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The Santa Ana Pond Park Redevelopment Design

An Interactive Qualifying Project submitted to the faculty of Worcester Polytechnic Institute in partial fulfillment of the requirements for the degree of Bachelor of Science

Submitted By

Samuel Bergstrom

Victoria Botelho

Brianna Goncalves

Vinny Tavernelli

Sponsoring Agency

Santa Ana Pueblo

Liaison

Joseph McGinn

Advisors

Scott Barton

Fabio Carrera

sf15-ana@wpi.edu

<https://sites.google.com/site/sf15sana>

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Abstract

The goal of this project was to assist the Pueblo of Santa Ana, Department of Natural Resources in developing a park design for the Santa Ana Pond. We designed multiple park designs in order to present to members of the Pueblo in order to obtain feedback. The designs were then altered to cater to community feedback in order to create a final design incorporating all of the feedback received. We provided an estimated material cost to implement the final park design created. Finally, we provided recommendations that would best suit the Santa Ana Pueblo in moving forward in the park design process

Authorship

Section	Contributing Authors	Reviewers
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Executive Summary

The Santa Ana Pond Park is a 4.9 acre parcel of land recently acquired in 2002 by the Pueblo of Santa Ana. The parcel of land is currently underutilized, but has potential to become a resource the Pueblo currently lacks: a nature and educational park where Pueblo traditions can be celebrated and preserved. The park currently is comprised of a 0.15 acre pond, electrical hookup, warehouse, outhouse, a variety of native vegetation, and an adjacent irrigation ditch. Currently, the Pueblo of Santa Ana has six parks, four of which are playgrounds geared towards children's use. The Pueblo is currently constructing a Wellness Center that will include baseball fields, basketball courts, and a playground when completed. Lastly, there is the outdoor classroom located a far distance from the Pueblo's residential areas. Due to the distance, the Outdoor Classroom is no longer a utilized resource for the Pueblo members. The Outdoor Classroom includes a path lined with exercise equipment and signage geared toward educating visitors about vegetation and nature in the area. From analyzing the existing parks in the Pueblo, we determined there is a need for a nature park that would enable Pueblo members to preserve their traditions while visitors can be educated about Pueblo practices.

With approximately 800 residents in three villages, the Santa Ana Pueblo is a community with tight knit traditions. Cultural aspects such as their native language Keres, cultivation techniques, and appreciation of native vegetation are all still prevalent in Santa Ana Pueblo. Cultivation techniques involve flood irrigation through water-carrying ditches called acequias. Additionally, the waffle gardening technique and fishing are important traditions the Pueblo continues to practice. These traditional practices are aspects that can be integrated into the Santa Ana Pond Park to educate younger generations while allowing Pueblo members to have a destination to appreciate their traditions.

In order to create a park design that incorporates all of the traditional and educational aspects three steps were taken, which are listed below.

1. Survey structural and landscape elements of the Santa Ana Pond
2. Propose multiple park designs and obtain community feedback
3. Create master plan design and estimate cost for proposed improvements

To start the design process, the dimensions of the Santa Ana Pond were determined by using the National Geographic mapmaking program. Multiple tours of the Santa Ana Pond were taken where existing features and native and invasive vegetation species were identified. The existing features such as the parking, pond, and outhouse were mapped on ScribbleMaps program, along with the existing plant species. After the Santa Ana Pond area was defined and described, multiple park design prototypes were created. Features suggested from the Department of Natural Resources were included in these prototypes and were presented to Mr. Joseph McGinn, Water Resource Division Manager and Ms. Tammy Montoya, Water Resources Consultant. From their feedback, the designs were narrowed down to three designs and presented to the Pueblo community. Feedback from community members, shown in Table 1, was compiled during this presentation. In addition to the Pueblo members, the Department of Natural Resources participated in the surveying and feedback was collected. The final map was created using the

Question	Design 1	Design 2	Design 3	Yes	No	No Response
Favorite Design	0	0	8			3
Pond Location	0	8	3			
Parking	1	2	1			7
Restroom Location	1	1	1			8
1 or 2 Ponds				7	0	4
Exercise Equipment				4	1	6
Location of Gardens				4	0	7
Picnic Area Location				6	1	4
Fruit Trees				0	3	8

Table 1: Results from Community Feedback

ponds. The location of the ponds were chosen to be at the southern end of the park to optimize the shade provided by the large cottonwoods in the area and avoid evaporation in the pond. This location was additionally chosen to avoid the pond being in the same vicinity of the parking lot which was suggested from Pueblo members during the feedback activity. It was also determined that the majority of attendees liked the waffle garden and community gardens and their locations. Resulting from this, the waffle garden and community gardens are incorporated at the east side of the park where it can be easily flood irrigated from the offshoot of the Albuquerque Main Canal running adjacent to the park. From the comment section in the survey, all of the participants requested a picnic area which was incorporated into the northern end of the pond. An outdoor classroom structure is included by request from the Department of Natural Resources, along with the restroom nearby. In addition all of the native vegetation is recommended to be preserved, along with the planting of new vegetation and removal of invasive species. The park will be irrigated via an acequia canal running from the northern offshoot of the Albuquerque Main Canal while looping around the park and filtering back into the southern offshoot of the canal. This was suggested by the landscape architects to optimize water conservation. The final cost for materials was calculated to be 58,720 dollars.

After the design was presented, a tour of the proposed designs at the park took place. This was done by creating signs which briefly described each feature. The signs were placed in the location that the final design recommended. The tour allowed the attendees to be able to visualize what the final design entailed. As a final form of feedback, participants were encouraged to fill out a survey. This left the Department of Natural Resources with a final design along with the last form of feedback from the tour and an estimated cost, enabling them to alter the designs according to the feedback.

We recommend before implementing the final design, that the Department of Natural Resources collects more feedback from community members. Due to the small amount of participants, we believe our results may be biased and recommend that the DNR get a more representative sample of feedback regarding the park design. We also recommend that the DNR apply for grant funding from the Native Plant Society of New Mexico or an equivalent funding source. This specific grant funds projects that advocate for plant conservation and education, which the Santa Ana Pond Park design has a large focus

GIS mapping program AutoCAD shown in Figure 1. The cost of the materials for the final park design were then calculated by researching price quotes for the materials making up the main features of the park.

Due to 100 percent of attendees identifying that two ponds were wanted, it was recommended that the park include two

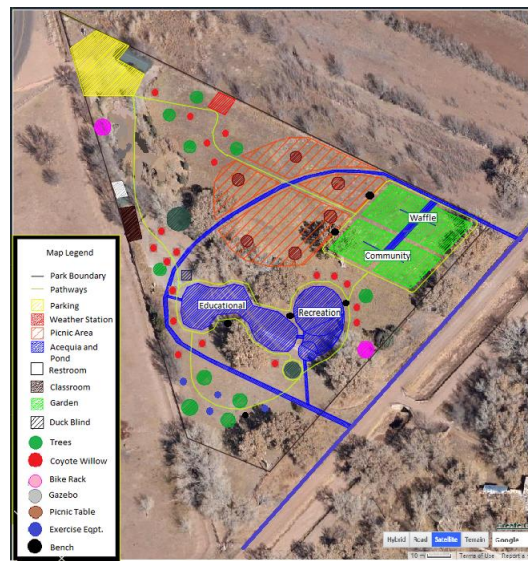


Figure 1: Final Park Design

on. Lastly we recommend that the DNR contact landscape architects and contractors to get professional advice before starting to construct the final design.

1. Introduction

This project assisted the Pueblo of Santa Ana in developing a design for a recreational space around Santa Ana Pond. The Santa Ana Pond Park, a 4.9 acre parcel of land encompassing a 0.15 acre pond, is located in the Pueblo of Santa Ana Reservation between Santa Ana Road and the Albuquerque Main Canal Road. The Tribal Council Resolution, adopted in 2004, assigned the Department of Natural Resources (DNR) of the Santa Ana Pueblo to utilize and maintain the area surrounding the Santa Ana Pond. The department recognizes that the Santa Ana Pond has the potential to serve as an outlet to preserve tribal culture by providing an area for the community to use. The agricultural fields and groundwater availability make an ideal site to create a community garden, an accessible fishery, and educational demonstrations of traditional tribal practices. An implementation of a long-term plan is needed to maintain and create new purpose for the Santa Ana Pond.

Our project's focus was to create a comprehensive plan to develop and fully utilize the Santa Ana Pond area in a way that reflects the desires and needs of the community it will serve. The pond and surrounding area are currently not being used to their full potential. The goal of this partnership between the Pueblo of Santa Ana and our team was to develop a viable option for the creation of a final park design. This plan created the park as a place for recreational activities as well as wildlife and agricultural education for all tribal members. The final plan included specific recommendations for the redevelopment of the pond. Specifically, adjustments to the depth through the use of dredging as well as replacing the old liner helped develop the pond into a resource that can be used for recreational activities. The plan for the pond focused on creating a prime habitat for numerous aquatic species in order to facilitate a proper environment for learning about native animals and ecosystems. A proposal for the implementation of new pond features, native aquatic plants, and the stocking of the pond with native fish for sport and consumption was a part of this project.

