LONG TERM PAVEMENT PERFORMANCE PROGRAM DIRECTIVE

For the Technical Direction of the LTPP Program

Program Area:	General Operations	**Directive Number**:	GO-18
Date:	February 2, 1999	**Supersedes**:	NA
Subject:	**Metrication of LTPP Materials**		

This directive implements the guidelines for metrication of LTPP program materials to include correspondence, documentation, IMS data, and off-line data and records. The guidelines are found in "Metrication of the LTPP Program".

No changes are being made in the practices relating to test section marking. Modifications to those documents are to relate IMS values to field locations. Sections will continue being marked in U.S. customary units to obtain consistency for location related measurements.

Traffic information is not covered in the guidelines. The current practice for converting data received in SI units to U.S. customary units prior to processing will continue through 2000.

No reissue of forms or documents will occur prior to 1 October 1999. States and Provinces may submit information in U.S. customary units until the reissue of the complete set of data collection guides and protocols. Submissions in U.S. customary units after that point for items which are loaded into the IMS in SI units require written approval from the LTPP Program Manager.

None of the hard copy data collection materials (forms, distress maps, site installation documents, etc.) are being converted. None of the off-line electronic files are being converted.

The guidelines will be provided to every individual who receives off-line material so that they may relate IMS materials to other information collected by the program. Distribution may be in hard copy or electronic format.

Questions or concerns related to the metrication of the LTPP program should be addressed in writing to Shahed Rowshan of the FHWA LTPP Team, with a carbon copy to the FHWA LTPP Technical Support Services Contractor.

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Metrication of the LTPP Program

February 1999

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Federal Highway Administration

Long-Term Pavement Performance
Serving Your Need for Durable Pavements

Metrication of the LTPP Program

This document contains the guidelines for metrication of various materials within the Long Term Pavement Performance (LTPP) program. The materials include but are not limited to correspondence, the Information Management System (IMS), test protocols and data collection guidelines, data collected and stored in hard copy, and data collected and stored off-line in electronic files.

The conversion is being done to enhance user ability to use LTPP data without unintentional errors occurring due to different unit systems, for similar types of data stored in separate locations.

The IMS will be in Système International (SI) units, with very few exceptions, by the completion of the process. All documentation that describes methods for collection of information, that is ultimately input in some fashion into the IMS, is being modified. Such guidelines and protocols contain dual units to document in one source both the original practice and the current presentation of the data. All other materials are substantially unchanged. All data users are being provided with a copy of these guidelines so that they can make any necessary conversions when working simultaneously with IMS and off-line material.

This document consists of three sections:

- A basic discussion of the application of SI units to the LTPP program
- An appendix on units in the documentation and other written material
- An appendix with data types, units and conversion factors

The conversion factor appendix contains information only for those modules which were originally collected, at least partially, in U.S. customary units. Therefore, no conversion instructions exist for the climatic tables (tables starting **AWS_***, **CLM_***, and **SMP_***), and the dynamic load response tables (**DLR_***). Additionally, tables added to existing modules since 1996 have used SI units. Elements within the tables which are completely new to the data base have no conversion factors which would allow a user to obtain values in U.S. customary units.

Metrication in LTPP

The LTPP program is completing a transition to data collection and storage in SI units. The guidelines affect all individuals working with LTPP information who intend to have data collected or research results made available with the LTPP imprimatur. Since mid-1996 all new data collection activities have been in SI units. This has included conversion of most field operations activities, development of new materials testing protocols, collection of various types of climatic data, and development of computed parameters. With very few exceptions, all information within the LTPP program is being converted to SI units by the end of 1999.

General Guidelines

Complete physical conversion is limited to the IMS. Within the IMS some exceptions exist. The exceptions are values for which no SI equivalent exists (i.e. Mays Output, RMSVA values), traffic data, and friction data. A decision on how to convert traffic data is pending the outcome of decisions on loading information for future AASHTO pavement design guides. Friction data is currently an element provided by the States with multiple protocols. Retention in its existing form makes it easier for users to discuss data issues with the various States.

Revised documentation in the form of data collection guidelines and protocols is in dual units for elements which were originally collected in U.S. customary units. Figures and tables which are extremely complex or contain examples may be metricated by reference to a conversion table. Data collection sheets in those documents are revised to include spaces for data entry in either system with SI units followed by U.S. customary units in parentheses. Each column is headed with the system used.

Sections continue to be marked in U.S. customary units according to existing test section marking and signing practices. The conversion of documents on signing and marking relates field locations to IMS information. Retaining repeatability of location information overrides conversion of markings in the field.

Requests for data collection in SI units from sources other than LTPP contractors will not occur until after all data collection and protocol documents have been approved and formally issued by FHWA's LTPP Team.

If data was collected and stored on paper in U.S. customary units, it is not converted without a specific directive identifying which data is being converted and how. If it was collected electronically in U.S. customary units and is stored outside the IMS, it is not converted without a directive to that effect. Information affected by this decision is not limited to field measurements but includes SMP installation reports, SPS construction documents, and similar reports.

ASTM Standard E380 is the standard reference in the LTPP metrication effort. This standard includes a convention of "precision in conversion" which is followed in the metrication of the LTPP program.

Conversion Practices

A "soft" conversion methodology is used to metricate the LTPP program, but with some rationality built into the process. Actual measurement values are "soft" converted to retain correspondence between measurements, particularly those done before and after the conversion of data collection instructions. Values used in descriptive text may be less precise. Extreme care was taken to ensure that the converted variables maintain the same level of precision as the original. A series of examples follows.

- A test section length of 500 ft equals 152 m in general discussions of section length; however, measurements are done over 152.4 m when collecting data in the field.

- An outer wheel path location of 30 in ± 6 in equals 0.76 m ± 0.15 m, and not 0.762 m ± 0.154 m reflecting the expected level of precision.

- A 4 in core is the same as a 100 mm core. This happens to be a hard conversion. The soft conversion is 101.6 or 102 mm depending on the original precision.

A station length is defined as 100 meters. GPS and most SPS sections will be reported as 1 + 52 stations in length.

