

# “A Case for SlenderWall”



Six case studies on the composite precast concrete cladding system

***SLENDERWALL***<sup>®</sup>

*Architectural Precast Concrete/Steel Stud Building Panels*

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Luxembourg III Apartments, Quebec



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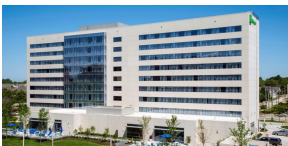
Le Griffix Apartments, Montreal



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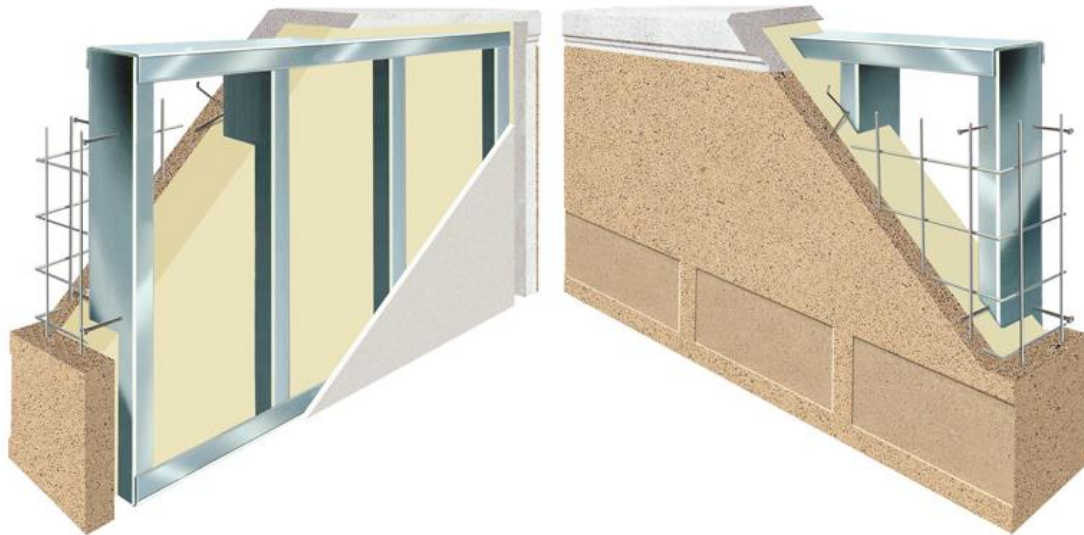


U.S. Army Command Legal Headquarters, Fort Belvoir, Virginia



Cleveland Clinic Holiday Inn, Cleveland

# What is SlenderWall?



More than just a lightweight precast architectural panel, SlenderWall is an entire envelope system in a monolithic, panelized unit. The 2-in. exterior face is a composite of architectural concrete and polyvinyl alcohol (PVA) fibers with welded-wire reinforcement. Stainless-steel fasteners attach this exterior concrete face to 14- and 16-gauge, G90 galvanized-steel studs in a way that creates a thermal air gap that is filled with factory-applied, closed-cell foam insulation.

The entire SlenderWall assembly tips the scales at just a third the weight of a traditional 6-in.-thick architectural precast panel. Its cost and installation-efficiency benefits really come into play in high-rise designs that incorporate larger-format panels. In these projects, especially, architects will appreciate the fact that a single set of plans and details will take care of the entire building envelope. And, similarly, contractors eliminate the scheduling and warranty issues that arise when multiple insulation and interior framing crews are required – and, in high-rises, the challenges of bringing in the oversized cranes necessary to lift significantly heavier architectural precast panels into place are eliminated.

SlenderWall is manufactured by a network of architectural precast concrete firms through licensing agreements with Easi-Set Worldwide. <https://slenderwall.com/benefits/value-of-slenderwall>

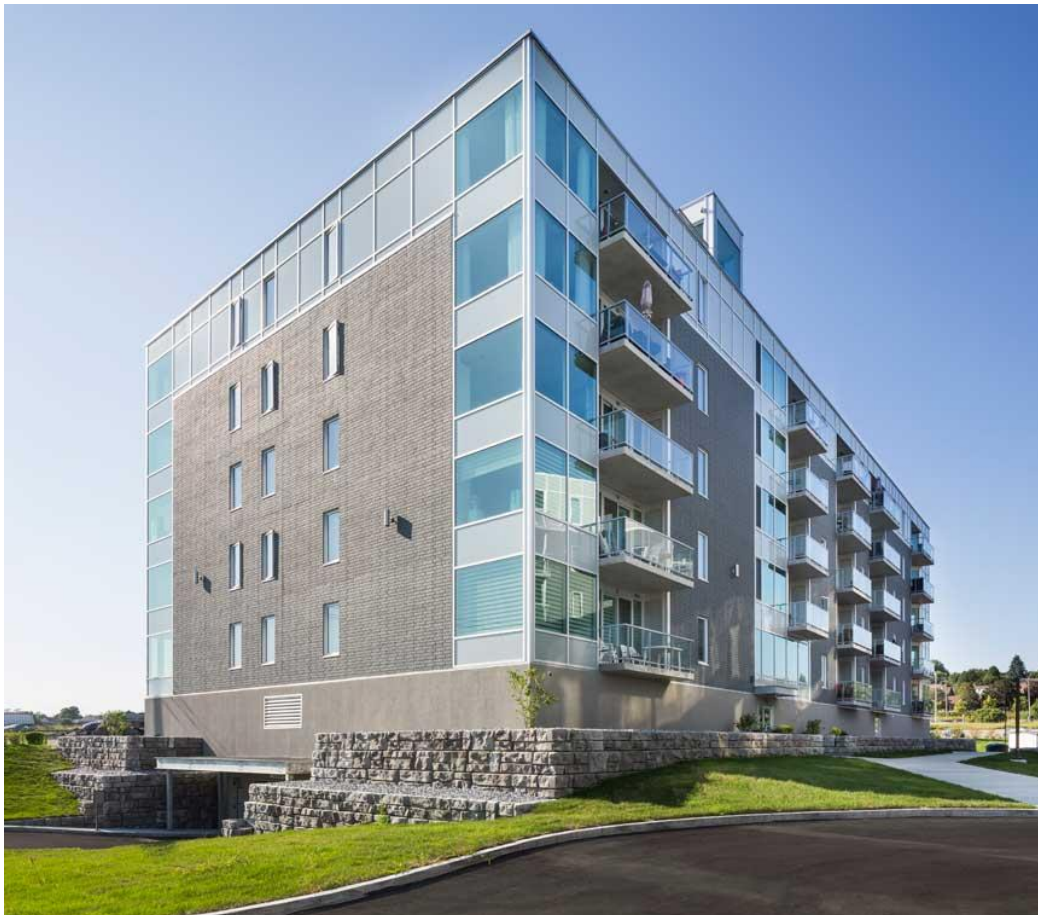
## Case 1:

### **On Time and On Schedule – With Style, Thanks to SlenderWall**

#### Luxembourg III, luxury apartment

Remaining on top in a competitive residential rental market requires developers to stay savvy on a range of issues, from today's latest color palettes to new construction technologies. The Canadian firm Logisbourg, based in Quebec City, has managed this feat with aplomb, with a portfolio that now includes approximately 1,000 units across its hometown. It's latest addition, Luxembourg III, a five-story luxury apartment (or "rental condo" in the Canadian vernacular), represents the company's addition of an advanced precast wall system – SlenderWall – to its technology portfolio.

