1633 BROADWAY / GREEN TOWNHOUSE TOWER

CREATING A NEW YORK GREEN LIVING PARADIGM

Metals in Construction Magazine 2023 Design Challenge

1633 Broadway – Creating a New York Green Living Paradigm

In the wake of the pandemic and the endurance of hybrid work, the long-term economic viability of a significant percentage of Manhattan office buildings is being called into question. The resulting impact on Manhattan business districts, combined with an urgent need for housing and the critical mandate to reduce energy consumption, will likely result in regulatory changes to the zoning and building codes that will make more office-to-residential conversions viable.

This proposal grafts new living and working experiences into the existing Paramount Tower at 1633 Broadway with a mindful intervention that includes circular manipulation and re-use of the existing materials of this carbon-laden building. This approach endows the future building with a sense of identity, place and sustainability while merging two traditional modes of New York housing: **the tower and the townhouse**.

Rather than proposing office or storage uses beyond the depth and daylight of marketable residential units, we are proposing that the existing 48-story structure undergoes decisive, 60- foot-wide removals through the entire building stack. This "carving" allows for the creation of two interconnected residential bars with the potential for a wide mix of unit types, including the ability to connect units vertically into townhouse configurations. Anchored by a modified core, the resulting exposed façades permit an array of solar exposure, greening, spatial and ventilation opportunities around the inner area of the building - an organic and vegetative, chrysalis-like *"healing machine"*.

Sustainable Design Strategies – New Living and Co-Working Realms

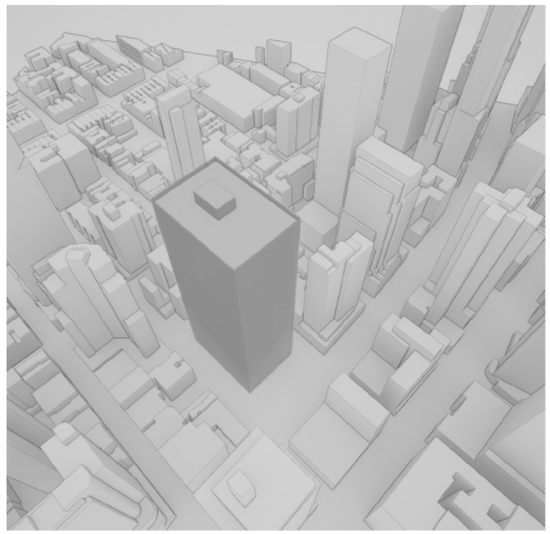
By recycling and re-using the steel removed from the site, the new residential building features, on its outer shell, a modular, faceted exterior frame system attached to the existing structure. In addition to providing lateral wind bracing for the narrower floor plates, this "exo-frame", that spans each 25-foot bay and creates recesses 4 stories in height, recalls the proportions of a traditional New York townhouse façade. The recesses staggered across this frame create shading and allow for vertical green loggias, adding a biophilic and cooling vegetative layer to the building on the South, East and West facades. Discrete deployment of cable-supported, transparent photovoltaic fins, provide an additional layer of architectural interest and solar capacity.

Together with a photovoltaic trellis above the landscaped rooftop, the green systems reduce the heat island effect, and lower overall building cooling requirements. Building occupants will be provided with connections to the outdoors via private green loggias and communal sky gardens as new realms of social interaction and inclusive living. Storm water collected from the roofs and elevated terraces will be stored on-site and used for irrigation of the vegetation.

Though primarily a residential building, the tower will preserve a fraction of its original function by attaching co-working pods to its vertical core, thus responding to the current social and urban tendencies that have been reshaping our cities in the post-pandemic era. As a green, hybrid live-work concept, the future residential tower at 1633 Broadway could serve as a model for a green urban renaissance, where buildings and cities will collectively manifest a sustainable **consciousness** of their own.