The use of secondary or derived SI units, such as centimeters, is prohibited.

The use of liters (L) and milliliters (ml) is restricted to mix design and other areas where use of liquids must be conveyed.

The use of auxiliary units is discouraged, but their use may be necessary in some instances. An example is vehicle speed, where the generally accepted practice is kilometers per hour (km/h). Wind speeds are reported in meters per sec (m/s).

Guidelines addressing the finer points of metrication with regards to usage and grammar in LTPP documents are in appendix A. In addition, concurrently with the metrication effort, changes were made in dates and times.

- Date -- month/day/year (mm/dd/yyyy); e.g., 2 April 1983 is 04/02/1983. Conversion to mm/dd/yyyy format is not considered practicable following the decision not to metricate existing hard copy forms.

- Time -- military (24-hour) clock; e.g., 1:15 p.m. equals 1315 hours

A series of tables of conversion factors by module appears in appendix B. Precision is not indicated for each conversion due to the variability in precision of the original values. A separate table of reasonable limiting values for frequently encountered units is found at the end of the same appendix.

Metrication Process

LTPP data may be grouped into three categories, new data, current data, and archived data.

New data is data for which a data collection process or parameter computation was not implemented as of 1 August 1998. All new data is collected or computed as applicable in SI units.

Archived data as defined in this directive is data stored in U.S. customary units for which an SI conversion has already been made. All software in the IMS related to archived data has been archived as well. Archiving is discussed in two separate directives, one on software and the other on data.

Current data includes information in the IMS as well as various electronic and paper files which contain supporting information. The actual conversion occurred using the following general process.

- Update the data collection procedures and other reference materials in customary units.

- Convert the data collection procedures and other reference materials to SI units.

- Convert the IMS data. The first stage is creating specifications by marking up the data dictionary, the schema, the codes list, the QC checks, and on screen forms as applicable. The second stage is converting IMS tables from U.S. customary to SI units to validate the revised specifications. Revisions to IMS filters for electronic data transfer are the next stage for data collected electronically. The following stage consists of coding, testing, and actual conversion of IMS data. The final step in conversion is distribution of revised IMS software and tables.

- Set the implementation schedule for field operations in SI units. The implementation schedule includes distribution of revised documentation, a date on which all IMS data collected in customary units must be available for a release upload, a date on which new procedures become effective, and review and training periods as needed.

- Off-line information collected prior to the effective date of SI data collection is not converted without specific instructions for the LTPP Program Manager. All individuals requesting off-line data which is in U.S. customary units will be provided a copy of this directive in hard copy or electronic form in lieu of conversion of the original material.

Data Categories

Conversion occurs on a modular basis beginning with materials testing, followed by SPS construction, monitoring, and lastly elements of the Data Collection Guide. As of 1 February 1999 the status of IMS data was as follows:

Profile:	Conversion to the SI system is complete.
Distress:	Manual distress surveys have been converted to SI units. New manual surveys and photo interpretations are in SI units. Old photo interpretation (Rounds 1&2) are being converted to SI units.
Rut:	Conversion to the SI system is complete.
FWD:	Conversion to the SI system is complete except for some temperatures and test locations. Conversion will be complete by 1 June 1999.

Dynamic Load Response:	Data is in SI units from program initiation.
Friction:	Data is in U.S. customary units. Data will not be converted.
Seasonal Monitoring Program:	Data is in SI units from program initiation.
Automatic Weather Stations:	Data is in SI units from program initiation.
Climatic Data:	The replacement data set is in SI units. Raw climatic data was soft converted from U.S. customary units where applicable.
Traffic Data:	Reporting will continue in U.S. customary units through 2000. Traffic data processing software allows entry of data in both U.S. customary and SI units.
Maintenance Data:	Currently in U.S. customary units. State collected information will be requested with dual unit forms after 1 October 1999. Regional offices will verify and complete any conversions required.
Rehabilitation Data:	Currently in U.S. customary units. State collected information will be requested with dual unit forms after 1 October 1999. Regional offices will verify and complete any conversions required.
Testing Data:	Currently in mixed units. All tables associated with field guides and layering methodologies will be converted by the end of 1999. All new materials tests and protocols are or will be developed with SI units. Conversion to SI units conforms to ASTM and AASHTO 1996 specifications. Protocols are not updated if a revision has been made in the relevant ASTM or AASHTO standard. Protocols without an SI equivalent are not metricated. Those will be reviewed for an update after the release of the ASTM and AASHTO standards for 2000. Since materials testing units are both equipment and state policy dependent,

dual unit forms are provided for use after completion of conversion.

SPS Construction Data:

Currently in U.S. customary units.

It is anticipated that all SPS construction and data submissions will be completed prior to the conversion to SI units. States will be encouraged to submit all data, other than testing, prior to 1 October 1999. Conversion activities are limited to documentation and the IMS. No conversion, reissue, or paper forms is expected. Forms reference a conversion table.

Inventory:

Currently in U.S. customary units.

Inventory data is a historical record. Conversion of IMS data is done for a consistent set of units within the IMS. Metrication of documentation serves as reference material in dual units. Revision of data collection forms is limited to a table of conversion factors.

ATTACHMENT A
GUIDE TO SI UNITS IN LTPP DOCUMENTATION

GUIDE TO SI UNITS IN LTPP DOCUMENTATION

1. Plurals Same as Singular for Symbols

Incorrect To train for the 10 kms race, Bob runs 1 km a day.

Correct To train for the 10-km race, Bob runs 1 km a day.

Plurals for units when units are written in full are subject to the normal rules of grammar. Bob raced ten kilometers Sunday after weeks of one kilometer training runs.

2. Plurals for Units

Example Bob raced ten kilometers Sunday after weeks of one kilometer training runs.

When units are written in full, they are subject to the normal rules of grammar.

3. No Period Follows Unit (except end of sentence)

Incorrect After the 10 km. Race, Bob will walk 1 km.

Correct After the 10-km race, Bob will walk 1 km.

