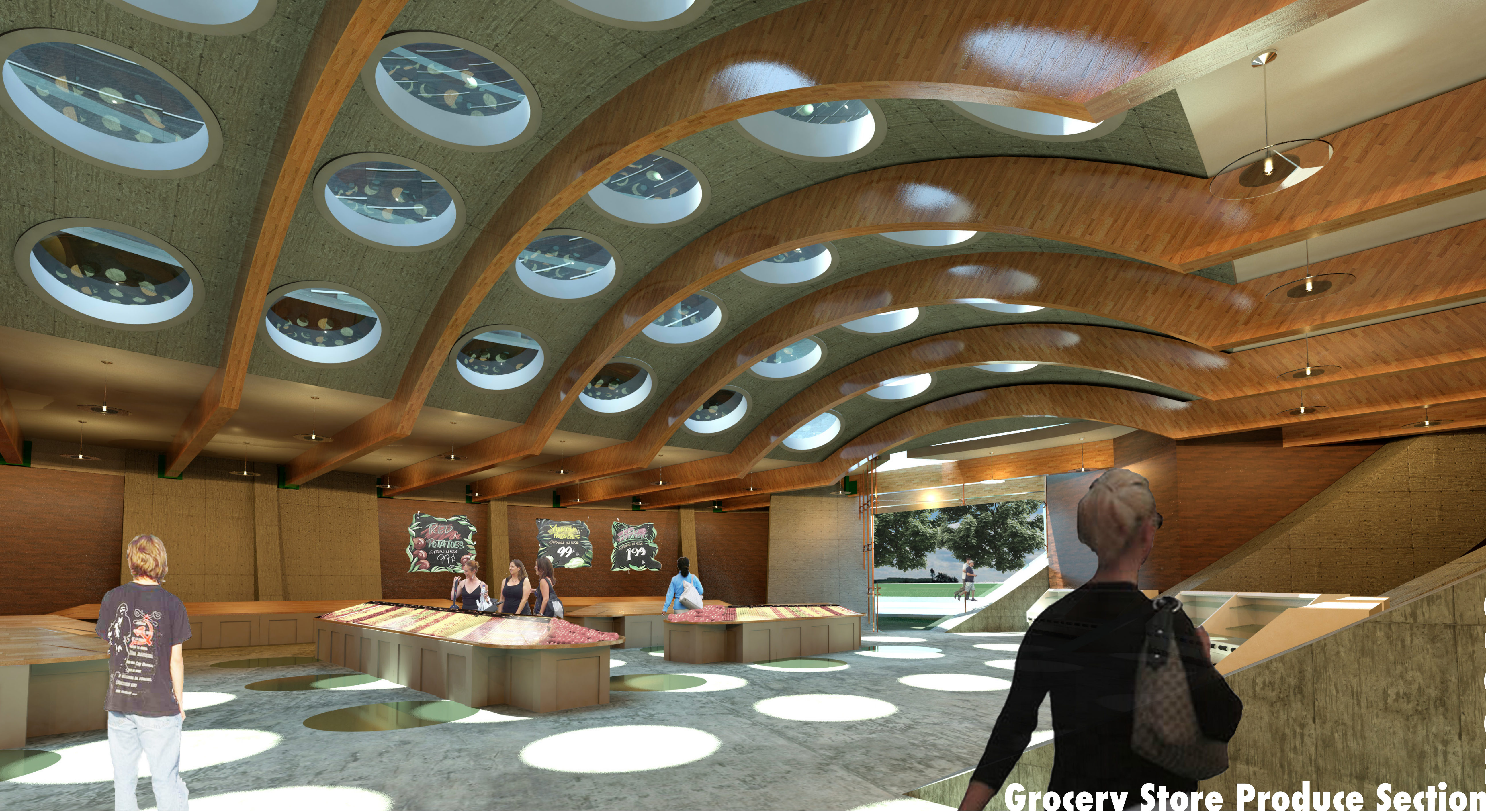
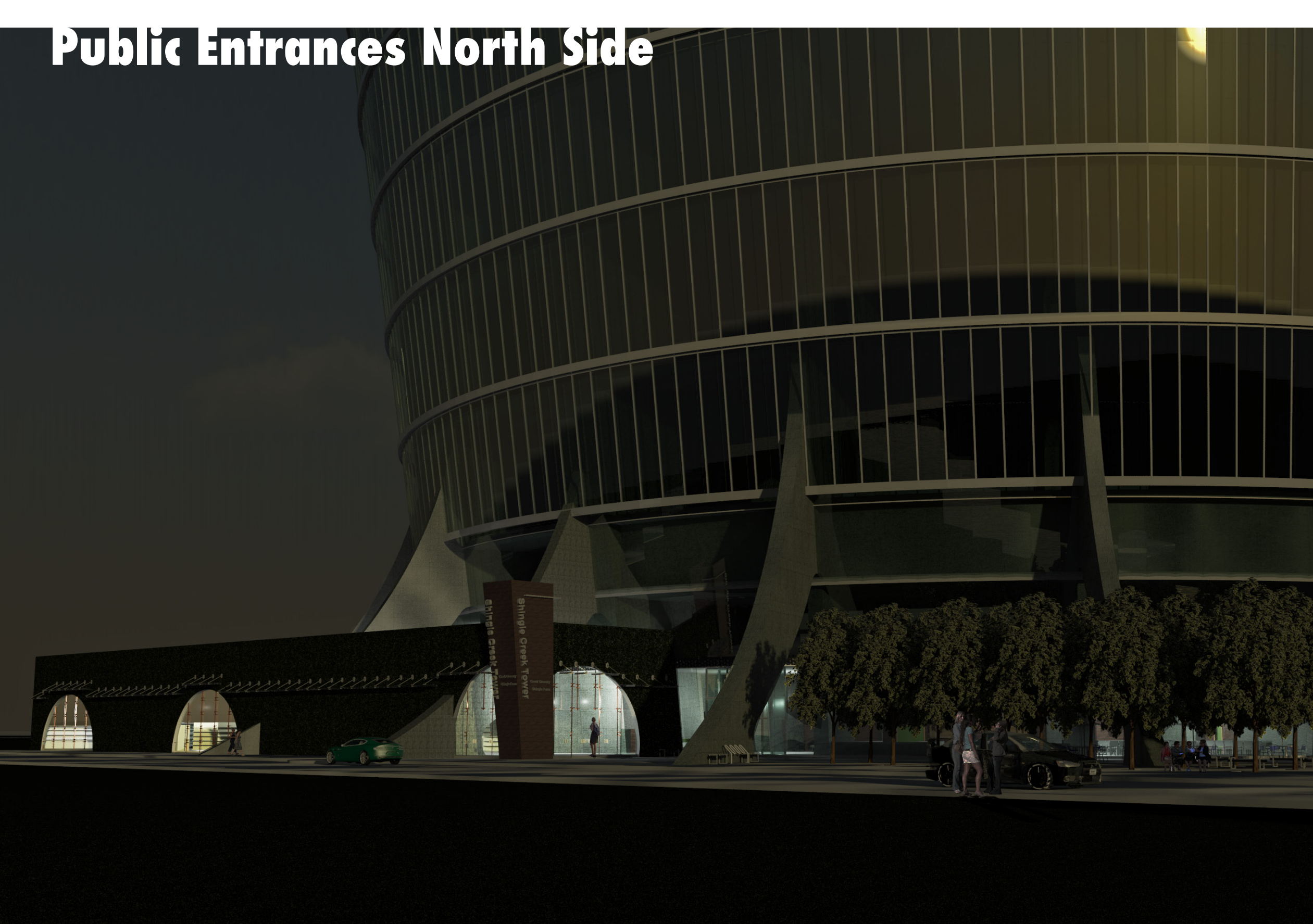




