RESEARCH NOTES

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METRIC IS BACK...THIS TIME TO STAY!

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After an initial effort for metric conversion in the 1970's, that disappeared in the 1980's, metric conversion *is* going to happen in the 1990's. Current law mandates metric as the preferred system of measurement in the United States. A 1988 law requires metric to be used in all federal procurement, grants and business related activities to the extent economically feasible. Executive Order 12770, passed in July, 1991, required all federal agencies to adopt metric conversion plans by November, 1991. The FHWA response to the legislation requires the state DOT's and local governments Federal-Aid and Direct Federal construction contracts in metric units by September 30, 1996.

The reasons for metric conversion are simple. The United States is the only industrialized country in the world not metric. Not being able to "speak the metric language" has limited the U.S. competitiveness in what has become a global economy. The metric system itself is easy to use. Other nations, like Great Britain, Canada, and Australia that converted in the 1960's and 1970's, have found that metric is a superior system.

Basic Metric Concepts

Metric conversion may be soft or hard. In a soft conversion, a measurement is mathematically converted to its exact or nearly exact equivalent. For example, 12 in. converted to exactly 304.8 mm is a soft conversion. Hard metric refers to products manufactured in metric dimensions. With hard conversion, a new rounded, rationalized metric number is created that is convenient to work with and remember. Products that had been manufactured to 12 in. would be manufactured to 300 mm (not 304.8 mm).

For civil work, the standard unit is the meter (1.1 yards). The metric unit of an area is the square meter, but large land or water areas are expressed in square kilometers (0.4 square miles). The metric unit for volume is the cubic meter, except for liquids, which are expressed in liters (1.06 quarts).

To think in metric, 1 mm is the thickness of a dime; 10 mm is the diameter of a ballpoint pen; 2 m is the height of a door and 100 m is the length of a football field. For design, a 12 ft. lane width *will be* 3.6 m, a design speed of 55 mph *will be* 90 km/h, and a 6 in. mountable curb *will be* 150 mm.

Metric and Construction

To address construction concerns related to metric, the following questions and answers are provided. The information was taken from the *ASTM Standardization News*, November 1992 "Metric in Construction" article.

The construction industry is primarily a domestic industry. Why does it have to convert?

The federal law is intended to increase U.S. competitiveness. Basic construction products such as brick, block and concrete are made and used locally, but a surprisingly large number are or can be exported, such as glass, coatings, finishes, fasteners, structural steel, wood and wood composites and most electrical, HVAC, mechanical, plumbing and conveying equipment. U.S. architect/engineer/contractor services, which have been exported worldwide for decades, also represent an important part of the industry's revenues.

What is the construction industry's response to metric?

In general, it is positive. Everyone in construction reads newspapers and knows we have to improve our international competitive position. So the message from the industry is: "We understand the need to change--just don't drag it out."

Do designers like metric?

Most prefer it, especially those who have used it. No more dimension strings made up of fractions, inches and feet; with metric it's all millimeters. And no more dealing with a multitude of conversion factors.

ODOT and Metric

FHWA will require ODOT and local agencies to submit contract documents in metric after September 30, 1996. According to Donnie Bedford, ODOT Metric Coordinator, the ODOT Standard Specifications will be converted to metric with the next update in 1995 or later. Special Provisions reflecting metric units may be used to meet FHWA requirements, if the Standard Specifications have not been prepared prior to the September deadline. ODOT's Standard Drawings will be converted on an as-needed basis to meet FHWA requirements with the possible use of a consultant for bridge, traffic and roadway revisions. Conversion of signs and distance markers has not yet been addressed as by FHWA.

ODOT will establish a date after which new projects will be located and designed in metric. For those projects in the pipeline, a soft conversion of contract documents to metric is anticipated to minimize field and office reworks.

Additional Information

Several publications are available to assist in metric conversion. AASHTO has recently published the *AASHTO Guide for Metric Conversion* which ODOT will distribute soon. In addition, AASHTO has published the *Interim Selected Metric Values for Geometric Design*, which is an addendum to *A Policy on Geometric Design of Highways and Streets*, 1990, recently distributed throughout the Agency. Finally, a training session conducted by the National Highway Institute is scheduled in Salem in September. The course will be a "train the trainer" effort. Notification of selected attendees will be sent out soon. The Research/T2 Unit may also be providing training. For additional information contact:

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