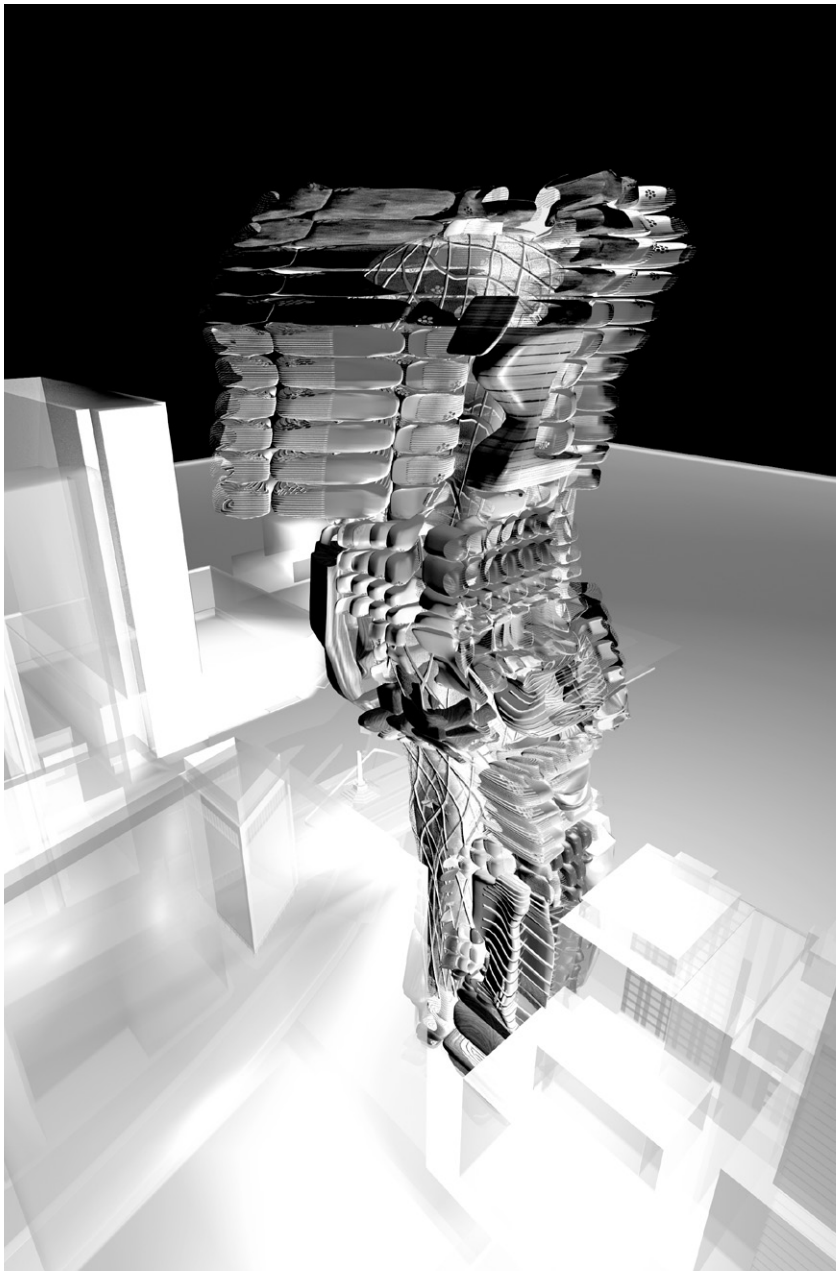
Resi-Rise Skyscraper

Sulan Kolatan and William Mac Donald



The resi-rise is less "building," more "vertical urbanism." Its frame, not unlike a spatial matrix of "lots," is initially built-out to the maximum allowable zoning envelope with deformations accounting for site influences, such as views and adjacencies.

Once the territory is staked out, the frame is ready for rental space in the form of pods. It is possible for individual tenants to inhabit their space without depending on the full occupation of the building itself. Assuming that the top and bottom are considered "most desirable," the resi-rise can already be operational as it fills up from top and bottom first, leaving the mid-section free to be taken later. Following the urban analogy, this would be much like being among the first to live on a new block with the necessary infrastructure in place but unlike residing in a partially populated shell-and-core building. The resi-rise is complete when the frame and infrastructure are installed.

The morphology, size, program, function, materials, servicing, and furnishing of the pods are customizable within parameters set by the architects. This strategy couples individual choice (via the development of mass-customized units) with the collective performance and identity of the resi-rise into a complex relational system between the whole and its parts. Individual residents can play a role in the spatial organization of their pods into contiguous or distributed affiliations of space. When tenants leave, old pods are removed and recycled. Within this structure, it becomes feasible for short-term programmatic scenarios, such as corporate leasing of space for the duration of a convention for instance, to come (and go) with their own pods.

