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Three Points of the Residential High-Rise: Designing for Social Connectivity

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Architect Jeanne Gang is Founder and Principal of the award-winning design and planning practice Studio Gang. A graduate of the University of Illinois, Jeanne received her Master of Architecture degree from the Harvard University Graduate School of Design. She is a MacArthur Fellow and recipient of the Cooper-Hewitt National Design Award.

The architect of the 82-story Aqua Tower, Jeanne continues to explore the tall-building typology in projects such as Wanda Vista tower and City Hyde Park in Chicago, 160 Folsom in San Francisco, Solar Carve Tower in New York, and the Miami Design District Residences.

Abstract

In this paper we discuss the terms "exo-spatial design," "solar carving," and "bridging" as strategies for creating more socially connective tall buildings. As a typology, high-rise residential buildings have a unique set of challenges to becoming fully activated urban participants in the cities in which they are located. While there is a general recognition and appreciation that tall buildings provide identity to a city, there is often criticism of how they relate to their surroundings. Critics have posited that tall buildings are insular and foreboding by their very nature. This paper explores several design avenues for architects to consider in order to improve the social aspect of tall buildings. As all cities become taller and denser to accommodate growth, the need to design social space in, on, and around tall buildings must be continually examined if we are to have cohesive urban fabric that supports communities.

Keywords: Connectivity, Energy Efficiency, Passive Design, Social Interaction, Urban Design, Vertical Urbanism

Introduction

Social connectivity is especially important given the changing demographic of city dwellers. Millennials, the current generation moving to cities, are highly social and desire social opportunities that are both virtual and real. Comfortable with sharing, this generation is capable of transforming many established aspects of urban living. With information technology in the palm of our hands, in many ways the transformation is well underway. Indeed, all ages desire social interaction; it's part of being human. Tall buildings need to respond to these desires by becoming social connectors themselves.

It may seem that tall buildings are fully accepted today. Their construction in place of lower-density development has become the status quo. One reason for this is that tall buildings are resoundingly appreciated and celebrated for their ability to address issues of identity and iconography in cities. Yet the original critique about tall buildings was never aimed at their iconic potential; rather it was squarely focused on their perceived inability to contribute to the social well-being of the city.[1] On this point there remains doubt about the tall building type, and the concern of early critics that tall buildings may have negative consequences on the social fabric, even "adverse effects on mental and social health,"[2] seems to linger. Research conducted in a range of disciplines, from sociology to economics to urban planning, continues to critique tall buildings for isolating people from each other, negatively impacting the ground-level civic space with shadows and other environmental problems, and blocking connections between spaces of the city due to impenetrable large podia.[3]

Creating social space was a driving factor in the design of Studio Gang's Aqua Tower, completed in 2009. The research that was begun for that project has developed into architectural strategies for tall buildings that continue to grow within our practice, contributing to a morphology that is continually tracked and updated. We have applied this research to both real and hypothetical projects to date. By sharing these strategies, we hope to offer tools that architects can deploy to make tall buildings more socially connected and responsive to the urban environments in which they are built – and in doing so address the public's ongoing concerns about the tall building typology and respond to our uniquely social generation's desires for the kinds of cities we want to live in.

In this paper we posit three simple points for residential high-rise design, developed through our design research, that specifically address the need for social connectivity, strategies that

