
12.5-6	12/23/09	02/17/10	7.5	40	0.1	3/15/2010	417.8	24.0	40.2	0.2	86.0	-0.2	1.4	-157.8	5.6	7.9	1.5
12.5-6	12/23/09	02/17/10	7.5	40	0.01	3/15/2010	291.8	17.9	39.9	0.2	93.0	0.1	0.8	-222.3	8.2	8.0	2.4
12.5-8	12/23/09	03/08/10	7.1	4	10	3/12/2010	14579.0	10.5	4.0	0.8	95.0	0.0	1.7	-43.5	3.0	51.7	0.8
12.5-8	12/23/09	03/08/10	7.1	4	1	3/12/2010	10946.0	13.8	4.0	0.8	98.0	0.0	0.4	-65.6	2.9	50.6	0.6
12.5-8	12/23/09	03/08/10	7.1	4	0.1	3/12/2010	7577.0	18.0	4.0	0.8	98.0	0.0	0.2	-108.3	3.6	50.0	0.5
12.5-8	12/23/09	03/08/10	7.1	4	0.01	3/12/2010	4903.0	22.0	4.0	0.7	94.0	0.0	0.3	-120.1	4.3	48.8	0.5
12.5-8	12/23/09	03/08/10	7.1	20	10	3/12/2010	7124.0	20.4	20.0	0.5	96.0	0.3	1.9	-181.3	5.2	43.1	0.7
12.5-8	12/23/09	03/08/10	7.1	20	1	3/12/2010	4241.0	25.2	20.0	0.5	94.0	0.1	0.5	-200.1	4.8	41.8	0.4
12.5-8	12/23/09	03/08/10	7.1	20	0.1	3/12/2010	2265.0	28.9	20.0	0.5	90.0	0.0	0.2	-202.3	4.6	41.9	0.4
12.5-8	12/23/09	03/08/10	7.1	20	0.01	3/12/2010	1086.0	28.9	20.0	0.5	98.0	0.0	0.5	-139.4	3.8	41.5	0.6
12.5-8	12/23/09	03/08/10	7.1	40	10	3/15/2010	1797.0	30.2	40.2	0.1	81.0	-0.5	5.0	-241.4	7.5	38.9	0.2
12.5-8	12/23/09	03/08/10	7.1	40	1	3/15/2010	793.9	29.5	40.1	0.1	91.0	0.1	1.4	-126.8	4.2	39.1	0.5
12.5-8	12/23/09	03/08/10	7.1	40	0.1	3/15/2010	386.5	25.0	40.3	0.3	87.0	0.5	1.4	-75.7	4.9	39.3	0.4
12.5-8	12/23/09	03/08/10	7.1	40	0.01	3/15/2010	250.2	19.1	39.9	0.2	94.0	0.1	0.8	-68.0	6.6	37.2	0.3

Table B26. Lab 5 loose mix confined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5-2	12/23/09	02/11/10	7.6	4	10	[redacted]											
12.5-2	12/23/09	02/11/10	7.6	4	1	[redacted]											
12.5-2	12/23/09	02/11/10	7.6	4	0.1	[redacted]											
12.5-2	12/23/09	02/11/10	7.6	4	0.01	[redacted]											
12.5-2	12/23/09	02/11/10	7.6	20	10	3/29/2010	7063.0	20.2	20.3	69.0	96.0	0.3	2.3	-176.7	4.8	9.4	0.8
12.5-2	12/23/09	02/11/10	7.6	20	1	3/29/2010	4186.0	24.6	20.1	69.0	94.0	0.0	0.5	-169.9	3.8	10.7	1.0
12.5-2	12/23/09	02/11/10	7.6	20	0.1	3/29/2010	2230.0	27.3	20.0	69.0	91.0	-0.1	0.3	-138.1	3.5	12.5	1.2
12.5-2	12/23/09	02/11/10	7.6	20	0.01	3/29/2010	1187.0	27.1	19.9	69.0	93.0	0.0	0.5	-50.5	3.6	14.0	1.2
12.5-2	12/23/09	02/11/10	7.6	40	10	4/1/2010	2188.0	28.5	40.5	69.0	83.0	0.5	4.0	-193.5	6.6	31.0	0.4
12.5-2	12/23/09	02/11/10	7.6	40	1	4/1/2010	1029.0	27.5	40.6	69.0	91.0	0.3	0.8	-76.4	3.7	31.8	0.6
12.5-2	12/23/09	02/11/10	7.6	40	0.1	4/1/2010	546.3	23.9	40.3	69.0	88.0	0.2	0.5	-39.2	3.9	32.9	0.3
12.5-2	12/23/09	02/11/10	7.6	40	0.01	4/1/2010	359.6	19.1	40.0	69.0	95.0	0.3	0.6	-45.1	5.4	32.5	0.2
12.5-6	12/23/09	02/17/10	7.5	4	10	[redacted]											
12.5-6	12/23/09	02/17/10	7.5	4	1	[redacted]											
12.5-6	12/23/09	02/17/10	7.5	4	0.1	[redacted]											
12.5-6	12/23/09	02/17/10	7.5	4	0.01	[redacted]											
12.5-6	12/23/09	02/17/10	7.5	20	10	3/29/2010	6820.0	20.2	20.2	69.0	97.0	0.2	2.2	-168.7	4.7	8.6	0.8
12.5-6	12/23/09	02/17/10	7.5	20	1	3/29/2010	4065.0	24.2	20.0	69.0	95.0	0.1	0.6	-155.3	3.7	6.6	1.0
12.5-6	12/23/09	02/17/10	7.5	20	0.1	3/29/2010	2210.0	26.4	20.0	69.0	91.0	0.0	0.3	-117.7	3.4	6.4	0.9
12.5-6	12/23/09	02/17/10	7.5	20	0.01	3/29/2010	1192.0	25.8	19.9	69.0	95.0	0.0	0.5	-37.2	3.5	7.6	1.2
12.5-6	12/23/09	02/17/10	7.5	40	10	4/1/2010	2066.0	28.4	40.3	69.0	83.0	0.6	3.8	-167.1	6.3	5.8	1.1
12.5-6	12/23/09	02/17/10	7.5	40	1	4/1/2010	994.2	26.4	40.3	69.0	90.0	-0.1	0.7	-42.2	3.7	8.4	2.1
12.5-6	12/23/09	02/17/10	7.5	40	0.1	4/1/2010	537.7	22.6	40.1	69.0	88.0	0.0	0.5	0.1	4.9	10.1	2.7
12.5-6	12/23/09	02/17/10	7.5	40	0.01	4/1/2010	353.1	18.0	39.8	69.0	97.0	0.0	0.6	-21.9	6.6	11.1	2.7
12.5-8	12/23/09	03/08/10	7.1	4	10	[redacted]											
12.5-8	12/23/09	03/08/10	7.1	4	1	[redacted]											
12.5-8	12/23/09	03/08/10	7.1	4	0.1	[redacted]											
12.5-8	12/23/09	03/08/10	7.1	4	0.01	[redacted]											
12.5-8	12/23/09	03/08/10	7.1	20	10	3/29/2010	6597.0	20.2	20.0	69.0	94.0	0.5	2.4	-173.0	4.7	21.7	0.4
12.5-8	12/23/09	03/08/10	7.1	20	1	3/29/2010	3931.0	24.4	19.7	69.0	93.0	0.0	0.6	-155.6	3.9	21.3	0.2
12.5-8	12/23/09	03/08/10	7.1	20	0.1	3/29/2010	2112.0	26.7	20.0	69.0	90.0	0.0	0.3	-112.1	3.7	23.2	0.2
12.5-8	12/23/09	03/08/10	7.1	20	0.01	3/29/2010	1161.0	26.0	19.9	69.0	93.0	0.0	0.5	-37.9	3.9	26.9	0.6
12.5-8	12/23/09	03/08/10	7.1	40	10	4/2/2010	2280.0	28.8	40.2	69.0	83.0	0.4	3.9	-227.6	7.3	12.1	0.3
12.5-8	12/23/09	03/08/10	7.1	40	1	4/2/2010	1075.0	27.9	40.2	69.0	90.0	-0.1	0.8	-95.4	4.3	17.2	0.4
12.5-8	12/23/09	03/08/10	7.1	40	0.1	4/2/2010	562.7	24.4	39.9	69.0	87.0	0.0	0.5	-52.1	4.6	25.0	0.8
12.5-8	12/23/09	03/08/10	7.1	40	0.01	4/2/2010	351.9	19.6	39.8	69.0	97.0	0.1	0.6	-59.6	6.0	26.5	1.5

Table B27. Lab 6 loose mix unconfined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
C	12/01/09	02/01/10	7.9	4	10	4/7/2010	16613.0	9.9	3.9	0.4	96.0	0.1	1.3	-39.1	1.8	11.1	0.2
C	12/01/09	02/01/10	7.9	4	1	4/7/2010	12564.0	13.0	3.9	0.3	99.0	0.1	0.4	-59.2	1.5	10.6	0.3
C	12/01/09	02/01/10	7.9	4	0.1	4/7/2010	8733.0	17.0	3.9	0.3	104.0	0.0	0.3	-93.4	1.9	10.9	0.5
C	12/01/09	02/01/10	7.9	4	0.01	4/7/2010	5651.0	20.9	3.9	0.4	99.0	0.0	0.3	-101.0	1.5	13.0	0.8
C	12/01/09	02/01/10	7.9	20	10	4/7/2010	7966.0	19.5	20.2	0.2	95.0	0.3	2.1	-147.4	3.9	3.5	0.3
C	12/01/09	02/01/10	7.9	20	1	4/7/2010	4745.0	24.2	20.2	0.2	95.0	0.1	0.6	-171.2	3.4	4.1	0.5
C	12/01/09	02/01/10	7.9	20	0.1	4/7/2010	2536.0	27.7	20.2	0.1	98.0	0.0	0.2	-166.3	3.2	7.4	0.7
C	12/01/09	02/01/10	7.9	20	0.01	4/7/2010	1237.0	28.3	20.1	0.2	103.0	0.0	0.4	-82.5	2.9	12.7	0.9
C	12/01/09	02/01/10	7.9	40	10	4/8/2010	2117.0	30.1	40.0	0.0	83.0	0.4	4.6	-237.8	7.7	3.9	0.8
C	12/01/09	02/01/10	7.9	40	1	4/8/2010	959.6	29.2	40.0	0.0	93.0	0.2	1.5	-113.5	3.9	9.4	0.9
C	12/01/09	02/01/10	7.9	40	0.1	4/8/2010	463.9	24.9	40.0	0.0	95.0	0.1	0.4	-75.4	4.5	14.6	0.9
C	12/01/09	02/01/10	7.9	40	0.01	4/8/2010	278.8	18.9	39.9	0.0	102.0	0.1	0.5	-72.5	6.4	17.2	1.4
D	12/01/09	02/01/10	7.5	4	10	4/7/2010	15828.0	9.7	3.9	0.3	95.0	0.3	1.3	-33.8	1.7	8.2	0.3
D	12/01/09	02/01/10	7.5	4	1	4/7/2010	12103.0	12.6	4.0	0.3	98.0	0.1	0.4	-51.4	1.5	8.2	0.3
D	12/01/09	02/01/10	7.5	4	0.1	4/7/2010	8567.0	16.2	4.0	0.2	102.0	0.0	0.3	-78.9	1.8	8.7	0.4
D	12/01/09	02/01/10	7.5	4	0.01	4/7/2010	5662.0	20.0	4.0	0.3	99.0	0.0	0.3	-83.4	1.5	10.2	0.7
D	12/01/09	02/01/10	7.5	20	10	4/7/2010	7890.0	18.8	20.1	0.2	96.0	0.4	2.1	-130.1	3.6	1.6	0.3
D	12/01/09	02/01/10	7.5	20	1	4/7/2010	4777.0	23.5	20.1	0.2	95.0	0.1	0.6	-149.1	3.0	2.4	0.4
D	12/01/09	02/01/10	7.5	20	0.1	4/7/2010	2591.0	27.3	19.9	0.2	99.0	0.0	0.2	-139.0	2.6	4.3	0.8
D	12/01/09	02/01/10	7.5	20	0.01	4/7/2010	1280.0	28.5	19.9	0.2	103.0	0.0	0.4	-50.0	2.3	7.1	1.1
D	12/01/09	02/01/10	7.5	40	10	4/8/2010	2143.0	30.2	40.2	0.0	86.0	0.4	4.2	-262.5	8.3	2.9	0.8
D	12/01/09	02/01/10	7.5	40	1	4/8/2010	983.0	29.7	40.2	0.0	93.0	0.2	1.3	-132.2	3.7	4.9	1.1
D	12/01/09	02/01/10	7.5	40	0.1	4/8/2010	475.2	26.1	40.2	0.0	95.0	0.0	0.4	-99.3	4.5	6.6	1.0
D	12/01/09	03/25/10	7.5	40	0.01	4/8/2010	277.5	21.1	40.0	0.0	101.0	0.1	0.5	-107.8	6.4	7.5	1.2
1	12/01/09	03/25/10	6.9	4	10	4/7/2010	16386.0	9.8	4.0	0.3	95.0	0.3	1.2	-33.1	2.0	7.4	0.2
1	12/01/09	03/25/10	6.9	4	1	4/7/2010	12601.0	12.4	4.0	0.3	99.0	0.0	0.4	-47.0	1.8	6.3	0.2
1	12/01/09	03/25/10	6.9	4	0.1	4/7/2010	9059.0	15.7	3.9	0.3	103.0	0.0	0.3	-71.0	1.8	6.7	0.4
1	12/01/09	03/25/10	6.9	4	0.01	4/7/2010	6286.0	19.1	3.8	0.3	97.0	0.0	0.3	-65.1	4.5	7.4	0.8
1	12/01/09	03/25/10	6.9	20	10	4/7/2010	8058.0	18.6	20.2	0.2	96.0	0.3	2.1	-119.2	3.8	10.0	0.4
1	12/01/09	03/25/10	6.9	20	1	4/7/2010	4983.0	22.7	20.2	0.1	96.0	0.1	0.6	-141.6	3.0	9.8	0.6
1	12/01/09	03/25/10	6.9	20	0.1	4/7/2010	2820.0	26.1	20.2	0.1	98.0	0.0	0.2	-153.7	3.0	10.2	0.7
1	12/01/09	03/25/10	6.9	20	0.01	4/7/2010	1488.0	27.5	20.1	0.2	100.0	0.0	0.4	-93.0	2.8	9.8	1.2
1	12/01/09	03/25/10	6.9	40	10	4/8/2010	2404.0	29.1	40.0	0.0	86.0	0.5	4.3	-276.9	8.2	17.1	0.6
1	12/01/09	03/25/10	6.9	40	1	4/8/2010	1154.0	29.7	40.0	0.0	92.0	0.2	1.3	-169.5	3.9	17.8	0.9
1	12/01/09	03/25/10	6.9	40	0.1	4/8/2010	558.6	27.8	39.9	0.0	94.0	-0.2	0.3	-142.2	4.3	16.8	1.6
1	12/01/09	03/25/10	6.9	40	0.01	4/8/2010	309.0	23.7	40.0	0.0	101.0	0.0	0.5	-147.3	6.0	14.1	1.9

Table B28. Lab 6 loose mix confined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
C	12/01/09	02/01/10	7.9	4	10	[redacted]											
C	12/01/09	02/01/10	7.9	4	1	[redacted]											
C	12/01/09	02/01/10	7.9	4	0.1	[redacted]											
C	12/01/09	02/01/10	7.9	4	0.01	[redacted]											
C	12/01/09	02/01/10	7.9	20	10	4/6/2010	8102.0	19.6	20.4	69.0	96.0	0.4	1.9	-153.7	3.7	18.8	0.8
C	12/01/09	02/01/10	7.9	20	1	4/6/2010	4709.0	24.9	20.0	69.0	102.0	0.1	0.5	-218.3	4.6	20.1	1.2
C	12/01/09	02/01/10	7.9	20	0.1	4/6/2010	2449.0	29.0	19.9	69.0	100.0	0.0	0.2	-198.2	3.0	20.3	1.3
C	12/01/09	02/01/10	7.9	20	0.01	4/6/2010	1220.0	29.9	19.8	69.0	99.0	0.0	0.4	-105.9	2.4	18.8	1.7
C	12/01/09	02/01/10	7.9	40	10	4/6/2010	2081.0	31.3	39.9	69.0	91.0	0.7	3.7	-323.5	8.4	10.1	1.1
C	12/01/09	02/01/10	7.9	40	1	4/6/2010	962.1	30.4	39.9	69.0	93.0	0.2	1.0	-162.0	3.4	11.6	1.4
C	12/01/09	02/01/10	7.9	40	0.1	4/6/2010	503.9	26.0	39.7	69.0	92.0	0.0	0.4	-105.1	4.0	15.1	1.9
C	12/01/09	02/01/10	7.9	40	0.01	4/6/2010	332.1	21.3	40.1	69.0	95.0	0.0	0.5	-88.6	5.6	17.7	1.8
D	12/01/09	02/01/10	7.5	4	10	[redacted]											
D	12/01/09	02/01/10	7.5	4	1	[redacted]											
D	12/01/09	02/01/10	7.5	4	0.1	[redacted]											
D	12/01/09	02/01/10	7.5	4	0.01	[redacted]											
D	12/01/09	02/01/10	7.5	20	10	4/6/2010	7481.0	18.9	20.2	69.0	97.0	0.4	1.8	-130.5	3.3	6.0	0.7
D	12/01/09	02/01/10	7.5	20	1	4/6/2010	4500.0	23.9	20.0	69.0	98.0	0.0	0.5	-161.4	2.8	5.2	0.7
D	12/01/09	02/01/10	7.5	20	0.1	4/6/2010	2452.0	27.8	19.9	69.0	100.0	0.0	0.2	-179.7	2.9	2.9	0.9
D	12/01/09	02/01/10	7.5	20	0.01	4/6/2010	1294.0	28.5	19.9	69.0	97.0	0.0	0.4	-84.0	2.4	1.0	1.0
D	12/01/09	02/01/10	7.5	40	10	4/6/2010	2171.0	30.6	40.3	69.0	91.0	0.6	3.3	-288.6	7.9	9.6	1.3
D	12/01/09	02/01/10	7.5	40	1	4/6/2010	1018.0	30.5	40.3	69.0	93.0	0.1	0.9	-142.4	3.2	13.2	1.6
D	12/01/09	02/01/10	7.5	40	0.1	4/6/2010	537.1	27.1	40.5	69.0	92.0	0.0	0.4	-70.5	3.2	17.5	1.6
D	12/01/09	03/25/10	7.5	40	0.01	4/6/2010	352.5	22.5	40.5	69.0	94.0	0.0	0.5	-67.2	4.0	19.6	2.0
1	12/01/09	03/25/10	6.9	4	10	[redacted]											
1	12/01/09	03/25/10	6.9	4	1	[redacted]											
1	12/01/09	03/25/10	6.9	4	0.1	[redacted]											
1	12/01/09	03/25/10	6.9	4	0.01	[redacted]											
1	12/01/09	03/25/10	6.9	20	10	4/6/2010	7955.0	18.6	20.0	69.0	95.0	0.3	2.1	-123.2	3.9	24.1	0.6
1	12/01/09	03/25/10	6.9	20	1	4/6/2010	4859.0	23.2	19.9	69.0	96.0	0.0	0.5	-156.3	3.3	20.5	0.9
1	12/01/09	03/25/10	6.9	20	0.1	4/6/2010	2720.0	27.0	19.8	69.0	99.0	0.0	0.2	-175.3	3.3	17.3	1.3
1	12/01/09	03/25/10	6.9	20	0.01	4/6/2010	1466.0	28.7	20.0	69.0	97.0	0.0	0.4	-111.1	4.7	12.9	1.7
1	12/01/09	03/25/10	6.9	40	10	4/6/2010	2415.0	29.7	40.1	69.0	90.0	0.6	3.6	-308.4	7.9	9.4	1.2
1	12/01/09	03/25/10	6.9	40	1	4/6/2010	1168.0	30.5	40.0	69.0	91.0	0.2	1.0	-188.4	3.9	11.7	1.7
1	12/01/09	03/25/10	6.9	40	0.1	4/6/2010	580.9	29.1	39.9	69.0	92.0	0.1	0.4	-89.9	3.6	13.6	1.7
1	12/01/09	03/25/10	6.9	40	0.01	4/6/2010	353.5	26.6	40.2	69.0	92.0	-0.1	0.5	-77.6	7.8	15.4	1.1

Table B29. Lab 7 loose mix unconfined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5-11	02/01/10	04/19/10	6.7	4	10	4/26/2010	14691.0	10.6	4.1	1.6	81.0	0.9	2.7	-53.8	2.7	9.5	0.6
12.5-11	02/01/10	04/19/10	6.7	4	1	4/26/2010	10912.0	14.2	4.1	1.6	96.0	0.1	0.7	-71.8	1.8	9.9	0.2
12.5-11	02/01/10	04/19/10	6.7	4	0.1	4/26/2010	7482.0	18.0	4.0	1.6	101.0	0.0	0.3	-103.3	2.1	10.3	0.1
12.5-11	02/01/10	04/19/10	6.7	4	0.01	4/26/2010	5084.0	21.1	3.9	1.6	94.0	0.0	0.3	-89.6	4.5	12.3	0.7
12.5-11	02/01/10	04/19/10	6.7	20	10	4/26/2010	7411.0	20.0	20.0	1.6	93.0	0.1	3.2	-164.6	4.8	8.1	0.5
12.5-11	02/01/10	04/19/10	6.7	20	1	4/26/2010	4500.0	24.4	20.1	1.6	93.0	0.2	0.9	-173.0	4.7	8.5	0.8
12.5-11	02/01/10	04/19/10	6.7	20	0.1	4/26/2010	2510.0	27.0	20.0	1.6	97.0	0.0	0.2	-137.0	3.4	9.9	0.9
12.5-11	02/01/10	04/19/10	6.7	20	0.01	4/26/2010	1317.0	27.5	19.9	1.6	101.0	0.0	0.4	-44.9	2.9	11.3	0.9
12.5-11	02/01/10	04/19/10	6.7	40	10	4/26/2010	2538.0	29.2	39.5	1.5	86.0	-0.3	5.2	-195.7	6.6	13.1	0.9
12.5-11	02/01/10	04/19/10	6.7	40	1	4/26/2010	1124.0	31.4	39.5	1.5	93.0	0.5	4.2	-108.9	4.8	13.7	0.7
12.5-11	02/01/10	04/19/10	6.7	40	0.1	4/26/2010	508.0	29.0	39.6	1.5	95.0	-0.1	0.4	-63.8	4.7	14.0	0.6
12.5-11	02/01/10	04/19/10	6.7	40	0.01	4/26/2010	257.6	25.1	39.9	1.6	107.0	-0.2	0.7	41.5	6.5	13.9	0.5
12.5-13	02/01/10	04/20/10	6.7	4	10	4/26/2010	15021.0	10.3	4.2	1.7	82.0	0.5	2.6	-46.4	3.3	6.4	0.4
12.5-13	02/01/10	04/20/10	6.7	4	1	4/26/2010	11370.0	13.5	4.1	1.7	97.0	0.1	0.8	-63.0	2.0	7.0	0.4
12.5-13	02/01/10	04/20/10	6.7	4	0.1	4/26/2010	7894.0	17.5	3.8	1.7	103.0	0.0	0.3	-93.3	1.9	8.4	0.4
12.5-13	02/01/10	04/20/10	6.7	4	0.01	4/26/2010	5221.0	21.0	4.0	1.7	98.0	0.0	0.3	-89.9	1.5	11.7	0.3
12.5-13	02/01/10	04/20/10	6.7	20	10	4/26/2010	7393.0	19.7	20.0	1.7	90.0	0.3	3.1	-159.9	4.8	17.3	0.5
12.5-13	02/01/10	04/20/10	6.7	20	1	4/26/2010	4464.0	24.3	19.9	1.7	93.0	0.3	0.9	-168.0	3.6	18.8	0.5
12.5-13	02/01/10	04/20/10	6.7	20	0.1	4/26/2010	2401.0	27.6	19.9	1.6	98.0	-0.1	0.2	-149.3	3.2	19.3	0.4
12.5-13	02/01/10	04/20/10	6.7	20	0.01	4/26/2010	1192.0	28.3	20.1	1.6	103.0	0.0	0.4	-54.9	2.8	19.3	0.5
12.5-13	02/01/10	04/20/10	6.7	40	10	4/27/2010	2116.0	30.3	40.1	1.6	86.0	-0.6	6.1	-187.3	7.0	7.9	0.5
12.5-13	02/01/10	04/20/10	6.7	40	1	4/27/2010	888.5	32.0	40.1	1.5	95.0	0.6	5.2	-93.6	5.4	5.8	0.6
12.5-13	02/01/10	04/20/10	6.7	40	0.1	4/27/2010	402.1	29.2	40.1	1.6	95.0	0.2	0.6	-52.6	4.3	3.2	0.7
12.5-13	02/01/10	04/20/10	6.7	40	0.01	4/27/2010	209.6	25.4	40.0	1.6	105.0	-0.1	0.9	12.9	5.9	1.2	0.7
12.5-14	02/01/10	04/20/10	6.7	4	10	4/26/2010	15265.0	10.4	4.3	1.7	79.0	0.4	2.7	-52.5	2.9	12.5	0.8
12.5-14	02/01/10	04/20/10	6.7	4	1	4/26/2010	11196.0	13.9	4.3	1.7	96.0	0.3	0.7	-70.7	1.9	15.3	0.6
12.5-14	02/01/10	04/20/10	6.7	4	0.1	4/26/2010	7595.0	17.7	4.1	1.7	99.0	0.0	0.3	-100.4	2.2	16.9	0.4
12.5-14	02/01/10	04/20/10	6.7	4	0.01	4/26/2010	4808.0	21.2	4.1	1.7	99.0	0.0	0.4	-98.7	2.0	18.4	0.5
12.5-14	02/01/10	04/20/10	6.7	20	10	4/26/2010	6900.0	21.0	20.1	1.8	90.0	0.2	3.2	-184.8	5.2	5.0	0.7
12.5-14	02/01/10	04/20/10	6.7	20	1	4/26/2010	4008.0	25.3	20.0	1.7	92.0	0.1	0.9	-180.5	4.0	6.4	0.7
12.5-14	02/01/10	04/20/10	6.7	20	0.1	4/26/2010	2089.0	28.1	20.0	1.6	95.0	-0.2	0.2	-149.2	3.4	7.9	0.3
12.5-14	02/01/10	04/20/10	6.7	20	0.01	4/26/2010	1041.0	28.2	20.0	1.6	102.0	0.0	0.4	-53.6	3.9	9.9	0.0
12.5-14	02/01/10	04/20/10	6.7	40	10	4/27/2010	1978.0	30.1	40.0	1.6	89.0	-0.4	5.3	-179.2	6.5	10.1	0.2
12.5-14	02/01/10	04/20/10	6.7	40	1	4/27/2010	829.2	31.0	40.0	1.6	94.0	0.3	2.2	-95.5	4.2	6.2	1.3
12.5-14	02/01/10	04/20/10	6.7	40	0.1	4/27/2010	390.3	28.1	40.0	1.6	94.0	0.3	0.5	-59.6	4.4	3.0	1.9
12.5-14	02/01/10	04/20/10	6.7	40	0.01	4/27/2010	212.6	24.1	40.1	1.6	104.0	-0.1	0.9	4.7	5.5	7.7	2.7

Table B30. Lab 7 loose mix confined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5-11	02/01/10	04/19/10	6.7	4	10	[redacted]											
12.5-11	02/01/10	04/19/10	6.7	4	1												
12.5-11	02/01/10	04/19/10	6.7	4	0.1												
12.5-11	02/01/10	04/19/10	6.7	4	0.01												
12.5-11	02/01/10	04/19/10	6.7	20	10	4/22/2010	6947.0	21.4	20.4	69.6	92.0	0.3	2.7	-190.0	4.6	10.9	1.5
12.5-11	02/01/10	04/19/10	6.7	20	1	4/22/2010	4011.0	26.8	20.1	69.6	95.0	0.1	0.7	-229.0	3.7	11.8	1.6
12.5-11	02/01/10	04/19/10	6.7	20	0.1	4/22/2010	2107.0	30.7	20.1	69.6	96.0	0.0	0.2	-248.1	3.8	13.4	1.5
12.5-11	02/01/10	04/19/10	6.7	20	0.01	4/22/2010	1124.0	30.7	20.0	69.6	92.0	0.0	0.4	-136.2	3.6	14.3	2.2
12.5-11	02/01/10	04/19/10	6.7	40	10	4/22/2010	2266.0	28.3	40.5	69.6	90.0	0.1	3.3	-154.5	4.8	11.9	0.4
12.5-11	02/01/10	04/19/10	6.7	40	1	4/22/2010	1169.0	27.1	40.1	69.5	92.0	0.1	0.7	-110.4	3.2	11.6	0.7
12.5-11	02/01/10	04/19/10	6.7	40	0.1	4/22/2010	722.0	23.0	40.3	69.6	93.0	-0.1	0.3	-95.2	4.5	13.0	1.3
12.5-11	02/01/10	04/19/10	6.7	40	0.01	4/22/2010	538.7	18.7	40.0	69.6	94.0	0.0	0.5	-66.0	4.3	14.4	1.1
12.5-13	02/01/10	04/20/10	6.7	4	10	[redacted]											
12.5-13	02/01/10	04/20/10	6.7	4	1												
12.5-13	02/01/10	04/20/10	6.7	4	0.1												
12.5-13	02/01/10	04/20/10	6.7	4	0.01												
12.5-13	02/01/10	04/20/10	6.7	20	10	4/21/2010	6700.0	21.1	20.2	69.6	92.0	0.2	2.5	-172.8	4.7	8.6	0.9
12.5-13	02/01/10	04/20/10	6.7	20	1	4/21/2010	3872.0	26.5	19.9	69.6	101.0	0.1	0.6	-239.6	5.2	8.7	1.1
12.5-13	02/01/10	04/20/10	6.7	20	0.1	4/21/2010	2025.0	30.2	20.0	69.6	97.0	0.0	0.2	-214.7	3.4	8.3	1.2
12.5-13	02/01/10	04/20/10	6.7	20	0.01	4/21/2010	1092.0	31.1	20.0	69.6	93.0	0.0	0.4	-95.9	5.8	8.2	0.7
12.5-13	02/01/10	04/20/10	6.7	40	10	4/22/2010	2441.0	29.9	40.4	69.6	89.0	0.4	3.2	-226.1	5.5	2.9	1.0
12.5-13	02/01/10	04/20/10	6.7	40	1	4/22/2010	1191.0	30.5	40.1	69.6	91.0	0.1	0.7	-177.6	3.4	4.0	1.0
12.5-13	02/01/10	04/20/10	6.7	40	0.1	4/22/2010	626.5	28.3	40.0	69.6	96.0	-0.2	0.3	-166.5	4.4	5.3	0.7
12.5-13	02/01/10	04/20/10	6.7	40	0.01	4/22/2010	464.5	23.5	40.0	69.6	83.0	0.1	0.6	-143.2	6.1	8.8	0.3
12.5-14	02/01/10	04/20/10	6.7	4	10	[redacted]											
12.5-14	02/01/10	04/20/10	6.7	4	1												
12.5-14	02/01/10	04/20/10	6.7	4	0.1												
12.5-14	02/01/10	04/20/10	6.7	4	0.01												
12.5-14	02/01/10	04/20/10	6.7	20	10	4/21/2010	6275.0	22.4	20.2	69.6	92.0	0.6	3.0	-209.0	5.0	17.8	0.7
12.5-14	02/01/10	04/20/10	6.7	20	1	4/21/2010	3478.0	27.2	19.8	69.5	95.0	0.1	0.9	-215.9	3.6	17.6	0.7
12.5-14	02/01/10	04/20/10	6.7	20	0.1	4/21/2010	1806.0	29.6	19.9	69.6	95.0	0.1	0.2	-201.7	3.7	17.5	0.8
12.5-14	02/01/10	04/20/10	6.7	20	0.01	4/21/2010	1063.0	28.2	19.9	69.6	89.0	0.0	0.4	-71.9	3.3	17.8	0.9
12.5-14	02/01/10	04/20/10	6.7	40	10	4/22/2010	1829.0	31.0	40.1	69.7	89.0	-0.1	4.3	-181.8	6.3	15.2	1.0
12.5-14	02/01/10	04/20/10	6.7	40	1	4/22/2010	855.7	30.0	39.9	69.5	92.0	0.2	1.7	-107.8	4.2	17.0	0.9
12.5-14	02/01/10	04/20/10	6.7	40	0.1	4/22/2010	497.3	25.7	40.1	69.6	90.0	0.1	0.4	-82.6	3.9	20.6	0.5
12.5-14	02/01/10	04/20/10	6.7	40	0.01	4/22/2010	357.1	20.8	40.0	69.6	92.0	-0.1	0.6	-31.1	4.2	22.3	1.2

Table B31. Lab 8 loose mix unconfined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12-2	03/02/10	06/02/10	7.5	4	10	6/26/2010	16708.0	9.6	3.8	-0.2	100.0	0.0	1.7	-40.9	2.4	10.8	0.3
12-2	03/02/10	06/02/10	7.5	4	1	6/26/2010	12698.0	12.7	4.2	0.0	102.0	0.0	0.4	-55.4	2.8	12.4	0.6
12-2	03/02/10	06/02/10	7.5	4	0.1	6/26/2010	8913.0	16.1	4.2	0.0	102.0	0.0	0.3	-82.0	2.2	14.7	0.9
12-2	03/02/10	06/02/10	7.5	4	0.01	6/26/2010	5829.0	19.7	3.6	0.0	97.0	0.0	0.4	-83.9	1.9	17.7	1.1
12-2	03/02/10	06/02/10	7.5	20	10	6/28/2010	8126.0	18.1	19.8	-0.2	98.0	-2.5	2.0	-134.4	4.4	4.0	0.6
12-2	03/02/10	06/02/10	7.5	20	1	6/28/2010	4997.0	22.6	20.3	0.0	97.0	0.1	0.5	-149.3	3.5	4.8	0.5
12-2	03/02/10	06/02/10	7.5	20	0.1	6/28/2010	2782.0	25.8	20.1	0.1	94.0	-0.1	0.4	-138.9	3.3	6.1	0.2
12-2	03/02/10	06/02/10	7.5	20	0.01	6/28/2010	1402.0	27.2	20.2	0.0	100.0	-0.1	0.6	-80.5	3.4	6.3	0.4
12-2	03/02/10	06/02/10	7.5	40	10	6/29/2010	2322.0	27.2	40.4	-0.1	95.0	-7.1	4.6	-108.7	4.8	8.9	0.5
12-2	03/02/10	06/02/10	7.5	40	1	6/29/2010	1071.0	27.9	40.2	0.1	91.0	0.1	0.8	-77.5	3.4	9.5	0.8
12-2	03/02/10	06/02/10	7.5	40	0.1	6/29/2010	548.5	24.5	40.4	0.0	88.0	-0.3	0.8	-59.2	5.5	8.9	0.7
12-2	03/02/10	06/02/10	7.5	40	0.01	6/29/2010	368.2	18.9	40.4	0.0	94.0	-0.1	0.9	-77.4	7.3	10.3	0.5
12-4	03/02/10	06/02/10	7.3	4	10	6/26/2010	16712.0	9.5	3.6	0.1	99.0	-0.4	1.7	-39.4	2.1	17.7	0.1
12-4	03/02/10	06/02/10	7.3	4	1	6/26/2010	12800.0	12.5	3.8	0.0	101.0	0.0	0.4	-55.5	1.6	18.0	0.2
12-4	03/02/10	06/02/10	7.3	4	0.1	6/26/2010	9058.0	16.1	3.7	0.0	101.0	0.0	0.3	-83.6	1.8	18.6	0.4
12-4	03/02/10	06/02/10	7.3	4	0.01	6/26/2010	5867.0	20.0	3.4	0.0	98.0	0.0	0.4	-92.2	1.4	19.4	0.5
12-4	03/02/10	06/02/10	7.3	20	10	6/28/2010	7709.0	19.3	20.2	0.0	96.0	-2.5	2.3	-155.4	4.4	8.9	0.1
12-4	03/02/10	06/02/10	7.3	20	1	6/28/2010	4638.0	24.0	20.5	0.0	95.0	0.1	0.5	-165.5	3.6	9.0	0.2
12-4	03/02/10	06/02/10	7.3	20	0.1	6/28/2010	2506.0	27.3	20.1	0.0	92.0	0.0	0.4	-138.1	2.9	9.7	0.4
12-4	03/02/10	06/02/10	7.3	20	0.01	6/28/2010	1219.0	27.7	20.2	0.0	100.0	0.0	0.6	-61.9	3.7	10.9	0.9
12-4	03/02/10	06/02/10	7.3	40	10	6/29/2010	2121.0	28.8	40.2	0.5	92.0	-9.0	4.8	-136.3	5.3	9.6	0.5
12-4	03/02/10	06/02/10	7.3	40	1	6/29/2010	942.0	29.1	40.3	0.1	89.0	0.1	0.9	-100.0	4.2	9.8	0.4
12-4	03/02/10	06/02/10	7.3	40	0.1	6/29/2010	496.2	24.7	40.4	0.0	83.0	-0.1	0.8	-82.3	6.0	9.6	0.3
12-4	03/02/10	06/02/10	7.3	40	0.01	6/29/2010	362.0	18.7	40.4	0.0	91.0	-0.2	0.8	-171.8	7.2	12.4	1.0
12-11	03/02/10	06/02/10	6.6	4	10	6/26/2010	16644.0	9.7	3.6	-0.1	101.0	-0.2	1.8	-37.4	3.6	10.1	0.3
12-11	03/02/10	06/02/10	6.6	4	1	6/26/2010	12651.0	12.9	3.8	0.0	103.0	0.0	0.4	-62.8	2.8	11.1	0.3
12-11	03/02/10	06/02/10	6.6	4	0.1	6/26/2010	8896.0	16.7	3.8	0.0	102.0	0.0	0.3	-93.7	2.0	11.0	0.4
12-11	03/02/10	06/02/10	6.6	4	0.01	6/26/2010	5640.0	20.8	3.7	0.0	99.0	0.0	0.4	-92.7	1.9	10.0	0.5
12-11	03/02/10	06/02/10	6.6	20	10	6/28/2010	7592.0	19.6	20.0	-0.4	96.0	-2.9	2.3	-162.6	4.6	16.9	0.7
12-11	03/02/10	06/02/10	6.6	20	1	6/28/2010	4534.0	24.3	20.5	0.0	94.0	0.1	0.5	-166.1	3.7	18.4	0.7
12-11	03/02/10	06/02/10	6.6	20	0.1	6/28/2010	2396.0	27.8	20.2	0.0	92.0	0.0	0.4	-135.1	5.0	19.7	0.4
12-11	03/02/10	06/02/10	6.6	20	0.01	6/28/2010	1126.0	27.8	20.1	0.0	102.0	-0.1	0.7	-54.5	4.3	21.2	0.6
12-11	03/02/10	06/02/10	6.6	40	10	6/29/2010	2073.0	29.4	40.4	0.4	93.0	-6.1	4.8	-122.3	5.3	25.2	0.6
12-11	03/02/10	06/02/10	6.6	40	1	6/29/2010	894.2	29.7	40.4	0.0	91.0	0.2	0.9	-70.7	3.7	27.2	1.4
12-11	03/02/10	06/02/10	6.6	40	0.1	6/29/2010	449.7	25.2	40.7	0.1	87.0	-0.1	0.8	-23.2	5.0	26.4	2.1
12-11	03/02/10	06/02/10	6.6	40	0.01	6/29/2010	314.4	18.7	40.4	0.0	92.0	-0.3	0.9	-8.9	7.1	23.6	2.4

Table B32. Lab 8 loose mix confined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12-2	03/02/10	06/02/10	7.5	4	10	[redacted]											
12-2	03/02/10	06/02/10	7.5	4	1												
12-2	03/02/10	06/02/10	7.5	4	0.1												
12-2	03/02/10	06/02/10	7.5	4	0.01												
12-2	03/02/10	06/02/10	7.5	20	10	6/23/2010	7271.0	20.0	20.4	69.0	97.0	-6.5	3.0	-148.2	4.4	8.9	0.6
12-2	03/02/10	06/02/10	7.5	20	1	6/23/2010	4280.0	24.5	19.7	69.0	96.0	0.0	0.5	-166.6	3.0	10.1	0.5
12-2	03/02/10	06/02/10	7.5	20	0.1	6/23/2010	2347.0	27.1	19.9	69.0	92.0	-0.1	0.5	-161.3	4.0	10.6	0.5
12-2	03/02/10	06/02/10	7.5	20	0.01	6/23/2010	1386.0	26.8	20.1	69.0	88.0	0.0	0.5	-103.7	6.8	9.8	0.7
12-2	03/02/10	06/02/10	7.5	40	10	6/24/2010	2498.0	27.8	40.2	69.0	93.0	-4.5	3.3	-172.9	4.8	7.9	0.2
12-2	03/02/10	06/02/10	7.5	40	1	6/24/2010	1305.0	27.7	40.1	69.0	91.0	0.0	0.6	-143.7	3.2	7.9	0.8
12-2	03/02/10	06/02/10	7.5	40	0.1	6/24/2010	815.7	24.1	40.1	69.0	89.0	-0.3	0.7	-133.5	4.7	7.6	1.0
12-2	03/02/10	06/02/10	7.5	40	0.01	6/24/2010	632.2	19.4	40.1	69.0	86.0	-0.2	0.8	-61.6	4.8	7.3	0.9
12-4	03/02/10	06/02/10	7.3	4	10	[redacted]											
12-4	03/02/10	06/02/10	7.3	4	1												
12-4	03/02/10	06/02/10	7.3	4	0.1												
12-4	03/02/10	06/02/10	7.3	4	0.01												
12-4	03/02/10	06/02/10	7.3	20	10	6/23/2010	6686.0	20.8	20.1	69.1	96.0	-7.1	2.2	-169.1	4.7	10.7	0.5
12-4	03/02/10	06/02/10	7.3	20	1	6/23/2010	3878.0	25.4	19.7	69.0	95.0	0.0	0.5	-190.4	3.6	12.0	0.7
12-4	03/02/10	06/02/10	7.3	20	0.1	6/23/2010	2111.0	27.7	20.0	69.0	91.0	-0.1	0.4	-138.6	3.2	13.7	1.2
12-4	03/02/10	06/02/10	7.3	20	0.01	6/23/2010	1314.0	26.1	20.1	69.0	85.0	0.1	0.5	-52.6	4.1	16.5	1.3
12-4	03/02/10	06/02/10	7.3	40	10	6/24/2010	2291.0	28.5	39.9	68.8	92.0	-4.7	3.5	-151.9	4.9	8.9	0.5
12-4	03/02/10	06/02/10	7.3	40	1	6/24/2010	1209.0	27.2	40.0	69.0	91.0	0.2	0.7	-111.5	3.3	8.2	0.9
12-4	03/02/10	06/02/10	7.3	40	0.1	6/24/2010	807.3	22.3	40.1	69.0	89.0	-0.1	0.7	-81.1	4.9	7.5	0.9
12-4	03/02/10	06/02/10	7.3	40	0.01	6/24/2010	647.2	17.5	40.1	69.0	92.0	0.0	0.8	-37.7	4.5	6.0	0.8
12-11	03/02/10	06/02/10	6.6	4	10	[redacted]											
12-11	03/02/10	06/02/10	6.6	4	1												
12-11	03/02/10	06/02/10	6.6	4	0.1												
12-11	03/02/10	06/02/10	6.6	4	0.01												
12-11	03/02/10	06/02/10	6.6	20	10	6/23/2010	7307.0	20.2	19.8	69.0	97.0	-4.7	2.2	-165.7	4.6	18.3	1.0
12-11	03/02/10	06/02/10	6.6	20	1	6/23/2010	4289.0	24.7	19.9	69.0	96.0	0.0	0.5	-173.6	3.2	19.3	0.9
12-11	03/02/10	06/02/10	6.6	20	0.1	6/23/2010	2345.0	27.0	20.0	69.0	92.0	-0.1	0.4	-139.1	3.6	19.4	0.7
12-11	03/02/10	06/02/10	6.6	20	0.01	6/23/2010	1354.0	25.6	20.1	69.0	91.0	0.0	0.5	-60.8	4.4	18.5	0.8
12-11	03/02/10	06/02/10	6.6	40	10	6/24/2010	2296.0	28.2	40.1	69.1	93.0	-4.1	3.4	-123.0	4.4	17.3	0.7
12-11	03/02/10	06/02/10	6.6	40	1	6/24/2010	1194.0	26.8	40.0	69.0	93.0	0.1	0.6	-91.5	3.1	15.5	1.2
12-11	03/02/10	06/02/10	6.6	40	0.1	6/24/2010	764.2	22.2	40.1	69.0	93.0	0.0	0.7	-63.8	4.5	13.1	1.2
12-11	03/02/10	06/02/10	6.6	40	0.01	6/24/2010	590.6	17.3	40.1	69.0	92.0	-0.1	0.8	-15.4	5.4	10.5	1.0

Table B33. Lab 1 loose mix unconfined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				UNCONFINED												
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, µst	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_4	5/28/2009	5/28/2009	7.2	4	10	6/2/2009	17090.6	11.6	4.4	0.0	68.4	0.4	5.0	118.0	8.3	2.9	0.2
25_4	5/28/2009	5/28/2009	7.2	4	1	6/2/2009	10926.7	17.1	4.0	0.0	94.8	-0.1	1.4	128.2	5.7	5.6	0.3
25_4	5/28/2009	5/28/2009	7.2	4	0.1	6/2/2009	6906.4	22.7	4.0	0.0	84.8	97.1	2.3	627.3	9.1	6.9	0.1
25_4	5/28/2009	5/28/2009	7.2	4	0.01	6/2/2009	3604.1	28.3	4.0	0.0	96.4	-0.1	1.5	263.1	6.0	12.1	0.2
25_4	5/28/2009	5/28/2009	7.2	20	10	6/3/2009	6171.2	25.1	19.6	0.0	87.6	1.7	4.4	271.1	14.6	8.7	0.2
25_4	5/28/2009	5/28/2009	7.2	20	1	6/3/2009	3129.4	30.1	20.0	0.0	88.4	0.1	0.8	221.0	10.1	25.6	0.3
25_4	5/28/2009	5/28/2009	7.2	20	0.1	6/3/2009	1361.3	31.2	19.9	0.0	91.2	1.9	1.4	124.4	5.1	12.3	0.4
25_4	5/28/2009	5/28/2009	7.2	20	0.01	6/3/2009	593.0	26.4	20.0	0.0	98.8	-0.2	1.9	29.3	4.8	18.0	0.9
25_4	5/28/2009	5/28/2009	7.2	40	10	6/5/2009	1169.9	35.4	40.0	0.0	92.0	1.0	6.4	182.8	16.0	20.3	1.9
25_4	5/28/2009	5/28/2009	7.2	40	1	6/5/2009	500.3	27.3	40.0	0.0	100.0	0.0	3.4	39.3	6.0	23.8	1.8
25_4	5/28/2009	5/28/2009	7.2	40	0.1	6/5/2009	304.7	17.9	40.0	0.0	96.8	1.8	3.6	34.7	4.8	25.2	1.2
25_4	5/28/2009	5/28/2009	7.2	40	0.01	6/5/2009	235.9	11.4	40.0	0.0	98.0	-1.6	3.8	47.9	4.8	23.4	0.3
25_7	5/28/2009	5/28/2009	7.7	4	10	6/2/2009	12841.4	11.8	4.2	0.0	91.0	0.4	5.0	119.7	8.7	21.5	0.6
25_7	5/28/2009	5/28/2009	7.7	4	1	6/2/2009	8985.1	17.2	4.0	0.0	92.2	-0.2	1.3	147.6	6.6	21.8	0.6
25_7	5/28/2009	5/28/2009	7.7	4	0.1	6/2/2009	5678.9	23.4	4.0	0.0	87.2	3.3	1.4	296.6	2.5	24.0	0.6
25_7	5/28/2009	5/28/2009	7.7	4	0.01	6/2/2009	3011.9	28.4	4.0	0.0	83.6	0.3	1.7	395.8	7.7	25.3	0.5
25_7	5/28/2009	5/28/2009	7.7	20	10	6/3/2009	5656.4	25.0	20.0	0.0	86.8	1.7	5.3	305.4	14.1	23.1	0.4
25_7	5/28/2009	5/28/2009	7.7	20	1	6/3/2009	2858.3	30.6	20.0	0.0	85.6	0.1	1.1	285.3	10.5	23.4	0.4
25_7	5/28/2009	5/28/2009	7.7	20	0.1	6/3/2009	1273.1	31.7	20.0	0.0	89.2	2.7	1.5	216.9	5.9	19.8	1.5
25_7	5/28/2009	5/28/2009	7.7	20	0.01	6/3/2009	595.3	26.8	20.0	0.0	94.6	0.2	1.9	164.3	5.1	11.1	2.2
25_7	5/28/2009	5/28/2009	7.7	40	10	6/5/2009	1151.2	31.9	40.0	0.0	95.8	1.0	6.3	134.6	12.5	10.6	0.0
25_7	5/28/2009	5/28/2009	7.7	40	1	6/5/2009	555.3	23.1	40.0	0.0	100.0	-0.1	2.2	42.4	6.0	3.8	0.6
25_7	5/28/2009	5/28/2009	7.7	40	0.1	6/5/2009	360.1	15.3	40.0	0.0	99.4	1.0	2.4	49.6	4.3	1.3	0.2
25_7	5/28/2009	5/28/2009	7.7	40	0.01	6/5/2009	276.4	10.0	40.0	0.0	101.2	-0.4	2.7	59.6	5.3	2.5	1.0
25_8	5/28/2009	5/28/2009	6.7	4	10	6/2/2009	16405.3	11.8	4.0	0.0	71.4	0.5	4.8	118.4	8.8	9.7	0.7
25_8	5/28/2009	5/28/2009	6.7	4	1	6/2/2009	11238.6	17.7	4.1	0.0	95.0	-0.2	1.4	161.7	6.1	10.8	0.8
25_8	5/28/2009	5/28/2009	6.7	4	0.1	6/2/2009	6292.7	23.0	4.0	0.0	86.0	3.4	1.9	461.9	5.8	15.5	0.4
25_8	5/28/2009	5/28/2009	6.7	4	0.01	6/2/2009	3269.0	29.9	4.0	0.0	88.4	-0.9	1.6	411.5	7.8	10.4	0.5
25_8	5/28/2009	5/28/2009	6.7	20	10	6/3/2009	5656.4	25.0	20.0	0.0	87.6	1.7	5.3	305.4	14.1	23.1	0.4
25_8	5/28/2009	5/28/2009	6.7	20	1	6/3/2009	2858.3	30.6	20.0	0.0	84.6	0.1	1.1	285.3	10.5	23.4	0.4
25_8	5/28/2009	5/28/2009	6.7	20	0.1	6/3/2009	1273.1	31.7	20.0	0.0	90.0	2.7	1.5	216.9	5.9	19.8	1.5
25_8	5/28/2009	5/28/2009	6.7	20	0.01	6/3/2009	595.3	26.8	20.0	0.0	100.6	0.2	1.9	164.3	5.1	11.1	2.2
25_8	5/28/2009	5/28/2009	6.7	40	10	6/5/2009	1106.2	34.0	40.0	0.0	96.8	1.1	6.0	116.0	13.7	29.8	0.7
25_8	5/28/2009	5/28/2009	6.7	40	1	6/5/2009	495.3	24.7	40.0	0.0	101.8	0.0	2.0	14.7	5.6	29.3	0.4
25_8	5/28/2009	5/28/2009	6.7	40	0.1	6/5/2009	326.2	14.5	40.0	0.0	99.4	-1.3	2.6	13.4	5.1	30.9	0.3
25_8	5/28/2009	5/28/2009	6.7	40	0.01	6/5/2009	273.9	8.2	40.0	0.0	99.2	-0.4	3.0	-6.3	5.3	34.6	0.6

Table B34. Lab 1 loose mix confined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μst	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_4	5/28/2009	5/28/2009	7.2	4	10	[redacted]											
25_4	5/28/2009	5/28/2009	7.2	4	1	[redacted]											
25_4	5/28/2009	5/28/2009	7.2	4	0.1	[redacted]											
25_4	5/28/2009	5/28/2009	7.2	4	0.01	[redacted]											
25_4	5/28/2009	5/28/2009	7.2	20	10	6/3/2009	6678.1	24.4	20.3	68.0	85.0	0.7	4.5	263.2	15.0	0.7	1.2
25_4	5/28/2009	5/28/2009	7.2	20	1	6/3/2009	3428.5	29.8	20.5	68.0	88.4	0.1	0.7	235.1	10.5	0.3	2.3
25_4	5/28/2009	5/28/2009	7.2	20	0.1	6/3/2009	1614.3	29.6	20.4	68.0	94.6	5.9	1.6	131.9	5.0	3.0	3.3
25_4	5/28/2009	5/28/2009	7.2	20	0.01	6/3/2009	877.7	24.5	20.0	68.0	94.8	0.6	1.6	18.1	5.2	9.9	3.0
25_4	5/28/2009	5/28/2009	7.2	40	10	6/5/2009	1500.1	31.1	39.8	68.4	92.4	1.0	5.7	126.9	12.2	18.9	1.5
25_4	5/28/2009	5/28/2009	7.2	40	1	6/5/2009	796.4	23.0	40.0	68.4	97.2	0.2	2.5	30.6	6.6	21.1	1.4
25_4	5/28/2009	5/28/2009	7.2	40	0.1	6/5/2009	573.6	15.0	40.0	68.4	98.6	6.3	2.0	26.1	5.5	20.3	0.9
25_4	5/28/2009	5/28/2009	7.2	40	0.01	6/5/2009	486.6	9.1	40.0	68.4	101.2	-0.1	2.0	8.6	5.8	15.3	0.6
25_7	5/28/2009	5/28/2009	7.7	4	10	[redacted]											
25_7	5/28/2009	5/28/2009	7.7	4	1	[redacted]											
25_7	5/28/2009	5/28/2009	7.7	4	0.1	[redacted]											
25_7	5/28/2009	5/28/2009	7.7	4	0.01	[redacted]											
25_7	5/28/2009	5/28/2009	7.7	20	10	6/3/2009	6740.5	23.5	20.2	68.0	89.6	0.8	4.2	253.7	12.1	15.0	0.6
25_7	5/28/2009	5/28/2009	7.7	20	1	6/3/2009	3541.4	28.4	20.2	68.0	90.4	0.1	0.7	237.1	8.5	13.5	0.2
25_7	5/28/2009	5/28/2009	7.7	20	0.1	6/3/2009	1769.7	27.5	20.1	68.0	89.6	2.1	1.6	159.3	4.5	12.6	0.3
25_7	5/28/2009	5/28/2009	7.7	20	0.01	6/3/2009	1019.3	21.6	20.0	68.0	94.4	-1.9	1.6	96.8	4.5	12.2	0.3
25_7	5/28/2009	5/28/2009	7.7	40	10	6/5/2009	1626.8	29.6	39.7	68.5	93.6	1.0	5.1	126.9	11.1	24.7	0.2
25_7	5/28/2009	5/28/2009	7.7	40	1	6/5/2009	904.9	21.4	39.8	68.4	96.4	0.1	1.4	36.6	5.6	21.5	0.4
25_7	5/28/2009	5/28/2009	7.7	40	0.1	6/5/2009	662.2	15.4	40.0	68.4	98.8	3.5	2.0	27.9	4.8	19.4	0.3
25_7	5/28/2009	5/28/2009	7.7	40	0.01	6/5/2009	568.3	9.0	40.0	68.4	101.6	0.0	2.0	5.4	4.9	17.3	0.3
25_8	5/28/2009	5/28/2009	6.7	4	10	[redacted]											
25_8	5/28/2009	5/28/2009	6.7	4	1	[redacted]											
25_8	5/28/2009	5/28/2009	6.7	4	0.1	[redacted]											
25_8	5/28/2009	5/28/2009	6.7	4	0.01	[redacted]											
25_8	5/28/2009	5/28/2009	6.7	20	10	6/3/2009	6389.8	24.8	20.2	67.9	87.4	0.9	4.2	275.2	13.0	18.5	0.1
25_8	5/28/2009	5/28/2009	6.7	20	1	6/3/2009	3254.3	29.6	20.2	68.0	87.0	0.2	0.8	254.5	9.7	22.8	0.2
25_8	5/28/2009	5/28/2009	6.7	20	0.1	6/3/2009	1600.6	29.0	20.2	68.2	93.8	3.5	1.6	204.8	6.2	25.9	0.3
25_8	5/28/2009	5/28/2009	6.7	20	0.01	6/3/2009	933.0	22.2	20.0	68.0	94.0	-1.9	1.6	115.6	5.6	27.2	0.4
25_8	5/28/2009	5/28/2009	6.7	40	10	6/5/2009	1558.0	29.7	40.1	68.4	94.0	1.2	5.3	113.6	11.2	1.3	0.8
25_8	5/28/2009	5/28/2009	6.7	40	1	6/5/2009	881.7	20.7	40.2	68.4	96.6	0.1	2.1	30.5	6.4	1.1	0.7
25_8	5/28/2009	5/28/2009	6.7	40	0.1	6/5/2009	664.9	13.0	40.0	68.6	92.6	4.9	1.9	24.7	5.4	0.4	0.5
25_8	5/28/2009	5/28/2009	6.7	40	0.01	6/5/2009	588.3	7.7	40.0	68.4	96.4	-0.7	1.8	9.3	5.1	2.1	0.5

Table B35. Lab 2 loose mix unconfined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μst	Load Drift,	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_4	6/2/2009	6/13/2009	7.3	4	10	6/18/2009	15377.0	12.3	3.8	0.0	103.0	0.2	1.2	-75.1	2.6	17.5	0.3
25_4	6/2/2009	6/13/2009	7.3	4	1	6/18/2009	10768.0	17.2	3.9	0.0	101.0	0.0	0.4	-137.2	2.5	16.5	0.3
25_4	6/2/2009	6/13/2009	7.3	4	0.1	6/18/2009	6651.0	23.6	4.1	0.1	99.0	0.0	0.6	-234.8	3.9	15.5	0.4
25_4	6/2/2009	6/13/2009	7.3	4	0.01	6/18/2009	3621.0	29.2	4.1	0.1	93.0	0.0	0.5	-221.0	3.3	15.0	0.7
25_4	6/2/2009	6/13/2009	7.3	20	10	6/17/2009	5657.0	27.1	20.2	0.1	87.0	0.4	1.7	-385.3	7.5	29.0	0.9
25_4	6/2/2009	6/13/2009	7.3	20	1	6/17/2009	2818.0	33.9	19.9	0.2	90.0	0.1	0.5	-466.6	6.6	26.6	1.3
25_4	6/2/2009	6/13/2009	7.3	20	0.1	6/17/2009	1168.0	36.7	20.1	0.2	89.0	0.0	0.6	-433.8	5.6	27.2	1.9
25_4	6/2/2009	6/13/2009	7.3	20	0.01	6/17/2009	468.9	33.4	20.0	0.2	98.0	-0.1	0.7	-190.4	5.0	27.9	2.0
25_4	6/2/2009	6/13/2009	7.3	40	10	6/28/2009	1153.0	37.3	40.0	-0.1	82.0	1.0	4.6	-249.0	7.6	3.8	0.7
25_4	6/2/2009	6/13/2009	7.3	40	1	6/28/2009	394.4	34.1	40.1	0.0	96.0	0.4	2.2	-100.6	5.2	9.4	0.6
25_4	6/2/2009	6/13/2009	7.3	40	0.1	6/28/2009	164.7	26.9	40.2	0.0	92.0	0.0	0.9	-78.7	5.7	14.6	1.1
25_4	6/2/2009	6/13/2009	7.3	40	0.01	6/28/2009	109.7	17.1	40.0	0.1	95.0	-0.1	1.3	-150.2	7.7	18.1	2.0
25_5	6/2/2009	6/13/2009	6.8	4	10	6/18/2009	15643.0	12.3	4.0	0.2	101.0	0.3	1.3	-71.5	2.7	25.7	0.2
25_5	6/2/2009	6/13/2009	6.8	4	1	6/18/2009	11052.0	16.9	4.1	0.1	99.0	0.0	0.4	-124.8	2.8	22.8	0.2
25_5	6/2/2009	6/13/2009	6.8	4	0.1	6/18/2009	6936.0	22.8	4.1	0.1	98.0	0.0	0.6	-202.7	3.9	20.8	0.2
25_5	6/2/2009	6/13/2009	6.8	4	0.01	6/18/2009	3860.0	28.0	4.1	0.1	93.0	0.0	0.6	-189.0	2.8	19.7	0.5
25_5	6/2/2009	6/13/2009	6.8	20	10	6/17/2009	6404.0	25.7	20.1	0.4	94.0	0.2	1.9	-309.1	6.8	25.5	0.1
25_5	6/2/2009	6/13/2009	6.8	20	1	6/17/2009	3225.0	31.7	20.2	0.3	92.0	0.0	0.5	-323.8	5.0	22.4	0.2
25_5	6/2/2009	6/13/2009	6.8	20	0.1	6/17/2009	1377.0	34.4	19.9	0.3	91.0	0.0	0.6	-262.5	3.2	20.3	0.5
25_5	6/2/2009	6/13/2009	6.8	20	0.01	6/17/2009	562.2	31.4	20.0	0.3	101.0	0.1	0.6	-87.5	4.1	17.9	0.6
25_5	6/2/2009	6/13/2009	6.8	40	10	6/28/2009	1234.0	35.6	40.1	0.0	80.0	1.0	4.4	-317.3	9.8	13.8	2.1
25_5	6/2/2009	6/13/2009	6.8	40	1	6/28/2009	479.7	30.0	40.1	0.1	98.0	0.5	2.3	-102.5	5.1	10.9	2.6
25_5	6/2/2009	6/13/2009	6.8	40	0.1	6/28/2009	233.9	21.3	40.2	0.0	92.0	-0.1	0.8	-80.9	6.4	12.6	2.8
25_5	6/2/2009	6/13/2009	6.8	40	0.01	6/28/2009	178.2	12.4	39.9	0.1	98.0	0.1	1.0	-150.2	8.2	8.7	3.9
25_8	6/2/2009	6/13/2009	7.0	4	10	6/18/2009	15311.0	12.0	4.0	0.1	99.0	0.2	1.4	-69.2	3.7	12.8	0.2
25_8	6/2/2009	6/13/2009	7.0	4	1	6/18/2009	11109.0	16.4	4.1	0.2	95.0	0.0	0.4	-117.3	3.3	8.0	0.4
25_8	6/2/2009	6/13/2009	7.0	4	0.1	6/18/2009	7140.0	22.2	4.1	0.2	94.0	0.0	0.6	-190.5	4.4	7.4	0.7
25_8	6/2/2009	6/13/2009	7.0	4	0.01	6/18/2009	4115.0	26.8	3.9	0.2	92.0	0.0	0.5	-186.5	3.2	10.0	1.2
25_8	6/2/2009	6/13/2009	7.0	20	10	6/17/2009	6334.0	25.2	20.1	0.3	92.0	0.4	1.8	-292.4	7.0	20.2	0.7
25_8	6/2/2009	6/13/2009	7.0	20	1	6/17/2009	3292.0	31.3	20.0	0.3	90.0	0.0	0.5	-327.3	5.6	21.3	1.5
25_8	6/2/2009	6/13/2009	7.0	20	0.1	6/17/2009	1436.0	34.6	20.0	0.3	89.0	0.0	0.7	-315.1	5.7	24.9	2.2
25_8	6/2/2009	6/13/2009	7.0	20	0.01	6/17/2009	586.8	32.4	20.0	0.3	101.0	0.1	0.6	-163.2	5.8	29.5	1.8
25_8	6/2/2009	6/13/2009	7.0	40	10	6/28/2009	1421.0	33.8	40.0	0.1	79.0	0.3	4.2	-264.1	9.5	12.6	0.9
25_8	6/2/2009	6/13/2009	7.0	40	1	6/28/2009	574.0	27.9	40.1	0.1	96.0	0.2	1.4	-87.7	5.7	15.7	0.7
25_8	6/2/2009	6/13/2009	7.0	40	0.1	6/28/2009	293.7	19.5	39.9	0.0	91.0	-0.1	0.7	-85.4	7.0	17.4	0.3
25_8	6/2/2009	6/13/2009	7.0	40	0.01	6/28/2009	249.2	11.3	40.0	0.1	94.0	-0.1	0.8	-185.2	8.7	23.7	2.2

Table B36. Lab 2 loose mix confined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μst	Load Drift,	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_4	6/2/2009	6/13/2009	7.3	4	10	[redacted]											
25_4	6/2/2009	6/13/2009	7.3	4	1	[redacted]											
25_4	6/2/2009	6/13/2009	7.3	4	0.1	[redacted]											
25_4	6/2/2009	6/13/2009	7.3	4	0.01	[redacted]											
25_4	6/2/2009	6/13/2009	7.3	20	10	6/24/2009	5673.0	26.3	20.1	69.0	92.0	0.4	1.5	-341.3	7.2	15.9	0.2
25_4	6/2/2009	6/13/2009	7.3	20	1	6/24/2009	2950.0	31.6	19.9	69.0	90.0	0.0	0.4	-324.5	6.1	14.5	0.4
25_4	6/2/2009	6/13/2009	7.3	20	0.1	6/24/2009	1400.0	32.6	20.1	69.0	88.0	0.0	0.6	-221.8	4.8	13.3	0.6
25_4	6/2/2009	6/13/2009	7.3	20	0.01	6/24/2009	783.0	28.8	19.9	69.0	85.0	0.1	0.6	-44.7	3.7	10.6	0.7
25_4	6/2/2009	6/13/2009	7.3	40	10	6/25/2009	1477.0	32.8	40.1	69.0	86.0	0.8	3.1	-221.0	5.8	10.2	0.8
25_4	6/2/2009	6/13/2009	7.3	40	1	6/25/2009	750.6	26.5	39.9	69.0	93.0	0.1	0.7	-104.6	3.4	11.8	0.6
25_4	6/2/2009	6/13/2009	7.3	40	0.1	6/25/2009	504.9	19.2	39.9	69.0	92.0	0.2	0.6	-50.9	3.5	12.7	0.4
25_4	6/2/2009	6/13/2009	7.3	40	0.01	6/25/2009	414.5	13.2	40.1	69.0	95.0	0.0	0.7	12.3	7.1	13.4	0.1
25_5	6/2/2009	6/13/2009	6.8	4	10	[redacted]											
25_5	6/2/2009	6/13/2009	6.8	4	1	[redacted]											
25_5	6/2/2009	6/13/2009	6.8	4	0.1	[redacted]											
25_5	6/2/2009	6/13/2009	6.8	4	0.01	[redacted]											
25_5	6/2/2009	6/13/2009	6.8	20	10	6/24/2009	6392.0	25.2	20.0	69.0	96.0	0.4	1.5	-313.5	6.6	14.4	0.7
25_5	6/2/2009	6/13/2009	6.8	20	1	6/24/2009	3292.0	30.6	19.8	69.0	92.0	0.1	0.4	-292.5	5.3	10.2	1.2
25_5	6/2/2009	6/13/2009	6.8	20	0.1	6/24/2009	1508.0	31.9	20.1	69.0	91.0	0.0	0.6	-182.3	4.3	4.1	1.9
25_5	6/2/2009	6/13/2009	6.8	20	0.01	6/24/2009	786.3	27.9	20.0	69.0	89.0	0.0	0.6	-43.3	3.4	4.8	2.0
25_5	6/2/2009	6/13/2009	6.8	40	10	6/25/2009	1410.0	31.8	40.1	69.0	87.0	0.8	3.4	-155.4	4.8	6.1	1.4
25_5	6/2/2009	6/13/2009	6.8	40	1	6/25/2009	732.9	25.2	39.8	69.0	94.0	0.0	0.8	-55.0	3.0	2.2	1.4
25_5	6/2/2009	6/13/2009	6.8	40	0.1	6/25/2009	498.6	18.3	39.9	69.0	92.0	0.0	0.6	-17.8	3.3	1.6	1.1
25_5	6/2/2009	6/13/2009	6.8	40	0.01	6/25/2009	413.9	12.5	40.1	69.0	95.0	0.0	0.8	7.7	3.4	1.6	0.5
25_8	6/2/2009	6/13/2009	7.0	4	10	[redacted]											
25_8	6/2/2009	6/13/2009	7.0	4	1	[redacted]											
25_8	6/2/2009	6/13/2009	7.0	4	0.1	[redacted]											
25_8	6/2/2009	6/13/2009	7.0	4	0.01	[redacted]											
25_8	6/2/2009	6/13/2009	7.0	20	10	6/24/2009	6845.0	24.6	19.9	69.0	93.0	0.2	1.5	-285.2	6.3	6.3	0.9
25_8	6/2/2009	6/13/2009	7.0	20	1	6/24/2009	3662.0	29.2	19.7	69.0	91.0	0.1	0.5	-265.6	4.8	8.9	1.3
25_8	6/2/2009	6/13/2009	7.0	20	0.1	6/24/2009	1762.0	30.3	20.1	69.0	90.0	0.0	0.7	-172.8	5.1	12.4	1.7
25_8	6/2/2009	6/13/2009	7.0	20	0.01	6/24/2009	960.9	27.0	19.9	69.0	89.0	0.1	0.6	-48.7	4.6	15.3	1.3
25_8	6/2/2009	6/13/2009	7.0	40	10	6/25/2009	1639.0	30.8	40.1	69.0	87.0	0.8	3.2	-181.6	4.9	15.1	0.9
25_8	6/2/2009	6/13/2009	7.0	40	1	6/25/2009	862.4	24.7	40.0	69.0	94.0	0.1	0.8	-74.6	3.4	15.7	0.6
25_8	6/2/2009	6/13/2009	7.0	40	0.1	6/25/2009	592.0	18.0	40.0	69.0	94.0	0.0	0.6	-51.9	3.7	14.9	0.4
25_8	6/2/2009	6/13/2009	7.0	40	0.01	6/25/2009	496.8	12.7	39.9	69.0	96.0	0.0	0.7	-5.5	3.6	14.7	0.4

Table B37. Lab 3 loose mix unconfined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_3	09/23/09	12/03/09	7.1	4	10	3/9/2010	17048.0	11.4	4.1	0.8	96.0	0.1	1.7	-52.6	2.2	11.0	0.6
25_3	09/23/09	12/03/09	7.1	4	1	3/9/2010	12501.0	15.0	4.1	0.9	98.0	0.1	0.6	-84.9	1.9	12.1	0.9
25_3	09/23/09	12/03/09	7.1	4	0.1	3/9/2010	8296.0	20.0	4.1	0.9	102.0	0.0	0.6	-137.9	2.4	12.8	0.9
25_3	09/23/09	12/03/09	7.1	4	0.01	3/9/2010	4926.0	25.1	4.1	0.9	99.0	0.0	0.5	-145.3	1.5	12.9	0.8
25_3	09/23/09	12/03/09	7.1	20	10	3/10/2010	8501.0	21.0	19.8	1.0	94.0	0.2	3.0	-199.3	4.9	7.4	0.7
25_3	09/23/09	12/03/09	7.1	20	1	3/10/2010	4877.0	26.7	19.8	0.9	94.0	0.3	0.9	-241.2	4.4	8.8	0.6
25_3	09/23/09	12/03/09	7.1	20	0.1	3/10/2010	2373.0	30.5	20.2	0.9	100.0	-0.1	0.6	-208.9	3.4	10.4	0.5
25_3	09/23/09	12/03/09	7.1	20	0.01	3/10/2010	936.2	29.4	20.2	0.9	116.0	-0.1	0.8	-89.6	3.1	10.8	0.6
25_3	09/23/09	12/03/09	7.1	40	10	3/12/2010	2074.0	32.8	40.0	0.5	81.0	0.7	6.0	-178.2	6.5	8.2	1.1
25_3	09/23/09	12/03/09	7.1	40	1	3/12/2010	823.3	31.8	40.2	0.5	97.0	-2.3	3.6	-73.7	4.5	10.6	1.6
25_3	09/23/09	12/03/09	7.1	40	0.1	3/12/2010	348.2	26.5	40.1	0.5	99.0	0.1	2.2	-47.8	5.0	9.1	2.3
25_3	09/23/09	12/03/09	7.1	40	0.01	3/12/2010	184.2	18.4	40.1	0.5	110.0	0.0	1.5	-55.4	7.8	6.1	2.5
25_6	09/23/09	12/03/09	7.6	4	10	3/9/2010	17396.0	10.6	4.1	0.9	94.0	0.0	1.7	-46.9	2.0	13.2	0.2
25_6	09/23/09	12/03/09	7.6	4	1	3/9/2010	12962.0	14.1	4.0	0.9	98.0	0.1	0.6	-80.2	1.6	14.5	0.2
25_6	09/23/09	12/03/09	7.6	4	0.1	3/9/2010	8624.0	19.5	4.0	0.9	102.0	0.0	0.6	-143.9	2.1	16.4	0.4
25_6	09/23/09	12/03/09	7.6	4	0.01	3/9/2010	4675.0	25.9	4.0	1.0	106.0	0.0	0.5	-168.3	1.6	18.6	0.5
25_6	09/23/09	12/03/09	7.6	20	10	3/10/2010	8471.0	20.9	20.2	0.7	93.0	0.2	3.1	-208.2	4.8	16.7	0.9
25_6	09/23/09	12/03/09	7.6	20	1	3/10/2010	4817.0	27.2	20.2	0.9	93.0	0.2	1.0	-267.2	4.9	18.1	0.5
25_6	09/23/09	12/03/09	7.6	20	0.1	3/10/2010	2303.0	31.6	20.2	0.9	98.0	0.0	0.7	-220.7	4.1	20.1	0.2
25_6	09/23/09	12/03/09	7.6	20	0.01	3/10/2010	843.3	31.0	20.2	0.9	121.0	0.1	0.8	-106.8	3.5	20.7	0.3
25_6	09/23/09	12/03/09	7.6	40	10	3/12/2010	1864.0	32.8	40.2	0.5	84.0	0.7	6.4	-121.5	6.1	12.1	0.4
25_6	09/23/09	12/03/09	7.6	40	1	3/12/2010	659.9	31.9	40.2	0.5	100.0	4.4	5.2	-51.9	5.5	13.7	0.5
25_6	09/23/09	12/03/09	7.6	40	0.1	3/12/2010	259.0	26.4	40.2	0.5	101.0	0.2	2.7	-42.2	5.9	14.1	0.9
25_6	09/23/09	12/03/09	7.6	40	0.01	3/12/2010	143.5	17.1	40.2	0.6	106.0	0.0	1.6	-80.4	8.8	11.6	1.0
25_9	09/23/09	12/03/09	6.6	4	10	3/10/2010	18031.0	10.6	3.9	1.0	94.0	0.1	1.8	-42.7	2.1	6.0	0.3
25_9	09/23/09	12/03/09	6.6	4	1	3/10/2010	13562.0	13.6	3.9	1.0	98.0	0.1	0.6	-61.9	1.5	6.4	0.5
25_9	09/23/09	12/03/09	6.6	4	0.1	3/10/2010	9346.0	17.6	4.0	1.0	101.0	0.0	0.6	-88.1	1.9	7.7	0.5
25_9	09/23/09	12/03/09	6.6	4	0.01	3/10/2010	6057.0	21.5	3.9	1.0	97.0	0.0	0.5	-88.2	1.3	10.5	0.7
25_9	09/23/09	12/03/09	6.6	20	10	3/11/2010	9130.0	19.4	20.1	0.9	94.0	0.4	2.8	-136.9	4.3	22.0	0.9
25_9	09/23/09	12/03/09	6.6	20	1	3/11/2010	5535.0	23.8	20.0	1.0	94.0	0.2	0.9	-132.9	3.4	24.3	0.6
25_9	09/23/09	12/03/09	6.6	20	0.1	3/11/2010	2985.0	26.8	20.0	0.9	97.0	0.0	0.5	-89.6	2.4	27.4	0.2
25_9	09/23/09	12/03/09	6.6	20	0.01	3/11/2010	1474.0	27.6	20.0	0.9	105.0	0.0	0.7	-28.8	2.1	30.5	0.6
25_9	09/23/09	12/03/09	6.6	40	10	3/11/2010	2653.0	29.3	40.2	0.5	83.0	0.4	5.9	-133.7	6.3	19.8	0.2
25_9	09/23/09	12/03/09	6.6	40	1	3/11/2010	1191.0	29.2	40.2	0.6	95.0	0.3	2.3	-61.2	3.6	24.0	0.4
25_9	09/23/09	12/03/09	6.6	40	0.1	3/11/2010	536.6	26.3	40.2	0.6	98.0	-0.3	1.7	-34.7	4.1	26.5	0.9
25_9	09/23/09	12/03/09	6.6	40	0.01	3/11/2010	275.8	21.2	40.2	0.6	109.0	0.4	1.3	-37.6	6.5	26.8	1.5

