

# MATERIAL DEVELOPMENT & INNOVATION

## ST. FRANCIS XAVIER CATHOLIC ELEMENTARY SCHOOL

*Site Improvements*



## Cast-In-Place Concrete



### PROJECT CREDITS

#### OWNER

Toronto Catholic District School Board

#### ARCHITECT OF RECORD

Northwood Associates Landscape Architects Ltd.

#### GENERAL CONTRACTOR

Bevcon Construction & Paving Ltd.

#### MATERIAL SUPPLIER

Innocon

#### ADDITIONAL PARTICIPANTS

- BASF Canada Inc.
- Increte Systems, A Division of Euclid Chemical
- LIUNA Local 506

### PROJECT FACTS

**LOCATION** Toronto, Ontario

**COMPLETION** September 2013

#### FINISHES

- This project provided barrier free accessibility between various parts of the school yard
- This adhered to the TCDSB 'Green' initiatives which included the use of recycled materials, reducing the urban heat island effect (creating shade), protecting and preserving the existing urban forest, treating water as a resource rather than as waste (stormwater retention on site), using durable low-maintenance materials to improve sustainability, extend project life cycle and reducing emissions and fossil fuel use.





### Specialty Concrete Construction

Many key specialty concrete materials were used on the project. These materials included pre-cast concrete walls and permeable concrete unit pavers as a way to construct an outdoor classroom to reduce surface water discharge and maintain existing plantation. Crushed recycled concrete was used as a sub-base granular material in parking areas. Conventional cast-in-place concrete was used to construct accessibility ramps and stairs.

To fulfill the Toronto Catholic District School Board's primary initiative to decrease storm water discharge as a sustainable construction medium, and to reduce the urban heat island effect, Hydromedia™ was used.

Hydromedia™ is a fast draining concrete pavement solution that rapidly directs stormwater off streets, parking surfaces, driveways and walkways. A cutting-edge development, Hydromedia™ also minimizes the cost and long-term maintenance for local authorities and developers of stormwater management.

Hydromedia™'s advanced, engineered design offers not only best-in-class drainage and a surface resilient to wear but also an industry-leading aesthetic appeal and an increased ease of placement by contractors. The key to this improved performance is an innovative mix design developed by Lafarge's world-class R&D labs. Outperforming the benchmarks set by standard permeable pavements, Hydromedia™ is a sustainable solution that combines the durability of concrete with advanced drainage technology.

The unique mix design technology behind Hydromedia™ has created a no-fines concrete that is particularly fluid in application, but highly robust and resilient after placement and curing. Together, it makes for a much

simpler application, improving not only the workability of the product but also its consistency, and provides a much stronger surface. The key to this is the breakthrough paste technology, where the rheological properties are a carefully calculated balance between fluidity and viscosity, offering short-term flexibility and long-term strength.

The paste is only part of the Hydromedia™ equation. The aggregate matrix is designed to minimize compaction and provide a predictable and homogeneous permeability in the final hardened product. The choice of materials, combined with the specially created mix design tool, provides that final properties of the concrete can be engineered prior to placement allowing for a predictable and consistent designed solution to the management of stormwater.

Hydromedia™ allows rainwater to drain through the wearing surface to the underlying ground (or drainage



system), combined with the aggregate sub-base, and also acts as a reservoir during periods of high rainfall. During these periods the system performs as a reservoir, which can aid in delaying the discharge of storm water into water courses or drainage systems. Its ability to store water also acts as a cooling system. During periods of rising temperatures, stored water evaporates creating a surface cooling cycle. Combined with the reservoir cooling effect, Hydromedia™ can also reduce the Urban Heat Island Effect.

### Material Development and Innovation

As an innovation on an already innovative product Bevcon Construction & Paving has developed a method known as Hydro-Tere™ to achieve an aesthetically appealing, functional decorative finish with Hydromedia™. Bevcon's Hydro-Tere™ finish eliminates virtually all loose or un-bonded aggregate materials from the finished Hydromedia™ surface, levels out any high or low spots, provides various different surface traction levels, reduces maintenance on surface, as well as enables the introduction and exposure of different

aggregates into Hydromedia™ without affecting the functional characteristics. Within the Hydro-Tere™ system, finishes range from a very basic rough Hydro-Tere™ Level 1 finish, which allows for aggregate exposure while maintaining great anti-slip performance, to Hydro-Tere™ Level 10 finish, which provides a stunning polished finish. For this project application, it was mutually agreed that Bevcon Construction & Paving would apply a Level 2 Hydro-Tere™ finish. Black Granite was added to the Hydromedia™ mix in order to provide a colour contrast between the conventional grey stone and paste. For this application Hydromedia™ with a Hydro-Tere™ finish was used around a newly constructed tree planting area. This provided a hard decorative surface around the plantation without inhibiting the plantations ability to flourish and establish a solid root structure. This area also acts as a natural drainage zone within the playground, thus keeping the existing plantings well irrigated.

### Sustainable Concrete Construction

As a part of the Toronto Catholic District School Board's 'greening' initiative, St. Frances Xavier site renewal project has many features which emphasize sustainability. This includes the use of crushed recycled concrete as a green alternative, as well as a cost savings measure, to virgin granular in parking lot areas. The use of crushed recycled concrete also aided in the reduction of the project's carbon footprint with a reduction in sourcing distance.

St. Frances Xavier Catholic School innovative and creative use of precast concrete walls and permeable unit pavers, provided a medium to construct a functional outdoor classroom, while providing the benefit of a surface water discharge mitigation system.

The use of Hydromedia™ (perVIOUS concrete) acted as a primary source to reduce surface water runoff, eliminate catch basins, aid in the reduction of urban heat island effect, and support the Toronto Catholic District School Board's Green Initiative. Hydromedia™ was used in conjunction with Bevcon's Hydro-Tere™ decorative finish as a source of maintaining a sustainable planting system while providing a safe esthetically appealing decorative hard surface for children to enjoy.

