

Integrated Portfolio

The Bartlett School of Architecture
MEng Engineering & Architectural Design
Class of 2023
Isaac Wang

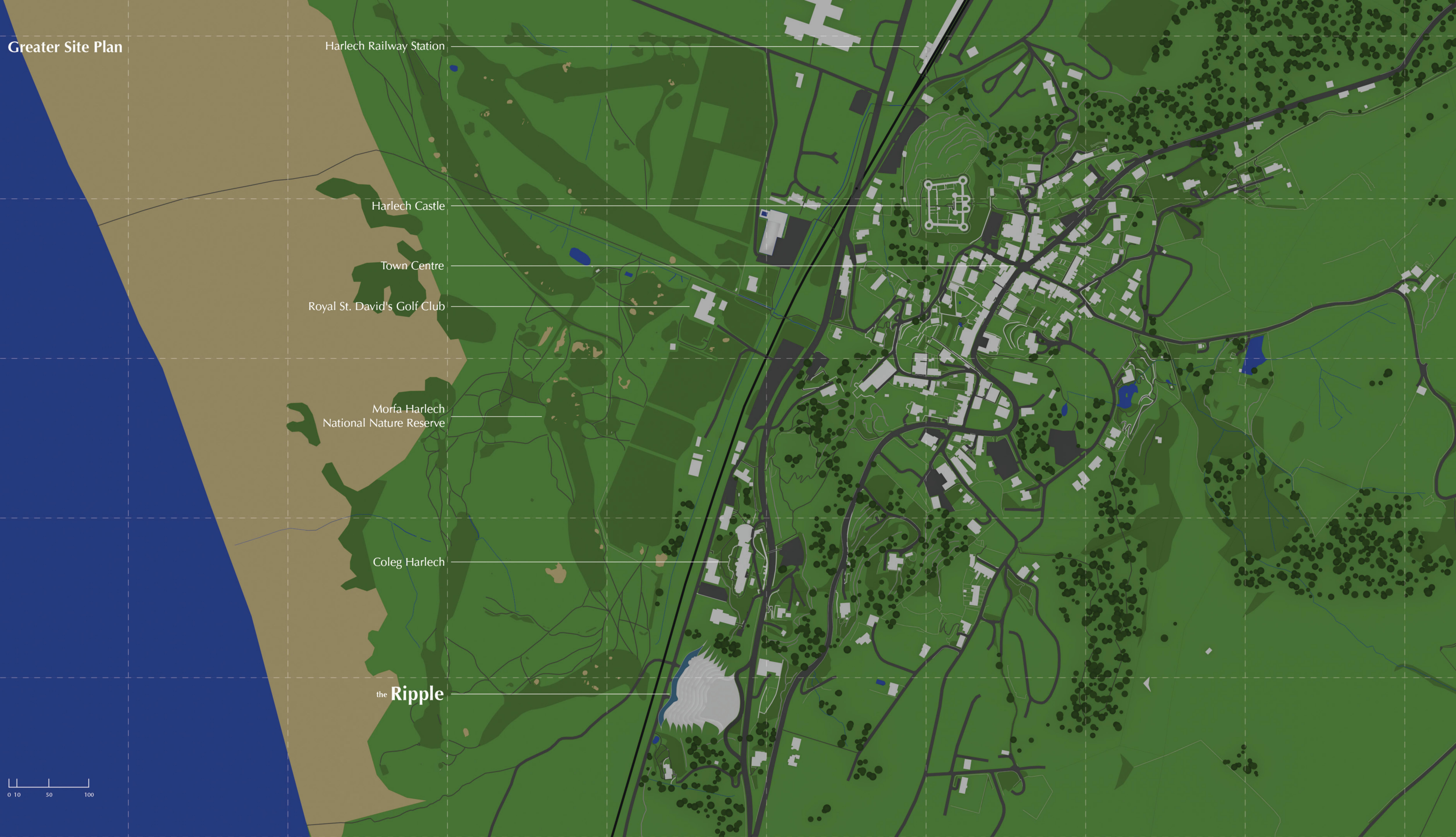
the Ripple

MEng Year 4
Design Practice III

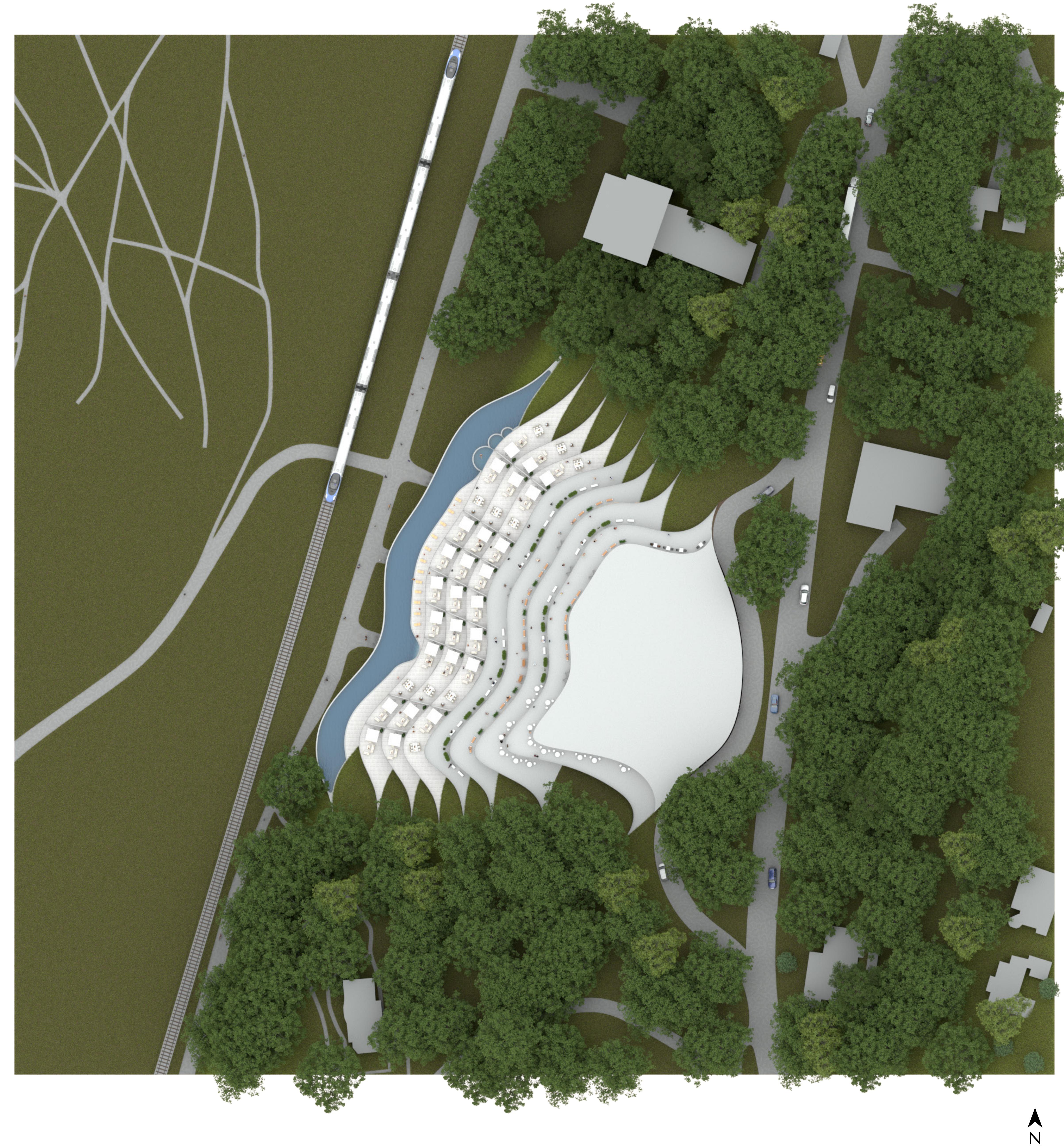
Innovative green multifunctional structure in Harlech, Wales, harnessing nuclear batteries to convert CO₂ into liquid methane, water, and oxygen. With fully adjustable internal conditions, emphasising carbon reduction and energy efficiency in sustainability design.



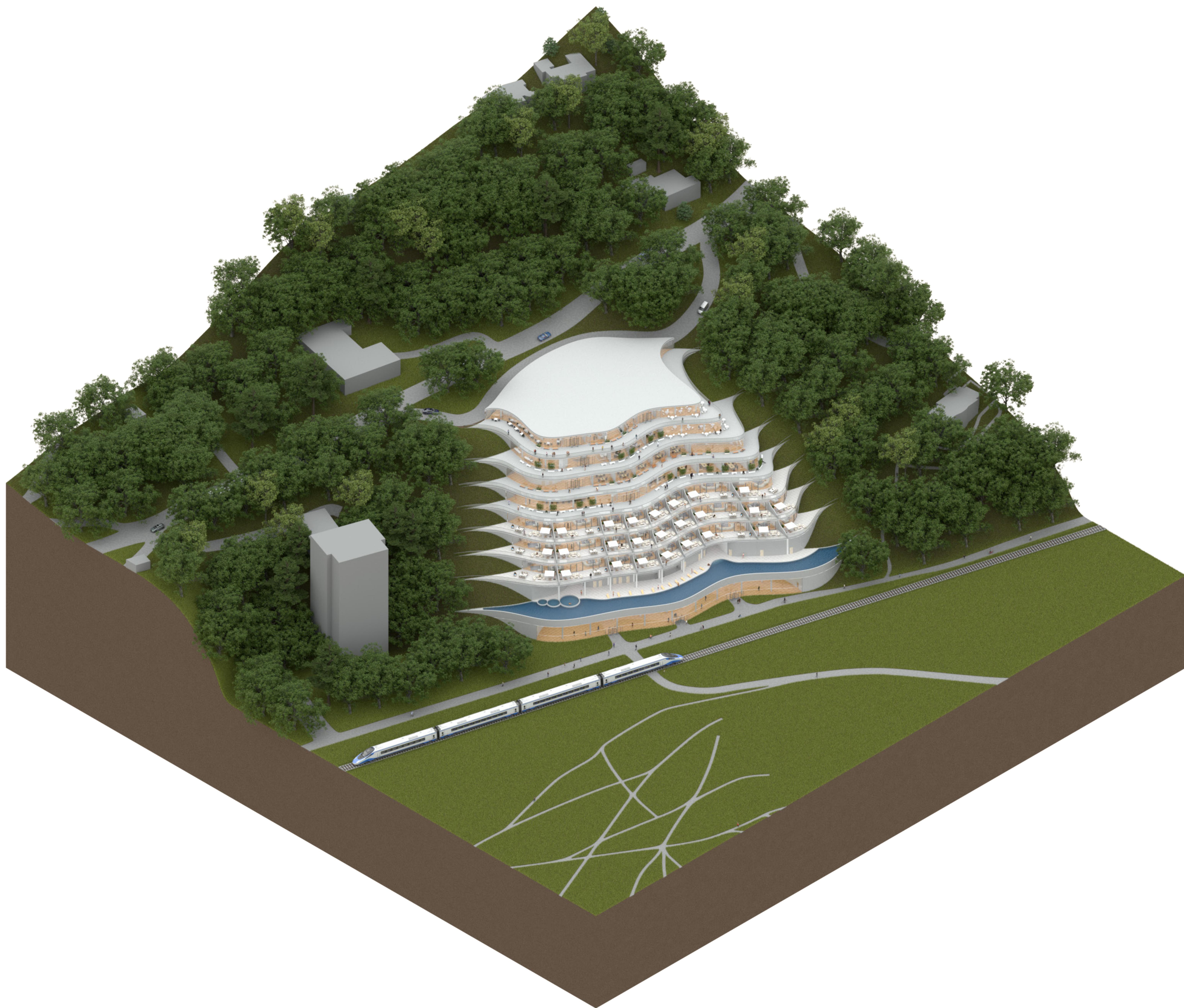
Greater Site Plan



Site Plan

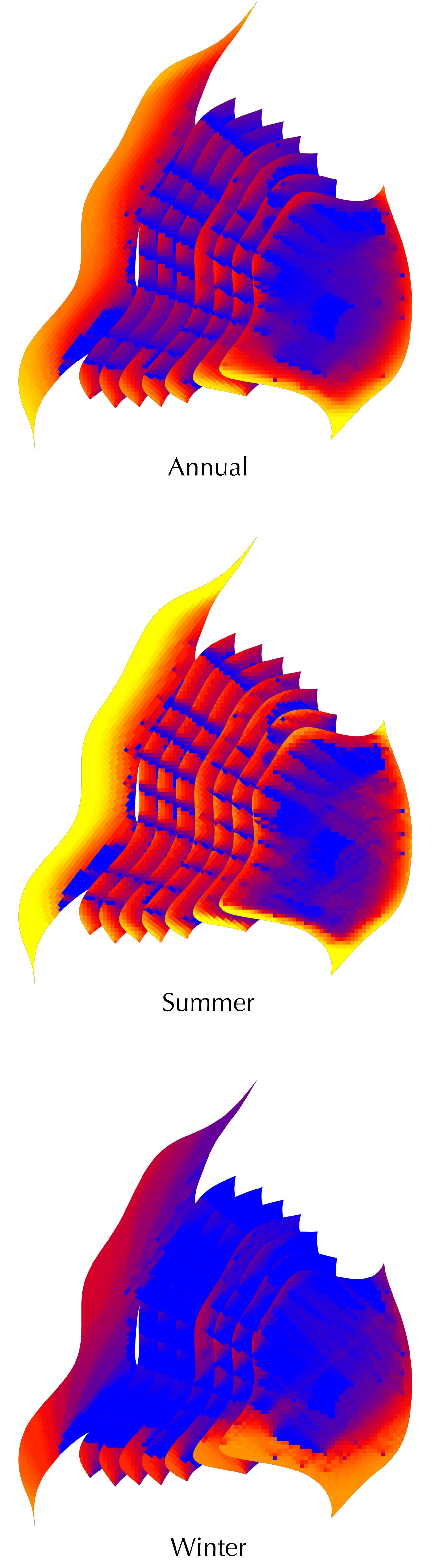
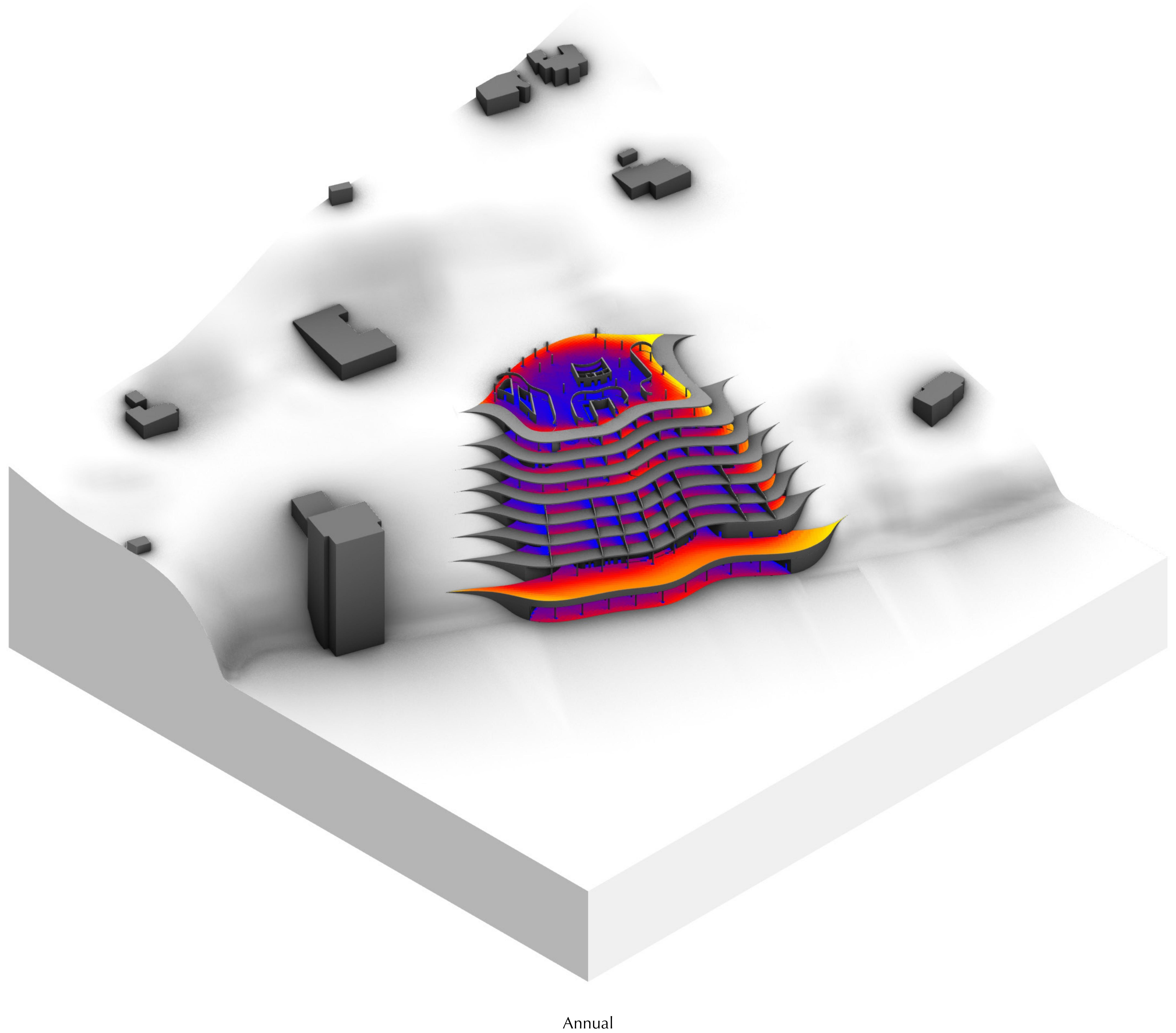