Table B38. Lab 3 loose mix confined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_3	09/23/09	12/03/09	7.1	4	10	[redacted]											
25_3	09/23/09	12/03/09	7.1	4	1												
25_3	09/23/09	12/03/09	7.1	4	0.1												
25_3	09/23/09	12/03/09	7.1	4	0.01												
25_3	09/23/09	12/03/09	7.1	20	10	3/4/2010	7038.0	23.6	20.4	69.2	93.0	0.4	2.5	-247.2	5.4	13.8	0.4
25_3	09/23/09	12/03/09	7.1	20	1	3/4/2010	3892.0	28.8	20.1	69.0	93.0	0.0	0.8	-265.9	5.0	12.6	0.5
25_3	09/23/09	12/03/09	7.1	20	0.1	3/4/2010	1964.0	30.8	20.1	69.0	96.0	0.1	0.7	-185.2	4.0	13.3	0.4
25_3	09/23/09	12/03/09	7.1	20	0.01	3/4/2010	1052.0	28.2	20.0	69.0	94.0	0.1	0.9	-46.3	2.3	15.1	0.4
25_3	09/23/09	12/03/09	7.1	40	10	3/4/2010	2439.0	32.1	40.5	69.1	83.0	1.2	3.2	-181.1	4.7	11.2	1.5
25_3	09/23/09	12/03/09	7.1	40	1	3/4/2010	1133.0	30.6	40.0	69.0	94.0	-0.7	1.6	-66.0	2.7	11.6	1.3
25_3	09/23/09	12/03/09	7.1	40	0.1	3/4/2010	645.1	26.6	39.9	69.0	91.0	0.0	1.6	-31.4	2.8	11.0	1.2
25_3	09/23/09	12/03/09	7.1	40	0.01	3/4/2010	456.4	21.5	40.0	69.0	89.0	-0.2	1.4	-3.2	3.4	8.0	1.7
25_6	09/23/09	12/03/09	7.6	4	10	[redacted]											
25_6	09/23/09	12/03/09	7.6	4	1												
25_6	09/23/09	12/03/09	7.6	4	0.1												
25_6	09/23/09	12/03/09	7.6	4	0.01												
25_6	09/23/09	12/03/09	7.6	20	10	3/1/2010	7819.0	22.1	20.3	69.0	92.0	0.4	2.5	-211.8	4.8	21.5	0.8
25_6	09/23/09	12/03/09	7.6	20	1	3/1/2010	4353.0	28.3	20.1	69.0	94.0	-0.2	0.8	-279.2	4.2	23.0	0.7
25_6	09/23/09	12/03/09	7.6	20	0.1	3/1/2010	2095.0	32.4	19.9	69.0	98.0	0.0	0.6	-311.5	3.9	23.2	0.7
25_6	09/23/09	12/03/09	7.6	20	0.01	3/1/2010	938.9	31.2	20.0	69.0	102.0	0.0	0.9	-158.6	2.1	22.2	1.1
25_6	09/23/09	12/03/09	7.6	40	10	3/8/2010	2138.0	33.2	40.4	68.8	93.0	1.6	3.3	-211.1	4.6	20.7	1.6
25_6	09/23/09	12/03/09	7.6	40	1	3/8/2010	973.4	31.5	40.0	69.0	94.0	0.5	1.7	-50.1	2.7	18.5	2.0
25_6	09/23/09	12/03/09	7.6	40	0.1	3/8/2010	574.5	28.1	40.0	69.0	88.0	0.3	1.9	56.3	3.3	16.2	2.6
25_6	09/23/09	12/03/09	7.6	40	0.01	3/8/2010	428.4	22.5	40.2	69.0	85.0	0.2	1.4	87.7	4.8	13.4	2.4
25_9	09/23/09	12/03/09	6.6	4	10	[redacted]											
25_9	09/23/09	12/03/09	6.6	4	1												
25_9	09/23/09	12/03/09	6.6	4	0.1												
25_9	09/23/09	12/03/09	6.6	4	0.01												
25_9	09/23/09	12/03/09	6.6	20	10	3/4/2010	9015.0	19.9	20.4	68.9	94.0	0.4	2.4	-142.3	3.9	17.2	0.4
25_9	09/23/09	12/03/09	6.6	20	1	3/4/2010	5453.0	24.5	20.1	69.0	94.0	0.1	0.7	-168.5	3.4	19.3	0.2
25_9	09/23/09	12/03/09	6.6	20	0.1	3/4/2010	3038.0	27.7	20.1	69.0	96.0	0.0	0.6	-157.3	3.5	21.0	0.1
25_9	09/23/09	12/03/09	6.6	20	0.01	3/4/2010	1657.0	27.8	20.1	69.0	97.0	-0.1	0.7	-57.8	2.1	21.4	0.5
25_9	09/23/09	12/03/09	6.6	40	10	3/8/2010	3082.0	29.3	40.5	68.8	86.0	1.1	3.2	-144.6	4.6	8.6	0.3
25_9	09/23/09	12/03/09	6.6	40	1	3/8/2010	1537.0	28.5	40.1	69.0	94.0	0.5	1.3	-40.2	2.5	8.9	0.6
25_9	09/23/09	12/03/09	6.6	40	0.1	3/8/2010	894.1	24.8	40.1	69.0	94.0	-0.3	1.6	3.5	2.5	8.9	0.8
25_9	09/23/09	12/03/09	6.6	40	0.01	3/8/2010	604.1	21.5	40.1	69.0	96.0	0.1	1.2	62.5	3.2	9.8	0.9

Table B39. Lab 4 loose mix unconfined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
3	10/22/09	04/01/10	6.5	4	10	5/12/2010	16272.0	12.0	4.4	1.6	91.0	0.2	2.2	-61.6	2.5	23.9	0.9
3	10/22/09	04/01/10	6.5	4	1	5/12/2010	11424.0	16.8	4.2	1.6	95.0	0.0	0.7	-117.5	2.4	25.0	1.0
3	10/22/09	04/01/10	6.5	4	0.1	5/12/2010	7174.0	22.6	3.7	1.6	96.0	-0.2	0.9	-182.5	3.3	26.6	1.0
3	10/22/09	04/01/10	6.5	4	0.01	5/12/2010	4399.0	26.9	3.1	1.6	87.0	0.1	0.7	-153.0	3.6	25.7	1.0
3	10/22/09	04/01/10	6.5	20	10	5/14/2010	6711.0	25.2	20.4	1.5	91.0	0.1	4.0	-259.1	6.2	12.2	0.6
3	10/22/09	04/01/10	6.5	20	1	5/14/2010	3392.0	31.7	20.4	1.5	89.0	0.0	1.5	-267.6	5.6	16.6	0.5
3	10/22/09	04/01/10	6.5	20	0.1	5/14/2010	1403.0	35.2	20.4	1.5	92.0	0.2	2.3	-141.1	3.3	17.5	1.5
3	10/22/09	04/01/10	6.5	20	0.01	5/14/2010	532.6	34.4	20.2	1.5	103.0	-1.2	3.7	10.5	3.3	15.6	2.5
3	10/22/09	04/01/10	6.5	40	10	5/17/2010	1450.0	36.6	40.0	1.1	83.0	0.6	7.7	-268.9	9.0	28.9	2.3
3	10/22/09	04/01/10	6.5	40	1	5/17/2010	488.3	35.7	40.5	1.1	101.0	-1.0	6.9	-54.9	6.2	28.4	3.6
3	10/22/09	04/01/10	6.5	40	0.1	5/17/2010	171.8	31.9	41.9	1.2	98.0	-0.2	10.0	58.1	5.8	24.3	5.2
3	10/22/09	04/01/10	6.5	40	0.01	5/17/2010	73.2	25.8	41.3	1.3	112.0	0.9	4.2	174.3	6.8	21.3	4.2
4	10/22/09	04/05/10	8.0	4	10	5/12/2010	14385.0	13.1	4.6	1.7	93.0	0.2	2.1	-76.1	2.9	8.0	0.5
4	10/22/09	04/05/10	8.0	4	1	5/12/2010	9935.0	18.2	4.6	1.7	94.0	0.1	0.8	-141.9	3.6	5.6	0.6
4	10/22/09	04/05/10	8.0	4	0.1	5/12/2010	6065.0	24.4	4.6	1.6	94.0	-0.1	1.1	-219.7	4.0	8.0	0.9
4	10/22/09	04/05/10	8.0	4	0.01	5/12/2010	3348.0	29.1	4.1	1.6	91.0	-0.2	0.8	-175.2	4.1	9.7	1.1
4	10/22/09	04/05/10	8.0	20	10	5/14/2010	6338.0	25.3	20.3	1.6	90.0	0.1	4.0	-258.1	6.3	11.4	1.0
4	10/22/09	04/05/10	8.0	20	1	5/14/2010	3197.0	30.9	20.3	1.6	89.0	1.1	1.7	-260.2	4.7	13.3	1.0
4	10/22/09	04/05/10	8.0	20	0.1	5/14/2010	1343.0	33.1	20.4	1.6	91.0	0.1	2.7	-155.7	4.3	16.4	1.0
4	10/22/09	04/05/10	8.0	20	0.01	5/14/2010	519.7	31.0	20.3	1.5	107.0	-0.1	2.5	-40.3	8.1	20.3	0.8
4	10/22/09	04/05/10	8.0	40	10	5/17/2010	1173.0	34.5	41.1	1.2	84.0	0.7	8.4	-176.2	8.2	22.2	1.2
4	10/22/09	04/05/10	8.0	40	1	5/17/2010	340.8	35.1	41.4	1.2	112.0	0.3	9.6	-28.2	8.0	28.2	0.7
4	10/22/09	04/05/10	8.0	40	0.1	5/17/2010	118.9	31.2	42.1	1.2	97.0	-0.7	11.4	71.3	6.4	24.9	3.9
4	10/22/09	04/05/10	8.0	40	0.01	5/17/2010	53.5	25.3	41.5	1.2	109.0	-0.1	4.0	249.8	8.0	11.4	5.0
8	10/22/09	04/06/10	7.1	4	10	5/12/2010	14620.0	13.2	4.4	1.6	92.0	0.3	2.0	-75.0	2.5	13.2	0.5
8	10/22/09	04/06/10	7.1	4	1	5/12/2010	10022.0	18.4	4.3	1.6	95.0	0.2	0.8	-149.2	2.7	13.6	0.8
8	10/22/09	04/06/10	7.1	4	0.1	5/12/2010	6159.0	24.6	4.0	1.7	96.0	-0.2	1.1	-231.5	4.1	15.0	0.9
8	10/22/09	04/06/10	7.1	4	0.01	5/12/2010	3688.0	28.8	3.9	1.6	86.0	0.1	0.9	-193.5	6.6	17.2	1.1
8	10/22/09	04/06/10	7.1	20	10	5/14/2010	6422.0	24.7	20.2	1.5	92.0	0.3	4.0	-262.0	6.4	18.5	0.1
8	10/22/09	04/06/10	7.1	20	1	5/14/2010	3291.0	31.0	20.2	1.5	91.0	0.1	1.7	-292.6	5.7	19.1	0.7
8	10/22/09	04/06/10	7.1	20	0.1	5/14/2010	1400.0	33.8	20.3	1.5	92.0	0.4	2.4	-168.8	3.4	19.2	1.1
8	10/22/09	04/06/10	7.1	20	0.01	5/14/2010	541.5	31.9	20.3	1.5	105.0	0.7	4.0	-14.2	3.3	18.4	1.7
8	10/22/09	04/06/10	7.1	40	10	5/17/2010	1333.0	36.8	39.9	1.3	80.0	0.5	8.6	-311.3	9.7	16.8	2.1
8	10/22/09	04/06/10	7.1	40	1	5/17/2010	436.1	36.4	39.9	1.3	105.0	-1.2	9.8	-78.3	8.2	18.6	2.6
8	10/22/09	04/06/10	7.1	40	0.1	5/17/2010	158.7	31.8	39.9	1.3	96.0	-0.2	10.5	19.7	5.7	19.2	3.4
8	10/22/09	04/06/10	7.1	40	0.01	5/17/2010	66.5	25.7	40.0	1.3	112.0	1.9	5.9	178.9	7.1	16.5	3.9

Table B40. Lab 4 loose mix confined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
3	10/22/09	04/01/10	6.5	4	10	[redacted]											
3	10/22/09	04/01/10	6.5	4	1												
3	10/22/09	04/01/10	6.5	4	0.1												
3	10/22/09	04/01/10	6.5	4	0.01												
3	10/22/09	04/01/10	6.5	20	10	5/6/2010	6959.0	24.3	19.6	69.0	92.0	0.5	2.5	-261.3	4.9	27.1	1.4
3	10/22/09	04/01/10	6.5	20	1	5/6/2010	3613.0	30.8	19.3	69.0	91.0	0.1	1.6	-341.0	5.1	29.9	1.0
3	10/22/09	04/01/10	6.5	20	0.1	5/6/2010	1681.0	33.8	19.9	69.0	89.0	-0.4	2.8	-273.8	5.4	28.6	0.2
3	10/22/09	04/01/10	6.5	20	0.01	5/6/2010	889.1	30.7	19.3	69.0	85.0	0.0	2.6	-50.0	3.0	24.6	1.2
3	10/22/09	04/01/10	6.5	40	10	5/7/2010	1470.0	31.9	41.9	69.0	90.0	0.8	6.2	-177.2	5.8	12.3	0.9
3	10/22/09	04/01/10	6.5	40	1	5/7/2010	732.4	25.9	42.4	69.0	98.0	-0.7	5.0	-90.0	4.3	11.2	0.7
3	10/22/09	04/01/10	6.5	40	0.1	5/7/2010	487.0	17.9	43.1	69.0	96.0	0.1	5.4	-74.0	4.0	11.5	1.0
3	10/22/09	04/01/10	6.5	40	0.01	5/7/2010	400.4	11.9	42.2	69.0	95.0	-0.1	2.8	-42.3	3.2	11.5	1.0
4	10/22/09	04/05/10	8.0	4	10	[redacted]											
4	10/22/09	04/05/10	8.0	4	1												
4	10/22/09	04/05/10	8.0	4	0.1												
4	10/22/09	04/05/10	8.0	4	0.01												
4	10/22/09	04/05/10	8.0	20	10	5/6/2010	8255.0	12.0	19.2	69.0	95.0	0.4	2.7	-233.2	17.4	52.8	20.9
4	10/22/09	04/05/10	8.0	20	1	5/6/2010	4527.0	34.8	19.2	69.0	89.0	-0.1	1.2	-328.0	116.7	71.9	2.6
4	10/22/09	04/05/10	8.0	20	0.1	5/6/2010	2030.0	5.2	19.4	69.0	87.0	-0.3	2.4	-51.0	400.1	71.5	57.4
4	10/22/09	04/05/10	8.0	20	0.01	5/6/2010	1041.0	37.5	19.5	69.0	83.0	0.2	2.4	5221.8	1736.5	70.9	6.9
4	10/22/09	04/05/10	8.0	40	10	5/7/2010	1470.0	31.9	41.9	69.0	90.0	0.8	6.2	-177.2	5.8	12.3	0.9
4	10/22/09	04/05/10	8.0	40	1	5/7/2010	732.4	25.9	42.4	69.0	98.0	-0.7	5.0	-90.0	4.3	11.2	0.7
4	10/22/09	04/05/10	8.0	40	0.1	5/7/2010	487.0	17.9	43.1	69.0	96.0	0.1	5.4	-74.0	4.0	11.5	1.0
4	10/22/09	04/05/10	8.0	40	0.01	5/7/2010	400.4	11.9	42.2	69.0	95.0	-0.1	2.8	-42.3	3.2	11.5	1.0
8	10/22/09	04/06/10	7.1	4	10	[redacted]											
8	10/22/09	04/06/10	7.1	4	1												
8	10/22/09	04/06/10	7.1	4	0.1												
8	10/22/09	04/06/10	7.1	4	0.01												
8	10/22/09	04/06/10	7.1	20	10	5/6/2010	6642.0	24.9	20.2	69.0	92.0	0.4	3.3	-283.1	5.3	37.7	1.2
8	10/22/09	04/06/10	7.1	20	1	5/6/2010	3418.0	31.9	19.9	69.0	91.0	0.1	1.6	-379.1	6.0	37.8	0.9
8	10/22/09	04/06/10	7.1	20	0.1	5/6/2010	1584.0	34.6	20.1	69.0	89.0	0.1	2.9	-296.7	5.5	33.8	1.6
8	10/22/09	04/06/10	7.1	20	0.01	5/6/2010	852.2	30.3	19.6	69.0	84.0	0.1	2.4	-114.0	4.7	28.9	2.5
8	10/22/09	04/06/10	7.1	40	10	5/7/2010	1513.0	32.8	39.7	69.0	89.0	0.8	6.1	-221.2	6.2	19.0	1.6
8	10/22/09	04/06/10	7.1	40	1	5/7/2010	754.2	26.6	40.6	69.0	97.0	0.2	4.7	-118.7	4.4	20.0	1.6
8	10/22/09	04/06/10	7.1	40	0.1	5/7/2010	507.1	18.7	41.8	69.0	95.0	-0.4	5.2	-94.5	4.4	20.4	1.6
8	10/22/09	04/06/10	7.1	40	0.01	5/7/2010	425.8	12.5	40.9	69.0	94.0	-0.9	3.0	-34.2	3.5	19.7	1.3

Table B41. Lab 5 loose mix unconfined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25-3	12/17/09	03/08/10	7.3	4	10	3/24/2010	13737.0	11.7	4.0	0.9	95.0	0.5	1.7	-64.6		53.6	0.6
25-3	12/17/09	03/08/10	7.3	4	1	3/24/2010	9996.0	15.5	4.0	0.9	95.0	0.2	0.5	-50.1	18.9	52.5	1.4
25-3	12/17/09	03/08/10	7.3	4	0.1	3/24/2010	6346.0	22.0	4.0	0.9	95.0	0.0	0.2	-206.7	3.2	49.3	0.8
25-3	12/17/09	03/08/10	7.3	4	0.01	3/24/2010	3532.0	28.0	3.9	0.8	94.0	0.0	0.4	-262.3	3.7	46.9	1.3
25-3	12/17/09	03/08/10	7.3	20	10	3/24/2010	6596.0	22.7	20.1	0.4	91.0	0.6	2.2	-268.9	5.6	48.0	1.5
25-3	12/17/09	03/08/10	7.3	20	1	3/24/2010	3573.0	29.2	20.1	0.5	92.0	0.1	0.5	-324.8	5.4	46.2	1.4
25-3	12/17/09	03/08/10	7.3	20	0.1	3/24/2010	1664.0	33.6	20.0	0.5	89.0	0.1	0.4	-331.8	4.9	44.8	1.8
25-3	12/17/09	03/08/10	7.3	20	0.01	3/24/2010	668.4	31.9	20.0	0.6	103.0	0.0	0.5	-209.4	3.9	42.0	2.0
25-3	12/17/09	03/08/10	7.3	40	10	3/26/2010	1491.0	33.1	39.7	0.1	84.0	0.5	5.0	-206.3	6.7	34.4	1.6
25-3	12/17/09	03/08/10	7.3	40	1	3/26/2010	571.4	28.9	39.7	0.2	96.0	0.0	1.7	-42.7	4.6	35.2	2.0
25-3	12/17/09	03/08/10	7.3	40	0.1	3/26/2010	259.9	19.9	39.7	0.2	93.0	-0.3	1.9	-23.2	6.3	36.1	3.8
25-3	12/17/09	03/08/10	7.3	40	0.01	3/26/2010	184.1	6.2	39.5	0.2	99.0	0.0	0.9	-75.6	9.2	44.8	9.6
25-6	12/17/09	03/18/10	7.2	4	10	3/24/2010	14862.0	13.3	4.0	0.9	93.0	0.5	1.8	-83.2	2.7	23.3	0.1
25-6	12/17/09	03/18/10	7.2	4	1	3/24/2010	10192.0	18.4	4.0	0.9	99.0	0.0	0.5	-156.1	2.8	20.1	0.3
25-6	12/17/09	03/18/10	7.2	4	0.1	3/24/2010	6114.0	25.0	4.0	0.9	99.0	0.0	0.2	-275.4	4.2	18.9	0.6
25-6	12/17/09	03/18/10	7.2	4	0.01	3/24/2010	3497.0	30.0	4.0	0.9	88.0	0.0	0.4	-284.2	4.1	19.2	0.6
25-6	12/17/09	03/18/10	7.2	20	10	3/24/2010	6441.0	25.2	20.0	0.7	96.0	0.3	2.5	-327.9	7.1	31.0	0.6
25-6	12/17/09	03/18/10	7.2	20	1	3/24/2010	3297.0	31.5	20.0	0.7	93.0	0.1	0.7	-344.4	5.8	28.8	1.0
25-6	12/17/09	03/18/10	7.2	20	0.1	3/24/2010	1445.0	34.1	20.0	0.7	91.0	0.0	0.4	-297.8	4.9	28.1	1.1
25-6	12/17/09	03/18/10	7.2	20	0.01	3/24/2010	609.2	30.0	20.0	0.7	101.0	0.0	0.5	-171.5	4.1	29.5	0.9
25-6	12/17/09	03/18/10	7.2	40	10	3/26/2010	1390.0	32.7	40.2	0.1	84.0	0.2	5.7	-150.6	6.5	16.4	0.7
25-6	12/17/09	03/18/10	7.2	40	1	3/26/2010	538.1	27.0	40.1	0.1	97.0	0.3	2.1	-55.3	5.1	19.2	1.0
25-6	12/17/09	03/18/10	7.2	40	0.1	3/26/2010	256.1	16.8	40.0	0.2	92.0	-0.3	2.1	-123.7	7.0	23.1	2.9
25-6	12/17/09	03/18/10	7.2	40	0.01	3/26/2010	210.4	2.6	39.7	0.2	96.0	0.0	0.9	-424.0	10.6	31.2	7.5
25-9	12/17/09	03/11/10	7.3	4	10	3/24/2010	13571.0	12.7	4.1	0.9	95.0	0.4	1.7	-75.3	2.8	47.6	0.6
25-9	12/17/09	03/11/10	7.3	4	1	3/24/2010	9603.0	17.4	4.1	0.9	96.0	0.1	0.5	-135.3	2.5	43.3	0.5
25-9	12/17/09	03/11/10	7.3	4	0.1	3/24/2010	6037.0	23.9	4.0	0.9	95.0	0.0	0.2	-253.2	3.8	39.2	0.5
25-9	12/17/09	03/11/10	7.3	4	0.01	3/24/2010	3429.0	29.6	4.0	0.9	91.0	0.0	0.4	-297.2	3.6	35.2	0.7
25-9	12/17/09	03/11/10	7.3	20	10	3/24/2010	6102.0	25.1	20.1	0.7	87.0	0.3	2.6	-331.5	7.1	31.4	0.5
25-9	12/17/09	03/11/10	7.3	20	1	3/24/2010	3207.0	31.4	20.1	0.7	90.0	0.2	0.7	-376.1	6.2	25.8	0.6
25-9	12/17/09	03/11/10	7.3	20	0.1	3/24/2010	1411.0	34.6	20.1	0.7	89.0	0.1	0.5	-341.5	5.1	23.5	0.4
25-9	12/17/09	03/11/10	7.3	20	0.01	3/24/2010	585.3	31.6	20.0	0.7	100.0	0.0	0.5	-188.3	4.4	22.6	0.2
25-9	12/17/09	03/11/10	7.3	40	10	3/26/2010	1521.0	33.8	40.1	0.3	84.0	0.5	5.5	-207.8	7.4	21.5	0.6
25-9	12/17/09	03/11/10	7.3	40	1	3/26/2010	559.2	29.6	40.1	0.3	97.0	0.3	2.0	-50.7	4.9	25.4	1.6
25-9	12/17/09	03/11/10	7.3	40	0.1	3/26/2010	240.4	20.6	40.1	0.3	94.0	-0.9	2.0	-47.8	6.2	29.0	2.9
25-9	12/17/09	03/11/10	7.3	40	0.01	3/26/2010	172.2	8.4	39.8	0.3	98.0	0.0	0.9	-167.8	9.3	28.2	5.5

Table B42. Lab 5 loose mix confined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25-3	12/17/09	03/08/10	7.3	4	10	[redacted]											
25-3	12/17/09	03/08/10	7.3	4	1												
25-3	12/17/09	03/08/10	7.3	4	0.1												
25-3	12/17/09	03/08/10	7.3	4	0.01												
25-3	12/17/09	03/08/10	7.3	20	10	3/25/2010	4712.0	23.1	20.5	69.0	75.0	0.0	3.0	-93.9	12.5	98.7	1.3
25-3	12/17/09	03/08/10	7.3	20	1	3/25/2010	2975.0	24.3	20.3	69.0	77.0	0.2	0.6	-154.6	16.1	115.9	5.8
25-3	12/17/09	03/08/10	7.3	20	0.1	3/25/2010	1500.0	2.5	20.2	69.0	83.0	0.0	0.4	-509.1	47.3	120.4	47.1
25-3	12/17/09	03/08/10	7.3	20	0.01	3/25/2010	691.3	35.1	20.0	69.0	97.0	0.0	0.5	-139.4	11.4	98.6	9.7
25-3	12/17/09	03/08/10	7.3	40	10	3/25/2010	1542.0	33.4	40.3	69.0	84.0	0.3	5.2	-231.1	7.0	31.8	0.2
25-3	12/17/09	03/08/10	7.3	40	1	3/25/2010	602.1	29.8	40.2	69.0	95.0	0.3	1.7	-59.9	4.1	34.3	0.5
25-3	12/17/09	03/08/10	7.3	40	0.1	3/25/2010	268.9	23.5	40.0	69.0	93.0	0.5	2.1	-36.1	5.3	36.6	0.7
25-3	12/17/09	03/08/10	7.3	40	0.01	3/25/2010	163.4	14.4	40.1	69.0	103.0	0.0	1.0	-55.0	8.2	38.1	1.1
25-6	12/17/09	03/18/10	7.2	4	10	[redacted]											
25-6	12/17/09	03/18/10	7.2	4	1												
25-6	12/17/09	03/18/10	7.2	4	0.1												
25-6	12/17/09	03/18/10	7.2	4	0.01												
25-6	12/17/09	03/18/10	7.2	20	10	3/25/2010	6402.0	25.4	20.0	69.0	89.0	0.4	2.3	-265.5	7.2	23.4	1.3
25-6	12/17/09	03/18/10	7.2	20	1	3/25/2010	3333.0	30.4	19.6	69.0	91.0	0.1	0.6	-212.7	4.4	23.5	1.8
25-6	12/17/09	03/18/10	7.2	20	0.1	3/25/2010	1472.0	31.9	20.0	69.0	92.0	0.1	0.4	-161.1	4.3	26.3	1.9
25-6	12/17/09	03/18/10	7.2	20	0.01	3/25/2010	674.2	28.7	19.9	69.0	100.0	0.1	0.5	-143.1	5.5	30.5	1.5
25-6	12/17/09	03/18/10	7.2	40	10	3/25/2010	1486.0	32.5	40.5	69.0	83.0	-0.5	5.5	-166.3	6.4	16.9	0.9
25-6	12/17/09	03/18/10	7.2	40	1	3/25/2010	611.2	27.0	40.6	69.0	95.0	0.2	1.9	-58.5	4.8	21.1	0.3
25-6	12/17/09	03/18/10	7.2	40	0.1	3/25/2010	319.1	17.2	40.5	69.0	91.0	0.2	1.7	-125.9	6.0	28.2	2.1
25-6	12/17/09	03/18/10	7.2	40	0.01	3/25/2010	263.3	5.5	40.2	69.0	94.0	-0.1	0.8	-384.3	9.1	34.4	2.7
25-9	12/17/09	03/11/10	7.3	4	10	[redacted]											
25-9	12/17/09	03/11/10	7.3	4	1												
25-9	12/17/09	03/11/10	7.3	4	0.1												
25-9	12/17/09	03/11/10	7.3	4	0.01												
25-9	12/17/09	03/11/10	7.3	20	10	3/25/2010	6410.0	24.6	20.3	69.0	88.0	0.0	2.3	-311.4	7.0	21.3	0.2
25-9	12/17/09	03/11/10	7.3	20	1	3/25/2010	3395.0	30.2	20.0	69.0	90.0	0.0	0.6	-310.5	6.0	18.3	0.3
25-9	12/17/09	03/11/10	7.3	20	0.1	3/25/2010	1518.0	32.5	19.9	69.0	90.0	0.0	0.4	-230.6	4.7	18.6	0.2
25-9	12/17/09	03/11/10	7.3	20	0.01	3/25/2010	659.0	29.9	19.9	69.0	100.0	0.0	0.5	-91.9	4.4	19.0	0.3
25-9	12/17/09	03/11/10	7.3	40	10	3/26/2010	1472.0	34.2	40.3	69.0	85.0	0.5	4.0	-245.5	6.3	16.9	0.3
25-9	12/17/09	03/11/10	7.3	40	1	3/26/2010	577.5	30.2	40.3	69.0	96.0	-0.1	1.2	-90.8	3.7	20.0	0.4
25-9	12/17/09	03/11/10	7.3	40	0.1	3/26/2010	259.1	23.2	40.0	69.0	94.0	0.3	1.9	-128.6	5.4	25.9	1.3
25-9	12/17/09	03/11/10	7.3	40	0.01	3/26/2010	169.1	14.9	39.6	69.0	98.0	-0.2	1.0	-140.5	7.5	30.7	2.3

Table B43. Lab 6 loose mix unconfined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
1-1	11/19/09	02/02/10	6.6	4	10	3/12/2010	17857.0	11.1	3.9	0.3	95.0	0.1	1.4	-51.6	2.1	11.9	0.1
1-1	11/19/09	02/02/10	6.6	4	1	3/12/2010	13140.0	15.0	3.9	0.3	97.0	0.0	0.4	-87.9	2.0	15.2	0.2
1-1	11/19/09	02/02/10	6.6	4	0.1	3/12/2010	8656.0	20.3	4.0	0.3	101.0	0.0	0.3	-155.8	2.6	19.1	0.3
1-1	11/19/09	02/02/10	6.6	4	0.01	3/12/2010	5066.0	25.4	3.9	0.3	99.0	0.0	0.3	-175.5	2.1	18.9	0.1
1-1	11/19/09	02/02/10	6.6	20	10	3/15/2010	7291.0	22.5	19.9	0.1	92.0	0.5	2.8	-233.0	5.2	13.3	0.8
1-1	11/19/09	02/02/10	6.6	20	1	3/15/2010	3970.0	28.3	19.9	0.1	92.0	0.1	0.7	-260.1	4.7	14.3	1.0
1-1	11/19/09	02/02/10	6.6	20	0.1	3/15/2010	1894.0	31.5	19.9	0.1	96.0	0.0	0.2	-212.2	4.1	15.0	1.0
1-1	11/19/09	02/02/10	6.6	20	0.01	3/15/2010	834.9	30.2	19.8	0.1	106.0	0.0	0.4	-59.6	3.4	13.5	0.8
1-1	11/19/09	02/02/10	6.6	40	10	3/17/2010	1747.0	33.3	40.1	0.0	79.0	0.2	5.2	-294.5	9.0	16.0	1.0
1-1	11/19/09	02/02/10	6.6	40	1	3/17/2010	692.7	30.3	40.1	0.0	97.0	0.3	1.8	-101.6	4.6	13.6	0.8
1-1	11/19/09	02/02/10	6.6	40	0.1	3/17/2010	302.3	24.0	39.9	0.0	100.0	0.3	0.5	-69.3	5.6	11.0	0.7
1-1	11/19/09	02/02/10	6.6	40	0.01	3/17/2010	182.3	14.9	40.2	0.0	105.0	0.1	0.7	-128.1	8.1	12.5	1.8
1-3	11/19/09	02/02/10	6.1	4	10	3/12/2010	18141.0	10.8	4.3	0.3	94.0	0.4	1.7	-50.0	2.3	10.8	0.8
1-3	11/19/09	02/02/10	6.1	4	1	3/12/2010	13374.0	14.6	4.3	0.3	98.0	0.1	0.4	-74.9	1.9	14.9	1.1
1-3	11/19/09	02/02/10	6.1	4	0.1	3/12/2010	8979.0	19.5	4.4	0.3	104.0	0.0	0.3	-129.8	2.4	18.6	0.9
1-3	11/19/09	02/02/10	6.1	4	0.01	3/12/2010	5452.0	24.4	4.5	0.4	99.0	0.0	0.3	-144.3	1.6	21.0	0.7
1-3	11/19/09	02/02/10	6.1	20	10	3/15/2010	8206.0	21.1	19.9	0.1	96.0	0.3	2.3	-190.8	4.7	16.2	0.6
1-3	11/19/09	02/02/10	6.1	20	1	3/15/2010	4634.0	26.9	19.9	0.1	95.0	0.1	0.6	-235.5	4.2	15.2	0.8
1-3	11/19/09	02/02/10	6.1	20	0.1	3/15/2010	2305.0	31.0	19.7	0.1	97.0	0.0	0.2	-220.4	3.9	15.9	1.4
1-3	11/19/09	02/02/10	6.1	20	0.01	3/15/2010	1053.0	31.0	19.8	0.2	102.0	0.0	0.4	-85.0	2.7	17.8	1.9
1-3	11/19/09	02/02/10	6.1	40	10	3/17/2010	1946.0	33.8	40.1	0.0	83.0	0.3	5.2	-330.3	9.8	8.3	1.1
1-3	11/19/09	02/02/10	6.1	40	1	3/17/2010	799.2	32.0	40.1	0.0	95.0	0.3	1.8	-133.6	4.2	9.3	1.7
1-3	11/19/09	02/02/10	6.1	40	0.1	3/17/2010	349.2	26.6	40.1	0.0	99.0	0.0	0.4	-87.6	4.6	11.8	2.1
1-3	11/19/09	02/02/10	6.1	40	0.01	3/17/2010	186.6	19.5	40.1	0.0	108.0	-0.1	0.7	-114.3	6.5	13.3	2.0
1-9	11/19/09	02/02/10	5.9	4	10	3/12/2010	17099.0	9.8	3.8	0.3	95.0	0.5	1.4	-41.6	1.9	11.0	0.8
1-9	11/19/09	02/02/10	5.9	4	1	3/12/2010	13059.0	12.9	3.9	0.4	96.0	0.1	0.4	-61.6	2.0	10.6	0.9
1-9	11/19/09	02/02/10	5.9	4	0.1	3/12/2010	9163.0	16.9	4.0	0.3	99.0	0.0	0.3	-101.0	2.2	8.6	1.0
1-9	11/19/09	02/02/10	5.9	4	0.01	3/12/2010	6061.0	21.2	3.9	0.4	97.0	0.0	0.3	-123.5	2.3	5.9	1.1
1-9	11/19/09	02/02/10	5.9	20	10	3/15/2010	8569.0	19.0	19.8	0.2	92.0	0.2	2.3	-147.5	3.7	3.5	1.4
1-9	11/19/09	02/02/10	5.9	20	1	3/15/2010	5099.0	24.3	19.7	0.2	93.0	0.1	0.6	-189.2	3.5	5.0	1.9
1-9	11/19/09	02/02/10	5.9	20	0.1	3/15/2010	2687.0	28.6	19.6	0.1	96.0	0.0	0.2	-198.3	3.7	5.5	2.1
1-9	11/19/09	02/02/10	5.9	20	0.01	3/15/2010	1310.0	29.6	19.7	0.2	101.0	0.0	0.4	-98.3	2.8	3.9	2.1
1-9	11/19/09	02/02/10	5.9	40	10	3/17/2010	2232.0	32.2	40.1	0.2	83.0	0.3	5.1	-335.2	9.4	17.5	1.7
1-9	11/19/09	02/02/10	5.9	40	1	3/17/2010	953.6	32.2	40.2	0.2	93.0	0.3	1.9	-174.1	4.2	15.2	2.4
1-9	11/19/09	02/02/10	5.9	40	0.1	3/17/2010	412.6	28.4	40.1	0.1	98.0	0.1	0.4	-107.5	4.6	12.1	2.7
1-9	11/19/09	02/02/10	5.9	40	0.01	3/17/2010	209.3	22.2	40.0	0.0	107.0	-0.2	0.6	-87.3	6.2	10.6	2.8

Table B44. Lab 6 loose mix confined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
1-1	11/19/09	02/02/10	6.6	4	10	[redacted]											
1-1	11/19/09	02/02/10	6.6	4	1												
1-1	11/19/09	02/02/10	6.6	4	0.1												
1-1	11/19/09	02/02/10	6.6	4	0.01												
1-1	11/19/09	02/02/10	6.6	20	10	3/9/2010	7262.0	23.4	19.8	69.0	95.0	0.6	1.5	-245.0	4.5	17.6	0.5
1-1	11/19/09	02/02/10	6.6	20	1	3/9/2010	3900.0	29.6	19.8	69.0	94.0	0.0	0.4	-332.0	4.2	18.4	0.3
1-1	11/19/09	02/02/10	6.6	20	0.1	3/9/2010	1886.0	33.1	20.0	69.0	96.0	0.0	0.3	-382.2	4.8	20.2	0.4
1-1	11/19/09	02/02/10	6.6	20	0.01	3/9/2010	995.0	31.0	19.9	69.0	90.0	-0.1	0.4	-213.7	3.6	21.3	0.9
1-1	11/19/09	02/02/10	6.6	40	10	3/9/2010	2260.0	30.8	40.1	69.0	92.0	0.8	2.5	-375.7	8.3	24.6	2.0
1-1	11/19/09	02/02/10	6.6	40	1	3/9/2010	1187.0	26.0	40.1	69.0	97.0	0.1	0.7	-220.1	3.7	22.7	1.8
1-1	11/19/09	02/02/10	6.6	40	0.1	3/9/2010	781.4	20.1	39.9	69.0	99.0	0.1	0.3	-177.9	3.6	20.0	1.6
1-1	11/19/09	02/02/10	6.6	40	0.01	3/9/2010	625.6	14.9	40.2	69.0	97.0	0.0	0.4	-93.2	3.2	16.3	1.5
1-3	11/19/09	02/02/10	6.1	4	10	[redacted]											
1-3	11/19/09	02/02/10	6.1	4	1												
1-3	11/19/09	02/02/10	6.1	4	0.1												
1-3	11/19/09	02/02/10	6.1	4	0.01												
1-3	11/19/09	02/02/10	6.1	20	10	3/9/2010	7981.0	21.3	20.1	69.1	94.0	0.5	1.6	-186.0	3.7	9.2	0.6
1-3	11/19/09	02/02/10	6.1	20	1	3/9/2010	4501.0	27.5	20.0	69.0	95.0	0.0	0.5	-263.3	3.6	9.1	1.0
1-3	11/19/09	02/02/10	6.1	20	0.1	3/9/2010	2256.0	32.2	19.8	69.0	98.0	0.0	0.2	-333.5	4.1	10.6	1.2
1-3	11/19/09	02/02/10	6.1	20	0.01	3/9/2010	1127.0	32.3	19.9	69.0	93.0	0.0	0.4	-204.3	3.0	12.5	2.1
1-3	11/19/09	02/02/10	6.1	40	10	3/9/2010	2293.0	34.0	40.1	69.0	98.0	0.9	3.2	-440.6	10.0	5.6	0.9
1-3	11/19/09	02/02/10	6.1	40	1	3/9/2010	1062.0	32.9	40.0	69.0	91.0	0.2	0.8	-239.8	3.9	6.1	1.3
1-3	11/19/09	02/02/10	6.1	40	0.1	3/9/2010	592.1	29.4	40.2	69.0	90.0	0.2	0.4	-219.1	5.3	8.1	1.3
1-3	11/19/09	02/02/10	6.1	40	0.01	3/9/2010	450.9	20.5	40.5	69.0	67.0	0.1	0.5	1.1	3.4	13.3	1.3
1-9	11/19/09	02/02/10	5.9	4	10	[redacted]											
1-9	11/19/09	02/02/10	5.9	4	1												
1-9	11/19/09	02/02/10	5.9	4	0.1												
1-9	11/19/09	02/02/10	5.9	4	0.01												
1-9	11/19/09	02/02/10	5.9	20	10	3/9/2010	8691.0	19.5	20.2	69.0	94.0	0.4	1.6	-151.5	3.6	7.8	1.4
1-9	11/19/09	02/02/10	5.9	20	1	3/9/2010	5142.0	25.1	20.0	69.0	95.0	0.0	0.5	-218.3	3.3	7.0	1.8
1-9	11/19/09	02/02/10	5.9	20	0.1	3/9/2010	2716.0	29.9	19.8	69.0	98.0	0.0	0.2	-312.3	5.1	6.4	1.8
1-9	11/19/09	02/02/10	5.9	20	0.01	3/9/2010	1462.0	31.0	19.8	69.0	91.0	0.0	0.4	-314.6	5.4	6.2	1.7
1-9	11/19/09	02/02/10	5.9	40	10	3/10/2010	2444.0	31.8	40.1	69.0	95.0	0.8	2.6	-395.2	8.6	11.1	1.7
1-9	11/19/09	02/02/10	5.9	40	1	3/10/2010	1184.0	30.9	40.2	69.0	93.0	0.2	0.7	-242.9	3.9	11.7	1.8
1-9	11/19/09	02/02/10	5.9	40	0.1	3/10/2010	675.3	27.0	40.3	69.0	93.0	-0.1	0.4	-195.6	4.4	10.7	1.8
1-9	11/19/09	02/02/10	5.9	40	0.01	3/10/2010	488.9	22.3	40.1	69.0	87.0	0.1	0.5	-100.1	3.6	9.8	1.6

Table B45. Lab 7 loose mix unconfined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25-7	01/25/10	03/29/10	7.4	4	10	4/6/2010	13945.0	12.6	4.0	1.6	81.0	0.6	2.7	-83.0	3.2	13.6	0.6
25-7	01/25/10	03/29/10	7.4	4	1	4/6/2010	9615.0	17.7	4.0	1.6	99.0	0.2	0.8	-153.4	3.2	17.9	0.2
25-7	01/25/10	03/29/10	7.4	4	0.1	4/6/2010	5791.0	24.5	4.0	1.6	101.0	0.0	0.3	-238.4	3.4	20.5	0.1
25-7	01/25/10	03/29/10	7.4	4	0.01	4/6/2010	3145.0	30.2	4.0	1.6	95.0	0.0	0.4	-200.8	6.1	20.8	0.6
25-7	01/25/10	03/29/10	7.4	20	10	4/6/2010	6650.0	24.2	20.1	1.5	88.0	0.3	3.5	-294.4	6.4	12.5	0.3
25-7	01/25/10	03/29/10	7.4	20	1	4/6/2010	3434.0	31.5	20.0	1.7	93.0	0.1	1.0	-321.4	5.3	13.8	0.7
25-7	01/25/10	03/29/10	7.4	20	0.1	4/6/2010	1469.0	36.1	20.0	1.6	100.0	0.1	0.5	-250.0	3.4	14.7	1.0
25-7	01/25/10	03/29/10	7.4	20	0.01	4/6/2010	500.8	35.3	19.9	1.6	118.0	0.0	0.7	-43.0	3.0	11.1	1.3
25-7	01/25/10	03/29/10	7.4	40	10	4/6/2010	1354.0	38.3	40.0	1.5	86.0	-0.8	7.4	-248.6	8.0	15.4	1.6
25-7	01/25/10	03/29/10	7.4	40	1	4/6/2010	416.4	39.0	40.0	1.6	103.0	0.7	8.5	-80.0	7.4	13.6	1.3
25-7	01/25/10	03/29/10	7.4	40	0.1	4/6/2010	139.8	33.3	39.9	1.5	106.0	-0.3	1.3	-4.2	3.6	14.3	1.6
25-7	01/25/10	03/29/10	7.4	40	0.01	4/6/2010	56.0	26.9	40.0	1.6	118.0	0.1	1.9	192.0	5.7	16.5	1.1
25-8	01/25/10	03/29/10	7.1	4	10	4/6/2010	16106.0	12.1	4.0	1.6	80.0	0.5	2.8	-78.0	3.1	5.8	0.3
25-8	01/25/10	03/29/10	7.1	4	1	4/6/2010	11319.0	16.8	4.1	1.6	95.0	0.2	0.8	-130.8	2.2	6.1	0.5
25-8	01/25/10	03/29/10	7.1	4	0.1	4/6/2010	6970.0	23.3	4.0	1.6	100.0	0.0	0.2	-222.6	3.3	6.3	1.1
25-8	01/25/10	03/29/10	7.1	4	0.01	4/6/2010	3982.0	28.2	4.1	1.6	94.0	0.0	0.4	-213.4	5.9	3.8	0.3
25-8	01/25/10	03/29/10	7.1	20	10	4/6/2010	7088.0	24.6	20.1	1.6	92.0	0.2	3.5	-329.8	7.3	4.0	0.8
25-8	01/25/10	03/29/10	7.1	20	1	4/6/2010	3635.0	31.1	20.1	1.7	90.0	0.1	1.1	-315.6	5.2	1.0	2.1
25-8	01/25/10	03/29/10	7.1	20	0.1	4/6/2010	1557.0	34.3	20.0	1.6	97.0	0.0	0.3	-228.3	4.0	3.3	1.6
25-8	01/25/10	03/29/10	7.1	20	0.01	4/6/2010	589.1	33.6	20.0	1.6	112.0	0.1	0.5	-1.1	3.7	5.2	1.1
25-8	01/25/10	03/29/10	7.1	40	10	4/7/2010	1547.0	36.1	40.0	1.5	87.0	0.3	5.5	-242.7	8.6	10.2	1.3
25-8	01/25/10	03/29/10	7.1	40	1	4/7/2010	493.8	36.2	40.0	1.6	102.0	0.6	6.8	-58.9	6.4	9.2	1.2
25-8	01/25/10	03/29/10	7.1	40	0.1	4/7/2010	177.4	31.3	40.0	1.6	103.0	-0.2	0.8	28.6	4.8	11.5	2.1
25-8	01/25/10	03/29/10	7.1	40	0.01	4/7/2010	73.6	27.1	40.1	1.6	116.0	0.0	1.5	403.7	8.5	16.1	1.3
25-1	01/25/10	03/18/10	7	4	10	4/8/2010	17900.0	10.0	4.0	1.5	80.0	0.4	2.7	-49.7	3.1	2.0	0.4
25-1	01/25/10	03/18/10	7	4	1	4/8/2010	13389.0	13.0	4.0	1.5	95.0	0.2	0.7	-73.1	2.0	3.0	0.4
25-1	01/25/10	03/18/10	7	4	0.1	4/8/2010	8965.0	17.6	4.1	1.5	100.0	0.0	0.3	-118.1	2.2	4.2	0.7
25-1	01/25/10	03/18/10	7	4	0.01	4/8/2010	5471.0	22.4	4.1	1.5	99.0	0.0	0.3	-120.3	5.6	2.4	0.9
25-1	01/25/10	03/18/10	7	20	10	4/8/2010	7814.0	21.5	20.2	1.5	91.0	0.2	3.5	-210.0	5.5	8.3	0.5
25-1	01/25/10	03/18/10	7	20	1	4/8/2010	4371.0	27.1	20.2	1.5	92.0	0.1	0.9	-222.5	4.6	7.9	0.7
25-1	01/25/10	03/18/10	7	20	0.1	4/8/2010	2194.0	30.5	20.1	1.5	95.0	0.0	0.5	-173.1	3.6	4.6	0.6
25-1	01/25/10	03/18/10	7	20	0.01	4/8/2010	1059.0	30.7	20.0	1.6	99.0	0.0	0.6	-20.6	2.6	2.0	0.8
25-1	01/25/10	03/18/10	7	40	10	4/8/2010	1354.0	34.2	40.1	1.6	91.0	-0.4	6.9	-192.7	7.5	14.4	0.1
25-1	01/25/10	03/18/10	7	40	1	4/8/2010	492.8	34.2	40.1	1.6	97.0	0.6	7.1	-79.5	6.5	9.1	0.1
25-1	01/25/10	03/18/10	7	40	0.1	4/8/2010	216.7	29.6	39.9	1.6	96.0	-1.3	2.7	-22.7	4.3	4.9	0.3
25-1	01/25/10	03/18/10	7	40	0.01	4/8/2010	126.6	25.9	39.9	1.6	95.0	0.3	2.5	105.4	5.5	3.0	0.6

Table B46. Lab 7 loose mix confined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25-7	01/25/10	03/29/10	7.4	4	10	[redacted]											
25-7	01/25/10	03/29/10	7.4	4	1	[redacted]											
25-7	01/25/10	03/29/10	7.4	4	0.1	[redacted]											
25-7	01/25/10	03/29/10	7.4	4	0.01	[redacted]											
25-7	01/25/10	03/29/10	7.4	20	10	4/1/2010	4991.0	27.4	20.1	69.7	91.0	0.5	2.6	-369.7	6.2	7.4	0.2
25-7	01/25/10	03/29/10	7.4	20	1	4/1/2010	2352.0	34.5	20.2	69.6	94.0	0.1	0.5	-431.6	4.7	10.5	0.2
25-7	01/25/10	03/29/10	7.4	20	0.1	4/1/2010	1004.0	37.2	20.0	69.6	95.0	0.0	0.3	-377.7	4.7	13.6	0.5
25-7	01/25/10	03/29/10	7.4	20	0.01	4/1/2010	526.8	34.6	19.9	69.6	83.0	0.4	0.5	6.6	7.0	14.2	1.1
25-7	01/25/10	03/29/10	7.4	40	10	4/5/2010	1491.0	35.7	39.9	69.6	87.0	0.3	4.0	-204.2	5.7	11.7	1.3
25-7	01/25/10	03/29/10	7.4	40	1	4/5/2010	671.4	31.9	39.7	69.5	91.0	0.1	0.9	-125.6	2.7	12.5	1.5
25-7	01/25/10	03/29/10	7.4	40	0.1	4/5/2010	393.4	27.6	40.1	69.6	85.0	0.0	1.0	-95.4	3.2	11.1	1.5
25-7	01/25/10	03/29/10	7.4	40	0.01	4/5/2010	316.2	20.1	40.1	69.6	77.0	0.2	0.9	-71.3	4.0	11.2	1.7
25-8	01/25/10	03/29/10	7.1	4	10	[redacted]											
25-8	01/25/10	03/29/10	7.1	4	1	[redacted]											
25-8	01/25/10	03/29/10	7.1	4	0.1	[redacted]											
25-8	01/25/10	03/29/10	7.1	4	0.01	[redacted]											
25-8	01/25/10	03/29/10	7.1	20	10	4/5/2010	6364.0	25.6	19.9	69.4	89.0	0.5	2.5	-356.0	6.0	9.8	0.9
25-8	01/25/10	03/29/10	7.1	20	1	4/5/2010	3169.0	33.1	19.9	69.6	93.0	0.1	0.6	-454.0	5.4	7.2	1.4
25-8	01/25/10	03/29/10	7.1	20	0.1	4/5/2010	1422.0	36.9	20.1	69.6	94.0	0.0	0.3	-495.9	6.6	6.4	1.4
25-8	01/25/10	03/29/10	7.1	20	0.01	4/5/2010	720.3	35.7	20.0	69.6	84.0	0.0	0.5	-233.0	7.3	9.1	1.1
25-8	01/25/10	03/29/10	7.1	40	10	4/5/2010	1519.0	34.2	39.9	69.6	85.0	0.5	3.7	-209.6	5.2	6.5	1.2
25-8	01/25/10	03/29/10	7.1	40	1	4/5/2010	728.3	29.6	40.1	69.6	90.0	0.1	0.9	-170.4	3.0	6.5	1.0
25-8	01/25/10	03/29/10	7.1	40	0.1	4/5/2010	465.8	24.9	40.2	69.6	86.0	0.1	1.0	-239.3	5.0	7.1	0.7
25-8	01/25/10	03/29/10	7.1	40	0.01	4/5/2010	400.8	18.6	40.1	69.6	79.0	0.0	0.7	-206.9	9.1	7.3	0.8
25-1	01/25/10	03/18/10	7	4	10	[redacted]											
25-1	01/25/10	03/18/10	7	4	1	[redacted]											
25-1	01/25/10	03/18/10	7	4	0.1	[redacted]											
25-1	01/25/10	03/18/10	7	4	0.01	[redacted]											
25-1	01/25/10	03/18/10	7	20	10	4/7/2010	7074.0	22.5	20.0	69.7	89.0	0.4	2.7	-217.0	5.1	11.2	0.7
25-1	01/25/10	03/18/10	7	20	1	4/7/2010	3846.0	27.4	20.0	69.5	95.0	0.0	0.6	-219.9	3.8	13.8	0.6
25-1	01/25/10	03/18/10	7	20	0.1	4/7/2010	2000.0	29.2	20.2	69.6	96.0	0.0	0.2	-187.8	3.4	13.4	0.6
25-1	01/25/10	03/18/10	7	20	0.01	4/7/2010	1253.0	26.2	20.0	69.6	86.0	0.0	0.4	-116.2	3.6	11.5	0.6
25-1	01/25/10	03/18/10	7	40	10	4/7/2010	2366.0	31.0	40.1	69.5	87.0	0.2	3.0	-244.8	5.0	17.5	0.4
25-1	01/25/10	03/18/10	7	40	1	4/7/2010	1154.0	29.8	39.8	69.6	91.0	0.1	0.6	-261.5	3.5	18.6	0.3
25-1	01/25/10	03/18/10	7	40	0.1	4/7/2010	668.0	26.1	40.1	69.6	93.0	0.0	0.4	-361.9	7.5	19.4	0.7
25-1	01/25/10	03/18/10	7	40	0.01	4/7/2010	501.1	20.4	40.0	69.6	86.0	0.2	0.5	-202.8	6.2	18.2	1.0

Table B47. Lab 8 loose mix unconfined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25-5	02/23/10	06/08/10	7.1	4	10	6/26/2010	15698.0	12.3	3.9	-0.1	95.0	-0.7	2.3	-72.2	2.9	23.4	0.3
25-5	02/23/10	06/08/10	7.1	4	1	6/26/2010	11021.0	17.0	3.9	0.0	99.0	0.0	0.3	-117.9	2.3	22.3	0.5
25-5	02/23/10	06/08/10	7.1	4	0.1	6/26/2010	6836.0	22.9	3.9	0.0	97.0	0.0	0.3	-196.9	3.3	19.9	0.9
25-5	02/23/10	06/08/10	7.1	4	0.01	6/26/2010	3638.0	28.3	3.9	0.0	97.0	0.0	0.5	-191.0	2.7	18.4	1.3
25-5	02/23/10	06/08/10	7.1	20	10	6/28/2010	6361.0	24.9	19.9	0.8	92.0	-4.7	2.6	-294.4	7.1	12.3	0.9
25-5	02/23/10	06/08/10	7.1	20	1	6/28/2010	3238.0	30.4	19.8	0.3	91.0	0.1	0.6	-265.5	5.1	13.8	1.0
25-5	02/23/10	06/08/10	7.1	20	0.1	6/28/2010	1385.0	32.3	20.2	0.0	91.0	0.1	0.5	-136.9	4.8	15.3	0.6
25-5	02/23/10	06/08/10	7.1	20	0.01	6/28/2010	524.9	29.7	20.1	0.0	111.0	-0.1	0.8	-4.4	5.0	16.9	0.3
25-5	02/23/10	06/08/10	7.1	40	10	6/29/2010	1299.0	32.0	40.4	-0.2	100.0	-12.2	5.6	-51.9	4.3	9.1	0.2
25-5	02/23/10	06/08/10	7.1	40	1	6/29/2010	446.6	29.6	40.6	0.0	97.0	0.1	1.3	-32.8	4.3	13.2	1.1
25-5	02/23/10	06/08/10	7.1	40	0.1	6/29/2010	222.7	20.3	40.4	0.0	90.0	-0.2	1.3	-60.5	6.2	14.1	2.0
25-5	02/23/10	06/08/10	7.1	40	0.01	6/29/2010	196.9	8.1	40.4	0.0	90.0	-0.2	1.2	-136.0	10.4	8.4	3.9
25-8	02/23/10	06/08/10	7.1	4	10	6/28/2010	16557.0	12.1	3.5	0.1	95.0	-0.8	1.7	-72.0	2.5	14.9	0.5
25-8	02/23/10	06/08/10	7.1	4	1	6/28/2010	11527.0	16.8	3.7	0.0	102.0	0.0	0.3	-121.4	2.3	12.6	0.8
25-8	02/23/10	06/08/10	7.1	4	0.1	6/28/2010	7100.0	22.7	3.5	0.0	101.0	0.0	0.3	-203.4	3.0	10.7	0.9
25-8	02/23/10	06/08/10	7.1	4	0.01	6/28/2010	3749.0	27.8	3.5	0.0	97.0	0.0	0.5	-180.9	2.7	9.4	0.7
25-8	02/23/10	06/08/10	7.1	20	10	6/28/2010	6385.0	25.2	19.9	0.0	94.0	-5.2	2.5	-316.4	7.7	18.0	1.0
25-8	02/23/10	06/08/10	7.1	20	1	6/28/2010	3205.0	30.7	20.2	0.0	92.0	0.0	0.6	-264.8	5.3	20.9	0.8
25-8	02/23/10	06/08/10	7.1	20	0.1	6/28/2010	1360.0	32.5	20.2	0.0	93.0	-0.2	0.6	-140.8	3.3	22.8	0.5
25-8	02/23/10	06/08/10	7.1	20	0.01	6/28/2010	520.0	29.7	20.2	0.0	111.0	-0.1	0.7	-8.6	4.6	22.9	0.9
25-8	02/23/10	06/08/10	7.1	40	10	6/30/2010	1320.0	31.2	40.4	0.2	97.0	-20.6	5.6	-24.2	4.4	15.8	1.1
25-8	02/23/10	06/08/10	7.1	40	1	6/30/2010	478.0	28.5	40.7	0.0	97.0	0.1	1.3	-45.5	4.5	16.4	1.0
25-8	02/23/10	06/08/10	7.1	40	0.1	6/30/2010	255.1	19.4	40.6	0.0	88.0	-0.4	1.1	-104.4	6.6	17.7	1.7
25-8	02/23/10	06/08/10	7.1	40	0.01	6/30/2010	227.4	9.1	40.5	0.0	91.0	0.0	1.0	-252.0	9.9	18.9	1.8
25-9	02/23/10	06/08/10	7.2	4	10	6/28/2010	16050.0	12.6	3.9	0.2	99.0	-1.1	1.6	-82.3	3.1	18.1	0.4
25-9	02/23/10	06/08/10	7.2	4	1	6/28/2010	11027.0	17.6	4.3	0.0	103.0	0.1	0.3	-137.0	2.5	17.4	0.5
25-9	02/23/10	06/08/10	7.2	4	0.1	6/28/2010	6728.0	23.3	3.9	0.0	99.0	0.0	0.3	-230.1	2.9	17.1	0.4
25-9	02/23/10	06/08/10	7.2	4	0.01	6/28/2010	3583.0	28.0	3.5	0.0	95.0	0.0	0.5	-193.7	2.9	16.8	0.1
25-9	02/23/10	06/08/10	7.2	20	10	6/29/2010	6379.0	25.3	20.2	-0.1	92.0	-7.1	2.5	-322.0	8.0	7.2	0.4
25-9	02/23/10	06/08/10	7.2	20	1	6/29/2010	3216.0	30.8	20.2	0.1	92.0	0.3	2.0	-277.5	5.9	7.8	0.1
25-9	02/23/10	06/08/10	7.2	20	0.1	6/29/2010	1377.0	32.5	20.3	0.0	91.0	-0.2	0.5	-160.8	3.7	7.2	1.2
25-9	02/23/10	06/08/10	7.2	20	0.01	6/29/2010	530.9	29.7	20.1	0.0	110.0	-0.2	0.7	-29.0	5.0	4.3	2.6
25-9	02/23/10	06/08/10	7.2	40	10	6/30/2010	1244.0	31.3	40.3	0.4	99.0	-11.7	5.7	-32.3	4.7	20.4	1.2
25-9	02/23/10	06/08/10	7.2	40	1	6/30/2010	439.7	28.9	40.4	0.0	97.0	0.0	1.2	-26.6	4.5	15.5	3.3
25-9	02/23/10	06/08/10	7.2	40	0.1	6/30/2010	229.4	19.1	40.4	0.0	89.0	0.3	1.2	-43.3	6.6	11.6	4.3
25-9	02/23/10	06/08/10	7.2	40	0.01	6/30/2010	211.0	6.2	40.5	0.0	90.0	0.1	1.1	-114.3	9.6	12.4	5.4

Table B48. Lab 8 loose mix confined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25-5	02/23/10	06/08/10	7.1	4	10	[redacted]											
25-5	02/23/10	06/08/10	7.1	4	1	[redacted]											
25-5	02/23/10	06/08/10	7.1	4	0.1	[redacted]											
25-5	02/23/10	06/08/10	7.1	4	0.01	[redacted]											
25-5	02/23/10	06/08/10	7.1	20	10	6/23/2010	5189.0	27.3	20.2	68.9	93.0	1.0	3.2	-318.2	5.6	20.9	1.4
25-5	02/23/10	06/08/10	7.1	20	1	6/23/2010	2590.0	32.9	19.8	69.0	92.0	0.0	0.6	-372.2	5.9	19.2	1.8
25-5	02/23/10	06/08/10	7.1	20	0.1	6/23/2010	1232.0	33.2	20.0	69.0	87.0	-0.1	0.7	-267.5	8.1	16.8	2.1
25-5	02/23/10	06/08/10	7.1	20	0.01	6/23/2010	727.0	26.6	20.0	69.0	80.0	-0.1	0.8	-49.0	8.1	17.5	0.5
25-5	02/23/10	06/08/10	7.1	40	10	6/24/2010	1484.0	31.3	40.4	69.0	91.0	-6.7	4.4	-78.8	4.1	6.5	0.6
25-5	02/23/10	06/08/10	7.1	40	1	6/24/2010	767.2	25.3	39.8	69.0	91.0	0.1	0.7	-43.5	2.8	8.3	0.4
25-5	02/23/10	06/08/10	7.1	40	0.1	6/24/2010	530.6	18.2	40.1	69.0	94.0	0.1	1.0	-23.6	3.2	11.5	0.6
25-5	02/23/10	06/08/10	7.1	40	0.01	6/24/2010	446.3	12.2	40.1	69.0	95.0	-0.2	0.8	5.8	3.4	13.2	0.6
25-8	02/23/10	06/08/10	7.1	4	10	[redacted]											
25-8	02/23/10	06/08/10	7.1	4	1	[redacted]											
25-8	02/23/10	06/08/10	7.1	4	0.1	[redacted]											
25-8	02/23/10	06/08/10	7.1	4	0.01	[redacted]											
25-8	02/23/10	06/08/10	7.1	20	10	6/24/2010	6214.0	26.1	20.1	69.1	95.0	0.7	2.5	-325.7	5.2	12.7	1.5
25-8	02/23/10	06/08/10	7.1	20	1	6/24/2010	3123.0	32.2	20.3	69.0	93.0	-0.2	0.6	-417.1	6.3	16.3	1.0
25-8	02/23/10	06/08/10	7.1	20	0.1	6/24/2010	1449.0	32.7	20.0	69.0	88.0	-0.3	0.8	-342.4	5.6	18.2	0.1
25-8	02/23/10	06/08/10	7.1	20	0.01	6/24/2010	800.4	26.0	20.1	69.0	84.0	-0.1	0.7	-122.5	4.4	19.1	0.4
25-8	02/23/10	06/08/10	7.1	40	10	6/24/2010	1460.0	29.9	40.4	69.0	89.0	-5.5	4.3	-65.7	3.9	15.4	0.7
25-8	02/23/10	06/08/10	7.1	40	1	6/24/2010	785.0	23.5	40.1	69.0	93.0	0.0	0.7	-44.4	2.8	16.5	0.5
25-8	02/23/10	06/08/10	7.1	40	0.1	6/24/2010	560.9	16.5	40.1	69.0	96.0	-0.1	0.9	-38.6	3.7	16.1	0.3
25-8	02/23/10	06/08/10	7.1	40	0.01	6/24/2010	484.7	11.4	40.1	69.0	96.0	-0.1	0.8	-14.2	4.0	15.5	0.2
25-9	02/23/10	06/08/10	7.2	4	10	[redacted]											
25-9	02/23/10	06/08/10	7.2	4	1	[redacted]											
25-9	02/23/10	06/08/10	7.2	4	0.1	[redacted]											
25-9	02/23/10	06/08/10	7.2	4	0.01	[redacted]											
25-9	02/23/10	06/08/10	7.2	20	10	6/23/2010	5825.0	26.0	20.6	69.0	94.0	0.5	2.6	-247.4	5.9	9.2	0.5
25-9	02/23/10	06/08/10	7.2	20	1	6/23/2010	2943.0	29.8	20.2	69.0	91.0	0.2	0.6	-170.2	3.7	9.8	1.0
25-9	02/23/10	06/08/10	7.2	20	0.1	6/23/2010	1399.0	28.8	20.1	69.0	90.0	-0.1	0.6	-76.4	3.1	8.7	2.2
25-9	02/23/10	06/08/10	7.2	20	0.01	6/23/2010	811.6	23.9	20.1	69.0	89.0	0.0	0.6	-16.7	3.8	6.5	2.2
25-9	02/23/10	06/08/10	7.2	40	10	6/24/2010	1530.0	30.8	40.3	69.3	89.0	-4.8	4.2	-74.7	4.3	7.0	1.6
25-9	02/23/10	06/08/10	7.2	40	1	6/24/2010	801.6	24.7	40.1	69.0	93.0	0.1	0.7	-39.0	2.8	5.2	1.9
25-9	02/23/10	06/08/10	7.2	40	0.1	6/24/2010	567.5	17.7	40.2	69.0	96.0	0.1	0.8	-5.9	3.6	6.3	1.6
25-9	02/23/10	06/08/10	7.2	40	0.01	6/24/2010	487.7	11.7	40.2	69.0	95.0	-0.1	0.8	49.8	4.3	8.1	1.1

APPENDIX C

Prefabricated Core Dynamic Modulus Test Data

Table C1. Lab 1 prefabricated core unconfined dynamic modulus data for the 9.5-mm mixture.

	Mix	Compact				UNCONFINED													
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ degrees	Temp., C	Conf, kPa	Strain, μst	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg		
9.5_5	3/24/2009	3/24/2009	7.5	4	10	4/8/2009	14775.5	12.2	3.9	0.0	99.3	0.2	7.4	102.7	8.9	9.4	0.0		
9.5_5	3/24/2009	3/24/2009	7.5	4	1	4/8/2009	10381.4	17.5	3.9	0.0	93.5	0.1	0.7	129.8	5.3	10.6	0.4		
9.5_5	3/24/2009	3/24/2009	7.5	4	0.1	4/8/2009	6488.7	22.9	3.9	0.0	91.6	2.9	1.4	208.9	4.9	7.0	1.0		
9.5_5	3/24/2009	3/24/2009	7.5	4	0.01	4/8/2009	3484.8	27.2	3.9	0.0	92.0	0.2	1.3	162.7	5.6	14.1	1.7		
9.5_5	3/24/2009	3/24/2009	7.5	20	10	4/2/2009	5821.6	26.7	19.9	0.0	120.0	1.0	9.7	281.5	13.6	11.8	0.4		
9.5_5	3/24/2009	3/24/2009	7.5	20	1	4/2/2009	2968.2	31.3	20.1	0.0	165.8	0.0	0.6	365.0	9.7	8.2	0.7		
9.5_5	3/24/2009	3/24/2009	7.5	20	0.1	4/2/2009	1256.3	33.5	20.1	0.0	88.1	2.3	1.6	271.4	3.7	5.5	0.2		
9.5_5	3/24/2009	3/24/2009	7.5	20	0.01	4/2/2009	577.8	28.3	20.0	0.0	89.2	-0.6	1.9	254.9	6.4	5.1	0.8		
9.5_5	3/24/2009	3/24/2009	7.5	40	10	4/6/2009	1107.2	36.8	39.7	0.0	122.2	-2.6	7.6	198.0	17.8	19.0	0.8		
9.5_5	3/24/2009	3/24/2009	7.5	40	1	4/6/2009	438.7	29.0	39.6	0.0	162.5	0.4	2.9	47.2	6.9	14.3	1.2		
9.5_5	3/24/2009	3/24/2009	7.5	40	0.1	4/6/2009	228.7	19.4	39.7	0.0	97.4	1.2	3.4	1.9	4.2	9.7	0.1		
9.5_5	3/24/2009	3/24/2009	7.5	40	0.01	4/6/2009	176.6	10.7	40.0	0.0	98.8	0.2	4.1	-6.2	4.8	6.9	0.9		
9.5_6	3/24/2009	3/24/2009	6.9	4	10	4/8/2009	15392.9	12.7	3.7	0.0	99.2	1.9	9.0	120.1	10.3	14.8	0.3		
9.5_6	3/24/2009	3/24/2009	6.9	4	1	4/8/2009	10739.7	18.1	3.6	0.0	94.8	0.0	0.7	137.5	6.4	23.8	0.1		
9.5_6	3/24/2009	3/24/2009	6.9	4	0.1	4/8/2009	6572.7	23.8	4.0	0.0	92.3	2.5	1.4	204.6	6.2	27.3	0.5		
9.5_6	3/24/2009	3/24/2009	6.9	4	0.01	4/8/2009	3576.4	28.6	3.9	0.0	94.1	0.1	1.3	192.1	6.0	42.6	1.8		
9.5_6	3/24/2009	3/24/2009	6.9	20	10	4/2/2009	6126.3	26.3	20.2	0.0	90.7	0.8	10.8	262.8	14.1	6.9	0.3		
9.5_6	3/24/2009	3/24/2009	6.9	20	1	4/2/2009	3026.4	32.3	20.2	0.0	87.1	0.1	0.8	312.7	10.7	10.2	0.1		
9.5_6	3/24/2009	3/24/2009	6.9	20	0.1	4/2/2009	1322.6	34.4	20.1	0.0	91.4	2.1	1.5	220.1	5.0	10.5	0.6		
9.5_6	3/24/2009	3/24/2009	6.9	20	0.01	4/2/2009	576.1	30.7	20.0	0.0	98.7	0.3	1.8	58.5	3.1	10.5	0.1		
9.5_6	3/24/2009	3/24/2009	6.9	40	10	4/6/2009	1155.5	36.1	39.7	0.0	117.1	-2.5	7.7	234.3	19.1	12.3	2.2		
9.5_6	3/24/2009	3/24/2009	6.9	40	1	4/6/2009	466.9	30.1	39.7	0.0	153.0	0.5	2.9	69.9	7.1	17.4	2.8		
9.5_6	3/24/2009	3/24/2009	6.9	40	0.1	4/6/2009	238.2	21.6	39.8	0.0	97.0	-5.3	3.8	16.5	4.3	16.8	3.6		
9.5_6	3/24/2009	3/24/2009	6.9	40	0.01	4/6/2009	174.0	13.6	40.0	0.0	99.8	-1.6	5.2	38.7	5.0	5.2	3.4		
9.5_7	3/24/2009	3/24/2009	6.9	4	10	4/8/2009	15502.9	11.6	3.8	0.0	98.1	2.2	9.9	109.7	11.2	7.3	0.2		
9.5_7	3/24/2009	3/24/2009	6.9	4	1	4/8/2009	11112.2	16.8	4.0	0.0	93.2	0.1	1.0	127.5	5.0	6.6	0.4		
9.5_7	3/24/2009	3/24/2009	6.9	4	0.1	4/8/2009	7020.2	22.2	3.8	0.0	91.2	2.4	1.4	217.0	6.0	1.4	0.5		
9.5_7	3/24/2009	3/24/2009	6.9	4	0.01	4/8/2009	3968.4	27.2	3.7	0.0	90.6	0.1	1.3	188.9	4.5	6.1	0.0		
9.5_7	3/24/2009	3/24/2009	6.9	20	10	4/2/2009	6275.2	26.0	20.0	0.0	91.5	0.9	11.1	248.0	14.8	15.0	0.1		
9.5_7	3/24/2009	3/24/2009	6.9	20	1	4/2/2009	3128.7	31.5	20.0	0.0	87.1	0.0	1.1	239.2	10.2	13.4	0.4		
9.5_7	3/24/2009	3/24/2009	6.9	20	0.1	4/2/2009	1331.7	32.8	20.0	0.0	92.0	2.0	1.8	121.4	4.6	8.7	1.4		
9.5_7	3/24/2009	3/24/2009	6.9	20	0.01	4/2/2009	584.8	27.4	20.0	0.0	96.9	0.2	1.9	61.1	3.5	0.4	1.1		
9.5_7	3/24/2009	3/24/2009	6.9	40	10	4/6/2009	1174.0	37.3	39.9	0.0	116.4	-3.1	8.2	199.2	19.2	12.5	1.5		
9.5_7	3/24/2009	3/24/2009	6.9	40	1	4/6/2009	459.7	30.0	39.9	0.0	155.3	0.3	3.0	31.9	6.9	13.5	1.8		
9.5_7	3/24/2009	3/24/2009	6.9	40	0.1	4/6/2009	226.7	22.0	39.9	0.0	92.6	-1.2	4.3	-78.8	4.0	27.3	2.4		
9.5_7	3/24/2009	3/24/2009	6.9	40	0.01	4/6/2009	176.0	12.5	40.0	0.0	104.0	-0.3	3.5	-57.9	4.7	29.1	1.1		

Table C2. Lab 1 prefabricated core confined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μst	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_5	3/24/2009	3/24/2009	7.5	4	10	[redacted]											
9.5_5	3/24/2009	3/24/2009	7.5	4	1	[redacted]											
9.5_5	3/24/2009	3/24/2009	7.5	4	0.1	[redacted]											
9.5_5	3/24/2009	3/24/2009	7.5	4	0.01	[redacted]											
9.5_5	3/24/2009	3/24/2009	7.5	20	10	4/3/2009	5442.3	24.4	20.1	68.0	90.8	0.8	10.5	210.1	19.9	21.0	1.6
9.5_5	3/24/2009	3/24/2009	7.5	20	1	4/3/2009	2962.7	29.7	20.2	68.0	88.3	0.1	1.0	271.8	10.1	17.3	1.1
9.5_5	3/24/2009	3/24/2009	7.5	20	0.1	4/3/2009	1466.2	30.5	20.1	68.0	90.0	2.8	1.7	233.0	4.7	11.5	0.7
9.5_5	3/24/2009	3/24/2009	7.5	20	0.01	4/3/2009	849.8	25.6	20.0	68.2	87.3	0.5	2.0	180.6	4.9	4.8	0.8
9.5_5	3/24/2009	3/24/2009	7.5	40	10	4/6/2009	1517.7	32.5	39.7	68.4	93.5	-1.5	6.5	120.7	12.7	4.2	0.4
9.5_5	3/24/2009	3/24/2009	7.5	40	1	4/6/2009	770.5	24.5	39.9	68.4	94.8	-0.1	3.6	23.5	5.6	2.2	0.4
9.5_5	3/24/2009	3/24/2009	7.5	40	0.1	4/6/2009	547.9	15.1	40.0	68.4	99.3	6.2	2.0	17.5	3.2	0.2	0.2
9.5_5	3/24/2009	3/24/2009	7.5	40	0.01	4/6/2009	481.3	8.4	40.0	68.4	98.9	0.4	1.8	10.8	3.7	1.5	0.4
9.5_6	3/24/2009	3/24/2009	6.9	4	10	[redacted]											
9.5_6	3/24/2009	3/24/2009	6.9	4	1	[redacted]											
9.5_6	3/24/2009	3/24/2009	6.9	4	0.1	[redacted]											
9.5_6	3/24/2009	3/24/2009	6.9	4	0.01	[redacted]											
9.5_6	3/24/2009	3/24/2009	6.9	20	10	4/3/2009	6044.5	25.6	19.7	68.2	89.3	1.1	8.2	284.5	14.6	18.3	0.6
9.5_6	3/24/2009	3/24/2009	6.9	20	1	4/3/2009	3075.9	30.6	20.1	68.2	87.3	0.0	1.2	276.3	10.3	16.1	0.8
9.5_6	3/24/2009	3/24/2009	6.9	20	0.1	4/3/2009	1471.8	31.4	20.2	68.0	91.4	3.5	1.6	193.6	5.5	11.6	0.9
9.5_6	3/24/2009	3/24/2009	6.9	20	0.01	4/3/2009	819.8	25.2	20.0	68.0	94.2	-0.6	2.0	85.0	3.9	9.1	0.6
9.5_6	3/24/2009	3/24/2009	6.9	40	10	4/6/2009	1486.6	33.2	39.6	68.4	93.0	-1.9	7.1	150.0	13.6	11.5	0.2
9.5_6	3/24/2009	3/24/2009	6.9	40	1	4/6/2009	726.1	25.8	39.7	68.4	98.3	0.5	2.5	25.8	5.1	14.8	0.7
9.5_6	3/24/2009	3/24/2009	6.9	40	0.1	4/6/2009	515.6	16.0	39.8	68.4	95.6	4.1	2.2	21.9	4.1	12.4	1.0
9.5_6	3/24/2009	3/24/2009	6.9	40	0.01	4/6/2009	424.9	9.4	40.0	68.4	99.3	1.0	2.0	8.9	4.2	12.3	0.4
9.5_7	3/24/2009	3/24/2009	6.9	4	10	[redacted]											
9.5_7	3/24/2009	3/24/2009	6.9	4	1	[redacted]											
9.5_7	3/24/2009	3/24/2009	6.9	4	0.1	[redacted]											
9.5_7	3/24/2009	3/24/2009	6.9	4	0.01	[redacted]											
9.5_7	3/24/2009	3/24/2009	6.9	20	10	4/3/2009	6355.1	26.0	20.0	68.0	92.1	1.2	9.6	262.8	15.2	0.5	0.5
9.5_7	3/24/2009	3/24/2009	6.9	20	1	4/3/2009	3208.9	31.4	20.3	68.0	86.1	0.0	0.8	312.0	10.6	3.2	0.1
9.5_7	3/24/2009	3/24/2009	6.9	20	0.1	4/3/2009	1523.6	31.8	20.3	68.0	88.7	3.2	1.6	238.6	7.3	0.0	1.4
9.5_7	3/24/2009	3/24/2009	6.9	20	0.01	4/3/2009	857.9	25.2	20.0	68.0	91.0	-0.5	1.5	141.7	5.1	8.4	1.4
9.5_7	3/24/2009	3/24/2009	6.9	40	10	4/6/2009	1529.7	33.4	39.7	68.4	92.2	-1.6	6.1	117.2	13.3	36.9	1.8
9.5_7	3/24/2009	3/24/2009	6.9	40	1	4/6/2009	773.1	25.2	40.0	68.4	94.3	0.2	2.7	19.7	6.6	43.3	2.3
9.5_7	3/24/2009	3/24/2009	6.9	40	0.1	4/6/2009	544.2	15.6	40.0	68.4	98.1	0.8	2.1	8.1	5.5	41.0	1.6
9.5_7	3/24/2009	3/24/2009	6.9	40	0.01	4/6/2009	460.9	9.2	40.0	68.4	97.2	1.3	2.0	1.2	5.5	40.4	1.5

