

# Permeable Pavement: Design



Brian Ivancich

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Bradley University

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## **Introduction**

There are many different forms of permeable pavement, but the pavement form at study is permeable asphalt pavement. Permeable asphalt pavement has many different applications such as parking lots, residential streets, and heavy highway streets. All of which holds a minimum thickness in design per different form: 2.5 inches, 4 inches, and 6 inches, respectively. Within a general cross section of a permeable asphalt pavement, there are numerous layers in order from bottom to top of pavement: uncompacted subgrade, non-woven geotextile fabric, stone subbase recharge bed, choker course, and the hot mix asphalt layer. The aggregate used for the stone recharge bed should be clean, crushed stone. The crushed stone should have minimal to zero fines with a minimum void ratio of 40%. According to the American Association of State and Highway Transportation Officials (AASHTO), No. 3 size stone is specified for the stone recharge bed, but No. 1 and No. 2 have also been used.

A key component for flexible pavement design is the layer coefficient. The layer coefficient can identify each pavement layer with a number. When a pavement layer has a higher coefficient, the stiffer the material may be. The pavement layer coefficient is built upon a structural value, which can be determined by specific factors such as soil strength, climate, moisture, and traffic loads. According to a study done by University of Central Florida, the modulus of elasticity ranges from 300 to 1100 ksi for pervious asphalt.

Although permeable pavement design is still in its formative stages compared to impervious pavement design, many benefits come from the complex design of permeable pavement. These benefits include the replenishment of groundwater, decrease of stormwater runoff, and decrease the possibility of flooding in an area. Permeable pavement design has also

allowed for a lesser need of retention basins and swales. Although there are many benefits to porous asphalt design, there are defects in the design such as clogging, which requires maintenance for cleaning, and deterioration from the freeze thaw cycle of winter cold temperatures and snow.

### **Work in Progress**

Permeable pavement design software is currently exploring to determine the thickness of pavement layers considering traffic, material properties, and hydrologic properties. The final report will be delivered in end of March 2017.