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at CUSTOM heights

A specially designed suspended work platform makes window repair possible on unique architecture

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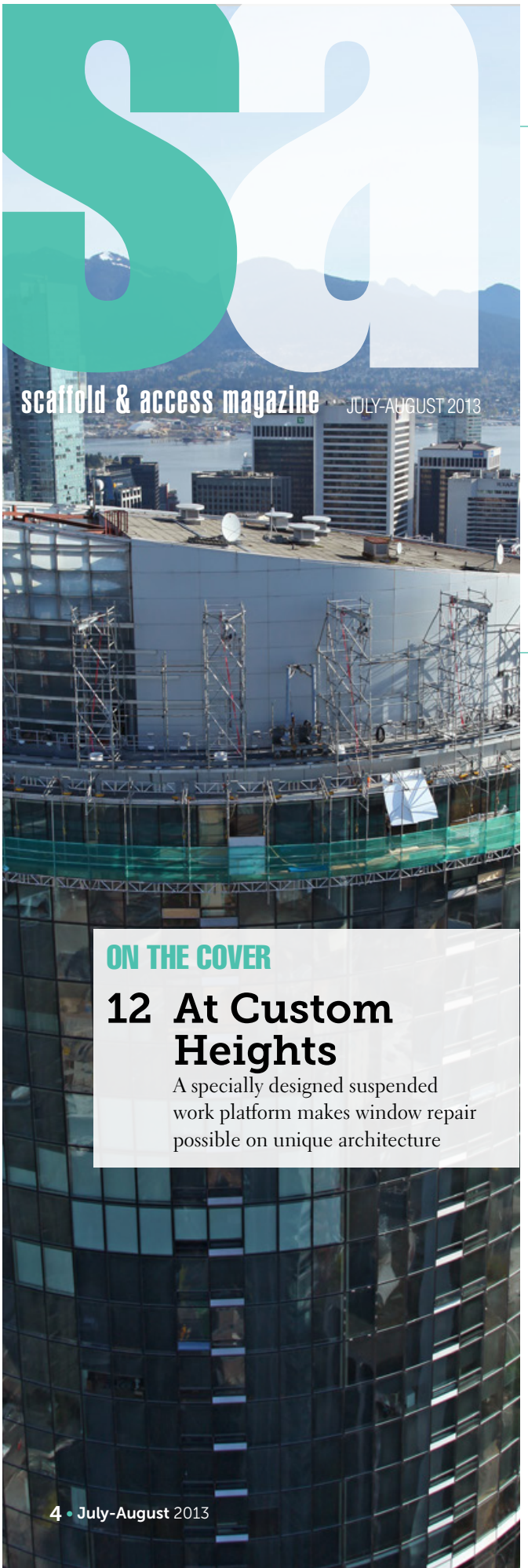

