# Open for Business

Steel facilitates an open, efficient floor plan and a building-length atrium in the first structure of a major riverfront development in Chicago.

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**THE BRAND-NEW OFFICE** building at 1515 W. Webster Avenue in Chicago kicks off a major development for the city.

The 207,000-sq.-ft, four-story edifice will serve as the Midwest headquarters for logistics company C.H. Robinson. Located on the North Branch of the Chicago River a few miles north of the city's Loop business district, it is the first building to be constructed as part of the ambitious Lincoln Yards project. Proposed by Chicago-based real estate investment and development firm Sterling Bay, Lincoln Yards is a massive development that will transform a former industrial area into a modern, multi-building riverside district interwoven with ample green space. Completed last year and targeting LEED Gold certification, the building incorporates a structural steel framing system to achieve large columns bays with efficient office space planning.

The building maximizes usability for C.H. Robinson, providing flexibility for the company to grow within the building over time. Architect and structural engineer SOM studied the company's prior office setting, including furniture layouts, ceiling heights and access to daylighting as part of the design process. This information led to the design of two 345-ft-long by 67-ft-wide office floor plates, slightly offset from one

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The 207,000-sq.-ft, four-story building at 1515 W. Webster will serve as the Midwest headquarters for logistics company C.H. Robinson and is the first building in the vast Lincoln Yards development.


Modern Steel Construction

above: The overall plan involves two 345-ft-long by 67-ft-wide office floor plates, slightly offset from one another, that share a central atrium.

below: The building features large columns bays with efficient office space planning.

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another, that share a central atrium. Each floor plate is supported by two column lines forming a typical bay of 30 ft by 52.5 ft, with 7.5-ft circulation corridors that cantilever from the columns. This layout maximizes occupant desk density for the company while maintaining access to natural daylight, yet still minimizing glare on workstations. The steel structure supporting these efficient office floors required careful coordination of MEP services to maximize ceiling heights, control floor deflections and evaluate vibrations.

The typical floor structure consists of lightweight composite metal deck supported by W16 composite steel beams supported by cambered W27 girders that span between the columns. The girders are rigidly connected to the columns with bolted end plate moment connections to stiffen the girders and reduce floor deflections. The columns were designed as deeper W18 sections to provide rotational restraint to the ends of the girders, a framing approach that also creates a back span for the cantilevered corridors and renders the long spans more economical.

MEP services were integrated with the steel structure by providing shallower floor framing or web openings where required. The main HVAC ducts are routed below shallow W12 beams supporting canti-

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levered corridors or directly below the deck near the cores. Other services such as sprinklers, drain pipes and electrical conduits were routed through typical web openings in each W27 girder. Web reinforcing was only required for girders supporting high live load areas such as the occupied roof deck. The coordination of services and structure allows for 10-ft ceiling heights with a modest 13-ft, 4-in. floor-to-floor height, a significant achievement given the large column bays.

Daylight management was a key consideration in the building design as it impacts sustainability goals and workstation comfort/productivity. Continuous aluminum sunshades control daylight at the perimeter of the building while also giving the project its visual identity. Daylight is also brought into the building through skylights distributed along the central atrium roof; a daylighting analysis was performed to locate the 18 individual skylights to maximize lighting comfort and minimize glare. The skylights are supported by 5-in. square HSS frames that are disguised as part of the metal roof deck system. The steel supporting the metal deck roof was painted and exposed as part of the interior design, and does not require fireproofing. This is due to the atrium's height of 55 ft (the local building code does not require fire protection for Type I-B construction located

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above: The light-filled atrium creates an inviting space for informal meetings, work breaks and office-wide announcements.

below: The building and Lincoln Yards as a whole are located northwest of Chicago's Loop central business district.

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20 ft or more above floors or for roof construction above light-hazard occupancy).

The light-filled atrium creates an inviting space for informal meetings, work breaks and office-wide announcements. Two connecting stairs were provided in the atrium to encourage walking circulation throughout the building. The atrium stairs consist of 17-in.-deep built-up structural steel channels for stringers and concrete-filled metal pan stairs. The atrium stairs are supported by the cantilevered corridor framing, giving them a floating appearance in the space, and the 12-in.-deep cantilevered members supporting the stairs are built up to remain shallow for HVAC and ceiling height coordination. The vibration performance of the system was evaluated with the finite element analysis method recommended in AISC Design Guide 11: *Vibrations of Steel-Framed Structural Systems Due to Human Activity* (available at **www.aisc.org/dg**) due to the unusual geometry and support conditions of the atrium stairs.

