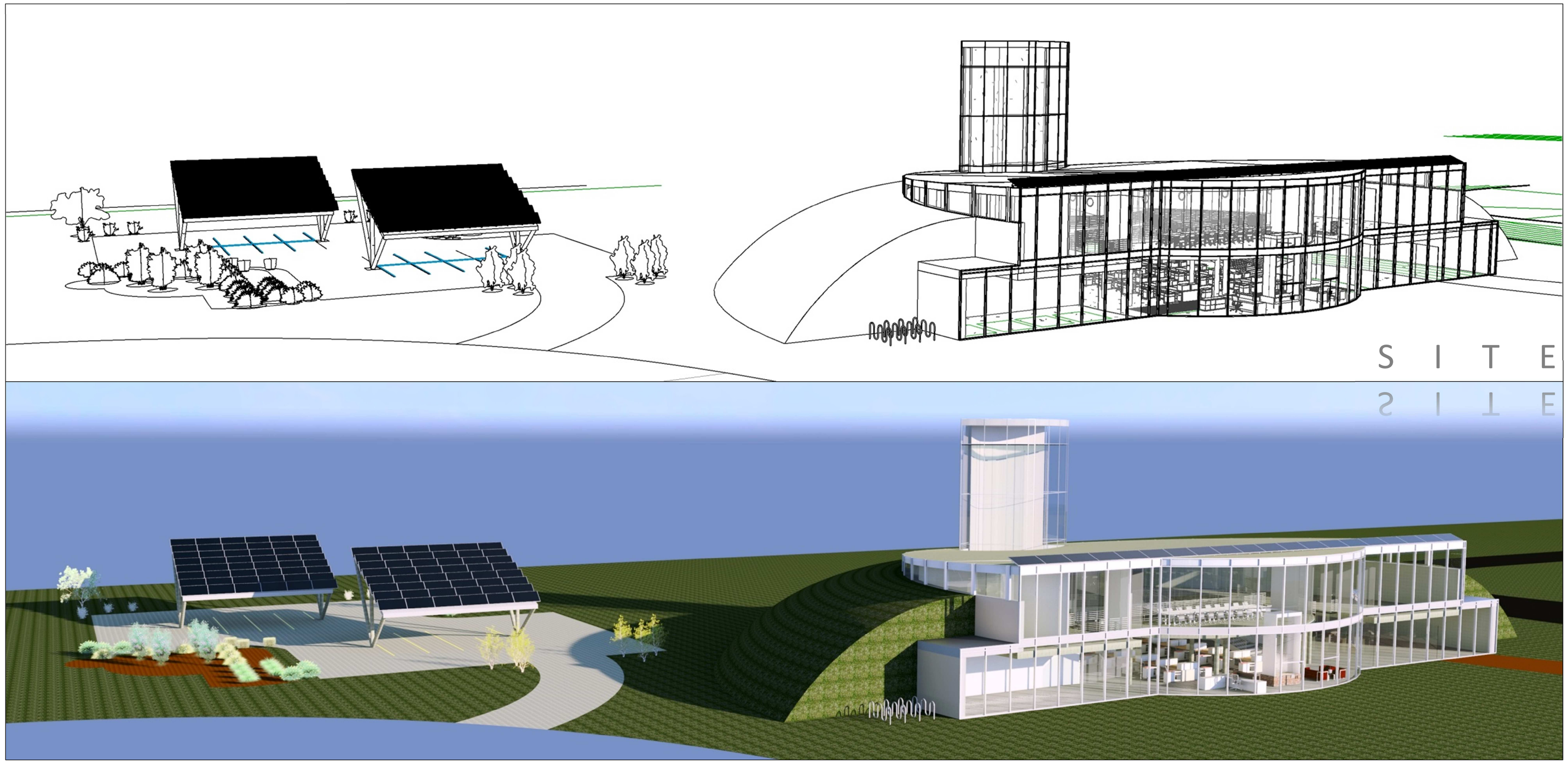
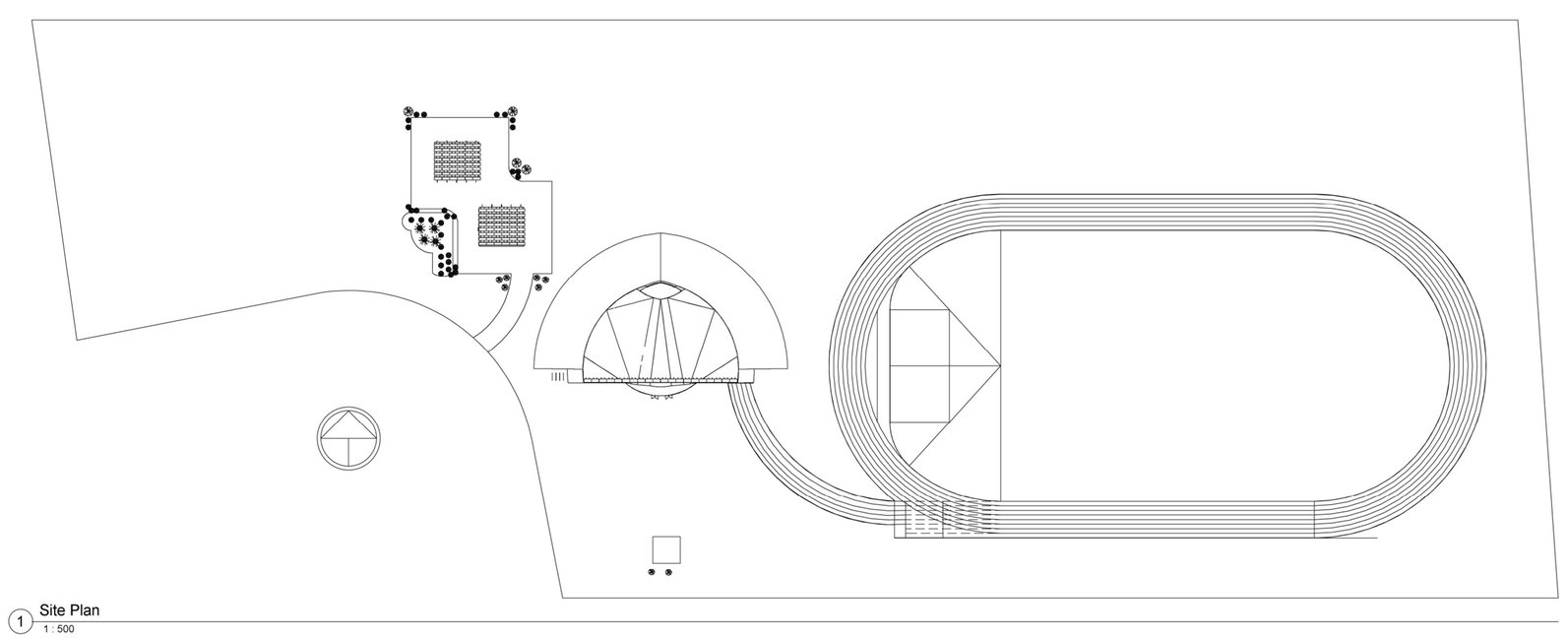
