



PERVIOUS ASPHALT PARKING LOT GETS PICP MAKEOVER

By Charles Taylor, Commercial Hardscapes Advisor,
Belgard Hardscapes



Permeable pavement solves the need for parking space, and the need for stormwater management.

PRODUCT:

Aqua Bric Type 4

PROJECT TYPE:

Public Parking Lot

LOCATION:

Nashville, TN

MANUFACTURER:

Adams
an Oldcastle company

INSTALLERS:

Cumberland Valley Construction
Aqua Paving Construction

About Belgard® Commercial Hardscapes

Belgard Commercial is part of the Oldcastle Architectural Group, the largest concrete products manufacturer in North America. With over 180 locations and a company culture characterized by a commitment to customer satisfaction, Oldcastle adheres to a level of service and consistency that no other supplier can match. Our combination of local market presence and national capabilities allows us to meet and exceed the demanding needs of an ever-changing industry.

In 2005, Nashville's Richard H. Fulton Complex Metro Water Service Fulton campus installed a 52,000 sq. ft. porous asphalt parking lot as part of a low impact design (LID) system to control stormwater runoff. It was soon discovered the asphalt couldn't carry the weight of its burden in traffic and storm water management, and continuous maintenance was necessary to keep the asphalt pores free of debris and functioning properly. Due to the consistent maintenance/sweeping, the parking lot had eroded the asphalt surface making it unsafe for walking on the surface. The solution: a permeable interlocking concrete paver (PICP) makeover.

Goal One: Sustainability

When Nashville was seeking a parking solution for the complex—which houses its property taxes and assessment department, county

clerk and metro finance services—it looked for a pavement system with low impact benefits to meet new local stormwater requirements under the EPA and the Clean Water Act. Like many municipalities across the country that are seeking to meet stormwater regulations and take environmental stewardship to the next level, the primary goal was sustainability,

When porous asphalt was chosen, it was a sound decision at the time based on industry buzz around the low impact design that promised stormwater infiltration instead of runoff. The system was intended to reduce peak flows as the water would pass through the wearing course and then travel to bio-retention islands and bio-retention swales before being introduced into the traditional storm water system. An under drain configuration of pipes was put in place to make sure the water was directed to the various bio-retention islands and swales.

However, a few years later the porous asphalt on top of the system began to deteriorate. Aggregate loosened with cleaning and weather, and the surface became a liability risk and challenge for maintenance efforts.

Take Two: A Long-Term Solution

In 2012, the City of Nashville elected to replace the failing porous asphalt with permeable interlocking concrete pavers, basing the decision on the performance benefits of PICP— strength, durability, superior functionality and lower lifetime maintenance—and the effective results PICP was gaining in other projects.

Nearby shopping center, Gateway Village—a 92,000 square-foot mixed-use parking lot in Murfreesboro—had recently installed a PICP system and was able to show exceptional results and success in the two years following



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the install. Working with a grant from the City of Murfreesboro, the Concrete Industry Management program at Middle Tennessee State University studied water quality and quantity using an ISCO sampler situated at the site for two years. In that period of time there was 41 inches of rain (2.3 million gallons of water) and they found that there was no water discharge at the outlet located at the back of the site. All of the water from the rooftops and parking surface was infiltrated back into the soil and replenished into the groundwater aquifer system.

With this case study in hand and several other area commercial projects seeing success in permeable pavers, the City of Nashville had a clear path for a long-term solution.

No Time Lost

Permeable interlocking concrete pavers also offered a short-term benefit. During construction, half the parking area needed to remain open to the public to conduct business with the various government offices that share the lot. Contractor Cumberland Valley Construction and installer Aqua Paving Construction began by demolishing and removing the existing four to five inches of porous asphalt. The area was re-graded to bring the existing #57 open-graded aggregate to a compacted elevation of -5". The project team placed and screeded #8 washed chips as a setting bed and support of the 80mm (3") thick concrete permeable pavers. They mechanically placed the Belgard Aqua Bric Type 4 permeable pavers in 12 square foot layers in the final laying pattern. The pavers were saw-cut at the edges, as required, and the installation crew used a 5,000-pound plate compactor to force setting bed and pavers into position.

Once that was done, they were able to sweep and compact washed 1/4-inch chips into joints (the open spaces between the pavers). The job was estimated to take six weeks, but the mechanical installation helped reduce the schedule by two weeks. Additionally, the areas completed were immediately available the next day for business parking, since no curing time is required for PICP.

In addition to keeping the parking lot open during renovation, the project team also was able to save time during the installation phase

thanks to the condition of the base. The layer of No. 57 stone needed very little re-leveling, and the existing bioswales and original storage capacity were in good condition and did not need replacing or reconstruction.

Putting the Pavement to the Test

After the installation, the City of Nashville enlisted the help of the local fire department to conduct a demonstration of the new paver parking lot's infiltration capabilities. Thousands of gallons of water were released in an isolated area to show the infiltration rates. The test proved the stormwater benefits; permeable pavers efficiently reintroduce rain water back into the ground, reducing the amount of stormwater runoff entering the Cumberland River and carrying with it contaminants and pollutants. Additionally, the engine from the Nashville Fire Department illustrated the structural capability of the paved parking surface, whose concrete pavers offer both durability and aesthetics. Permeable interlocking concrete pavers provided the City of Nashville with a post-structural Best Manufacturing Practice that reflects its commitment to sustainability and safety.

Benefits of PICP

The obvious benefit of PICPs is the control of stormwater quantities. Depending on the exfiltration design selected, runoff can be significantly if not totally eliminated therein reducing the stress on area sewer systems. Groundwater infiltration is promoted, allowing for recharge of the aquifer and maintenance of the area base flow conditions.

Other Potential Benefits

Infrastructure

- Conservation of space on the site
- Reduction or elimination of stormwater retention ponds, which creates more usable property on the site
- Reduction or elimination of stormwater conveyance works, therein reducing total development costs

Environmental

- Reduction of downstream erosion
- Improved water quality
- Prevention of water heating
- Increased recharge of groundwater
- Enhancement of tree survival by providing air and water to the roots
- Urban heat island reduction by using light colored pavers

Health and Safety

- Elimination of puddling and flooding on parking lots
- Reduction in risk of accidents/injuries/pests associated with retention ponds

Regulatory

- Reduction of impervious cover quantities (which are regulated in certain areas)
- Faster snow melt drainage, and reduction in the use of de-icing salt
- Eligibility for LEED® credits