



# neighborhood sufficiency

macy anderson

neighborhood sufficiency

2021



# neighborhood sufficiency

an environmental model of a self-sufficient urban community

final study by  
macy anderson

# dedication

I want to begin by thanking the people who have helped me get to where I am today.

To my parents: Thank you for fighting for me back in elementary school to get me the best education and opportunities possible. Without that fight, I would have never made it to Texas A&M and I would have never have been able to pursue a master's degree. Thank you for the constant support, encouragement, and the day-long road trips to pick me up from Langford to feed me.

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# table of contents

## research

- 10 self-sufficient communities
- 13 sustainable communities
- 14 sustainable systems
- 17 material choice

## site studies

- 20 demographics
- 23 services in area
- 24 timeline

## concepts

- 29 site + building process
- 30 systems + operations
- 33 program

## designs

- 38 urban park
- 43 cafe, community + work space
- 46 food market
- 51 medical + pharmacy
- 54 child care
- 57 wall section

## conclusion

- 61 acknowledgments
- 62 image references
- 63 textual references







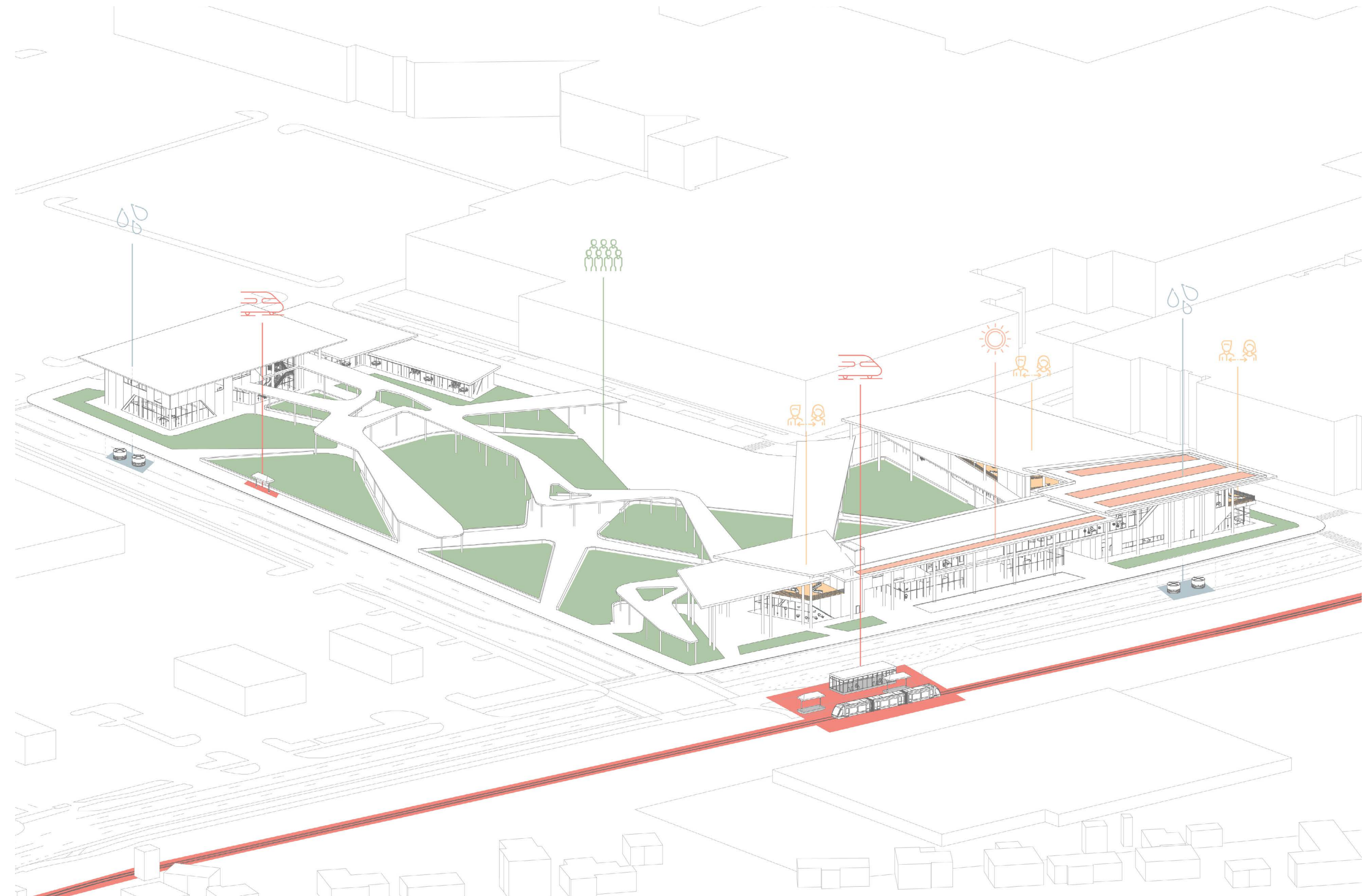


research



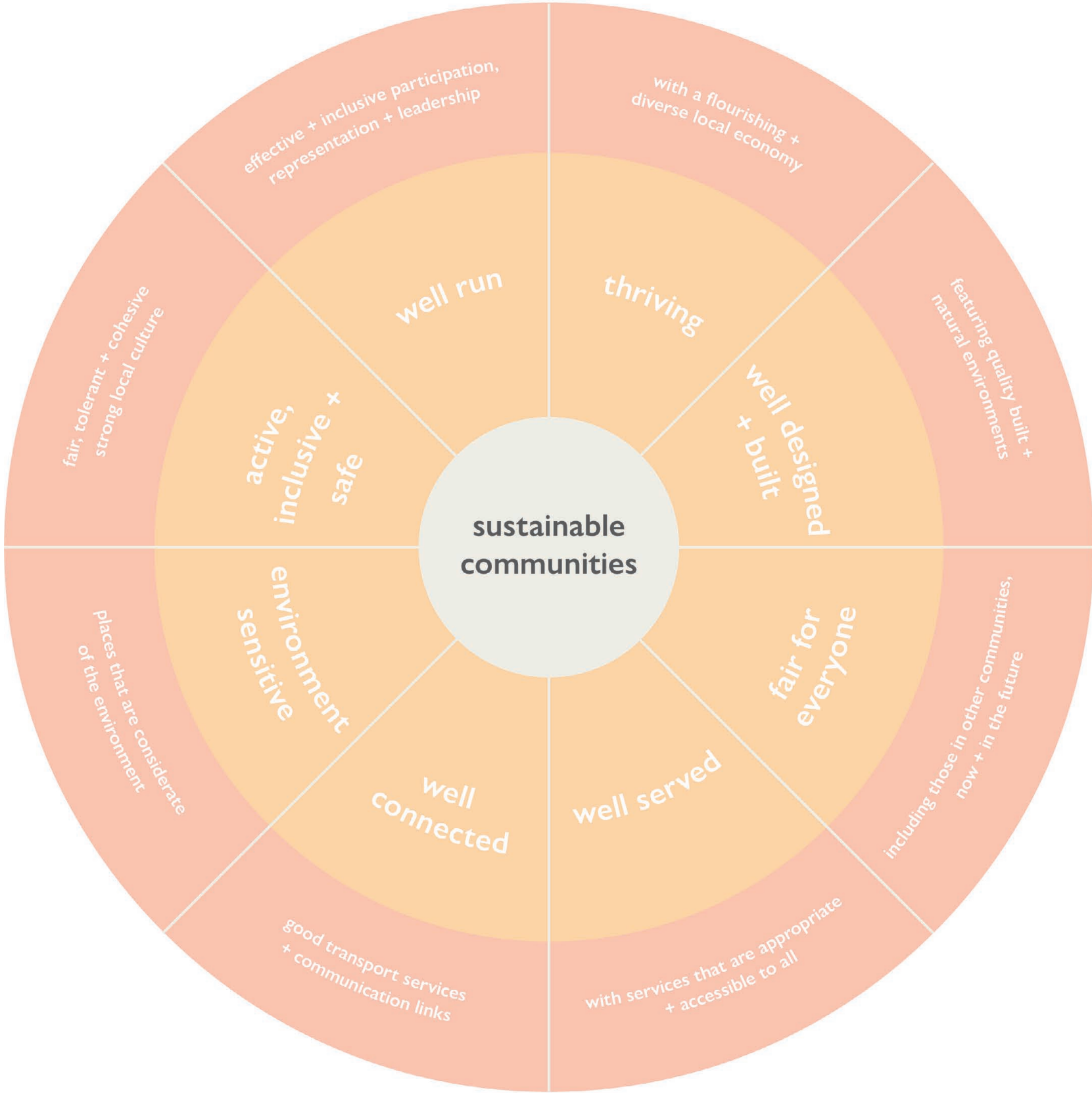
# self-sufficient communities

This project explores ideas of self-sufficiency through the design of a neighborhood-campus. This neighborhood is composed with easily accessible structures that are connected to multiple public urban mobility forms. This allows for the support of the construction of smaller groupings that connect to other network enclaves. The buildings themselves aspire and are proposed to engage with renewable natural resources, energy efficiency practices, and easily maintainable buildings and landscaping. According to Vicente Guallart, self-sufficient communities are composed of connections including six vectors or cycles that connect everything with everything. This includes information networks, the water cycle, materials cycles, energy, human transportation, and green systems. The community provides a connection with solar energy and allows for the ability for buildings to produce energy. Greywater systems are placed on the east and west sides of the site to allow for optimal, sustainable irrigation of the urban park. Finally, the community needs a connection with human transportation. The roads have designated space for motor vehicles and bicycles. The sidewalks are designed with space for pedestrians on foot or bicycle travel. The neighborhood has immediate access to the metrorail. Guallart states that the “city streets and squares represent the spaces for human mobility; in traditional cities, they are the meeting places where paths cross, and spaces for social interaction.”





