Aequitas, an integrated architecture and engineering team, approached this mixed-use building with the aim of designing a Net Zero Energy building with a holistic and integrated approach to sustainability and resilience. It aims to minimize embodied carbon, enhance community assets and resources, provide ample outdoor space for gathering and food, and achieve long-term resiliency in the face of increasing temperatures and extreme storm events. The building integrates occupant comfort, beautiful and functional design, and healthy materials – and makes these assets accessible to all. Residents and neighbors can gather in outdoor green spaces and community gardens, fostering bonds through a shared appreciation of food production and our connection to our collective impact on the environment.

The architectural design is driven by a balance of both contextual neighborhood cues and functional performance. Borrowing its architectural language from the nearby industrial area, the building's primary façade echoes the design of nearby warehouses. Layered onto this are functional elements that augment the building's performance and comfort including narrow floorplates for ample daylight and ventilation, a dichotomous façade on the northwest that acts as a sound barrier to adjacent vehicle and train noise, and a diaphanous open façade on the southeast, aimed at maximizing daylight and solar energy captured through a PV integrated window system. Enhanced thermal-mass walls, roof insulation, triple-pane glazing, and a 40% window-to-wall ratio balances passive solar gains in winter with reducing peak summer loads, resulting in a well-balanced and high performing envelope.

Resiliency measures are integral to the design solution. The choice of a concrete structure for the first two levels assures structural integrity in the case of future flash flooding events. The integration of green roofs and community gardens reduce heat island effect, assist with air quality, and are integral components of the stormwater management systems. Additionally, the building is equipped with a 12 MWh battery to power essential loads in the case of a power outage during a storm; supplemented by the envelope's thermal mass it can sustain a habitable interior temperature for passive survivability. The mechanical room housing the battery storage is located on the second level to protect equipment in the event of flash flooding.

To achieve net zero energy the building was designed to optimize exposure to the south to facilitate energy generation from the PV integrated façade; this is coupled with a piezoelectric energy generation system installed in the adjacent railway site, which generates energy from passing train vibrations. The PV panels are integrated into the building's southeastern façade as horizontal louvers, which not only generate energy but also reduce cooling load, mitigate glare, and improves occupant comfort. The northwest façade was designed with deep vertical brick louvers to block the harsh late afternoon sunlight while still providing diffuse daylighting and views to the north. To optimize daylighting for the café and retail spaces on the first level of the building, the first floor was programmed with the spaces hugging the perimeter of the building and designed with a dramatic overhang to block direct sunlight.

The HVAC systems provide an enhanced level of thermal comfort and indoor environmental quality with minimum use of fossil fuels. The core of the heating and cooling system is a series of sequential water to water waste source heat pumps that produce simultaneous chilled water and hot water from the site-adjacent sanitary sewer main. The reduction in the total building energy usage and peak heat loads allowed for the building to fully utilize the sanitary system, as a more typical building energy usage would be greater than the heat capacity of the sanitary main. In addition, a combination of chilled beams with radiant floor systems and axial ceiling fans provide the comfort control in each space. A central dedicated outside air system (DOAS) will provide the ventilation air for the building.

To achieve the desired reduction in embodied carbon, the team selected mass timber for the primary structural system. At 15 stories, this building would be one of the tallest mass timber structures in North America. The specification of concrete, foam insulation and aluminum were minimized. Where concrete is used, a low carbon mix is specified, supplied by plants with CarbonCure technologies. Wood fiber board provides continuous exterior insulation and sheathing. Dense-packed cellulose is used for stud cavity insulation, and windows with timber frames minimizes the use of aluminum.

Together, these strategies achieve a Net Zero, sustainable building that will become a beloved community amenity, weather future climate change impacts, foster equity, and enhance the wellbeing of residents and neighbors alike.