

The background features a series of wavy, concentric lines that curve from the top left towards the bottom right. The lines are colored in a gradient: light blue on the left, transitioning through teal and green in the middle, and ending in red on the right. The text is overlaid on the left side of these lines.

ELEVATING LANDFORM AESTHETIC AND USE

SENIOR PROJECT OF MIRANDA GAUSS

I want to thank Patsy Owens, Cory Parker, David de la Peña, and Yutaka Okano for advising and challenging me throughout this project. With their support, I investigated further, making the project far more thorough than if I had done it alone. I greatly appreciate all the Vacaville staff's help, particularly Jo-Anmarie Ricasata and Fred Buderl. Also, special thanks to Haven Kiers and her knowledge of plants. Thank you to Department of Human Ecology faculty who helped me grow as a designer these past three years. I am grateful for my classmates - my family given to me by this department - who helped me grow as a person. And finally, an immense thank you to my lifelong family - Mom, Dad, and Allison.

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Landform design is a unique element of the landscape architecture field. It gets people's attention and gives a definite idea of a landscape architect's abilities to shape the earth. Although landforms are interesting and give a clear definition of what landscape architecture can be, so many projects refrain from using them. Much of the time, we do not consider how to utilize the third dimension by vastly raising or lowering the earth to create a more dynamic space.

This discrepancy leads to the question, "How can landforms, particularly sculpture-like landforms, be utilized more to solve design problems while providing an engaging space for people?" I specifically mention sculpture-

like landforms because much of the time when landscape architects do earthmoving, they try to make it look "natural". Hiding work under this "natural" coating contradicts the landscape architecture profession's goal of making their work known. Why should we try to make something look natural when it isn't? How does making it look natural to the point that it seems untouched help the landscape architecture field? Land artists are primarily the designers of artificial-looking landforms but landscape architects are capable of this work more so because of their technical knowledge of slope and drainage. Landform design is so fascinating because it melds art and engineering, the natural and artificial.

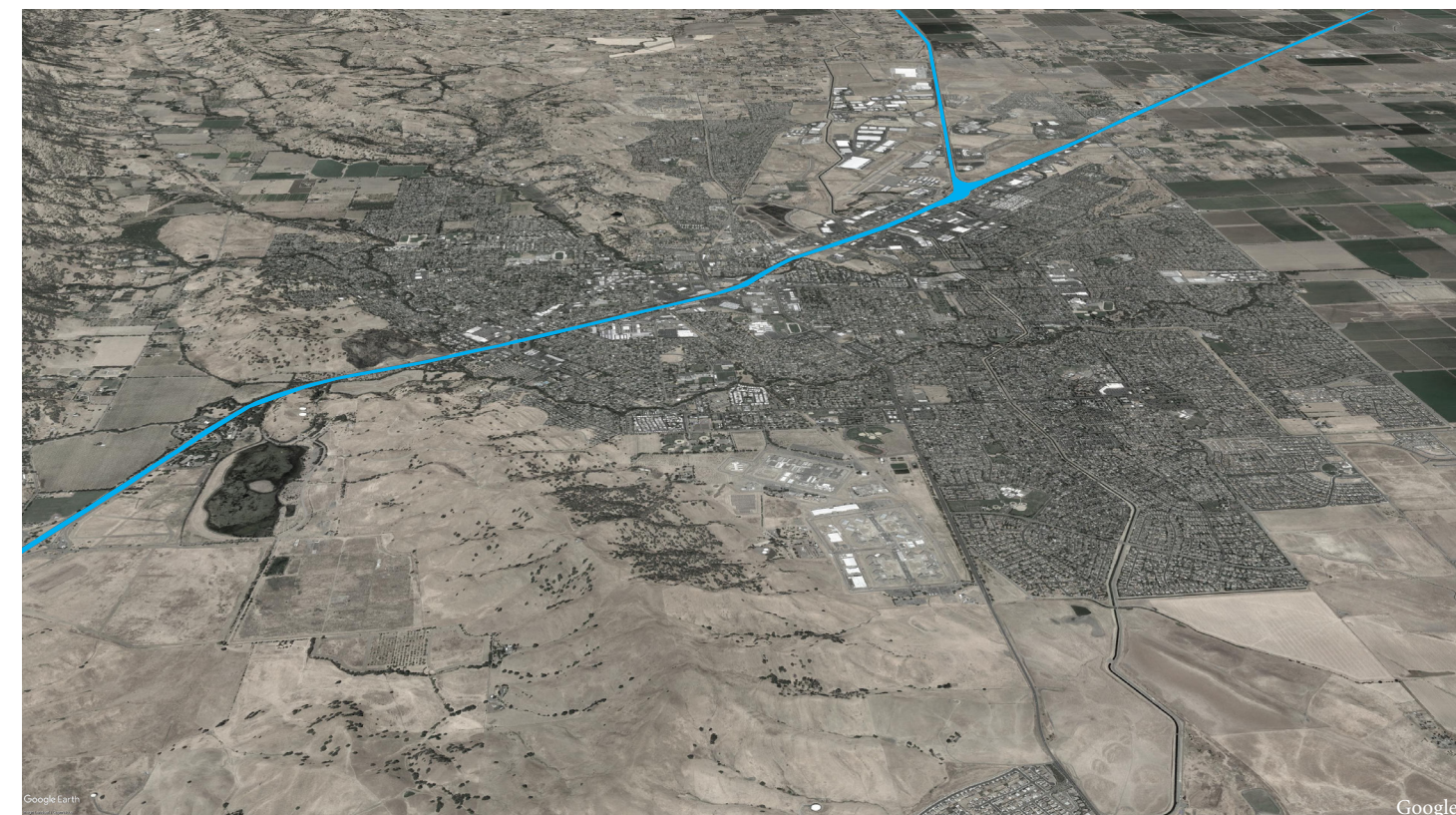


My senior project is based in Vacaville and I expressed my intent to design sculptural landforms to the city staff. They encouraged me to look at sites adjacent to the interstates running through their city for a gateway design that could better represent the character of Vacaville to commuters.

Due to Interstates 80 and 505, around 120,000 vehicles pass through Vacaville each day (City, 1999). The commuters only see what is visible from the freeways and assume that what they see represents all of Vacaville. The freeway corridor also affects what Vacaville citizens think of their city so it is important that this area reflects the proud and positive character of their city. Driving along the freeway, chain stores and restaurants are what commuters primarily see. Without investigating further, drivers assume

that the rest of Vacaville is lacking character as well. Most of the residential and open spaces are hidden behind this commercial space, hiding what makes the city unique.

The City of Vacaville is aware of this problem and is looking for gateway elements that can be implemented along the freeways to tell commuters the character of the city. The gateway plan “involves identifying the City effectively, directing visitors to key uses, making key entrances more attractive, improving screening unattractive areas, and ensuring that new uses meet appropriate design standards” (City, 1999). Vacaville’s intention for the gateway design is to create a “unique and memorable visual experience” (City, 1999) for those passing through the city on the 505 and 80 Interstates.



Most sculptural landforms are designed for the pedestrian. The viewer can move at the pace they prefer and move around the form as they choose. But this project supplied unique opportunities to design for a different kind of viewer; the kind of viewer moving 65, or more, miles an hour. Their path of travel is defined and limited. Their line of vision follows this path of travel with very little time to look away. Every driver's experience is so alike that the design can

focus on these short, controlled interactions. For the most part, the viewer's experience can be manipulated by the designer.

The goals of this project are to:

1. Learn about the process of landform design
2. Solve challenges of sites through landform design
3. Convey Vacaville's identity using sculptural landforms





