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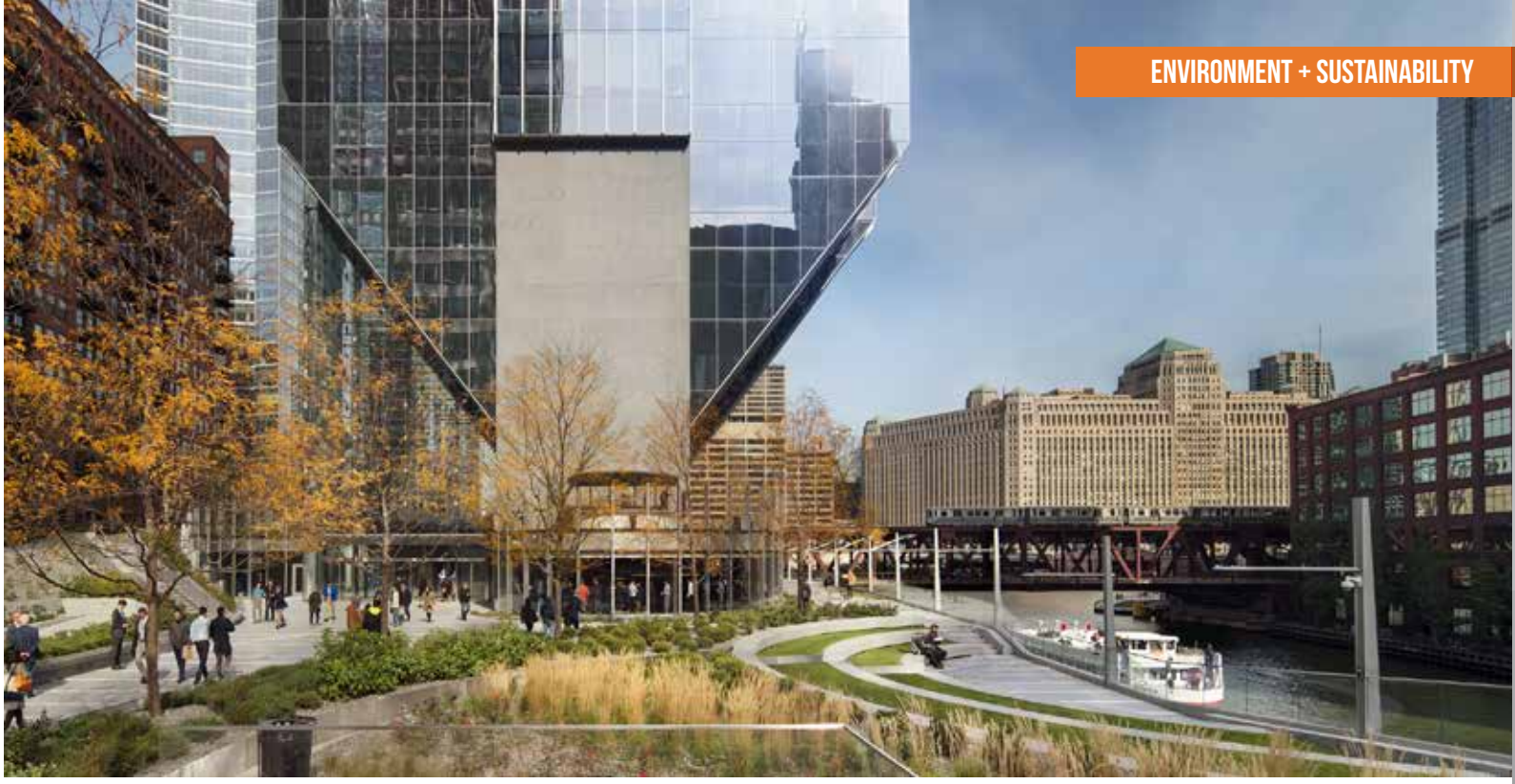

Building with Foam-Control Geofoam allowed Wolff Landscape Architecture to create a two-tier park system that addresses vertical movement onsite through a combination of ramps and stairs. *Photo: © Tom Rossiter Photography*

HIGH-RISE LANDSCAPES

GEOFOAM PROVIDES LIGHTWEIGHT STRUCTURAL FILL FOR MULTI-LEVEL URBAN GREEN SPACE AND PEDESTRIAN CONNECTION.

