

French Drain Project at Woods Humane Society

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The Woods Humane Society is a prominent animal care facility that aims to rehabilitate, rescue, and assist in the adoption of dogs and cats in the greater San Luis Obispo area. The property contains multiple dog playpen areas which consist of a concrete slab surrounded by a chain link fence, designed for the animals to have an open space to run around throughout the day. Employees are required to hose down the slab hourly to maintain a clean environment for the animals. When employees hose down the playpen areas, a considerable amount of water runs off the slab and into the soil on the outside of the playpen, resulting in the overgrowing of weeds and shrubbery, diminishing aesthetics, and producing potential hazards towards the dogs. To mediate this issue, the installation of a French drain was proposed. The 173 ft drain, 6” deep x 18” wide broken down into three sections, would border all dog playpen areas preventing further water runoff and weed growth. The French drain consisting of significant excavation, pressure treated lumber, gopher wire, weed barrier, and 2-3” Noiyo cobble stone was the work completed for this project.

Key Words: French Drain, Runoff, Animal Care, Play Yard, Slab

Introduction

The Woods Humane Society is a prominent animal care facility that aims to rehabilitate, rescue, and assist in the adoption of dogs and cats in the greater San Luis Obispo area. The property contains multiple dog playpen areas which consist of a concrete slab surrounded by a chain link fence, designed for the animals to have an open space to run around throughout the day. Employees are required to hose down the slab hourly to maintain a clean environment for the animals. When employees hose down the playpen areas, a considerable amount of water runs off the slab and into the soil on the outside of the playpen, resulting in the overgrowing of weeds and shrubbery, diminishing aesthetics, and producing potential hazards towards the dogs. To mediate this issue, the installation of a French drain was proposed. The Project was based on the goal to install a French drain along the fence line of three play yards running across the southeast side of the property to prevent further dog stomach issues and paw pain from excessive weed growth. This French drain was able to be completed by the work of both our team’s superintendent and project manager. Both these individuals used their knowledge from internships and California Polytechnic State University, San Luis Obispo (Cal Poly) Construction Management courses to take on these roles and execute the project accordingly. This project took a multitude of steps and critical workdays that aligned for the project completion in a six-week period.

This project was broken down into two distinct roles, the project manager, and the superintendent. The superintendent, Cade Rees, was responsible for acquisition of all materials, creating drawings for the French drain as well as planning out logistics for daily activities on site. The project manager, the focus of this paper, was responsible for all communications with the owner, creating accurate budgets

and coordinating field activities with the superintendent. First, the superintendent and project manager split up tasks to complete the planning and organization of the project to set Woods Humane Society up for success. The superintendent was tasked with communication with all manufacturers, ordering all materials, and leading the onsite movement of materials in the proper locations. For the project manager, they were tasked with establishing a budget, communication with the owners, and on-site delegation of the task alongside the superintendent. These tasks required long hours of planning and coordinating with the owner and manufacturers to best establish a work schedule that did not interfere with the regular movement of animals around Woods. Furthermore, the design phase was tedious in determining how materials like gopher wire and weed barrier would sit in the French drain without previous knowledge of these materials. During the build itself, it was clear that the superintendent and project manager were not prepared for the number of hours some of these tasks would take. For instance, the excavation of the 173ft trench took over 40 hours, a process both the superintendent and project manager were not prepared for. This project was like one done on an actual landscaping job and therefore allowed all members involved to gain knowledge for their futures in the construction industry. In the eyes of Woods, this project will allow a large struggle with dog health problems to decrease and allow more time and care for these animals as they are rehabilitated before finding their perfect home.

Background

The idea for this project was initiated by the project manager who had connections at Woods due to his relationships and was the location where they got their own dog only a year and a half before this project. Once discussing it with the superintendent it was clear that both parties felt passionate about the project and saw how crucial this work could be for Woods as an organization. Soon both members of the team were able to communicate via email with the facility maintenance manager and eventually came to the site to see the area in question. While walking the site, it was determined that a french drain would be the senior project both these students could complete effectively while also allowing ample room to grow. After communication with the owner was complete the team began to fill out and submit a senior project proposal form which was signed by all necessary parties. The initial plan for the project was to begin work in winter of 2023 but due to heavy weather concerns the project was postponed springing of 2023. Most of the project was funded by Level 10 Construction, an outside party in which both members of this team worked previous internships with their company.