The plan for the park included designs for an agricultural area that focused on traditional Pueblo farming practices. To do this, research on the implementation of waffle gardens, as well as other farming and irrigation techniques was completed. The design created an area to practice and teach traditional agricultural practices to younger generations. Another focus of the overall plan is on the flora and fauna native to the region. Research and development of a basic design for the planting of native vegetation contributed to the eventual creation of a park that meets all of the criteria that the tribe desires for the space.

Park infrastructure is another crucial aspect of the park design. The design of walkways, benches, lights, restroom facilities, a classroom, and locations of the waffle gardens and flower beds are a focus of the research which was conducted for the foundation of the plan for the park. Learning from successful park designs as well as visiting existing local parks are steps that were taken in the process of completing the final proposal for the park design.

The final design incorporated background research on pond design and aquatic ecosystems, traditional Pueblo agricultural practices, native vegetation, park designs with a focus on native vegetation and pond life, and educational opportunities. The design put forth intends to meet all of the goals set by Department of Natural Resources of the Pueblo of Santa Ana, but most importantly it

fills the needs of the community and visitors. In order to achieve this, the focus was on community outreach, feedback, and involvement in the design process. These steps, coupled with background research done by our team, resulted in a final product which allowed the Pueblo of Santa Ana to redevelop the Santa Ana Pond area into the kind of natural resource they require.

2. Background

The Pueblo of Santa Ana, located along the Rio Grande is an area rich in culture. These cultural practices have been maintained since the 1500's. Among these cultural practices include speaking in the native language, preserving native vegetation, utilizing traditional farming techniques and continuing fishing practices. Located in the Pueblo of Santa Ana is a 4.9 acre parcel of land that contains multiple opportunities to preserve the Pueblo's traditions. The area of land is underutilized but has a large potential to be transformed into a park focused on education and nature, which is a resource that the Pueblo currently lacks. This chapter discusses the cultural traditions of the Pueblo, along with the resources in the Santa Ana Pond to recognize such culture, along with basic principles concerning park design.

2.1 The Santa Ana Pueblo

The Pueblo of Santa Ana, originally called Tamaya was located along the Jemez River in New Mexico before relocation to their current settlement. Upon the arrival of Spanish explorers the Pueblo was

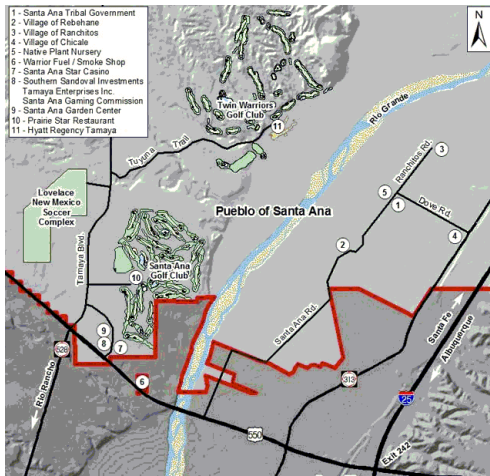


Figure 2: Santa Ana Pueblo

submitted to Spanish rule in 1598, when the Pueblo was renamed Santa Ana.¹ After built up aggression due to Spanish rule, the Pueblo revolted in 1680, where the Spanish were driven out. The members of Pueblo of Santa Ana were forced to retreat into the Black Mesa and Jemez Mountains after another Spanish attack shortly thereafter. In 1693 the members moved out of the mountains and into their current location, along the Rio Grande approximately 27 miles northwest of Albuquerque, where they reside today. The reservation is approximately 79,000 acres with approximately 800 residents and is comprised of three villages: Rebahane, Ranchitos, and Chicale.²

The Pueblo of Santa Ana is rich in culture and its inhabitants hold true to many of their traditional cultural practices. A description of the Santa Ana Pond and its main characteristics are referred to below, along with cultural aspects that will be integrated into the park such as waffle gardens and flood irrigation. The importance of the tribe's unique traditions, along with details of their practices, will be defined in the following sections. The opportunities that the Santa Ana Pond provides to integrate education, culture, and recreational space are explained in further detail, along with the historical significance of the traditions in Pueblo culture. Understanding where the Pueblo originated as well as their traditions is crucial to appreciate the park's importance to the tribe.



Figure 3: Three Neighborhoods in the Santa Ana Pueblo

¹ A Brief History of the Santa Ana Pueblo website The Pueblo of Santa Ana. <http://www.santaana.org>

² Pueblo Lands website Tamaya. <http://www.tamaya-nsn.gov/index.html>

2.1.1. Traditional Language in the Santa Ana Pueblo

The Pueblo of Santa Ana speaks a native language called Keres. Keres, spoken by 11,000 people and is strictly an oral language. Elders in the tribe believe the language should not be written for preservation of the oral history.³ However many Pueblo members believe that writing the language is important for passing Keres literacy on to children learning the language.⁴ The Santa Ana Pueblo is connected to four other Keresan-speaking tribes The Pueblos of Zia, Santo Domingo, Cochiti and San Felipe.

2.1.2. Native Vegetation

There is distinct native vegetation in the Southwest due to the arid climate. Due to this, drought tolerant plants are prevalent in New Mexico. These specific and specialized plants can be found in the Santa Ana Pueblo. Among the most prevalent of the native vegetation species found in the Pueblo of Santa Ana are cottonwoods.⁵ Found in the Santa Ana is the Rio Grande Cottonwood, which is found only along the Rio Grande in central New Mexico.⁶ Additionally found in the Santa Ana Pueblo, and specifically the Santa Ana Pond are prairie grasses.⁷ Prairie grasslands are a threatened habitat and are in need of being protected.⁸ There are also invasive vegetation found in the Pueblo of Santa Ana, which is defined as a non-native species that has a negative effect. Among the non-native species found in the Santa Ana Pond are Spanish broom, tree of heaven, and Russian olives.⁹ Due to the distinct vegetation found in areas in the Southwest it is important that native vegetation be preserved and invasive species be removed.



Figure 4: Rio Grande Cottonwood

2.1.3 Traditional Farming

The cultivation of crops is a high priority in Pueblo culture. Agriculture used to be of importance to the Pueblo of Santa Ana, both culturally and as a means of survival.¹⁰ Crops were once the backbone to the Pueblo economy and are a part of many religious ceremonies, which revolve around the agricultural season. Irrigation is vital because drought is a reality in New Mexico. Irrigation serves as the Pueblo's weapon against aridity and drought.¹¹ Native American agriculture

³Native Languages of the Americas website <http://www.native-languages.org/keres.htm>

⁴ Native Languages of the Americas website <http://www.native-languages.org/keres.htm>

⁵ Schroeder, personal communication, 2015

⁶ Rio Grande Cottonwoods website "Rio Grande Cottonwoods." <http://www.nmnaturalhistory.org>

⁷ Schroeder personal communication, 2015

⁸ New Mexico: Prairie and Grasslands website "Nature Conservancy" <http://www.nature.org>

⁹ Schroeder personal communication, 2015

¹⁰ Santa Ana Pueblo, 2013

¹¹ Some aspects of Pueblo mythology and society, 1943

was most advanced in the southwest where many different types of special farming techniques were used.¹² The main crops being cultivated in the area were squash, corn, and beans. Many of the Pueblo farmers of New Mexico were able to develop a new type of corn that was better suited for the climate and high elevation of the area. These new corn species were adopted all over the southwest because of their ability to grow in adverse conditions.¹³ With growing populations, it became a necessary to develop forms of growing crops in the generally dry and arid Southwest.

