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PICP Supports Toyota Dealership in Attaining LEED® Certification

Jordan Meade, MacKay & Sposito, Inc. • Vancouver, WA



Toyota builds the largest PICP project in the U.S. which eliminates runoff from a dealership in Vancouver, Washington

McCord's Vancouver Toyota recently faced a unique design challenge when planning an expansion to its facility in Vancouver, Washington. Its goal was to enlarge the existing 50,000 sf (5,000 m²) facility to more than 80,000 sf (8,000 m²) on a ~16 acres (~6.5 ha) site. Toyota wanted to maximize space for parking, vehicle display and storage, but also needed to meet Clark County's stormwater quality and quantity control requirements. In addition, an existing state stormwater facility in the vicinity was not designed to accommodate additional runoff from the Toyota site.

The design team recognized the low-impact way to handle stormwater on-site with permeable interlocking concrete pavement (PICP) for the vehicle parking spaces. The solution provided 7½ acres or about 326,000 sf (3 ha) of mechanically installed PKCP (see Figure 1) that eliminated connecting to a stormwater system. Early in the site planning process when PICP was suggested as a design option, the team recognized that PICP could assist in the entire project in qualifying for LEED® silver certification. LEED® certification is pending at this writing. PICP contributed to

earning Sustainable Sites (SS) LEED® credits 6.1 and 6.2 due to PICP reductions of runoff volumes and water pollutants. The pavers have a 39 solar reflectance index (SRI) so they support LEED® credit SS 7.1: Heat Island Effect-Non-Roof. In addition, the project earned additional credits from LEED® Materials & Resources credits MR 5.1 and 5.2—Regional Materials 20% based largely on the pavers.

The project design team included two LEED® pioneers: MacKay & Sposito's Bob Sable, a senior planner, and Jennifer McClure, a professional engineer. Sable and McClure were the first planner and engineer in southwest Washington to earn LEED® Accredited Professional status. "I knew the goal to achieve LEED® certification would fit perfectly with Toyota's philosophy and corporate values," Sable said. "Even with the large-scale expansion of their Vancouver Toyota facility, they wanted to minimize the environmental impacts as best as possible." Greg Leonard, general manager of Vancouver Toyota, added, "When you consider how much energy is consumed during the life span of a building, it makes perfect sense to build a green site."

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Figure 1. Mechanical installation speeds PICP installation.



Figure 2. The completed project was submitted for LEED® silver certification. The paver's solar reflective index of 39 and the PICP's ability to reduce runoff and pollutants contributed to LEED® credits.



Figure 3. PICP cross section utilized ICPI recommendations on stone sizes for bedding, base and subbase.



Figure 4. PICP can withstand heavy truck loads. Since PICP requires no curing, this truck delivered pavers on a completed area of PICP to support construction of the remaining area.

The conversation on sustainable design started early in the site planning process. The design team approached City development review staff and presented the low-impact alternative using PICP throughout the parking area. Collaborators worked through the design issues not currently specified in the local building code but encouraged through City policies supporting sustainable design. The design eliminated a ~1.5 acre (0.6 ha) detention pond since all water was infiltrated on the site.

The ability of the PICP to eliminate a detention pond was based on a cross section of 3 1/8 in. (80 mm) thick concrete pavers, 2 in. (50 mm) of ASTM No. 8 stone bedding over 4 in. (100 mm) of ASTM No. 57 open-graded base and 12 in. (300 mm) of ASTM No. 2 subbase. Figure 3 illustrates the cross section which can store about 5 in. (125 mm) of

rainfall. The PICP was built over a mix of gravelly and silty loam. ICPI members supplied and installed the project.

During the 100-yr, 24-hr design storm the ponding depth in the subbase was forecast to be less than 5 in. (125 mm) using an infiltration rate of 1/2 in./hr (13 mm/hr). The infiltration rate used to analyze the section was well below the tested infiltration rates at the site. The PICP will handle storm depths larger than the 100-yr storm; however, the section was only analyzed to the 100-yr storm event. In the highly unlikely event of a catastrophic flooding of the PICP, emergency overflows will drain into a wetland at the southwest corner of the site which is ultimately connected to Burnt Bridge Creek. With this design the intent is for all storms to be infiltrated with no overflows even during the largest design storms. To date, there has been no pond-

ing on the pavers. The project can easily handle tractor-trailers including those that frequent dealerships with car deliveries (see Figure 4).

This project was the first project in Clark County, Washington that proposed using PICP in a system for water quality treatment as well as quantity control. That being the case, Clark County accepted this project as a "pilot project" for new and emerging technologies and agreed to monitor the system per their Pilot Project Program.

The team then turned its attention to obtaining site certification. McCord's Vancouver Toyota exceeded all requirements for LEED® silver certification. The process to register for LEED® certification is technically meticulous and usually increases development costs. For Toyota, LEED® certification increased costs by 15 percent but it expects to recover the investment in six to eight years thanks to savings from the pavement and building expansion design. The inclusion of a LEED®-AP on the design team qualified the project for one automatic point toward LEED® certification. Through broad thinking and collaborative design, McCord's Vancouver Toyota is on track to become Washington's first LEED® accredited auto dealership. Once construction is completed, Vancouver Toyota will have the largest permeable paver site in the U.S.

The project team came away with recommendations for future LEED® certified projects:

- Involve city and state agencies early in the design process when proposing alternatives that are not yet specified in codes. This was invaluable in simplifying the review timeline for the project.
- Decide whether to pursue LEED® certification when site planning is occurring. This provides opportunity to document decisions and alternatives as a project evolves.
- Ensure that the documentation process is a collaborative one that involves all contractors and sub-consultants affected. As with all effective project management, clarifying expectations for all contributors early in the design process will streamline the pursuit of certification. This effort requires participation from everyone on the project team including civil and mechanical engineers, building and landscape architects, the general contractor and lighting designer. ♦

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