Pervious Concrete
Concept Doesn't Hold Water – But That's The Point

A significant cost of the infrastructure for new development is to ensure that water drains away from buildings and roads. Covering over natural vegetation with hard surfaces means less water naturally infiltrates into the ground, creating more surface runoff that needs to be removed and delivered through stormwater systems of underground pipes and ditches to receiving watercourses. Stormwater runoff from developed areas flows to the receiving waters much faster and in greater volume than under natural conditions. This can cause channel erosion, flooding, loss of aquatic habitat, and water quality degradation. As more development occurs, municipalities are faced with one of two options: increase the municipal to deal with the increase in stormwater runoff, or find ways to decrease the volume of runoff that flows to streams.

Challenged with the latter, BC's developers, specifiers and architects are discovering to a unique product with extremely porous qualities that can be employed as an alternative to asphalt and conventional concrete. Pervious concrete – a zero slump mix that allows rainwater to pass through the pavement and into the underlying soil at an astonishing rate of 100 to 750 liters per minute per square meter – has been used successfully in parts of the US for over twenty years, is beginning to find its way into British Columbia.

Also referred to as "no-fines concrete" or "porous concrete," this material is a simple mix of coarse aggregate, cementitious materials, water, and in some cases, fibres for binding. Carefully controlled amounts of water and cementitious materials are used to create a paste that forms a thick coating around aggregate particles without flowing off during mixing and placing. Using just enough paste to coat the particles maintains a system of interconnected voids on the order of 15% to 35% depending on materials and intended application. The result is a very high permeability concrete mix that is suitable for parking lots, sidewalks, driveways, green house floors or low-speed applications such as golf course paths and residential streets.

Construction Practices
Installation of pervious concrete is not difficult. Because the surface requires no slope, grading requirements are less complicated. Depending on the porosity of the ground, a varying layer of coarse aggregate is put down before the concrete is placed, essentially creating a storage areas for the water as it is released into the ground. The aggregate provides a key safeguard against water backing up into the concrete pavement.

Pervious concrete is a very low workability material, so considerable hand work may be necessary for placement. The use of a vibrating screed is important for optimum density and strength. After screeding, this material is usually compacted with a hand roller. There are no bull floats, trowels etc. used in placing pervious concrete. Conventional jointing methods and spacing are recommended. Curing with plastic sheeting must start immediately and continue for at least 7 days. Careful engineering is required to assure structural adequacy, hydraulic performance, and minimum clogging potential.

After placement, pervious concrete resembles a rice crispy square, Contrasted with regular concrete mixes, pervious concrete has a high cement content and no fine aggregates. The compressive strength of pervious concrete is limited since the void content is so high. However, compressive strengths of 3,5 to 27,5 MPa (500 psi to 4000 psi) are typical and sufficient for many applications,

Rainwater runs through pervious concrete and an aggregate substrate and is absorbed directly into the soil below, eliminating the need for conventional stormwater collection systems typically required for impervious surfaces. Because gutters, bioswales and water detention vaults are not necessary, the developer can designate more property for structure or parking. The water management system is built into the parking lot.

The premium on initial cost for pervious concrete, approximately 15 per cent above that of conventional concrete, is more than offset by the savings from eliminated infrastructure requirements.

Control of "First Flush" Stormwater

Beyond stormwater management, municipalities are looking for programs and practices to help control the amount of hazardous contaminants in our waterways. Impervious pavements, particularly in parking lots, collect oil, anti-freeze and other automobile fluids, which may be washed into streams and lakes when it rains.

Pervious concrete pavement reduces runoff. It can also be used as part of a system to reduce the level of pollution contained in storm water that is captured, the so-called "first flush" that contains most of the pollution that comes from an impervious surface. By capturing the first flush of rainfall and allowing it to percolate into the ground, soil chemistry and biology are allowed to naturally "treat" the polluted water. Thus, storm water retention areas may be reduced, allowing increased land use.

Trees planted in parking lots capture some storm water and offer a cooling effect in the area, further reducing pollution. Pervious concrete pavement is ideal for protecting trees in a paved environment. For lack of water, trees planted in small "islands" in parking lots often have difficulty growing.

Pervious concrete placed in parking spaces and pavements adjacent to tree islands greatly increases the amount of rain available to the trees without reducing usable area. Pervious concrete sidewalks allow urban trees to receive more water and still permit full pedestrian usage.

The key to reducing property damage, poor water quality and damage to aquatic habitat is to decrease the volume of runoff that flows to streams. As the concept of controlling stormwater becomes more widespread throughout the province, so will the use of this beneficial porous pavement.

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