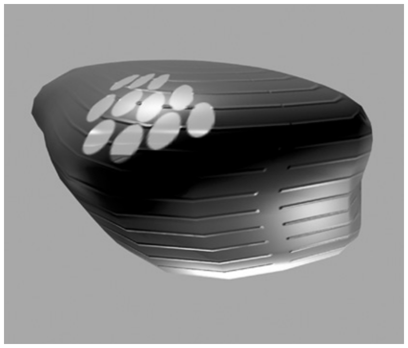
The pod is less like "real estate," and more like a "leased car" to the tenant. In this proposal the architects continue to remain involved with their "product" by updating it as new materials and technologies emerge on the market. This gives the owner/tenant the option to upgrade to the latest model—by developing accessories for use in conjunction with the pods, and by supplying the user with information on compatible third-party products. The construction of the resi-rise is never quite finished.

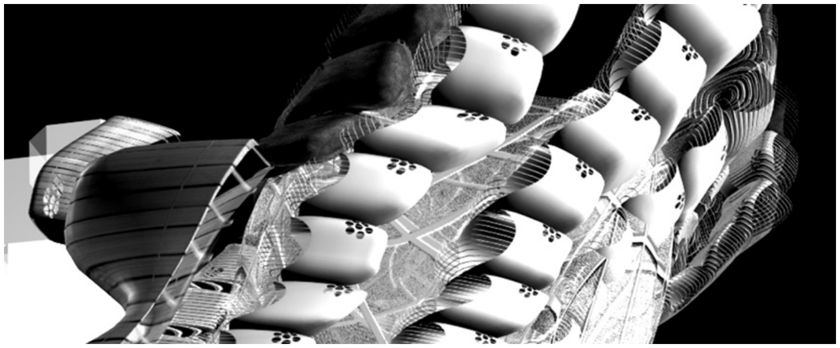
Materials and Technologies

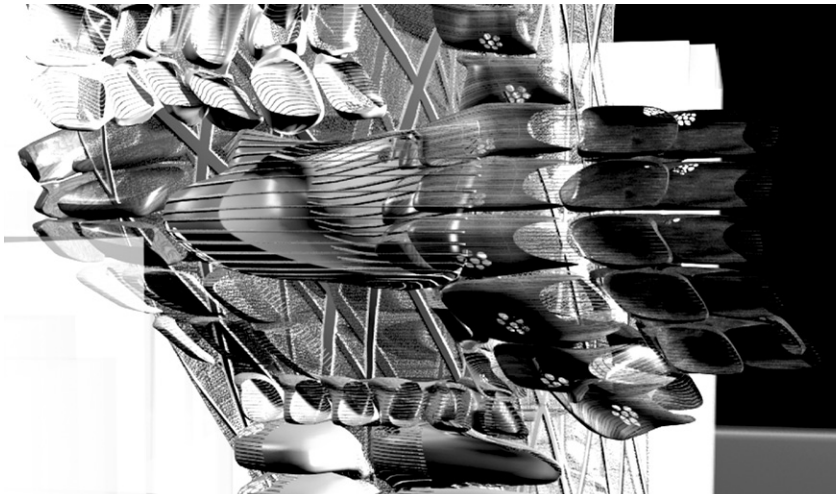
Plastics that undergo molecular restructuring with stress; smart glass that responds to light and weather conditions; antibacterial woven glass-fiber wall covering; smart interior walls that control climate; and pultruded fiberglass-reinforced polymer structural composites.