1. SUDJIC, D. (2005) Goodbye to all that? The Guardian. [Online] 2nd April. Available from: http://www.theguardian.com/artanddesign/2005/apr/03/architecture. [Accessed June 2015].
2. CAPPON, D. (1972) Mental health in the hi-rise. Ekistics. 33. p.192–196.
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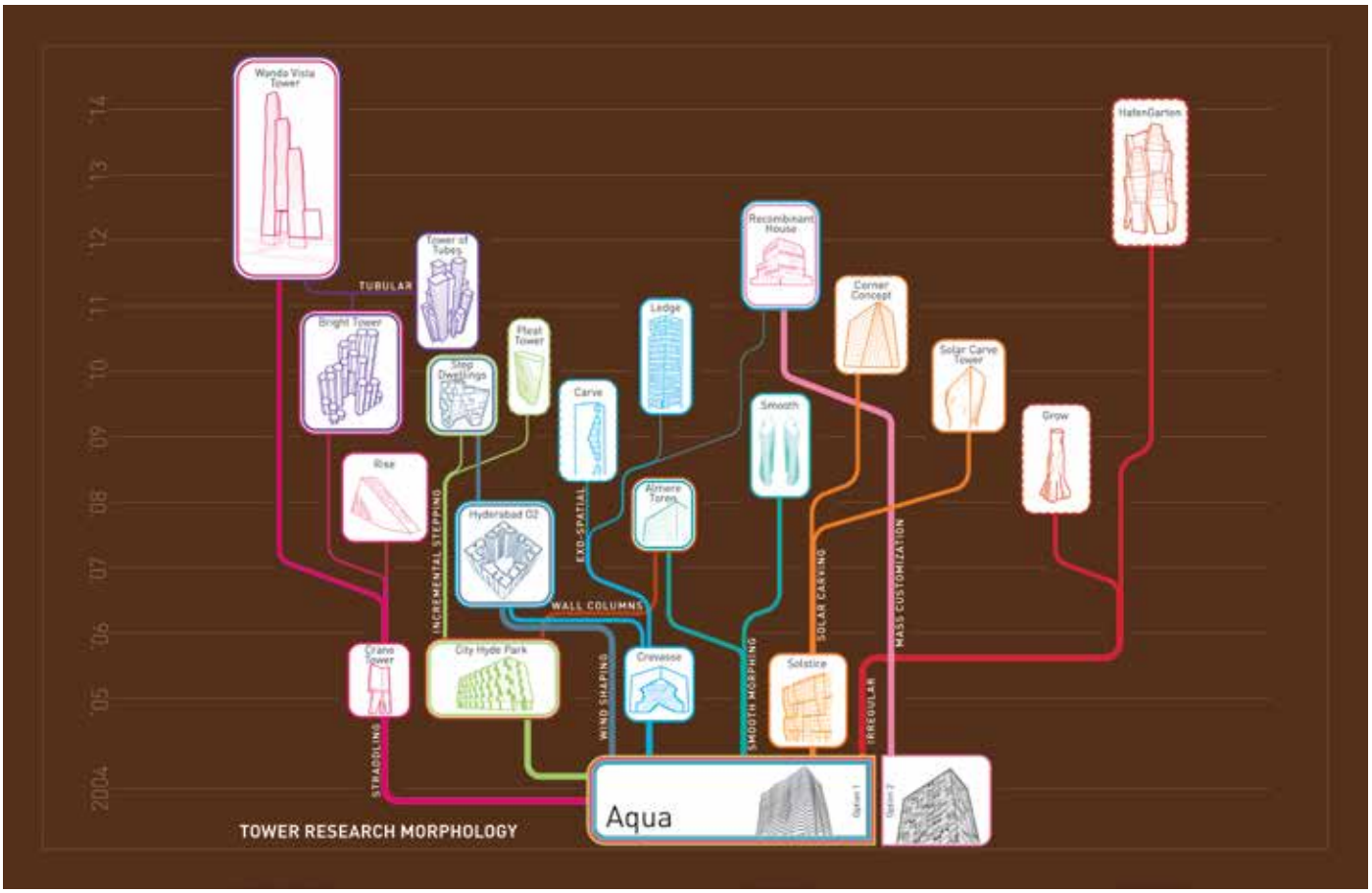

Figure 1. Diagram showing the relationships between general strategies and specific buildings in Studio Gang's tall building designs. (Source: Studio Gang Architects)

we have termed: "exo-spatial design," "solar carving," and "bridging." The Aqua Tower contains seeds of all three strategies in nascent form, as exhibited in its large social balconies on the exterior, floor slabs that are shaped or carved by solar and other environmental conditions, and spanning elements in its podium that allow it to bridge a complex ground condition. We examine how these initial ideas have been implemented in a variety of ways in our current work (see Figure 1).

Exo-Spatial

Exploring the Idea of Outdoor Living and Its Potential Social Dimensions

An exo-spatial building strives to be socially vibrant on its entire exterior surface. It reinterprets architectural elements such as balconies and roof gardens into the urban equivalent of a front porch or a back yard – social spaces that may occur more typically when living closer to the ground. How can something as ordinary as a balcony become something more social?

The exo-spatial concept is based on extending the threshold of the interior to the outdoors and creating a social space within that threshold. First developed for the Aqua Tower, it has been further explored in Studio Gang projects such as City Hyde Park and the Garden in the Machine.