As students at Cal Poly, this team was able to assemble a multitude of skills and interests that would help them throughout the project. In many of their courses they learned specific skills, one example is in CM 115, in which the students learned to use both the Bluebeam function as well as basic estimating skills that they would develop more in other courses. In CM 214, the students learned scheduling, project drawings, as well as woodworking skills that were applied in the 2x6 assembly. Another essential course would be CM 313 in which the student refined their pre-task planning skills in the form of budgeting, scheduling, and procurement planning. As the team has worked multiple internships, they were able to practice in real time many of the attributes they had learned in their courses. This includes site planning, procurement, scheduling items, keeping a record of materials,

and communicating with owners and other faculty members from an organization. With these skills, the team is confident they will be capable of executing this project correctly and efficiently.

Project Planning

Estimating and Funding

One of the most difficult aspects of this project was allocating and proper use of funding on the project. As mentioned before the team received most of its budget from Level 10 Construction. In the budgeting process the initial idea was for the team's project manager to delegate funds for not only the 173 ft French drain but also for an additional concrete slab extension. Later the slab extension was cut from the project's overall scope due to issues in the cost total and the time needed for completion. The French drain budget alone cost about \$1920 which took up much more of the budget than the team initially anticipated (figure 1). Most of this cost came from the cobblestone that would cover the weed barrier and gopher wire inside of the trench. The Noiyo 2–3-inch cobble covered an astonishing 64 percent of the budget. The superintendent was also able to add additional items to the schedule that covered the existing materials and equipment on site, as well as item delivery dates and possible shipping cost for most if not all the items on the budget. Using this budget, the team was able to use each workday diligently and worked directly around all order times and holds that occurred throughout the project.

Description	Quantity	Unit	Price per unit	Total Price	Delivery	Total + Fee	Date to Order	Arrival Date (Range)	Material Needed By
Gopher Wire	2	EA	\$148.13	\$296.26	\$0.00	\$296.26	05-02	05/05-10	05/05-12
3 ft Level	1	EA	N/A	N/A	N/A	\$0.00	N/A	N/A	N/A
2X6X12ft Pressure Treated Lumber	15	EA	\$15.38	\$230.70	\$0.00	\$230.70	05/05	05/05	05/05
Landscaping Staples (100 pack)	1	EA	\$24.62	\$24.62	\$0.00	\$24.62	05/02	05/05-06	05/05-12
Wooden Stakes 1"x2"x1-1/2" (12 pack)	8	EA	\$5.98	\$47.84	\$0.00	\$47.84	05/05	05/05	05/05
#6 1-1/2" Screws (100pack)	2	EA	\$8.98	\$17.96	\$0.00	\$17.96	05/05	05/05	05/05
Simpson Strong Tie Connection Plates	20	EA	\$1.12	\$22.40	\$0.00	\$22.40			
Square Point Shovel	2	EA	N/A	N/A	N/A	\$0.00	N/A	N/A	N/A
Round Point Shovel	2	EA	N/A	N/A	N/A	\$0.00	N/A	N/A	N/A
Wheel Barrel	1	EA	N/A	N/A	N/A	\$0.00	N/A	N/A	N/A
John Deer w/ handlift trailer attachment	1	EA	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickaxe	1	EA	N/A	N/A	N/A	\$0.00	N/A	N/A	N/A
Metal Stakes		EA			\$0.00	\$0.00	N/A	N/A	N/A
Weed Barrier	2	EA	\$28.29	\$56.58	\$0.00	\$56.58	05-02	05/05-10	05/05-12
2-3" Noiyo Cobbelstone (Central Coast Landscaping)	5	CY	\$225.00	\$1,125.00	\$100.00	\$1,225.00	05/03	05/05	05/05
					Total:	\$1,921.36			