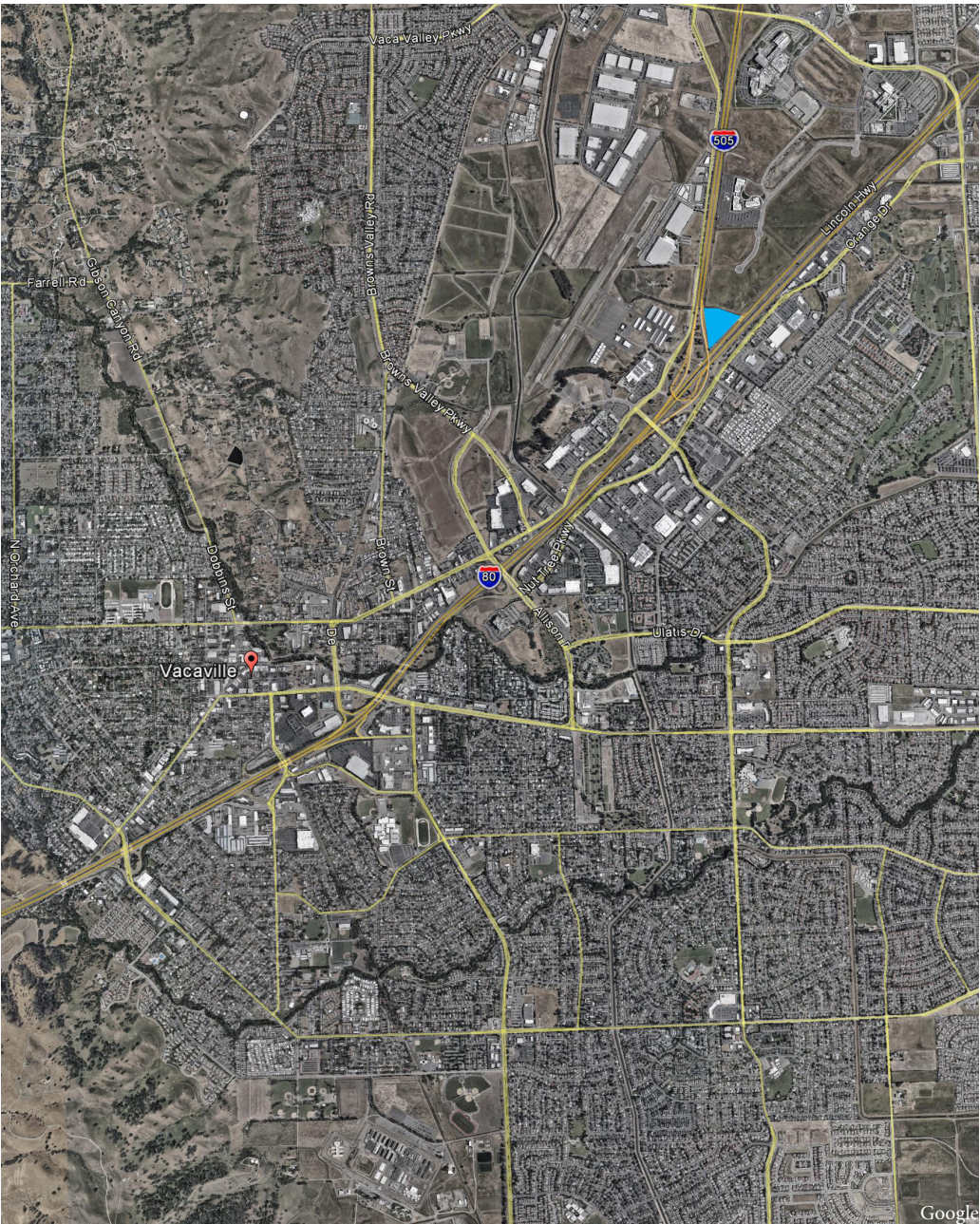
ANALYSIS

PHYSICAL CHARACTERISTICS

Where Interstates 505 and 80 merge, there is a vacant lot that sits in the crevice between the interstates. Enveloping most of the site's perimeter, the freeways allow the site to be seen, making it an ideal space for a landmark. This little island between the two freeways has been severed from the city by its lack of accessibility, which is likely why developers have left it untouched.

Although the site is located around many large developments, it has been untouched except for the freeways carved around it. West of the 505 Interstate are primarily industrial sites like

the Nut Tree Airport and the Southern Pacific Railroad. To the east of the 80 Interstate are sites more for the public including general commercial, Leisure Town residential development, and the closed Green Tree Golf Course. Other than the golf course, there is no nearby land that has been deemed open space. The site and north of it are zoned as Business Park and are still in the process of being developed. Just north of the site, a church was recently built and further north is Genentech and Kaiser Permanente Vacaville Medical Center, two large corporations.



When walking through the site, I found many surprises. I was amazed to see how untouched the site appeared to be. The vegetation was high, at least half my height. The diversity in plants was astonishing with masses of the same species creating patterns in the landscape. The drainage ditch moving through broke these patterns, providing a change that enriched the ecology of the site. The ditch had a steady stream of water that moved below the interstates which is a reminder of this site's connection to the city even though the roads around it make it feel removed. It also provided habitat for turtles. This site was overgrown, messy, and unnoticed. All of which made this site striking. It was a stark contrast to the maintained, finely-engineered roadways wrapping around it. My experience at the site left me with a desire to keep some of its current traits like large masses of unmaintained plants and better utilizing the water running through the site.

Although the site felt secluded with these anonymous cars moving around its border, it was interesting how sounds infiltrated into the site. The sound of cars was a constant invader in this landscape, a reminder that this “untouched” landscape is surrounded by disruption. Occasionally a plane would fly overhead after taking off from the airport to the west. Their engines would whirl loudly, muting the passing cars. These sounds were inescapable. However, some softer sounds had to be looked for underneath these inescapable ones. You could hear birds chirping to each other, water moving through the ditch, and the grasses hitting each other, a side effect of the wind. As bare as the site appeared to be, there were changing factors that made the site more complex.



IMAGE MAPPING



ANALYSIS



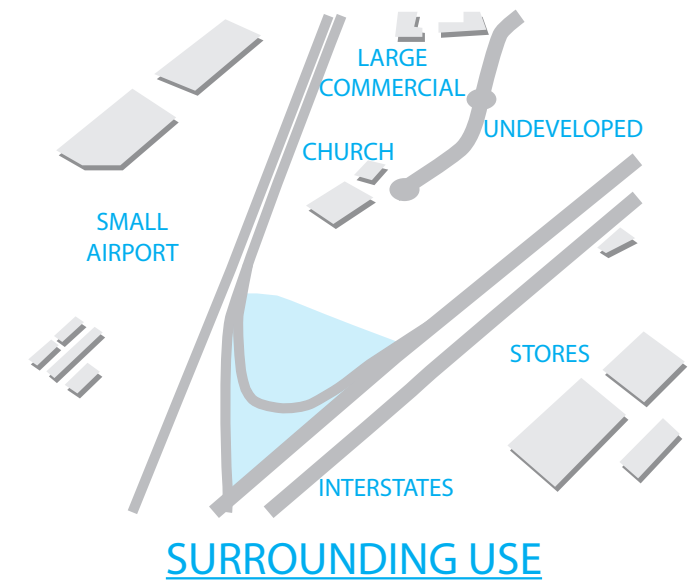
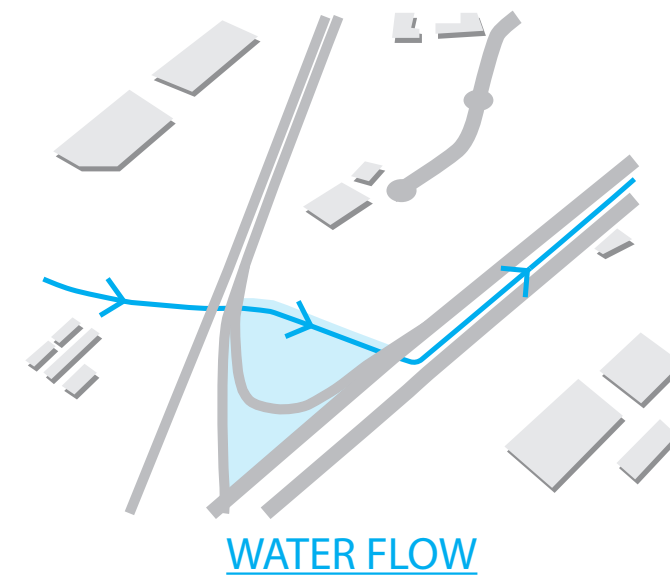
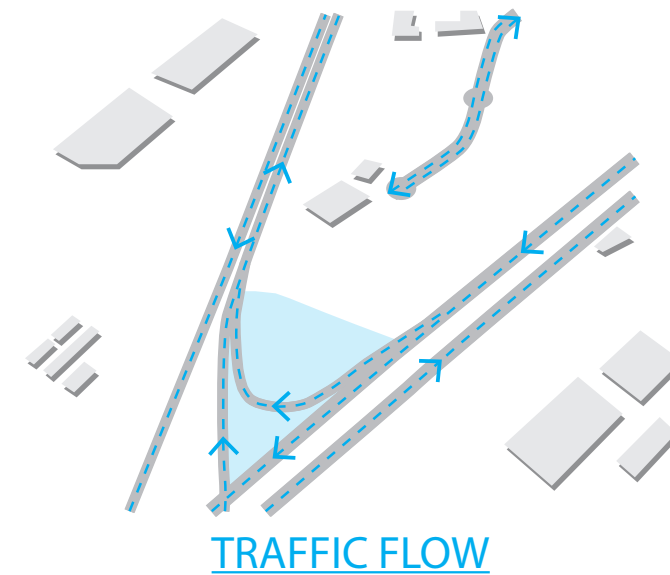
The topography north of the West 80 to North 505 interchange is bowl-like with a steep decline at the edges of the interstates. However, the East 80 to North 505 interchange on the southern edge of the site has land rising up to support the bridge. The interior of the site is relatively flat with this plane-like look because of the overgrown vegetation. The only exception is the drainage ditch cutting through the northern edge. Once again the cut is deep and abrupt. All these manmade topographic alterations are utilitarian to help with drainage or structural support. I was inspired to see how these could be better utilized for function as well as aesthetics.

When driving along the interstates, many of these small details are not noticeable. The dip in topography between the road and site is minimal when moving across the landscape so quickly. The sounds of the site cannot be heard. All the plant diversity cannot be differentiated;

they are just blurs of vegetation. Moving so quickly produces the challenge of making changes in the landscape that are big enough to notice. What are drivers able to identify?

I originally considered designing this project for drivers and pedestrians. The drivers would see this massive landform sculpture while pedestrians would move through the sculpture itself, having a heightened sensory experience. Unfortunately, there are few reasons to have a park at this site. There are only businesses here; not the kind of audience looking for a park. People would have to drive to go to a park here and who is going to do that? For a park to be useful to a community, it should probably be within that community instead of some destination point outside of it. Because of this, I scrapped the idea of a park and focused on how a driver's visual experience of this site could tell the story of the Vacaville community.

