

CTBUH Journal

International Journal on Tall Buildings and Urban Habitat

Advancing Sustainable Vertical Urbanism | 2023 Issue IV

Case Study: Quay Quarter Tower, Sydney

Integrated Infrastructure at Sydney Metro Pitt Street

Talking Tall: Charles Thornton & Richard Tomasetti

Achieving Resilient Seismic Behavior in Quito

Tall Buildings in Numbers: Height Alterations



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Structural Engineering

Challenges to Achieving Resilient Seismic Behavior at Qorner, Quito

This article discusses the structural challenges of achieving resilient seismic behavior for the Qorner tower in Quito, Ecuador. It covers the unique seismic conditions, the building's design, and the construction process.

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Urban Infrastructure

Unraveling the Complexities of Integrated Infrastructure at Sydney Metro Pitt Street

This article explores the complexities of integrated infrastructure at the Sydney Metro Pitt Street station. It details the challenges of integrating different modes of transport and the innovative solutions implemented.

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Architecture/Design

IIT Design/Build: Library & Community Center, Vietnam

This article features the IIT Design/Build project for a library and community center in Vietnam. It highlights the design process, the integration of traditional and modern architecture, and the community's involvement.

“To lead to a shift in the perception of greenery from ‘ornamentation’ to an essential building system, there needs to be a clear discussion of the reality of organic matter.”

Wodzisz, page 35.

Americas

A final revised height of 91 stories has been determined for **The One**, currently under construction in **Toronto**. The building had originally been approved for 85 stories and 308.6 meters, but an application to go higher to 94 stories and 338.3 meters had been pending. The City opposed the 94-story mark, and agreed to 91 stories and 328.4 meters. The building aims to be Canada's first "supertall" building. Another development application in the city is asking for revisions to add two more floors at **185 King Street East**. The revised design features a more cohesive architectural style, with stepped articulation across the tower and a simplified reveal between the heritage homes and the tower.

In **New York City** the fight for decarbonizing construction is at the forefront. The New York City Economic Development Corporation (NYCEDC) is launching the New York City Mass Timber Studio (NYC Mass Timber Studio) to support mass timber projects in the early planning and design stages. It aims to increase awareness and promote the adoption of mass timber practices, presenting exciting prospect for potential future developments.

Brookfield Properties announced that **5 World Trade Center** will now include 1,200 housing units. The approved project featuring a glass curtain wall, designed to fit into the Financial District and will provide 400 permanent low- and middle-income housing units, with 80 units reserved for individuals who were living and working in Lower Manhattan during the 9/11 attacks and the immediate aftermath.

On the Upper East Side of New York City, plans have been filed for **1026 Third Avenue**, a new building on a vacant lot. The proposed structure will be a 93.6-meter building located between East 60th and 61st streets. The foundation work is already underway. In **Brooklyn**, the 40-story **60 Wharf Drive** building has opened along the waterfront with views of the East River. Over 60,000 square feet (5,574 square meters) of

interior amenities and 50,000 square feet (4,645 square meters) of outdoor space are provided for residents.

In **Philadelphia**, the 76ers football team, have announced their plans for a US\$1.3 billion mixed-use stadium complex, which has been updated to include a 20-story residential building, the **76 Tower**. This will be constructed on the site of a former Greyhound Bus Station and will accommodate 395 housing units, including 79 affordable housing units at below-market rates.

Completion of 34-story residential building, **Alcove**, **Nashville** was announced. Located near the Nashville Yards development, the new building includes 356 units and is composed of a series of stacked, shifted cubes—mirroring anchor tenant Amazon's signature boxes—organized in pairs on four levels. Importance was placed on the experience of moving throughout the building and the lobby. The design connects directly to the street and provides transparency, inviting residents and visitors into the core of the building.

Miami continues to have a hot property market, and plans for the construction of five

new towers are currently being reviewed at the **Miami Worldcenter** development, located just north of the Downtown area. The proposed project includes the **Miami World Towers 3** building at 777 North Miami Avenue, two high-rises equivalent to 66 stories, and a third building reaching 280 feet (85 meters).