Figure 1 - Budget

French Drain Design Concept

The original plan for the french drain project was to install 2x6s 18 inches away from the play yard slab along the entire 173-foot span. Full breakdown of the section view is shown in figure 2. To do this, the team had to calculate a multitude of factors before making this happen. First, they would have to determine the length of each 2x6 and furthermore how many 2x6s would be needed to cover the entire span on one side. After this they had to understand the thickness of both the weed barrier and gopher wire that would be needed to cover the bottom and sides of the inside of the trench. The gopher wire was determined, after much research, to be best suited at 1/8in thick by 2 feet wide and 100 feet long. The vapor barrier had less variety in options so a 3ft by 100ft sheet was chosen. 2 of

each item were ordered for this project and was able to cover the entirety of the inside of the trench during installation. The most difficult item to coordinate and plan for was the cobble. After some disagreements with the owner on which cobble would be best for the project, the team was able to talk with the owner and determine that the Noiyo 2–3-inch cobble was the best choice possible for the owner's satisfaction. The team's initial idea was to use a much cheaper smaller rock, but the owner was not particularly fond of this option which made major adjustments to both the budget and schedule. The Noiyo cobble became a much bigger issue when it came to funding and budgeting in that the superintendent needed to contact a local landscaping company to procure the rock and get the rock delivered, unlike the previous option which could be picked up at a local hardware store. After these adjustments were made the team was able to take the project and execute extremely efficiently around each date with material pickups and deliveries.

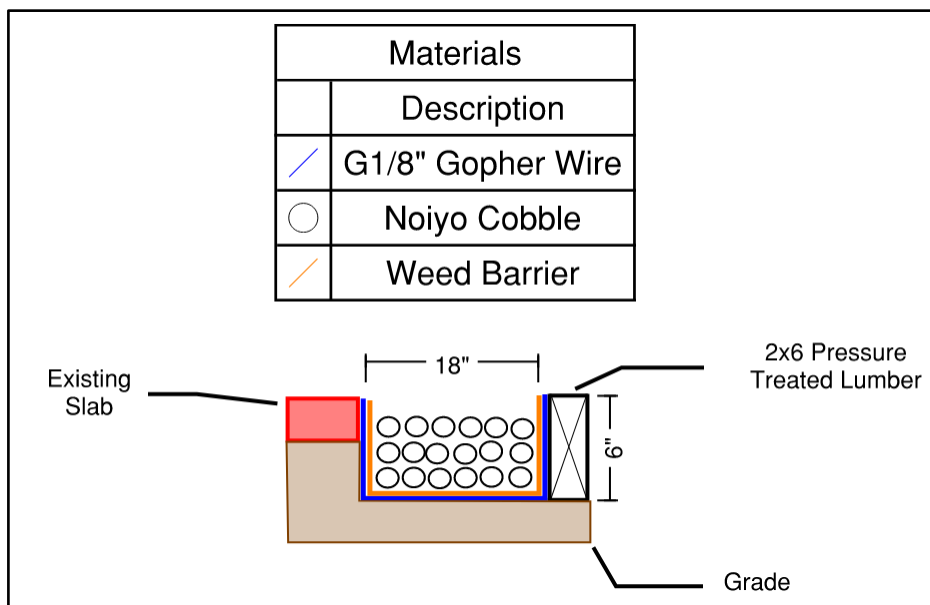


Figure 2 - Section View

Results

Construction began with the shortest of the three sections of the 173 feet French drain (Figure 3, showing all section length breakdown). Both students excavated that section in full, 18 inches down and six inches deep, and timed themselves to analyze how long it would take 2 people to perform 25 feet of excavation. Their research resulted in the conclusion that 2 people could perform the 25-foot excavation in about an hour but when they considered fatigue they rounded up to an hour and 30 minutes for each 25 foot section. Soon the team would go out again and start working on further excavation on the longest section of the drain (Figure 4), this would further cause many issues to tree roots, (Figure 5), and existing fence footings. The issues faced by the team would slow down much of their project but did not stop them in any way that affected the schedule of the budget. As mentioned

earlier, the excavation of the project alone took around 40 hours or more and was the most physically draining aspect of the project. Once excavation was complete the team then installed 2x6s in all sections of the French drain, making sure to carefully measure distance from slab and level at each end of the lumber. Each 2x6 was required, by the owner, to be level to the existing slab of the play area. Some exceptions were made to keep the 2x6 in line with an existing path that split the two longer sections of the French drain to prevent a tripping hazard. Each 2x6 was then nailed together using nail plates, (Figure 6), and were then backfilled for any sections behind the 2x6 so the lumber would be to grade with the existing grass yard. This is the point when the team decided to tamp, (Figure 7), the entire trench down and begin the installation of the gopher wire and weed barrier. The main issue encountered during this process was getting the flimsy weed barrier to stay flush with the concrete slab side of the trench as it could not be drilled into this side like it could on the lumber side of the trench. Using landscaping staples we were able to attach both the gopher wire and weed barrier to the bottom of the trench and to the fullest extent of the side we could.



