

APPENDIX L

METRIC/ENGLISH CONVERSION PROCEDURES

INTRODUCTION

The HPMS software is capable of converting HPMS files from English to metric and vice versa when using the import process. The units are set by selecting *Admin Tools/Change State/Year*. Once the data have been imported into the system, the units cannot be changed. If a State chooses to work in different units, the data must be exported and then reimported after the units are reset.

All data are converted to metric by the HPMS software during the submittal process, *FHWA Submittal/Send Submittal*.

The following data items are converted:

| Item No. | Description | Conversion Units |
|----------|---------------------------------|--------------------------------|
| 3 | Reporting Units | Codes 0 (English);1 (Metric) |
| 11-12 | LRS MPT/KMPT | Miles - Kilometers |
| 30 | Section Length | Miles - Kilometers |
| 35 | Roughness (IRI) | Inches/Mile - Meters/Kilometer |
| 51 | D (Slab Thickness) | Inches - Millimeters |
| 54 | Lane Width | Feet - Meters |
| 57 | Median Width | Feet - Meters |
| 59-60 | Shoulder Width (Right and Left) | Feet - Meters |
| 63-68 | Curves (6 Values) | Miles - Kilometers |
| 72-77 | Grades (6 Values) | Miles - Kilometers |
| 79 | Weighted Design Speed | MPH - km/h |
| 80 | Speed Limit | MPH - km/h |

HARD CONVERSION

Hard conversion is accomplished via a table lookup where a current value is converted directly to a predetermined value. In these cases, the computed rounded values may not always be identical to the soft conversion value. Hard conversion is used whenever possible for the following items:

| Item | Data |
|-------|-------------------------------|
| 54 | Lane Width |
| 59-60 | Right and Left Shoulder Width |
| 79 | Weighted Design Speed |
| 80 | Speed Limit |

For current lane or shoulder widths from 0.3 meters to 5.6 meters (1 foot to 18 feet), the hard conversion value is as found in Tables L-3 (English to metric) and L-4 (metric to English) for Items 54, 59, and 60. Any current value which is less than the lower limit or greater than the upper limit of the appropriate portion of these tables is converted using a soft conversion (e.g., 32 feet becomes 9.8 meters).

Weighted design speed (Item 79) and speed limit (Item 80) should be coded in multiples of 5. If coded in multiples of 5, and if within the limits of Tables L-1 (5 to 75 miles per hour) or L-2 (10 to 120 kilometers per hour), a hard conversion is used; otherwise, a soft conversion is made. Where there is no speed limit, code "A999" is used for either metric or English.

SOFT CONVERSION

A soft conversion is a computation using the current value times a conversion factor to produce a converted value (e.g., 13 feet x 0.3048 meter/foot = 3.9624 meters). Any computed value is then rounded to the required number of decimal positions (e.g., 3.9624 meters becomes 4.0 meters for a 1 decimal place precision).

The following list of factors are used when making soft conversions:

| Field Units Being Converted | English to Metric | Metric to English |
|----------------------------------------|-------------------|-------------------|
| Miles - Kilometers | 1.609344 | 1 / 1.609344 |
| Feet - Meters | 0.3048 | 1 / 0.3048 |
| Inches per Mile - Meters per Kilometer | 1 / 63.36 | 63.36 |
| Inches - Millimeters | 25.4 | 1 / 25.4 |
| MPH - km/h | 1.609344 | 1 / 1.609344 |

Soft conversion is used on the following data items:

| Item No. | Description | Conversion Units |
|----------|--------------------|--------------------------------|
| 11-12 | LRS MPT/KMPT | Miles - Kilometers |
| 30 | Section Length | Miles - Kilometers |
| 35 | Roughness (IRI) | Inches/Mile - Meters/Kilometer |
| 51 | D (Slab Thickness) | Inches - Millimeters |
| 57 | Median Width | Feet - Meters |
| 63-68 | Curves by Class | Miles - Kilometers |
| 72-77 | Grades by Class | Miles - Kilometers |

