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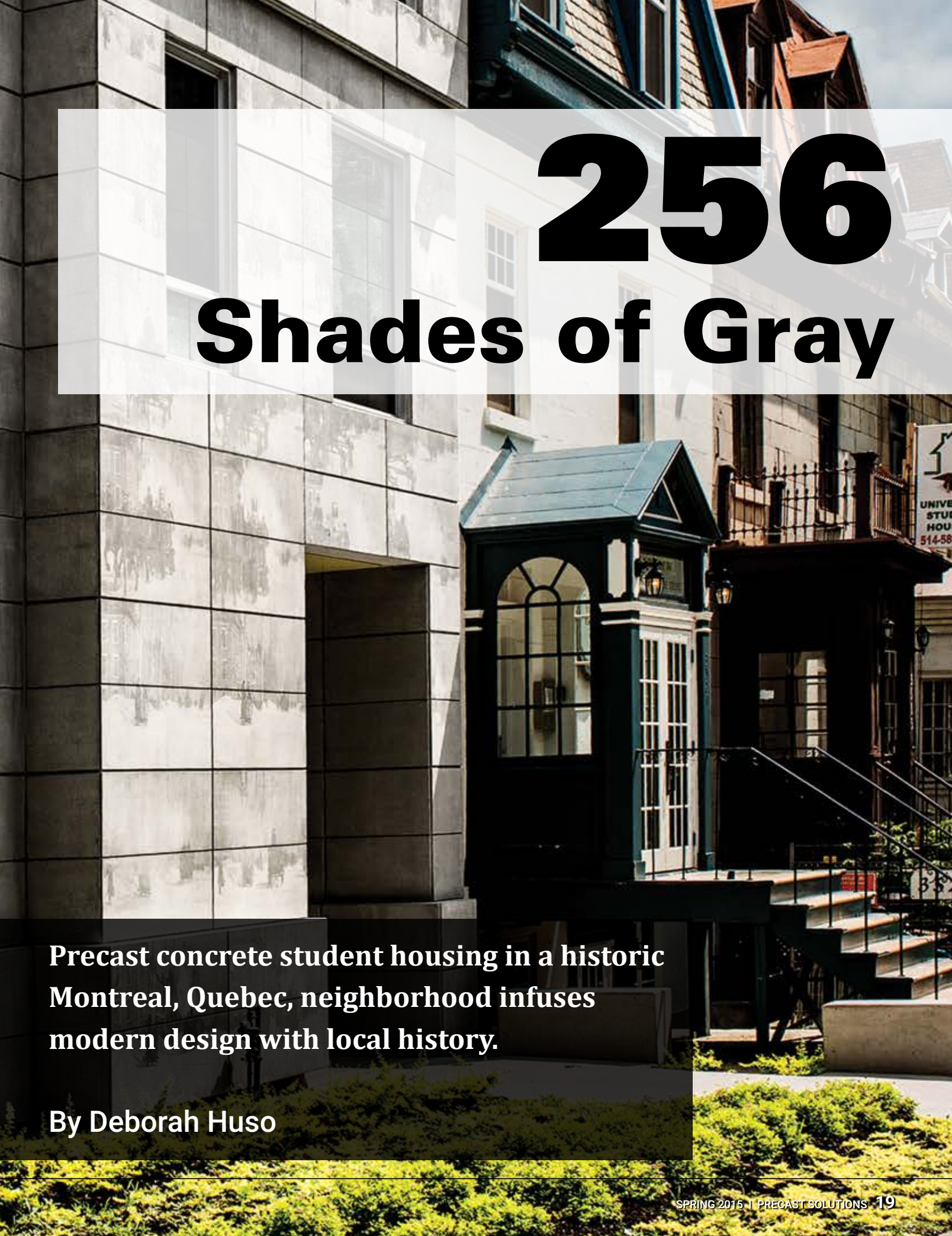
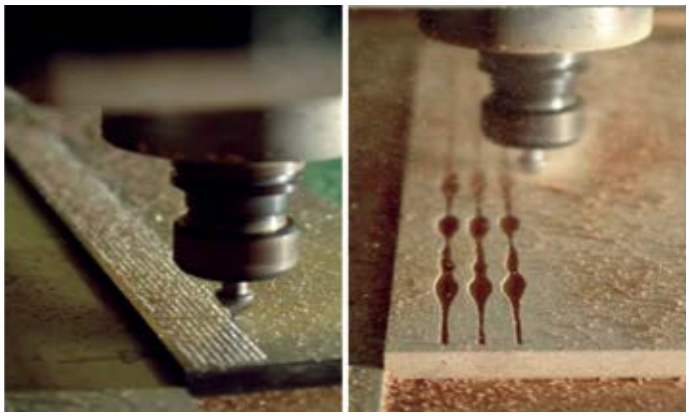
256 Shades of Gray



256 Shades of Gray

Precast concrete student housing in a historic Montreal, Quebec, neighborhood infuses modern design with local history.

