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## Perspectives on the Skyscraper City

To commemorate the CTBUH 2015 International Conference, some of the most prominent voices in the New York tall building industry today – all of whom are speaking at the conference – offer their perspectives on the big issues that have emerged as the increasingly fluid and multi-directional flow of global capital has driven a skyscraper city resurgence. Key projects from around the city, highlighted here through mini case studies, accentuate and further exemplify these critical viewpoints.

### Beyond the Baseline: The Sound Economics of “Green and Tall”



Alexander Durst, Chief Development Officer, The Durst Organization

While many agree that we must reduce greenhouse gases to stem global warming, there is little agreement as to how we can achieve this goal. The Durst Organization believes that developers

building for the future should always aim to implement the most effective and aggressive sustainable measures that economy allows. When it comes to building and operating tall buildings, the smart thing to do just happens to be the right thing to do.

Developers of tall buildings must recognize the lasting impact of their work. In the United States, buildings consume 70% of the electricity load, accounting for some 40% of carbon emissions. Both the scale of tall building construction and the impact of material used are massive. In addition to these important environmental considerations, tall buildings built today become profoundly integrated into the culture and economy of their cities for generations to come. Buildings built for the future must incorporate sustainability measures designed to last as well.

It is in a developer's best interest to keep ahead of the curve and provide buildings that are more sustainable than the market or legislation requires. A brief review of building regulations that have recently been implemented in New York City illustrates why it is smart to be an early and eager adopter of sustainable technologies.

In 2005, the City introduced Local Law 86, requiring projects that receive significant municipal funding to be LEED-certified. At that point, developers that had been building green for years were far better poised to secure City dollars than those scrambling to make sense of the certification process.

In 2009, Local Law 87 mandated that buildings of more than 4,645 gross square meters undergo regular energy auditing. Buildings that failed to meet efficiency standards were subject to expensive, bureaucracy-addled retro-commissioning. For buildings already operating near peak efficiency, it was “business as usual.”

In 2014, Mayor de Blasio challenged New York to reduce its carbon emissions 80% by 2050, outpacing Mayor Bloomberg's earlier commitment to a 30% reduction by 2030. Recommendations for reaching this benchmark include updating the NYC Energy Conservation Code within the next five years to reflect a target reduction in energy

consumption of 40% below ASHRAE's 2013 standards for commercial buildings.

The trend is obvious: building to a baseline means forever struggling to keep up with increasing legislative pressure. Meanwhile, regulatory bodies reward the more ambitious sustainable builders with funding, stretched codes and tax incentives. The benefits of early adoption generally far outweigh the long-term costs. It is possible, for example, to substantially reduce source energy consumption with on-site generation, micro-grid development, and other distributed energy methods. Such sustainable measures go well beyond what current regulations and market pressure demand. But buildings that employ these technologies will be able to supply energy efficiently to high-demand tenants well into the future.

Global temperatures, greenhouse gas emissions, and sea levels continue to rise. Developers can exhibit leadership by building to a standard that elevates the sustainable baseline and duly recognizes the scope and urgency of the challenge.

### The High-Rise Tower as a Building Block for the Public Realm



Moshe Safdie, Founder, Safdie Architects

Though the skyscraper has been with us for over a century, we are yet to discover how to deploy it as an effective building block for contemporary urbanism. Before the age of towers, we could take for granted that buildings aggregated to create boulevards, streets, squares, and crescents – wholesome places for the public realm. Today, the dominant typology of towers

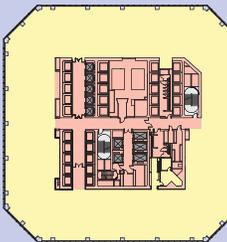
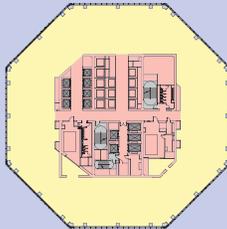
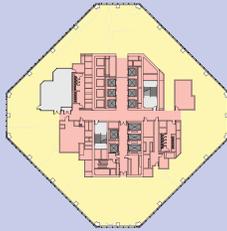
“Developers can exhibit leadership by building to a standard that elevates the sustainable baseline and duly recognizes the scope and urgency of the challenge.”

– Alexander Durst, *The Durst Organization*

## One World Trade Center

Rising from the northwest corner of the World Trade Center (WTC) site, One World Trade Center recaptures the New York skyline, reasserts downtown Manhattan's preeminence as a business center, and establishes a new civic icon for the United States. It is a memorable architectural landmark for the city and the nation, connecting seamlessly to its surroundings with entrances on all four elevations and linkages to an extensive underground transportation network.

The tower's spire reaches the symbolic height of 1,776 feet, a nod to the year that the United States declared independence, and is topped with a large revolving beacon. Sited north of the National September 11 Memorial, the tower rises from a cubic base; its



Floor plans – 45, 75 & 90.  
© Durst Organization

edges are chamfered back, resulting in a faceted form composed of eight elongated isosceles triangles. At its middle, the tower forms a perfect octagon in plan. It culminates in a glass parapet rotated 45 degrees from the base. A luminous glass curtain wall sheaths the tower on all sides from the first office floor to the observatory. Designers worked with industry experts to develop glass of unprecedented scale, which is capable of withstanding both wind loads at supertall height and stringent security requirements.

## CTBUH 2015 New York Conference

Alexander Durst, Chief Development Officer of The Durst Organization will be discussing One World Trade Center in his presentation, "Efficient Energy Production for High Demand Tenants" during Session 1e: New New York Typologies, on Monday, October 26 at 11:15 am.



