

Camp Ocean Pines – Aviary Extension

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This paper describes the construction process of an additional 192 SF storage area for an existing Nature Center, along with a new 1000 SF deck around the entire structure. The scope of work included the excavation and pouring of concrete piers and stem walls, framing of the subfloor, shear walls, roof, and deck, electrical rough-in and finish, roofing system, windows, doors, insulation, drywall, and decking. All work on this project was managed by the author, and construction was done by the author, subcontractors, local hires, and volunteers. Construction of the project took place between December 2016 and June 2017, and cost approximately \$40,000. This paper will focus on means and methods, deliverables, knowledge and lessons learned, and how this knowledge will be brought into the construction industry.

Keywords: Construction, existing structure, foundation, deck, framing

Background

The project is located at Camp Ocean Pines in Cambria, California, approximately forty minutes north of San Luis Obispo. Camp Ocean Pines is a non-profit organization dedicated to teaching kids about California natural history and care of the environment. The Nature Center is a cabin-like structure at the camp that contains a variety of animals, furs, skeletons, and touch tanks. The additional space will provide storage for more material at the nature center.

My aunt, Rosemay Cameron, and my uncle, Chris Cameron, are the director of finance and the camp director at Camp Ocean Pines. I spoke with them back in mid-September of 2016 inquiring about any construction projects at the campground. They offered me the construction of the Nature Center, which I happily agreed to. Around October 16, 2016, the project was given the notice to proceed by the County of San Luis Obispo. The architect of the project is San Luis Sustainability Group, the engineer for the project is Taylor & Syfan, and the soils engineer is Earth Systems.

Throughout the project, I relied on the advice of several professionals, including: Bob Stephens with Morley Builders, Chris and Rosemay Cameron with Camp Ocean Pines, Craig Beecham with C Beecham Corporation, Rocio Garcia with Taylor & Syffon, Robert Down with Earth Systems, Darwin Waite and Alan Hanson with Simpson Strongtie, Monte Garrison, and Mark Kniffen.

Construction Process

Once the project was given the notice to proceed, I immediately began planning the construction to be done. After reviewing the documents, soils report, and other necessary documents I felt comfortable to begin work on the project. One of the first things I noticed is the high level of engineering for this project. My first task was to begin work on the foundation, and according to the construction documents, I needed to construct approximately forty 2'x2' pads that rested on bedrock to create the piers for the deck posts. The stem wall also needed to be excavated to bedrock, which was found at a depth anywhere from two feet to four feet throughout the project.

I consulted with Robert Down from Earth Systems to determine if excavating this deep was absolutely necessary. We reviewed the soils report at concluded it was accurate. I then reached out to a fellow Construction Management student who had family that worked in the civil construction sector. I was put in

contact with Craig Beecham with C Beecham Corporation. He agreed to perform the necessary excavation services for the project.

Next, I was tasked with finding an appropriate layout worker that would be able to help with laying out the location of the piers, and potentially staying to help form and pour the piers. Craig Beecham put me in contact with Monte Garrison, who met me on the jobsite to review the project. Monte has been in the industry for decades, and has a strong experience in concrete work.

Lastly, before work could begin, I needed to get the underground utilities marked out so we did not break any during construction. I worked with the camp to contact USA Dig, which was able to layout the location of the existing utilities. During a site visit before excavation, I noticed a tree needed to be removed for the foundation. I worked with the camp to ensure the tree was removed before the scheduled start date, Friday, December 2, 2016.

On the first day of construction, I assisted with Monte and Craig in the layout of the location of the piers. It was difficult to determine the exact location of piers due to minimal dimensions on the plan. Once the piers and stem walls were laid out, Craig began excavation with the backhoe. Work was running smoothly until early in the afternoon when the backhoe dug through an existing underground utility. This utility was near the marked location determined by USA Dig, however it was not directly underneath it. We determined the utility line was an abandoned electrical line. We continued digging, with the assumption that we had hit the utility USA Dig had marked out. However, later in the afternoon the backhoe ripped through the active gas and water line. This caused natural gas to flow freely, and water was flooding the area. We immediately went to the main shut off valve to shut off the water and gas for the entire campground. The next day, a plumber came to repair the damaged lines. The lines were completed and the rest of the excavation was completed by the end of the day without any further errors.