4. Use Lower-Case for Names of Units (except for unit symbol when unit is derived from someone's name)

mm	millimeter	L	liter (1)
km	kilometer	°C	Celsius (2)
kg	kilogram	N	newton
J	joule		

When writing for example, "I am applying a force of seven newtons", newtons is lower-case and spelled out because the number was. On the other hand, if I write "I am applying a force of 7 N", the unit symbol "N" is capitalized. The same apply for watt, joule, and others (see ASTM Standard E-380, Tables 1 through 7).

Notes: (1) The above rule also applies to the unit symbol of liter, although it is not a person's name. L and l are approved alternative symbols for liter. Since the letter 1 can easily be confused for the numeral 1, only the symbol L is recommended for USA use.

(2) the exception to the above rule is the word Celsius which is always capitalized. The degree symbol "°" always accompanies the unit symbol °C for Celsius. In WordPerfect the ° can be typed by holding the "Alt" key and entering "248" on the numeric pad (Num Lock light off), or as a "superscript" small letter "o".

5. Space Between Digit Number and Unit Symbol (see also #8 and #10)

Incorrect 35mm 250kg

Correct 35 mm 250 kg

Exceptions 45°and not 45 °
20°C (or 20 °C) and not 20° C

When using word processing programs that automatically wrap around to the next line at the right margin on the sheet, it is good practice to use a "hard" space between the Digit Number and the Unit symbol. The purpose of the hard space is to keep the digits with the symbol, so that one is not on one line and the other on the next as shown here, "350 kN". The same applies to other uses of spaces, as discussed in 8 and 10 below.

6. No Space Between Prefix or its Symbol and Unit

Incorrect mega pascal M Pa

Correct megapascal MPa

7. Use Lower-Case for Symbols of Prefixes (except for prefixes with magnitudes of 10^6 and higher)

Incorrect	kilometer (10^3)	Km,	megawatt (10^6)	mW
Correct		km		MW

8. With Symbols

N⎵m for newton meter

N.m with typewriter [use period]

Use Slash or Solidus for Quotient:

meters per second: use m/s or m⎵s^{-1} $\frac{m}{s}$
or

9. With Unit Names (rules slightly different than with symbols)

Use Space or Hyphen for Product:

Incorrect newtonmeter

Correct newton meter, or newton-meter

Exception watthour

Use "per" for Quotient (not /):

Incorrect meter/second

Correct meter per second

10. Group Digits by Three from Decimal Point and

11. No Comma within a Number

Because other countries use the comma as a decimal marker instead of a dot or period on the line, the recommended international practice calls for separating digits into groups of three on either side of the decimal point with a small space (ASTM E-380, section 4.54.2). The exemptions to this are on engineering drawings and financial statements. Examples of this new practice are shown below. The numbers in the "International" column have been aligned with the location of the decimal point.

As was recommended under "5", it is desirable to get in the habit of using a "hard space between the groups of digits.

U.S.	International (metric)
26,345	26 345
3.141596	3.141 596
2,123,987.23	2 123 987.23
34.34523	34.345 23
24,246,680	24 246 680

In numbers with FOUR digits on either side of the decimal point a space is not necessary except for uniformity in tables.

Examples:	0.1335	and not 0.133 5
	2345	and not 2 345
	8976.3456	and not 8 976.345 6
	56234.5678	and not 56 234.567 8

In tables or in a column, as for an addition with numbers with 5 digits, set as follows:

2 345	and not	2345
+56 234.567 8	and not	56 234.5678
+ 6 056.123 345	and not	6056.123 345

12. Fractions Unnecessary

Examples: Use 2.5 not 2 ½
Use 3.124 not 3**c**

Note: Do not use fractions with SI Units. Write 0.5 kPA not ½ kPa

13. Use Zero before Decimal Marker

Incorrect .1234

Correct 0.1234

RULES OF GRAMMAR

Rule #1: Print unit symbols in the upright type and in lower case except for liter, or unless the unit name is derived from a proper name.

m not M g not G
Exceptions: L not l N not n Pa not pa °C not °c

Rule #2: Print unit names in lower-case, even those derived from a proper name (except for Celsius).

meter liter newton pascal
Exception: Celsius

Rule #3: Print symbols for prefixes in lower-case for magnitudes 10^3 and lower, and do not print symbols for prefixes in upper-case for magnitudes 10^6 and higher. Names for prefixes are always lower-case.

k (kilo) = 10^3 M (mega) = 10^6

Rule #4: Leave a space between a numeral and a symbol.

20 kg not 20kg

Rule #5: Do not leave a space between a prefix and its unit symbol or name.

kg not k g kilogram not kilo gram

Rule #6: Use plural of unit names, but do not use the plural of written unit symbols.

20 kilograms 20 kg, not 20 kgs

Rule #7: Use symbols, not abbreviations.

10 m^2 not 10 sq. mts.

Rule #8: For unit symbols: Use a raised dot to express a product, and a diagonal to express a quotient.

J = N⋅m Pa = N/m^2

For unit names: Use a space to express a product, and the word “per” to express a quotient.

newton meter newton per square meter

Rule #9: Do not mix names and symbols.

N@m or newton meter, not N@meter or newton@m

Rule #10: Do not use a period after a symbol (except when it occurs at the end of a sentence).

12 kg not 12 kg.

Rule #11: Always use decimals, not fractions; and use a zero before the decimal marker for values less than one.

0.75 g not .75 g or ¾ g

Rule #12: Use spaces instead of commas to separate blocks of three digits for any number over four digits (except for amounts of money).