One World Trade Center, New York.  
© SOM/James Ewing

**Completion Date:** November 2014  
**Height:** 541 m (1,776 ft)  
**Stories:** 94  
**Area:** 325,279 sq m (3,501,274 sq ft)  
**Primary Function:** Office

is still that of a singular, autonomous structure – experienced as a lone sculptural object in the cityscape. Alternatively, and becoming more common, (particularly in Asia) are clusters of mixed-use towers atop a podium, predominantly designed as self-contained, introverted, and privatized environments. Planning, zoning, and urban design guidelines have not provided the tools to accommodate and regulate the great inter-dependency of towers in the city, the impact on light and view, nor on each other and their surroundings, let alone getting towers to cluster in a complementary way in the city.

The challenge going forward is to recognize that towers are highly interdependent and require new planning tools to resolve their relationship. Moreover, their impact, as they collide with the ground, with or without podiums, is enormous. Only powerful concepts for how earth meets tower can begin to bring about an urbanism in which the public realm is continuous, truly public, and possesses the appropriate environmental conditions.

In this world of towers, designed as a collective – connecting, bridging, and creating urban places at various levels – opens up a new realm of possibilities for a better functioning and humane city. Tower design would then become considered as part of an assembly of towers, creating a new kind of urban fabric, rather than – as it is too often, a set of competing narcissistic sculptural objects. To be clear, in the traditional city the concepts of the public realm – streets, piazzas, gallerias, agoras, souks, and bazaars – were all formed by incremental, additive, individual structures, each a building block of the whole. This idea was so organically ingrained that it did not take major regulatory controls to achieve. Individual architects accepted that each incremental building activity was part of a whole. Somehow, we must now arrive at urban concepts that can deploy towers in a similar system of additive components of the urban whole.

Our predicament, perhaps skepticism, about the high-rise tower as an antagonistic

contribution to the urban fabric will prevail until we can come up with an equally compelling concept for how to deploy the high-rise tower as a building block for a well-conceived and understood public realm. Clearly, we must reinvent streets and piazzas into something more continuous, more three-dimensional, capable of cohabiting with public transportation and vehicular traffic. I am not speaking of the complex of towers separated by freeways of Le Corbusier's Ville Radieuse, or Hilberseimer's Ideal City, but rather of a more complex new urbanism of clustering high-rise buildings, in a morphologically sustaining and complementary way, considering issues of light, view, and shadow, connecting and bridging between them both at ground and upper levels. A new kind of public realm, in part climate-controlled, in part open, must be conceived as a continuous network, regardless of land parcelization and ownership. Tower design and placement should support, and in turn be sustained, by the surrounding development.

## 2 World Trade Center

2 World Trade Center (2WTC) is the capstone in the redevelopment of the World Trade Center and the final component of the revitalization of Lower Manhattan. Bound by Church Street, Vesey Street and Fulton Street, the tower will rise to 403 meters, respectfully framing the 9/11 Memorial Park alongside its tall neighbors.



2 World Trade Center, New York. © BIG

The 80-plus-story building will serve as the new headquarters for 21st Century Fox and News Corp., which will occupy the lower half of the tower, housing their subsidiary companies and more than 5,000 people under one roof. The upper half of the tower will be leased to other commercial office tenants. The needs and requirements of the media company and other tenants are concentrated into seven separate building volumes, each tailored to their unique activities.

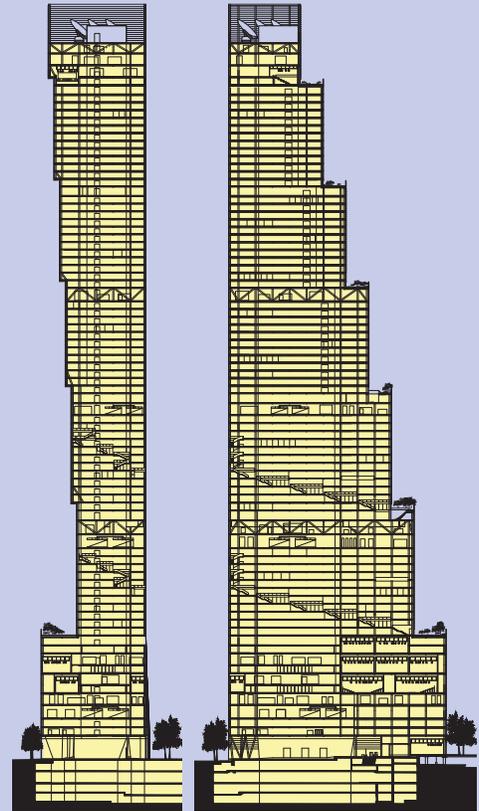
The volumes of varying sizes and depths are stacked on top of each other, from the largest at the base to the smallest towards the top. The stacking creates 3,530 square meters of outdoor terraces full of lush greenery and unprecedented views of the surrounding cityscape, extending life and social interaction

### CTBUH 2015 New York Conference

Bjarke Ingels, Founding Partner of Bjarke Ingels Group, and the architect for 2 World Trade Center, will be presenting on “Engineering Without Engines” during the Closing Plenary: *Towards the Future* on Tuesday, October 27 at 3:45 pm.

**Completion Date:** 2020 (expected)  
**Height:** 403 m (1,323 ft)  
**Stories:** 82  
**Area:** 226,960 sq m (2,442,977 sq ft)  
**Primary Function:** Office

outdoors. The Modernist skyscraper and the contemporary interpretation of the pre-Modern setback merge in a new hybrid and an exciting addition to the NYC skyline.



Building Sections. © BIG

## Defending Infrastructure: Enhancing the Public Realm



Bjarke Ingels, *Founding Partner, Bjarke Ingels Group*

Due to climate change, increased recorded sea surface temperatures have significantly expanded the area over which major hurricanes can form over the Atlantic. When Hurricane Sandy

hit New York two years ago, it caused havoc, and left Lower Manhattan in the dark for more than two weeks. Hurricanes are likely to become a more constant threat, hitting the densely populated and economically productive region with accelerating frequency and potency. Due to the almost 90-degree funnel shape of the New York Bight, New York City is especially prone, with almost half the city at risk.