Casting & Decoration

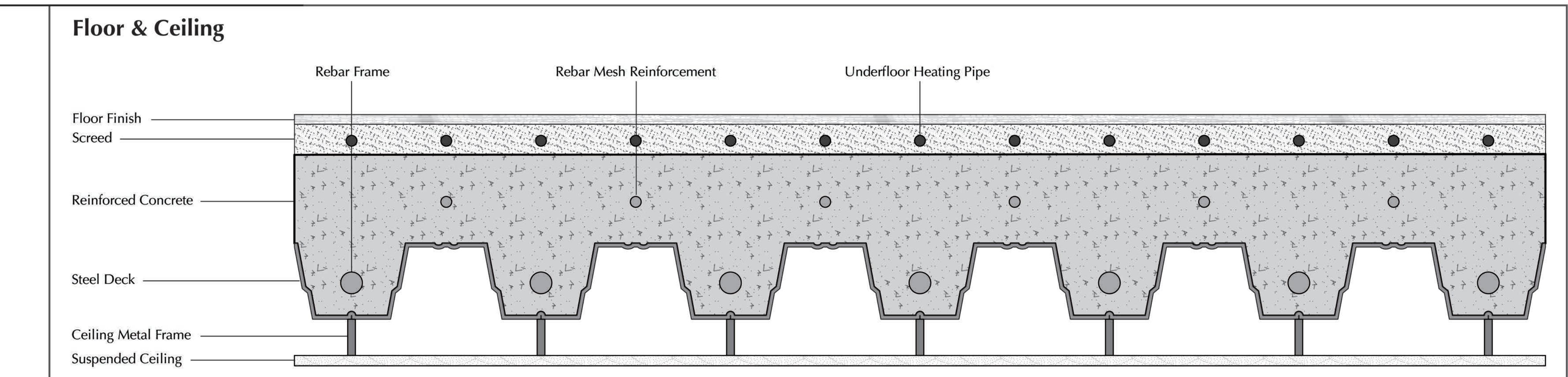
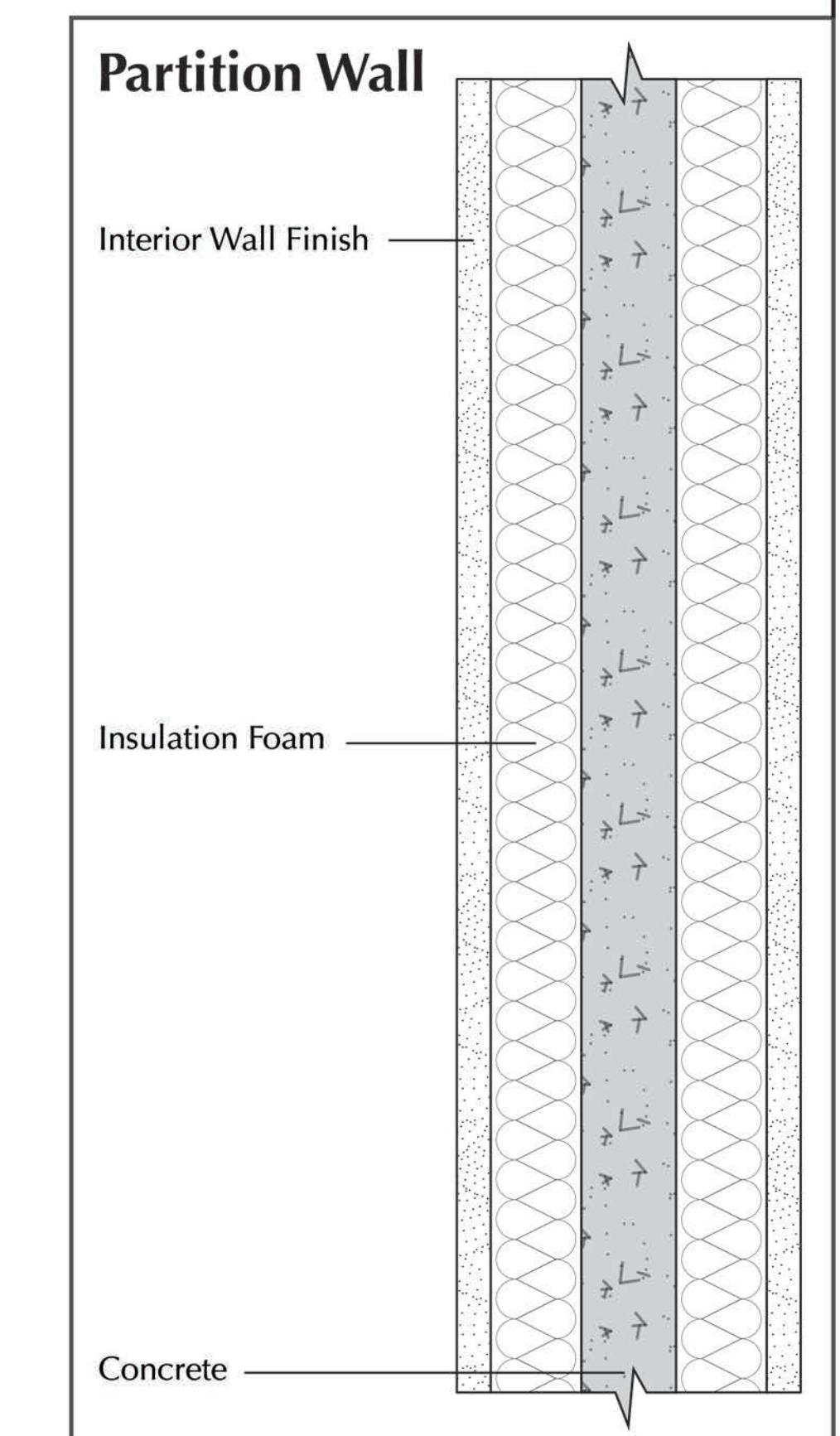
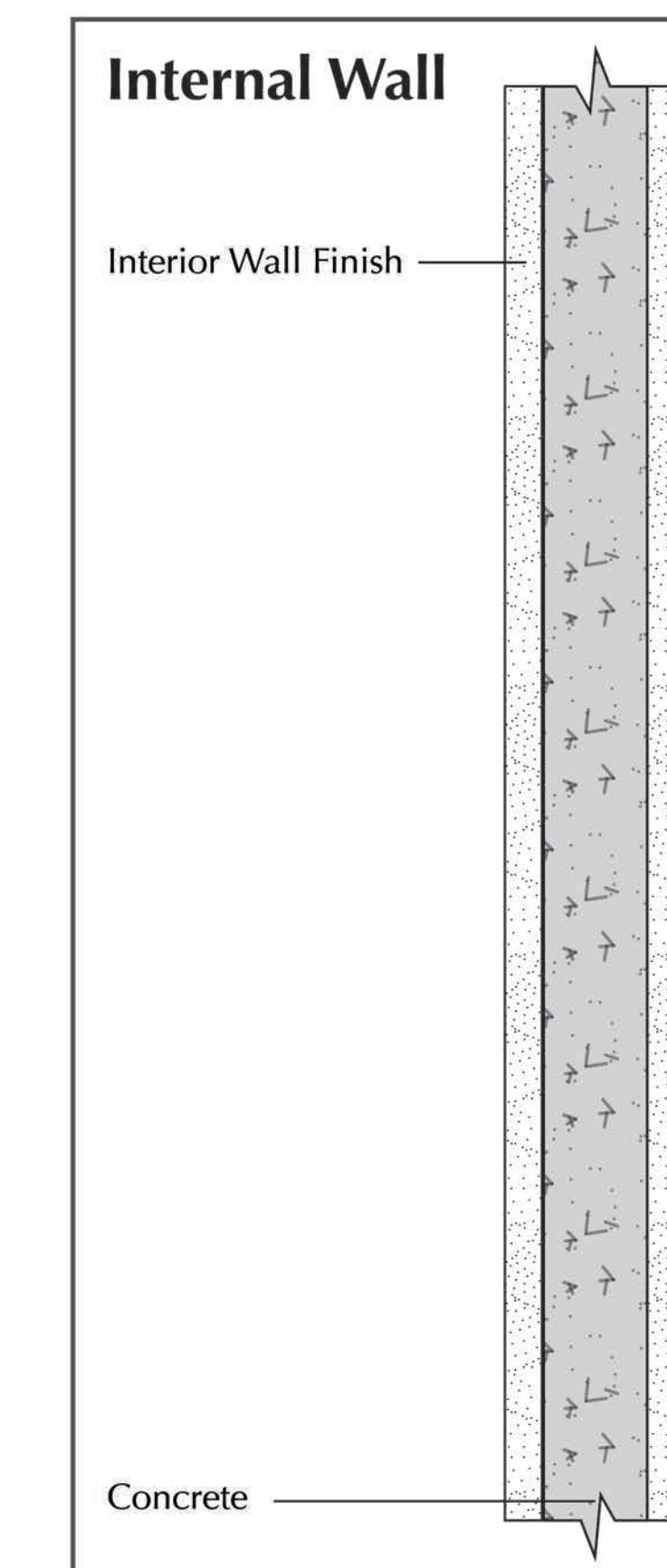
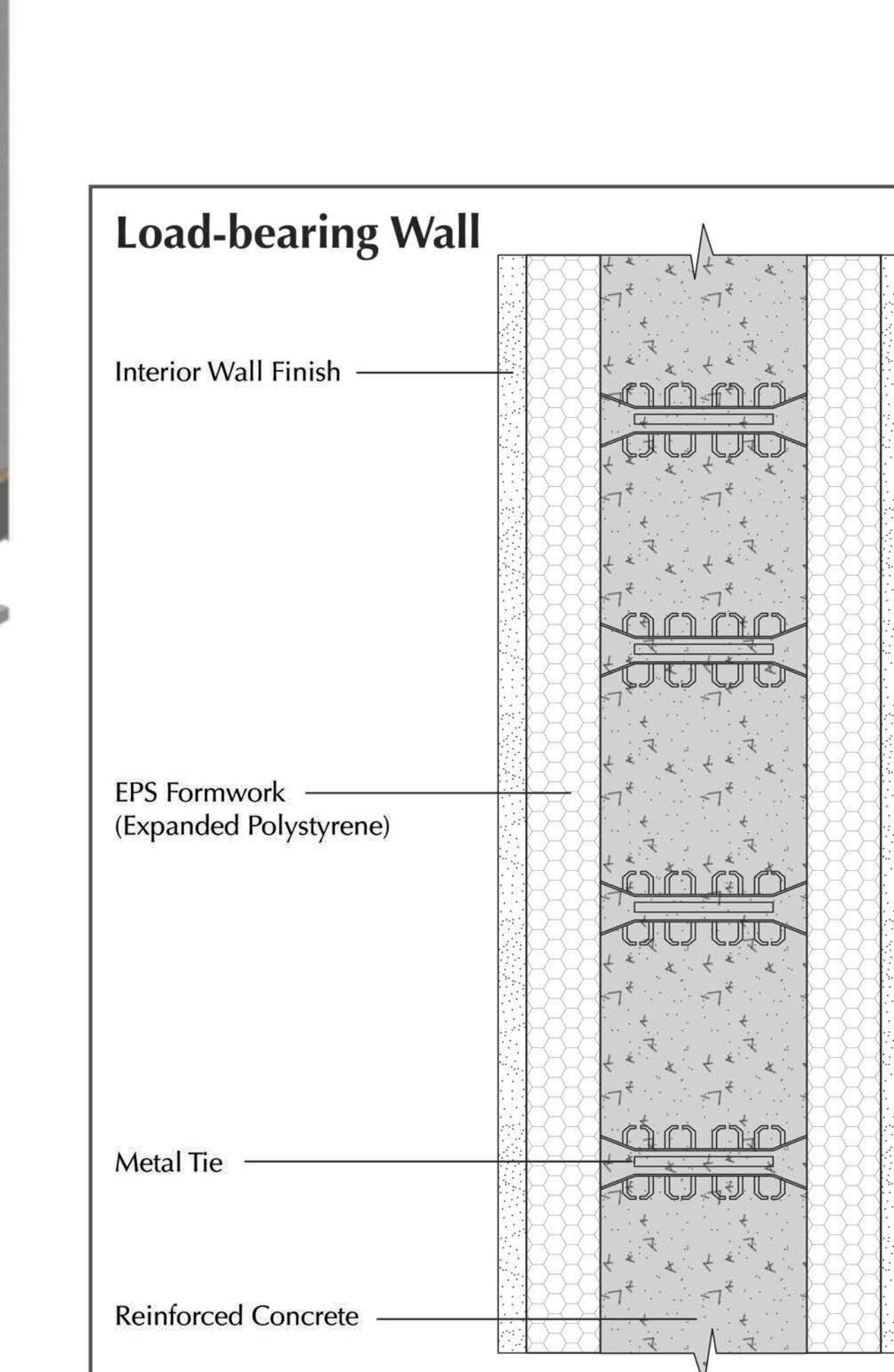
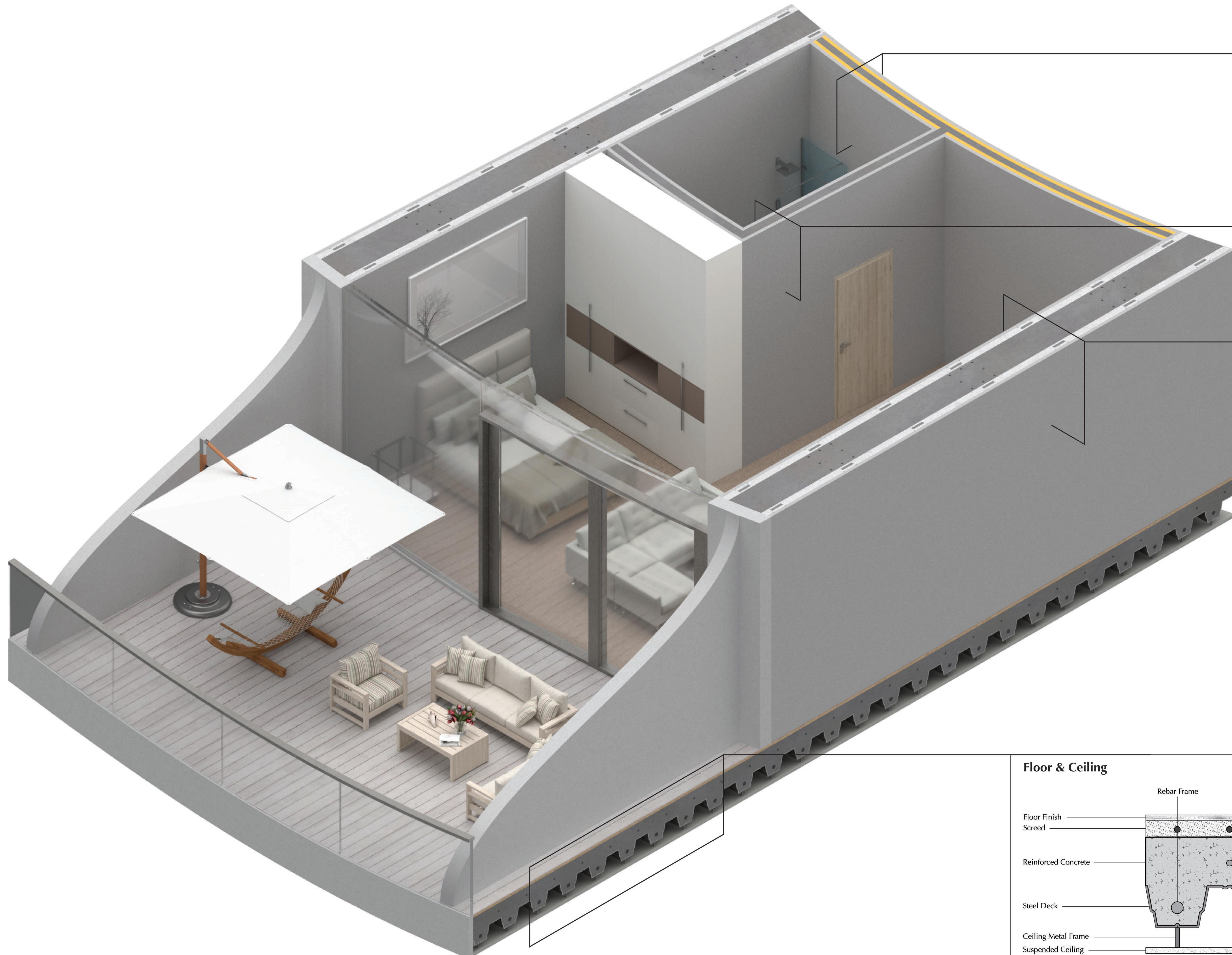


