This paper will construe the steps of determining the original concept design by discussing the challenges of the current conditions of the scope work, coordinating with the Garden Director by insuring all his requests were met, recycling existing material, implementing skills learned in surveying, installing a new brick walkway, and renovating 31 planter boxes. All of this was designed and installed in the San Luis Obispo Dallidet Adobe & Gardens. These gardens are a historic site located in the heart of San Luis Obispo where the public can utilize this area for certain events. The goal for this project was to renovate the vegetable garden area where it was more appropriate and safer for people to walk through and make more appealing to the eye. This project was broken up into two parts one part being the brick walkway and the other being the renovation of the 31 planters in the vegetable garden. Being two CM students on the project they each took a part however, the students worked collectively to deliver the project. There will be images throughout the paper demonstrating the before and after of each part with a budget breakdown on the savings done on the project.

**Key Words:** Garden, Brick Walkway, Planters, Lumber, Demolition

**Background**

The Dallidet Adobe and Gardens is a historic landmark in San Luis Obispo. Pierre Hypolite Dallidet a French native moved to San Francisco during the 1840’s. He, like many others, was attracted to the gold rush throughout the state of California. Constructed in 1856 the Dallidet Adobe and Garden was established in a unique way, utilizing some of the highest quality but also cheap at the time were adobe bricks that were created locally in San Luis Obispo. Dallidet’s original intention was to travel down to Mexico, but during his expedition his intention was to make a brisk stop in San Luis Obispo California. Dallidet had ended up falling for the beauty that was offered through the central coast. Constructed in 1856 the Dallidet Adobe and Garden was established in a unique way, utilizing some of the highest quality but also cheap at the time were adobe bricks that were created locally in San Luis Obispo.
Pierre Dallidet almost immediately upon acquiring the land, began planting his vineyard and orchard. The family had originally cultivated all their crops for food and other farm crops. Originally Dallidet had planted raised artichokes, melons, corn, parsley, passion vine, potatoes and had 14 acres of wine grapes, 3 acres of table grapes and 2 acres of peaches under cultivation on their farm by the late 1870s. As family members aged, as economic and personal woes hit the family and as the city of San Luis Obispo grew around their holdings, the vineyard acreage became less tenable. By the early twentieth century, the grounds immediately surrounding the Dallidet home were becoming more of a garden than a farm. Trees planted by the family were maturing and shading out the grape arbors near the house even before 1900. These same trees had modified the garden’s climate enough to allow the introduction of “exotics” into the gardens.

How The Project Came About

As another school year came along with this last one moving pretty quick, Spring quarter was coming around the corner and as many other seniors having relatively the same issue, they did not have an idea on what to do their senior project on. During the winter quarter Professor Barlow sent out an email regarding an opportunity for a project-based project that listed the details of the Dallidet Adobe Gardens, where Construction Management (CM) student Cristian Melo reached out to get more information regarding the project. After Student Cristian M. had gone to visit the gardens to see in person what needed to be done, he agreed upon the walkway.

Before commencing the project, it was quickly recognized that the assigned scope of work would be a substantial challenge to complete with only one individual. Cristian had reached out to Nicholas to see if he’d be interested in collaborating with the current scope of work of the current project. Upon agreement both individuals had reached back out to the assigned SME to ensure that this wasn’t going to be an issue. The SME had approved the change and the coordination and planning had begun for project.

Cristian had met with the project director to discuss the needs and wants of what was desired regarding the scope of work. The director had expressed that he had wanted to have an area that was going to be safe but also appealing to the public eye; he had created a list of items that he had wanted completed. When both students came to an exact idea of what the client wanted, they had begun planning out of the necessary implications that need to be taken in order to complete the project.