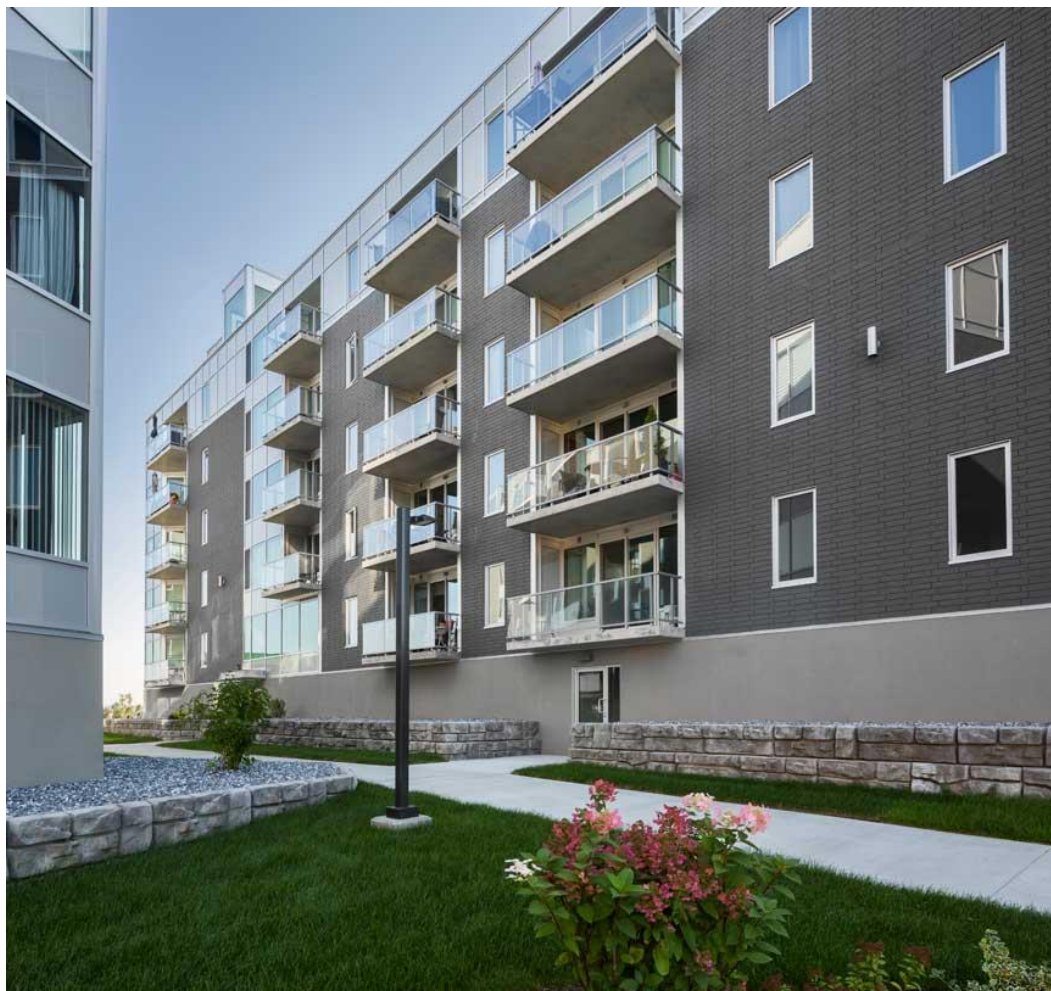
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Innovative structural approach Logisbourg has a history of such innovation – in 2015, the company was recognized by the Canadian financial services company Desjardins with a Desjardins Entrepreneurs award for real estate development. Building design is just one of the ways the company demonstrates its leadership. For example, the first two buildings in the Luxembourg development were among the earliest in North America to feature the Finnish company Peikko’s lightweight DELTABEAM Slim Floor structural system, also used for the Luxembourg III.

The grid-based Slim Floor system is designed to allow for spans of up to 52 feet – for a residential developer that allows for more of the open floor plans today’s renter’s desire. And it’s delivered to a jobsite with predesigned, standardized connections that allow for much faster construction than similar approaches.

“We are one of the only companies that build like this in Quebec City, and maybe the entire province,” says Logisbourg project manager Jean-Simon G neroux, explaining how quickly Slim Floor buildings can come together. “You know exactly what it’s going to cost and exactly how much time – it’s like LEGO blocks.”

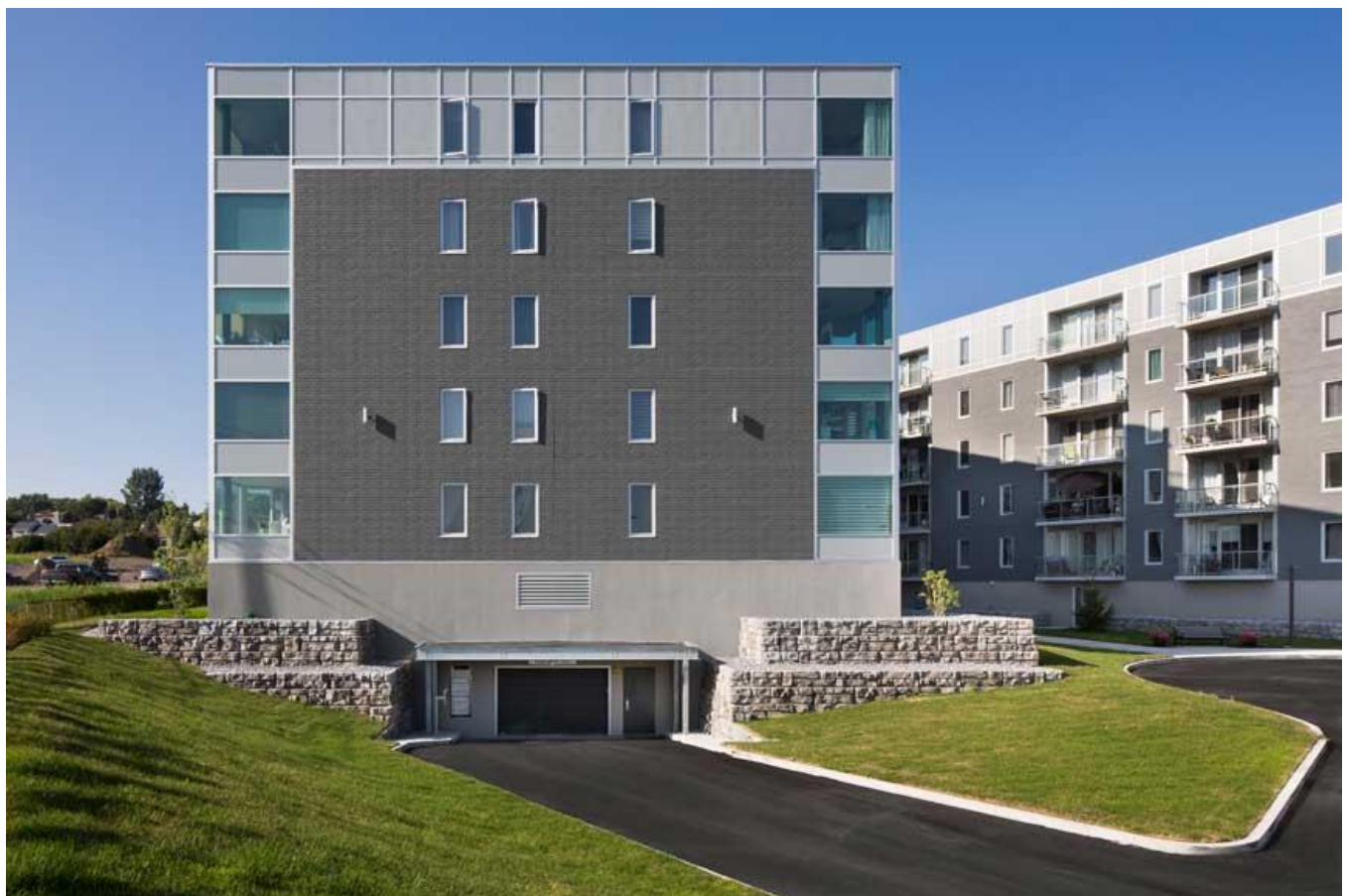


## **A perfect precast partner**

SlenderWall, a product licensed by Easi-Set Worldwide, proved a perfect match with the Peikko system, G n roux says. This all-in-one approach incorporates precast concrete’s design flexibility into a lighter-weight assembly that also includes a vapor barrier, insulation and interior framing studs. Like Peikko’s structural elements, SlenderWall panels are delivered to the customer ready for assembly, with connections cast into place. And, when required, the panels also can be fabricated to be load-bearing, which was a requirement with the Slim Wall plan.

