

The National Arts Centre – Ottawa, ON, Canada

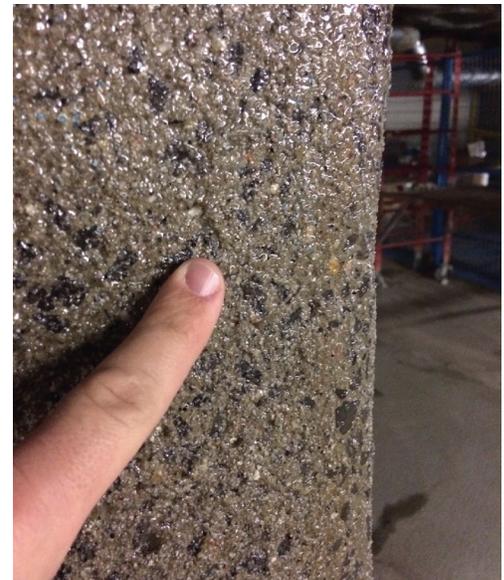
Project overview

A variety of MAPEI structural-strengthening products was used to bring concrete beams, columns and slabs up to new building requirements for the renovation of the premier performing arts center in Canada. *Carboplate™ E 170* fiber plate was placed along two large beams and then wrapped in *MapeWrap™ C Uni-Ax 300* fabric. *MapeWrap C Fiocco* anchors were used in a unique approach to strengthening concrete slabs.



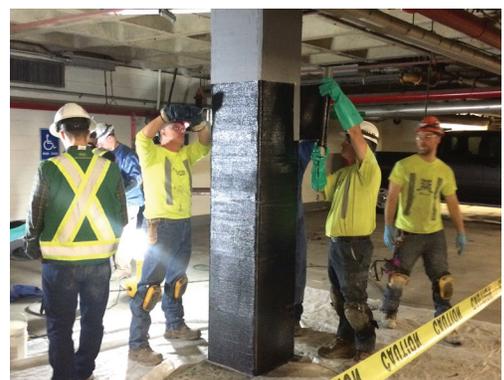
Project information

Project category:	Public Building – Performing arts center
Period of original construction:	1969
Year of MAPEI involvement:	2016
MAPEI coordinator:	Justin Lafontaine
Project owner:	The National Arts Centre
MAPEI distributor:	Bellai Brothers Construction Ltd.
Original designer:	Fred Lebensold
Architect:	Diamond Schmitt Architects
General contractor:	PCL Constructors Inc.
Concrete structural strengthening contractor:	Bellai Brothers Construction Ltd.
Project manager:	Earle McKay
Photographers:	Olivier Gariepy and Justin Lafontaine



MAPEI products used

- *MapeWrap Primer 1*
- *MapeWrap 11*
- *MapeWrap 21*
- *Carboplate E 170*
- *MapeWrap C Uni-Ax 1200*
- *MapeWrap C Uni-Ax 300*
- *MapeWrap C Fiocco*



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MAPEI structural-strengthening products help reinforce Canada arts center facility

MAPEI products are at work on public building jobsites around the globe. One of these jobsites is the National Arts Centre (NAC) in Ottawa, Ontario.

As Canada approached its centennial year in 1967, then Prime Minister Lester B. Pearson initiated the idea of creating a performing arts center in Ottawa (the capital city of Canada) as a special mark of the city's preeminence. Under the guidance of G. Hamilton Southam, the complex of four performance centers took shape above an underground parking facility. Music, opera, theater and dance found a home in the edifice that opened in 1969.

The NAC will turn 50 in 2017 and is currently undergoing a makeover that will include improved spaces for performance, as well as new wings for audience and presentation events.

To support the renovations, the structural supports for the building and its underlying parking facility needed to be strengthened to meet new building requirements. PCL Constructors Inc., general contractor for the project, selected Bellai Brothers Construction Ltd. to perform the structural strengthening.

MAPEI product on the jobsite

The Bellai Brothers team reinforced columns, beams and concrete slabs with MAPEI's **Carboplate E 170** pultruded carbon fiber plate and **MapeWrap C Uni-Ax** uni-directional carbon fiber fabric.

Columns on the four different levels of the parking facility beneath the NAC were strengthened with **MapeWrap C Uni-Ax 300**. The team first sandblasted the surface of each column and then applied **MapeWrap Primer 1**. After mixing, **MapeWrap Primer 1** becomes a low-viscosity resin that is able to penetrate a cementitious pore structure and provide a high bond for the other components of the **MapeWrap** composite system on horizontal, vertical and overhead surfaces.

Next, **MapeWrap 11** structural epoxy putty was applied to level the uneven concrete surface before application of the **MapeWrap** fabrics. Using the wet layup method, Bellai Brothers crew members impregnated **MapeWrap C Uni-Ax 300** with **MapeWrap 21** low-viscosity epoxy resin and then wrapped it around the columns over the **MapeWrap 11**. Some of the columns required as many as 6 to 11 wraps in order to reach the required structural strength.

Two large, 40-foot (12.2-m) beams – located on the top level of the parking facility – that support the first floor of the NAC building also needed strengthening. In these instances, the teams reinforced the beams with both **Carboplate E 170** and **MapeWrap C Uni-Ax 300**. **Carboplate E 170** is used for the repair and upgrade of beams and slabs with increased live loads, making it an ideal choice for the increased loads from the renovations and from the expected heavier traffic.

After coating the bottom of each beam with **MapeWrap Primer 1**, the teams applied **MapeWrap 11** and then installed **Carboplate E 170** into the putty using a hard-rubber roller. Again using the wet layup method, **MapeWrap C Uni-Ax 300** was used to cover the **Carboplate E 170** and the sides of the beams. **MapeWrap C Uni-Ax 300** was applied on both sides and the bottom of the beams.

In several areas throughout the parking facility and the NAC building, the concrete slab – about 8" (20 cm) thick – needed to be fortified as well. The Bellai Brothers team met this challenge with a unique solution. Team members began by drilling holes 1/2" (12 mm) in diameter through the slab from top to bottom. They then cut 47.2" (1,200 mm) lengths of **MapeWrap C Fiocco** pultruded carbon fiber cord and impregnated them with **MapeWrap 21**. After the cords had hardened, they were inserted into the holes for true slab penetration.

On the top side of the slab (the floor of each level), the teams installed **Carboplate E 170**; on the bottom side of the slab (the ceiling of the level below), they installed **MapeWrap C Uni-Ax 1200** using the wet layup method. The two structural-strengthening materials were anchored together by **MapeWrap C Fiocco**.

With the structural strengthening completed, other trades will move forward with the rejuvenation of the NAC. MAPEI products for floor and wall surface finishes might also be used within the facility.