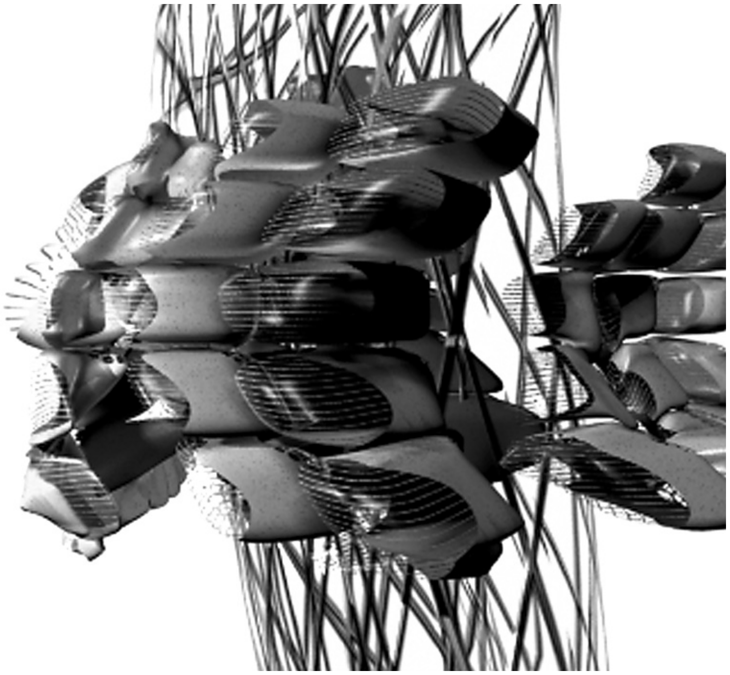
Structural Elements

Frame—this system provides a basic load-bearing structure for the tower. Constructed of prefabricated, fiber-reinforced composite components, it is built initially to the full height permitted by zoning and comprises









two crosslinked, basket-like rings, deformed according to site parameters. Elements of the frame are removed as pods are added, to make room for them and because their load-bearing role is supplanted. The removed elements are warehoused for later use, sent to other sites, or recycled.

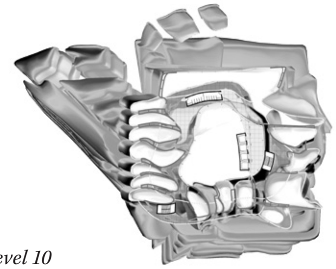
Pods—these form the bulk of the habitable volume of the tower. They are constructed in a hybrid monocoque fashion, consisting primarily of a low-density core material and high-density skins, formed to the specific tenants' requirements. Areas of the pod shells are made fully or partially transparent with rigid, curved laminated glass as needed. The pod shells also contain prefabricated plumbing, ventilation and electrical/communications networks, which are linked as needed when the pods are installed. Pods are lifted into place and secured to the frame and to adjacent pods, whose combined action supplements or replaces the structural role of the frame. Upon removal, the pods are disassembled for recovery of their service components, and the remaining shell materials are recycled.

Membrane—this wraps the frame and provides the required degree of enclosure as well as lighting and ventilation for the occupiable spaces formed within. It is primarily a lightweight industrial-grade fabric with transparent, translucent and opaque areas, while some areas are of rigid, pod-shell materials where required, such as shaftways for elevators and other core elements.

Cores—these rigid shaftways wind their way through the area enclosed by the frame, housing transportation and other service components. Elevators run at angles to follow the shaftways, stopping at intermittent skylobbies from where escalators and stairways make more local connections. Ventilation, heating/cooling and electrical/communications systems for the areas within the membrane are also contained in these cores, as is the water treatment system. The cores also contribute to the structural action of the frame.

Systems
Lighting is achieved with generous fenestration where appropriate for daytime, controlled with automatically or manually adjusted, variable transparency (electrochromic) glazing. Supplementary and nighttime lighting runs on electrical power generated during the day, as discussed below.

Ventilation is provided primarily with outdoor air drawn through the pods by natural pressure differentials and venturis located in the gaps between pods, assisted minimally by backup fans. Heat obtained from solar gain at the fenestration or recovered through heat exchangers at discharge pre-tempers the air in cold conditions, while in hot



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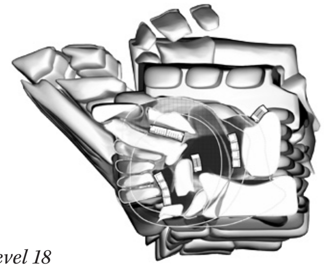

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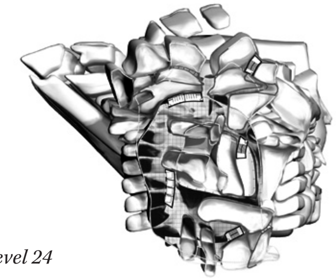

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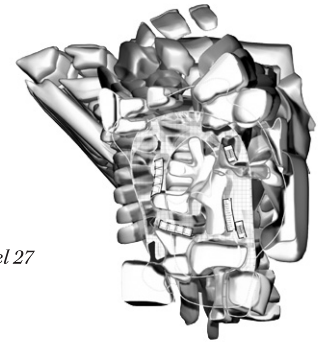

