

# Trail and Signage Design for Valles Caldera National Preserve

Day Use Areas of La Jara and the Cabin District



A University of Michigan School of Natural Resources and Environment Masters Opus Practicum  
Student Team: Yun Liu (MLArch/MS) and Jamie McArdle (MLArch/MS)  
Faculty Advisor: Mark Lindquist  
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## Project Abstract

This project sets out to provide a trail layout and interpretive signage system for Valles Caldera National Preserve. The preserve has recently come under the management of the National Parks System and needs to make upgrades to the visitor amenities. There is a network of remnant logging roads, however no circulation system. Management would like to utilize these roads as a foundation for a trail system. The preserve has little in the way of signage, interpretation programs or physical visitor amenities such as picnic areas and parking. Theft of artifacts is a major concern for the preserve as it is difficult to monitor visitor behavior and warnings are not posted. As a master's practicum this project incorporates research based design practices to develop trail layout and interpretive signage program for the Day Use areas of the Cabin District and La Jara.

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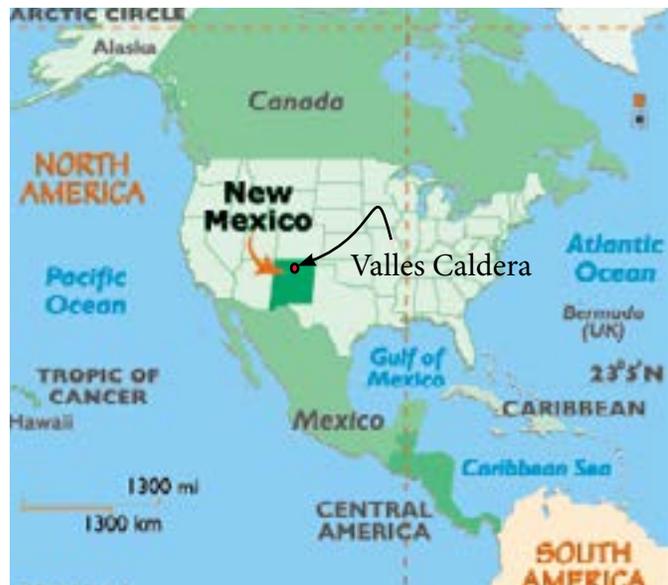
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# Introduction

## Location

Valles Caldera lies in north-central New Mexico, just southwest of Los Alamos in Sandoval County. The Preserve is bordered by Carson National Forest, not far from Santa Fe National Forest. Various local pueblos as well as the relatively close Jicarilla Apache Nation Reservation and Navajo Country also have interest in the Preserve as it houses important religious sites. The Caldera fracture rings, volcanic and resurgent domes, and alpine prairies have had significant implications for the land use of the area from the archaic era to current day. Nearby attractions also include the Los Alamos laboratories and Bandelier National Monument.





## History of Valles Caldera

Valles Caldera became a National Park Service property in 2014 after an attempt to be a self-sufficient government trust recreational and preservation property. The original land assemblage came about as a private land grant. In the early 1820s, the Cabeza de Baca family was granted property around what is present day Las Vegas, New Mexico by the Spanish-Mexican government. The family utilized the land for their sheep operation, however were reportedly deterred by frequent attacks from native raiding parties. The town was then established on apparently unclaimed land in 1835. After the United States of America assumed control of the region, the Baca family petitioned the new government for reparation of their land grant. In 1860, the U.S. Government awarded the family 5 floats in what is now New Mexico (1 and 2), Arizona (3 and 5) and Colorado (4) each encompassing 99,289.39 acres to replace the original grant that was super edged by the town of Old Las Vegas. The first of these floats was Valles Caldera which became known as Baca Location No. 1.

For the rest of the nineteenth century and into the twentieth century, two primary families (Otero and Bond) were successors of the Baca family and ran sheep on the lands. In 1918 the timber rights were leased out for a 99-year term to the New Mexico Timber Company. Timbering did not take off in the Caldera until the mid-1930's when the demand for lumber and construction of Route 4 made timbering the Caldera feasible. By the end of World War II, cattle ranching became a primary use of the caldera. Elk were brought in from Jackson Hole in the mid 1960's. Resort and tourism culture was also seeing a rise in the region and a 185 acre portion of the land grant was sold to a Los Alamos Ski Club. The US government also began to show interest in the land for natural area protection in the 1970's. As timbering continued and expanded throughout the twentieth century efforts to retrieve the timber rights became a focus. The Dunnigan family, who had used the caldera as a private family resort with some cattle ranching and racehorse training, were finally able to buy back the timber rights, which had also changed hands over the years, in 1972 from New Mexico Timber, Inc. This purchase ended a long court battle over clear-cut timbering in the caldera and future was completed with less harsh, selective techniques.

The United States government was finally able to purchase the property from the Dunnigan family and President Clinton signed orders that created the Valles Caldera National Trust. Under this legislation, the Preserve was given specific benchmarks to meet toward becoming a self-sufficient property or it would be annexed into the National Park System. As the Trust was unable to demonstrate adequate progress toward the provision of public amenities and protection of sensitive cultural and ecological areas, the Preserve became National Park Property in late 2014.

## Project Context

Although Preserve governance transitioned to the National Park System, the lack of amenities and structured programming for visitors remained a problem. In effort to improve the visitor experience, the Preserve management approached the University of Michigan School of Natural Resources and Environment with opportunity for students to take on development of a trail and Signage. The original hope was for a team of up to five students to create a physical layout plan and interpretive programming as well as complete a comprehensive visitor survey to meet National Park System standards. Due to time constraints for the project and a smaller than anticipated team, the two students undertaking the project limited this scope to trail layout and Signage design for the La Jara and Cabin District day use areas.

## Goals

This project aims at enhancing visitor experience by designing an integrative trail and interpretive Signage system that facilitates navigation, provide educational information, as well as protecting natural and cultural resources in the preserve. Designated trails tell people where they can walk, provide routes between destinations, promote visitor safety by avoiding hazards, and promote the ecological health of the park by avoiding sensitive habitats or vulnerable site features. The interpretive Signage accompanying the trails helps to reinforce the trail's purpose by providing locational direction to the visitor, offering information related to the park features, and giving direction related to expected behaviors. A general programming map is created to guide allocation of visitor activities. Trail layout and Signage plan for Cabin District and La Jara area are designed as a pilot project with a sustainable design approach. The preserve may use this project as a reference in developing other parts of the preserve in a sustainable way.

## Approach

This practicum consists of four major phases as illustrated in Figure 1. The first phase (Fig. 1, purple boxes) is a preparatory period in which previous work and research were examined, on-site data were collected and semi-structured interviews were conducted. The second phase (Fig. 1, blue boxes) is the analysis and summary of preparatory study. Design drivers were extracted from preliminary findings. The third phase (Fig. 1, the 3rd column) is an iterative process in which preliminary design concept was discussed by the students and the client. The last phase is producing final representations and the report.

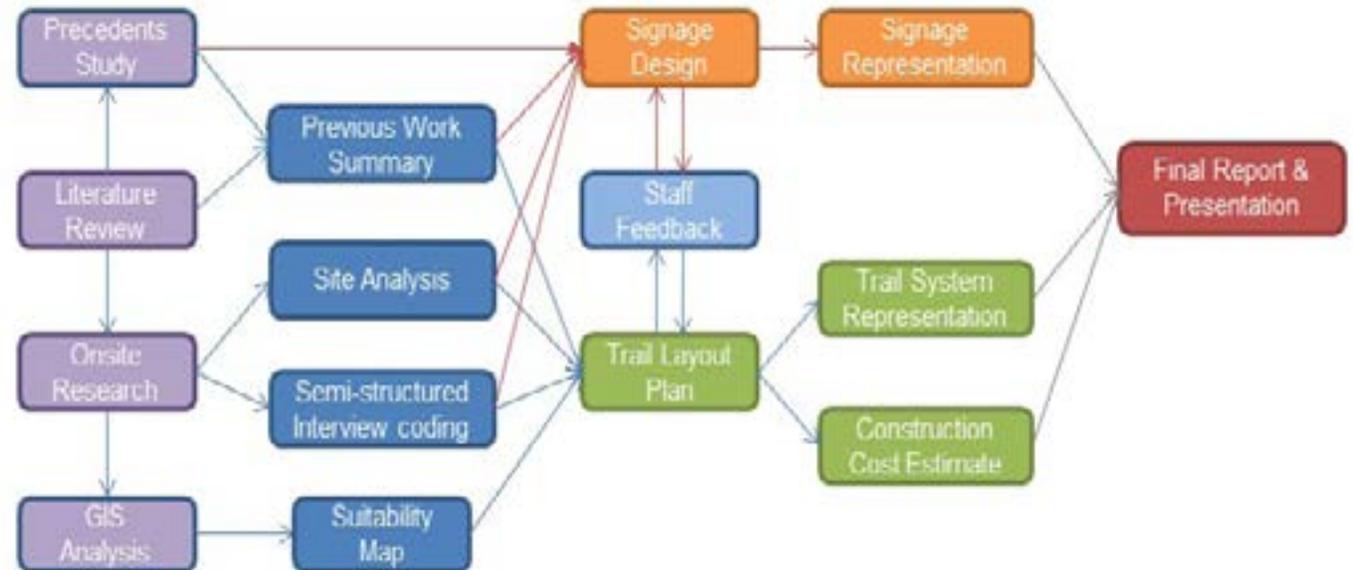


Fig. 1



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# Day Use Areas

## Cabin District Introduction

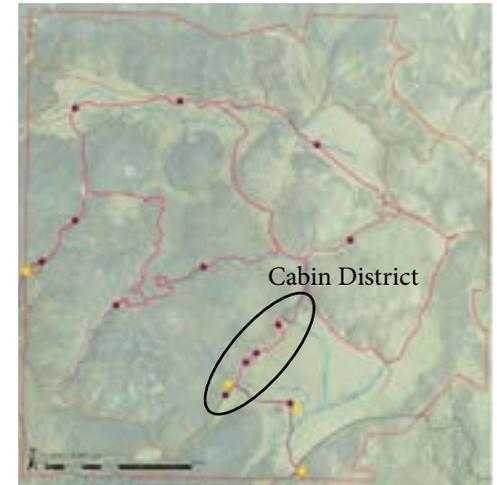
Cabin district has been the center of human activity in the preserve since long ago. This area has been designated for development of a new visitor center and will be the highest traffic area for future use.

### Existing Conditions:

- Only one hiking route which is partially shared by vehicles and pedestrians.
- Lack of interpretive and directional Signage.

### Design goals:

- Maximize hiking experience and accessibility by creating shorter hiking routes with various difficulties.
- Minimize interruption of culturally and naturally sensitive area by GIS suitability analysis.
- Providing educational interpretation and directional signage along trails to increase clarity to the trail system.



Existing Trail



Proposed Trail



## Site Analysis

### On-site Study

The existing trail is about 10 miles. Part of the trail is the access road to back country that is shared by both vehicles and pedestrians. Walking experience on this part can be unpleasant due to dusts caused by passing by vehicles.