Figure 3 - French Drain 3 Section Breakdown By Length



Figure 4 - Excavation



Figure 5 - Tree Roots



Figure 6 - Nail Plates



Figure 7 - Tamping the Backfill

Cobblestone installation did not go as expected in any way as the team discovered shortly that they could not shovel the cobble into a wheelbarrow due to the large size of the rocks. Many methods were tried to find the most productive way to fill up wheel barrels or our tractor trailer but the method that ended up being the most efficient was filling up buckets with rocks and using the buckets to fill up each load. When the students brought the cobble loads to the drain site from the cobblestone laydown area, (Figure 8), they then loaded up the buckets once more to gently place the cobblestone in the existing french drain until the cobble completely covered the exposed gopher wire and weed barrier. The overall construction of the project required constant measuring, releveling, and backfilling. In no way was the project performed perfectly at every point but the way the team remedied any issues throughout allowed the project to result in a fantastic product (Figure 9).



Figure 8 - Cobblestone Laydown Area

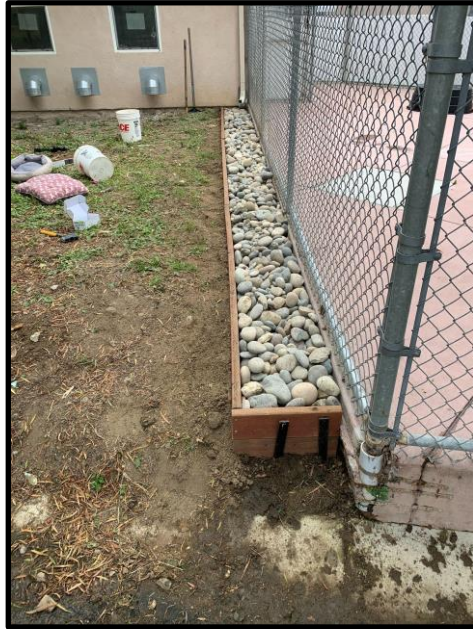


Figure 9 - Finishes Product of Section 1

Lessons Learned

Many aspects of this project served as both experience and teaching moments to the two student teams involved that spanned from the design phase all the way to the final aspects of the construction process. The team expected many things from this project, especially assuming how the owner would become involved with the project, this was their most crucial mistake. Dealing with an owner is never easy, often people conflict over ideas. Soon enough these students understood this idea and were able to learn from them for the project. The French drain project at Woods Humane Society was one with a multitude of difficulties and struggles but with precision, patience, and the ability to improve the student team was able to establish a project that themselves and Woods can be proud of. The main message to be taken away from this project is to keep patient and do not take shortcuts to reach the outcome. Although the team faced struggles throughout, they did not settle for things like a 2x6 being left unlevel or leaving exposed gopher wire in the finished product. The team used a diligent work mentality and would often take longer days to get things done properly. Oftentimes the team had to push on after finding a mistake and restarting an aspect of the project. Another key lesson to learn from this project is to consistently communicate with the owner on expectations and timing. The owner controls any construction project despite what the contractor is looking to do. Every aspect of the project should go through the owner and in this project the team was extremely communicative with the owner to ensure no mistakes or delays due to owner resistance. The team made a lot of mistakes on this project but overall felt that learning from their mistakes was key to future success in the industry.

Summary

The French Drain installation project was meant to prevent weed growth onto the property while upgrading overall aesthetics, installing a proper area for all onsite water to drain. Woods is an amazing organization, working hard to help animals in rehabilitation, adoption, and rescues. The project here will allow for a healthier environment for the dogs and the surrounding vegetation. More students should feel compelled to perform a project that means something to them and can truly help another community. This project was one that took countless hours of work and a good amount of learning from the students involved. At completion, the French drain project was a success and was completed in a timely manner, within the designated budget. Overall, the project turned out to be a complete success and the project team is extremely pleased with the work and the contribution made to a place they find important.