Floating Dock at Santa Rita Ranch:  
A Design and Cost Estimate Package Prepared for  
The Land Conservancy of San Luis Obispo

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The purpose of this project is to provide the Land Conservancy of San Luis Obispo with three design options for a floating fishing/boat dock system that they want to build on a small lake located on a plot of land that they own and preserve called Santa Rita Ranch. The design package that I created includes drawings, weight and buoyancy calculations, a cost estimate, and product specs. My approach was to utilize my estimating skills that I have acquired from my construction management classes and from my work at a general contractor’s office in the preconstruction department. The design and cost estimate package was created using BlueBeam and Excel, and it is intended to be a starting point for the Land Conservancy as they plan to build this dock in the near future. The entirety of this project changed a lot from the time of the initial proposal to the time that I delivered the final product. This was due to permitting, weather, and time limitations. This paper will provide a detailed account of how the ideas for the project evolved, as well as a walkthrough of the process of creating the final design and cost estimate package.

Key Words:  Design, Cost, Estimate, BlueBeam, Floating Dock

Introduction

When I first set out to choose a topic for my senior project, I knew that I wanted to do a project-based project where I could build something for a local organization. The organization that I chose to reach out to was the Land Conservancy of San Luis Obispo. I have connections to the land Conservancy through my job at Precision Construction Services, a San Luis Obispo based general contractor. Precision has provided construction management services to the Land Conservancy on multiple occasions, and one of the company owners has close connections with their Director of Stewardship, Jon Hall. Jon was my first point of contact. I gave him a call and asked if there was anything that I could build and donate to them. Jon came back to me with a long list of possible projects located all over SLO county that ranged in size and level of involvement.
The Creek Crossings Idea

The project idea that stuck out to me as the best fit from Jon’s list was the need for some pedestrian creek crossings at Santa Rita Ranch. There is a big creek that flows through this plot of land in Templeton that the Land Conservancy owns and preserves, and they had been wanting to build these crossings so that they can take donors and volunteers on tours of the gorgeous property without them getting wet from trekking through the creek. The idea sounded perfect, and I was familiar with small creek crossings from my experiences in mountain biking and hiking. I figured they would be easy enough to build off site and then take them to the ranch to install them. Little did I know this would not be the case.

Jon Hall got me in contact with Scott Couture, another employee of the Land Conservancy who frequently works out at Santa Rita Ranch. I contacted Scott and set up a time to come check out the ranch and stake out the areas where they would like creek crossings installed. Due to the intense storms that we were having this winter, I was not able to make it to the Santa Rita Ranch until the end of January. By that point, the creek was at the highest level it’s been at in years, and it spanned close to 40 feet wide at some of the narrowest sections (see figure 1). On top of the massive span, there was the issue of permitting. After sharing my project idea and pictures from the creek visit with a friend of mine who works in environmental management, I was made aware of how long and how difficult it would be to get the right permitting for these crossings.

![Figure 1. Scott (back) and I (front) attempting to measure the width of the creek](image)

After raising the permitting and size concerns to Scott, he suggested that I try to design something modular that does not have to be permanently set into the ground. He also requested that the structure be easily moveable so that they could remove them with the water gets too high or too low. After days
of research into this new set of criteria, and a meeting with my SME, Eric Brinkman, I had to face the
fact that this project was now far out of my skill set. This creek needs legitimate bridges with proper
footings and supports, designed by certified structural engineers. I broke the bad news to Scott and
circled back to Jon Hall to go through his list of potential projects once again.

The Floating Dock Idea

I called Jon Hall and explained my dilemma with the creek crossings. He agreed that the project was
almost impossible under the new criteria that Scott had given me. Jon was quick to suggest another
project that he thought would be more appropriate for my skill set and my time constraint. The project
that he suggested was to build a floating fishing dock on the lake at Santa Rita Ranch. This seemed
very doable, since I have spent almost a year in architectural engineering classes analyzing deck
structures and calculating forces to determine structural framing needs. I also learned how to frame in
my residential construction class with my SME, Eric Brinkman. I ran the new idea for the floating
dock by Eric, and he told me that it was a much better project to run with. After checking in with Eric,
I called Scott to schedule another time to come out to the ranch, this time, to examine the build area.
In the meantime, I proceeded to explore YouTube for some DIY dock inspiration. I found a channel
called “DC WOODWORKS” that had a couple of dock build videos that serviced as the inspiration
for the designs that I came up with (see figure 2).