Cultivate: A Vertical Farming Solution



Grocery Store Produce Section



Public Entrances North Side



Private Residential Entrance West Side

Ground Level

Suburban sprawl has been the mode of development throughout the last 50 years. This development has created cheap impersonal places and an inefficient way of life. To sustain growth and our future, people need to live in more dense communities. From this need to live more compact lives came the idea for Shingle Creek Tower. A vertical farm for Brooklyn Center, Minnesota.

This building was designed to create a place where people can live within a dense community with the smallest footprint on the earth as possible. In less than 2 acres this building provides 200 people with homes and the food they need. This building will create a self-sustaining community and a gathering place for the city of Brooklyn Center.

The Vertical Farm works on the principal of growing food where people need it in order to reduce spoilage and energy spent in transportation. This farm encompasses 344,000 sqft of floor space, but through stacking the growing surface on racks provide 33 acres of growing space.

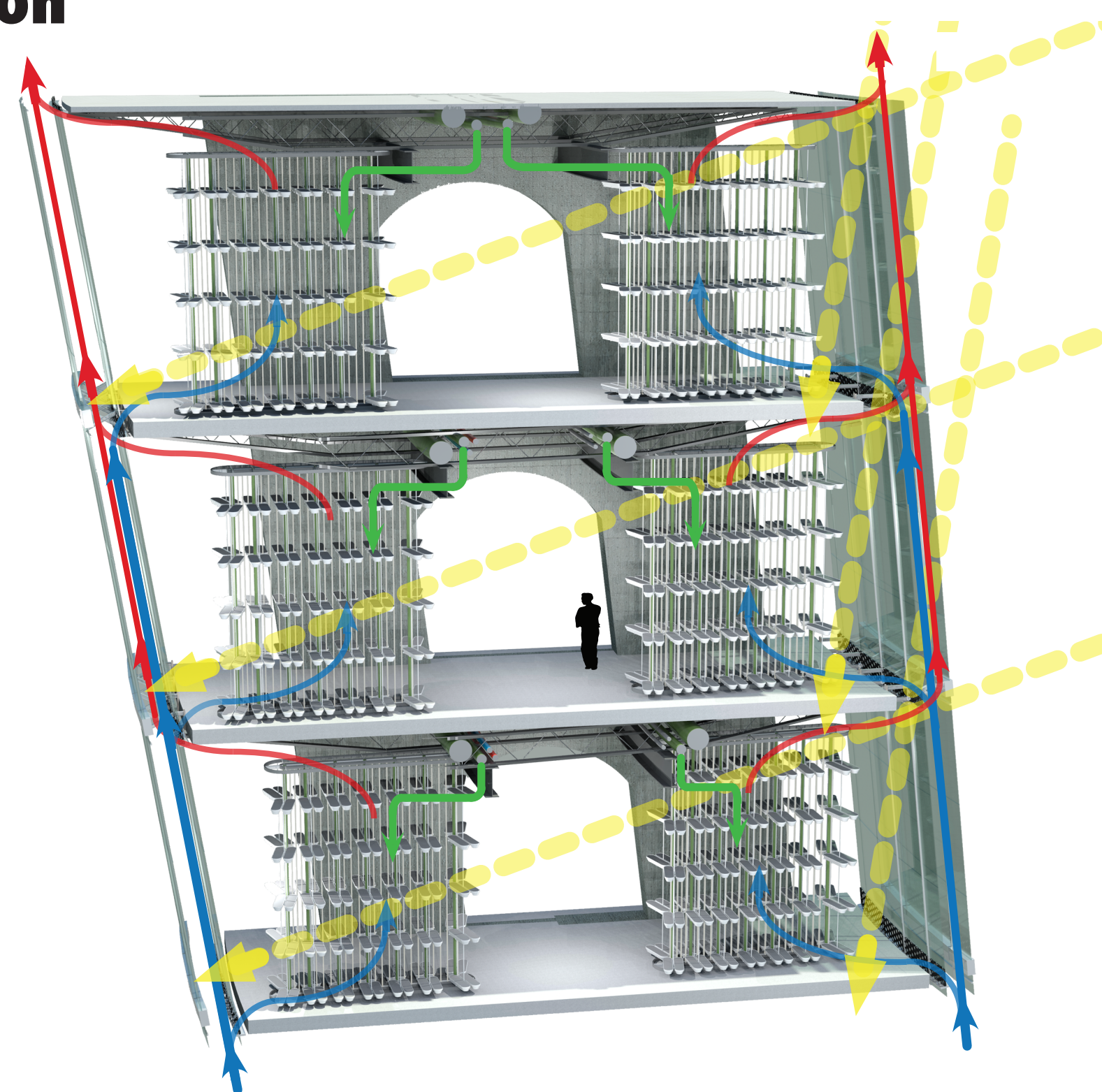
The farming tower uses aeroponics, currently the most productive and efficient growing method. Through aeroponics a solution of water and essential nutrients is sprayed onto the suspended roots of plants. This method uses substantially less growing medium, water, chemicals, and minerals, than other growing methods because they are delivered directly to the root and not lost in dirt or other growing mediums.