Incorrect:	4500	45, 000	0.00446	0.0044
Correct:	4 500	45 000	0.004 46	0.004 4

ATTACHMENT B
CONVERSION OF U.S. CUSTOMARY TO SI (METRIC) UNITS FOR LTPP PROGRAM

Climatic Data[1,2]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply By**
Precipitation	Snowfall	(in)	(mm)	(2.54×10^{1})
	Rainfall	(mm)	(mm)	(1)
	Wet Days	Days	Days	1
Temperature	Freeze Index	(day-EF)		
	Freeze Thaw	Cycle	Cycle	1
	Hot Days	#day > 90 EF	#day>32 EC	1
	Cold Days	#day < 32 EF	#day<0 EC	1
Wind	Speed	(mph)	(km/h)	(1.609)
	Gust	(mph)	(km/h)	(1.609)
Spatial	Latitude	Deg, Min, Sec	Deg, Min, Sec	1
	Longitude	Deg, Min, Sec	Deg, Min, Sec	1
	Elevation	ft	m	3.048×10^{-1}
	Distance	ft	m	3.048×10^{-1}
	Bearing	Deg, Min, Sec	Deg, Min, Sec	1

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

[2] For ENV_* tables and data only.

Inventory Data[1]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply By**
Spacial or Global Position	Milepoint	(mi)	(km)	(1.609)
	Latitude	Deg, Min, Sec	Deg, Min, Sec	1
	Longitude	Deg, Min, Sec	Deg, Min, Sec	1
	Elevation	(ft)	(m)	(3.048×10^{-1})
Pavement Geometry	Lane Width	(ft)	(m)	(3.048×10^{-1})
	Section Length	(ft)	(m)	(3.048×10^{-1})
	Offset	(ft) (in)	(m) (mm)	(3.048×10^{-1}) (2.54×10^{1})
	Stationing	(ft)	(m)	(3.048×10^{-1})
	Shoulder Width	(ft)	(m)	(3.048×10^{-1})
	Skewness	(ft/lane)	(mm/lane)	(3.048×10^{2})
Equipment	Roller: Gross Weight Tire Pressure Amplitude Speed	 (tons) (kips) (psi) (vib/min) (hz) (mph)	 (kg) (N) (Pa) (hz) (hz) (km/h)	 (9.07×10^{2}) (4.4482×10^{3}) (6.895×10^{3}) (1.7×10^{-2}) (1) (1.609)
Pavement Structural	Layer Thickness	(in)	(mm)	(2.54×10^{1})
	Depth to Rigid	(ft)	(mm)	(3.048×10^{2})
	Dowel/Reinforcing Dimensions	(ft) (in and fractions) (size)	(mm) (mm) (size)	(3.048×10^{2}) (2.54×10^{1}) (1)
	Construction Details	(ft) (in and fractions)	(mm) (mm)	(3.048×10^{2}) (2.54×10^{1})
	Joint Spacing Dimensions Reservoir Skewness	(ft) (ft) (in) (in and fractions) (ft/lane)	(mm) (mm) (mm) (mm) (mm/lane)	(3.048×10^{2}) (3.048×10^{2}) (2.54×10^{1}) (2.54×10^{1}) (3.048×10^{2})

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

Inventory Data[1]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply By**
Material Properties	Gradation	Percent Size	Percent Size	1
	Mix Designs	(lb/cy) (gal/cy)	(kg/m^3) (L/m^3)	($5.93x10^{-1}$) (4.95)
	Quantities	(lb/sy) (gal/sy)	(kg/m^2) (L/m^2)	($5.425x10^{-1}$) (4.53)
	Elastic Modulus	(psi) (ksi)	(Pa) (kPa)	($6.895x10^3$) ($6.895x10^3$)
	Flexural Strength	(psi)	(Pa)	($6.895x10^3$)
	Compressive Strength	(psi)	(Pa)	($6.895x10^3$)
	Tensile Strength	(psi)	(Pa)	($6.895x10^3$)
	Viscosity	(P) (Cst)	(Pa§s) (m^2/s)	($1x10^{-1}$) ($1x10^{-6}$)
	Penetration	(0.1 mm) [count]	(0.1 mm)	1
	Ductility	(cm) (cm/min)	(mm) (mm/sec)	($1.0x10^1$) ($1.667x10^{-1}$)
	Softening	(EF)	(EC)	(EF-32)/1.8
	Marshall Stability	(lbs) (0.01 in) [count]	(kg) (0.01 in)	($4.536x10^{-1}$) (1)
	Hveem Stability	Ratio	Ratio	1
	Maximum Density	(pcf)	(kg/m^3)	($1.602x10^1$)
	Compactive Energy	(ft-lbs/ci)	(J/mm^3)	$8.274x10^{-3}$
	Swell Pressure	(tsf) (psf)	(Pa) (Pa)	($2.4x10^{-2}$) ($4.788x10^1$)
	Unconfined Compressive Strength	(tsf) (psf) (psi)	(Pa) (Pa) (Pa)	($2.4x10^{-2}$) ($4.788x10^1$) ($6.895x10^3$)
	Steel Yield Strength	(psi) (ksi)	(Pa) (kPa)	($6.895x10^3$) ($6.895x10^3$)
	Aggregate Durability	value	value	1

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

Inventory Data[1]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply By**
Material Properties (cont.)	Insitu Density	(pcf)	(kg/m^3)	($1.602x10^1$)
	Subgrade Reaction	(pci)	(kg/m^3)	($2.767x10^4$)
	CBR	value	value	1
	R-Value	value	value	1
Drainage	Long Drain Diameter	(in)	(mm)	($2.54x10^1$)
	Laterals Spacing	(ft)	(m)	($3.048x10^{-1}$)
Improvements	Quantities	(sy) (cy) (sf) (cf)	(m^2) (m^3) (m^2) (m^3)	($8.361x10^{-1}$) ($7.646x10^{-1}$) ($9.290x10^{-2}$) ($2.832x10^{-2}$)
	Costs	($1000/ln mi)	($1000/ln km)	($6.22x10^{-1}$)
	Thickness	(in)	(mm)	($2.54x10^1$)
Construction Information	Temperature Placement Ambient	 (EF) (EF)	 (EC) (EC)	 (EF-32)/1.8 (EF-32)/1.8
	Thickness	(in)	(mm)	($2.54x10^1$)
	Density	(pcf)	(kg/m^3)	($1.602x10^1$)