Shading & Glazing

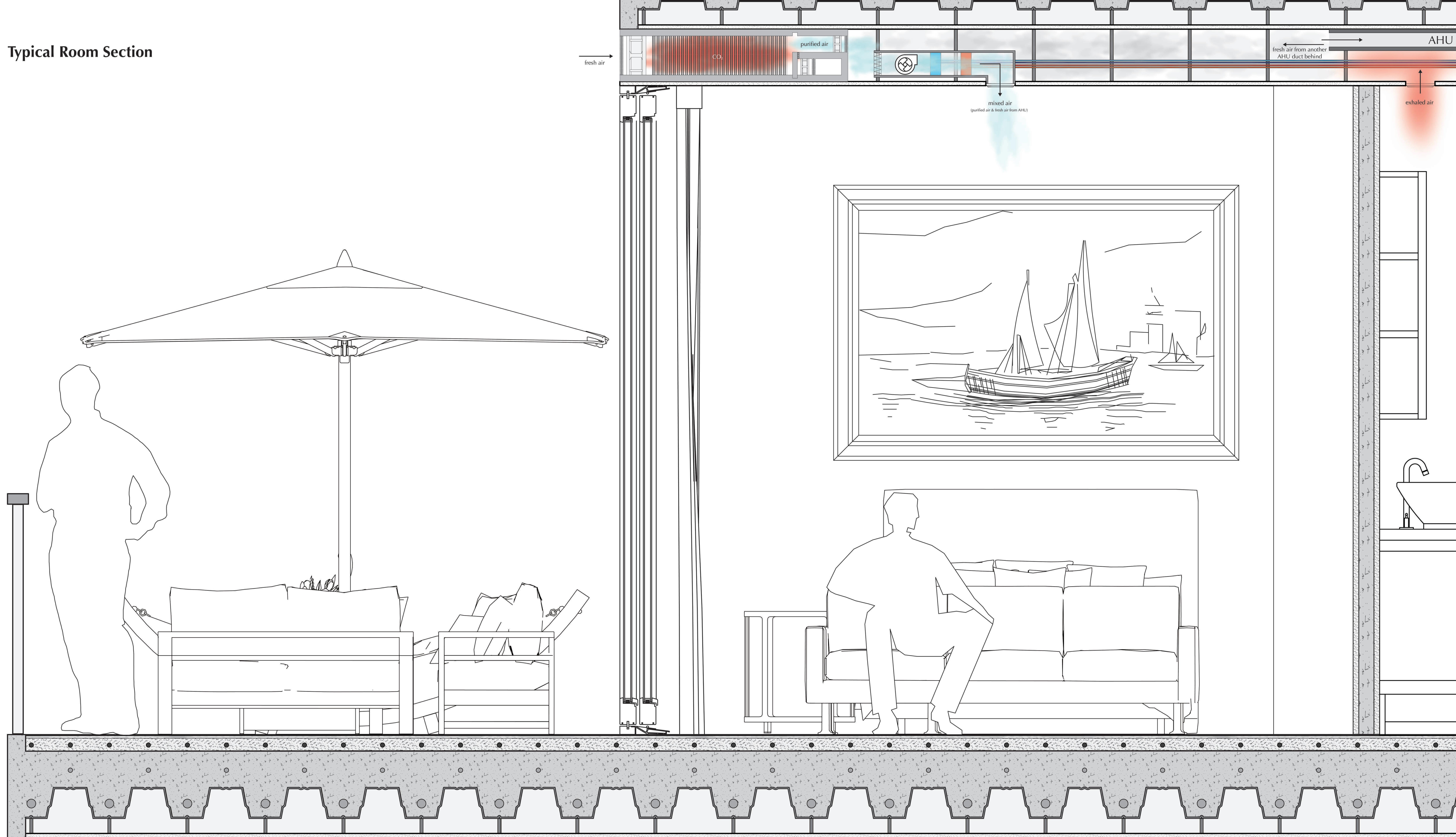
Sunlight Hours Analysis



Typical Room

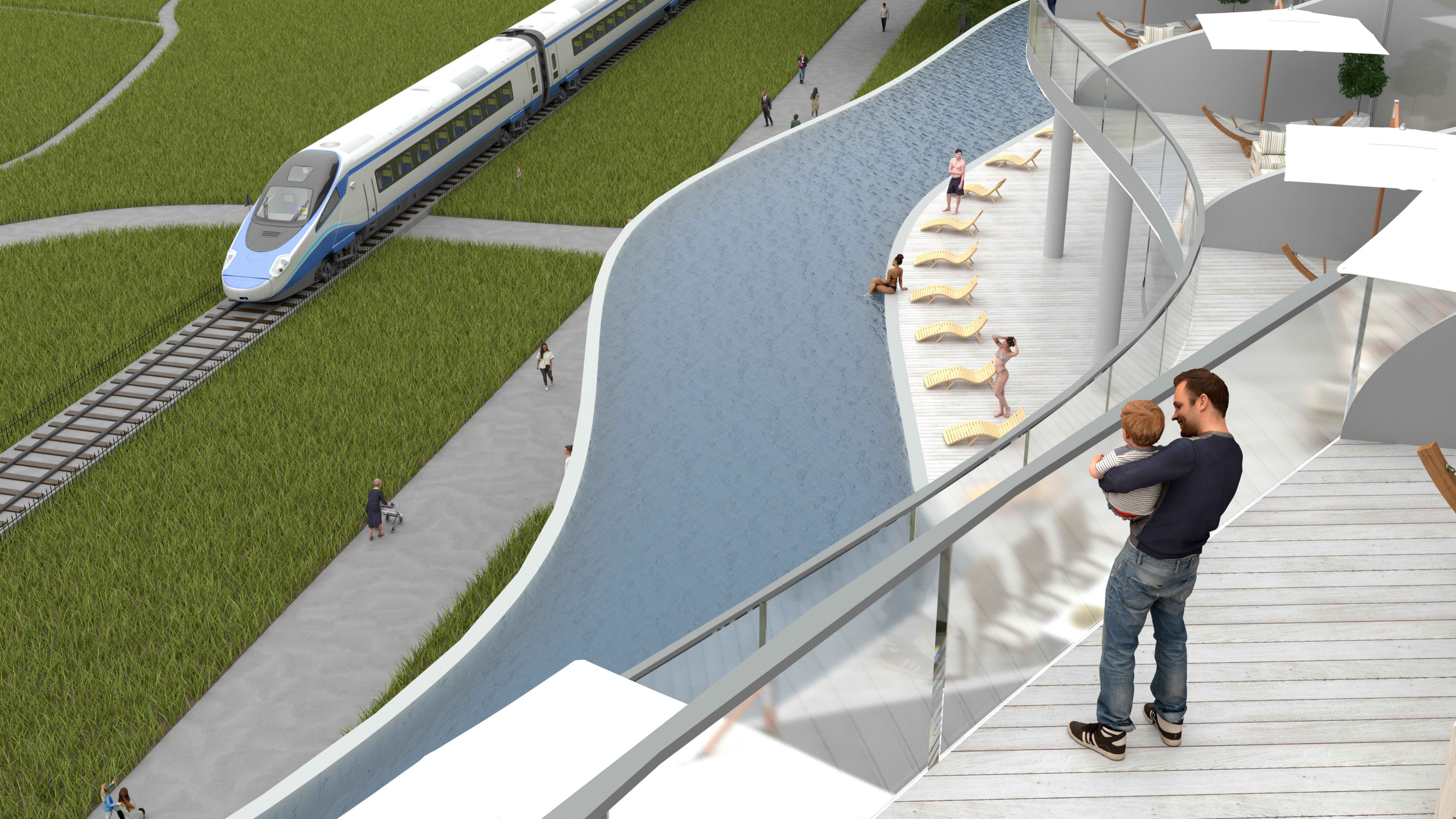


Typical Room Section





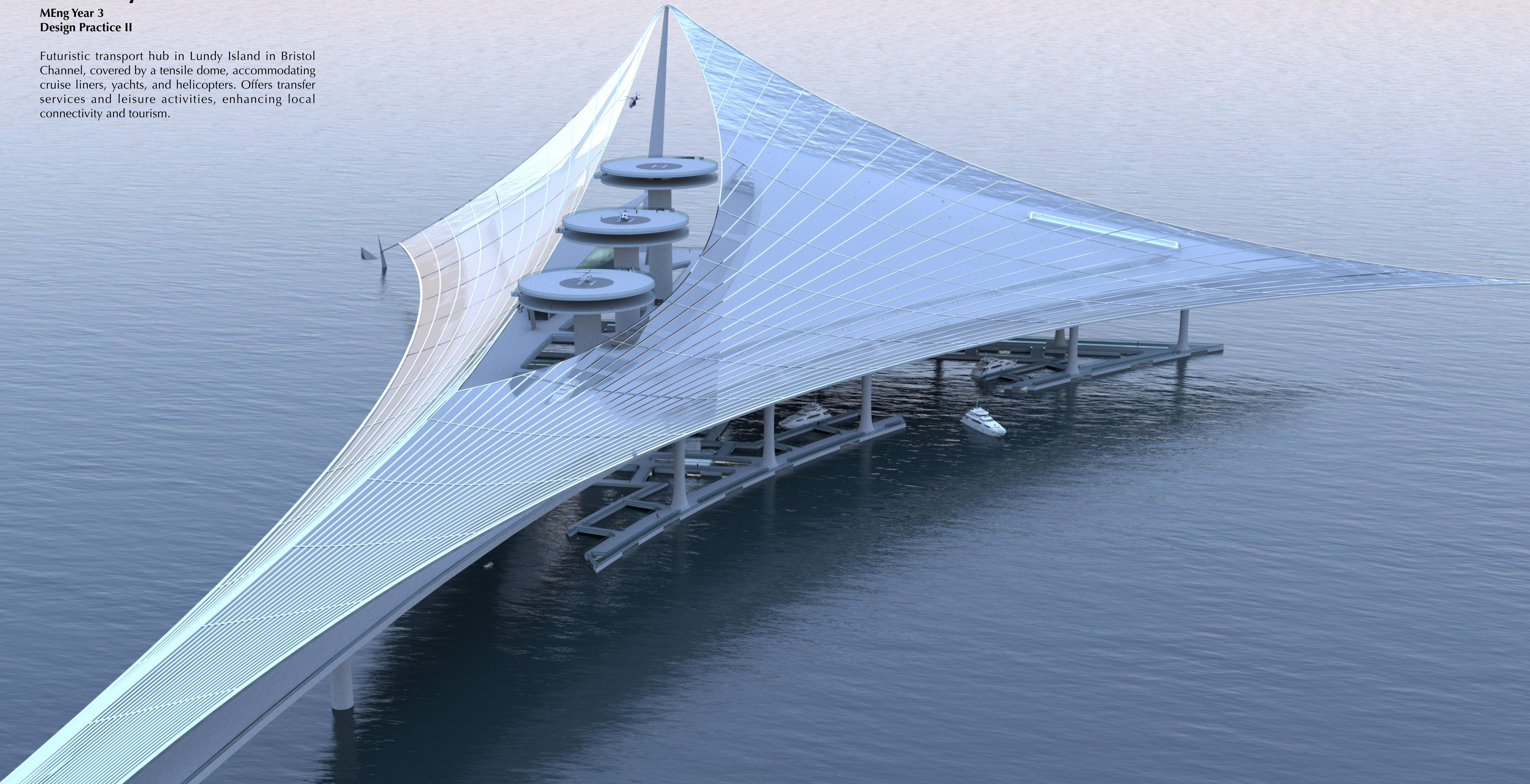


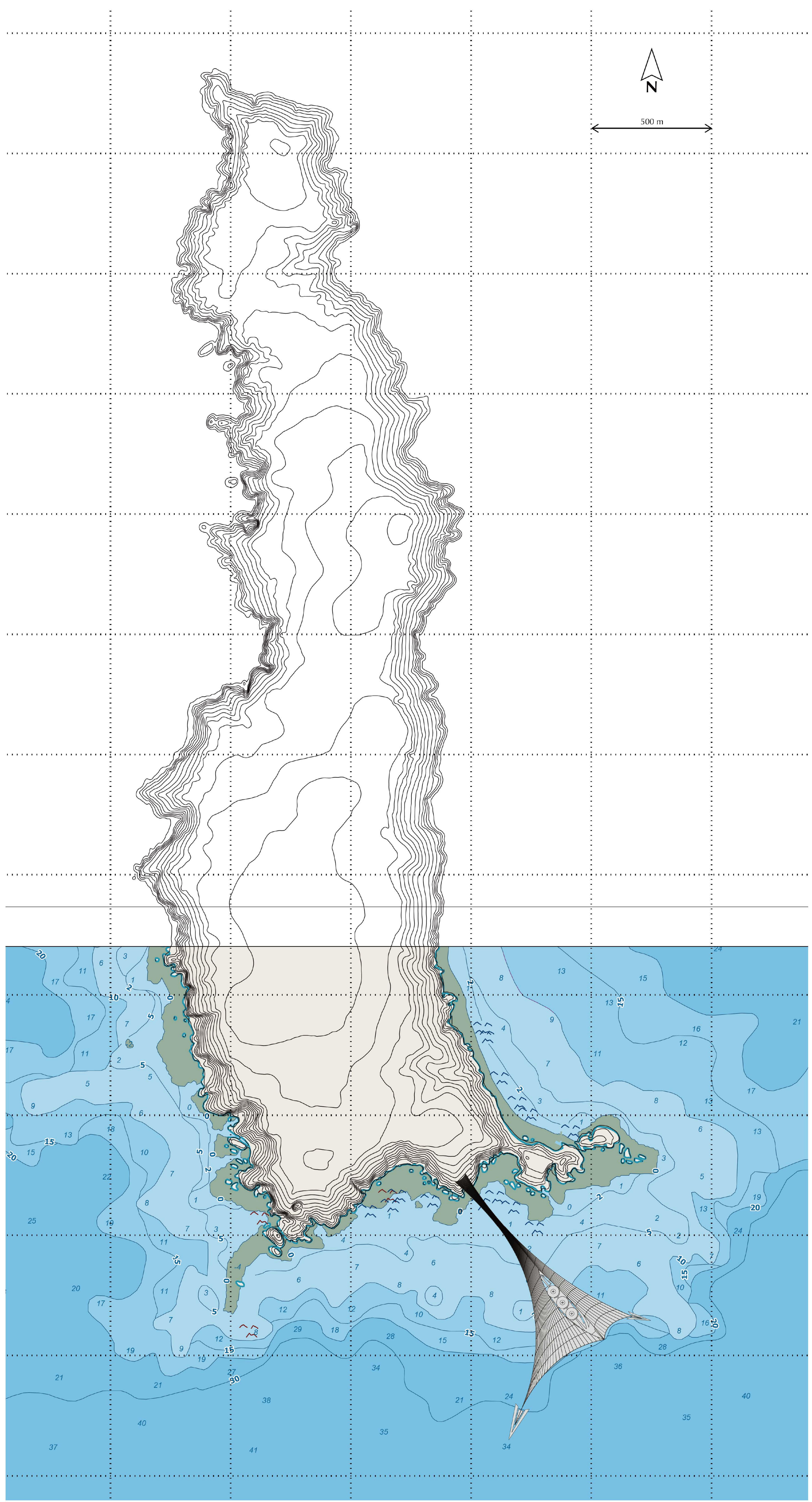


Lundy Terminal

MEng Year 3
Design Practice II

Futuristic transport hub in Lundy Island in Bristol Channel, covered by a tensile dome, accommodating cruise liners, yachts, and helicopters. Offers transfer services and leisure activities, enhancing local connectivity and tourism.



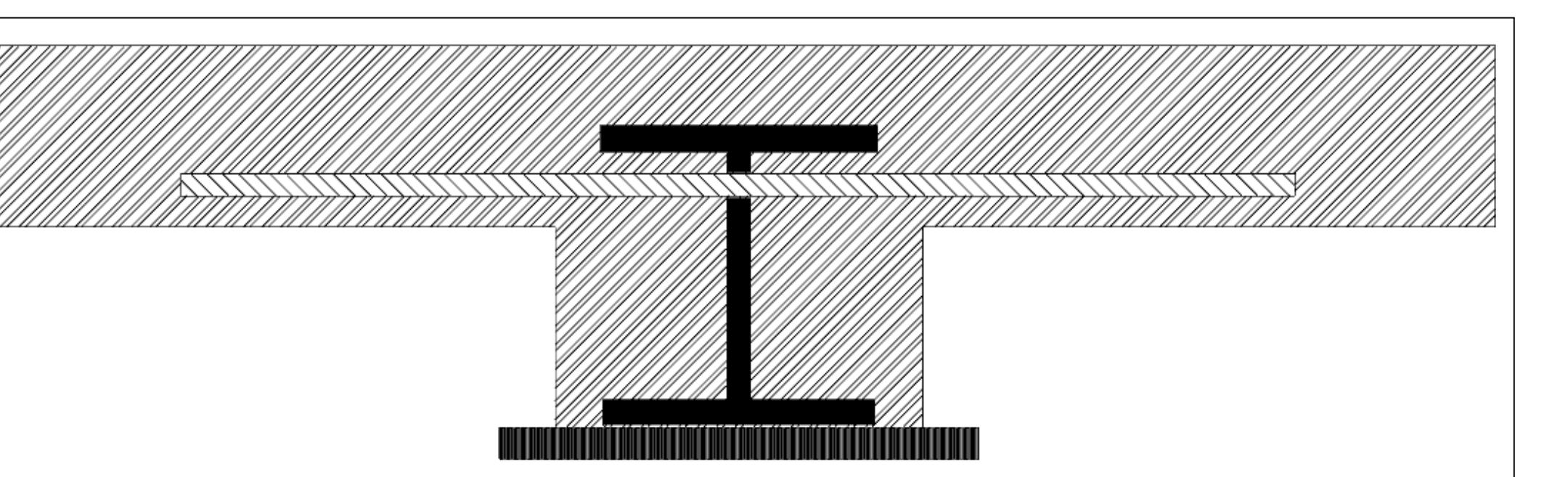


Site Plan

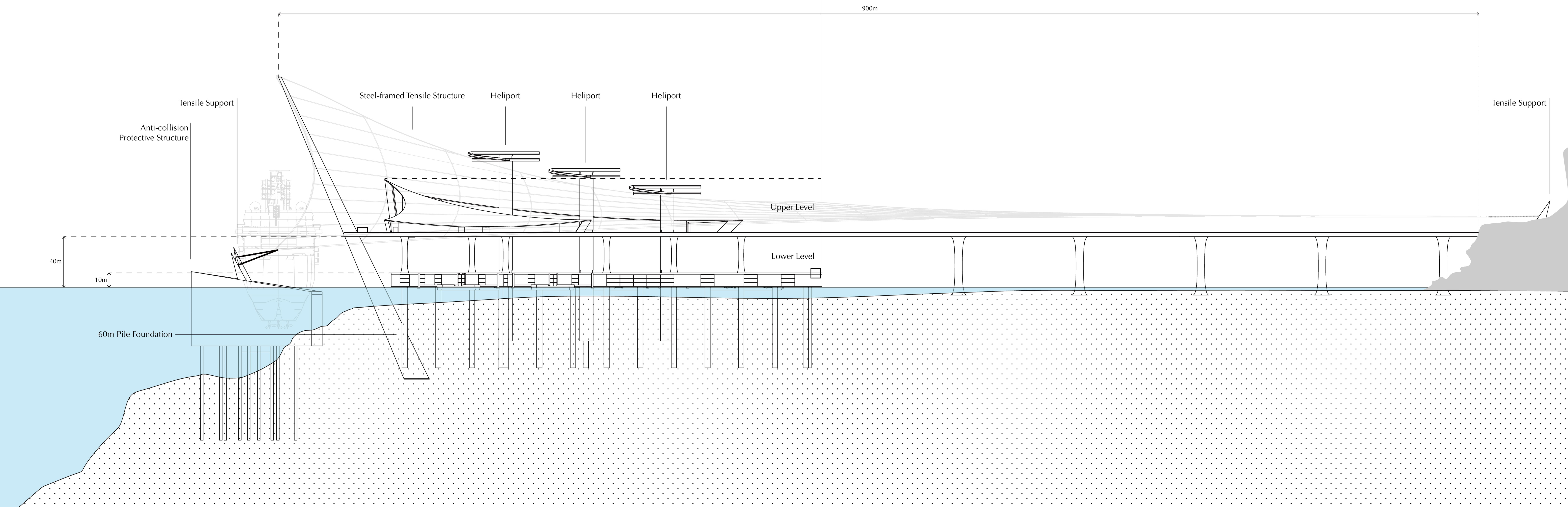
The terminal is covered by a steel-framed tensile structure divided into two levels, an upper level acting as the cruise port containing the leisure areas and functional areas like a circulation