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/post-traumatic stress dogs at the shelter. A team of two Cal Poly Construction Management students consisting of myself and Spencer Allen worked to design, estimate, coordinate, and construct a new kennel structure for the site. The roles were divided in the project between the preconstruction and construction phases. During preconstruction, I was in charge of reaching out to local businesses to provide funding and materials for the project, and Spencer scheduled the job while also working on drawings of the structure. 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 Association was created to provide free housing for Veterans in return for maintaining sobriety and a full-time job. The California Veterans Association we aided is based out of Bakersfield, CA, and has expanded to serve all Veterans in the Kern County area. Their main goal is to minimize the growing homelessness problem among Veterans in Kern County. They have purchased various apartment complexes through charity and have even begun constructing tiny homes to create more housing opportunities for homeless veterans. I contacted the California Veterans Association when I decided to do a project-based senior project because I knew there are many opportunities to help their mission of getting our veterans off the streets. Upon hearing that they needed dog kennels constructed to provide for their various service/Post-traumatic stress animals, I knew it was a project I would love to do. I have many veterans in my family and I understand the sacrifices they make to serve our country and anything I could do to help their mission was important to me. Utilizing the knowledge I have gained from my Cal Poly construction management classes and summer construction internships I was able to create a solid plan and manage this project properly. The experience Cal Poly has given me navigated me to successfully and efficiently complete this project.

Process

Funding

All funding necessary to complete this project was given to us through donations from local businesses in Bakersfield, CA. The tools needed to complete the project, including wrenches, shovels, saws, etc., were donated by Terrio Therapy Fitness. The ready-mix concrete needed for the 96-square feet pad for the base of the dog kennels was donated by Rosedale Concrete. Lastly, all chain link materials including posts, ties, tension bars, tension bands, bolts, nuts, etc., were donated by Mike’s fencing. The generosity and help from these local companies provided us with all the necessary materials needed to complete this project successfully.

Design

Through our contact, Eric Martinez, we began having conversations about what he was expecting out of the dog kennel construction. After many deliberation meetings, it became apparent to us that he was looking for two separate dog kennels, a larger one for larger dogs, and a smaller one for smaller dogs. Utilizing the experience we have gained from various Cal Poly design classes we began working on the design through the Revit program. Eric was expecting one kennel to be roughly 4’ x 8’ x 6’ and the other smaller kennel to be 4’ x 5’ x 5’. He then asked us to create a design and then meet later to review it and get it approved. We decided to go
with an L-shaped pad that we could place both kennels on in order to prevent us from having to pour two separate pads. We ensured that there would be a one-foot gap between the two kennels to keep the dogs in separate kennels far enough apart from each other. We planned to place the large kennel (4’ x 8’) in the back of the pad and the smaller kennel (4’ x 5’) in the front for aesthetic purposes. We chose a 3 ½” concrete pad with a foot spacing around the perimeter to provide a step up to the structure while also preventing any vegetation from growing into the structure. We also chose chain link as our material for the kennels due to the strength it provides for keeping dogs inside and the durability against the naturally hot climate of Bakersfield. Upon completing our design (Figure 1), we then presented it to Eric Martinez over zoom for his review and approval, and he approved.

![Figure 1. Revit Kennel Design. Chain Link material is not depicted in drawings for aesthetic purposes.](image)

**Construction**

**Day 1**

The first day of the project began with us going to meet Eric Martinez at the site location and confirm our plan of attack. This was our first time meeting in person since we had previously just coordinated over zoom. He gave us the gate code for the site and also coordinated the removal of the previous kennel so we had a clear site upon arrival. He also informed us that we were allowed to choose the location of the new dog kennels and upon reviewing the entire site we decided that the best location would be where the previous dog kennel stood. The day would consist of grading the site, purchasing tools, and preparing formwork for concrete on Day 2. Upon assessing the site conditions we determined what tools we would need to properly get started on the project. The materials needed for the day consisted of a Milwaukee circular saw with a 7 ¼ in. wood cutting blade, two 12 ft. 2 x 4’s, four 6 ft. 2 x 4’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.