Table C3. Lab 2 prefabricated core unconfined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_4	01/12/09	01/12/09	7.0	4	10	3/19/2009	15354.0	12.2	4.0	0.3	98.0	0.2	1.6	-68.3	2.5	8.0	0.3
9.5_4	01/12/09	01/12/09	7.0	4	1	3/19/2009	10820.0	16.7	3.9	0.3	98.0	0.0	0.4	-113.3	2.3	6.6	0.3
9.5_4	01/12/09	01/12/09	7.0	4	0.1	3/19/2009	6792.0	22.2	4.2	0.3	98.0	0.0	0.3	-185.3	3.6	6.5	0.5
9.5_4	01/12/09	01/12/09	7.0	4	0.01	3/19/2009	3953.0	26.9	4.1	0.3	92.0	0.0	0.4	-171.6	3.3	6.4	0.6
9.5_4	01/12/09	01/12/09	7.0	20	10	3/17/2009	6077.0	25.6	20.1	1.0	93.0	0.4	1.8	-328.9	6.0	13.1	0.7
9.5_4	01/12/09	01/12/09	7.0	20	1	3/17/2009	3038.0	32.0	20.0	0.8	93.0	0.2	0.6	-377.3	5.6	11.1	0.8
9.5_4	01/12/09	01/12/09	7.0	20	0.1	3/17/2009	1294.0	34.7	20.1	0.9	91.0	0.0	1.2	-302.5	4.3	10.6	0.9
9.5_4	01/12/09	01/12/09	7.0	20	0.01	3/17/2009	529.9	32.3	20.0	1.0	99.0	-0.2	1.3	-94.9	4.1	10.2	0.7
9.5_4	01/12/09	01/12/09	7.0	40	10	5/23/2009	1302.0	34.3	39.9	0.3	87.0	1.0	4.4	-151.1	5.9	1.8	0.8
9.5_4	01/12/09	01/12/09	7.0	40	1	5/23/2009	480.6	30.8	40.0	0.2	96.0	0.3	1.4	-44.3	4.3	0.6	0.4
9.5_4	01/12/09	01/12/09	7.0	40	0.1	5/23/2009	218.6	22.5	40.0	0.2	92.0	0.0	1.0	-86.1	5.7	2.2	0.4
9.5_4	01/12/09	01/12/09	7.0	40	0.01	5/23/2009	170.0	11.8	40.0	0.3	95.0	0.0	1.1	-413.6	10.5	10.2	1.8
9.5_6	01/12/09	01/12/09	6.7	4	10	3/19/2009	15666.0	11.8	3.8	0.4	98.0	0.2	1.6	-62.5	2.3	15.2	0.5
9.5_6	01/12/09	01/12/09	6.7	4	1	3/19/2009	11158.0	15.9	3.9	0.3	98.0	0.1	0.4	-103.1	2.1	14.5	0.6
9.5_6	01/12/09	01/12/09	6.7	4	0.1	3/19/2009	7149.0	21.1	4.0	0.3	98.0	0.0	0.3	-177.3	2.6	14.3	0.7
9.5_6	01/12/09	01/12/09	6.7	4	0.01	3/19/2009	4181.0	25.8	4.1	0.3	93.0	0.0	0.4	-166.4	2.9	13.8	0.6
9.5_6	01/12/09	01/12/09	6.7	20	10	3/17/2009	6505.0	24.4	20.4	0.8	97.0	0.4	1.6	-292.4	5.7	14.4	0.4
9.5_6	01/12/09	01/12/09	6.7	20	1	3/17/2009	3369.0	30.5	20.0	0.9	93.0	0.1	0.6	-339.0	5.0	12.9	0.5
9.5_6	01/12/09	01/12/09	6.7	20	0.1	3/17/2009	1502.0	34.0	19.9	0.9	91.0	0.1	1.0	-310.1	3.6	12.3	0.4
9.5_6	01/12/09	01/12/09	6.7	20	0.01	3/17/2009	624.5	32.4	20.0	1.0	99.0	0.0	1.1	-136.8	3.9	11.9	0.4
9.5_6	01/12/09	01/12/09	6.7	40	10	3/26/2009	1430.0	33.5	40.0	0.2	87.0	0.9	4.2	-158.6	6.1	6.3	0.5
9.5_6	01/12/09	01/12/09	6.7	40	1	3/26/2009	546.4	30.0	40.1	0.2	95.0	0.3	1.4	-52.8	3.9	9.5	0.7
9.5_6	01/12/09	01/12/09	6.7	40	0.1	3/26/2009	254.2	21.8	40.0	0.2	92.0	0.0	1.0	-84.0	5.3	13.6	1.3
9.5_6	01/12/09	01/12/09	6.7	40	0.01	3/26/2009	191.5	10.5	40.0	0.3	96.0	0.0	1.0	-228.3	8.4	15.4	2.4
9.5_7	01/12/09	01/12/09	7.3	4	10	3/19/2009	14673.0	12.4	3.9	0.3	102.0	0.0	1.5	-66.9	2.1	0.6	0.3
9.5_7	01/12/09	01/12/09	7.3	4	1	3/19/2009	10301.0	16.6	4.1	0.2	99.0	0.0	0.4	-111.2	2.1	0.9	0.4
9.5_7	01/12/09	01/12/09	7.3	4	0.1	3/19/2009	6488.0	22.2	3.9	0.1	98.0	0.1	0.3	-170.8	3.3	1.9	0.5
9.5_7	01/12/09	01/12/09	7.3	4	0.01	3/19/2009	3767.0	27.0	4.1	0.2	92.0	0.0	0.4	-171.2	2.7	3.5	0.7
9.5_7	01/12/09	01/12/09	7.3	20	10	3/17/2009	6078.0	25.2	19.9	1.0	98.0	0.4	1.7	-321.3	5.9	4.2	0.3
9.5_7	01/12/09	01/12/09	7.3	20	1	3/17/2009	3063.0	31.8	19.8	0.9	93.0	-0.1	0.6	-395.5	5.6	2.8	0.5
9.5_7	01/12/09	01/12/09	7.3	20	0.1	3/17/2009	1335.0	35.5	19.9	0.9	90.0	-0.1	1.3	-380.6	4.4	2.3	0.7
9.5_7	01/12/09	01/12/09	7.3	20	0.01	3/17/2009	555.1	34.1	20.0	1.0	96.0	0.2	1.4	-175.7	4.0	2.5	0.9
9.5_7	01/12/09	01/12/09	7.3	40	10	5/23/2009	1499.0	33.8	39.9	0.1	86.0	1.1	4.1	-199.7	6.8	9.2	0.3
9.5_7	01/12/09	01/12/09	7.3	40	1	5/23/2009	581.5	30.4	40.0	0.1	95.0	0.2	1.3	-70.5	4.2	9.6	0.2
9.5_7	01/12/09	01/12/09	7.3	40	0.1	5/23/2009	267.7	22.8	40.1	0.0	91.0	0.3	0.7	-123.6	6.0	8.9	1.1
9.5_7	01/12/09	01/12/09	7.3	40	0.01	5/23/2009	207.9	10.7	39.9	0.1	95.0	-0.2	1.0	-416.9	10.1	7.2	3.5

Table C4. Lab 2 prefabricated core confined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_4	01/12/09	01/12/09	7.0	4	10	[redacted]											
9.5_4	01/12/09	01/12/09	7.0	4	1												
9.5_4	01/12/09	01/12/09	7.0	4	0.1												
9.5_4	01/12/09	01/12/09	7.0	4	0.01												
9.5_4	01/12/09	01/12/09	7.0	20	10	5/12/2009	6206.0	24.9	19.9	69.0	97.0	0.3	1.6	-290.6	6.2	11.1	0.3
9.5_4	01/12/09	01/12/09	7.0	20	1	5/12/2009	3205.0	30.2	19.8	69.0	93.0	0.0	0.4	-281.4	5.3	10.0	0.6
9.5_4	01/12/09	01/12/09	7.0	20	0.1	5/12/2009	1479.0	31.7	20.0	69.0	91.0	0.0	0.6	-194.5	4.3	8.7	0.9
9.5_4	01/12/09	01/12/09	7.0	20	0.01	5/12/2009	762.7	28.2	19.9	69.0	90.0	0.0	0.7	-97.6	3.4	6.6	0.9
9.5_4	01/12/09	01/12/09	7.0	40	10	5/23/2009	1457.0	32.1	40.1	69.0	89.0	1.3	3.3	-154.2	4.9	5.9	0.3
9.5_4	01/12/09	01/12/09	7.0	40	1	5/23/2009	715.2	26.0	40.1	69.0	94.0	0.1	0.8	-54.9	2.6	6.8	0.6
9.5_4	01/12/09	01/12/09	7.0	40	0.1	5/23/2009	466.8	18.6	40.2	69.0	95.0	-0.1	0.7	-34.3	3.1	8.8	0.7
9.5_4	01/12/09	01/12/09	7.0	40	0.01	5/23/2009	413.9	12.6	40.0	69.0	88.0	0.0	0.8	-6.6	3.2	9.5	0.6
9.5_6	01/12/09	01/12/09	6.7	4	10	[redacted]											
9.5_6	01/12/09	01/12/09	6.7	4	1												
9.5_6	01/12/09	01/12/09	6.7	4	0.1												
9.5_6	01/12/09	01/12/09	6.7	4	0.01												
9.5_6	01/12/09	01/12/09	6.7	20	10	5/12/2009	6795.0	23.6	20.0	69.0	95.0	0.5	1.5	-256.9	5.4	9.3	0.6
9.5_6	01/12/09	01/12/09	6.7	20	1	5/12/2009	3632.0	29.0	19.7	69.0	93.0	0.2	0.4	-267.4	5.1	7.7	0.6
9.5_6	01/12/09	01/12/09	6.7	20	0.1	5/12/2009	1703.0	31.4	20.1	69.0	91.0	0.0	0.7	-166.6	4.9	6.1	0.6
9.5_6	01/12/09	01/12/09	6.7	20	0.01	5/12/2009	799.9	28.7	20.1	69.0	96.0	0.0	0.7	-23.0	3.2	4.7	0.6
9.5_6	01/12/09	01/12/09	6.7	40	10	5/23/2009	1584.0	32.4	40.1	69.0	89.0	1.0	3.1	-174.0	5.4	5.7	1.2
9.5_6	01/12/09	01/12/09	6.7	40	1	5/23/2009	720.9	27.9	39.9	69.0	95.0	0.0	0.9	-27.2	2.9	7.0	1.0
9.5_6	01/12/09	01/12/09	6.7	40	0.1	5/23/2009	537.0	20.3	40.0	69.0	83.0	0.0	0.6	1.3	2.8	3.4	0.1
9.5_6	01/12/09	01/12/09	6.7	40	0.01	5/23/2009	449.9	13.8	40.0	69.0	91.0	0.0	0.8	5.5	3.5	3.0	0.1
9.5_7	01/12/09	01/12/09	7.3	4	10	[redacted]											
9.5_7	01/12/09	01/12/09	7.3	4	1												
9.5_7	01/12/09	01/12/09	7.3	4	0.1												
9.5_7	01/12/09	01/12/09	7.3	4	0.01												
9.5_7	01/12/09	01/12/09	7.3	20	10	5/12/2009	6714.0	24.0	20.0	69.3	97.0	0.2	1.5	-259.5	5.7	2.3	0.5
9.5_7	01/12/09	01/12/09	7.3	20	1	5/12/2009	3588.0	29.2	19.9	69.0	93.0	0.1	0.5	-238.9	5.1	2.4	0.7
9.5_7	01/12/09	01/12/09	7.3	20	0.1	5/12/2009	1681.0	31.3	20.1	69.0	92.0	-0.1	0.7	-97.5	3.9	3.2	1.0
9.5_7	01/12/09	01/12/09	7.3	20	0.01	5/12/2009	811.4	29.0	20.1	69.0	95.0	0.0	0.6	51.8	3.4	2.4	1.3
9.5_7	01/12/09	01/12/09	7.3	40	10	5/23/2009	1530.0	32.3	40.0	69.0	89.0	0.9	3.1	-160.6	5.2	2.8	0.4
9.5_7	01/12/09	01/12/09	7.3	40	1	5/23/2009	722.2	27.5	39.9	69.0	93.0	0.1	0.8	-19.4	2.8	3.0	0.2
9.5_7	01/12/09	01/12/09	7.3	40	0.1	5/23/2009	457.1	21.7	40.0	69.0	89.0	0.0	0.7	43.5	4.5	1.9	1.0
9.5_7	01/12/09	01/12/09	7.3	40	0.01	5/23/2009	399.9	15.0	40.0	69.0	86.0	0.1	0.8	37.6	4.1	2.2	1.1

Table C5. Lab 3 prefabricated core unconfined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_2	09/25/09	09/25/09	6.9	4	10	12/10/2009	15141.0	13.4	3.9	0.8	95.0	0.3	1.2	-88.3	2.6	9.2	0.3
9.5_2	09/25/09	09/25/09	6.9	4	1	12/10/2009	10264.0	18.3	3.9	0.8	99.0	0.1	0.4	-144.2	2.4	10.5	0.4
9.5_2	09/25/09	09/25/09	6.9	4	0.1	12/10/2009	6160.0	24.0	3.4	0.9	99.0	0.0	0.6	-211.3	3.7	10.9	0.6
9.5_2	09/25/09	09/25/09	6.9	4	0.01	12/10/2009	3666.0	27.5	3.2	0.9	90.0	0.0	0.5	-136.3	2.6	10.3	0.7
9.5_2	09/25/09	09/25/09	6.9	20	10	12/11/2009	6817.0	24.7	19.8	0.6	91.0	0.3	2.1	-284.3	6.1	7.7	0.1
9.5_2	09/25/09	09/25/09	6.9	20	1	12/11/2009	3501.0	30.1	19.8	0.6	95.0	0.1	0.5	-261.0	4.9	8.1	0.4
9.5_2	09/25/09	09/25/09	6.9	20	0.1	12/11/2009	1534.0	32.1	19.8	0.7	99.0	0.0	0.5	-169.0	3.3	8.4	0.6
9.5_2	09/25/09	09/25/09	6.9	20	0.01	12/11/2009	620.8	29.4	19.9	0.7	112.0	0.0	0.6	-84.2	3.7	7.5	0.3
9.5_2	09/25/09	09/25/09	6.9	40	10	12/14/2009	1502.0	33.9	40.0	0.4	91.0	-0.2	4.4	-100.8	4.9	4.3	0.4
9.5_2	09/25/09	09/25/09	6.9	40	1	12/14/2009	531.8	31.4	40.0	0.6	101.0	0.7	1.9	-42.9	4.3	5.4	0.3
9.5_2	09/25/09	09/25/09	6.9	40	0.1	12/14/2009	236.8	23.2	40.0	0.5	97.0	0.0	0.5	-50.0	5.4	8.1	0.6
9.5_2	09/25/09	09/25/09	6.9	40	0.01	12/14/2009	166.6	12.6	40.1	0.5	99.0	0.1	0.9	-111.2	7.7	13.5	1.4
9.5_4	09/25/09	09/25/09	7.0	4	10	12/9/2009	15979.0	12.3	3.7	0.9	97.0	0.1	1.3	-69.7	2.0	3.8	0.1
9.5_4	09/25/09	09/25/09	7.0	4	1	12/9/2009	11164.0	16.9	3.7	0.7	99.0	0.1	0.4	-120.0	2.0	3.4	0.2
9.5_4	09/25/09	09/25/09	7.0	4	0.1	12/9/2009	6936.0	22.8	3.7	0.9	101.0	0.0	0.6	-207.2	3.0	3.9	0.1
9.5_4	09/25/09	09/25/09	7.0	4	0.01	12/9/2009	3915.0	27.5	3.7	0.9	96.0	0.0	0.5	-192.0	2.4	4.5	0.0
9.5_4	09/25/09	09/25/09	7.0	20	10	12/11/2009	6652.0	25.0	19.9	0.7	93.0	0.3	2.1	-288.7	6.0	1.6	0.3
9.5_4	09/25/09	09/25/09	7.0	20	1	12/11/2009	3417.0	30.7	19.9	0.8	95.0	0.1	0.5	-294.7	5.2	3.9	0.2
9.5_4	09/25/09	09/25/09	7.0	20	0.1	12/11/2009	1503.0	32.9	19.9	0.6	98.0	0.0	0.5	-210.6	3.8	5.2	0.5
9.5_4	09/25/09	09/25/09	7.0	20	0.01	12/11/2009	611.0	29.7	19.9	0.7	111.0	0.0	0.6	-109.0	3.5	5.4	0.7
9.5_4	09/25/09	09/25/09	7.0	40	10	12/14/2009	1545.0	33.8	40.2	0.6	90.0	-0.1	4.6	-98.9	5.0	2.4	0.2
9.5_4	09/25/09	09/25/09	7.0	40	1	12/14/2009	543.6	31.6	40.2	0.6	100.0	0.6	1.7	-38.6	4.1	4.1	0.5
9.5_4	09/25/09	09/25/09	7.0	40	0.1	12/14/2009	241.3	23.3	40.1	0.5	97.0	-0.4	0.6	-56.1	5.4	5.0	1.4
9.5_4	09/25/09	09/25/09	7.0	40	0.01	12/14/2009	178.5	11.4	40.1	0.5	96.0	0.0	0.9	-125.0	8.2	8.2	2.6
9.5_7	09/25/09	09/25/09	6.9	4	10	12/9/2009	15422.0	12.4	3.6	0.9	92.0	0.1	1.3	-67.5	2.1	8.4	0.2
9.5_7	09/25/09	09/25/09	6.9	4	1	12/9/2009	10900.0	17.0	3.7	0.7	97.0	0.1	0.4	-120.4	2.2	6.6	0.2
9.5_7	09/25/09	09/25/09	6.9	4	0.1	12/9/2009	6737.0	22.9	3.7	0.9	100.0	0.0	0.6	-199.9	3.2	6.8	0.6
9.5_7	09/25/09	09/25/09	6.9	4	0.01	12/9/2009	3758.0	27.5	3.7	0.9	97.0	0.0	0.5	-157.5	2.2	7.5	0.8
9.5_7	09/25/09	09/25/09	6.9	20	10	12/10/2009	6603.0	24.8	20.0	0.7	92.0	0.1	2.5	-278.9	6.0	7.5	0.6
9.5_7	09/25/09	09/25/09	6.9	20	1	12/10/2009	3388.0	30.5	20.0	0.7	95.0	0.1	0.6	-275.4	5.2	6.8	0.8
9.5_7	09/25/09	09/25/09	6.9	20	0.1	12/10/2009	1481.0	32.7	19.9	0.6	99.0	0.0	0.5	-192.0	3.1	7.4	1.2
9.5_7	09/25/09	09/25/09	6.9	20	0.01	12/10/2009	585.3	30.2	19.9	0.7	112.0	0.0	0.6	-96.8	3.2	9.8	1.2
9.5_7	09/25/09	09/25/09	6.9	40	10	12/14/2009	1810.0	33.5	39.9	0.4	88.0	-0.4	4.5	-140.7	5.4	6.1	0.6
9.5_7	09/25/09	09/25/09	6.9	40	1	12/14/2009	671.2	31.9	39.9	0.4	99.0	0.2	1.1	-69.5	3.6	6.7	0.5
9.5_7	09/25/09	09/25/09	6.9	40	0.1	12/14/2009	282.7	25.0	39.9	0.4	99.0	0.1	0.5	-93.6	5.0	4.9	0.9
9.5_7	09/25/09	09/25/09	6.9	40	0.01	12/14/2009	171.8	14.1	40.1	0.5	104.0	0.0	0.8	-238.1	8.2	0.6	1.3

Table C6. Lab 3 prefabricated core confined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_2	09/25/09	09/25/09	6.9	4	10												
9.5_2	09/25/09	09/25/09	6.9	4	1												
9.5_2	09/25/09	09/25/09	6.9	4	0.1												
9.5_2	09/25/09	09/25/09	6.9	4	0.01												
9.5_2	09/25/09	09/25/09	6.9	20	10	12/9/2009	6982.0	24.5	20.1	69.2	94.0	0.3	1.6	-287.7	5.8	9.3	0.1
9.5_2	09/25/09	09/25/09	6.9	20	1	12/9/2009	3656.0	30.1	19.9	69.0	95.0	0.1	0.4	-280.5	5.2	8.5	0.3
9.5_2	09/25/09	09/25/09	6.9	20	0.1	12/9/2009	1736.0	31.3	19.9	69.0	97.0	0.0	0.6	-133.1	2.6	8.1	0.2
9.5_2	09/25/09	09/25/09	6.9	20	0.01	12/9/2009	914.5	26.0	20.0	69.0	96.0	0.0	0.5	20.1	2.9	8.2	0.6
9.5_2	09/25/09	09/25/09	6.9	40	10	12/7/2009	1579.0	33.2	39.3	69.2	87.0	0.4	2.4	-118.8	3.9	2.9	0.3
9.5_2	09/25/09	09/25/09	6.9	40	1	12/7/2009	789.5	28.0	39.7	69.0	91.0	0.1	0.5	-32.1	2.5	4.4	0.7
9.5_2	09/25/09	09/25/09	6.9	40	0.1	12/7/2009	532.3	20.3	40.1	69.0	91.0	0.2	0.5	-36.8	3.0	5.0	0.9
9.5_2	09/25/09	09/25/09	6.9	40	0.01	12/7/2009	439.4	13.3	40.0	69.0	95.0	0.0	0.6	-5.2	3.3	4.3	0.8
9.5_4	09/25/09	09/25/09	7.0	4	10												
9.5_4	09/25/09	09/25/09	7.0	4	1												
9.5_4	09/25/09	09/25/09	7.0	4	0.1												
9.5_4	09/25/09	09/25/09	7.0	4	0.01												
9.5_4	09/25/09	09/25/09	7.0	20	10	12/3/2009	6435.0	25.2	20.1	69.3	93.0	0.4	1.4	-314.3	5.4	17.1	1.4
9.5_4	09/25/09	09/25/09	7.0	20	1	12/3/2009	3257.0	31.7	19.8	69.0	95.0	0.0	0.4	-401.5	5.2	16.1	0.9
9.5_4	09/25/09	09/25/09	7.0	20	0.1	12/3/2009	1506.0	34.2	19.9	69.0	95.0	0.0	0.6	-367.1	5.3	13.0	0.5
9.5_4	09/25/09	09/25/09	7.0	20	0.01	12/3/2009	790.8	29.9	19.9	69.0	89.0	0.0	0.6	-94.0	3.5	10.5	1.0
9.5_4	09/25/09	09/25/09	7.0	40	10	12/7/2009	1547.0	33.5	38.3	69.1	87.0	0.4	2.5	-121.1	3.9	1.6	0.5
9.5_4	09/25/09	09/25/09	7.0	40	1	12/7/2009	773.3	28.2	39.2	69.0	90.0	0.1	0.5	-29.1	2.7	3.3	0.9
9.5_4	09/25/09	09/25/09	7.0	40	0.1	12/7/2009	528.0	20.5	40.1	69.0	89.0	0.0	0.5	-42.0	3.4	3.8	1.4
9.5_4	09/25/09	09/25/09	7.0	40	0.01	12/7/2009	440.9	13.5	40.1	69.0	94.0	0.0	0.6	-7.2	3.5	4.0	1.2
9.5_7	09/25/09	09/25/09	6.9	4	10												
9.5_7	09/25/09	09/25/09	6.9	4	1												
9.5_7	09/25/09	09/25/09	6.9	4	0.1												
9.5_7	09/25/09	09/25/09	6.9	4	0.01												
9.5_7	09/25/09	09/25/09	6.9	20	10	12/3/2009	6278.0	25.6	20.2	69.4	93.0	0.4	1.5	-304.0	5.3	2.5	1.1
9.5_7	09/25/09	09/25/09	6.9	20	1	12/3/2009	3148.0	31.8	19.9	69.0	96.0	0.0	0.4	-379.0	4.9	4.6	1.0
9.5_7	09/25/09	09/25/09	6.9	20	0.1	12/3/2009	1439.0	33.9	19.9	69.0	96.0	0.0	0.6	-368.2	4.4	6.4	0.7
9.5_7	09/25/09	09/25/09	6.9	20	0.01	12/3/2009	710.2	29.9	20.0	69.0	95.0	0.1	0.6	-124.6	2.8	9.3	0.6
9.5_7	09/25/09	09/25/09	6.9	40	10	12/8/2009	1489.0	32.2	39.9	69.0	93.0	0.1	2.3	-52.3	3.1	1.6	1.0
9.5_7	09/25/09	09/25/09	6.9	40	1	12/8/2009	731.1	25.8	39.6	69.0	94.0	0.0	0.5	-9.2	2.0	2.2	0.7
9.5_7	09/25/09	09/25/09	6.9	40	0.1	12/8/2009	496.2	17.8	39.8	69.0	95.0	-0.1	0.5	-7.8	3.1	2.6	0.6
9.5_7	09/25/09	09/25/09	6.9	40	0.01	12/8/2009	408.9	11.7	40.0	69.0	99.0	0.0	0.6	-0.6	3.1	2.7	0.7

Table C7. Lab 4 prefabricated core unconfined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_4	10/13/09	10/13/09	7.0	4	10	3/11/2010	15689.0	12.5	4.1	1.6	91.0	0.2	2.3	-63.4	2.4	8.7	0.2
9.5_4	10/13/09	10/13/09	7.0	4	1	3/11/2010	10993.0	17.2	4.1	1.6	95.0	0.2	0.8	-128.3	2.4	9.7	0.6
9.5_4	10/13/09	10/13/09	7.0	4	0.1	3/11/2010	6816.0	23.2	4.1	1.6	97.0	-0.1	1.1	-203.8	3.5	9.7	0.5
9.5_4	10/13/09	10/13/09	7.0	4	0.01	3/11/2010	3829.0	28.0	3.9	1.6	92.0	0.2	0.8	-175.9	2.8	8.6	0.4
9.5_4	10/13/09	10/13/09	7.0	20	10	3/15/2010	6769.0	24.1	20.2	1.5	92.0	0.2	4.2	-220.5	10.2	8.7	0.5
9.5_4	10/13/09	10/13/09	7.0	20	1	3/15/2010	3506.0	29.6	20.3	1.5	91.0	-0.4	1.7	-208.3	5.1	7.5	0.3
9.5_4	10/13/09	10/13/09	7.0	20	0.1	3/15/2010	1486.0	33.0	20.2	1.5	94.0	-0.7	2.6	-111.8	2.9	7.6	0.1
9.5_4	10/13/09	10/13/09	7.0	20	0.01	3/15/2010	535.6	33.1	20.4	1.5	110.0	0.1	3.7	-19.0	3.3	6.8	0.8
9.5_4	10/13/09	10/13/09	7.0	40	10	3/19/2010	1246.0	37.1	39.8	1.0	89.0	-2.3	12.5	-236.7	15.5	16.1	0.6
9.5_4	10/13/09	10/13/09	7.0	40	1	3/19/2010	406.2	36.6	40.0	1.0	102.0	0.8	14.3	-68.3	14.3	14.7	1.2
9.5_4	10/13/09	10/13/09	7.0	40	0.1	3/19/2010	139.8	31.2	40.2	1.0	92.0	-0.4	24.1	23.8	8.0	11.5	1.9
9.5_4	10/13/09	10/13/09	7.0	40	0.01	3/19/2010	63.1	21.9	40.1	1.0	99.0	1.4	37.5	134.7	8.4	7.3	1.7
9.5_5	10/13/09	10/13/09	7.2	4	10	3/11/2010	15828.0	12.2	4.2	1.6	91.0	0.2	2.1	-64.4	2.8	7.5	0.7
9.5_5	10/13/09	10/13/09	7.2	4	1	3/11/2010	11110.0	17.0	4.2	1.6	94.0	0.1	0.8	-124.9	2.4	8.0	0.9
9.5_5	10/13/09	10/13/09	7.2	4	0.1	3/11/2010	6849.0	23.2	4.2	1.5	97.0	0.0	1.0	-214.1	3.4	8.0	0.6
9.5_5	10/13/09	10/13/09	7.2	4	0.01	3/11/2010	3655.0	29.0	4.0	1.5	95.0	0.0	0.8	-210.0	3.1	8.5	0.3
9.5_5	10/13/09	10/13/09	7.2	20	10	3/15/2010	6296.0	25.3	20.2	1.4	92.0	0.3	4.4	-265.5	6.0	12.4	0.3
9.5_5	10/13/09	10/13/09	7.2	20	1	3/15/2010	3146.0	31.8	20.1	1.4	91.0	0.0	1.8	-310.0	5.4	11.2	0.3
9.5_5	10/13/09	10/13/09	7.2	20	0.1	3/15/2010	1321.0	35.7	20.1	1.4	92.0	-0.4	3.3	-208.4	4.0	10.2	0.3
9.5_5	10/13/09	10/13/09	7.2	20	0.01	3/15/2010	490.7	34.3	20.1	1.4	105.0	0.0	4.5	-7.2	3.2	8.3	0.5
9.5_5	10/13/09	10/13/09	7.2	40	10	3/19/2010	1251.0	37.8	39.7	1.0	88.0	-2.1	11.7	-300.2	11.2	2.7	0.8
9.5_5	10/13/09	10/13/09	7.2	40	1	3/19/2010	395.0	37.4	39.7	1.0	103.0	-0.3	13.4	-81.9	9.3	1.9	1.3
9.5_5	10/13/09	10/13/09	7.2	40	0.1	3/19/2010	132.9	31.9	39.7	1.1	92.0	-0.7	22.2	33.4	7.2	2.5	1.0
9.5_5	10/13/09	10/13/09	7.2	40	0.01	3/19/2010	60.3	24.6	39.7	1.0	100.0	4.2	38.7	173.5	8.1	5.1	1.2
9.5_7	10/13/09	10/13/09	7.0	4	10	3/11/2010	16108.0	12.2	4.1	1.5	91.0	0.2	2.3	-65.3	3.0	5.2	0.8
9.5_7	10/13/09	10/13/09	7.0	4	1	3/11/2010	11208.0	17.1	4.1	1.6	95.0	0.1	0.8	-123.9	2.6	5.7	0.8
9.5_7	10/13/09	10/13/09	7.0	4	0.1	3/11/2010	6903.0	23.1	4.2	1.6	97.0	0.1	1.1	-209.2	3.6	6.9	0.6
9.5_7	10/13/09	10/13/09	7.0	4	0.01	3/11/2010	3678.0	28.7	4.3	1.5	96.0	0.0	0.8	-184.5	2.5	7.7	0.1
9.5_7	10/13/09	10/13/09	7.0	20	10	3/15/2010	6764.0	24.8	20.6	70.0	93.0	0.3	4.0	-254.9	5.8	16.4	0.4
9.5_7	10/13/09	10/13/09	7.0	20	1	3/15/2010	3408.0	31.2	20.3	69.0	91.0	1.0	2.0	-285.4	5.5	15.7	0.9
9.5_7	10/13/09	10/13/09	7.0	20	0.1	3/15/2010	1456.0	34.3	19.8	69.0	92.0	-1.1	3.1	-161.8	3.8	14.2	1.4
9.5_7	10/13/09	10/13/09	7.0	20	0.01	3/15/2010	581.4	32.8	19.9	69.0	102.0	-0.5	4.1	-10.2	3.3	11.6	1.8
9.5_7	10/13/09	10/13/09	7.0	40	10	3/19/2010	1177.0	37.8	39.7	1.0	92.0	-2.2	12.2	-216.8	14.3	4.7	0.5
9.5_7	10/13/09	10/13/09	7.0	40	1	3/19/2010	365.8	37.0	39.8	1.0	105.0	1.1	12.6	-44.4	13.0	3.5	0.4
9.5_7	10/13/09	10/13/09	7.0	40	0.1	3/19/2010	120.7	31.9	39.8	1.0	94.0	-0.5	22.1	36.5	7.3	1.3	0.5
9.5_7	10/13/09	10/13/09	7.0	40	0.01	3/19/2010	56.4	21.6	39.8	1.0	92.0	-4.9	44.7	89.4	8.1	3.3	0.8

Table C8. Lab 4 prefabricated core confined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_4	10/13/09	10/13/09	7.0	4	10	[redacted]											
9.5_4	10/13/09	10/13/09	7.0	4	1	[redacted]											
9.5_4	10/13/09	10/13/09	7.0	4	0.1	[redacted]											
9.5_4	10/13/09	10/13/09	7.0	4	0.01	[redacted]											
9.5_4	10/13/09	10/13/09	7.0	20	10	3/4/2010	6860.0	24.8	19.6	69.0	95.0	0.4	3.0	-278.7	4.9	7.2	0.2
9.5_4	10/13/09	10/13/09	7.0	20	1	3/4/2010	3453.0	31.8	19.7	69.0	93.0	-0.5	1.9	-402.6	5.5	6.4	0.4
9.5_4	10/13/09	10/13/09	7.0	20	0.1	3/4/2010	1550.0	35.0	20.0	69.0	91.0	0.0	3.1	-394.3	5.5	5.2	0.7
9.5_4	10/13/09	10/13/09	7.0	20	0.01	3/4/2010	763.5	31.0	20.0	69.0	85.0	-0.1	2.5	-178.1	5.5	2.9	0.5
9.5_4	10/13/09	10/13/09	7.0	40	10	3/22/2010	1525.0	32.7	39.6	69.0	98.0	1.3	6.1	-155.4	6.1	13.4	0.1
9.5_4	10/13/09	10/13/09	7.0	40	1	3/22/2010	755.1	26.4	39.9	69.0	94.0	-1.2	11.1	-53.3	6.8	13.3	0.4
9.5_4	10/13/09	10/13/09	7.0	40	0.1	3/22/2010	494.8	17.9	40.5	69.0	98.0	-0.3	7.2	-43.1	4.2	13.1	0.4
9.5_4	10/13/09	10/13/09	7.0	40	0.01	3/22/2010	414.8	11.1	39.9	69.0	96.0	0.9	3.3	-19.9	6.3	13.7	0.7
9.5_5	10/13/09	10/13/09	7.2	4	10	[redacted]											
9.5_5	10/13/09	10/13/09	7.2	4	1	[redacted]											
9.5_5	10/13/09	10/13/09	7.2	4	0.1	[redacted]											
9.5_5	10/13/09	10/13/09	7.2	4	0.01	[redacted]											
9.5_5	10/13/09	10/13/09	7.2	20	10	3/4/2010	6860.0	24.8	19.6	69.0	95.0	0.4	3.0	-278.7	4.9	7.2	0.2
9.5_5	10/13/09	10/13/09	7.2	20	1	3/4/2010	3453.0	31.8	19.7	69.0	93.0	-0.5	1.9	-402.6	5.5	6.4	0.4
9.5_5	10/13/09	10/13/09	7.2	20	0.1	3/4/2010	1550.0	35.0	20.0	69.0	91.0	0.0	3.1	-394.3	5.5	5.2	0.7
9.5_5	10/13/09	10/13/09	7.2	20	0.01	3/4/2010	763.5	31.0	20.0	69.0	85.0	-0.1	2.5	-178.1	5.5	2.9	0.5
9.5_5	10/13/09	10/13/09	7.2	40	10	3/22/2010	1394.0	31.4	39.7	69.0	94.0	0.7	6.4	-107.2	5.5	16.4	0.6
9.5_5	10/13/09	10/13/09	7.2	40	1	3/22/2010	694.9	24.9	39.8	69.0	99.0	1.6	4.3	-36.4	3.9	14.3	0.6
9.5_5	10/13/09	10/13/09	7.2	40	0.1	3/22/2010	470.7	16.8	39.7	69.0	98.0	0.2	5.5	-31.8	3.6	12.6	0.5
9.5_5	10/13/09	10/13/09	7.2	40	0.01	3/22/2010	398.9	10.7	40.1	69.0	96.0	0.1	3.6	-26.7	3.3	11.9	0.3
9.5_7	10/13/09	10/13/09	7.0	4	10	[redacted]											
9.5_7	10/13/09	10/13/09	7.0	4	1	[redacted]											
9.5_7	10/13/09	10/13/09	7.0	4	0.1	[redacted]											
9.5_7	10/13/09	10/13/09	7.0	4	0.01	[redacted]											
9.5_7	10/13/09	10/13/09	7.0	20	10	3/4/2010	6466.0	25.9	20.3	69.1	94.0	0.5	3.7	-290.0	6.0	11.9	0.3
9.5_7	10/13/09	10/13/09	7.0	20	1	3/4/2010	3186.0	32.3	20.2	69.0	92.0	0.7	2.1	-379.6	5.1	12.7	0.5
9.5_7	10/13/09	10/13/09	7.0	20	0.1	3/4/2010	1411.0	34.5	20.1	69.0	91.0	-0.7	3.2	-282.6	4.6	12.6	1.0
9.5_7	10/13/09	10/13/09	7.0	20	0.01	3/4/2010	728.1	30.2	20.0	69.0	84.0	0.3	3.0	-63.6	2.7	13.1	1.0
9.5_7	10/13/09	10/13/09	7.0	40	10	3/22/2010	1486.0	32.5	39.5	69.0	91.0	1.1	6.1	-147.3	5.8	13.4	0.8
9.5_7	10/13/09	10/13/09	7.0	40	1	3/22/2010	730.0	26.0	39.5	69.0	99.0	0.3	3.7	-45.9	3.4	13.3	0.8
9.5_7	10/13/09	10/13/09	7.0	40	0.1	3/22/2010	487.5	17.6	40.0	69.0	98.0	0.1	4.9	-30.1	3.4	11.9	0.7
9.5_7	10/13/09	10/13/09	7.0	40	0.01	3/22/2010	410.1	11.1	39.8	69.0	95.0	0.4	3.2	-27.2	3.3	10.1	0.5

Table C9. Lab 5 prefabricated core unconfined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_3	12/03/09	12/03/09	7.0	4	10	2/16/2010	14529.0	13.9	4.0	0.8	95.0	-0.3	1.6	-92.7	2.6	2.3	0.3
9.5_3	12/03/09	12/03/09	7.0	4	1	2/16/2010	9774.0	19.0	4.0	0.8	98.0	0.1	0.4	-153.7	2.6	2.7	0.2
9.5_3	12/03/09	12/03/09	7.0	4	0.1	2/16/2010	5868.0	24.9	4.0	0.8	96.0	0.0	0.2	-235.2	3.6	2.1	0.4
9.5_3	12/03/09	12/03/09	7.0	4	0.01	2/16/2010	3571.0	28.4	3.9	0.8	84.0	0.0	0.4	-191.3	3.4	2.1	0.5
9.5_3	12/03/09	12/03/09	7.0	20	10	2/17/2010	6802.0	24.0	19.9	0.3	92.0	0.2	2.1	-263.6	6.5	21.0	0.2
9.5_3	12/03/09	12/03/09	7.0	20	1	2/17/2010	3598.0	29.5	20.0	0.3	92.0	0.3	0.6	-253.7	4.6	19.9	0.2
9.5_3	12/03/09	12/03/09	7.0	20	0.1	2/17/2010	1616.0	32.3	20.0	0.4	91.0	0.0	0.3	-200.6	3.4	20.0	0.3
9.5_3	12/03/09	12/03/09	7.0	20	0.01	2/17/2010	679.6	31.0	20.0	0.5	102.0	0.0	0.5	-116.7	3.7	21.7	0.4
9.5_3	12/03/09	12/03/09	7.0	40	10	2/23/2010	1292.0	35.2	40.4	0.2	86.0	0.9	5.4	-108.2	6.5	4.5	0.9
9.5_3	12/03/09	12/03/09	7.0	40	1	2/23/2010	434.3	32.7	40.4	0.2	98.0	0.1	2.4	-16.1	4.2	4.8	1.3
9.5_3	12/03/09	12/03/09	7.0	40	0.1	2/23/2010	188.0	24.5	40.4	0.2	94.0	0.4	2.2	-21.5	4.7	5.7	1.9
9.5_3	12/03/09	12/03/09	7.0	40	0.01	2/23/2010	129.0	14.0	39.9	0.2	95.0	0.1	1.1	-57.8	7.1	13.8	2.5
9.5_4	12/03/09	12/03/09	7.1	4	10	2/16/2010	15683.0	12.4	4.1	0.7	93.0	0.0	1.8	-72.8	2.5	16.1	0.4
9.5_4	12/03/09	12/03/09	7.1	4	1	2/16/2010	11029.0	16.8	4.1	0.7	97.0	0.1	0.4	-123.7	2.3	15.2	0.2
9.5_4	12/03/09	12/03/09	7.1	4	0.1	2/16/2010	6885.0	22.9	4.0	0.7	98.0	0.0	0.2	-219.9	3.1	13.5	0.4
9.5_4	12/03/09	12/03/09	7.1	4	0.01	2/16/2010	3798.0	28.5	4.1	0.7	94.0	0.0	0.4	-252.0	2.9	11.4	0.5
9.5_4	12/03/09	12/03/09	7.1	20	10	2/17/2010	6778.0	24.0	20.1	0.8	92.0	0.4	2.1	-267.1	6.3	9.2	0.3
9.5_4	12/03/09	12/03/09	7.1	20	1	2/17/2010	3559.0	29.5	20.1	0.8	93.0	0.1	0.6	-247.4	4.6	8.8	0.6
9.5_4	12/03/09	12/03/09	7.1	20	0.1	2/17/2010	1588.0	32.0	19.9	0.7	92.0	0.1	0.3	-181.3	3.2	8.8	0.9
9.5_4	12/03/09	12/03/09	7.1	20	0.01	2/17/2010	649.0	30.7	19.9	0.7	104.0	0.0	0.5	-110.8	3.9	8.7	1.2
9.5_4	12/03/09	12/03/09	7.1	40	10	2/23/2010	1402.0	34.6	39.8	0.3	84.0	1.0	5.8	-247.7	6.8	8.9	0.7
9.5_4	12/03/09	12/03/09	7.1	40	1	2/23/2010	517.8	31.4	39.9	0.3	96.0	0.2	2.3	-98.2	4.9	4.3	0.9
9.5_4	12/03/09	12/03/09	7.1	40	0.1	2/23/2010	222.8	24.2	40.0	0.2	93.0	0.6	2.0	-84.6	5.6	1.8	1.4
9.5_4	12/03/09	12/03/09	7.1	40	0.01	2/23/2010	143.4	14.7	39.6	0.3	99.0	0.0	1.1	-152.1	7.8	4.8	1.6
9.5_9	12/03/09	12/03/09	7.2	4	10	2/16/2010	14710.0	13.4	4.0	0.8	88.0	0.2	1.5	-88.9	3.0	22.4	0.4
9.5_9	12/03/09	12/03/09	7.2	4	1	2/16/2010	9944.0	18.8	4.0	0.8	98.0	0.1	0.5	-165.6	2.9	16.2	0.8
9.5_9	12/03/09	12/03/09	7.2	4	0.1	2/16/2010	5811.0	25.6	3.9	0.8	98.0	0.0	0.2	-288.9	4.4	11.1	1.2
9.5_9	12/03/09	12/03/09	7.2	4	0.01	2/16/2010	3034.0	31.3	3.9	0.7	91.0	0.0	0.4	-310.1	3.7	7.7	1.8
9.5_9	12/03/09	12/03/09	7.2	20	10	2/17/2010	5298.0	28.8	19.9	0.6	96.0	0.4	2.4	-464.9	7.7	1.5	1.4
9.5_9	12/03/09	12/03/09	7.2	20	1	2/17/2010	2428.0	35.9	19.9	0.6	92.0	0.2	0.8	-531.0	7.6	2.6	2.9
9.5_9	12/03/09	12/03/09	7.2	20	0.1	2/17/2010	982.5	37.9	19.9	0.6	87.0	0.1	0.6	-484.5	8.2	2.9	3.7
9.5_9	12/03/09	12/03/09	7.2	20	0.01	2/17/2010	434.6	32.7	19.9	0.6	91.0	0.0	0.6	-217.9	5.3	4.6	2.7
9.5_9	12/03/09	12/03/09	7.2	40	10	2/23/2010	1209.0	36.7	39.9	0.2	84.0	1.7	5.9	-340.9	7.6	4.2	2.8
9.5_9	12/03/09	12/03/09	7.2	40	1	2/23/2010	426.4	32.2	39.9	0.2	98.0	0.4	2.4	-162.0	5.1	3.9	2.5
9.5_9	12/03/09	12/03/09	7.2	40	0.1	2/23/2010	191.1	22.5	39.9	0.3	94.0	0.8	2.2	-124.6	5.9	10.0	3.3
9.5_9	12/03/09	12/03/09	7.2	40	0.01	2/23/2010	133.6	11.7	39.3	0.3	99.0	-0.3	1.1	-188.1	7.6	22.4	6.0

Table C10. Lab 5 prefabricated core confined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_3	12/03/09	12/03/09	7.0	4	10	[redacted]											
9.5_3	12/03/09	12/03/09	7.0	4	1												
9.5_3	12/03/09	12/03/09	7.0	4	0.1												
9.5_3	12/03/09	12/03/09	7.0	4	0.01												
9.5_3	12/03/09	12/03/09	7.0	20	10	3/30/2010	6944.0	24.2	20.4	69.0	95.0	0.2	1.9	-276.6	6.2	4.3	0.3
9.5_3	12/03/09	12/03/09	7.0	20	1	3/30/2010	3647.0	29.2	20.2	69.0	93.0	0.0	0.6	-243.2	5.3	5.1	0.4
9.5_3	12/03/09	12/03/09	7.0	20	0.1	3/30/2010	1653.0	30.9	20.1	69.0	92.0	0.0	0.3	-151.7	3.9	5.2	0.7
9.5_3	12/03/09	12/03/09	7.0	20	0.01	3/30/2010	722.8	28.2	20.0	69.0	102.0	0.0	0.5	-42.9	4.0	5.5	0.8
9.5_3	12/03/09	12/03/09	7.0	40	10	3/31/2010	1945.0	31.8	40.3	69.0	89.0	0.5	3.8	-143.7	6.0	11.0	0.5
9.5_3	12/03/09	12/03/09	7.0	40	1	3/31/2010	759.6	29.8	40.3	69.0	97.0	0.1	1.1	-58.2	3.2	10.0	1.3
9.5_3	12/03/09	12/03/09	7.0	40	0.1	3/31/2010	328.8	23.6	40.0	69.0	94.0	0.3	0.8	-72.0	5.0	12.5	2.3
9.5_3	12/03/09	12/03/09	7.0	40	0.01	3/31/2010	217.3	11.5	40.2	69.0	100.0	-0.1	0.8	-158.7	8.9	15.2	4.2
9.5_4	12/03/09	12/03/09	7.1	4	10	[redacted]											
9.5_4	12/03/09	12/03/09	7.1	4	1												
9.5_4	12/03/09	12/03/09	7.1	4	0.1												
9.5_4	12/03/09	12/03/09	7.1	4	0.01												
9.5_4	12/03/09	12/03/09	7.1	20	10	3/30/2010	6996.0	23.8	20.3	69.0	94.0	0.3	2.0	-276.8	5.9	10.2	0.3
9.5_4	12/03/09	12/03/09	7.1	20	1	3/30/2010	3720.0	29.4	20.0	69.0	93.0	0.2	0.6	-288.3	5.3	9.9	0.6
9.5_4	12/03/09	12/03/09	7.1	20	0.1	3/30/2010	1719.0	31.9	20.0	69.0	91.0	0.0	0.3	-234.5	4.5	9.3	1.0
9.5_4	12/03/09	12/03/09	7.1	20	0.01	3/30/2010	755.0	29.3	19.9	69.0	99.0	0.0	0.5	-95.7	4.1	8.5	1.0
9.5_4	12/03/09	12/03/09	7.1	40	10	3/31/2010	1756.0	34.2	40.4	69.0	80.0	0.8	7.3	-300.1	11.4	21.1	1.5
9.5_4	12/03/09	12/03/09	7.1	40	1	3/31/2010	662.1	30.8	40.5	69.0	95.0	0.2	2.1	-109.7	8.1	53.4	0.1
9.5_4	12/03/09	12/03/09	7.1	40	0.1	3/31/2010	286.5	29.5	40.2	69.0	93.0	0.2	0.8	173.3	48.6	68.8	7.3
9.5_4	12/03/09	12/03/09	7.1	40	0.01	3/31/2010	185.0	14.8	40.3	69.0	99.0	0.0	0.9	-154.7	7.6	69.9	1.0
9.5_9	12/03/09	12/03/09	7.2	4	10	[redacted]											
9.5_9	12/03/09	12/03/09	7.2	4	1												
9.5_9	12/03/09	12/03/09	7.2	4	0.1												
9.5_9	12/03/09	12/03/09	7.2	4	0.01												
9.5_9	12/03/09	12/03/09	7.2	20	10	3/30/2010	6008.0	25.7	20.3	69.0	92.0	0.1	3.2	-323.3	7.1	19.8	1.2
9.5_9	12/03/09	12/03/09	7.2	20	1	3/30/2010	2950.0	32.0	20.0	69.0	95.0	0.3	1.3	-299.0	7.4	17.8	1.1
9.5_9	12/03/09	12/03/09	7.2	20	0.1	3/30/2010	1243.0	34.2	20.0	69.0	93.0	0.0	0.4	-198.7	7.8	21.2	3.2
9.5_9	12/03/09	12/03/09	7.2	20	0.01	3/30/2010	507.5	30.9	19.9	69.0	103.0	0.0	0.6	-62.2	7.7	21.3	4.2
9.5_9	12/03/09	12/03/09	7.2	40	10	4/1/2010	1397.0	34.8	40.4	69.0	84.0	3.7	3.4	-271.3	13.1	18.5	4.7
9.5_9	12/03/09	12/03/09	7.2	40	1	4/1/2010	532.4	32.2	40.4	69.0	98.0	-0.1	0.9	-121.3	2.7	13.4	0.7
9.5_9	12/03/09	12/03/09	7.2	40	0.1	4/1/2010	235.5	25.2	40.1	69.0	93.0	-0.4	0.9	-171.4	4.4	12.4	0.9
9.5_9	12/03/09	12/03/09	7.2	40	0.01	4/1/2010	148.9	15.2	39.7	69.0	102.0	-0.1	1.0	-236.0	6.9	20.9	2.4

Table C11. Lab 6 prefabricated core unconfined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_3	11/10/09	11/10/09	7.2	4	10	2/8/2010	15679.0	12.5	3.8	0.3	97.0	0.3	1.2	-66.5	2.1	2.7	0.5
9.5_3	11/10/09	11/10/09	7.2	4	1	2/8/2010	10914.0	17.1	3.9	0.3	99.0	0.0	0.4	-118.0	2.0	3.2	0.6
9.5_3	11/10/09	11/10/09	7.2	4	0.1	2/8/2010	6720.0	23.0	3.9	0.3	103.0	0.0	0.3	-194.2	2.8	4.4	0.7
9.5_3	11/10/09	11/10/09	7.2	4	0.01	2/8/2010	3776.0	27.8	3.8	0.3	96.0	0.0	0.3	-165.3	1.8	5.6	0.6
9.5_3	11/10/09	11/10/09	7.2	20	10	2/9/2010	6663.0	24.3	20.0	0.2	94.0	0.4	2.4	-262.8	5.6	5.7	0.6
9.5_3	11/10/09	11/10/09	7.2	20	1	2/9/2010	3410.0	30.7	20.0	0.1	101.0	0.1	0.6	-355.4	9.7	6.1	0.8
9.5_3	11/10/09	11/10/09	7.2	20	0.1	2/9/2010	1359.0	34.4	20.0	0.3	109.0	0.0	0.2	-47.2	2.5	7.1	0.8
9.5_3	11/10/09	11/10/09	7.2	20	0.01	2/9/2010	507.6	33.3	19.9	0.3	112.0	0.0	0.4	-13.5	2.8	8.2	0.6
9.5_3	11/10/09	11/10/09	7.2	40	10	2/10/2010	1262.0	35.9	40.2	0.0	81.0	0.3	6.2	-266.0	10.1	6.3	0.7
9.5_3	11/10/09	11/10/09	7.2	40	1	2/10/2010	452.7	32.0	40.2	0.0	100.0	0.3	2.4	-58.3	4.5	5.8	0.6
9.5_3	11/10/09	11/10/09	7.2	40	0.1	2/10/2010	193.4	24.0	39.9	0.0	100.0	0.0	0.7	-29.8	5.0	7.0	0.8
9.5_3	11/10/09	11/10/09	7.2	40	0.01	2/10/2010	125.0	14.3	40.0	0.0	101.0	0.2	0.9	-59.7	6.7	11.6	1.4
9.5_4	11/10/09	11/10/09	7.4	4	10	2/8/2010	15578.0	12.2	3.8	0.3	95.0	0.3	1.2	-64.3	2.1	8.9	0.1
9.5_4	11/10/09	11/10/09	7.4	4	1	2/8/2010	10948.0	16.8	3.8	0.3	97.0	0.0	0.4	-116.3	2.1	8.2	0.1
9.5_4	11/10/09	11/10/09	7.4	4	0.1	2/8/2010	6818.0	22.6	3.8	0.3	101.0	0.0	0.3	-200.4	2.9	6.3	0.2
9.5_4	11/10/09	11/10/09	7.4	4	0.01	2/8/2010	3893.0	27.4	3.8	0.4	96.0	0.0	0.3	-186.0	2.4	4.8	0.4
9.5_4	11/10/09	11/10/09	7.4	20	10	2/9/2010	6339.0	24.9	20.0	0.3	93.0	0.5	2.6	-272.3	5.7	1.6	0.4
9.5_4	11/10/09	11/10/09	7.4	20	1	2/9/2010	3230.0	30.7	20.0	0.2	93.0	0.1	0.7	-279.7	4.7	0.5	0.4
9.5_4	11/10/09	11/10/09	7.4	20	0.1	2/9/2010	1424.0	33.2	19.9	0.2	99.0	0.0	0.2	-207.0	3.2	1.4	0.3
9.5_4	11/10/09	11/10/09	7.4	20	0.01	2/9/2010	584.9	31.4	19.9	0.2	109.0	0.0	0.4	-64.9	3.3	3.2	0.1
9.5_4	11/10/09	11/10/09	7.4	40	10	2/10/2010	1269.0	34.9	40.0	0.1	79.0	0.3	6.0	-216.4	8.3	4.1	0.3
9.5_4	11/10/09	11/10/09	7.4	40	1	2/10/2010	462.2	31.4	40.0	0.0	99.0	0.3	2.1	-78.4	4.7	5.7	0.4
9.5_4	11/10/09	11/10/09	7.4	40	0.1	2/10/2010	200.4	23.7	40.1	0.0	99.0	0.1	0.7	-70.6	5.6	7.5	0.7
9.5_4	11/10/09	11/10/09	7.4	40	0.01	2/10/2010	134.7	14.0	40.0	0.0	99.0	0.1	0.8	-168.4	7.4	12.2	0.7
9.5_8	11/10/09	11/10/09	7.0	4	10	2/8/2010	16036.0	12.3	3.9	0.4	96.0	0.2	1.4	-65.1	2.3	9.7	0.1
9.5_8	11/10/09	11/10/09	7.0	4	1	2/8/2010	11209.0	16.8	3.9	0.4	99.0	0.1	0.4	-115.7	2.2	9.1	0.1
9.5_8	11/10/09	11/10/09	7.0	4	0.1	2/8/2010	6999.0	22.6	3.9	0.3	103.0	0.0	0.3	-193.9	3.0	8.4	0.2
9.5_8	11/10/09	11/10/09	7.0	4	0.01	2/8/2010	4038.0	27.2	3.8	0.4	96.0	0.0	0.3	-171.1	2.4	8.5	0.3
9.5_8	11/10/09	11/10/09	7.0	20	10	2/9/2010	6464.0	24.9	20.0	0.3	94.0	0.4	2.7	-273.2	5.9	3.5	0.5
9.5_8	11/10/09	11/10/09	7.0	20	1	2/9/2010	3312.0	30.8	20.1	0.3	94.0	0.1	0.7	-285.3	4.8	4.7	0.5
9.5_8	11/10/09	11/10/09	7.0	20	0.1	2/9/2010	1463.0	33.6	19.9	0.2	99.0	0.0	0.2	-214.4	3.4	6.4	0.4
9.5_8	11/10/09	11/10/09	7.0	20	0.01	2/9/2010	597.7	32.1	19.9	0.2	108.0	0.0	0.5	-66.7	3.1	7.7	0.7
9.5_8	11/10/09	11/10/09	7.0	40	10	2/10/2010	1368.0	34.8	40.1	0.0	81.0	0.1	6.3	-236.6	8.8	7.5	0.3
9.5_8	11/10/09	11/10/09	7.0	40	1	2/10/2010	494.8	31.7	40.1	0.0	100.0	0.2	2.6	-69.1	4.9	11.7	0.7
9.5_8	11/10/09	11/10/09	7.0	40	0.1	2/10/2010	208.4	24.3	40.0	0.0	100.0	0.1	0.6	-68.3	5.2	12.9	1.1
9.5_8	11/10/09	11/10/09	7.0	40	0.01	2/10/2010	133.6	14.7	40.0	0.0	101.0	0.0	0.8	-164.8	7.3	10.6	1.3

Table C12. Lab 6 prefabricated core confined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_3	11/10/09	11/10/09	7.2	4	10	[redacted]											
9.5_3	11/10/09	11/10/09	7.2	4	1	[redacted]											
9.5_3	11/10/09	11/10/09	7.2	4	0.1	[redacted]											
9.5_3	11/10/09	11/10/09	7.2	4	0.01	[redacted]											
9.5_3	11/10/09	11/10/09	7.2	20	10	2/3/2010	6300.0	25.0	20.2	69.0	95.0	0.6	1.7	-303.9	5.8	13.8	0.5
9.5_3	11/10/09	11/10/09	7.2	20	1	2/3/2010	3225.0	31.4	19.9	69.0	94.0	0.1	0.4	-342.7	5.0	12.8	0.7
9.5_3	11/10/09	11/10/09	7.2	20	0.1	2/3/2010	1496.0	33.8	19.8	69.0	97.0	0.0	0.3	-287.8	4.5	12.9	0.9
9.5_3	11/10/09	11/10/09	7.2	20	0.01	2/3/2010	782.5	29.8	19.8	69.0	90.0	0.0	0.4	-58.3	2.7	14.7	0.7
9.5_3	11/10/09	11/10/09	7.2	40	10	2/3/2010	1400.0	34.5	40.5	69.0	88.0	1.0	3.2	-319.2	8.8	9.3	1.1
9.5_3	11/10/09	11/10/09	7.2	40	1	2/3/2010	702.6	27.7	40.5	69.0	94.0	0.1	0.8	-104.4	2.9	10.8	0.8
9.5_3	11/10/09	11/10/09	7.2	40	0.1	2/3/2010	472.1	20.1	40.3	69.0	94.0	0.1	0.5	-60.2	2.9	10.6	0.5
9.5_3	11/10/09	11/10/09	7.2	40	0.01	2/3/2010	395.3	13.0	40.1	69.0	94.0	0.1	0.5	-29.2	2.9	10.1	0.5
9.5_4	11/10/09	11/10/09	7.4	4	10	[redacted]											
9.5_4	11/10/09	11/10/09	7.4	4	1	[redacted]											
9.5_4	11/10/09	11/10/09	7.4	4	0.1	[redacted]											
9.5_4	11/10/09	11/10/09	7.4	4	0.01	[redacted]											
9.5_4	11/10/09	11/10/09	7.4	20	10	2/3/2010	6253.0	25.2	20.1	69.0	95.0	0.5	1.9	-289.1	5.1	7.6	0.3
9.5_4	11/10/09	11/10/09	7.4	20	1	2/3/2010	3165.0	31.6	19.9	69.0	94.0	0.1	0.4	-369.1	4.7	8.5	0.4
9.5_4	11/10/09	11/10/09	7.4	20	0.1	2/3/2010	1477.0	34.3	19.7	69.0	96.0	0.0	0.3	-381.7	5.6	9.3	0.6
9.5_4	11/10/09	11/10/09	7.4	20	0.01	2/3/2010	799.4	30.1	19.8	69.0	87.0	0.0	0.4	-147.0	3.6	9.9	0.2
9.5_4	11/10/09	11/10/09	7.4	40	10	2/3/2010	1466.0	33.3	40.5	69.0	90.0	1.0	3.4	-311.4	8.2	9.3	0.5
9.5_4	11/10/09	11/10/09	7.4	40	1	2/3/2010	738.9	26.4	40.5	69.0	97.0	0.0	0.8	-101.9	2.8	10.1	0.4
9.5_4	11/10/09	11/10/09	7.4	40	0.1	2/3/2010	491.3	18.9	40.4	69.0	100.0	0.0	0.4	-73.1	2.9	10.6	0.8
9.5_4	11/10/09	11/10/09	7.4	40	0.01	2/3/2010	411.9	13.1	40.2	69.0	96.0	-0.1	0.5	-53.8	3.1	10.4	1.1
9.5_8	11/10/09	11/10/09	7.0	4	10	[redacted]											
9.5_8	11/10/09	11/10/09	7.0	4	1	[redacted]											
9.5_8	11/10/09	11/10/09	7.0	4	0.1	[redacted]											
9.5_8	11/10/09	11/10/09	7.0	4	0.01	[redacted]											
9.5_8	11/10/09	11/10/09	7.0	20	10	2/3/2010	6408.0	25.0	20.0	69.0	95.0	0.4	2.0	-285.8	5.0	22.6	0.7
9.5_8	11/10/09	11/10/09	7.0	20	1	2/3/2010	3271.0	31.6	19.9	69.0	95.0	0.0	0.4	-369.4	4.7	17.6	1.1
9.5_8	11/10/09	11/10/09	7.0	20	0.1	2/3/2010	1526.0	34.4	19.7	69.0	96.0	0.0	0.2	-378.5	5.5	10.9	1.5
9.5_8	11/10/09	11/10/09	7.0	20	0.01	2/3/2010	833.1	30.4	19.8	69.0	87.0	0.1	0.4	-187.2	4.3	5.4	1.4
9.5_8	11/10/09	11/10/09	7.0	40	10	2/3/2010	1476.0	32.3	40.0	69.0	92.0	1.0	3.4	-264.0	7.5	4.5	0.4
9.5_8	11/10/09	11/10/09	7.0	40	1	2/3/2010	753.9	25.1	40.0	69.0	98.0	0.1	0.8	-74.3	2.5	4.9	0.5
9.5_8	11/10/09	11/10/09	7.0	40	0.1	2/3/2010	509.2	17.5	40.1	69.0	101.0	0.2	0.4	-52.8	2.6	4.6	0.4
9.5_8	11/10/09	11/10/09	7.0	40	0.01	2/3/2010	426.3	11.9	40.2	69.0	98.0	-0.1	0.5	-36.1	2.6	4.4	0.7

Table C13. Lab 7 prefabricated core unconfined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_5	01/12/10	01/12/10	7.3	4	10	3/1/2010	14681.0	12.8	4.0	1.6	85.0	0.2	2.0	-80.6	2.6	4.1	0.3
9.5_5	01/12/10	01/12/10	7.3	4	1	3/1/2010	10122.0	17.7	4.0	1.6	96.0	0.0	0.5	-132.5	2.4	3.4	0.2
9.5_5	01/12/10	01/12/10	7.3	4	0.1	3/1/2010	6154.0	23.6	4.1	1.6	101.0	0.0	0.2	-200.4	3.2	3.8	0.2
9.5_5	01/12/10	01/12/10	7.3	4	0.01	3/1/2010	3340.0	28.0	4.0	1.6	98.0	0.0	0.4	-122.0	4.4	4.8	0.3
9.5_5	01/12/10	01/12/10	7.3	20	10	3/2/2010	5971.0	25.7	20.0	1.4	92.0	0.4	2.3	-293.9	6.6	5.4	0.2
9.5_5	01/12/10	01/12/10	7.3	20	1	3/2/2010	2969.0	31.4	20.0	1.4	93.0	0.0	0.5	-242.2	4.6	6.9	0.5
9.5_5	01/12/10	01/12/10	7.3	20	0.1	3/2/2010	1214.0	33.7	20.0	1.4	102.0	-0.1	0.3	-110.6	5.6	8.4	1.4
9.5_5	01/12/10	01/12/10	7.3	20	0.01	3/2/2010	455.6	33.8	19.8	1.6	113.0	0.0	0.5	81.5	4.0	10.1	0.7
9.5_5	01/12/10	01/12/10	7.3	40	10	3/16/2010	1149.0	36.9	40.1	1.6	91.0	-1.2	7.1	-168.3	7.3	0.5	0.4
9.5_5	01/12/10	01/12/10	7.3	40	1	3/16/2010	343.3	37.3	40.1	1.6	105.0	0.8	9.2	-38.0	8.0	1.7	0.6
9.5_5	01/12/10	01/12/10	7.3	40	0.1	3/16/2010	132.0	30.7	40.0	1.6	101.0	0.0	1.2	30.4	4.2	3.1	0.9
9.5_5	01/12/10	01/12/10	7.3	40	0.01	3/16/2010	65.2	24.5	40.0	1.6	106.0	-0.1	2.0	228.6	6.3	8.2	1.1
9.5_7	01/12/10	01/12/10	7.3	4	10	3/3/2010	15979.0	11.9	3.9	1.6	86.0	0.7	1.9	-70.4	2.4	6.7	0.3
9.5_7	01/12/10	01/12/10	7.3	4	1	3/3/2010	11291.0	16.5	3.9	1.6	96.0	0.0	0.5	-112.8	2.1	5.8	0.3
9.5_7	01/12/10	01/12/10	7.3	4	0.1	3/3/2010	7064.0	22.4	4.0	1.6	101.0	0.0	0.2	-185.1	2.8	5.7	0.3
9.5_7	01/12/10	01/12/10	7.3	4	0.01	3/3/2010	3860.0	27.6	4.0	1.6	99.0	0.0	0.4	-166.3	4.8	5.3	0.2
9.5_7	01/12/10	01/12/10	7.3	20	10	3/3/2010	6439.0	25.2	20.2	1.5	97.0	0.5	2.1	-295.8	6.7	7.3	0.3
9.5_7	01/12/10	01/12/10	7.3	20	1	3/3/2010	3239.0	30.9	20.2	1.5	92.0	0.0	0.5	-243.3	4.8	7.2	0.2
9.5_7	01/12/10	01/12/10	7.3	20	0.1	3/3/2010	1345.0	33.7	20.1	1.5	100.0	0.1	0.3	-127.7	2.8	7.9	0.2
9.5_7	01/12/10	01/12/10	7.3	20	0.01	3/3/2010	492.2	33.0	20.0	1.5	116.0	0.1	0.5	3.8	3.2	7.6	0.5
9.5_7	01/12/10	01/12/10	7.3	40	10	3/16/2010	1225.0	33.7	40.1	1.6	95.0	-0.2	4.8	-119.1	4.8	6.0	1.2
9.5_7	01/12/10	01/12/10	7.3	40	1	3/16/2010	489.7	28.7	40.1	1.5	97.0	0.1	1.0	-86.3	2.9	5.4	1.4
9.5_7	01/12/10	01/12/10	7.3	40	0.1	3/16/2010	274.0	20.9	40.0	1.5	97.0	0.0	0.6	-101.2	3.5	3.5	1.2
9.5_7	01/12/10	01/12/10	7.3	40	0.01	3/16/2010	192.8	15.5	40.0	1.5	100.0	-0.1	0.8	-31.5	3.6	4.8	1.0
9.5_9	01/12/10	01/12/10	7.2	4	10	3/4/2010	14915.0	12.9	4.3	1.6	85.0	0.3	1.9	-86.2	3.2	14.0	0.3
9.5_9	01/12/10	01/12/10	7.2	4	1	3/4/2010	10204.0	18.1	4.3	1.6	97.0	0.1	0.5	-148.6	2.8	11.0	0.5
9.5_9	01/12/10	01/12/10	7.2	4	0.1	3/4/2010	6144.0	24.3	4.1	1.6	101.0	0.0	0.2	-232.2	3.9	7.5	0.6
9.5_9	01/12/10	01/12/10	7.2	4	0.01	3/4/2010	3417.0	28.4	4.1	1.6	95.0	0.0	0.4	-149.3	2.4	5.6	0.6
9.5_9	01/12/10	01/12/10	7.2	20	10	3/8/2010	6818.0	24.6	20.0	1.7	93.0	0.5	2.1	-298.6	6.3	4.0	0.5
9.5_9	01/12/10	01/12/10	7.2	20	1	3/8/2010	3499.0	30.4	20.0	1.6	93.0	-0.1	0.5	-280.4	5.4	2.6	0.6
9.5_9	01/12/10	01/12/10	7.2	20	0.1	3/8/2010	1509.0	33.3	20.1	1.6	100.0	-0.1	0.3	-142.3	3.0	3.0	0.5
9.5_9	01/12/10	01/12/10	7.2	20	0.01	3/8/2010	533.6	33.3	20.0	1.6	121.0	0.0	0.6	64.5	5.3	5.1	0.8
9.5_9	01/12/10	01/12/10	7.2	40	10	3/16/2010	1226.0	37.0	40.0	1.7	90.0	-1.3	6.9	-185.7	7.4	11.7	1.3
9.5_9	01/12/10	01/12/10	7.2	40	1	3/16/2010	355.1	37.5	40.0	1.6	106.0	0.8	9.0	-43.7	7.9	9.2	1.8
9.5_9	01/12/10	01/12/10	7.2	40	0.1	3/16/2010	131.9	31.1	40.0	1.6	103.0	-0.2	1.0	35.8	4.3	4.2	1.6
9.5_9	01/12/10	01/12/10	7.2	40	0.01	3/16/2010	61.5	24.2	40.1	1.6	111.0	-0.6	1.9	168.1	6.5	1.9	2.1

Table C14. Lab 7 prefabricated core confined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_5	01/12/10	01/12/10	7.3	4	10	[redacted]											
9.5_5	01/12/10	01/12/10	7.3	4	1	[redacted]											
9.5_5	01/12/10	01/12/10	7.3	4	0.1	[redacted]											
9.5_5	01/12/10	01/12/10	7.3	4	0.01	[redacted]											
9.5_5	01/12/10	01/12/10	7.3	20	10	3/1/2010	2746.0	31.8	20.0	69.5	86.0	0.6	3.1	-261.4	5.8	10.0	0.3
9.5_5	01/12/10	01/12/10	7.3	20	1	3/1/2010	1221.0	30.9	20.0	69.6	93.0	0.1	0.7	-176.8	2.7	11.3	0.1
9.5_5	01/12/10	01/12/10	7.3	20	0.1	3/1/2010	695.8	24.5	20.1	69.6	93.0	-0.1	0.3	-259.2	6.2	11.3	0.1
9.5_5	01/12/10	01/12/10	7.3	20	0.01	3/1/2010	594.2	19.7	20.0	69.6	81.0	0.1	0.4	-124.9	5.6	12.3	0.1
9.5_5	01/12/10	01/12/10	7.3	40	10	3/16/2010	1546.0	32.0	39.9	69.7	92.0	0.3	3.7	-77.5	4.2	6.3	1.1
9.5_5	01/12/10	01/12/10	7.3	40	1	3/16/2010	778.9	26.0	40.0	69.5	94.0	0.1	0.8	-31.3	2.6	5.2	1.2
9.5_5	01/12/10	01/12/10	7.3	40	0.1	3/16/2010	516.9	19.2	40.1	69.6	96.0	-0.4	0.5	-15.0	2.9	3.6	1.1
9.5_5	01/12/10	01/12/10	7.3	40	0.01	3/16/2010	425.3	12.6	40.0	69.6	95.0	0.1	0.7	-9.5	2.9	3.9	0.9
9.5_7	01/12/10	01/12/10	7.3	4	10	[redacted]											
9.5_7	01/12/10	01/12/10	7.3	4	1	[redacted]											
9.5_7	01/12/10	01/12/10	7.3	4	0.1	[redacted]											
9.5_7	01/12/10	01/12/10	7.3	4	0.01	[redacted]											
9.5_7	01/12/10	01/12/10	7.3	20	10	3/2/2010	4715.0	28.6	20.1	69.6	91.0	0.6	2.1	-365.8	6.7	3.6	0.3
9.5_7	01/12/10	01/12/10	7.3	20	1	3/2/2010	2230.0	33.4	19.9	69.5	92.0	0.1	0.5	-359.1	5.0	3.6	0.4
9.5_7	01/12/10	01/12/10	7.3	20	0.1	3/2/2010	1064.0	32.4	20.1	69.6	92.0	-0.1	0.3	-277.5	6.3	6.3	0.4
9.5_7	01/12/10	01/12/10	7.3	20	0.01	3/2/2010	724.5	26.8	20.0	69.6	79.0	0.1	0.5	-90.5	4.2	10.8	0.7
9.5_7	01/12/10	01/12/10	7.3	40	10	3/16/2010	1391.0	32.1	39.9	69.5	92.0	0.4	3.7	-70.6	4.0	4.8	0.6
9.5_7	01/12/10	01/12/10	7.3	40	1	3/16/2010	709.5	25.8	39.8	69.5	93.0	0.1	0.8	-26.1	2.1	5.9	0.1
9.5_7	01/12/10	01/12/10	7.3	40	0.1	3/16/2010	487.3	18.5	40.0	69.6	91.0	-0.1	0.5	-4.8	2.5	6.0	0.1
9.5_7	01/12/10	01/12/10	7.3	40	0.01	3/16/2010	411.9	11.6	40.0	69.6	94.0	0.2	0.6	-4.3	5.5	5.5	0.3
9.5_9	01/12/10	01/12/10	7.2	4	10	[redacted]											
9.5_9	01/12/10	01/12/10	7.2	4	1	[redacted]											
9.5_9	01/12/10	01/12/10	7.2	4	0.1	[redacted]											
9.5_9	01/12/10	01/12/10	7.2	4	0.01	[redacted]											
9.5_9	01/12/10	01/12/10	7.2	20	10	3/3/2010	5114.0	28.2	20.0	69.6	92.0	0.5	2.0	-368.7	6.5	7.1	0.5
9.5_9	01/12/10	01/12/10	7.2	20	1	3/3/2010	2439.0	33.7	20.0	69.6	93.0	0.0	0.5	-383.0	5.1	4.8	0.5
9.5_9	01/12/10	01/12/10	7.2	20	0.1	3/3/2010	1136.0	33.6	20.1	69.6	93.0	0.0	0.3	-286.4	5.4	2.7	0.3
9.5_9	01/12/10	01/12/10	7.2	20	0.01	3/3/2010	701.5	28.9	20.0	69.6	83.0	0.1	0.5	-61.9	5.9	4.1	0.4
9.5_9	01/12/10	01/12/10	7.2	40	10	3/16/2010	1516.0	31.7	40.0	69.6	92.0	0.4	3.6	-77.8	4.1	11.1	0.5
9.5_9	01/12/10	01/12/10	7.2	40	1	3/16/2010	767.7	24.9	40.1	69.6	94.0	0.1	0.8	-40.5	2.4	12.4	0.4
9.5_9	01/12/10	01/12/10	7.2	40	0.1	3/16/2010	522.5	17.1	40.0	69.6	97.0	-0.2	0.5	-32.9	2.9	12.7	0.2
9.5_9	01/12/10	01/12/10	7.2	40	0.01	3/16/2010	435.5	11.0	39.9	69.6	98.0	0.0	0.7	-18.4	3.1	14.0	0.1

Table C15. Lab 8 prefabricated core unconfined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				UNCONFINED												
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_2	02/03/10	02/03/10	7.1	4	10	6/14/2010	15527.0	12.3	4.0	0.0	100.0	0.1	1.6	-66.2	2.5	11.9	0.5
9.5_2	02/03/10	02/03/10	7.1	4	1	6/14/2010	10914.0	16.6	4.0	0.0	99.0	0.0	0.4	-103.8	2.1	12.2	0.6
9.5_2	02/03/10	02/03/10	7.1	4	0.1	6/14/2010	6852.0	22.1	3.9	0.0	98.0	0.0	0.3	-161.0	2.6	13.3	0.8
9.5_2	02/03/10	02/03/10	7.1	4	0.01	6/14/2010	3856.0	27.1	3.5	0.0	94.0	0.0	0.3	-148.0	2.1	15.2	0.8
9.5_2	02/03/10	02/03/10	7.1	20	10	6/15/2010	6854.0	24.1	20.0	-0.1	97.0	0.3	2.3	-268.1	5.6	6.6	0.2
9.5_2	02/03/10	02/03/10	7.1	20	1	6/15/2010	3571.0	29.8	19.7	0.1	93.0	0.1	0.7	-272.7	5.2	4.7	0.7
9.5_2	02/03/10	02/03/10	7.1	20	0.1	6/15/2010	1603.0	32.6	20.1	0.0	91.0	-0.1	0.3	-159.9	4.0	2.5	1.1
9.5_2	02/03/10	02/03/10	7.1	20	0.01	6/15/2010	658.6	30.9	20.2	0.0	104.0	-0.1	0.5	-23.9	3.8	1.3	1.3
9.5_2	02/03/10	02/03/10	7.1	40	10	6/17/2010	1280.0	33.4	40.1	0.0	98.0	1.1	5.4	-76.4	5.2	22.7	0.4
9.5_2	02/03/10	02/03/10	7.1	40	1	6/17/2010	462.5	30.6	40.3	0.0	97.0	0.3	2.7	-27.6	4.5	20.2	0.8
9.5_2	02/03/10	02/03/10	7.1	40	0.1	6/17/2010	222.7	20.9	40.2	0.0	90.0	0.8	0.9	-87.8	6.1	15.9	2.3
9.5_2	02/03/10	02/03/10	7.1	40	0.01	6/17/2010	192.5	5.7	40.1	0.0	91.0	0.2	0.8	-208.1	9.7	14.5	4.3
9.5_7	02/03/10	02/03/10	7.0	4	10	6/14/2010	16637.0	11.9	3.9	-0.1	96.0	-0.1	1.7	-65.2	2.3	13.2	0.3
9.5_7	02/03/10	02/03/10	7.0	4	1	6/14/2010	11709.0	16.5	3.9	0.0	99.0	0.0	0.4	-114.0	2.1	13.4	0.3
9.5_7	02/03/10	02/03/10	7.0	4	0.1	6/14/2010	7282.0	22.3	4.0	0.0	100.0	0.0	0.3	-191.4	3.2	13.1	0.3
9.5_7	02/03/10	02/03/10	7.0	4	0.01	6/14/2010	3879.0	27.7	3.9	0.0	97.0	0.0	0.3	-175.3	2.2	13.3	0.2
9.5_7	02/03/10	02/03/10	7.0	20	10	6/15/2010	6527.0	24.8	20.1	0.2	95.0	0.3	2.4	-287.9	5.9	4.9	0.3
9.5_7	02/03/10	02/03/10	7.0	20	1	6/15/2010	3335.0	30.4	20.0	0.0	92.0	0.3	0.7	-275.2	5.6	5.1	0.5
9.5_7	02/03/10	02/03/10	7.0	20	0.1	6/15/2010	1441.0	33.0	20.1	0.0	92.0	0.0	0.3	-149.6	3.7	4.6	0.6
9.5_7	02/03/10	02/03/10	7.0	20	0.01	6/15/2010	556.6	31.2	20.1	0.1	107.0	0.1	0.4	-0.9	3.6	2.8	0.4
9.5_7	02/03/10	02/03/10	7.0	40	10	6/16/2010	1382.0	32.8	40.4	0.2	102.0	0.8	5.3	-55.7	4.8	2.2	0.5
9.5_7	02/03/10	02/03/10	7.0	40	1	6/16/2010	480.8	30.4	40.9	0.0	100.0	0.3	2.5	-4.7	4.4	3.6	1.0
9.5_7	02/03/10	02/03/10	7.0	40	0.1	6/16/2010	223.1	20.9	40.3	0.1	94.0	0.0	1.2	5.2	5.7	5.1	1.1
9.5_7	02/03/10	02/03/10	7.0	40	0.01	6/16/2010	177.5	7.2	40.3	0.1	95.0	0.0	0.8	-30.9	8.8	11.7	2.5
9.5_9	02/03/10	02/03/10	7.5	4	10	6/14/2010	14601.0	12.8	3.9	0.3	98.0	0.1	1.5	-75.2	2.2	6.0	0.8
9.5_9	02/03/10	02/03/10	7.5	4	1	6/14/2010	10090.0	17.5	4.0	0.0	98.0	0.0	0.4	-115.6	2.9	6.8	0.9
9.5_9	02/03/10	02/03/10	7.5	4	0.1	6/14/2010	6248.0	22.9	4.1	0.0	96.0	0.0	0.3	-150.2	3.4	8.8	1.0
9.5_9	02/03/10	02/03/10	7.5	4	0.01	6/14/2010	3403.0	27.4	3.9	0.0	95.0	0.0	0.3	-96.5	2.3	10.8	0.9
9.5_9	02/03/10	02/03/10	7.5	20	10	6/15/2010	6030.0	25.1	20.1	0.3	95.0	0.5	2.6	-291.3	6.3	9.8	0.6
9.5_9	02/03/10	02/03/10	7.5	20	1	6/15/2010	3058.0	30.6	20.3	0.0	92.0	0.1	0.7	-267.9	5.6	10.9	0.8
9.5_9	02/03/10	02/03/10	7.5	20	0.1	6/15/2010	1297.0	33.0	20.1	0.0	92.0	0.0	0.3	-139.4	4.0	11.8	0.7
9.5_9	02/03/10	02/03/10	7.5	20	0.01	6/15/2010	483.4	31.6	20.1	0.0	110.0	0.0	0.5	-12.4	3.9	10.7	0.7
9.5_9	02/03/10	02/03/10	7.5	40	10	6/16/2010	1167.0	33.2	40.2	-0.1	102.0	1.2	5.5	-71.5	5.0	10.6	1.3
9.5_9	02/03/10	02/03/10	7.5	40	1	6/16/2010	411.1	29.8	40.3	0.1	99.0	0.2	2.9	-39.8	5.0	11.9	1.3
9.5_9	02/03/10	02/03/10	7.5	40	0.1	6/16/2010	210.0	18.6	40.4	0.1	90.0	0.4	1.3	-124.4	6.8	11.9	1.8
9.5_9	02/03/10	02/03/10	7.5	40	0.01	6/16/2010	196.4	3.1	40.3	0.0	91.0	0.1	0.7	-368.6	10.4	14.5	3.3

