

P4 Infrastructure for the ASCE PICP

Monitoring Systems

Recipient: ASCE Foundation

Grant: \$23,685

Completion: 2022

Project Summary: 27



Background and Need

In 2022, P4 Infrastructure Inc. installed a monitoring station in the 4,000+ square feet Permeable Interlocking Concrete Pavement (PICP) parking lot at the headquarters of the American Society of Civil Engineers (ASCE) in Reston, VA. For more details on the ASCE Low Impact Development (LID) PICP Retrofit Project, generously donated by the ICPI Foundation for Education and Research, please consult Fact Sheet 24.

P4's technology is tailored to monitor infiltration and flows in LID practices, particularly in permeable pavements. The technology and software can be deployed in partially or non-infiltration permeable pavements within an urban drainage system. Furthermore, the information obtained from the software can be employed to mitigate the risk of excessive (conservative) over-design, which is often associated with LID practices, particularly permeable pavements. This is achieved by demonstrating the efficacy of a permeable system even when using a reduced subbase reservoir thickness or a lower count and size of pipes in a stormwater drainage system. This project is P4's first project integrating their monitoring equipment with PICP.

Objectives

The primary objectives of the P4 PICP monitoring systems were to maximize exposure for the ASCE PICP LID Retrofit Project and to illustrate the purpose and benefits of PICP. A display, situated in the main lobby (Figure 2), is intended to be viewed by students, government officials, ASCE staff, and civil engineers visiting ASCE for meetings.

To achieve this, a rainfall gauge (Figure 4) was installed on the building roof, along with two devices measuring infiltration at the lower and upper ends of the parking lot's permeable pavement (Figure 3). These gauges are equipped with hardware that transmits rainfall, temperature, humidity, and infiltration data to a monitor display in the building's main lobby through ASCE's Wi-Fi (Figure 1). The display also features a cross-section model of the PICP along with a replicated sensor



Figure 1: Display on the Monitoring Station in the ASCE Lobby



Figure 2: ASCE main lobby with PICP display

Outcomes

The P4 PICP monitoring system serves the dual purpose of educating on PICP while highlighting the significance of the PICP parking area, which serves as a flagship entrance to the ASCE Headquarters. This prominently underscores ASCE's design values of sustainability and resiliency. Additionally, there is the potential for the rainfall depths and infiltration data generated by these devices to serve as a valuable byproduct for future projects undertaken by the ICPI Foundation and ASCE.



Figure 3: Infiltration monitor installed in the lower PICP parking lot.



Figure 4: Rain gauge on ASCE headquarters rooftop.