hall, ticket office, and a lower level acting as the pier/dock for ferries, ocean liners and smaller ships and vessels to dock and operate. Above the upper level, there are three separate heliports, each allocated at the top of a central column, which contains lifts and sets of stairs within which to provide access and interconnection between the levels and the heliports.

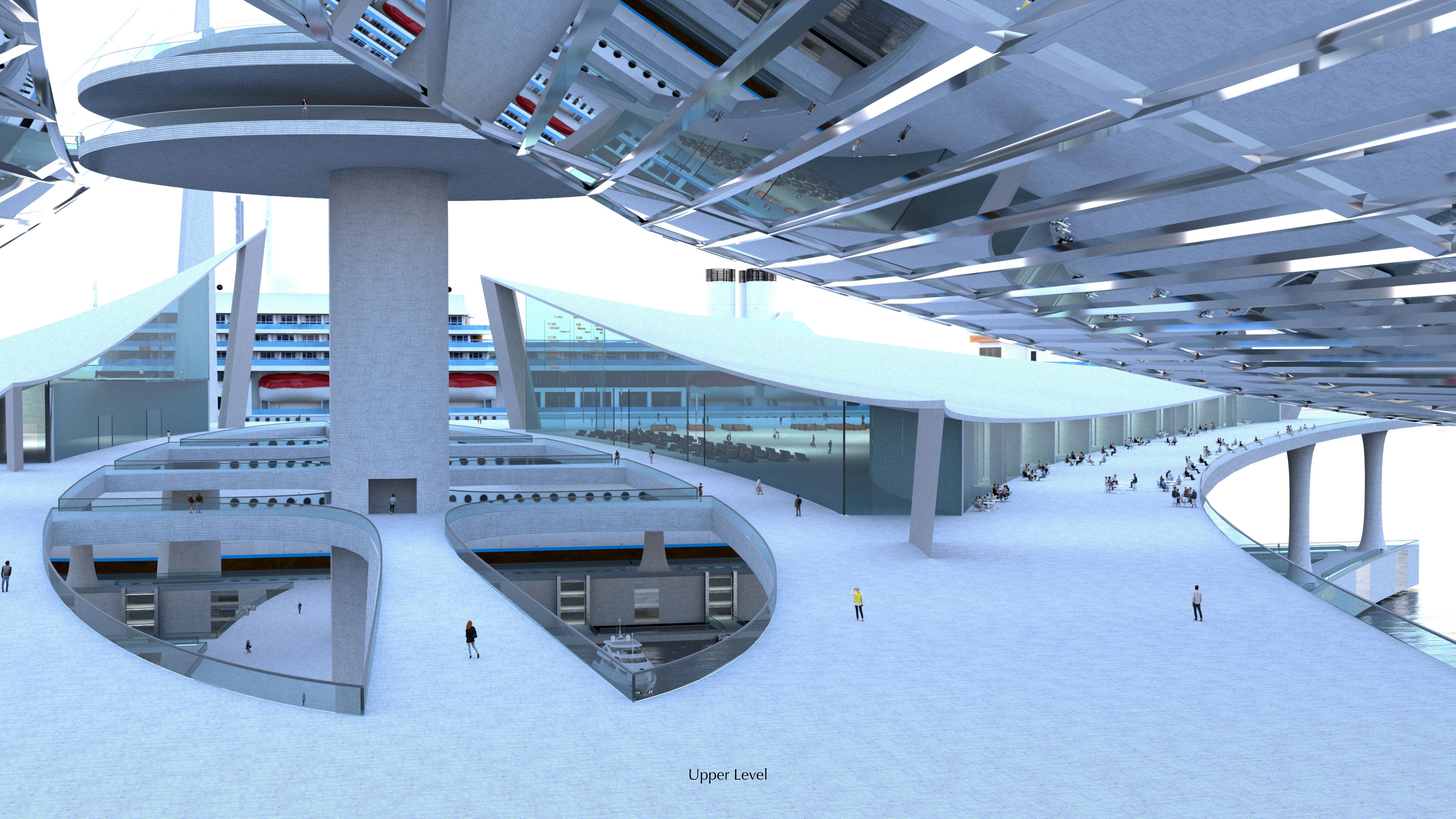
The upper level is 40 meters above the sea level (low tide) to allow access for the majority of different sized vessels to the lower level and to shelter the lower level from solar exposure and rain, and the top of the lower level is 10 meters above the sea level (low tide). The upper level is firmly supported by the lower level, a four-storey, solid-concrete building supported by pile foundations.