Aqua Tower, Chicago

"What's missing in tall buildings?" For the design of the Aqua Tower, we began by surveying our own office and colleagues and found the overwhelming response to this question was: outdoor space. As the design developed, we found that extensive outdoor space on the exterior surface of the building could provide more than a private amenity for the individual apartment; it could act as a vertical community where residents could see one another and informally interact. The physical manifestation of exo-spatial design, Aqua's large undulating balconies, which vary in shape ever so slightly from floor to floor over the height of the building, are also the tower's most recognizable feature. The terraces seamlessly extend the interior to the outdoors, creating spaces that imbue high-rise living with the character of a neighborhood. From the living room, the balconies act as a visual extension of space from inside to outside, but stepping outside offers an expansive urban experience. The balconies offer oblique visual connections between neighboring units, allowing for informal ties to form between people, as well as vistas to landmarks within the fabric of downtown, strengthening a sense of place and identity. In doing so, the building challenges the notion of the tall building as a gated community and prioritizes social connection. Semi-private spaces like Aqua's terraces serve as "a type of social network,"[4] becoming the locus not only of individual identity, made possible by residents' unique customizations, but of community as well, allowing for the crucial interactions that occur as the result of more public spaces.

City Hyde Park, Chicago

With City Hyde Park, slated for completion in 2015, we challenged ourselves to advance the lively social interactions we explored in Aqua's design while also improving energy efficiency. City Hyde Park advances our exo-spatial design concept and simultaneously proves that outdoor space does not have to compromise environmental performance in cold climates. By minimizing the area where the balcony touches the slab, taking gravity loads directly to the ground, and inserting a thermal break, the conductivity of the slab is likewise minimized and performance is improved.

Located at a busy commercial intersection near Lake Michigan and adjacent to a commuter rail stop, City Hyde Park is a 500,000

4. KOOLHAAS, R. (ed.) (2014) Fundamentals. 14th International Architecture Exhibition, la Biennale di Venezia.

Figure 2. City Hyde Park's south-facing balconies offer opportunities for social interaction. (Source: Studio Gang Architects)

sf mixed-use residential and commercial project that is designed to become a pedestrian-friendly hub. At street level, the building's retail arcade, multiple lobbies, and wider, improved sidewalks create a dynamic, walkable community scene. Above, a residential tower with a transparent amenity level and outdoor gardens and fitness areas rises from the plinth. Sited on a former parking lot, the project offers new options for living, leisure, and recreation that sensitively integrate with the neighborhood and encourage its evolution.

Geared toward university students and young faculty, the apartments vary widely in layout and size, accommodating multiple living situations and personal preferences. The north-facing apartments have skyline views through bay windows and the south-facing apartments have campus views with outdoor balconies (see Figure 2).

The structural system was specifically designed to adapt to the variety of different climate and environmental conditions. The large bays in the north apartments are supported by vertically stacked and alternating concrete panels. This maximizes views and infuses the apartments with light by eliminating columns in the center of the bay. The exo-spatial design on the south façade is developed through vertically stacked, alternating concrete panels that are then offset from the central axis to form columns, bays, balconies, and sun-shades. They create a visually exciting exterior that offers multiple opportunities for residents to socialize outdoors and connect with the surrounding city. On the south, the balconies utilize the same staggered structural panels to create exo-spatial balconies that deliver gravity loads to the ground and liberate the balconies from the façade.

While the vertical aspect of the structural panel system offers privacy and sun-shading, the column-free horizontal axis offers new and exciting relationships between apartments and balconies by allowing for nonintrusive yet highly social opportunities to engage with neighbors. The structural panel system thus achieves two goals: exploring a new standard of energy efficiency for exo-spatial design and advancing the social connectivity achieved with the Aqua Tower.

The Garden in the Machine, Cicero, IL

The idea of creating and sustaining social vibrancy through exo-spatial design is also explored in a different manner in the Garden in the Machine, a concept for a live-work community in an inner-ring suburb of Chicago. Cicero's demographic is made up of recent arrivals to the United States and represents contemporary families that differ in composition from post-war years. Today's families live in multi-generational and extended combinations that sometimes include friends and un-related adults. The Garden in the Machine provides an alternative model to the suburban ideal of housing that was specifically designed for the nuclear family (see Figure 3).