![Figure 2. The floating dock system that DC WOODWORKS built on YouTube](image-url)

After another long weather delay, I was able to make it back out to Santa Rita Ranch in April. I met
up with Scott and he took me to the location where the Land Conservancy has been thinking about
putting a dock (see figure 3). I measured the depth of the water at incremental distances from the
shore to make sure that I knew how far out it needs to be so that it doesn’t scrape the lake bottom.
Luckily, the lake has about a four foot drop off two feet from the shoreline. I proposed to Scott a 5’ x
10’ floating dock built with plastic 55-gallon barrels, but he wanted to go bigger. Scott requested a 10’
x 20’ dock with a 16’ long ramp. I thought, no problem! I can build that! I went home and started
drafting some design ideas that would allow me to construct most of the pieces on campus in the
CAED support shop and make for minimal field construction.
After I got some preliminary designs put together, I went back to run things by Eric. When I showed him the framing plan with the dimensions, he expressed concern over how much work I had just signed myself up for. I was frustrated because I thought this was a very doable project, but the more I thought about it, the more I realized that I had bitten off way more than I could chew. At this point, it was the end of April, and with graduation approaching in less than two months, I had to ask myself if I was willing to push the project through as fast as I could, or if I wanted to extend my timeframe and work into the summer to get the dock built. On one hand, I knew it would be possible to work through the summer since I will be staying in and working in San Luis Obispo after graduation, but on the other hand, I had been working so hard to make sure that I am finished with school by Spring 2023. The decision was a hard one to make, especially because I had my heart set on physically building something. In the end, Eric gave me a good suggestion that would still allow me to create something and finish it by the end of the quarter.

The New Approach

Eric Brinkman suggested that instead of physically building the dock for the Land Conservancy, I could provide them with some design options instead. I was opposed to the idea at first, as I was still bent on building the dock, but after a lot of thought, I realized that the design option was my best
choice. In order to make sure that I had enough content for a senior project, Eric and I brainstormed some other deliverables that could be included in the final design package. I revised my project proposal and immediately called Scott at the Land Conservancy to let him know what I would not be able to build the dock. It was slightly embarrassing to have to go back to him a second time to tell him that I could not follow through with my initial proposal, but he was very understanding. After we spoke, I began working on the new deliverables, which will be described in greater detail below.

**Creating the Design and Cost Estimate Package**

Now that I had a solid plan for this project laid out, I was ready to begin creating my design and cost estimate package. In order to make sure I had a substantial amount of work, I decided to make this design and cost estimate package with three different design options. This way, the Land Conservancy can weigh out their options and pick the design that they think is best suited for the lake at Santa Rita Ranch and for the people who will be using the dock.

**Deliverables**

As mentioned above, my design and cost estimate package outlines three design options. My final deliverable for the package was a 30-page plan set that I created. The package included three design options. Option one is a 10’ X 20’ dock with a 16’ X 5’ ramp that are both framed with 2 x 6 redwood lumber, trex decking, and 55-gallon plastic barrel floats. The ramp footing is a 5’-3” x 2’ x 2’-6” concrete rectangle with #4 rebar supporting it. Option two is a 10’ x 20’ dock with a 16’ x 5’ ramp that are both framed with 2 x 6 redwood lumber, trex decking, and 24” x 48” x 16” rectangular dock floats. The ramp footing is the exact same as option one. Option three is an 8’ x 20’ dock that consists of four prefabricated floating docks that are framed together with 2 x 6 redwood lumber as well as a 16’ x 4’ prefabricated dock ramp that is to be modified to support a floating dock system. The ramp footing is a 4’ x 2’ x 2’-6” concrete rectangle with #4 rebar supporting it.