For approximately two weeks following the excavation, there were rain showers on and off at the campground. I returned to the campground on December 15 to dewater all of the holes. The holes dug for the approximately forty pad footings and twenty-five feet of stem wall had filled up completely with water. I spent the next two days bucketing out water, and scheduled an inspection with the soils engineer and San Luis Obispo County to take a look at the excavation on December 19.

The soils engineer said all of the depths for the foundation were at the proper depth and have met bedrock. The county inspector said all looked good, except had questions regarding the existing stem wall that was to be used as part of the foundation for the new portion of the Nature Center. Since there were no drawings showing the reinforcement in the wall, he required us to x-ray the wall to determine the reinforcement. This was taken care of at a later date.

With the depth of the foundations approved, I began work on formwork with Monte and his assistant on Monday, December 19. We continued to work hard through the week to complete formwork before Friday because it was scheduled to rain this day. The pour was scheduled for Thursday December 22. Despite our best efforts, it proved to be very time consuming to hang all of the formwork required for the piers. The county inspector was scheduled to come out on Thursday before the pour scheduled at 2PM. Typically, the county inspector showed up in the morning, but by noon I had no confirmation he was coming. As a result, I pushed the pour to Friday at 6:30 AM. The inspector came around 12:30 PM, and passed us for the formwork we completed, which included approximately twenty piers. The pour occurred Friday December 23 at 6:30 AM in the rain. I worked with Monte and a few others to place, vibrate, and finish the concrete. The pour was completed by 9AM, and the concrete was finished by noon. With half of the foundation complete, I took two weeks off for winter break.

I returned to the camp on Thursday January 12th to check on progress. The footings that were completed looked good, while all of the other holes refilled with water. Despite efforts to cover the holes with tarp, the hillside to the north of the construction site allowed water to drain into the holes. This made it impossible to waterproof any of the holes that were dug.

Rain continued to make work difficult to resume for the next several weeks. There needed to be about a two-week gap to allow the holes to drain out and complete the rest of the foundation work. In the mean time, I took care of the x-ray of the existing stem wall, since this only required a brief gap in the rain. Earth Systems performed the task, and found some reinforcement in the wall. Taylor & Syfan took a look at the report, and determined there was inadequate reinforcement, and there needed to be underpinning at the existing stair wall consisting of three new piers. On January 16th, Earth Systems came out again to the camp again to inspect the installation of epoxied rebar at locations where new pads tied into the existing foundation.

When planning the construction for the project, I spoke with Al Hauck, Stacy Kolegraff, and Phil Barlow about having a CM 214 Residential Construction class prefabricate the walls for my project. This class typically constructs a small shed, which is a similar size to the additional space I am building at the nature center. The prefabrication would provide a similar experience as the typical shed project, allowing students to learn how to frame and build a wooden shearwall. The CM Department agreed to this plan.

While the rain continued to delay any major progress, I worked with Stacy Kolegraff to begin construction on the prefabricated walls. Her class worked on the walls and was able to complete them around February 16th.

Beginning on March 2nd, there was finally a significant enough break in the weather to resume the construction of the foundation. The first task was to complete the additional digging required for the new underpinned locations. This was completed with the help of some volunteers, and we began to work on the formwork for the stemwall. While working on the stemwall, I was walking the job with Chris, reviewing work to be completed for the next pour. In discussion with the difficulty of a few pads, we decided to change the design of the deck to eliminate approximately eight pads.

I scheduled the next pour for Friday, March 17th. The county inspection was scheduled for that Thursday. Despite being nearly complete with the formwork, the inspector did not pass us for all of the pads scheduled to be poured. As a result, the pour consisted of the stem walls and about five more pads. The pour went without any issues, and left about six pads to be completed. This final pour took place the following Monday on March 20th.

After the final pour was complete, I went home for spring break. Upon my return, I was notified that the facilities manager had resigned. The facilities manager was responsible for the construction of all facilities on site, and assisted me with working on and managing the project. When he left, the project was completely under my control.

Once construction of the foundation was complete, construction continued at a quicker pace. Framing of the subfloor was completed and passed inspection on Thursday April 6th. That weekend, the prefabricated walls were transported to the project. A 6'x12' U-Haul was rented to carry the walls and additional lumber. The largest wall was 8'x12', and just fit in the U-Haul.