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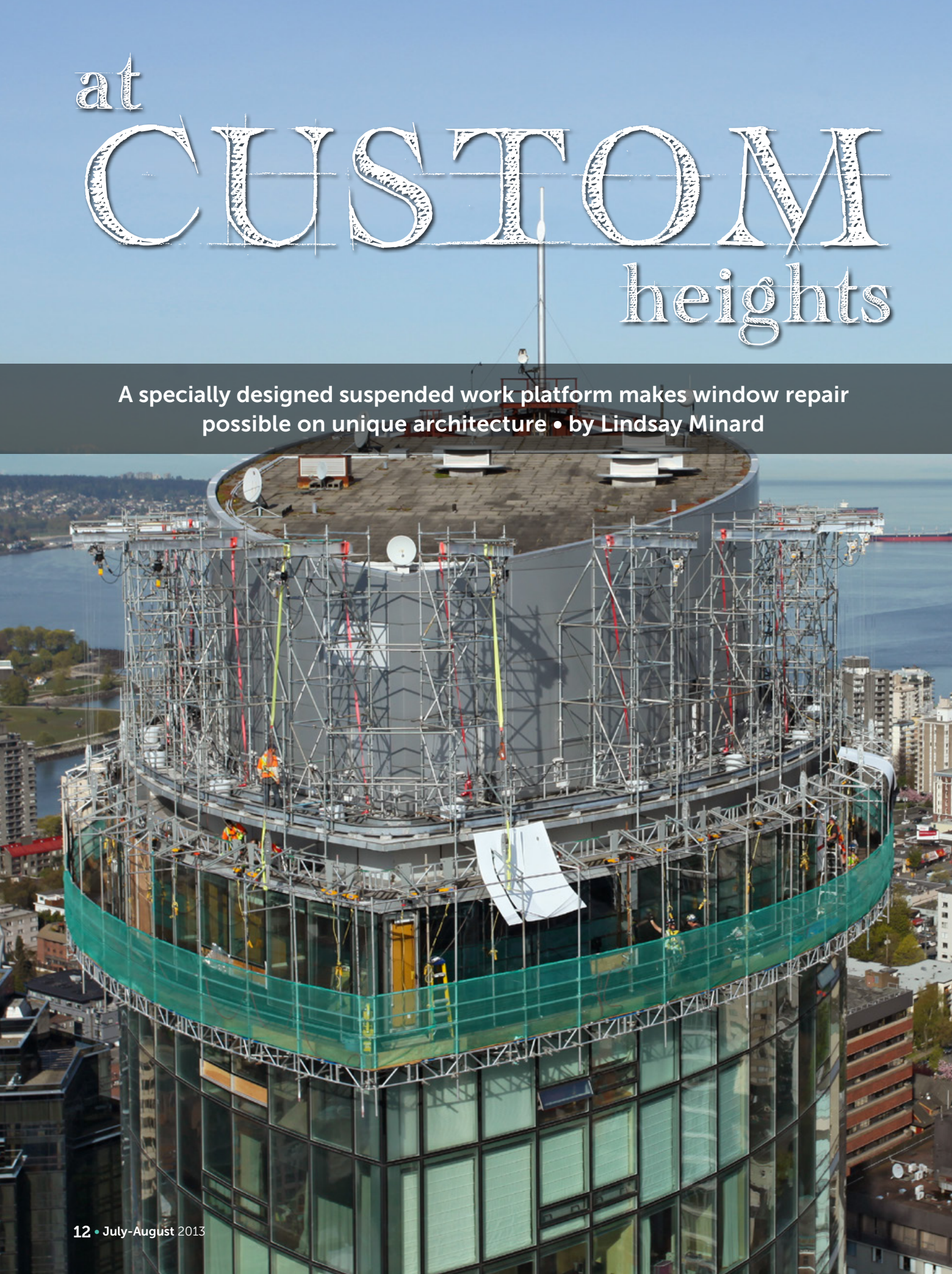

The team at Canadian-based Matakana Scaffolding Inc. grew up on hangers, truss-outs, and cantilevers. With over 85 years of scaffolding experience in the commercial and industrial markets between them, they have been involved in solving some of the industry's most difficult access challenges.

"Having done a significant amount of work utilizing European and Australasian (South Pacific, including Australia and New Zealand) techniques and equipment, we tend to look at access problems from a different perspective," says Nick Shaw, president of Matakana. "Unit beams—trusses that can be connected end-to-end—open up all sorts of possibilities for bridging, suspended decks, cantilevers, and temporary roofing. Those options combined with grounding in tube and fitting allow us to create solutions beyond the standard scope of modular scaffold systems."

It's these unique possibilities Matakana is able to engineer that won them the One Wall Center project in Vancouver, British Columbia. One Wall Center is something of a landmark for the city, at one point holding the distinction of its tallest building. Completed in 2001, the oval structure is currently undergoing renovation work that entails replacing the windows of its top 17 floors.

"One Wall is a prominent and important building in Vancouver. As engineers and construction managers, we wanted no room for error," says Kevin Ganzert, director of construction services with RDH Building Engineering Ltd., the consultant representing the owner. "We developed the repair strategy, and then solicited proposals from qualified firms across North America to put it into action. Matakana came forward with the best proposal in virtually every category, and thus was awarded the job."

The custom platform is a 4'x400' long, multi-point suspended work platform that weighs 18,368 lbs.

Custom Design for Unique Challenges

The timing of the work on the One Wall project needed to happen between Vancouver's windy seasons. The Matakana team felt the key to winning the contract was being able to provide complete 360° access to each floor, at a given time, in order to ensure the job was completed on schedule.

Additional needs for One Wall included a deck loading of 2,000 lbs. between lifting points that would be safe for use in winds up to 53mph. "It had to be rated for wind speeds of 62mph, and had to have the ability to be raised to the roof level and then be tied off should the winds exceed that," explains Shaw. "The clearance between the deck and the glass had to be 8 in., the deck 4 ft. wide, allowing for glass to be rolled around the deck on dollies. A rubber seal was needed between the platform and the glass at deck level to prevent even a screw from dropping."