The design of this vertical farm was influenced by efficiency and flexibility. The north farming tower relies on sunlight, natural ventilation, and rain water harvesting to reduce energy and costs. Using these natural processes is the most efficient way of growing. With this being said, the layout of the farm was designed to be flexible. The growing area is essentially empty with tall ceilings. This allows adjusting the space for different crops or new, more efficient techniques in the future.

Essential to this growing environment is the growing racks. They are adjustable to accommodate different crops. The 1 1/2' x 4' growing shelves are easily moved by hand. This reduces the need for heavy equipment. The racks are also responsible for the distribution of nutrient solutions and artificial light, if necessary. Everything the plants need is provided in the growing rack assembly.

The Farm

Farm Level 12
Farm Tower Section



Summer and Winter Sun Angles

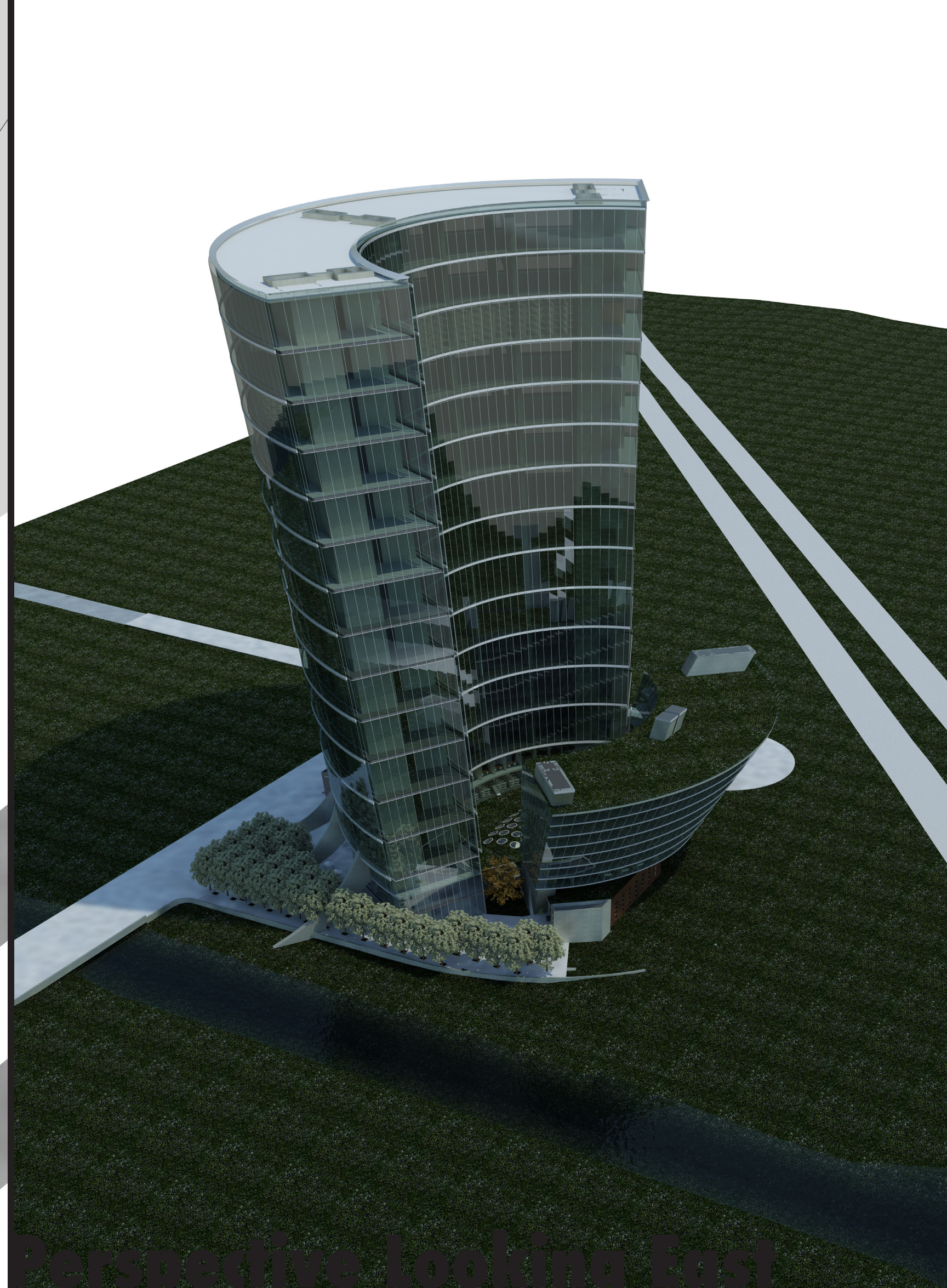
The tower is built at an angle to provide a larger surface area for daylight absorption reducing the need for artificial light. In the summer less direct sunlight penetrates deep into the building but the abundance of indirect light during this period will provide the light needed for growth. Conversely in the winter when the sunlight is less intense the angle of the building and the floor proportions allow direct sunlight to penetrate farther into the growing area. With 30' floor height less sunlight is wasted hitting the floor.

