United Methodist Children’s Center Playground Improvements Senior Project

Kyle Passey
California Polytechnic State University, San Luis Obispo
San Luis Obispo, California

Mario Taurian
California Polytechnic State University, San Luis Obispo
San Luis Obispo, California

Hayden Garcia
California Polytechnic State University, San Luis Obispo
San Luis Obispo, California

The project consists of multiple pieces that were done as a team to improve the outdoor areas of the United Methodist Children’s Center. The scope of the work consists of placing gorilla hair mulch, making a bench for the kids, removing, grading, and placing artificial turf, and replacing the canvas of a shade structure. There are a few other smaller pieces that will be completed as well but those are the main pieces of the project. The project was executed by teaming up with multiple companies and getting teams of students together to construct the pieces of the project in the timeline we were given. Being a children’s center, there was a challenge with working around their schedule and not interfering with the kids. This project began in February of 2023 and was completed on June 4, 2023. The children’s center was left with a cleaner, safer playground for their students to enjoy during their recess, and the members of the project team left with a new understanding of what goes into placing turf, mulch, building benches, and replacing a canvas shade structure.

Key Words: Project, Mulch, Turf, Shade Structure, Bench

Introduction

This project came about with the help of Bryan Knakiewicz. This team approached Bryan and brainstormed ideas of service projects that could benefit the community. He said that the United Methodist Children’s Center (UMCC) had some projects that they wanted to get done to create a safer environment for the kids. After contacting the manager at UMCC, Liz Richardson, a meeting was set up to get a better understanding of what they wanted done. They had a list of potential service projects, and decided to work on replacing turf, mulch, a shade structure. One of the projects they wanted done was benches, but they did not have an exact design in mind. Liz mentioned repairing their old benches, but the idea of building new ones from scratch was more appealing to coincide with the other renovations.
Steps Taken

The first step of this project was to talk to the client and get a plan in place to attack the project. Being a children’s center, the children are there during the week, so all the work onsite needed to be done over spring break or on the weekends. This set the basis for creating the schedule. Each component of the project was scheduled around the working hours known to be available throughout the year.

Continuous rain in the beginning of the year greatly impacted the schedule. The end of March was the best time to attack the turf because it was spring break for UMCC, and the turf was going to be the longest and toughest part of the project. Doing the turf this week ended up being a great decision because it took us the whole week and both weekends to complete. Once the turf was finished, the project moved on to the mulch portion. The existing irrigation lines were tested, and then new mulch was laid on top. The benches were the next focus, and these took a few weeks to plan and get started due to the struggles of getting all the required materials. The last step was ensuring the shade canvas was ordered as soon as possible. This was evidently the longest lead time item, so it was essential to order as soon as confirmation was had from UMCC. This allowed for the completion of our schedule.

Artificial Turf Replacement

The United Methodist Childrens Center had many projects that were needing immediate attention. The largest in size and cost was the removal and replacement of the Artificial turf in two of the playground areas. The existing turf had been installed roughly 20 years ago and since its installation there had not been any maintenance to it. Figures 2 and 3 below show the condition of the old turf. The majority was covered in sand and dirt from the surrounding sand boxes and the vibrant green had faded to the muted green that is shown below. The UMCC originally wanted to have only their main playground replaced, which was going to be 1200 square feet, due to the cost that was going to be associated with the replacement. This quantity ended up increasing to 2,200 square feet after the project received a $2,000 from the CMAC.
The Project group along with the UMCC Principal did an initial site walk and discussed the options we had for completing this project. It was during this site walk that it was discovered the existing base had not been installed correctly. The Artificial turf suppliers recommend installing 1 inch of Decomposed Granite over 2 inches of Drain rock, the existing base consisted solely of dirt with no suitable base being used. After the Site walk it was decided that the best course of action would be to install all aspects of the turf to the manufacturer’s specifications. This would require us to excavate down 3” over the whole area of turf and bring in all new bases. It was also decided that the work would be completed over the Childrens Centers Spring Break which was from March 24th to April 2nd. This provided only 10 days to get all of the work completed.

