

Update September 2005

Several issues with the 2002-2003 permeable asphalt parking lots have been identified since the parking lots have been in use. These issues were identified through the research of Dr. Thomas Boving, Dr. Mark Stolt, and Janelle Augenstern, URI Departments of Geosciences and Natural Resources as well as through discussions with Jim Devol, Gilbane Company, Jerry Sidio, Director of URI Facilities Services and Dave Bascom, URI Landscaping.

Clogged Layer

Some clogging of the permeable surface was observed, especially in highly trafficked areas and, to some extent, in areas where snow was stockpiled during the winter. In addition, excavation at the edge of the parking lot for construction of a new sidewalk in July 2005, revealed that the permeable asphalt layer had become tacky and soft, apparently due to separation of the binder from the aggregate. (See Figure 6.) This resulted in sediment collecting at the surface, at a depth of approximately 1/16" thick. This sedimentation and tackiness is inhibiting infiltration. Cahill Associates suggested that the use of an improved mixture that includes the polymer Styrene-Butadiene-Styrene should prevent separation of the binder and eliminate tackiness.



Figure 6: Clogged Layer of Porous Asphalt

While this new porous asphalt mixture is recommended for future construction projects, it is likely that the cost of replacing the current asphalt on the parking lots would be prohibitive.

Water Quality Testing

Water quality testing indicates that no bacteria, BOD, or lead were present in the percolating water. Very low levels of organic pollutants (PAH) were found, and there was some indication that nitrate and phosphate are entering the ground. Additional tests reveal a 90% retention of zinc and copper in the asphalt.

Winter Maintenance

Magnesium chloride is being used as a deicer, as recommended by Cahill Associates. However, water quality testing reveals high chlorides during the winter, possibly indicating the presence of road salt within the parking lot during snow events. The addition of rumble strips at the entryways to the parking lots to shake salt and sand from tires might reduce the amount of salt and sand that is carried onto the porous asphalt, but Cahill Associates is unfamiliar with construction projects that can validate that outcome.

Some surface defects were observed on the parking lot. (See Figure 7.) This might be attributed, at least partially, to plowing, since it is uncertain whether the winter maintenance personnel were setting the plow blade 1" above normal use, as recommended by Cahill Associates. Since that time, additional recommendations were provided to URI personnel, so it is hoped that this can be

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corrected. However, it is also recommended that URI personnel investigate the progression of surface defects, after the plowing height is corrected, in order to determine if there are other causes.



Figure 7. Surface defects have appeared within the parking lots. The left photo shows a close-up view, while the right photo shows a particularly damaged area.

Geotextile Filter Fabric

Finally, restricted infiltration was observed below the geotextile layer at the base of the parking lot. While there are no current recommendations for solving this problem with the existing lots, it is worthwhile considering an alternative geotextile filter fabric, if additional construction occurs.

New Porous Parking Lots: Design Changes

In the summer of 2005, a new porous asphalt parking lot was constructed at URI, expanding the existing lot and increasing the capacity from 800 to 1600 cars. Several changes were made to the design to simplify maintenance and reduce the number of wheel stops, highly vulnerable to plowing. Those changes include:

- fewer, wider infiltration islands (See Figure 8 right.)
- curb cuts for water entry to island bioinfiltration areas
- mowed grass, not meadow grasses for islands
- fewer wheel stops, where possible



Figure 8. Wider infiltration islands are connected to conventional islands.

Final Recommendations

The field of permeable pavement technology is continually advancing. In light of that, we recommend thorough consultations not only with the engineering firm designing the permeable feature, but also with a range of environmental consultants who have demonstrated, recent experience with permeable projects. In addition, long term performance monitoring to demonstrate effectiveness of these technologies, identify design and maintenance improvements, and to make findings widely available to designers, regulators and consumers is also critical.