Air Circulation

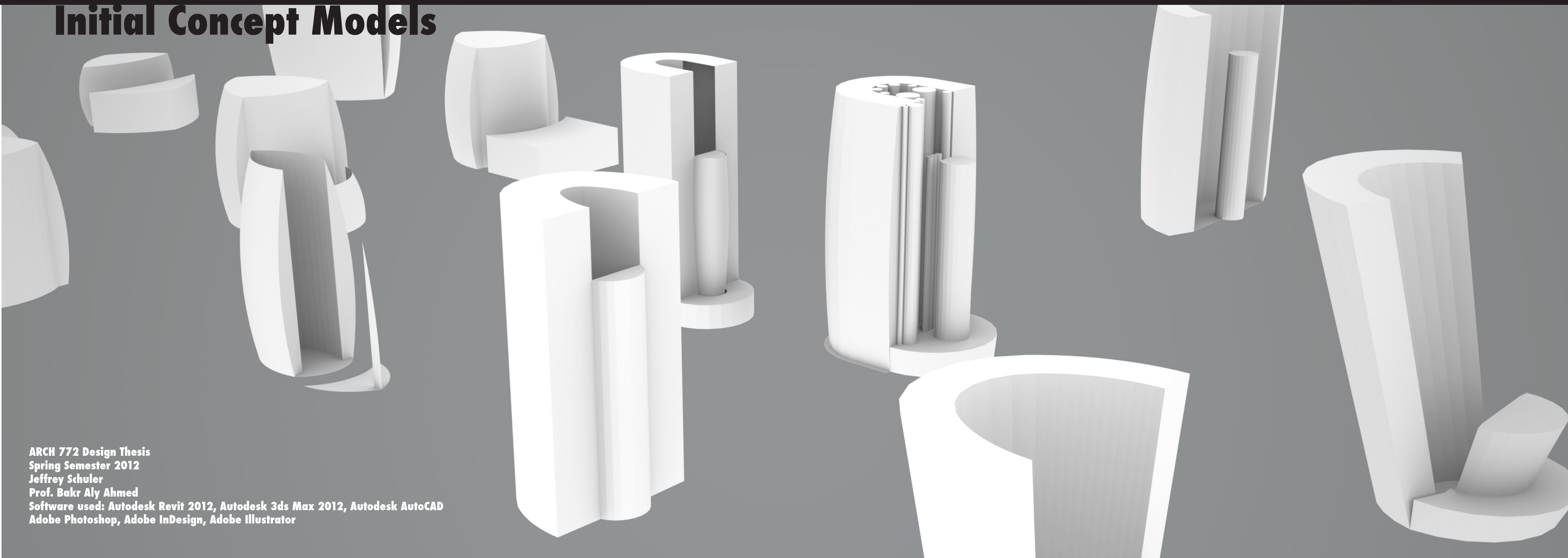
The farm tower relies on natural ventilation harnessing the stack effect in the double skin airspaces. Hot air will be drawn to the top of the tall floors and move upwards into the double skin airspace. This movement of air will naturally draw cooler air in from below. The airspace on the exterior of the building will cool the tower in the summer but insulate the tower in the winter. Plants are naturally tolerant of a range of temperatures so precise temperature control isn't necessary. The natural air movement will supply the plants with fresh air using no energy.

Water Delivery

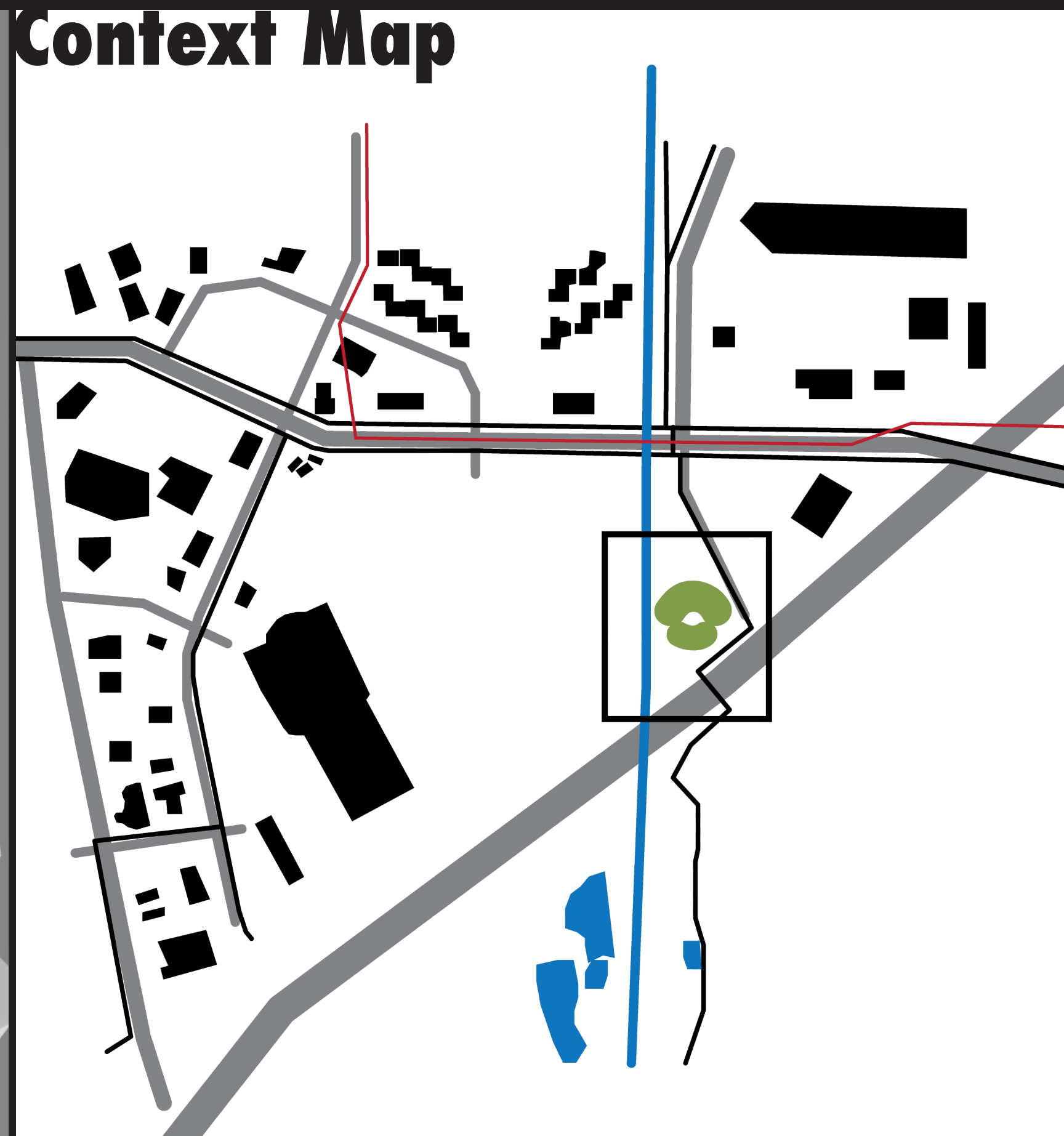
The final factor for plant growth is water and nutrients. A nutrient solution specific to different crops is mixed and stored in the basement of the building and then pumped to the growing racks periodically during the day.

