

Porous Paving Design

Compared to Impervious Pavement Standards

Porous pavements by their very nature are designed to move water through their cross section - vertically and horizontally, without loss of structural integrity. This is in direct opposition to design training and construction materials and methods developed since the early 1900's, where totally impervious pavement sections were the supreme objective.

Must all pavements be constructed to impervious standards? No! Are all pavements appropriate for porous standards? No! However, there are appropriate applications for each, and the designer must determine which pavement is best suited to each project, or portion of project. A critical element to remember is that each pavement, whether porous or impervious, must be designed to meet project criteria.

Porous pavements are generally appropriate for applications where traffic moves slowly (less than 30 mph) and/or infrequently, such as with firelanes, service drives, overflow or all day parking, pedestrian areas, etc.

Porous pavement design incorporates more than just the surface "wearing" course, as is the usual case with porous asphalt or porous concrete, where the primary objective to remove water from contact between tires and the pavement surface. The base course, or primary structural layer, should also be designed for porosity to meet environmental and stormwater management objectives, as well as the occasional aesthetic design criteria. Depth of base course is still determined by evaluating the design load to be supported, and the load capacity of the subsoil (native or fill).

Eliminate "Fines"

The one significant difference between porous and non-porous pavement is the presence of "fines", or material that will pass a 200 mesh screen. Also classified as clay or silt size particles, fines will enhance compaction, reduce voids (air spaces), and restrict water movement through the pavement cross section. By the simple action of removing (or restricting) fines from the base course material, porosity is achieved.

Structural integrity is maintained by a wide range of particle sizes, varying from fine sand to 1.5" diameter stone, usually crushed to provide angular surfaces which interlock better than rounded surfaces. Sand and smaller stone help to fill large voids and prevent larger stone from rotation or other gross movement.

If local gravel material sources do not have standard mixtures that meet the low fines requirement, we have clients that have successfully prepared their own base course mixtures by blending 3/4"-1" crushed drainage rock (at 66%) with concrete sand (at 34%) by using a front end loader to do the blending into piles on a hard surface.

Horticultural Demands

Some variations of porous pavements, such as our Grasspave2 system, must also meet horticultural requirements in order for the vegetation to survive and flourish. This demand is met mostly by the sand sized particles and stability of the larger stone to prevent movement of the root zone once established. Sand will allow water movement, including capillary (vertical), and air access to the root zone.

Compaction

We have been promoting porous pavements since 1982, and have found that if the base course material is compacted to 95% Modified Proctor, both structural and horticultural criteria can be satisfied.