THE EGAN WHEEL: COMPONENTS OF SUSTAINABLE COMMUNITIES



# sustainable communities

With self-sufficiency being a form of sustainability, this project explores ideas based on sustainable communities and eco-neighborhoods. Sustainable communities embody characteristics including a thriving local economy, a strong sense of place and community, and healthier lifestyles overall. When looking at this project at the neighborhood scale, we can see that eco-neighborhoods significantly reduce greenhouse gas emissions, enhance local environment quality while focusing on a healthy environment, provide local work opportunities and social inclusion, as well as increase the value of community. These objectives are achieved by reducing the need to travel with personal motor vehicles by bringing daily services to the immediate area, allowing for immediate access to multiple forms of public transportation, increasing energy efficiency in the buildings, promoting active lifestyles, and increasing the user's involvement within the project in terms of maintenance, daily operations, and social networking.

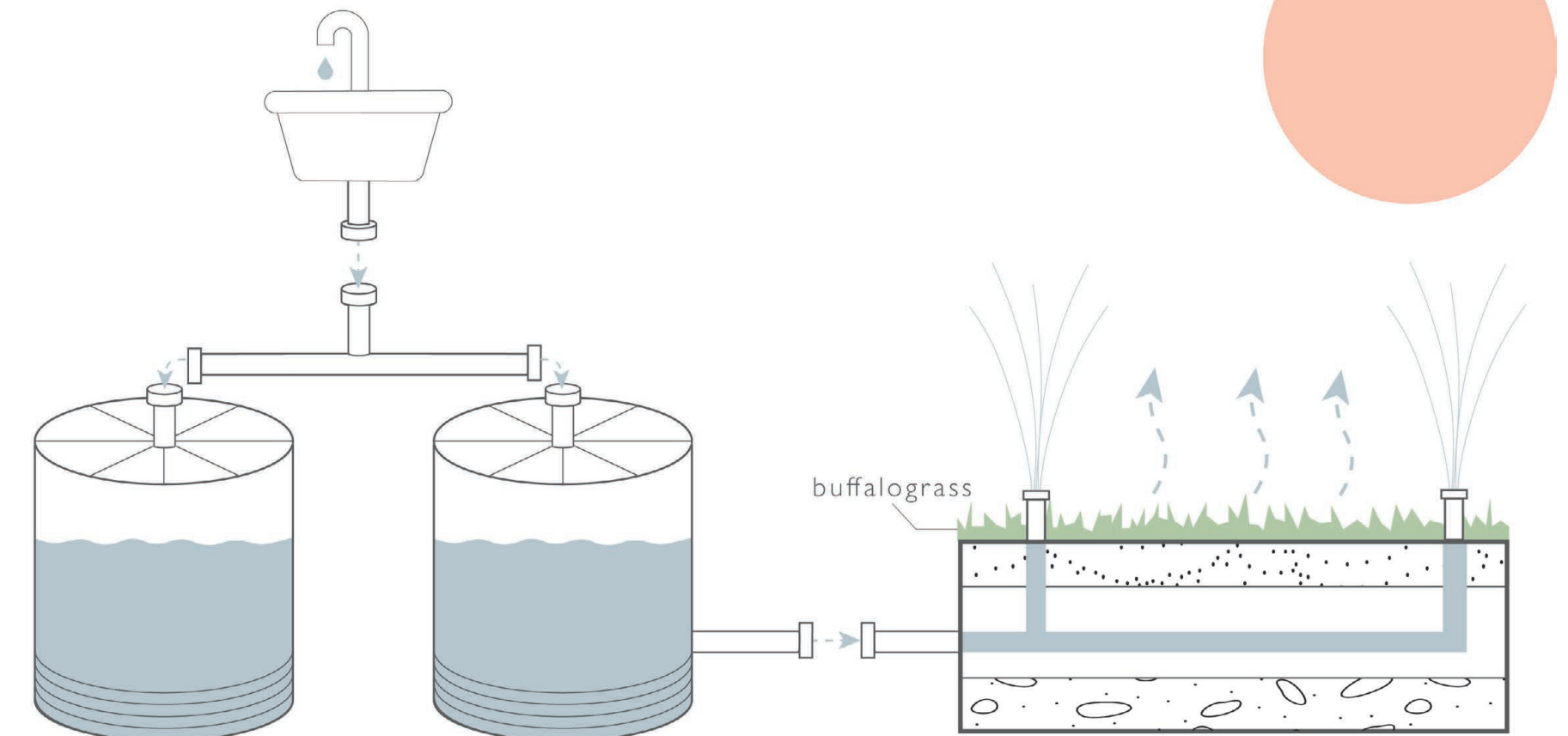


# sustainable systems

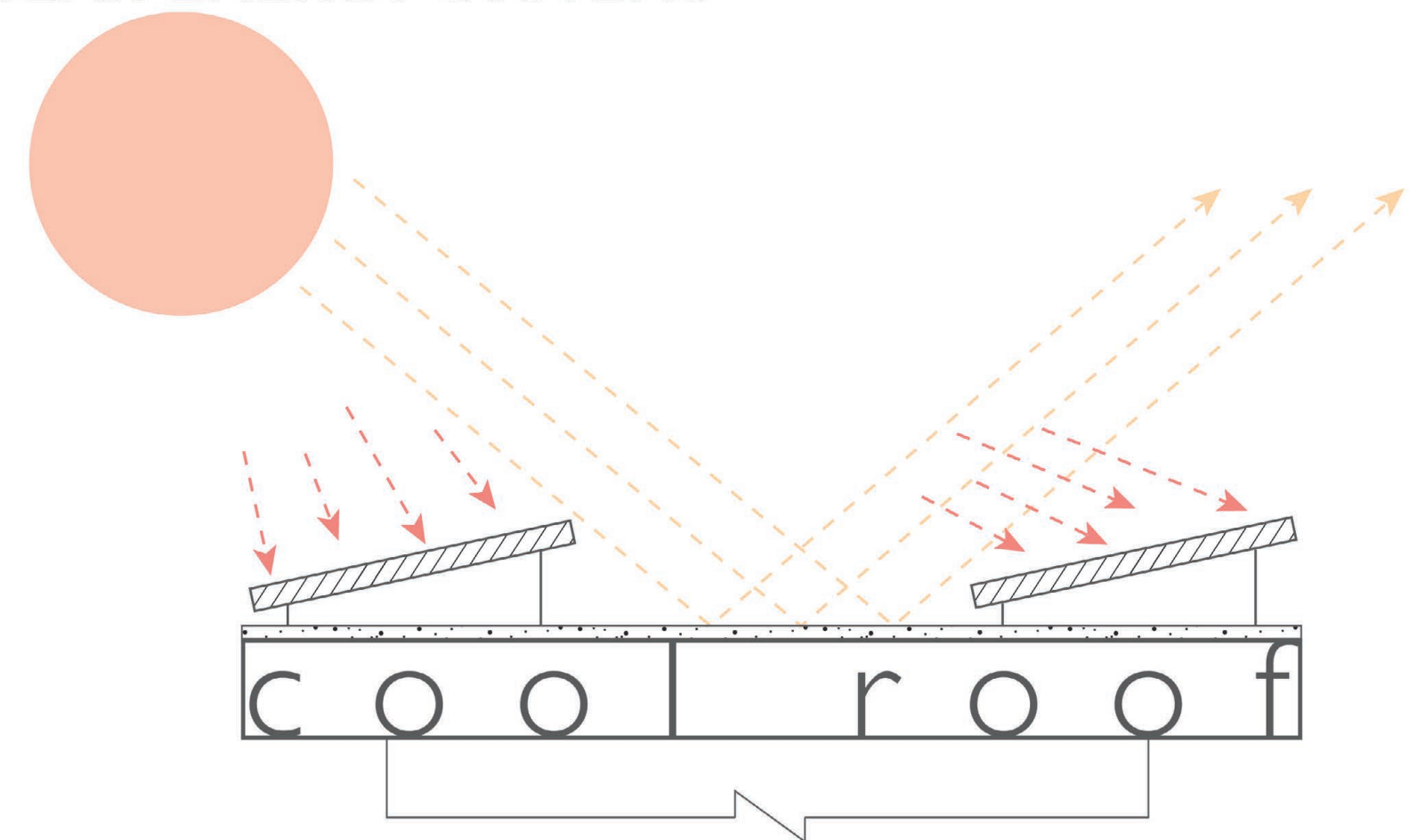
This project focuses on how to cause the least harm and the most benefits to not only the users and the community, but also the environment. Neighborhood Sufficiency is most notably recognized by the large, uniquely designed urban park that the buildings surround. With its organically shaped canopy overhead, this project contains 126,140 square feet of Buffalograss green space. Buffalograss is native to Central Texas and requires little water to maintain its lushness. These green spaces are also decorated with Cedar Elm, Chinquapin Oak, and Kidneywood trees all of which are native to the area, thrive in sunny conditions, and require little to very little water. In an effort to reduce the impact on our ecosystem, Neighborhood Sufficiency uses the water used throughout the sinks in the buildings, transfers it to four greywater tanks held in the mechanical rooms within the below-grade parking garages, and then pumps it out to the green spaces by sprinkler systems and drip lines to irrigate the hardscaping. Once the nutrients are absorbed, the water will then evaporate and return into the water cycle.

In regards to solar energy, the project utilizes PV panels that create a clean, quiet, and efficient way to generate renewable energy. Neighborhood Sufficiency is designed so that the solar energy is able to be utilized within the project but also decrease the amount of solar heat that enters the buildings by use of overhangs created by the roofs and setbacks in the exterior facades. These roofs also contain a cool roof coating that helps reflect sunlight and keep the buildings cooler. This can reduce energy bills, improve indoor comfort, and reduce local air temperatures.