Table C16. Lab 8 prefabricated core confined dynamic modulus test data for the 9.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
9.5_2	02/03/10	02/03/10	7.1	4	10	[redacted]											
9.5_2	02/03/10	02/03/10	7.1	4	1	[redacted]											
9.5_2	02/03/10	02/03/10	7.1	4	0.1	[redacted]											
9.5_2	02/03/10	02/03/10	7.1	4	0.01	[redacted]											
9.5_2	02/03/10	02/03/10	7.1	20	10	6/10/2010	6107.0	24.7	20.1	69.0	96.0	0.4	2.4	-261.0	5.4	6.0	0.5
9.5_2	02/03/10	02/03/10	7.1	20	1	6/10/2010	3161.0	30.3	20.2	69.0	93.0	0.1	0.7	-286.1	5.0	6.9	0.6
9.5_2	02/03/10	02/03/10	7.1	20	0.1	6/10/2010	1513.0	31.7	20.3	69.0	90.0	0.0	0.2	-191.4	5.7	7.7	0.8
9.5_2	02/03/10	02/03/10	7.1	20	0.01	6/10/2010	841.4	27.7	20.1	69.0	86.0	0.1	0.4	-22.0	3.5	8.4	0.9
9.5_2	02/03/10	02/03/10	7.1	40	10	6/11/2010	1529.0	31.6	40.1	69.1	90.0	1.0	5.4	-112.3	5.3	11.0	1.3
9.5_2	02/03/10	02/03/10	7.1	40	1	6/11/2010	784.9	26.3	39.8	69.0	93.0	0.1	1.6	-45.1	2.9	11.8	1.6
9.5_2	02/03/10	02/03/10	7.1	40	0.1	6/11/2010	530.8	19.5	39.9	69.0	91.0	-0.2	0.4	-16.8	4.0	12.6	1.7
9.5_2	02/03/10	02/03/10	7.1	40	0.01	6/11/2010	426.5	13.7	40.1	69.0	95.0	0.0	0.5	19.2	4.0	12.3	1.9
9.5_7	02/03/10	02/03/10	7.0	4	10	[redacted]											
9.5_7	02/03/10	02/03/10	7.0	4	1	[redacted]											
9.5_7	02/03/10	02/03/10	7.0	4	0.1	[redacted]											
9.5_7	02/03/10	02/03/10	7.0	4	0.01	[redacted]											
9.5_7	02/03/10	02/03/10	7.0	20	10	6/10/2010	6262.0	25.4	19.7	68.8	96.0	0.2	2.3	-294.0	5.7	9.6	0.3
9.5_7	02/03/10	02/03/10	7.0	20	1	6/10/2010	3154.0	31.4	19.8	69.0	93.0	0.1	0.6	-318.9	5.2	10.1	0.6
9.5_7	02/03/10	02/03/10	7.0	20	0.1	6/10/2010	1467.0	32.6	19.9	69.0	90.0	0.0	0.2	-203.2	6.1	9.8	0.9
9.5_7	02/03/10	02/03/10	7.0	20	0.01	6/10/2010	804.4	27.4	20.0	69.0	87.0	0.0	0.4	-23.6	3.6	9.1	0.3
9.5_7	02/03/10	02/03/10	7.0	40	10	6/11/2010	1481.0	32.2	40.2	68.9	89.0	1.2	5.2	-131.2	5.4	8.7	1.4
9.5_7	02/03/10	02/03/10	7.0	40	1	6/11/2010	760.8	26.0	39.8	69.0	93.0	0.0	1.6	-72.8	3.3	11.2	1.5
9.5_7	02/03/10	02/03/10	7.0	40	0.1	6/11/2010	516.3	18.8	40.0	69.0	95.0	0.0	0.4	-18.8	4.3	12.9	1.3
9.5_7	02/03/10	02/03/10	7.0	40	0.01	6/11/2010	466.2	12.9	40.0	69.0	89.0	-0.1	0.5	60.4	4.3	12.0	1.4
9.5_9	02/03/10	02/03/10	7.5	4	10	[redacted]											
9.5_9	02/03/10	02/03/10	7.5	4	1	[redacted]											
9.5_9	02/03/10	02/03/10	7.5	4	0.1	[redacted]											
9.5_9	02/03/10	02/03/10	7.5	4	0.01	[redacted]											
9.5_9	02/03/10	02/03/10	7.5	20	10	6/10/2010	5642.0	26.2	20.3	69.0	95.0	0.4	2.4	-326.4	5.8	3.8	0.7
9.5_9	02/03/10	02/03/10	7.5	20	1	6/10/2010	2801.0	32.5	20.0	69.0	93.0	0.8	0.9	-401.5	6.3	6.0	0.9
9.5_9	02/03/10	02/03/10	7.5	20	0.1	6/10/2010	1294.0	33.9	20.0	69.0	88.0	0.0	0.2	-306.3	5.1	8.7	0.7
9.5_9	02/03/10	02/03/10	7.5	20	0.01	6/10/2010	720.6	28.8	20.0	69.0	83.0	0.1	0.5	-82.9	4.5	10.3	0.9
9.5_9	02/03/10	02/03/10	7.5	40	10	6/11/2010	1506.0	30.7	40.2	69.0	95.0	1.0	5.1	-56.9	4.4	6.2	1.2
9.5_9	02/03/10	02/03/10	7.5	40	1	6/11/2010	771.5	24.5	40.1	69.0	96.0	0.2	1.6	-19.4	2.9	7.9	1.4
9.5_9	02/03/10	02/03/10	7.5	40	0.1	6/11/2010	526.2	16.5	40.2	69.0	97.0	-0.1	0.4	-10.5	3.6	7.3	1.0
9.5_9	02/03/10	02/03/10	7.5	40	0.01	6/11/2010	437.3	10.6	40.3	69.0	97.0	0.0	0.5	29.2	5.4	6.7	0.9

Table C17. Lab 1 prefabricated core unconfined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μst	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5-3	4/16/2009	4/16/2009	7.4	4	10	4/30/2009	12940.4	10.0	4.0	0.0	99.8	0.1	4.7	62.3	6.1	25.9	0.3
12.5-3	4/16/2009	4/16/2009	7.4	4	1	4/30/2009	9725.4	14.4	4.0	0.0	95.6	-0.2	0.8	82.0	4.2	28.8	0.5
12.5-3	4/16/2009	4/16/2009	7.4	4	0.1	4/30/2009	6765.7	18.5	4.0	0.0	93.4	0.0	1.4	120.3	3.6	30.3	0.4
12.5-3	4/16/2009	4/16/2009	7.4	4	0.01	4/30/2009	4324.4	20.2	3.2	0.0	93.3	-1.7	5.8	-43.2	7.8	40.2	0.5
12.5-3	4/16/2009	4/16/2009	7.4	20	10	4/30/2009	6521.2	20.6	20.0	0.0	94.0	0.9	10.3	156.1	12.0	25.9	0.2
12.5-3	4/16/2009	4/16/2009	7.4	20	1	4/30/2009	3862.8	25.2	20.0	0.0	90.4	0.0	0.7	191.4	7.7	27.1	0.4
12.5-3	4/16/2009	4/16/2009	7.4	20	0.1	4/30/2009	2106.7	27.3	20.0	0.0	89.2	12.0	1.5	240.9	3.5	24.8	0.6
12.5-3	4/16/2009	4/16/2009	7.4	20	0.01	4/30/2009	1051.3	26.4	20.0	0.0	90.4	-0.2	1.5	185.4	4.3	25.5	1.0
12.5-3	4/16/2009	4/16/2009	7.4	40	10	5/1/2009	1662.4	33.6	39.9	0.0	98.8	-0.4	8.9	140.5	15.0	23.6	1.4
12.5-3	4/16/2009	4/16/2009	7.4	40	1	5/1/2009	745.2	28.7	39.9	0.0	98.2	0.3	2.8	31.2	5.8	22.3	1.6
12.5-3	4/16/2009	4/16/2009	7.4	40	0.1	5/1/2009	432.8	19.7	39.9	0.0	98.0	0.4	2.7	15.7	4.3	23.5	0.9
12.5-3	4/16/2009	4/16/2009	7.4	40	0.01	5/1/2009	328.8	11.5	40.0	0.0	96.2	0.2	2.5	5.8	5.2	28.7	0.1
12.5-7	4/24/2009	4/24/2009	7.5	4	10	4/30/2009	15692.3	9.9	4.0	0.0	97.8	-0.2	7.2	66.8	8.4	13.6	0.4
12.5-7	4/24/2009	4/24/2009	7.5	4	1	4/30/2009	11737.0	14.5	4.1	0.0	95.4	-0.2	0.9	89.6	4.3	11.8	0.4
12.5-7	4/24/2009	4/24/2009	7.5	4	0.1	4/30/2009	8061.4	18.9	4.1	0.0	93.4	2.5	1.4	150.9	3.1	9.3	0.2
12.5-7	4/24/2009	4/24/2009	7.5	4	0.01	4/30/2009	4865.8	22.7	4.0	0.0	92.0	0.0	1.4	156.0	3.2	2.4	0.1
12.5-7	4/24/2009	4/24/2009	7.5	20	10	4/30/2009	7477.6	21.6	19.9	0.0	92.6	0.8	9.3	174.1	11.8	13.3	0.5
12.5-7	4/24/2009	4/24/2009	7.5	20	1	4/30/2009	4321.8	26.5	20.0	0.0	90.2	0.0	0.6	218.7	8.5	13.7	1.0
12.5-7	4/24/2009	4/24/2009	7.5	20	0.1	4/30/2009	2234.3	29.2	20.0	0.0	89.4	2.0	1.5	210.4	5.6	17.7	1.5
12.5-7	4/24/2009	4/24/2009	7.5	20	0.01	4/30/2009	1094.5	27.6	20.0	0.0	92.4	0.7	1.5	196.0	4.6	25.8	1.1
12.5-7	4/24/2009	4/24/2009	7.5	40	10	5/1/2009	1585.1	33.5	39.7	0.0	100.6	-0.5	9.4	145.6	15.3	26.3	1.5
12.5-7	4/24/2009	4/24/2009	7.5	40	1	5/1/2009	749.1	27.9	39.7	0.0	97.4	0.2	3.0	41.5	6.6	16.6	1.9
12.5-7	4/24/2009	4/24/2009	7.5	40	0.1	5/1/2009	463.0	19.6	39.8	0.0	94.2	7.0	2.3	36.9	5.0	8.3	1.4
12.5-7	4/24/2009	4/24/2009	7.5	40	0.01	5/1/2009	360.6	12.8	40.0	0.0	95.0	-0.8	2.6	54.4	5.6	7.3	0.2
12.5-9	4/24/2009	4/24/2009	7.7	4	10	4/30/2009	15948.2	8.8	3.6	0.0	96.0	-0.2	7.0	56.7	8.3	3.1	0.3
12.5-9	4/24/2009	4/24/2009	7.7	4	1	4/30/2009	12474.2	12.8	3.7	0.0	95.0	-0.1	1.0	72.3	4.2	4.7	0.6
12.5-9	4/24/2009	4/24/2009	7.7	4	0.1	4/30/2009	8889.2	16.9	3.6	0.0	94.2	2.6	1.3	125.6	3.7	6.5	0.4
12.5-9	4/24/2009	4/24/2009	7.7	4	0.01	4/30/2009	5273.4	21.5	3.9	0.0	93.0	0.2	1.4	152.5	3.2	3.1	0.7
12.5-9	4/24/2009	4/24/2009	7.7	20	10	4/30/2009	7536.2	20.3	19.9	0.0	95.0	0.9	9.1	160.0	11.0	7.5	0.7
12.5-9	4/24/2009	4/24/2009	7.7	20	1	4/30/2009	4467.3	25.1	19.9	0.0	90.4	0.0	0.6	202.9	7.6	4.8	1.5
12.5-9	4/24/2009	4/24/2009	7.7	20	0.1	4/30/2009	2431.4	27.7	20.0	0.0	93.0	2.6	1.5	210.1	5.4	3.5	1.4
12.5-9	4/24/2009	4/24/2009	7.7	20	0.01	4/30/2009	1236.1	26.3	20.0	0.0	92.4	-0.1	1.5	168.7	4.4	17.0	1.7
12.5-9	4/24/2009	4/24/2009	7.7	40	10	5/1/2009	1745.3	32.2	39.6	0.0	96.0	-0.4	9.1	142.6	15.0	33.8	0.4
12.5-9	4/24/2009	4/24/2009	7.7	40	1	5/1/2009	826.3	27.9	39.8	0.0	95.8	0.2	2.2	53.7	6.7	38.1	2.2
12.5-9	4/24/2009	4/24/2009	7.7	40	0.1	5/1/2009	485.7	21.0	39.8	0.0	96.6	2.7	1.8	31.3	4.7	38.1	2.9
12.5-9	4/24/2009	4/24/2009	7.7	40	0.01	5/1/2009	350.5	14.3	40.0	0.0	98.8	0.7	2.5	35.7	4.9	28.2	2.5

Table C18. Lab 1 prefabricated core confined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μst	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5-3	4/16/2009	4/16/2009	7.4	4	10	[redacted]											
12.5-3	4/16/2009	4/16/2009	7.4	4	1												
12.5-3	4/16/2009	4/16/2009	7.4	4	0.1												
12.5-3	4/16/2009	4/16/2009	7.4	4	0.01												
12.5-3	4/16/2009	4/16/2009	7.4	20	10	4/30/2009	7240.6	19.7	20.1	68.2	93.8	0.8	8.1	137.9	14.3	23.8	0.2
12.5-3	4/16/2009	4/16/2009	7.4	20	1	4/30/2009	4276.1	24.2	20.1	68.2	93.0	0.0	0.7	148.9	7.3	20.9	0.5
12.5-3	4/16/2009	4/16/2009	7.4	20	0.1	4/30/2009	2393.0	25.7	20.1	68.0	93.0	3.7	1.6	117.2	4.0	15.6	0.5
12.5-3	4/16/2009	4/16/2009	7.4	20	0.01	4/30/2009	1361.5	23.1	20.0	68.1	92.4	0.0	1.5	45.6	4.0	5.9	0.7
12.5-3	4/16/2009	4/16/2009	7.4	40	10	5/1/2009	2302.4	28.2	40.3	68.4	93.8	0.1	6.3	123.2	10.8	21.3	0.3
12.5-3	4/16/2009	4/16/2009	7.4	40	1	5/1/2009	1326.3	23.8	40.5	68.4	93.4	0.1	1.5	57.2	5.7	15.6	1.0
12.5-3	4/16/2009	4/16/2009	7.4	40	0.1	5/1/2009	918.5	18.0	40.3	68.4	97.6	0.3	1.5	30.4	4.2	16.7	0.8
12.5-3	4/16/2009	4/16/2009	7.4	40	0.01	5/1/2009	713.2	13.1	40.0	68.4	100.4	0.6	1.5	26.7	4.1	15.0	0.5
12.5-7	4/24/2009	4/24/2009	7.5	4	10	[redacted]											
12.5-7	4/24/2009	4/24/2009	7.5	4	1												
12.5-7	4/24/2009	4/24/2009	7.5	4	0.1												
12.5-7	4/24/2009	4/24/2009	7.5	4	0.01												
12.5-7	4/24/2009	4/24/2009	7.5	20	10	4/30/2009	7826.7	20.6	20.2	68.4	93.0	0.7	7.5	152.1	11.2	11.6	0.4
12.5-7	4/24/2009	4/24/2009	7.5	20	1	4/30/2009	4563.1	25.3	20.2	68.2	91.4	0.0	0.5	174.3	7.4	9.3	0.5
12.5-7	4/24/2009	4/24/2009	7.5	20	0.1	4/30/2009	2459.6	27.1	20.2	68.0	93.8	3.3	1.4	147.6	6.0	2.6	0.6
12.5-7	4/24/2009	4/24/2009	7.5	20	0.01	4/30/2009	1364.7	24.7	20.0	68.0	95.0	-0.1	1.4	81.2	4.1	10.2	0.1
12.5-7	4/24/2009	4/24/2009	7.5	40	10	5/1/2009	2264.6	28.3	39.7	68.4	95.0	-0.1	8.7	109.3	12.2	54.3	1.0
12.5-7	4/24/2009	4/24/2009	7.5	40	1	5/1/2009	1320.6	23.9	40.0	68.4	93.6	0.1	2.1	39.3	5.6	49.7	2.1
12.5-7	4/24/2009	4/24/2009	7.5	40	0.1	5/1/2009	943.5	18.2	40.0	68.4	99.4	3.9	2.0	24.5	4.3	44.6	2.3
12.5-7	4/24/2009	4/24/2009	7.5	40	0.01	5/1/2009	762.6	13.1	40.0	68.4	104.4	-0.1	1.9	8.9	4.6	41.2	2.0
12.5-9	4/24/2009	4/24/2009	7.7	4	10	[redacted]											
12.5-9	4/24/2009	4/24/2009	7.7	4	1												
12.5-9	4/24/2009	4/24/2009	7.7	4	0.1												
12.5-9	4/24/2009	4/24/2009	7.7	4	0.01												
12.5-9	4/24/2009	4/24/2009	7.7	20	10	4/30/2009	7869.4	19.6	20.2	68.0	96.0	0.7	7.4	138.8	15.2	25.9	0.0
12.5-9	4/24/2009	4/24/2009	7.7	20	1	4/30/2009	4633.6	24.0	20.2	68.0	92.6	0.0	0.5	156.5	7.6	27.2	0.2
12.5-9	4/24/2009	4/24/2009	7.7	20	0.1	4/30/2009	2560.3	26.0	20.1	68.0	92.4	3.1	1.5	113.8	4.8	24.3	0.8
12.5-9	4/24/2009	4/24/2009	7.7	20	0.01	4/30/2009	1428.8	24.3	20.0	68.0	94.8	0.1	1.5	63.1	5.1	25.7	0.2
12.5-9	4/24/2009	4/24/2009	7.7	40	10	5/1/2009	2175.6	29.2	40.0	68.4	93.2	0.0	8.1	139.9	12.7	23.7	1.3
12.5-9	4/24/2009	4/24/2009	7.7	40	1	5/1/2009	1224.0	25.1	40.2	68.4	94.0	0.1	1.7	70.6	6.9	18.3	1.8
12.5-9	4/24/2009	4/24/2009	7.7	40	0.1	5/1/2009	847.7	18.3	40.2	68.5	96.8	4.5	1.9	48.9	5.1	18.6	1.6
12.5-9	4/24/2009	4/24/2009	7.7	40	0.01	5/1/2009	666.6	14.6	40.0	68.4	101.0	-0.6	2.1	12.7	5.0	23.3	1.3

Table C19. Lab 2 prefabricated core unconfined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_1	1/22/2009	1/22/2009	7.3	4	10	4/1/2009	16030.0	10.3	4.0	0.3	102.0	0.2	1.9	-48.6	2.2	8.7	0.1
12.5_1	1/22/2009	1/22/2009	7.3	4	1	4/1/2009	11970.0	13.5	4.0	0.3	101.0	0.1	0.4	-68.3	1.8	8.7	0.2
12.5_1	1/22/2009	1/22/2009	7.3	4	0.1	4/1/2009	8236.0	17.7	4.0	0.4	101.0	0.0	0.3	-100.1	2.1	8.3	0.1
12.5_1	1/22/2009	1/22/2009	7.3	4	0.01	4/1/2009	5388.0	21.4	3.9	0.3	94.0	0.0	0.4	-103.1	2.1	6.9	0.2
12.5_1	1/22/2009	1/22/2009	7.3	20	10	3/29/2009	7215.0	20.8	20.1	0.1	97.0	0.4	1.5	-190.3	4.4	17.8	0.6
12.5_1	1/22/2009	1/22/2009	7.3	20	1	3/29/2009	4150.0	25.8	20.2	0.2	95.0	0.0	0.5	-219.2	4.1	17.6	0.4
12.5_1	1/22/2009	1/22/2009	7.3	20	0.1	3/29/2009	2141.0	29.4	20.1	0.2	92.0	0.0	0.4	-210.2	3.0	17.4	0.1
12.5_1	1/22/2009	1/22/2009	7.3	20	0.01	3/29/2009	1054.0	29.6	20.1	0.2	96.0	0.0	0.6	-117.4	4.5	17.4	0.3
12.5_1	1/22/2009	1/22/2009	7.3	40	10	5/20/2009	2151.0	28.0	40.0	0.1	88.0	0.7	3.2	-177.6	6.0	10.6	1.2
12.5_1	1/22/2009	1/22/2009	7.3	40	1	5/20/2009	1034.0	25.9	40.1	0.2	90.0	0.1	0.9	-92.4	4.5	12.4	1.3
12.5_1	1/22/2009	1/22/2009	7.3	40	0.1	5/20/2009	554.4	21.2	40.0	0.2	86.0	-0.1	0.6	-72.9	6.0	12.8	1.5
12.5_1	1/22/2009	1/22/2009	7.3	40	0.01	5/20/2009	401.3	15.2	40.0	0.3	96.0	0.0	0.7	-123.6	8.9	12.8	2.1
12.5_4	1/22/2009	1/22/2009	7.2	4	10	4/1/2009	15848.0	10.2	4.3	0.3	100.0	0.3	1.7	-45.7	2.2	6.3	0.2
12.5_4	1/22/2009	1/22/2009	7.2	4	1	4/1/2009	11895.0	13.5	4.1	0.3	100.0	0.0	0.4	-65.0	1.6	7.3	0.1
12.5_4	1/22/2009	1/22/2009	7.2	4	0.1	4/1/2009	8169.0	17.6	3.9	0.3	101.0	0.0	0.3	-99.8	2.1	7.9	0.2
12.5_4	1/22/2009	1/22/2009	7.2	4	0.01	4/1/2009	5162.0	21.9	3.9	0.3	96.0	0.0	0.4	-96.6	2.1	9.8	0.5
12.5_4	1/22/2009	1/22/2009	7.2	20	10	3/29/2009	7018.0	20.9	20.0	0.3	97.0	0.3	1.6	-202.6	4.5	8.0	0.4
12.5_4	1/22/2009	1/22/2009	7.2	20	1	3/29/2009	4050.0	25.8	20.0	0.4	94.0	0.1	0.5	-241.5	4.3	10.4	0.4
12.5_4	1/22/2009	1/22/2009	7.2	20	0.1	3/29/2009	2083.0	29.4	19.9	0.4	91.0	0.1	0.5	-243.9	3.5	12.2	0.1
12.5_4	1/22/2009	1/22/2009	7.2	20	0.01	3/29/2009	1013.0	29.8	20.0	0.4	96.0	0.0	0.6	-131.2	4.0	12.9	0.8
12.5_4	1/22/2009	1/22/2009	7.2	40	10	5/20/2009	2036.0	28.8	40.0	0.3	88.0	0.6	3.3	-213.6	6.4	8.4	0.7
12.5_4	1/22/2009	1/22/2009	7.2	40	1	5/20/2009	954.7	27.0	40.1	0.2	91.0	0.1	0.9	-121.9	4.6	7.8	1.2
12.5_4	1/22/2009	1/22/2009	7.2	40	0.1	5/20/2009	502.8	22.2	40.3	0.2	86.0	-0.1	0.7	-130.0	6.3	5.4	1.1
12.5_4	1/22/2009	1/22/2009	7.2	40	0.01	5/20/2009	365.3	15.8	40.1	0.3	95.0	0.0	0.7	-269.4	9.4	3.4	0.4
12.5_9	1/22/2009	1/22/2009	7.5	4	10	4/1/2009	16666.0	10.0	4.0	0.2	100.0	0.4	1.8	-44.2	2.1	7.8	0.6
12.5_9	1/22/2009	1/22/2009	7.5	4	1	4/1/2009	12654.0	13.2	3.9	0.3	98.0	0.0	0.4	-60.8	1.4	8.5	0.8
12.5_9	1/22/2009	1/22/2009	7.5	4	0.1	4/1/2009	8800.0	17.3	4.1	0.2	99.0	0.0	0.3	-90.9	2.2	9.9	1.0
12.5_9	1/22/2009	1/22/2009	7.5	4	0.01	4/1/2009	5675.0	21.2	3.9	0.3	95.0	0.0	0.4	-85.1	1.9	11.5	1.0
12.5_9	1/22/2009	1/22/2009	7.5	20	10	3/29/2009	7658.0	19.8	20.0	0.4	96.0	0.4	1.6	-173.9	4.2	14.3	0.9
12.5_9	1/22/2009	1/22/2009	7.5	20	1	3/29/2009	4565.0	24.4	20.1	0.4	93.0	0.0	0.5	-201.0	3.9	15.0	0.8
12.5_9	1/22/2009	1/22/2009	7.5	20	0.1	3/29/2009	2425.0	27.8	20.0	0.4	91.0	-0.1	0.5	-197.0	4.6	16.4	0.6
12.5_9	1/22/2009	1/22/2009	7.5	20	0.01	3/29/2009	1218.0	28.3	20.0	0.4	97.0	0.0	0.6	-129.0	4.0	18.1	0.2
12.5_9	1/22/2009	1/22/2009	7.5	40	10	5/20/2009	2397.0	28.2	39.9	0.0	87.0	0.7	3.0	-197.1	6.6	14.6	0.8
12.5_9	1/22/2009	1/22/2009	7.5	40	1	5/20/2009	1105.0	27.3	40.0	0.1	91.0	0.1	0.8	-92.8	4.5	18.5	0.6
12.5_9	1/22/2009	1/22/2009	7.5	40	0.1	5/20/2009	536.9	24.0	40.0	0.1	88.0	-0.1	0.6	-54.1	5.7	22.0	0.5
12.5_9	1/22/2009	1/22/2009	7.5	40	0.01	5/20/2009	351.7	18.3	40.0	0.3	97.0	0.0	0.8	-105.4	8.0	21.2	1.0

Table C20. Lab 2 prefabricated core confined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_1	1/22/2009	1/22/2009	7.3	4	10	[redacted]											
12.5_1	1/22/2009	1/22/2009	7.3	4	1												
12.5_1	1/22/2009	1/22/2009	7.3	4	0.1												
12.5_1	1/22/2009	1/22/2009	7.3	4	0.01												
12.5_1	1/22/2009	1/22/2009	7.3	20	10	4/30/2009	7645.0	20.1	20.1	69.0	99.0	0.3	1.5	-160.1	4.2	4.9	0.6
12.5_1	1/22/2009	1/22/2009	7.3	20	1	4/30/2009	4583.0	24.1	20.0	69.0	94.0	0.0	0.5	-142.0	3.5	4.9	0.6
12.5_1	1/22/2009	1/22/2009	7.3	20	0.1	4/30/2009	2517.0	26.0	20.1	69.0	92.0	0.0	0.6	-83.1	3.8	4.9	0.6
12.5_1	1/22/2009	1/22/2009	7.3	20	0.01	4/30/2009	1407.0	24.9	20.0	69.0	94.0	0.0	0.5	-20.4	3.6	5.7	0.6
12.5_1	1/22/2009	1/22/2009	7.3	40	10	5/30/2009	2390.0	28.0	40.0	69.0	90.0	0.7	2.6	-180.9	5.7	2.6	1.1
12.5_1	1/22/2009	1/22/2009	7.3	40	1	5/30/2009	1232.0	25.8	39.9	69.0	91.0	0.1	0.6	-69.8	3.7	4.3	0.9
12.5_1	1/22/2009	1/22/2009	7.3	40	0.1	5/30/2009	764.9	21.9	39.8	69.0	85.0	0.0	0.6	-34.5	4.2	4.9	0.5
12.5_1	1/22/2009	1/22/2009	7.3	40	0.01	5/30/2009	634.3	17.0	40.0	69.0	88.0	0.1	0.6	8.1	4.2	6.4	0.5
12.5_4	1/22/2009	1/22/2009	7.2	4	10	[redacted]											
12.5_4	1/22/2009	1/22/2009	7.2	4	1												
12.5_4	1/22/2009	1/22/2009	7.2	4	0.1												
12.5_4	1/22/2009	1/22/2009	7.2	4	0.01												
12.5_4	1/22/2009	1/22/2009	7.2	20	10	4/30/2009	7094.0	20.0	20.1	69.0	99.0	0.4	1.6	-171.0	4.4	9.0	0.5
12.5_4	1/22/2009	1/22/2009	7.2	20	1	4/30/2009	4222.0	24.2	19.9	69.0	94.0	0.1	0.5	-167.9	3.7	8.7	0.7
12.5_4	1/22/2009	1/22/2009	7.2	20	0.1	4/30/2009	2266.0	26.7	20.1	69.0	92.0	0.0	0.6	-113.7	4.5	8.8	0.6
12.5_4	1/22/2009	1/22/2009	7.2	20	0.01	4/30/2009	1162.0	26.6	20.0	69.0	98.0	0.0	0.6	-38.6	4.1	9.3	0.5
12.5_4	1/22/2009	1/22/2009	7.2	40	10	5/30/2009	2064.0	28.5	40.2	69.0	90.0	0.8	2.7	-184.1	5.9	8.8	1.2
12.5_4	1/22/2009	1/22/2009	7.2	40	1	5/30/2009	1030.0	26.4	40.2	69.0	91.0	0.2	0.7	-67.8	3.7	7.6	1.9
12.5_4	1/22/2009	1/22/2009	7.2	40	0.1	5/30/2009	602.2	22.6	40.0	69.0	88.0	-0.1	0.6	-9.5	4.5	8.6	2.0
12.5_4	1/22/2009	1/22/2009	7.2	40	0.01	5/30/2009	420.6	19.0	40.0	69.0	95.0	0.0	0.7	-10.5	5.7	10.6	2.0
12.5_9	1/22/2009	1/22/2009	7.5	4	10	[redacted]											
12.5_9	1/22/2009	1/22/2009	7.5	4	1												
12.5_9	1/22/2009	1/22/2009	7.5	4	0.1												
12.5_9	1/22/2009	1/22/2009	7.5	4	0.01												
12.5_9	1/22/2009	1/22/2009	7.5	20	10	4/30/2009	7778.0	19.5	20.1	69.0	98.0	0.3	1.4	-153.6	4.1	11.8	1.1
12.5_9	1/22/2009	1/22/2009	7.5	20	1	4/30/2009	4729.0	23.1	19.8	69.0	94.0	0.0	0.4	-139.6	3.5	13.0	1.1
12.5_9	1/22/2009	1/22/2009	7.5	20	0.1	4/30/2009	2632.0	25.2	20.0	69.0	92.0	0.0	0.6	-103.2	3.1	15.6	1.2
12.5_9	1/22/2009	1/22/2009	7.5	20	0.01	4/30/2009	1493.0	24.2	20.1	69.0	94.0	0.0	0.6	-22.9	3.5	18.4	1.3
12.5_9	1/22/2009	1/22/2009	7.5	40	10	5/30/2009	2508.0	27.0	40.1	69.0	91.0	0.7	2.5	-149.7	5.3	15.3	0.6
12.5_9	1/22/2009	1/22/2009	7.5	40	1	5/30/2009	1334.0	25.0	39.8	69.0	92.0	0.1	0.6	-38.9	3.2	16.9	0.7
12.5_9	1/22/2009	1/22/2009	7.5	40	0.1	5/30/2009	864.8	21.5	39.8	69.0	91.0	0.0	0.6	-0.9	3.8	15.6	0.8
12.5_9	1/22/2009	1/22/2009	7.5	40	0.01	5/30/2009	675.8	17.6	40.0	69.0	90.0	0.0	0.6	6.4	4.6	14.5	1.1

Table C21. Lab 3 prefabricated core unconfined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_4	10/06/09	10/06/09	7.1	4	10	12/9/2009	14903.0	11.4	3.6	0.6	100.0	0.2	1.3	-55.4	1.9	5.3	0.2
12.5_4	10/06/09	10/06/09	7.1	4	1	12/9/2009	10817.0	15.1	3.6	0.7	100.0	0.1	0.4	-79.4	1.7	5.6	0.3
12.5_4	10/06/09	10/06/09	7.1	4	0.1	12/9/2009	7263.0	19.2	3.6	0.8	101.0	0.0	0.6	-113.4	2.5	7.6	0.6
12.5_4	10/06/09	10/06/09	7.1	4	0.01	12/9/2009	4793.0	22.0	3.6	0.8	94.0	0.0	0.5	-85.6	2.0	10.8	1.0
12.5_4	10/06/09	10/06/09	7.1	20	10	12/11/2009	7191.0	21.0	20.0	0.7	94.0	0.3	1.9	-184.9	5.0	3.1	0.5
12.5_4	10/06/09	10/06/09	7.1	20	1	12/11/2009	4214.0	25.1	20.0	0.6	95.0	0.1	0.5	-165.9	3.8	6.0	0.5
12.5_4	10/06/09	10/06/09	7.1	20	0.1	12/11/2009	2221.0	27.6	19.9	0.7	96.0	0.0	0.6	-133.3	2.6	7.7	0.4
12.5_4	10/06/09	10/06/09	7.1	20	0.01	12/11/2009	1088.0	26.8	19.9	0.7	106.0	0.0	0.5	-66.2	3.4	10.9	0.1
12.5_4	10/06/09	10/06/09	7.1	40	10	12/14/2009	2038.0	30.2	40.0	0.7	90.0	0.1	3.9	-143.8	5.0	8.7	0.8
12.5_4	10/06/09	10/06/09	7.1	40	1	12/14/2009	875.4	29.8	39.9	0.5	95.0	0.3	1.3	-88.2	4.1	11.3	0.7
12.5_4	10/06/09	10/06/09	7.1	40	0.1	12/14/2009	430.4	25.3	40.1	0.5	93.0	-0.1	0.5	-91.3	4.9	15.5	0.6
12.5_4	10/06/09	10/06/09	7.1	40	0.01	12/14/2009	275.2	19.3	40.0	0.5	98.0	0.0	0.7	-133.6	6.6	20.8	0.6
12.5_6	10/06/09	10/06/09	6.9	4	10	12/9/2009	15589.0	10.6	3.6	0.7	97.0	0.2	1.3	-47.1	1.9	3.0	0.5
12.5_6	10/06/09	10/06/09	6.9	4	1	12/9/2009	11625.0	14.2	3.6	0.8	100.0	0.0	0.4	-70.6	1.6	3.9	0.4
12.5_6	10/06/09	10/06/09	6.9	4	0.1	12/9/2009	7964.0	18.4	3.7	0.8	102.0	0.0	0.6	-110.1	2.3	5.0	0.5
12.5_6	10/06/09	10/06/09	6.9	4	0.01	12/9/2009	5066.0	22.0	3.7	0.8	98.0	0.0	0.5	-106.5	1.8	5.5	0.3
12.5_6	10/06/09	10/06/09	6.9	20	10	12/11/2009	7092.0	20.9	19.9	0.7	93.0	0.3	1.9	-173.8	4.4	8.1	0.3
12.5_6	10/06/09	10/06/09	6.9	20	1	12/11/2009	4133.0	25.3	19.8	0.7	96.0	0.1	0.5	-186.2	3.7	8.5	0.4
12.5_6	10/06/09	10/06/09	6.9	20	0.1	12/11/2009	2189.0	27.8	19.9	0.7	96.0	0.0	0.6	-170.5	3.7	8.4	0.8
12.5_6	10/06/09	10/06/09	6.9	20	0.01	12/11/2009	1105.0	27.3	19.9	0.7	103.0	0.0	0.5	-110.1	3.5	6.4	0.9
12.5_6	10/06/09	10/06/09	6.9	40	10	12/14/2009	2067.0	29.8	40.1	0.5	90.0	0.1	3.7	-173.8	5.1	3.6	1.0
12.5_6	10/06/09	10/06/09	6.9	40	1	12/14/2009	904.0	29.5	40.2	0.4	95.0	0.4	1.8	-130.0	4.8	7.3	1.8
12.5_6	10/06/09	10/06/09	6.9	40	0.1	12/14/2009	456.3	25.4	40.0	0.4	91.0	-0.1	0.5	-124.0	5.4	11.8	2.1
12.5_6	10/06/09	10/06/09	6.9	40	0.01	12/14/2009	291.2	20.0	40.1	0.4	99.0	0.0	0.7	-214.9	7.1	12.5	2.7
12.5_8	10/06/09	10/06/09	6.7	4	10	12/10/2009	15609.0	10.6	3.7	0.9	95.0	0.2	1.3	-47.8	1.9	15.6	0.3
12.5_8	10/06/09	10/06/09	6.7	4	1	12/10/2009	11670.0	14.4	3.5	0.9	99.0	0.0	0.4	-75.6	1.7	8.2	0.8
12.5_8	10/06/09	10/06/09	6.7	4	0.1	12/10/2009	7839.0	19.0	3.5	0.9	101.0	0.0	0.7	-120.9	2.2	3.5	1.0
12.5_8	10/06/09	10/06/09	6.7	4	0.01	12/10/2009	4944.0	23.0	3.5	0.9	97.0	0.0	0.5	-104.1	1.7	0.4	0.9
12.5_8	10/06/09	10/06/09	6.7	20	10	12/11/2009	7006.0	21.8	20.0	0.8	93.0	0.3	2.2	-203.0	5.0	5.9	1.3
12.5_8	10/06/09	10/06/09	6.7	20	1	12/11/2009	3957.0	26.9	20.0	0.8	95.0	0.1	0.6	-200.8	4.2	5.1	1.5
12.5_8	10/06/09	10/06/09	6.7	20	0.1	12/11/2009	1969.0	29.7	19.9	0.8	97.0	0.0	0.5	-144.8	2.7	7.8	0.8
12.5_8	10/06/09	10/06/09	6.7	20	0.01	12/11/2009	927.9	28.7	19.9	0.7	105.0	0.0	0.6	-68.6	3.1	11.2	0.4
12.5_8	10/06/09	10/06/09	6.7	40	10	12/14/2009	1938.0	31.8	40.2	0.6	88.0	-0.3	4.3	-151.4	5.3	8.0	0.8
12.5_8	10/06/09	10/06/09	6.7	40	1	12/14/2009	802.3	30.9	40.2	0.5	96.0	0.5	2.4	-88.1	4.6	10.7	0.4
12.5_8	10/06/09	10/06/09	6.7	40	0.1	12/14/2009	389.8	25.5	40.1	0.4	94.0	0.0	0.4	-90.5	5.1	16.3	0.7
12.5_8	10/06/09	10/06/09	6.7	40	0.01	12/14/2009	243.3	19.5	40.1	0.4	101.0	0.1	0.8	-167.9	7.1	24.3	2.0

Table C22. Lab 3 prefabricated core confined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_4	10/06/09	10/06/09	7.1	4	10	[redacted]											
12.5_4	10/06/09	10/06/09	7.1	4	1												
12.5_4	10/06/09	10/06/09	7.1	4	0.1												
12.5_4	10/06/09	10/06/09	7.1	4	0.01												
12.5_4	10/06/09	10/06/09	7.1	20	10	12/2/2009	7663.0	20.0	20.2	69.0	98.0	0.2	1.3	-173.5	3.8	6.4	0.8
12.5_4	10/06/09	10/06/09	7.1	20	1	12/2/2009	4467.0	25.0	19.9	69.0	97.0	0.1	0.4	-215.7	3.3	8.6	1.1
12.5_4	10/06/09	10/06/09	7.1	20	0.1	12/2/2009	2350.0	28.6	20.0	69.0	98.0	0.0	0.7	-243.6	2.6	11.0	1.0
12.5_4	10/06/09	10/06/09	7.1	20	0.01	12/2/2009	1113.0	29.2	20.0	69.0	103.0	0.0	0.5	-165.5	3.3	12.6	0.5
12.5_4	10/06/09	10/06/09	7.1	40	10	12/7/2009	2639.0	28.2	40.2	68.9	90.0	0.5	2.2	-141.7	4.3	3.5	0.9
12.5_4	10/06/09	10/06/09	7.1	40	1	12/7/2009	1317.0	27.4	39.8	69.0	93.0	0.0	0.4	-56.2	2.7	3.6	0.6
12.5_4	10/06/09	10/06/09	7.1	40	0.1	12/7/2009	751.8	23.6	39.9	69.0	97.0	0.0	0.5	-30.2	3.2	2.7	0.7
12.5_4	10/06/09	10/06/09	7.1	40	0.01	12/7/2009	422.0	19.4	40.1	69.0	109.0	0.0	0.6	-32.2	5.2	3.4	0.8
12.5_6	10/06/09	10/06/09	6.9	4	10	[redacted]											
12.5_6	10/06/09	10/06/09	6.9	4	1												
12.5_6	10/06/09	10/06/09	6.9	4	0.1												
12.5_6	10/06/09	10/06/09	6.9	4	0.01												
12.5_6	10/06/09	10/06/09	6.9	20	10	12/2/2009	7089.0	20.5	20.3	69.4	96.0	0.4	1.6	-172.9	3.7	9.1	0.6
12.5_6	10/06/09	10/06/09	6.9	20	1	12/2/2009	4099.0	25.4	19.9	69.0	97.0	0.0	0.5	-216.3	3.4	9.7	0.7
12.5_6	10/06/09	10/06/09	6.9	20	0.1	12/2/2009	2158.0	28.6	20.0	69.0	97.0	0.0	0.6	-236.5	2.7	9.1	0.6
12.5_6	10/06/09	10/06/09	6.9	20	0.01	12/2/2009	1115.0	28.4	20.0	69.0	99.0	0.0	0.5	-141.7	3.3	7.5	0.5
12.5_6	10/06/09	10/06/09	6.9	40	10	12/4/2009	2176.0	29.7	39.9	69.3	90.0	0.3	2.2	-186.4	4.4	10.7	0.2
12.5_6	10/06/09	10/06/09	6.9	40	1	12/4/2009	1099.0	28.7	39.7	69.0	92.0	0.0	0.5	-119.8	2.9	9.8	0.3
12.5_6	10/06/09	10/06/09	6.9	40	0.1	12/4/2009	625.2	25.4	40.0	69.0	99.0	-0.2	0.5	-120.7	3.3	8.4	0.7
12.5_6	10/06/09	10/06/09	6.9	40	0.01	12/4/2009	422.6	21.1	40.1	69.0	87.0	0.0	0.7	-10.3	4.6	2.9	0.7
12.5_8	10/06/09	10/06/09	6.7	4	10	[redacted]											
12.5_8	10/06/09	10/06/09	6.7	4	1												
12.5_8	10/06/09	10/06/09	6.7	4	0.1												
12.5_8	10/06/09	10/06/09	6.7	4	0.01												
12.5_8	10/06/09	10/06/09	6.7	20	10	12/2/2009	7045.0	21.4	20.3	69.5	95.0	0.4	1.5	-202.3	4.2	14.5	0.5
12.5_8	10/06/09	10/06/09	6.7	20	1	12/2/2009	3986.0	26.8	20.0	69.0	97.0	0.1	0.4	-240.6	3.5	13.3	0.6
12.5_8	10/06/09	10/06/09	6.7	20	0.1	12/2/2009	2047.0	30.0	20.0	69.0	97.0	0.0	0.6	-245.0	2.9	11.6	0.8
12.5_8	10/06/09	10/06/09	6.7	20	0.01	12/2/2009	1103.0	28.3	20.0	69.0	95.0	0.0	0.5	-120.7	2.7	10.9	0.8
12.5_8	10/06/09	10/06/09	6.7	40	10	12/9/2009	2377.0	30.0	39.9	69.5	88.0	0.1	2.6	-142.8	4.6	13.6	0.6
12.5_8	10/06/09	10/06/09	6.7	40	1	12/9/2009	1179.0	27.9	39.9	69.0	92.0	0.0	0.4	-39.2	2.7	15.1	0.8
12.5_8	10/06/09	10/06/09	6.7	40	0.1	12/9/2009	768.4	22.0	39.4	69.0	91.0	0.0	0.5	2.5	2.8	15.2	1.2
12.5_8	10/06/09	10/06/09	6.7	40	0.01	12/9/2009	601.5	15.9	40.2	69.0	96.0	0.0	0.6	4.9	4.0	13.5	1.1

Table C23. Lab 4 prefabricated core unconfined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_5	10/27/09	10/27/09	7.0	4	10	3/12/2010	15344.0	9.8	4.3	1.5	91.0	0.2	2.2	-35.1	2.3	15.6	0.3
12.5_5	10/27/09	10/27/09	7.0	4	1	3/12/2010	11636.0	12.9	4.3	1.5	96.0	0.1	0.7	-59.6	1.6	19.2	0.7
12.5_5	10/27/09	10/27/09	7.0	4	0.1	3/12/2010	8091.0	16.7	4.2	1.5	100.0	0.1	0.8	-92.7	1.8	23.4	1.0
12.5_5	10/27/09	10/27/09	7.0	4	0.01	3/12/2010	5133.0	21.0	4.0	1.5	98.0	0.1	0.6	-113.6	1.6	24.9	1.2
12.5_5	10/27/09	10/27/09	7.0	20	10	3/16/2010	7535.0	19.1	20.2	1.5	93.0	0.3	3.9	-134.1	4.5	19.9	0.2
12.5_5	10/27/09	10/27/09	7.0	20	1	3/16/2010	4493.0	24.1	20.2	1.5	92.0	0.6	1.5	-188.1	3.5	20.6	0.2
12.5_5	10/27/09	10/27/09	7.0	20	0.1	3/16/2010	2377.0	28.3	20.0	1.5	92.0	0.6	2.1	-196.0	3.6	21.5	0.6
12.5_5	10/27/09	10/27/09	7.0	20	0.01	3/16/2010	1135.0	30.0	20.1	1.4	97.0	0.3	2.5	-128.1	3.2	21.7	0.9
12.5_5	10/27/09	10/27/09	7.0	40	10	3/19/2010	1975.0	31.6	39.6	1.1	87.0	-0.1	9.7	-296.4	10.2	18.1	0.8
12.5_5	10/27/09	10/27/09	7.0	40	1	3/19/2010	860.1	33.1	39.7	1.1	92.0	0.7	5.6	-185.7	6.5	18.5	1.0
12.5_5	10/27/09	10/27/09	7.0	40	0.1	3/19/2010	386.6	31.5	39.9	1.1	86.0	-0.2	6.6	-117.2	5.2	19.3	1.3
12.5_5	10/27/09	10/27/09	7.0	40	0.01	3/19/2010	195.6	25.7	40.0	1.1	93.0	-4.9	20.4	-41.7	6.4	18.9	0.9
12.5_7	10/27/09	10/27/09	7.2	4	10	3/12/2010	16921.0	9.3	4.3	1.5	90.0	0.2	2.7	-38.9	2.8	14.9	0.8
12.5_7	10/27/09	10/27/09	7.2	4	1	3/12/2010	12994.0	12.7	4.3	1.5	95.0	0.1	0.7	-63.3	1.7	16.4	1.2
12.5_7	10/27/09	10/27/09	7.2	4	0.1	3/12/2010	9172.0	16.8	4.2	1.5	99.0	0.1	0.8	-99.0	2.1	16.9	0.9
12.5_7	10/27/09	10/27/09	7.2	4	0.01	3/12/2010	6025.0	21.0	3.9	1.5	95.0	0.0	0.7	-106.2	1.8	15.5	0.4
12.5_7	10/27/09	10/27/09	7.2	20	10	3/16/2010	8680.0	18.5	20.0	1.5	94.0	0.3	3.8	-133.1	4.3	4.3	0.3
12.5_7	10/27/09	10/27/09	7.2	20	1	3/16/2010	5315.0	23.3	20.0	1.4	92.0	-0.2	1.4	-172.7	4.0	5.5	0.2
12.5_7	10/27/09	10/27/09	7.2	20	0.1	3/16/2010	2872.0	27.2	19.9	1.4	91.0	0.3	2.0	-153.8	4.3	7.3	0.2
12.5_7	10/27/09	10/27/09	7.2	20	0.01	3/16/2010	1404.0	28.4	19.8	1.4	98.0	-0.3	2.0	-88.5	3.5	7.6	0.6
12.5_7	10/27/09	10/27/09	7.2	40	10	3/19/2010	2392.0	30.5	39.9	1.1	85.0	-0.5	10.0	-269.7	10.8	12.3	0.4
12.5_7	10/27/09	10/27/09	7.2	40	1	3/19/2010	1033.0	31.1	40.0	1.1	91.0	0.1	7.9	-143.4	7.1	13.3	0.5
12.5_7	10/27/09	10/27/09	7.2	40	0.1	3/19/2010	443.5	28.6	39.9	1.1	89.0	-0.5	8.7	-75.8	5.7	15.8	0.4
12.5_7	10/27/09	10/27/09	7.2	40	0.01	3/19/2010	232.2	23.6	39.8	1.0	96.0	-1.9	16.9	-38.8	7.1	15.5	0.4
12.5_13	10/27/09	10/27/09	7.1	4	10	3/12/2010	16217.0	10.1	4.2	1.5	91.0	0.2	2.3	-37.9	2.7	9.5	1.1
12.5_13	10/27/09	10/27/09	7.1	4	1	3/12/2010	12247.0	13.6	4.2	1.5	96.0	0.0	0.7	-61.7	2.0	7.9	1.5
12.5_13	10/27/09	10/27/09	7.1	4	0.1	3/12/2010	8427.0	17.9	4.1	1.5	99.0	0.1	0.8	-94.8	2.6	8.7	1.1
12.5_13	10/27/09	10/27/09	7.1	4	0.01	3/12/2010	5338.0	22.0	3.9	1.5	96.0	0.0	0.7	-107.7	2.8	10.5	0.8
12.5_13	10/27/09	10/27/09	7.1	20	10	3/16/2010	7968.0	19.7	20.2	1.4	95.0	0.5	3.5	-140.9	4.3	4.3	0.4
12.5_13	10/27/09	10/27/09	7.1	20	1	3/16/2010	4760.0	24.5	20.1	1.4	92.0	0.2	1.7	-178.3	4.0	3.9	0.4
12.5_13	10/27/09	10/27/09	7.1	20	0.1	3/16/2010	2514.0	28.1	19.8	1.4	92.0	-0.5	2.2	-164.3	3.0	3.0	0.3
12.5_13	10/27/09	10/27/09	7.1	20	0.01	3/16/2010	1195.0	29.1	19.8	1.4	99.0	0.4	2.3	-108.1	3.7	0.8	0.4
12.5_13	10/27/09	10/27/09	7.1	40	10	3/19/2010	1965.0	31.3	40.1	1.0	91.0	0.1	9.3	-272.3	9.7	7.0	0.4
12.5_13	10/27/09	10/27/09	7.1	40	1	3/19/2010	839.6	32.0	40.1	1.0	92.0	1.4	7.7	-161.2	7.2	6.8	0.3
12.5_13	10/27/09	10/27/09	7.1	40	0.1	3/19/2010	366.8	29.7	40.0	1.0	87.0	-0.3	8.9	-84.5	6.2	9.4	0.5
12.5_13	10/27/09	10/27/09	7.1	40	0.01	3/19/2010	189.6	25.2	40.0	1.0	94.0	-0.1	20.0	-26.3	7.6	11.5	0.7

Table C24. Lab 4 prefabricated core confined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_5	10/27/09	10/27/09	7.0	4	10	[redacted]											
12.5_5	10/27/09	10/27/09	7.0	4	1												
12.5_5	10/27/09	10/27/09	7.0	4	0.1												
12.5_5	10/27/09	10/27/09	7.0	4	0.01												
12.5_5	10/27/09	10/27/09	7.0	20	10	3/3/2010	6860.0	24.8	19.6	69.0	95.0	0.4	3.0	-278.7	4.9	7.2	0.2
12.5_5	10/27/09	10/27/09	7.0	20	1	3/3/2010	3453.0	31.8	19.7	69.0	93.0	-0.5	1.9	-402.6	5.5	6.4	0.4
12.5_5	10/27/09	10/27/09	7.0	20	0.1	3/3/2010	1550.0	35.0	20.0	69.0	91.0	0.0	3.1	-394.3	5.5	5.2	0.7
12.5_5	10/27/09	10/27/09	7.0	20	0.01	3/3/2010	763.5	31.0	20.0	69.0	85.0	-0.1	2.5	-178.1	5.5	2.9	0.5
12.5_5	10/27/09	10/27/09	7.0	40	10	3/20/2010	2103.0	30.3	40.8	69.0	92.0	0.1	6.5	-247.2	7.8	6.8	0.9
12.5_5	10/27/09	10/27/09	7.0	40	1	3/20/2010	1031.0	30.0	41.2	69.0	94.0	-0.9	2.8	-129.1	4.6	10.2	1.5
12.5_5	10/27/09	10/27/09	7.0	40	0.1	3/20/2010	615.9	25.6	42.2	69.0	88.0	0.0	4.8	-83.1	4.2	15.2	1.7
12.5_5	10/27/09	10/27/09	7.0	40	0.01	3/20/2010	433.9	20.7	41.9	69.0	88.0	-0.9	7.6	-31.7	4.3	18.2	1.5
12.5_7	10/27/09	10/27/09	7.2	4	10	[redacted]											
12.5_7	10/27/09	10/27/09	7.2	4	1												
12.5_7	10/27/09	10/27/09	7.2	4	0.1												
12.5_7	10/27/09	10/27/09	7.2	4	0.01												
12.5_7	10/27/09	10/27/09	7.2	20	10	3/4/2010	8413.0	19.1	20.2	69.0	94.0	0.4	2.9	-146.2	4.2	16.0	0.4
12.5_7	10/27/09	10/27/09	7.2	20	1	3/4/2010	5076.0	24.1	20.2	69.0	93.0	0.0	1.3	-202.9	4.0	15.8	0.5
12.5_7	10/27/09	10/27/09	7.2	20	0.1	3/4/2010	2788.0	27.5	20.0	69.0	92.0	0.4	2.1	-191.5	4.0	14.7	0.7
12.5_7	10/27/09	10/27/09	7.2	20	0.01	3/4/2010	1550.0	27.3	20.1	69.0	91.0	-0.2	1.5	-95.7	2.9	12.7	1.2
12.5_7	10/27/09	10/27/09	7.2	40	10	3/20/2010	2527.0	28.5	39.7	69.0	94.0	0.5	5.8	-200.3	7.2	6.1	0.5
12.5_7	10/27/09	10/27/09	7.2	40	1	3/20/2010	1285.0	27.3	39.8	69.0	94.0	0.5	3.9	-96.3	4.1	5.2	1.3
12.5_7	10/27/09	10/27/09	7.2	40	0.1	3/20/2010	811.0	22.4	40.4	69.0	90.0	0.1	4.8	-59.9	4.4	6.5	1.6
12.5_7	10/27/09	10/27/09	7.2	40	0.01	3/20/2010	692.4	16.6	40.5	69.0	82.0	-0.8	6.2	-15.5	4.2	7.6	1.3
12.5_13	10/27/09	10/27/09	7.1	4	10	[redacted]											
12.5_13	10/27/09	10/27/09	7.1	4	1												
12.5_13	10/27/09	10/27/09	7.1	4	0.1												
12.5_13	10/27/09	10/27/09	7.1	4	0.01												
12.5_13	10/27/09	10/27/09	7.1	20	10	3/5/2010	7695.0	19.7	19.5	69.0	94.0	0.3	3.8	-140.6	4.6	18.2	0.9
12.5_13	10/27/09	10/27/09	7.1	20	1	3/5/2010	4575.0	24.5	19.2	69.0	92.0	-0.4	1.7	-180.3	3.7	19.1	1.1
12.5_13	10/27/09	10/27/09	7.1	20	0.1	3/5/2010	2424.0	27.9	20.0	69.0	92.0	0.1	2.3	-181.6	5.0	20.2	0.8
12.5_13	10/27/09	10/27/09	7.1	20	0.01	3/5/2010	1229.0	28.4	20.0	69.0	95.0	0.5	1.9	-99.3	5.9	22.0	0.7
12.5_13	10/27/09	10/27/09	7.1	40	10	3/20/2010	2154.0	29.9	39.5	69.0	94.0	-0.4	6.5	-223.5	7.4	6.2	0.4
12.5_13	10/27/09	10/27/09	7.1	40	1	3/20/2010	1080.0	28.8	39.5	69.0	92.0	0.6	5.2	-117.2	5.0	6.0	0.7
12.5_13	10/27/09	10/27/09	7.1	40	0.1	3/20/2010	676.8	24.2	39.7	69.0	89.0	0.0	5.5	-76.5	4.3	6.3	1.2
12.5_13	10/27/09	10/27/09	7.1	40	0.01	3/20/2010	525.5	18.9	39.9	69.0	87.0	-1.4	7.1	-33.3	4.1	7.0	1.3

Table C25. Lab 5 prefabricated core unconfined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_2	12/21/09	12/21/09	7.3	4	10	2/16/2010	15416.0	10.5	4.0	0.8	94.0	0.1	1.8	-48.5	2.0	5.7	0.3
12.5_2	12/21/09	12/21/09	7.3	4	1	2/16/2010	11536.0	13.8	4.0	0.8	98.0	-0.1	0.4	-71.6	1.7	6.5	0.2
12.5_2	12/21/09	12/21/09	7.3	4	0.1	2/16/2010	7925.0	18.0	3.8	0.7	99.0	0.0	0.2	-111.8	2.1	6.1	0.3
12.5_2	12/21/09	12/21/09	7.3	4	0.01	2/16/2010	5209.0	21.8	3.9	0.7	93.0	0.0	0.3	-130.0	2.4	5.3	0.5
12.5_2	12/21/09	12/21/09	7.3	20	10	2/17/2010	7786.0	19.0	20.0	0.8	93.0	0.2	1.9	-144.8	4.1	2.8	0.3
12.5_2	12/21/09	12/21/09	7.3	20	1	2/17/2010	4732.0	23.1	20.0	0.7	95.0	0.2	0.5	-142.4	3.3	2.3	0.3
12.5_2	12/21/09	12/21/09	7.3	20	0.1	2/17/2010	2575.0	26.4	20.0	0.7	92.0	0.0	0.2	-132.8	2.7	2.4	0.3
12.5_2	12/21/09	12/21/09	7.3	20	0.01	2/17/2010	1280.0	28.3	20.1	0.7	99.0	0.0	0.5	-110.3	3.7	2.2	0.5
12.5_2	12/21/09	12/21/09	7.3	40	10	2/23/2010	2289.0	28.2	40.6	0.2	84.0	-0.5	5.2	-236.4	7.1	6.4	0.5
12.5_2	12/21/09	12/21/09	7.3	40	1	2/23/2010	1064.0	28.2	40.6	0.2	91.0	0.3	1.6	-135.1	5.0	9.0	0.3
12.5_2	12/21/09	12/21/09	7.3	40	0.1	2/23/2010	521.7	25.1	40.5	0.2	88.0	-0.4	1.1	-109.7	5.3	8.5	0.4
12.5_2	12/21/09	12/21/09	7.3	40	0.01	2/23/2010	334.6	19.6	39.9	0.2	94.0	0.0	0.7	-145.8	7.4	2.9	1.1
12.5_4	12/21/09	12/21/09	7.4	4	10	2/16/2010	15013.0	10.0	4.0	0.8	95.0	0.1	1.7	-45.2	2.2	11.2	0.5
12.5_4	12/21/09	12/21/09	7.4	4	1	2/16/2010	11298.0	13.2	4.0	0.8	99.0	0.0	0.4	-64.3	1.8	10.6	0.3
12.5_4	12/21/09	12/21/09	7.4	4	0.1	2/16/2010	7859.0	17.2	4.0	0.8	100.0	0.0	0.2	-101.6	2.2	10.6	0.6
12.5_4	12/21/09	12/21/09	7.4	4	0.01	2/16/2010	5160.0	21.0	3.9	0.7	95.0	0.0	0.3	-117.3	2.4	11.5	0.8
12.5_4	12/21/09	12/21/09	7.4	20	10	2/18/2010	7164.0	19.6	20.3	0.8	95.0	0.2	2.0	-169.3	4.4	17.2	0.3
12.5_4	12/21/09	12/21/09	7.4	20	1	2/18/2010	4272.0	24.3	20.3	0.7	95.0	0.1	0.5	-196.1	4.0	17.2	0.3
12.5_4	12/21/09	12/21/09	7.4	20	0.1	2/18/2010	2321.0	27.9	20.3	0.7	90.0	0.1	0.2	-218.5	4.2	18.2	0.5
12.5_4	12/21/09	12/21/09	7.4	20	0.01	2/18/2010	1192.0	29.1	20.2	0.7	94.0	0.0	0.5	-170.3	3.4	18.7	0.7
12.5_4	12/21/09	12/21/09	7.4	40	10	2/19/2010	2052.0	29.6	40.2	0.0	83.0	-0.7	4.6	-283.7	7.4	14.2	1.0
12.5_4	12/21/09	12/21/09	7.4	40	1	2/19/2010	951.2	30.0	40.2	0.0	90.0	0.1	1.5	-196.7	4.8	12.1	1.3
12.5_4	12/21/09	12/21/09	7.4	40	0.1	2/19/2010	475.0	27.0	40.0	0.0	86.0	0.1	1.2	-162.9	5.3	9.7	1.9
12.5_4	12/21/09	12/21/09	7.4	40	0.01	2/19/2010	306.5	22.3	38.9	0.6	91.0	0.0	0.8	-181.3	8.2	7.1	2.4
12.5_8	12/21/09	12/21/09	7.2	4	10	2/16/2010	15812.0	9.9	4.0	0.8	92.0	0.0	1.8	-43.0	2.2	7.7	0.3
12.5_8	12/21/09	12/21/09	7.2	4	1	2/16/2010	12011.0	13.0	3.9	0.8	98.0	0.1	0.4	-63.7	1.6	8.2	0.0
12.5_8	12/21/09	12/21/09	7.2	4	0.1	2/16/2010	8413.0	17.1	3.9	0.8	100.0	0.0	0.2	-101.1	2.1	8.1	0.3
12.5_8	12/21/09	12/21/09	7.2	4	0.01	2/16/2010	5501.0	21.0	3.9	0.7	96.0	0.0	0.3	-114.6	2.1	7.7	0.5
12.5_8	12/21/09	12/21/09	7.2	20	10	2/18/2010	7717.0	19.1	20.1	0.8	93.0	0.5	2.2	-151.6	4.3	3.1	0.5
12.5_8	12/21/09	12/21/09	7.2	20	1	2/18/2010	4716.0	23.2	20.1	0.7	95.0	0.1	0.5	-147.7	3.4	2.7	0.8
12.5_8	12/21/09	12/21/09	7.2	20	0.1	2/18/2010	2584.0	26.2	20.1	0.7	92.0	0.0	0.2	-132.4	3.0	2.6	1.0
12.5_8	12/21/09	12/21/09	7.2	20	0.01	2/18/2010	1323.0	26.7	20.1	0.7	98.0	0.0	0.4	-93.0	3.7	3.5	1.0
12.5_8	12/21/09	12/21/09	7.2	40	10	2/19/2010	2188.0	27.7	39.7	0.3	82.0	0.7	4.4	-200.3	6.5	9.4	0.2
12.5_8	12/21/09	12/21/09	7.2	40	1	2/19/2010	1041.0	26.4	39.7	0.4	91.0	0.2	1.3	-110.7	4.5	8.3	0.4
12.5_8	12/21/09	12/21/09	7.2	40	0.1	2/19/2010	541.1	22.3	39.7	0.3	87.0	-0.1	1.0	-91.5	5.7	8.9	0.8
12.5_8	12/21/09	12/21/09	7.2	40	0.01	2/19/2010	372.3	17.0	39.8	0.3	95.0	-0.2	0.7	-134.2	7.9	10.9	1.2

Table C26. Lab 5 prefabricated core confined dynamic modulus test data for the 12.5-mm mixture

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_2	12/21/09	12/21/09	7.3	4	10	[redacted]											
12.5_2	12/21/09	12/21/09	7.3	4	1												
12.5_2	12/21/09	12/21/09	7.3	4	0.1												
12.5_2	12/21/09	12/21/09	7.3	4	0.01												
12.5_2	12/21/09	12/21/09	7.3	20	10	3/30/2010	7077.0	18.9	20.2	69.0	86.0	0.1	3.6	-154.9	6.1	41.8	1.0
12.5_2	12/21/09	12/21/09	7.3	20	1	3/30/2010	4363.0	23.4	20.0	69.0	90.0	0.3	0.7	-168.8	5.7	39.3	0.8
12.5_2	12/21/09	12/21/09	7.3	20	0.1	3/30/2010	2445.0	26.4	20.0	69.0	86.0	0.0	0.2	-167.6	5.7	40.0	0.9
12.5_2	12/21/09	12/21/09	7.3	20	0.01	3/30/2010	1320.0	26.7	19.9	69.0	94.0	0.0	0.5	-95.3	5.3	40.1	0.7
12.5_2	12/21/09	12/21/09	7.3	40	10	4/1/2010	2493.0	28.3	40.2	69.0	86.0	1.0	3.4	-240.2	7.1	4.4	1.2
12.5_2	12/21/09	12/21/09	7.3	40	1	4/1/2010	1226.0	28.0	40.1	69.0	91.0	-0.1	0.7	-140.2	3.9	4.9	1.6
12.5_2	12/21/09	12/21/09	7.3	40	0.1	4/1/2010	633.9	25.3	39.7	69.0	87.0	0.2	0.4	-105.5	4.7	7.2	1.7
12.5_2	12/21/09	12/21/09	7.3	40	0.01	4/1/2010	409.7	20.5	39.7	69.0	93.0	0.0	0.6	-102.9	5.9	11.2	1.5
12.5_4	12/21/09	12/21/09	7.4	4	10	[redacted]											
12.5_4	12/21/09	12/21/09	7.4	4	1												
12.5_4	12/21/09	12/21/09	7.4	4	0.1												
12.5_4	12/21/09	12/21/09	7.4	4	0.01												
12.5_4	12/21/09	12/21/09	7.4	20	10	3/29/2010	7375.0	19.1	20.3	69.0	95.0	0.1	2.1	-150.8	4.2	7.1	0.5
12.5_4	12/21/09	12/21/09	7.4	20	1	3/29/2010	4536.0	22.9	20.0	69.0	95.0	0.0	0.4	-151.4	3.4	5.5	0.7
12.5_4	12/21/09	12/21/09	7.4	20	0.1	3/29/2010	2546.0	25.3	20.0	69.0	92.0	0.0	0.2	-144.9	3.8	5.1	0.9
12.5_4	12/21/09	12/21/09	7.4	20	0.01	3/29/2010	1396.0	25.3	19.9	69.0	95.0	0.0	0.5	-63.5	3.5	6.1	0.7
12.5_4	12/21/09	12/21/09	7.4	40	10	4/1/2010	2542.0	26.4	39.9	69.0	86.0	0.5	3.5	-184.7	6.1	8.6	0.4
12.5_4	12/21/09	12/21/09	7.4	40	1	4/1/2010	1343.0	25.1	40.0	69.0	92.0	0.2	0.6	-82.1	3.3	8.7	0.8
12.5_4	12/21/09	12/21/09	7.4	40	0.1	4/1/2010	741.3	22.2	39.7	69.0	97.0	0.0	0.4	-61.3	4.2	7.6	0.9
12.5_4	12/21/09	12/21/09	7.4	40	0.01	4/1/2010	452.8	18.0	39.7	69.0	98.0	0.0	0.6	-49.2	6.4	10.0	0.7
12.5_8	12/21/09	12/21/09	7.2	4	10	[redacted]											
12.5_8	12/21/09	12/21/09	7.2	4	1												
12.5_8	12/21/09	12/21/09	7.2	4	0.1												
12.5_8	12/21/09	12/21/09	7.2	4	0.01												
12.5_8	12/21/09	12/21/09	7.2	20	10	3/29/2010	7539.0	18.9	20.2	69.0	93.0	0.2	2.1	-150.1	4.2	9.0	0.8
12.5_8	12/21/09	12/21/09	7.2	20	1	3/29/2010	4611.0	22.9	20.0	69.0	95.0	0.2	0.5	-149.1	3.3	10.4	0.8
12.5_8	12/21/09	12/21/09	7.2	20	0.1	3/29/2010	2553.0	25.6	20.0	69.0	92.0	0.0	0.3	-131.6	3.8	12.7	0.9
12.5_8	12/21/09	12/21/09	7.2	20	0.01	3/29/2010	1360.0	25.6	19.9	69.0	96.0	0.0	0.4	-52.8	3.1	15.6	0.9
12.5_8	12/21/09	12/21/09	7.2	40	10	4/1/2010	2422.0	27.7	40.1	69.0	84.0	0.7	3.5	-207.9	6.8	17.1	0.6
12.5_8	12/21/09	12/21/09	7.2	40	1	4/1/2010	1180.0	27.1	40.0	69.0	91.0	0.1	0.7	-89.1	3.8	20.3	0.7
12.5_8	12/21/09	12/21/09	7.2	40	0.1	4/1/2010	612.8	24.0	39.9	69.0	88.0	0.1	0.4	-37.2	4.5	23.4	1.0
12.5_8	12/21/09	12/21/09	7.2	40	0.01	4/1/2010	380.5	19.4	39.7	69.0	98.0	-0.2	0.6	-18.5	6.2	24.3	1.0

Table C27. Lab 6 prefabricated core unconfined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_2	11/24/09	11/24/09	7.4	4	10	2/8/2010	15534.0	10.1	3.9	0.4	96.0	0.4	1.4	-40.2	1.8	11.5	0.5
12.5_2	11/24/09	11/24/09	7.4	4	1	2/8/2010	11743.0	13.2	3.9	0.3	99.0	0.0	0.4	-60.8	1.4	12.3	0.6
12.5_2	11/24/09	11/24/09	7.4	4	0.1	2/8/2010	8184.0	17.2	3.8	0.2	103.0	0.0	0.3	-93.2	1.7	12.7	0.6
12.5_2	11/24/09	11/24/09	7.4	4	0.01	2/8/2010	5418.0	20.6	3.9	0.3	98.0	0.0	0.3	-96.4	1.5	12.6	0.6
12.5_2	11/24/09	11/24/09	7.4	20	10	2/10/2010	7696.0	19.1	20.1	0.2	96.0	0.3	2.1	-137.6	3.7	2.4	0.1
12.5_2	11/24/09	11/24/09	7.4	20	1	2/10/2010	4684.0	23.3	20.1	0.2	95.0	0.1	0.6	-155.3	3.1	2.6	0.3
12.5_2	11/24/09	11/24/09	7.4	20	0.1	2/10/2010	2595.0	26.2	20.1	0.2	98.0	0.0	0.2	-155.2	3.0	3.1	0.8
12.5_2	11/24/09	11/24/09	7.4	20	0.01	2/10/2010	1334.0	26.8	20.0	0.1	103.0	0.0	0.4	-98.3	3.3	5.1	1.1
12.5_2	11/24/09	11/24/09	7.4	40	10	2/11/2010	2196.0	29.1	40.0	0.2	82.0	0.3	4.9	-280.5	9.1	8.7	0.2
12.5_2	11/24/09	11/24/09	7.4	40	1	2/11/2010	1045.0	28.5	40.1	0.2	92.0	0.3	1.4	-167.7	4.7	11.5	0.6
12.5_2	11/24/09	11/24/09	7.4	40	0.1	2/11/2010	531.0	25.1	39.9	0.2	92.0	-0.1	0.4	-146.9	5.5	15.1	1.4
12.5_2	11/24/09	11/24/09	7.4	40	0.01	2/11/2010	335.6	19.9	39.9	0.0	99.0	0.1	0.5	-219.4	7.5	19.9	1.3
12.5_5	11/24/09	11/24/09	7.4	4	10	2/8/2010	15736.0	10.1	4.0	0.3	96.0	0.3	1.3	-40.2	1.8	6.4	0.1
12.5_5	11/24/09	11/24/09	7.4	4	1	2/8/2010	11945.0	13.3	4.0	0.3	98.0	0.0	0.4	-62.0	1.6	6.1	0.0
12.5_5	11/24/09	11/24/09	7.4	4	0.1	2/8/2010	8341.0	17.2	4.0	0.3	102.0	0.0	0.3	-92.8	1.9	5.3	0.1
12.5_5	11/24/09	11/24/09	7.4	4	0.01	2/8/2010	5556.0	20.5	3.9	0.3	98.0	0.0	0.3	-87.2	1.6	3.7	0.4
12.5_5	11/24/09	11/24/09	7.4	20	10	2/10/2010	7522.0	19.7	19.8	0.3	95.0	0.3	2.3	-148.8	4.2	6.3	0.4
12.5_5	11/24/09	11/24/09	7.4	20	1	2/10/2010	4541.0	23.7	19.8	0.3	94.0	0.1	0.6	-154.1	3.4	7.2	0.4
12.5_5	11/24/09	11/24/09	7.4	20	0.1	2/10/2010	2501.0	26.3	20.0	0.3	97.0	0.0	0.2	-131.5	3.0	7.6	0.7
12.5_5	11/24/09	11/24/09	7.4	20	0.01	2/10/2010	1303.0	26.5	19.9	0.2	103.0	0.0	0.4	-59.0	3.4	6.7	1.1
12.5_5	11/24/09	11/24/09	7.4	40	10	2/11/2010	2177.0	29.3	40.2	0.0	81.0	0.3	5.0	-251.5	9.2	6.5	0.6
12.5_5	11/24/09	11/24/09	7.4	40	1	2/11/2010	1026.0	28.4	40.1	0.0	92.0	0.2	1.4	-114.8	4.5	4.8	1.1
12.5_5	11/24/09	11/24/09	7.4	40	0.1	2/11/2010	520.4	24.5	39.9	0.0	93.0	0.1	0.4	-94.0	5.3	4.0	1.6
12.5_5	11/24/09	11/24/09	7.4	40	0.01	2/11/2010	331.3	18.5	40.0	0.0	100.0	0.2	0.5	-141.8	7.7	6.5	1.5
12.5_7	11/24/09	11/24/09	7.2	4	10	2/9/2010	14758.0	10.0	4.0	0.3	97.0	0.1	1.3	-39.4	1.7	10.5	0.1
12.5_7	11/24/09	11/24/09	7.2	4	1	2/9/2010	11194.0	13.1	4.0	0.3	98.0	0.0	0.4	-60.0	1.4	11.3	0.2
12.5_7	11/24/09	11/24/09	7.2	4	0.1	2/9/2010	7827.0	17.1	4.0	0.3	102.0	0.0	0.3	-91.6	1.7	12.1	0.3
12.5_7	11/24/09	11/24/09	7.2	4	0.01	2/9/2010	5177.0	20.6	3.9	0.3	98.0	0.0	0.3	-88.3	1.8	12.8	0.3
12.5_7	11/24/09	11/24/09	7.2	20	10	2/10/2010	7064.0	19.9	20.0	0.4	95.0	0.3	2.6	-152.1	4.2	2.0	0.3
12.5_7	11/24/09	11/24/09	7.2	20	1	2/10/2010	4229.0	24.2	20.1	0.4	94.0	0.1	0.6	-166.3	3.4	2.9	0.4
12.5_7	11/24/09	11/24/09	7.2	20	0.1	2/10/2010	2298.0	27.0	19.9	0.2	97.0	0.0	0.2	-139.9	2.9	4.1	0.5
12.5_7	11/24/09	11/24/09	7.2	20	0.01	2/10/2010	1166.0	27.3	19.9	0.2	103.0	0.0	0.4	-59.5	3.2	5.8	0.4
12.5_7	11/24/09	11/24/09	7.2	40	10	2/11/2010	2073.0	29.2	40.0	0.3	82.0	0.2	5.2	-245.3	8.9	2.7	0.6
12.5_7	11/24/09	11/24/09	7.2	40	1	2/11/2010	973.6	28.1	40.0	0.2	93.0	0.3	1.6	-118.4	4.4	5.9	0.3
12.5_7	11/24/09	11/24/09	7.2	40	0.1	2/11/2010	501.0	23.8	39.6	0.1	93.0	0.1	0.4	-102.0	5.0	9.1	0.0
12.5_7	11/24/09	11/24/09	7.2	40	0.01	2/11/2010	327.2	17.8	39.9	0.0	99.0	0.0	0.5	-167.3	7.1	13.6	0.2

Table C28. Lab 6 prefabricated core confined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_2	11/24/09	11/24/09	7.4	4	10	[redacted]											
12.5_2	11/24/09	11/24/09	7.4	4	1												
12.5_2	11/24/09	11/24/09	7.4	4	0.1												
12.5_2	11/24/09	11/24/09	7.4	4	0.01												
12.5_2	11/24/09	11/24/09	7.4	20	10	2/5/2010	7817.0	19.5	20.1	69.0	97.0	0.5	1.8	-146.7	3.6	5.1	0.6
12.5_2	11/24/09	11/24/09	7.4	20	1	2/5/2010	4658.0	24.0	19.9	69.0	97.0	0.1	0.5	-179.7	2.9	6.6	0.8
12.5_2	11/24/09	11/24/09	7.4	20	0.1	2/5/2010	2548.0	26.9	19.9	69.0	99.0	0.0	0.2	-219.3	3.2	9.0	1.4
12.5_2	11/24/09	11/24/09	7.4	20	0.01	2/5/2010	1392.0	26.9	19.8	69.0	98.0	0.0	0.4	-162.9	2.8	15.4	2.3
12.5_2	11/24/09	11/24/09	7.4	40	10	2/5/2010	2363.0	29.8	40.3	69.0	91.0	0.6	3.1	-326.0	8.5	4.7	0.7
12.5_2	11/24/09	11/24/09	7.4	40	1	2/5/2010	1160.0	29.7	40.3	69.0	91.0	0.1	0.8	-204.9	4.1	4.3	1.3
12.5_2	11/24/09	11/24/09	7.4	40	0.1	2/5/2010	628.2	26.8	40.2	69.0	91.0	0.0	0.4	-154.7	4.6	4.5	1.7
12.5_2	11/24/09	11/24/09	7.4	40	0.01	2/5/2010	409.9	23.0	40.1	69.0	94.0	-0.1	0.5	-119.8	5.4	4.2	1.1
12.5_5	11/24/09	11/24/09	7.4	4	10	[redacted]											
12.5_5	11/24/09	11/24/09	7.4	4	1												
12.5_5	11/24/09	11/24/09	7.4	4	0.1												
12.5_5	11/24/09	11/24/09	7.4	4	0.01												
12.5_5	11/24/09	11/24/09	7.4	20	10	2/5/2010	7466.0	19.5	20.0	69.0	96.0	0.5	1.7	-148.9	3.6	18.6	0.1
12.5_5	11/24/09	11/24/09	7.4	20	1	2/5/2010	4477.0	24.1	19.9	69.0	96.0	0.1	0.5	-178.7	3.2	17.1	0.3
12.5_5	11/24/09	11/24/09	7.4	20	0.1	2/5/2010	2454.0	27.4	19.8	69.0	98.0	0.0	0.2	-186.3	3.5	15.4	0.6
12.5_5	11/24/09	11/24/09	7.4	20	0.01	2/5/2010	1348.0	27.4	19.8	69.0	97.0	0.0	0.4	-98.6	3.2	14.2	0.9
12.5_5	11/24/09	11/24/09	7.4	40	10	2/5/2010	2363.0	28.8	40.2	69.0	92.0	0.8	3.1	-281.3	7.9	7.6	0.3
12.5_5	11/24/09	11/24/09	7.4	40	1	2/5/2010	1196.0	28.3	40.2	69.0	93.0	0.1	0.8	-151.9	3.6	6.6	0.8
12.5_5	11/24/09	11/24/09	7.4	40	0.1	2/5/2010	664.4	25.5	39.9	69.0	93.0	0.0	0.3	-89.6	4.4	5.1	1.2
12.5_5	11/24/09	11/24/09	7.4	40	0.01	2/5/2010	448.7	20.4	40.1	69.0	96.0	0.1	0.5	-56.0	6.0	5.0	1.2
12.5_7	11/24/09	11/24/09	7.2	4	10	[redacted]											
12.5_7	11/24/09	11/24/09	7.2	4	1												
12.5_7	11/24/09	11/24/09	7.2	4	0.1												
12.5_7	11/24/09	11/24/09	7.2	4	0.01												
12.5_7	11/24/09	11/24/09	7.2	20	10	2/5/2010	7103.0	19.9	20.1	69.1	96.0	0.4	1.7	-155.8	3.6	16.9	0.2
12.5_7	11/24/09	11/24/09	7.2	20	1	2/5/2010	4227.0	24.5	19.9	69.0	96.0	0.1	0.5	-188.9	3.3	16.3	0.3
12.5_7	11/24/09	11/24/09	7.2	20	0.1	2/5/2010	2299.0	27.9	19.7	69.0	99.0	0.0	0.2	-202.9	3.7	15.3	0.7
12.5_7	11/24/09	11/24/09	7.2	20	0.01	2/5/2010	1234.0	27.7	19.8	69.0	97.0	0.0	0.4	-108.3	3.2	15.3	0.8
12.5_7	11/24/09	11/24/09	7.2	40	10	2/5/2010	2222.0	29.5	40.1	69.0	92.0	0.7	2.9	-288.7	8.0	12.5	0.6
12.5_7	11/24/09	11/24/09	7.2	40	1	2/5/2010	1145.0	28.2	40.1	69.0	92.0	0.1	0.7	-135.5	3.5	13.6	0.7
12.5_7	11/24/09	11/24/09	7.2	40	0.1	2/5/2010	620.3	25.7	40.1	69.0	103.0	0.1	0.3	-124.2	3.5	14.0	0.8
12.5_7	11/24/09	11/24/09	7.2	40	0.01	2/5/2010	395.0	20.9	40.2	69.0	96.0	0.1	0.5	-54.8	4.6	14.8	0.9