In order to get the project started the Childrens center needed an estimated cost for the Removal and replacement of the artificial turf. Below Figure 4 has all of our original cost listed out. The first item we needed to get ordered was the Artificial Turf. Upon further evaluation of the costs, it was discovered that the lowest price was going to be $3.00 per square foot. It was then brought to the group’s attention that Professor Brinkman at Cal Poly would be able to order the turf through his account with a supplier and it would bring the cost down to $1.61 per square foot. This resulted in thousands of dollars in savings and made this project a reality for the Childrens Center. The next item we needed to get ordered was the ¾” Drain Rock and the Decomposed Granite. After takeoffs were completed, it was determined that 25 tons of Drain rock would be needed along with 12.5 tons of
Decomposed Granite. Cal Portland was generous enough to donate all of the base material for the cost of delivery, essentially cutting the material cost in half. The next items to get ordered were all able to be purchased from Site One Landscape in Arroyo Grande California. This included all the necessary Staples, seam glue, and silica sand Infill.

<table>
<thead>
<tr>
<th>Description</th>
<th>Qty</th>
<th>Unit</th>
<th>$/Unit</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Rock</td>
<td>1</td>
<td>EA</td>
<td>$500.00</td>
<td>$500.00</td>
</tr>
<tr>
<td>Artificial Grass</td>
<td>2550</td>
<td>Sf</td>
<td>$1.61</td>
<td>$4,105.50</td>
</tr>
<tr>
<td>Silica Sand Infill</td>
<td>26</td>
<td>bag</td>
<td>$22.50</td>
<td>$585.00</td>
</tr>
<tr>
<td>Vibratory Plate</td>
<td>3</td>
<td>Day</td>
<td>$55.00</td>
<td>$165.00</td>
</tr>
<tr>
<td>Dump Fees</td>
<td>10</td>
<td>Ea</td>
<td>$125.00</td>
<td>$1,250.00</td>
</tr>
<tr>
<td>Misc. expenses</td>
<td>1</td>
<td>Ea</td>
<td>$800.00</td>
<td>$800.00</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$7,405.50</strong></td>
</tr>
</tbody>
</table>

*Table 1 Estimate for the Removal and Replacement of the Artificial Turf*

Placing the equipment rentals on will call was the next step in the process. Originally there was only going to be one dump trailer and one vibratory compactor placed on rent for 2 days. After construction began it became evident that one trailer would not be enough and a second was added. It was also planned originally that all the excavation would be done by hand with a group of roughly 8 student volunteers. This plan changed once our volunteers discussed that they would be leaving the day after the project began. This created a need to rent a small stand on skid steer, which was rented from united rentals and is shown in use in Figure 5.

With all the equipment in place and materials ordered we started the excavation phase and found that the dump fees along with the cost of fuel to get to the cold canyon landfill was going to be much more than originally anticipated. This brought the need for a free dump site that was closer to the project. There is a property owner who lives on Hwy 1 near the men’s colony who agreed to take all of dirt we excavated for free, which saved a large sum of money. Without this generosity the total cost would have been way larger than it ended up being.

*Figure 4 Stand on Skid Steer Loader being used to excavate the existing soil sub-base.*
The excavation took a total of 2 days to get all of the existing dirt base dug down 3” and ready for new base to be brought in, the area before the base rock was brought in is shown in Figure 6. Before the base was brought it was decided that the subbase would be compacted slightly by running the vibratory plate over it for roughly 30 minutes to ensure the subbase was properly compacted as well. It was then time for the ¾” drain rock to be brought in. The location the rock was stockpiled was up the hill in the parking lot with too long of a haul route to be able to utilize the skid steer. This created the need to use wheel barrels to move all 37.5 tons of rock down to the project. The wheel barrel haul route was roughly 100 yards long and was on a hill, so it took a lot of hours and energy to get the rock moved. The skid steer was able to be utilized in loading the wheel barrels to make the process go faster but it was still a large time commitment. After the ¾” drain rock was placed a large grade rake was used to smooth and even the surface before the vibratory compactor was used over it. Once the Drain Rock was compacted the decomposed Granite was able to be placed in the same way the Drain Rock was, figure 7 shows the area with the decomposed granite installed and compacted. When we installed the decomposed granite, we kept the final elevation a half inch lower than the surrounding sidewalk, so that the new turf would be at the same elevation as the concrete. The base was completed on Tuesday March 24th and all of the equipment was able to be taken off rent that morning.