A recent competition run by the Department of Housing and Urban Development examined how to not only rebuild but to create more resilient cities for when the next Sandy arrives, raising important design questions with implications for tall buildings in coastal cities, where most of the world's urban populations continue to accumulate.

The critical questions that arose were: Can we create flood protection infrastructure in a way that wouldn't feel like a wall segregating the city life and the water? How do we protect the sub-surface areas of tall buildings from flooding without ruining the streetscape?

Creating 16 kilometers of coordinated, contiguous flood protection – a “Dryline” – requires a holistic, big-picture approach, but to make it urbanistically successful, it needs to happen through close dialogue with the local communities. The idea is simple: a certain flood threat needs to be countered by a certain geometry. This can be designed in

many ways to transcend its initial purpose as a flood barrier.

The Lower East Side serves as a prototype of how to design the entire Dryline. This dense residential area, with practically all of the public housing in Lower Manhattan, much of it in towers, is among the most diverse in the city. When the 100- and 500-year floodplains are considered, almost two-thirds of its population is at risk. It also has very little green space compared to the rest of Manhattan, and 95% of the ground surface doesn't absorb storm water, furthering the severity of risks during a flood event. The area also suffers from poor infrastructure, it is underserved by subways, and it is cut off from the water by the elevated FDR Drive. A narrow promenade along the water reveals the lack of public space.

Raising the topography of East River Park in underused areas between sports fields and along service roads would screen the park from the noise of the highway, and protect the

neighborhood from flooding. Bicycle lanes and caged bridges turn into green passages, leading visitors to the new, resilient coastal landscape. Disabled-accessible slopes are integrated into the design providing unhindered access.

At the South Street Seaport, protective pavilions would animate the highway undersides and hold back the water, placed in such a way that the waterfront view is always retained from the adjoining side streets. Only right before a storm would the walls slide out and close the perimeter.

Coastal defense solutions can transform to respond to different conditions, landscapes, neighborhoods, and challenges. This “social infrastructure” – public utilities designed for practical use as well as positive social and environmental side-effects – mutates the utilitarian infrastructure at the core of New York’s crude charm to become the stage for a new public domain.

## Toward Modular Construction



MaryAnne Gilmartin,  
President & CEO, Forest City  
Ratner Companies

If you took a walk outside now, what would you see? How does the environment compare to 10, 25 or 50 years ago? You would see progress.

Today, technology has helped us break barriers that have never been broken before. Sure, people don’t look at each other anymore because everyone is changing the world on their smartphones. But it’s clear, we’ve reached a point where technology has brought us to new heights, impacting just about every industry.

It’s hard to understand why, at a time when progress has dramatically impacted so many industries, the construction industry is still

doing business very much the way it was done generations ago. While the equipment might be getting better, the methods are the same.

Having witnessed this firsthand, Forest City Ratner Companies undertook a multi-million dollar R&D initiative to find a better way to build. What we found was simultaneously simple and complex: construction’s answer to progress can be found in modular construction. Modular methods of construction innovate and streamline the construction process, which leads to greater savings of time and money.

For years, modular construction has been used to build bathrooms, hospitals, and low-rise homes. But modular construction had yet to be used for high-rise buildings.

For the Pacific Park project, the team devised a way to build high-rise modular and opened a factory, at the Brooklyn Navy Yard. Here, complexity was counteracted by taking a high

### 461 Dean Street

The 461 Dean Street building at Pacific Park will be the tallest volumetric modular building in the world when completed. The challenge for the design team was to develop a new modular construction methodology and system that was optimized for the construction market conditions in NYC, capable of withstanding the loads associated with going 32 stories tall, and would deliver quality with union labor at a price competitive with conventional flat-slab construction.

The team developed a process and a modular system that maximizes work in the factory and minimizes work in the field. The system consists of modules shipped to site with structure, interior finishes, façades, and MEP systems complete. The basic building block of the modular system consists of a fully welded steel-framed chassis. The sides of the modules act as welded vierendeel trusses spanning between corner columns, where the module columns below carry the weight of all modules above. On average, the modular solution weighs approximately 65% of a conventional RC flat-slab building. The reduced superstructure weight was monetized as savings in foundations and transfer steel.

With the module roof acting as a diaphragm, the primary structural connections between the modules can be done from outside the apartment units, avoiding the risk of doing heavy steelwork in a finished apartment. This proved to be one of the keys to the phasing puzzle.

More of a process than a product, the modular system designed for 461 Dean Street is versatile enough to be employed on a wide variety of projects. Modular construction can provide significant advantages over conventional construction in terms of worker safety, neighborhood impact, consistent workplace location, and productivity in all weather conditions.

### CTBUH 2015 New York Conference

MaryAnne Gilmartin, President & CEO of Forest City Ratner Companies, the company developing Pacific Park together with China’s Greenland Group, is part of the Opening Plenary panel discussion “Developing Tall in the New York Context” on Monday, October 26 at 9:15 am.

Height: 106 m (347 ft)

Stories: 32

Primary Function: Residential



461 Dean Street (formerly B2 Tower), New York.  
© SHoP Architects



Baccarat Hotel & Residences, New York.  
© SOM/Albert Vecerka

## Baccarat Hotel & Residences

The building's form and craftsmanship are inspired by the eponymous luxury crystal brand that owns the building. Located on 53rd Street between 5th and 6th Avenues, the building lies directly across the street from the Museum of Modern Art (MoMA) in the heart of Manhattan. It comprises 32 floors of condominiums with 59 residential units, nine floors of hotel, and a public library facility.

The tower's east and west elevations – its main structural components – are sheathed in faceted jet-black aluminum panels. These surfaces appear austere and muted in relation to the neighboring MoMA, while protecting occupants from hard-to-control morning and afternoon sun. The tower has a sleek profile on the New York skyline. The residential program is set back from the hotel, giving the building a slender profile.

