

# YVR (Vancouver Airport) Aquarium

Richmond, British Columbia (2007)

## BACKGROUND

Vancouver International Airport (YVR) is undergoing a \$200 million expansion of the International Terminal. To give the project a British Columbia outdoors feel, a man-made stream runs from the new aircraft gates through the centre of the building. At the end of the stream, a huge aquarium has been installed featuring native BC sea life and a jellyfish tank that includes 100 moon jellyfish.

The project team had several concerns about waterproofing the aquarium:

1. **Waterproofing:** Since the 114-cubic-litre (30,000 gallon) aquarium is a water containment structure, keeping water in is vital.
2. **Access:** The tank was installed on the third level of YVR, suspended above a roadway. Access to pour concrete across the top of the aquarium was limited. The team required a waterproofing solution that could work in conjunction with self-consolidating concrete (SCC).
3. **Hydraulic pressure:** The aquarium is four metres deep and includes a lot of corners requiring support. The specifications called for a single pour and due to the depth and the unique design of the aquarium, stick formwork rather than regular formwork was specified. The hydraulic pressure from the pour could potentially blow out the forms.
4. **Tight schedule:** The team required a waterproofing/SCC solution that could meet the technical complexities of the project within a tight schedule.

## SOLUTION

"The small but complex YVR Aquarium Project required detailed coordination to ensure the schedule was not compromised," says Paul Hobern, Manager of PCL, who recommended Kryton's Krystol Concrete Waterproofing System to waterproof the aquarium. Since the waterproofed concrete had to be dropped in from above, there were placement concerns. In addition to the stick formwork there was a massive amount of reinforcing steel that the concrete would need to vibrate through.

### OWNER:

YVR Airport Authority

### ARCHITECT:

Stantec

### ENGINEER:

Bush, Bohlman & Partners

### CONTRACTOR:

PCL Construction Westcoast Inc.

### APPLICATOR:

PCL Construction Westcoast Inc.

### READY-MIX SUPPLIER:

Ocean

### DISTRIBUTOR:

Fairwind Construction Supplies

### PRODUCTS & TECHNICAL SPECIFICATIONS:

Learn more at [kryton.com](http://kryton.com)  
 Krystol Internal Membrane (KIM)<sup>®</sup>  
 Krystol<sup>®</sup> Waterstop System



*The pour required 40 cubic metres of concrete and took 14 hours in order to reduce the hydraulic pressure on the stick formwork.*



*The solution had to work in conjunction with self-consolidating concrete (SCC).*

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After intensive pre-pour testing, Kryton and Ocean Ready Mix achieved a successful self-consolidating concrete mix design of 119 centimetres, which included Krystol Internal Membrane (KIM) admixture and an accelerator.

SCC places quickly and easily with little or no vibration, and it achieves a high early stripping strength, which yields a quicker turnaround on the forms, an important factor with the aquarium since smaller strips of plywood (stick formwork) were used rather than sheets (regular formwork). By achieving a successful SCC waterproofing mix, the challenges of water containment, access, and hydraulic pressure were all met. And in spite of the project's complexity, the flexibility of the waterproofing solution (KIM admixture can be added onsite) helped ensure that the team kept within its schedule.

***“We had enthusiastic supplier and trade input, which included a formwork mock-up and hydrostatic testing of the concrete mix to establish the correct pour rate,” says Hobern. “We are very pleased with the outcome.”***

The Krystol Concrete Waterproofing System for the Aquarium includes:

- Krystol Internal Membrane (KIM) to pour the slab and walls. KIM, the world's leading and original integral crystalline concrete waterproofing admixture, eliminates the need for conventional external waterproofing membranes.
- Krystol Waterstop System, an advanced joint design system that provides both physical and chemical waterproofing barriers. Krystol Waterstop System is easy to install, and unlike complicated, unreliable barrier systems such as PVC and bentonite, it won't shift during pours or deteriorate over time. It was used on the only cold joint in the project – between the slab and the wall where the kicker keeps the formwork in place.

## PROJECT INFORMATION CONT'D:

### The Krystol Concrete Waterproofing System

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The project was completed in Spring 2007.

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#### Sidebars:

- The pour required 40 cubic metres (131 cubic feet) of concrete and took 14 hours in order to reduce the hydraulic pressure on the stick formwork.

This is the first time KIM has been used in a SCC mixture.

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#### Author note:

Leo Connell is Director of Marketing at Kryton International Inc, Vancouver, British Columbia, Canada. Kryton International products are distributed in more than 40 countries worldwide. For more information about Kryton or integral crystalline waterproofing and their below-grade tanked system, visit [www.kryton.com](http://www.kryton.com).