The iconic **Willis Tower** (formerly Sears Tower) in **Chicago** successfully installed a new antenna in September. A helicopter lifted the 5,500-pound (2,495-kilogram), 32-foot (9.6 meter) antenna to the top of the skyscraper, where a courageous crew awaited its installation. The new antenna is intended to enhance broadcasting capabilities, allowing for a wider signal reach and improved quality. Another soaring high-rise, the 73-story residential **1000M** officially topped off and will add 738 housing units to the area. The building is scheduled to be completed by the summer of 2024.

A revised proposal for **2033 North Kingsbury** was shared in Chicago, increasing the height from a 16 to 25 stories. The project site is directly across the street from Lincoln Yards North, and with a combination of low-rise retail buildings and parking lots surrounding the site, the high-rise will be a middle



60 Wharf Drive, New York City. © Halcyon Management



Alcove, Nashville. © James Steinkamp

Repositioning: Transformation for the Social, Urban, and Environmental Realms



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Fred Holt joined 3XN in 2010 and has experience in a wide range of phases from design and programming through documentation. Holt's primary focus is on design and then carrying the design through detail development. He brings a level of expertise to projects that have a proper balance between design and "know-how." Recent projects include mixed-use towers in Sweden and India, and the new IOC headquarters in Lausanne. Holt was responsible for the design and development of Quay Quarter Tower.

“This radical reuse of the existing structure reduces the development’s embodied carbon footprint, while its more salient design feature, the façade’s external sunshade hood, reduces the solar gain by 30 percent.”

Abstract

Addressing the dual challenges facing contemporary architecture: the imperative to minimize the industry’s carbon footprint and the pursuit of enhanced well-being and collaboration, the transformative approach the Quay Quarter Tower project adopted exemplifies this ethos and redefines adaptive reuse. Originally erected in 1976, the building approached the end of its lifecycle, prompting a visionary approach. Rather than opting for complete demolition, the project aimed to set new benchmarks for adaptive reuse, ultimately achieving a remarkable feat. It retains over 65 percent of its original structure and an impressive 95 percent of the original core, resulting in a substantial embodied carbon reduction of 12,000 metric tons. This achievement corresponds to significant environmental savings, equivalent to 8,800 one-way flights between Copenhagen and Sydney, or approximately three to three and a half years of operational carbon emissions.

Keywords: Adaptive Reuse, Social Sustainability, Vertical Village

An Innovative Approach to High-Rise Transformation and Environmental Impact

Architecture faces two fundamental and seemingly independent responsibilities: the need to drastically reduce the industry’s carbon footprint, and the need to focus on well-being and collaboration. To 3XN GXN, transformation offers an opportunity to unite these two responsibilities; it is about enabling flexibility in the response to changing social and urban dynamics without coming at a high cost to the environment.

Risks in planning were inherent if there was a reduction of height or if a full demolition was undertaken of the existing tower.

Transformation was therefore embedded in the competition brief for Quay Quarter Tower (QQT), without any required parameters for what that would entail (i.e., whether it would be full structural retention or partial retention). 3XN’s proposal united a behavior/people-first design approach with an, at the time, unheard-of ambition for high-rise transformation—to retain as much core and structure as possible.

Located on the edge of Sydney’s bustling Circular Quay and within view of the Sydney Opera House (see Figure 1), QQT transforms the AMP Centre tower, built in 1976. The tower was reaching the end of its usable lifespan, but rather than simply tear it down and start over, the project team set out to reach an ambitious goal: to reuse as much of the existing building as possible and set a lofty new standard for what is possible for adaptive reuse in architecture.

But transformation is not just about structure. With QQT, the impact of transforming the former AMP Centre (as opposed to demolishing it and building an entirely new tower on site) can be described in three broad categories: social transformation, urban transformation, and environmental transformation.

Social

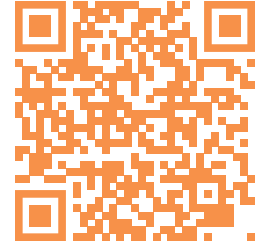
Eschewing the conventions of traditional, uniform high-rise design, QQT was developed around a “vertical village” concept, designed from both the inside out and the outside in, and with the user experience top of mind.