All slabs use composite slim floor solution, which embeds steel beams into the planks by connecting in-situ concrete with the beams like a dowel, to trim down the thickness of the slab to minimise the weight of the structure and the cost while saving valuable vertical spaces for the lower level, as the height of each storey of the lower level is directly proportional to the distance between the main structure of the lower level and the floating dock which shall be kept as small as possible while maintaining the ratio of rise no larger than 1:5. The thicknesses of the top slab of the lower level and the floor slab of the top level are 0.4m and 2.0m respectively.

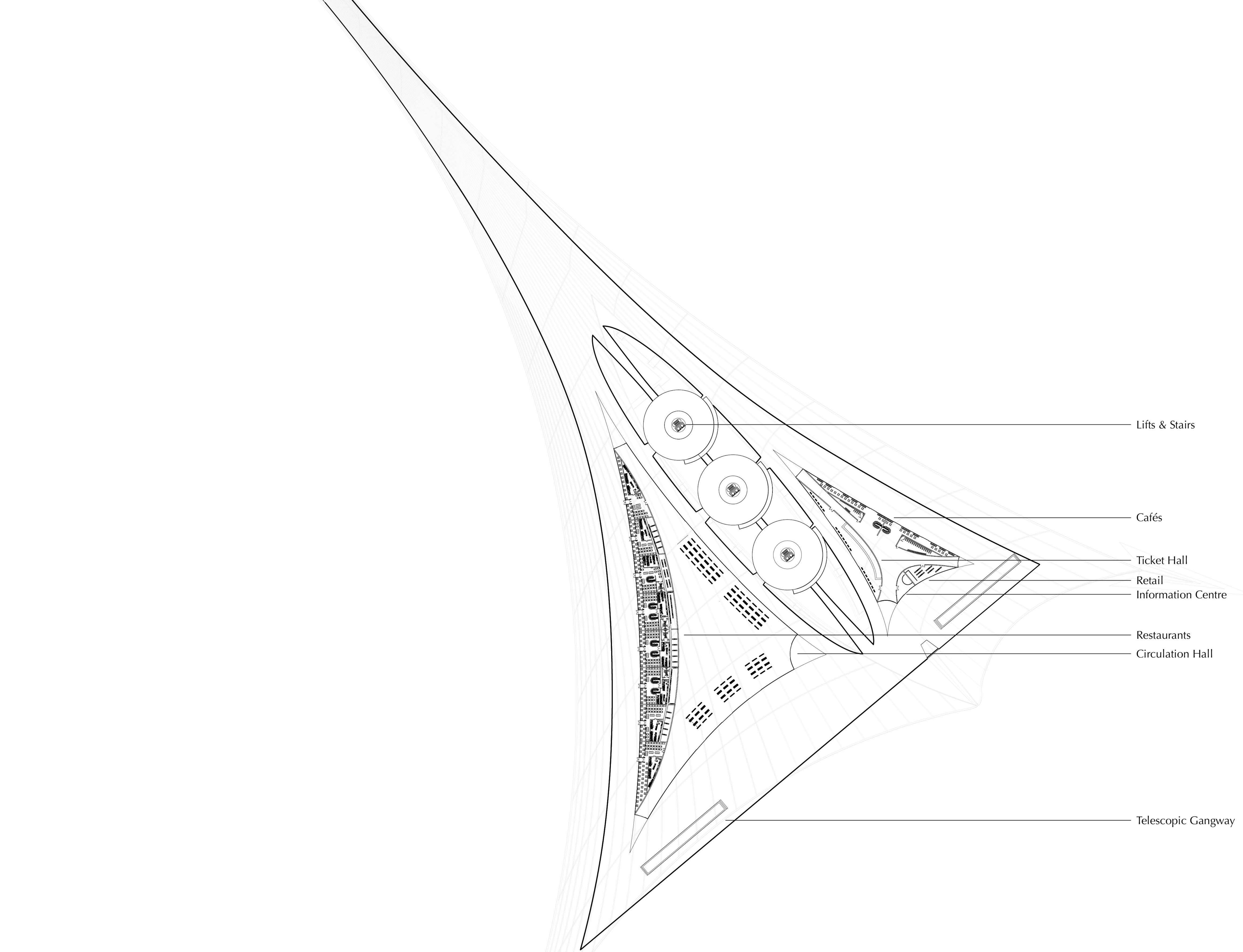


Composite Slim Floor Beam (CoSFB)