## GREYWATER SYSTEM

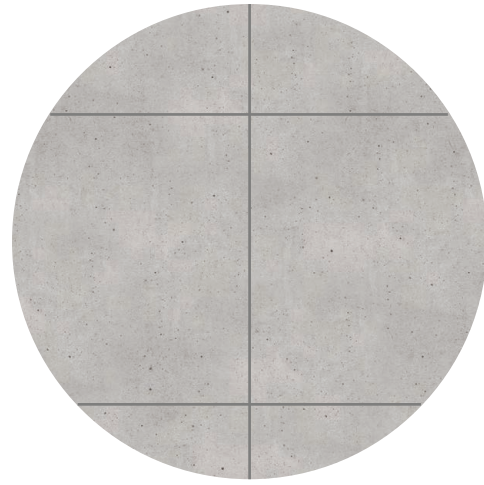


## SOLAR ENERGY SYSTEMS

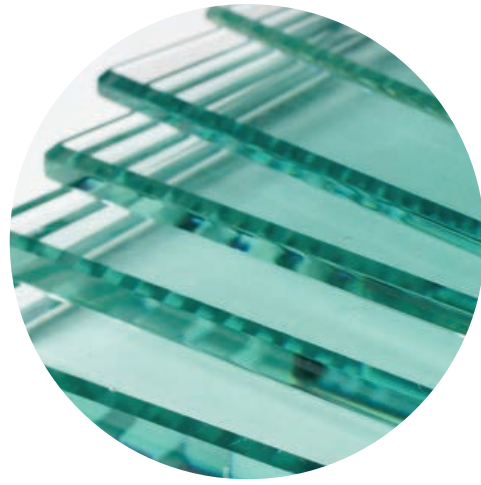




fiber cement panels



glazing



woodgrain aluminum soffit



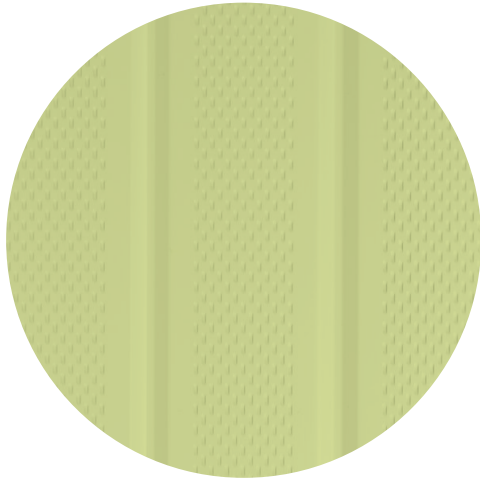
lime green tinted concrete



pink tinted concrete



lime green aluminum soffit



stabilized crushed granite



recycled rubber mulch



## material choice

Utilizing durable, easily maintainable building and construction materials allows for this project to be the most user-friendly. Neighborhood Sufficiency is designed so that the community members are able to fully maintain and run daily operations without the need of a management company. This aids in providing and increasing a sense of community as well as lowering costs and decreasing negative impacts on the environment. The facades of these buildings consist of a fiber cement paneling system and glass storefront curtain walls. Fiber cement panels have color that is designed to last for several years while resisting peeling or fading. This means that the panels will keep the maintenance costs down for the exterior of the building. These panels are also non-combustible and resistant to insects and moisture allowing for a rot-resistant material that also does not require a lot of special handling or installation. This material is high quality, durable, and attractive and will last for years with less upkeep and maintenance.

The park utilizes locally sourced, stabilized crushed granite as a contrasting material that is less susceptible to erosion and weathering. This makes it a great material for pathways with a long lifespan and low level of required maintenance.

In both of the playscape areas, rubber mulch made from recycled tires is in place to provide a low maintenance, long lasting option. This material also comes at a more efficient price as the mulch will last longer than traditional mulch options. Rubber mulch also provides high shock absorbency which allows for a safer experience for children and a more relaxed experience for parents and guardians.



site  
studies



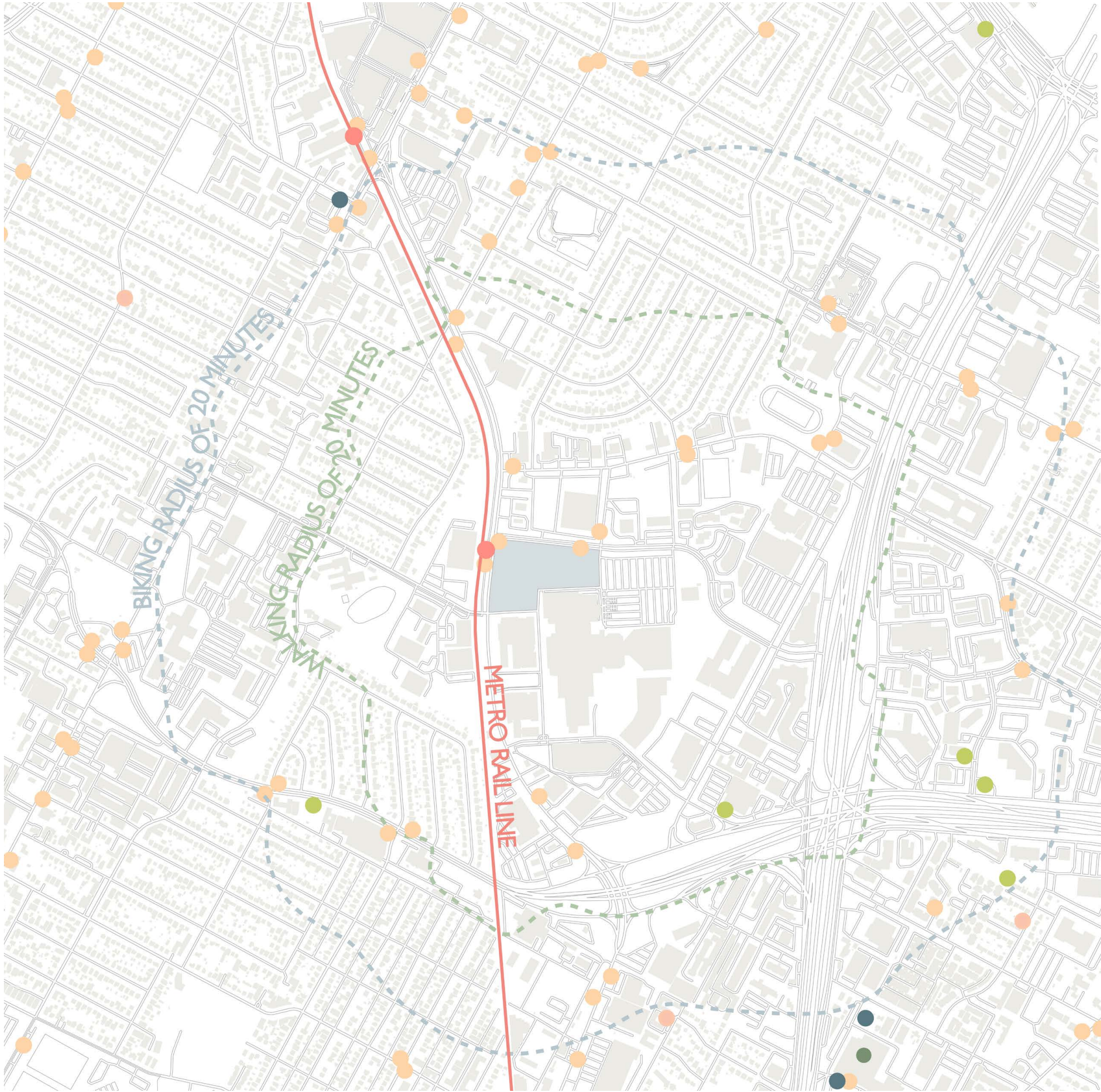
# demographics

Using census data from the ACS 2018 5-year, demographic data for the Highland area was observed. Using the zip code 78752, 3.3 square miles were observed with a population count of 21,324. Immediately noted, almost half of the community is between the ages of 20 and 39 with the median age being 31. With the Austin Community College Highland Campus adjacent to the site, it was reasonable to expect higher numbers of young adults. 24% of the community is comprised of children under the age of 19. The local community appears to be young, Hispanic adults making under \$50k a year. With the average income being \$26,276, 22.8% of the community falls below the poverty line.

From this data it was determined that the area was lower income and mainly young adults and families. This was just another reason that this site was chosen. Jobs and a thriving local economy are key to a self-sufficient community. This means that this project will not only bring jobs to the community but also provide a place for the community to come together to grow.







# services in area

The site for this project was selected by first analyzing the Austin Capital Metro rail line. After exploring the areas surrounding each rail stop, the Highland stop was selected. The Austin Highland neighborhood flourished starting in the early 70's but began to decline at the turn of the century causing the Highland Mall to officially close down in 2015. Since the closing of its doors, the building has been purchased and retrofitted to become Austin Community College's ninth campus. The specific site needed to be in immediate proximity of the rail stop making the area surrounding the new ACC campus ideal. The area was indeed lacking basic and essential services allowing for this project to engage with the current urban context. By using census data from the ACS 2018 5-year, the immediate area's demographics were observed to show that 67% of the population in the area traveled to work by personal motor vehicles, 5% used public transportation, 2% traveled by foot, and 1% biked. This data allowed for the exploration of walkability and public transportation access within the project.

After analyzing a 20 minute walking and biking radius from the site, it was determined that the area was lacking specific services. The area lacked a food market, medical services, a pharmacy, and child care services that the community could easily and quickly access. These public-oriented services determined the program for this project which offers the spatial and built infrastructure to access most essential services within a close proximity. Overall, this produces an increase in walkability and a decrease in daily use of personal motor vehicles allowing for a positive effect on the communities personal health as well as the environment.