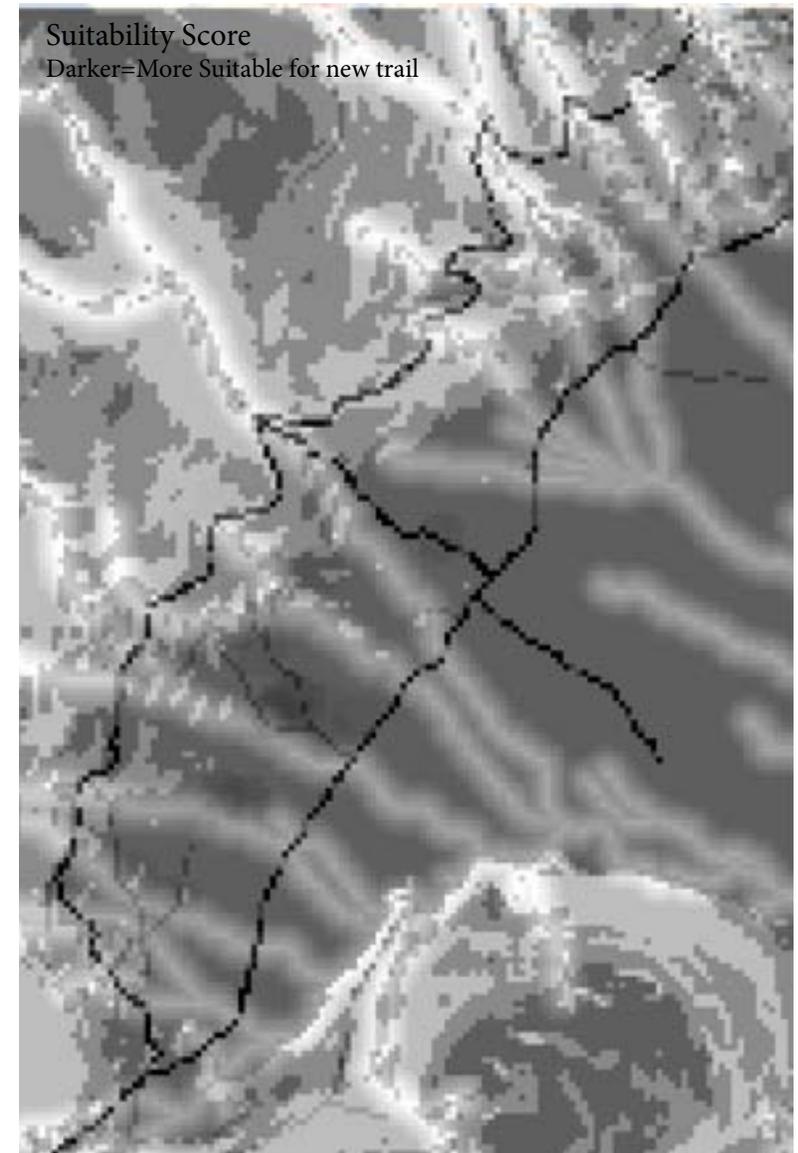
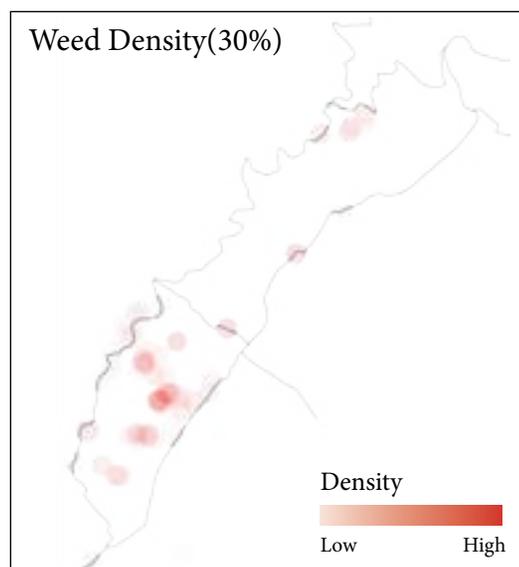
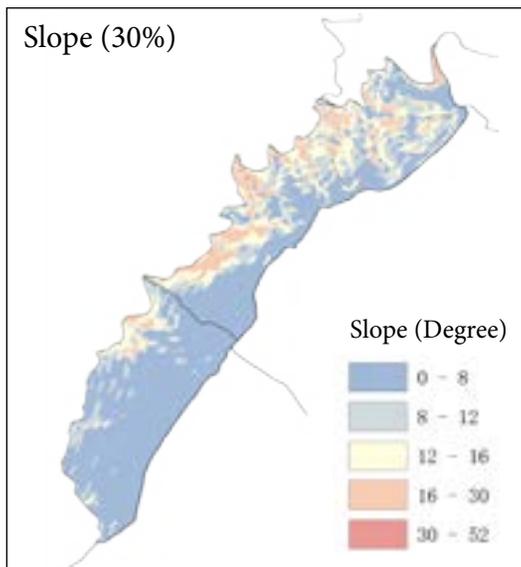
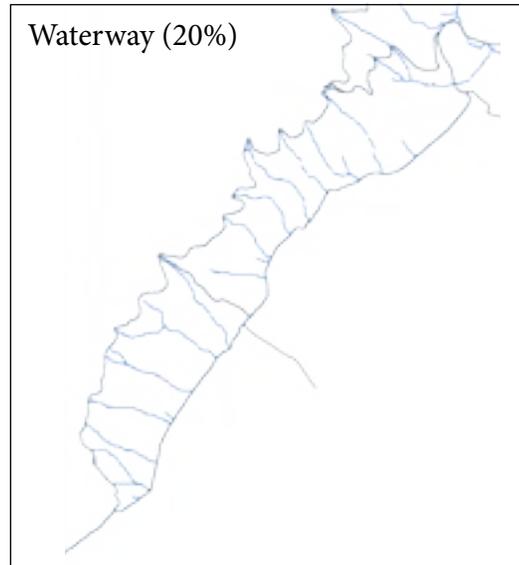
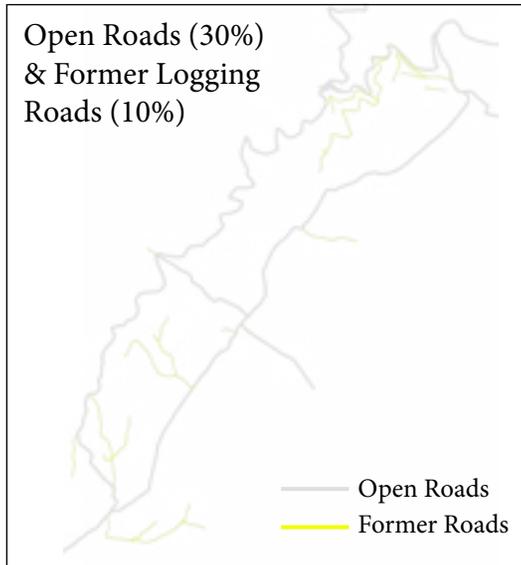


In addition to limited trail option, this area is lack of signs for navigation and interpretation. There are a few roadside signs with minimum amount of directional information but no interpretive Signage at all.



## GIS Suitability Analysis

To avoid the sensitive areas and taking advantage of existing disturbed area, the team used GIS to generate a suitable map for locating new trails. Factors taken into account were slope, waterway, open roads, former logging roads and weed. Slope and waterways represent difficulty for future construction and other factors indicate existing disturbance level. Each factor was assigned a weight based on its importance and the weighted score for each factor is added up to get the final suitability score.



## Guided Tour of Historic Cabin Headquarters

Ana Steffen, the Cultural Coordinator for the preserve provided a guided tour of the Historic Ranch Headquarters. The tour focused on the history of the structures in the district. Context for the buildings was given along with an oral report of some historical accounts of life on the preserve as told by some former residents. Most of these accounts originated during Dunnigan control of the property, but there were also a few representations from the Bond era. These latter stories likely had some variation from actual occurrences as they relied on memory and may have been altered over time. They do, however, provide an insight into life on the preserve. The tour concluded with a discussion of the Thomopson Ridge Fire of 2013 and its lasting impacts on the preserve.



This cabin was painted for Ruby, the Bond housekeeper.



The newer bunkhouse is to used as the Visitor's Center.



Down trees were used to direct water after the fire.



The old cowboy cabin was likely for ranch workers.



the Bond family cabin is currently used as a set for TV.



This cabin was painted for Ruby, the Bond housekeeper.

## Review of Literature and Prior Studies

Review of the literature and previous site studies included books and texts on the social and physical history of the caldera as well as surveys and studies completed on the property. Additional literature reviews were conducted for precedents in trail design and interpretive programming. The Bibliography includes the full list of reviewed literature and studies.

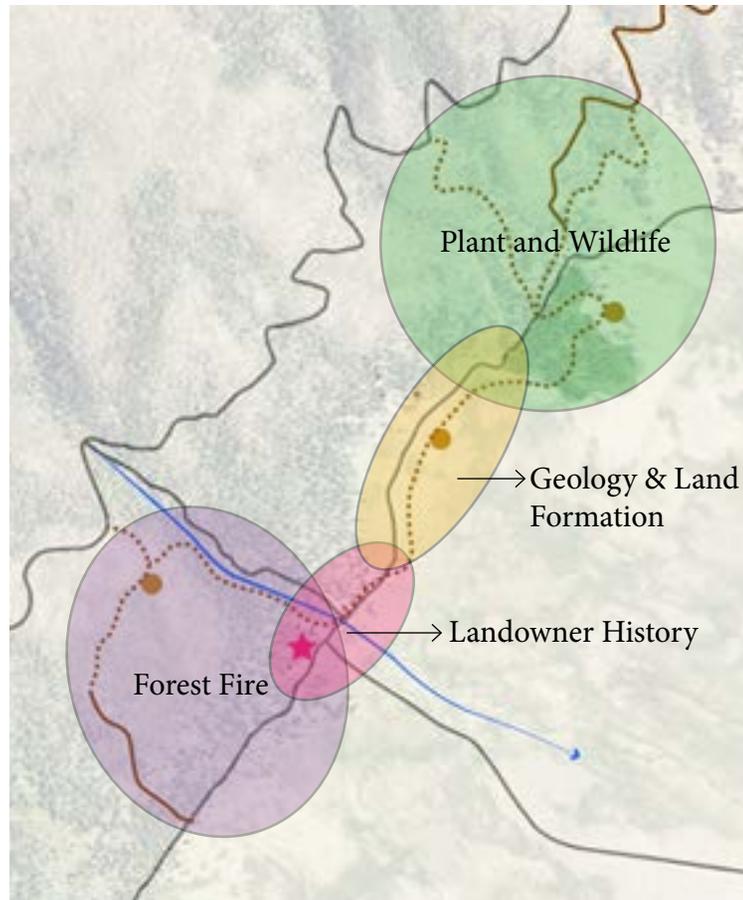
## Take Aways

- Signage System is unclear or non-existent
- Trails are hard to identify
- Interesting history - ownership/ranching and geology/volcanology
- Forest Fire has had a significant impact on the landscape

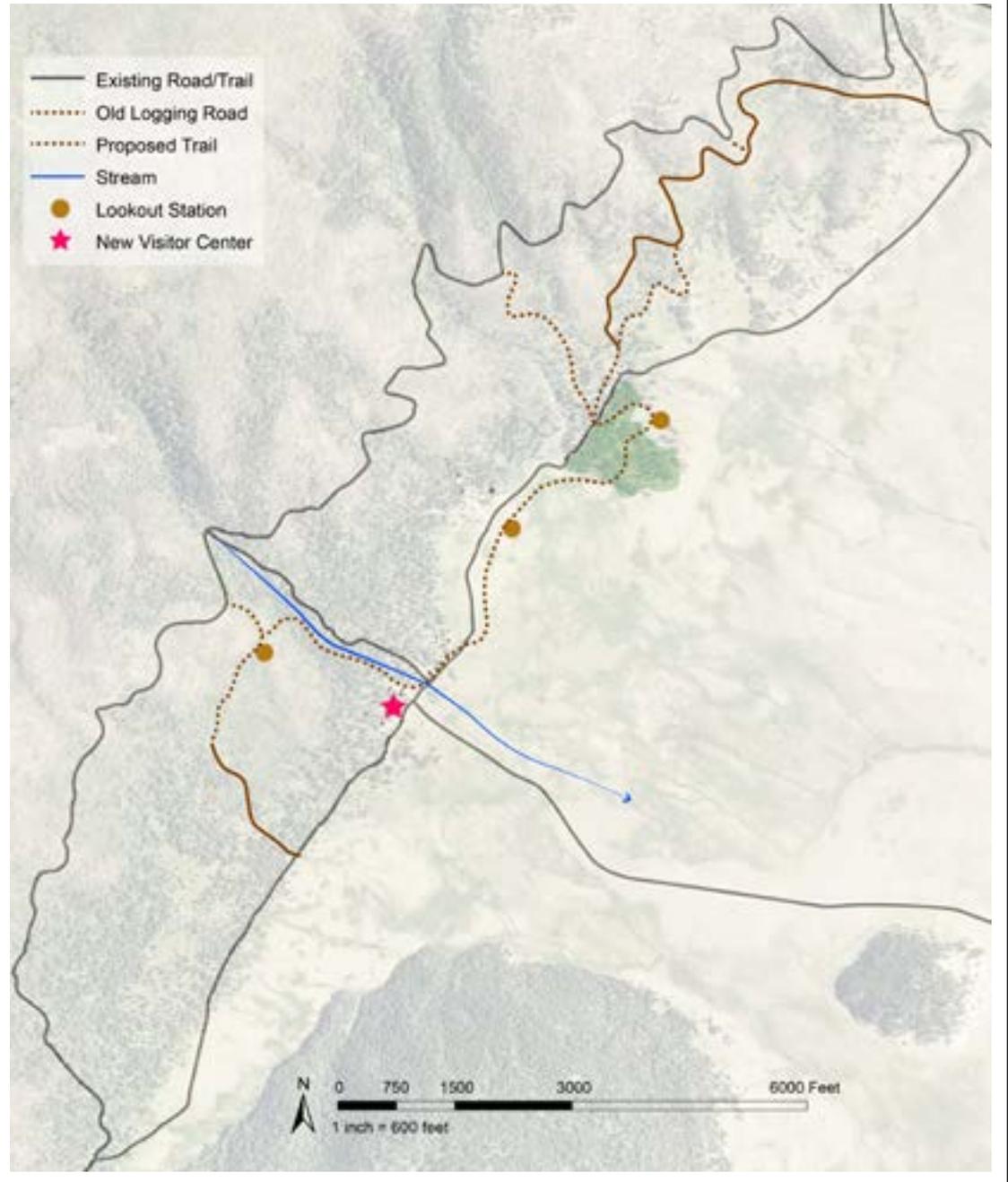
## Cabin District Trail System Design

### Interpretive Themes

The team studied a combination of literature review, semi-structured interviews and one-on-one tours with Preserve rangers specializing in the history of the preserve. From these sources, interpretive themes of Ranching and Landowner History, Forest Fires, Geology and Land Formations, and Plant and Wildlife diversity were selected. Each theme was matched to a section of the Cabin District trails based on the views and experiences that would be best supported in that area.