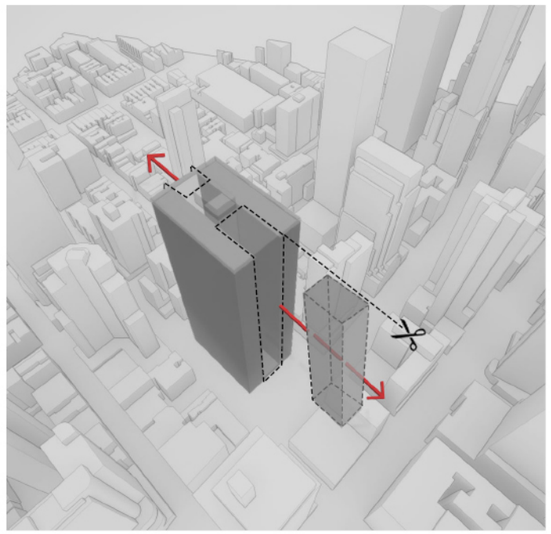
INTERVENTION DESIGN STRATEGIES

CARVE OUT EXISTING MASS, RECYCLE , AND GRAFT IN BIOPHILIA



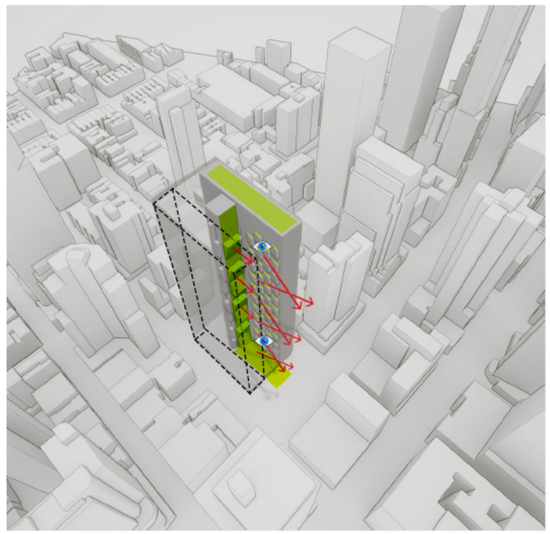
Existing Massing

Deep office floor plates



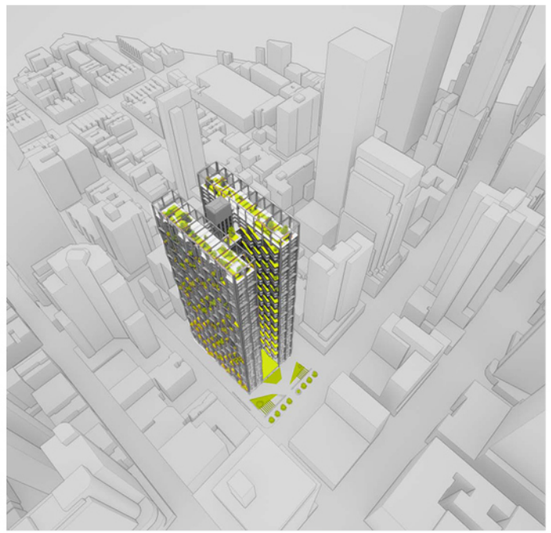
Programmatic Carving

A 60-foot-wide volume of the building is removed from the mass for recycling. This will create residential units of usable depth and bring daylight deep into the structure.



