

Acequias:
Building Social Resilience in Española, New Mexico

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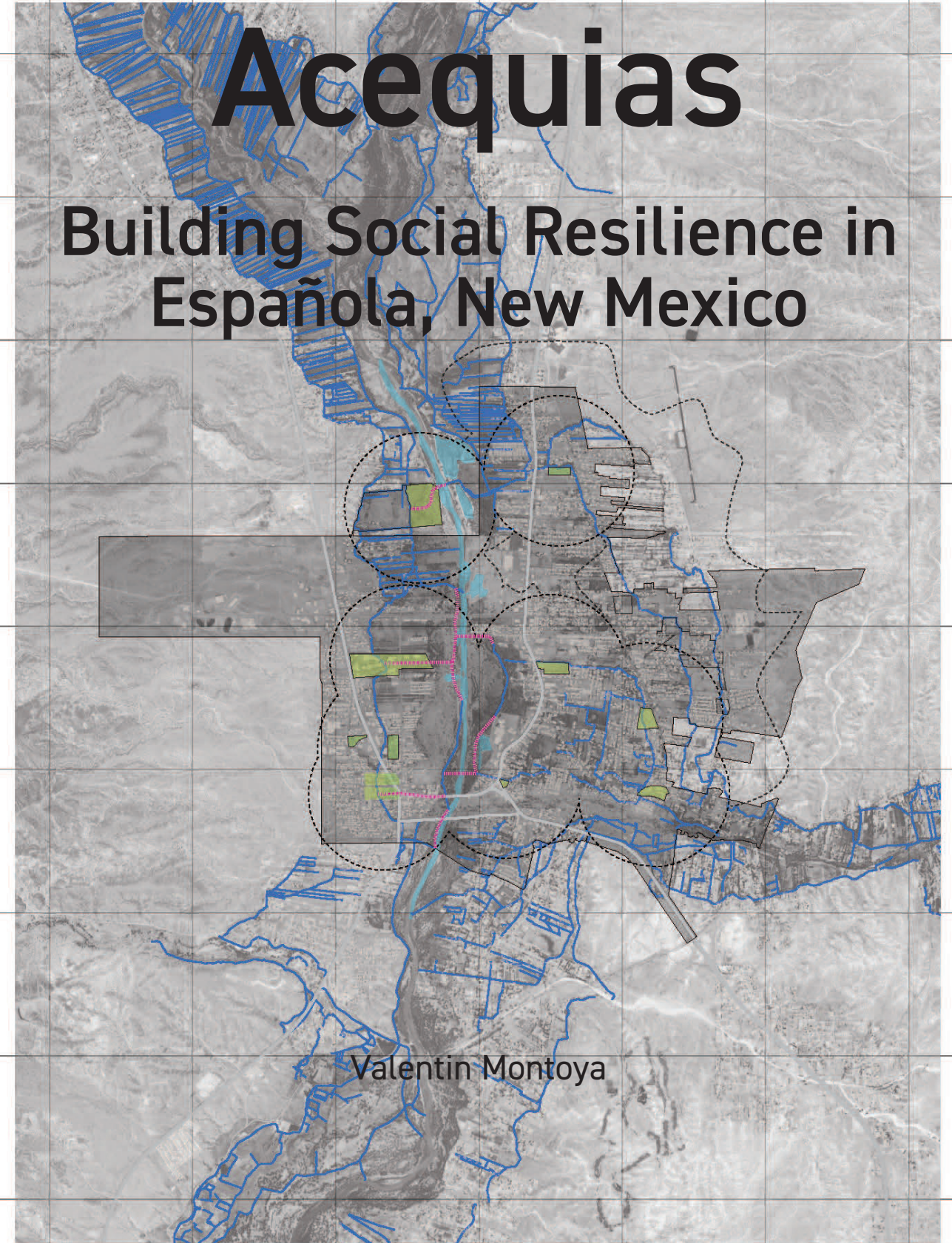
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Abstract

Facing decades of debilitating social issues and a changing climate, this design research explores the historical importance of acequia systems in Española, New Mexico, to help re-imagine the future of the city. Española currently experiences poverty and a lack of economic opportunity caused by years of land use, urbanization, and shifting economies poorly suited for its unique culture. This investigation utilizes the city's existing acequia infrastructure to propose a connecting network of open spaces. The site design of a single node in the proposed system focuses on moving the community towards food, water, and energy security to establish a sustainable community and generate economic opportunity. As a guiding framework, the research investigates the traditional acequias landscape and permaculture to reinterpret acequias as a catalyst for a new community hub. Providing intergenerational knowledge through environmental stewardship and support for the Española's community. Ultimately proving opportunity for the community to connect will help move the city towards a greater social resiliency.

Acequias

Building Social Resilience in
Española, New Mexico



Valentin Montoya

“In the season of good harvest, nowhere are the lands more lush or the crops more colorful than in the Española Valley. The Valley farms are bright with red chiles, with pumpkins and squashes and colored corn drying on the rooftops. For rural living in New Mexico — or anywhere — few areas enjoy any more advantages than the Valley where the conquistadors founded the first New Mexico colony 366 years ago.”

– George Fitzpatrick and John Sinclair, 1965

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My community

for inspiring me to pursue this project in the first place and the community members that were willing to talk with me and offer their knowledge.

My peers and mentors

for being there during long studio hours, pandemics, and protests, and always bringing the best out of each other.

Preface

This thesis explores the place that shaped me, a place I will always consider home. I always thought I had a pretty typical childhood. I grew up next door to my grandparents, and my cousins all lived up and down our street. We played in the apricot trees at my grandma and grandpa Montoya's house, claiming each tree as our imaginary fort. We often rode bikes up the dirt road, from my house, into the arroyo at Tio Sam's, and up the hill to Tio Nelson's. When it was full of water, we raced sticks down the acequia. The hills to the acequia was our territory, our place of belonging as children.

I remember my grandpa's grapevines

and small garden. A hobby garden, considering a generation before me, families were working acres of land from the acequia to the river, growing everything they needed to survive. My grandma made jams and jelly and hung dried apples from the clothesline. My grandpa was outside every day, pulling weeds, pruning, and irrigating from the acequia. My chores were very similar. Get outside and water early in the morning to beat the heat. Except I watered from a hose, not an acequia. Nevertheless, I watered, and as I watered, I played with the mud from the *bordo* or tree tank, making miniature canals and dams, until the tank was full. Then I moved onto the next one.



Figure 1: La mesilla Acequia at my Grandma and Grandpa Montoya's

The late Estevan Arellano wrote about “Querencia,” as “that which gives us a sense of place, that which anchors us to the land, that which makes us a unique people.” He continues, “for that reason, we respect our place, for it is our home, and we do not want to violate our home in any way.” Querencia is a place where one feels safe, a place from which one's strength of character is drawn, where one feels at home.” (Arellano, 2012)

This small recollection of my own early memories constitute pieces of my querencia. It is what will always make the beautiful Española Valley my home. Just like it is the home for my fellow Hispanos, Nuevo Mexicanos, and pueblo brothers and sisters,

that either cannot leave or leave knowing one day we will return. It is where our roots are, our heritage, and our culture. Querencia drives my research and is the motivation that lets me see the challenges and the beauty of this place. It allows me to embrace both the good and the bad. It pushes my search for opportunities to help make this the city that I believe it deserves to be.



Figure 2 Low rider and “Welcome to Española” mural

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Figure 3 Satellite image focusing on New Mexico



Figure 4: Satellite image focusing on Northern, New Mexico

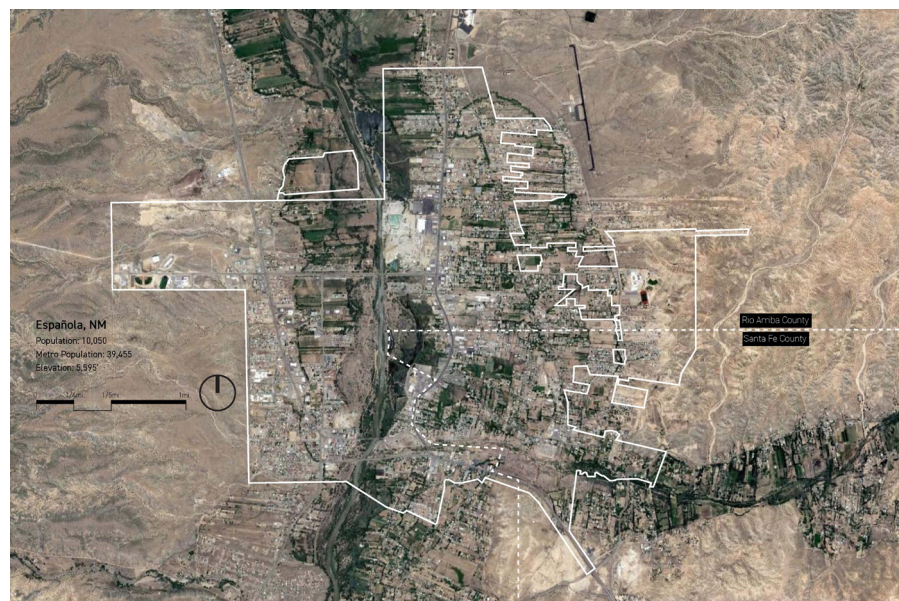


Figure 5: Satellite image focusing on Española, New Mexico

Chapter 1

Introduction

Many social issues have and continue to plague my hometown of Española, New Mexico. The Federal Bureau of Investigation recently listed it as the most dangerous city in the state of New Mexico (Napolitano, 2014). It is consistently one of the nation's top cities for drug overdoses, at four times, the national average per capita (Eckholm, 2008; Todd, 2016; Tobar, 2000). For many years and throughout my childhood, I remember regularly hearing the city had the title as the heroin capital of New Mexico. The lack of economic and education opportunities in Española leaves very few outlets for residents of the town. A lack of community-based resources has fed into

decades-long issues of crime and substance abuse. Communities that were once intimately connected through their land and water use are now fragmented. A lack of social capital and opportunity within the last few generations is evident. Together, the projected and real risks of changing climate, water, food security, and community health, seem insurmountable for this small New Mexican city.

Models of climate change predict long term drought, less snow pack, and unpredictable rain events, increasing water stress in a region already threatened by drought. Since the 1970s, the average temperature in New Mexico has increased

faster than any other state in the United States, approximately .7 degrees Fahrenheit every decade (Climate Central, 2016). While snowfall intensity has yet to reveal a long-term reduction, it is predicted that snow pack in elevations over 5000ft will eventually reduce, following similar states in the western United States. Further, while winter snowfall amounts are projected to decrease, winter rain events are likely to increase – altering the cycles of water flow in the landscape. Throughout the spring and summer months, rain events will be less predictable. These changes in precipitation will affect the seasonal hydrologic flows in the Rio Grande and its tributaries. Human

settlements and ecosystems dependent on the river will be affected as water and food insecurities increase.

One critical system that will be impacted is the acequias. This system also contains the potential to play a significant role in this region for mitigating effects on people of a changing hydrological cycle for the community it serves in the area. Local knowledge established through 400 years of generational stewardship with the landscape can serve as the foundation for social adaptation in response to these changes. Utilizing the traditional understanding of the acequia system and permaculture as theoretical frameworks, a



Figure 6: Snow covered acequia. A sight that may only become more rare.

design within the city of Española proposes a network of connectors and nodes spanning the city and further warrants a specific site design exploration.

The acequia as a physical hydrologic infrastructure has multiple conditions well suited for people. The ability to safely transport people across the landscape becomes a method of retroactively reconnecting people to the acequias. Proposing vital open spaces, directly connected to the acequias can create active uses of the system by residents, through multiple programmed and site-specific opportunities. The network of acequias and public open space nodes can be the catalyst

to create long term social resilience that is essential to and climate resilience, ensuring the continuance of people, plants, and animals in the Española valley.

Acequias are still a prominent landscape feature in Española. The corridors full of life, vegetation, and water create a stark contrast to the surrounding desert environment. They have untapped potential in how they can be adapted to suit the needs of the city better. They also move a limited and precious amount of water. It is essential to imagine the best uses of acequias that can add value to the community and makes best use of a limited supply of water. Traditionally they have



Figure 7: *Parciante jumping acequia*



Figure 8: El Agua es la Vida, A rallying cry for acequia activists

been used primarily for supporting food production, and this can and should still happen. However, today, this has turned into an activity that mainly occurs on private property where acequia water rights are typically connected to the property and can be publicly accessed. So then, it is crucial to explore how what has long been the communal resource of the acequia system, can be used to support community needs in a public setting. Further, for a proposal of this scale to work, it is essential to consider how to partner local and private food growers with local businesses and the community. With an emphasis being on placing public land, resources, and

knowledge into the community that cannot access private acequia property. Therefore, this thesis explores how Española's public land can best serve social needs, while supporting local ecology and hydrology through sustainable agricultural methods. Ecology and hydrology are natural systems the acequias are well-designed to benefit, but this relationship must be examined in an urban context.



Figure 9: Parciante tending to crops

Thesis Overview

This design research investigates how a traditional local infrastructure, such as the acequia system, can be the catalyst for social change. Utilizing a design research approach, this project establishes a design proposal for the continued use of the acequia system of northern New Mexico across two spatial scales.

The first scale proposes a citywide connector and node system based on the existing acequia infrastructure. Existing and proposed public open spaces that make use of currently underutilized properties are identified based on their adjacency to an acequia and proximity to other nodes. The proximity and spacing of proposed nodes to each other considers more evenly

spaced open spaces in the city to create more equitable access for residents. This includes existing institutions such as the historic Santa Cruz de la Cañada church, McCurdy K-12 schools, and Northern New Mexico Community College that can become partners of a greater community support system. Currently, all of the existing open space sites in Española are located directly on an acequia. Following this logic, every proposed addition to the park network would maintain a similar adjacency to an acequia. Open space adjacencies ensure that all nodes connect to the acequia trail network, leaving the opportunity for each site to explore a relationship with the acequia and other nodes. Proposed nodes

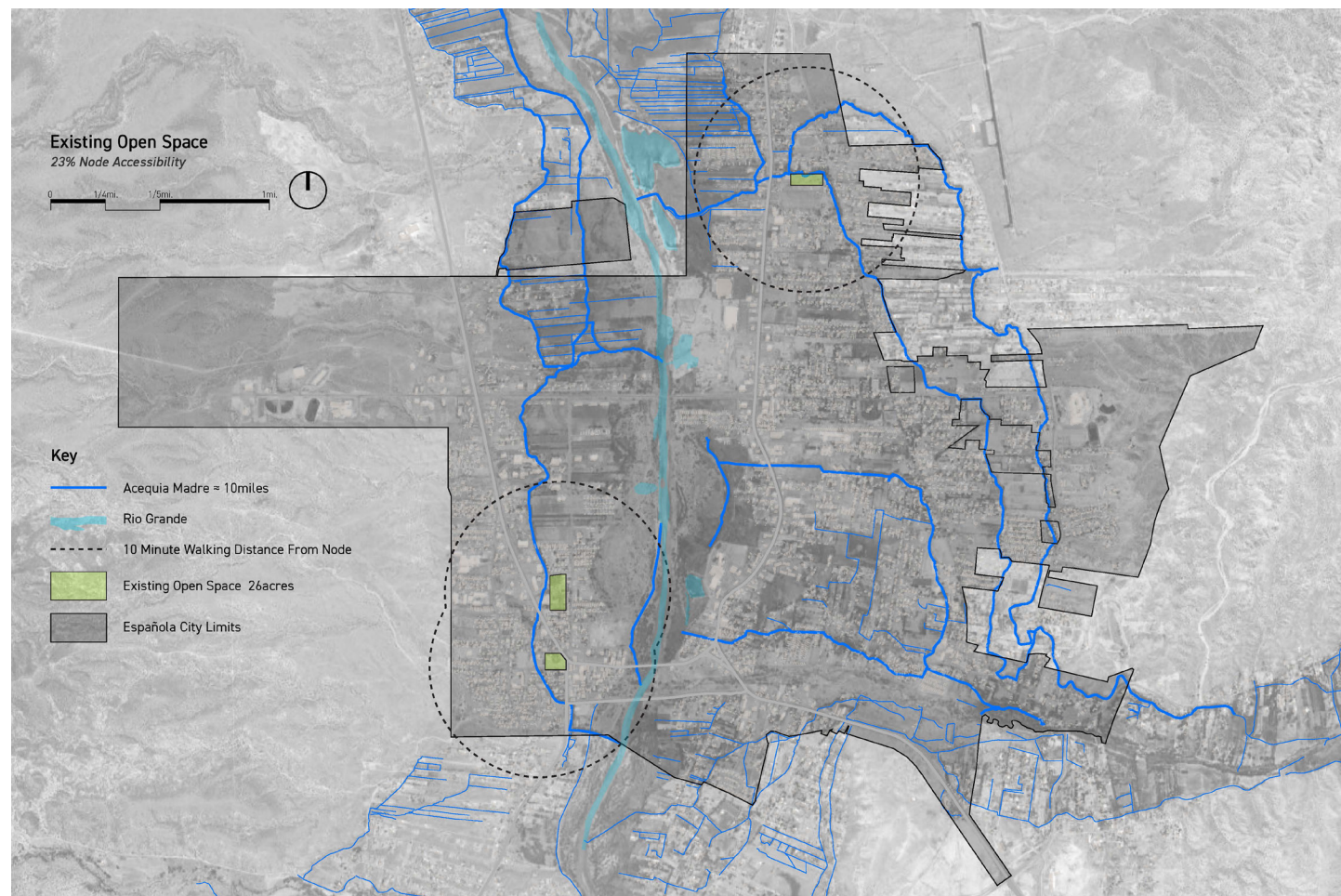


Figure 10: Existing Open Space Map of Española showing 23% ten minute walking distance to an open space

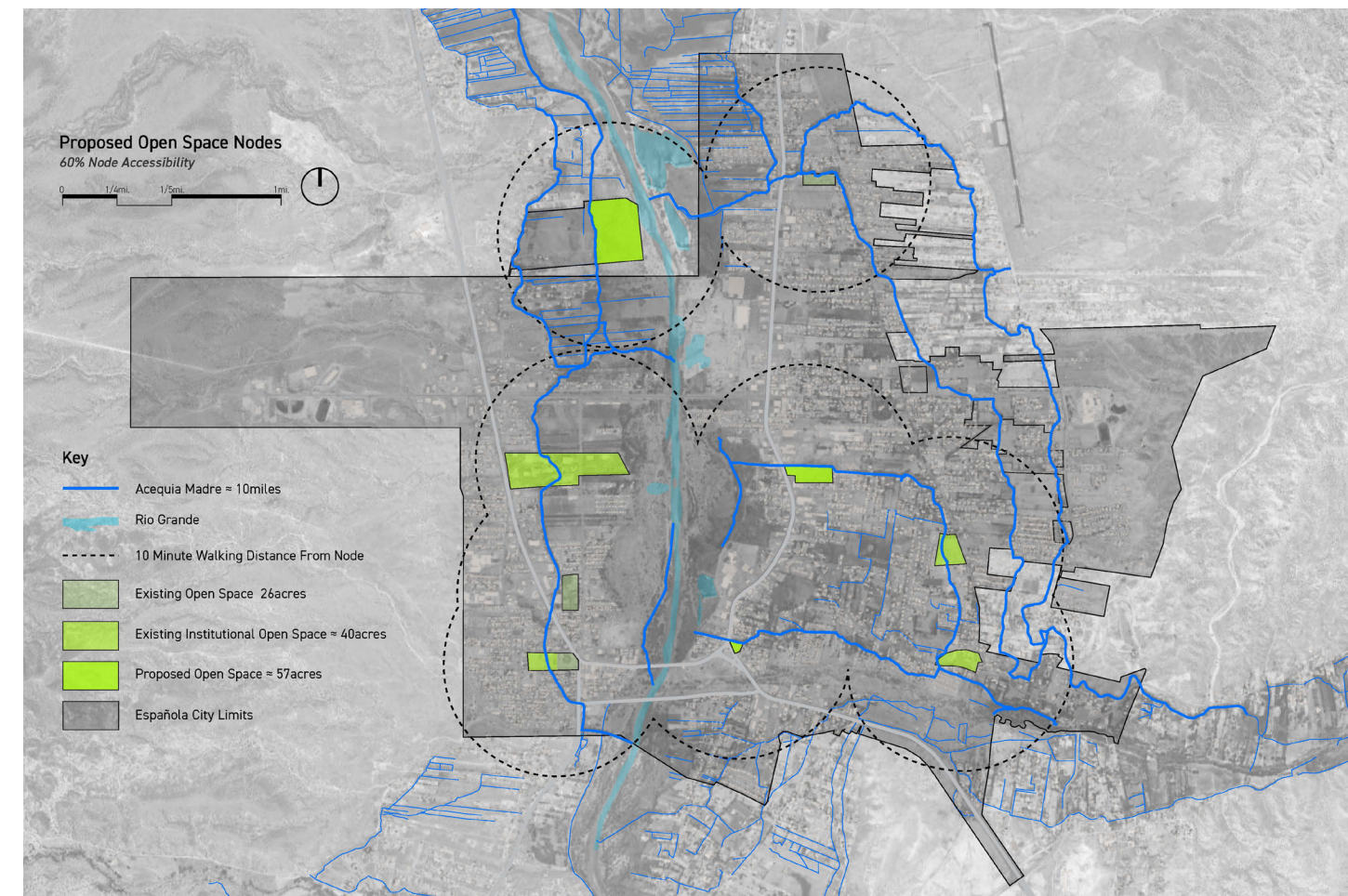


Figure 11: Proposed Open Space Nodes Map of Española showing 60% ten minute walking distance to an open space.

