

## Pervious Concrete: When it Rains...

## It Drains.

### Naturally...

- Reduces Runoff
- Cleans Stormwater
- Replenishes Aquifers
- Conserves Water
- Protects Streams

### When it Rains, it Drains

Stormwater runoff occurs when rain falls in urban areas. This runoff causes increased pollution in rivers and streams, flash floods and loss of rainwater that could otherwise replenish water tables and aquifers. Pervious concrete has a 15–25% void structure in the hardened concrete. Typically, flow rates of 200 litres of water per minute pass through each square metre of pervious pavement but flow rates can be substantially higher. This is far more water than is normally generated during most rain storms.<sup>1</sup> Pervious concrete puts rainwater back in the ground where it belongs.

#### Pervious Concrete: The Natural Choice

Parking lot pavement made of pervious concrete allows rainwater to filter through to underlying soil and is thus an excellent choice for stormwater management. Pervious concrete is a mixture of mainly coarse aggregate, cementing materials and water. The reduced sand content results in a pavement with a high void content, thereby, allowing water to pass freely through it. Overall, pervious concrete can make an important contribution to achieving a community's sustainable development goals.

#### Pervious Concrete: The Smart Business Choice

Using pervious concrete pavement in large parking lot areas can reduce the need for water retention ponds



because the pavement itself acts as a retention area. Parking lot owners will spend fewer dollars on labour, construction and maintenance of retention ponds, skimmers, pumps, drainage pipes and other stormwater management systems. Expensive irrigation systems can also be downsized or eliminated. A pervious concrete parking lot will help reduce demands upon sewer systems.

Developers could be using pervious concrete for parking lots to increase utilization of commercial properties. The land ordinarily devoted to costly stormwater management practices can now be developed or preserved.

Pervious concrete is a durable material; properly designed and constructed streets and parking lots will last many years with minimal maintenance. Thus concrete, conventional or pervious, is widely recognized as the lowest life cycle cost option available for pavement material selection.

#### Pervious Concrete: The Environmentally Sound Choice

Stormwater runoff can send as much as 90% of the pollutants, such as oil and other hydrocarbon liquids found on the surface of traditional parking lots, directly into rivers and streams. By capturing rainfall and allowing it to percolate into the ground, soil chemistry and biology can treat the polluted water naturally.<sup>1</sup>

Pervious concrete also contributes to enhanced air quality by lowering atmospheric heating through light color and low density, decreasing the heat island effect which occurs with dark pavement surfaces. The heat island effect is characterized by an up to 4° C average temperature increase between an urban area and its surrounding countryside and an increase in the probability of smog due to the higher temperatures.<sup>2</sup>

Concrete surfaces, both pervious and conventional, have a much higher albedo—a measure of reflectance—



than other paving materials such as asphalt. The inherently light color of concrete naturally reflects heat and light. A study comparing conventional concrete pavement and asphalt pavement showed potential savings of up to 31% for the cost of initial energy and maintenance for lighting.<sup>2</sup>

#### Benefits of Pervious Concrete

- Reduces stormwater runoff
- Reduces or eliminates the need for retention ponds
- Reduces impact and cost of stormwater treatment infrastructure and public safety liability.
- Replenishes water tables and aquifers
- Allows for more efficient land development
- Minimizes flash flooding, standing water and backflow into the property causing damage (continued overleaf >)



## Pervious concrete puts rainwater back in the ground where it belongs.

- Prevents warm and polluted water from entering streams and affecting marine habitats
- Mitigates surface pollutants
- Reduces Heat-Island Effect
- Enhances traction and helps minimize the potential for hydroplaning
- May assist in earning points for LEED certified buildings

Pervious pavement is a Best Management Practice recommended by the U.S. Environmental Protection

Agency (EPA) and for the management of stormwater runoff.

### Frequently Asked Questions

#### Q: What about drainage issues in soils with high clay content?

**A:** Typically, if a soil type has sufficient percolation to support a septic tank system it will be compatible with pervious concrete. If a soil is truly impervious, the pervious concrete system will still be useful for retention pond requirements. A typical parking lot design may have 120 to 200 mm of pervious pavement on top of a 150 to 300 mm sub-base of 19 mm (#57) stone (40% voids) on a geotextile fabric.