The next step was to get the rolls of artificial turf rolled out and allow them to bake in the sun so that the creases are able to leave the turf before installation, per the manufacture’s recommendation. The installation of the turf is where the first major problems started. There was 2500 square feet of turf that was ordered with a little over 300 square feet of waste and overages accounted for. When the material was ordered it did not take into account that the grain of the artificial turf ran in a specific way and if the grain is not installed the correct way the final product would not be visually appealing. This caused the material to be slightly underorder and required many conversations to ensure we used the material in the most efficient way. this error was found once the second piece of turf was getting laid into place. This caused a one daybreak to be taken to analyze how we can maximize the materials we have to get the job completed.
After the day off there was a solid plan in place and the remainder of the turf was all able to be installed correctly with the grains running the correct way throughout. The installation procedure was straightforward and after one day, productions were able to increase. The turf was laid down and 6 inch nails were hammered in to the corner and then from there the turf was stretched and pulled with the use of a carpet knee kicker. The turf would be pulled roughly a foot and a 6” turf staple would be installed, ensuring that there was roughly 1 staple per square foot.

The turf staples brought to light the next problem that was faced. With the ¾” drain rock as the subbase hammering in the staples was difficult and many of them would bend before they were fully in place requiring them to be re installed. This cause us to use more staples than we had originally planned for.

Another challenge that was encountered was installing the seams. There is 2 main strategies for completing this task, one with glue and tape and the other with nails and staples. Both options were discussed, and it was decided that we would incorporate a combination of both strategies to provide maximum strength at the seams. Installation of the seams was very time consuming and complex due to the fact that in order to fully hide the seam care needed to be shown on trimming the turf to ensure that the two separate pieces were set up with the same distance and spacing as they would if they were one continuous piece. The concept of this made sense but to actually implement it was a lot harder than it sounds and turned out to be the most complicated part of the project.
Once all the turf was installed, the final task was to add silica sand over the turf in a ratio of 1 pound per square foot. This created extra weight for the turf and helped to hold it down and prevent it from getting torn up or loosened. After the sand was installed, the project was ready to be turned over to the Children’s Center. The project finished at 7pm on April 2nd, which gave us 1 hour of daylight extra until we had to be completely finished. This project almost went over schedule but with the help and support of all the volunteers and the group members the project got completed and helped change the lives of everyone that comes into contact with it. The best part about this project was getting to see just how much the children enjoyed playing on the new turf and getting to hear how much they look forward to the outdoor breaks now. Below is Figures 10, 11, and 12 that all show case the final product that was installed for the United Methodist Childrens Center.

Figure 9 Completed Section of turf in the lower playground.

Figure 10 Completed section of turf in the upper playground.

Figure 11 Main area of playground completed.
Mulch

The mulch on this project consisted of first surveying the area with GNSS equipment to get an accurate area measurement. This allowed for an accurate measurement to quantify the amount of gorilla hair mulch to order from Central Coast Landscape Products. An average of 2 inches of coverage was decided for the 4,200 square feet of area to be covered. 26 cubic yards of mulch was decided on to cover the area. Central Coast Landscape was able to provide 20% off the total cost of the material and free trucking. Once the quantity of material was approved, the existing irrigation that ran under the mulch was ready to be tested. There were no issues to be addressed. There was existing fabric under the mulch that was in good condition, so it did not need to be replaced. The first proposed date for placing the mulch was set back from the rain. It was decided to push back the date of installation to make sure the rain did not wash the mulch away after it was placed. The date was pushed back to April 21st to have the material delivered. All 26 cubic yards of mulch was placed in about 4 hours with the help of Kyle Passey, Hayden Garcia, Mario Taurian, and 5 others, coming in at almost 20 total hours.

Figure 12 Completed portion of mulch.

Figure 13 Completed mulch at entrance of UMCC.