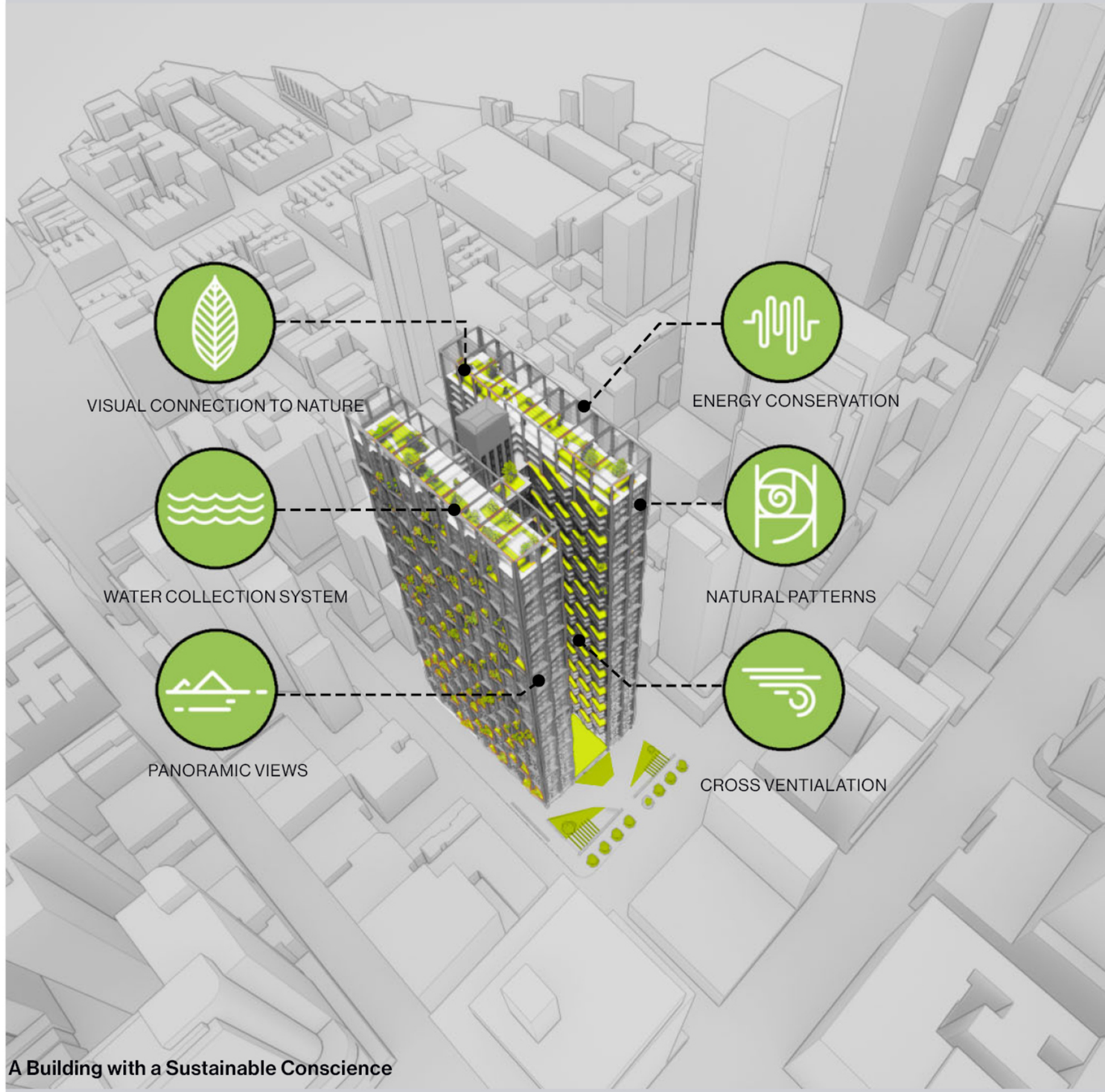
Green Graftings

After establishing marketable apartment layouts, the remaining core and mass receive insertions of complementary program elements (amenities, co-working) and sky garden pods, exterior terracing and a rooftop garden.



Exo-Frame

The building is further wrapped in an exo-frame made of steel removed from the building which provides lateral bracing to the narrower floor plates, shading to the units and a distinctive façade that symbolizes the renewal of the building.



A Building with a Sustainable Conscience

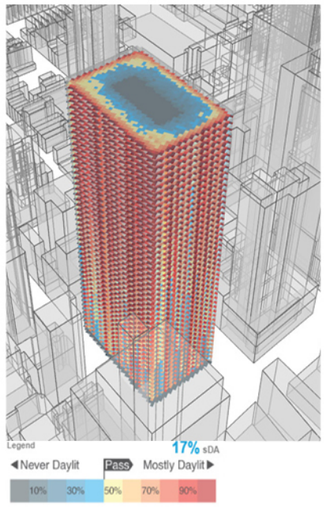
BUILDING MASSING

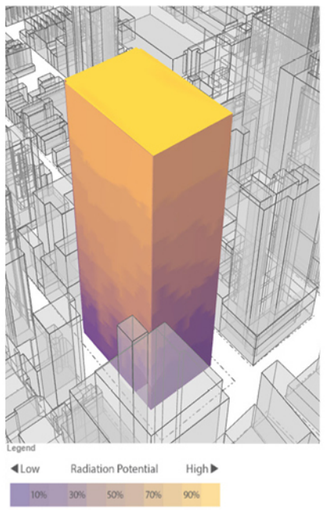
SOLAR CARVING AND GREEN EXTERIOR FRAME

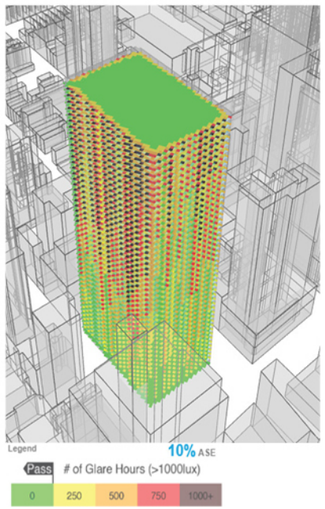
BUILDING ENERGY ANALYSIS AND SOLAR STUDIES

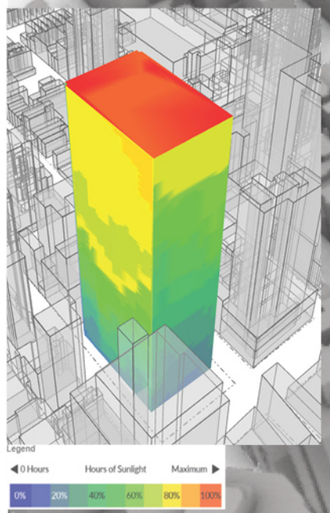
PROJECTED ENERGY AND DAYLIGHT IMPROVEMENTS