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

Maintenance Data[1]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply by**
Material Properties	Gradation	Percent Size	Percent Size	1
	Mix Design Quantities	(lb/cy) (gal/cy)	(kg/m^3) (L/m^3)	($5.93x10^{-1}$) (4.95)
	Elastic Modulus	(psi) (ksi)	(Pa) (kPa)	($6.895x10^3$) ($6.895x10^3$)
	Flexural Strength	(psi)	(Pa)	($6.895x10^3$)
	Compressive Strength	(psi)	(Pa)	($6.895x10^3$)
	Tensile Strength	(psi)	(Pa)	($6.895x10^3$)
	Viscosity	(P) (Cst) (Sec)	(PaCs) (m^2/s) (Sec)	($1x10^{-1}$) ($1x10^{-6}$) (1)
	Penetration	(0.1 mm) [count]	(0.1 mm)	(1)
	Ductility	(cm) (cm/sec)	(mm) (mm/sec)	($1.0x10^1$) ($1.0x10^1$)
	Softening	(EF)	(EC)	(EF-32)/1.8
	Marshall Stability	(lbs) (0.01 in) [count]	(kg) (0.01 in)	($4.536x10^{-1}$) (1)
	Hveem Stability	Ratio	Ratio	1
	Maximum Density	(pcf)	(kg/m^3)	($1.602x10^1$)
	Compactive Energy	(ft-lb/ci)	(J/mm^3)	$8.274x10^{-3}$
	Swell Pressure	(tsf) (psf) (psi)	(Pa) (Pa) (Pa)	($2.4x10^{-2}$) ($4.788x10^1$) ($6.895x10^3$)
	Unconfined Compressive Strength	(tsf) (psf) (psi)	(Pa) (Pa) (Pa)	($2.4x10^{-2}$) ($4.788x10^1$) ($6.895x10^3$)
	Steel Yield Strength	(psi) (ksi)	(Pa) (kPa)	($6.895x10^3$) ($6.895x10^3$)

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

Maintenance Data[1]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply by**
Equipment	Roller			
	Gross Weight	(tons)	(kg)	(9.07×10^{2})
	Tire Pressure	(psi)	(Pa)	(6.895×10^{3})
	Amplitude	(in)	(mm)	(2.54×10^{1})
	Frequency	(vib/min)	(hz)	(1.7×10^{-2})
		(hz)	(hz)	(1)
	Speed	(mph)	(km/h)	(1.609)
	Miller			
	Width	(in)	(mm)	(2.54×10^{1})
		(ft)	(mm)	(3.048×10^{2})
	Blade Dimensions	(in)	(mm)	(2.54×10^{1})
	Blade Spacing	(in)	(mm)	(2.54×10^{1})
Drainage	Long. Drain Diameter	(in)	(mm)	(2.54×10^{1})
	Laterals Spacing	(ft)	(m)	(3.048×10^{-1})
Improvements	Quantities	(sy)	(m^2)	(8.361×10^{-1})
		(cy)	(m^3)	(7.646×10^{-1})
		(sf)	(m^2)	(9.290×10^{-2})
		(cf)	(m^3)	(2.832×10^{-2})
	Costs	($1000/ln mi)	($1000/ln km)	(6.22×10^{-1})
	Thicknesses	(in)	(mm)	(2.54×10^{1})
Construction Information	Temperature			
	Placement	(EF)	(EC)	(EF-32)/1.8
	Ambient	(EF)	(EC)	(EF-32)/1.8
	Length Sealed	(ft)	(m)	(3.048×10^{-1})
	Preparation			
	Cutting	(ft)	(m)	(3.048×10^{-1})
		(in)	(mm)	(2.54×10^{1})
	Quantities			
	Patches	(sf)	(m^2)	(9.290×10^{-2})
	Seal Coat	(gal/sy)	(L/m^2)	(4.53)
		(sf)	(m^2)	(9.290×10^{-2})
	Joint Seal	(ft)	(m)	(3.048×10^{-1})
	Application Rate	(lb/sy)	(kg/m^2)	(5.425×10^{-1})
		(gal/sy)	(L/m^2)	(4.53)
	Thickness	(in)	(mm)	(2.54×10^{1})
	Density	(pcf)	(kg/m^3)	(1.602×10^{1})

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

Monitoring Data[1]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply by**
Pavement Geometry	Lane Width	(ft)	(m)	$(3.048x10^{-1})$
	Section Length	(ft)	(m)	$(3.048x10^{-1})$
	Offset	(ft) (in)	(mm) (mm)	$(3.048x10^{2})$ $(2.54x10^{1})$
	Stationing	(ft) (Sta)	(m) (Sta)	$(3.048x10^{-1})$ (1)
	Shoulder Width	(ft)	(mm)	$(3.048x10^{2})$
Pavement Areal Distress	Alligator Cracking Bleeding Patching Shoving Polish Overlay Raveling Durability Cracking Scaling Potholes Popouts	All units are recorded in metric units.		
Pavement Lineal Distress	Cracking Transverse Longitudinal Reflective Separation Edge Pumping	All units are recorded in metric units.		
Pavement Depth Distress	Faulting Lane/Shoulder Drop Off Rut Depth	All units are recorded in mm.		
Equipment Calibration	Load Cell Gain	Ratio	Ratio	1
	Sensor Gain	Ratio	Ratio	1
	Voltage	(V)	(V)	(1)

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

Monitoring Data[1]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply by**
Monitoring Equipment	Deflection	(microns)	(microns)	(1)
	Plate Radius	(mm)	(mm)	(1)
	Offset	(ft)	(mm)	(3.048×10^{2})
	Load Sensor Measurements	(kPa)	(kPa)	(1)
	Temperature Air Pavement	(EF) (EF)	(EC) (EC)	(EF-32)/1.8 (EF-32)/1.8
	Profile Wavelength Temperature	(in/mi) (ft) (EF)	(mm/km) (m) (EC)	(1.579×10^{1}) (3.048×10^{-1}) (EF-32)/1.8
	Distance Traveled Stop	(ft) (ft)	(m) (m)	(3.048×10^{-1}) (3.048×10^{-1})
	Amplitudes	(in)	(mm)	(2.54×10^{1})
	Mayes Meter	(in/mi)	(in/mi)	(1)
	Friction (Skid) Speed Temperature	Not converted		