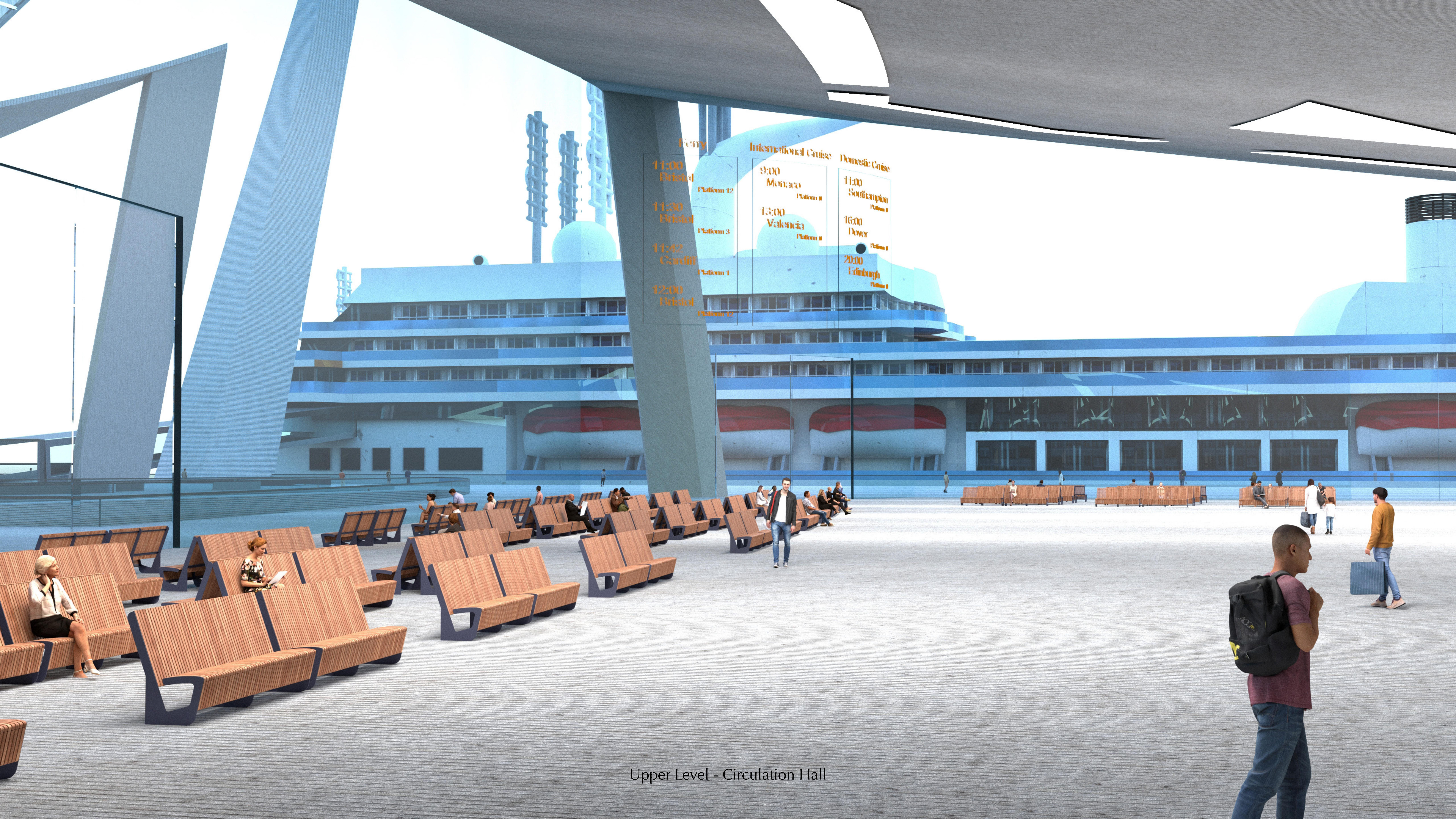




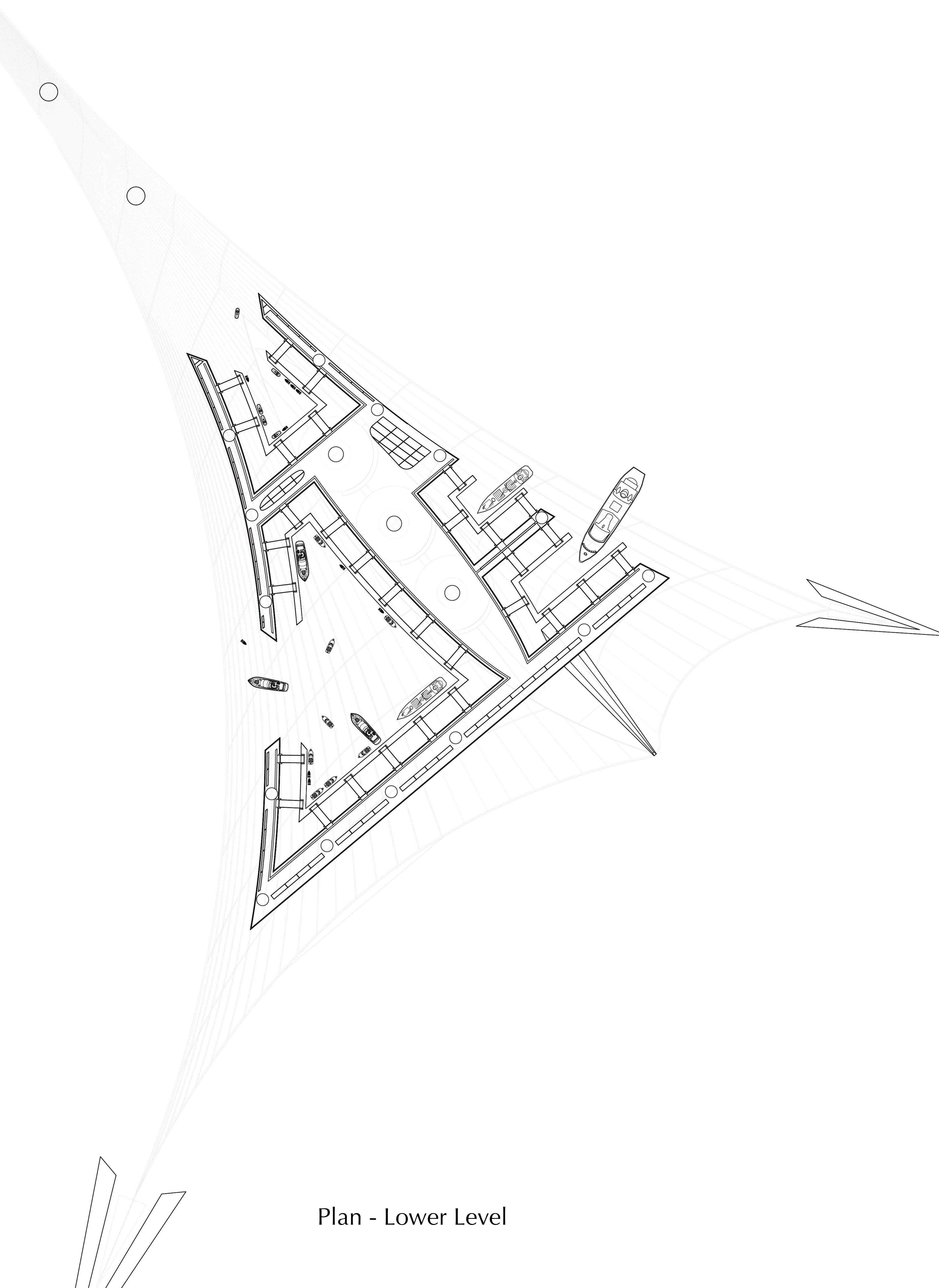
Upper Level



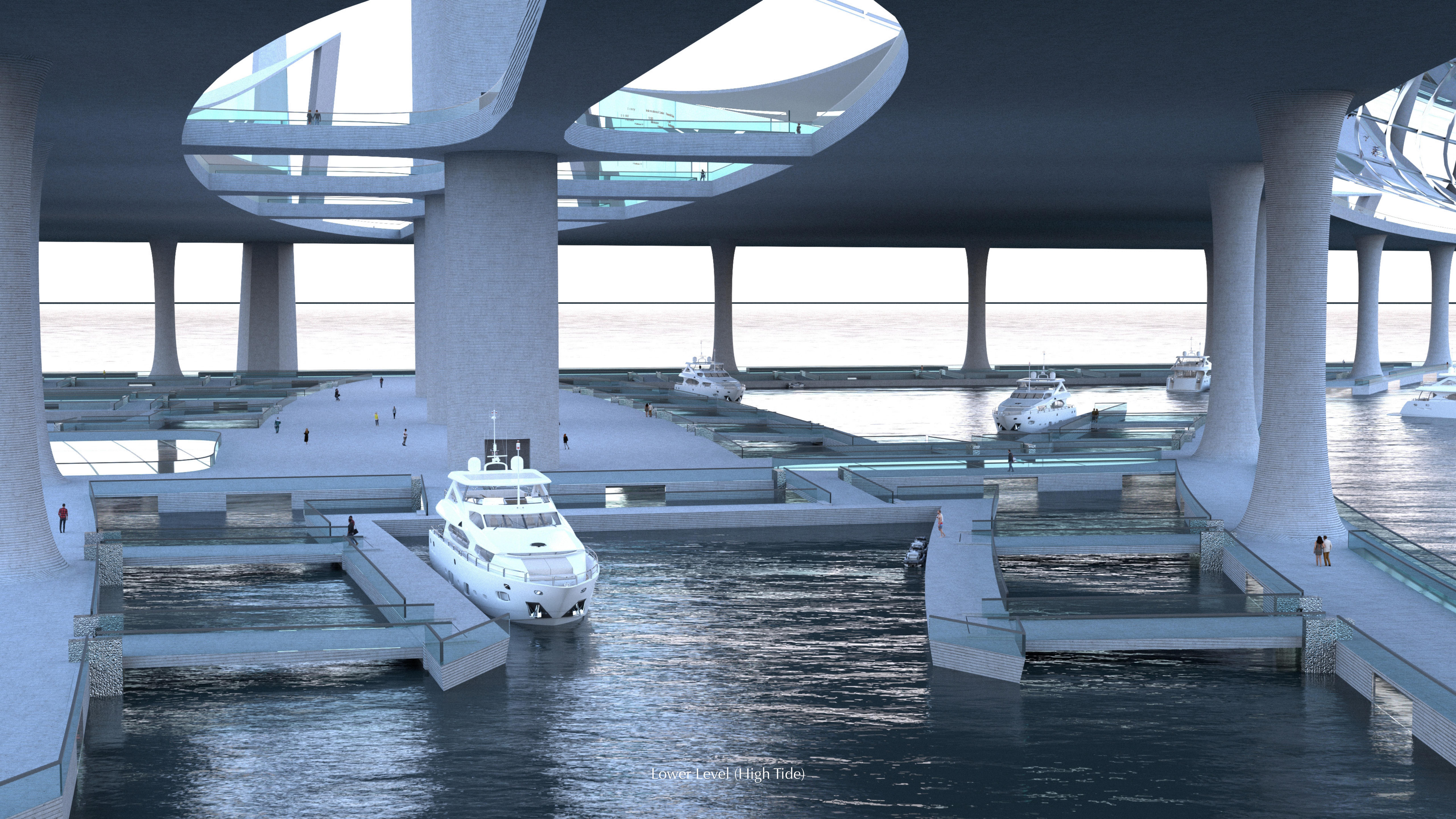
Plan - Upper Level Function



Upper Level - Circulation Hall

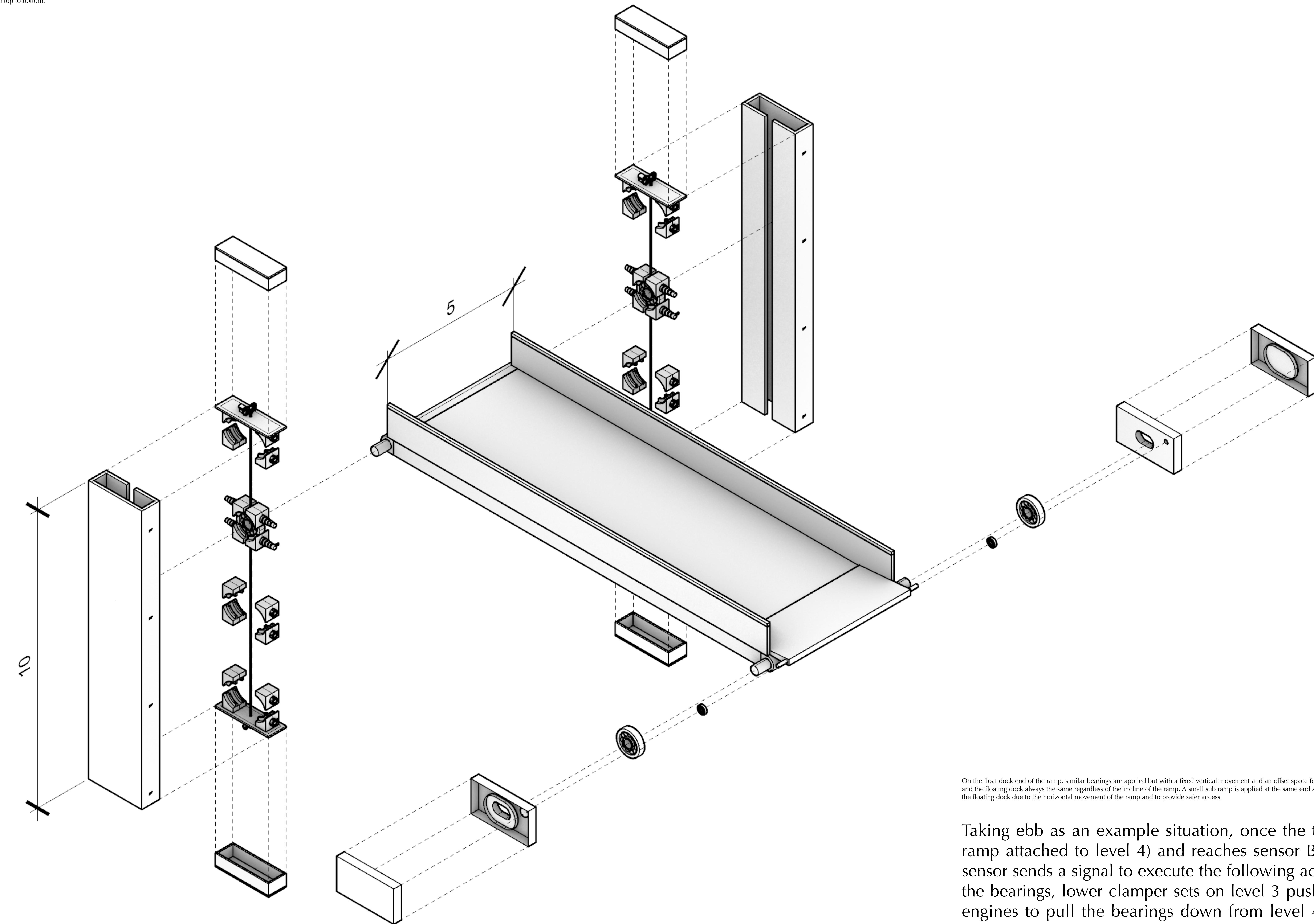


Plan - Lower Level

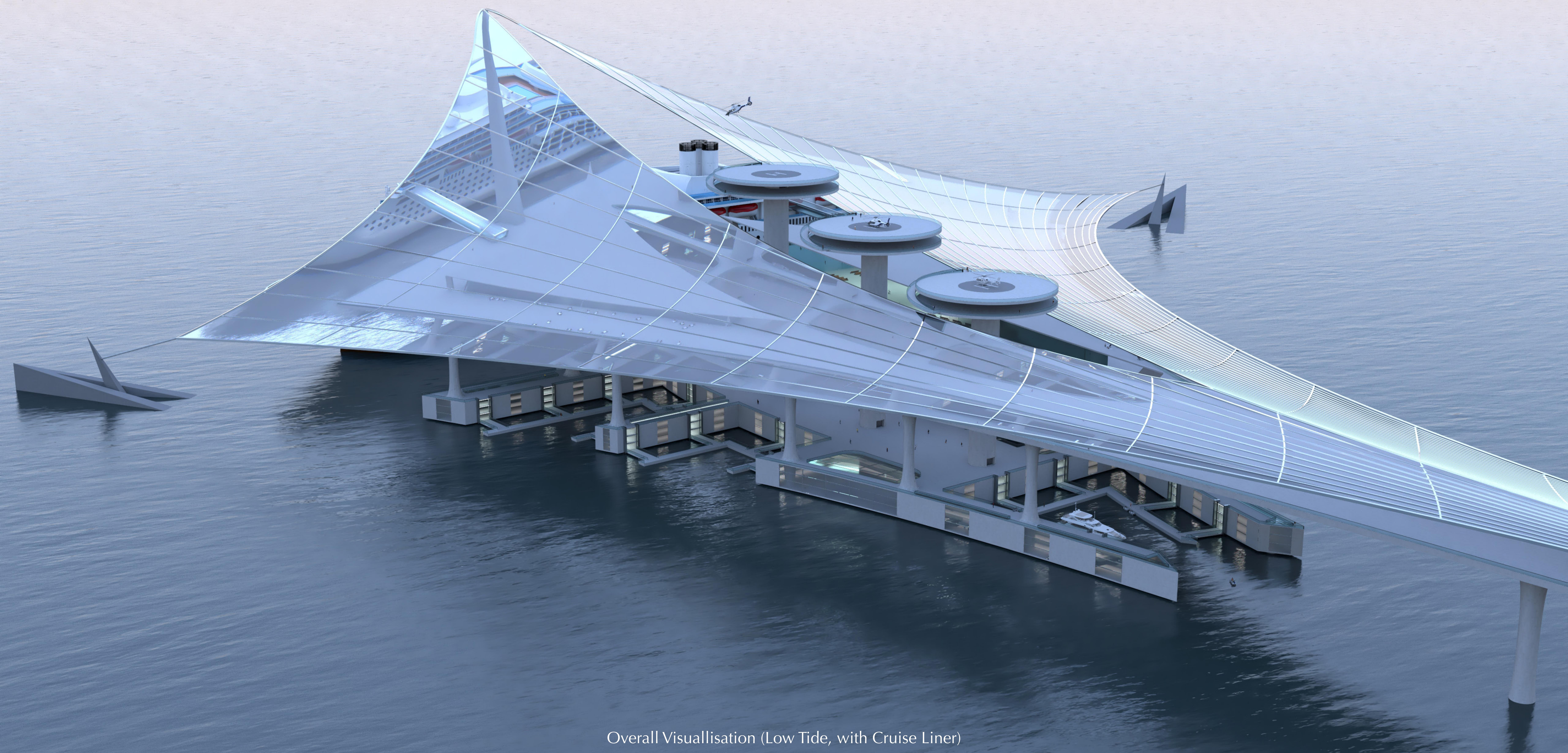


Lower Level (High Tide)

The greatest challenge Lundy brought to the lower level, which acts as a pier, was the huge 8.5-meter tide difference. A four-storey rigid main structure was designed for the lower level. A floating dock is set within each docking bay. A detachable ramp system was designed to connect the floating dock and the respective level of the main structure according to the tide situation. The ramp is fixed to a rail on each side through the circular beam that is fixed with the bearing located within the rail to allow unrestricted horizontal rotation. Each bearing is attached through steel ropes to two engines, respectively found on both ends of the rail. Four sets of clamps are set within each rail, each horizontally parallel to the four levels of the main structure of the lower level. A sensor for each set is distributed 0.22 meters below the centre of the respective set of clamps, named sensor A to D from top to bottom.



Detachable Ramp System Configuration




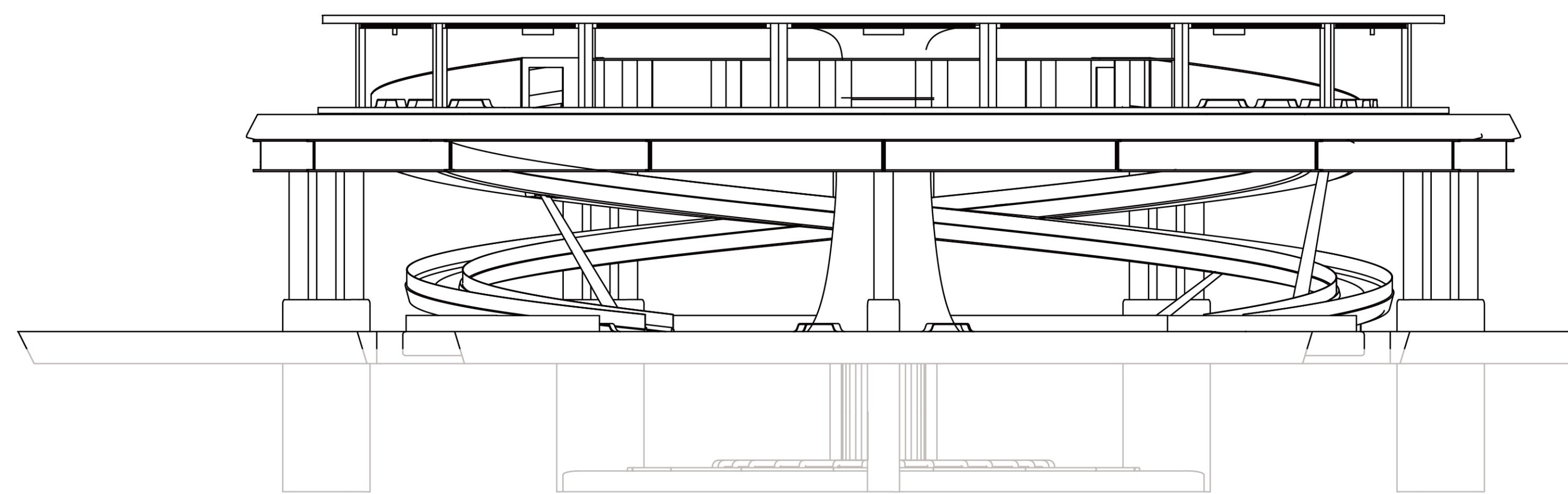
Overall Visualisation (Low Tide, with Cruise Liner)

the Waterdrop

MEng Year 2
Design Practice I Project II

Off-shore railway station with an integrated pier in Dungeness, England, providing seamless train-to-boat transfers. Enhances coastal access and connects to adjacent towns via waterways.





Upper Level - Train Station
Railway

Lower Level - Pier
Harbour Entrance

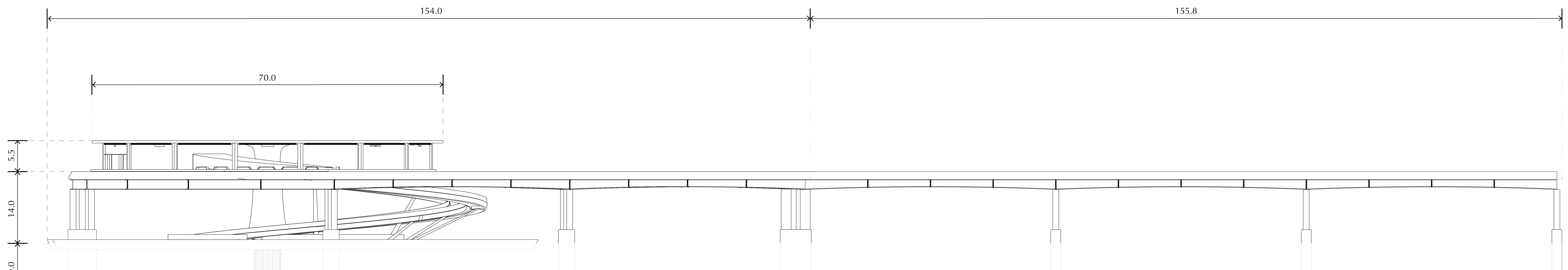
Under Water - Foundation

The design comprises a bridge and the main structure. The bridge extends the railway from the coast due south for 150.8 meters, then it diverges and forms a loop. The trains heading to the new station turn into the east diversion to enter the loop, going in clockwise direction, then exit the loop from the western diversion. The loop has a radius of 40 meters.