## Proposed Cabin District Trail System



## Interpretive Themes - Forest Fire

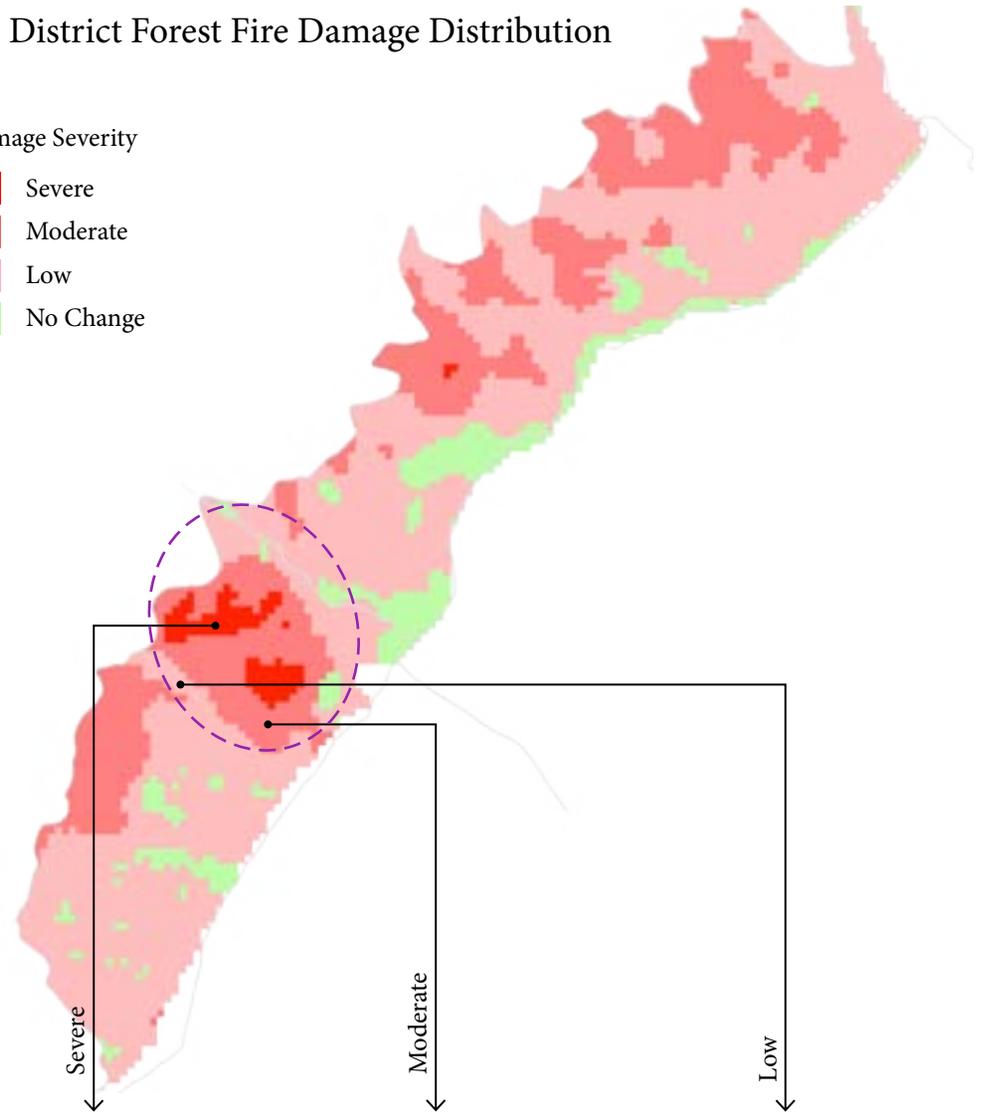
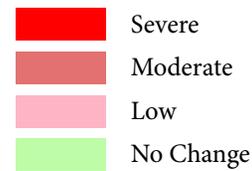
The Cabin District was significantly impacted by the Thompson Ridge Fire of 2013. The fire spread into the caldera from the southwest, burning much of Redondo and threatening the Historic Ranch Headquarters. The fire was fought both on the ground and through aerial tactics. This resulted in patchy intensity of burn areas with some areas experiencing virtually no impact from the fire while others ranged to extreme damage. Saving the Historic Cabin Headquarters was a priority for the Granite Mountain Hotshot ground crew. The team fought relentlessly as the fire was nearly contained then circled back around to once again threaten the historic buildings. The Valles Caldera Historic Ranch Headquarters was one of last victories the crew was able to claim as 19 of its 20 members perished while battling a devastating fire not a month later.

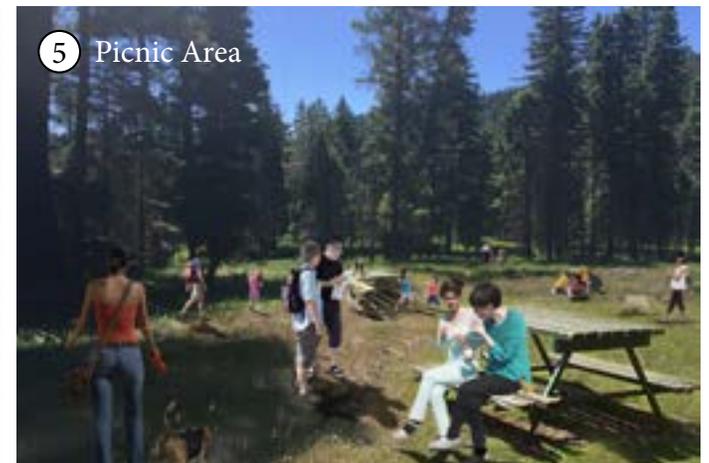
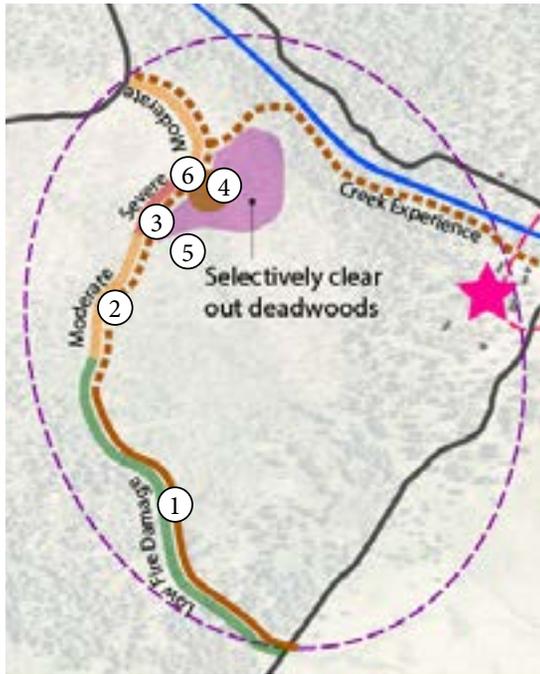
The land of the Cabin District has responded in different ways to the fire. The wet season following the fire was a time of significant erosion on the slopes of Redondo. The plants helping to stabilize the banks were turned to ash that simply flowed with the runoff rather than slowing it for infiltration. New gullies were formed and waterways shifted. Fallen trees were often strategically placed to direct these waters and to catch debris flowing down the mountain. Jersey barriers and sandbag walls were placed to protect the cabins from being washed out.

The forests have also responded in different ways. In the areas experiencing the most intense fires, burned snags remain mostly upright. These charred remnants are beginning to fall, especially during high winds. Grasses and forbs are returning to the ground layer, however seedlings have yet to sprout. In other areas of lesser fire intensity, aspen saplings are dominating the mountainside. Mature Ponderosa pines and a few other conifers can be found. It is only in areas sustaining very little damage from the fire where conifer saplings can be noted.

## Cabin District Forest Fire Damage Distribution

Fire Damage Severity





## Trail Experience - Forest Fire

The Forest Fires theme trails provide visitors with hiking experience at various fire damage area. Interpretive signs along these trails would provide information about forest fire, natural succession, as well as fire restoration.

A picnic area is proposed at a relatively flat and open area. An overlook is proposed with selectively clearing out deadwoods at a severely burnt area.



## Interpretive Themes - Landowner History

Most of the structures in the Caldera are clustered at the eastern base of Redondo, overlooking the Grande Valle in the Historic Ranch Headquarters. The buildings of the Historic Ranch Headquarters date as far back as the Otero period. The Otero Cabin is built in the traditional Spanish stacked room style with the entrance on the northern end. The subsequent buildings were constructed in the Bond era and later in an Anglo style with entrance on the eastern faces. Core aging of the wood materials has been able to help narrow some of the buildings construction dates. Due to discrepancy in some of these date results and oral and written histories claiming building presence, it is likely some of these buildings, such as the commissary, have been replaced. The bunkhouse is slated to become the new Visitor's Center with accompanying universally accessible pathways.

The most recent buildings were constructed under Dunnigan control of the ranch. These buildings were intended in for retreat purposes and catered to the aesthetics of rustic luxury. The A-frame cabins served as private retreats while the lodge was intended as a bachelor haven. The building was featured in Playboy magazine as the ideal bachelor lodge. Modern uses of these buildings may include seasonal staff accommodations and/or restricted use rentals.

All of the private landowners and associations from the original Baca grant to the Dunnigan family used the caldera for livestock. The Baca's ran sheep and harvested hay crop much like their Native American predecessors harvested plants and animals to sustain their families. The Otero family began their occupation of the Valles Caldera as sheepherders for the Baca family and continued to run sheep under their own control. The Bond family prospered greatly from the wool of the sheep until the end of WWII at which time their interest turned more heavily to cattle. Elk were also reintroduce to the caldera for a

resurgence in hunting transitioning into the Dunnigan years. This final family ran cattle and trained racehorses in the caldera, however had great conflict with the logging companies' enacting timbering rights. Cattle ranching continued under the Valles Caldera Trust and by special permit in the National Preserve.

### Historic Ranch Headquarters

The new visitor center has been designated to be built in the historic ranch headquarters. Anticipated to be the most populated area in the future, enhancing visitor amenities at this area is one of the major goals. As the gateway of the preserve and major location for obtaining information, accessibility is also critical to this area.

Proposed visitor amenities include a restroom, a parking lot, a shuttle station, a native plant garden with seating, various resting areas, a paved trail connecting several historic cabins, etc.



# Historic Ranch Headquarters Master Plan

- ① Visitor Center
- ② Restroom
- ③ Native Plant Garden
- ④ Rain Gardens
- ⑤ Shuttle Bus Station
- ⑥ Rain Garden
- ⑦ Rest Pavilion
- ⑧ Otero Cabin
- ⑨ Commissary
- ⑩ Bond Cabin
- ⑪ Ruby's (Housekeeper's) Cabin
- ⑫ Foreman's Cabin
- ⑬ Salt Barn

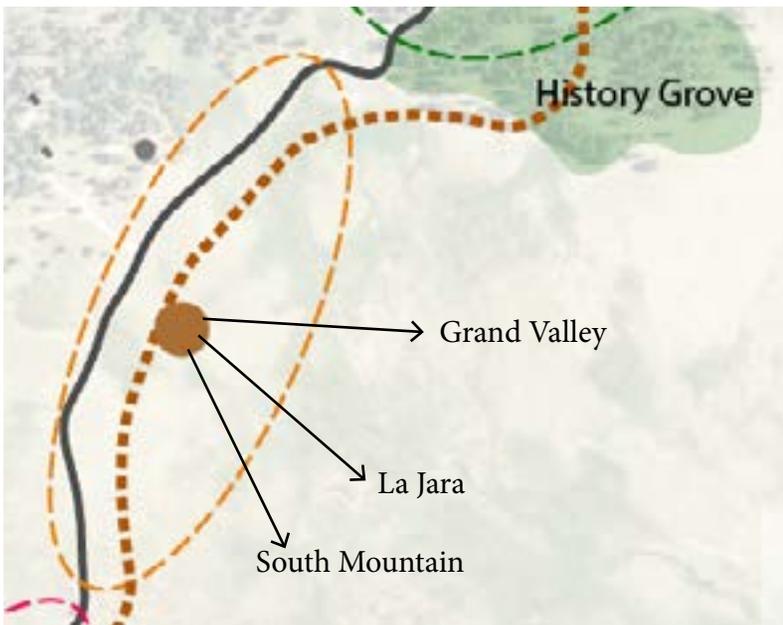


## Reference Images (Picture courtesy of google image)



## Interpretive Themes - Geology & Land Formation

The Caldera has served as an archetype for volcanology and geology as it offers accessible viewing and research opportunities in these fields. Fraser Goff among others have completed extensive study of the caldera's volcanic formation and resulting geology and volcanology texts that help to explain the process of resurgent caldera formation. The valley was formed from the ancient volcano, its explosion and subsequent collapse, the resurgence and eruptions resulting in the interior domes, collecting waters and period as a Mountain lake and draining to current conditions. These studies have resulted in the Caldera becoming the archetype resurgent caldera. The time spent Caldera is also a rare large scale Alpine Prairie landscape.