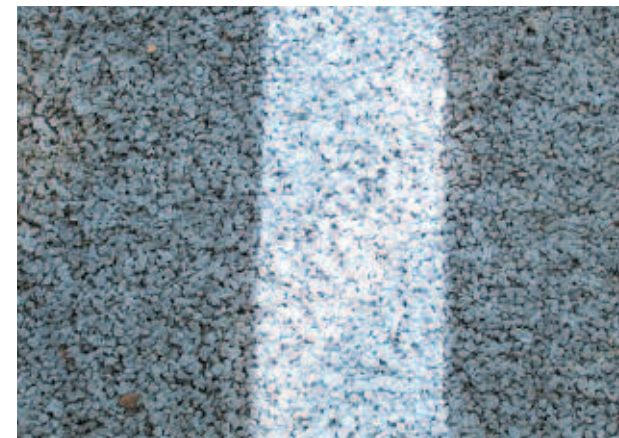


#### Q: What about freeze-thaw issues?

**A:** Pervious concrete has been used in freeze-thaw climates for over 15 years. Successful applications of pervious concrete in freeze-thaw environments have two common design features: the cement paste is air-entrained and the pervious concrete is placed on 150 - 300 mm of drainable aggregate base (19 mm or larger clean gravel). Research by the National Concrete Pavement Technology Center showed mixes containing single-sized river gravel with 7 % sand showed the best performance when subjected to freeze-thaw cycles.<sup>3</sup> For additional information on pervious pavement in freeze-thaw applications, see: [www.concreteparking.org](http://www.concreteparking.org) and view documents on pervious concrete, including "Freeze-Thaw Resistance of Pervious Concrete" and "Concrete in Practice #38 – Pervious Concrete."

#### Q: What about clogging?

**A:** Clogging is a design and winter maintenance issue. Proper design will separate natural areas with grass or exposed soil from draining onto pervious pavement, which will minimize chances of clogging. Vegetable matter can collect on the surface of the pervious concrete causing some clogging, but routine sweeping or vacuuming will restore porosity. In northern climates, winter maintenance routinely includes the use of rock salt and sand mixtures which can also potentially cause clogging. Owners may request winter main-



tenance with no sand. Studies indicate pressure washing can restore 80% to 90% of the pavements original permeability.<sup>1</sup> It should also be noted that even clogged pervious pavement still drains partially.

#### Q: What other uses are there for pervious concrete?

**A:** Pervious concrete has been successfully used for low volume streets, driveways, sidewalks, golf cart paths, slope protection and French drains. It can be utilized in a variety of paving applica-

tions to provide hardscape without altering hydrology of the land.

#### Q: Where can I find additional studies and technical papers on Pervious Concrete?

See references list in the [Pervious Paving Applications section of the Concrete Thinker](#) ( [www.concretethinker.com/Papers.aspx?DocId=10](http://www.concretethinker.com/Papers.aspx?DocId=10) ) and ( [www.perviouspavement.org/](http://www.perviouspavement.org/) )



### References

- 1) Tennis, P.D., Leming, M.L., Akers, D.J., "Pervious Concrete Pavements" PCA Serial No. 2828, Portland Cement Association, 2004.
- 2) Gajda, J.W., Van Geem, M.G., "A Comparison of Six Environmental Impacts of Portland Cement Concrete and Asphalt Cement Concrete Pavement," PCA R&D Serial No. 2068, Portland Cement Association, 1997.
- 3) Schaefer, V.R., Wang, K., Suleiman, M.T., Kevern, J.T., "Mix Design Development for Pervious Concrete in Cold Weather Climates," National Concrete Pavement Technology Center, Final Report, February 2006.



Ready Mixed Concrete Association of Ontario  
#3 – 365 Brunel Road, Mississauga, ON L4Z 1Z5  
[www.rmcao.org](http://www.rmcao.org)