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

Rehabilitation Data[1]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply by**
Pavement Geometry	Shoulder Width	(ft)	(mm)	($3.048x10^{2}$)
Drainage	Long. Drain Diameter	(in)	(mm)	($2.54x10^{1}$)
	Laterals Spacing	(ft)	(m)	($3.048x10^{-1}$)
	Filter Permeability	(ft/day) (cm/sec)	(m/day) (mm/sec)	($3.048x10^{-1}$) ($1.0x10^{1}$)
Improvements	Quantities	(sy) (cy) (sf) (cf)	(m^2) (m^3) (m^2) (m^3)	($8.361x10^{-1}$) ($7.646x10^{-1}$) ($9.290x10^{-2}$) ($2.832x10^{-2}$)
	Costs	($1000/ln mi)	($1000/ln km)	($6.22x10^{-1}$)
	Thicknesses	(in)	(mm)	($2.54x10^{1}$)
Pavement Structural	Layer Thicknesses	(in)	(mm)	($2.54x10^{1}$)
	Dowel/Reinforcing Dimensions	(in or fractions) (ft) (size)	(mm) (mm) (size)	($2.54x10^{1}$) ($3.048x10^{2}$) (1)
	Construction Details	(ft) (in)	(mm) (mm)	($3.048x10^{2}$) ($2.54x10^{1}$)
	Joint Spacing Dimensions Reservoir	(ft) (in or fractions) (ft) (in or fractions) (ft)	(mm) (mm) (mm) (mm) (mm)	($3.048x10^{2}$) ($2.54x10^{1}$) ($3.048x10^{2}$) ($2.54x10^{1}$) ($3.048x10^{2}$)
	Skewness	(ft/lane)	(mm/lane)	($3.048x10^{2}$)
Material Properties	Gradation	Percent Size	Percent Size	1
	Mix Designs Quantities	(lb/cy) (gal/cy)	(kg/m^3) (L/m^3)	($5.93x10^{-1}$) (4.95)
	Elastic Modulus	(psi) (ksi)	(Pa) (kPa)	($6.895x10^{3}$) ($6.895x10^{3}$)
	Flexural Strength	(psi)	(Pa)	($6.895x10^{3}$)
	Compressive Strength	(psi)	(Pa)	($6.895x10^{3}$)

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

Rehabilitation Data[1]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply by**
Material Properties (cont.)	Tensile Strength	(psi)	(Pa)	(6.895×10^{3})
	Viscosity	(P) (Cst) (Sec)	(PaCs) (m^2/s) (Sec)	(1×10^{-1}) (1×10^{-6}) (1)
	Penetration	(0.1 mm) [count]	(0.1 mm)	(1)
	Ductility	(cm) (cm/sec)	(mm) (mm/sec)	(1.0×10^{1}) (1.0×10^{1})
	Softening	(EF)	(EC)	(EF-32)/1.8
	Marshall Stability	(lb) (0.01in) [count]	(kg) (0.01in)	(4.536×10^{-1}) (2.54×10^{1})
	Hveem Stability	Ratio	Ratio	1
	Maximum Density	(pcf)	(kg/m^3)	(1.602×10^{1})
	Compactive Energy	(ft-lb/ci)	(J/mm^3)	8.274×10^{-3}
	Swell Pressure	(psf) (tsf) (psi)	(Pa) (Pa) (Pa)	(4.788×10^{1}) (2.4×10^{-2}) (6.895×10^{3})
	Unconfined Compressive Strength	(psf) (tsf) (psi)	(Pa) (Pa) (Pa)	(4.788×10^{1}) (2.4×10^{-2}) (6.895×10^{3})
	Steel Yield Strength	(psi) (ksi)	(Pa) (kPa)	(6.895×10^{3}) (6.895×10^{3})
	Aggregate Durability	Unit	Unit	1
Construction Information	Temperature Placement Ambient	 (EF) (EF)	 (EC) (EC)	 (EF-32)/1.8 (EF-32)/1.8
	Length Sealed	(ft)	(m)	(3.048×10^{-1})
	Patches	(sf)	(m^2)	(9.290×10^{-2})
	Application Rate	(lb/sy) (gal/sy)	(kg/m^2) (L/m^2)	(5.425×10^{-1}) (4.53)
	Thickness	(in)	(mm)	(2.54×10^{1})
	Density	(pcf)	(kg/m^3)	(1.602×10^{1})

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

Rehabilitation Data[1]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply by**
Construction Information (cont.)	Pressure Relief			
	Width	(in)	(mm)	($2.54x10^{1}$)
	Spacing	(ft)	(m)	($3.048x10^{-1}$)
			(mm)	($2.54x10^{1}$)
	Depth	(in)		
	Undersealing			
	Volume	(cf)	(m^3)	($2.832x10^{-2}$)
	Fluidity	(sec)	(sec)	(1)
Equipment	Roller			
	Gross Weight	(tons)	(kg)	($9.07x10^{2}$)
	Tire Pressure	(psi)	(Pa)	($6.895x10^{3}$)
	Amplitude	(in)	(mm)	($2.54x10^{1}$)
		(lb)	(kg)	($4.536x10^{-1}$)
	Frequency	(vib/min)	(hz)	($1.7x10^{-2}$)
		(hz)	(hz)	(1)
	Speed	(mph)	(km/h)	(1.609)
	Miller			
	Width	(ft)	(mm)	($3.048x10^{2}$)
		(in)	(mm)	($2.54x10^{1}$)
	Depth	(in)	(mm)	($2.54x10^{1}$)
	Blade Dimensions	(in)	(mm)	($2.54x10^{1}$)
	Blade Spacing	(in)	(mm)	($2.54x10^{1}$)
	Crack & Seat			
	Gross Weight	(tons)	(kg)	($9.07x10^{2}$)
		(kips)	(N)	($4.4482x10^{3}$)
	Width	(ft)	(mm)	($3.048x10^{2}$)
	Length	(ft)	(mm)	($3.048x10^{2}$)
	Frequency	(hz)	(hz)	(1)
		(vib/min)	(hz)	($1.7x10^{-2}$)
	Scarifier			
	Depth	(in)	(mm)	($2.54x10^{1}$)
	Grout Pump			
	Pressure	(psi)	(Pa)	($6.895x10^{3}$)