SITE INVENTORY



SITE BOUNDARY

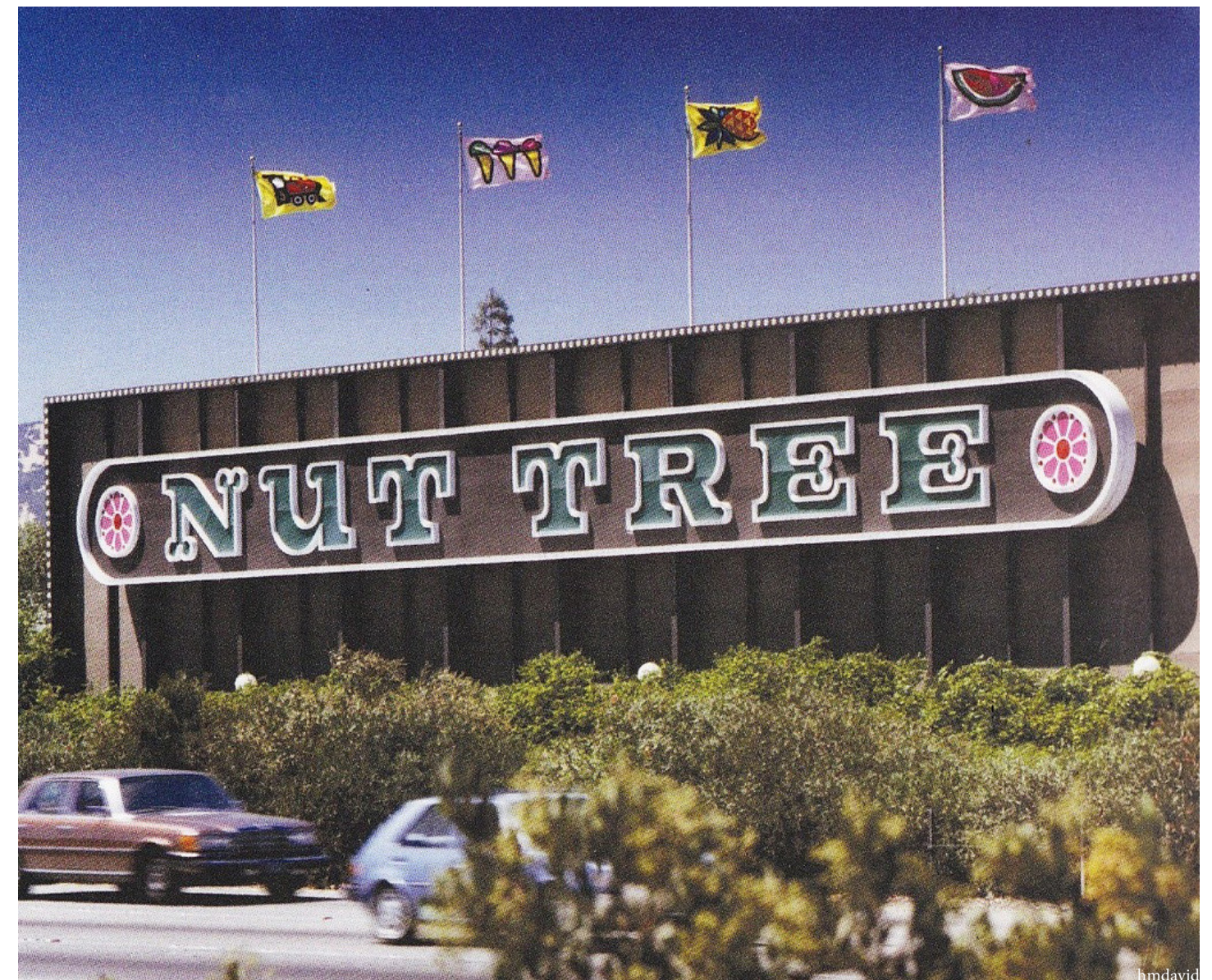
COMMUNITY CHARACTER

Vacaville has an intriguing topography compared to other cities in the valley. On the western boundary of the city, there are mountains covering the horizon, serving as a scenic backdrop. To the east is relatively flat land used for farming, creating a distinct contrast from one side of Vacaville to the other. Within the city there are fragments of hills strewn about, acting as a gradient between the two extremes. There are also a number of creeks running through the city as a side effect of the topography as well as a remnant of Vacaville's previous life as farming community.

Vacaville's rich soil allowed a successful agriculture industry to permeate, which Vacaville owes much of its history and growth from. This industry was the catalyst to a number of developments. The refrigerated freight train was invented for Vacaville's produce to be shipped more widespread. It also led to the start of The Nut Tree, a small roadside fruit stand that expanded into a popular rest stop with many shops along Route 40, now Interstate 80.



Jennvacal



hmdavid


The highway system played a large role in the growth of Vacaville. Because of Route 40's proximity to the city, lots of tourists stopped to enjoy the food and entertainment Nut Tree offered. With the construction of Interstate 80 and 505, Vacaville was a convenient city to live in because it was between the major destination points of San Francisco and Sacramento. With people working in these larger cities but wanting to live in smaller nearby cities, Vacaville's residential growth increased drastically. These interstates also get a high amount of people passing through Vacaville, making it ideal for shops along the road to entice drivers into stopping and shopping.

Vacaville is primarily known for its commercialized impression along the interstates. This roadside spending began with Nut Tree, a shopping area influenced by Vacaville character. When commuting became more common, the Premium Outlets and other chain stores moved in. These stores were not created for Vacaville residents but for the commuters within the region instead. These commercialized stores do not hold any of Vacaville's history in their image and could be placed anywhere. Because of this, the freeway corridors seem separate from Vacaville and keep commuters from wandering too far from the interstates.




While the Vacaville known today was influenced by many events in its past, I was curious how people see Vacaville now. Much of the city's history was not obvious to me without research so it is likely that most people are not aware of what made Vacaville what it is. How does the average Vacaville resident see their city? What do they think makes the city unique? What gives it character?

I sought to answer these questions by conducting a questionnaire. I needed to reach as many people as I could because I was looking for a large, diverse group to give a complete understanding of how Vacaville is viewed by everyone. Because of this, I made an online survey and posted it to multiple Vacaville-related Facebook pages as well as Twitter. Within two weeks, I had received 226 responses that revealed some expected answers as well as some unexpected.

**Visit Vacaville** shared your post.
April 24 at 10:01am · 🌐

If you have a few minutes, a UC Davis student would love to hear your thoughts on Vacaville!

**Miranda Gauss** · Visit Vacaville
April 24 at 9:48am · 🌐

Hello everyone! As a UC Davis landscape architecture student, I am working on a project involving how Vacaville is perceived by its residents and visitors. I have made a survey to find out what makes Vacaville unique and how the city's character can be better represented in order to have a stronger sense of community. The survey takes about 5 minutes to complete and will be open until Sunday (4/30) at noon. The following link will take you to the survey on Google Forms. Thank you.

What Gives Vacaville Character?

This questionnaire is for a student project involving how Vacaville is perceived by its residents and visitors. As a UC Davis landscape architecture student, I am interested in what makes Vacaville unique and how the city's character can be better represented in order to have a stronger sense of community. The following questions are about Vacaville and the people who are connected to the city. You may skip any questions you do not wish to answer. Thank you for your time.

Are you a Vacaville resident?

☐ Yes

☐ No

If so, how long have you lived in Vacaville?

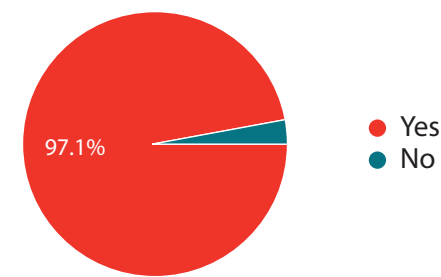
☐ 1-5 years

☐ 6-10 years

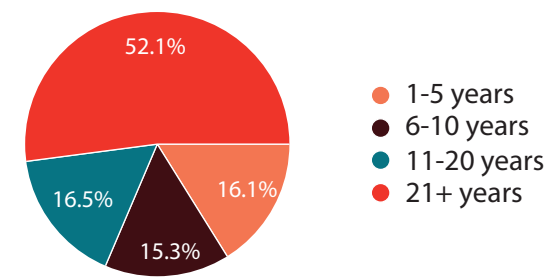
☐ 11-20 years

SURVEY ANALYSIS

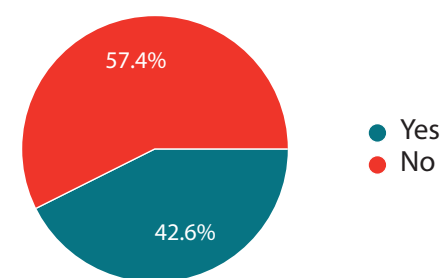
Are you a Vacaville resident?



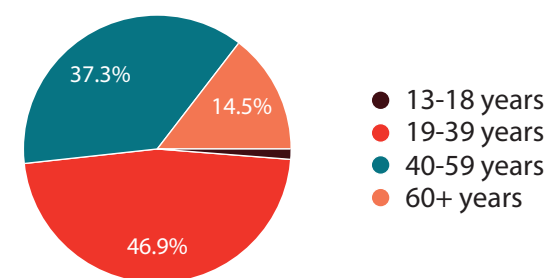
How long have you lived in Vacaville?