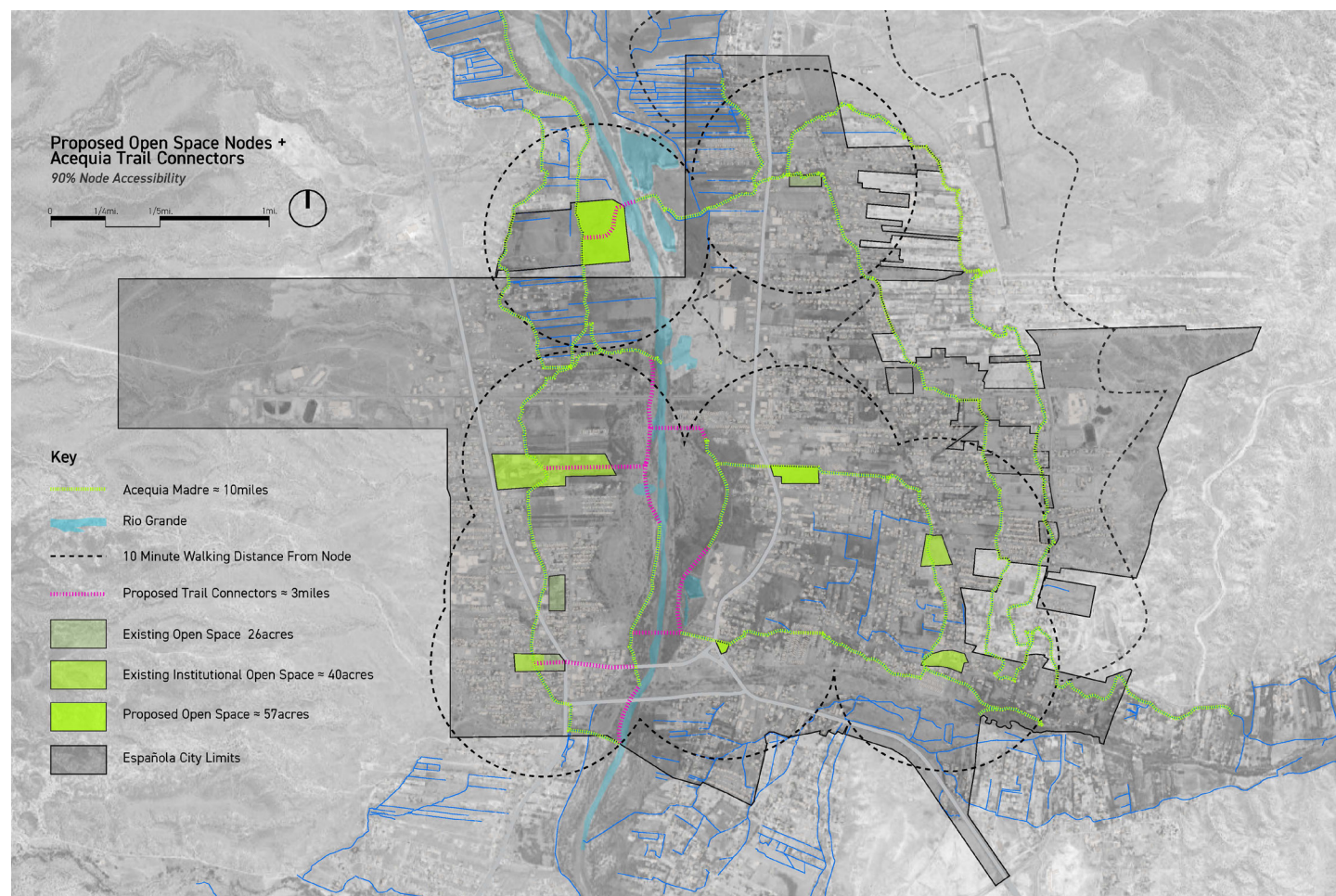


Figure 12: Existing Open Space Nodes and Acequia Trail Connectors Map of Española showing 90% ten minute walking distance to an open space.

are chosen based on a 10-minute walking distance. Using the 10-minute walkability to an open space node benchmark, the existing conditions only reach 23 percent of the city residents. (Figure 10) The final proposal consists of nine total nodes connected by the acequia trail network, ensuring up to 90 percent of city residents are within the 10-minute benchmark for any node. (Figure 12, Land, n.d.)

Part two identifies the Plaza de Española as a particularly important node in the proposed connector and node system. The historical significance of the Plaza that has made it the civic center of Española makes it a catalyst site for the proposed system. Therefore, at a closer scale, a master plan and site design explore opportunities in the Plaza that meet the thesis's goals. Site programming will

include utilizing the existing acequia for food production but adapt it to address the city's ongoing and future needs. The final design proposal re-imagines the public relationship to land and water while seeking to reconnect communities that were once more reliant on one another. By doing so, the acequias can create new opportunities for healing, learning, growth, and resiliency in Española.

Figures 13-17 depict moments that occur along the proposed trail network. With approximately twelve-foot easements flanking the acequia, the trail shares the easement and leaves room for annual maintenance to occur and vegetation to grow along the acequia. Only when there is a need to enhance pedestrian security is the trail emphasized.

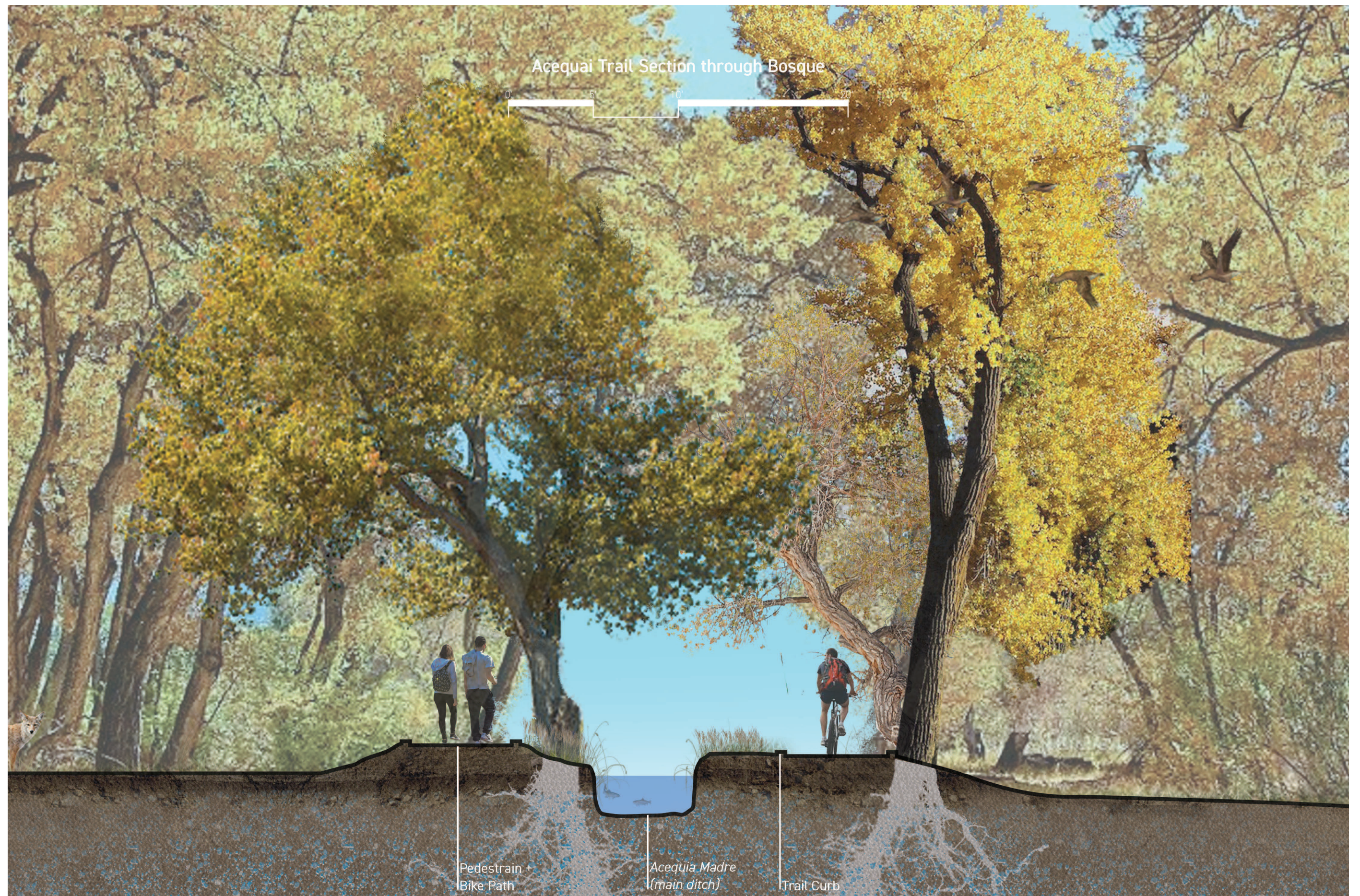


Figure 13: Section of the proposed acequia trail system through the bosque. Subtle berming and trail curbs guide people along the path and slightly elevate views into the surrounding bosque.



Figure 14: Section of the proposed acequia trail system through the desert. Vegetation along the acequia contrasts the surrounding desert species and provides a cool path, especially during summer months.



Figure 15: Section of the proposed acequia trail system adjacent to an agriculture field. Walking past exiting acequia landscape can subtly display and familiarize people with acequia knowledge.



Figure 16: Section of the proposed acequia trail system through a residential neighborhood. Most of the trail runs behind homes and backyards. More eyes on the trail could enhance the safety of the trail.

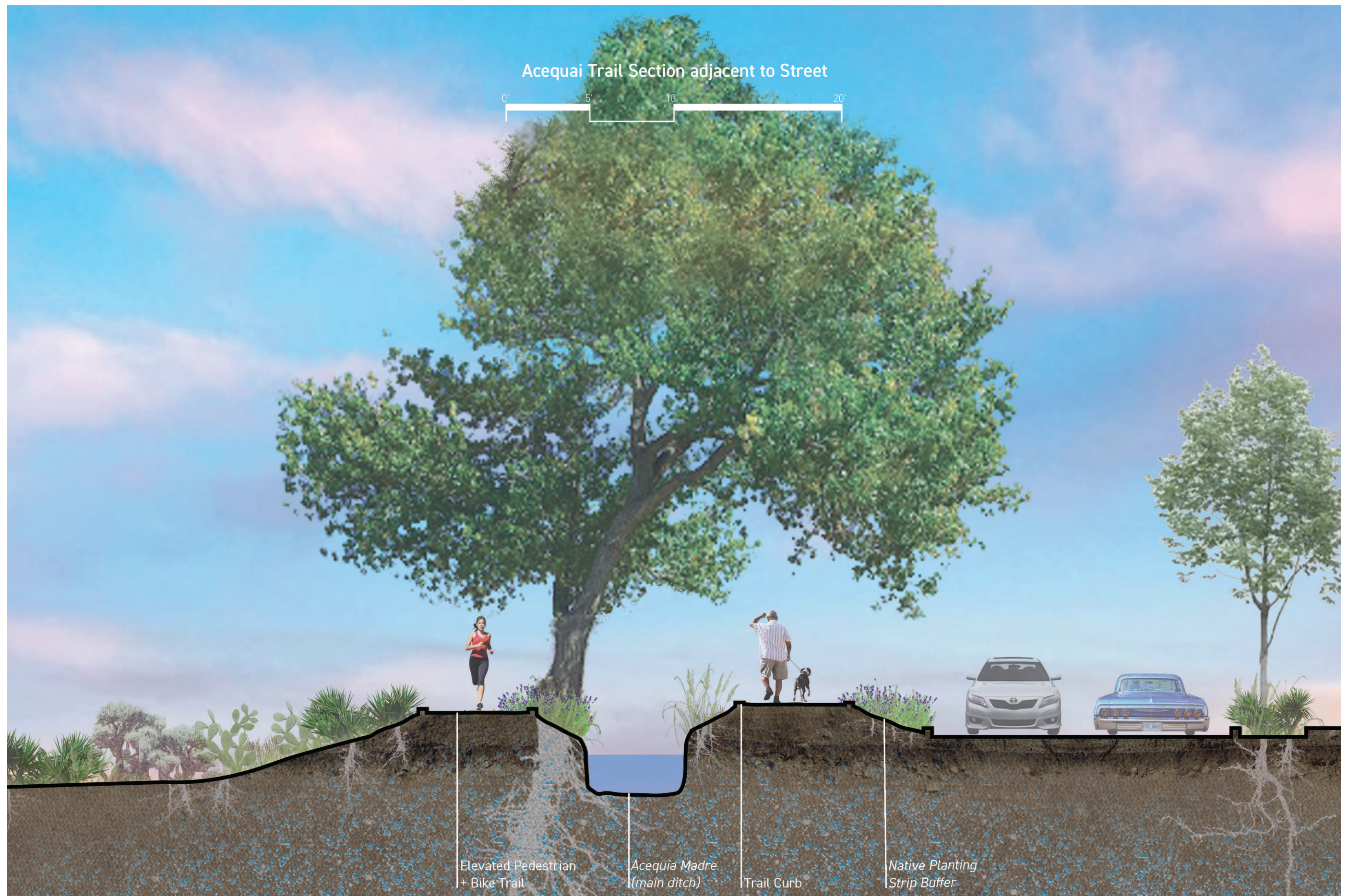


Figure 17: Section of the proposed acequia trail system adjacent to a street. Berming and planting strips are used to separate pedestrians from the vehicular street and enhance safety.

Chapter 2

Theoretical Framework



Figure 18: Satellite image above Hernandez showing green ribbons, a pattern characteristic of acequia land use.

The development of the acequia systems in New Mexico have been traced back more than 400 years. At the end of the 16th century, Spanish colonists brought the technology into the region. (Rodriguez, 2007) While agricultural farming existed before the Spanish arrived, the acequias were used to divert water from more substantial water sources such as the Rio Grande and other rivers throughout the state. In some instances, the acequias were built over existing indigenous canals, but new irrigation ditches were mostly dug. Often during the establishment of a new settlement, acequias were the first element to be constructed. Sourcing water

for agriculture was crucial for developing new settlements. Relying on gravity to move water through all the settled lands required the system to adhere strictly to the landscape's topography. Ecotypes within the topography determined common lands, areas for dwelling, orchards, crops, and grazing while maintaining an ecological relationship to the riparian corridor. The land development pattern resulted in long thin strips of land, *suerter*, that stretch between an acequia and the river and up into the common lands. (Arellano, 2014) This land-use pattern ensured villagers access to all the resources within that landscape.

When a new settlement was

established, the first built component was an acequia. The creation of an acequia established a source of water and food. Because acequias rely on gravity, the physical infrastructure of an acequia begins at the river. Here a *presa*, small diversion dam, is created.(Figure 20) This dam raises the water level just enough to start the flow of water into the acequia. The *acequia madre*, main ditch, slowly carries water downhill from property to property. (Figure 21) At each property, the *parciante*, acequia member, of that property will open a *compuerta lindero*, small head gate, diverting water from the *acequia madre* onto their property for irrigation.

(Figures 22, 23) Along the acequia madre, *desagues* or sediment traps are designed into the system. Through the spring and summer, the *desagues* will collect sand as the acequia flows. This sediment is regularly removed, allowing the *desagues* to continue functioning.

Once the water has reached all acequia *parciantes*, the excess water flows back into the river. Near the end of every winter and before the growing season begins, the *saca la acequia* is performed. This is a one-day cleaning of the acequia, removing all debris, reshaping the walls, and trimming overgrowth, by hand, with *palas y rastrillos*, shovels and rakes,



Figure 19: Members of the community performing the *limpia*, annual maintenance of an acequia.