Steps Taken:

The first step taken throughout this whole project was contacting Garden Director David Hannings and setting up a walkaround of the project at hand. Once agreed upon after reviewing the work at hand while walking the garden area students were ready to get started on the project, they had been set responsible for. It is shown on Figure 1 the walk around that is being done with Mr. Hannigns as he explained the work that needs to be done.
The second line of action was in completing this project was beginning the demolition of the project. The students had begun tearing out the overgrown weeds, plants, rocks, and sand that had incumbered the existing walkway as shown in Figure 2. Once all the overgrown vegetation was removed the students were able to begin removing the existing walkway. The walkway had contained different sized bricks, broken bricks, warped 2x4’s that held bricks in place shown in Figure 3a & 3b.
Figure 2: Before Picture of Garden.

Figure 3a: Demolition of Existing Walkway
Once the existing walkway was completely removed, the next challenge was grading out the existing foundation. The existing foundation contained an uneven slope, large rocks, sunken holes, roots from existing plants, roots from dead plants, and a list of other items that had incumbered the existing ground shown in Figure 4. The students then begun tearing out the entire foundation, excavating 3-6 inches of existing soil. The students had utilized pic-axes, shovels, and a wheel barrel to complete this portion the scope of work. Once the ground was properly excavated the students were able to fill the uneven surfaces with the native backfill from an existing stockpile in the gardens.
Both students were both fortunate to have taken a surveying class that was provided by the Cal Poly Construction Management program. Reaching out to different resources in the department, the students were able to borrow surveying equipment from the department. Utilizing the equipment, the students were able to properly grade a slope in order for existing rainwater to properly drain in the correct direction; in order to avoid any erosion or puddling up in the center of the pathway. The slope was divided into two section that met at the center that was benchmarked by a water box located there. Figure 5a & 5b shows students using self-leveling laser to grade the pathway.
The next step after completing a rough grade was renting out a vibratory plate from United Rentals in order to achieve the finish grade that was needed to be able to start laying brick. None of the students had ever used a vibratory plate so they had to learn as they were compacting, some mistakes were done but they were able to fix them right away as they continued compacting the path. On Figures 6a & 6b you can see the vibratory plate on the path before starting to compact and the first pass of using the vibratory plate. And as the students compacted the pathway, they had the laser level out to make sure that the slope was correct.

Once they had a leveled and compacted foundation to work on, students were able to start on laying the 2x4 sides that will hold the bricks in place. Some designs were mocked in order to figure out which would be the most appropriate to take advantage of the whole path. As shown on Figures 7a & 7b you can see the mockup of bricks and the line that was being pulled in order to get set width of the walkway and to be able to lay the lumber on the sides that is also shown.
Once having that wood casing going around the whole perimeter of where the brick will be laid, students started laying brick. This process went by quick as they were both laying brick and had it done in no time. For the brick, the students went with a running bond pattern as it was the most logical one to do as it created the least amount of waste and used the bricks efficiently. As you can see in Figures 8a, 8b, and 8c you can see the process of laying bricks from start to finish.
When getting to the finish point of laying brick the garden director wanted to expand to a portion of the walkway but at this point, the students had run out the of the bricks they had to improvise with different sized bricks. To layout that they had different bricks the students used a different pattern (basket weave pattern). As shown on Figure 9 the audience can see the extension that was made.

Figure 9: Extension laid out

The last step on the brick walkway was to add the sand that would keep all the bricks from moving and give it its finished look. Once adding the sand, students would have to go around and sweep any excess of it off and rinse it down with water to activate the sands chemical reaction and get it solid. Figure 10 shows the final product of the brick walkway.
Lastly to end off the whole project students worked on the trimming for all the planters this process went by easy. Students purchased pressure treated 2x4’s that would lay on top of the existing planters hiding any imperfections and at the same time giving it the rustic look that it was missing. On Figures 11a, 11b, 11c, and 11d you can see the work that was done around the planters and show the finish product of the whole garden area.
Before starting this project, students were given a budget for the two parts of the project from the Adobe Gardens. Any purchases that were made regarding the garden would get refunded to students towards the completion of the project. For the brick walkway students were given a budget of about $3,000 and for the trimming of the vegetable planters students were given a budget of $800 for a total of $3,800. When budgeted this project the price of lumber was considerably lower about a year ago to what it was purchased this past month, so they had to make a few changes to the budgeted wood.