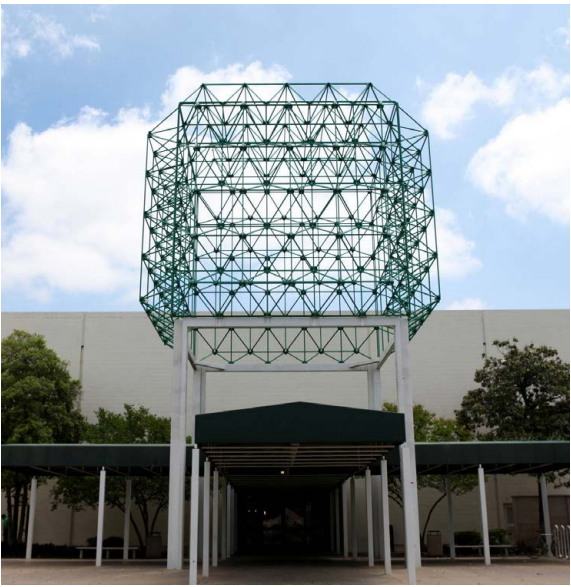
## Legend

- 20 Minute Walking Radius
- 20 Minute Biking Radius
- Metro Rail Line
- Metro Bus Stop
- Pharmacy
- Child Care
- Grocery Store
- Medical



# timeline

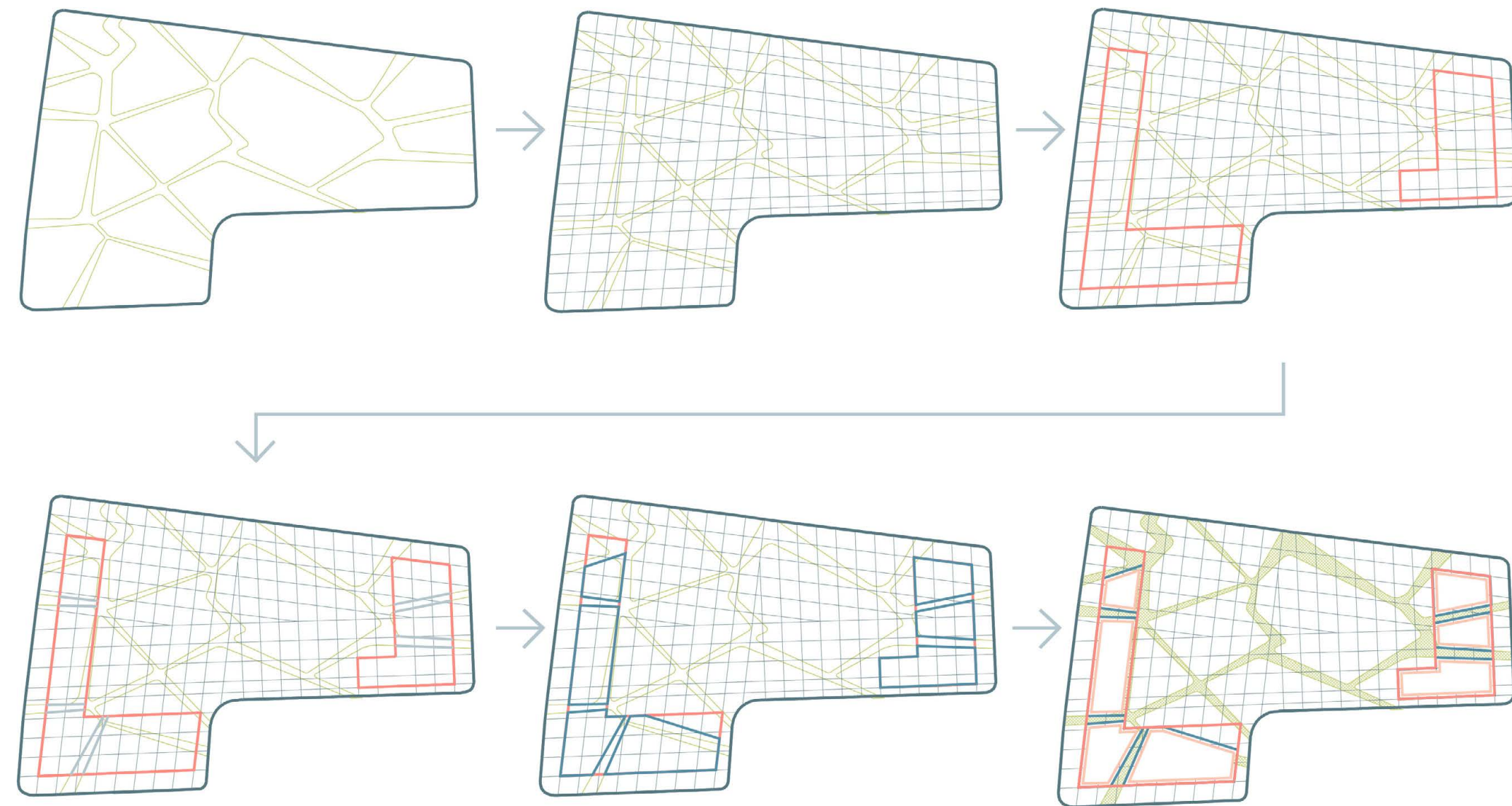
The Highland Neighborhood, just three miles northeast of Downtown Austin, became a high traffic area back in the 70's when the Highland Mall first opened its doors. With a combination of stores closing, the Great Recession, and the newest shopping mall, The Domain, opening just a few miles north, the neighborhood began to decline. Capital Metro first opened the Highland MetroRail train stop soon after to provide fast, easy, and accessible connections to popular spots in Austin but it was not enough to save the area from a rapid decline. Highland Mall officially closed their doors and sold the building to Austin Community College who then renovated the building and reopened as ACC's ninth campus.



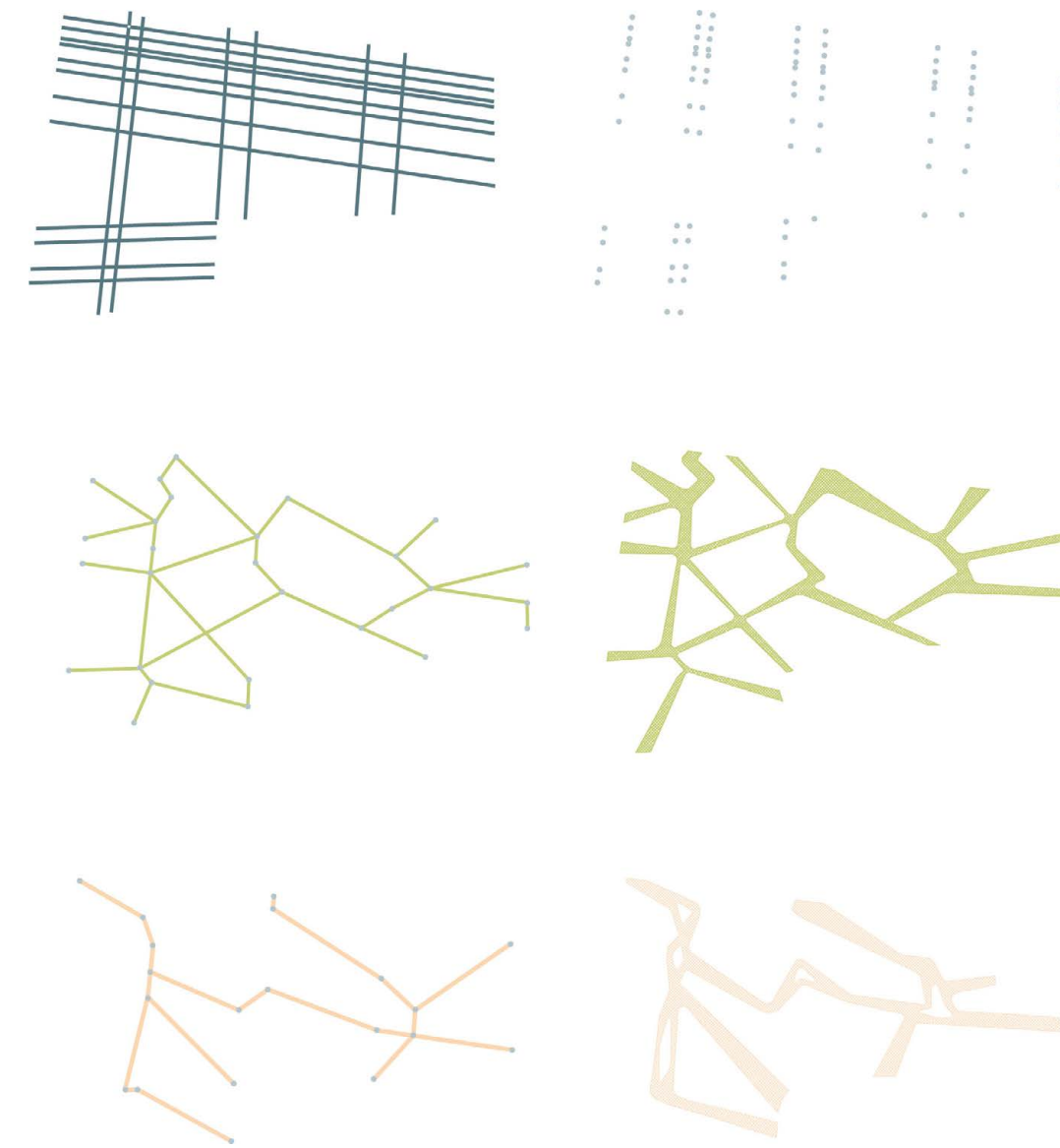


concepts





building process diagram



site process diagram

## site + building process

When beginning the design phase, the site was first analyzed. What currently exists as two separate lots was combined into one to allow for more open green space. Starting with the site process, the overall site was divided into a grid based off of the existing perimeter as well as lines taken from surrounding context. At the intersections of the grid lines, nodes were placed. From there, pathways were mapped out in directions where a user would need to travel. Instead of creating these pathways as straight lines, the connected nodes allowed for a more unique design making the walk more appealing. As a result, unique green spaces enclosed with short retaining walls form between the pathways allowing for many different activities to take place.

