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## **Tacoma Asphalt Landfill Cap Is Tough and Impermeable**

***By Edward D. Schlect, District Engineer, Asphalt Institute***

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The City of Tacoma needed a cap on a three-acre portion of its 190-acre refuse landfill for use as a solid waste processing station. The cap had to be structurally adequate, impermeable to water and environmentally acceptable.

The majority of the 190-acre landfill is being capped and closed over the next 24 years with drainage and protective layers.

After examining several options, the Tacoma Public Works Department decided that a hot-mix asphalt (HMA) cap was the answer. It was designed to be impermeable to the intrusion of surface water as well as structurally adequate for the support of refuse trucks.

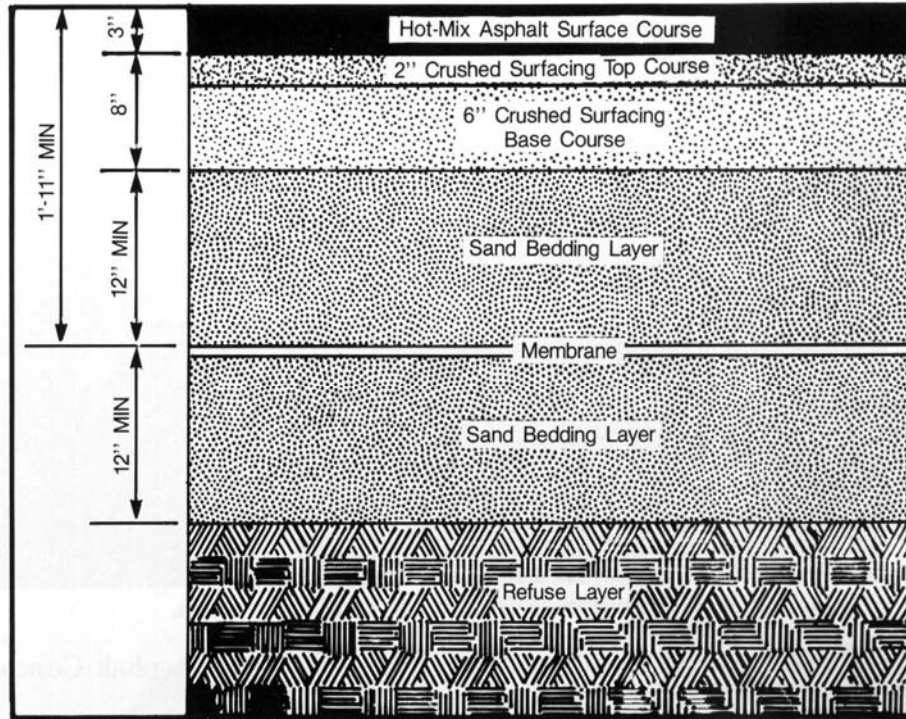
### **Design**

Consoer, Townsend & Associates, Inc. of Tacoma designed the cap and protective structure. The asphalt mix was designed by the City of Tacoma in conjunction with the Asphalt Institute and Woodworth & Company, the paving contractor.

First, 12 inches of sand was placed on top of the refuse. One layer of high-density polyethylene membrane (HDPE) was placed on the sand. Then another 12-inch layer of sand was placed over the liner to protect it and to serve as a working platform. Finally, 8 inches of dense-graded aggregate were placed on the sand and topped with 3 inches of HMA.

A Washington State DOT 5/8-inch maximum-size aggregate mixture was used for the 3-inch-thick HMA cap. A 75-blow Marshall mix design using 6.5 percent asphalt cement provided stability of 2500, flow of 15, 0.7 percent air-voids and a maximum permeability of  $1 \times 10^{-7}$  cm/sec. A seal coat of emulsified asphalt was applied to the paved HMA surface.

A drainage system, designed to catch any moisture that might intrude the cap, was constructed between the membrane and the HMA pavement. This provided the means to monitor the integrity of the cap.



Cross-section of paved area of refuse landfill with synthetic cover.

### **Cross-Section of Paved Area of Refuse Landfill with Synthetic Cover**

#### **Exceeded Requirements**

Both the EPA and the Washington State Department of Ecology criteria required a maximum permeability of  $1 \times 10^{-7}$  cm/sec. Six cores from the completed pavement had permeability values of  $9.1 \times 10^{-10}$  cm/sec or less under a constant 5.5 foot head of water for a minimum of 24 hours.

Mary L. Henley, Project Engineer for the City of Tacoma, says that the landfill cap is working well. A key test, she says, was the 100-year rainstorm that hit Tacoma in November 1990. "There was no leakage," said Henley. "No water was collected in the monitoring system: "She added that there is little or no ponding on the surface of the HMA pavement.

Construction of the landfill cap was completed in June 1990 and opened for use in July.

***This article appeared in the SUMMER, 1991, Vol. 5, No. 1, ASPHALT magazine***