By Sean O'Keefe

THE CITY OF CHICAGO lives a legacy of architectural excellence derived from an insistence on pushing boundaries through experimentation and innovation. Long viewed as a design laboratory, Chicago's unique architectural heritage owes much to the Great Chicago Fire of 1871, which left the decimated city ripe for redevelopment. Chicago has also had the fortune of being home to more than a few 20th Century architectural giants, including American-icon Frank Lloyd Wright; father of skyscrapers, Louis Sullivan; and modernist pioneer, Mies van der Rohe.

Famous for what he called "skin and bones" architecture defined by a minimal framework of structural order to achieve open unobstructed space, van der Rohe established his Chicago practice in 1938. Today that practice lives on as Goettsch Partners, a firm more than willing to take on some of the world's greatest design challenges. Among Chicago's latest legacy assets, one of Goettsch Partners' newest additions to the cityscape — 150 North Riverside — stands out as an immediately obvious example of the incredible made possible.

"150 North Riverside is located along Chicago's famous loop on a fantastic site where designing something buildable was considered next-to-impossible," said Erik Harris, an associate principal with Goettsch Partners.

Hemmed in by a combination of barriers, including the city's set-back zoning requirements along the Chicago River and a bustling, seven-line Amtrak right-of-way spanning more than 140-feet, the developable parcel offered only a small sliver of land just 55-feet wide upon which to build. Meeting the challenge of building a cost-effective high-rise on this site came down to delivering the required floorplate area with a 45-foot lease span supported by four-story trusses on either side of the 39-foot-wide core.

While the striking geometry of 150 North Riverside will always make the perched structure remarkable to the passerby, the site's incredible landscape is an almost equally impressive engineering accomplishment that will likely go largely unnoticed.

"From the hard edge of the building, we were able to secure the air rights over the Amtrak right-of-way," Harris said. "We decked over it to create two and a half acres of public greenspace that conceals the parking structure, lobby area, and loading dock enclosing about 28 percent of the site. Though the building is extremely vertical, the site is quite horizontal — both presented equations to solve."

Filling the horizontal void and creating beneficial pedestrian connections to the urban fabric surrounding 150 North Riverside was a multidisciplinary effort involving every aspect of civil, structural, and mechanical engineering integrated within the unique landscape. Craig Soncrant, a principal with Wolff Landscape Architecture led the firm's work on the project, relishing the challenge.

"Complicated green roofs and innovative plaza design is where we thrive," said Soncrant, relaying that Wolff had 21 such projects under construction in 2017 in Chicago alone. Soncrant himself led 15 separate high-rise landscapes last year and believes that providing effective green space for tenants is a must-have amenity in Chicago's post-recession development. "150 North Riverside is a showstopper, an incredible building with a wonderful investment in city beautification that repositioned an inaccessible, eye-sore site as a convenient pedestrian thoroughfare, entry plaza, and river walk."

The investment was certainly significant and stretching every dollar to improve pro forma is rarely a waste of time. Goettsch Partners originally planned to employ hollowed slab-on-void construction to build up the site topography, but when value engineering analysis revealed that that much site concrete was cost-prohibitive, a new solution was sought. Wolff Landscape Architecture's experience with an alternative, lightweight, structural fill was extensive, and Soncrant proposed geofoam as a workable surface substrate substitute.

"EPS geofoam has been a go-to product in our designs for many years," Soncrant said. "We use it whenever we need a light, strong, durable material to fill voids and make architecturally contoured surfaces."

Bringing the design strategy to Goettsch Partners meant providing examples of previous Chicago-area, decked plazas successfully built with geofoam and introducing the design team to ACH Foam Technologies.