By Deborah Huso



A computer numerical control milling machine creates a variety of subtle grooves which ultimately display the selected image.

The urban landscape is bleached white with snow. Shadowy horses pull carts of similarly shadowy men, whose wispy breath is exhaled in the cold. Steam rises from fire engines as they make their way through downtown Montreal. It's 1901, and American inventor Thomas Edison is capturing the scene in scratchy black-and-white film as firefighters roll past to battle blazes in the city.

It has been more than a century since Edison immortalized those firefighters in his film "Montreal Fire Department on Runners," but the scene still plays out again and again on the bustling University Street. Architects recently put the finishing touches on the Edison Residence, an airy 30-room building with communal living spaces just outside the gates of McGill University. The residence's precast concrete façade is finished with stills from Edison's film that appear to move depending on the angle an individual takes when viewing the building. The technique, called photoengraving, was made possible by RECKLI, a Germany-based rubber formliner manufacturer and one of several photoengraving formliner producers throughout the world.

BRINGING PRECAST TO LIFE

The site of the Edison Residence had been vacant for more than 50 years after a fire demolished the site's original stone house. But this was prime real estate in a historic Montreal neighborhood, and the location's easy access to the McGill campus made it perfect for student housing.

Tasked with the building project, KANVA, a Montreal architecture firm known for its unique approach to storytelling through design, faced a few limitations.

"Given its location in a heritage zone, the building was required to have a masonry façade," said Katrine Rivard, one of the project architects. "But we knew the building design needed to be cutting edge and push architectural boundaries – a laboratory for experimentation. And given our restriction on using masonry, concrete was a good compromise to fit within our material limitations while enabling extensive possibilities."

KANVA selected square, 10-and-a-half-foot precast concrete

The finished precast concrete panel can display 256 shades of gray, allowing any image to be produced.

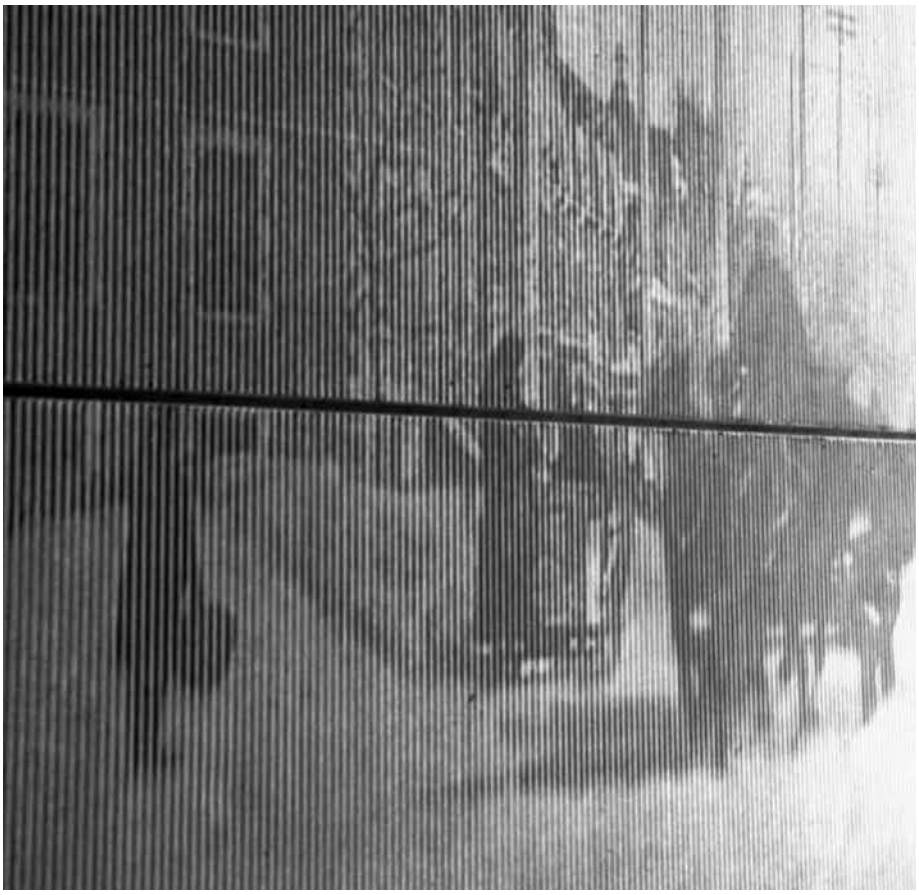
panels with insulation sandwiched in the middle. The outer surfaces serve as the photoengraving's canvas, while the other side functions as the residence's inner walls with a uniform finish applied. According to Rivard, no additional elements needed to be added post-installation. Designers also chose the panels for their ability to endure the freeze/thaw cycle of Montreal's harsh springs and for the zero maintenance necessary post-construction.

