

CVAF: Service Dog Kennel Construction

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The California Veterans Assistance Foundation Service Dog Kennel Construction gave back to our country's veterans by constructing new kennels for their service dogs. The previous kennel on the veteran residential site needed an upgrade due to the increased number of service dogs at the shelter. A team of two Cal Poly Construction Management students consisting of Spencer Allen and Luke Terrio worked to design, estimate, coordinate, and construct a new kennel structure for the site. The roles were divided on the project between the preconstruction and construction phases. During preconstruction Spencer's role was to schedule the job and create the necessary drawings to complete the structure, while Luke's role was to estimate the project and reach out to local businesses to fund and provide materials. The construction process was a joint effort between both students that consisted of grading the site, cutting and staking formwork, setting fence posts, mixing and pouring concrete, and installing the chain link fencing. The project was successful in overcoming challenges during each phase such as communicating an effective design, organizing material procurement, and working around conflicting schedules. The new kennel will provide a secure place for service dogs to live for years to come.

Key Words: Chain Link, Concrete, Formwork, Kennel, Veterans

Background

The California Veterans Assistance Foundation is a non-profit based out of Bakersfield, California that aims to serve all of Kern County. The foundation was created to provide for veterans who are homeless, at risk, or of low income who need a place to stay. Homeless prevention is at the forefront of their mission with a goal of preventing both first time and repeated homelessness. The foundation has been able to do just that with new developments such as tiny homes and apartment buildings being constructed and retrofitted in the area for veterans in need. When I heard about this association I reached out to see if they needed a helping hand in any of their upcoming projects. The opportunity to upgrade their dog kennels arouse and I jumped right on it. I come from a military family and a long line of veterans and firmly believe in providing the necessary resources for military members. I figured that upgrading the dog kennels for the service dogs at the facility would be a perfect opportunity to give back to those who risked their lives for our country. Prior to this project, I had experience with project management through both my classes at Cal Poly and my three summers of interning in the construction industry. I have learned to strategically plan out a project before embarking on it to make sure the process is completed as efficiently as possible. Despite this

experience in the classroom and in the field I had never been in charge of carrying out a project like this with just the help of one other person. My experience at Cal Poly prepared me to embark on this process and navigate my way to a successful project.

Process

Funding

The funding for this project was donated by local businesses in Bakersfield. All of the chain link fencing materials including the posts, rail ends, brace bands, tension bars, tension bands, bolts, nuts, and ties were donated by Mike's Fencing. The ready-mix concrete used to construct the 96 sf. kennel pad was donated by Penny Lawn Service Inc. The rest of the tools and materials were donated by Terrio Therapy Fitness. Without the help of these three generous local businesses this project couldn't have been completed. The funding allowed us to be able to build the best kennel possible for the veterans in need without having to worry about budget restrictions.

Design

The design of the project was left in our hands. When I reached out to my contact at the California Veterans Assistance Foundation, Eric Martinez, he specified that he wanted two separate kennels constructed, one for large dogs and one for smaller ones. He gave rough dimensions of a one large kennel with dimensions of 4'x8'x 6' and one small kennel with dimensions of 4'x 5'x 5'. Other than these rough dimensions Eric left most of the design process up to Luke and I telling us to draft a plan and get back to him when we had an idea. There was no material specified for the kennels or exact location given. I drafted up a design of an "L" shaped kennel placing the smaller 4' x 5' kennel in the front and the larger 4' x 8' kennel along the back (Figure 1). This design allowed the gates to open outwards to not interfere with each other and provided a one-foot gap between the kennels to keep the dogs from playing with each other through the fence. I placed the design on top of a 3½ in. concrete pad spreading a foot in each direction out from the kennel structures to provide a step up to the structure and prevent any vegetation from interfering with the fencing. Chain link was chosen for the kennel structures due to its strength in keeping in large dogs and weatherproof characteristics that help it withstand the hot Bakersfield climate. I presented the design to Eric in a zoom meeting a couple of weeks later and he said it would work perfectly. He then emailed us a picture of the site we were working with so we could mitigate in potential hazards and plan out our construction process.