Spencer and I began by cutting the 2 x 4’s in our garage to create the formwork for the concrete pad. As previously mentioned, we had chosen a 3 ¼” concrete pad because that is the exact height of a 2 x 4 when laying on its side. This gave us a good visual of the thickness of the pad and made keeping a consistent height of the concrete simple. We then traveled back to the site to begin. We started by laying out our formwork in the proper arrangement as what we had recently cut them to, this guaranteed that our pad would be 96-square feet. After laying the 2 x 4’s out we then screwed them all together to keep them in place. We had an unforeseen condition occur, a concrete pipe was in the area we selected so we were forced to move the future structure over a foot. Then we spray-painted a perimeter line around the formwork so that it could be visualized upon removal of the formwork. Once the formwork was removed we utilized the spray-paint line as the perimeter of where we began grading (Figure 2). Using shovels, Spencer and I dug roughly an inch down and leveled the site. We were unaware of the soil conditions prior to grading and it was much more difficult than we expected. It was also late afternoon in Bakersfield heat so the temperature exceeded 100 degrees. The excavating and grading process took us roughly an hour (Figure 3). After leveling the soil we created two piles of excavated soil and watered them down to prevent unnecessary dust from drifting into the air. We then cleaned up the remainder of the site and headed home for the day.

Figure 2. Spray-painted perimeter for grading

Figure 3. Completed excavation
Day 2

The second day of the project consisted of gathering materials, digging holes for posts, setting posts with Quikcrete, setting our formwork, and lastly pouring concrete. 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. We then headed to the site with all of our necessary materials for the day in hand.

We began by putting our 2 x 4 formwork together with a hammer and nails over our newly graded ground. We ensured that our formwork was completely level by using an air bubble level in order to confirm that the concrete pad would also be level. From there we measured every hole location where we would be setting our posts. We used spray paint to mark these exact locations on the newly graded ground. Once every location had been marked and remeasured for accuracy we began digging 2 feet holes with a post hole digger (Figure 4). The holes were dug 2 feet so that the posts would be set with ⅓ of the post into the ground to ensure stability. Once again the soil conditions proved to be challenging since the ground was extremely hard. We placed all the excavated dirt into our two designated soil piles that we established during the grading process. Once every hole was dug we began installing the 8’ posts one by one. Spencer was in charge of placing the post in the hole and then using a level to ensure the post remained level during the Quik Crete process. While he did that I used our Quik Crete and a water bucket to begin filling these holes and setting them while Spencer maintained a level post. I gradually poured water into the Quik Crete mix until I achieved a uniform consistency. After doing the very first post we moved to the next one immediately but quickly realized that our first post was no longer level. To fix this dilemma, Spencer would hold the post level for an additional 5-10 minutes after the Quik Crete and water were poured to ensure that the post remained level until the Quik Crete had fully hardened and set. This slowed down the process since there were only 2 of us and we needed both of us for every post installment but it drastically improved the quality of our work since each post remained level. Before moving onto each new post we used an extra 2 x 4 and a level to ensure that each post was the same height from the ground before beginning the Quik Crete process. We continued this process for setting each post, including the 7’ posts for the smaller kennel.

Once each post was set and level we then began preparing for concrete. We discussed ready-mix concrete delivery with Rosedale Concrete the night before and established a time of 11 am delivery. We calculated that we would need 1.04 cubic yards of concrete and added an additional 5% to ensure we would have enough. Rosedale Concrete was happy to provide us with as much concrete as we needed. Just before 11 am we watered down our graded dirt and the concrete truck arrived promptly at 11 am. The truck parked in a parking lot adjacent to the site, with a ready-mix trailer full of concrete. We then worked together making trips out to the truck to pour
the concrete into a wheelbarrow and move it around the corner to the site. I poured the concrete from the wheelbarrow as Spencer used a screed to begin flattening out and spreading the concrete into our pad. One issue we ran into was maneuvering the concrete around the posts we had just set, it was difficult to pour the concrete in certain places because of the set posts. However, we were capable of pouring it in certain areas and then moving the concrete with the screed. It took multiple trips to unload the full cubic yard of concrete from the truck and onto the pad. Once the concrete had all been poured Spencer and I then worked together using the screed and trowels to flatten and level out the concrete. Another problem arose when trying to maneuver and flatten the concrete around the 8 posts we had set, it took more time than the open areas but eventually we successfully flattened and leveled the entire pad. In certain areas, we spilled concrete outside of our formwork but we successfully cleaned up these areas and moved the concrete into our designated waste piles.

Thanks to our accurate calculations during preconstruction the spilled concrete did not cause an issue with the amount of concrete we needed to fill the pad. Once the concrete pad was finished, we waited 30 minutes to ensure that no blowouts occurred with our formwork. Our diligence in installing the formwork paid off and no blowouts occurred. We then made a call to Eric Martinez and asked him to message the complex and ensure no one walked on the pad as it cured over the next few days (Figure 5).
Day 3

After waiting for the concrete to cure over the weekend we began our third and final day of work on Monday. This day would be focused on gathering materials, removing the formwork from the concrete pad, installing all of the chain link fencings, and final clean-up. 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. After collecting all of our fencing materials generously donated by Mike’s Fencing we headed to the site.