One form of cultivation used in the Southwest is waffle gardens. These are referred to as terraced, grid, stone-outlined, or bordered gardens.¹⁴ They are usually created for a single family, but can also be used on large scales to feed the community. Using whatever water source is available such as runoff, waffle gardens are passive consumers of irrigated water.¹⁵ Many southwestern farmers rely on this planting technique to conserve water and protect their crops from wind damage.¹⁶ The structure of these gardens is a grid pattern. Each basin is usually around 15 to 24 inches in length and have borders built around them four inches high. A



Figure 5: Traditional Waffle Garden



Figure 6: Three Sisters: Corn, Bean, and Squash

covering of

manure or sand is used to help conserve the moisture and keep the ground soft.¹⁷ These gardens can be found all over the Southwest. One of the largest waffle gardens can be seen at Beaver Creek in the sacred mountain basin in Central Arizona. These fields were once enormous, measuring over 80,000 m² in size. This was such an extensive field that it had canals within the garden itself.¹⁸ For the most part, these waffle gardens are used to grow basic crops for the tribes. A few of the usual crops are maize, beans, and squash.¹⁹ Some other crops commonly

grown on a small scale in waffle gardening are onions, and chili peppers.²⁰ Corn is an important crop to Native Americans. Corn is at the center of religious and cultural events for many tribes.²¹

Another cultivation technique in the Southwest is known as the “Three Sisters.” Three Sisters is a cooperation of many plants in symbiosis to provide each other with an improved growing environment. These plants are determined through research and practice.²² One plant will treat the other plants with

¹² Native American Food, 2015

¹³ American Agriculture, 2002

¹⁴ Prehistoric Water Utilization and Technology in Arizona, 2002

¹⁵ Agricultural Diversity in the prehistoric Southwest, 1980

¹⁶ Lessons from Southwestern Indian Agriculture, 1928

¹⁷ Lessons from Southwestern Indian Agriculture, 1928

¹⁸ Prehistoric Water Utilization and Technology in Arizona, 2002

¹⁹ Prehistoric Human Impact, 1992

²⁰ Agricultural diversity in the Prehistoric Southwest, 1980

²¹ The Zuni Way, 2007

²² Biodynamic Gardening, 2010

certain things they need to flourish. The flourishing plant will in turn treat the other plant with something it needs to grow successfully as well. A common selection of crops is to use hills of corn to serve as poles for beans while adding squash to help keep down invasive weeds.²³ There are many other groupings of crops traditionally used by Native American tribes as well. Each crop provides for the other, requiring a small usage of minerals in the ground. Due to this minimal usage of the minerals available, this practice, if followed correctly, can be done successfully for many years, thus deeming itself as a sustainable practice. Sustainable farming is arguably the most effective form of farming. It allows a small garden to produce year after year without needing relocation.²⁴



Figure 7: Flood Irrigation

The irrigation in the Santa Ana Pueblo is floodgate irrigation.²⁵ Floodgate irrigation involves ditches called acequias, which transport water from a river or other water source to farmlands. More specifically, the Pueblo traditionally uses farm gate flood irrigation, which involves ditches working with laterals and sub-laterals until it reaches the farmer's field.²⁶ The gates are then opened manually to allow the water to flow among the crops. The water flows over the ground and through the crops where the plants can then obtain water.²⁷ Because the Santa Ana

Pueblo is located along the Rio Grande, the river serves as the main source of water for flood irrigation.

2.1.4 Fishing in Pueblo Culture

The Pueblo of Santa Ana is rich in their culture and traditions. Nature and wildlife have always been an integral part of Native American life and culture. Wildlife provided sustenance and guaranteed the tribe's survival. A strong reverence for nature developed as a response to the codependence developed over generations. Being located adjacent to the Rio Grande, the Pueblo community has long developed a historical dependence on fishing. Fishing, regardless of the specific method used, allowed for the collection of food as well as the strengthening of community bonds. While the importance of fishing as a source of food has waned in the last half century due to the spread of western culture and weakening dependence on nature, fishing remains a part of the culture.



Figure 8: Platform Fishing Technique

²³ The Three Sisters and more, 2013

²⁴ Three Sisters Gardening is Sustainable, 2013

²⁵ Irrigation in the Pueblo of Santa Ana, 2013

²⁶ Exploring Efficient Irrigation Methods, 2014

²⁷ Irrigation Techniques, 2014

Fishing has been an integral part of cultures and societies spanning the globe since the beginning of human history. The Pueblos in southwestern North America are no different; fishing was, and remains, an important aspect of traditional Pueblo culture and community. Fishing was once an important part of obtaining food, as was sustenance farming and hunting. Traditional fishing practices included netting as well as the line and hook method.²⁸ The method with strongest ties to the culture and societal structure of Native Americans is netting. Large communal fishing nets were kept by war captains, which suggested that fishing was once an integral part of a group-oriented gathering of food.²⁹ Not only was fishing part of everyday food gathering, it was a communal activity. Popular methods of fishing, most notably the aforementioned netting, required the entire tribe to work together in accomplishing the task of catching fish. These group efforts were commonplace in the pre-colonization era. It contributed to the strong community bonds and hierarchical structure that the Native American tribes enjoyed. For the Pueblo community to preserve these practices, a recreational space would be needed.

Fishing is considered to be a natural right of Native American tribes. The traditional link between tribes and nature are so strong that the federal law officially recognizes them.³⁰ The U.S. Supreme Court stated in a ruling that access to wildlife was “not much less necessary to the existence of the Indians than the atmosphere they breathed.”³¹ Due to these federal statutes, Native Americans have enjoyed enhanced hunting and fishing rights in the United States.³² Native American fishing practices are uniquely intertwined with their spiritual beliefs and practices.³³ Their traditional methods for killing animals reflects the great respect and reverence for nature that is central in much of Native American culture. While communal fish harvesting was once a source of large quantities of food for the Pueblos, the settling and westernization of the region caused many traditional practices to fall out of favor. Jobs of hunting and fishing were replaced with jobs in local cities. Modernization caused much of tribal structure and tradition to dwindle. Fishing for sustenance seems to have fallen out of common practice in the last sixty years in much of the same way as hunting and traditional farming practices.³⁴

²⁸ Indian Fishing: Early Methods on the Northwest Coast, 2008.

²⁹ Pei-Chien Lin, Richard M. Adams and Robert P. Berrens, 1996.

³⁰ New ways to fulfill old promises: Native American hunting and fishing rights as intangible cultural property, 2014.

³¹ United States v. Winans, 198 U.S. 371, 381 1905.

³² New ways to fulfill old promises: Native American hunting and fishing rights as intangible cultural property, 2014.

³³ New ways to fulfill old promises: Native American hunting and fishing rights as intangible cultural property, 2014.

³⁴ *A Native American encyclopedia: History, culture, and peoples*, 2000.

2.2. Santa Ana Parks and Recreational Areas

There are currently four parks in the Santa Ana Pueblo, shown in Figure 8. These parks consist of playgrounds geared toward young children. The villages of Rebahene and Ranchitos both have a park and the remaining two parks reside in Chicale. In addition to the four parks, there is the Wellness Center being constructed across the street from the Santa Ana government buildings. Once completed, the center will include baseball fields, softball fields, an indoor pool, basketball and racquetball courts, and a playground.³⁵ Lastly, situated in the Pueblo along the Rio Grande is the former



Figure 9: Park Locations and Population Density

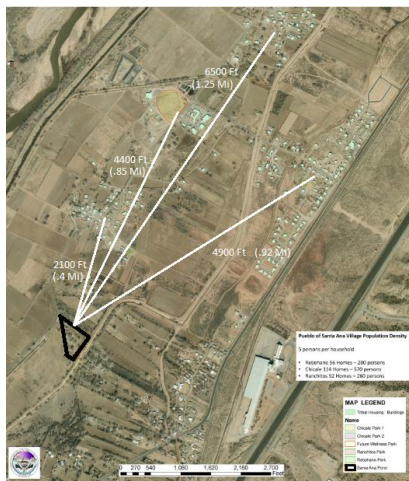


Figure 10: Distance from the Santa Ana Pueblo to Parks

Outdoor Classroom.

The Outdoor classroom is an area complete with paths lined with exercise equipment, where visitors can learn about native vegetation and wildlife situated in the area via educational signage. Due to its distant location and lack of road access to it, the outdoor classroom is no longer in use.

With five of the parks in the Pueblo of Santa Ana containing only playgrounds and sports fields, the Santa Ana Pond fills a vital need for the communities in the Santa Ana Pueblo. The Santa Ana Pond is the only nature park on the reservation that is viable for community use. The Santa Ana Pond is in a prime location to serve the communities of the Pueblo, with the farthest community located 1.25 miles from the park site, as shown in Figure 9. The densest population areas are all centered in the vicinity of the Santa Ana Pond, making the location ideal for a community nature park.

³⁵ McGinn Master Plan, 2015

2.3 Santa Ana Pond

The Santa Ana Pond (Figure 1) is located in the Pueblo of Santa Ana in the Rebahene community in Bernalillo, New Mexico. This 4.9-acre fenced in triangularly shaped park was purchased by the Pueblo in 2002 with the objective of creating a common area for community members to visit on a regular basis.³⁶ The pond on site is a 0.15-acre pond with an average of a 3 foot depth with trails surrounding the perimeter. There are a variety of assets located on the Santa Ana Pond property including a 20' x 40' metal warehouse, a small storage shed, gazebo, outhouse and two groundwater wells. The farm fields located on site can be irrigated from a turnout on the Albuquerque Main Canal by a small ditch that runs into the site, allowing for the development of an agricultural area. The Santa Ana Pond has electricity supplied by a



Figure 12: Aerial View of the Santa Ana Pond

power box located in a small shed that powers the pumps and warehouse on site.³⁷ Recently, the park installed a fully equipped weather station that provides weather data for the Department of Natural Resources and Pueblo farmers.³⁸ In order to educate children about traditions and cultural practices in the Santa Ana Pueblo, youth outreach programs currently utilize the park.