“It’s not a high rise, so we don’t have to have the load on each floor,” G n roux says. Instead, the wall panels are designed to stack on top of each other in a load-bearing fashion. “For five stories, there’s no problem with that.”

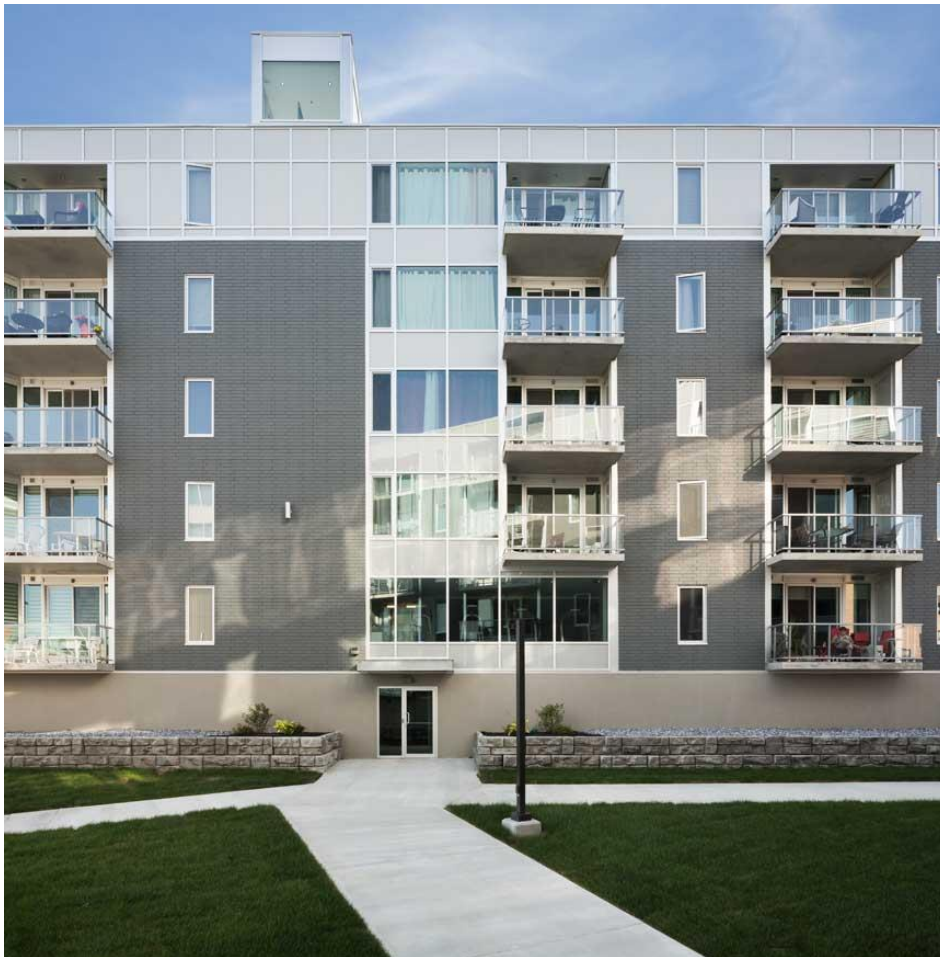
Speeding construction even further, SlenderWall panels can be delivered with all windows pre-installed, so the building envelope is essentially sealed once panels are installed and caulked. This was a valuable option for Logisbourg because, as G n roux, notes. “To install the windows in the precast plant is a lot faster, and the quality is better.”



## **Strong performance and good looks**

Beyond providing an accelerated construction schedule, SlenderWall panels also offered Logisbourg performance advantages that are critical in a climate as challenging as Quebec City's. The city's average low temperatures drop well into the Fahrenheit scale's single digits in January and February, earning it a Zone 7 designation from the International Code Council's International Energy Conservation Code (IECC). SlenderWall panels feature closed-cell foam insulation that is installed at the factory to ensure continuous, even coverage, along with the proprietary ThermaGuard connection system that creates an air gap to reduce thermal transfer by as much as 25%, compared to a traditional architectural precast system. Additionally, SlenderWall panels have been independently laboratory tested to meet IECC thermal performance requirements up to Zone 8 in the United States and Canada.

SlenderWall also offered the developer advantages from an aesthetic standpoint, with finish options that enabled consistency with a style set by the adjacent Luxenbourg II building. That structure features a face-brick pattern that SlenderWall licensed precast producer BPDFL was able to replicate using SlenderWall's Second Nature architectural precast brick finish. Not only does this option save time and labor versus a jobsite-installed veneer approach, it also eliminates the possibility of future grout-joint leaks as it's form-cast in the factory.



## **Fabricating a strong relationship**

BPDL's support proved invaluable in a range of other ways, as well, according to Généroux. The Quebec-based precast concrete fabricator operates internationally, with plants in Canada, the United States and Brazil. The company offers a range of precast products, along with related design and engineering assistance.

BPDL's expertise with SlenderWall proved a relief for Logisbourg, following an unfortunate experience with the wall fabricator and competing product supplied for the previous building, Luxembourg II. "We had a lot of trouble with coordination, and when the walls for Luxembourg II came to the site, there were mistakes," Généroux says, describing a number of schedule-busting frustrations. Though the precast product being supplied was, like SlenderWall, meant to include factory-applied insulation, some panels showed up missing that insulation and were rejected even before being removed from the delivery truck. "We had a really bad experience – the quality wasn't there."

So, when plans started developing for the third building on the Luxembourg site, Généroux wanted clear assurance this new project's fabricator could meet Logisbourg's high quality standards. BPDL stood out from the start.

"When we asked for quotes, BPDL took care of each detail," Généroux says, and that added attention continued throughout the project's development. "We went to the BPDL shop two times – it's really professional. And we had a great project manager in Luc Beaumont."

Construction on Luxembourg III was completed in late spring of 2017, and tenants now are moving into the building's 54 luxury units, each featuring high-end amenities like central vacuums and underfloor radiant heating. Logisbourg now has moved on to plans for three more buildings on the site, with SlenderWall and fabricator BPDL likely to remain team members for those projects – and more. "We are now working on the building plans for buildings 4, 5 and 6," Généroux says. "We're pretty sure we'll work with BPDL, because we had a very good experience with them."

## **Case 2:**

### **Johns Hopkins Hospital Selects Innovative Precast To Reclad Major Hospital Building**

#### **Nelson Harvey Building**

Overcladding technique using SlenderWall insulated lightweight precast is key to sustainability at leading hospital, boosting energy efficiency and durability while even improving interior acoustics.

Johns Hopkins Hospital operates in a dense, urban medical campus in East Baltimore with an outside global reputation. Nestled amid the pioneering clinical and research facilities is the Nelson-Harvey



Building, a 1970s-era modernist structure with narrow ribbon windows and long expanses of brick colored to match the nearby Halstead Building and the 1880s Billings Building, a campus landmark with its classic dome. After opening a major new facility next door, the Zayed Bloomberg complex, the hospital began renovating existing facilities on its East Baltimore campus. The nine-story Nelson-Harvey was a candidate for an interior renovation.