For the walkway students used a total of $541.63, which was considerably lower to what was estimated that the project would take. This was done as the students reused a grand majority of the bricks, and everything was self-performed by both CM students. Personal tools were used for this whole project apart from the vibratory plate that was rented out from United Rentals. You will be able to see the list of purchases for the walkway on Figure 12.
However, the students had gone over budget for the trimming for the vegetable planters as previously stated the price of lumber had changed tremendously from what it used to be when budgeted. As you can see in Figure 13 the actual cost for the trimming was $1,115.65 about $300 over budget. But thanks to the savings of the brick walkway, students were able to direct some of that money towards the trimming portion of the project.

Overall, the project was completely underbudget which benefitted the gardens so they can allocate that money to any other future projects. Thanks to the effort of both CM students the Dallidet Adobe Gardens was able to save a total of $2,102.72 from self-performing the project. On Figure 14 below you can see the full doc showing the grand total that was spent throughout the whole project.
When working on this project students had a few milestones that they had in mind when planning out the steps to the project. Some of them ones they thought were crucial for them was to continue to the next deliverable each time. Everything was done in order to fit perfectly into the puzzle and minimize the time that the students had already gone over from their original estimated time.

Demolition

Demolition the first major deliverable of the project that would determine the start of their senior project. This deliverable was a big event as the students pulled up the existing bricks it showed the projects true colors because they were able to determine the condition of the path that they would be working with and cleaning up in order to make their new walkway that the students would be laying down work without any issues. As the students finished with the demo of the existing of the existing pathway, they were able to estimate roughly the number of bricks that they would be using and the siding of lumber that would be required in order to hold the bricks in place.
Graded Path

Once finished with demolition their next deliverable for the path was to have a graded path. As explained on the following section, this deliverable was one of the more complicated to accomplish as the students were fighting to find a slope that would work perfectly with the walkway. Having this deliverable complete was an important factor to the continuation of their project because without this step they would have had issue when laying brick. It would have created a path that was too unsafe for anyone to walk on which is why this was an important step for the group.

Finished Walkway

The most important of them all, was having the complete walkway finished. This deliverable was one of the enjoyable and the most satisfying one out of all the project. As the students worked on the walkway, the students were able to enjoy the work they were putting in because every after day of work they were able to see that the amount of prep work they did beforehand pay off. And it was satisfying to lay the bricks as it seemed like the students were solving a puzzle that was just continuous throughout the whole path. Everything was working and moving out smoothly as they had all the bricks staged but once the students would run out, they had to stop and go towards the back a wheelbarrow more bricks to the walkway. Overall, this was the most exciting and pleasing deliverables from the whole project as it was the biggest portion of the project.

Lumber Delivery

On the second part of the project the most important part of it is getting the material/lumber delivered to the site as without this the students would not be able to start the trimming on the vegetable planters. Between both students, they went to Home Depot to pick up the 70 pieces of lumber and hauled it to the jobsite. This task was more a tedious job since they know that Home Depot does not have the best quality of lumber, so they had hand pick every piece of 2x in order to make sure there was no bow or severe deformation to the lumber as it would be used as a finish piece. Once having all the lumber staged at the site it allowed for the students to get started on cutting and installing the trimming.

Finish Trim

Lastly their final part of their deliverable was having the finished planter boxes with the trimming requested from Garden Director Mr. Hannings. This process to achieve the finished deliverable was not complicated it was only tedious work as they had 31 planter boxes the varied from shape and form. One person was set to solely cutting the lumber and the other was installing and calling out the measurements for the following pieces. At points during this deliverable, it was complicated as they would mix up some of the lengths so they would have to remeasure, and they finished it about a day and a half of work non-stopping except to use the restroom. This trimming gave the planters a professional and rustic look as it complemented the look of the rest of the garden area. At the end of the deliverable, it was the most joyful portion of the work because finishing the trimming determined the end of the whole project that they worked on during the quarter. And with the whole remodel transformed the look of the whole garden area.
Lessons Learned During the Process

When working throughout this senior project there was many obstacles that the students faced as part of doing a project-based project compared to a research based one. In the way that it mimicked to what they would experience on the field at an actual jobsite. Which in the long run, the students were able to tackle and come up with a solution as each issue was presented to them. For now, on they also learned some lessons of the brick and wood laying process that they will think about next time they do any project of this type.