Glass on the north-south exterior is bright and reflective, accented only by thin vertical mullions grouped in threes. The glass allows the building to reflect varying light and sky conditions.

### CTBUH 2015 New York Conference

SOM, the designers of Baccarat Hotel & Residences, will be presenting on their **Zhongtian Project in Guiyang, China** during Session 1a: *Zhongtian Project, Guiyang* on Monday, October 26 at 11:15 am.

**Completion Date:** March 2015  
**Height:** 185 m (605 ft)  
**Stories:** 46  
**Area:** 32,200 sq m (346,598 sq ft)  
**Primary Functions:** Residential / Hotel



Typical residential floor plan. © SOM

degree of control over the construction process. All building components, from drywall and finished carpentry to the building's façade panels, are integrated into fully-assembled modules. When "mods" arrive on-site they are 80–90% complete. Building within this all-inclusive, controlled environment reduces the amount of construction waste and consumption of natural resources, which, in turn, creates a positive, sustainable civic-minded development and a methodology that will impart a benefit on cities that will last for generations.

Modular building also allows us to create operational efficiencies. Working inside the factory, we are much less likely to be delayed by inclement weather and building materials are stored and distributed by a special team that allows for a seamless transfer. And, because there are fewer truck deliveries to the

construction site, there is less pollution and disruption to the community.

Using modular technology, we are currently building 461 Dean Street, which will be the world's tallest modular building. As part of our 8.9-hectare Pacific Park Brooklyn development, it will contain 363 residential units, half of which will be affordable.

Like any new innovation, this undertaking has experienced its ups and downs. While it evolves out of its infancy, we can look into its use at some of the other buildings at Pacific Park. We are very confident that this new technology will be a success and the proof will be 461 Dean Street standing at its full 32 stories, fully leased. Modular construction has the potential to transform our industry and make buildings and cities better all-around.

## Building Renovation and Environmental Upgrade



Anthony Malkin, CEO,  
Empire State Realty Trust

Sustainability is a global hot button. Energy consumption has the largest impact on our future on earth. The built environment is the single largest consumer of energy, and with population densification through urbanization, this will only grow in the years ahead. The largest contribution the built environment can make towards a sustainable future is to reduce energy consumption.

First-movers began to look at sustainability in the built environment decades ago. Despite many standards set, certifications created, and methods of measurements proposed, very

little had been done by the real estate industry to define the cost and return potential of energy efficiency in the existing built environment. Most of the initial focus came from people outside of the real estate industry and concentrated on new construction. While that was an easy place to start, this focus disregards the fact that the vast majority of the buildings that will exist 25, 30, or even 50 years from now already exist in the world.

When we began our work on the *Empire State ReBuilding* program in 2007, our top priority was to position the Empire State Building as a leader in sustainability. We adopted a policy that required each expense to have an economic result. We wanted top-line improvements, and wanted to reduce costs of operation through investment. We wanted not only to “do the right thing,” but to make a return on investment.

When we initiated our process of integrating efficiency into our design and execution, we focused on calculations, projections, execution, and verification of investments made and results achieved. We are now seeing a three-year payback on incremental costs, and our results are ahead of projections and saving millions of dollars each year.

The value of the bottom line eclipses the first movers in the sustainability space. While the current bandwidth is still hogged by non-owner-defined “scavenger hunts” for points and evaluations, based upon irrelevant measures that do not advance towards true sustainability, owners are beginning to wake up. In the for-profit world, those who do not move forward fall behind and fail.

Soon a new, replicable program will be announced around integrated energy efficiency in design and construction of office tenant spaces. There is a proven significant reduction in consumption of energy through plug loads, HVAC, and lighting with a fantastic return on investment over the life of a typical tenant’s lease. Building owners should take ownership of the discussion so that success is measured by return on investment, and reduce the influence of the not-for-profits that have dominated the discussion for too long.

## Engineering Superlims: Challenges and Solutions



Silvian Marcus, Director of Building Structures, WSP

Thanks to their unique geometry, structural engineering solutions are the defining characteristic of the design of superslim towers. Overcoming structural challenges is essential, not only for creating a safe, code-compliant structure that meets the norms for dynamic movements, but also for designing a marketable building

with minimal structural intrusion, thus maximizing the usable space for inhabitants.

Achieving the ideal structure is a long, tedious process, starting with the creation of a basic model. Adequate analysis leads to design improvements and solutions for managing dynamic responses. Redistributing the mass, improving the building’s shape for reduced wind resistance, or increasing the building’s “porosity” are effective strategies to be considered. If needed, auxiliary damping systems can be added to improve dynamics without affecting the marketable space.

### The High Line

The transformation of an elevated freight rail line into a linear urban park on Manhattan’s West Side is one of the city’s most successful urban development projects in recent years. This park has almost single-handedly brought energy and vitality to an area that had largely been ignored. Its impact on the cultural, economic, and social life of the area around it has been even more significant than much larger and more expensive urban interventions – typically buildings – designed to promote economic regeneration.

The 2.3-kilometer High Line starts at Gansevoort Street in the Meatpacking district on the west side of Lower Manhattan and continues northwards to Chelsea, ending in a loop around Hudson Yards. When built in the early 1930s, elevated trains above streets were disliked due to the shadows they cast on

adjoining streets; as a result, the High Line was built in the middle of the block, running through the massive industrial buildings that would profit from its freight deliveries. It is many of these buildings, on or adjacent to the line itself, which have now seen their values skyrocket as developers move in to cash in on the proximity to the new park.

### CTBUH 2015 New York Conference

Kate Ascher, Partner at BuroHappold Engineering Company will be discussing the High Line in her presentation, “**The High Line Effect**” during Session 2c: *At the Urban Scale*, on Monday, October 26 at 1:45 pm.