The Platform

Beyond the wind and the schedule, the main challenge the team faced was the actual design of a plaform that would not only withstand the elements while removing every window, but conform to the distinct oval shape of the building, and not damage its façade while being raised and lowered.

The solution came courtesy of Matakana's in-house engineering team, with swing stage expertise given by

Canadian-based Scaffcat Staging Ltd., an SAIA Accredited Training Institute.

The Matakana design team had experience with a 450-mm deep truss utilized in temporary roofing applications; using this knowledge made designing the platform for the One Wall project a matter of modeling a curved truss with the webbing reconfigured to allow for lifting stirrups to be connected with band and plate couplers. The team's end-product was a custom, 4'x400' long, multi-point suspended work platform that weighed in at 18,368 lbs., with an 8,600 lb. allowance for workers and materials.

Shaw explains, "We were able to design the platform with curved aluminum truss beams to encircle the building and have it manufactured with custom stirrups, tying it together with conventional tube and fitting."

Keeping the integrity of the façade in mind, the design and engineering team made the platform rigid with serious plan bracing, rubber-rolling bumpers located approximately every 20 ft. around its inside, and a uniform lowering and lifting speed.

Lifting a Mammoth

For lifting this unique scaffold, Matakana consulted swing stage expert Victor Kilp, owner of Scaffcat.

"We were able to achieve this by having the Scaffcat team provide us with a custom-made controller and 18 brand new motors to ensure consistent performance," states Shaw.

"Given the load requirements and the limited available power on the roof of the structure, it was decided that a three line pulley system incorporating a swingstage hoist was the best way to approach hoisting," explains Kilp. "This would give each 1,000-lb. hoist a lifting capacity of 3,000 lbs.

Kilp says, "Not only were we able to achieve the load requirement but by using the three line system we were able to bring the travel speed down to a very safe 2.3 in. per second."

Scaffcat Staging supplied and installed 18 Nihon Bisoh B210 hoists, citing their reliability and ability to be operated upside down. The hoists have an overspeed and mechanical overload device that shuts down the hoist should an overload occur.

In conjunction with the CCD control box, should a shutdown of any one hoist occur, all hoists automatically shut down. The CCD then pinpoints the hoist with the issue, rectifing the issue safely.

"These hoists can be reeved from the bottom as well as the top, which made their installation safer and easier to do, as we drove them upside down from the roof into their work location on the beam," explains Kilp.

Ultimately, the hoist allows the entire platform to be lowered 17 floors, with a section designed to break away that enables windows in a notched-in section of the building to be removed for a further 17 floors. Additionally, the custom equipment adjusts as the building tapers out to provide easy, safe access to contractors.

Erection

The next challenge the team faced was safely erecting the scaffold around the top of the 500-ft. high building and operating hotel. Steel tubes were fixed on existing steel tracks from the building's window washing system that were then

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The netting attached to the suspended deck prevents spillage for the One Wall project.

cantilevered out over the roof's side with debris netting; the result was 8 ft. of protective fan beyond the edge of the building.

"All the work was then carried out above this fan, with all tools and equipment being tethered until fixed in position," says Shaw.

Safety First

"Matakana and the engineering team prepared a safe work plan and procedures, including full engineered drawing, which was submitted to Worksafe (Canadian equivalent of OSHA) for approval prior to project start up," says Paul Roche, general manager with Matakana. "This included full engineered drawings; the work of Matakana's engineers was reviewed by an external engineering consultant."

The platform system meets the criteria of Canadian standards, and all its fabricated components, anchorage, and various accessories have a safety factor of four, with its suspended lines showing off a safety factor of 10.

"Safety was a priority for all involved in the project, and Matakana's design was developed with several fail safe measures, including dead bolting of the system together," says Roche. "The building structure itself was also examined to ensure its ability to handle the loads imposed."

"The size, configuration, and all-glass skin of One Wall makes exterior access for this kind of construction a real challenge. We considered all options and concluded that the only viable solution was a suspended work platform," states Ganzert.

Extremely Effective

"The suspended work platform designed and erected by Matakana is nothing less than a marvel. It provides a means for the glaziers and RDH engineers to go about their work with a high degree of safety and efficiency," affirms Ganzert. "It is an extremely effective solution to what was a very challenging problem. We expect to have the glazing replacement project complete before the winter storms arrive in the fall—on time and within budget." •