Making use of a former industrial building, the design employs a lattice of harvested steel trusses that are reconfigured to span between new concrete cores. The exo-spatial approach in this project involves the use of trusses to create a network of shared community spaces and gardens that wind their way through the vertical structure. Private live-and-work units are supported above and below the trusses. A limited equity cooperative model of ownership allows residents to own property while giving them the flexibility to expand or contract their units both horizontally and vertically within the network as their families grow, shrink, or change. Workshops, gardens, and other flexible spaces encourage work opportunities close to home. The Garden in the Machine model caters to people of varied social and economic statuses who desire a dynamic collaborative network that supports innovation and entrepreneurship. A variety of outdoor spaces contained within the network, including terraces, courtyards, plazas, markets, and playscapes for kids, enhance the quality of life and improve the live-work environment.

Solar Carving

Shaping the angles of the building's form to maximize solar access and social benefit.

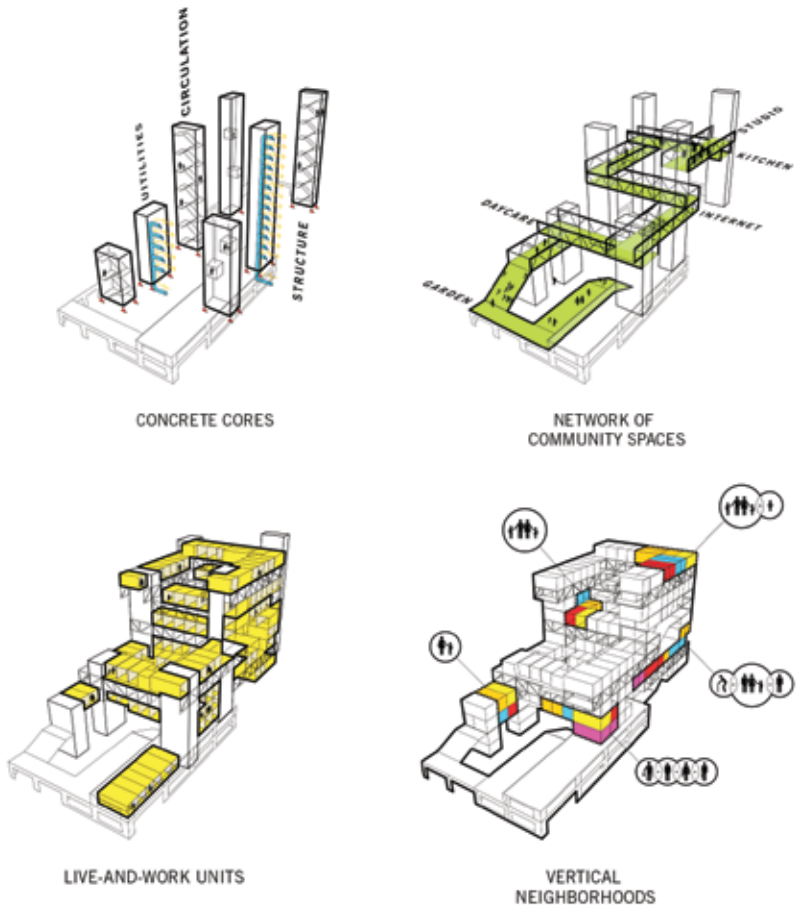

Figure 3. Backyard in the sky: The Garden in the Machine's open green areas offer playspace close to home. (Source: Studio Gang Architects)

In northern cities, a building that employs solar carving activates the social space around the building as much as the social space within the property lines. In hotter climates, self-shading can work similarly to activate outdoor space.

In researching our ideas of solar carving and shading, we identified precedents for their use. Perhaps the best known is New York City's 1916 Zoning Resolution, which required that skyscrapers be set back from the street as they rise upward.[5] It focuses on the importance and right to see and feel daylight in public space and ensures that the streets of the City are daylit and useful for social and commercial activity. Another precedent is the idea of the solar envelope, developed by Ralph Knowles, a Professor at the University of Southern California. Knowles outlined policies that would maintain solar access for neighboring properties during the key energy-receiving times of day and season.[6] While Studio Gang's solar carving concept is not a policy proposal, it is a way of working creatively with the form of tall buildings to bring light, air, and views to shared space around buildings. Our research suggests that tall buildings that incorporate this principle will provide a more socially vibrant space for residents and neighbors alike.