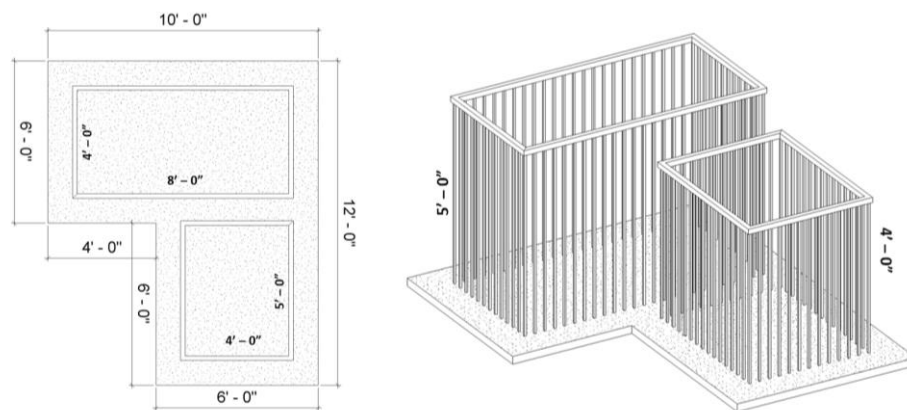


Figure 1. Kennel design. Chain link material not depicted in drawing for aesthetic purposes.

Construction

Day 1

The first day of the project consisted of gathering the proper materials, visiting the site, meeting with the veteran's association finance officer, and grading the foundation. The materials for the day consisted of a Milwaukee circular saw, a 7 ¼ in. wood cutting blade, two 12 ft. 2x4's, four 6 ft. 2x4's, fourteen pine grade stakes, two shovels, one bucket, a can of spray paint, a tape measurer, a level, a hammer, a screwdriver, and screws. Once all of the materials were purchased Luke and I measured and cut the 2x4s in our garage to the proper dimensions accounting for the 1.5 in. of overlapping where the wood overlapped. These would be used as formwork for the concrete pad. We had decided previously to pour a 3.5 in. pad to have it level with the actual height of 2x4 laid on the ground. Luke and I then went to the site to meet with Eric Martinez. Eric is the finance officer for the California Veterans Assistance Foundation who we had been corresponding with over zoom and through email but had never meet face to face. Eric informed us of the gate code for the facility and the area we were allowed to work in for the project. He coordinated the removal of the old kennel to a different housing location earlier that morning so that we had space to work on the upgraded one. He informed us that the veteran's foundation didn't have an exact location picked out for us, so we were free to construct the kennel wherever we saw the best fit. The old kennel location worked the best for our L shaped design as it would be out of the way of the existing pavilion structure and horseshoe game set up.

Once the guidelines were established Luke and I got to work laying out the site. We set up our formwork on the ground in the proper arrangement and screwed the 2x4's together. This gave us an idea of what the concrete pad was going to look like in the space. We ran into a problem with a concrete pipe located to the right of the site next to the existing pavilion. We were forced to move our kennel pad about a foot away from the pavilion pad in order to not interfere with the pipe. Once we decided on the proper place for the kennel footing we spray painted the grass around the outside edges of the 2x4 formwork (figure 1). This allowed us to know where we would need to dig out and level the ground. Once spray painted, we unscrewed the formwork and moved it to our material stockpile out of the way and began excavating the existing soil. This process proved to be more daunting than we had anticipated. By the time we got to digging it was mid afternoon in the heat of a Bakersfield summer day. Not only were the conditions less than ideal for manual excavation, but the soil conditions were far harder than expected. We worked on excavating the top layer of grass and then smoothing the soil underneath. The excavation process was daunting, but with both Luke and I digging the process took around an hour. We piled the excavated soil into two material piles on each end of the site and cleaned up the site for the day (figure 2).



Figure 2. Spray painted border for excavation Figure 3. Completed Excavation after day 1

Day 2

The second day of the project consisted of gathering materials, preparing the site for concrete, setting the holes for the chain link corner posts, and pouring the concrete. The first task for the day was to gather materials. The materials for the day consisted of two 50 lb. bags of Quikrete, a post hole digger, four 8 ft. galvanized metal fence corner posts, four 7 ft. galvanized metal fence corner posts, a 2x4 screed, a wheelbarrow, two trowels, premixed concrete, a hammer, nails, and a water bucket.