Table L-1. Hard Conversion for Speed
ENGLISH TO METRIC — Using Factor 1.609344

| MPH | km/h Hard Conversion | km/h Computed |
|--------------------------------------------------------------------------------------------------------------|-------------------------|------------------|
| 5 | 10 | 8.05 |
| 10 | 15 | 16.09 |
| 15 | 25 | 24.14 |
| 20 | 30 | 32.19 |
| 25 | 40 | 40.23 |
| 30 | 50 | 48.28 |
| 35 | 60 | 56.33 |
| 40 | 65 | 64.37 |
| 45 | 70 | 72.42 |
| 50 | 80 | 80.47 |
| 55 | 90 | 88.51 |
| 60 | 100 | 96.56 |
| 65 | 105 | 104.61 |
| 70 | 110 | 112.65 |
| 75 | 120 | 120.70 |
| BOLD indicates what is used for hard conversions. | | |
| Values beyond 75 MPH and those that are NOT multiples of 5 use soft conversions rounded to the nearest km/h. | | |

Table L-2. Hard Conversion for Speed
METRIC TO ENGLISH — Using Factor 1 / 1.609344

| km/h | MPH Hard Conversion | MPH Computed |
|-------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------|
| 10 | 5 | 6.21 |
| 15 | 10 | 9.32 |
| 20 | 10 | 12.43 |
| 25 | 15 | 15.53 |
| 30 | 20 | 18.64 |
| 35 | 20 | 21.75 |
| 40 | 25 | 24.85 |
| 45 | 30 | 27.96 |
| 50 | 30 | 31.07 |
| 55 | 35 | 34.18 |
| 60 | 35 | 37.28 |
| 65 | 40 | 40.39 |
| 70 | 45 | 43.50 |
| 75 | 45 | 46.60 |
| 80 | 50 | 49.71 |
| 85 | 55 | 52.82 |
| 90 | 55 | 55.92 |
| 95 | 60 | 59.03 |
| 100 | 60 | 62.14 |
| 105 | 65 | 65.24 |
| 110 | 70 | 68.35 |
| 115 | 70 | 71.46 |
| 120 | 75 | 74.56 |
| BOLD indicates what is used for hard conversions. | | |
| Values beyond 10 km/h, beyond 120 km/h and those that are NOT multiples of 5 use soft conversions rounded to the nearest MPH. | | |

Table L-3. Hard Conversion for Length
ENGLISH TO METRIC — Using Factor 0.3048

| | Feet | Meters Hard Conversion | Meters Computed |
|-----------------------------------------------------------------------------------------------------------|------|---------------------------|--------------------|
| Lane Width | 6 | 1.8 | 1.83 |
| | 7 | 2.1 | 2.13 |
| | 8 | 2.4 | 2.44 |
| | 9 | 2.7 | 2.74 |
| | 10 | 3.0 | 3.05 |
| | 11 | 3.3 | 3.35 |
| | 12 | 3.6 | 3.66 |
| | 13 | 3.9 | 3.96 |
| | 14 | 4.2 | 4.27 |
| | 15 | 4.5 | 4.57 |
| | 16 | 4.8 | 4.88 |
| | 17 | 5.2 | 5.18 |
| | 18 | 5.5 | 5.49 |
| Shoulder Width | 1 | 0.3 | 0.30 |
| | 2 | 0.6 | 0.61 |
| | 3 | 0.9 | 0.91 |
| | 4 | 1.2 | 1.22 |
| | 5 | 1.5 | 1.52 |
| | 6 | 1.8 | 1.83 |
| | 7 | 2.1 | 2.13 |
| | 8 | 2.4 | 2.44 |
| | 9 | 2.7 | 2.74 |
| | 10 | 3.0 | 3.05 |
| | 11 | 3.3 | 3.35 |
| | 12 | 3.6 | 3.66 |
| BOLD indicates what is used for hard conversions. | | | |
| Values not shown for the item of interest are soft converted and rounded to the nearest tenth of a meter. | | | |