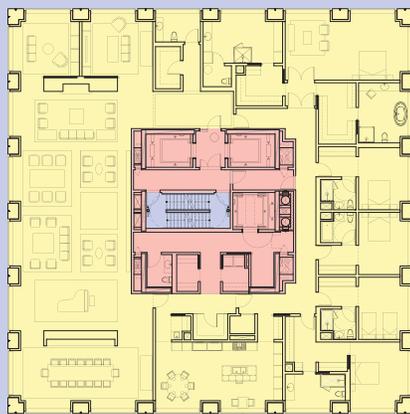
**Completion Date:** Phase 1: 2009; Phase 2: 2011; Phase 3: 2014  
**Length:** 2.33 km (1.45 miles)  
**Primary Functions:** Public Space



High Line park, New York. © David Berkowitz

## 432 Park Avenue

The pencil-thin 432 Park Avenue represents a new generation of supertall, superslim skyscrapers. Simplicity is the defining trait of 432 Park Avenue. With a series of large glass windows set in a regular grid of exposed concrete members, the building offers few aesthetic frills, but rather rises out of the ground as a singular, white monolith. The straight, clean lines of the building's façade evoke a modern aesthetic,



Typical residential floor plan. © Rafael Viñoly

while also reflecting Manhattan's orderly street grid. Each floor incorporates 24 windows (each 9.2 square meters) that add weight to the structure, creating a sense of visual stability despite its slender frame. The oversized windows will also benefit residents with ample amounts of light and uncontested views.

The building's outward simplicity belies a complex structural scheme. A regular grid of exposed concrete creates an open basket within which seven "independent buildings" stack up, separated by spaces where building cores are exposed to the outdoor elements. These breaks allow for the deflection of wind pressures and help the building, with its 1:15 slenderness ratio, achieve structural stability.

The orderly, almost methodical, design of 432 Park manages to fully harness its small footprint without appearing to dominate its surroundings. It is clear that this type of economical design will have a lasting impact on the future of tall buildings, as it becomes more important to consider the long-term impact of buildings at such extreme height.

432 Park Avenue, with a height of 426 meters and a base of 28.5 meters, boasts a slenderness ratio of 1:15. The structural rigidity was achieved with a robust center floor core of about 9 meters by 9 meters and a perimeter tubular frame made of columns and spandrel beams. By connecting the core to the perimeter tubular system five times throughout the building's height, the rigidity is augmented by about 26%. The same

connecting levels have double open floors, achieving porosity and minimizing vortex forces inherent to wind flow. Using 14,000-psi concrete at the lower floors improves the rigidity while minimizing the column sizes. The generalized mass was improved by increasing the floor thickness in upper floors. Finally, a pair of tuned mass dampers controlled the accelerations. While the core houses vertical transportation and mechanical



432 Park Avenue, New York. © Rafael Viñoly/Dbox

**Completion Date:** 2015  
**Height:** 426 m (1,396 ft)  
**Stories:** 88  
**Area:** 65,497 sq m (705,004 sq ft)  
**Primary Function:** Residential

### CTBUH 2015 New York Conference

Harry Macklowe, Chairman of Macklowe Properties Inc. will be discussing 432 Park Avenue in his presentation, "432 Park Avenue" during Session 1e: New York Typologies, on Monday, October 26 at 11:15 am.

“But if you are the owner, especially a public owner, of one of those sturdy mid-century-modern tall buildings that are ubiquitous in our cities... you should seriously consider recycling your building.”

– Michael Adlerstein, *UN Capital Master Plan*

spaces, the floor outside the core is free of interior columns.

The 77-story 53 West 53rd Street tower, also known as MoMA Tower, will house 140 luxury condominiums and three gallery floors. With a height of 320 meters and a slenderness ratio of 1:12, the inclined diagonal columns (diagrid) make up the primary lateral resisting system. An eccentric concrete core serves as the structure's backbone, although the diagonal members provide its rigidity. The galleries' space constraints were challenging, because the floors needed to be unobstructed, but also able to carry substantial load. Special truss transfers on the 6th and 7th floors were engineered to carry the superstructure's interior concrete columns from above and the weight of the hung interior columns supporting the gallery. Thanks to the overall pyramidal building shape, interior columns above the 26th floor were elimi-

nated, maximizing the layout flexibility. The dynamic performance is augmented by a tuned mass damper at the top of the building.

111 West 57th Street, known also as the Steinway Tower, is 438 meters tall with a slenderness ratio of 1:24.3, breaking a world record. Every floor was required to have unobstructed Central Park views, so the first residence starts on the 20th floor. The challenge at lower floors was adding structure while preserving the historic Steinway Building. Using 14,000-psi concrete at the lower floors and built-up steel members consisting of welded plates helped minimize the structure. A limited floor plate prompted the use of two exterior walls, located at the east and west façades, connected to the side core in the shape of an “H.” To maximize the

space on the south end, two vertical columns were replaced with a 1.8-meter-wide flat beam. Four outrigger walls were added at the mechanical floors to augment the structural stiffness. A tuned mass damper and three open floors control the acceleration.

Ultimately, super-slender towers such as 432 Park Avenue, MoMA Tower, and 111 W 57th Street are highly marketable despite their reduced floor plates, because of efficient structural design. While meeting safety and comfort requirements is essential for any tall or slender building, open, flexible space is critical for capturing the interest of elite buyers. The greatest challenge for structural engineers of such towers is finding cost-effective, innovative, and buildable solutions that will marry safety and luxury.

## Grey Eminences Going Green



Michael Adlerstein,  
Assistant Secretary  
General, United Nations  
Capital Master Plan

All building owners will eventually face the “replace or renovate” moment and, based upon many symbolic, political, and financial factors, will have to make that decision. But governments and other public entities have too often made

the wrong choice instead of renovating an existing one, and built a new monument. If we believe climate change is a problem, public owners must lead by example and recycle our buildings.