After the walking paths were in place, a canopy was designed to reside above the park. Using the same process as the pathways, the grid and accompanying nodes were put in place. In an effort to provide a similar style, the canopy only follows the pathways partially. This is to provide a less restrictive flow throughout the space. From a bird's eye view, every place where the canopy intersects the green spaces, the retaining walls open to allow for entry and exit points to the specific green space.

A similar process was done to create the building foot prints and massing forms. By using the same grid and the newly designed pathways, two 'L' shapes were placed on either side of the site. These shapes were then divided at each intersection of a pathway. These new divided shapes were then offset to create the building footprints. The original 'L' shapes became the roof footprint for the buildings.

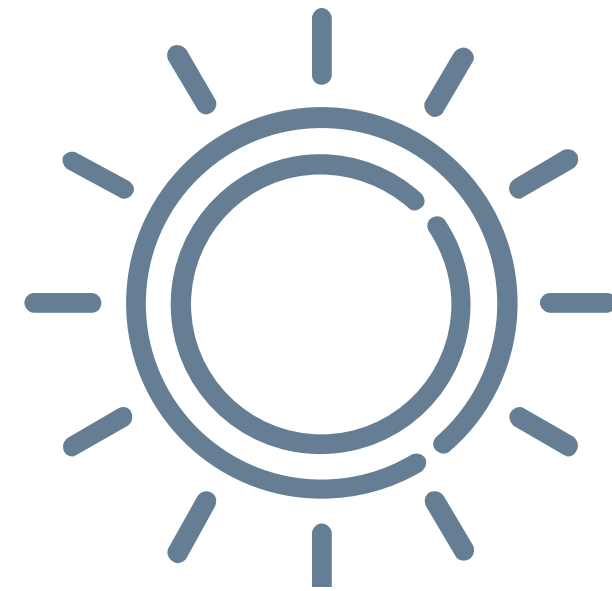
## systems + operations

In an effort to responsibly design a neighborhood that poses the least harm to the environment while also improving the local environment, many eco-friendly systems were put in place. As a neighborhood geared towards community, the project features durable, low maintenance materials and landscaping to allow for the community to participate in daily operations.

The solar systems put in place include PV panels and cool roofs. The PV panels convert sunlight into electricity and help prevent heat absorption into the buildings. The cool roofs consist of a thick, white, reflective pigment that protects the roof surface while reflecting the sunlight and keeping the building cool. These coatings also serve as a water protection barrier allowing for less of a need for maintenance.

With such a large green space, sustainable irrigation was a must. These buildings utilize greywater systems disclosed in mechanical rooms in both below-grade parking garages. The water used from the sinks throughout the entire project is transferred to these tanks and then pumped to the park to be utilized in irrigation of landscaping and hardscaping.

This design surrounds an urban park that encourages walking and biking. Green space for people of all ages and a community to come together was crucial. Greenery used is all native to Central Texas and requires little water and lots of sun. Having pathways that encourage walking as well as providing daily services to the immediate area decreases the need of daily travel by personal cars. Bike racks are placed around the site and access to public transportation is located both directly on and off site.



solar systems



greywater systems



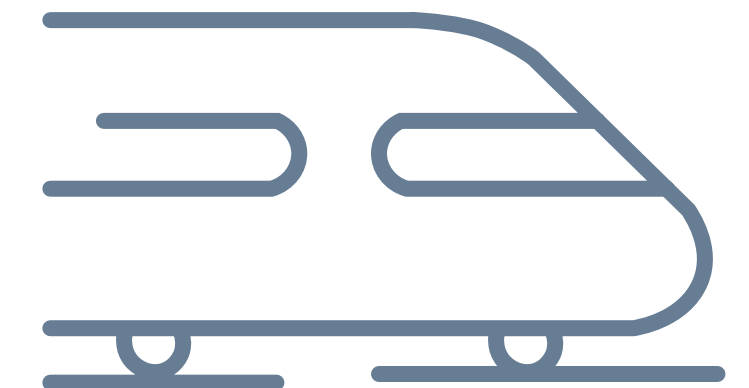
community operated



walking paths + bike racks



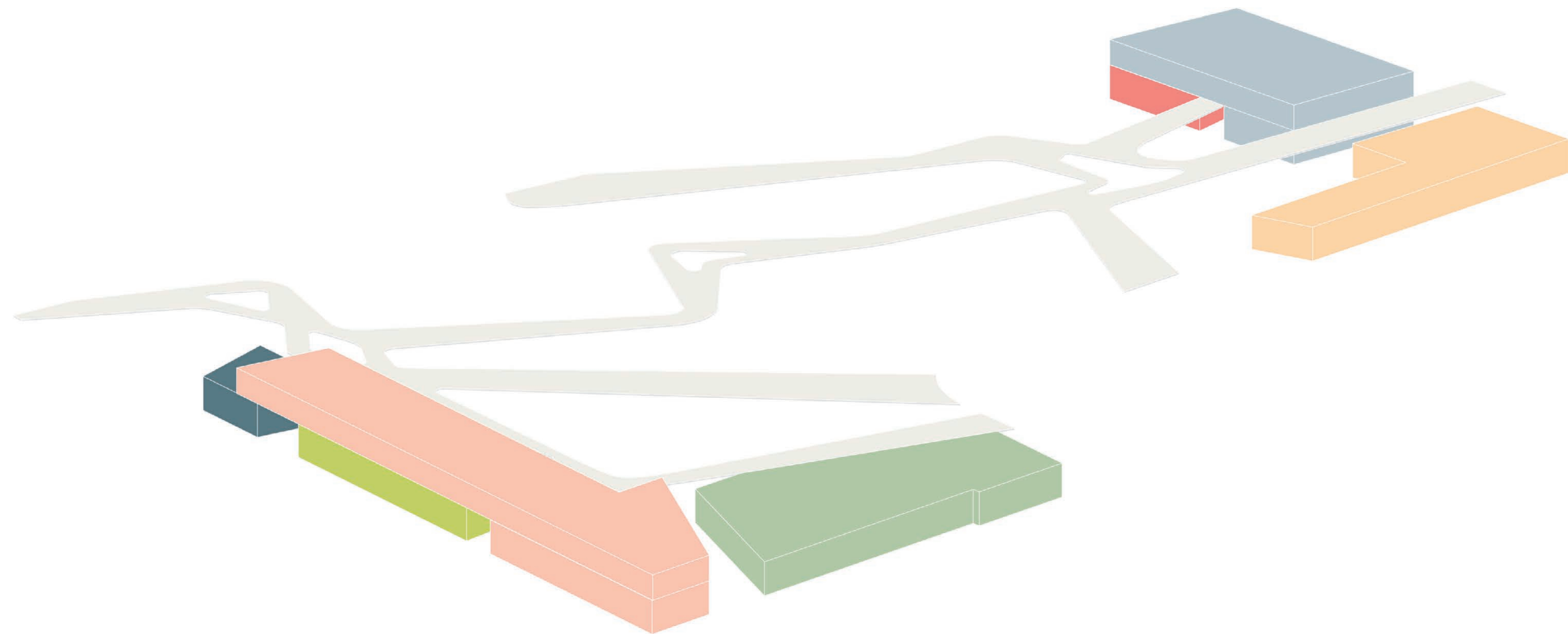
native landscaping +  
green spaces



public transportation



- cafe
- work space
- community
- food market
- child care
- medical
- pharmacy



## program

According to the Services in Area section, it was determined that the Highland community was lacking in medical and pharmaceutical services, child care options, and a local grocery store. This information guided the selection of program for this project. With these services being brought to the immediate area, the community is then able to utilize basic daily services without the hassle of finding transportation or using a personal motor vehicle. Having services located in close proximity to the community is key for a successful, sustainable, self-sufficient community.