Table L-4. Hard Conversion for Length
METRIC TO ENGLISH — Using Factor 1 / 0.3048

| | Meters | Feet Hard Conversion | Feet Computed |
|------------|---------------|-----------------------------|----------------------|
| Lane Width | 1.7 | 6 | 5.57 |
| | 1.8 | 6 | 5.90 |
| | 1.9 | 6 | 6.23 |
| | 2.0 | 7 | 6.56 |
| | 2.1 | 7 | 6.89 |
| | 2.2 | 7 | 7.21 |
| | 2.3 | 8 | 7.54 |
| | 2.4 | 8 | 7.87 |
| | 2.5 | 8 | 8.20 |
| | 2.6 | 9 | 8.52 |
| | 2.7 | 9 | 8.85 |
| | 2.8 | 9 | 9.18 |
| | 2.9 | 10 | 9.51 |
| | 3.0 | 10 | 9.84 |
| | 3.1 | 10 | 10.16 |
| | 3.2 | 10 | 10.49 |
| | 3.3 | 11 | 10.82 |
| | 3.4 | 11 | 11.15 |
| | 3.5 | 11 | 11.48 |
| | 3.6 | 12 | 11.80 |
| | 3.7 | 12 | 12.13 |
| | 3.8 | 12 | 12.46 |
| | 3.9 | 13 | 12.79 |
| | 4.0 | 13 | 13.11 |
| | 4.1 | 13 | 13.44 |
| | 4.2 | 14 | 13.77 |
| | 4.3 | 14 | 14.10 |
| | 4.4 | 14 | 14.43 |
| | 4.5 | 15 | 14.75 |
| | 4.6 | 15 | 15.08 |
| 4.7 | 15 | 15.41 | |
| 4.8 | 16 | 15.74 | |
| 4.9 | 16 | 16.07 | |
| 5.0 | 16 | 16.39 | |
| | 5.1 | 17 | 16.72 |

| | Meters | Feet Hard Conversion | Feet Computed |
|---------------------------|---------------|-----------------------------|----------------------|
| Lane Width (continued) | 5.2 | 17 | 17.05 |
| | 5.3 | 17 | 17.38 |
| | 5.4 | 18 | 17.70 |
| | 5.5 | 18 | 18.03 |
| | 5.6 | 18 | 18.36 |
| Shoulder Width | 0.3 | 1 | 0.98 |
| | 0.4 | 1 | 1.31 |
| | 0.5 | 2 | 1.64 |
| | 0.6 | 2 | 1.97 |
| | 0.7 | 2 | 2.30 |
| | 0.8 | 3 | 2.62 |
| | 0.9 | 3 | 2.95 |
| | 1.0 | 3 | 3.28 |
| | 1.1 | 4 | 3.61 |
| | 1.2 | 4 | 3.93 |
| | 1.3 | 4 | 4.26 |
| | 1.4 | 5 | 4.59 |
| | 1.5 | 5 | 4.92 |
| | 1.6 | 5 | 5.25 |
| | 1.7 | 6 | 5.57 |
| | 1.8 | 6 | 5.90 |
| | 1.9 | 6 | 6.23 |
| | 2.0 | 7 | 6.56 |
| | 2.1 | 7 | 6.89 |
| | 2.2 | 7 | 7.21 |
| | 2.3 | 8 | 7.54 |
| | 2.4 | 8 | 7.87 |
| | 2.5 | 8 | 8.20 |
| | 2.6 | 9 | 8.52 |
| | 2.7 | 9 | 8.85 |
| | 2.8 | 9 | 9.18 |
| | 2.9 | 10 | 9.51 |
| | 3.0 | 10 | 9.84 |
| | 3.1 | 10 | 10.16 |
| | 3.2 | 10 | 10.49 |
| | 3.3 | 11 | 10.82 |
| | 3.4 | 11 | 11.15 |
| | 3.5 | 11 | 11.48 |

| | Meters | Feet Hard Conversion | Feet Computed |
|-----------------------------------------------------------------------------------------------|---------------|-----------------------------|----------------------|
| Shoulder Width | 3.6 | 12 | 11.80 |
| (continued) | 3.7 | 12 | 12.13 |
| | 3.8 | 12 | 12.46 |
| BOLD indicates what is used for hard conversions. | | | |
| Values not shown for the item of interest are soft converted and rounded to the nearest foot. | | | |