Solar Carve Tower, NY

Several projects were important in our design research leading up to the Solar Carve Tower, including Solstice on the Park, designed in 2005 for Chicago, and 02, a residential high rise designed in 2007 for Hyderabad, India. Solstice on the Park used solar carving and 02 employed self-shading to create social space around the buildings. The idea to implement solar carving for the design of an office building in the Meatpacking District of Manhattan stemmed from analyzing the building envelope allowed by the local zoning ordinance. Adjacent to the site, on the interior of the block, stretches the popular amenity of the High Line, a linear elevated park on a former train line that is animated by gardens and walking paths. We realized the negative impact our building would have if we were to design a form that was "as-of-right" and decided to test what shape the building would be if it were designed to benefit the solar access and views for the public space around it (see Figure 4).

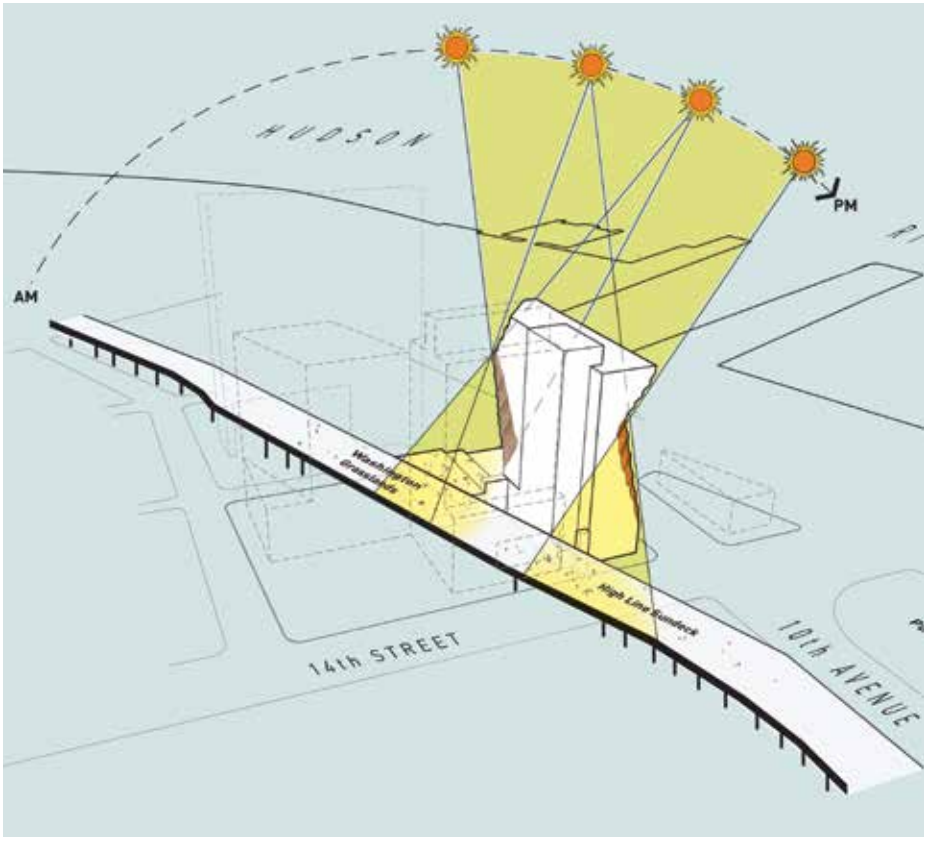

Figure 4. Solar Carve Tower uses the sun's angles to shape a building that creates a better park space. (Source: Studio Gang Architects)

5. NYC.GOV. (1916) Zoning Resolution. [Online] Available from: http://www.nyc.gov/html/dcp/pdf/history_project/1916_zoning_resolution.pdf . [Accessed May 2015].
6. KNOWLES, R. (1981) Sun Rhythm Form. Cambridge: MIT Press.