Table C29. Lab 7 prefabricated core unconfined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_3	01/27/10	01/27/10	7.6	4	10	4/14/2010	13933.0	11.0	4.0	1.6	85.0	0.4	2.2	-52.1	3.1	4.3	0.3
12.5_3	01/27/10	01/27/10	7.6	4	1	4/14/2010	10278.0	14.6	3.9	1.6	98.0	0.1	0.6	-76.5	2.7	6.0	0.2
12.5_3	01/27/10	01/27/10	7.6	4	0.1	4/14/2010	6935.0	18.9	4.0	1.5	102.0	0.0	0.2	-106.7	2.9	7.8	0.4
12.5_3	01/27/10	01/27/10	7.6	4	0.01	4/14/2010	4394.0	22.4	3.9	1.6	98.0	0.0	0.4	-90.2	1.5	9.6	0.4
12.5_3	01/27/10	01/27/10	7.6	20	10	4/14/2010	6633.0	20.6	20.0	1.6	91.0	0.0	3.5	-153.4	4.9	5.2	0.3
12.5_3	01/27/10	01/27/10	7.6	20	1	4/14/2010	3878.0	25.1	20.0	1.5	93.0	0.1	0.9	-140.4	4.0	6.2	0.3
12.5_3	01/27/10	01/27/10	7.6	20	0.1	4/14/2010	2022.0	28.1	20.0	1.6	97.0	0.1	0.3	-84.8	4.2	6.6	0.4
12.5_3	01/27/10	01/27/10	7.6	20	0.01	4/14/2010	997.0	29.1	20.0	1.6	103.0	0.0	0.5	58.9	3.1	6.2	0.4
12.5_3	01/27/10	01/27/10	7.6	40	10	4/15/2010	1452.0	32.1	40.1	1.7	92.0	-0.9	7.2	-161.0	7.3	6.7	0.5
12.5_3	01/27/10	01/27/10	7.6	40	1	4/15/2010	554.9	32.9	40.1	1.5	97.0	0.6	6.5	-62.7	6.2	9.7	0.4
12.5_3	01/27/10	01/27/10	7.6	40	0.1	4/15/2010	258.7	28.6	40.0	1.5	94.0	0.0	0.7	-17.0	5.8	11.6	0.3
12.5_3	01/27/10	01/27/10	7.6	40	0.01	4/15/2010	150.4	24.1	40.0	1.6	100.0	0.1	0.9	229.8	6.3	11.2	0.4
12.5_5	01/27/10	01/27/10	7.2	4	10	4/14/2010	15914.0	10.0	3.9	1.6	84.0	0.8	2.3	-48.1	2.5	3.3	0.5
12.5_5	01/27/10	01/27/10	7.2	4	1	4/14/2010	11895.0	13.5	3.9	1.6	96.0	0.1	0.6	-66.8	1.7	3.0	0.4
12.5_5	01/27/10	01/27/10	7.2	4	0.1	4/14/2010	8155.0	17.6	4.2	1.5	101.0	0.0	0.2	-100.7	2.0	2.8	0.4
12.5_5	01/27/10	01/27/10	7.2	4	0.01	4/14/2010	5140.0	21.5	4.2	1.6	99.0	0.0	0.4	-106.2	1.7	2.7	0.3
12.5_5	01/27/10	01/27/10	7.2	20	10	4/14/2010	7514.0	20.4	19.9	1.8	92.0	0.2	3.2	-174.6	5.0	6.5	0.9
12.5_5	01/27/10	01/27/10	7.2	20	1	4/14/2010	4385.0	25.0	19.8	1.9	93.0	0.1	0.8	-181.1	3.8	4.4	0.8
12.5_5	01/27/10	01/27/10	7.2	20	0.1	4/14/2010	2287.0	28.4	20.1	1.7	96.0	0.0	0.3	-153.5	3.2	2.8	0.8
12.5_5	01/27/10	01/27/10	7.2	20	0.01	4/14/2010	1087.0	29.6	20.2	1.7	105.0	0.0	0.4	-41.6	3.1	1.9	0.9
12.5_5	01/27/10	01/27/10	7.2	40	10	4/15/2010	2142.0	30.8	40.0	1.6	89.0	-0.6	5.9	-209.7	7.0	8.1	0.6
12.5_5	01/27/10	01/27/10	7.2	40	1	4/15/2010	888.4	32.5	40.0	1.6	93.0	0.4	2.6	-119.3	4.6	7.9	0.7
12.5_5	01/27/10	01/27/10	7.2	40	0.1	4/15/2010	387.1	30.2	40.0	1.5	95.0	0.2	0.5	-69.4	4.7	9.2	0.7
12.5_5	01/27/10	01/27/10	7.2	40	0.01	4/15/2010	190.9	25.1	40.0	1.6	107.0	0.1	0.9	25.1	9.6	11.4	0.9
12.5_8	01/27/10	01/27/10	7.8	4	10	4/19/2010	14313.0	10.7	4.1	1.6	88.0	1.0	2.5	-51.7	2.9	5.5	0.3
12.5_8	01/27/10	01/27/10	7.8	4	1	4/19/2010	10603.0	14.3	4.1	1.6	98.0	0.1	0.6	-72.2	1.9	6.0	0.5
12.5_8	01/27/10	01/27/10	7.8	4	0.1	4/19/2010	7243.0	18.5	4.0	1.6	103.0	0.0	0.2	-105.7	3.3	5.1	0.5
12.5_8	01/27/10	01/27/10	7.8	4	0.01	4/19/2010	4873.0	22.0	3.9	1.6	93.0	0.0	0.4	-88.6	4.4	4.4	0.7
12.5_8	01/27/10	01/27/10	7.8	20	10	4/19/2010	8084.0	18.5	20.1	1.7	95.0	0.2	3.1	-140.9	4.5	7.3	0.3
12.5_8	01/27/10	01/27/10	7.8	20	1	4/19/2010	5030.0	22.9	20.1	1.7	94.0	0.1	0.7	-155.3	3.3	7.1	0.4
12.5_8	01/27/10	01/27/10	7.8	20	0.1	4/19/2010	2800.0	26.4	20.0	1.6	98.0	0.1	0.3	-152.3	2.7	5.5	0.4
12.5_8	01/27/10	01/27/10	7.8	20	0.01	4/19/2010	1332.0	28.0	20.0	1.6	109.0	0.0	0.5	-81.9	5.8	3.9	0.3
12.5_8	01/27/10	01/27/10	7.8	40	10	4/19/2010	2213.0	29.2	39.9	1.6	91.0	-0.4	6.3	-172.2	6.8	5.3	0.5
12.5_8	01/27/10	01/27/10	7.8	40	1	4/19/2010	963.2	30.8	40.0	1.6	96.0	0.4	4.7	-105.6	5.3	2.9	0.3
12.5_8	01/27/10	01/27/10	7.8	40	0.1	4/19/2010	434.1	28.2	40.0	1.6	97.0	-0.1	1.6	-87.9	5.0	4.3	0.7
12.5_8	01/27/10	01/27/10	7.8	40	0.01	4/19/2010	210.1	24.8	40.0	1.6	111.0	0.1	1.3	-4.0	6.7	3.7	1.1

Table C30. Lab 7 prefabricated core confined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_3	01/27/10	01/27/10	7.6	4	10	[redacted]											
12.5_3	01/27/10	01/27/10	7.6	4	1												
12.5_3	01/27/10	01/27/10	7.6	4	0.1												
12.5_3	01/27/10	01/27/10	7.6	4	0.01												
12.5_3	01/27/10	01/27/10	7.6	20	10	4/13/2010	6336.0	21.2	19.8	69.5	94.0	0.3	2.8	-183.0	4.6	6.5	0.3
12.5_3	01/27/10	01/27/10	7.6	20	1	4/13/2010	3597.0	26.3	19.8	69.6	96.0	0.1	0.6	-212.6	3.7	6.9	0.4
12.5_3	01/27/10	01/27/10	7.6	20	0.1	4/13/2010	1886.0	29.5	20.0	69.6	96.0	0.0	0.2	-200.9	3.2	7.0	0.5
12.5_3	01/27/10	01/27/10	7.6	20	0.01	4/13/2010	1051.0	28.8	19.9	69.6	92.0	0.0	0.4	-69.9	4.5	7.7	1.2
12.5_3	01/27/10	01/27/10	7.6	40	10	4/13/2010	2117.0	28.6	39.8	69.5	91.0	0.3	3.8	-156.9	5.4	2.6	0.4
12.5_3	01/27/10	01/27/10	7.6	40	1	4/13/2010	1083.0	27.5	39.8	69.6	92.0	0.1	0.8	-112.5	3.9	2.7	0.6
12.5_3	01/27/10	01/27/10	7.6	40	0.1	4/13/2010	656.1	23.6	40.0	69.6	95.0	0.2	0.3	-93.6	5.2	6.0	1.1
12.5_3	01/27/10	01/27/10	7.6	40	0.01	4/13/2010	487.5	19.2	40.0	69.6	93.0	-0.1	0.5	-75.9	4.3	9.9	1.3
12.5_5	01/27/10	01/27/10	7.2	4	10	[redacted]											
12.5_5	01/27/10	01/27/10	7.2	4	1												
12.5_5	01/27/10	01/27/10	7.2	4	0.1												
12.5_5	01/27/10	01/27/10	7.2	4	0.01												
12.5_5	01/27/10	01/27/10	7.2	20	10	4/13/2010	7567.0	20.2	19.9	69.5	95.0	0.3	2.7	-168.0	4.3	8.1	0.2
12.5_5	01/27/10	01/27/10	7.2	20	1	4/13/2010	4411.0	25.3	19.8	69.6	96.0	0.1	0.6	-205.2	3.4	9.6	0.7
12.5_5	01/27/10	01/27/10	7.2	20	0.1	4/13/2010	2332.0	29.2	20.1	69.6	97.0	0.1	0.2	-222.1	3.5	10.3	1.0
12.5_5	01/27/10	01/27/10	7.2	20	0.01	4/13/2010	1210.0	30.2	20.0	69.6	96.0	0.0	0.4	-103.0	4.7	12.4	1.3
12.5_5	01/27/10	01/27/10	7.2	40	10	4/13/2010	2082.0	30.9	40.1	69.5	91.0	0.2	3.5	-228.7	5.8	10.3	1.3
12.5_5	01/27/10	01/27/10	7.2	40	1	4/13/2010	1040.0	30.1	39.8	69.6	89.0	0.1	0.7	-209.0	4.0	16.2	1.9
12.5_5	01/27/10	01/27/10	7.2	40	0.1	4/13/2010	598.2	27.0	40.1	69.6	94.0	0.3	0.4	-150.7	4.7	24.7	1.8
12.5_5	01/27/10	01/27/10	7.2	40	0.01	4/13/2010	439.8	22.0	40.0	69.6	83.0	0.0	0.5	-84.2	5.6	25.5	1.9
12.5_8	01/27/10	01/27/10	7.8	4	10	[redacted]											
12.5_8	01/27/10	01/27/10	7.8	4	1												
12.5_8	01/27/10	01/27/10	7.8	4	0.1												
12.5_8	01/27/10	01/27/10	7.8	4	0.01												
12.5_8	01/27/10	01/27/10	7.8	20	10	4/14/2010	7021.0	20.0	19.9	69.6	94.0	0.4	2.9	-157.8	4.2	11.2	0.7
12.5_8	01/27/10	01/27/10	7.8	20	1	4/14/2010	4152.0	25.0	20.0	69.5	97.0	0.2	0.6	-196.8	3.2	11.1	0.6
12.5_8	01/27/10	01/27/10	7.8	20	0.1	4/14/2010	2263.0	28.5	20.1	69.6	98.0	0.0	0.3	-217.4	3.2	9.8	0.8
12.5_8	01/27/10	01/27/10	7.8	20	0.01	4/14/2010	1221.0	28.2	20.0	69.6	95.0	0.0	0.6	-123.9	7.0	5.9	2.2
12.5_8	01/27/10	01/27/10	7.8	40	10	4/15/2010	2527.0	28.6	40.1	69.5	90.0	0.4	3.4	-206.4	5.2	15.7	0.4
12.5_8	01/27/10	01/27/10	7.8	40	1	4/15/2010	1277.0	29.3	39.8	69.6	92.0	0.1	0.7	-172.9	3.5	14.3	0.9
12.5_8	01/27/10	01/27/10	7.8	40	0.1	4/15/2010	680.9	27.5	40.0	69.6	98.0	0.0	0.6	-120.0	4.0	14.0	1.2
12.5_8	01/27/10	01/27/10	7.8	40	0.01	4/15/2010	403.4	23.2	40.0	69.6	96.0	-0.1	0.8	-71.6	5.7	15.5	1.0

Table C31. Lab 8 prefabricated core unconfined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_4	02/24/10	02/24/10	6.7	4	10	6/14/2010	16130.0	10.1	3.9	0.4	100.0	0.0	1.6	-42.9	2.0	11.3	0.3
12.5_4	02/24/10	02/24/10	6.7	4	1	6/14/2010	12262.0	13.5	4.0	0.0	100.0	0.0	0.4	-63.1	2.4	11.5	0.7
12.5_4	02/24/10	02/24/10	6.7	4	0.1	6/14/2010	8587.0	17.4	4.4	0.0	101.0	0.0	0.3	-96.7	2.4	11.2	0.7
12.5_4	02/24/10	02/24/10	6.7	4	0.01	6/14/2010	5439.0	21.1	4.8	0.0	98.0	0.0	0.3	-85.6	2.0	9.8	0.4
12.5_4	02/24/10	02/24/10	6.7	20	10	6/15/2010	7896.0	19.1	20.0	0.2	98.0	0.3	2.2	-151.0	4.2	11.9	0.7
12.5_4	02/24/10	02/24/10	6.7	20	1	6/15/2010	4874.0	23.3	19.9	0.0	93.0	0.1	0.6	-158.4	3.7	12.9	1.1
12.5_4	02/24/10	02/24/10	6.7	20	0.1	6/15/2010	2707.0	26.3	20.1	0.0	91.0	0.1	0.2	-129.6	5.1	14.2	1.4
12.5_4	02/24/10	02/24/10	6.7	20	0.01	6/15/2010	1341.0	27.6	20.2	0.0	100.0	0.0	0.4	-44.9	4.6	14.9	1.4
12.5_4	02/24/10	02/24/10	6.7	40	10	6/16/2010	2325.0	27.7	40.2	0.0	92.0	0.5	4.4	-145.9	5.4	8.8	0.8
12.5_4	02/24/10	02/24/10	6.7	40	1	6/16/2010	1071.0	27.8	40.6	0.0	91.0	0.2	1.5	-92.8	4.5	10.8	1.3
12.5_4	02/24/10	02/24/10	6.7	40	0.1	6/16/2010	532.8	23.9	40.5	0.1	86.0	0.2	0.4	-96.2	6.0	11.5	2.5
12.5_4	02/24/10	02/24/10	6.7	40	0.01	6/16/2010	354.1	16.9	40.3	0.0	94.0	-0.2	0.6	-160.0	8.3	16.5	4.5
12.5_5	02/24/10	02/24/10	7.3	4	10	6/14/2010	15730.0	9.7	4.1	0.3	100.0	0.1	1.6	-41.1	2.1	6.0	0.2
12.5_5	02/24/10	02/24/10	7.3	4	1	6/14/2010	11881.0	12.9	4.3	0.0	100.0	0.0	0.4	-61.4	1.5	6.2	0.2
12.5_5	02/24/10	02/24/10	7.3	4	0.1	6/14/2010	8266.0	16.7	4.9	0.0	101.0	0.0	0.3	-95.8	2.0	6.6	0.2
12.5_5	02/24/10	02/24/10	7.3	4	0.01	6/14/2010	5003.0	21.1	5.7	0.0	102.0	0.0	0.3	-111.7	1.5	7.5	0.1
12.5_5	02/24/10	02/24/10	7.3	20	10	6/15/2010	7579.0	18.9	20.0	-0.1	97.0	0.3	2.2	-144.3	4.0	12.7	0.5
12.5_5	02/24/10	02/24/10	7.3	20	1	6/15/2010	4629.0	23.0	19.9	0.0	94.0	0.1	0.6	-161.1	3.5	12.3	0.6
12.5_5	02/24/10	02/24/10	7.3	20	0.1	6/15/2010	2571.0	26.0	20.2	0.0	92.0	0.1	0.3	-124.8	2.8	11.4	0.8
12.5_5	02/24/10	02/24/10	7.3	20	0.01	6/15/2010	1312.0	26.1	20.2	0.0	99.0	0.0	0.4	-72.2	6.6	12.0	1.0
12.5_5	02/24/10	02/24/10	7.3	40	10	6/17/2010	2228.0	27.8	40.3	0.2	92.0	0.6	4.5	-159.6	5.5	18.5	1.4
12.5_5	02/24/10	02/24/10	7.3	40	1	6/17/2010	1054.0	27.7	40.5	0.1	90.0	0.2	4.1	-109.7	4.5	18.6	1.1
12.5_5	02/24/10	02/24/10	7.3	40	0.1	6/17/2010	547.9	24.0	40.4	0.0	86.0	0.0	0.7	-99.5	6.3	17.5	1.2
12.5_5	02/24/10	02/24/10	7.3	40	0.01	6/17/2010	358.1	18.0	40.4	0.0	97.0	-0.1	0.6	-129.3	7.2	18.3	1.9
12.5_7	02/24/10	02/24/10	7.8	4	10	6/14/2010	15072.0	10.1	4.2	0.0	99.0	0.0	1.6	-45.1	2.0	27.1	0.4
12.5_7	02/24/10	02/24/10	7.8	4	1	6/14/2010	11244.0	13.6	4.3	0.0	99.0	0.0	0.4	-68.9	1.7	27.1	0.5
12.5_7	02/24/10	02/24/10	7.8	4	0.1	6/14/2010	7704.0	17.7	4.9	0.0	100.0	0.0	0.3	-110.0	2.1	26.9	0.5
12.5_7	02/24/10	02/24/10	7.8	4	0.01	6/14/2010	4623.0	22.1	5.7	0.0	101.0	0.0	0.3	-122.3	1.6	27.0	0.2
12.5_7	02/24/10	02/24/10	7.8	20	10	6/15/2010	7233.0	19.8	20.0	0.0	97.0	0.2	2.3	-158.7	4.3	11.8	0.3
12.5_7	02/24/10	02/24/10	7.8	20	1	6/15/2010	4325.0	24.1	20.0	0.0	94.0	0.2	0.7	-169.9	3.8	11.4	0.2
12.5_7	02/24/10	02/24/10	7.8	20	0.1	6/15/2010	2323.0	27.1	20.1	0.0	92.0	0.0	0.3	-144.1	3.3	11.4	0.6
12.5_7	02/24/10	02/24/10	7.8	20	0.01	6/15/2010	1157.0	27.4	20.1	0.0	98.0	0.0	0.4	-69.1	5.8	12.4	1.3
12.5_7	02/24/10	02/24/10	7.8	40	10	6/17/2010	2060.0	28.5	40.4	0.1	94.0	0.6	4.6	-153.3	5.4	6.5	0.8
12.5_7	02/24/10	02/24/10	7.8	40	1	6/17/2010	945.2	28.2	40.6	0.0	91.0	0.1	1.6	-101.4	4.1	6.5	1.0
12.5_7	02/24/10	02/24/10	7.8	40	0.1	6/17/2010	485.4	24.1	40.4	0.0	86.0	0.0	0.4	-90.7	5.7	6.0	1.0
12.5_7	02/24/10	02/24/10	7.8	40	0.01	6/17/2010	324.0	18.2	40.4	0.0	95.0	0.1	0.6	-168.7	7.2	3.2	0.9

Table C32. Lab 8 prefabricated core confined dynamic modulus test data for the 12.5-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
12.5_4	02/24/10	02/24/10	6.7	4	10	[redacted]											
12.5_4	02/24/10	02/24/10	6.7	4	1												
12.5_4	02/24/10	02/24/10	6.7	4	0.1												
12.5_4	02/24/10	02/24/10	6.7	4	0.01												
12.5_4	02/24/10	02/24/10	6.7	20	10	6/10/2010	7947.0	18.9	20.1	69.1	99.0	0.4	2.1	-137.8	3.6	18.8	0.2
12.5_4	02/24/10	02/24/10	6.7	20	1	6/10/2010	4885.0	23.1	19.9	69.0	96.0	0.1	0.6	-155.0	3.3	20.0	0.3
12.5_4	02/24/10	02/24/10	6.7	20	0.1	6/10/2010	2772.0	26.0	19.9	69.0	93.0	0.1	0.2	-118.3	4.2	20.7	0.4
12.5_4	02/24/10	02/24/10	6.7	20	0.01	6/10/2010	1587.0	25.5	20.1	69.0	92.0	0.0	0.4	-41.0	3.7	21.2	0.5
12.5_4	02/24/10	02/24/10	6.7	40	10	6/11/2010	2477.0	27.8	40.2	69.3	91.0	0.8	4.3	-167.1	5.6	5.2	1.3
12.5_4	02/24/10	02/24/10	6.7	40	1	6/11/2010	1335.0	27.0	39.8	69.0	91.0	0.1	1.1	-134.2	4.7	5.2	1.5
12.5_4	02/24/10	02/24/10	6.7	40	0.1	6/11/2010	859.4	23.1	40.1	69.0	89.0	-0.2	0.3	-97.3	6.8	5.2	1.7
12.5_4	02/24/10	02/24/10	6.7	40	0.01	6/11/2010	645.2	18.0	40.1	69.0	89.0	-0.1	0.6	39.6	7.6	5.1	2.1
12.5_5	02/24/10	02/24/10	7.3	4	10	[redacted]											
12.5_5	02/24/10	02/24/10	7.3	4	1												
12.5_5	02/24/10	02/24/10	7.3	4	0.1												
12.5_5	02/24/10	02/24/10	7.3	4	0.01												
12.5_5	02/24/10	02/24/10	7.3	20	10	6/10/2010	7605.0	19.1	20.4	68.9	98.0	0.3	2.1	-137.2	3.7	3.4	0.5
12.5_5	02/24/10	02/24/10	7.3	20	1	6/10/2010	4573.0	23.5	20.1	69.0	96.0	0.1	0.6	-153.2	3.1	4.6	0.7
12.5_5	02/24/10	02/24/10	7.3	20	0.1	6/10/2010	2545.0	26.4	20.0	69.0	93.0	0.1	0.2	-137.5	3.5	5.6	1.0
12.5_5	02/24/10	02/24/10	7.3	20	0.01	6/10/2010	1432.0	26.6	20.1	69.0	93.0	0.0	0.4	-48.7	5.7	5.9	1.0
12.5_5	02/24/10	02/24/10	7.3	40	10	6/11/2010	2258.0	28.1	40.3	69.1	92.0	0.9	4.5	-169.3	5.3	11.1	0.8
12.5_5	02/24/10	02/24/10	7.3	40	1	6/11/2010	1205.0	27.3	39.8	69.0	91.0	0.1	1.3	-124.3	3.7	12.0	0.6
12.5_5	02/24/10	02/24/10	7.3	40	0.1	6/11/2010	757.3	23.8	40.1	69.0	89.0	0.1	0.3	-78.4	4.4	14.1	0.2
12.5_5	02/24/10	02/24/10	7.3	40	0.01	6/11/2010	525.5	19.8	39.9	69.0	91.0	0.1	0.5	25.4	9.7	16.5	0.7
12.5_7	02/24/10	02/24/10	7.8	4	10	[redacted]											
12.5_7	02/24/10	02/24/10	7.8	4	1												
12.5_7	02/24/10	02/24/10	7.8	4	0.1												
12.5_7	02/24/10	02/24/10	7.8	4	0.01												
12.5_7	02/24/10	02/24/10	7.8	20	10	6/10/2010	7038.0	20.5	20.3	69.1	97.0	0.2	2.3	-153.8	3.9	8.3	1.0
12.5_7	02/24/10	02/24/10	7.8	20	1	6/10/2010	4166.0	25.0	19.9	69.0	95.0	0.1	0.6	-175.1	3.5	8.3	0.9
12.5_7	02/24/10	02/24/10	7.8	20	0.1	6/10/2010	2269.0	28.1	20.0	69.0	92.0	0.0	0.2	-147.2	2.5	7.2	0.7
12.5_7	02/24/10	02/24/10	7.8	20	0.01	6/10/2010	1304.0	27.7	20.0	69.0	89.0	0.0	0.4	-69.0	4.3	4.6	0.8
12.5_7	02/24/10	02/24/10	7.8	40	10	6/11/2010	2023.0	29.9	40.3	68.9	91.0	0.9	4.8	-197.9	5.9	13.1	0.7
12.5_7	02/24/10	02/24/10	7.8	40	1	6/11/2010	1079.0	28.7	39.7	69.0	89.0	0.1	1.4	-159.2	4.0	9.2	1.1
12.5_7	02/24/10	02/24/10	7.8	40	0.1	6/11/2010	752.0	24.3	40.0	69.0	83.0	-0.1	0.3	-143.9	5.6	9.2	1.2
12.5_7	02/24/10	02/24/10	7.8	40	0.01	6/11/2010	658.0	19.2	40.0	69.0	82.0	0.0	0.5	-10.7	7.4	11.6	1.4

Table C33. Lab 1 prefabricated core unconfined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μst	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_1	3/18/2009	3/18/2009	7.0	4	10	4/8/2009	13724.8	12.3	5.0	0.0	96.4	1.1	5.1	109.0	7.7	12.3	0.1
25_1	3/18/2009	3/18/2009	7.0	4	1	4/8/2009	9586.1	17.7	5.0	0.0	92.0	0.1	0.7	134.8	5.4	13.9	0.1
25_1	3/18/2009	3/18/2009	7.0	4	0.1	4/8/2009	6026.2	23.2	4.7	0.0	91.5	1.2	1.4	183.4	5.2	13.5	0.1
25_1	3/18/2009	3/18/2009	7.0	4	0.01	4/8/2009	3427.1	27.0	4.2	0.0	92.0	0.1	1.3	160.5	4.5	8.0	0.0
25_1	3/18/2009	3/18/2009	7.0	20	10	4/2/2009	5916.4	25.9	20.0	0.0	90.7	0.9	11.7	259.0	14.7	4.5	1.1
25_1	3/18/2009	3/18/2009	7.0	20	1	4/2/2009	3013.4	31.5	20.0	0.0	86.4	0.1	0.9	312.9	10.1	4.4	0.9
25_1	3/18/2009	3/18/2009	7.0	20	0.1	4/2/2009	1388.1	33.5	20.0	0.0	89.7	-0.3	1.5	303.4	6.7	4.2	0.3
25_1	3/18/2009	3/18/2009	7.0	20	0.01	4/2/2009	686.4	28.9	20.0	0.0	90.5	1.1	1.6	284.4	5.0	9.0	1.3
25_1	3/18/2009	3/18/2009	7.0	40	10	4/6/2009	1270.5	36.8	39.8	0.0	107.8	-2.2	8.3	227.7	18.8	17.1	0.6
25_1	3/18/2009	3/18/2009	7.0	40	1	4/6/2009	502.4	30.4	39.8	0.0	142.2	0.2	2.7	58.9	6.9	26.0	1.1
25_1	3/18/2009	3/18/2009	7.0	40	0.1	4/6/2009	260.6	21.1	39.8	0.0	91.5	8.1	3.7	-77.4	4.5	29.3	0.3
25_1	3/18/2009	3/18/2009	7.0	40	0.01	4/6/2009	189.5	13.0	40.0	0.0	111.8	-0.1	3.3	-2.9	7.6	21.5	0.1
25_2	3/25/2009	3/25/2009	6.7	4	10	4/8/2009	16489.7	12.2	4.4	0.0	93.0	2.0	9.5	116.4	10.9	6.8	0.3
25_2	3/25/2009	3/25/2009	6.7	4	1	4/8/2009	11562.7	17.7	4.4	0.0	94.7	0.0	0.7	128.0	5.3	8.1	0.0
25_2	3/25/2009	3/25/2009	6.7	4	0.1	4/8/2009	7186.7	23.2	3.9	0.0	91.6	1.7	1.4	171.8	3.8	7.6	0.3
25_2	3/25/2009	3/25/2009	6.7	4	0.01	4/8/2009	3860.6	27.7	4.0	0.0	91.3	0.1	1.3	122.9	4.4	8.5	0.6
25_2	3/25/2009	3/25/2009	6.7	20	10	4/2/2009	6841.6	27.1	20.1	0.0	89.7	1.0	10.7	289.6	14.2	24.9	0.7
25_2	3/25/2009	3/25/2009	6.7	20	1	4/2/2009	3361.9	33.1	20.2	0.0	86.0	0.1	0.7	350.5	11.0	27.6	2.5
25_2	3/25/2009	3/25/2009	6.7	20	0.1	4/2/2009	1497.9	34.5	20.2	0.0	89.5	2.0	1.5	271.8	5.3	32.5	3.9
25_2	3/25/2009	3/25/2009	6.7	20	0.01	4/2/2009	707.7	28.7	20.0	0.0	96.0	-0.5	1.5	141.1	4.3	28.2	4.8
25_2	3/25/2009	3/25/2009	6.7	40	10	4/6/2009	1142.4	34.4	39.8	0.0	101.7	-2.3	7.9	160.6	13.6	0.2	2.2
25_2	3/25/2009	3/25/2009	6.7	40	1	4/6/2009	517.0	25.1	39.8	0.0	123.1	0.5	2.8	49.9	6.9	5.6	2.1
25_2	3/25/2009	3/25/2009	6.7	40	0.1	4/6/2009	330.3	12.4	39.8	0.0	94.0	3.1	2.6	91.1	6.0	8.7	2.1
25_2	3/25/2009	3/25/2009	6.7	40	0.01	4/6/2009	262.0	9.2	40.0	0.0	92.5	-1.2	2.1	200.3	6.2	1.4	0.4
25_3	3/25/2009	3/25/2009	7.4	4	10	4/8/2009	16216.6	12.3	4.2	0.0	94.7	1.9	9.3	121.3	10.6	15.3	0.4
25_3	3/25/2009	3/25/2009	7.4	4	1	4/8/2009	11330.7	17.6	4.2	0.0	94.2	0.0	0.8	146.6	6.5	12.5	1.1
25_3	3/25/2009	3/25/2009	7.4	4	0.1	4/8/2009	7004.0	23.5	4.1	0.0	89.3	2.7	1.4	227.9	5.4	14.8	1.7
25_3	3/25/2009	3/25/2009	7.4	4	0.01	4/8/2009	3715.0	28.5	4.0	0.0	91.5	0.3	1.3	184.2	7.9	10.1	2.6
25_3	3/25/2009	3/25/2009	7.4	20	10	4/2/2009	6441.7	26.6	20.1	0.0	90.2	1.0	10.8	281.1	14.2	26.1	0.1
25_3	3/25/2009	3/25/2009	7.4	20	1	4/2/2009	3171.7	32.6	20.1	0.0	86.2	0.1	0.8	337.0	10.6	29.7	0.5
25_3	3/25/2009	3/25/2009	7.4	20	0.1	4/2/2009	1355.7	34.2	20.1	0.0	89.9	2.9	1.5	242.7	4.0	30.6	1.5
25_3	3/25/2009	3/25/2009	7.4	20	0.01	4/2/2009	608.1	28.9	20.0	0.0	95.3	-0.9	1.8	132.0	4.1	35.1	2.3
25_3	3/25/2009	3/25/2009	7.4	40	10	4/6/2009	1197.0	36.1	39.9	0.0	113.5	-2.7	7.5	184.4	17.5	33.3	1.9
25_3	3/25/2009	3/25/2009	7.4	40	1	4/6/2009	475.4	28.7	39.9	0.0	150.0	0.1	3.0	44.9	7.5	31.1	2.7
25_3	3/25/2009	3/25/2009	7.4	40	0.1	4/6/2009	250.4	19.7	39.9	0.0	92.9	11.8	3.4	21.3	4.8	32.5	1.8
25_3	3/25/2009	3/25/2009	7.4	40	0.01	4/6/2009	187.7	11.2	40.0	0.0	95.6	-0.5	3.9	6.3	5.5	30.0	1.4

Table C34. Lab 1 prefabricated core confined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μst	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_1	3/18/2009	3/18/2009	7.0	4	10	[redacted]											
25_1	3/18/2009	3/18/2009	7.0	4	1												
25_1	3/18/2009	3/18/2009	7.0	4	0.1												
25_1	3/18/2009	3/18/2009	7.0	4	0.01												
25_1	3/18/2009	3/18/2009	7.0	20	10	4/3/2009	6304.3	25.5	20.2	68.0	88.4	1.1	10.4	229.1	22.9	12.3	1.0
25_1	3/18/2009	3/18/2009	7.0	20	1	4/3/2009	3281.0	30.3	20.2	67.9	87.5	0.0	0.8	252.8	9.2	8.3	1.4
25_1	3/18/2009	3/18/2009	7.0	20	0.1	4/3/2009	1605.1	30.5	20.2	68.0	91.3	0.8	1.4	165.2	5.7	3.5	1.8
25_1	3/18/2009	3/18/2009	7.0	20	0.01	4/3/2009	944.0	24.9	20.0	68.1	91.6	0.2	1.4	99.8	4.8	0.7	1.8
25_1	3/18/2009	3/18/2009	7.0	40	10	4/3/2009	1635.8	32.1	39.9	68.4	95.0	-1.2	6.1	120.5	12.5	36.2	0.5
25_1	3/18/2009	3/18/2009	7.0	40	1	4/3/2009	839.0	24.6	39.9	68.4	93.9	0.1	2.3	23.3	5.7	42.0	0.3
25_1	3/18/2009	3/18/2009	7.0	40	0.1	4/3/2009	596.7	16.0	40.0	68.4	97.1	7.1	1.7	23.4	4.5	42.0	0.1
25_1	3/18/2009	3/18/2009	7.0	40	0.01	4/3/2009	490.7	10.3	40.0	68.4	99.0	0.0	1.9	6.7	5.2	43.8	0.2
25_2	3/25/2009	3/25/2009	6.7	4	10	[redacted]											
25_2	3/25/2009	3/25/2009	6.7	4	1												
25_2	3/25/2009	3/25/2009	6.7	4	0.1												
25_2	3/25/2009	3/25/2009	6.7	4	0.01												
25_2	3/25/2009	3/25/2009	6.7	20	10	4/3/2009	7239.2	26.1	20.1	68.0	89.0	1.0	8.8	267.3	24.3	19.7	0.5
25_2	3/25/2009	3/25/2009	6.7	20	1	4/3/2009	3707.6	31.3	20.4	68.2	86.7	0.0	0.5	317.8	10.7	22.0	1.6
25_2	3/25/2009	3/25/2009	6.7	20	0.1	4/3/2009	1764.7	31.4	20.4	68.0	89.2	1.9	1.5	208.9	4.9	18.7	2.4
25_2	3/25/2009	3/25/2009	6.7	20	0.01	4/3/2009	955.4	25.7	20.0	68.1	92.3	0.1	1.6	82.0	4.6	14.4	2.7
25_2	3/25/2009	3/25/2009	6.7	40	10	4/3/2009	1641.2	33.1	39.9	68.4	93.8	-1.7	6.8	144.5	13.0	24.6	2.3
25_2	3/25/2009	3/25/2009	6.7	40	1	4/3/2009	834.4	25.6	39.9	68.4	93.7	0.0	2.6	28.3	5.2	32.1	2.6
25_2	3/25/2009	3/25/2009	6.7	40	0.1	4/3/2009	591.5	16.6	39.9	68.4	98.4	5.8	2.1	21.4	3.7	28.6	1.4
25_2	3/25/2009	3/25/2009	6.7	40	0.01	4/3/2009	500.8	10.5	40.0	68.4	97.5	0.1	1.8	4.5	3.7	27.9	0.6
25_3	3/25/2009	3/25/2009	7.4	4	10	[redacted]											
25_3	3/25/2009	3/25/2009	7.4	4	1												
25_3	3/25/2009	3/25/2009	7.4	4	0.1												
25_3	3/25/2009	3/25/2009	7.4	4	0.01												
25_3	3/25/2009	3/25/2009	7.4	20	10	4/3/2009	6121.2	26.8	20.2	68.0	90.4	1.0	9.9	261.2	16.7	1.6	1.0
25_3	3/25/2009	3/25/2009	7.4	20	1	4/3/2009	3071.4	31.7	20.3	68.0	86.7	0.1	0.9	285.4	9.6	0.8	1.7
25_3	3/25/2009	3/25/2009	7.4	20	0.1	4/3/2009	1472.2	31.2	20.3	68.1	89.4	3.7	1.5	220.2	5.0	3.0	1.3
25_3	3/25/2009	3/25/2009	7.4	20	0.01	4/3/2009	853.3	25.1	20.0	68.0	89.0	-0.2	1.6	158.9	4.9	9.5	0.3
25_3	3/25/2009	3/25/2009	7.4	40	10	4/3/2009	1436.9	32.6	40.0	68.4	97.0	-1.5	6.2	116.7	11.7	45.7	1.0
25_3	3/25/2009	3/25/2009	7.4	40	1	4/3/2009	738.2	24.8	40.0	68.4	96.3	0.3	2.5	19.1	5.0	51.9	1.9
25_3	3/25/2009	3/25/2009	7.4	40	0.1	4/3/2009	530.7	15.9	40.0	68.4	99.0	6.8	2.4	-7.6	3.9	50.5	2.0
25_3	3/25/2009	3/25/2009	7.4	40	0.01	4/3/2009	446.7	9.7	40.0	68.4	101.8	-0.3	1.8	-72.2	3.9	48.9	1.5

Table C35. Lab 2 prefabricated core unconfined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μst	Load Drift,	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_4	1/19/2009	1/19/2009	6.5	4	10	4/8/2009	17006	11.83	4.0	0.1	99	0.1	2.2	-69.8	2.6	4.3	0.4
25_4	1/19/2009	1/19/2009	6.5	4	1	4/8/2009	12065	16.39	4.1	0.2	98	0	0.4	-121.3	2.2	5.8	0.6
25_4	1/19/2009	1/19/2009	6.5	4	0.1	4/8/2009	7558	22.29	4.1	0.2	98	0	0.3	-199	3.4	8.1	0.6
25_4	1/19/2009	1/19/2009	6.5	4	0.01	4/8/2009	4250	27.51	4.0	0.2	93	0	0.4	-188.6	2.6	11.2	0.5
25_4	1/19/2009	1/19/2009	6.5	20	10	4/7/2009	6791	26.13	20.1	0.1	98	0.4	1.5	-366.7	6.6	7.5	0.6
25_4	1/19/2009	1/19/2009	6.5	20	1	4/7/2009	3362	32.65	20.2	0.1	92	0.1	0.4	-411.5	6	8.9	0.3
25_4	1/19/2009	1/19/2009	6.5	20	0.1	4/7/2009	1418	35.4	20.0	0.1	90	0	0.4	-346.1	5.3	8.8	0.3
25_4	1/19/2009	1/19/2009	6.5	20	0.01	4/7/2009	570.4	32.12	19.9	0.1	100	0.1	0.5	-127.7	4.5	8.5	0.3
25_4	1/19/2009	1/19/2009	6.5	40	10	5/17/2009	1424	33.77	39.9	0.0	86	1	4.1	-187.9	6.5	16.5	1.1
25_4	1/19/2009	1/19/2009	6.5	40	1	5/17/2009	543.6	28.86	40.0	0.1	97	0.3	1.2	-66	4.7	15.8	1.1
25_4	1/19/2009	1/19/2009	6.5	40	0.1	5/17/2009	260.4	19.11	40.0	0.1	92	-0.2	0.9	-100.4	6.5	17.5	2.4
25_4	1/19/2009	1/19/2009	6.5	40	0.01	5/17/2009	206.9	5.75	39.9	0.2	99	0	1	-279.9	9.2	23.8	7.6
25_6	1/19/2009	1/19/2009	7.1	4	10	4/8/2009	17448	11.52	3.9	0.2	96	0.4	2.2	-64.2	2.4	17	0.8
25_6	1/19/2009	1/19/2009	7.1	4	1	4/8/2009	12555	15.93	3.9	0.2	98	0	0.4	-112.6	2.1	17.3	1.2
25_6	1/19/2009	1/19/2009	7.1	4	0.1	4/8/2009	8051	21.65	3.9	0.2	98	0	0.3	-197.5	3.9	17.4	1.3
25_6	1/19/2009	1/19/2009	7.1	4	0.01	4/8/2009	4605	26.9	4	0.2	93	0	0.4	-204.5	2.6	16.7	1.1
25_6	1/19/2009	1/19/2009	7.1	20	10	4/7/2009	7048	25.53	20.2	0.1	99	0.4	1.5	-365.8	6.4	25.5	1.2
25_6	1/19/2009	1/19/2009	7.1	20	1	4/7/2009	3601	32.21	20.0	0.2	90	0.1	0.4	-443.7	6.1	24.2	0.9
25_6	1/19/2009	1/19/2009	7.1	20	0.1	4/7/2009	1590	35.58	19.9	0.2	87	0	0.5	-430.1	4.7	24.9	0.5
25_6	1/19/2009	1/19/2009	7.1	20	0.01	4/7/2009	665.8	32.49	19.9	0.1	96	0	0.5	-196.7	4.9	23.7	0.6
25_6	1/19/2009	1/19/2009	7.1	40	10	5/17/2009	1544	34.08	39.8	0.2	84	0.9	4.4	-256.6	7.2	21.7	0.9
25_6	1/19/2009	1/19/2009	7.1	40	1	5/17/2009	600.1	29.12	39.9	0.1	96	0.3	1.5	-101.8	5.7	17.6	0.6
25_6	1/19/2009	1/19/2009	7.1	40	0.1	5/17/2009	285.1	20.98	40.1	0.1	92	-0.1	0.9	-105.6	7.8	14.1	1.3
25_6	1/19/2009	1/19/2009	7.1	40	0.01	5/17/2009	234.2	12.9	40.1	0.2	92	0.1	1	-301.4	11.1	14.3	4.1
25_9	1/19/2009	1/19/2009	7.2	4	10	4/8/2009	14958	12.66	4.0	0.1	98	0.2	1.2	-77.6	2.1	8.7	0.3
25_9	1/19/2009	1/19/2009	7.2	4	1	4/8/2009	10491	17.51	3.9	0.1	96	0	0.4	-133.2	2.4	8.5	0.3
25_9	1/19/2009	1/19/2009	7.2	4	0.1	4/8/2009	6458	23.58	3.9	0.1	96	0	0.3	-204.5	3.4	8.5	0.3
25_9	1/19/2009	1/19/2009	7.2	4	0.01	4/8/2009	3563	28.39	3.8	0.1	92	0	0.4	-187.8	2.8	9.8	0.4
25_9	1/19/2009	1/19/2009	7.2	20	10	4/7/2009	5955	26.92	19.9	0.2	97	0.3	2.1	-391.4	6.7	3.3	0.4
25_9	1/19/2009	1/19/2009	7.2	20	1	4/7/2009	2929	33.44	20.0	0.2	91	0.1	0.5	-460	6.5	3.8	0.2
25_9	1/19/2009	1/19/2009	7.2	20	0.1	4/7/2009	1219	36.04	19.9	0.2	89	0	0.6	-402.9	5.3	4.5	0.4
25_9	1/19/2009	1/19/2009	7.2	20	0.01	4/7/2009	474	32.26	19.9	0.1	102	-0.1	0.6	-158.9	4.9	3.9	0.2
25_9	1/19/2009	1/19/2009	7.2	40	10	5/17/2009	1184	34.5	39.9	0.1	86	1.3	4.6	-192.3	6	9.5	1.2
25_9	1/19/2009	1/19/2009	7.2	40	1	5/17/2009	446.4	28.88	39.9	0.1	97	0.4	1.6	-84	5.3	11.2	1.4
25_9	1/19/2009	1/19/2009	7.2	40	0.1	5/17/2009	225.5	19.26	40.0	0.2	91	-0.2	0.9	-153.2	7.1	12.9	1.7
25_9	1/19/2009	1/19/2009	7.2	40	0.01	5/17/2009	201	7.02	40.1	0.2	95	-0.1	1	-593.6	9.5	15.4	3.1

Table C36. Lab 2 prefabricated core confined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μst	Load Drift,	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_4	1/19/2009	1/19/2009	6.5	4	10												
25_4	1/19/2009	1/19/2009	6.5	4	1												
25_4	1/19/2009	1/19/2009	6.5	4	0.1												
25_4	1/19/2009	1/19/2009	6.5	4	0.01												
25_4	1/19/2009	1/19/2009	6.5	20	10	4/25/2009	6281.0	27.2	20.3	69.0	97.0	0.3	1.9	-390.3	7.1	6.0	0.9
25_4	1/19/2009	1/19/2009	6.5	20	1	4/25/2009	3073.0	32.9	20.0	69.0	92.0	0.1	0.4	-400.5	6.3	8.6	0.9
25_4	1/19/2009	1/19/2009	6.5	20	0.1	4/25/2009	1427.0	33.1	20.1	69.0	87.0	0.0	0.6	-263.4	6.8	10.5	0.7
25_4	1/19/2009	1/19/2009	6.5	20	0.01	4/25/2009	838.4	27.3	20.1	69.0	82.0	0.0	0.6	-4.6	3.5	10.5	0.6
25_4	1/19/2009	1/19/2009	6.5	40	10	4/26/2009	1612.0	33.2	40.2	69.0	88.0	0.8	3.3	-226.9	5.8	13.5	0.3
25_4	1/19/2009	1/19/2009	6.5	40	1	4/26/2009	793.5	26.8	40.3	69.0	95.0	0.0	0.8	-78.2	3.1	13.4	0.2
25_4	1/19/2009	1/19/2009	6.5	40	0.1	4/26/2009	514.7	19.8	40.1	69.0	95.0	-0.1	0.7	-30.9	3.1	13.2	0.8
25_4	1/19/2009	1/19/2009	6.5	40	0.01	4/26/2009	410.8	13.8	40.0	69.0	96.0	0.1	0.8	-9.0	3.4	12.7	1.0
25_6	1/19/2009	1/19/2009	7.1	4	10												
25_6	1/19/2009	1/19/2009	7.1	4	1												
25_6	1/19/2009	1/19/2009	7.1	4	0.1												
25_6	1/19/2009	1/19/2009	7.1	4	0.01												
25_6	1/19/2009	1/19/2009	7.1	20	10	4/25/2009	6812.0	25.5	19.9	68.9	94.0	0.2	2.1	-341.1	6.7	19.0	1.4
25_6	1/19/2009	1/19/2009	7.1	20	1	4/25/2009	3485.0	31.7	19.7	69.0	92.0	0.1	0.5	-388.3	6.1	24.9	1.4
25_6	1/19/2009	1/19/2009	7.1	20	0.1	4/25/2009	1626.0	33.8	20.1	69.0	89.0	0.0	0.7	-303.8	7.3	31.1	1.5
25_6	1/19/2009	1/19/2009	7.1	20	0.01	4/25/2009	903.7	29.9	20.1	69.0	83.0	0.0	0.6	-77.7	4.8	28.9	1.3
25_6	1/19/2009	1/19/2009	7.1	40	10	4/26/2009	1711.0	33.3	39.9	69.0	86.0	1.0	3.3	-267.3	6.3	21.8	1.5
25_6	1/19/2009	1/19/2009	7.1	40	1	4/26/2009	866.9	27.1	39.9	69.0	93.0	0.1	0.8	-124.6	3.8	22.8	1.3
25_6	1/19/2009	1/19/2009	7.1	40	0.1	4/26/2009	583.3	20.1	40.1	69.0	93.0	0.0	0.6	-93.8	4.0	23.2	0.7
25_6	1/19/2009	1/19/2009	7.1	40	0.01	4/26/2009	481.2	14.5	40.0	69.0	94.0	-0.2	0.7	-46.6	4.2	23.3	0.6
25_9	1/19/2009	1/19/2009	7.2	4	10												
25_9	1/19/2009	1/19/2009	7.2	4	1												
25_9	1/19/2009	1/19/2009	7.2	4	0.1												
25_9	1/19/2009	1/19/2009	7.2	4	0.01												
25_9	1/19/2009	1/19/2009	7.2	20	10	4/25/2009	5672.0	27.6	20.1	69.0	94.0	0.4	1.6	-394.0	7.0	8.4	0.4
25_9	1/19/2009	1/19/2009	7.2	20	1	4/25/2009	2799.0	33.7	19.8	69.0	91.0	0.0	0.5	-450.7	6.7	6.7	0.7
25_9	1/19/2009	1/19/2009	7.2	20	0.1	4/25/2009	1282.0	34.9	20.0	69.0	87.0	0.0	0.6	-377.1	5.8	6.3	0.8
25_9	1/19/2009	1/19/2009	7.2	20	0.01	4/25/2009	715.5	28.8	20.1	69.0	82.0	0.0	0.7	-129.2	4.2	7.8	0.5
25_9	1/19/2009	1/19/2009	7.2	40	10	4/26/2009	1342.0	32.9	39.9	68.9	86.0	1.3	3.6	-197.4	5.0	4.3	1.0
25_9	1/19/2009	1/19/2009	7.2	40	1	4/26/2009	683.1	26.0	39.8	69.0	94.0	0.2	0.9	-100.0	3.1	4.0	0.7
25_9	1/19/2009	1/19/2009	7.2	40	0.1	4/26/2009	464.2	18.9	40.0	69.0	94.0	0.0	0.6	-70.4	3.6	3.3	0.2
25_9	1/19/2009	1/19/2009	7.2	40	0.01	4/26/2009	388.6	13.3	40.2	69.0	94.0	0.0	0.7	-30.4	4.4	2.2	0.3

Table C37. Lab 3 prefabricated core unconfined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_4	09/28/09	09/28/09	6.9	4	10	12/8/2009	16315.0	12.6	3.9	0.9	96.0	0.1	1.3	-77.2	2.4	7.4	0.2
25_4	09/28/09	09/28/09	6.9	4	1	12/8/2009	11369.0	17.7	3.9	0.8	100.0	0.0	0.4	-139.9	2.3	7.0	0.3
25_4	09/28/09	09/28/09	6.9	4	0.1	12/8/2009	6954.0	24.1	3.9	0.7	101.0	0.0	0.6	-239.1	3.7	8.7	0.2
25_4	09/28/09	09/28/09	6.9	4	0.01	12/8/2009	3858.0	28.8	3.9	0.8	96.0	0.0	0.5	-204.9	2.4	9.3	0.1
25_4	09/28/09	09/28/09	6.9	20	10	12/10/2009	7119.0	24.8	20.0	0.7	92.0	0.3	2.0	-302.1	6.2	7.8	0.6
25_4	09/28/09	09/28/09	6.9	20	1	12/10/2009	3662.0	30.7	20.0	0.8	94.0	0.1	0.5	-303.3	5.4	6.3	0.3
25_4	09/28/09	09/28/09	6.9	20	0.1	12/10/2009	1615.0	32.6	19.9	0.8	97.0	0.0	0.6	-216.6	3.1	4.8	0.2
25_4	09/28/09	09/28/09	6.9	20	0.01	12/10/2009	669.1	28.8	19.9	0.8	111.0	-0.1	0.6	-137.2	4.2	3.3	0.5
25_4	09/28/09	09/28/09	6.9	40	10	12/11/2009	1580.0	34.0	40.1	0.6	91.0	-0.1	4.1	-141.5	4.8	8.0	0.6
25_4	09/28/09	09/28/09	6.9	40	1	12/11/2009	563.9	30.7	40.0	0.5	99.0	0.1	0.9	-75.5	4.7	8.7	0.5
25_4	09/28/09	09/28/09	6.9	40	0.1	12/11/2009	259.9	22.5	40.1	0.4	95.0	0.0	0.5	-109.6	6.1	10.4	0.7
25_4	09/28/09	09/28/09	6.9	40	0.01	12/11/2009	186.4	13.4	40.1	0.4	97.0	0.0	0.8	-289.8	7.7	15.7	2.4
25_6	09/28/09	09/28/09	7.1	4	10	12/8/2009	16959.0	12.6	3.9	0.8	96.0	0.3	1.4	-79.5	2.3	10.2	1.2
25_6	09/28/09	09/28/09	7.1	4	1	12/8/2009	11677.0	17.9	3.9	0.9	100.0	0.0	0.4	-148.7	2.2	16.5	1.2
25_6	09/28/09	09/28/09	7.1	4	0.1	12/8/2009	6960.0	24.7	3.9	0.8	101.0	0.0	0.6	-257.8	3.6	17.7	1.0
25_6	09/28/09	09/28/09	7.1	4	0.01	12/8/2009	3650.0	29.6	3.9	0.8	98.0	0.0	0.5	-216.0	2.3	16.9	0.5
25_6	09/28/09	09/28/09	7.1	20	10	12/10/2009	7108.0	25.6	19.9	0.7	90.0	0.4	2.0	-323.3	6.8	13.9	0.7
25_6	09/28/09	09/28/09	7.1	20	1	12/10/2009	3532.0	31.3	19.9	0.8	95.0	0.1	0.5	-306.5	5.5	16.0	0.5
25_6	09/28/09	09/28/09	7.1	20	0.1	12/10/2009	1478.0	32.9	19.9	0.8	99.0	0.0	0.5	-201.4	3.2	15.4	0.5
25_6	09/28/09	09/28/09	7.1	20	0.01	12/10/2009	573.4	28.9	19.9	0.7	116.0	0.0	0.6	-115.9	4.5	11.8	1.1
25_6	09/28/09	09/28/09	7.1	40	10	12/11/2009	1435.0	34.7	40.2	0.4	93.0	-0.2	4.2	-132.9	4.9	8.1	0.4
25_6	09/28/09	09/28/09	7.1	40	1	12/11/2009	491.2	30.9	40.2	0.3	100.0	0.4	1.0	-73.4	4.8	6.4	0.9
25_6	09/28/09	09/28/09	7.1	40	0.1	12/11/2009	226.2	22.1	40.2	0.3	95.0	-0.1	0.6	-101.9	6.4	4.8	1.8
25_6	09/28/09	09/28/09	7.1	40	0.01	12/11/2009	172.7	12.2	40.1	0.4	95.0	0.1	0.9	-210.4	8.2	6.7	2.5
25_9	09/28/09	09/28/09	7.0	4	10	12/8/2009	16449.0	12.5	3.9	0.7	91.0	0.2	1.3	-75.5	2.2	5.1	0.8
25_9	09/28/09	09/28/09	7.0	4	1	12/8/2009	11547.0	17.8	3.9	0.8	97.0	0.0	0.4	-144.6	2.2	3.5	0.6
25_9	09/28/09	09/28/09	7.0	4	0.1	12/8/2009	6975.0	24.4	3.9	0.7	100.0	0.0	0.6	-254.3	3.7	3.8	0.4
25_9	09/28/09	09/28/09	7.0	4	0.01	12/8/2009	3680.0	29.6	3.9	0.8	98.0	0.0	0.5	-227.4	2.3	3.7	0.3
25_9	09/28/09	09/28/09	7.0	20	10	12/10/2009	6749.0	25.9	20.0	0.5	91.0	0.3	2.2	-312.4	6.5	22.9	0.5
25_9	09/28/09	09/28/09	7.0	20	1	12/10/2009	3310.0	31.7	19.9	0.8	95.0	0.1	0.6	-289.0	4.9	21.9	0.5
25_9	09/28/09	09/28/09	7.0	20	0.1	12/10/2009	1362.0	32.9	20.0	0.7	100.0	0.0	0.5	-191.5	3.9	19.5	0.9
25_9	09/28/09	09/28/09	7.0	20	0.01	12/10/2009	538.7	28.9	19.9	0.7	114.0	0.0	0.6	-111.1	4.4	14.3	1.6
25_9	09/28/09	09/28/09	7.0	40	10	12/11/2009	1438.0	34.5	39.4	0.5	93.0	-0.2	4.5	-133.3	5.0	10.6	0.6
25_9	09/28/09	09/28/09	7.0	40	1	12/11/2009	496.7	30.9	39.6	0.6	100.0	0.2	1.1	-80.5	4.7	8.3	0.6
25_9	09/28/09	09/28/09	7.0	40	0.1	12/11/2009	231.2	21.6	40.0	0.4	95.0	0.2	0.6	-125.1	6.7	4.3	0.4
25_9	09/28/09	09/28/09	7.0	40	0.01	12/11/2009	180.4	11.0	40.1	0.4	96.0	0.0	0.8	-250.8	9.5	10.0	1.1

Table C38. Lab 3 prefabricated core confined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_4	09/28/09	09/28/09	6.9	4	10	[redacted]											
25_4	09/28/09	09/28/09	6.9	4	1												
25_4	09/28/09	09/28/09	6.9	4	0.1												
25_4	09/28/09	09/28/09	6.9	4	0.01												
25_4	09/28/09	09/28/09	6.9	20	10	12/2/2009	6,329.0	26.4	20.3	69.4	94.0	0.3	1.4	-357.3	5.9	15.6	1.3
25_4	09/28/09	09/28/09	6.9	20	1	12/2/2009	3,142.0	32.6	19.9	69.0	94.0	0.0	0.4	-426.0	5.2	15.3	1.6
25_4	09/28/09	09/28/09	6.9	20	0.1	12/2/2009	1,427.0	34.6	19.9	69.0	94.0	0.0	0.6	-367.8	5.6	12.8	1.5
25_4	09/28/09	09/28/09	6.9	20	0.01	12/2/2009	769.4	30.8	20.0	69.0	87.0	0.0	0.6	-93.3	3.6	10.5	1.2
25_4	09/28/09	09/28/09	6.9	40	10	12/7/2009	1,742.0	32.8	40.4	69.1	90.0	0.2	2.3	-105.2	3.5	10.1	0.7
25_4	09/28/09	09/28/09	6.9	40	1	12/7/2009	854.9	27.0	40.0	69.0	92.0	0.1	0.5	-29.6	2.4	11.8	0.5
25_4	09/28/09	09/28/09	6.9	40	0.1	12/7/2009	565.1	19.7	40.0	69.0	96.0	-0.1	0.5	-37.1	2.9	11.7	0.4
25_4	09/28/09	09/28/09	6.9	40	0.01	12/7/2009	450.3	14.2	40.0	69.0	97.0	0.1	0.6	-15.6	3.2	10.5	0.5
25_6	09/28/09	09/28/09	7.1	4	10	[redacted]											
25_6	09/28/09	09/28/09	7.1	4	1												
25_6	09/28/09	09/28/09	7.1	4	0.1												
25_6	09/28/09	09/28/09	7.1	4	0.01												
25_6	09/28/09	09/28/09	7.1	20	10	12/2/2009	6,442.0	26.3	20.2	69.5	93.0	0.3	1.6	-329.0	6.1	12.3	0.9
25_6	09/28/09	09/28/09	7.1	20	1	12/2/2009	3,136.0	32.2	19.9	69.0	95.0	0.0	0.4	-345.0	4.0	12.7	0.6
25_6	09/28/09	09/28/09	7.1	20	0.1	12/2/2009	1,390.0	33.3	20.0	69.0	97.0	0.0	0.6	-272.7	3.7	10.8	1.1
25_6	09/28/09	09/28/09	7.1	20	0.01	12/2/2009	747.6	28.7	20.0	69.0	90.0	0.0	0.6	-92.6	3.2	7.8	1.4
25_6	09/28/09	09/28/09	7.1	40	10	12/7/2009	1,487.0	32.7	40.4	69.1	91.0	0.2	2.3	-70.6	3.4	5.4	0.9
25_6	09/28/09	09/28/09	7.1	40	1	12/7/2009	759.8	25.2	39.9	69.0	92.0	0.1	0.5	-18.1	2.5	7.1	1.2
25_6	09/28/09	09/28/09	7.1	40	0.1	12/7/2009	535.6	17.5	40.0	69.0	95.0	-0.2	0.5	-29.3	2.9	8.9	1.2
25_6	09/28/09	09/28/09	7.1	40	0.01	12/7/2009	457.5	12.0	40.1	69.0	96.0	0.0	0.6	-8.7	3.4	8.4	1.1
25_9	09/28/09	09/28/09	7.0	4	10	[redacted]											
25_9	09/28/09	09/28/09	7.0	4	1												
25_9	09/28/09	09/28/09	7.0	4	0.1												
25_9	09/28/09	09/28/09	7.0	4	0.01												
25_9	09/28/09	09/28/09	7.0	20	10	12/2/2009	6,481.0	26.7	20.2	69.6	94.0	0.3	1.5	-373.2	6.4	16.0	0.0
25_9	09/28/09	09/28/09	7.0	20	1	12/2/2009	3,168.0	33.1	19.9	69.0	95.0	0.1	0.4	-434.9	5.5	15.6	0.5
25_9	09/28/09	09/28/09	7.0	20	0.1	12/2/2009	1,406.0	34.7	20.0	69.0	96.0	0.1	0.6	-334.2	5.1	15.9	0.8
25_9	09/28/09	09/28/09	7.0	20	0.01	12/2/2009	735.9	29.3	20.0	69.0	90.0	0.0	0.6	-72.1	5.2	16.4	0.8
25_9	09/28/09	09/28/09	7.0	40	10	12/9/2009	1,473.0	33.3	40.4	69.0	90.0	0.5	2.7	-33.9	3.5	16.8	0.4
25_9	09/28/09	09/28/09	7.0	40	1	12/9/2009	728.7	26.9	40.0	69.0	91.0	0.1	0.5	103.2	3.4	17.0	0.7
25_9	09/28/09	09/28/09	7.0	40	0.1	12/9/2009	523.7	18.5	39.9	69.0	89.0	0.0	0.5	76.5	4.0	17.7	1.1
25_9	09/28/09	09/28/09	7.0	40	0.01	12/9/2009	457.0	12.1	40.1	69.0	95.0	0.1	0.6	52.4	4.2	16.7	1.1

Table C39. Lab 4 prefabricated core unconfined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_1	10/20/09	10/20/09	6.9	4	10	3/12/2010	17547.0	11.7	3.9	1.5	91.0	0.3	3.3	-60.2	3.4	21.8	0.6
25_1	10/20/09	10/20/09	6.9	4	1	3/12/2010	12526.0	16.4	3.9	1.5	96.0	0.2	0.7	-119.7	2.2	26.0	0.9
25_1	10/20/09	10/20/09	6.9	4	0.1	3/12/2010	7844.0	22.6	3.6	1.5	99.0	0.0	1.0	-215.4	3.4	28.6	1.0
25_1	10/20/09	10/20/09	6.9	4	0.01	3/12/2010	4255.0	28.8	3.7	1.7	95.0	0.1	0.8	-246.1	2.8	30.3	1.0
25_1	10/20/09	10/20/09	6.9	20	10	3/15/2010	8189.0	23.2	20.3	1.4	94.0	0.4	3.6	-250.2	5.4	10.0	0.5
25_1	10/20/09	10/20/09	6.9	20	1	3/15/2010	4293.0	29.7	20.2	1.4	92.0	0.6	2.2	-312.0	4.8	11.8	0.3
25_1	10/20/09	10/20/09	6.9	20	0.1	3/15/2010	1855.0	33.6	20.2	1.4	93.0	1.1	2.9	-225.4	3.6	14.5	0.3
25_1	10/20/09	10/20/09	6.9	20	0.01	3/15/2010	628.5	32.1	20.3	1.4	115.0	-0.2	4.1	-40.4	4.5	16.8	0.2
25_1	10/20/09	10/20/09	6.9	40	10	3/18/2010	1412.0	36.6	39.6	1.0	86.0	-0.4	9.6	-287.9	9.9	21.0	0.7
25_1	10/20/09	10/20/09	6.9	40	1	3/18/2010	413.8	37.0	39.7	1.0	110.0	-2.1	10.4	-43.5	8.5	24.2	1.1
25_1	10/20/09	10/20/09	6.9	40	0.1	3/18/2010	128.4	32.6	39.8	1.0	97.0	-0.5	14.8	27.2	7.8	25.0	1.9
25_1	10/20/09	10/20/09	6.9	40	0.01	3/18/2010	55.1	23.9	39.9	1.1	95.0	10.9	35.8	70.6	6.8	25.3	1.7
25_3	10/20/09	10/20/09	7.0	4	10	3/12/2010	16879.0	12.3	3.9	3.3	90.0	0.2	2.3	-63.2	2.7	7.2	0.5
25_3	10/20/09	10/20/09	7.0	4	1	3/12/2010	11904.0	17.0	3.9	1.5	95.0	0.0	0.7	-109.3	2.4	9.2	0.6
25_3	10/20/09	10/20/09	7.0	4	0.1	3/12/2010	7390.0	22.8	4.0	1.5	97.0	-0.1	1.0	-157.7	2.5	11.1	0.5
25_3	10/20/09	10/20/09	7.0	4	0.01	3/12/2010	3959.0	28.7	4.0	1.6	96.0	-0.1	0.7	-167.4	1.9	12.7	0.2
25_3	10/20/09	10/20/09	7.0	20	10	3/15/2010	7321.0	24.3	20.1	1.4	93.0	0.5	4.0	-264.9	6.0	10.8	0.6
25_3	10/20/09	10/20/09	7.0	20	1	3/15/2010	3762.0	30.9	20.2	1.4	90.0	0.0	2.1	-330.0	5.6	10.4	0.5
25_3	10/20/09	10/20/09	7.0	20	0.1	3/15/2010	1578.0	35.3	20.2	1.4	92.0	-0.4	3.3	-247.2	4.0	11.4	1.3
25_3	10/20/09	10/20/09	7.0	20	0.01	3/15/2010	546.7	34.4	20.2	1.4	110.0	0.2	4.6	-83.9	3.6	10.3	2.3
25_3	10/20/09	10/20/09	7.0	40	10	3/18/2010	1246.0	37.8	40.3	1.0	87.0	-0.3	10.3	-312.0	10.1	13.6	1.2
25_3	10/20/09	10/20/09	7.0	40	1	3/18/2010	373.1	37.4	40.3	1.0	108.0	-2.2	10.1	-71.4	7.9	12.1	2.2
25_3	10/20/09	10/20/09	7.0	40	0.1	3/18/2010	122.3	32.8	40.5	1.0	95.0	2.1	15.4	12.4	6.5	11.3	2.0
25_3	10/20/09	10/20/09	7.0	40	0.01	3/18/2010	51.2	26.3	40.3	1.1	103.0	5.3	35.4	106.5	7.3	9.2	1.5
25_7	10/20/09	10/20/09	7.2	4	10	3/12/2010	16464.0	12.4	4.2	1.7	91.0	0.2	2.3	-63.4	3.4	5.0	0.8
25_7	10/20/09	10/20/09	7.2	4	1	3/12/2010	11602.0	17.1	4.1	1.7	95.0	0.1	0.8	-126.5	3.9	5.8	0.8
25_7	10/20/09	10/20/09	7.2	4	0.1	3/12/2010	7131.0	23.7	4.2	1.7	96.0	0.2	1.0	-230.8	7.8	6.1	0.8
25_7	10/20/09	10/20/09	7.2	4	0.01	3/12/2010	3810.0	29.4	3.9	1.6	94.0	0.1	0.8	-228.4	3.7	8.3	0.4
25_7	10/20/09	10/20/09	7.2	20	10	3/15/2010	7523.0	23.9	20.3	1.4	93.0	0.4	3.6	-256.3	5.4	6.4	0.4
25_7	10/20/09	10/20/09	7.2	20	1	3/15/2010	3897.0	30.8	20.3	1.4	91.0	-0.6	2.2	-319.9	6.0	6.4	0.6
25_7	10/20/09	10/20/09	7.2	20	0.1	3/15/2010	1621.0	35.1	20.2	1.4	93.0	0.0	3.2	-222.2	4.0	5.9	1.0
25_7	10/20/09	10/20/09	7.2	20	0.01	3/15/2010	531.9	34.0	20.2	1.4	114.0	-1.2	5.1	-24.8	3.7	7.1	1.9
25_7	10/20/09	10/20/09	7.2	40	10	3/18/2010	1239.0	37.8	40.3	0.9	89.0	-0.7	9.4	-276.0	9.5	7.5	1.6
25_7	10/20/09	10/20/09	7.2	40	1	3/18/2010	363.8	37.6	40.6	1.0	108.0	-5.2	8.3	-43.9	6.9	0.9	2.9
25_7	10/20/09	10/20/09	7.2	40	0.1	3/18/2010	112.0	33.6	40.9	0.7	97.0	0.8	15.8	49.7	9.1	11.1	2.7
25_7	10/20/09	10/20/09	7.2	40	0.01	3/18/2010	53.2	22.1	39.7	1.0	91.0	8.3	52.3	154.8	10.4	13.3	0.7

Table C40. Lab 4 prefabricated core confined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_1	10/20/09	10/20/09	6.9	4	10	[redacted]											
25_1	10/20/09	10/20/09	6.9	4	1	[redacted]											
25_1	10/20/09	10/20/09	6.9	4	0.1	[redacted]											
25_1	10/20/09	10/20/09	6.9	4	0.01	[redacted]											
25_1	10/20/09	10/20/09	6.9	20	10	3/3/2010	6860.0	24.8	19.6	69.0	95.0	0.4	3.0	-278.7	4.9	7.2	0.2
25_1	10/20/09	10/20/09	6.9	20	1	3/3/2010	3453.0	31.8	19.7	69.0	93.0	-0.5	1.9	-402.6	5.5	6.4	0.4
25_1	10/20/09	10/20/09	6.9	20	0.1	3/3/2010	1550.0	35.0	20.0	69.0	91.0	0.0	3.1	-394.3	5.5	5.2	0.7
25_1	10/20/09	10/20/09	6.9	20	0.01	3/3/2010	763.5	31.0	20.0	69.0	85.0	-0.1	2.5	-178.1	5.5	2.9	0.5
25_1	10/20/09	10/20/09	6.9	40	10	3/22/2010	1903.0	35.0	40.8	69.0	93.0	1.4	5.9	-293.6	7.8	11.6	0.3
25_1	10/20/09	10/20/09	6.9	40	1	3/22/2010	861.1	30.3	40.7	69.0	94.0	-1.4	5.6	-95.0	5.0	10.9	0.5
25_1	10/20/09	10/20/09	6.9	40	0.1	3/22/2010	526.0	22.1	40.2	69.0	93.0	-0.1	6.2	-55.1	3.8	11.1	0.6
25_1	10/20/09	10/20/09	6.9	40	0.01	3/22/2010	404.9	14.7	40.5	69.0	93.0	0.1	3.5	-19.4	3.1	12.6	0.8
25_3	10/20/09	10/20/09	7.0	4	10	[redacted]											
25_3	10/20/09	10/20/09	7.0	4	1	[redacted]											
25_3	10/20/09	10/20/09	7.0	4	0.1	[redacted]											
25_3	10/20/09	10/20/09	7.0	4	0.01	[redacted]											
25_3	10/20/09	10/20/09	7.0	20	10	3/4/2010	6305.0	26.4	20.1	69.0	93.0	0.6	3.4	-303.9	5.4	15.6	1.1
25_3	10/20/09	10/20/09	7.0	20	1	3/4/2010	3075.0	33.4	20.2	69.0	92.0	0.1	1.9	-401.3	5.8	18.2	0.6
25_3	10/20/09	10/20/09	7.0	20	0.1	3/4/2010	1351.0	36.3	20.1	69.0	89.0	-0.7	3.4	-293.7	4.6	18.1	0.6
25_3	10/20/09	10/20/09	7.0	20	0.01	3/4/2010	687.8	31.9	20.1	69.0	83.0	-0.6	2.9	-35.2	2.8	15.2	1.1
25_3	10/20/09	10/20/09	7.0	40	10	3/20/2010	1587.0	35.3	39.6	69.0	96.0	0.7	6.8	-233.2	7.0	17.9	0.3
25_3	10/20/09	10/20/09	7.0	40	1	3/20/2010	707.9	29.8	39.5	69.0	95.0	-0.2	7.8	-53.0	5.1	14.7	0.7
25_3	10/20/09	10/20/09	7.0	40	0.1	3/20/2010	435.1	20.8	39.2	69.0	97.0	-0.2	6.5	-46.3	5.2	11.6	0.5
25_3	10/20/09	10/20/09	7.0	40	0.01	3/20/2010	358.2	14.4	39.7	69.0	91.0	0.8	9.0	-6.4	3.5	7.9	0.8
25_7	10/20/09	10/20/09	7.2	4	10	[redacted]											
25_7	10/20/09	10/20/09	7.2	4	1	[redacted]											
25_7	10/20/09	10/20/09	7.2	4	0.1	[redacted]											
25_7	10/20/09	10/20/09	7.2	4	0.01	[redacted]											
25_7	10/20/09	10/20/09	7.2	20	10	3/4/2010	6370.0	25.6	20.2	69.1	94.0	0.6	3.3	-295.2	5.3	8.9	0.6
25_7	10/20/09	10/20/09	7.2	20	1	3/4/2010	3163.0	32.4	20.2	69.0	92.0	-0.2	2.7	-385.6	5.6	6.1	0.9
25_7	10/20/09	10/20/09	7.2	20	0.1	3/4/2010	1420.0	34.3	20.1	69.0	90.0	-2.4	3.3	-285.5	5.1	2.2	1.3
25_7	10/20/09	10/20/09	7.2	20	0.01	3/4/2010	754.5	29.9	20.1	69.0	83.0	0.2	2.9	-51.7	2.6	3.6	1.4
25_7	10/20/09	10/20/09	7.2	40	10	3/20/2010	1373.0	34.2	40.2	68.9	98.0	0.4	6.9	-157.4	6.7	6.3	1.2
25_7	10/20/09	10/20/09	7.2	40	1	3/20/2010	704.3	28.0	40.3	69.0	90.0	0.2	10.5	-57.9	7.0	8.4	1.2
25_7	10/20/09	10/20/09	7.2	40	0.1	3/20/2010	491.5	19.6	39.9	69.0	88.0	-0.7	7.1	-43.0	4.2	8.8	0.9
25_7	10/20/09	10/20/09	7.2	40	0.01	3/20/2010	418.3	12.8	39.8	69.0	92.0	0.7	6.9	-36.1	3.6	9.1	0.5