## Trail Experience - Geology & Land Formation

The trail goes along the periphery of the central prairie, providing an expansive view of the grand valley. La Jara Dome and South Mountain can also be seen easily from this angle.



## Interpretive Themes - Plant & Wildlife

The various landforms of the caldera have resulted in diverse plant and animal communities. The complex ecosystem supports several species of interest, including protected species such as the Jemez Mountain Salamander and the Spotted Owl. Wildlife enthusiasts are able to observe and photograph woodland, grassland and wetland species within short distances.

The History Grove is a prime example of an old growth Ponderosa Pine stand. As this area was not logged, many of these trees are over 100 years old. The sheltered views of the Grand Valle provided by this grove of pines gives visitors a sense of protection and safety.



## Trail Experience - Plant & Wildlife

The peaceful and reverent atmosphere of the towering pines and small woodland creatures adds to the sense of well being within the History Grove. Combined with the expansive views of the Valle Grande wildlife, it is a premier location for wildlife viewing, photography and other artistic pursuits as well as a scenic rest point in the larger Cabin District Trails.



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# Day Use Areas

## La Jara Introduction

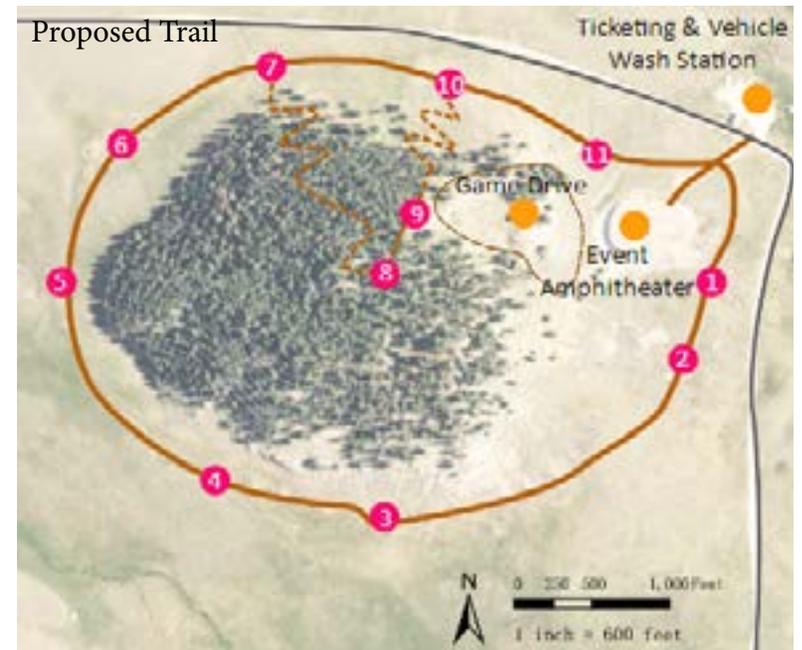
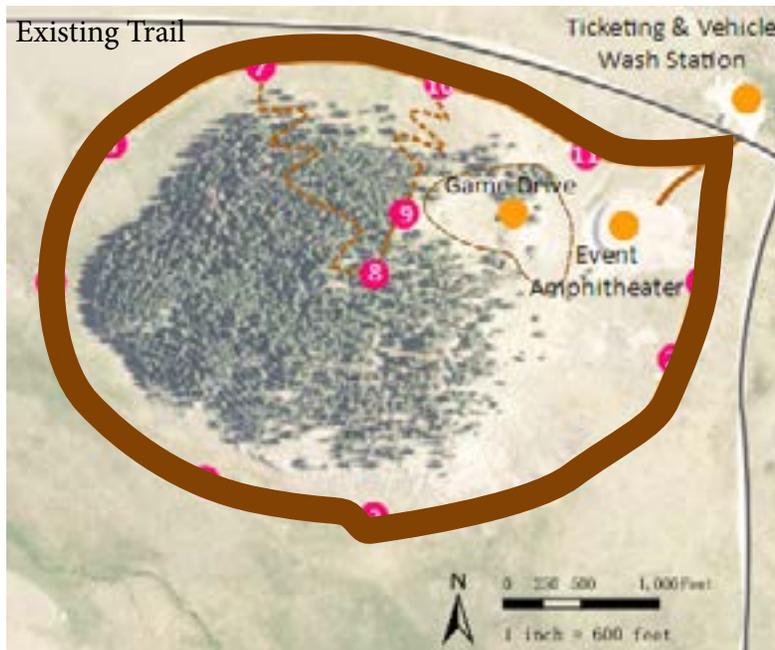
Cerro la Jara serves as an introduction to the preserve as a whole. Not only does its location along the entrance drive from Route 4 make it more apparent to visitors than other features of the preserve, but it offers a variety of experiences that can be found throughout the preserve on a scale visitors can experience during short visits. La Jara is easily accessed.. It has a rich human use history and is home to diverse plant and animal species. With some simple expansions of the current trail system, visitors would be able to discover the juxtaposition of the open vistas of the valleys opposed to the enclosed summit of a reverse treeline peak and view landforms that have drawn human interest for centuries.

### Existing Conditions:

- Perimeter trail, difficult to follow at times
- Lack of access to the interior
- No consideration for sensitive ecological areas

### Design goals:

- Minimize disruption of culturally significant and ecologically sensitive areas
- Maximize representative experience by providing diverse trail experiences
- Providing educational interpretation and directional signage along trails to increase clarity to the trail system.



## Analysis

### On-site

On-site analysis consisted of a guided tour of the La Jara interior with Ranger Anna Steffen as well as a self-guided perimeter trail hike and exploration of the site. These were combined with review of digital data and previous studies to inform the points of interest and trail layouts proposed in the interactive design process.



The guided tour consisted of a day-hike beginning at the existing visitor center. Throughout the tour, Ranger Anna Steffens provided commentary on human history in the caldera from human times to the present. The first stop on the tour was the borrow pit from which gravel was taken for construction of roads through the caldera. The high levels of disturbance were noted. The cut banks remain mostly barren, contributing to the erosion taking place. The center of the borrow pit is a large flat area that is occasionally used for special events and large gatherings. This area has been designated for formal special event use.



The tour continued along the rim of the borrow pit skirting the Game Drive area. The views of the boulder formations along the edges and the boulder wall bisecting the depression offer clues to its archaic use as hunting grounds. Pieces of obsidian and the occasional bone fragment can be identified in the loose gravel on the ground. With the obsidian fragments carried across the Grand Valle from Cerro del Medio by archaic peoples, all three forms of lava stone can be found on La Jara. Because the obsidian was brought to the lava dome, it is an artifact and must not be removed from its place on the Preserve. Making it clear to visitors that collection of obsidian is a crime and halting the theft of these artifacts is one of the biggest problems.

A shady lunch spot overlooking the game drive with the Grand Valle in the distance provided the setting for discussing the ranching history of La Jara and the Game Drive's service as sheep corrals by the Otero and Bond families. From there the tour continued to through the forest to the rocky summit. On the descent, the tour explored topics and evidence of fire, animal inhabitation and diverse plant species.





The self-guided hike along the existing perimeter trail was completed using the current trail guide materials. The topics of interpretation were interesting and contributed to overall understanding of the ecological and historical role of the Preserve. The specific connections to La Jara were not always apparent however. In addition, the trail itself was not clearly marked in places, making it easy to wander off the designated route.



## Remote Site Analysis



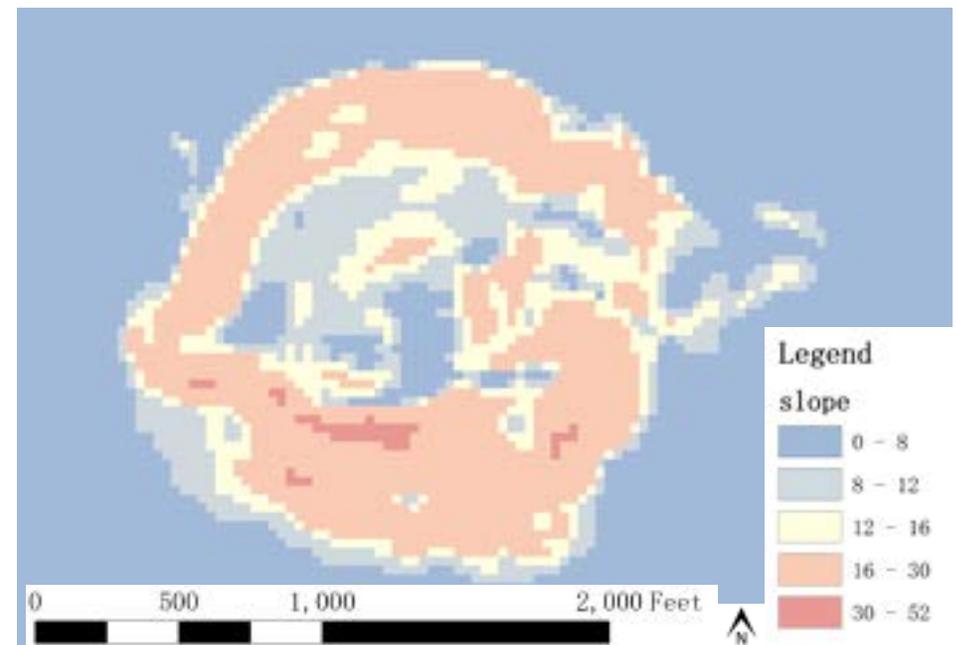
Slope was an important consideration for the trail layout of the La Jara Trail system. The design team strove to provide opportunities trails with varying difficulty levels that would well represent the experiences of the preserve. At the same time the challenge was to maximize accessibility and be sensitive to ecological concerns of erosion.

The slope illustration to the right shows the grade for La Jara. There is a thin ring of 12-16% slope surrounding the entire dome. Just inside that is a wider ring of 16-30% slopes. The summit area flattens out again, but any trail to the summit must go through these areas of higher slope.

The team proposed multiple iterations of a trail layout that would emphasize one concern over another. Trail construction and design techniques to mitigate erosion were considered. Due to the slopes and sensitivity constraints, the interior trail must be a more challenging trek that represents the mountain hiking experience more than the leisurely stroll experienced along the perimeter trail.

Sensitive areas are a major constraint for trail layout in the La Jara trail system. The surface of La Jara has undergone archaeological survey which discovered several sites of cultural significance. These areas are very sensitive to disruption. Construction of a trail in these sites would be detrimental. Traffic from visitors going off trail is a major concern when designing the trails as well.

The trail must be well marked and provide interest to keep people on the trail. Locator information that tells people what distances and difficulty levels to expect will help them to better plan their hikes and reduce off trail occurrences. Frequent reminders using multiple delivery methods stating the expectation to remain on the trail, the damage that is caused to sensitive areas by off trail visitors, and the potential consequences for individuals going off trail should be made clear.



## Review of Literature and Prior Studies

As for the Cabin District trail system, a review of the literature on social and physical history as well as surveys and studies completed in the La Jara region contributed to the context of the site. Precedent studies and applications were studied for trail layout and interpretive programming. The full listing of reviewed literature and studies is found in the Bibliography.

## Precedent Examples

Precedent parks in the region were visited for current industry standard practices in trail layouts and interpretive programming.