Most importantly, Rami Bebawi, KANVA cofounder and partner, said the photoengraving of the precast concrete offered "the possibility of bringing to life what is traditionally considered a more neutral material."

ETCHING HISTORY INTO PRECAST CONCRETE

To set the process in motion, architects at KANVA first chose images to extract from Edison's film. Rivard said the most dynamic sequences made the cut. According to Bebawi, choosing the stills was a challenging process.

"Selecting images carries a greater responsibility with respect to displayed content and storytelling," he said. "Unlike digital billboards that readily offer the possibility of ever-changing imagery, photoengraving remains permanent, and thus, depicting images involves considerations in terms of pertinence and social context."



The image appears to move based on the viewer's vantage point, pace and lighting conditions.

Once KANVA selected stills, they were shipped overseas. A group of KANVA architects next traveled to Herne, Germany, to gain a solid understanding of the entire photoengraving process.

The following is a step-by-step look at how the photoengraving formliners are created according to Bruce MacPherson, marketing director for Nawkaw/U.S. Formliner, the North American RECKLI supplier:

- The manufacturer scans film images into a computer and "digitizes and optimizes" them for reproduction.
- The computer separates color tones into 256 shades of gray, essentially creating a digital photo negative.
- The computer generates a machining file from the identified gray values. The file includes milling commands for a computer numerical control milling machine.
- The milling commands tell the CNC machine how to engrave the photograph onto a model. Commands include a variety of subtle grooves that vary in texture from fine to coarse in order to create the different shades of gray first identified from the separated color tones.
- The CNC machine then draws the image onto a concrete milling model.
- The polyurethane formliners are poured over the finished milling model. The rubber formliner is a negative, so when the precast concrete panels are poured into the grooved formliners, the final image is a positive.

"RECKLI uses rubber molds to add flexibility and preserve intricate details of the photoengraving," MacPherson said.

Once created, the liners were shipped to Montreal precast concrete manufacturer Saramac to handle pouring. During the pouring process, site workers added in extras, including "spacers for joints and embedded elements like insulation and metal connectors," Bebawi said.

A crane fastened the panels to the structural slab with large metal brackets and all joints between panels were filled with silicone. Within five days, builders had put together the structure's façade. As a finishing touch, they applied Faceal Oleo HD, a protective outer seal that safeguards the building from the elements and helps preserve the façade's appearance.

MOVING PICTURES

Pedestrians tend to pause as they come upon the Edison Residence. Based on the vantage point, pace and lighting, the images on each panel appear to move.

"Because the image is engraved into the concrete, it is dependent on a light source to cast shadows," MacPherson said. "This is why people claim the image moves or changes – it truly does.

"There's no question that this is a very eye-catching technique. But it's also a zero-maintenance way to permanently add intrinsic aesthetics to any concrete structure."

While there are other types of photoengraving using colored aggregates and dyes, the process is a relatively new technology. In 2008, Quebec City's Promenade Samuel-De Champlain constructed concrete walls with engraved scenes. It was the first project where the technique was used in North America.

"The Edison Residence is the second project and the first building [in North America] using this technology that we're aware of," Rivard said.

As Bebawi explained, with new technology comes growing pains.

"It was a major challenge coordinating all the openings and elements embedded within the concrete pour while trying to maintain a continuous façade image," he said.

But, he added, with the gained experience from this project, in the future, "we'd try to optimize the modular system to facilitate production and installation while maintaining a non-repetitive façade pattern."