Figure 1. Located near the bustling Quay, the building has views towards the iconic Sydney Opera House. © Adam Mork | 3XN

Tall Tales of Transformation: Height Alterations

Even after construction has commenced, it is not uncommon for alterations to be made to a tall building's design, which can result in subsequent changes in the building's planned architectural height. Evolving pressures from economic conditions, aviation considerations, design preferences, and an enhanced focus on sustainability have reduced the anticipated height of some of the world's tallest planned buildings. Conversely, new heights have been reached on existing buildings, where the original structure has been expanded upon to intensify the density of the site.

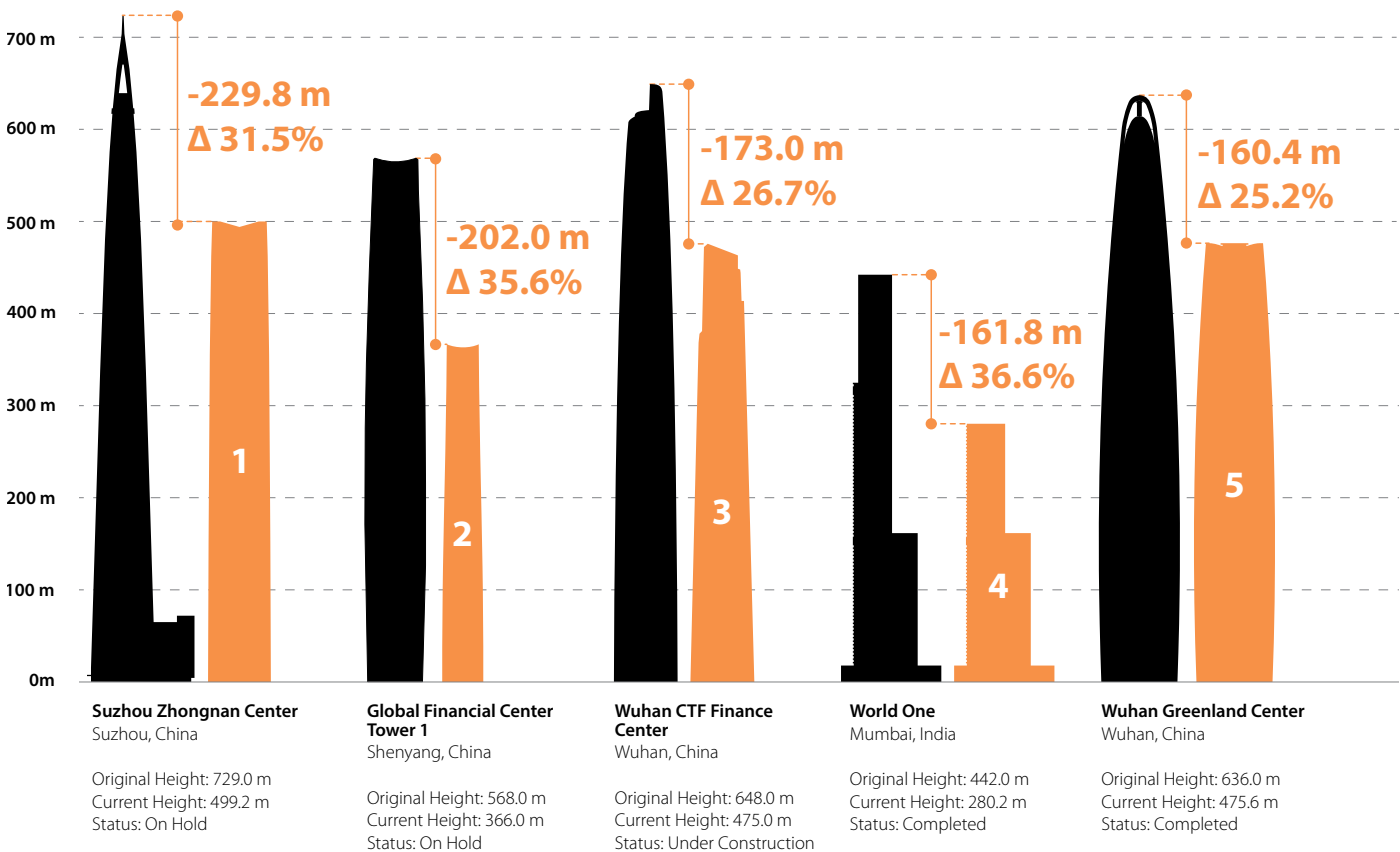


This data study explores 35 buildings that have undergone height changes of 50 meters or greater after construction has commenced, and compared against the original anticipated architectural height prior to redesign or renovation. Explore the interactive version of this data study by scanning the QR code or visiting:

skyscrapercenter.com/tall-transformations

The Most Significant Height Changes

The graphic skylines represent the five buildings that have undergone the largest height decreases (this page) and increases (opposite page).