Bridge at Bandelier  
National Monument



Woodland Trail at Pictured  
Rocks National Lakeshore



Paved Trail at Pictured  
dRocks National Lakeshore



Interpretive Sign in Isle  
Royal National Park



Boot Cleaning Station at Picture  
Rocks National Lakeshore

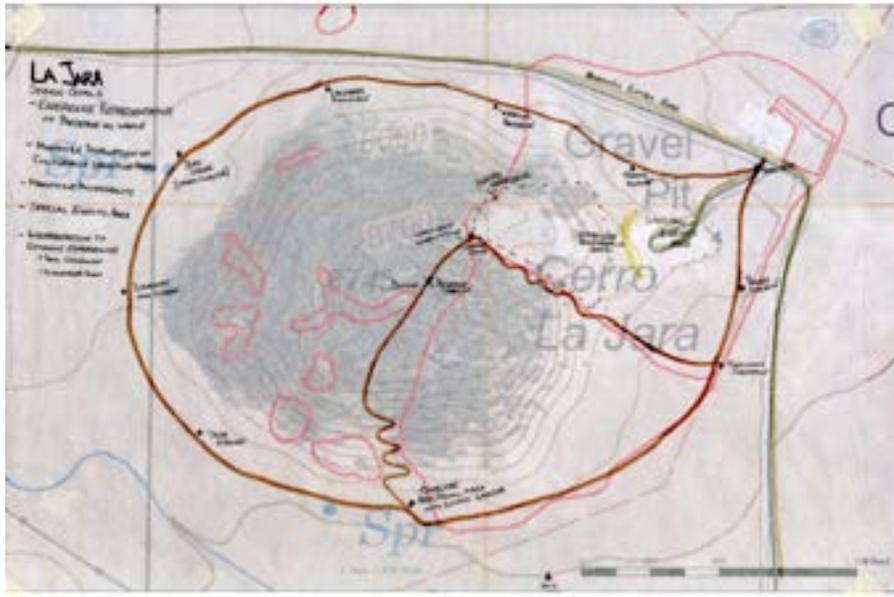
## Take Aways

- Protect Culturally Sensitive Areas from Disturbance
- Protect Artifacts
- Mitigate Erosion
- Provide Diverse Trail Experience
- Provide Experiences Representative of Entire Preserve on Scale of 4-5 hour visit

# La Jara Trail System Design

## Trail Concept Plan

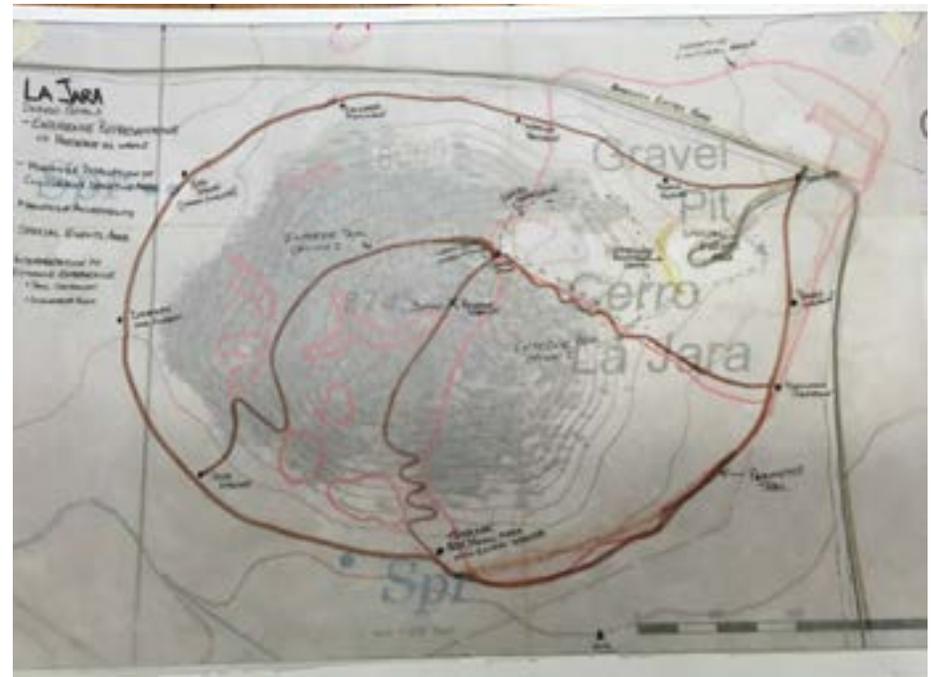
Concept plans were generated through implementation of the iterative design process. In effort to minimize disruption and maximize accessibility, the basic route of the perimeter trail was largely maintained. The proposed trail is wider (4') with a hard surface to allow for wheelchairs or strollers. Above ground storm shelters that resemble the large boulder outcropping on and surrounding La Jara have been placed to provide cover in sudden storm events.



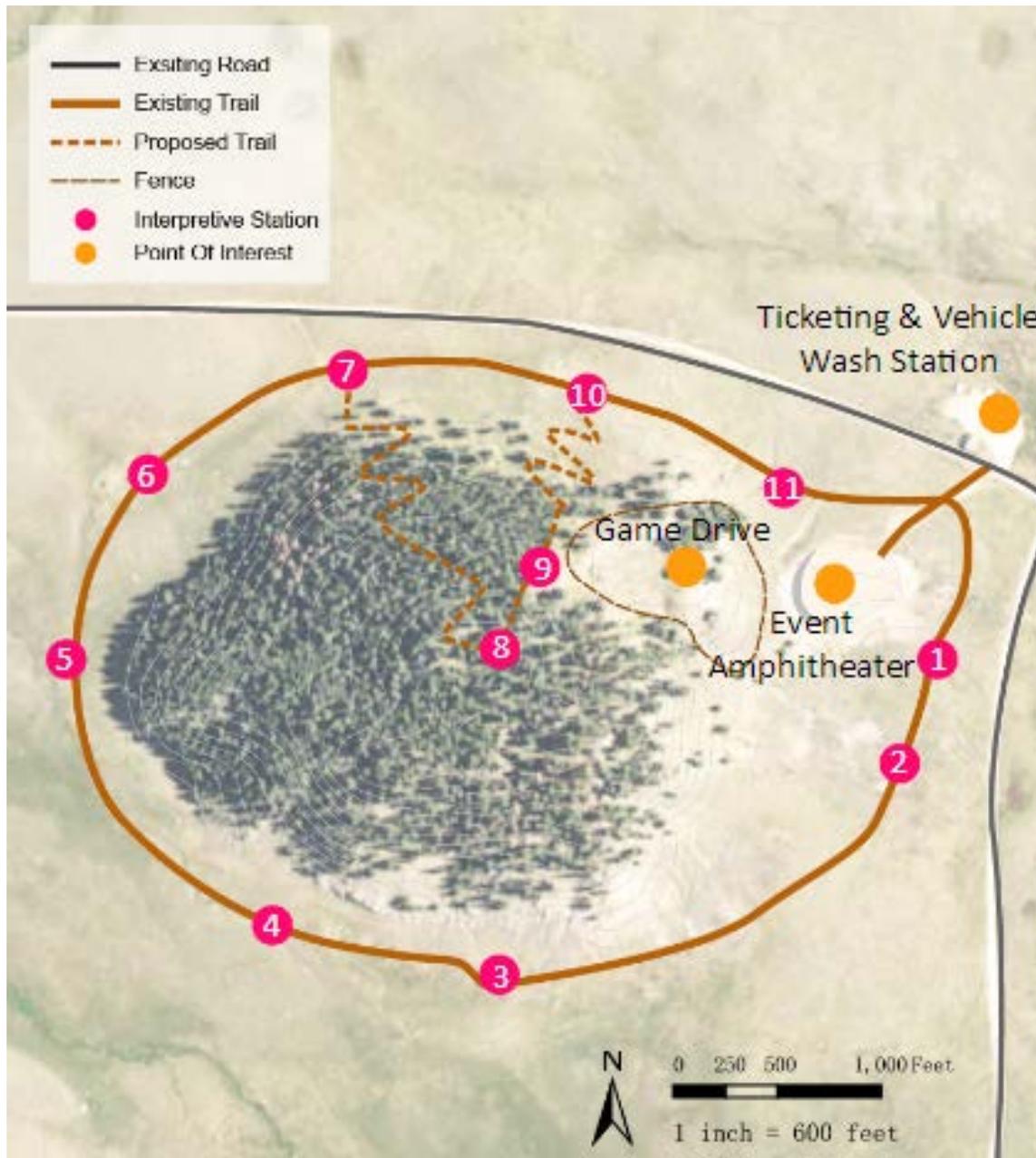
The interior trail had a few different iterations before its final placement. An early proposal cut from the perimeter trail just after the Prairie Dog Town, climbed the dome along the treeline at the rim of the Game Drive and cut along the center of the dome to the Summit. This version then zigzagged to meet the perimeter trail down the rocky cliffs of the southern slopes of La Jara. Using a combination of switchbacks and natural steps, this option would provide the hiker a more vigorous mountain climbing experience while avoiding archaeological dig sites.

A second version of this more vigorous mountain climb concept focused on easy navigation of the trail companion interpretive materials. It also completely avoided culturally sensitive areas, including their boundary lines. This version showed the interior trail splitting from the perimeter trail at the Refuge and Rest picnic and shelter area. It wound its way up the rock slope to the Summit and onto the Game Drive. From there the trail circled back around the summit at a lower elevation and descended in a similar switchback and stair style to meet the perimeter trail again at the Birds of the Caldera point of interest site.

This version minimized intrusion into culturally sensitive areas. It also provided visitors with easily accessed mountain climb experiences that could alleviate some of the pressure to provide access to more remote sites of the preserve with more sensitive cultural and ecological contexts.



## La Jara Trail System Concept



The final concept reflects the client feedback to avoid the more rigorous climbs that would necessitate greater trail distances due to the large amount of switchback trail. This design incorporates the ideas for ease of trail companion navigation by leaving the perimeter trail at the point of interest marker 7 Life Cycle in Action and rejoining at the next perimeter point of interest 10 Alpine Prairie. The Perimeter trail was extended along the northern edge of La Jara to provide a pedestrian pathway that is separate from the entrance road which will accommodate vehicular traffic. Perimeter trail improvements and development of an interior trail is recommended as an initial phase of La Jara Day Use development.

## Interpretation

### Themes

The generation of interpretive themes was informed by the semi-structured interviews with staff. Through coding of these interviews, the design team was able to identify prominent themes for the Day Use area. Additional support for themes and fine tuning of information to present was drawn from the guided tours the design team were given as part of the on-site analysis. The existing trail flip book was also consulted for topics specific to La Jara. The trail companion for the La Jara Trail System addresses the following topics.

- Prairie Dog Town - Ecosystem builders
- Caldera Formation - The volcanology and geology of the caldera
- Elk Calving - The ecology of elk birthing habits
- Refuge and Rest - The history of seeking shelter on La Jara
- Birds of the Caldera - Birds to observe and tracking opportunities
- A Mix of Trees - Diverse tree species, conifer and deciduous on La Jara
- Life Cycle in Action - The ecological role of deadwood and snags
- Reverse Treeline - Why are the alluvial slopes covered in trees while the valleys are open grassland
- Provision and Protection - La Jara has historically provided shelter for humans and animals as well as possibly hunting grounds
- Alpine Prairie - A rare large scale example of an alpine prairie
- Cattle and Sheep Ranching - The use of Valles Caldera to run sheep or cattle

Picnic and Storm Shelter Rest Stop



Game Drive Overlook

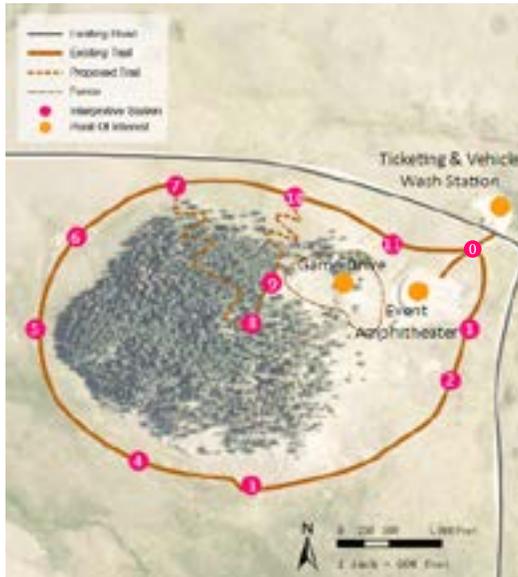


# Trail Companion



The Trail Companion was developed as an interpretive guide for the La Jara Trail System. The team found the existing flipbook very convenient to refer to other interpretation sites along the trail. It was determined this would be extremely beneficial to visitors looking for specific plant or animal species. The companion book could be offered as borrow option like a library book or purchased for visitors to take home as a souvenir. Also by carrying the Trail Companion with them, visitors may be more likely to remember collection of plant, animal or mineral material from the preserve is strictly prohibited. This idea is being implemented in various other parks.

## Trail Experiences



The La Jara trails provide a sample of the experiences available in the preserve. The volcanic mound is a prime example of the meeting of history and modern recreation. There are numerous sites of cultural significance as well as sensitive ecologies. Visitors are able to interact with these places in positive ways. Subtle cues such as fencing as well as more direct postings of expected behavior help to promote sustainable visits to the preserve and may even trigger at home applications.



## Special Events Site Analysis



The Borrow Pit was designated by park management prior to the commencement of this project as a special events area. Due to the high levels of disturbance sustained during road construction, this area is not a concern as a culturally significant area. The unstable cut banks show impacts of erosion and would benefit from stabilization and restoration efforts. The central area of the Borrow Pit is a large flat area that would provide a good stage for performances or large gatherings.

## Precedent Examples

Precedent parks in the region were visited for current industry standard practices in trail layouts and interpretive programming.