Existing Condition

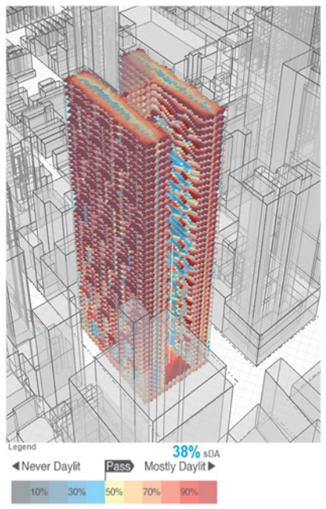


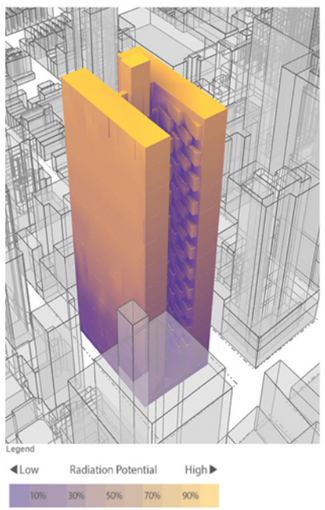


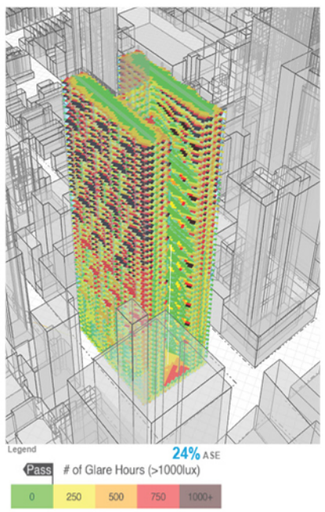


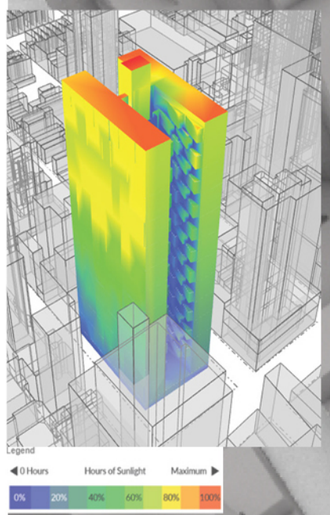


After Conversion







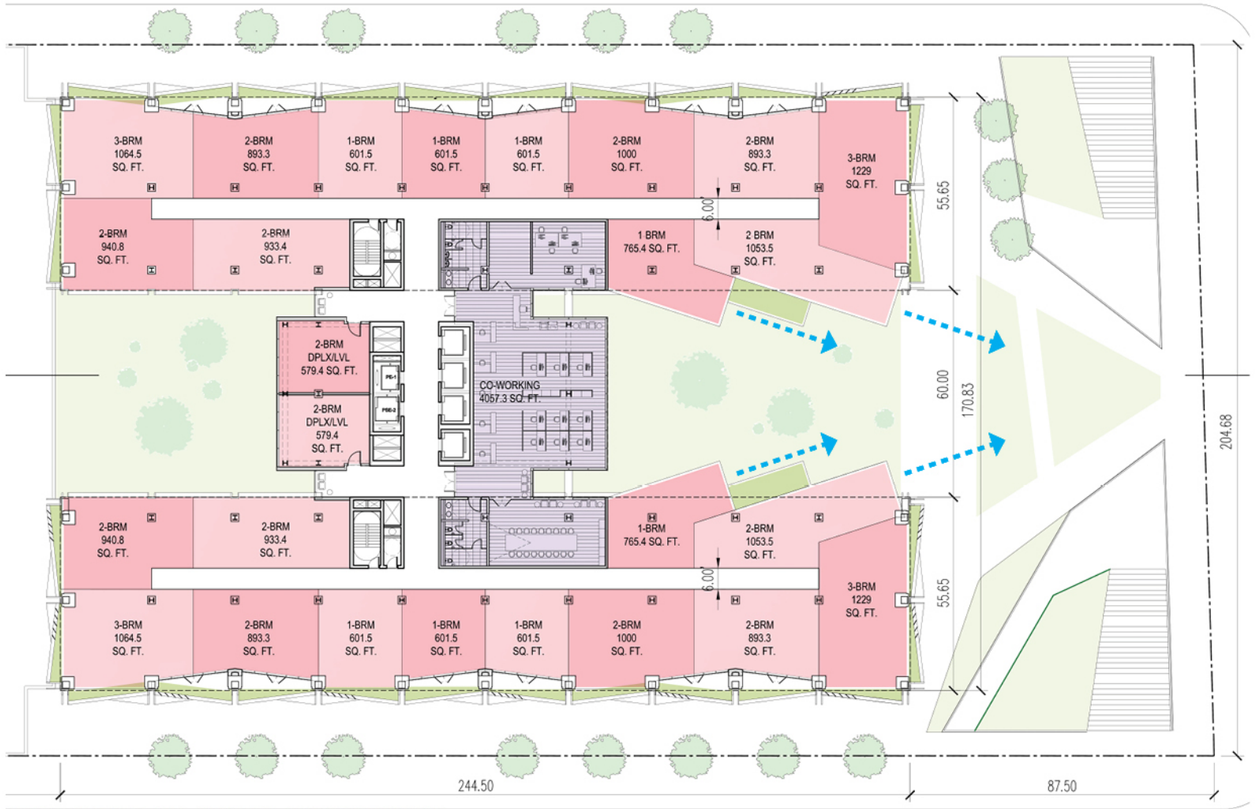


The results of the study indicate that the existing building is not receiving enough daylight (Existing sDA: 17% / New Design sDA: 38%), which can lead to a range of issues such as increased energy consumption for heating and decreased productivity of occupants. Therefore, it is crucial to find ways to improve the building's access to natural light while also ensuring that the design is suitable for residential purposes.

To achieve this goal, the new design allows the building to **maximize the exposure to daylight** while maintaining its radiation potential on the roof and south facade. The proposed notch design allows for deeper penetration of natural light into the building's floor plate. This approach will increase the amount of natural light entering the building, promote natural ventilation and will enhance the overall quality of life of its occupants.

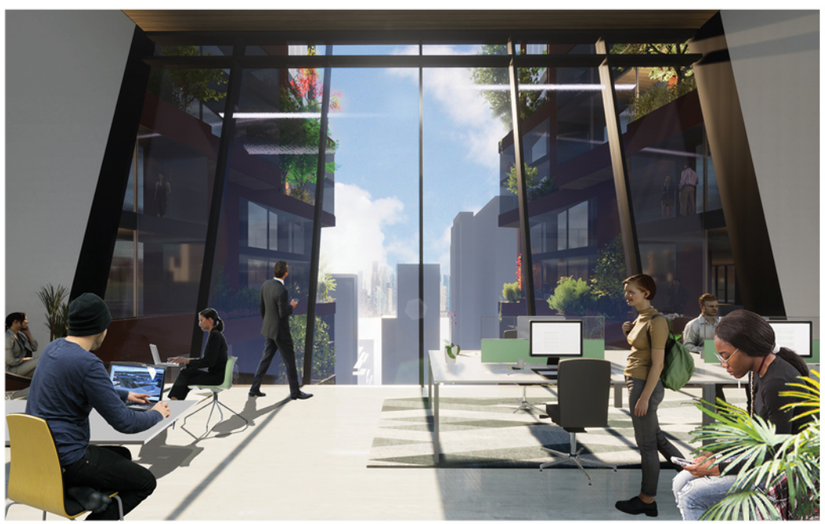
FLOOR PLANS

RECONFIGURE THE BUILDING FOR A LIVE-WORK PROGRAM



RESIDENTIAL LEVEL WITH CO-WORKING SPACE

RESIDENTIAL LEVEL WITH COMMUNAL SKY GARDEN



CO-WORKING POD

COMMUNAL SKY GARDEN

RESIDENTIAL INTERIOR

BUILDING SECTIONS

PROGRAM DIAGRAM

BUILDING SECTION

ALL ELECTRIC MEP SYSTEMS / SUSTAINABILITY

Individual HVAC operation and control by occupancy zone

For occupant comfort, apartment buildings demand sufficient occupant control and system flexibility with individual zone control and user interface simplicity being paramount. To achieve this, apartments will be divided into a series of temperature control and ventilation zones. The varying orientation of exposure of rooms along each façade and the varied use of each room will require mechanical systems to respond differently to each