Permeable Pavement Road Map

Recipient: University of California (Davis) Pavement Research Center (UCPRC)
Grant: $15,000 PI: John Harvey, PhD and David R. Smith
Completion: 2018
Fact Sheet 12

icpi Foundation for Education and Research

Background and Need

In early 2017, the UCPRC and the National Center for Sustainable Transportation (NCST), working with the Interlocking Concrete Pavement Institute (ICPI), identified gaps in knowledge and other barriers to wider implementation perceived to be holding back the full potential for deployment of pavements that simultaneously solve transportation, stormwater quality, and flood control problems.

Objectives

A workshop was organized in November 2017 based on those discussions with the goal of identifying knowledge, information, and communication barriers to adoption of permeable pavement of all types, and creation of a road map to address and overcome them. The workshop brought together a diverse group of over 50 stakeholders from the planning, stormwater quality, flood control, and pavement communities to listen to presentations, exchange and discuss unanswered questions identified by the group, and then to discuss a proposed road map to fill the gaps in knowledge, processes, and guidance. Besides the ICPI Foundation, other sponsors included the National Ready Mixed Concrete Association (NRMCA), the National Asphalt Pavement Association (NAPA), and Tongji University Sponge City Project (Shanghai, China).

Outcomes

The full report is found here. The following summarizes 10 proposed roadmap routes. Each route was detailed with a set of projects to fill gaps and help achieve the goal of making permeable pavements a choice that can be considered by planners, designers, and maintenance and water quality professionals with confidence. The document provides funding guidance to the Foundation.

Route 1. Infrastructure management organizations that consider the full functionality of permeable pavements. Research and empirical information inevitably points to institutional changes, i.e., bridging the gap between stormwater agency and road agency priorities and cultures.

Route 2. Planning guidance that considers the multi-functionality of permeable pavements. This route also capitalizes on research and expanding experience with permeable pavements. This route includes developing planning guidance, reviewing the long-term performance of existing installations, developing criteria for user comfort, and developing idea books, some of which will include case studies in various climates, soils, and applications.

Route 3. Accurate life cycle cost analysis and environmental life cycle assessment tools. Concurrent with asset management, perfect life cycle cost analysis (LCCA) tools that account for on- and off-site costs and benefits to support designer, stormwater agency, and road agency decisions regarding use of permeable pavements. This route includes development of life cycle assessment (LCA) tools to calculate environmental impacts considering the full life cycle, i.e., manufacturing, construction, use, and end-of-life stage environmental impacts for a functional unit of permeable pavements and including their related off-site impacts. This requires flexible, site-specific system boundary condition definitions. These should be integrated into pavement design and asset management programs.

Route 4. Reduction of target pollutants to meet water quality requirements. Develop design decision trees/menus for reduction of target pollutants from existing and additional research. Include runoff reduction as an integral part of water quality management objectives and pollutant reduction credits.

Route 5. Reduction of urban flooding risks. Develop approaches for considering permeable pavement in flood models for use in zoning, planning, land development codes, and flood control design.

Route 6. Reliable pavement structural designs. Complete the development of reliable structural design tables that account for long-term saturated soils typical to permeable pavements. This will likely require a significant investment in materials research, full-scale pavement testing, and mechanistic modeling that covers a range of soil conditions and traffic loads. Hybrid pavement systems that have some combination of pervious concrete, porous asphalt, and/or concrete pavers must be explored to achieve higher capacity, more reliable structural designs that perform well in saturated soils. Demonstration projects are encouraged.

Route 7. Routine achievement of high-quality construction. Improve construction guide specifications, including improved construction methods, and quality control and quality assurance test methods and inspection protocols/checklists.

Route 8. Maintenance and rehabilitation costs and methods. Refine information regarding maintenance best practices and their costs for different applications and make them widely available. Improve maintenance methods, including surface-cleaning techniques and equipment, and quantify potential deicer use reduction. Identify best practices for hydrologic and structural rehabilitation and for reconstruction methods for aging permeable pavements.

Route 9. Incorporation of permeable pavements into asset management systems. Based on results from the five routes above, develop/refine asset management tools for stormwater agencies and road agencies.

Route 10. Efficient and comprehensive access to the best information. This path includes developing a clearinghouse and/or a center or centers for permeable pavements, as well as communications with practitioners, policy-makers, and other stakeholders. It also includes finding funding to execute this road map.