Shade Structure

The process for retrofitting the shade structure with a new fabric began by trying to contact the original company who installed the structure. This was difficult as the original structure was installed in 2006 and the company is no longer in business. After some research, the parent company was found, and they were able to help order a new fabric and hardware for the existing structure. The next step was to get measurements for the fabric and identify the type of connections used in the corners. With this information, a product description form was filled out and sent to Zoom Recreation who gave a quote for the product. A line of constant communication had to be maintained between Zoom Recreation and UMCC so that everyone could be up to date with the pricing and lead time. After 7 weeks of waiting for the custom-made fabric, it was finally received on June 6th.
The installation process began by running a ¼” metal wire through the perimeter of the new fabric. Then, a rope was used to pull the fabric up and over the exiting frame structure. Once the new fabric was laid out on top, each corner of the fabric was connected to the posts. The portion proved to be difficult as the fabric was very tight over the frame. The strength of multiple people was needed to pull a rope attached to the fabric towards the connection point as another person stood on a ladder guiding the fabric to the correct spot. After securing the fabric to the frame through the loopholes, the wire rope needed to be fastened to the turnbuckle and tightened. The wire rope was run through the turnbuckle, then secured with wire rope clamps. Lastly, the turnbuckle was greased and tightened to ensure a secure shade fabric.

<table>
<thead>
<tr>
<th>Description</th>
<th>Qty</th>
<th>Unit</th>
<th>S/Unit</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shade fabric/hardware</td>
<td>1</td>
<td>EA</td>
<td>$4,600.00</td>
<td>$4,600.00</td>
</tr>
<tr>
<td>Ladder</td>
<td>1</td>
<td>Per Day</td>
<td>$20.00</td>
<td>$20.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$4,620.00</strong></td>
</tr>
</tbody>
</table>

*Table 2 Takeoff of required materials for shade structure*

*Figure 14 Existing shade structure*

*Figure 15 tear in existing shade structure*
Figure 16 Completed Shade Structure

Figure 17

Figure 18
One of the items on the list of potential projects provided by the United Methodist Children’s Center was benches. In the first meeting, Liz mentioned repairing the ones they had but did not have a super concrete idea of what they wanted, which allowed our team to get creative.

The plans decided on were for a full-size person, and they needed to be scaled down for the children. This happened by shortening the legs and making the back and the seat narrower. This led to having to change the size of the rotating mechanism, which took some guessing and checking. A template was made from cardboard to mimic the rotating mechanism to allow for accurate piece measurements. Once the cut sheet was finalized, it was time to cut the pieces. The CAED (College of Architecture and Environmental Design) shop had all the required tools, and this is where the cuts were made. Once all the pieces were cut, the pieces needed to be stained with a dark stain. After the stain had dried, the construction of the benches started, and the final product was finished.

All the materials were donated from Big Creek Lumber and Passey Construction. The required materials for these benches were 11 12” 2x4’s, 4 3” utility hinges, and 5lb’s of 2 ½” decking screws. All the cutting of the pieces was done at the CAED shop. The construction of the benches was
completed at Kyle Passey’s house. There was 18 hours in the planning, design, and construction of this activity.

![Figure 20 Benches unfolded for sitting.](image1)

![Figure 21 Benches folded up as a picnic table.](image2)

**Lessons Learned in the Process**

Some of the major takeaways from this project included learning how to work around the weather, anticipating lead times, working with a non-responsive client, and. The goal was to be done before spring quarter. There was a large amount of rain at the beginning of the year that greatly impacted the schedule. The existing soil could not be excavated to place the drain rock and DG and the mulch could not be placed as it would just wash away. Another lesson learned was planning for long lead times. It was difficult enough acting as a mediator between two parties while ordering a very specific fabric, but it needed to be done as soon as possible to ensure the project would be finished before graduation. Luckily, the fabric was received on June 2nd, and it was installed the next day. This was a close call, and if done again, the ordering process would have begun before Winter break.

**Deliverables**

As a team, there was 4 completed projects for the United Methodist Childrens Center. Artificial turf was replaced in three different playground areas and with a new base placed beneath it. Mulch was replaced in the landscaped regions of the school and the irrigation system was tested at the entrance of the children’s center. Two benches were also built from scratch that fold into a picnic table. And last, the canvas of a pre-existing shade structure was replaced as it was ripping and covered in mold. Overall, the children’s center was given a brand-new look, while providing them with new clean turf, and new benches for seating along with the other projects completed.