On Tuesday April 11th, the walls were erected and braced in place. However, it was soon discovered that the existing structure walls were only about 7'-10" tall. As a result, the new walls, which are 8', did not match with the existing structure. After a few calls with the engineer, it was determined that there needed to be a step in the roof, with the new roof to match the slope of the existing roof.

Over the next few weeks, the ridge was completed and the wall of the existing structure was demolished to allow a proper connection of the two structures. The roof framing was complete with sheathing around May 16th.

At this time, work on the deck also began. We started by plumbing posts, and followed by adding in beams and joists. All of the members were pressure treated lumber, and consisted of 4x6 posts, 4x8 beams, and 4x10 joists.

Once the rough framing inspection was passed, I contacted Dan Miller for help with the electrical rough-in. Dan is the training director for a local electrical union, and offered to provide free labor and material for my project. He completed the electrical rough-in by June 1st.

The most current work being done at the Nature Center involves the completion of roofing and completing framing of the deck. As of June 5th, approximately half of the roof has been completed with shingles. The framing for the deck is nearly complete, with approximately 200SF left.

Final Deliverables

The final deliverable that has been handed over to the owner includes the foundation for the new structure and deck, framing of the new structure and deck, electrical rough-in, partial roofing, and partial decking. The remaining work includes additional roofing, additional decking, insulation, drywall, and finish electrical.

New Knowledge and Lessons Learned

Working on this project over the academic school year has taught me an incredible amount of new knowledge that will be invaluable to my future in construction. With so many problems that arrived, every day on the jobsite was a learning experience.

I learned my first lesson before construction began. Reaching out to friends and local subcontractors taught me how to use my contacts to my advantage. I was able to increase my skills in communicating with subcontractors, and hired people for work for the first time.

On the first day of construction, I learned how scary it is to dig for foundations. The Earth has several unknown items buried, and it seems like there is a high chance of finding something. I learned that yellow utilities are gas lines, and that only shovels should be used anywhere near them. Once we severed the lines, I learned the proper procedure is to shut off the utilities and contact someone to repair them immediately.

I also scheduled the soils engineer to come out early in the morning on the first day of construction to ensure we were digging to the proper depth. I learned that this is a good precautionary step to take because I knew exactly how deep to dig for the rest of the footings. I also learned how to schedule third party connections, and further enhanced communication skills with fellow professionals.

After the first few days of construction, rain began to delay the project. This project taught me how significant a role the weather plays in construction. Overall, the rain delayed my project for approximately eight weeks, primarily in the winter quarter of school. I was completely unprepared for this, and will be sure to take it into account for future projects.

With the first concrete pour, I learned how to order concrete. This involved contacting someone to get a discount, and contacting dispatch to schedule the pour and get the correct mix. I also had to order a pump for the first time, and since we poured in the rain I learned how to do that as well. The concrete pours in general taught me the basics of how to order, schedule, and complete a concrete pour.

During the framing of the project, I learned all about tilting up walls, and framing a roof. I discovered the variety of connectors used to transfer shear throughout a building. I was taught proper techniques on how to demolish the existing wall as well.

From a managerial perspective, I learned how to order material, and plan ahead for it to be delivered. I learned how to speak with suppliers, and negotiate pricing on material. I also learned how to track the costs as they were incurred throughout a project.

There are several other things I learned through physically building the structure itself. I figured out a variety of “tricks of the trade”, from building formwork, to underpinning foundations, to properly installing eaves, to placing roofing material. I ended up learning something new everyday on the job.

Carrying the Knowledge into the Industry

Overall, this senior project experience has provided me a great amount of knowledge that I will be able to carry into the construction industry. All of the issues that I have faced will likely be encountered again when I am in the industry, and now I will have experience on how to handle these issues. For example, in the future I will be sure to take extra precautions before beginning an excavation, and make sure I have the ability to contact the necessary people to shut off certain utilities. I also need to be aware of how to shut these utilities down by myself. Another example is that I will aim to have foundation work completed in the spring and summer so rain has minimal impacts. If I need to do foundation work in the winter, I will be sure to have plans for waterproofing and dewatering the site. It will be critical to develop these plans to keep projects on schedule.

At the end of this project, I feel like I have had a full year of industry experience during my final year of school. I look forward to using this experience to solve problems before they arise, and getting ahead of the competition in the industry. It has been an extremely rewarding experience, and I am glad I chose to take on such a challenge for my senior project.