Timing

One of the first things the students learned was that the scheduling that they laid out will not necessarily be what they finish out with. With saying this, in their proposal they had estimated that the original day of finish would be four weeks from the start date which of course did not happen. As they were presented with many obstacles on the site when working and with rainy days, many days had to be added to their original schedule and the students also had personal issue that they both had to take care off during some of the days and had to miss going to the garden some of the days. So now they understand that there are many factors that must be taken in account when estimating for a preliminary schedule.

Soil Grading

Another lesson that they came across was one of the hardest issues that they faced when working on the walkway was grading the soil along the pathway. This was big factor from time delay because there were many underlaying issues that they uncovered when demoing the existing walkway. When they uncovered the existing walkway, the students found many holes from moles that were living around the garden area that deteriorated soil that they would lay the bricks. Also, thorough out the existing walkway there was no existing slope that whole walkway followed and when trying to grade the area there was different elevations at both ends from the walkway which presented an issue as well. When keeping a consistent slope throughout the walkway it would leave the center to a high point in comparison to other cuts of the garden area, which resulted in breaking the grade into two sections. One from each end of the walkway that met in the center of the walkway that was set by a water box.

Students did not realize the amount of soil that they would be off hauling from the path since they thought they can just grade from what the existing path was on. For a while they also struggled on rough grading the path as at first, they tried doing manually but later realized that it was taking too much time and was not consistent. So, student Cristian M. took a 2x4 and attached a handle into the middle of it to create a makeshift screed that would create a flat and level path.

As grading was a tremendous portion of their work, they now understand the implications that can arise from working with soil especially when trying to fix the imperfect work from the existing walkway that was created many years ago.

Compacting

Quick lesson that the students learned regarding the preparation of the soil prior to laying brick was compacting the soil. They did not realize that when compacting soil, it takes various passes with the vibratory plate in order to harden the path. Also, they did not realize that when compacting u shouldn’t add water especially to the type of, we were working with
as it turned into clay/muddy solution. And when running the plate over it would just sink. Once they had figured out that issue in the begging the rest worked out smoothly.

Quantity of Materials

When demoing the existing walkway, they did not realize that amount of shortage of bricks they would be at. They knew that they had enough but the fact that was when they ran out of the existing red brick that was laid on the existing path had depleted in the first quarter of the walkway was surprising because they assumed it would last at least for half of the path. But they had enough stowed away in the back property of the garden that allowed them to finish the path.

Scope Changes

When coming to an end to laying brick along the walkway, garden director Mr. Hannings asked student to extend the width of the end section (south side) of the walkway so it would look more pleasant. So, students had to dig and grade a section about 15x2 feet which was not complicated, but this thought them that even though a project is finished it never really is until the client is happy and approves the finished product which was a quick lesson they experienced.

Waste Percentage

When working on the second part of the project which was the adding of trimming for the 31 vegetable platers, when estimated there was no waste percentage considered when measuring out all the required lumber for the project. When installing the trimming the students started realizing the quantity that they came along short on the lumber that was purchased which at first did not understand how it had happened. But realized that there was no 2-3% waste multiplied into the estimated lumber quantity. This was a quick miss, but it resulted on doing an extra visit to Home Depot. This lesson served more as a refresher to the students on what they had learned in their commercial and residential classes where they learned to estimate material.

Future Projects

At the Dallidet Adobe & Gardens there was more than working on the vegetable garden area. What students Nick and Cristian did was just part of what needs to get done at the site. The whole facility consists about 8,000 square feet with one main building in the center and various distinct gardens surrounding it. With this site being so big and old there is much potential for future projects. There are many walkways that are made from soil and can be replaced with concrete or pavers. In the center where the main building is located, some renovation work that can be performed such as making a designated bride changing room. This site has lots of potential in order to come up with future projects for students thanks to its size and age of the building.