Figure 5. The shape of the Solar Carve Tower brings 200 more hours of daylight (annually) to the High Line Park than a building adhering to NYC zoning regulations. (Source: Studio Gang Architects)

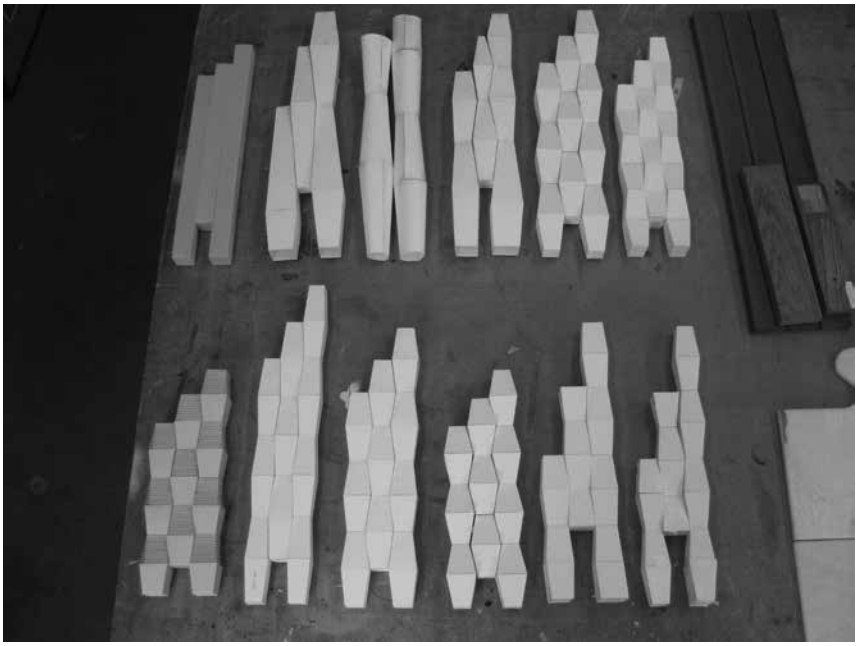

Figure 6. Iterations of the "bridging" base of the Wanda Vista Tower. (Source: Studio Gang Architects)

The Solar Carve Tower's faceted tapering form is shaped through a process of mapping the incident angles of the sun's rays as they intersect the allowable building envelope (see Figure 5). In addition to solar rays, eye-level directional angles were considered to permit views from the Highline Park toward the Hudson River. The cuts from these views result in facets around the lower portion of the tower while the sun angles trim the top of the tower. The process results in a design that has angular facets subtracted from the otherwise rectangular form. This method of shaping the tower brings over 200 hours of additional daylight (annually) to the High Line gardens that would otherwise be blocked and also allows views to the water from the High Line Park. These self-imposed subtractions from the allowable massing are aimed at improving the neighboring public space and enhancing its social dimension. To achieve this outcome, the project actually inverts the logic of the New York City Zoning Code of 1916, an unusual but necessary solution required by the specifics of the site.

Bordering the vast openness of Tenth Avenue, the Lincoln Highway, and the Hudson River to the west, the streetscape adjacent to the site was already completely exposed to daylight. Stepping back the top of the building on the Tenth Avenue side in compliance with zoning would add little benefit because the street is already completely open to the sun from the east. Zoning required no step back on the west side, where sunshine is most needed. This is because the High Line is an anomaly; it is not a street condition but rather an interior block phenomenon. Recognizing our project's unique condition of use patterns and problems never imagined by the 1916 zoning regulations, we sought permission from New York's Department of Standards and Appeals to invert the setbacks. By demonstrating how the building form was sculpted by the incident angles of the sun to improve the interior block, we were able to prove the public benefit of privileging the green, social space of the High Line. The City approved the request in 2014, officially recognizing the logic of its form for the public good. Construction is set to begin in 2016.

Bridging

Spanning Over or Under Features, Including Buildings, Roads, or Important Axes to Make Urban Connections For People

A central observation about social connectivity in cities is that human-scaled movement such

Figure 7. Crane Tower bridges infrastructure to improve connectivity at the ground level and also serves as an elevated passageway for people.. (Source: Studio Gang Architects)

as walking and biking are critically needed to make connections happen. Unfortunately, the previous century's many infrastructure projects scaled to high-speed movement for cars have spatially dominated and often cut off the opportunity for connectivity at the human scale. "Bridging" over infrastructure conditions is a strategy that is often helpful in tall building design so that public space can be connected without interruption and people inside the building can connect directly to the ground (see Figure 6).