Yet, the opportunity to improve the building’s performance and capabilities took the project team beyond mere interior changes, says Dan McKelvey, an associate principal and building envelope expert with Ayers Saint Gross, the Baltimore-based planning and architecture firm that has supported Johns Hopkins for more than a decade.

“Late in the game, during design development, the client determined that we should also address envelope issues,” says McKelvey, describing the existing, hand laid brick façades with a concrete masonry unit (CMU) backup on structural steel. “There were problems including cracking and deflecting brick, and the window system was outdated. The building had no insulation in the wall system, either.”

The design team strategized on how to address the exterior, and make it completely weathertight and add sufficient insulation. “It needed to be a lightweight system and it had to match the Johns Hopkins signature brick aesthetic on the campus, especially with its adjacency to the iconic Billings Building,” says McKelvey. That ruled out one candidate, a lightweight metal panel system. So the architects reviewed ways to re clad the building with a brick exterior and also address the envelope failures.

The solution the team found was a surprise to many: Instead of removing and replacing the old façade system, an overcladding system was devised using SlenderWall panels attached to the original steel frame. At less than 30 pounds per square foot, precast SlenderWall sections would not be too heavy for the existing structure – one critical hurdle. Plus the fully insulated, hybrid panels could provide a matching thin-brick finish – a classic brick exterior to perfectly complement the Johns Hopkins brand image.

### **“Recycle in Place”**

According to Ayers Saint Gross, the recladding system could be attached while preserving the original building cladding. The new SlenderWall precast sections would attach to the steel structure, bypassing the original exterior masonry wall through openings cut for access to the perimeter steel, using a technique known as “needling.” The precast sections came with factory-installed windows, and a glazed curtain wall would replace the original ribbon windows, with some metal panels added as an accent material.



According to the architects, prevailing engineering codes dictated that the new overcladding envelope system could not exceed the building’s dead load by more than 10% or exceed any individual structural member by 5%. Because the building’s parapets had deflected severely, they would be

removed. “That reduced some of the dead load, and the combination of precast panels, curtain wall and metal cladding panels allowed us to remain under those limits,” says McKelvey. In fact, the conservative methods left enough available structural capacity to allow the hospital to add a green roof, which they had desired.

“We call a project like this recycle-in-place, which is preferable in a healthcare setting,” says McKelvey. “Demolition in a hospital campus affects the patients and care delivery, and there is always concern about the intake of dust into adjacent air-handling units.” By preserving that façade, Johns Hopkins was able to retain what would have been tons of demolition material and “repurpose” the existing masonry façade, which enhances the structure’s fire resistance and interior temperature stability, thanks to the added thermal mass. It also improves the sound isolation of the interior spaces -- ideal for a hospital -- because the thicker walls helps reduce sound transmission, which is measured as STC, or sound transmission coefficient, say the architects.

“This is a unique and promising application of SlenderWall,” says Matthew Smith of Smith-Midland, the precast provider which developed the cladding system and licenses it through its sister company, Easi-Set Worldwide. “Recladding while retaining an existing façade is a valuable alternative for hospitals, civic buildings and other structures that need to remain open. It can also be used on tight sites where demolition is difficult.”

McKelvey agrees, noting that many owners have large inventories of existing buildings. “You can’t move patients, so a reclad is best if a hospital building can remain occupied,” he explains. “This can complicate the contractor’s job tremendously, and many may advise against it for that reason. But the advantage for the owner was saving of time and money while gaining a more resilient and sustainable building.”

## **Greener Cladding for Greener Buildings**

How green is the resulting Nelson-Harvey Building? This overcladding technique has been designed by Ayers Saint Gross and Wilmot Sanz to achieve at least Green Star II, a Baltimore city certification approximately equivalent to LEED Silver. “As this is the first healthcare project to seek certification under this program, we have worked closely with the city and the hospital to develop appropriate standards for projects of this scope,” according to architects at Wilmot Sanz.

SlenderWall benefits the green approach, adds Smith. “SlenderWall has regional materials and recycled materials,” he says. “It also has closed-cell spray foam insulation on panels and between panels, so this has become a very well insulated building.”

SlenderWall weighs about 28 lbs. per square foot, with a unique composite construction that allowed for the overcladding that “recycled in place” the old fascia. In total, Smith-Midland Corporation cast and delivered 158 panels totaling about 27,164 square feet. Smith notes that the panels were specified with a factory-applied Endicott brick facing, keeping in continuity with the campus and the original 1970s exterior.

Johns Hopkins Hospital and the design team also chose to include factory-applied closed-cell foam insulation and a proprietary, advanced sealant system with integral leak detection called H2Out. “The addition of these options will provide not only savings in time and onsite trades, but also insurance against future air and water infiltration as well as continuous insulation, adding significantly to the enclosure’s thermal performance,” says Smith. SlenderWall also incorporates proven technologies to connect its 2-inch-thick reinforced architectural precast concrete with the interior steel-stud frame to create a true composite, exterior/interior wall panel system. The panels are also available with the optional continuous closed-cell foam insulation as well as factory-installed indows, offering savings in time and onsite labor.

In March 2013, Smith-Midland began installing the cladding for the project’s contractor Whiting-Turner, and it was concluded in June. The short schedule showcased the benefits of SlenderWall in reduced times and costs for production, shipping and installation, as well as decreasing the need for some onsite trades.

After decades of wear and with a failing façade on their hands, Johns Hopkins Hospital stands to benefit from an innovative architectural solution and a proven, robust wall system with excellent acoustical STC ratings and insulating ability.

#### **Project Facts: Nelson-Harvey Building, Johns Hopkins Hospital**

Building:	Nine floors, about 180,000 square feet
Project type:	Healthcare (renovation)
Location:	Baltimore, Md.
Design challenge:	Lightweight overcladding with brick finish to match campus, with sealant/leak detection system
Delivery type:	Negotiated construction contract
Total project cost:	About \$52 million
Owner:	Johns Hopkins Hospital
Architects:	Ayers Saint Gross, with Wilmot Sanz
General contractor:	Whiting-Turner
Precaster:	Smith-Midland Corp., Midland, Va.

#### **SlenderWall® Architectural Precast Specs**

Number of panels:	158 total SlenderWall precast panels
Wall area:	27,164 square feet
Panel type:	Precast panel with factory-applied Endicott brick facing and factory-applied closed-cell foam insulation, with proprietary H2Out advanced sealant system with leak detection
Panel finish:	Endicott brick to match site
Manufacturer:	Smith-Midland Corp. (manufacturer/fabricator)

Case 3:

## **Montreal's Griffix: SlenderWall Makes a Clean, Contemporary Mark for Expanding Skyline**

Le Griffix Apartments



For a city making development in Montreal, SlenderWall serves a future-looking design concept with multiple construction benefits.

Urban revitalization is a major trend throughout North America, and although each individual development brings its own specific obstacles, certain challenges are more universal. How can a new building respect the past of the existing neighborhood while also looking to the future? How can it be constructed with the newest green building technologies and the most desired amenities at a reasonable cost? With the aid of SlenderWall, the Griffix condominium project in Montreal offers a compelling answer to these increasingly pertinent questions.

The Griffix reaches 20 stories above the corner of Peel and Wellington Streets in the Griffintown neighborhood and houses 175 units of between 545 and 1,245 square feet, as well as commercial space on the ground floor. The building, constructed atop the location's original one-story brick building, has a clean, contemporary finish façade combining 380 floor-to-floor height SlenderWall panels – for a total of 50,000 square feet of SlenderWall cladding – with a fully glazed curtain wall.

A variety of benefits led the project team to consider and employ SlenderWall for this major project. Among those was the high R-value of the cladding and its relatively lightweight, easy-to-assembly nature. SlenderWall's hybrid construction – a lightweight 2 inch-thick precast panel fixed to a heavy-gauge steel frame – provides both the exterior insulated envelope and an interior stud wall ready to receive gypsum board.