Deltona Amphitheater, Deltona

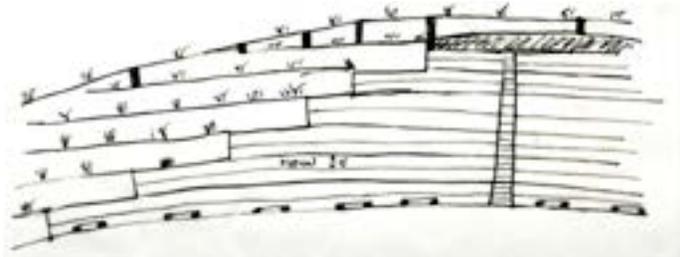


Scott Arboretum amphitheater, Swathmore, PA

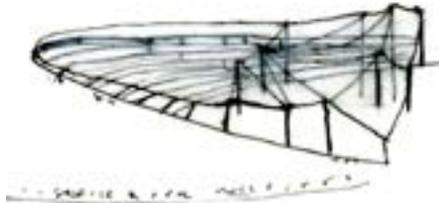
## Special Events Concept Plan

The Borrow Pit on La Jara is easily identified from the entrance road. Parking at the existing visitor center, which we propose be repurposed as a ticketing station and car wash area to minimize the spread of invasive species into the preserve.

Development of the Borrow Pit into a special events amphitheater is recommended for a secondary stage of La Jara Day Use development.



A system of terraces will provide stabilization for the cut banks as well as offer seating opportunities for events. The sketch is an early illustration of the terraced amphitheater concept.



The amphitheater will benefit from a shade structure that can be scale to match the size of the event. The shape of the Borrow Pit banks lend well to parsing out sections for smaller events.

## Borrow Pit Amphitheater Concept



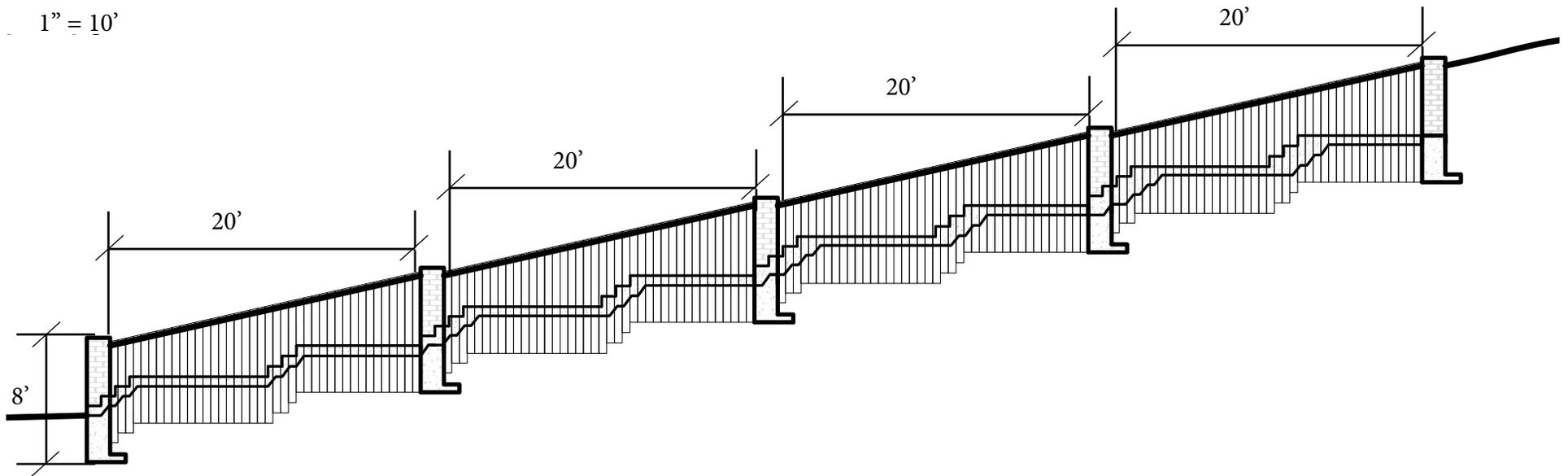
The final design for the Borrow Pit utilizes the previously disturbed area where gravel was taken for road construction. Vegetated terraces along the upper edge of the cut banks extend along the sides of the amphitheater to provide stabilization. These terraces are filled with native plantings but are more heavily geared toward some of the flowering perennials to provide an attractive aesthetic for the event area. The seating area of the amphitheater is designed to be framed with the same rock walls that delineate the vegetated terraces. The seating terraces are half the height and width of the vegetated stabilization terraces. Half log benches can be added for seating or visitors may use the ledges themselves as seatwalls.

A removable shade structure allows the used of the Borrow Pit to be extended to less desirable weather conditions. The ability to take the structure down in the winter or extreme weather prolongs the life of the structure. Informational Kiosks in a gallery style that mimics the Visitor's Center Gallery is fitted with solar panels that can power event lighting or add to the power resources for other areas of the preserve.

## Borrow Pit Details

### Stabilization Terrace Structure

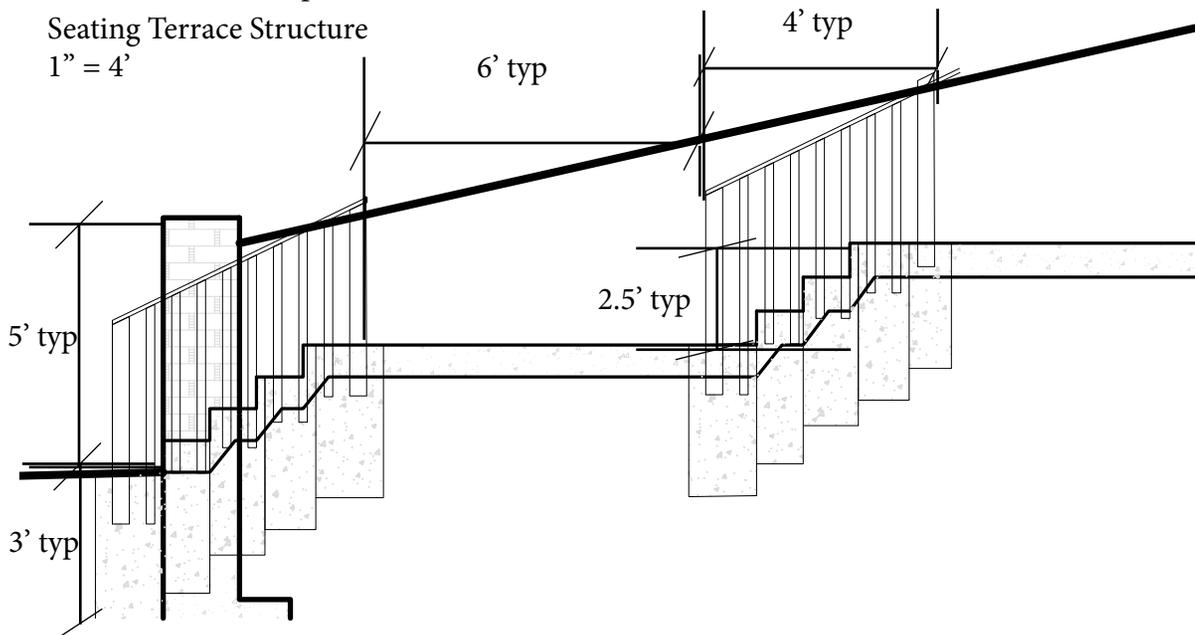
1" = 10'



The terraces are designed to line the unstable cut banks of the borrow pit. This will help to stabilize the bank. The vegetation planted in each terrace level will supplement this bank stabilization as well as provide habitat and aesthetic value to the edges of the amphitheater. These vegetated terraces can also help to infiltrate rain water and runoff from the tensile shade structure. Each stabilization terrace is 20' wide. The front wall of

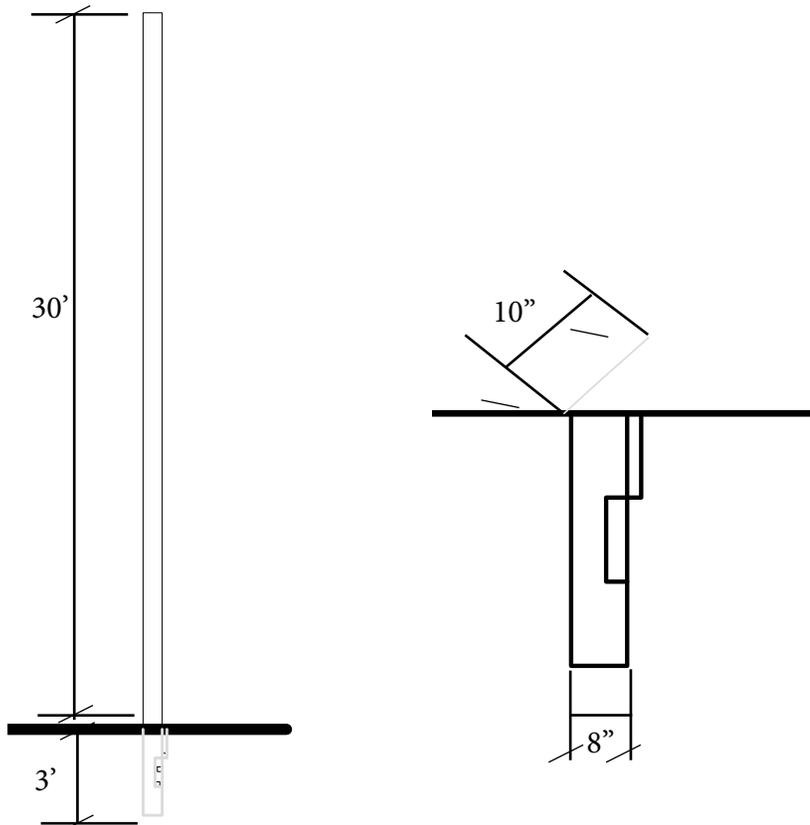
### Seating Terrace Structure

1" = 4'



each level is 5' tall. The foundation extends 3' into the ground to allow for frost. The terrace ends are lined with wooden post walls that extend at minimum 4" above the sloping terrace ground level and 3' into below the seating platform or stairs to combat freeze-thaw heave.

Two seating terraces are created for each stabilization terrace level. The 18" thick terrace walls extend along the seating terraces at a height of 2.5'. Midway between each stabilization terrace wall, an 18" wide by 2.5' tall wall faces the upper seating terrace. The seating terrace and wall facade create cheekwalls for the stairs that supports the hand rails. Steps are 7.5" tall and 1' deep. The hand rail end posts are 4" in diameter with the infill 2" in diameter spacing is 4" on center.

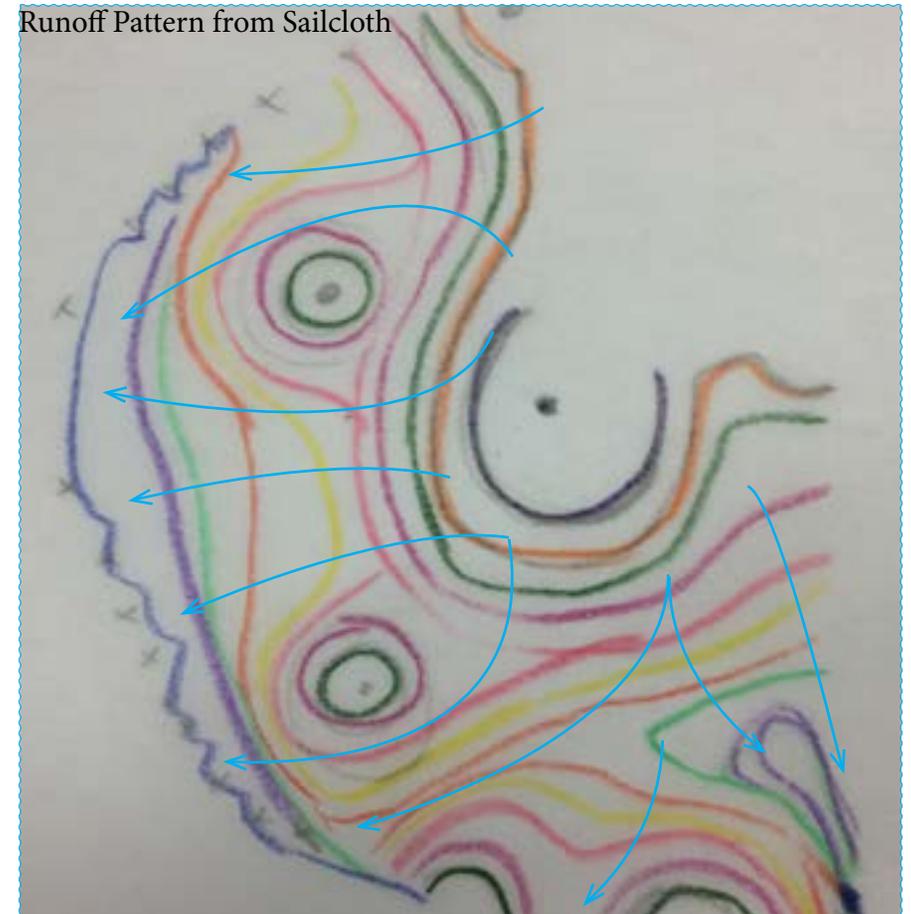


Tensile Shade Support Poles  
1" = 10'

Subterranean Pole Anchor Port  
1" = 4'

The proposed shade structure is to be made of a heavy sail cloth or PVC material to provide shade while also being water repellent. Utilizing a framework of poles and cables, this structure can be removed during winter or when extreme weather is forecasted. The subterranean pole anchors allow the foundation for the poles to be built into the hard surface of the amphitheater base. By capping these anchor ports, the floor of the amphitheater remains smooth and debris is deterred from accumulating in the ports.