Once all the materials were acquired we headed over to the site and began to set up our formwork now over the leveled ground. To install the formwork, we made sure that our 2x4's were level with each other in order for our concrete to be poured to a level surface even throughout the entire pad. Once the formwork was nailed together in the proper position we used the stakes we purchased the day before and hammered them in on each side. We placed two stakes on each of the shorter sides and three along the 10 ft. and 12 ft. side. Once the formwork was set we began to work on the corner posts for our chain link fence. The posts were to be 1 ft. from each of the corners of formwork. We measured them one by one with the tape measure and spray painted the ground to represent where our holes were to be dug. We then took turns using the post hole digger to dig out the holes for the corner posts. The holes were dug 2 ft. deep to ensure that the post was set $\frac{1}{3}$ of the distance below ground as it was to be above ground. Digging out the holes was easier than I had expected but was still a daunting task. We didn't have access to an auger, so we had to use the post hole digger to dig down 2 ft. into the soil for all eight corner posts (figure 4). Once the holes were dug we began to install the 8 ft. corner posts one by one. I would hold the post in place and use the level to make sure that the post was level and exactly 90 degrees from the ground. While I was holding the post level Luke poured $\frac{1}{4}$ of the bag of Quikrete into the hole and then poured around $\frac{2}{3}$ of that amount in water after. Luke gradually added water to the mix until the mix reached a uniform consistency. We ran through this process with the remaining seven corner posts. A problem arose quickly when we moved onto the second post and realized that our first post was no longer level. We realized that we had to hold the post in place for 5-10 minutes after we poured the quickrete in order to keep our posts level. This slowed down the process, but vastly increased the quality of our work in the end. Before we moved onto the next post each time we would make sure that the posts were level with each other by spanning an extra 2x4 over the posts and placing the level on top.

Once all the posts were set we were now ready to pour the concrete. I have experience working with concrete from my internship with Granite Construction. I learned how it was poured on a much larger scale and what the necessary procedures were for a successful pour. We calculated that we would need 1.04 CY of concrete for our pad. We were fortunate enough to have Penny Lawn Service Inc. donate as much ready mixed concrete as we needed. We told them our amount and added 5% to be safe. Penny Lawn Service Inc. confirmed that they would be able to deliver it to our jobsite. We had originally envisioned pouring the concrete early in the morning during the coldest part of the day, but we received a call from our supplier the day before telling us that they were only available to deliver to us at 11am. We adapted to the situation and made it work. The concrete was delivered right on time at 11am just as we had finished setting the corner posts. The concrete truck parked in the lot adjacent to our site in order to easily access the pad. Luke and I then worked together to pour the concrete from the truck into our wheelbarrow and roll it around the corner to our site. Luke poured the concrete into the pad as I leveled it out with the screed. We made multiple trips back and forth from the truck to fill up the wheelbarrow, pour it on the pad, and level it out with the screed. Once all of the concrete was poured Luke and I worked together to use the screed and level it out to an even surface. We ran into problems trying to maneuver around the posts that we had just placed. The areas around the posts were more difficult to flatten, but we eventually evened it out. Another problem arose during one of the last wheelbarrows pours where I missed the formwork and ended up spilling a little bit of concrete

onto the surrounding soil. I cleaned it up as best as I could and placed it into our waste pile. Despite this, we ended up having just the right amount of concrete for the job due to our accurate calculations during preconstruction. We then waited for 30 minutes to make sure that the concrete started curing properly and that no blowouts occurred in our formwork. After this we cleaned up the site for the day and informed the veterans living at the facility, the site manager, and Eric Martinez to make sure to stay off of the concrete for the weekend in order to let it cure (figure 5).



Figure 4. Setting posts prior to pour



Figure 5. Finished concrete pad directly after pour

Day 3

We left the site for the weekend to let the concrete cure enough to be able to be walked on. On Monday we had the task of gathering materials and installing the chain link fencing for the kennels on top of our concrete pad. The materials for the day consisted of a circular saw with a steel cutting blade, metal cutting pliers, a socket wrench, two 8 ft. top rails, four 7 ft. top rails, a 13 ft. roll of 5 ft. chain-link, a 20 ft. roll of 6 ft. chain link, eight dome caps, twelve rail ends, twelve brace bands, twelve 6 ft. tension bars, forty-eight tension bands, sixty bolts, sixty hex nuts, and twenty metal chain link ties. All materials were donated by Mikes Fencing for the project. Once all of the materials were acquired from the Mikes Fencing yard, we headed over to the site.

The first task for the day was to measure the actual dimensions between the corner fence posts as they had changed slightly from our plans. Luke measured the dimensions and subtracted 3 in. from each one in order to account for the distance that the rail ends stuck out from the posts. He then cut the top rails to size as I worked on clamping the brace bands to each of the posts. The four outside posts had one brace band and the four inside posts had two. I used the tape measure to place the brace bands at the proper heights which were 6 ft. for the large kennel and 5 ft. for the small kennel. Each band was fastened together with the rail ends using a bolt and nut. I ran into a challenge as I used the socket wrench to tighten the nuts onto the bolts. The wrench could only tighten the nuts so far until an extender was needed which we didn't have. To overcome this obstacle, I used pliers to finish tightening the bolts for these brace bands. Once I had done this Luke had finished cutting the six top rails. We then installed these together inserting them into the rail ends on each corner.