Over the past few years there have been a few areas of the park that have fallen into disrepair, such as the pond. The liner in the pond has been punctured by cattle and is in need of being replaced. Over time, the DNR found it challenging to allocate resources for the upkeep of

the park.³⁹ In 2011, a large project was undertaken to clean and maintain multiple aspects within the park. However, this maintenance is mostly limited to one day a year called “clean-up day.” Oftentimes, however, this day cannot be scheduled until the growing season, causing park maintenance to be overlooked. This makes cleaning up the area somewhat unappealing for community members. A continuing plan for maintenance is needed for the Santa Ana Pond, along with a comprehensive plan for a new park design.



Figure 11: Santa Ana Pond Location in the Santa Ana Pueblo

³⁶ McGinn Master Plan, 2015

³⁷ McGinn Master Plan, 2015

³⁸ McGinn Master Plan, 2015

³⁹ McGinn Master Plan, 2015

2.4 Principles of Park Design

Various park design methods have been practiced in the United States from the 19th century to present day. One of the most notable contributors to the field of park design was Frederick Law Olmsted. With quiet wilderness adventures in Connecticut and the teachings of English writers such as Uvedale Price and William Gilpin as his inspiration, Olmsted developed a method of park design based upon six main design principles. These principles guided Olmsted in the design of numerous notable parks such as Central Park in New York City and Worcester's historic Elm Park, while also serving as a benchmark for later park designers.⁴⁰

Many things can be learned from these design principles. Firstly, the unique attributes of the land in question should be incorporated into the design. For example, a design of a landscape with a unique water feature or old growth trees should work to preserve those elements. A design should also incorporate multiple landscape elements without any one element standing out. Each element must blend with the rest to create a cumulative visual for the observer. Another thing to consider in the design of a park is the flow of visitors, chiefly through the use of pathways. A park should have a flow that allows for convenient travel throughout while avoiding potential bottlenecks and visitor traffic. When determining the location of park features, Olmsted advocates the maximization of unique uses of the park while working to ensure the avoidance of competition for space. The design should ensure the proper allocation of park space and resources for each individual attribute with minimal overlap.⁴¹

Maintenance is an important consideration when determining the long-term viability of a design. Making proper use of pre-existing landscape elements is needed to achieve a sustainable park design. For instance, plants should be native, non-invasive species to reduce care and upkeep costs, since most non-native species require additional irrigation. A reduction in infrastructure often contributes to a reduction in maintenance costs. When designing a park, it is best to look past the boundaries of the park and consider the surroundings and how the park design will affect this area. Noting the locations of other nearby parks and public spaces will help when determining the needs of the community the new park will be filling. Avoiding redundancy of park services can be avoided by mapping and documenting the proximity of other local parks. Public access from one park to another must be thought of in order to maximize public enjoyment of park spaces.⁴²

Another strong influence in landscape design is geodesign. "Geodesign is a design and planning method which tightly couples the creation of design proposals with impact simulations informed by geographic contexts, systems thinking, and digital technology" –Michael Flaxman.⁴³ It is a decision-driven process rather than data-driven, meaning that a solution cannot be proposed simply by compiling figures and numbers. Rather, final designs spawn from a clear and well understood problem statement along with continuous customer feedback during the design process. Routine and frequent feedback from the stakeholders is important to the planning process to ensure that the final product fulfills all of the desires of the customer. It is also important to consider alternative designs and to present the stakeholders

⁴⁰ "Olmsted-His Essential Theory - National Association for Olmsted Parks." Olmsted-His Essential Theory - National Association for Olmsted Parks. Accessed April 30, 2015. <http://www.olmsted.org/the-olmsted-legacy/olmsted-theory-and-design-principles/olmsted-his-essential-theory>.

⁴¹ "Design Principles - National Association for Olmsted Parks." Design Principles - National Association for Olmsted Parks. Accessed April 30, 2015. <http://www.olmsted.org/the-olmsted-legacy/olmsted-theory-and-design-principles/design-principles>.

⁴² "Olmsted-His Essential Theory - National Association for Olmsted Parks." Olmsted-His Essential Theory - National Association for Olmsted Parks. Accessed April 30, 2015. <http://www.olmsted.org/the-olmsted-legacy/olmsted-theory-and-design-principles/olmsted-his-essential-theory>.

⁴³ Steinitz, Carl. A Framework for Geodesign: Changing Geography by Design. Redlands, Calif.: Esri, 2012.

with all possible options. Geodesign is an iterative process, with each step being repeated several times throughout the design project as new information is gleaned from stakeholder feedback.⁴⁴

Charrettes is a commonly used multi-disciplinary design workshop intended to promote communication between the design team and stakeholders. It is used to foster a better working relationship with stakeholders and allow for a constant exchange of ideas. A charrette is a cyclical process that starts with information gathering, then the creation of designs based on collected data, and third is the presentation of the designs. Then, after stakeholder feedback from the presentation is analyzed, the process is repeated with the incorporation of the feedback in the next iteration of final design.⁴⁵

Following a definitive design process is important for the success of a design project. Gaining community feedback throughout the design process is vital to ensuring the final product fulfills the wishes of the project's stakeholders. Both geodesign and charrettes include obtaining stakeholder feedback as the most important step in their process. Both of these methods are important to consider when establishing the scope of the project and during the feedback process. Olmsted's park design principles come into play during the actual creation of the park design. Incorporating all of these sources of park design procedures into one comprehensive park design plan will aid a design team during the creation of their final product.

⁴⁴ Steinitz, Carl. *A Framework for Geodesign: Changing Geography by Design*. Redlands, Calif.: Esri, 2012.

⁴⁵ "Charrettes Defined." CharretteCenter.net. Accessed April 30, 2015.
<http://www.charrettecenter.net/charrettecenter.asp?a=spf&pfk=7&gk=261>.

3. Methodology

There is currently a lack of recreational space in Santa Ana which can be used for the preservation of traditions within the Pueblo community. The goal of this project is to assist the Pueblo of Santa Ana in developing a design for a recreational space around the Santa Ana Pond. In order to meet this goal, we developed three objectives:

1. Survey structural and landscape elements of the Santa Ana Pond
2. Propose multiple park designs and obtain community feedback
3. Create master plan design and estimate cost for proposed improvements

The focus of this project is on the 4.9 acres of land encompassing the Santa Ana Pond.

3.1 Surveying Structural Landscape Elements around the Santa Ana Pond

The first step in a design process is determining the current status quo of the area. This is laid out by the engineering design process principles which firsts states to define the problem by understanding the current condition of the perceived issue.⁴⁶ In the Santa Ana Park design process, defining the current state of the park involved surveying the area. Gathering this basic information about the current status of the park will be crucial in moving forward because developing a proper park design plan is dependent on an accurate initial understanding of the current state of the site.

3.1.1 Dimensioning the Santa Ana Pond

The perimeter of the park first had to be determined. In order to determine the dimensions, an online GIS service provided by National Geographic was used. This program provides GPS to create accurate land measurements. Two layers were drawn on the program. The first included a picture of the site, along with a legend. The second layer was created by drawing in the boundaries of the park, where the program then could calculate the measurements. Fences were additionally drawn in and measurements were recorded. This additionally allowed for the area to be calculated for the parcel of land, along with the three separate sections of the park that was created by the fencing.



Figure 13: National Geographic Mapmaking Program

⁴⁶ What is Engineering Design Process website “Intro to Engineering”, 2002

3.1.2 Determining the Locations of Existing Structures in the Santa Ana Pond



Figure 14: Map Used to Draw Features

Next, the existing features in the pond had to be determined and mapped in order to further understand the layout of the existing area. In Olmstead’s park design principles (see Section 2.4) he specified it is important use existing landscape features in the final park design. This enables the features that already exist to be highlighted and utilized. The existing features in the park were documented by touring the park and drawing on a printed map the locations of each element. Additionally, photographs of the park were taken to provide visual aid. The data collected was then translated into a GIS map making program called ScribbleMaps. This enabled all of the existing features to be documented into a map which created a graphic that allowed what was missing from the park to be further analyzed.

3.1.3 Identifying Vegetation in the Santa Ana Pond

The last step in surveying involved identifying vegetation in the Santa Ana Pond. This was required in order to identify which species were invasive and which were native. Due to the prerequisite of maintaining the Santa Ana Pond as a nature park, non-indigenous species are not wanted in the final park design, thus need to be identified for future removal. In order to complete this, we met with a biologist who identified all of the vegetation in the park. Similarly, to determining the locations of the key features, a map was used in order to draw the types of vegetation found in the park. Using the program ScribbleMaps, the data collected was drawn on the map to be used as a resource for the future park designs.

