



# CTBUH Research Paper

[ctbuh.org/papers](http://ctbuh.org/papers)

---

**Title:** **The High Life: Residential Towers in Central Business Districts**

**Authors:** Peter Noone, Principal, Solomon Cordwell Buenz  
Gary Klompmaker, Associate Principal, Solomon Cordwell Buenz  
Crista Sumanik, Communications Consultant, Solomon Cordwell Buenz

**Subjects:** Architectural/Design  
Social Issues

**Keywords:** Density  
Human Scale  
Sustainability

**Publication Date:** 2011

**Original Publication:** CTBUH Journal, 2011 Issue II

**Paper Type:**

1. Book chapter/Part chapter
2. **Journal paper**
3. Conference proceeding
4. Unpublished conference paper
5. Magazine article
6. Unpublished

© Council on Tall Buildings and Urban Habitat / Peter Noone; Gary Klompmaker; Crista Sumanik

# The High Life

## Residential Towers in Central Business Districts



Peter Noone



Gary Klompmaker



Crista Sumanik

“These buildings serve growing segments of the population who desire amenity-rich lifestyles and safe urban homes. They serve cities that desire significant real estate tax revenues, as well as local businesses, which desire the potentially substantial purchasing power of new urban residents.”

Though the halcyon days (from an architect’s perspective) of city skylines dotted with tower cranes atop lofty infill projects are a distant memory, tall residential buildings in central business districts remain integral to the establishment and maintenance of sustainable cities. Demographics – populations colorfully identified as empty nesters, echo-boomers, and generation Y – and anyone attracted to living more sustainably, will continue to create demand for urban multi-family housing projects. Whether the economy supports developments for apartments, condominiums or ultimately a balance of both, good design makes the difference: design that promotes a sense of place, is responsive to the human scale, and creates environments for livable, sustainable density. This paper focuses on the tall building specific issues of planning, designing, developing and constructing a residential skyscraper in a historic, high-density and business dominated urban environment. It draws on the experience of The Legacy at Millennium Park project, a 72-story condominium tower rising from the heart of Chicago’s Downtown Loop District.

### Authors

**Peter Noone**, Principal  
**Gary Klompmaker**, Associate Principal  
**Crista Sumanik**, Communications Consultant

Solomon Cordwell Buenz (SCB)  
625 North Michigan Avenue, Suite 800  
Chicago, Illinois 60611

t: +1 312 896 1100 f: +1 312 896 1200  
www.scb.com

### Peter Noone

Peter Noone, AIA, oversees the coordination and management of all professional disciplines in the delivery of a range of building types for SCB studios in Chicago and San Francisco, from tall mixed-use residential developments such as the Legacy at Millennium Park, to corporate headquarters, retail, and large institutional facilities.

Mr. Noone is a guest lecturer at the “High-rise Studio” at the University of Notre Dame, and has presented to the School of Architecture at IIT. He has been a guest critic at the University of Notre Dame, and the University of Wisconsin, Milwaukee. He has edited and contributed to the Journal of the School of Architecture, University of Illinois at Chicago.

### Gary Klompmaker

In a career spanning 27 years, Gary Klompmaker, AIA, has focused his practice on the design of residential developments, many of them high-rise. These projects include multi-family mixed-use, as well as designs for senior living.

Mr. Klompmaker earned his Bachelors and his Masters of Architecture from the University of Michigan.

### Crista Sumanik

Crista Sumanik is a communications consultant who has worked for both the Chicago and San Francisco offices of Solomon Cordwell Buenz. She has 15 years experience writing and editing for a range of media, both as a television journalist and with in-house communications teams. In Hong Kong, Ms. Sumanik was Executive Producer of an award winning nightly newscast for CNN International. In Canada, she was Associate Producer of the nation’s top-rated morning news and current affairs show.