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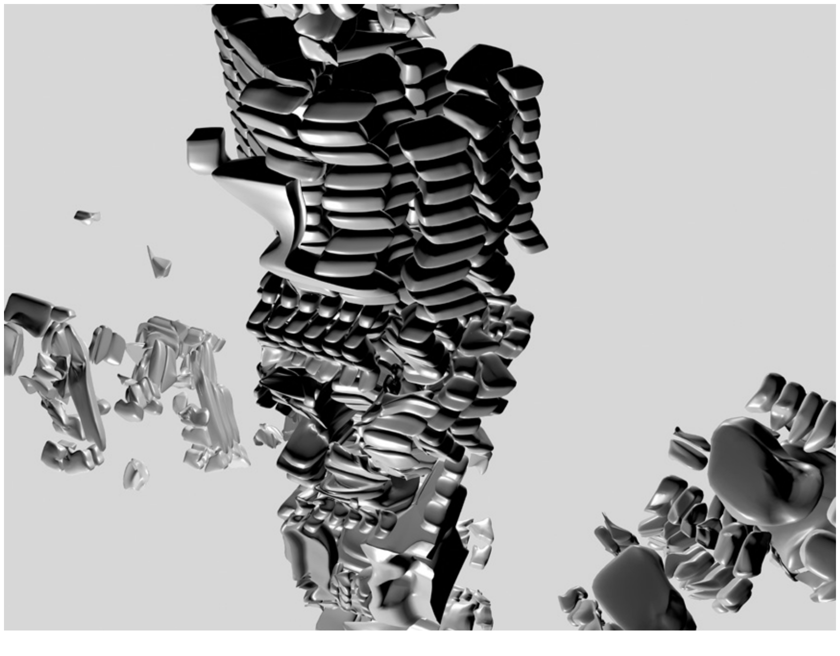
conditions air is drawn from the pods' shaded sides and cooled moderately.

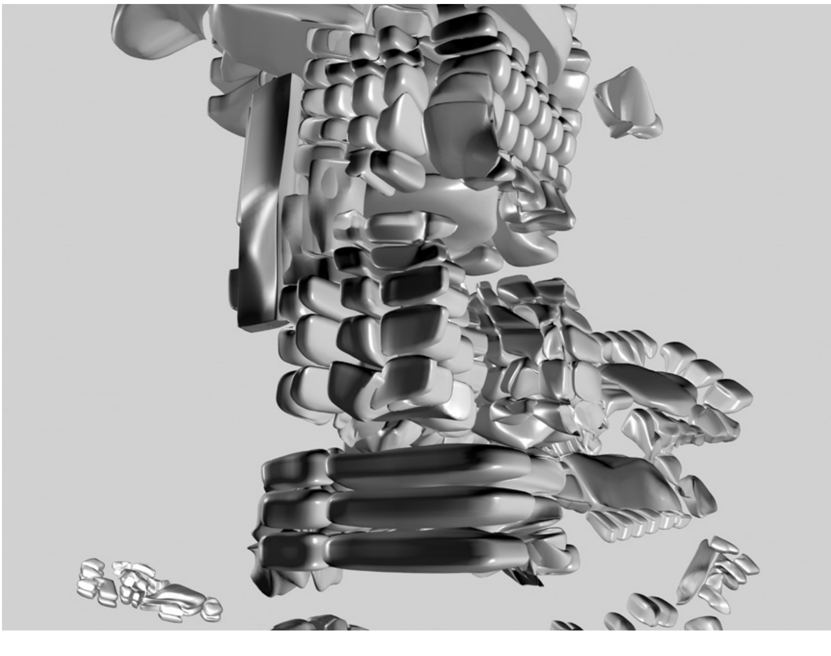
Thermal control supplementary to the ventilation system is provided by radiant panels, which selectively modulate the interior surface temperature of the pod shells. The thermal mass of the water contained within the shell also contributes to stabilizing the temperature.

Water is collected on the shell surfaces of the pods and membrane, where ribs, which stiffen and interlock them also channel rainwater to a processing and distribution system within the shells. This provides much of the potable water supply, with the remainder coming from the core. Grey-water is recycled within the individual pods or clusters, and sewage is discharged to core elements in the frame/membrane areas, where it is chemically and biologically cleaned for reuse or return to the watershed.

Energy for much of the building's electrical power requirements is generated on-site by thin-film photovoltaics which are incorporated into the pods' shells and the membrane and which are capable of harnessing indirect as well as direct sunlight.

Areas of glazing requiring permanent shading also incorporate thin-film photo-voltaics, which are etched to permit the required degree of light passage. twenty-four-hour electrical loads are serviced with clean, on-site generation by natural gas fuel cells. Connection to the grid is made for backup purposes.