For each design option, I created framing plans with dimensions and hardware included. I used these framing plans to put together overall site plans for each design option. The prefabricated design option includes notes about connecting the four floating docks together and modifying the ramp to be compatible with a floating dock system. I provided calculations for the weight and buoyancy of design options one and two using the skills that I obtained in my architectural engineering classes. I chose to also provide a disclaimer at the beginning of the plan set that states that I recommend having a structural engineer confirm the weight limit and structural integrity of the dock that they choose to build. I also noted that I would not be liable for any injuries, death, permitting, or lack thereof. Each design option also includes a cost estimate with quantities and unit pricing, as well as a final cost for each of the three dock designs. The final package includes specs for all components of the three dock design options as a way to provide the Land Conservancy with references to where I got my pricing from and where they can order the components when they are ready to build the dock of their choosing.

**Approach**

The approach that I took to make my final plan set was to use BlueBeam to draw my designs. Initially, I wanted to use AutoCAD, but my BlueBeam skills are far more advanced due to how often I have to use it at work. I mimicked the style of plan sets that I have looked at in the past, including the
title bar on the right side of each sheet as well as the page naming and numbering convention. My approach for the weight and buoyancy calculations was to do a takeoff on BlueBeam to get the final quantities of the material for each design option. Then, I put those quantities into an Excel spreadsheet and found weight per lineal footage for the redwood lumber and weight per square footage for the trex decking online. I compared the total weight of each design to the total buoyancy force that the floats would provide to verify that the system would float. After that, I used the same quantity takeoff to compile a cost estimate using pricing that I found online through Home Depot, Menard’s, and Amazon. I then created another spreadsheet in Excel that contains the quantities of material as they would be ordered along with unit pricing and a final overall cost for each of the three design options. When my Excel spreadsheets were completed, I inserted screenshots of them into my plan set as well as screenshots from the websites where I found the pricing.

The Final Product

See the final design and cost estimate package located in the Appendix.

Lessons Learned

Throughout the entire process of completing this project, I learned a lot of valuable lessons. Below are the top three most valuable of those lessons.

Lesson #1: Permit Requirements for Construction Near Creeks in SLO County

My experience with trying to build the creek crossings taught me that there are very strict permitting requirements involved with construction on or near any of the creeks in San Luis Obispo County. I owe it to my friend who works in environmental management for being transparent with me when I told her my plan to build those creek crossings. She informed me in a gentle way that my project idea was essentially impossible to complete in less than a year due to lead-time with permitting as well as other requirements for environmental impact reports. Since learning about the permitting process, I have heard more scary stories about large construction projects being delayed or forced to stop work due to issues with creek-related permits. If I were to build creek crossings in the future, I would make sure to allot enough time for the permitting process.

Lesson #2: Client Expectations

Something that I learned from working with Scott at the Land Conservancy is that sometimes a client will request something that is just not feasible, and it is okay to tell them if that is the case. There is definitely a disconnect in the construction industry between the client, the designer, and the contractor who actually has to perform the work. I experienced this firsthand during the process of this project. Although Scott’s requests were not outrageous, the creek crossing idea as a whole and the construction of the floating dock were just past my skill level and time constraints. If I were to attempt either of those two projects in the future, I would make sure that expectations are clearly set long before the design process. I would also establish my abilities and time constraints ahead of time, so that I can avoid having to make that call to the client at the last minute to tell them that I cannot meet their expectations.
Lesson #3: Time Management

An overarching lesson that I learned through this project was the importance of time management. I know that if I had established my proposal for my project a lot sooner, I would have had time to build the floating dock. I began this project in winter quarter, but my indecisiveness combined with the complexity of the project and the stubbornness of not wanted to back out of my original proposal really sucked up a lot of valuable time. In the end, I was able to get everything done by the end of spring quarter, but if I were to do my senior project over again, I would have set much harder deadlines much further in advance to allow myself extra time for navigating roadblocks and getting all the way through the construction phase.

Appendix

See attached appendix for the final design and cost estimate package.