Slab Extension at Woods Humane Society

Corey Smith
California Polytechnic State University
San Luis Obispo, CA

Woods Humane Society is an animal shelter that provides pet rehabilitation and adoption services to San Luis Obispo and surrounding areas. The Woods’ facility contains a number of kennels for dogs as well as numerous outdoor, fenced-in, concrete exercise yards. These yards give dogs the opportunity to play outside a few times a day allowing them to get vital exercise. One of these yards on the south side of the property had an exterior fence that was offset from an existing slab on the interior of the fence by one foot. This was an issue for the shelter as dogs would attempt to dig underneath the fence, and rodents would often come through the fence. It became apparent that a slab extension would be necessary to mitigate this issue. The extension consisted of a 49 foot long by 18 inch wide by 4 inch thick concrete slab. Construction activities included trenching on both sides of the fence; drilling into the existing slab; installing epoxied rebar dowels; forming and backfilling the trench with 2 inches of sand; laying and tying rebar; and pouring the slab. The student coordinated funding for the project, procurement of materials, and performed all construction tasks.

Key Words: Concrete, Rebar, Backfill, Trenching, Extension

Introduction

The goal of this project was to secure the yard on the south side of Woods Humane Society so that dogs and rodents were prevented from getting through the fence. The student’s experiences during the Carpenters Apprenticeship, classes taken at Cal Poly, and other internship opportunities provided the knowledge necessary to complete the project. There were a number of steps taken to both plan and execute the construction of the slab extension. First, the student planned and designed the proposed slab extension which was then approved by the Woods facilities manager. Then materials and tools were procured, some were donated, others purchased. The student planned one week for preparations for the slab pour. Once materials were gathered, construction activities began with trenching. Within 1 week, all preparations for the slab were complete and the slab was poured. One significant challenge to the execution of the slab extension was that the facilities manager was unwilling to move or alter the fence in any way. This created issues with access, specifically when drilling the holes for the dowels into the existing slab. The student accommodated the owner’s needs throughout this project and ultimately delivered a satisfactory finished product that addressed the needs of the owner. The student learned valuable lessons in the pursuit of this project including managing owners expectations, coordination, and time management.
Background

The student had originally sought to complete a research based project surrounding mental health in construction workers. After a comprehensive literature review, a number of interviews surrounding the topic, and an attempted survey of construction workers, the student realized that no new insight would be brought to fruition with the pursuit of the research project. The student needed to execute a pivot in their senior project.

The inspiration for this project came from another senior project completed at Woods. Originally, the slab was supposed to be completed by another team, however the students realized that the slab was too much scope for their senior project. The student was volunteering for the other students’ senior project when the facilities manager asked about completing the slab extension. After walking the site and discussing with the facilities manager, the student agreed to complete the slab extension and immediately began work on the project. Funding for the project was secured through a local construction company: Crizer Construction. Final completion was set to be May 27. However, due to illness, the student pushed the project back 1 week with the pour scheduled for June 5.

About the Project

Funding

Funding for the project was primarily used to cover the cost of materials that were not donated. These items included the sand, forming materials, concrete, rebar and other miscellaneous items that were needed as the project continued. Crizer Construction in Los Osos provided all of the funding necessary to complete the project. Additionally, the student was able to get a short load fee covered by CalPortland which significantly reduced the cost of the concrete load. The students budget was estimated to be around $750, however with the discounts, donated materials, and tools, the final cost of the project was less than $500 (Figure 1).

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Figure 1: Estimate
Design and Preparation

The task was to create a new 4 inch deep slab that would tie into the existing slab on the interior of the fence line. The current slab was set back 1 foot from an existing fence that was not to be moved during construction of the new slab (Figure 2). The student informed the owner that the finish on the new slab would not be perfect due to the fence penetrating into the finished surface. The student also notified the owner that there would be significant risk of cracking along the fence line. The owner indicated that the proposed slab’s aesthetics were not as important as the functionality the slab would provide. They insisted that the fence was not to be moved or altered. The student generated a rough sketch of the proposed slab (Figure 3). After finishing the design, procurement of materials began. Crizer Construction was generous enough to donate forming stakes, tie wire, a rebar cutter, a rotary hammer, and epoxy for the dowels. The student coordinated the pour with CalPortland and the facilities manager at Woods. It was important to schedule the pour well in advance because the facilities manager had to coordinate with the National Guard who owns the access road used to get to the site. Once procurement was complete, the student began work on preparing the site. To form the 4 inch slab, the student excavated to 6 inches below the finished surface of the slab on the interior and exterior of the fence (Figure 4).