### How Tall – Then and Now

It was a different financial climate when the Legacy was envisioned, yet the condominium building stands today as a successful example of what is possible for residential density in a

historic commercial city center. The 250-meter (822-foot) tall, 356-unit tower is stimulating economic growth and reinvigorating an important urban neighborhood in Chicago’s Loop. It has defined new standards for



Figure 1. Chicago’s iconic skyline: The Legacy at Millennium Park reaches skyward from the historic commercial Loop © Tom Rossiter Photography © SCB

efficient and sustainable design and has responded to a city's vision to evolve its iconic skyline (see Figure 1).

When the Legacy Project was first proposed early in 2002, city planners were actively engaged with the external design community in re-evaluating policies affecting the construction of tall buildings. There were no height limits for buildings in the downtown area per se, with maximum height governed by buildable floor area ratios negotiated in a planned development process that considers what works best for each project site. Still, as the city expanded eastward, planners were concerned with how best to advance the skyline while protecting the context of the Grant Park area and the historic Michigan Avenue street wall, which defines the dramatic eastern edge of Chicago's downtown. There was a general design guideline to keep heights in the area around 120 meters (400 feet), while north of Grant

Park a significant amount of the taller buildings reached heights of 240 to 300 meters (800 to 1,000 feet). Samuel Assefa, now Senior Urban Designer for the City of Boulder, Colorado, was director of Land Use and Planning Policy for the city of Chicago at that important time and states, "From a design perspective, we wondered how to mirror the development at the north end of the park in a sensible way. We determined that technically and urbanistically, it was better to have buildings that maximize height and minimize bulk, with tall and thin better for the urban form."

However, new buildings in the urban center would not just be taller, they would be more sustainable, and have significant street presence. Assefa states, "Our focus, primarily, was the building's impact on the total urban environment – physically, sustainably, economically – to give the city a competitive

advantage, but also make it an attractive and livable place."

With Mayor Daley's blessing, the city established the Chicago Design Initiative – a group of architects, urban planners, and landscape designers – as an outside sounding board on major city design policies. "While the community was skeptical initially – how could they make the numbers work to make these developments possible – through the planned development review process we came to agree on not benching the height but rather creating an interesting profile in the 240 to 300-meter (800 to 1,000-foot) height range all along the western edge of Grant Park." (see Figure 2)

### Site and Urban Form

Early analysis suggested that along Wabash Avenue, in the historic Jeweler's Row ↗



Figure 2. View of the Legacy from Chicago Art Institute Extension © Tom Rossiter Photography