Table C41. Lab 5 prefabricated core unconfined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_1	12/10/09	12/10/09	7.1	4	10	2/10/2010	15628.0	12.4	4.2	0.8	89	0	2.7	-76.2	3.2	8.8	0.2
25_1	12/10/09	12/10/09	7.1	4	1	2/10/2010	10983.0	17.2	4.1	0.8	97	0	0.5	-132.8	2.5	8.7	0.1
25_1	12/10/09	12/10/09	7.1	4	0.1	2/10/2010	6785.0	23.4	4.1	0.8	96	0	0.2	-234.0	3.5	8.3	0.0
25_1	12/10/09	12/10/09	7.1	4	0.01	2/10/2010	3638.0	29.2	4.2	0.8	94	0	0.4	-279.2	2.9	7.7	0.3
25_1	12/10/09	12/10/09	7.1	20	10	2/12/2010	5779.0	26.9	19.9	0.8	99	0	1.9	-345.1	9.2	7.9	0.7
25_1	12/10/09	12/10/09	7.1	20	1	2/12/2010	2862.0	30.5	19.8	0.9	91	0.1	0.6	-190.1	5.1	3.2	0.9
25_1	12/10/09	12/10/09	7.1	20	0.1	2/12/2010	1200.0	29.9	19.9	0.9	93	0	0.4	-55.1	3.3	1.9	0.8
25_1	12/10/09	12/10/09	7.1	20	0.01	2/12/2010	528.9	25.8	19.9	0.7	106	0	0.5	4.9	5.1	1.9	0.6
25_1	12/10/09	12/10/09	7.1	40	10	2/23/2010	1463.0	31.5	40.3	0.2	83	0.7	4.3	-215.5	6.6	2.6	1.0
25_1	12/10/09	12/10/09	7.1	40	1	2/23/2010	645.4	25.1	40.3	0.2	96	0.2	1.1	-92.6	4.7	4.9	1.0
25_1	12/10/09	12/10/09	7.1	40	0.1	2/23/2010	371.9	16.3	40.2	0.1	93	-0.1	1.4	-71.1	5.4	5.5	1.4
25_1	12/10/09	12/10/09	7.1	40	0.01	2/23/2010	299.4	8.7	39.9	0.2	98	-0.1	0.7	-143.4	5.9	6.9	2.1
25_8	12/10/09	12/10/09	7.2	4	10	2/11/2010	14647.0	13.4	4.0	0.9	91	0.3	1.5	-87.3	2.6	7.3	0.5
25_8	12/10/09	12/10/09	7.2	4	1	2/11/2010	10001.0	18.5	4.0	1.0	97	0.1	0.5	-151.7	2.7	8.0	0.5
25_8	12/10/09	12/10/09	7.2	4	0.1	2/11/2010	5988.0	25.0	4.0	0.9	96	0.1	0.2	-256.4	3.9	9.6	0.8
25_8	12/10/09	12/10/09	7.2	4	0.01	2/11/2010	3349.0	29.9	3.8	0.9	88	0	0.4	-262.4	3.7	12.3	0.8
25_8	12/10/09	12/10/09	7.2	20	10	2/12/2010	6169.0	26.1	20.2	0.4	92	0.3	2.0	-339.1	7.1	7.6	0.8
25_8	12/10/09	12/10/09	7.2	20	1	2/12/2010	3066.0	31.7	20.2	0.5	93	0	0.6	-338.6	5.3	4.5	1.0
25_8	12/10/09	12/10/09	7.2	20	0.1	2/12/2010	1311.0	33.5	20.2	0.5	92	0	0.4	-265.9	3.9	4.2	1.2
25_8	12/10/09	12/10/09	7.2	20	0.01	2/12/2010	553.8	30.1	19.9	0.6	100	0	0.6	-118.6	4.2	6.7	1.0
25_8	12/10/09	12/10/09	7.2	40	10	2/12/2010	1177.0	34.4	40.9	0.3	84	-0.7	5.5	-222.0	6.3	5.1	0.8
25_8	12/10/09	12/10/09	7.2	40	1	2/12/2010	430.6	29.1	40.9	0.3	98	0.1	2.1	-97.5	5.7	6.3	0.9
25_8	12/10/09	12/10/09	7.2	40	0.1	2/12/2010	202.7	19.4	40.9	0.2	91	-0.5	2.0	-81.3	7.1	8.5	2.3
25_8	12/10/09	12/10/09	7.2	40	0.01	2/12/2010	159.2	9.9	40.3	0.3	95	0	1.0	-148.1	9.1	18.4	4.7
25_9	12/10/09	12/10/09	7.2	4	10	2/10/2010	14302.0	12.7	4.1	0.9	94	0.6	1.6	-80.9	2.2	8.1	0.5
25_9	12/10/09	12/10/09	7.2	4	1	2/10/2010	9952.0	17.5	4.0	0.9	97	0.1	0.4	-135.2	2.4	7.1	0.3
25_9	12/10/09	12/10/09	7.2	4	0.1	2/10/2010	6095.0	23.8	3.9	0.8	96	0	0.2	-235.9	3.3	6.3	0.3
25_9	12/10/09	12/10/09	7.2	4	0.01	2/10/2010	3333.0	29.1	3.8	0.8	92	0	0.4	-266.9	2.9	5.4	0.3
25_9	12/10/09	12/10/09	7.2	20	10	2/11/2010	5662.0	26.2	19.8	0.8	90	0.1	2.2	-344.3	7.2	6.7	0.5
25_9	12/10/09	12/10/09	7.2	20	1	2/11/2010	2834.0	32.0	19.8	0.7	91	0.1	0.6	-370.0	5.7	5.5	0.8
25_9	12/10/09	12/10/09	7.2	20	0.1	2/11/2010	1241.0	34.2	19.8	0.7	89	0	0.4	-343.6	5.0	5.3	1.0
25_9	12/10/09	12/10/09	7.2	20	0.01	2/11/2010	561.9	31.0	19.8	0.7	94	0.1	0.5	-197.1	4.4	6.4	1.2
25_9	12/10/09	12/10/09	7.2	40	10	2/15/2010	1623.0	33.2	40.2	0.0	85	1.3	4.8	-252.0	6.6	7.9	0.8
25_9	12/10/09	12/10/09	7.2	40	1	2/15/2010	619.1	30.1	40.2	0.0	96	0.2	1.7	-108.3	4.9	8.3	0.6
25_9	12/10/09	12/10/09	7.2	40	0.1	2/15/2010	267.7	22.2	40.1	0.0	94	0.2	1.6	-94.8	6.3	8.8	1.0
25_9	12/10/09	12/10/09	7.2	40	0.01	2/15/2010	174.1	12.1	40.1	0.0	102	-0.4	0.9	-210.9	8.6	5.2	2.8

Table C42. Lab 5 prefabricated core confined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_1	12/10/09	12/10/09	7.1	4	10												
25_1	12/10/09	12/10/09	7.1	4	1												
25_1	12/10/09	12/10/09	7.1	4	0.1												
25_1	12/10/09	12/10/09	7.1	4	0.01												
25_1	12/10/09	12/10/09	7.1	20	10	3/30/2010	7631.0	23.6	20.2	69.0	96.0	0.3	2.0	-306.7	6.7	13.3	0.8
25_1	12/10/09	12/10/09	7.1	20	1	3/30/2010	4053.0	28.9	20.0	69.0	93.0	0.1	0.5	-285.6	6.2	17.5	0.8
25_1	12/10/09	12/10/09	7.1	20	0.1	3/30/2010	1873.0	30.2	19.9	69.0	90.0	0.0	0.3	-170.1	4.4	18.7	0.7
25_1	12/10/09	12/10/09	7.1	20	0.01	3/30/2010	840.7	25.9	19.9	69.0	104.0	0.0	0.5	-42.4	4.9	17.2	0.7
25_1	12/10/09	12/10/09	7.1	40	10	3/31/2010	1916.0	31.0	40.3	69.0	85.0	1.4	3.5	-156.7	6.0	17.9	1.2
25_1	12/10/09	12/10/09	7.1	40	1	3/31/2010	782.5	25.9	40.6	69.0	96.0	-0.1	0.8	-32.7	4.5	20.3	1.7
25_1	12/10/09	12/10/09	7.1	40	0.1	3/31/2010	373.4	16.7	40.7	69.0	91.0	0.5	0.6	-20.5	6.6	25.0	4.7
25_1	12/10/09	12/10/09	7.1	40	0.01	3/31/2010	311.7	1.3	40.1	69.0	93.0	0.0	0.6	-70.9	11.0	38.9	14.7
25_8	12/10/09	12/10/09	7.2	4	10												
25_8	12/10/09	12/10/09	7.2	4	1												
25_8	12/10/09	12/10/09	7.2	4	0.1												
25_8	12/10/09	12/10/09	7.2	4	0.01												
25_8	12/10/09	12/10/09	7.2	20	10	3/31/2010	6708.0	28.5	20.4	69.0	91.0	0.2	3.7	-494.1	9.0	12.3	1.5
25_8	12/10/09	12/10/09	7.2	20	1	3/31/2010	3093.0	36.2	20.2	69.0	93.0	0.2	0.9	-597.7	9.4	10.4	0.6
25_8	12/10/09	12/10/09	7.2	20	0.1	3/31/2010	1276.0	38.8	20.1	69.0	86.0	0.1	0.4	-459.0	13.2	15.6	0.8
25_8	12/10/09	12/10/09	7.2	20	0.01	3/31/2010	611.1	31.5	20.0	69.0	86.0	0.0	0.6	-175.1	7.8	32.6	1.9
25_8	12/10/09	12/10/09	7.2	40	10	3/31/2010	1576.0	35.6	40.3	69.0	83.0	0.0	3.9	-328.2	8.1	10.3	1.3
25_8	12/10/09	12/10/09	7.2	40	1	3/31/2010	601.6	31.2	40.3	69.0	95.0	0.2	0.8	-198.4	3.9	10.1	1.2
25_8	12/10/09	12/10/09	7.2	40	0.1	3/31/2010	292.7	21.8	40.1	69.0	89.0	0.1	0.7	-216.6	6.3	14.1	1.3
25_8	12/10/09	12/10/09	7.2	40	0.01	3/31/2010	219.7	12.0	40.0	69.0	96.0	-0.2	0.8	-221.2	8.4	10.8	3.4
25_9	12/10/09	12/10/09	7.2	4	10												
25_9	12/10/09	12/10/09	7.2	4	1												
25_9	12/10/09	12/10/09	7.2	4	0.1												
25_9	12/10/09	12/10/09	7.2	4	0.01												
25_9	12/10/09	12/10/09	7.2	20	10	3/31/2010	6446.0	23.8	20.2	69.0	86.0	-0.3	4.1	-274.3	7.4	23.4	2.4
25_9	12/10/09	12/10/09	7.2	20	1	3/31/2010	3388.0	29.7	20.0	69.0	92.0	0.3	1.8	-225.3	10.2	28.7	0.7
25_9	12/10/09	12/10/09	7.2	20	0.1	3/31/2010	1529.0	32.4	20.0	69.0	91.0	0.0	0.3	-173.3	11.5	36.0	4.9
25_9	12/10/09	12/10/09	7.2	20	0.01	3/31/2010	718.9	27.5	19.9	69.0	98.0	0.0	0.5	-66.1	7.0	21.2	3.6
25_9	12/10/09	12/10/09	7.2	40	10	3/31/2010	1599.0	33.0	40.3	69.0	85.0	1.1	4.0	-220.2	6.7	5.8	0.5
25_9	12/10/09	12/10/09	7.2	40	1	3/31/2010	651.5	29.2	40.4	69.0	95.0	0.0	0.8	-82.1	3.8	7.5	0.7
25_9	12/10/09	12/10/09	7.2	40	0.1	3/31/2010	287.0	22.6	40.3	69.0	93.0	0.1	0.8	-106.4	6.0	9.0	1.6
25_9	12/10/09	12/10/09	7.2	40	0.01	3/31/2010	199.8	11.8	39.9	69.0	96.0	0.3	0.8	-76.1	8.7	15.4	3.0

Table C43. Lab 6 prefabricated core unconfined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_2	11/17/09	11/17/09	7.1	4	10	2/8/2010	17500.0	11.9	3.8	0.3	95.0	0.4	1.5	-66.7	2.1	18.8	0.5
25_2	11/17/09	11/17/09	7.1	4	1	2/8/2010	12375.0	16.7	3.8	0.3	98.0	0.1	0.4	-126.9	2.1	20.1	0.5
25_2	11/17/09	11/17/09	7.1	4	0.1	2/8/2010	7693.0	23.0	3.8	0.3	102.0	0.0	0.3	-227.2	3.2	20.9	0.4
25_2	11/17/09	11/17/09	7.1	4	0.01	2/8/2010	4334.0	28.4	3.8	0.3	96.0	0.0	0.3	-209.1	2.4	20.4	0.1
25_2	11/17/09	11/17/09	7.1	20	10	2/9/2010	7350.0	24.9	19.8	0.1	93.0	0.4	2.5	-301.1	6.1	20.2	0.6
25_2	11/17/09	11/17/09	7.1	20	1	2/9/2010	3737.0	31.3	19.8	0.2	92.0	0.1	0.7	-311.9	5.0	19.7	1.0
25_2	11/17/09	11/17/09	7.1	20	0.1	2/9/2010	1580.0	34.4	19.9	0.2	99.0	0.0	0.2	-210.9	3.1	19.4	1.5
25_2	11/17/09	11/17/09	7.1	20	0.01	2/9/2010	604.9	32.6	19.9	0.2	112.0	0.0	0.5	-17.0	4.0	18.1	1.4
25_2	11/17/09	11/17/09	7.1	40	10	2/11/2010	1509.0	36.5	40.0	0.0	81.0	0.4	5.9	-365.4	10.3	15.6	1.1
25_2	11/17/09	11/17/09	7.1	40	1	2/11/2010	543.9	32.0	40.0	0.0	100.0	0.4	1.9	-137.8	5.0	15.7	1.5
25_2	11/17/09	11/17/09	7.1	40	0.1	2/11/2010	231.8	23.8	40.0	0.0	99.0	0.1	0.6	-120.7	6.3	17.9	1.5
25_2	11/17/09	11/17/09	7.1	40	0.01	2/11/2010	150.7	14.7	40.1	0.0	102.0	0.1	0.8	-290.1	8.4	20.5	2.6
25_6	11/17/09	11/17/09	7.0	4	10	2/8/2010	15785.0	12.6	3.8	0.4	97.0	0.3	1.4	-71.5	2.5	6.6	0.4
25_6	11/17/09	11/17/09	7.0	4	1	2/8/2010	10920.0	17.6	3.9	0.3	99.0	0.1	0.4	-131.2	2.4	6.0	0.8
25_6	11/17/09	11/17/09	7.0	4	0.1	2/8/2010	6688.0	23.7	3.9	0.2	103.0	0.0	0.3	-220.9	3.2	6.4	1.0
25_6	11/17/09	11/17/09	7.0	4	0.01	2/8/2010	3780.0	28.5	3.8	0.3	95.0	0.0	0.3	-184.8	2.5	7.1	0.9
25_6	11/17/09	11/17/09	7.0	20	10	2/9/2010	6472.0	25.3	20.0	0.1	94.0	0.4	2.8	-291.7	6.0	2.9	0.5
25_6	11/17/09	11/17/09	7.0	20	1	2/9/2010	3276.0	31.6	20.0	0.2	93.0	0.1	0.7	-308.1	5.0	3.9	0.5
25_6	11/17/09	11/17/09	7.0	20	0.1	2/9/2010	1414.0	34.4	19.9	0.2	99.0	0.0	0.2	-222.2	3.5	4.8	0.3
25_6	11/17/09	11/17/09	7.0	20	0.01	2/9/2010	565.3	32.4	19.9	0.2	109.0	0.0	0.4	-48.4	3.4	6.0	0.5
25_6	11/17/09	11/17/09	7.0	40	10	2/11/2010	1245.0	36.1	39.9	0.0	80.0	0.4	6.2	-268.4	9.5	17.5	0.4
25_6	11/17/09	11/17/09	7.0	40	1	2/11/2010	443.3	32.0	39.9	0.0	99.0	0.3	2.2	-51.3	4.4	17.9	0.9
25_6	11/17/09	11/17/09	7.0	40	0.1	2/11/2010	183.4	24.8	40.0	0.0	101.0	0.1	0.7	-20.6	5.0	24.0	2.0
25_6	11/17/09	11/17/09	7.0	40	0.01	2/11/2010	107.1	16.2	39.9	0.0	105.0	0.2	0.9	-30.7	7.0	34.8	3.5
25_8	11/17/09	11/17/09	7.2	4	10	2/8/2010	16230.0	12.3	3.9	0.3	95.0	0.4	1.3	-70.4	2.1	5.9	0.7
25_8	11/17/09	11/17/09	7.2	4	1	2/8/2010	11300.0	17.3	3.9	0.3	98.0	0.1	0.4	-131.0	2.2	8.5	1.1
25_8	11/17/09	11/17/09	7.2	4	0.1	2/8/2010	6915.0	23.5	4.0	0.3	102.0	0.0	0.3	-217.9	3.3	12.1	1.4
25_8	11/17/09	11/17/09	7.2	4	0.01	2/8/2010	3868.0	28.0	4.0	0.3	96.0	0.0	0.3	-168.7	2.0	15.1	1.3
25_8	11/17/09	11/17/09	7.2	20	10	2/9/2010	6720.0	25.2	20.0	0.2	94.0	0.4	2.4	-288.7	6.2	9.1	0.8
25_8	11/17/09	11/17/09	7.2	20	1	2/9/2010	3474.0	30.6	20.0	0.2	97.0	0.1	0.6	-329.2	8.4	11.8	0.6
25_8	11/17/09	11/17/09	7.2	20	0.1	2/9/2010	1524.0	32.0	19.9	0.1	100.0	0.0	0.2	-158.3	2.7	12.7	0.2
25_8	11/17/09	11/17/09	7.2	20	0.01	2/9/2010	610.6	29.8	19.9	0.2	114.0	0.0	0.4	-43.4	3.9	10.8	0.5
25_8	11/17/09	11/17/09	7.2	40	10	2/11/2010	1368.0	35.0	39.9	0.0	81.0	0.2	5.7	-282.4	9.6	11.6	0.4
25_8	11/17/09	11/17/09	7.2	40	1	2/11/2010	513.5	29.9	39.9	0.0	99.0	0.3	1.9	-91.7	5.0	11.5	0.9
25_8	11/17/09	11/17/09	7.2	40	0.1	2/11/2010	236.0	20.8	39.9	0.0	98.0	-0.2	0.6	-73.1	6.3	17.5	2.1
25_8	11/17/09	11/17/09	7.2	40	0.01	2/11/2010	173.3	10.5	39.9	0.0	98.0	0.0	0.7	-160.1	8.1	34.5	3.8

Table C44. Lab 6 prefabricated core confined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_2	11/17/09	11/17/09	7.1	4	10	[redacted]											
25_2	11/17/09	11/17/09	7.1	4	1												
25_2	11/17/09	11/17/09	7.1	4	0.1												
25_2	11/17/09	11/17/09	7.1	4	0.01												
25_2	11/17/09	11/17/09	7.1	20	10	2/4/2010	7376.0	25.0	19.9	68.9	95.0	0.5	1.5	-317.0	5.2	16.6	0.6
25_2	11/17/09	11/17/09	7.1	20	1	2/4/2010	3739.0	32.2	19.8	69.0	94.0	0.0	0.4	-437.5	6.3	16.1	0.9
25_2	11/17/09	11/17/09	7.1	20	0.1	2/4/2010	1687.0	36.0	19.9	69.0	95.0	0.0	0.3	-484.3	10.3	14.3	1.6
25_2	11/17/09	11/17/09	7.1	20	0.01	2/4/2010	829.2	32.1	19.8	69.0	92.0	0.0	0.4	-115.3	3.1	11.8	2.6
25_2	11/17/09	11/17/09	7.1	40	10	2/4/2010	1748.0	35.6	40.0	69.1	91.0	0.9	3.0	-405.5	10.1	6.2	1.7
25_2	11/17/09	11/17/09	7.1	40	1	2/4/2010	823.7	29.3	40.0	69.0	94.0	0.1	0.8	-124.7	3.1	5.2	2.1
25_2	11/17/09	11/17/09	7.1	40	0.1	2/4/2010	523.9	22.0	40.1	69.0	94.0	0.0	0.4	-55.9	3.0	5.9	2.5
25_2	11/17/09	11/17/09	7.1	40	0.01	2/4/2010	426.3	15.6	40.0	69.0	92.0	0.0	0.5	-32.2	3.2	7.2	2.6
25_6	11/17/09	11/17/09	7.0	4	10	[redacted]											
25_6	11/17/09	11/17/09	7.0	4	1												
25_6	11/17/09	11/17/09	7.0	4	0.1												
25_6	11/17/09	11/17/09	7.0	4	0.01												
25_6	11/17/09	11/17/09	7.0	20	10	2/4/2010	6158.0	25.0	19.8	69.0	94.0	0.5	1.9	-262.1	4.7	15.1	0.5
25_6	11/17/09	11/17/09	7.0	20	1	2/4/2010	3140.0	31.5	19.7	69.0	94.0	0.1	0.4	-339.8	4.3	14.5	0.3
25_6	11/17/09	11/17/09	7.0	20	0.1	2/4/2010	1446.0	34.3	19.9	69.0	97.0	0.0	0.3	-342.3	5.4	13.9	0.6
25_6	11/17/09	11/17/09	7.0	20	0.01	2/4/2010	762.8	30.4	19.9	69.0	89.0	0.0	0.4	-131.0	3.2	12.9	1.3
25_6	11/17/09	11/17/09	7.0	40	10	2/4/2010	1539.0	34.7	40.2	69.0	89.0	1.0	3.4	-359.5	9.1	9.8	0.4
25_6	11/17/09	11/17/09	7.0	40	1	2/4/2010	751.3	28.4	40.1	69.0	94.0	0.2	0.8	-120.2	3.1	9.4	0.7
25_6	11/17/09	11/17/09	7.0	40	0.1	2/4/2010	486.3	21.1	40.0	69.0	96.0	0.0	0.4	-73.8	2.9	10.0	0.7
25_6	11/17/09	11/17/09	7.0	40	0.01	2/4/2010	405.1	14.1	40.1	69.0	93.0	-0.1	0.5	-58.0	2.7	10.5	0.6
25_8	11/17/09	11/17/09	7.2	4	10	[redacted]											
25_8	11/17/09	11/17/09	7.2	4	1												
25_8	11/17/09	11/17/09	7.2	4	0.1												
25_8	11/17/09	11/17/09	7.2	4	0.01												
25_8	11/17/09	11/17/09	7.2	20	10	2/4/2010	6614.0	25.9	20.1	69.0	94.0	0.5	1.8	-326.0	5.5	8.4	1.6
25_8	11/17/09	11/17/09	7.2	20	1	2/4/2010	3272.0	32.3	19.9	69.0	94.0	0.1	0.4	-396.6	5.0	11.5	1.9
25_8	11/17/09	11/17/09	7.2	20	0.1	2/4/2010	1494.0	34.2	19.9	69.0	96.0	0.0	0.3	-364.8	5.6	13.2	1.9
25_8	11/17/09	11/17/09	7.2	20	0.01	2/4/2010	805.5	29.4	19.9	69.0	89.0	0.0	0.4	-99.6	3.6	12.6	1.9
25_8	11/17/09	11/17/09	7.2	40	10	2/4/2010	1552.0	31.5	40.3	69.0	88.0	0.8	3.6	-141.1	5.8	15.2	0.3
25_8	11/17/09	11/17/09	7.2	40	1	2/4/2010	768.2	24.5	40.3	69.0	97.0	0.0	0.9	-22.2	2.4	15.3	0.6
25_8	11/17/09	11/17/09	7.2	40	0.1	2/4/2010	510.8	16.9	40.3	69.0	100.0	0.0	0.4	-11.4	2.8	16.0	1.0
25_8	11/17/09	11/17/09	7.2	40	0.01	2/4/2010	421.7	11.7	40.3	69.0	99.0	0.0	0.5	-4.5	3.1	17.8	1.3

Table C45. Lab 7 prefabricated core unconfined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_2	01/20/10	01/20/10	7.0	4	10	3/24/2010	16704.0	12.1	3.9	1.5	83.0	0.6	2.2	-74.0	2.6	12.5	0.6
25_2	01/20/10	01/20/10	7.0	4	1	3/24/2010	11757.0	17.0	3.9	1.6	96.0	0.0	0.5	-130.8	2.2	14.0	1.0
25_2	01/20/10	01/20/10	7.0	4	0.1	3/24/2010	7255.0	23.3	4.1	1.5	101.0	0.0	0.2	-219.9	3.3	12.2	1.0
25_2	01/20/10	01/20/10	7.0	4	0.01	3/24/2010	3935.0	28.5	3.9	1.6	98.0	0.0	0.4	-186.8	3.2	8.3	0.5
25_2	01/20/10	01/20/10	7.0	20	10	3/25/2010	5836.0	27.6	20.0	1.7	89.0	0.2	3.9	-366.9	8.1	6.7	0.7
25_2	01/20/10	01/20/10	7.0	20	1	3/25/2010	2783.0	33.4	20.0	1.7	91.0	0.2	1.1	-295.1	5.5	5.5	1.2
25_2	01/20/10	01/20/10	7.0	20	0.1	3/25/2010	1143.0	34.7	20.1	1.6	98.0	0.0	0.4	-130.6	3.7	4.9	1.7
25_2	01/20/10	01/20/10	7.0	20	0.01	3/25/2010	462.2	33.2	20.0	1.6	109.0	0.2	0.6	85.1	6.5	4.3	2.0
25_2	01/20/10	01/20/10	7.0	40	10	3/25/2010	1137.0	37.0	40.0	1.6	94.0	-1.2	7.3	-142.1	7.2	5.5	1.0
25_2	01/20/10	01/20/10	7.0	40	1	3/25/2010	343.2	37.2	40.1	1.6	105.0	0.8	9.1	-29.0	8.2	5.4	1.3
25_2	01/20/10	01/20/10	7.0	40	0.1	3/25/2010	136.7	30.9	40.1	1.6	101.0	0.1	1.2	-8.6	4.7	8.4	1.0
25_2	01/20/10	01/20/10	7.0	40	0.01	3/25/2010	74.1	25.3	40.1	1.6	103.0	-0.3	1.7	39.6	6.8	11.9	1.4
25_6	01/20/10	01/20/10	7.4	4	10	3/25/2010	16882.0	12.0	4.0	1.6	83.0	0.9	2.4	-74.1	3.3	3.7	0.7
25_6	01/20/10	01/20/10	7.4	4	1	3/25/2010	11817.0	16.7	4.0	1.7	97.0	0.1	0.6	-130.9	2.7	2.8	0.7
25_6	01/20/10	01/20/10	7.4	4	0.1	3/25/2010	7242.0	23.0	4.1	1.6	102.0	0.0	0.2	-220.9	3.3	1.7	0.6
25_6	01/20/10	01/20/10	7.4	4	0.01	3/25/2010	3782.0	28.8	4.1	1.6	100.0	0.0	0.4	-190.2	5.5	2.8	0.5
25_6	01/20/10	01/20/10	7.4	20	10	3/25/2010	6301.0	26.5	19.9	1.7	89.0	0.3	3.7	-341.1	7.8	7.0	0.7
25_6	01/20/10	01/20/10	7.4	20	1	3/25/2010	3047.0	32.6	19.9	1.7	92.0	0.2	1.9	-298.8	5.2	7.9	0.9
25_6	01/20/10	01/20/10	7.4	20	0.1	3/25/2010	1234.0	35.0	20.0	1.6	99.0	0.0	0.3	-155.8	3.0	9.3	0.6
25_6	01/20/10	01/20/10	7.4	20	0.01	3/25/2010	458.2	34.1	20.1	1.6	114.0	0.0	0.6	106.2	3.9	8.0	0.6
25_6	01/20/10	01/20/10	7.4	40	10	3/29/2010	1378.0	35.5	40.1	1.5	89.0	-0.9	6.1	-168.5	6.7	5.1	0.9
25_6	01/20/10	01/20/10	7.4	40	1	3/29/2010	422.0	36.0	40.1	1.3	105.0	0.7	8.3	-38.5	7.3	8.4	1.0
25_6	01/20/10	01/20/10	7.4	40	0.1	3/29/2010	156.6	29.9	40.0	1.5	104.0	0.0	1.0	19.0	4.2	12.2	1.0
25_6	01/20/10	01/20/10	7.4	40	0.01	3/29/2010	71.4	24.1	39.9	1.5	113.0	0.2	1.6	185.7	8.2	17.5	1.3
25_9	01/20/10	01/20/10	7.4	4	10	3/24/2010	14769.0	13.3	4.1	1.5	85.0	1.0	2.1	-98.6	4.2	10.1	0.6
25_9	01/20/10	01/20/10	7.4	4	1	3/24/2010	9991.0	19.1	4.1	1.6	99.0	0.1	0.6	-190.2	4.5	11.4	0.6
25_9	01/20/10	01/20/10	7.4	4	0.1	3/24/2010	5785.0	26.1	4.1	1.5	101.0	0.0	0.2	-261.4	8.2	8.1	0.2
25_9	01/20/10	01/20/10	7.4	4	0.01	3/24/2010	2935.0	31.2	4.0	1.6	97.0	0.0	0.4	-183.2	1.9	5.6	0.9
25_9	01/20/10	01/20/10	7.4	20	10	3/25/2010	6074.0	26.6	20.0	1.4	89.0	0.2	3.3	-330.1	7.9	9.7	0.6
25_9	01/20/10	01/20/10	7.4	20	1	3/25/2010	2832.0	32.9	20.0	1.4	94.0	0.2	1.0	-227.3	9.7	10.4	0.6
25_9	01/20/10	01/20/10	7.4	20	0.1	3/25/2010	1067.0	34.7	20.0	1.4	103.0	-0.1	0.4	-106.8	2.8	11.4	1.0
25_9	01/20/10	01/20/10	7.4	20	0.01	3/25/2010	355.3	33.1	20.0	1.5	123.0	0.0	0.7	18.8	3.7	12.2	1.3
25_9	01/20/10	01/20/10	7.4	40	10	3/29/2010	967.3	36.8	40.0	1.5	98.0	-1.0	7.0	-107.0	6.4	5.3	1.4
25_9	01/20/10	01/20/10	7.4	40	1	3/29/2010	256.2	37.2	40.0	1.5	111.0	0.8	11.1	-2.6	9.1	7.5	2.5
25_9	01/20/10	01/20/10	7.4	40	0.1	3/29/2010	99.3	29.9	40.0	1.5	103.0	-0.7	1.3	21.9	4.2	7.2	4.1
25_9	01/20/10	01/20/10	7.4	40	0.01	3/29/2010	49.8	23.0	40.0	1.5	109.0	-0.7	2.2	76.6	5.9	14.0	4.6

Table C46. Lab 7 prefabricated core confined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				CONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_2	01/20/10	01/20/10	7.0	4	10	[redacted]											
25_2	01/20/10	01/20/10	7.0	4	1												
25_2	01/20/10	01/20/10	7.0	4	0.1												
25_2	01/20/10	01/20/10	7.0	4	0.01												
25_2	01/20/10	01/20/10	7.0	20	10	3/23/2010	6732.0	25.7	20.1	69.6	92.0	0.4	2.5	-333.5	6.1	6.2	0.3
25_2	01/20/10	01/20/10	7.0	20	1	3/23/2010	3355.0	32.4	20.1	69.6	94.0	0.0	0.5	-389.6	4.9	6.0	0.6
25_2	01/20/10	01/20/10	7.0	20	0.1	3/23/2010	1526.0	34.5	20.1	69.6	95.0	-0.1	0.2	-357.1	5.0	5.3	0.8
25_2	01/20/10	01/20/10	7.0	20	0.01	3/23/2010	808.9	30.1	20.0	69.6	89.0	0.1	0.4	-126.0	6.1	6.0	1.1
25_2	01/20/10	01/20/10	7.0	40	10	3/23/2010	1584.0	32.8	39.9	69.5	91.0	0.3	3.6	-114.6	4.5	10.2	0.9
25_2	01/20/10	01/20/10	7.0	40	1	3/23/2010	773.5	26.1	39.8	69.6	94.0	0.1	0.8	-67.7	2.6	13.0	1.1
25_2	01/20/10	01/20/10	7.0	40	0.1	3/23/2010	515.1	18.4	40.1	69.6	97.0	0.2	0.6	-62.7	3.0	13.3	0.7
25_2	01/20/10	01/20/10	7.0	40	0.01	3/23/2010	423.8	12.2	40.1	69.6	97.0	-0.1	0.6	-38.4	3.0	12.3	0.3
25_6	01/20/10	01/20/10	7.4	4	10	[redacted]											
25_6	01/20/10	01/20/10	7.4	4	1												
25_6	01/20/10	01/20/10	7.4	4	0.1												
25_6	01/20/10	01/20/10	7.4	4	0.01												
25_6	01/20/10	01/20/10	7.4	20	10	3/23/2010	6333.0	26.2	20.1	69.8	93.0	0.4	2.3	-348.2	6.0	8.0	1.2
25_6	01/20/10	01/20/10	7.4	20	1	3/23/2010	3079.0	33.1	20.2	69.6	95.0	0.1	0.5	-440.8	6.4	8.6	1.0
25_6	01/20/10	01/20/10	7.4	20	0.1	3/23/2010	1560.0	33.7	20.1	69.6	90.0	0.0	0.3	-342.6	5.1	8.1	0.7
25_6	01/20/10	01/20/10	7.4	20	0.01	3/23/2010	811.6	29.2	20.1	69.6	91.0	0.0	0.5	-149.8	2.6	6.9	0.9
25_6	01/20/10	01/20/10	7.4	40	10	3/23/2010	1420.0	32.5	39.9	69.5	89.0	0.3	3.8	-112.8	4.8	2.6	0.8
25_6	01/20/10	01/20/10	7.4	40	1	3/23/2010	743.8	25.6	40.0	69.6	93.0	0.1	0.8	-82.5	3.1	1.1	0.5
25_6	01/20/10	01/20/10	7.4	40	0.1	3/23/2010	517.6	19.0	40.2	69.6	94.0	0.0	0.6	-106.8	3.7	2.0	0.5
25_6	01/20/10	01/20/10	7.4	40	0.01	3/23/2010	437.7	13.4	40.1	69.6	94.0	-0.1	0.6	-73.8	3.5	2.3	0.5
25_9	01/20/10	01/20/10	7.4	4	10	[redacted]											
25_9	01/20/10	01/20/10	7.4	4	1												
25_9	01/20/10	01/20/10	7.4	4	0.1												
25_9	01/20/10	01/20/10	7.4	4	0.01												
25_9	01/20/10	01/20/10	7.4	20	10	3/23/2010	5292.0	28.8	20.2	69.5	91.0	0.5	2.8	-437.2	7.2	3.7	0.6
25_9	01/20/10	01/20/10	7.4	20	1	3/23/2010	2434.0	35.2	20.2	69.5	93.0	0.0	0.5	-475.5	5.8	2.5	0.9
25_9	01/20/10	01/20/10	7.4	20	0.1	3/23/2010	1056.0	35.3	20.3	69.6	95.0	-0.1	0.5	-367.6	5.8	3.9	0.9
25_9	01/20/10	01/20/10	7.4	20	0.01	3/23/2010	608.4	29.1	20.1	69.6	83.0	0.0	0.6	-114.6	3.3	3.7	0.5
25_9	01/20/10	01/20/10	7.4	40	10	3/24/2010	1588.0	34.6	39.8	69.6	90.0	0.4	3.3	-153.3	5.1	6.1	0.3
25_9	01/20/10	01/20/10	7.4	40	1	3/24/2010	732.7	28.7	40.0	69.5	93.0	0.0	0.8	-66.5	2.5	8.6	0.9
25_9	01/20/10	01/20/10	7.4	40	0.1	3/24/2010	457.0	21.2	40.1	69.6	95.0	0.1	0.6	-61.6	2.9	9.8	1.0
25_9	01/20/10	01/20/10	7.4	40	0.01	3/24/2010	367.9	13.4	40.0	69.6	93.0	0.0	0.7	-59.2	5.3	8.7	0.5

Table C47. Lab 8 prefabricated core unconfined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				UNCONFINED											
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ, degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_2	02/16/10	02/16/10	7.1	4	10	6/15/2010	17216.0	11.9	3.6	-0.1	100.0	0.0	2.0	-69.9	2.5	6.3	0.2
25_2	02/16/10	02/16/10	7.1	4	1	6/15/2010	12083.0	16.7	3.6	0.0	99.0	0.0	0.4	-122.7	2.2	5.1	0.2
25_2	02/16/10	02/16/10	7.1	4	0.1	6/15/2010	7528.0	22.7	3.3	0.0	98.0	0.0	0.2	-205.9	3.3	4.8	0.2
25_2	02/16/10	02/16/10	7.1	4	0.01	6/15/2010	4022.0	28.1	4.7	0.0	97.0	0.0	0.3	-251.3	2.8	4.9	0.3
25_2	02/16/10	02/16/10	7.1	20	10	6/15/2010	6690.0	25.4	20.1	0.2	94.0	0.5	2.3	-317.3	6.8	4.8	0.6
25_2	02/16/10	02/16/10	7.1	20	1	6/15/2010	3378.0	31.1	20.4	0.0	91.0	0.1	0.7	-285.2	5.9	5.8	0.6
25_2	02/16/10	02/16/10	7.1	20	0.1	6/15/2010	1411.0	33.6	20.2	0.0	92.0	0.0	0.3	-125.5	3.3	6.1	0.5
25_2	02/16/10	02/16/10	7.1	20	0.01	6/15/2010	526.0	31.5	20.2	0.0	110.0	-0.1	0.5	4.3	4.6	6.9	1.0
25_2	02/16/10	02/16/10	7.1	40	10	6/17/2010	1274.0	34.3	40.5	-0.2	99.0	1.0	5.3	-90.7	5.2	10.3	0.6
25_2	02/16/10	02/16/10	7.1	40	1	6/17/2010	445.1	30.6	40.4	0.0	98.0	0.3	2.7	-36.8	4.8	14.8	0.6
25_2	02/16/10	02/16/10	7.1	40	0.1	6/17/2010	213.4	20.7	40.5	0.1	91.0	-0.4	0.9	-86.6	6.3	22.0	1.5
25_2	02/16/10	02/16/10	7.1	40	0.01	6/17/2010	175.0	8.0	40.4	0.0	93.0	0.1	0.9	-249.2	10.4	34.8	4.5
25_4	02/16/10	02/16/10	7.1	4	10	6/15/2010	16691.0	12.5	4.6	0.3	98.0	0.0	2.8	-75.3	3.3	12.2	0.2
25_4	02/16/10	02/16/10	7.1	4	1	6/15/2010	11536.0	17.5	4.7	0.0	100.0	0.1	0.5	-137.5	2.5	10.1	0.3
25_4	02/16/10	02/16/10	7.1	4	0.1	6/15/2010	7019.0	23.6	5.0	0.0	99.0	0.0	0.3	-226.2	3.7	8.2	0.4
25_4	02/16/10	02/16/10	7.1	4	0.01	6/15/2010	3683.0	28.9	4.7	0.0	96.0	0.0	0.3	-180.4	2.5	8.4	1.2
25_4	02/16/10	02/16/10	7.1	20	10	6/16/2010	6868.0	25.1	20.2	-0.1	94.0	0.4	2.3	-311.4	6.6	2.4	0.7
25_4	02/16/10	02/16/10	7.1	20	1	6/16/2010	3522.0	30.9	20.0	0.1	91.0	0.4	0.7	-293.6	6.0	4.2	1.1
25_4	02/16/10	02/16/10	7.1	20	0.1	6/16/2010	1494.0	33.4	19.9	0.0	92.0	0.0	0.2	-166.8	3.4	6.7	1.5
25_4	02/16/10	02/16/10	7.1	20	0.01	6/16/2010	555.4	31.7	20.0	0.0	109.0	0.2	0.5	-24.1	4.1	9.2	1.2
25_4	02/16/10	02/16/10	7.1	40	10	6/17/2010	1317.0	33.5	40.4	0.2	98.0	1.0	5.4	-112.6	5.2	14.5	1.8
25_4	02/16/10	02/16/10	7.1	40	1	6/17/2010	483.1	29.2	40.1	0.0	97.0	0.2	2.5	-63.1	5.0	13.5	1.5
25_4	02/16/10	02/16/10	7.1	40	0.1	6/17/2010	258.4	18.0	40.2	0.0	88.0	0.0	0.8	-131.7	6.6	11.5	1.4
25_4	02/16/10	02/16/10	7.1	40	0.01	6/17/2010	262.7	1.6	40.2	0.0	88.0	0.0	0.7	-457.9	11.3	15.1	6.5
25_8	02/16/10	02/16/10	7.1	4	10	6/15/2010	15405.0	12.6	3.9	-0.1	97.0	0.2	1.6	-78.2	2.3	20.6	0.5
25_8	02/16/10	02/16/10	7.1	4	1	6/15/2010	10645.0	17.7	4.0	0.0	98.0	0.1	0.4	-147.6	2.4	20.8	0.6
25_8	02/16/10	02/16/10	7.1	4	0.1	6/15/2010	6383.0	24.4	4.4	0.0	98.0	0.0	0.3	-260.0	3.8	21.7	0.7
25_8	02/16/10	02/16/10	7.1	4	0.01	6/15/2010	3257.0	30.4	4.2	0.0	95.0	0.0	0.3	-224.5	2.9	23.8	0.7
25_8	02/16/10	02/16/10	7.1	20	10	6/16/2010	6265.0	26.2	20.0	0.1	94.0	0.2	2.5	-345.7	7.0	11.1	0.3
25_8	02/16/10	02/16/10	7.1	20	1	6/16/2010	3096.0	32.4	19.9	0.0	91.0	0.2	0.7	-330.7	6.1	9.9	0.4
25_8	02/16/10	02/16/10	7.1	20	0.1	6/16/2010	1258.0	34.9	20.1	0.0	92.0	0.1	0.3	-157.3	3.7	9.7	0.6
25_8	02/16/10	02/16/10	7.1	20	0.01	6/16/2010	449.7	32.7	20.0	0.0	111.0	0.0	0.5	28.9	4.6	12.1	0.7
25_8	02/16/10	02/16/10	7.1	40	10	6/17/2010	1106.0	34.8	40.3	0.2	103.0	1.1	5.6	-82.5	6.8	6.9	0.7
25_8	02/16/10	02/16/10	7.1	40	1	6/17/2010	365.5	31.8	40.2	0.0	99.0	0.3	2.8	-33.8	6.0	9.2	1.0
25_8	02/16/10	02/16/10	7.1	40	0.1	6/17/2010	176.8	21.9	40.2	0.0	90.0	0.1	1.2	-91.1	7.2	12.7	1.4
25_8	02/16/10	02/16/10	7.1	40	0.01	6/17/2010	159.9	8.8	40.2	0.0	89.0	0.1	1.0	-309.9	10.0	23.2	0.9

Table C48. Lab 8 prefabricated core confined dynamic modulus test data for the 25-mm mixture.

	Mix	Compact				CONFINED												
ID	Date	Date	Voids, %	Temp, C	Freq, Hz	Test Date	E*, MPa	δ degrees	Temp., C	Conf, kPa	Strain, μstrain	Load Drift, %	Load Se, %	Def Drift, %	Def Se, %	Def Unif, %	Phase σ, deg
25_2	02/16/10	02/16/10	7.1	4	10	[redacted]											
25_2	02/16/10	02/16/10	7.1	4	1												
25_2	02/16/10	02/16/10	7.1	4	0.1												
25_2	02/16/10	02/16/10	7.1	4	0.01												
25_2	02/16/10	02/16/10	7.1	20	10	6/10/2010	6097.0	25.9	20.1	69.1	94.0	0.4	2.5	-301.7	6.6	16.0	1.4
25_2	02/16/10	02/16/10	7.1	20	1	6/10/2010	3065.0	31.0	19.9	69.0	92.0	0.1	0.7	-257.9	5.1	17.5	1.5
25_2	02/16/10	02/16/10	7.1	20	0.1	6/10/2010	1405.0	31.2	20.1	69.0	91.0	0.0	0.2	-94.4	5.2	16.2	1.1
25_2	02/16/10	02/16/10	7.1	20	0.01	6/10/2010	769.7	26.2	20.1	69.0	90.0	0.0	0.4	20.8	4.3	11.3	1.3
25_2	02/16/10	02/16/10	7.1	40	10	6/12/2010	1543.0	32.0	40.2	69.1	93.0	0.7	4.9	-63.8	4.3	13.4	1.0
25_2	02/16/10	02/16/10	7.1	40	1	6/12/2010	785.8	25.4	39.4	69.0	95.0	0.1	1.5	-19.7	2.8	13.1	1.4
25_2	02/16/10	02/16/10	7.1	40	0.1	6/12/2010	540.6	17.9	39.8	69.0	98.0	0.1	0.4	-2.6	4.8	12.6	2.3
25_2	02/16/10	02/16/10	7.1	40	0.01	6/12/2010	464.0	12.3	39.9	69.0	96.0	0.0	0.5	54.6	5.0	12.8	3.5
25_4	02/16/10	02/16/10	7.1	4	10	[redacted]											
25_4	02/16/10	02/16/10	7.1	4	1												
25_4	02/16/10	02/16/10	7.1	4	0.1												
25_4	02/16/10	02/16/10	7.1	4	0.01												
25_4	02/16/10	02/16/10	7.1	20	10	6/10/2010	6391.0	26.7	20.3	69.0	95.0	0.3	2.3	-338.0	6.1	11.8	0.5
25_4	02/16/10	02/16/10	7.1	20	1	6/10/2010	3146.0	33.3	19.6	69.0	92.0	0.1	0.6	-357.2	5.2	11.0	1.5
25_4	02/16/10	02/16/10	7.1	20	0.1	6/10/2010	1380.0	35.0	20.0	69.0	89.0	-0.1	0.2	-178.6	5.1	11.2	2.3
25_4	02/16/10	02/16/10	7.1	20	0.01	6/10/2010	701.2	30.9	20.1	69.0	86.0	0.0	0.4	69.9	5.0	13.3	2.9
25_4	02/16/10	02/16/10	7.1	40	10	6/12/2010	1506.0	32.2	40.2	69.1	93.0	0.8	5.1	-77.6	4.8	14.4	1.7
25_4	02/16/10	02/16/10	7.1	40	1	6/12/2010	762.3	25.5	39.6	69.0	95.0	0.1	1.5	-14.5	3.0	16.3	1.5
25_4	02/16/10	02/16/10	7.1	40	0.1	6/12/2010	527.9	18.2	39.7	69.0	96.0	0.1	0.4	54.4	3.8	16.8	1.6
25_4	02/16/10	02/16/10	7.1	40	0.01	6/12/2010	450.9	13.0	39.8	69.0	96.0	0.0	0.5	114.3	4.7	15.0	2.1
25_8	02/16/10	02/16/10	7.1	4	10	[redacted]											
25_8	02/16/10	02/16/10	7.1	4	1												
25_8	02/16/10	02/16/10	7.1	4	0.1												
25_8	02/16/10	02/16/10	7.1	4	0.01												
25_8	02/16/10	02/16/10	7.1	20	10	6/10/2010	5831.0	26.3	20.2	69.0	94.0	0.3	1.9	-314.4	5.9	7.3	0.5
25_8	02/16/10	02/16/10	7.1	20	1	6/10/2010	2880.0	31.7	19.8	69.0	94.0	0.0	0.5	-344.8	4.6	8.1	0.5
25_8	02/16/10	02/16/10	7.1	20	0.1	6/10/2010	1335.0	31.6	20.0	69.0	92.0	0.1	0.3	-304.2	5.4	9.9	0.5
25_8	02/16/10	02/16/10	7.1	20	0.01	6/10/2010	757.9	25.1	20.1	69.0	89.0	0.1	0.4	-158.7	4.7	12.3	0.1
25_8	02/16/10	02/16/10	7.1	40	10	6/12/2010	1409.0	35.0	40.1	68.9	89.0	1.1	5.3	-130.9	5.5	6.9	1.6
25_8	02/16/10	02/16/10	7.1	40	1	6/12/2010	685.3	28.7	39.5	68.9	92.0	0.1	5.9	-33.6	4.8	6.4	2.0
25_8	02/16/10	02/16/10	7.1	40	0.1	6/12/2010	458.6	20.9	39.9	69.0	92.0	-0.2	0.6	-26.7	3.6	7.6	2.7
25_8	02/16/10	02/16/10	7.1	40	0.01	6/12/2010	402.7	14.7	39.9	69.0	90.0	0.0	0.7	22.4	4.1	9.9	3.5

APPENDIX D

Loose Mix Dynamic Modulus Statistical Analysis

Table D1. Dynamic modulus within-laboratory consistency statistic, *k*.

		UNCONFINED												CONFINED							
		40 °C	40 °C	40 °C	40 °C	20 °C	20 °C	20 °C	20 °C	4 °C	4 °C	4 °C	4 °C	40 °C	40 °C	40 °C	40 °C	20 °C	20 °C	20 °C	20 °C
Mix	Lab	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz
9.5 mm	1	0.207	0.294	0.338	0.553	0.446	0.532	0.758	0.952	0.666	0.965	1.180	1.317	0.109	0.144	0.229	0.246	0.611	0.279	0.691	0.880
	2	0.637	0.289	0.461	0.640	0.286	0.351	0.270	1.138	0.684	0.978	1.113	1.092	0.122	0.123	0.182	0.367	0.285	0.409	0.544	0.602
	3	0.688	1.356	1.664	1.686	1.147	0.490	0.557	0.887	1.780	1.283	1.078	0.983	0.329	0.746	1.081	1.275	0.913	0.738	0.637	0.465
	4	0.706	0.878	0.945	1.065	0.794	1.070	1.194	0.872	1.073	1.139	1.008	0.845	2.694	2.421	1.775	0.940	0.817	0.504	0.410	0.387
	5	0.751	0.423	0.391	0.443	1.313	1.958	2.001	1.587	0.392	0.495	0.489	0.561	0.282	0.317	0.464	0.432	1.823	2.328	2.447	2.485
	6	2.348	2.158	1.767	1.306	1.497	0.996	0.600	0.510	1.259	1.286	1.381	1.515	0.308	0.399	0.513	0.525	1.262	0.897	0.473	0.163
	7	0.313	0.073	0.260	0.616	0.647	0.443	0.475	0.494	0.995	1.038	0.932	0.773	0.620	1.118	1.575	1.927	0.826	0.593	0.434	0.329
	8	0.635	0.617	0.817	1.014	1.178	1.089	1.013	1.110	0.202	0.441	0.418	0.431	0.218	0.191	0.797	1.059	0.669	0.618	0.505	0.430
12.5 mm	1	1.706	1.039	0.780	0.766	1.118	1.277	1.379	0.991	1.037	0.719	0.735	0.755	1.751	1.950	1.626	1.457	1.320	0.889	1.073	1.081
	2	0.407	0.405	0.583	0.797	0.971	1.318	1.506	0.860	0.674	0.744	0.684	0.620	1.633	1.133	0.327	0.402	0.183	1.056	1.340	1.403
	3	0.804	1.592	1.738	1.816	1.066	0.723	0.950	1.420	0.602	0.786	0.520	0.286	0.129	0.968	1.550	1.577	2.013	2.036	1.782	1.622
	4	0.659	0.789	0.684	0.622	0.359	0.324	0.233	0.166	2.352	2.466	2.563	2.611	1.009	0.375	0.257	0.348	0.384	0.314	0.444	0.619
	5	0.893	0.383	0.162	0.049	0.296	0.926	1.010	1.317	0.170	0.293	0.256	0.221	0.048	0.139	0.297	0.481	0.174	0.323	0.390	0.503
	6	0.712	0.995	0.952	0.781	1.188	0.806	0.452	0.548	0.613	0.279	0.221	0.254	0.139	0.424	0.780	0.774	1.322	0.795	0.551	0.701
	7	1.075	1.247	1.399	1.435	1.223	1.169	0.961	0.773	0.355	0.237	0.184	0.181	1.048	1.238	1.375	1.412	0.320	0.795	0.845	0.734
	8	1.177	0.951	0.821	0.650	1.243	1.064	0.851	1.267	0.205	0.099	0.061	0.024	0.337	0.322	0.441	0.529	0.378	0.693	0.717	0.753
25 mm	1	0.576	0.448	0.286	0.174	0.006	0.204	0.477	0.041	0.518	0.889	1.378	1.908	0.815	0.578	0.394	0.251	0.329	0.283	0.275	0.238
	2	1.783	1.042	0.771	0.729	0.340	0.565	0.782	1.022	0.431	0.356	0.206	0.147	0.721	0.581	0.485	0.466	0.469	0.561	0.677	0.750
	3	1.732	2.287	2.334	2.167	1.859	1.505	1.215	1.071	1.284	0.779	0.600	0.417	1.427	1.869	2.005	1.909	1.780	1.768	1.525	1.264
	4	0.256	0.445	0.642	0.738	0.060	0.136	0.297	0.580	0.936	0.892	0.943	0.860	0.222	0.129	0.087	0.098	0.461	0.708	1.126	1.085
	5	0.500	0.167	0.145	0.364	0.234	0.551	0.582	0.597	0.091	0.233	0.339	0.587	0.848	0.358	0.120	0.147	0.075	0.070	0.431	1.242
	6	0.371	0.893	1.126	1.293	1.298	1.591	1.730	1.201	0.875	0.372	0.185	0.451	1.389	1.056	0.492	0.388	1.110	1.255	1.181	0.907
	7	0.939	0.620	0.381	0.591	1.638	1.587	1.504	1.419	2.055	2.326	2.133	1.656	1.400	1.584	1.820	1.968	1.734	1.510	1.423	1.345
	8	0.390	0.276	0.175	0.208	0.030	0.051	0.051	1.287	0.148	0.277	0.328	0.361	0.349	0.257	0.119	0.141	0.212	0.343	0.516	0.657

Table D2. Dynamic modulus between-laboratory consistency statistic, *h*.

		UNCONFINED												CONFINED							
		40 °C	40 °C	40 °C	40 °C	20 °C	20 °C	20 °C	20 °C	4 °C	4 °C	4 °C	4 °C	40 °C	40 °C	40 °C	40 °C	20 °C	20 °C	20 °C	20 °C
Mix	Lab	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz
9.5 mm	1	1.550	1.063	-0.073	-0.670	0.093	-0.380	-0.508	-0.719	-0.852	-0.743	-0.804	-0.753	1.082	1.025	0.382	-0.301	-0.384	-0.100	0.001	0.134
	2	0.331	-0.271	-0.466	-0.539	-1.037	-1.081	-1.100	-1.094	-0.720	-0.645	-0.693	-0.868	0.243	0.189	-0.295	-0.670	-0.152	-0.481	-0.570	-0.666
	3	0.505	1.469	1.977	2.025	1.529	1.729	1.754	1.678	1.457	1.259	1.337	1.364	0.392	0.738	1.157	1.585	1.574	1.813	1.799	1.723
	4	-1.551	-1.562	-1.214	-1.058	-1.112	-0.956	-0.911	-0.514	-0.774	-1.042	-1.104	-1.123	-0.889	-0.971	-1.435	-1.412	-0.792	-0.742	-0.734	-0.673
	5	0.144	-0.276	-0.416	-0.479	-0.427	-0.597	-0.656	-1.018	-0.426	-0.660	-0.758	-0.845	-2.075	-1.840	-1.446	-0.701	-1.558	-1.297	-1.324	-1.495
	6	-0.381	0.414	0.914	0.889	1.430	1.191	1.055	0.955	1.659	1.682	1.424	1.065	0.447	0.724	1.023	1.114	1.116	1.032	0.970	0.840
	7	-1.159	-0.966	-0.612	-0.147	-0.268	0.095	0.271	0.408	-0.031	-0.132	0.095	0.436	0.421	0.570	0.452	0.463	0.223	0.160	0.242	0.356
	8	0.562	0.130	-0.111	-0.023	-0.210	-0.001	0.096	0.304	-0.313	0.281	0.505	0.723	0.378	-0.435	0.163	-0.078	-0.027	-0.385	-0.384	-0.219
12.5 mm	1	0.976	0.330	-0.353	-0.713	-0.359	-0.562	-0.701	-1.099	-0.893	-0.848	-0.924	-0.976	1.406	1.278	0.439	-0.122	0.282	-0.066	-0.160	-0.190
	2	-0.311	-0.814	-0.857	-0.922	-1.329	-1.301	-1.288	-0.912	-1.369	-1.162	-1.162	-1.226	-0.242	-0.284	-0.684	-0.957	-0.891	-0.900	-0.960	-1.082
	3	1.424	2.093	2.234	2.155	1.969	1.962	1.912	1.880	1.656	1.777	1.625	1.429	0.896	1.609	1.963	2.142	2.186	2.282	2.234	2.149
	4	-1.713	-1.183	-0.862	-0.706	-0.757	-0.498	-0.359	-0.572	0.509	0.404	0.659	0.896	-1.412	-1.482	-1.436	-1.159	-0.746	-0.268	-0.042	0.082
	5	-0.272	-0.546	-0.553	-0.555	-0.446	-0.576	-0.620	-0.429	-0.588	-0.613	-0.673	-0.705	-0.739	-0.471	-0.324	-0.117	-0.422	-0.378	-0.417	-0.529
	6	-0.027	0.200	0.310	0.287	0.612	0.612	0.656	0.691	0.659	0.494	0.460	0.436	-0.796	-0.518	-0.259	-0.008	0.122	0.325	0.428	0.547
	7	-0.712	-0.271	0.001	0.266	0.029	-0.062	-0.091	-0.192	-0.509	-0.728	-0.719	-0.635	-0.104	-0.089	-0.170	-0.115	-0.745	-0.782	-0.785	-0.725
	8	0.635	0.192	0.080	0.188	0.282	0.425	0.492	0.632	0.535	0.677	0.734	0.781	0.990	-0.043	0.471	0.335	0.214	-0.213	-0.298	-0.253
25 mm	1	1.349	0.793	-0.334	-0.982	-0.493	-0.794	-0.950	-1.181	-1.028	-0.853	-0.784	-0.387	1.020	0.694	-0.052	-0.507	0.088	-0.223	-0.318	-0.143
	2	0.089	-0.399	-0.526	-0.643	-0.728	-0.743	-0.736	-0.387	-0.328	-0.278	-0.289	-0.388	0.046	-0.052	-0.433	-0.631	-0.435	-0.500	-0.486	-0.476
	3	0.425	1.402	1.782	1.840	1.601	1.803	1.838	1.551	1.334	1.446	1.407	1.302	0.547	1.214	1.653	1.817	1.512	1.637	1.502	1.361
	4	-1.652	-1.368	-0.870	-0.511	-0.762	-0.629	-0.498	-0.638	-0.394	-0.691	-0.720	-0.678	-0.256	-0.331	-0.637	-0.688	0.004	0.051	0.381	0.615
	5	0.239	-0.143	-0.110	-0.113	-0.379	-0.370	-0.412	-0.688	-0.793	-0.971	-1.162	-1.533	-2.189	-1.880	-1.326	-0.652	-1.315	-0.658	-0.592	-0.988
	6	0.297	1.085	1.352	1.246	1.522	1.266	1.171	1.411	1.710	1.611	1.559	1.473	0.782	1.056	1.315	1.300	1.401	1.427	1.421	1.384
	7	-1.333	-1.031	-0.611	-0.244	0.028	0.114	0.183	0.263	0.082	0.033	0.099	0.057	-0.282	-0.218	-0.099	0.033	-0.487	-0.715	-0.768	-0.654
	8	0.586	-0.339	-0.683	-0.594	-0.788	-0.646	-0.595	-0.331	-0.584	-0.297	-0.109	0.155	0.332	-0.484	-0.420	-0.672	-0.768	-1.019	-1.140	-1.098

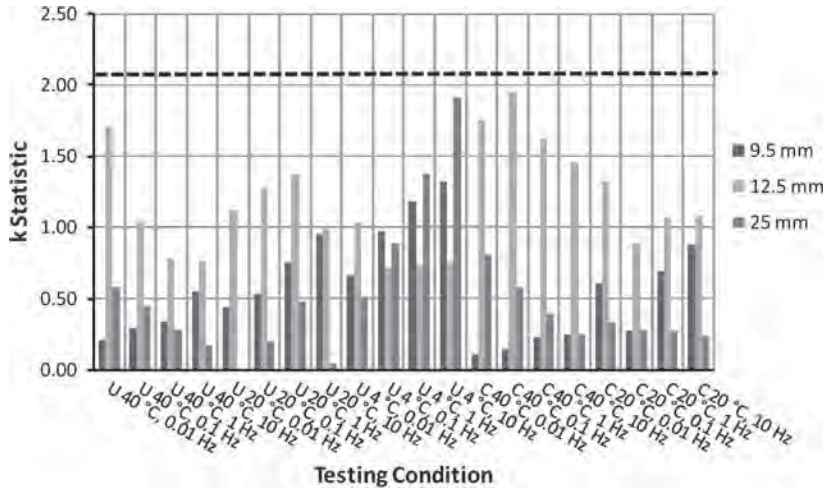

Figure D1. Within-laboratory dynamic modulus consistency statistic, k, ***for Lab 1.***

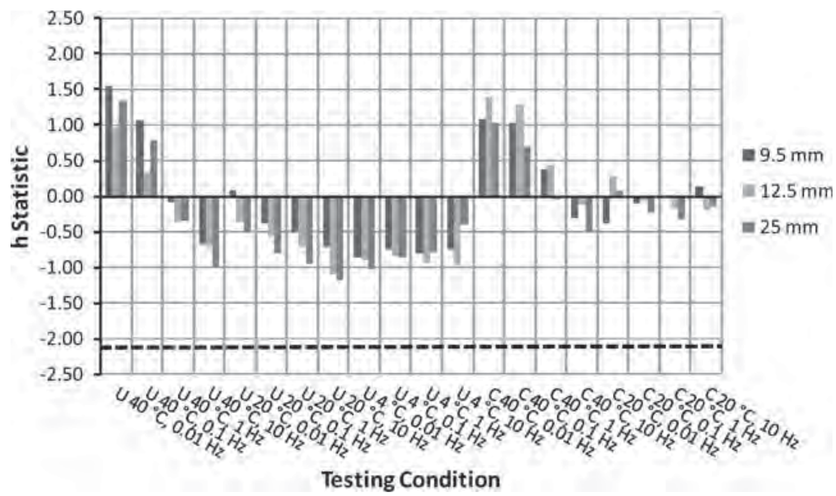

Figure D2. Between-laboratory dynamic modulus consistency statistic, h, ***for Lab 1.***

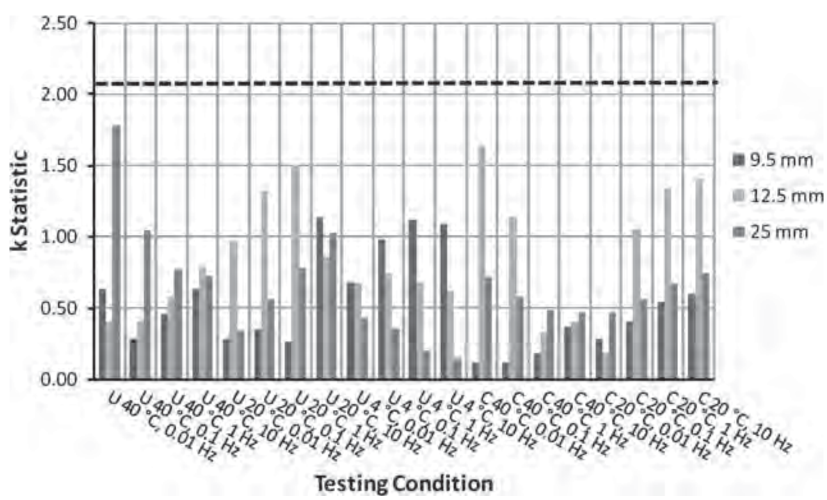

Figure D3. Within-laboratory dynamic modulus consistency statistic, k, ***for Lab 2.***

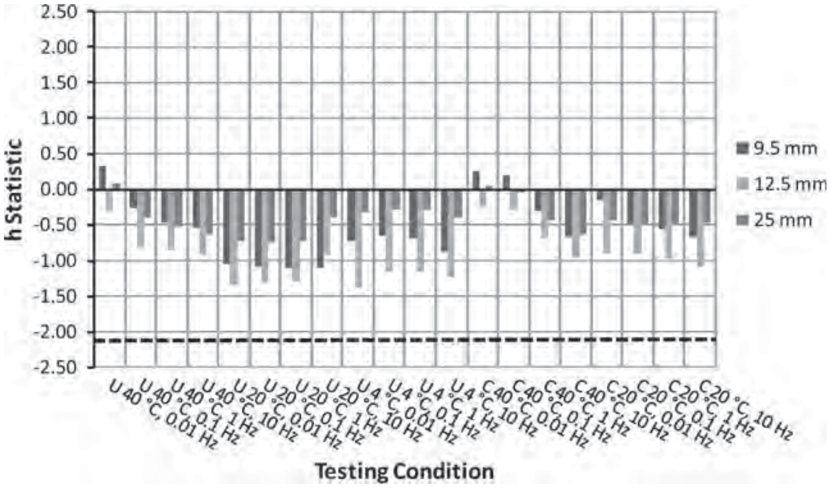

Figure D4. Between-laboratory dynamic modulus consistency statistic, h, *for Lab 2.*

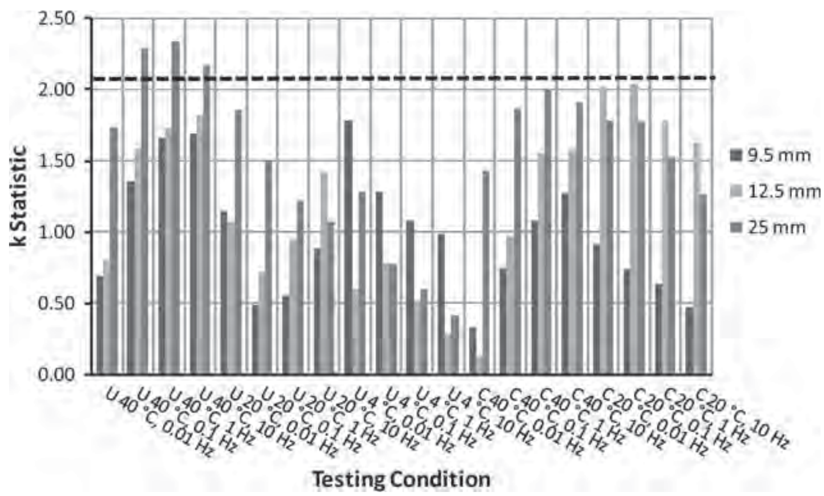

Figure D5. Within-laboratory dynamic modulus consistency statistic, k, *for Lab 3.*

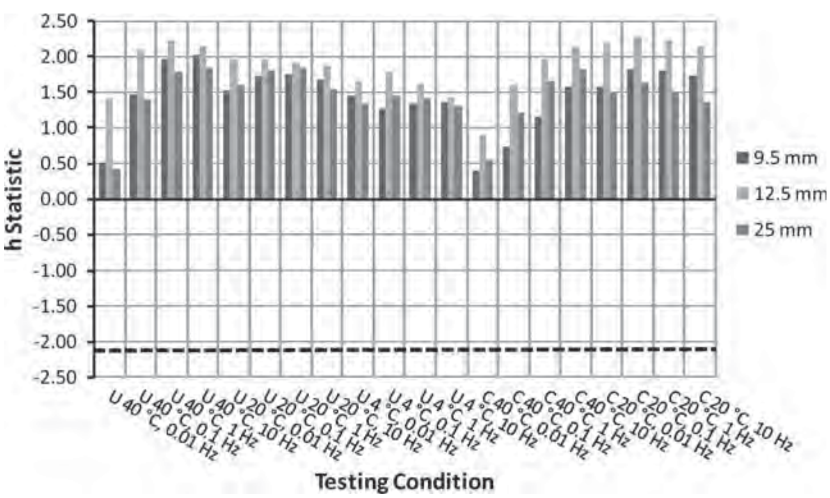

Figure D6. Between-laboratory dynamic modulus consistency statistic, h, *for Lab 3.*

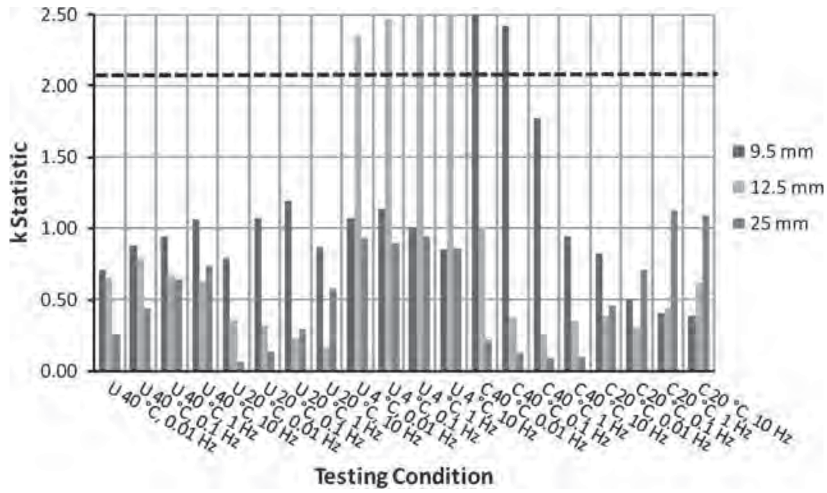

Figure D7. Within-laboratory dynamic modulus consistency statistic, **k*****, for Lab 4.***

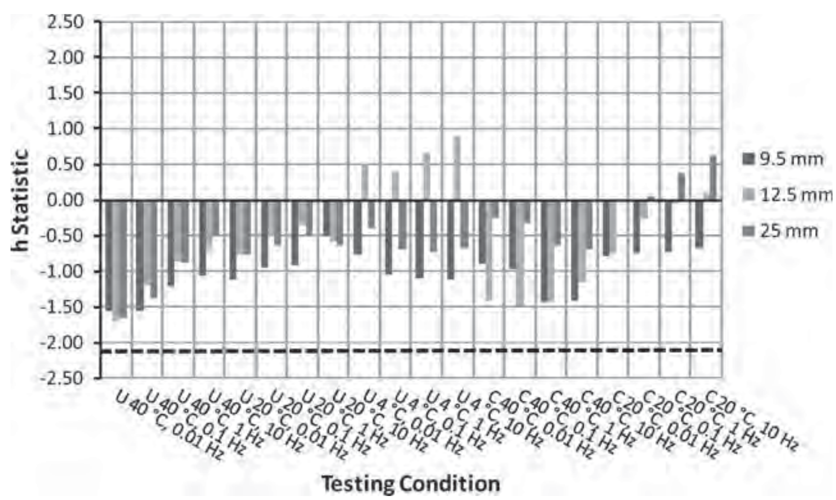

Figure D8. Between-laboratory dynamic modulus consistency statistic, **h*****, for Lab 4.***

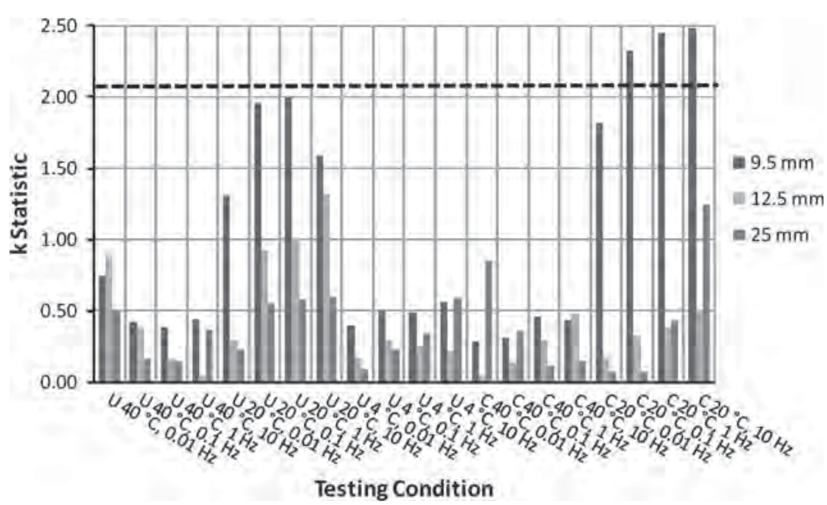

Figure D9. Within-laboratory dynamic modulus consistency statistic, **k*****, for Lab 5.***

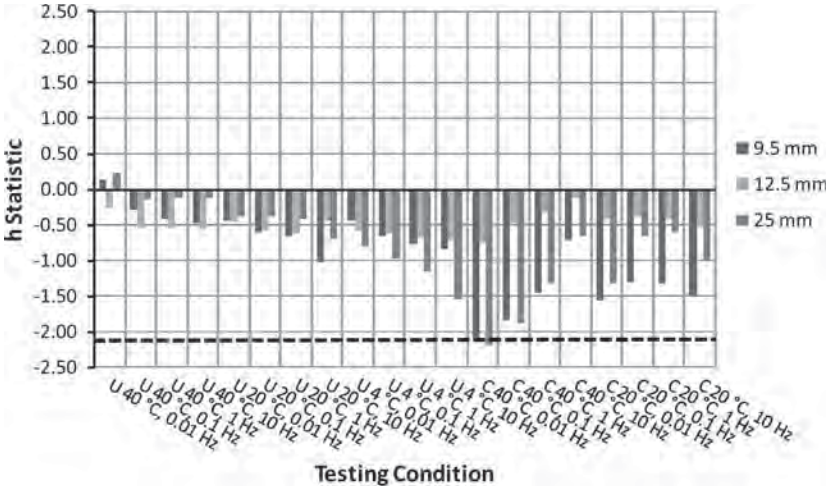

Figure D10. Between-laboratory dynamic modulus consistency statistic, h, *for Lab 5.*

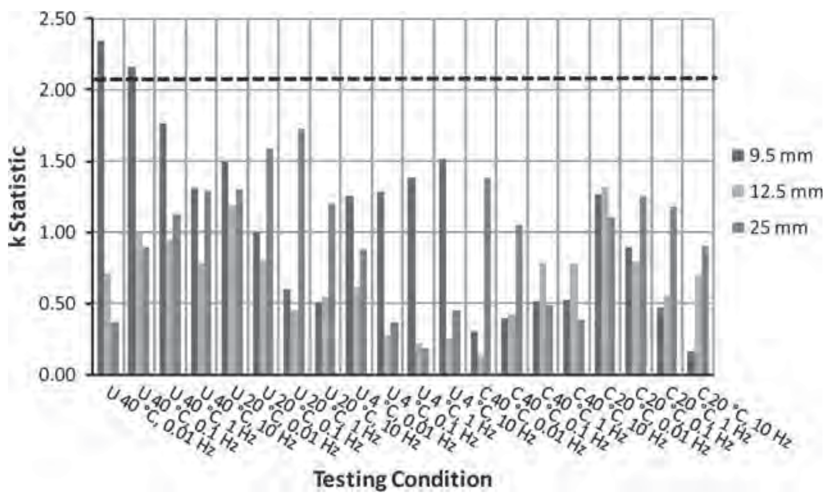

Figure D11. Within-laboratory dynamic modulus consistency statistic, k, *for Lab 6.*

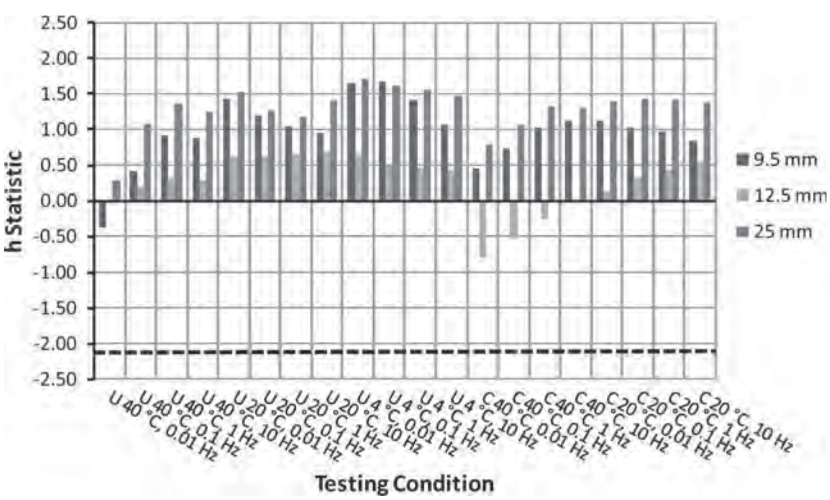

Figure D12. Between-laboratory dynamic modulus consistency statistic, h, *for Lab 6.*

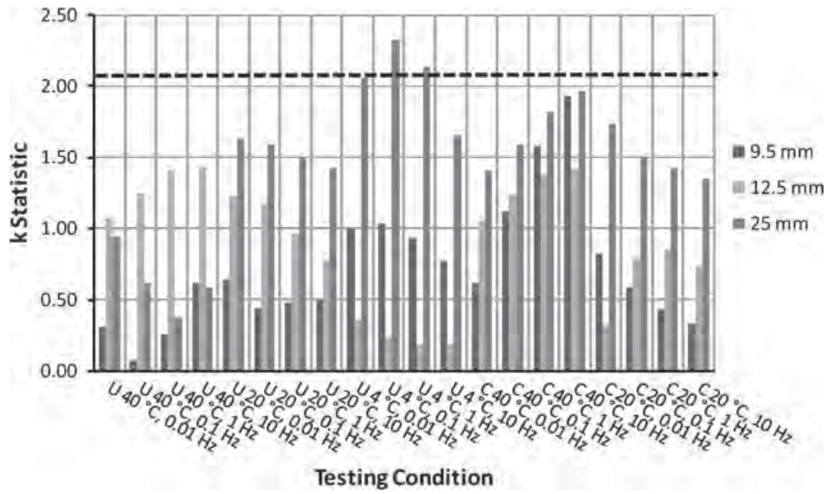

Figure D13. Within-laboratory dynamic modulus consistency statistic, k, *for Lab 7.*

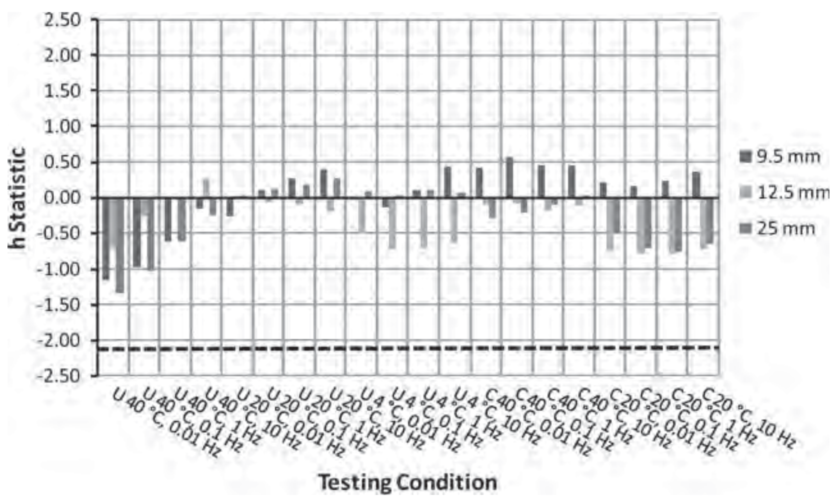

Figure D14. Between-laboratory dynamic modulus consistency statistic, h, *for Lab 7.*

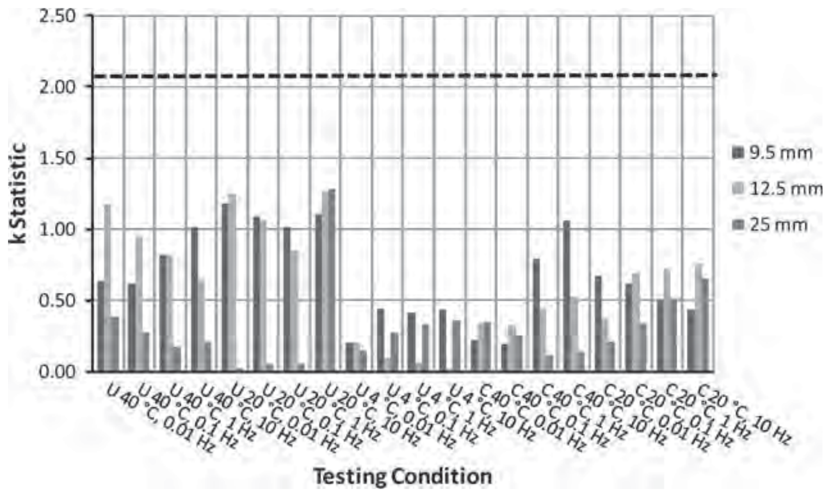

Figure D15. Within-laboratory dynamic modulus consistency statistic,* k*, for Lab 8.

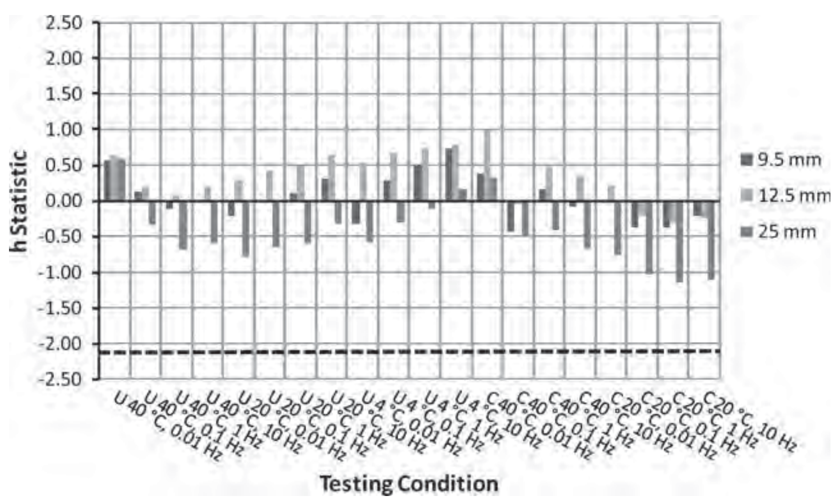

Figure D16. Between-laboratory dynamic modulus consistency statistic,* h*, for Lab 8.

