

Growing Grounds Farm & Nursery - Serenity Shade Structure

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Faculty Advisor: Kevin Dong

Location: 3740 Orcutt Road, San Luis Obispo, CA 94301

Overview

This project includes the design and construction of a shade structure over the serenity seating area at Growing Grounds Farm & Nursery. Growing Grounds is a part of Transitions-Mental Health Association. It is a nonprofit wholesale nursery that provides horticulture, socialization opportunities, paid employment and soft job skills training for adults with severe and persistent mental illness. The shade structure will serve as place where staff and volunteers can gather and sit.

Background

Keenan Brekke, a Cal Poly construction management alumni (2018), built the concrete planters and benches at the serenity seating area where the shade structure was built. The shade structure covers this area and is a continuation of Cal Poly CAED involvement at Growing Grounds. The shade structure consists of six isolated (pole) footings that support six posts which support the main beams of the structure. The original design of the structure utilized prefabricated panels for shade constructed out of angled wooden slats. Due to unforeseen increase in lumber prices, the prefabricated panels were substituted with three canvas shade clothes. This ended up saving money during construction.

The Project

After meeting with the staff at Growing Grounds in winter 2021, I decided on a design for the structure. One goal for this project was to build a structure that was very low maintenance and built to the last. Since Growing Grounds is a nonprofit organization, I wanted to leave them with something that would be cost free. We discussed post locations to optimize the flow of people in and out of the structure. An additional design consideration was creating an opening for a tree to grow through at the corner of the structure. Once the framing layout was determined, I started sizing the members and designing the reinforced concrete pole footings. Simpson Strong-Tie post bases were specified so that 6x6 posts could cantilever from the ground and provide support for both gravity and lateral loads. The 6x8 beams attach to the posts with Simpson post buckets. The structure was designed for dead load along with a service live load of 200 pounds. This would occur in the event of someone standing on structure for maintenance. After finalizing the design with my advisor during winter, I began construction during spring 2021. First, I used a hand-held post hole digger to make 6 holes (18" diameter x 36" deep) (image 4-7). Next, I utilized the CAED shop on campus to bend the rebar hoops and tie the cages (image 8&9). I used concrete dobies to set the cages in the holes to maintain a clear distance of 3" from all dirt to rebar. On Saturday May 22, I rented a concrete mixer and towed it to Growing Grounds. We mixed and poured 50 90 pound bags of concrete. Each pole

footing was filled with concrete until 3/4 full and then the post base was set into the hole using a wood form and stakes (image 11). Once the base was plum, the rest of the concrete was filled into the hole using a shovel. Stakes and a string line were used to make sure all posts were aligned properly. A square form was placed on the ground surface to provide a finished concrete square look at all post bases. Once the concrete cured for a few days, the forms were stripped and stakes were pulled. This is how I left the project for summer 2021.

Returning to SLO for fall 2021, I was very excited to start framing. I ordered the wood through Big Creek Lumber in Paso Robles and got it delivered. First, I set all 6 6x6 posts into their bases. I then went at night and set up my laser level on a ladder to set an 8' height for all posts. Since the elevation of the post bases varied, the laser level allowed for me cut all post tops to the same elevation. Once the posts were cut and installed into their bases with SDS screws, I attached the post buckets (image 12). Next my roommates/friends helped me set the 6x8 beams into place (image 13/14). After the main level of 6x8 beams was in, I began framing the upper level. I started by moving the 4x8s into position and fastening to the tops of 6x8s (image 19). Then 2x8s were cut and framed between the 4x8s (image 21). Finally, I used a 2x8 redwood fascia to wrap around the upper level of framing. The last step was installing the shade cloth.

Reflection

As my time in San Luis Obispo draws to a close, I could not be happier to leave Growing Grounds with this shade structure. Building this was extremely gratifying for me. Throughout the entire process, the staff at Growing Grounds was very supportive and always motivating me to do my best work. After seeing the quality of Keenan's work on the benches and planters, my goal was to make the shade structure of equal caliber. The ARCE program at Cal Poly gave me the skills to design the structure and being able to actually build something and see the process go full circle is satisfying to say the least. It was a nice end to my time at Cal Poly and I am grateful that I could leave the community of San Luis Obispo with something that will last.

I want to thank all my friends for helping me throughout the construction process. I could not have completed the project without them. I also want to thank everyone at Growing Grounds for continuous support and words of encouragement. I also want to thank Kevin Dong for his support and guidance throughout the design and construction process. I could not have completed this project without him. Lastly, thank you to my parents, Amy and Andy, for their support throughout my time at Cal Poly.