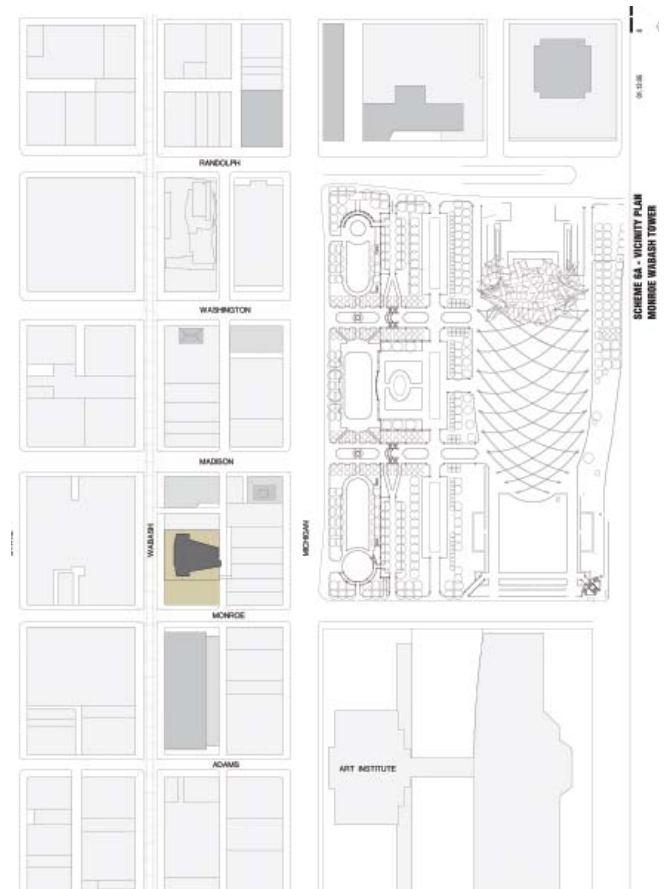


Figure 3. Vicinity plan showing the Legacy Tower site between Wabash Avenue and Michigan Avenue and facing eastward to Millennium Park and Lake Michigan © SCB



Figure 4. Demolition of vacant structures behind historic façades on Wabash Avenue © Walsh Construction

District, there were several possible sites where buildings could be set back, made as thin as possible and extruded to appropriate heights in skyline profile. This included the site for the Legacy, which was a significant determiner of the building's form. At 60 E. Monroe Street, the challenging 2,694-square meter (29,000-square foot) site is surrounded by landmark buildings, such as Adler and Sullivan's oldest surviving design, and several by Holabird & Root. The developer, Monroe/Wabash Development purchased the site from the School of the Art Institute of Chicago (SAIC), which had previously acquired the site for future expansion. On the small site were four existing buildings, one occupied by the SAIC and landmarked (the Sharp Building, not part of the purchase), and three vacant six-story buildings, which were part of the historic district but not individually landmarked (see Figure 3).

There was nothing remarkable about the vacant buildings besides the façades and their relationship to Wabash Avenue. It was determined that these buildings would be demolished, but the historic façades would be saved, restored, and incorporated into the base of the tower (see Figure 4).

Comprehensive research by consulting firm McGuire Iglesias and Associates directed the restoration and the return of the façades to a period in time when they worked best together. As a group, they belie the extensive activity that now exists behind them: on the first three floors they interact with the street,



Figure 5. The restored façades integrated into the base of the Legacy tower, looking south along Wabash Avenue © Tom Rossiter Photography

retail and dedicated school space, as well as the city's elevated train (the "El"). Above the third floor, the façades discretely hide the multi-level parking garage. The ground level façades of the historic Sharp Building, immediately south of the site, were also restored.

Some detractors did not consider this treatment an adequately sensitive compromise between preservation and reuse, but Assefa demurs, "That's a critical debate that constantly takes place – a hard line taken by some about what to do with historic buildings – that if you touch it, it's gone. Where we lose sight is not being able to see if it's done right – the value that is added to a historic district, or historic street, or historic building when a new building is well integrated. I think that the Legacy and the Heritage Court (a residential tower at 130 N. Garland developed by Mesa and designed by SCB) are good examples of really enhancing the place and the historic character, and integrating all of the uses" (see Figure 5).

### Scale and Synergy

Respecting the existing urban fabric and showing utmost sensitivity to placement, the



Figure 6. The cantilevered sky-bridge connecting the 13<sup>th</sup> floor of the Legacy tower to the adjacent University Club © Tom Rossiter Photography



Figure 7. Temporary supports protecting historic façades, with “El” tracks in foreground © Walsh Construction



Figure 8. Third pour of mat slab with north wall of historic Sharp building to left of site © Walsh Construction

tower was set back 9 meters (30 feet) from the historic street faces, allowing the Legacy to fit with its small scaled neighbors. From Wabash, the 116,129-square meter (1.2 million-square foot) tower looks like it sits on Michigan Avenue, while from Michigan Avenue it looks like it sits on Wabash Avenue. The roughly triangular typical floor plan maximizes the number of units with views of Millennium Park and Lake Michigan to the east, and the tapered point of the plan provides an extremely narrow profile for the tower when viewed from the park.