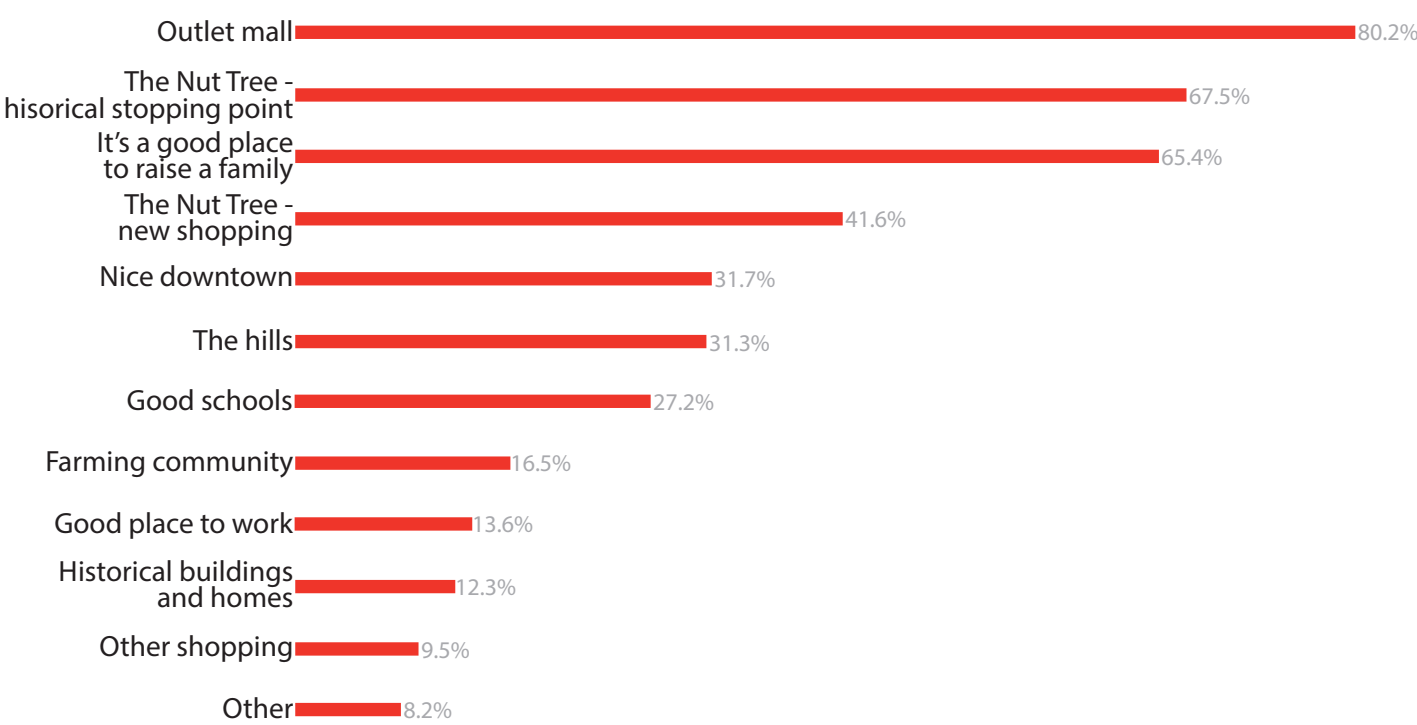
Do you work in Vacaville?



How old are you?



What do you think Vacaville is known for? (select all that apply)



Based on the data, most responses were from young adults who lived in Vacaville for most of their lives. Unsurprisingly, they thought Vacaville was mostly known for its shopping including the Premium Outlets and The Nut Tree. People also thought that Vacaville, to a lesser extent, was known for its hills and nice downtown. It was surprising so few thought farming community was something the city was known for. Although not much farming happens there today, it was a big part of Vacaville's past.

When describing Vacaville in their own words, responders said it was “family friendly” and is a “city with a small town feel”. There is a strong sense of community and a focus on family. This can be validated by all the Vacaville community events held like Food Truck Mania, Fiesta Days, and Friday Night Music. A surprising description I read about Vacaville a couple of times was comfortable. This would probably not be a common word you would use to describe a city. This appreciation of their city felt unique and intrigued me.



DESIGN PROCESS

VACAVILLE INFLUENCE

The community feedback from the survey narrowed down what elements should influence the design. For instance, it felt important to utilize softer forms to reflect the comforting and welcoming atmosphere of Vacaville, a common theme in the responses. During the design process I also focused on the idea of community, Vacaville's hills, the city's agricultural background, and the moving components on site. I attempted to distill these elements down to parties, or a central concept, to get a clearer understanding of what I wanted to show.

Beginning with the idea of community, I struggled to find a symbol for such an ambiguous word. It often deals with a group having something in common. For this instance, it is that they all live in Vacaville. I eventually came to the concept of people from different paths, the things that make them different, coming

together because of what they have in common. Inspired by Vacaville's existing hills, I wanted to incorporate a piece of these natural landmarks. The hills all appear to be pushed together creating this overlapping look with crevices and lumps that create interesting shapes and shadows. Although many of the survey responders did not mention the city's agricultural past, a few people who had lived in Vacaville for decades commented on how agriculture made Vacaville what it is today. I decided to incorporate repetition into the design to represent farming. This artificiality would serve as an interesting contrast to the randomness of the existing hills. The moving components on site, including the direction of cars and water flow, also informed the movement of the landforms. The result of my perceptions on these subjects can be seen in the parties I drew to the right.



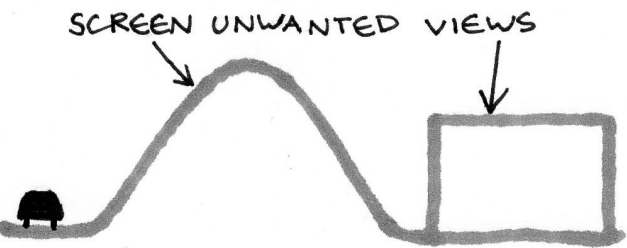
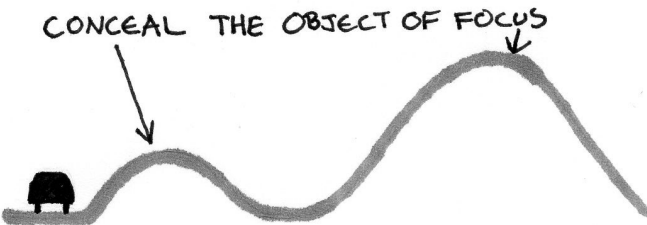
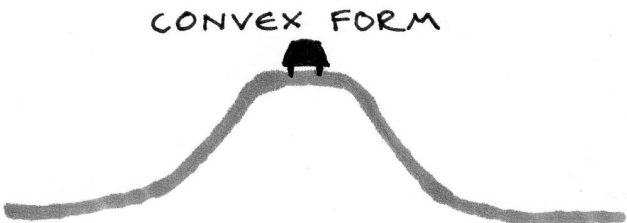
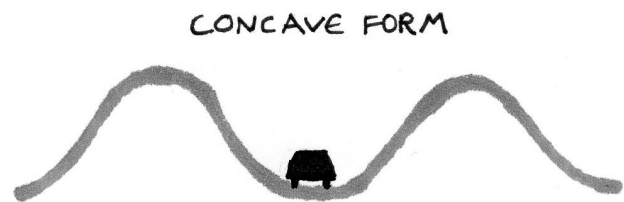
RESEARCH INFLUENCE

When researching the topic of artificial landforms, I found precedents and literature that pertained to this project. The following references are just the three most influential for this design out of numerous others found.

Sawtooth Ramps by Patricia Leighton is situated along a major east-west route in Bathgate, Scotland. Sponsored by Motorola's nearby plant, the seven ramps are 35 feet high and stretch 1,000 feet in Pyramids Business Park. This work had a strong effect on the community, becoming a landmark that gave identity. In fact, its pyramidal shape led to the name of Pyramids Business Park (Sawtooth, n.d.). This precedent inspired me to think about how the perception of a landform changes when moving around it. Sawtooth Ramps is also a reminder that large, simple forms can have a strong presence along a roadway. Forms that are small with slight nuances cannot be read because the viewer is moving too fast.