Thank you to the project sponsors:





Image 1 – Site before construction (Winter 2021)

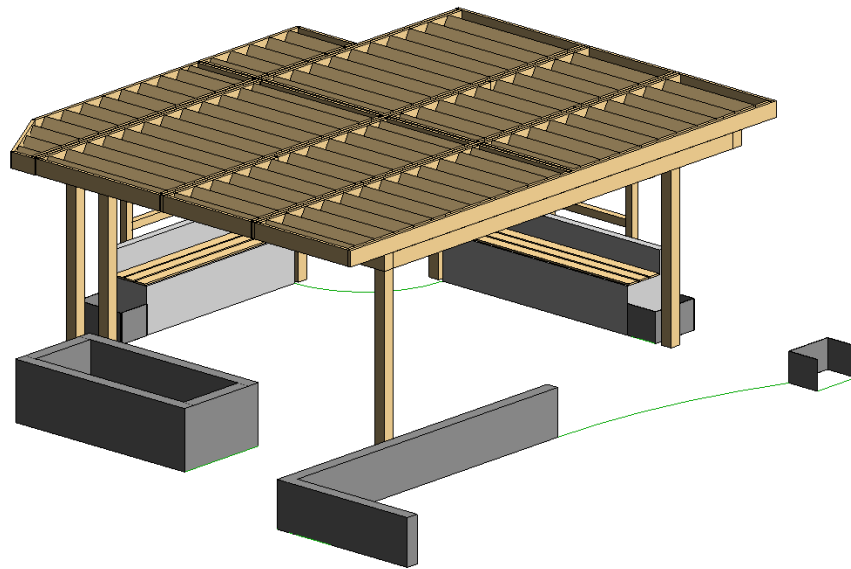


Image 2 – Initial Design

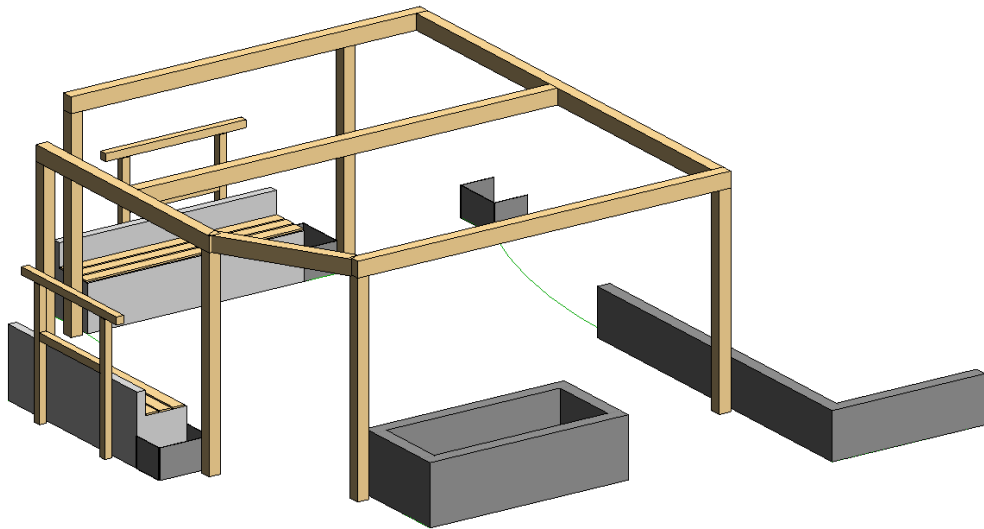


Image 3 – Initial Design



Image 4 & 5 – Digging Post Holes and Checking Depth



Image 6 & 7 – 18" diameter X 36" deep



Image 8 & 9 – Rebar cages ready to set and post bases going in



Image 10 - 50 90 lb. bags of concrete poured in one day



Image 11 – Post base installed and concrete cured



Image 12 – 6x6 posts in place, ready for 6x8 beams





Image 13 & 14 – Team work to place the 6x8 beams



Image 15 – Hammering the beams into position



Image 16 – Post to beam connection



Image 17 – Growing Grounds employees liked the long cantilever so I left it



Image 18 – 4x8s moved into position ready to be aligned



Image 19 – 4x8s fastened to 6x8s with Simpson ML24 angles. One on each side.



Image 20 – First perpendicular 2x8 installed.



Image 21 – 2x8 framing



Image 22 – 2x8 redwood fascia installed. Ready for shade cloth



Image 23 – Nearly done



Image 24 – Shade cloth on





Image 25 – Finished structure



Image 26 – The structure from underneath