Our first task was removing the formwork from the cured concrete pad, with the use of a hammer the formwork could be easily knocked off and disposed of. Then we began remeasuring the fence posts since they were slightly different than our original design. In each measurement I subtracted 3 inches to account for the 1 ½ inch rail ends that stuck out from the posts on each side. Once we had all of our measurements, Spencer began clamping the correct amount of brace bands to each post. While he worked on this I took our new measurements and began cutting the top rails with the circular saw. He placed each brace band at its correct height of 6’ for the large kennel and 5’ for the small kennel. The outside posts needed one brace band and the inside posts needed 2. Once set to their correct height using a tape measure they were then fastened with a nut and bolt. We ran into a slight issue while fastening the bolts, in order to fasten them completely, we needed an extension for the wrench. To combat this issue we used pliers instead to completely fasten each bolt. While he worked on this I took our new measurements and began cutting the top rails with the circular saw. Once both of these tasks were complete we worked together to install each of the newly cut top rails into the rail ends, 6 in total.

Our next objective was to cut the chain link to its appropriate length to fit each section. We began with the 5’ chain link to install the small kennel fencing. During this phase, Spencer and I alternated measuring the distance between posts and cutting the chain link with metal cutters (Figure 6). After a few tedious cuttings of the chain link, we discovered we only need to cut the top and bottom of the chain link since it was spiraled together and could easily be spun out rather than cutting every single section. Once a section of chain link was cut we would hold it up and begin connecting it to the tension bands on the post. Eight tension bands were needed on the inside posts while only four were needed on the outside posts. The tension bands, like the brace bands, were fastened using nuts and bolts. The chain link had to be the perfect size in order to fit into the tension band connections correctly while also being taught enough to maintain structural integrity (Figure 7). This ended up being more difficult than we imagined and were forced several times to recut until we had the perfect amount of chain link vertical strands to fit. It was very difficult to fasten the tension bands because many of them were hard to close while also screwing the bolt to the nut, we both had multiple cuts on our hands from this process.
Once the chain link was attached to each tension band the next step was to install tension bars on each side of the fence. I went back to the circular saw to begin cutting tension bars to size as Spencer continued to tighten bolts for the tension bands. 12 tension bars in total were needed for the fence. Once they were cut we began installing them into our fencing that had been hung up. After this step, we began installing the metal ties on the top of the fence by using pliers and wrapping them around the top of the chain link and the top rail for extra support. We decided to install 3 ties on the shorter runs of the fence and 4 ties for the longer sections. After completing a few sections together, Spencer and I began to develop a quicker pace as we understood the process better. We repeated all of these steps six times in total for the six sections of the fence. In total, this process took us roughly five hours to complete the entirety of the chain link.

Results

The project was extremely successful overall. We were able to work together efficiently and construct the dog kennels with no major issues. The coordination of our preconstruction planning made the actual project construction seamless. We diligently discussed all materials that would be needed for the project as well as calculated the total quantity of material we would need. This helped us mitigate the risk of potential material shortages ongoing in the industry. Each kennel has been completed minus the gates of the kennels. However, we have coordinated with
Mike’s Fencing our chain link supplier to finish building specific gates for the kennels and they will be installed shortly. They insured us that it is only a minor issue and material has been tough to come by but they will be able to complete them in the near future. The way we constructed the kennels provides easy installation of gates. We did underestimate the time it would take for grading and set the fence posts. If I were to complete this project again I would allot more time for this phase of the project. We felt rushed in setting the posts since we knew concrete was coming at a specified time. However, we buckled down and completed it just in time for ready-mix concrete. We would have also replaced the post-hole diggers with an automated auger to simplify and quicken this process. We also would have replaced the socket wrench we used with an extended socket wrench with a greater amount of torque to make the nuts and bolts process easier. Another element I would change would be to include a few extra people in the concrete pour phase. Only having two people for that size of a concrete pad proved to be difficult since you have to work extremely quickly to pour, level, and smooth the concrete before it begins to harden. Overall the project was completed successfully and with great quality, these changes would solely make the process go faster, not change the outcome.

**Conclusion**

The California Veterans Association was extremely pleased with the quality and timeliness of our work. It was rewarding to improve the quality of life for our veterans and their service animals. We were encouraged every day since we were able to meet most of the veterans living in the facility and their dogs. They never failed in conversing with us and letting us meet their service animals. They even offered to lend us a helping hand by bringing us water on the hot days we were working and also watering down our site so the soil conditions were better for us. Our project was completed with great quality and will last the veterans and their service animals for years to come.

![Completed dog kennels](image_url)