Crane Tower, Hamburg

At first, bridging wasn't a concept we employed for social connectivity. With the design of the Aqua Tower, bridging was simply an unseen structural solution to the technical challenge of spanning a power station on the site that was required to remain intact. But as several projects seemed to have similar conditions, we began to use bridging as a social connector. Infrastructure is often planned before buildings are, and more and more urban sites are affected by it. In our Crane Tower for the HafenCity urban development project, we explored deploying the bridging concept above ground and found a new social purpose (see Figure 7).

The Crane Tower employs a three-legged base that straddles the site's existing infrastructure and pedestrian and bike routes, enabling new connections to the Elbe River. These connections allow for greater engagement both among people and between people and nature. Inside, residents can take the elevators to an amenity level located within a giant truss that stabilizes the tower's legs. The apartments rise up from the platform provided by this truss, giving residents unencumbered views of the city and water beyond and providing a second tier of engagement for neighbors. Bridging over the train line and bike paths allowed the Crane Tower design to overcome obstacles for pedestrians at the base, the prime location for urban connectivity and social continuity.

Wanda Vista Tower, Chicago

The idea of improving social connectivity via bridging has been further explored in our Wanda Vista Tower for Chicago's Lakeshore East community, scheduled for completion in 2019 (see Figure 8).

At approximately 1,100 feet in height, and more than 1.8 million sf, this new hotel and residential tower will be one of the tallest buildings in Chicago and a dynamic new presence on the horizon. From a distance, the tower's three slender vertical elements, nested side by side, step down gradually toward Lake Michigan, maximizing views of the city and river below. The building's multiple rooftops vertically distribute elevated gardens to the tower's different programs.

While the silhouette of the building will be appreciated from afar, it is the activity at its multi-level base that has the potential to transform the city for better social connectivity. Defining a new urban edge along the Chicago River, the Wanda Vista Tower aims to tightly knit the thriving Lakeshore East community to its environment with unprecedented urban connections.

Tree-lined plazas, retail, restaurant, and hotel amenities combine to form vibrant public spaces where the building connects to multiple street levels as well as at different heights throughout the structure itself. Wanda's bridging elements not only allow for improved vehicle, bicycle, and pedestrian connections within a dense fabric of large-block developments, but also create an essential pedestrian connection between the Riverwalk and the community park's outdoor recreational facilities. These grade-level connections make it possible for people to connect to the riverboats, kayaks, water taxi, and walking and bike paths along the Chicago River.

Bridging requires the building's structure to be carefully coordinated in order to make fluid connections possible. The two outer vertical tower elements carry some of the load of the central element. This allows the interior structure to be lighter with less columns, encouraging horizontal passage through the center of the building at the base. Elevators that serve both public and private functions make navigating the site easier and more fluid.

Figure 8. Wanda Vista Tower bridges a walkway connecting the Riverwalk to the community park beyond. (Source: Studio Gang Architects)

By creating the conditions for an activated public realm, the design maximizes the social, ecological, and economic value of the project. Wanda's mixed uses, green spaces at various heights, and visual and physical connections to the city suggest a new social aspiration for tall buildings that will become increasingly necessary to the health of our cities and the people who live and work in them. Bridging, then, is not only a feat that fundamentally impacts the shape of the tower above and ensures social connections at its base, but improves the quality of life, attracting people, jobs, and investment (see Figure 9).

Conclusion

As David Harvey observed in his 2008 article "The Right to the City," "the question of what kind of city we want cannot be divorced from that of what kind of social ties […] we desire."[7]

We desire informal social interaction. Exo-spatial characteristics connect indoor and outdoor zones for residents, expanding the thresholds in towers the way homes on the ground have always done and giving neighbors a comfortable opportunity to say "hello" in the vertical dimension.

We desire light, air, and views. Solar carving grants solar access to the surrounding environments of the building, not just to benefit its interior. The community around a solar-carved building gains better shared spaces – a benefit for all.

We desire highly connected communities in walkable, bike-friendly cities. Bridging can create outdoor-to-outdoor public connections at the base of buildings in urban centers, rather than cordoning them off-limits or blocking connections with enormous dimensions.

As the scale of cities increases and goes vertical, and our social outlets become more and more virtual, these physical strategies help expand the ways people can meet each other and create relationships, alliances, and community within the city. Through these three points, we see our designs beginning to shape better social connectivity in, on, and around tall buildings.