With the tower oriented and sculpted for the best possible views from residences on floors 15 to 72, the design team also set to maximizing the potential synergy between the building and its neighbors. At street level, the entrance to the tower is through the first floor of the existing on-site historic Sharp Building (owned by the SAIC) with the parking entrance for the Legacy accessed through the historic façades on Wabash Avenue. Incorporated into the first three floors of the tower are 3,809 square meters (41,000 square feet) of academic space for the SAIC, with the second and third floors tying directly into the more than a hundred year-old Sharp Building adjacent to the site. At the completion of construction, ownership of the space was transferred from the Developer to the SAIC.

Standing beside the Legacy is a landmark, neo-gothic-inspired Holabird & Root skyscraper, home of the more than 125 year-old University Club of Chicago. In exchange for incorporating expanded athletic amenities (including five new squash courts) for the University Club on the 13<sup>th</sup> floor of the Legacy, reciprocal agreements allow Legacy residents benefit from the extensive amenities of the club. The Legacy and the University Club are connected via a cantilevered sky-bridge on the 13<sup>th</sup> floor that is wholly supported from the tower (see Figure 6). Ownership of the squash courts and the sky-bridge were transferred to the University Club upon completion of that space in the tower. The Legacy also shares loading dock space with its neighbors, allowing a previously congested alley to be cleaned up and operated efficiently.

### Challenges Inspire Innovation

Notwithstanding the challenges of deftly sculpting a 116,129-square meter (1.2 million-square foot) building on a 2,694-square meter (29,000-square foot) site, the lack of any staging area created many significant design and logistical challenges that the team, led by Walsh Construction, needed to manage. During demolition and construction, a temporary support system was used to support the existing Wabash Avenue façades. With the site surrounded by the Sharp

Building to the south, the Adler & Sullivan building to the north, the retained façades to the west, and a narrow shared alley on the east, all materials and personnel entering the site had to come through openings in the retained façades; all of the crane lifted materials were hoisted within nine meters (thirty feet) of the active elevated train tracks, which are located above Wabash Avenue, just outside the retained façades (see Figure 7).

Theoretically, site soil conditions and the dense footprint of the building required that caisson foundations be extended to the underlying bedrock, rather than having them sit on hardpan as is common in Chicago residential high-rise construction. The project team worked with city engineers to utilize Osterberg testing of the bearing strata during construction, a method to statistically test the near ultimate capacity of full-sized caissons (or drilled piers) and obtain information about their performance. This testing demonstrated that the optimum solution was to sit the caissons on top of the bedrock, rather than socket them into it. As a result, over US\$1 million was saved, and the construction schedule was shortened by 30 days.

Parking requirements necessitated that spaces be located in a podium beneath the tower where columns would be tightly spaced for residential planning. A 2.7-meter (9-foot) thick mat transfer slab at the 14<sup>th</sup> floor allowed for optimal placement of columns ↗

## ...greener

“Besides making cities more affordable and architecturally interesting, tall buildings are greener than sprawl, and they foster social capital and creativity. Yet some urban planners and preservationists seem to have a misplaced fear of heights that yields damaging restrictions on how tall a building can be. From New York to Paris to Mumbai, there’s a powerful case for building up, not out.”

*Edward Glaeser in his article, “How Skyscrapers Can Save the City,” TheAtlantic Magazine, March 2011*

efficiently spaced for parking below the tower, and for ideal column spacing for the residential floor plan above the slab. The slab was poured over the course of three weeks in three separate lifts (see Figure 8).

### Sustainable Elements

While seeking creative solutions to technical and logistical challenges, city planners also encouraged the development team to push the envelope with regard to sustainability as a way to enhance the building experience. Assefa: “There are so many different ways one can define sustainability, but to me, the most important part is quality of life. Can people actually live comfortably in that space?” While the evidence was mostly anecdotal at the time, and has since been proven to have merit, city planners believed green spaces within the vertical neighborhood would improve the residents’ experience. Designers found opportunities to incorporate sky gardens – large, common, landscaped spaces – into the 15<sup>th</sup>, 42<sup>nd</sup> and 60<sup>th</sup> floors (see Figure 9). These interior/exterior public areas are the high-rise equivalent of the many parks that dot Chicago’s residential neighborhoods (see Figure 10).

