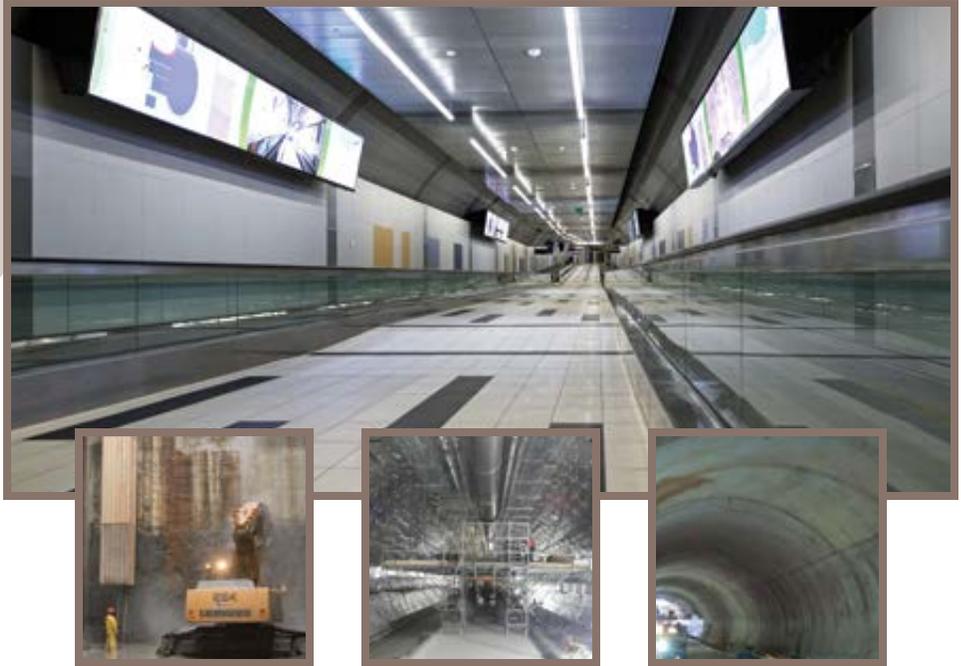


# STRUCTURAL DESIGN INNOVATION

## BILLY BISHOP TORONTO CITY AIRPORT

### *Pedestrian Tunnel*



## PROJECT CREDITS

### OWNER

PortsToronto

### ARCHITECT OF RECORD

ZAS Architects + Interiors

### ENGINEER OF RECORD

Arup Canada

### GEOTECHNICAL ENGINEER

exp Services Inc.

### GENERAL CONTRACTOR

PCL Constructors Canada Inc.

### TUNNELING CONTRACTOR

Technicore Underground Inc.

### MATERIAL SUPPLIERS

- Dufferin Concrete, a division of CRH Canada Group Inc.
- Tecmix

### ADDITIONAL PARTICIPANTS

- Alpine Forming
- BASF Canada Inc.
- Euclid Canada
- Gilbert Steel Limited
- Ironworkers Local 721
- LIUNA Local 183
- Aluma Systems Inc.
- CRH Canada Group Inc.
- Forum Equity Partners
- Hatch Mott MacDonald
- Isherwood Associates
- National Concrete Accessories

## PROJECT FACTS

### LOCATION

Toronto, Ontario

### COMPLETION

July 2015

### COST

\$82.5 million

### QUICK FACTS

- The journey from mainland pavilion to island-side atrium is 853 feet in length
- The horizontal segment of the tunnel is located 100 feet underground and runs 550 feet end-to-end
- Approximately 1,100 people per hour can travel through the tunnel
- Winner of the International Tunnelling & Underground Space Association's 2014 Specialist Tunnelling Project of the Year Award and the Tunneling Association of Canada's 2014 Canadian Project of the Year Award