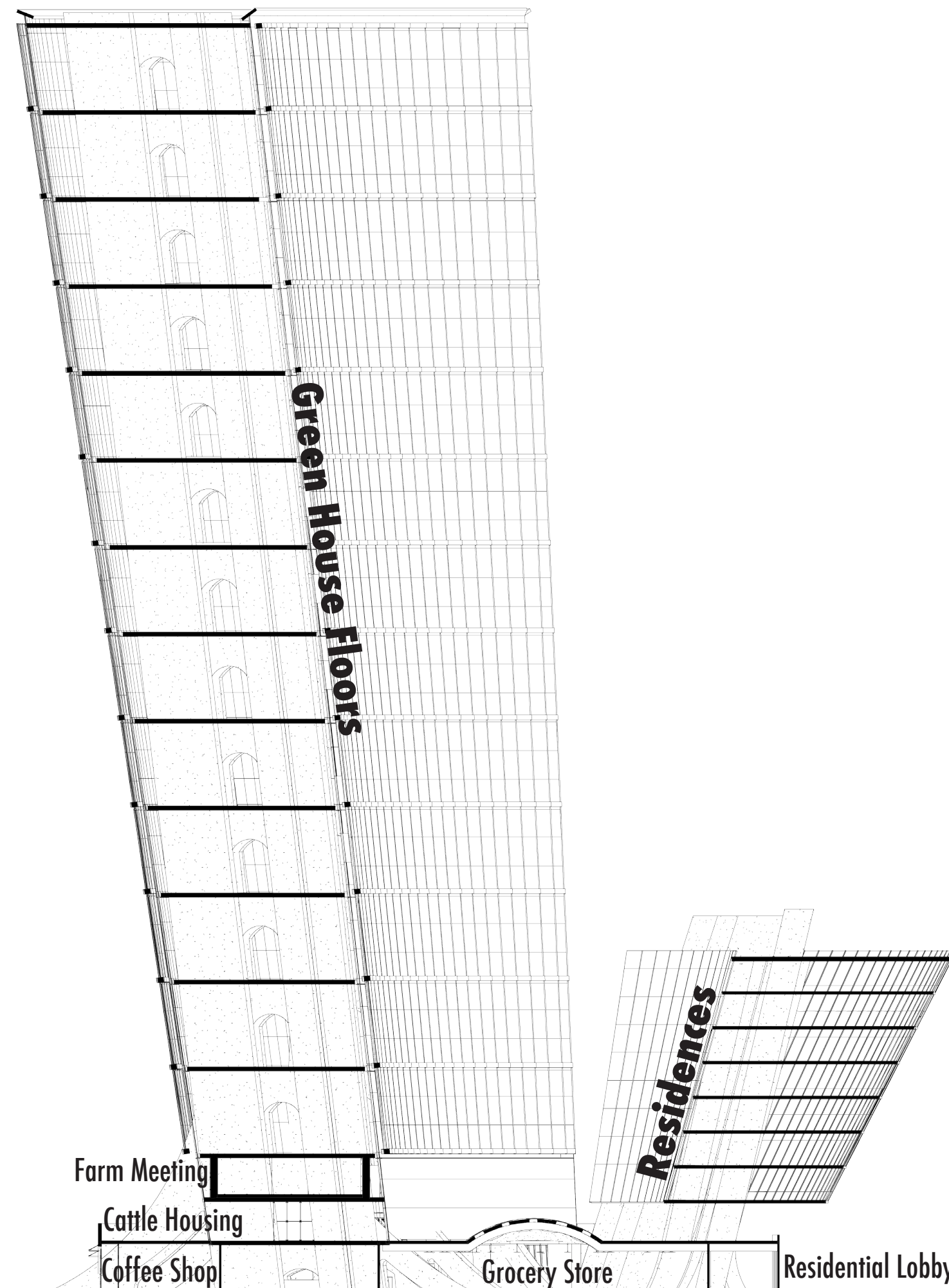


Initial Concept Models

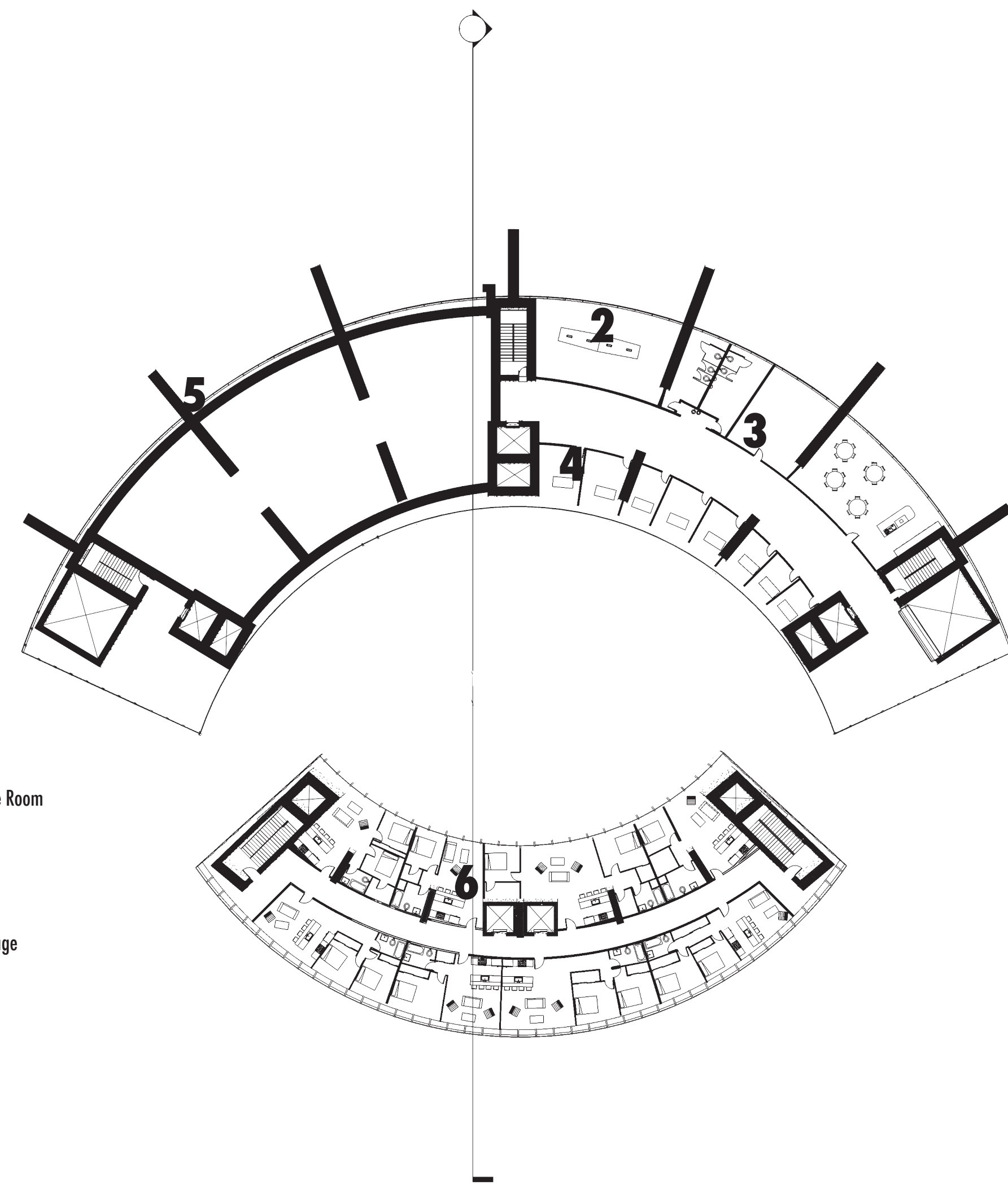


Context Map



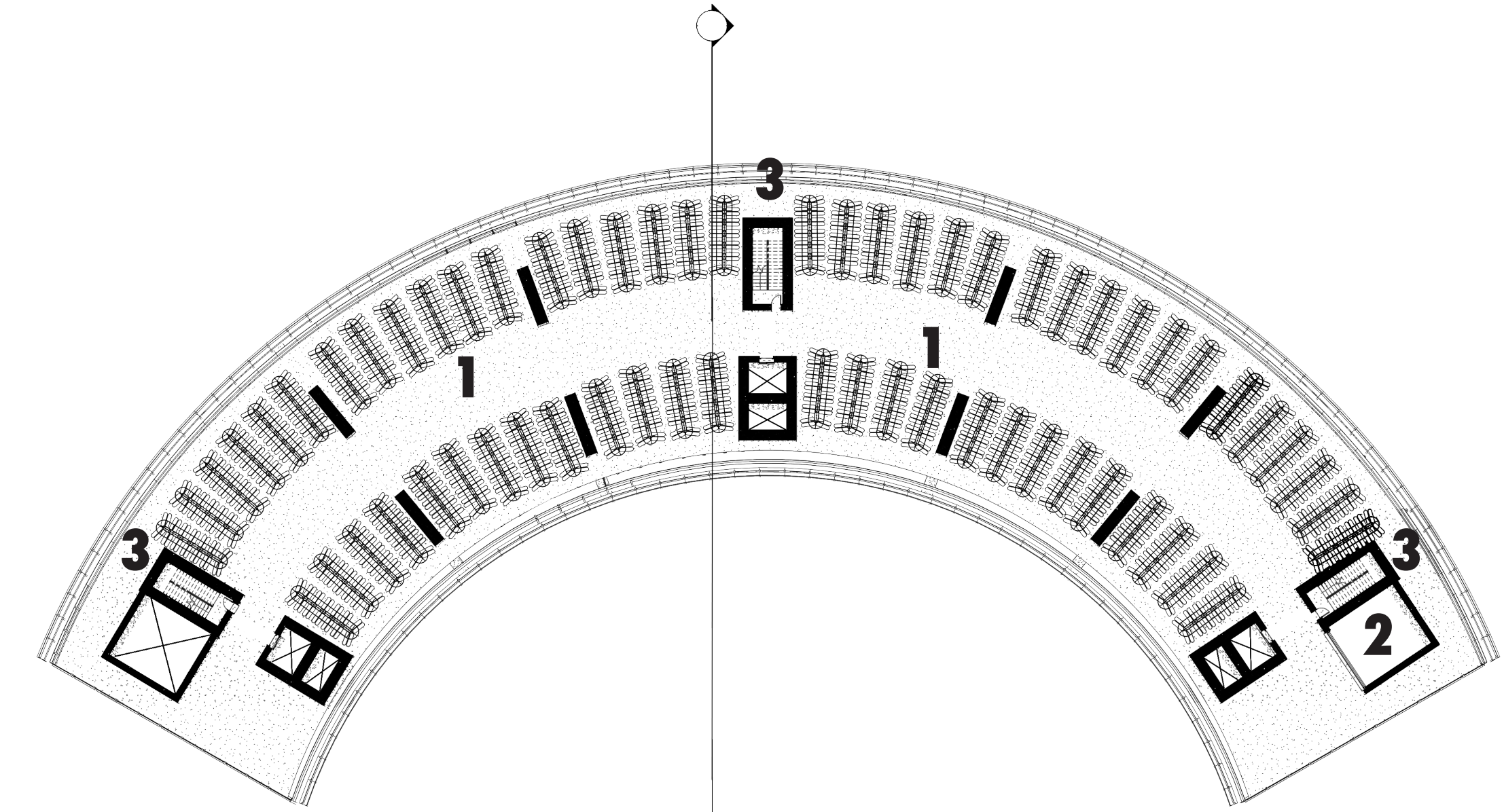


