

Community Service Project for Senior Citizen

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This community service project for a local senior citizen consisted of a complete construction package including: obtaining funding, purchasing necessary materials, schedule planning, design, development and construction of a mid-sized concrete staircase. Using the knowledge and prior practices I acquired while studying Construction Management at California Polytechnic University San Luis Obispo I was able to fulfill every aspect the client had requested. This staircase not only served as an easier walkway into the backyard of the home but also as a stormwater accessway allowing for minimal puddle and mud accumulation outside the clients front door. The projects material cost of an estimated \$300 was made possible through funding provided by Austin Harkin, owner of AH Cullyvore Construction, a Peninsula Bay Area residential contractor. This concrete staircase simultaneously benefitted a senior citizen from my home town that was financially unable to fix a flooding problem, while honing the skills required of a future industry professional in planning, designing, collaborating and constructing.

Key Words: Community Service, Concrete Staircase, Residential, Construction

Introduction

My senior project came fruition in early December while I was home for winter break from college. Home for me is in Half Moon Bay California, a fairly affluent area, located west of Silicon Valley and north of San Francisco. I was at the mailbox in my neighborhood a few days after arriving home when I met my neighbor, Vince. Vince is a well known community member who spends most of his time volunteering at after school programs and has had a profound effect on many of the teenagers growing up in the area. He explained the flooding problem he was having in his backyard and asked if I would take a look in the coming days. I went to his house the next day and saw a serious problem. Recent rain sprawls had pushed mud and water to a center point at the bottom of the backyard near the front door. Vince is 72 years old and lives with a serious lung condition and very brittle bones. His wife, April, is also in a wheelchair. I saw the 4' wide puddle he was being forced to step over as a serious safety concern. I immediately jumped at the opportunity to help Vince and April out. I called a previous employer, Austin Harkin at AH Cullyvore Construction, and asked him what his thoughts were on sponsoring the project. He, as well, knows Vince because his kids were involved in afterschool programs growing up. It took little convincing. We agreed I would do all the purchasing, scheduling, design and construction and Austin would take care of all material costs, equipment and help out me with the layout of concrete forms.

Design & Construction

The design of the concrete staircase was intended to be fairly simple. Five steps that would each be two feet long and just over five inches tall. A perfect project for my fist solo construction endeavour. I broke ground by excavating the the rectangular area of the backyard where the stairs would be poured. This allowed for the concrete to sit about 5-6 inches below ground, adding extra strength. The extra dirt was spread in low parts of the backyard where it was needed.

Next came the layout, the staircase would be constructed side by side with the foundation of Vince's house. I decided the best layout practice would be to draw out the steps, using a 4 foot level, on the concrete foundation with a pencil. I paid particular attention, making sure the stairs wouldn't go too high and touch the wood siding on the houses exterior. The stairs needed to bind concrete to concrete with the foundation. I made sure to implement 1/8" of fall on each stair to allow for stormwater runoff.

When the form boards went in I was instructed by Austin to begin with a block being screwed to the houses concrete foundation at the bottom, middle and top of the staircase, this is where each portion of the forming would attach to (See Figure 1). I cut a 45 degree angle on the bottom of each form so that I could get a trowel in behind the back of each step to finish it off nicely. This is standard practice and a very important step (See Figure 3).



Fig. 1: 2x6 block connection.



Fig. 2: recycled block, rebar, wire



Fig. 3: 45 deg. angle

I laid a bottom layer of recycled wire fencing under the rebar as an added structural component. From there I started to insert rows of #4 rebar (1/2"), making sure they stayed 3" away from the form boards all the way around. I inserted crushed up recycled masonry blocks and bricks as concrete fill and also used them as a chair, keeping the rebar 2 1/2" off the dirt (See Figure 2). I took extra precaution during this step, making sure no rebar would be exposed during the concrete pour.

With funding provided by Austin I was able to go to Home Depot and purchase thirty five 80lb bags of Quikrete cement. I used two bags at a time, pouring out each bag and slowly adding water until I found the desired workability. In a lab class I took while at Cal Poly called CM 114 I learned that a lower ratio of water to cement leads to higher strength and durability, but may make the mix difficult to work with and form. Simultaneously while pouring the concrete I would take a few seconds to hit the side of the form with a hammer, this allowed for some vibration inside the concrete so that it would sink into the corners of the forms nicely. This process also got rid of any air pockets. From there I would roughly move the concrete around with a larger trowel and quickly move to the next step to repeat this process. Here is where I learned that timing is everything when it comes to concrete. I put together a homemade screed so that I could spread out the concrete while leveling it as well (See Figure 4).

After screeding each step and making sure everything was level with the forms I waited until the concrete went off a little. I knew it was time to give it a steel finish with a trowel when the concrete became a darker shade of grey. I used a semi circle trowel to corner smooth over the edges, this tool is also called an edger (See Figure 5). Finally I was able to complete the last step of the concrete pour, giving it a brush finish. Right before the concrete is completely hard I ran a finish brush over each stair to give it a nice smooth finish.

The last step before the jobsite clean up was to remove the concrete forms. I was particular about using screws not nails on this project because I knew if I had used nails, the banging and pulling would have offset the concrete finish and symmetry. I stripped the forms on the bottom stair when the concrete was cured enough to the point where it wouldn't collapse or sag. I gave the front of the bottom step a nice brush finish and then based each steps finish off of that bottom stair. I felt a sense of accomplishment and relief when I stripped the last form. I stepped back and looked hard at what I had just built, then whipped out my phone and snapped a final photo (See Figure 6).



Fig. 4: Screeding over concrete Fig. 5: rounded off corners w/ edger Fig 6: finished product

Lessons Learned

Throughout the process of my project based senior project, I learned a few things that will stick with me, into my next projects and the construction workforce. In concrete, timing is everything. You can't walk away at any moment because the concrete cures in many steps and very quickly. This is why we often see, on commercial and residential jobsites, concrete laborers working through their lunch breaks on pour days.

My goal for building this project with funding provided by AH Cullyvore was to do it in the most feasible way possible and have little to no scraps leftover. I did a concrete estimate for the staircase and came up with thirty nine 80 pound bags of Quikrete. As it turned out I only needed thirty five. Luckily I was able to return the extra four bags to Home Depot for a full refund. This simply taught me that I need to slow down when doing estimates. I was able to find the sheet of paper I did my calculations on and caught where my math error occurred.

The largest potential risk I saw in completing this project was not installing the forms correctly. If even one board wasn't screwed in level and cut perfectly the finished concrete would have been incorrect, consequently resulting in jackhammering and starting over. This is why, during the layout and formwork portion of the project, I received help from Austin, who is very knowledgeable in the field. The lesson here is never hold back on asking questions and asking for help.

Conclusion

This project touched upon many different skill sets that I will take with me into the construction management field as a Assistant Superintendent beginning in the new year. From the project estimate, purchasing materials, schedule planning, design, development and construction. I kept in contact with the client throughout the whole project making sure he was informed on what was being constructed, while I focused on his expectations. The most valuable stage of this project was the hands on construction process. I learned things that go beyond book learning and allowed me to better understand the means and methods of construction.