SlenderWall's weight advantages over traditional precast panels -- 28 lbs. per square foot versus close to 85 lbs. per square foot – also made it an ideal specification. For example, the contractors could use smaller, lower-cost construction equipment and build the structural frame with smaller members. These helped reduce steel tonnage and associated first costs as well as contribute to lower construction-phase expenses for the owner. In addition, the ability of the system to be pre-manufactured off-site also helped boost the speed of construction scheduling. This proved critical for the developer, who could get the condominiums on the market before competitors in this rapidly changing neighborhood.

Yet cost was not the only consideration. The new development also demanded a finish quality and permanence that was truly modern in look yet could adapt to the context. The gray, sandblast-finished panels provide a simulated stone exterior that is trendy while also true to the area's history and aesthetic.

## **Unique history, big opportunity**

A century ago, Griffintown was the beating heart of Montreal's waterfront industrial life. Located on the Lachine Canal in the southeast corner of the city, "the Griff," as it has been affectionately known, gave a home to factories, breweries, shipping companies, the Port of Montreal, and other operations needing easy access to waterways or transportation. But in 1959, as the opening of the St. Lawrence Expressway meant the closing of the Lachine Canal – and a drop in Griffintown's economic importance. Less than a decade later, the Bonaventure Expressway was opened, severing Griffintown from the rest of Montreal.

Starting in the 1990s, artists began to gravitate towards the neighborhood, slowly turning it into one of Montreal's cultural centers. In early 2012, the city of Montreal unveiled its new urban plan for downtown, including Griffintown.

Seeking to attract an urbane clientele, Griffix was conceived by Diamond Trust and Investissement Poirier – along with their lead design firm, Geiger Huot Architects – as a lifestyle choice with a long list of amenities including a balcony for each unit, a furnished roof terrace with stunning views of Montreal and its surroundings, highly energy-efficient HVAC systems and windows, and of course, its location. The compatibility of all these needs with the lightweight, flexible hybrid system of SlenderWall panels, created an instant appeal for the developers, architect, fabricators and contractors.

Nearby, Griffintown began to show signs of being a highly livable, walkable neighborhood. Along with six new public green spaces and \$93 million of public investment, city planners enacted a residential rezoning for much of Griffintown, opening the door for redevelopment of the area as a desirable waterfront location for mixed-use towers like Griffix. Young professionals, drawn by the interesting historical atmosphere and easy access to Montreal's new "cultural corridor" of art galleries, restaurants, shopping, parks, and transportation, came to Griffix to get a feel for the building and locale.



## **A novel design and SlenderWall**

The revitalization presented an ideal building scenario for the developers Diamond Trust and Investissement Poirier. Yet for the architects and construction team, it added certain challenges – including the rush to get to market first. On top of that, for a neighborhood where visual appeal derives in large part from its historic low-rise brick and warehouse buildings, the architects needed the high-rise to maintain the local character while standing on its own merit. SlenderWall was an essential part of answering these questions.

For Eric Huot, a principal in the Montreal-based architectural firm of Geiger + Huot and the primary architect involved in the Griffix design, his main mission was "incorporating the existing façade of the historic building, recreating the arcade along Wellington Street, and marrying these to a new high-rise building." From a site planning standpoint, the solution was to locate the high-rise tower at the eastern edge of the site and leave the corner of Peel Street to the existing building, "in an effort to maintain the streetscape as it had been for most of the last century," Huot says.

To emphasize the tower's "distinct expression" in relation to the original building, Huot used SlenderWall and recessed windows to create a cladding design that combines solid masses with punched openings and a "lighter, airy counterpoint of glass curtain wall." The exterior system also had to be adaptable and cost-effective to meet these and other design needs. From the start, Geiger + Huot looked to SlenderWall for the Griffix, preferring the premanufactured, panelized exterior approach. Familiar with the system and its benefits from their award-winning 400 Sherbrooke Ouest hotel project, the firm took advantage of the design freedom offered by SlenderWall. For example, the interplay of solids and voids that formed the basis of Le Griffix design depended on the façade's concrete cladding being attached to the edge of the floor slabs in the building, a standard feature of SlenderWall. The detail also adds a small amount of bonus square footage to the interior footprint.

## **Adaptable, efficient and lightweight**

But it wasn't only the architects who advocated the use of SlenderWall on the Griffix, says Guy Tremblay, the technical director at Precasting firm Béton Préfabriqué du Lac (BPDL). Tremblay adds that the structural engineers for Le Griffix advocated for SlenderWall's use based on its suitability for the project and their experience with the system on previous multifamily projects in the United States and Canada. Construction advantages added to their case for SlenderWall. For example, with the balcony panels in-set from the main exterior of the building, crane access presented a potential design challenge. The reduced weight of the SlenderWall panels as compared to standard precast combined with a user-friendly erection method eliminated this concern by allowing for the use of smaller cranes that saved time and money.

Beyond weight, SlenderWall offered other benefits that attracted the Griffix's builders. "The SlenderWall panel already comes to the building with insulation," notes Tremblay, which helped both designers and contractors. Also, he notes, with its pre-insulated panels and built-in interior framing, "SlenderWall also speeds up the construction process, whereas usually with a precast panel, you set the panel in place and have to waterproof, enclose, and then do the insulation and the interior stud wall framing."



"So we had an advantage with SlenderWall," says Tremblay. Indeed, SlenderWall made it simple to achieve the tight thermal envelope and highly energy-efficient environment that the developers sought for Le Griffix as one of its major selling points.

Although the Griffix has been open for only a short time, the neighborhood has embraced it and the Montreal press has already described it as "spectacular," "hip," and "urbane." The Montreal Online says the building "captured the collective imagination of many purchasers" even before completion. The latest and greatest addition to the growing Griffintown scene, the Griffix is notable not only for its high design and amenities, but also for the cutting-edge construction elements that allowed vision to become reality.

### **Project Facts: The Griffix**

- Building: 21 stories with 175 units
- Project type: Multifamily residential (new construction)
- Location: Montreal, Q.C., Canada
- Design challenge: High-end architectural finish with inset and cantilevered panels
- Owner: Diamond Trust / Investissement Poirier
- Architects: Geiger Huot Architects
- General contractor : Giffels Westpro
- Precaster: Beton Prefabrique du Lac (BPDL), Alma, Q.C., Canada.

### **SlenderWall® Architectural Precast Specs**

- Number of panels: 380 total SlenderWall panels
- Wall area: 50,000 square feet
- Panel type: Precast concrete with integrated steel-stud frame
- Panel finish: Sandblast gray

## **Case 4:**

### **Built With Innovative, Efficient Lightweight Precast**

#### **New Orleans BioInnovation Center**

Progressive, modern design of biotech incubator employs SlenderWall lightweight precast panels with integral interior wall framing, lending design flexibility and sophisticated design statement.

What do you get by combining renowned architects, a burgeoning biotechnology district, and a sustainable enclosure product?

When it's in New Orleans, the result is a memorable, graceful building that complements the city while pointing to a brave, new future: The 65,500-square-foot New Orleans BioInnovation Center, designed by the nearby award-winning architecture firm, Eskew+Dumez+Ripple, in collaboration with Seattle's NBBJ. Built on a revived brownfield site with a design that garnered a LEED Gold certification, this new

incubator facility has attracted attention for its unique incubator model, strong architectural presence and people-friendly features, including a courtyard with walkway and fountain.



The BioInnovation Center blends a large expanse of impact-resistant glass curtainwall in its southwest entry façade with the crisp lines of what looks like honed limestone. In fact, the walls are SlenderWall – thin-profile precast panels backed by steel framing that doubles as perimeter stud walls. The primary transparent façade is fitted with a slatted sunscreen to reduce solar heat gain and protect against windborne projectiles during storms. Most important, the SlenderWall panels and sunscreens combine to ensure comfortable daylighting and consistent interior temperatures for the building's occupants in laboratories, offices and a 100-person conference center.