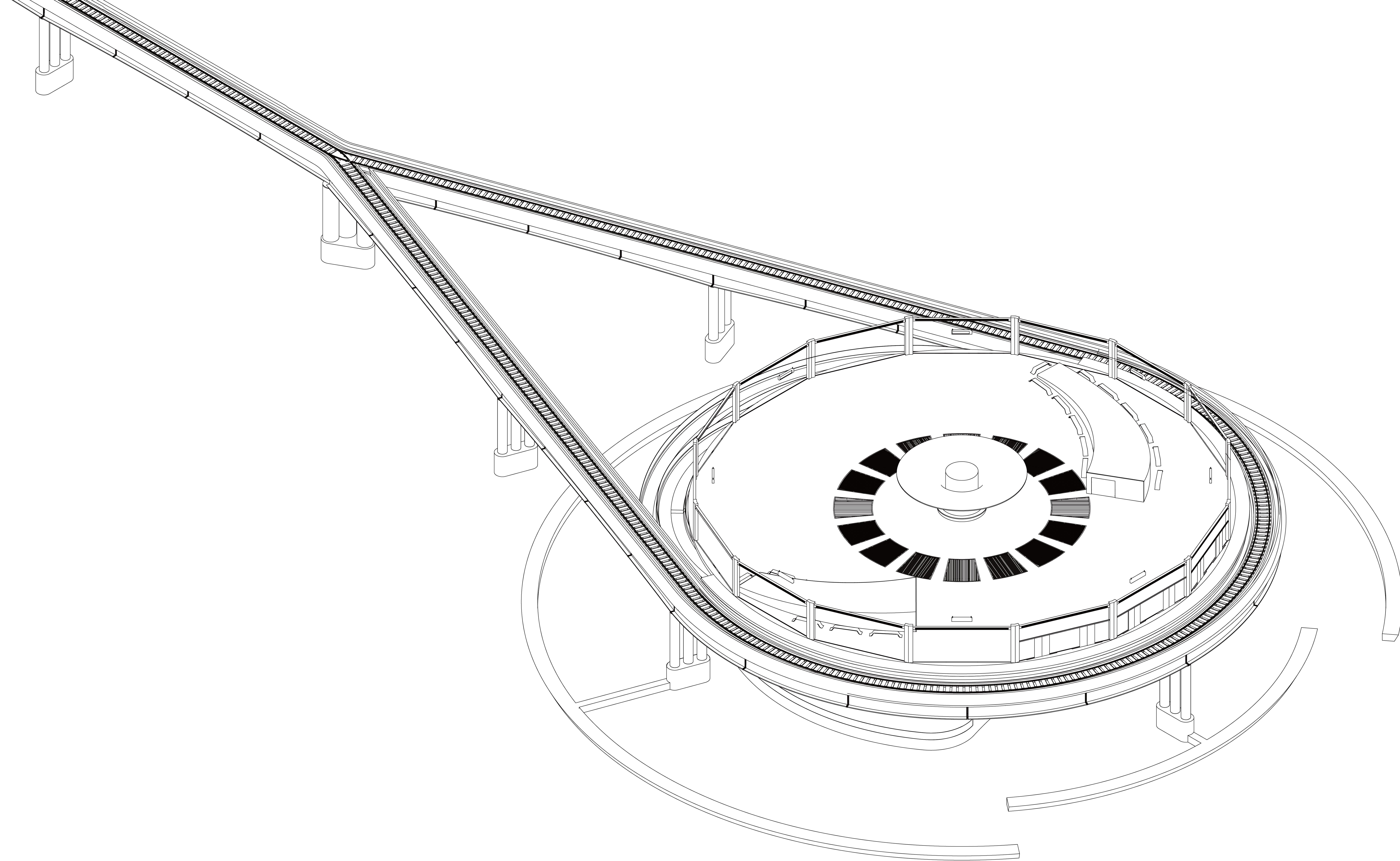
The main structure is divided into two levels. An upper level containing the train station and a lower level for the pier. Two levels are connected via two one-way helix ramps to diverge passengers heading to for different transports.

The train station, the upper level is cooled by a water cooling system, which cools the air by cycling the water within the system cooled by seawater at the lower radiators located on the foundation of the main structure under water shown in dimmer curves.

Front View

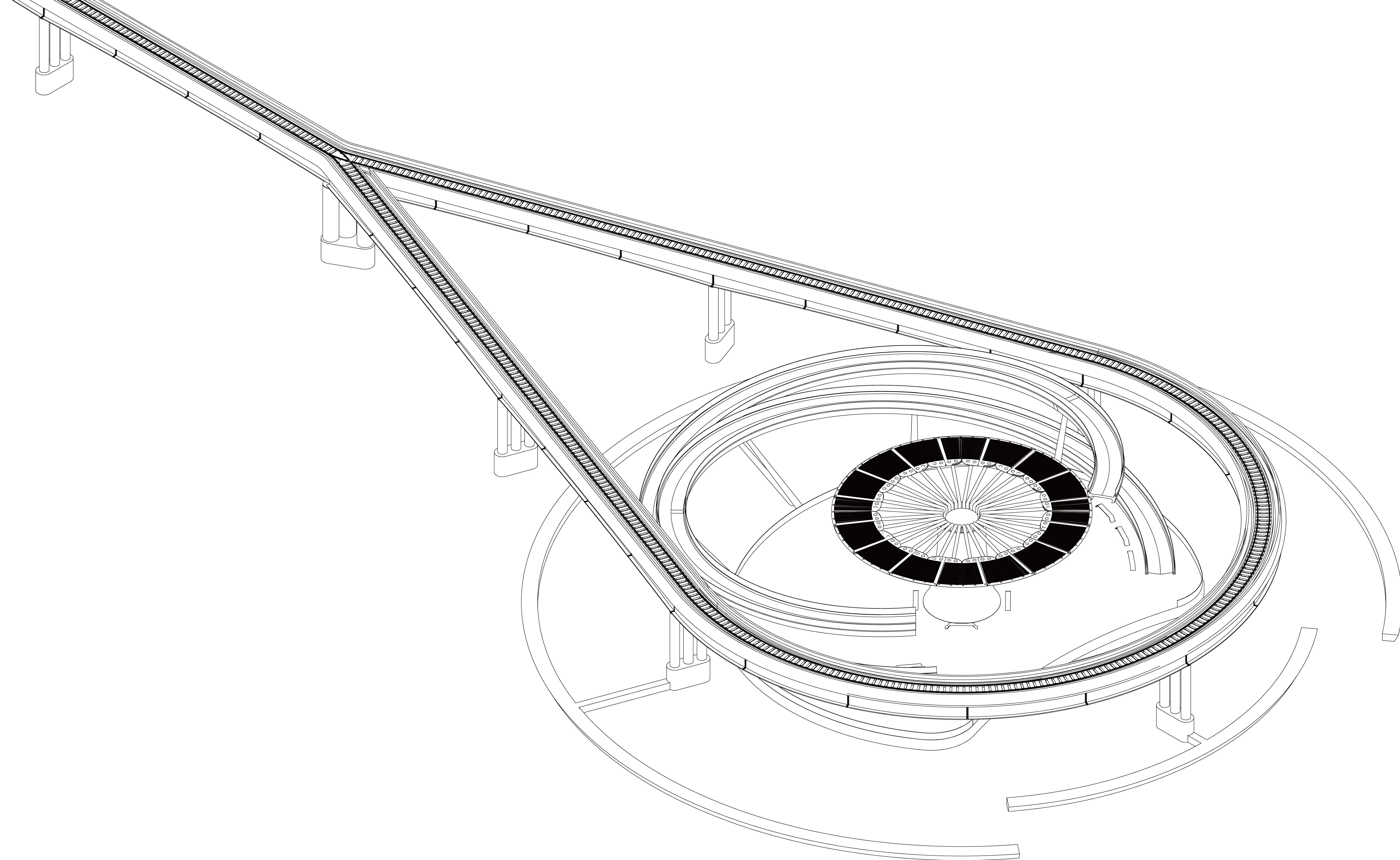


Elevation View




Isometric View

Above Water - Upper Level (Train Station)



Isometric View

Above Water - Under Upper Level

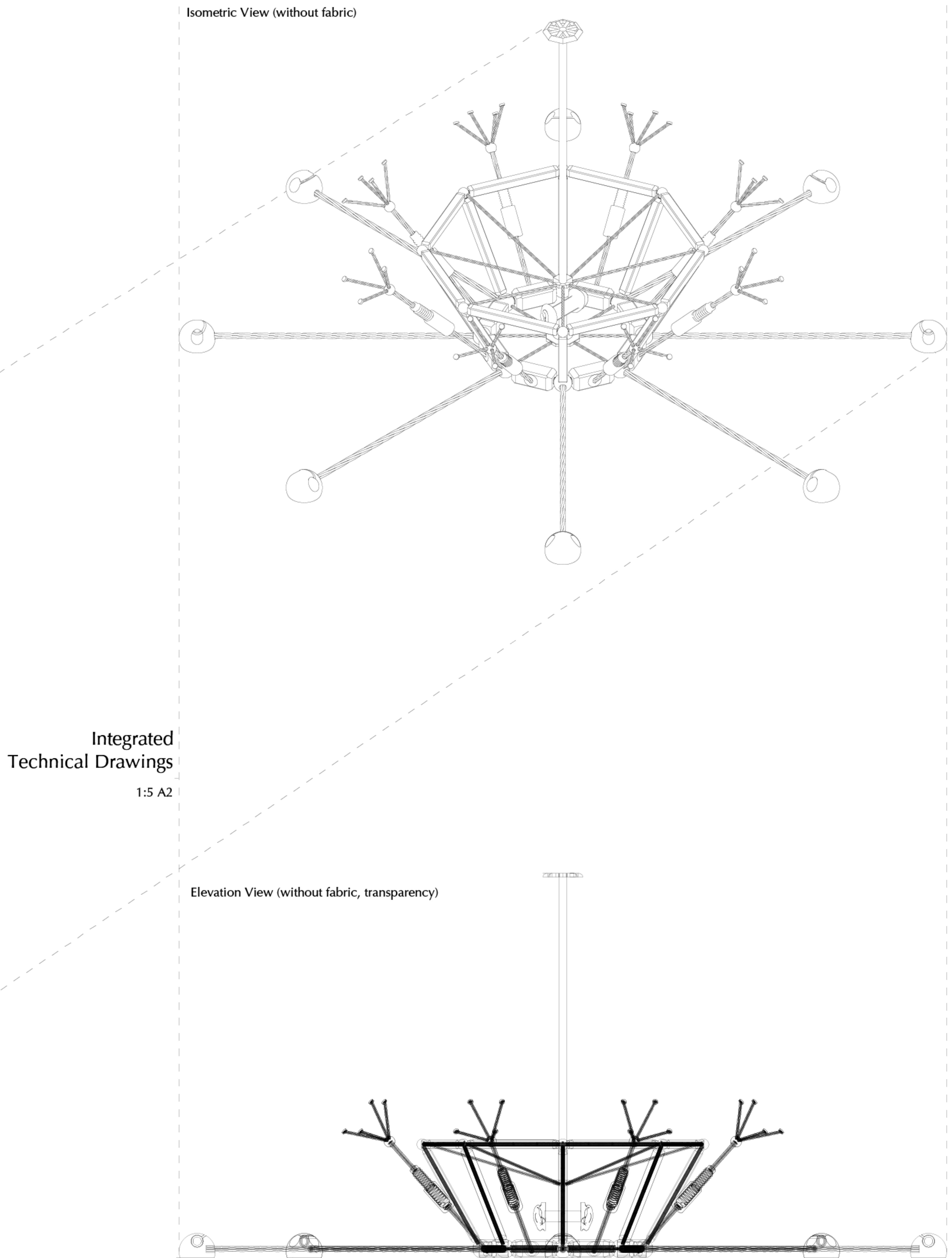
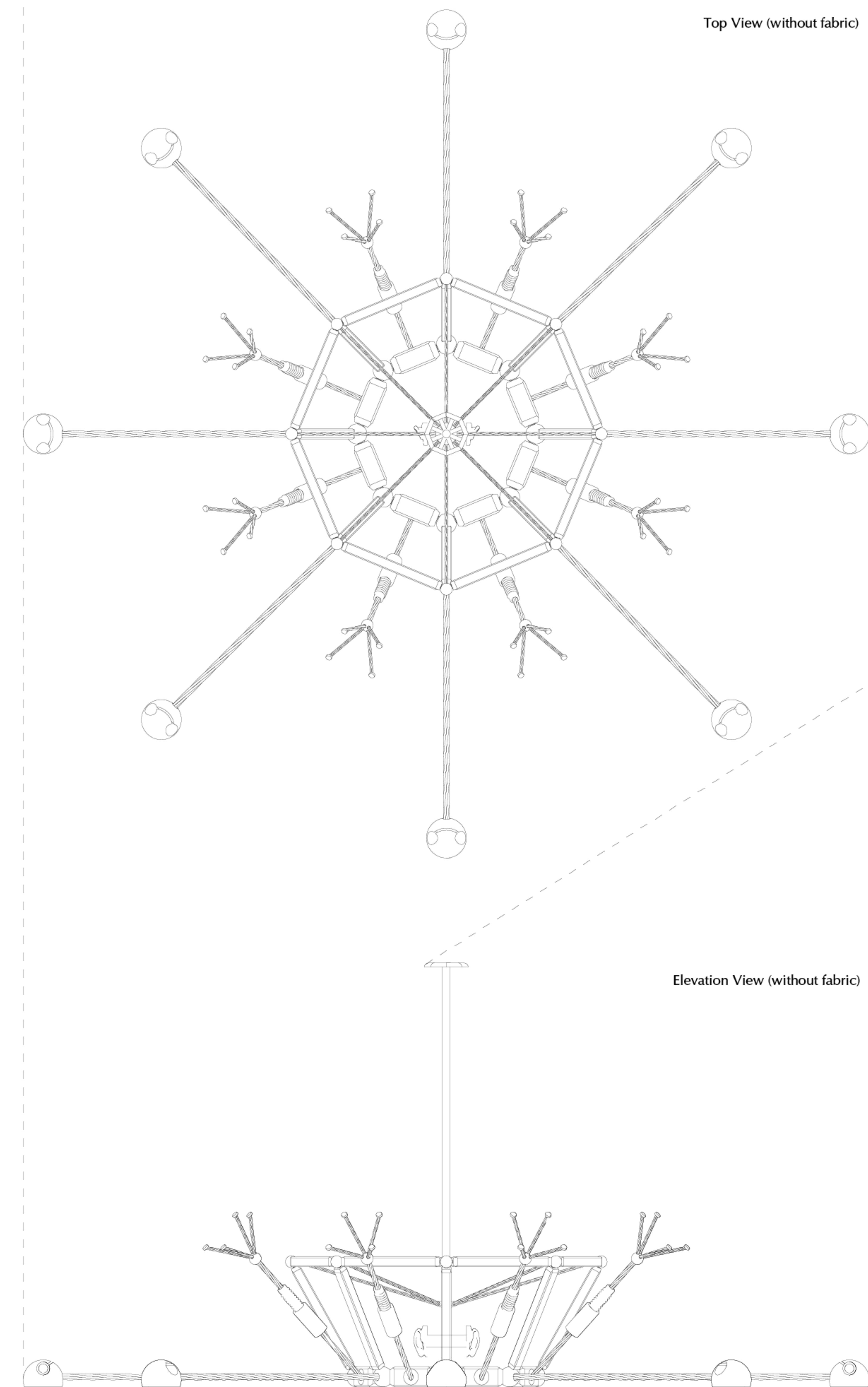