The Legacy also has a green roof, which is one of the highest green roofs in the country. At the time, there was a strong push in the city to develop green roofs, and as a result,

Chicago now has more than 371,612 square meters (4 million square feet) of green roof area in the city center. But Assefa says Mayor Daley’s vision was bigger than that: “We wanted to use the Legacy as a lab to try new ideas and concepts. The challenge was, of course, the structure, but tall buildings also consume significant energy, so how could we mitigate that?” Beyond the actual, quantifiable impacts of a green roof, or other sustainable design elements, or even LEED ratings, Assefa says that one of the most important impacts of embracing sustainability is the opportunity to change paradigms: “From a city’s perspective, we were framing it as ‘good sustainable policy is good economic policy;’ good, well-designed buildings are good economically for the developer, but they’re also good economically for the

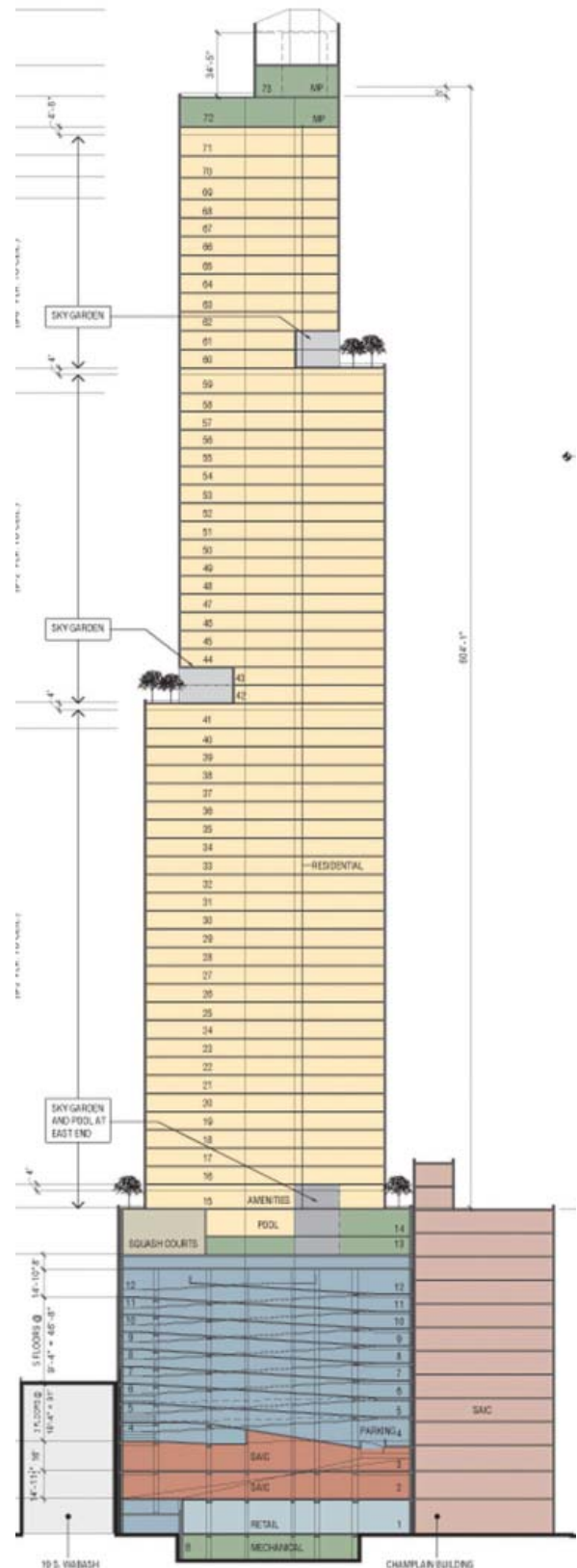


Figure 9. Section looking east toward Lake Michigan shows sky gardens on Level 15, 42, and 60 © SCB

city to have a competitive advantage.” He adds that changing paradigms is the path to the eventual acceptance of green as an important element in a city’s development and evolution.