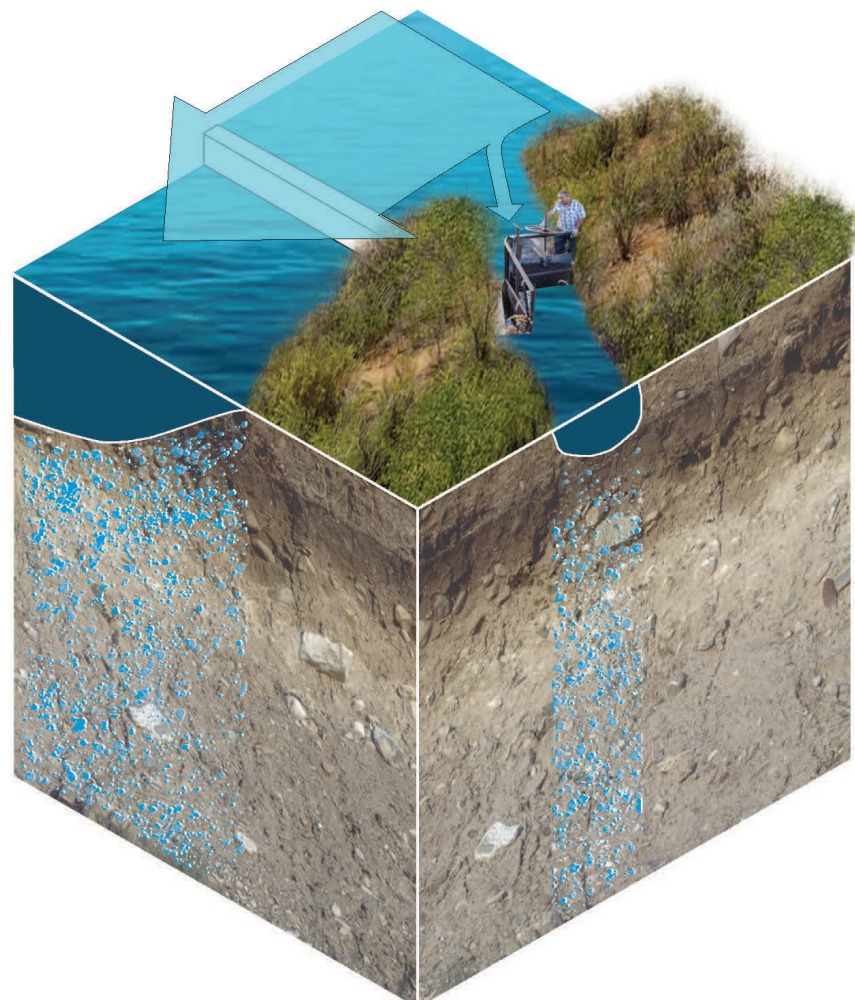


Figure 20: Diagram of La Presa, diversion dam

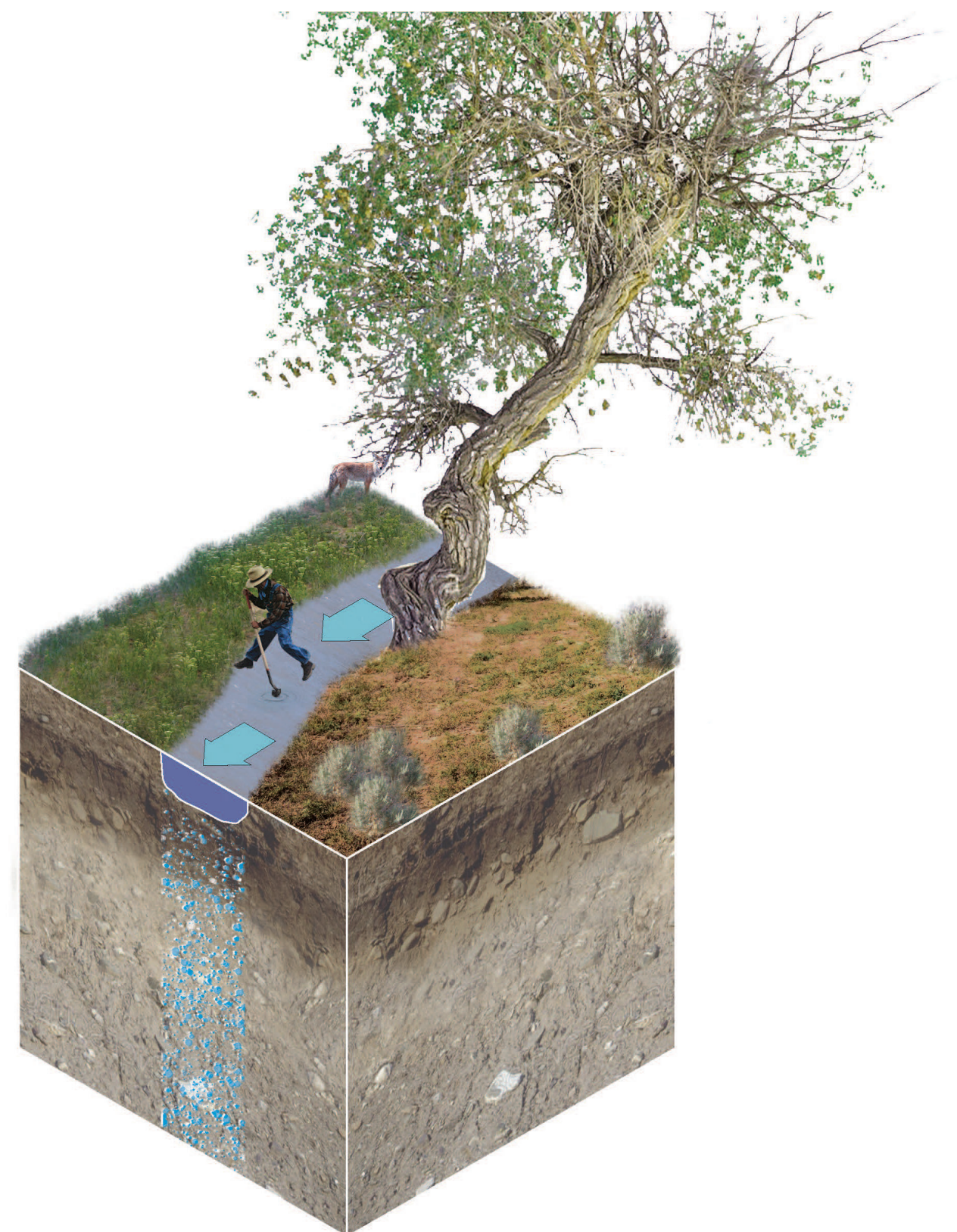


Figure 21: Diagram of an Acequia Madre, mother ditch

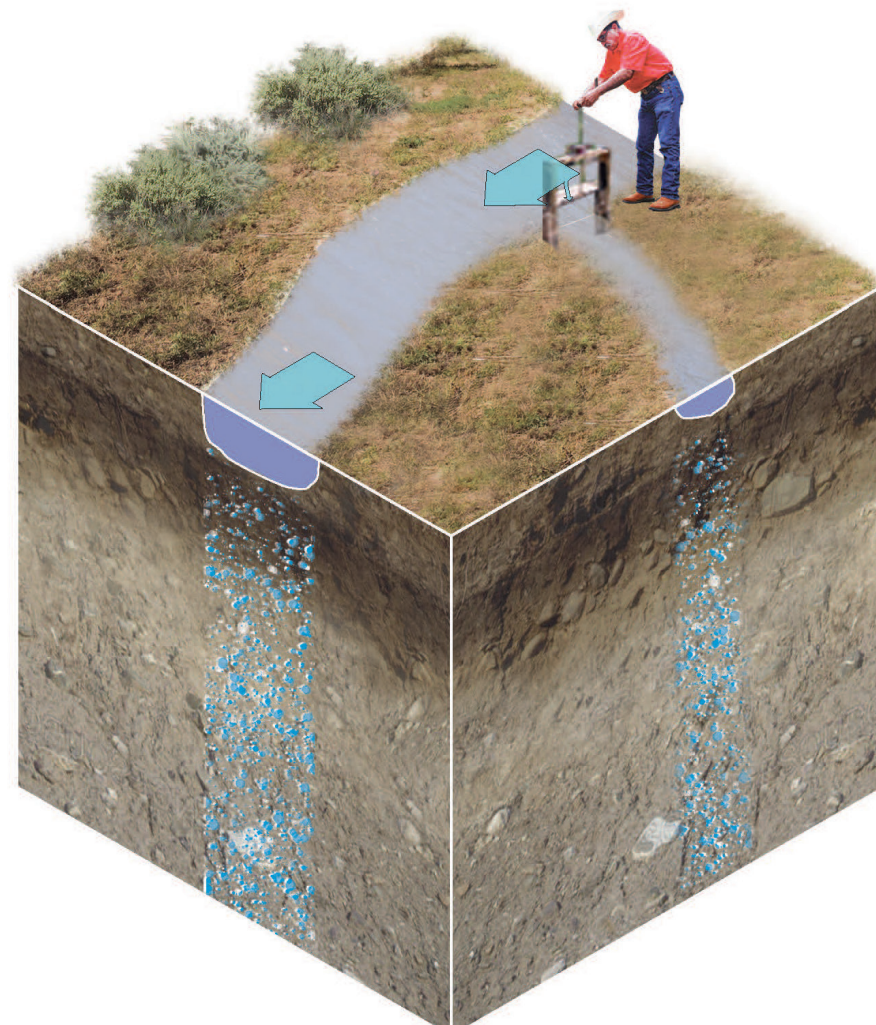


Figure 22: Diagram of a Lateral, or lateral ditch

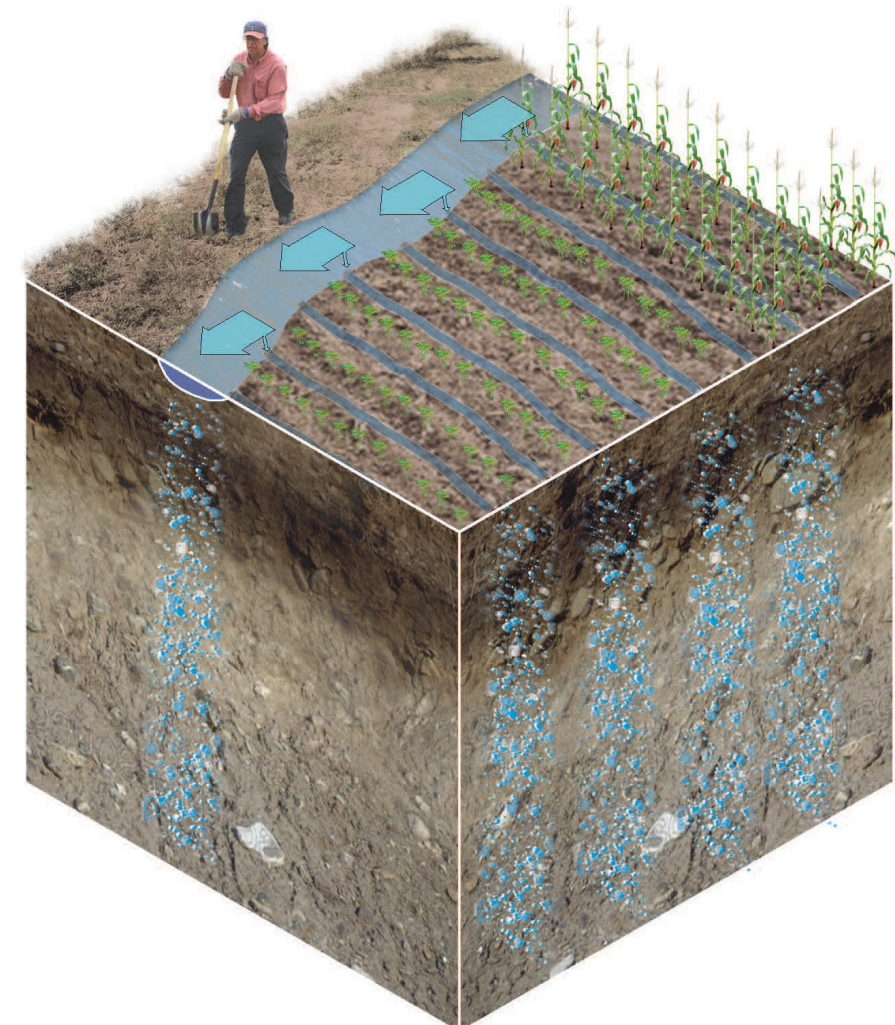


Figure 23: Diagram of a flood irrigation



Figure 24: Community members cleaning an acequia

as it has been done for centuries. This maintenance ritual has occurred every year for hundreds of years in acequia communities. Each *parciante* must participate, traditionally themselves, but contemporarily by hiring a worker. (Arellano, 2014, Figures 19, 24).

The *saca la acequia* is not only done out of necessity to maintain a functioning irrigation ditch. It is one example of the cooperative principles built into the structure of the system. For *parciantes* of the acequia, having the annual duty of cleaning the ditch meant working with neighbors to ensure the backbone of your livelihood is well-tended. In each

acequia, the *parciantes* elect a *mayordomo* or ditch boss. The elected *mayordomo* is then in charge of handling day-to-day situations on the acequia and ensuring that all water is distributed equally and without waste. Before there were local governments and courthouses in New Mexico, communities created their democracy based on communal water use. An official, the *mayordomo*, was elected by acequia *parciantes*. It is the *mayordomos* duty to ensure the success and continuance of an acequia while handling day-to-day occurrences. This position lasts a year with the possibility of re-election. The *mayordomo* position has persisted in

modern times and is now accompanied by three commissioners or *comisionados* below the *mayordomo* that assist in decision making and water distribution.

Repartimientos or water sharing is the water ethic of all acequias that ensures water will be shared equally to all people, plants, and animals, during times of surplus water, and especially in times of drought, down to the last drop. *Auxilio*, special dispensation, during drought periods has for generations allowed acequias members to collectively withstand water shortages, shaping the sustainable nature of acequias. When there is a surplus, water is still shared equally, and the remaining water

flows back to the river. When there is a drought, the water is divided even more carefully. Maintaining a strong water ethic built around equitable water sharing and community participation has created social resilience in acequia communities that have warded off climate issues through New Mexico's history. (Arellano, 2014).

Ecological studies of the acequias have shown multiple positive benefits. Because acequias are earth lines, they “allow for seepage, which creates shallow groundwater flow, benefits aquifers, and protects deep groundwater quality while flowing directly back to the river. Only between 7.4% and 15% of diverted water



Figure 25: Acequia parciante flood irrigating

Traditional Acequia Landscape Organization

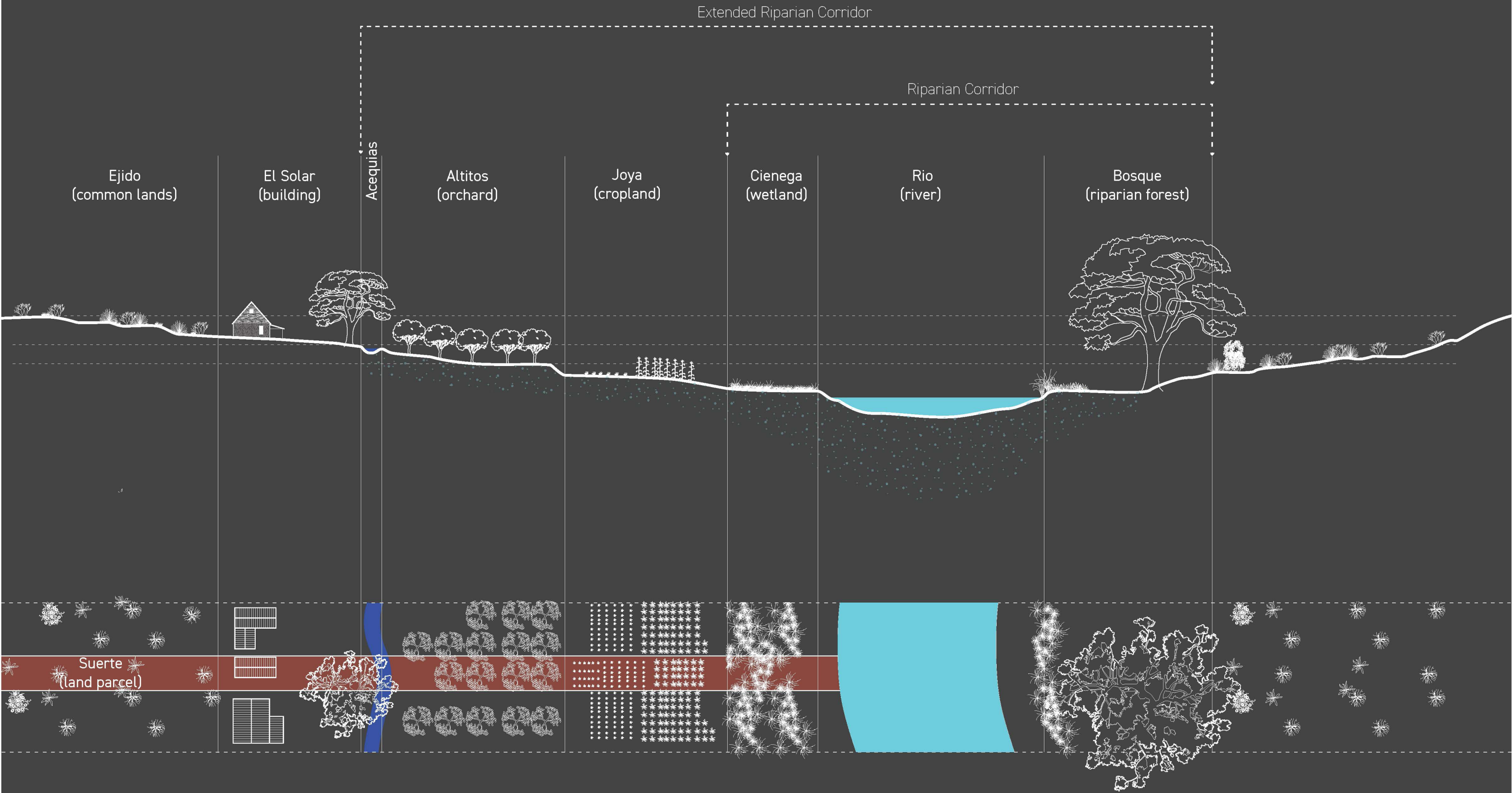


Figure 26: The section and plan diagram the traditional acequia land use organization based on topography, ecotypes, and, resource sharing.

is consumptively depleted and sent back to the atmosphere. About 33% seeps into the groundwater and flows back to the river while the remaining portion moves through the ditch and goes back to the river as surface water (Steven J. Guldan, 2015). Seepage along the acequias also provides water for trees, shrubs, and pastures to grow in areas far from the river, extending the riparian corridor, providing food and habitat for wildlife, and improving rural aesthetics and land values. Acting as an extension of the riparian corridor, irrigated crops mimic the *Bosque*, riparian forest, and wetlands, *cienegas*, which performs similar to a sponge and retains water underground

and upstream for longer periods. By maintaining the acequias, local farming communities have simultaneously played the role of environmental stewards.

Today there are still communal functions of the acequias such as the annual ditch cleaning and the hierarchical structure of an acequia association. However, there is far less dependence on the acequias from local communities today due to changes in economic opportunity. Land with acequia water rights have become the most expensive and sought-after properties in the area. Many people have sold their property and water rights to newcomers with money. Sometimes newcomers are



Figure 27: Flood irrigated crops

unaware or reluctant to participate and maintain a relationship with the acequia and fellow *parciantes*. People who can afford to have property on an acequia today are primarily white-collar workers who are not necessarily interested in farming and with no dire need to either.