The specific design of the shade structure will need to be contracted out to a specialist. The general concept recommended will cover the seating terraces and follow the end lines of the wooden post walls. Support cables will attach to the terrace walls for a secure anchor. Freestanding support poles will provide the points of the sail structure. The shade structure itself is proposed to have multiple sections so the amount of cover can be scaled to the size of the event. Water runoff should be given special attention in the design of this structure. Below is an example of a topographic representation of a shade structure that would direct water into the terraces and prevent pooling on the shade structure itself



## Materials

The use of local materials and construction styles will help the amphitheater to blend into the landscape when not in use. Material ideas were taken from existing structures and furnishings on the Preserve as well as local precedents and new product presentations from trade shows. Native plantings will also improve the ecological functioning of the event area.



Log benches and stone firepit precedent from Redcliff Ascent

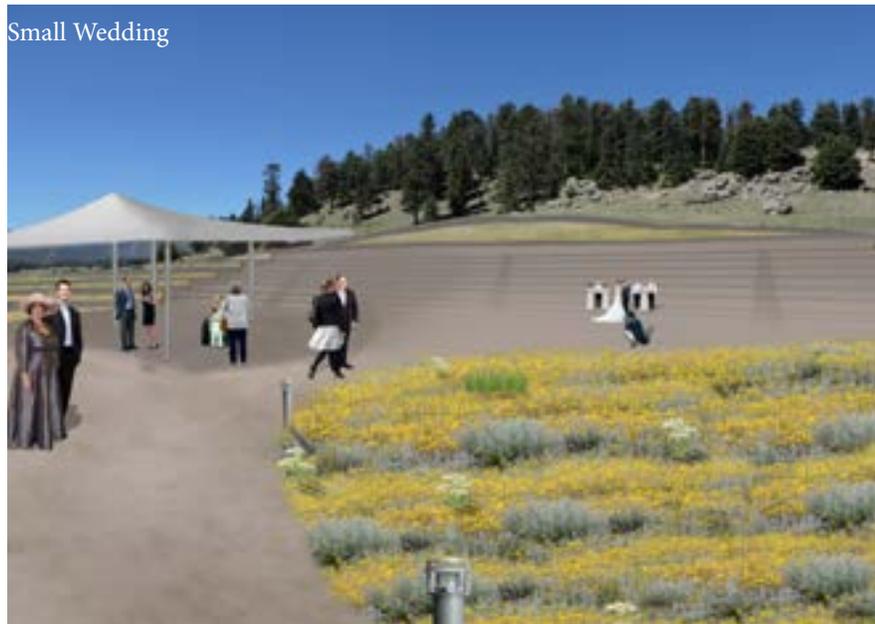


Porous Pavement material from Geotechnology, Inc.



Stepped rock wall of a kiva found at Bandelier National Monument

## Borrow Pit Events



Small Wedding



Public Concert

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# Signage

## Hierarchy

The current Signage system for the preserve is disjointed from years under private ownership and development as a National Trust property. It is also far from comprehensive in the information needed to be provided. Rangers frequently field questions related to where visitors are allowed to be and where restricted areas begin. Even with these questions, visitors often find themselves in areas that are not open to the public due to safety

Entrance Sign



existing

Road Signs



Road Barricades



Trailhead Kiosk/ Gallery Sign



Trailside Locator



Trailside Interpretive Sign



Point of Interest Marker and Trail Companion



A new Signage system that builds off of the existing entrance sign as the top tier of the hierarchy and is consistent throughout the preserve will increase the legibility of the sign system. This will help to alleviate some of the visitor confusion regarding where they are able to go and what they can do. Many of the navigation issues can be solved by providing visitors the tools to solve their own problems. These proposed Signage system could easily be integrated into the digital map application within the preserve. Future development in QR codes and interactive software is recommended.

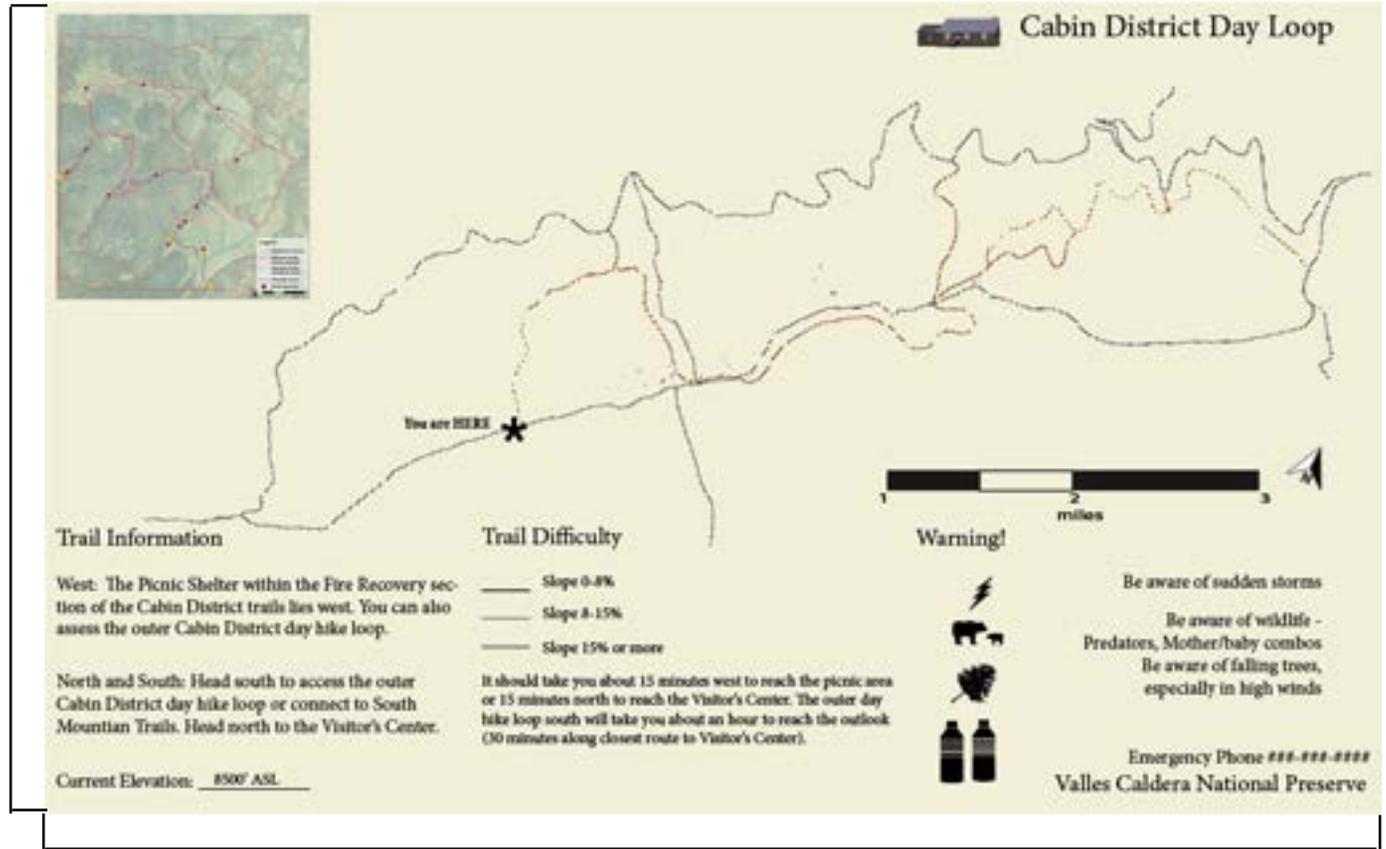
While good Signage is not a foolproof solution, people tend to continue to ask questions that have posted answers, having behavioral expectations posted has been shown to increase compliance with behavioral expectations. This is most effective when the surrounding environment displays compliance with the behavioral norm. For the preserve to accomplish this, signs of disturbance need to be repaired quickly. People can easily be directed to or away from specific areas with clever design such as groomed trails with hard edges, aesthetically appealing fencing, and distinct borders for gathering areas. Informational interviews with established visitor programming corroborate the need to reinforce messages of care with subtle cues and nudges as well as maintaining appearance of compliance with the mandate. Repetition is also a key component of reducing disruption sensitive sites and artifact theft.



# Trailside Locator



7"



8.5"

Trailside fencing and markers designating points of interest or significant areas provide cues on how visitors should behave. These nudges can be very effective in directing visitors' travels throughout the preserve. Established pathways and clear trails are the first step. These are then supported with fences that deter off trail excursions and clearly marked public areas. Trail and point of interest markers help visitors to navigate the preserve while providing them cues as to where to look and areas designated for more

## Informational Signage

Informational Signage falls just under the directional Signage in the sign hierarchy. It can have many similar elements as directional Signage and in many cases may be a combination Signage such as a trailhead sign. The Signage system the team developed for Valles Caldera implements multiple forms of informational Signage. The Interpretive Galleries specified for the new Visitor Center and Borrow Pit follow the model of the Trailhead Kiosk although they may have modified roof structures that incorporate solar panels. Traditional trailside interpretive Signage is recommended for the Cabin District trails. The La Jara interpretive program utilizes a system of Point of interest markers and a Trail Companion to provide interpretive material visitors are able to carry with them.

## Trailside Interpretive Sign



24"

36"

### Cabin District Day Trails Tree Wellness Checks



Fire is a natural part of the Alpine Prairie landscape of the caldera. Many of the flowering plants and grasses of the valley depend on fire to replenish nutrients in the soil and keep competing plants in check. The reverse treeline patterns of the caldera has been maintained over centuries by periodic fires that limit tree recruitment in the valley.

**Trees also get sick, can be injured, and change their growing habits to respond to their environment.**



When you picture a tree, what does it look like? Does the trunk grow straight out of the ground? Is it roughly symmetrical? Just like people, trees come in all shapes and sizes. They grow in different patterns depending on the resources they have available and the type of tree species they are. These Ponderosa Pines have the same general shape. However, some of the trees have grown at an angle to better catch sunlight. Others have more branches on one side than another. Trees close together may be smaller than trees the same age growing on their own.

#### Monitoring Tree Health



The blackened wood under the split bark of the scar in this tree is evidence of fire damage. The tree was able to heal itself and continued to add growth in the years since the fire. Scientists are able to study the fire as well as growth patterns for this tree by taking a "live Cookie" section from the trunk. Tree Cookies from dead trees may be a slice of the whole trunk while samples from living trees could be small core samples.

Some damage like animal browse, where something is eating the leaves and outer bark of the tree or lightning strikes are easy to identify. It can be more difficult to find the cause of damage from insects, or lack of light, water, or nutrients.

The size of large landscapes like forests can make it challenging to care for them. Protecting trees from damage is a nearly impossible task. For the majority of the twentieth century, the United States concentrated on keeping fire out of the forest. We now know this has prevented some plants from germinating while allowing other plants to spread to areas they had previously occupied. This new forest undergrowth has often become a rich fuel source for wildfires that quickly get out of control.

It is fairly easy to water or feed your garden a fertilizer treatment. Watering an entire forest is not so easy to do. Damage from insects and animals is also difficult to control in large forests.




**Valles Caldera National Preserve**

## **Materials**

Road signs should be wooden posts that reflect the Ponderosa Pines that are iconic for the Preserve. Barricades should have log posts and stainless steel chains with wooden sign faces. Trailside sign posts and kiosk framing shall be of the same material as the road sign posts. Signboards may be a particle board laminate or a fiberglass material. The kiosk roof shall either be green sheet metal or solar panels. Trailside locators shall also be wooden with wooden sign faces so the locator information may be burned or carved directly into the face, allowing for a textural aspect that may aid visually impaired. The Point of interest markers shall be 4” iron fence posts with the corresponding number laser cut from the post so the number cannot be defaced. Unifying materials will help to make the signs more easily identified throughout the preserve.

## **Templates**

Trailside sign templates can be found in Appendix C. The title bars of these signs can be expanded to 6” wide and used as title bars for the Trailhead/ Gallery Kiosks. Corresponding solid footers should measure 3” in width.

## **Concluding Remarks**

Valles Caldera National Preserve is a prime recreational area. The rich history combines with a vibrant plant and animal life that offers an abundance of opportunities for visitors to connect with the preserve. As a national park property, the preserve is able to protect some significant cultural and ecological resources on the preserve. The proposed trail and signage system for the Day Use Area can be expanded into other areas of the property for a unified system that is easy for visitors to navigate.