Figure 2: Existing Slab and Fence
Figure 3: Rough Sketch of Proposed Slab

Figure 4: Finished Excavation
Construction

Dowel Installation

After excavations were complete, the student began working on constructing the new slab. The first step was to drill into the existing slab so epoxied rebar dowels could be inserted; holding the slabs together (Figure 5). This required more excavation, as the rotary hammer could not be made to fit into the existing trench (Figure 6). Once the holes were drilled, the student filled the holes with epoxy and hammered 12 inch dowels into the holes at 3 feet on center (Figures 7 and 8).

Figure 5: Rotary Hammer in Existing Slab
Figure 6: Extra Excavation to Fit Rotary Hammer

Figure 7: Epoxy Poured into Dowel Holes
Once the dowels were installed and the epoxy cured, work began on forming the new slab. On the west side of the new slab, the form had to extend through the fence. To negotiate this, the student notched the form around the chainlink fence (Figure 9). On the east side, an existing pole for the fence prevented fully forming the edge of the slab on that side (Figure 10). A mix of metal and wood stakes were used for installing the 2x6 boards. Duplex nails were utilized to allow for easy stripping of forms after the pour. After the slab was formed, the student backfilled 2 inches of sand along the length of the slab and installed rebar to sit 2 inches below the finished surface of the new slab (Figure 11).
Figure 9: West Side Form

Figure 10: East Side Form
After the form materials and rebar were installed, the student was prepared to pour. The plan was to tailgate the concrete into the forms and then shovel the concrete under and through the fence (Figure 12). Because the load was so small, the pour itself only took about 15 minutes. The most challenging aspect of the pour was ensuring that there was an adequate amount of concrete on both sides of the fence. Sticking with the plan, the student shoveled the concrete through the fence where a friend was able to level it to the existing slab. After the student was satisfied with the amount of concrete in the forms, they screeded the outside area beyond the fence while a peer screeded the interior section of the extension. Then the student and peer trowelled both sides of the fence allowing cream to rise to the finish surface. After trowelling was complete, they allowed time for the concrete to rest while they pulled excess concrete off the exterior of the forms and cleaned tools. Finally, the student finished the concrete with a light broom finish and ran a curbing trowel around the exterior sides of the slab (Figure 13).
Figure 12: Concrete Truck with Tailgate
Lessons Learned

Some of the key takeaways from this project were the importance of touch planning and communicating with the owner. Touch planning was essential in order to establish a correct order of operations for the project. When the order of operations was incorrect, rework had to be done. For example, the student set a string line before hammering dowels into the existing slab. Inevitably the string line broke and had to be replaced. With respect to communicating with the owner, the student had to be flexible with the scheduled delivery of the concrete. The owner had to work with the National Guard to confirm access on the road leading to the project site. The student planned accordingly and gave ample notice to the owner regarding delivery times. However, the owner failed to communicate with the National Guard in a timely manner which resulted in a two day delay in the schedule. The final lesson the student learned is that no matter how much planning goes into the execution of the project, there is no way to control every variable. In this way, construction is not an exact science. The ability to adapt under pressure while working towards project completion was paramount to the success of this project.

Conclusion

In conclusion, the concrete slab extension at Woods Humane Society was successful in meeting the project objective: preventing dogs and rodents from getting through the fence. This project highlighted the importance of communication between the construction team and the owner, as well as
the importance of planning key activities. Although the slab was not perfect, the student and owner were both tremendously satisfied with the level to which the student was able to finish the slab. In order to complete a project of this scope, it is key that one has technical knowledge regarding construction of concrete flatwork. Further, coordination between the student and owner is crucial. Finally, it is important to be adaptable to difficult situations. For example, the fence running through the slab was a challenge that created imperfections with the finished product. The student had to manage his own expectations of what the product would be as well as manage the owner’s expectations of what it should have been. Overall, the successful slab extension delivered exactly what the owner asked for, securing the yard for the dogs.