Table D3. Phase angle within-laboratory consistency statistic, *k*.

		UNCONFINED												CONFINED							
		40 °C	40 °C	40 °C	40 °C	20 °C	20 °C	20 °C	20 °C	4 °C	4 °C	4 °C	4 °C	40 °C	40 °C	40 °C	40 °C	20 °C	20 °C	20 °C	20 °C
Mix	Lab	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz
9.5 mm	1	0.369	0.602	0.629	0.306	1.447	1.402	0.741	0.328	0.932	0.759	0.531	0.961	0.281	0.202	0.253	0.196	1.019	1.607	1.274	0.510
	2	0.308	0.542	0.811	0.871	0.827	0.988	0.842	0.659	0.060	0.095	0.219	0.199	0.315	0.515	0.744	1.021	0.360	0.439	0.608	0.444
	3	0.268	0.218	0.545	1.837	0.083	0.632	0.587	0.605	1.538	1.239	0.915	0.448	0.403	0.241	0.209	0.650	0.408	0.212	0.815	0.711
	4	1.296	1.219	1.510	1.524	1.795	1.447	0.883	0.686	0.396	0.817	0.770	1.227	2.673	2.658	2.650	2.343	1.392	1.332	1.083	0.800
	5	0.704	1.061	0.961	0.067	1.169	1.254	2.071	2.301	0.862	1.106	1.327	1.176	0.222	0.240	0.246	0.466	1.944	1.328	1.231	2.157
	6	2.155	1.958	1.567	0.824	0.195	0.864	0.995	0.949	1.696	1.576	1.522	1.335	0.378	0.525	0.443	0.357	0.622	1.229	1.468	1.118
	7	0.392	0.751	0.966	0.354	0.324	0.186	0.074	0.205	0.914	1.107	1.313	1.237	0.524	0.416	0.117	0.768	0.653	0.169	0.361	0.416
	8	0.852	0.539	0.243	0.801	0.697	0.461	0.577	0.619	0.385	0.530	0.662	0.798	0.220	0.256	0.216	0.269	0.368	0.322	0.610	0.571
12.5 mm	1	0.597	0.339	0.619	0.371	1.564	1.228	1.132	0.760	0.142	0.284	0.307	0.626	0.367	0.738	0.806	1.433	0.243	1.084	0.663	1.045
	2	1.730	1.853	1.657	1.036	1.920	1.715	1.834	1.856	0.214	0.395	0.322	0.791	1.544	1.496	1.707	1.369	1.302	0.743	0.937	1.313
	3	0.761	0.745	0.276	0.449	0.518	0.471	0.375	0.301	0.371	0.818	0.653	1.397	0.687	0.788	0.732	0.552	1.316	1.651	1.977	1.627
	4	0.848	0.425	1.432	1.344	0.460	0.599	0.635	0.731	2.773	2.635	2.703	2.204	0.993	0.389	0.437	0.328	0.906	0.393	0.387	0.396
	5	0.627	0.887	0.850	0.758	0.195	0.388	0.799	1.024	0.062	0.075	0.117	0.282	0.422	0.568	0.742	0.266	0.705	0.646	0.260	0.050
	6	1.656	1.563	0.364	0.890	0.791	1.002	0.835	0.614	0.275	0.324	0.157	0.137	1.426	0.982	0.056	0.973	0.750	1.467	1.307	0.799
	7	0.456	0.602	0.663	0.914	0.691	0.597	0.635	0.901	0.032	0.130	0.146	0.215	1.214	1.643	1.721	1.580	1.527	0.754	0.545	1.104
	8	0.094	0.353	1.205	1.606	0.495	1.207	1.035	1.056	0.159	0.159	0.105	0.173	0.583	0.677	0.440	0.384	0.550	0.505	0.743	0.721
25 mm	1	0.704	0.901	1.172	1.207	0.174	0.182	0.196	0.051	0.451	0.209	0.269	0.171	0.328	0.553	0.697	0.599	0.541	0.124	0.319	0.226
	2	1.352	1.960	1.755	1.200	0.774	0.788	0.938	0.857	0.599	0.436	0.342	0.293	0.164	0.265	0.546	0.714	0.322	0.134	0.492	0.294
	3	0.937	0.054	0.849	1.371	1.300	1.598	1.227	0.807	1.182	0.749	0.600	0.665	0.237	0.692	0.911	1.423	0.651	0.271	0.978	0.626
	4	0.110	0.200	0.348	0.853	1.300	0.669	0.293	0.276	0.599	0.643	0.733	0.943	0.150	0.194	0.246	0.396	1.437	1.913	0.855	2.471
	5	1.285	1.013	0.723	0.387	0.777	0.316	0.897	1.275	0.536	0.910	1.234	1.168	2.228	1.518	1.044	0.610	1.207	1.963	1.449	0.409
	6	1.616	1.134	0.577	0.538	0.540	0.968	1.394	1.591	1.094	1.055	0.958	1.005	1.621	2.078	2.090	1.164	0.256	0.187	0.955	0.664
	7	0.291	0.939	1.325	1.403	1.759	1.817	1.649	1.529	2.046	2.195	2.087	2.000	0.409	0.584	0.756	1.728	1.831	0.518	1.577	0.837
	8	0.664	0.331	0.305	0.295	0.015	0.088	0.145	0.197	0.104	0.177	0.339	0.425	0.167	0.381	0.543	0.488	0.490	0.279	0.685	0.237

Table D4. Phase angle between-laboratory consistency statistic, *h*.

		UNCONFINED												CONFINED							
		40 °C	40 °C	40 °C	40 °C	20 °C	20 °C	20 °C	20 °C	4 °C	4 °C	4 °C	4 °C	40 °C	40 °C	40 °C	40 °C	20 °C	20 °C	20 °C	20 °C
Mix	Lab	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz
9.5 mm	1	-0.912	-1.485	-1.623	0.409	-2.216	-0.885	0.267	0.548	0.704	1.084	0.972	0.026	-1.656	-1.781	-1.849	-1.739	-1.653	-1.428	-0.034	0.362
	2	-0.662	-0.560	-0.496	-0.072	0.626	1.123	1.059	1.129	0.489	0.422	0.411	0.719	-0.589	-0.765	-0.813	-0.590	-0.270	-0.141	0.345	0.704
	3	-0.005	0.291	-0.034	-1.477	-0.481	-1.554	-1.619	-1.477	-1.339	-1.003	-0.913	-0.507	1.230	1.101	0.994	0.315	0.098	-0.798	-1.618	-1.561
	4	1.195	1.160	1.146	1.451	0.787	0.904	0.726	0.542	0.848	0.655	0.726	0.685	0.314	0.197	0.379	0.977	1.321	1.797	1.214	0.692
	5	-0.916	-0.771	-0.544	0.033	0.142	0.976	0.921	0.835	0.704	0.518	0.411	0.794	-0.188	0.663	0.858	1.155	-0.471	-0.384	0.558	0.931
	6	1.071	0.945	0.589	0.049	0.243	-0.799	-1.338	-1.485	-1.758	-1.958	-2.007	-2.140	1.380	1.094	0.894	0.771	1.424	0.426	-1.217	-1.510
	7	1.184	1.069	1.404	0.913	0.875	0.346	0.101	0.097	-0.051	0.328	0.552	0.690	0.101	0.083	0.041	-0.089	-0.017	-0.287	-0.219	-0.156
	8	-0.956	-0.648	-0.441	-1.305	0.024	-0.111	-0.116	-0.189	0.403	-0.047	-0.151	-0.266	-0.593	-0.592	-0.503	-0.799	-0.432	0.815	0.972	0.537
12.5 mm	1	-1.548	-1.805	-1.668	0.490	-1.640	-0.189	0.488	0.505	-0.059	0.987	0.995	-0.197	-1.820	-1.938	-1.790	-0.711	-1.750	-0.870	-0.174	-0.136
	2	-0.984	-0.848	-0.507	0.866	0.900	1.390	1.377	1.432	0.447	1.137	1.019	1.302	-0.579	-0.637	-0.535	0.357	-0.247	0.291	0.781	1.199
	3	0.336	0.294	-0.633	-1.992	-1.257	-1.847	-1.864	-1.764	-1.248	-1.637	-1.295	-1.718	0.691	0.482	-0.197	-1.633	-0.599	-1.711	-2.120	-2.020
	4	1.303	1.236	1.440	1.074	1.148	0.692	0.387	0.261	2.112	-0.934	-1.515	-0.106	1.220	1.036	1.344	1.458	0.953	0.967	0.451	0.152
	5	-0.301	-0.145	0.161	0.412	0.729	0.879	0.724	0.736	0.157	0.719	0.622	1.052	-0.277	-0.131	-0.239	-0.317	-0.238	-0.310	-0.071	0.141
	6	0.287	0.314	0.175	-0.017	0.180	-0.404	-0.640	-0.699	-0.624	-0.424	-0.265	-0.367	0.980	1.058	1.103	0.978	0.894	0.273	-0.298	-0.576
	7	1.240	1.123	1.185	0.015	0.105	-0.074	0.075	0.198	-0.221	0.563	0.691	0.746	0.296	0.505	0.570	0.437	1.290	1.455	1.238	1.019
	8	-0.334	-0.169	-0.154	-0.847	-0.166	-0.447	-0.548	-0.668	-0.563	-0.410	-0.252	-0.713	-0.512	-0.376	-0.256	-0.569	-0.302	-0.094	0.191	0.221
25 mm	1	-0.759	-1.418	-1.586	-0.052	-1.871	-0.547	0.328	0.606	0.826	0.519	0.727	-0.111	-1.268	-1.426	-1.709	-1.502	-1.792	-0.168	-0.261	0.268
	2	-0.284	-0.265	-0.084	0.903	0.812	1.332	1.144	1.073	0.397	0.444	0.387	0.474	-0.398	-0.547	-0.535	-0.103	-0.341	0.538	0.318	0.787
	3	0.381	0.391	-0.008	-1.197	-0.623	-1.522	-1.677	-1.607	-1.427	-1.498	-1.460	-1.239	1.478	1.201	0.948	-0.344	-0.013	0.226	-1.269	-0.836
	4	1.231	1.296	1.268	1.128	0.839	0.723	0.661	0.609	0.525	0.933	1.069	1.198	-0.545	-0.627	-0.322	0.199	1.056	-1.202	1.304	-1.503
	5	-1.284	-0.865	-0.659	-0.343	0.241	0.735	0.434	0.256	0.975	0.820	0.557	0.929	-0.643	0.065	0.571	1.188	0.591	-1.743	-0.739	0.327
	6	0.379	0.387	0.135	-0.411	-0.170	-1.132	-1.400	-1.415	-1.645	-1.581	-1.526	-1.555	0.948	0.977	0.857	0.216	0.654	0.581	-1.159	-1.036
	7	1.359	1.256	1.462	1.249	1.211	0.506	0.085	-0.175	-0.083	-0.120	-0.313	-0.330	1.036	1.130	1.020	1.410	0.862	1.235	0.915	0.689
	8	-1.022	-0.782	-0.529	-1.277	-0.439	-0.096	0.425	0.654	0.430	0.483	0.559	0.634	-0.607	-0.773	-0.830	-1.064	-1.018	0.534	0.891	1.303

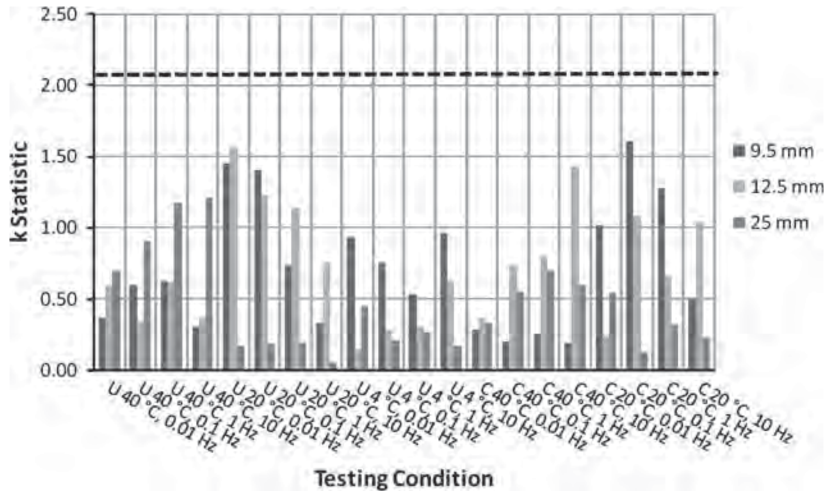

Figure D17. Within-laboratory phase angle consistency statistic, k, *for Lab 1.*

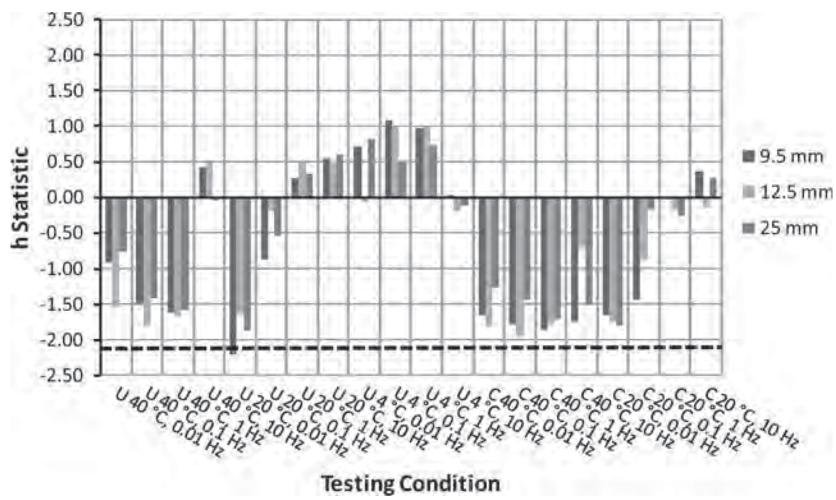

Figure D18. Between-laboratory phase angle consistency statistic, h, *for Lab 1.*

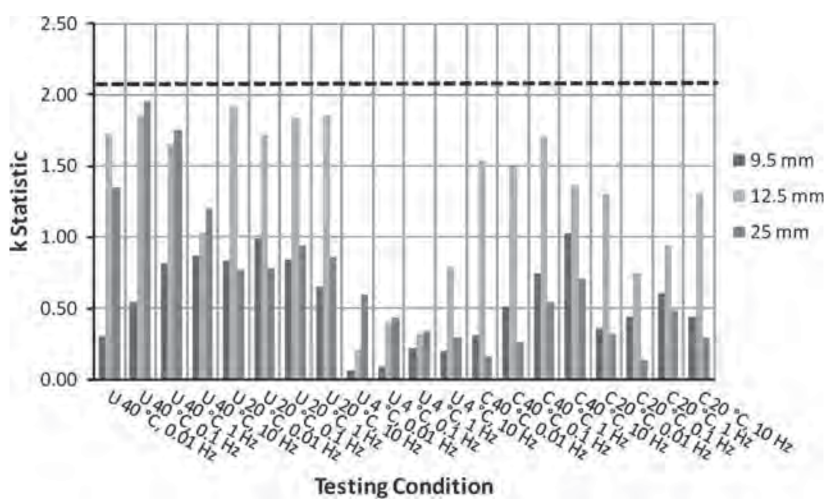

Figure D19. Within-laboratory phase angle consistency statistic, k, *for Lab 2.*

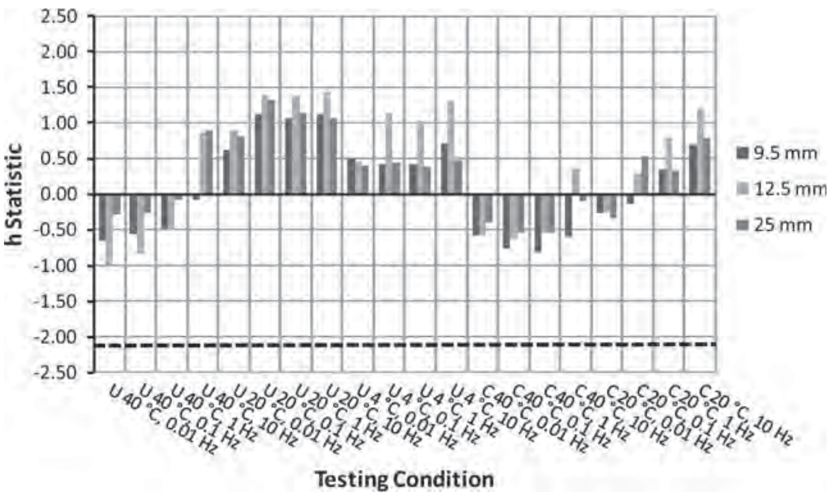

Figure D20. Between-laboratory phase angle consistency statistic, h, *for Lab 2.*

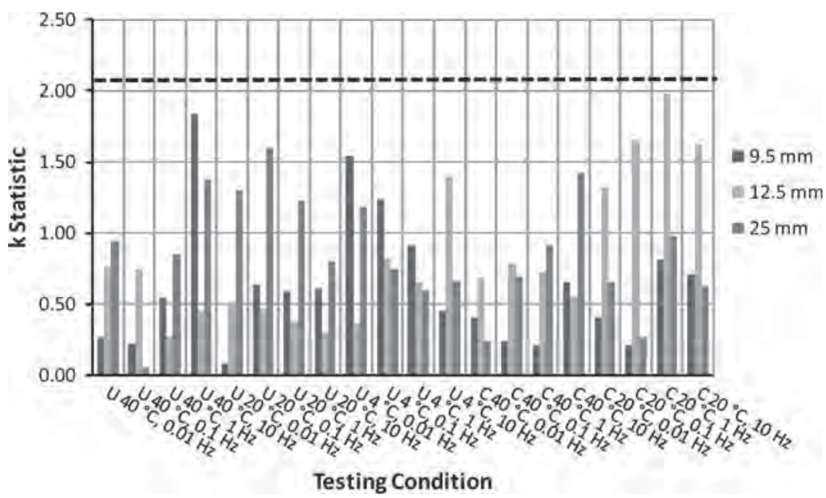

Figure D21. Within-laboratory phase angle consistency statistic, k, *for Lab 3.*

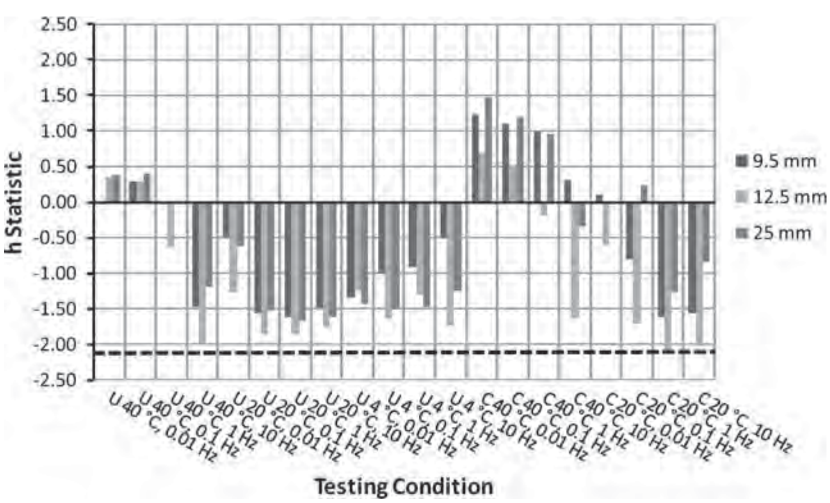

Figure D22. Between-laboratory phase angle consistency statistic, h, *for Lab 3.*

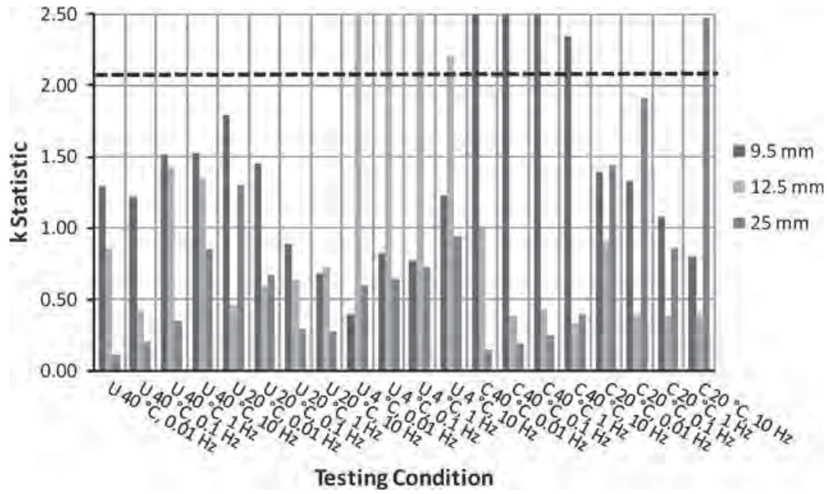

Figure D23. Within-laboratory phase angle consistency statistic, k, *for Lab 4.*

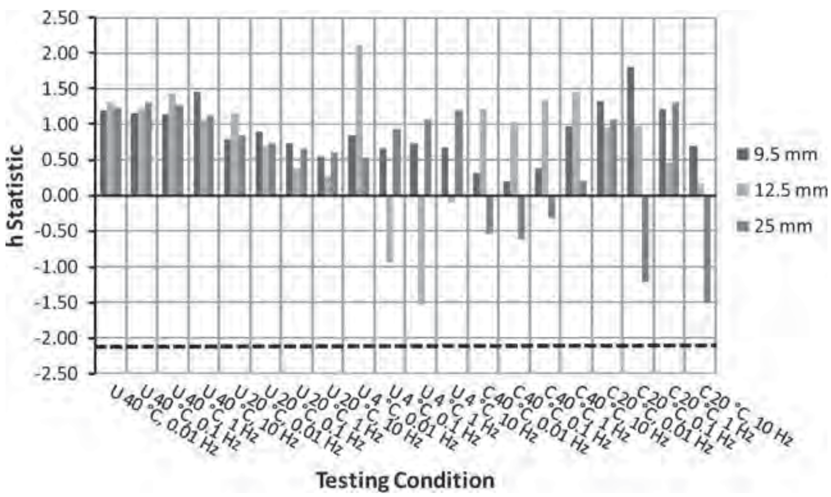

Figure D24. Between-laboratory phase angle consistency statistic, h, *for Lab 4.*

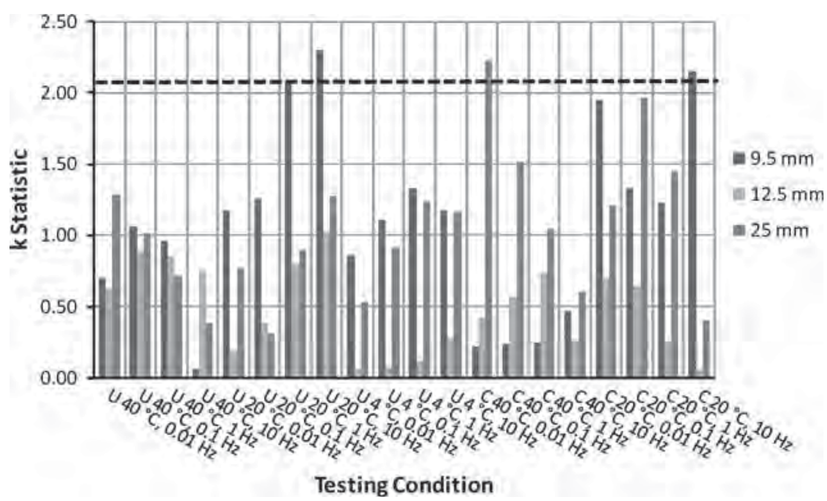

Figure D25. Within-laboratory phase angle consistency statistic, k, *for Lab 5.*

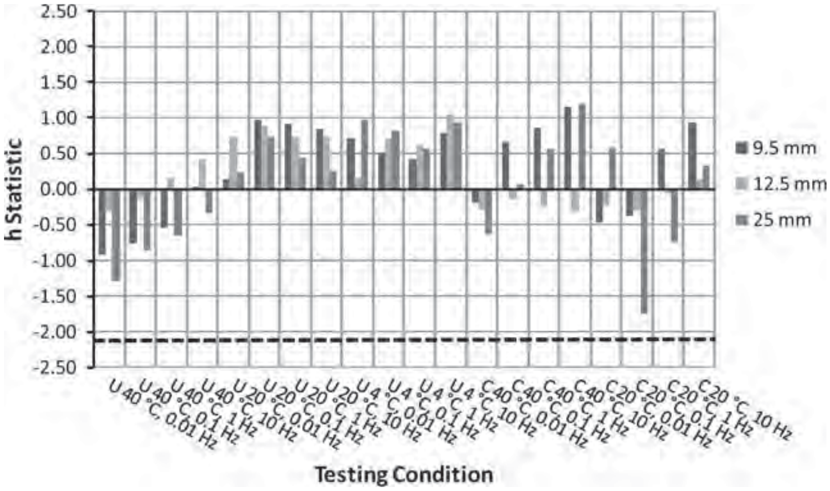

Figure D26. Between-laboratory phase angle consistency statistic, h, ***for Lab 5.***

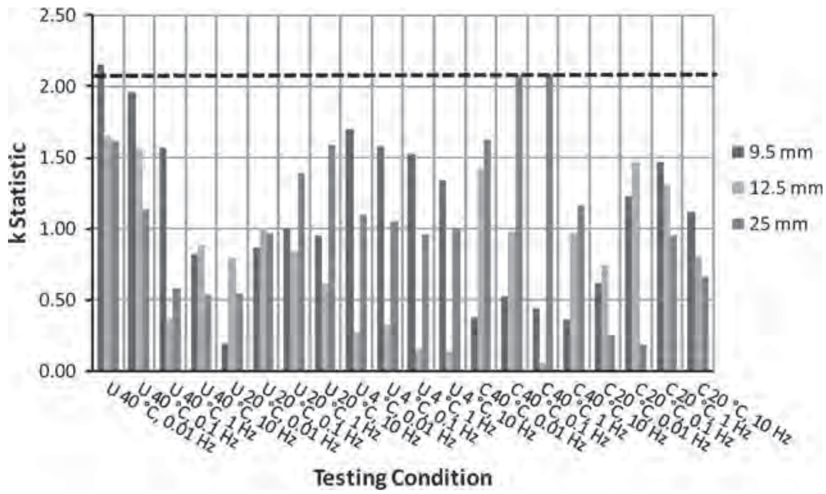

Figure D27. Within-laboratory phase angle consistency statistic, k, ***for Lab 6.***

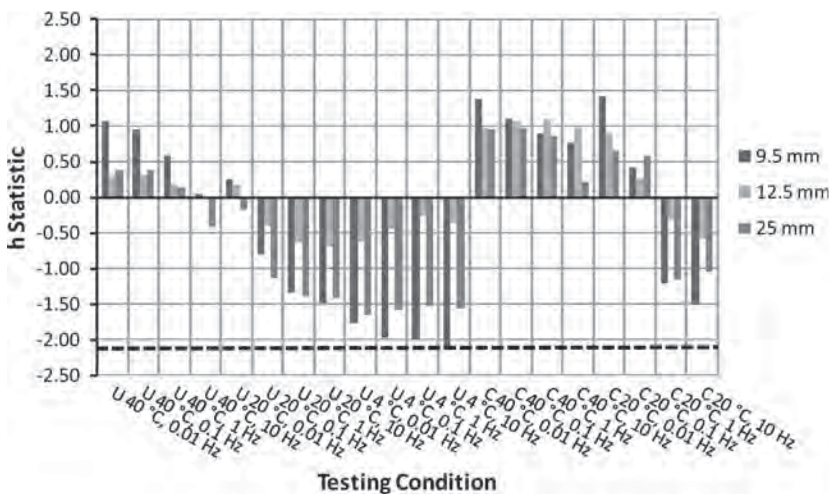

Figure D28. Between-laboratory phase angle consistency statistic, h, ***for Lab 6.***

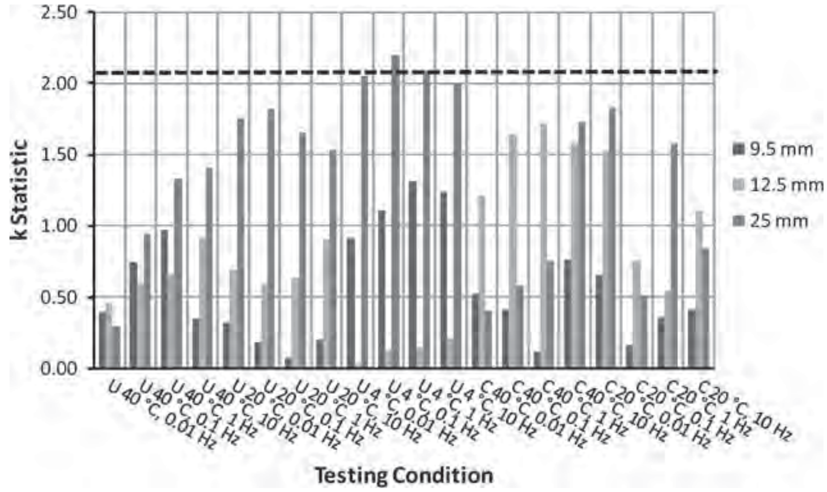

Figure D29. Within-laboratory phase angle consistency statistic, **k**, ***for Lab 7.***

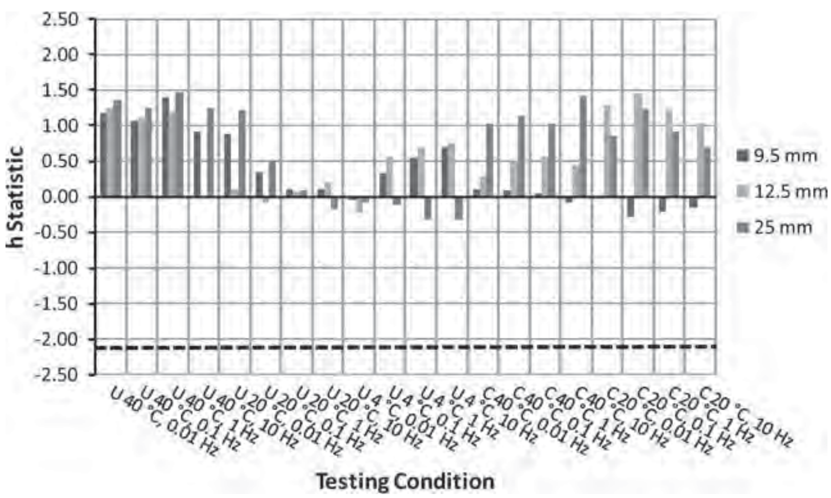

Figure D30. Between-laboratory phase angle consistency statistic, **h**, ***for Lab 7.***

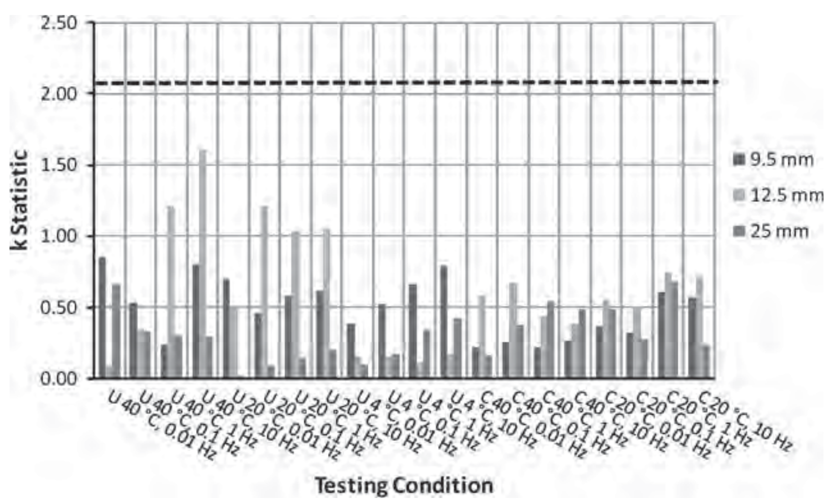

Figure D31. Within-laboratory phase angle consistency statistic, **k**, ***for Lab 8.***

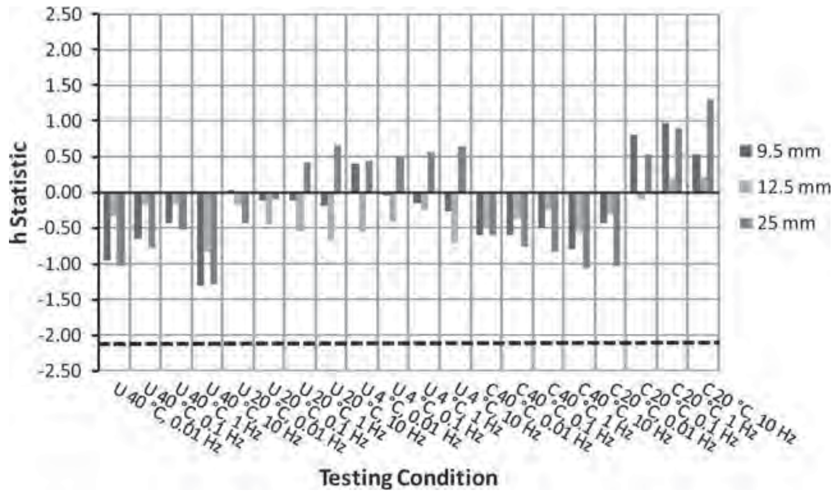

Figure D32. Between-laboratory phase angle consistency statistic, h, *for Lab 8.*

APPENDIX E

Prefabricated Core Dynamic Modulus Statistical Analysis

Table E1. Dynamic modulus within-laboratory consistency statistic, *k*.

		UNCONFINED												CONFINED							
		40 °C	40 °C	40 °C	40 °C	20 °C	20 °C	20 °C	20 °C	4 °C	4 °C	4 °C	4 °C	40 °C	40 °C	40 °C	40 °C	20 °C	20 °C	20 °C	20 °C
Mix	Lab	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz
9.5 mm	1	0.055	0.179	0.290	0.377	0.072	0.264	0.283	0.568	1.075	0.711	0.711	0.687	1.302	0.642	0.561	0.201	0.286	0.209	0.386	0.825
	2	0.684	0.773	1.019	1.091	0.748	0.700	0.639	0.607	0.869	0.824	0.839	0.891	1.176	1.584	0.079	0.577	0.362	0.816	0.735	0.567
	3	0.215	0.771	1.538	1.821	0.280	0.169	0.204	0.276	0.528	1.004	0.899	0.748	0.824	0.716	0.640	0.413	1.465	1.030	0.838	0.657
	4	0.121	0.295	0.415	0.451	0.693	0.558	0.646	0.668	0.396	0.109	0.209	0.374	0.373	0.449	0.642	0.609	0.291	0.530	0.483	0.404
	5	0.265	0.587	1.007	1.057	2.039	2.273	2.306	2.120	1.644	1.505	1.324	1.089	1.560	1.697	2.419	2.519	1.915	1.704	1.331	0.988
	6	0.191	0.229	0.439	0.647	0.745	0.334	0.313	0.402	0.550	0.353	0.314	0.422	0.707	0.674	0.560	0.374	0.367	0.163	0.166	0.141
	7	2.689	2.498	1.618	0.482	0.596	0.938	0.919	1.044	1.176	1.316	1.269	1.214	0.540	0.687	0.791	0.744	0.990	1.561	2.040	2.253
	8	0.359	0.227	0.719	1.174	1.344	0.972	0.891	1.021	1.125	1.294	1.574	1.788	0.936	0.746	0.256	0.217	0.881	0.763	0.645	0.573
12.5 mm	1	0.695	0.618	0.461	0.402	0.854	0.745	0.941	0.637	1.412	1.924	1.971	1.999	0.563	0.638	0.520	0.343	0.227	0.305	0.484	0.751
	2	1.088	0.610	0.759	0.926	0.956	0.835	0.815	1.143	0.762	0.623	0.579	0.515	1.606	1.701	1.400	1.213	1.025	0.677	0.667	0.775
	3	1.036	0.779	0.529	0.340	0.861	0.626	0.392	1.051	0.405	0.672	0.665	0.482	1.214	1.005	0.998	1.224	0.038	0.555	0.643	0.737
	4	0.979	0.926	1.072	1.223	1.245	1.167	1.251	1.200	1.385	0.995	0.942	0.947	1.537	1.281	1.220	1.221	2.360	2.302	2.125	1.661
	5	1.402	0.790	0.601	0.597	0.589	0.682	0.779	0.728	0.547	0.544	0.503	0.479	0.427	0.884	0.761	0.318	0.227	0.219	0.325	0.501
	6	0.178	0.354	0.373	0.332	0.788	0.693	0.694	1.282	0.569	0.474	0.538	0.619	0.325	0.302	0.237	0.429	0.487	0.455	0.553	0.763
	7	1.294	2.111	2.193	2.110	1.529	1.805	1.723	0.696	1.121	1.141	1.184	1.260	0.495	0.545	1.143	1.305	0.568	0.869	1.063	1.318
	8	0.792	0.758	0.689	0.673	0.872	0.889	0.821	1.042	1.211	0.804	0.712	0.640	0.857	0.938	1.159	1.197	0.846	0.911	0.922	0.981
25 mm	1	1.074	1.043	0.319	0.431	0.908	0.636	0.791	0.763	0.641	1.076	1.355	1.523	0.803	0.932	0.831	0.722	0.759	0.831	0.997	1.149
	2	0.448	0.720	1.164	1.230	1.658	1.584	1.542	2.147	1.538	1.406	1.352	1.328	1.349	1.519	1.351	1.185	1.296	0.980	1.061	1.093
	3	0.174	0.437	0.606	0.556	1.167	1.081	0.806	0.369	0.327	0.019	0.194	0.340	0.112	0.541	0.960	0.939	0.231	0.105	0.052	0.151
	4	0.049	0.199	0.398	0.657	0.899	1.272	1.249	0.210	0.658	0.622	0.591	0.546	0.881	1.166	1.307	1.654	0.561	0.573	0.608	0.581
	5	1.949	2.053	1.754	1.516	0.297	0.479	0.573	0.526	0.499	0.746	0.729	0.688	1.666	1.228	1.365	1.179	1.558	1.700	1.512	1.192
	6	0.852	0.703	0.772	0.886	0.426	0.721	1.047	0.276	0.865	0.908	0.946	0.890	0.311	0.485	0.553	0.726	0.456	0.724	0.967	1.179
	7	0.337	0.700	1.241	1.385	1.047	0.713	0.636	1.268	1.564	1.456	1.301	1.171	1.031	0.871	0.308	0.595	1.580	1.598	1.453	1.424
	8	1.405	0.983	0.898	0.748	0.943	1.021	0.981	0.817	1.113	0.989	0.910	0.931	0.901	0.820	0.768	0.429	0.497	0.201	0.419	0.537

Table E2. Dynamic modulus between-laboratory consistency statistic, *h*.

		UNCONFINED												CONFINED							
		40 °C	40 °C	40 °C	40 °C	20 °C	20 °C	20 °C	20 °C	4 °C	4 °C	4 °C	4 °C	40 °C	40 °C	40 °C	40 °C	20 °C	20 °C	20 °C	20 °C
Mix	Lab	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz
9.5 mm	1	0.673	0.592	-0.186	-1.109	0.491	-1.630	-1.724	-1.632	-0.265	0.160	-0.067	-0.626	0.668	0.837	0.578	-0.141	1.190	0.182	-0.070	-0.210
	2	0.982	0.982	1.056	0.681	0.205	-0.423	-0.800	-0.917	1.471	0.656	-0.010	-0.604	0.275	0.224	-0.388	0.018	0.405	0.838	0.727	0.540
	3	0.599	1.152	1.764	2.091	1.247	1.701	1.424	1.392	0.352	-0.195	0.050	0.299	0.372	0.623	0.787	0.208	0.617	0.541	0.480	0.532
	4	-1.860	-1.926	-1.206	-0.573	-0.781	0.301	0.769	0.994	0.000	0.854	1.253	1.450	0.123	0.191	-0.200	-0.696	-0.204	0.263	0.501	0.728
	5	-0.210	-0.179	-0.122	-0.058	0.725	-0.118	-0.495	-0.561	-1.511	-2.006	-1.886	-1.424	-2.434	-2.323	-2.159	2.287	-1.584	0.433	0.654	0.633
	6	-0.303	-0.177	0.038	-0.067	0.018	0.208	0.482	0.401	1.085	0.810	0.959	1.097	0.160	0.273	-0.067	-0.967	0.615	0.243	0.210	0.238
	7	-0.841	-0.716	-1.098	-0.740	-2.004	-0.769	-0.170	0.012	-1.085	-0.867	-0.821	-0.729	0.309	0.499	0.460	-0.490	-1.406	-2.375	-2.343	-2.318
	8	0.960	0.272	-0.246	-0.224	0.099	0.729	0.514	0.311	-0.048	0.588	0.521	0.536	0.527	-0.323	0.989	-0.218	0.366	-0.124	-0.159	-0.142
12.5 mm	1	0.673	-0.083	-1.459	-2.130	-0.591	-0.745	-0.913	-0.189	-1.151	-0.388	-0.724	-1.131	1.776	2.172	1.715	-0.783	0.789	0.615	0.578	0.992
	2	1.036	1.003	0.952	0.753	-0.942	-0.992	-0.759	-0.394	0.936	0.975	1.184	1.355	0.480	0.450	0.031	0.061	0.533	0.620	0.693	0.373
	3	-0.413	-0.624	-0.643	-0.227	-1.540	-1.534	-1.387	-1.090	-0.749	-0.982	-0.594	-0.177	-0.416	0.139	0.025	0.945	-1.478	-1.265	-1.150	-0.688
	4	-1.316	-1.031	-0.173	0.297	0.696	1.244	1.694	2.253	1.257	1.419	1.448	1.316	0.231	-0.012	-1.193	-0.624	-0.896	-0.811	-0.114	1.038
	5	0.543	0.715	0.835	0.653	0.919	0.676	0.540	-0.487	0.515	0.053	-0.053	-0.089	-1.056	-0.429	0.968	1.964	0.572	0.903	0.648	-0.402
	6	0.453	0.790	0.799	0.503	0.948	0.503	0.178	-0.321	0.848	0.194	-0.026	-0.223	-1.023	-0.699	-0.550	0.007	0.291	0.370	0.370	0.180
	7	-1.626	-1.631	-1.189	-0.654	-0.464	-0.069	-0.041	0.414	-1.218	-1.653	-1.581	-1.395	-0.780	-0.619	-1.169	-0.847	-1.062	-1.427	-1.885	-1.975
	8	0.651	0.860	0.879	0.805	0.974	0.919	0.687	-0.186	-0.438	0.382	0.347	0.344	0.788	-1.003	0.172	-0.724	1.251	0.995	0.861	0.481
25 mm	1	0.799	1.011	0.351	-1.022	1.528	0.021	-0.405	0.169	-0.427	-0.583	-0.915	-1.022	0.994	1.124	1.153	-0.139	2.132	1.597	0.723	0.360
	2	0.815	0.634	0.763	0.562	0.147	-0.010	-0.079	0.625	1.486	1.083	0.726	0.432	0.261	0.457	0.560	-0.394	0.619	-0.282	-0.516	-0.681
	3	0.300	0.344	0.599	1.440	0.483	0.458	0.500	0.440	-0.177	0.022	0.403	0.583	0.653	0.721	0.559	-0.201	-0.430	-0.697	-0.359	-0.117
	4	-1.605	-1.565	-1.121	-0.182	0.133	1.686	1.868	1.550	0.953	1.351	1.300	1.153	-0.201	-0.010	-0.052	0.639	-0.672	-0.333	0.073	0.210
	5	0.768	1.018	1.213	0.886	-0.163	-0.984	-1.147	-1.908	-1.350	-1.798	-1.877	-1.927	-2.296	-2.137	-2.123	1.828	-0.852	0.989	1.558	1.656
	6	-0.243	-0.012	0.379	0.474	0.481	0.587	0.484	-0.294	0.897	0.389	0.404	0.482	0.133	0.281	0.557	0.514	0.311	0.800	0.883	0.919
	7	-1.426	-1.404	-1.675	-1.392	-1.909	-1.616	-1.241	-0.500	-0.901	-0.524	-0.238	-0.084	0.023	0.148	-0.255	-0.774	-0.553	-0.997	-1.378	-1.153
	8	0.592	-0.026	-0.508	-0.766	-0.700	-0.141	0.020	-0.081	-0.482	0.059	0.198	0.383	0.433	-0.585	-0.399	-1.473	-0.554	-1.078	-0.985	-1.196

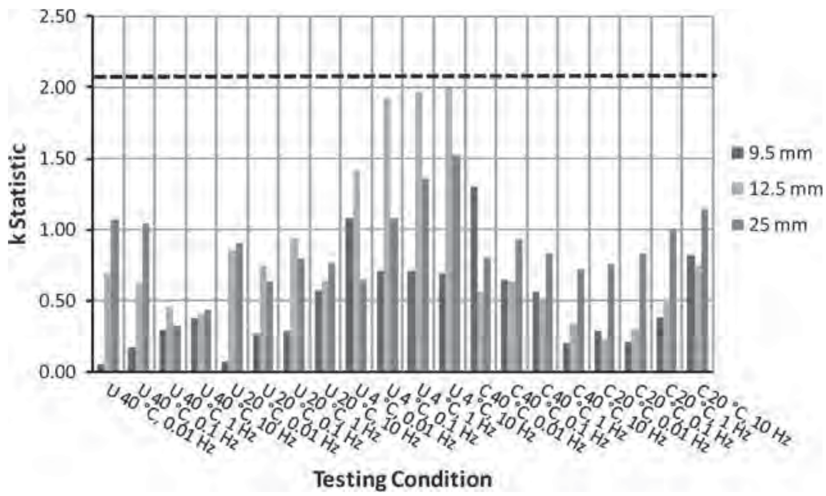

Figure E1. Within-laboratory dynamic modulus consistency statistic, k, *for Lab 1.*

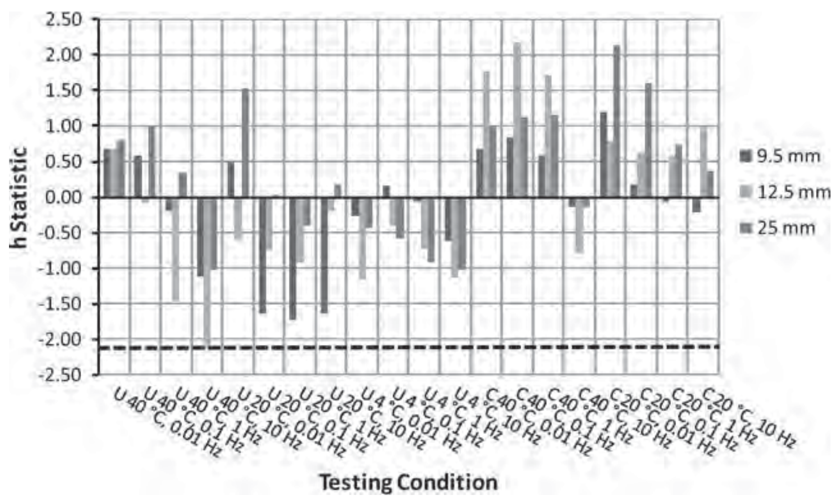

Figure E2. Between-laboratory dynamic modulus consistency statistic, h, *for Lab 1.*

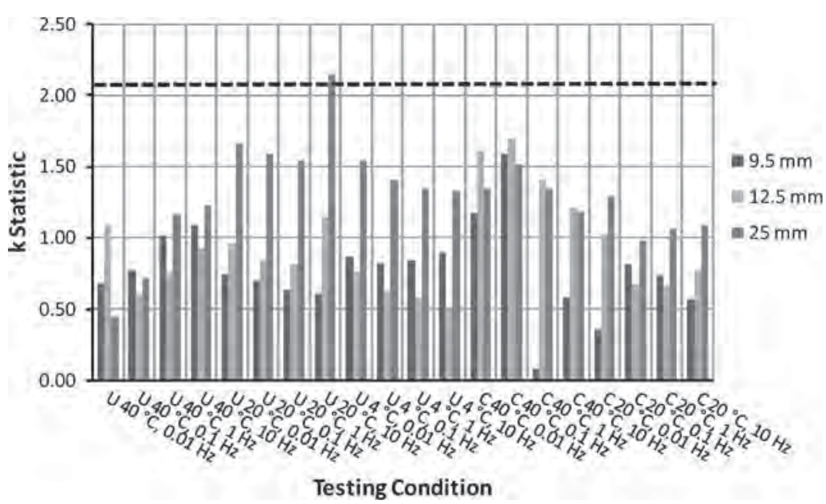

Figure E3. Within-laboratory dynamic modulus consistency statistic, k, *for Lab 2.*

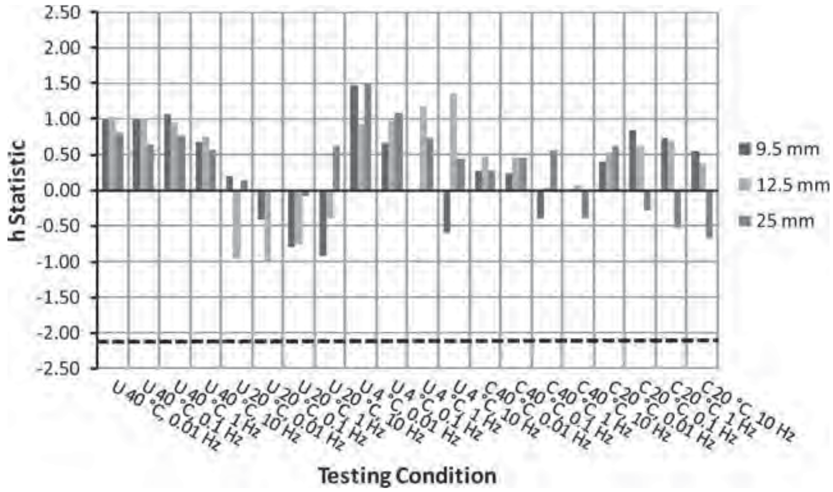

Figure E4. Between-laboratory dynamic modulus consistency statistic, h, ***for Lab 2.***

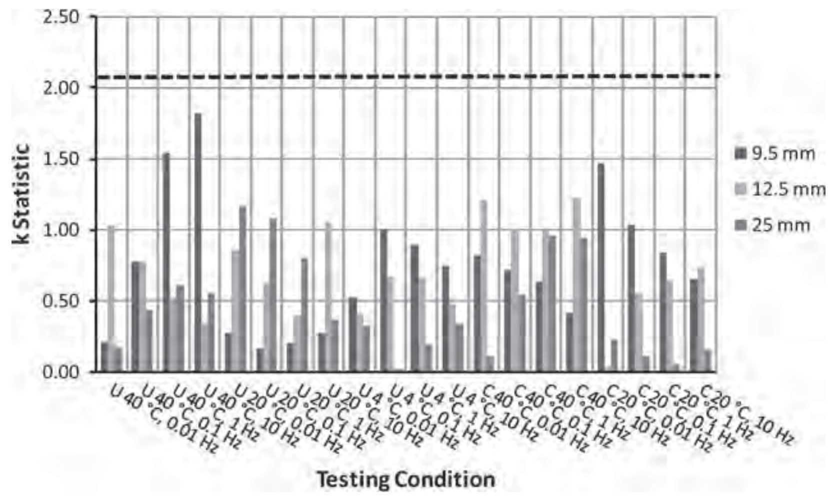

Figure E5. Within-laboratory dynamic modulus consistency statistic, k, ***for Lab 3.***

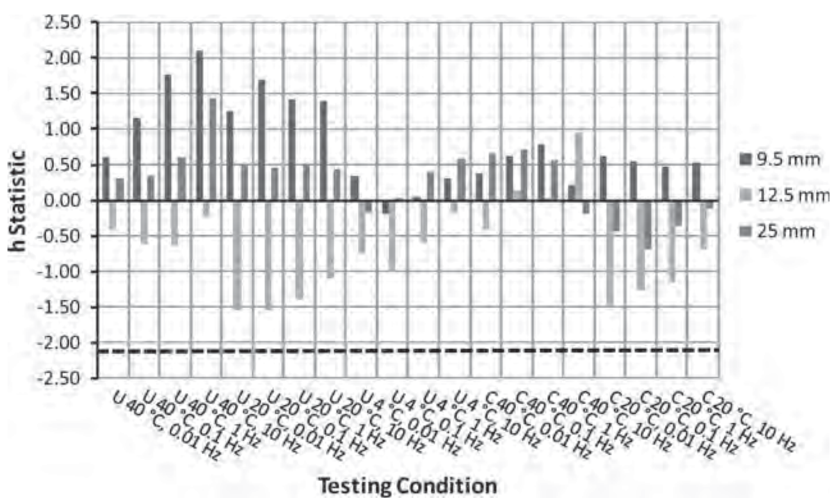

Figure E6. Between-laboratory dynamic modulus consistency statistic, h, ***for Lab 3.***

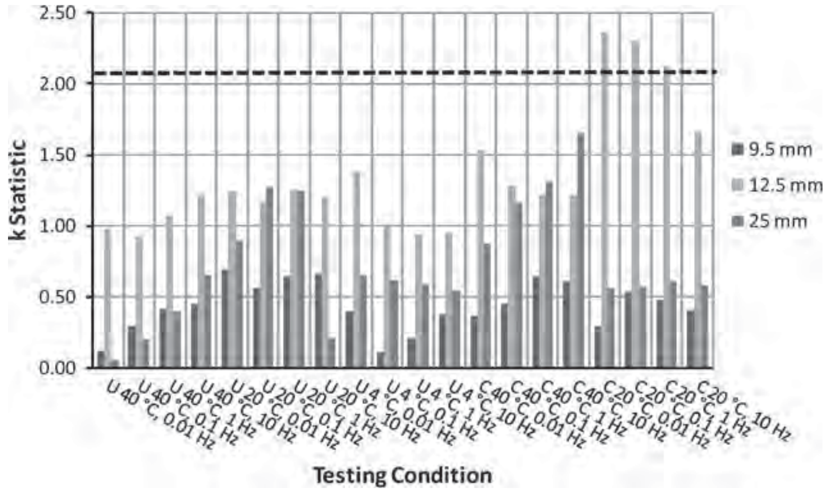

Figure E7. Within-laboratory dynamic modulus consistency statistic, k, ***for Lab 4.***

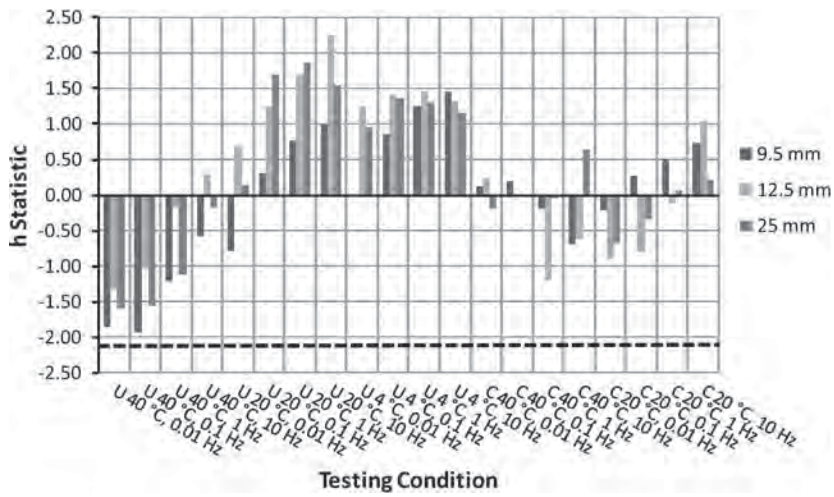

Figure E8. Between-laboratory dynamic modulus consistency statistic, h, ***for Lab 4.***

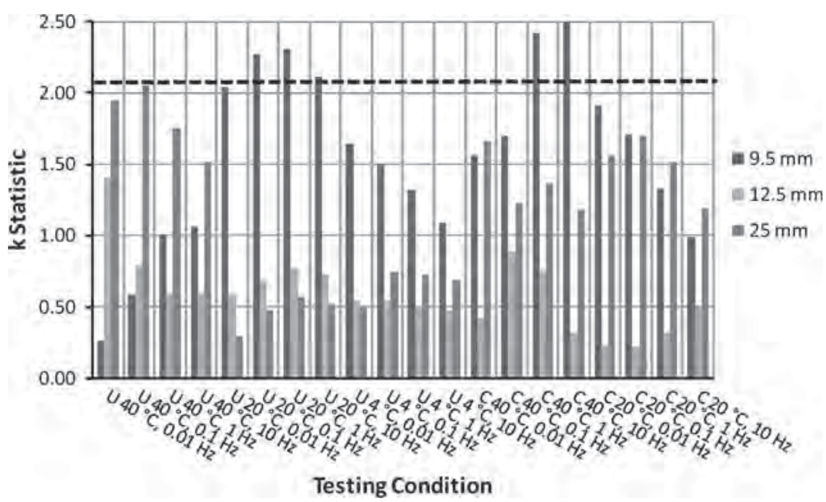

Figure E9. Within-laboratory dynamic modulus consistency statistic, k, ***for Lab 5.***

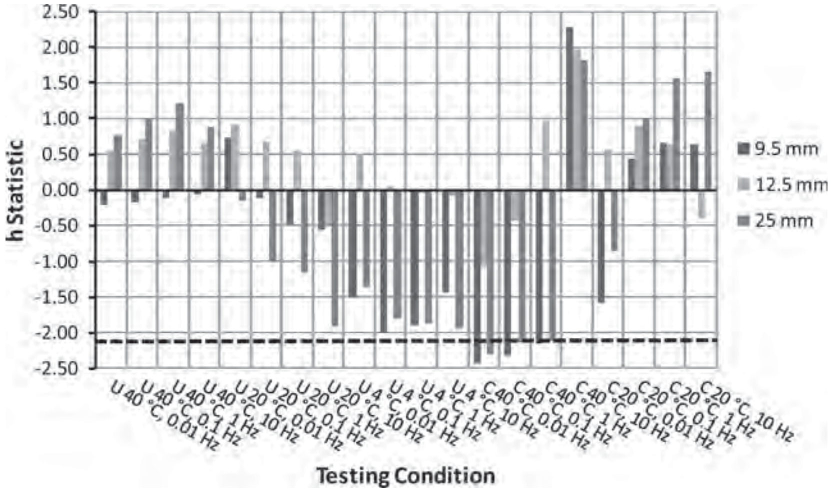

Figure E10. Between-laboratory dynamic modulus consistency statistic, h, *for Lab 5.*

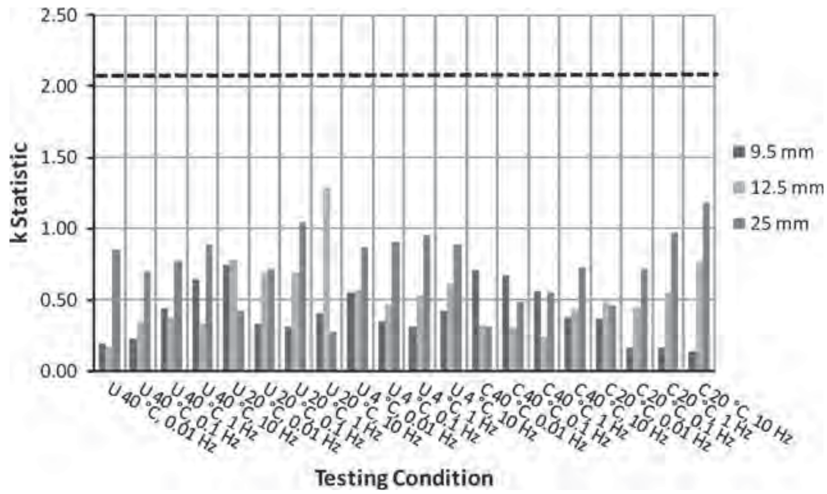

Figure E11. Within-laboratory dynamic modulus consistency statistic, k, *for Lab 6.*

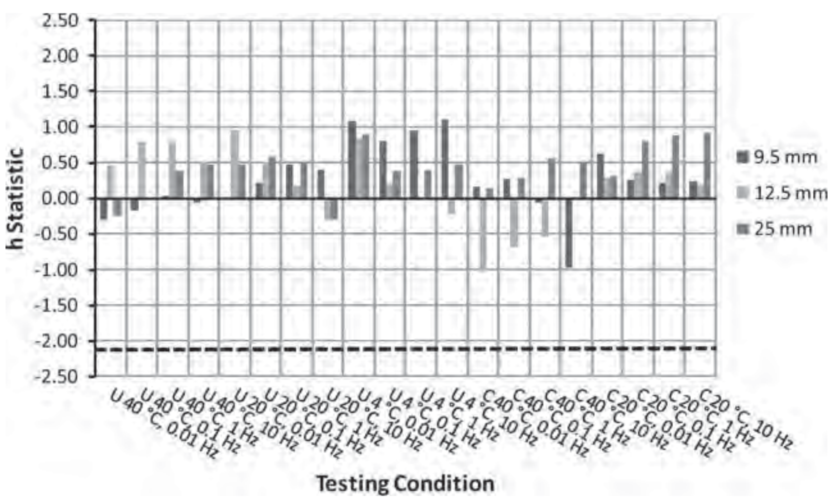

Figure E12. Between-laboratory dynamic modulus consistency statistic, h, *for Lab 6.*

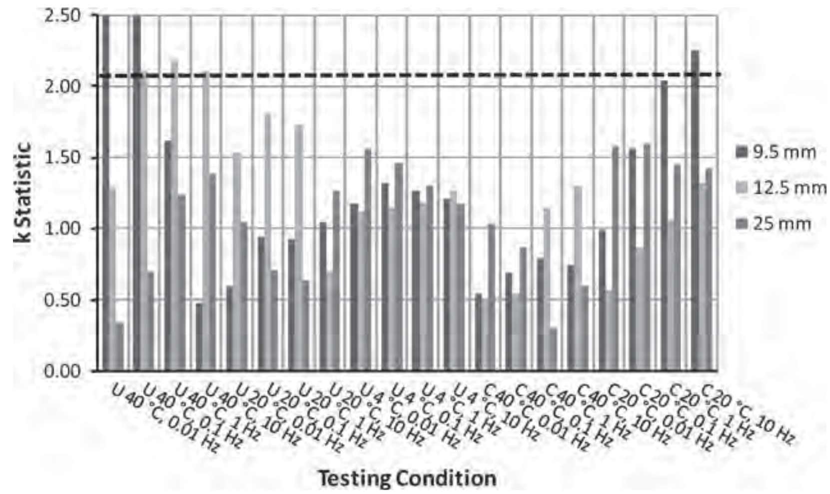

Figure E13. Within-laboratory dynamic modulus consistency statistic, k, *for Lab 7.*

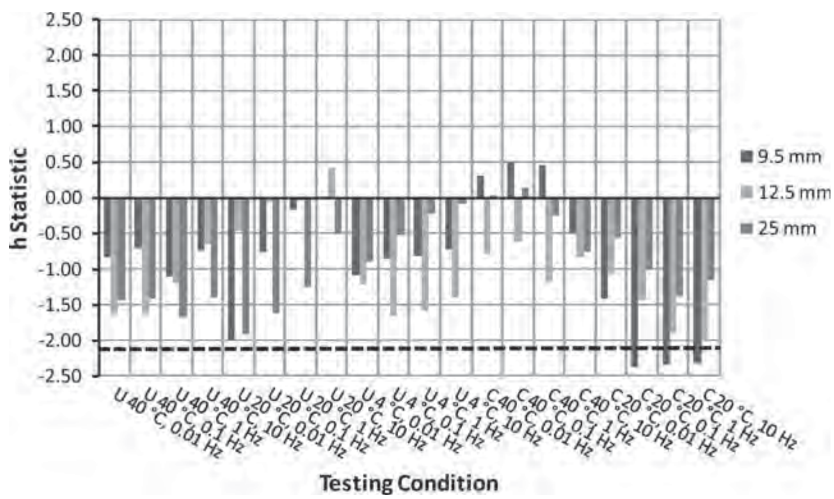

Figure E14. Between-laboratory dynamic modulus consistency statistic, h, *for Lab 7.*

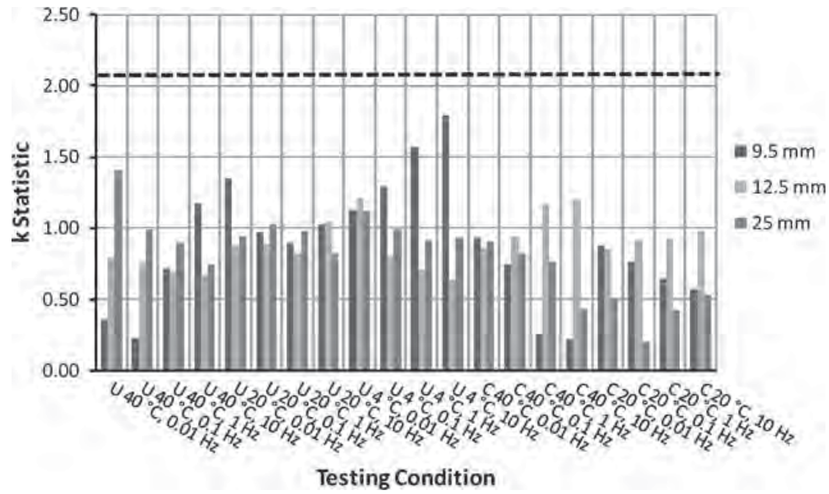

Figure E15. Within-laboratory dynamic modulus consistency statistic, k, *for Lab 8.*

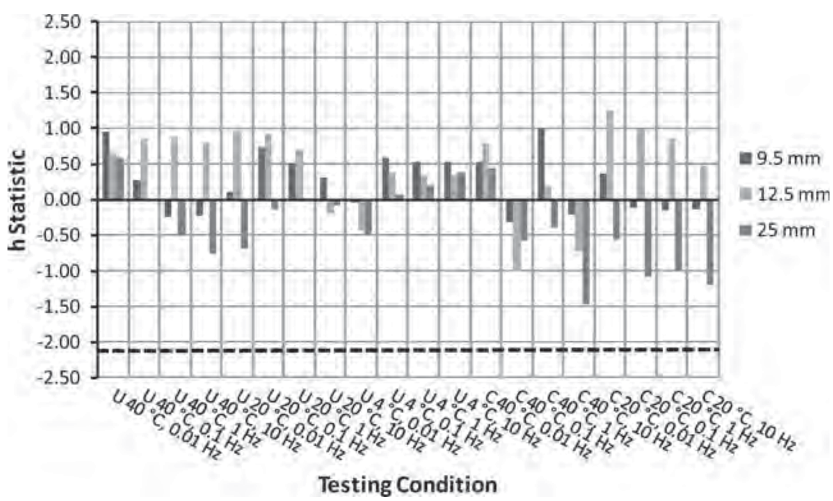

Figure E16. Between-laboratory dynamic modulus consistency statistic, h, *for Lab 8.*

Table E3. Phase angle within-laboratory consistency statistic, *k*.

		UNCONFINED												CONFINED							
		40 °C	40 °C	40 °C	40 °C	20 °C	20 °C	20 °C	20 °C	4 °C	4 °C	4 °C	4 °C	40 °C	40 °C	40 °C	40 °C	20 °C	20 °C	20 °C	20 °C
Mix	Lab	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz
9.5 mm	1	0.649	0.629	0.332	0.704	1.802	0.588	0.368	0.330	1.092	1.051	0.954	1.108	0.459	0.286	0.645	0.558	0.117	0.333	0.844	0.863
	2	0.296	0.228	0.205	0.443	1.042	0.557	0.538	0.550	0.895	0.875	0.678	0.601	1.019	1.007	0.998	0.146	0.203	0.086	0.642	0.718
	3	0.606	0.465	0.139	0.245	0.419	0.298	0.218	0.141	0.031	0.821	1.168	1.255	0.863	0.931	1.311	0.829	1.132	0.802	0.962	0.542
	4	0.738	0.169	0.227	0.482	0.867	1.008	0.790	0.568	0.650	0.060	0.183	0.316	0.191	0.382	0.762	0.844	0.234	0.162	0.309	0.634
	5	0.701	0.488	0.357	1.219	1.164	2.447	2.588	2.575	2.217	1.873	1.744	1.585	1.790	1.940	1.210	1.899	0.667	0.860	1.559	1.052
	6	0.147	0.140	0.162	0.713	1.035	0.444	0.053	0.355	0.394	0.259	0.247	0.324	0.599	0.822	1.260	1.336	0.140	0.170	0.130	0.117
	7	2.286	2.587	2.751	2.211	0.426	0.173	0.345	0.519	0.554	1.269	1.225	1.124	0.697	0.676	0.607	0.272	2.450	2.478	1.489	2.078
	8	0.917	0.597	0.237	0.368	0.362	0.161	0.293	0.471	0.455	0.518	0.793	0.926	1.386	0.997	0.930	0.894	0.375	0.550	1.092	0.779
12.5 mm	1	1.015	0.685	0.523	0.932	0.854	1.129	0.964	1.058	2.016	1.826	1.875	1.706	0.524	0.117	0.687	0.588	0.795	0.449	0.421	0.450
	2	1.217	1.234	0.856	0.510	0.936	1.071	0.998	0.915	0.523	0.359	0.327	0.403	0.604	0.423	0.654	0.798	1.149	0.460	0.353	0.286
	3	0.255	0.097	0.883	1.245	1.182	1.340	1.256	0.765	0.890	0.708	0.973	1.169	1.629	1.315	0.605	1.045	0.473	0.468	0.563	0.571
	4	0.861	0.694	0.712	0.684	0.926	0.663	0.781	0.956	0.918	1.117	1.007	0.995	1.253	1.243	1.291	1.021	1.790	2.574	2.604	2.566
	5	1.920	2.097	2.009	1.195	1.442	1.054	0.826	0.506	0.791	0.908	0.825	0.790	0.747	1.176	1.430	1.048	0.686	0.341	0.182	0.090
	6	0.780	0.553	0.265	0.113	0.482	0.472	0.525	0.666	0.047	0.166	0.131	0.097	0.819	0.531	0.837	0.524	0.371	0.283	0.158	0.168
	7	0.374	0.899	1.233	1.774	0.955	1.237	1.546	1.833	0.686	1.098	1.089	1.244	1.263	1.629	1.252	1.430	0.999	0.305	0.411	0.503
	8	0.498	0.079	0.281	0.516	0.957	0.693	0.735	0.697	0.964	0.855	0.730	0.624	0.562	0.461	0.867	1.211	1.007	0.675	0.609	0.719
25 mm	1	0.741	2.070	1.794	1.409	0.093	0.479	1.261	1.098	0.924	0.201	0.088	0.135	0.173	0.211	0.314	0.364	0.241	0.250	0.437	0.505
	2	1.486	0.460	0.096	0.418	0.151	0.308	0.960	1.270	0.922	1.143	1.236	1.375	0.256	0.355	0.344	0.161	0.736	0.471	0.597	0.874
	3	0.464	0.189	0.090	0.370	0.041	0.190	0.732	1.031	0.584	0.364	0.167	0.169	0.514	0.605	0.577	0.262	0.625	0.424	0.273	0.179
	4	0.813	0.241	0.186	0.797	0.969	0.894	1.020	0.980	0.477	0.714	0.551	0.835	0.442	0.702	0.708	0.432	0.582	0.519	0.499	0.610
	5	0.683	1.316	1.784	1.677	2.232	2.128	1.205	0.844	0.566	0.930	1.062	1.148	2.532	1.781	1.602	1.687	1.684	2.354	2.409	2.143
	6	1.167	0.911	0.787	0.907	1.249	1.282	0.728	0.379	0.356	0.414	0.657	0.857	0.823	1.501	1.487	1.584	0.785	0.539	0.275	0.431
	7	0.449	0.276	0.467	0.930	0.443	0.178	0.580	1.166	1.804	1.984	1.984	1.636	0.299	0.820	0.980	0.829	0.300	0.434	0.881	1.305
	8	1.529	0.878	0.843	0.754	0.538	0.796	1.263	0.970	1.423	1.018	0.796	0.798	0.518	0.936	1.100	1.242	1.769	1.116	0.690	0.311

Table E4. Phase angle between-laboratory consistency statistic, *h*.