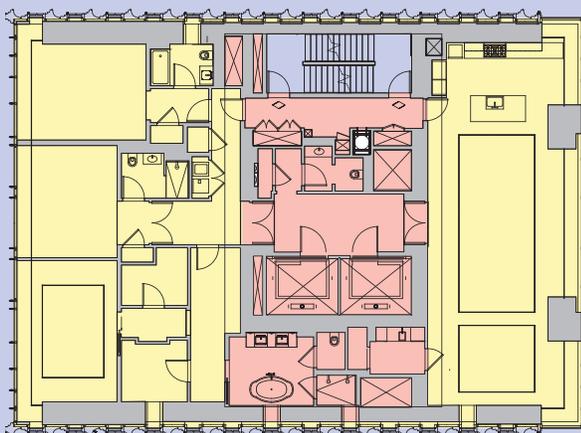
### 111 West 57th Street

111 West 57th Street typifies the luxurious extreme of the superslim typology in New York City. Containing only 60 units, the tower will offer an exclusive, centered perspective affording vantage points overlooking Central Park and the entire region.

The tower’s form is derived through an unconventional interpretation of what is possible when working with the requirements of the Midtown zoning envelope, multiplying the height of each setback to present a feathered, rather than a stepped, profile.

New methods were also explored to exploit the possibilities of terracotta, one of the most

flexible and beautiful materials from the golden age of the Manhattan skyscraper. Blocks will be extruded and glazed, then stacked into undulating “pilasters” on the east and west façades, their staggered waves combining into a subtle and distinctive moiré pattern. Each pilaster ascends to one of the stepped setbacks above, so the tower appears to dematerialize as it rises. Alternating between them are vertical bands of glazing trimmed with bronze. The footprint of the building was kept as compact as possible, positioning it well back from the street to respect and preserve the landmark Steinway Building at its base.



Typical residential floor plan. © SHoP Architects

### CTBUH 2015 New York Conference

Simon Koster, Principal at JDS Development, who are developing 111 West 57th Street, will be sitting on the final jury panel for the CTBUH Student Design Competition. Finalist students will present their schemes in a special session on Monday, October 26 starting at 11:15 am.

**Completion Date:** 2018 (expected)  
**Height:** 438 m (1,438 ft)  
**Stories:** 80  
**Area:** 29,357 sq m (315,996 sq ft)  
**Primary Function:** Residential



111 West 57th Street, New York. © SHoP Architects

## 53 West 53rd

53 West 53rd (also known as 53W53) is a gracefully tapered, 320-meter tower rising above the Museum of Modern Art (MoMA). The building's multiple tapered surfaces create a unique silhouette – both an heir to the classic towers that shaped the New York skyline and a paradigm for the skyscraper of the future. The architecture embraces a decidedly modern point of view. Its innovative exposed diagrid structural system gives the façades of the tower a distinctly angular rhythm, which, when combined with floor-to-ceiling windows, creates a unique architectural context through which to view Central Park and the Manhattan skyline.

The elegant, refined interior spaces of the 139 private residences offer a 21st-century vision of the gracious urban living for which New York is celebrated.

Each of the tower's residences, which range from one-bedroom homes to duplex penthouses with private elevators, and full-floor dwellings, is imbued with gracious proportions and attention to detail. The design comprises lighting and fully bespoke kitchens and bathrooms, as well as elegantly crafted furniture-grade mahogany doors, with custom-designed bronze hardware inspired by the tower's distinctive silhouette.



53W53, New York. © Ateliers Jean Nouvel

53W53 has the unique distinction of being integrated into the MoMA's urban campus, granting this renowned cultural institution a sculptural presence on the New York skyline.

Beyond MoMA, 53W53 is surrounded by luxury shopping, renowned restaurants, and cultural landmarks, including Central Park.

Extensive in-house amenities – including a 20-meter lap pool, graced by a vertical green wall – staff and services elevate the living experience to that of a super-luxury hotel. Each resident will also receive a unique Benefactor W53 membership at MoMA, affording many substantial museum benefits and privileges.

## CTBUH 2015 New York Conference

**Silvian Marcus**, Director of Building Structures at WSP Group will be discussing the superslim typology in his presentation **"The New Supers: Super-Slender Towers of New York"** during Session 3e: *The Super Slim*, on Monday, October 26 at 3:45 pm.

**Completion Date:** 2018 (expected)

**Height:** 320 m (1,050 ft)

**Stories:** 77

**Primary Function:** Residential

Most mid-century buildings never get a chance for a retrofit, because owners and architects usually first (and only) consider the "clean slate" option – demolition.

Of course, if the structural system is no longer sound, or the layout is not functional, demolition might be a better decision. But if you are the owner, especially a public owner, of one of those sturdy mid-century-modern

tall buildings that are ubiquitous in our cities, and you are serious about sustainability, you should seriously consider recycling your building. There need be no delta in energy consumption between an energy-efficient new building and an energy-efficient restored building. And the vast amount of embodied energy that goes into the foundations and structural system alone would be wasted if you tore it down. Climate change is here to

stay, and we must change the culture of "demolish and build anew."

I am very proud that the United Nations chose the sustainable road for its renovation of the Secretariat building. Our project demonstrates that a very green product is achievable even in a highly complex renovation, even with full restoration of multiple large-scale meeting and conference rooms, with serious security and blast concerns, with major budgetary concerns, and as compared to the cost of new construction.

The renovation of the United Nations compound under the Capital Master Plan (CMP) was designed to meet LEED Gold standards, and at the conclusion we actually realized that the Secretariat Building surpassed that goal and achieved LEED Platinum. We greatly improved both the

“As the world moves into the big-data age of the 21st century, there is both an opportunity and an obligation to optimize and build more secure, sustainable, and efficient energy systems within buildings.”

– Michael Rudin, *Rudin Management Company*

efficiency of the chiller and heating plant, as well as the entire building envelope. We also used all the latest Building Management Systems (BMS) controls to improve our operations and employed a wide range of architectural features to save energy, such as sensor-controlled daylight harvesting systems.