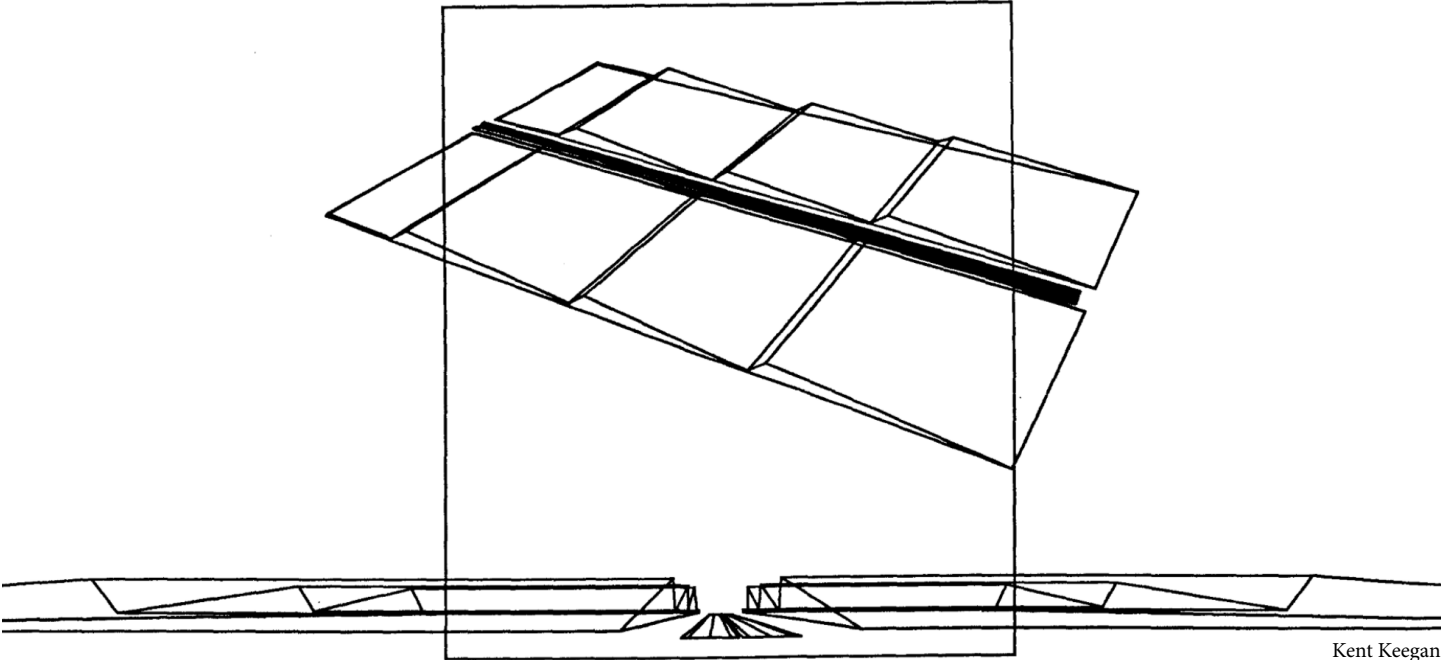
Basic Elements of Landscape Architectural Design by Norman Booth provides design

guidelines for a number of facets in landscape architectural design, specifically the significance of landforms. The writer is a landscape architect and has taught landscape architectural design for decades. Different types of landforms including level, convex, concave, ridge, and valley landforms are described by their characteristics and people's perception of them (Booth, 1983). The book also explains how landforms can be used to affect microclimate, control views, influence movement, and define spaces. It covers the psychology of landforms such as a concave landform. It "produces a feeling of seclusion, isolation, refuge, confinement, privacy, and to some extent protection from the surrounding environment" (Booth, 1983). Being in a concave landform draws your attention to the center or the ground, creating a focus. Booth also explains how convex landforms create a feeling of "reverence and respect" (Booth, 1983) because you are looking up to it rather than looking down. Information on people's perceptions about landforms led to thoughts on how I can change the driver's perception about the design depending on where they are in reference to it.



“The Integration of the Highway and Landform” describes the national interstate highway system as a system that focuses on efficiency over aesthetics (Keegan, 1988). Kent Mitchell Keegan, Associate Professor of Architecture at the University of Wisconsin, explains how aesthetics can aid in the safety and efficiency of the highway system (Keegan, 1988). While many forms of design were discussed such as vegetation and walls, I was most interested in the effect that landform can have on the driver. The following describes the potential of interrupting the landscape with landform. “The motion of the landscape relative to the motion of the automobile is deceiving. While the distant view remains static, the automobile is moving at a

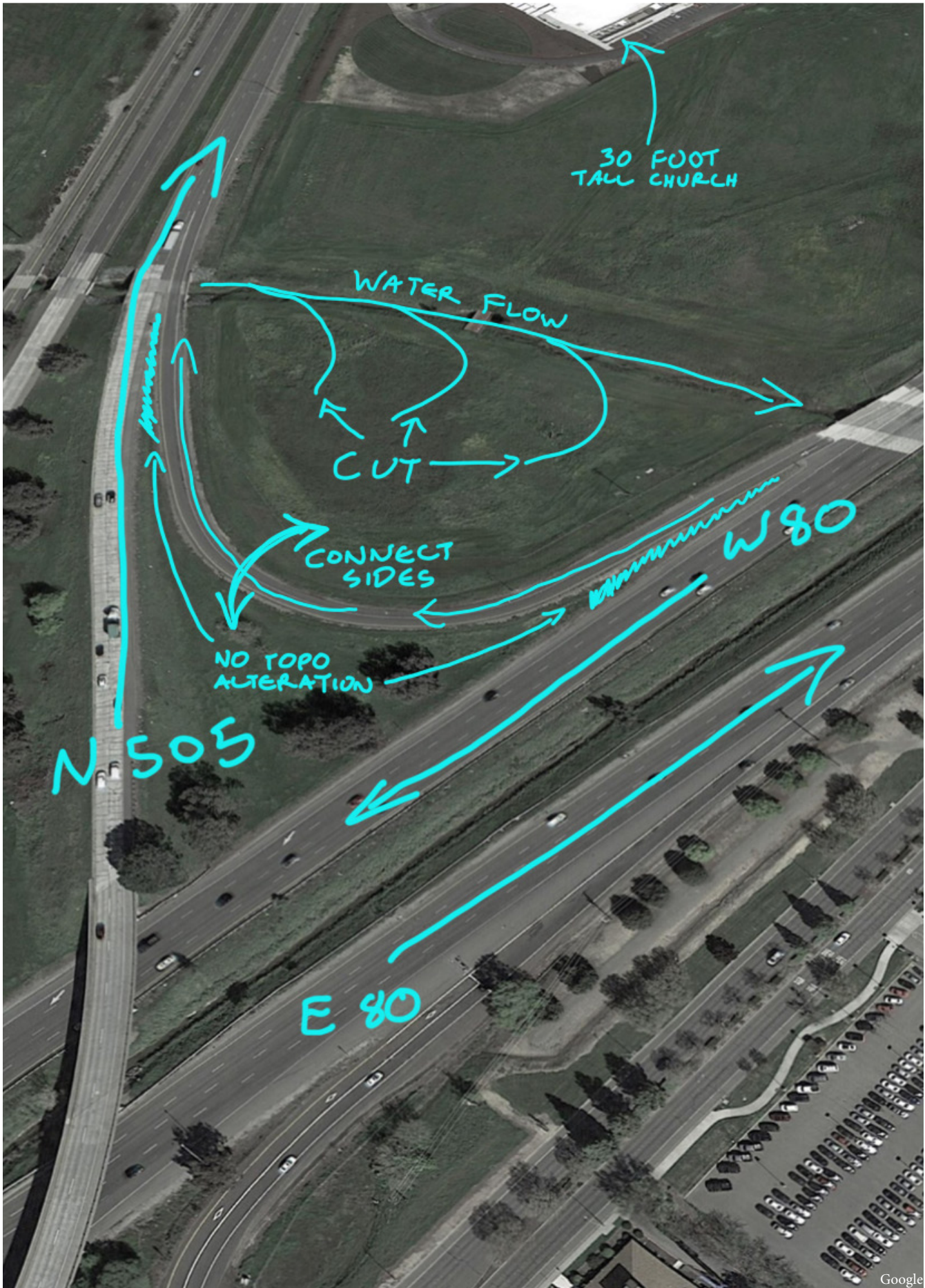
certain velocity. The imbalance between the two can create a hazardous condition. This scheme is designed to counteract the effects of imbalance. By introducing large scale wave forms, the visual effect of speed is narrowed. The rise and fall of the wave motion, shown in a singular direction, will open and close the horizon to the driver. This will narrow the field of vision thus equalizing the differences in apparent velocity” (Keegan, 1988). Before reading this paper, I had not considered how landform can aid in traffic calming. Although farming inspired my use of repetitive forms, this paper convinced me to bring the forms right up to the edge of the road, creating a more immersive experience.