Lateral load resistance is provided by braced frames located in the north and south building cores at each end of the central atrium. The typical bracing system consists of bolted double angles concealed within nonstructural walls. The northern-most braced frame is located along a circulation corridor and expressed to the outside of the building. This braced frame consists of 7-in. square HSS braces and W10 columns, protected with an intumescent paint system, and is back-lit at night to draw focus to C.H. Robinson's logo signage.

Structural steel was selected for its ability to provide the open and flexible space requirements of the project while meeting budget requirements. The structural steel package was well below budget upon award, resulting in a significant savings in the overall project cost. The efficiency of the steel system can be attributed to ease of erection and prefabrication, and all typical connections for the project were bolted in the field or welded in fabricator Lenex Steel's shop, such as the column trees with shop-welded W12 cantilevers. Field welding was limited to the flanges of column splices and unique conditions such as the expressed HSS bracing to gusset plate connections.

The building represents a strong start to Lincoln Yards, anchoring the northernmost parcel. The integrated design of the steel structure with the architectural goals and MEP systems was key to the success of this project and serves as a positive example as the site continues to be developed. ■

**Owner**
Sterling Bay

**General Contractor**
Power Construction

**Architect and Structural Engineer**
Skidmore, Owings & Merrill, LLP

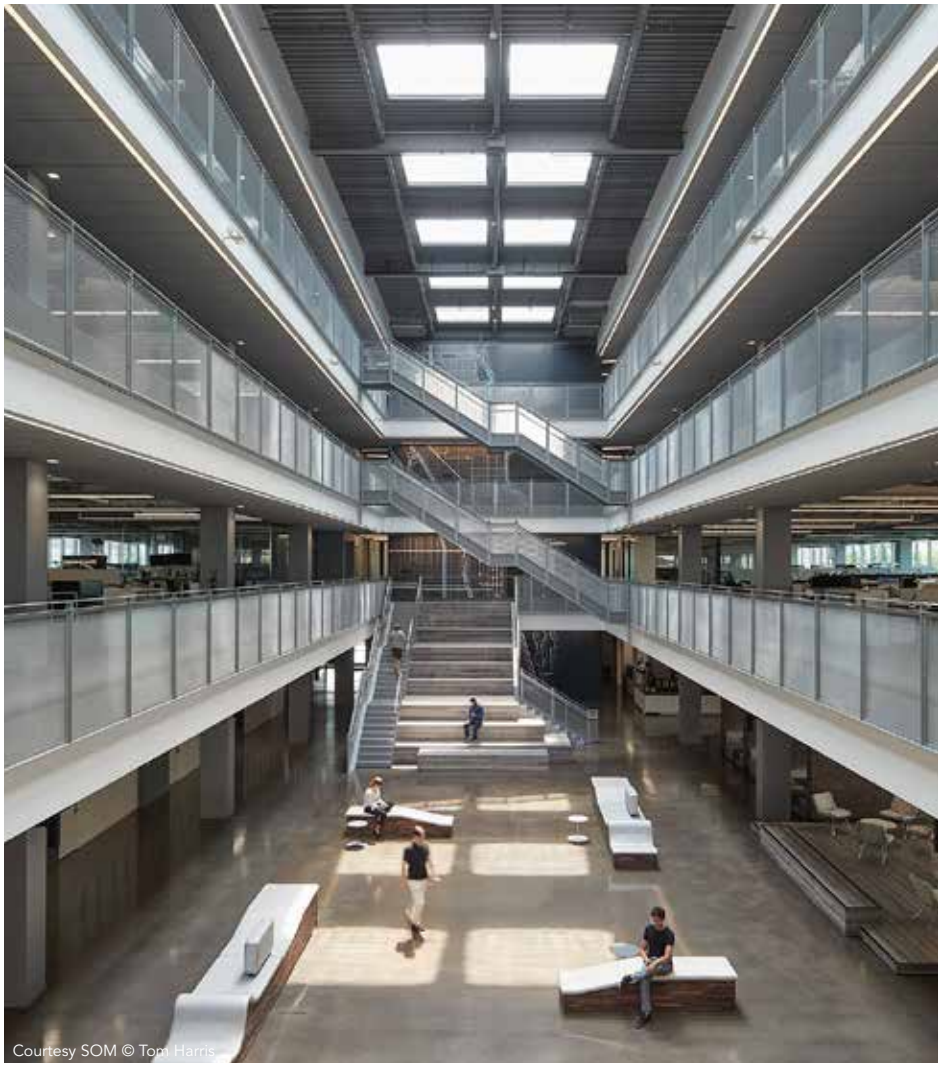
**Steel Team**

**Fabricator**
Lenex Steel Company, Indianapolis

**Detailer**
MoldTek Technologies, Inc.

above: The atrium under construction...

below: ...and completed. It ties together the two slightly offset floor plates of the building.



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