designs







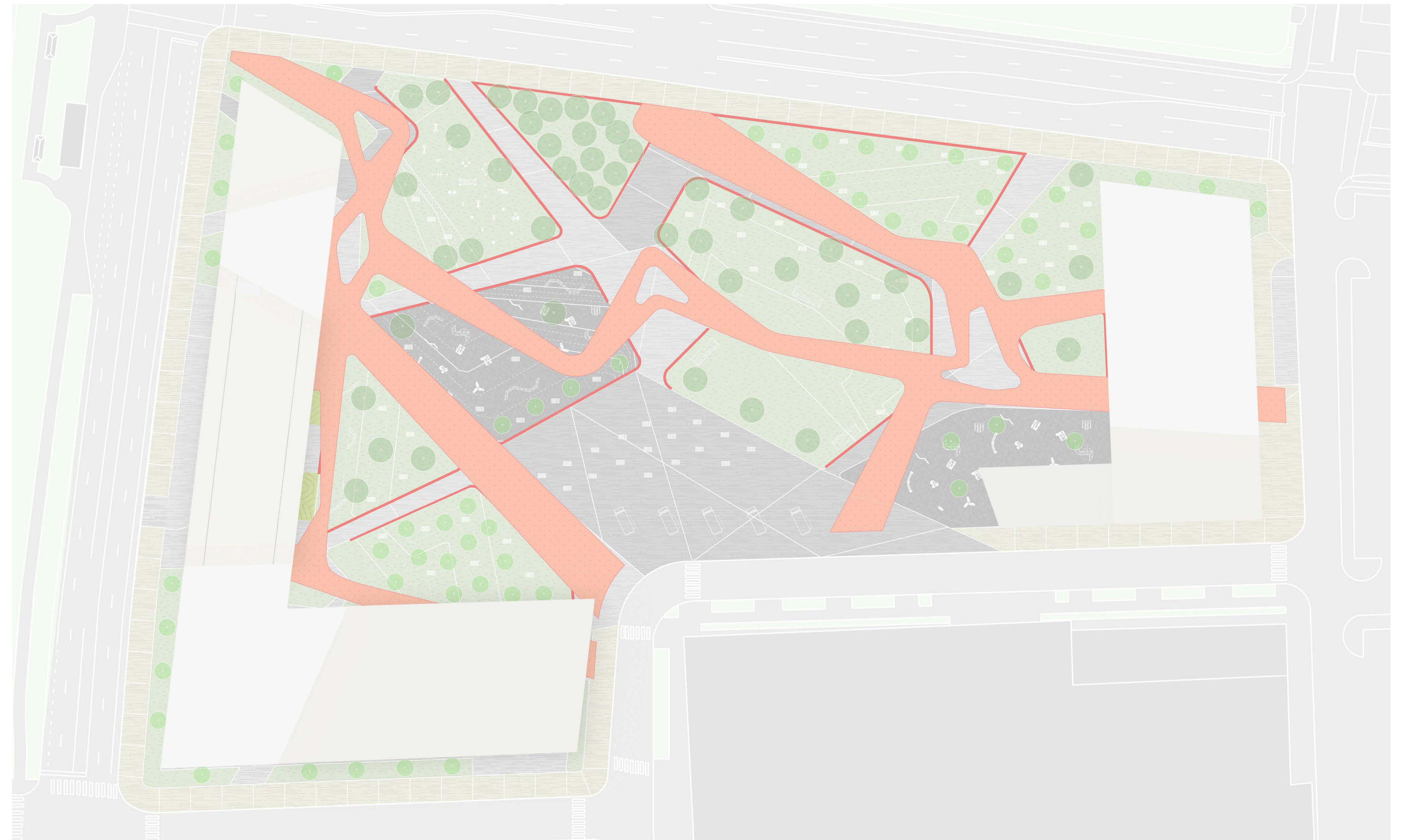
# urban park

The most notable aspect of this design is the urban park. Pathways leading the user through the site are uniquely formed to entice users to walk or bike. The pathways are comprised of two different materials: standard concrete and stabilized crushed granite.

The unique design of the pathways then forms interesting green spaces within. These spaces allow for many individual activities to take place including space for exercise and physical fitness, seating space for studying or relaxing, open space for recreational activities, play space for the children in the community, and paved space for local food truck businesses to serve the community.

As mentioned in the Sustainable Systems section, the park utilizes greenery native to the area. Buffalograss covers all green spaces and Cedar Elm, Chinquapin Oak, and Kidneywood trees are placed throughout the site. Specifically chosen as greenery that requires little water and thrives in the sun, this allows for the project to utilize greywater systems for irrigation.

Residing above the pathways and green spaces is a canopy piece that provides shade to those within the site. Following a similar design as the pathways, the canopy partially covers the walkways but overall provides a sense of movement without restricting access to just the designated pathways.







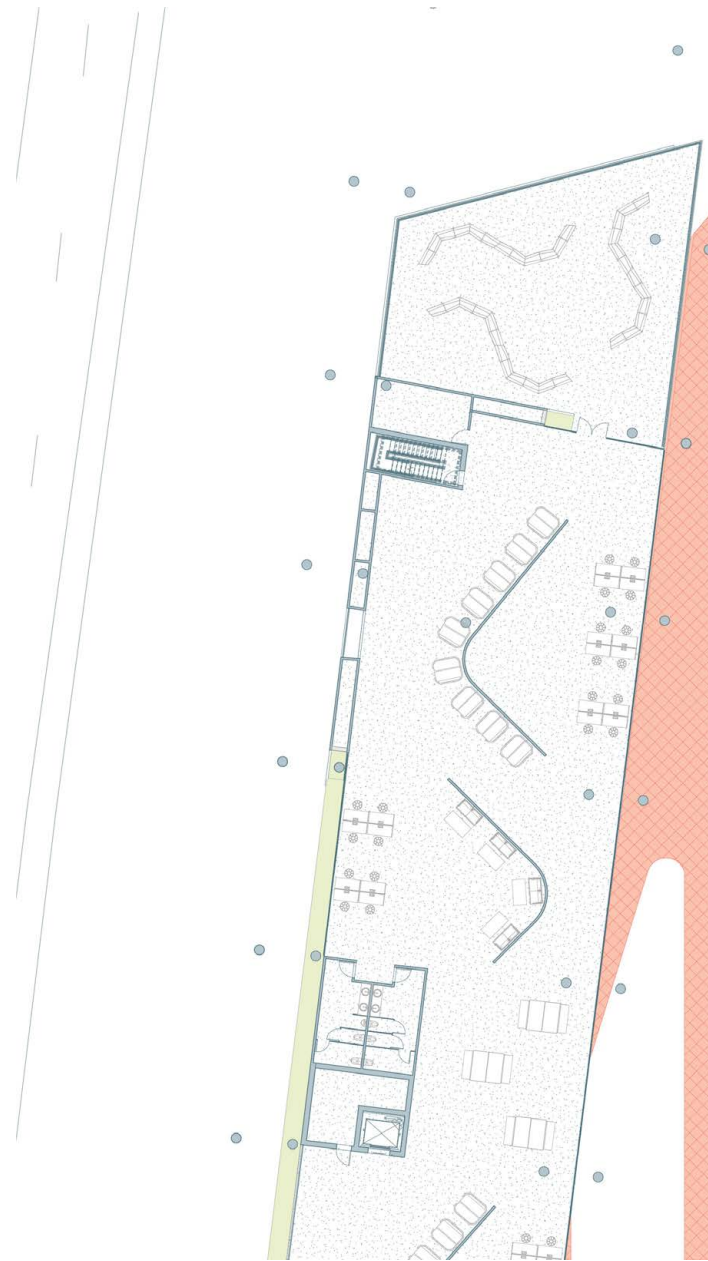




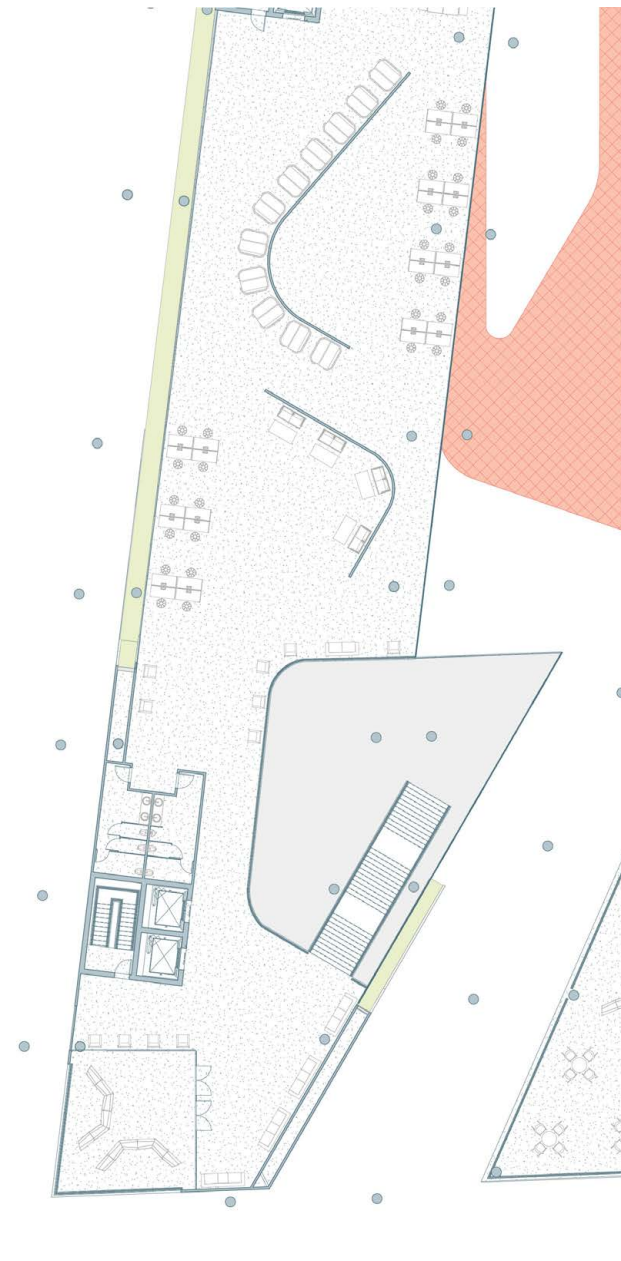
first floor - north side



first floor - south side



second floor - north side



second floor - south side



## cafe, community + work space

Entering from the northwest corner of the site directly adjacent to the Highland MetroRail train stop, the user will approach a large covered outdoor space connected to the café. Here, coffee or food can be purchased before heading to another building on site or across the street to Austin Community College. The next building is an open community space. This space comes equipped with a small kitchen area with large restaurant-grade refrigerators and freezers for a local food bank to utilize once a week. This space can be used for anything that the community needs it to be whether that is a space to distribute COVID vaccines or a place for a local artist to display their work. Finally, the first-floor lobby of the work space and large second floor work space provides an area where the community can utilize free Wi-Fi and open desks. The second-floor features two outdoor terraces, one on either side of the building, to allow for open-air socialization.