SITE INFLUENCE

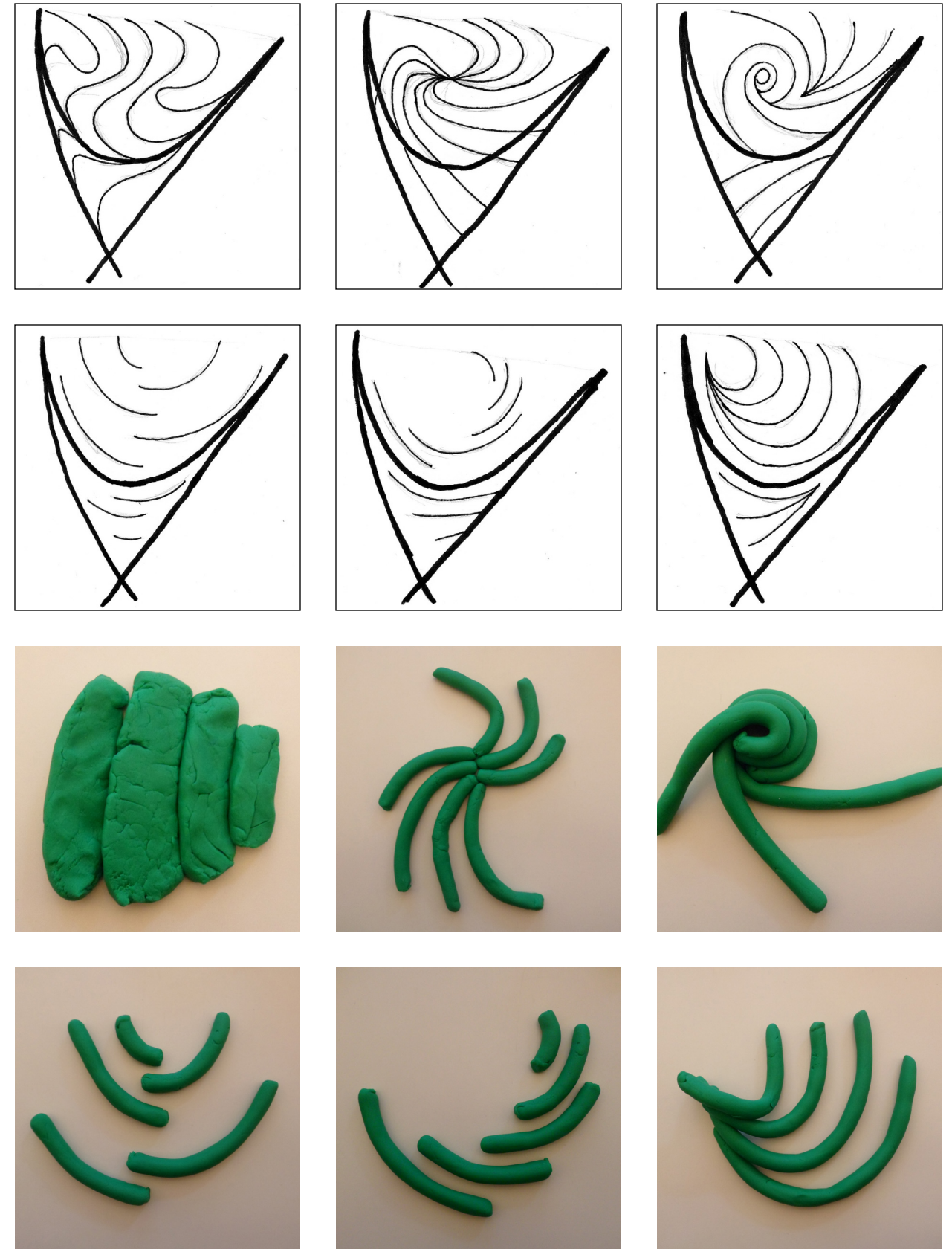
The site had elements that added restrictions and possibilities to the design. As stated earlier, the movement of the landforms was meant to reflect the movement on site. Coincidentally, the traffic and water flow on the boundaries of the site all create a clockwise loop. Therefore, the forms were to follow in some configuration that indicated a clockwise movement. The drainage ditch to the north also influenced where the earth would be cut into because in order to retain water on site, these cuts had to connect to the ditch. Fill also had some parameters. The 30 foot tall church next to the site draws a lot of focus on this otherwise flat landscape. The fill needed to have a height that could compete for the focus of drivers while still maintaining a

reasonable slope. Safety was also a consideration because the road through the site splits off from the West 80 and merges into the North 505. No drastic changes in elevation could occur where the road splits and comes together for safety-related reasons. This road running through the site created another challenge with the two landscapes feeling separated on either side of it so the forms moving through needed to feel connected. It was also important for the landforms to create an experience from all the roads around the site. More specifically, it was important to create a design that looks different when entering Vacaville compared to leaving Vacaville.



EXPERIMENTATION

Based on these design goals and restrictions with the site, I drew up numerous forms that would fit within these parameters. I then moved on to quick mock-ups with Play-Doh to see these drawings with a third dimension. By doing this, I realized that ideas which appeared to work on paper did not work like I had imagined when translated into a 3D object. The slope would be too steep or the slope to support the height would be too wide, taking up much of the site.



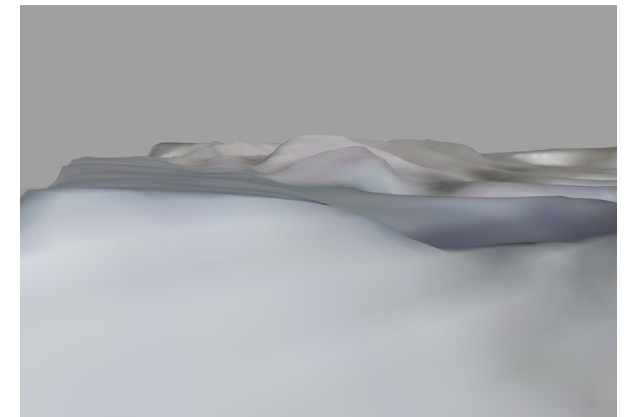
I ultimately decided to move further with two designs with more permanent to-scale clay models. The two differed in their method of being a landmark. The first option had shorter landforms that felt more incorporated into the land. The second option had a taller, more central form that had the appearance of being placed on the landscape. I felt that these options contrasted enough to get opinions from the community about which they prefer. The community feedback reflected my opinion of the models. People liked option one for its more natural forms while option two was liked for its focus point. With this information, I still

could not decide which design was best so I investigated these models further.

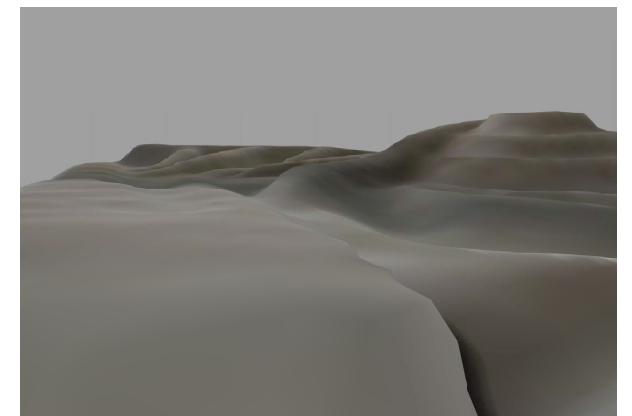
Although the clay models were a quick way to make forms, it was difficult to view these forms from the driver's perspective. To get these views, the clay models were scanned three dimensionally to create computer models. Once the models were looked at this way, the weaknesses and strengths of each were more apparent. The first option was difficult to see from afar while the second option was less interesting in form. Both models' forms also felt fragmented by the road cutting across the site.



OPTION 1



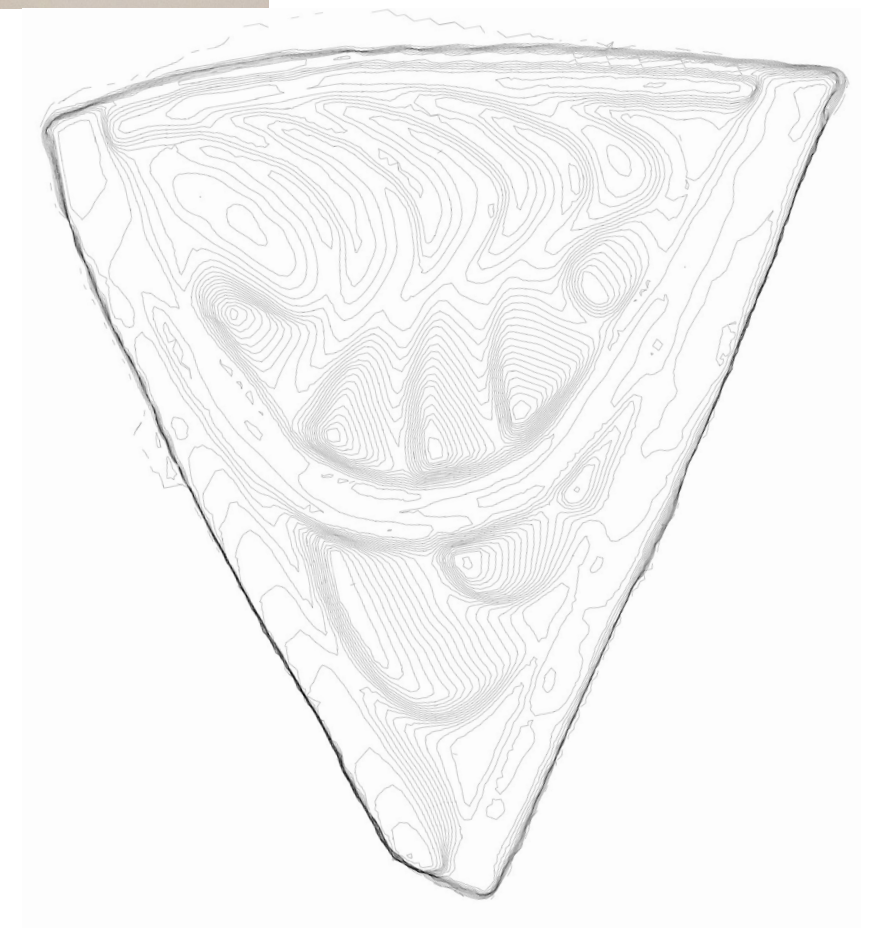
OPTION 2



Since neither model was at their best, I decided to make a third model. This model would use the forms of the first option but with more height like the second option. The forms were also altered to be more cohesive and feel less separated by the road running through the site. Feeling more complete than the previous two, the third model was scanned to create a computer model. It was then cut to reveal the model's contour lines. Although the roads and slopes were inaccurate, this preliminary grading plan gave me something to work off of in order to create the final grading plan.