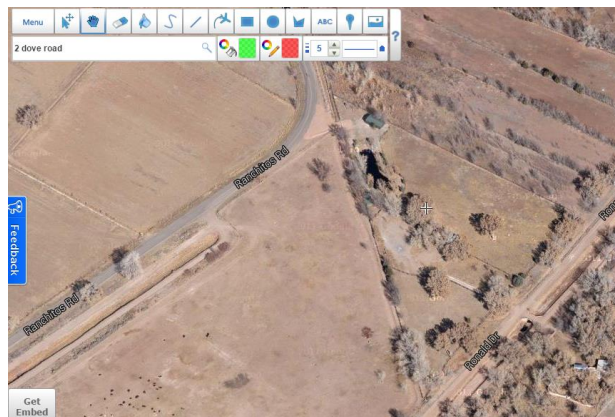


Figure 15: ScribbleMaps Program

3.2 Designing Santa Ana Pond and Obtaining Feedback

In order to proceed with the design process, feedback must be obtained to better evaluate the needs and wishes of the stakeholders. Gathering data on stakeholder feedback is vital to the design team’s decision-making process. Determining what park features are important to the stakeholders and what they value in a park design was the main purpose of this design objective. Rather than administering a blind survey to the Pueblo community, we set out to create multiple park designs that

could then be presented to the stakeholders to gain their feedback regarding park features. The feedback would be focused on answering the questions needed to create the final park design.

3.2.1 Creating Initial Designs

To answer the question of what key landscape features should be included in the park design, we first met with our sponsors, Mr. Joe McGinn and Ms. Tammy Montoya from the Department of Natural Resources (DNR) of The Pueblo of Santa Ana, to determine what features they wished to see in the final park design. Several meetings regarding the current status of the park involved establishing a working list of potential additions to the park. Previous surveys that the Department of Natural Resources conducted to Pueblo members helped in determining features that were desired in the park. This gave our design process an initial direction regarding what was wanted out of the park design.

Possibilities for locations of these features were also determined during the initial meetings with the sponsors. Tours of the park were made, accompanied by representatives of the DNR. During this time, open spaces existing in the park were noted as possible spots for various key features that had been previously identified as desirable additions. Based on this feedback from our sponsors, we created seven initial designs. To create the designs, we first sketched them out by hand. Then, once seven sketches were chosen as the best representations of the multitude of sponsor feedback, they were created digitally using a GIS mapping platform known as Scribble Maps. Within the designs were varying locations of key features in order to visualize the numerous suggestions given by representatives from the DNR. Several of the seven designs were alternative plans outside of what the DNR had recommended. This method follows one of the principles of geodesign which is to consider alternative designs to what the stakeholders have so far considered. This promotes a broadening of ideas, preferably ending with a superior and fully inclusive final design.

To narrow down the seven initial designs to a smaller set of designs that would be more manageable to present to the stakeholders, we presented the initial designs to our sponsors. During the presentation, we went over each design, noting the differences between them and the unique characteristics of each one. Through an open-ended discussion, our sponsors discussed the pros and cons they identified in each preliminary design. To quantify their feedback, surveys were created and administered during the informal presentation of the initial designs. Based upon the additional feedback from the DNR and analyzing their suggestions from the survey, our design team created three designs that embodied the best aspects of the initial seven designs. These three designs were created first using Scribble Maps and then, more permanently using AutoCAD.

3.2.2 Getting Community Feedback

With the second iteration of designing embodied in the three designs, community feedback was needed. Though the DNR had supplied ample suggestions and feedback at this point, feedback from the Pueblo community, being the main stakeholders for the project, was incredibly important for the advancement of the design process. Without proper stakeholder feedback, the final design

would end up representing the wishes of the design team rather than that of the people who will be making use of the final product. Therefore, the importance of the presentation step of the charrette process cannot be overstated. Presenting to the stakeholders may highlight things that have been overlooked by the team.

In preparation for the first presentation to the Pueblo community, our group transferred the second set of designs onto a larger, more viewer friendly medium. This was done by printing out three large copies of a Google Earth image of the park area, attaching them to a poster board backing, and then overlaying the proposed designs using tracing paper. Therefore, the community members could easily distinguish where the new park features would be located in relation to what is currently present. A PowerPoint presentation was also created that introduced our team, the purpose of the project, and included an in-depth description of the three designs being presented. In addition, the material costs of each design were calculated using pricing quotes from online suppliers of the required materials. This material cost estimate was included in the presentation as a way to attach a cost to each of the three proposed set of improvements to the park area. By doing this, the stakeholders could better determine which features they truly valued and wished to be included knowing fully what the cost would entail.

After the presentation of the PowerPoint, we welcomed the attendees to make their way over to the large representations of the three designs. There we demonstrated the process of feedback collection that involved having the present community members place color-coded sticky notes on features of each design, with yellow sticky notes denoting preferred park additions and orange sticky notes denoting design aspects that they wish to see removed or altered. This method allowed for the stakeholders to have a hands on experience with the proposed designs and express their desires for the park. We also provided printed surveys as a secondary outlet for stakeholder feedback. The survey is shown in Appendix C. This was used to document their preferences as well as allow for the community members to submit alternate ideas that hadn't been considered in the three proposed designs.

In the days following the presentation to the community members, we sought additional feedback on our designs. The three large maps were presented to members of the Department of Natural Resources (DNR) who were also encouraged to place sticky notes in the same manner as during the stakeholder presentation. We then met with the director of the DNR, Alan Hatch, to discuss his thoughts on the proposed designs. During the following weeks, we also met with two of the architects of Surroundings, a multidisciplinary design studio that focuses on park and landscape design. After presenting our three designs ideas to them, we engaged in a constructive discussion on the merits of each design as well as flaws and overlooked opportunities that their more practiced eyes caught.

3.3 Creating the Master Plan & Estimating Cost

In a design process, the final product needs to be refined. Refining is the stage in a design process where the concept is made more official and involves analyzing all of the details from the feedback and presenting stages.⁴⁷ This stage involves compiling all of the prototyped designs and feedback so the full

⁴⁷ What is Engineering Design Process website "Intro to Engineering", 2002

design can be created. Additionally, at this stage a final cost was calculated in order to analyze how feasible implementation of the proposed design is. Creating the final design by refining and calculating the total cost is essential in proposing such ideas to an audience, along with presenting the designs and collecting final feedback.

3.3.1 Creating the Final Master Plan Map & Collecting Final Feedback

A final map had to be refined after presenting three maps to the members of the Pueblo, Department of Natural Resources, and the landscape architects. This was first done by analyzing the data collected in the surveys and charrette. We decided to implement each feature where the most members favored each location, which were concluded from the survey results and from the number of stickers on each map during the charrette. Additionally, the architects aided in deciding where each feature should be located by analyzing the landscape, along with advising where the water flow from the canals would be optimized. After gathering and analyzing all of the data from the feedback, the master plan was drawn out by hand. The plan was then translated into the program AutoCAD, allowing for all of the features to be drawn on top of the park as it exists currently.

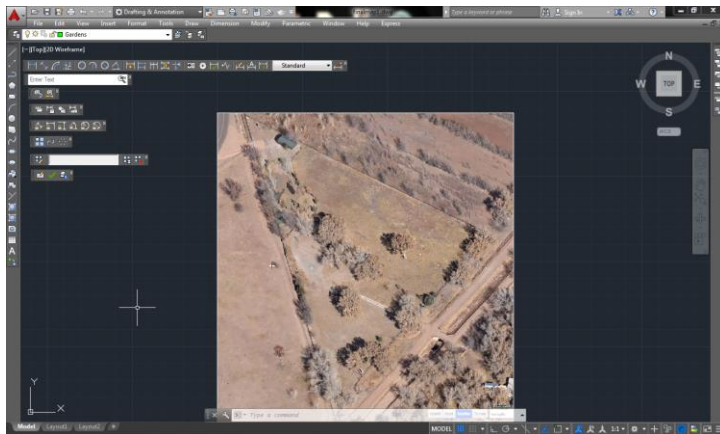


Figure 16: CAD program used for Final Design

After the locations of each feature were determined and drawn on AutoCAD, the pathways were drawn and adapted to each feature. The pathways were created to connect all of the features of the park fluidly by analyzing the locations of each feature and determining a path that would connect all of the features. Additionally, a prototype of the signage was created. The location of the signage is determined to be in front of each major feature and the native vegetation along the pathways. The

prototype created involved an example of what each sign will embody. The prototype included a description of the feature, along with its translation in the native Keres language to incorporate more of the Pueblo's traditions. Although the language is not typically written, many members of the Pueblo would like it to be in order to pass on traditions easier to younger generations. The cost of the main features of the park were estimated by analyzing the amount of materials needed for each feature. Cost was estimated by researching price quotes from retailers and added in an excel spreadsheet. Labor cost was not included due to the highly equipped and trained members of the Pueblo able to complete the labor.

In order to present the final design we created a presentation along with a tour of the final park design in the Santa Ana Pond to enable attendees to be able to visualize the park and collect a final source of feedback. Both geodesign and charrette procedures advocate a cyclical design process centered on altering designs and obtaining feedback (see Section 2.4). To create the tour, signs were created using



Figure 17: Stake placed for Tour in the Santa Ana Pond

stakes. The signs included a description of each feature that was integrated into the final design. The signs were placed in the location of where each feature appeared in the final park design. Additionally, a brief survey was created so participants could give any comments they had regarding the final park design. The survey is shown in Appendix D.