A multi-level green space connects 150 North Riverside and the parking structure immediately to greater Chicago in many different directions. Working with geofoam enables designers to create a custom contour of substrate material in the exact depth needed below specific planting areas. ***Photo: © Tom Rossiter Photography***

"We only work with materials that we know will perform," said Harris regarding the geofoam value engineering proposition. "Performance, in this case, means supporting the pounding it will take from heavy pedestrian use in Chicago's harsh weather; being easier, faster, and less expensive to work with; and, most importantly, feeling confident in the material's capacity to meet loading requirements."

Wolff Landscape Architecture's previous projects with ACH Foam Technologies have included a lightweight rooftop amenity deck on the eleventh floor of Chicago's Prudential Plaza and at 222 South Riverside Plaza Renovation, also located over railroad tracks and along the Chicago River. Geofoam has also solved technical challenges beneath highways, bridge embankments, levees, and other large civil infrastructure applications where loading requirements are substantially greater than anything required by 150 North Riverside.

A GEOFOAM BASE THAT ACCOMMODATES APPROPRIATE SOIL DEPTHS DECREASES THE OVERALL DEAD LOAD ON THE STRUCTURE AND SUPPORTS CONTROLLED, POSITIVE DRAINAGE ACROSS THE SITE.

Developing a pedestrian-friendly site solution meant responding to elevations as low as the river and as high as the roof of the parking structure, a vertical transition of about 15 feet. Animating the long, horizontal site meant creating a multi-level green space connecting 150 North Riverside and the parking structure immediately to greater Chicago in many different directions.

"Building with Foam-Control Geofoam allowed us to create a two-tier park system that addresses vertical movement onsite through a combination of ramps and stairs," Soncrant said.

Since single blocks of geofoam can be large enough to fill sections 8 feet long by 4 feet deep, they make building multi-level terraces, ramps, stairwells, and planter boxes easy. As importantly, working with geofoam enables designers to create a custom contour of substrate material in the exact depth needed below specific planting areas. Since a tree may need a soil depth of several feet, a shrub about 18 inches, and grass just 6 inches, building a geofoam base that accommodates appropriate soil depths decreases the overall dead load on the structure and supports controlled, positive drainage across the site.

The task of installing the overall landscape and the Foam-Control Geofoam blocks was won by Twin Oaks Landscaping, Inc., a Chicago-area firm with a national practice dating back to 1983. Steve Jungermann was the man responsible for overseeing the firm's efforts.

"The project was a challenge simply because of where it's located," said Jungermann, regarding the complexity of the surrounding cityscape and the site's abundant elevation changes. "On something as complicated as this it's imperative to get expert guidance."

Jungermann detailed the challenges of developing material take-offs that account for the quantities of geofoam required to respond to the site's many grade changes, soil depth-profiles, and architectural contours. Working with ACH Foam Technologies' product representative, Twin Oaks was able to develop an accurate purchase order and devise

The 150 North Riverside site, shown during excavation, is hemmed in by a combination of barriers, including the city's set-back zoning requirements along the Chicago River and a seven-line Amtrak right-of-way. *Photo: Goettsch Partners*

Lightweight geofoam blocks are easily maneuvered by two laborers and can be customized to virtually any shape with a hand-held hot wire cutter. *Photo: ACH Foam Technologies*

a finely tuned delivery sequence for the material. With limited lay-down space and intense coordination required between site work, electrical, plumbing, and landscape construction, maintaining constant communication and just the right amount and types of geofoam on hand was critical. Though large, the lightweight geofoam blocks are easily maneuvered by two laborers and can even be customized to virtually any shape with a hand-held hot wire cutter.

"Though this building is both bold and dramatic, when it comes to material selection we are not looking to be risk takers," Harris said. "Like the design for 150 North Riverside itself, Foam-Control Geofoam provided a confident approach to a unique engineering problem and contributed greatly to an overall wonderful building solution."

SEAN O'KEEFE has more than 18 years of experience articulating the complexities, challenges, and comradery of construction and design. He writes built environment stories for owners, architects, builders, and product manufacturers and can be reached at sean@sokpr.com.