FINAL DESIGN

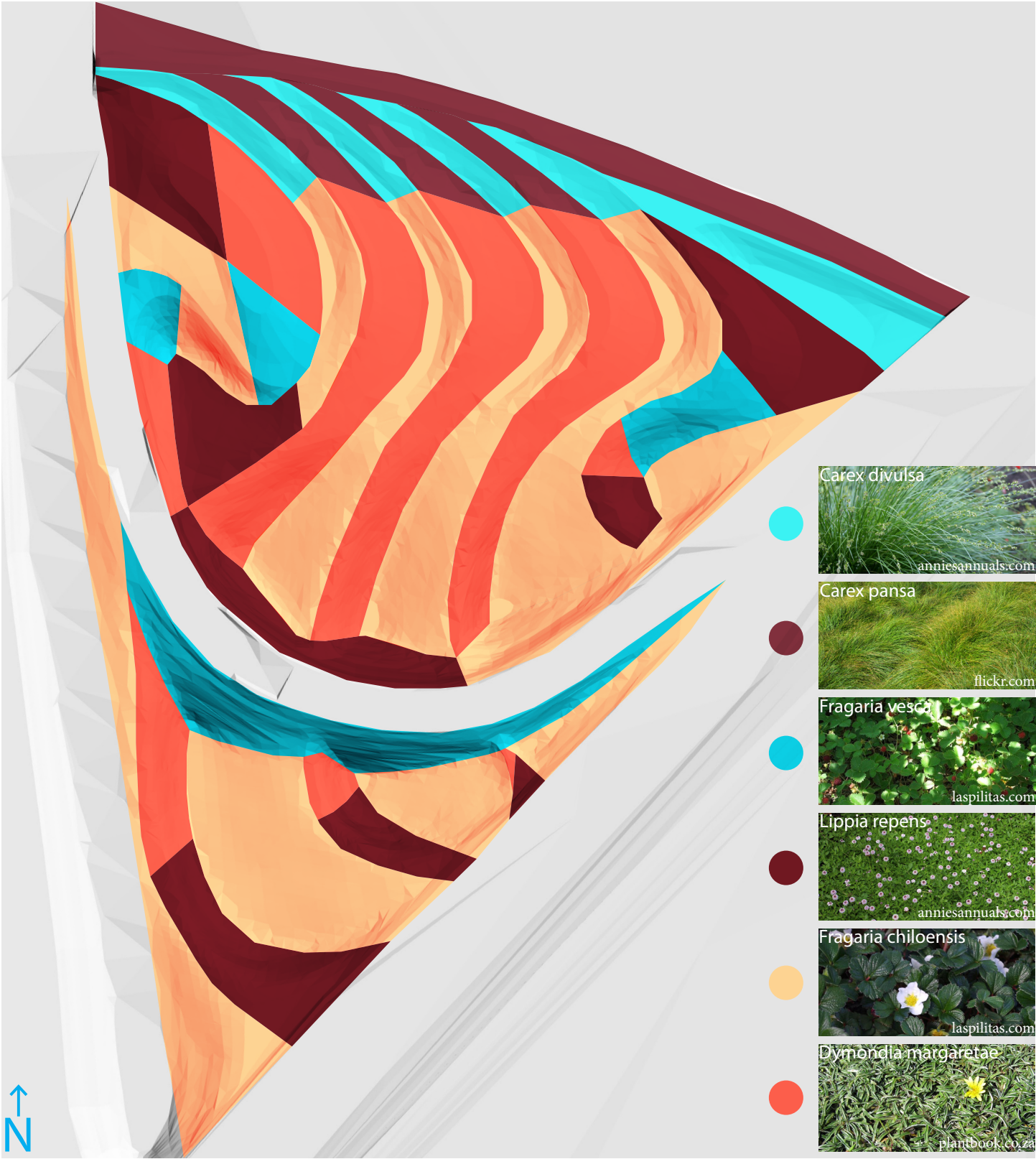


PLANTING MOSAIC

Most sculptural landform works are covered by turf. It is the ideal vegetation for most projects because it can be treaded on while accentuating the shapes of the form. However, turf requires regular maintenance including mowing and watering. This would not be ideal for this design because it a large site not meant for the pedestrian. The vegetation on this site needed to be self-sustaining, needing no human activity or irrigation after establishment. Once constructed the site should be designed to be left alone because there are not enough reasons to put time and money into a space which is primarily an object for the motorist to experience. Because of this, the types of plants on site needed to be maintenance-free and preserve the shape of the landform. It was determined that low water-use ground covers or grasses were needed for

the dry areas while riparian ground covers or grasses were needed for the wet areas.

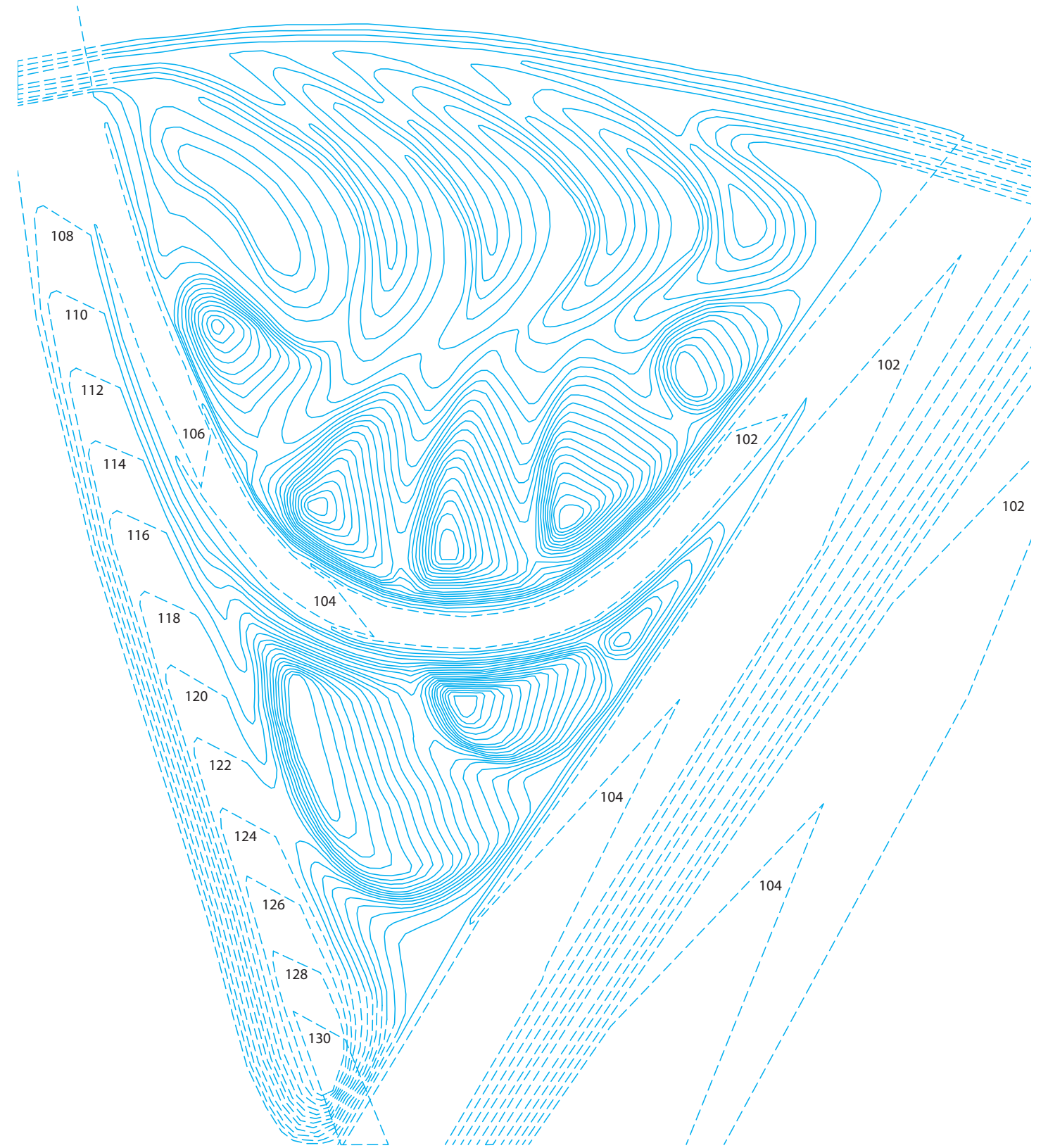
The slopes, and the shadows they caused, further complicated the planting design. It was clear that certain plants would grow better depending on what slope aspect they were on. This resulted in a plant configuration fractured by slope aspect, creating a mosaic-like pattern across the site. Each slope aspect has a single plant species that covers the space. It was important to have large masses containing one plant species so the colors and forms of that plant could be read by the fast-moving motorists. For instance, all the dry north facing slopes are covered in Woodland Strawberry, a species that can handle full shade. The plants for each slope aspect are shown to the right.