Section Facing West



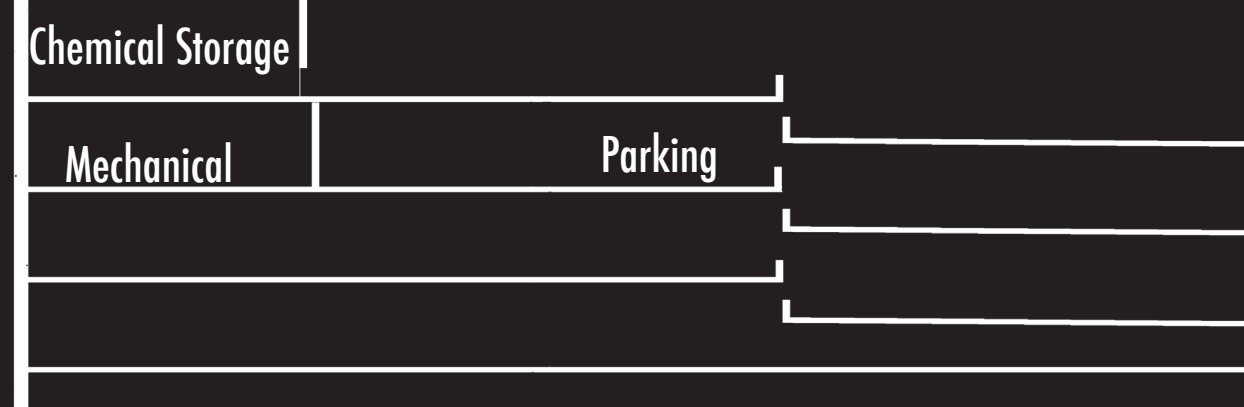
Farm Meeting Level & Typical Residential

Scale 1/32" = 1'