New Mexico state law says an acequia *parciante* will lose their water rights if they are not used for four years. So, to ensure their rights are not lost, many people use the water to grow ornamental lawns. In their defense and the acequias, this is better than forfeiting the communal water rights, which would likely be transferred and commodified. However, it is a tremendous

waste of the most precious resource in an arid environment. Because only people with a lot of money have access to this resource, the less fortunate now have no access to an acequia or the ability to grow fresh and healthy food. They are the ones that can stand to benefit the most from it. This gentrification is further disconnecting people from their heritage to this place. Land and water are often no longer seen as a precious resource steeped in a resilient culture but instead are commodities to subdivide and make a profit.



Figure 28: *Parciante* opening a headgate

Permaculture

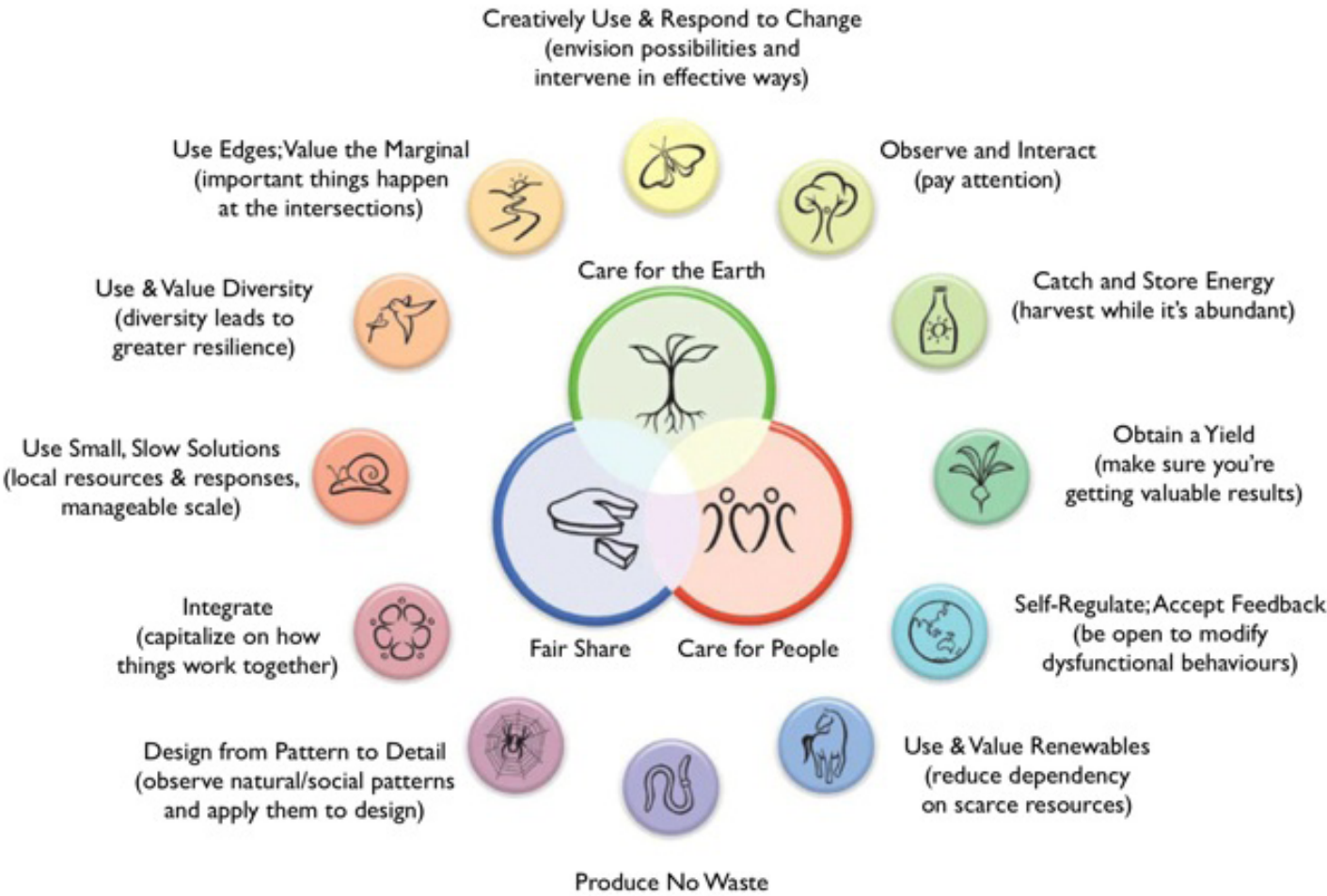


Figure 29: Permaculture ethics and values diagram

Permaculture is an agricultural system for creating sustainable human environments. Permaculture considers plants, animals, buildings, infrastructure, and the relationships built between themselves and these elements. The goal of permaculture is to create ecologically and economically viable systems that are sustainable, healthy, and non-extractive. (Bill Mollison, 2011) Based on the observation of natural systems, permaculture combines traditional knowledge and contemporary scientific knowledge. Simply put, permaculture works with natural processes rather than in opposition while considering plants and

animals for multiple functions rather than as single-use resources. As an alternative to using the landscape and resources in an exploitative manner, permaculture ethics promotes care of the earth and the care of people. In turn, this results in the contribution of surplus time, money, and energy.(Figure 29) In other words, responsibility for all living and nonliving things, cover the basic needs of humans and use our spare time and resources to help others achieve these goals. Everything has value if we can recognize the worth of all things. (Bill Mollison, 2011)

Permaculture design combines a set of universal principles and practical

techniques that change between climate and cultures. Relative location, multi-functional elements, zone and sector planning, energy recycling, diversity, and edge use are universal principles used with an understanding of local culture, climate, site conditions, and context to begin site design. Relative location is about linking a site's components together to create productive relationships based on inputs and outputs of an element. Multi-functional elements are chosen and located so that they can perform as many functions as possible. For example, trees can be shade, windbreaks, and privacy. Permaculture zone planning includes five zones and places elements within zones based on use and need. Zone

1 features those that are most visited and need more care. Zone 2 and 3 are successively areas that require less regular maintenance, Zone 4 are less managed natural systems, and Zone 5 is entirely natural areas. Zones are not as strict as they appear diagrammatically and can blend and shift together to best support site needs. (Bill Mollison, 2011, Figure 30)

Beginning to learn and understand the principles and ethics of permaculture became important and influential to begin considering how common goals and values in the community can begin to address social needs. From a design perspective, utilizing adjacencies between programs of the site to enhance function

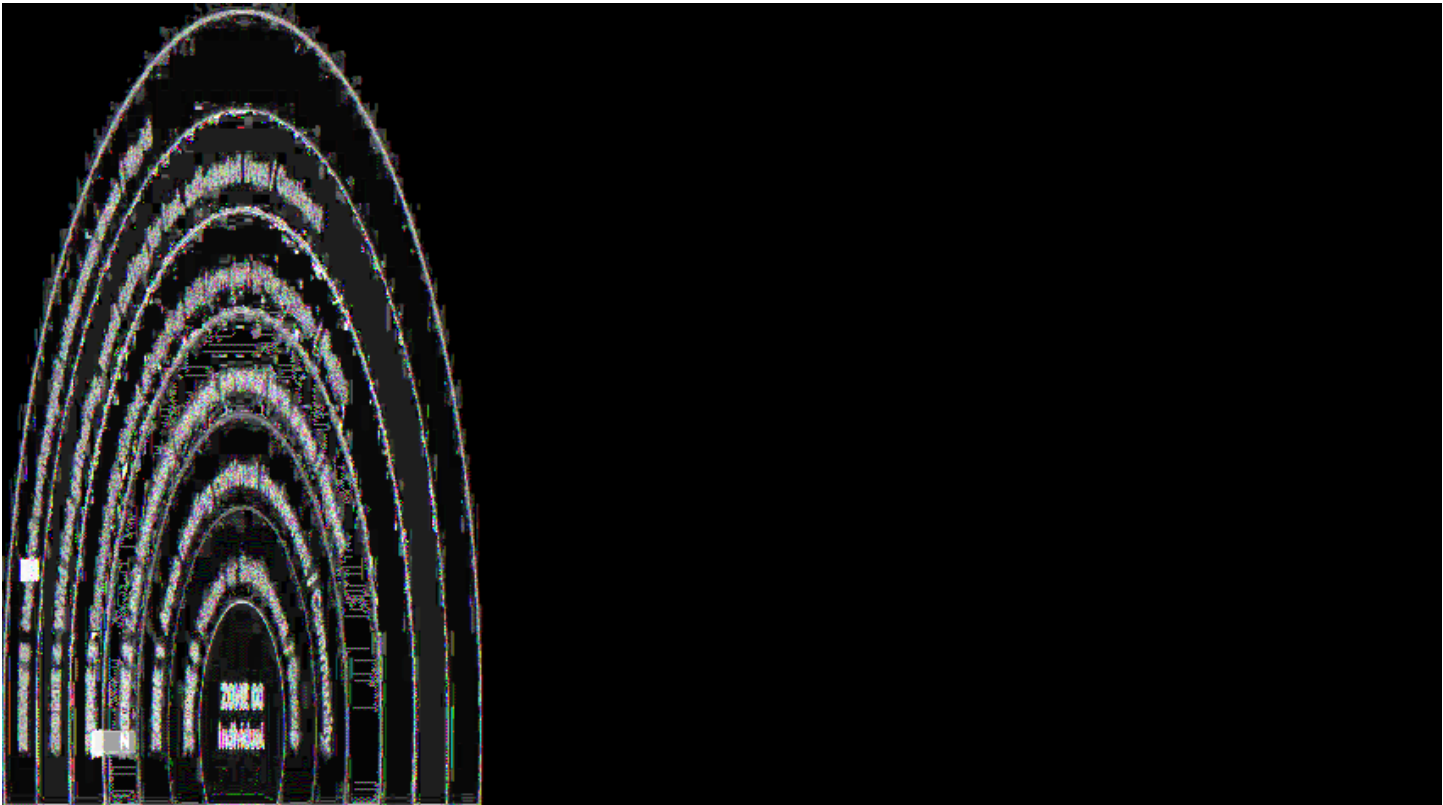


Figure 30: Permaculture zone diagram

and experience, and closed-loop systems that promote sustainability and long-term resilience became two important parts guiding the design thinking of this project. Most examples of permaculture exist as homesteads. Although permaculture typically is formatted and taught as a method of site design applied to homesteads, adjacencies and closed loop systems can be used at any site and scale. There are many overlapping elements between the traditional acequia water ethic and land use patterns, and permaculture teachings. Part of this overlap occurs because permaculture is based in traditional knowledge. Conceptually, the two concepts

begin to merge and borrow from one another most at the site design scale. At this scale and level of detail, permaculture principles lend themselves to generating a thorough site design. Acequia traditions can benefit from a more conscious effort to be more sustainable. The knowledge of acequias can be more visible pieces of the design while permaculture is the guiding hand that connects the threads.

Chapter 3

Precedents

Inspiration for this thesis came in many forms. Early research moved towards river and creek restorations in urban centers. What resonated was a projects ability to consider, human use, ecology, water, and public space. What I looked for in precedents was less about aesthetics and more about meeting goals and site functions that align with my own ethics and goals. The biggest challenge, was adapting ideas to fit this particular culture and climate. As I shifted from large scale concepts into site design and building design I looked to local typologies and precedents to fine tune the experience and function on the site. Many projects influenced my project but the following precedents had the most lasting impact on my thoughts and design intents.

- 1. Town Branch Commons, SCAPE Landscape Architects, Lexington, Kentucky
- 2. R-Urban: Network of Urban Commons, Atelier D'Architecture Autogeree, Colombes, France
- 3. Spanish Plazas, Downtown Santa Fe Plaza, Albuquerque Old Town Plaza, New Mexico
- 4. Nest We Grow, Kengo Kuma & Associates + College of Environmental Design UC Berkeley, Hokkaido, Japan

Town Branch Commons

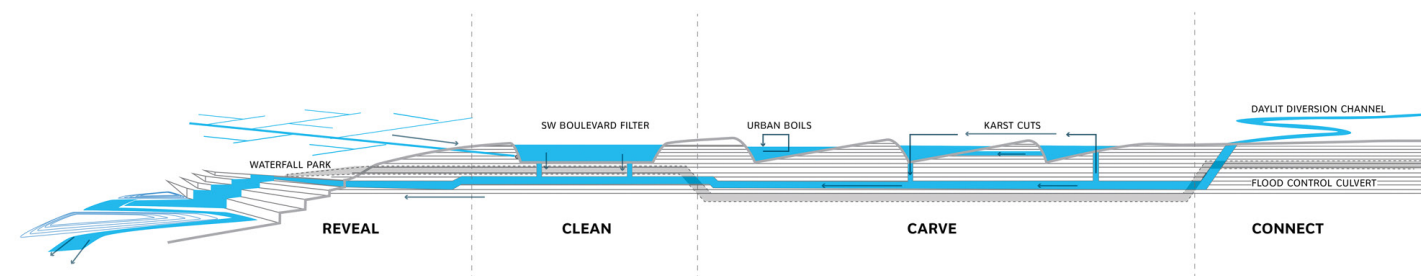
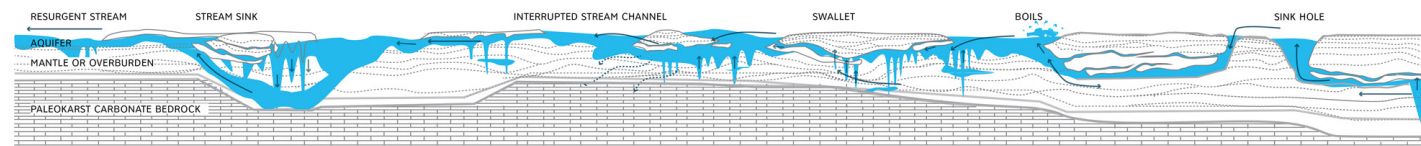


Figure 31: Concept sections



Figure 32: Site concept diagram

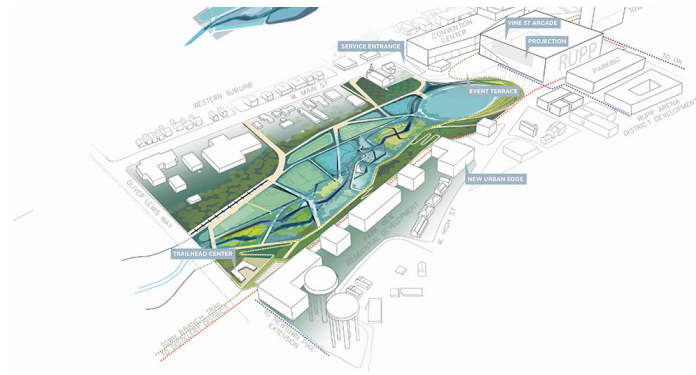


Figure 33: "Reveal" site aerial perspective

What stood out about this project for me, was the designers able to identify a geological formation that occurs in this area that already played a role in defining parts of the city. Karst geology became a tangible design element that makes this place unique, and something that could be embraced and illuminated through the design. The design reimagines a large corridor in the city that reveals this unique geological formation while providing public spaces. It also collects, cleans, and moves storm water through the corridor while creating opportunities for improved vegetation and habitat.

How the designers translated the site research, from karst geology, into a design that developed a well-coordinated master plan, and then an intimate sequence of public spaces, was initially helpful and influential for me in considering how I would begin to translate my own research into a design.(SCAPE, 2013)



Figure 34: Agrocite hub



Figure 35: Interior greenhouse



Figure 36: Recyclab hub



Figure 37: Exterior community gardens



Figure 38: Agrocite hub interior

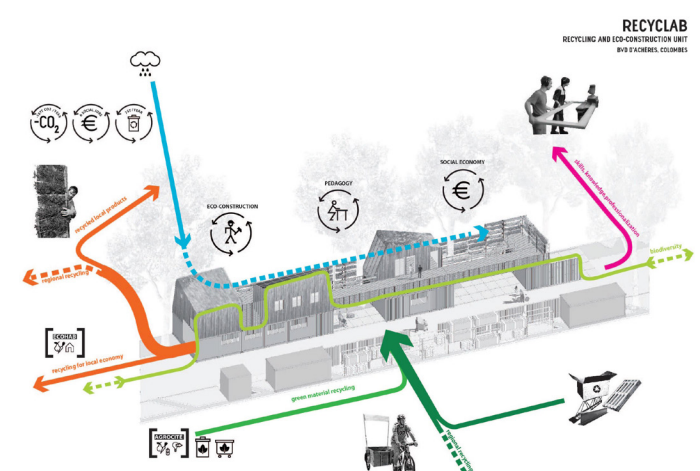


Figure 39: Agrocite building use diagram

“R-Urban”: Network of Urban Commons

The intent of this community project originally planned to create three self-managed community facilities, aimed at the social, economic, and ecological transformation of the neighborhood. The “Agrocité” facility, was devoted to producing ecological crops. “Recyclab”, recycled recovered materials for sustainable construction. “Ecohab”, which wasn’t realized, would work to produce accessible, environmentally friendly housing. The reason Ecohab was not built was the new municipal officials did not approve of the grassroots project.

What I found important and interesting in this initiative, was that it

came out of a marginalized community's desire to reclaim public space and improve their surroundings. The spaces that were reclaimed by the community were, at the time, ceded by the local government and all of them were vacant. The sites were able to provide steady employment and also have regular classes and workshops for cooking, gardening, recycling, composting, etc. The project is credited for creating new relationships within the community and an increased environmental awareness. (Bravo, 2018)

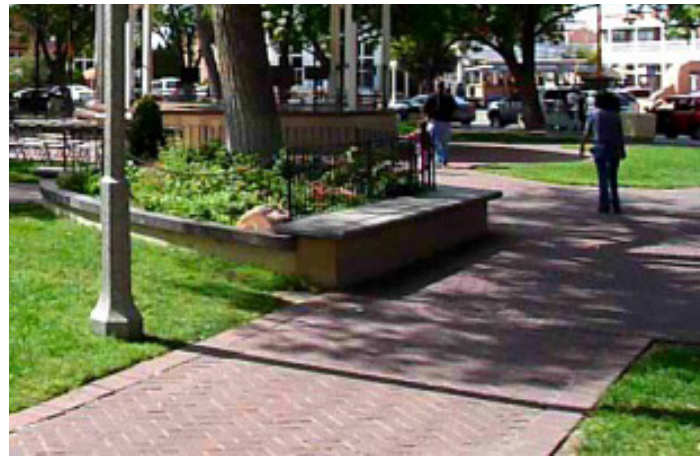


Figure 40: Material edges



Figure 42: Aerial showing layers of edges



Figure 41: Portals along a building edge



Figure 43: Shaded seating areas

Spanish Plaza

Knowing that the Plaza de Española is not a historic plaza, but a recreation of a typical Spanish plaza, made understanding the built components that comprise a Spanish plaza important. After doing an analysis of the plazas in Albuquerque and Santa Fe, I was able to establish a rudimentary kit of parts that architecturally define these spaces and help them function socially and are well adapted to the regions climate. The kit of parts for a plaza consisted of the following elements.

1: Shade

- a. Tree Canopy
- b. *Portales* or “porches”, covered walkways along the edge of buildings.

