Porous Asphalt

Parking Lot Wins Praise in Portland

By Chuck MacDonald

The Port of Portland in Portland, Oregon., had a problem with a 45-acre, gravel-covered lot. Located next to the Columbia River, the lot was used as an offloading site for cars manufactured in Asia that were waiting to be shipped throughout the U.S. Drivers parking and turning in the lot caused the new cars to be sprayed with gravel, causing dents and chips to the paint.

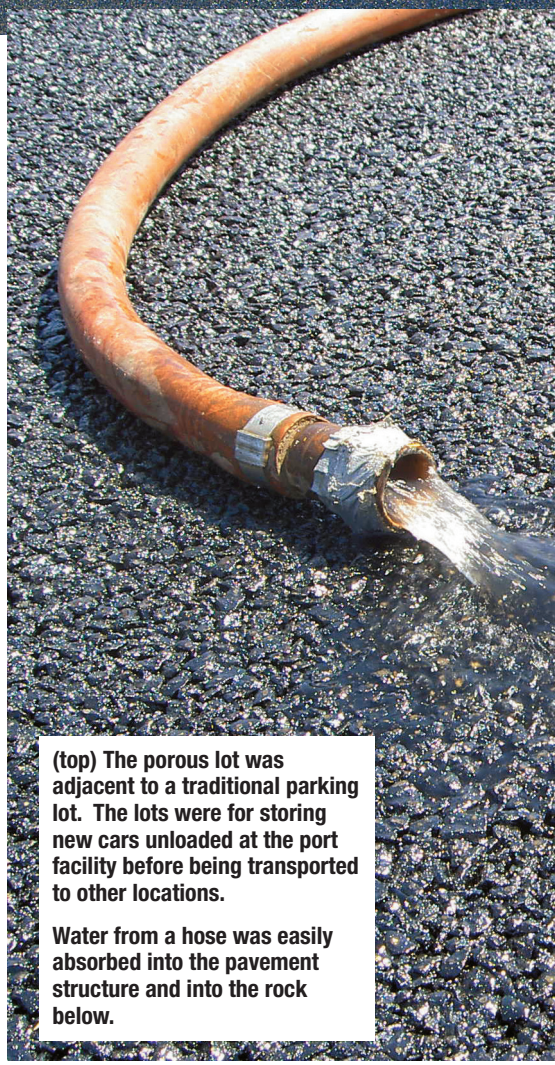
Engineers for the city decided to fix the problem by paving the lot. As they did their homework, they discovered some unpleasant facts. Applying for and receiving a permit could take as long as a year and a half. Meanwhile, the port would lose the revenue from the tenant who would no longer be parking cars on the lot.

Dave Dittmer, P.E., project manager for the port, and his colleagues, decided instead to try a porous asphalt lot on the site. An advantage to this option was that the project did not require a laborious permitting process since no stormwater would be discharged directly into the river, allowing the port personnel to begin planning for the construction right away.

"Since the lot was built on sand that had been dredged up from the river, it was an ideal place for a porous asphalt lot," said Dittmer. "Rainfall would filter through the pavement into the stone recharge bed and, over time, into the river."

The porous lot would also mean that the Port of Portland would not have to build a catch basin or outfalls to direct the stormwater to the river. "That saved us thousands of dollars," said Dittmer. "So when you add it all up, the porous lot was cheaper than a traditional lot would have been."

The unusual concept of a porous parking lot is that it allows water to filter through the pavement structure and to collect in a stone recharge bed underneath the pavement. The

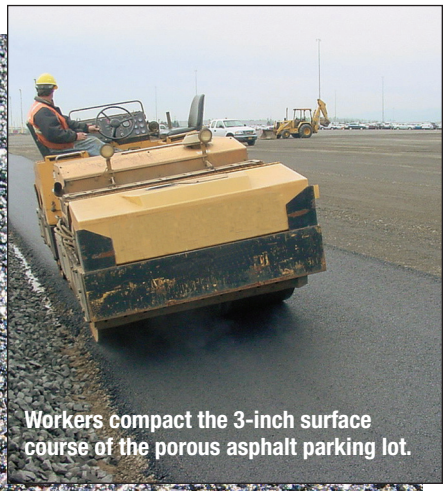


(top) The porous lot was adjacent to a traditional parking lot. The lots were for storing new cars unloaded at the port facility before being transported to other locations.

