Materials in Use in U.S. Interstate Highways

Materials Usage

Natural aggregates (construction sand and gravel and crushed stone) make up the largest component of nonfuel mineral materials consumed in the United States (fig. 1). Most of these materials are used in construction activities, such as in buildings and roads. In highways, natural aggregates are incorporated into asphalt and concrete and are used as road base.

Roads and Highways

Comprising 9.6 million square kilometers (3.7 million square miles), the United States is the third largest country in the world. With a large, complex economy, the United States requires a vast system of roads and highways in order to move goods and supply services and for other travel purposes. Almost 3 trillion vehicle-miles (4.8 trillion vehicle-kilometers) were traveled in the United States in 2004 (Bureau of Transportation Statistics, 2005). There is almost 4 million miles (6.5 million kilometers) of roads in the United States, with just over 45,000 miles [73,000 kilometers (km)] composing the Interstate Highway System (fig. 2) (Federal Highway Administration, 2004). The total distance of U.S. roads combined could circle the Earth at the equator 160 times; the interstate highways, almost two times.

The Interstate Highway System, formally known as the Dwight D. Eisenhower National System of Interstate and Defense Highways, began to be constructed in the 1950s. Interstate highways were required to meet specific standards to ensure a long service life and provide safe travel. Standards included limited access, a design to accommodate vehicle speeds of 50 to 70 miles per hour (80 to 113 km per hour), a minimum of two travel lanes in each direction, 12-foot [3.7-meter (m)] lane widths, 10-foot (3-m) paved right shoulder, and a 4-foot (1.2-m) paved left shoulder (Federal Highway Administration, 2006). A generalized cross section of an interstate highway is shown in figure 3.

Materials in Use

The materials used to construct interstate highways are in continuous use except for those replaced during maintenance and lost through wear and tear. Even during maintenance much of the concrete and asphalt that is removed is eventually placed back in the highway. A U.S. Geological Survey study showed that, in the Denver, Colo., area in 1996, 80 percent of asphalt pavement debris and 50 percent of cement concrete debris were reused in some capacity, thereby reducing the need for new material from mining operations (Wilburn and Goonan, 1998).

Figure 4 shows the total quantity as of 2006 of selected mineral materials estimated to be in use in the roadways composing the Interstate Highway System. The data that were used to

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Figure 1. Graph showing U.S. apparent consumption of raw materials.

Figure 2. Map showing the National Highway System. Interstate highways are drawn in blue. Map from Federal Highway Administration (2006b).

Figure 3. Cross section showing of a typical interstate highway with concrete pavement. Data from Bob Bisgard, Asphalt Paving Company, Golden, Colo., oral commun., 2005.
The vast system of roads and highways in the United States provides a critical service to the country’s economy and people. The construction of these roads and highways has required and continues to require large quantities of materials, such as aggregates, asphalt, cement, and steel. The materials are providing services every time the road or highway is used.

**Summary**

The vast system of roads and highways in United States provides a critical service to the country’s economy and people. The construction of these roads and highways has required and continues to require large quantities of materials, such as aggregates, asphalt, cement, and steel. The materials are providing services every time the road or highway is used.

**References Cited**


**For more information, contact:**

Daniel E. Sullivan
U.S. Geological Survey
Box 25046
Denver Federal Center, Mail Stop 750
Denver, CO 80225–0046

Telephone: (303) 236–8747 x267
E-mail: desulliv@usgs.gov