2: Ground Surfaces

- a. Variety of patterns and materials to indicate uses and edges

3: Street Edge

- a. Typically a one-way street between the plaza and immediate buildings

4: Buildings

- a. Scale, typically between one and two levels
- b. Enclosure, typically enclose all four sides of a plaza
- c. Openings, street, sidewalk, and arcade openings allow the plaza to be porous

These pieces were used as the simple building blocks to redesign the Plaza de Española in a way that would generate and sustain social activity.



Figure 44: Nest We Grow exterior



Figure 45: Produce drying using traditional methods

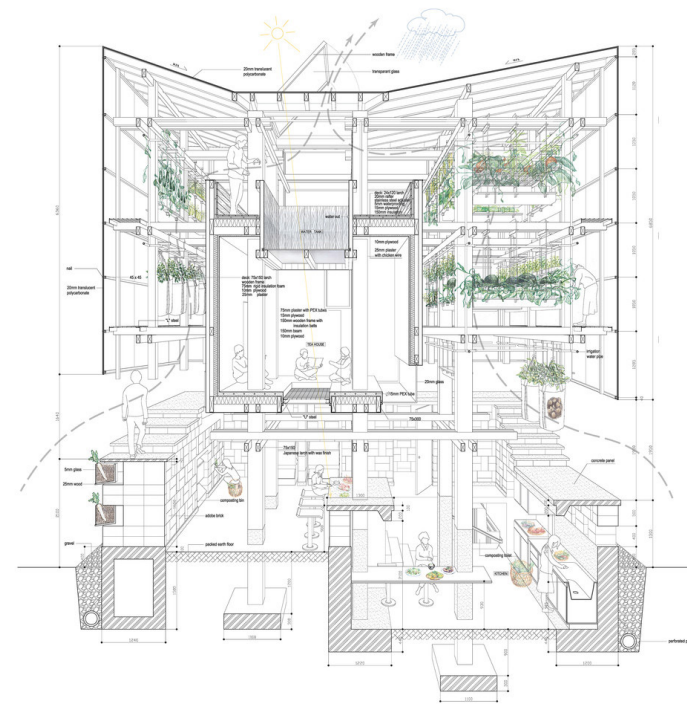


Figure 45: Section perspective



Figure 44: Nest We Grow exterior

Nest We Grow

Nest We Grow is a community building in Japan that celebrates the food culture of this area. The design considers the life cycle of food processing from cultivation and processing, to waste and reuse. The program displays traditional methods used to process food and creates work space for community members to participate in food processing. The project pursued renewable technologies and translates modern methods and materials to utilize local craft techniques in the construction. The wood structure was used to invoke a forest where food would have traditionally been hung to dry. Communal spaces such as the tea room and kitchen created the space for the

community to gather and celebrate the food culture. Lessons of growing, harvesting, storing, cooking/dining, and composting, are incorporated into the design, so there are many teaching opportunities throughout. (Arch Daily, 2015)

Conclusion

As I expected, there were no precedent studies that I came across in my research that could speak directly to the acequias. However, I was able to find guidance in many projects aiming to achieve similar goals. The initial research which trended towards river and creek restoration projects in urban spaces, helped me to develop the big picture design concepts that became the citywide connector and node system.

Intimate moments of the site design were guided by precedent studies that could work together with the larger city/site scale studies as well as precedents that addressed a site and its culture-specific

needs. Getting an understanding of the “kit of parts” that make up a typical Spanish plaza in this region helped reimagine a plaza that could be integrated into the existing site more naturally. Finding an architectural precedent for the proposed Acequia Community Hub that addresses similar needs helped guide the purpose of the hub. The formal architecture of “Nest we grow”, while masterful, became secondary to the ideas about sustainability, traditional materials and building methods, and everyday uses, embedded in the projects goals.

Chapter 4

Methodology and Site Analysis



Figure 48: Satellite image focusing on Española, New Mexico and Site

This thesis projects initial goals came from trying to determine how acequias could adapt to address social and climate-related issues. After further researching acequias, the values embedded in them became equally crucial to the physical components. These values were primarily discovered through the available literature regarding acequias. Still, small conversations and interviews with local acequia users gave me a more accurate present-day image of acequia values. Understanding the present day and the traditional situation of acequias made it very clear that they need to continue serving agricultural uses. Adaptation could allow for added social opportunities within

the system.

Mapping was used to better understand acequias within the city of Española. Geographic Information System (GIS) mapping was used early on to collect and compile multiple layers of information. This became very helpful in finding the extent of all the existing acequias within Española. Some information, such as public parks/open spaces were not available through GIS, so these layers were created and compiled into a single map file. When the open space layer was added, it became clear that there was an exciting connection and missing opportunity with open space and acequia adjacencies. There was also

an apparent disparity in the location and amount of open spaces throughout the City's communities and overall lack of public spaces as an accessible resource. Using publicly available maps of property boundaries and ownership throughout the City, I was able to identify properties that were owned by the City or County and could potentially be used to bolster the amount and accessibility of open spaces. While there is a limited amount of mapping information available for Española, what was found was enough to get a picture of what was missing and what could be added to help the project's goals.

Site selection initially came through

mapping, but after visiting the site and researching the history, it became clear that this would be the primary site that was explored in greater detail. The acequia was a driving factor in choosing this site, but the context was equally important. The plaza itself is the culmination of a drive-through Paseo de Oñate or the historic main street. What stood out most was that the civic center of the city, in its current condition, does not even come close to addressing any of the many community needs. It was too good of an opportunity to envision what could be here and open the conversation of public spaces in the city that can directly benefit the community.



Figure 49: Diagram of major context elements related to the plaza site



Figure 50: Historic photo of the railroad tracks in Española's downtown

Site Analysis and Methods

In the 1880s, Española was founded as a stop along the Denver and Rio Grande Railroad. Before the railroad, Española was a village known as La Vega de Los Vigiles. The expansion of the railroad into Española occupied what is now the downtown area of the city. The railroad stop created new business and established the downtown and main street visible today. However, by the 1940s, with the rise of the National highway system to transfer goods from one region to the next more efficiently, the railroad was becoming less integral to the local economy. By the 1960s, the tracks and service buildings had been removed. (Commerce, n.d.)

In the 1990s, efforts were made to re-establish the downtown area as the heart of the city. A formal plaza was created along with the Mision y Convento, a reconstruction based on archaeological records of the original mission church built in 1598 but destroyed during the Pueblo Revolt. The Bond House museum is the oldest standing structure on the site, formerly the house of the Bond family, who, during the railroad era, became the largest mercantile in New Mexico. Over time a monument, the Arches of the Alhambra, and a memorial, the Veterans Wall, were built. Together, these four structures create the cultural and historical setting of the Plaza.



Figure 51: Historic Bond House and Museum



Figure 52: Mision y Convento



Figure 53: Veterans memorial



Figure 54: Arches de Alhambra monument

Today the Plaza de Española serves as the central gathering space for annual events such as the Fiestas, Matanza, and Main Street low rider show.

Despite the historic buildings and recreations to envision a plaza representative of local Hispano culture, a crucially important piece of the Española's history is entirely ignored in the Plaza. Further mapping of the site revealed an acequia, or the Vigiles ditch, sharing the name of the original village, bisects the plaza site. Sadly, once the acequia enters the Plaza, it is channelized in concrete and eventually culvert-ed for the remainder of the site. The concrete and culvert create a lifeless

environment along the acequia. One would expect some acknowledgment of an acequia that runs through the heart of downtown, especially considering the historic significance of acequias to the community.

While this acequia, the Vigiles ditch, is no more important than any of the hundreds of other acequias in New Mexico, its location through the Plaza creates an immediate and rare opportunity to acknowledge the history of acequias in the region. By recognizing the history and values of the acequias, a new public space can weave the two historical narratives of the site together. Making a cohesive civic space better suited for the city and its people.

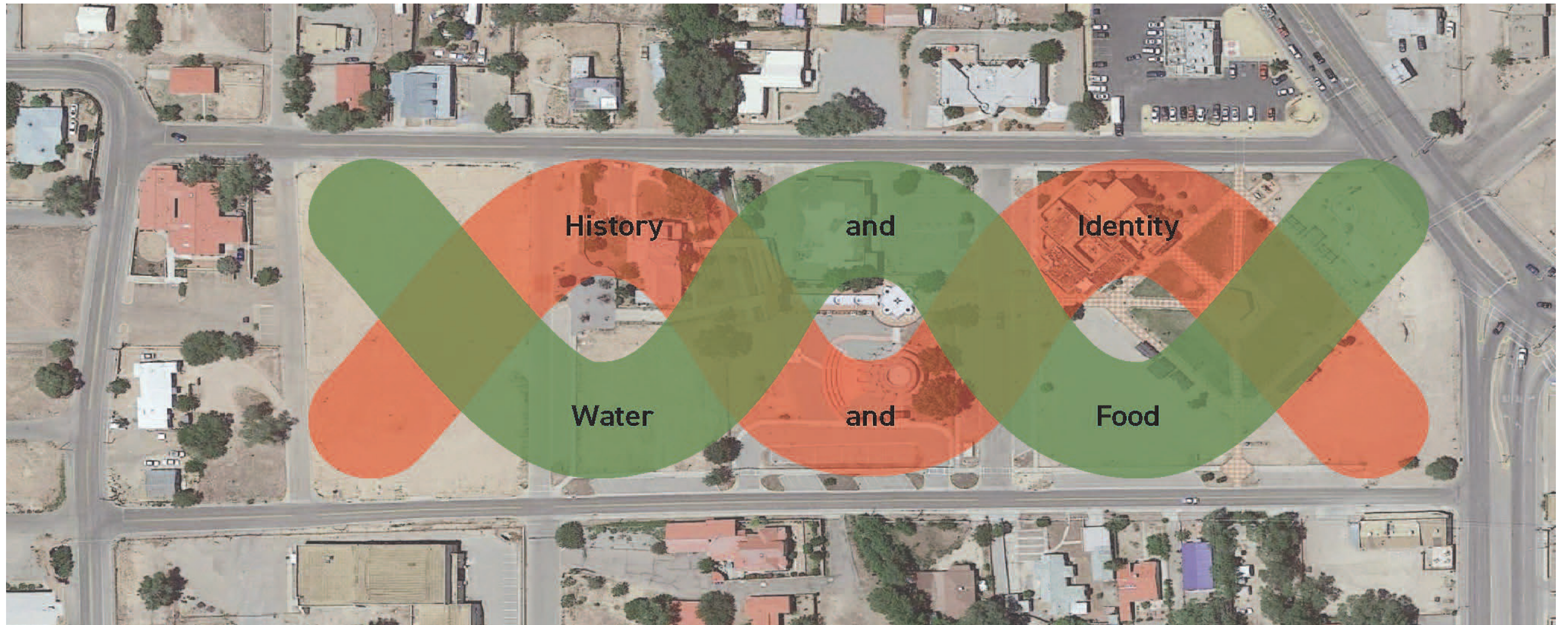


Figure 55: Conceptual Site Diagram illustration weaving of historic narratives onto the site



Figure 56: Conceptual Site Diagram illustrating overlay of traditional acequia landscape onto the downtown/main street corridor.

Chapter 5

Design Response

The organization of the traditional acequia landscape became a guiding framework for the plaza site's organizational strategies. Overlaying it onto the site became an exercise of interpretation to maintain the ecosystem and food production services provided by a traditional model while taking on a new role as a public space and community organizer within the City. A conceptual overlay of a traditional acequia landscape onto the Plaza and Main Street corridor first allows us to see where traditional land use features based off the site topography would lie.

The proposed site plan is my vision of the potential in this site, once we

acknowledge the history and needs of the City. Although not drawn or diagrammed in detail, there is a full understanding that the site's phasing would be necessary to achieve the master plan. The order of proposed elements in the key of Figure 57 is how I imagine the order of phasing on the site to occur.

The design incorporates the conceptual understandings of permaculture to determine where site programs are placed and how they respond and enhance their context. The Vigiles ditch became the theoretical and physical catalyst for the site design. Everything that follow is related and dependent on the acequia, its values, and resources. Because of this, the design proposal begins with the daylighting and restoration of the acequia itself Next, I introduce the Community Orchard, which sits slightly to the east of the acequia, downhill. To the west, labeled Number 3 in Figure 57, uphill from the acequia, is what I am calling the Acequia Community

Hub. This is introduced as a facility that supports the proposed community gardens, greenhouses, and composting facility as a public agricultural hub for the community. On the eastern portion of the site sits the redesigned plaza. The redesign proposes a perimeter of building programs providing needed services for the community while supporting site functions.

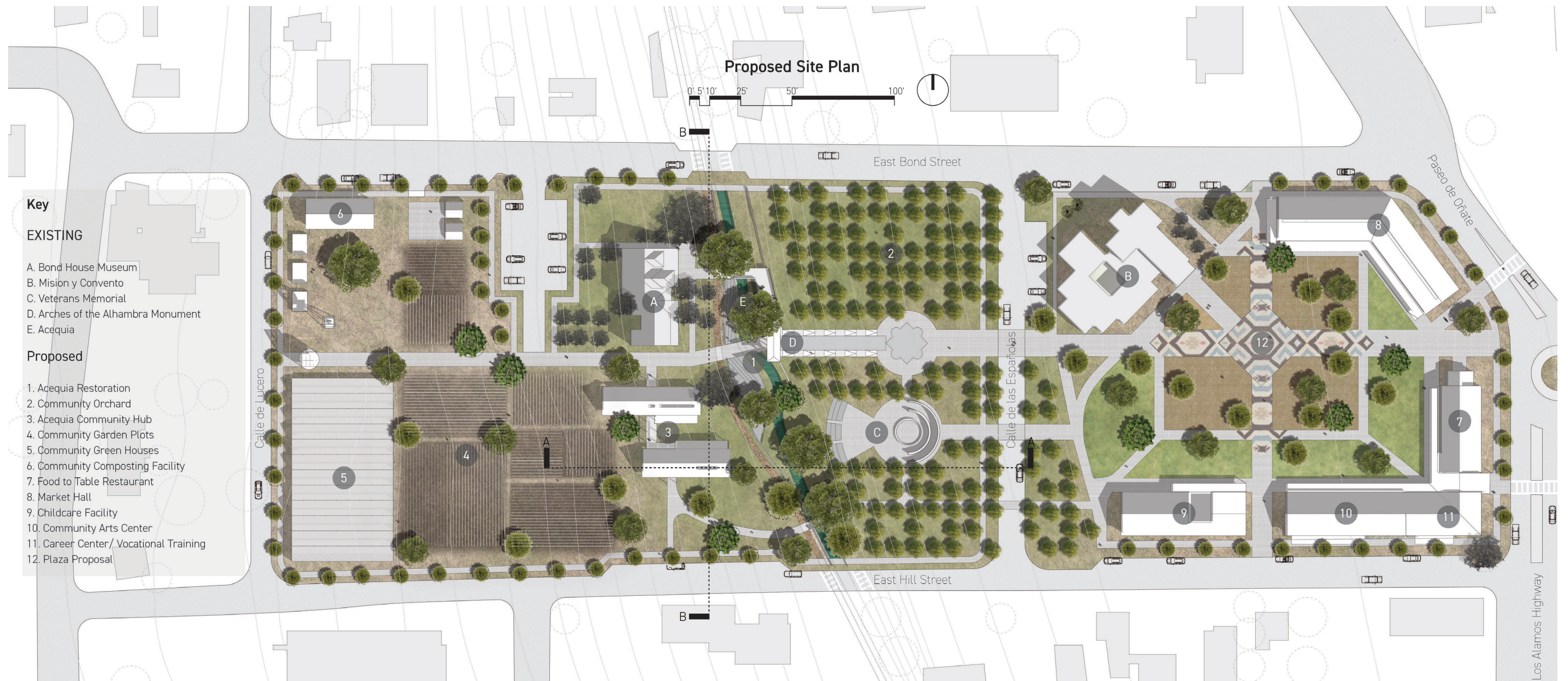


Figure 57: Proposed Site Master Plan

Acequia (Vigiles Ditch)



Figure 58: Vignette depicting daylit and restored Acequia through the plaza site

As mentioned, the acequia is the catalyst of the reimagining of the Plaza de Española. Design work begins here and radiates outwards through the site. In its current condition, it does nothing for the site except divide it. First, the acequia needs to be daylit. The concrete and culvert need to be replaced by earthen walls typical of traditional acequias. This would allow native plant species to grow along its banks again. Native trees such as the cottonwood could also be planted along its edges to provide shade. Subtle design elements such as adding a meander and a series of seated steps allow people to venture closer to the acequia.

Orchard

Directly to the east of the acequia and down a gentle slope lies the orchard. The orchard serves two primary functions to the site. First, it serves as a productive landscape that can be cultivated by the community. The harvested fruit could be utilized in various ways. Second, being located downhill from the acequias, according to a traditional acequias layout, the orchard could be flood-irrigated by the daylight acequia. By irrigating the orchard with the acequia, it allows people to participate and learn from century-old traditions. Connecting with countless generations of Hispano farmers before them and learning through doing. Using the acequia to flood irrigate, the orchard improves the hydrological functions of the site. Water would be able to permeate the soil. Regeneration of this cycle is imperative to maintaining an environmentally healthy site. It aids in preserving river surface flow levels and recharges the aquifers that the city primarily depends on for potable water. This is critical for river health and city health. The two cannot be thought of separately anymore.

Acequia Community Hub

The Acequia Community Hub became a vital architectural element of this project that I wanted to explore in more detail. The Acequia Community Hub is envisioned as the heart of agricultural activity on the site. This facility would create an environment that allows community members and visitors of Española to gather. Here one could learn how to process food using traditional methods. People could enroll in classes and learn to prepare local foods such as tamales, sopaipillas, and enchiladas. They could learn how to tie a chile ristra and celebrate the agricultural heritage of the place.

The program of the building is split between two structures. The northernmost structure contains administration offices, a restroom, and a conference room. As well as multipurpose space available to the public upon reservation. The southern structure is programmed with a community kitchen and a flexible interior workspace. The workspace can spill out onto the exterior workspace by opening a series of garage doors. Above is a storage loft that would also be used for drying fruits, vegetables, and meats.