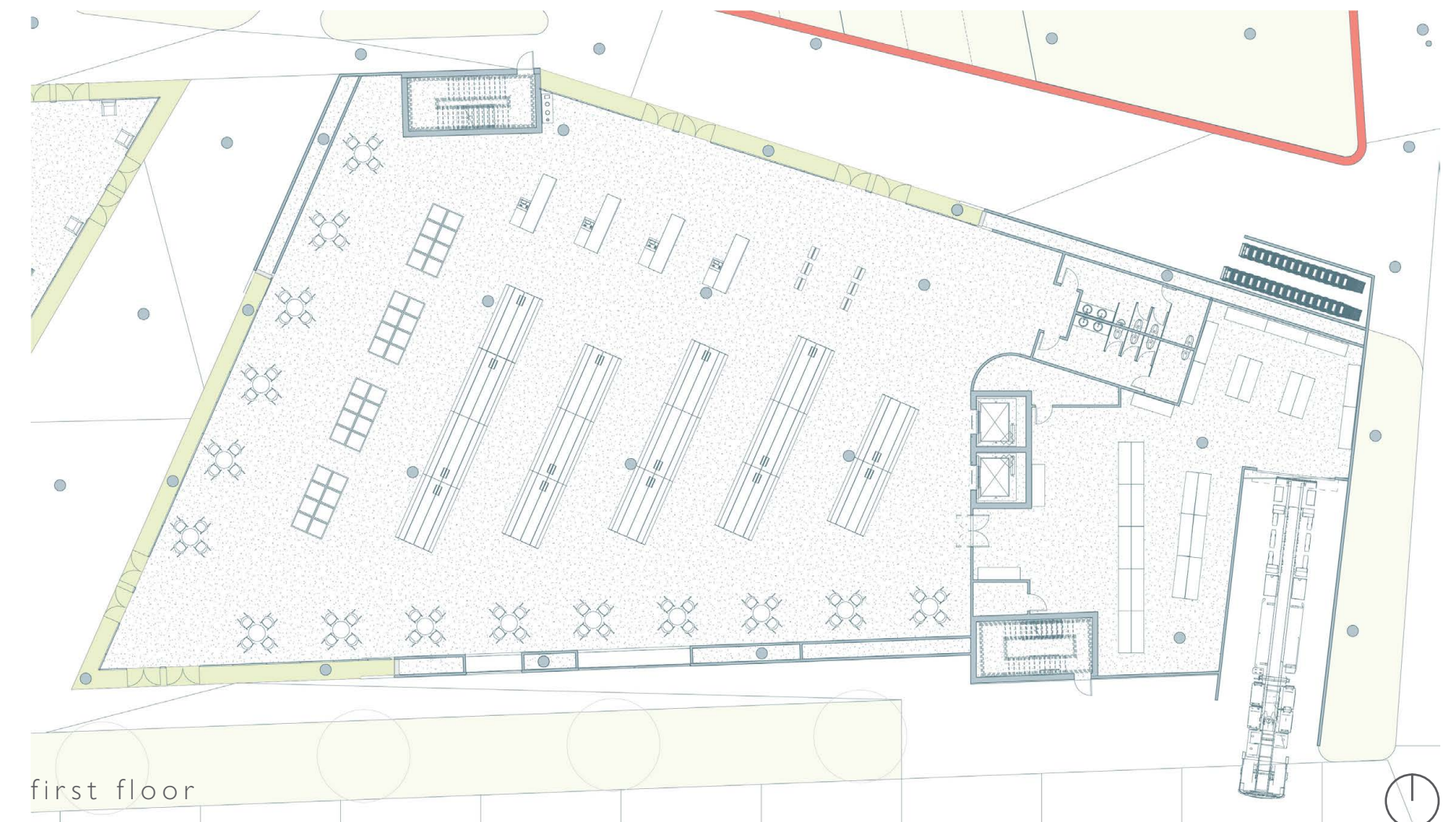
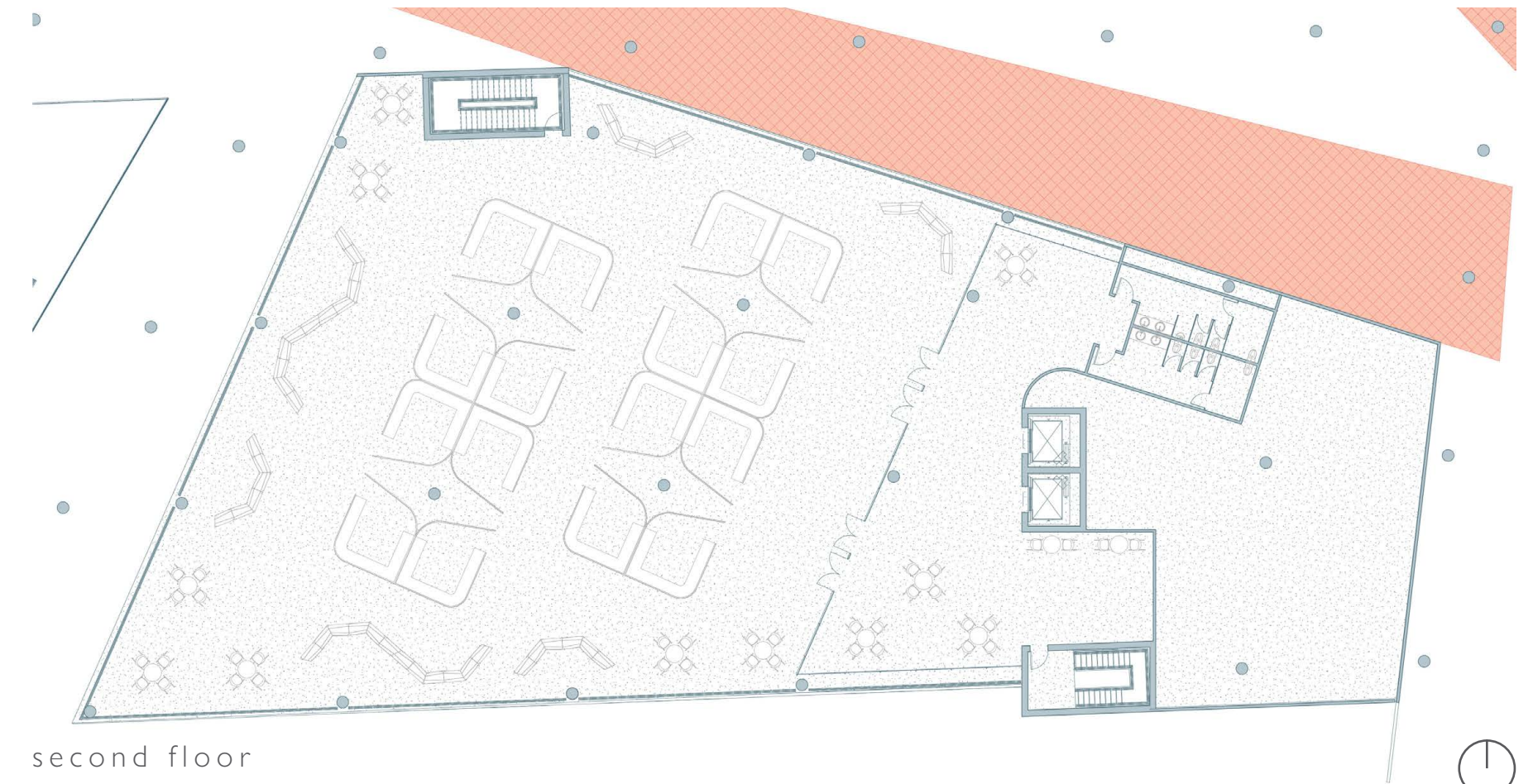