The iterative design process implemented in this project revealed many different ideas for the direction of development in Valles Caldera National Preserve. The concepts generated here are ideas, inspirations and rough plans for phasing. Further refinement of these ideas can generate specific construction details and associated costs. It is difficult to address cost issues without specific information and timing as the price of some materials and labor carries greatly. These estimates are more accurate at a later stage in the design implementation process.



## Appendix A

### **Semi-Structured Interview**

- What do you feel are the identifying features of Valles Caldera National Preserve?
- What features would you like to see highlighted with the trail system and interpretive programming?
- What features/areas do you feel require protection?
- What park or nature area would you identify as a model park?
- What are exemplary features of that park or other parks you would like to see incorporated at Valles Caldera Preserve?
- Can you describe/is there an average Valles Caldera Preserve visitor?
- Are there common issues or problems on the preserve?
- What are frequent questions visitors ask?
- How well do you feel the current trail system...
  - Directs circulation
  - Prevents disturbance of sensitive areas
  - Ensures visitor safety
  - Highlights site features
- How efficient do you feel the current Signage system is in...
  - Providing location direction to visitors
  - Providing behavioral direction to visitors
  - Conveying information about the preserve

## Appendix A

### **Semi-Structured Interview**

- What would you change?
- What is the current maintenance regime?
- What maintenance projects or tasks would you address if you had unlimited funding?
- What style and materials would you like to see in the preserve trail system?
- What conservation practices seem to be successful?
- What conservation practices may benefit from review or updating

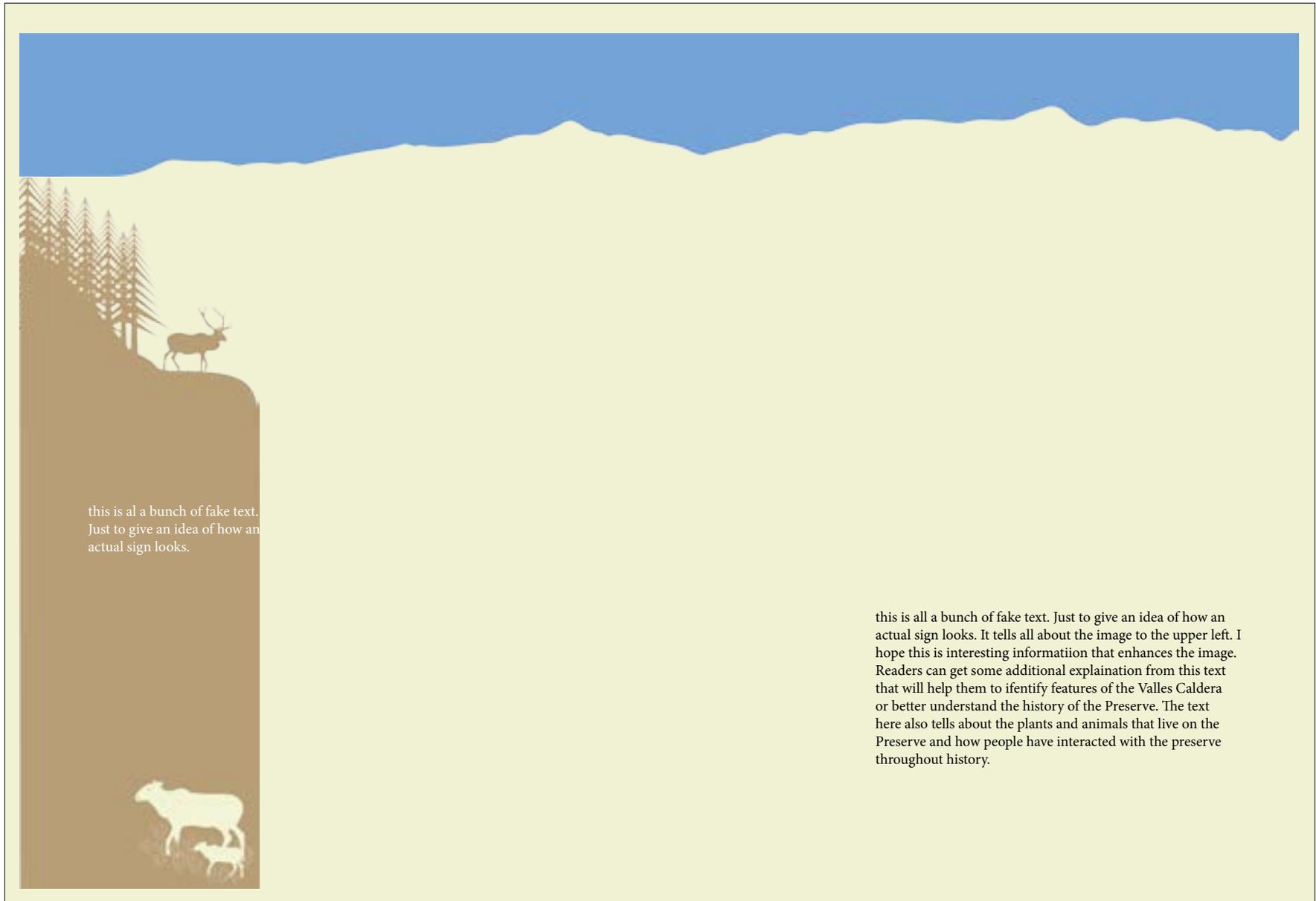
Appendix B

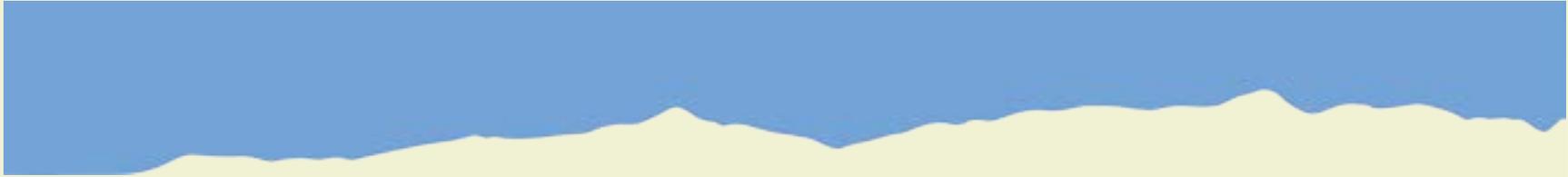
**Semi-Structured Interview Coding Results**

Theme	Bundle	Code
Physical Conditions	Land Formation	Valles Grande; Volcanic/Geologic History, High altitude Prairie, reversed tree line Domes; facture ring; closed basin/lake bank; island geology; Washout due to fire
	Plant Life	Invasive plants (cheat grass, daisy, thistles), plant species (70-75 grasses, 27 sedges, forbs, trees);forest management (prescribed burn, forest thinning); Species are endangered due to climate change; Logging, fire, aspen carving
	Animal Life	Elks; Prairie dogs, Birds; grazing & Browsing; no large animals
	Climate	Climate features (frost pocket, temperature drops down to freezing point); climate change
Attractive Features	Activity Attraction Feature	Rustic camping (South Mountain to Banco Bonito); Hiking Trails; Snowshoeing (south mountain); Pei-friend Area
	Social Attraction Feature	Prehistory Story; Hollywood; Human use history; Ranching history; Archaeological Sites/Artifacts; Obsidian;
	Experience	Peace; human scale (La Jara compared to the whole preserve); Wildness; Changing Landscape
	Physical Attraction Feature	Geology (land formation); Artifacts (Obsidian, pottery); Animal and plant life
	Design Idea	Vehicle wash station; Walking tour in ranch headquarters; Parking (50-100); Paved entry road; La Jara borrow for special events; Road network reduction
Users and Park Management	Barrier (Navigation & Physical)	Poor Signage; No locator map; Direction to specific sites; Access information; Distinguishing trail; Dust on the roads;
	Demographic	Retirees (fishing); Mountain bikers; 75-250 visitors/day
	Use Conflict	Guided tour is limited; too populated by human; Grazing; Artifacts collection; exploitation of the land
	Management	Trail erosion; unhealthy forest due to fire suppression; Resiliency in restoration

## Appendix C

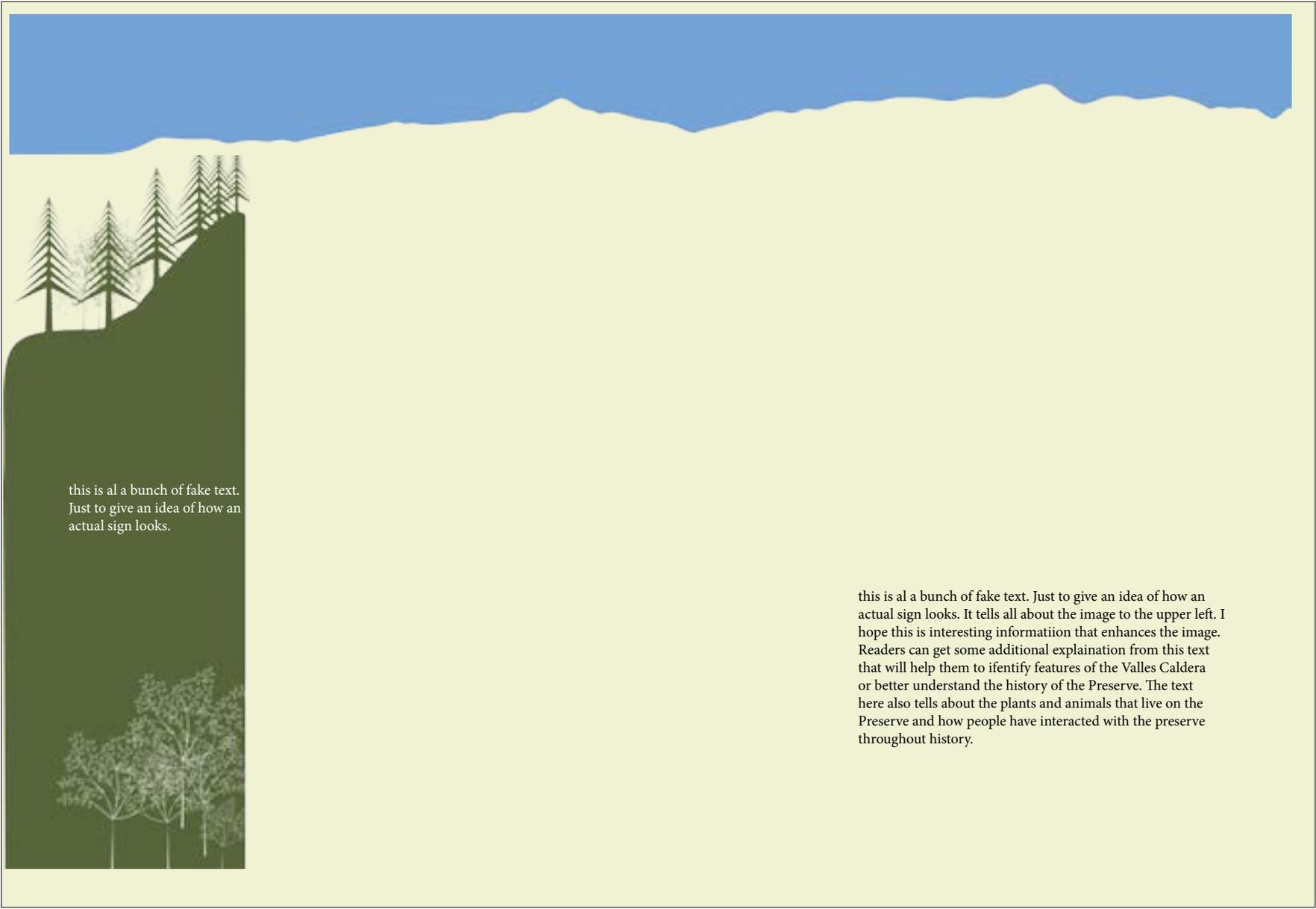
### Sign Templates





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hope this is interesting informatiion that enhances the image.  
Readers can get some additional explanation from this text  
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or better understand the history of the Preserve. The text  
here also tells about the plants and animals that live on the  
Preserve and how people have interacted with the preserve  
throughout history.



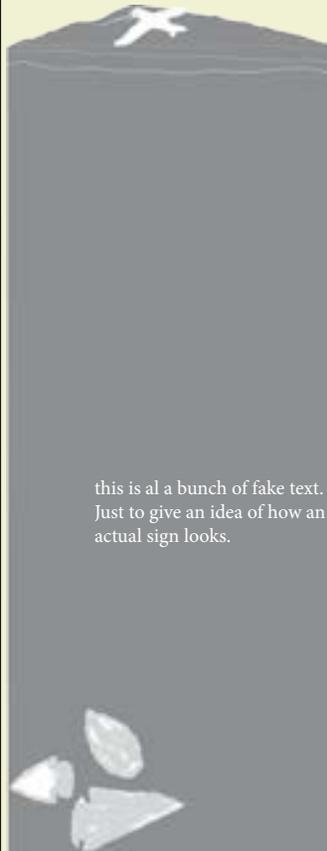
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