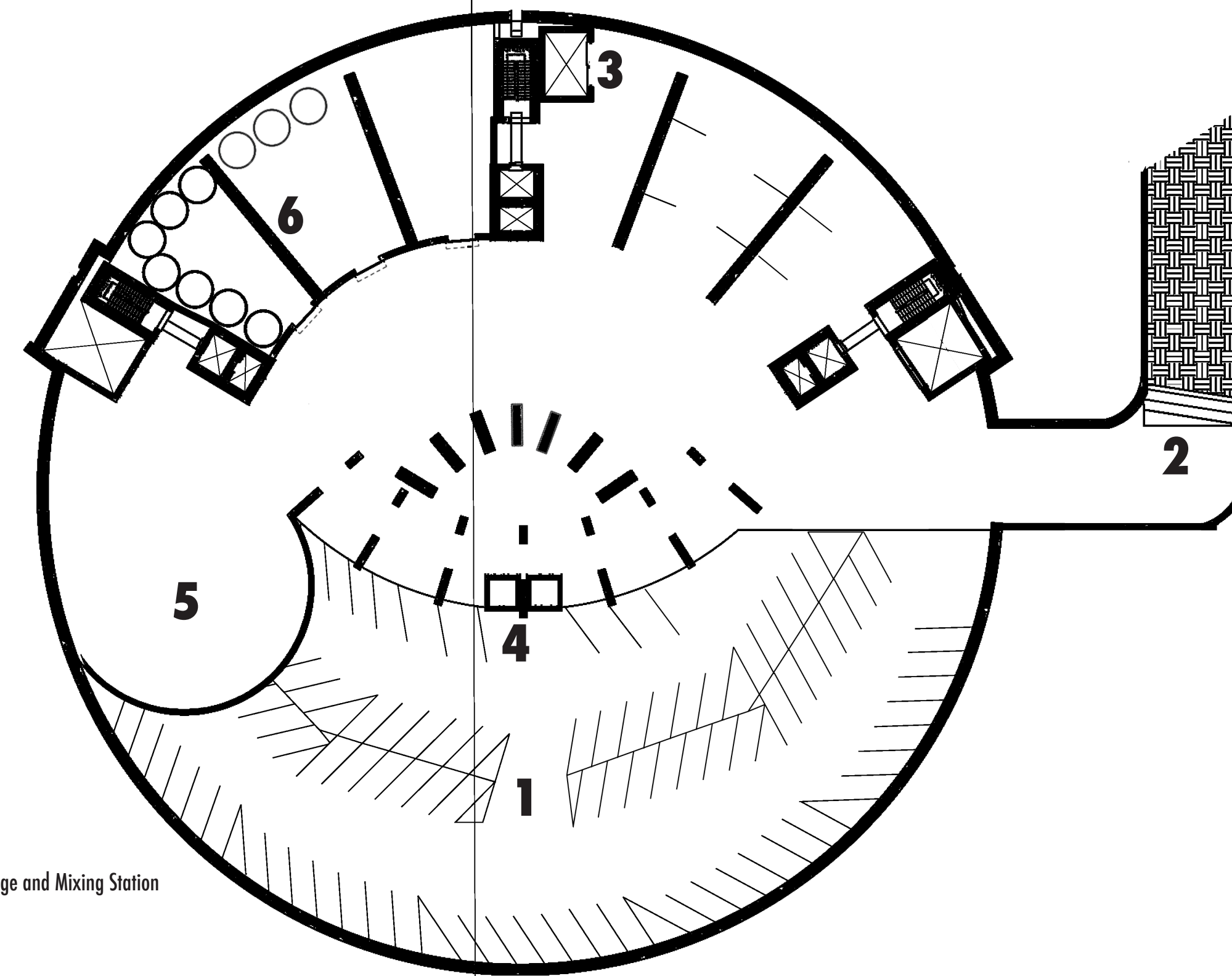
Typical Greenhouse Level

Scale 1/32" = 1'



Garage Level 1

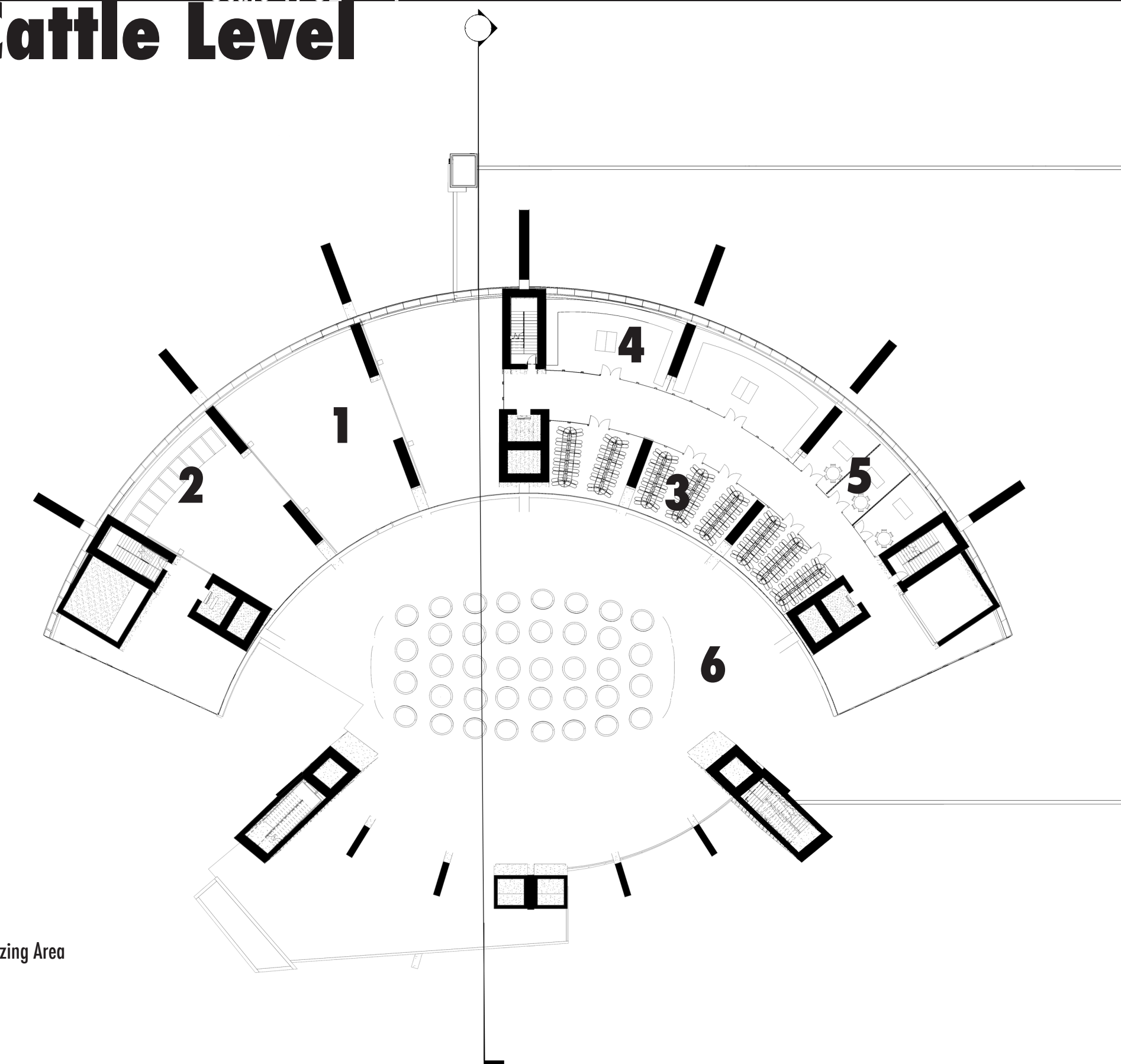
Scale 1/32" = 1'



- 1 Daily Parking
- 2 Parking Entrance Ramp
- 3 Grocery Elevator
- 4 Residential Elevators
- 5 Delivery Area
- 6 Chemical Solution Storage and Mixing Station

Dairy Cattle Level

Scale 1/32" = 1'



- 1 Cattle Housing
- 2 Milking Station
- 3 Experimental Crop Lab
- 4 Farm Control Rooms
- 5 Offices
- 6 Lobby Roof & Cattle Grazing Area