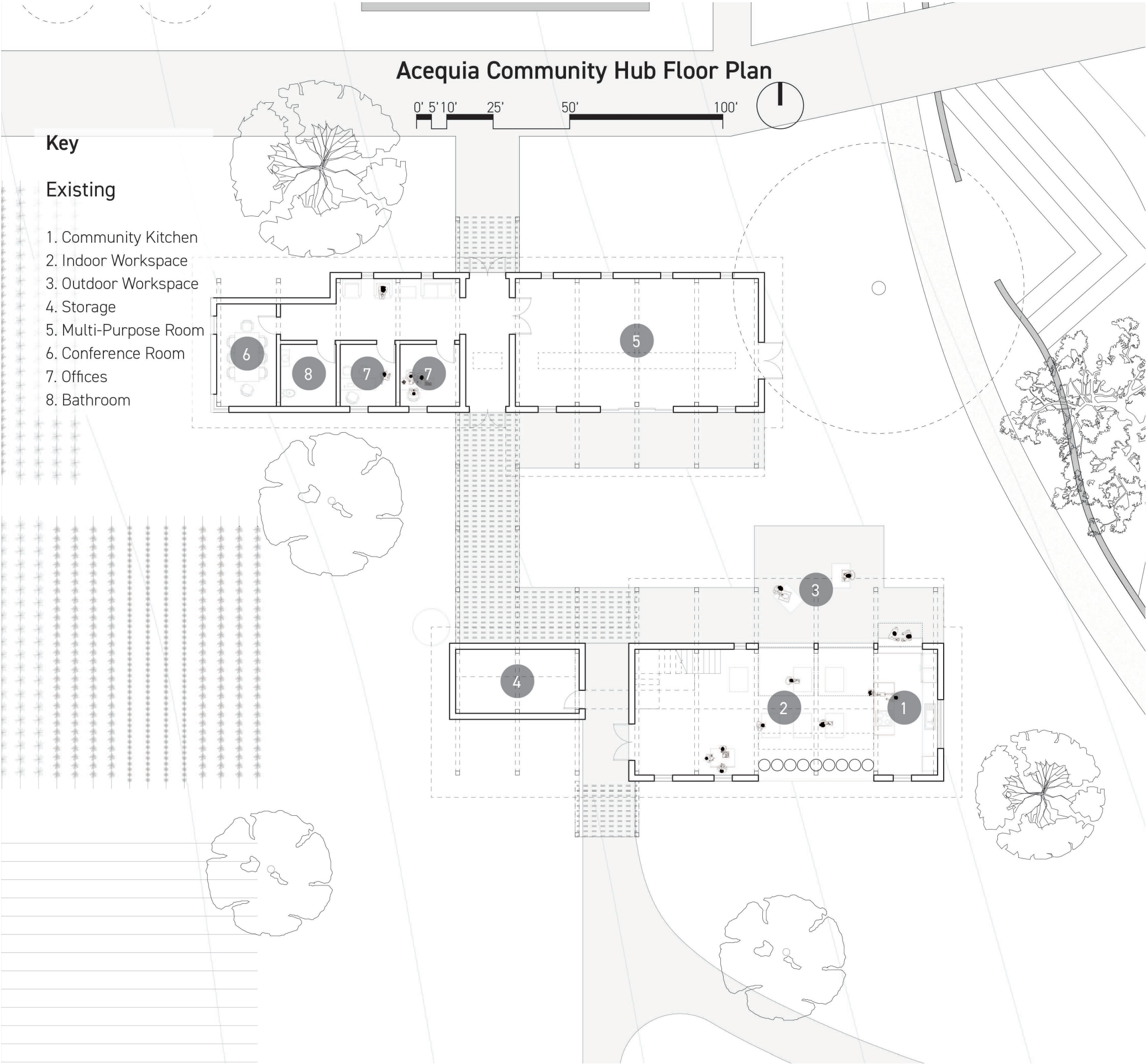
Both structures are elongated and laid out east to west, maximizing passive solar gains and creating a sheltered courtyard. The design of this building is intended to fully display the food processes occurring



Figure 59: Section illustrating relationship between the acequia, community orchard, and community hub

throughout the facility while using materials and forms that express the local vernacular and traditional building methods.

Adobe walls would assist passive heating and cooling of the building. Locally sourced timber would create an open post and beam structure on the interior, allowing for uninterrupted natural daylight and cross ventilation. Additional elements such as a south-facing thermal water wall and photo voltaic panels would further reduce building system loads and demonstrate cost-effective building technologies suitable to the region.



Enlarged Section A through Acequia Community Hub

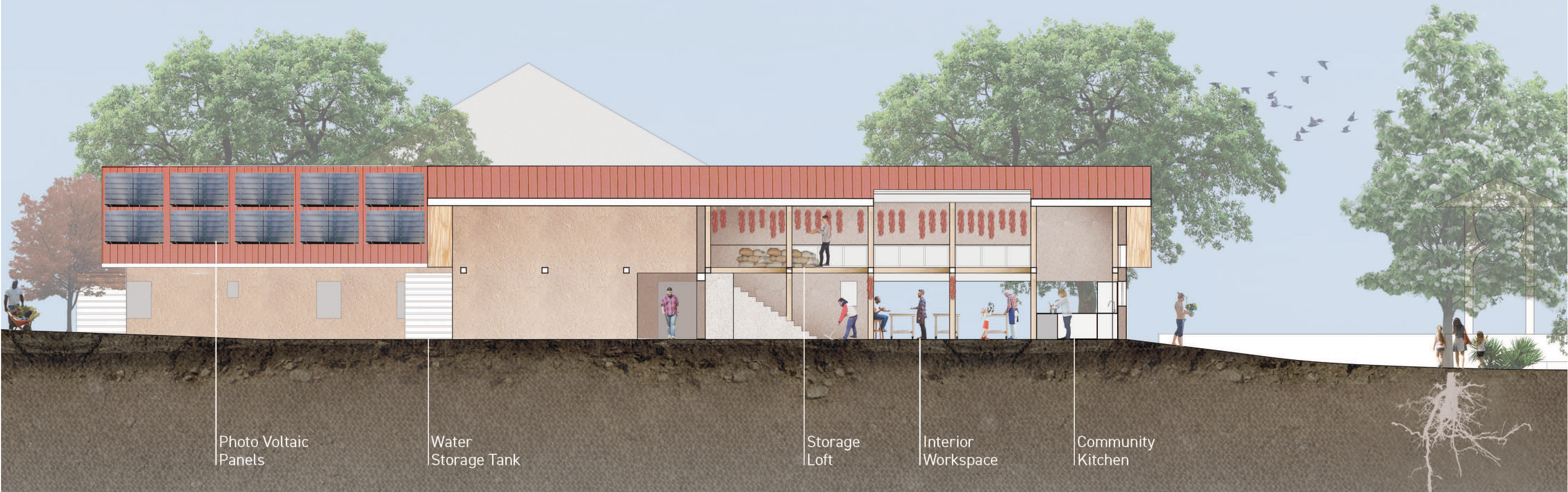


Figure 61: Enlarged Section through the Acequia Community Hub looking north



Figure 62: Enlarged Section through the Acequia Community Hub looking West

Community Gardens, Green Houses, and Composting Facility

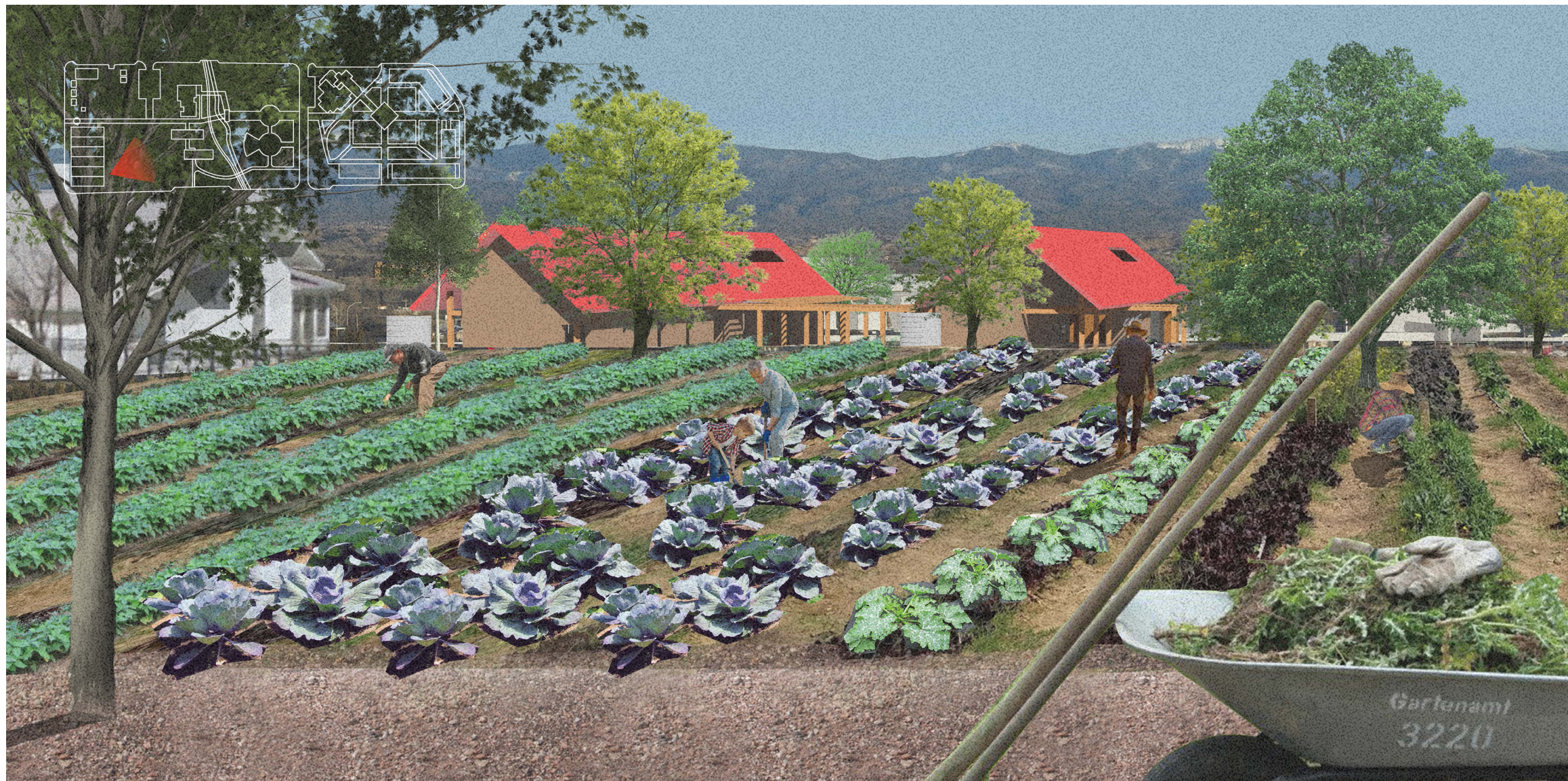


Figure 63: Vignette of the community gardens overlooking the plaza site

Sited west of the Acequia Community Hub are the community gardens. In this space, residents, primarily those who no longer have access to an acequia or the land, knowledge, and resources available for growing food, can gather. Exterior planting areas will allow for the seasonal production of fruits and vegetables. The growing season here is only a few months so greenhouses would allow for year-round community food production.

Irrigation for the community garden plots and greenhouses will be sourced from a combination of acequia water, when seasonally available, and be supplemented by harvested and stored storm water.

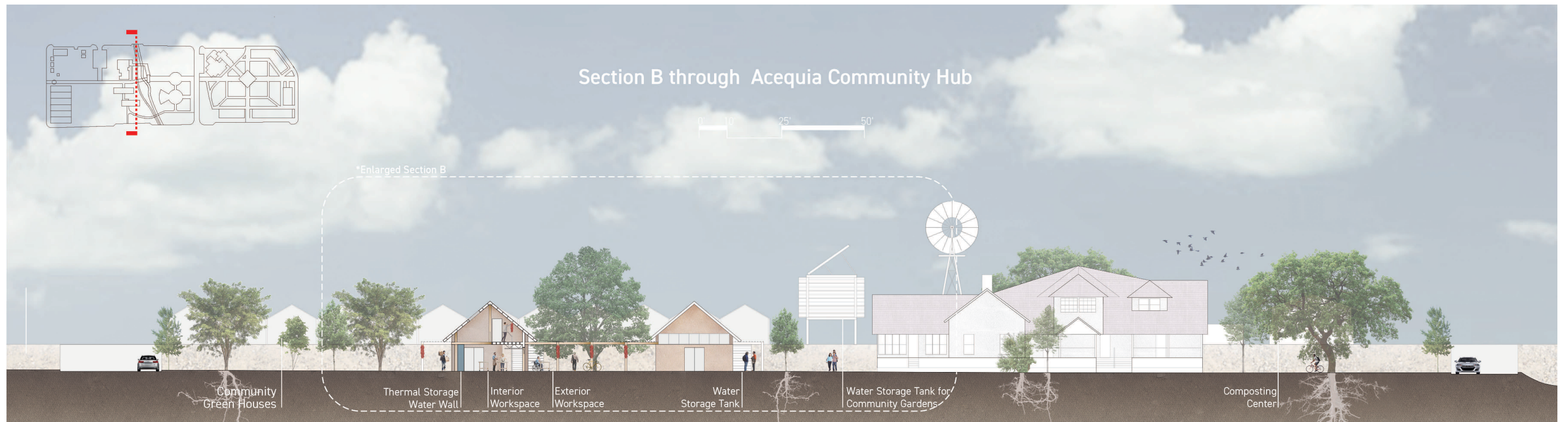


Figure 64: Section illustrating the relation between the Acequia Community Hub and the Bond House Museum with supporting community garden services in the background

Plaza de Española

Harvested storm water will be used for irrigation during dry spells and through cold seasons. More extensive on site water harvesting could provide a more substantial source of water during prolonged droughts. Supplementing the acequia water with collected rainwater would also reduce the dependence on a single source. As well as providing some level of food security for the community, the gardens would ideally connect people to the land and water in more meaningful ways.

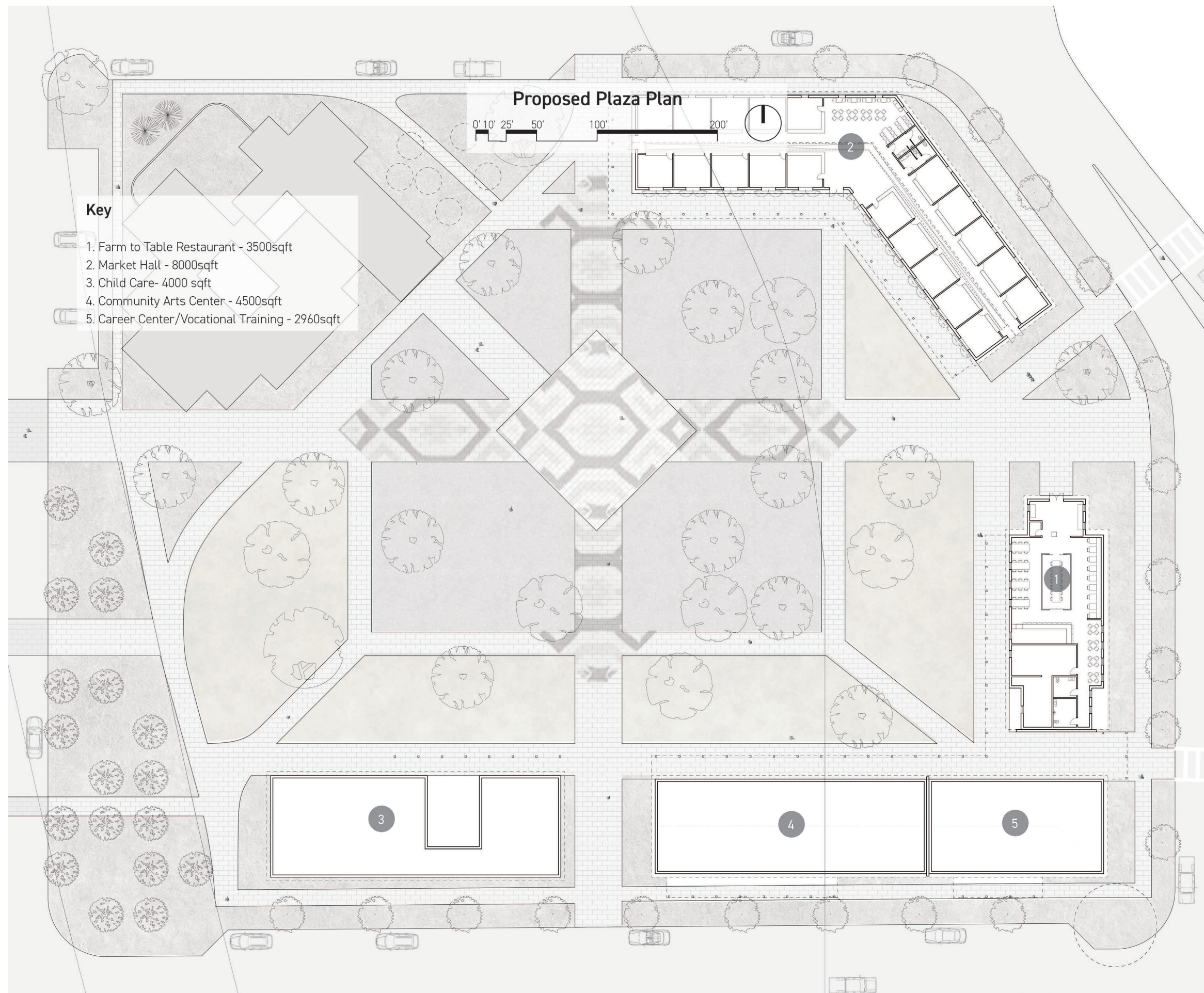
A composting facility will accompany community gardens. Composting will enable the regeneration of healthy soils for the community gardens, orchard, and Plaza. A

major goal is to limit waste and inputs onto the site and reuse on-site resources. Over time, this composting facility could have the capacity to take in external organic waste from the city, other proposed community gardens, and surrounding communities. Potentially becoming a repository for broader community composting.

Lastly, the Plaza de Española is redesigned and programmed to be better utilized as an everyday civic center that supports the city, and other site uses. The proposed buildings create a perimeter of services around the plaza. The proposed services include a market hall, farm to table restaurant, childcare facility, community arts complex, and a career and vocational training center. The proposed buildings re-define edges of the plaza creating a more intimate and human scaled space on the interior. The proposed buildings frame primary entrances in and out, and allow the orientation of the plaza itself to respond more comfortably within the context of the

site. Adding tree canopy provides much needed shade, supplemented by the building portals that line the interior walkways of the proposed buildings. These formal elements would create a plaza better suited for the climate and human use.

The market hall would contain small business spaces. The emphasis of these would be on local craft. The commercial spaces would serve as small business incubators that would give local entrepreneurs more support to begin operating a business. A variety of startups could also serve a variety of clientele that would come to the site as locals and



tourists. The market hall could be the space that celebrates local craft through arts and food, and also keep a daily influx of people into the plaza for various goods.

More opportunities to eat at the Plaza de Española is something that is desperately needed. A local restaurant would diversify the existing eateries and operate daily for breakfast, lunch, and dinner to keep people visiting the site. Making this space a farm to table restaurant creates an opportunity to engage with local growers and the produce grown from the on site community gardens or from other public space nodes in a citywide network. It is one potential outlet for local growers to

Figure 65: Redesigned Plaza de Española with proposed building services



Figure 66: Vignette illustrating a farmers market in the redesigned plaza

Chapter 6

Conclusion

contract and sell produce with or potentially form a cooperative of growers that become a regional supply chain for restaurants and other businesses. Emphasizing a farm to table restaurant on the site is, in many ways, the final celebration of a seasonal harvest and the water used to provide the meal. Fresh local produce would also enrich the New Mexican cuisine experience ten-fold.

The proposed services that make up the southern edge of buildings include a childcare facility, community arts complex, and a career and vocational training center. Together these address existing and daily needs of community members, centralizing these services and making the plaza a space that is first and foremost about the locals.