situation. Living spaces will have individual zone control and bedrooms will be grouped into zones appropriately. The cooling and heating system will be zoned using separate units as space allows. Zone heating and cooling set points and control of heating and cooling equipment will be via either a single wall or unit-mounted control or via communication with a central controller.

The residence-level ventilation system will provide an additional level of controllability to the resident. The ventilation level can be adjusted from code-minimum to a greater level according to preference. Since the ventilation system is at the residence level, the energy cost for providing ventilation will be recorded on the electrical meter of the unit.

HVAC Systems

Heating and cooling plant and infrastructure

The main mechanical system will be a water-cooled and electric boiler-injected heat pump system which will be comprised of:

- An open loop condenser water system from the roof mounted cooling tower to a set of plate and frame heat exchangers located on the mechanical floor below the roof.
- A secondary closed loop condenser water system from the plate and frame heat exchangers to the heat pumps serving the residential floors
- A tertiary closed-loop condenser water system from the plate and frame heat exchangers to the heat pumps serving the lower floors.
- An electric boiler plant along with associated pumps & heat exchangers.
- Water-source heat pumps, both water-to-air and water-to-water.
- Central air-source heat pumps

To minimize the size of the cooling tower and reduce the size of the electric boiler, and thus electric resistive heating, the mechanical floors will use air-source heat pumps to provide conditioned outside air to the amenities floors and pressurization air to corridors of the residential floors. Air-source heat pumps use the outside air as the source for heating and cooling and are ducted to louvers for both condenser air and ventilation air.

Residential Systems

The residential systems will comprise of local water to air vertically stacked heat pumps and apartment ventilation. As an energy saving alternative, local fixed-plate total energy recovery ventilators could be provided at each apartment unit. This approach maximizes ceiling heights. minimizes stack effect and provides filtered outside air. The key features of the system comprise of:

- Vertically mounted heat pumps at the façade with local condenser water risers for multiple heat pumps.
- Living spaces zoned per facade, master bedrooms in 2+ bedroom apartments with individual control.
- Toilet and kitchen exhaust provided per unit from base building fan system.

Front of House Common Areas

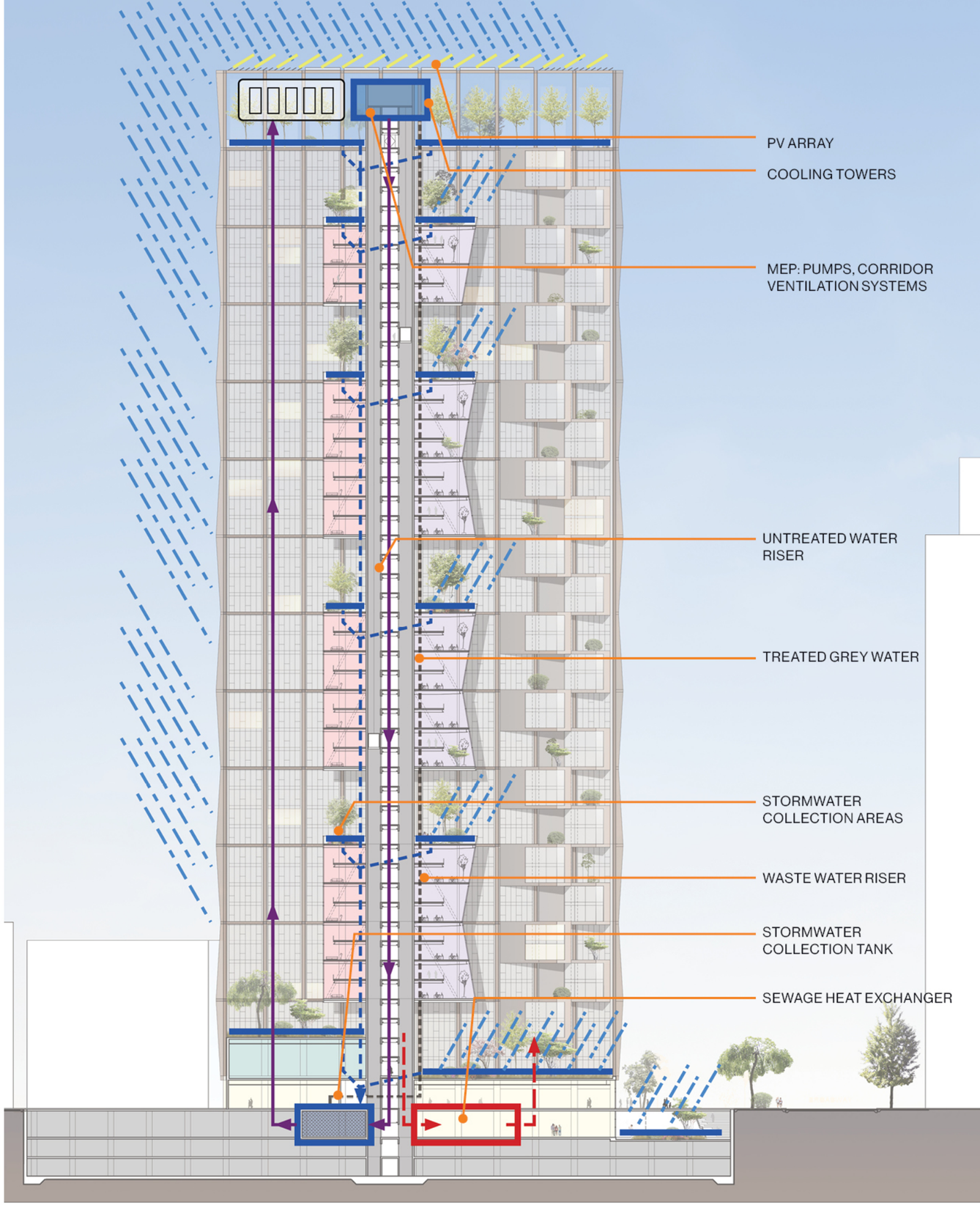
The front-of-house areas systems will utilize local hot water and chilled water fan coils, with fan coils fed from a water-to-water heat pump located within mechanical levels. Heat will be injected to the condenser loop from the electric boiler serving as the heat source. Cooling heat rejection cascades up to the cooling tower. Ventilation will be from air-source heat pumps serving as dedicated outside air energy recovery units.

