Project Narrative

The mid-rise residential tower with ground floor commercial space ubiquitous in New York City. Urban density and high real estate values often result in buildings that prioritize occupancies, allowable building areas, and layout efficiencies. The Parametric Posse Recharged team focused on using parametric design tools to strategically enhance the performance of this building type with respect to climate response, energy efficiency, carbon mitigation, and occupant well-being while respecting existing industry trends in the NY real-estate market. Throughout the design process, we examined performance enhancement at 3 scales: apartment unit, floor plate, and the whole building.

Climate response strategies focus on current conditions and future projections. NYC falls within Climate Zone 4A (mixed-humid) and is characterized by hot, humid summers (exacerbated by urban heat island effect) and cold, wet, and windy winters. With hotter summer temperatures and increased risk of flooding in the future, our team focused on design enhancements that allow a residential building to remain usable during heat waves, flood events, and black outs. Apartment units were designed for passive survivability (e.g. their ability to float without power) including a super insulated envelope, operable windows for natural ventilation, daylighting, and solar shading. Floor plates feature ample outdoor space for occupants to escape from units without going down to the street level. At the whole building scale, the concrete podium construction reduces potential flood damage to the mass timber construction above. The orientation of the main façade was adjusted to maximize access to prevailing summer winds from the southwest. The 3D façade provides external shading and aesthetic interest. The chosen site offered the best flood protection and access to wind/views of the three sites we analyzed.

Energy efficiency strategies focus on hybrid active/passive systems. Active systems include a high-COP centralized GSHP system to provide hot/chilled water to individual air-handling units in the apartments and restaurant spaces. Despite a higher first cost, this system results in substantial energy savings over time and a shorter ROI. Ventilation meets ASHRAE-62 via a dedicated outdoor air system coupled with energy recovery. Dedicated restaurant exhaust uses energy recovery to preheat domestic hot water. High internal heating loads mean that the heating season is reduced to December-February, which results in wider “shoulder seasons” where passive cooling strategies such as cross/stack ventilation are viable. Facade window heights vary depending on the modeled internal heating loads (e.g. higher heads for units needing more solar gain). At the scale of the building, the GSHP system eliminates the need for a cooling tower on the roof, opening up additional green space and reducing urban heat island effect. The overall EUI was reduced to 8.6 kBtu/sqft, an 80% over a typical building of this type in NYC.

Carbon mitigation strategies focus on operational and embodied carbon impacts separately. Our operational carbon approach was to use high-efficiency active systems when necessary and to take advantage of passive cooling, shading, and daylighting whenever possible. The predicted annual operational carbon emissions are 5.7 kgCO2e/sqft.The primary embodied carbon approach uses a mass timber structure with CLT wall and floor panels for the residential floors, which reduces the amount of concrete and steel in the building. Select claddings are also wood.

Occupant well-being strategies focus on IEQ and outdoor access. New Yorkers are spending more time than ever in their units. To provide for occupant physical and mental health, lofted apartments provide unobstructed views of the city/ surroundings, increased interior spaciousness, and ample daylighting. Comfort in accordance with ASHRAE-55 (with the air speed extension) is provided via occupant control of heating/cooling, operable windows, and low-energy ceiling fans. The dedicated ventilation system and operable windows ensure optimal air quality. Outdoor space is a coveted amenity in NYC apartments. The recent pandemic means that dwellers now have fewer places to go outside their apartments or buildings. The design employs sky gardens every other floor to provide flexible outdoor space and the access being restricted to apartments only on that floor. The sky gardens also function as elevated breezeways allowing air to circulate freely and facilitating passive cooling in the units. Street-level and rooftop outdoor dining provide healthy seating options for restaurant patrons.

The sky gardens are the most significant changes to a typical NYC residential tower building form. We call our final scheme the “Swiss Cheese Model.” Although one might argue that the outdoor sky garden spaces increase the surface area of the building envelope and sacrifice floor area that could be used for more apartment units, our configuration reduces the horizontal circulation and necessary elevator stops by half due to the skip-stop corridor arrangement while providing unsurpassed access to outdoor space and natural ventilation. Occupant units and outdoor amenities are clustered for greater safety, all units have corner façade conditions for views/light, and typical amenities shared by all building occupants are reduced. This approach could be a new model for high-performance residential development in a post Covid-19 New York.