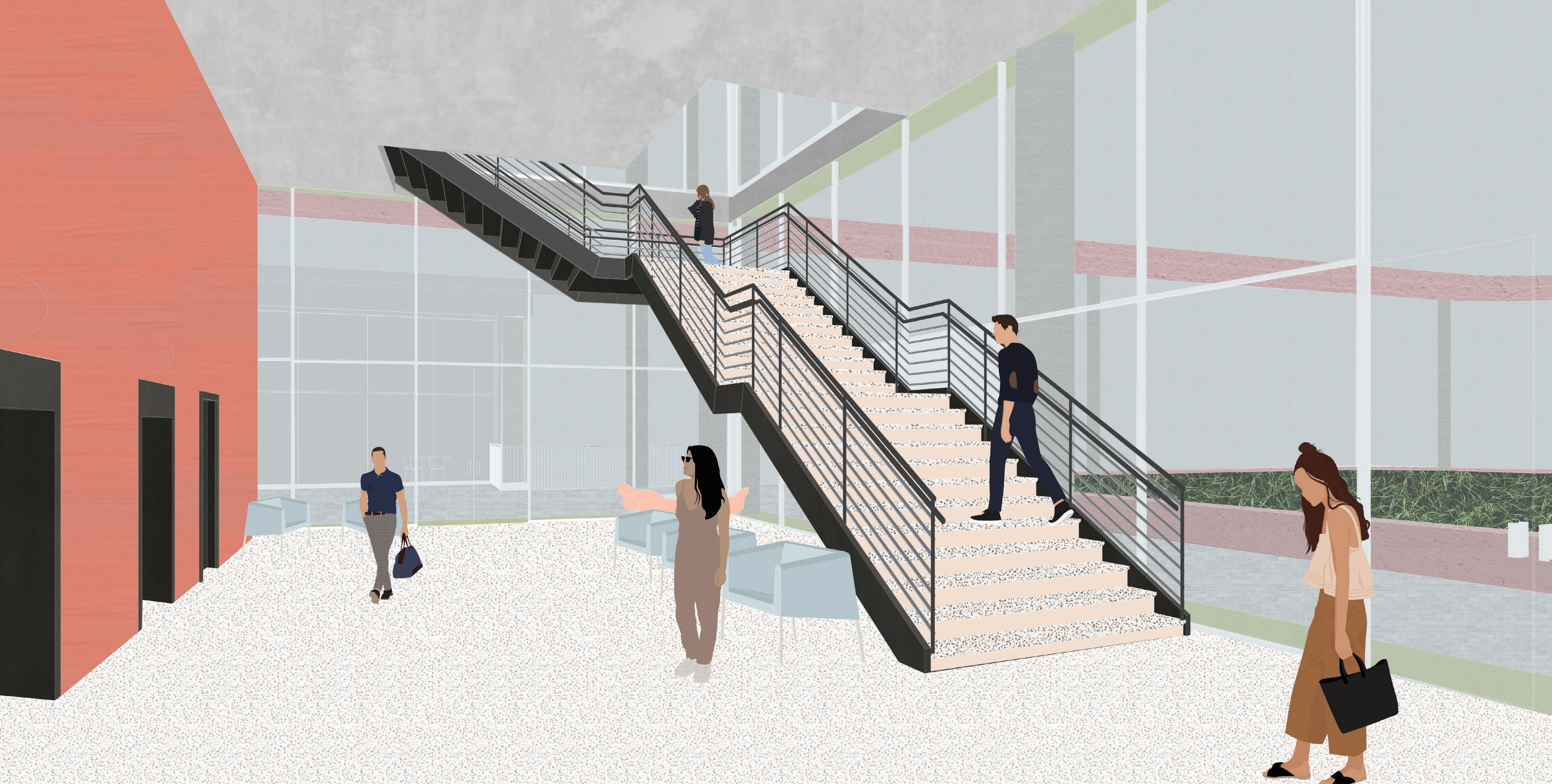
# food market

The food market is located at the south most edge of the site between Austin Community College and FiveTwo at Highland, a multifamily development. This food market provides the community immediate access to healthy food. With a sense of community in mind, the market was designed with more distance between aisles and specified seating space to allow for socialization to take place. Traditionally, grocery stores are not designed for social gathering but more often than not, the aisles get backed up with people gathering and talking. This food market embraces this in an effort to provide a sense of community to the local neighborhood.

Located on the second floor of the market is a rooftop terrace with space for a farmers' market. Equipped with sixteen booths, the space allows for locals to bring their goods to the neighborhood economy. To continue with the social gathering of the market, the rooftop provides gathering space both indoors and out to accommodate any weather.











## medical + pharmacy

Located at the northeast corner of the site is the medical and pharmacy services. As seen in the Services in Area section, there are no pharmacies in the immediate area and just a few medical services. This building provides not only space for a pharmacy but also space for three individual medical offices including primary care, pediatrics, and urgent care.

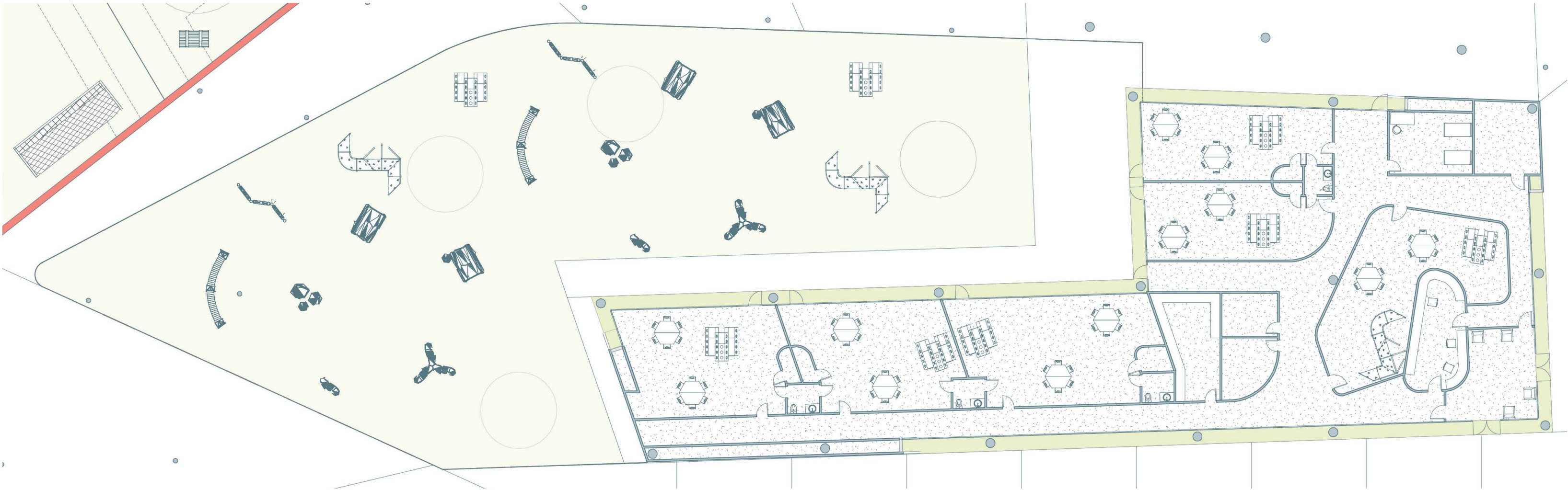






# child care

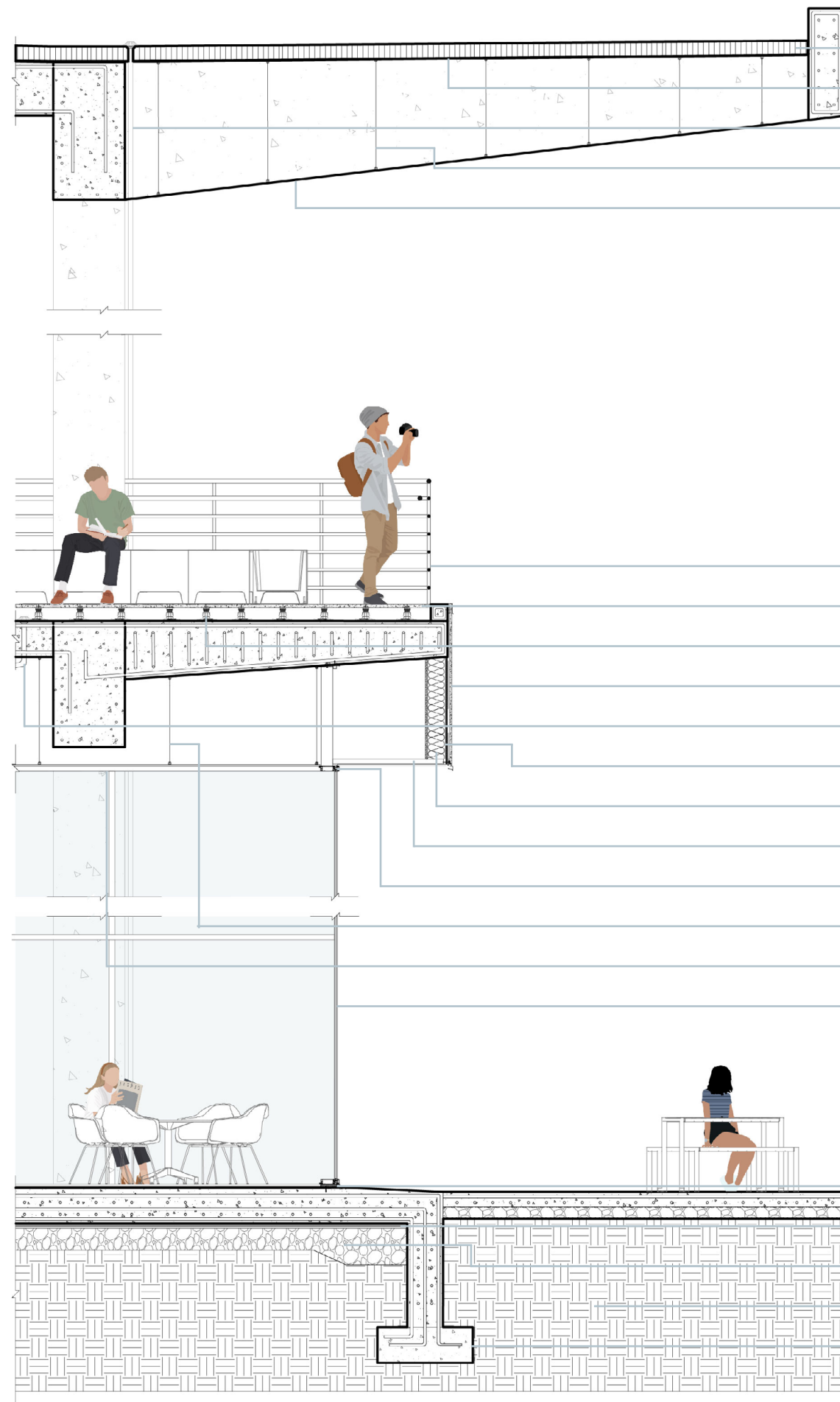
At the southeast corner of the site is the one-story child care center. This center is located in this specific corner as it is the most private, protected, and secure corner of the site. This design features an 'L' shaped plan with five classrooms, an indoor multipurpose room, a small kitchen, and a nurse's office. The building provides a partial perimeter for the private outdoor children's play space to allow for the most secure and safe space possible.



first floor







rigid insulation  
waterproof membrane  
roof drain  
soffit suspended clips  
woodgrain aluminum soffit

## wall section

This design utilizes a two-way flat plate system. With the many different angles of each building derived from the pathway intersections with the forms, the two-way systems allows for deviation from a standard column grid and allows for the creation of irregular building forms.

aluminum railing system  
composite decking  
adjustable pedestals  
fiber cement paneling system  
roof drain  
exterior sheathing  
insulation  
aluminum soffit  
aluminum mullion system  
acoustical ceiling suspension clips  
suspended acoustical ceiling  
curtain wall

aluminum mullion system  
waterproof membrane  
crushed stone underslab  
compacted fill  
concrete footing





conclusion



# acknowledgments

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chair

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Stephen Caffey  
committee member

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Michelle Meyer  
committee member

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James Haliburton  
studio professor

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master of architecture  
final study presented march 15th, 2021



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