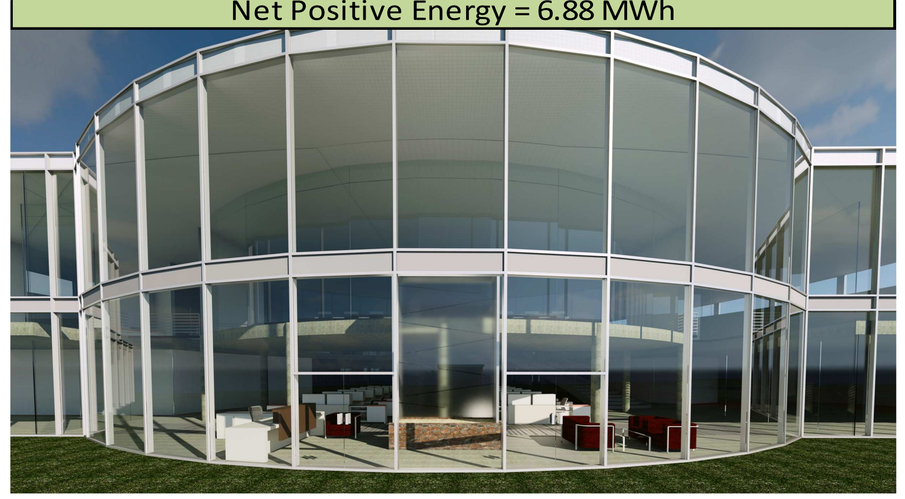
589
SPORTS RESEARCH FACILITY