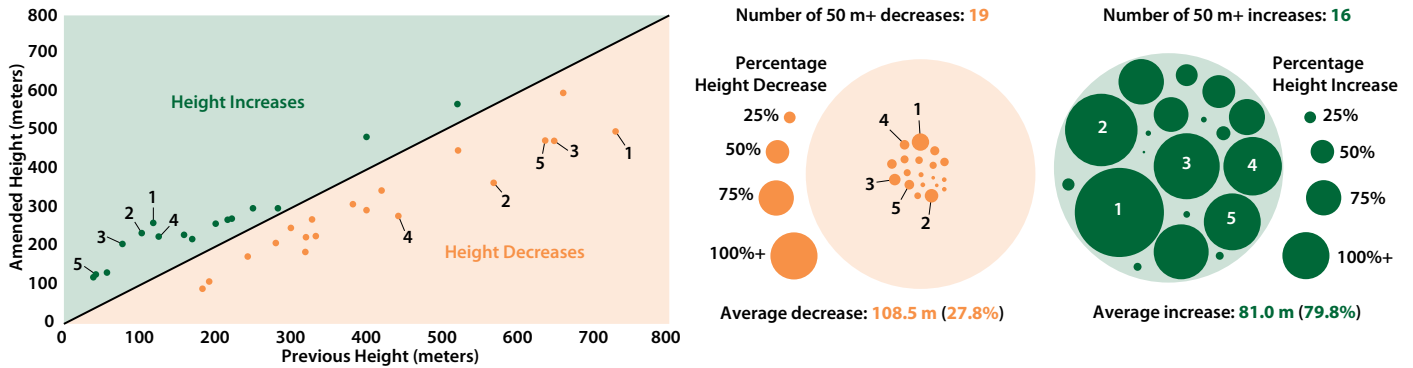
Most height increases occurred after the completion of the original design. **Only 6 of the increases (38 percent)** happened during the active construction period of the original design.



More than half of the tall buildings that have had a height cut of 30 percent or greater have had construction put on hold indefinitely.