### **A beneficial enclosure choice**

The choice of SlenderWall was an easy one for the architects, says Mark Ripple, AIA, LEED AP, principal of Eskew+Dumez+Ripple. "For the cladding we wanted a durable, hurricane-proof and opaque system, and SlenderWall would allow a fine architectural surface and yet be lighter in weight than traditional, heavier precast," says the designer. "The system has a lower carbon footprint than alternatives, and the structures supporting it can be lighter, which is important in our soft soils of Southern Louisiana." SlenderWall was also recommended by the general contractor, Turner Construction, according to Brian Stock, national sales manager for Easi-Set Worldwide, a precast products licensor based in Midland,

Virginia. The architects also desired certain cantilever conditions that did not lend themselves to a heavier panel, he adds.

"The architects wanted something substantial but lightweight, and they did not want to use EIFS," an exterior insulation and finish system, Stock explains. "Also, the windows were designed for a floor-to-ceiling window profile, which SlenderWall could accommodate with specially designed attachments at the floor line."

In ways big and small, the hybrid precast and light-gauge steel cladding system befitted the architectural sensibilities of Eskew+Dumez+Ripple as well as the needs of their client, adds J. Matt DeVoss, whose company Jackson Precast Inc., of Jackson, Mississippi, produced the SlenderWall system. "It provides a high-end, very architectural finish that can't be as easily achieved and controlled with many other materials," says DeVoss, adding that SlenderWall also stands up to cost analysis for many budgets and project schedules.



"We practice unabashedly modern architecture in a city known for its historicism and architectural scenography," says Ripple. "So for us, the challenge is simple but the resolution is hard: Do buildings that are both of their place and their time." That means using time-tested means for dealing with the hot, humid climate with powerful storms and wind-driven rains, while also creating a building that reflects the social nature of the city.

In broad terms, that meant wrapping an L-shaped layout of labs, offices and public facilities around a landscaped interior courtyard – a classic New Orleans conceit – that passersby can glimpse through the main facade. The courtyard is one of several amenities for the building's laboratory researchers and biotech executives, who tend to work long hours and desire social areas for breaks and spontaneous collaboration. Another exterior feature is a fully integrated rain cistern incorporated to modulate and control the significant rainwater of the area on the site, which the architects utilized in both functional and aesthetic features like plant watering, indoor brownwater, and exterior fountains.



## **Developing the façade design**

The four-story building was conceived as a very public glazed main façade with a covered public entry meant to suggest a classic New Orleans balcony condition. An aluminum sunscreen above the entry elegantly curbs the sunlight entering the building. The secondary exterior walls are more private and controlled, for research spaces, with punched windows.

To evaluate the building performance and LEED points, the project design team – which included the Atlanta-based MEP engineers Newcomb & Boyd and an enclosure consultant – used envelope modeling mainly to study solar heat gain and bulk moisture drive into the building. The studies showed excellent performance for the SlenderWall portions, and that even with 68% glazing, the main entry façade was only the equivalent of 18% glass, thanks to incorporation of the sunscreen and the highly insulated precast.

SlenderWall helped ensure a consistent and controlled building envelope, adds Easi-Set's Stock. "The precast sections were delivered from the plant with closed-cell foam insulation that also acts as a vapor barrier, which contributes to the air- and water-tightness of the structure," he explains. That means the panels simultaneously deliver cladding, 3-1/2 inches of closed-cell foam insulation (R-21), with a shop-applied, continuous air barrier and moisture protection behind a perimeter stud frame wall.

Yet there were other benefits for using SlenderWall. First was the tight project site on the main transportation artery of Canal Street in the city's downtown core, which limited crane access. Traditional, heavy precast elements, which weigh 78 lbs. per square foot, require a larger crane; with SlenderWall – at only 28 lbs. per square foot – a smaller crane could be used. The lighter panels took less time and space to hoist, too, and the lighter weight also saved the State of Louisiana on costs for related structural framing, moment connections and foundations. In addition, the panels would meet the local hurricane code, which references the Miami/Dade County standards for wind and impact resistance.

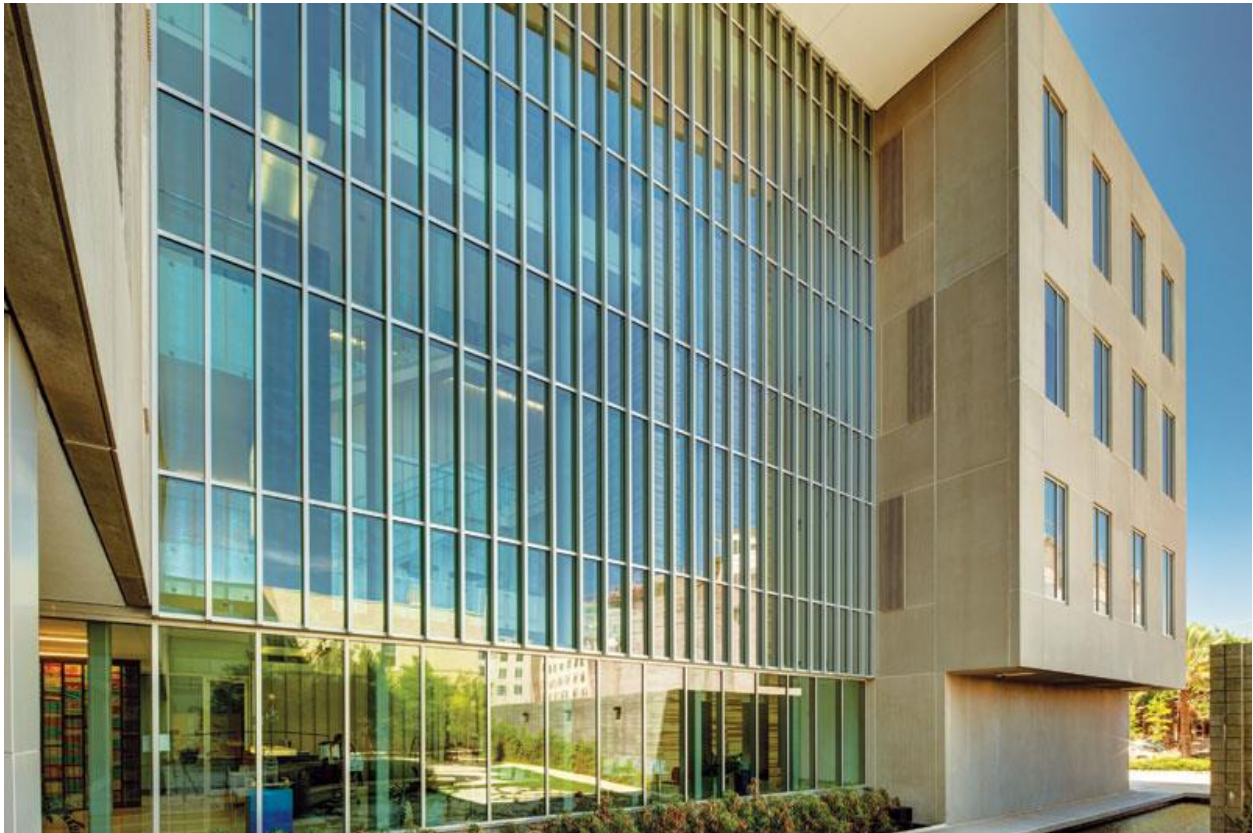
Further, the precast assemblies are cast with a steel-stud frame during manufacturing, says Jackson Precast's DeVoss. That frame is mounted outboard of the floor edge. Then it is used after erection to receive drywall and other interior finishes, eliminating the cost of a traditional knee wall and opening up an additional 4 inches of available floor space around the entire perimeter.