Once the top rails were installed it was time to cut the chain link. We worked to complete the small kennel first using the 5 ft. roll of chain link. Luke and I alternated calculating the length of fencing

needed by measuring from post to post and cutting the chain link with the metal cutters. We learned that we only needed to cut the bottom connection of the chain link spiral and then spin the spiral apart to detach the section we wanted. Once a section was cut we would hang it onto the fence using the tension bands on each pole. Four tension bands were installed on each outside pole while eight were installed on the four inside poles to allow for connections for the two directions of chain link. The tension bands were attached the same way as the brace bands with nuts and bolts only this time the chain link and a tension bar had to fit into the connections (figure 6). This proved difficult as we often misjudged the amount of chain link we needed when we cut it and were left with too much chain link when we tightened it along the fence (figure 7). When this happened, we would cut one or two vertical strands off of the chain link and try again to see if it fit.

Once the chain link was at the right length we would tighten the tension bands to the chain link to keep it sturdy onto the fence. This process was difficult and tough on the hands as many of the tension bands were hard to close with one hand as the other hand was trying to tighten the nut. Once one side of the chain link was attached we would slide the tension bar in through the fence and into each tension band. Luke cut the tension bars to size with the circular saw as we needed six for the 5 ft. kennel and six for the 6 ft. kennel. Once the tension bar was in place you could repeat the process on the other side, tighten the tension bands, and slide that bar into place. When both ends were secured with tension bars and bands I used the pliers to wrap the metal chain link ties around the top rail to attach it to the fencing. I tied three ties for each of the shorter lengths of fencing and four ties for the longer lengths. The ties were evenly spaced to allow for the best fence stability. Luke and I got into a rhythm once we got the hang of installing the fencing. We would work together to get the fence started and then split up to finish it off and screw in the nuts and bolts to tighten it. This process took around five hours from start to finish to install the six sides of fencing on the kennels.



Figure 6. Finished corner with tension bars, tension bands, and metal ties.



Figure 7. Measuring the chain link section before hanging

Results

The project was a success overall. The concrete pad was constructed without any major mishap and the chain link kennel structures were installed efficiently. The project was organized and completed to the best of our ability. The risk of the material shortage for the project was mitigated as well as possible as we coordinated with the suppliers early on in the process to ensure that the concrete and fencing material would be available when we started our construction process. The major roadblock in the project was the lack material for the kennel gates. Each kennel was completed minus the gate structure due to our chain link supplier Mikes Fencing not having premade fence gates in stock. The fence contractor will have to custom make the two gates, one for each kennel. They ensured us that this is a minor issue as they can get the gates done in the near future and go out to the site to install them themselves. The three-sided chain link kennel structure that Luke and I constructed allows for easy installation of the gates once Mikes Fencing completes them (figure 8). I learned many lessons throughout the project that can be applied to future projects down the line. These mainly stem from improper time estimates. The amount of time it takes to dig out and install fence posts or how long it takes to hang chain link fencing was underestimated. If I was to do the project again I would have allotted more time in the morning before the concrete truck came to not be as rushed when we were setting the corner posts. I would have also upgraded the tools I was using to do the job if at all possible. The post hole digger could be replaced by an auger to speed up the drilling process and make more accurate holes. I would buy an extender for the socket wrench or use shorter bolts to speed up the install process for the bands for the chain link fencing. When pouring concrete, I would have gotten a helping set of hands as Luke and I struggled to do such a large pad with a two-man crew. Overall, the project ran smoothly, and the work was completed, yet it could have been done more efficiently with the information I learned if recreated in the future.

Conclusion

The veteran's association was pleased with our work and thanked us for our donation. Once the gates are installed the final product will be able to achieve the goal of improving the quality of life for veterans located at the site and provide housing for their service dogs that help them with post-traumatic stress disorder and other needs. It was encouraging having many of the veterans that live at the facility come out of their homes to talk to us about the project and to meet their dogs who will be using the kennels. Some of the veterans even lent a helping hand when we were thirsty and needed water. Their generosity motivated us to do our best work possible. The project was completed with quality at the forefront of our minds to ensure that the kennels stand for years to come, and I am sure they will do just that.



Figure 8. Finished kennel structure before gate instillation