4. Results and Analysis

The results and analysis from our three objectives are discussed in this section. First, the evaluation of the Santa Ana Pond and the maps created from the surveying are described. The maps include the dimensions of the Santa Ana Pond, the native vegetation in the park, and the existing features currently residing in the park. Next, the multiple designs created for the area around the Santa Ana Pond are discussed, along with the results from the community feedback collected. The cost for three of the proposed designs are additionally determined and shown in this section. Lastly, the final design created from the community feedback is presented along with a cost estimate and the final collection of feedback.

4.1 Landscape Elements around the Santa Ana Pond

Dimensioning

First, the dimensions of the Santa Ana Pond and map were found and shown in Figure 17. The dimensions show that there is a lot of options available in potential designs due to the large open areas.



Figure 18: Map and Dimensions of the Santa Ana Pond

The dimensions also demonstrate that they park is separated into three areas by fences. The triangular shape and overall length of the park impact many design features of the park. It was determined by the map shown in Figure 17 that the triangular shape would imply a loop like pathway throughout the pond enabling visitors to circle back around to one of the two available entrances.

Existing Features

Secondly, in surveying the Santa Ana Pond, the current features of the park had to be identified. Due to the park being split into three different areas with

different existing features included in each section, designing new features in the park depended on this aspect. Shown in Figure 18, the pond, parking, water pump, weather station, gazebo, and irrigation ditch service the most northern section of the field. Resulting from this, the placement of the waffle gardens and community gardens would be most feasible in the northern section of the park due to the available irrigation ditch. Additionally, shown in Figure 18 is the electricity, storage, and outhouse in the central most section of the park. This implies that the classroom and restroom would be most viable in this vicinity due to the available electrical hookup. In the southern most area of the park is open field and vegetation. Preserving native vegetation is priority in the park, so this area would be most fit to have additional vegetation planted.

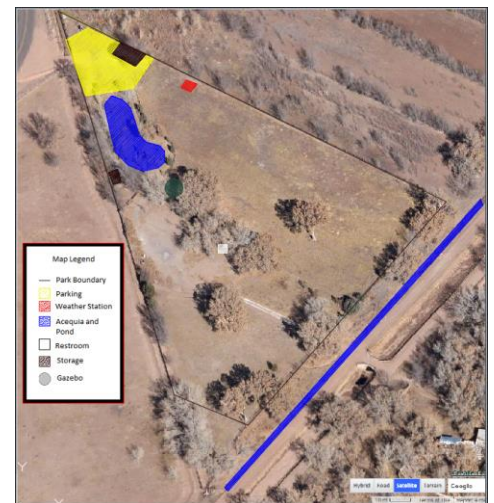


Figure 19: Features in the Santa Ana Pond

Native Vegetation

The vegetation in the park was identified and shown in Figure 19 in order to identify what native species would remain in the park and which species would be removed. Cottonwoods, denoted by the red dots on the map are the most prevalent native vegetation species in the park. Additionally shown by the large green area towards the Southern end of the park are native prairie grasses. Less common but still present in the park are native species such as yerba mansa, milkweed, cherry trees, apricot trees, black willow, rose, and locust. The map in Figure 19 also shows invasive species that are found in the Santa Ana Pond. Shown by the light green circle is the tree of heaven which is a non-native species which will be removed for the final park design. Similarly, a non-indigenous species that is found in the park is Spanish broom, which is prevalent in the area around the pond. Additionally, found along the pond is Russian olives which are also among the non-native species in the park. Lastly, is the Chinese elms denoted in white, which is the most prevalent non-native species found in the park. It was determined from these results that the non-native species would be removed in order to preserve the park as a nature park that exclusively includes only native vegetation.

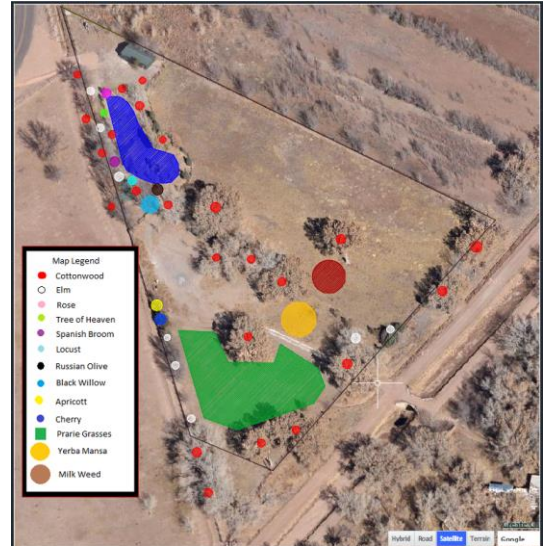


Figure 20: Vegetation in the Santa Ana Pond

4.2 Design Feedback

Being a design project, the feedback received from presentations throughout the design process is the keystone of the project. Obtaining usable data from stakeholder feedback is the priority of the design process since it is what drives the team's decision-making process. In order to determine the desires of the stakeholders and incorporate that into our park designs, their feedback was needed at several junctions during the design process. This was achieved by maintaining an open and constant dialogue with our sponsors as well as holding presentations of potential design proposals to the community. The data collected throughout the feedback process dictated much of our final product.

4.2.1 Initial Designs Feedback

Initial talks with our sponsors, Mr. Joe McGinn and Ms. Tammy Montoya of the Department of Natural Resources (DNR) of the Pueblo of Santa Ana, resulted in a working list of park features and design suggestions. Our seven initial designs (see Appendix A) included plans to relocate the pond to a more easterly location on the park grounds due to strong suggestions from our sponsors to have the pond, located farther from the main entrance in hopes of preserving the natural aspect of the main water feature. After viewing their earlier suggestions rendered as overlays on a map of the current park and seeing our team's design input in the designs, our sponsors advocated the addition of a second pond as a preferred option over the renovation of the current pond or the relocation of a single pond.

Based upon the desires of the DNR, our early designs all included the addition of an area in the park for agricultural use in the form of traditional waffle gardens (refer to Section 2.1.3) in an effort to preserve the farming traditions of the Pueblo community. Wishes for an outdoor classroom to be used by local youth outreach programs as a center for environmental education were noted and included in the

initial designs. From the discussions with the DNR, we determined the main purpose of the park to be better connecting the local community with nature and aiding the education of young children about the environment and the traditional link between Pueblo culture and nature.

4.2.2 Final Design Options Feedback

With the major stakeholders of the project being the Pueblo community that would be using the Santa Ana Pond, obtaining their feedback contributed greatly to the design process. The feedback generated from the presentation of the three proposed designs on April 9th proved informative and useful in the rest of the design process. The majority of the community members that attended preferred Design 3 (see Figure 22) due to the inclusion of two ponds. There was overwhelming support for the two pond design, as well as for the location of the pond in Design 2 (see Figure 21). Therefore, we incorporated two ponds in the final design, though shifted in position from that in Design 3 to reflect the location of the pond in Design 2, which was the location preferred by the stakeholders.

The feedback regarding the location of the parking lot as well as the restroom was fairly ambivalent, leaving the final decision regarding the location of those two features up to our group. We decided to locate the parking lot within the boundaries of the park in order to increase the area available for parking. Based upon the level of interest in the park and sponsor recommendations, we determined that the parking lot should be able to accommodate approximately twenty cars, resulting in a design for a 6000 sq. ft. parking lot at the western entrance of the park. We made the decision to incorporate a picnic area, gazebos, and waffle gardens in our final design based upon the positive feedback received from the community members regarding these features.

Based upon the feedback received from the Director of the DNR, Mr. Alan Hatch, our team incorporated Coyote Willow, a native tree species, into the landscape design. Mr. Hatch also suggested the removal of the proposed fruit trees in the three final design options, noting an existing orchard located nearby as a redundancy of services. Our team made the decision to move the location of the picnic area from the southern field to the northern field based upon Mr. Hatch's determination that the southern field contained native grasses that should be preserved, whereas the northern field lacked desirable vegetation which made it a better candidate for conversion to a picnic area.