## **Incubator for Bayou science**

The state-funded biotech incubator project was commissioned by the state agency, Louisiana Economic Development, as one of three incubator sites in New Orleans, Baton Rouge and Shreveport. In New Orleans, says Z Smith, director of sustainability and building performance at Eskew+Dumez+Ripple, the biotech business incubator benefits from its proximity to Louisiana State, Tulane, Delgado, Xavier and other higher-education science hubs.

"The tenants at the New Orleans BioInnovation Center are developing huge projects and valuable startups, and the idea is to provide an attractive facility at attractive rates so we can keep this intellectual capital here in the state of Louisiana," says Smith, who is also on the adjunct faculty at Tulane School of Architecture. "Inside these walls, we've designed successful generalized facilities that would work for a

wide selection of start-ups and bigger companies that need 10,000 square feet of cleanroom and labs – and anything in between."



For this social city, the project also shows the design potential and sustainability benefits of SlenderWall, a proven composite technology of precast concrete exterior panels integrated with finish-ready stud framing. The high-end finish, which looks like a honed limestone cut in large, joint-free expanses, actually contains an engineered assembly, shop-fabricated and pre-insulated, weighing only 28 pounds per foot.

Like the biotech labs contained within this elegant building, SlenderWall incorporates a high level of research, too.

**Project Facts: New Orleans BioInnovation Center**

Building: 65,500 square feet of state-of-the-art wet lab, office and conference space

Project type: Science/Research (new construction)

Location: New Orleans

Design challenge: High-end architectural finish for LEED-rated project on tight site

Delivery type: Negotiated construction contract; LEED Gold achieved

Architects: Eskew+Dumez+Ripple with NBBJ

General contractor: Turner Construction

Precaster: Jackson Precast, Jackson, Miss.

## Case 5:

### **Lean, Green and Visually Clean**

#### U.S. Army Command Headquarters at Fort Belvoir

SlenderWall lightweight precast panels with integral interior wall framing wall shave construction time and costs while preserving LEED Gold quality.

Midland, VA - Several innovations in sustainable, lean construction techniques have been gaining broad adoption. One of those is a hybrid enclosure system combining lightweight, architectural precast cladding with a highly insulated inner barrier wall of closed-cell foam and metal studs. Replacing the work of four separate trades, this composite product has been credited with reducing project schedules and costs, sometimes by two months or more. Yet it also offers aesthetic flexibility while ensuring proper building envelope function – two key aims of every project team.



A recent example of its use is a new, four-story legal office building and courtroom at Fort Belvoir, Virginia, spearheaded by the U.S. Army Corps of Engineers for its client, the U.S. Army Legal Service Agency Administration. Aiming for LEED Gold, the project's design/build team led by architects at Perkins+Will and BCRA Inc. and the contractor Suffolk Construction focused on methods for achieving a high-quality, durable building that could be constructed within a short, 12-month fast-track schedule.

On a design level, the building – called the BRAC 132 Army Administrative Facility – had to "express the permanency of the court system and the high ideals to which the military legal system adheres," according to Andrew Rashid, Perkins+Will's science and technology market leader, Washington, D.C. Conceived in a brick finish to match the base's buildings, "The building exterior incorporates two simple volumes and flat roofs that provide a transition from the adjacent new hospital facility to the more traditional pitched roofs on the base," says Rashid, while the court wing, with its double-height interior and curved, glass-walled façade, "is distinct from that of the administrative portion, emphasizing its unique function."

At the same time, the team looked at ways to boost productivity and reduce waste while ensuring a high level of workmanship and quality, according to Chris Seveney of Suffolk Construction. "A project like this would typically carry a delivery schedule of 24 months, but it was given a congressionally mandated completion date of one year," says Seveney. "It was essential that the team use as many lean design-and-construction practices as possible."

On top of these challenges, the U.S. Army saw the new facility as an opportunity to meet the U.S. Green Building Council's LEED certification for green buildings. A minimum LEED Silver was given as the project goal.

## **Building system choice**

Taking time to compare a variety of building approaches, the team considered using the novel composite system, SlenderWall, which combines a precast exterior panel with an integrated perimeter stud-wall system. The cladding could match the local brick finish and had punched window openings, with sections up to 26 feet wide to minimize visible joints. SlenderWall could also simultaneously install the perimeter stud frame wall around the entire 97,300-square-foot building footprint. Filled with closed-cell foam insulation at 3.5 inches deep, the 169 discrete panels would also deliver high thermal performance of R-21 with a continuous air and moisture barrier.

"The selected wall system also already had approvals for meeting the strict anti-terrorism criteria for security and blast-resistance as required for all new government buildings by the federal departments of Defense and Homeland Security," says Jeffrey P. Wholey, manager of business development with Smith-Midland, the precast subcontractor. "Yet it is a lightweight method of only about 30 pounds per square foot, mounted outboard of the floor slab."

Smith-Midland took only 14 days to enclose both buildings with the 10-foot-tall panels, according to Suffolk Construction, helping telescope the schedule. The use of the SlenderWall system further saved time by eliminating the need for an insulation contractor and carpenters for perimeter wall framing. "This compares to the eight to 10 weeks you would need for traditional brick veneer masonry, with two more weeks for the interior framing, and five days for closed-cell foam application," says Wholey. "That potentially saved the team 11 weeks."

The exterior, which combines a brick veneer finish with buff-colored banding and windowsills, matches the brick finishes used throughout the Virginia military base, yet projects the image of a modern office



structure. The exposed precast concrete resists moisture intrusion thanks to an integral concrete admixture employed in the manufacturing process of all SlenderWall panels.



## **Lean and green**

The use of the pre-engineered SlenderWall system, along with other prefabricated assemblies and standardized details, saved the U.S. Army both time and money – but without sacrificing quality. Inside, the buildings feature traditional wood wainscoting, stone lobby floors, and ample daylight. In fact, the fast-track project won the first-ever "Best Lean Construction" Award from the Associated General Contractors, and later earned LEED Gold certification.

Although government projects are required to target LEED Silver as a minimum, by using SlenderWall and other green techniques the team was able to earn enough additional points to achieve LEED Gold. For example, SlenderWall is a high-speed cladding technique that produces minimal construction waste and requires no scaffolding. It is much lighter than traditional precast, which in some cases allows downsizing of the steel structural frame and foundation.

Other advantages of SlenderWall include saving valuable interior space. The 8.5-inch-deep panels attach using gravity connects and lateral connects at the floor slabs that don't impede use of the full slab surface. After the pre-insulated panels are installed, the 3/4-inch joints are completed with caulk and a backer rod, and then sprayed over with closed-cell foam for a continuous thermal and air/moisture barrier.

"This project shows how the federal sector can think lean and smart in future projects," says Heidi Perham, NCARB, AICP, managing director with BCRA, which designed the interiors and later presented the project at the 2012 Design-Build Institute of America Federal Sector Conference in Arlington, Va. Just as important, the project vividly captures the case for employing more sustainable, lean construction techniques such as SlenderWall's hybrid structure of insulated precast cladding with a perimeter frame stud wall. "Lean construction is a movement," says Smith-Midland's Wholey. "But its methods will be adopted widely as project teams search for more ways to build quickly and cost effectively while still retaining excellence in design."