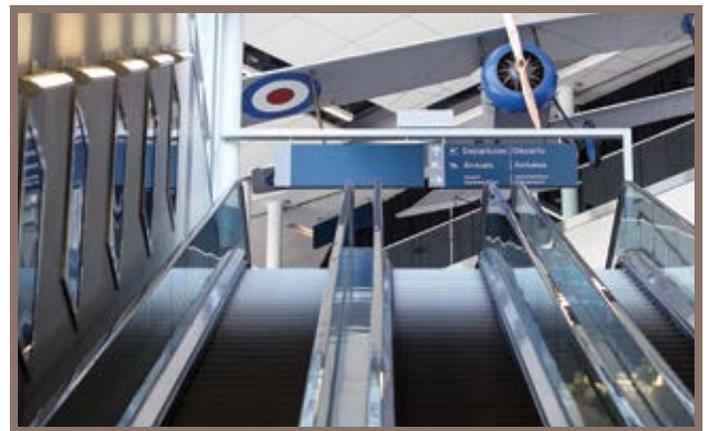
## *Powered by 100% Green Energy*

Ports Toronto owns and operates Billy Bishop Toronto City Airport located at the foot of Bathurst Street. The pedestrian tunnel, officially opened on July 30 2015, features modern, mechanized underground walkway and will be powered by 100% green energy supplied by Bullfrog Power Inc. To provide access to the pedestrian tunnel, a brand new pavilion has been constructed on the mainland and an extension added to the airport terminal building on the island side.

From design to construction to final finishes this tunnel exemplifies innovation and reflects the priorities of travelers. Whether it be the number of moving walkways and escalators, the acoustics and shape of the tunnel's interior, or the state-of-the-art digital screens that create a visual experience as people move through the tunnel, every detail of the project was carefully thought out to ensure a tunnel that would not only deliver travelers to where they needed to go, but would also engage them along the way.

The tunnel is a game-changer for their operations and customer service, as it will provide passengers with convenient, predictable and reliable access to Billy Bishop Airport, and enable passengers to travel, on their own schedule, from the mainland to the airport in approximately six minutes. Approximately 1,100 people per hour can travel through the tunnel.

The tunnel has a longitude of 260m and is below approximately 10 meters of rock and river bed, and 20 meters of water. An innovative pre-support technique was used to drill seven 1,800mm diameter interlocking drift bores, or mini tunnels, above the main tunnel crown using boring machines. Two Canadian-made TBMs dubbed Chip and Dale were used to create the drift tunnels. The TBMs were built by Technicore, a leading tunneling company based in Newmarket, Ontario. The TBMs were built specifically for the project at Billy Bishop.



Three of the tunnel drifts were built to include new City of Toronto sanitary and water mains, which has helped save Toronto taxpayers an estimated \$10 million in duplicated construction efforts. These drifts allowed excavation to continue under the crown while enabling the tunnel to hold its shape (Fig 1).

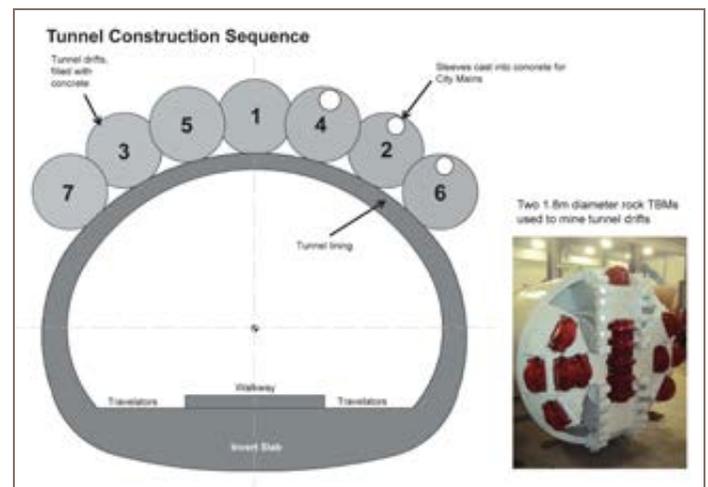


Figure 1