Meeting with the landscape architects of the design company Surroundings connected our team with a knowledgeable group of professionals engaged in the park design profession. Their suggestions illuminated several issues that had not been considered, most notably the issue of water conservation. As mentioned in Section 2.1.2, the region has an arid climate with unreliable water supplies. Since previous feedback established the pond(s) as the primary feature of the park, our design team decided to focus on the conservation of water in the



Figure 21: Community Member giving Feedback

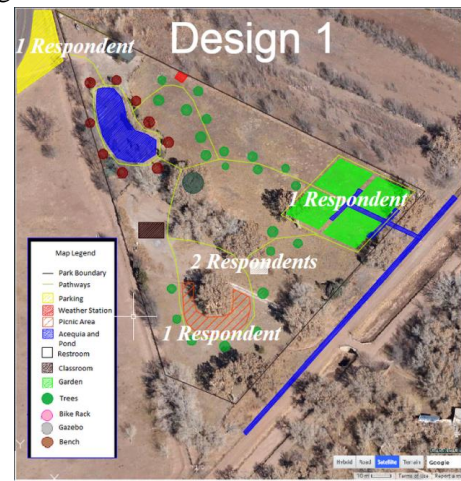


Figure 22: Feedback on Design 1

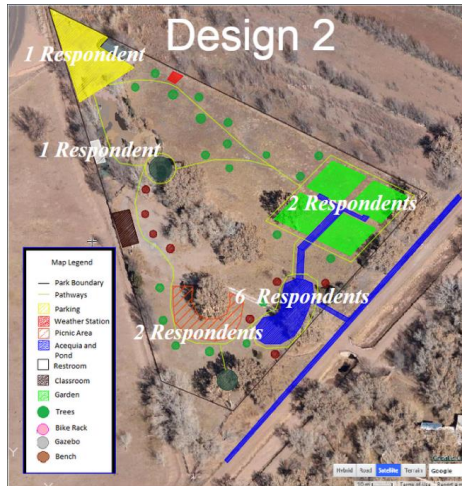


Figure 23: Feedback on Design 2

park and make the recycling of irrigation water a priority in the park design. The architects pointed out a potential waste of water, a valuable resource in the Southwest, in our three designs (see Appendix B) that all lacked a proper plan for water recycling. Based upon their recommendations, we looked into the implementation of a loop-like irrigation system that recycled the unused water of the park system back into the main water source, the canal running adjacent to the eastern boundary of the park.

We also made the preservation of the existing native vegetation in the park a design priority, creating a design that worked around the large trees already present in the park. The architects recommended the utilization of shade from the existing Cottonwood trees in the park as a way to reduce evaporation from the pond(s). Using the natural resources of the park landscape to their fullest was very important to them. They stressed the importance of preserving the current native vegetation, most notably the native Cottonwood trees. Also, the architects recommended the separation of the natural landscape features from the other park features such as the waffle gardens and picnic area as a way to preserve the natural aspect of the pond(s) and native vegetation. We worked to incorporate many of their recommendations into our later designs, creating a much more comprehensive landscape design.

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We also made the preservation of the existing native vegetation in the park a design priority, creating a design that worked around the large trees already present in the park. The architects recommended the utilization of shade from the existing Cottonwood trees in the park as a way to reduce evaporation from the pond(s).

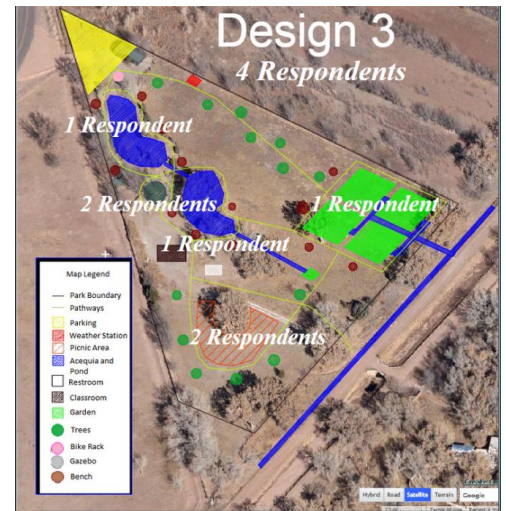


Figure 24: Feedback on Design 3

4.3 Final Design, Cost, and Feedback

Final Map

The final map was created after receiving feedback from our sponsors, the Pueblo community, and landscape architects. The final design is shown in Figure 23. The parking is near the northern

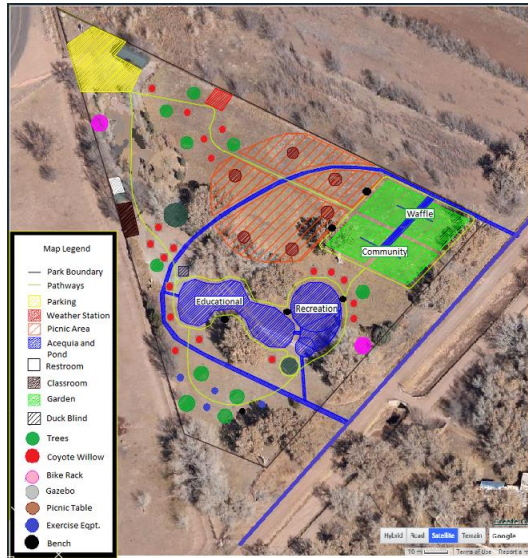


Figure 25: Final Park Design for the Santa Ana Pond

entrance of the pond, and can accommodate approximately 20 vehicles. This was based on the industry standard 300 square feet per car.⁴⁸ From feedback it was determined that two ponds were most wanted by community members. The location of the two ponds are chosen to be far away from the parking lot, to avoid disrupting the nature feel of the park to visitors using the ponds. Their location was also determined due to the cottonwoods surrounding the area. To avoid removing these cottonwoods, the ponds are placed in between them. This also provides benefits to the pond because the shade will prevent water evaporation in the pond, a suggestion from the landscape architects. A duck blind is placed in front of the educational pond so visitors can view and learn more about the wildlife in the pond without disrupting the animals. To also conserve water, a loop like acequia is proposed in the final design. This takes water from an offshoot from the Albuquerque Main Canal and cycles it through the park. There will be

additional offshoots of the acequia which will then feed off into features that require water, such as the gardens and the ponds. Any water not used will filter back into the offshoot of the Albuquerque Main Canal to preserve any water not utilized by the features in the park. Additionally it is proposed that the classroom and restroom be in a close proximity to one another for convenience when bringing meetings or youth outreach programs to the classroom. A large picnic area is shown in the southern portion of the park complete with picnic tables and room for an open recreational area. Bike racks at the main entrance and east entrance are included in the design for visitors traveling to the park via bike. In addition, to the original gazebo, a second gazebo near the ponds is included in the final design, along with the exercise equipment to be moved from the outdoor classroom to the southern end of the park. Lastly it is proposed that more native vegetation is planted throughout the park including coyote willows and trees such as cottonwoods to encourage preservation of native New Mexico plants.

⁴⁸ Site Parking, Design and Zoning Web <https://www.planning.org/pas/at60/report59.htm>

Signage

A prototype of the signage that is proposed to be incorporated into the park was created and shown in Figure 24. The sign includes the name of the feature visitors are viewing, along with its translation in Keres to incorporate and preserve the culture in the Pueblo of Santa Ana. A brief description of the feature is also included in the prototyped signage.

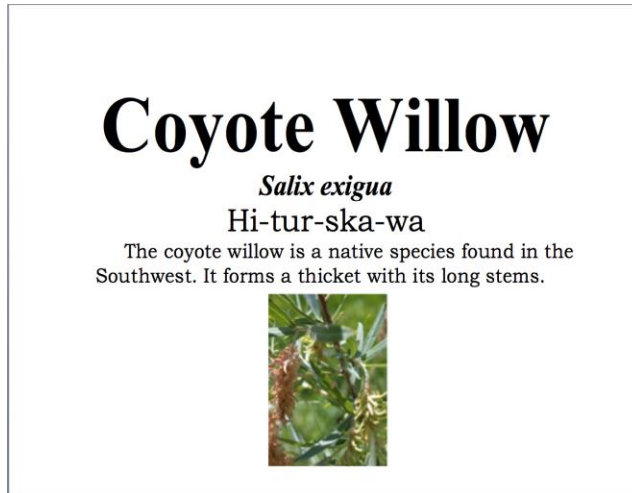


Figure 26: Prototyped Signage

Cost

The material cost was estimated for the final design and is shown in Table 1.

Feature	Final Design Material Cost
Pond	\$26,632
Waffle Garden	N/A
Pathways	\$4,204
Benches	\$1,331
Classroom	\$10,512
Irrigation	\$3,000
Picnic Area	\$2,360
Trees	\$2,400
Duck Blind	\$400
Restroom	\$7,880
Total Cost	\$58,320

Table 2: Estimate Cost for Final Design

Feedback

The survey data was collected and analyzed in order to enable us to give final recommendations regarding the park design and to gain more community feedback. From analyzing survey data regarding the final park design, attendees had a variety of different aspect of the park design that they disliked. There were six responses to the question, is there anything in the park design that you disliked? The answers are shown below in Table 2.

Survey Results: Is there anything in the park design you disliked?
Not fond of the exercise equipment, passive and active recreation is hard to integrate and there will be a full suite of equipment at the health center
Too much focus on agriculture
Better restroom facilities
More picnic tables
Picnic area put a few 3-4 tables closer together to accommodate large groups of people/families and then scatter the rest
Exercise equipment should be near picnic area and leave native grasses alone

Table 3: Survey Results Question 1

In addition, the participants were asked if they had any suggestions regarding the park design. This was to allow us to enhance our recommendations regarding the final park design to cater to suggestions that the attendees provided. The results are tabulated below in Table 3.