		UNCONFINED												CONFINED							
		40 °C	40 °C	40 °C	40 °C	20 °C	20 °C	20 °C	20 °C	4 °C	4 °C	4 °C	4 °C	40 °C	40 °C	40 °C	40 °C	20 °C	20 °C	20 °C	20 °C
Mix	Lab	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz	0.01 Hz	0.1 Hz	1 Hz	10 Hz
9.5 mm	1	-0.335	-0.877	-1.010	1.004	-1.693	-0.161	1.336	2.058	-0.188	-0.080	0.457	-0.831	-1.974	-1.197	-0.842	0.579	-1.412	-0.820	-0.539	-0.123
	2	-0.563	-0.514	-0.715	-0.864	0.754	1.464	0.793	-0.096	-1.452	-1.557	-1.520	-0.915	1.038	0.299	0.207	-0.481	0.189	-0.672	-1.625	-0.838
	3	-0.260	-0.115	-0.217	-0.924	-1.120	-1.564	-1.069	-0.528	-0.368	0.259	0.358	0.683	0.416	0.085	0.306	0.463	0.171	0.401	0.066	-0.271
	4	1.522	1.972	1.969	1.526	1.047	0.917	-0.221	-0.698	0.856	0.182	-0.213	-0.543	-0.744	-0.591	-0.512	-0.530	1.192	1.502	0.816	-0.231
	5	-0.114	-0.145	-0.015	0.198	-0.115	0.547	1.138	0.848	1.865	1.860	1.819	2.095	1.053	2.209	2.258	1.361	0.606	-0.106	-0.921	-0.597
	6	0.032	-0.080	-0.199	-0.010	0.371	0.079	-0.470	-0.750	-0.454	-0.380	-0.624	-0.404	0.310	-0.141	-0.187	1.015	0.905	1.061	0.392	-0.287
	7	1.297	0.881	0.957	0.427	1.002	-0.185	-0.144	0.006	0.238	0.500	0.395	0.237	-0.260	-0.330	-0.622	-0.921	-1.522	-1.517	1.521	2.391
	8	-1.578	-1.123	-0.769	-1.357	-0.246	-1.097	-1.363	-0.841	-0.497	-0.784	-0.673	-0.320	0.162	-0.334	-0.609	-1.486	-0.129	0.150	0.290	-0.044
12.5 mm	1	-1.630	-1.576	-0.500	1.852	-1.140	0.554	1.172	1.113	-0.022	0.599	0.547	-1.338	-2.109	-2.110	-1.854	-0.240	-1.582	-0.784	-0.149	-0.074
	2	-0.720	-0.804	-1.259	-0.900	1.246	1.456	0.927	0.699	0.063	-0.352	-0.429	0.103	-0.366	-0.570	-0.969	-1.198	-0.930	-0.956	-0.720	-0.200
	3	0.093	0.148	0.493	0.391	-0.318	0.899	1.352	1.560	1.673	1.785	1.772	1.779	0.010	0.090	0.390	0.723	0.901	0.920	0.881	0.860
	4	1.309	1.398	1.278	0.566	1.163	0.298	-0.530	-1.042	-0.322	-0.940	-1.055	-0.900	-0.021	0.250	0.814	1.028	1.042	1.562	1.702	1.632
	5	0.100	-0.038	-0.493	-0.831	0.073	-0.821	-0.946	-0.905	-0.400	-0.446	-0.512	-0.077	0.215	0.158	-0.365	-1.640	-0.590	-1.091	-1.331	-1.511
	6	-0.131	-0.153	-0.421	-0.416	-1.037	-1.178	-0.769	-0.458	-1.769	-0.893	-0.767	-0.218	1.081	1.011	0.824	0.770	0.208	-0.096	-0.396	-0.567
	7	1.383	1.332	1.561	0.447	0.905	0.062	-0.132	-0.124	0.890	0.966	1.032	1.019	1.092	1.043	0.982	0.774	1.143	0.888	0.661	0.614
	8	-0.404	-0.308	-0.658	-1.107	-0.892	-1.269	-1.074	-0.843	-0.113	-0.719	-0.589	-0.367	0.099	0.128	0.177	-0.218	-0.193	-0.443	-0.649	-0.753
25 mm	1	-0.391	-0.989	-0.940	0.436	-1.171	0.057	0.766	0.809	-1.322	-0.391	0.764	-0.346	-1.097	-2.140	-1.519	-1.099	-1.924	-2.016	-1.536	0.078
	2	-0.771	-0.617	-0.696	-0.710	0.553	1.596	1.181	0.465	-1.498	-1.668	-1.653	-1.389	0.709	0.252	-0.326	-0.363	-0.064	0.112	0.631	1.093
	3	-0.233	-0.201	-0.184	-0.520	-1.160	-1.154	-0.568	-0.318	0.772	1.351	1.039	0.789	0.173	-0.480	-0.536	-0.616	0.440	0.347	0.508	0.565
	4	1.520	1.783	1.601	1.540	1.144	0.619	-1.435	-1.954	0.290	-0.799	-1.157	-0.888	0.765	1.086	1.615	2.099	1.156	1.065	0.311	-0.768
	5	-0.525	-0.703	-0.927	-1.465	-1.098	-1.413	-0.387	0.650	0.868	0.810	0.879	1.831	-1.980	0.786	1.194	-0.286	-0.252	0.026	-0.896	-1.265
	6	0.000	-0.011	-0.048	0.494	0.209	-0.413	-0.632	-0.635	-0.591	-0.252	-0.372	-0.254	0.680	0.520	0.204	0.775	1.006	0.784	-0.360	-1.260
	7	1.529	1.279	1.452	0.903	1.122	0.753	1.407	1.163	0.995	0.938	0.589	0.340	0.292	0.164	-0.206	-0.076	0.375	0.549	1.684	1.273
	8	-1.128	-0.540	-0.258	-0.678	0.400	-0.046	-0.331	-0.180	0.487	0.011	-0.090	-0.082	0.458	-0.189	-0.425	-0.434	-0.738	-0.868	-0.343	0.284

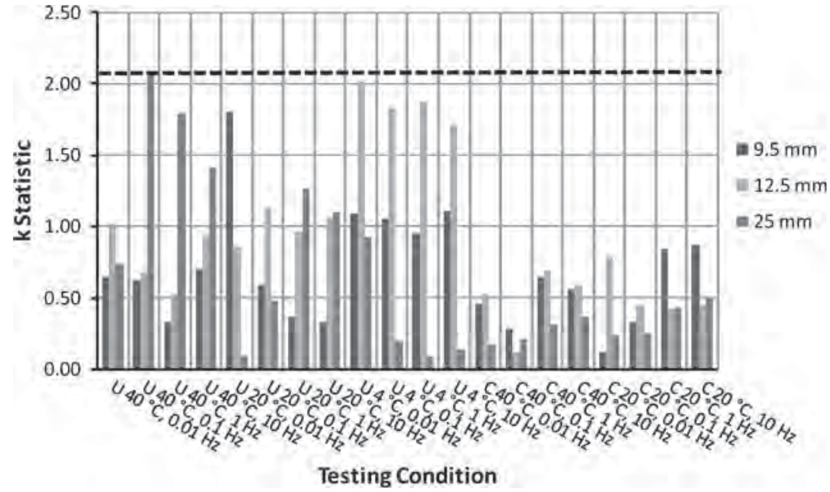

Figure E17. Within-laboratory phase angle consistency statistic, k, *for Lab 1.*

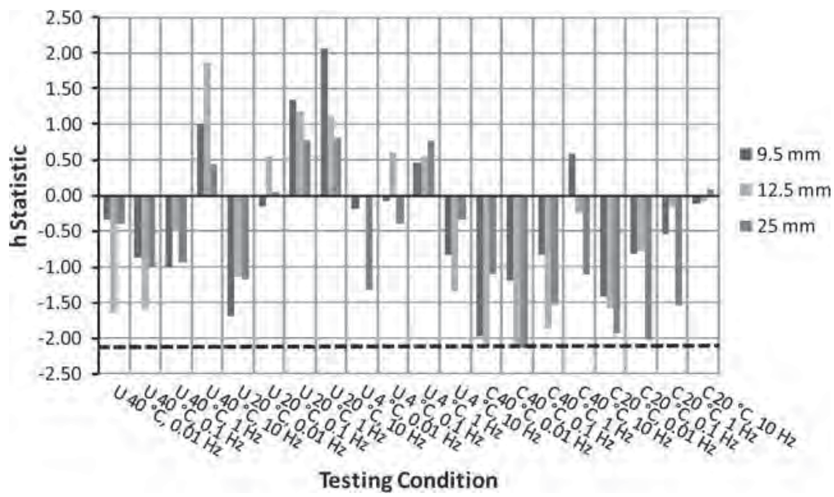

Figure E18. Between-laboratory phase angle consistency statistic, h, *for Lab 1.*

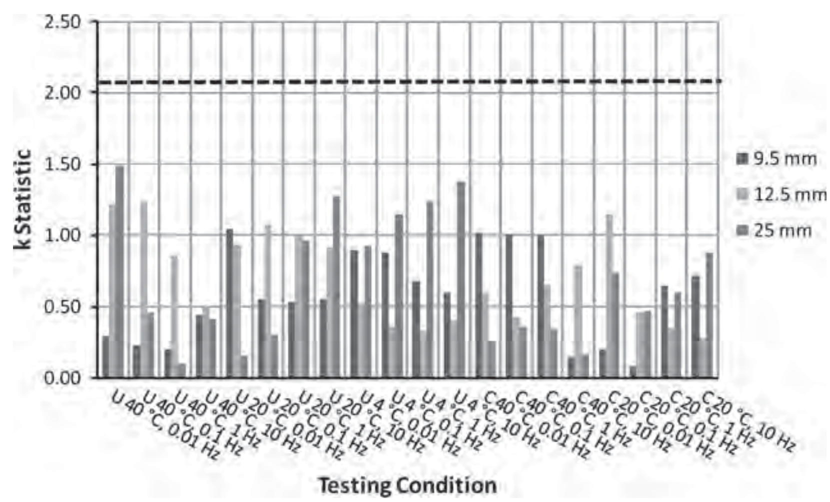

Figure E19. Within-laboratory phase angle consistency statistic, k, *for Lab 2.*

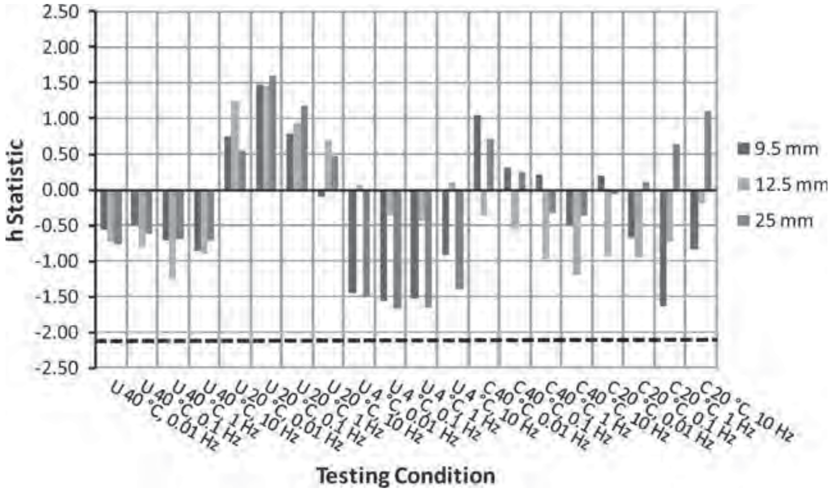

Figure E20. Between-laboratory phase angle consistency statistic, h, ***for Lab 2.***

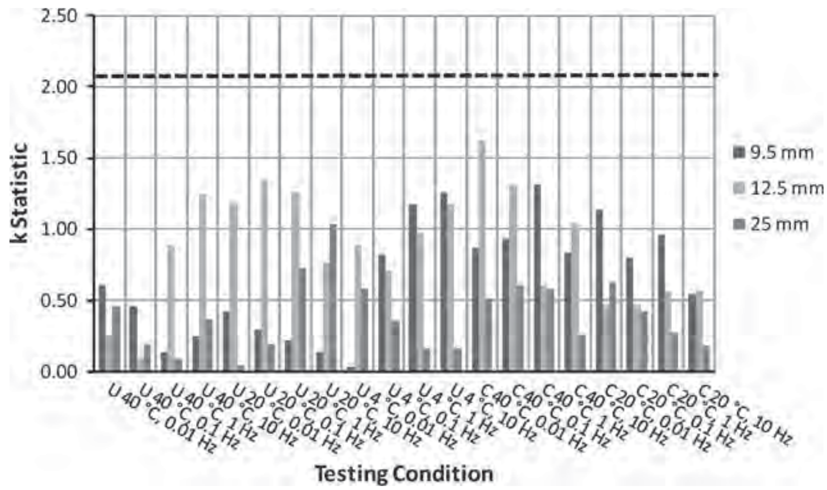

Figure E21. Within-laboratory phase angle consistency statistic, k, ***for Lab 3.***

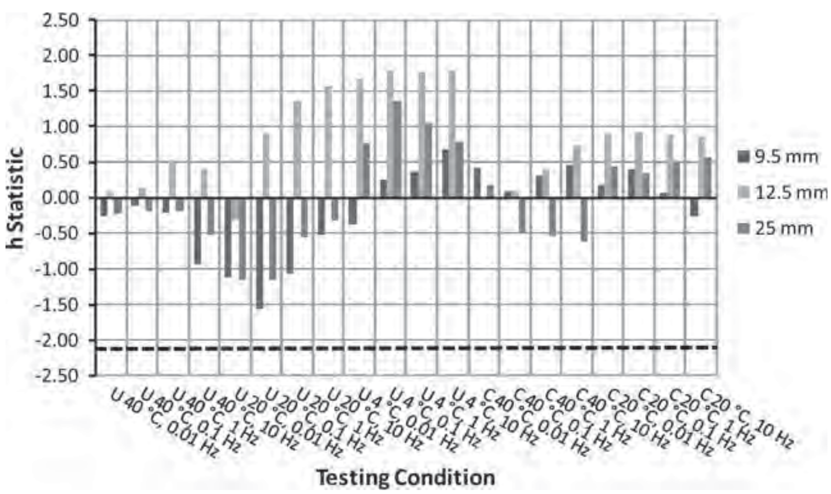

Figure E22. Between-laboratory phase angle consistency statistic, h, ***for Lab 3.***

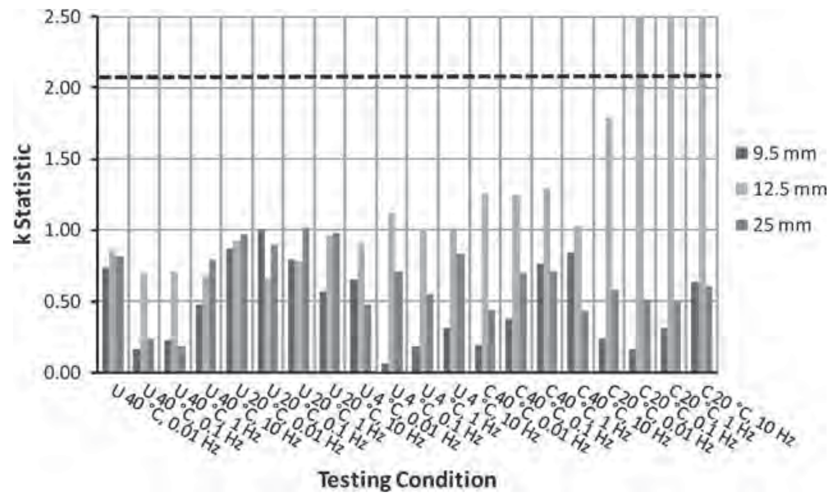

Figure E23. Within-laboratory phase angle consistency statistic,* k, *for Lab 4.

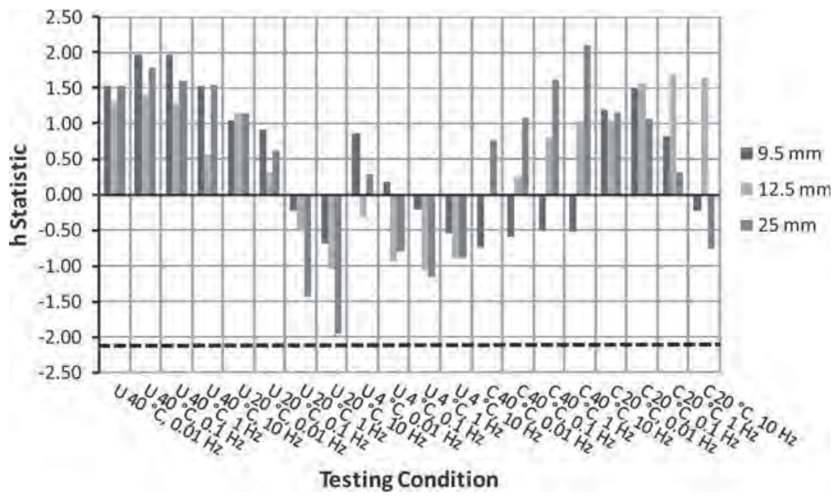

Figure E24. Between-laboratory phase angle consistency statistic,* h, *for Lab 4.

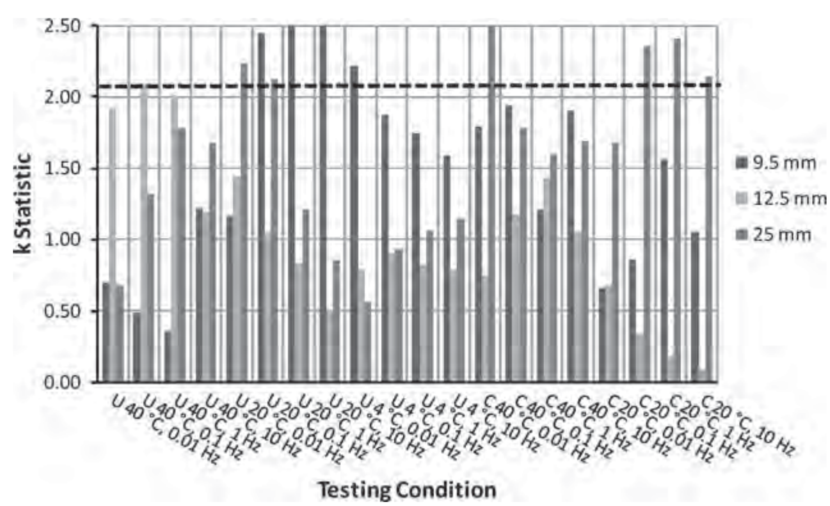

Figure E25. Within-laboratory phase angle consistency statistic,* k, *for Lab 5.

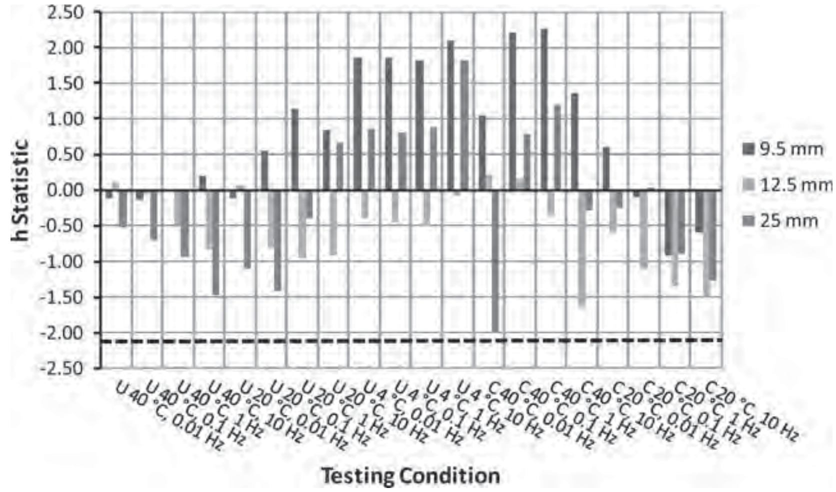

Figure E26. Between-laboratory phase angle consistency statistic,* h, *for Lab 5.

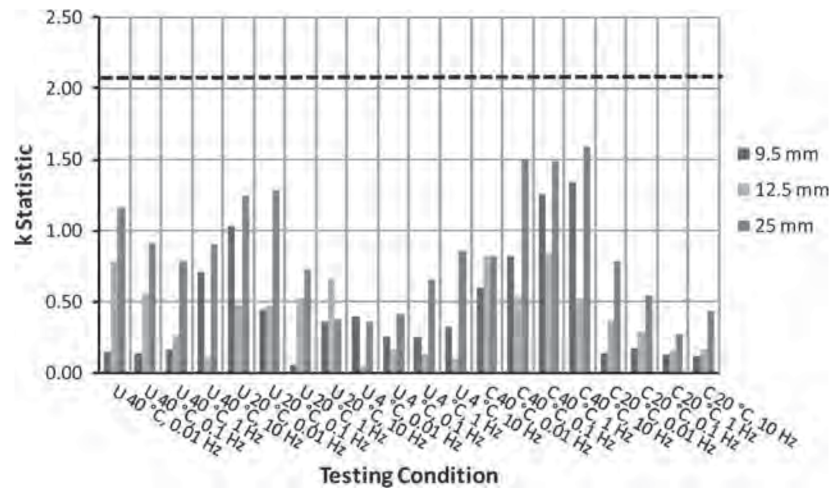

Figure E27. Within-laboratory phase angle consistency statistic,* k, *for Lab 6.

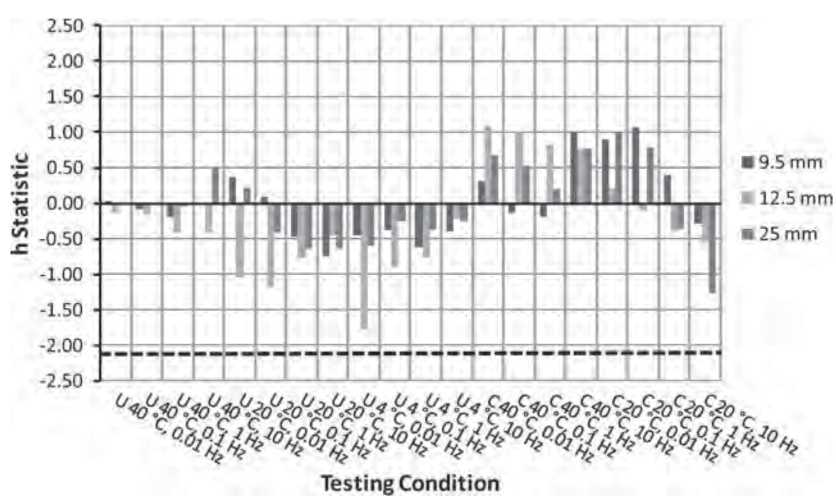

Figure E28. Between-laboratory phase angle consistency statistic,* h, *for Lab 6.

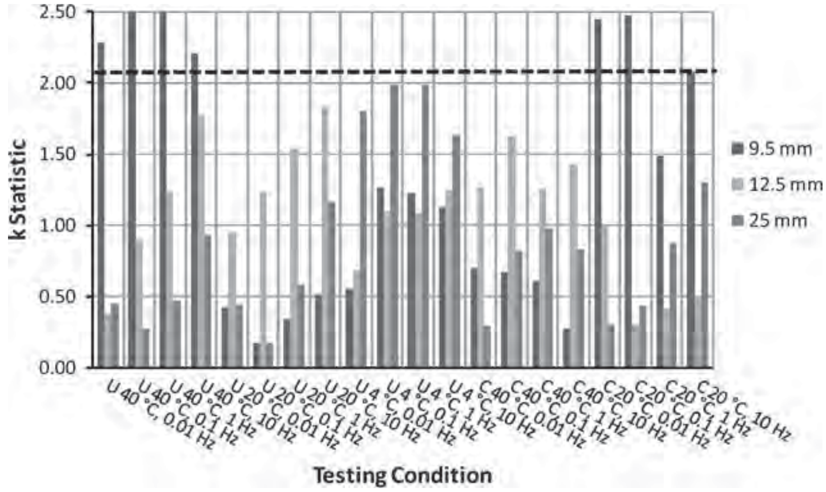

Figure E29. Within-laboratory phase angle consistency statistic, k, *for Lab 7.*

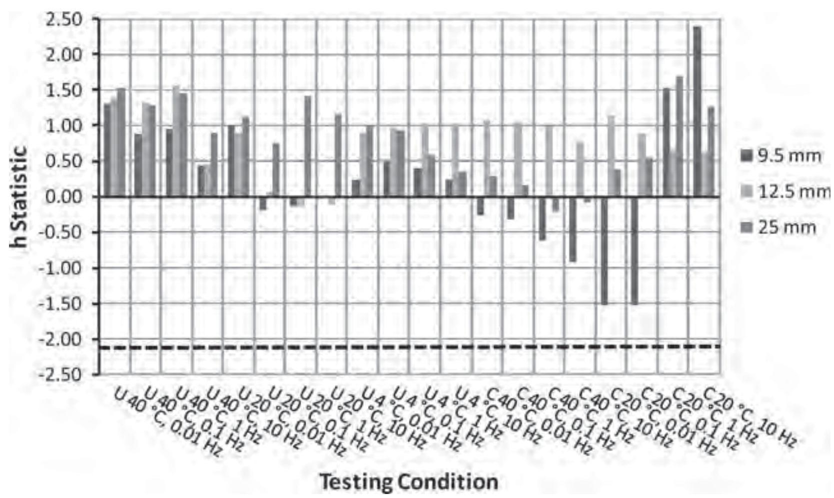

Figure E30. Between-laboratory phase angle consistency statistic, h, *for Lab 7.*

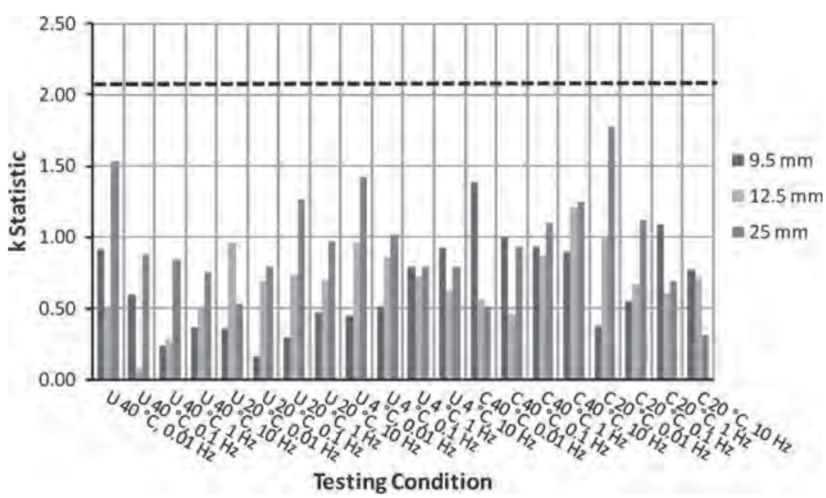

Figure E31. Within-laboratory phase angle consistency statistic, k, *for Lab 8.*

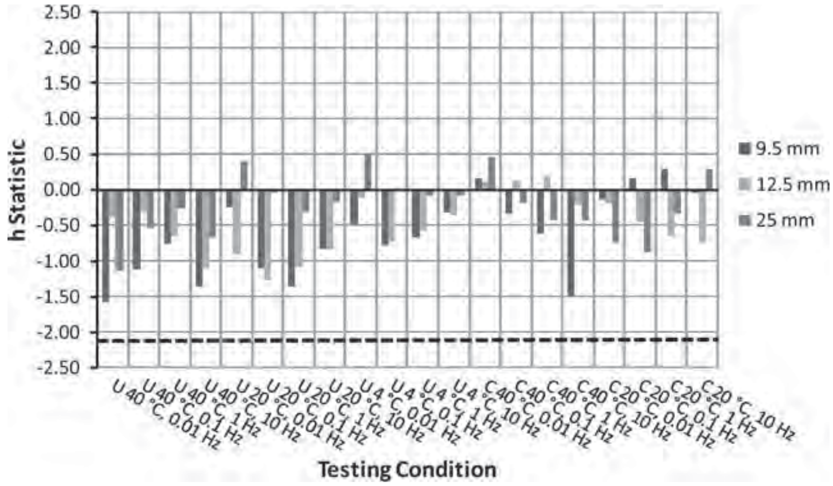

Figure E32. Between-laboratory phase angle consistency statistic, h, *for Lab 8.*

APPENDIX F

Unconfined Flow Number Test Data

Table F1. Loose mix unconfined flow numbers.

Mixture	Lab	Flow Number, Cycles		
		Result 1	Result 2	Result 3
9.5 mm	1	49	39	50
	2	42	46	54
	3	315	290	214
	4	32	81	66
	5	214	99	88
	6	229	228	305
	7	135	150	138
	8	62	65	42
12.5 mm	1	192	173	167
	2	301	374	166
	3	618	1068	1632
	4	115	154	33
	5	274	253	960
	6	643	542	3061
	7	508	379	277
	8	450	251	204
25 mm	1	46	38	40
	2	59	62	41
	3	523	375	102
	4	40	23	42
	5	102	99	104
	6	230	267	448
	7	112	124	105
	8	50	31	30

Table F2. Prefabricated core unconfined flow numbers.

Mixture	Lab	Flow Number, Cycles		
		Result 1	Result 2	Result 3
9.5 mm	1	98	128	107
	2	125	89	116
	3	125	128	102
	4	60	70	63
	5	200	93	100
	6	87	98	90
	7	56	59	46
	8	56	61	49
12.5 mm	1	307	318	344
	2	218	169	260
	3	355	269	257
	4	173	223	182
	5	Incorrect temperature		
	6	352	577	398
	7	323	140	244
	8	282	217	176
25 mm	1	90	140	96
	2	76	102	121
	3	79	67	105
	4	77	69	52
	5	76	80	68
	6	108	108	110
	7	58	87	54
	8	54	46	49

APPENDIX G

Unconfined Flow Number Statistical Analysis

Table G1. Loose mix unconfined flow number within-laboratory consistency statistic, *k*, and between-laboratory consistency statistic, *h*.

Mix	Lab	Consistency Statistic	
		k	*h*
9.5 mm	1	0.168	-0.867
	2	0.169	-0.853
	3	1.451	1.582
	4	0.693	-0.720
	5	1.925	0.079
	6	1.218	1.377
	7	0.219	0.158
	8	0.345	-0.756
12.5 mm	1	0.066	-0.699
	2	0.537	-0.378
	3	2.585	2.201
	4	0.314	-0.939
	5	0.076	-0.430
	6	0.363	0.597
	7	0.589	-0.041
	8	0.664	-0.311
25 mm	1	0.048	-0.705
	2	0.131	-0.603
	3	2.472	1.646
	4	0.121	-0.756
	5	0.029	-0.219
	6	1.350	1.499
	7	0.111	-0.122
	8	0.130	-0.740

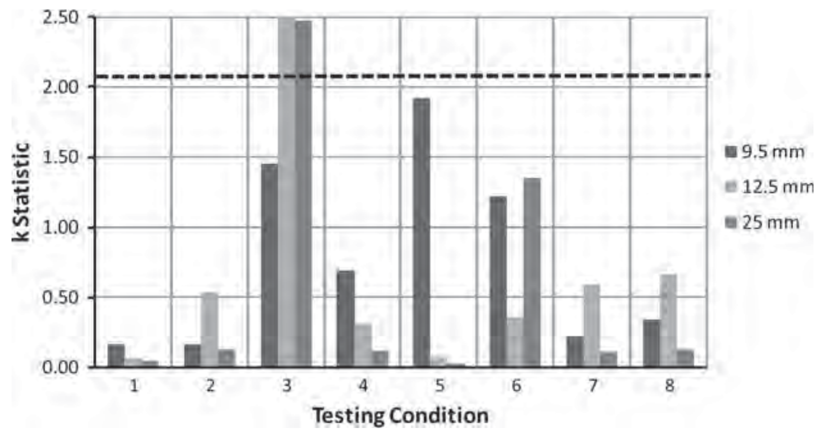

Figure G1. Loose mix unconfined flow number within-laboratory consistency statistic, k.

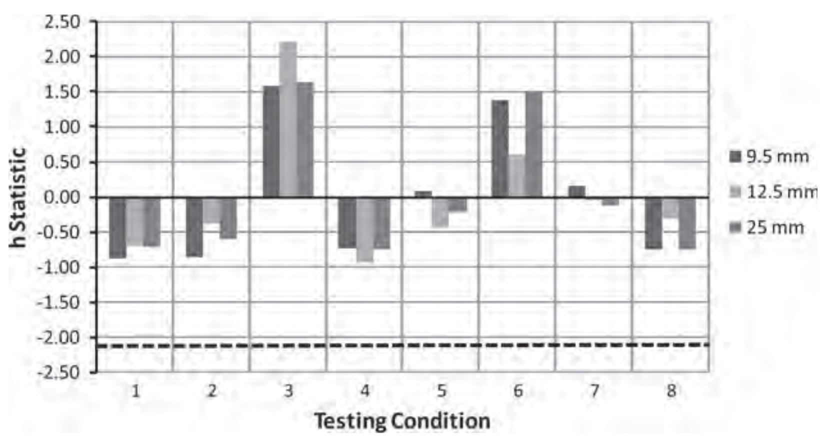

Figure G2. Loose mix unconfined flow number between-laboratory consistency statistic, h.

Table G2. Prefabricated core unconfined flow number within-laboratory consistency statistic, *k*, and between-laboratory consistency statistic, *h*.

Mix	Lab	Consistency Statistic	
		k	*h*
9.5 mm	1	1.408	0.891
	2	1.714	0.853
	3	1.301	1.171
	4	0.469	-0.886
	5	0.453	0.339
	6	0.520	0.155
	7	0.623	-1.293
	8	0.551	-1.229
12.5 mm	1	0.284	0.549
	2	0.680	-0.690
	3	0.798	0.211
	4	0.398	-0.956
	5	Not included	
	6	1.774	1.927
	7	1.370	-0.459
	8	0.798	-0.582
25 mm	1	1.656	1.214
	2	1.370	0.801
	3	1.178	0.069
	4	0.774	-0.740
	5	0.371	-0.343
	6	0.070	1.214
	7	1.092	-0.725
	8	0.245	-1.488

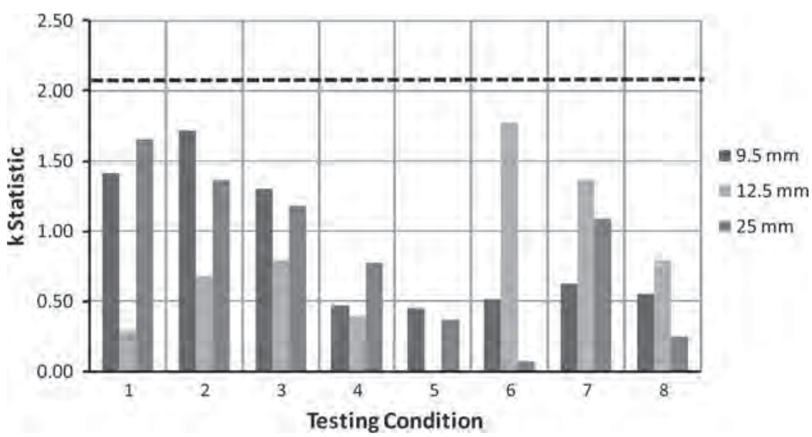

***Figure G3. Prefabricated core unconfined flow number within-laboratory consistency statistic,* k.**

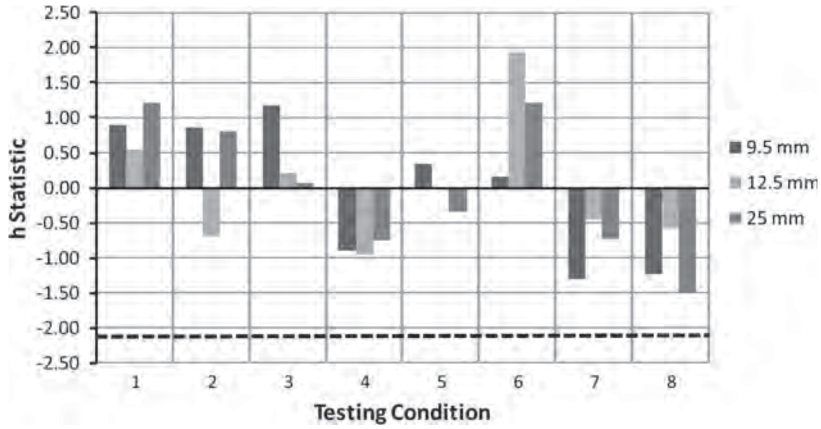

Figure G4. Prefabricated core unconfined flow number between-laboratory consistency statistic, h.

APPENDIX H

Confined Flow Number Test Data

Table H1. Loose mix confined flow number permanent deformation.

Mix	Lab	Permanent Strain, μstrain																				
		10 Cycles			30 Cycles			100 Cycles			300 Cycles			1000 Cycles			3000 Cycles			10000 Cycles		
		Result 1	Result 2	Result 3	Result 1	Result 2	Result 3	Result 1	Result 2	Result 3	Result 1	Result 2	Result 3	Result 1	Result 2	Result 3	Result 1	Result 2	Result 3	Result 1	Result 2	Result 3
9.5 mm	1	4035	3911	3895	5638	5350	5342	7580	7081	7097	9595	9057	9074	12372	11432	11951	15496	14134	16758	19830	17503	43202
	2	6015	8053	4395	7942	10525	6246	10223	13326	8496	12550	16239	10866	15666	20059	14231	19379	24304	17869	24608	29539	22653
	3	5085	784	2122	7136	1766	4778	9590	2714	6849	12160	4148	8836	15535	6618	11223	19313	9920	13647	24191	14838	16675
	4	3892	4433	6752	5877	6486	9817	8459	9086	13603	11283	11861	17616	15030	15348	22955	19127	19008	28811	24351	23741	35995
	5	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
	6	4192	3090	3240	6397	4845	5117	9058	7027	7478	11715	9252	9930	15197	12001	13076	19237	14926	16526	24058	18552	20923
	7	2882	4380	4174	4233	6341	6219	6150	8659	8605	8596	10993	10844	12289	13763	13526	16521	16348	16421	21956	19267	20046
	8	5203	4441	4469	8037	6786	6908	11970	9850	10262	16571	13215	14090	23318	17857	19441	32055	23372	25872	46095	31571	35415
12.5 mm	1	3450	2856	Flow	4849	3911	Flow	6737	5039	Flow	9041	6147	Flow	10823	7171	Flow	11530	8005	Flow	12275	9008	Flow
	2	6582	Flow	4571	9672	Flow	6159	13868	Flow	7849	17112	Flow	9321	20683	Flow	10843	22272	Flow	12303	23756	Flow	14030
	3	3023	3084	3250	4594	4665	4554	6466	6601	6186	8420	8718	8006	10413	10669	9913	11924	11657	10945	13443	12911	11791
	4	2893	5009	4206	4381	7476	6209	6075	11081	8415	7562	13247	9666	9182	14552	10853	10592	15682	11924	12392	17012	13165
	5	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
	6	3509	3669	3515	5342	5625	5217	7511	7990	7088	9865	10009	8735	13136	12242	10577	14310	14012	12639	15546	15787	13693
	7	Flow	4273	3890	Flow	6086	5433	Flow	8481	7096	Flow	9656	9169	Flow	10707	10991	Flow	11533	11656	Flow	12394	12423
	8	3842	5916	4959	5857	8236	7660	8634	11072	11920	11954	13217	18922	13891	15209	26143	15408	17178	28524	17164	19767	31449
25 mm	1	3606	4035	3574	5137	5737	5047	7015	7964	6884	9090	10514	8911	11813	14183	11619	14779	18432	14803	18488	23920	18744
	2	6928	6389	4603	9534	9088	7007	12864	12769	10306	16679	17081	14084	21529	22949	19673	27460	29991	25617	35804	40650	33601
	3	3616	4375	4879	8127	6565	7165	11726	9233	10175	15568	12128	13579	20842	16006	17883	26805	20459	22661	34975	26298	29496
	4	5114	9950	5894	7957	15351	8481	11763	21298	11748	15887	27364	15226	21063	35297	19680	26593	43901	23935	33803	50000	29943
	5	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
	6	2948	2642	4161	4834	4403	6439	7269	6602	9222	9856	8780	12078	13370	11458	15721	17633	14359	19780	26572	18182	25155
	7	4426	5413	5658	6777	8136	8328	9774	11664	11602	12928	15607	15057	17124	20863	19537	22057	26504	24138	28954	33587	29830
	8	5465	7952	5426	8048	11672	8101	11310	16647	11733	14841	22320	15944	19643	30268	21888	25626	38943	28893	34834	50003	38426

Table H2. Prefabricated core confined flow number permanent deformation.

Mix	Lab	Permanent Strain, µstrain																				
		10 Cycles			30 Cycles			100 Cycles			300 Cycles			1000 Cycles			3000 Cycles			10000 Cycles		
		Result 1	Result 2	Result 3	Result 1	Result 2	Result 3	Result 1	Result 2	Result 3	Result 1	Result 2	Result 3	Result 1	Result 2	Result 3	Result 1	Result 2	Result 3	Result 1	Result 2	Result 3
9.5 mm	1	2063	2427	3376	2930	3310	4660	3845	4241	6221	4915	5211	7956	6196	6401	10173	7506	7522	12591	9082	8764	15737
	2	3861	3802	3591	5541	5527	5265	7550	7710	7314	9579	10010	9399	12163	12946	12057	15007	16151	14957	18782	20518	18865
	3	1578	2264	2524	3716	5096	5657	6186	7323	8048	8681	9564	10474	11835	12511	13628	15550	16009	17166	20509	20811	21680
	4	4431	4539	4212	6484	6523	6199	9030	8995	8665	11653	11535	11213	14971	14692	14543	18680	17913	18060	23535	21965	22461
	5	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
	6	3990	2963	3156	5851	4363	4606	8068	6015	6333	10302	7610	8010	13167	9536	10035	16450	11540	12088	20605	13981	14579
	7	4424	4374	4453	6256	6322	6319	8430	8723	8597	10601	11193	10865	13185	14206	13563	15599	17136	16058	18370	20535	18925
	8	4453	4372	4556	6525	6376	6778	8955	8790	9552	11375	11207	12472	14432	14330	16423	17885	17629	20993	22534	22064	27873
12.5 mm	1	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
	2	2879	3292	1343	4196	5914	2300	5834	9419	4015	8705	11285	6587	17357	12875	7698	20474	14967	8625	22126	17153	9777
	3	1952	3182	3575	4414	4871	5379	6350	7485	7833	8593	11525	11076	15115	20050	15349	26421	23113	16313	29854	25439	17570
	4	3381	3086	3607	4746	4323	4884	6195	5792	6105	7444	6556	7041	8365	7291	7981	9088	7916	8718	9925	8598	9509
	5	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
	6	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
	7	4043	4127	4441	5567	5729	6433	7211	7839	8051	8944	11638	8942	16341	15356	9742	17596	16178	10366	18723	17193	11041
	8	Flow	3366	3784	Flow	4802	5379	Flow	6434	7019	Flow	7723	8328	Flow	8815	9721	Flow	9782	10988	Flow	10773	12516
25 mm	1	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
	2	4347	4596	5127	6266	6717	7563	8632	9443	10884	11061	12416	14885	14175	16368	20837	17658	20804	28311	22135	26812	38797
	3	3332	3806	3648	7466	8581	8161	10652	12175	11657	13944	15762	15411	18325	20619	20484	23174	26143	26381	29726	33605	34447
	4	4431	4539	4212	6484	6523	6199	9030	8995	8665	11653	11535	11213	14971	14692	14543	18680	17913	18060	23535	21965	22461
	5	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
	6	4167	4584	4620	6415	7022	6931	9406	10245	9847	12733	13866	12988	17379	18817	17204	22746	24634	21994	29701	32954	28446
	7	4685	4716	5797	7039	6963	8555	10078	9761	12212	13372	12731	16372	17507	16515	21824	21818	20571	27599	28157	25857	34734
	8	5765	5366	6069	8459	8261	9103	11720	12094	12866	15237	16523	17090	19893	22671	22926	25173	30155	29444	32202	40968	38386

APPENDIX I

Confined Flow Number Statistical Analysis

Table I1. Loose mix confined flow number permanent deformation within-laboratory consistency statistic, *k*, and between-laboratory consistency statistic, *h*.

Mix	Lab	Within-Laboratory Consistency Statistic, k							Between-Laboratory Consistency Statistic, h						
		10	30	100	300	1000	3000	10000	10	30	100	300	1000	3000	10000
9.5 mm	1	0.059	0.102	0.136	0.124	0.160	0.362	2.001	-0.274	-0.620	-0.811	-0.875	-0.887	-0.777	0.212
	2	1.416	1.309	1.175	1.114	1.032	0.929	0.500	1.664	1.462	1.081	0.770	0.522	0.333	0.019
	3	1.701	1.635	1.661	1.632	1.515	1.306	0.698	-1.401	-1.278	-1.290	-1.231	-1.123	-1.033	-1.072
	4	1.174	1.288	1.347	1.420	1.525	1.553	0.972	0.673	0.833	0.916	0.923	0.857	0.727	0.396
	5	Not Included							Not Included						
	6	0.462	0.503	0.512	0.516	0.553	0.602	0.389	-0.660	-0.613	-0.479	-0.438	-0.439	-0.462	-0.667
	7	0.627	0.719	0.688	0.545	0.269	0.024	0.195	-0.393	-0.505	-0.506	-0.502	-0.508	-0.564	-0.784
	8	0.334	0.419	0.540	0.706	0.955	1.234	1.060	0.391	0.721	1.088	1.353	1.579	1.777	1.895
12.5 mm	1	0.523	0.533	0.581	0.621	0.590	0.616	0.561	-0.999	-1.171	-1.224	-0.854	-0.845	-1.097	-1.087
	2	1.771	1.997	2.058	1.672	1.590	1.742	1.670	1.664	1.545	1.384	1.084	0.971	0.926	0.866
	3	0.146	0.045	0.102	0.109	0.088	0.125	0.205	-1.036	-0.998	-0.946	-0.582	-0.487	-0.629	-0.597
	4	1.330	1.251	1.211	0.873	0.628	0.652	0.601	-0.029	0.091	0.159	0.030	-0.165	-0.299	-0.248
	5	Not Included							Not Included						
	6	0.113	0.168	0.218	0.212	0.297	0.220	0.278	-0.547	-0.391	-0.363	-0.184	-0.043	-0.051	-0.054
	7	0.337	0.371	0.473	1.315	1.129	0.021	0.005	0.021	-0.111	-0.227	-1.087	-1.114	-0.606	-0.669
	8	1.293	0.998	0.825	1.127	1.536	1.759	1.848	0.927	1.035	1.218	1.594	1.683	1.756	1.789
25 mm	1	0.198	0.195	0.229	0.270	0.338	0.395	0.519	-0.976	-1.212	-1.309	-1.347	-1.359	-1.366	-1.448
	2	0.935	0.703	0.565	0.500	0.389	0.413	0.611	0.628	0.419	0.377	0.407	0.456	0.525	0.678
	3	0.489	0.410	0.490	0.531	0.577	0.606	0.743	-0.580	-0.215	-0.199	-0.189	-0.188	-0.184	-0.161
	4	1.995	2.150	2.145	2.098	2.046	2.040	1.803	1.355	1.455	1.439	1.372	1.269	1.137	0.838
	5	Not Included							Not Included						
	6	0.617	0.559	0.530	0.517	0.505	0.514	0.761	-1.326	-1.253	-1.162	-1.148	-1.158	-1.163	-1.068
	7	0.501	0.441	0.418	0.435	0.449	0.419	0.417	0.049	0.018	0.029	0.021	0.003	-0.034	-0.091
	8	1.112	1.082	1.155	1.241	1.326	1.306	1.343	0.849	0.788	0.826	0.884	0.979	1.085	1.252

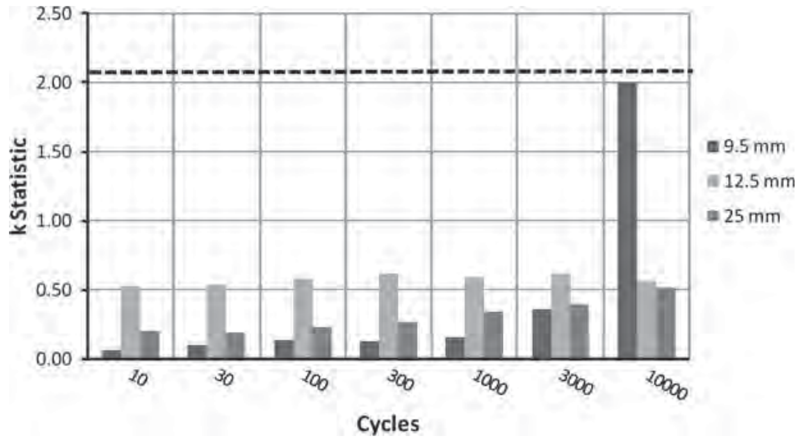

Figure I1. Within-laboratory loose mix confined flow permanent deformation consistency statistic, k, *for Lab 1.*

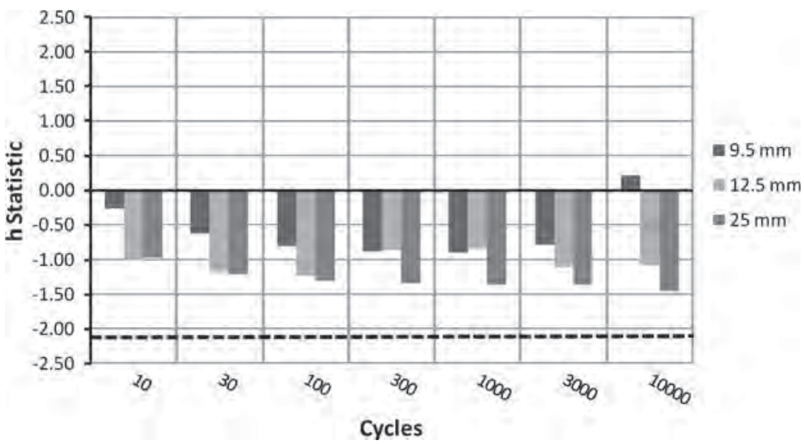

Figure I2. Between-laboratory loose mix confined flow permanent deformation consistency statistic, h, *for Lab 1.*

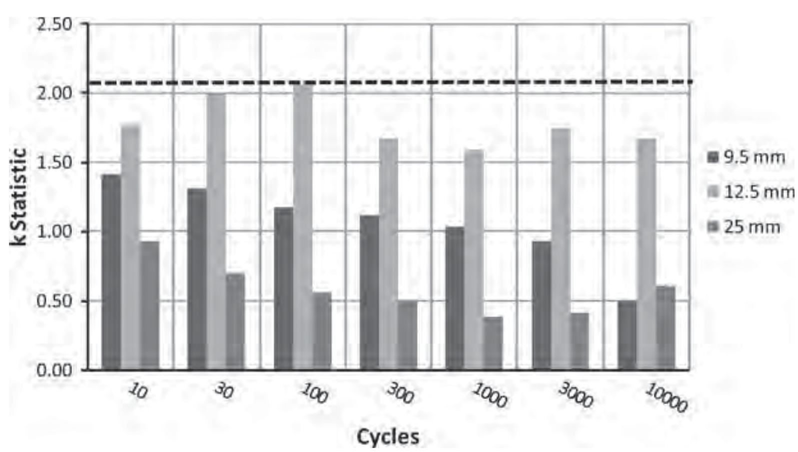

Figure I3. Within-laboratory loose mix confined flow permanent deformation consistency statistic, k, *for Lab 2.*

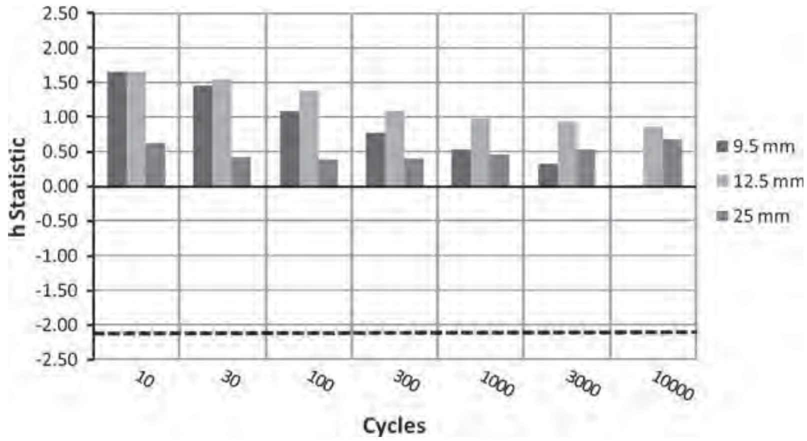

Figure I4. Between-laboratory loose mix confined flow permanent deformation consistency statistic, h, *for Lab 2.*

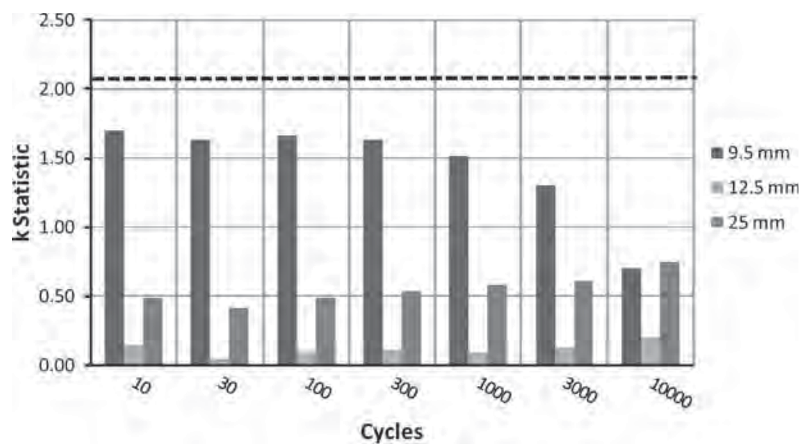

Figure I5. Within-laboratory loose mix confined flow permanent deformation consistency statistic, k, *for Lab 3.*

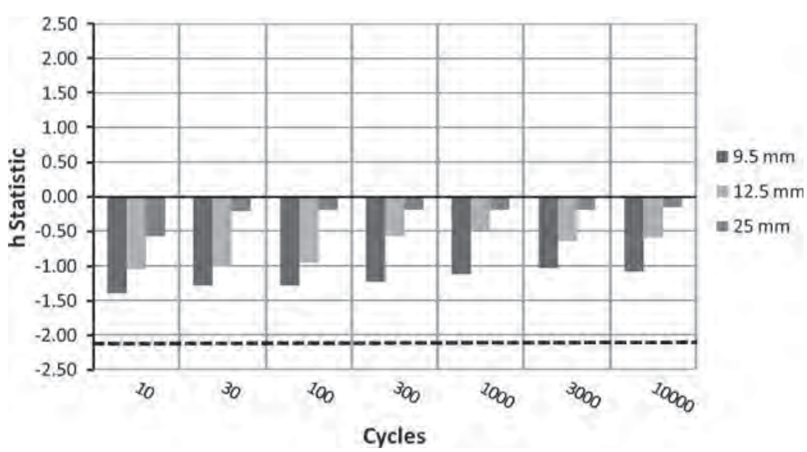

Figure I6. Between-laboratory loose mix confined flow permanent deformation consistency statistic, h, *for Lab 3.*

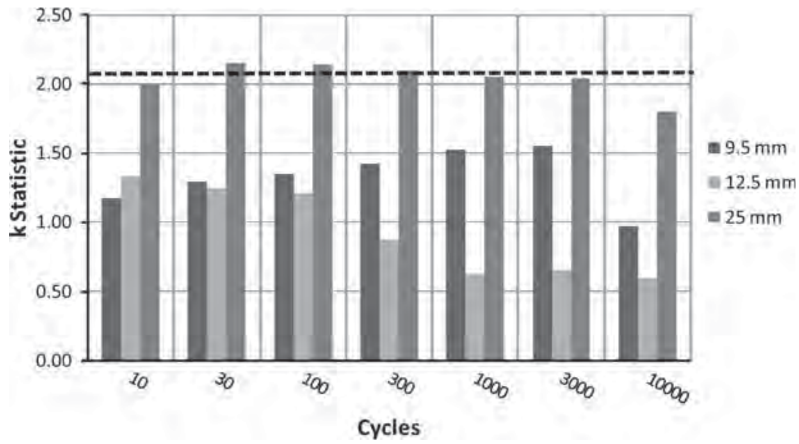

Figure I7. Within-laboratory loose mix confined flow permanent deformation consistency statistic, k, *for Lab 4.*

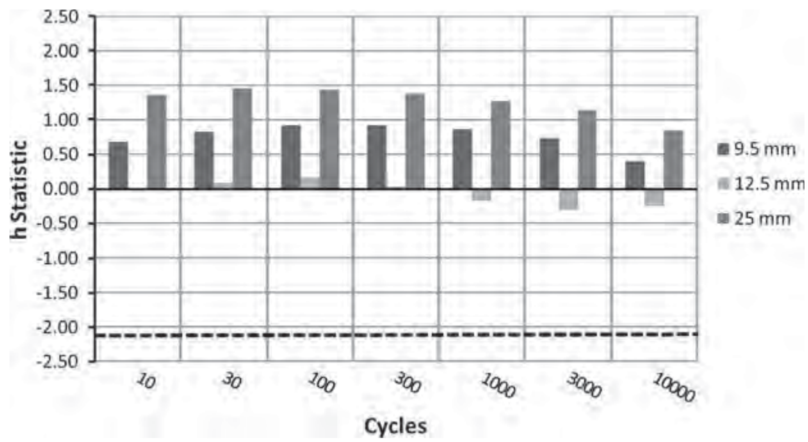

Figure I8. Between-laboratory loose mix confined flow permanent deformation consistency statistic, h, *for Lab 4.*

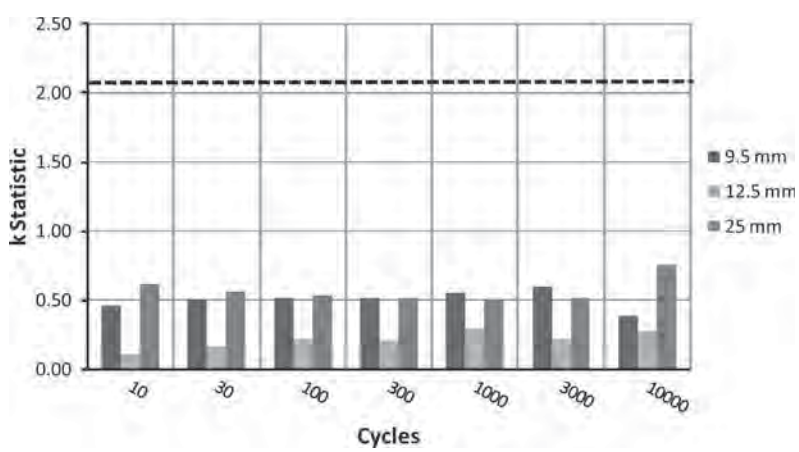

Figure I9. Within-laboratory loose mix confined flow permanent deformation consistency statistic, k, *for Lab 6.*

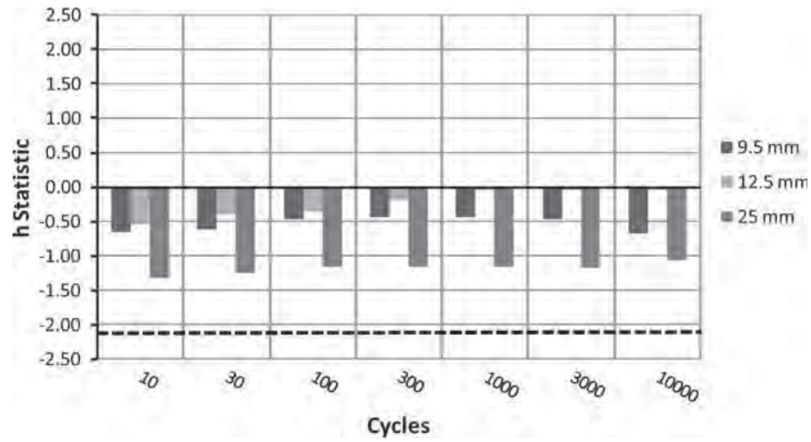

Figure I10. Between-laboratory loose mix confined flow permanent deformation consistency statistic,* h*, for Lab 6.

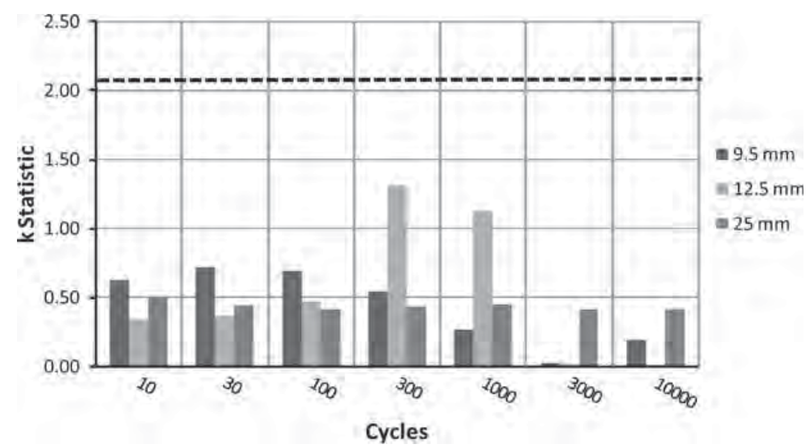

Figure I11. Within-laboratory loose mix confined flow permanent deformation consistency statistic,* k*, for Lab 7.

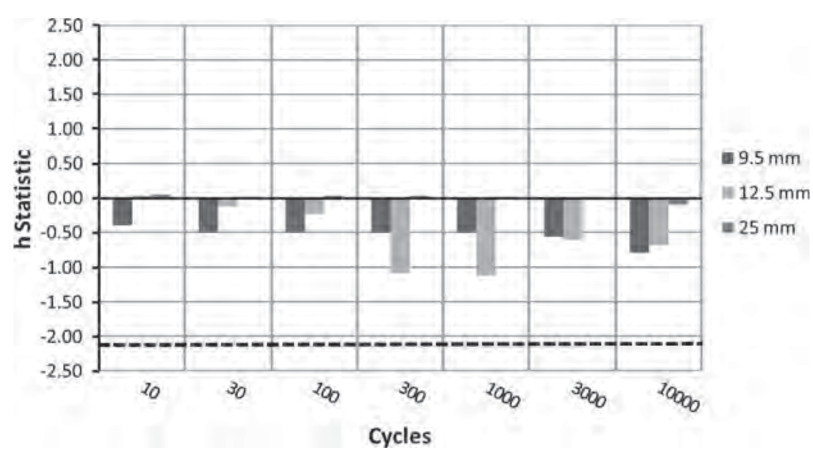

Figure I12. Between-laboratory loose mix confined flow permanent deformation consistency statistic,* h*, for Lab 7.

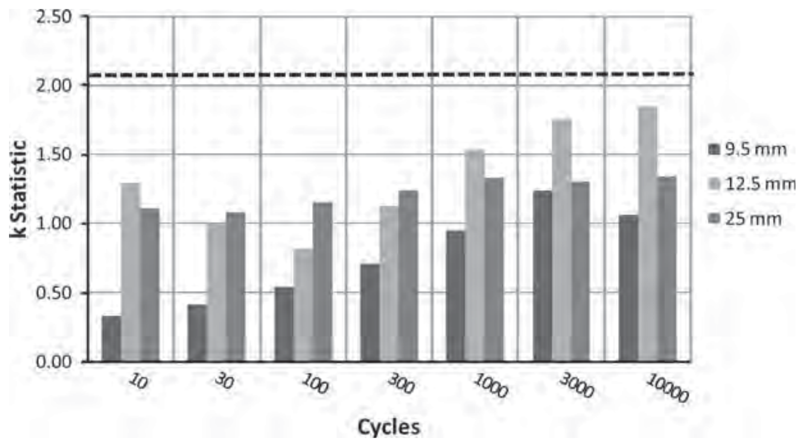

Figure I13. Within-laboratory loose mix confined flow permanent deformation consistency statistic, k*, for Lab 8.*

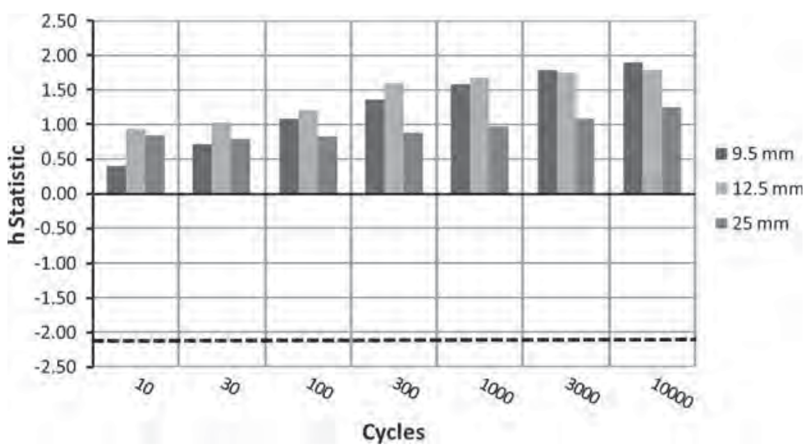

Figure I14. Between-laboratory loose mix confined flow permanent deformation consistency statistic, h*, for Lab 8.*

Table I2. Prefabricated core confined flow number permanent deformation within-laboratory consistency statistic, *k,* and between-laboratory consistency statistic, *h.*

Mix	Lab	Within-Laboratory Consistency Statistic, k							Between-Laboratory Consistency Statistic, h						
		10	30	100	300	1000	3000	10000	10	30	100	300	1000	3000	10000
9.5 mm	1	1.747	1.504	1.687	1.749	1.736	1.681	1.597	-1.036	-1.698	-1.842	-1.875	-1.885	-1.887	-1.844
	2	0.366	0.257	0.264	0.327	0.376	0.387	0.397	0.171	0.001	-0.018	-0.022	-0.015	0.005	0.055
	3	1.259	1.652	1.244	0.935	0.702	0.478	0.247	-1.569	-0.582	-0.242	-0.068	0.090	0.272	0.428
	4	0.429	0.292	0.267	0.238	0.168	0.234	0.325	0.858	0.900	0.890	0.898	0.899	0.878	0.812
	5	Not Included							Not Included						
	6	1.406	1.320	1.465	1.515	1.526	1.543	1.486	-0.236	-0.472	-0.494	-0.543	-0.591	-0.613	-0.640
	7	0.103	0.062	0.195	0.309	0.400	0.453	0.456	0.883	0.803	0.682	0.602	0.477	0.279	0.029
	8	0.238	0.336	0.531	0.717	0.915	1.074	1.308	0.929	1.048	1.024	1.009	1.026	1.068	1.160
12.5 mm	1	Not Included							Not Included						
	2														
	3														
	4														
	5														
	6														
	7														
	8														
25 mm	1	Not Included							Not Included						
	2	1.137	1.182	1.274	1.363	1.238	1.914	1.862	0.188	-0.311	-0.356	-0.371	-0.416	-0.112	-0.216
	3	0.688	1.010	0.865	0.678	0.469	0.625	0.546	-1.370	0.946	0.956	0.862	0.754	0.712	0.489
	4	0.476	0.317	0.225	0.160	0.079	0.142	0.174	-0.233	-0.772	-0.895	-1.094	-1.459	-1.231	-1.604
	5								Not Included						
	6	0.719	0.587	0.469	0.418	0.323	0.476	0.504	-0.144	-0.373	-0.228	-0.147	-0.123	0.128	0.020
	7	1.808	1.611	1.488	1.366	1.029	1.311	0.998	0.722	0.379	0.378	0.380	0.233	0.185	-0.145
	8	1.007	0.790	0.653	0.667	0.613	0.942	0.976	1.672	1.501	1.478	1.543	1.635	1.549	1.456

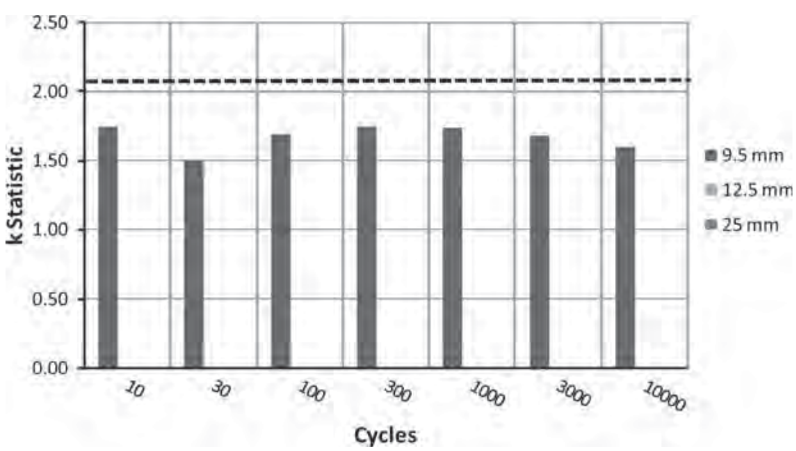

Figure I15. Within-laboratory prefabricated core confined flow permanent deformation consistency statistic,* k*, for Lab 1.

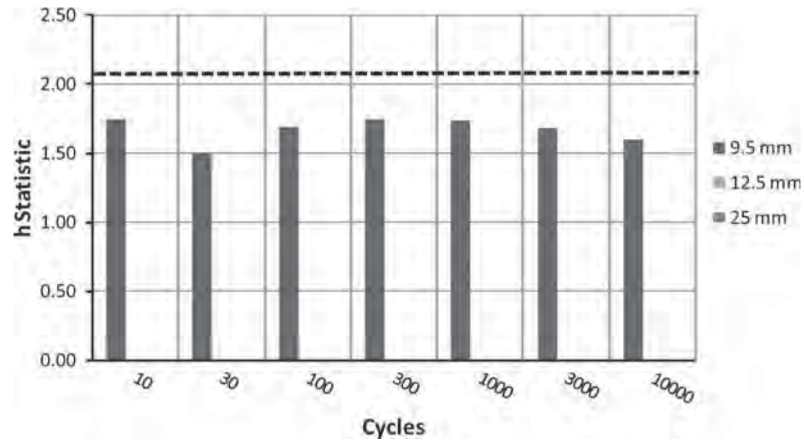

Figure I16. Between-laboratory prefabricated core confined flow permanent deformation consistency statistic, h, *for Lab 1.*

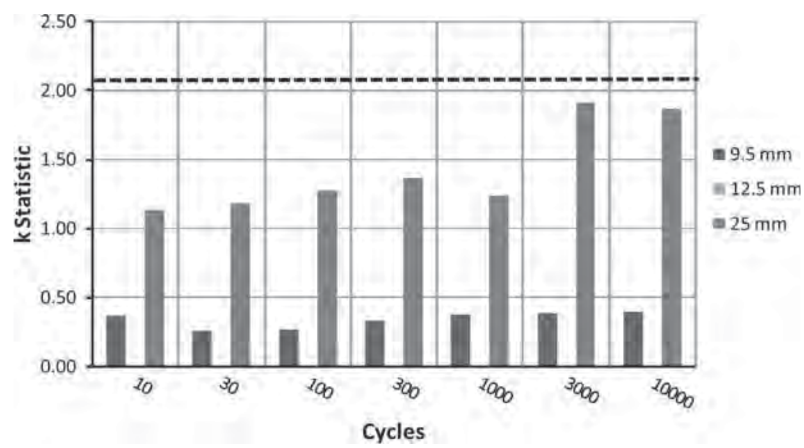

Figure I17. Within-laboratory prefabricated core confined flow permanent deformation consistency statistic, k, *for Lab 2.*

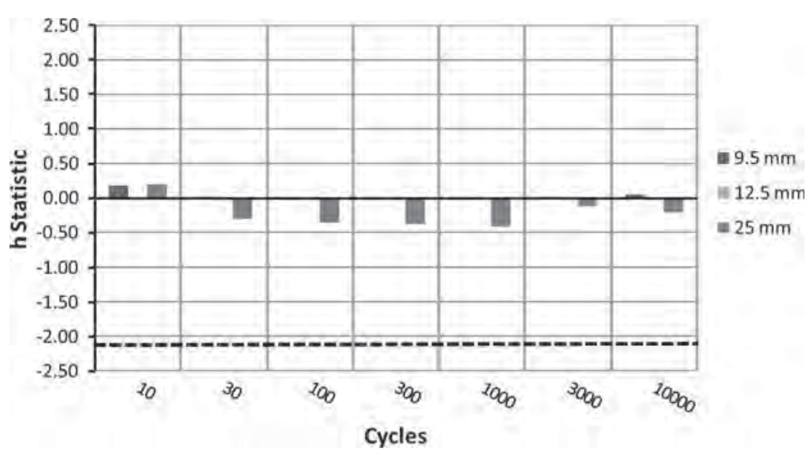

Figure I18. Between-laboratory prefabricated core confined flow permanent deformation consistency statistic, h, *for Lab 2.*

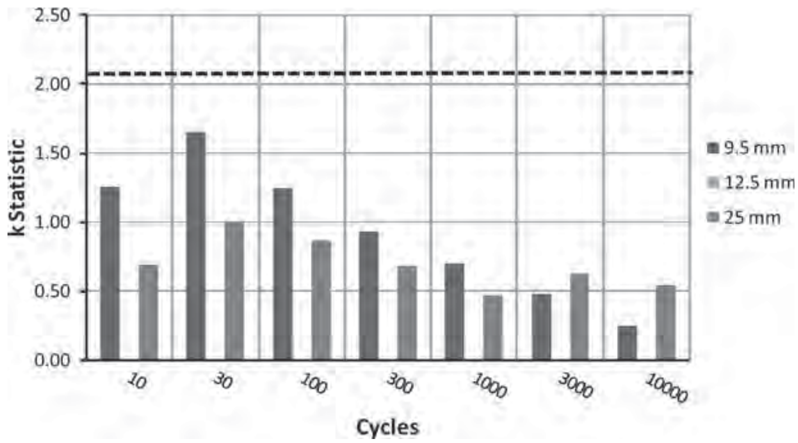

Figure I19. Within-laboratory prefabricated core confined flow permanent deformation consistency statistic, k, *for Lab 3.*

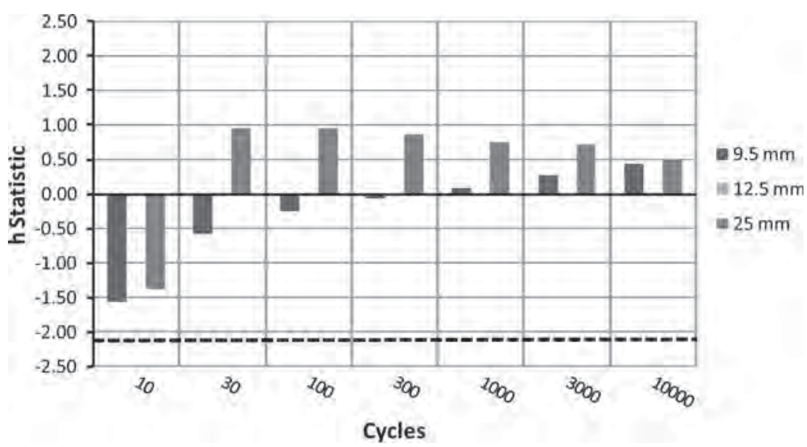

Figure I20. Between-laboratory prefabricated core confined flow permanent deformation consistency statistic, h, *for Lab 3.*

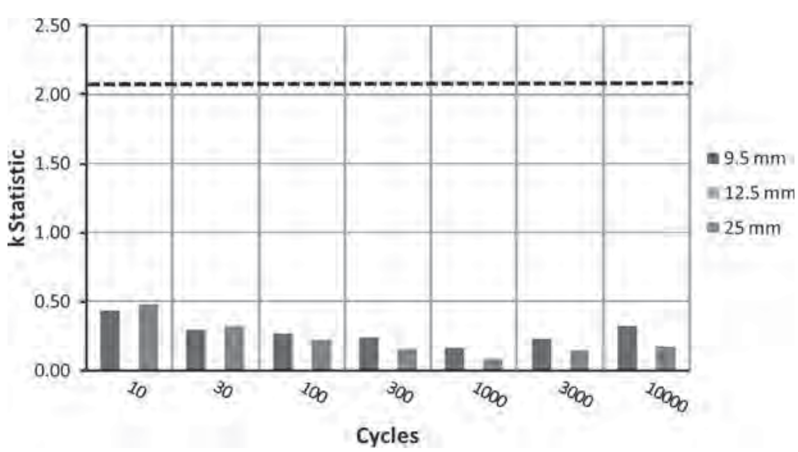

Figure I21. Within-laboratory prefabricated core confined flow permanent deformation consistency statistic, k, *for Lab 4.*

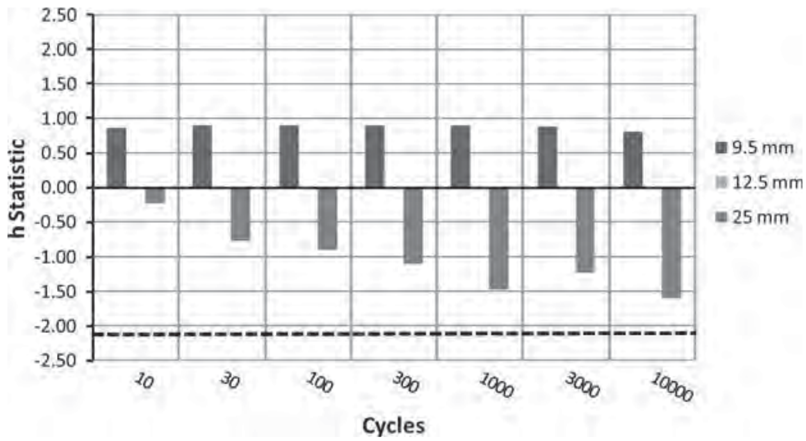

Figure I22. Between-laboratory prefabricated core confined flow permanent deformation consistency statistic, h, *for Lab 4.*

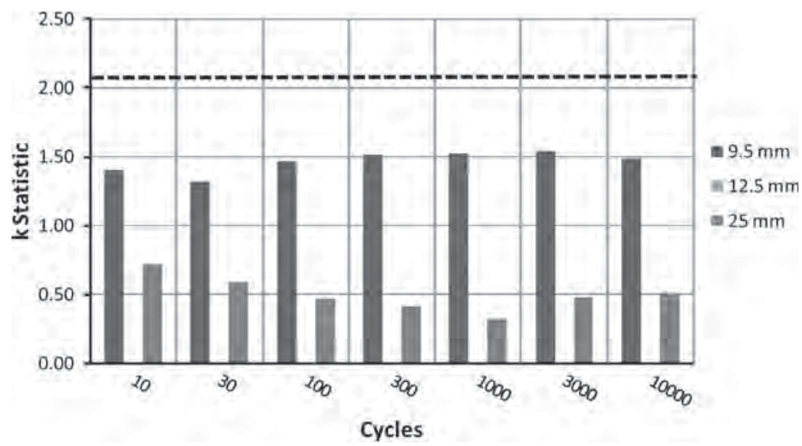

Figure I23. Within-laboratory prefabricated core confined flow permanent deformation consistency statistic, k, *for Lab 6.*

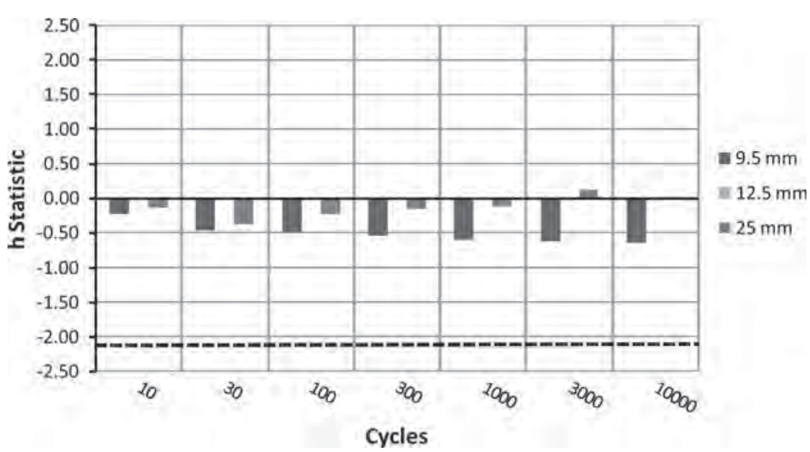

Figure I24. Between-laboratory prefabricated core confined flow permanent deformation consistency statistic, h, *for Lab 6.*

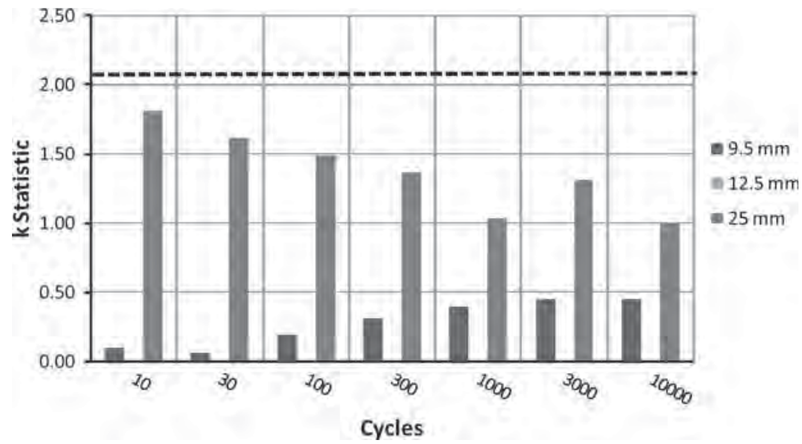

Figure I25. Within-laboratory prefabricated core confined flow permanent deformation consistency statistic, k, *for Lab 7.*

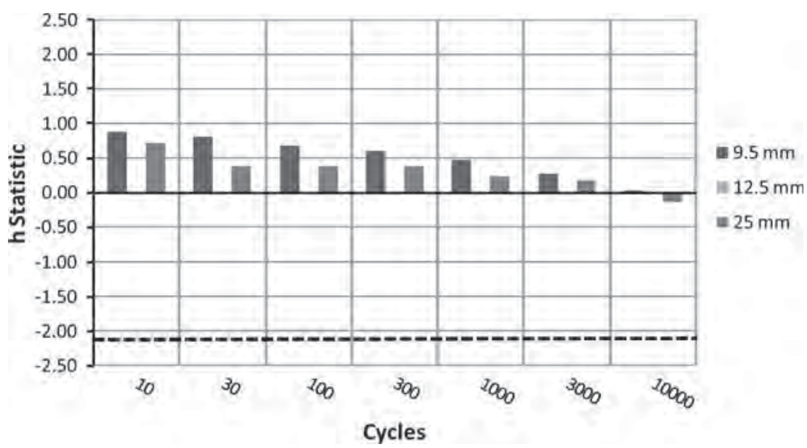

Figure I26. Between-laboratory prefabricated core confined flow permanent deformation consistency statistic, h, *for Lab 7.*

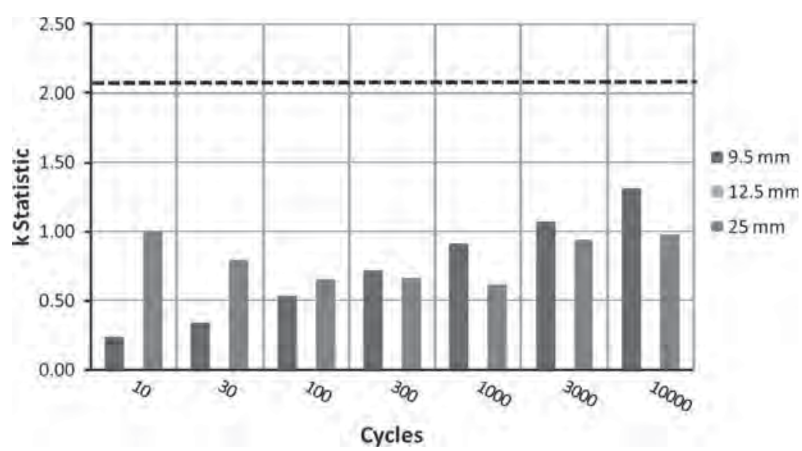

Figure I27. Within-laboratory prefabricated core confined flow permanent deformation consistency statistic, k, *for Lab 8.*

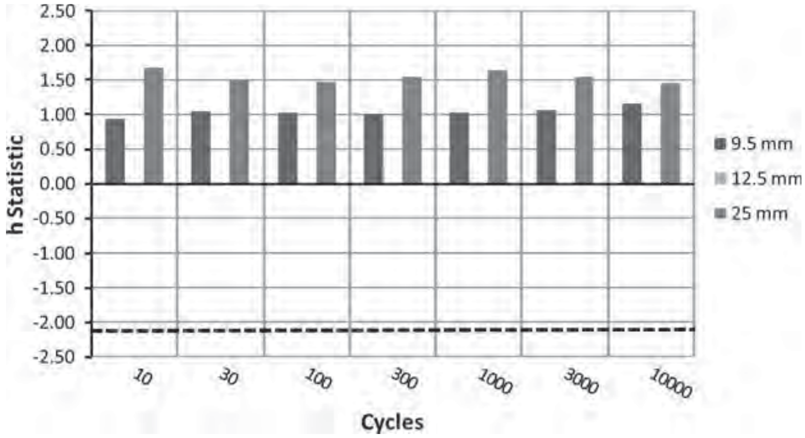

Figure I28. Between-laboratory prefabricated core confined flow permanent deformation consistency statistic,* h, *for Lab 8.

Abbreviations and acronyms used without definitions in TRB publications:

AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	Air Transport Association
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation