

LIVING | IN THE | WALL

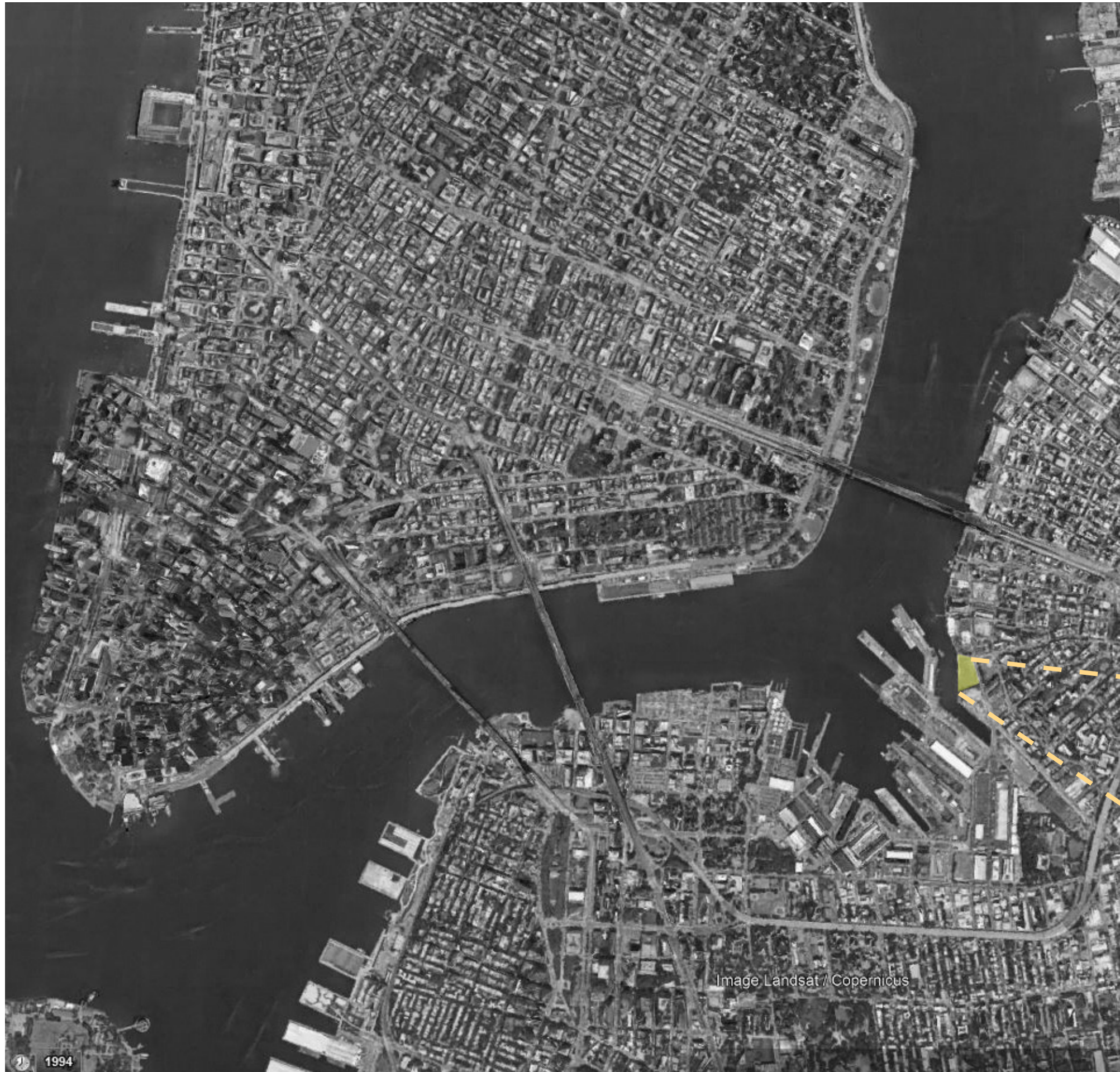
DESIGN STATEMENT

Living in the Wall explores what happens when the curtain wall seeks to become more than a "line on a page", but instead a multi-dimensional blur between people and the environment, technology and humanity, the inside and the outside. Through the tenets of Air, Water and Well, the design rethinks the concept of skin and expands the definition beyond that of the vertical plane, into an overarching idea for what is wall, roof, core, landscape and building performance. By this means, the curtain wall, or skin, becomes the foundation for every element of the building.

The 30-story, module-based, unitized tower embodies WELL building design with the intent to improve the health, productivity and connection to the community of its inhabitants. By focusing on Air, Water, and Well, as well as the deep connection to the environment, the impact is positive and restorative, to the occupant, the community, the place (Brooklyn) and the greater city of NYC.

The site, in the Navy Pier-technology hub, framed at an urban scale by the Williamsburg and Manhattan Bridges on the East River, brings a rich context to the building that stitches the land with the river. To create a symbiotic relationship between the site, community and building, the tower lifts five stories off the ground, maintaining air flow and preserving views from and to Brooklyn, up and across the East River to Manhattan.



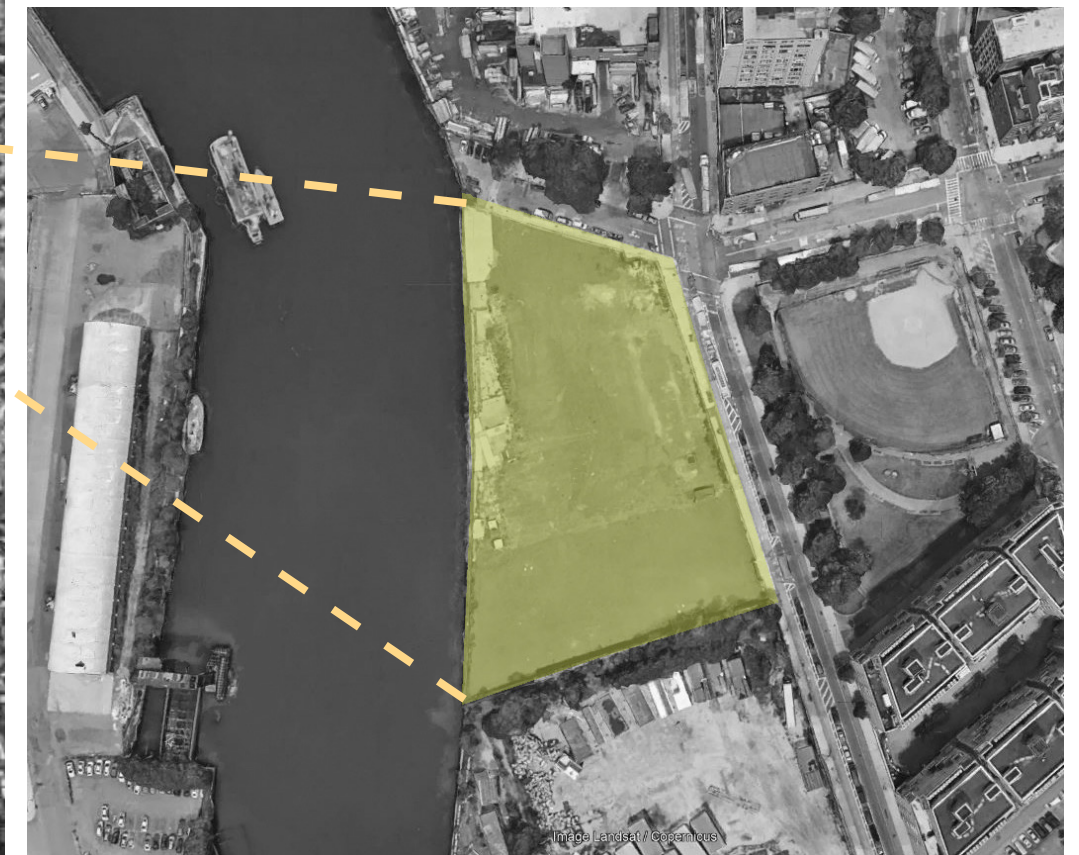


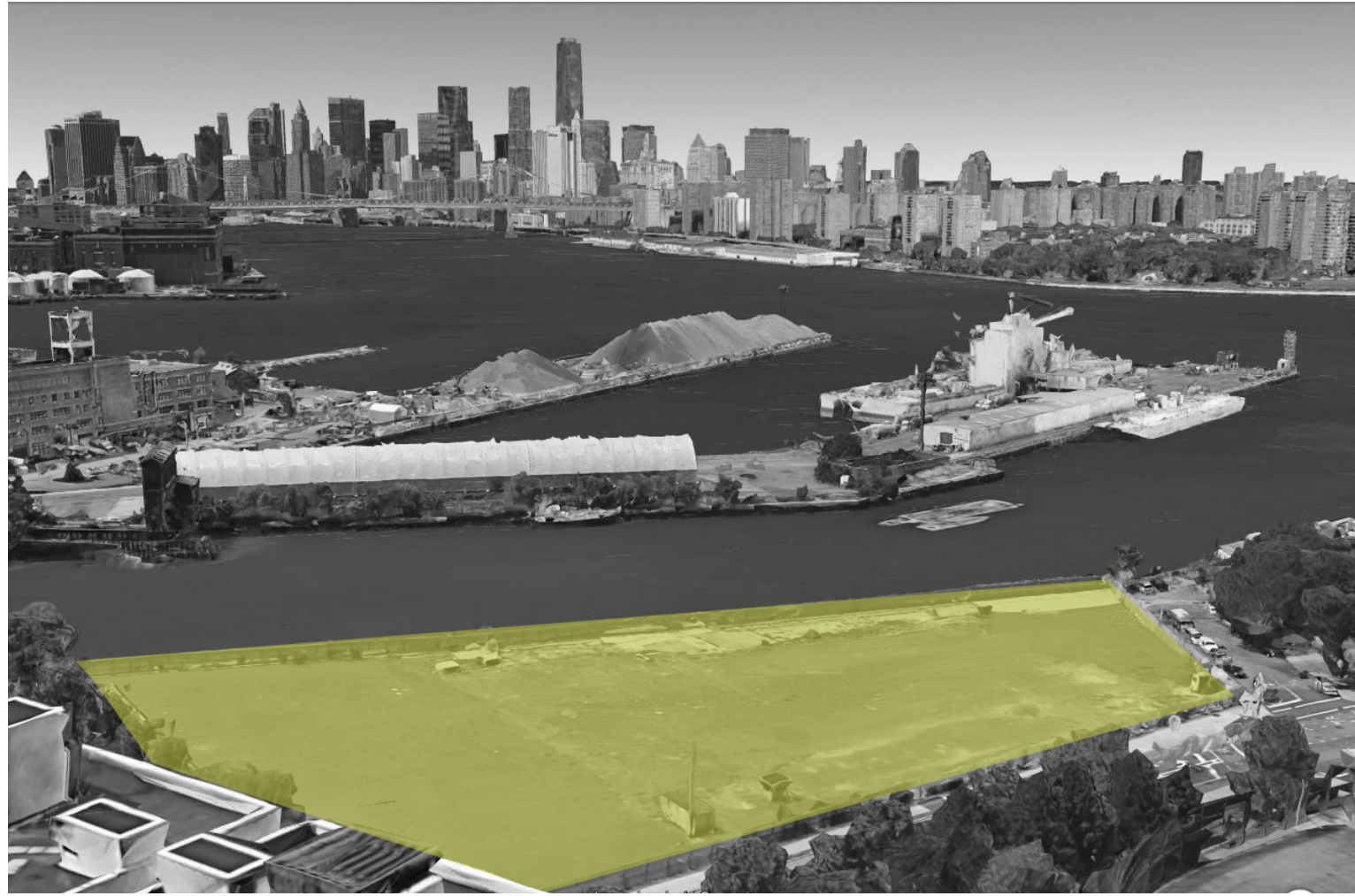
The Metals in Construction Magazine 2018 Design Challenge

competition to generate ideas for a facade system that can play a major role in enhancing employee health and well-being.

Design challenge: Conceptualize a state-of-the-art curtain wall system for a hypothetical 30-story office tower to be located on a 2.65-acre (115,244-square-foot) waterfront site, with 230,500 buildable square feet, at 500 Kent Avenue in the heart of Brooklyn's developing tech hub.

About the site (source: Cushman & Wakefield): 500 Kent Avenue is situated in South Williamsburg immediately adjoining the emerging Brooklyn Navy Yard and Brooklyn Tech Triangle office markets. Close proximity to the East River Ferry and the J M Z trains connecting Manhattan, Brooklyn and Queens as well anticipated arrival of the Brooklyn Queens Connector (BQX) streetcar further contribute to the attractiveness of this unique offering in rapidly evolving North Brooklyn neighborhood. Benefit from waterfront exposure with panoramic Manhattan views and a roughly 648 feet of frontage along Kent and Division Avenues.







SUN
SHADING CONTROL
SOLAR POWER

RAIN
RAINWATER HARVESTING

POLLUTANTS
AIR FILTRATION +
PURIFICATION

WIND
NATURAL VENTILLATION
WIND TURBINES

SITE
BROWNFIELD RESTORATION
STORM SURGE MITIGATION

WATER
WALLABOUT CHANNEL
CONSERVATION



The tower is designed as a 30-story unitized system module, with the structure embedded, and assembled as a series of cassettes. The skin is comprised of two sophisticated layers, continuously working in concert: the ever-changing outside smart layer, responding to the environment constantly and the inside, able to be fine-tuned by the inhabitant for ultimate comfort. This design gives the high tech building a "human" override, enabling people to be the internal sensors working along with the exterior mechanical sensors.

The building ascends in volumetric zones of three that are stacked, creating outdoor "in between" spaces where they overlap. These gardens, living between the curtain wall layers, create a connection between inside and out, are ever changing with the seasons, and contribute to the living,

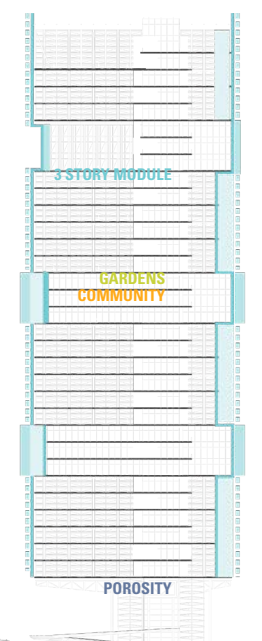
breathing dynamic nature of the building skin. The result is a blurring of boundaries where one is, in effect, "living and working in the wall".

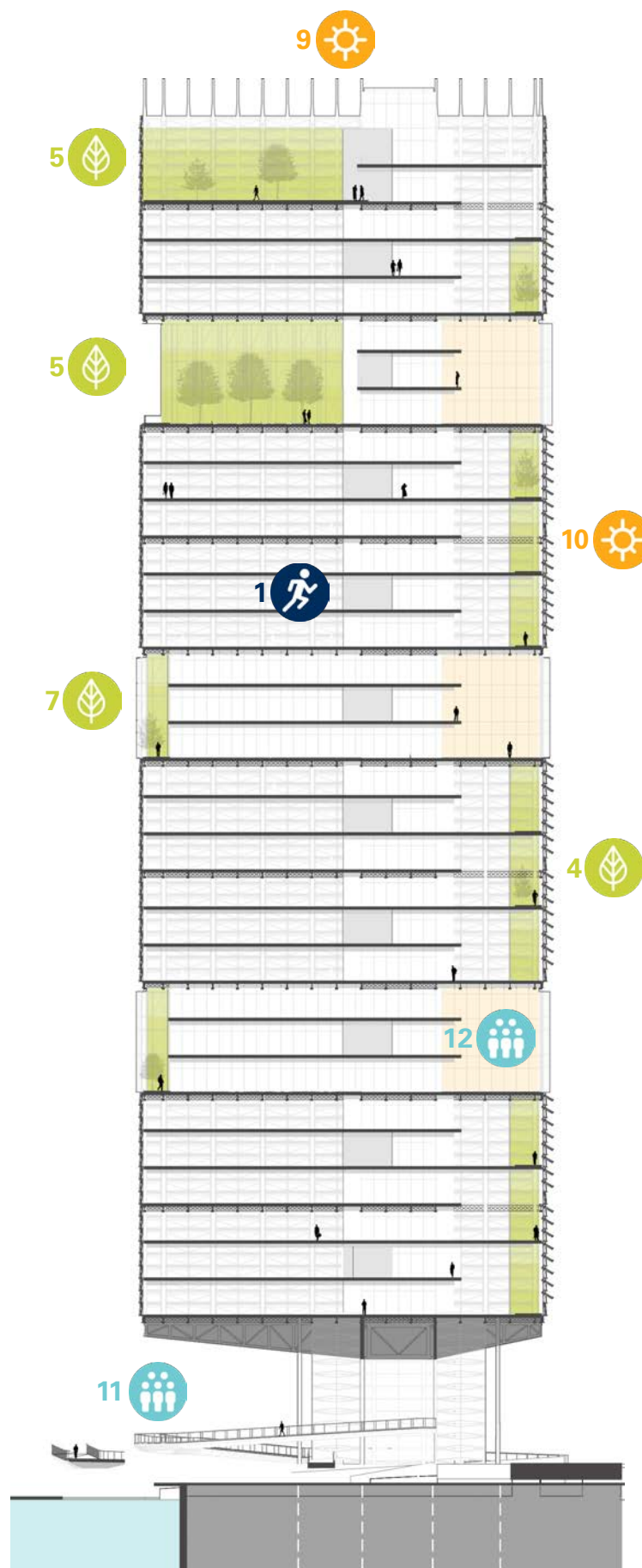
Each facade responds to that which it faces; towards Manhattan, the modules are stacked to provide a six story volume of space that appropriately reads as a tower. On the Brooklyn side, only three story volumes are visible, relating to the neighborhood scale, and presenting more as a series of shipping containers being lifted by the gantry, a nod to the nearby historic Navy yard.

In an effort to embrace the attributes of Well, the building lifts from the site to bridge the biophilic elements of nature that are inherent to a landscape and, by design, also find themselves living within the building.

DYNAMIC FACADE
ADAPTS TO MEET INTERNAL
NEEDS WHILE MITIGATING
EXTERNAL CONDITIONS

**CONTEXTUAL
EMPATHY**
LIFTED BUILDING
PRESERVES VIEWS FROM
WILLIAMSBURG





Active Design



Biophilia



Circadian Rhythm



Community

The three driving tenets of the building are Air, Water and WELL. The importance of recognizing the connection between human neurobiology and the built environment is critical to creating spaces that improve the physical and mental health of the people who come into contact with them, allowing them to function at the healthiest and highest levels possible.

We based our response on what we call the ABC's of Well:

Active Design – A space that focuses on helping occupants be more active influences the growth of new neurons in the memory and cognition structures in the brain.

1. Bathroom Core every Third Level

By locating the bathroom cores every third floor, occupants will use the stairs and gain the benefit of traveling from one floor to the other.

2. Create Exterior Rooms and Active Site Features

By creating programmable exterior spaces that act as an extension of the building – the promenade stairs, and the pedestrian ramp that swoops out over the channel – people are drawn to the experience and engaged to be more active.

3. Active Stairs

By orienting the stairs to views, one featuring views toward Manhattan, and one that featuring views back to Brooklyn, it allows Users to immerse themselves in the neighborhood and local context.

Biophilia – the use of natural materials and patterns to calm bodies and minds.

4. Operable Walls

By using these operable walls where the locus of control rests with the User, they're able to let the outdoors in.

5. Indoor/Winter/Roof Garden Rooms

By placing these spaces throughout the building on every third floor the Users are exposed to nature and organic materials, part of Attention Restoration Theory.

6. Nature Analogues

By creating a softer, web-supported building skin at the stair evoking natural forms and textures.

7. Views to the Outside

From every space in the building.

Circadian Rhythm – access to daylight helps the body and brain perform optimally, warding off sleep disruption and many chronic diseases such as obesity, type 2 diabetes, high blood pressure, heart disease and certain cancers.

8. Views to the Outside

By ensuring exterior views from every interior space, each User connects to daylight facilitating human homeostasis.

9. Thin Building Shape

Allowing light to bounce deeply into all spaces, and the core has been deliberately pulled apart along the East/West axis to allow unobstructed views to Manhattan, and conversely into Brooklyn.

10. Double Skin / The Building Skin

Shingled glazing panels with water catchment and building-integrated photovoltaics allow for light refraction, and for occupants to control the shading, leaving the locus of control with the User.

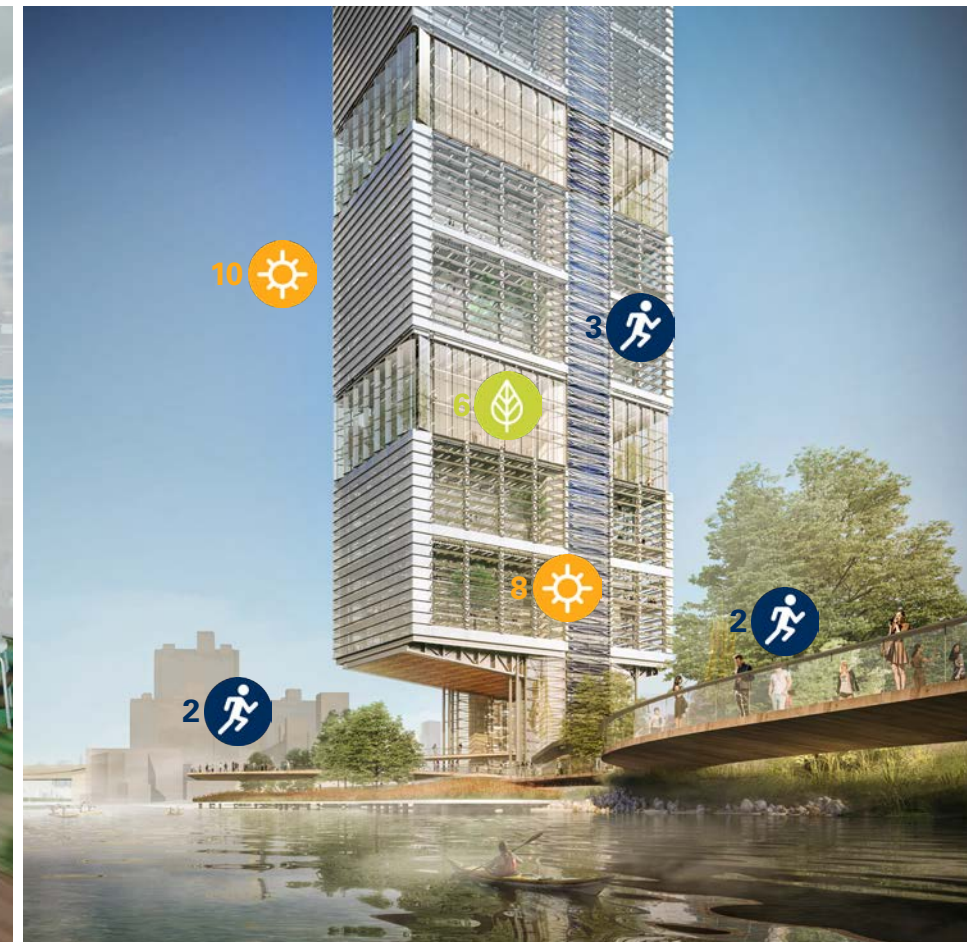
Community – When people are able to come together and form rich social networks, not only are they happier and more fulfilled, but they are actually physically and mentally healthier.

11. Exterior Community Spaces

From the lawn and the esplanade, to the Spanish steps and outdoor café at Kent & Division Ave., creating spaces for people to connect and engage.

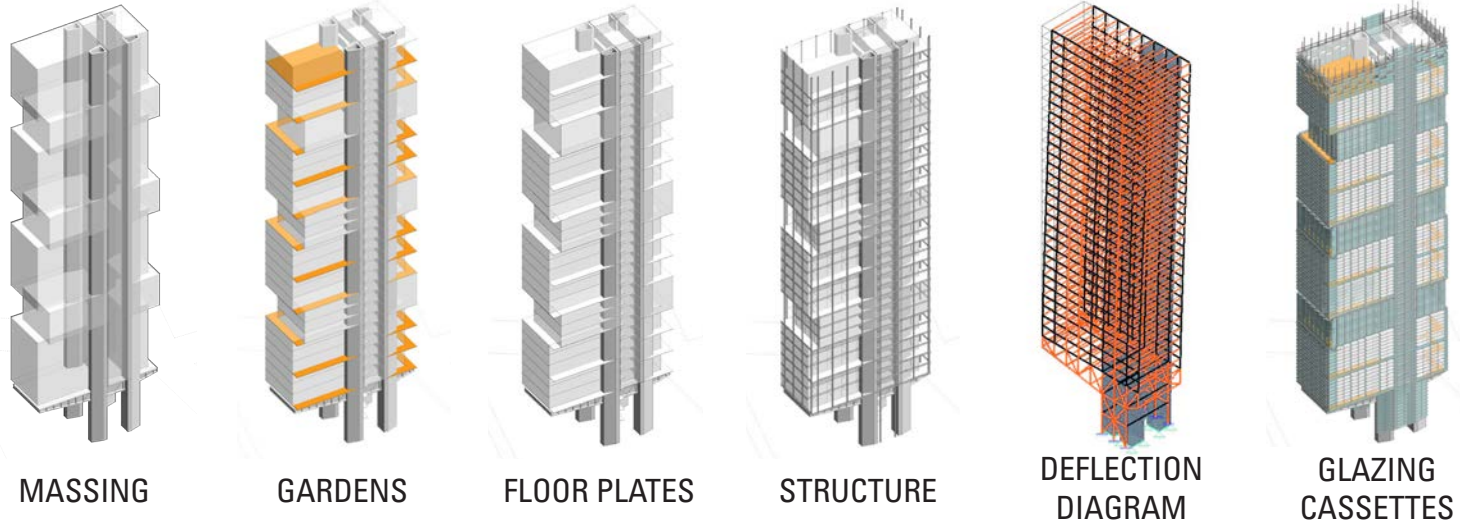
12. Interior Community Spaces

The garden rooms/winter gardens, looking out to either Brooklyn (neighborhood), or to Manhattan (larger context) help to connect people to their community and their larger communal identity.



LIVING IN THE WALL

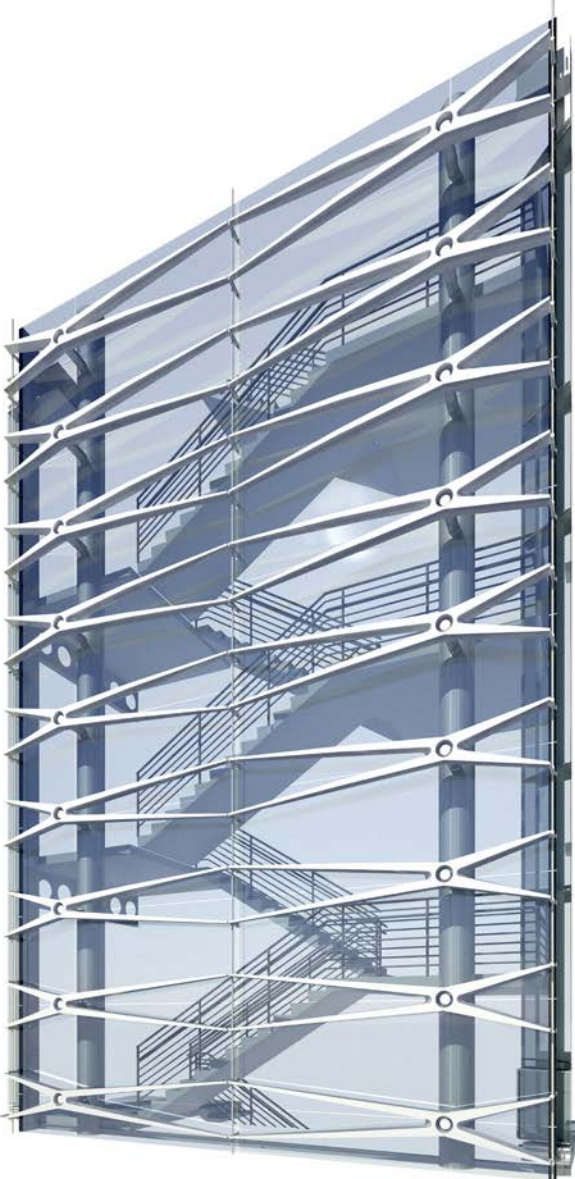
TECTONICS / CURTAINWALL



The Living in the Wall concept is brought to life by innovative solutions that unite both building envelope and site as a "skin" that embodies the core principles of engagement, adaptation and resiliency.

- **Engagement:** Provides a "skin" framework as a system of parts that encourages interaction between the environment and the users. Positioning this framework to optimize and maintain resource potential (as energy and talent/skill) by capturing and manipulating external forces of water, wind and light and internal forces of user comfort, workplace activities and business infrastructures.

- **Adaptation:** Allows the "skin" framework to adapt to daily and seasonal external and internal forces, where large-scale and small-scale dynamics emerge, dissipate and reemerge as continuous flows of natural and human energy. This skin can be adjusted to focus, direct and/or block forces for optimal energy use and wellbeing balance.
- **Resiliency:** With energy flows being both predictable and unpredictable, the "skin" framework is setup to harness positive disruptors and mitigate negative disruptors. These disruptors come in the forms of user behavior, market performance and environmental disasters. Built-in buffers and redundancies within the building façade/site system allows it to be robust and flexible simultaneously.



INTEGRATED POINT SUPPORTED SYSTEM



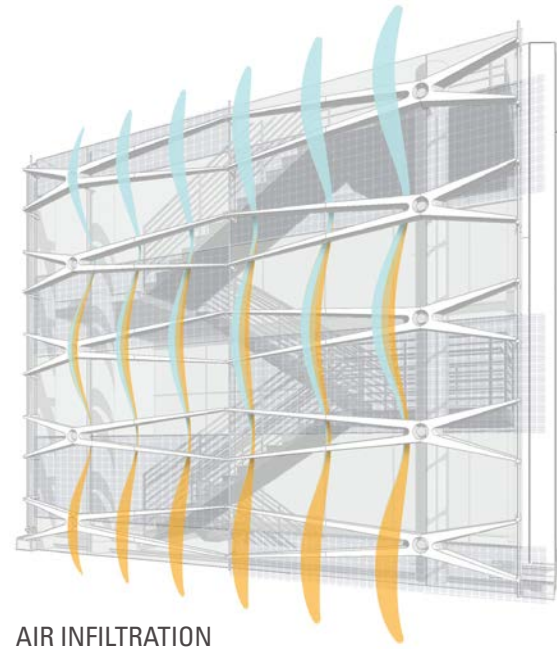
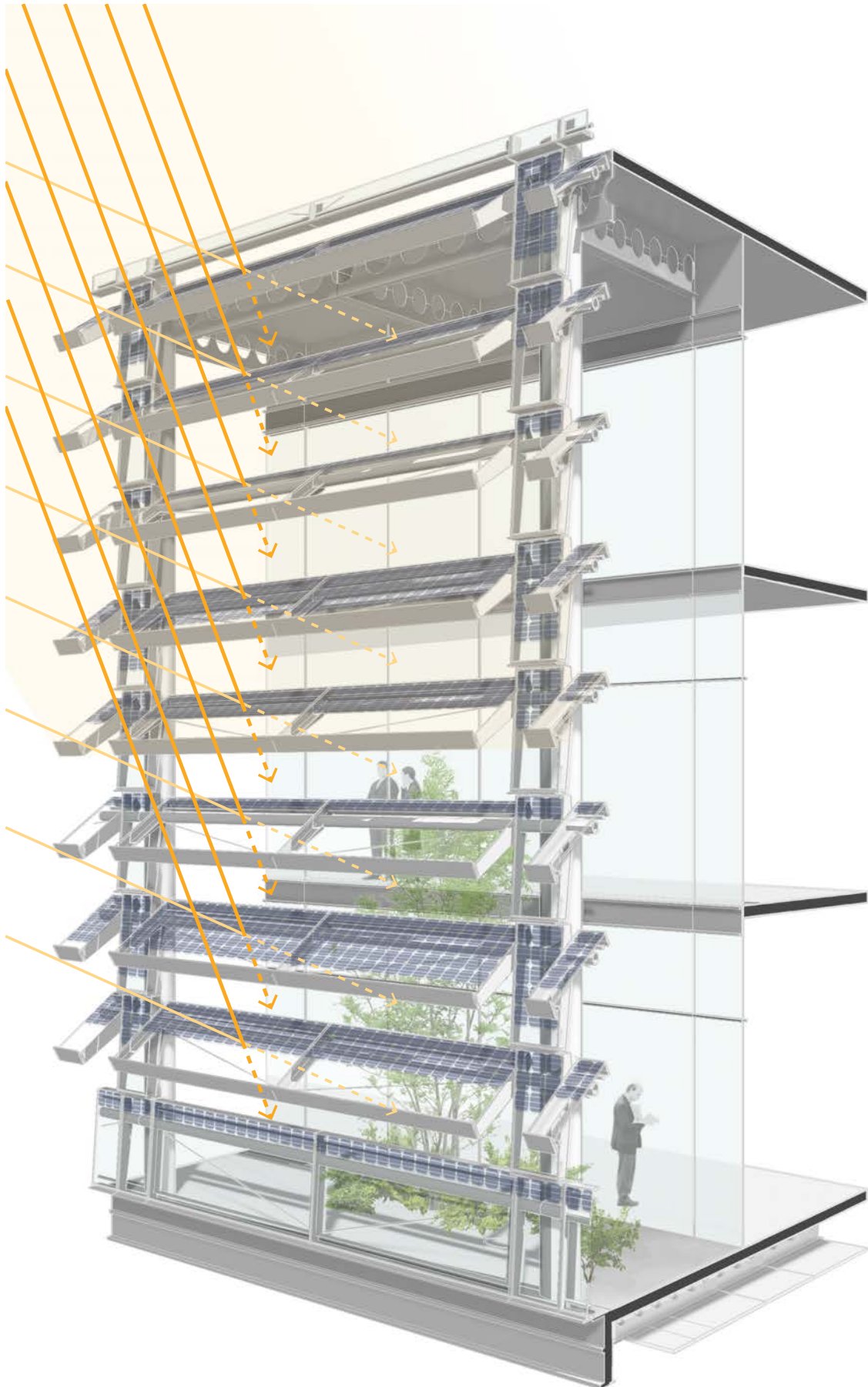
SERRATED RAIN-HARVESTING CURTAINWALL



OPERABLE GLAZING CASSETTES



DYNAMIC PIVOTING WALL ASSEMBLY



AIR INFILTRATION



PV PANELS AT STAIR TOWERS

Shading

- Kinetic curtainwall fins allow adjustment to maximize shading and minimize glare
- Double façade creates depth to provide a buffer zone to mitigate solar heat gain between the inner and outer skin

Energy generation

- PV panels integrated within the fins create a regenerative energy source for the building
- PV panels within the kinetic façade utilize the fins to adjust based on the optimal summer and winter angles of the sun

Daylighting/Views

- Narrow footprint
 - » 60' wide footprint to allow natural daylight spaces throughout
 - » Tall ceilings to allow light to penetrate entire space
- 70' open views of Manhattan
 - » Column free design to give user views out from entire space

Glare control

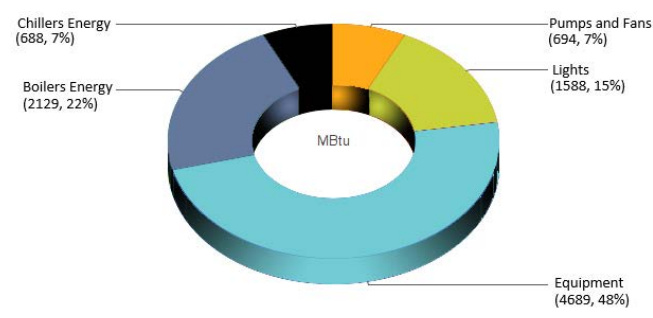
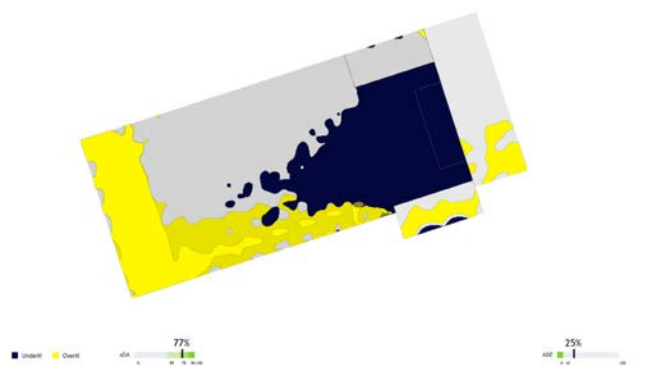
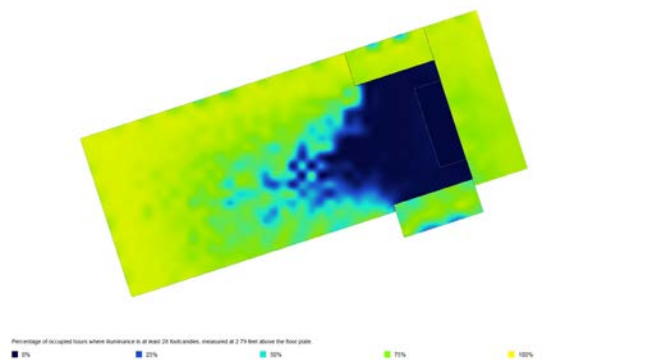
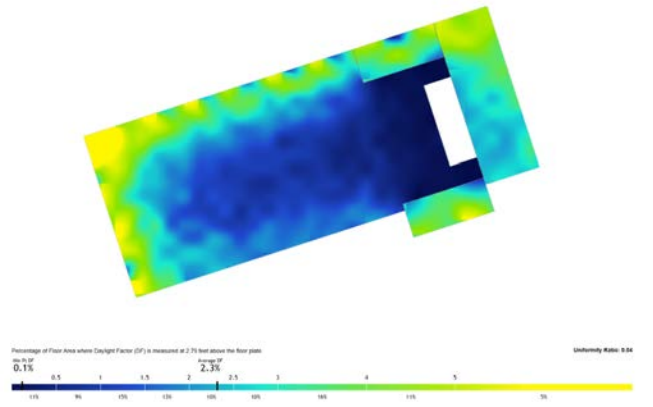
- Using Lo^a2-240, a high-performance glass coating to reduce glare typically associated with glass buildings
 - » Regular tinted glass works by absorbing sunlight, the color of the glass changes with the thickness and becomes hot in the sunlight. However, Lo^a2-240 is a coating that is applied to clear glass, so that the appearance and performance are the same regardless of the glass thickness.

Biomimetic Cues

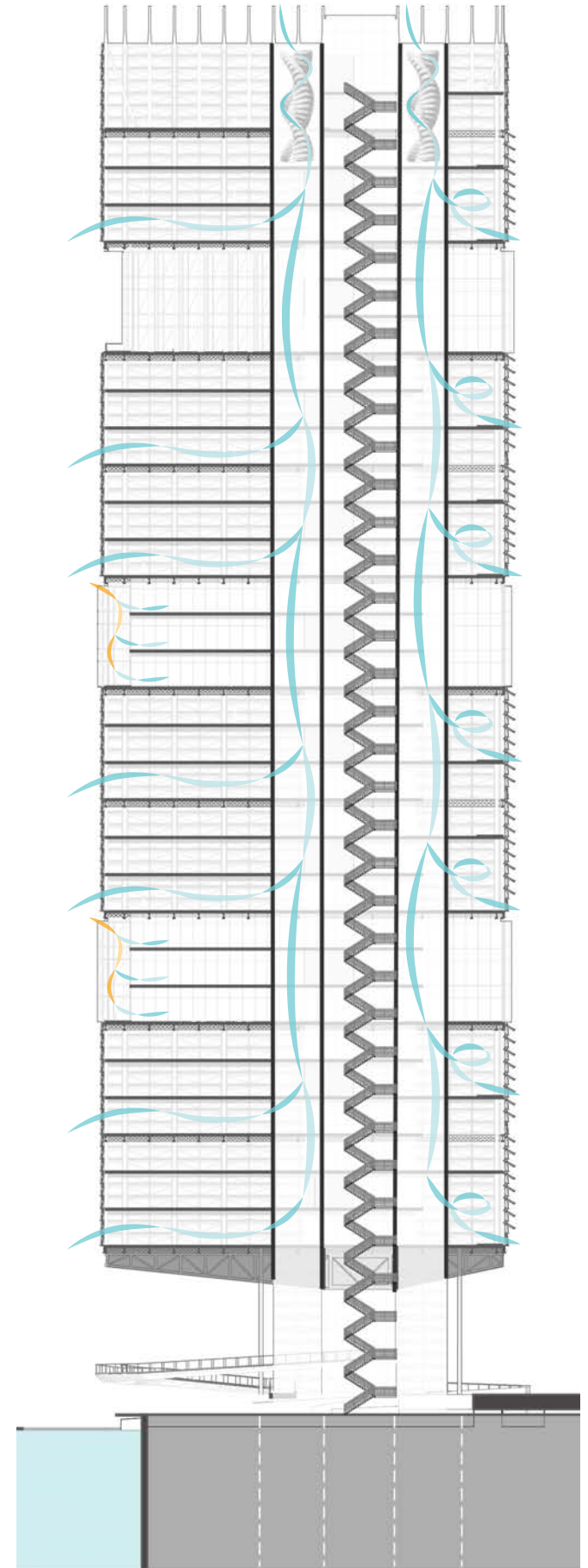
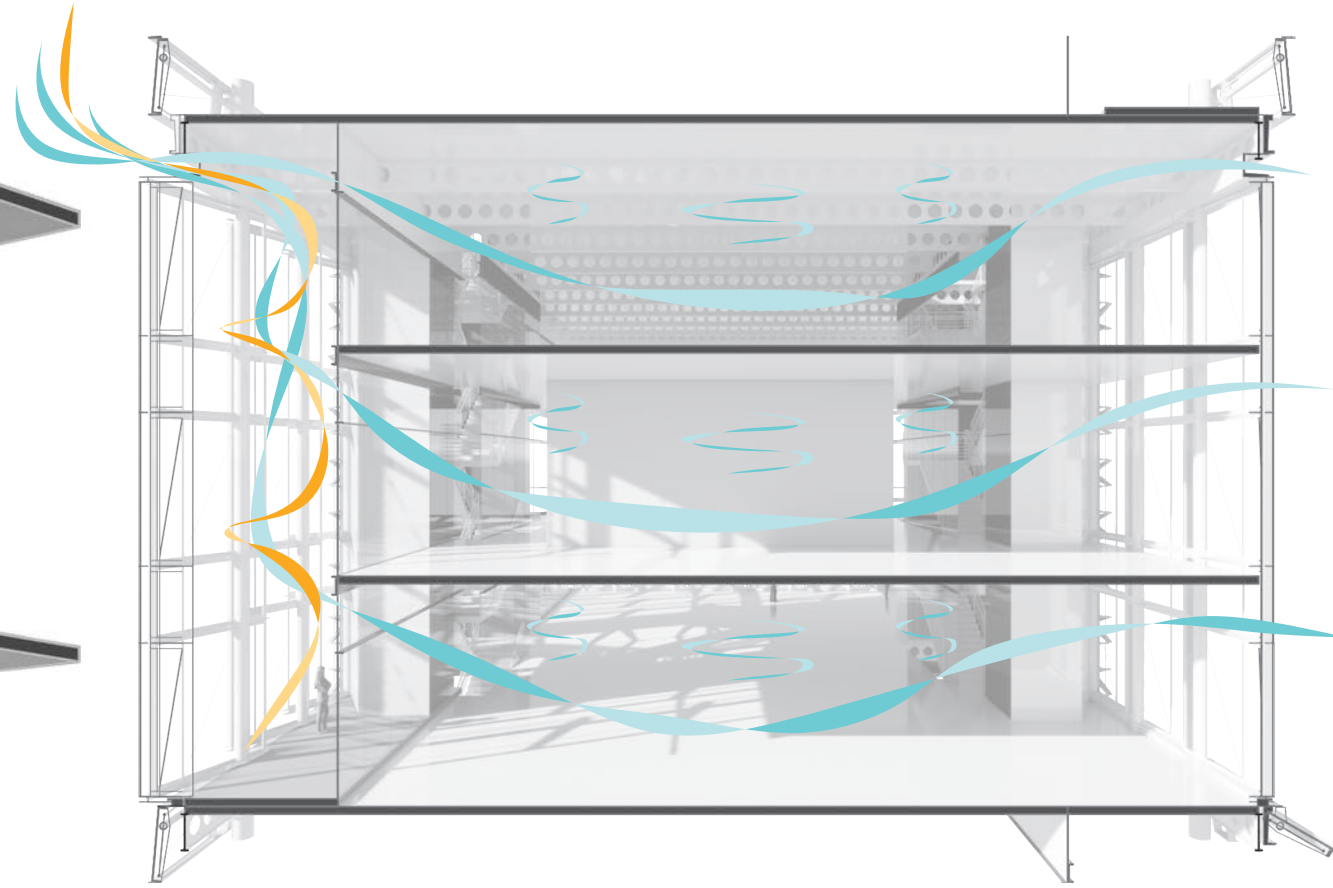
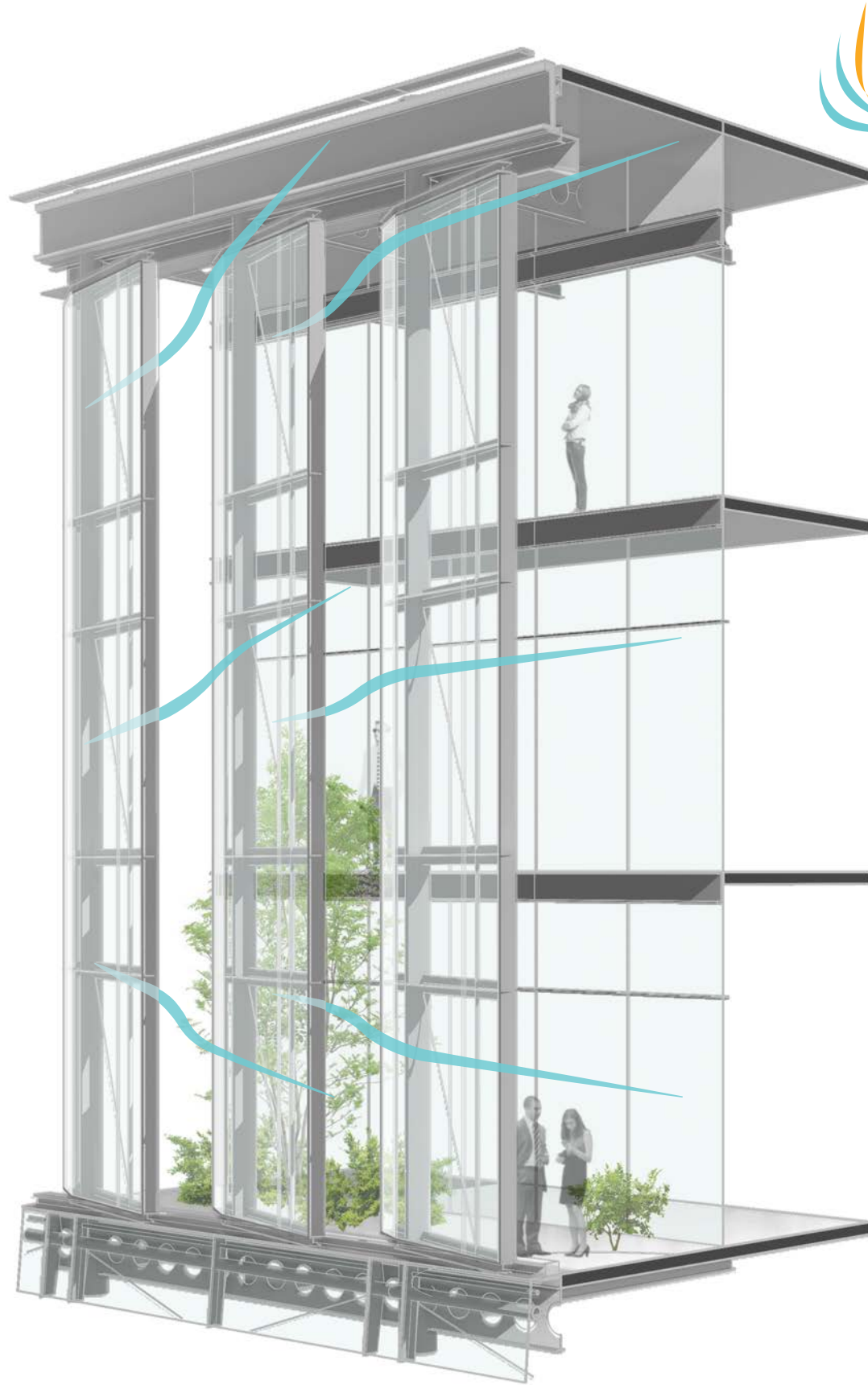
- The process of photosynthesis within a plant to turn UV rays into energy

Glass Types

- Obsorb - to catch water
- Heat Mirror Suspended Film



IGU with suspended film
 EUI: 29.6 kBtu/sf/yr
 Net Zero Energy is not feasible – there is not enough room on the building. With South Stair paneled in PV and South/East/West glass with PV frit PV can generate 71% of energy the building consumes



Natural Ventilation

- Facade opens to allow natural ventilation into the office, with the open floor plan maximizing cross-ventilation across the space
- Balance between man and machine
 - » Outer layer is controlled by sensors
 - » Inner layer is manually controlled by users
- Solar chimneys are located parallel to the stairwells to create a stack ventilation effect throughout the entirety of the building

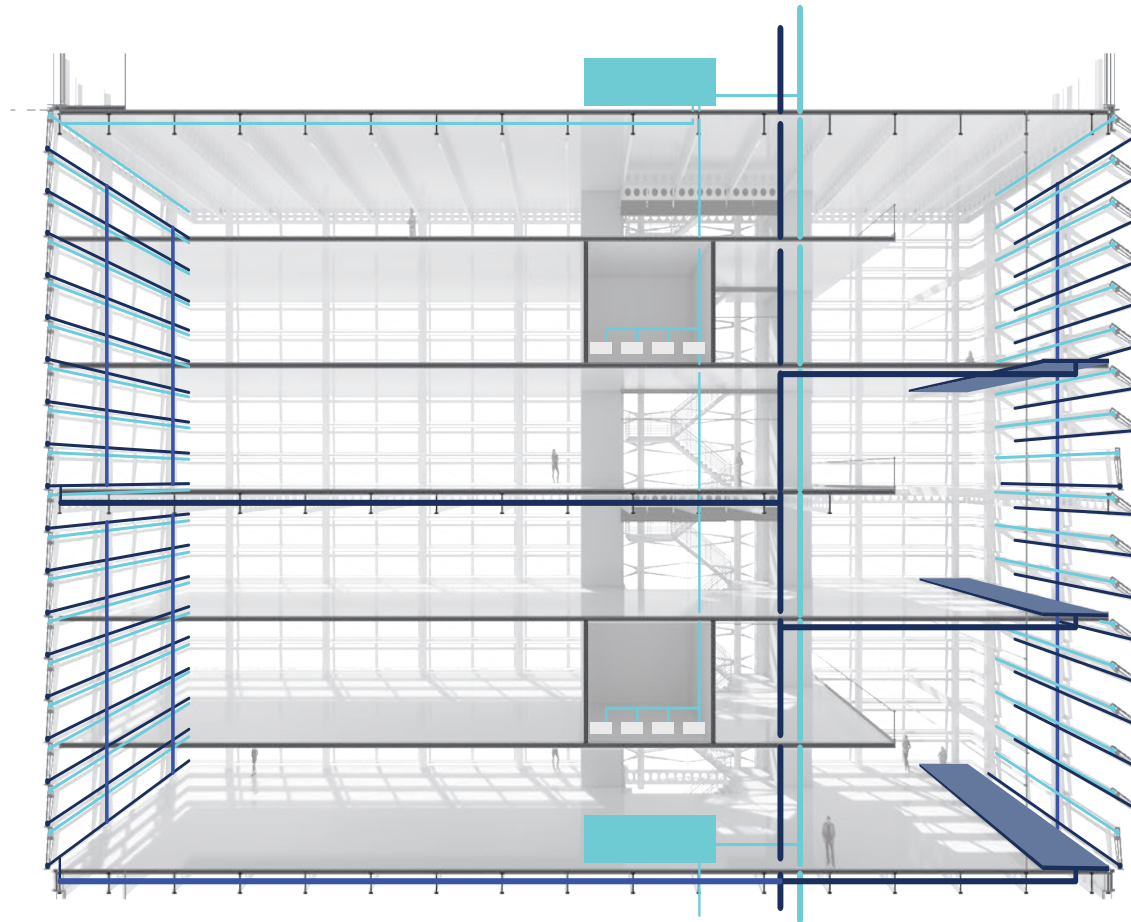
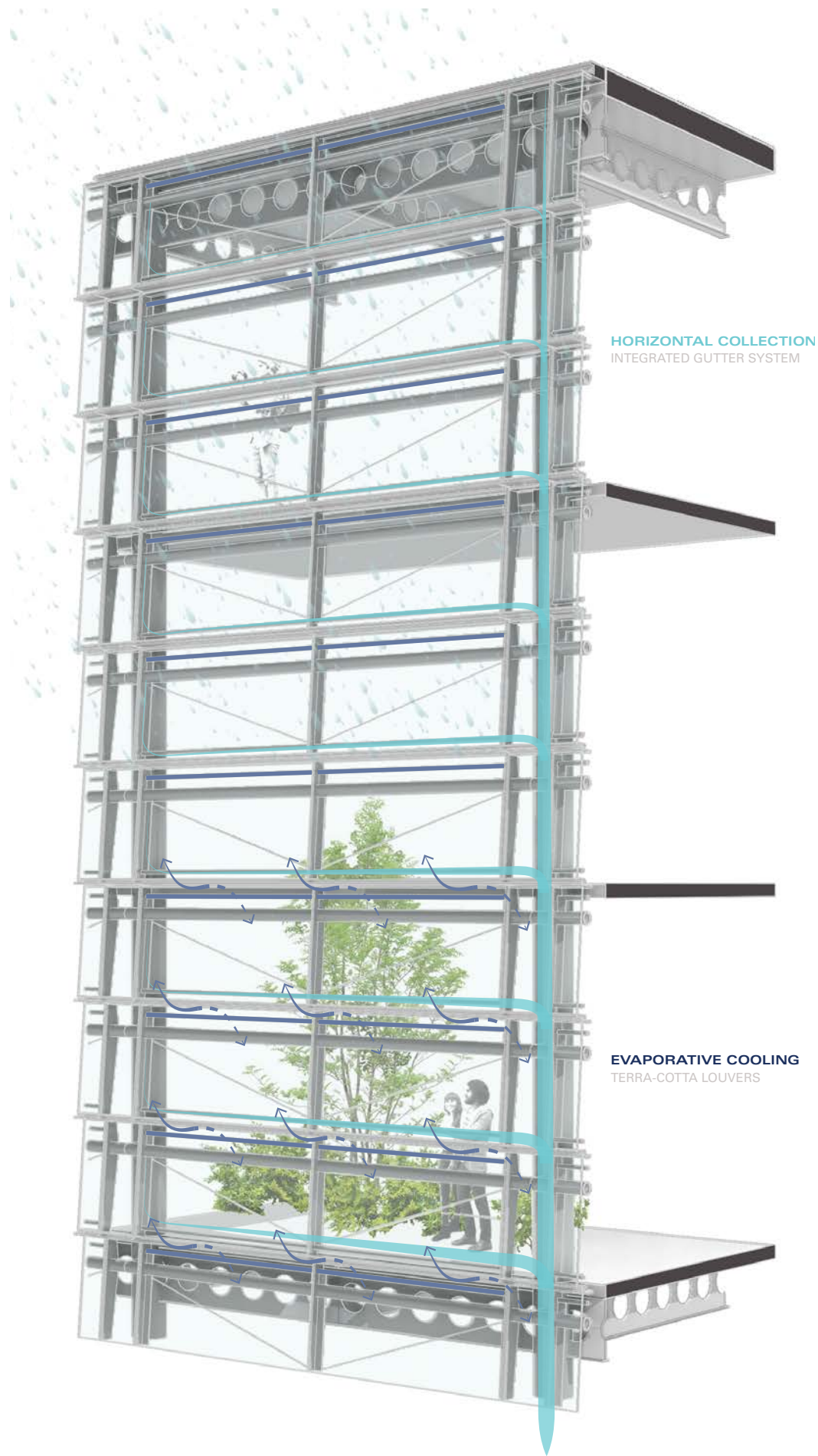
Filtration

- Filtration and Pollution control
 - » Titanium Dioxide
 - » Titanium Dioxide integrated within building elements located in the façade fins and along the stairwell and solar chimney
 - » Is an element which is activated by ultra-violet exposure that filters and “scrubs” pollution within the air

Biomimetic Cues

- The nesting of animals within the branches of a tree, which uses the trees foliage to create a buffer from the elements

WATER



Filtration/Purification

- Water is captured through a gutter system integrated within the horizontal fins and floor drains at the terraces
- Local filtration systems paired with reservoirs are located throughout the building, which minimize the energy required for pumping water from the base
- Main filtration and reservoir system at the base allows for overflow of local reservoirs as well as used for site irrigation
- Purification for limited potable water use

Collection

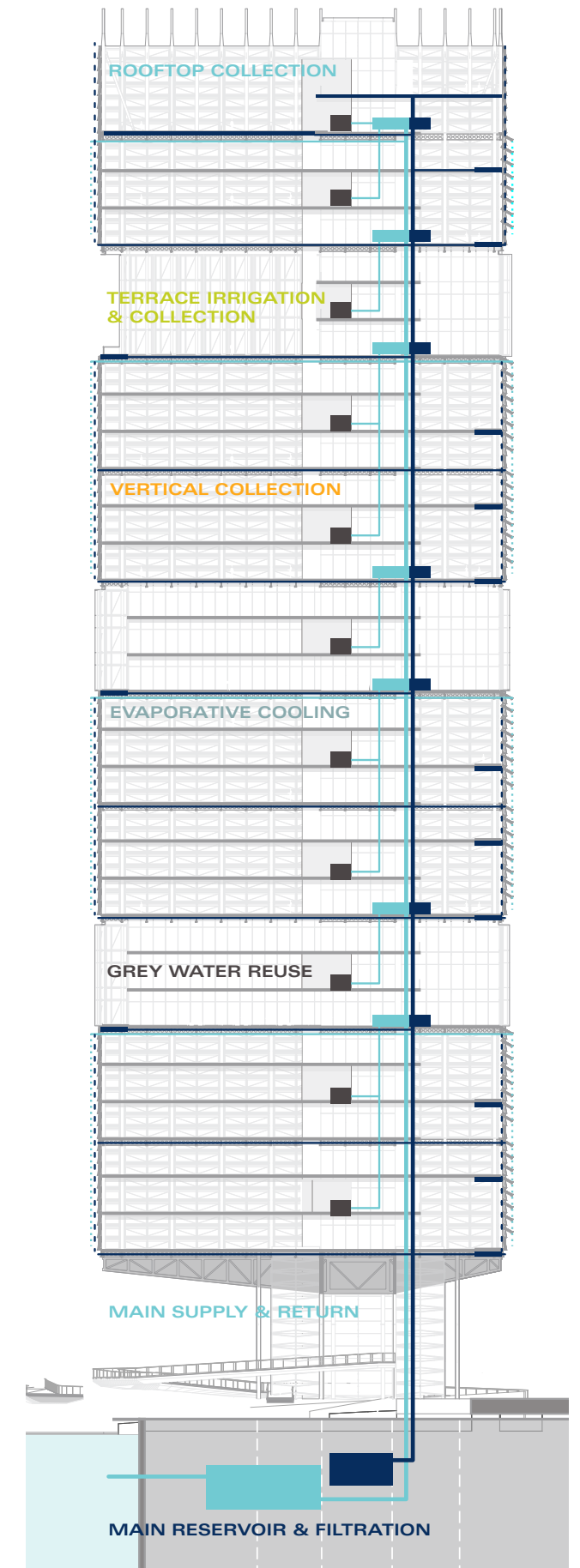
- Terra-cotta louvers working in tandem with the gutters within the horizontal fins provide evaporative cooling affect by water seeping through the porous material and evaporating from air moving across them
- Building uses a gravity feed system to provide water to grey water and irrigation systems below it

Native plants

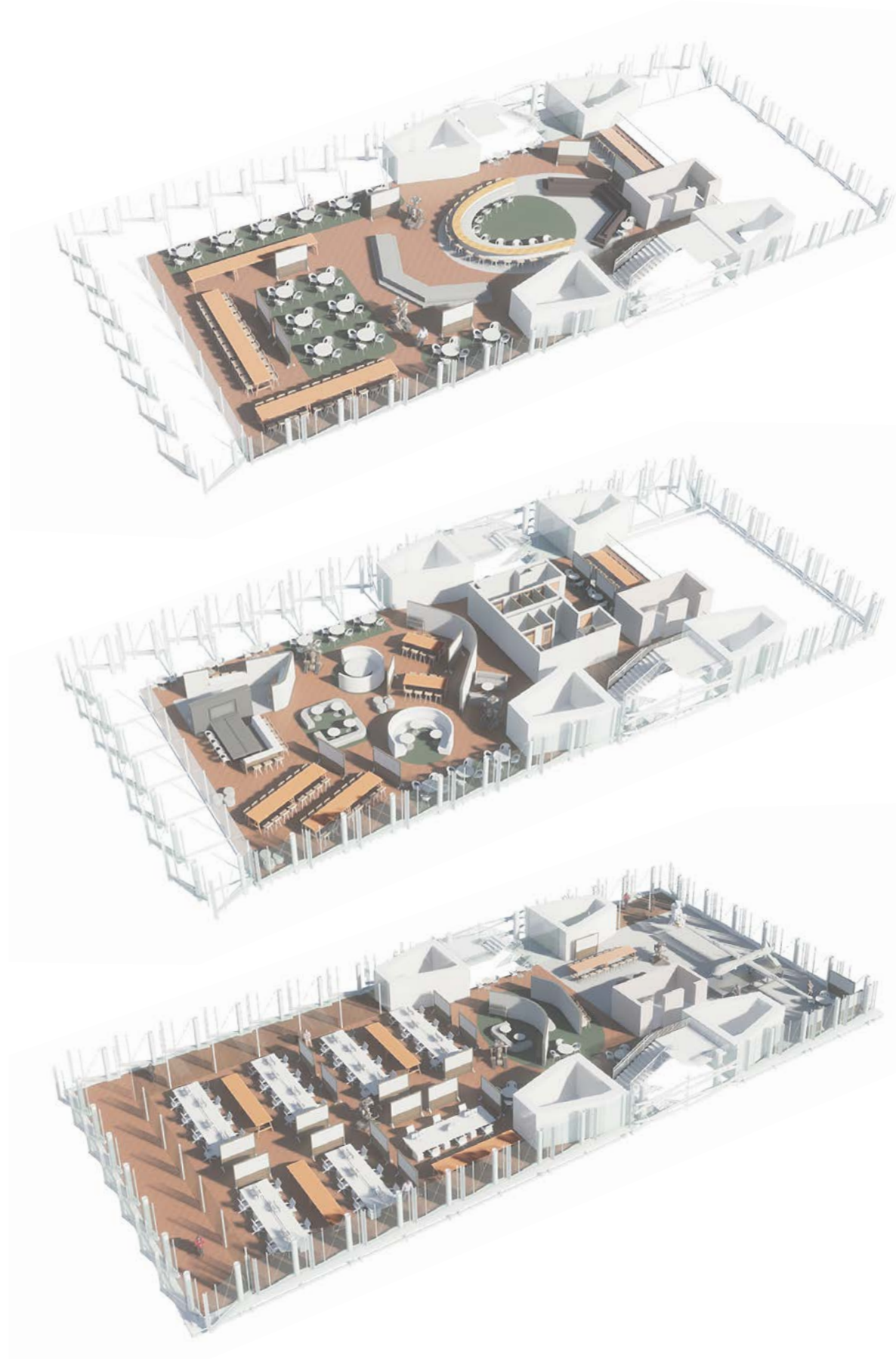
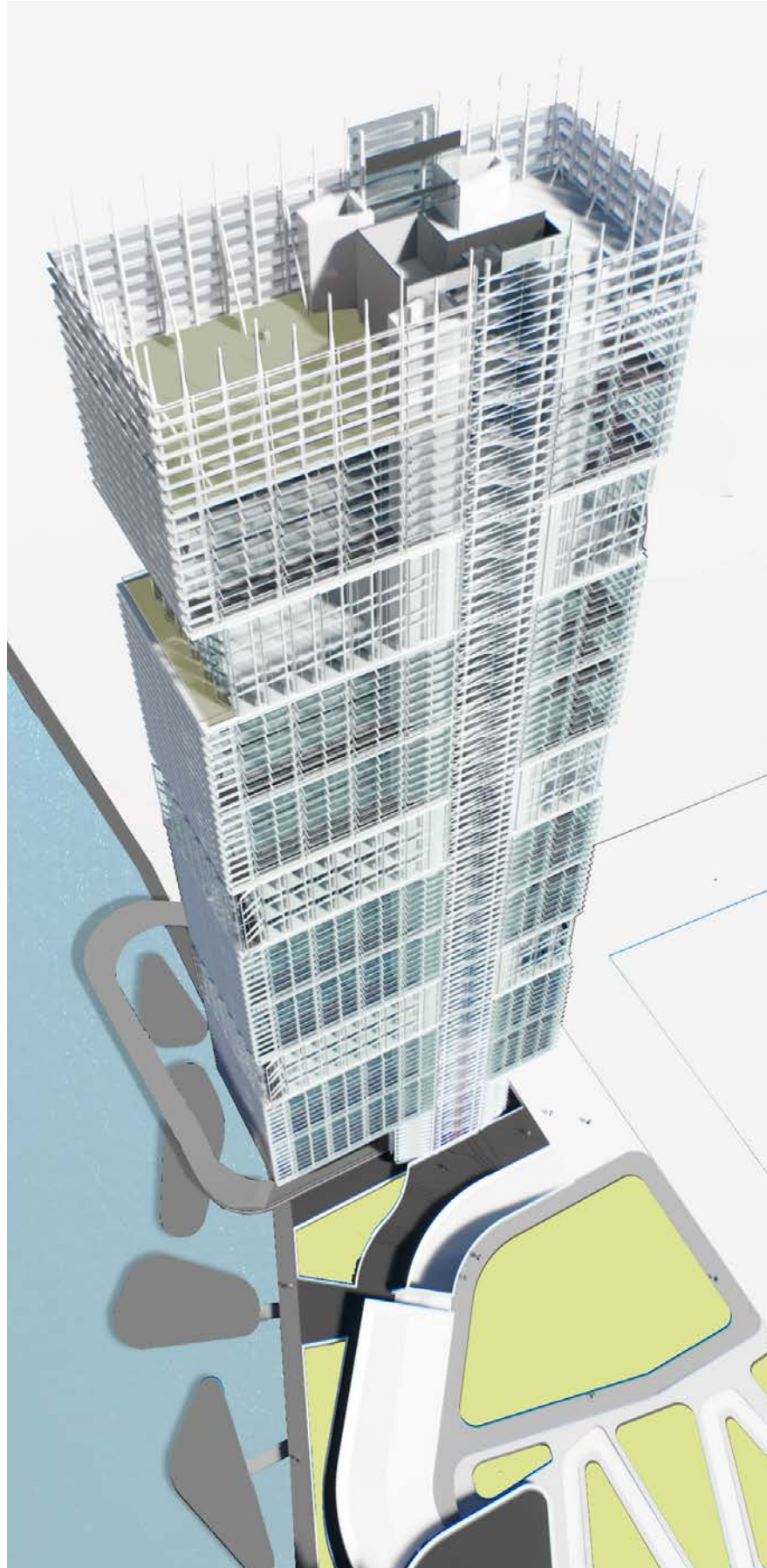
- Bottle Gentian, False Dragonhead, Great Lobelia

Biomimetic Cues

- Skins act of perspiration to cool the exterior of the body to regulate its internal temperature



EMPLOYEE / COMMUNITY



The 30-story, 230, 500 sf building intentionally has a small floor plate designed to keep the space column-free and maximize daylighting and views. By rotating the placement 18 degrees perpendicular to Kent Street, the occupant has 270 degree views across the river to Manhattan and daylight permeates the space from all sides. Separating the core to the outside is instrumental in maintaining these open views throughout the space. Volumetrically, with a larger zone to one side and a smaller zone opposite, the linear floor is organized into Think Space and Do Space, aligning with the high tech/high performance industry, and ultimately providing on demand flexibility.

In addition to the views to Manhattan, enhancing the relationship to Brooklyn and specifically the Williamsburg/Brooklyn Navy Yard tech-hub community is also important. Lifting the building not only addresses any storm water concerns, but it introduces a pedestrian esplanade that moves through the site, over water and around the water, revealing a continuously changing series and views and experiences that connect the community to the building and beyond. The design for the building and façade take cues from the site and the current community transformation by being sensitive to this place, touching it gently and creating an environment for healthy living, working and interaction.



SITE



Site Plan

Site Concept: To fully integrate with the façade design, the site utilizes sustainable mechanisms that focus, direct and/or block outdoor environmental forces of water, wind and light, as well as the indoor forces of human comfort, workplace activities and tech business infrastructures. With this in mind, the site unfolds as multi-functional layers that respond to dynamic fluctuations, both natural and human, occurring day-to-night, season-to-season; within public-to-private, product-to-market situations. These strategies are held to the expectation that wellbeing and health, both physical and emotional, will be cultivated for users who work, play and socialize within this distinct place.

Urban Ecology: The core principles of “urban ecology”, including engagement, adaptation and resiliency are the foundation for the innovative solutions that unite both building envelope and site as a “skin”, becoming the Next Generation Façade; a living and breathing system responding to external and internal environmental forces.

Site & Context Analysis: Positioned along the east edge of the Wallabout Channel, the site is charged with numerous contextual opportunities that take advantage of environmental forces, both natural and human. Following the principles of urban ecology, the site is analyzed to reveal the macro and micro relationships, from the horizontal ground/water plane to the vertical cityscape skyline.

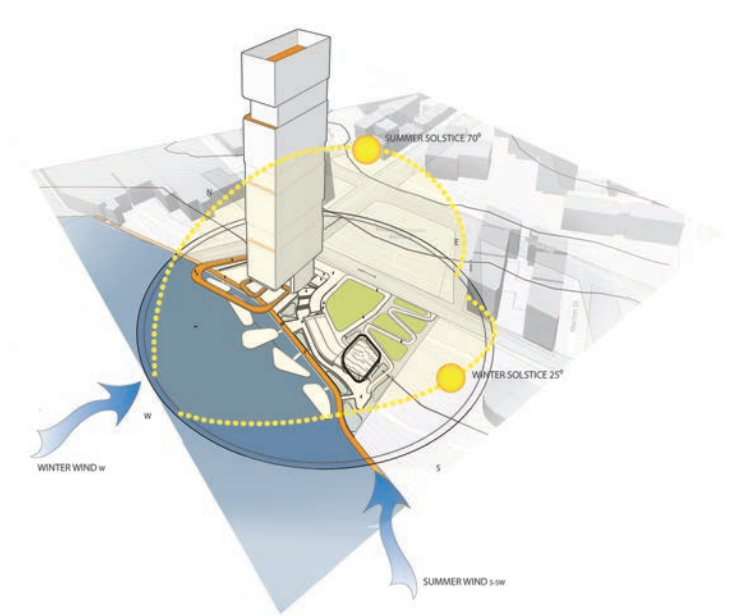
Water, Wind & Light: Located on the waterfront amidst a rapid urban transformation, **water** is a critical resource in reestablishing the site’s significance to the greater region. It provides opportunities for placemaking (boardwalks, esplanades, piers), sustainability (water filtration/ collection & soil remediation, rain gardens, community gardens), and weather protection (storm surge barriers, reduced runoff, erosion control). The buildings orientation maximizes the potential to harness and mitigate the movement of **air** through the building façade/ site skin system, as well as allow for easy energy capture through turbine integration. As a precious commodity, **light** plays a crucial role in the urban context. By orienting the building along the east/west latitudinal axis, as well as positioning it to the northern portion of the site, light exposure is fully maximized throughout the site and the full height of the building.



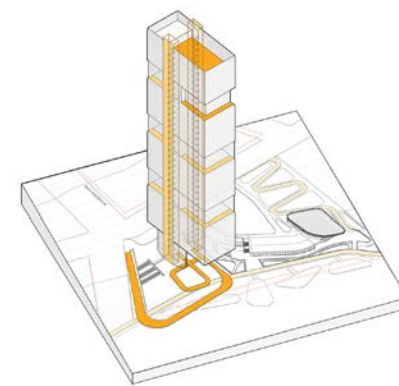
Site Activation



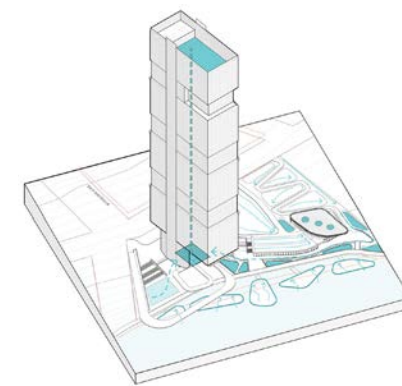
Site Organization



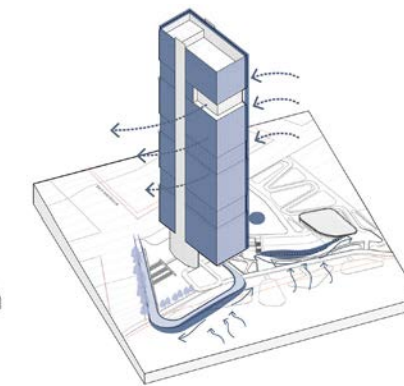
Site Environment (Water, Wind & Light Analysis)



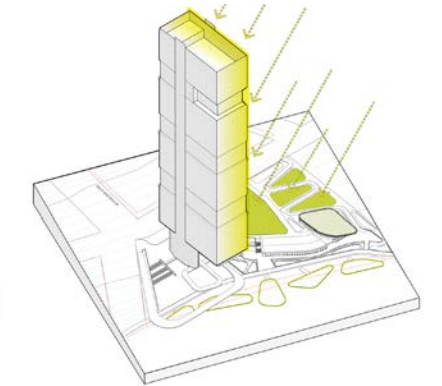
People



Water



Wind



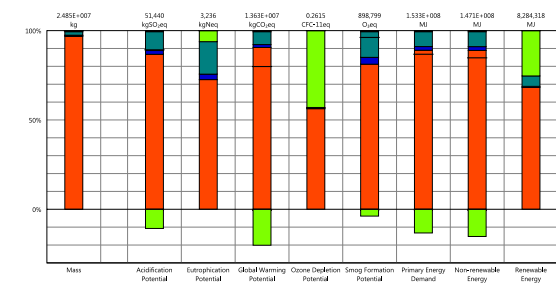
Light

The 3-story, structurally-integrated glazing cassette boldly pushes the limits of typical unitized curtain-walls. The pre-assembled units ensure an effective water-tight, energy efficient, acoustically sensitive and safe module that is finely tuned to the dynamic climatic swings experienced along New York City's East River. Rather than relying on the slab for lateral loading, the independently stacked cassettes reduce the

additional steel required to prevent the typical slab's deflection requirements. Curtainwall coupled with a network of steel members and composite steel columns effectively shoulder the gravity and lateral loads applied to the structure.

The embodied energy results...

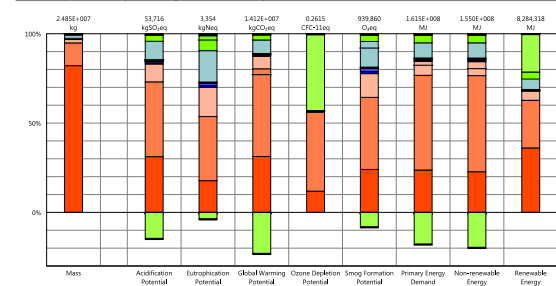
Results per Life Cycle Stage



Legend

- Net value (impacts + credits)
- Life Cycle Stages
- Manufacturing [A1-A3]
- Transportation [A4]
- Maintenance and Replacement [B2-B4]
- End of Life [C2-C4, D]

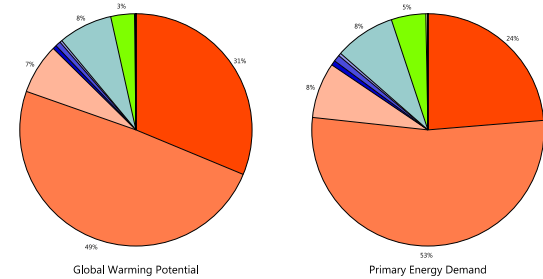
Results per Life Cycle Stage, itemized by Division



Legend

- Net value (impacts + credits)
- Manufacturing [A1-A3]
- 03 - Concrete
- 05 - Metals
- 08 - Openings and Glazing
- Transportation [A4]
- 03 - Concrete
- 05 - Metals
- 08 - Openings and Glazing
- Maintenance and Replacement [B2-B4]
- 03 - Concrete
- 05 - Metals
- 08 - Openings and Glazing
- End of Life [C2-C4, D]
- 03 - Concrete
- 05 - Metals
- 08 - Openings and Glazing

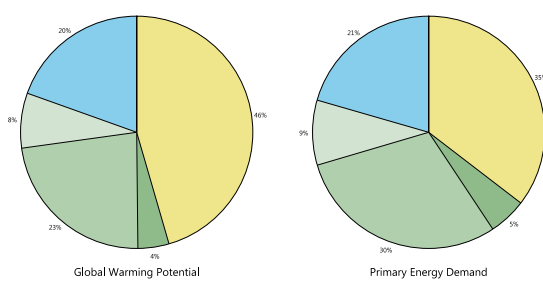
Results per Life Cycle Stage, itemized by Division



Legend

- Net value (impacts + credits)
- Manufacturing [A1-A3]
- 03 - Concrete
- 05 - Metals
- 08 - Openings and Glazing
- Transportation [A4]
- 03 - Concrete
- 05 - Metals
- 08 - Openings and Glazing
- Maintenance and Replacement [B2-B4]
- 03 - Concrete
- 05 - Metals
- 08 - Openings and Glazing
- End of Life [C2-C4, D]
- 03 - Concrete
- 05 - Metals
- 08 - Openings and Glazing

Results per Division, itemized by Tally Entry



Legend

- 03 - Concrete
- Cast-in-place concrete, reinforced structural concrete, 4000 psi (30 MPa)
- 05 - Metals
- Steel composite form deck
- Steel round tubing
- Steel W section (wide flange shape)
- 08 - Openings and Glazing
- Glazing, double pane IGU