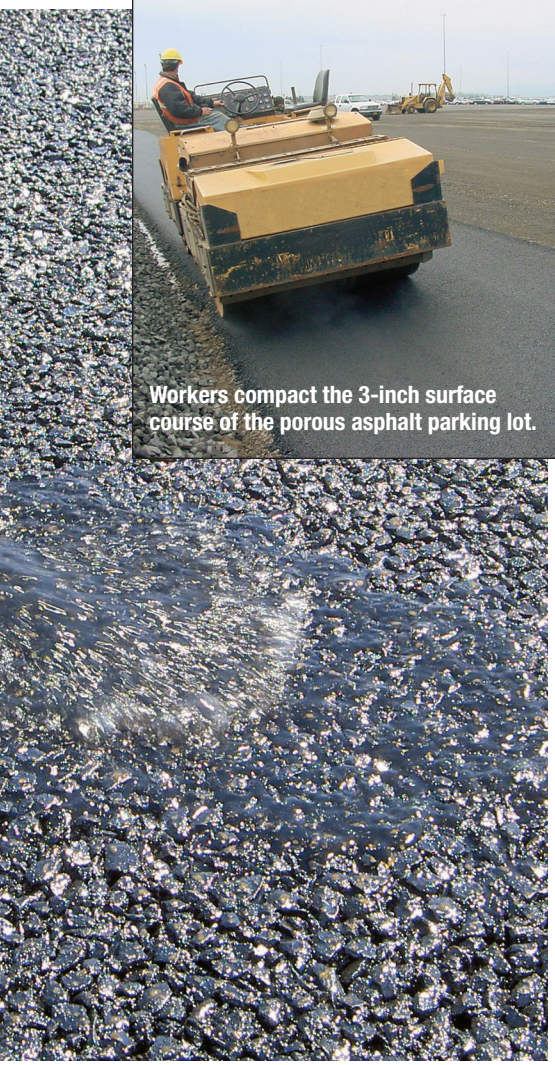
Water from a hose was easily absorbed into the pavement structure and into the rock below.

The paving crew kept a steady flow of asphalt to the paver. When complete, the lot comprised 45 acres. The project used 30,000 tons of porous asphalt and 13,000 tons of traditional HMA.

porous asphalt mix has a lower concentration of fines than traditional asphalt, allowing water to drain through the material. The underlying stone recharge bed must be uniformly graded to maximize the void space. The void space between the stones provides the critical storage volume for the stormwater.



Workers compact the 3-inch surface course of the porous asphalt parking lot.



Purifying effect

While many soils have clay-like properties that resist the water infiltration, the Portland site had sandy soil inviting the water to percolate through. This grid of rock and sand traps and treats impurities as well, enabling the water to flow into the river in a cleaner state than stormwater running off a traditional impervious pavement.

The pavement has three inches of porous AC surface course. The surface course was placed over a 1" choker course with a mixture of fine drain rock, which lies on top of an eight to 10 inch thick stone bed constructed of clean, uniformly graded drain rock. A non-woven geotextile between the base rock and uncompacted subgrade prevents fines from the subgrade from infiltrating into the stone bed. In many regions, the stone bed needs to be deeper, but because this area has soils that have high infiltration rates and does not have freeze-thaw issues, 11 inches of stone was sufficient. A total of about 30,000 tons of porous asphalt and 13,000 tons of traditional HMA were used for the 45-acre lot.

Lakeside Industries began the project in mid-May and completed it at the end of June. The paving crew compacted the stone bed only slightly, making sure it was porous enough for water to easily filter through.

Coffman Excavation was the prime contractor on the project. Their construction team prepared the subgrade and ran the static roller ahead of the paving operation. "The paving crew used a material transfer vehicle to keep a steady flow of asphalt to the paver, while at the same time keeping trucks off the tender surface of the choker rock," said Larry Hansen who supervised the paving operation. "The actual paving process was quite normal; we didn't experience any real problems."

Hansen noted that the production of the mix at the plant was tricky. "We had to keep tight controls on the mix, and not go back and forth producing other mixes at the plant in between loads. The mix was not easy to get right."

When the lot was completed, it was given the final test. Always a crowd pleaser, the final test involves running a stream of water from a hose on the surface of the lot. The Portland porous pavement swallowed water at the rate of more than 20 inches per hour, meaning it could easily absorb a rainfall of 20 inches per hour.

Tom Cahill's team at Cahill Associates, West Chester, Pennsylvania., designed the lot for the port. He sees this porous lot, and others of its kind, fulfilling an important need. "Every drop of stormwater that can be kept out of the regular sewer, is a drop that doesn't have to be processed by the system," said Cahill. "Porous parking lots can help cities keep their sewers and stormwater systems from being overwhelmed." *HMAT*