

# Permeable Design Pro Software Update

Recipient: Applied Research Associates, Inc.

Grant: \$48,430 PI: David K. Hein, P. Eng.

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Project Summary: 17

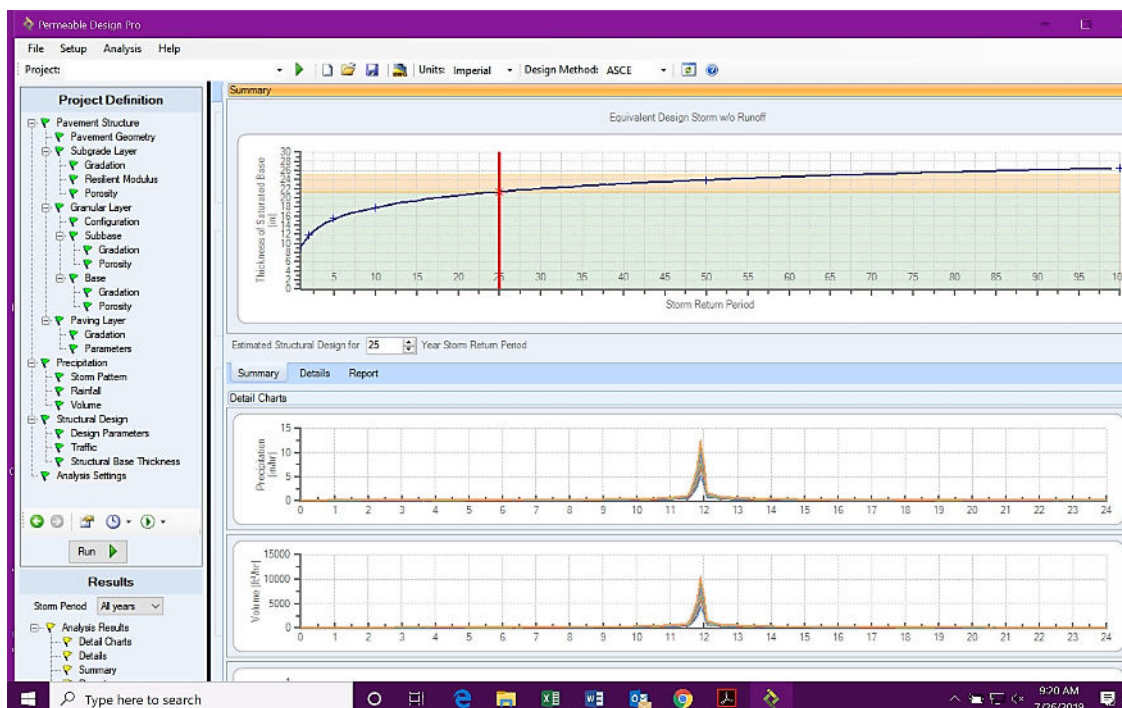


## Background and Need

Permeable Design Pro (PDP) software was initially released in 2008. The program includes hydrologic and structural design models for permeable interlocking concrete pavement (PICP). A water balance model is used for hydrologic design based on the U.S. Federal Highway Administration's (non-proprietary) Drainage Requirements in Pavements program. Structural design was based on the flexible pavement design methods in the 1993 AASHTO *Guide for Design of Pavement Structures*. This design method for impervious flexible pavements was adopted for use with PICP by ICPI in 2011.

In 2014, the ICPI Foundation received a research report from the University of California Pavement Research Center (UCPRC) with revised subbase thickness design tables for permeable interlocking concrete pavement (PICP). The revisions were based on mechanistic modeling and full-scale load testing by UCPRC. The tables were included in ASCE 68-18 *Permeable Interlocking Concrete Pavement*, in Caltrans permeable pavement design guidance, and in ICPI's PICP manual.

The UCPRC research resulted in revising ICPI's subbase thickness design tables in 2016. UCPRC validated the AASHTO method but provided more efficient (thinner) subbase cross sections, especially in semi-arid regions and over high infiltration soils.



Hydrologic design output from the program.

## **Objectives**

This project updated the design tables in PDP. Specifically, users can select the existing AASHTO design method or the labeled “ASCE” method for structural design. If the latter is selected, the updated program provides a library on the 24-hour rainfall depth sorted by the number of days per year. This is essential design information since the number of days per year water stand in the subbase is an input variable in determining its thickness. The user also inputs soil infiltration rate, soil strength, and lifetime equivalent single axle loads (ESALs). This information is used to calculate a subbase thickness using the UCPRC design method.

## **Outcomes**

Including the UCPRC design method in PDP can result in thinner, less costly subbase thicknesses than using the AASHTO design method.

The project deliverables include a PowerPoint presentation as well as the structural design upgrades. The PowerPoint will be delivered via webinar to ICPI members. For current users of PDP, the updated version will automatically upload and upgrade to the existing version when connected to the Internet. This is expected to be available in the fall of 2019.

PDP is for sale on [www.permeabledesignpro.com](http://www.permeabledesignpro.com). The program is provided free to ICPI members so that it can be given without charge to civil and geotechnical engineers and other professionals that design PICP.