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

Construction Data[1]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply by**
Special or Global Position	Mile Point	(mi)	(km)	(1.609)
	Latitude	Deg, Min, Sec	Deg, Min, Sec	1
	Longitude	Deg, Min, Sec	Deg, Min, Sec	1
	Elevation	(ft)	(m)	(3.048×10^{-1})
Pavement Geometry and Reference	Lane Width	(ft)	(m)	(3.048×10^{-1})
	Section Length	(ft)	(m)	(3.048×10^{-1})
	Offset	(ft) (in)	(mm) (mm)	(3.048×10^{2}) (2.54×10^{1})
	Stationing	(Sta) (ft)	(Sta) (m)	(1) (3.048×10^{-1})
	Shoulder Width	(ft)	(mm)	(3.048×10^{2})
Pavement Structural	Layer Thicknesses	(in)	(mm)	(2.54×10^{1})
	Depth to Rigid	(ft)	(m)	(3.048×10^{-1})
	Dowel/Reinforcing Dimensions	(ft) (in) (size)	(mm) (mm) (size)	(3.048×10^{2}) (2.54×10^{1}) (1)
	Construction Details	(ft) (in) (size)	(mm) (mm) (size)	(3.048×10^{2}) (2.54×10^{1}) (1)
	Joint Spacing Dimensions Skewness	(ft) (in) (in) (ft/lane)	(mm) (mm) (mm) (mm/lane)	(3.048×10^{2}) (2.54×10^{1}) (2.54×10^{1}) (3.048×10^{2})
Material Properties	Gradation	Percent Size	Percent Size	1
	Mix Designs Quantities	(lb/cy) (gal/cy)	(kg/m^3) (L/m^3)	(5.93×10^{-1}) (4.95)
	Elastic Modulus	(psi) (ksi)	(Pa) (kPa)	(6.895×10^{3}) (6.895×10^{3})
	Flexural Strength	(psi)	(Pa)	(6.895×10^{3})
	Compressive Strength	(psi)	(Pa)	(6.895×10^{3})

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

Construction Data[1]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply by**
Material Properties (cont.)	Tensile Strength	(psi)	(Pa)	(6.895×10^{3})
	Shear Strength	(psi)	(Pa)	(6.895×10^{3})
	Viscosity	(P) (Cst) (Sec)	(PaCs) (m^2/s) (Sec)	(1×10^{-1}) (1×10^{-6}) (1)
	Penetration	(0.1 mm) [count]	(0.1 mm)	(1)
	Ductility	(cm) (cm/sec)	(mm) (mm/sec)	(1.0×10^{1}) (1.0×10^{1})
	Softening	(EF)	(EC)	(EF-32)/1.8
	Marshall Stability	(lb) (0.01 in) [count]	(kg) (0.01 in)	(4.536×10^{-1}) (1)
	Hveem Stability	Ratio	Ratio	1
	Maximum Density	(pcf)	(kg/m^3)	(1.602×10^{1})
	Compactive Energy	(ft-lb/ci)	(J/mm^3)	8.274×10^{-3}
	Swell Pressure	(psf) (tsf) (psi)	(Pa) (Pa) (Pa)	(4.788×10^{1}) (2.4×10^{-2}) (6.895×10^{3})
	Unconfined Compressive Strength	(psf) (tsf) (psi)	(Pa) (Pa) (Pa)	(4.788×10^{1}) (2.4×10^{-2}) (6.895×10^{3})
	Steel Yield Strength	(psi) (ksi)	(Pa) (kPa)	(6.895×10^{3}) (6.895×10^{3})
	Aggregate Durability	Unit	Unit	1
Construction Information	Temperature Placement Ambient	(EF) (EF)	(EC) (EC)	(EF-32)/1.8 (EF-32)/1.8
	Thickness	(in)	(mm)	(2.54×10^{1})
	Density	(psf)	(Pa)	(4.788×10^{1})
	Application AC Rate AGG Rate	 (gal/sy) (lb/sy)	 (L/m^2) (kg/m^2)	 (4.53) (5.425×10^{-1})
Construction Information (cont.)	Underseal Volume	 (cf) (cy)	 (m^3) (m^3)	 (2.832×10^{-2}) (7.646×10^{-1})

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

Construction Data[1]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply by**
	Crack Lengths			
	Routing	(ft)	(mm)	($3.048x10^{2}$)
	Sawing	(ft)	(mm)	($3.048x10^{2}$)
	Sealing	(ft)	(mm)	($3.048x10^{2}$)
	Crack Dimensions			
	Width	(in, fractions)	(mm)	($2.54x10^{1}$)
	Depth	(in, fractions)	(mm)	($2.54x10^{1}$)
	Haul Distance	(mi)	(km)	(1.609)
	Work Zone Speed	(mph)	(km/h)	(1.609)
Equipment	Roller			
	Gross Weight	(tons)	(kg)	($9.07x10^{2}$)
	Tire Pressure	(psi)	(Pa)	($6.895x10^{3}$)
	Amplitude	(in)	(mm)	($2.54x10^{1}$)
		(lb)	(kg)	($4.536x10^{-1}$)
	Frequency	(vib/min)	(hz)	($1.7x10^{-2}$)
		(hz)	(hz)	(1)
	Speed	(mph)	(km/h)	(1.609)
	Chip Seal			
	Distributor Rate	(gal)	(L)	(3.785)
		(gal/sy)	(L/m^{2})	(4.53)
	Aggregate Rate	(lb)	(kg)	($4.536x10^{-1}$)
		(lb/sy)	(kg/m^{2})	($5.425x10^{-1}$)
	Slurry Seal Rate	(gal/sy)	(L/m^{2})	(4.53)
	Crack Seal			
	Temperature	(EF)	(EC)	(EF-32)/1.8
	Pressure	(psi)	(Pa)	($6.895x10^{3}$)
	Saw Blade Diameter	(in)	(mm)	($2.54x10^{1}$)
	Laydown Machine Width	(ft)	(<10 ft = mm, >10 ft = m)[1]	($3.048x10^{2}$, $3.048x10^{-1}$)
		(in)	(mm)	($2.54x10^{1}$)
Equipment (cont.)	Vibrators			
	Depth	(in)	(mm)	($2.54x10^{1}$)
	Spacing	(in)	(mm)	($2.54x10^{1}$)
	Frequency	(hz)	(hz)	(1)
		(rpm)	(rad/s)	($1.047x10^{-1}$)
	Miller			
	Dimensions	(ft)	(mm)	($3.048x10^{2}$)
		(in)	(mm)	($2.54x10^{1}$)
	Depth	(in)	(mm)	($2.54x10^{1}$)