In the end, the entire compound has reduced its energy consumption by about 55% and its greenhouse gas emissions by more than 45%. We have also reduced water consumption by over 40%.

Achieving these considerable savings did not require the use of pioneering technology. They were realized through intelligent design using tried-and-true engineering. Secretary-General Ban Ki-moon wanted the UN Headquarters to “become a globally-acclaimed model of efficient use of energy and resources.” With a 65 year-old skyscraper that is LEED Platinum-equivalent, the renovation has met that objective and hopefully will serve as an inspiration for other public and private building owners.

## Smart Buildings & Smart Cities: Why Tall Buildings Need “Brains”



Michael Rudin, Vice President, Rudin Management Company

The future of the world’s great cities depends on the tall buildings that make up those cities. As these cities continue to grow and thrive, the need for them to become smarter is ever more important.

The growth of these cities must be matched by the growth of the utilities that serve them; electric grids, sewer systems, and other infrastructure networks must continue to advance along with the cities. As cities become smarter, the buildings that make up the skylines of those great cities must too become smarter, and in order for a building to become smart, it needs a brain.

Tall commercial and residential buildings worldwide are primarily designed for tenant

comfort and safety, with massive engine rooms and complex building systems such as Heating Ventilation and Air Conditioning (HVAC), elevator management, power, plumbing, fire and life safety, security, lighting, and others. Historically, these systems have never truly been integrated. Over the last 20 years Building Management Systems (BMS) have helped manage certain systems more efficiently. A BMS primarily integrates the HVAC to assist building operators in sustaining comfort of the tenant spaces. While the BMS can be used to retrieve energy-related building data, such as readings from electric sub-meters and space temperature sensors, it is not an energy optimization tool and it does not integrate with every subsystem within a building. In fact, none of these building subsystems communicates with others like a true “nervous system” instead they provide supervisory control and data acquisition only within each subsystem.

The missing ingredient has been a “brain” that continuously ingests, processes, and remembers all nervous system data, predicts potential outcomes in the future, and issues orders to the nervous system, causing actions that make the whole building operate optimally. All the while, the “brain” is reacting to potential system malfunctions, breakdowns, and changing external conditions.

For example, in the case of a commercial building, HVAC systems could be regulated during business hours by changing the speeds of Variable Frequency Drives (VFDs) to reduce energy costs by tracking building occupancy, then adjusting fan speeds up or down accordingly.

According to the New York City Mayor’s Office of Sustainability, 40% of all energy use is in tall office and residential buildings, with about 60% of this energy consumed by tenants. Tall office buildings are obligated to provide comfortable spaces to their tenants during business hours; some buildings have extended operating hours and others run around the clock. The optimal operation of these tall buildings is of great importance to the success of the work of the tenants, and ultimately, the economies they drive. As the

world moves into the big-data age of the 21st century, there is both an opportunity and an obligation to optimize and build more secure, sustainable, and efficient energy systems within buildings. Only by providing a brain for these tall buildings can such a goal be achieved. And only when tall buildings become smart, can our cities become truly smart as well.

## New York City vs. Jersey City: A Development Perspective



Robert D. Cotter, Planning Director, City of Jersey City

It has been said that the difference between development approvals in New York City *vis-a-vis* Jersey City are a matter of “slow but sure” versus “fast but discretionary.” NYC does not do site-plan review for “As-of-Right” projects, in which no special approvals are needed for construction. Jersey City does discretionary site plan review with an eye towards the street and less towards the height of the towers. As competition for buyers and tenants has increased the call for better architecture, we can spend our energies on something much more important, something that New York cannot do very fast. We can make necessary adjustments to the rules.

Because of differences in basic enabling legislation, New Jersey allows local discretion as to how to deal with areas in need of redevelopment and/or rehabilitation. New York does too, but with many more procedural requirements, including an environmental impact study. In New Jersey, if the area declared “in need” is located in an area where development is “encouraged,” the designation is considered approved and effective by the State Commissioner of Community Affairs upon transmittal by the city clerk. The adoption of a redevelopment plan, and amendments thereto, may proceed with publication in the local newspaper. There is a public hearing before the governing body and a vote to approve or deny, usually on the same night.

The ability to modify zoning is paramount to expediting approvals and development. As markets shift, and demand changes, Jersey City can rapidly change gears and move with the markets. No long-term studies are required to determine if this is good or bad for the environment. It has been established through the New Jersey State Strategic Plan that the areas where development is “encouraged” are the state’s urban centers, which are, for the most part, less dense than they ever were and have excess capacity to regenerate themselves. Jersey City population peaked at 316,000 in 1930; at 265,000 today, there is lots of room to grow.

It comes down to traffic, which are the only studies required to change the zoning, and even that is at the discretion of the town. (Jersey City chose to consider the transportation/land use connection as critical to its market.) The latest analyses have shown that increased density and diversity of land uses (mixed-use) actually decreases peak-hour trips, even as population density increases. In fact, the denser you get – the less auto trips you need, essentially because with higher mixes of use, “everything is everywhere.”

## GSA Public Buildings: Maintaining and Learning from the Legacy



Leslie Shepherd, Chief Architect, US General Services Administration

The numerous Federal buildings that were completed after World War II – a boom whose peak corresponded with President Johnson’s Great Society initiatives – are not substantially different from more recently constructed Federal offices. The government’s mid-century facilities do have anachronisms. For example, office high-rises’ Modernist plazas now require interventions that simultaneously enhance security and urbanism. Even so, in the ensuing decades the architecture of civil service has evolved only incrementally. The same could be said for comparable buildings in the private sector.

On the other hand, Americans’ understanding of what takes place at work, and how, has shifted dramatically. As clerical tasks have been replaced by technology, administrative, management, and creative jobs now dominate the office environment. Spatial configuration of employees has followed suit: Workers once ran an “intellectual assembly line” in fully enclosed offices and cubicle farms, while today approximately 70% of workplaces have no or low partitions, according to the International Facility Management Association. Moreover, “creative collision” is driving the design of these workspaces, where openness is combined with higher utilization rates to foster collaboration and engagement among employees. Mobile and cloud computing have both responded to these social and physical transformations and hastened them.