Annual Process Loads (MWh)		On-Site Generation (MWh)	
Mechanical Heating Loads	7.90	Solar PV	27.69
Mechanical Cooling Loads	1.35	PaveGen	3.67
Lighting loads	5.43		
Equipment loads	9.80		
Total Building Load	24.48	**Total Energy Produced**	31.36
Net Positive Energy = 6.88 MWh			



A conceptualization of a sports research facility closely aligned with Downsview Park's gentrification, designed to support environmental, social and economic sustainability. The building design leverages the advantages of passive building systems and components in order to cultivate an unrestrained and synergistic atmosphere. It incorporates innovative sustainable technologies that integrate net-zero building envelope strategies and passive heating, cooling, and ventilation techniques.

The north face of the building consists exclusively of an above ground earth berm, designed to minimize heat loss and maintain indoor air temperatures, a key parameter for establishing a net-zero super-thermally insulated building. The south face consists of triple glazed, argon filled fenestration that is designed to allow for passive solar daylighting and heating. Where necessary, such as the entrance from the track, windows will be operable and automated. The sun's energy penetrates the thermal massing of the building through the south-facing fenestration. The massing acts as a heat sink absorbing the heat during the day and releasing it as evening falls, taking advantage of free energy.

Several other passive techniques were employed to optimize the heating, cooling and ventilation of the building. Earth tubes are used to pre-treat the incoming ventilation air, requiring less work energy for the ground source heat pump. A solar chimney creates a pressure differential between itself and the earth tubes drawing the incoming air into the central HVAC room where it is further treated and pulled throughout the building.

Operable fenestration on the south face of the building allows for warm summer air to reach an interior waterfall feature that condenses and cools the warm air entering the space. This air then reaches a green wall feature that works to improve the indoor air quality by absorbing air pollutants. Operable clerestory windows on the perimeter of the second floor allow for diffuse natural light to penetrate the spaces, while providing occupants control of ventilation.

Water use is optimized with the development of rainwater harvesting and grey water systems. Rainwater collected from the roof, parking lot and ground is filtered, stored and in some cases treated for use in the hydro-therapy pools and for irrigation. The lavatory and shower water is provided by the city water supply as mandated. The remaining water requirements of the institute are met using an aquascape rain exchange system that stores grey water in an underground storage tank. This system utilizes a pondless waterfall feature, which mimics the natural plant based purification and filtration process of a bioswale. Blackwater is treated on-site with a bio-filter that returns the water to the ground via a small irrigation system.

To meet city requirements, the rainwater used in the hydro-therapy pools is chlorinated and tested before implemented. When the water is cycled out the bio-filter will be capable of filtering out the chlorine before the water returns to the ground. Grey water is recycled from the lavatories and showers and is used for flushing ultra low flow water closets. Water recycling showers are equipped with a self-contained filter and water reuse system that uses 90% less water then conventional showers. Site is landscaped with native plant species and sufficient space for herb and gardens.

The parking lot and roof are equipped with south facing solar PV panels angled at 43.7 degrees to optimize the locations solar gain and offset on-site non-renewable energy consumption.