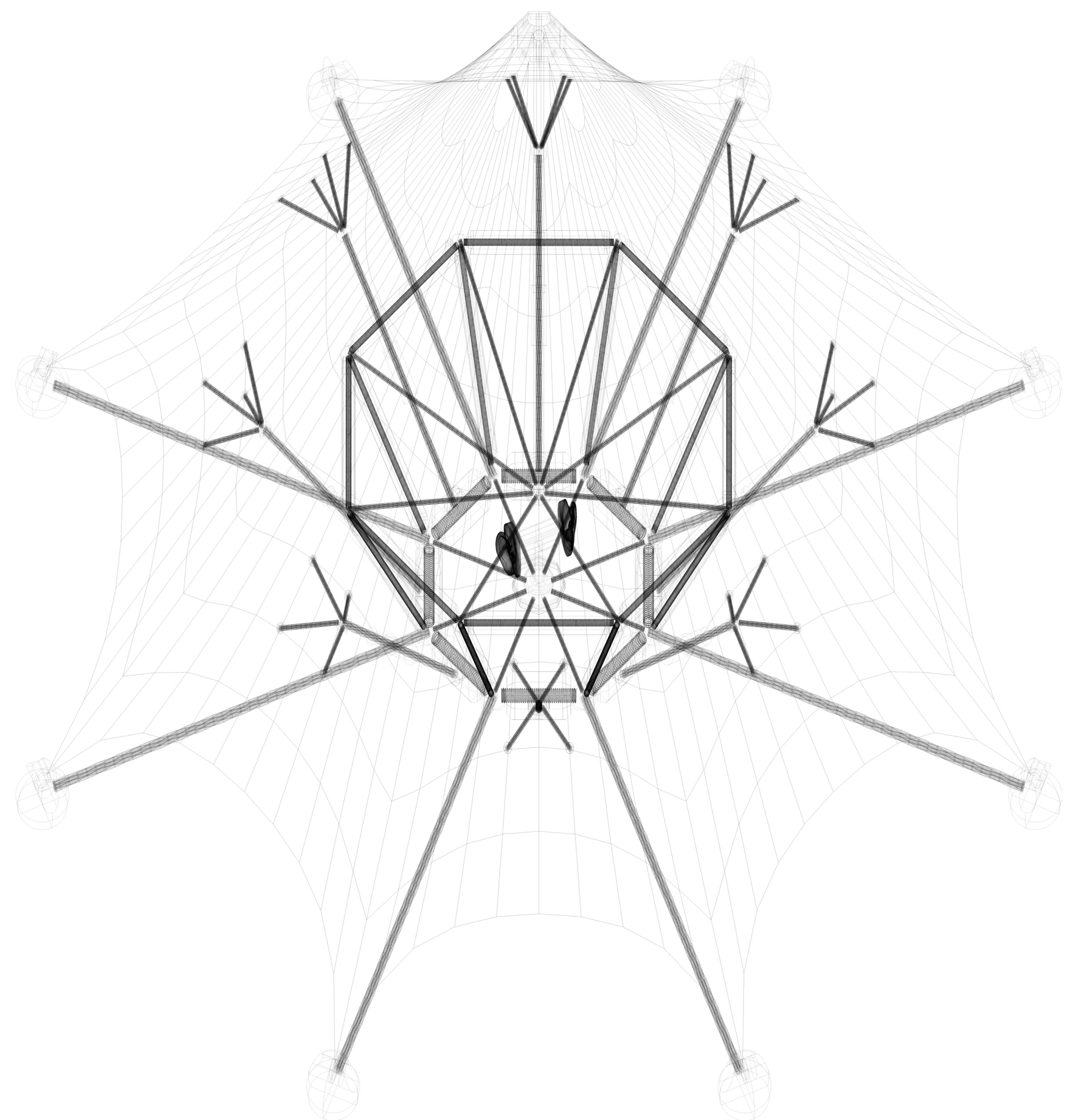
the Octagon

MEng Year 2
Design Practice I Project I

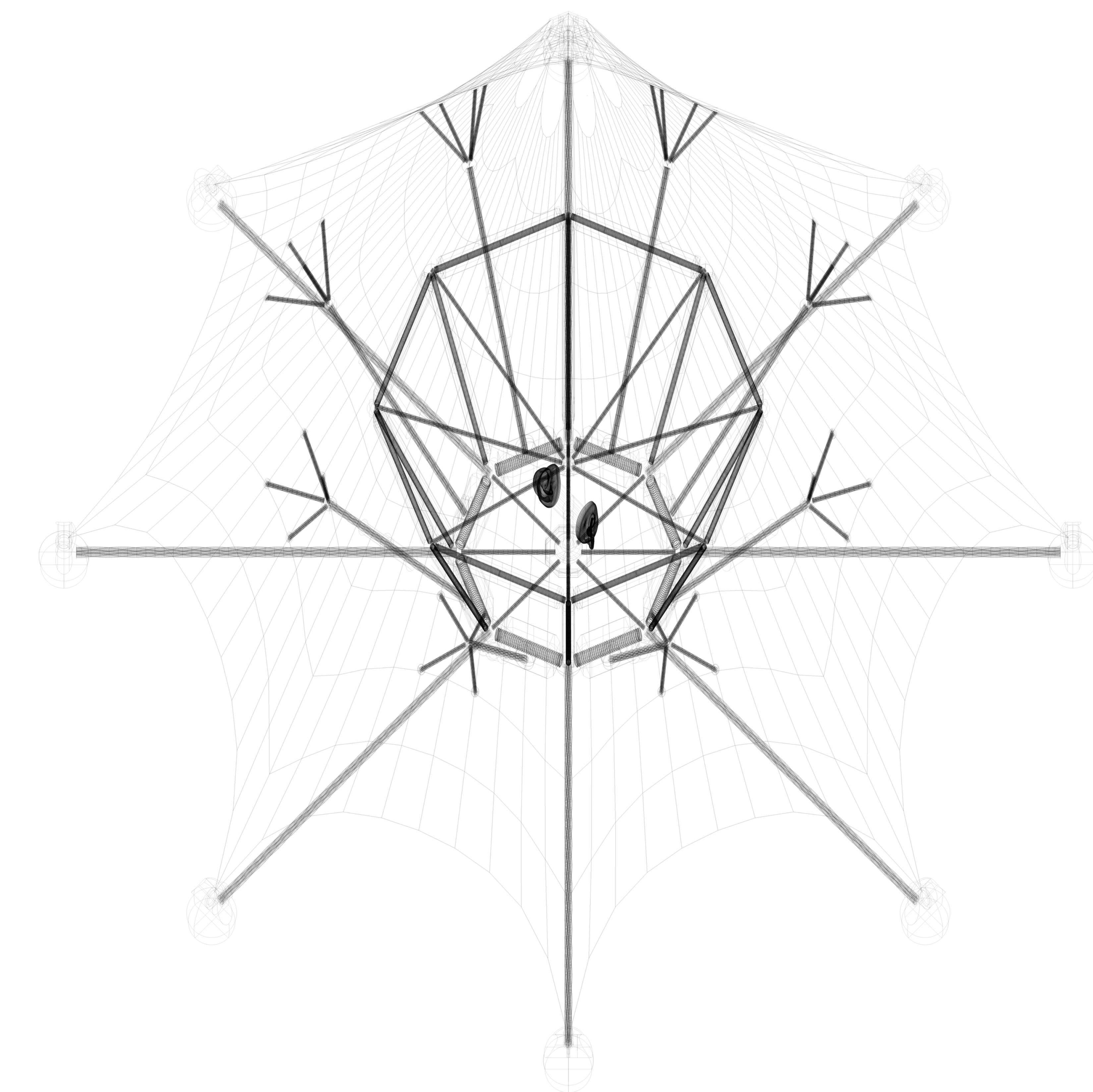
Innovative tensile structure in Dungeness, England, utilising raindrop sounds for wind and rain data collection. Features a terrain-adaptive design with a central core support system.



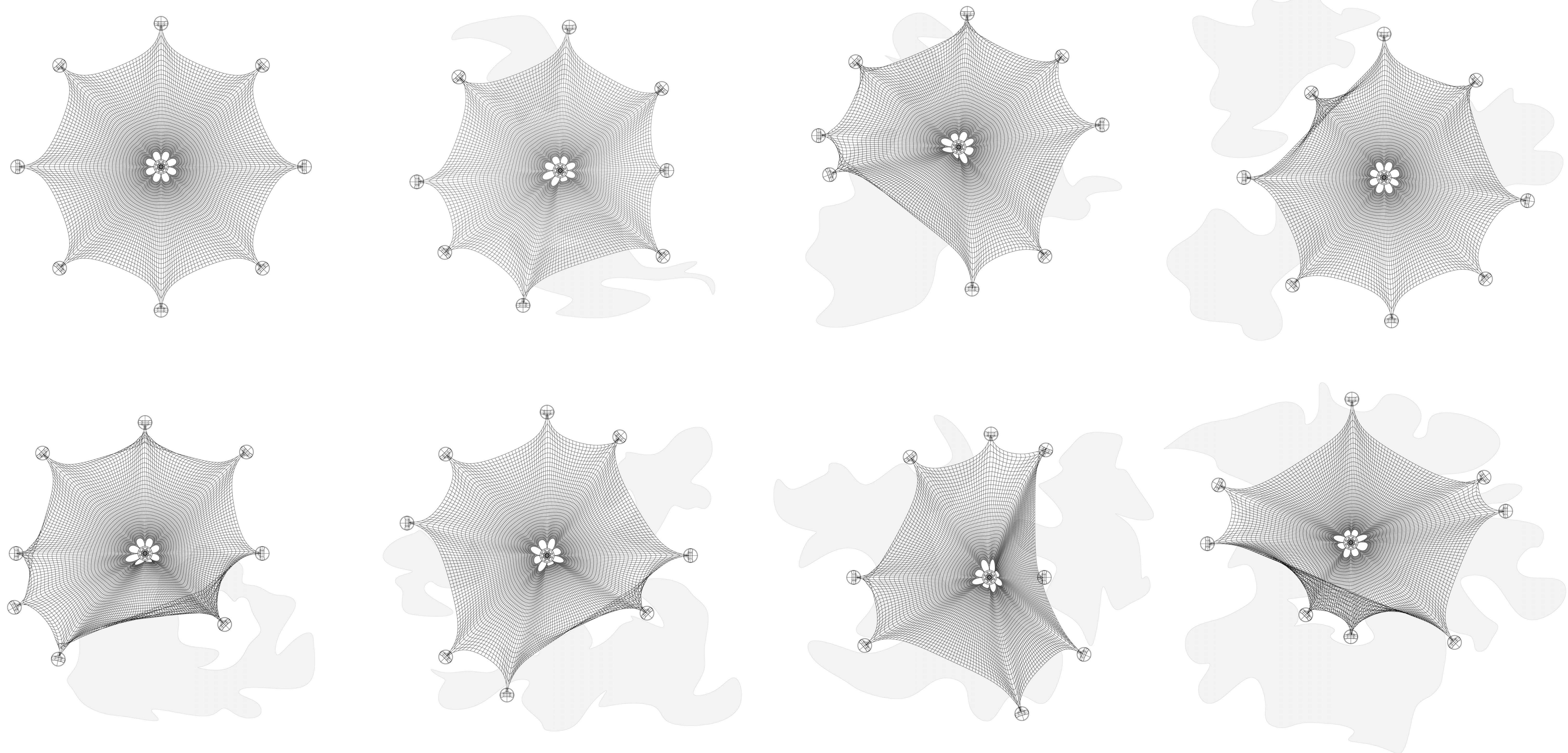




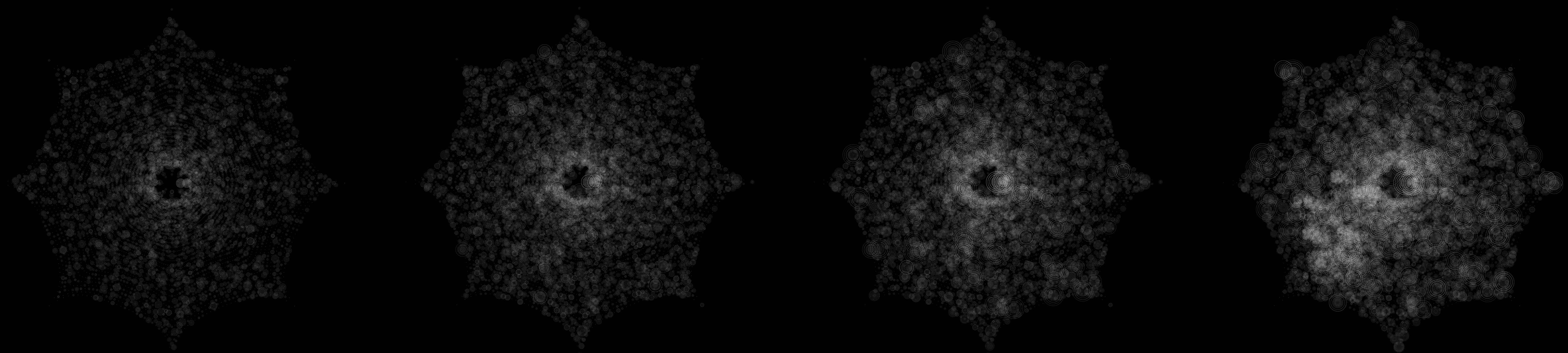
Axonometric View (transparency)



Axonometric View (rotated, transparency)



Adaptation Examples

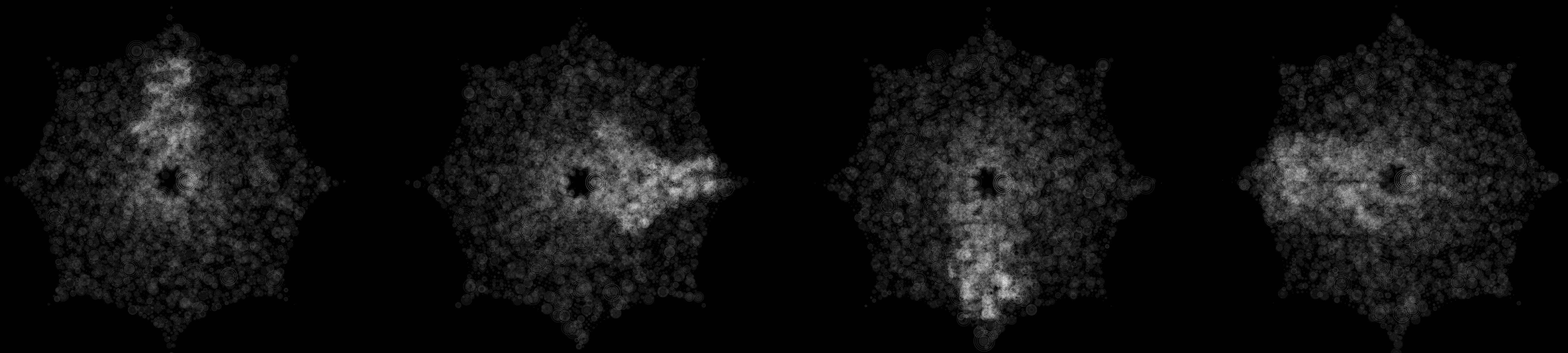


Slight Rain Level / Average Wind Direction

Light Rain Level / Average Wind Direction

Moderate Rain Level / Average Wind Direction

Heavy Rain Level / Average Wind Direction



Moderate Rain Level / Northerly Wind

Moderate Rain Level / Easterly Wind

Moderate Rain Level / Southerly Wind

Moderate Rain Level / Westerly Wind