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

Construction Data[1]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply by**
Drainage	Long. Drain Diameter	(in)	(mm)	($2.54x10^{1}$)
	Laterals Spacing	(ft)	(m)	($3.048x10^{-1}$)
Project Costs	Quantities	(sy)	(m^2)	($8.361x10^{-1}$)
		(cy)	(m^3)	($7.646x10^{-1}$)
		(sf)	(m^2)	($9.290x10^{-2}$)
		(cf)	(m^3)	($2.832x10^{-2}$)
	Costs	($1000/ln mi)	($1000/ln km)	($6.22x10^{-1}$)
Repairs	Patches			
	AC Area	(sf)	(m^2)	($9.290x10^{-2}$)
	Overlay	(sf)	(m^2)	($9.290x10^{-2}$)
	PCC Area	(sf)	(m^2)	($9.290x10^{-2}$)
	Base Replacement	(sf)	(m^2)	($9.290x10^{-2}$)
	Load Transfer			
	Depth	(in)	(mm)	($2.54x10^{1}$)
	Length	(in)	(mm)	($2.54x10^{1}$)
Pavement Measurements	Deflection			
	FWD	(microns)	(microns)	(1)
		(kPa)	(kPa)	(1)
	Benkelman	(tons)	(kg)	($9.07x10^{2}$)
		(in)	(mm)	($2.54x10^{1}$)
	Dynaflect	(mils)	(mils)	(1)
		(lbs)	(kg)	($4.536x10^{-1}$)
	Epoxy Core	(in)	(mm)	($2.54x10^{1}$)
Locational	MilePoint	No conversion		

* All other units are embedded in the variable names such that the recorded value is unitless

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

Testing Data[1]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply by**
Mass	Weights	(g) (kg)	(g) (kg)	(1) (1)
Loads		(lbs)	(kg)	(4.536×10^{-1})
Pressure/Vacuum		(in) (psi)	(mm) (Pa)	(2.54×10^{1}) (6.895×10^{3})
Displacements		(in) (mil) (micron)	(mm) (mil) (micron)	(2.54×10^{1}) (1) (1)
Linear Measurements		(in) (ft) (mil)	(mm) (<10 ft = mm, >10 ft = m)[1] (mil)	(2.54×10^{1}) (3.048×10^{2}, 3.048×10^{-1}) (1)
Areal Measurements		(si) (sf) (sy)	(m^2) (m^2) (m^2)	(6.451×10^{-4}) (9.290×10^{-2}) (8.361×10^{-1})
Volumetric Measurements		(cf) (ci) (cy)	(m^3) (m^3) (m^3)	(2.832×10^{-2}) (1.639×10^{-5} (7.646×10^{-1})
Loading Rate Shear Force		 (psi/sec) (in/min) (cm/min) (cm/sec)	 (Pa/sec) (mm/sec) (mm/min) (mm/sec)	 (6.895×10^{3}) (2.36) (1.0×10^{1}) (1.0×10^{1})
Indirect Measurements	Penetration Standard Blow Counts Durometer Hardness Resilience	(0.1 mm) [count] (blows/ft) (in/lb) Ratio	(0.1 mm) (blows/mm) (mm/kg) Ratio	(1) (3.3×10^{-3}) (5.51×10^{1}) 1
Density		(pcf)	(kg/m^3)	(1.602×10^{1})

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

Testing Data[1]				
Data Type	**Data Element**	**Collection Units**	**SI Units**	**Multiply by**
Equipment Forced	Petrography			
	Linear	Screw Pitch		
	Transverse	(in)	(mm)	($2.54x10^{1}$)
	Sand	(lb)	(kg)	($4.536x10^{-1}$)
		(in)	(mm)	($2.54x10^{1}$)
	Equivalent	(sec)	(sec)	(1)
	Plate Bearing	loss	loss	1
	Saybolt			
	Viscosity	Number	Number	1
	Sulfate	Number	Number	1
	Soundness	Size	Size	1
	Slurry Seal	Geometry	Geometry	1
	Tack Point	Geometry	Geometry	1
	Wet Track	Geometry Energy	Geometry Energy	1
	Gradations	Geometry	Geometry	1
	Marshall			
	Hveem			
	Proctor			
	Resistance			

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.

Limiting Values for Frequently Encountered Units		
US Customary Unit of Measure	**SI Unit of Measure**	**Maximum Precision Allowable**
in	mm	1 mm
ft (<10)	mm	10 mm
ft (>10)	m	0.1 m
in^2	mm^2	1 mm^2
ft^2	mm^2	1 mm^2
EF	EC	0.1 EC
lbs	kg	0.01 kg
psi	Pa	0.01 Pa
psf	Pa	0.1 Pa
ksi	kPa	0.1 kPa
lb/cy	kg/m^3	0.1 kg/m^3
gal/cy	L/m^3	0.1 L/m^3
ft^3	m^3	0.1 m^3

[1] Measurements in feet are converted to either meters or millimeters. If the original value is expected to be greater than or equal to 10 feet the appropriate unit is meters. If it is expected to be less than 10 feet, the appropriate unit is mm.