To be sure, these three points are just a beginning. Exo-spatial design, solar carving, and bridging can take many forms, shapes, and sizes and can be interpreted differently to respond to any site in different climates. We hope other design teams will expand on and reinterpret them in their own projects.

[7]: HARVEY, D. (2008) The right to the city. New Left Review. 53 (Sept/Oct).

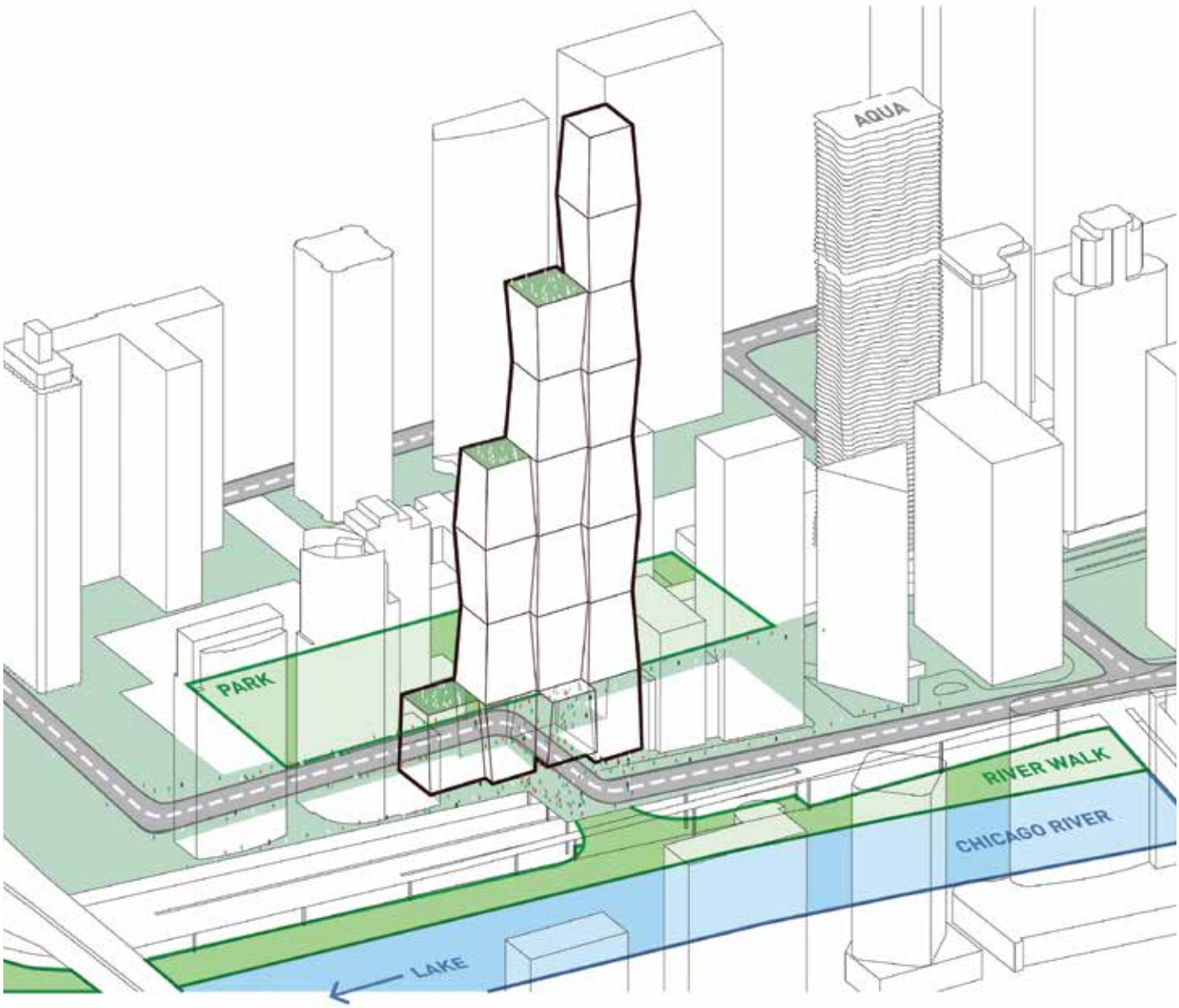

Figure 9. Wanda Vista Tower makes connections at multiple ground levels. (Source: Studio Gang Architects)

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