



OHIO CONCRETE - ENGINEERING SERVICES CENTER

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CAUTION

PROPER DESIGN, INSTALLATION, SPECIFICATION ENFORCEMENT AND MAINTENANCE OF PERVIOUS CONCRETE PAVEMENT SYSTEMS

There has been an increasing interest and use of pervious pavements in Ohio for post-construction stormwater management systems. In many areas pervious concrete pavement systems have been applied and are functioning successfully, however in others they have clogged in a short time and/or experienced excessive surface raveling damage. Many failures can be attributed to installation contractor inexperience, use of unproven/untested pervious mixtures, lack of oversight and enforcement of specifications, improper site design and routine inspection and maintenance (cleaning). For a pervious concrete pavement to work successfully:

- A Maintenance Program is critical to the long-term performance of pervious concrete pavement, especially those activities that prevent clogging of the surface pavement and subsequent clogging of the subsurface layers by accumulated sediments and organic matter. Changes in infiltration rates must be routinely monitored throughout the life of the pavement (ASTM C1701 - Standard Test Method for Infiltration Rate of In-Place Pervious Concrete). Establishment of a base infiltration rate at the completion of pavement construction will allow for routine inspection and subsequent infiltration rate testing of potential clogged areas. A routine inspection schedule is required to check for infiltration rate changes that would prompt the restoring procedures (cleaning) required to remedy porosity levels;
- Proper specifications must be required which clearly state the desired performance, installation and testing requirements of the fresh and in-place concrete. Many failures have been caused by a lack of clear guidance and enforcement of the specifications from the Architect/Engineer as to what is expected of the producer and contractor. A pre-paving conference by the supply, testing and placement teams is critical to address the key items necessary for a successful installation;
- Ideal site locations to place pervious concrete pavements with detention are in the project's parking stalls. Caution is suggested to avoid placement of pervious concrete in areas with repeated dynamic torsional forces such as turning lanes, entrance/exit aprons and tight radius locations. Barriers, rock borders or perimeter swales should be used to prevent or limit the runoff of sediment onto pervious pavements. Developers, architects and engineers are strongly advised to visit locations where pervious concrete pavement systems have been installed before making the decision to use this concept;

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- Permeability of the project's soils should be verified. The permeability of the soil must, at a minimum, match that of the stormwater system design whether on a sandy subgrade or less permeable soil type such as clay. Permeable pavements facilitate infiltration and filtering of runoff and recharging of the groundwater table (although they may not infiltrate the entirety of the rain water in large storms). If necessary, an overflow outlet may be required to prevent water storage within the pavement if storage volumes are at capacity in the recharge bed layer;
- Construction site runoff and heavy equipment should be kept from entering the pervious pavement area. The pervious concrete pavement should not be placed into service until all disturbed land that drains to it has been stabilized by vegetation. Strict erosion and sediment controls during any construction or landscaping activity are essential to prevent the system from clogging and should be incorporated into the construction site stormwater management plan and;
- Cold weather placement of pervious concrete placement is not advised since the pervious concrete is more susceptible to freezing because its porous nature prevents pervious concrete from generating and retaining heat of hydration. Any freezing of the pavement will likely result in damage. Construction should not be scheduled when there is a chance for liquid precipitation or when a cold front with freezing temperatures is expected. Due to rapid evaporation causing insufficient water for cement hydration, hot water should not be used in batching pervious concrete mixtures. Besides protecting the freshly placed concrete from freezing, the concrete must be maintained at a reasonably warm temperature for the first 7 days to sustain hydration of cementitious materials. Curing duration before opening to traffic may need to be extended in cooler weather.

Further information and guidance on the proper applications, design, installation, specifications, material mixture, quality control inspection/testing, and maintenance is available through the below sources:

Ohio Concrete - Specifier's Guide for Pervious Concrete Pavement with Detention
<http://www.ohioconcrete.org/>

American Concrete Institute's ACI 522R - Report on Pervious Concrete
American Concrete Institute's ACI 522.1 - Specification for Pervious Concrete Pavement
<http://www.concrete.org/topicsinconcrete/topicdetail/pervious%20concrete>

Ohio Department of Natural Resources (ODNR) Division of Soil and Water Resources - *Rainwater and Land Development Manual*; refer to Chapter 2 - Post Construction Stormwater Management Practices.
<http://www2.ohiodnr.com/soilwater/water-conservation/stormwater-management#RAI>

National Ready Mixed Concrete Association - Pervious Concrete Pavement
<http://www.perviouspavement.org/>

Environmental Protection Agency - Water: Best Management Practices
<http://water.epa.gov/polwaste/npdes/swbmp/Pervious-Concrete-Pavement.cfm>

Contact one of Ohio Concrete's Regional Directors or engineers for further discussion and assistance. Visit our website at www.ohioconcrete.org

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