

# OTTAWA LIGHT RAIL TRANSIT LINE



## HIGHLIGHTS:

**LOCATION:**  
Ottawa, ON

**PROJECT TYPE:**  
LRT-shotcrete and tunnel lining for underground portion of LRT

**PROJECT PURPOSE:**  
Transit infrastructure

**AUTHORIZED CONTRACTOR:**  
RTG Group

**DEVELOPER/OWNER:**  
City of Ottawa

**ARCHITECT/ENGINEER/CONSULTANT:**  
RTG Group

**PROJECT TIMELINES:**  
Q4 2015- Q1 2018

**MATERIALS SUPPLIED:**  
69,317 m<sup>3</sup> Ultra Series®  
57,373 m<sup>3</sup> Agilia®  
34,374m<sup>3</sup> Shotcrete  
11,002 m<sup>3</sup> Ready-Mix  
1,527 m<sup>3</sup> Chronolia®

Ottawa's Confederation Line project is a massive infrastructure public-private partnership. It involved reconstruction of highways, bridges and bus routes to accommodate the city's first-ever light rail transit line (LRT). A \$2.1 billion investment funded first phase of the LRT. The twelve station LRT connects to the city's local bus and train lines and VIA Rail.

## DOWNTOWN CORE CONSTRUCTION CHALLENGE

One of the greatest challenges facing the project and commuters in general was the intense traffic congestion of cars and buses in the downtown core. Lafarge played a significant role in the solution. The fix was to construct an underground transit tunnel beneath downtown.

## PLANNING FOR COMPLEX PROJECT

Lafarge engineers participated in construction planning for the 2.5 km tunnel. The north team and large project team brought in mining expertise and technical knowledge that other groups lacked. These subject matter experts got mixes and contingency plans approved in the early stages to keep the project on schedule.

It was clear from the beginning that this type of construction was far more demanding than typical civil construction. In order for the tunnel to support the weight downtown high-rises, vehicles and people, the tunnel had to be shotcreted for every three metres of linear progression. If the rock that was being bored deteriorated in quality, shotcrete had to be placed within hours. This required Lafarge to be on call around the clock ready to supply quality concrete on very short notice.

## CRISIS MID-CONSTRUCTION

Lafarge's preparedness was put to the ultimate test when a sink hole developed



approximately 50 metres from the tunneling operation. The morning of June 6, 2016, at 10:30AM the soft ground collapsed revealing a large sink hole just east of the intersection of Rideau Street and Sussex Drive, in the middle of downtown Ottawa. It caused a gas leak, a water main break and power outages and created a major safety crisis for local pedestrians and workers alike. This resulted in building evacuations and several street closures. The sinkhole spread quickly, consuming a minivan.

At its onset some mobile equipment and several vehicles were engulfed by the sinkhole. The only solution was to fill the hole with concrete to stabilize it. This would prevent the sinkhole from consuming more ground or possibly even buildings.



## PREPARATION MADE LARGE-SCALE EMERGENCY RESPONSE VIABLE

The amount of concrete to repair the sinkhole was not small. It required a continuous rate of pour over a day long and more than 6000 tonnes of material relayed to site. Lafarge coordinated and completed the pour with an instant response. The sinkhole was successfully filled, preventing further expansion, which allowed construction of the LRT to continue.

## SPECIALIZED CONCRETES

This project also featured specialized mix designs stretching the boundaries of what concrete can do. Agilia®, Lafarge's self-consolidating concrete, was pumped horizontally underground; over 1 km in some cases. It forms the tunnel liner that is exposed as an architectural finish in the public stations. The shotcrete that stabilized the rock tunnel was pumped, retarded and accelerated well beyond what was initially thought possible. The stabilized rock ensured the tunnel was safe for work and workers to proceed.



## MASSIVE PROJECT

As of February 28, 2018 Lafarge delivered over 173,000 m<sup>3</sup> of concrete consuming over 37,000 tonnes of GU cement, 20,000 tonnes of slag cement and over 14,000 tonnes of silica fume cement. In addition, the concrete used over 80,000 tonnes of premium 14mm aggregate and over 45,000 tonnes of 7mm chip.

This project has been a true multi-product line success featuring specialty products from all of our Eastern Canadian product lines.



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