Many reasons already underpin the General Service Administration (GSA)’s efforts to modernize its postwar buildings. Consider their embodied energy. According to the landmark report *The Greenest Building: Quantifying the Environmental Value of Building Reuse*, existing buildings impact the environment as much as 46% less than new construction of comparable energy performance. The study also found that more efficient new buildings still must operate between one and eight decades in order for their energy performance to outweigh the climate change related to construction.

The GSA portfolio also boasts impressive access to public transportation. Commuting can consume between 30 and 137% more energy than building operations, and reducing automobile use is key to cutting the greenhouse gas emissions associated with commuting. Our research shows that site selection in transit-rich CBDs cuts these indirect (Scope 3) emissions approximately 2%, and that 42% of Federally-owned office and courthouse space is located within 400 meters of fixed-guideway transit. Scope 3 emissions are poised to become an increasingly accepted calculation of environmental impact.

That workplace architecture and our collective approach to work have failed to change in lockstep validates the cause of renovation and adaptive reuse. As GSA undertakes systems replacement and other necessary upgrades of Great Society-era tall buildings, it is propelling workplace environments into productive, 21st-century space with relatively little additional capital investment.

## World Trade Center, 14 Years On



Daniel Libeskind, Founder, Studio Daniel Libeskind

**Editor’s Note:** *The original master plan for the reconstruction of the World Trade Center (WTC) after the terror attacks of September 11, 2001, was created by Studio Daniel Libeskind. Mr. Libeskind was asked his opinion of the WTC site now that reconstruction nears completion.*

The WTC site has emerged after years of debate, design, and construction to become what we all hoped it would be – a place of memory, reflection, and inspiration embodying the resilient spirit of New York.

The master plan’s challenge was not only figuring out how to accommodate the programmatic requirements of office buildings, retail, and commercial space. Clearly the challenge was creating a balance between maintaining memory of what happened on September 11, while providing a place that would be a source of hope and inspiration for the future. New York is a city of optimism, and the neighborhood had to be repaired and reinvigorated. In designing the master plan, we tried to listen to all of the competing voices, knowing that it was fundamental to balance the memory of the tragedy that had changed so many lives with the need to foster a vibrant, exciting, and working neighborhood.

Half of the 6.5-hectare site is dedicated to the Memorial, but the master plan also set aside locations for sustainable, high-tech office

towers, stitched the site back into the historic street grid, reinvigorated the streetscape with above-ground retail and public space, reshaped the underground transit concourses and even found room for two major new public facilities: an iconic new transportation station and a performing arts center.

The public space for the memorial had to be sufficient for the millions who would come to see it, intimate enough to allow solitude and reflection. The footprints are a physical and real reminder of the enormity of the event. The five towers ring the site in an echo of the torch of the Statue of Liberty; with One World Trade Center rising to 1,776 feet, representing the year of the US Declaration of Independence. The exposed slurry wall, part of the memorial museum, is the living embodiment of a heroic structural element that held back the waters of the Hudson from flooding the site.

Given the extreme political and physical complexity of the rebuilding process, the development of the site today is a testament to the strength of the city, New Yorkers, and Americans. The Memorial and Museum are open to the public, towers are complete or rising, the streets are opening up, and people are using the site every day – it is no longer a vision, but a living reality as a vibrant neighborhood in lower Manhattan.

From the beginning, the aim of the master plan was to develop a mixed-use site that could be developed in stages. At the core of the plan is memory and meaning, with the memorial and museum at the center, surrounded by 3.2 hectares of public space, creating a true celebration of life. All of these pieces are components of what continues a culture and defines a human being: memory. ■

*All the authors presented in this article are featured in the 2015 CTBUH New York Conference proceedings publications. These include a 700 page main proceedings and three Region Room books (158 to 199 pages in length). For more information, go to: [store.ctbuh.org](http://store.ctbuh.org)*

## 56 Leonard Street

The project is conceived as a stack of individual houses, where each house is unique and identifiable. A careful investigation of local construction methods revealed the possibility of shifting and varying floor-slabs to create corners, cantilevers, and balconies – thus providing individual and different conditions in each apartment. At the base of the tower, the stack reacts to the scale and specific local conditions on the street, while the top staggers and undulates to merge with the sky. The staggering and variation in the middle is more controlled and subtle, as in a column shaft.

To break up the tendency towards repetition and anonymity in high-rise buildings, 56 Leonard Street was developed from the inside out. The project began with individual rooms, treating them as “pixels” grouped together on a floor-by-floor basis. These pixels come together to directly inform the volume and to shape the outside of the tower. From the interior, the experience of these pixels is like stepping into a series of large bay windows.

The top of 56 Leonard Street is the most expressive part of the project, driven directly by the requirements of the interior, consisting of 10 large-scale penthouses with expansive outdoor spaces and spacious living areas. These large program components register on the exterior as large-scale blocks, cantilevering and shifting according to internal configurations and the desire to capture specific views, which ultimately results in the sculptural expression of the top.

Meanwhile, the base of the tower responds to the special character of Tribeca. This is a part of New York characterized by a wide range of building scales – from small townhouses to large industrial blocks and the ubiquitous high-rise buildings of downtown. By grouping together “pixels” of various sizes, including lobby, parking decks, and housing amenities, the tower reflects and incorporates each of these neighborhood scales.

**Completion Date:** 2016 (expected)  
**Height:** 250 m (821 ft)  
**Stories:** 57  
**Primary Function:** Residential

## CTBUH 2015 New York Conference

56 Leonard Street will be the focus of a conference technical tour led by the project's structural engineer WSP Group on Wednesday, October 28.



56 Leonard Street, New York. © John Cahill