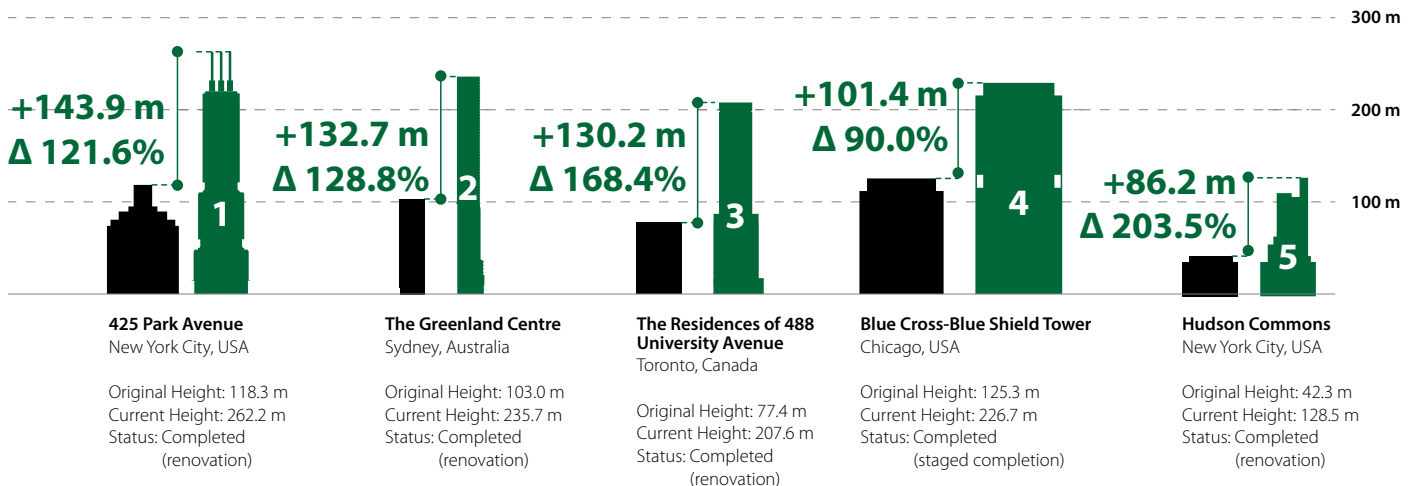
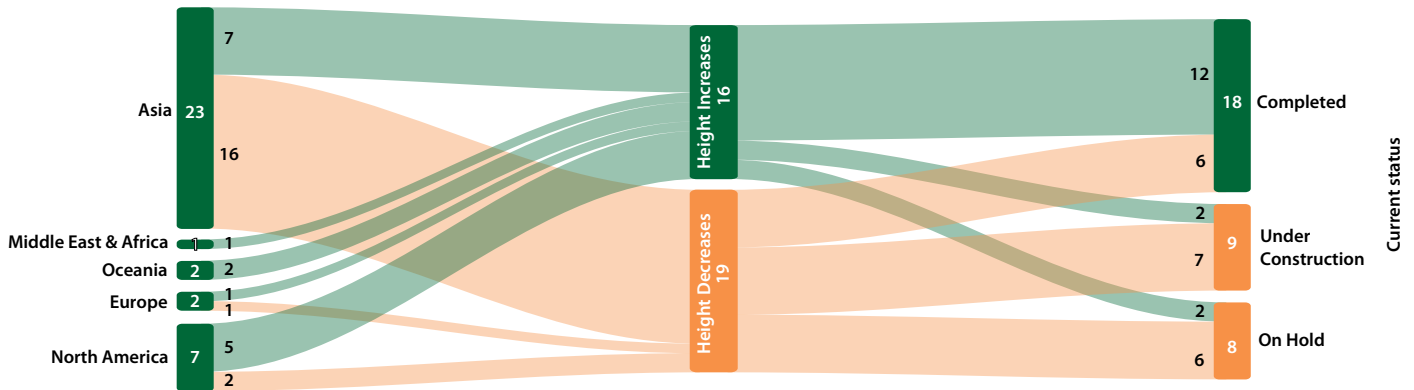
Tracking Changes in Architectural Height

The below tables track the degree to which heights of the tall buildings have changed, by height in meters (left) and by proportion (center and right), compared against the original anticipated architectural height prior to redesign or renovation. While the largest differences in height were experienced by buildings that underwent reductions, buildings that experienced increases had the largest differences proportionally. Buildings that have experienced the largest height changes are labeled, corresponding with their ranking and color coding in the skyline below.



Characteristics of Buildings with Height Changes

The below graph shows buildings that have undergone height changes of 50 meters or greater, by building location (left) and current building status (right), broken down by height increases and decreases.



Only five buildings have undergone height changes of 150 meters or greater, all of which were height decreases from the original design.

Proportionally, the **AC Hotel/Residence Inn Charlotte City Center** had the largest height change, dropping from an anticipated 183.3 meters to a final height of 91.5 meters upon completion.

About the Council

The Council on Tall Buildings and Urban Habitat (CTBUH) is the world's leading non-profit organization for all those interested in the future of cities. It explores how increased urban density and vertical growth can support more sustainable and healthy cities, especially in the face of mass urbanization and the increasing effects of climate change worldwide.

Founded in the USA in 1969, the CTBUH member network embraces more than a million professionals working in all building industry sectors in almost all countries of the world. With offices in Chicago, Shanghai, and Venice, the Council runs hundreds of multidisciplinary programs across the world each year, through its regional chapters and expert committees, its annual conferences and global awards program, through funded research projects and academic collaborations, and via its extensive online resources and physical outputs. The Council is perhaps best-known to the public as the arbiter of tall building height and the global authority that bestows titles such as "The World's Tallest Building." Operating on a global scale, CTBUH serves as a platform for both cutting-edge information-share and business networking for all companies and professionals focused on the inception, design, construction, and operation of cities, and the buildings they comprise.



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