Survey Results: Do you have any suggestions regarding the park design?
The coyote willows might be hard to maintain since water heavy trees might try New Mexico olive instead
Back trail away from portion of educational pond
I would like to see a place for sand volleyball or horseshoes
Insert an archery range for kids
Add small archery range about 30 yards
Add small fishing dock to recreation pond
Direct path to restroom from picnic area
Shade trees or structures in picnic areas
Man-made shades over picnic area or another open classroom by picnic area

Table 4: Survey Results Question 2

5. Conclusions and Recommendations

After analyzing the results of the data collected, there are multiple recommendations regarding the design for the Santa Ana Pond. Our first recommendation would be to apply the feedback received from the survey participants after the tour of the proposed Santa Ana Pond Design shown in Figure 25.

Many participants had similar ideas when generating their opinions, so we recommend to alter the final design to cater to the wants of the Pueblo members. After this feedback is applied and the final design is altered to the feedback, we recommend that the designs be presented for additional feedback. Due to the lack of attendees during the feedback activity and first rounds of surveying, we believe that our results may not embody all of the Pueblo member’s opinions. In order to get a less biased survey sample, we recommend polling Pueblo members at random about the design via survey. We then suggest that features that are most frequently wanted in the park that are feasible, should be integrated along with features that are commonly disliked to be removed. We also suggest when taking feedback into account, that the implementations stay consistent with the purpose of the educational and nature aspects of the park. With this in mind, playgrounds and sport like activities should be avoided in order to keep the park for educational and culture preservation purposes.

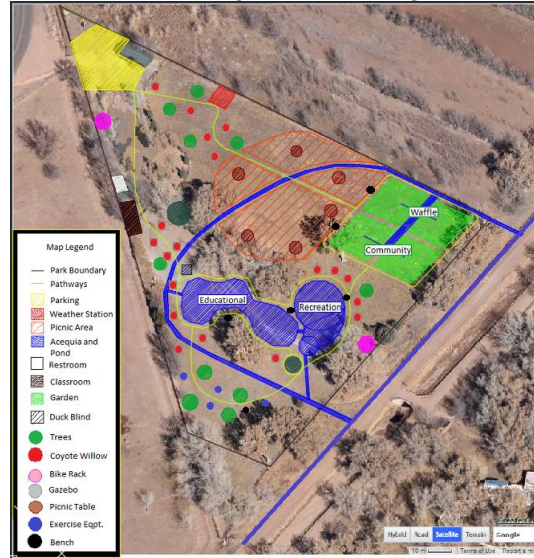


Figure 27: Final Park Design for the Santa Ana Pond

Our second recommendation is that the Pueblo apply for grant funding in order to implement the final park design. We recommend that the Department of Natural Resources apply for the Native Plant Society of New Mexico’s grant program. This society is a non-profit organization that focuses on promoting knowledge of native plant life in New Mexico, along with plant conservation. Due to the park having a large focus on planting and preserving native vegetation in the Santa Ana Pond, this project meets requirements in order to receive funding. The Santa Ana Pond Park also has a centered focus around education of native plant life, which the Native Plant Society of New Mexico strives to achieve in projects they fund.

Our last recommendation is that the Department of Natural Resources contact landscape architects to finalize a final master plan design to implement in the park. We suggest the Pueblo seek professional landscape design advice to solidify the feasibility of the proposed design. We also recommend that they DNR contact prospective contractors in order to start executing the final design. Although the Pueblo has much of the equipment needed to start creating the park, we suggest that contractors help aid in this process.

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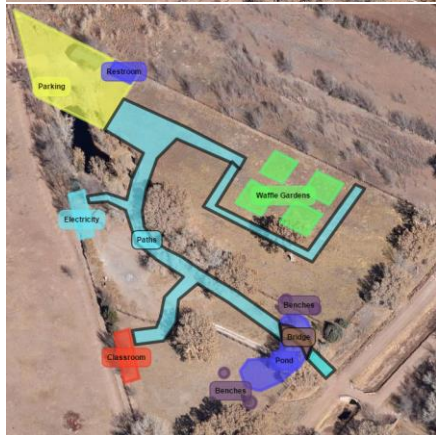
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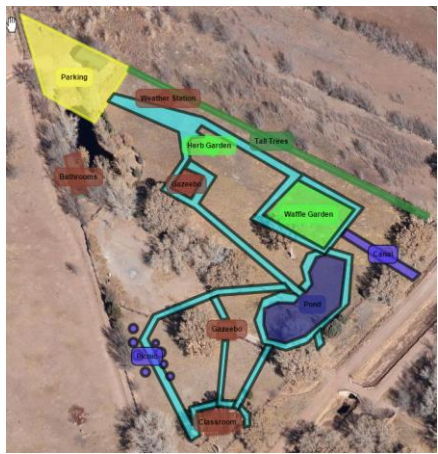
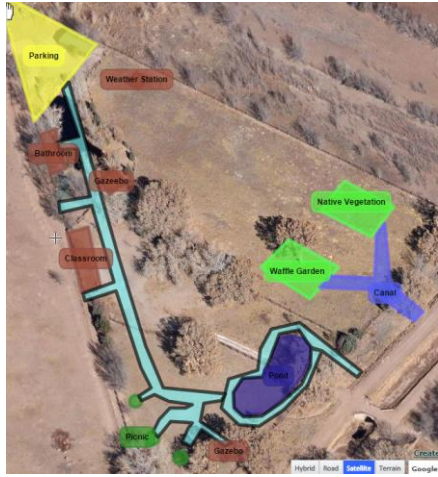
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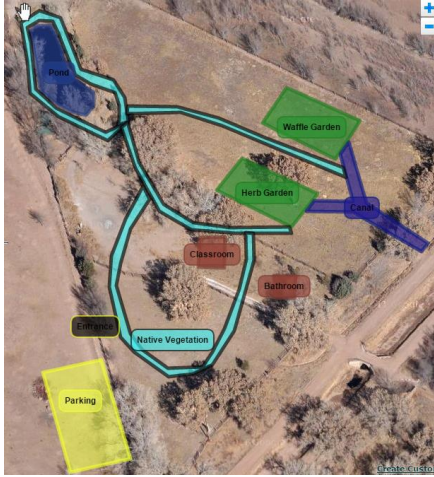
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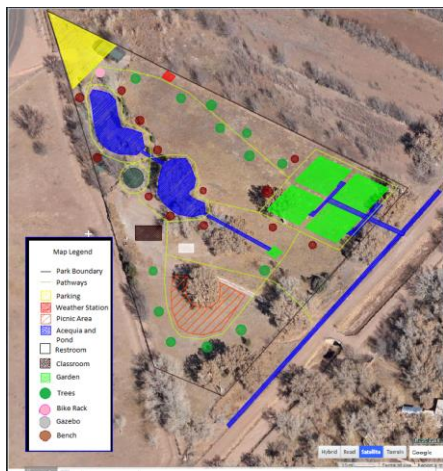
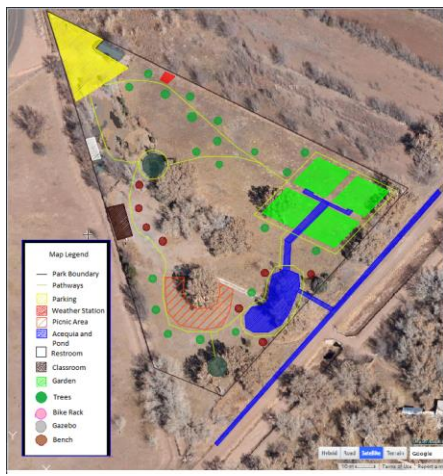
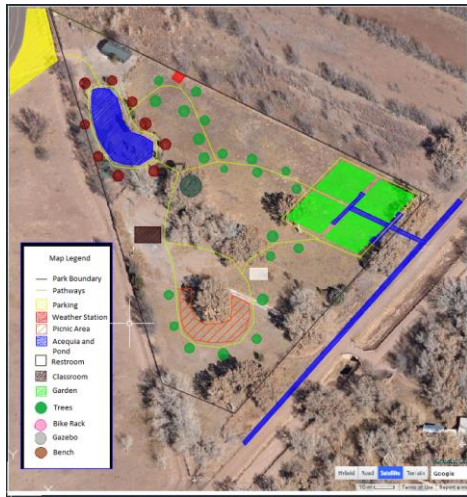
Appendix A: Seven Initial Designs







Appendix B: Three Secondary Designs



Appendix C: Survey One

What was your favorite design?

- Design 1
- Design 2
- Design 3

Do you prefer 1 or 2 ponds?

- 1 Pond
- 2 Ponds

In which design did you prefer the pond location?

- Design 1
- Design 2
- Design 3

In which design did you prefer the parking location?

- Design 1
- Design 2
- Design 3

Would you like to see exercise equipment in the park?

- Yes
- No

Rank the following features from 1-5 (1=most important to you, 5=least important to you)

- Pond
- Waffle Gardens
- Picnic Area
- Classroom
- Exercise Equipment

Do you have any other features you would like to see in the park?

Appendix D: Survey Two

Post Tour Survey

Is there anything in the park design that you disliked?

Do you have any suggestions regarding the park design?

Any other comments/concerns