Back of House Areas

Elevator machine rooms, electrical rooms, and IT rooms will use room-adjacent water source heat pumps with power backup from an emergency generator. Mechanical and plumbing rooms which require heating only shall use local electric resistance heaters.

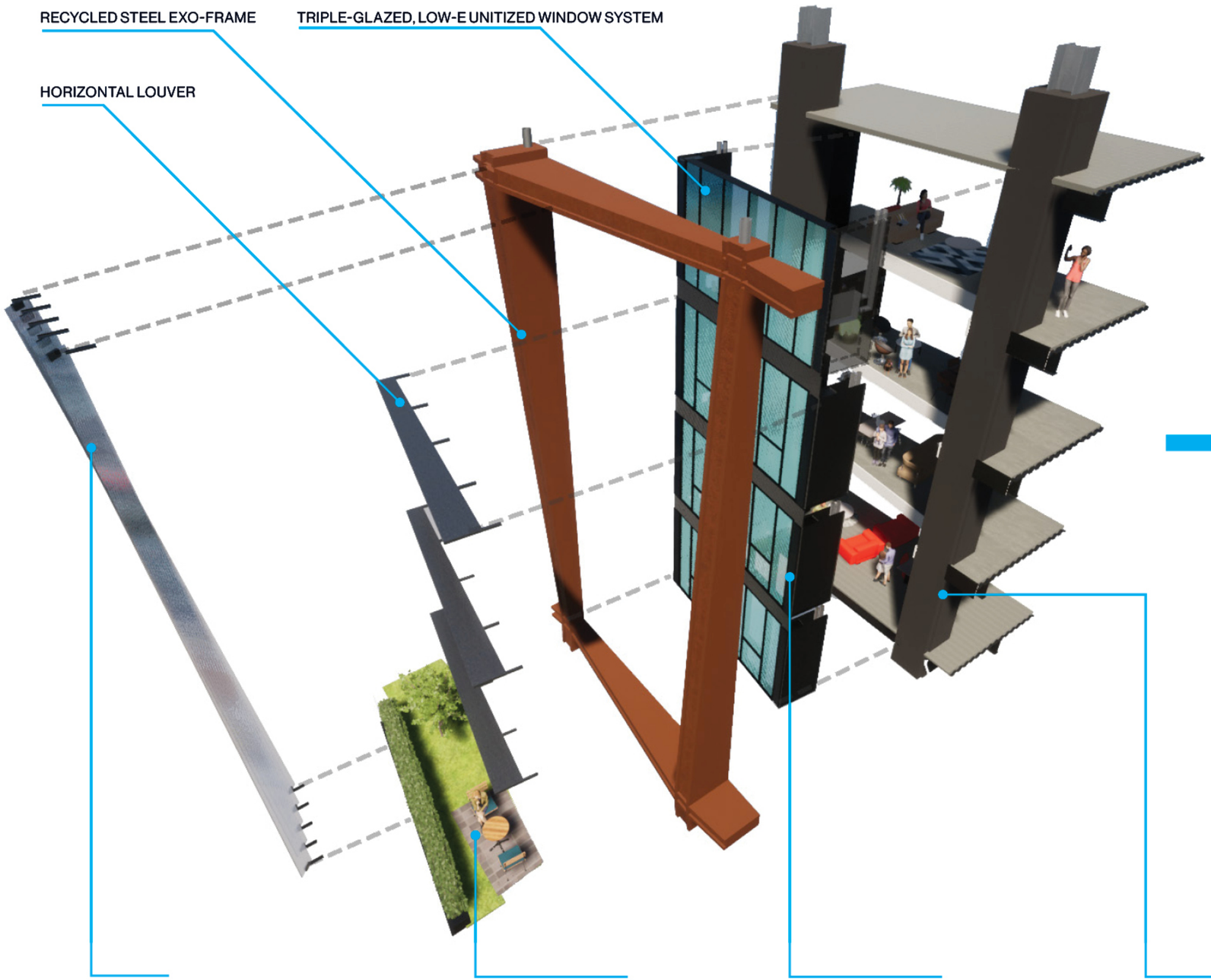
Domestic Hot Water System

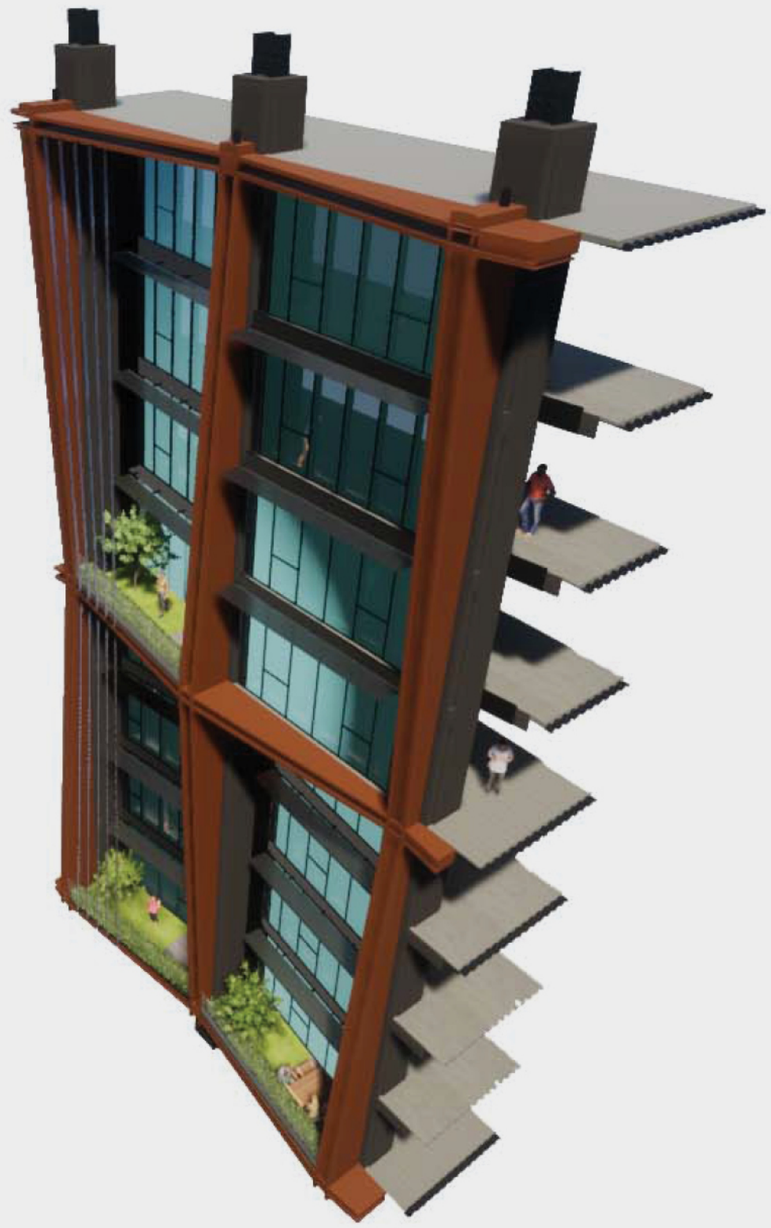
A dedicated domestic hot water systems will utilize a series of domestic hot water, air