### **Project Facts: BRAC / USALSA Administration Building**

Building:	Four-story U.S. Army Legal Service Agency Administration Building and U.S. Army Legal Services and Army Audit Agency, With two-story adjacent Courtroom Building
Project type:	Military/Judicial (new construction)
Location:	Fort Belvoir, Virginia
Design challenge:	Fast-track brick face façade system
Delivery type:	Design-build / lean construction, LEED Gold
Architects:	Perkins + Will and BCRA
General contractor:	Suffolk Construction
Precaster:	Smith-Midland / SlenderWall licensee

#### SlenderWall® Architectural Precast Specs

Number of panels:	169
Panel type:	Precast panel with thin-set brick finish, metal stud frame and R-21 closed-cell foam insulation
Panel finish:	Thin Set Brick with buff precast accent bands and windowsills
Installation period:	14 days
Manufacturer:	Smith-Midland (fabricator)

## Case 6:

### **Hotel Project Team Finds Value is More Than Skin Deep with Precast-Alternative Cladding**

#### Cleveland Clinic Holiday Inn

Architectural precast panels have been a "go-to" cladding material for decades in the hospitality industry. With their design versatility and modularity, these panels offer advantages for architects and contractors, alike. However, precast also can pose some challenges – notably, in its weight. An increasingly popular alternative, SlenderWall, incorporates precast's design flexibility into a lighter-weight assembly that also

includes a vapor barrier, insulation and interior framing studs. The product's installation advantages are winning new converts among hotel developers, including the team behind the recently completed Holiday Inn located on the campus of Cleveland Clinic in Cleveland, Ohio.



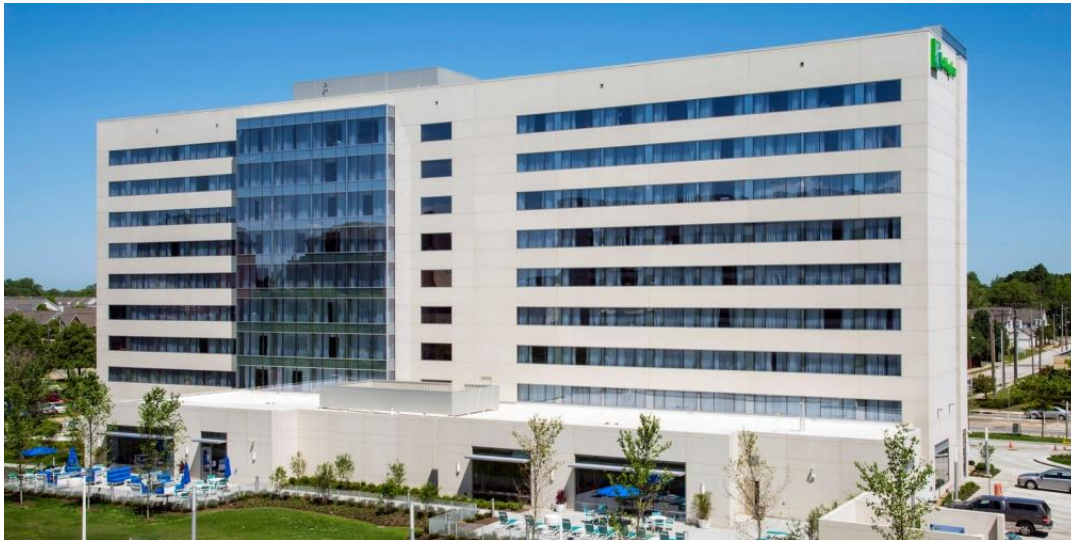
## **Bringing hospitality to world-class healthcare**

Cleveland Clinic is a world-class research and clinical care institution, with more than 40 buildings (including a hospital with more than 1,400 beds) across its 165-acre grounds. Patients and their families come to the Clinic from across the United States and around the globe for treatment. The need for nearby lodging to serve these visitors became obvious when the Clinic chose to demolish a former guest house to make way for a new medical-education complex.

The hometown firm of Kaczmar Architects, Inc., (KAI) landed the design contract for the 276-room hotel, operated under the Holiday Inn brand that was intended to take the place of the previous guest house. This firm's first task was ensuring its plans meshed with Cleveland Clinic's well-defined architectural guidelines. KAI wasn't a newcomer to these requirements – as architects for several other recent projects on the campus; they were very familiar with their client's fit-and-finish priorities.

“White everything,” is the shorthand Dave Kaplan, project manager for work on the hotel's exterior façade and its detailing, uses to describe these guidelines. He adds that modernist touches, such as incorporating glass curtainwall and wood interior-trim detailing, also can be incorporated. “They have a very simple color palette that we have to adhere to.”

KAI architects have frequently turned to traditional architectural precast panels as exterior cladding for other hospitality projects, as well as other KAI projects on the clinic's grounds. Initially, Kaplan and his team were focused on this material for the nine-story Holiday Inn, as well. But when the building team, which also included contractors Walsh Construction and Forest City Erectors, started costing out installation – including the large cranes required to lift very heavy precast panels to eight-story heights – it became very clear an alternative solution was needed.



Representatives from Chicago-based Walsh Construction had worked successfully with SlenderWall on previous projects and suggested that Kaplan take a look at the product. He quickly saw opportunities for budget savings, without compromising the design, given SlenderWall's significantly lighter weight and faster installation time. Because SlenderWall panels combine multiple building elements into a single system, they can shorten a project's overall construction schedule significantly.

"The initial reaction was, 'What's the catch?'" he says, remembering some initial skepticism from the building team. "Then we soon realized there was no catch."

### **Designed for performance**

The outer face of a SlenderWall panel is 2-in. of architectural precast concrete containing PVA fiber and welded-wire reinforcement. Even with the addition of the vapor barrier, insulation and framing studs, the entire assembly is a third the weight of traditional 6-in.-thick architectural precast. Especially appealing to owners and construction managers, is the fact that any potential exterior wall problems can be addressed through a single-point-of-contact.

"It's essentially a one-phone-call product, because a SlenderWall panel contains the framing studs, the insulation and the precast," Kaplan says. This differs from traditional precast construction, with different manufacturers and installation crews handling each of these building-envelope elements, individually. In such projects, he says, "If something happens in the future, everyone's pointing fingers."

As one would expect, there was a learning curve for Kaplan, in terms of SlenderWall's detailing requirements. But he says the SlenderWall-producer's team at Smith-Midland was very responsive to all his questions, providing design details in graphic formats compatible with KAI's Revit platform, and lending assistance on such safety-related issues as the appropriate means for fire-stopping the gap between the edge of the floor slab and the back of the precast panel.

"They were able to point me to UL assemblies they've used on other projects—they were able to answer all my questions and they provided the graphics," he says. And the combination of vapor barrier and insulation proved to be a big timesaver for Kaplan and his team, because it meant that complicated building-envelope questions could be answered with a single phone call. "A huge advantage was that it was one guy taking care of the energy code."

### **Smooth construction process**

As KAI's plans moved from CAD screen to the construction site, the process of installing the SlenderWall panels proved just as smooth as their design, according to Kaplan. One concern had been pairing the traditional architectural precast used at ground level with the SlenderWall panels used to clad the floors above. Because the precast was also fabricated by Smith-Midland, the Acid Washed finish was a perfect match between the two materials. And, thanks to clear, consistent detailing, erection proceeded on time and on budget, with no complications for the Walsh Construction team.

"I can't think of any hiccups, and I can't think of anything I'd want to change," says Kaplan, who says he'll be coming back to SlenderWall for future projects, thanks to this experience. "Any time you can just watch things go up as you expect, that works for me."

### **Project Facts: Cleveland Clinic Holiday Inn**

Project cost: \$40 million

Project size: 175,000 sq. ft.

SlenderWall: 31,467 sq. ft.

Traditional precast: 10,252 sq. ft.

Owner: Integrated Cleveland Clinic, LLC

Architect: Kaczmar Architects Inc.

Contractor: Walsh Construction

Erectors: Forest City Erectors

SlenderWall Producer: Smith-Midland Corp.

Product Licensor: Easi-Set Worldwide

To learn more about SlenderWall visit [www.SlenderWall.com](http://www.SlenderWall.com) or call 1-800-547-4045

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