### Energy Savings

Whereas the traditional approach to residential construction in Chicago utilizes an exposed architectural concrete structure as part of the building envelope, the Legacy is fully clad with a thermally efficient unitized curtain wall featuring “low-E” and Argon-filled insulating glass units. The design of the high-performance skin features floor-to-ceiling glass and operable windows for abundant natural interior lighting and ventilation; this makes the Legacy more efficient to heat and cool as compared to traditional exposed concrete and punched window buildings of a similar size and scale. Photovoltaic cells on the top three floors offset some of the energy used by the Legacy’s exterior decorative lighting system.

Richard Hanson, CEO of Mesa Development, takes a more macro view. He asserts that the Legacy addresses sustainability by adding density to downtown without taking even one square foot of ground level space from an

existing use: “Getting people to live downtown is really important. If you tried to take 356 residences in a suburban subdivision context, and you estimated that each residence required half an acre, that’s about 60 hectares (150 acres) of land just to put the houses on, and then when you add the roads, streets, arterial... you’re probably saving four to five hundred acres of land with just one building.” Additionally, living within the central business district means residents are in close proximity to extensive public transportation to access work and life pursuits, without the use of private vehicles.

Its location in the downtown core also allowed the Legacy to connect to the city’s district chilled water system, Thermal Chicago, eliminating the need for three 600-ton water chillers and associated cooling towers on the building roof. This means the building is supplied with 13°C (56°F) water to be used as a heat sink or source for temperature control. In addition to the elimination of chillers or tanks on the roof, the heating/cooling system uses no chemicals, dumps nothing into the waste water system and significantly reduced mechanical noise and heat dissipation on site.

### Future Outlook

Residential real estate market fundamentals are strengthening – albeit more convincingly in some areas of the country than in others, depending on size, demographics and geography – and infill projects in central business districts are being built, but not to the heights of recent years. These projects are returning to levels around fifty stories, the seemingly optimal height respecting current cost per square foot thresholds in major American cities. Increasingly, these developments are also more balanced between rental and condominium properties, and the trend in the short term will continue to be for developers to offer smaller, more efficient apartments in amenity-rich buildings with ample sustainable features.

Still, Hanson says he’s been in the game long enough to see tough times return to good times, and he remains a firm believer in tall, infill developments encouraging density: “Our

population is expected to grow by 100 million people by the year 2050, which isn’t long from now. All those people are going to have to live somewhere, and they can’t live in somebody else’s basement. So the question comes about as to where?” Whether condominiums or apartments, as increased residential density in CBDs, or more transit oriented developments in collar suburbs of major cities, or even as increased relocation of office hubs to residential areas outside of city centers, Hanson sees the end of suburban sprawl and the commuter culture: “The boom times that this country has had since World War II are essentially over. We can’t afford massive single-family homes in sprawling edge suburbs anymore because we cannot continue to consume energy like we have been. Tall infill projects are not being financed right now, but tall residential buildings are probably the most critical things to get built.”

Until that happens, the Legacy and similarly successful residential towers now reaching skyward from central business districts will continue to demonstrate what is possible for this building typology in a downtown commercial core. These buildings serve growing segments of the population who desire amenity-rich lifestyles and safe urban homes. They serve cities that desire significant real estate tax revenues, as well as local businesses, which desire the potentially substantial purchasing power of new urban residents. And as architectural statements, well-designed residential towers provide opportunities to revitalize the urban experience, knit multiple and disparate structures into a seamless urban fabric, and contribute to the progression and sustainable growth of America’s cities. ■



Figure 10. Sky garden on the 15<sup>th</sup> floor © Walsh Construction