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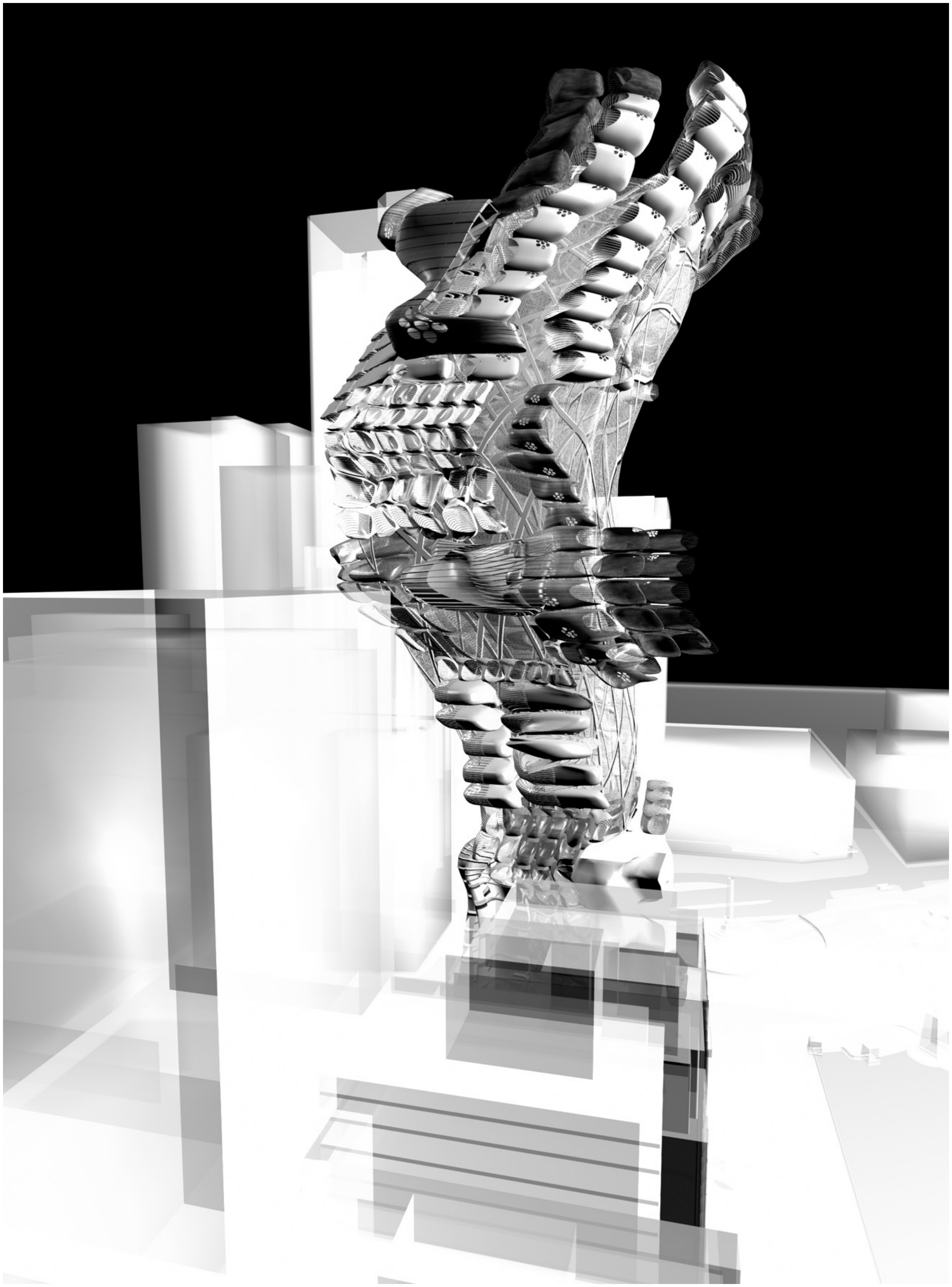

Resi-Rise Skyscraper

Location: Manhattan Columbus Circle, Central Park South Corner, New York, New York. USA

Program: Residential Hotel and offices for short- and long-term occupation with entertainment and retail facilities

Size: 51 Stories

Project Credits

Design Team: Sulan Kolatan and William Mac Donald, Principals; S. Colombo and J. Baker, project coordinators; L. Malibran, Y. do Campo, G. Rojas, C.D. Bruun, A. Burk, B. Schenk, and M. Kosmidou.

Consultants: Andre Chaszar of Buro Happold Engineers