It's a technique KANVA plans on continuing to explore in the future – a way to incorporate fresh, unexpected ideas into hardy, cost-effective precast concrete.

"The process enabled extensive possibilities and experimentation," Rivard said. "The technology allowed the historic site to tell a story, uniting old and new in a unique, unprecedented way." **PS**

Deborah Huso is a freelance writer specializing in construction, real estate, finance and agriculture.

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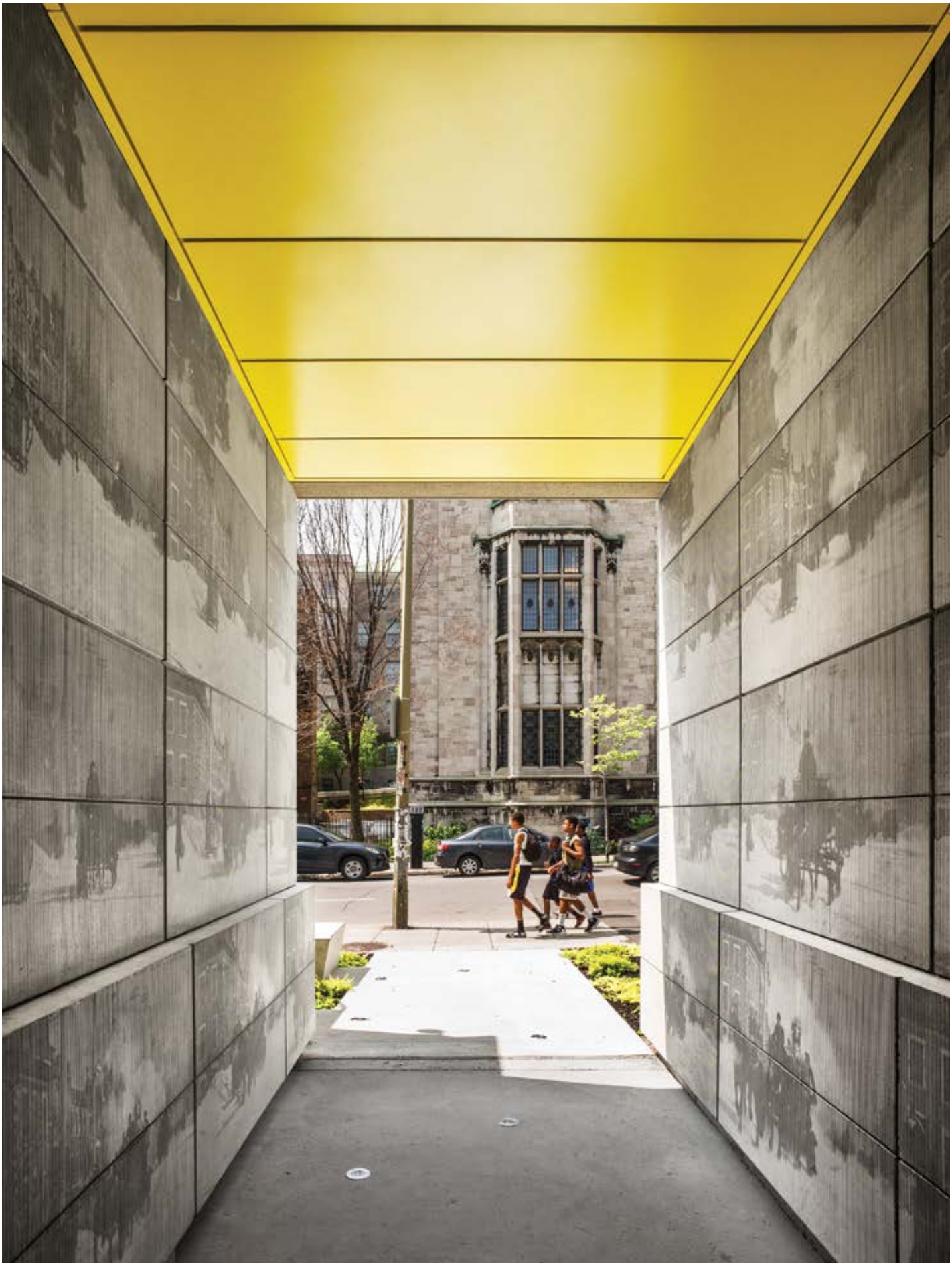

For the Edison Residence, using precast concrete offered “the possibility of bringing to life what is traditionally considered a more neutral material.”