During this project it became essential to understand the values of the acequia system and its potential to connect the city and neighboring communities. The proposed multi-modal network would serve as a connector and in turn, get people out of cars, promote recreation, and build social connections across the city.

I also recognize that the site I chose is one within a more extensive network of public space nodes that complete the system. Each node would respond to their own sites and context. This system and the distinct nodes share the values embodied in acequia culture to be the catalyst for a healthy and productive urban environment. This new vision embraces

the culture and identity of the people in the Española Valley to address long-standing social issues, and to forge a new type of public realm for the citizens. Ultimately community resilience will continue to be a fundamental component of surviving drought, adapting to climate change, and addressing social woes. Española is tipping towards becoming a generic city, occupied by global markets, fast food chains, and cars, pushing people further and further apart and disintegrating the local identity. This thesis project proposes a place based design that cooperatively reclaims the city, keeps it unique, and points it towards a more resilient future.



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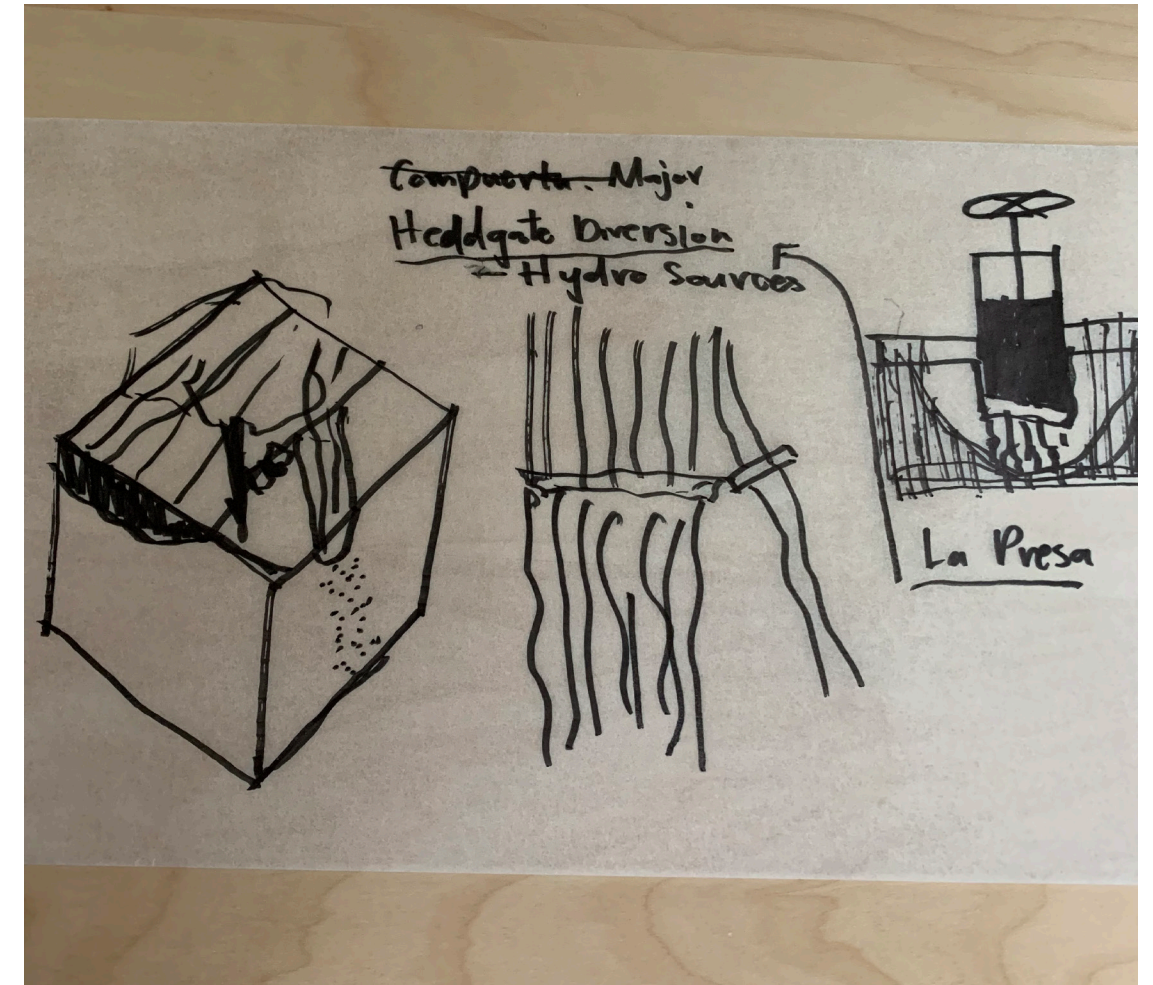
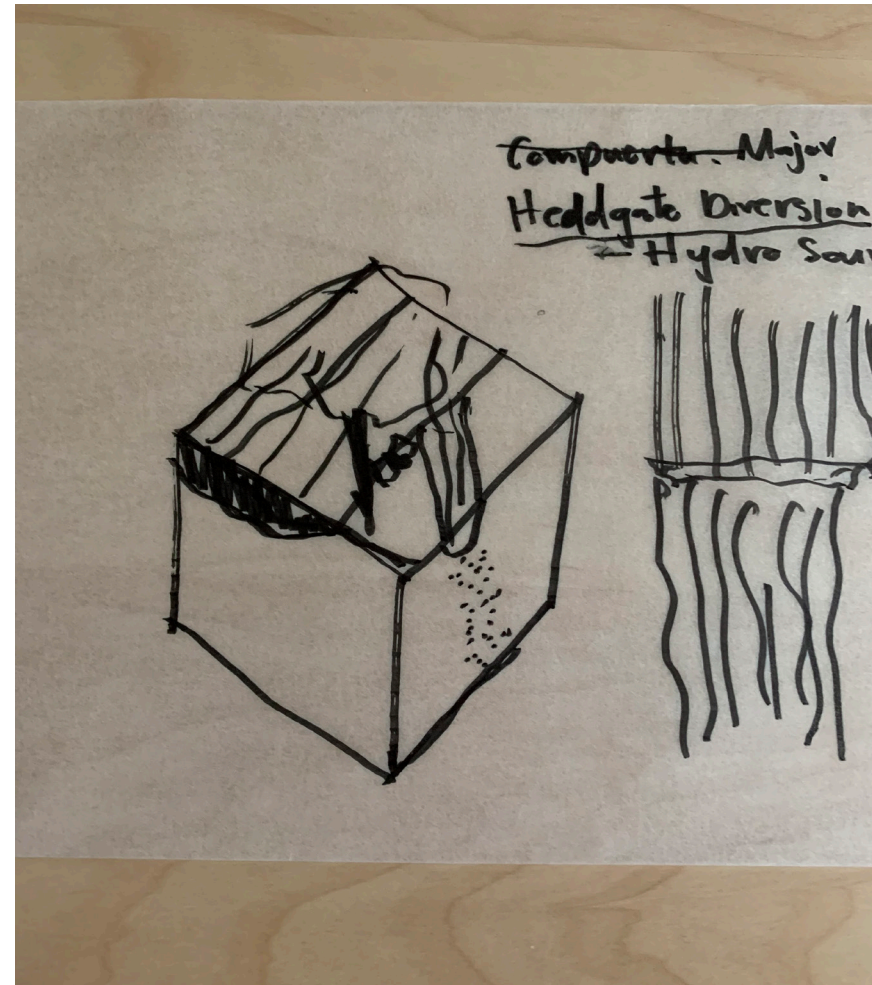
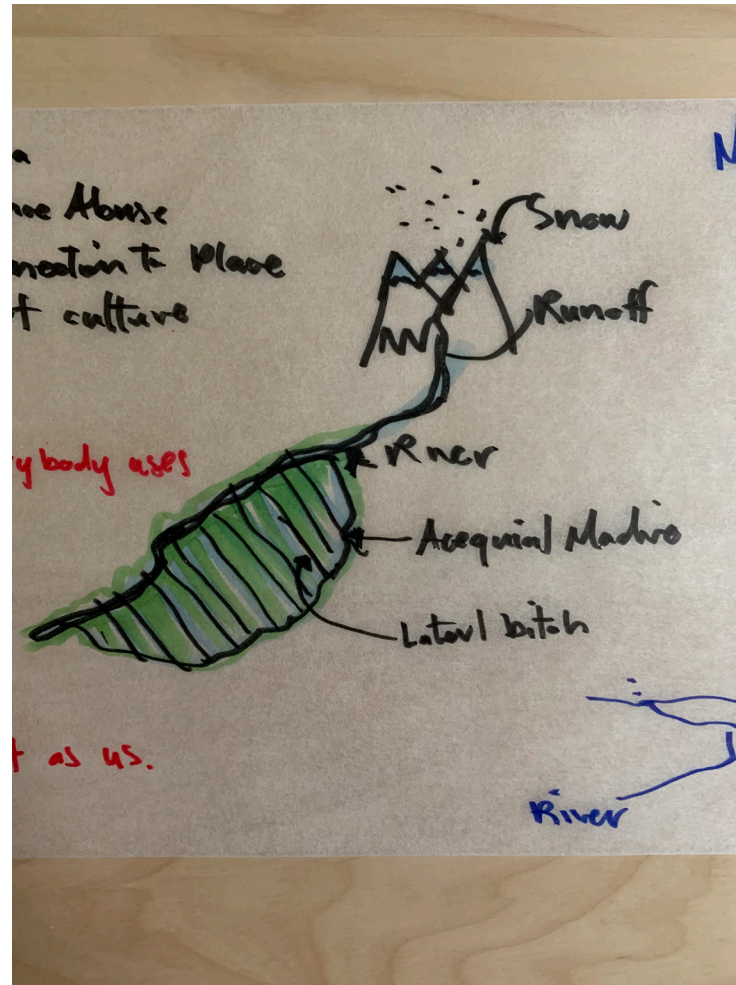
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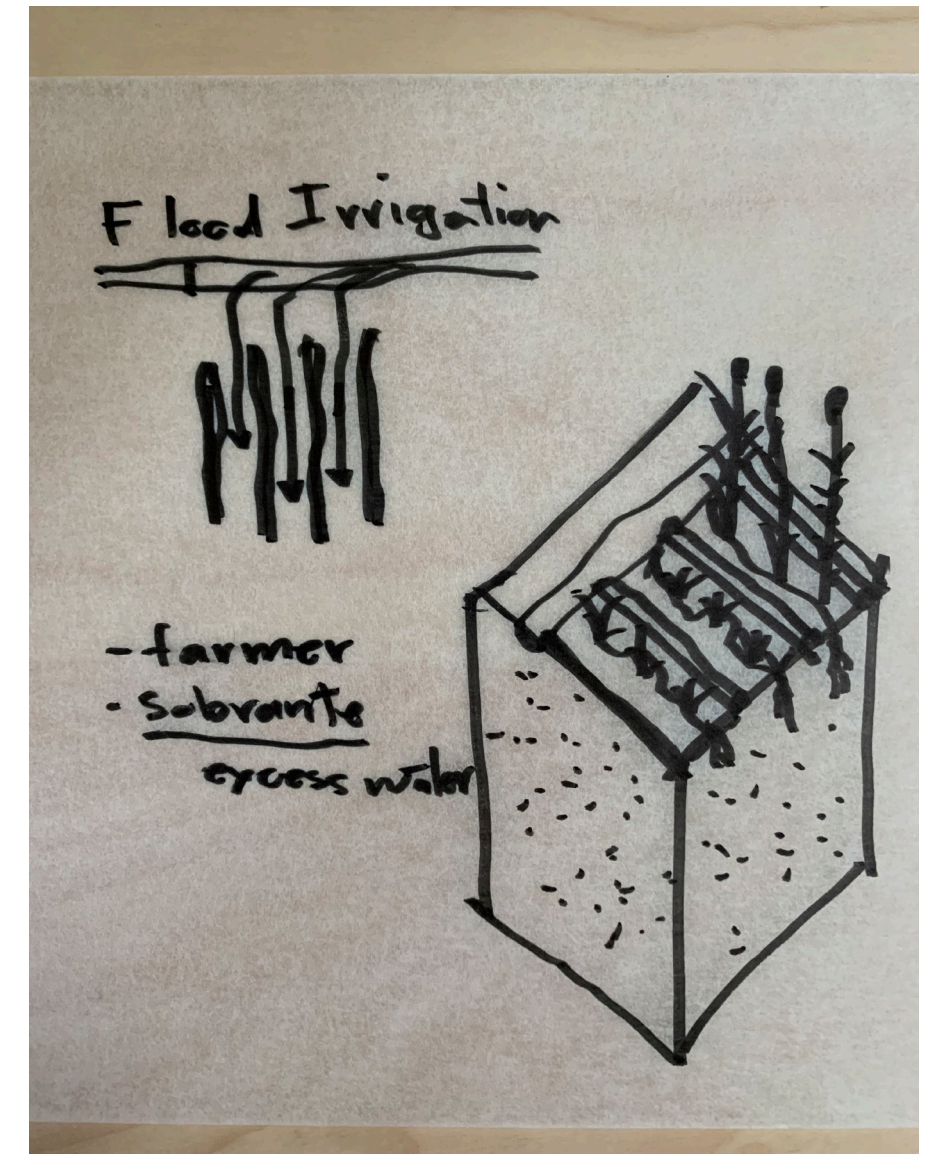
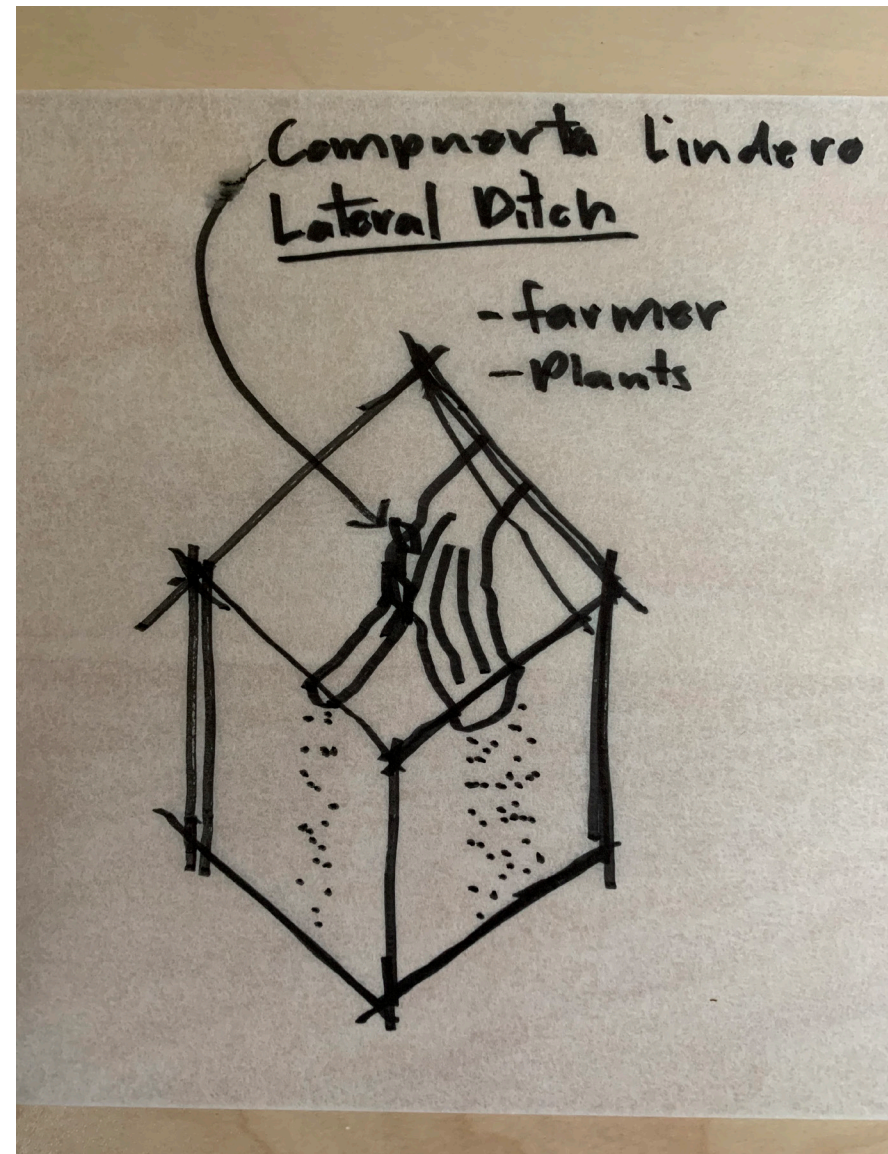
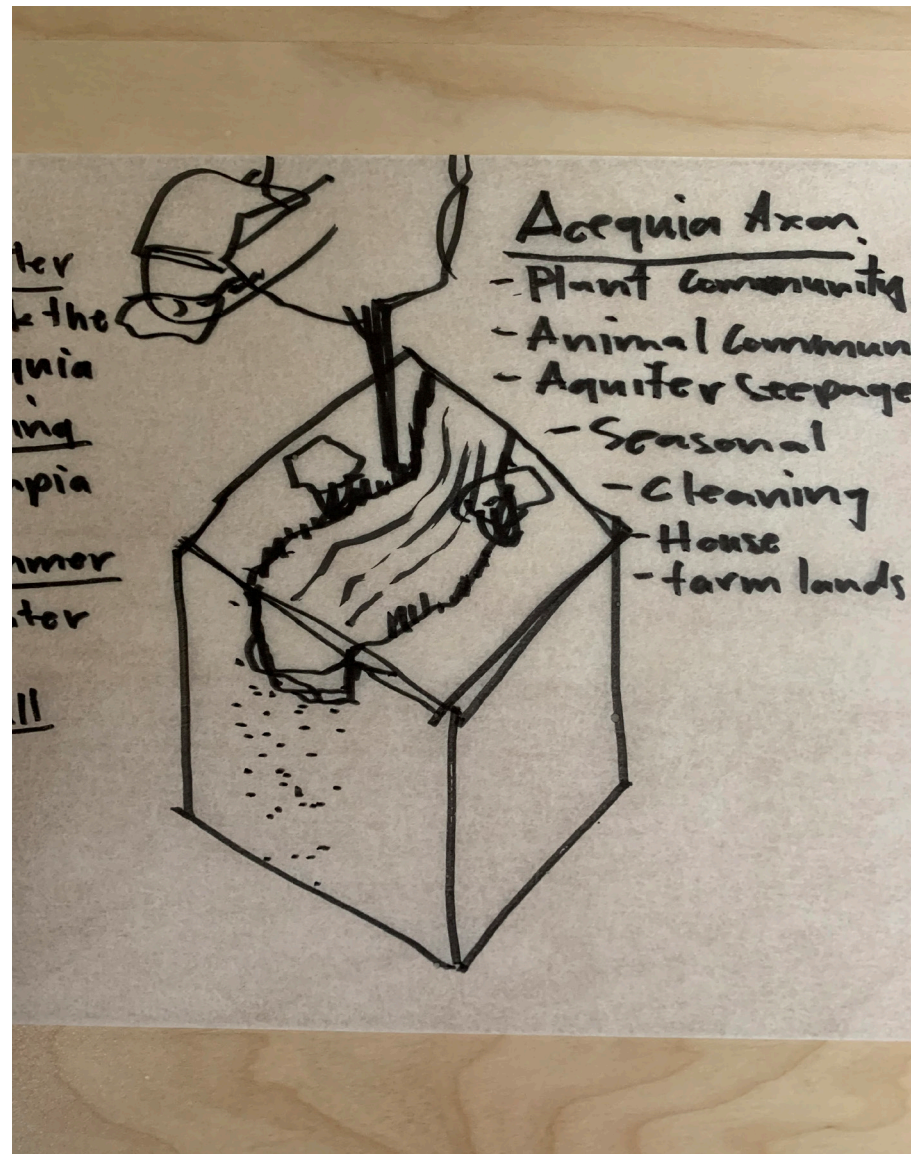
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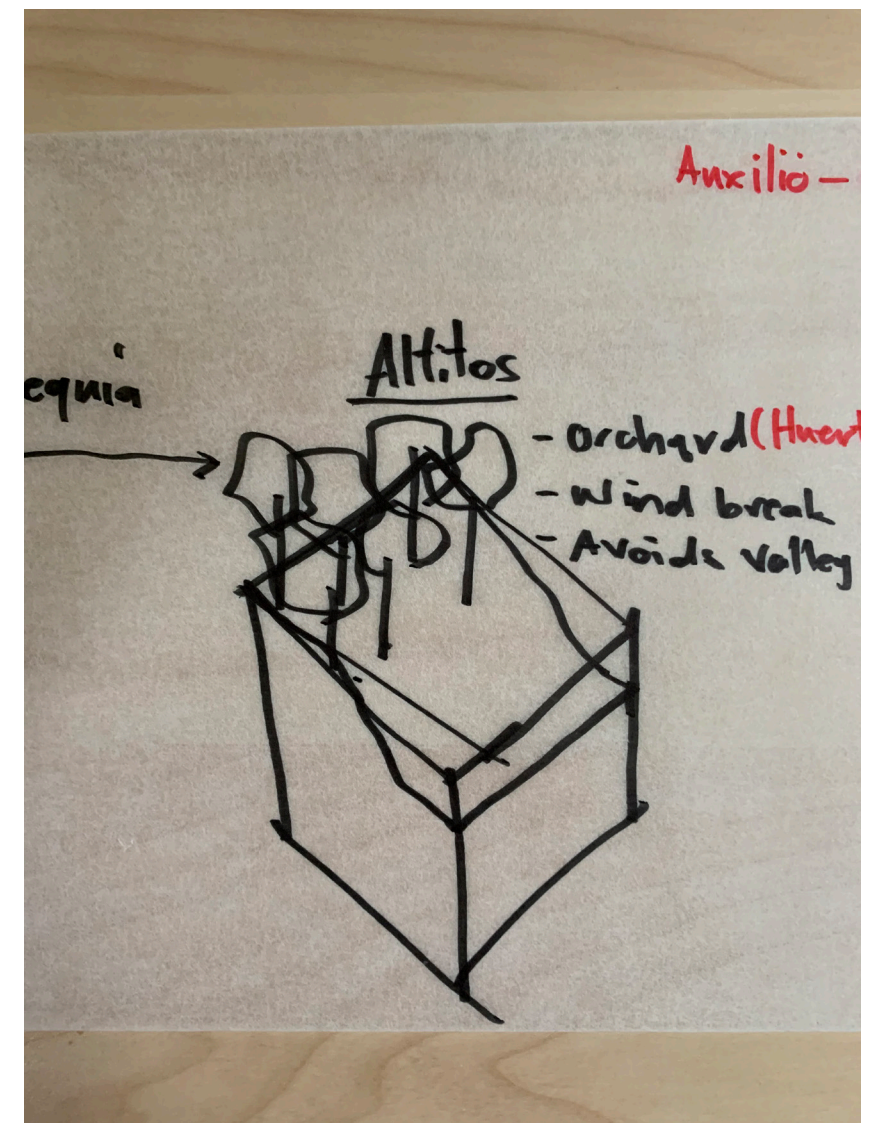
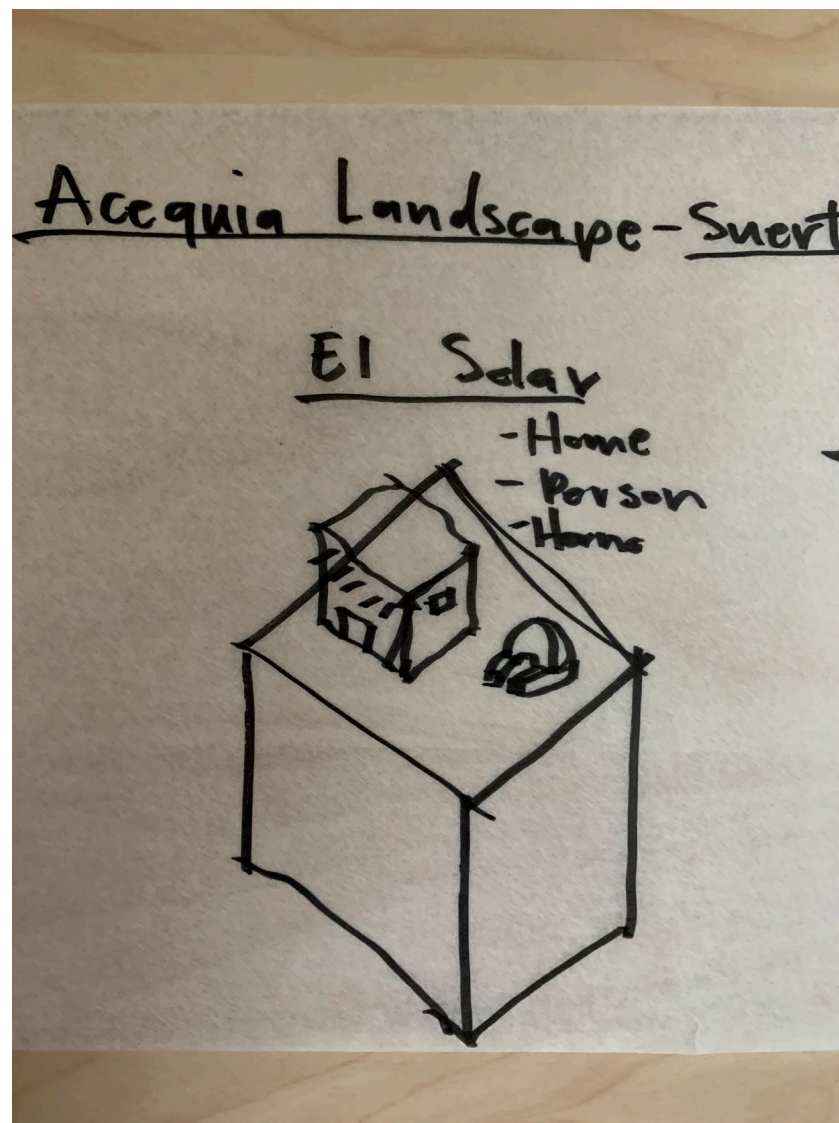
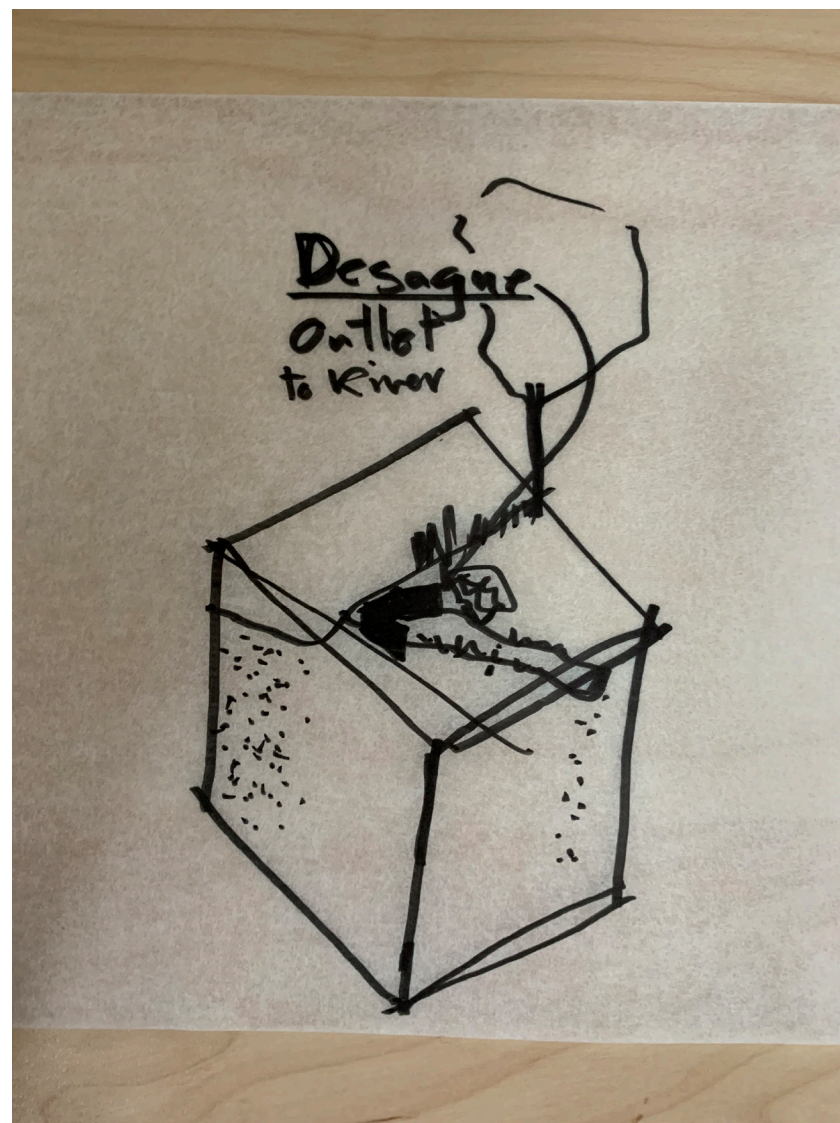
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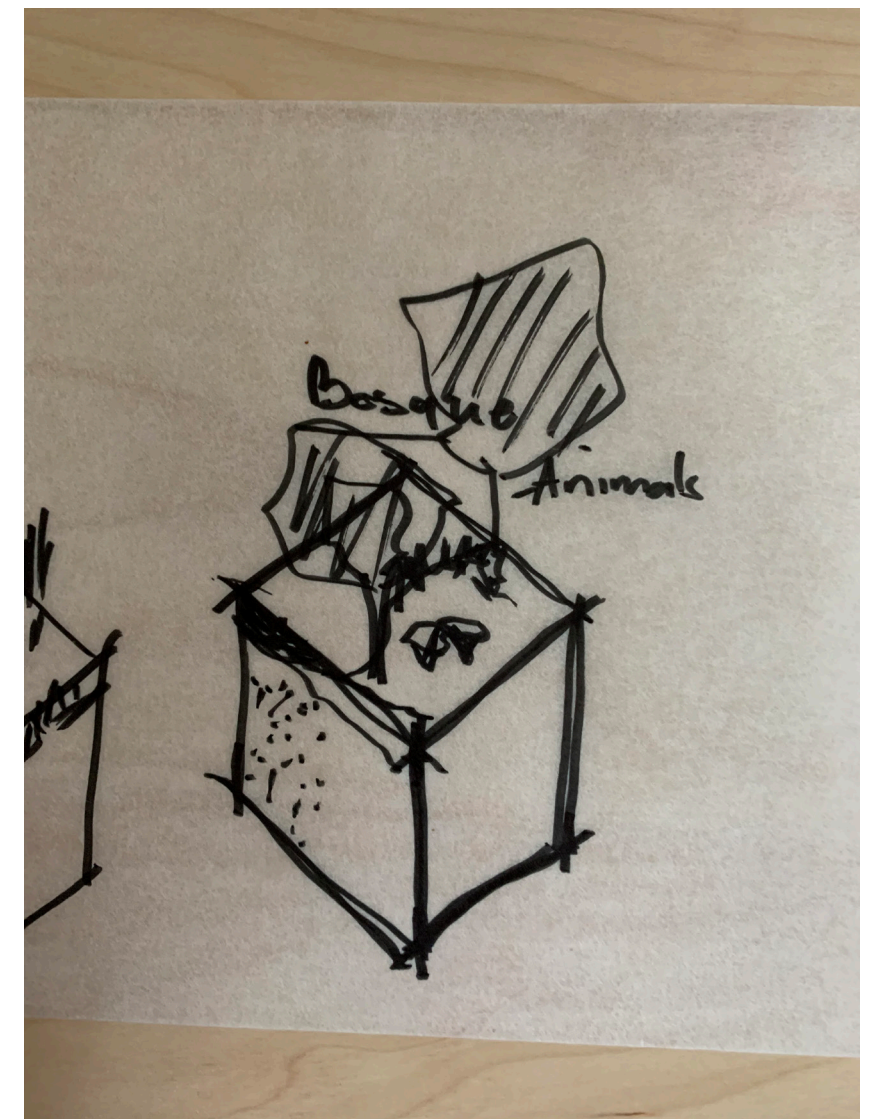
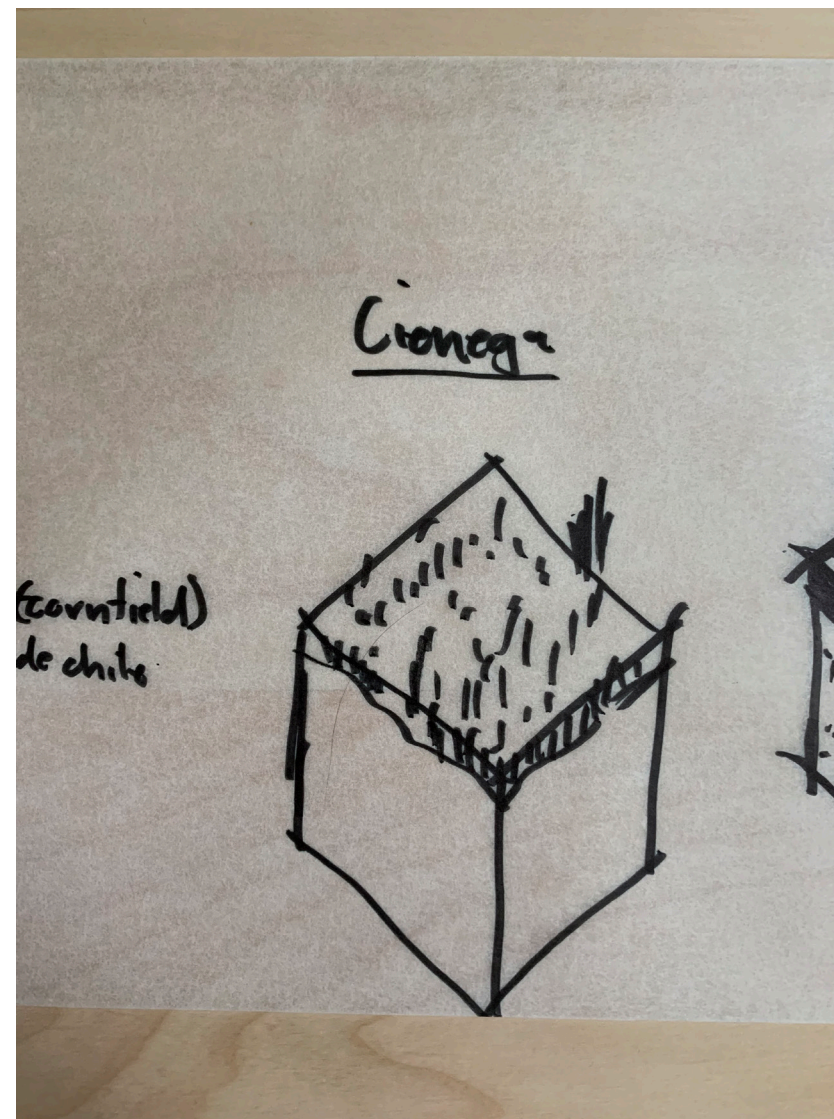
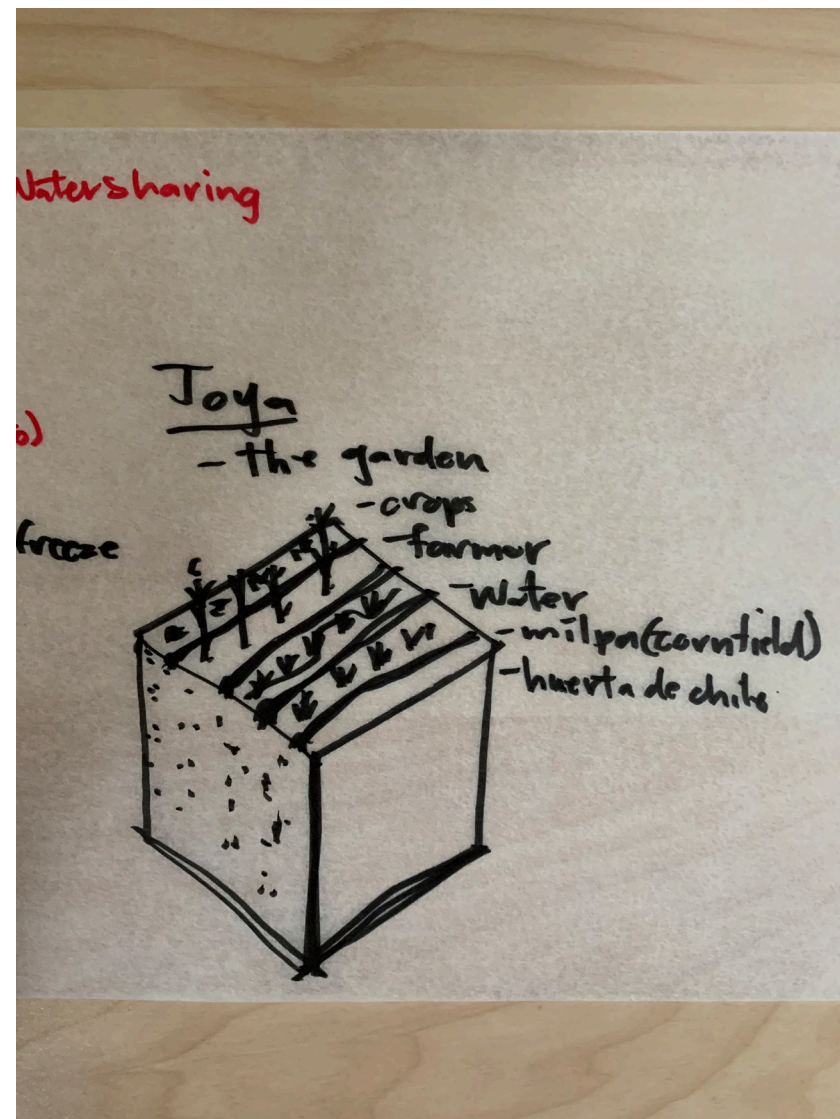
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Appendix















Section Through Community Gardens + Food Hall