source heat pumps with storage located in mechanical areas. The domestic hot water system will be designed to provide a code-compliant domestic hot water return piping system, with recirculation pumps for each hot water zone to recirculate the domestic hot water through the building and provide hot water to each fixture.



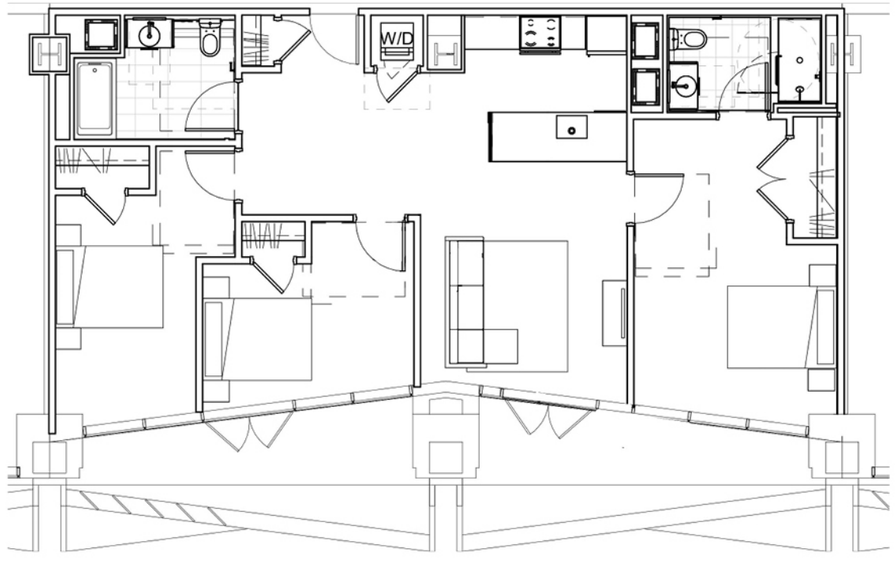
SUPERFRAME AS ADAPTIVE SHADING DEVICE

EXPLODED AXONOMETRIC





PERSPECTIVE VIEWS



TYPICAL APARTMENT LAYOUT