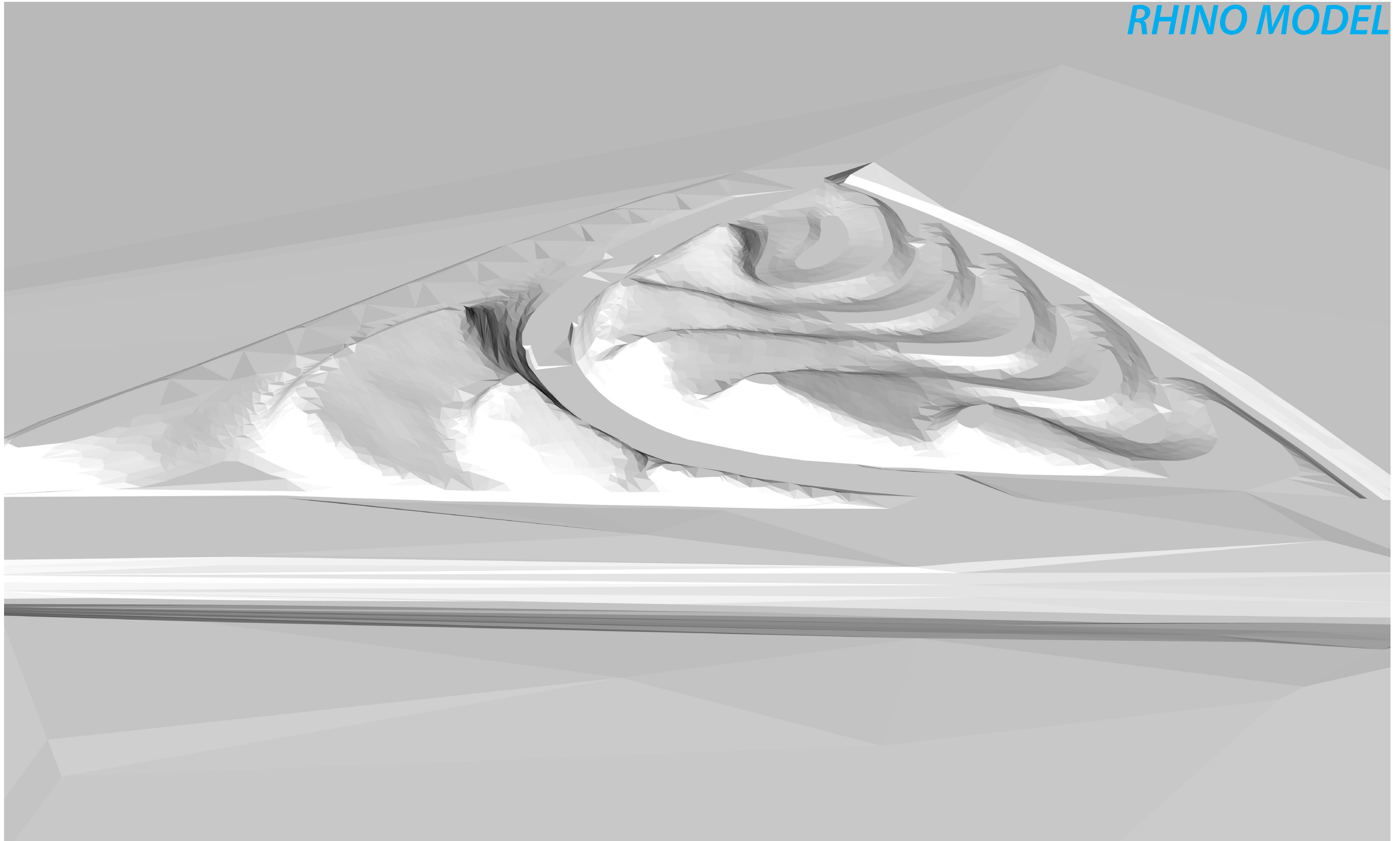


FINAL DESIGN

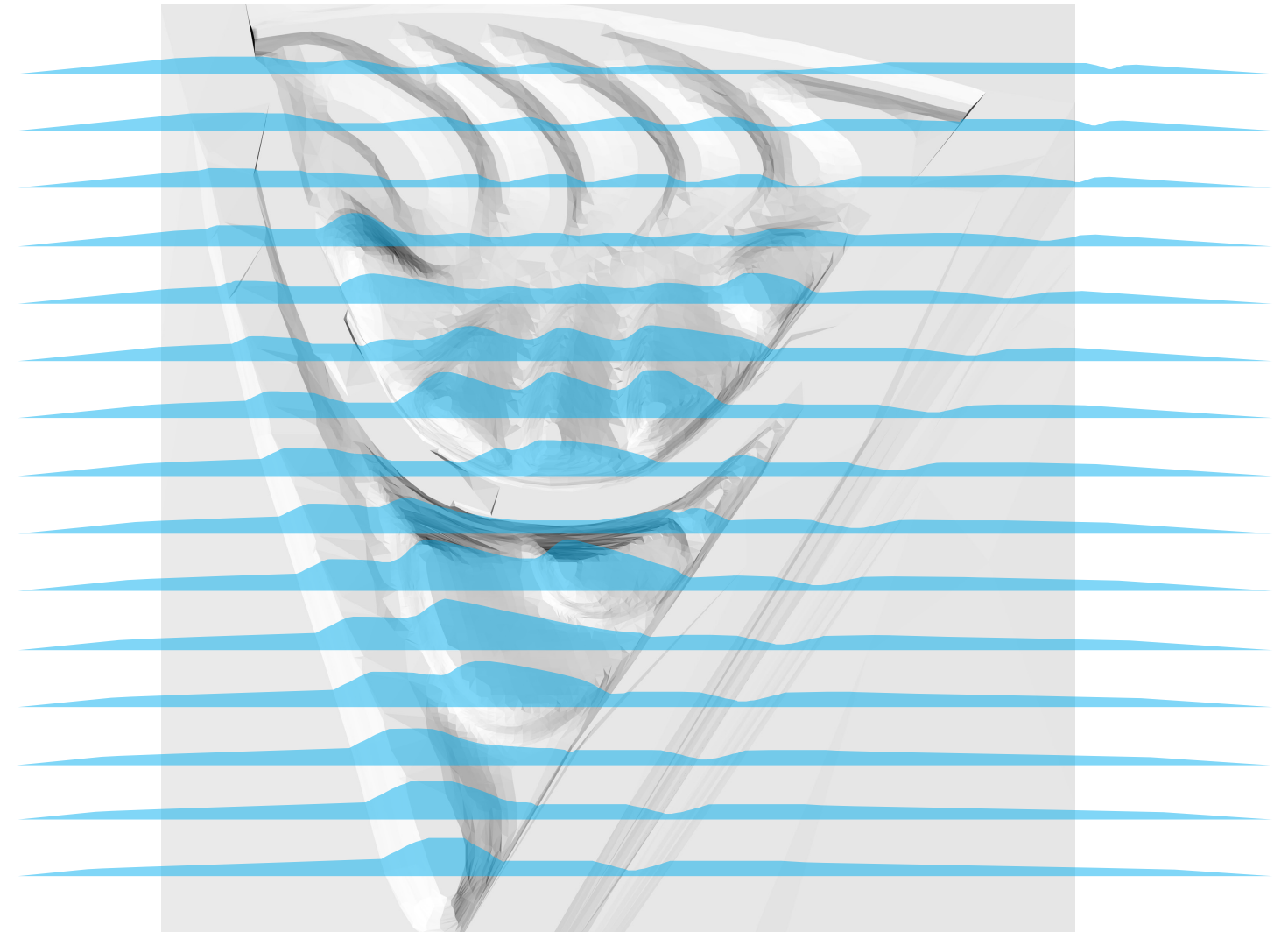
GRADING PLAN



Based on the preliminary grading plan during the design process, the contours were integrated into those that currently exist around the site. The proposed contours were also adjusted for more gradual slopes while attempting to maintain the original designed forms. The contours were also altered to better direct drainage, keeping it off the roads and moving it to where water currently drains on site. Once the grading plan was adjusted for these issues, the contours were raised to create a three dimensional computer model.



The sections to the right show the elevation change throughout the site. From the southern mounds that rise 40 feet above to the northern depressions that dip 10 feet below, the repetitive and overlapping forms carry throughout the site. These forms were inspired by Vacaville's agricultural past which used repetition and the captivating hills to the west of the city that overlap one another. Seen on the following pages, the landforms mimic the movement of water and traffic flow, integrating the design into the site. This is accentuated by the planting mosaic that draws attention to the angles of the form.





The following pages show views of the landforms from the interstates. They rise above the landscape, declaring their presence and leaving an impression on the motorists passing by. The commuter's attention is drawn away from the chain stores and towards the forms that accentuate the hills in the distance. When heading towards Vacaville, the angles of the forms appear to be moving with you. However, when leaving Vacaville, they seem to oppose your movement.



CONCLUSION

This project aimed to learn about the process of landform design, solve challenges of sites through landform design, and convey Vacaville’s identity using sculptural landforms. Throughout this project, all three goals were achieved with each affecting the other two.

The process of designing these landforms was circuitous with many adjustments to find a more ideal form. Beginning with the parties that influenced the design, these elements somehow had to be translated into landform. I then used information from research along with the site’s opportunities and challenges to create a number of designs. Many of these designs were not ideal and needed revisions a number of times. After that, the forms were made in clay, and once again altered, to create scaled models. The final chosen model was three-dimensionally scanned to provide preliminary contour lines which were also changed. Lastly, these new contour lines were raised to create the final design for this project.

This landform design also solved challenges within the site. Based on research, having repetitive forms along the highway acts as a reference for commuters to determine how fast they are going, making them more aware of their speed and possibly lowering it. The site also has a drainage ditch that’s primary purpose is to

move water through the site and downstream. With this design, the water was better utilized by keeping more of it on site.

The final goal of conveying Vacaville’s identity using sculptural landforms was sought through a multi-step process. I began with researching the history of Vacaville, trying to get an understanding of what it was known for. To identify what the city is known for today, I surveyed Vacaville citizens to see what they thought. This narrowed down what should influence the design. Then I approached the community with two designs in order to learn about what forms they prefer. From this information, a new design was made to represent the identity of Vacaville along the interstates.

With this project, I got to experiment with a rare and less-known form of landscape architecture. When presenting this design to the community, a common response I got was that they had never seen anything like this before but were intrigued. Projects like this are the kind you do not need signs for. When a person sees sculptural landforms, it is clear that human intervention occurred, shaping the flat earth into a form only humans could create. It is the art and engineering of such forms that make them unique and can leave an impression on one’s mind.



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